Supporting Information

Ru-Catalyzed Hydroamidation of Alkenes and Cooperative Aminocarboxylation Procedure with Chelating Formamide

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General Methods. ^1H and ^{13}C NMR spectra were recorded on 300 and 75 MHz NMR spectrometer, respectively. Chemical shifts are reported in delta (δ) units, parts per million (ppm) downfield from tetramethylsilane, or in ppm relative to the singlet at 7.26 ppm of chloroform-*d* or to a center line of a pentet at 2.50 ppm of DMSO-*d*₆. Splitting patterns are designated as follows: s, singlet; d, doublet; t, triplet; q, quartet; m, multiplet; td, triple of doublet; dd, double of doublet; b, broad. ^{13}C NMR data are reported in ppm relative to the center line of a triplet at 77.0 ppm of chloroform-*d* or to a center line of a heptet at 39.5 ppm of DMSO-*d*₆. Column chromatography was carried out using silica gel 60 (230-400 mesh). Solvents were purified by standard procedures. Chemicals including Ru, Pd, and alkenes were purchased from a commercial supplier and used as obtained without further purification.

Representative procedure for the preparation of substituted formamides. To a solution of 2-aminopyridine (5.0 g, 0.053 mol) in THF (10 mL) was added acetyl formyl anhydride (8.7 g, 0.080 mol, 1.5 equiv) at 0 °C. After stirring the reaction mixture for 1 h at rt, the organic layer was extracted with ethyl acetate (20 mL x 3), washed with water, and then dried over MgSO_4 . The extracts were evaporated under reduced pressure to give analytically pure *N*-(2-pyridyl)formamide (**1b**, 5.95 g, 92%) as a yellow solid; mp 71 °C dec; ^1H NMR (CDCl_3 , 300 MHz) δ 10.59 (bs, 0.45H), 9.26 (d, 1H, J = 7.7 Hz), 8.47 (s, 0.55H), 8.25 (m, 1H), 8.19 (d, 0.55H, J = 6.3 Hz), 7.65 (td, 0.55H, J = 6.7, 1.2 Hz), 7.58 (td, 0.45H, J = 6.3, 1.2 Hz), 6.95-7.02 (m, 1H), 6.88 (td, 0.45H, J = 6.2 Hz); ^{13}C NMR (CDCl_3 , 75 MHz) δ 163.2, 159.7, 151.0, 148.2, 147.1, 138.7, 138.5, 119.9, 119.6, 115.0, 110.4; IR (KBr) 3189, 2988, 1700, 1594, 1438, 1308, 1174, 776 cm^{-1} ; HRMS (EI) calcd for $\text{C}_6\text{H}_6\text{N}_2\text{O}$ 122.0481 (M^+), found 122.0485.

***N*-(2-Pyridylmethyl)formamide (1a):** ^1H NMR (CDCl_3 , 300 MHz) δ 9.51 (bs, 0.5H), 8.37 (d, 1H, $J = 3.5$ Hz), 8.14 (s, 1H), 7.65 (bs, 0.5H), 7.57 (td, 1H, $J = 4.2, 1.3$ Hz), 7.20 (d, 1H, $J = 5.9$ Hz), 7.10 (m, 1H), 4.45 (d, 2H, $J = 4.3$ Hz), 1.94 (s, 1H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 161.6, 156.0, 148.3, 137.3, 122.5, 122.3, 42.7; HRMS (EI) calcd for $\text{C}_7\text{H}_8\text{N}_2\text{O}$ 136.0637 (M^+), found 136.0627.

***N*-Methyl-*N*-(2-pyridyl)formamide (1c):** ^1H NMR (CDCl_3 , 300 MHz) δ 9.23 (s, 1H), 8.30 (m, 1H), 7.65 (td, 1H, $J = 6.2, 1.4$ Hz), 7.04 (m, 1H), 6.94 (d, 1H, $J = 6.2$ Hz), 3.33 (s, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 162.1, 153.8, 148.3, 138.4, 120.0, 111.4, 28.6; HRMS (EI) calcd for $\text{C}_7\text{H}_8\text{N}_2\text{O}$ 136.0637 (M^+), found 136.0636.

