Supporting Information for

Ruthenium-catalysed synthesis of chiral exocyclic allylic alcohols via chemoselective transfer hydrogenation of 2-arylidene cycloalkanones

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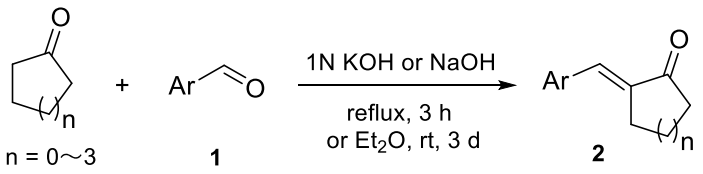
1. General Information

Unless otherwise noted, all reagents, catalysts and solvents were purchased from commercial suppliers and used without further purification. Column Chromatography was performed with silica gel. NMR spectra were recorded on Bruker AVANCE III (400 MHz) spectrometers. $CDCl_3$ was used for the NMR analysis with tetramethyl silane as the internal standard. Chemical shifts were reported up field to TMS (0.00 ppm) for ^1H NMR and relative to $CDCl_3$ (77.0 ppm) for ^{13}C NMR. HPLC analyses were conducted on a Waters 2489 Series instrument with chiral column OJ-H and OD-H. Optical rotations were measured on a MCP-500. Melting points were determined using X-4 made by Peking Taike Apparatus Co., Ltd. HRMS spectra were acquired using an Agilent 6540 ESI/TOF mass spectrometer.

2. Preparation of 2-Arylidene Cycloalkanones [1]



A mixture of aldehyde **1** (30 mmol), cycloalkanone (45 mmol), and 1N KOH solution (30 mL) was refluxed for 3 h (method A) or a mixture of aldehyde (30 mmol), cycloalkanone (36 mmol), diethyl ether (30 mL), and 1N NaOH solution (30 mL) was stirred at room temperature for 72 h (method B). After reaction, the mixture was diluted with 50 mL of diethyl ether and the aqueous layer was separated and extracted with ether (3 × 20 mL). The combined ethereal solution was washed to neutral with water and dried over Na_2SO_4. The solvent was evaporated, and the product was purified by silica gel column chromatography with PE/EA to yield the corresponding 2-arylidene cycloalkanone as a yellow solid.

Method A is for the synthesis of 2-arylidene cycloalkanone **2a-2w** and **4a-4i**.

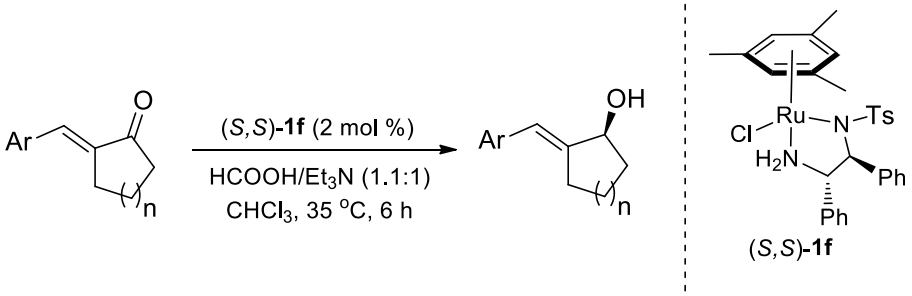
Method B is for the synthesis of 2-arylidene cycloalkanone **4j-4a'**.

3. General Procedure for the Synthesis of Racemic 2-Arylidene Cycloalkanols

The cycloalkanone (0.2 mmol) was dissolved in 1.0 mL MeOH, and $NaBH_4$ (0.4 mmol) was added slowly. The mixture was stirred at room temperature until the starting material was disappeared. And then 5.0 mL of H_2O was added slowly, the residue was extracted 3 times with

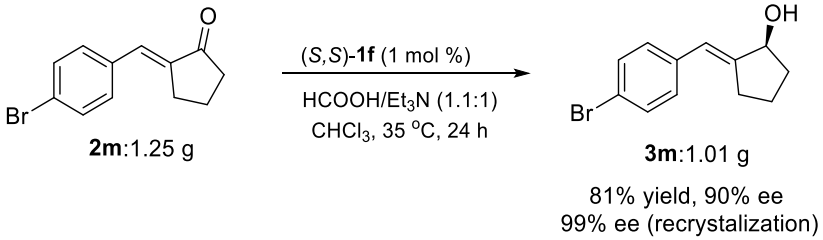
ethyl acetate. The combined organic layer was dried over Na_2SO_4 and evaporated under reduced pressure. The product was further purified by silica gel column.

4. Asymmetric Transfer Hydrogenation of 2-Arylidene Cycloalkanones



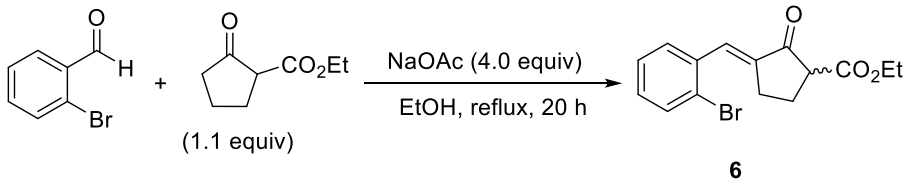
In a 10 mL Schlenk tube, formic acid (1.1 mmol, 42 μL)，triethylamine (1.0 mmol, 139 μL), and 1.0 mL $CHCl_3$ were added. After stirring for 1 h, (*S*,*S*)-**1f** (0.004 mmol, 2.49 mg), 2-arylidene cycloalkanone (0.2 mmol) were added. And then the mixture was stirred at 35 °C for 6 h. The solvent was removed under reduced pressure. Saturated sodium bicarbonate (5 mL) was added and extracted 3 times with ethyl acetate. The combined organic layer was dried over Na_2SO_4 and concentrated under reduced pressure. The residue was further purified by silica gel column to give the desired 2-arylidene cycloalkanol.

5. Gram-Scale Synthesis of Compound 3m [1]

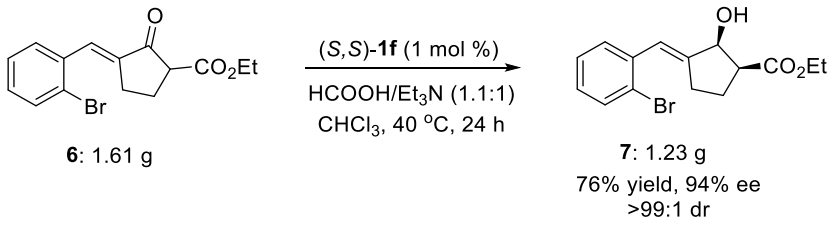


In a 30 mL Schlenk tube, formic acid (5.5 mmol, 208 μL)，triethylamine (5.0 mmol, 695 μL), and 10 mL $CHCl_3$ were added. After stirring for 1 h, (*S*,*S*)-**1f** (0.025 mmol, 6.2 mg), compound **2m** (1.25g, 5 mmol) were added. And then the mixture was stirred at 35 °C for 24 h. The solvent was removed under reduced pressure. Saturated sodium bicarbonate (5 mL) was added and extracted 3 times with ethyl acetate. The combined organic layer was dried over Na_2SO_4 and concentrated under reduced pressure. The residue was further purified by silica gel column to give compound **3m** (1.01 g, 81% yield, 90% ee). The ee value was improved to 99% by recrystallization from ethyl acetate/petroleum ether.

6. Gram-Scale Synthesis of Compound 7 [2]



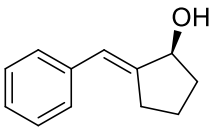
To a flame-dried three-neck flask, NaOAc (2.0 g, 24 mmol), anhydrous ethanol (10 mL), 2-bromobenzaldehyde (1.1 g, 6 mmol) and ethyl 2-oxocyclopentanecarboxylate (1.0 g, 6.6 mmol) were added. The reaction mixture was refluxed for 20 h. And then the reaction mixture was acidified with 2 M HCl at 0 ℃. The mixture was extracted with EtOAc (20 mL × 3). The combined organic layers were washed with brine and dried over anhydrous Na_2SO_4. Then filtered and concentrated under reduced pressure. The residue was purified by a column chromatography on a silica gel with ethyl acetate/petroleum ether (1:50→1:20) as an eluent to give compound **6** as pale-yellow solid (1.7 g, 88% yield).



In a 30 mL Schlenk tube, formic acid (5.5 mmol, 208 μL)，triethylamine (5.0 mmol, 695 μL), and 10 mL $CHCl_3$ were added. After stirring for 1 h, (*S*,*S*)-**1f** (0.025 mmol, 6.2 mg), compound **6** (1.61g, 5 mmol) were added. And then the mixture was stirred at 40ºC for 24 h. The solvent was removed under reduced pressure. Saturated sodium bicarbonate (5 mL) was added and extracted 3 times with ethyl acetate. The combined organic layer was dried over Na_2SO_4 and concentrated under reduced pressure. The residue was further purified by silica gel column to give compound **7** (1.23 g, 76% yield, 94% ee).

7. Analytical Data of the Products

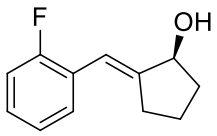
(*S, E*)-2-benzylidenecyclopentanol (3a, known compound**)** [1]



Colorless oil, 30 mg, 86% yield, 99% ee. $[\alpha]^{20}_D$ 13.780 (*c* 0.500, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.42-7.37 (m, 4H), 7.28-7.24 (m, 1H), 6.63 (s, 1H),

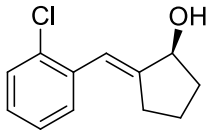
4.66-4.63 (m, 1H), 2.83-2.75 (m, 1H), 2.66-2.59 (m, 1H), 2.06-1.96 (m, 2H), 1.84-1.66 (m, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 147.83, 137.77, 128.43, 128.34, 126.62, 123.69, 77.39, 34.89, 29.39, 22.59 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 8.98 min (minor), t_S = 10.13 min (major).

(*S, E*)-2-(2-fluorobenzylidene)cyclopentanol (3b, unknown compound**)**



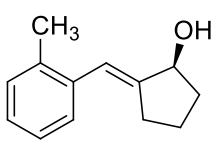
Yellow oil, 79% yield, 99% ee. $[\alpha]^{20}_D$ 16.037 (*c* 0.222, $CHCl_3$). Purified by flash column chromatography (PE: EA = 8 :1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.48-7.44 (m, 1H), 7.26-7.21 (m, 1H), 7.17-7.06 (m, 2H), 6.78 (s, 1H), 4.67-4.65 (m, 1H), 2.76-2.68 (m, 1H), 2.59-2.52 (m, 1H), 2.05-1.97 (m, 2H), 1.81-1.69 (m, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 160.18 (d, $J_{C\text{-}F}$ = 246.7 Hz), 150.04, 129.13 (d, $J_{C\text{-}F}$ = 3.2 Hz), 128.18 (d, $J_{C\text{-}F}$ = 8.3 Hz), 125.54 (d, $J_{C\text{-}F}$ = 12.7 Hz), 123.68 (d, $J_{C\text{-}F}$ = 3.6 Hz), 115.40 (d, $J_{C\text{-}F}$ = 9.7 Hz), 115.27 (d, $J_{C\text{-}F}$ = 7.2 Hz), 77.09, 34.84, 29.17, 22.39 ppm. HRMS (ESI) calcd for $C_{12}H_{13}OFNa$ ([M + Na]$^+$): 215.0843; Found: 215.0847. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.03 min (minor), t_S = 7.94 min (major).

(*S, E*)-2-(2-chlorobenzylidene)cyclopentanol (3c, known compound**)** [3]



Colorless oil, 30 mg, 73% yield, 97% ee. $[\alpha]^{20}_D$ 16.201 (*c* 0.250, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.46 (dd, *J* = 7.6, 1.6 Hz, 1H), 7.41 (dd, *J* = 8.0, 1.2 Hz, 1H), 7.27 (td, *J* = 7.6, 1.2 Hz, 1H), 7.19 (td, *J* = 7.6, 1.6 Hz, 1H), 6.87 (q, *J* = 2.4 Hz, 1H), 4.67 (s, 1H), 2.75-2.61 (m, 1H), 2.58-2.45 (m, 1H), 2.11-1.89 (m, 3H), 1.81-1.65 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 150.12, 135.67, 133.61, 129.50, 129.38, 127.84, 126.39, 120.05, 76.84, 34.76, 28.89, 22.34. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.77 min (minor), t_S = 9.81 min (major).

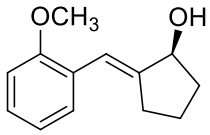
(*S, E*)-2-(2-methylbenzylidene)cyclopentanol (3d, known compound**)** [3]



Yellow oil, 31 mg, 82% yield, 97% ee. $[\alpha]^{20}_D$ 23.019 (*c* 0.480, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400

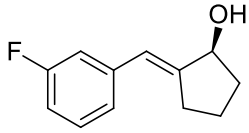
MHz, $CDCl_3$): δ = 7.39-7.33 (m, 1H), 7.25-7.14 (m, 3H), 6.72 (s, 1H), 4.65 (t, *J* = 5.6 Hz, 1H), 2.72-2.59 (m, 1H), 2.54-2.43 (m, 1H), 2.35 (s, 3H), 2.07-1.89 (m, 2H), 1.84 (s, 1H), 1.76-1.65 (m, 2H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 147.67, 137.84, 137.70, 129.25, 128.23, 127.44, 125.47, 123.78, 77.44, 34.89, 29.41, 22.61, 21.54 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.11 min (minor), t_S = 8.54 min (major).

(*S*, *E*)-2-(2-methoxybenzylidene)cyclopentanol (3e, known compound**)** [3]



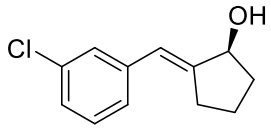
Colorless oil, 31 mg, 77% yield, 98% ee.$[\alpha]^{20}_D$ 34.153 (*c* 0.165, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.41 (dd, *J* = 7.6, 1.2 Hz, 1H), 7.24 (td, *J* = 8.0, 1.6 Hz, 1H), 6.97 (td, *J* = 7.6, 1.2 Hz, 1H), 6.92-6.87 (m, 2H), 4.65 (s, 1H), 3.87 (s, 3H), 2.77-2.66 (m, 1H), 2.59-2.49 (m, 1H), 2.01-1.92 (m, 2H), 1.75-1.64 (m, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 156.79, 147.98, 128.80, 127.94, 126.70, 120.21, 117.90, 110.40, 55.44, 34.77, 29.75, 29.12, 22.62. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 11.64 min (minor), t_S = 24.24 min (major).

(*S*, *E*)-2-(3-fluorobenzylidene)cyclopentanol (3f, known compound**)** [3]



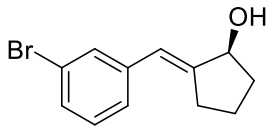
White oil, 27 mg, 71% yield, 98% ee.$[\alpha]^{20}_D$ 26.742 (*c* 0.240, $CHCl_3$). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.36-7.28 (m, 1H), 7.15 (d, *J* = 7.8 Hz, 1H), 7.10 (d, *J* = 10.5 Hz, 1H), 6.95 (td, *J* = 8.2, 2.2 Hz, 1H), 6.58 (s, 1H), 4.62 (s, 1H), 2.73 (ddd, *J* = 8.7, 6.1, 3.0 Hz, 1H), 2.67-2.54 (m, 1H), 2.07-1.95 (m, 2H), 1.87 (s, 1H), 1.77 (dd, *J* = 8.2, 6.1 Hz, 1H), 1.72-1.63 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 162.8 (d, $J_{C\text{-}F}$ = 243.1 Hz), 149.2, 140.2 (d, $J_{C\text{-}F}$ = 7.7 Hz), 129.7 (d, $J_{C\text{-}F}$ = 8.5 Hz), 124.3 (d, $J_{C\text{-}F}$ = 2.7 Hz), 112.6 (d, $J_{C\text{-}F}$ = 2.5 Hz), 114.8 (d, $J_{C\text{-}F}$ = 21.7 Hz), 113.4 (d, $J_{C\text{-}F}$ = 21.2 Hz), 77.2, 34.8, 29.4, 22.4 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.62 min (minor), t_S = 8.24 min (major).

(*S*, *E*)-2-(3-chlorobenzylidene)cyclopentanol (3g, known compound**)** [3]



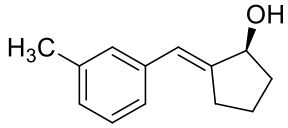
Yellow oil, 35 mg, 83% yield, 98% ee. $[\alpha]^{20}_{D}$ 14.570 (*c* 0.500, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1).**^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.37-7.29 (m, 4H), 6.56 (d, *J* = 2.1 Hz, 1H), 4.62 (td, *J* = 5.4, 4.6, 2.6 Hz, 1H), 2.84-2.52 (m, 2H), 2.08-1.97 (m, 2H), 1.87-1.62 (m, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 148.40, 136.24, 132.20, 129.61, 128.48, 122.51, 77.29, 34.87, 29.37, 22.46 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.31 min (minor), t_S = 8.13 min (major).

(*S*, *E*)-2-(3-bromobenzylidene)cyclopentanol (3h, known compound**)** [3]



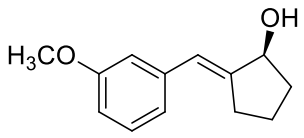
Yellow oil, 38 mg, 76% yield, 99% ee. $[\alpha]^{20}_{D}$ 18.315 (*c* 0.125, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz,$CDCl_3$): δ = 7.53 (t, *J* = 2.0 Hz, 1H), 7.36 (dt, *J* = 8.0, 1.6 Hz, 1H), 7.31-7.28 (m, 1H), 7.25-7.19 (m, 1H), 6.53 (q, *J* = 2.4 Hz, 1H), 4.61 (s, 1H), 2.80-2.68 (m, 1H), 2.66-2.55 (m, 1H), 2.05-1.95 (m, 2H), 1.82-1.62 (m, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 149.4, 139.9, 131.1, 129.8, 129.5, 127.0, 122.5, 122.3, 77.2, 34.8, 29.4, 22.4.ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 8.09 min (minor), t_S = 8.74 min (major).

(S, *E*)-2-(3-methylbenzylidene)cyclopentanol (3i, unknown compound**)**



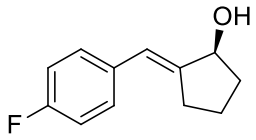
Yellow oil, 28 mg, 75% yield, 99% ee. $[\alpha]^{20}_{D}$ 9.998 (*c* 0.225, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.38-7.36 (m, 1H), 7.23-7.17 (m, 3H), 6.72 (s, 1H), 4.66-4.66 (m, 1H), 2.71-2.63 (m, 1H), 2.53-2.45 (m, 1H), 2.36 (s, 3H), 2.05-1.92 (m, 3H), 1.76-1.69 (m, 2H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 148.26, 136.59, 136.20, 130.01, 128.01, 126.79, 125.56, 121.65, 76.86, 35.03, 28.81, 22.43, 20.04 ppm. HRMS (ESI) calcd for $C_{13}H_{16}ONa$ ($[M + Na]^+$): 211.1093; Found: 211.1095. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.63 min (minor), t_S = 8.57 min (major).

(*S*, *E*)-2-(3-methoxybenzylidene)cyclopentanol (3j, known compound**)** [3]



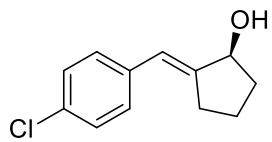
Colorless oil, 31 mg, 77% yield, 98% ee. $[\alpha]^{20}_{D}$ 34.153 (*c* 0.100, $CHCl_3$). **^{1}H NMR** (400 MHz, $CDCl_3$): δ =7.30 (t, *J* = 7.9 Hz, 1H), 7.03-6.93 (m, 2H), 6.82 (ddd, *J* = 8.2, 2.7, 0.9 Hz, 1H), 6.59 (q, *J* = 2.4 Hz, 1H), 4.72-4.49 (m, 1H), 3.85 (s, 3H), 2.84-2.71 (m, 1H), 2.68-2.56 (m, 1H), 2.13-2.03 (m, 1H), 2.02- 1.93 (m, 2H), 1.81-1.64 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 159.50, 148.14, 139.23, 129.27, 123.51, 121.13, 113.96, 112.14, 77.46, 77.28, 77.14, 76.82, 55.21, 34.82, 29.44, 22.52. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 16.23 min (major), t_R = 17.14 min (minor).

(*S*, *E*)-2-(4-fluorobenzylidene)cyclopentanol (3k, known compound**)** [3]



Colorless oil, 32 mg, 83% yield, 99% ee.$[\alpha]^{20}_{D}$ 17.362 (*c* 0.250, $CHCl_3$). Purified by flash columnchromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, Chloroform-*d*): δ = 7.35 (dd, *J* = 8.7, 5.6 Hz, 2H), 7.11-7.01 (m, 2H), 6.58 (d, *J* = 2.1 Hz, 1H), 4.62 (dd, *J* = 6.5, 4.7 Hz, 1H), 2.72 (dtd, *J* = 11.6, 6.4, 2.3 Hz, 1H), 2.63 -2.53 (m, 1H), 2.00 (dq, *J* = 9.0, 6.3, 5.8 Hz, 2H), 1.86 (s, 1H), 1.81-1.64 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 161.5 (d, $J_{C\text{-}F}$ = 244.9 Hz), 147.3 (d, $J_{C\text{-}F}$ = 2.2 Hz), 133.9 (d, $J_{C\text{-}F}$ = 3.3 Hz), 129.9 (d, $J_{C\text{-}F}$ = 8.7 Hz), 115.2 (d, $J_{C\text{-}F}$ = 21.2 Hz), 77.3, 34.9, 29.2, 22.5 ppm. HPLC (Chiracel OD-H column, n-hexane/ 2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 8.09 min (major), t_R = 8.74 min (minor).

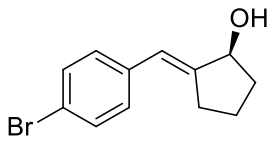
(*S*,*E*)-2-(4-chlorobenzylidene)cyclopentanol (3l, known compound**)** [3]



Yellow oil, 34 mg, 81% yield, 98% ee. $[\alpha]^{20}_{D}$ 9.998 (*c* 0.225, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.34-7.30 (m, 3H), 7.29-7.27 (m, 1H), 6.55 (q, *J* = 2.4 Hz, 1H), 4.61 (t, *J* = 6.0 Hz, 1H), 2.79-2.66 (m, 1H), 2.64-2.50 (m, 1H), 2.07-1.93 (m, 2H), 1.84-1.60 (m, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 148.26, 136.59, 136.20, 130.01, 128.01, 126.79, 125.56, 121.65, 76.86, 35.03, 28.81, 22.43, 20.04 ppm. HPLC (Chiracel OD-H column,

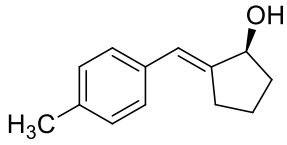
n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.63 min (minor), t_S = 8.57 min (major).

(*S, E*)-2-(4-bromobenzylidene)cyclopentanol (3m, known compound) [3]



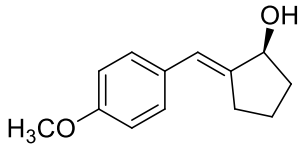
White solid, 40 mg, 79% yield, 98% ee. mp 70-72 ºC. $[\alpha]^{20}_D$ 15.378 (*c* 0.200, $CHCl_3$). Purified by flash column chromatography (PE: EA = 9:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.49 (d, *J* = 8.4 Hz, 2H), 7.26 (d, *J* = 8.4 Hz, 2H), 6.56 (s, 1H), 4.63-4.61 (m, 1H), 2.77-2.70 (m, 1H), 2.62-2.54 (m, 1H), 2.05-1.97 (m, 2H), 1.83-1.69 (m, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 148.63, 136.68, 131.43, 129.93, 122.55, 120.38, 77.31, 34.88, 29.38, 22.45 ppm. HPLC (Chiracel OD-H column, n-hexane/ 2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 7.58 min (major), t_R = 8.07 min (minor).

(*S, E*)-2-(4-methylbenzylidene)cyclopentanol (3n, known compound**)** [3]



Yellow oil, 30 mg, 80% yield, 98% ee. $[\alpha]^{20}_D$ 3.944 (*c* 0.240, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.31 (d, *J* = 8.0 Hz, 2H), 7.20 (d, *J* = 8.0 Hz, 2H), 6.60-6.59 (s, 1H), 4.65-4.62 (m, 1H), 2.81-2.73 (m, 1H), 2.65-2.57 (m, 1H), 2.39 (s, 3H), 2.05-1.96 (m, 2H), 1.82-1.67 (m, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 146.82, 136.38, 134.95, 129.05, 128.35, 123.61, 77.45, 34.92, 29.39, 22.66, 21.20 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 7.70 min (major), t_R = 8.32 min (minor).

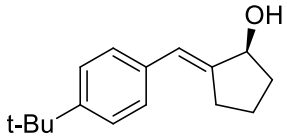
(S, *E*)-2-(4-methoxybenzylidene)cyclopentanol (3o, known compound**)** [3]



White oil, 33 mg, 81% yield, 98% ee.$[\alpha]^{20}_D$ 40.357 (*c* 0.100, $CHCl_3$).Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.35 (d, *J* = 8.8 Hz, 2H), 6.97-6.89 (m, 2H), 6.57 (d, *J* = 2.0 Hz, 1H), 4.77-4.49 (m, 1H), 3.86 (s, 3H), 2.82-2.69 (m, 1H), 2.64-2.52 (m, 1H), 2.09-1.92 (m, 2H), 1.79 (ddd, *J* = 12.4, 6.1, 2.1 Hz, 1H), 1.72-1.67 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 158.26, 145.47, 130.63, 129.65, 123.21, 113.78, 77.45, 55.28, 34.92,

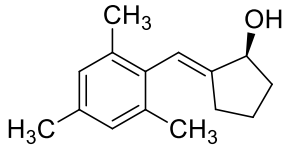
29.31, 22.71. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 9.19 min (major), t_R = 10.02 min (minor).

(*S*, *E*)-2-(4-(tert-butyl)benzylidene)cyclopentanol (3p, known compound**)** [3]



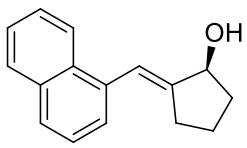
White oil, 39 mg, 85% yield, 98% ee. $[\alpha]^{20}_D$ 23.104 (*c* 0.250, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.42 (d, *J* = 8.5 Hz, 2H), 7.35 (d, *J* = 8.5 Hz, 2H), 6.60 (d, *J* = 2.0 Hz, 1H), 4.63 (s, 1H), 2.87-2.72 (m, 1H), 2.70-2.56 (m, 1H), 2.05-1.94 (m, 2H), 1.85-1.66 (m, 3H), 1.37 (s, 9H);**^{13}C NMR** (100 MHz, $CDCl_3$): δ = 149.63, 147.05, 134.94, 128.17, 125.26, 123.46, 77.47, 34.91, 34.55, 31.32, 29.74, 29.39, 22.66. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 6.68 min (minor), t_S = 7.29 min (major).

(*S*, *E*)-2-(2,4,6-trimethylbenzylidene)cyclopentanol (3q, known compound**)** [3]



Colorless oil, 29 mg, 67% yield, 98% ee. $[\alpha]^{20}_D$ 20.179 (*c* 0.100, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 6.82 (s, 2H), 6.30 (d, *J* = 2.6 Hz, 1H), 4.92 (d, *J* = 5.2 Hz, 1H), 4.41 (d, *J* = 5.6 Hz, 1H), 2.21 (s, 3H), 2.11 (s, 6H), 1.98-1.78 (m, 3H), 1.76-1.64 (m, 1H), 1.56-1.43 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 149.07, 135.45, 135.27, 134.76, 128.12, 120.20, 74.05, 35.39, 27.86, 21.46, 21.03, 20.26. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 5.06 min (minor), t_S = 5.36 min (major).

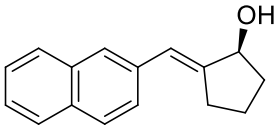
(*S*, *E*)-2-(naphthalen-1-ylmethylene)cyclopentanol (3r, known compound**)** [3]



Yellow oil, 37 mg, 82% yield, 98% ee. $[\alpha]^{20}_D$ 8.630 (*c* 0.250, $CHCl_3$).Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 8.14-8.06 (m, 1H), 7.93-7.85 (m, 1H), 7.79 (t, *J* = 4.8 Hz, 1H), 7.57-7.45 (m, 4H), 7.21 (q, *J* = 2.4 Hz, 1H), 4.76 (t, *J* = 6.0 Hz, 1H), 2.71-2.58 (m, 1H), 2.53-2.40 (m, 1H), 2.13-2.02 (m, 1H), 1.99-1.82 (m, 2H), 1.78-1.66 (m, 2H); **^{13}C NMR**

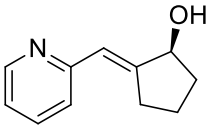
(100 MHz, $CDCl_3$): δ = 149.92, 134.74, 133.59, 131.67, 128.54, 127.27, 125.88, 125.86, 125.75, 125.33, 124.44, 120.69, 76.64, 35.15, 28.85, 22.24. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 15.94 min (major), t_R = 17.14 min (minor).

(*S*, *E*)-2-(naphthalen-2-ylmethylene)cyclopentanol (3s, known compound**)** [3]



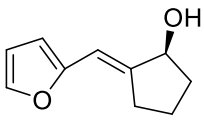
Yellow oil, 41 mg, 91% yield, 98% ee. $[\alpha]^{20}_D$ 12.699 (*c* 0.250, $CHCl_3$). Purified by flash columnchromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.90-7.80 (m, 4H), 7.57 (dd, *J* = 8.6, 1.7 Hz, 1H), 7.54-7.47 (m, 2H), 6.78 (d, *J* = 2.1 Hz, 1H), 4.73-4.67 (m, 1H), 2.98-2.83 (m, 1H), 2.81-2.67 (m, 1H), 2.05 (ddq, *J* = 12.5, 10.0, 5.8 Hz, 2H), 1.86-1.71 (m, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 148.34, 135.37, 133.49, 132.20, 128.05, 127.81, 127.59, 127.25, 126.79, 126.14, 125.79, 123.77, 77.48, 34.93, 29.56, 22.62. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 10.60 min (major), t_R = 11.44 min (minor).

(*S*, *E*)-2-(pyridin-2-ylmethylene)cyclopentanol (3t, known compound**)** [3]



Red oil, 27 mg, 77% yield, 99% ee. $[\alpha]^{20}_D$ 6.137 (*c* 0.050, $CHCl_3$). Purified by flash columnchromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 8.62 (dd, *J* = 5.0, 1.7 Hz, 1H), 7.69 (td, *J* = 7.8, 1.9 Hz, 1H), 7.34 (d, *J* = 7.9 Hz, 1H), 7.13 (dd, *J* = 7.5, 4.9 Hz, 1H), 6.75 (d, *J* = 2.3 Hz, 1H), 4.66 (s, 1H), 3.02-2.86 (m, 1H), 2.86-2.72 (m, 1H), 2.33 (s, 1H), 2.08-1.98 (m, 2H), 1.78-1.66 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 156.66, 153.39, 149.02, 136.25, 123.35, 122.82, 120.97, 34.79, 30.01, 22.22. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 10.39 min (minor), t_S = 13.83 min (major).

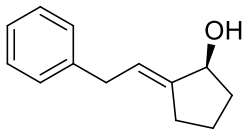
(*S*, *E*)-2-(furan-2-ylmethylene)cyclopentan-1-ol (3u, known compound**)** [3]



Yellow oil, 21 mg, 63% yield, 98% ee. $[\alpha]^{20}_D$ 23.794 (*c* 0.200, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.42 (s, 1H), 6.47 (d, *J* = 18.8 Hz, 2H), 6.27 (d, *J* = 2.8 Hz,

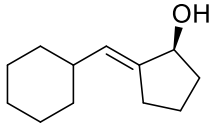
1H), 4.64-6.57 (m, 1H), 2.78-2.54 (m, 2H), 2.05-1.95 (m, 2H), 1.91 (s, 1H), 1.80-1.62 (m, 2H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 153.56, 146.30, 141.46, 112.24, 111.34, 108.14, 76.62, 35.45, 29.72, 22.15 ppm. HPLC (Chiracel OD-H column, n-hexane/ 2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 7.33 min (major), t_R = 7.85 min (minor).

(*S, E*)-2-(2-phenylethylidene)cyclopentanol (3v, known compound**)** [3]



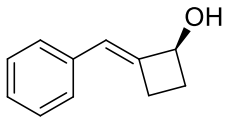
Yellow oil, 33 mg, 87% yield, 94% ee. $[\alpha]^{20}_D$ 8.290 (*c* 0.100, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.34 (dd, *J* = 8.5, 6.7 Hz, 2H), 7.25 (dd, *J* = 7.6, 5.3 Hz, 3H), 5.79 (ddd, *J* = 9.3, 4.8, 1.9 Hz, 1H), 4.49 (d, *J* = 5.9 Hz, 1H), 3.42 (d, *J* = 7.4 Hz, 2H), 2.55 (dt, *J* = 14.6, 4.5 Hz, 1H), 2.43-2.30 (m, 1H), 2.00-1.89 (m, 2H), 1.72 (dq, *J* = 10.8, 5.8 Hz, 2H), 1.52 (s, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 146.84, 140.83, 128.51, 128.35, 126.00, 122.76, 75.65, 35.70, 35.65, 27.21, 22.02. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 7.42 min (major), t_R = 8.09 min (minor).

(*S, E*)-2-(cyclohexylmethylene)cyclopentanol (3w, known compound**)** [3]



Yellow oil, 30 mg, 83% yield, 93% ee. $[\alpha]^{20}_D$ 17.326 (*c* 0.100, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 5.41 (dd, *J* = 9.2, 2.0 Hz, 1H), 4.40 (t, *J* = 4.8 Hz, 1H), 2.53-2.35 (m, 1H), 2.30-2.17 (m, 1H), 2.14-2.02 (m, 1H), 1.94-1.81 (m, 2H), 1.78-1.64 (m, 7H), 1.38-1.00 (m, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 144.0, 130.20, 75.7, 38.5, 35.5, 32.8, 32.8, 26.8, 26.1, 26.0, 22.0. HPLC (Chiracel OJ-H column, n-hexane/2-propanol =79:1 (v/v), 0.5 mL/min, 254 nm, temp, r.t.), t_R = 6.32 min (minor), t_S = 8.30 min (major).

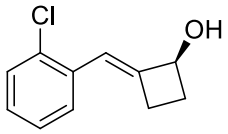
(*S, E*)-2-benzylidenecyclobutanol (5a, known compound**)** [4]



White solid, 30 mg, 93% yield, 96% ee.$[\alpha]^{20}_D$45.270 (*c* 0.250, $CHCl_3$). Mp76-78 ^{o}C. Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.41-7.34 (m, 2H), 7.33-7.28 (m, 2H),

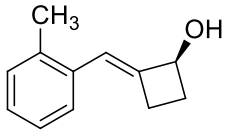
7.28-7.22 (m, 1H), 6.48 (d, *J* = 2.4 Hz, 1H), 5.07-4.67 (m, 1H), 2.91-2.78 (m, 1H), 2.72 (dtd, *J* = 15.8, 8.9, 2.6 Hz, 1H), 2.56 (dddd, *J* = 11.6, 8.8, 8.0, 3.7 Hz, 1H), 2.01 (tdd, *J* = 10.6, 9.0, 7.2 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 147.91, 136.79, 128.46, 127.81, 126.71, 120.07, 72.24, 32.01, 25.18. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.95 min (minor), t_S = 10.33 min (major).

(*S*, *E*)-2-(2-chlorobenzylidene)cyclobutanol (5b, known compound**)** [4]



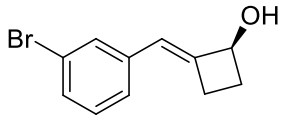
White solid, 37 mg, 96% yield, 95% ee. $[\alpha]^{20}_D$63.253 (*c* 0.250, $CHCl_3$). Mp 84-86 °C. Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.41 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.35 (dd, *J* = 7.8, 1.6 Hz, 1H), 7.28-7.22 (m, 1H), 7.19 (td, *J* = 7.6, 1.8 Hz, 1H), 6.84 (q, *J* = 2.4 Hz, 1H), 4.89 (d, *J* = 7.8 Hz, 1H), 2.80-2.63 (m, 2H), 2.61-2.51 (m, 1H), 2.15 (s, 1H), 2.06-1.94 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 150.43, 134.32, 133.13, 129.71, 128.77, 127.85, 126.48, 116.10, 72.24, 31.80, 24.87. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.78 min (minor), t_S = 10.86 min (major).

(*S*, *E*)-2-(2-methylbenzylidene)cyclobutanol (5c, known compound**)** [4]



White solid, 31 mg, 88% yield, 94% ee. $[\alpha]^{20}_D$47.695 (*c* 0.250, $CHCl_3$). Mp 102-104 °C. Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.29 (d, *J* = 7.6 Hz, 1H), 7.25-7.14 (m, 3H), 6.65 (d, *J* = 2.4 Hz, 1H), 4.90 (s, 1H), 2.77-2.64 (m, 2H), 2.55 (ddt, *J* = 10.8, 8.4, 4.2 Hz, 1H), 2.40 (s, 3H), 2.14 (s, 1H), 2.04-1.94 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 148.24, 135.77, 135.07, 130.34, 127.51, 126.82, 125.73, 117.27, 72.26, 31.90, 24.92, 19.95. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 8.24 min (minor), t_S = 12.52 min (major).

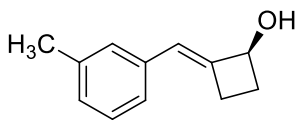
(*E*)-2-(3-bromobenzylidene)cyclobutanol (5d, known compound**)** [4]



White solid, 40 mg, 85% yield, 97% ee. $[\alpha]^{20}_D$56.430(*c* 0.250, $CHCl_3$). Mp 91-93°C. Purified by flash column chromatography (PE: EA =

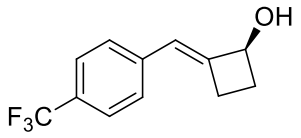
10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.42 (s, 1H), 7.36 (dt, *J* = 6.8, 2.2 Hz, 1H), 7.21 (d, *J* = 6.6 Hz, 2H), 6.39 (d, *J* = 2.4 Hz, 1H), 4.88 (s, 1H), 2.85-2.75 (m, 1H), 2.74-2.64 (m, 1H), 2.59-2.46 (m, 2H), 2.01 (tdd, *J* = 10.7, 9.0, 7.2 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 149.66, 138.90, 130.55, 129.97, 129.56, 126.36, 122.59, 118.75, 72.01, 31.76, 25.11. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 8.14 min (minor), t_S = 8.91 min (major).

(*S, E*)-2-(3-methylbenzylidene)cyclobutanol (5e, known compound **)** [4]



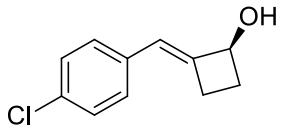
White solid, 33 mg, 94% yield, 98% ee. $[\alpha]^{20}_D$60.153 (*c* 0.250, $CHCl_3$). Mp 64-67 °C. Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.27 (t, *J* = 7.8 Hz, 1H), 7.15-7.10 (m, 2H), 7.08 (d, *J* = 7.6 Hz, 1H), 6.45 (d, *J* = 2.5 Hz, 1H), 4.94-4.83 (m, 1H), 2.91-2.78 (m, 1H), 2.76-2.65 (m, 1H), 2.55 (dddd, *J* = 11.5, 8.8, 8.0, 3.7 Hz, 1H), 2.40 (s, 3H), 2.22 (s, 1H), 2.07-1.94 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 147.73 , 138.00 , 136.77 , 128.62 , 128.37 , 127.52 , 124.90, 120.10, 72.21, 31.94 , 25.23 , 21.53. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.51 min (minor), t_S = 9.10 min (major).

(*S, E*)-2-(4-(trifluoromethyl)benzylidene)cyclobutanol (5f, known compound**)** [4]



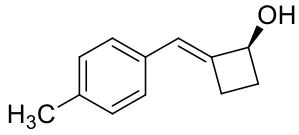
White solid, 41 mg, 89% yield, 98% ee. $[\alpha]^{20}_D$24.375 (*c* 0.250, $CHCl_3$). Mp 95-97 °C. Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.63 (dd, *J* = 29.3, 8.1 Hz, 2H), 7.41 (dd, *J* = 29.0, 8.1 Hz, 2H), 6.62-6.44 (m, 1H), 4.93 (dd, *J* = 20.0, 11.0 Hz, 1H), 2.93-2.69 (m, 2H), 2.66-2.39 (m, 2H), 2.18-1.98 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 150.9 (d, $J_{C\text{-}F}$ = 6.9 Hz), 140.3, 127.6, 127.8, 125.4 (m), 118.9 (d, $J_{C\text{-}F}$ = 6.9 Hz), 72.0 (d, $J_{C\text{-}F}$ = 6.2 Hz), 31.7 (d, $J_{C\text{-}F}$ = 5.1 Hz), 25.2 (d, $J_{C\text{-}F}$ = 7.1 Hz) ppm. HPLC (Chiracel AD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 7.68 min (minor), t_S = 9.12 min (major).

(*S*, *E*)-2-(4-chlorobenzylidene)cyclobutanol (5g, known compound**)** [4]



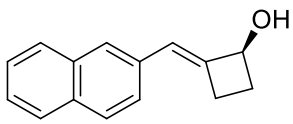
White solid, 33 mg, 85% yield, 99% ee. $[\alpha]^{20}_{D}$26.184 (*c* 0.250, $CHCl_3$). Mp72-74°C. Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.35-7.31 (m, 2H), 7.22 (d, *J* = 8.5 Hz, 2H), 6.43 (q, *J* = 2.4 Hz, 1H), 4.88 (ddt, *J* = 7.5, 5.5, 2.6 Hz, 1H), 2.88-2.62 (m, 2H), 2.61-2.51 (m, 1H), 2.01 (tdd, *J* = 10.7, 8.9, 7.1 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 148.58, 135.26, 132.31, 128.97, 128.61, 119.00, 72.14, 31.90, 25.09. HPLC (Chiracel AD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 8.21 min (minor), t_S = 9.71 min (major).

(*S*, *E*)-2-(4-methylbenzylidene)cyclobutanol (5h, known compound**)** [4]



White solid, 33 mg, 94% yield, 98% ee. $[\alpha]^{20}_{D}$72.396 (*c* 0.250, $CHCl_3$). Mp 84-86 °C. Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.25-7.15 (m, 4H), 6.45 (d, *J* = 2.5 Hz, 1H), 4.88 (s, 1H), 2.88-2.77 (m, 1H), 2.75-2.65 (m, 1H), 2.55 (dtd, *J* = 8.8, 7.6, 4.4 Hz, 1H), 2.47 (s, 1H), 2.40 (s, 3H), 2.01 (tdd, *J* = 10.6, 8.8, 7.0 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 146.81, 136.44, 134.06, 129.19, 127.76, 119.97, 72.17, 31.92, 25.17, 21.25. HPLC (Chiracel AD-H column, n-hexane/2-propanol = 95:5 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 12.07 min (minor), t_S = 14.34 min (major).

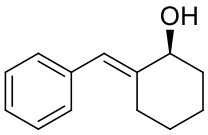
(*S*, *E*)-2-(naphthalen-2-ylmethylene)cyclobutanol (5i, known compound**)** [4]



White solid, 38 mg, 91% yield, 93% ee. $[\alpha]^{20}_{D}$47.221 (*c* 0.250, $CHCl_3$). Mp 141-143 °C. Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.88-7.80 (m, 3H), 7.72 (s, 1H), 7.54-7.45 (m, 3H), 6.64 (q, *J* = 2.4 Hz, 1H), 4.94 (q, *J* = 8.4 Hz, 1H), 3.00-2.76 (m, 2H), 2.66-2.53 (m, 1H), 2.16-1.98 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 150.87, 135.10, 133.70, 132.11, 128.33, 128.19, 127.93, 126.68, 126.37, 126.22, 126.08, 119.01, 71.21, 31.17,

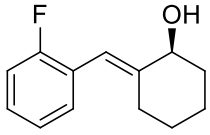
25.29. HPLC (Chiracel AD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 9.38 min (minor), t_S = 10.87 min (major).

(*S*, *E*)-2-benzylidenecyclohexanol (5j, known compound) [1]



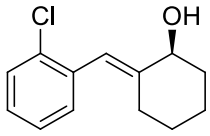
White solid, 34 mg, 91% yield, 88% ee. mp 82−83 °C. $[\alpha]^{25}_D$ -3.386 (*c* 0.244, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.39-7.35 (m, 2H), 7.27-7.24 (m, 3H), 6.57 (s, 1H), 4.30-4.27 (m, 1H), 2.80-2.73 (m, 1H), 2.20-2.14 (m, 1H), 2.08-2.03 (m, 1H), 1.95-1.89 (m, 1H), 1.72-1.66 (m, 3H), 1.58-1.49 (m, 2H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 144.37, 137.68, 128.95, 128.12, 126.26, 120.82, 73.79, 36.59, 27.38, 27.01, 23.23 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 6.42 min (minor), t_S = 7.79 min (major).

(*S*, *E*)-2-(2-fluorobenzylidene)cyclohexanol (5k, known compound**)** [1]



Yellow oil, 32 mg, 79% yield, 92% ee. $[\alpha]^{20}_D$ -18.223 (*c* 0.420, $CHCl_3$). Purified by flash column chromatography (PE: EA = 8:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.28-7.22 (m, 2H), 7.15-7.06 (m, 2H), 6.49 (s, 1H), 4.32-4.29 (m, 1H), 2.66-2.60 (m, 1H), 2.11-2.04 (m, 2H), 1.94-1.88 (m, 1H), 1.80 (s, 1H), 1.70-1.47 (m, 4H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 160.24 (d, $J_{C\text{-}F}$ = 244.5 Hz), 146.75, 130.98 (d, $J_{C\text{-}F}$ = 3.8 Hz), 128.17 (d, $J_{C\text{-}F}$ = 8.0 Hz), 125.26 (d, $J_{C\text{-}F}$ = 15.3 Hz), 123.57 (d, $J_{C\text{-}F}$ = 3.6 Hz), 115.38 (d, $J_{C\text{-}F}$ = 22.2 Hz), 113.56 (d, $J_{C\text{-}F}$ = 2.5 Hz), 73.60, 36.62, 27.68, 27.24, 23.32 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 5.39 min (minor), t_S = 6.34 min (major).

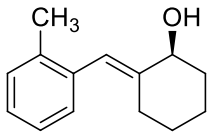
(*S*, *E*)-2-(2-chlorobenzylidene)cyclohexanol (5l, unknown compound**)**



Yellow oil, 32 mg, 72% yield, 76% ee. $[\alpha]^{20}_D$ -12.280 (*c* 0.442, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.42 (d, *J* = 7.2 Hz, 1H), 7.28-7.19 (m, 3H), 6.57 (s, 1H), 4.34-4.31 (m, 1H), 2.63-2.57 (m, 1H), 2.12-2.01 (m, 2H), 1.95-1.89 (m, 1H), 1.78 (s, 1H), 1.72-1.67 (m, 1H), 1.64-1.48 (m, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 145.82, 136.08,

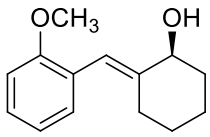
133.96, 130.82, 129.31, 127.81, 126.21, 118.15, 73.52, 36.67, 27.42, 27.34, 23.33 ppm. HRMS (ESI) calcd for $C_{13}H_{15}OClNa$ ([M + Na]$^+$): 245.0704; Found: 245.0702. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 5.89 min (minor), t_S = 8.02 min (major).

(*S, E*)-2-(2-methylbenzylidene)cyclohexanol (5m, unknown compound**)**



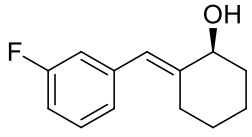
Yellow oil, 32 mg, 80% yield, 83% ee. $[\alpha]^{20}_D$ -13.131 (*c* 0.554, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.24-7.17 (m, 3H), 7.15-7.12 (m, 1H), 6.51 (s, 1H), 4.33-4.30 (m, 1H), 2.59-2.53 (m, 1H), 2.29 (s, 3H), 2.10-1.98 (m, 3H), 1.94-1.87 (m, 1H), 1.67-1.54 (m, 3H), 1.51-1.44 (m, 1H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 144.17, 136.89, 136.59, 129.72, 129.28, 126.61, 125.33, 119.84, 73.65, 36.80, 27.48, 27.28, 23.33, 20.04 ppm. HRMS (ESI) calcd for $C_{14}H_{18}ONa$ ([M + Na]$^+$): 225.1250; Found: 225.1249. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 5.87 min (minor), t_S = 6.85 min (major).

(*S, E*)-2-(2-methoxybenzylidene)cyclohexanol (5n, known compound**)** [1]



Colorless oil, 35 mg, 83% yield, 95% ee. $[\alpha]^{20}_D$ -29.105 (*c* 0.400, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.29 (dt, J = 8.0 Hz, 1.6 Hz, 1H), 7.20 (d, J = 7.2 Hz, 1H), 6.96 (t, J = 7.6 Hz, 1H), 6.93 (d, J = 8.0 Hz, 1H), 6.55 (s, 1H), 4.33-4.30 (m, 1H), 3.86 (s, 3H), 2.70-2.64 (m, 1H), 2.16-2.10 (m, 1H), 2.07-2.01 (m, 1H), 1.94-1.88 (m, 1H), 1.81 (s, 1H), 1.71-1.50 (m, 4H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 157.24, 144.34, 130.38, 127.86, 126.41, 120.07, 116.60, 110.40, 73.86, 55.41, 36.37, 27.42, 27.30, 23.23 ppm. HPLC (Chiracel OJ-H column, n-hexane/2-propanol = 49:1 (v/v), 0.5 mL/min, 230 nm, temp, r.t.), t_R = 43.62 min (major), t_S = 48.47 min (minor).

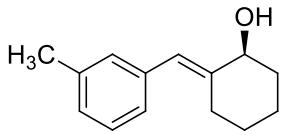
(S, *E*)-2-(3-fluorobenzylidene)cyclohexanol (5o, unknown compound**)**



Yellow oil, 31 mg, 75% yield, 80% ee. $[\alpha]^{20}_D$ -13.660 (*c* 0.400, $CHCl_3$). Purified by flash column chromatography (PE: EA = 8:1). **^{1}H NMR** (400

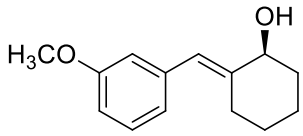
MHz, $CDCl_3$): δ = 7.34-7.29 (m, 1H), 7.04-7.01 (m, 1H), 6.97-6.93 (m, 2H), 6.54 (s, 1H), 4.29-4.26 (m, 1H), 2.80-2.74 (m, 1H), 2.15-2.04 (m, 2H), 1.93-1.89 (m, 1H), 1.73 (s, 1H), 1.64-1.48 (m, 4H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 162.69 (d, $J_{C\text{-}F}$ = 243.7 Hz), 145.56, 140.00 (d, $J_{C\text{-}F}$ = 7.6 Hz), 129.51 (d, $J_{C\text{-}F}$ = 8.4 Hz), 124.68 (d, $J_{C\text{-}F}$ = 2.9 Hz), 119.64 (d, $J_{C\text{-}F}$ = 2.1 Hz), 115.65 (d, $J_{C\text{-}F}$ = 21.0 Hz), 113.08 (d, $J_{C\text{-}F}$ = 21.0 Hz), 73.60, 36.73, 27.34, 27.16, 23.32 ppm. HRMS (ESI) calcd for $C_{13}H_{15}OFNa$ ([M + Na]$^+$): 229.0999; Found: 229.1003. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 5.61 min (minor), t_S = 6.32 min (major).

(*S*, *E*)-2-(3-methylbenzylidene)cyclohexanol (5p, known compound**)** [1]



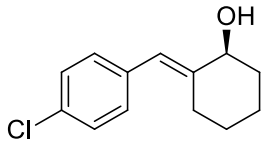
Colorless oil, 29 mg, 71% yield, 83% ee. $[\alpha]^{20}_D$ -23.670 (*c* 1.142, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.26 (t, *J* = 8.0 Hz, 1H), 7.08-7.07 (m, 3H), 6.54 (s, 1H), 4.30–4.27 (m, 1H), 2.80-2.73 (m, 1H), 2.40 (s, 3H), 2.22-2.15 (m, 1H), 2.08-2.01 (m, 1H), 1.96-1.86 (m, 1H), 1.76 (s, 1H), 1.71-1.63 (m, 2H), 1.60-1.49 (m, 2H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 144.18, 137.66, 137.60, 129.68, 128.01, 127.04, 126.00, 120.97, 73.83, 36.54, 27.39, 27.03, 23.19, 21.50 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 6.27 min (minor), t_S = 7.78 min (major).

(*S*, *E*)-2-(3-methoxybenzylidene)cyclohexanol (5q, known compound**)** [1]



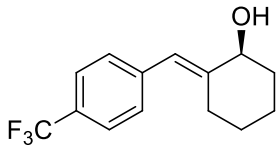
Colorless oil, 37 mg, 86% yield, 82% ee. $[\alpha]^{20}_D$ -12.696 (*c* 0.972, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.27 (d, *J* = 8.4 Hz, 1H), 6.87-6.81 (m, 3H), 6.54 (s, 1H), 4.29-4.26 (m, 1H), 3.85 (s, 3H), 2.80-2.75 (m, 1H), 2.19-2.14 (m, 1H), 2.07-2.03 (m, 1H), 1.92-1.88 (m, 1H), 1.81 (s, 1H), 1.70-1.63 (m, 2H), 1.58-1.49 (m, 2H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 159.39, 144.67, 139.14, 129.08, 121.48, 120.66, 114.57, 111.73, 73.74, 55.19, 36.62, 27.39, 27.17, 23.27 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 10.10 min (minor), t_S = 14.06 min (major).

(*S*, *E*)-2-(4-chlorobenzylidene)cyclohexanol (5r, known compound**)** [1]



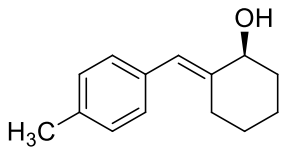
White solid, 36 mg, 81% yield, 74% ee. mp 80-82 °C. $[\alpha]^{20}_{D}$ -19.520 (*c* 0.340, $CHCl_3$). Purified by flash column chromatography (PE: EA = 8:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.32 (d, *J* = 8.4 Hz, 2H), 7.16 (d, *J* = 8.4 Hz, 2H), 6.51 (s, 1H), 4.27-4.24 (m, 1H), 2.75-2.70 (m, 1H), 2.13-2.03 (m, 3H), 1.89 (s, 1H), 1.68-1.57 (m, 3H), 1.51-1.44 (m, 1H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 145.16, 136.15, 131.95, 130.27, 130.25, 128.36, 128.27, 119.57, 73.62, 36.68, 27.34, 27.11, 23.32 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 99:1 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 28.36 min (major), t_S = 31.96 min (minor).

(*S*, *E*)-2-(4-(trifluoromethyl)benzylidene)cyclohexanol (5s, unknown compound**)**



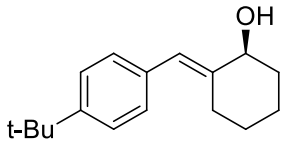
White solid, 44 mg, 85% yield, 71% ee. mp 66−68 °C. $[\alpha]^{20}_{D}$ -2.053 (*c* 1.000, $CHCl_3$). Purified by flash column chromatography (PE: EA = 8:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.61 (d, *J* = 8.0 Hz, 2H), 7.35 (d, *J* = 8.0 Hz, 2H), 6.60 (s, 1H), 4.30-4.29 (m, 1H), 2.79-2.73 (m, 1H), 2.12-2.07 (m, 2H), 1.94-1.91 (m, 1H), 1.70-1.66 (m, 3H), 1.59-1.47 (m, 2H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 146.47, 144.77, 141.49, 129.19 (d, $J_{C\text{-}F}$ = 3.3 Hz), 125.15 (m), 122.31, 119.40, 73.55, 36.84, 27.37, 27.27, 23.40 ppm. HRMS (ESI) calcd for $C_{14}H_{15}OF_3Na$ ([M + Na]$^+$): 279.0967; Found: 279.0969. HPLC (Chiracel OJ-H column, n-hexane/2-propanol = 99:1 (v/v), 1.0 mL/min, 230 nm, temp, r.t.), t_R = 19.33 min (minor), t_S = 27.64 min (major).

(*S*, *E*)- 2-(4-methylbenzylidene)cyclohexanol (5t, known compound**)** [1]



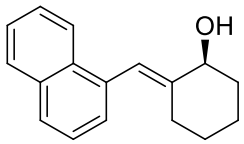
White solid, 34 mg, 84% yield, 89% ee. mp 48−50 °C. $[\alpha]^{20}_{D}$ -25.877 (*c* 0.838, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.20-7.15 (m, 4H), 6.53 (s, 1H), 4.30-4.27 (m, 1H), 2.79-2.73 (m, 1H), 2.39 (s, 3H), 2.22-2.15 (m, 1H), 2.06-2.00 (m, 1H), 1.96-1.87 (m, 1H), 1.78 (s, 1H), 1.70-1.62 (m, 2H), 1.59-1.49 (m, 2H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 143.77, 135.91, 134.70, 128.86, 128.84, 120.81, 73.85, 36.50, 27.37, 26.97, 23.17, 21.20 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 99:1 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 38.65 min (major), t_R = 43.89 min (minor).

(*S*, *E*)−2-(4-(tert-butyl)benzylidene)cyclohexanol (5u, unknown compound**)**



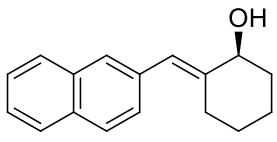
Colorless oil, 44 mg, 90% yield, 93% ee. $[\alpha]^{20}_{D}$ -21.622 (*c* 0.302, $CHCl_3$). Purified by flash column chromatography (PE: EA = 8:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.41 (d, *J* = 8.0 Hz, 2H), 7.23 (d, *J* = 8.0 Hz, 2H), 6.55 (s, 1H), 4.30-4.28 (m, 1H), 2.83-2.77 (m, 1H), 2.25-2.19 (m, 1H), 2.07-2.02 (m, 1H), 1.97-1.87 (m, 2H), 1.73-1.52 (m, 4H), 1.39 (s, 9H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 149.16, 143.81, 134.69, 128.65, 125.03, 120.74, 73.89, 36.50, 34.51, 31.37, 27.37, 26.98, 23.14 ppm. HRMS (ESI) calcd for $C_{17}H_{24}ONa$ ($[M + Na]^+$): 267.1719; Found: 267.1718. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 99:1 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 27.35 min (major), t_R = 29.74 min (minor).

(*S*, *E*)-2-(naphthalen-1-ylmethylene)cyclohexanol (5v, known compound**)** [1]



Colorless oil, 40 mg, 84% yield, 83% ee. $[\alpha]^{20}_{D}$ -5.500 (*c* 1.000, $CHCl_3$). Purified by flash column chromatography (PE: EA = 7:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 8.06-8.03 (m, 1H), 7.91-7.89 (m, 1H), 7.81 (d, *J* = 8.0 Hz, 1H), 7.54-7.47 (m, 3H), 7.32 (d, *J* = 6.8 Hz, 1H), 6.96 (s, 1H), 4.45-4.41 (m, 1H), 2.63-2.54 (m, 1H), 2.18-2.13 (m, 1H), 2.04-1.90 (m, 2H), 1.83 (s, 1H), 1.78-1.70 (m, 1H), 1.63-1.56 (m, 2H), 1.49-1.43 (m, 1H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 145.96, 135.03, 133.55, 132.29, 128.32, 126.97, 126.47, 125.73, 125.70, 125.32, 125.26, 118.59, 73.71, 36.98, 27.78, 27.52, 23.47 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 230 nm, temp, r.t.), t_R = 10.02 min (minor), t_S = 14.01 min (major).

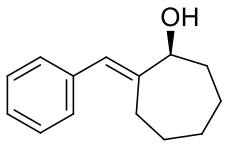
(*S*, *E*)-2-(naphthalen-2-ylmethylene)cyclohexanol (5w, known compound**)** [1]



Colorless oil, 40 mg, 85% yield, 83% ee. $[\alpha]^{20}_{D}$ -17.470 (*c* 0.400, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.87-7.83 (m, 3H), 7.70 (s, 1H), 7.52-7.46 (m, 2H), 7.42-7.39 (m, 1H), 6.72 (s, 1H), 4.36-4.33 (m, 1H), 2.88-2.82 (m, 1H), 2.27-2.20 (m, 1H), 2.11-2.06 (m, 1H), 1.96-1.91 (m, 1H), 1.75-1.69 (m, 3H), 1.58-1.50 (m, 2H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 144.87, 135.21, 133.36, 132.05, 127.79, 127.58, 127.39, 126.02, 125.57, 120.87, 73.85, 36.65, 27.41, 27.18, 23.26 ppm. HPLC (Chiracel OD-H column,

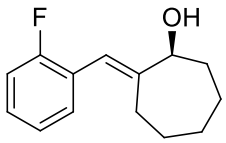
n-hexane/ 2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 8.42 min (major), t_R = 9.91 min (minor).

