

Supporting Information

Enantioselective Copper-Catalyzed Hydroamination of Vinylarenes with Anthranils

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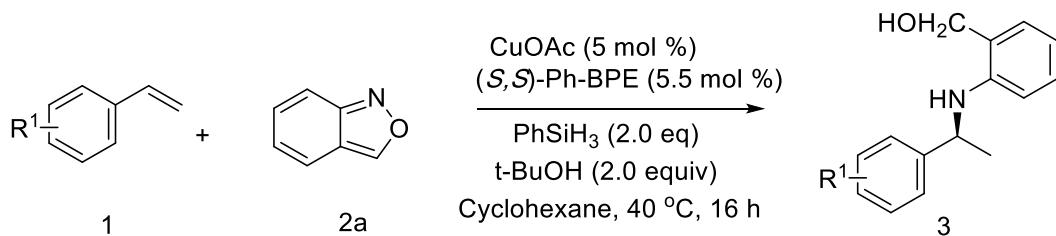
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I. General Information

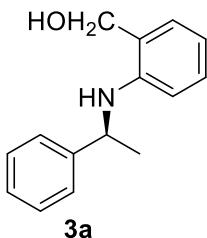
Commercially available chemicals were obtained from Adamas, Acros Organics, Aldrich Chemical Co., Alfa Aesar, and TCI and were used as received unless otherwise stated. Anhydrous solvent, purchased from Acros Organics and J&K Chemical, were also used as received. All reactions were carried out in a N₂-filled glovebox. NMR Spectra were recorded on a 400 MHz NMR spectrometer in the solvent indicated. The chemical shift is given in dimensionless δ values and is frequency referenced relative to TMS in ¹H and ¹³C NMR spectroscopy. HRMS data were obtained on a Thermo Scientific LTQ Orbitrap Discovery spectrometer (Bremen, Germany). Column chromatography was performed on silica gel (300-400 mesh) using ethyl acetate/hexanes. The enantiomeric excesses (ee) of the products were determined by high-performance liquid chromatography (HPLC) analysis performed on Shimadzu LC-2030 Series using a Chiralpak® columns (25 cm) as noted for each. Optical rotations were reported as follows: $[\alpha]_D^T = (C: g/100 mL \text{ in CHCl}_3)$. The derivatives of anthranil were prepared according to literature reports.^[1]

II. General Procedures for the Synthesis of Products 3



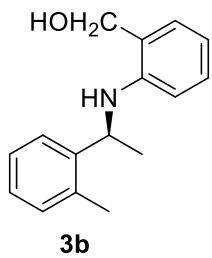
Typical Reaction Conditions for Synthesis of Chiral Amine **3**. A flame-dried pressure tube (15 mL) equipped with a magnetic stir bar was evacuated and filled N₂ for three times before being transferred into a glovebox. CuOAc (0.01 mmol), (S,S)-(Ph-BPE) (0.011 mmol) and dry cyclohexane (1 mL) was added to the tube in succession (note that the CuOAc was purchased from the Strem Chemicals as a white powder and was stored in a glovebox; the color remained white for three months). PhSiH₃ (100 μ L, 0.8 mmol) was then added. This mixture was stirred for 10 min as a homogenous solution formed. At this time, alkene substrate (0.2 mmol), fresh anthranil or derivatives (0.3 mmol) and *t*-BuOH (0.4 mmol) were added in succession. The reaction tube was capped and taken out of the glovebox. The reaction was stirred at 40 °C for 16 h. After completion, a saturated solution of NH₄F in MeOH (ca. 3 mL) was carefully added to quench the reaction (Caution: gas evolution was observed). The reaction mixture was allowed to stir at room temperature for 15 min before diluted with EtOAc (ca. 10 mL) and water (5mL). The organic phase was separated and the aqueous layer was extracted with EtOAc (10mL*2). The combined organic phase was concentrated in *vacuo* and the residue was purified by silica gel chromatography using PE/EA to afford the product **3**.

Preparation of Racemic Samples of **3:** To obtain racemic samples of the aminated products, the general procedure for synthesis of chiral **3** was followed except (\pm)-Ph-BPE was used instead as the ligand. (\pm)-Ph-BPE was prepared in a nitrogen filled glovebox by dissolving a mixture of (*R,R*)-Ph-BPE (507 mg, 1.00 mmol) and (*S,S*)-Ph-BPE (507 mg, 1.00 mmol) in THF (5 mL) followed by removal of the solvent *in vacuo*.^[2]



(*S*)-(2-((1-phenylethyl)amino)phenyl)methanol

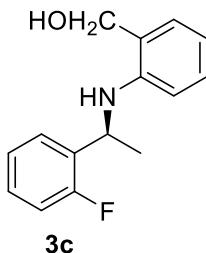
Colorless oil, Yield 89% (40.5 mg). ¹H NMR (400 MHz, Chloroform-*d*) δ 7.40 – 7.15 (m, 5H), 7.08 – 6.99 (m, 2H), 6.59 (td, J = 7.4, 1.1 Hz, 1H), 6.43 (dd, J = 8.6, 1.1 Hz, 1H), 4.72 (d, J = 3.2 Hz, 2H), 4.53 (q, J = 6.7 Hz, 1H), 1.55 (d, J = 6.7 Hz, 3H). ¹³C NMR (101 MHz, Chloroform-*d*) δ 146.39, 145.17, 129.49, 129.00, 128.63, 126.85, 125.85, 124.25, 116.54, 112.29, 65.04, 53.18, 25.19. HRMS (ESI) Calcd for [C₁₅H₁₇NO+H]⁺ 228.1388, Found 228.1381. Specific rotation $[\alpha]D^{20}$ = +56.20 (*c* = 1.0, CHCl₃). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40°C, λ = 254nm, *tM* = 12.25 min, *tm* = 16.93 min) indicated 97% *ee*.



(*S*)-(2-((1-(o-tolyl)ethyl)amino)phenyl)methanol

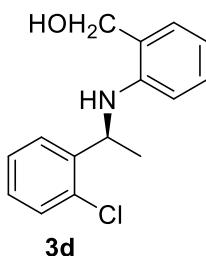
Colorless oil, Yield 85% (41.0 mg). ¹H NMR (400 MHz, Chloroform-*d*) δ 7.43 – 7.30 (m, 1H), 7.12 (m, 3H), 7.01 (m, 2H), 6.57 (td, J = 7.4, 1.1 Hz, 1H), 6.25 (d, J = 8.4 Hz, 1H), 4.83 – 4.61 (m, 3H), 2.44 (s, 3H), 1.49 (d, J = 6.6 Hz, 3H). ¹³C NMR (101 MHz, Chloroform-*d*) δ 146.50, 142.91, 134.46, 130.58, 129.58, 129.02, 126.63, 124.57, 124.09, 116.28, 111.67, 65.04, 49.38, 23.27, 18.98. HRMS (ESI) Calcd for [C₁₆H₁₉NO+H]⁺ 242.1545, Found 242.1547. Specific rotation $[\alpha]D^{20}$ = +118.56 (*c* = 0.7, CHCl₃). HPLC analysis (OJ-H column,

90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40°C, λ = 254nm, tM = 9.42 min, tm = 10.39 min) indicated 97% *ee*.



(*S*)-(2-((1-(2-fluorophenyl)ethyl)amino)phenyl)methanol

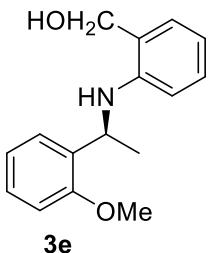
Colorless oil, Yield 82% (40.2 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.28 (td, J = 7.6, 1.7 Hz, 1H), 7.10 (tdd, J = 7.5, 6.2, 1.8 Hz, 1H), 7.00 – 6.93 (m, 3H), 6.53 (td, J = 7.4, 1.1 Hz, 1H), 6.35 (d, J = 8.0 Hz, 1H), 4.80 (q, J = 6.7 Hz, 1H), 4.66 (s, 2H), 1.49 (d, J = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 160.48 (d, $J_{\text{C}-\text{F}}$ = 243.1 Hz), 146.13, 131.76 (d, $J_{\text{C}-\text{F}}$ = 13.2 Hz), 129.58, 129.02, 128.22 (d, $J_{\text{C}-\text{F}}$ = 8.0 Hz), 127.03 (d, $J_{\text{C}-\text{F}}$ = 4.6 Hz), 124.41 (d, $J_{\text{C}-\text{F}}$ = 3.4 Hz), 124.24, 116.68, 115.40 (d, $J_{\text{C}-\text{F}}$ = 21.7 Hz), 111.85, 65.03, 46.76 (d, $J_{\text{C}-\text{F}}$ = 2.9 Hz), 23.50. HRMS (ESI) Calcd for [C₁₅H₁₆FNO+H]⁺ 246.1294, Found 246.1291. Specific rotation [α]D²⁰ = +117.24 (c = 0.4, CHCl₃). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40°C, λ = 254nm, tM = 8.94 min, tm = 9.99 min) indicated 96% *ee*.



(*S*)-(2-((1-(2-chlorophenyl)ethyl)amino)phenyl)methanol

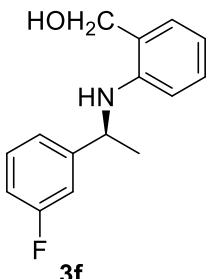
Colorless oil, Yield 82% (43.0 mg). ^1H NMR (400 MHz, Acetonitrile-*d*₃) δ 7.54 – 7.40 (m, 2H), 7.29 – 7.17 (m, 2H), 7.08 (dd, J = 7.2, 1.6 Hz, 1H), 6.97 (td, J = 7.8, 0.8 Hz, 1H), 6.57 (td, J = 7.4, 0.8 Hz, 1H), 6.23 (d, J = 7.8 Hz, 1H), 5.55 – 5.40 (m, 1H), 5.00 (p, J = 6.8 Hz, 1H), 4.68 (d, J = 5.6 Hz, 2H), 3.30 (t, J = 5.6 Hz, 1H), 1.53 (d, J = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, Acetonitrile-*d*₃) δ 146.45, 143.24, 132.99, 130.03, 129.14, 129.13, 128.86, 128.07, 127.30, 117.89, 116.96, 111.68, 63.79, 49.81, 22.77. HRMS (ESI) Calcd for [C₁₅H₁₆ClNO+H]⁺ 262.0999, Found 262.0996. Specific rotation [α]D²⁰ = +181.49 (c = 0.2,

CHCl_3). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40^\circ\text{C}$, $\lambda = 254 \text{ nm}$, $tM = 7.96 \text{ min}$, $tm = 9.28 \text{ min}$) indicated 92% *ee*.



(*S*)-(2-((1-(2-methoxyphenyl)ethyl)amino)phenyl)methanol

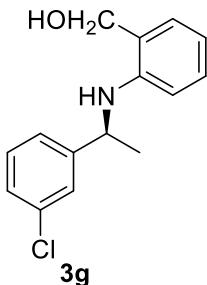
Colorless oil, Yield 78% (40.1 mg). ^1H NMR (400 MHz, Acetonitrile-*d*₃) δ 7.31 (dd, $J = 7.6, 2.0 \text{ Hz}$, 1H), 7.24 – 7.20 (m, 1H), 7.09 – 6.94 (m, 3H), 6.87 (td, $J = 7.4, 1.1 \text{ Hz}$, 1H), 6.55 (td, $J = 7.4, 1.1 \text{ Hz}$, 1H), 6.41 – 6.32 (m, 1H), 5.41 (bs, 1H), 5.04 – 4.88 (m, 1H), 4.65 (s, 2H), 3.92 (s, 3H), 3.27 (bs, 1H), 1.49 (d, $J = 6.7 \text{ Hz}$, 3H). ^{13}C NMR (101 MHz, Acetonitrile-*d*₃) δ 157.59, 147.00, 133.74, 129.08, 129.07, 128.34, 126.50, 125.78, 121.12, 116.50, 111.81, 111.34, 63.81, 55.73, 47.23, 22.87. HRMS (ESI) Calcd for [C₁₆H₁₉NO₂+H]⁺ 258.1494, Found 258.1498. Specific rotation $[\alpha]_D^{20} = +100.99$ ($c = 0.7$, CHCl_3). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40^\circ\text{C}$, $\lambda = 254 \text{ nm}$, $tM = 10.92 \text{ min}$, $tm = 12.69 \text{ min}$) indicated 97% *ee*.



(*S*)-(2-((1-(3-fluorophenyl)ethyl)amino)phenyl)methanol

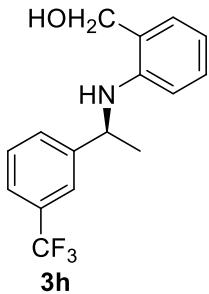
Colorless oil, Yield 82% (40.2 mg). ^1H NMR (400 MHz, Chloroform-*d*): δ 7.21 – 7.14 (m, 1H), 7.10 – 7.03 (m, 1H), 7.03 – 6.92 (m, 3H), 6.88 – 6.75 (m, 1H), 6.56 (td, $J = 7.4, 1.0 \text{ Hz}$, 1H), 6.43 – 6.27 (m, 1H), 4.73 – 4.53 (m, 2H), 4.44 (q, $J = 6.8 \text{ Hz}$, 1H), 1.47 (d, $J = 6.8 \text{ Hz}$, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 163.21 (d, $J_{C-F} = 244.2 \text{ Hz}$), 147.73 (d, $J_{C-F} = 6.4 \text{ Hz}$), 145.53, 130.16 (d, $J_{C-F} = 7.9 \text{ Hz}$), 129.42, 129.06, 124.82, 121.65 (d, $J_{C-F} = 2.8 \text{ Hz}$), 117.41, 113.89 (d, $J_{C-F} = 21.1 \text{ Hz}$), 112.84 (d, $J_{C-F} = 21.6 \text{ Hz}$), 112.82, 64.86, 53.38, 24.81. HRMS (ESI) Calcd for [C₁₅H₁₆FNO₂+H]⁺ 246.1294, Found 246.1294. Specific rotation

$[\alpha]D^{20} = +132.32$ ($c = 0.6$, CHCl_3). HPLC analysis (OJ-H column, 97:3 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40$ °C, $\lambda = 254$ nm, $tM = 20.10$ min, $tm = 23.12$ min) indicated 96% ee.



(*S*)-(2-((1-(3-chlorophenyl)ethyl)amino)phenyl)methanol

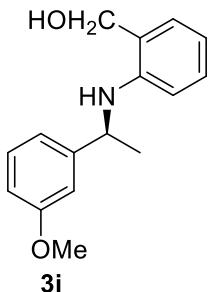
Colorless oil, Yield 77% (40.3 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.37 – 7.33 (m, 1H), 7.27 – 7.16 (m, 3H), 7.09 – 6.98 (m, 2H), 6.62 (td, $J = 7.4, 1.0$ Hz, 1H), 6.41 – 6.34 (m, 1H), 4.82 – 4.66 (m, 2H), 4.49 (q, $J = 6.7$ Hz, 1H), 1.54 (d, $J = 6.7$ Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 147.57, 146.12, 134.5, 129.97, 129.52, 129.06, 127.10, 126.05, 124.34, 124.05, 116.87, 112.20, 65.04, 52.95, 25.16. HRMS (ESI) Calcd for $[\text{C}_{15}\text{H}_{16}\text{ClNO}_2+\text{H}]^+$ 262.0999, Found 262.0994. Specific rotation $[\alpha]D^{20} = +150.99$ ($c = 0.3$, CHCl_3). HPLC analysis (OJ-H column, 95:5 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40$ °C, $\lambda = 254$ nm, $tM = 14.85$ min, $tm = 16.00$ min) indicated 95% ee.



(*S*)-(2-((1-(3-(trifluoromethyl)phenyl)ethyl)amino)phenyl)methanol

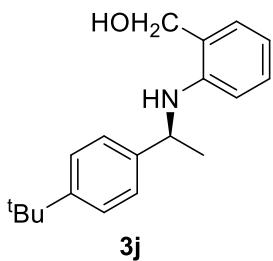
Colorless oil, Yield 75% (44.3 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.63 (s, 1H), 7.56 (d, $J = 7.6$ Hz, 1H), 7.47 (d, $J = 7.6$ Hz, 1H), 7.41 (t, $J = 7.6$ Hz, 1H), 7.15 – 6.88 (m, 2H), 6.62 (td, $J = 7.4, 1.0$ Hz, 1H), 6.39 – 6.30 (m, 1H), 4.84 – 4.66 (m, 2H), 4.58 (q, $J = 6.7$ Hz, 1H), 1.56 (d, $J = 6.7$ Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 146.54, 146.27, 130.95 (q, $J = 31.9$ Hz), 129.53, 129.14, 129.10, 124.30, 124.22 (q, $J = 270.5$ Hz), 123.81 (q, $J = 3.8$ Hz), 122.74 (q, $J = 3.8$ Hz), 116.82, 111.99, 65.04, 52.92, 25.23. HRMS (ESI) Calcd for $[\text{C}_{16}\text{H}_{16}\text{F}_3\text{NO}+\text{H}]^+$ 296.1262, Found 296.1268. Specific rotation $[\alpha]D^{20} = +88.55$ (c

α = 0.9, CHCl_3). HPLC analysis (OD-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40^\circ\text{C}$, $\lambda = 254 \text{ nm}$, $tM = 9.22 \text{ min}$, $tm = 13.42 \text{ min}$) indicated 90% *ee*.



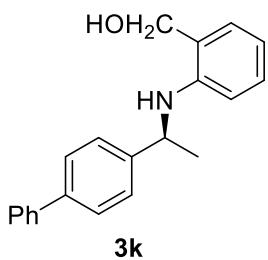
(*S*)-(2-((1-(3-methoxyphenyl)ethyl)amino)phenyl)methanol

Colorless oil, Yield 74% (38.1 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.21 (t, $J = 7.6 \text{ Hz}$, 1H), 7.10 – 6.98 (m, 2H), 6.95 (d, $J = 7.6 \text{ Hz}$, 1H), 6.93 – 6.90 (m, 1H), 6.79 – 6.68 (m, 1H), 6.58 (td, $J = 7.4, 1.0 \text{ Hz}$, 1H), 6.43 (d, $J = 8.0 \text{ Hz}$, 1H), 4.91 – 4.61 (m, 2H), 4.49 (q, $J = 6.7 \text{ Hz}$, 1H), 3.75 (s, 3H), 1.53 (d, $J = 6.7 \text{ Hz}$, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 159.89, 147.27, 146.58, 129.65, 129.49, 128.98, 124.16, 118.25, 116.41, 112.10, 111.82, 111.75, 65.01, 55.14, 53.05, 25.22. HRMS (ESI) Calcd for $[\text{C}_{16}\text{H}_{19}\text{NO}_2+\text{H}]^+$ 258.1494, Found 258.1491. Specific rotation $[\alpha]\text{D}^{20} = +92.49$ ($c = 0.6$, CHCl_3). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40^\circ\text{C}$, $\lambda = 254 \text{ nm}$, $tM = 15.04 \text{ min}$, $tm = 16.86 \text{ min}$) indicated 97% *ee*.



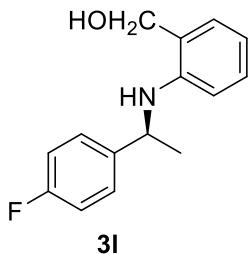
(*S*)-(2-((1-(4-(tert-butyl)phenyl)ethyl)amino)phenyl)methanol

Colorless oil, Yield 81% (45.9 mg). ^1H NMR (400 MHz, Acetonitrile-*d*₃) δ 7.44 – 7.28 (m, 4H), 7.07 (dd, $J = 7.4, 1.6 \text{ Hz}$, 1H), 6.99 (td, $J = 7.6, 1.6 \text{ Hz}$, 1H), 6.57 (td, $J = 7.4, 1.1 \text{ Hz}$, 1H), 6.49 – 6.40 (m, 1H), 5.37 (bs, 1H), 4.68 – 4.64 (m, 2H), 4.61 (t, $J = 6.3 \text{ Hz}$, 1H), 3.36 – 3.15 (m, 1H), 1.51 (d, $J = 6.7 \text{ Hz}$, 3H), 1.32 (s, 9H). ^{13}C NMR (101 MHz, Acetonitrile-*d*₃) δ 150.1, 147.0, 143.6, 129.1, 129.0, 126.2, 125.9, 117.9, 116.6, 112.1, 63.8, 52.5, 34.6, 31.2, 25.1. HRMS (ESI) Calcd for $[\text{C}_{19}\text{H}_{25}\text{NO}+\text{H}]^+$ 284.2014, Found 284.2016. Specific rotation $[\alpha]\text{D}^{20} = +53.10$ ($c = 1.0$, CHCl_3). HPLC analysis (OJ-H column, 95:5 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40^\circ\text{C}$, $\lambda = 254 \text{ nm}$, $tM = 8.78 \text{ min}$, $tm = 13.15 \text{ min}$) indicated 98% *ee*.



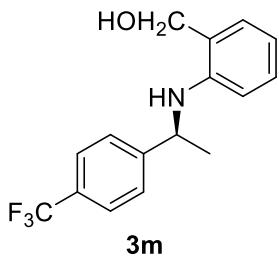
(*S*)-(2-((1-((1,1'-biphenyl)-4-yl)ethyl)amino)phenyl)methanol

Colorless oil, Yield 82% (49.8 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.59 – 7.47 (m, 4H), 7.44 – 7.37 (m, 4H), 7.35 – 7.25 (m, 1H), 7.02 - 6.97 (m, 2H), 6.60 (td, J = 7.4, 1.1 Hz, 1H), 6.55 – 6.37 (m, 1H), 4.85 – 4.64 (m, 2H), 4.57 (q, J = 6.7 Hz, 1H), 1.57 (d, J = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*): δ 146.6, 144.4, 141.0, 139.8, 129.6, 129.1, 128.7, 127.4, 127.1, 127.0, 126.3, 124.2, 116.5, 112.2, 85.1, 52.8, 25.3. HRMS (ESI) Calcd for [C₂₁H₂₁NO+H]⁺ 304.1701, Found 304.1699. Specific rotation $[\alpha]_D^{20} = +64.30$ (*c* = 0.65, CHCl₃). HPLC analysis (OJ-H column, 85:15 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 21.57 min, *tm* = 30.81 min) indicated 95% ee.



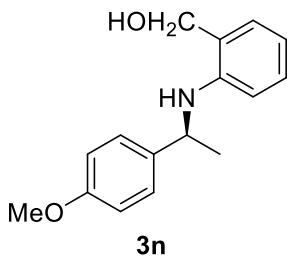
(*S*)-(2-((1-(4-fluorophenyl)ethyl)amino)phenyl)methanol

Colorless oil, Yield 86% (42.2 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.41 – 7.25 (m, 2H), 7.06 – 6.95 (m, 5H), 6.60 (td, J = 7.4, 1.1 Hz, 1H), 6.38 (d, J = 8.0 Hz, 1H), 4.82 – 4.63 (m, 2H), 4.51 (q, J = 6.7 Hz, 1H), 1.52 (d, J = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 161.73 (d, J_{C-F} = 242.8 Hz), 146.35, 140.91, 129.48, 129.05, 127.30 (d, J_{C-F} = 7.9 Hz), 124.26, 116.63, 115.42 (d, J_{C-F} = 21.2 Hz), 112.16, 65.02, 52.50, 25.34. HRMS (ESI) Calcd for [C₁₅H₁₆FNO+H]⁺ 246.1294, Found 246.1292. Specific rotation $[\alpha]_D^{20} = +105.39$ (*c* = 0.5, CHCl₃). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 10.08 min, *tm* = 14.95 min) indicated 97% ee.



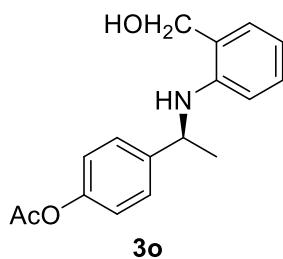
(*S*)-(2-((1-(4-(trifluoromethyl)phenyl)ethyl)amino)phenyl)methanol

Colorless oil, Yield 75% (44.3 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.47 (d, *J* = 8.1 Hz, 2H), 7.39 (d, *J* = 8.1 Hz, 2H), 6.98 – 6.92 (m, 2H), 6.54 (td, *J* = 7.4, 1.1 Hz, 1H), 6.24 (d, *J* = 8.1 Hz, 1H), 4.72 – 4.59 (m, 2H), 4.50 (q, *J* = 6.8 Hz, 1H), 1.47 (d, *J* = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 149.55, 146.19, 129.51, 129.16 (q, *J* = 32.1 Hz), 129.11, 126.18, 125.68 (q, *J* = 3.8 Hz), 124.24 (q, *J* = 270.3 Hz), 124.30, 116.86, 112.04, 65.03, 52.86, 25.15. HRMS (ESI) Calcd for $[\text{C}_{16}\text{H}_{16}\text{F}_3\text{NO}+\text{H}]^+$ 296.1262, Found 296.1263. Specific rotation $[\alpha]\text{D}^{20} = +111.49$ (*c* = 0.8, CHCl_3). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 7.19 min, *tm* = 8.32 min) indicated 93% ee.



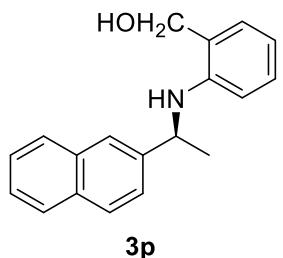
(*S*)-(2-((1-(4-methoxyphenyl)ethyl)amino)phenyl)methanol

Colorless oil, Yield 80% (41.2 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.31 – 7.25 (m, 2H), 7.08 – 6.95 (m, 2H), 6.87 – 6.78 (m, 2H), 6.59 (td, *J* = 7.4, 1.0 Hz, 1H), 6.44 (d, *J* = 8.0 Hz, 1H), 4.78 – 4.62 (m, 2H), 4.49 (d, *J* = 6.7 Hz, 1H), 3.76 (s, 3H), 1.52 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 158.44, 146.55, 137.30, 129.47, 128.98, 126.86, 124.1, 116.38, 114.01, 112.20, 65.02, 55.24, 52.46, 25.24. HRMS (ESI) Calcd for $[\text{C}_{16}\text{H}_{19}\text{NO}_2+\text{H}]^+$ 258.1494, Found 296.1490. Specific rotation $[\alpha]\text{D}^{20} = +71.39$ (*c* = 0.5, CHCl_3). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 21.11 min, *tm* = 27.97 min) indicated 98% ee.



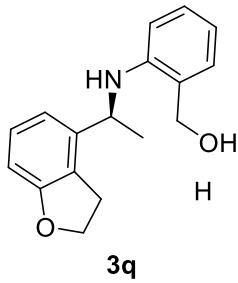
(*S*)-4-((2-(hydroxymethyl)phenyl)amino)ethyl)phenyl acetate

Colorless oil, Yield 66% (37.7 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.38 – 7.33 (m, 2H), 7.07 – 6.98 (m, 4H), 6.60 (td, J = 7.4, 1.1 Hz, 1H), 6.40 (d, J = 8.0 Hz, 1H), 4.80 – 4.62 (m, 2H), 4.53 (q, J = 6.7 Hz, 1H), 2.25 (s, 3H), 1.53 (d, J = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 169.55, 149.42, 146.37, 142.74, 129.50, 129.01, 126.83, 124.24, 121.61, 116.58, 112.17, 64.98, 52.60, 25.21, 21.14. HRMS (ESI) Calcd for [C₁₇H₁₉NO₃+H]⁺ 286.1443, Found 286.1448. Specific rotation $[\alpha]\text{D}^{20} = +71.88$ (c = 0.9, CHCl₃). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40°C, λ = 254 nm, *tM* = 26.15 min, *tm* = 46.93 min) indicated 97% ee.



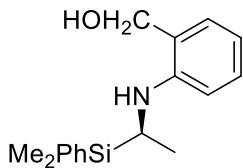
(*S*)-2-((1-(naphthalen-2-yl)ethyl)amino)phenylmethanol

Colorless oil, Yield 61% (33.8 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.85 – 7.75(m, 4H), 7.50 (dd, J = 8.4, 1.7 Hz, 1H), 7.46 – 7.39 (m, 2H), 7.05 – 6.96 (m, 2H), 6.58 (td, J = 7.4, 1.0 Hz, 1H), 6.48 (d, J = 8.1 Hz, 1H), 4.81 – 4.72 (m, 2H), 4.69 (q, J = 6.8 Hz, 1H), 1.62 (d, J = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 146.48, 142.76, 133.58, 132.76, 129.52, 129.01, 128.50, 127.81, 127.67, 125.99, 125.48, 124.34, 124.28, 116.60, 112.36, 65.09, 53.44, 25.19. HRMS (ESI) Calcd for [C₁₉H₁₉NO+H]⁺ 278.1545, Found 278.1542. Specific rotation $[\alpha]\text{D}^{20} = +99.99$ (c = 0.35, CHCl₃). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 22.06 min, *tm* = 24.20 min) indicated 96% ee.



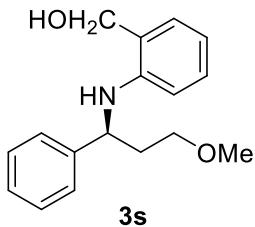
(*S*)-(2-((1-(2,3-dihydrobenzofuran-4-yl)ethyl)amino)phenyl)methanol

Colorless oil, Yield 78% (42.0 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.14 – 6.95 (m, 3H), 6.86 (d, *J* = 7.6 Hz, 1H), 6.66 (d, *J* = 7.6 Hz, 1H), 6.59 (td, *J* = 7.4, 1.0 Hz, 1H), 6.36 (d, *J* = 8.0 Hz, 1H), 4.75 – 4.65 (m, 2H), 4.62 – 4.52 (m, 2H), 4.49 (q, *J* = 6.7 Hz, 1H), 3.37 – 3.25 (m, 1H), 3.22 – 3.12 (m, 1H), 1.52 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 160.40, 146.46, 141.83, 129.56, 129.04, 128.55, 124.10, 123.64, 117.33, 116.49, 111.66, 107.80, 71.14, 65.01, 51.54, 28.40, 23.07. HRMS (ESI) Calcd for $[\text{C}_{17}\text{H}_{19}\text{NO}_2+\text{H}]^+$ 270.1494, Found 270.1490. Specific rotation $[\alpha]\text{D}^{20} = +150.24$ (*c* = 0.8, CHCl_3). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40°C, λ = 254 nm, *tM* = 17.48 min, *tm* = 19.37 min) indicated 96% ee.



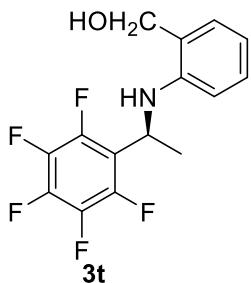
(*R*)-(2-((1-(dimethyl(phenyl)silyl)ethyl)amino)phenyl)methanol

Colorless oil, Yield 84% (48.0 mg). ^1H NMR (400 MHz, Acetonitrile-*d*₃) δ 7.46 – 7.36 (m, 2H), 7.22 – 7.10 (m, 3H), 6.99 – 6.85 (m, 1H), 6.76 (dd, *J* = 7.3, 1.6 Hz, 1H), 6.51 (d, *J* = 8.1 Hz, 1H), 6.31 (td, *J* = 7.3, 1.1 Hz, 1H), 4.60 (bs, 1H), 4.33 – 4.10 (m, 2H), 3.06 – 2.98 (m, 1H), 2.79 (bs, 1H), 0.94 (d, *J* = 7.1 Hz, 3H), 0.15 (m, 6H). ^{13}C NMR (101 MHz, Acetonitrile-*d*₃) δ 148.44, 137.40, 134.68, 129.89, 129.39, 129.27, 128.40, 125.76, 115.93, 110.61, 64.04, 36.69, 15.61, 1.52, 1.31. HRMS (ESI) Calcd for $[\text{C}_{17}\text{H}_{23}\text{NOSi}+\text{H}]^+$ 286.1627, Found 286.1627. Specific rotation $[\alpha]\text{D}^{20} = +64.10$ (*c* = 1.0, CHCl_3). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 8.94 min, *tm* = 10.88 min) indicated 85% ee.



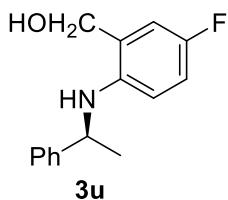
(*S*)-(2-((3-methoxy-1-phenylpropyl)amino)phenyl)methanol

Colorless oil, Yield 55% (29.8 mg). ^1H NMR (400 MHz, Acetonitrile- d_3) δ 7.43 – 7.39 (m, 2H), 7.37 – 7.31 (m, 2H), 7.27 – 7.21 (m, 1H), 7.07 (dd, J = 7.4, 1.6 Hz, 1H), 6.99 – 6.91 (m, 1H), 6.55 (td, J = 7.4, 1.2 Hz, 1H), 6.39 (d, J = 8.1 Hz, 1H), 5.74 – 5.60 (m, 1H), 4.67 – 4.59 (m, 3H), 3.55 – 3.39 (m, 2H), 3.32 (s, 3H), 3.25 (bs, 1H), 2.10 – 2.02 (m, 2H). ^{13}C NMR (101 MHz, Acetonitrile- d_3) δ 147.00, 145.04, 129.03, 129.00, 128.96, 127.37, 127.04, 16.53, 111.86, 69.96, 63.64, 58.43, 55.51, 38.81. HRMS (ESI) Calcd for [C₁₇H₂₁NO₂+H]⁺ 272.1651, Found 272.1649. Specific rotation $[\alpha]\text{D}^{20} = +50.50$ ($c = 0.4$, CHCl₃). HPLC analysis (OD-H column, 95:5 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 13.70 min, *tm* = 15.32 min) indicated 99% ee.



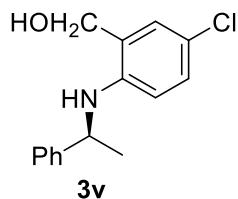
(*S*)-(2-((1-(perfluorophenyl)ethyl)amino)phenyl)methanol

Colorless oil, Yield 65% (41.2 mg). ^1H NMR (400 MHz, Acetonitrile- d_3) δ 7.14 – 7.04 (m, 2H), 6.64 (td, J = 7.4, 1.1 Hz, 1H), 6.59 (d, J = 8.1 Hz, 1H), 5.63 – 5.51 (m, 1H), 5.19 – 4.99 (m, 1H), 4.64 – 4.52 (m, 2H), 3.35 – 3.21 (m, 1H), 1.70 (d, J = 7.0 Hz, 3H). ^{13}C NMR (101 MHz, CD₃CN) δ 146.23, 129.49, 129.40, 126.40, 117.68, 110.94, 63.74, 44.43, 21.27. HRMS (ESI) Calcd for [C₁₅H₁₂F₅NO+H]⁺ 318.0917, Found 318.0916. Specific rotation $[\alpha]\text{D}^{20} = -41.50$ ($c = 0.8$, CHCl₃). HPLC analysis (OD-H column, 97:3 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 10.46 min, *tm* = 14.05 min) indicated 63% ee.



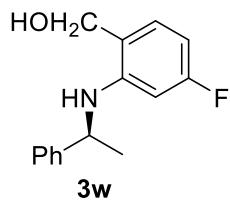
(*S*)-(5-fluoro-2-((1-phenylethyl)amino)phenyl)methanol

Colorless oil, Yield 73% (35.8 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.37 – 7.26 (m, 4H), 7.24 – 7.15 (m, 1H), 6.79 (dd, J = 8.6, 3.0 Hz, 1H), 6.73 (td, J = 8.6, 3.0 Hz, 1H), 6.36 – 6.28 (m, 1H), 4.81 – 4.56 (m, 2H), 4.47 (q, J = 6.7 Hz, 1H), 1.53 (d, J = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 154.89 (d, $J_{\text{C}-\text{F}}$ = 233.7 Hz), 145.05, 142.63 (d, $J_{\text{C}-\text{F}}$ = 1.9 Hz), 128.67, 126.93, 125.79, 125.55 (d, $J_{\text{C}-\text{F}}$ = 6.2 Hz), 115.59 (d, $J_{\text{C}-\text{F}}$ = 22.4 Hz), 115.17 (d, $J_{\text{C}-\text{F}}$ = 21.4 Hz), 113.05 (d, $J_{\text{C}-\text{F}}$ = 7.3 Hz), 64.34, 53.57, 25.28. HRMS (ESI) Calcd for [C₁₅H₁₇FNO+H]⁺ 246.1294, Found 246.1299. Specific rotation $[\alpha]\text{D}^{20}$ = +105.87 (c = 0.34, CHCl₃). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 13.62 min, *tm* = 16.46 min) indicated 96% *ee*.



(*S*)-(5-chloro-2-((1-phenylethyl)amino)phenyl)methanol

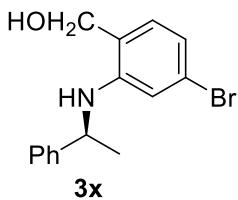
Colorless oil, Yield 76% (39.8 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.37 – 7.27 (m, 4H), 7.24 – 7.17 (m, 1H), 7.01 (d, J = 2.6 Hz, 1H), 6.96 (dd, J = 8.7, 2.6 Hz, 1H), 6.32 (d, J = 8.6 Hz, 1H), 4.75 – 4.62 (m, 2H), 4.49 (q, J = 6.7 Hz, 1H), 1.54 (d, J = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 144.99, 144.75, 128.93, 128.69, 128.61, 126.98, 125.73, 125.59, 121.01, 113.31, 64.42, 53.22, 25.20. HRMS (ESI) Calcd for [C₁₅H₁₆CINO+H]⁺ 262.0999, Found 262.1002. Specific rotation $[\alpha]\text{D}^{20}$ = +58.00 (c = 0.20, CHCl₃). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 12.19 min, *tm* = 14.52 min) indicated 96% *ee*.



(*S*)-(4-fluoro-2-((1-phenylethyl)amino)phenyl)methanol

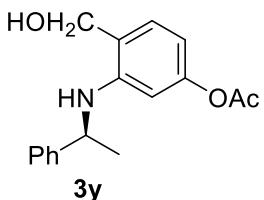
Colorless oil, Yield 82% (40.2 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.41 – 7.27 (m, 4H), 7.27 – 7.15 (m, 1H), 6.99 – 6.91 (m, 1H), 6.24 (td, J = 8.3, 2.5 Hz, 1H), 6.11 (dd, J = 11.9, 2.5 Hz, 1H), 4.73 – 4.63 (m, 2H), 4.46 (q, J = 6.7 Hz, 1H), 1.54 (d, J = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 164.12 (d, $J_{\text{C}-\text{F}}$ = 241.6 Hz), 148.34 (d, $J_{\text{C}-\text{F}}$ = 11.2 Hz), 144.57, 130.03 (d, $J_{\text{C}-\text{F}}$ = 10.5 Hz), 128.75, 127.05, 125.74, 119.92 (d, $J_{\text{C}-\text{F}}$ = 2.5 Hz), 102.29 (d, $J_{\text{C}-\text{F}}$ = 21.7 Hz), 99.41 (d, $J_{\text{C}-\text{F}}$ = 26.1 Hz), 64.40, 53.13, 25.09. HRMS (ESI) Calcd for [C₁₅H₁₆FNO+H]⁺ 246.1294, Found 246.1295. Specific rotation $[\alpha]\text{D}^{20}$ = +61.25 (c = 0.40,

CHCl_3). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40^\circ\text{C}$, $\lambda = 254 \text{ nm}$, $tM = 10.58 \text{ min}$, $tm = 11.72 \text{ min}$) indicated 97% ee.



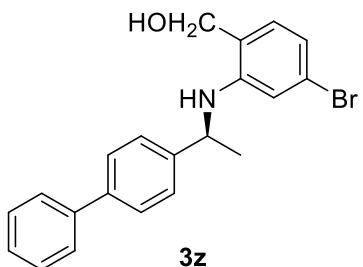
(S)-(4-bromo-2-((1-phenylethyl)amino)phenyl)methanol

Colorless oil, Yield 72% (44.1 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.39 – 7.28 (m, 4H), 7.26 – 7.20 (m, 1H), 6.87 (d, $J = 7.9 \text{ Hz}$, 1H), 6.70 (dd, $J = 7.9, 1.9 \text{ Hz}$, 1H), 6.56 (d, $J = 1.9 \text{ Hz}$, 1H), 4.73 - 4.62 (m, 2H), 4.50 (q, $J = 6.7 \text{ Hz}$, 1H), 1.54 (d, $J = 6.7 \text{ Hz}$, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 147.68, 144.39, 130.11, 128.75, 127.10, 125.76, 123.45, 122.95, 119.13, 114.83, 64.51, 52.97, 24.94. HRMS (ESI) Calcd for $[\text{C}_{15}\text{H}_{16}\text{BrNO}+\text{H}]^+$ 306.0494, Found 306.0493. Specific rotation $[\alpha]\text{D}^{20} = -59.00$ ($c = 0.20$, CHCl_3). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40^\circ\text{C}$, $\lambda = 254 \text{ nm}$, $tM = 11.51 \text{ min}$, $tm = 19.78 \text{ min}$) indicated 99% ee.



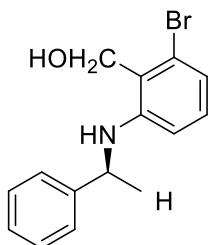
(S)-4-(hydroxymethyl)-3-((1-phenylethyl)amino)phenyl acetate

Colorless oil, Yield 53% (30.2 mg). ^1H NMR (400 MHz, Acetonitrile-*d*₃) δ 7.48 – 7.39 (m, 2H), 7.38 – 7.30 (m, 2H), 7.28 – 7.18 (m, 1H), 6.83 (d, $J = 2.8 \text{ Hz}$, 1H), 6.68 (dd, $J = 8.7, 2.8 \text{ Hz}$, 1H), 6.37 (d, $J = 8.7 \text{ Hz}$, 1H), 5.26 (bd, $J = 6.1 \text{ Hz}$, 1H), 4.70 – 4.45 (m, 3H), 3.36 (t, $J = 5.4 \text{ Hz}$, 1H), 2.18 (s, 3H), 1.52 (d, $J = 6.7 \text{ Hz}$, 3H). ^{13}C NMR (101 MHz, Acetonitrile-*d*₃) δ 170.70, 146.42, 144.52, 141.74, 129.10, 127.35, 126.73, 126.48, 122.03, 121.50, 112.26, 63.08, 53.32, 25.08, 20.72. HRMS (ESI) Calcd for $[\text{C}_{17}\text{H}_{19}\text{NO}_3+\text{H}]^+$ 286.1443, Found 286.1443. Specific rotation $[\alpha]\text{D}^{20} = +59.60$ ($c = 0.25$, CHCl_3). HPLC analysis (OD-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, $T = 40^\circ\text{C}$, $\lambda = 254 \text{ nm}$, $tM = 12.87 \text{ min}$, $tm = 14.72 \text{ min}$) indicated 93% ee.



(*S*)-(2-((1-([1,1'-biphenyl]-4-yl)ethyl)amino)-4-bromophenyl)methanol

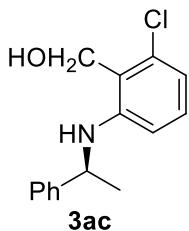
White solid, Yield 85% (65.0 mg). ^1H NMR (400 MHz, Acetonitrile-*d*₃) δ 7.68 – 7.60 (m, 4H), 7.53 – 7.44 (m, 4H), 7.41 – 7.34 (m, 1H), 7.03 – 6.88 (m, 1H), 6.71 (dd, *J* = 7.9, 1.9 Hz, 1H), 6.56 (d, *J* = 1.9 Hz, 1H), 5.55 (d, *J* = 6.4 Hz, 1H), 4.72 – 4.55 (m, 3H), 3.34 (t, *J* = 5.4 Hz, 1H), 1.55 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Acetonitrile-*d*₃) δ 148.29, 145.11, 141.08, 140.14, 130.51, 129.43, 127.90, 127.73, 127.39, 127.02, 125.06, 122.42, 119.09, 114.49, 63.15, 52.63, 24.90. HRMS (ESI) Calcd for [C₂₁H₂₀BrNO+H]⁺ 382.0807, Found 382.0806. Specific rotation $[\alpha]\text{D}^{20} = -117.33$ (*c* = 0.30, CHCl₃). HPLC analysis (OD-H column, 70:30 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 17.80 min) indicated >99% ee.



3ab

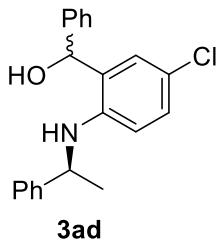
(*S*)-(2-bromo-6-((1-phenylethyl)amino)phenyl)methanol

Colorless oil, Yield 61% (37.2 mg). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.35 – 7.29 (m, 4H), 7.25 – 7.18 (m, 1H), 6.96 – 6.74 (m, 2H), 6.40 – 6.31 (m, 1H), 5.09 – 4.86 (m, 2H), 4.50 (q, *J* = 6.7 Hz, 1H), 1.54 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 148.20 , 144.78 , 130.12 , 128.71 , 126.97 , 125.73 , 124.38, 122.76 , 120.81 , 111.55 , 63.14 , 53.25 , 25.26 .HRMS (ESI) Calcd for [C₁₅H₁₆BrNO+H]⁺ 306.0494, Found 306.0491. Specific rotation $[\alpha]\text{D}^{20} = +162.39$ (*c* = 0.50, CHCl₃). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 9.02 min *tM* = 19.57 min) indicated 97% ee.



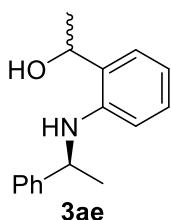
(*S*)-(2-chloro-6-((1-phenylethyl)amino)phenyl)methanol.

Colorless oil, Yield 65% (34.0 mg). ¹H NMR (400 MHz, Chloroform-*d*) δ 7.36 – 7.27 (m, 4H), 7.24 – 7.18 (m, 1H), 6.90 (t, *J* = 8.0 Hz, 1H), 6.64 (dd, *J* = 8.0, 1.0 Hz, 1H), 6.31 (d, *J* = 8.0 Hz, 1H), 5.09 – 4.82 (m, 2H), 4.51 (q, *J* = 6.7 Hz, 1H), 1.55 (d, *J* = 6.7 Hz, 3H). ¹³C NMR (101 MHz, Chloroform-*d*) δ 148.25, 144.83, 133.77, 129.69, 128.69, 126.95, 125.73, 121.21, 117.53, 110.87, 59.97, 53.26, 25.25. HRMS (ESI) Calcd for [C₁₅H₁₆ClNO+H]⁺ 262.0999, Found 262.0997. Specific rotation [α]D²⁰ = +176.99 (*c* = 0.60, CHCl₃). HPLC analysis (OJ-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254 nm, *tM* = 8.69 min *tM* = 18.17 min) indicated 97% ee.



(*S*)-(5-chloro-2-((1-phenylethyl)amino)phenyl)(phenyl)methanol

Colorless oil, Yield 53% (35.8 mg). ¹H NMR (400 MHz, Acetonitrile-*d*₃) Major diastereomer: δ 7.52 – 7.40 (m, 6H), 7.18 – 6.90 (m, 6H), 6.28 (d, *J* = 8.7 Hz, 1H), 5.90 – 5.78 (m, 1H), 5.46 – 5.32 (m, 1H), 4.48 – 4.45 (m, 1H), 4.30 (d, *J* = 4.0 Hz, 1H), 1.37 (d, *J* = 6.7 Hz, 3H); Minor diastereomer: δ 7.47 – 7.18 (m, 6H), 7.18 – 6.91 (m, 6H), 6.32 (d, *J* = 8.7 Hz, 1H), 5.90 – 5.78 (m, 1H), 5.32 – 5.22 (m, 1H), 4.48 – 4.45 (m, 1H), 4.26 (d, *J* = 4.1 Hz, 1H), 1.34 (d, *J* = 6.7 Hz, 3H). ¹³C NMR (101 MHz, Acetonitrile-*d*₃) δ 145.822, 144.49, 142.93, 129.83, 128.92, 128.75, 128.58, 128.23, 127.79, 127.25, 126.82, 126.31, 120.36, 113.73, 74.67, 52.84, 24.85. Minor diastereomer: δ 145.89, 144.38, 130.03, 129.05, 128.89, 128.16, 128.03, 127.35, 127.15, 126.35, 120.68, 113.92, 74.14, 53.09, 24.81. HRMS (ESI) Calcd for [C₂₁H₂₀ClNO+H]⁺ 338.1312, Found 338.1313. Specific rotation [α]D²⁰ = +121.99 (*c* = 0.30, CHCl₃). HPLC analysis (OJ-H column, 95: 5 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40°C, λ = 254 nm, dr = 3:1, major diasteromer: *tM* = 12.92 min *tM* = 15.67 min, indicated 99% ee. minor diasteromer: *tM* = 11.69 min *tM* = 18.57 min, indicated 79% ee.)

