Supporting Information

Efficient Access to Chiral 1,2-Amino Alcohols *via* Ir/f-Amphox-Catalyzed Asymmetric Hydrogenation of α-Amino Ketones

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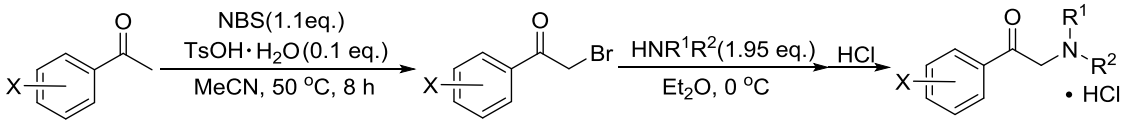
Contents

1. General remarks:

All reactions and manipulations which are sensitive to moisture or air were performed in an argon-filled glovebox or using standard Schlenk techniques. Hydrogen gas (99.999%) was purchased from Shanghai Regulator Factory Co., Ltd. Anhydrous *i*-PrOH and EtOH were purchased from J&K. Anhydrous CF_3CH_2OH were purchased from Sigma-Aldrich, Anhydrous THF, 1,4-dioxane and hexane was distilled from sodium benzophenone ketyl. Anhydrous $ClCH_2CH_2Cl$ were freshly distilled from calcium hydride. Na_2CO_3, K_2CO_3, Cs_2CO_3, $NaHCO_3$, NaOH, KOH, *t*-BuONa and *t*-BuOK was purchased from J&K. $[Ir(COD)Cl]_2$ was prepared according to the literature.[1-2] ^1H, ^{13}C and ^{31}P NMR spectra were recorded with a Bruker ADVANCE III (400 MHz) spectrometer with $CDCl_3$ as the solvent and tetramethylsilane (TMS) as the internal standard. Chemical shifts are reported in parts per million (ppm, δ scale) downfield from TMS at 0.00 ppm and referenced to the $CDCl_3$ at 7.26 ppm (for ^1H NMR) or 77.0 ppm (for ^{13}C NMR). Data are reported as: multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet), coupling constant in hertz (Hz) and signal area integration in natural numbers. ^{13}C NMR and ^{31}P NMR analyses were run with decoupling. Optical rotations $[\alpha]_D$ were determined using a PERKIN ELMER polarimeter 343 instrument. HPLC analyses were performed using Daicel chiral column.

All the α-amino ketones were prepared according the literature.[3-7] The absolute configuration of products were determined by comparison of analytical data with the literature (HPLC spectra, optical rotation). [6,9-12] The absolute configuration of others were assigned by analogy.

2. General procedure for the preparation of α-amino ketones.

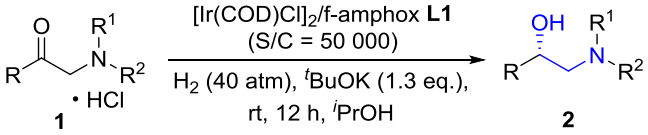


Step 1:[3-4] N-bromosuccinimide was added to the stirred solution of acetophenone in acetonitrile. The resulting reaction mixture was stirred for 10-15 minutes. After that *p*-TsOH·H_2O was added to the reaction mixture and refluxed for 8 h and monitored by TLC. After completion of the reaction, reaction content was brought to room temperature and washed with saturated solution of sodium bicarbonate and extracted with ethyl acetate, organic layer was dried over sodium sulphate and concentrated under reduced pressure. The obtained residues were used for the next step directly.

Step 2:[5-7] The obtained residues of step 1 was added to the stirred solution of NHR^1R^2 in diethylether, then stirred for 3-5 h and monitored by TLC. After completion of the reaction, the mixture was filtered and removed the solvent under reduced pressure. The residue was washed with saturated solution of sodium bicarbonate and the aqueous phase was extracted with ethyl

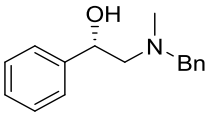
acetate. The combined organic extractions were dried over Na_2SO_4 and concentrated under reduced pressure to yield a residue. The residue was purified by flash chromatography on silica gel with ethyl acetate to get the corresponding α-amino ketones. The obtained α-amino ketone was then treated with hydrochloric acid and recrystallized in hot anhydrous EtOH to give the corresponding hydrochloride as a white crystalline solid.

3. Asymmetric hydrogenation of α-amino ketones:[3,6,8]



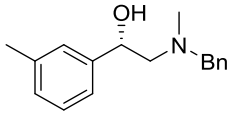
General procedure (at S/C = 50 000): To a 4.0 mL vial was added the catalyst precursor $[Ir(COD)Cl]_2$ (1.4 mg, 2.0×10^{-3} mmol), ligand **L1** (2.4 mg, 4.2×10^{-3} mmol) and anhydrous ^{i}PrOH (2.0 mL) in the argon-filled glovebox. The mixture was stirred for 2.0 h at 25 °C giving orange red solution. And then 0.2 mmol of α-amino ketone (as a hydrochloride), *t*-BuOK (29.2 mg, 1.3 eq.) were added into a 5 mL hydrogenation vessel. 1.0 mL anhydrous *i*-PrOH was added as solvent and a solution of Ir/f-amphox **L1** in anhydrous *i*-PrOH (2.0 μL) was added *via* an injection port. Then the vessel was placed in an autoclave, closed it and moved it out from golvebox. The autoclave quickly purged with hydrogen gas for three times, then pressurized to 40 atm H_2. The reaction solution was stirred at room temperature (25 °C-30 °C) until for 12 h, then released pressure carefully. The solution of reaction mixture was purified by a flash chromatography on a silical gel with ethyl acetate and the solvent was removed under reduced pressure. The ee value was determined by chiral HPLC analysis of the chiral amino alcohol directly. The characterization data of compounds **2a-2n** are in accordance with the reported data in the literature.[6,9-12]

(*S*)-2-(Benzyl(methyl)amino)-1-phenylethanol (2a)



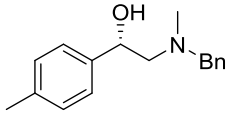
Light yellow oil; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 95:5; flow 1.0 mL/min; t_R (major) = 14.3 min, t_R (minor) = 16.8 min. $[\alpha]_D^{25}$ = 50.6 (*c* 1.0, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28-7.16 (m, 10H), 4.67 (dd, *J* = 10.4, 3.6 Hz, 1H), 3.67 (d, *J* = 13.1 Hz, 1H), 3.46 (d, *J* = 13.1 Hz, 1H), 2.53-2.43 (m, 2H), 2.24 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 142.16, 138.17, 129.11, 128.46, 127.52, 127.39, 125.94, 69.39, 65.50, 62.38, 41.75.

(*S*)-2-(Benzyl(methyl)amino)-1-(3-methylphenyl)ethanol (2b)



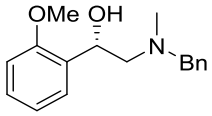
Light yellow oil; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 95:5; flow 1.0 mL/min; t_R (major) = 11.3 min, t_R (minor) = 12.8 min. $[\alpha]_D^{25}$ = 22.4 (*c* 0.5, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.43 -7.24 (m, 5H), 7.23-7.03 (m, 4H), 4.72 (dd, *J* = 10.5, 3.4 Hz, 1H), 3.74 (d, *J* = 13.1 Hz, 1H), 3.53 (d, *J* = 13.1 Hz, 1H), 2.58-2.50 (m, 1H), 2.34 (s, 3H), 2.31 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 142.08, 138.02, 129.12, 127.38, 126.58, 123.03, 69.39, 65.56, 62.39, 41.71, 21.51.

(*S*)-2-(Benzyl(methyl)amino)-1-(4-methylphenyl)ethanol (2c)



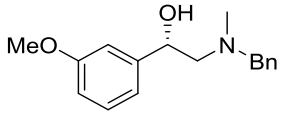
Light yellow oil; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 85:15; flow 1.0 mL/min; t_R (major) = 7.7 min, t_R (minor) = 8.7 min. $[\alpha]_D^{25}$ = 63.25 (*c* 1.2, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32-7.23 (m, 7H), 7.14 (d, *J* = 7.9 Hz, 2H), 4.72 (dd, *J* = 10.5, 3.4 Hz, 1H), 3.74 (d, *J* = 13.1 Hz, 1H), 3.52 (d, *J* = 13.1 Hz, 1H), 2.51-2.43 (m, 2H), 2.33 (s, 3H), 2.31 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 139.12, 138.18, 137.15, 129.11, 129.06, 128.44, 127.37, 125.90, 69.24, 65.56, 62.38, 41.73, 21.19.

(*S*)-2-(Benzyl(methyl)amino)-1-(2-methoxyphenyl)ethanol (2d)



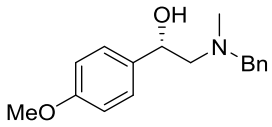
Light yellow oil; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 95:5; flow 1.0 mL/min; t_R (major) = 13.3 min, t_R (minor) = 15.3 min. $[\alpha]_D^{25}$ = 84.08 (*c* 1.2, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (dd, *J* = 7.5, 1.3 Hz, 1H), 7.42-7.18 (m, 6H), 6.97-6.95 (m, 1H), 6.83 (d, *J* = 8.2 Hz, 1H), 5.16 (dd, *J* = 10.0, 3.1 Hz, 3H), 3.87 (brs, 1H), 3.79 (s, 3H), 3.75 (d, *J* = 13.1 Hz, 1H), 3.53 (d, *J* = 13.1 Hz, 1H), 2.69 (dd, *J* = 12.3, 3.2 Hz, 1H), 2.50-2.47 (m, 1H), 2.32 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.25, 138.21, 130.39, 129.22, 128.38, 128.11, 127.29, 126.51, 120.81, 110.07, 64.49, 63.44, 62.16, 55.30, 41.97.

(*S*)-2-(Benzyl(methyl)amino)-1-(3-methoxyphenyl)ethanol (2e)



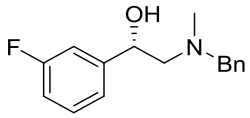
Light yellow oil; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 85:15; flow 1.0 mL/min; t_R (major) = 10.9 min, t_R (minor) = 11.5 min. $[\alpha]_D^{25}$ = 44.40 (*c* 0.5, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39-7.32 (m, 3H), 7.31-7.19 (m, 3H), 6.93-6.90 (m, 2H), 6.82-6.79 (m, 1H), 4.73 (dd, *J* = 10.2, 3.7 Hz, 1H), 3.80 (s, 3H), 3.74 (d, *J* = 13.1 Hz, 1H), 3.53 (d, *J* = 13.1 Hz, 1H), 2.60-2.51 (m, 2H), 2.31 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 159.73, 143.94, 138.15, 129.36, 129.11, 128.45, 127.38, 118.22, 113.13, 111.17, 69.27, 65.41, 62.36, 55.24, 41.74.

(*S*)-2-(Benzyl(methyl)amino)-1-(4-methoxyphenyl)ethanol (2f)



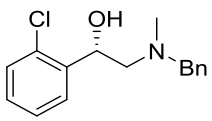
Light yellow oil; 99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 220 nm, 25 °C, *n*-hexane: *i*-PrOH = 85:15; flow 1.0 mL/min; t_R (major) = 14.6 min, t_R (minor) = 17.7 min. $[\alpha]_D^{25}$ = 46.40 (*c* 1.0, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36-7.28 (m, 7H), 6.92-6.85 (m, 2H), 4.70 (dd, *J* = 10.6, 3.3 Hz, 1H), 3.79 (d, *J* = 5.6 Hz, 3H), 3.81-3.72 (m, 1H), 3.53 (d, *J* = 13.1 Hz, 1H), 2.62-2.56 (m, 1H), 2.48 (dd, *J* = 12.4, 3.4 Hz, 1H), 2.31 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 159.04, 138.22, 134.16, 129.09, 128.43, 127.35, 127.20, 113.76, 69.02, 65.52, 62.38, 55.30, 41.74.

(*S*)-2-(benzyl(methyl)amino)-1-(3-fluorophenyl)ethanol (2g)



Light yellow oil; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 97:3; flow 1.0 mL/min; t_R (major) = 15.2 min, t_R (minor) = 16.2 min. $[\alpha]_D^{25}$ = 48.80 (*c* 1.0, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45-7.21 (m, 6H), 7.10-7.08 (m, 2H), 6.98-6.88 (m, 1H), 4.73 (dd, *J* = 8.7, 5.3 Hz, 1H), 3.74 (d, *J* = 13.0 Hz, 1H), 3.53 (d, *J* = 13.1 Hz, 1H), 2.56-2.52 (m, 2H), 2.32 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 162.99 (d, *J* = 246.4 Hz), 144.99 (d, *J* = 7.1 Hz), 137.99, 129.08, 128.48, 127.46, 121.41 (d, *J* = 7.1 Hz), 114.28 (d, *J* = 22.22 Hz), 112.81 (d, *J* = 22.22 Hz), 68.80, 65.20, 62.34, 41.75.

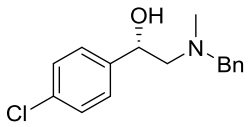
(*S*)-2-(Benzyl(methyl)amino)-1-(2-chlorophenyl)ethanol (2h)



Light yellow oil; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel AD-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 98:2; flow 0.3 mL/min; t_R (minor) = 32.9 min, t_R (major) = 36.0 min. $[\alpha]_D^{25}$ = 100.1 (*c* 1.0, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ

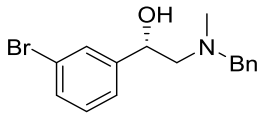
7.54 (dd, *J* = 7.7, 1.3 Hz, 1H), 7.34-7.07 (m, 8H), 5.10 (dd, *J* = 10.3, 2.9 Hz, 1H), 3.92 (brs, 1H), 3.69 (d, *J* = 13.1 Hz, 1H), 3.44 (d, *J* = 13.1 Hz, 1H), 2.68-2.65 (m, 1H), 2.35-2.32 (m, 1H), 2.26 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 139.57, 138.16, 131.72, 129.20, 129.13, 128.47, 128.42, 127.40, 127.34, 127.18, 66.49, 63.22, 62.25, 41.85.

(*S*)-2-(Benzyl(methyl)amino)-1-(4-chlorophenyl)ethanol (2i)



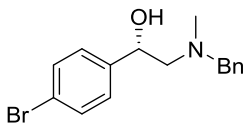
White solid; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 220 nm, 25 °C, *n*-hexane: *i*-PrOH = 85:15; flow 1.0 mL/min; t_R (major) = 7.8 min, t_R (minor) = 8.3 min. $[\alpha]_D^{25}$ = 43.00 (*c* 1.0, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38-7.26 (m, 9H), 4.71 (dd, *J* = 9.6, 4.5 Hz, 1H), 3.74 (d, *J* = 13.0 Hz, 1H), 3.53 (d, *J* = 13.0 Hz, 1H), 2.56-2.48 (m, 2H), 2.32 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 140.69, 138.01, 133.09, 129.08, 128.50, 128.48, 127.44, 127.27, 68.76, 65.29, 62.35, 41.75.

(*S*)-2-(Benzyl(methyl)amino)-1-(3-bromophenyl)ethanol (2j)



Colorless oil; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 97:3; flow 1.0 mL/min; t_R (minor) = 18.2 min, t_R (major) = 20.2 min. $[\alpha]_D^{25}$ = 29.41 (*c* 1.0, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (s, 1H), 7.42-7.23 (m, 7H), 7.19 (t, *J* = 7.7 Hz, 1H), 4.70 (dd, *J* = 8.6, 5.4 Hz, 1H), 3.73 (d, *J* = 13.1 Hz, 1H), 3.53 (d, *J* = 13.1 Hz, 1H), 2.60-2.49 (m, 2H), 2.31 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 144.63, 137.98, 130.54, 129.95, 129.08, 128.97, 128.49, 127.47, 124.50, 122.54, 68.76, 65.27, 62.35, 41.72.

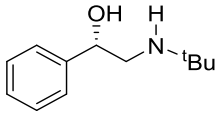
(*S*)-2-(Benzyl(methyl)amino)-1-(4-bromophenyl)ethanol (2k)



White solid; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 95:5; flow 1.0 mL/min; t_R (major) = 16.1 min, t_R (minor) = 17.4 min. $[\alpha]_D^{25}$ = 38.40 (*c* 1.0, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 (d, *J* = 8.2 Hz, 2H), 7.32-7.18 (m, 5H), 7.14 (d, *J* = 8.1 Hz, 2H), 4.62 (dd, *J* = 9.1, 4.5 Hz, 1H), 3.66 (d, *J* = 13.0 Hz, 1H), 3.45 (d, *J* = 13.0 Hz, 1H), 2.45-2.41 (m, 2H), 2.24 (s, 3H). ^{13}C NMR

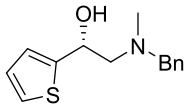
(101 MHz, $CDCl_3$) δ 140.18, 136.91, 130.37, 127.41, 126.56, 126.38, 120.13, 67.73, 64.15, 61.27, 40.68.

(*S*)-2-(tert-butylamino)-1-phenylethanol (2l)



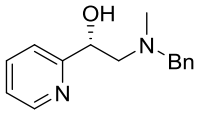
White solid; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel AD-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 85:15; flow 1.0 mL/min; t_R (major) = 12.5 min, t_R (minor) = 15.6 min. HPLC conditions (To the corresponding benzoyl derivatives). $[\alpha]_D^{25}$ = 25.9 (*c* 1.2, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51-7.45 (m, 2H), 7.40-7.28 (m, 3H), 5.45 (dd, *J* = 10.6, 2.0 Hz, 1H), 3.24 (dd, *J* = 12.2, 2.3 Hz, 1H), 3.06 (dd, *J* = 12.0, 10.8 Hz, 1H), 1.51 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 139.87, 128.74, 128.29, 125.85, 68.74, 58.10, 49.66, 26.07.

(*R*)-2-(benzyl(methyl)amino)-1-(thiophen-2-yl)ethanol (2m)



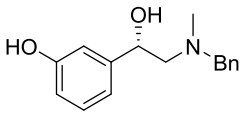
Colorless oil; >99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 95:5; flow 1.0 mL/min; t_R (minor) = 19.2 min, t_R (major) = 21.6 min. $[\alpha]_D^{25}$ = 14.7 (*c* 1.2, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40-7.21 (m, 6H), 7.01-6.93 (m, 2H), 5.02 (dd, *J* = 10.4, 3.5 Hz, 1H), 3.73 (d, *J* = 13.0 Hz, 1H), 3.56 (d, *J* = 13.1 Hz, 1H), 2.77 (dd, *J* = 12.3, 10.4 Hz, 1H), 2.64 (dd, *J* = 12.4, 3.5 Hz, 1H), 2.30 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 145.78, 138.04, 129.09, 128.47, 127.42, 126.62, 124.46, 123.73, 65.94, 65.36, 62.38, 41.72.

(*R*)-2-(benzyl(methyl)amino)-1-(pyridin-2-yl)ethanolol (2n)



Light brown oil; 99% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel AS-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 97:3; flow 1.0 mL/min; t_R (minor) = 12.9 min, t_R (major) = 17.3 min. $[\alpha]_D^{25}$ = 80.8 (*c* 1.2, EtOH). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.52 (d, *J* = 4.4 Hz, 1H), 7.68 (td, *J* = 7.7, 1.7 Hz, 1H), 7.51 (d, *J* = 7.9 Hz, 1H), 7.37-7.22 (m, 5H), 7.17 (dd, *J* = 6.9, 5.4 Hz, 1H), 4.87 (dd, *J* = 9.8, 3.9 Hz, 1H), 3.73 (d, *J* = 13.1 Hz, 1H), 3.54 (d, *J* = 13.1 Hz, 1H), 2.81 (dd, *J* = 12.4, 3.9 Hz, 1H), 2.66 (dd, *J* = 12.4, 9.8 Hz, 1H), 2.32 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 161.72, 148.64, 138.35, 136.77, 129.06, 128.39, 127.28, 122.34, 120.42, 70.20, 63.83, 62.40, 41.87.

(*S*)-3-(2-(benzyl(methyl)amino)-1-hydroxyethyl)phenol (2o)



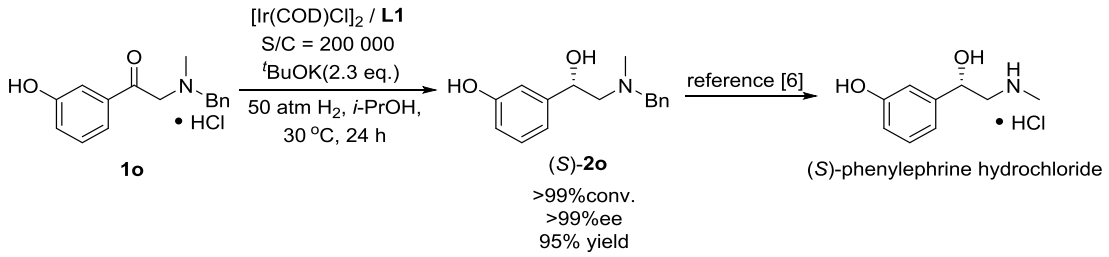
To a 4.0 mL vial was added the catalyst precursor $[Ir(COD)Cl]_2$ (1.4 mg, 2.0×10^{-3} mmol), ligand **L1** (2.4 mg, 4.2×10^{-3} mmol) and anhydrous ^{i}PrOH (2.0 mL) under argon atmosphere. The mixture was stirred for 2.0 h at 25 °C giving orange red solution in the argon-filled glovebox. And then 0.2 mmol of α-amino ketone **1o** (as a hydrochloride), *t*-BuOK (51.6 mg, 2.3 eq.) were added into a 5 mL hydrogenation vessel. 1 mL anhydrous *i*-PrOH was added as solvent and a solution of Ir/f-amphox **L1** in anhydrous *i*-PrOH (2 μL, c = 2.0×10^{-3} mol/L) was added *via* an injection port. Then the vessel was placed in an autoclave, closed it, and moved out of the golvebox. The autoclave was quickly purged with hydrogen gas for three times, then pressurized to 40 atm H_2. The reaction solution was stirred at room temperature (25 °C - 30 °C) until for 12 h, then released pressure carefully. The reaction solution was treated with 2N HCl aqueous solution to adjust pH to ~7. the solvent was removed under reduced pressure and the residue was purified by a flash chromatography on a silical gel with ethyl acetate (1% Et_3N) as eluent to afford **2o** as a white solid; >99% conv.; 97% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 80:20; flow 1.0 mL/min; t_R (major) = 10.8 min, t_R (minor) = 15.9 min. $[\alpha]_D^{25}$ = 50.7 (*c* 1.0, EtOH).^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40-7.24 (m, 5H), 7.16 (t, *J* = 7.8 Hz, 1H), 6.91 (s, 1H), 6.83 (d, *J* = 7.6 Hz, 1H), 6.77-6.68 (m, 1H), 4.74 (dd, *J* = 10.3, 3.6 Hz, 1H), 4.10 (brs, 2H), 3.77 (d, *J* = 13.1 Hz, 1H), 3.57 (d, *J* = 13.1 Hz, 1H), 2.59 (dt, *J* = 12.5, 5.4 Hz, 2H), 2.33 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.17, 143.60, 137.47, 129.57, 129.25, 128.51, 127.56, 117.93, 114.69, 112.83, 69.16, 65.03, 62.18, 41.62.

Asymmetric hydrogenation of α-amino ketone 1a at S/C = 500 000**:**

To a 4.0 mL vial was added the catalyst precursor $[Ir(COD)Cl]_2$ (1.4 mg, 2.0×10^{-3} mmol), ligand **L1** (2.4 mg, 4.2×10^{-3} mmol) and anhydrous ^{i}PrOH (2.0 mL) in the argon-filled glovebox. The mixture was stirred for 2.0 h at 25 °C giving orange red solution. The 10 mmol of α-amino ketone **1a** (as a hydrochloride) and *t*-BuOK (13 mmol, 1.46 g) were added into a 10 ml hydrogenation vessel. 5 mL anhydrous *i*-PrOH was added as solvent and a solution of Ir/f-amphox **L1** in anhydrous *i*-PrOH (10 μL, 2.0×10^{-3} mol/L) was added via an injection port. Then the vessel was placed in an autoclave, closed it and moved it out from golvebox. The autoclave was quickly purged with hydrogen gas for three times, then pressurized to 50 atm H_2. The reaction solution was stirred at 30 °C until no obvious hydrogen pressure drop was observed (48 h), then released pressure carefully. The solvent of the reaction mixture was removed under reduced pressure and the residue was purified by a flash chromatography on a silical gel with ethyl acetate as eluent to

afford the chiral amino alcohol (*S*)-**2a** 2.38 g as a light yellow oil, >99% conversion, >99% yield, >99% ee (*S*).