(*S*, *E*)-2-benzylidenecycloheptanol (5x, known compound**)** [1]



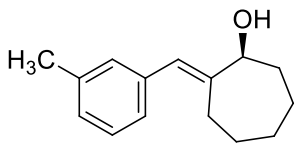
Colorless oil, 35 mg, 86% yield, 85% ee. $[\alpha]^{20}_D$ 70.218 (*c* 0.300, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.40-7.32 (m, 4H), 7.29-7.25 (m, 1H), 6.62 (s, 1H), 4.45-4.41 (m, 1H), 2.52-2.49 (m, 2H), 2.20-2.13 (m, 1H), 1.90-1.86 (m, 1H), 1.82-1.73 (m, 3H), 1.69-1.40 (m, 4H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 146.43, 137.62, 128.70, 128.22, 126.87, 126.51, 77.09, 36.66, 29.19, 28.13, 26.61, 23.92 ppm. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 6.03 min (minor), t_S = 7.20 min (major).

(*S*, *E*)-2-(2-fluorobenzylidene)cycloheptanol (5y, unknown compound**)**



Yellow oil, 38 mg, 86% yield, 90% ee. $[\alpha]^{20}_D$ 5.800 (*c* 1.000, $CHCl_3$). Purified by flash column chromatography (PE: EA = 8 :1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.33-7.23 (m, 2H), 7.16-7.06 (m, 2H), 6.63 (s, 1H), 4.49-4.46 (m, 1H), 2.44-2.40 (m, 2H), 2.18-2.11 (m, 1H), 1.80-1.70 (m, 5H), 1.54-1.40 (m, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 160.21 (d, $J_{C\text{-}F}$ = 244.9 Hz), 148.85, 130.27 (d, $J_{C\text{-}F}$ = 3.4 Hz), 128.28 (d, $J_{C\text{-}F}$ = 8.2 Hz), 125.41 (d, $J_{C\text{-}F}$ = 14.6 Hz), 123.61 (d, $J_{C\text{-}F}$ = 3.7 Hz), 119.10 (d, $J_{C\text{-}F}$ = 3.3 Hz), 115.34 (d, $J_{C\text{-}F}$ = 22.3 Hz), 76.54, 36.67, 28.88, 27.84, 26.97, 24.05 ppm. HRMS (ESI) calcd for $C_{14}H_{17}OFNa$ ($[M + Na]^+$): 243.1156; Found: 243.1159. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 5.10 min (minor), t_S = 5.66 min (major).

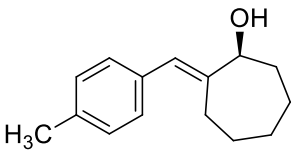
(*S*, *E*)-2-(3-methylbenzylidene)cycloheptanol (5z, unknown compound**)**



Yellow oil, 34 mg, 79% yield, 86% ee. $[\alpha]^{20}_D$ 28.206 (*c* 0.420, $CHCl_3$). Purified by flash column chromatography (PE: EA = 8:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.29-7.25 (m, 1H), 7.15-7.08 (m, 3H), 6.59 (s, 1H), 4.44-4.41 (m, 1H), 2.54-2.47 (m, 2H), 2.40 (s, 3H), 2.19-2.12 (m, 1H), 1.92-1.85 (m, 1H), 1.80-1.70 (m, 3H), 1.61-1.37 (m, 4H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 146.27, 137.71,

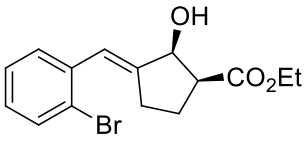
137.58, 129.51, 128.09, 127.27, 126.96, 125.66, 77.11, 36.66, 29.18, 28.14, 26.63, 23.92, 21.52 ppm. HRMS (ESI) calcd for $C_{15}H_{20}ONa$ ([M + Na]$^+$): 239.1406; Found: 239.1408. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 5.44 min (minor), t_S = 6.91 min (major).

(*S, E*)-2-(4-methylbenzylidene)cycloheptanol (5a', unknown compound**)**



Colorless oil, 38 mg, 87% yield, 84% ee. $[\alpha]^{20}_D$ 12.576 (*c* 1.000, $CHCl_3$). Purified by flash column chromatography (PE: EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.24 (d, *J* = 8.0 Hz, 2H), 7.19 (d, *J* = 8.0 Hz, 2H), 6.58 (s, 1H), 4.44-4.40 (m, 1H), 2.56-2.45 (m, 2H), 2.39 (s, 3H), 2.19-2.12 (m, 1H), 1.93-1.85 (m, 1H), 1.81-1.70 (m, 3H), 1.66-1.39 (m, 4H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 145.70, 136.21, 134.69, 128.94, 128.61, 126.85, 77.21, 36.61, 29.28, 28.16, 26.59, 23.90, 21.19 ppm. HRMS (ESI) calcd for $C_{15}H_{20}ONa$ ([M + Na]$^+$): 239.1406; Found: 239.1404. HPLC (Chiracel OD-H column, n-hexane/2-propanol = 95:5 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_R = 8.42 min (minor), t_S = 9.01 min (major).

(*1S, 2S, E*)-ethyl 3-(2-bromobenzylidene)-2-hydroxycyclopentanecarboxylate (7, known compound**)** [2]



Pale yellow solid, 1.23 g, 76% yield, 94% ee. $[\alpha]^{20}_D$ 5.800 (*c* 1.000, $CHCl_3$). mp 54-55 ^{o}C. Purified by flash column chromatography (PE: EA = 5:2). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.62 (dd, *J* = 8.0 Hz, 1.2 Hz, 1H), 7.44 (dd, *J* = 8.0 Hz, 1.2 Hz, 1H), 7.33 (dt, *J* = 7.6 Hz, 0.8 Hz, 1H), 7.12 (dt, *J* = 7.6 Hz, 1.6 Hz, 1H), 6.88 (s, 1H), 4.82-4.78 (m, 1H), 4.25 (q, *J* = 7.2 Hz, 2H), 3.15 (d, *J* = 5.6 Hz, 1H), 2.99-2.94 (m, 1H), 2.85-2.78 (m, 1H), 2.53-2.44 (m, 1H), 2.33-2.24 (m, 1H), 2.13-2.04 (m, 1H), 1.33 (t, *J* = 7.2 Hz, 3H) ppm; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 173.74, 146.62, 136.98, 132.78, 129.56, 128.37, 127.04, 124.40, 124.31, 76.92, 60.86, 48.19, 27.32, 25.70, 14.27 ppm. HPLC (Chiracel AD-H column, n-hexane/2-propanol = 90:10 (v/v), 1.0 mL/min, 254 nm, temp, r.t.), t_S = 9.55 min (major), t_R = 10.75 min (minor).

Reference:

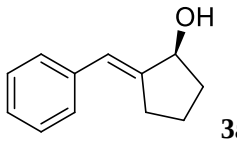
[1] Xie, J. B.; Xie, J. H.; Liu, X. Y.; Kong, W. L.; Li, S.; Zhou, Q. L.; *J. Am. Chem. Soc*. **2010**, *132*, 4538–4539.

[2] Bin, H. Y.; Wang, K.; Yang, D.; Yang, X. H.; Xie, J. H.; *Angew. Chem. Int. Ed*., **2019**, *58*, 1174–1177.

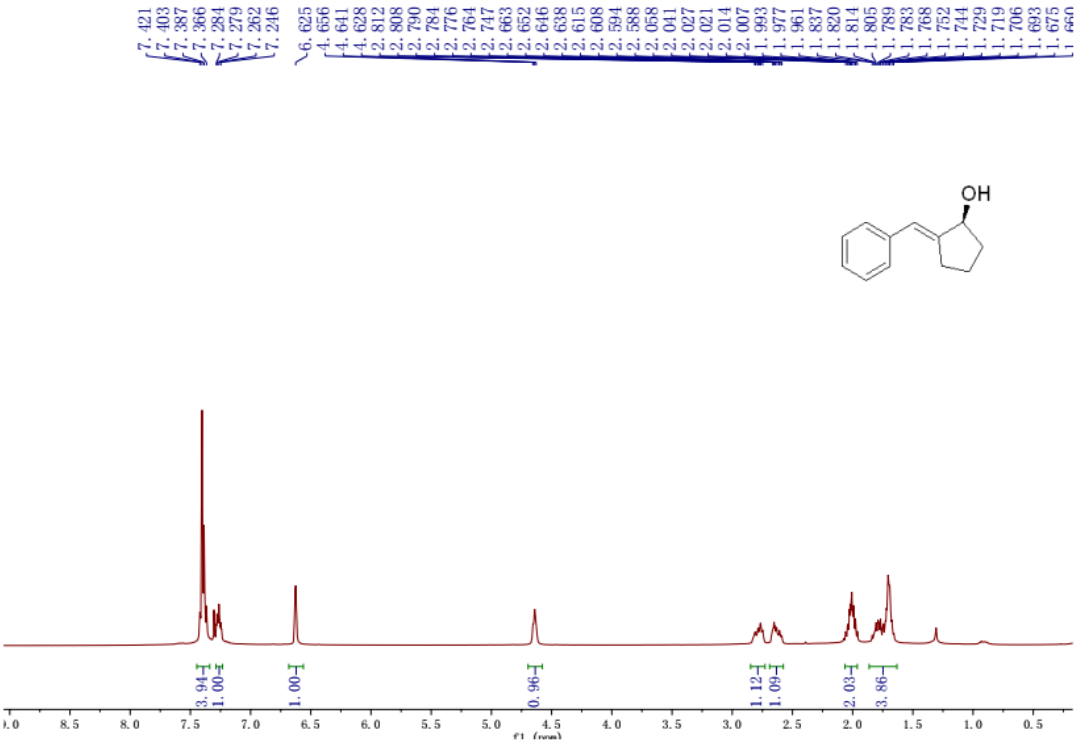
[3] Li, J.; Zhu, Y.; Lu, Y.; Wang, Y.; Liu, Y.; Liu, D.; Zhang, W. *Organometallics* **2019**, *38*, 3970−3978.

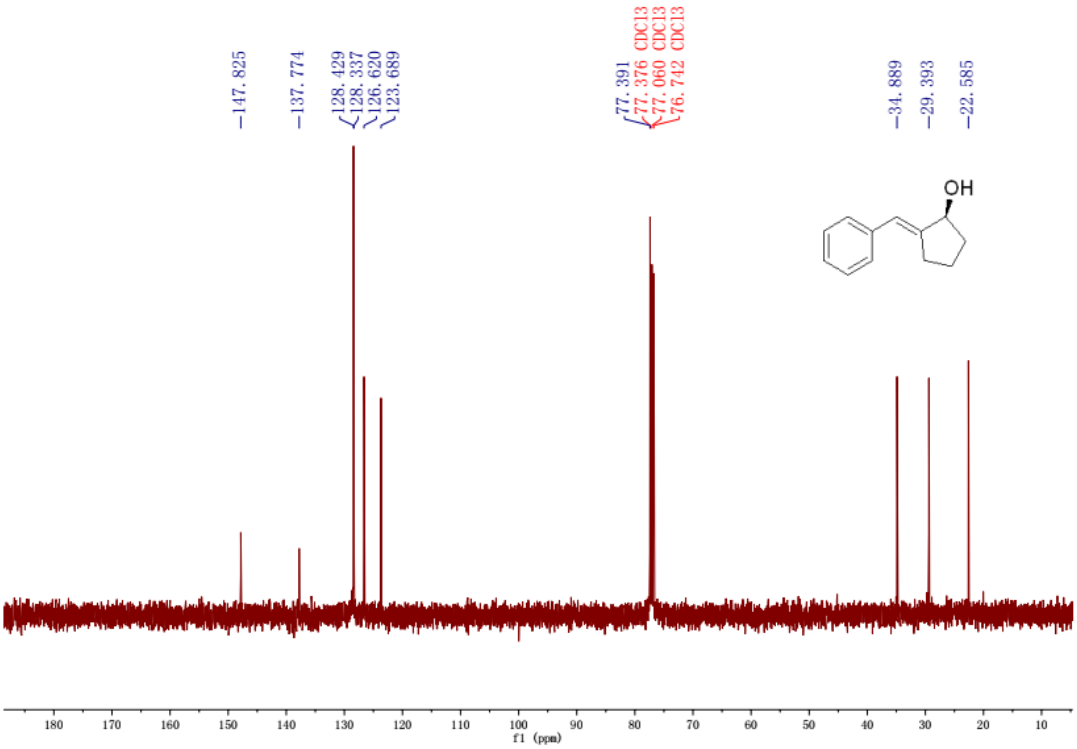
[4] Li, J.; Lu, Y.; Zhu, Y.; Nie, Y.; Shen, J.; Liu, Y.; Liu, D.; Zhang, W. *Org. Lett.* **2019**, *21*, 4331-4335.

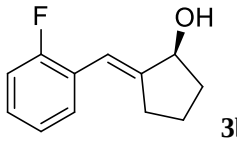
8. ^{1}H NMR & ^{13}C NMR Spectra of the Products



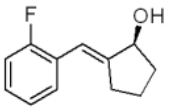
3a

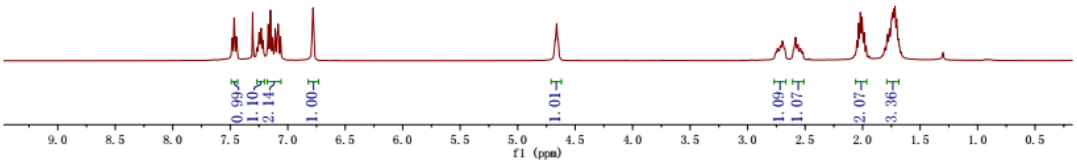


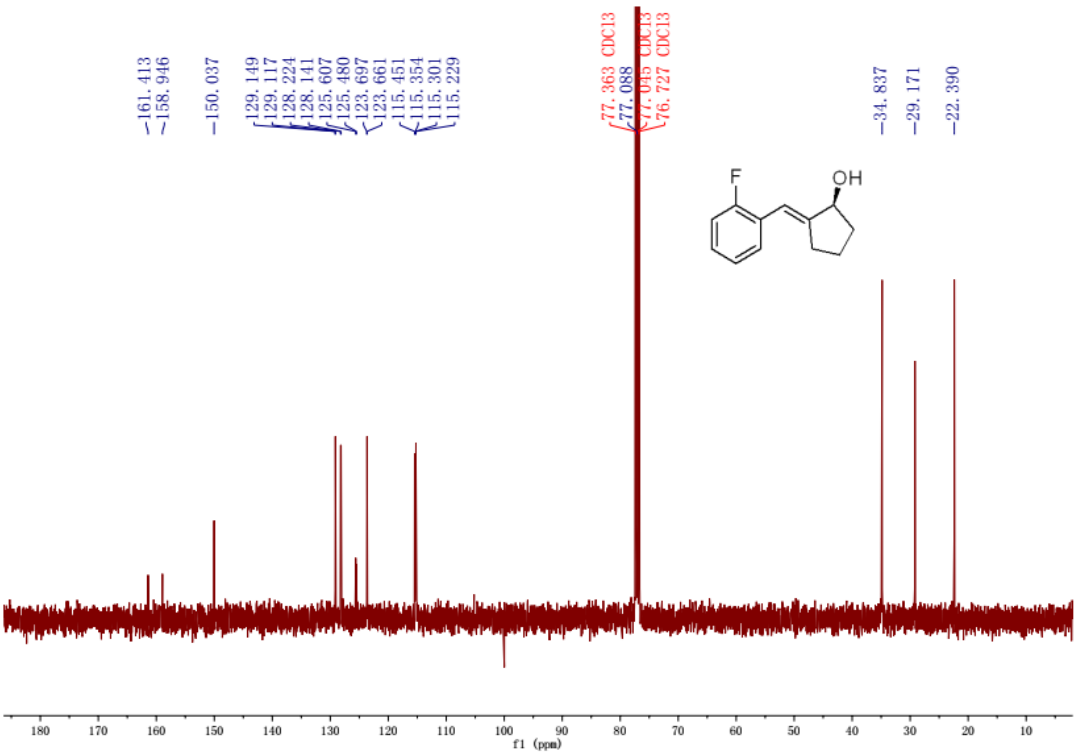


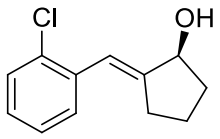

F
OH

3b

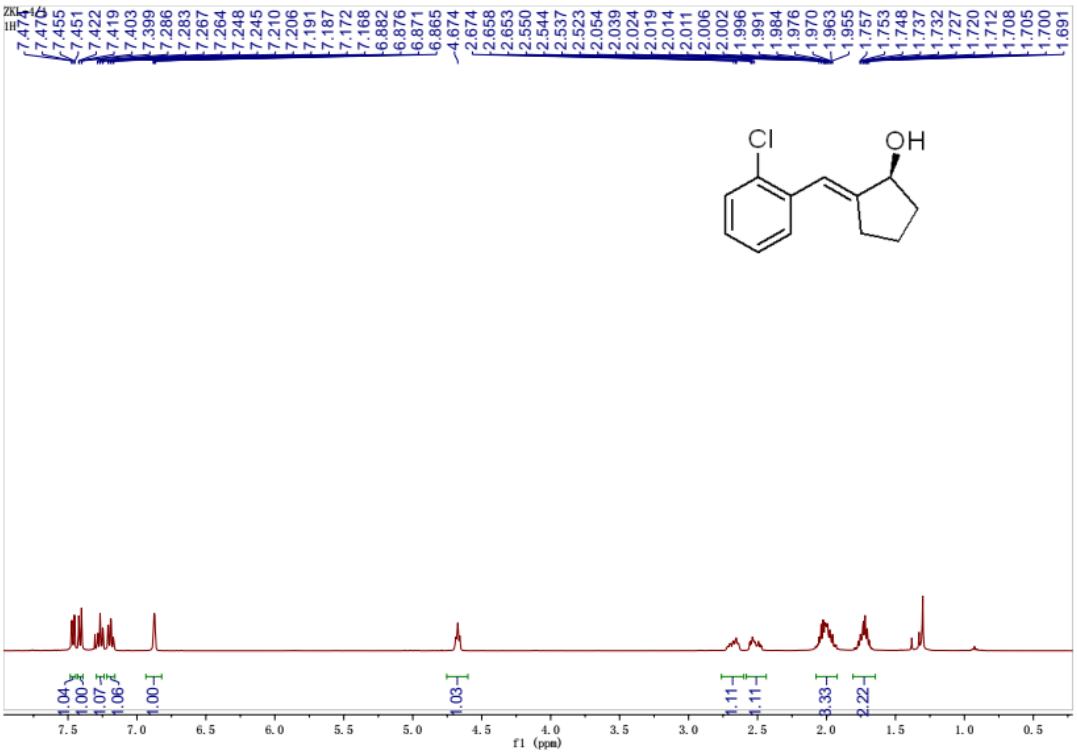

F
OH

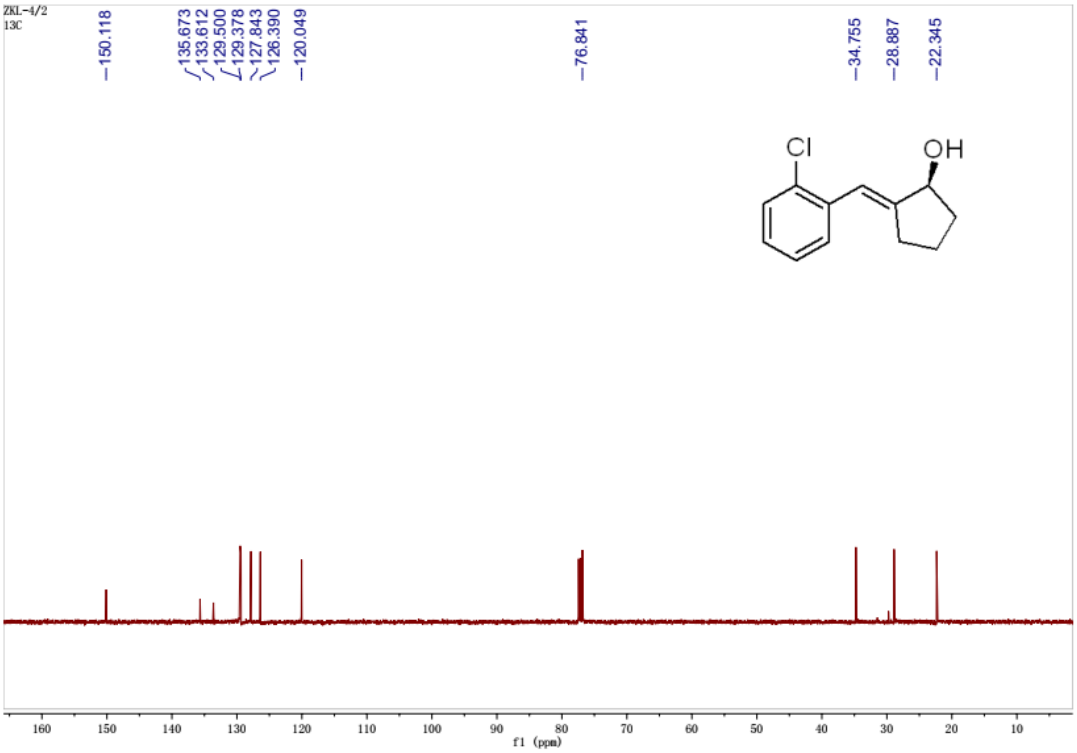

0.99
1.10
2.14
1.00
1.01
1.09
1.07
2.07
3.36
f1 (ppm)

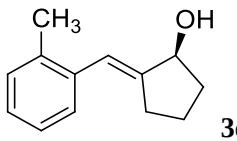

161.413
158.946
150.037
129.149
129.117
128.224
128.141
125.607
125.480
123.697
123.661
115.451
115.354
115.301
115.229
77.363 CDCl3
77.088
76.727 CDCl3
34.837
29.171
22.390
F
OH
f1 (ppm)


Cl
OH

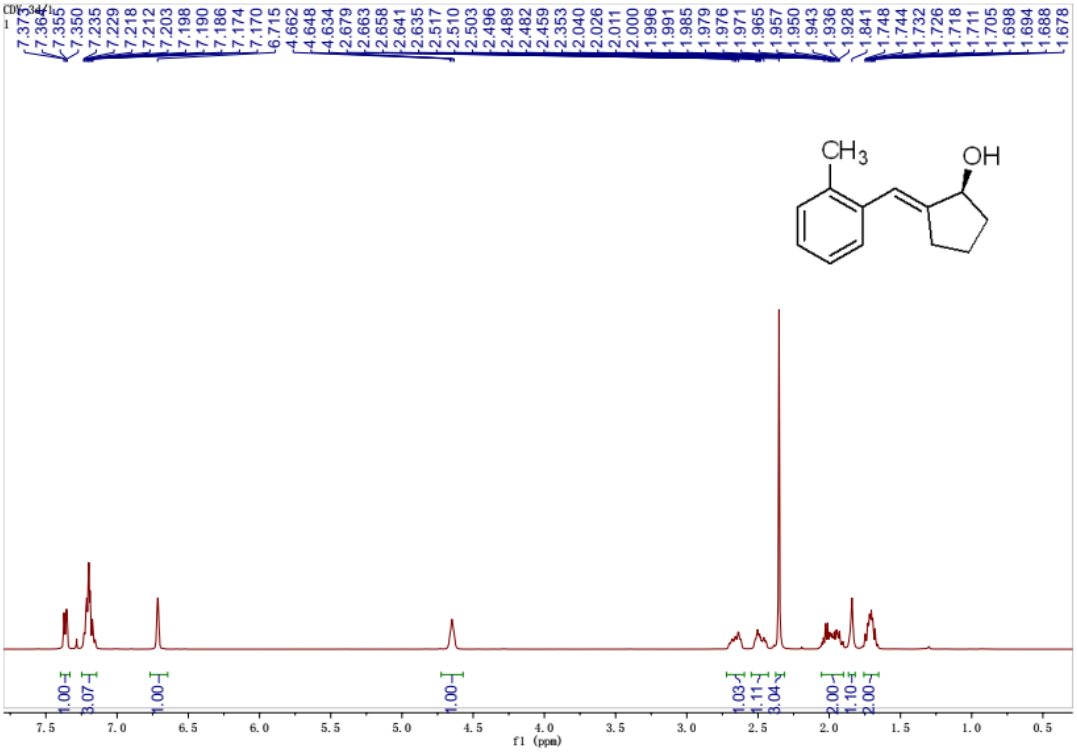
3c

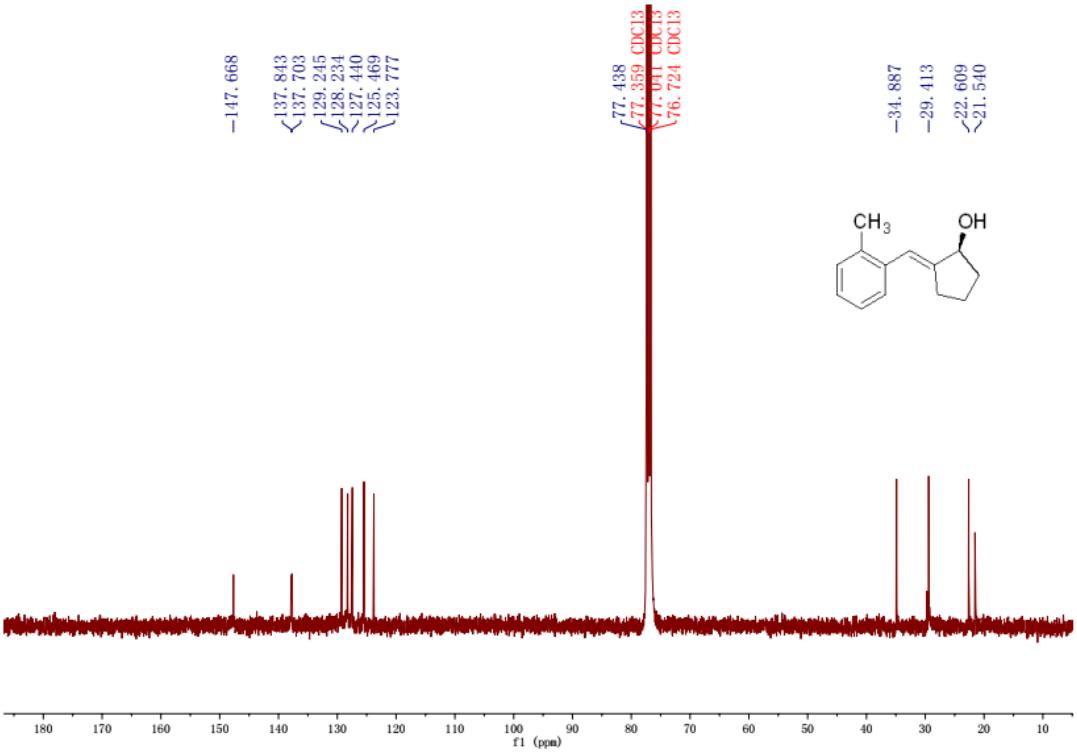

Cl
OH
1.04
1.00
1.07
1.06
1.00
1.03
1.11
1.11
3.33
2.22
f1 (ppm)

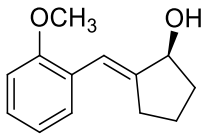

ZKL-4/2
13C
150.118
135.673
133.612
129.500
129.378
127.843
126.390
120.049
76.841
34.755
28.887
22.345
Cl
OH
f1 (ppm)



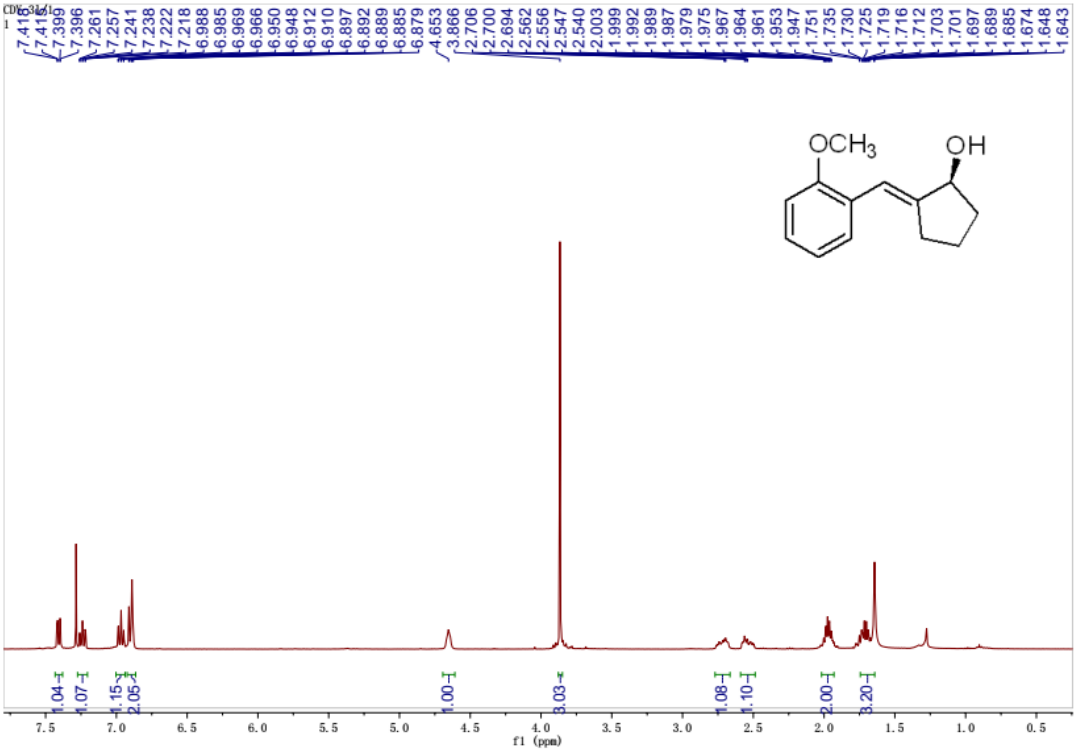
3d







3e



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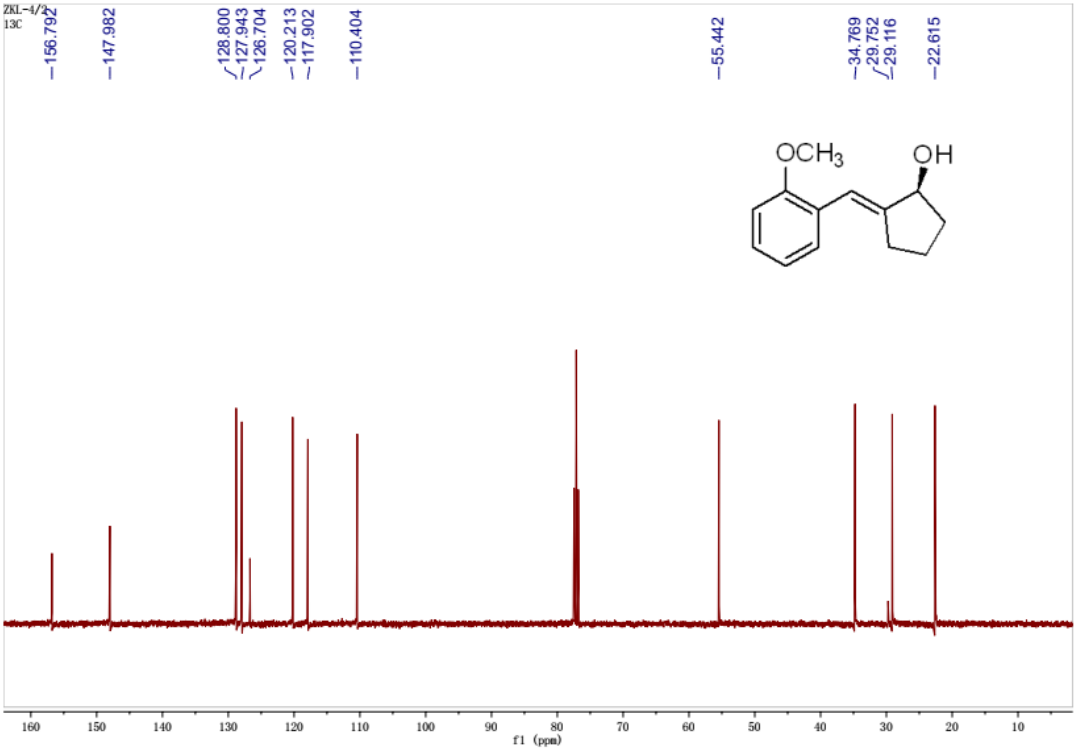
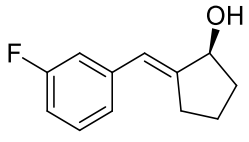
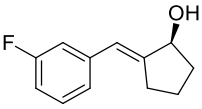


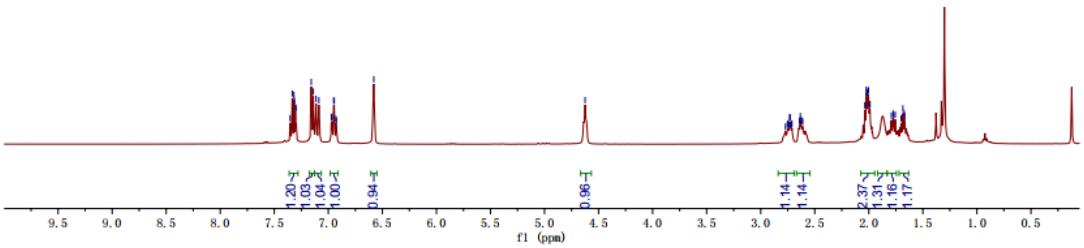

OH
F

3f

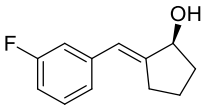

7.35
7.33
7.32
7.31
7.30
7.30
7.16
7.14
7.11
7.09
6.97
6.97
6.95
6.94
6.93
6.93
6.58

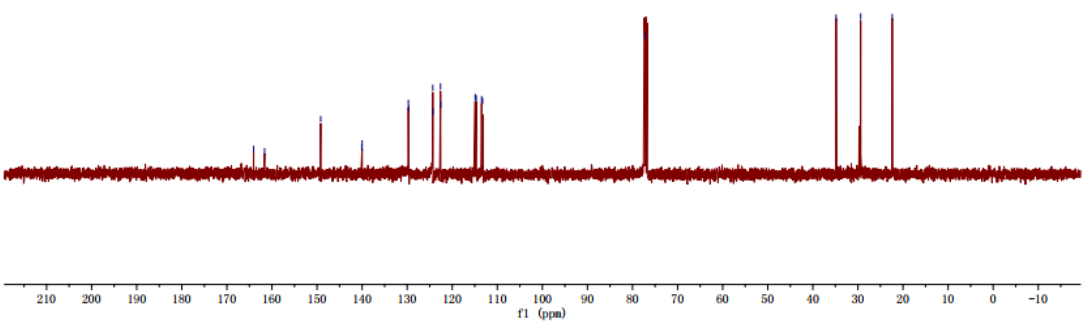

4.62
2.77
2.75
2.75
2.74
2.73
2.73
2.72
2.72
2.71
2.64
2.63
2.63
2.62
2.61
2.04
2.02
2.02
2.01
2.00
1.99
1.99
1.79
1.78
1.77
1.76
1.70
1.68
1.67
1.67

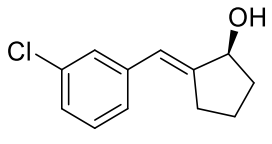

OH
F


1.20
1.03
1.04
1.00
0.94
0.96
1.14
1.14
2.37
1.31
1.16
1.17
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)


164.06
161.63
149.18
140.07
139.99
129.73
129.64
124.32
124.29
122.60
122.58
114.91
114.69
113.49
113.27
77.24
34.84
29.39
22.39


OH
F


210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


OH
Cl

3g


7.390
7.386
7.381
7.328
7.309
7.305
7.290
7.276
7.271
7.256
7.252
7.241
7.236
7.232
7.223
7.218
7.213
6.567
6.562
6.556


4.640
4.624


2.787
2.765
2.761
2.743
2.724
2.658
2.641
2.627
2.621
2.596
2.049
2.044
2.035
2.031
2.027
2.023
2.019
2.014
2.002
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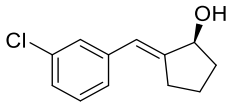
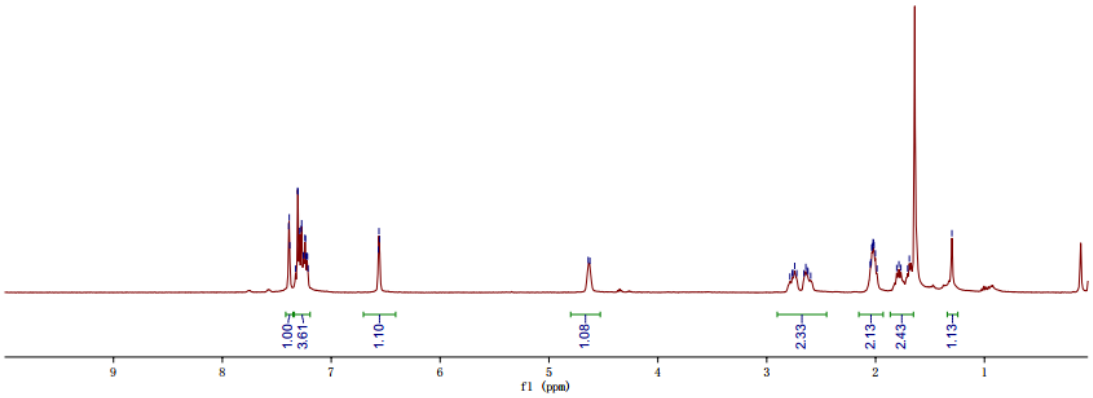
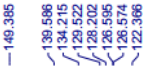
1.806
1.786
1.768
1.705
1.690
1.299


OH
Cl

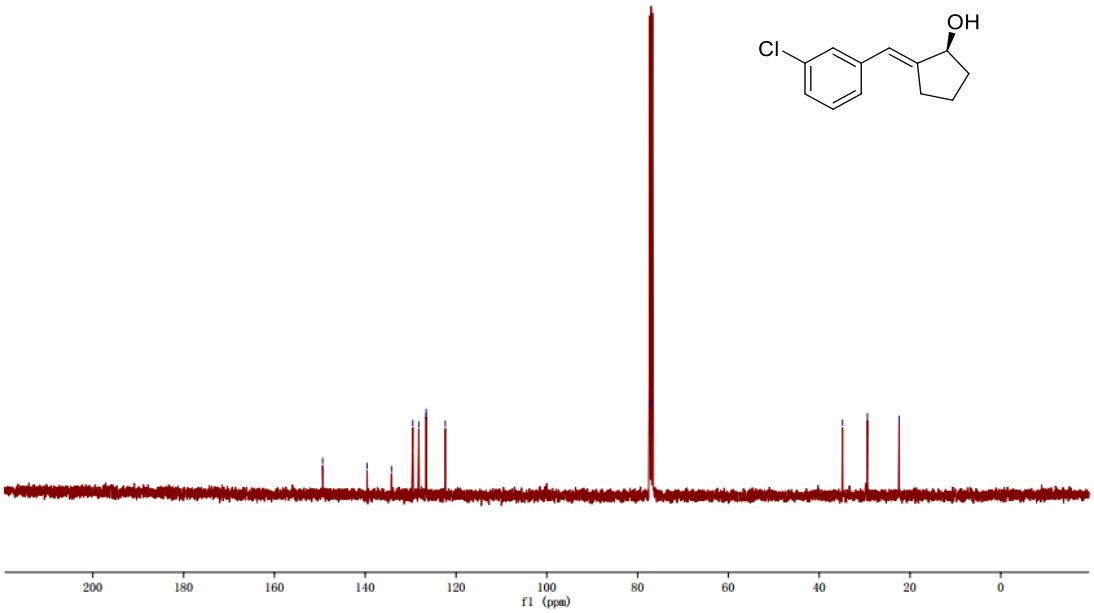

1.00
3.61
1.10
1.08
2.33
2.13
2.43
1.13
9
8
7
6
5
4
3
2
1
f1 (ppm)

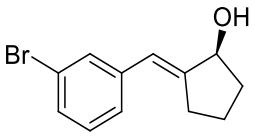

149.385
139.586
134.215
129.522
128.202
126.595
126.574
122.366


77.261

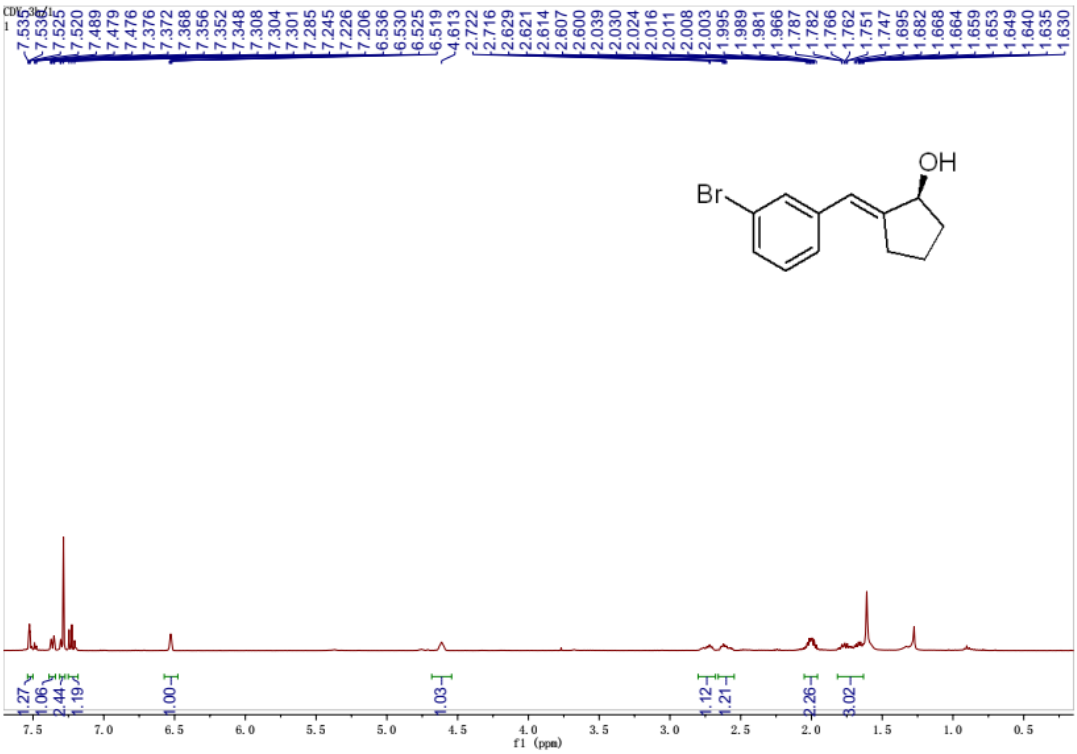

34.869
29.380
22.390

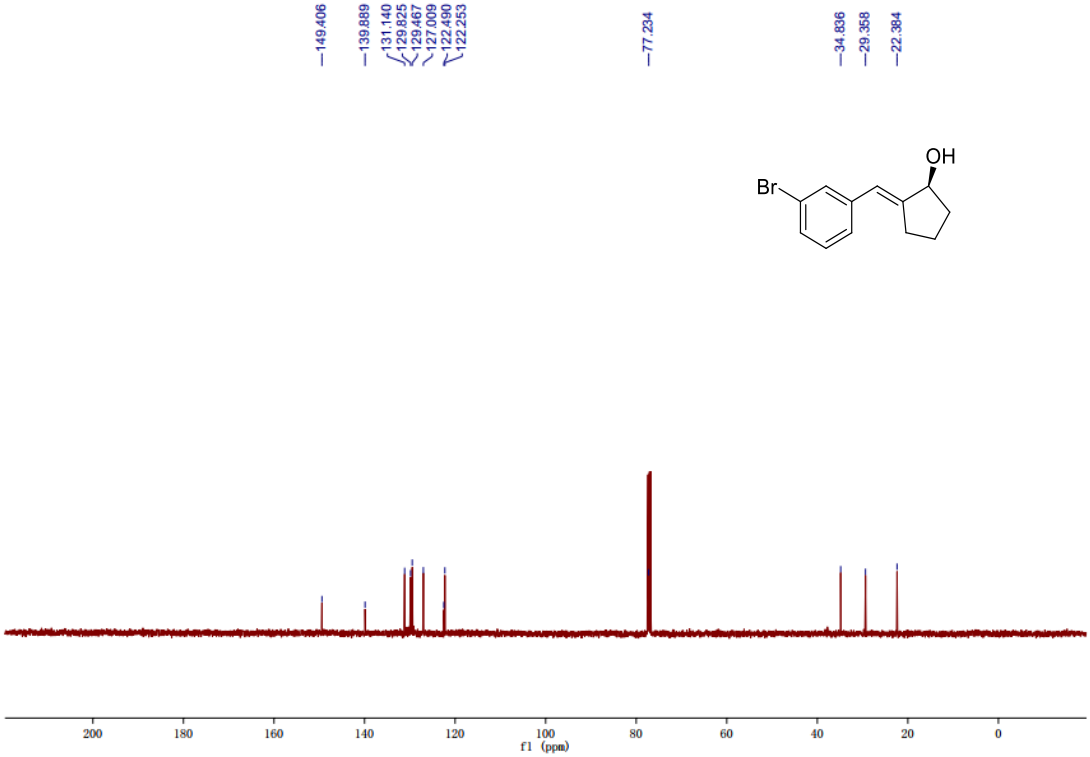
OH
Cl

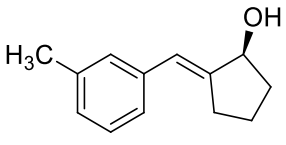

200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)


OH
Br

3h

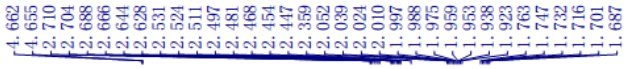

7.535
7.533
7.525
7.520
7.489
7.479
7.476
7.376
7.372
7.368
7.356
7.352
7.348
7.308
7.304
7.301
7.285
7.245
7.226
7.206
6.536
6.530
6.525
6.519
4.613
2.722
2.716
2.629
2.621
2.614
2.607
2.600
2.039
2.030
2.024
2.016
2.011
2.008
2.003
1.995
1.989
1.981
1.966
1.787
1.782
1.766
1.762
1.751
1.747
1.695
1.682
1.668
1.664
1.659
1.653
1.649
1.640
1.635
1.630
OH
Br
1.27
1.06
2.44
1.19
1.00
1.03
1.12
1.21
2.26
3.02
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

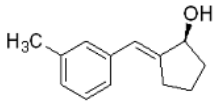

149.406
139.889
131.140
129.825
129.467
127.009
122.490
122.253
77.234
34.836
29.358
22.384
OH
Br
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

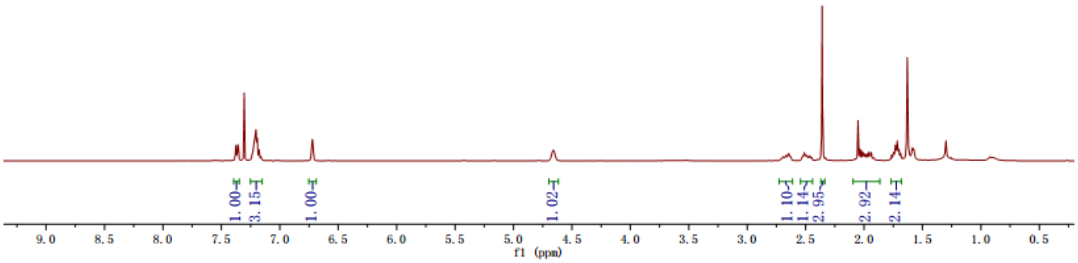

OH
H3C

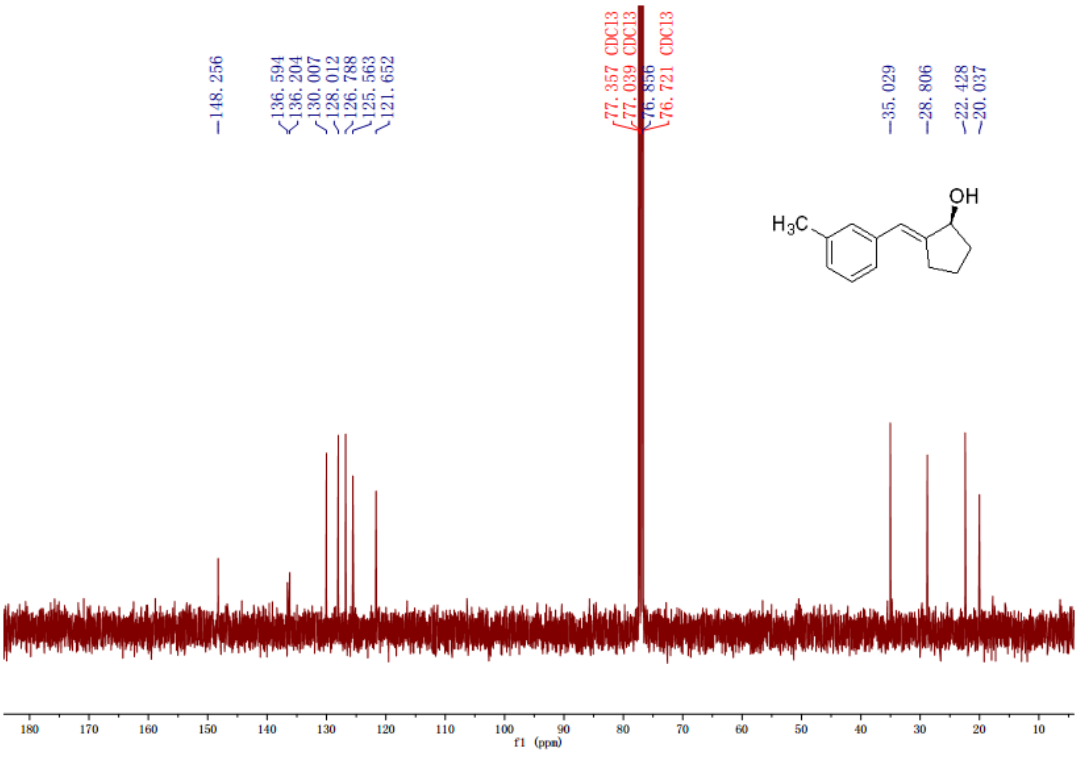
3i

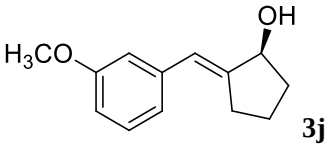

7.376
7.359
7.355
7.234
7.222
7.204
7.192
7.177
7.166
6.720


4.662
4.655
2.710
2.704
2.688
2.666
2.644
2.628
2.531
2.524
2.511
2.497
2.481
2.468
2.454
2.447
2.359
2.052
2.039
2.024
2.010
1.997
1.988
1.975
1.959
1.953
1.938
1.923
1.763
1.747
1.732
1.716
1.701
1.687

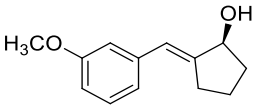

OH
H3C

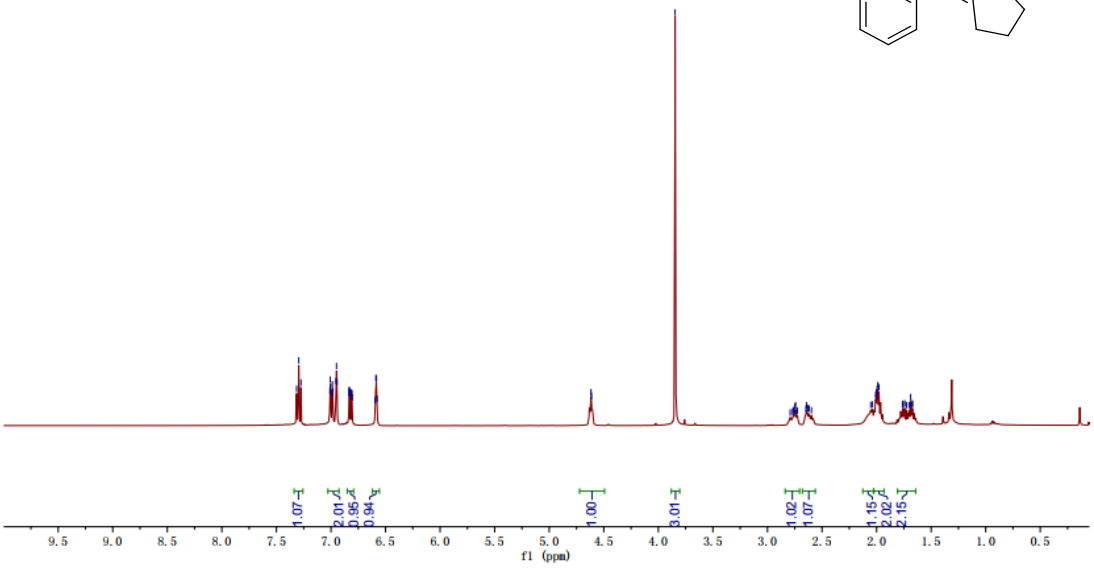

1.00
3.15
1.00
1.02
1.10
1.14
2.95
2.92
2.14
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


148.256
136.594
136.204
130.007
128.012
126.788
125.563
121.652
77.357 CDCl3
77.039 CDCl3
76.836
76.721 CDCl3
35.029
28.806
22.428
20.037
OH
H3C
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

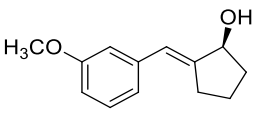

OH
H3CO

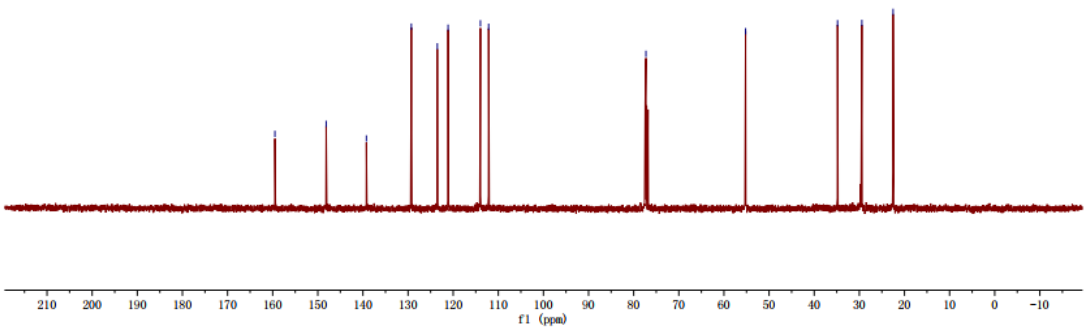
3j

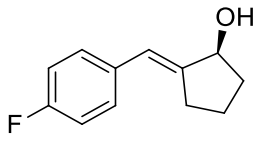

OH
H3CO


1.07
2.01
0.95
0.94
1.00
3.01
1.02
1.07
1.15
2.02
2.15
f1 (ppm)

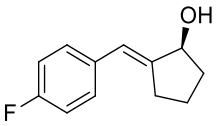

159.50
148.14
139.23
129.27
123.51
121.13
113.96
112.14
77.28
55.21
34.82
29.44
22.52

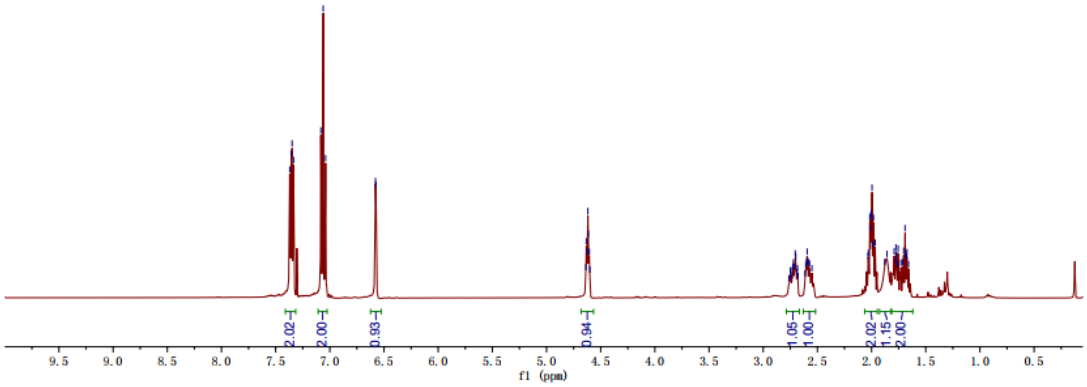

OH
H3CO

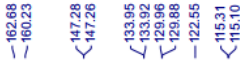

f1 (ppm)

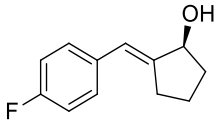


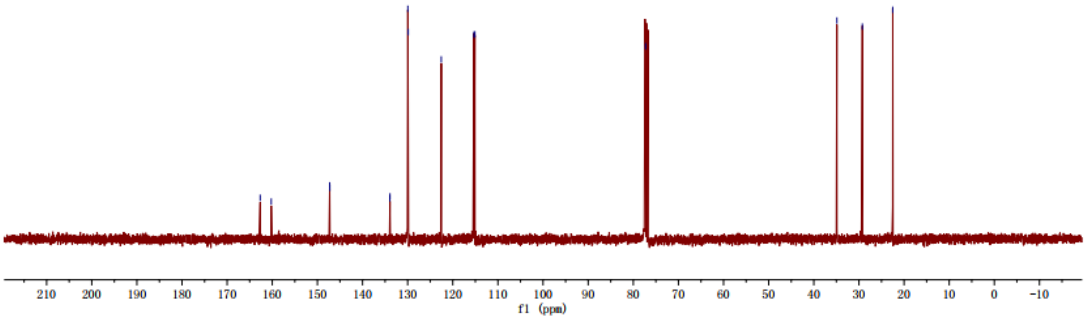
3k

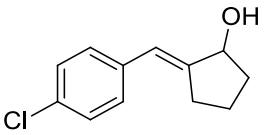




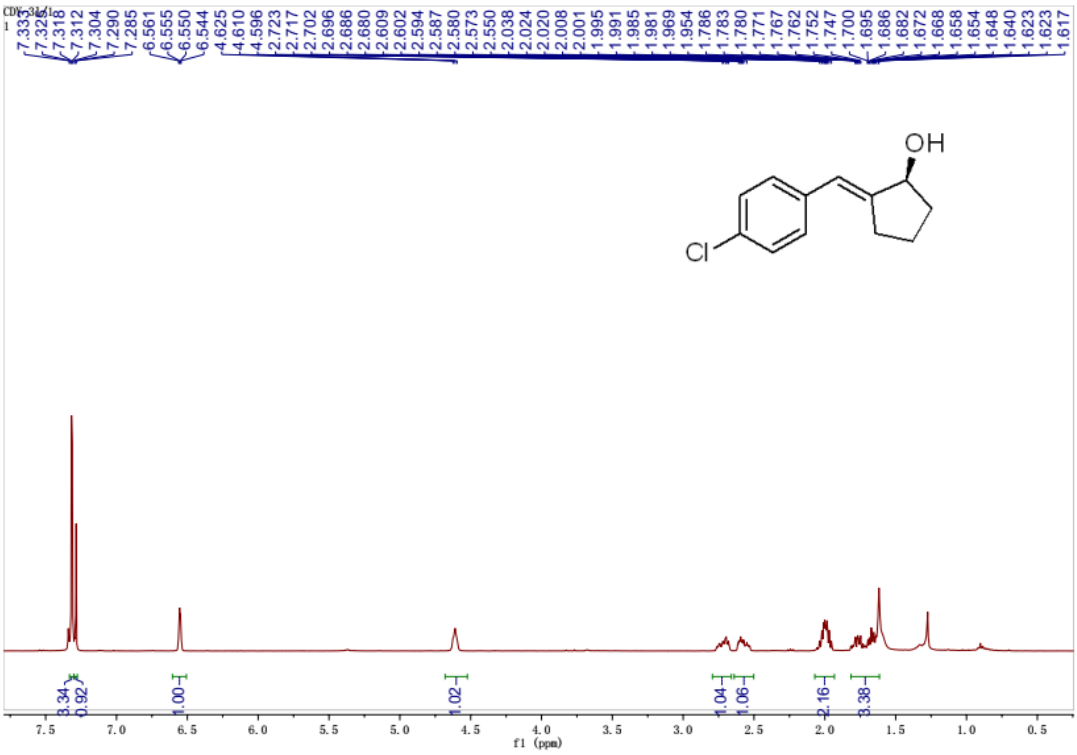


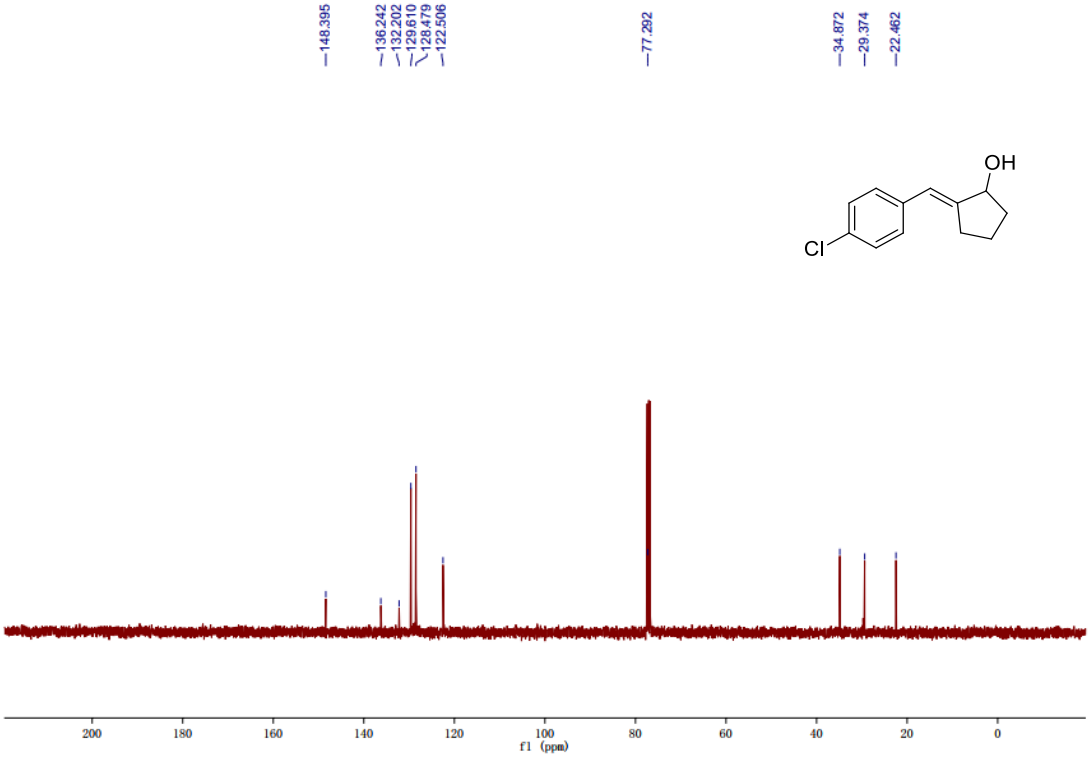


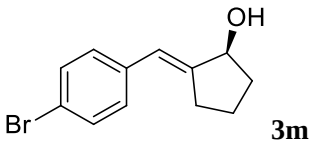



OH
Cl

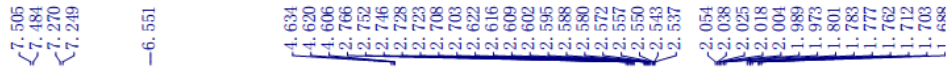
3l


7.335
7.328
7.318
7.312
7.304
7.290
7.285
6.561
6.555
6.550
6.544
4.625
4.610
4.596
2.723
2.717
2.702
2.696
2.686
2.680
2.609
2.602
2.594
2.587
2.580
2.573
2.550
2.038
2.024
2.020
2.008
2.001
1.995
1.991
1.985
1.981
1.969
1.954
1.786
1.783
1.780
1.771
1.767
1.762
1.752
1.747
1.700
1.695
1.686
1.682
1.672
1.668
1.658
1.654
1.648
1.640
1.623
1.623
1.617
OH
Cl
3.34
0.92
1.00
1.02
1.04
1.06
2.16
3.38
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


