Supporting Information

Triazole-Based Monophosphines for Suzuki-Miyaura Coupling and Amination Reactions of Aryl Chlorides

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General Methods. All reactions and manipulations were performed in a nitrogen-filled glove-box or under nitrogen using standard Schlenk techniques, unless otherwise noted. THF and toluene were dried and distilled from sodium-benzophenone ketyl under nitrogen. Column chromatography was performed using Sorbent silica gel 60 Å (230×450 mesh). ¹H, ¹³C, and ³¹P NMR spectral data were recorded on Bruker DPX-300, CDPX-300, AMX-360, and DRX-400 MHz spectrometers. Chemical shifts were reported in ppm upfield to tetramethylsilane with the solvent resonance as the internal standard. MS spectra were recorded on a KRATOS MS 9/50 mass spectrometer for LR-APCI and HR-APCI.

1,5-Diphenyl-1H-[1,2,3]triazole (6a). To a solution of EtMgBr in THF (1.0 M, 11.9 mL) was added phenylacetylene (1.3 mL, 11.9 mmol) at rt. The reaction mixture

was heated to 50 °C for 15 min. After cooling the mixture to rt, a solution of phenylazide (1.41 g, 11.9 mmol) in THF (4 mL) was added. The resulting solution was stirred at rt for 30 min, and then heated to 50 °C for 1 h before quenching with saturated NH₄Cl (10 mL). The layers were separated, and the aqueous layer was extracted with CH₂Cl₂ (10 mL × 3). The combined organic layers were dried over Na₂SO₄ and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel to afford **6a** as a white solid (1.98 g, 75%). ¹H NMR (CDCl₃, 300 MHz) δ 7.86 (s, 1H), 7.44-7.30 (m, 8H), 7.23-7.20 (m, 2H); ¹³C NMR (CDCl₃, 75 MHz) δ 137.6, 136.5, 133.4, 129.3, 129.2, 128.8, 128.5, 126.7, 125.1.

1-Phenyl-5-(1-naphthyl)-1H-[1,2,3]triazole (6b). To a solution of EtMgBr in THF (3.0 M, 2.5 mL) was added 1-naphthlyne (1.12 g, 7.36 mmol) at rt. The reaction mixture was heated to 50 °C for 15 min. After cooling the mixture to rt, a solution of phenylazide (0.88 g, 7.36 mmol) in THF (4 mL) was added. The resulting solution was stirred at rt for 30 min, and then heated to 50 °C for 1 h before quenching with saturated NH₄Cl (10 mL). The layers were separated, and the aqueous layer was extracted with CH₂Cl₂ (10 mL × 3). The combined organic layers were dried over Na₂SO₄ and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel to afford **6b** as a white solid (1.16 g, 58%). ¹H NMR (CDCl₃, 360 MHz) δ 7.98 (s, 1H), 7.94 (t, *J* = 9.2 Hz, 3H), 7.67 (d, *J* = 8.3 Hz, 1H), 7.56-7.46 (m, 3H), 7.35-7.24 (m, 6H); ¹³C NMR (CDCl₃, 90 MHz) δ 136.6, 135.7, 135.4,

133.6, 131.7, 130.2, 129.2, 129.0, 128.8, 128.6, 127.2, 126.6, 125.1, 124.8, 124.6, 124.1;
HRMS (ESI⁺) calcd. for C₁₈H₁₄N₃ (MH⁺) 272.1188, found 272.1182.

1-Phenyl-5-(2-methoxyphenyl)-1H-[1,2,3]triazole (6c). To a solution of EtMgBr in THF (3.0 M, 2.3 mL) was added 2-methoxyphenylacetylene (0.92 g, 6.96 mmol) at rt. The reaction mixture was heated to 50 °C for 15 min. After cooling the mixture to rt, a solution of phenylazide (0.83 g, 6.96 mmol) in THF (4 mL) was added. The resulting solution was stirred at rt for 30 min, and then heated to 50 °C for 1 h before quenching with saturated NH₄Cl (10 mL). The layers were separated, and the aqueous layer was extracted with CH₂Cl₂ (10 mL × 3). The combined organic layers were dried over Na₂SO₄ and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel to afford **6c** as a white solid (1.45 g, 83%). ¹H NMR (CDCl₃, 300 MHz) δ 7.85 (s, 1H), 7.44-7.33 (m, 6H), 7.01(t, *J* = 7.5 Hz, 1H), 6.87 (d, *J* = 8.3 Hz, 1H) 3.44 (s, 3H); ¹³C NMR (CDCl₃, 75 MHz) δ 156.9, 138.1, 135.1, 134.9, 131.7, 131.4, 129.4, 129.0, 124.2, 121.2, 116.6, 111.8, 55.3; HRMS (ESI⁺) calcd. for C₁₅H₁₄N₃O (MH⁺) 252.1137, found 252.1127.

