Catalytic Asymmetric Strecker Hydrocyanation of Imines Using Yb(OTf)$_3$-pybox Catalysts

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1. Experimental Procedure:

1-1. General: \(^1\)H-NMR spectra were recorded on commercial instruments (250 MHz). Chemical shifts were reported in ppm from tetramethylsilane with the solvent resonance as the internal standard (CDCl\(_3\): δ = 7.26). Spectra are reported as follows: chemical shift (= ppm), multiplicity (s= singlet, d= doublet, t= triplet, q= quartet, m= multiplet), coupling constants (Hz), integration. \(^13\)C-NMR spectra were collected on commercial instruments (62.90 MHz) with complete proton decoupling. The enantiomeric excesses were determined by HPLC analysis on CHIRALPAK AD column. Optical rotations were measured on a commercial polarimeter and reported as follows: [α]_D\(^T\) (c = g/100 mL, solvent). Reagents obtained from commercial sources were used without further purification.

1-2. Preparation of the Chiral Ligand

The preparation of chiral 4-bromopyridine-2,6-bis(oxazoline) ligand was achieved according to a known procedure reported by Moberg et al. (Org. Lett. 2003, 5, 3663) almost without any modification. The reaction sequences was demonstrated in the above reaction scheme:

**Compound 2:** m.p. 155-156 °C; \(^1\)H NMR (250 MHz, CDCl\(_3\)): δ = 8.40 (s, 2H), 3.97 (s, 6H); \(^13\)C NMR (62.90 MHz, CDCl\(_3\)): δ = 163.97, 149.05, 135.7, 131.27, 53.45.

**Compound 3:** m.p. 83-85 °C; \(^1\)H NMR (250 MHz, CDCl\(_3\)): δ = 8.50 (d, J = 7.5, 2H), 8.36 (s, 2H), 7.27 (m, 10H), 5.16 (m, 2H), 3.92 (d, J = 5.0 Hz, 4H), 2.94 (br s, 2H); \(^13\)C NMR (62.90 MHz, CDCl\(_3\)): δ = 162.5, 149.8, 138.7, 136.3, 128.8, 128.4, 127.9, 126.6, 66.9, 56.9.

**Compound 4:** m.p. 195-196 °C; \(^1\)H NMR (250 MHz, CDCl\(_3\)): δ = 8.51 (s, 2H), 7.29 (m, 10H), 5.44 (t, J = 7.5 Hz, 2H), 4.92 (t, J = 7.5 Hz, 2H), 4.42 (t, J = 10 Hz, 2H); \(^13\)C NMR
(62.90 MHz, CDCl₃): δ = 162.5, 147.6, 141.3, 134.0, 129.4, 128.9, 127.9, 126.8, 75.7, 70.3.

1-3. General Procedure for the Preparation of Imine Substrate: the aldehyde (20 mmol) and diphenylmethylamine (20 mmol) and Na₂SO₄ (0.5 g) in dichloromethane (5 mL) were stirred in rt at 22 °C. The solution was filtrated and solvent was removed in vacuo. Products could be purified by recrystallization (Hexane-ethylacetate).

1-4. General Procedure for the Preparation of Ytterbium(III) Triflate Complexes: A 2-dram ovendried vial was charged with a stirbar, Yb(OTf)₃ (30 mg, 0.048 mmol), and the corresponding pybox ligand (44 mg, 0.098 mmol) in a dry box. The vial was capped with a septum and removed from the dry box. Dichloromethane (1.0 mL) was added to the vial under an atmosphere of dry Ar. The resulting mixture was stirred vigorously at rt for 1 h until the reaction became homogeneous.

1-5. General Catalytic Procedure: To the resulting complex solution 1 mmol of corresponding imine and 4 mL dichloromethane were added under argon and the resulting reaction mixture were cooled to the desired temperature. After 20 min TMSCN (2 mmol) were added to the flask in one portion and then methanol (2 mmol) was injected via the septum through a drop wise mode. The reaction was maintained at the desired temperature until consumption of imine as monitored by thin layer chromatography. The excess of nucleophile and the solvent were removed in the cold in vacuo and then products were purified by flash chromatography on silica gel.