***N*-(6-Methyl-2-pyridyl)formamide (1d):** mp 68 °C dec; ^1H NMR (CDCl_3 , 300 MHz) δ 9.28 (d, 0.45H, $J = 10.1$ Hz), 9.11 (bs, 1H), 8.43 (s, 0.55H), 7.99 (d, 0.55H, $J = 3.2$ Hz), 7.59 (t, 0.55H, $J = 7.8$ Hz), 7.50 (t, 0.45H, $J = 7.8$ Hz), 6.89 (t, 1H, $J = 7.2$ Hz), 6.65 (d, 1H, $J = 7.9$ Hz), 2.44 (s, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 163.0, 159.3, 158.0, 156.8, 150.1, 150.0, 139.0, 138.7, 119.8, 119.3, 111.9, 107.5, 24.1, 23.8; HRMS (EI) calcd for $\text{C}_7\text{H}_8\text{N}_2\text{O}$ 136.0637 (M^+), found 136.0637.

General procedure for the hydroamidation of alkenes with formamide 1b. To a solution of *N*-(2-pyridyl)formamide (**1b**, 122 mg, 1.0 mmol) in acetonitrile (1.0 mL) was added 1-hexene (252 mg, 3.0 mmol) and then $\text{Ru}_3(\text{CO})_{12}$ (32 mg, 5 mol %). The reaction mixture was stirred at 135 °C for 6 h in a sealed vial. After removal of the solvent under the reduced pressure, the residue was purified by flash column chromatography on silica gel (ethyl acetate/hexane = 1:6) to obtain *N*-(2-pyridyl) heptanamide (144 mg, 72 %) as a major product: ^1H (CDCl_3 , 300 MHz) 9.14 (bs, 1H), 8.27 (m, 2H), 7.71 (td, 1H, $J = 8.6, 1.6$ Hz), 7.03 (m, 1H), 2.38 (t, 2H, $J = 7.5$ Hz), 1.70 (m, 2H), 1.32 (m, 6H), 0.81 (m, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) 172.0, 151.7, 147.5, 138.4, 119.5, 114.3, 37.7, 31.4, 28.8, 25.3, 22.4, 13.9; HRMS (EI) calcd for $\text{C}_{12}\text{H}_{18}\text{N}_2\text{O}$ 206.1420 (M^+), found 206.1414.

***N*-(2-Pyridyl)-2-methyl hexanamide** (minor isomer in the above reaction, Table 2, entry 1): ^1H NMR (CDCl_3 , 300 MHz) δ 8.22 (m, 2H), 7.95 (bs, 1H), 7.68 (t, 1H, $J = 6.9$ Hz), 7.01 (m, 1H), 2.35 (m, 1H), 1.72 (m, 1H), 1.45 (m, 1H), 1.29 (m, 4H), 1.22 (d, 3H, $J = 6.9$ Hz), 0.88 (m, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 175.4, 151.4, 147.7, 138.4, 119.7, 114.0, 42.8, 34.0, 29.6, 22.7, 17.7, 13.9; HRMS (EI) calcd for $\text{C}_{12}\text{H}_{18}\text{N}_2\text{O}$ 206.1420 (M^+), found 206.1412.

***N*-(2-Pyridyl)-3-cyclohexyl propanamide** (Table 2, entry 2): ^1H NMR (CDCl_3 , 300 MHz) δ 8.59 (bs, 1H), 8.22 (m, 2H), 7.67 (td, 1H, $J = 8.7, 1.9$ Hz), 7.00 (m, 1H), 2.36 (t, 2H, $J = 8.0$ Hz),

1.56-1.68 (m, 7H), 1.10-1.23 (m, 4H), 0.88 (m, 2H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 172.2, 151.7, 147.5, 138.4, 119.5, 114.1, 37.2, 35.2, 33.0, 32.7, 26.4, 26.1; HRMS (EI) calcd for $\text{C}_{14}\text{H}_{20}\text{N}_2\text{O}$ 232.1577 (M^+), found 232.1570.