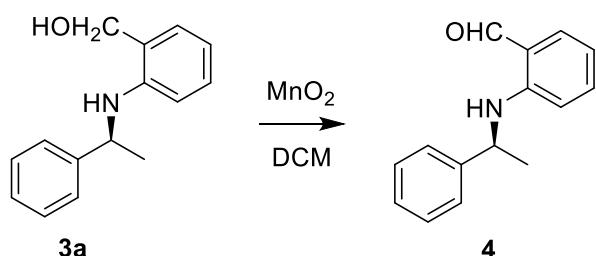


1-(2-((*S*)-1-phenylethyl)amino)phenyl)ethan-1-ol

Colorless oil, Yield 79% (38.1 mg). ¹H NMR (400 MHz, Acetonitrile-*d*₃) Major diastereomer: δ 7.48 – 7.39 (m, 2H), 7.39 – 7.30 (m, 2H), 7.29 – 7.17 (m, 1H), 7.07 (dd, *J* = 7.5, 1.6 Hz, 1H), 6.96 – 6.85 (m, 1H), 6.56 (td, *J* = 7.4, 1.2 Hz, 1H), 6.39 (td, *J* = 8.2, 1.1 Hz, 1H), 5.80 (bs, 1H), 5.05 – 4.87 (m, 1H), 4.57 – 4.47 (m, 1H), 3.51(bs, 1H), 1.60 (d, *J* = 6.6 Hz, 3H), 1.52 (d, *J* = 6.8, Hz, 3H). Minor diastereomer: δ 7.48 – 7.39 (m, 2H), 7.39 – 7.30 (m, 2H), 7.25 – 7.21 (m, 1H), 7.07 (dd, *J* = 7.5, 1.6 Hz, 1H), 6.96 – 6.85 (m, 1H), 6.55 (td, *J* = 7.2, 1.2 Hz, 1H), 6.39 (td, *J* = 8.2, 1.1 Hz, 1H), 5.80 (bs, 1H), 5.05 – 4.87 (m, 1H), 4.67 – 4.57 (m, 1H), 3.53(bs, 1H), 1.58 (d, *J* = 6.4 Hz, 3H), 1.52 (d, *J* = 6.8, Hz, 3H). ¹³C NMR (101 MHz, Acetonitrile-*d*₃) Major diastereomer: δ 146.82, 146.18, 129.20, 129.08, 128.30, 127.25, 126.91, 126.47, 116.58, 112.41, 69.92, 53.21, 25.15, 21.97. Minor diastereomer: δ 146.76, 146.10, 129.25, 129.03, 128.30, 127.21, 126.85, 126.50, 116.56, 112.57, 69.77, 52.97, 25.20, 21.99. HRMS (ESI) Calcd for [C₁₆H₁₉NO+H]⁺ 242.1545, Found 242.1547. Specific rotation [α]D²⁰ = +81.37 (*c* = 0.80, CHCl₃). HPLC analysis (OD-H column, 95: 5 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40°C, λ = 254 nm, dr = 3:2 major diastereomer: *tM* = 14.30 min, *tM* = 22.26 min, indicated 97% ee. minor diastereomer: *tM* = 16.09 min *tM* = 24.38 min, indicated 89% ee.)

III. Derivatization of hydroamination products

(*S*)-2-((1-phenylethyl)amino)benzaldehyde (4)

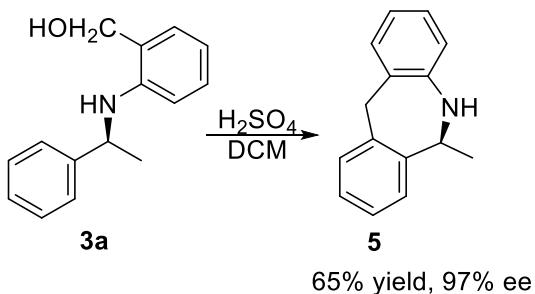


61% yield, 99% ee

3a (113.7 mg, 0.5 mmol) in 10 mL of DCM solution was added MnO₂ (130.5 mg, 1.5 mmol). The reaction mixture was stirred at room temperature for 48h. Then the mixture was filtered through a pad of SiO₂ and the filter cake was washed with EtOAc (10mL*3). The combined filtrate was dried over anhydrous sodium sulfate, filtered and concentrated in vacuo. The residue was purified by silica gel chromatography to afford compound **4** as a yellow solid

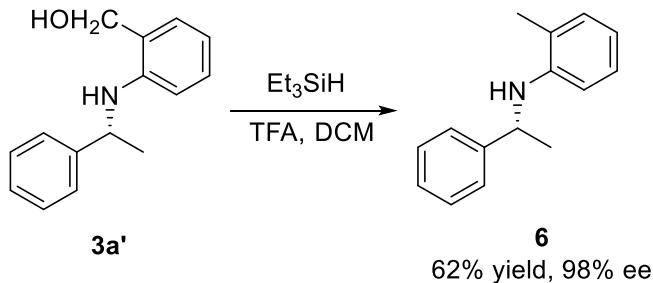
(68.7 mg, 61%). ^1H NMR (400 MHz, Chloroform-*d*) δ 9.80 (s, 1H), 8.66 (bs, 1H), 7.39 (dd, *J* = 7.7, 1.7 Hz, 1H), 7.28 – 7.21 (m, 4H), 7.19 – 7.10 (m, 2H), 6.65 – 6.60 (m, 1H), 6.38 (d, *J* = 8.5 Hz, 1H), 4.62– 4.46 (m, 1H), 1.53 (d, *J* = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 194.20, 149.75, 144.38, 136.60, 135.63, 128.76, 127.06, 125.72, 118.52, 115.14, 112.28, 52.64, 24.90 .HRMS (ESI) Calcd for [C₁₅H₁₅NO+H]⁺ 226.1232, Found 226.1231. Specific rotation $[\alpha]D^{20} = +235.86$ (*c* = 0.80, CHCl₃). HPLC analysis (AD-H column, 90: 10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254nm, *tM* = 5.97min *tM* = 6.42 min, indicated 99% ee.)

(S)-6-methyl-6,11-dihydro-5H-dibenzo[b,e]azepine (5)



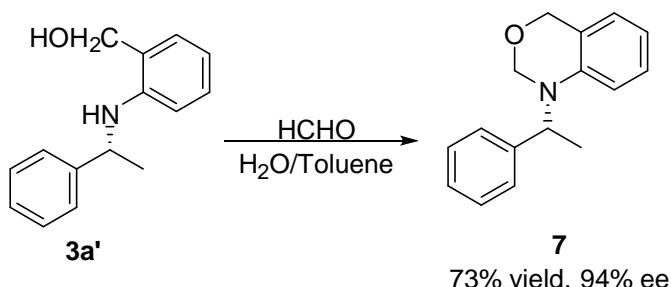
A 10 mL of DCM solution containing **3a** (45.5 mg, 0.2 mmol) was cooled to -10°C, then H₂SO₄ (44μL, 0.6 mmol) was added. The reaction mixture was stirred at room temperature for 2h. After that, saturated NaHCO₃ solution was added till the pH of solution became basic. The organic phase was separated and the aqueous layer was extracted with EtOAc (10mL*3). The combined organic solution was dried over anhydrous sodium sulfate, filtered, and concentrated in vacuo. The residue was purified by silica gel chromatography using PE/EA to afford compound **5** as a white solid (27.2 mg, 65%). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.19 – 7.08 (m, 4H), 6.92 (dt, *J* = 7.5, 1.1 Hz, 1H), 6.89 – 6.81 (m, 1H), 6.52 (td, *J* = 7.3, 1.2 Hz, 1H), 6.33 (dd, *J* = 8.0, 1.2 Hz, 1H), 5.12 (q, *J* = 6.7 Hz, 1H), 4.73 (d, *J* = 15.0 Hz, 1H), 3.47 (d, *J* = 15.0 Hz, 1H), 1.52 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 145.52, 140.29, 139.57, 130.40, 128.14, 127.65, 127.55, 127.00, 123.60, 123.06, 118.22, 117.27, 49.68, 39.94, 20.12 .HRMS (ESI) Calcd for [C₁₅H₁₅N+H]⁺ 210.1283, Found 210.1283. Specific rotation $[\alpha]D^{20} = -45.30$ (*c* = 0.80, CHCl₃). HPLC analysis (OJ-H column, 85:15 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40 °C, λ = 254nm, *tM* = 27.78 min *tM* = 30.44 min, indicated 97% ee.)

(R)-2-methyl-N-(1-phenylethyl)aniline (6)



A 10 mL of DCM solution containing **3a'** (45.5 mg, 0.2 mmol) were added Et₃SiH (96 μL, 0.6 mmol) and TFA (59 μL, 0.8 mmol) successively. The reaction mixture was stirred under N₂ at room temperature for 2h. After that, saturated NaHCO₃ solution was added till the pH of solution became basic. The organic phase was separated and the aqueous layer was extracted with EtOAc (10 mL*3). The combined organic solution was dried over anhydrous sodium sulfate, filtered, and concentrated in vacuo. The residue was purified by silica gel chromatography using PE/EA to afford compound **6** as colorless oil (26.2 mg, 62%). ¹H NMR (400 MHz, Chloroform-d) δ 7.31 – 7.21 (m, 4H), 7.18 – 7.11 (m, 1H), 7.02 – 6.94 (m, 1H), 6.88 (td, *J* = 7.6, 1.6 Hz, 1H), 6.54 (t, *J* = 7.6 Hz, 1H), 6.32 (d, *J* = 8.0 Hz, 1H), 4.46 (q, *J* = 6.7 Hz, 1H), 2.15 (s, 3H), 1.50 (d, *J* = 6.7 Hz, 3H). ¹³C NMR (101 MHz, Chloroform-d) δ 145.20, 145.09, 129.99, 128.64, 126.99, 126.87, 125.82, 121.63, 116.92, 111.13, 53.39, 25.22, 17.65. HRMS (ESI) Calcd for [C₁₅H₁₇N+H]⁺ 212.1439, Found 212.1436. Specific rotation [α]D²⁰ = -70.40 (*c* = 0.50, CHCl₃). HPLC analysis (OD-H column, 90:10 hexanes/2-propanol, flow rate 0.5 mL/min, T = 40°C, λ = 254nm, *t*M = 9.22 min *t*M = 12.97 min, indicated 98% ee.) The absolute stereochemistry was determined by comparison of optical rotation measurement and HPLC retention times with literature data.^[3]

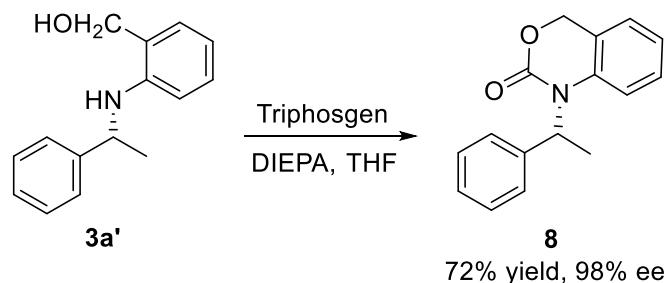
(R)-1-(1-phenylethyl)-1,4-dihydro-2H-benzo[d][1,3]oxazine (7)



To the suspension of **3a'** (45.5 mg, 0.2 mmol) in 10 ml of toluene, a 0.1 mL of 37% formaldehyde solution was added slowly. The mixture was then stirred vigorously at room temperature for 1 h (The process of the reaction could be monitored by TLC analysis). The organic phase was separated and the aqueous layer was extracted with DCM (10 mL*2). The combined organic solution was dried over anhydrous sodium sulfate, filtered, and concentrated in vacuo. The residue was purified by flash column chromatography using

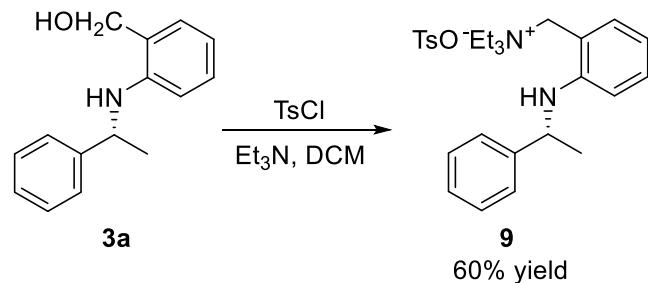
PE/EA to afford **6** as a colorless oil (35.0 mg, 73% yield). ¹H NMR (400 MHz, Chloroform-*d*) δ 7.40 – 7.34 (m, 2H), 7.33 – 7.23 (m, 2H), 7.23 – 7.15 (m, 1H), 7.10 – 7.00 (m, 1H), 6.91 – 6.83 (m, 2H), 6.77 (td, *J* = 7.4, 1.1 Hz, 1H), 4.90 – 4.81 (q, *J* = 7.2 Hz, 1H), 4.79 (s, 2H), 4.59 (d, *J* = 10.2 Hz, 1H), 4.46 (d, *J* = 10.2 Hz, 1H), 1.51 (d, *J* = 7.2 Hz, 3H). ¹³C NMR (101 MHz, Chloroform-*d*) δ 143.91, 142.99, 128.46, 127.20, 127.16, 127.08, 125.05, 124.58, 119.68, 117.36, 76.65, 67.80, 58.99, 17.83. HRMS (ESI) Calcd for [C₁₆H₁₇NO+H]⁺ 240.1388, Found 240.1386. Specific rotation [α]D²⁰ = +95.99 (*c* = 0.40, CHCl₃). HPLC analysis (OD-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40°C, λ = 254 nm, *tM* = 8.80 min *tM* = 14.08 min, indicated 94% ee.)

(R)-1-(1-phenylethyl)-1,4-dihydro-2H-benzo[d][1,3]oxazin-2-one (8)



3a' (45.5 mg, 0.2 mmol) was dissolved in 10 mL of dry THF and the solution was cooled to 0°C. Then DIEPA (115 μL, 0.66 mmol) and triphosgen (20 mg, 0.033 mmol) were added in succession. The reaction mixture was stirred at 0°C for 1 h and then continued stirring at RT for overnight. The volatile was removed in vacuo and the residue was purified by flash column chromatography using PE/EA to afford **8** as colorless oil (36.0 mg, 72% yield). ¹H NMR (400 MHz, Chloroform-*d*) δ 7.34 – 7.13 (m, 6H), 7.09 – 6.99 (m, 2H), 6.93 (td, *J* = 7.4, 1.1 Hz, 1H), 6.75 – 6.58 (m, 1H), 5.87 – 5.64 (m, 1H), 5.17 – 5.01 (m, 2H), 1.84 (d, *J* = 7.1 Hz, 3H). ¹³C NMR (101 MHz, Chloroform-*d*) δ 153.77, 140.17, 137.01, 128.69, 128.58, 127.11, 126.17, 124.55, 123.00, 122.32, 115.67, 67.25, 54.34, 16.96. HRMS (ESI) Calcd for [C₁₆H₁₅NO₂+H]⁺ 254.1181, Found 254.1180. Specific rotation [α]D²⁰ = +82.99 (*c* = 0.30, CHCl₃). HPLC analysis (OD-H column, 90:10 hexanes/2-propanol, flow rate 0.8 mL/min, T = 40°C, λ = 254 nm, *tM* = 13.04 min *tM* = 15.17 min, indicated 98% ee.)

(R)-*N,N*-diethyl-*N*-(2-((1-phenylethyl)amino)benzyl)ethanaminium Tosylate (9)

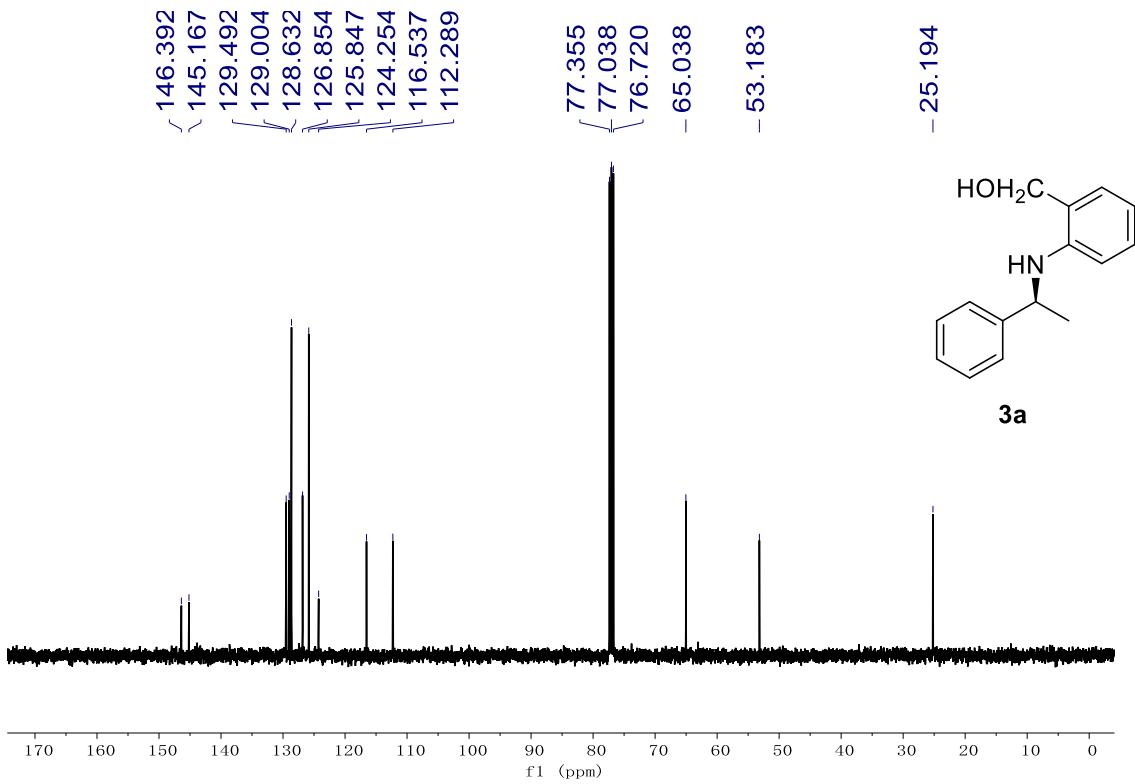
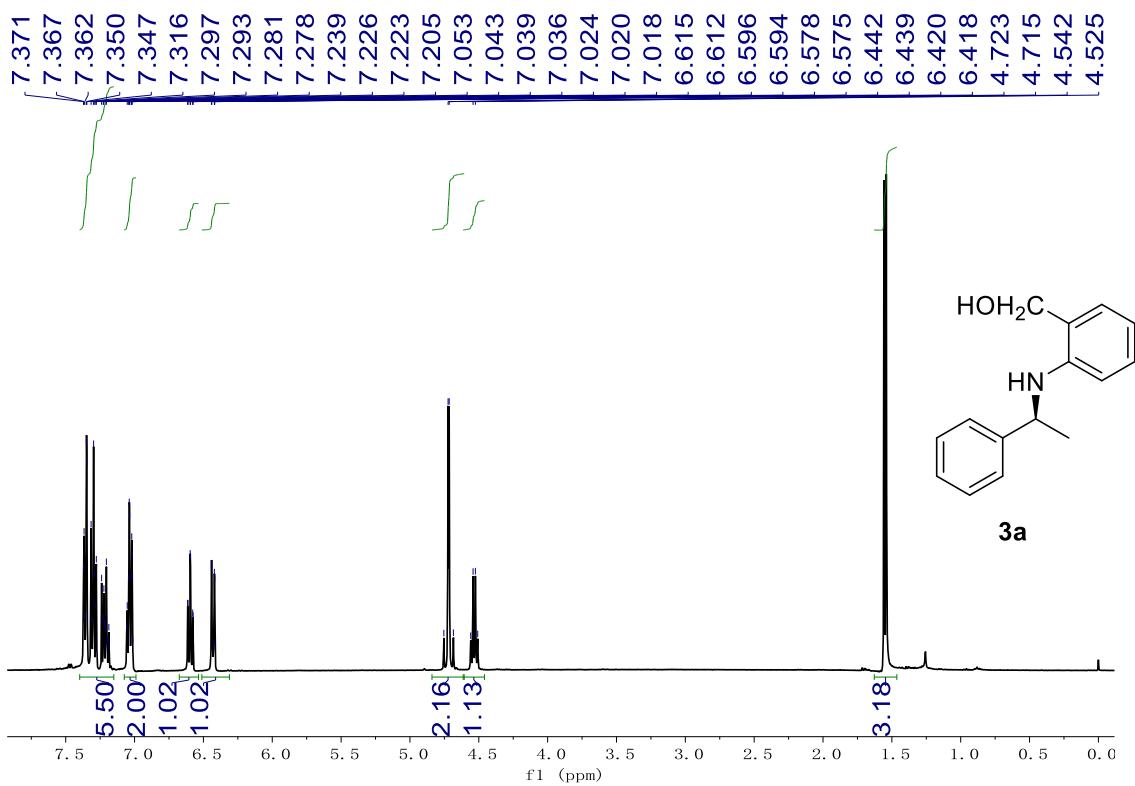


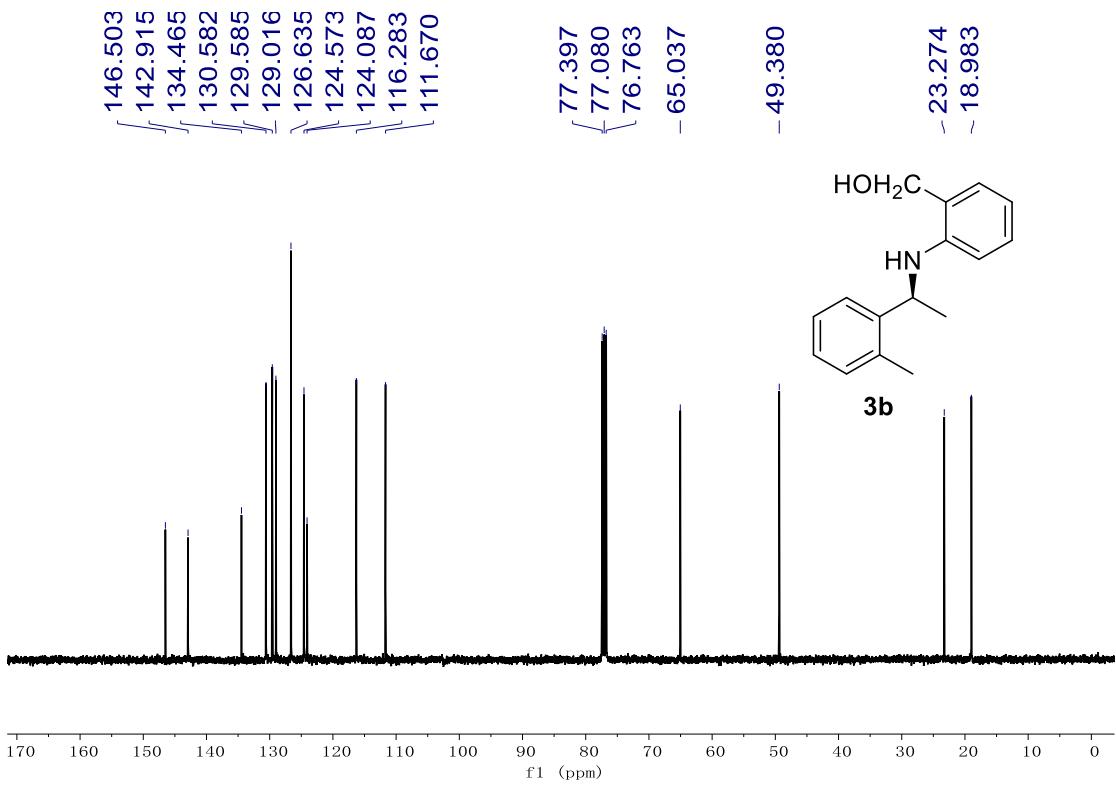
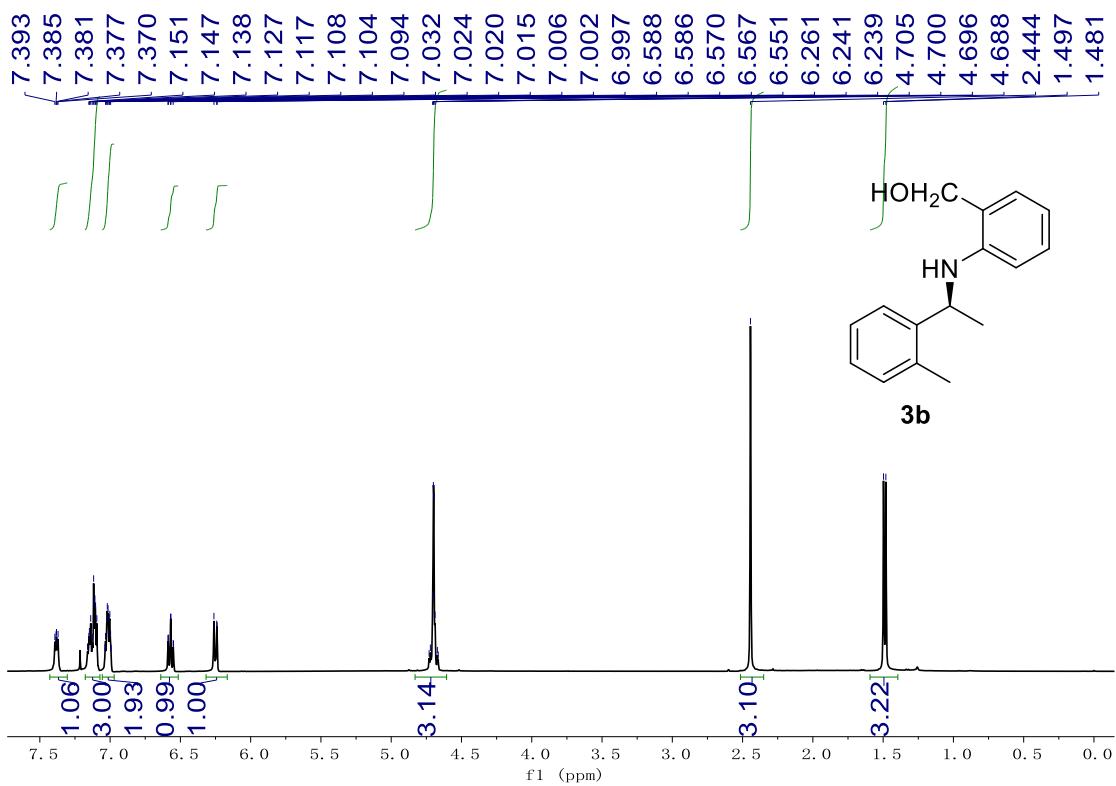
A 10 mL of DCM solution containing **3a'** (45.5 mg, 0.2 mmol) were added TsCl (41.9 mg, 0.22 mmol) and TEA (83 μ L, 0.6 mmol) successively. The reaction mixture was stirred under N₂ at room temperature for 2h. After that, 10 mL of water was added. The organic phase was separated and the aqueous layer was extracted with DCM (10mL*2). The combined organic solution were dried over anhydrous sodium sulfate, filtered, and concentrated in vacuo. The residue was purified by silica gel chromatography using PE/EA to afford compound **9** as a white solid (57.9 mg, 60% yield). ¹H NMR (400 MHz, Chloroform-*d*) δ 7.70 (d, *J* = 7.9 Hz, 2H), 7.29 (d, *J* = 7.1 Hz, 2H), 7.23 – 7.13 (m, 3H), 7.11 – 6.95 (m, 5H), 6.49 (t, *J* = 7.4 Hz, 1H), 6.43 (d, *J* = 8.4 Hz, 1H), 5.01 – 4.70 (m, 2H), 4.33 (q, *J* = 6.8 Hz, 1H), 3.44 – 3.38 (m, 6H), 3.12 – 2.96 (m, 2H), 1.55 (d, *J* = 6.8 Hz, 3H), 1.30 – 1.26 (m, 9H). ¹³C NMR (101 MHz, Chloroform-*d*) δ 149.12, 145.51, 143.70, 139.19, 134.03, 131.69, 128.54, 128.50, 126.62, 126.02, 126.00, 116.44, 113.92, 111.81, 60.07, 54.37, 53.30, 24.71, 21.28, 8.86 .HRMS (ESI) Calcd for [C₂₁H₃₁N₂]⁺ 311.2482, Found 311.2487. Calcd for [C₇H₇O₃S]⁻ 171.0116, Found 171.0116. Specific rotation $[\alpha]D^{20} = -84.90$ (*c* = 0.55, CHCl₃)

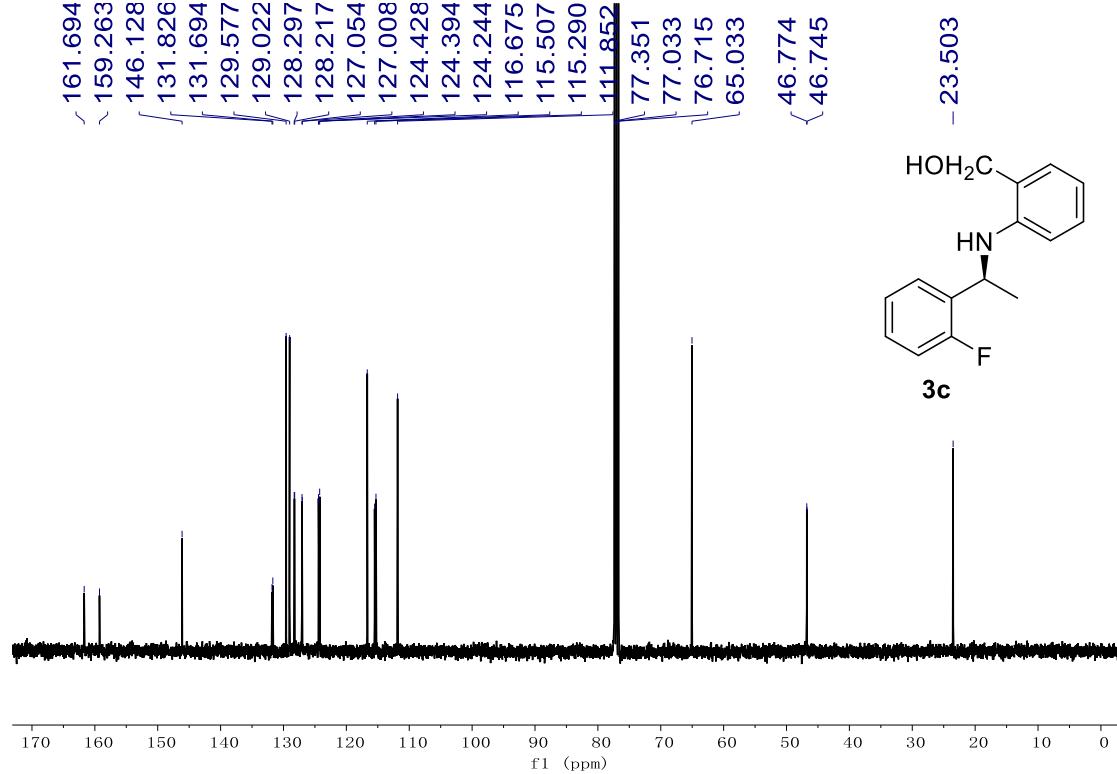
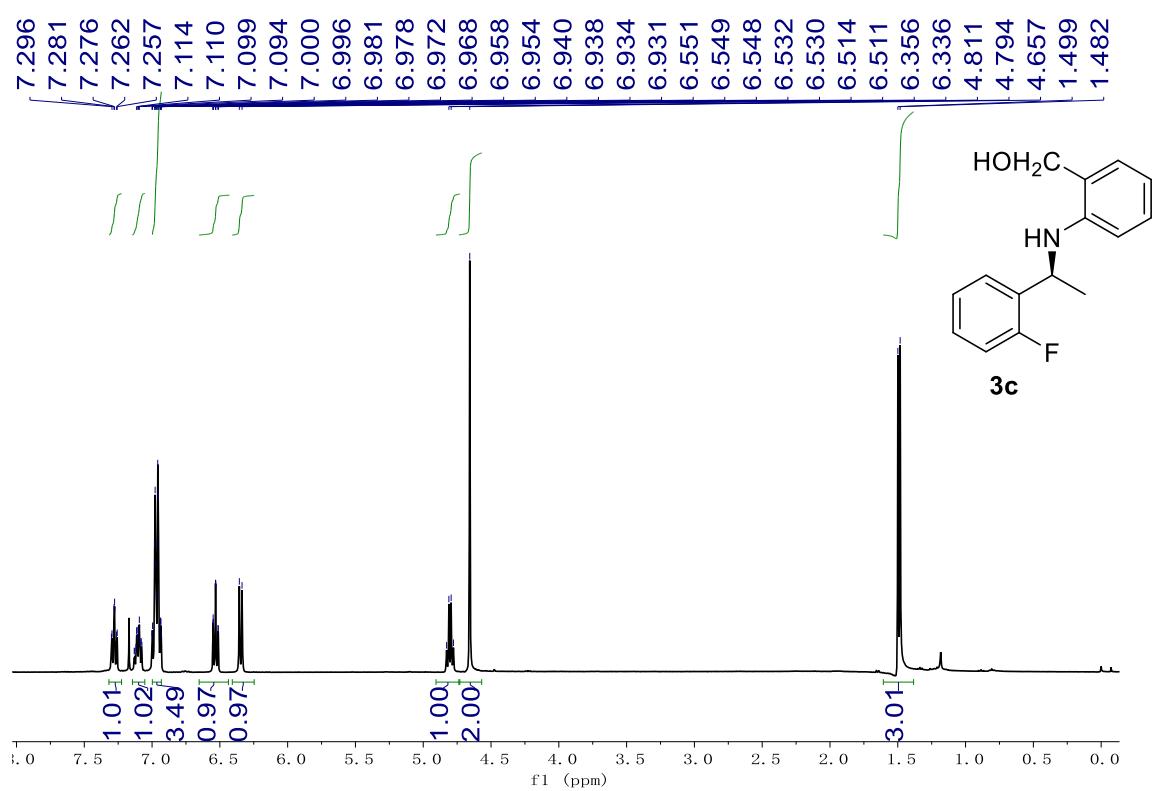
IV. References

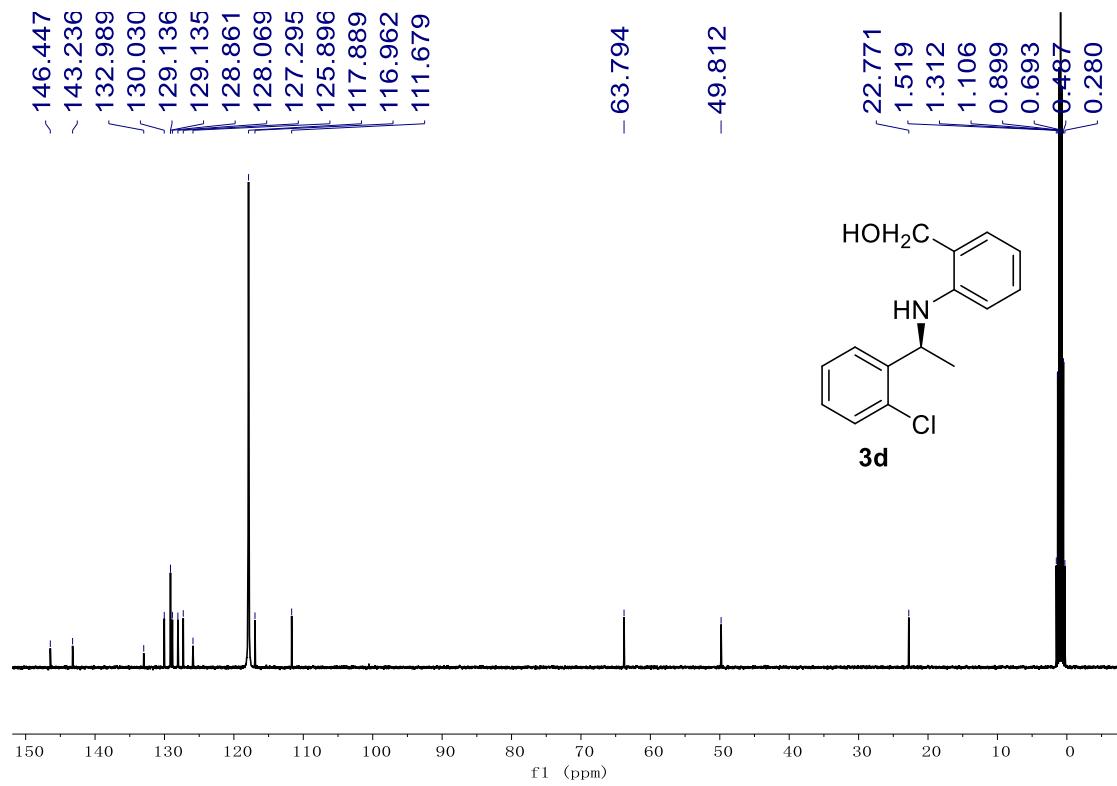
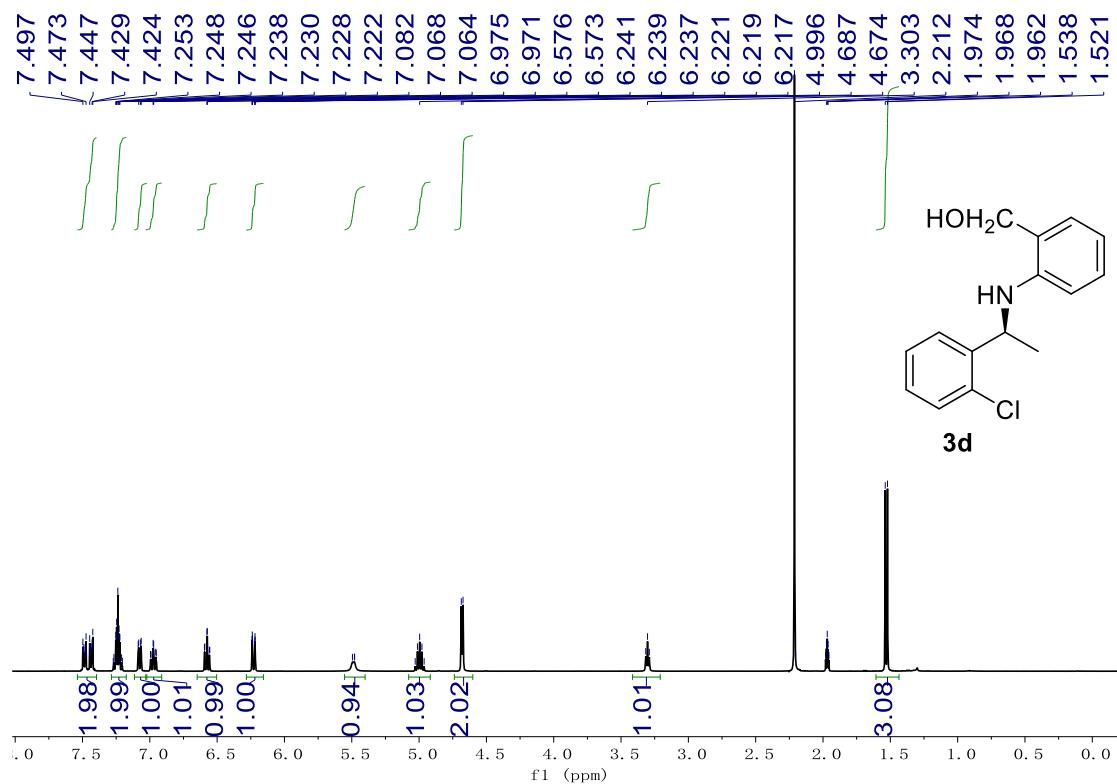
- [1] H. Jin, L. Huang, J. Xie, M. Rudolph, F. Rominger, A. S. K. Hashmi, *Angew. Chem. Int. Ed.* **2016**, *55*, 794–797.
- [2] Y.-M. Wang, S.-L. Buchwald, *J. Am. Chem. Soc.* **2016**, *138*, 5024–5027.
- [3] a) J. Tagashira, D. Imao, T. Yamamoto, T. Ohta, I. Furukawa, Y. Ito, *Tetrahedron: Asymmetry* **2005**, *16*, 2307-2314. b) Known compound, CAS Registry Number 791613-49-5, Reported Specific Rotation $[\alpha]D^{24} = -41$ (*c* = 1.1, CHCl₃)

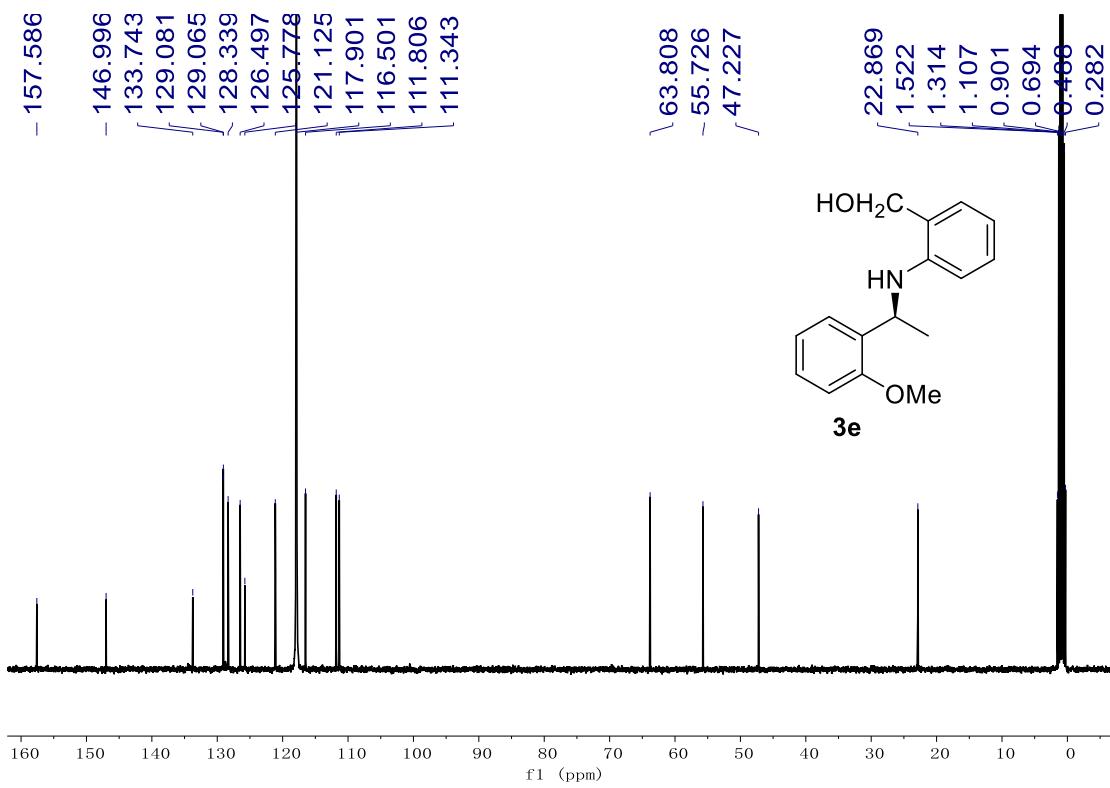
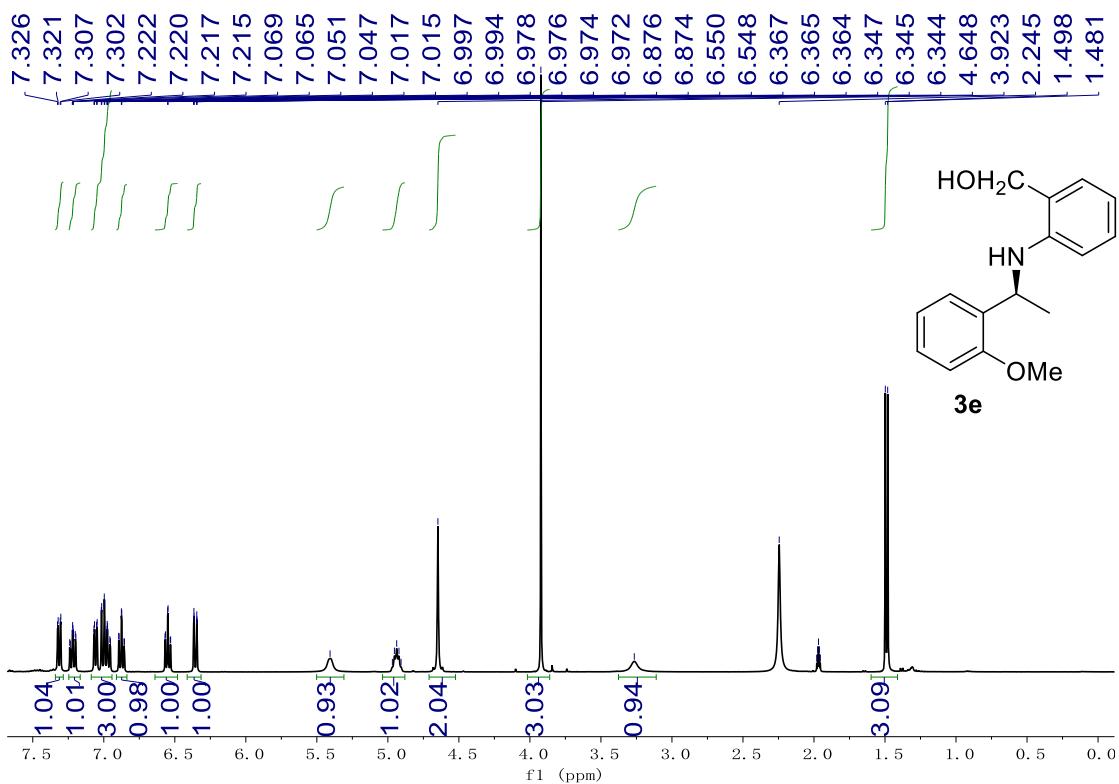
V. NMR Spectra of Products and Drivatization Products

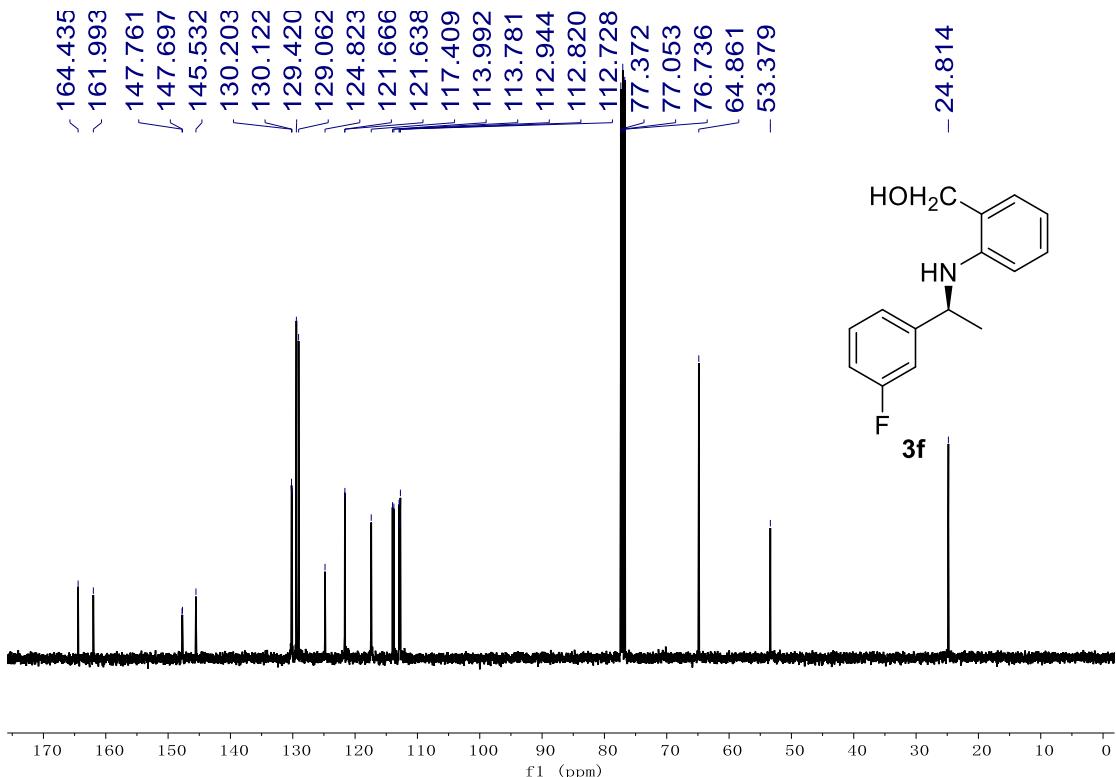
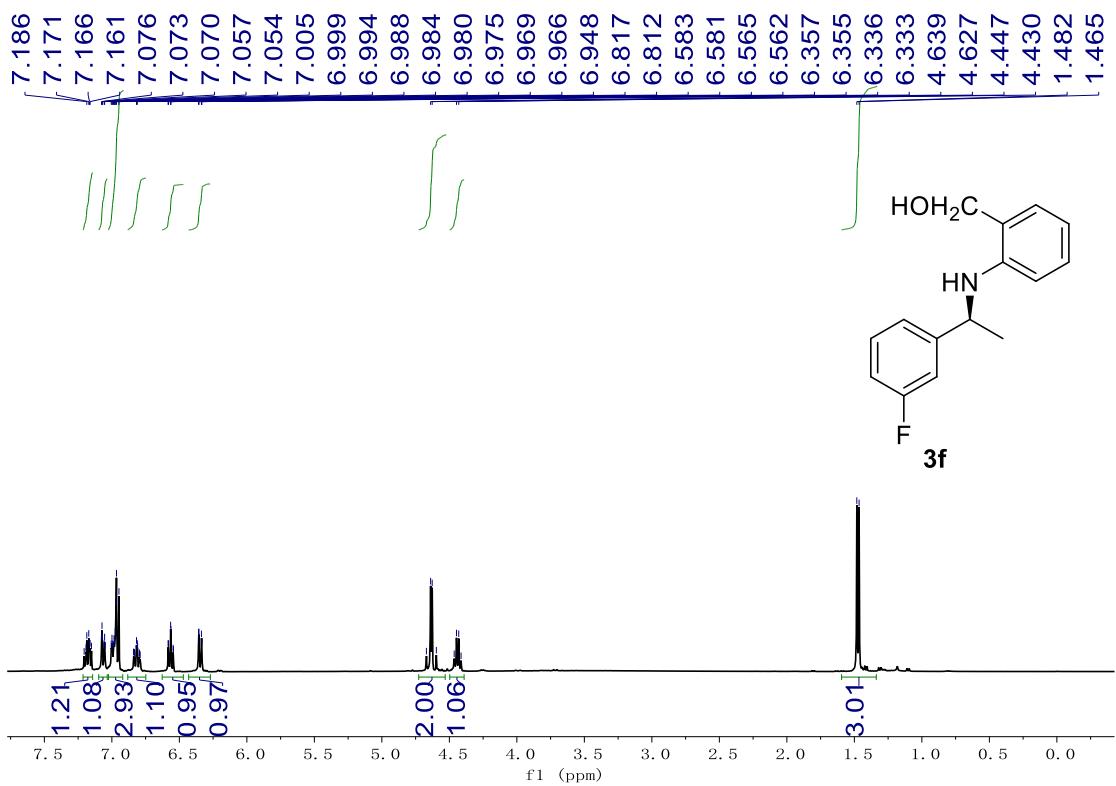


