

# Supplementary Materials: Mild and Highly Efficient Copper(I) Inspired Acylation of Alcohols and Polyols

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## S1. Materials and Methods

All other chemicals were obtained from commercial vendors and used without further purification. All acetylation reactions were performed in a dried and argon flushed round bottom flask. The reaction's progress was routinely monitored by analytical thin-layer chromatography (TLC) using a pre-coated silica gel glass plates. The products were identified and analyzed using IR,  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR. The  $^1\text{H}$  NMR spectra were recorded on a Varian 600 MHz spectrometer. The  $^{13}\text{C}$  NMR spectra were recorded on a Varian 150 MHz spectrometer using  $\text{CDCl}_3$  as reference solvent.

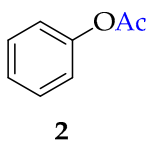
The initial studies of the acetylation reaction using phenol as the model substrate are shown in Table S1.

**Table S1.** Preliminary studies of  $\text{Cu}(\text{CH}_3\text{CN})_4\text{OTf}$  catalyzed acetylation of phenols.

| Entry | Catalyst Loading (mol %) | Solvent                               | Time (min) | Yield (%) <sup>b</sup> |
|-------|--------------------------|---------------------------------------|------------|------------------------|
| 1     | 10                       | $\text{CH}_2\text{Cl}_2$ <sup>a</sup> | 2          | 96                     |
| 2     | 7                        | $\text{CH}_2\text{Cl}_2$ <sup>a</sup> | 2          | 97                     |
| 3     | 7                        | -                                     | 2          | 95                     |
| 4     | 5                        | -                                     | 2          | 97                     |
| 5     | 2                        | -                                     | 3          | 98                     |
| 6     | 1                        | -                                     | 3          | 98                     |

<sup>a</sup> Reaction was run in  $\text{CH}_2\text{Cl}_2$  at 1.25M. <sup>b</sup> Isolated yield.

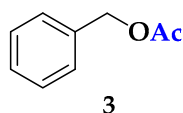
## Spectra Data



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.40–7.36 (m, 2H), 7.25–7.21 (m, 1H), 7.10–7.07 (m, 2H), 2.29 (s, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm):  $\delta$  169.6, 150.7, 129.5, 125.9, 121.5, 77.3, 77.1, 76.9, 21.2.

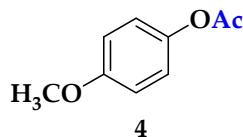
IR (film,  $\text{cm}^{-1}$ ): 3045, 1762, 1594, 1493, 1370, 1214, 1187, 1162.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.43–7.24 (m, 5H), 5.09 (d,  $J$  = 1.4 Hz, 2H), 2.08 (s, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.8, 135.9, 128.5, 128.2, 77.3, 77.1, 76.9, 66.2, 21.0.

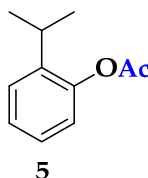
IR (film,  $\text{cm}^{-1}$ ): 3067, 3035, 2955, 1736, 1456, 1380, 1362, 1222, 1024.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 6.99 (d,  $J = 12.0$  Hz, 2H), 6.87 (d,  $J = 6.0$  Hz, 2H), 3.77 (s, 3H), 2.26 (s, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 169.8, 157.4, 144.2, 122.3, 114.4, 77.3, 77.1, 76.8, 55.5, 21.0.

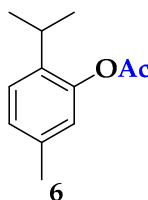
IR (film,  $\text{cm}^{-1}$ ) 2917, 2838, 1760, 1505, 1369, 1249, 1215, 1190.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.40–7.33 (m, 1H), 7.28–7.19 (m, 2H), 7.07–7.01 (m, 1H), 3.13–3.03 (m, 1H), 2.34 (s, 3H), 1.26 (d,  $J = 7.0$  Hz, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ ):  $\delta$  (ppm):  $\delta$  169.7, 148.1, 140.1, 126.7, 126.3, 122.3, 77.4, 77.2, 77.0, 27.4, 23.0, 20.9.

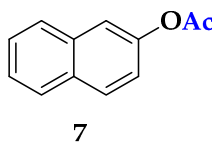
IR (film,  $\text{cm}^{-1}$ ): 3012, 2995, 2872, 1760, 1488, 1450, 1368, 1201, 1176, 1084, 1009, 914.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.19 (d,  $J = 7.9$  Hz, 1H), 7.02 (d,  $J = 7.9$  Hz, 1H), 6.80 (s, 1H), 3.01–2.92 (m, 1H), 2.31 (s, 6H), 1.19 (d,  $J = 1.4$  Hz, 3H), 1.18 (d,  $J = 1.4$  Hz, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 169.7, 147.9, 136.9, 136.5, 127.1, 126.4, 122.7, 77.2, 77.0, 76.8, 27.1, 23.0, 20.9, 20.8.

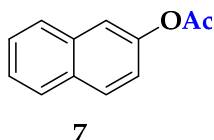
IR (film,  $\text{cm}^{-1}$ ): 2964, 2928, 1760, 1507, 1458, 1369, 1203, 1146, 1088, 1058, 1016.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.86–7.82 (m, 2H), 7.79 (d,  $J = 8.0$  Hz, 1H), 7.55 (d,  $J = 2.3$  Hz, 1H), 7.51–7.43 (m, 2H), 7.23 (dd,  $J = 8.8, 2.3$  Hz, 1H), 2.35 (s, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 169.6, 148.36, 133.7, 131.5, 129.4, 127.7, 127.1, 126.6, 125.7, 121.1, 118.5, 77.2, 77.0, 76.8, 21.2.