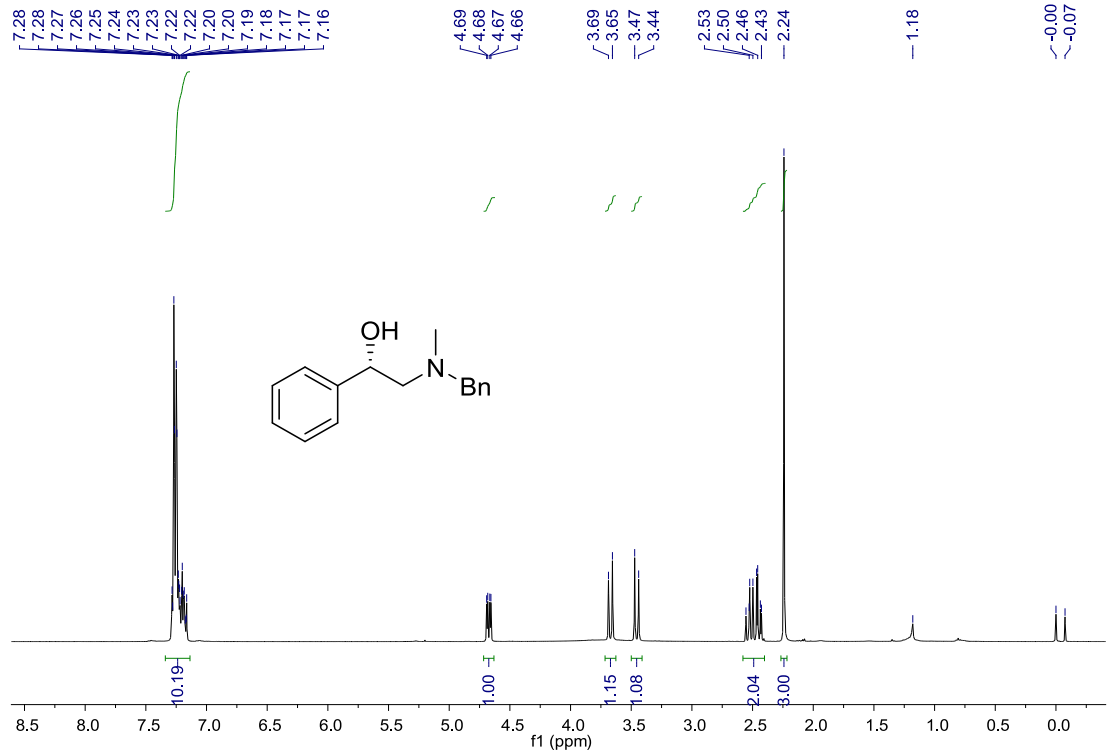
4. **The Synthesis of (*S*)-Phenylephrine Hydrochloride at** S/C=200 000.[6,8,13]

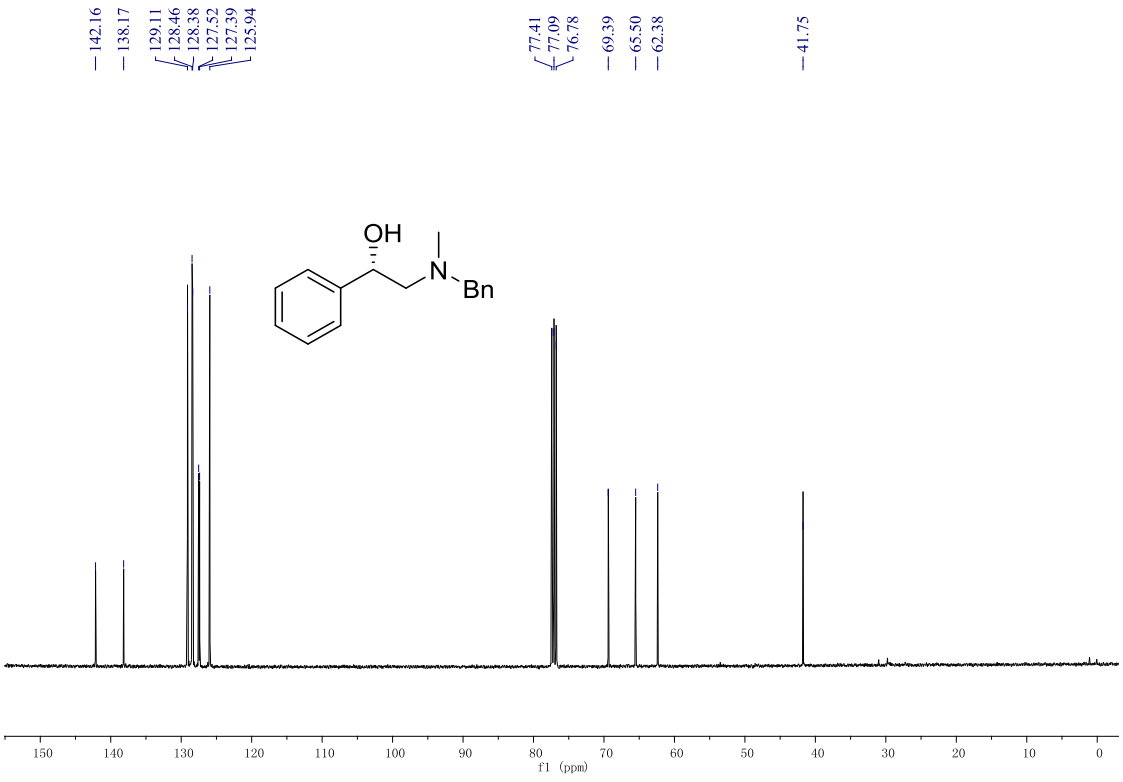


1.17 g (4 mmol) of amino ketone **1o** (as a hydrochloride) and 1.03 g (9.2 mmol) of *t*-BuOK were added into a 10 ml hydrogenation vessel. Then 4 mL of anhydrous *i*-PrOH and 10 μL (2.0×10^{-3} mol/L, 0.02 μmol) of the solution of Ir-**L1** in anhydrous *i*-PrOH was added via an injection port. Then the vessel was placed in an autoclave, closed it and moved it out from golvebox. The autoclave was quickly purged with hydrogen gas for three times, then pressurized to 50 atm H_2. The reaction solution was stirred at 30 °C until no obvious hydrogen pressure drop was observed (24 h), then released pressure carefully. The reaction solution was treated with 2N HCl aqueous solution to adjust pH to ~7. The solvent was removed under reduced pressure and the residue was purified by a flash chromatography on a silical gel with ethyl acetate (1% Et_3N) as eluent to afford (*S*)-**2o** 0.98 g as a white solid; >99% conv.; 95% yield; >99% ee. The enantiomeric excess was determined by HPLC on Chiracel OJ-H column, 210 nm, 25 °C, *n*-hexane: *i*-PrOH = 80:20; flow 1.0 mL/min; t_R (major) = 10.8 min, t_R (minor) = 15.9 min. $[\alpha]_D^{25}$ = 50.7 (*c* 1.0, EtOH).^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40-7.24 (m, 5H), 7.16 (t, *J* = 7.8 Hz, 1H), 6.91 (s, 1H), 6.83 (d, *J* = 7.6 Hz, 1H), 6.77-6.68 (m, 1H), 4.74 (dd, *J* = 10.3, 3.6 Hz, 1H), 4.10 (brs, 2H), 3.77 (d, *J* = 13.1 Hz, 1H), 3.57 (d, *J* = 13.1 Hz, 1H), 2.59 (dt, *J* = 12.5, 5.4 Hz, 2H), 2.33 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.17, 143.60, 137.47, 129.57, 129.25, 128.51, 127.56, 117.93, 114.69, 112.83, 69.16, 65.03, 62.18, 41.62.

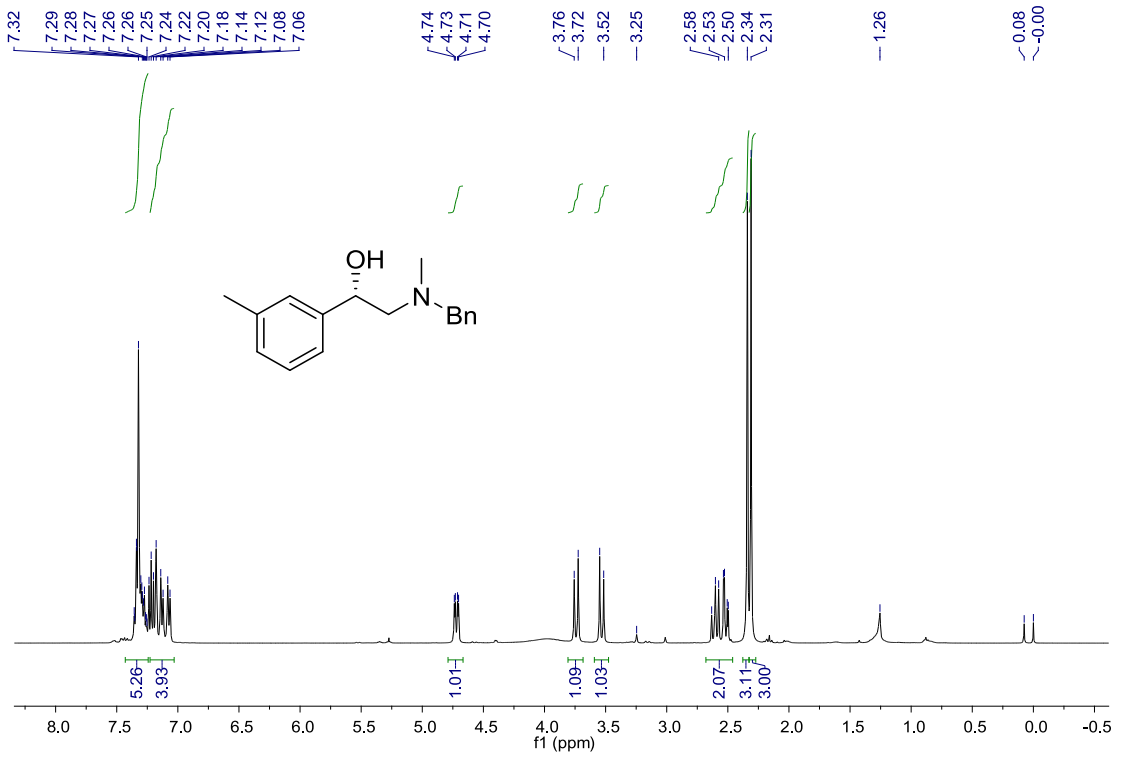
5. NMR spectra

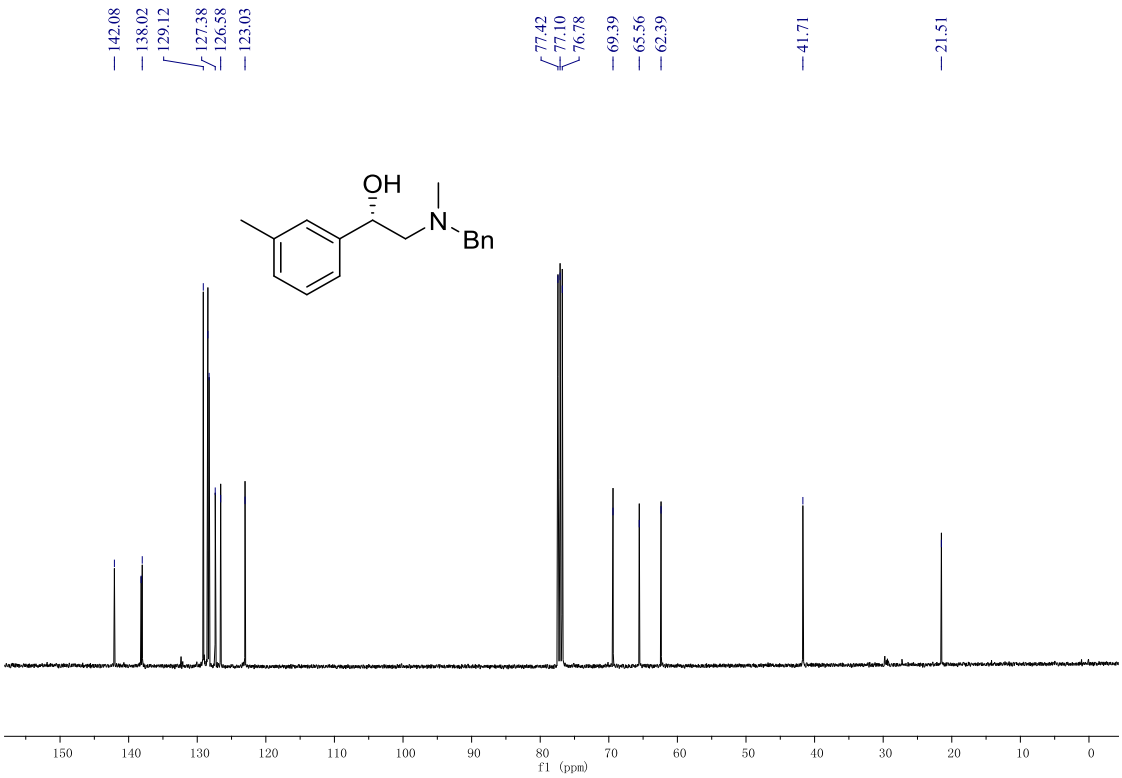
(*S*)-2-(Benzyl(methyl)amino)-1-phenylethanol (2a)



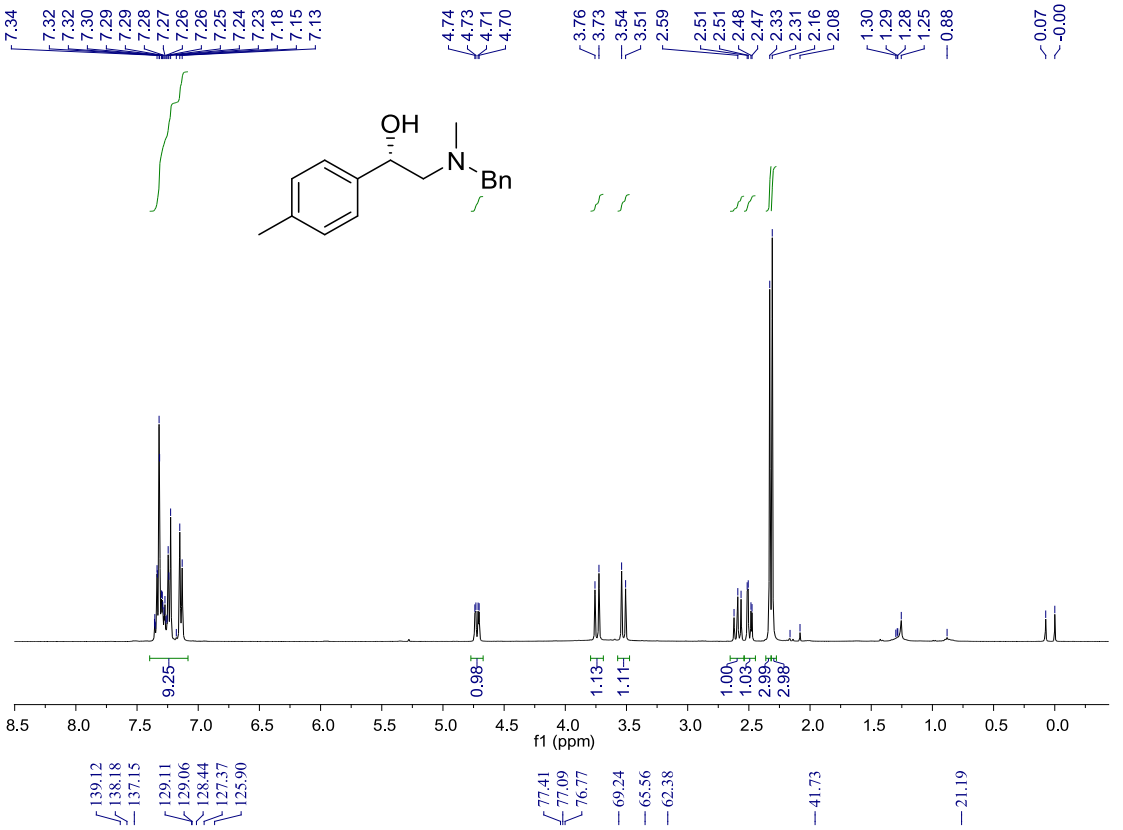


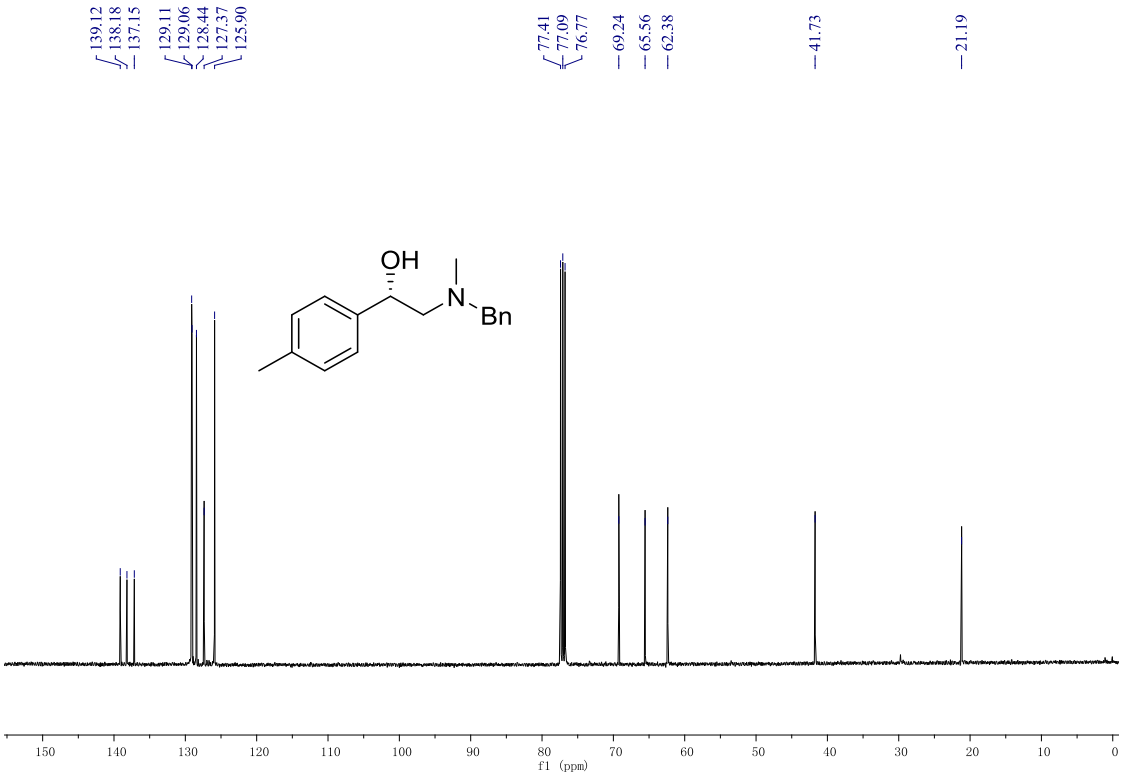
(*S*)-2-(Benzyl(methyl)amino)-1-(3-methylphenyl)ethanol (2b)



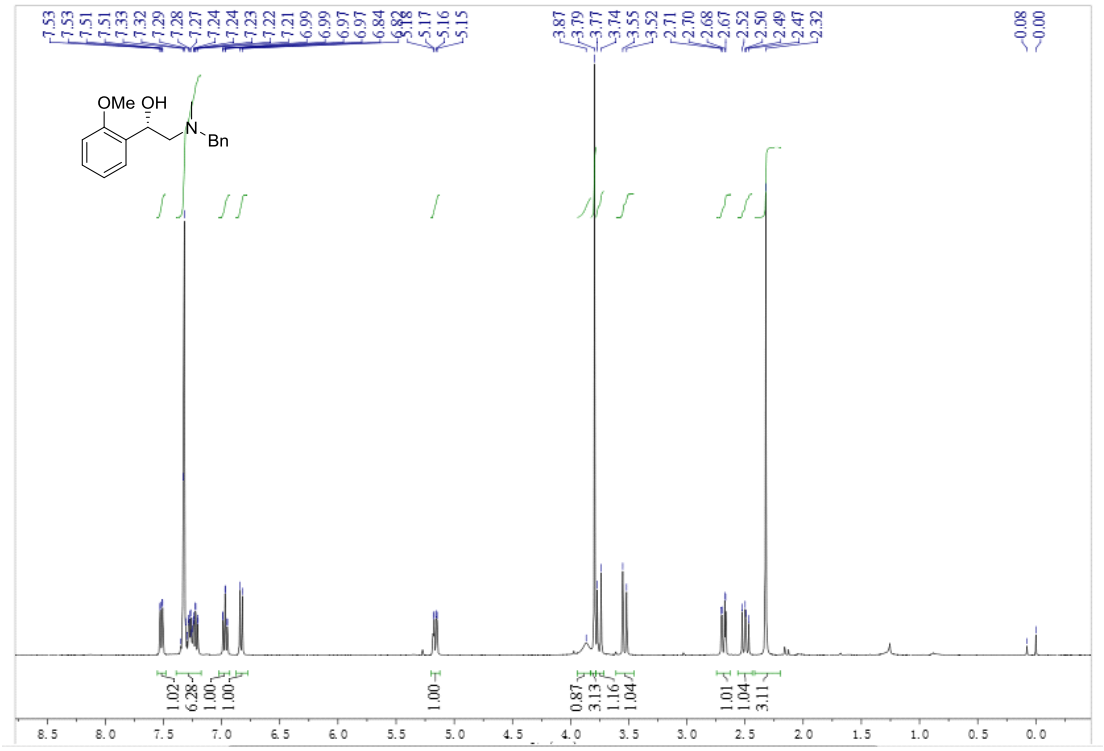


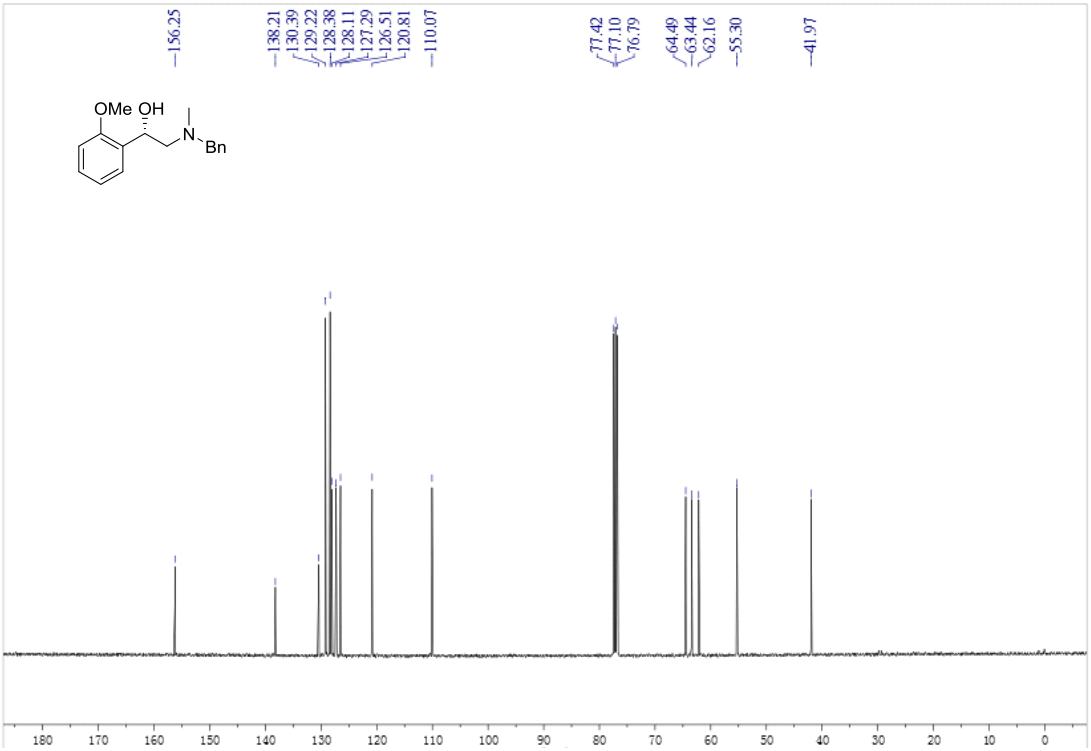
(*S*)-2-(Benzyl(methyl)amino)-1-(4-methylphenyl)ethanol(2c)