4-Diphenylphosphanyl-1,5-diphenyl-1H-[1,2,3]triazole (1a). To a solution of **6a** (0.260 g, 1.18 mmol) in THF (10 mL) at 0 °C was added LDA (1.24 mmol), which was prepared from diisopropylamine (0.174 mL, 1.24 mmol) and ⁿBuLi (1.24 mmol) at 0 °C. The reaction mixture was stirred at 0 °C for 1.5 h followed by

addition of PPh₂Cl (0.24 mL, 1.24 mmol). The resulting mixture was slowly warmed to rt and stirred for 1 h. TLC showed the reaction was essentially complete. The organic solution was washed with brine (10 mL), dried over Na₂SO₄ and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel (hexenes:EtOAc, 95:5) to afford **1a** as a white solid (0.43 g, 90%). ¹H NMR (CDCl₃, 360 MHz) δ 7.73-7.69 (m, 4H), 7.44-7.36 (m, 14H), 7.26 (d, *J* = 7.3 Hz, 2H); ¹³C NMR (CDCl₃, 90 MHz) δ 143.3 (d, *J* = 39.5 Hz), 141.1 (d, *J* = 14.2 Hz), 136.40, 136.38 (d, *J* = 15.4 Hz), 133.8, 133.5, 130.1 (d, *J* = 3.5 Hz), 129.2, 129.0, 128.8, 128.6, 128.35, 128.28, 128.2, 126.5, 124.8; ³¹P NMR (CDCl₃, 145 MHz) δ -35.85; HRMS (ESI+) calcd. for C₂₆H₂₁N₃P (MH⁺) 406.1475, found 406.1473.

4-Dicyclohexylphosphanyl-1,5-diphenyl-1H-[1,2,3]triazole (1b). To a solution of **6a** (0.500 g, 2.26 mmol) in THF (20 mL) at 0 °C was added LDA (2.26 mmol), which was prepared from diisopropylamine (0.32 mL, 2.26 mmol) and ⁿBuLi (2.26 mmol) at 0 °C. The reaction mixture was stirred at 0 °C for 1.5 h followed by addition of PCy₂Cl (0.500 mL, 2.26 mmol). The resulting mixture was slowly warmed to rt and stirred for 4 h. TLC showed the reaction was essentially complete. The organic solution was washed with brine (10 mL), dried over Na₂SO₄ and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel under nitrogen (hexanes:ether, 80:20) to afford **1b** as a white solid (0.88 g, 93%). ¹H NMR (CD₂Cl₂, 360 MHz) δ 7.41-7.23 (m, 10H), 2.28-2.21 (m, 2H), 1.87-1.67 (m, 10H), 1.38-1.09 (m, 10H); ¹³C NMR (CDCl₃, 90 MHz) δ 144.7 (d, *J* = 34.8 Hz), 141.2 (d, *J* =

24.6 Hz), 137.2, 130.9 (d, $J = 2.9$ Hz), 129.4, 129.3, 129.1, 128.6, 128.0, 125.3, 33.5 (d, $J = 8.4$ Hz), 30.8 (d, $J = 16.3$ Hz), 29.8 (d, $J = 7.5$ Hz), 27.5 (d, $J = 18.5$ Hz), 27.4 (d, $J = 1.6$ Hz), 26.8; ^{31}P NMR (CD_2Cl_2 , 145 MHz) δ -27.76; HRMS (ESI+) calcd. for $\text{C}_{26}\text{H}_{33}\text{N}_3\text{P}$ (MH^+) 418.2419, found 418.2412.