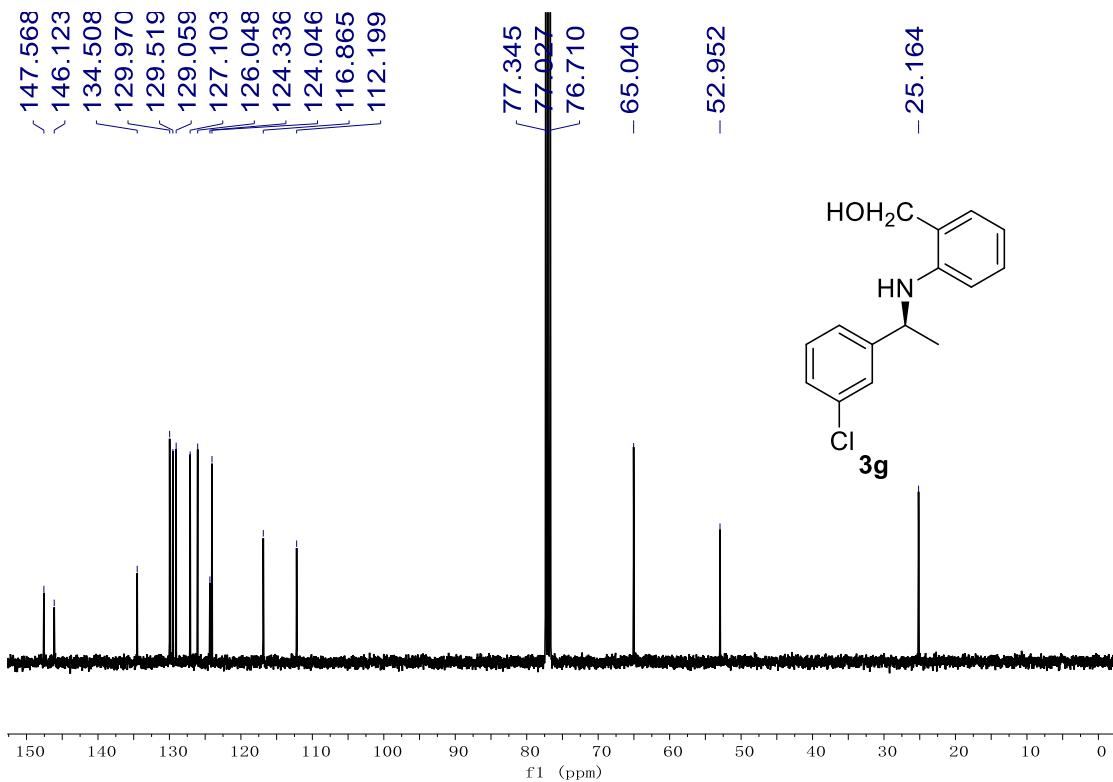
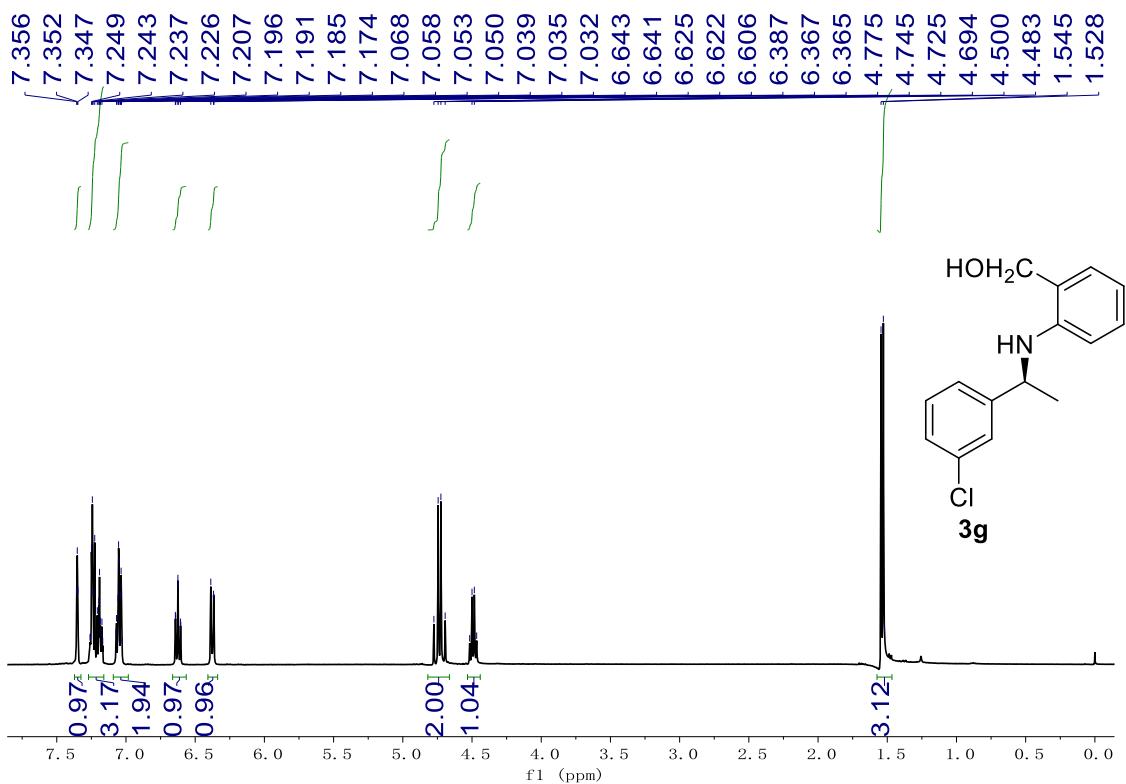


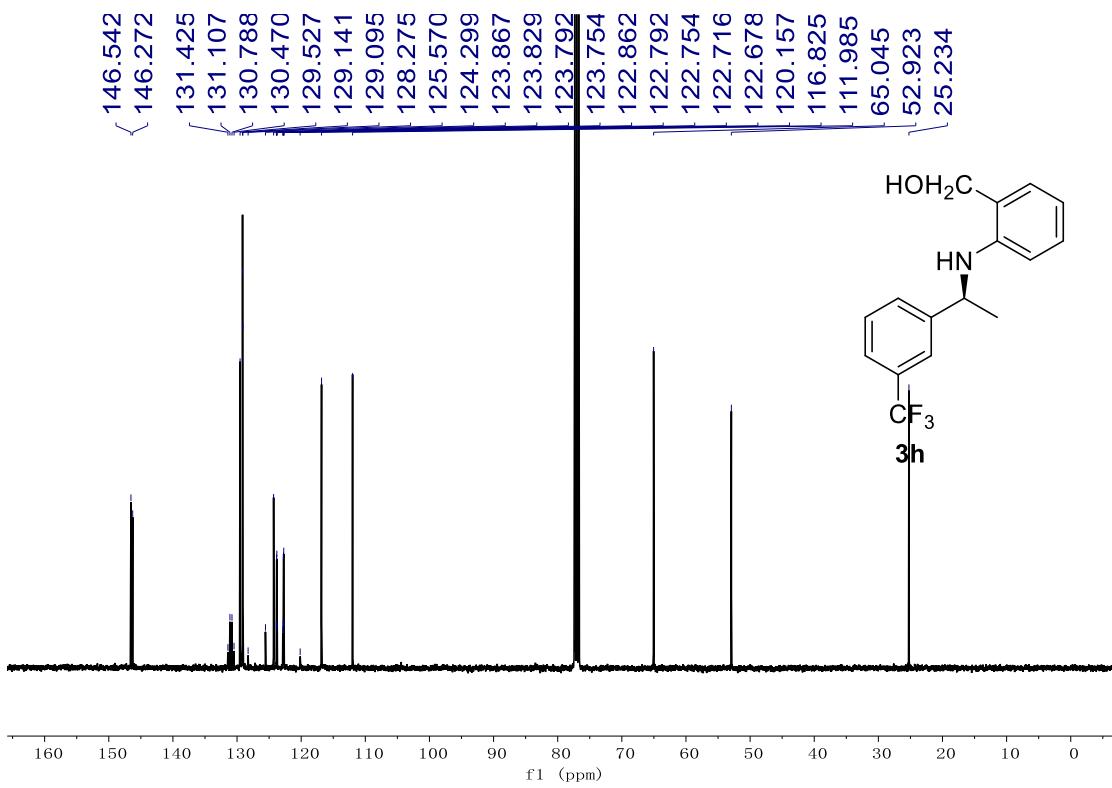
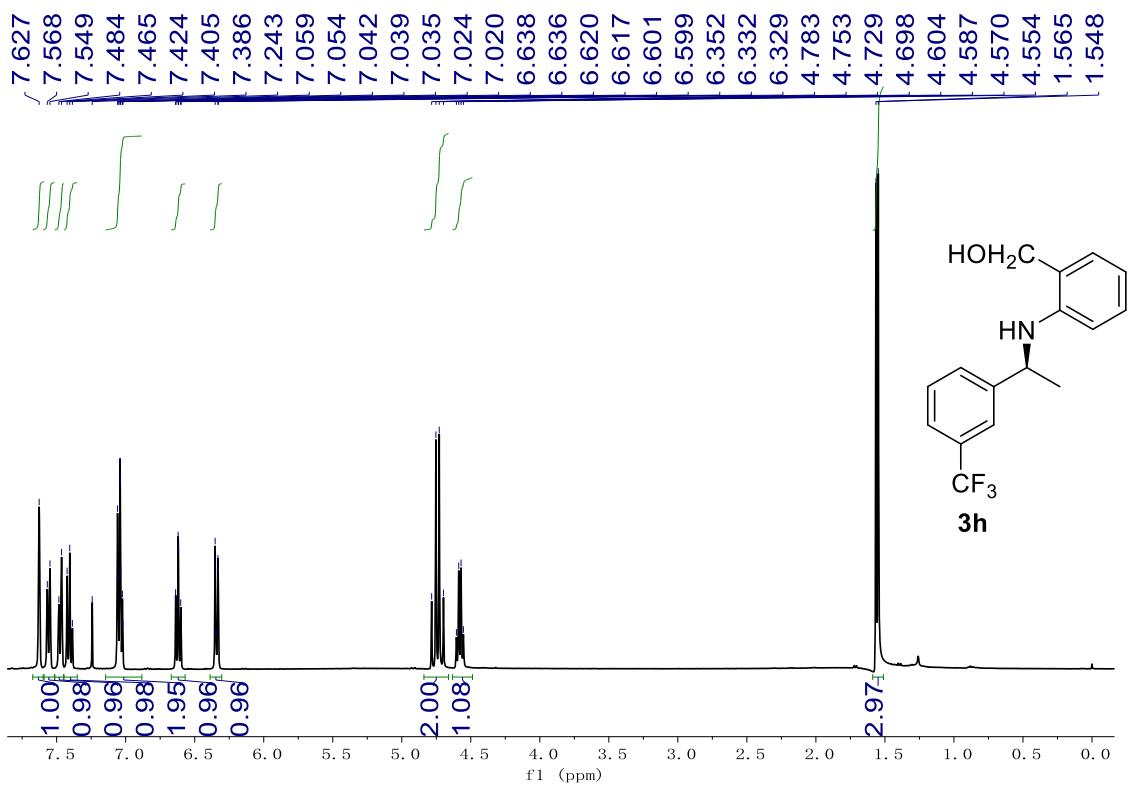


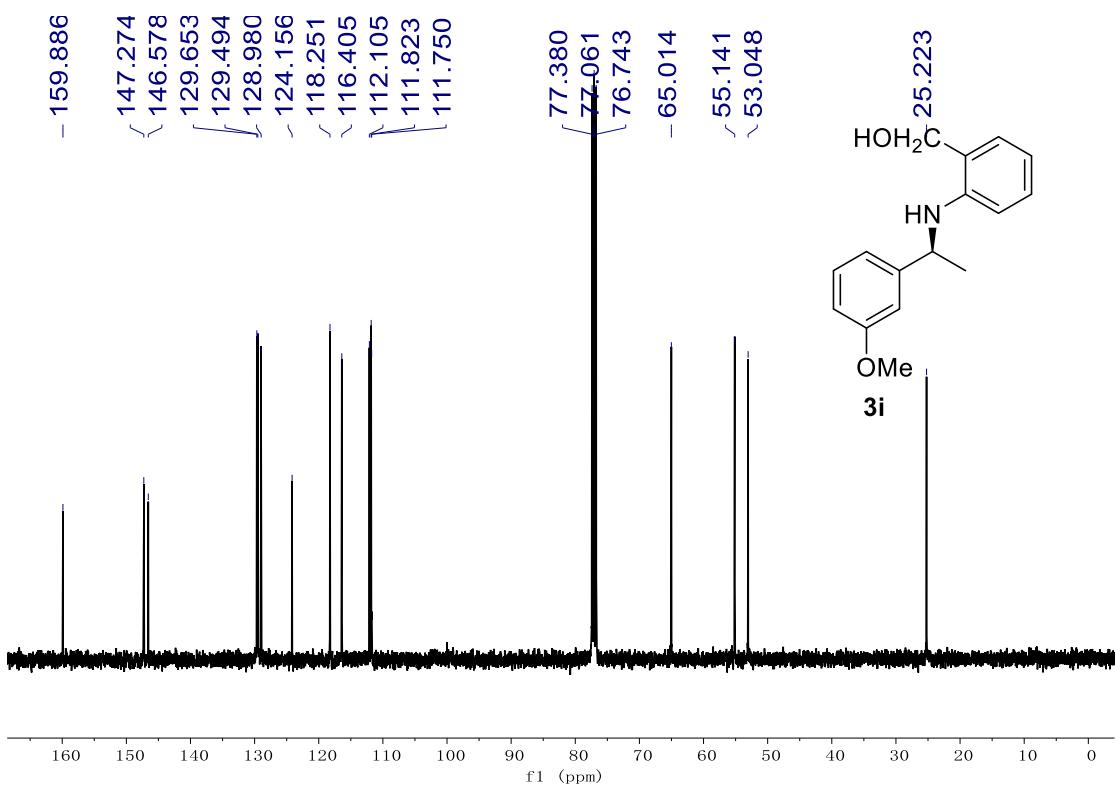
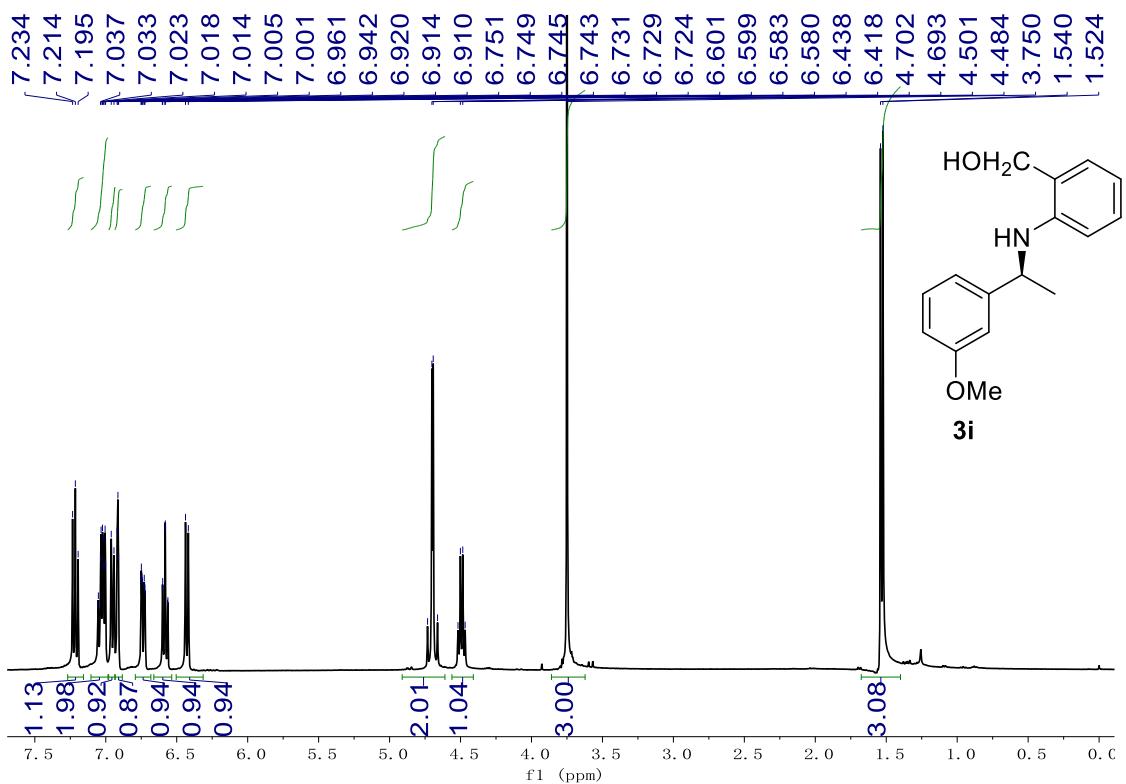


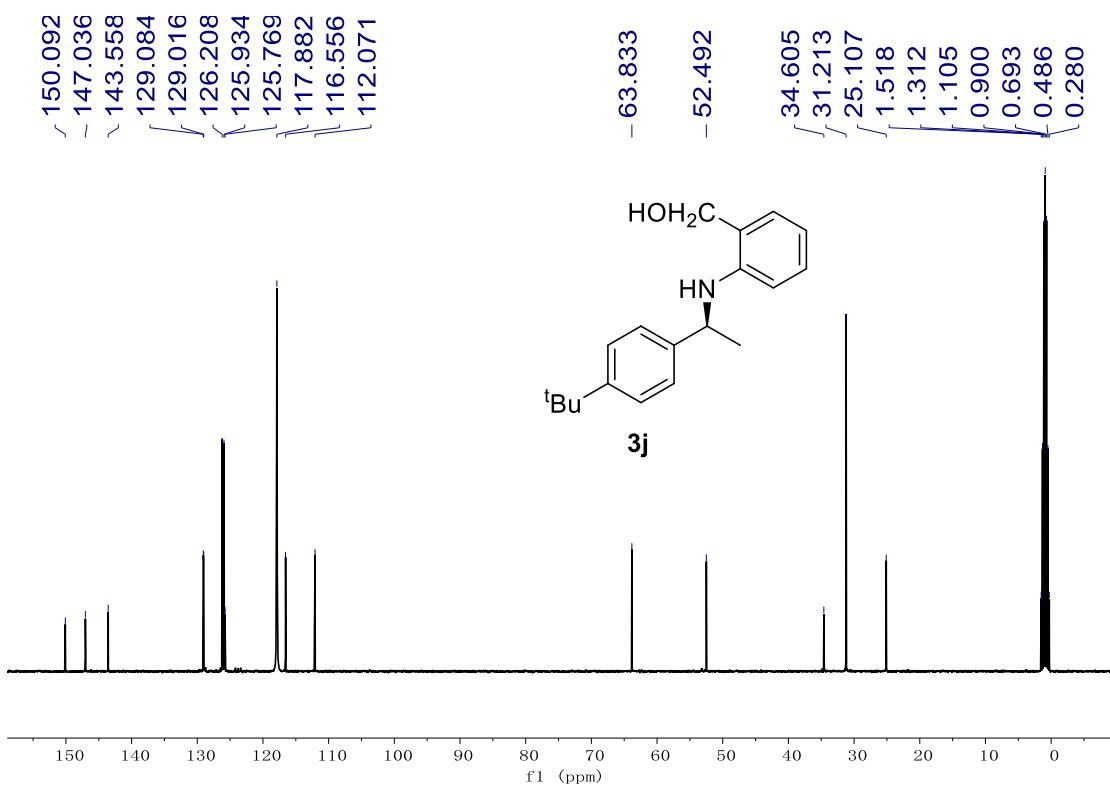
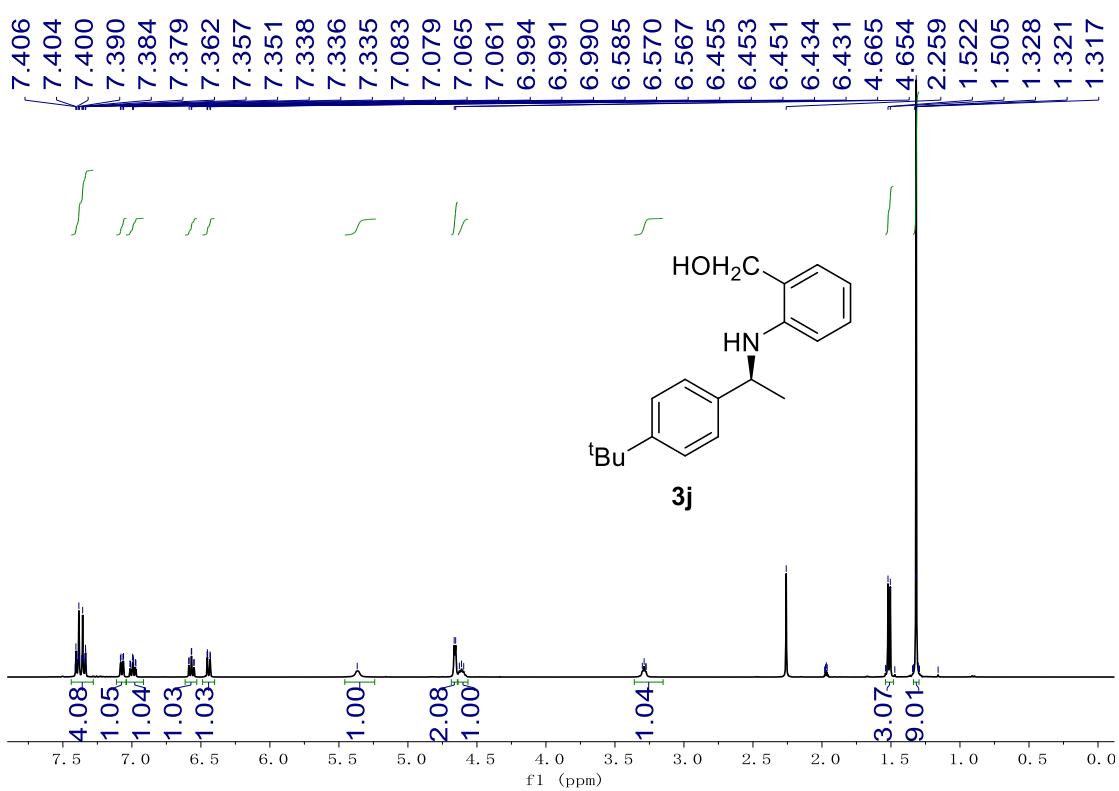


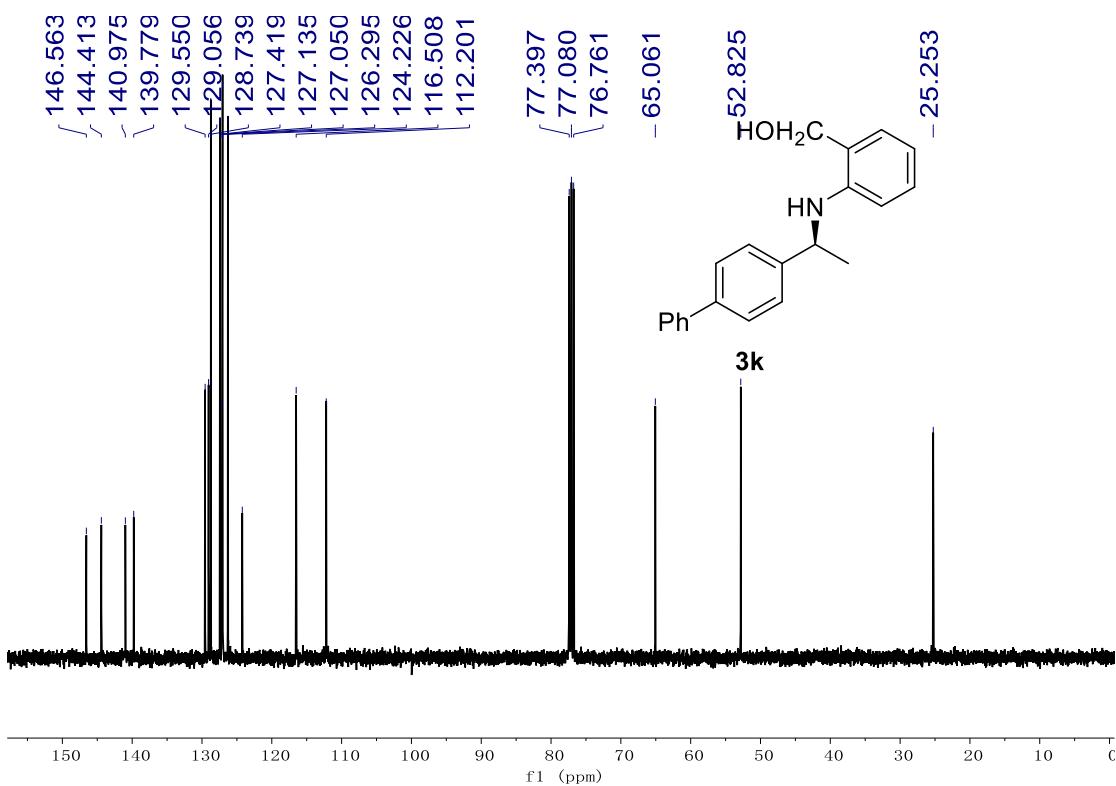
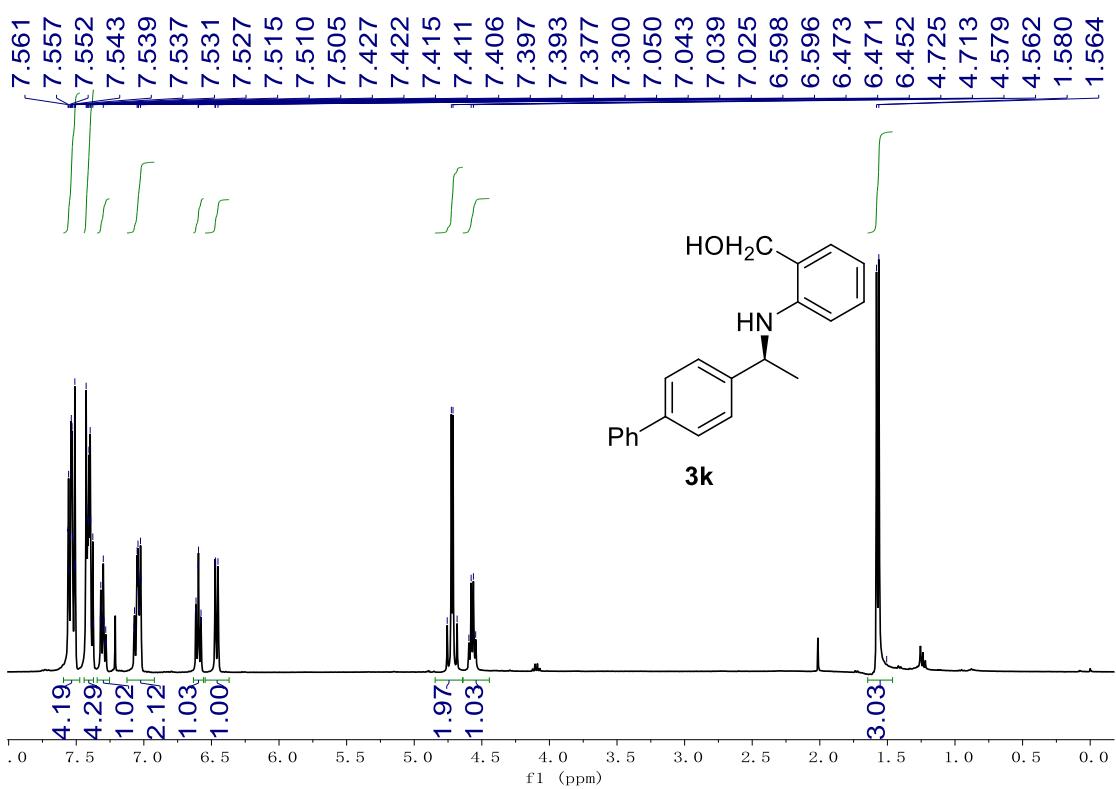


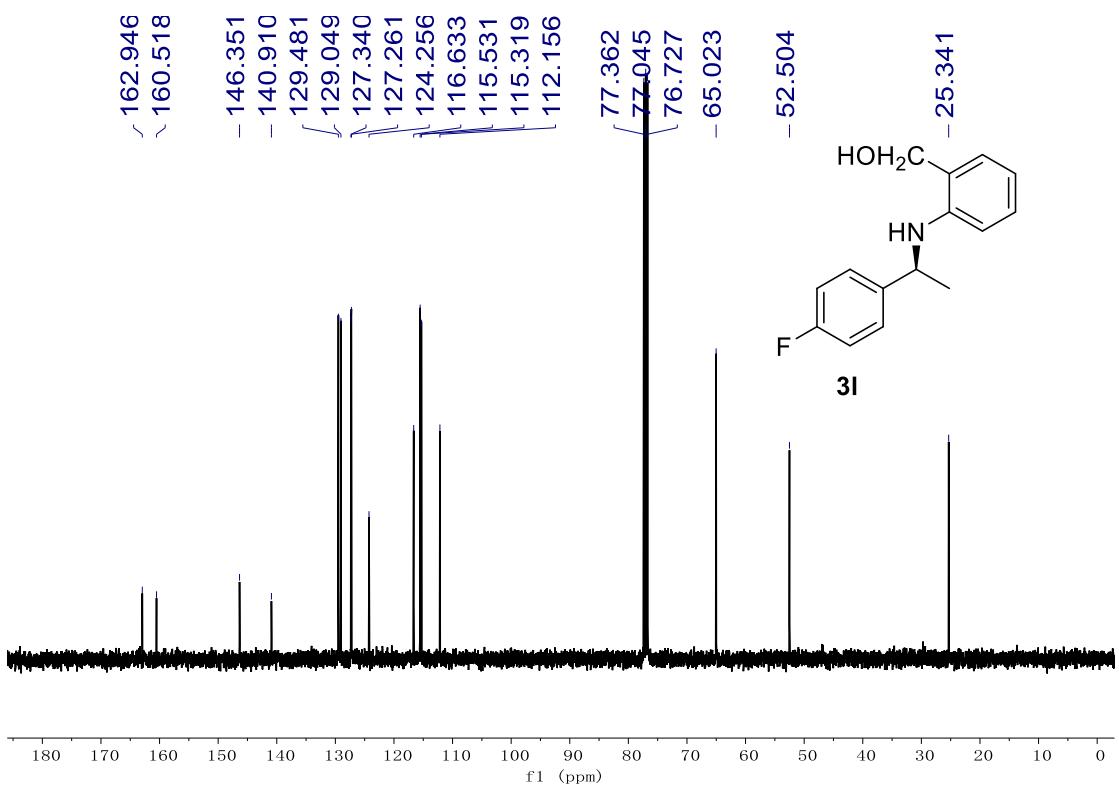
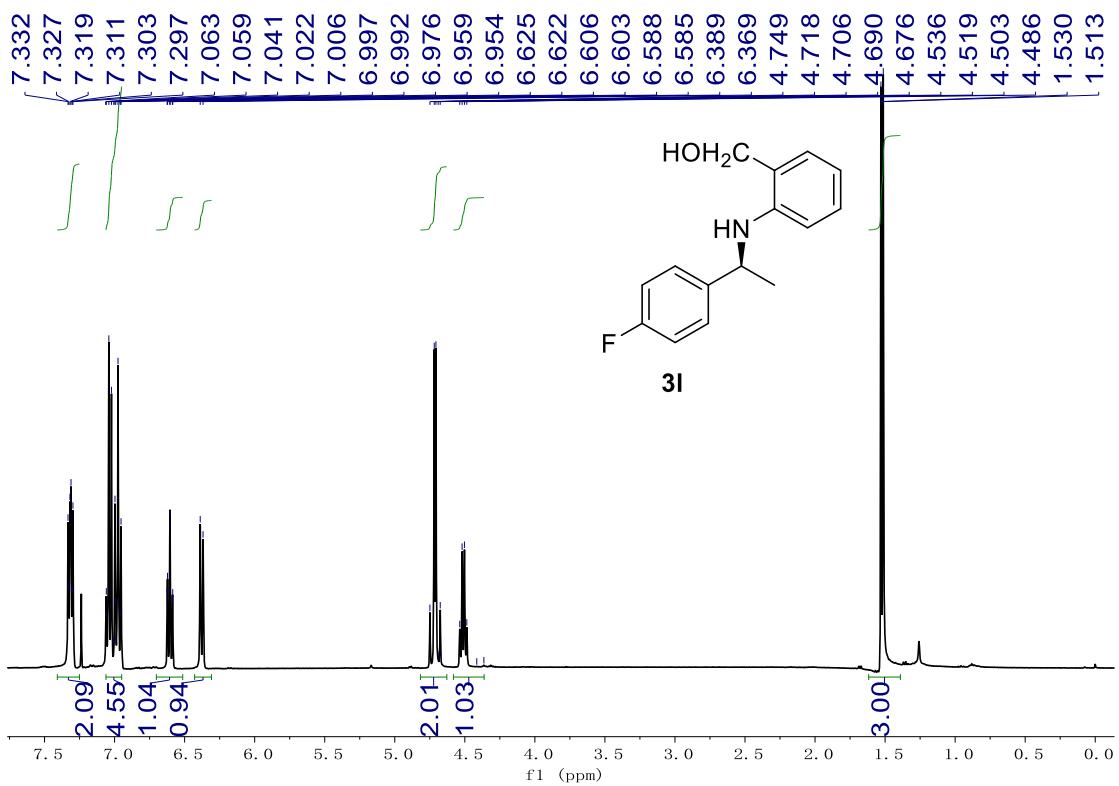


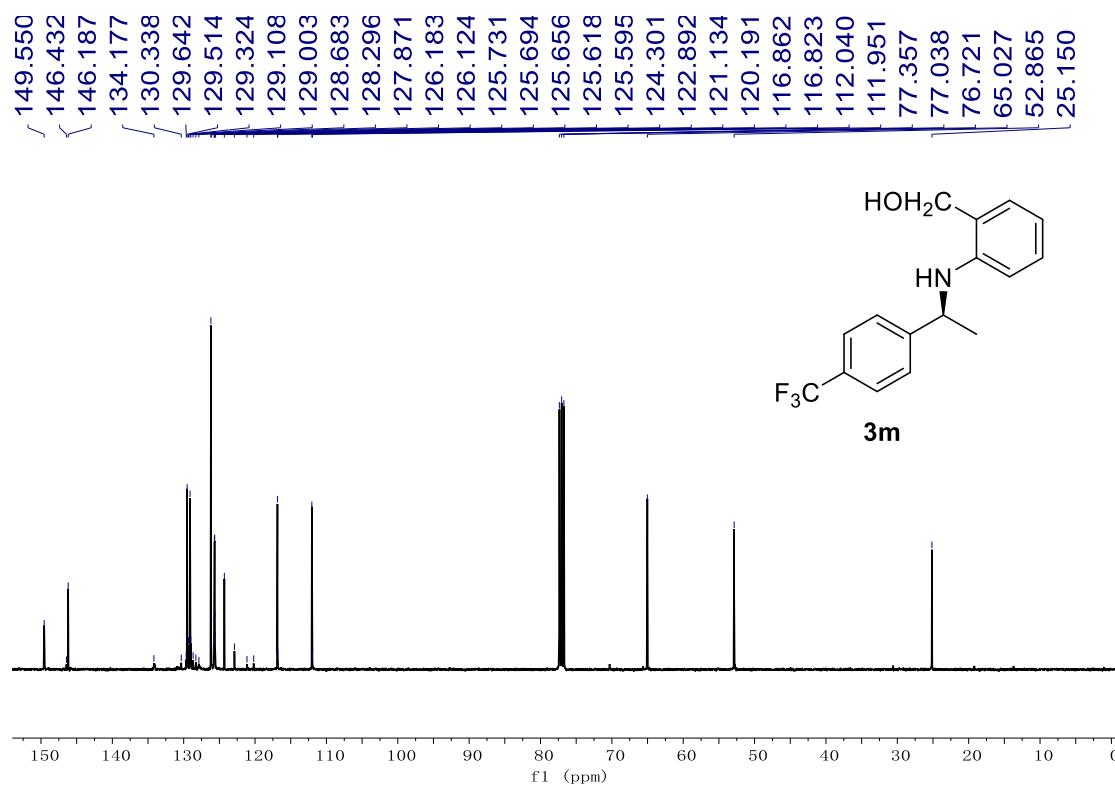
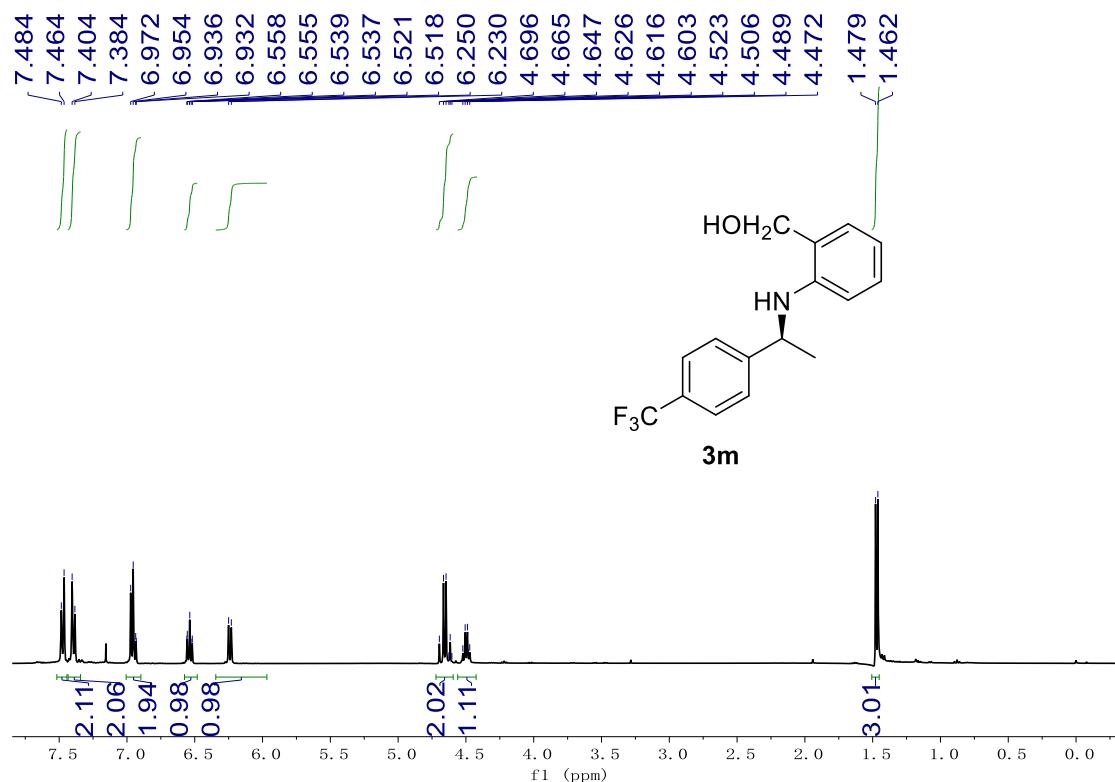


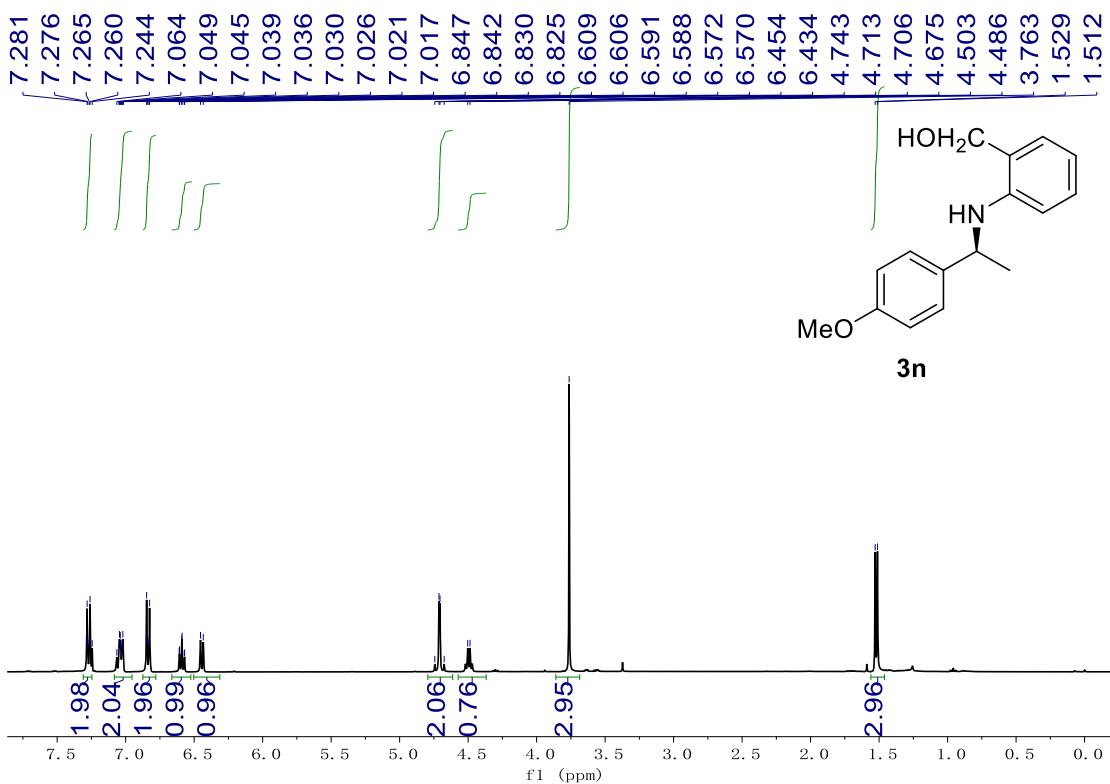


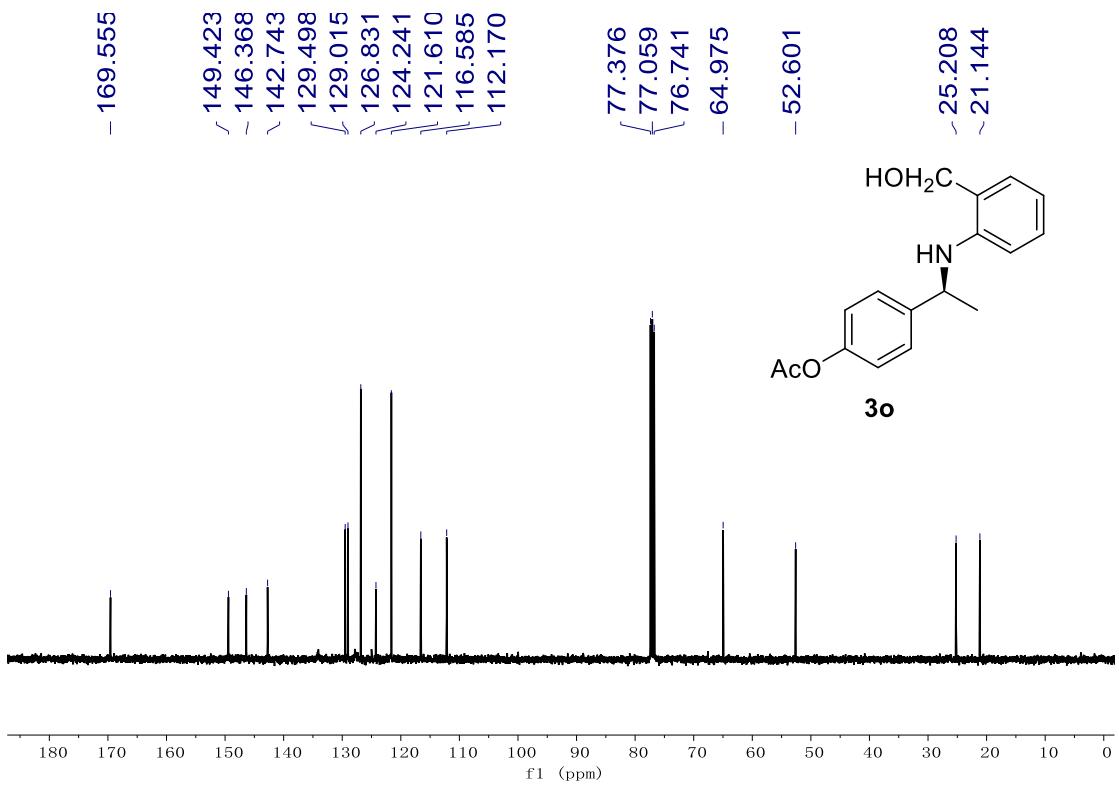
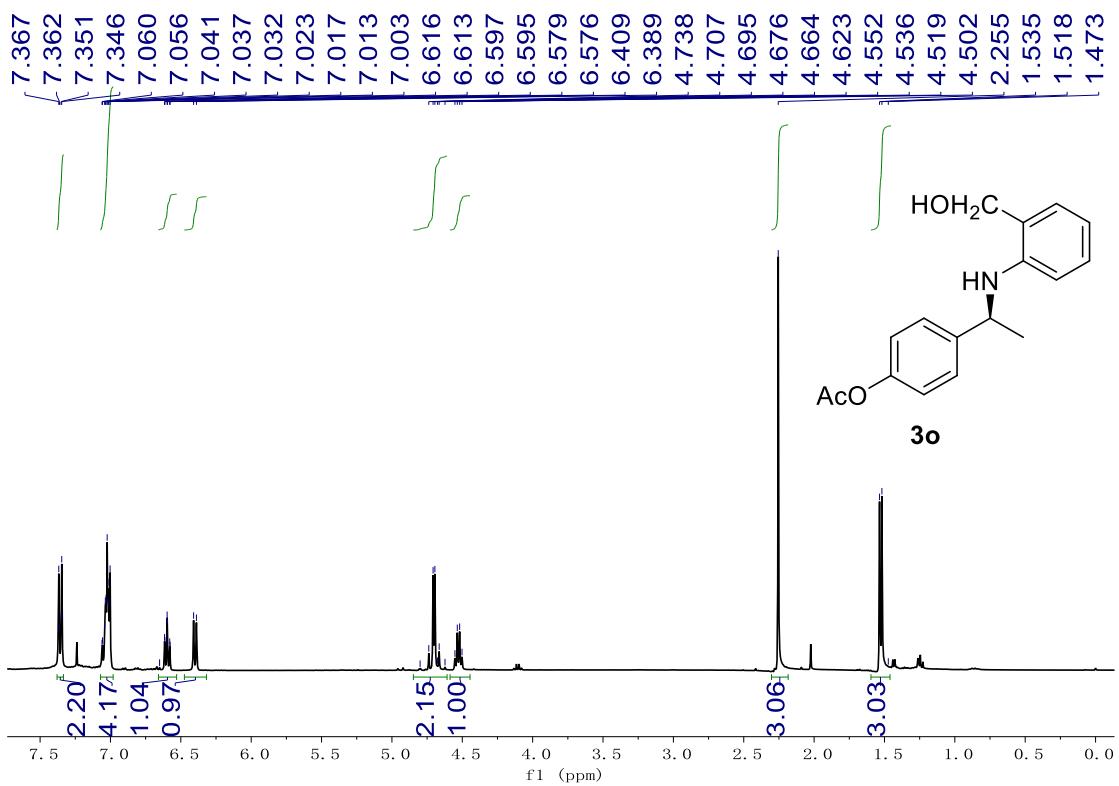


