Supporting Information

for

An Efficient Copper-Aluminium Hydrotalcite Catalyst for Asymmetric Hydrosilylation of Ketones at Room Temperature

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Materials and Methods

$\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$, $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$, NaOH and Na_2CO_3 were purchased from S D Fine - Chem Limited, India. Acetophenone, substituted ketones, polymethylhydrosiloxane (PMHS), phenylsilane (PhSiH_3), (S)-BINAP, (R)-(+)-2,2'-Bis-(diphenylphosphino)-6,6'-dimethoxy-1,1'-binaphthyl (BIPHEP), (S)-BINAM, (S)-2,2'-Isopropylidenebis[(4S)-4-tert-butyl-2-Oxazoline] and (S)-BINOL were purchased from Aldrich and used as such. Toluene and other solvents were purchased from commercial sources and dried before use. ACME silica gel (100-200 mesh) was used for column chromatography and thin layer chromatography was performed on Merck precoated silica gel 60-F₂₅₄ plates. ^1H and ^{13}C NMR spectra were recorded on Bruker Avance 300 MHz spectrometers. Chemical shifts (δ) are reported in ppm, using TMS as an internal standard. High Performance Liquid Chromatography (HPLC) was performed using the following apparatus; SHIMADZU LC-10AT (liquid chromatograph), SHIMADZU SPD-10A (UV detector), and SHIMADZU C-R6A Chromatopac. Optical rotations were obtained on Jasco P-1020 Polarimeter and reported as follows $[\alpha]_D^{\text{temperature}}$ [concentration $c = \text{g}/100\text{mL}$ of solvent], and solvent. The absolute stereochemistry was assigned by comparison of the optical rotation with literature values. X-ray powder diffraction (XRD) data were collected on a Siemens/D-5000 diffractometer using $\text{Cu K}\alpha$ radiation. X-ray photoemission spectra (XPS) were recorded on a KRATOS AXIS 165 with a dual anode (Mg and Al) apparatus using the Mg $\text{K}\alpha$ anode. The pressure in the spectrometer was about 10^{-9} Torr. For energy calibration, we have used the carbon 1s photoelectron line. The carbon 1s binding energy was taken to be 285.0 eV. Spectra were deconvoluted using the Sun Solaris based Vision 2 curve resolver. The location and the full width at half maximum (FWHM) for a species were first determined using the spectrum of a

pure sample. The location and FWHM of the products, which were not obtained as pure species, were adjusted until the best fit was obtained. Symmetric Gaussian shapes were used in all cases. The Cu/Al ratio was determined by Inductively Coupled Plasma-Atomic Emission Spectroscopy and the results are presented in the following table.

Sample	Cu/Al ratio
Catalyst A	3.1
Catalyst B	2.4
Catalyst C	2.1

Experimental Procedure

Preparation of catalysts: Various catalysts with varied composition of Cu-Al hydrotalcites [Cu:Al. 3:1 (Cat A), 2.5:1 (Cat B), 2:1 (Cat C)] were prepared by coprecipitation employing NaOH/ Na₂CO₃ as described in the literature.¹ Cu-Al hydrotalcite, Cat A, (Cu:Al, 3:1) was prepared as follows. A mixture of solution of Cu(NO₃)₂·3H₂O (32.92 g, 0.1404 mol) and Al(NO₃)₃·9H₂O (16.88 g, 0.045 mol) in deionised and decarbonated water (140 mL) and the aqueous solutions of sodium hydroxide (13.124 g, 0.328 mol) and sodium carbonate (8.9252 g, 0.0842 mol) in deionised and decarbonated water (140 mL) were added simultaneously drop-wise from the respective burettes into the round bottomed flask. The pH of the reaction mixture was maintained constantly (8–9) by the continuous addition of base solution. The resulting slurry was aged at 65 °C for 30 min. The solid product was isolated by filtration, washed thoroughly with deionised and decarbonated water, and dried at under vacuum. The weight of the catalyst obtained was 16.4 g. Similarly Cat B and Cat C were prepared by varying the Cu: Al ratios. From AAS studies the copper loading was found to be 34.11 wt. % for catalyst A, 47.15 wt % for catalyst B and 46.07 wt % for catalyst C.