***N*-(2-Pyridyl)-4,4-dimethyl pentanamide** (2, Table 2, entry 3): ^1H NMR (CDCl_3 , 300 MHz) δ 9.49 (bs, 1H), 8.22 (m, 2H), 7.64 (td, 1H, $J = 6.6, 1.3$ Hz), 6.96 (m, 1H), 2.28 (m, 2H), 1.56 (m, 2H), 0.80 (s, 9H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 172.7, 152.0, 147.2, 138.4, 119.4, 114.5, 38.9, 33.1, 30.0, 29.0; IR (neat) 3243, 2952, 1668, 1532, 1430, 1308, 783 cm^{-1} ; HRMS (EI) calcd for $\text{C}_{12}\text{H}_{18}\text{N}_2\text{O}$ 206.1420 (M^+), found 206.1425.

***N*-(2-Pyridyl)-3-phenyl propanamide** (Table 2, entry 4, major isomer): ^1H NMR (CDCl_3 , 300 MHz) δ 9.05 (bs, 1H), 8.23 (d, 1H, $J = 6.2$ Hz), 8.18 (dd, 1H, $J = 3.7, 0.7$ Hz), 7.67 (td, 1H, $J = 6.5, 0.7$ Hz), 7.24 (m, 2H), 7.17 (m, 2H), 6.99 (m, 1H), 3.02 (t, 2H, $J = 5.6$ Hz), 2.67 (t, 2H, $J = 5.6$ Hz); ^{13}C NMR (CDCl_3 , 75 MHz) δ 171.0, 151.7, 147.5, 140.5, 138.5, 128.5, 128.3, 126.3, 119.6, 114.5, 39.1, 31.2; IR (neat) 3260, 3029, 2931, 1694, 1529, 1434, 780 cm^{-1} ; HRMS (EI) calcd for $\text{C}_{14}\text{H}_{14}\text{N}_2\text{O}$ 226.1107 (M^+), found 226.1107.

***N*-(2-Pyridyl)-2-phenyl propanamide** (Table 2, entry 4, minor isomer): ^1H NMR (CDCl_3 , 300 MHz) δ 8.21 (d, 1H, $J = 6.3$ Hz), 8.15 (m, 2H), 7.65 (m, 1H), 7.25-7.33 (m, 5H), 6.96 (m, 1H), 3.70 (q, 1H, $J = 5.3$ Hz), 1.56 (d, 3H, $J = 5.3$ Hz); ^{13}C NMR (CDCl_3 , 75 MHz) δ 172.7, 151.4, 147.6, 140.4, 138.3, 129.1, 127.6, 119.7, 113.9, 48.1, 18.4; HRMS (EI) calcd for $\text{C}_{14}\text{H}_{14}\text{N}_2\text{O}$ 226.1107 (M^+), found 226.1107.

***N*-(2-Pyridyl)-3-(2,4,6-trimethylphenyl) propanamide** (Table 2, entry 5): ^1H NMR (CDCl_3 , 300 MHz) δ 8.46 (s, 1H), 8.23 (m, 2H), 7.70 (dd, 1H, $J = 7.2, 1.3$ Hz), 7.02 (m, 1H), 6.83 (s, 2H), 3.04 (m, 2H), 2.51 (m, 2H), 2.29 (s, 6H), 2.24 (s, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 171.1, 151.5, 147.6, 138.5, 136.0, 135.6, 133.9, 129.0, 119.7, 114.1, 36.9, 24.9, 20.8, 19.6; HRMS (EI) calcd for $\text{C}_{17}\text{H}_{20}\text{N}_2\text{O}$ 268.1577 (M^+), found 268.1574.