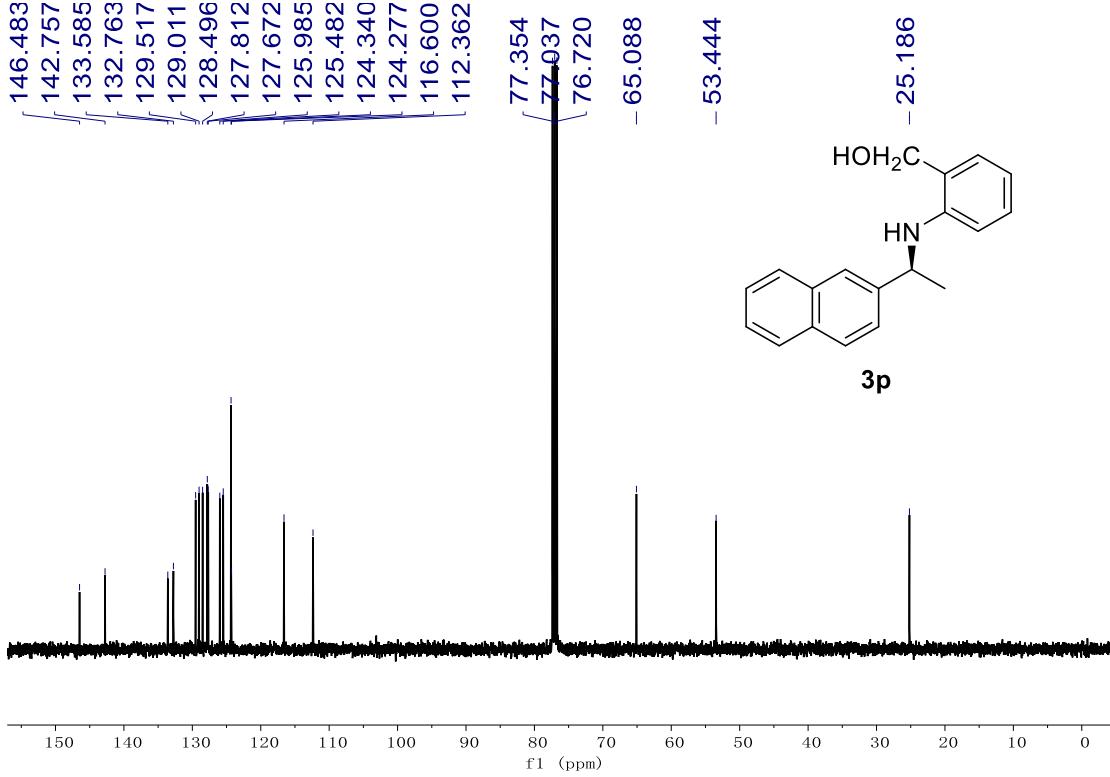
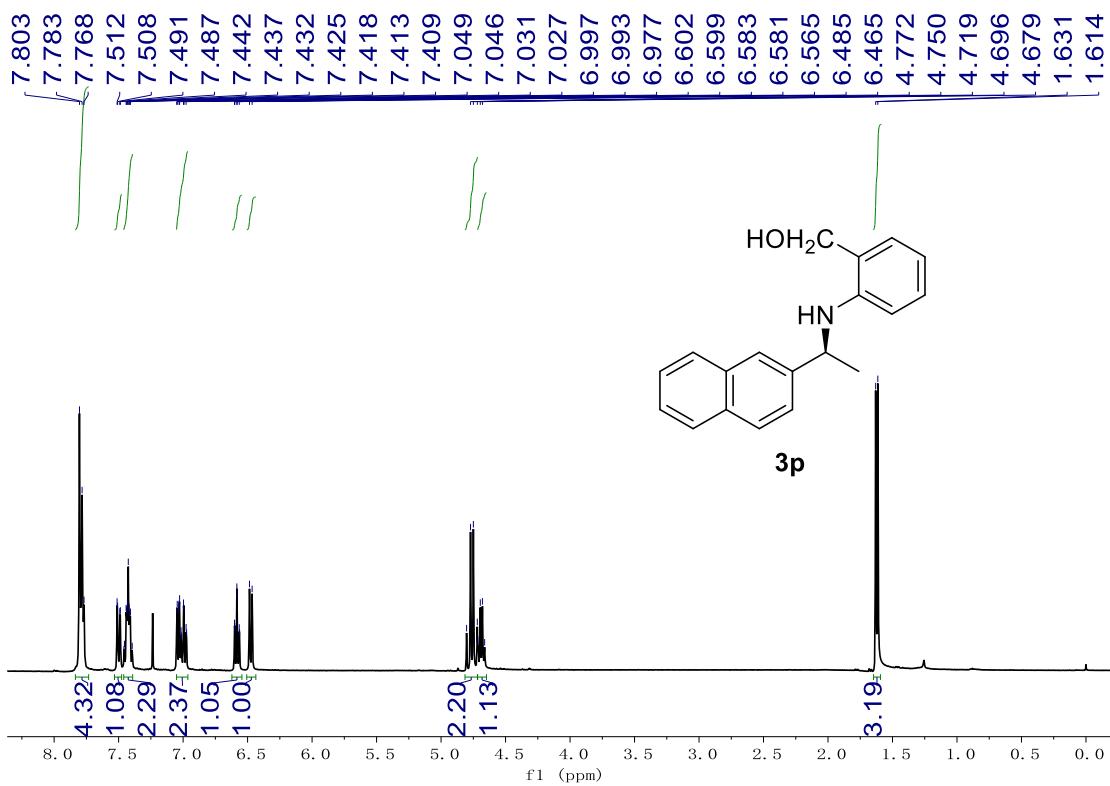


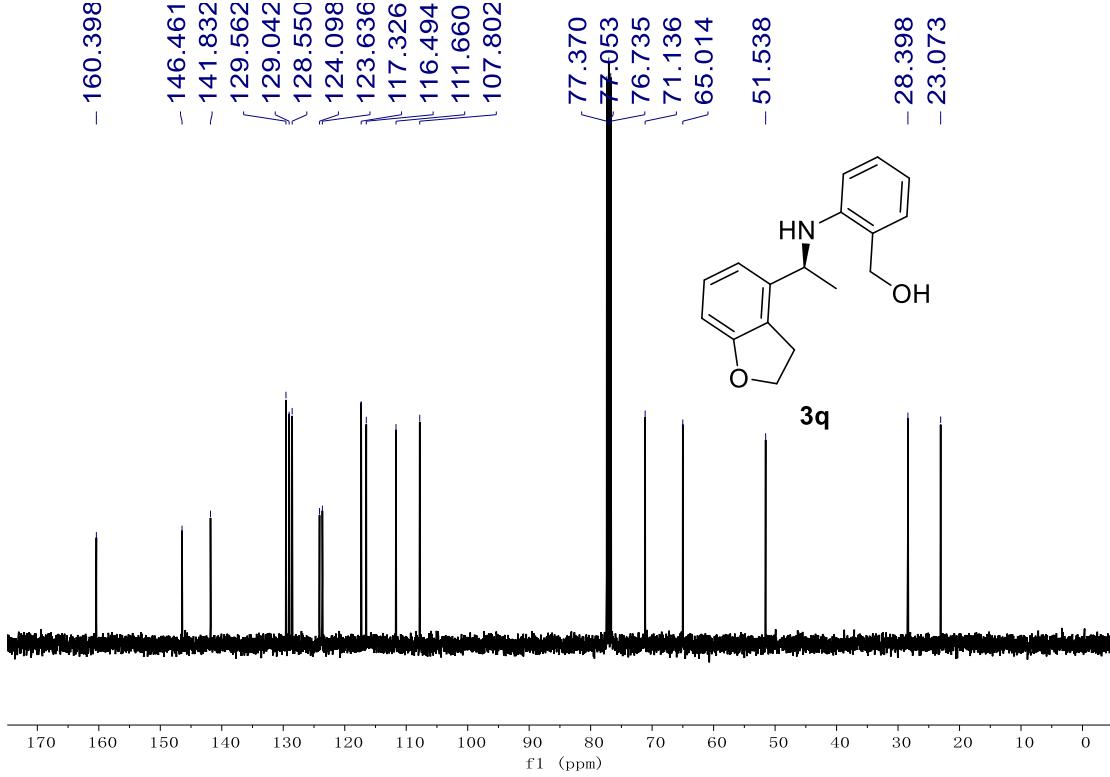
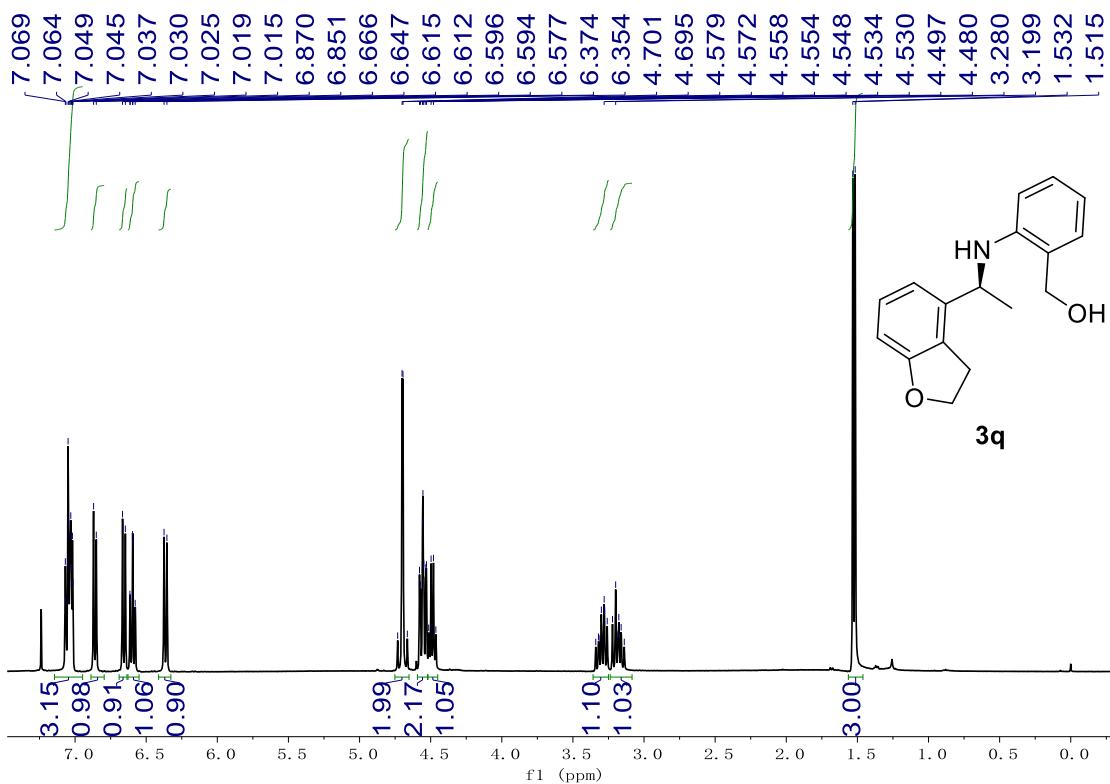


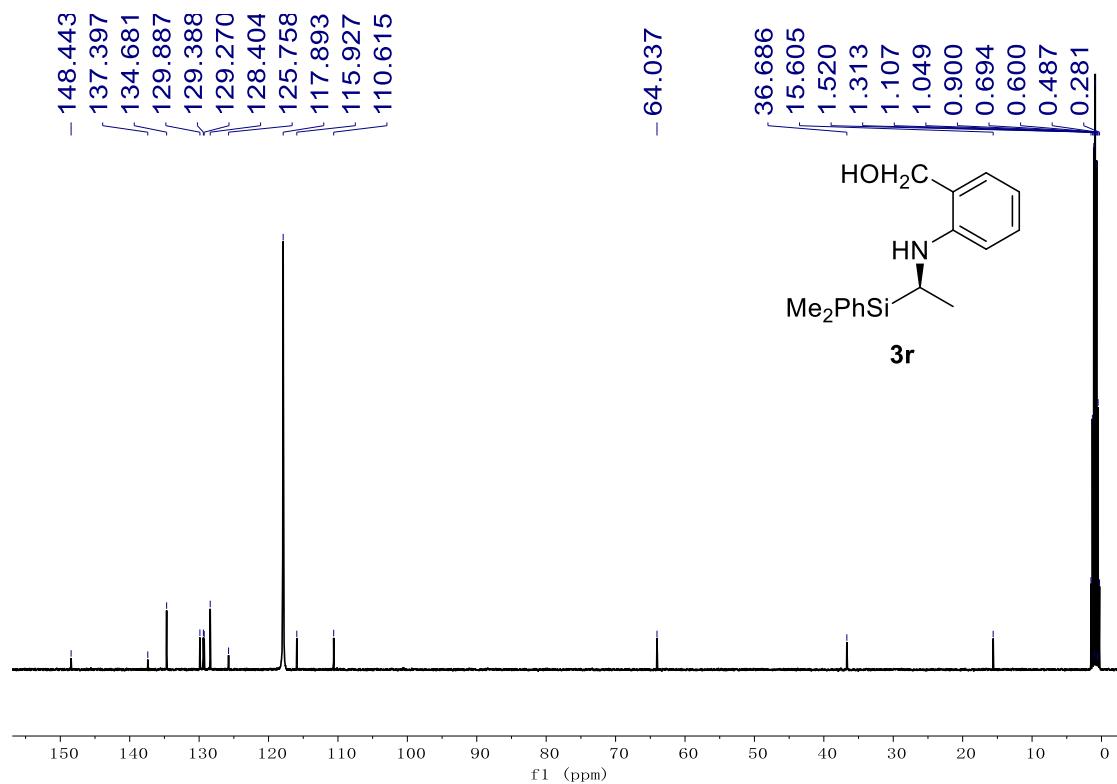
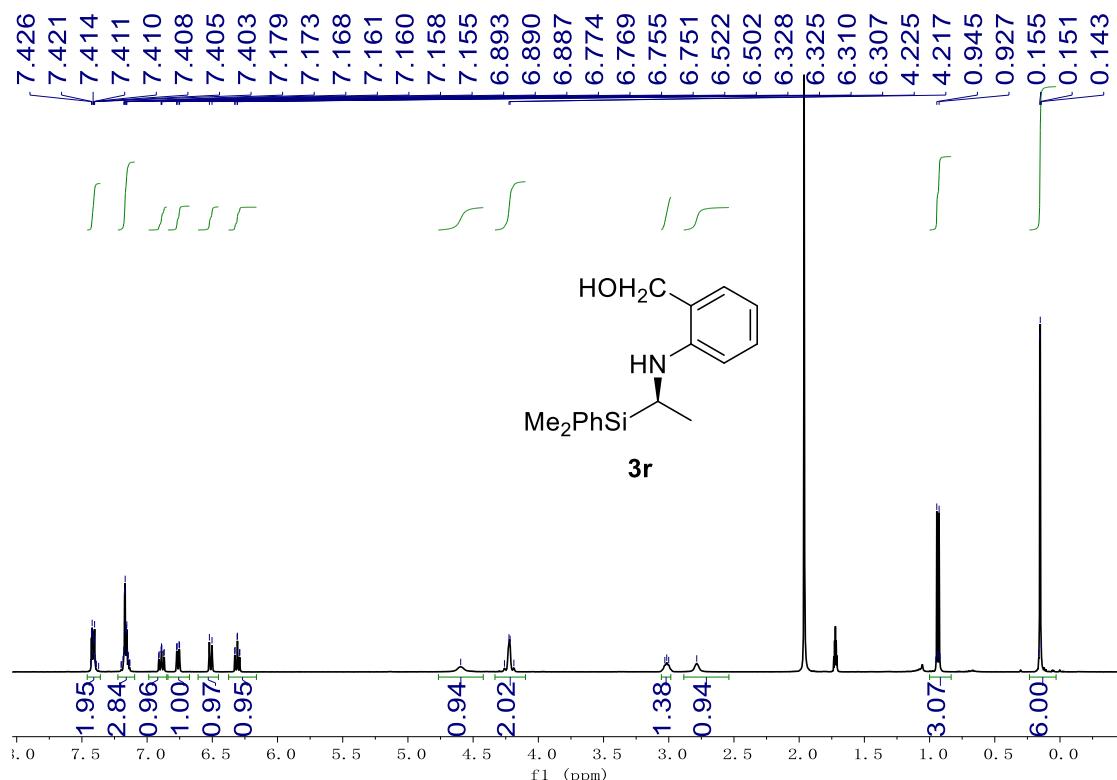


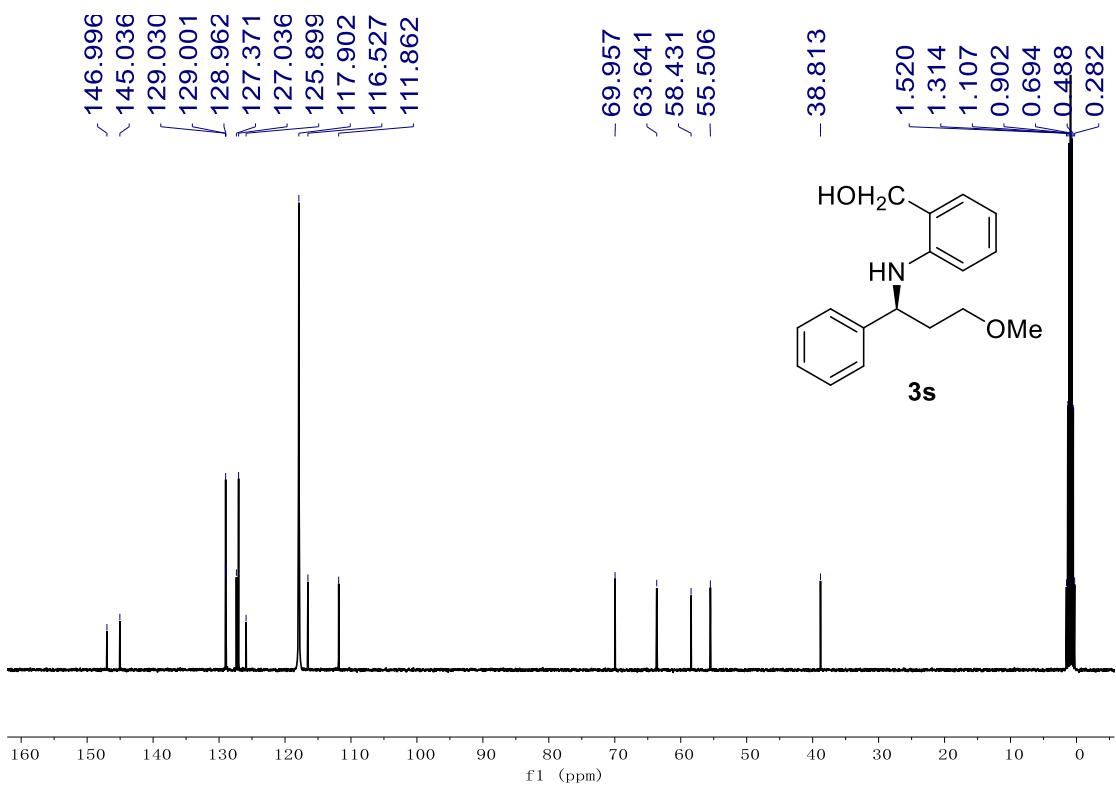
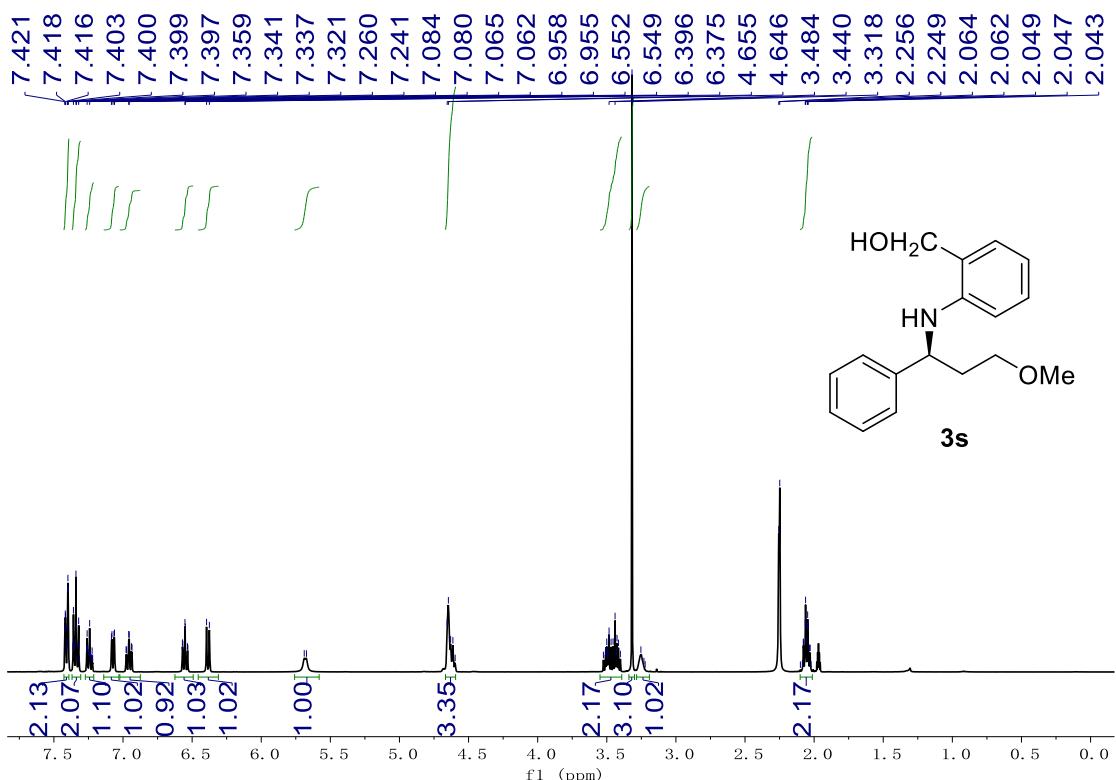


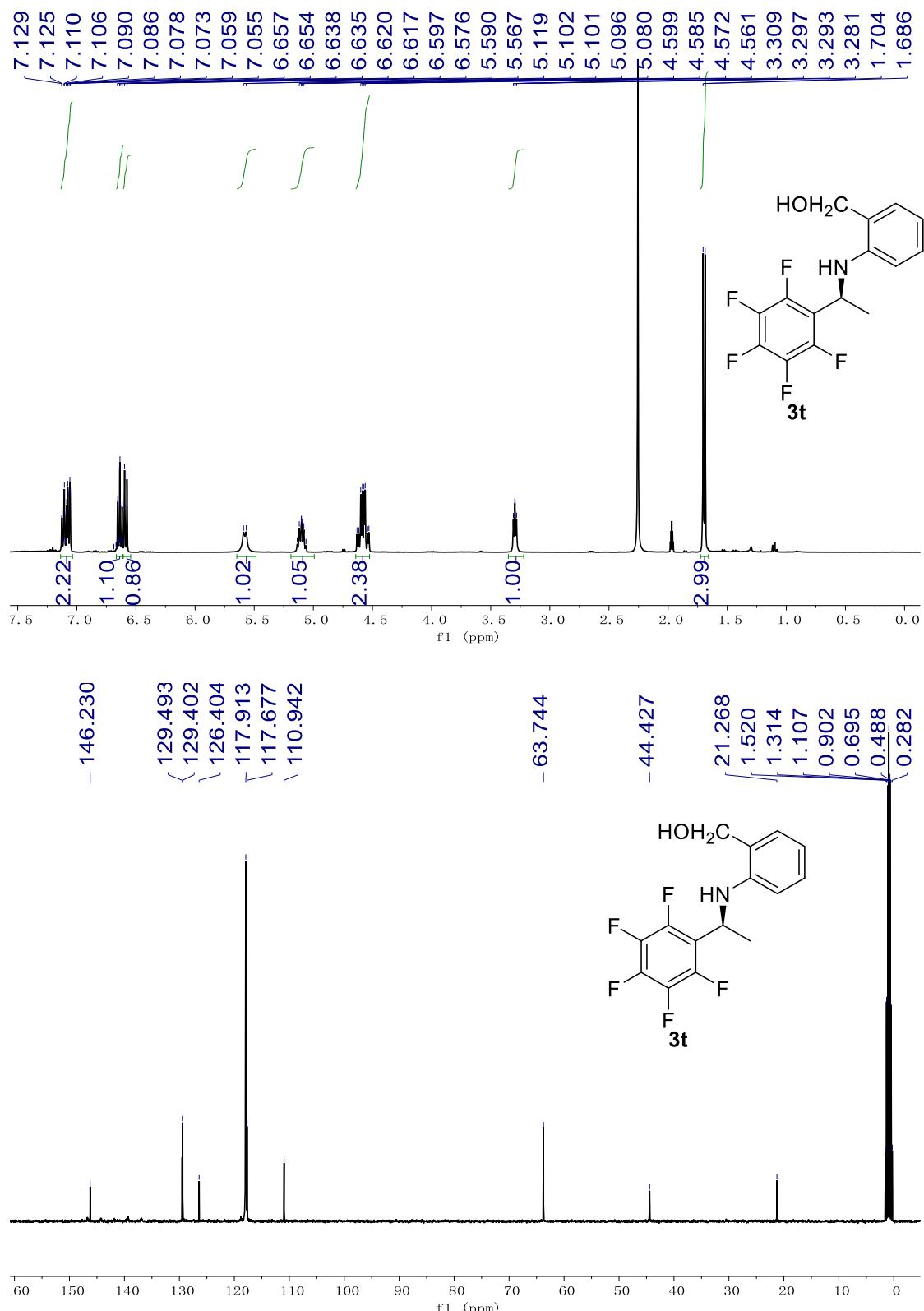


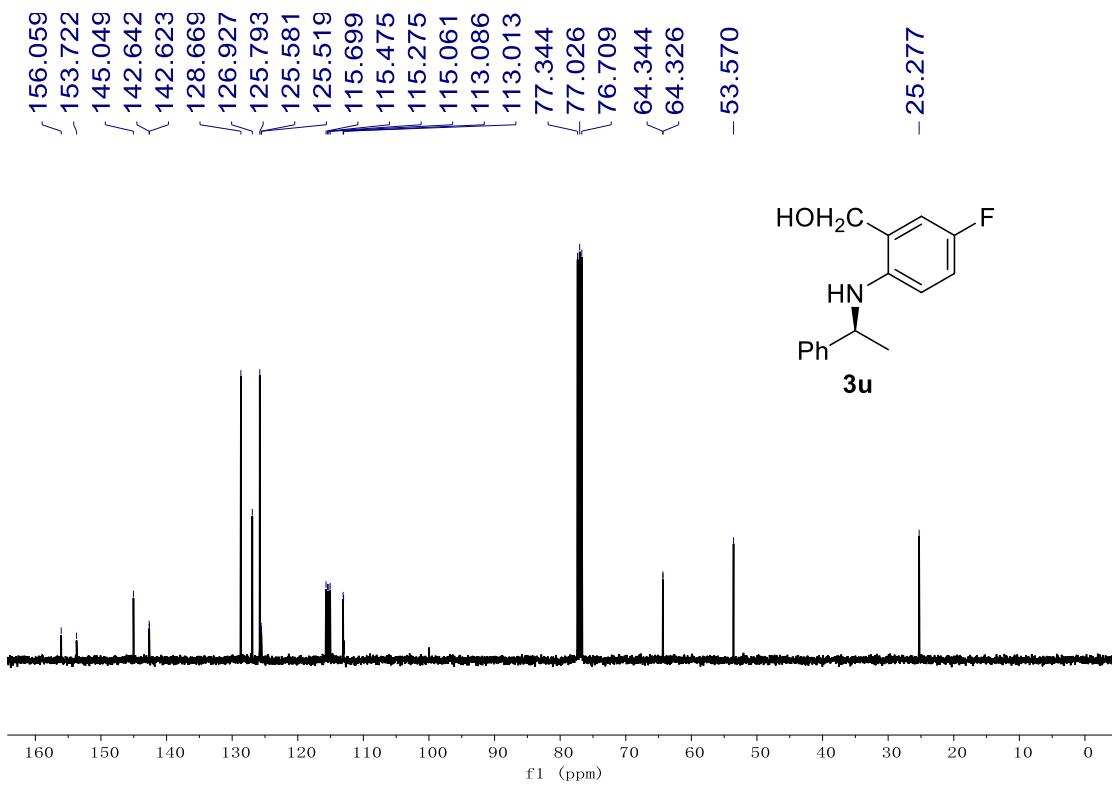
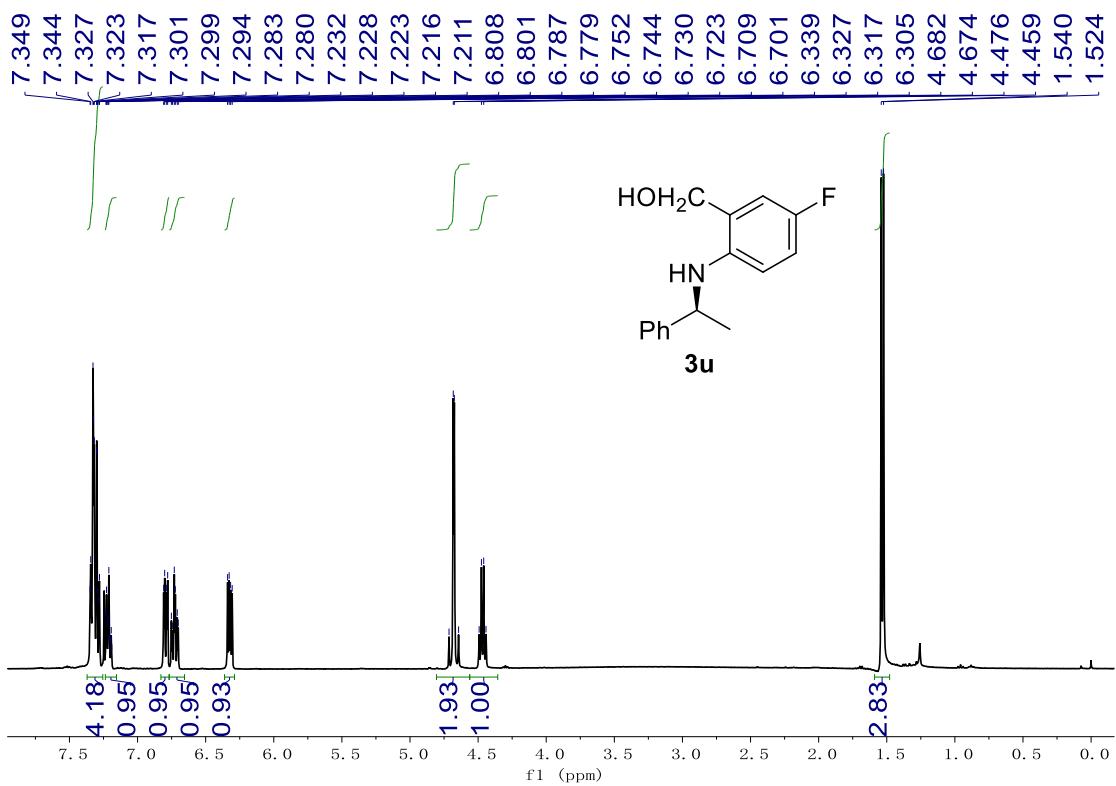


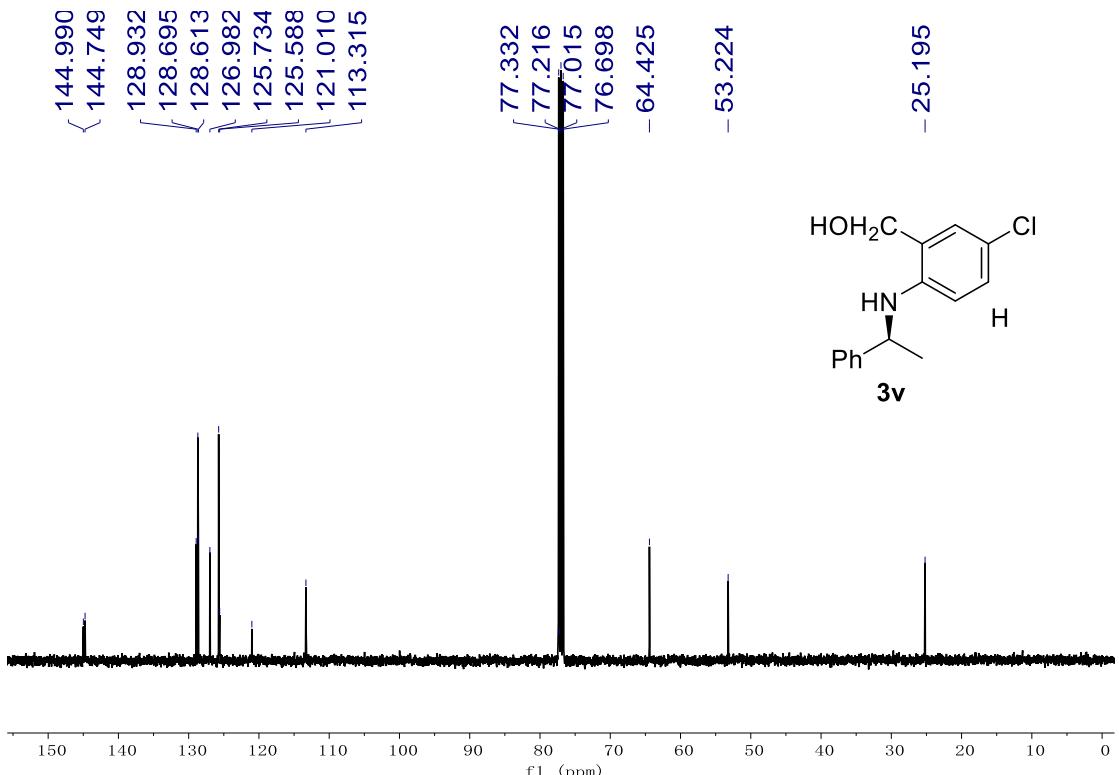
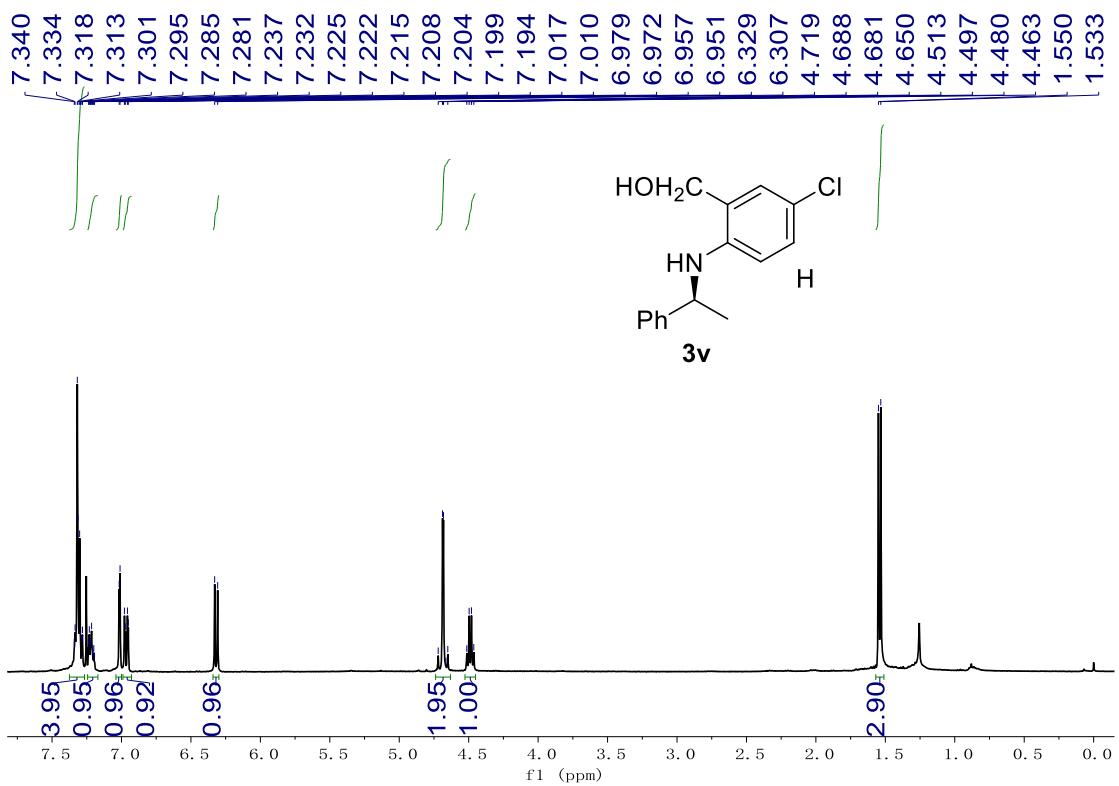


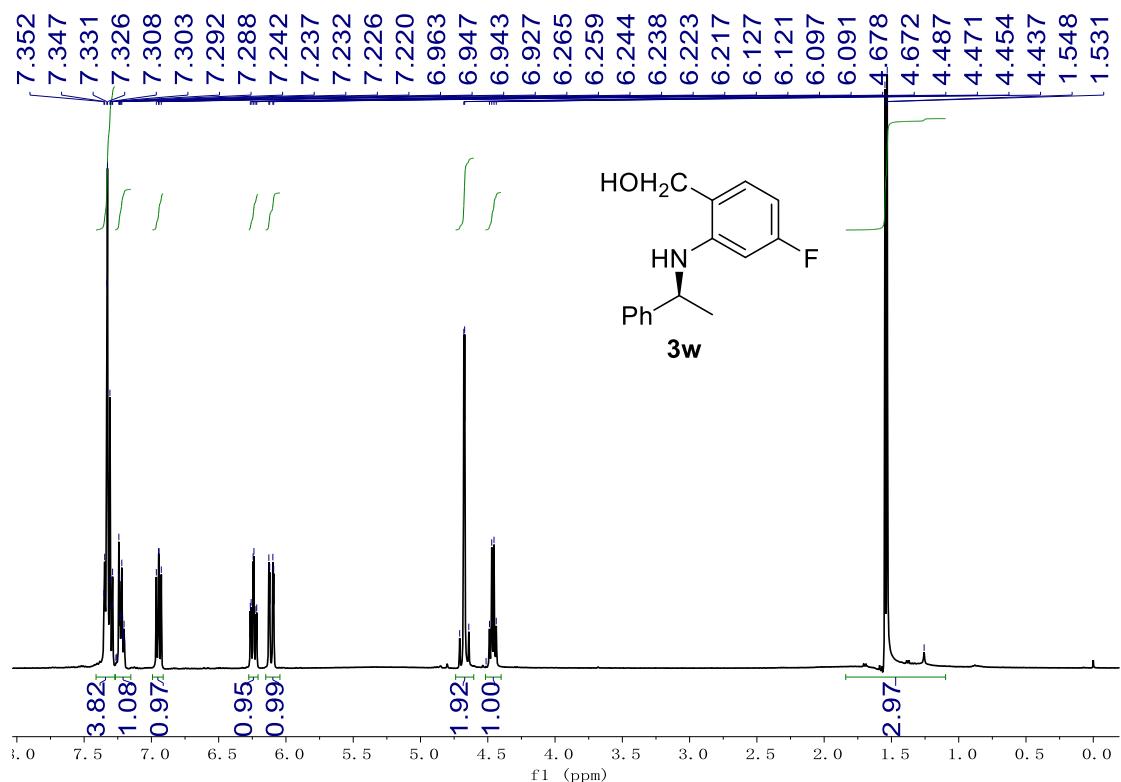


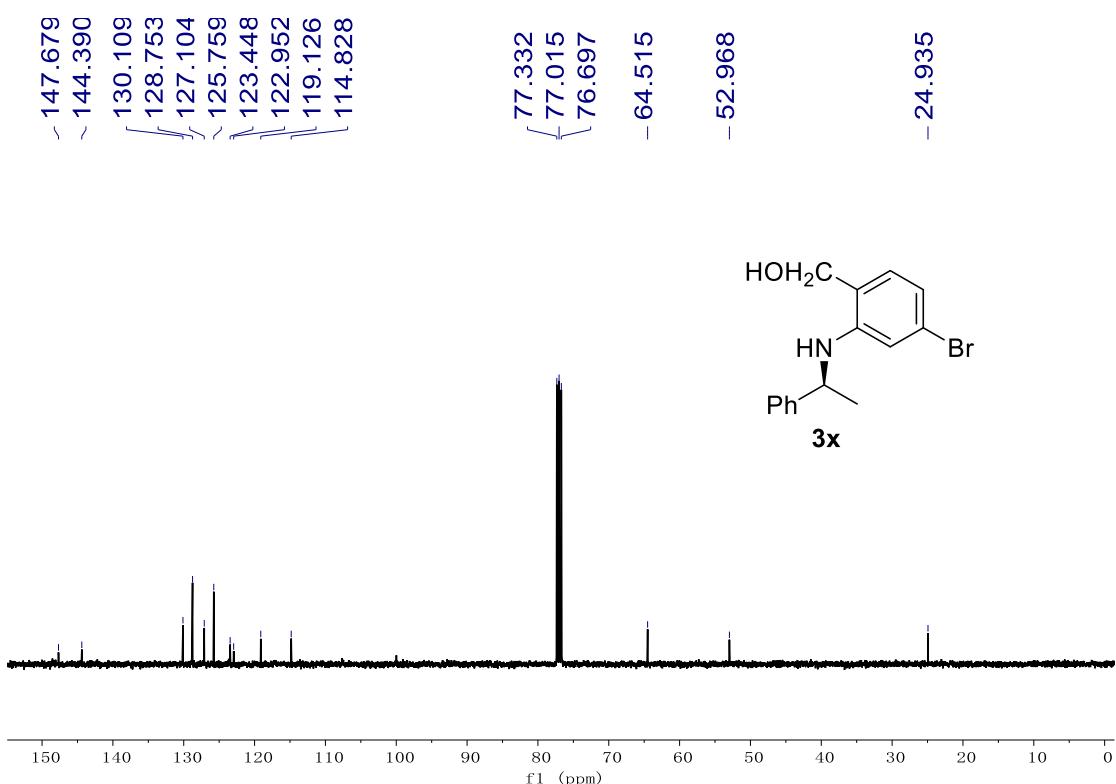
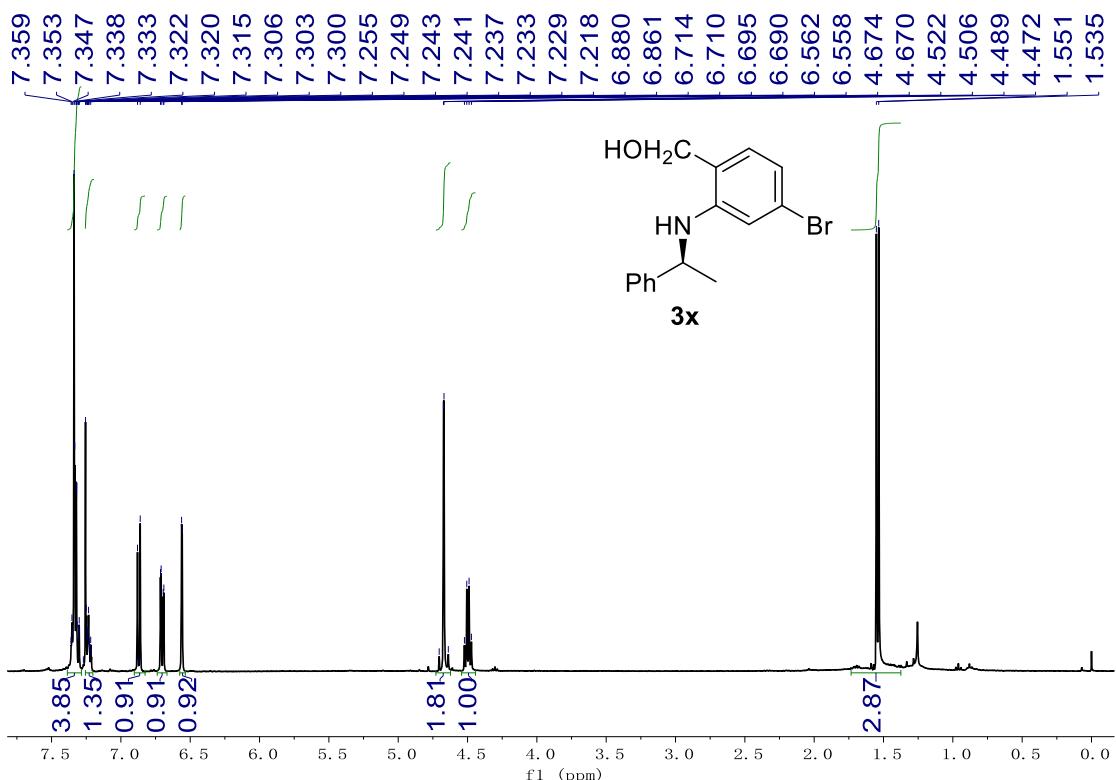