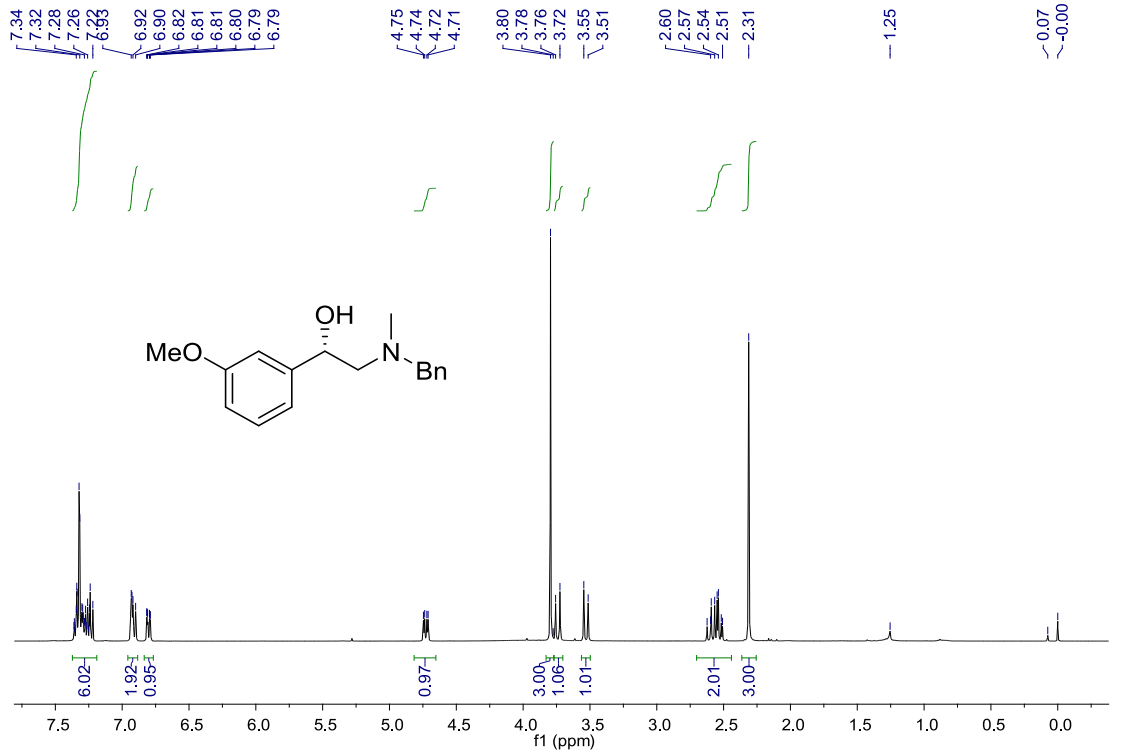


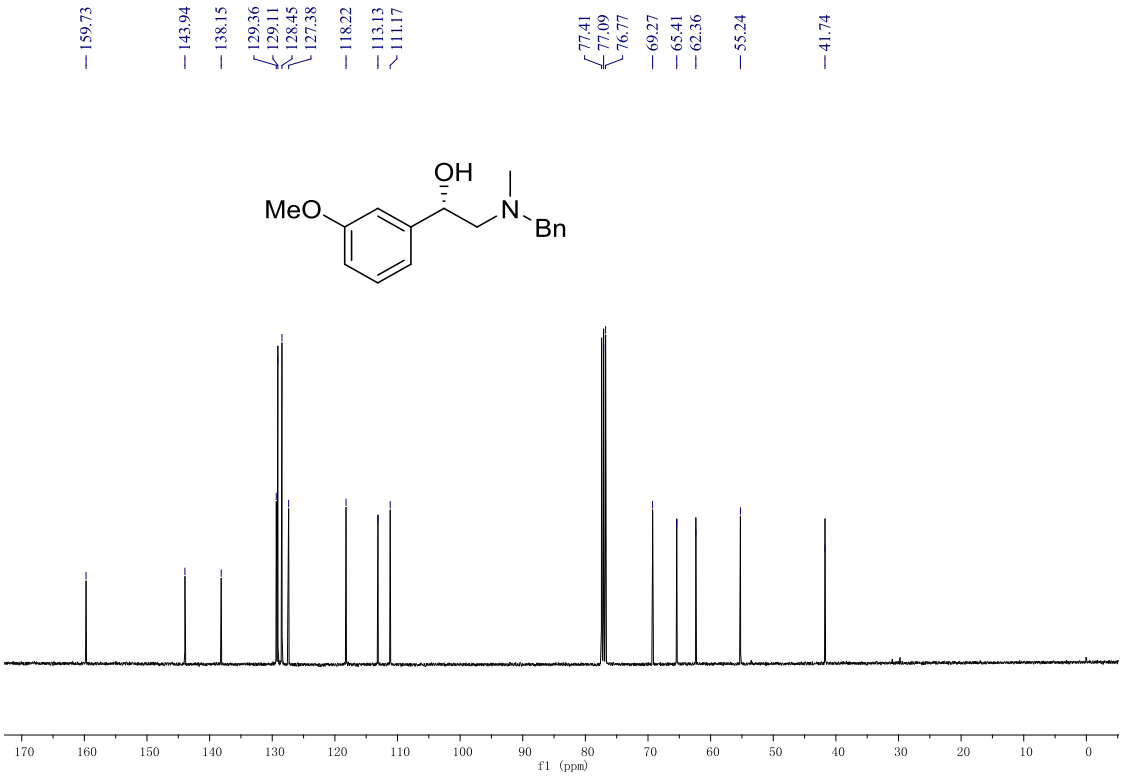
(*S*)-2-(Benzyl(methyl)amino)-1-(2-methoxyphenyl)ethanol (2d)



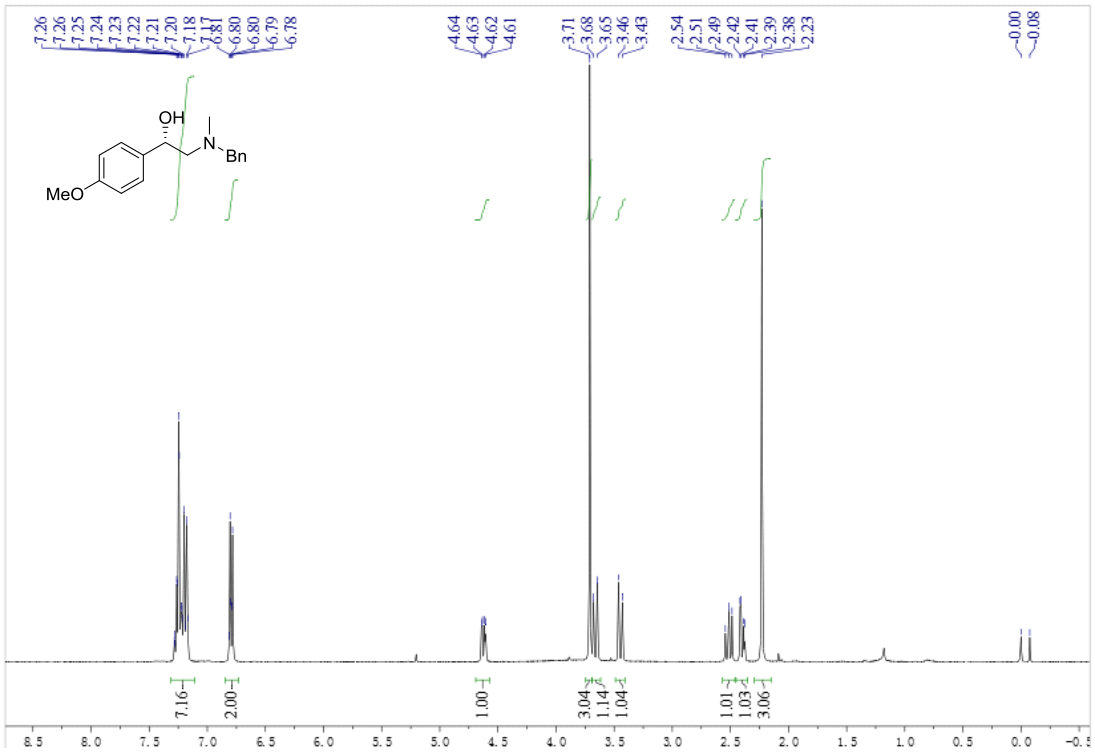


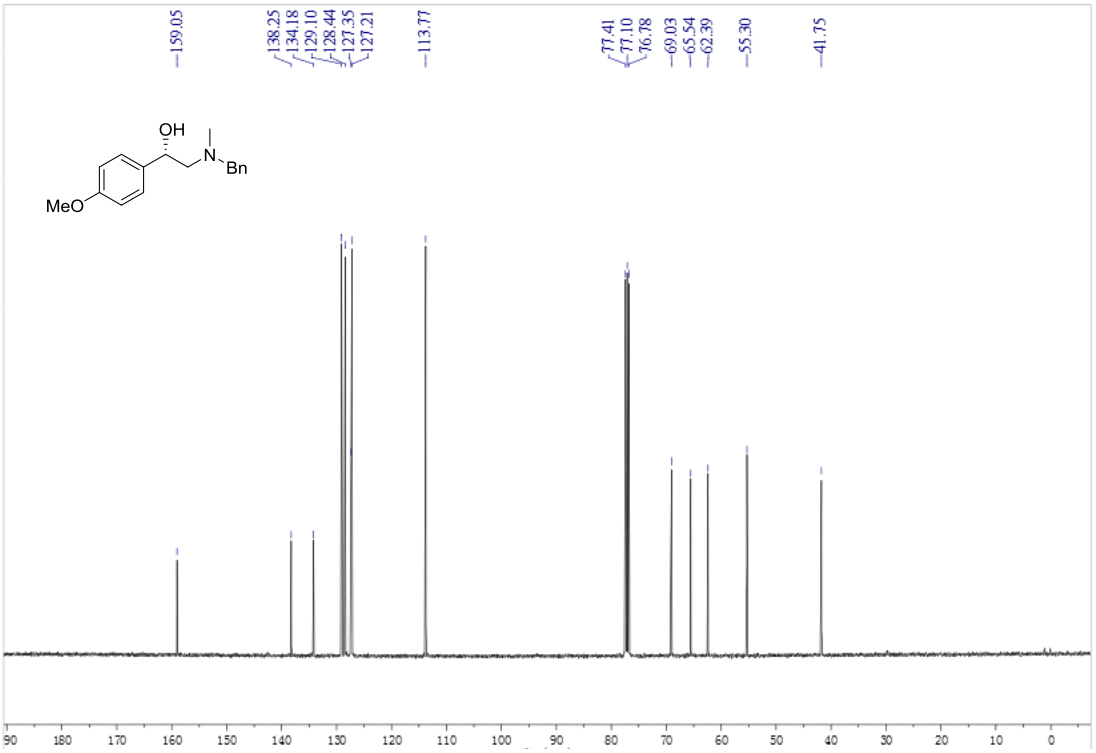
(*S*)-2-(Benzyl(methyl)amino)-1-(3-methoxyphenyl)ethanol (2e)



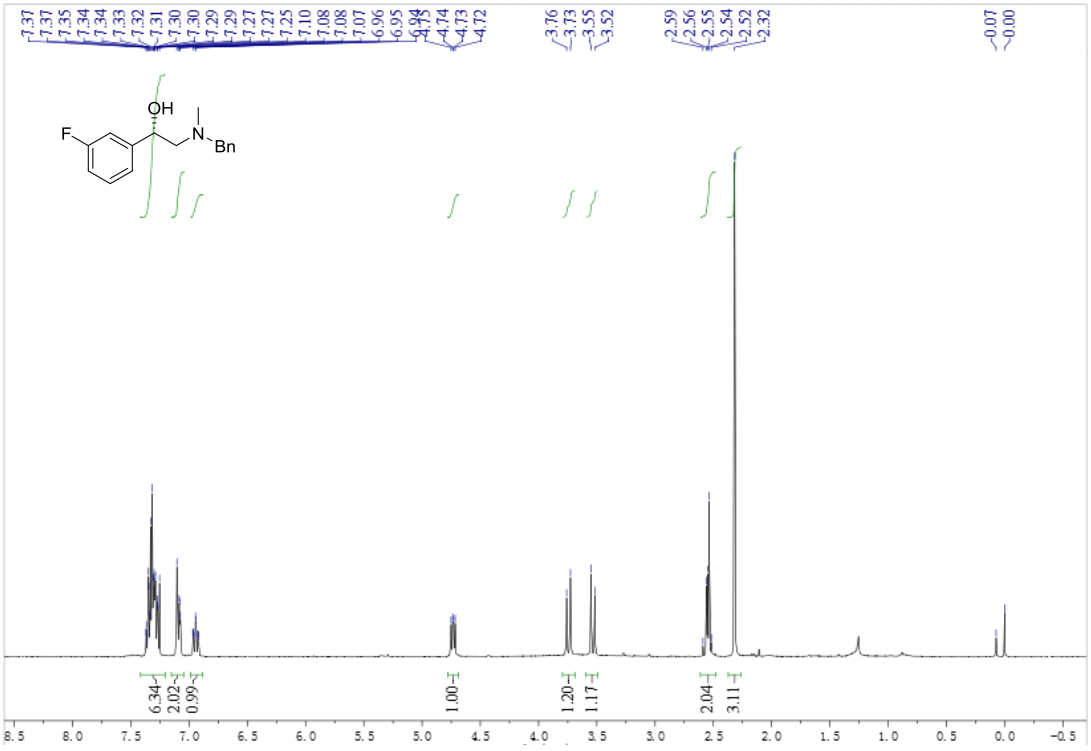


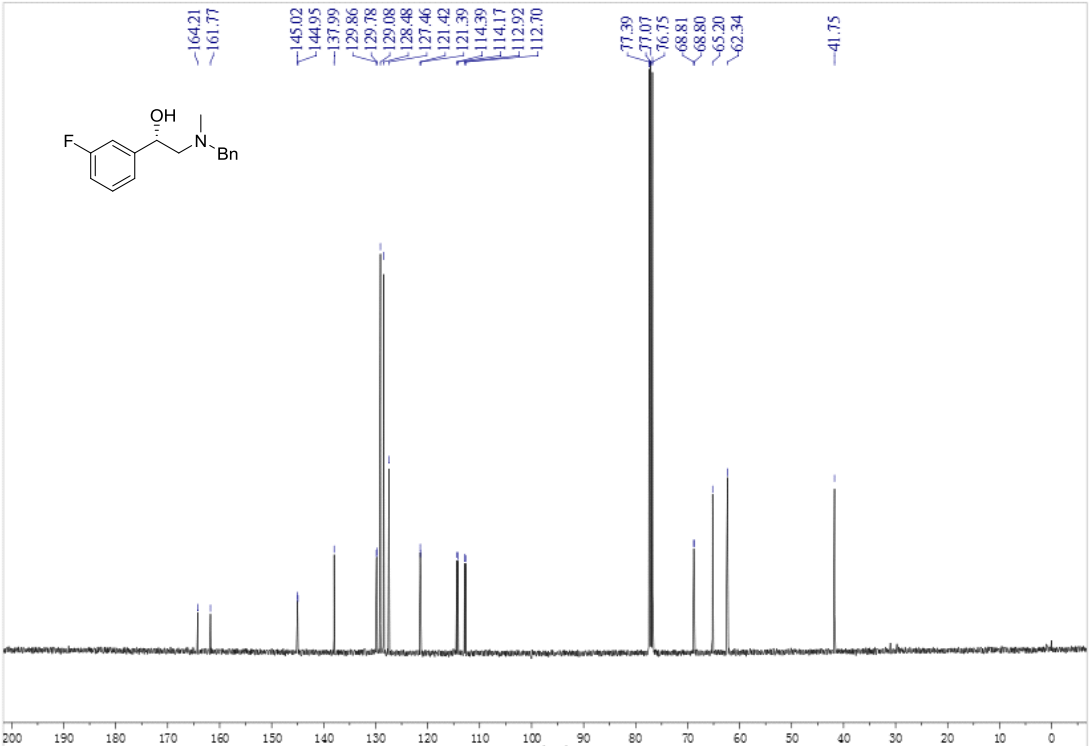
(*S*)-2-(Benzyl(methyl)amino)-1-(4-methoxyphenyl)ethanol (2f)



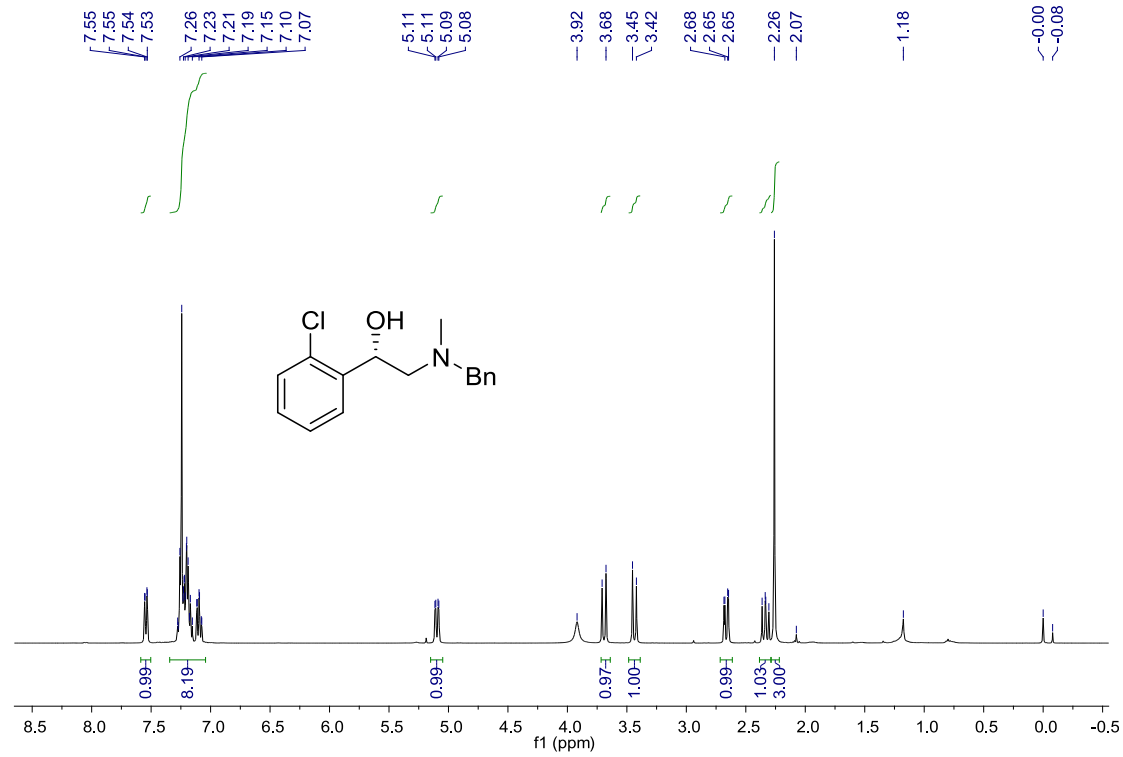


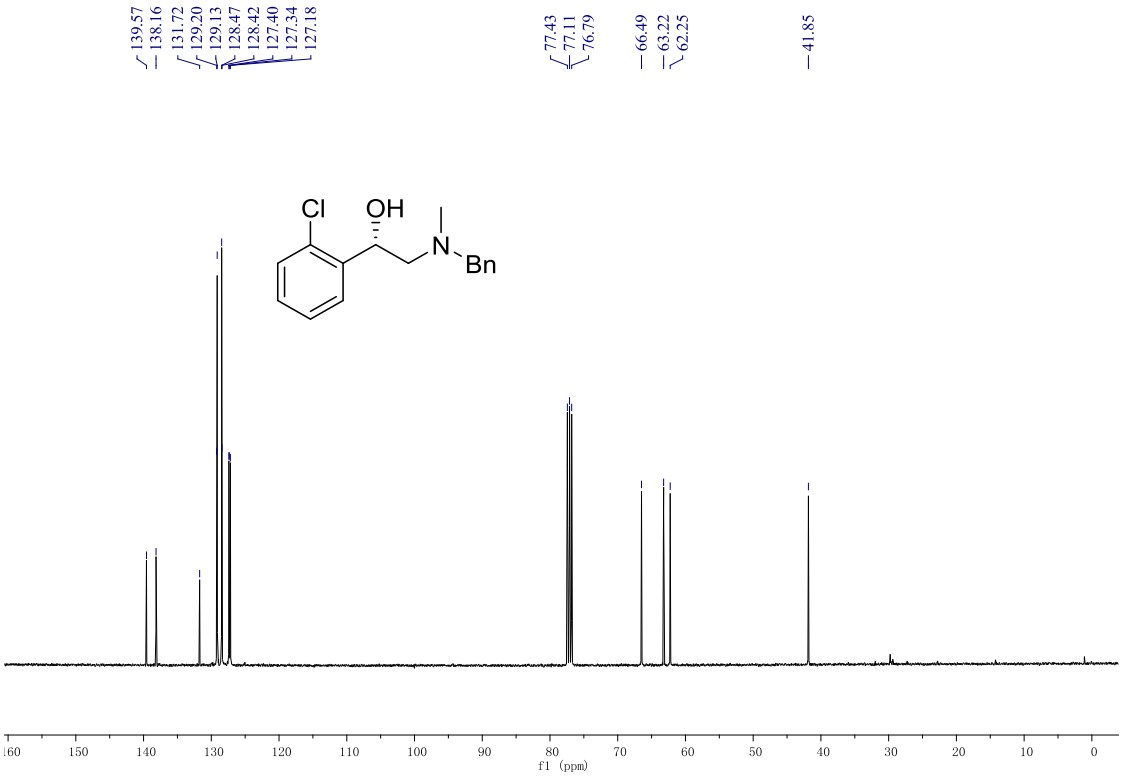
(*S*)-2-(benzyl(methyl)amino)-1-(3-fluorophenyl)ethanol (2g)