***N*-(2-Pyridyl)-4-trimethylsilyl butanamide** (Table 2, entry 6, major isomer): ^1H NMR (CDCl_3 , 300 MHz) δ 8.51 (bs, 1H), 8.22 (m, 2H), 7.67 (dd, 1H, $J = 8.3, 1.3$ Hz), 7.00 (m, 1H), 2.38 (t, 2H, $J = 7.4$ Hz), 1.65-1.76 (m, 2H), 0.53 (m, 2H), -0.04 (s, 9H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 171.9, 151.6, 147.6, 138.4, 119.6, 114.2, 41.5, 20.2, 16.5, -1.8; HRMS (FAB) calcd for $\text{C}_{12}\text{H}_{20}\text{N}_2\text{OSi}$ 237.1425 [$\text{M}+\text{H}$] $^+$, found 237.1423.

***N*-(2-Pyridyl)-2-methyl-3-trimethylsilyl propanamide** (Table 2, entry 6, minor isomer): ^1H NMR (CDCl_3 , 300 MHz) δ 8.19-8.24 (m, 2H), 7.97 (bs, 1H), 7.67 (td, 1H, $J = 6.6, 1.4$ Hz), 7.00 (m, 1H), 2.48 (m, 1H), 1.26 (d, 3H, $J = 5.1$ Hz), 1.07 (dd, 1H, $J = 14.6, 6.6$ Hz), 0.76 (m, 1H), 0.01 (s, 9H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 176.2, 151.5, 147.7, 138.4, 119.6, 113.9, 38.9, 22.1, 20.8, -1.0.

***N*-(2-Pyridyl)-3-trimethylsilyl propanamide** (Table 2, entry 7): ^1H NMR (CDCl_3 , 300 MHz) δ 8.80 (bs, 1H), 8.22 (m, 2H), 7.67 (td, 1H, $J = 8.4, 1.9$ Hz), 6.98 (m, 1H), 2.32 (m, 2H), 0.89 (m, 2H), -0.02 (s, 9H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 173.2, 151.7, 147.4, 138.4, 119.4, 114.2, 32.1, 12.0, -2.1; IR (neat) 3272, 2958, 1606, 1519, 1331, 770 cm^{-1} ; HRMS (EI) calcd for $\text{C}_{11}\text{H}_{18}\text{N}_2\text{OSi}$ 223.1268 $[\text{M}+\text{H}]^+$, found 223.1267.

***exo-N*-(2-Pyridyl)bicyclo [2,2,1] heptancarboxamide** (Table 2, entry 8, major isomer): ^1H NMR (CDCl_3 , 300 MHz) δ 8.35 (d, 1H, $J = 6.3$ Hz), 8.26 (d, 1H, $J = 3.4$ Hz), 8.21 (d, 1H, $J = 8.4$ Hz), 7.69 (t, 1H, $J = 7.0, 1.7$ Hz), 7.01 (m, 1H), 2.53 (s, 1H), 2.28-2.34 (m, 2H), 1.97 (m 1H), 1.44-1.61 (m, 4H), 1.19 (m, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 174.4, 151.8, 147.6, 138.4, 119.4, 114.0, 49.1, 41.6, 36.4, 36.0, 33.9, 29.7, 28.6; HRMS (EI) calcd for $\text{C}_{13}\text{H}_{15}\text{N}_2\text{O}$ 215.1186 (M^+), found 215.1190.