148.395
136.242
132.202
129.610
128.479
122.506
77.292
34.872
29.374
22.462
OH
Cl
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)


OH
Br

3m


7.505
7.484
7.270
7.249
6.551
4.634
4.620
4.606
2.766
2.752
2.746
2.728
2.723
2.708
2.703
2.622
2.616
2.609
2.602
2.595
2.588
2.580
2.572
2.557
2.550
2.543
2.537
2.054
2.038
2.025
2.018
2.004
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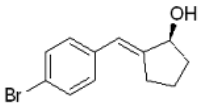
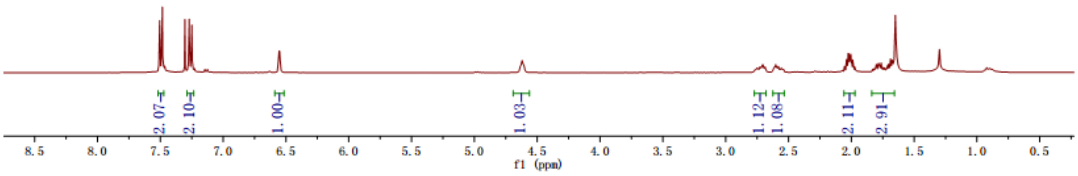
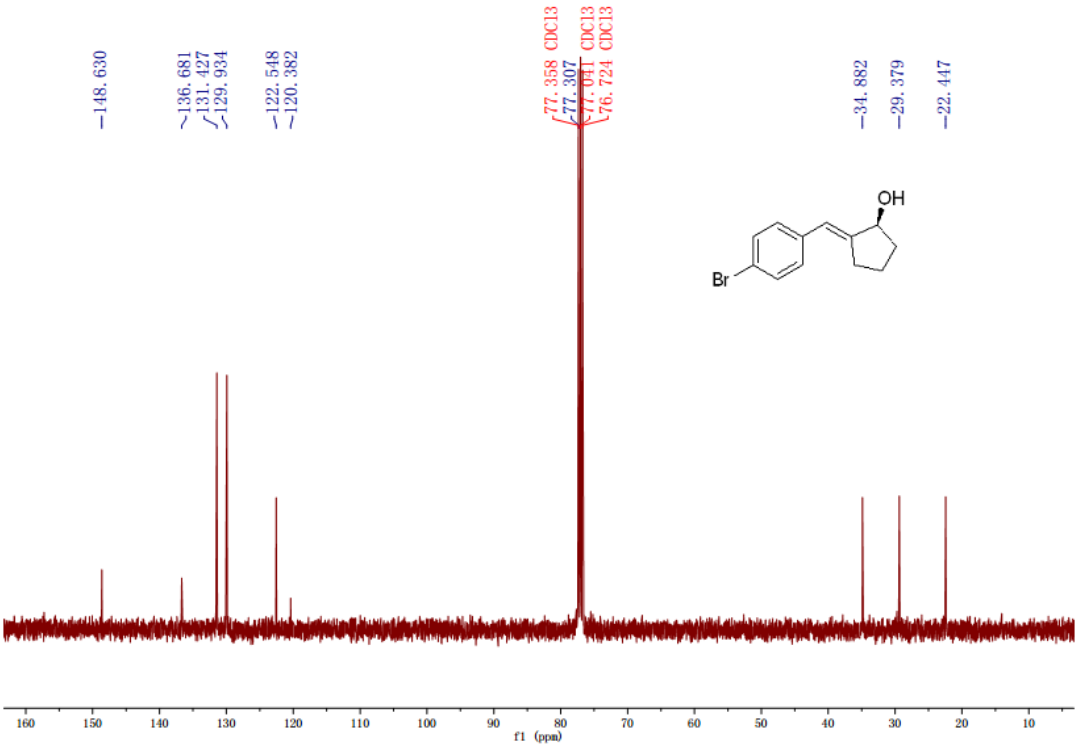
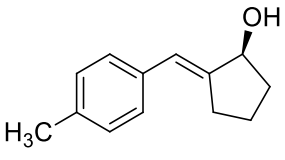
1.801
1.783
1.777
1.762
1.712
1.703

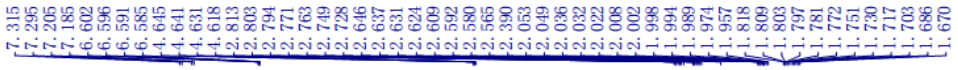

OH
Br


2.07
2.10
1.00
1.03
1.12
1.08
2.11
2.91
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


148.630
136.681
131.427
129.934
122.548
120.382
77.358 CDCl3
77.307
77.041 CDCl3
76.724 CDCl3
34.882
29.379
22.447
OH
Br
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


OH
H3C

3n


7.315
7.295
7.205
7.185
6.602
6.596
6.591
6.585
6.645
4.641
4.631
4.618
2.813
2.803
2.794
2.771
2.763
2.749
2.728
2.646
2.637
2.631
2.624
2.609
2.592
2.580
2.565
2.390
2.053
2.049
2.036
2.032
2.022
2.008
2.002
1.998
1.994
1.989
1.974
1.957
1.818
1.809
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1.797
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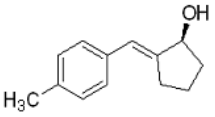
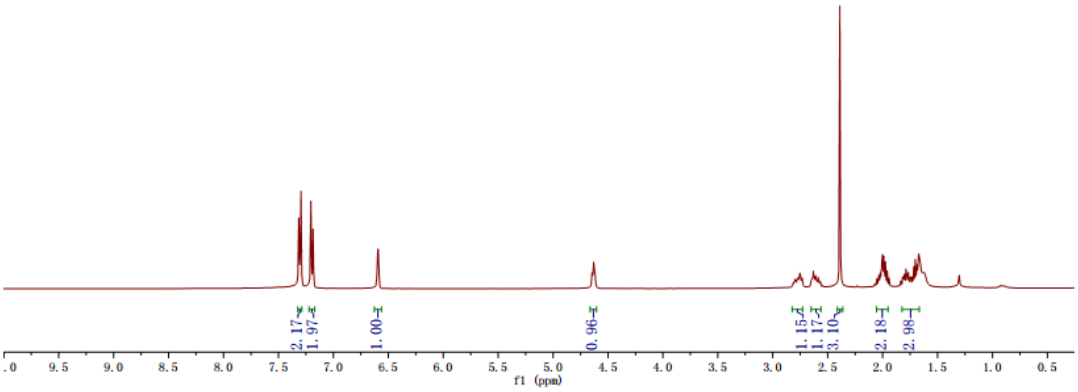
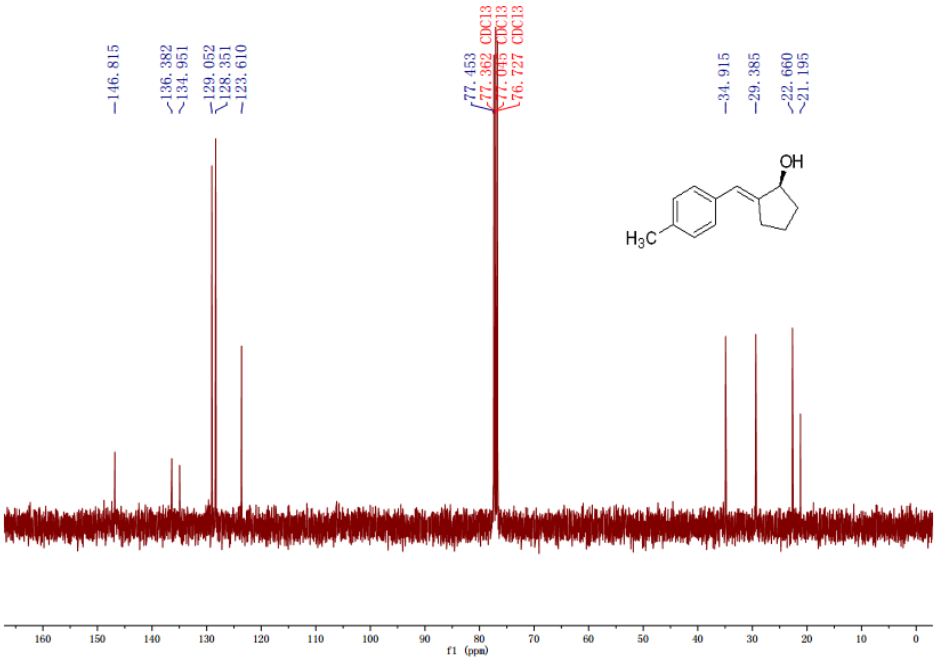
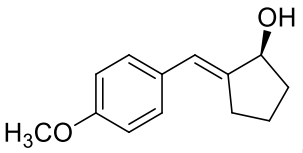
1.751
1.730
1.717
1.703
1.686
1.670

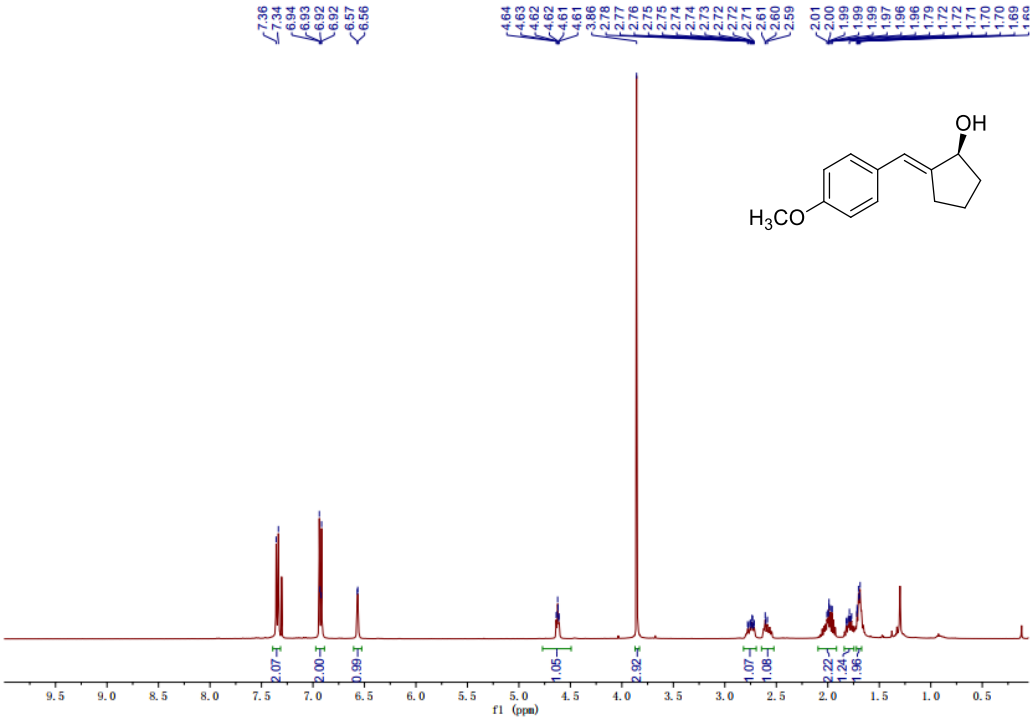

OH
H3C

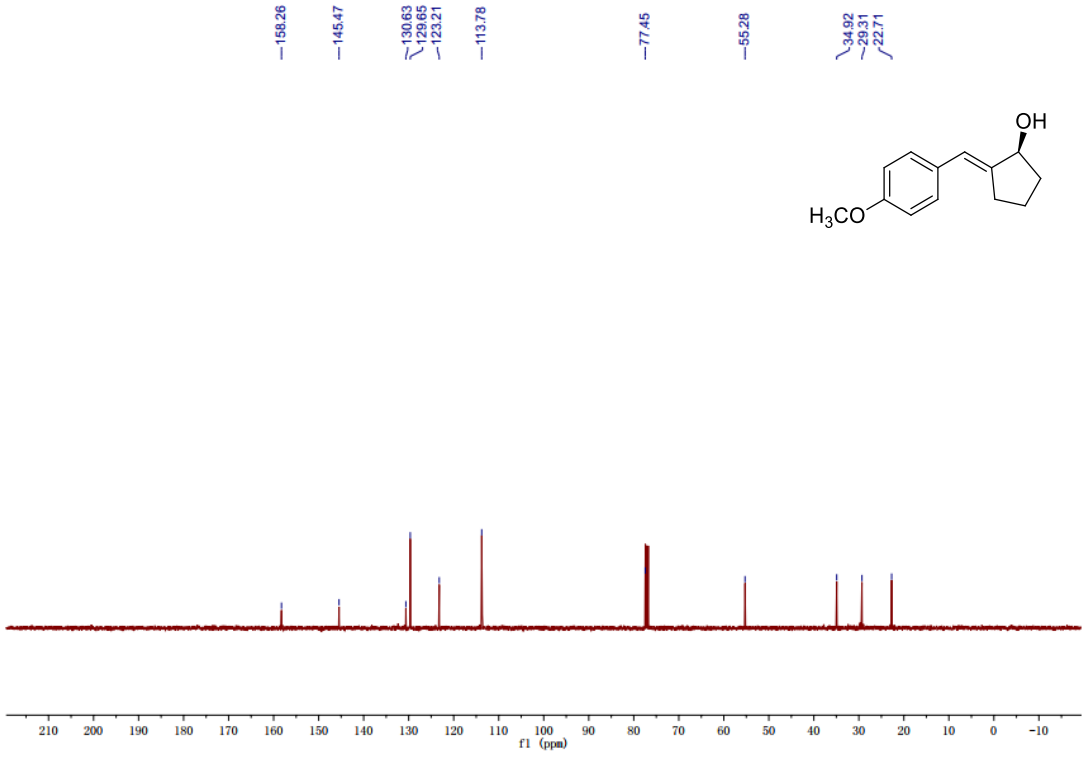

2.17
1.97
1.00
0.96
1.15
1.17
3.10
2.18
2.98
f1 (ppm)

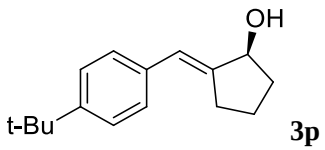

146.815
136.382
134.951
129.052
128.351
123.610
77.453
77.362 CDCl3
77.045 CDCl3
76.727 CDCl3
34.915
29.385
22.660
21.195
OH
H3C
f1 (ppm)


OH
H3CO

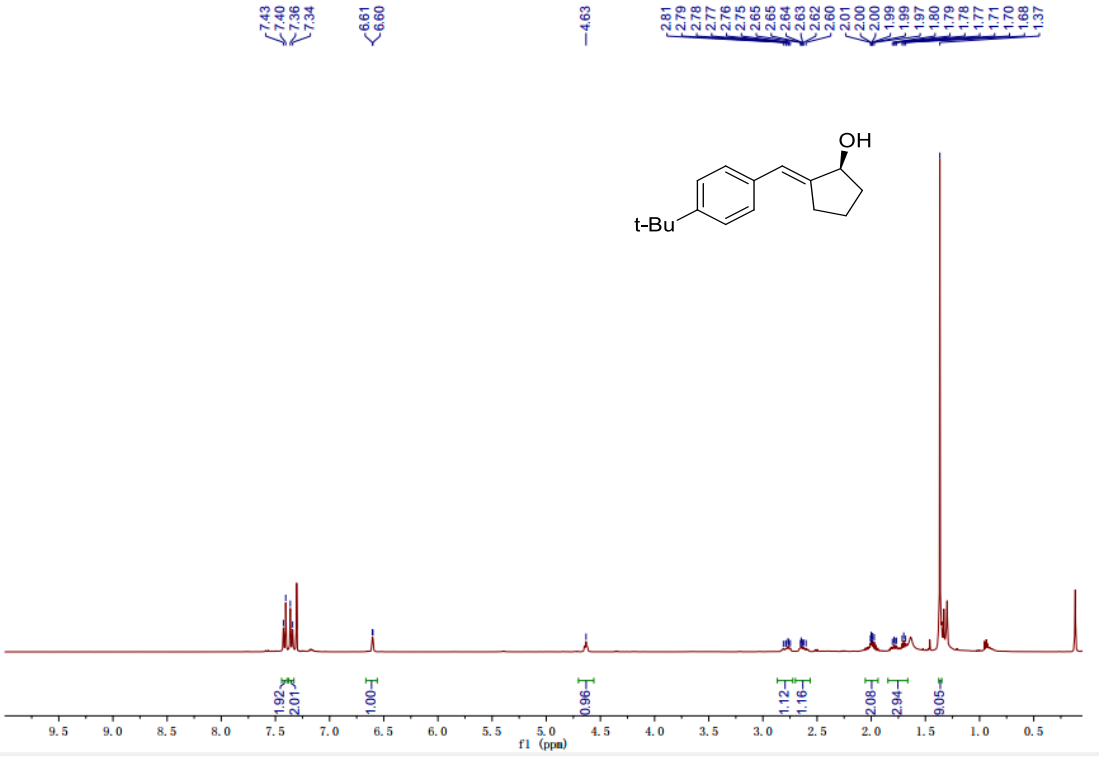
3o

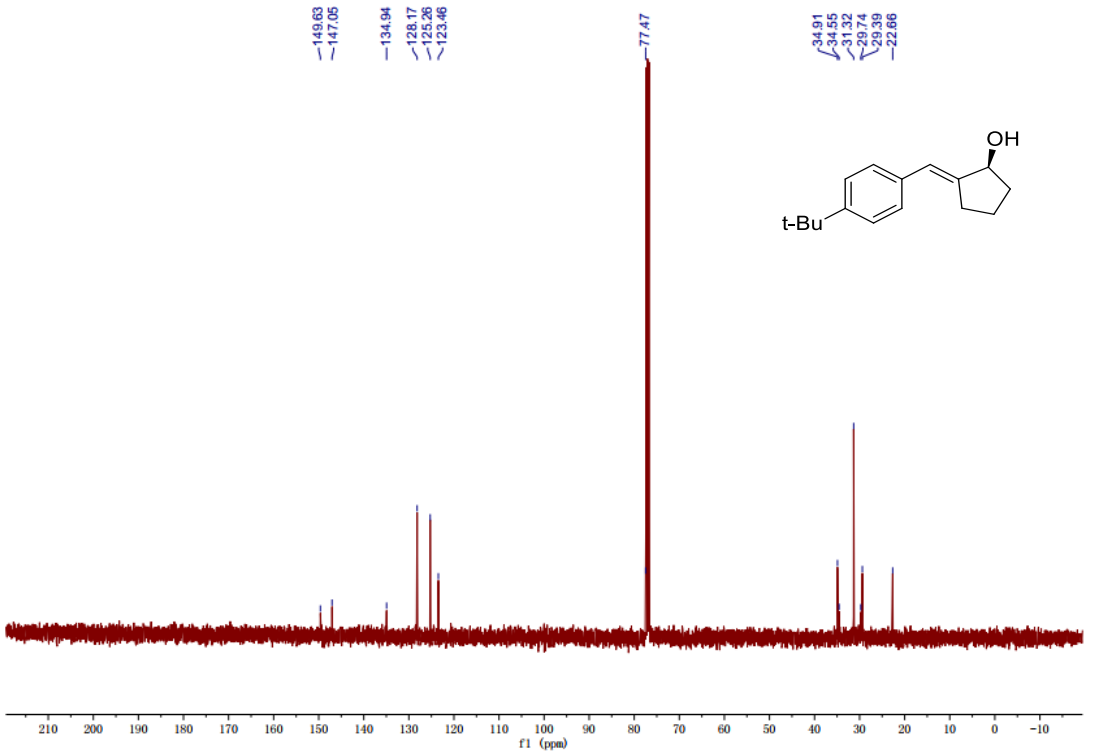

7.36
7.34
6.94
6.93
6.92
6.92
6.57
6.56
4.64
4.63
4.62
4.62
4.61
4.61
3.86
2.78
2.77
2.76
2.75
2.74
2.74
2.73
2.72
2.72
2.71
2.61
2.60
2.59
2.01
2.00
1.99
1.99
1.99
1.97
1.96
1.96
1.79
1.72
1.72
1.71
1.70
1.70
1.69
OH
H3CO
2.07
2.00
0.99
1.05
2.92
1.07
1.08
2.22
1.24
1.98
f1 (ppm)

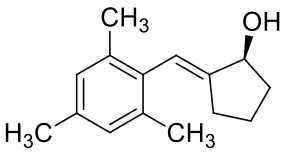

158.26
145.47
130.63
129.65
123.21
113.78
77.45
55.28
34.92
29.31
22.71
OH
H3CO
f1 (ppm)


OH
t-Bu

3p


7.43
7.40
7.36
7.34
6.61
6.60
4.63
2.81
2.79
2.78
2.77
2.76
2.75
2.65
2.64
2.63
2.62
2.60
2.01
2.00
2.00
1.99
1.99
1.97
1.80
1.79
1.78
1.77
1.71
1.70
1.68
1.37
OH
t-Bu
1.92
2.01
1.00
0.96
1.12
1.16
2.08
2.94
9.05
f1 (ppm)


149.63
147.05
134.94
128.17
125.26
123.46
77.47
34.91
34.55
31.32
29.74
29.39
22.66
OH
t-Bu
f1 (ppm)


CH3
OH
H3C
CH3

3q


6.82
6.30
6.29
4.93
4.92
4.42
4.41
2.21
2.11
1.91
1.90
1.89
1.89
1.88
1.88
1.86
1.86
1.86
1.85
1.84
1.84
1.83
1.82
1.82
1.71
1.70
1.69
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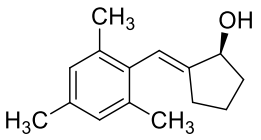
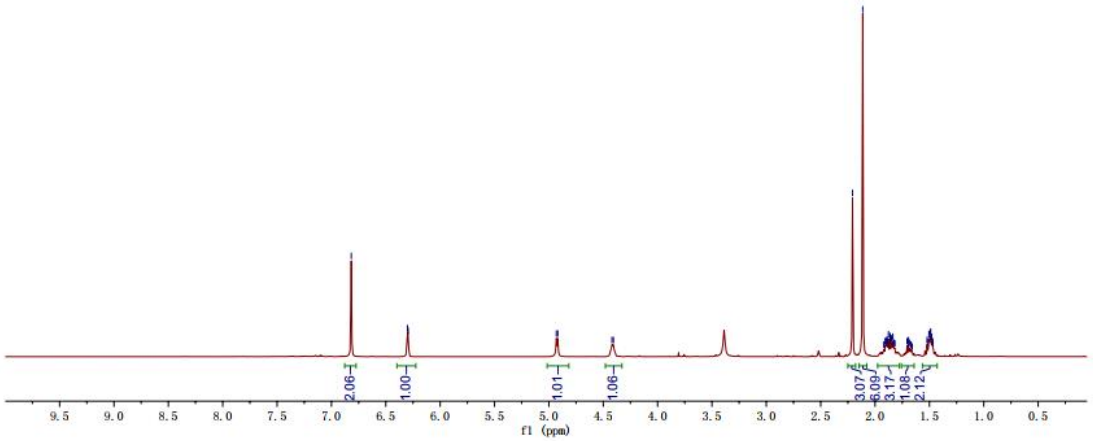
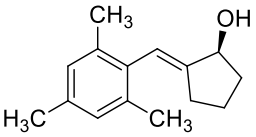
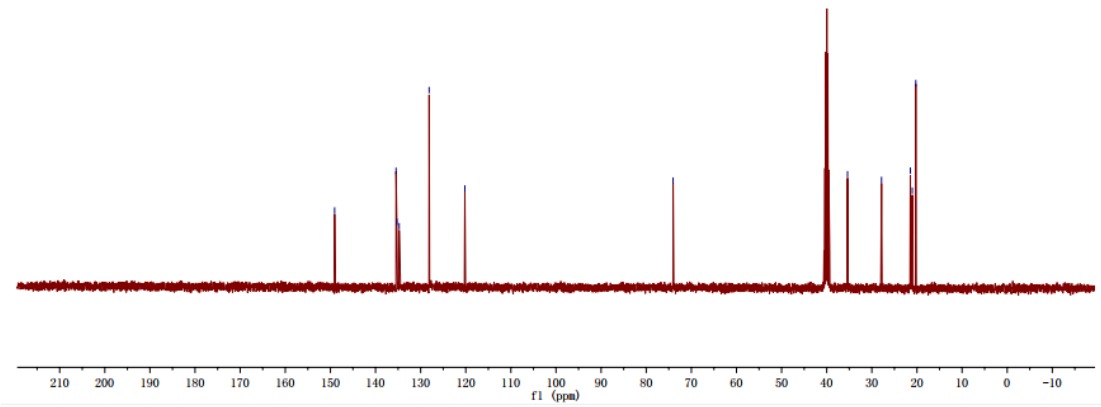
1.49
1.48
1.48
1.47
1.47
1.47

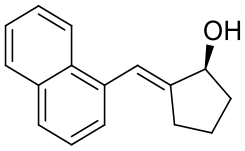

CH3
OH
H3C
CH3


2.06
1.00
1.01
1.06
3.07
6.09
3.17
1.08
2.12
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

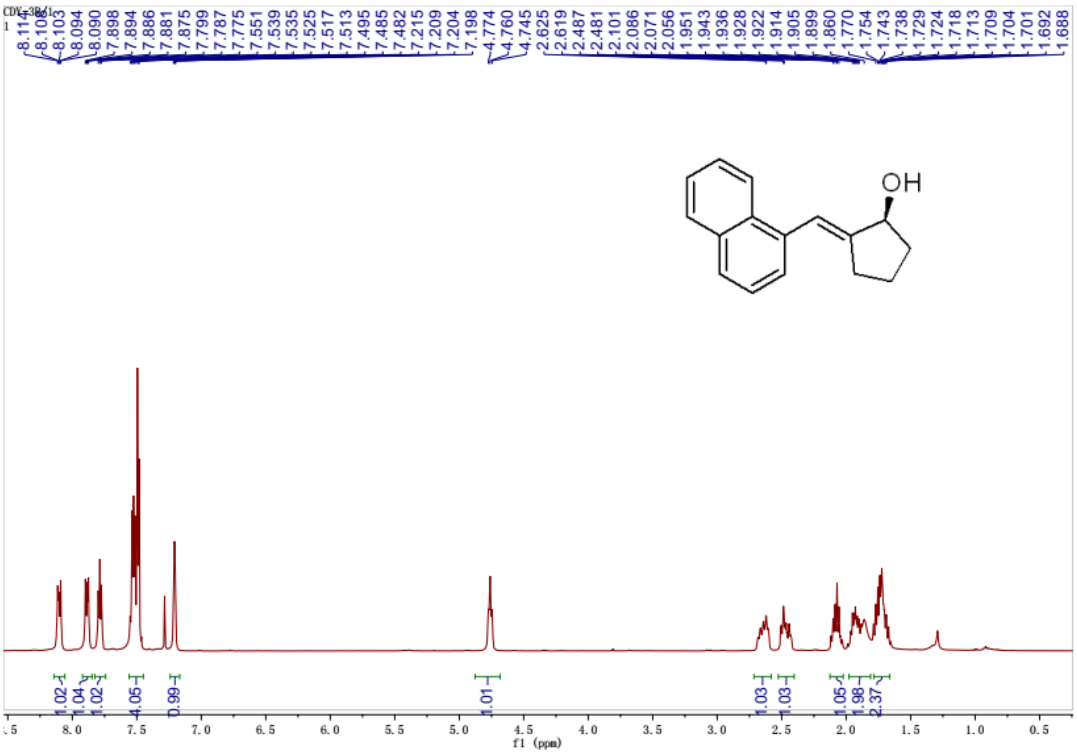

149.07
135.45
135.27
134.76
128.12
120.20
74.05
35.39
27.86
21.46
21.03
20.26

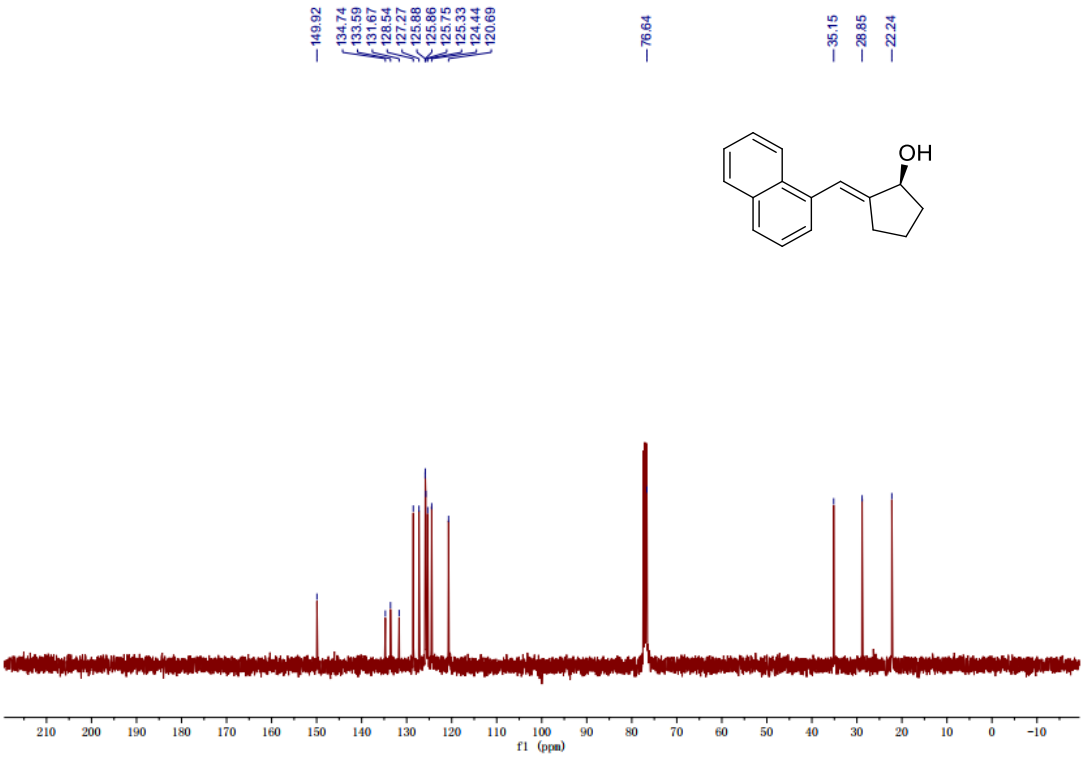

CH3
OH
H3C
CH3

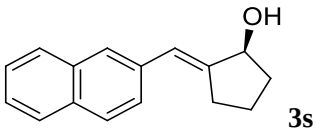

210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)



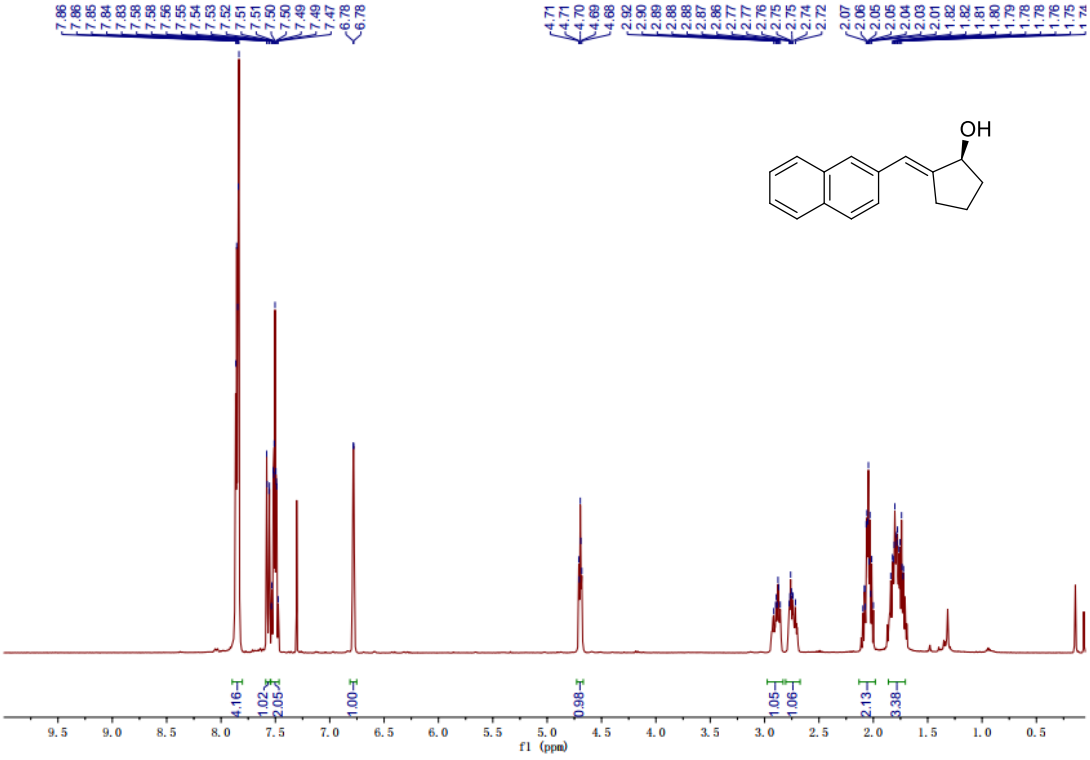
3r

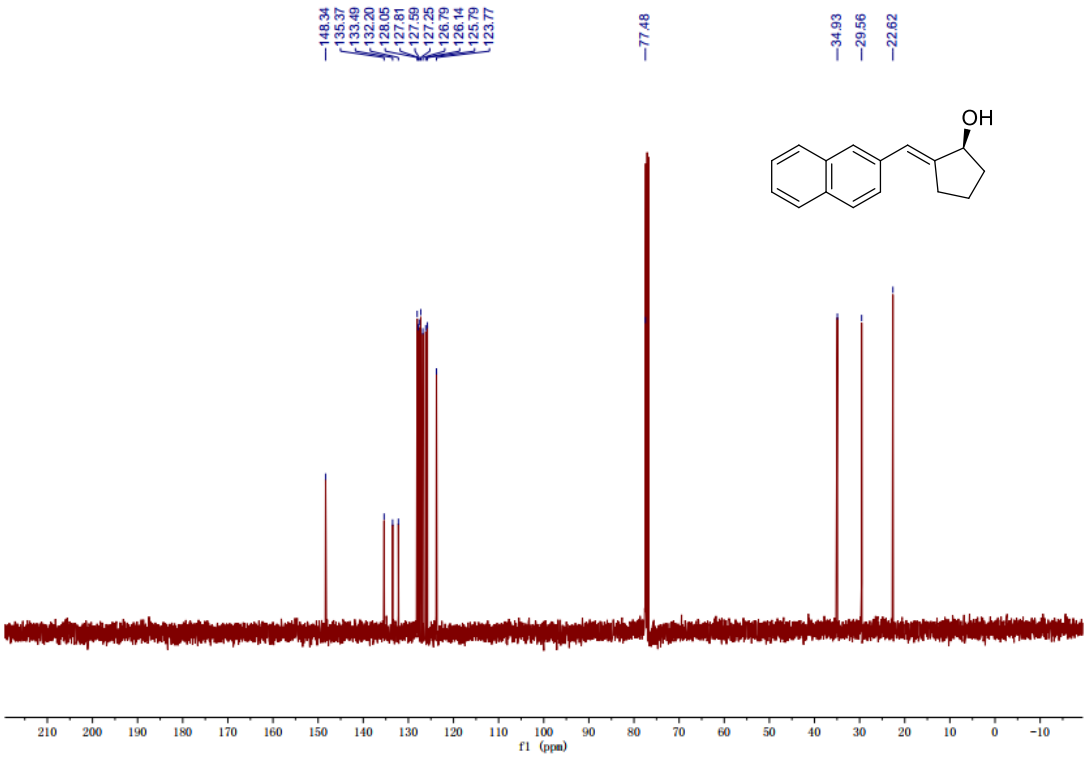


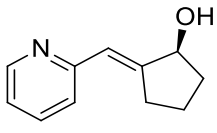



OH

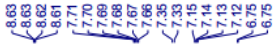
3s

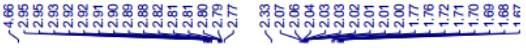

7.86
7.86
7.85
7.84
7.83
7.58
7.58
7.56
7.55
7.54
7.53
7.52
7.51
7.51
7.50
7.50
7.49
7.49
7.47
6.78
6.78
4.71
4.71
4.70
4.69
4.68
2.92
2.90
2.89
2.88
2.88
2.87
2.86
2.77
2.77
2.76
2.75
2.75
2.74
2.72
2.07
2.06
2.05
2.05
2.04
2.03
2.01
1.82
1.82
1.81
1.80
1.79
1.78
1.78
1.76
1.75
OH
4.16
1.02
2.05
1.00
0.98
1.05
1.06
2.13
3.38
f1 (ppm)

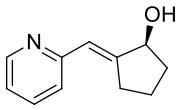

148.34
135.37
133.49
132.20
128.05
127.81
127.59
127.25
126.79
126.14
125.79
123.77
77.48
34.93
29.56
22.62
OH
f1 (ppm)

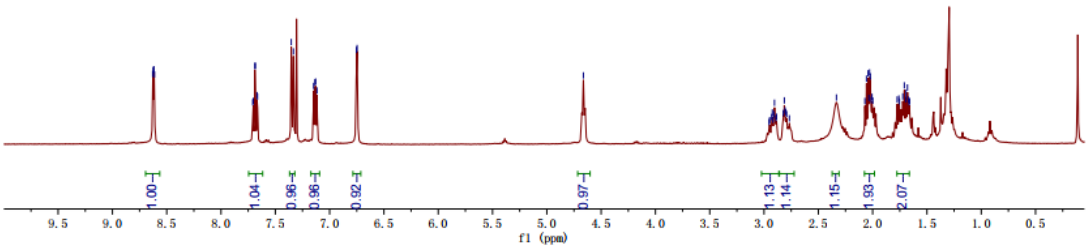

OH
N

3t

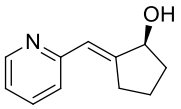

8.63
8.63
8.62
8.61
7.71
7.70
7.69
7.68
7.67
7.66
7.35
7.33
7.15
7.14
7.13
7.12
6.75
6.75

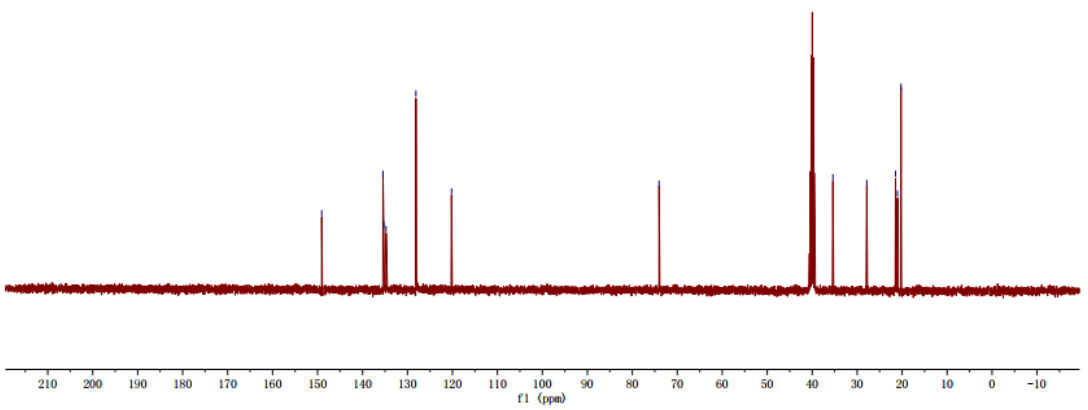

4.66
2.95
2.95
2.93
2.92
2.92
2.91
2.90
2.89
2.88
2.82
2.81
2.81
2.80
2.79
2.77
2.33
2.07
2.06
2.04
2.03
2.03
2.02
2.01
2.01
2.00
1.77
1.76
1.72
1.71
1.70
1.69
1.68

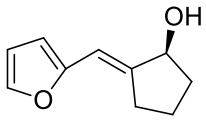

OH
N


1.00
1.04
0.96
0.96
0.92
0.97
1.13
1.14
1.15
1.93
2.07
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

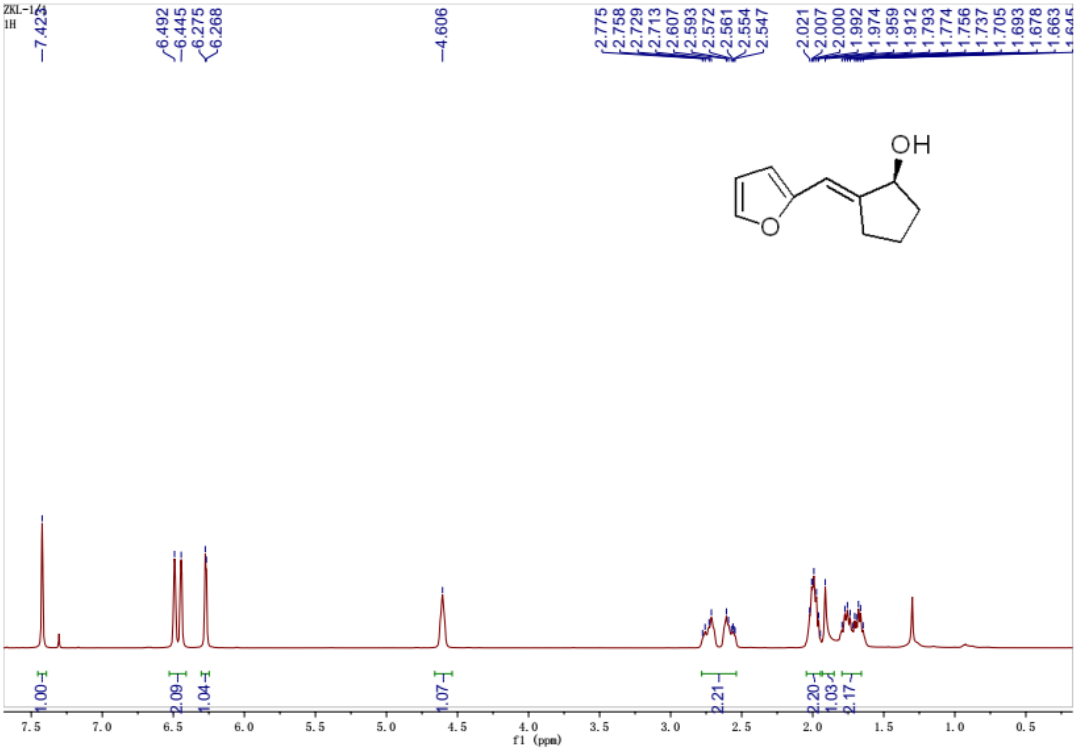

149.07
135.45
135.27
134.76
128.12
120.20
74.05
35.39
27.86
21.46
21.03
20.26

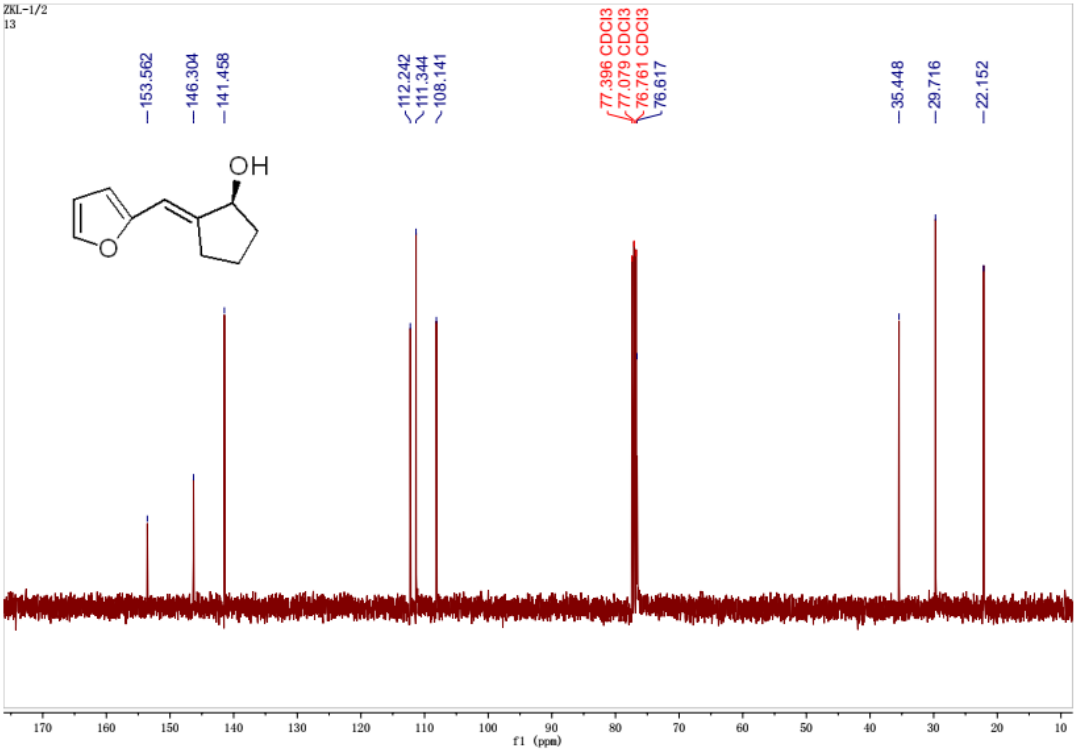

OH
N

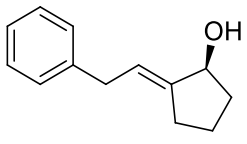

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


OH
O

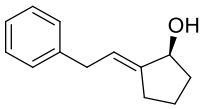
3u

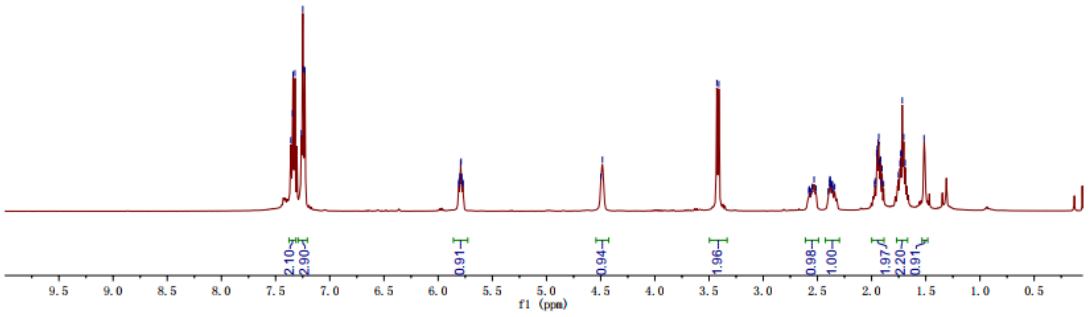

7.423
6.492
6.445
6.275
6.268
4.606
2.775
2.758
2.729
2.713
2.607
2.593
2.572
2.561
2.554
2.547
2.021
2.007
2.000
1.992
1.974
1.959
1.912
1.793
1.774
1.756
1.737
1.705
1.693
1.678
1.663
OH
O
1.00
2.09
1.04
1.07
2.21
2.20
1.03
2.17
f1 (ppm)

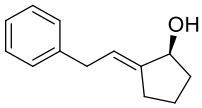

153.562
146.304
141.458
112.242
111.344
108.141
77.396 CDCl3
77.079 CDCl3
76.761 CDCl3
76.617
35.448
29.716
22.152
OH
O
f1 (ppm)

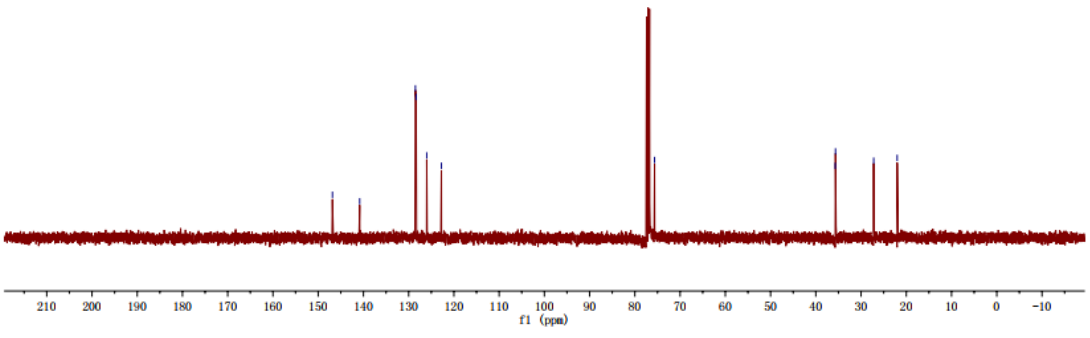


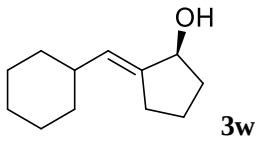
3v





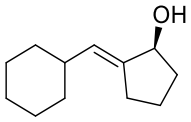


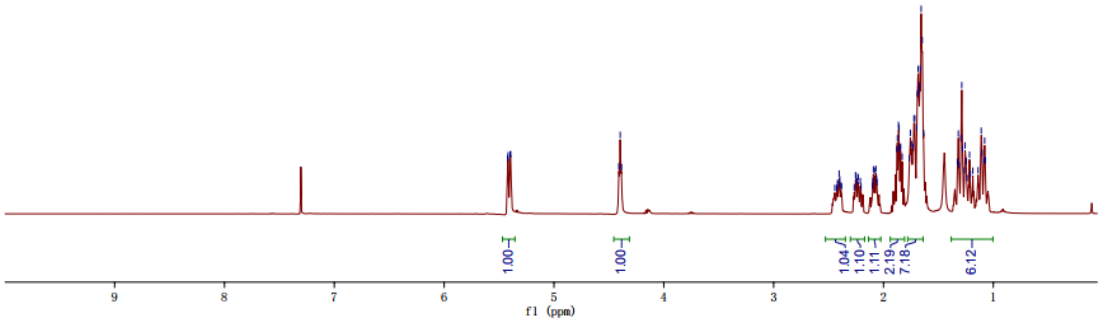


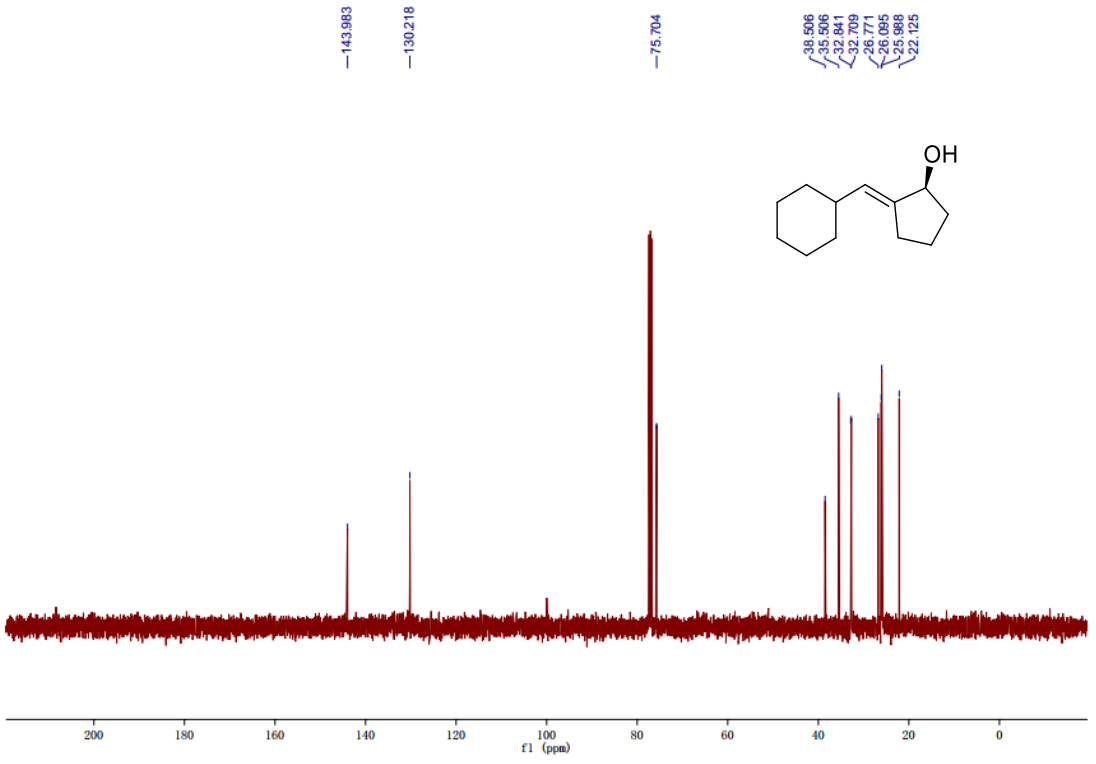

OH

3w

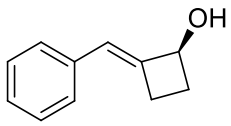

5.422
5.418
5.400
5.394
4.409
4.397
4.385
2.443
2.426
2.419
2.411
2.403
2.398
2.388
2.382
2.266
2.254
2.248
2.245
2.236
2.230
2.210
2.204
2.101
2.097
2.091
2.081
2.069
2.064
2.059
1.878
1.873
1.863
1.858
1.853
1.848
1.844
1.830
1.764
1.755
1.745
1.733
1.723
1.715
1.698
1.692
1.685
1.678
1.671
1.666
1.657
1.647
1.634
1.327
1.319
1.311
1.295
1.287
1.280
1.265
1.257
1.246
1.239
1.217
1.209
1.187
1.139
1.110
1.102
1.086
1.079
1.072


OH

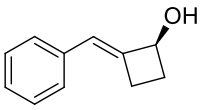

1.00
1.00
1.04
1.10
1.11
2.19
7.18
6.12
9
8
7
6
5
4
3
2
1
f1 (ppm)

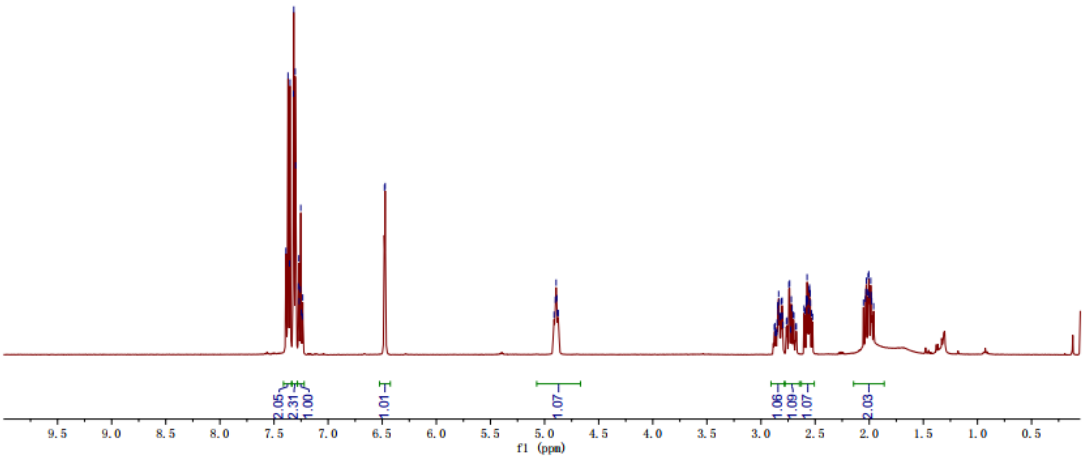

143.983
130.218
75.704
38.506
35.506
32.841
32.709
26.771
26.095
25.988
22.125
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

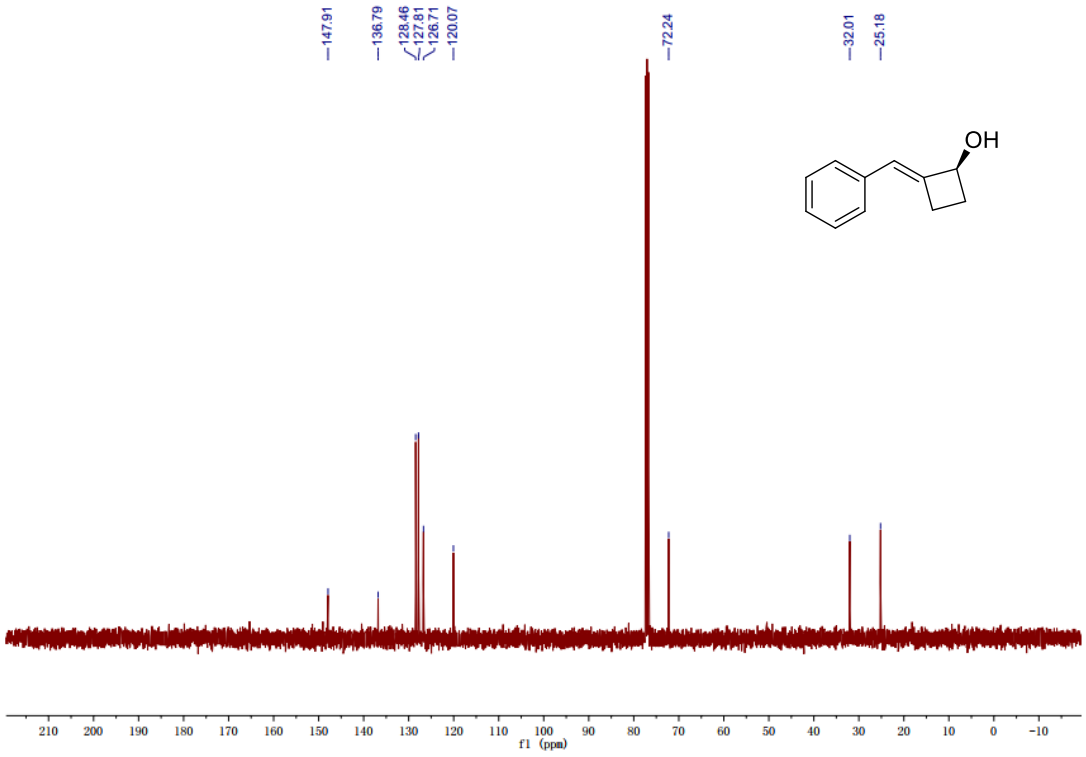
OH


OH

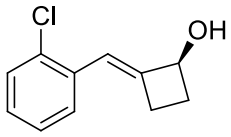
5a


OH


2.05
2.31
1.00
1.01
1.07
1.06
1.09
1.07
2.03
f1 (ppm)