1-6. Characterizations of products:

(Benzhydryl-amino)-phenyl-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 92% yield as a white solid. The chromatographed material was determined to be of 97% ee by chiral HPLC analysis [Chiralpak AD, 90-10 n-hexane/iPrOH, 1.0 mL/min; m.p. 94-96 °C; [α]D²⁰ = 66.25 (c = 0.08 in CHCl₃). ¹H NMR (250 MHz, CDCl₃): δ = 7.61-7.075 (m, 15 H), 5.27 (s, 1 H), 4.62 (s, 1 H), 2.16 (s, 1 H) ppm. ¹³C NMR (62.90 MHz, CDCl₃): δ = 159.7, 142.7, 141.1, 134.9, 129.0, 128.8, 128.0, 127.7, 127.4, 127.3, 127.1, 118.78, 65.6, 52.4 ppm.
(Benzhydryl-amino)-o-tolyl-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 97% yield as a white solid. The chromatographed material was determined to be of 93% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min; m.p. 106-108 °C, [α]_D^20 = 181.25 (c = 0.32 in CHCl₃).\(^1\)H NMR (250 MHz, CDCl₃): δ = 7.61-7.22 (m, 14 H), 5.31 (s, 1 H), 4.64 (s, 1 H), 2.30 (s, 3 H), 2.02 (s, 1 H; NH) ppm.\(^1\)C NMR (62.90 MHz, CDCl₃): δ = 142.8, 141.0, 136.5, 133.2, 131.2, 129.2, 128.9, 128.8, 128.1, 127.9, 127.7, 127.5, 127.0, 126.7, 118.8, 65.8, 50.4, 18.9 ppm.

(Benzhydryl-amino)-m-tolyl-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 95% yield as a white solid. The chromatographed material was determined to be of 82% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min], m.p. 69-71 °C; [α]_D^20 = 56.7 (c = 0.10 in CHCl₃).\(^1\)H NMR (250 MHz, CDCl₃): δ = 7.58-7.24 (m, 14 H), 5.28 (s, 1 H), 4.58 (s, 1 H), 2.41 (s, 3 H), 2.15 (s, 1 H) ppm.\(^1\)C NMR (62.90 MHz, CDCl₃): δ = 142.8, 141.0, 138.9, 134.9, 129.8, 129.0, 128.9, 128.8, 127.9, 127.7, 127.5, 127.2, 124.4, 118.9, 65.6, 52.4, 21.4 ppm.

(Benzhydryl-amino)-p-tolyl-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 93% yield as a white solid. The chromatographed material was determined to be of 96% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 90: 10, 1.0 mL/min], m.p. 104-106 °C. [α]_D^20 = 55.0 (c = 0.2 in CHCl₃).\(^1\)H NMR (250 MHz, CDCl₃): δ = 7.63-7.24 (m, 14 H), 5.29 (s, 1 H), 4.60 (s, 1 H), 2.41 (s, 3 H), 2.16 (s, 1 H) ppm.\(^1\)C NMR (62.90 MHz, CDCl₃): δ = 142.8, 141.3, 139.0, 132.1, 129.7, 129.1, 128.8, 127.9, 127.7, 127.5, 127.2, 127.2, 119.0, 65.6, 52.2, 21.2 ppm.
(Benzhydryl-amino)-(2-chloro-phenyl)-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 97% yield as a white solid. The chromatographed material was determined to be of 92% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min; m.p. 98-100 °C, [α]D 20 = 127.7 (c = 0.18 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.59-7.02 (m, 14H), 5.25(s, 1 H), 4.91 (s, 1 H), 2.19 (s, 1 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 142.6, 140.7, 133.5, 132.8, 130.6, 130.4, 129.3, 128.8, 128.0, 127.7, 127.7, 127.6, 127.2, 118.2, 65.7, 50.2 ppm.

(Benzhydryl-amino)-(3-chloro-phenyl)-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 93% yield as a white solid. The chromatographed material was determined to be of 91% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 90:10, 1.0 mL/min]; m.p. 101-103 °C, [α]D 20 = 38.8 (c = 0.34 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.62-7.26 (m, 14H), 5.27(s, 1 H), 4.60 (s, 1 H), 2.20 (s, 1 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 142.6, 140.9, 136.8, 135.0, 130.3, 129.3, 129.2, 128.9, 128.1, 127.9, 127.5, 127.2, 125.5 118.3, 65.7, 51.9 ppm.