Representative Procedure for the Cooperative Catalytic Aminocarbonylation Reaction. To a solution of *N*-(2-pyridyl)formamide (**1b**, 54.8 mg, 0.4 mmol) in acetonitrile (0.4 ml) was added iodobenzene (163.2 mg, 0.8 mmol) followed by $\text{Ru}_3(\text{CO})_{12}$ (12.8 mg, 5 mol %), PdCl_2 (3.5 mg, 5 mol %) and NaHCO_3 (50.4 mg, 0.6 mmol). The reaction mixture was stirred at 135 $^\circ\text{C}$ for 6 h in a sealed vial. After removal of the solvent under the reduced pressure, the residue was purified by flash column chromatography on silica gel (15% EtOAc in hexane) to afford *N*-(2-pyridyl)benzamide (26.7 mg, 58%): ^1H NMR (CDCl_3 , 300 MHz) δ 9.70 (bs, 1H), 8.37 (d, 1H, $J = 8.4$ Hz), 7.92 (m, 1H), 7.87 (d, 2H, $J = 7.2$ Hz), 7.64 (m, 1H), 7.33-7.48 (m, 3H), 6.90 (m, 2H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 166.1, 151.8, 147.5, 138.2, 134.3, 131.9, 128.5, 127.3, 119.5, 114.3; IR (neat) 3059, 2545, 1916, 1813, 1683, 1519, 1302, 1151, 777 cm^{-1} ; HRMS (EI) calcd for $\text{C}_{12}\text{H}_{10}\text{N}_2\text{O}$ 198.0794 (M^+), found 198.0795.

***N*-(2-Pyridyl)-3-bromobenzamide** (Table 3, entry 2): ^1H NMR (CDCl_3 , 300 MHz) δ 8.82 (bs, 1H), 8.34 (d, 1H, $J = 8.4$ Hz), 8.22 (dd, 1H, $J = 4.9, 0.8$ Hz), 8.06 (m, 1H), 7.81 (dd, 1H, $J = 7.7, 1.2$ Hz), 7.74 (m, 1H), 7.67 (m, 1H), 7.34 (t, 1H, $J = 8.0$ Hz), 7.05 (m, 1H); ^{13}C NMR (CDCl_3 , 75

MHz) δ 164.3, 151.3, 147.9, 138.6, 136.3, 135.1, 130.6, 130.3, 125.7, 123.0, 120.2, 114.3; HRMS (EI) calcd for $C_{13}H_{10}NO_2Br$ 275.9898 (M^+), found 275.9900.

***N*-(2-Pyridyl)-4-methylbenzamide** (Table 3, entry 3): 1H NMR ($CDCl_3$, 300 MHz) δ 8.85 (bs, 1H), 8.37 (dd, 1H, J = 8.4, 0.6 Hz), 8.20 (m, 1H), 7.80 (m, 1H), 7.71 (m, 1H), 7.25 (d, 2H, J = 7.8 Hz), 7.01 (m, 1H), 2.39 (s, 3H); ^{13}C NMR ($CDCl_3$, 75 MHz) δ 165.7, 151.7, 147.8, 142.7, 138.4, 131.4, 129.4, 127.2, 119.7, 114.2, 21.4; HRMS (EI) calcd for $C_{13}H_{12}N_2O$ 212.0951 (M^+), found 212.0950.

***N*-(2-Pyridyl)-4-methoxybenzamide** (Table 3, entry 4): 1H NMR ($CDCl_3$, 300 MHz) δ 8.81 (bs, 1H), 8.36 (dd, 1H, J = 8.4, 0.8 Hz), 8.20 (m, 1H), 7.88 (m, 2H), 7.71 (m, 1H), 7.01 (m, 2H), 6.93 (m, 2H), 3.84 (s, 3H); ^{13}C NMR ($CDCl_3$, 75 MHz) δ 165.3, 162.7, 151.8, 147.7, 138.3, 129.2, 126.4, 119.6, 114.2, 113.9, 55.4; HRMS (EI) calcd for $C_{13}H_{12}N_2O_2$ 228.0900 (M^+), found 228.0894.

