10.1071/CH14332_AC

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Supplementary Material

A Green Approach for Copper-Free Sonogashira Reaction of Aryl Halides with Phenylacetylene in the Presence of Nano-Pd/Phosphorylated Silica (SDPP/Pd^0)

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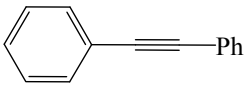
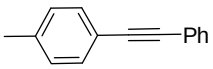
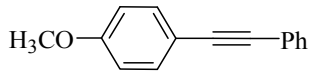
Spectral data:



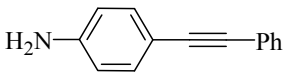
^{1}H NMR ($CDCl_3$, 250 MHz): δ (ppm): 7.54 (m, 4 H), 7.35 (m, 6 H); ^{13}C NMR ($CDCl_3$, 62.9 MHz): δ (ppm): 131.6, 129.2, 128.3, 123.2, 89.3. [14]



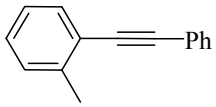
^{1}H NMR ($CDCl_3$, 250 MHz) δ (ppm): 2.3 (s, 3H), 7.06-7.17 (m, 2H), 7.24-7.46 (m, 7H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 21.5, 88.7, 89.5, 123.4, 128.0, 128.3, 128.4, 129.1, 131.5, 132.5, 138.3. [15]



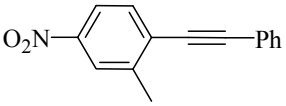
^{1}H NMR ($CDCl_3$, 250 MHz) δ (ppm): 3.75 (s, 3H), 6.80 (d, 2H, J=10 Hz), 7.18- 7.46 (m, 7H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 55.3, 89.2, 98.3, 113.9, 115.4, 123.6, 128.3, 128.8, 131.4, 133.0, 137.5. [16]



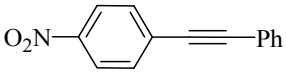
^{1}H NMR ($CDCl_3$, 250 MHz) δ (ppm): 3.71 (s br, 2H), 6.49 (d, 2H, J= 6.4 Hz), 7.23 (m, 5H), 7.39 (unresolved broad band, 2H); ^{13}C NMR ($CDCl_3$, 62.9 MHz) δ (ppm): 87.3, 90.2, 114.7, 123.9, 126.6, 128.3, 129.4, 131.3, 132.9, 146.7. [17]



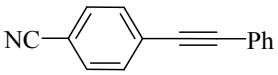
^{1}H NMR ($CDCl_3$, 250 MHz) δ (ppm): 2.44 (s, 3H), 7.14-7.46 (m, 9H); ^{13}C NMR ($CDCl_3$, 62.9 MHz) δ (ppm): 20.7, 86.0, 94.2, 123.0, 125.5, 128.1, 128.3, 128.3, 129.4, 131.5, 131.8, 133.7, 140.1. [18]



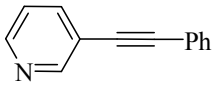
^{1}H NMR ($CDCl_3$, 250 MHz) δ (ppm): 2.52 (s, 3H), 7.30-7.32 (m, 3H), 7.46-7.55 (m, 3H), 7.93-8.03 (m, 2H); ^{13}C NMR ($CDCl_3$, 62.9 MHz) δ (ppm): 20.8, 86.6, 98.5, 120.8, 122.3, 124.2, 128.5, 128.9, 130.0, 131.7, 132.3, 141.6, 146.8. [11]



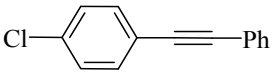
^{1}H NMR ($CDCl_3$, 250 MHz) δ (ppm): 7.31-7.59 (m, 7H), 8.12 (d, 2H, J= 7.5 Hz); ^{13}C NMR ($CDCl_3$, 62.9 MHz) δ (ppm): 87.5, 94.7, 122.0, 123.6, 128.5, 129.2, 130.2, 131.84, 132.2, 146.9. [16]



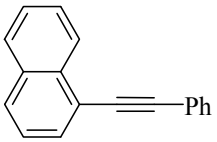
^{1}H NMR ($CDCl_3$, 250 MHz) δ (ppm): 7.26-7.52 (m, 9 H); ^{13}C NMR ($CDCl_3$, 62.9 MHz) δ (ppm): 87.7, 93.7, 111.4, 118.5, 122.2, 128.5, 130.8, 131.7, 132.0, 132.2, 132.5. [18]



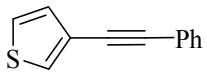
^{1}H NMR ($CDCl_3$, 250 MHz) δ (ppm): 7.29 (m, 4H), 7.45 (m, 2H), 7.70 (m, 2H), 8.45 (m, 2H), 8.68 (s, 1H); ^{13}C NMR ($CDCl_3$, 62.9 MHz) δ (ppm): 85.9, 92.7, 120.5, 122.4, 123.0, 128.45, 128.8, 131.6, 138.4, 148.4, 152.1. [16]



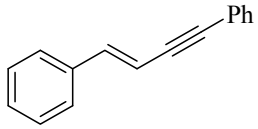
^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.13-7.25 (m, 3H), 7.33-7.43 (m, 6H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 88.2, 90.3, 121.8, 122.9, 128.4, 128.5, 128.7, 131.6, 132.8, 134.2. [19]



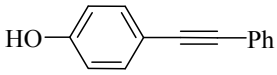
^{1}H NMR ($CDCl_3$, 250 MHz) δ (ppm): 7.26-7.74 (m, 11H), 8.36 (d, 1H, J= 8.2 Hz); ^{13}C NMR ($CDCl_3$, 62.9 MHz) δ (ppm): 87.5, 94.3, 120.9, 123.4, 125.3, 125.6, 126.4, 126.8, 128.3, 128.4, 128.8, 130.4, 131.7, 133.2, 133.3, 141.1. [18]



^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 6.94-7.48 (m, 8H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 87.3, 94.5, 123.8, 126.4, 128.3, 128.4, 129.2, 131.5, 132.5, 134.3. [20]



^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.23-7.42 (m, 10H), 6.94 (d, 1H, J= 16.0 Hz), 6.31 (d, 1H, J= 16.0 Hz); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 89.9, 91.7, 108.1, 126.3, 128.1, 128.3, 128.6, 128.7, 129.4, 131.5, 136.3, 141.2. [21]



^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 5.20 (br s, 1H), 6.74 (d, 2H, J= 8.75 Hz), 7.23-7.41 (m, 7H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 88.5, 96.6, 115.5, 117.8, 123.5, 127.9, 128.3, 131.4, 133.2, 155.7. [22]