147.91
136.79
128.46
127.81
126.71
120.07
72.24
32.01
25.18
f1 (ppm)

OH


Cl
OH

5b


7.42
7.42
7.41
7.40
7.37
7.36
7.35
7.34
7.27
7.25
7.25
7.23
7.21
7.20
7.19
7.18
7.17
7.16
6.85
6.84
6.84
6.83


2.72
2.71
2.70
2.70
2.69
2.68
2.67
2.60
2.58
2.57
2.55
2.54
2.53
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2.15
2.02
2.00
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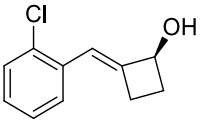
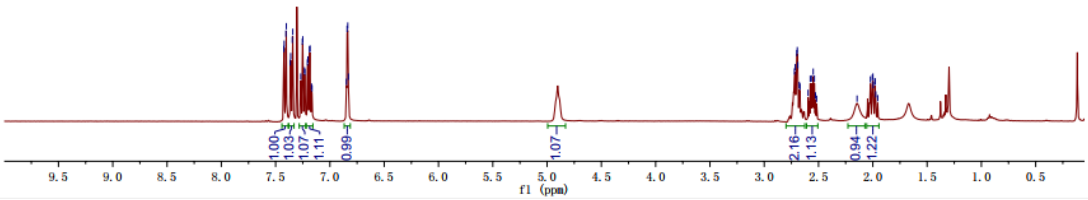
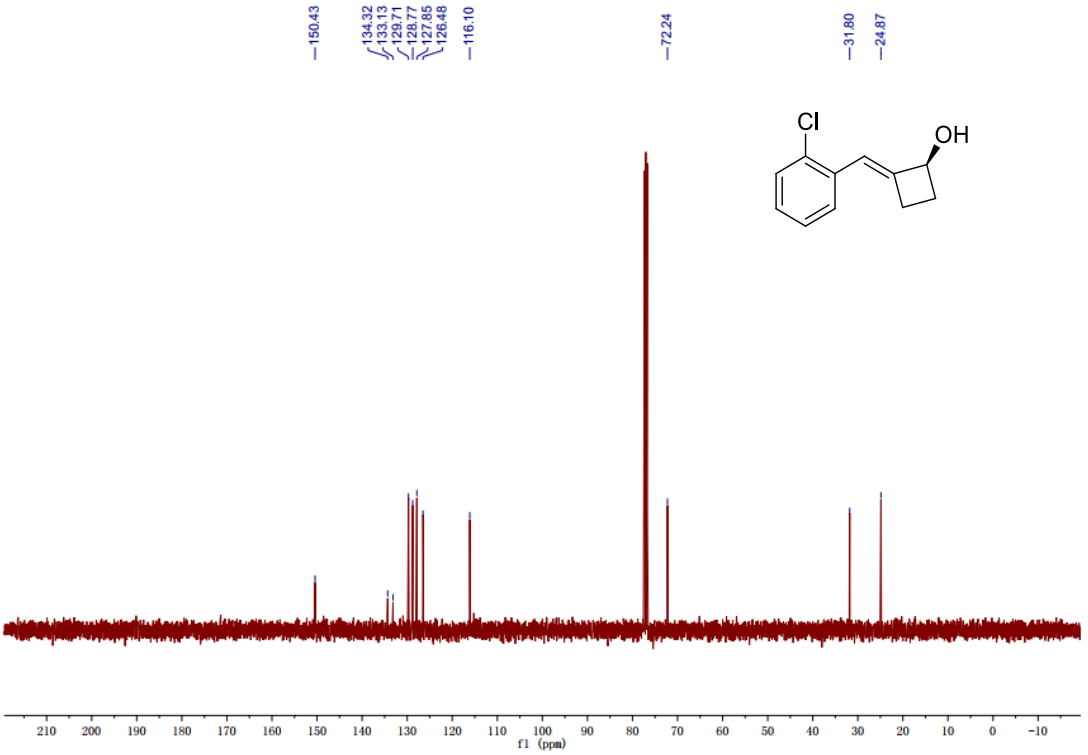
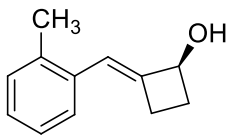
2.00
1.98
1.98
1.97
1.95


Cl
OH

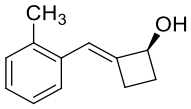

1.00
1.03
1.07
1.11
0.99
1.07
2.16
1.13
0.94
1.22
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

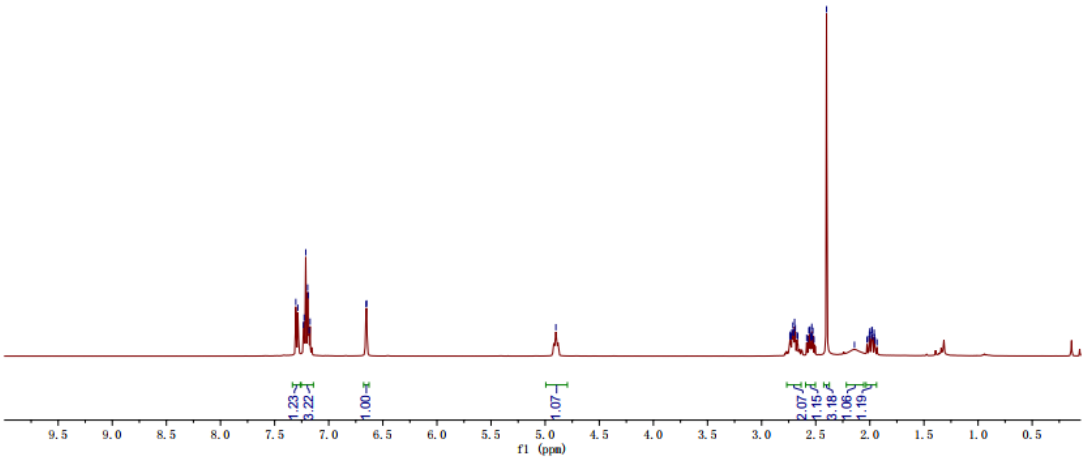

150.43
134.32
133.13
129.71
128.77
127.85
126.48
116.10
72.24
31.80
24.87
Cl
OH
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)


CH3
OH

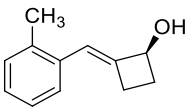
5c

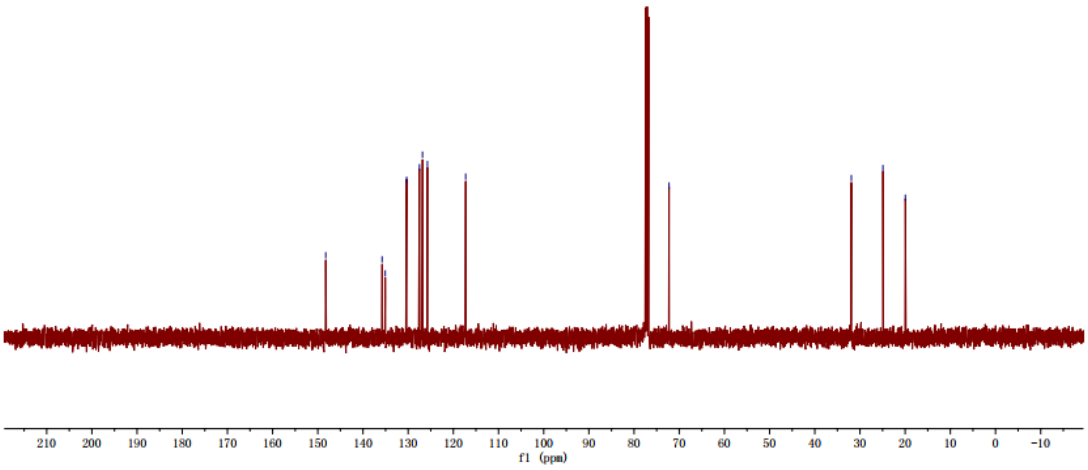

7.30
7.29
7.23
7.23
7.21
7.20
7.19
7.18
7.17
6.66
6.65
4.90
2.74
2.74
2.73
2.73
2.72
2.71
2.71
2.70
2.70
2.69
2.67
2.67
2.58
2.57
2.56
2.56
2.55
2.55
2.54
2.54
2.53
2.53
2.52
2.40
2.14
2.03
2.01
2.00
2.00
1.99
1.98
1.98
1.97
1.96
1.96
1.95
1.93

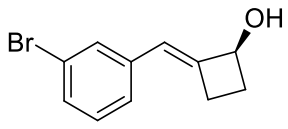

CH3
OH


1.23
3.22
1.00
1.07
2.07
1.15
3.18
1.06
1.19
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

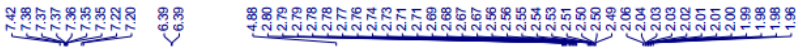

148.24
135.77
135.07
130.34
127.51
126.82
125.73
117.27
72.26
31.90
24.92
19.95

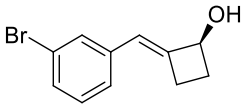

CH3
OH

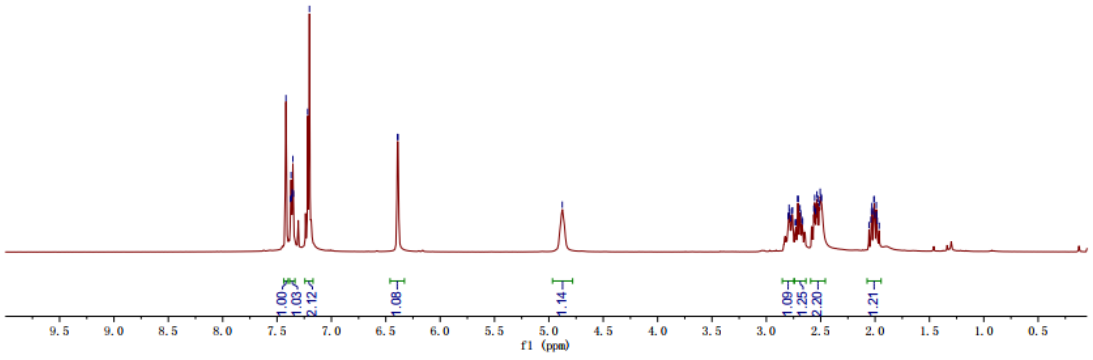

210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)


Br
OH

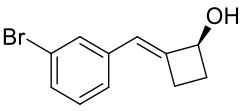
5d

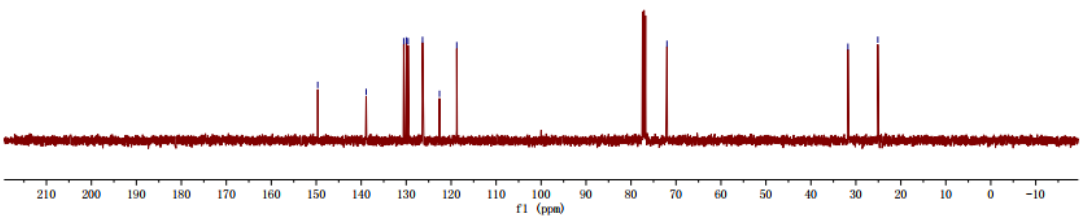

7.42
7.38
7.37
7.37
7.36
7.35
7.35
7.22
7.20
6.39
6.39
4.88
2.80
2.79
2.79
2.78
2.78
2.77
2.76
2.74
2.73
2.71
2.71
2.69
2.68
2.67
2.67
2.56
2.56
2.55
2.54
2.53
2.51
2.50
2.50
2.49
2.06
2.04
2.03
2.03
2.02
2.01
2.01
2.00
1.99
1.98
1.98
1.96

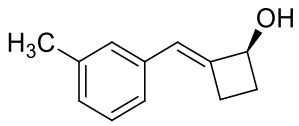

Br
OH


1.00
1.03
2.12
1.08
1.14
1.09
1.25
2.20
1.21
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

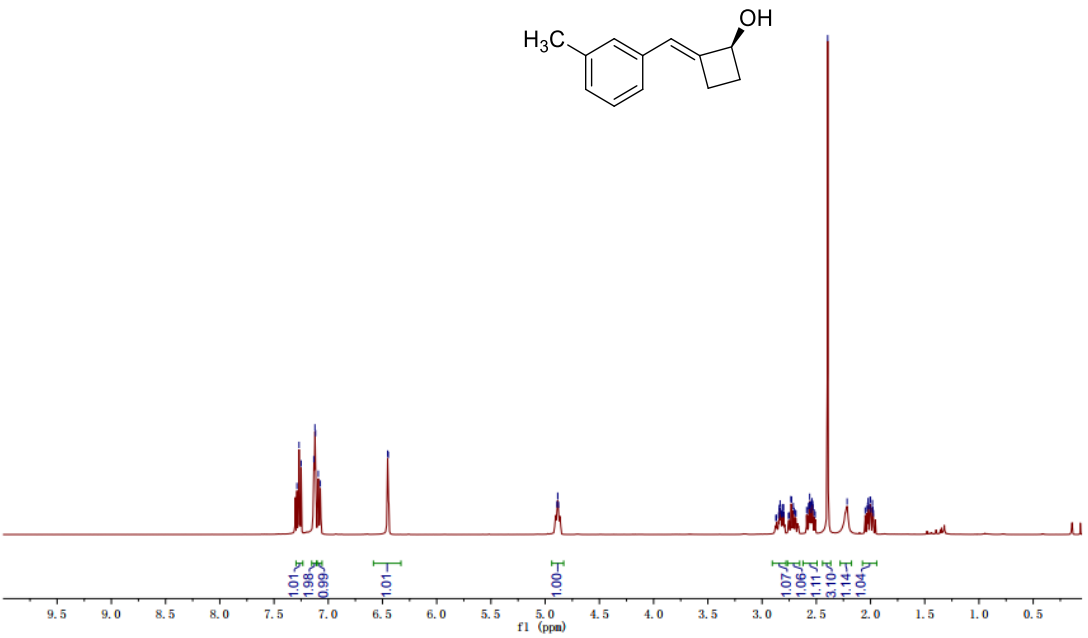

149.66
138.90
130.55
129.97
129.56
126.36
122.59
118.75
72.01
31.76
25.11

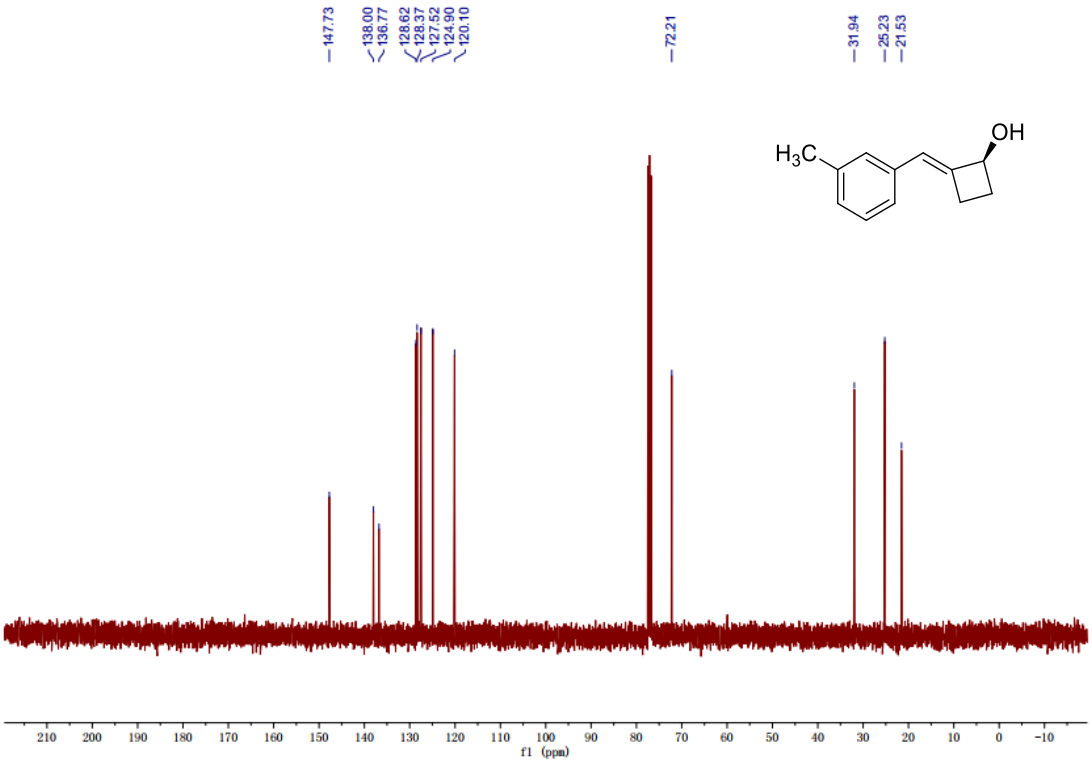

Br
OH

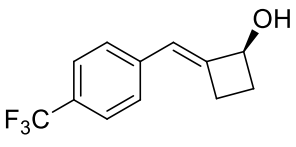

210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)


H3C
OH

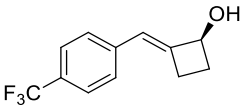
5e

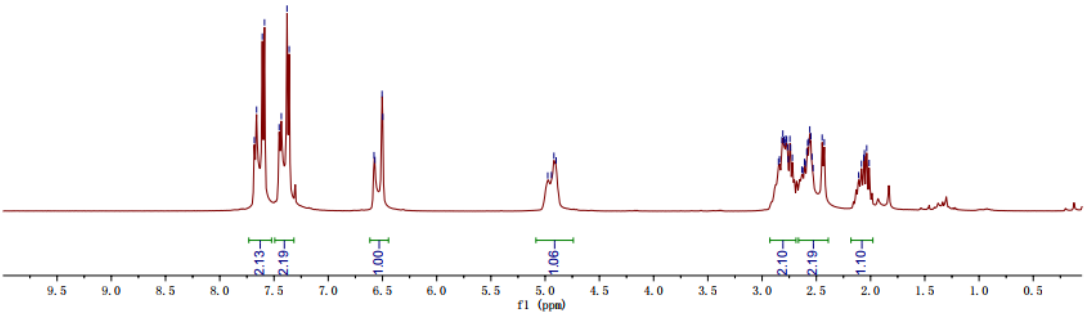

H3C
OH
1.01
1.98
0.99
1.01
1.00
1.07
1.06
1.11
3.10
1.14
1.04
f1 (ppm)

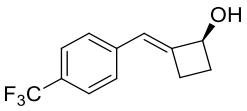

147.73
138.00
136.77
128.62
128.37
127.52
124.90
120.10
72.21
31.94
25.23
21.53
H3C
OH
f1 (ppm)

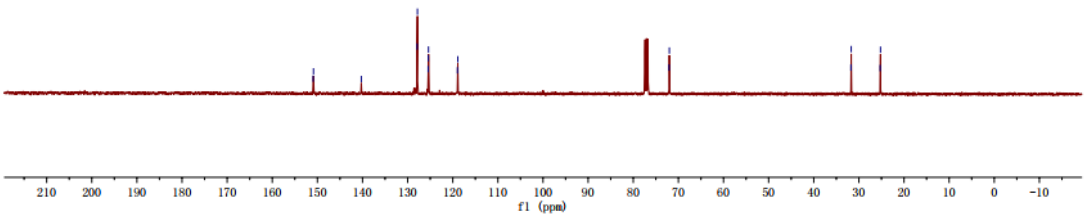

OH
F3C

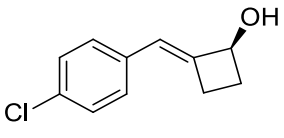
5f


OH
F3C

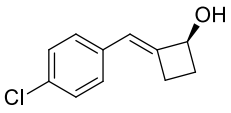

2.13
2.19
1.00
1.06
2.10
2.19
1.10
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

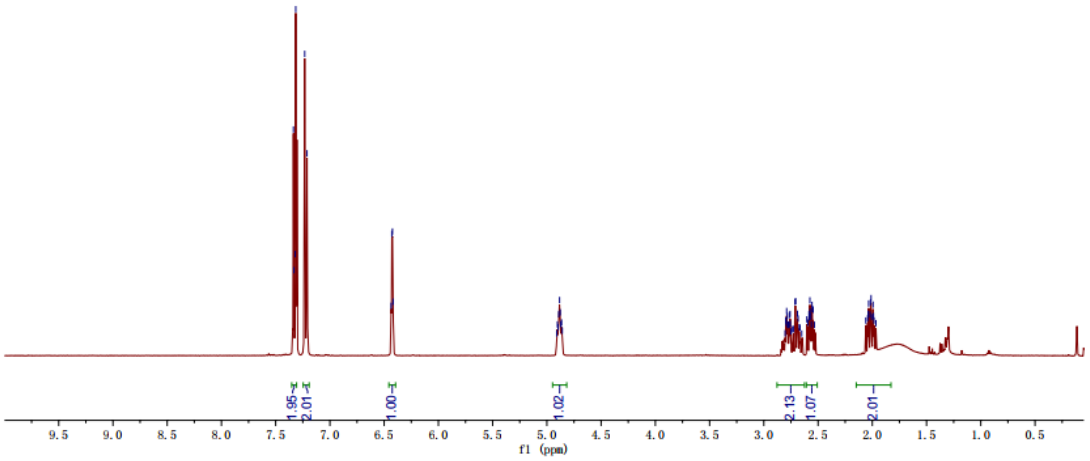

OH
F3C

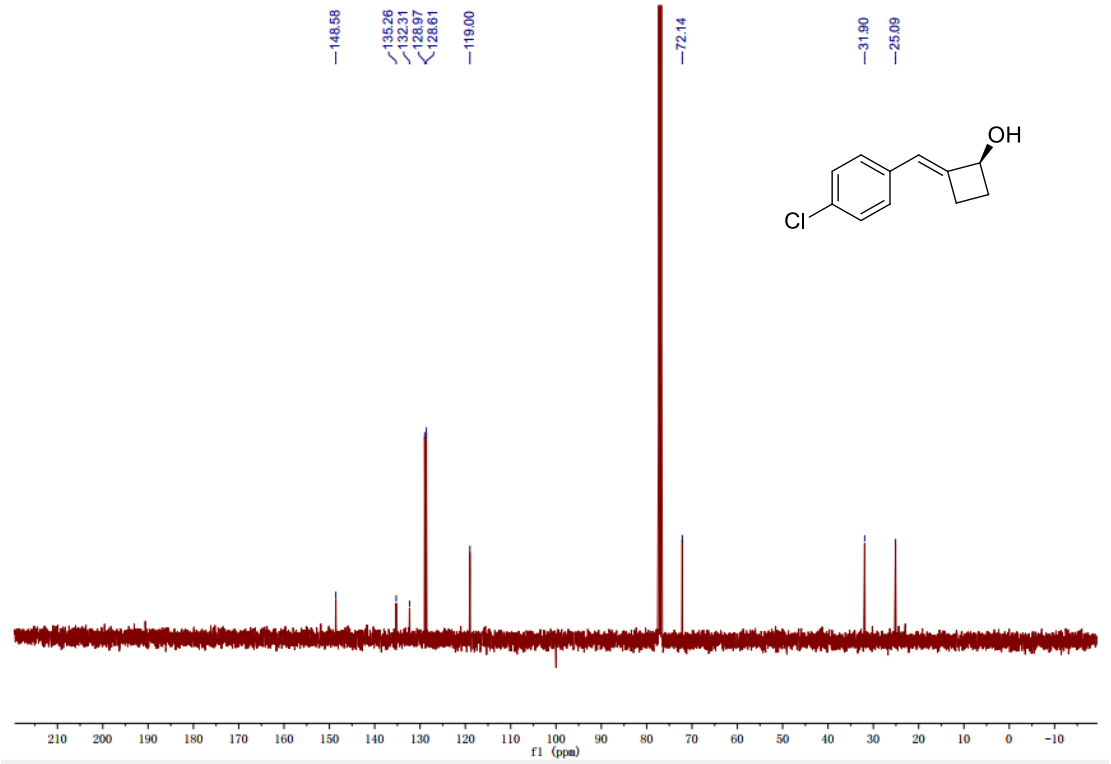

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

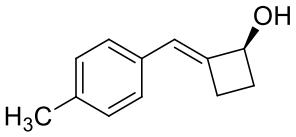

OH
Cl

5g

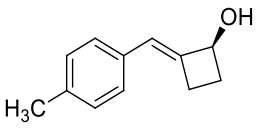

OH
Cl

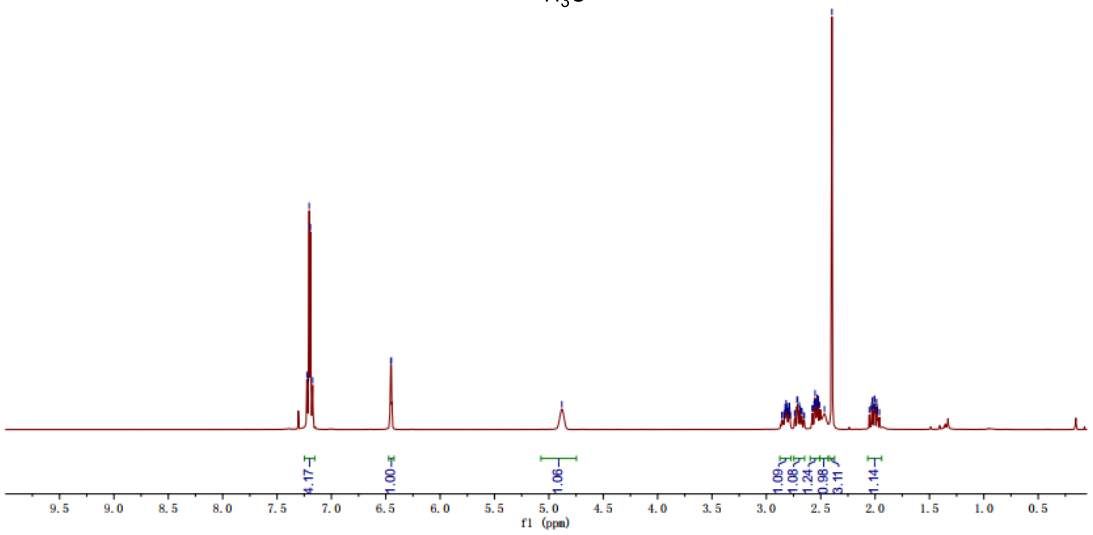

1.95
2.01
1.00
1.02
2.13
1.07
2.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)


148.58
135.26
132.31
128.97
128.61
119.00
72.14
31.90
25.09
OH
Cl
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

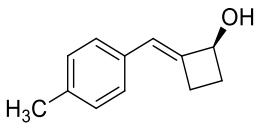

OH
H3C

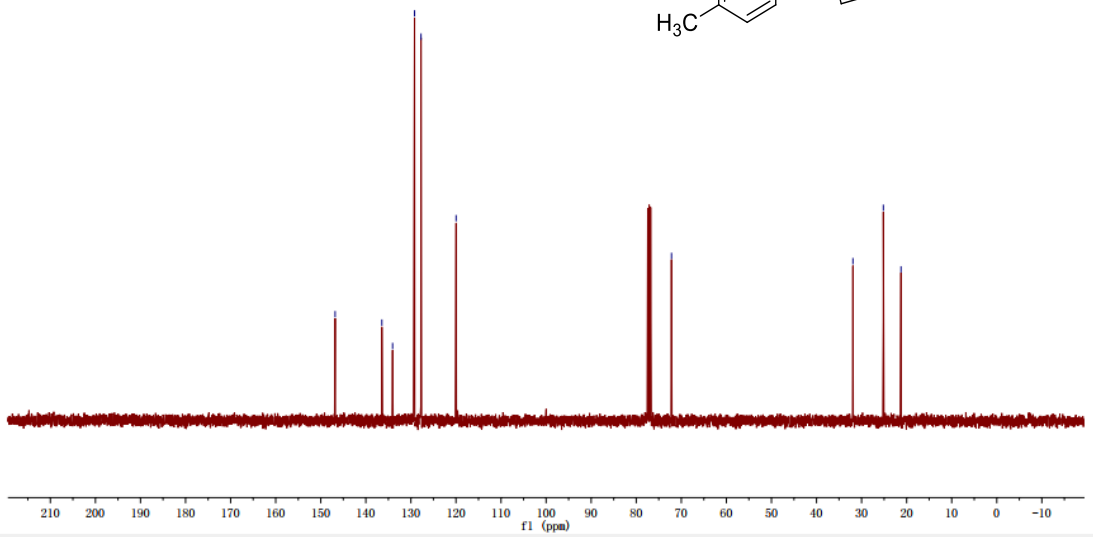
5h

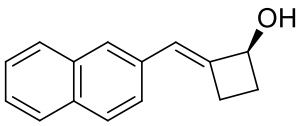

OH
H3C


4.17
1.00
1.06
1.09
1.08
1.24
0.98
3.11
1.14
f1 (ppm)

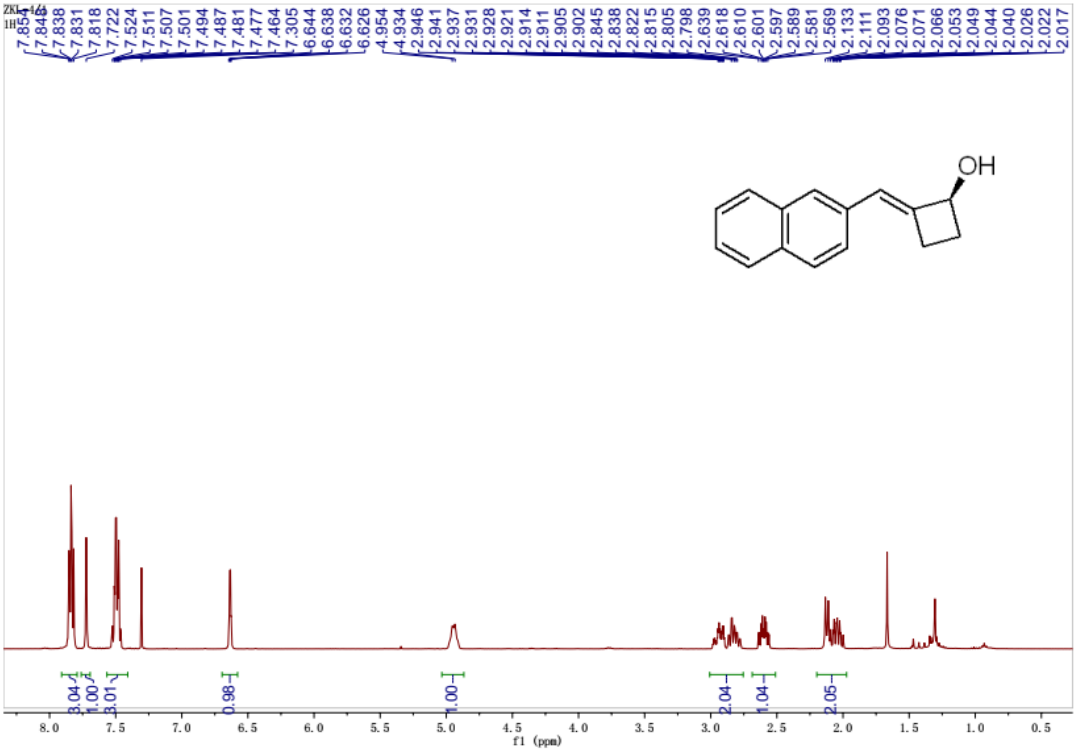

146.81
136.44
134.06
129.19
127.76
119.97
72.17
31.92
25.17
21.25

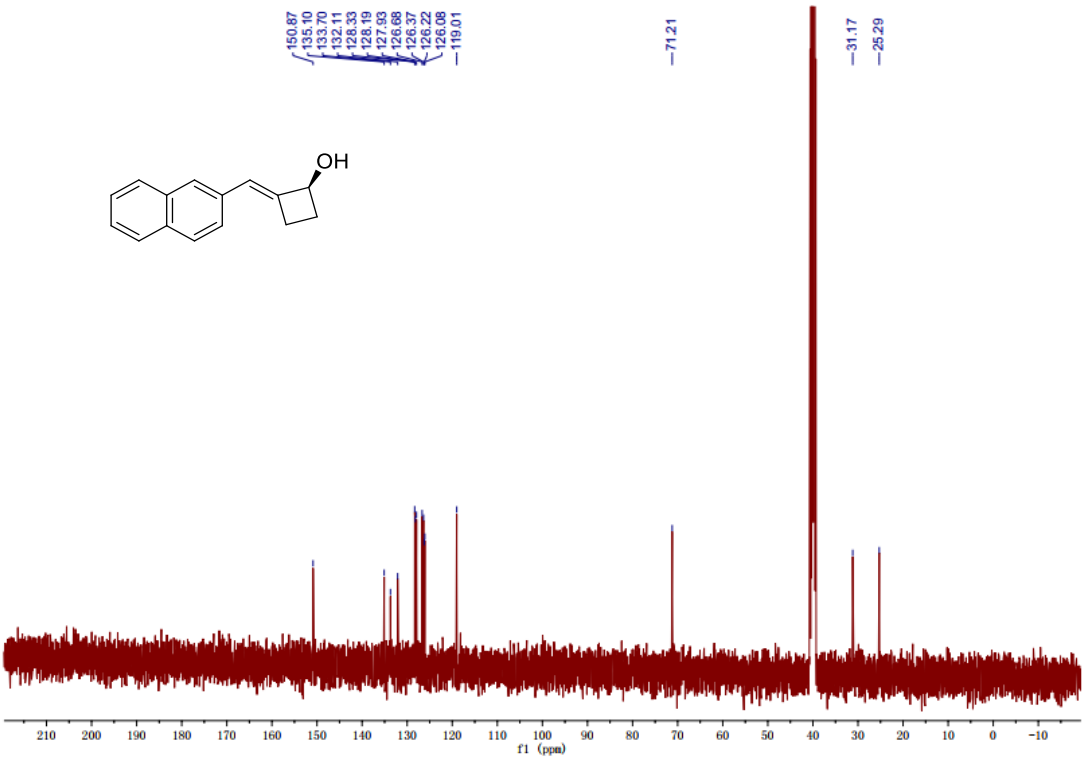

OH
H3C

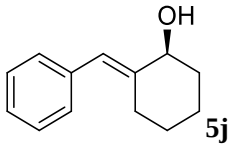

f1 (ppm)


OH

5i

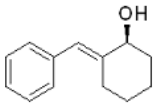

7.854
7.848
7.838
7.831
7.818
7.722
7.524
7.511
7.507
7.501
7.494
7.487
7.481
7.477
7.464
7.305
6.644
6.638
6.632
6.626
4.954
4.934
2.946
2.941
2.937
2.931
2.928
2.921
2.914
2.911
2.905
2.902
2.845
2.838
2.822
2.815
2.805
2.798
2.639
2.618
2.610
2.601
2.597
2.589
2.581
2.569
2.133
2.111
2.093
2.076
2.071
2.066
2.053
2.049
2.044
2.040
2.026
2.022
2.017
OH
3.04
1.00
3.01
0.98
1.00
2.04
1.04
2.05
f1 (ppm)

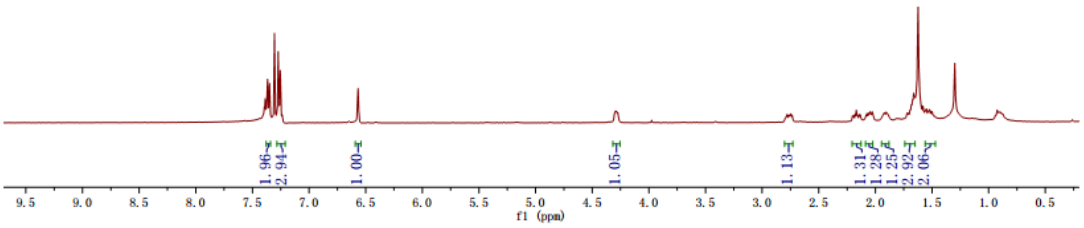

150.87
135.10
133.70
132.11
128.33
128.19
127.93
126.68
126.37
126.22
126.08
119.01
71.21
31.17
25.29
OH
f1 (ppm)



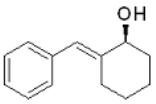
5j

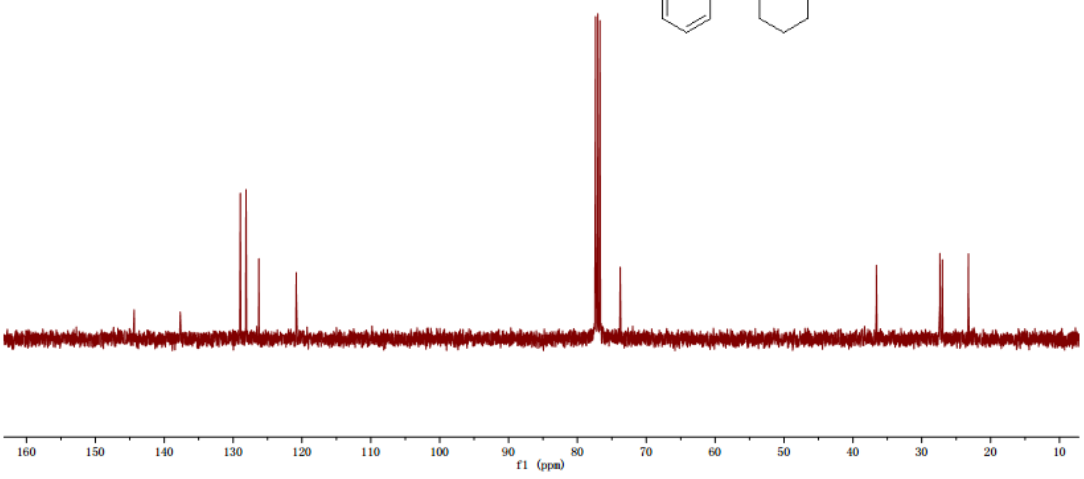
7.387
7.368
7.350
7.273
7.255
7.237
6.568
4.301
4.293
4.285
4.274
2.785
2.764
2.746
2.179
2.168
2.144
2.135
2.084
2.076
2.066
2.053
2.046
2.036
2.027
1.928
1.921
1.914
1.905
1.898
1.885
1.720
1.716
1.702
1.692
1.683
1.672
1.662
1.580
1.557
1.551
1.529
1.523
1.509
1.499
1.484

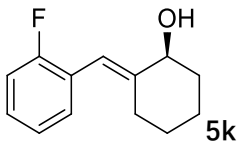




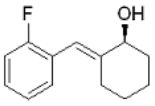
144.371
137.675
128.950
128.118
126.261
120.824
77.363 CDCl3
77.045 CDCl3
76.727 CDCl3
73.794
36.594
27.381
27.009
23.226

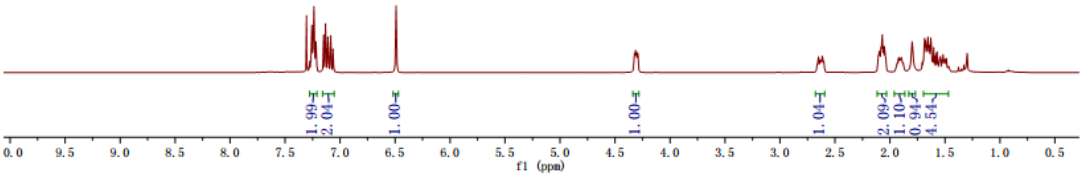


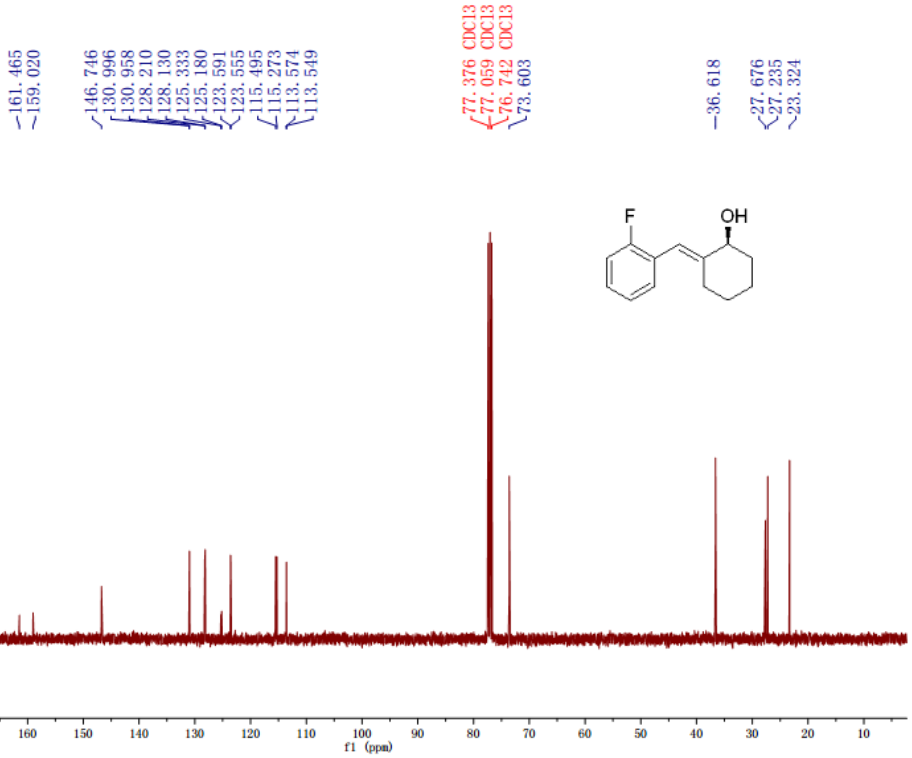


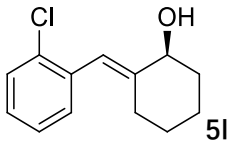

F
OH
5k

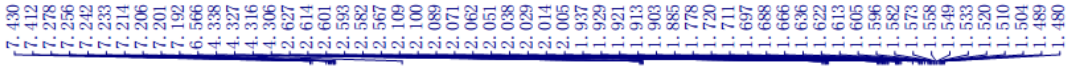

7.276
7.262
7.257
7.238
7.225
7.219
7.149
7.133
7.111
7.085
7.064
6.491
4.323
4.313
4.304
4.294
2.662
2.650
2.635
2.613
2.602
2.106
2.090
2.081
2.070
2.059
2.051
2.041
1.943
1.940
1.918
1.901
1.896
1.881
1.798
1.698
1.685
1.677
1.654
1.630
1.603
1.580
1.571
1.547
1.541
1.517
1.487
1.465

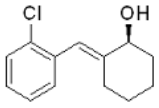

F
OH

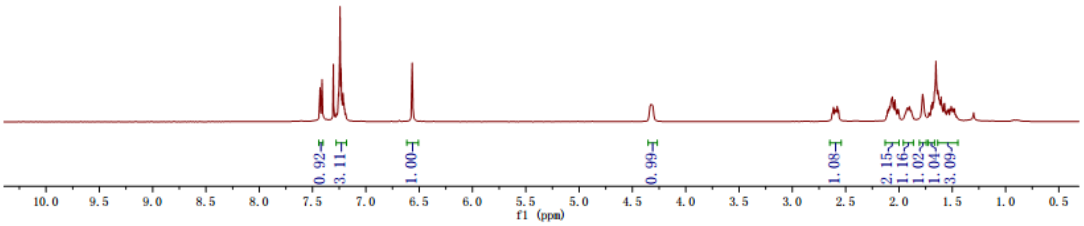

1.99
2.04
1.00
1.00
1.04
2.09
1.10
0.94
4.54
0.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

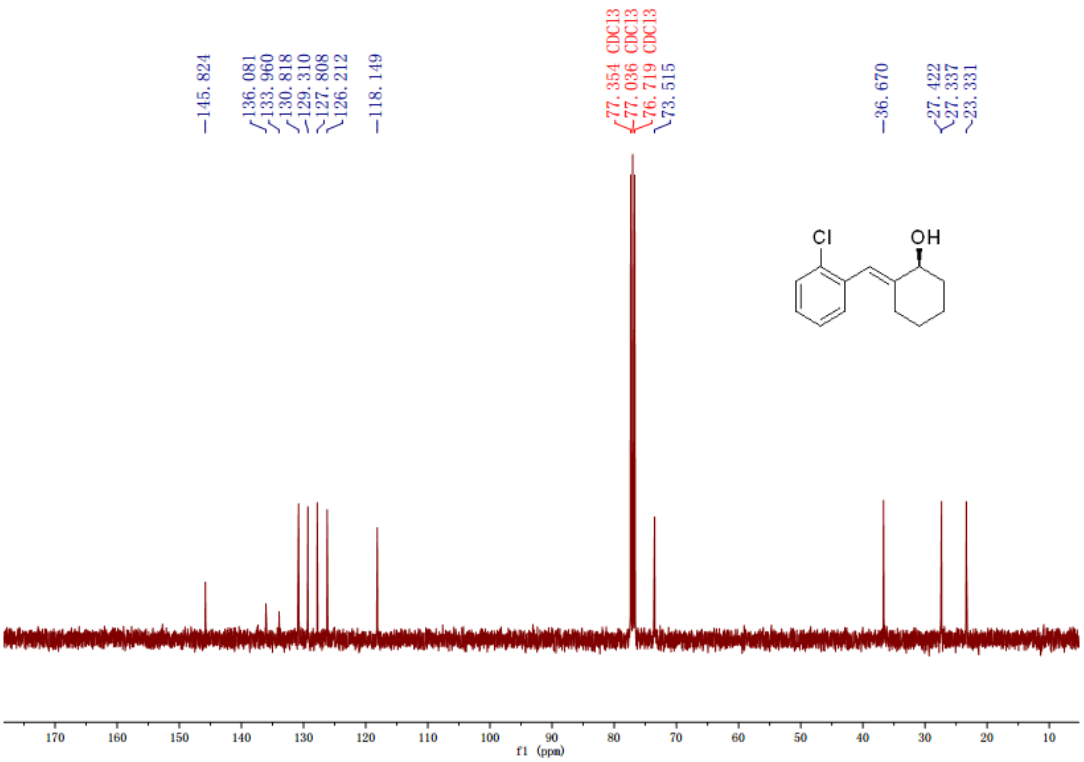

161.465
159.020
146.746
130.996
130.958
128.210
128.130
125.333
125.180
123.591
123.555
115.495
115.273
113.574
113.549
77.376 CDCl3
77.059 CDCl3
76.742 CDCl3
73.603
36.618
27.676
27.235
23.324
F
OH
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

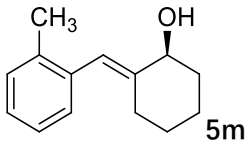

Cl
OH
5l

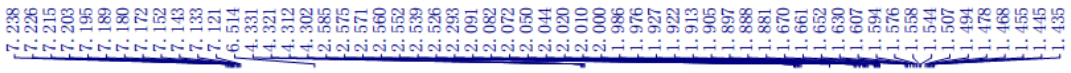

7.430
7.412
7.278
7.256
7.242
7.233
7.214
7.206
7.201
7.192
6.566
4.338
4.327
4.316
4.306
2.627
2.614
2.601
2.593
2.582
2.567
2.109
2.100
2.089
2.071
2.062
2.051
2.038
2.029
2.014
2.005
1.937
1.929
1.921
1.913
1.903
1.885
1.778
1.720
1.711
1.697
1.688
1.666
1.636
1.622
1.613
1.605
1.596
1.582
1.573
1.558
1.549
1.533
1.520
1.510
1.504
1.489
1.480


Cl
OH


0.92
3.11
1.00
0.99
1.08
2.15
1.16
1.02
1.04
3.09
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


145.824
136.081
133.960
130.818
129.310
127.808
126.212
118.149
77.354 CDCl3
77.036 CDCl3
76.719 CDCl3
73.515
36.670
27.422
27.337
23.331
Cl
OH
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


CH3
OH
5m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7.226
7.215
7.203
7.195
7.189
7.180
7.172
7.152
7.143
7.133
7.121
6.514
4.331
4.321
4.312
4.302
2.585
2.575
2.571
2.560
2.552
2.539
2.526
2.293
2.091
2.082
2.072
2.050
2.044
2.020
2.010
2.000
1.986
1.976
1.927
1.922
1.913
1.905
1.897
1.888
1.881
1.670
1.661
1.652
1.630
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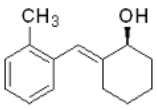
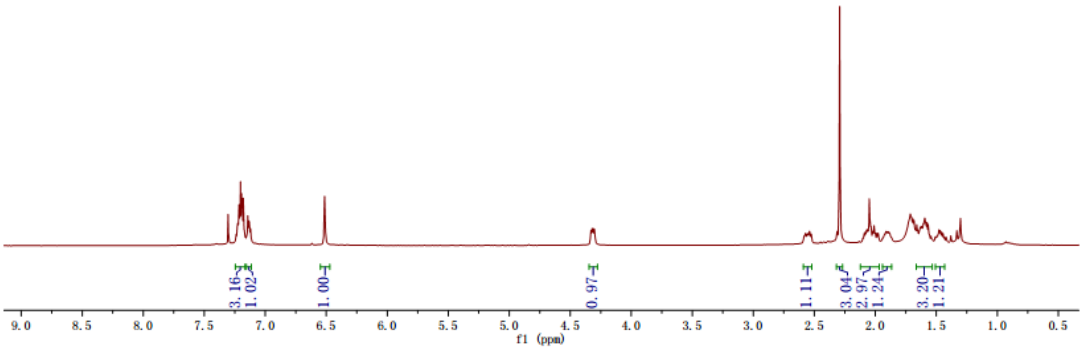
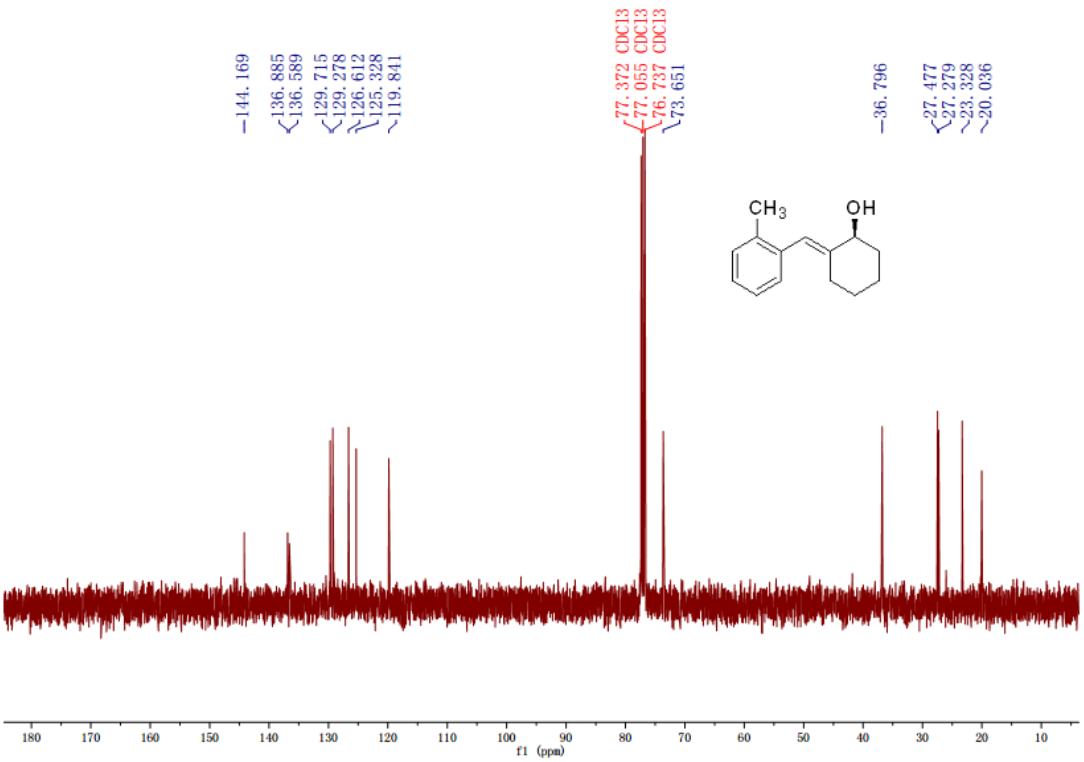
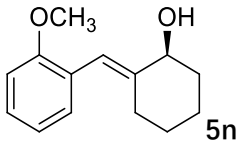
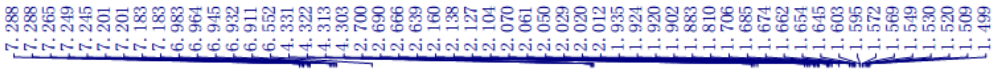
1.494
1.478
1.468
1.455
1.445
1.435


CH3
OH


3.16
1.02
1.00
0.97
1.11
3.04
2.97
1.24
3.20
1.21
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


144.169
136.885
136.589
129.715
129.278
126.612
125.328
119.841
77.372 CDCl3
77.055 CDCl3
76.737 CDCl3
73.651
36.796
27.477
27.279
23.328
20.036
CH3
OH
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


OCH3
OH
5n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7.288
7.265
7.249
7.245
7.201
7.201
7.183
7.183
6.983
6.964
6.945
6.932
6.911
6.552
4.331
4.322
4.313
4.303
2.700
2.690
2.666
2.639
2.160
2.138
2.127
2.104
2.070
2.061
2.050
2.029
2.020
2.012
1.935
1.924
1.920
1.902
1.883
1.810
1.706
1.685
1.674
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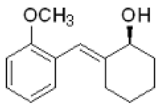
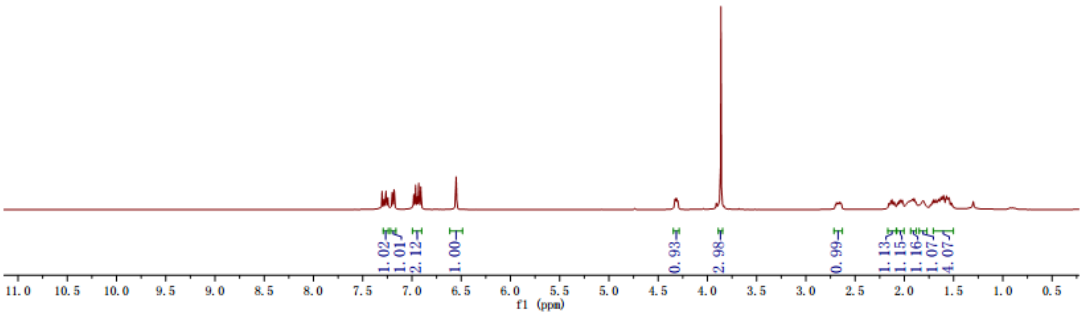
1.603
1.595
1.572
1.569
1.549
1.530
1.520
1.509
1.499


OCH3
OH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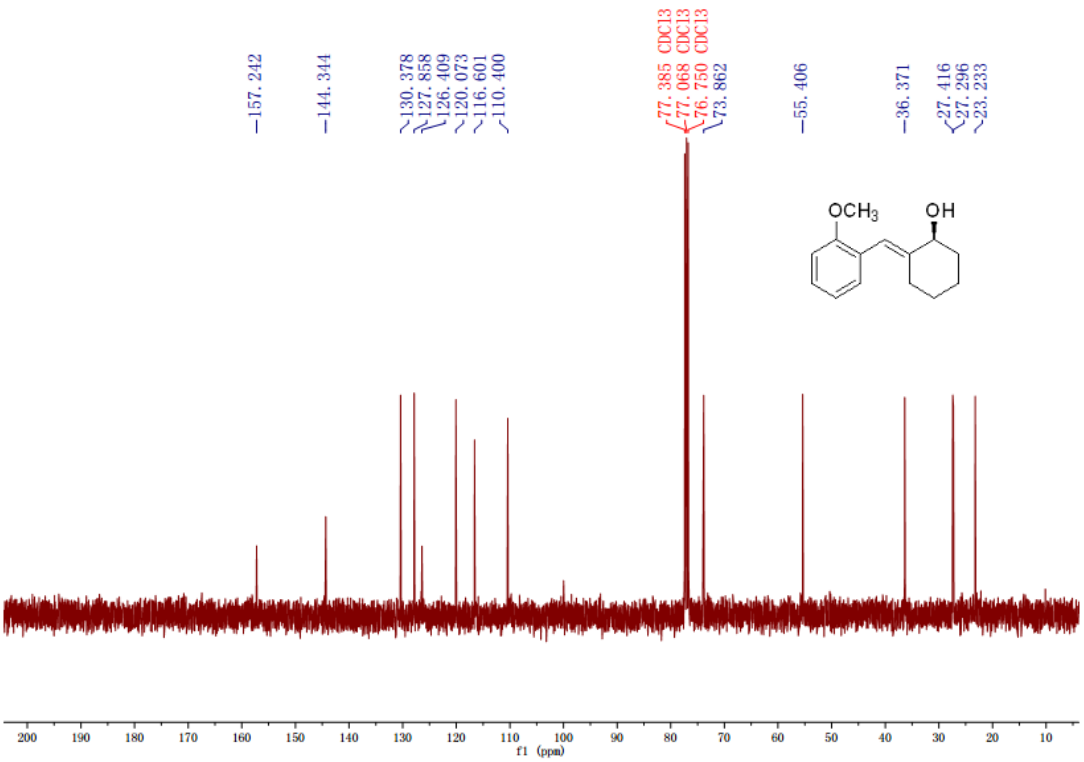
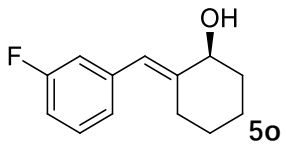
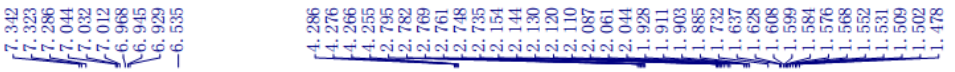
1.01
2.12
1.00
0.93
2.98
0.99
1.13
1.15
1.16
1.07
4.07
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


157.242
144.344
130.378
127.858
126.409
120.073
116.601
110.400
77.385 CDCl3
77.068 CDCl3
76.750 CDCl3
73.862
55.406
36.371
27.416
27.296
23.233
OCH3
OH
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


OH
F
5o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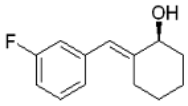
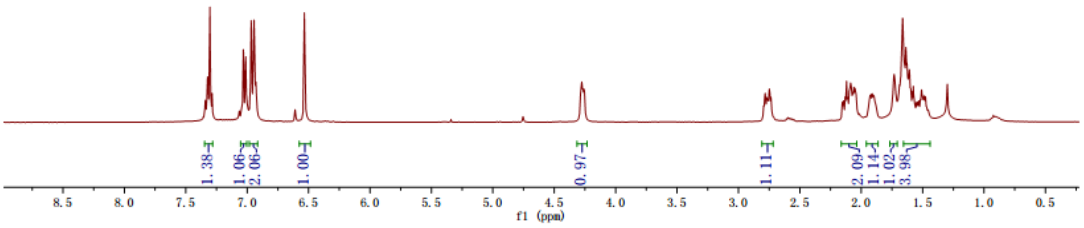
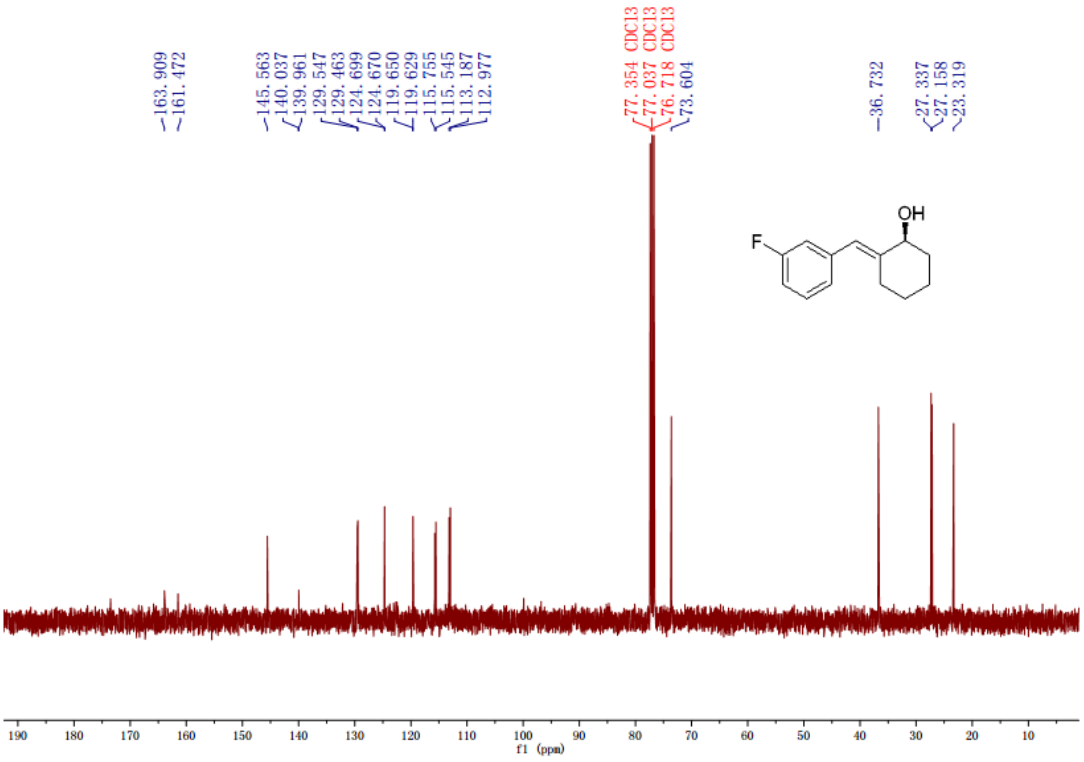
7.323
7.286
7.044
7.032
7.012
6.968
6.945
6.929
6.535
4.286
4.276
4.266
4.255
2.795
2.782
2.769
2.761
2.748
2.735
2.154
2.144
2.130
2.120
2.110
2.087
2.061
2.044
1.928
1.911
1.903
1.885
1.732
1.637
1.628
1.608
1.599
1.584
1.576
1.568
1.552
1.531
1.509
1.502
1.478