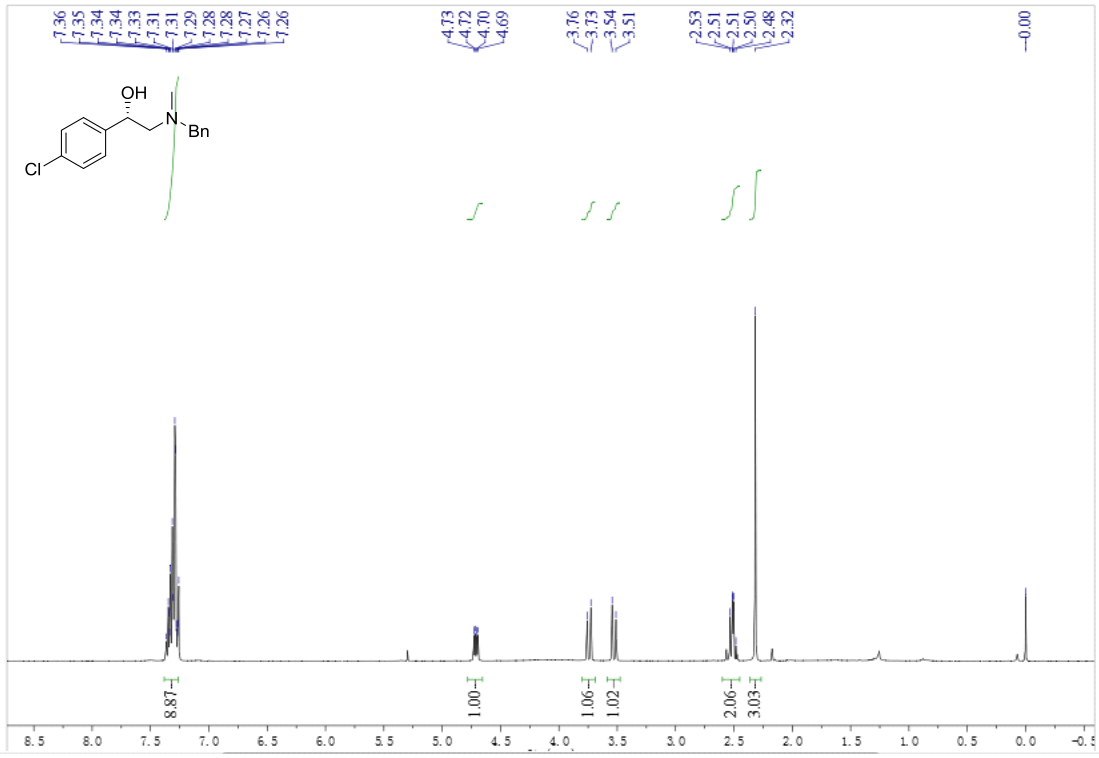


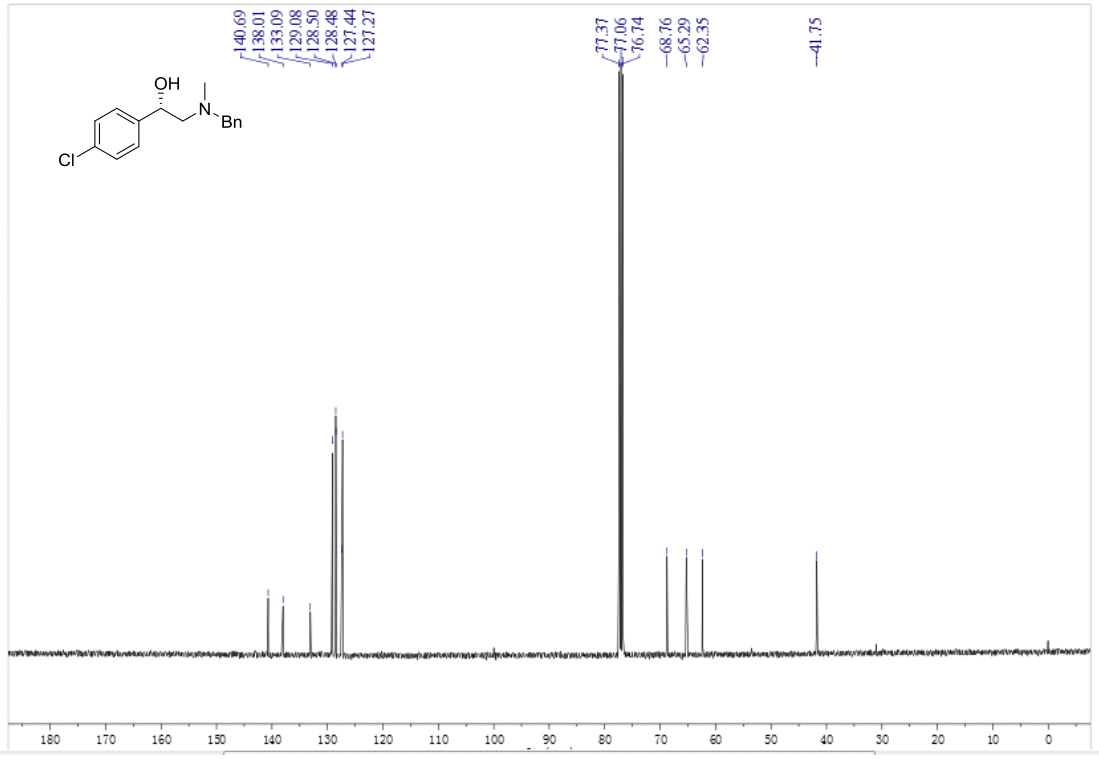
(*S*)-2-(Benzyl(methyl)amino)-1-(2-chlorophenyl)ethanol (2h)



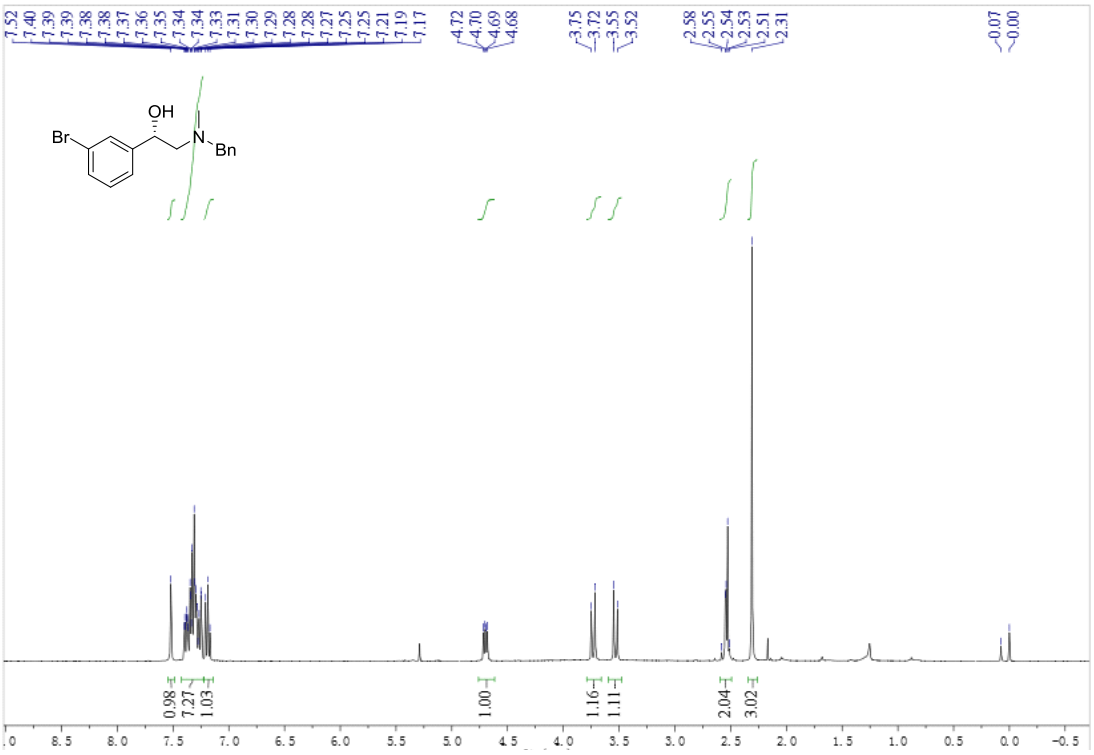


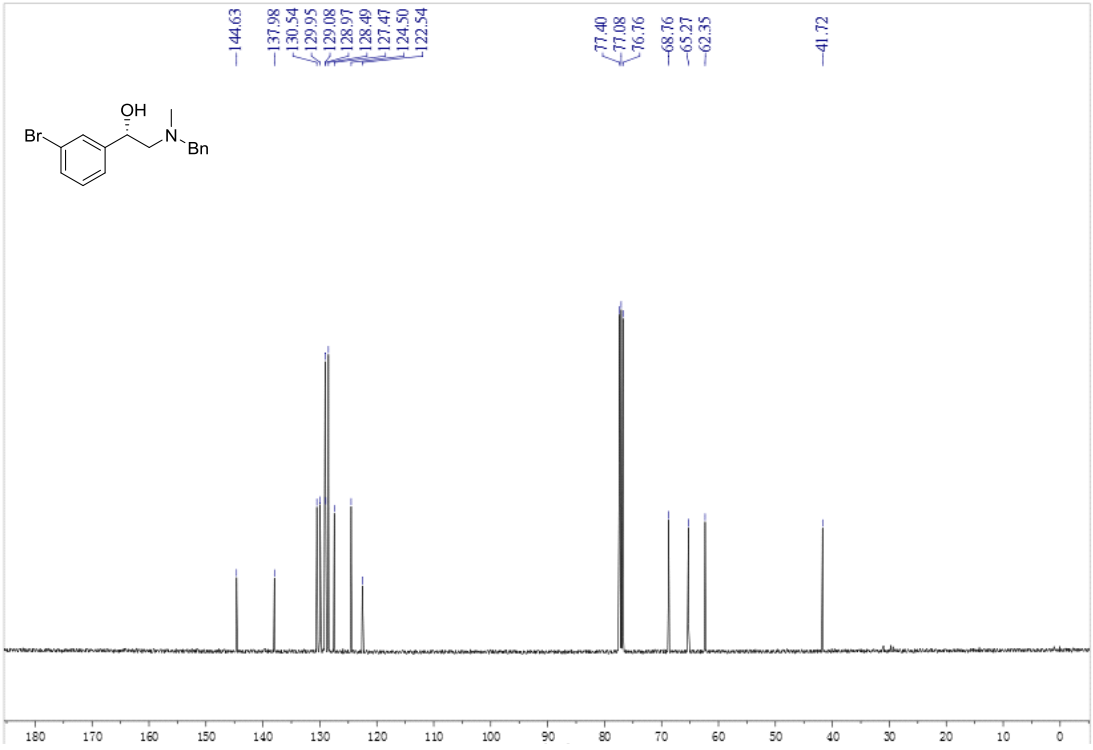
(*S*)-2-(Benzyl(methyl)amino)-1-(4-chlorophenyl)ethanol (2i)





(*S*)-2-(Benzyl(methyl)amino)-1-(3-bromophenyl)ethanol (2j)





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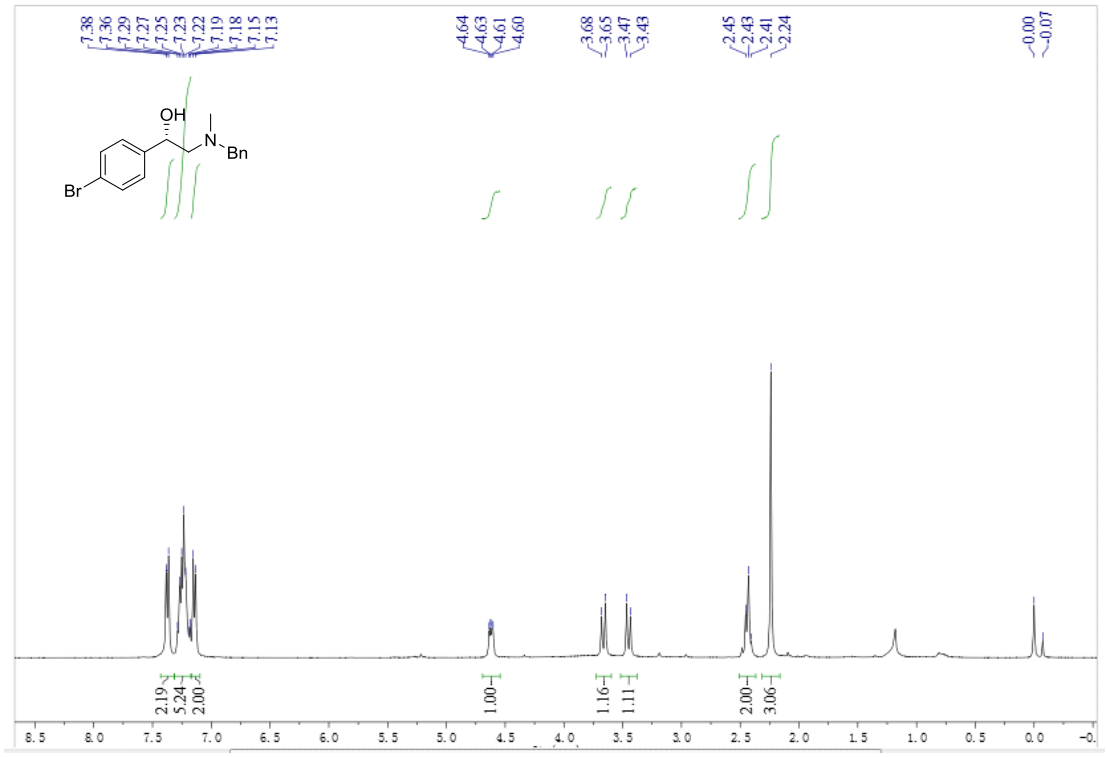
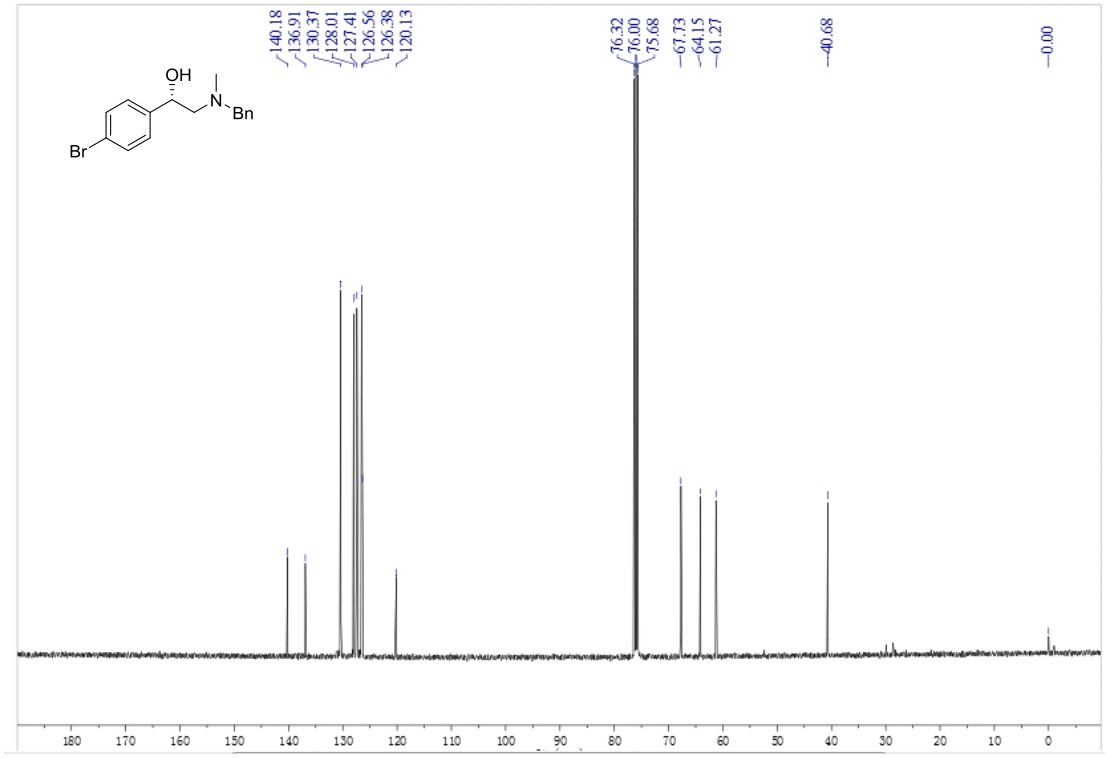
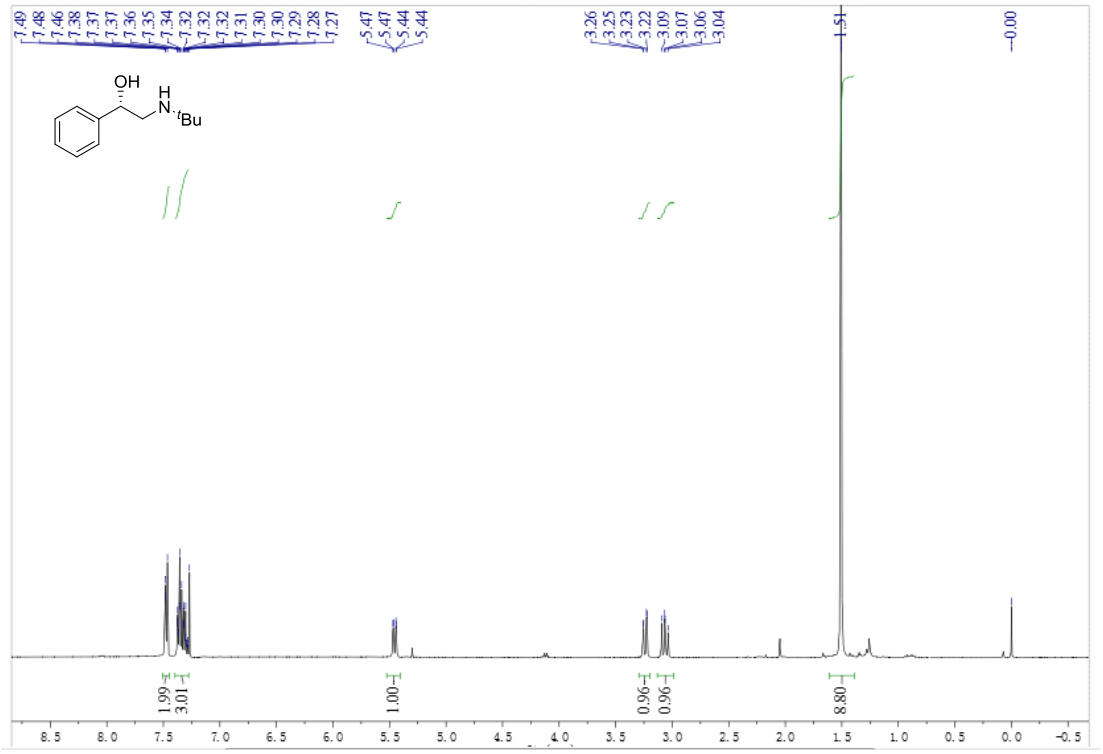
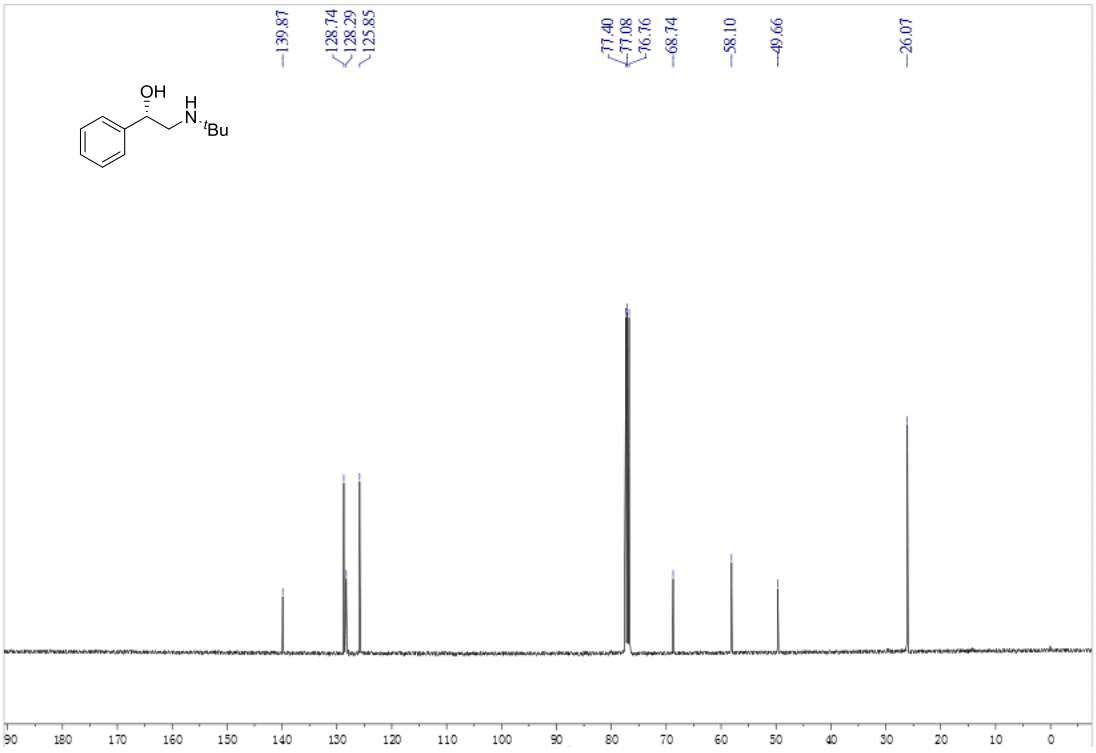


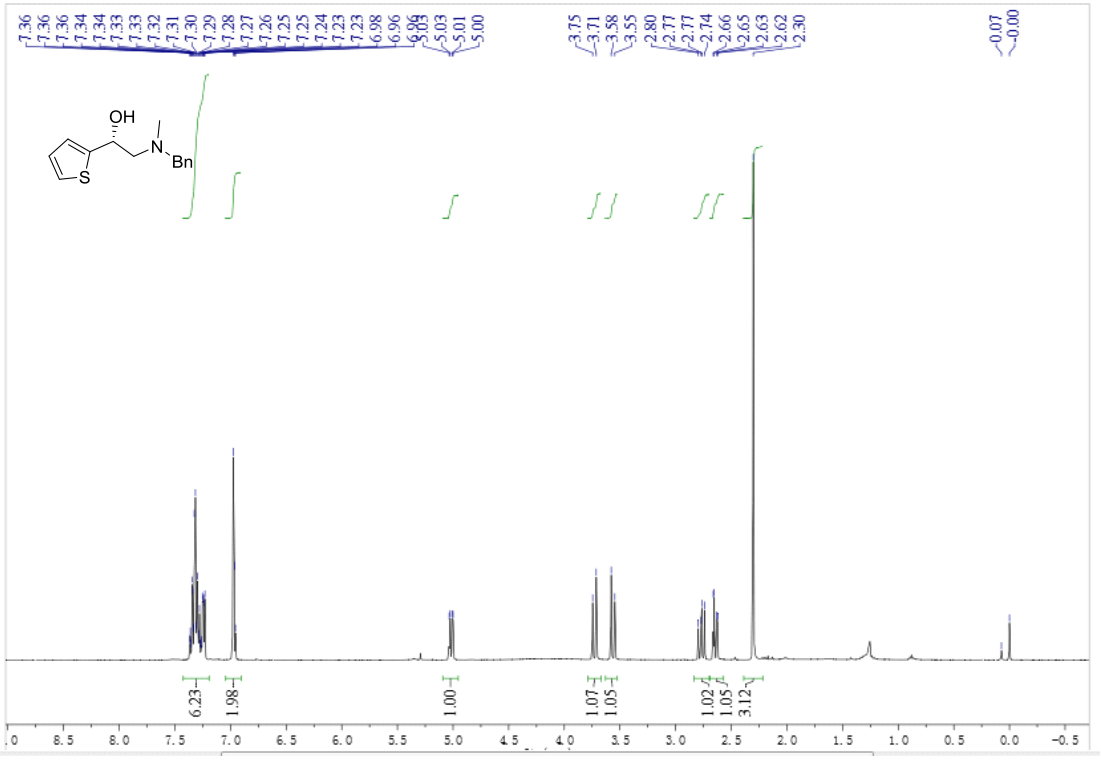


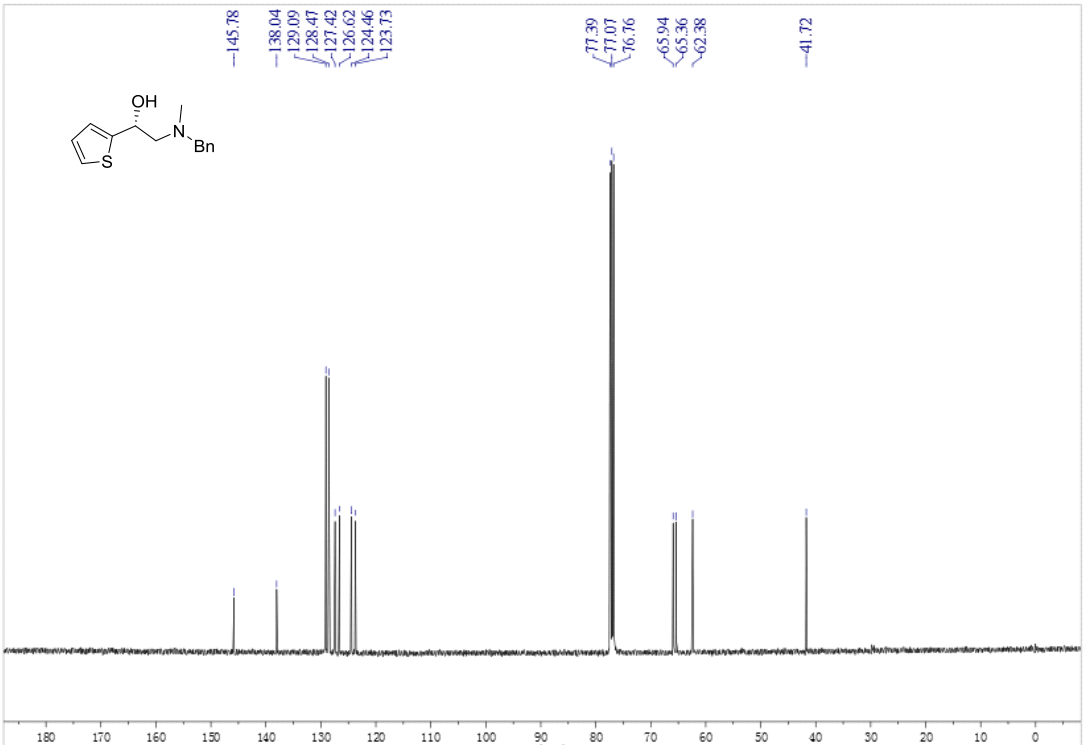
(*S*)-2-(tert-butylamino)-1-phenylethanol (2l)