4-Di-*tert*-butylphosphanyl-1,5-diphenyl-1H-[1,2,3]triazole (1c). To a solution of **6a** (0.520 g, 2.35 mmol) in THF (20 mL) at 0 °C was added LDA (2.35 mmol), which was prepared from diisopropylamine (0.33 mL, 2.35 mmol) and $n\text{BuLi}$ (2.35 mmol) at 0 °C. The reaction mixture was stirred at 0 °C for 1.5 h followed by addition of $\text{P}^t\text{Bu}_2\text{Cl}$ (0.446 mL, 2.35 mmol). The resulting mixture was slowly warmed to rt and stirred overnight. TLC showed the reaction was essentially complete after 16 h. The solvent was removed under vacuum. A degassed mixture of brine/ H_2O (1:1) was added, and the resulting mixture was extracted with degassed ether (15 mL $\times$ 3). The combined organic layers were dried over Na_2SO_4 and concentrated under vacuum. The residue was purified by flash column chromatography on silica gel under nitrogen (hexanes:ether, 80:20) to afford **1c** as a sticky solid (0.78 g, 91%). ^1H NMR (CD_2Cl_2 , 360 MHz) δ 7.41-7.23 (m, 10H), 1.27 (d, $J = 12.1$ Hz, 18H); ^{13}C NMR (CDCl_3 , 90 MHz) δ 145.2 (d, $J = 39.0$ Hz), 142.2 (d, $J = 27.9$ Hz), 137.2, 131.1 (d, $J = 2.5$ Hz), 129.4, 129.3, 129.0, 128.6, 128.5, 125.2, 33.1 (d, $J = 17.0$ Hz), 30.6 (d, $J = 14.4$ Hz); ^{31}P NMR (CD_2Cl_2 , 145 MHz) δ 3.51; HRMS (ESI+) calcd. for $\text{C}_{22}\text{H}_{29}\text{N}_3\text{P}$ (MH^+) 366.2084, found 366.2099.

4-Di-*tert*-butylphosphanyl-1-phenyl-5-(1-naphthyl)-1H-[1,2,3]triazole

(1d). To a solution of **6b** (0.40 g, 1.47 mmol) in THF (20 mL) at 0 °C was added LDA (1.47 mmol), which was prepared from diisopropylamine (0.23 mL, 1.62 mmol) and ⁿBuLi (0.59 mL, 1.47 mmol) at 0 °C. The reaction mixture was stirred at 0 °C for 1.5 h followed by addition of P^tBu₂Cl (0.28 mL, 1.47 mmol). The resulting mixture was slowly warmed to rt and stirred overnight. TLC showed the reaction was essentially complete after 16 h. The solvent was removed under vacuum. A degassed mixture of brine/H₂O (1:1) was added, and the resulting mixture was extracted with degassed ether (15 mL × 3). The combined organic layers were dried over Na₂SO₄ and concentrated under vacuum. The residue was purified by flash column chromatography on silica gel under nitrogen (hexanes:ether, 80:20) to afford **1d** as a white solid (0.46 g, 75%). ¹H NMR (CD₂Cl₂, 300 MHz) δ 7.98-7.88 (m, 2H), 7.55-7.21 (m, 10H), 1.34-1.24 (m, 18H); ¹³C NMR (CDCl₃, 75 MHz) δ 144.1 (d, *J* = 14.9 Hz), 143.7 (d, *J* = 28.6 Hz), 137.3, 133.7, 132.4, 130.6, 130.3, 129.3, 129.0, 128.8, 127.0, 126.6, 126.1, 125.6, 125.3, 124.2, 33.0 (d, *J* = 21.7 Hz), 32.8 (d, *J* = 21.6 Hz), 30.8 (d, *J* = 14.3 Hz), 30.7 (d, *J* = 14.1 Hz); ³¹P NMR (CD₂Cl₂, 145 MHz) δ 3.63; HRMS (ESI⁺) calcd. for C₂₆H₃₁N₃P (MH⁺) 416.2256, found 416.2252.