OH
F


1.38
1.06
2.06
1.00
0.97
1.11
2.09
1.14
1.02
3.98
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


163.909
161.472
145.563
140.037
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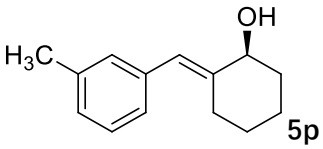
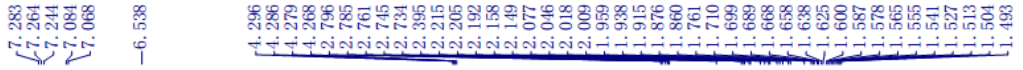
129.547
129.463
124.699
124.670
119.650
119.629
115.755
115.545
113.187
112.977
77.354 CDCl3
77.037 CDCl3
76.718 CDCl3
73.604
36.732
27.337
27.158
23.319
OH
F
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


OH
H3C
5p


7.283
7.264
7.244
7.084
7.068
6.538
4.296
4.286
4.279
4.268
2.796
2.785
2.761
2.745
2.734
2.395
2.215
2.205
2.192
2.158
2.149
2.077
2.046
2.018
2.009
1.959
1.938
1.915
1.876
1.860
1.761
1.710
1.699
1.689
1.668
1.658
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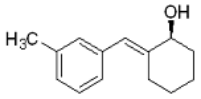
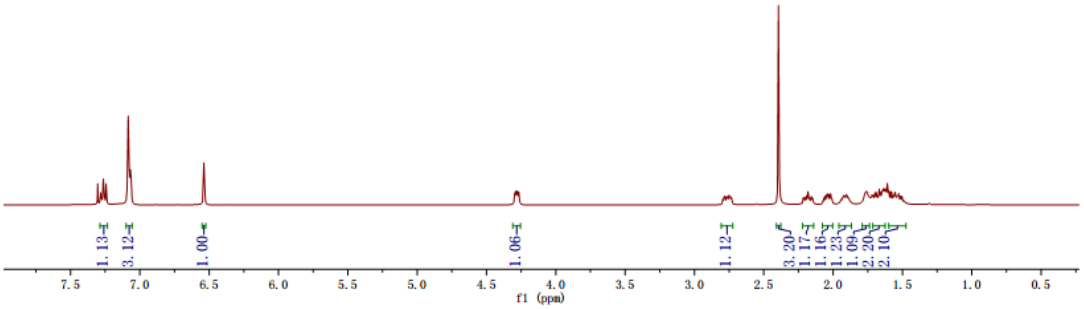
1.513
1.504
1.493


OH
H3C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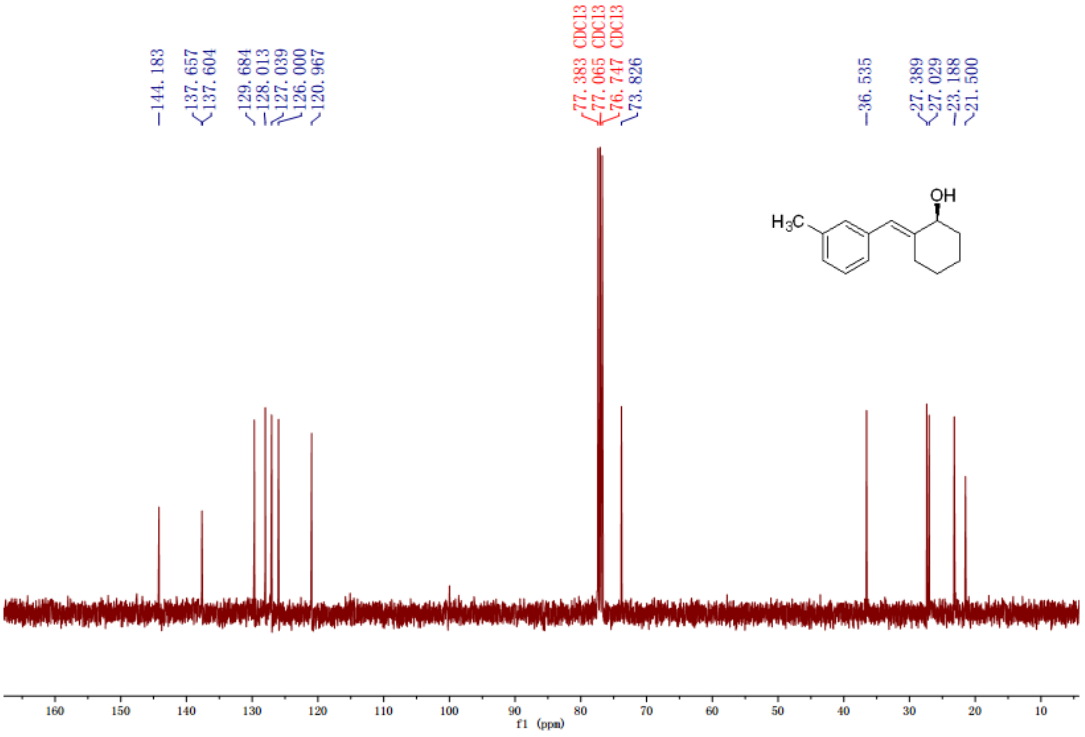
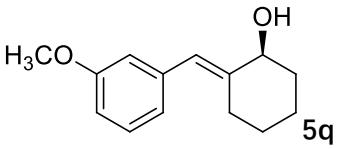
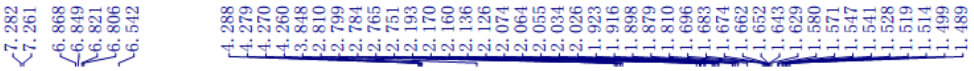
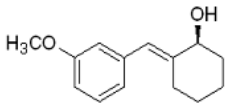
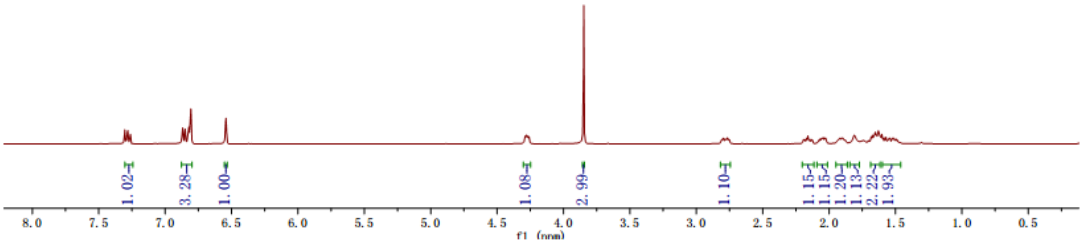
3.12
1.00
1.06
1.12
3.20
1.17
1.16
1.23
1.09
2.20
2.10
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

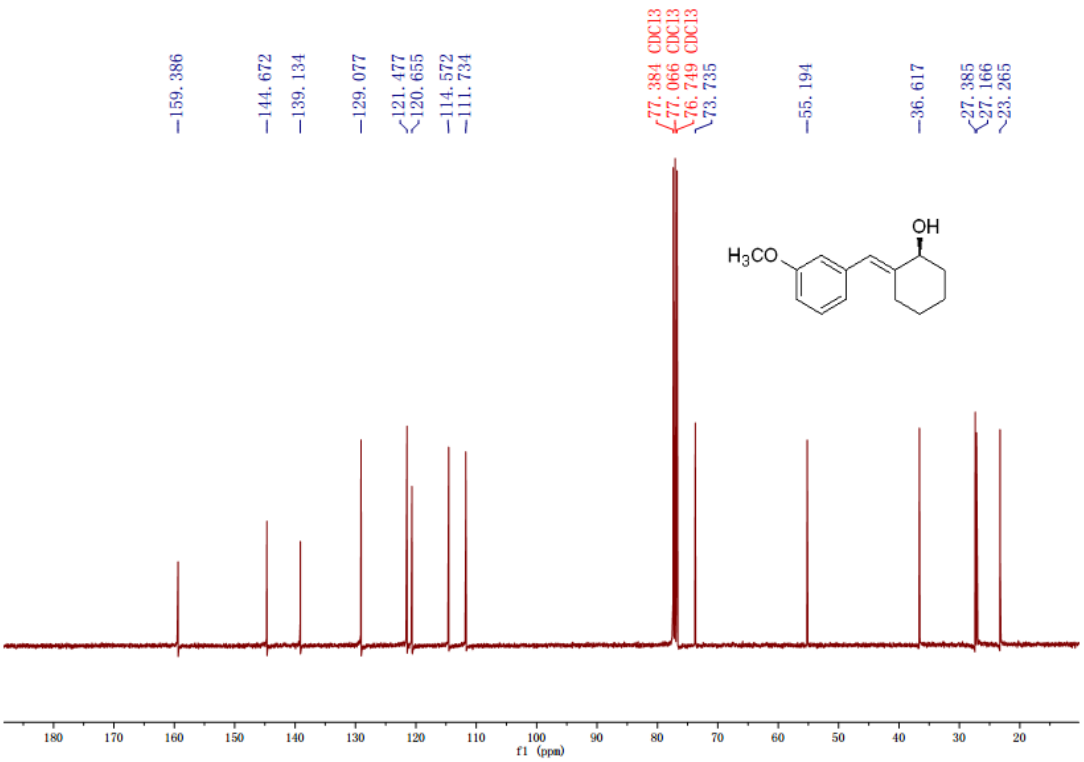

144.183
137.657
137.604
129.684
128.013
127.039
126.000
120.967
77.383 CDCl3
77.065 CDCl3
76.747 CDCl3
73.826
36.535
27.389
27.029
23.188
21.500
OH
H3C
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

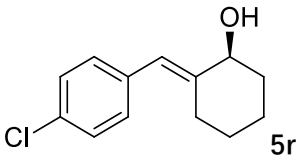

OH
H3CO
5q


7.282
7.261
6.868
6.849
6.821
6.806
6.542
4.288
4.279
4.270
4.260
3.848
2.810
2.799
2.784
2.765
2.751
2.193
2.170
2.160
2.136
2.126
2.074
2.064
2.055
2.034
2.026
1.923
1.916
1.898
1.879
1.810
1.696
1.683
1.674
1.662
1.652
1.643
1.629
1.580
1.571
1.547
1.541
1.528
1.519
1.514
1.499
1.489


OH
H3CO


1.02
3.28
1.00
1.08
2.99
1.10
1.15
1.15
1.20
1.13
2.22
1.93
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


159.386
144.672
139.134
129.077
121.477
120.655
114.572
111.734
77.384 CDCl3
77.066 CDCl3
76.749 CDCl3
73.735
55.194
36.617
27.385
27.166
23.265
OH
H3CO
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
f1 (ppm)



7.328
7.307
7.175
7.154
6.511

4.273
4.263
4.252
4.242
2.745
2.730
2.710
2.698
2.127
2.118
2.094
2.084
2.059
2.044
2.029
1.894
1.683
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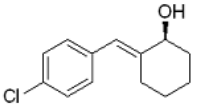
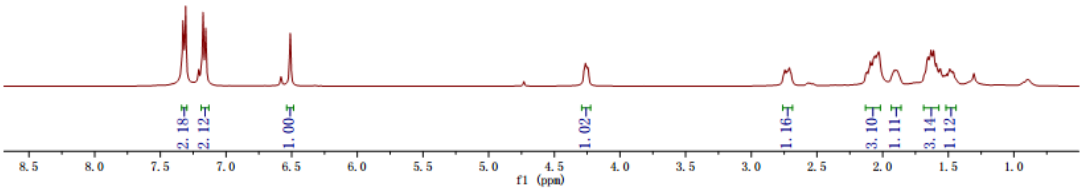
1.641
1.632
1.612
1.591
1.568
1.512
1.489
1.468
1.460
1.437



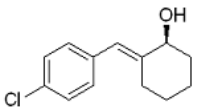


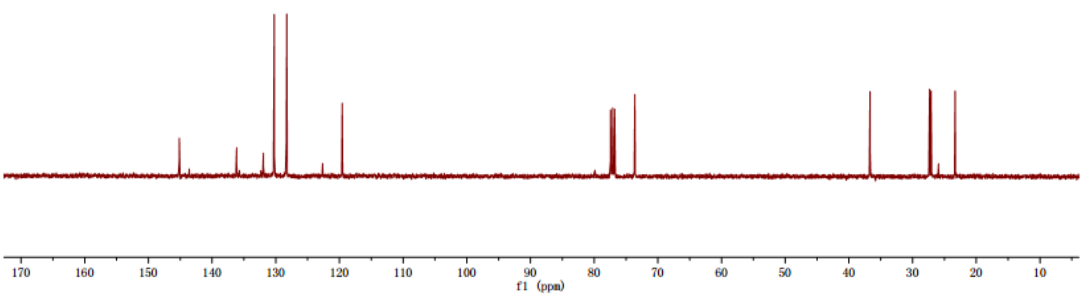
145.159
136.149
131.947
130.273
130.250
128.358
128.271
119.567

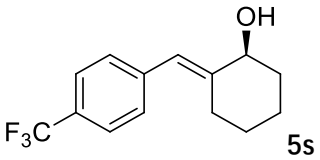
77.417 CDCl3
77.099 CDCl3
76.782 CDCl3
73.615

36.681

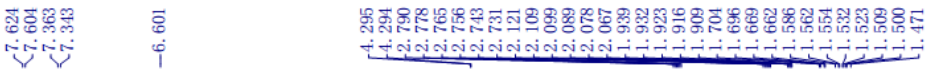
27.338
27.112
23.320






OH
F3C

5s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7.363
7.343
6.601
4.295
4.294
2.790
2.778
2.765
2.756
2.743
2.731
2.121
2.109
2.099
2.089
2.078
2.067
1.939
1.932
1.923
1.916
1.909
1.704
1.696
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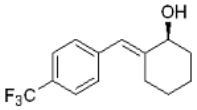
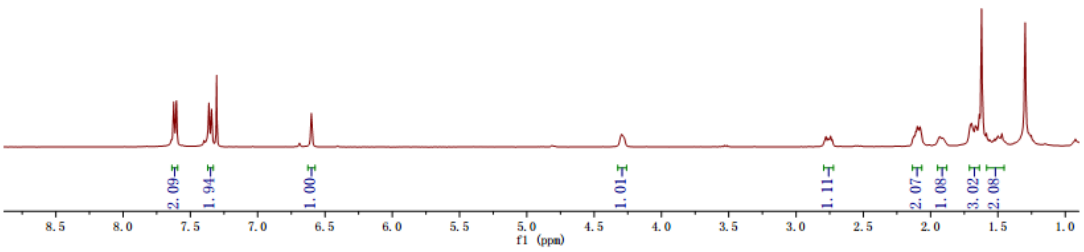
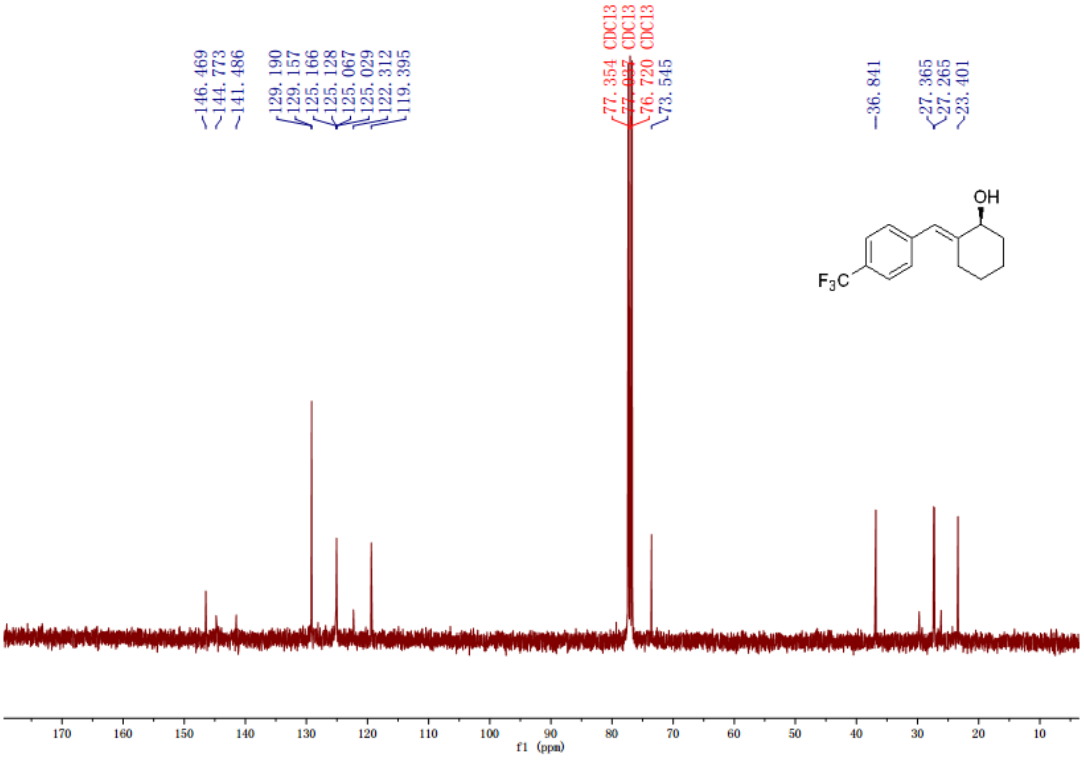
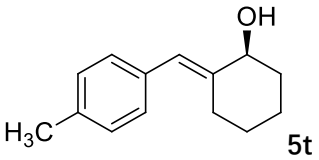
1.662
1.586
1.562
1.554
1.532
1.523
1.509
1.500
1.471

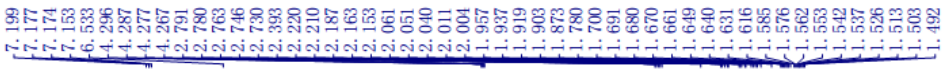

OH
F3C


2.09
1.94
1.00
1.01
1.11
2.07
1.08
3.02
2.08
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
f1 (ppm)


146.469
144.773
141.486
129.190
129.157
125.166
125.128
125.067
125.029
122.312
119.395
77.354 CDCl3
77.037 CDCl3
76.720 CDCl3
73.545
36.841
27.365
27.265
23.401
OH
F3C
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


OH
H3C

5t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7.153
6.533
4.296
4.287
4.277
4.267
2.791
2.780
2.763
2.746
2.730
2.393
2.220
2.210
2.187
2.163
2.153
2.061
2.051
2.040
2.011
2.004
1.957
1.937
1.919
1.903
1.873
1.780
1.700
1.691
1.680
1.670
1.661
1.649
1.640
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1.537
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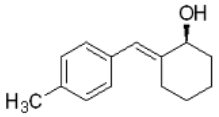
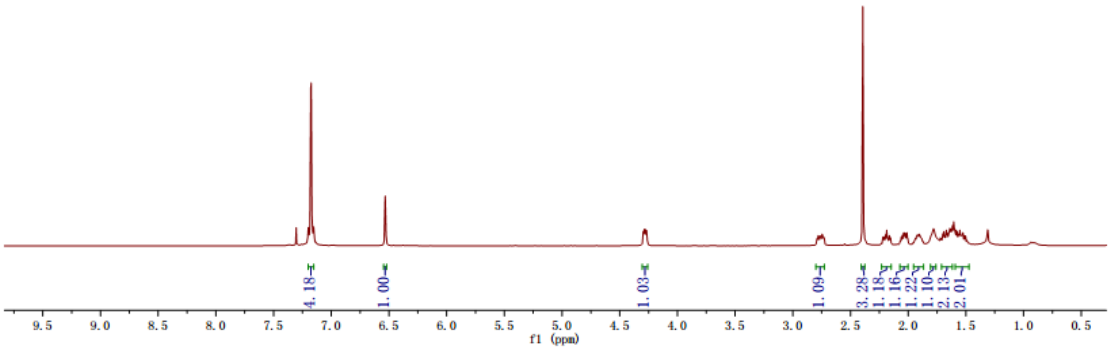
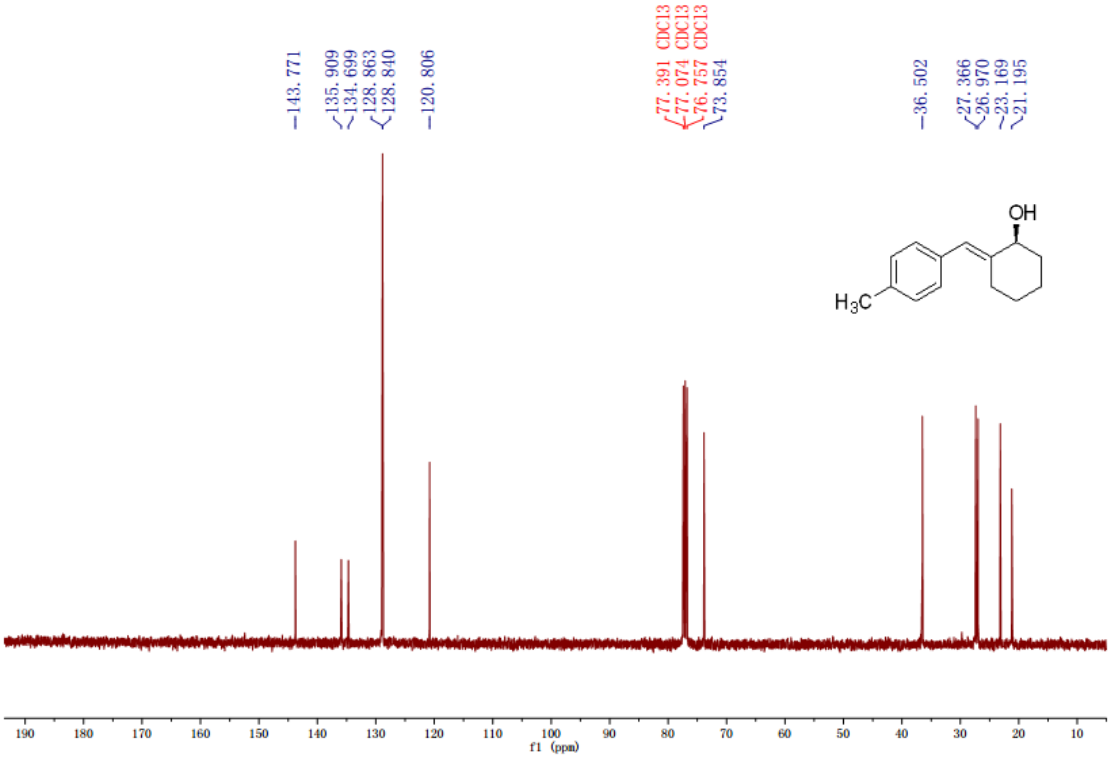
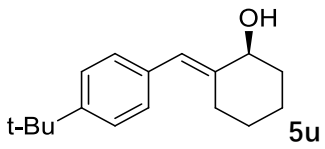
1.513
1.503
1.492

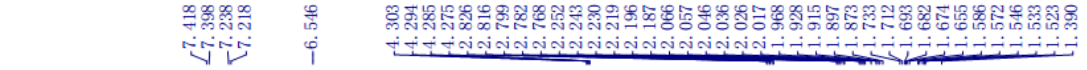

OH
H3C


4.18
1.00
1.03
1.09
3.28
1.18
1.16
1.22
1.10
2.13
2.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)


143.771
135.909
134.699
128.863
128.840
120.806
77.391 CDCl3
77.074 CDCl3
76.757 CDCl3
73.854
36.502
27.366
26.970
23.169
21.195
OH
H3C
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)


OH
t-Bu

5u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4.303
4.294
4.285
4.275
2.826
2.816
2.799
2.782
2.768
2.252
2.243
2.230
2.219
2.196
2.187
2.066
2.057
2.046
2.036
2.026
2.017
1.968
1.928
1.915
1.897
1.873
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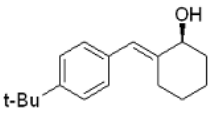
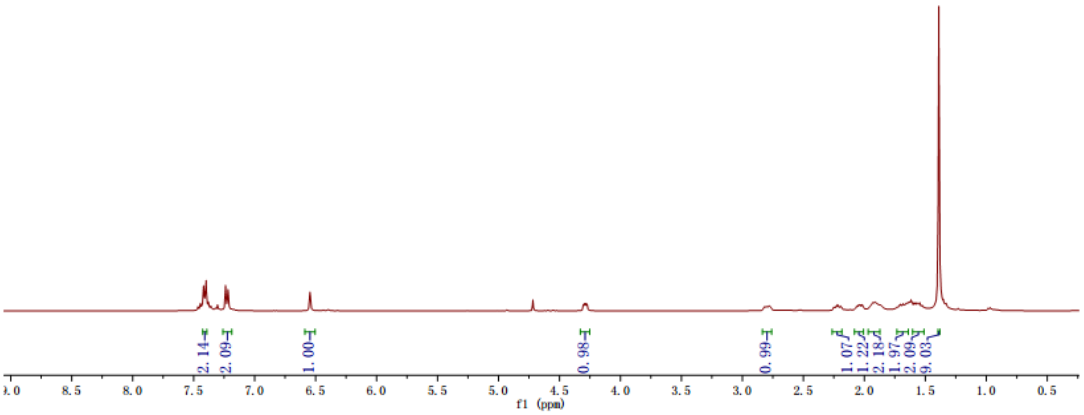
1.523
1.390


OH
t-Bu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2.09
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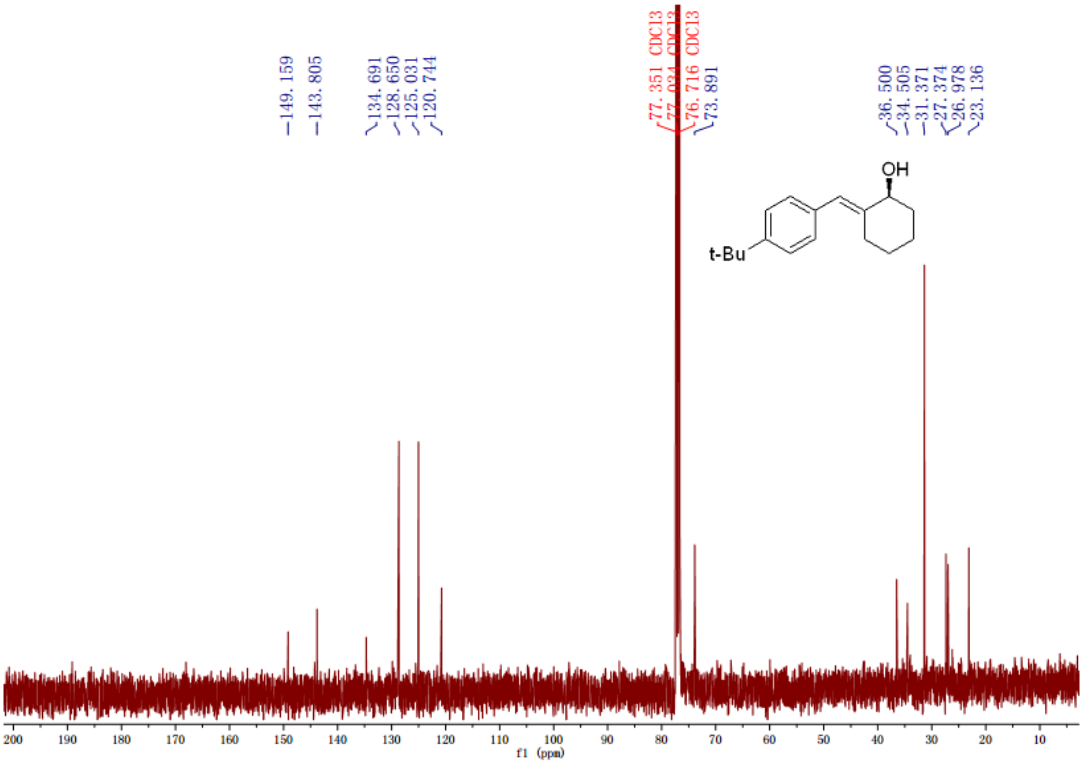
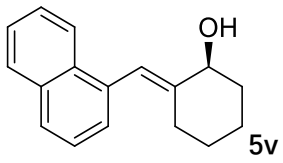
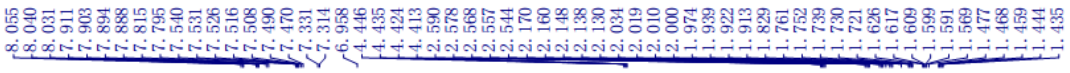
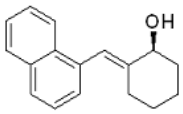
0.98
0.99
1.07
1.22
2.18
1.97
2.09
9.03
f1 (ppm)

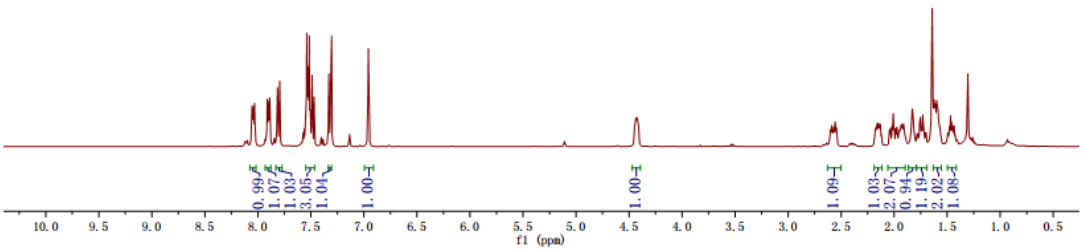

149.159
143.805
134.691
128.650
125.031
120.744
77.351 CDCl3
77.034 CDCl3
76.716 CDCl3
73.891
36.500
34.505
31.371
27.374
26.978
23.136
OH
t-Bu
f1 (ppm)


OH

5v




OH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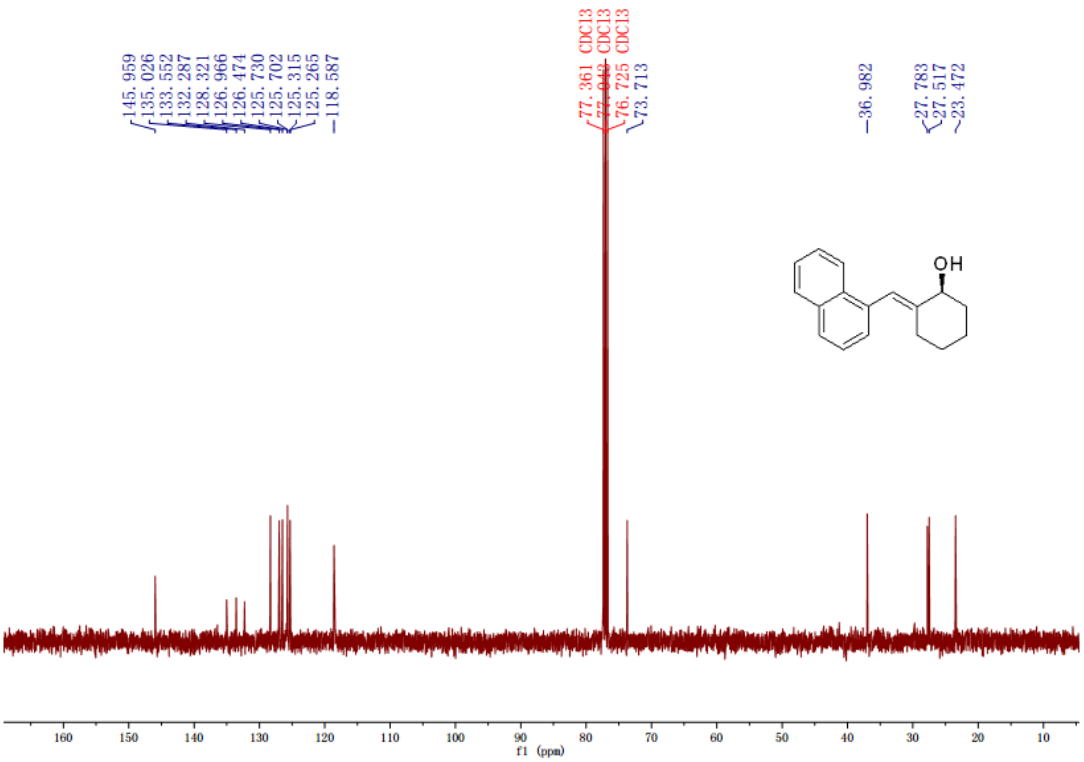
1.07
1.03
3.05
1.04
1.00
1.00
1.09
1.03
2.07
0.94
1.19
2.02
1.08
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)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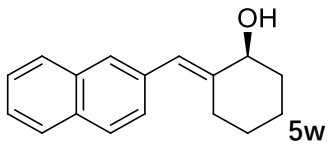
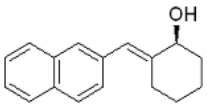
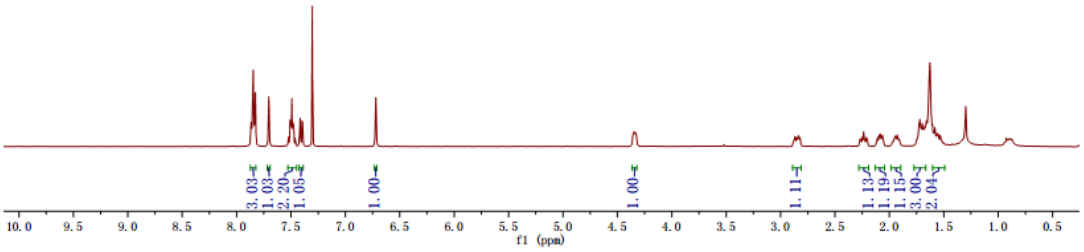
135.026
133.552
132.287
128.321
126.966
126.474
125.730
125.702
125.315
125.265
118.587
77.361 CDCl3
77.048 CDCl3
76.725 CDCl3
73.713
36.982
27.783
27.517
23.472
160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

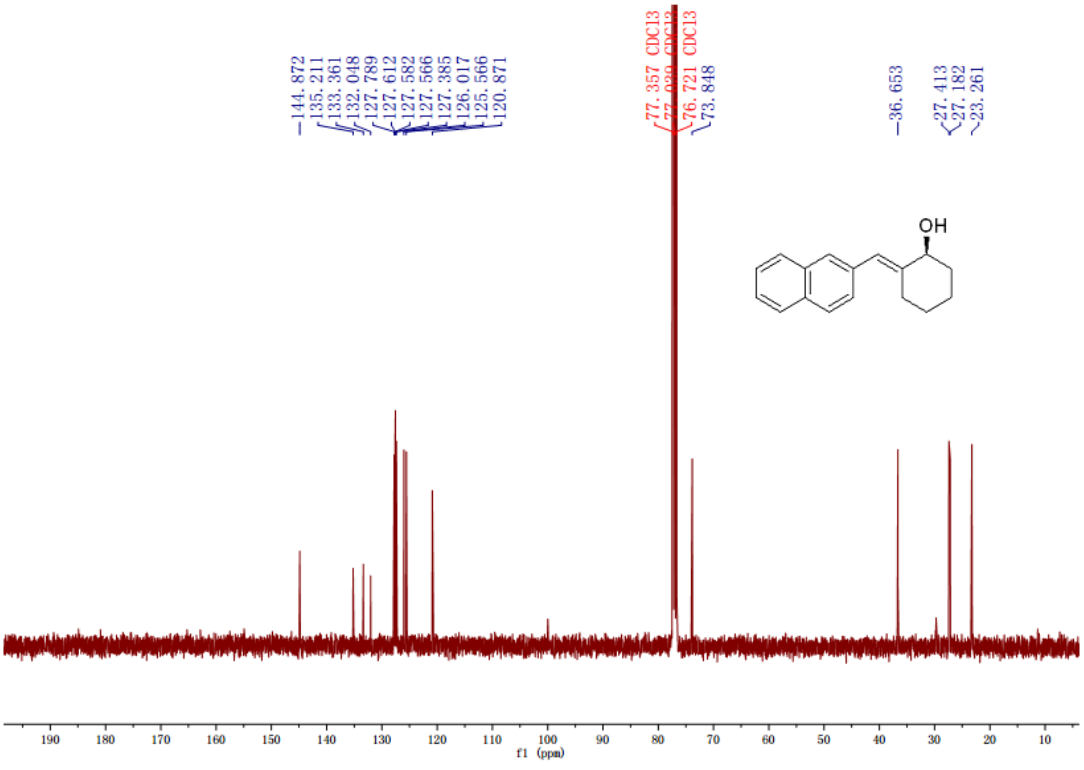
OH

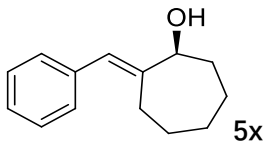

OH
5w


7.866
7.847
7.828
7.704
7.522
7.509
7.505
7.493
7.481
7.477
7.463
7.419
7.415
7.398
7.394
6.721
4.356
4.347
4.338
4.328
2.880
2.867
2.847
2.836
2.820
2.270
2.261
2.237
2.213
2.203
2.113
2.104
2.093
2.073
2.055
1.963
1.954
1.946
1.937
1.928
1.922
1.910
1.750
1.728
1.720
1.698
1.687
1.581
1.554
1.520
1.501
1.498

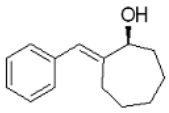

OH

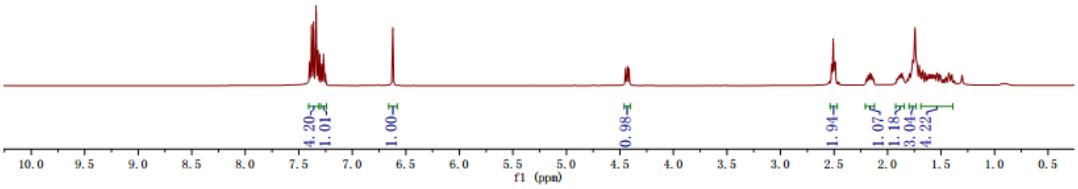

3.03
1.03
2.20
1.05
1.00
1.00
1.11
1.13
1.19
1.15
3.00
2.04
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

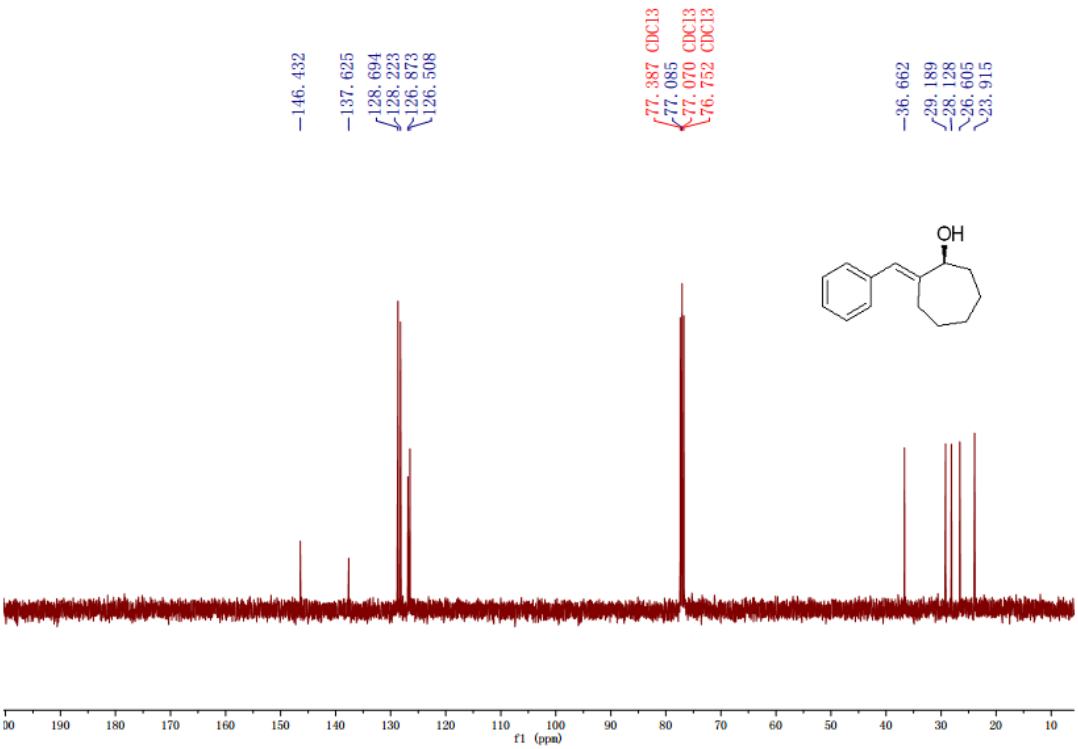

144.872
135.211
133.361
132.048
127.789
127.612
127.582
127.566
127.385
126.017
125.566
120.871
77.357 CDCl3
77.039 CDCl3
76.721 CDCl3
73.848
36.653
27.413
27.182
23.261
OH
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

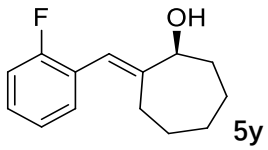

OH
5x


7.400
7.396
7.381
7.368
7.363
7.342
7.339
7.321
7.290
7.286
7.283
7.269
7.263
7.251
6.622
4.450
4.434
4.429
4.414
2.519
2.507
2.495
2.487
2.182
2.168
2.162
2.150
1.893
1.878
1.866
1.855
1.796
1.779
1.775
1.765
1.744
1.744
1.728
1.689
1.683
1.670
1.664
1.649
1.643
1.627
1.617
1.606
1.597
1.584
1.554
1.538
1.534
1.529
1.512
1.512
1.428
1.403
1.398

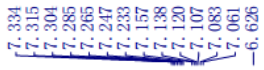

OH

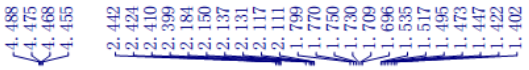

4.20
1.01
1.00
0.98
1.94
1.07
1.18
3.04
4.22
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

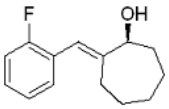

146.432
137.625
128.694
128.223
126.873
126.508
77.387 CDCl3
77.085
77.070 CDCl3
76.752 CDCl3
36.662
29.189
28.128
26.605
23.915
OH
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

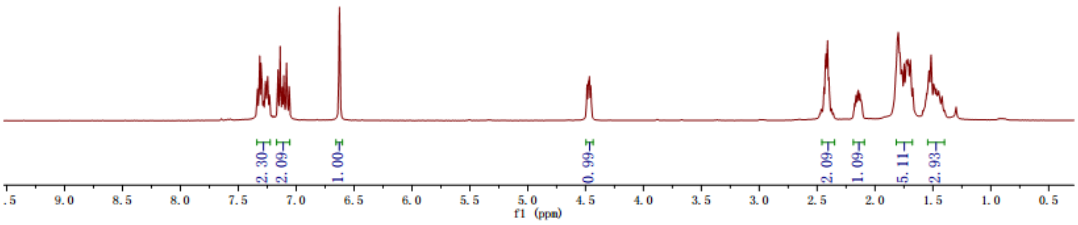

F
OH

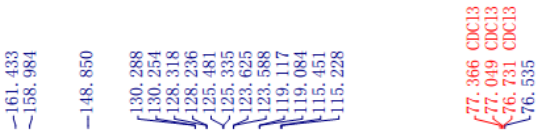
5y

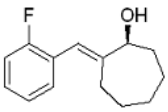

7.334
7.315
7.304
7.285
7.265
7.247
7.233
7.157
7.138
7.120
7.107
7.083
7.061
6.626

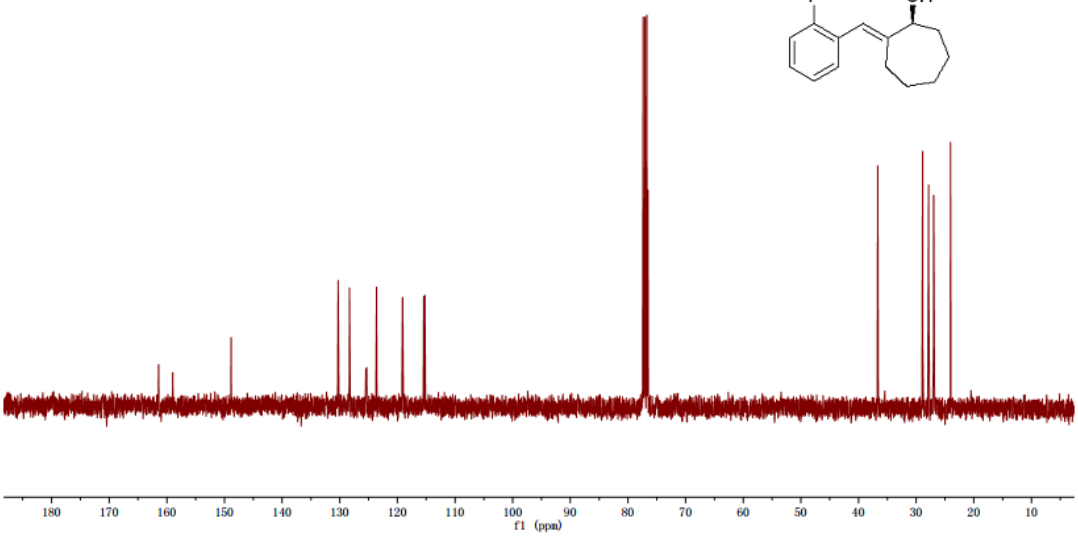

4.488
4.475
4.468
4.455
2.442
2.424
2.410
2.399
2.184
2.150
2.137
2.131
2.117
2.111
1.799
1.770
1.750
1.730
1.709
1.696
1.535
1.517
1.495
1.473
1.447
1.422
1.402

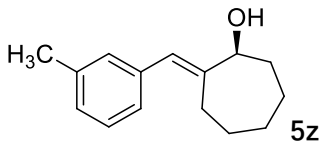

F
OH


2.30
2.09
1.00
0.99
2.09
1.09
5.11
2.93
f1 (ppm)

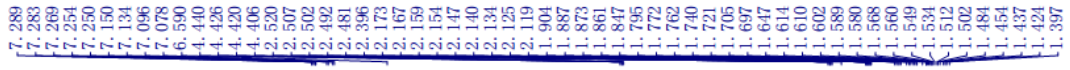

161.433
158.984
148.850
130.288
130.254
128.318
128.236
125.481
125.335
123.625
123.588
119.117
119.084
115.451
115.228
77.366 CDCl3
77.049 CDCl3
76.731 CDCl3
76.535
36.670
28.875
27.841
26.966
24.049

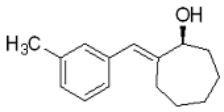

F
OH

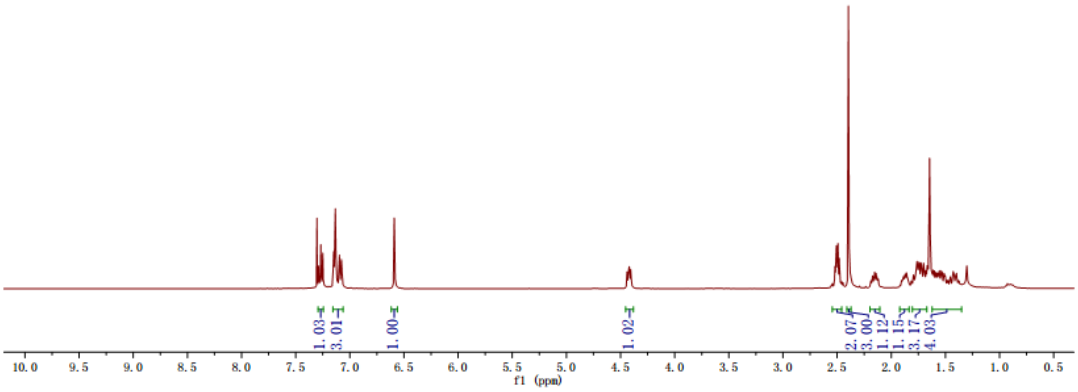

f1 (ppm)

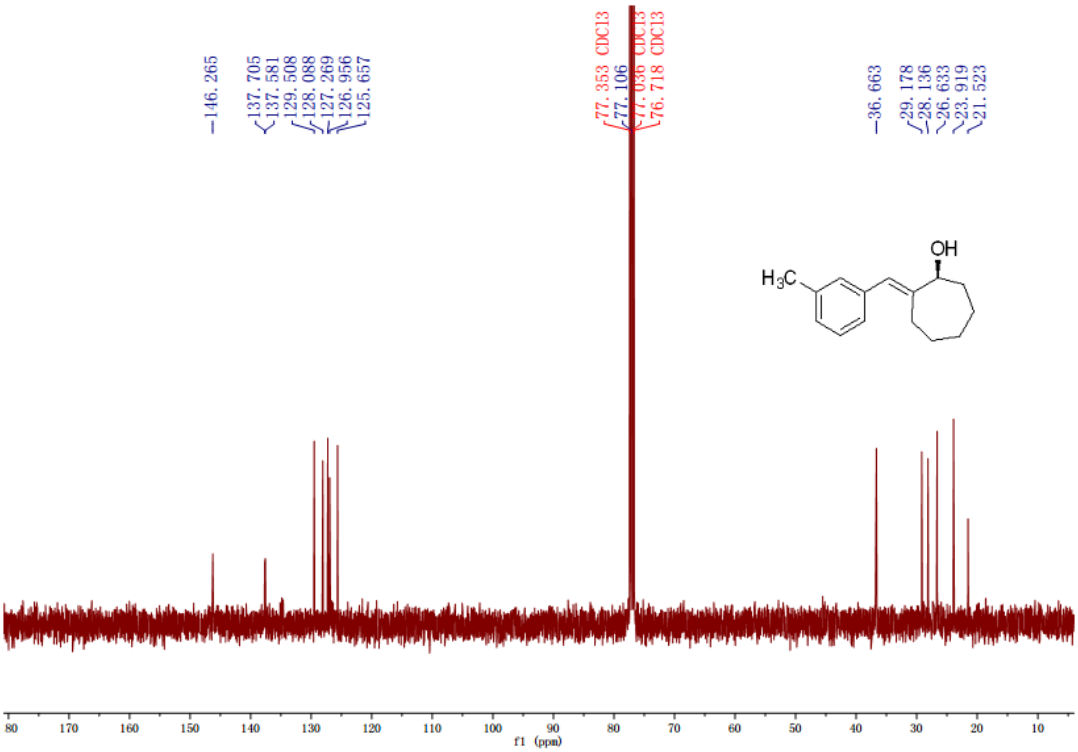

OH
H3C

5z

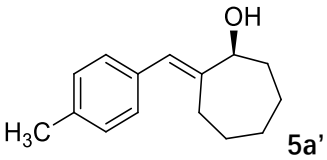

7.289
7.283
7.269
7.254
7.250
7.150
7.134
7.096
7.078
6.590
4.440
4.426
4.420
4.406
2.520
2.507
2.502
2.492
2.481
2.396
2.173
2.167
2.159
2.154
2.147
2.140
2.134
2.125
2.119
1.904
1.887
1.873
1.861
1.847
1.795
1.772
1.762
1.740
1.721
1.705
1.697
1.647
1.614
1.610
1.602
1.589
1.580
1.568
1.560
1.549
1.534
1.512
1.502
1.484
1.454
1.437
1.424
1.397


OH
H3C

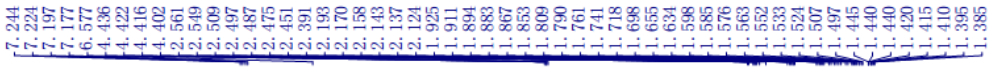

1.03
3.01
1.00
1.02
2.07
3.00
1.12
1.15
3.17
4.03
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


146.265
137.705
137.581
129.508
128.088
127.269
126.956
125.657
77.353 CDCl3
77.106
77.036 CDCl3
76.718 CDCl3
36.663
29.178
28.136
26.633
23.919
21.523
80
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

OH
H3C


OH
H3C

5a'


7.244
7.224
7.197
7.177
6.577
4.436
4.422
4.416
4.402
2.561
2.549
2.509
2.497
2.487
2.475
2.451
2.391
2.193
2.170
2.158
2.143
2.137
2.124
1.925
1.911
1.894
1.883
1.867
1.853
1.809
1.790
1.761
1.741
1.718
1.698
1.655
1.634
1.598
1.585
1.576
1.563
1.552
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1.524
1.507
1.497
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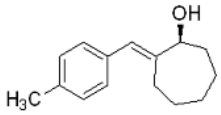
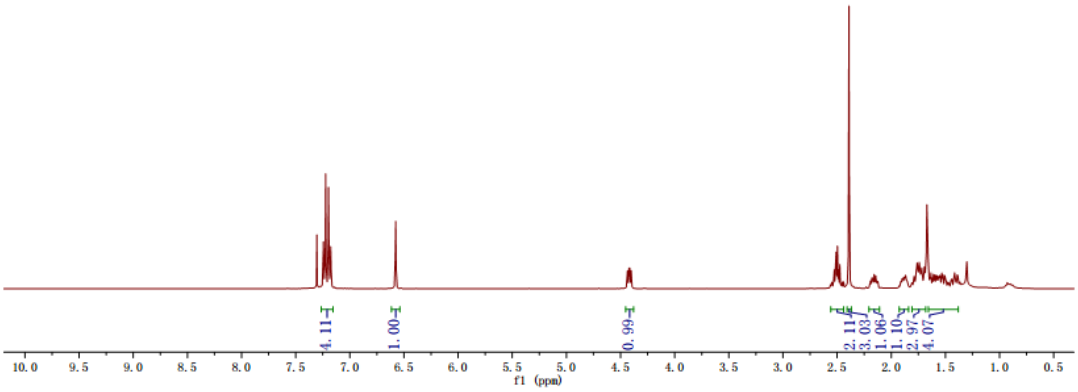
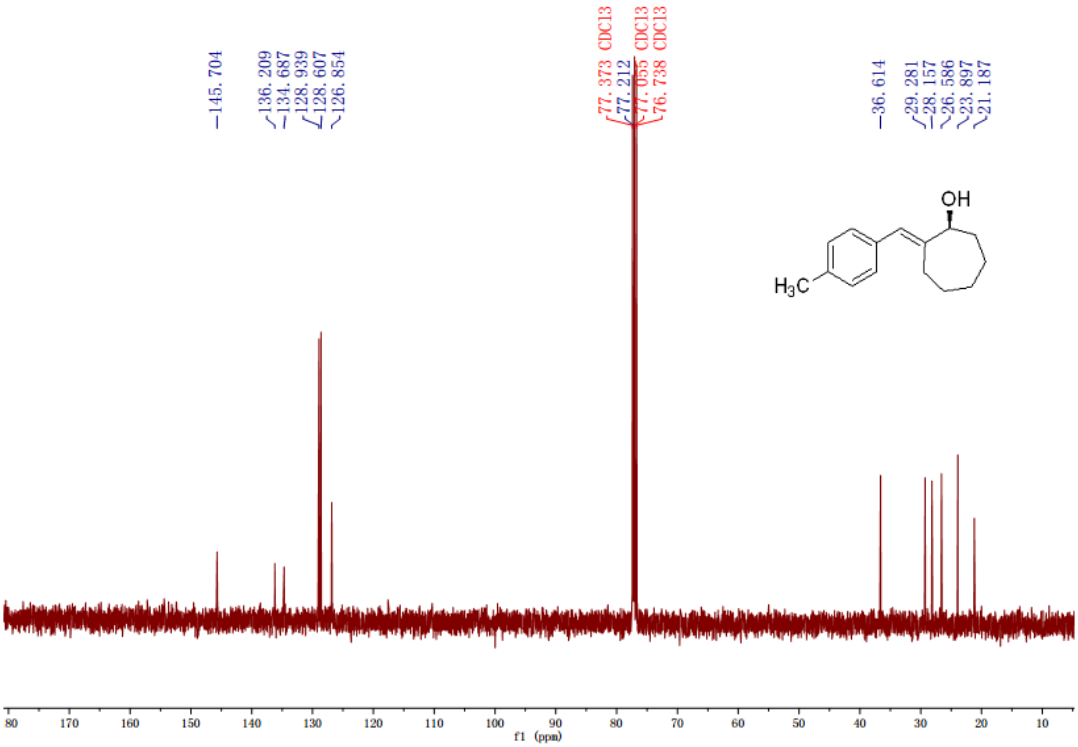
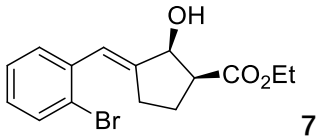
1.440
1.440
1.420
1.415
1.410
1.395
1.385

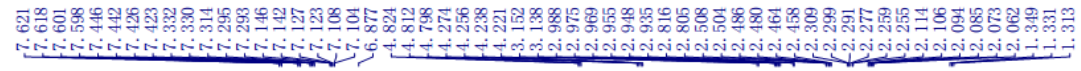

OH
H3C

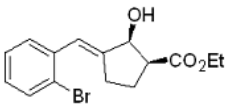

4.11
1.00
0.99
2.11
3.03
1.06
1.10
2.97
4.07
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

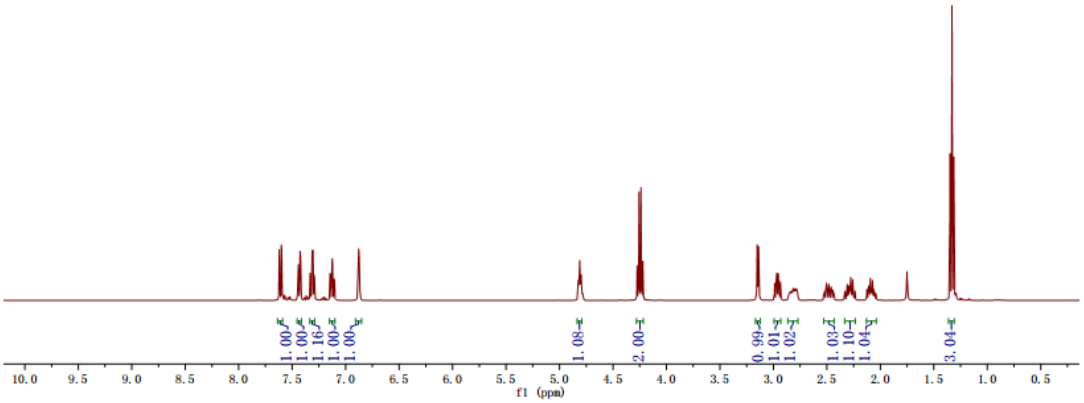

145.704
136.209
134.687
128.939
128.607
126.854
77.373 CDCl3
77.212
77.055 CDCl3
76.738 CDCl3
36.614
29.281
28.157
26.586
23.897
21.187
OH
H3C
80
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