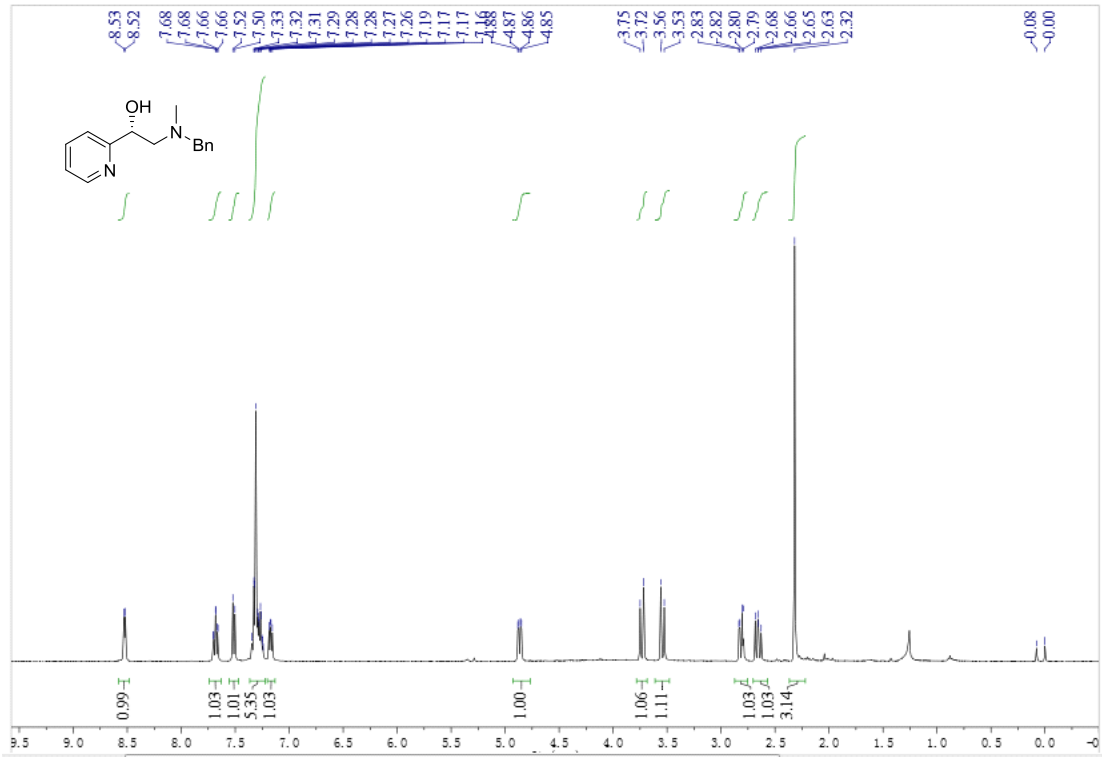


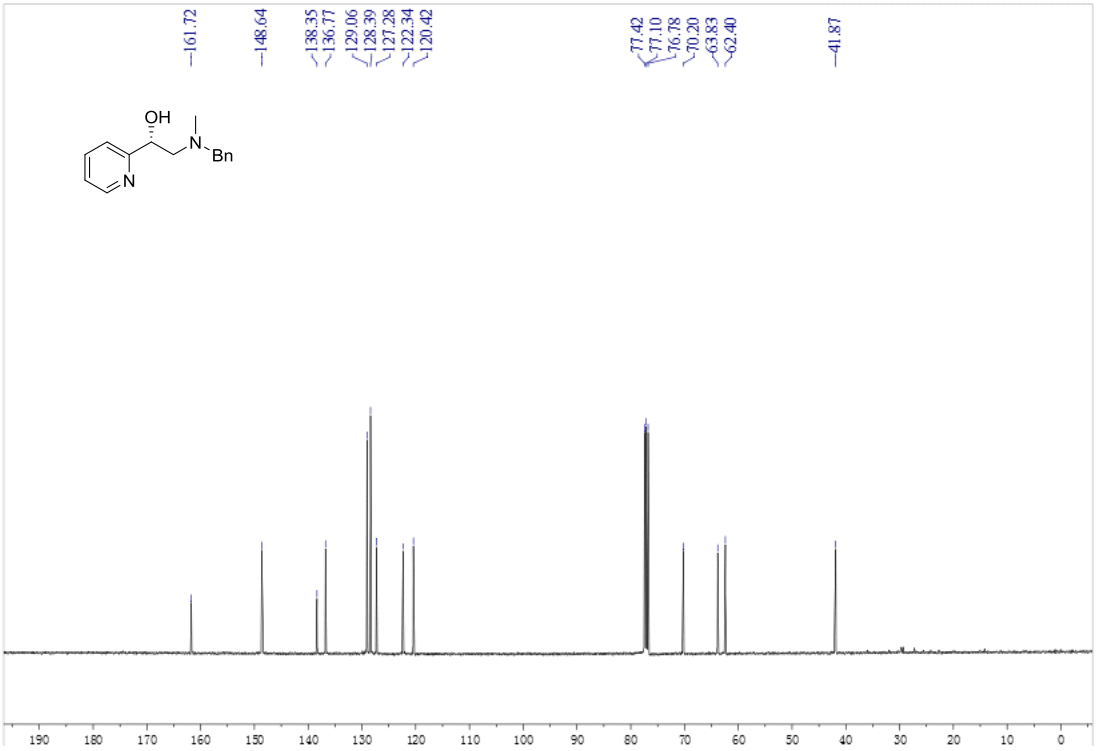
(*R*)-2-(benzyl(methyl)amino)-1-(thiophen-2-yl)ethanol (2m)



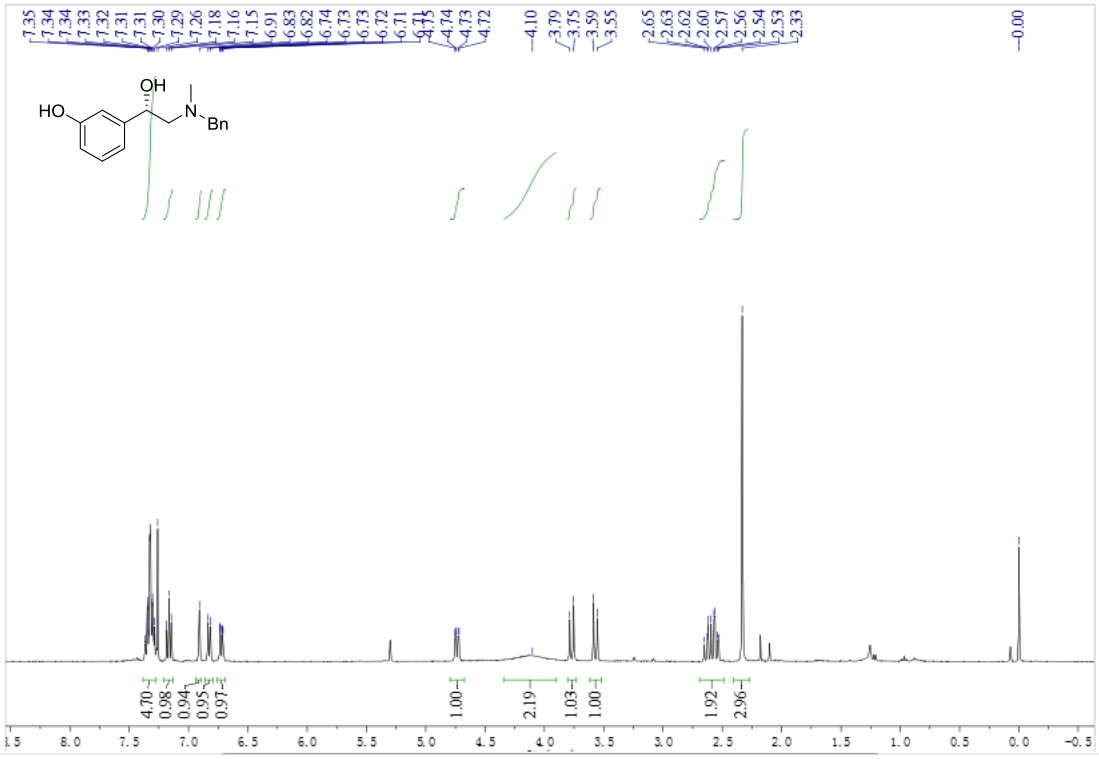


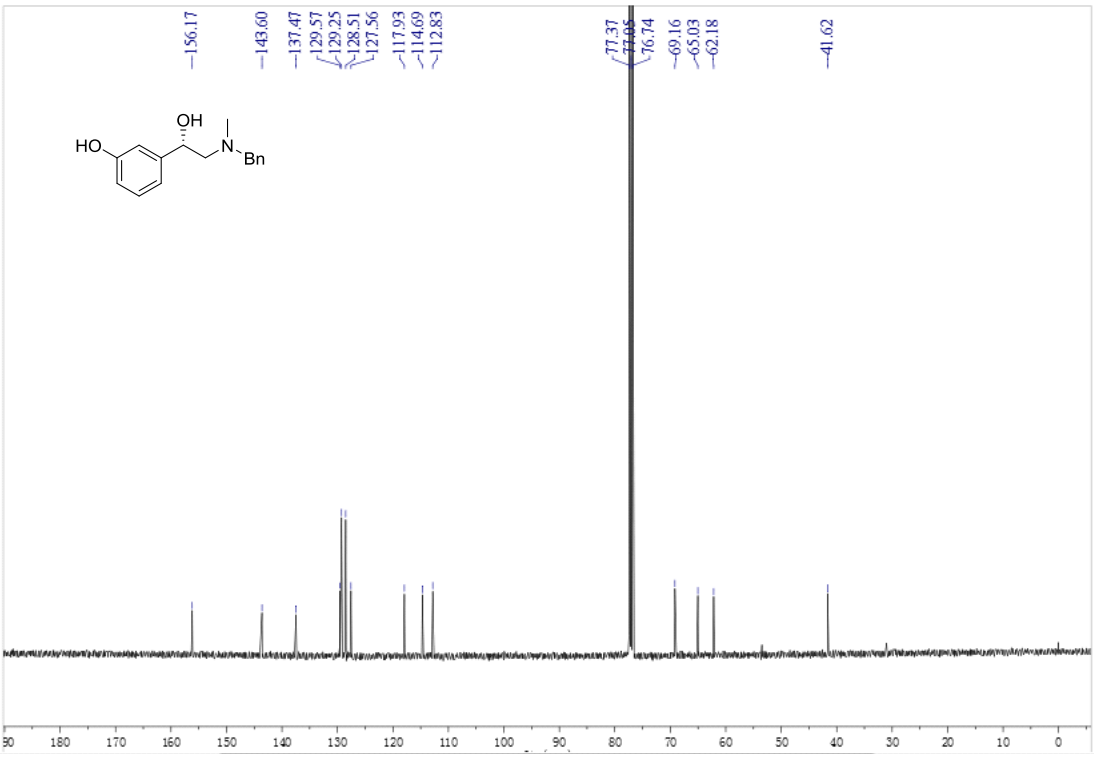
(*R*)-2-(benzyl(methyl)amino)-1-(pyridin-2-yl)ethanol (2n)





(*S*)-3-(2-(benzyl(methyl)amino)-1-hydroxyethyl)phenol (2o)





6. HPLC spectra

(*S*)-2-(Benzyl(methyl)amino)-1-phenylethanol (2a)

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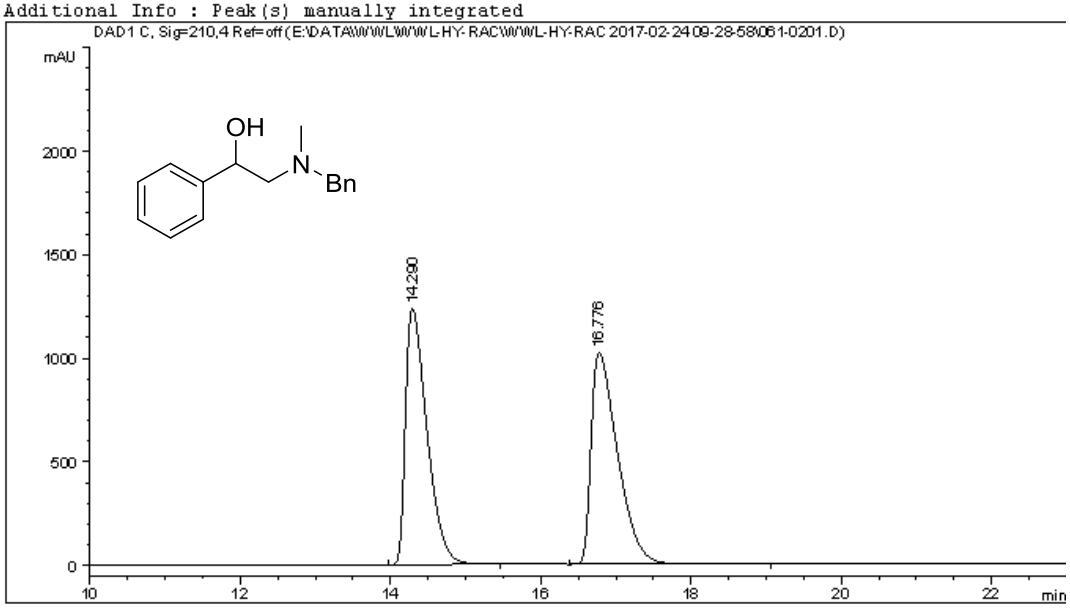


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    Do not use Multiplier & Dilution Factor with ISTDs


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    Additional Info : Peak(s) manually integrated
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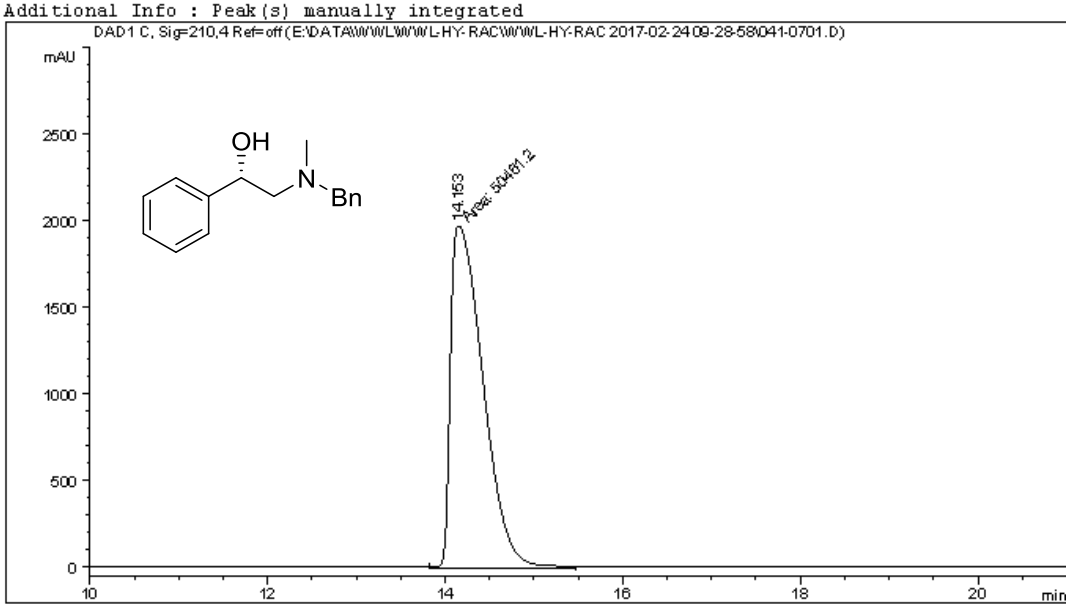
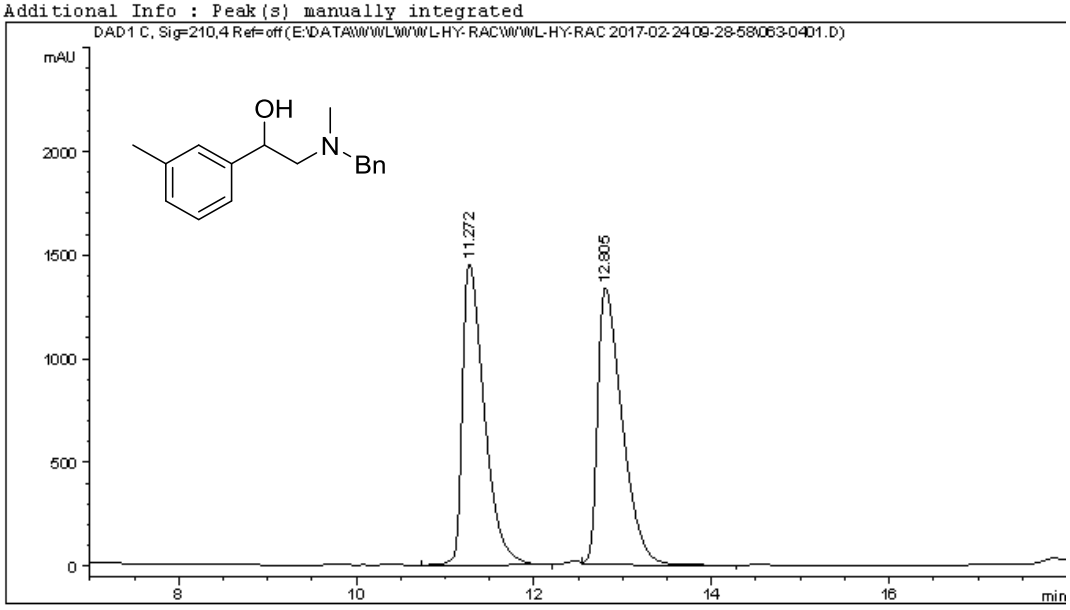



```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  14.153 MM    0.4254 5.04612e4  1977.12036 100.0000

    Totals :                  5.04612e4  1977.12036


    ======================================================================
                              *** End of Report ***
```

(*S*)-2-(Benzyl(methyl)amino)-1-(3-methylphenyl)ethanol (2b)

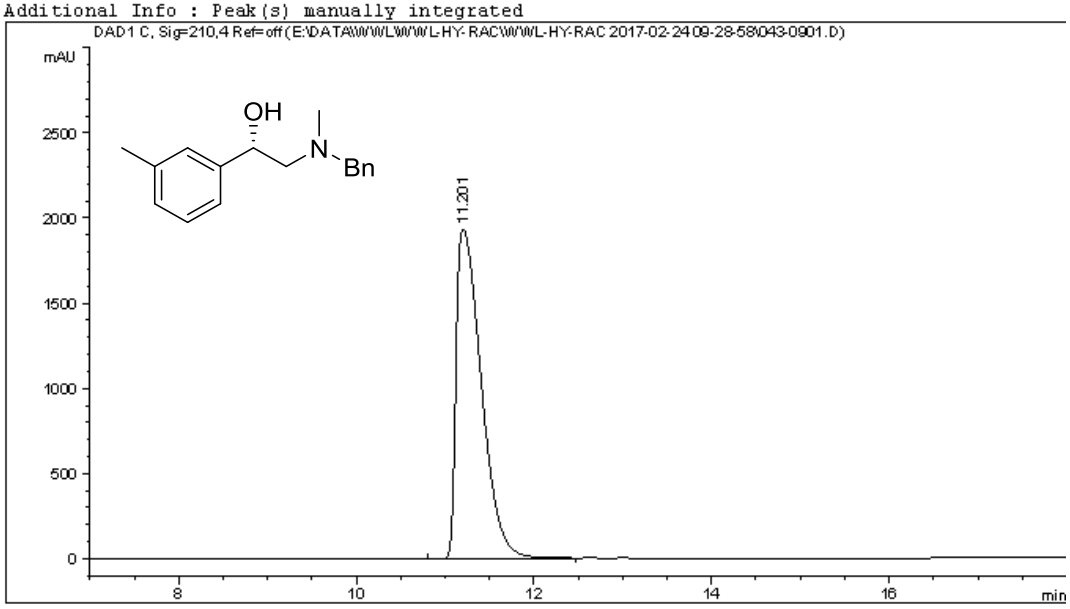
```
Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\063-0401.D
Sample Name: M-ME-RAC

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   4
    Acq. Instrument : 1260HPLC-DAD                    Location : Vial 63
    Injection Date  : 2/24/2017 10:43:54 AM               Inj :   1
                                                    Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/24/2017 9:28:58 AM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 4:22:58 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  11.272 BB    0.2618 2.48888e4  1453.32751  49.2322
       2  12.805 VB    0.2900 2.56651e4  1336.59631  50.7678

    Totals :                  5.05540e4  2789.92383


    ======================================================================
                              *** End of Report ***

1260HPLC-DAD 2/24/2017 4:23:05 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\043-0901.D
Sample Name: M-ME-EE

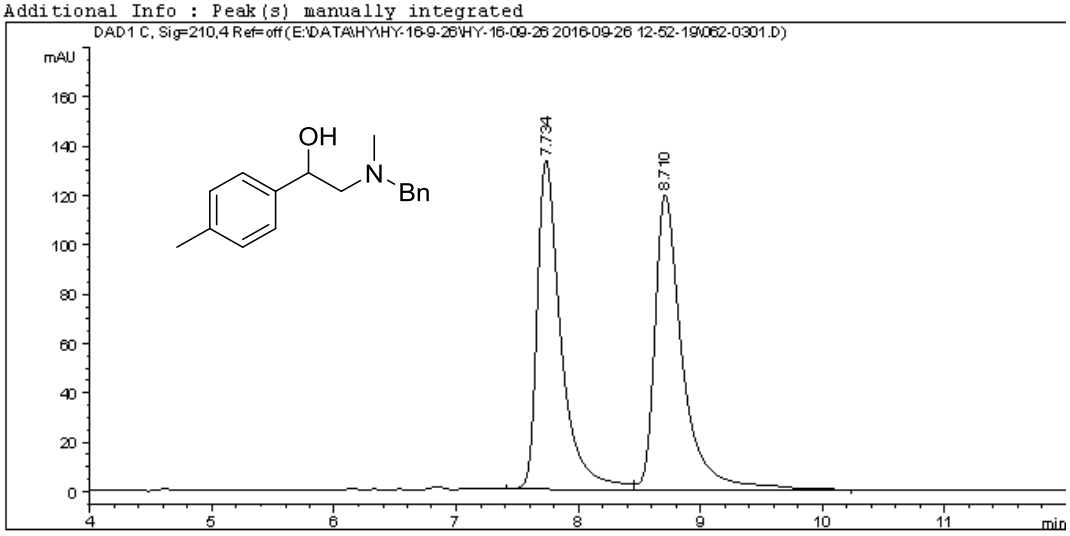
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   9
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 43
    Injection Date  : 2/24/2017 1:18:24 PM               Inj :   1
                                                   Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/24/2017 9:28:58 AM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 4:24:25 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  11.201 BB    0.3043 3.78525e4  1934.52808 100.0000

    Totals :                  3.78525e4  1934.52808


    ======================================================================
                              *** End of Report ***
```

(*S*)-2-(Benzyl(methyl)amino)-1-(4-methylphenyl)ethanol (2c)