4-Di-*tert*-butylphosphanyl-1-phenyl-5-(2-methoxyphenyl)-1H-

[1,2,3]triazole (1e). To a solution of **6c** (0.502 g, 2.0 mmol) in THF (20 mL) at 0 °C was added LDA (2.0 mmol), which was prepared from diisopropylamine (0.31 mL, 2.20

mmol) and n BuLi (0.80 mL, 2.0 mmol) at 0 °C. The reaction mixture was stirred at 0 °C for 1.5 h followed by addition of P^t Bu₂Cl (0.38 mL, 2.0 mmol). The resulting mixture was slowly warmed to rt and stirred overnight. TLC showed the reaction was essentially complete after 16 h. The solvent was removed under vacuum. A degassed mixture of brine/H₂O (1:1) was added, and the resulting mixture was extracted with degassed ether (15 mL $\times$ 3). The combined organic layers were dried over Na₂SO₄ and concentrated under vacuum. The residue was purified by flash column chromatography on silica gel under nitrogen (hexanes:ether, 80:20) to afford **1e** as a white solid (0.60 g, 76%). ¹H NMR (CD₂Cl₂, 360 MHz) δ 7.47-7.32 (m, 7H), 7.09 (t, J = 7.2 Hz, 1H), 6.90 (d, J = 8.2 Hz, 1H), 3.48 (s, 3H), 1.41 (d, J = 11.8 Hz, 9H), 1.24 (d, J = 11.8 Hz, 9H); ¹³C NMR (CDCl₃, 90 MHz) δ 157.3, 142.5 (d, J = 9.3 Hz), 142.2 (d, J = 24.5 Hz), 137.6, 132.6 (d, J = 2.6 Hz), 131.1, 128.8, 128.5, 123.9, 120.3, 117.4, 111.0, 54.9, 32.6 (d, J = 17.0 Hz), 32.4 (d, J = 16.1 Hz), 30.5 (d, J = 14.1 Hz), 30.0 (d, J = 14.3 Hz); ³¹P NMR (CD₂Cl₂, 145 MHz) δ 3.46; HRMS (ESI+) calcd. for C₂₃H₃₁N₃OP (MH⁺) 396.2205, found 396.2202.

General Procedure for Suzuki Coupling of Aryl Chlorides. To a Schlenk tube, which was flame-dried under vacuum and backfilled with nitrogen, was charged with boronic acid **8** (1.5 mmol) and K₃PO₄ (2 mmol). The flask was evacuated and backfilled with nitrogen three times. Toluene (3 mL), a stock solution of ligand **1** in toluene (0.002 mmol), a stock solution of Pd(dba)₂ (0.001 mmol) in toluene, and aryl chloride **7** (1.0 mmol) were subsequently added. The flask was sealed and the reaction mixture was heated at 100 °C with vigorous stirring for 12 h. After cooling the mixture to rt, 15 mL of EtOAc was added and the mixture was washed with 5 mL of 1 N NaOH (aq.) and 5 mL

of brine. The organic layer was dried over Na₂SO₄ and concentrated under reduced pressure. The crude product was purified by flash column chromatography on silica gel.

4-Methylbiphenyl (9a). ¹H NMR (CDCl₃, 400 MHz) δ 7.67-7.64 (m, 2H), 7.59-7.55 (m, 2H), 7.51-7.47 (m, 2H), 7.41-7.37 (m, 1H), 7.32 (d, *J* = 7.9 Hz, 2H), 2.47 (s, 3H); ¹³C NMR (CDCl₃, 100 MHz) δ 141.1, 138.3, 137.0, 129.5, 128.7, 127.0, 126.9, 21.1.

4-Acetylbiphenyl (9b). ¹H NMR (CDCl₃, 400 MHz) δ 8.04 (dd, *J* = 1.6, 7.6 Hz, 2H), 7.69 (dd, *J* = 1.6, 6.9 Hz, 2H), 7.65-7.62 (m, 2H), 7.50-7.41 (m, 3H), 2.64 (s, 3H); ¹³C NMR (CDCl₃, 90 MHz) δ 197.4, 145.4, 139.5, 135.6, 128.73, 128.67, 128.0, 127.0, 126.9, 26.4.

4-Nitrobiphenyl (9c). ¹H NMR (CDCl₃, 400 MHz) δ 8.30 (dt, *J* = 2.5, 9.3 Hz, 2H), 7.74 (dt, *J* = 2.0, 8.9 Hz, 2H), 7.65-7.62 (m, 2H), 7.53-7.45 (m, 3H); ¹³C NMR (CDCl₃, 75 MHz) δ 147.5, 147.0, 138.7, 129.1, 128.9, 127.7, 127.3, 124.0.