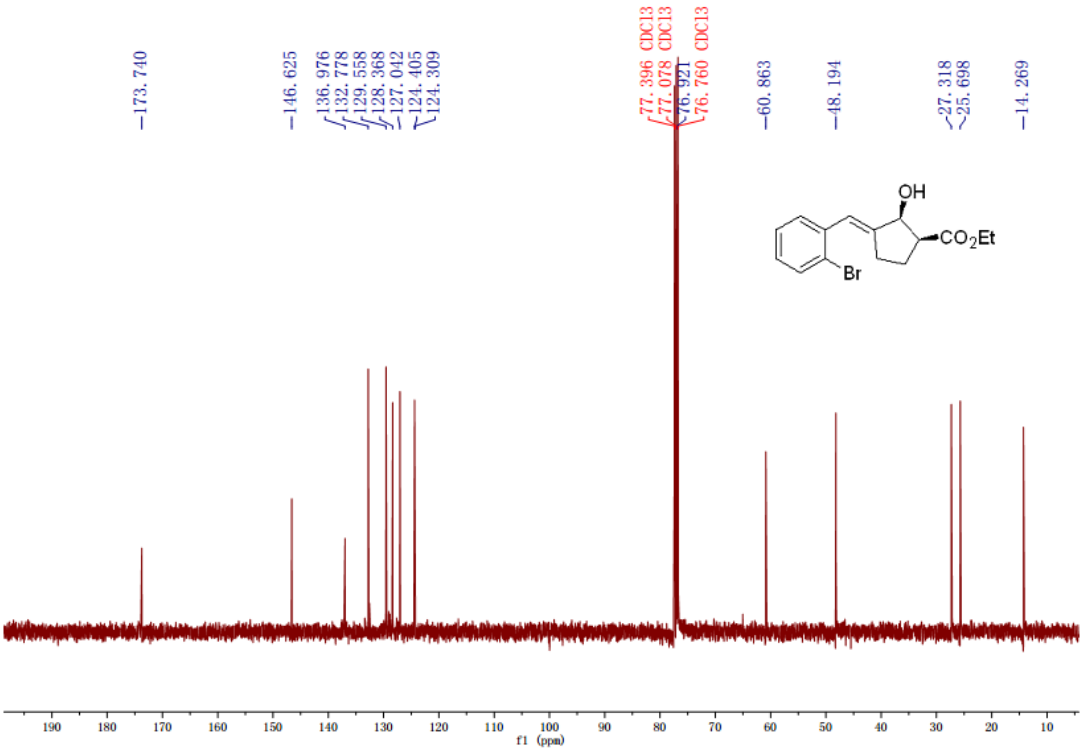

OH
CO2Et
Br

7

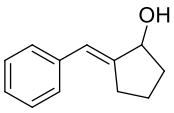

7.621
7.618
7.601
7.598
7.446
7.442
7.426
7.423
7.332
7.330
7.314
7.295
7.293
7.146
7.142
7.127
7.123
7.108
7.104
6.877
4.824
4.812
4.798
4.274
4.256
4.238
4.221
3.152
3.138
2.988
2.975
2.969
2.955
2.948
2.935
2.816
2.805
2.508
2.504
2.486
2.480
2.464
2.458
2.309
2.299
2.291
2.277
2.259
2.255
2.114
2.106
2.094
2.085
2.073
2.062
1.349
1.331
1.313


OH
CO2Et
Br

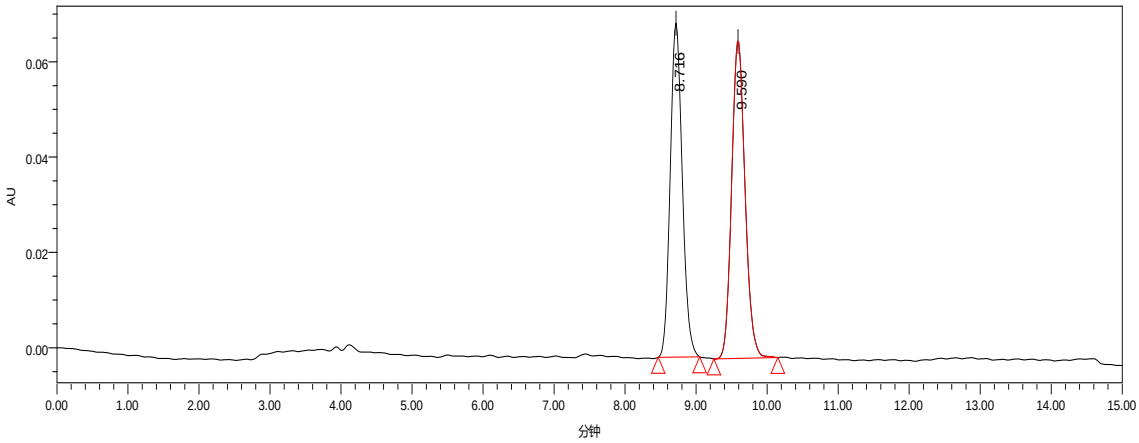

1.00
1.00
1.16
1.00
1.00
1.08
2.00
0.99
1.01
1.02
1.03
1.10
1.04
3.04
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)


173.740
146.625
136.976
132.778
129.558
128.368
127.042
124.405
124.309
77.396 CDCl3
77.078 CDCl3
76.760 CDCl3
60.863
48.194
27.318
25.698
14.269
OH
CO2Et
Br
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

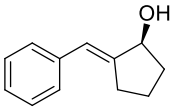
9. HPLC Spectra of the Products



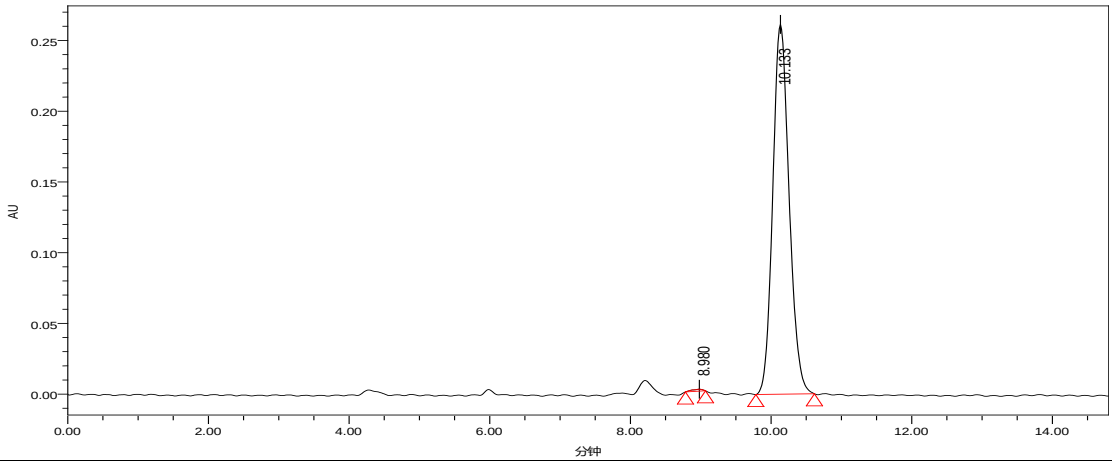
Racemate-3a



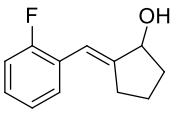
Peak	Ret Time[min]	Area	% Area	Height
1	8.716	820723	49.19	69615
2	9.590	847580	50.81	68828



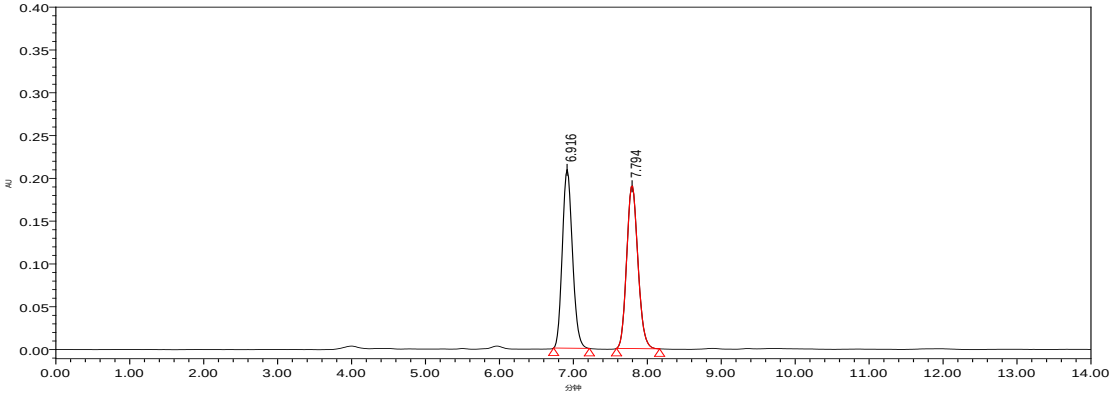
(*S*)-**3a**



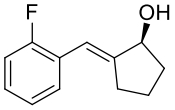
Peak	Ret Time[min]	Area	% Area	Height
1	8.980	15370	0.36	1389
2	10.133	4226813	99.64	261351



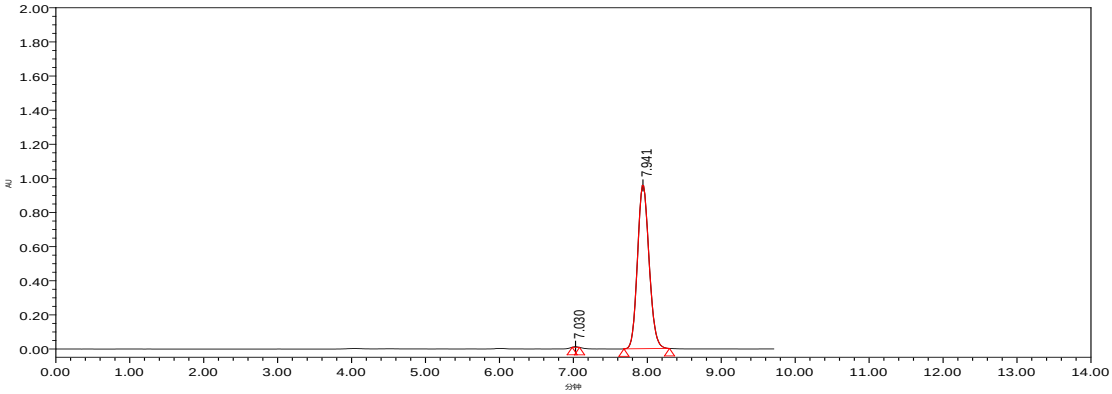
Racemate-**3b**



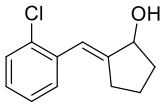
Peak	Ret Time[min]	Area	% Area	Height
1	6.916	2010045	49.68	209293
2	7.794	2036130	50.32	191261



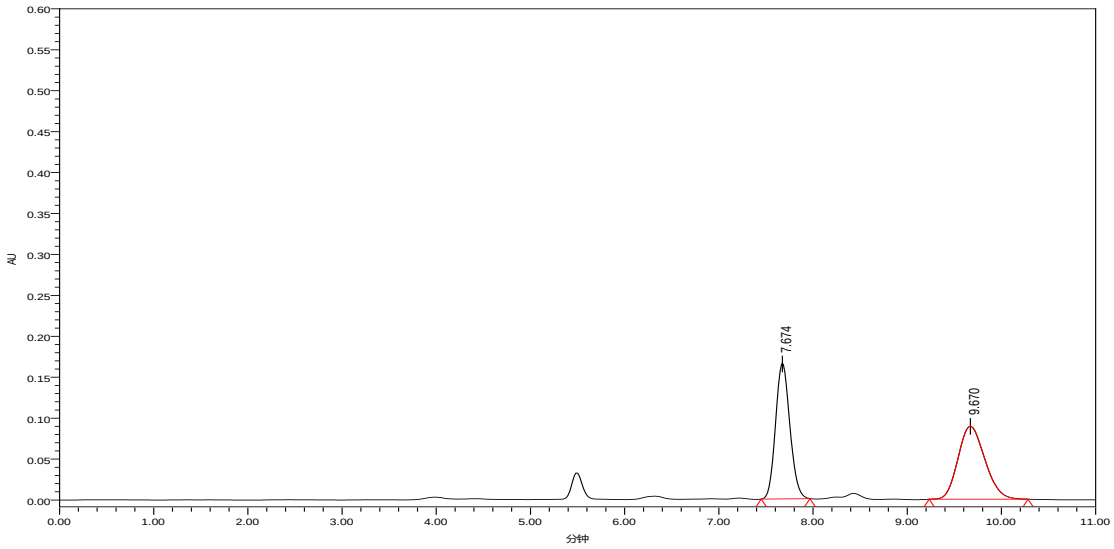
(*S*)-**3b**



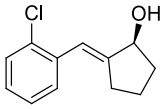
Peak	Ret Time[min]	Area	% Area	Height
1	7.030	13360	0.13	3524
2	7.941	10458194	99.87	963311



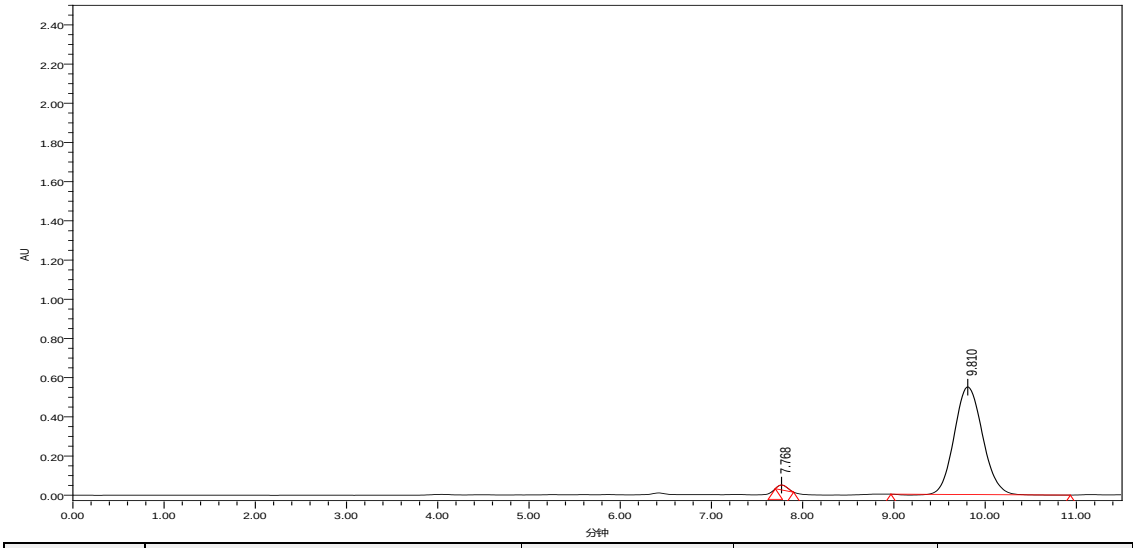
Racemate-**3c**



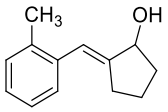
Peak	Ret Time[min]	Area	% Area	Height
1	7.674	1752115	49.86	165955
2	9.670	1762096	50.14	89144



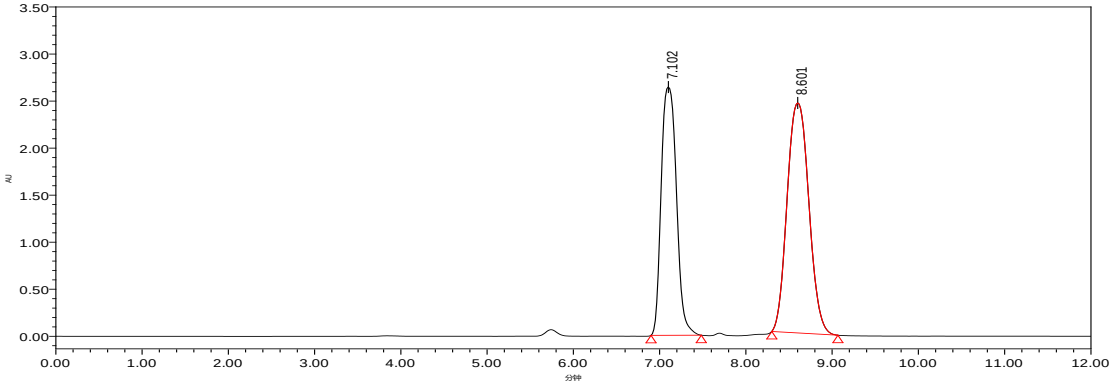
(*S*)-**3c**



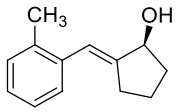
Peak	Ret Time[min]	Area	% Area	Height
1	7.768	171865	1.42	24449
2	9.810	11910578	98.58	549242



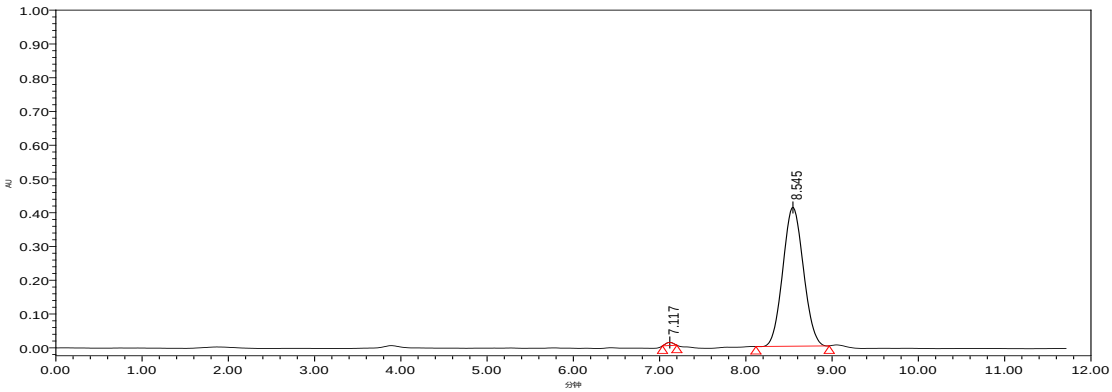
Racemate-**3d**



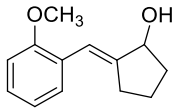
Peak	Ret Time[min]	Area	% Area	Height
1	7.102	36898503	49.01	2649203
2	8.601	38389199	50.99	2444270



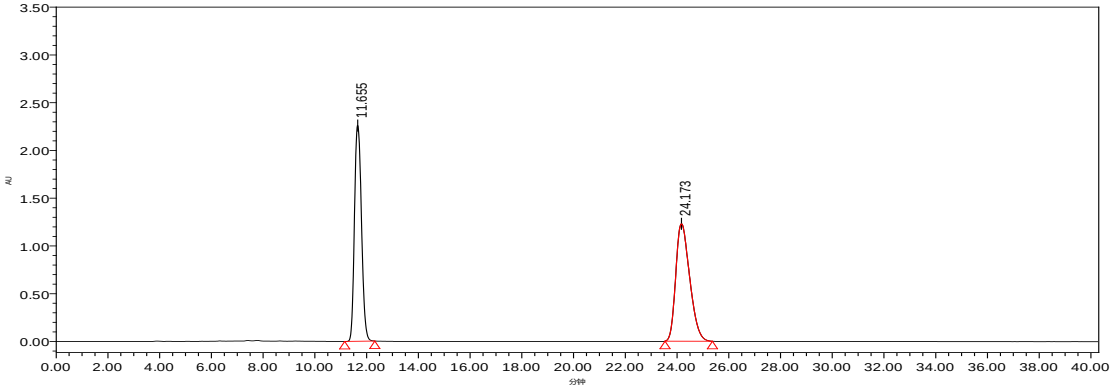
(*S*)-**3d**



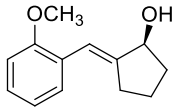
Peak	Ret Time[min]	Area	% Area	Height
1	7.117	56904	0.83	9355
2	8.545	6825985	99.17	411776



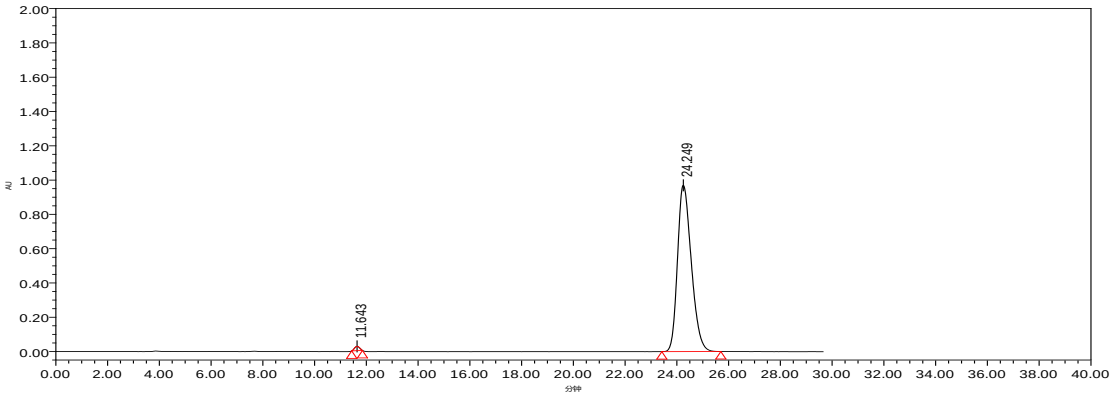
Racemate-**3e**



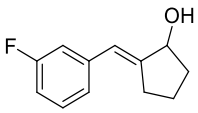
Peak	Ret Time[min]	Area	% Area	Height
1	11.655	44219677	49.88	2260210
2	24.173	44432443	50.12	1232180



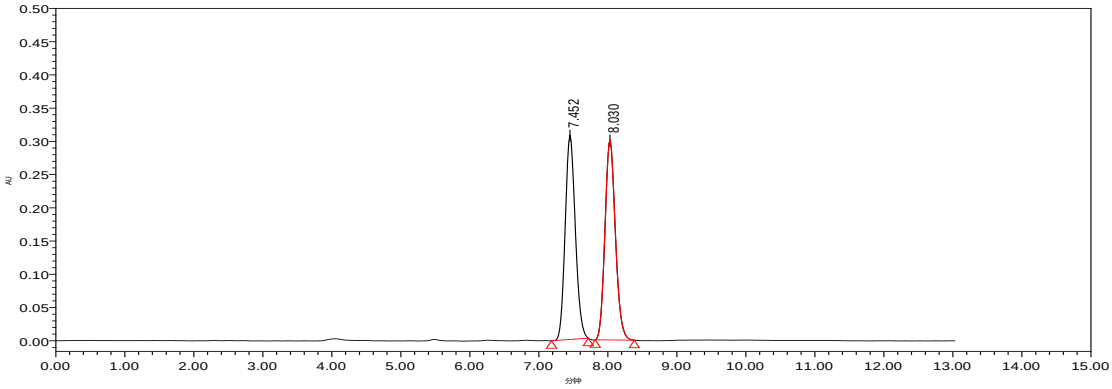
(*S*)-**3e**



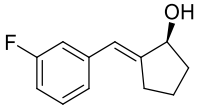
Peak	Ret Time[min]	Area	% Area	Height
1	11.643	345331	0.95	25251
2	24.249	35904609	99.05	970287



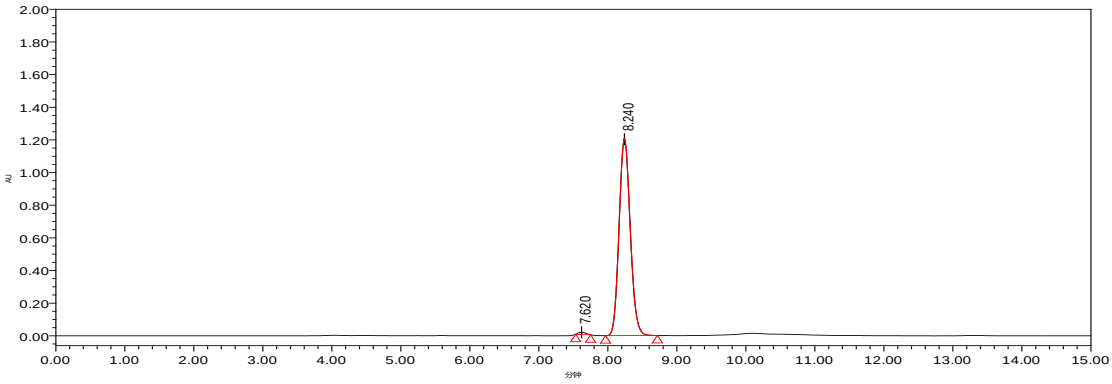
Racemate-**3f**



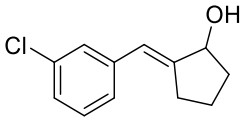
Peak	Ret Time[min]	Area	% Area	Height
1	7.452	3154929	50.02	307742
2	8.030	3153036	49.98	301033



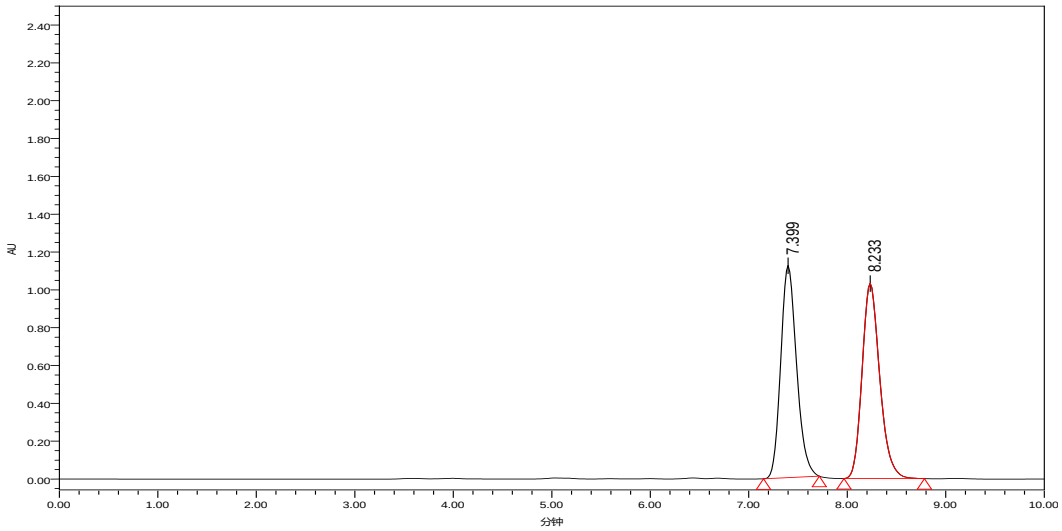
(*S*)-**3f**



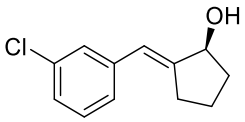
Peak	Ret Time[min]	Area	% Area	Height
1	7.620	101268	0.74	13723
2	8.240	13587456	99.26	1210308



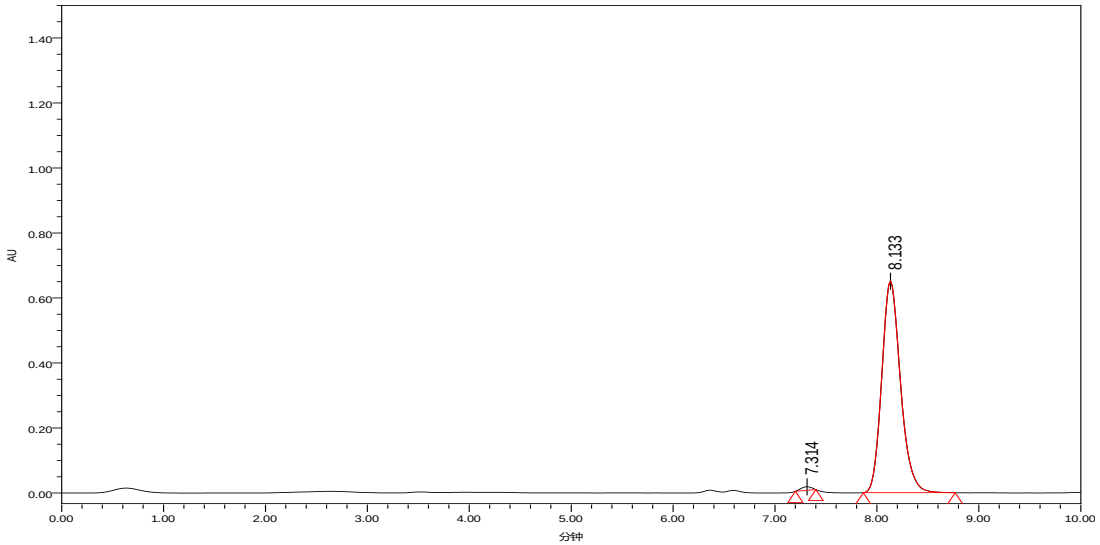
Racemate-**3g**



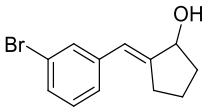
Peak	Ret Time[min]	Area	% Area	Height
1	7.399	12546515	49.41	1120741
2	8.233	12848416	50.59	1030973



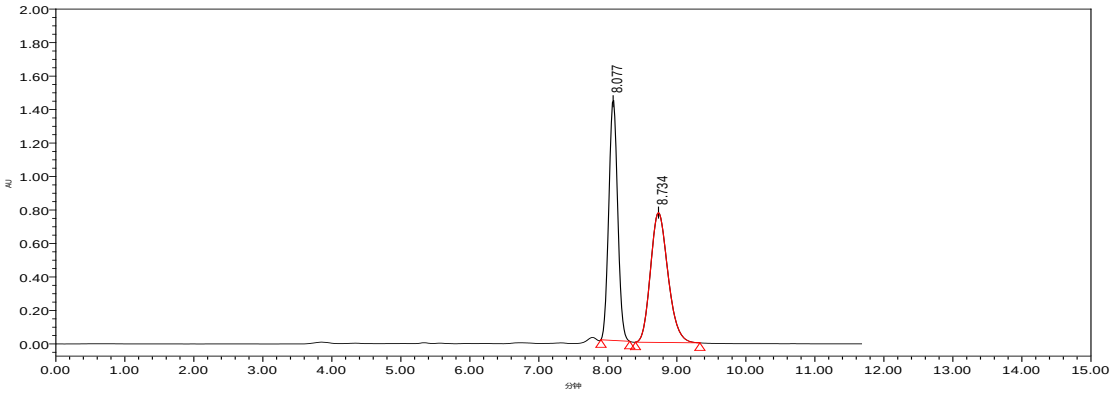
(*S*)-**3g**



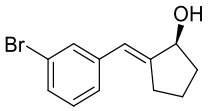
Peak	Ret Time[min]	Area	% Area	Height
1	7.314	78123	0.93	10852
2	8.133	8305713	99.07	651013



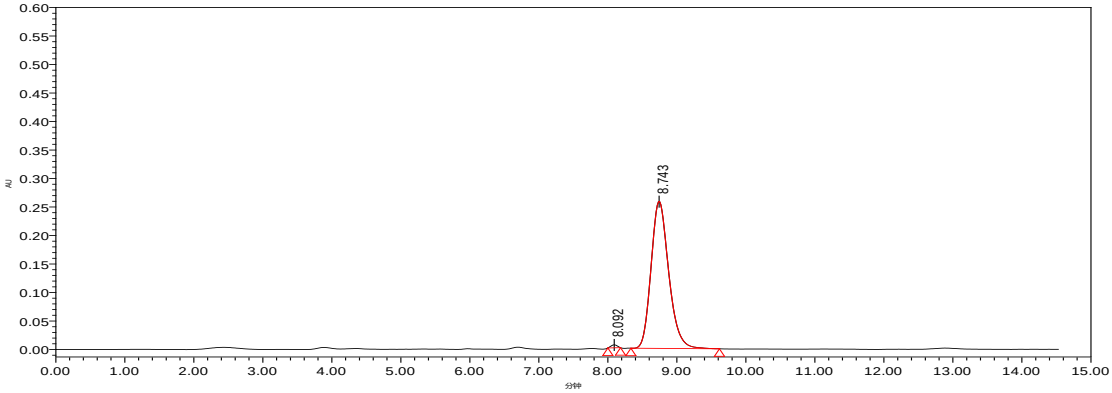
Racemate-**3h**



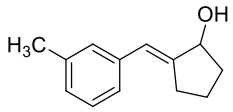
Peak	Ret Time[min]	Area	% Area	Height
1	8.077	12972951	49.31	1441967
2	8.734	13333409	50.69	768225



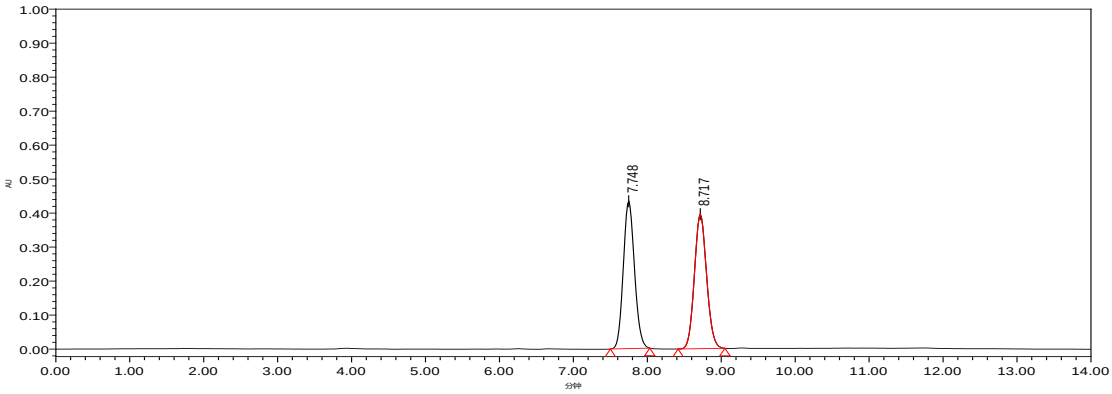
(*S*) -**3h**



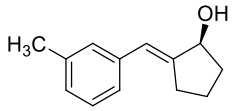
Peak	Ret Time[min]	Area	% Area	Height
1	8.092	12818	0.28	2926
2	8.743	4580698	99.72	258156



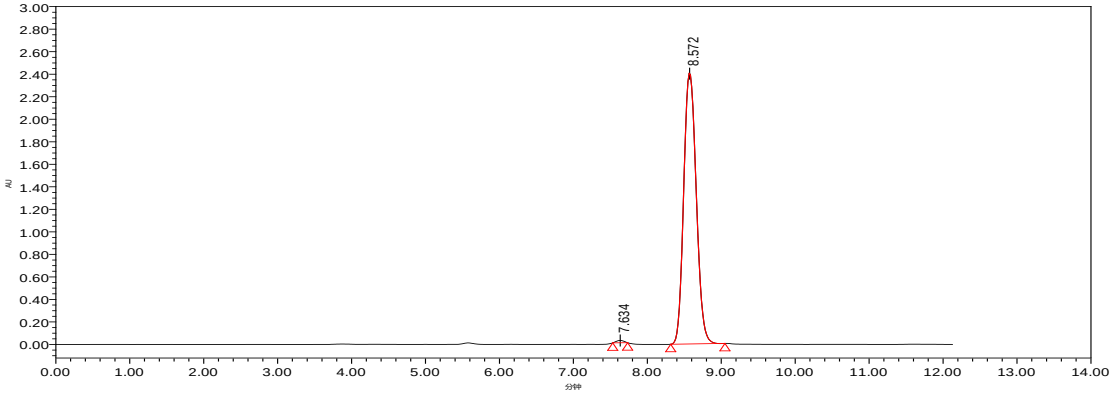
Racemate-**3i**



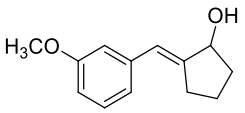
Peak	Ret Time[min]	Area	% Area	Height
1	7.748	4586533	50.18	434959
2	8.717	4553563	49.82	395813



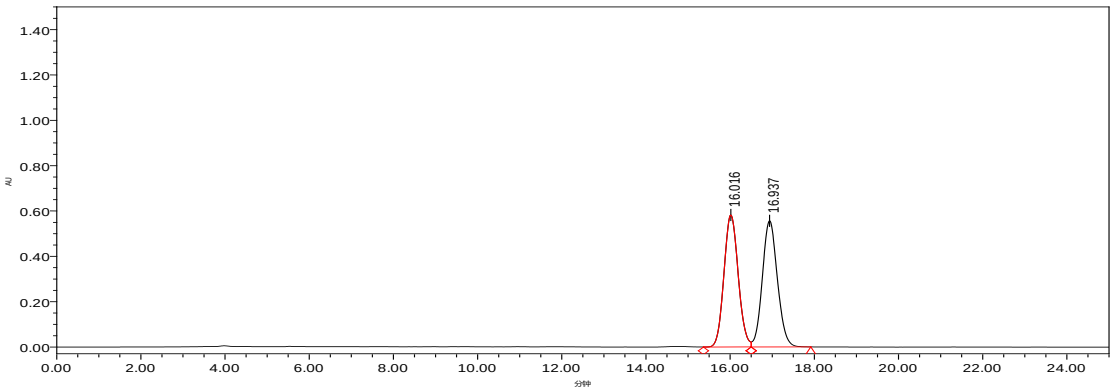
(*S*)-**3i**



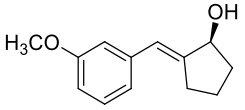
Peak	Ret Time[min]	Area	% Area	Height
1	7.634	146683	0.51	20663
2	8.572	28440254	99.49	2411793



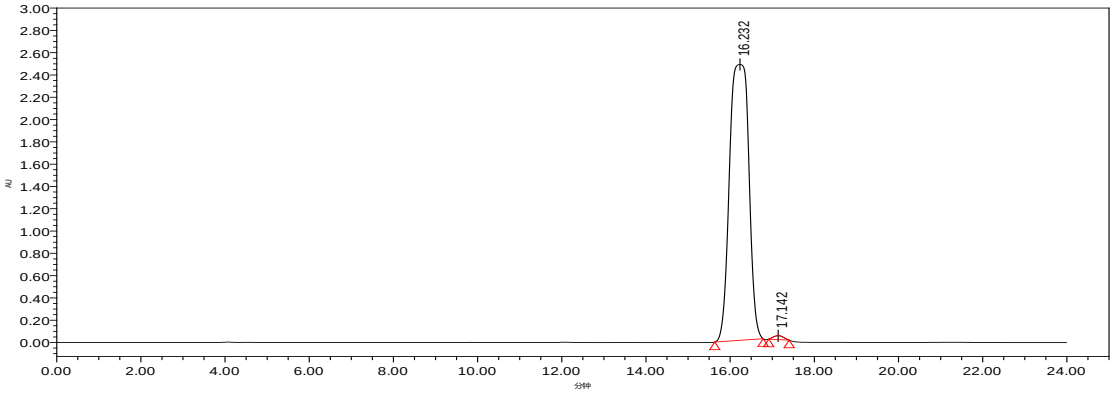
Racemate-**3j**



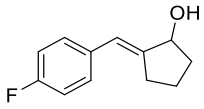
Peak	Ret Time[min]	Area	% Area	Height
1	16.016	13003578	50.50	570523
2	16.937	12744143	49.50	537409



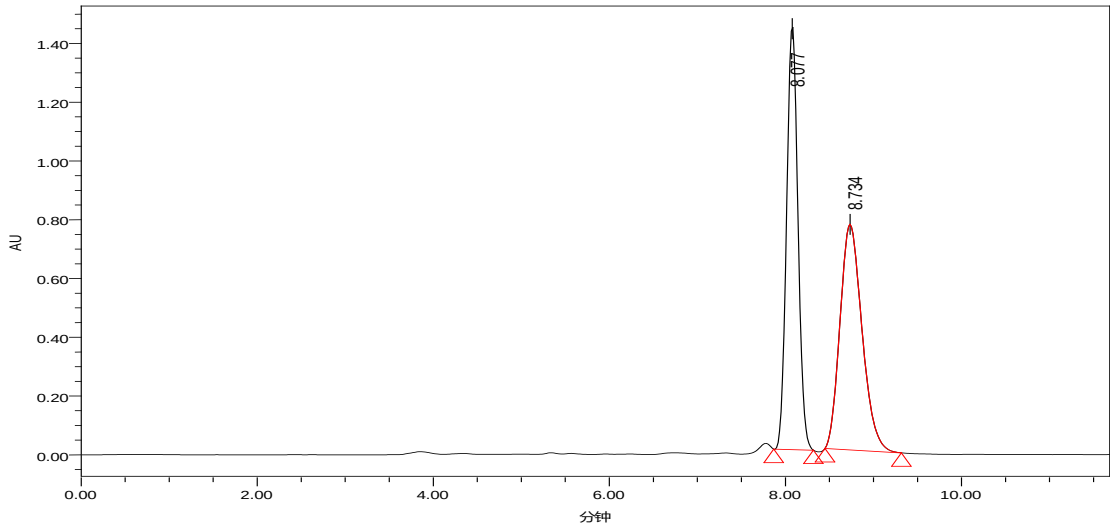
(*S*)-**3j**



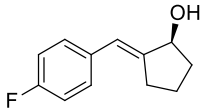
Peak	Ret Time[min]	Area	% Area	Height
1	16.232	79103881	99.24	2475159
2	17.142	602515	0.76	35196



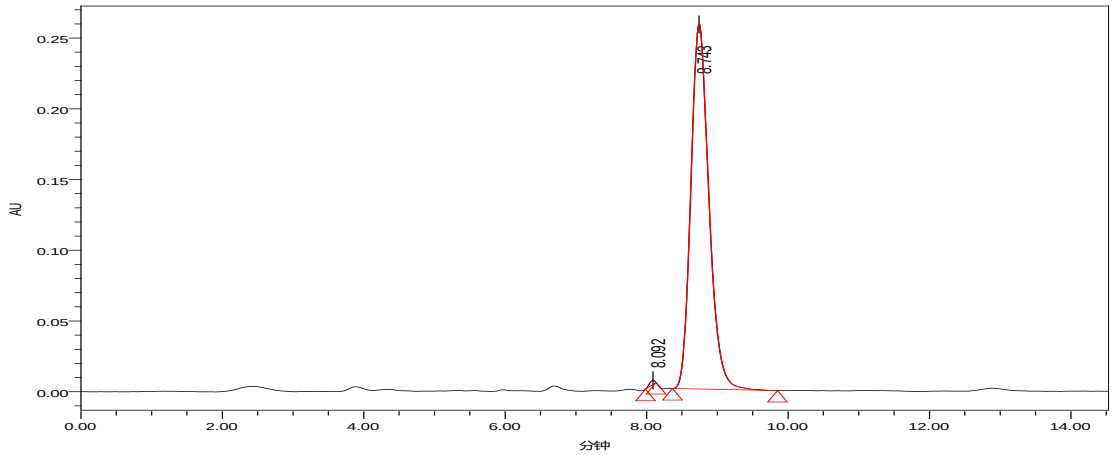
Racemate-**3k**



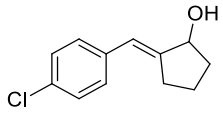
Peak	Ret Time[min]	Area	% Area	Height
1	8.077	12972951	49.31	1441967
2	8.734	13333409	50.69	768225



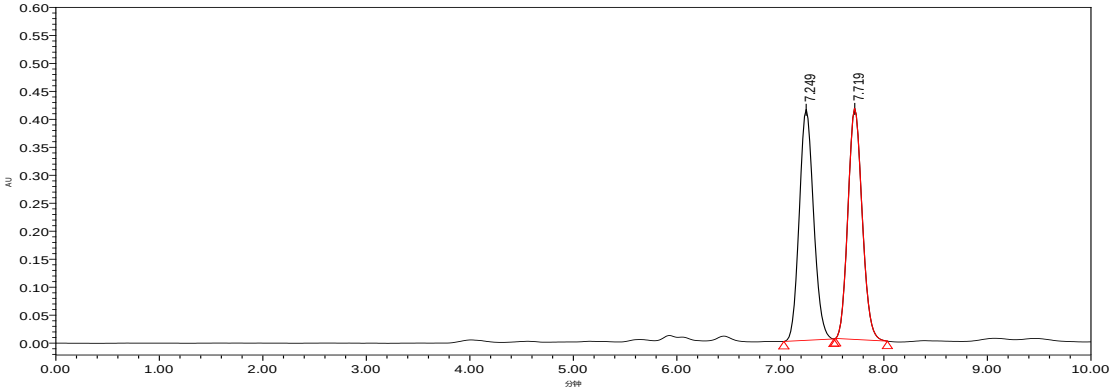
(*S*)-**3k**



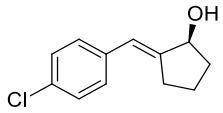
Peak	Ret Time[min]	Area	% Area	Height
1	8.092	16061	0.35	2947
2	8.743	4592187	99.65	258249



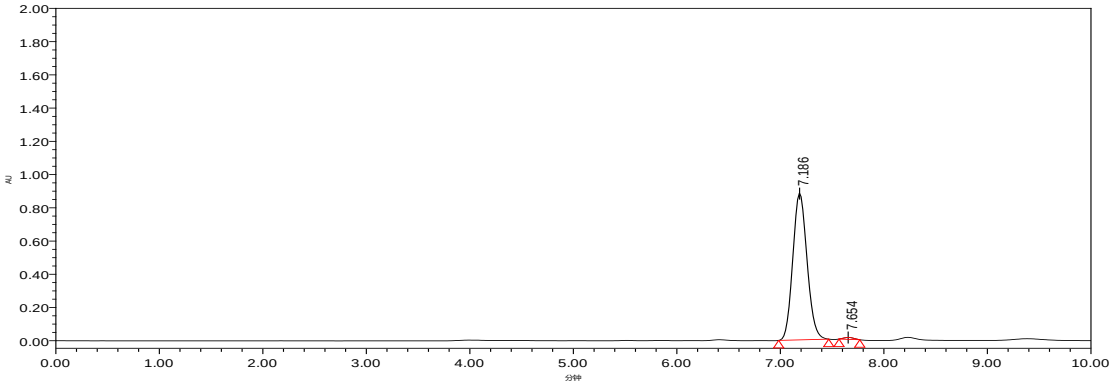
Racemate-**3l**



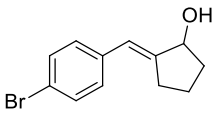
Peak	Ret Time[min]	Area	% Area	Height
1	7.249	3970295	50.48	411759
2	7.719	3894911	49.52	410521



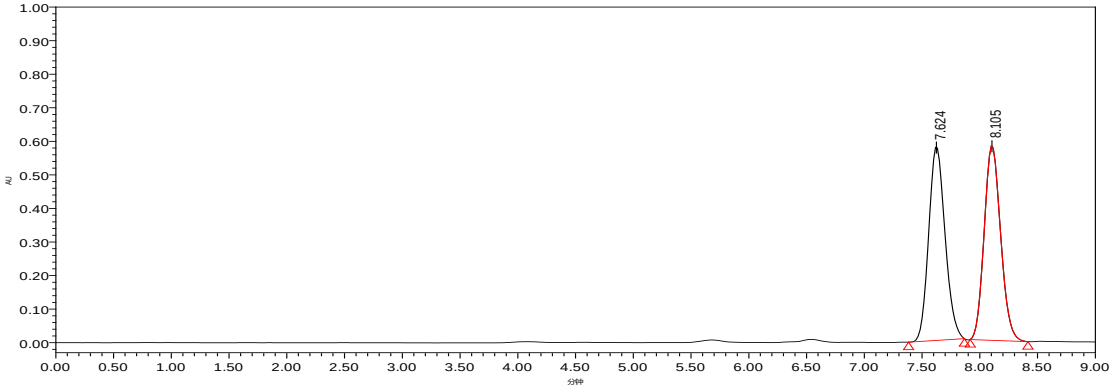
(*S*)-**3l**



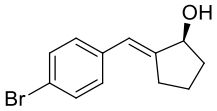
Peak	Ret Time[min]	Area	% Area	Height
1	7.186	8446556	99.09	883463
2	7.654	77773	0.91	11230



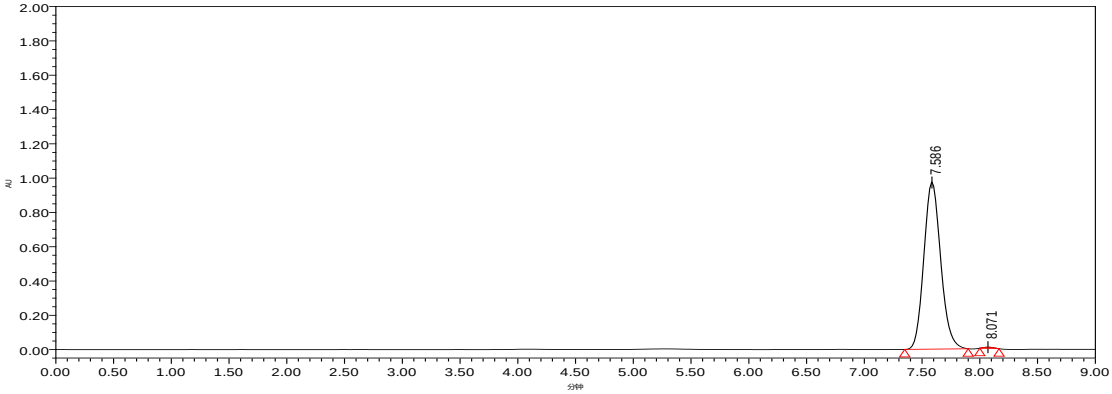
Racemate-**3m**



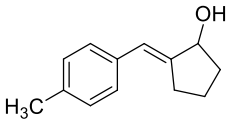
Peak	Ret Time[min]	Area	% Area	Height
1	7.624	5722518	49.73	579331
2	8.105	5784658	50.27	582770



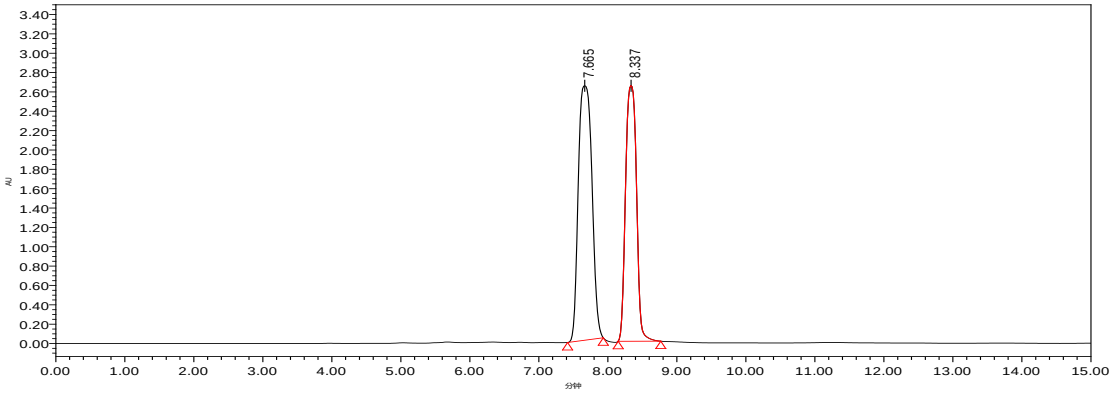
(*S*)-**3m**



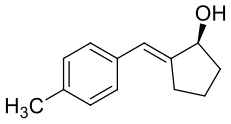
Peak	Ret Time[min]	Area	% Area	Height
1	7.586	9892892	99.56	974730
2	8.071	43892	0.44	7277



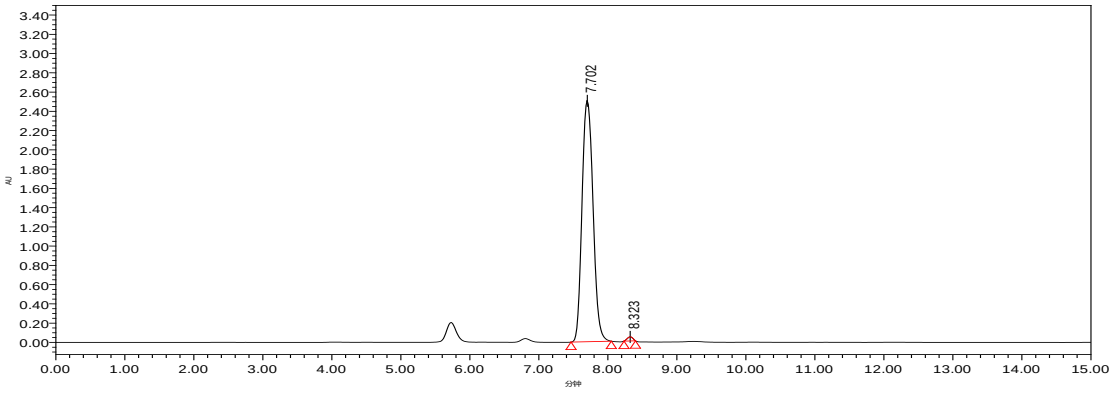
Racemate-**3n**



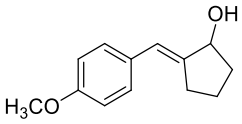
Peak	Ret Time[min]	Area	% Area	Height
1	7.665	33184993	50.82	2632287
2	8.337	32114088	49.18	2648136



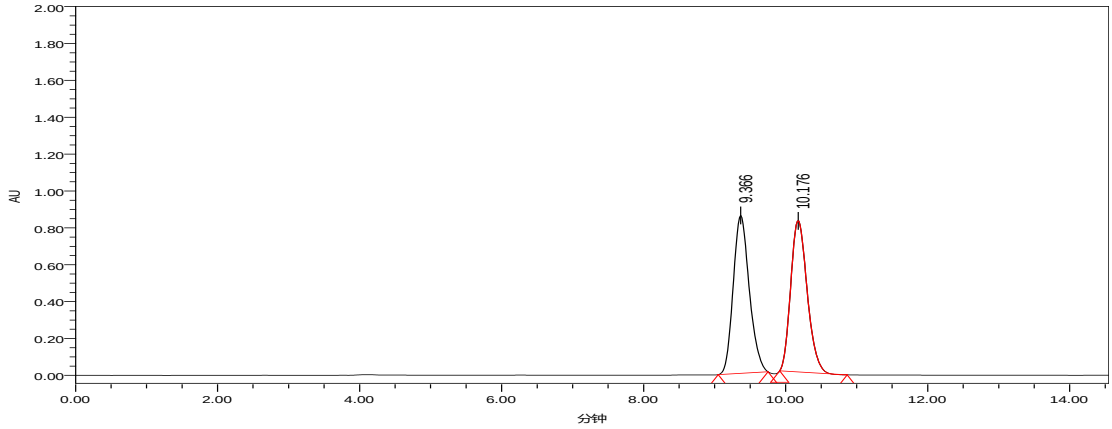
(*S*)-**3n**



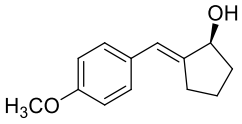
Peak	Ret Time[min]	Area	% Area	Height
1	7.702	27851448	99.14	2507543
2	8.323	240657	0.86	43142



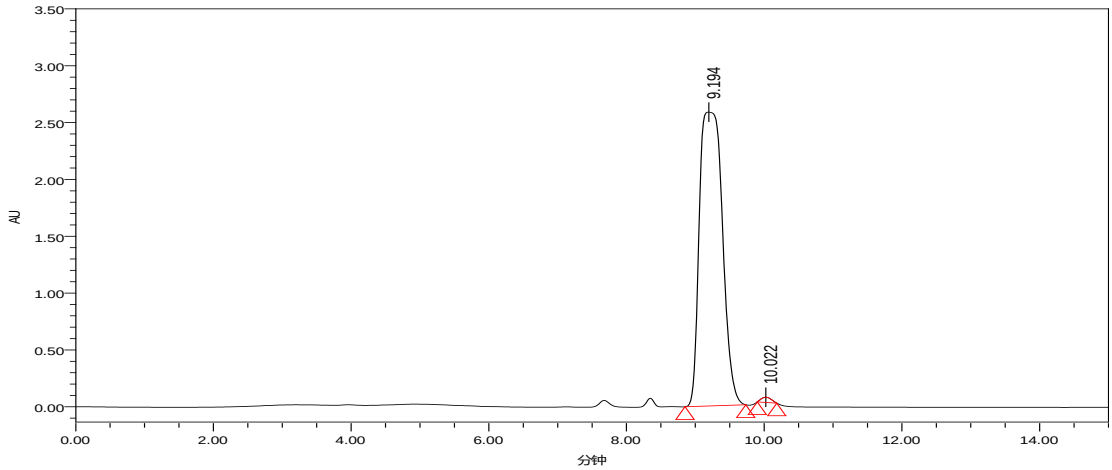
Racemate-**3o**



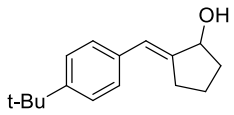
Peak	Ret Time[min]	Area	% Area	Height
1	9.366	13481787	50.38	856629
2	10.176	13277151	49.62	821530



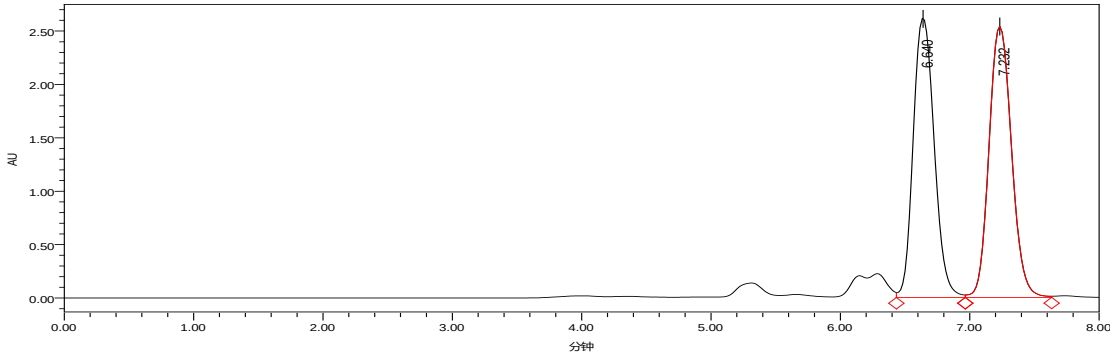
(*S*)-**3o**



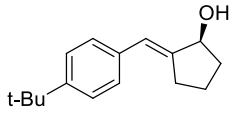
Peak	Ret Time[min]	Area	% Area	Height
1	9.194	60157590	99.23	2586343
2	10.022	469759	0.77	46129



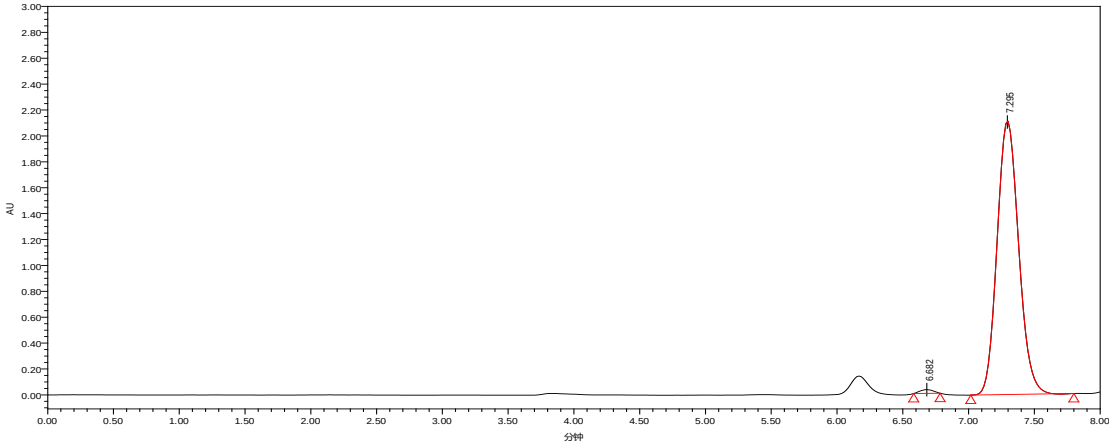
Racemate-**3p**



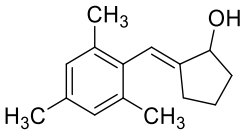
Peak	Ret Time[min]	Area	% Area	Height
1	6.640	29542379	49.04	2621876
2	7.232	30703327	50.96	2537610



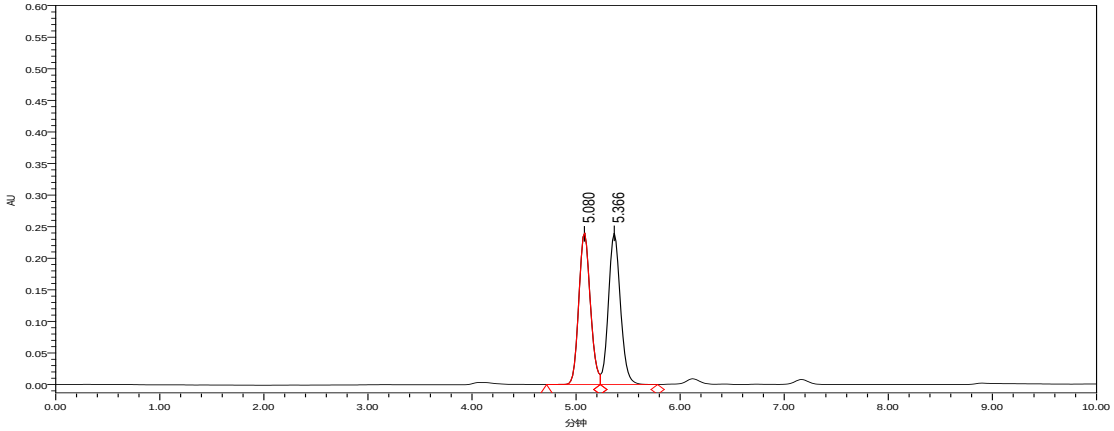
(*S*)-**3p**



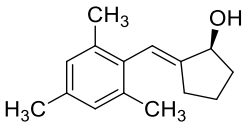
Peak	Ret Time[min]	Area	% Area	Height
1	6.682	166545	0.69	25436
2	7.295	24111024	99.31	2113891