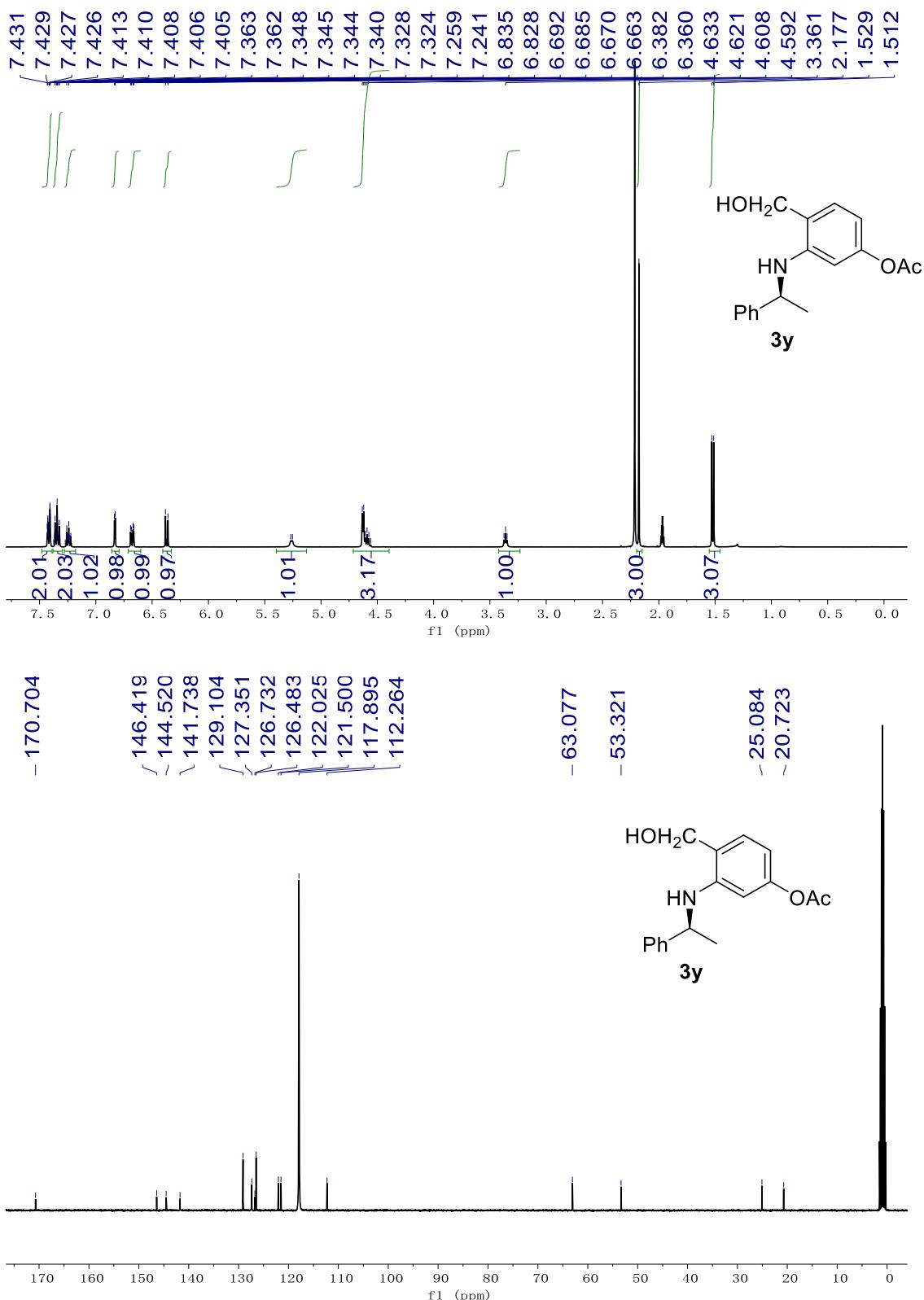


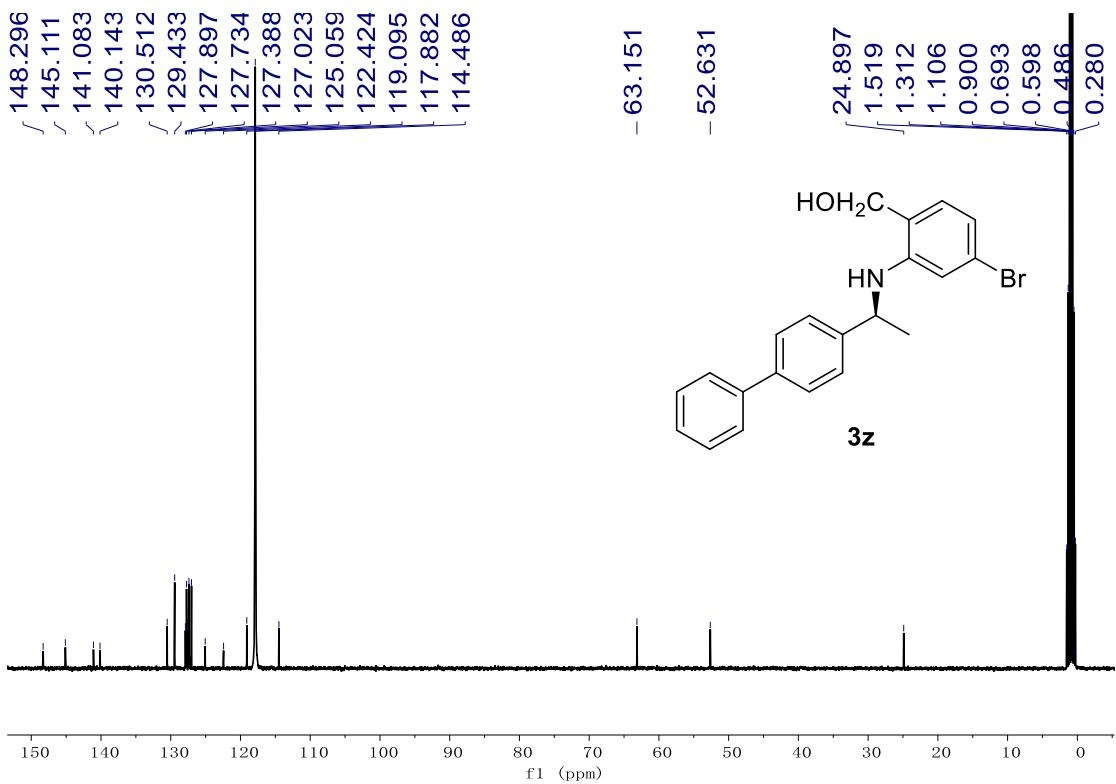
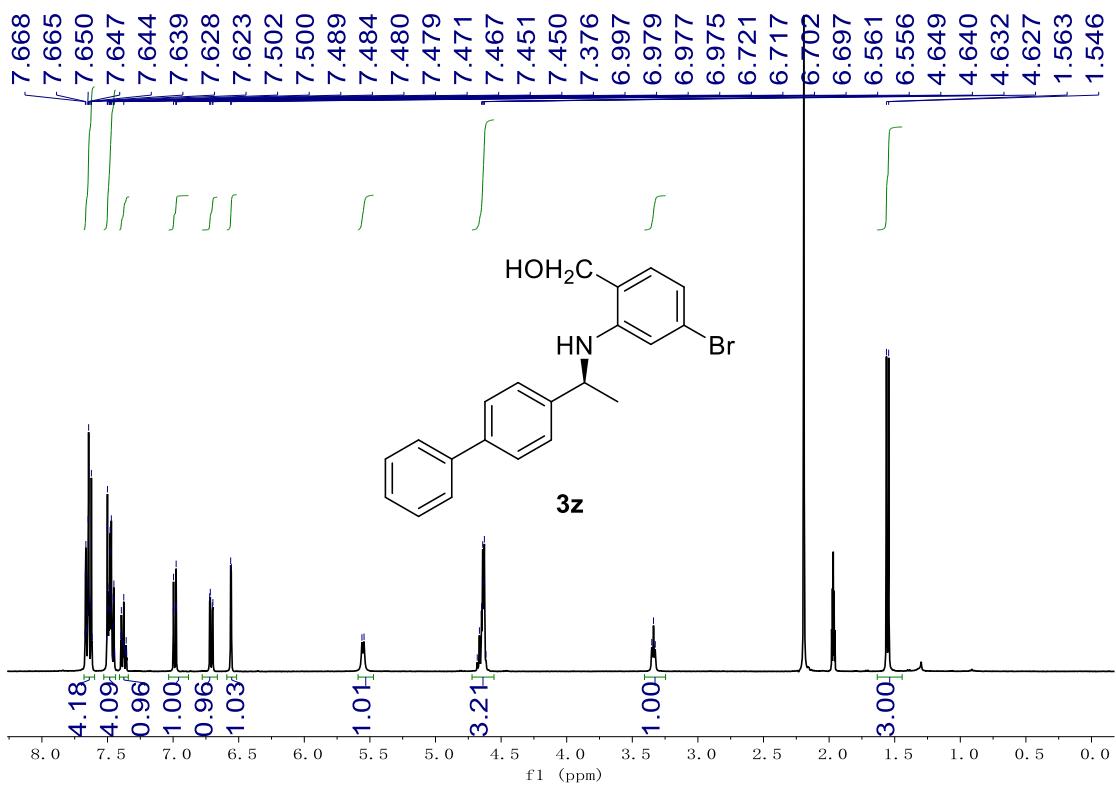


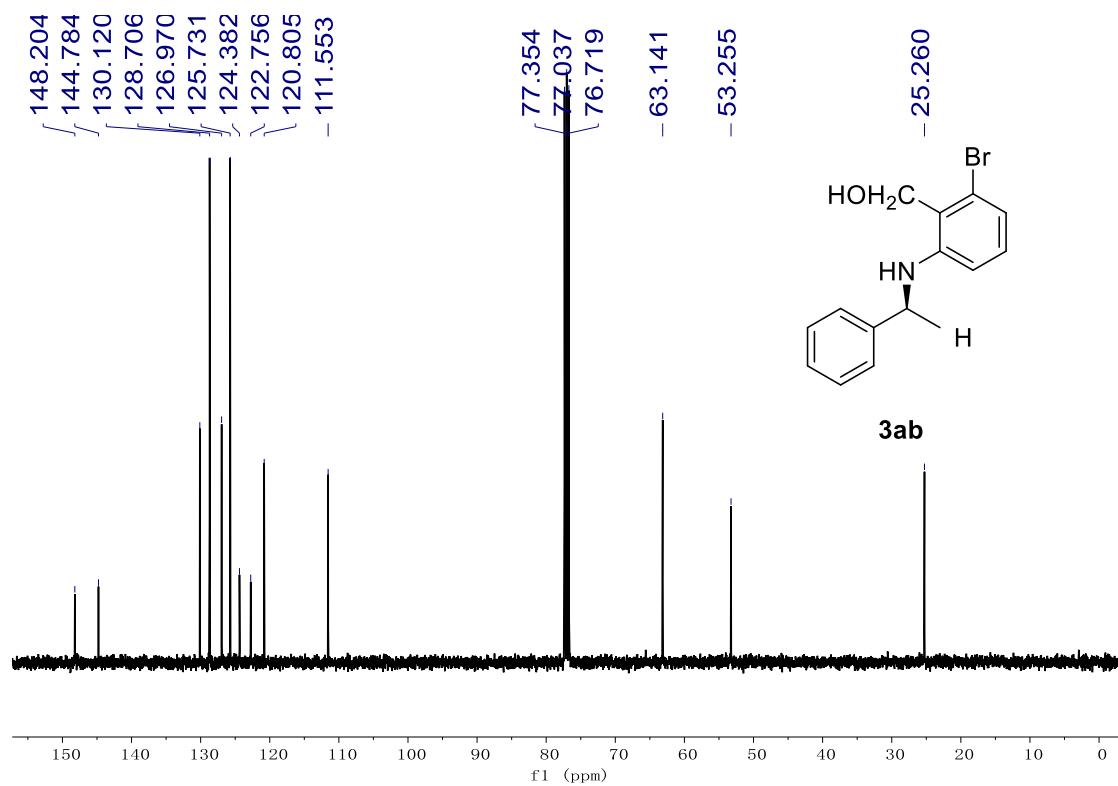
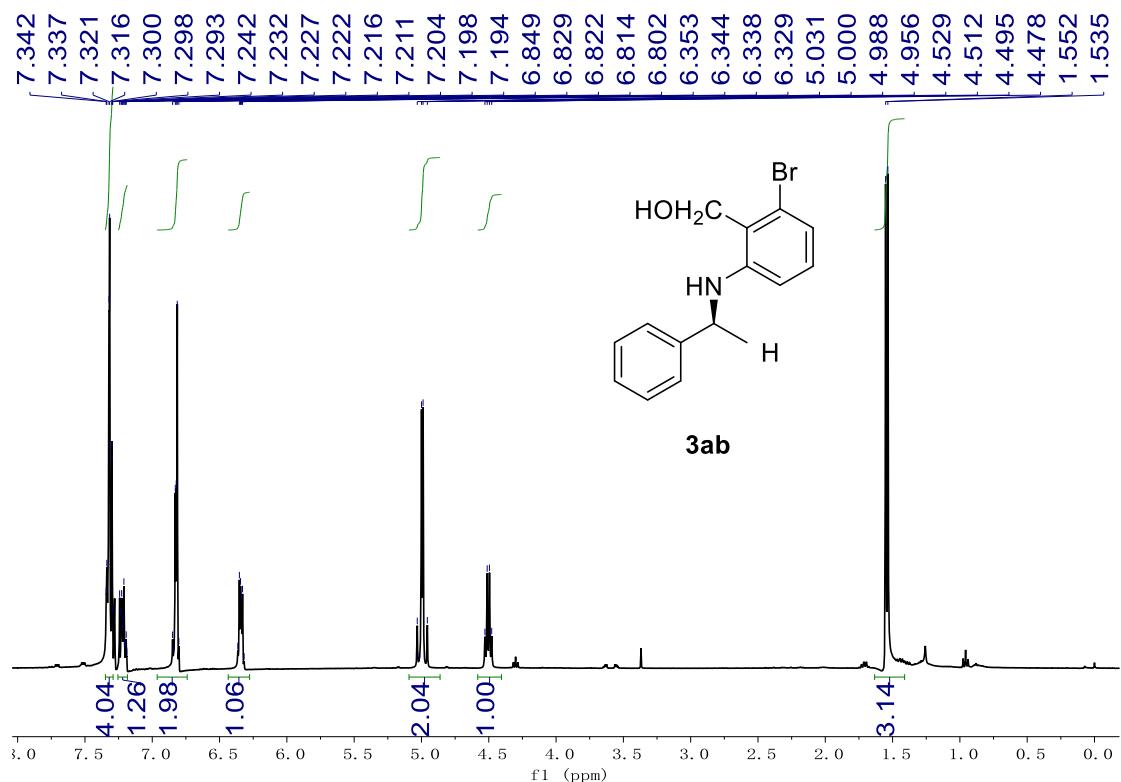


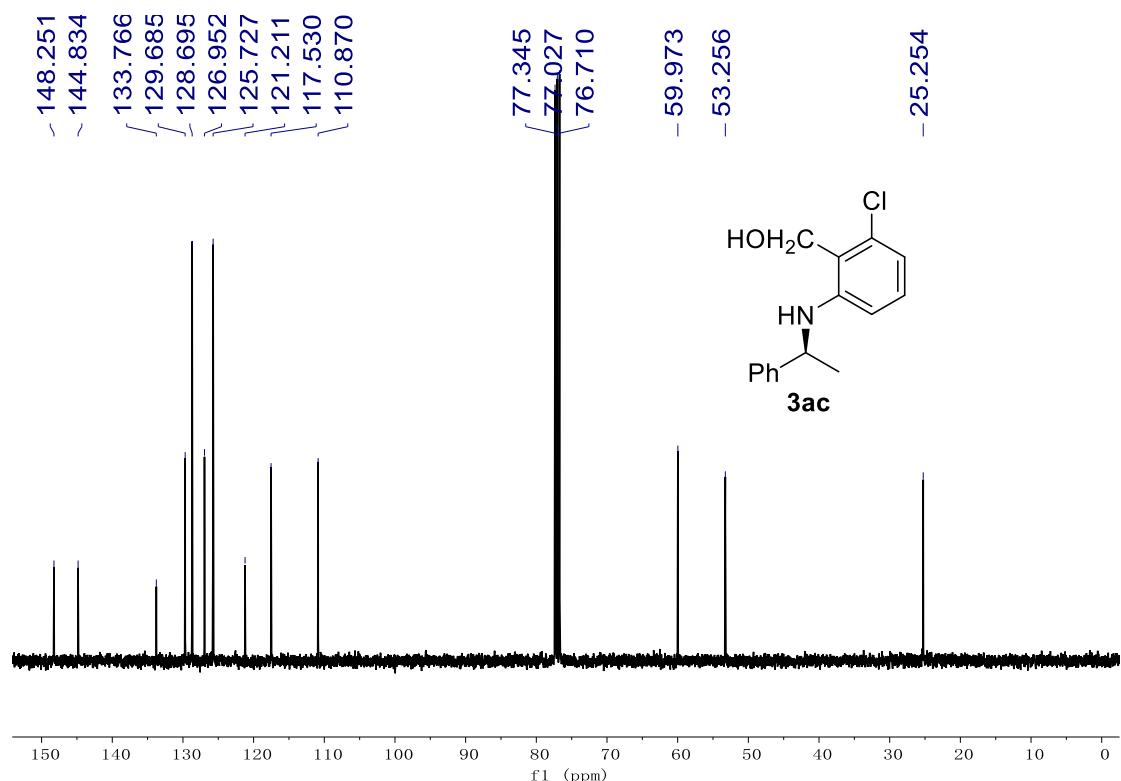
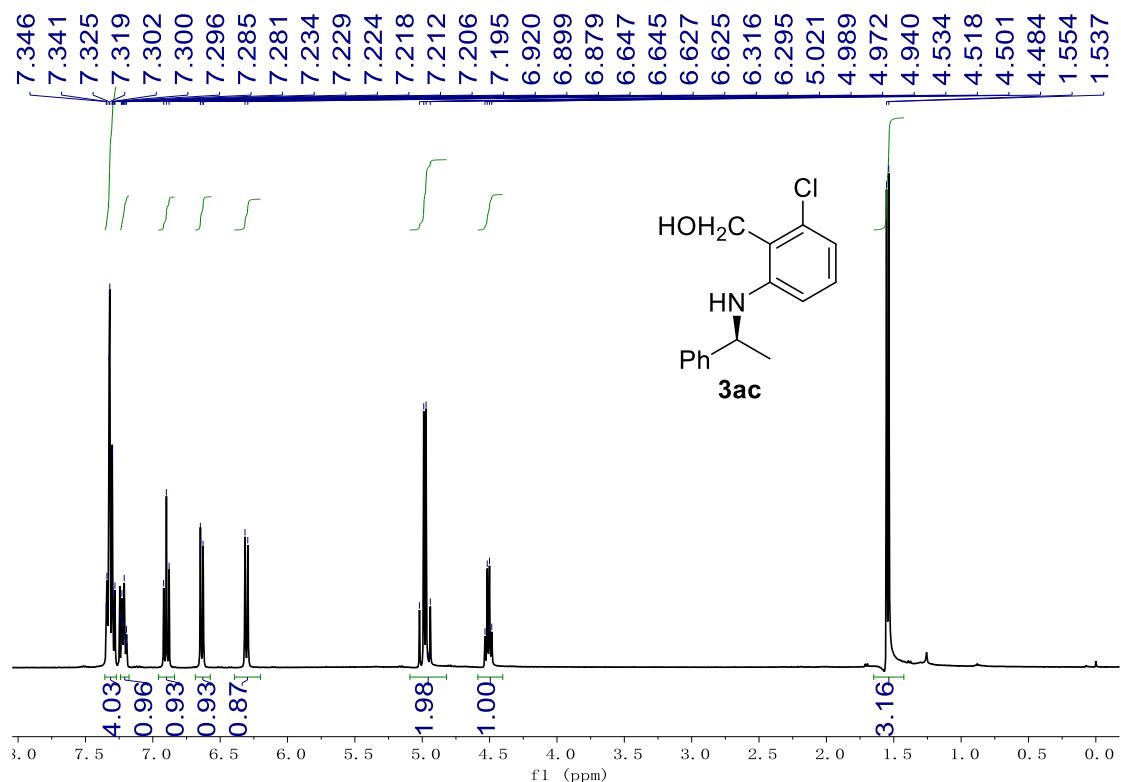


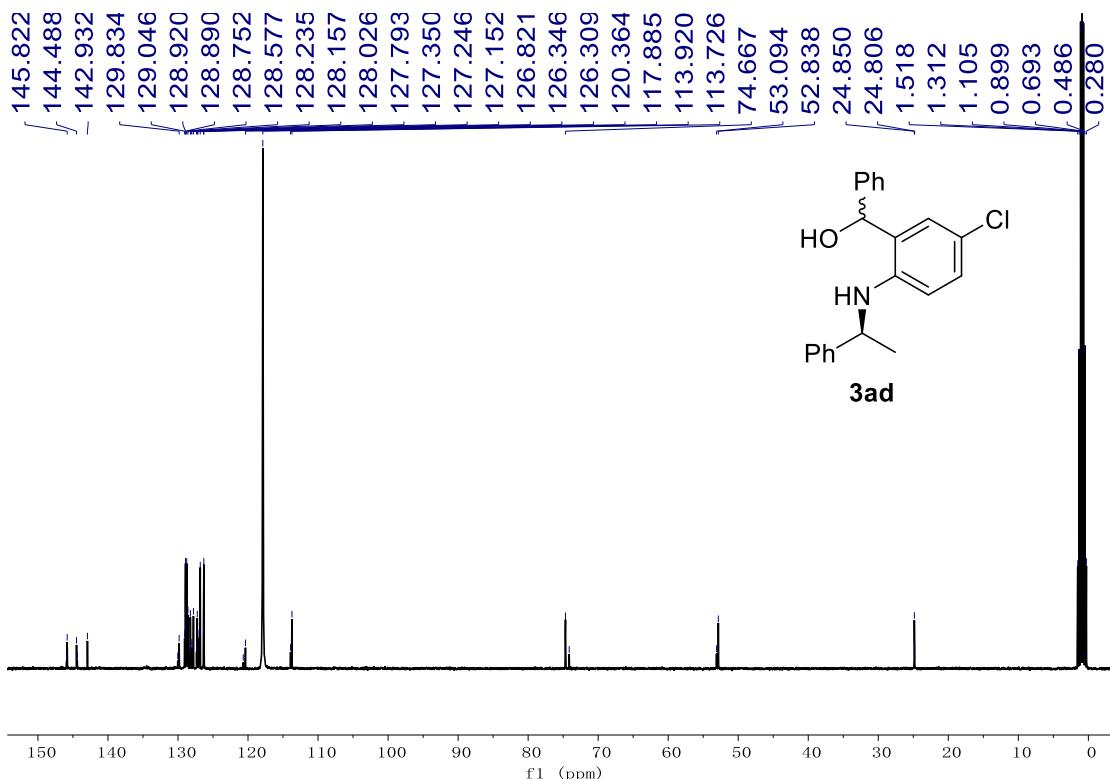
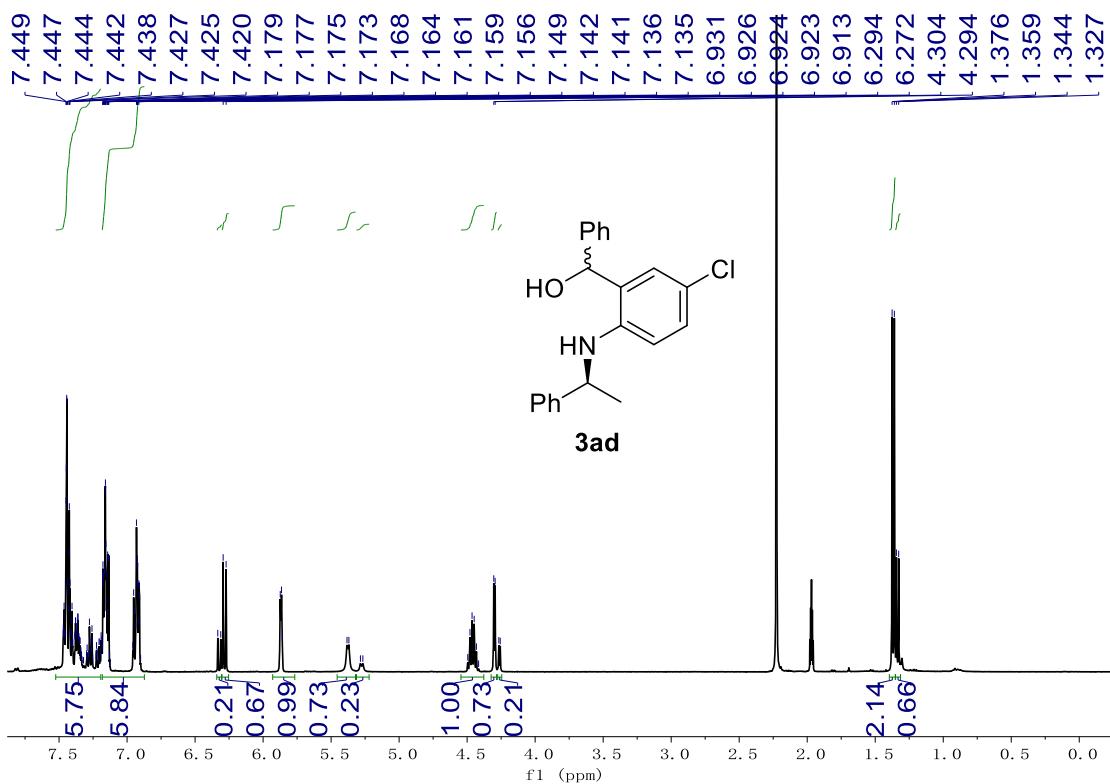


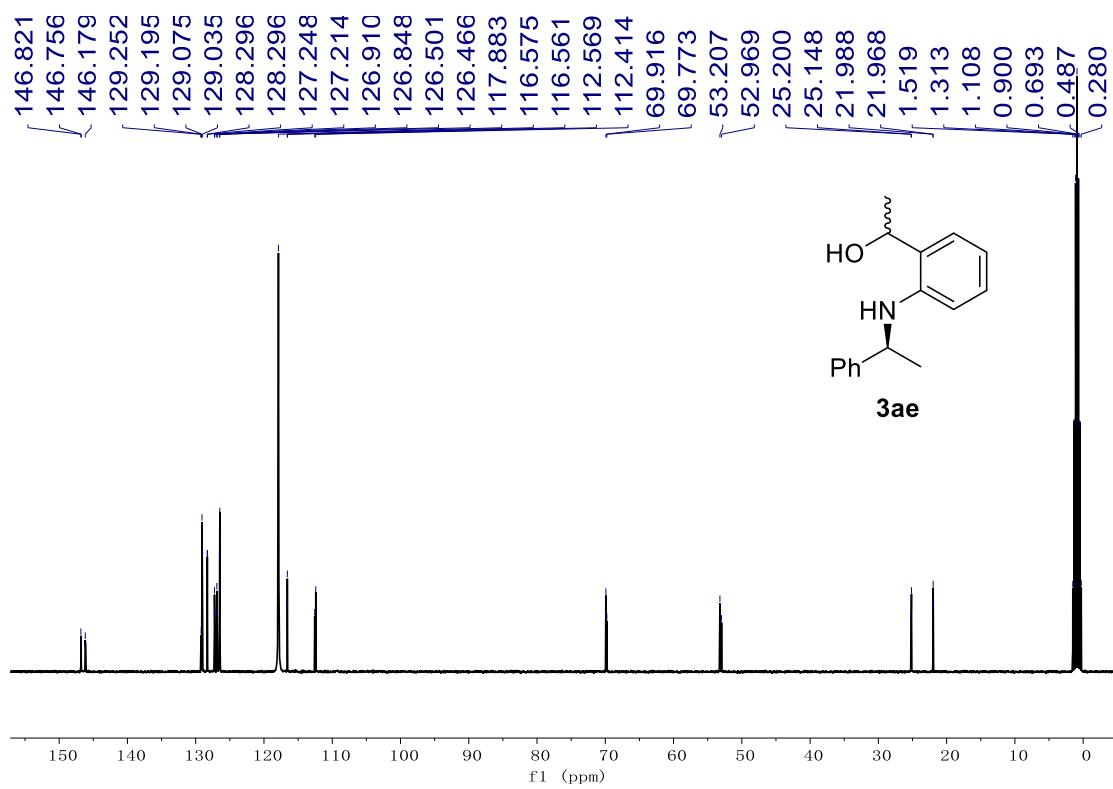
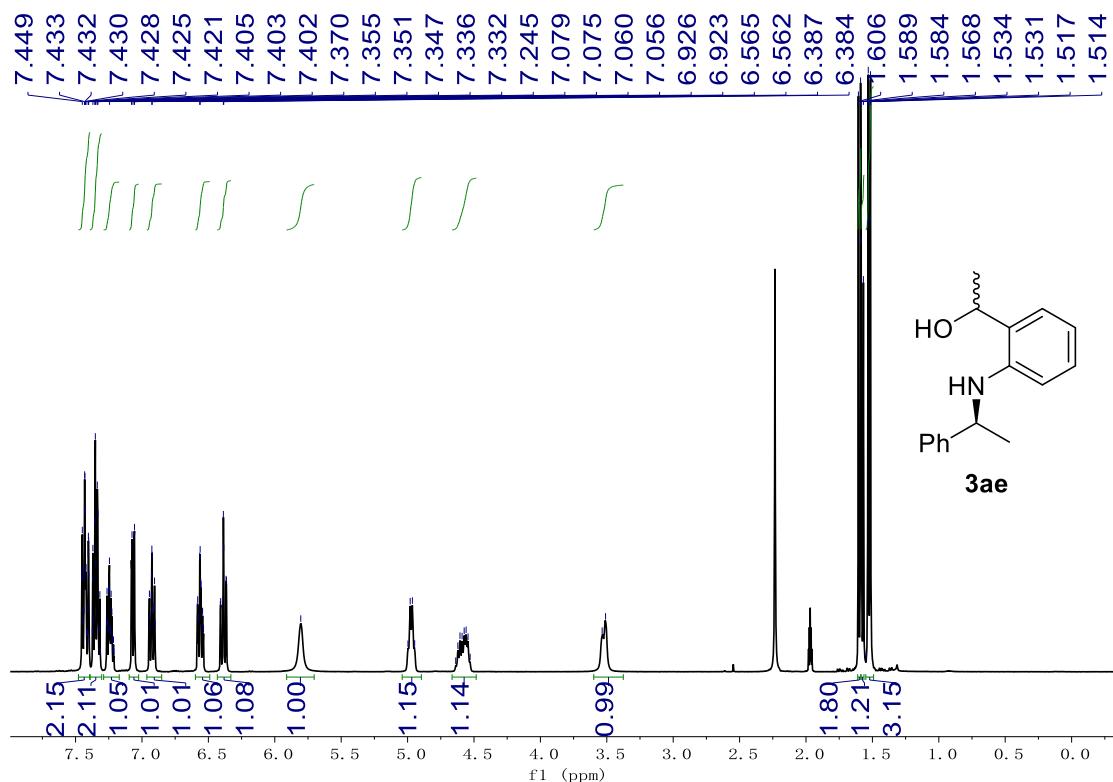


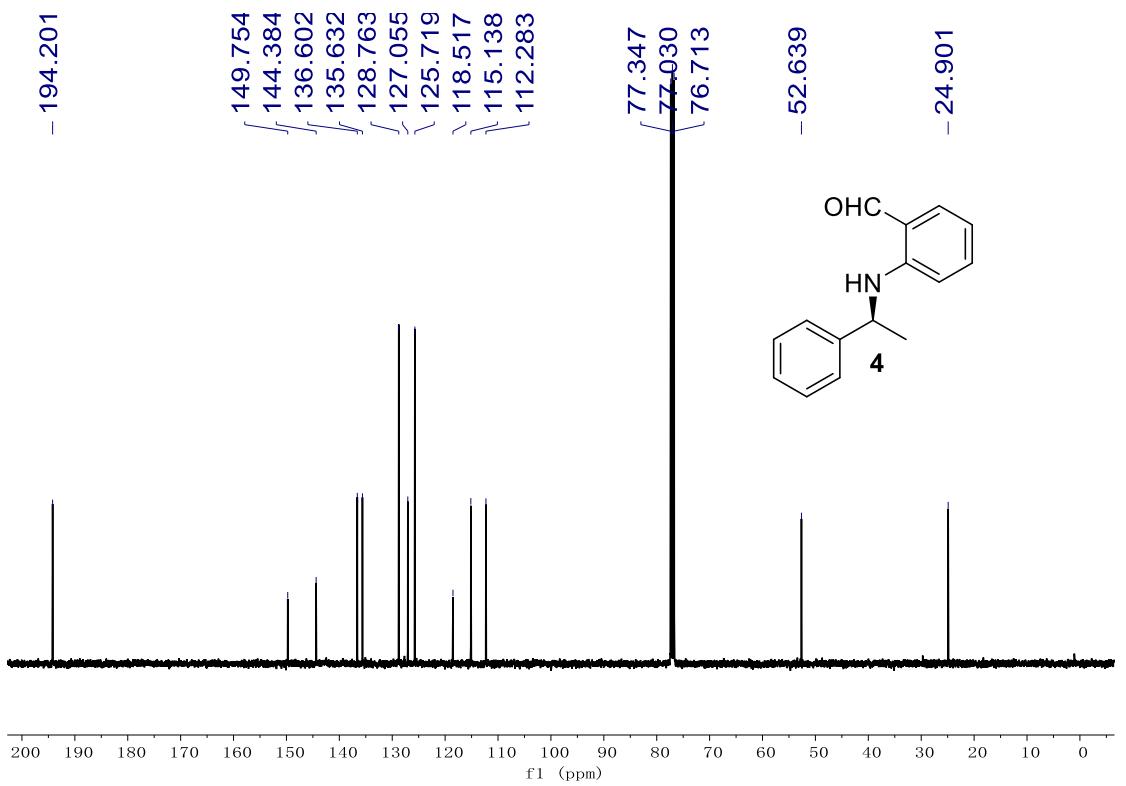
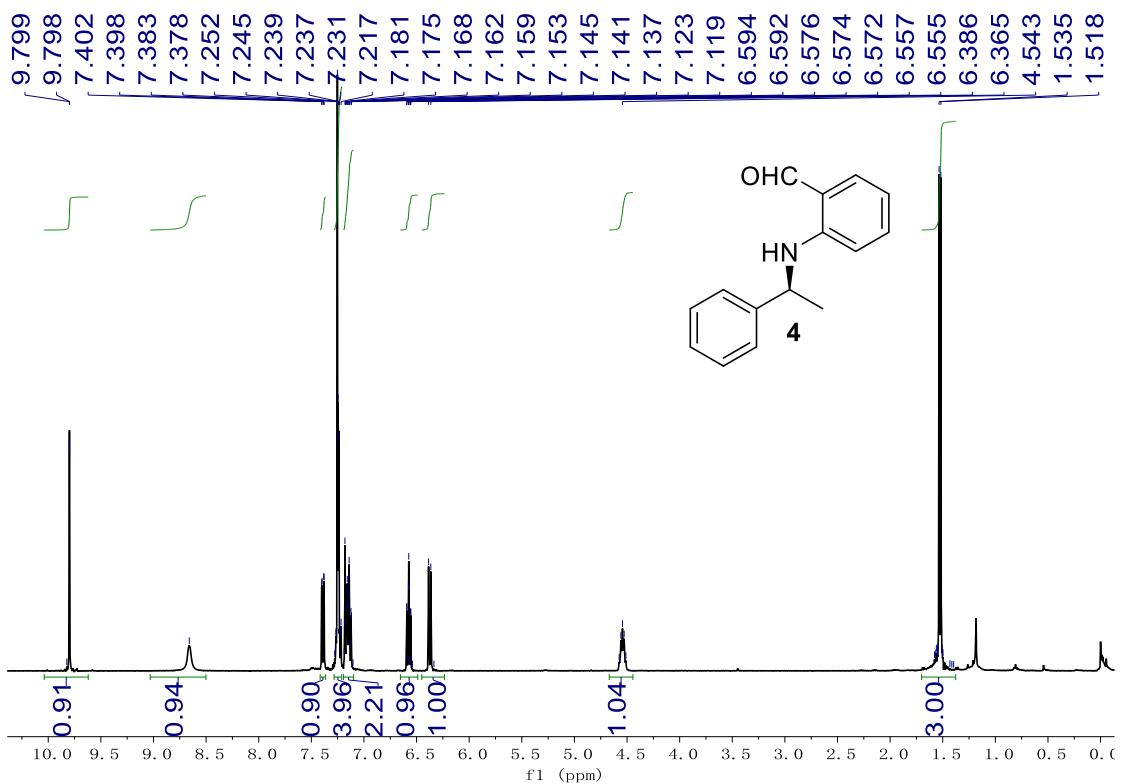


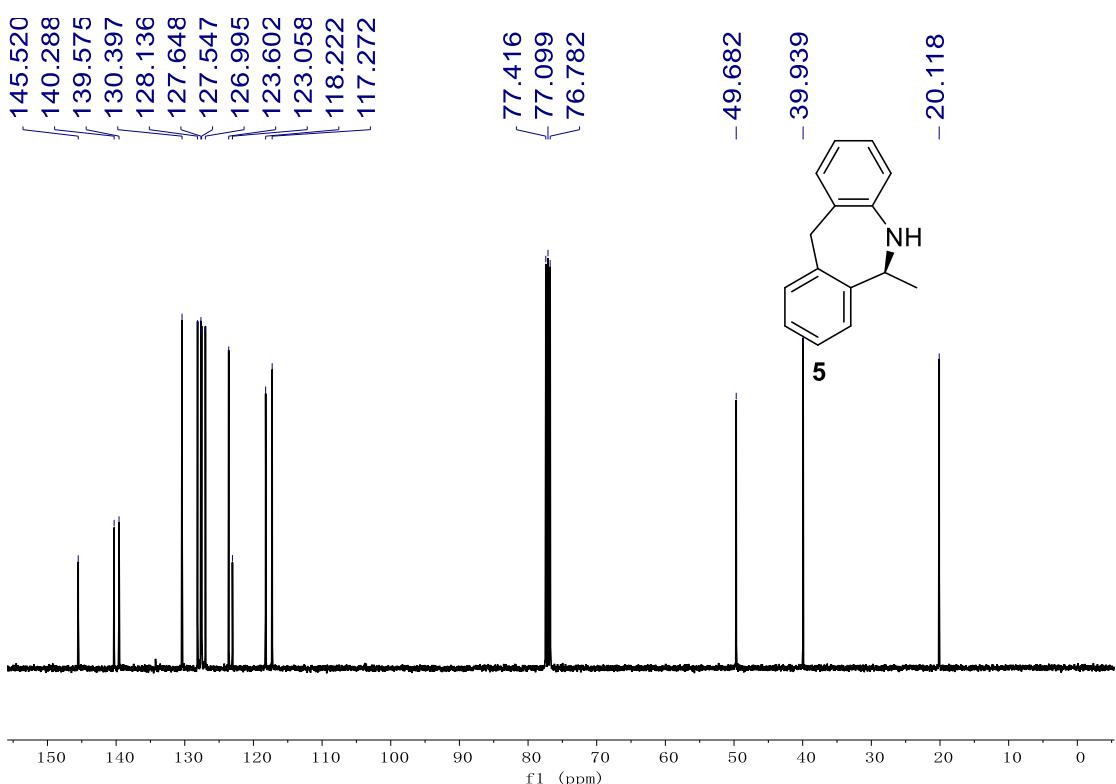
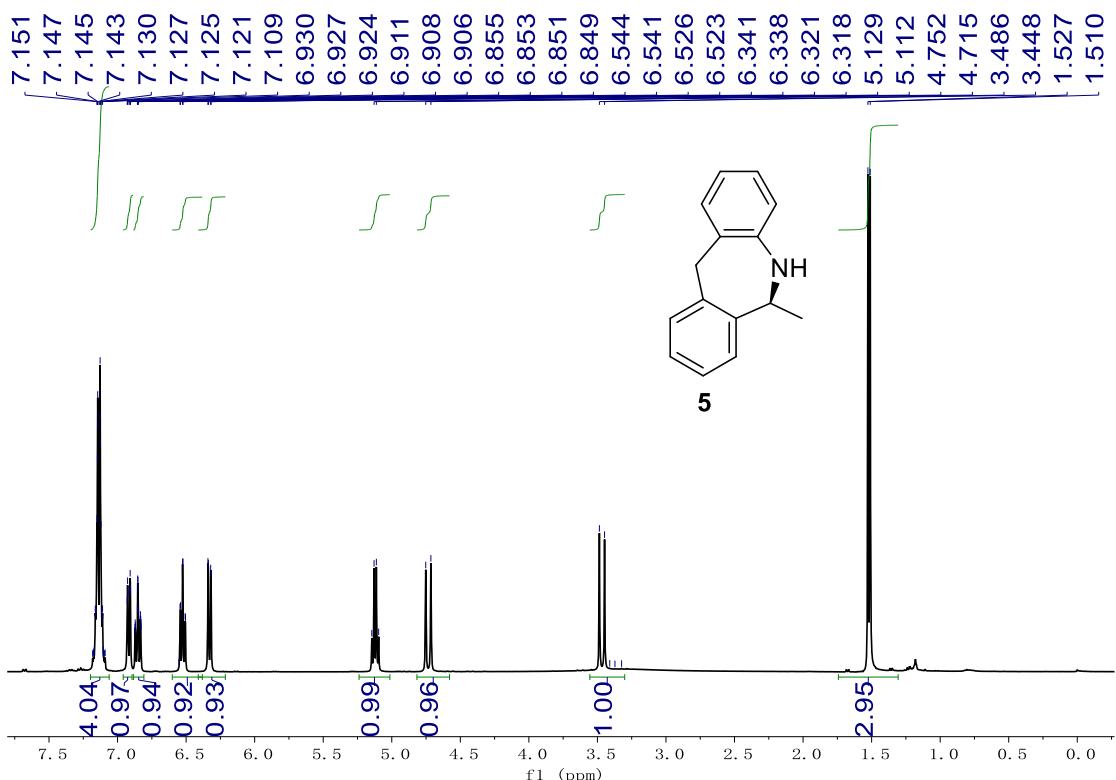


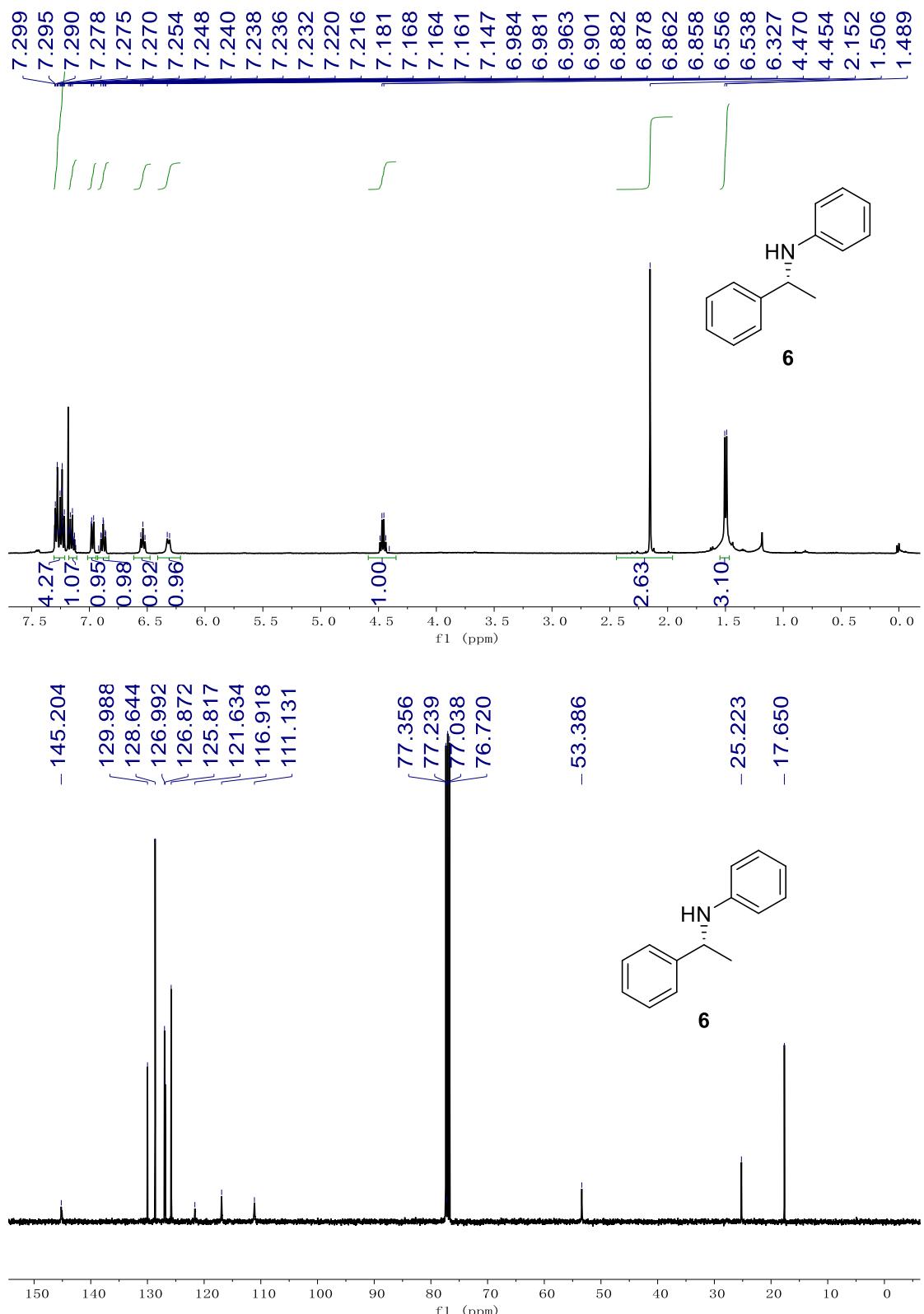


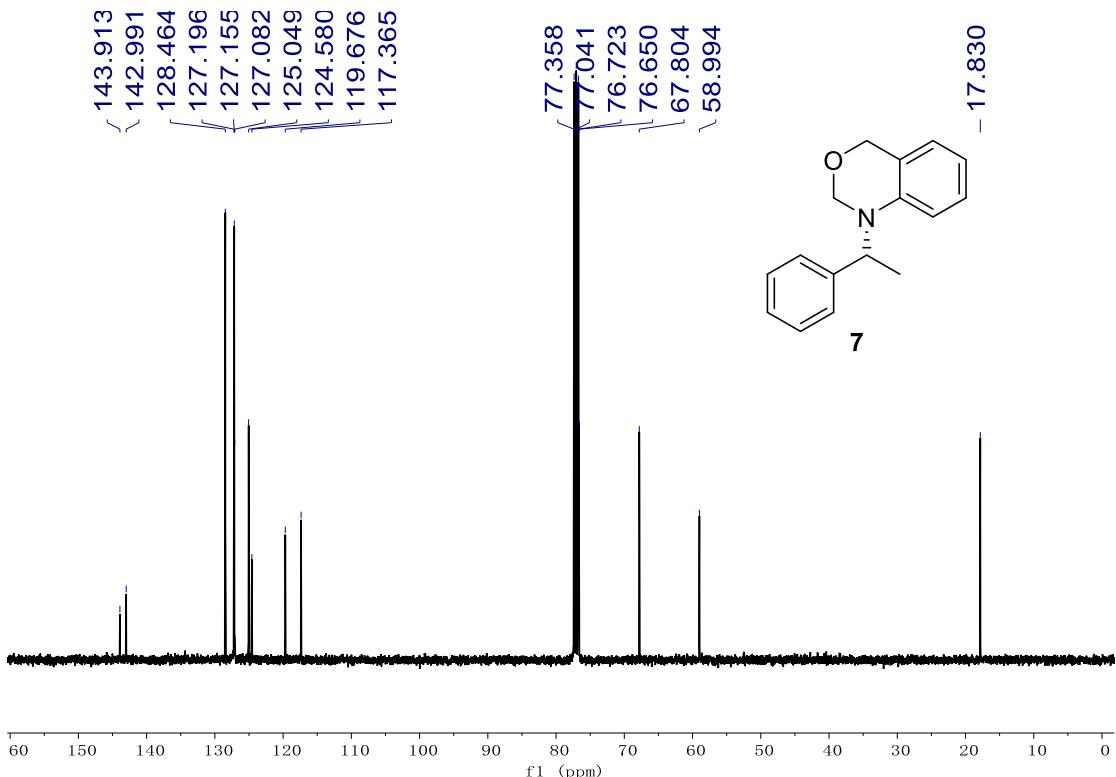
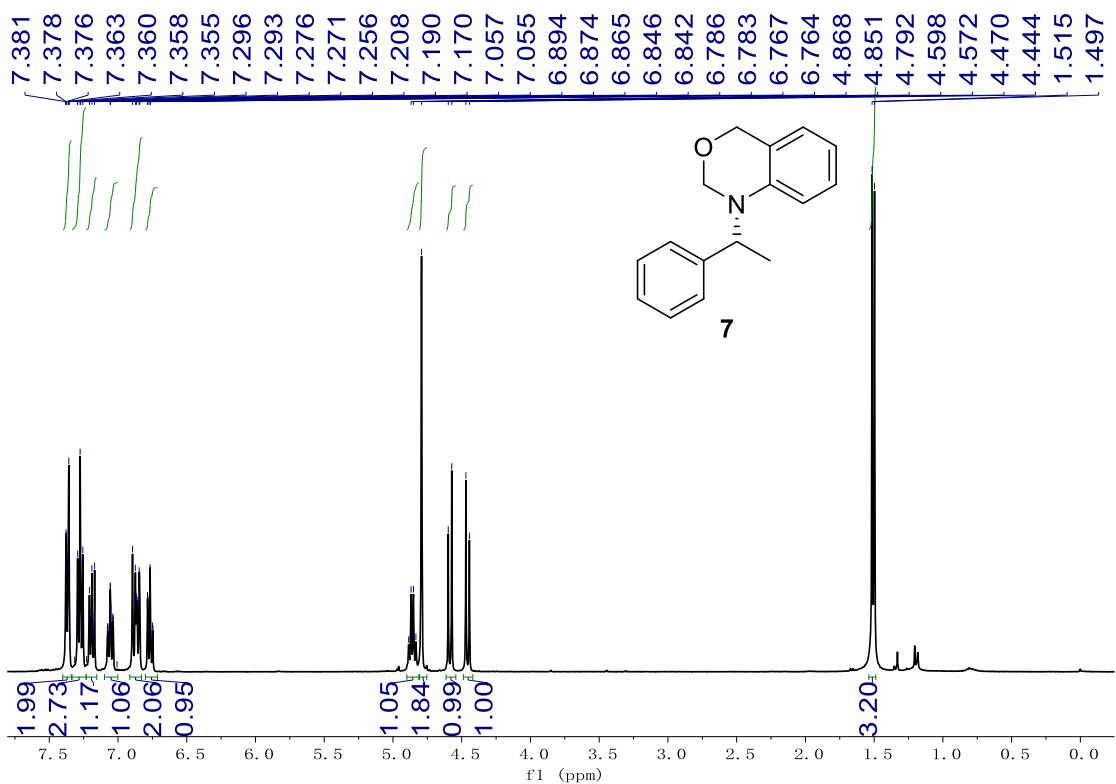