Typical procedure for the asymmetric hydrosilylation reaction: Cu-Al hydrotalcite (0.010g) and (S)-BINAP (0.01mmol, 0.007g) were placed in a dried Schlenk tube containing dry toluene (3 mL) at room temperature and stirred for 1h under nitrogen atmosphere. PMHS (4mmol, 0.24mL) was then added drop wise and allowed to stir for 30 min. To the reaction mixture ketone (1mmol) was added and stirring was continued. After completion of the reaction, (monitored by TLC), the reaction mixture was centrifuged to separate the catalyst and washed several times with ether. The catalyst was reused for another cycle after vacuum drying. The reaction mixture was quenched with water and transferred to a round-bottom flask with an aid of Et₂O (10 mL), and then tetrabutylammonium fluoride (TBAF) (1.0M in THF, 1.2 mL) was added. The reaction mixture was stirred vigorously for 0.5 h. The layers were separated and the aqueous layer was extracted with ether. The combined organic layers were dried over MgSO₄ and the solvent was removed under reduced pressure. The residue was purified by silica gel flash column chromatography (eluent: hexane/ethyl acetate) to give the corresponding *sec*-alcohols.

Reuse of the catalysts: The reusability of the catalysts was checked by performing the asymmetric hydrosilylation reaction on 1mmol scale. Copper-aluminium hydrotalcite shows consistent activity for three cycles. After completion of the reaction of each cycle, the catalyst was recovered by centrifugation, washed with ether, dried under vacuum and activated under nitrogen flow for 1h at room temperature.

Characterization Data of Compounds:

The following compounds are known compounds, and their spectra were in accordance with those reported in the literature. The absolute configuration of products was determined by comparison of the specific rotation with literature values. The enantiomeric excess of the obtained alcohols was determined by HPLC analysis with chiral stationary phases.

(S)-1-Phenylethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.39 (d, $J = 6.04$ Hz, 3H), 2.92 (br s, 1H), 4.74 (q, $J = 6.04\text{Hz}, 6.79\text{Hz}$, 1H), 7.17-7.29(m, 5H); ^{13}C NMR (300 MHz, CDCl_3) δ 24.92, 69.98, 125.22, 127.13, 128.19, 145.74; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 19.63$ min (major), 24.13 min (minor), $[\alpha]_D^{25} = -39.6^\circ$ ($c = 2.46$, CHCl_3); $\{\text{Lit. } [\alpha]_D^{20} = +47.4^\circ$ ($c = 2.60$, CHCl_3) $\}^2$

(S)-1-(4-Bromophenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.41 (d, $J = 6.04$ Hz, 3H), 2.75 (br s, 1H), 4.77 (q, $J = 6.04, 6.79$ Hz, 1H), 7.18 (d, $J = 8.30$ Hz, 2H), 7.42(d, $J = 9.06$ Hz, 2H); ^{13}C NMR (300 MHz, CDCl_3) δ 25.03, 69.50, 120.93, 127.03, 131.37, 144.69; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 21.02$ min (major), 25.32min (minor), $[\alpha]_D^{25} = -46.2^\circ$ ($c = 1.00$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = +45.3^\circ$ ($c = 1.0$, CHCl_3) $\}^2$

(S)-1-(3-Bromophenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.45 (d, $J = 6.04$ Hz, 3H), 1.94 (br s, 1H), 4.80 (q, $J = 6.04, 6.79$ Hz, 1H), 7.14-7.24 (m, 2H), 7.34-7.37 (m, 1H), 7.47 (s, 1H); ^{13}C NMR (300 MHz, CDCl_3) δ 25.06, 69.55, 122.46, 123.92, 128.43, 129.98, 130.32, 148.01; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 19.34$ min (major), 23.00 min (minor) $[\alpha]_D^{25} = -27.6^\circ$ ($c = 1.00$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -29.3^\circ$ ($c = 0.96$, CHCl_3) $\}^3$

(S)-1-(2-Bromophenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.44 (d, $J = 6.04$ Hz, 3H), 2.50 (br s, 1H), 5.19 (q, $J = 6.04, 6.79$ Hz, 1H), 7.07-7.56 (m, 4H); ^{13}C NMR (300 MHz, CDCl_3) δ 23.46, 69.06, 121.59, 126.60, 127.72, 128.64, 132.53, 144.55; HPLC (Diacel Chiralcel OD-H, 2% isopropanol in hexane, flow rate 0.8 mL/min): $t_R = 16.92$ min (minor), 18.10 min (major); $[\alpha]_D^{25} = -28.8^\circ$ ($c = 1.00$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -52.1^\circ$ ($c = 0.93$, CHCl_3) $\}^3$