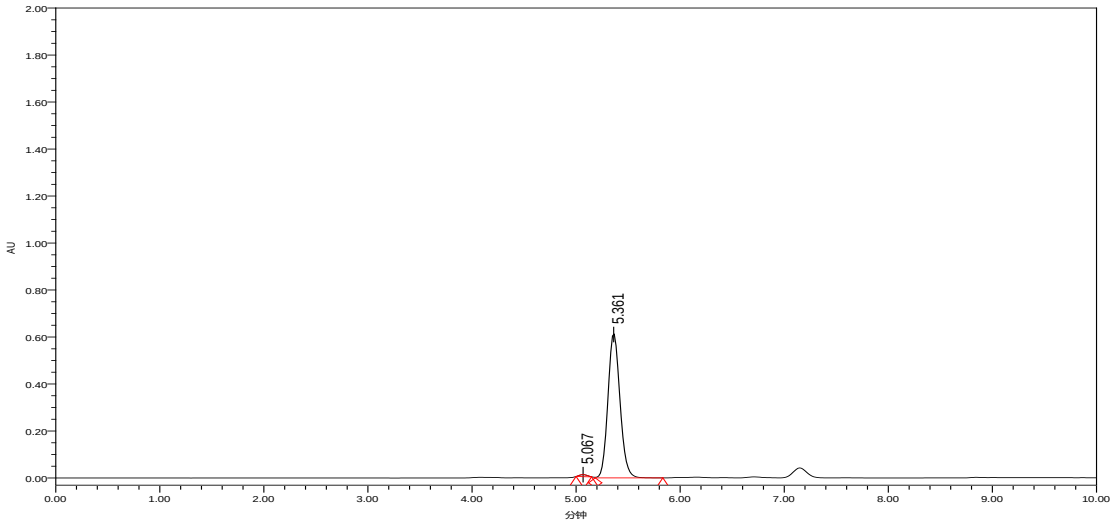
Racemate-**3q**



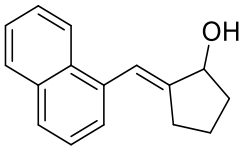
Peak	Ret Time[min]	Area	% Area	Height
1	5.080	1853030	49.04	239919
2	5.366	1925367	50.96	239013



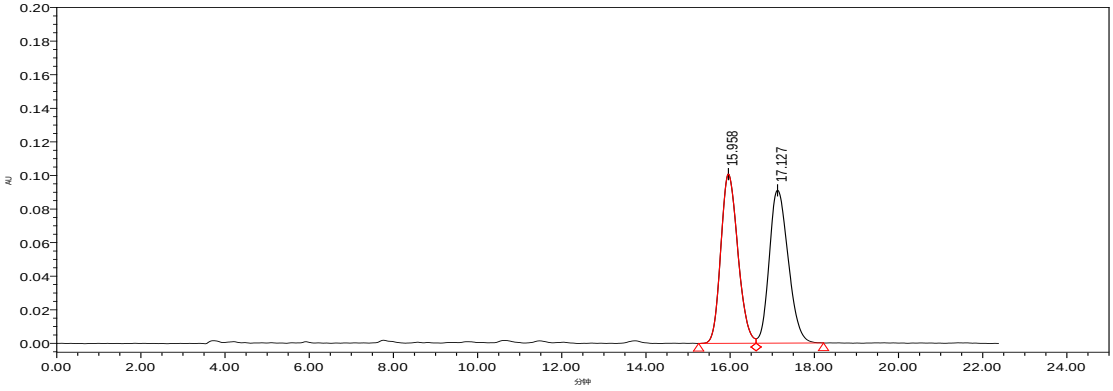
(*S*)-**3q**



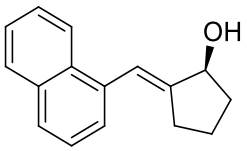
Peak	Ret Time[min]	Area	% Area	Height
1	5.067	44800	0.90	8485
2	5.361	4951964	99.10	614145



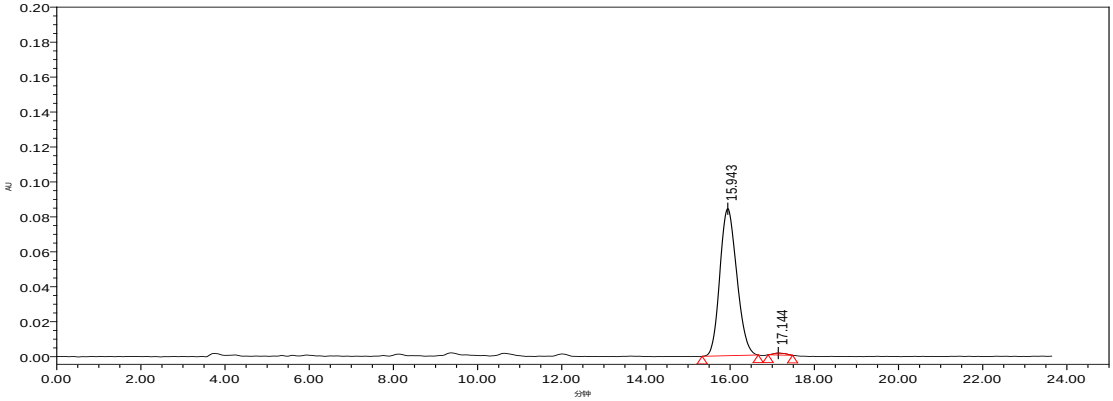
Racemate-**3r**



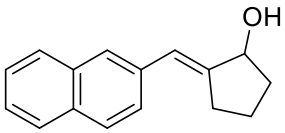
Peak	Ret Time[min]	Area	% Area	Height
1	15.958	2843661	49.87	100923
2	17.127	2858741	50.13	91068



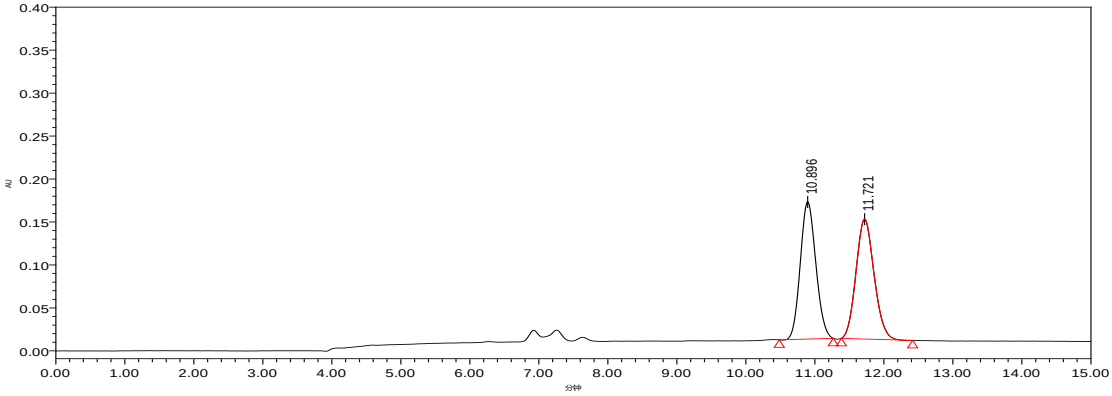
(*S*)-**3r**



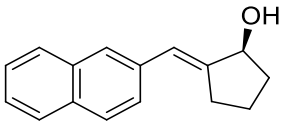
Peak	Ret Time[min]	Area	% Area	Height
1	15.943	2350320	99.05	84238
2	17.144	22525	0.95	1092



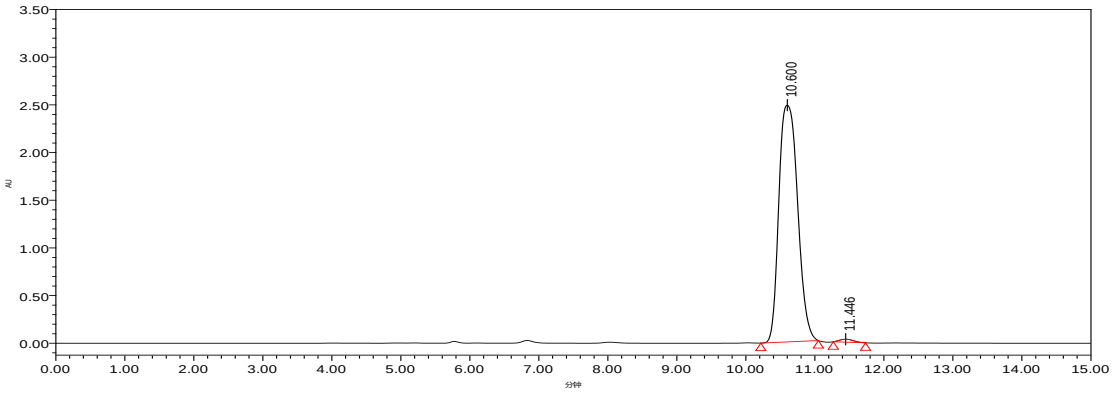
Racemate-**3s**



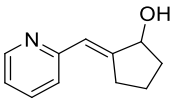
Peak	Ret Time[min]	Area	% Area	Height
1	10.896	2497792	49.55	159828
2	11.721	2542780	50.45	139740



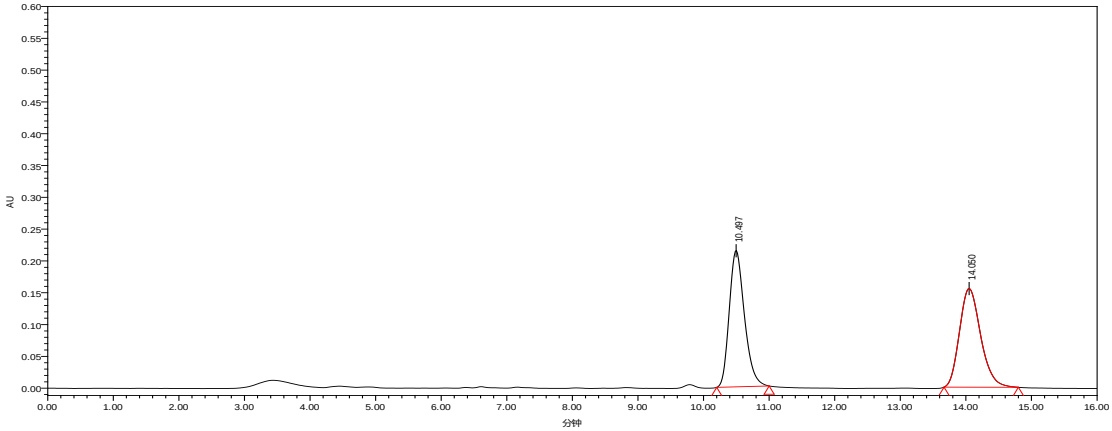
(*S*)-**3s**



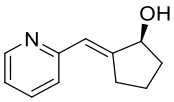
Peak	Ret Time[min]	Area	% Area	Height
1	10.600	47075095	99.08	2484993
2	11.446	435260	0.92	30935



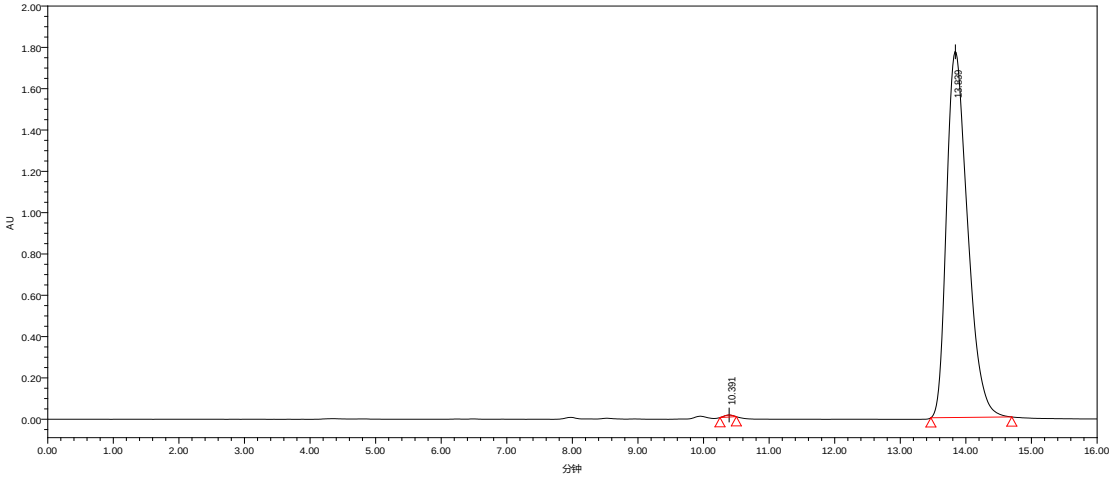
Racemate-**3t**



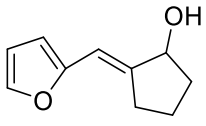
Peak	Ret Time[min]	Area	% Area	Height
1	10.497	3440811	49.73	214430
2	14.050	3478750	50.27	155195



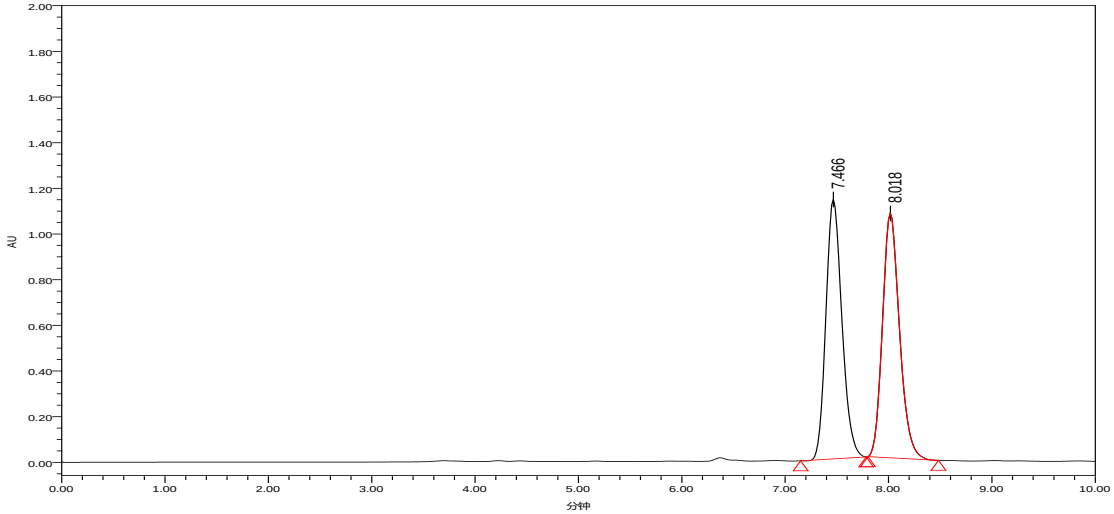
(*S*)-**3t**



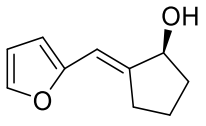
Peak	Ret Time[min]	Area	% Area	Height
1	10.391	89145	0.22	9913
2	13.839	39573214	99.78	1773150



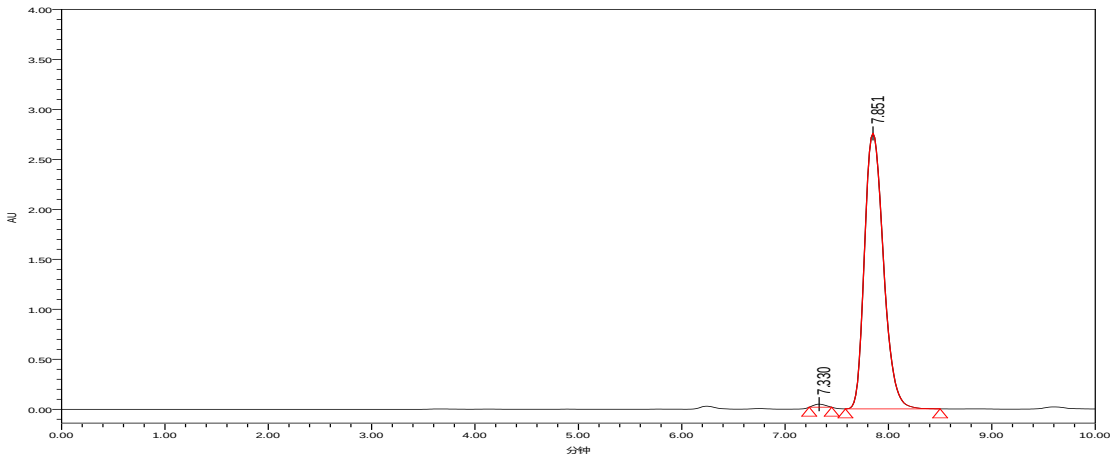
Racemate-**3u**



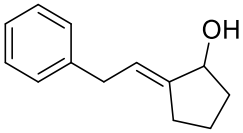
Peak	Ret Time[min]	Area	% Area	Height
1	7.466	12251900	50.06	1136797
2	8.018	12224006	49.94	1071621



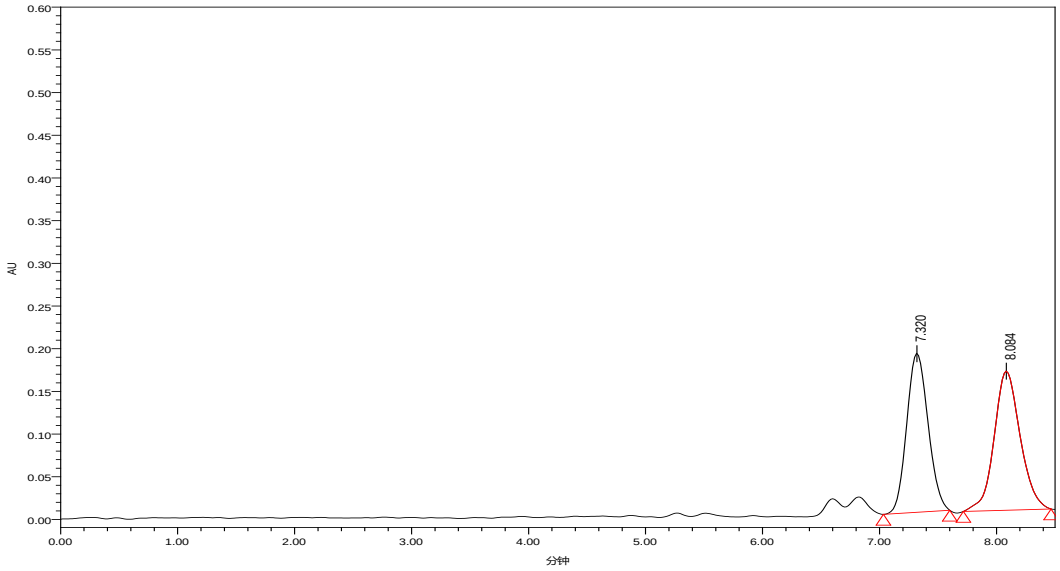
(*S*)-**3u**



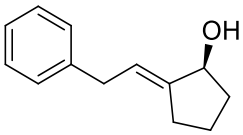
Peak	Ret Time[min]	Area	% Area	Height
1	7.330	270035	0.76	32987
2	7.851	35180058	99.24	2754864



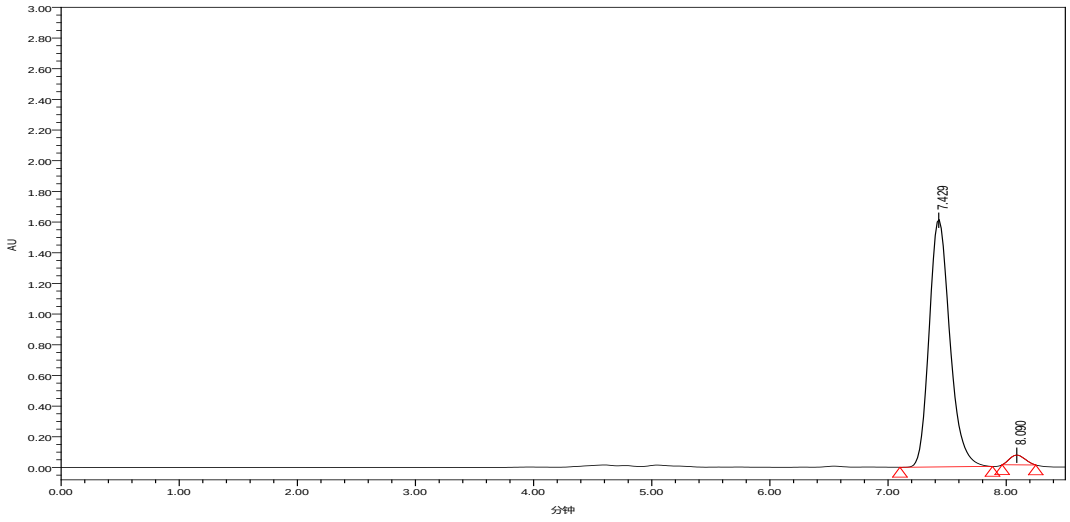
Racemate-**3v**



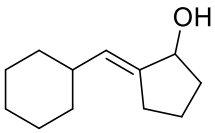
Peak	Ret Time[min]	Area	% Area	Height
1	7.320	2415495	49.50	186308
2	8.084	2464293	50.50	163016



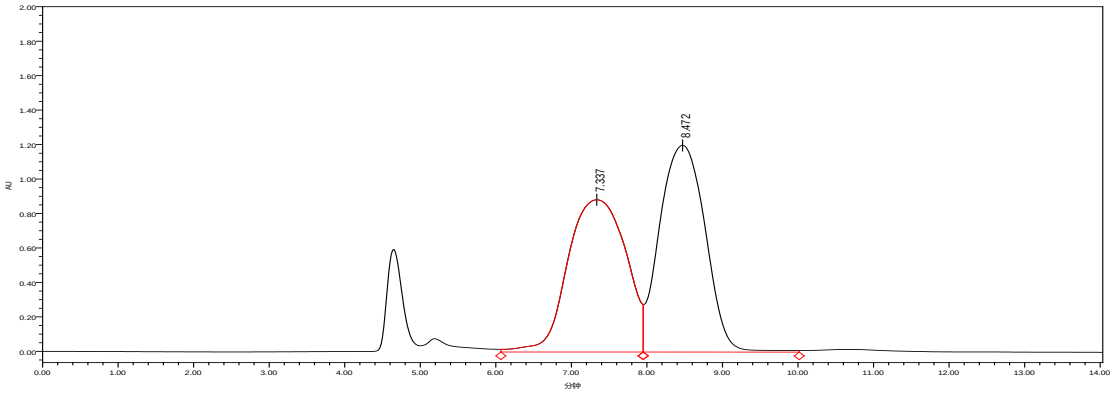
(*S*)-**3v**



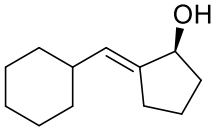
Peak	Ret Time[min]	Area	% Area	Height
1	7.429	19663250	97.16	1614462
2	8.090	575439	2.84	63701



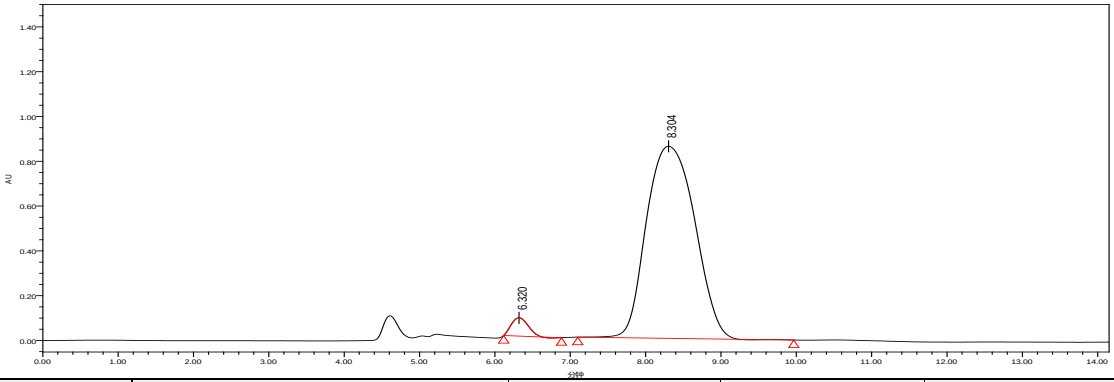
Racemate-**3w**



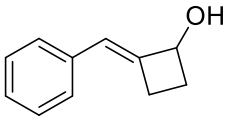
Peak	Ret Time[min]	Area	% Area	Height
1	7.337	48286526	49.33	883836
2	8.472	49598182	50.67	1199708



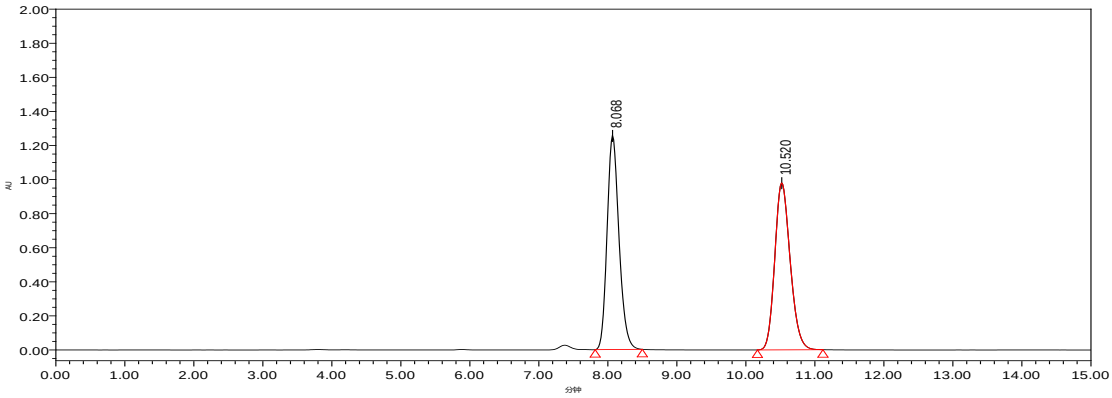
(*S*)-**3w**



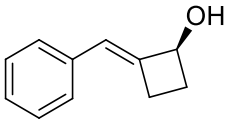
Peak	Ret Time[min]	Area	% Area	Height
1	6.320	1310983	3.30	81890
2	8.304	38420284	96.70	858108



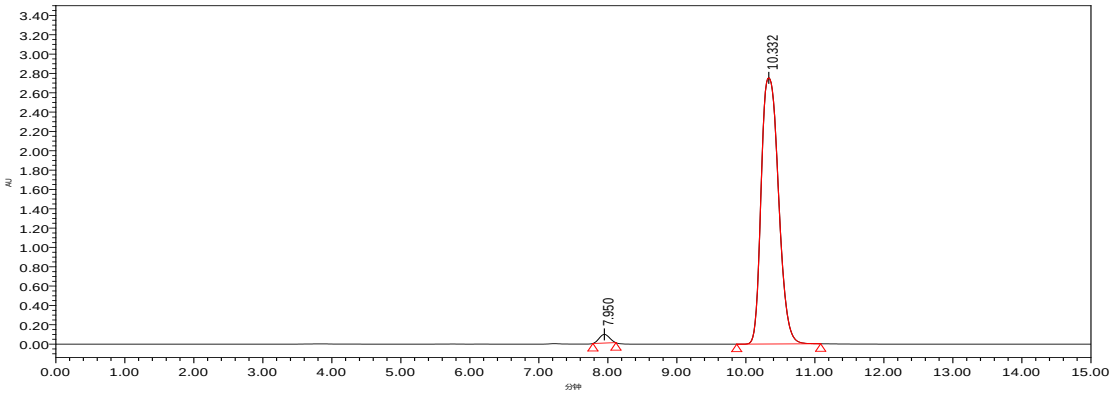
Racemate-**5a**



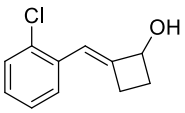
Peak	Ret Time[min]	Area	% Area	Height
1	8.068	15072449	49.74	1256223
2	10.520	15228908	50.26	980715



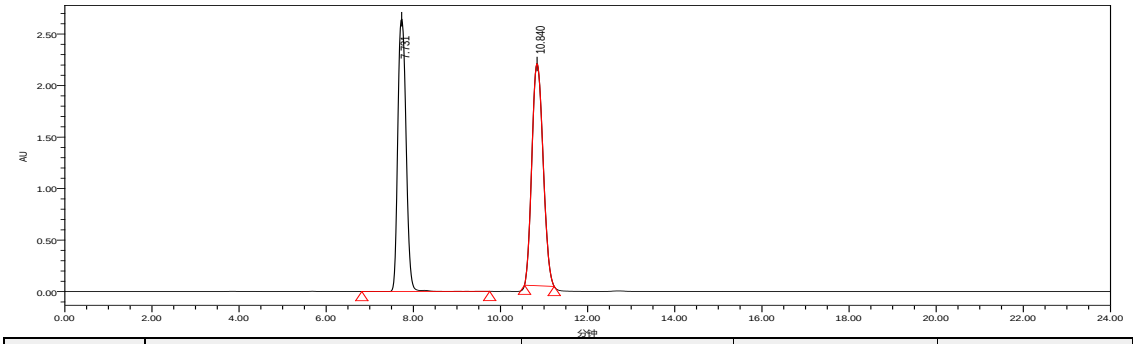
(*S*)-**5a**



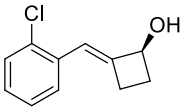
Peak	Ret Time[min]	Area	% Area	Height
1	7.950	916831	1.87	90039
2	10.332	48029001	98.13	2754889



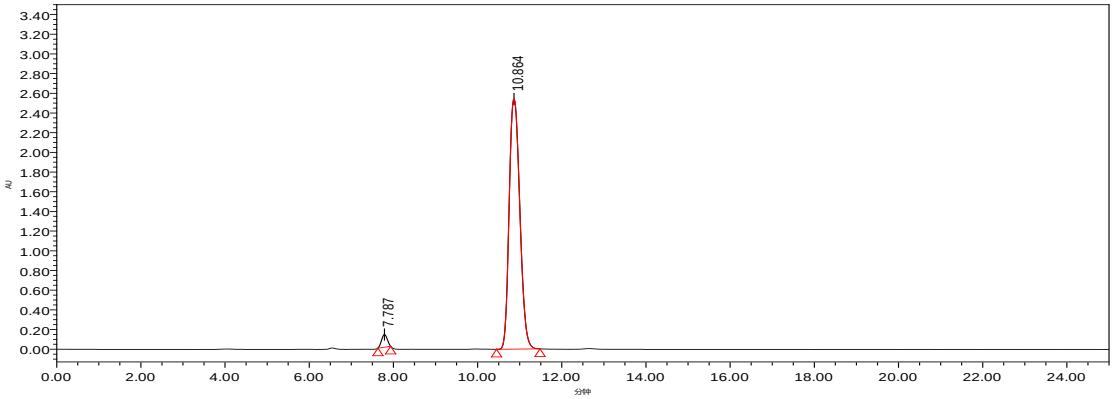
Racemate-**5b**



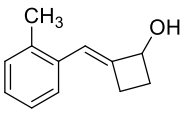
Peak	Ret Time[min]	Area	% Area	Height
1	7.731	36156894	49.10	2646580
2	10.840	37482401	50.90	2157896



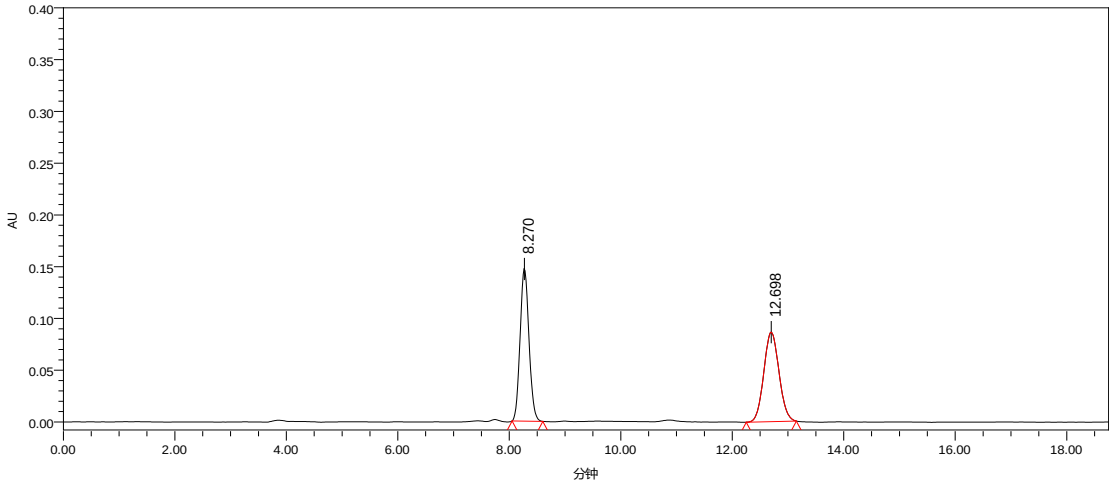
(*S*)-**5b**



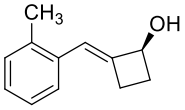
Peak	Ret Time[min]	Area	% Area	Height
1	7.787	1217890	2.65	129866
2	10.864	44763301	97.35	2543465



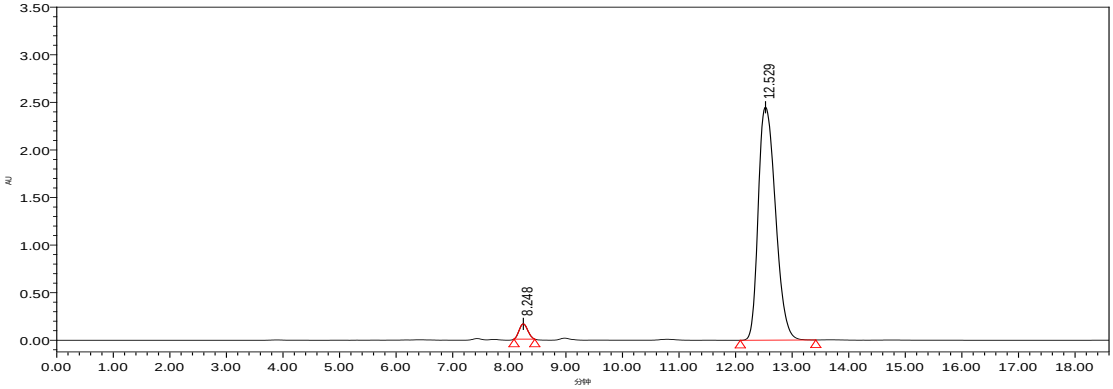
Racemate-**5c**



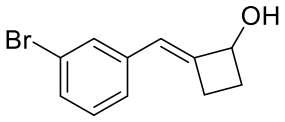
Peak	Ret Time[min]	Area	% Area	Height
1	8.270	1635115	49.93	147578
2	12.698	1639429	50.07	86544



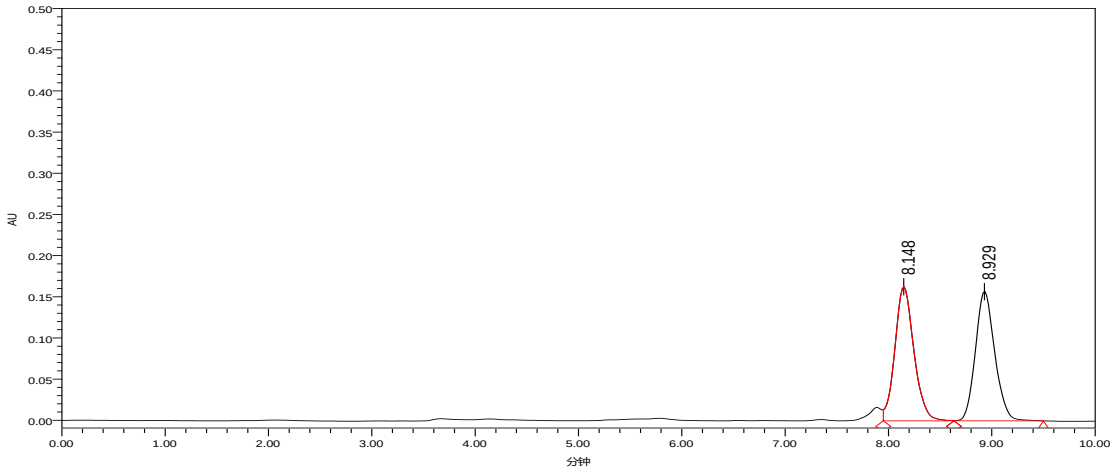
(*S*)-**5c**



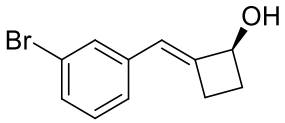
Peak	Ret Time[min]	Area	% Area	Height
1	8.248	1697786	3.17	161079
2	12.529	51864779	96.83	2449923



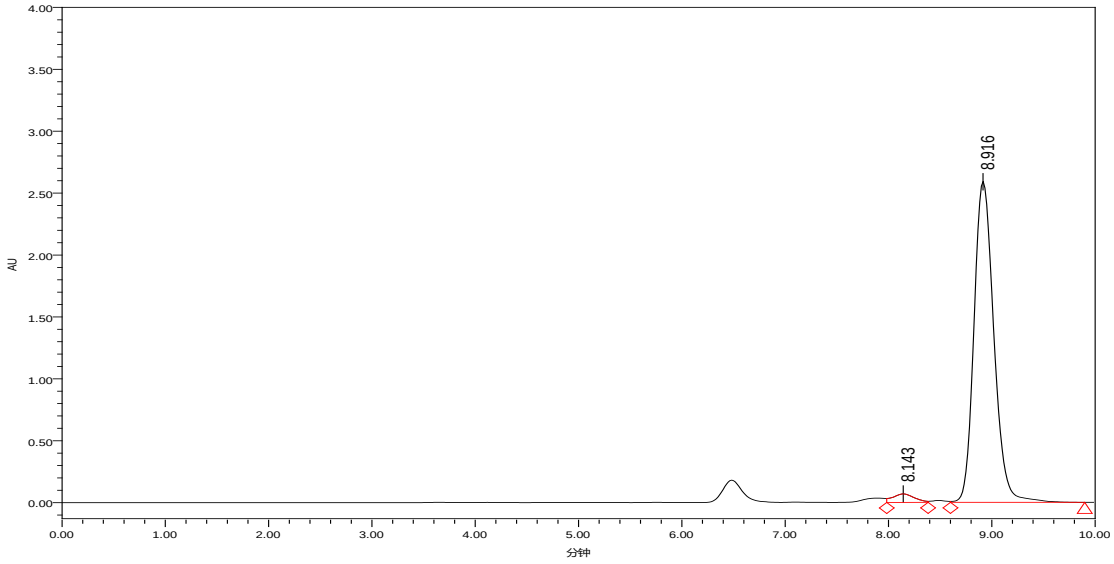
Racemate-**5d**



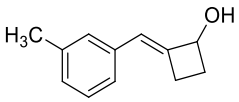
Peak	Ret Time[min]	Area	% Area	Height
1	8.148	2087126	50.48	163110
2	8.929	2047516	49.52	157544



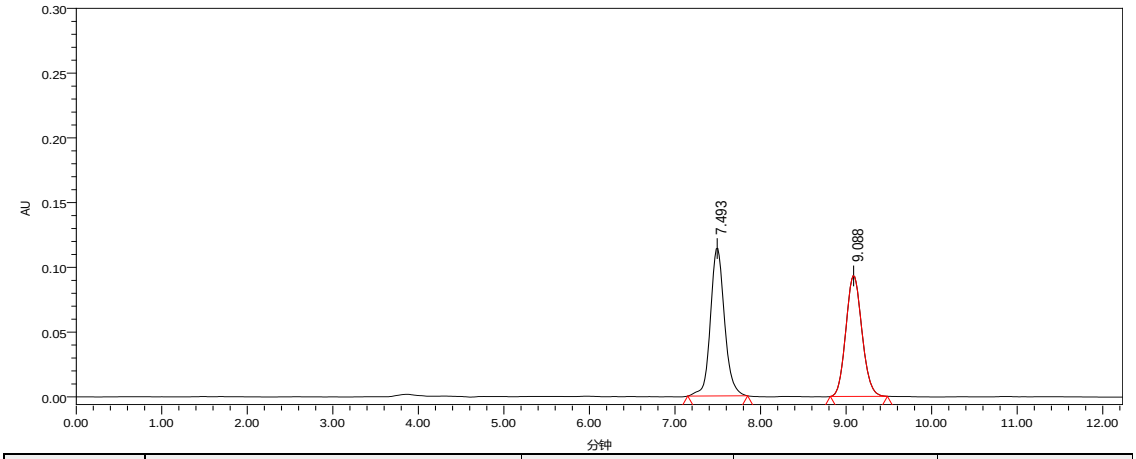
(*S*)-**5d**



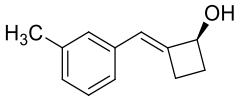
Peak	Ret Time[min]	Area	% Area	Height
1	8.143	989320	1.77	68441
2	8.916	34714653	99.03	2591497



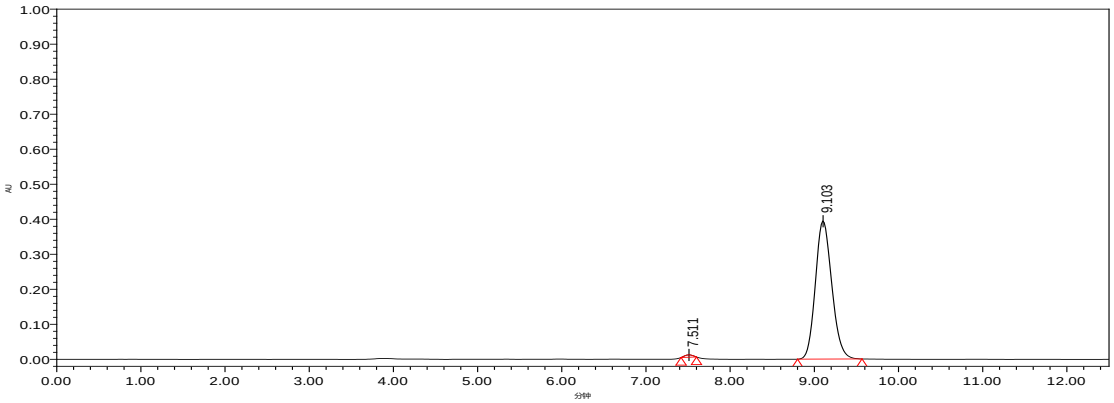
Racemate-**5e**



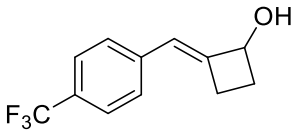
Peak	Ret Time[min]	Area	% Area	Height
1	7.493	1274166	50.74	114459
2	9.088	1237005	49.26	93448



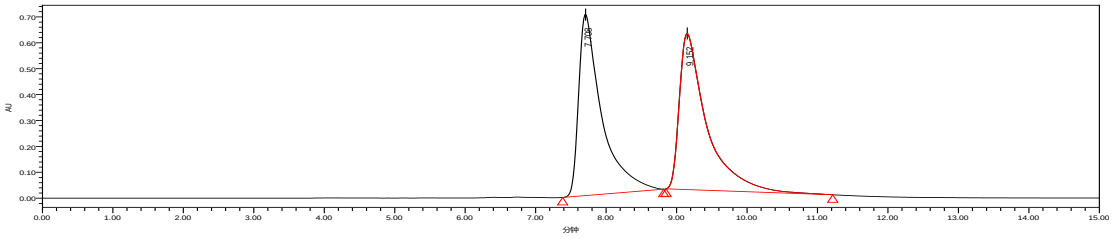
(*S*)-**5e**



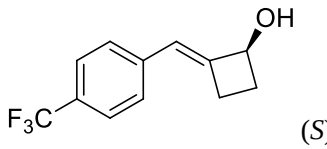
Peak	Ret Time[min]	Area	% Area	Height
1	7.511	45201	0.84	6785
2	9.103	5347050	99.16	394694



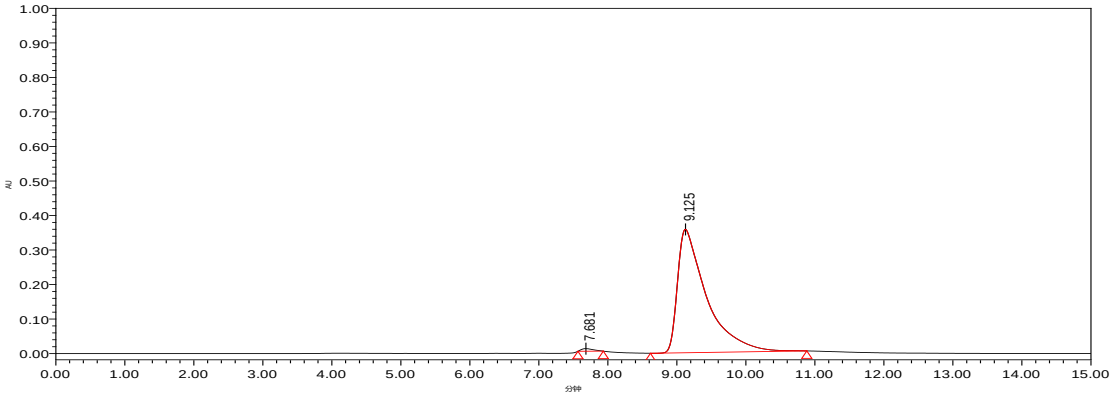
Racemate-**5f**



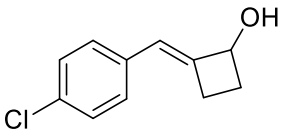
Peak	Ret Time[min]	Area	% Area	Height
1	7.708	15859510	49.55	701292
2	9.152	16150286	50.45	603219



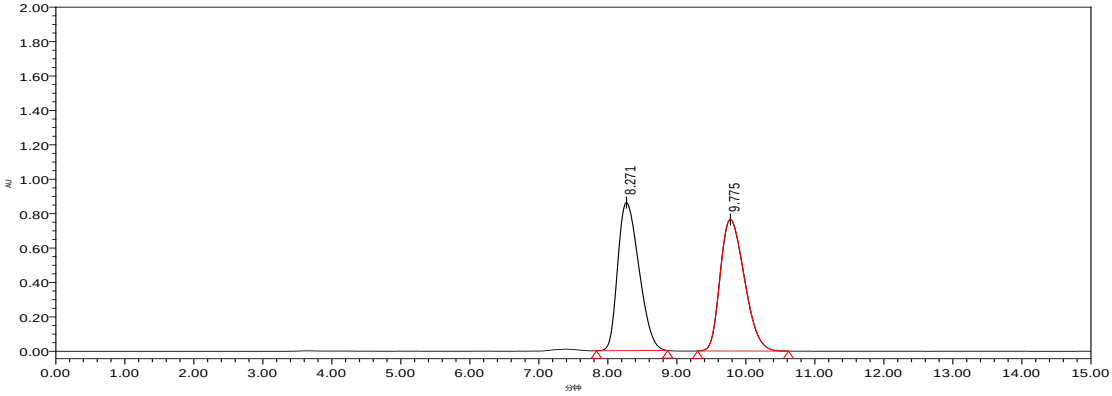
(*S*)-**5f**



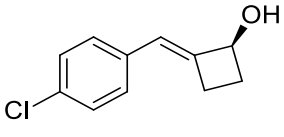
Peak	Ret Time[min]	Area	% Area	Height
1	7.681	90411	0.86	7505
2	9.125	10411752	99.14	358274



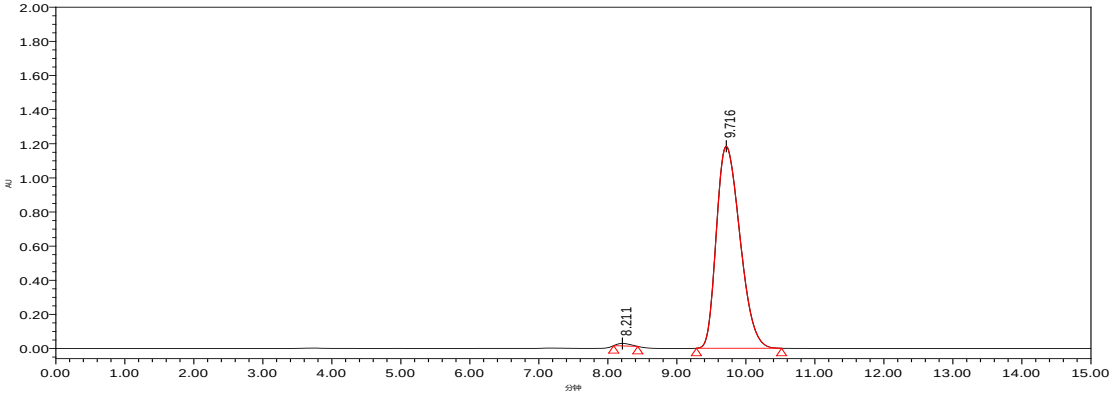
Racemate-**5g**



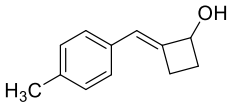
Peak	Ret Time[min]	Area	% Area	Height
1	8.271	18460373	49.79	861762
2	9.775	18618272	50.21	765078



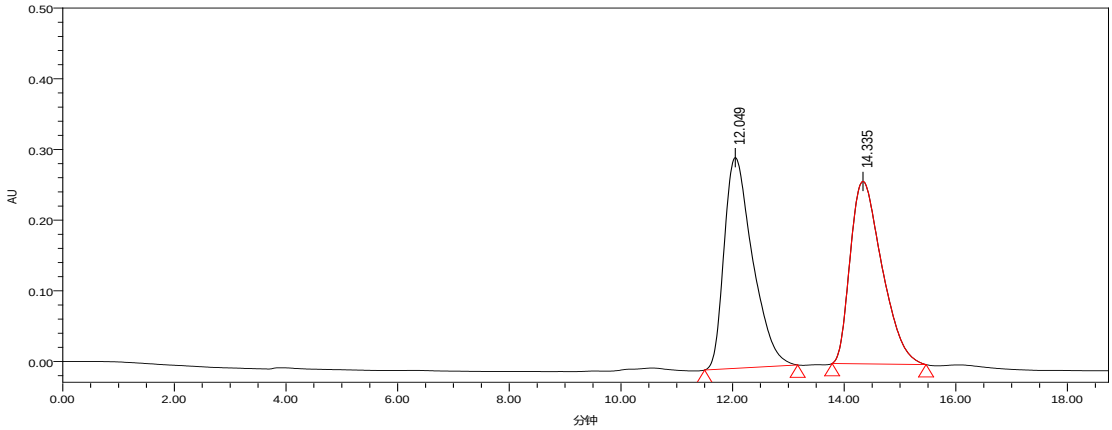
(*S*)-**5g**



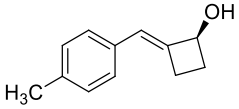
Peak	Ret Time[min]	Area	% Area	Height
1	8.211	187556	0.66	14458
2	9.716	28092931	99.34	1183722



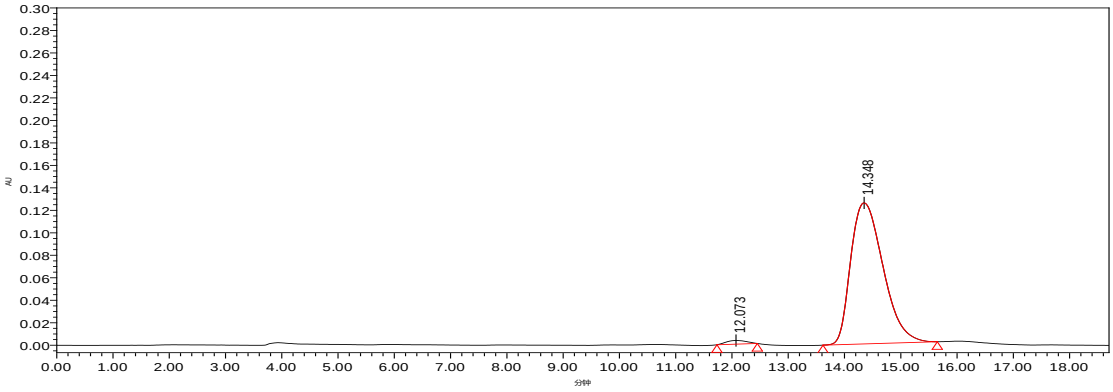
Racemate-**5h**



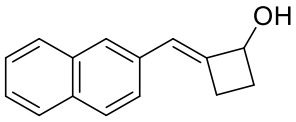
Peak	Ret Time[min]	Area	% Area	Height
1	12.049	10561923	50.85	298279
2	14.335	10208165	49.15	258153



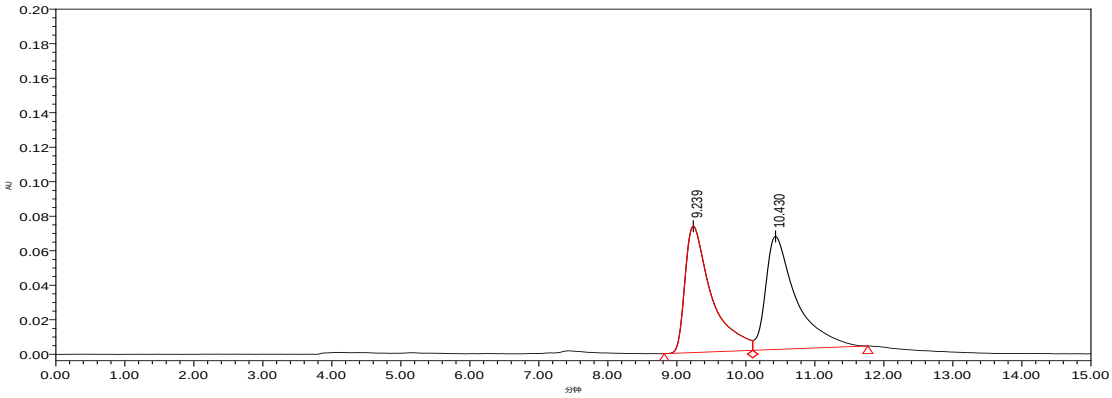
(*S*)-**5h**



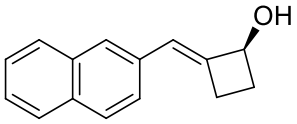
Peak	Ret Time[min]	Area	% Area	Height
1	12.074	64180	1.21	2711
2	14.348	5232259	98.79	126838



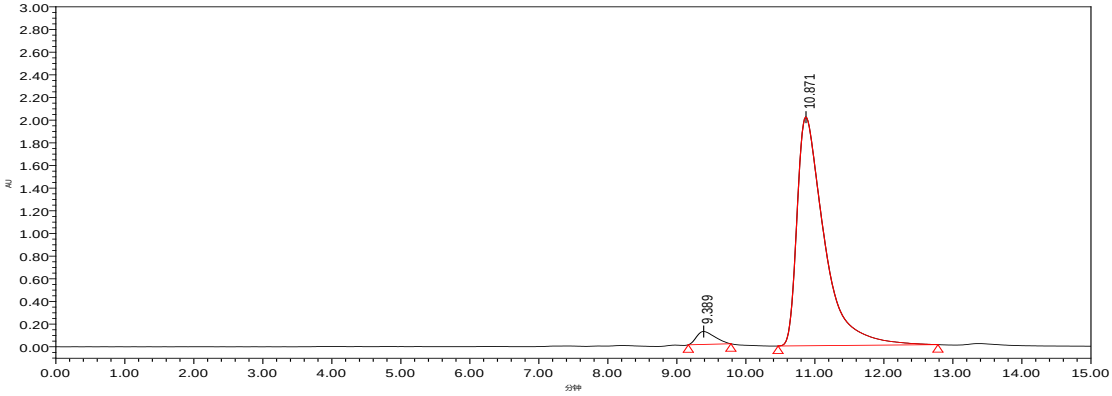
Racemate-**5i**



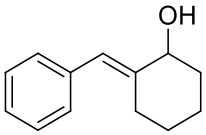
Peak	Ret Time[min]	Area	% Area	Height
1	9.239	1968317	49.36	73320
2	10.430	2019271	50.64	65599



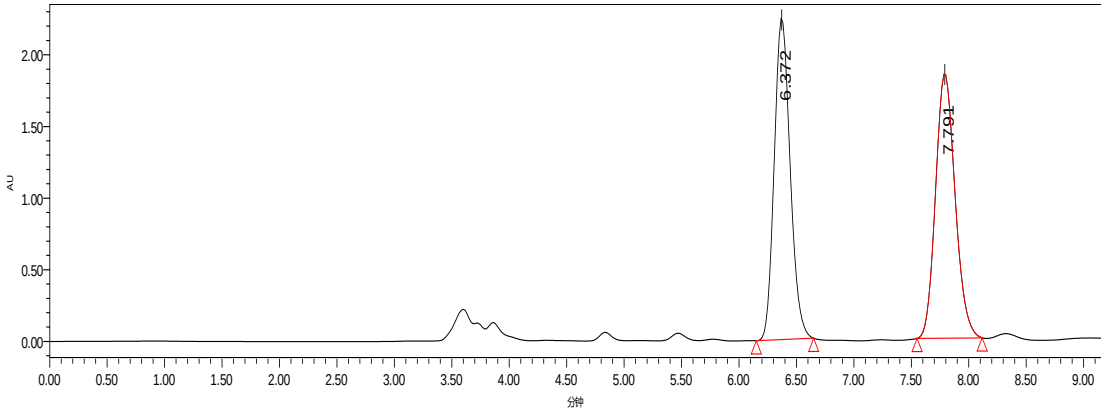
(*S*)-**5i**



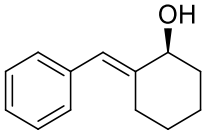
Peak	Ret Time[min]	Area	% Area	Height
1	9.389	2094303	3.63	114286
2	10.871	55641443	96.37	2020830



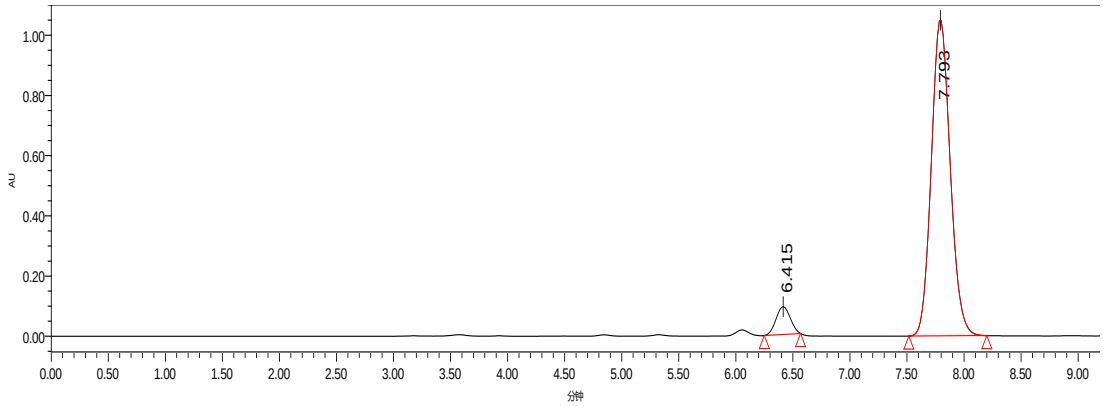
Racemate-**5j**



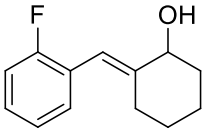
Peak	Ret Time [min]	Area	% Area	Height
1	6.372	21542359	49.49	2242832
2	7.791	21985575	50.51	1854274



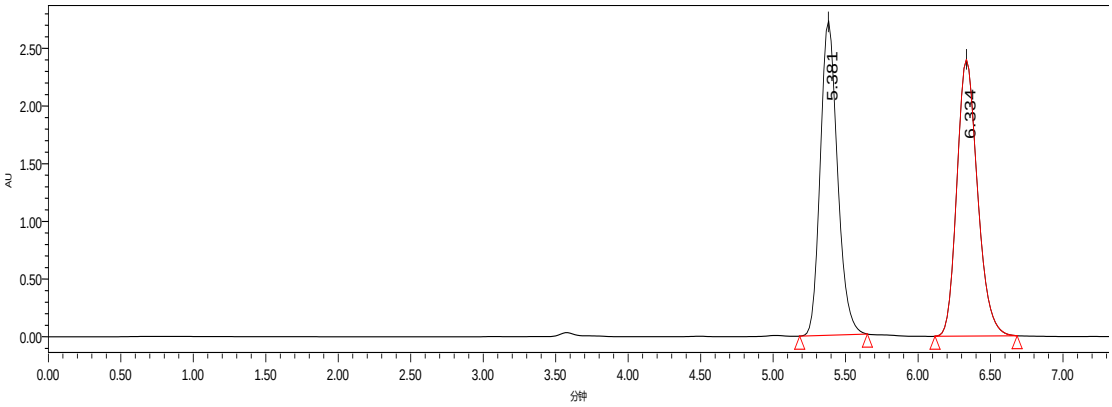
(*S*)-**5j**



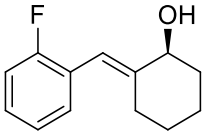
Peak	Ret Time [min]	Area	% Area	Height
1	6.415	741346	5.78	88379
2	7.793	12076040	94.22	1052311