4-Carbomethoxybiphenyl (9d). ¹H NMR (CDCl₃, 400 MHz) δ 8.12 (dt, *J* = 1.8, 8.5 Hz, 2H), 7.69-7.62 (m, 4H), 7.50-7.46 (m, 2H), 7.43-7.39 (m, 1H), 3.95 (s, 3H); ¹³C NMR (CDCl₃, 75 MHz) δ 166.9, 145.5, 139.9, 130.0, 128.9, 128.8, 128.1, 127.2, 127.0, 52.1.

4-Trifluoromethylbiphenyl (9e). ^1H NMR (CDCl_3 , 400 MHz) δ 7.72 (s, 4H), 7.66-7.60 (m, 2H), 7.54-7.41 (m, 3H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 144.7, 139.8, 129.3 (q, $J = 32.1$ Hz), 129.0, 128.2, 127.4, 127.3, 125.7 (q, $J = 3.7$ Hz), 124.4 (q, $J = 272$ Hz).

2-Acetylbiphenyl (9f). ^1H NMR (CDCl_3 , 400 MHz) δ 7.58 (dd, $J = 1.2$, 7.6 Hz, 1H), 7.53 (dt, $J = 1.4$, 7.5 Hz, 1H), 7.47-7.35 (m, 7H), 2.03 (s, 3H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 204.7, 140.8, 140.6, 140.4, 130.6, 130.1, 128.8, 128.6, 127.79, 127.77, 127.4, 30.3.

2-Cyanobiphenyl (9g). ^1H NMR (CDCl_3 , 400 MHz) δ 7.77 (dd, $J = 1.1$, 7.7 Hz, 1H), 7.65 (dt, $J = 1.3$, 7.7 Hz, 1H), 7.59-7.57 (m, 2H), 7.53-7.44 (m, 5H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 145.3, 138.0, 133.6, 132.7, 130.0, 128.63, 128.60, 127.4, 118.6, 111.1.

2-Phenyl-pyridine (9h). ^1H NMR (CDCl_3 , 400 MHz) δ 8.71 (d, $J = 4.8$ Hz, 1H), 8.01 (d, $J = 7.7$ Hz, 2H), 7.72 (d, $J = 3.3$ Hz, 2H), 7.49 (t, $J = 7.4$ Hz, 2H), 7.42 (t, $J = 7.3$ Hz, 1H), 7.21 (dd, $J = 4.5$, 8.6 Hz, 1H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 157.3, 149.5, 139.3, 136.6, 128.8, 128.6, 126.8, 122.0, 120.4.

2-Methylbiphenyl (9i). ^1H NMR (CDCl_3 , 400 MHz) δ 7.54-7.50 (m, 2H),

7.45-7.41 (m, 3H), 7.38-7.34 (m, 4H), 2.39 (s, 3H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 141.95, 141.91, 135.3, 130.3, 129.8, 129.2, 128.0, 127.2, 126.7, 125.7, 20.4.

2,4-Dimethylbiphenyl (9j). ^1H NMR (CDCl_3 , 400 MHz) δ 7.50-7.46 (m,

2H), 7.42-7.40 (m, 3H), 7.25 (d, $J = 8.2$ Hz, 1H), 7.17-7.15 (m, 2H), 2.44 (s, 3H), 2.32 (s, 3H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 142.1, 141.7, 135.1, 132.1, 130.5, 130.2, 129.1, 128.0, 127.9, 126.6, 20.9, 19.9.

4-Methoxybiphenyl (9k). ^1H NMR (CDCl_3 , 400 MHz) δ 7.61-7.56

(m, 4H), 7.47-7.43 (m, 2H), 7.36-7.32 (m, 1H), 7.01 (dt, $J = 2.2, 8.8$ Hz, 1H), 3.88 (s, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 159.1, 140.8, 133.7, 128.7, 128.1, 126.7, 126.6, 114.1, 55.3.