(Benzhydryl-amino)-(4-chloro-phenyl)-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 91% yield as a white solid. The chromatographed material was determined to be of 93% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 90:10, 1.0 mL/min]; m.p. 102-104 °C, [α]D 20 = 34.32 (c = 0.67 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.72-7.09 (m, 14 H), 5.26 (s, 1 H), 4.59 (s, 1 H), 2.07 (s, 1 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 142.5, 140.9, 135.1, 133.4, 129.2, 129.1, 128.9, 128.7, 128.1, 127.8, 127.4, 127.1, 118.4, 65.6, 51.8 ppm.
(Benzhydryl-amino)-(2-bromo-phenyl)-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 97% yield as a white solid. The chromatographed material was determined to be of 97% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min]; m.p. 101-103 °C, $[\alpha]_D^{22} = 107.14 \text{ (c = 0.28 in CHCl}_3$). $^1$H NMR (250 MHz, CDCl$_3$): $\delta = 7.90-7.24$ (m, 14H), 5.23 (s, 1 H), 4.89 (s, 1 H), 2.12 (s, 1 H) ppm. $^{13}$C NMR (62.90 MHz, CDCl$_3$): $\delta = 142.6$, 140.7, 134.5, 133.8, 130.8, 129.4, 128.8, 128.2, 128.0, 127.9, 127.7, 127.2, 123.4, 118.2, 65.6, 52.5 ppm.

(Benzhydryl-amino)-(3-bromo-phenyl)-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 92% yield as a white solid. The chromatographed material was determined to be of 91% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min]; m.p. 102-104 °C, $[\alpha]_D^{20} = 305 \text{ (c = 0.2 in CHCl}_3$. $^1$H NMR (250 MHz, CDCl$_3$): $\delta = 7.72-7.25$ (m, 14H), 5.25 (s, 1 H), 4.58 (s, 1 H), 2.17 (s, 1 H) ppm. $^{13}$C NMR (62.90 MHz, CDCl$_3$): $\delta = 142.5$, 140.8, 137.0, 132.3, 130.5, 130.4, 129.1, 128.9, 128.1, 127.8, 127.5, 127.1, 125.93, 123.0, 118.2, 65.7, 51.8 ppm.

(Benzhydryl-amino)-(4-bromo-phenyl)-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 90% yield as a white solid. The chromatographed material was determined to be of 84% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 90:10, 1.0 mL/min]; m.p. 99-101 °C, $[\alpha]_D^{20} = 28.46 \text{ (c = 0.13 in CHCl}_3$. $^1$H NMR (250 MHz, CDCl$_3$): $\delta = 7.76-7.22$ (m, 14H), 5.25 (s, 1 H), 4.57 (s, 1 H), 2.17 (s, 1 H) ppm. $^{13}$C NMR (62.90 MHz, CDCl$_3$): $\delta = 142.5$, 140.9, 133.9, 132.2, 129.1, 129.0, 128.9, 128.1, 127.8, 127.4, 127.1, 123.2, 118.3, 65.6, 51.8 ppm.
(Benzhydryl-amino)-naphthalen-2-yl-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 90% yield as a white solid. The chromatographed material was determined to be of 80% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 90:10, 1.0 mL/min]; m.p. 119-121 °C, [α]D20 = 7.8 (c = 0.12 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.94-7.04 (m, 17 H), 5.36 (s, 1 H), 4.79 (s, 1 H), 2.28(s, 1 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 142.8, 141.2, 133.4, 133.1, 132.3, 129.2, 129.0, 128.9, 128.2, 128.0, 127.8, 127.6, 127., 126.9, 126.8, 126.4, 124.9, 118.9, 65.8, 52.6 ppm.

(Benzhydryl-amino)-thiophen-2-yl-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 85% yield as a white solid. The chromatographed material was determined to be of 92% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 90:10, 1.0 mL/min], m.p. 83-85 °C, [α]D24 = 60.12 (c = 0.4 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.63-7.00 (m, 13 H), 5.27 (s, 1 H), 4.80 (s, 1 H), 2.41 (s, 1 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 142.5, 140.8, 138.3, 129.1, 128.9, 128.1, 127.9, 127.4, 127.1, 126.95, 126.7, 126.1, 118.2, 65.41, 48.2 ppm.