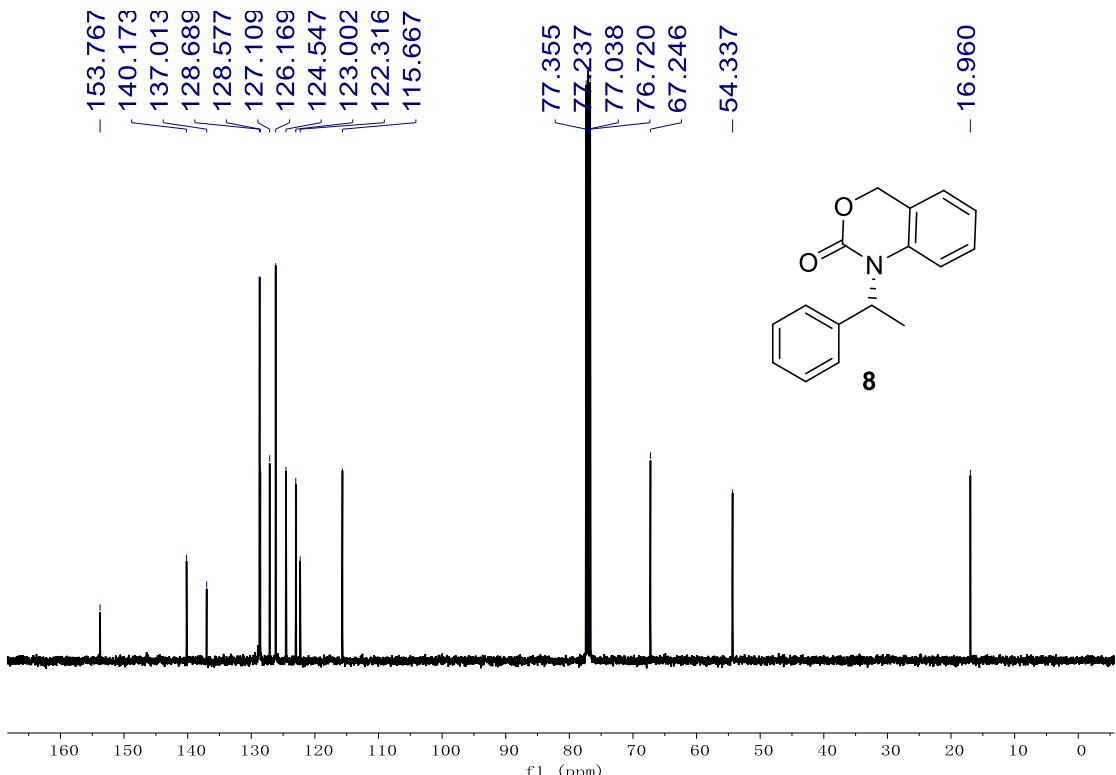
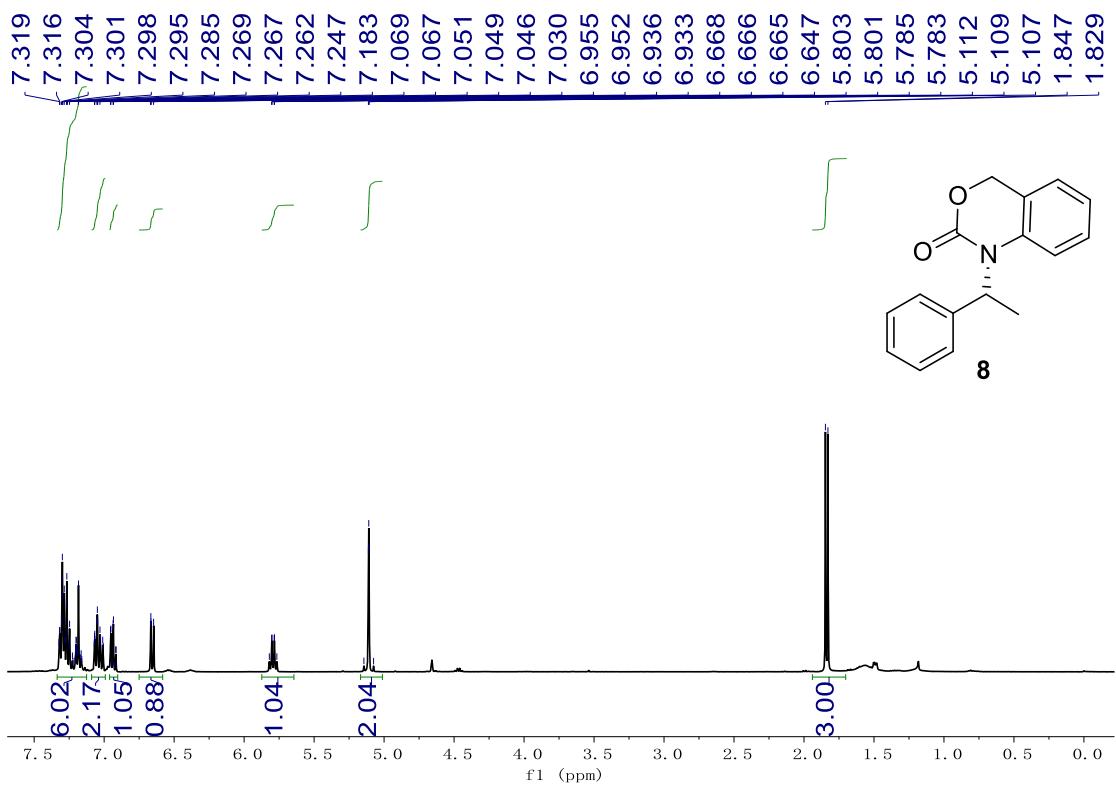


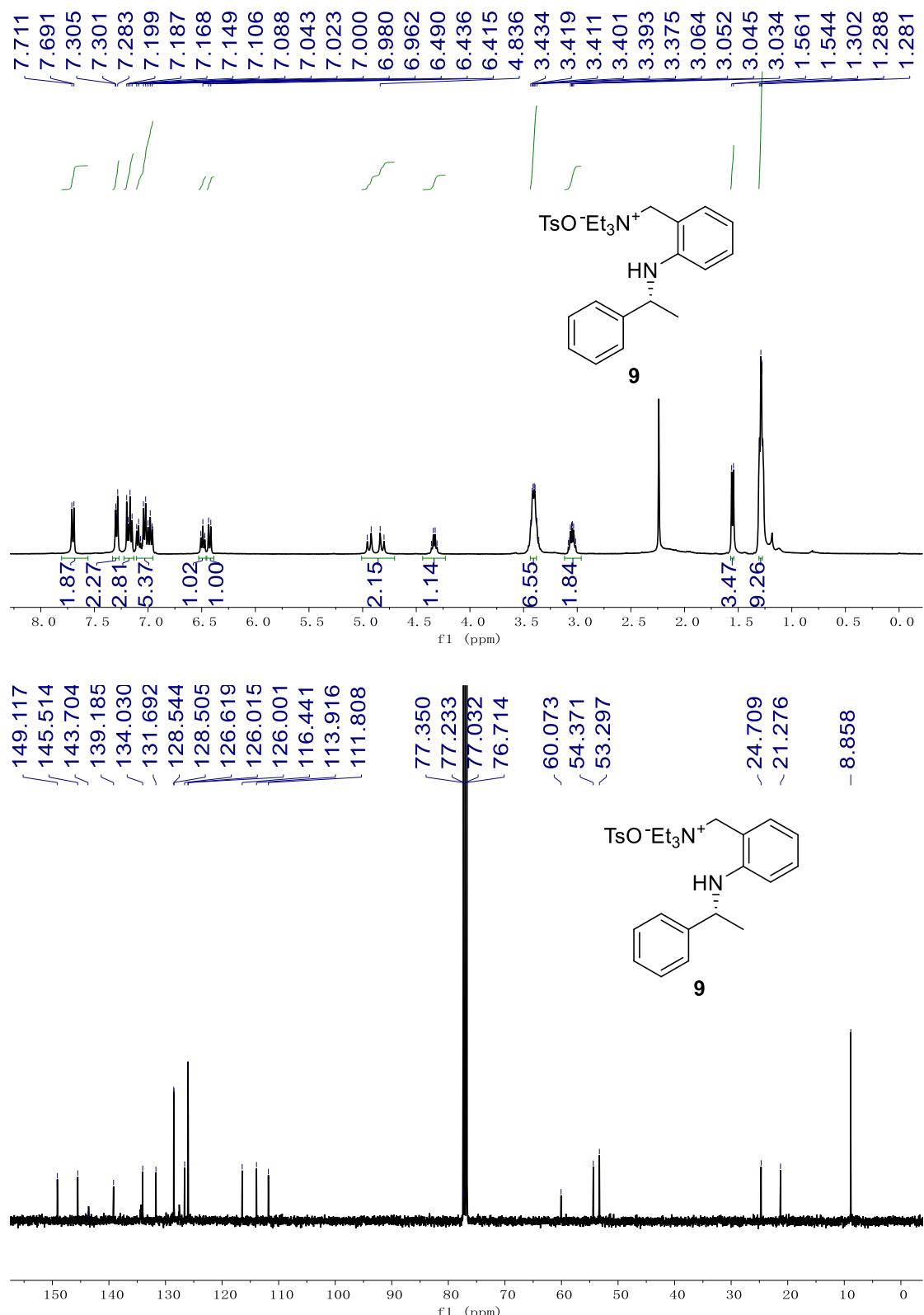




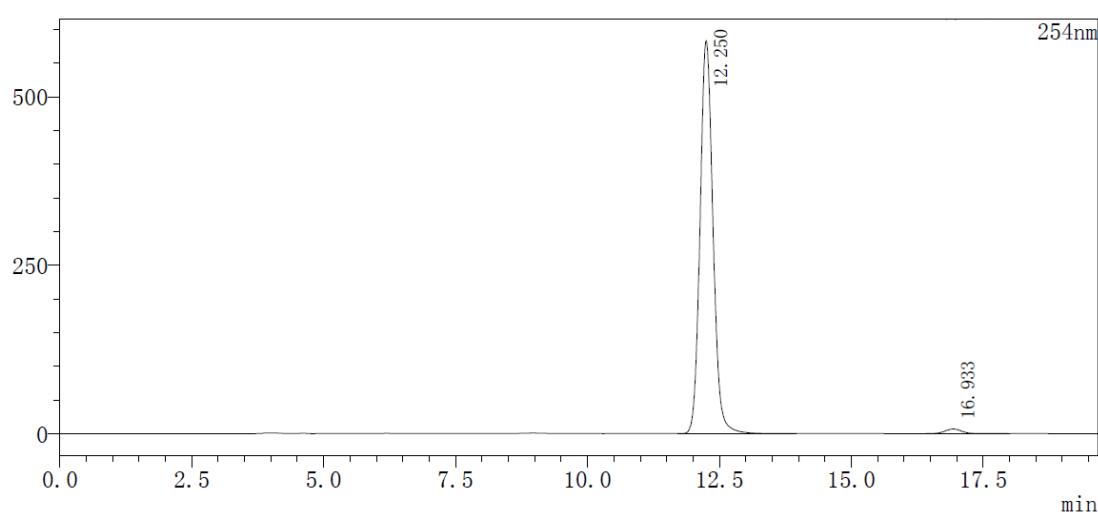
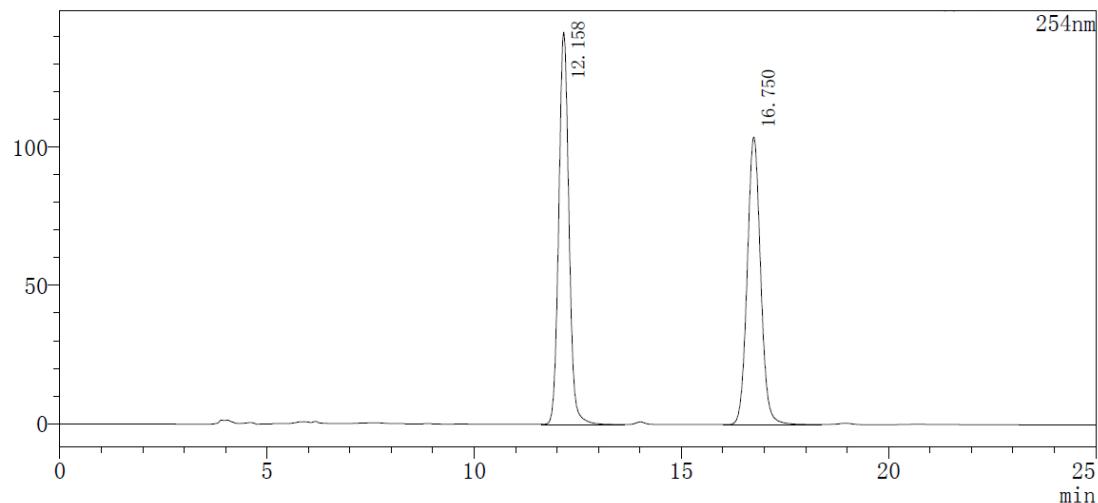
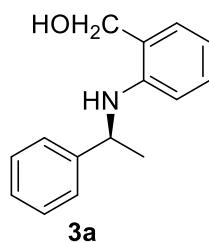


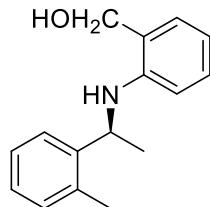




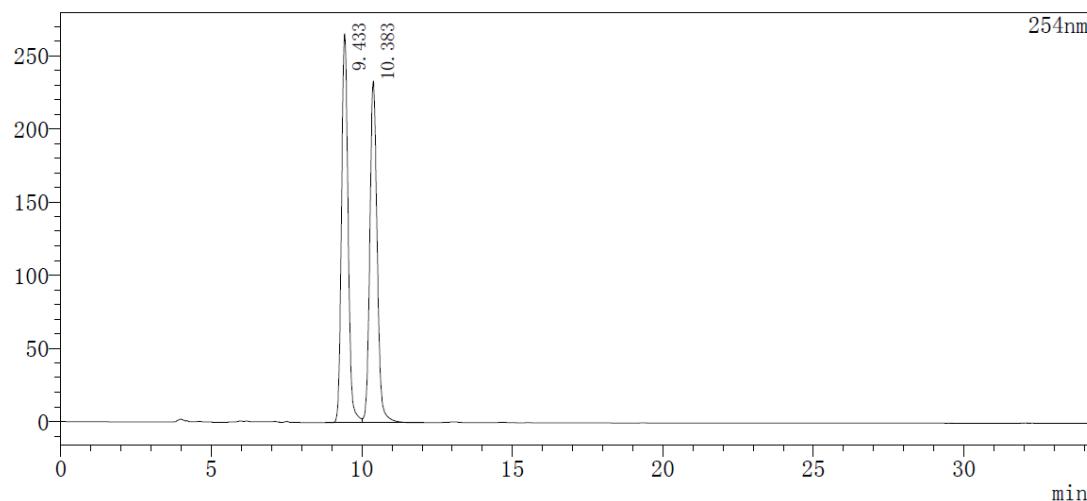


VI. Copies of HPLC Traces for Products 3 and Derivatization Products:

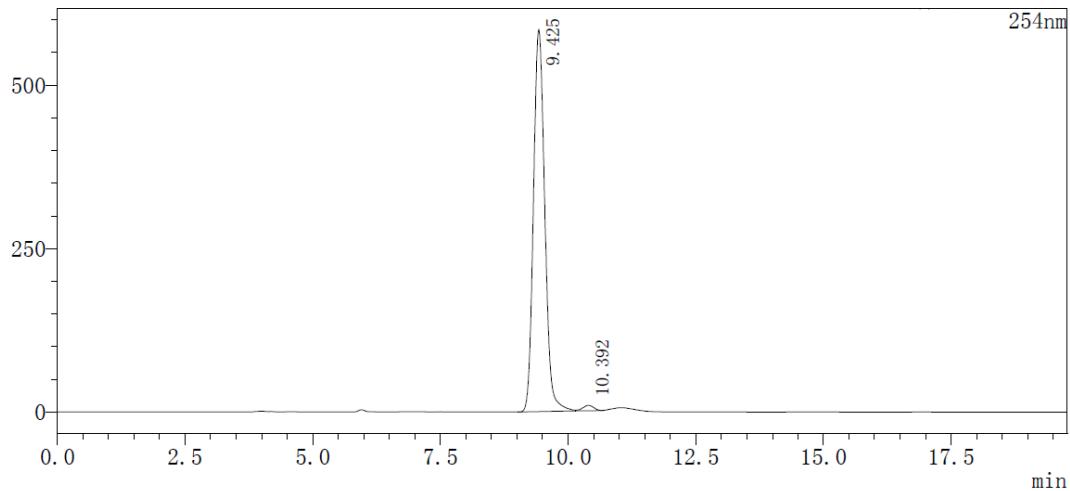




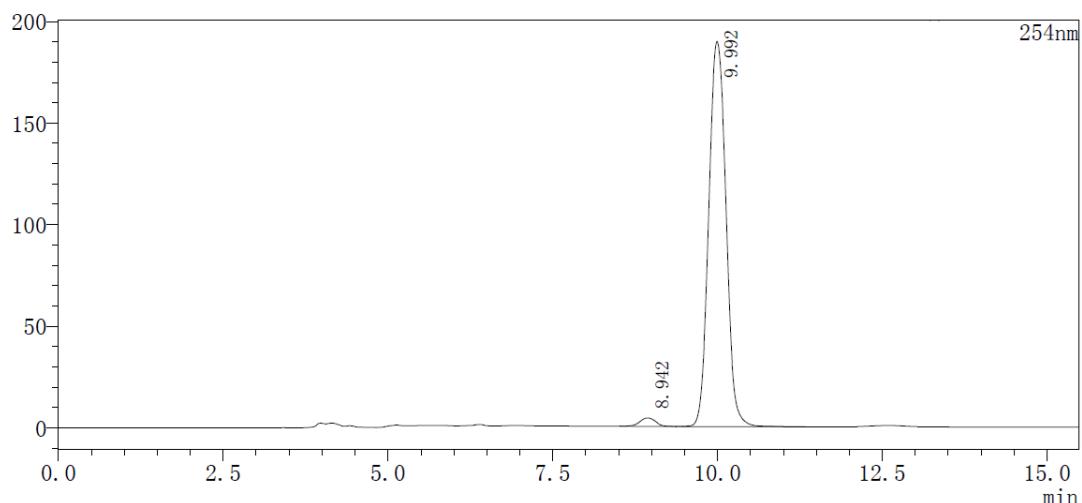
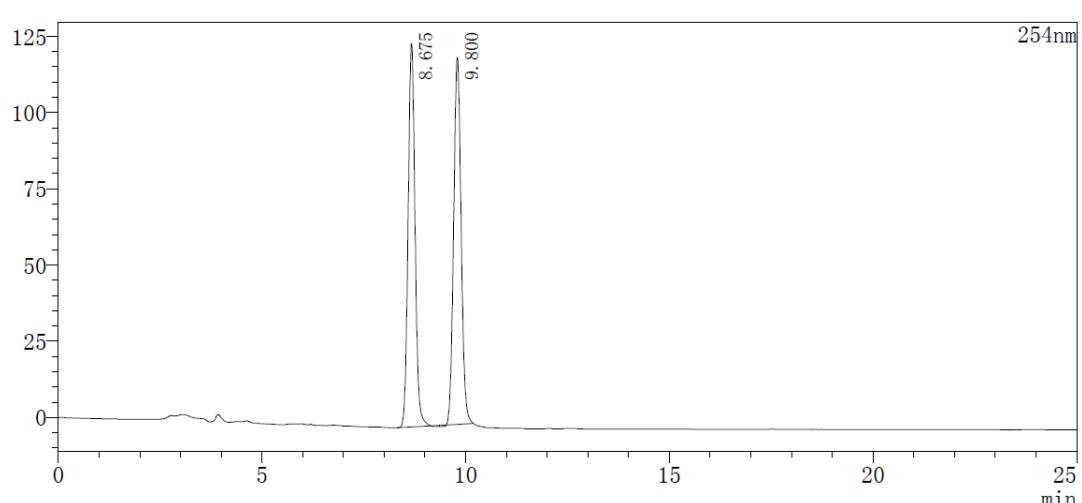
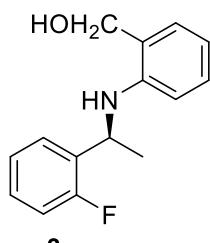
3b

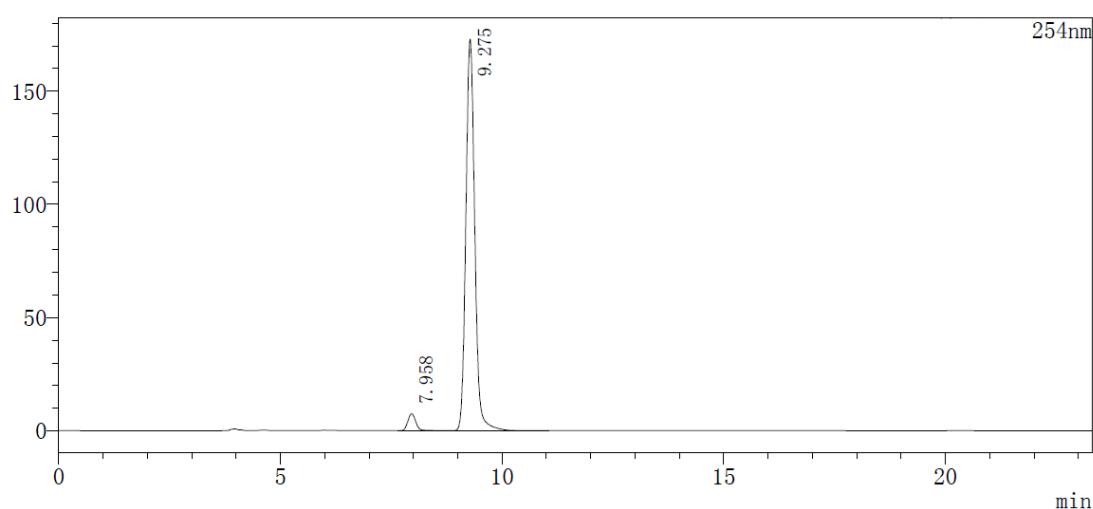
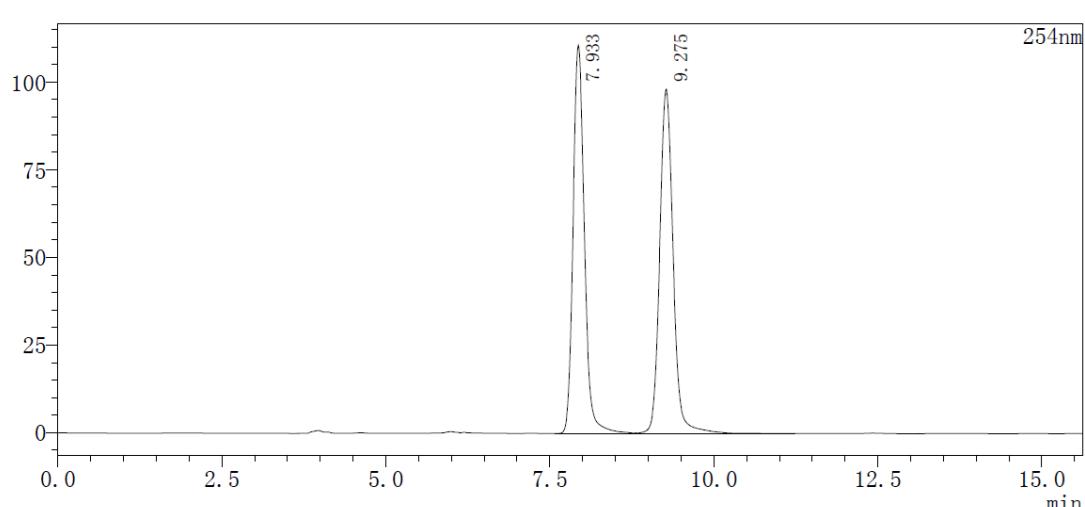
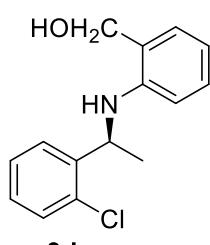


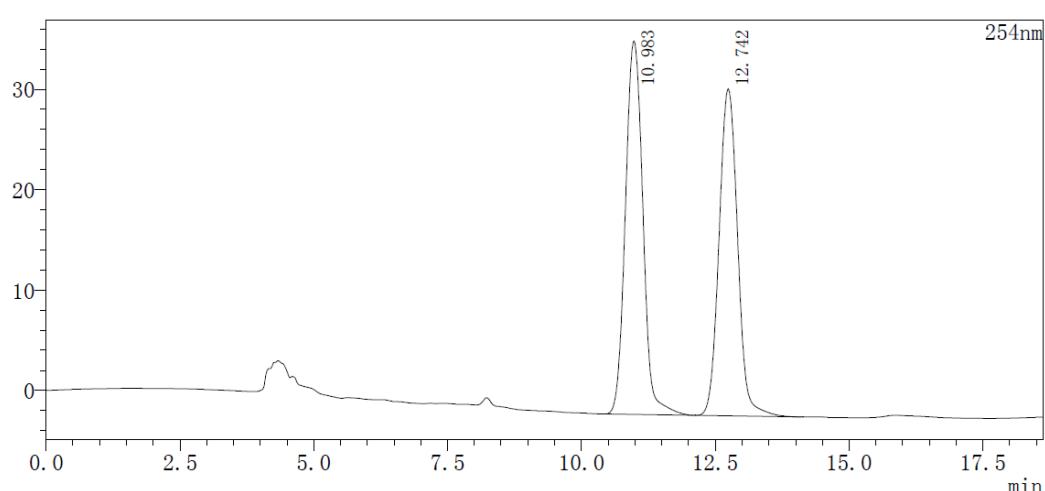
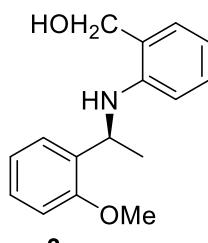
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	9.433	4061021	265493	50.510			
2	10.383	3979049	233122	49.490		V	
Total		8040070	498615				



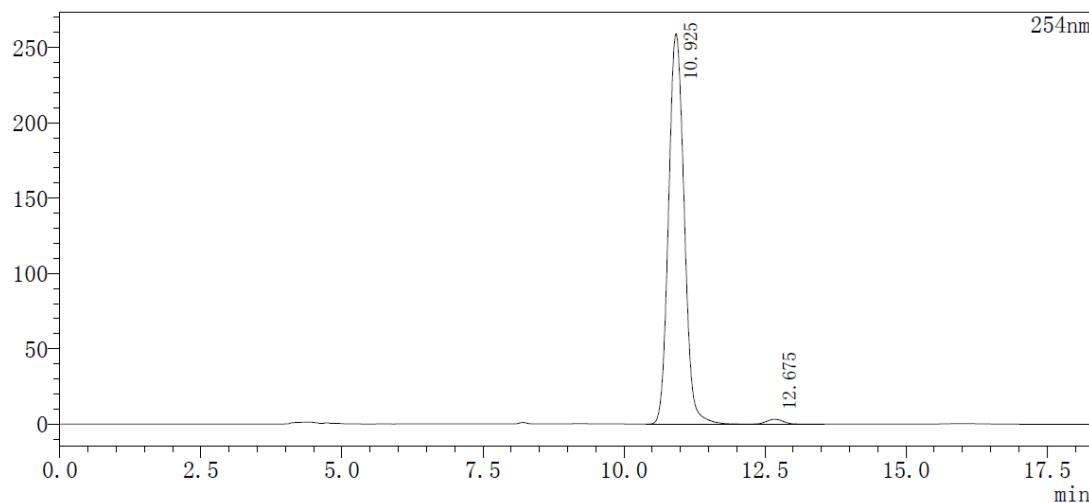
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	9.425	9012670	584541	98.657			
2	10.392	122726	8163	1.343		V	
Total		9135396	592704				



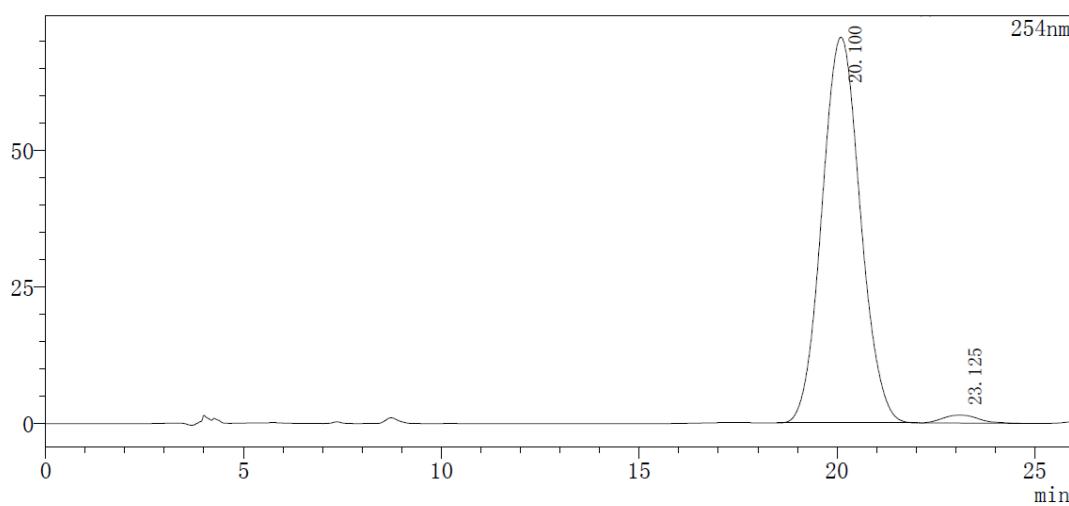
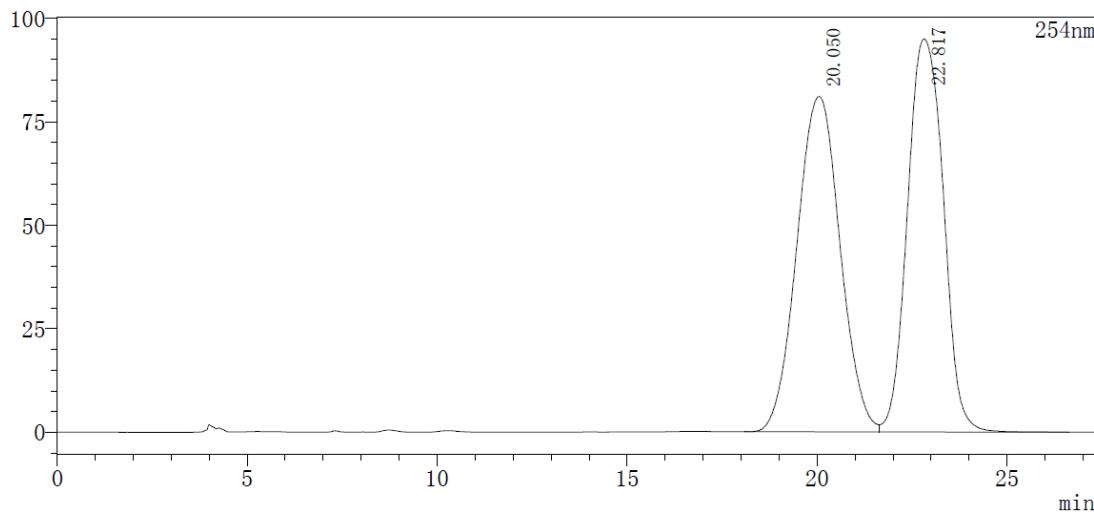
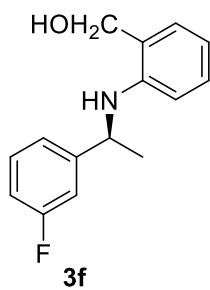


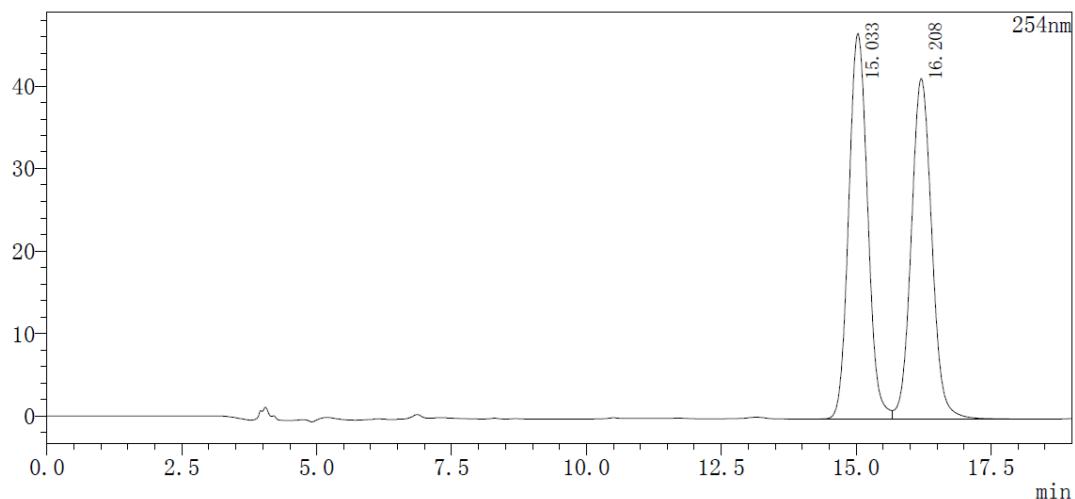
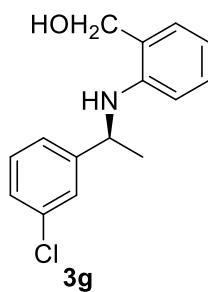


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	10.983	847295	37202	51.849			
2	12.742	786870	32575	48.151		V	
Total		1634165	69777				

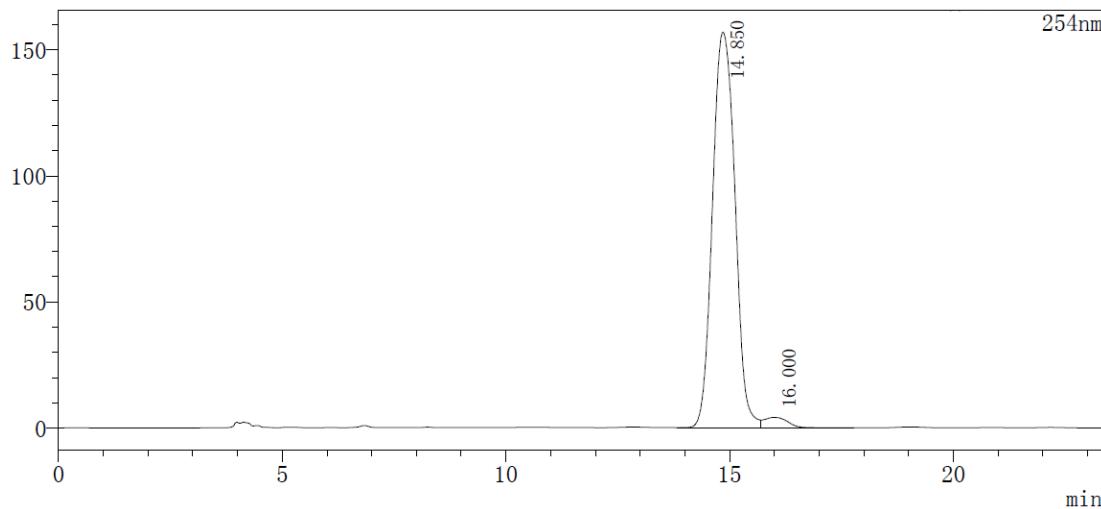


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	10.925	5003350	259024	98.635			
2	12.675	69262	3286	1.365		V	
Total		5072612	262309				

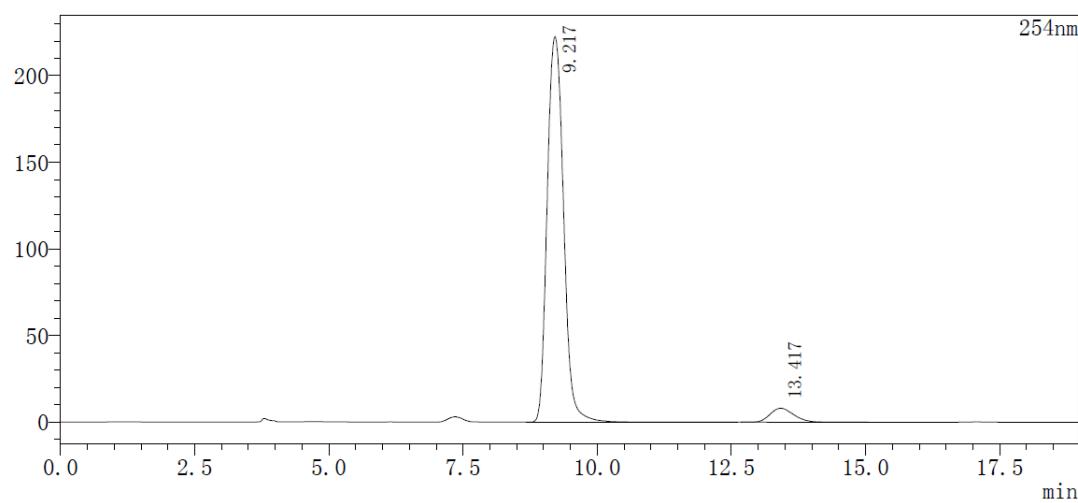
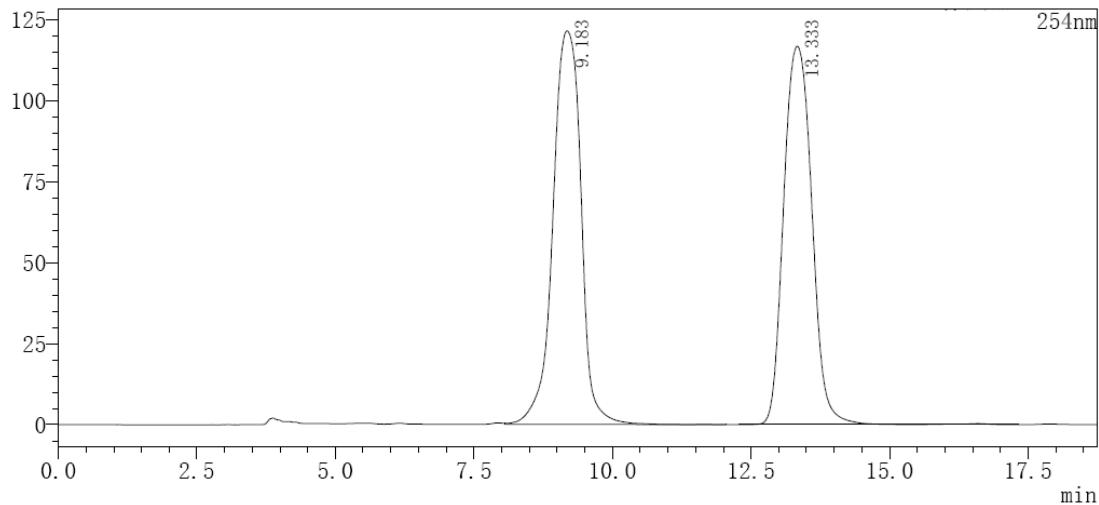
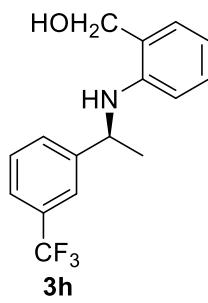


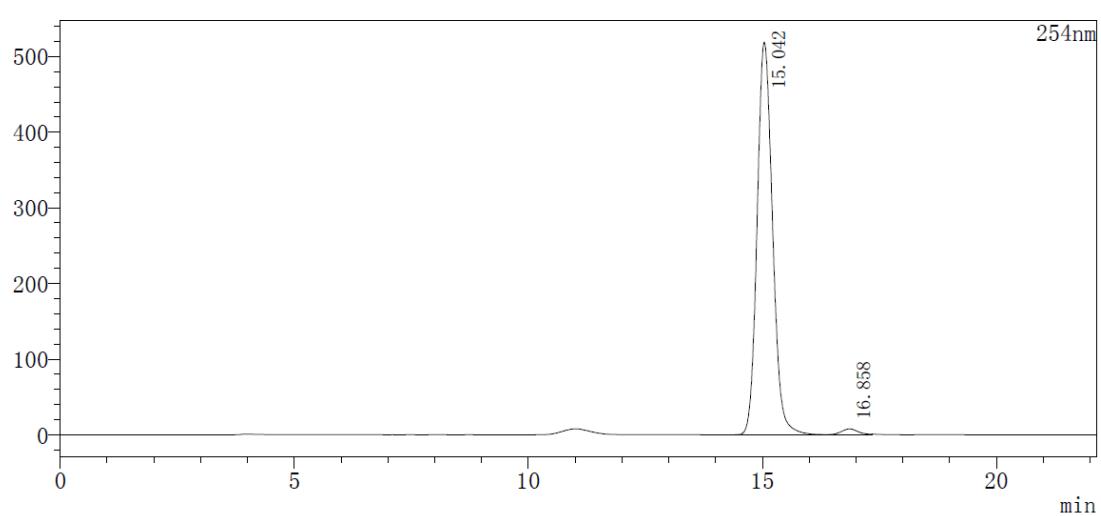
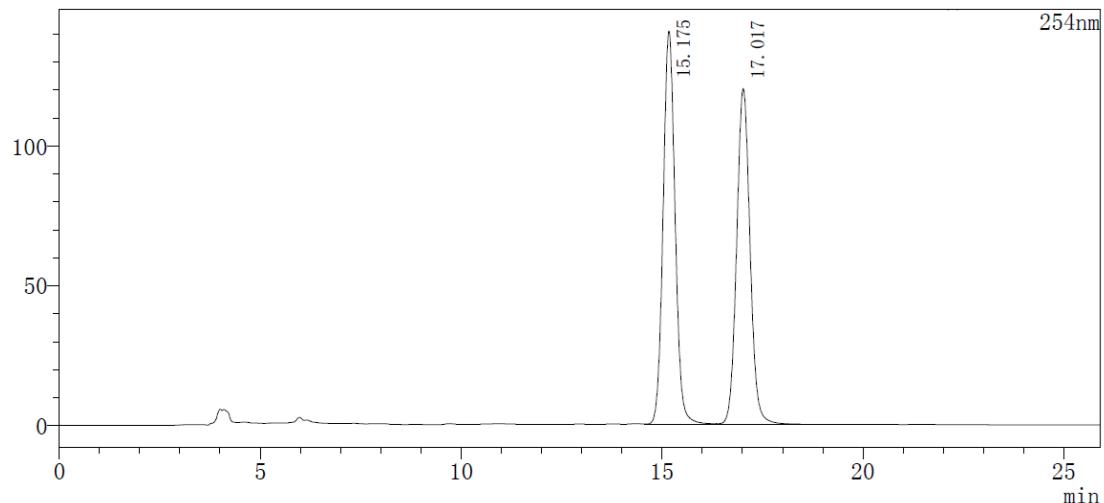
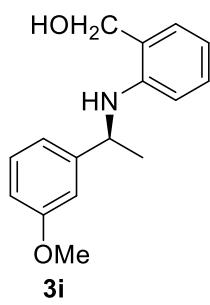


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	15.033	1141459	46748	50.983			
2	16.208	1097448	41293	49.017		V	
Total		2238907	88041				

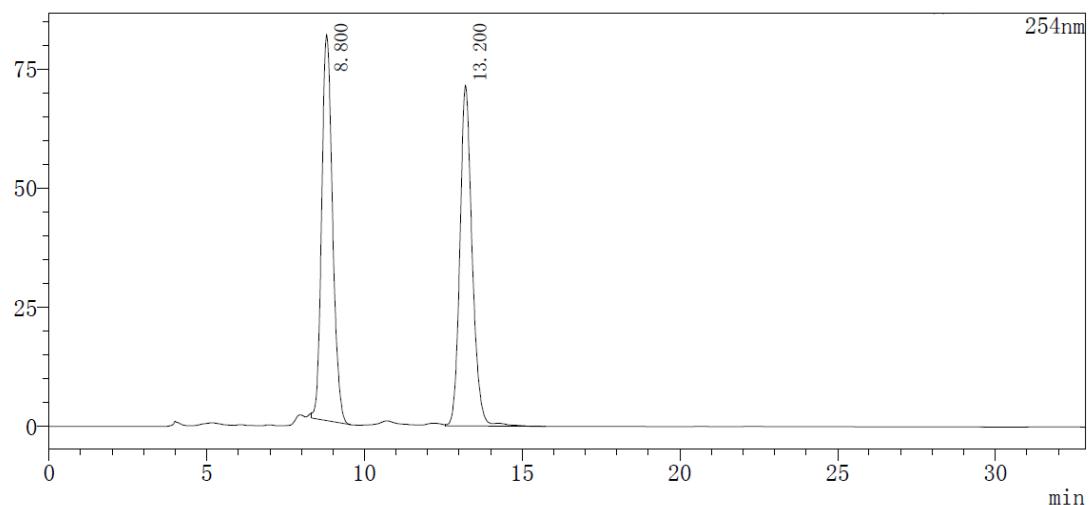
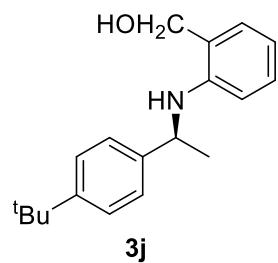


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	14.850	5479847	156931	97.311			
2	16.000	151411	4138	2.689		V	
Total		5631258	161069				

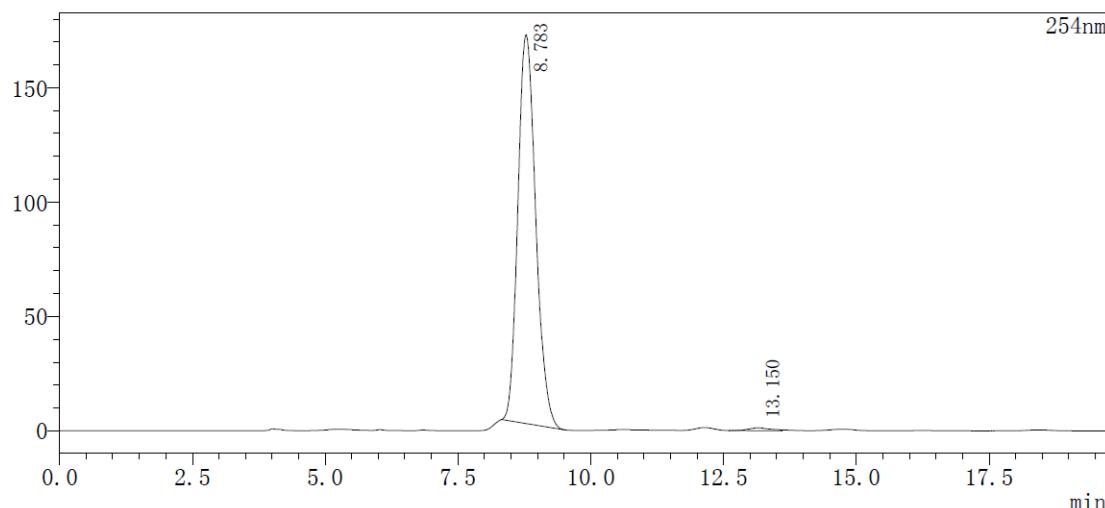




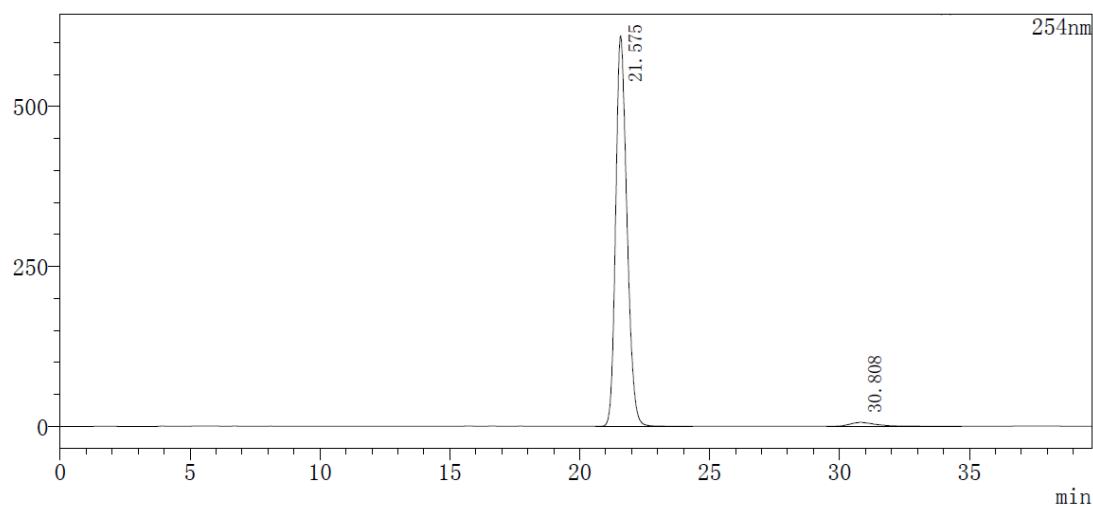
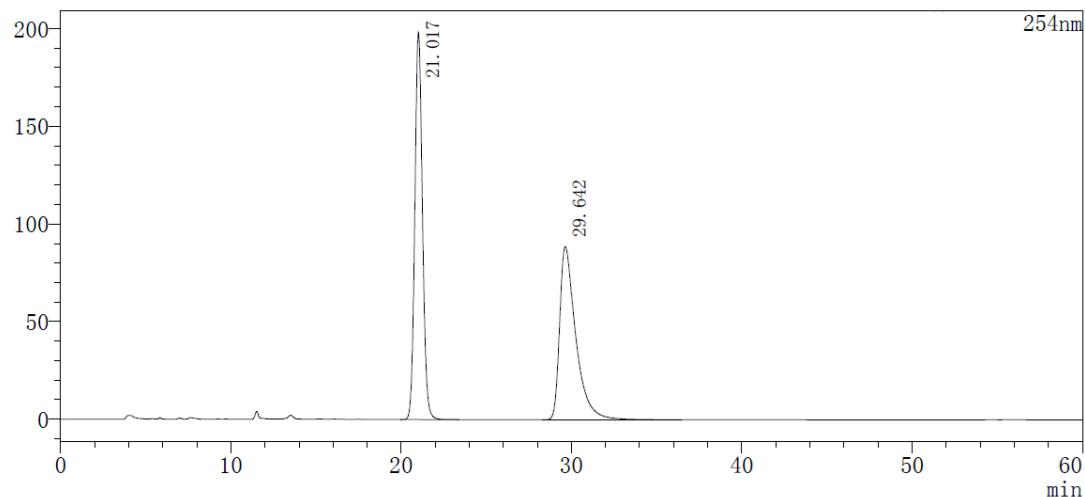
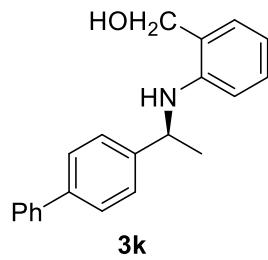
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	15.042	11915728	518977	98.315			
2	16.858	204264	7831	1.685		V	
Total		12119992	526808				