(S)-1-(4-Chlorophenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.43 (d, $J = 6.79$ Hz, 3H), 2.38 (br s, 1H), 4.82 (q, $J = 6.04, 6.79$ Hz, 1H), 7.24-7.34 (m, 4H); ^{13}C NMR (300 MHz, CDCl_3) δ 25.12, 69.57, 126.71, 128.46, 132.91, 144.16; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 21.50$ min

(major), 30.06 min (minor). $[\alpha]_D^{25} = -50.1^\circ$ ($c = 7.11$, CHCl_3); $\{\text{Lit. } [\alpha]_D^{27} = -48.4^\circ$ ($c = 7.29$, $\text{CHCl}_3\})$.⁴

(S)-1-(3-Chlorophenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.42 (d, $J = 6.79$, 3H), 2.76 (br s, 1H), 4.78 (q, $J = 6.04$, 6.79 Hz, 1H), 7.16-7.27 (m, 3H), 7.32 (s, 1H); ^{13}C NMR (300 MHz, CDCl_3) δ 25.04, 69.57, 123.42, 125.48, 127.36, 129.66, 134.2, 147.78; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 17.63$ min (major), 20.67 min (minor), $[\alpha]_D^{25} = -36.7^\circ$ ($c = 0.71$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -40.0^\circ$ ($c = 0.60$, $\text{CHCl}_3\})$.³

(S)-1-(2-Chlorophenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.43 (d, $J = 6.79$, 3H), 2.83 (br s, 1H), 5.22 (q, $J = 6.04$, 6.79 Hz, 1H), 7.13-7.29 (m, 3H), 7.53 (d, $J = 7.55$ Hz, 1H); ^{13}C NMR (300 MHz, CDCl_3) δ 23.38, 66.70, 126.31, 127.07, 128.20, 129.22, 131.43, 143.00; HPLC (Diacel Chiralcel OD-H, 2% isopropanol in hexane, flow rate 0.8 mL/min): $t_R = 15.51$ min (minor), 16.44 min (major), $[\alpha]_D^{25} = -39.6^\circ$ ($c = 0.85$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -60.3^\circ$ ($c = 0.80$, $\text{CHCl}_3\})$.³

(S)-1-(4-Fluorophenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.47 (d, $J = 6.04$ Hz, 3H), 2.02 (br s, 1H), 4.87 (q, $J = 6.04$, 6.79 Hz, 1H), 6.99-7.06 (m, 2H), 7.26-7.35 (m, 2H); ^{13}C NMR (300 MHz, CDCl_3) δ 25.25, 69.71, 115.06, 115.34, 126.94, 127.05, 141.50, 163.69; HPLC (Diacel Chiralpak AS-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 15.20$ min (minor), 16.11 min (major); $[\alpha]_D^{25} = -30.7^\circ$ ($c = 1.54$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -42.5^\circ$ ($c = 0.91$, $\text{CHCl}_3\})$.³

(S)-1-(4-Nitrilephenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.45 (d, $J = 6.79$ Hz, 3H), 3.56 (br s, 1H), 4.90 (q, $J = 6.04$, 6.79 Hz, 1H), 7.46 (d, $J = 7.55$ Hz, 2H), 7.57 (d, $J = 8.30$ Hz, 2H); ^{13}C NMR (300 MHz, CDCl_3) δ 24.89, 68.96, 110.16, 118.60, 125.81, 131.90, 151.27; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.7 mL/min): $t_R = 41.36$ min (minor), 45.74 min (major), $[\alpha]_D^{25} = -63.6^\circ$ ($c = 2.41$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -40.2^\circ$ ($c = 2.23$, $\text{CHCl}_3\})$.⁴

(S)-1-(4-Nitrophenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.50 (d, $J = 6.79$ Hz, 3H), 1.94 (br s, 1H), 4.98 (q, $J = 6.04$, 6.79 Hz, 1H), 7.51 (d, $J = 9.06$ Hz, 2H), 8.18

