Supporting Information

Palladium-Catalyzed Conversion of Benzylic and Allylic Halides into α -Aryl and β , γ -Unsaturated Tertiary Amides by the use of a Carbamoylsilane

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General: Toluene was distilled from sodium-benzophenone ketyl. ^1H and ^{13}C NMR spectra were determined in CDCl_3 at 11.75 T unless otherwise indicated. IR spectra were determined on neat samples using an FT-IR spectrometer unless otherwise indicated. Most amides were obtained as analytically pure oils from flash chromatography on silica gel (EtOAc-hexane) or from distillation. Boiling points are kugelrohr oven temperatures. Solid products (**3i**, **j**) were sublimed after chromatography. The following amides are known compounds and were identified spectrally: **3a**,¹ **3b**,² **3d**,³ **3e**,^{2,3} **3h**,⁴ **3i**,⁴ **3l**,⁵ **3m**,⁶ **3p**,⁷ dibenzo-1,3-cyclooctadiene.⁸

N, N-Dimethyl-2-(2-phenylphenyl)ethanamide (3c). IR: 1647 cm^{-1} . ^1H NMR (4.7T): δ 7.35 (m, 9H), 3.65 (s, 2H), 2.93 (s, 3H), 2.70 (s, 3H). ^{13}C NMR (4.7T): δ 171.5, 141.8, 141.3, 133.0, 130.0, 129.6, 129.2, 128.2, 127.7, 127.2, 126.8, 38.4, 37.3, 35.6. Anal. Calcd for $\text{C}_{16}\text{H}_{17}\text{NO}$: C, 80.30; H, 7.16; N, 5.85. Found: C, 80.15; H, 7.37; N, 5.78.

N, N-Dimethyl-2-(2, 4, 6-trimethylphenyl)ethanamide (3f). Bp. 185-195 $^{\circ}\text{C}$ (10 mm Hg). IR (CDCl_3): 1645 cm^{-1} . ^1H NMR (4.7T): δ 6.92 (s, 2H), 3.64 (s, 2H), 3.20 (s, 3H), 3.04 (s, 3H), 2.32 (s, 3H), 2.28 (s, 6H). ^{13}C NMR (4.7T): δ 170.4, 136.6, 135.9, 130.2, 129.0, 37.3, 35.7, 33.7, 20.9, 20.2. Anal. Calcd for $\text{C}_{13}\text{H}_{19}\text{NO}$: C, 76.06; H, 9.33; N, 6.82. Found: C, 76.10; H, 9.36; N, 6.81.

N, N-Dimethyl-2-(4-trifluoromethylphenyl)ethanamide (3g). IR: 1648, 1340 cm^{-1} . ^1H NMR: δ 7.59 (d, J = 8 Hz, 2H), 7.39 (d, J = 8 Hz, 2H), 3.78 (s, 2H), 3.04 (s, 3H), 2.99 (s, 3H). ^{13}C NMR: δ 170.0, 139.4, 129.4, 128.9 (q, J = 64 Hz), 125.4, 124.3 (q, J = 270 Hz), 40.3, 37.5, 35.5. Anal. Calcd for $\text{C}_{11}\text{H}_{12}\text{F}_3\text{NO}$: C, 57.14; H, 5.23; 6.06. Found: C, 57.09; H, 5.16; N, 6.07.

N, N, N', N'-Tetramethyl-2, 2'-(1,4-phenylene)diethanamide (3j). Mp. 154-155 $^{\circ}\text{C}$. IR: 1631 cm^{-1} . ^1H NMR: δ 7.23 (s, 4H), 3.72 (s, 4H), 3.02 (s, 6H), 2.99 (s, 6H). ^{13}C NMR: δ 171.0, 133.5, 129.1, 40.6, 37.8, 35.6. Anal. Calcd for $\text{C}_{14}\text{H}_{20}\text{N}_2\text{O}_2$: C, 67.71; H, 8.12; N, 11.28. Found: C, 67.71; H, 8.26; N, 11.27

N, N, N', N'-Tetramethyl-2, 2'-(1,3-phenylene)diethanamide (3k). Mp. 94-95 $^{\circ}\text{C}$. IR: 1637 cm^{-1} . ^1H NMR: δ 7.20 (m, 4H), 3.70 (s, 4H), 3.00 (s, 6H), 2.96 (s, 6H). ^{13}C NMR: δ 171.0, 135.4, 129.4, 128.9, 127.2, 40.8, 37.8, 35.6. Anal. Calcd for $\text{C}_{14}\text{H}_{20}\text{N}_2\text{O}_2$: C, 67.71; H, 8.12; N, 11.28. Found: C, 67.41; H, 7.91; N, 11.47.

N, N-Dimethyl-3-methyl-3-butenamide (3n). Bp 70-75 $^{\circ}\text{C}$ (10 mm Hg). IR: 1647 cm^{-1} . ^1H NMR : δ 4.93 (s, 1H), 4.78 (s, 1H), 3.12 (s, 2H), 3.03 (s, 3H), 2.98 (s, 3H), 1.82 (s, 3H). ^{13}C NMR (4.7T): δ 170.7, 139.6, 113.1, 43.3, 37.6, 35.4, 22.6. Anal. Calcd for $\text{C}_7\text{H}_{13}\text{NO}$: C, 66.10; H, 10.30; N, 11.01. Found: C, 65.80; H, 10.65; N, 11.04

N, N-Dimethyl-3-methyl-3-pentenamide (3o). IR: 1650 cm^{-1} . ^1H NMR (4.7T): δ 5.31 (t, J = 8 Hz, 1H), 3.00 (m, 2H), 3.01 (s, 3H), 2.94 (s, 3H), 1.75 (s, 3H), 1.66 (s, 3H). ^{13}C NMR: δ 171.9, 134.4, 117.1, 37.3, 35.4, 33.6, 25.7, 18.0. Anal. Calcd for $\text{C}_8\text{H}_{15}\text{NO}$: C, 68.04; H, 10.71; N, 9.92. Found: C, 67.88; H, 10.59; N, 10.01.

N, N-Dimethyl-2-methyl-3-butenamide (3q). Bp 90 °C (15 mm Hg). IR: 1650 cm⁻¹. ¹H NMR (4.7T): δ 5.89 (m, 1H), 5.08 (m, 2H), 3.39 (m, 1H), 3.05 (s, 3H), 2.97 (m, 3H), 1.24 (d, J = 7 Hz, 3H). ¹³C NMR: δ 173.8, 138.5, 115.3, 41.0, 37.1, 35.8, 17.8. Anal. Calcd for C₇H₁₃NO: C, 66.10; H, 10.30; N, 11.01. Found: C, 65.86; H, 10.15; N, 11.29.

E-N, N-Dimethyl-3-pentenamide (3r). Bp 90 °C (15 mm Hg). IR: 1646, 967 cm⁻¹. ¹H NMR (4.7T): δ 5.57 (m, 2H), 3.07 (m, 2H), 3.02 (s, 3H), 2.95 (s, 3H), 1.71 (m, 3H). ¹³C NMR: δ 171.6, 128.4, 124.0, 37.8, 37.4, 35.4, 18.0. Anal. Calcd for C₇H₁₃NO: C, 66.10; H, 10.30; N, 11.01. Found: C, 65.77; H, 10.45; N, 11.25.

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