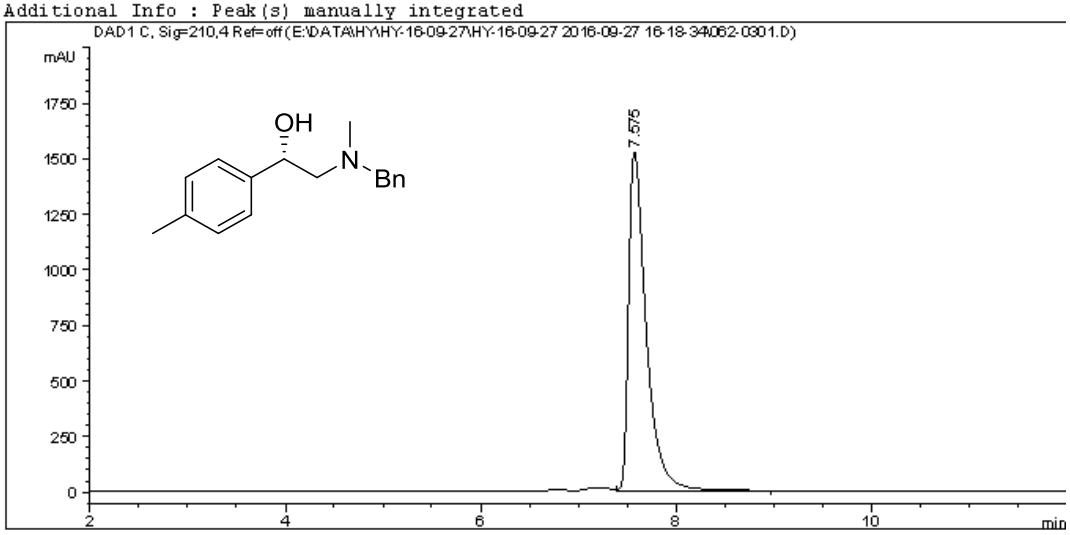
```
Data File E:\DATA\HY\HY-16-9-26\HY-16-09-26 2016-09-26 12-52-19\062-0301.D
Sample Name: HY-598

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   3
    Acq. Instrument : 1260HPLC-DAD                    Location : Vial 62
    Injection Date  : 9/26/2016 1:20:05 PM                 Inj :   1
                                                    Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\HY\HY-16-9-26\HY-16-09-26 2016-09-26 12-52-19\DAD-0J(1-6)-85-15-
                      1.0ML-ALLNM-15MIN.M
    Last changed    : 9/26/2016 12:52:20 PM by SYSTEM
    Analysis Method : E:\DATA\HY\HY-16-9-26\HY-16-09-26 2016-09-26 12-52-19\DAD-0J(1-6)-85-15-
                      1.0ML-ALLNM-15MIN.M (Sequence Method)
    Last changed    : 2/9/2017 8:40:58 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1   7.734 BV    0.2002 1809.70081  133.49043  49.1032
       2   8.710 VB    0.2310 1875.80273  119.59895  50.8968

    Totals :                   3685.50354  253.08938


    ======================================================================
                            *** End of Report ***


1260HPLC-DAD 2/9/2017 8:41:03 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\062-0301.D
Sample Name: HY-16-09-27-598

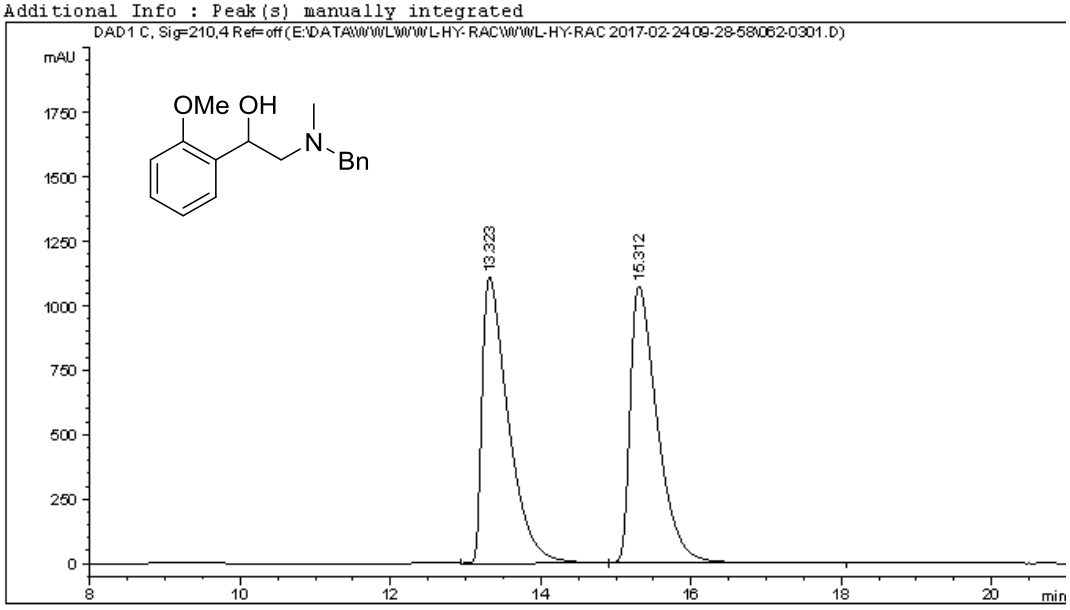
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   3
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 62
    Injection Date  : 9/27/2016 4:51:23 PM               Inj :   1
                                                   Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\DAD-0J(1-6)-85-15
                      -1.0ML-ALLNM-15MIN.M
    Last changed    : 9/27/2016 4:18:35 PM by SYSTEM
    Analysis Method : E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\DAD-0J(1-6)-85-15
                      -1.0ML-ALLNM-15MIN.M (Sequence Method)
    Last changed    : 2/9/2017 8:43:44 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1   7.575 VB    0.1889 1.92436e4  1528.72388 100.0000

    Totals :                   1.92436e4  1528.72388


    ======================================================================
                              *** End of Report ***
```

(*S*)-2-(Benzyl(methyl)amino)-1-(2-methoxyphenyl)ethanol (2d)

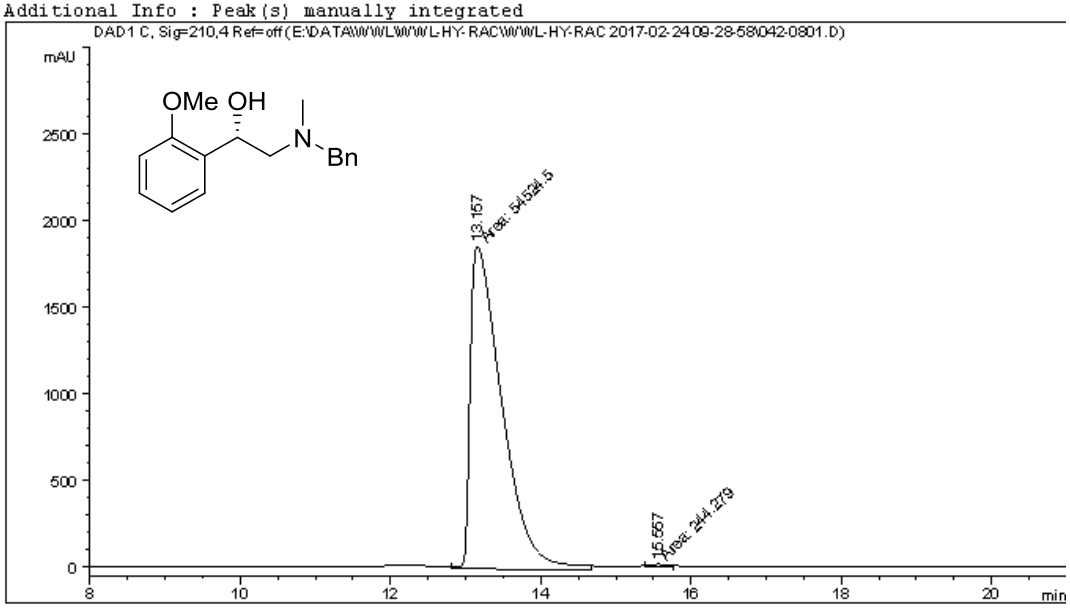
```
Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\062-0301.D
Sample Name: O-ME0-RAC

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   3
    Acq. Instrument : 1260HPLC-DAD                    Location : Vial 62
    Injection Date  : 2/24/2017 10:12:59 AM              Inj :   1
                                                    Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/24/2017 9:28:58 AM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 4:26:10 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  13.323 BV    0.3605 2.68774e4  1109.82776  49.8642
       2  15.312 VB    0.3791 2.70238e4  1075.81323  50.1358

    Totals :                  5.39012e4  2185.64099


    ======================================================================
                              *** End of Report ***

1260HPLC-DAD 2/24/2017 4:26:23 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\042-0801.D
Sample Name: O-ME0-EE

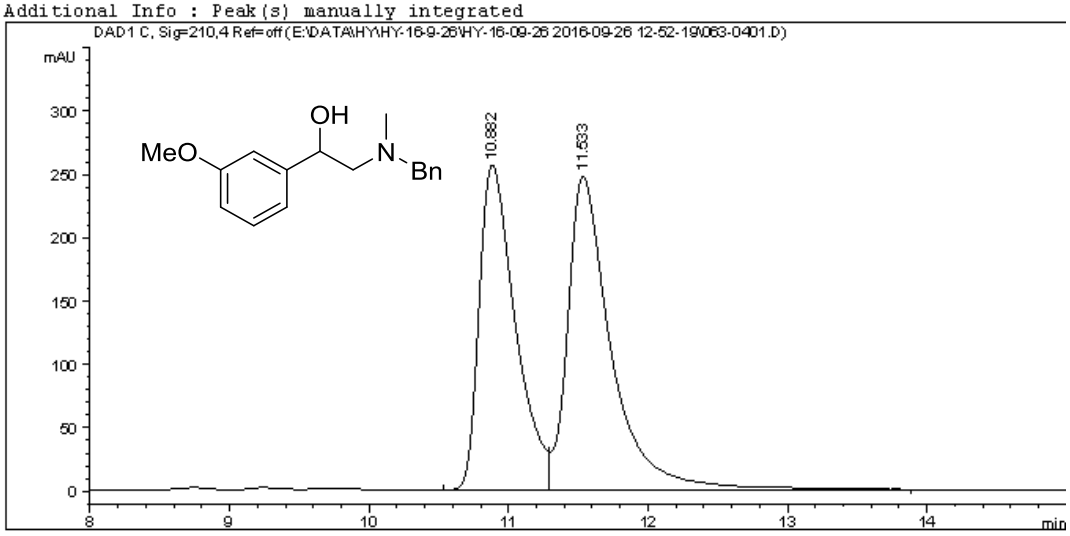
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   8
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 42
    Injection Date  : 2/24/2017 12:47:32 PM               Inj :   1
                                                  Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/24/2017 9:28:58 AM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 4:28:23 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]        %
    ----|-------|----|-------|----------|----------|--------|
       1  13.157 MM    0.4882 5.45245e4  1861.59180  99.5540
       2  15.557 MM    0.3054  244.27858   13.33094   0.4460

    Totals :                  5.47688e4  1874.92273


    ======================================================================
                              *** End of Report ***
```

(*S*)-2-(Benzyl(methyl)amino)-1-(3-methoxyphenyl)ethanol (2e)

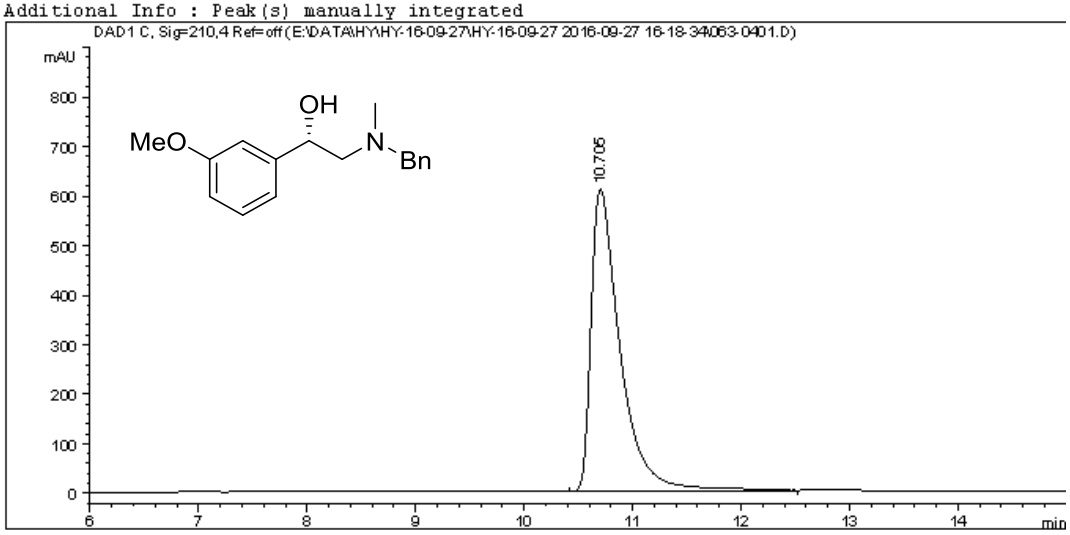
```
Data File E:\DATA\HY\HY-16-9-26\HY-16-09-26 2016-09-26 12-52-19\063-0401.D
Sample Name: HY-599

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   4
    Acq. Instrument : 1260HPLC-DAD                    Location : Vial 63
    Injection Date  : 9/26/2016 1:35:58 PM                 Inj :   1
                                                    Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\HY\HY-16-9-26\HY-16-09-26 2016-09-26 12-52-19\DAD-0J(1-6)-85-15-
                      1.0ML-ALLNM-15MIN.M
    Last changed    : 9/26/2016 12:52:20 PM by SYSTEM
    Analysis Method : E:\DATA\HY\HY-16-9-26\HY-16-09-26 2016-09-26 12-52-19\DAD-0J(1-6)-85-15-
                      1.0ML-ALLNM-15MIN.M (Sequence Method)
    Last changed    : 2/9/2017 8:47:00 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  10.882 BV    0.2700 4619.91064  256.70032  46.2962
       2  11.533 VB    0.3163 5359.11670  247.79356  53.7038

    Totals :                  9979.02734  504.49388


    ======================================================================
                            *** End of Report ***


1260HPLC-DAD 2/9/2017 8:47:05 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\063-0401.D
Sample Name: HY-16-09-27-599

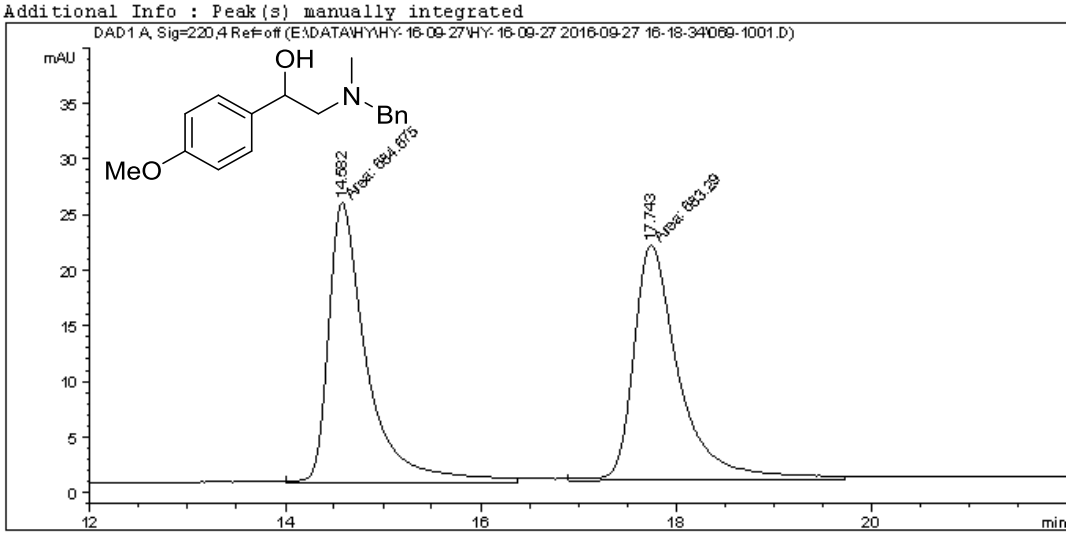
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   4
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 63
    Injection Date  : 9/27/2016 5:07:19 PM                Inj :   1
                                                  Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\DAD-0J(1-6)-85-15
                      -1.0ML-ALLNM-15MIN.M
    Last changed    : 9/27/2016 4:18:35 PM by SYSTEM
    Analysis Method : E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\DAD-0J(1-6)-85-15
                      -1.0ML-ALLNM-15MIN.M (Sequence Method)
    Last changed    : 2/9/2017 8:50:50 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  10.705 BB    0.2754 1.1370le4   610.29456 100.0000

    Totals :                  1.1370le4   610.29456


    ======================================================================
                              *** End of Report ***
```

(*S*)-2-(Benzyl(methyl)amino)-1-(4-methoxyphenyl)ethanol (2f)

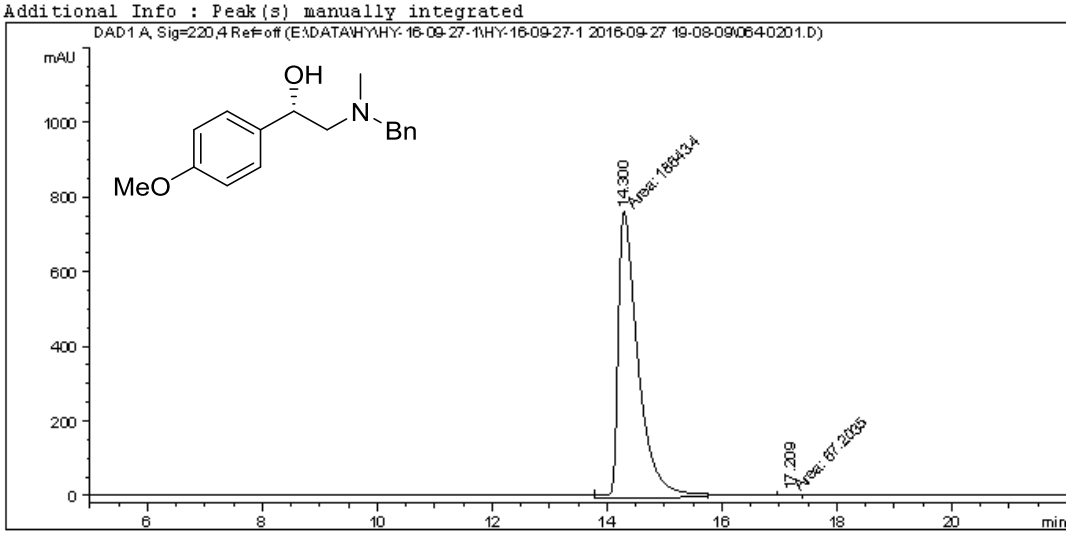
```
Data File E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\069-1001.D
Sample Name: HY-16-09-27-600-RAC

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :  10
    Acq. Instrument : 1260HPLC-DAD                    Location : Vial 69
    Injection Date  : 9/27/2016 6:42:45 PM                Inj :   1
                                                    Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\DAD-0J(1-6)-85-15
                      -1.0ML-ALLNM-15MIN.M
    Last changed    : 9/27/2016 7:06:17 PM by SYSTEM
                      (modified after loading)
    Analysis Method : E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\DAD-0J(1-6)-85-15
                      -1.0ML-ALLNM-15MIN.M (Sequence Method)
    Last changed    : 2/9/2017 8:31:33 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 A, Sig=220,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  14.582 MM    0.4541  684.67493   25.13113  50.0506
       2  17.743 MM    0.5397  683.29016   21.10250  49.9494

    Totals :                  1367.96509   46.23363

    ======================================================================
                              *** End of Report ***


1260HPLC-DAD 2/9/2017 8:31:39 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\HY\HY-16-09-27-1\HY-16-09-27-1 2016-09-27 19-08-09\064-0201.D
Sample Name: HY-16-09-27-600

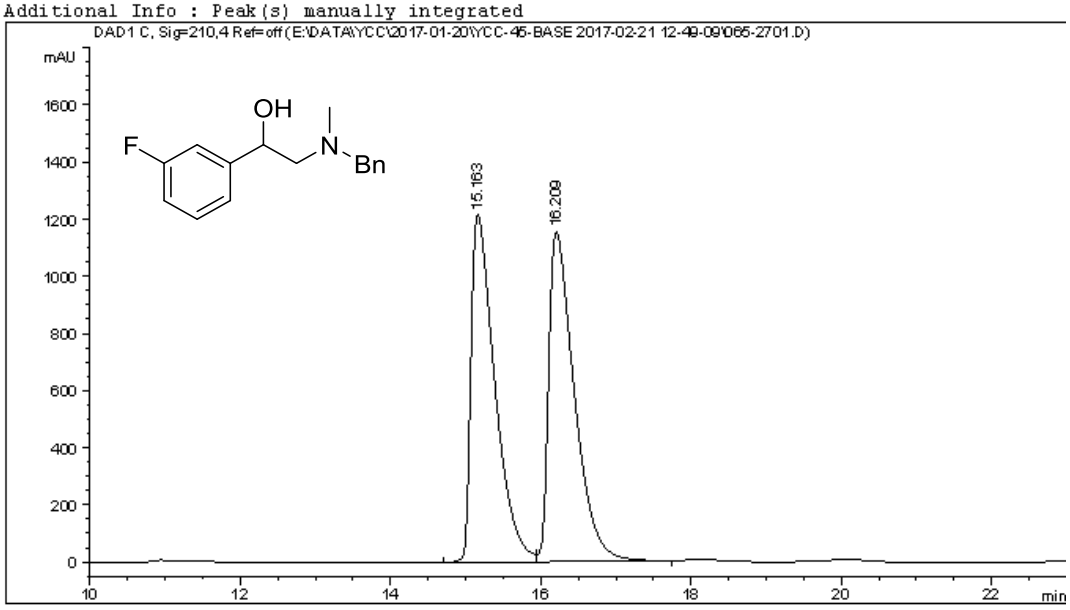
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 64
    Injection Date  : 9/27/2016 7:20:03 PM               Inj :   1
                                                   Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\HY\HY-16-09-27-1\HY-16-09-27-1 2016-09-27 19-08-09\DAD-0J(1-6)-
                      85-15-1.0ML-ALLNM-15MIN.M
    Last changed    : 9/27/2016 7:27:50 PM by SYSTEM
                      (modified after loading)
    Analysis Method : E:\DATA\HY\HY-16-09-27-1\HY-16-09-27-1 2016-09-27 19-08-09\DAD-0J(1-6)-
                      85-15-1.0ML-ALLNM-15MIN.M (Sequence Method)
    Last changed    : 2/9/2017 8:37:13 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 A, Sig=220,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  14.300 MM    0.4055 1.86434e4   766.19769  99.6408
       2  17.209 MM    0.3921   67.20346    2.85659   0.3592

    Totals :                  1.87106e4   769.05429


    ======================================================================
                            *** End of Report ***
```

(*S*)-2-(benzyl(methyl)amino)-1-(3-fluorophenyl)ethanol (2g)

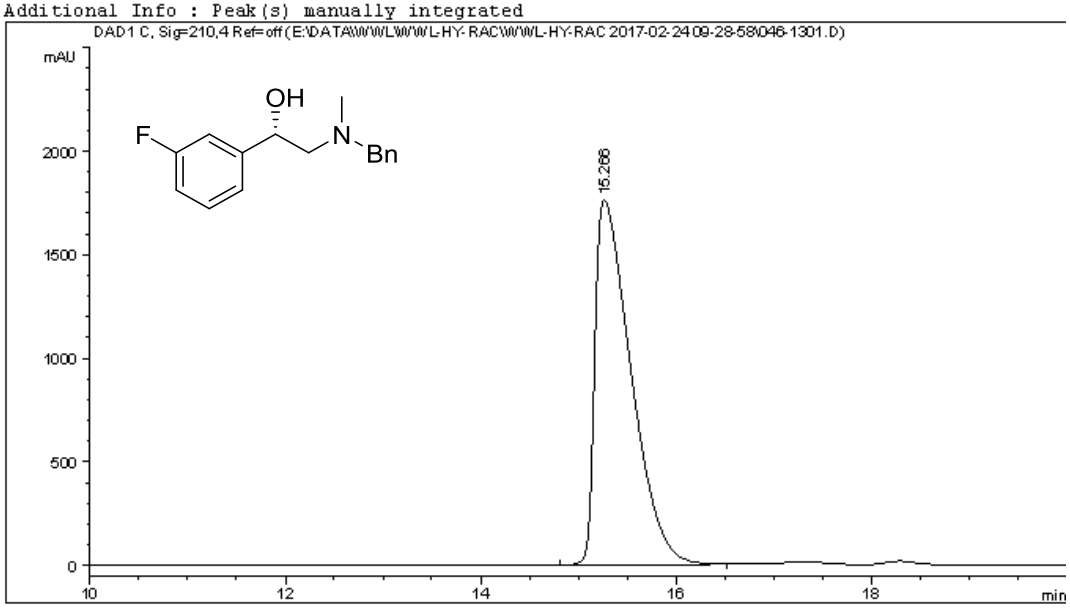
```
Data File E:\DATA\YCC\2017-01-20\YCC-45-BASE 2017-02-21 12-49-09\065-2701.D
Sample Name: HY-M-F-RAC

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :  27
    Acq. Instrument : 1260HPLC-DAD                    Location : Vial 65
    Injection Date  : 2/22/2017 3:02:27 AM                Inj :   1
                                                    Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\YCC\2017-01-20\YCC-45-BASE 2017-02-21 12-49-09\DAD-0J(1-6)-97-3-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/21/2017 9:57:46 PM by SYSTEM
    Analysis Method : E:\DATA\YCC\2017-01-20\YCC-45-BASE 2017-02-21 12-49-09\DAD-0J(1-6)-97-3-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 9:54:52 AM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  15.163 BV    0.3313 2.68137e4  1215.96887  49.4915
       2  16.209 VB    0.3586 2.73646e4  1154.09863  50.5085

    Totals :                  5.41783e4  2370.06750


    ======================================================================
                              *** End of Report ***

1260HPLC-VWD 2/24/2017 9:54:59 AM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\046-1301.D
Sample Name: M-F-EE

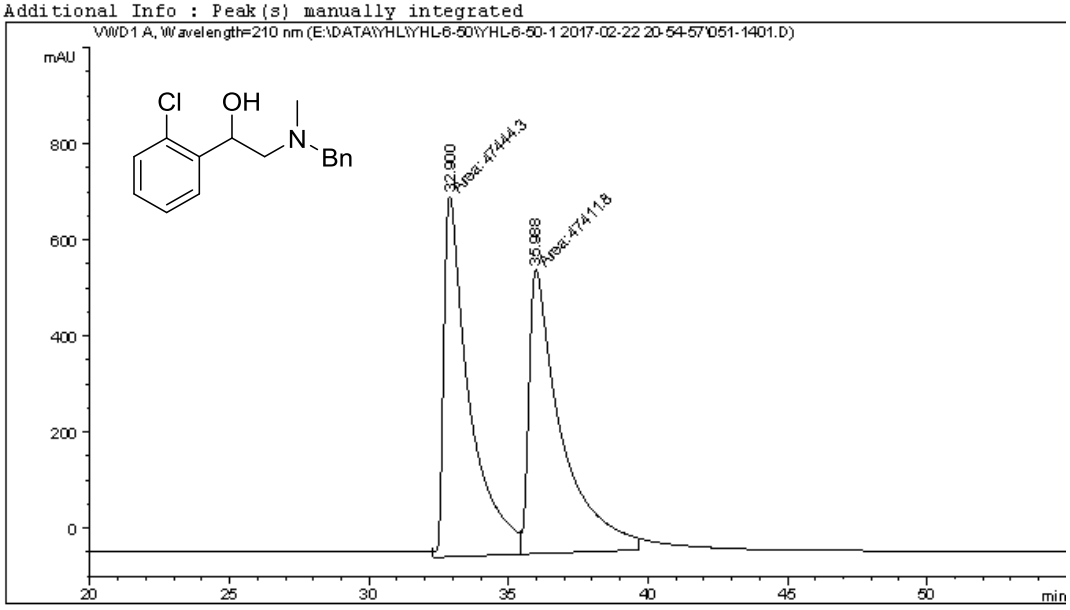
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :  13
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 46
    Injection Date  : 2/24/2017 3:02:15 PM                Inj :   1
                                                  Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-97-3-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/24/2017 9:45:54 AM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-97-3-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 4:18:55 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  15.266 BB    0.3920 4.50202e4  1762.76770 100.0000

    Totals :                  4.50202e4  1762.76770


    ======================================================================
                              *** End of Report ***
```