(d, $J = 8.30$ Hz, 2H); ^{13}C NMR (300 MHz, CDCl_3) δ 25.43, 69.43, 123.69, 126.07, 147.10, 153.07; HPLC (Diacel Chiralcel OB-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 48.57$ min (major), 51.89 min (minor), $[\alpha]_D^{25} = -22.6^\circ$ ($c = 1.00$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = +18.0^\circ$ ($c = 1.00$, $\text{CHCl}_3\})$.⁷

(S)-1-(4-Trifluoromethylphenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.45 (d, $J = 6.42$ Hz, 3H), 2.32 (br s, 1H), 4.88 (q, $J = 6.42$, 6.61 Hz, 1H), 7.42 (d, $J = 8.12$ Hz, 2H), 7.56 (d, $J = 8.12$ Hz, 2H); ^{13}C NMR (300 MHz, CDCl_3) δ 25.27, 69.75, 122.32, 125.37, 125.60, 125.93, 129.80, 149.67; HPLC (Diacel Chiralcel OD-H, 1% isopropanol in hexane, flow rate 1 mL/min): $t_R = 27.73$ min (major), 45.67 min (minor), $[\alpha]_D^{25} = -33.7^\circ$ ($c = 5.52$, CHCl_3); $\{\text{Lit. } [\alpha]_D^{22} = -31.5^\circ$ ($c = 5.49$, $\text{CHCl}_3\})$.⁴

(S)-1-(3-Trifluoromethylphenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.47 (d, $J = 6.79$ Hz, 3H), 2.35 (br s, 1H), 4.91 (q, $J = 6.04$, 6.79 Hz, 1H), 7.41-7.53 (m, 3H), 7.62 (s, 1H); ^{13}C NMR (300 MHz, CDCl_3) δ 25.21, 69.73, 122.14, 124.15, 128.73, 128.87, 146.68; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.7 mL/min): $t_R = 9.38$ min (major), 10.37 min (minor), $[\alpha]_D^{25} = -21.9^\circ$ ($c = 1.40$, CH_3OH) $\{\text{Lit. } [\alpha]_D^{20} = +25.4^\circ$ ($c = 1.35$, $\text{CH}_3\text{OH}\})$.²

(S)-1-(4-Methylphenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.45 (d, $J = 6.79$ Hz, 3H), 2.17 (br s, 1H), 2.33 (s, 3H), 4.81 (q, $J = 6.04$, 6.79 Hz, 1H), 7.13 (d, $J = 8.30$ Hz, 2H), 7.23 (d, $J = 8.30$ Hz, 2H); ^{13}C NMR (300 MHz, CDCl_3) δ 20.97, 24.94, 70.08, 125.26, 129.01, 136.98, 142.80; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.6 mL/min): $t_R = 16.60$ min (major), 19.32 min (minor), $[\alpha]_D^{25} = -39.4^\circ$ ($c = 2.72$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = +46.8^\circ$ ($c = 2.9$, $\text{CHCl}_3\})$.²

(S)-1-(3-Methylphenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.47 (d, $J = 6.79$ Hz, 3H), 1.99 (br s, 1H), 2.35 (s, 3H), 4.84 (q, $J = 6.04$, 6.79 Hz, 1H), 7.06-7.25 (m, 4H); ^{13}C NMR (300 MHz, CDCl_3) δ 21.44, 25.10, 70.39, 122.41, 126.11, 128.20, 128.41, 138.15, 145.81; HPLC (Diacel Chiralcel OD-H, 1% isopropanol in hexane, flow rate 1 mL/min): $t_R = 21.72$ min (minor), 34.18 min (major), $[\alpha]_D^{25} = -30.2^\circ$ ($c = 0.58$, EtOH) $\{\text{Lit. } [\alpha]_D^{20} = -36.2^\circ$ ($c = 0.55$, $\text{EtOH}\})$.³

(S)-1-(2-Methylphenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.42 (d, $J = 6.04$ Hz, 3H), 2.13 (br s, 1H), 2.31 (s, 3H), 5.07 (q, $J = 6.04$, 6.79 Hz, 1H), 7.09-7.23 (m, 3H), 7.47 (d, $J = 7.55$ Hz, 1H); ^{13}C NMR (300 MHz, CDCl_3) δ 18.78, 23.79, 66.63, 124.39, 126.24, 127.03, 130.24, 134.10, 143.73; HPLC (Diacel Chiralcel OB-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 13.60$ min (major), 20.29 min (minor), $[\alpha]_D^{25} = -46.2^\circ$ ($c = 0.75$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -72.5^\circ$ ($c = 0.75$, CHCl_3) $\}^3$