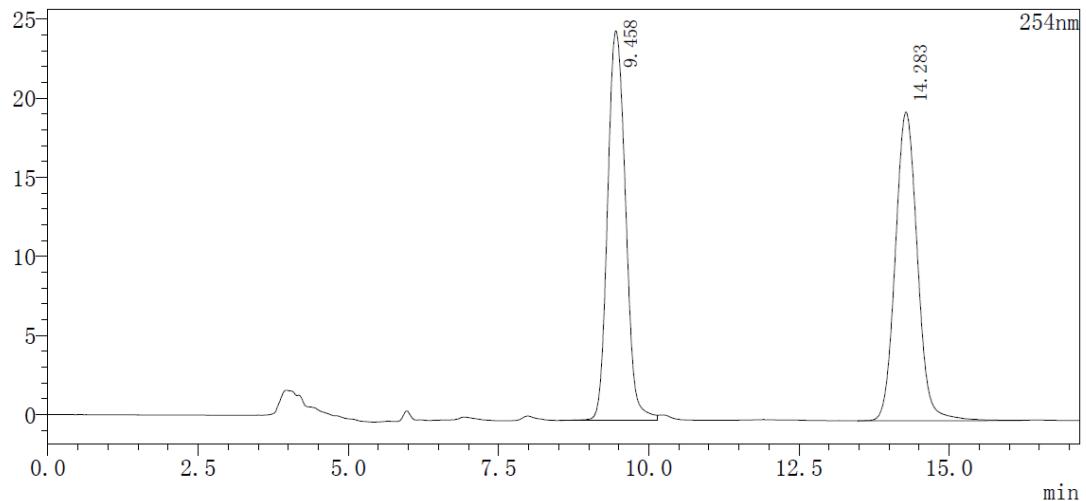
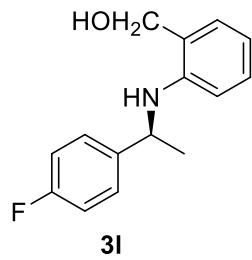


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	8.800	1935335	80942	50.066			
2	13.200	1930229	71447	49.934			
Total		3865564	152389				

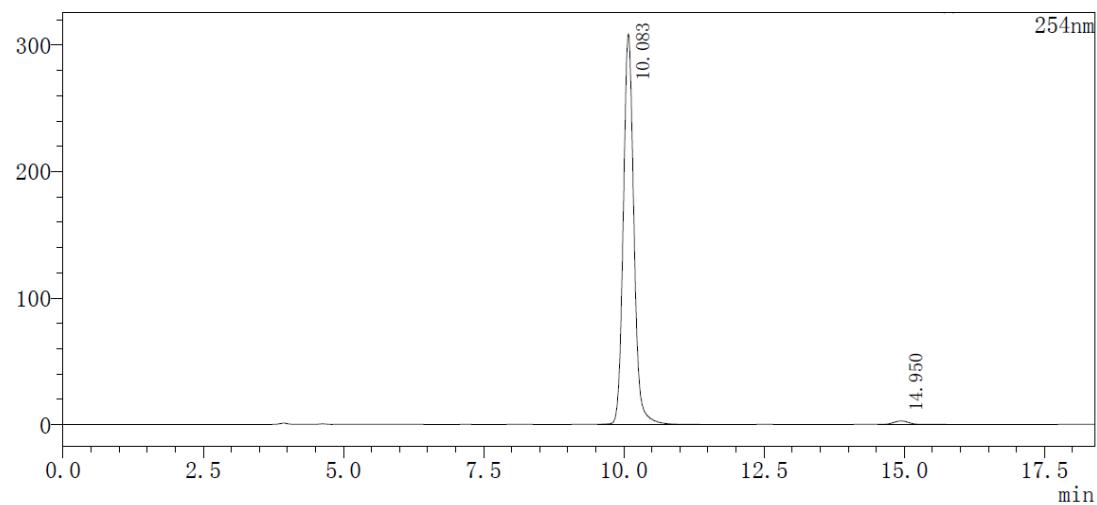


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	8.783	3981536	170036	99.115			
2	13.150	35568	1234	0.885			
Total		4017105	171271				

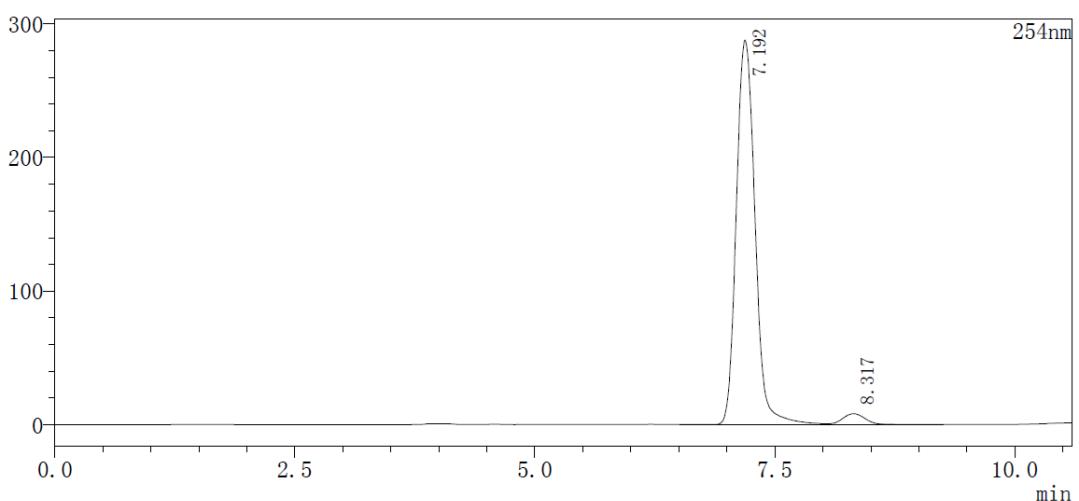
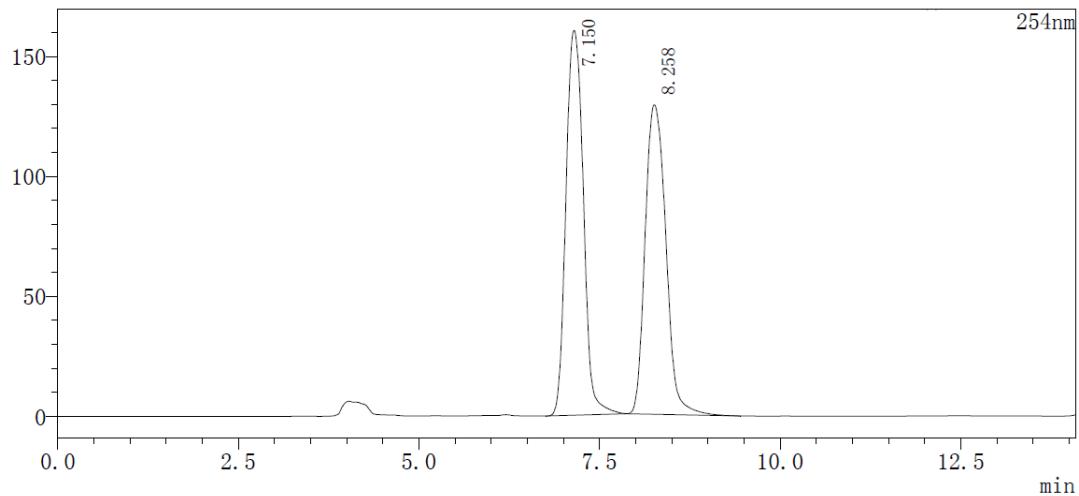
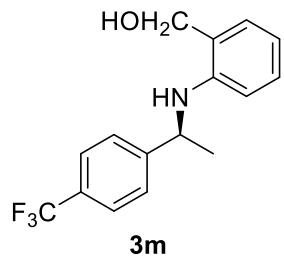


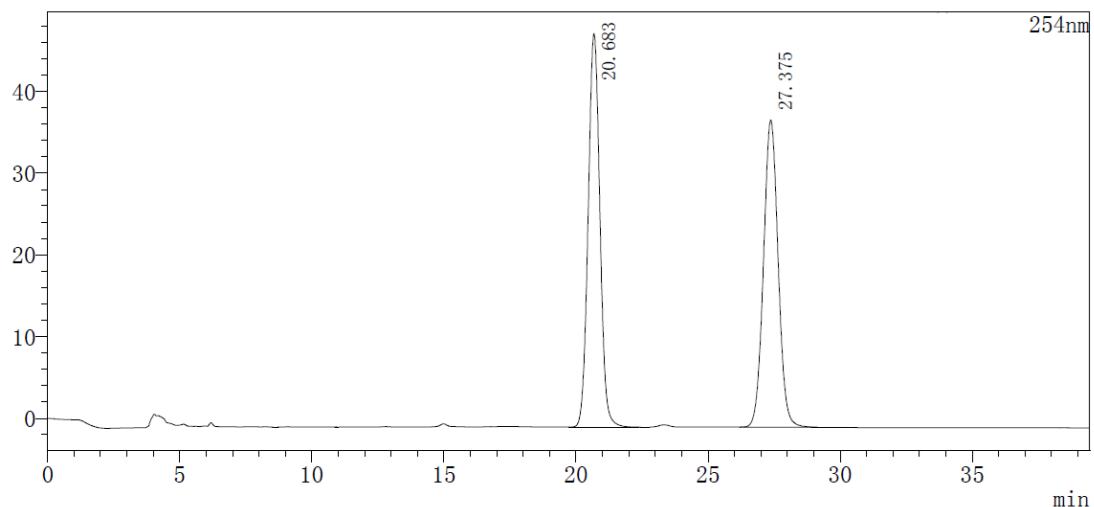
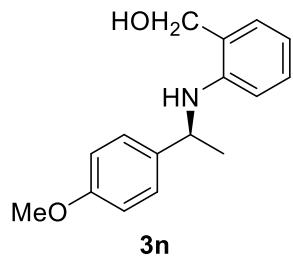


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	9.458	513773	24625	50.675			
2	14.283	500079	19513	49.325			
Total		1013852	44138				

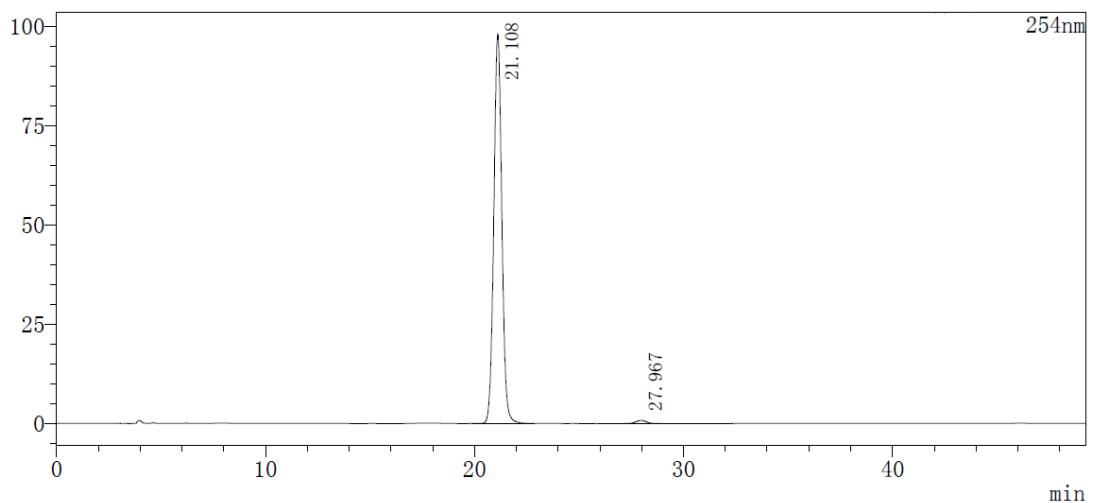


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	10.083	4063083	308565	98.627			
2	14.950	56544	2853	1.373			
Total		4119627	311418				

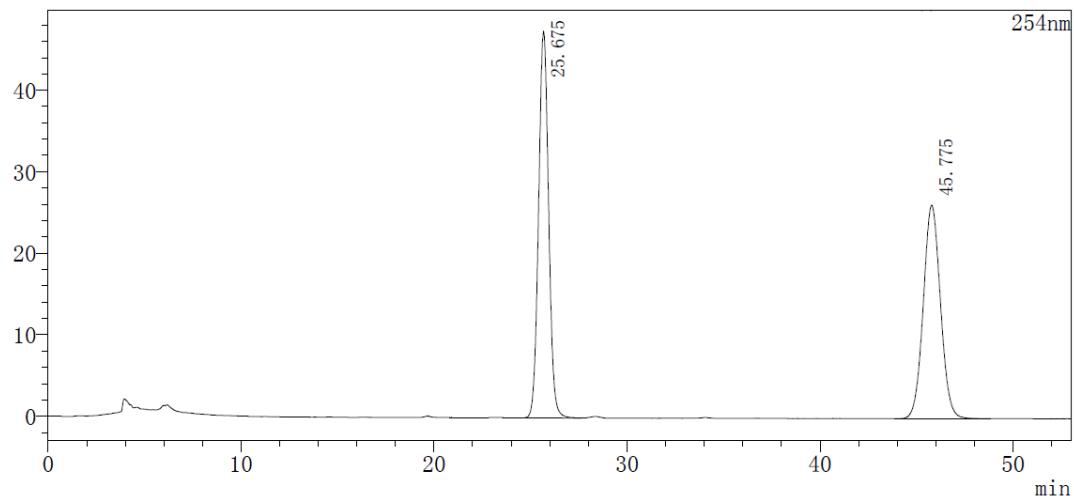
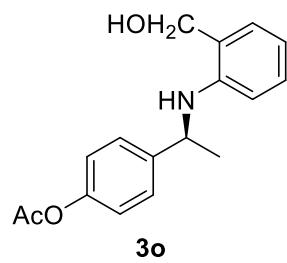




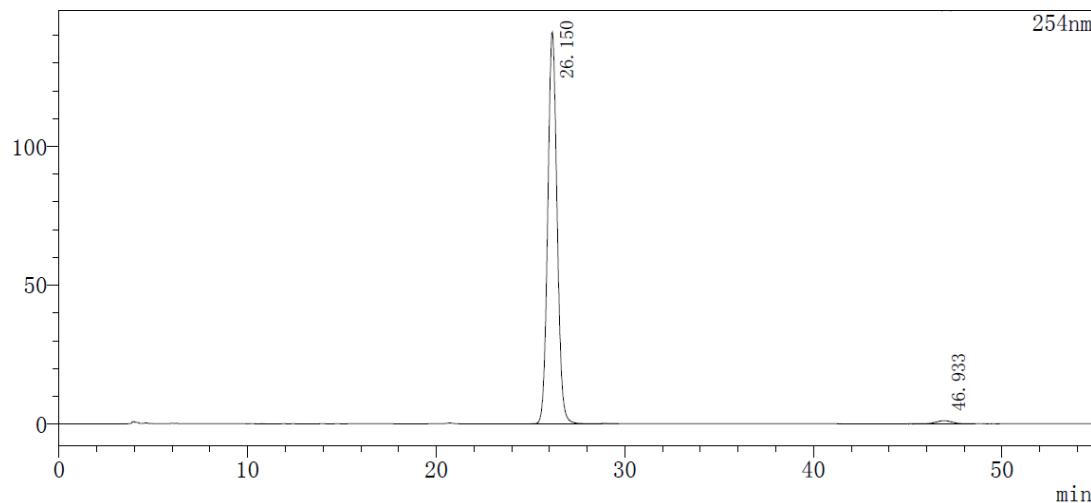
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	20.683	1486595	48140	50.599			
2	27.375	1451399	37563	49.401			
Total		2937994	85703				



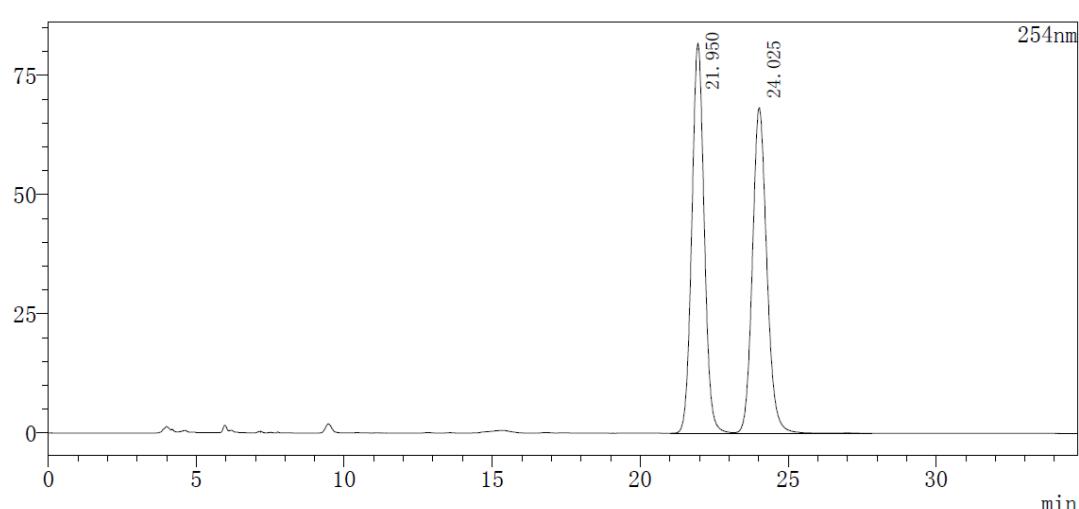
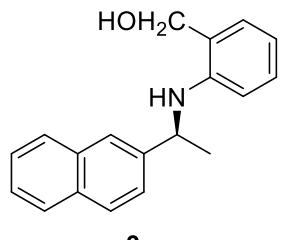
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	21.108	2623415	98104	98.934			
2	27.967	28257	807	1.066			
Total		2651673	98912				



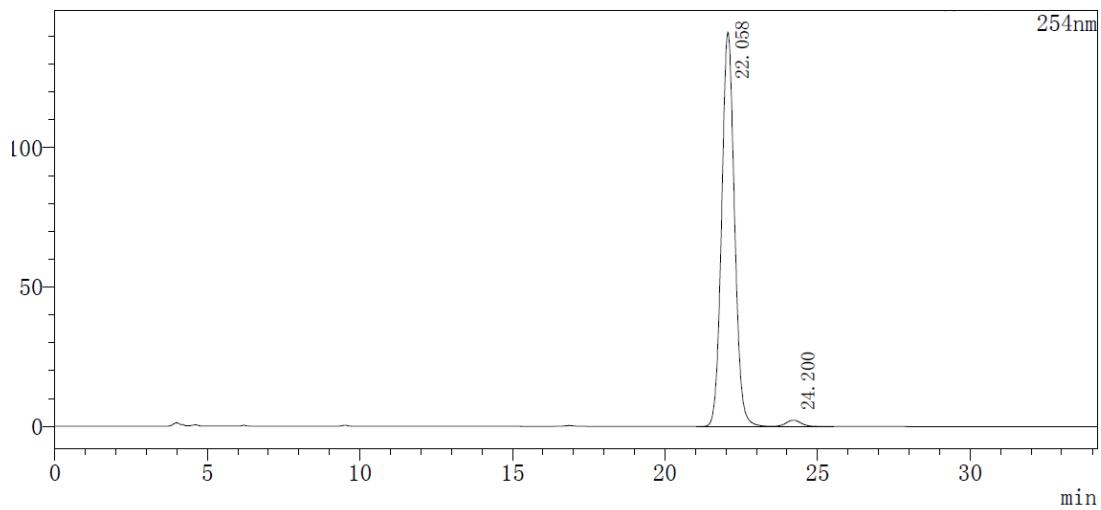
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	25.675	1716760	47392	51.396			
2	45.775	1623519	26191	48.604			
Total		3340280	73583				



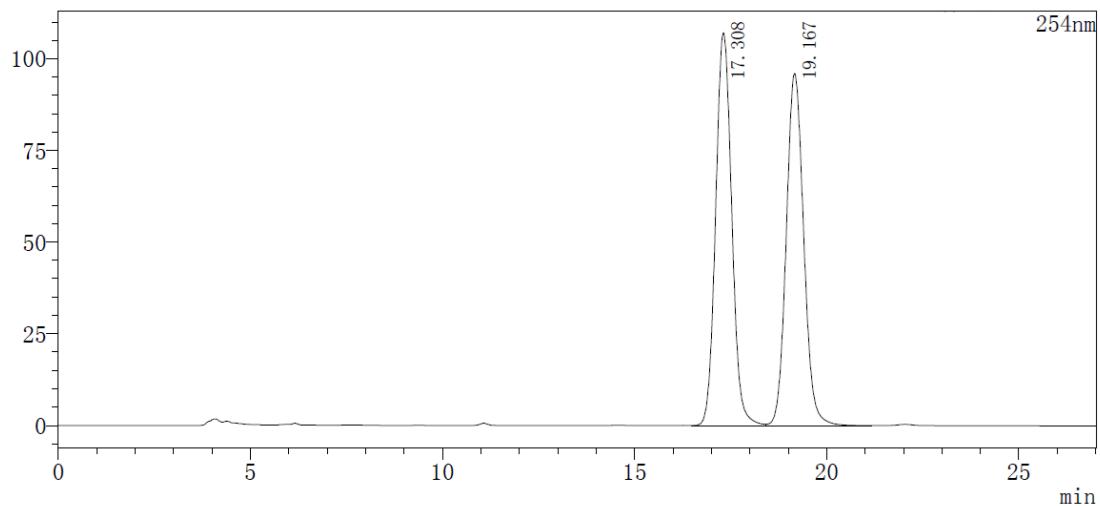
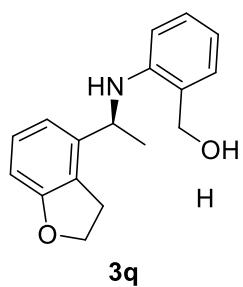
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	26.150	4867535	141161	98.619			
2	46.933	68150	1120	1.381			
Total		4935685	142281				



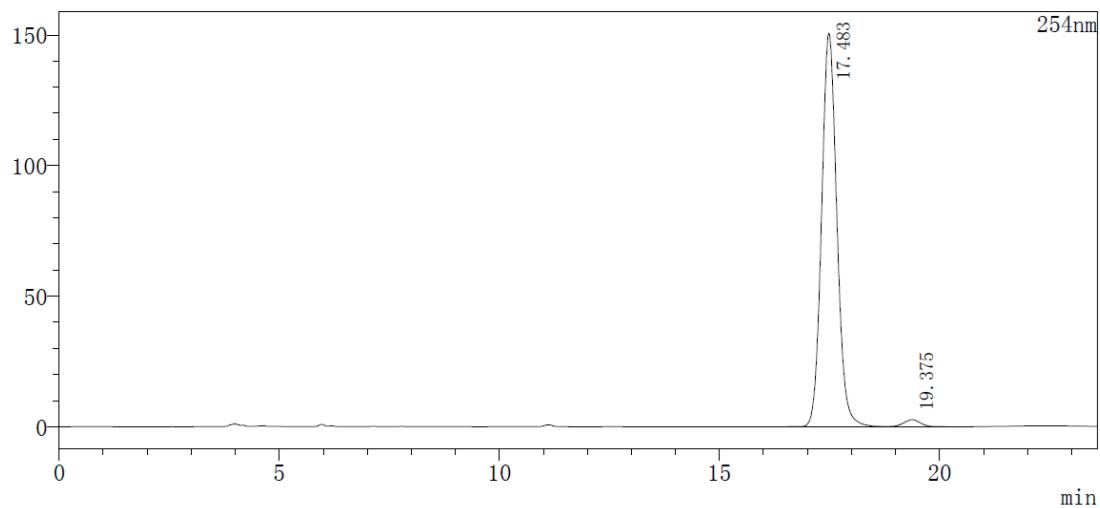
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	21.950	2389160	81710	50. 767			
2	24.025	2316976	68260	49. 233		V	
Total		4706136	149970				



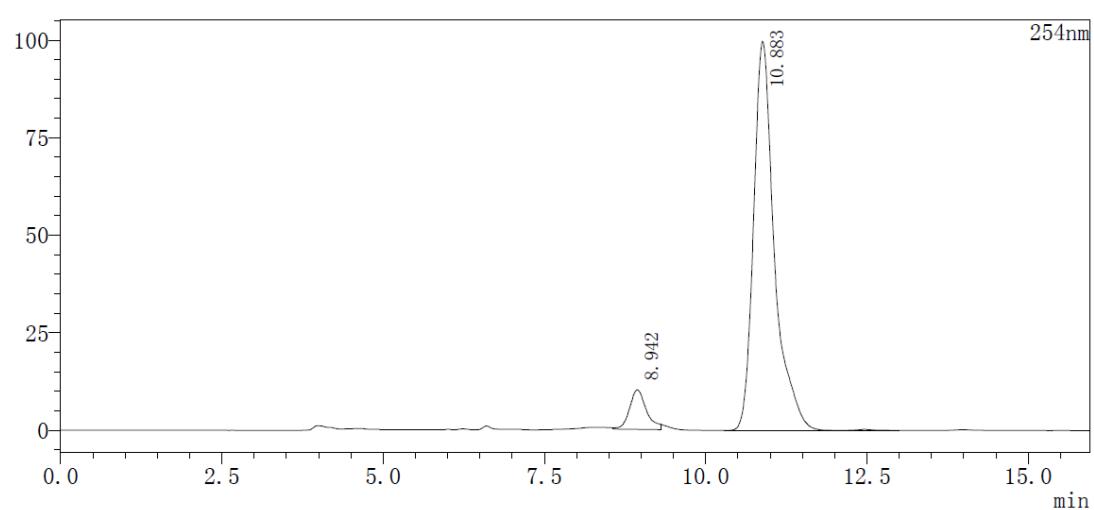
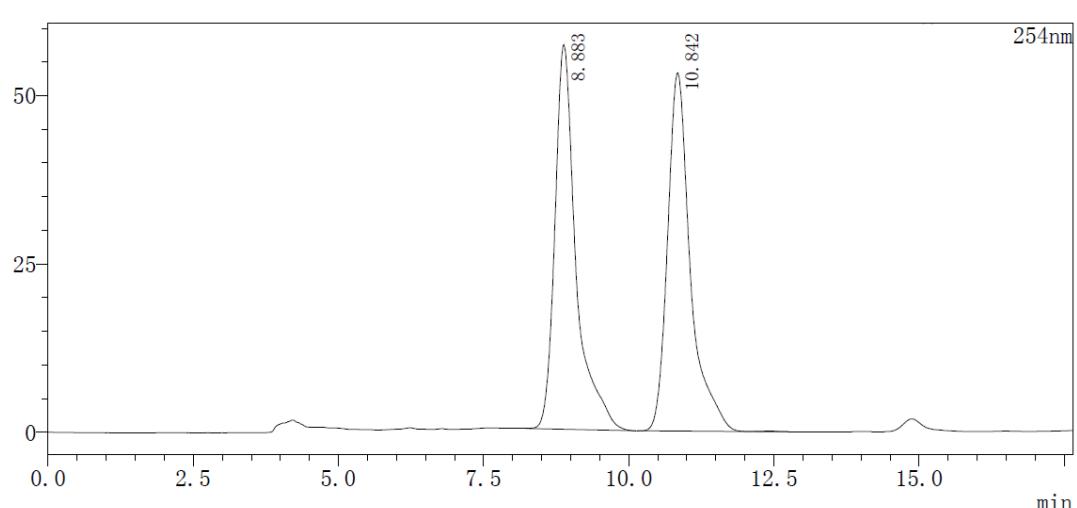
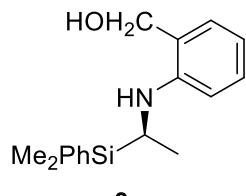
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	22.058	4163373	141488	98. 085			
2	24.200	81285	2311	1. 915		V	
Total		4244658	143799				

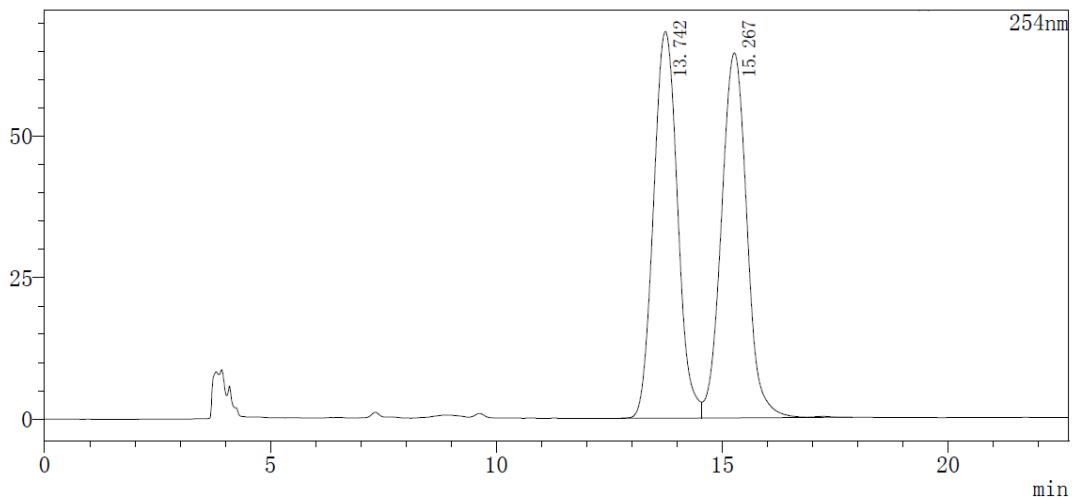
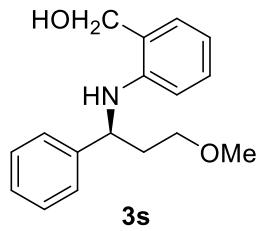


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	17.308	3125741	107111	50.676			
2	19.167	3042307	96084	49.324		V	
Total		6168048	203195				

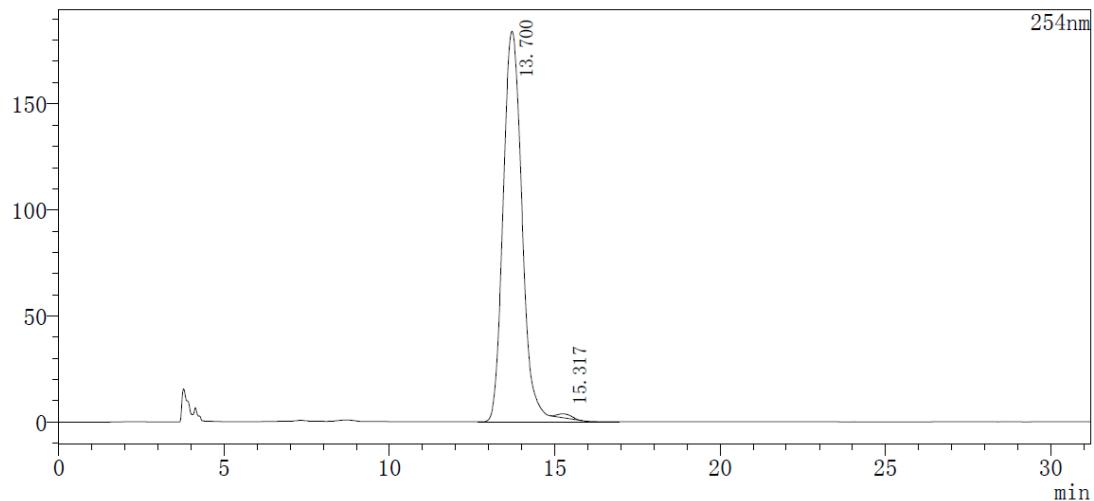


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	17.483	3644395	150589	98.010			
2	19.375	73995	2698	1.990		V	
Total		3718391	153287				

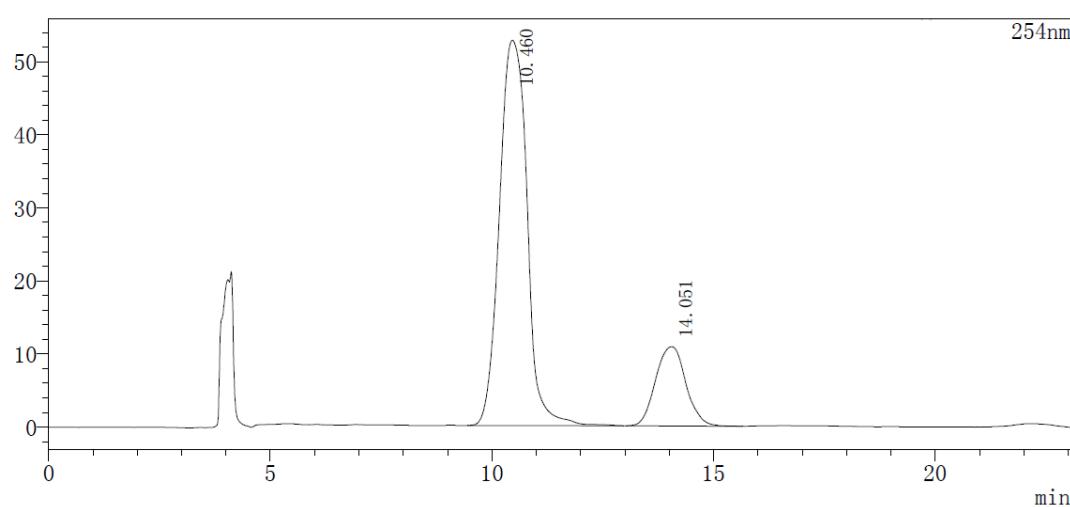
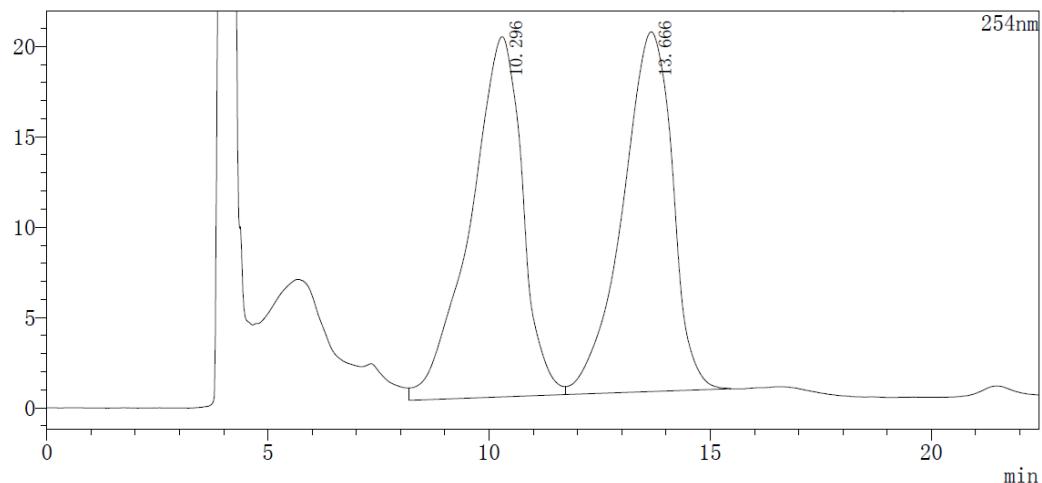
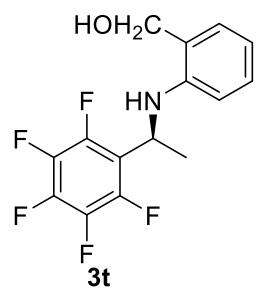


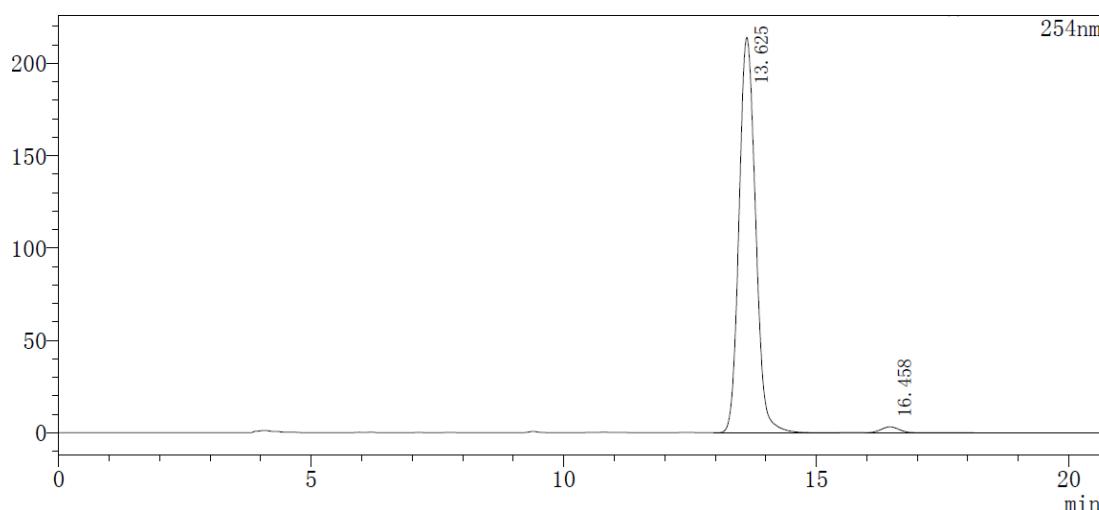
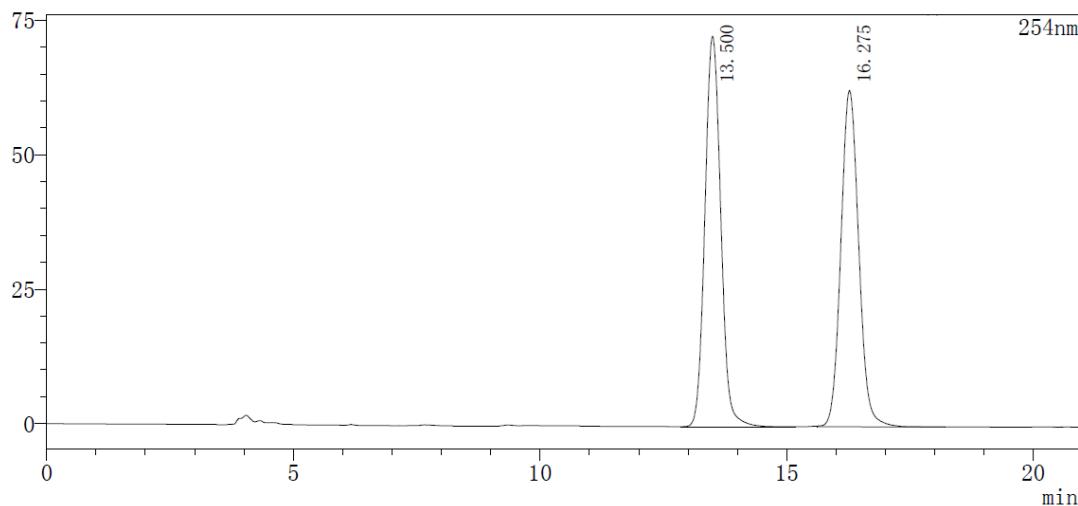
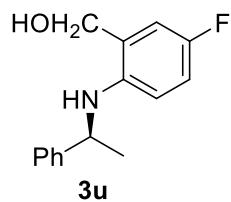


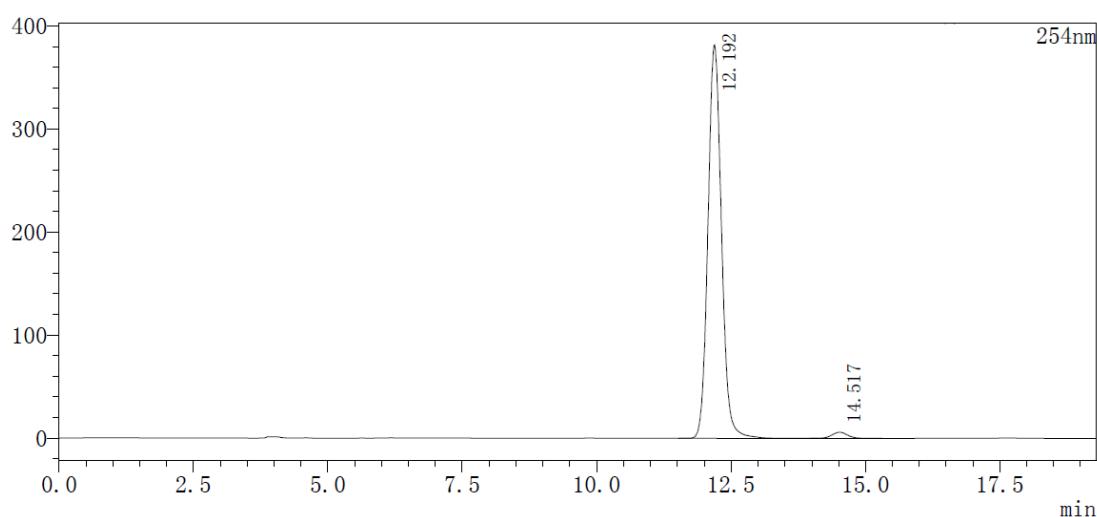
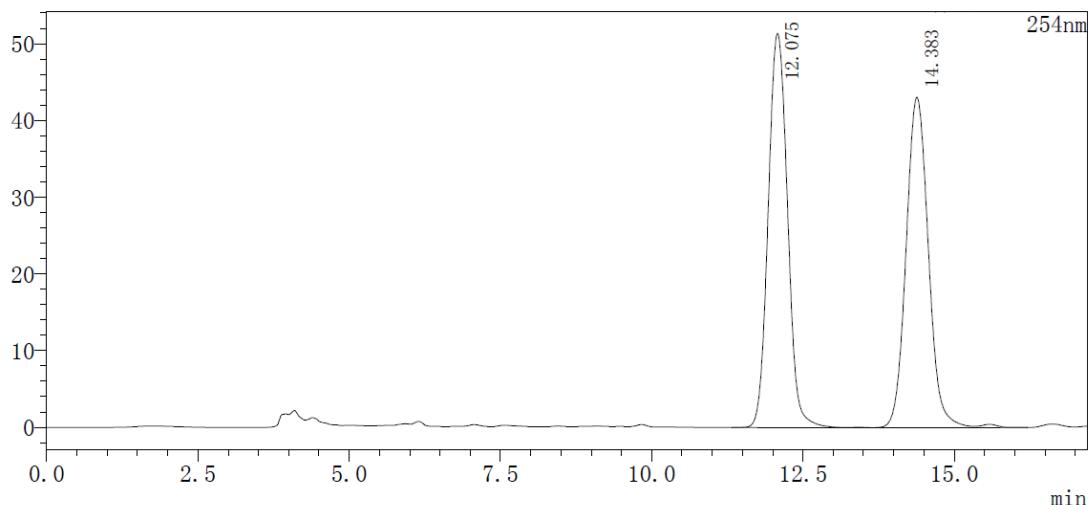
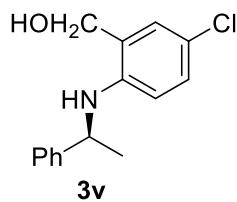
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	13.742	2523952	68275	49.985			
2	15.267	2525479	64447	50.015		V	
Total		5049431	132722				

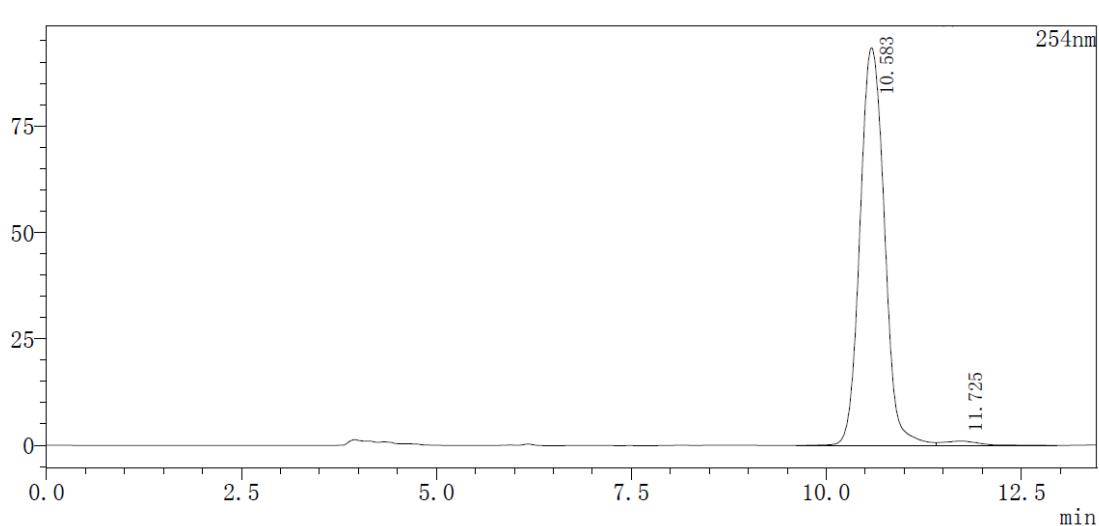
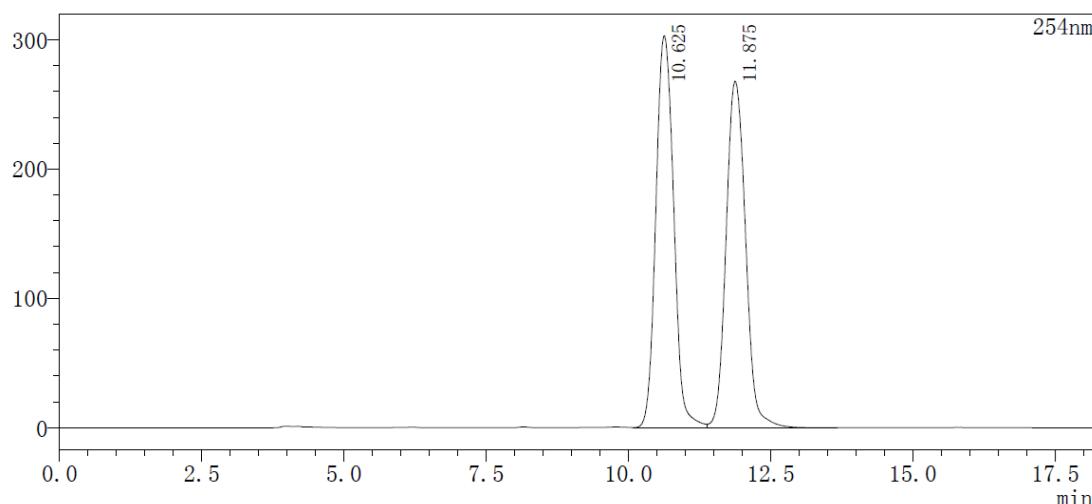
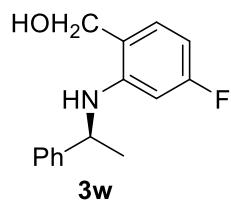