2-Cyano-4'-methylbiphenyl (9l). ^1H NMR (CDCl_3 , 400 MHz)

δ 7.76 (dd, $J = 0.9, 7.8$ Hz, 1H), 7.63 (dt, $J = 1.3, 7.7$ Hz, 1H), 7.51 (d, $J = 7.9$ Hz, 1H), 7.49 (d, $J = 8.1$ Hz, 2H), 7.42 (dt, $J = 1.1, 7.6$ Hz, 1H), 7.32 (d, $J = 8.0$ Hz, 2H), 2.43 (s, 3H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 145.4, 138.5, 135.1, 133.6, 132.7, 129.9, 129.3, 128.5, 127.2, 118.8, 111.0, 21.1.

2,5,2'-Trimethylbiphenyl (9m). ^1H NMR (CDCl_3 , 400 MHz) δ 7.25-7.18 (m, 3H), 7.13 (d, $J = 7.7$ Hz, 1H), 7.10-7.04 (m, 2H), 6.92 (s, 1H), 2.32 (s, 3H), 2.05 (s, 3H), 2.00 (s, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 141.7, 141.4, 135.8, 134.9, 132.6, 129.9, 129.7, 129.6, 129.2, 127.8, 127.0, 125.5, 20.9, 19.8, 19.3.

2'-Methoxy-2,5-dimethylbiphenyl (9n). ^1H NMR (CDCl_3 , 400 MHz) δ 7.35 (ddd, $J = 1.8, 7.5, 8.2$ Hz, 1H), 7.17 (dd, $J = 1.6, 7.4$ Hz, 2H), 7.09 (d, $J = 7.7$ Hz, 1H), 7.04 (d, $J = 1.0$ Hz, 1H), 7.01 (dd, $J = 1.0, 7.4$ Hz, 1H), 6.97 (d, $J = 8.2$ Hz, 1H), 3.77 (s, 3H), 2.36 (s, 3H), 2.13 (s, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 156.5, 138.4, 134.7, 133.6, 130.93, 130.90, 130.6, 129.4, 128.4, 128.0, 120.4, 110.5, 55.3, 20.9, 19.4.

General Procedure for Amination of Aryl Chlorides. To a Schlenk tube, which was flame-dried under vacuum and backfilled with nitrogen, NaO^tBu (1.2 mmol), toluene (3 mL), a stock solution of ligand **4** in toluene (0.01 mmol), a stock solution of $\text{Pd}(\text{dba})_2$ (0.005 mmol) in toluene, aryl chloride **7** (1.0 mmol) and amine **10** (1.2 mmol) were subsequently added. The flask was sealed and the reaction mixture was heated at 120 °C with vigorous stirring for 24 h. After cooling the mixture to rt, 15 mL of EtOAc was added and the mixture was washed with 5 mL of brine. The organic layer was dried over Na_2SO_4 and concentrated under reduced pressure. The crude product was purified by flash column chromatography on basic Al_2O_3 .

Phenyl-*p*-tolylamine (11a). ^1H NMR (CDCl_3 , 400 MHz) δ 7.32 (t, $J = 7.8$ Hz, 2H), 7.17 (d, $J = 8.1$ Hz, 2H), 7.10-7.06 (m, 4H), 6.97 (t, $J = 7.2$ Hz, 1H), 5.64 (brs, 1H), 2.39 (s, 3H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 143.9, 140.3, 130.9, 129.8, 129.3, 120.3, 118.9, 116.8, 20.7.

Methylphenyl-*p*-tolylamine (11b). ^1H NMR (CDCl_3 , 400 MHz) δ 7.33-7.28 (m, 2H), 7.19 (d, $J = 8.2$ Hz, 2H), 7.10-7.05 (m, 2H), 7.02-6.98 (m, 2H), 6.97-6.92 (m, 1H), 3.36 (s, 3H), 2.40 (s, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 149.3, 146.5, 132.0, 129.9, 129.0, 122.5, 119.7, 118.1, 40.3, 20.7.

Phenyl-*o*-tolylamine (11c). ^1H NMR (CDCl_3 , 400 MHz) δ 7.30-7.23 (m, 4H), 7.18 (t, $J = 7.5$ Hz, 1H), 7.00-6.92 (m, 4H), 5.38 (brs, 1H), 2.28 (s, 3H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 143.9, 141.1, 130.9, 129.2, 128.3, 126.7, 122.0, 120.4, 118.8, 117.3, 17.8.