(*S*)-2-(Benzyl(methyl)amino)-1-(2-chlorophenyl)ethanol (2h)

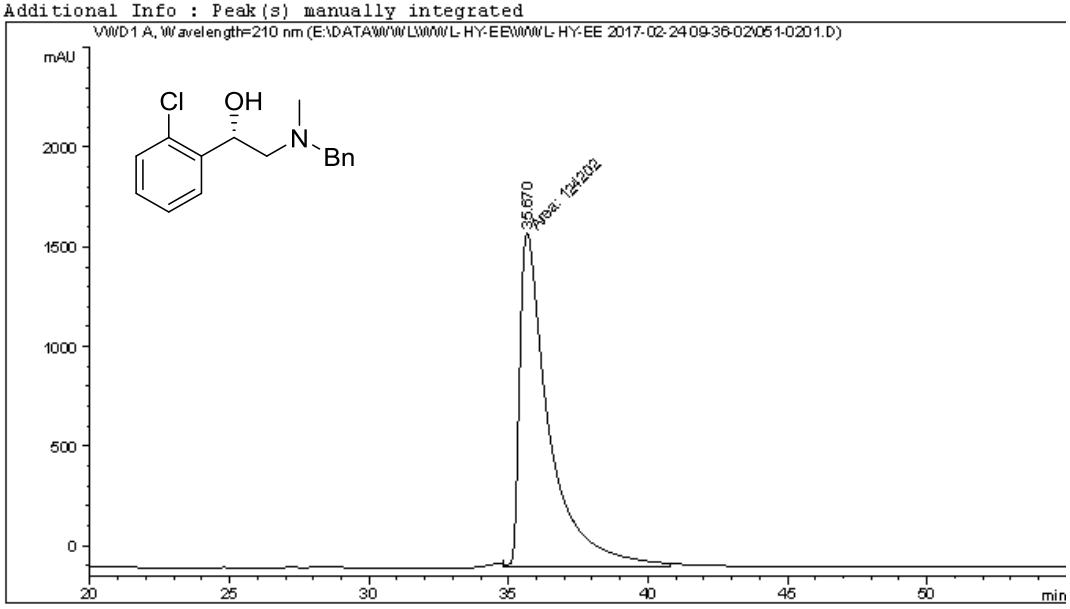
```
Data File E:\DATA\YHL\YHL-6-50\YHL-6-50-1 2017-02-22 20-54-57\051-1401.D
Sample Name: HY-O-CL-RAC

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :  14
    Acq. Instrument : 1260HPLC-VWD                    Location : Vial 51
    Injection Date  : 2/23/2017 6:30:51 AM                 Inj :   1
                                                    Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\YHL\YHL-6-50\YHL-6-50-1 2017-02-22 20-54-57\VWD-AD(1-2)-98-2-1UL
                      -0.3ML-210NM-60MIN.M
    Last changed    : 2/22/2017 9:42:42 PM by SYSTEM
    Analysis Method : E:\DATA\YHL\YHL-6-50\YHL-6-50-1 2017-02-22 20-54-57\VWD-AD(1-2)-98-2-1UL
                      -0.3ML-210NM-60MIN.M (Sequence Method)
    Last changed    : 2/23/2017 8:13:44 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=210 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  32.900 MF    1.0537 4.74443e4   750.42676  50.0171
       2  35.988 FM    1.3393 4.74118e4   589.99445  49.9829

    Totals :                  9.48562e4  1340.42120


    ======================================================================
                              *** End of Report ***

1260HPLC-VWD 2/23/2017 8:13:48 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-EE\WWL-HY-EE 2017-02-24 09-36-02\051-0201.D
Sample Name: HY-0-CL

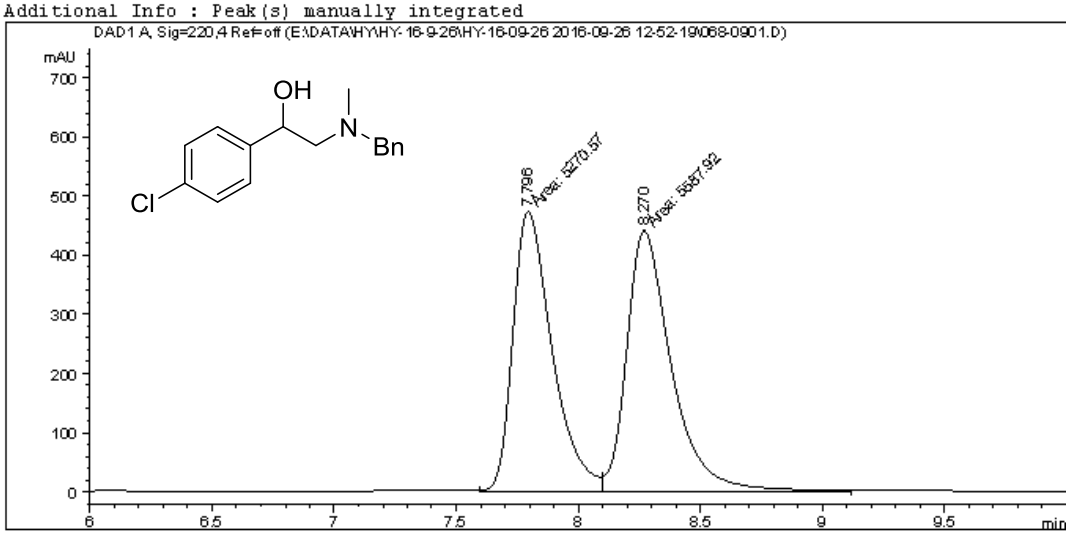
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Acq. Instrument : 1260HPLC-VWD                   Location : Vial 51
    Injection Date  : 2/24/2017 9:48:58 AM               Inj :   1
                                                   Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-EE\WWL-HY-EE 2017-02-24 09-36-02\VWD-AD(1-2)-98-2-1UL
                      -0.3ML-210NM-60MIN.M
    Last changed    : 2/24/2017 9:36:02 AM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-EE\WWL-HY-EE 2017-02-24 09-36-02\VWD-AD(1-2)-98-2-1UL
                      -0.3ML-210NM-60MIN.M (Sequence Method)
    Last changed    : 2/24/2017 4:45:02 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=210 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]        %
    ----|-------|----|-------|----------|----------|--------|
       1  35.670 MM    1.2350 1.24202e5  1676.17041 100.0000

    Totals :                  1.24202e5  1676.17041

    ======================================================================
                            *** End of Report ***
```

(*S*)-2-(Benzyl(methyl)amino)-1-(4-chlorophenyl)ethanol (2i)

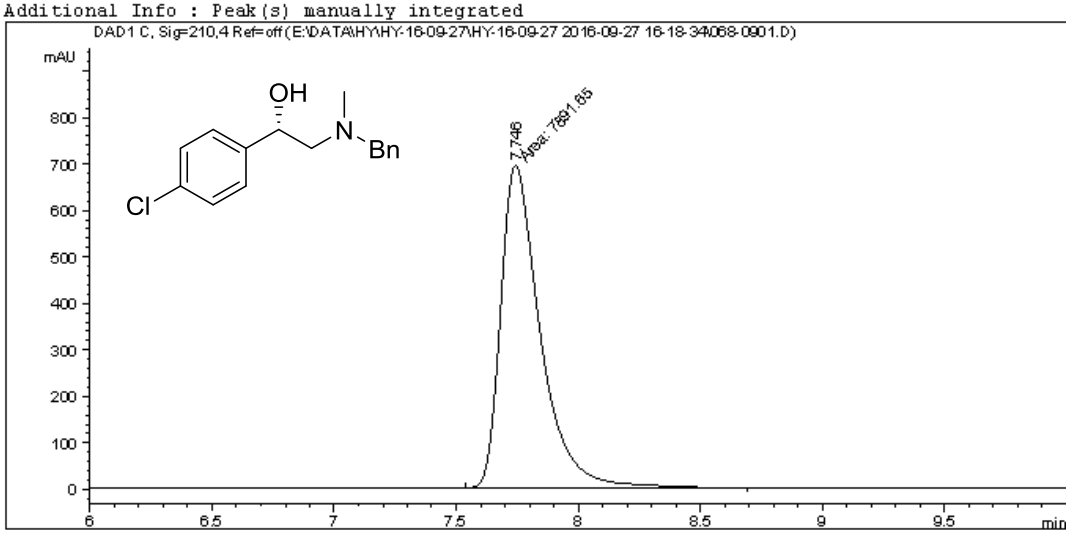
```
Data File E:\DATA\HY\HY-16-9-26\HY-16-09-26 2016-09-26 12-52-19\068-0901.D
Sample Name: HY-604

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   9
    Acq. Instrument : 1260HPLC-DAD                    Location : Vial 68
    Injection Date  : 9/26/2016 2:55:30 PM                 Inj :   1
                                                     Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\HY\HY-16-9-26\HY-16-09-26 2016-09-26 12-52-19\DAD-0J(1-6)-85-15-
                      1.0ML-ALLNM-15MIN.M
    Last changed    : 9/26/2016 12:52:20 PM by SYSTEM
    Analysis Method : E:\DATA\HY\HY-16-9-26\HY-16-09-26 2016-09-26 12-52-19\DAD-0J(1-6)-85-15-
                      1.0ML-ALLNM-15MIN.M (Sequence Method)
    Last changed    : 2/9/2017 9:04:21 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 A, Sig=220,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1   7.796 MF    0.1856 5270.57324  473.17984  48.5387
       2   8.270 FM    0.2114 5587.92285  440.55948  51.4613

    Totals :                  1.08585e4   913.73932


    ======================================================================
                              *** End of Report ***


1260HPLC-DAD 2/9/2017 9:11:04 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\068-0901.D
Sample Name: HY-16-09-27-604

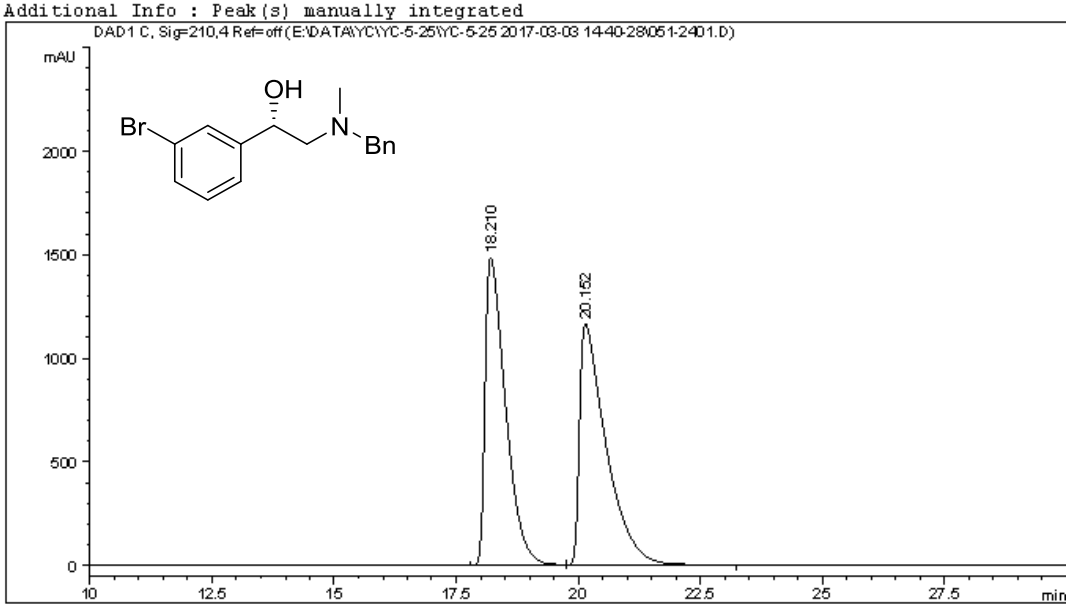
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   9
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 68
    Injection Date  : 9/27/2016 6:26:51 PM                Inj :   1
                                                  Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\DAD-0J(1-6)-85-15
                      -1.0ML-ALLNM-15MIN.M
    Last changed    : 9/27/2016 4:18:35 PM by SYSTEM
    Analysis Method : E:\DATA\HY\HY-16-09-27\HY-16-09-27 2016-09-27 16-18-34\DAD-0J(1-6)-85-15
                      -1.0ML-ALLNM-15MIN.M (Sequence Method)
    Last changed    : 2/9/2017 9:15:51 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1   7.746 MM    0.1894 7891.65234  694.37036 100.0000

    Totals :                   7891.65234  694.37036


    ======================================================================
                              *** End of Report ***
```

(*S*)-2-(Benzyl(methyl)amino)-1-(3-bromophenyl)ethanol (2j)

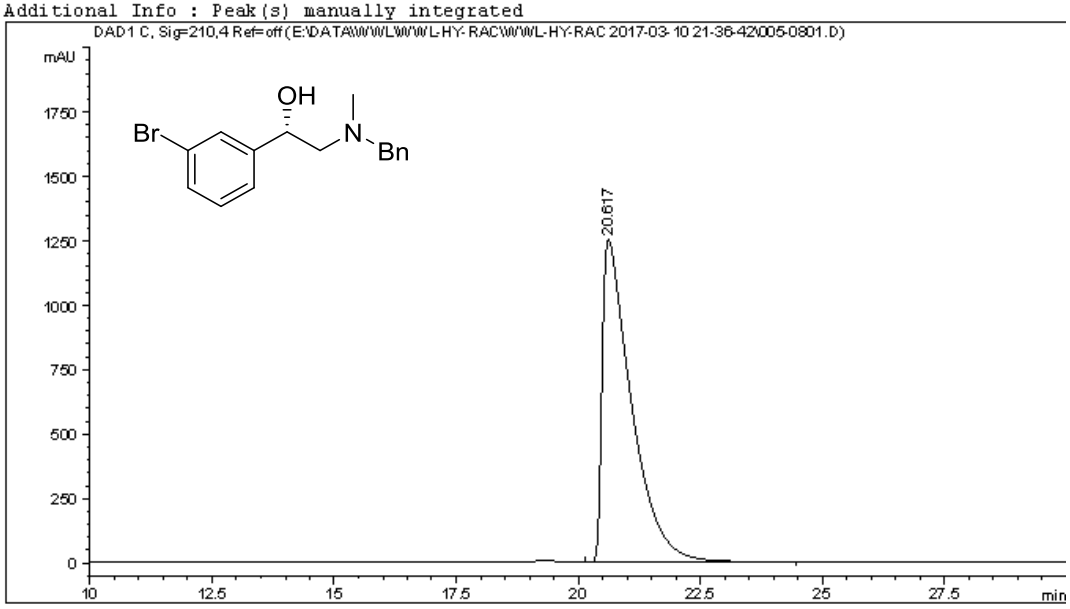
```
Data File E:\DATA\YC\YC-5-25\YC-5-25 2017-03-03 14-40-28\051-2401.D
Sample Name: HY-M-BR-RAC

    ====================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :  24
    Acq. Instrument : 1260HPLC-DAD                    Location : Vial 51
    Injection Date  : 3/4/2017 5:21:00 AM                 Inj :   1
                                                    Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\YC\YC-5-25\YC-5-25 2017-03-03 14-40-28\DAD-0J(1-6)-97-3-1ML-2UL-
                      ALL-45MIN.M
    Last changed    : 3/3/2017 8:47:17 PM by SYSTEM
    Analysis Method : E:\DATA\YC\YC-5-25\YC-5-25 2017-03-03 14-40-28\DAD-0J(1-6)-97-3-1ML-2UL-
                      ALL-45MIN.M (Sequence Method)
    Last changed    : 3/11/2017 9:40:01 AM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ====================================================================
                            Area Percent Report
    ====================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  18.210 VV    0.4345 4.33977e4  1486.92542  49.4453
       2  20.152 VB    0.5425 4.43713e4  1164.65344  50.5547

    Totals :                  8.77690e4  2651.57886


    ====================================================================
                               *** End of Report ***

1260HPLC-DAD 3/11/2017 9:40:08 AM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-10 21-36-42\005-0801.D
Sample Name: WWL-HY-M-BR-EE

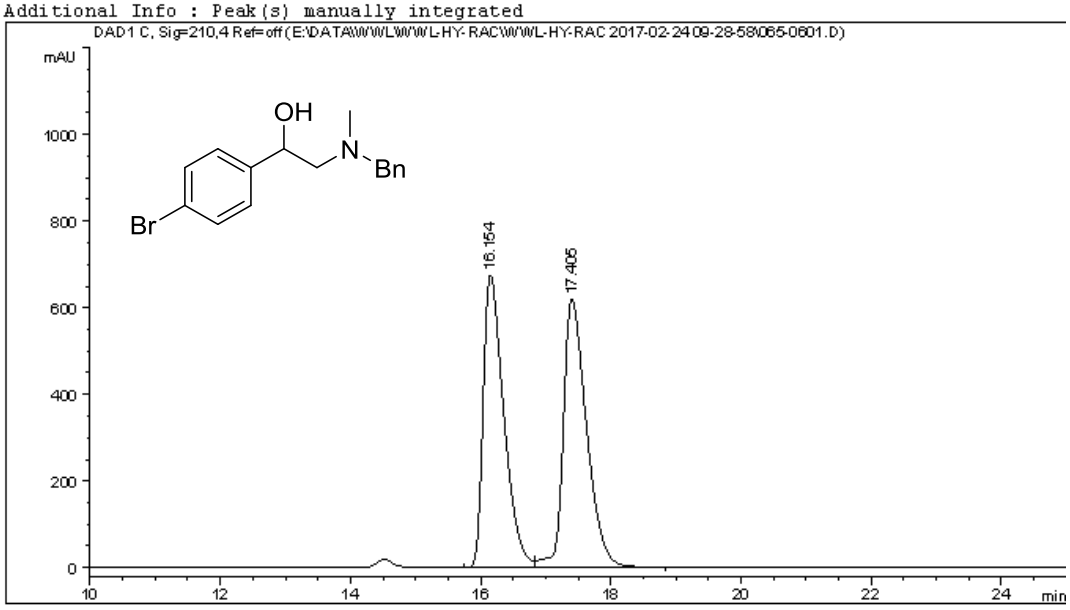
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   8
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 5
    Injection Date  : 3/11/2017 12:07:34 AM               Inj :   1
                                                   Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-10 21-36-42\DAD-0J(1-6)-97-3-
                      1ML-2UL-ALL-45MIN.M
    Last changed    : 3/10/2017 10:26:20 PM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-10 21-36-42\DAD-0J(1-6)-97-3-
                      1ML-2UL-ALL-45MIN.M (Sequence Method)
    Last changed    : 3/11/2017 9:44:35 AM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  20.617 BB    0.5934 5.22552e4  1250.82336 100.0000

    Totals :                  5.22552e4  1250.82336


    ======================================================================
                              *** End of Report ***
```

(*S*)-2-(Benzyl(methyl)amino)-1-(4-bromophenyl)ethanol (2k)

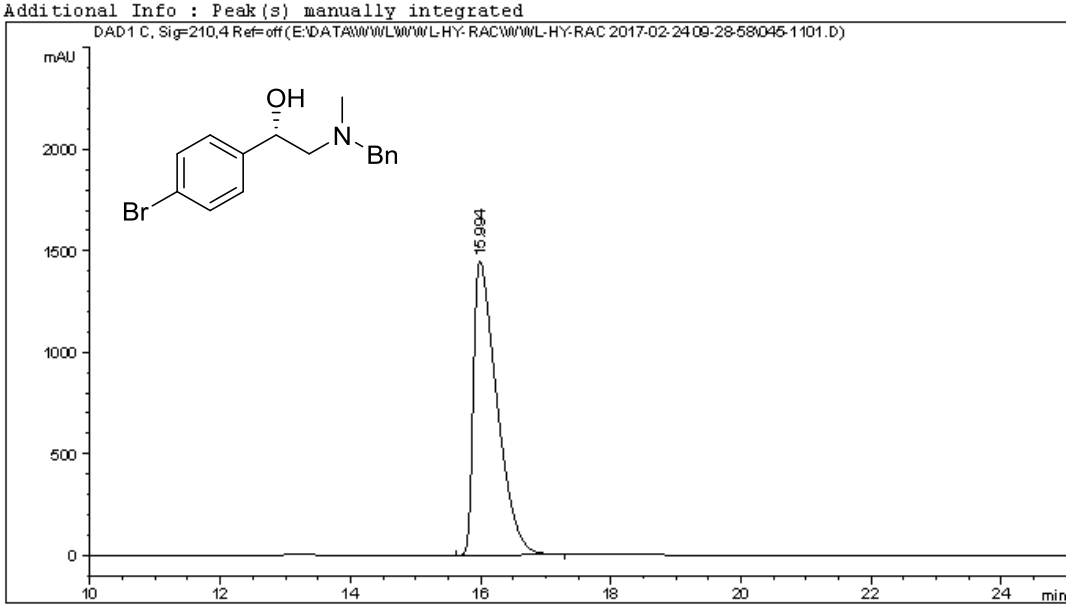
```
Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\065-0601.D
Sample Name: P-BR-RAC

    ================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   6
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 65
    Injection Date  : 2/24/2017 11:45:43 AM              Inj :   1
                                                   Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/24/2017 9:28:58 AM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 4:30:39 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ====================================================================
                            Area Percent Report
    ====================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  16.154 BV    0.3347 1.48655e4   675.62274  49.1446
       2  17.405 VB    0.3757 1.53830e4   619.44073  50.8554

    Totals :                  3.02485e4  1295.06348


    ====================================================================
                              *** End of Report ***

1260HPLC-DAD 2/24/2017 4:30:46 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\045-1101.D
Sample Name: P-BR-EE

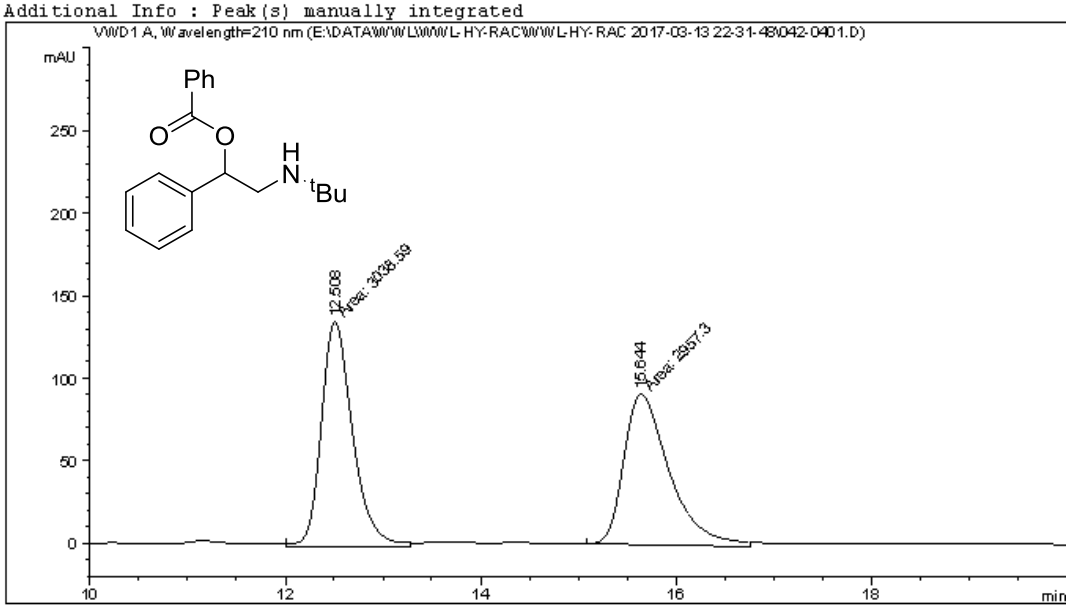
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :  11
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 45
    Injection Date  : 2/24/2017 2:20:14 PM                Inj :   1
                                                   Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/24/2017 9:28:58 AM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-24 09-28-58\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 4:33:15 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  15.994 BB    0.3777 3.61847e4  1447.10156 100.0000

    Totals :                  3.61847e4  1447.10156


    ======================================================================
                              *** End of Report ***
```