(S)-1-(2-Methoxyphenyl) ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.44 (d, $J = 6.79$ Hz, 3H), 3.04 (br s, 1H), 3.77 (s, 3H), 5.06 (q, $J = 6.04$, 6.79 Hz, 1H), 6.80-6.94 (m, 2H), 7.17-7.33 (m, 2H); ^{13}C NMR (300 MHz, CDCl_3) δ 22.83, 54.98, 65.77, 110.16, 120.54, 125.75, 127.91, 133.53, 156.15; HPLC (Diacel Chiralcel OB-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 17.91$ min (major), 31.36 min (minor), $[\alpha]_D^{25} = -14.1^\circ$ ($c = 0.82$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -17.5^\circ$ ($c = 0.75$, CHCl_3) $\}^5$

(S)-1-Phenyl-1-propanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 0.87 (t, $J = 7.55$ Hz, 3H), 1.64-1.82 (m, 2H), 2.41 (br s, 1H), 4.51 (t, $J = 6.79$ Hz, 1H), 7.22-7.34 (m, 5H); ^{13}C NMR (300 MHz, CDCl_3) δ 9.97, 31.70, 75.81, 125.88, 127.29, 128.19, 144.49; HPLC (Diacel Chiralcel OD-H, 1% isopropanol in hexane, flow rate 1 mL/min): $t_R = 18.69$ min (minor), 23.35 min (major), $[\alpha]_D^{25} = -42.1^\circ$ ($c = 1.00$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -46.0^\circ$ ($c = 1.00$, CHCl_3) $\}^3$

(S)-1-(4-Chlorophenyl)-propanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 0.78 (t, $J = 6.79$ Hz, 3H), 1.49-1.66 (m, 2H), 3.76 (br s, 1H), 4.33 (t, $J = 6.04$, 1H), 7.08 (d, $J = 8.30$ Hz, 2H), 7.20 (d, $J = 8.30$ Hz, 2H); ^{13}C NMR (300 MHz, CDCl_3) δ 9.92, 31.89, 75.19, 127.29, 128.43, 132.99, 142.99; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 17.26$ min (major), 20.98 min (minor), $[\alpha]_D^{25} = -25.6^\circ$ ($c = 1.58$, C_6H_6) $\{\text{Lit. } [\alpha]_D^{20} = +23.0^\circ$ ($c = 1.6$, C_6H_6) $\}^7$

(S)-1-Tetralol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.67-1.96 (m, 4H), 1.99 (br s, 1H), 2.61-2.81 (m, 2H), 4.65 (t, $J = 4.53$ Hz, 1H), 7.08-7.34 (m, 4H); ^{13}C NMR (300 MHz, CDCl_3) δ 18.73, 29.14, 32.16, 68.04, 126.07, 127.47, 128.55, 128.90, 137.02, 138.73;

HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 18.69$ min (major), 26.14 min (minor), $[\alpha]_D^{25} = +29.1^\circ$ ($c = 1.00$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -27.0^\circ$ ($c = 1.00$, $\text{CHCl}_3\})$.⁶

(S)-1-(2-Naphthyl)-1-ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.54 (d, $J = 6.79$ Hz, 3H), 2.14 (br s, 1H), 5.01 (q, $J = 6.04, 6.79$ Hz, 1H), 7.42-7.48 (m, 3H), 7.76-7.81 (m, 4H); ^{13}C NMR (300 MHz, CDCl_3) δ 25.04, 70.39, 123.75, 125.69, 126.04, 127.58, 127.84, 128.23, 132.86, 133.26, 143.11; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.5 mL/min): $t_R = 33.54$ min (major), 46.49 min (minor), $[\alpha]_D^{25} = -40.8^\circ$ ($c = 0.90$, CH_3OH) $\{\text{Lit. } [\alpha]_D^{20} = -47.2^\circ$ ($c = 0.82$, $\text{CH}_3\text{OH}\})$.³