***N*-(2-Pyridyl)-4-acetylbenzamide** (Table 3, entry 5): 1H NMR ($CDCl_3$, 300 MHz) δ 9.06 (bs, 1H), 8.38 (d, 1H, J = 8.4 Hz), 8.25 (d, 1H, J = 4.6 Hz), 8.04 (m, 4H), 7.78 (t, 1H, J = 7.2 Hz), 7.09 (t, 1H, J = 7.0 Hz), 2.65 (s, 3H); ^{13}C NMR ($CDCl_3$, 75 MHz) δ 197.2, 164.9, 151.3, 147.8, 139.6, 138.6, 138.1, 128.6, 127.6, 120.2, 114.4, 26.8; HRMS (EI) calcd for $C_{13}H_{10}NO_2Br$ 240.0900 (M^+), found 240.0898.

***N*-(2-Pyridyl)-4-hydroxybenzamide** (Table 3, entry 6): 1H NMR ($DMSO-d_6$, 300 MHz) δ 10.4 (s, 1H), 10.1 (s, 1H), 8.31 (dd, 1H, J = 4.5, 0.9 Hz), 8.15 (d, 1H), 7.92 (d, 2H, J = 8.7 Hz), 7.76 (m, 1H), 7.08 (m, 1H), 6.81 (d, 2H, J = 8.7 Hz); ^{13}C NMR ($DMSO-d_6$, 75 MHz) δ 165.5, 160.9, 152.5, 147.8, 138.0, 130.1, 124.6, 119.4, 115.0, 114.6; HRMS (EI) calcd for $C_{12}H_{10}N_2O_2$ 214.0743 (M^+), found 214.0744.

***N*-(2-Pyridyl)-1-naphthalenecarboxamide** (Table 3, entry 7): 1H NMR ($CDCl_3$, 300 MHz) δ 9.77 (bs, 1H), 8.48 (d, 1H, J = 8.4 Hz), 8.40 (m, 1H), 7.96 (d, 1H, J = 8.4 Hz), 7.90 (m, 1H), 7.67-7.78 (m, 2H), 7.51-7.64 (m, 3H), 7.46 (t, 1H, J = 7.3 Hz), 6.87 (m, 1H); ^{13}C NMR ($CDCl_3$, 75 MHz) δ 168.1, 151.8, 147.5, 138.4, 134.0, 133.7, 131.2, 130.1, 128.4, 127.3, 126.5, 125.5, 125.2, 124.6, 119.7, 114.4; IR (KBr) 3050, 1831, 1677, 1525, 1434, 1305, 777 cm^{-1} ; HRMS (EI) calcd for $C_{13}H_{10}NO_2Br$ 248.0951 (M^+), found 248.0956.

4,4-Dimethylpentanoic acid (3, Eq 1): To a solution of *N*-(2-pyridyl)-4,4-dimethylpentanamide (2, 200 mg, 0.97 mmol) in ethanol (2 mL) was added an aqueous NaOH solution

(20%, 3 mL), and then the reaction mixture was stirred for 1 h at 100 °C. After cooling the mixture to 0 °C, it was acidified (pH ~2) with 2 N HCl solution. Crude product was extracted with ethyl acetate (20 mL x 3), washed with brine, and dried over MgSO₄. Evaporation of the organic solvent gave analytically pure 4,4-dimethylpentanoic acid (**3**, 122 mg, 97%); ¹H NMR (CDCl₃, 300 MHz) 10.4 (bs, 1H), 2.51 (m, 2H), 1.49 (m, 2H), 0.83 (s, 9H); ¹³C NMR (CDCl₃, 75 MHz) 180.9, 38.3, 30.0, 29.9, 29.6, 28.9; IR (neat) 1710, 1416, 1302, 803 cm⁻¹; HRMS (EI) calcd for C₇H₁₄O₂ 130.0994 (M⁺), found 130.0986.