(*S*)-2-(tert-butylamino)-1-phenylethanol (2l)

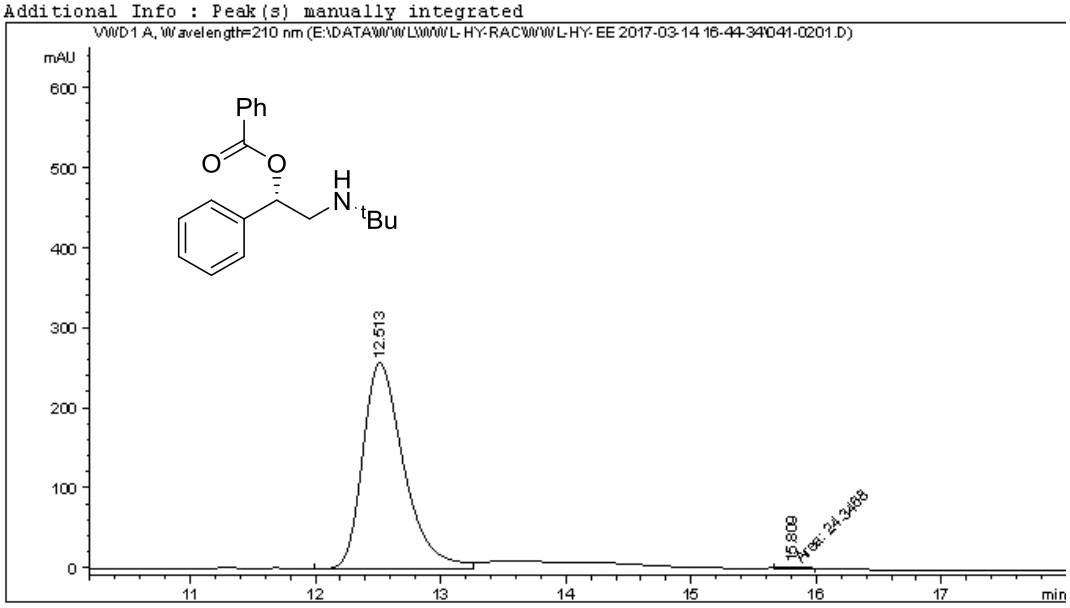
```
Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-13 22-31-48\042-0401.D
Sample Name: WWK-HY-TBU-RAC-1

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   4
    Acq. Instrument : 1260HPLC-VWD                    Location : Vial 42
    Injection Date  : 3/13/2017 11:34:54 PM              Inj :   1
                                                    Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-13 22-31-48\VWD-AD(1-2)-85-15-
                      1ML-1UL-210NM-30MIN.M
    Last changed    : 3/13/2017 10:31:49 PM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-13 22-31-48\VWD-AD(1-2)-85-15-
                      1ML-1UL-210NM-30MIN.M (Sequence Method)
    Last changed    : 3/14/2017 4:30:47 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=210 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  12.508 MM    0.3712 3038.59009  136.44746  50.6779
       2  15.644 MM    0.5403 2957.30371   91.22073  49.3221

    Totals :                  5995.89380  227.66819


    ======================================================================
                              *** End of Report ***

1260HPLC-VWD 3/14/2017 4:30:50 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-EE 2017-03-14 16-44-34\041-0201.D
Sample Name: WWL-HY-TBU-EE

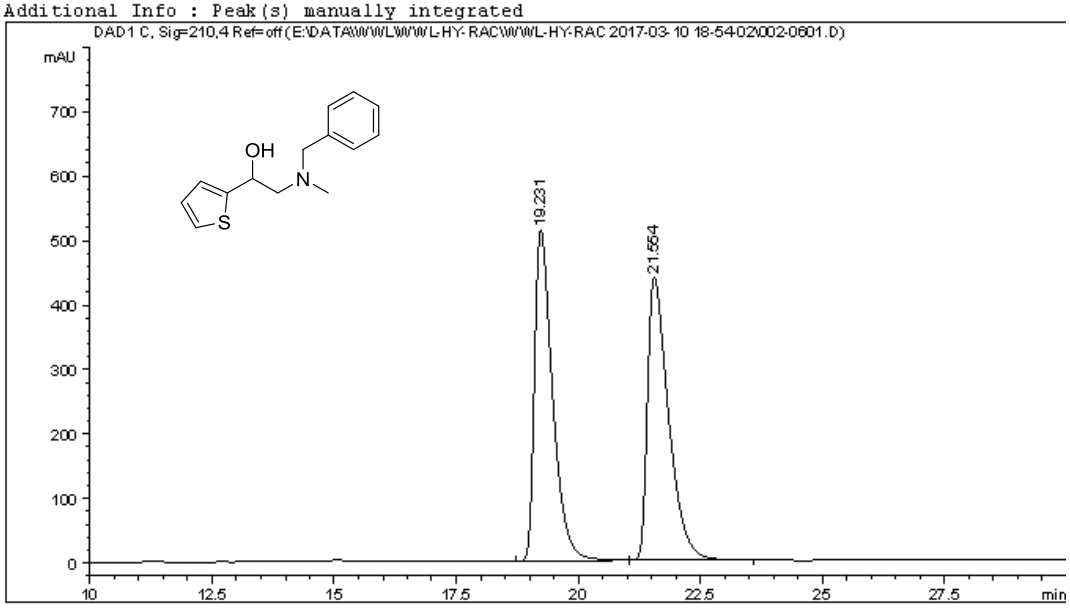
```
    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Acq. Instrument : 1260HPLC-VWD                   Location : Vial 41
    Injection Date  : 3/14/2017 4:56:09 PM               Inj :   1
                                                   Inj Volume : 5.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-EE 2017-03-14 16-44-34\VWD-ADH(1-2)-85-15-
                      1-5UL-210NM-30MIN.M
    Last changed    : 3/14/2017 5:23:07 PM by SYSTEM
                      (modified after loading)
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-EE 2017-03-14 16-44-34\VWD-ADH(1-2)-85-15-
                      1-5UL-210NM-30MIN.M (Sequence Method)
    Last changed    : 3/14/2017 5:28:57 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=210 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  12.513 BV    0.3473 5871.37012  257.20615  99.5870
       2  15.809 MM    0.2398   24.34677    1.69225   0.4130

    Totals :                  5895.71689  258.89840


    ======================================================================
```

(*R*)-2-(benzyl(methyl)amino)-1-(thiophen-2-yl)ethanol (2m)

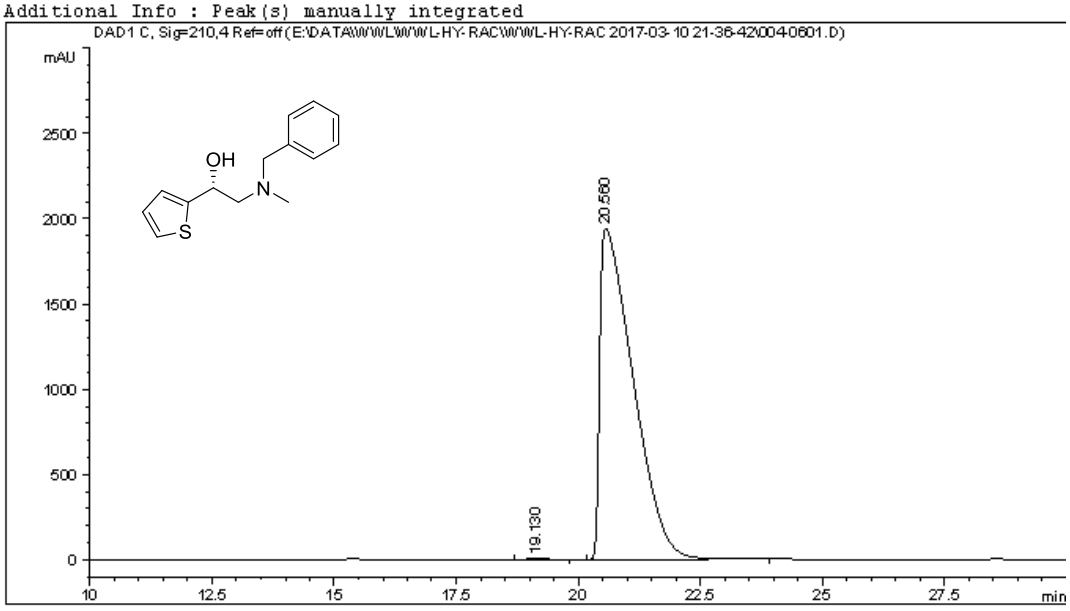
```
Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-10 18-54-02\002-0601.D
Sample Name: WWL-HY-SAIFEN-RAC

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   6
    Acq. Instrument : 1260HPLC-DAD                    Location : Vial 2
    Injection Date  : 3/10/2017 8:22:50 PM                 Inj :   1
                                                    Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-10 18-54-02\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 3/10/2017 8:42:52 PM by SYSTEM
                      (modified after loading)
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-10 18-54-02\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 3/11/2017 9:30:38 AM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  19.231 BB    0.3872 1.31402e4   512.39063  49.9750
       2  21.554 BB    0.4524 1.31534e4   437.89984  50.0250

    Totals :                  2.62936e4   950.29047


    ======================================================================

1260HPLC-DAD 3/11/2017 9:30:44 AM SYSTEM                       Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-10 21-36-42\004-0601.D
Sample Name: WWL-HY-SAIFEN-EE

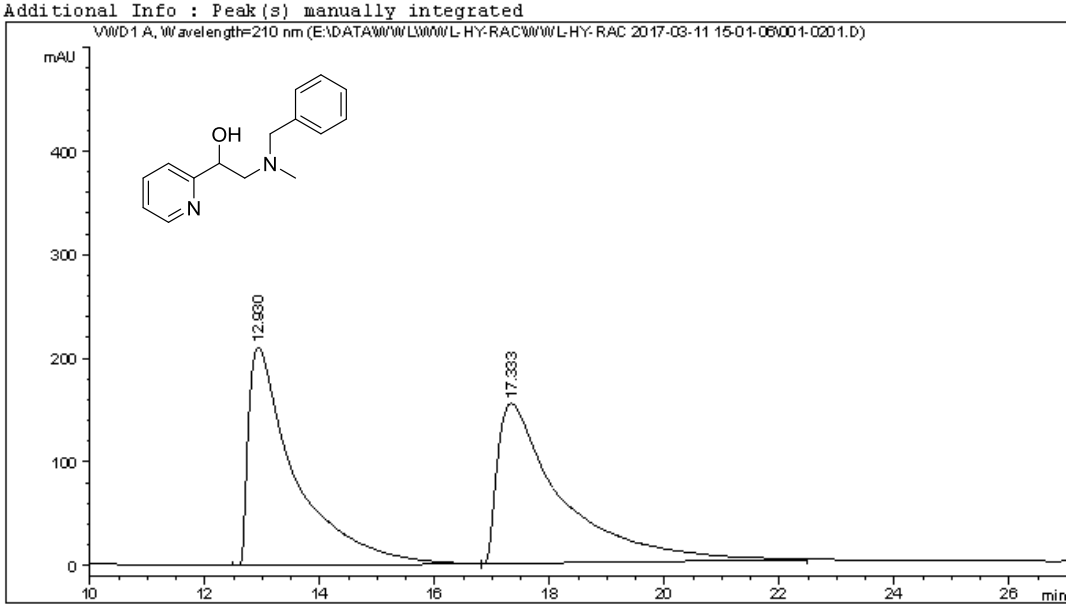
```
    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   6
    Acq. Instrument : 1260HPLC-DAD                     Location : Vial 4
    Injection Date  : 3/10/2017 11:25:36 PM                 Inj :   1
                                                    Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-10 21-36-42\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 3/10/2017 10:24:42 PM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-10 21-36-42\DAD-0J(1-6)-95-5-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 3/11/2017 9:35:39 AM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  19.130 BB    0.3338  110.10705    4.72548   0.1197
       2  20.560 BB    0.5945 9.18732e4  1939.86816  99.8803

    Totals :                  9.19833e4  1944.59365


    ======================================================================
                              *** End of Report ***

1260HPLC-DAD 3/11/2017 9:35:45 AM SYSTEM                    Page 1 of 1
```

(*R*)-2-(benzyl(methyl)amino)-1-(pyridin-2-yl)ethanol (2n)

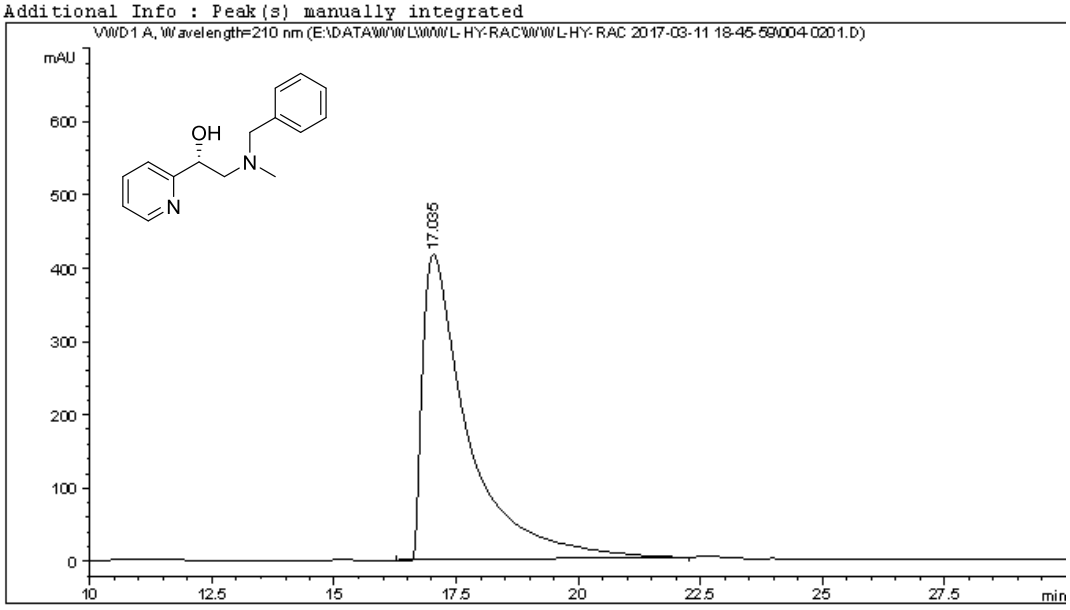
```
Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-11 15-01-06\001-0201.D
Sample Name: WWL-HY-PY-RAC

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   2
    Acq. Instrument : 1260HPLC-VWD                    Location : Vial 1
    Injection Date  : 3/11/2017 3:12:39 PM                 Inj :   1
                                                    Inj Volume : 1.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-11 15-01-06\VWD-AS(1-6)-97-3-
                      1ML-1UL-210NM-40MIN.M
    Last changed    : 3/11/2017 3:01:06 PM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-11 15-01-06\VWD-AS(1-6)-97-3-
                      1ML-1UL-210NM-40MIN.M (Sequence Method)
    Last changed    : 3/11/2017 6:40:28 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                               Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=210 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  12.930 BB    0.7926 1.19120e4   211.00032  49.8365
       2  17.333 BB    1.0925 1.19901e4   154.47755  50.1635

    Totals :                  2.39021e4   365.47787


    ======================================================================
                               *** End of Report ***

1260HPLC-VWD 3/11/2017 6:40:31 PM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-11 18-45-59\004-0201.D
Sample Name: WWL-HY-PY-EE-2.3

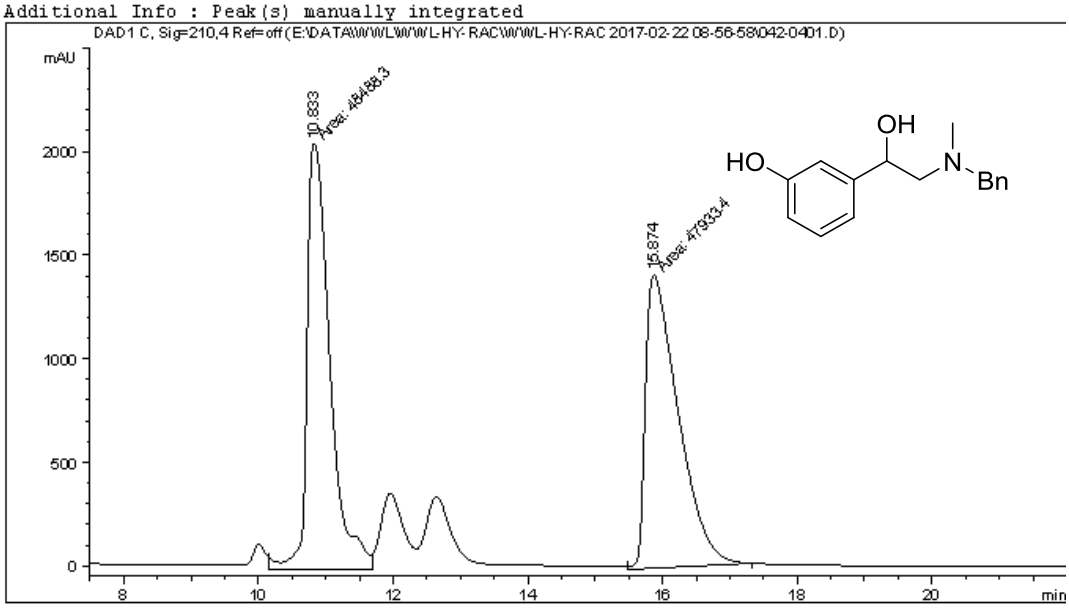
```
    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   2
    Acq. Instrument : 1260HPLC-VWD                     Location : Vial 4
    Injection Date  : 3/11/2017 6:57:34 PM                  Inj :   1
                                                    Inj Volume : 5.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-11 18-45-59\VWD-AS(1-6)-97-3-
                      1ML-5UL-210NM-40MIN.M
    Last changed    : 3/11/2017 6:46:00 PM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-03-11 18-45-59\VWD-AS(1-6)-97-3-
                      1ML-5UL-210NM-40MIN.M (Sequence Method)
    Last changed    : 3/11/2017 7:41:05 PM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=210 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]        %
    ----|-------|----|-------|----------|----------|--------|
       1  17.035 BB    0.9321 2.70536e4   416.34421 100.0000

    Totals :                  2.70536e4   416.34421

    ======================================================================
                              *** End of Report ***
```

(*S*)-3-(2-(benzyl(methyl)amino)-1-hydroxyethyl)phenol (2o)

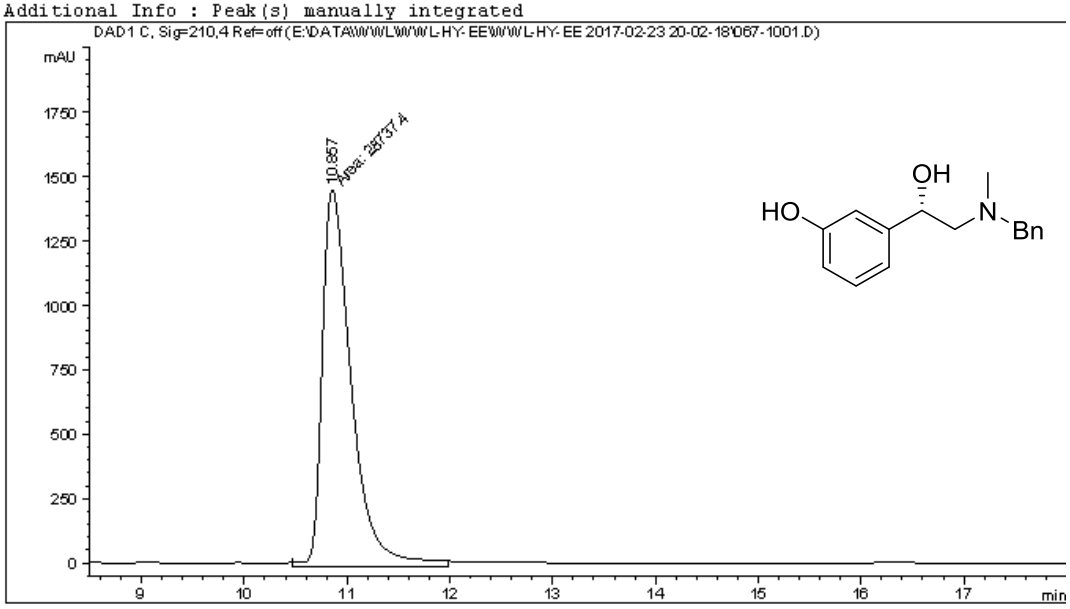
```
Data File E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-22 08-56-58\042-0401.D
Sample Name: HY-M-OH-RAC

    ==================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   4
    Acq. Instrument : 1260HPLC-DAD                     Location : Vial 42
    Injection Date  : 2/22/2017 9:57:24 AM                  Inj :   1
                                                    Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-22 08-56-58\DAD-0J(1-6)-80-20-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/22/2017 10:24:57 AM by SYSTEM
                      (modified after loading)
    Analysis Method : E:\DATA\WWL\WWL-HY-RAC\WWL-HY-RAC 2017-02-22 08-56-58\DAD-0J(1-6)-80-20-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 10:00:38 AM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ==================================================================
                            Area Percent Report
    ==================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  10.833 MM    0.3931 4.84883e4  2055.69678  50.2878
       2  15.874 MM    0.5646 4.79334e4  1415.00256  49.7122

    Totals :                  9.64216e4  3470.69934


    ==================================================================

1260HPLC-VWD 2/24/2017 10:00:43 AM SYSTEM                    Page 1 of 1
```

Data File E:\DATA\WWL\WWL-HY-EE\WWL-HY-EE 2017-02-23 20-02-18\067-1001.D
Sample Name: M-OH

```
    ==================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :  10
    Acq. Instrument : 1260HPLC-DAD                   Location : Vial 67
    Injection Date  : 2/23/2017 11:41:53 PM               Inj :   1
                                                   Inj Volume : 2.000 µl
    Acq. Method     : E:\DATA\WWL\WWL-HY-EE\WWL-HY-EE 2017-02-23 20-02-18\DAD-0J(1-6)-80-20-
                      1ML-2UL-ALL-30MIN.M
    Last changed    : 2/23/2017 8:02:19 PM by SYSTEM
    Analysis Method : E:\DATA\WWL\WWL-HY-EE\WWL-HY-EE 2017-02-23 20-02-18\DAD-0J(1-6)-80-20-
                      1ML-2UL-ALL-30MIN.M (Sequence Method)
    Last changed    : 2/24/2017 9:49:54 AM by SYSTEM
                      (modified after loading)
    Additional Info : Peak(s) manually integrated
```




```
    ==================================================================
                            Area Percent Report
    ==================================================================

    Sorted By             :      Signal
    Multiplier            :      1.0000
    Dilution              :      1.0000
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 C, Sig=210,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  10.857 MM    0.3274 2.87374e4  1462.93958 100.0000

    Totals :                  2.87374e4  1462.93958


    ==================================================================
                            *** End of Report ***
```

7. Reference

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