(Benzhydryl-amino)-(2,4-dimethyl-phenyl)-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 97% yield as a white solid. The chromatographed material was determined to be of 95% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 90:10, 1.0 mL/min], m.p. 123-125 °C, [α]D20 = 470 (c = 0.2 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.61-7.06 (m, 13 H), 5.29 (s, 1 H), 4.60 (d, J = 10 Hz, 1 H), 2.35 (s, 3H), 2.27 (s, 3H), 2.01 (d, J = 12.5 Hz, 1 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 142.9, 141.1, 139.1, 136.2, 132.0, 130.4, 128.9, 128.7, 128.0, 127.9, 127.6, 127.5, 127.3, 127.0, 118.94, 65.8, 50.1, 21.1, 18.8 ppm. Anal. Calcd for C23H22N2: C, 84.6; H, 6.7; N, 8.6. Found: C, 84.5; H, 6.9; N, 9.0.
2-(Benzhydryl-amino)-4-phenyl-but-3-enenitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 98% yield as a white solid. The chromatographed material was determined to be of 97% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min], m.p. 90-92 °C, [α]D20 = 16.08 (c = 0.23 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.64-7.03 (m, 15 H), 6.91 (d, J = 17.5 Hz, 1 H), 6.23 (dd, 1J = 17.5 2J = 5 Hz, 1 H), 5.22 (s, 1 H), 4.24 (s, 1 H), 1.01 (d, J = 12.5 Hz, 1 H), ppm. 13C NMR (62.90 MHz, CDCl3): δ = 142.8, 141.0, 135.3, 133.8, 129.0, 128.81, 128.75, 128.6, 127.9, 127.7, 127.4, 127.1, 126.82 122.4, 118.3, 65.4, 50.1 ppm.

![2-(Benzhydryl-amino)-4-phenyl-but-3-enenitrile](image)

2-(Benzhydryl-amino)-4-phenyl-butyronitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:50) to afford the product in 86% yield as a white solid. The chromatographed material was determined to be of 73% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min], m.p. 79-80 °C, [α]D20 = 63.4 (c = 0.54 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.55-7.21 (m, 15 H), 5.23 (s, 1 H), 3.47 (s, 1 H), 2.90 (t, J = 7.5 Hz, 2 H), 2.15 (q, J = 7.5 Hz, 2 H), 1.91(s, 1 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 143.3, 141.3, 140.2, 128.95, 128.86, 128.7, 128.5, 127.85, 127.7, 127.6, 127.2, 126.5, 120.2, 65.6, 48.0, 35.4, 31.9 ppm.

![2-(Benzhydryl-amino)-4-phenyl-butyronitrile](image)

2-(Benzhydryl-amino)-heptanenitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:60) to afford the product in 95% yield as oil. The chromatographed material was determined to be of 61% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min], m.p. 99-101 °C, [α]D20 =35 (c = 0.6 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.55-7.27 (m, 10 H), 3.41 (s, 1 H), 1.81 (m, 3 H), 1.55 (m, 2 H), 1.33(m, 4 H), 0.97(m, 3 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 143.6, 141.8, 129.0, 128.8, 127.8, 127.7, 127.6, 127.3, 120.4, 65.7, 48.5, 33.7, 31.3, 25.4, 22.6, 14.2 ppm.

![2-(Benzhydryl-amino)-heptanenitrile](image)

2-(Benzhydryl-amino)-3,3-dimethyl-butyronitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:60) to afford the product in 91%
yield as a white solid. The chromatographed material was determined to be of 76% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min]; m.p. 46-48 °C, [α]D20 = 83.62 (c = 0.41 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.54-7.25 (m, 10 H), 5.15 (s, 1 H), 3.11 (s, 1 H), 1.47 (s, 1 H), 1.12 (s, 9H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 143.6, 141.4, 130.1, 128.84, 127.78, 127.7, 127.5, 127.2, 119.6, 65.8, 59.0, 34.4, 26.4 ppm.

(Benzhydryl-amino)-pyridin-3-yl-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:30) to afford the product in 57% yield as a yellow solid. The chromatographed material was determined to be of 62% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 90:10, 1.0 mL/min], m.p. 115-117 °C, [α]D20 = 140.2 (c = 0.5 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 8.76 (s,1H), 8.58 (d, J = 5 Hz, 1 H), 7.86 (d, J = 7.5 Hz, 1 H), 7.56 (d, J = 7.5 Hz, 2 H), 7.45-7.21 (m, 8H), 4.63 (d, J = 10 Hz, 1 H), 2.31 (d, J = 10 Hz, 1 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 150.3, 148.8, 142.4, 140.7, 134.8, 130.8, 129.2, 128.9, 128.1, 127.8, 127.4, 127.0, 123.6, 117.8, 65.7, 50.3 ppm. Anal. Calcd for C20H17N3: C, 80.2; H, 5.68; N, 14.0. Found: C, 79.7; H, 5.8; N, 13.8.