***N*-(2-Pyridyl)-(4,4-dimethylpentyl)amine (**4**, Eq 1):** To a solution of *N*-(2-pyridyl)-4,4-dimethyl pentanamide (**2**, 200 mg, 0.97 mmol) in THF (3 mL) was added lithium aluminum hydride (110 mg, 2.9 mmol) at 0 °C. The reaction mixture was stirred for 10 min at room temperature and then 1 h at 70 °C. After cooling the mixture to 0 °C, it was quenched with water (1 mL). The crude product was extracted with ethyl acetate (20 mL x 2), dried (MgSO₄), and then evaporated under reduced pressure to afford analytically pure *N*-(2-pyridyl)-(4,4-dimethylpentyl)amine (**4**, 183 mg, 98%); ¹H NMR (CDCl₃, 300 MHz) 8.04 (dd, 1H, *J* = 5.0, 0.9 Hz), 7.39 (td, 1H, *J* = 6.8, 1.8 Hz), 6.52 (m, 1H), 6.34 (d, 1H, *J* = 8.4 Hz), 4.50 (bs, 1H), 3.20 (m, 2H), 1.57 (m 2H), 1.25 (m, 2H), 0.87 (s, 9H); ¹³C NMR (CDCl₃, 75 MHz) 158.8, 147.9, 137.3, 112.3, 106.1, 43.0, 41.3, 30.0, 29.2, 24.7; IR (neat) 3254, 2953, 1699, 1435, 1299, 837 cm⁻¹; HRMS (EI) calcd for C₁₂H₂₀N₂O 192.1628 (M⁺), found 192.1627.

***N*-(2-Pyridylmethyl)formamide (1a)**

***N*-(2-pyridyl)formamide (1b)**

***N*-Methyl-*N*-(2-pyridyl)formamide (1c)**

***N*-(6-Methyl-2-pyridyl)formamide (1d)**

***N*-(2-Pyridyl) heptanamide**(major-isomer , Table 2, entry 1)

***N*-(2-Pyridyl)-2-methyl hexanamide**(minor-isomer, Table 2, entry 1)

***N*-(2-Pyridyl)-3-cyclohexyl propanamide (Table 2, entry 2, major isomer)**

***N*-(2-Pyridyl)-4,4-dimethyl pentanamide (2, Table 2, entry 3)**

***N*-(2-Pyridyl)-3-phenyl propanamide** (Table 2, entry 4, major-isomer)

***N*-(2-Pyridyl)-2-phenyl propanamide** (Table 2, entry 4, minor isomer)

***N*-(2-Pyridyl)-3-(2,4,6-trimethylphenyl) propanamide** (Table 2, entry 5)

***N*-(2-Pyridyl)-4-trimethylsilyl butanamide** (Table 2, entry 6, major isomer)

***N*-(2-Pyridyl)-2-methyl-3-trimethylsilyl propanamide** (Table 2, entry 6, minor isomer)

***N*-(2-Pyridyl)-3-trimethylsilyl propanamide** (Table 2, entry 7)

(*exo/endo*)-*N*-(2-Pyridyl)bicyclo [2,2,1] heptancarboxamide (Table 2, entry 8)

***N*-(2-Pyridyl)benzamide** (Table 3, entry 1)

***N*-(2-Pyridyl)-3-bromobenzamide** (Table 3, entry 2)

***N*-(2-Pyridyl)-4-methylbenzamide** (Table 3, entry 3)

***N*-(2-Pyridyl)-4-methoxybenzamide**(Table 3, entry 4)

***N*-(2-Pyridyl)-4-acetylbenzamide**(Table 3, entry 5)

***N*-(2-Pyridyl)-4-hydroxybenzamide (Table 3, entry 6)**

***N*-(2-Pyridyl)-1-naphthalenecarboxamide (Table 3, entry 7)**

4,4-Dimethylpentanoic acid (3, Eq 1)

***N*-(2-Pyridyl)-(4,4-dimethylpentyl)amine(4, Eq 1)**