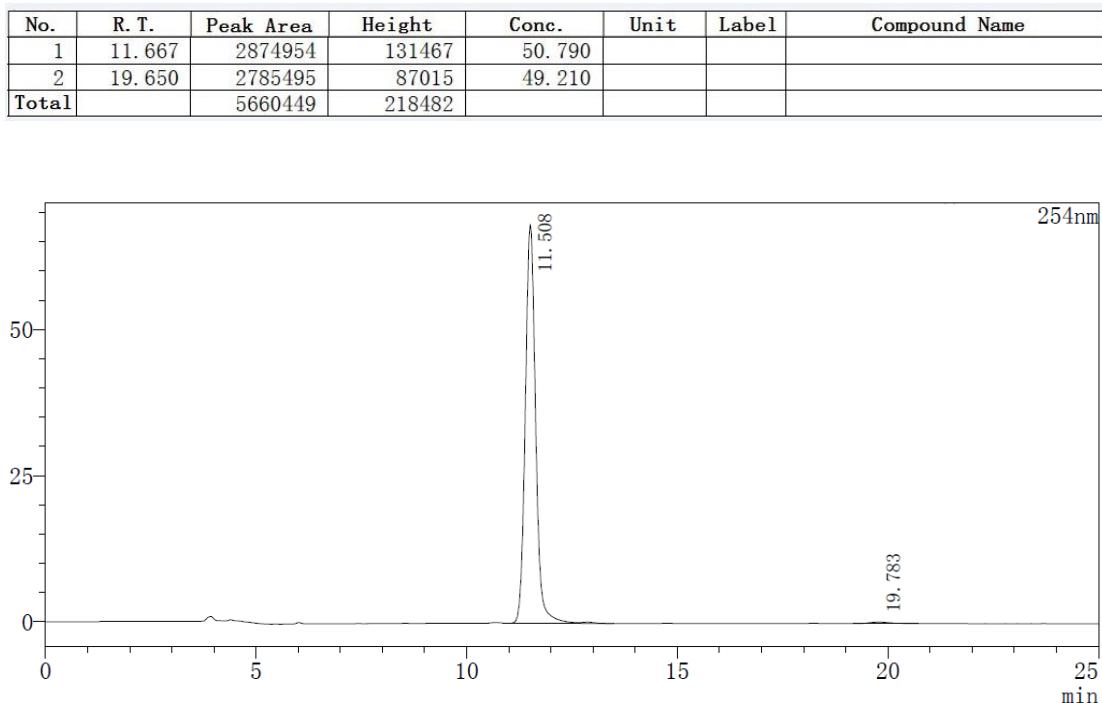
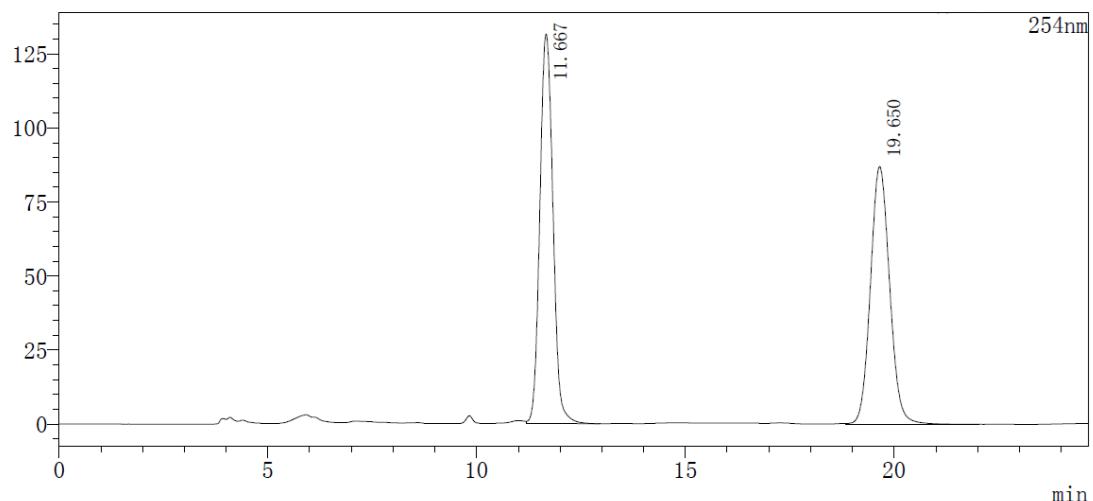
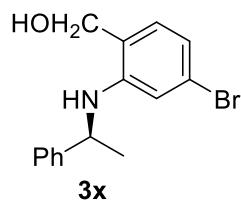
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	13.700	7377819	183955	99.259		S	
2	15.317	55067	1907	0.741		T	
Total		7432886	185862				

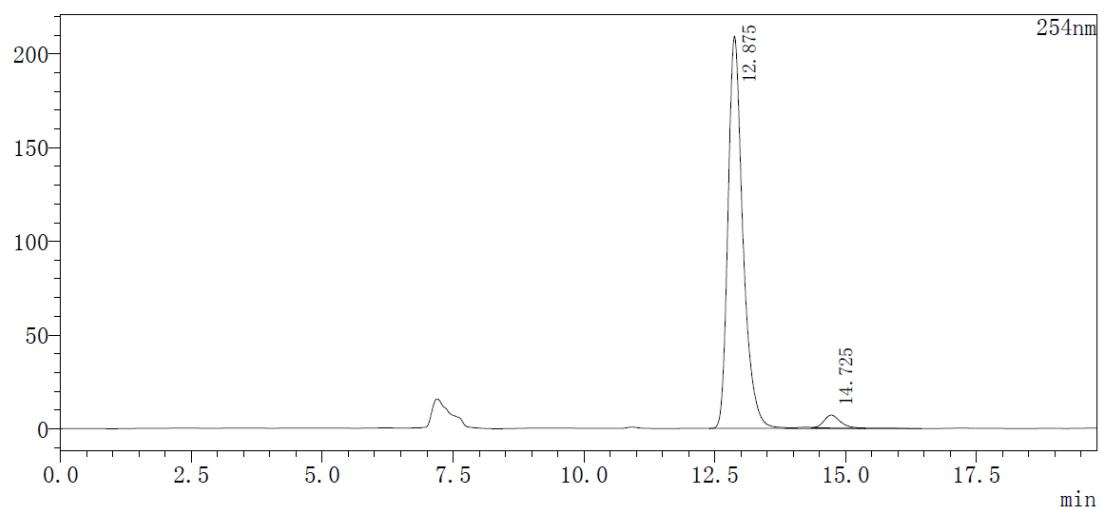
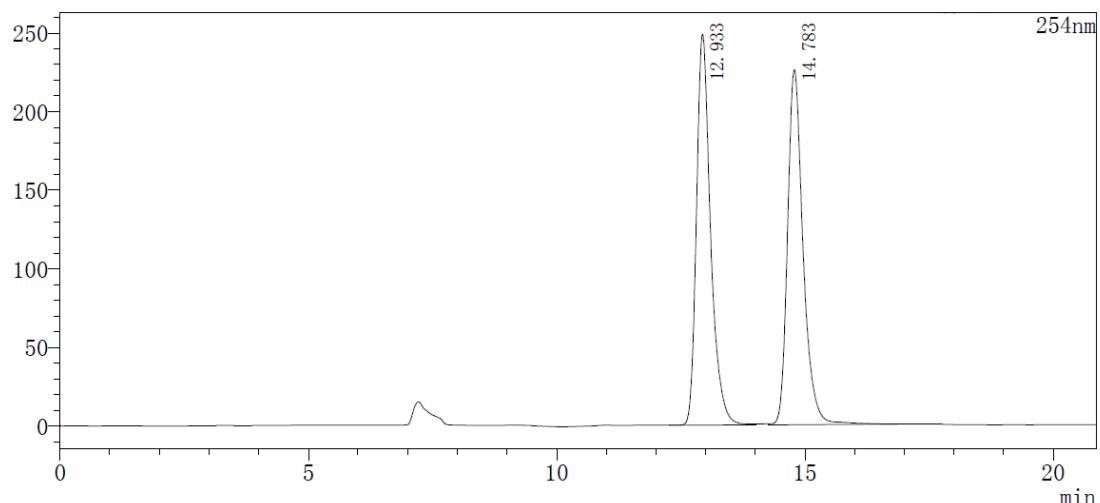
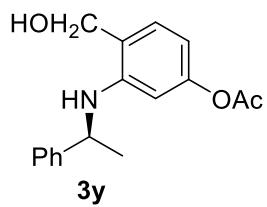


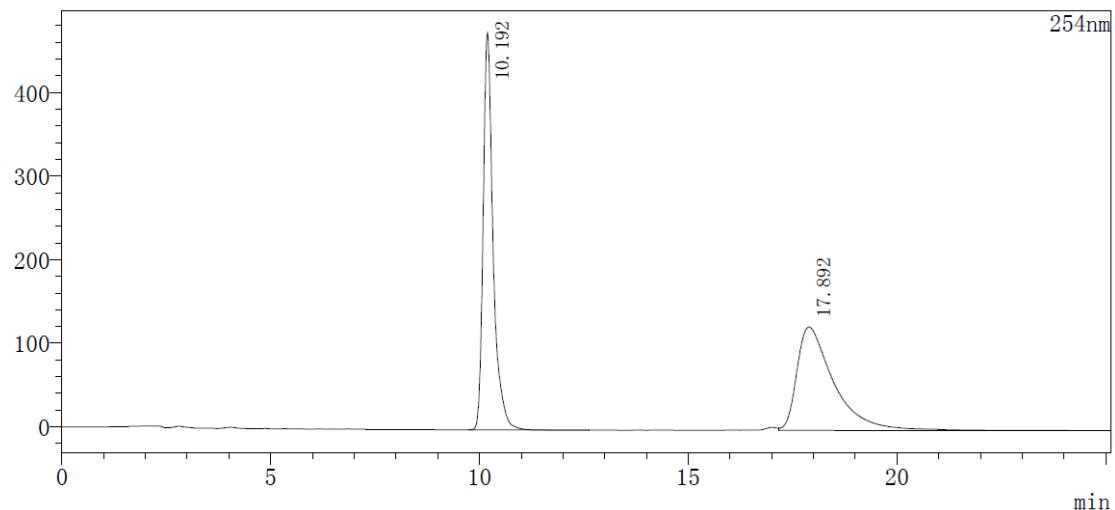
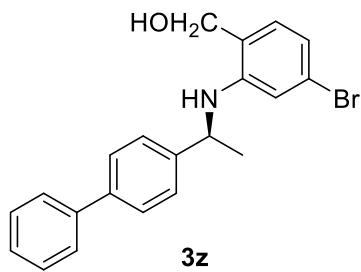




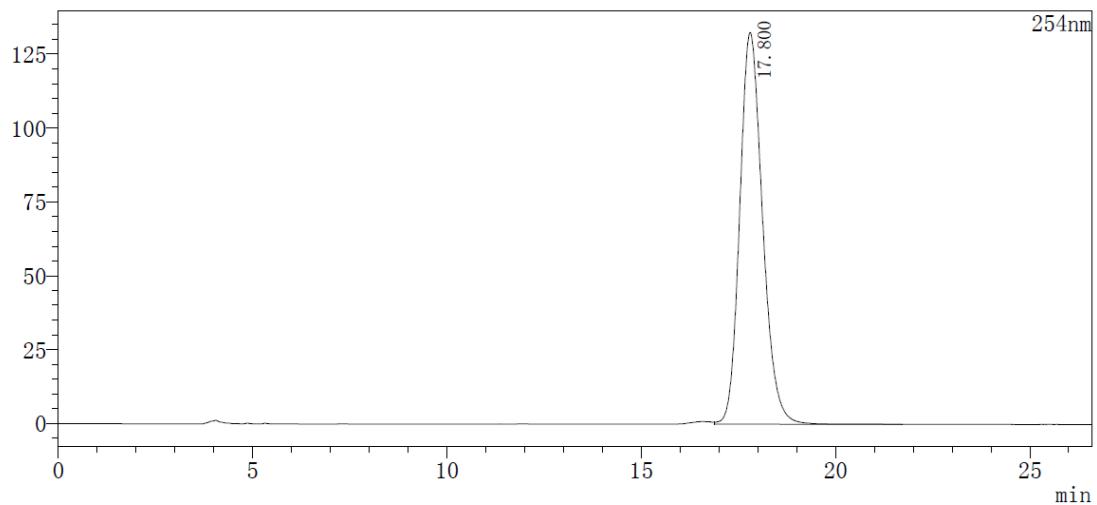




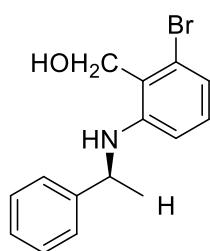




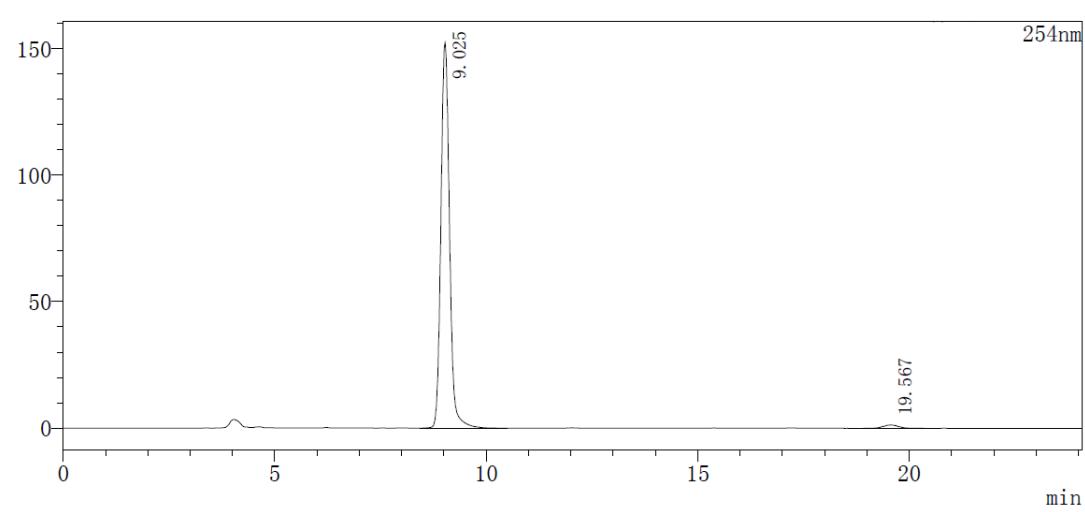
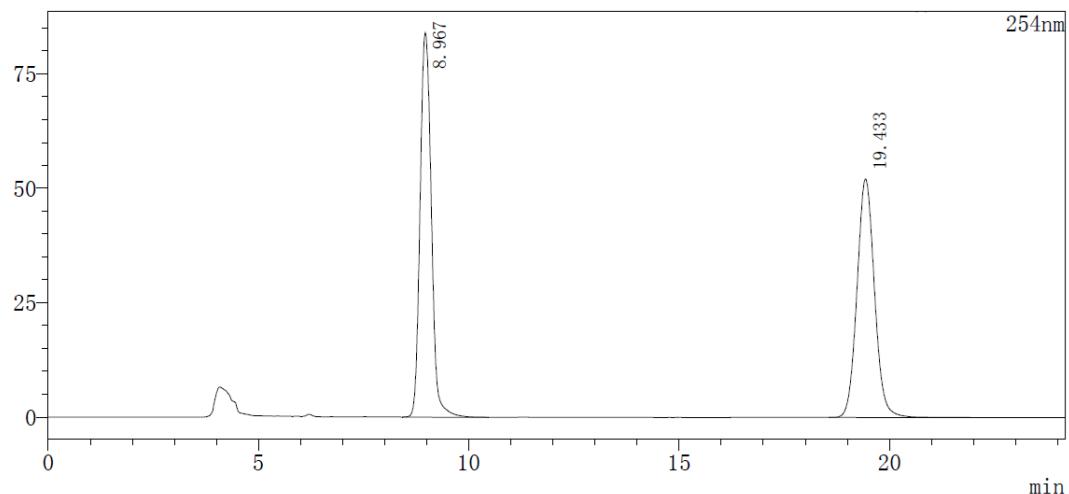
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	10.192	7862907	475299	50.714			
2	17.892	7641436	123769	49.286			
Total		15504343	599068				

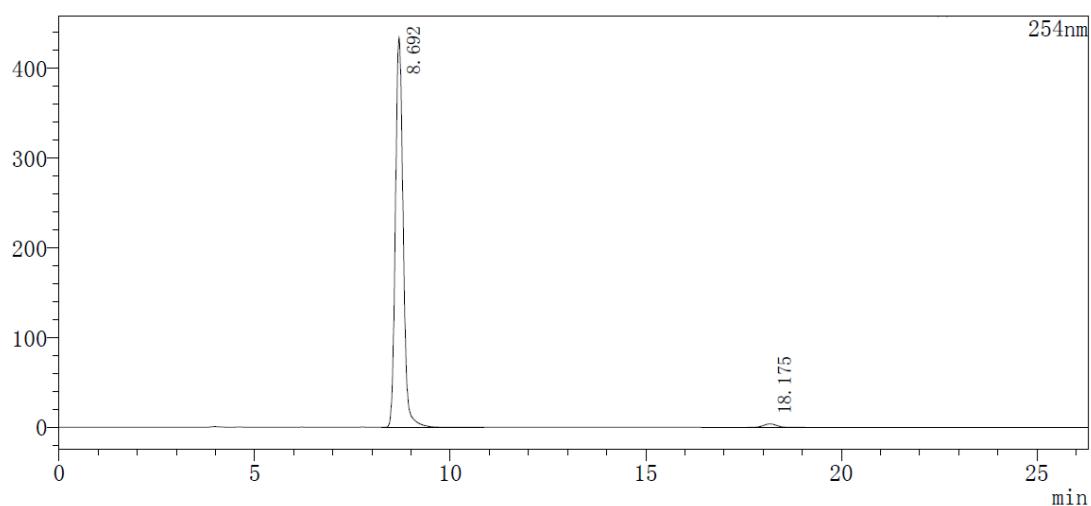
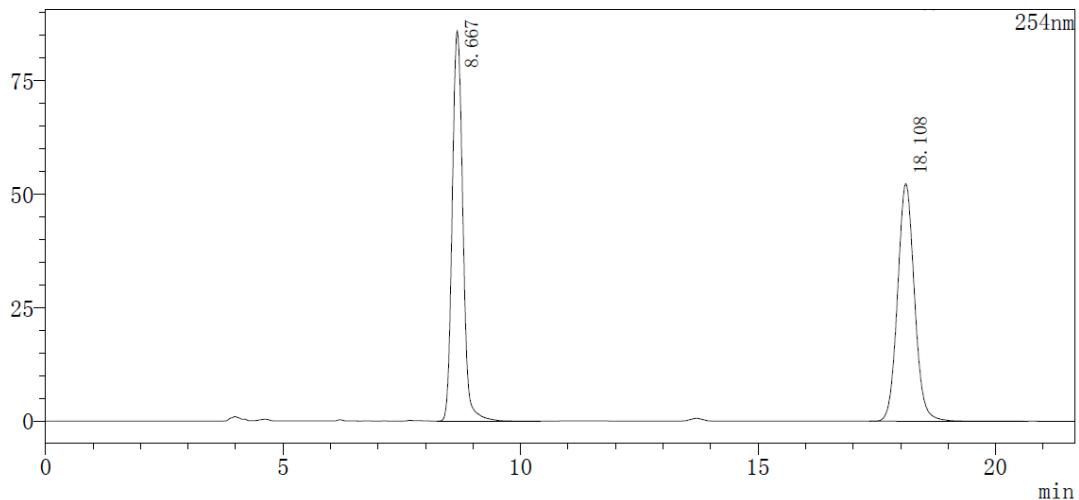
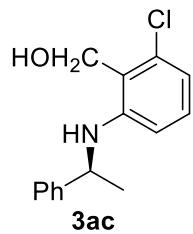


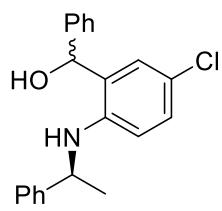
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	17.800	5417238	132549	100.000			
Total		5417238	132549				



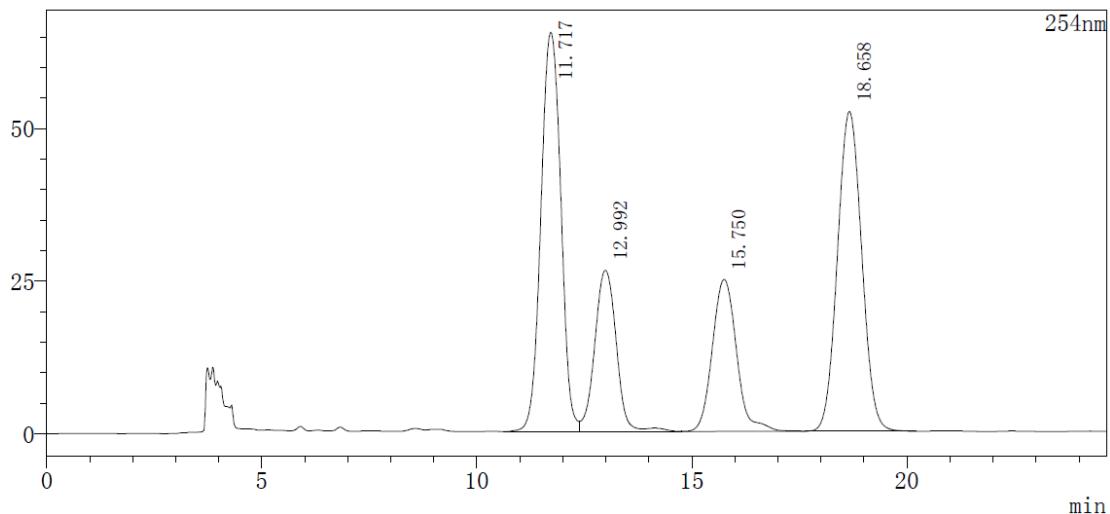
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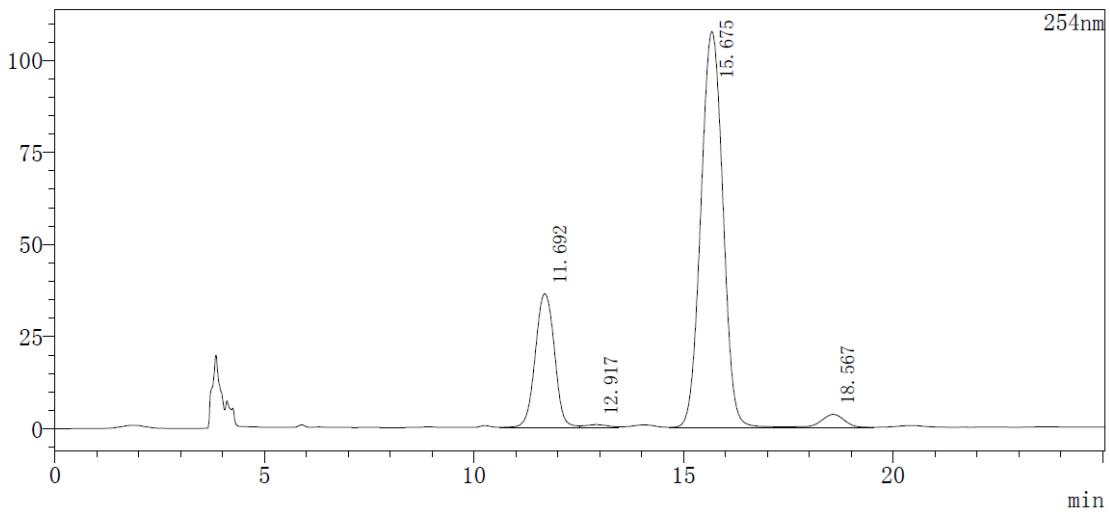




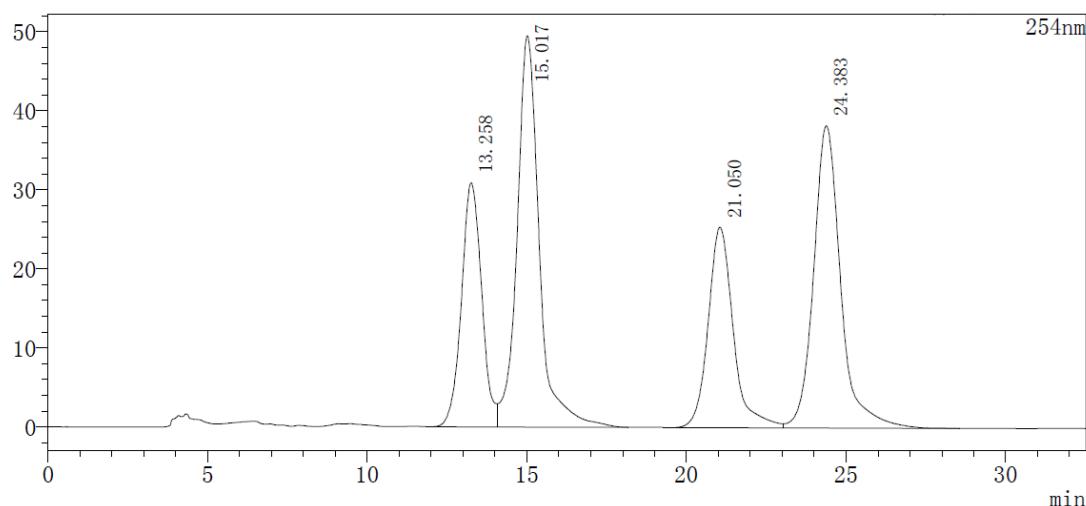
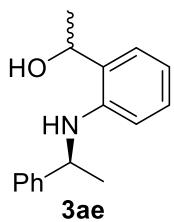
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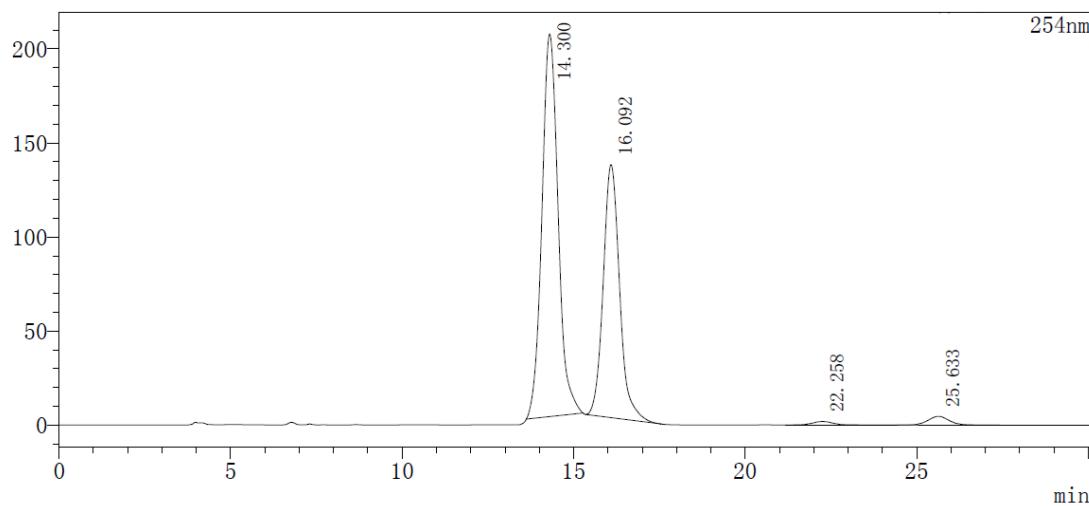
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	11.717	2105645	65445	34.714		M	
2	12.992	923544	26435	15.226		V M	
3	15.750	977851	24919	16.121		V M	
4	18.658	2058677	52425	33.940		V	
Total		6065717	169223				



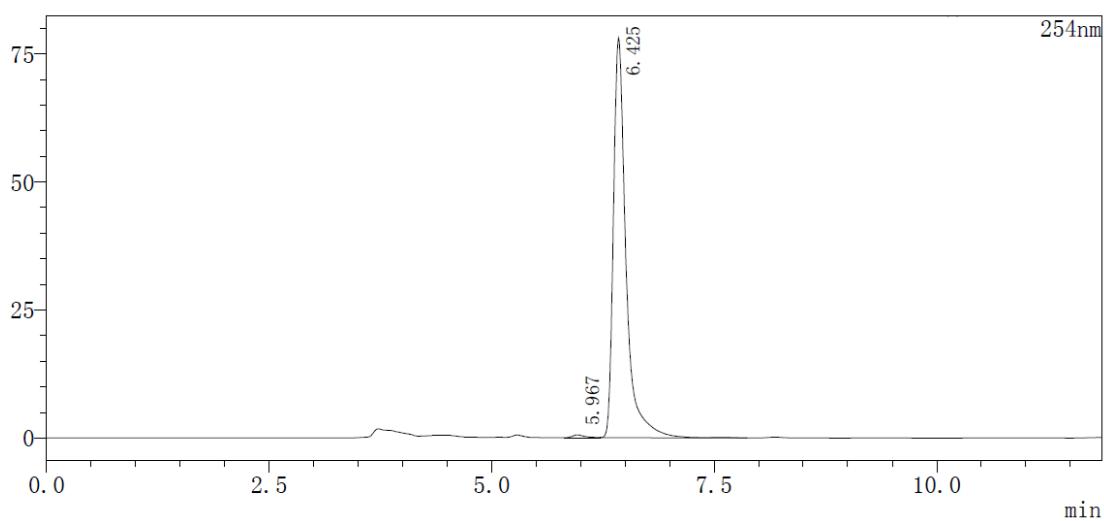
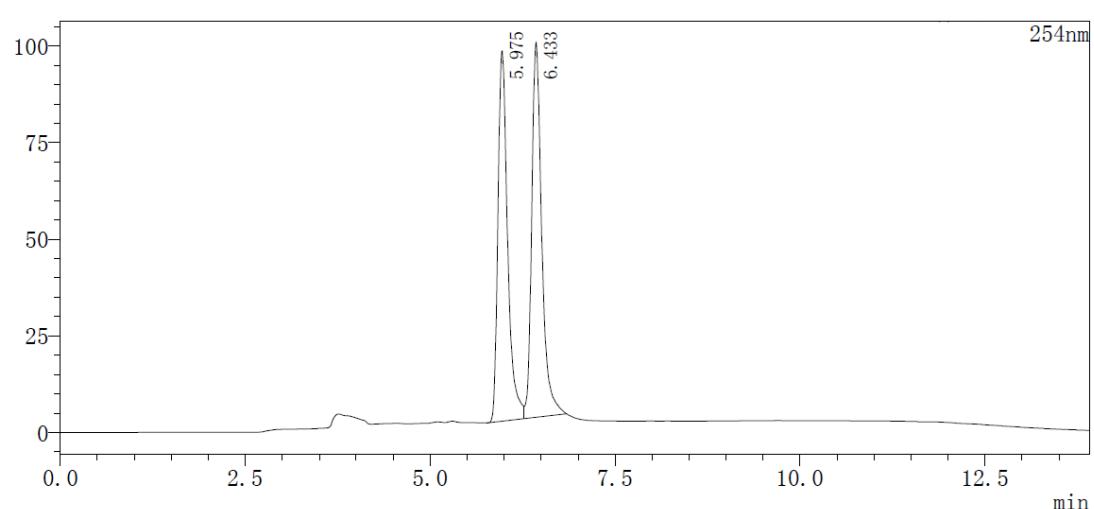
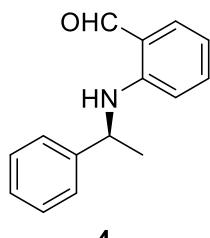
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	11.692	1153384	36296	21.990		V	
2	12.917	27926	758	0.532		V	
3	15.675	3929341	107433	74.917		V	
4	18.567	134305	3509	2.561		V	
Total		5244955	147996				

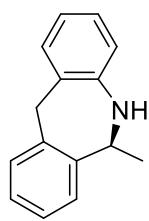


No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	13.258	1358633	30875	18.351			
2	15.017	2395499	49493	32.355		V	
3	21.050	1390696	25380	18.784			
4	24.383	2258924	38266	30.511		V	
Total		7403751	144014				

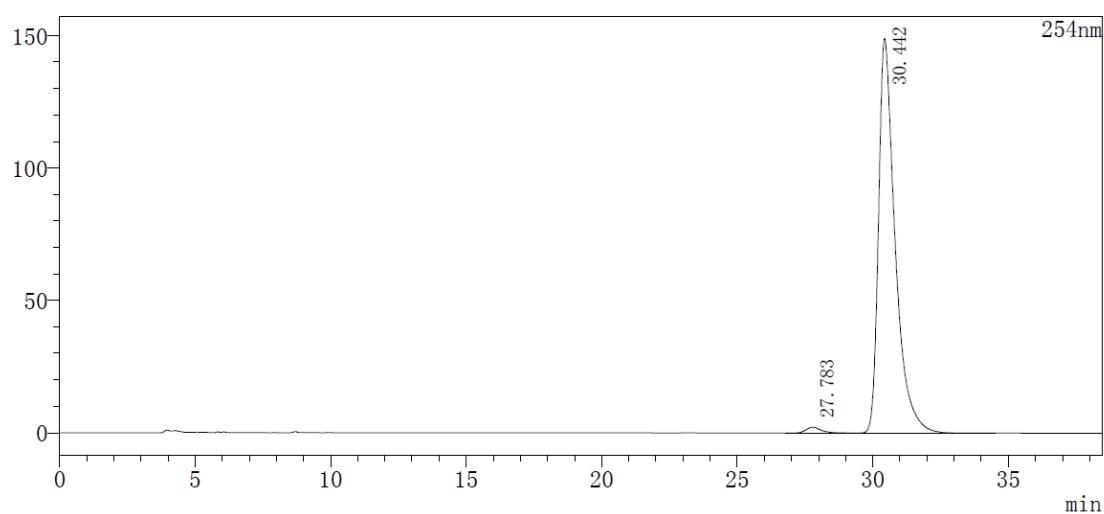
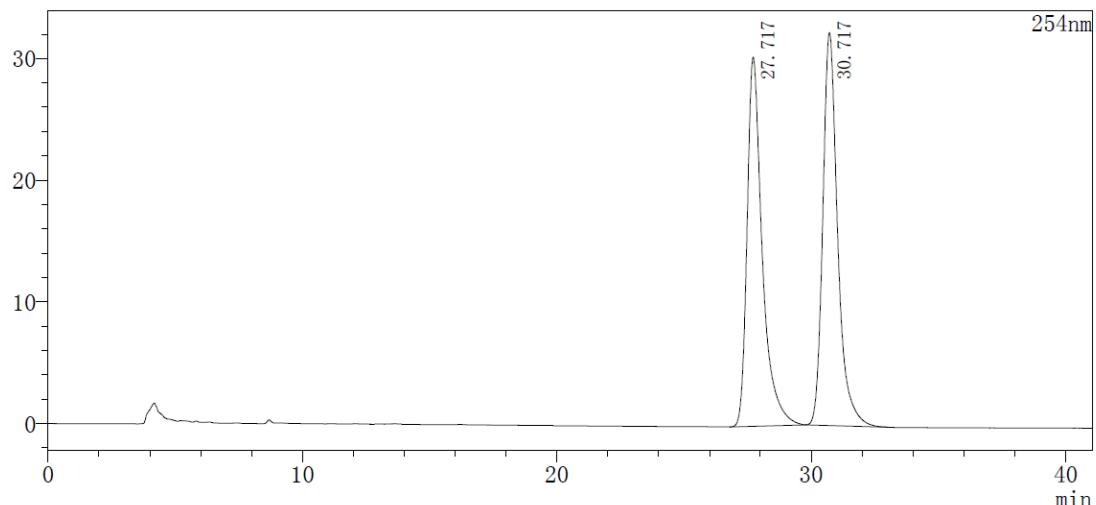


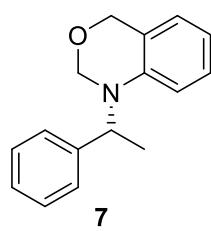
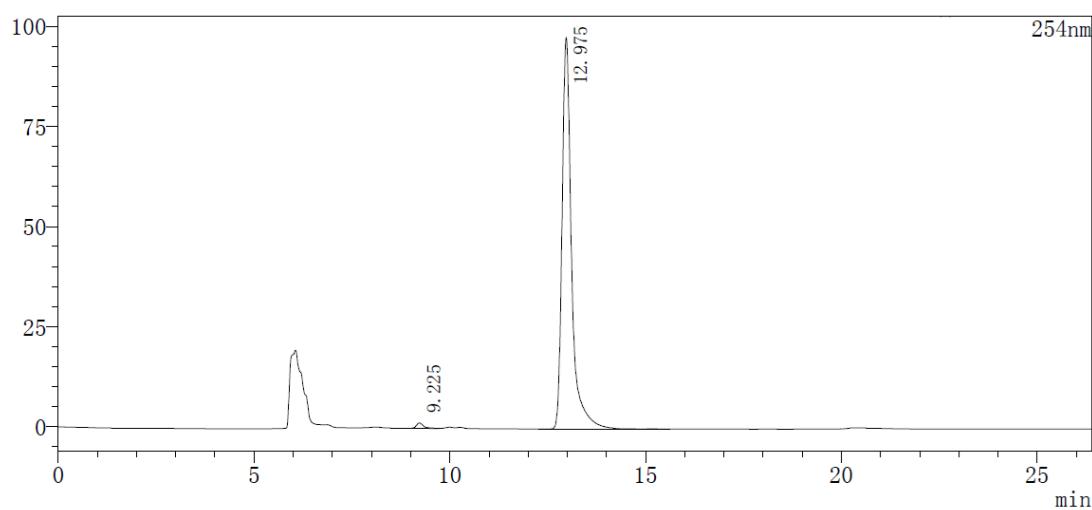
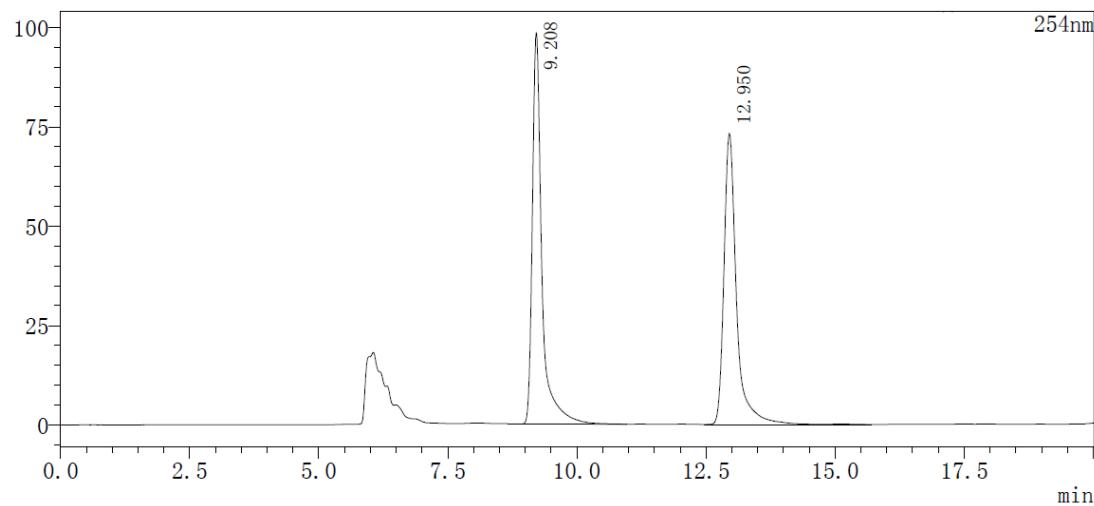
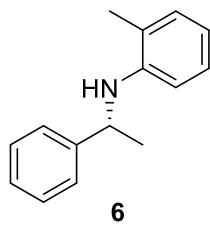
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	14.300	6670104	203328	58.296		M	
2	16.092	4466411	134464	39.036			
3	22.258	93443	1974	0.817			
4	25.633	211899	4710	1.852		V	
Total		11441857	344475				



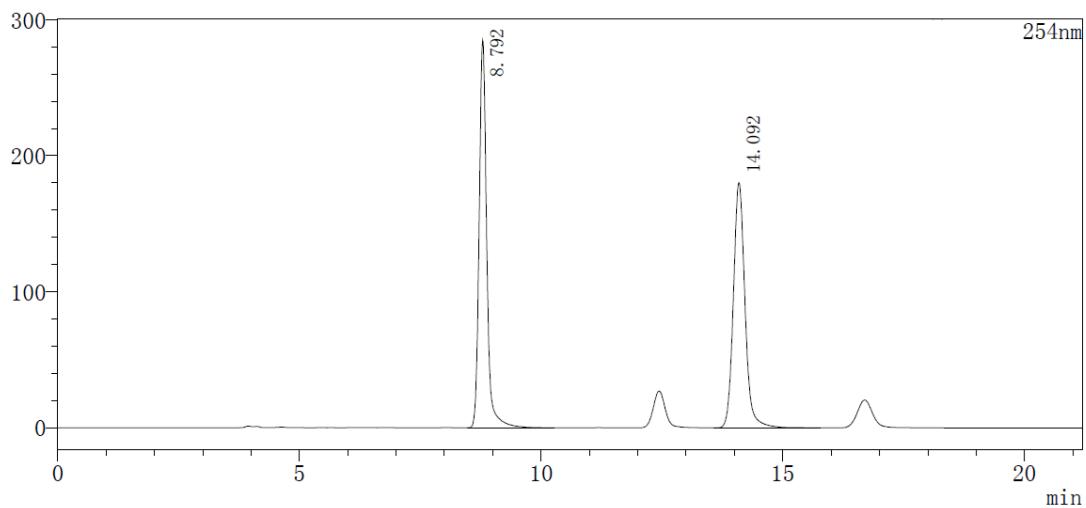


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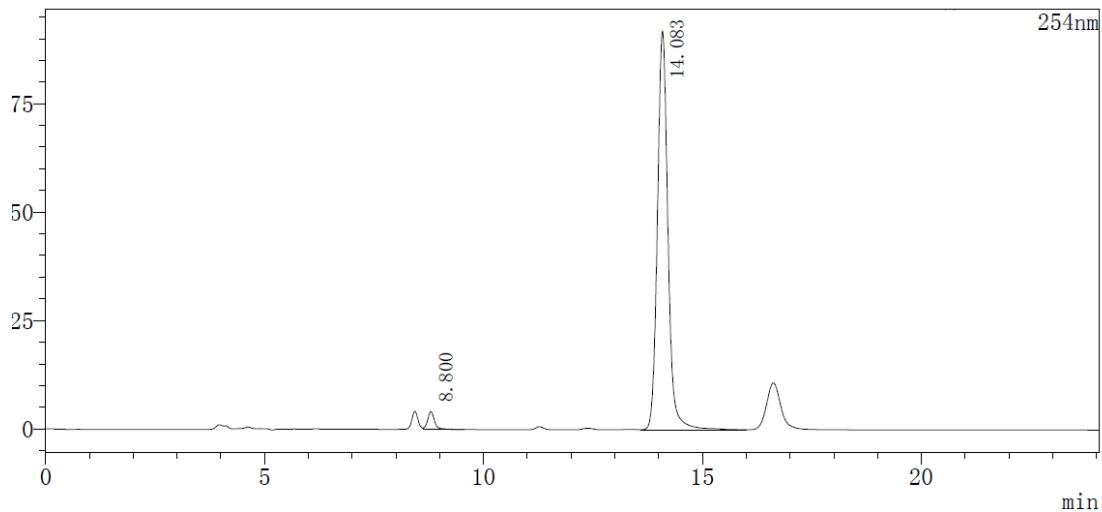




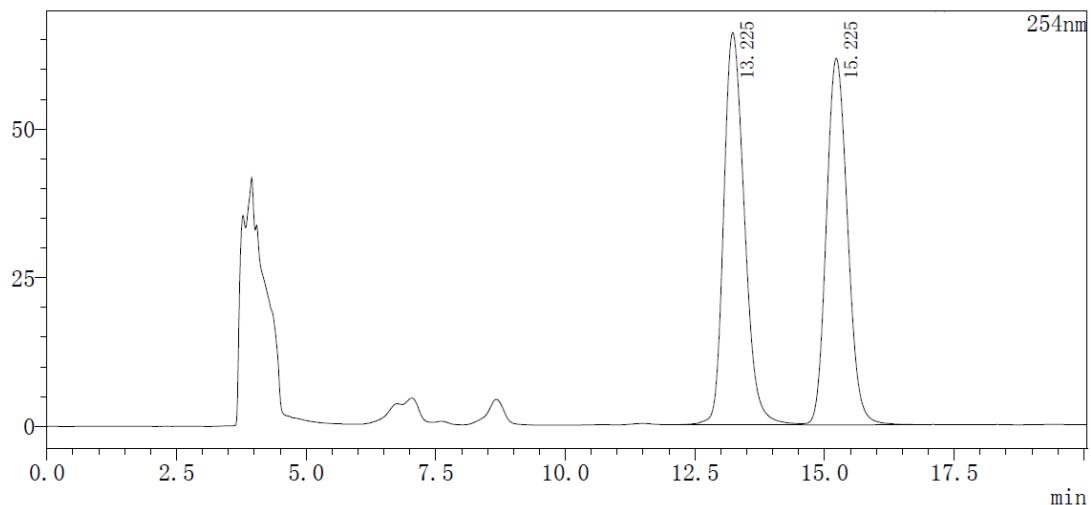
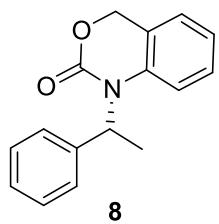
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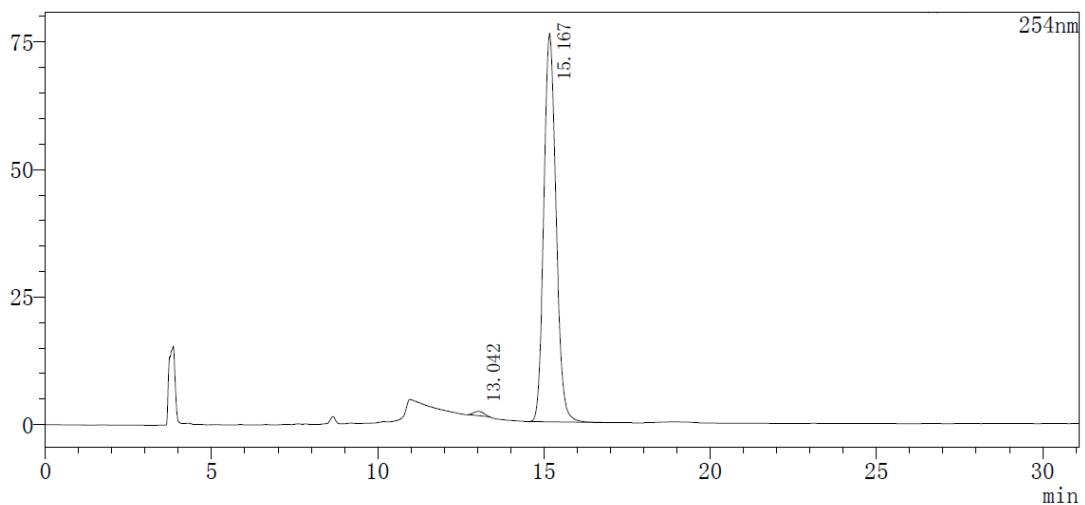
No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	8.792	3103791	284828	50.682			
2	14.092	3020229	180363	49.318			
Total		6124020	465191				



No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	8.800	44385	4097	2.807			
2	14.083	1536844	91887	97.193			
Total		1581229	95985				



No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	13.225	1838052	65951	51.263			
2	15.225	1747508	61598	48.737		V	
Total		3585560	127548				



No.	R. T.	Peak Area	Height	Conc.	Unit	Label	Compound Name
1	13.042	17979	842	0.913		M	
2	15.167	1950257	75997	99.087			
Total		1968236	76839				