(Benzhydryl-amino)-[3-(tert-butyl-dimethyl-silanyloxy)-phenyl]-acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 96% yield as a white solid. The chromatographed material was determined to be of 87% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min], m.p. 89-91 °C, [α]D20 = 550.3 (c = 0.12 in CHCl3). 1H NMR (250 MHz, CDCl3): δ = 7.58-6.84 (m, 14 H), 5.23 (s, 1 H), 4.55 (s, 1 H), 2.18 (s, 1 H), 1.01 (s, 9 H), 0.24(s, 6 H) ppm. 13C NMR (62.90 MHz, CDCl3): δ = 156.2, 142.7, 141.2, 136.4, 130.0, 129.0, 128.8, 127.9, 127.7, 127.4, 127.1, 120.6, 120.0, 119.0, 118.8, 65.5, 52.1, 25.7, 18.3, -4.3 ppm. Anal. Calcd for C27H32N2OSi: C, 75.7; H, 7.6; N, 7.2. Found: C, 76.3; H, 7.6; N, 7.2.
2-(benzhydrylamino)-2-(furan-2-yl)acetonitrile: The crude material was purified by flash chromatography on silica gel (THF/Hexane, 1:40) to afford the product in 50% yield as a white solid. The chromatographed material was determined to be of 45% ee by chiral HPLC analysis [Chiralpak AD, n-hexane/iPrOH, 98:2, 1.0 mL/min]; m.p. 99-101 °C, $[\alpha]_D^{20} = 8.07$ (c = 0.52 in CHCl₃), $^1$H NMR (250 MHz, CDCl₃): $\delta$ = 7.53-7.20 (m, 12 H), 6.39 (dd, $^1J = 17.5$ $^2J = 1.5$ Hz, 1 H), 5.16 (s, 1 H), 4.65 (s, 1 H), 2.33 (s, 1 H) ppm. $^{13}$C NMR (62.90 MHz, CDCl₃): $\delta$ =147.2, 143.6, 142.3, 140.8, 129.0, 128.8, 128.0, 127.8, 127.4, 127.2, 127.0, 110.6, 108.9, 65.1, 49.2 ppm.
Copy of, $^1$H, $^{13}$C-NMR, HPLC and FT-IR spectra of $\alpha$-amino nitril derivatives
Supplementary Material (ESI) for Chemical Communications
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S21
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**Totals**

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S25
Supplementary Material (ESI) for Chemical Communications

uv[1] Results

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Totals          | 11530683 | 100.00 | 321477    | 100.00   |

uv[2] Results

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Totals          | 4497072  | 100.00 | 155204    | 100.00   |

S29
### K-2600[1] Results

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### K-2600[1] Results

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**Supplementary Material (ESI) for Chemical Communications**

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![Chemical Structure](image)

**uv[1] Results**

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![Retention Time Graph](image)

**uv[1] Results**

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S37
Supplementary Material (ESI) for Chemical Communications
This journal is (c) The Royal Society of Chemistry 2009
**uv[1] Results**

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**Totals**

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**Totals**

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**Totals**

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Totals 1307615 100.00 55456 100.00

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Totals 929826 100.00 41614 100.00
**Supplementary Material (ESI) for Chemical Communications**

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![Chemical Structure](image)

**K-2600[1] Results**

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![Chemical Structure](image)

**K-2600[1] Results**

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**Supplementary Material (ESI) for Chemical Communications**

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**Totals**

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Supplementary Material (ESI) for Chemical Communications
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S62
**Supplementary Material (ESI) for Chemical Communications**

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Supplementary Material (ESI) for Chemical Communications
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uv[1] Results

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S73
**Supplementary Material (ESI) for Chemical Communications**

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** uv[1] Results **

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** Totals **

|            | 71838101 | 100.00  | 1503946 | 100.00 |

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** uv[1] Results **

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|            | 42224479 | 100.00  | 1039291 | 100.00 |
K-2600[1] Results

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K-2600[1] Results

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<td>13.017</td>
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### K-2600[1] Results

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### K-2600[1] Results

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### K-2600[1] Results

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<tbody>
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### K-2600[1] Results

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Supplementary Material (ESI) for Chemical Communications
This journal is (c) The Royal Society of Chemistry 2009
**uv[1] Results**

<table>
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**Totals**

|       | 22929783 | 100.00 | 1583086 | 100.00   |

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**uv[2] Results**

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**Totals**

|       | 815786 | 100.00 | 70193   | 100.00   |
Supplementary Material (ESI) for Chemical Communications
This journal is (c) The Royal Society of Chemistry 2009
Supplementary Material (ESI) for Chemical Communications
This journal is (c) The Royal Society of Chemistry 2009

uv[1] Results

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<thead>
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uv[1] Results

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