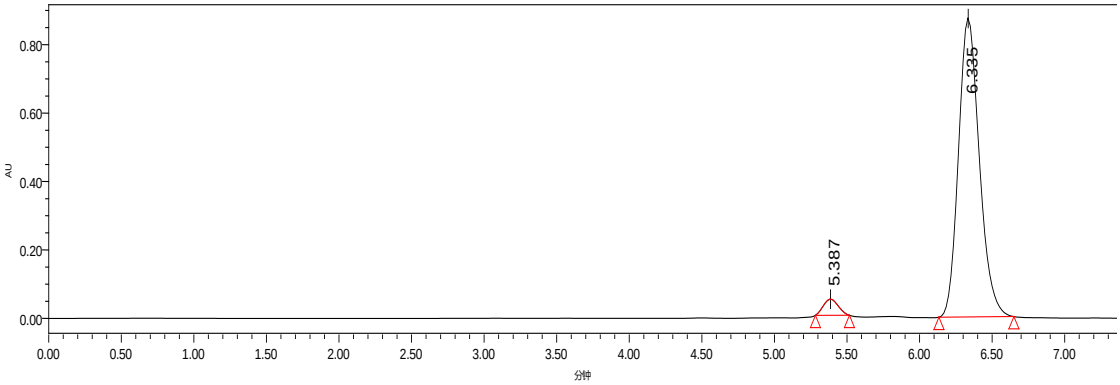
Racemate-**5k**



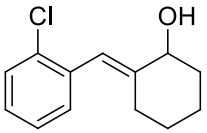
Peak	Ret Time [min]	Area	% Area	Height
1	5.381	22945614	49.65	2721645
2	6.334	23269117	50.35	2396932



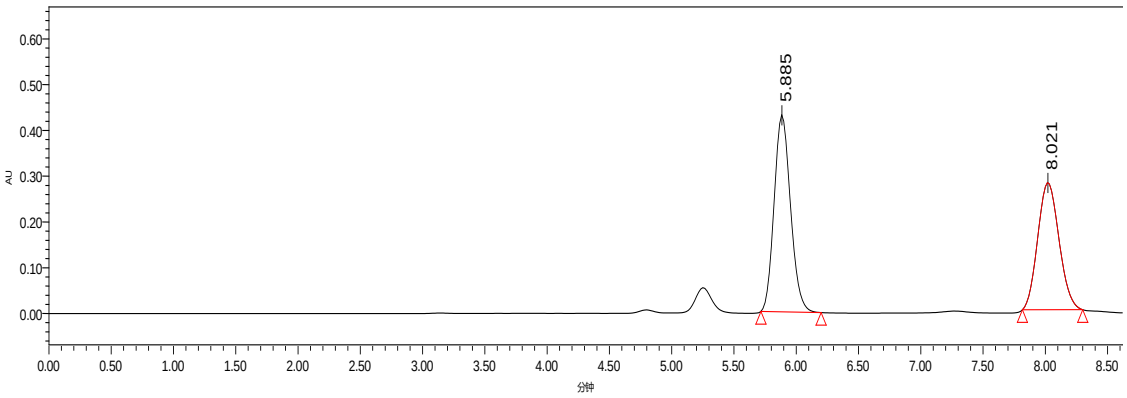
(*S*)-**5k**



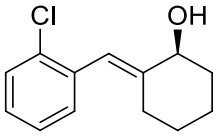
Peak	Ret Time [min]	Area	% Area	Height
1	5.387	364187	3.99	49071
2	6.335	8763230	96.01	875006



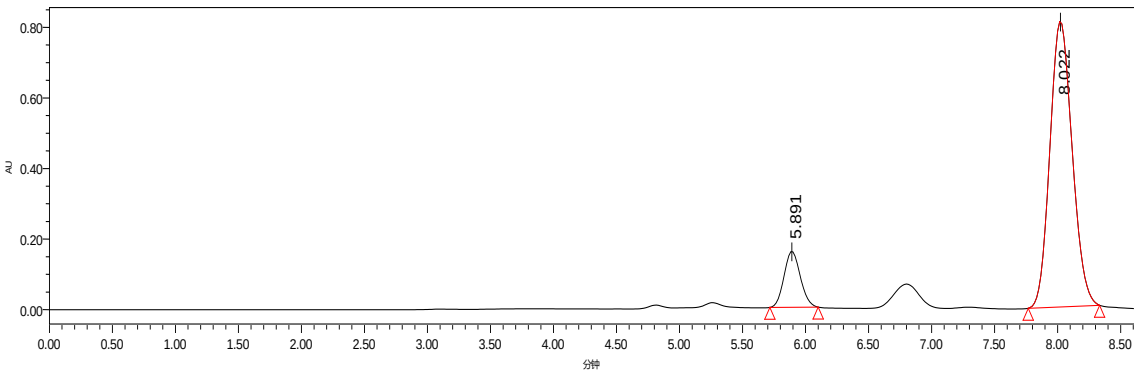
Racemate-**5l**



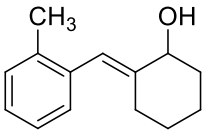
Peak	Ret Time [min]	Area	% Area	Height
1	5.885	3593082	50.03	421994
2	8.021	3588773	49.97	283082



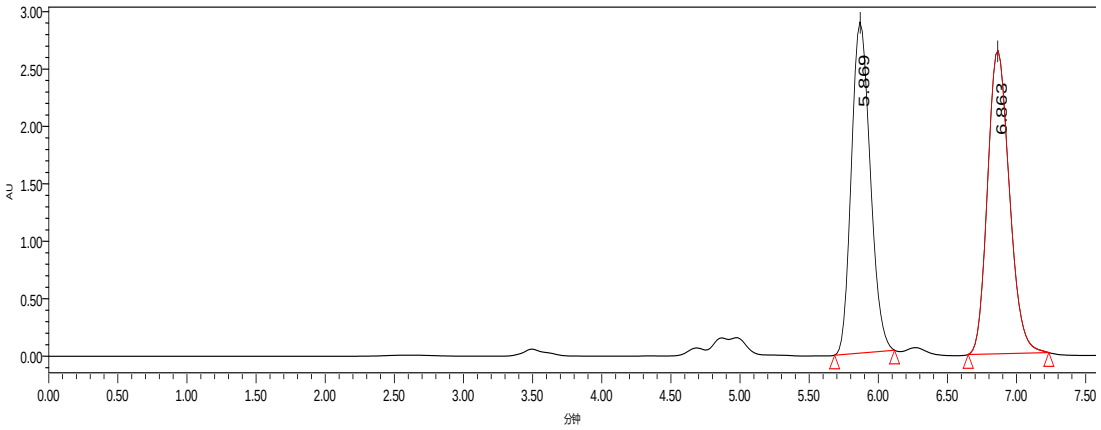
(*S*)-**5l**



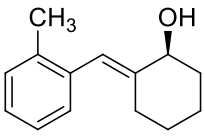
Peak	Ret Time [min]	Area	% Area	Height
1	5.891	1357483	12.01	155546
2	8.022	9945829	87.99	810179



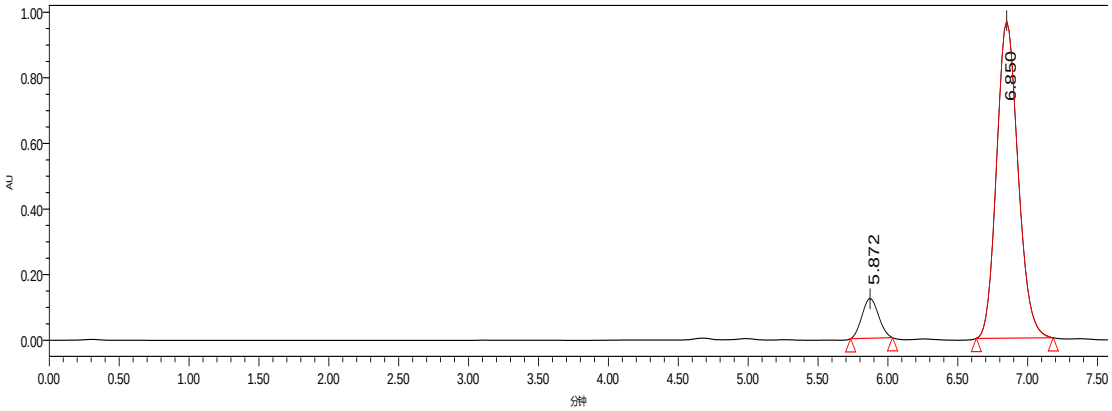
Racemate-**5m**



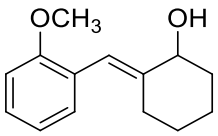
Peak	Ret Time [min]	Area	% Area	Height
1	5.869	2794779	49.53	2882421
2	6.863	28478197	50.47	2640690



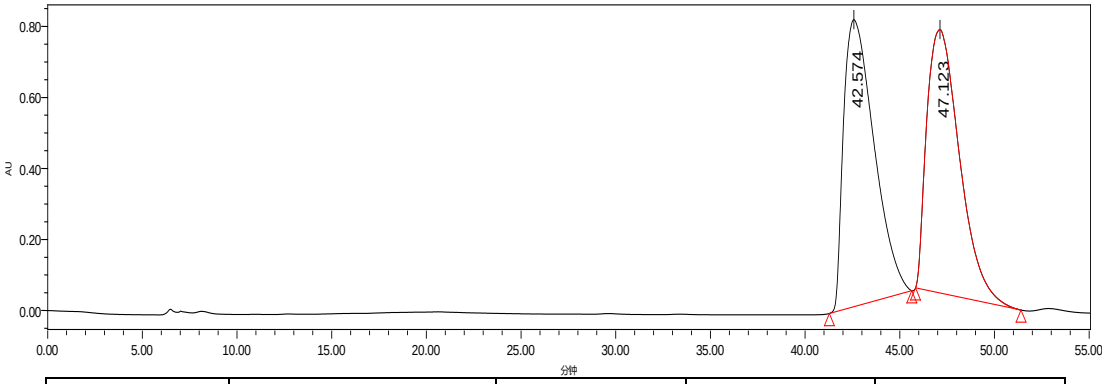
(*S*)-**5m**



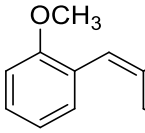
Peak	Ret Time [min]	Area	% Area	Height
1	5.872	998094	8.71	121320
2	6.850	10463692	91.29	971250



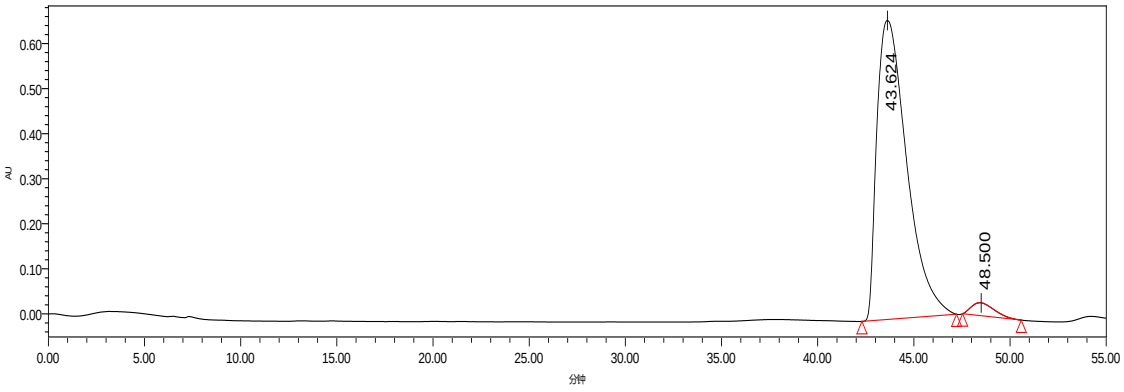
Racemate-**5n**



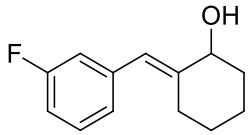
Peak	Ret Time [min]	Area	% Area	Height
1	42.574	90531836	50.39	807994
2	47.123	89145898	49.61	741759



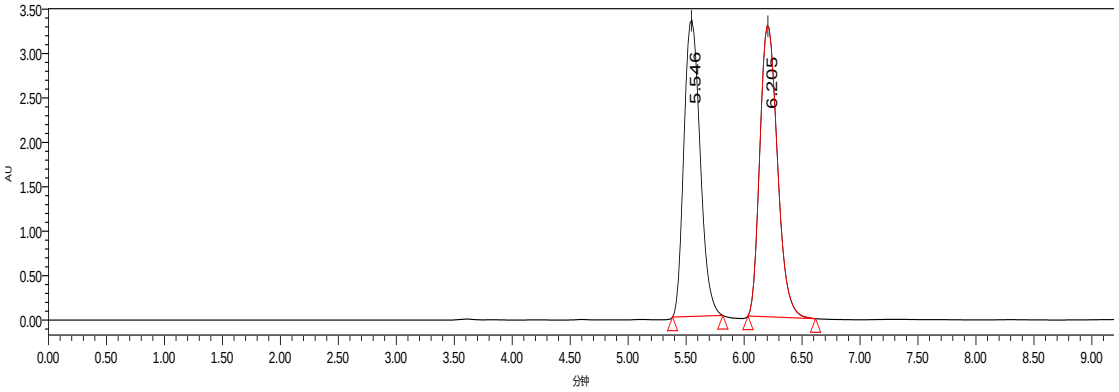
(*S*)-**5n**



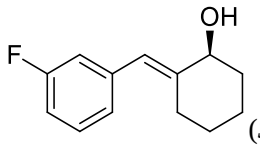
Peak	Ret Time [min]	Area	% Area	Height
1	43.624	71712238	97.39	663794
2	48.467	1919134	2.61	26044



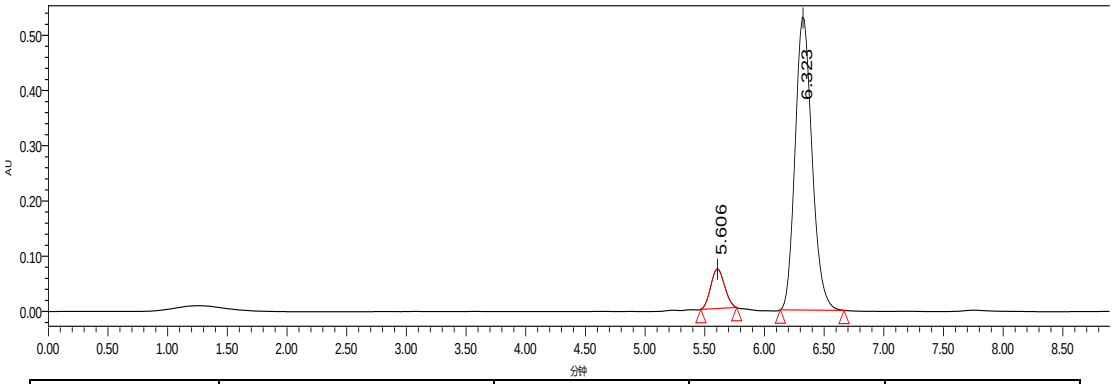
Racemate-**5o**



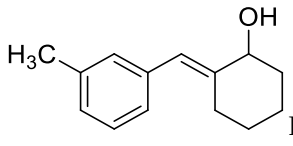
Peak	Ret Time [min]	Area	% Area	Height
1	5.546	33268313	49.55	3341673
2	6.205	33872581	50.45	3289192



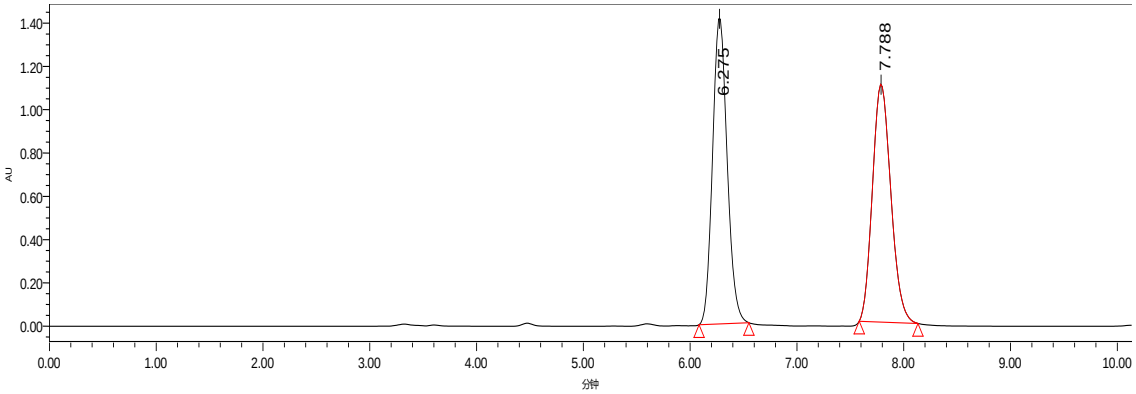
(*S*)-**5o**



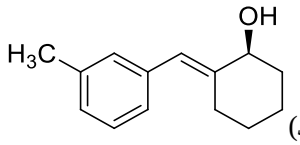
Peak	Ret Time [min]	Area	% Area	Height
1	5.606	580158	9.95	72002
2	6.323	5248407	90.05	532393



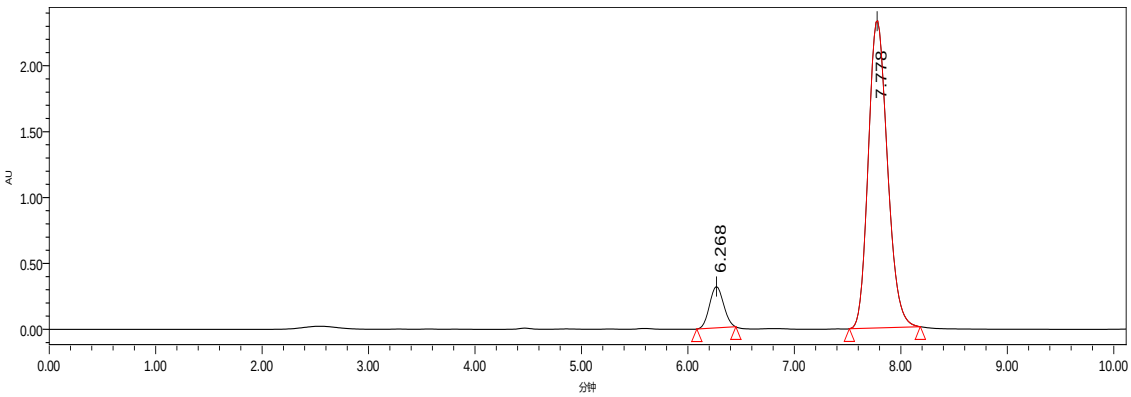
Racemate-**5p**



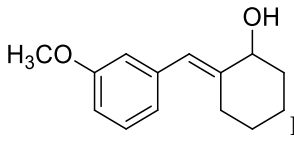
Peak	Ret Time [min]	Area	% Area	Height
1	6.275	13428288	50.43	1419445
2	7.788	13198909	49.57	1101174



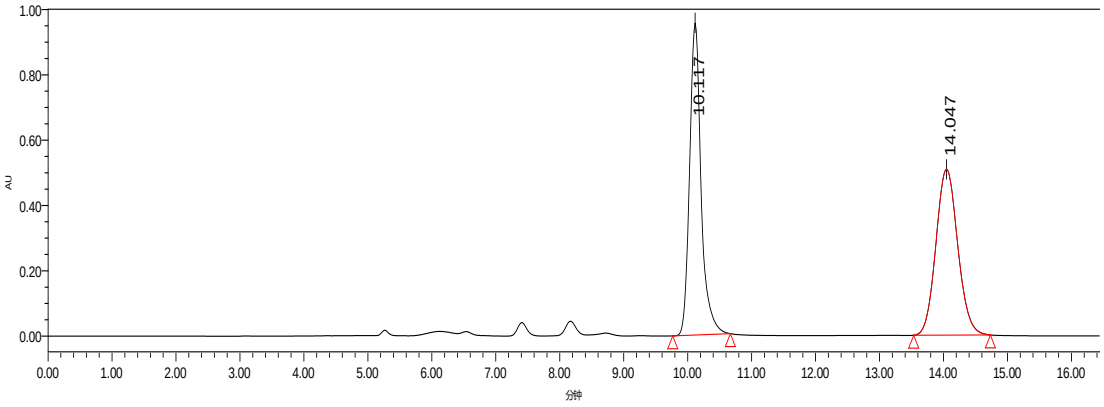
(*S*)-**5p**



Peak	Ret Time [min]	Area	% Area	Height
1	6.268	2641771	8.30	302418
2	7.778	29204708	91.70	2336243

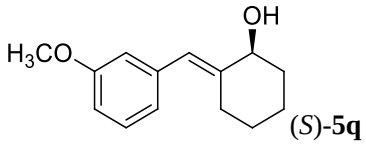


Racemate-**5q**

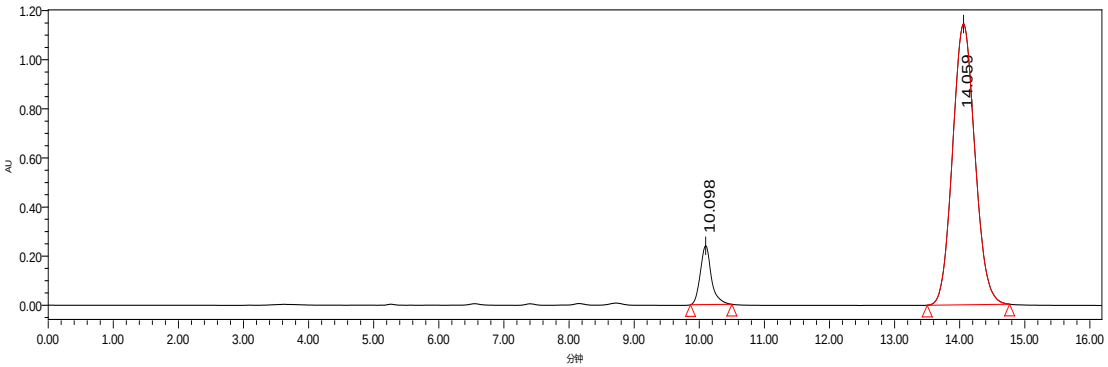


Peak	Ret Time [min]	Area	% Area	Height
1	10.117	11904281	49.74	955532
2	14.047	12029640	50.26	508155

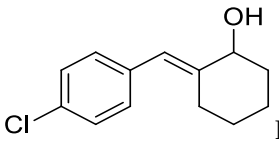
.



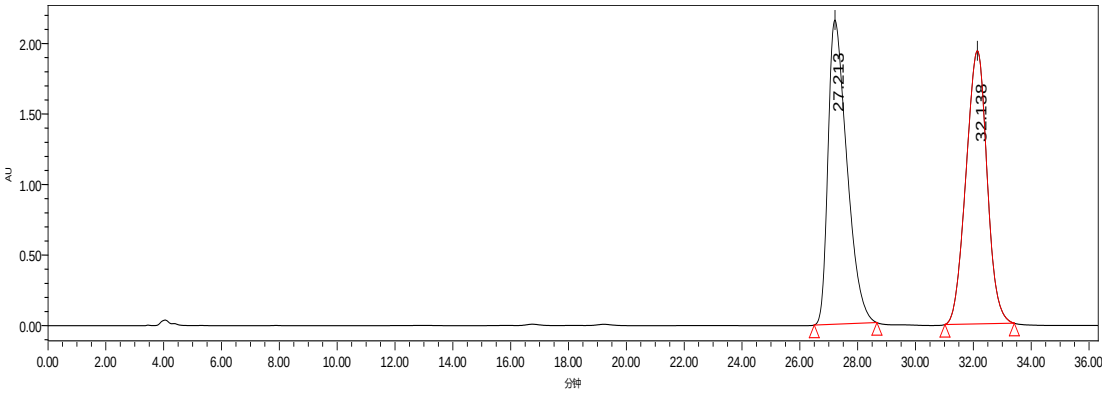
(*S*)-**5q**



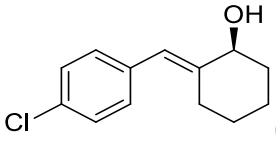
Peak	Ret Time [min]	Area	% Area	Height
1	10.098	2618126	8.76	235162
2	14.059	27274635	91.24	1145126



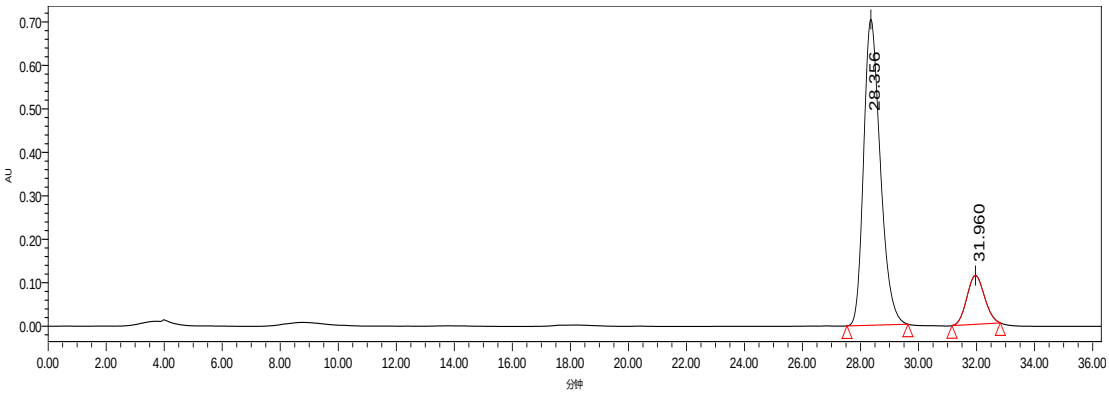
Racemate-**5r**



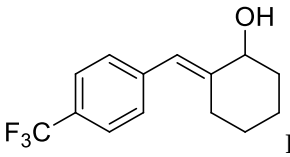
Peak	Ret Time [min]	Area	% Area	Height
1	27.213	97245781	50.11	2155181
2	32.138	96836864	49.89	1928088



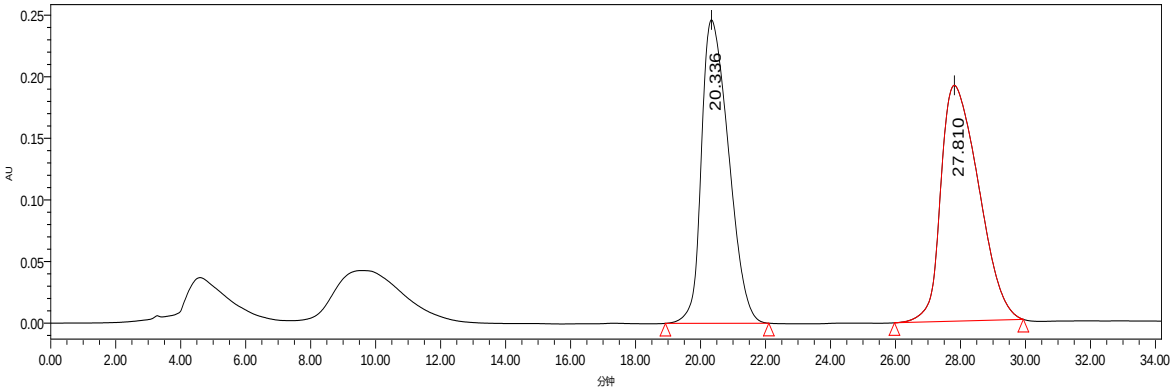
(*S*)-**5r**



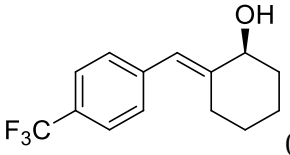
Peak	Ret Time [min]	Area	% Area	Height
1	28.356	28097538	86.77	703770
2	31.960	4285822	13.23	107552



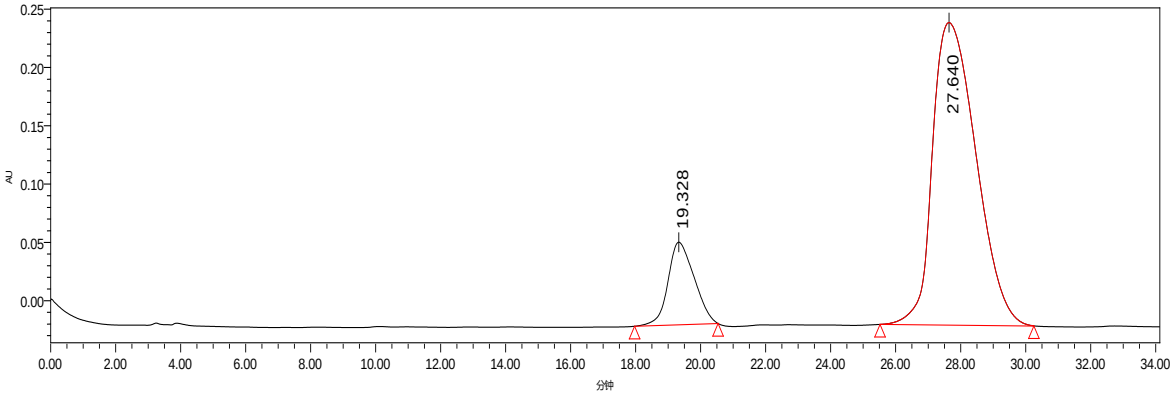
Racemate-**5s**



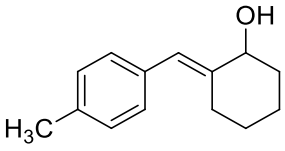
Peak	Ret Time [min]	Area	% Area	Height
1	20.336	14628678	49.04	246337
2	27.810	15201416	50.96	191492



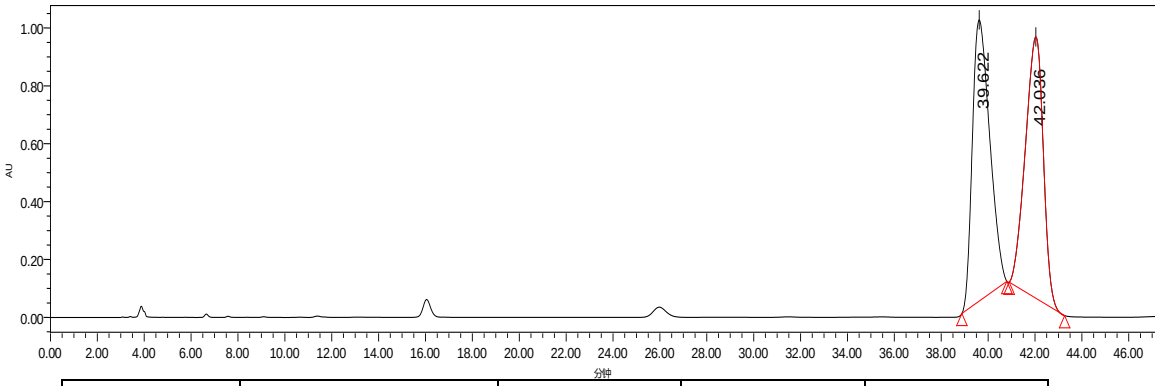
(*S*)-**5s**



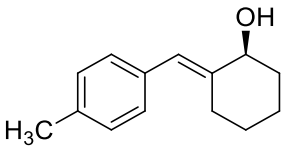
Peak	Ret Time [min]	Area	% Area	Height
1	19.328	4104976	14.52	71829
2	27.640	24167215	85.48	259458



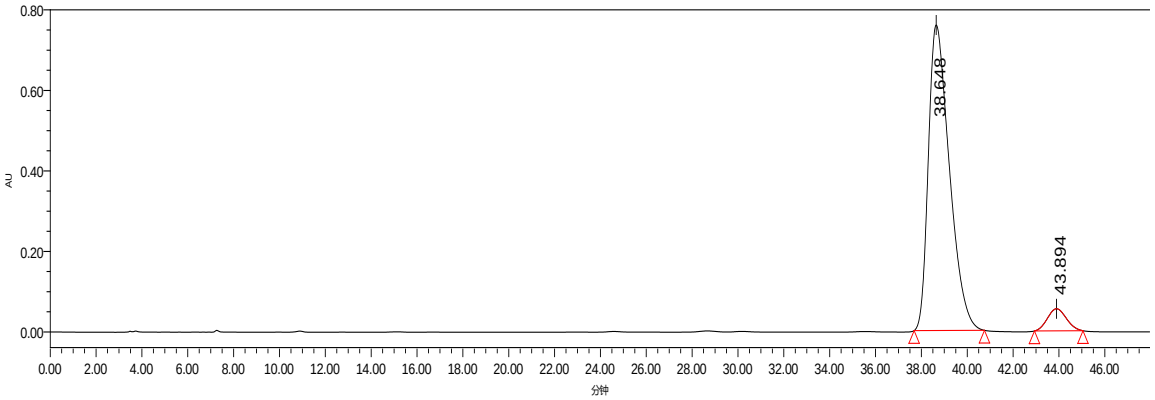
Racemate-**5t**



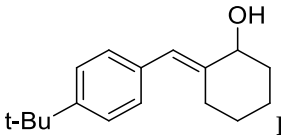
Peak	Ret Time [min]	Area	% Area	Height
1	39.622	49904542	50.99	971560
2	42.036	47959242	49.01	902585



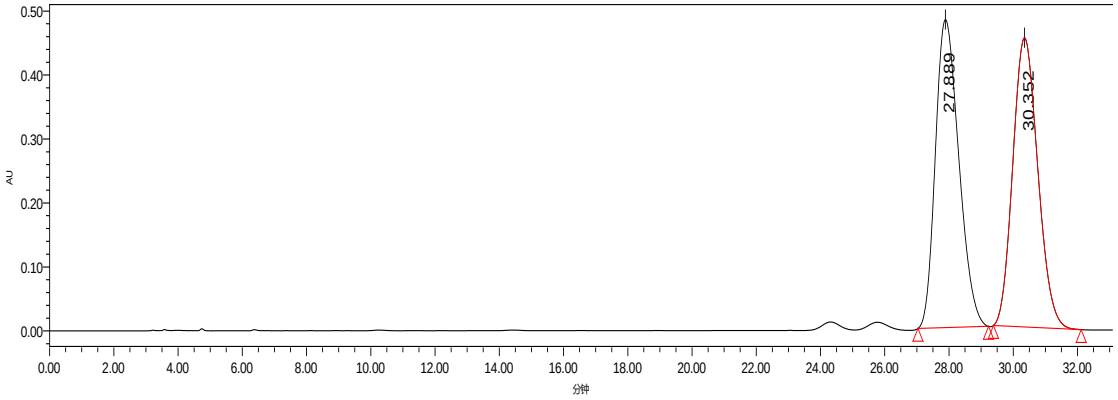
(*S*)-**5t**



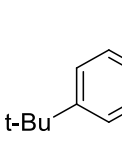
Peak	Ret Time [min]	Area	% Area	Height
1	38.648	48676496	94.60	760992
2	43.894	2780814	5.40	51902



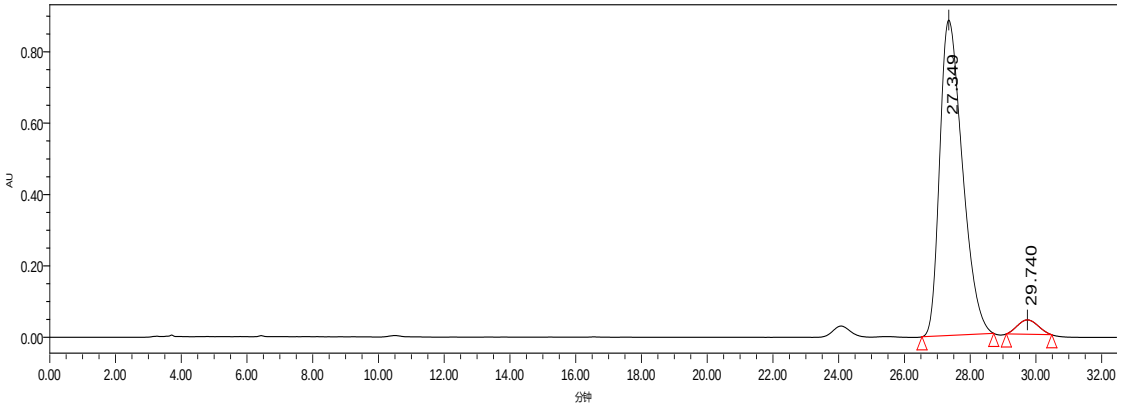
Racemate-**5u**



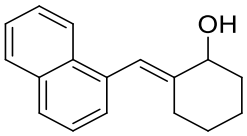
Peak	Ret Time [min]	Area	% Area	Height
1	27.889	24412830	49.99	481718
2	30.352	24418997	50.01	452043



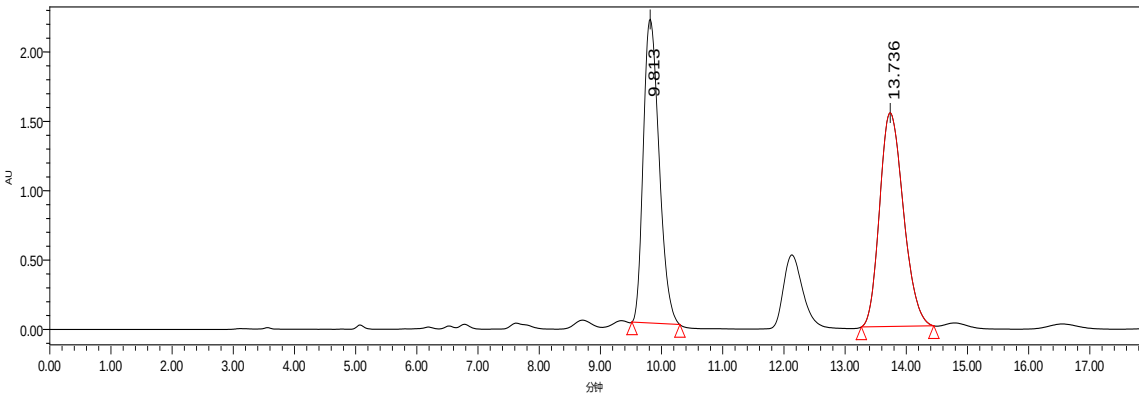
(*S*)-**5u**



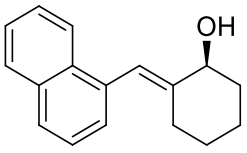
Peak	Ret Time [min]	Area	% Area	Height
1	27.349	42399827	96.39	884544
2	29.740	1589307	3.61	38243



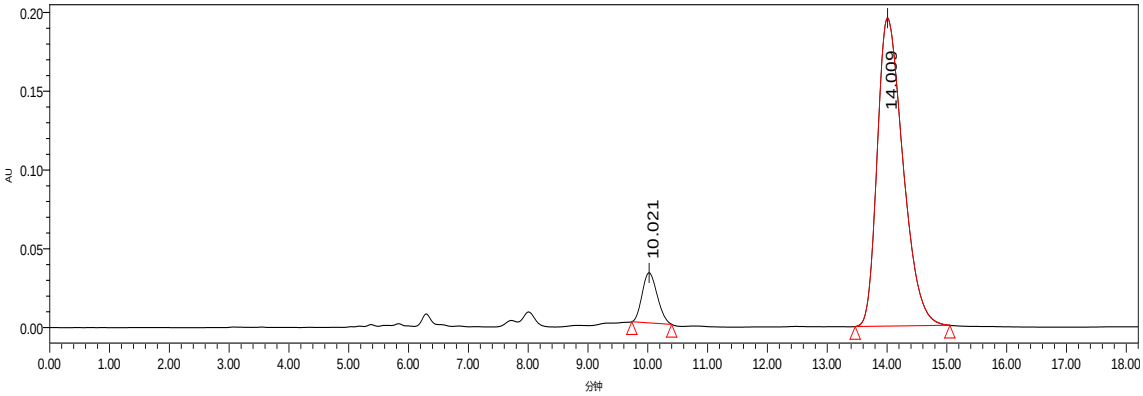
Racemate-**5v**



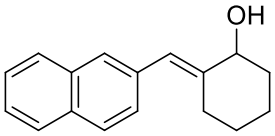
Peak	Ret Time [min]	Area	% Area	Height
1	9.813	40199623	49.59	2191365
2	13.736	40864347	50.41	1541108



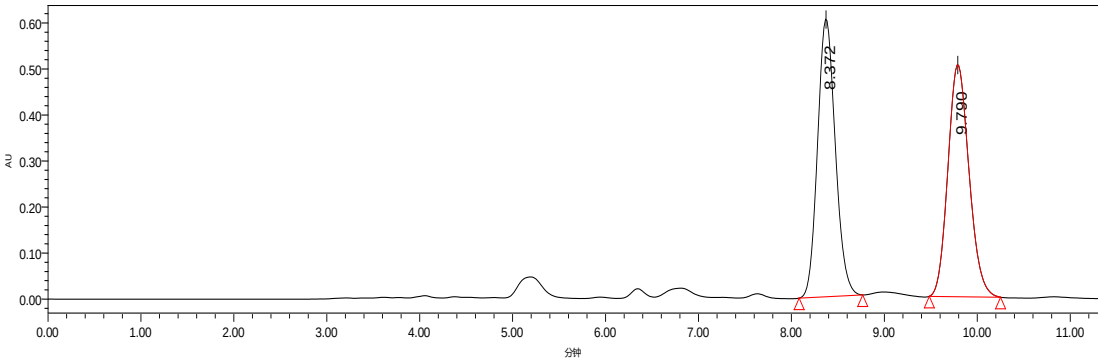
(*S*)-**5v**



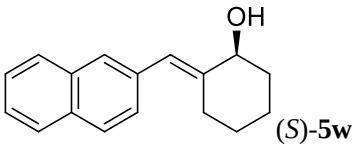
Peak	Ret Time [min]	Area	% Area	Height
1	10.021	528859	8.27	30895
2	14.009	5865084	91.73	195756



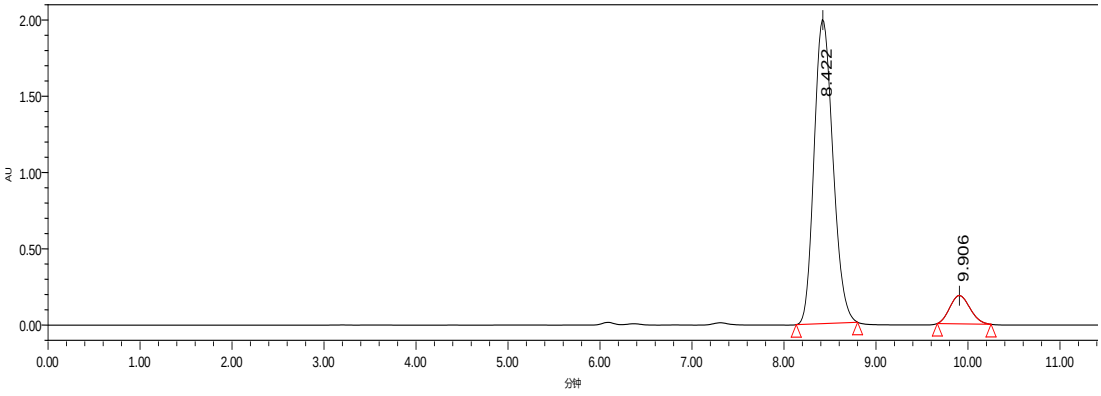
Racemate-**5w**



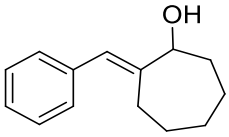
Peak	Ret Time [min]	Area	% Area	Height
1	8.372	8022270	50.21	604494
2	9.790	7956540	49.79	504831



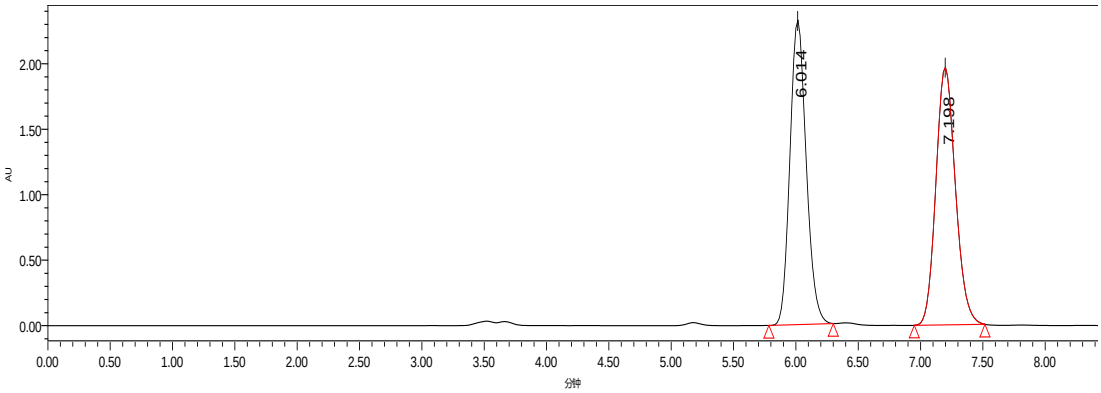
(*S*)-**5w**



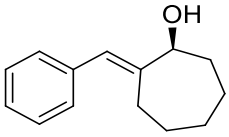
Peak	Ret Time [min]	Area	% Area	Height
1	8.422	28353940	91.64	1995150
2	9.906	2586007	8.36	178886



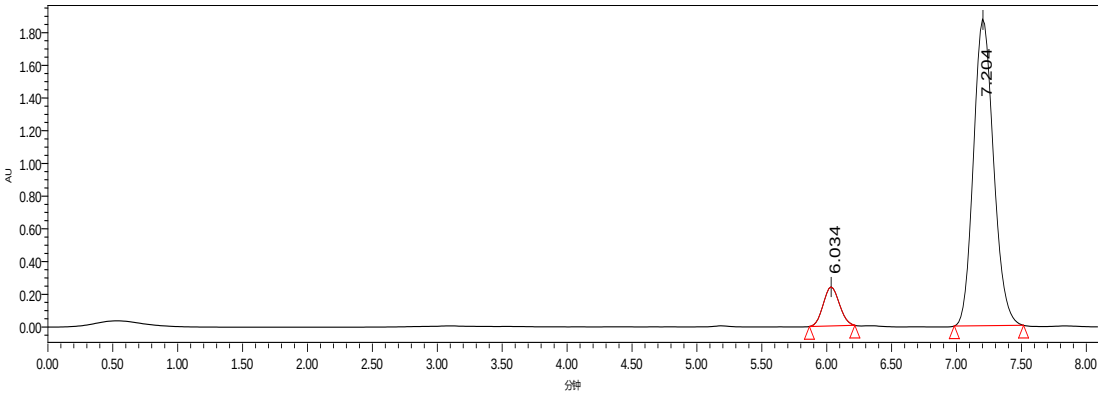
Racemate-**5x**



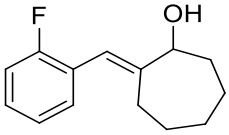
Peak	Ret Time [min]	Area	% Area	Height
1	6.014	21078766	49.65	2323508
2	7.198	21378717	50.35	1967614



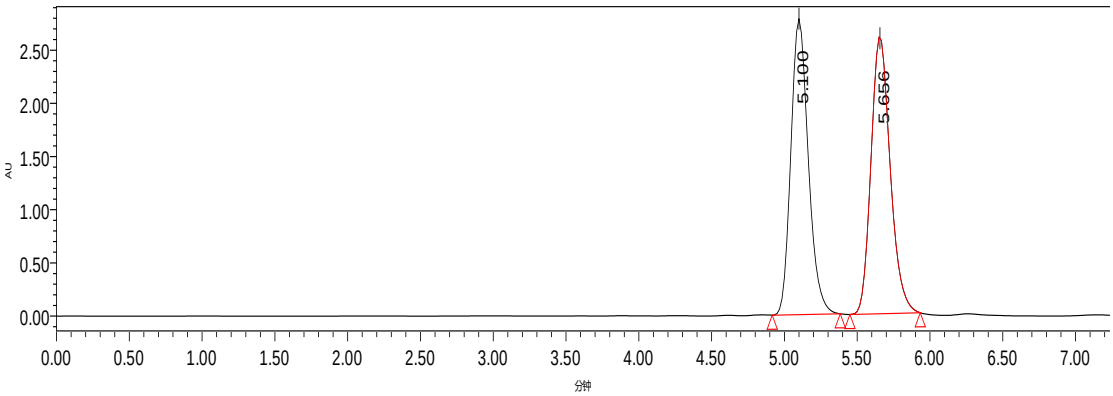
(*S*)-**5x**



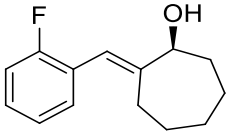
Peak	Ret Time [min]	Area	% Area	Height
1	6.034	1662364	7.60	215134
2	7.204	20201744	92.40	1877168



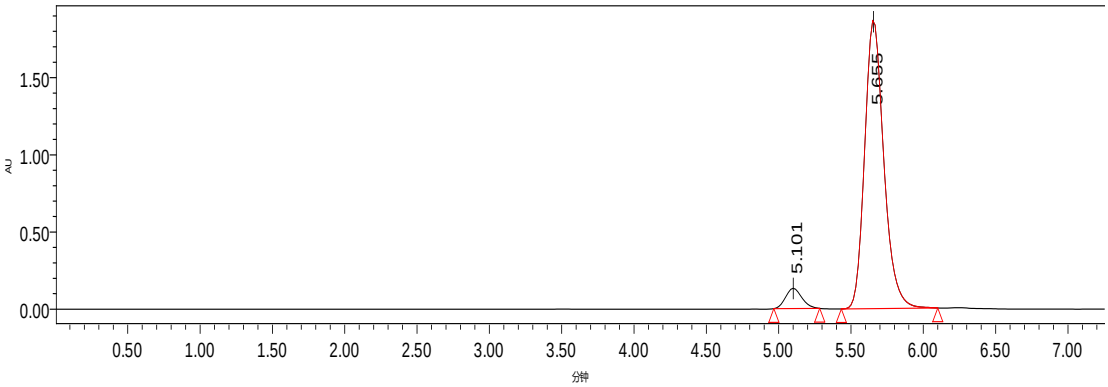
Racemate-**5y**



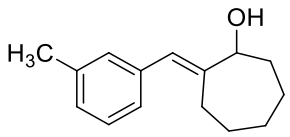
Peak	Ret Time [min]	Area	% Area	Height
1	5.100	23417123	49.70	2766796
2	5.656	23699824	50.30	2617282



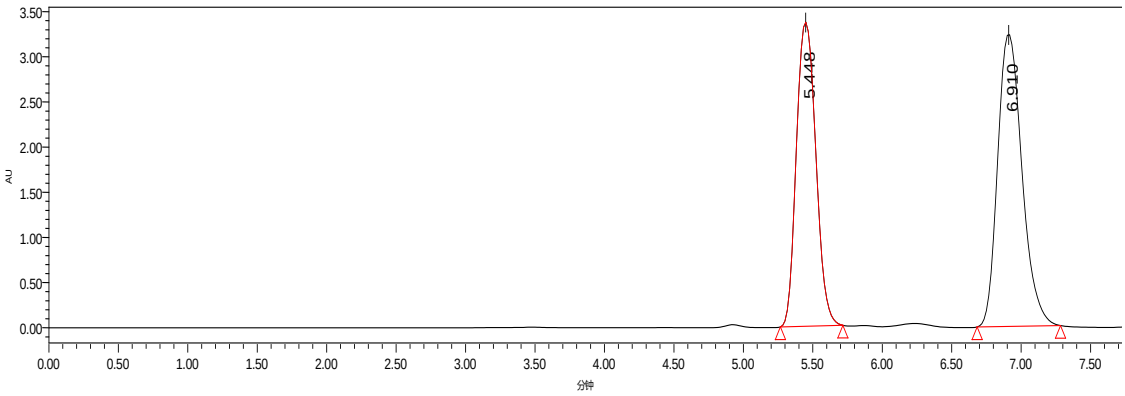
(*S*)-**5y**



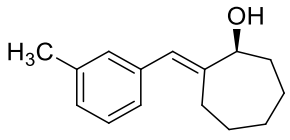
Peak	Ret Time [min]	Area	% Area	Height
1	5.101	862314	4.81	121686
2	5.655	17073546	95.19	1869363



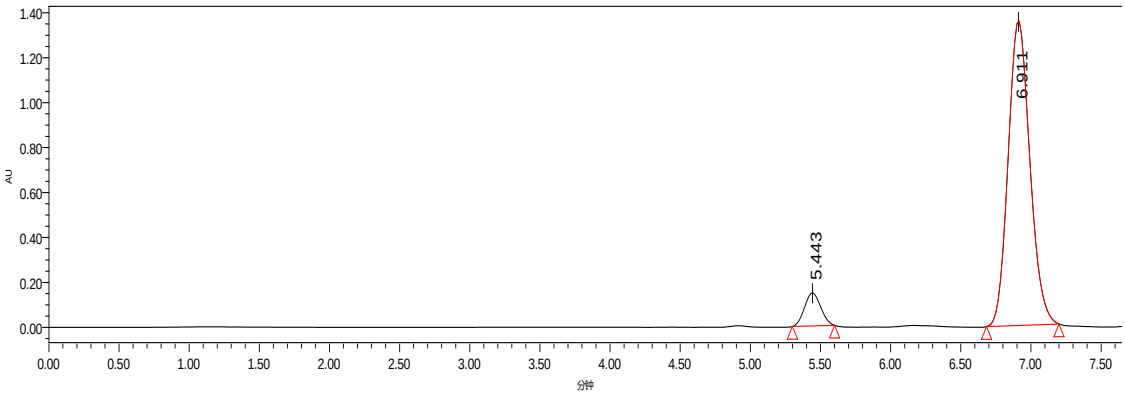
Racemate-**5z**



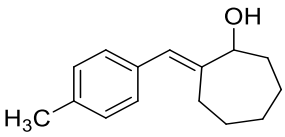
Peak	Ret Time [min]	Area	% Area	Height
1	5.448	32580682	49.70	3361851
2	6.910	32976954	50.30	3020364



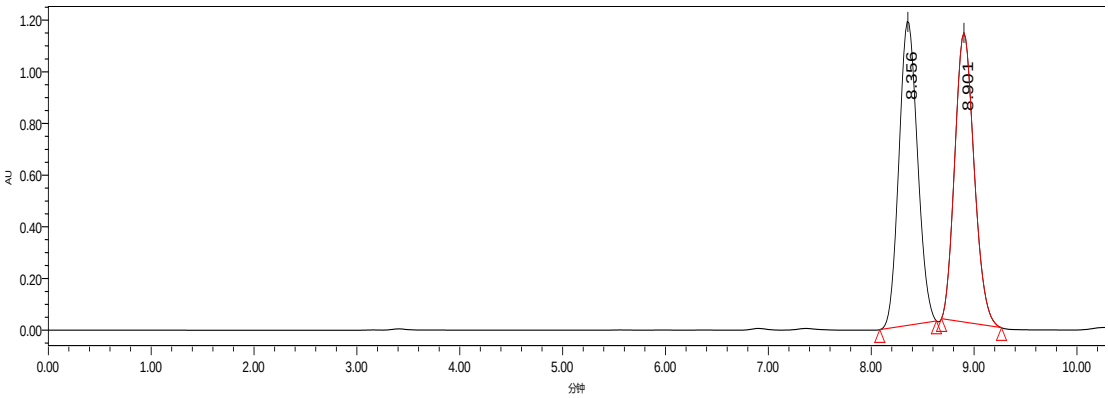
(*S*)-**5z**



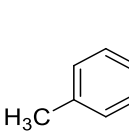
Peak	Ret Time [min]	Area	% Area	Height
1	5.443	1098062	6.99	142107
2	6.911	14618536	93.01	1357609



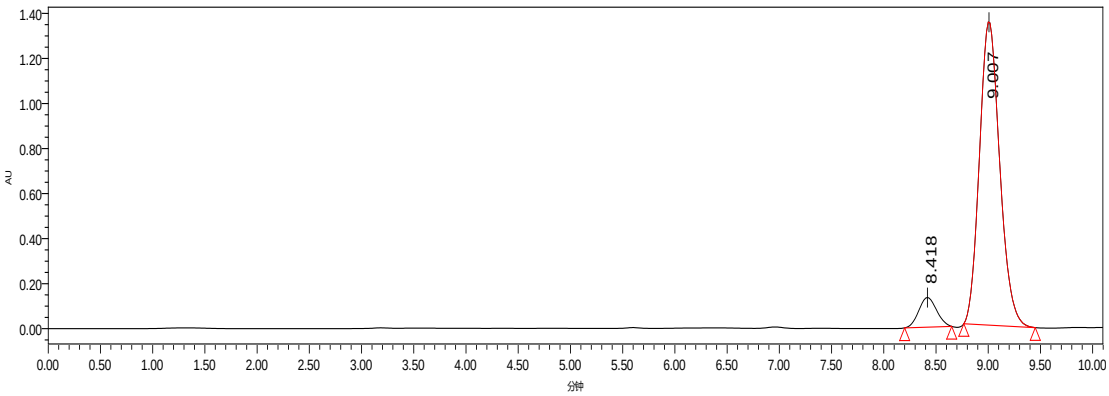
Racemate-**5a'**



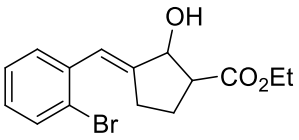
Peak	Ret Time [min]	Area	% Area	Height
1	8.356	14778213	50.33	1179599
2	8.901	14586676	49.67	1119881



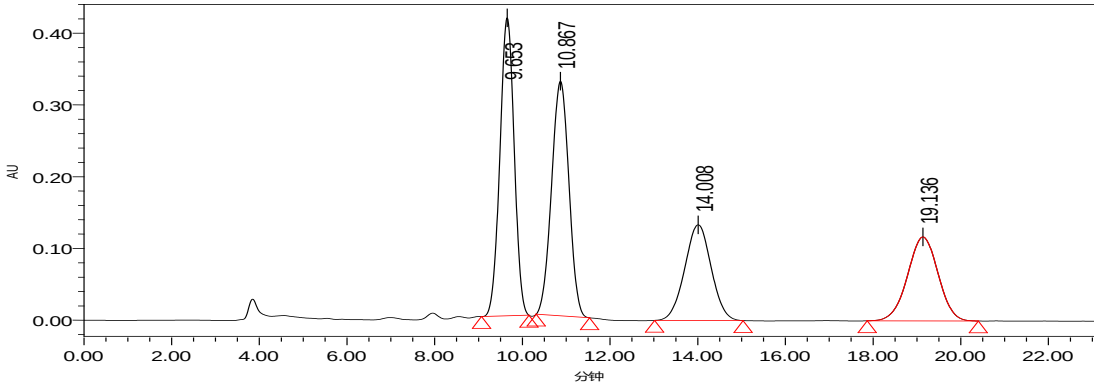
(*S*)-**5a'**



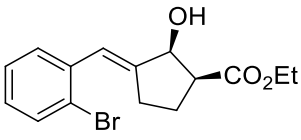
Peak	Ret Time [min]	Area	% Area	Height
1	8.418	1565516	7.92	131881
2	9.007	18192640	92.08	1350147



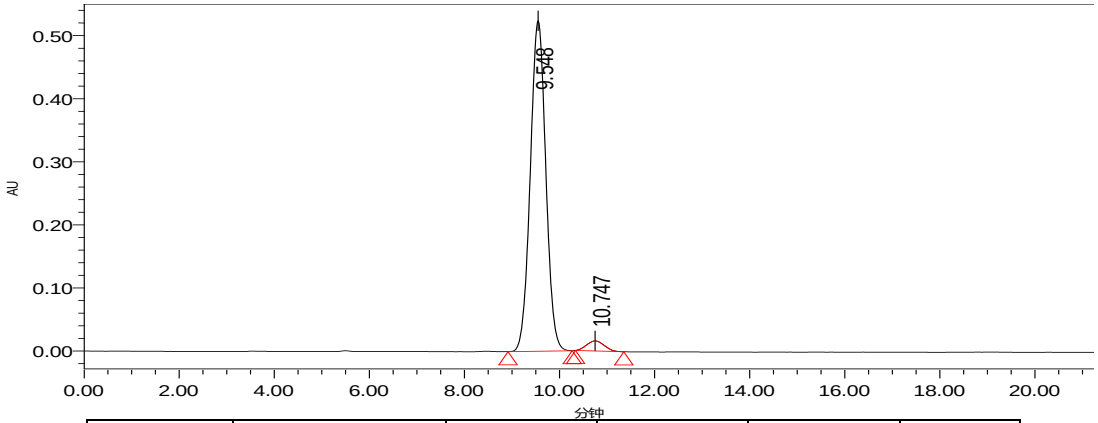
Racemate-**7**



Peak	Ret Time [min]	Area	% Area	Height	Type
1	9.653	9447018	31.81	415354	bb
2	10.867	8984743	30.25	327048	bb
3	14.008	5598461	18.85	133285	bb
4	19.136	5669274	19.09	117068	bb



(*S*,*S*)-**7**



Peak	Ret Time [min]	Area	% Area	Height	Type
1	9.548	11880217	96.97	523901	bb
2	10.747	371570	3.03	15263	bb