(S)-1-(1-Naphthyl)-1-ethanol: ^1H NMR (300 MHz, CDCl_3 , TMS) δ 1.63 (d, $J = 6.79$ Hz, 3H), 2.09 (br s, 1H), 5.62 (q, $J = 6.04, 6.79$ Hz, 1H), 7.42-7.51 (m, 3H), 7.62-7.86 (m, 3H), 8.07 (d, $J = 9.06$ Hz, 1H); ^{13}C NMR (300 MHz, CDCl_3) δ 24.25, 67.02, 121.91, 123.11, 125.43, 125.93, 127.81, 128.81, 130.23, 133.76, 141.28; HPLC (Diacel Chiralcel OJ-H, 5% isopropanol in hexane, flow rate 0.7 mL/min): $t_R = 30.28$ min (major), 47.21 min (minor), $[\alpha]_D^{25} = -35.5^\circ$ ($c = 0.92$, CHCl_3) $\{\text{Lit. } [\alpha]_D^{20} = -57.4^\circ$ ($c = 0.86$, $\text{CHCl}_3\})$.³

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(Table 2, entry 5)
1-(4-Chlorophenyl) ethanol
ee = 94 %

4: 230 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	21.506	34655410	96.76
2	30.061	1160938	3.24
Totals		35816348	100.00

(Table 2, entry 6)
1-(3-Chlorophenyl) ethanol
ee = 77 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	17.633	71411800	88.41
2	20.670	9364479	11.59
Totals		80776279	100.00

(Table 2, entry 7)
1-(2-Chlorophenyl) ethanol
ee = 59 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	15.518	9012313	20.50
2	16.446	34940595	79.50
Totals		43952908	100.00

(Table 2, entry 8)
1-(4-Fluorophenyl) ethanol
ee = 86 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	15.207	2242680	7.08
2	16.112	29455153	92.92
Totals		31697834	100.00

(Table 2, entry 9)
1-(4-Nitrilephenyl) ethanol
ee = 73 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	41.360	16094215	13.74
2	45.749	101032448	86.26

Totals		117126662	100.00
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(Table 2, entry 10)
1-(4-Nitrophenyl) ethanol
ee = 85 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	48.574	129302723	92.38
2	51.890	10664490	7.62

Totals		139967213	100.00
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(Table 2, entry 11)
1-(4-Trifluoromethylphenyl) ethanol
ee = 97 %

(Table 2, entry 12)
1-(3-Trifluoromethylphenyl) ethanol
ee = 84 %

1: 254 nm, 4 nm

Pk #	Retention Time	Area	Area Percent
1	16.608	21205863	91.37
2	19.328	2002797	8.63
Totals		23208660	100.00

1: 254 nm, 4 nm

Pk #	Retention Time	Area	Area Percent
1	21.721	617277	11.93
2	34.184	4556025	88.07
Totals		5173303	100.00

(Table 2, entry 15)
1-(2-Methylephenyl) ethanol
ee = 62 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	13.604	34957934	81.17
2	20.294	8111248	18.83
Totals		43069182	100.00

(Table 2, entry 16)
1-(2-Methoxyphenyl) ethanol
ee = 73 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	17.914	29861273	86.72
2	31.363	4573853	13.28
Totals		34435126	100.00

(Table 2, entry 17)
1-Phenyl-1-propanol
ee = 84 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	18.698	2560577	8.22
2	23.352	28582122	91.78
Totals		31142699	100.00

(Table 2, entry 18)
1-(4-Chlorophenyl) propanol
ee = 94 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	17.266	23980493	97.00
2	20.986	740618	3.00
Totals		24721111	100.00

(Table 2, entry 19)

1-tetralol

ee = 87 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	18.694	27043658	93.64
2	26.143	1835975	6.36

Totals		28879634	100.00
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(Table 2, entry 20)

1-(2-Naphthyl)-1-ethanol

ee = 79 %

1: 254 nm, 4 nm			
Pk #	Retention Time	Area	Area Percent
1	33.548	272226351	89.27
2	46.493	32730811	10.73

Totals		304957162	100.00
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1: 254 nm, 4 nm

Pk #	Retention Time	Area	Area Percent
1	30.282	28550076	81.04
2	47.210	6681231	18.96
Totals		35231307	100.00