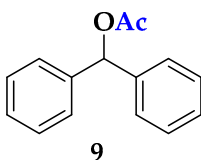
IR (film,  $\text{cm}^{-1}$ ): 3059, 2926, 1759, 1629, 1601, 1512, 1368, 1200, 1154, 1011, 964.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.22 (d,  $J = 6.0$  Hz, 2H), 6.99 (d,  $J = 6.0$  Hz, 2H), 2.93–2.87 (m, 1H), 2.28 (s, 3H), 1.23 (d,  $J = 6.9$  Hz, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 169.8, 148.5, 146.4, 127.3, 121.2, 77.2, 77.0, 76.8, 33.6, 24.0, 21.2.

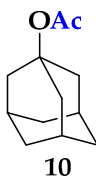
IR (film,  $\text{cm}^{-1}$ ): 3011, 2962, 1765, 1508, 1368, 1216, 1096, 1018, 908.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.36–7.30 (m, 8H), 7.30–7.24 (m, 2H), 6.88 (s, 1H), 2.15 (s, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.0, 140.2, 128.4, 127.9, 127.1, 77.2, 77.0, 76.9, 76.8, 21.3.

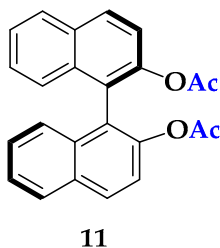
IR (film,  $\text{cm}^{-1}$ ): 2939, 1737, 1495, 1454, 1370, 1226, 1185, 1081, 1020, 972.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 2.16–2.11 (m, 3H), 2.10–2.06 (m, 6H), 1.94 (s, 3H), 1.68–1.59 (m, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.3, 80.3, 77.2, 77.0, 76.8, 41.3, 36.2, 30.8, 22.7.

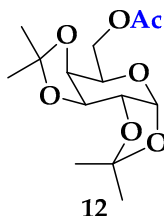
IR (film,  $\text{cm}^{-1}$ ): 2911, 2853, 1732, 1457, 1367, 1354, 1243, 1060, 1017.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 8.00 (d,  $J = 8.8$  Hz, 2H), 7.93 (d,  $J = 8.2$  Hz, 2H), 7.49–7.42 (m, 4H), 7.29 (ddd,  $J = 8.1, 7.5, 4.1$  Hz, 2H), 7.20 (d,  $J = 6.0$  Hz, 2H), 1.87 (s, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 169.4, 146.8, 133.3, 131.5, 129.5, 128.0, 126.7, 126.2, 125.7, 123.4, 121.9, 77.3, 77.1, 76.9, 20.6.

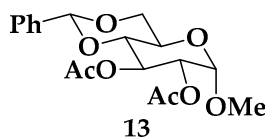
IR (film,  $\text{cm}^{-1}$ ): 3061, 1759, 1594, 1509, 1431, 1366, 1183, 1075, 1011, 968.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 5.54 (d,  $J = 4.9$  Hz, 1H), 4.64–4.60 (m, 1H), 4.35–4.31 (m, 1H), 4.28 (ddd,  $J = 11.6, 4.6, 1.4$  Hz, 1H), 4.24 (dd,  $J = 7.9, 1.7$  Hz, 1H), 4.18 (ddd,  $J = 11.6, 7.8, 1.5$  Hz, 1H), 4.05–4.00 (m, 1H), 2.09 (s, 3H), 1.52 (s, 3H), 1.45 (s, 3H), 1.34 (s, 3H), 1.33 (s, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.9, 109.6, 108.9, 96.3, 77.3, 77.1, 76.8, 71.08, 70.7, 70.5, 65.9, 63.5, 53.4, 26.0, 26.0, 25.0, 24.5, 20.9.

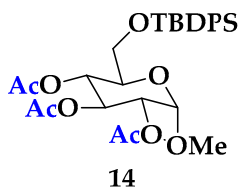
IR (film,  $\text{cm}^{-1}$ ): 2989, 1740, 1371, 1236, 1211, 1167, 1116, 1068, 1005.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.46–7.39 (m, 2H), 7.37–7.30 (m, 3H), 5.57 (t,  $J = 9.8$  Hz, 1H), 5.49 (s, 1H), 4.93 (d,  $J = 3.7$  Hz, 1H), 4.90 (dd,  $J = 9.9, 3.7$  Hz, 1H), 4.29 (dd,  $J = 10.3, 4.9$  Hz, 1H), 3.91 (td,  $J = 10.0, 4.9$  Hz, 1H), 3.76 (t,  $J = 10.3$  Hz, 1H), 3.63 (t,  $J = 9.6$  Hz, 1H), 3.40 (s, 3H), 2.07 (s, 3H), 2.03 (s, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.4, 169.7, 136.1, 129.0, 128.2, 126.1, 101.5, 97.6, 79.2, 77.2, 77.0, 76.8, 71.58, 69.0, 68.8, 62.3, 55.3, 20.8.

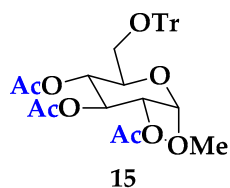
IR (film,  $\text{cm}^{-1}$ ): 3010, 2939, 2867, 1748, 1370, 1215, 1099, 1054, 1031, 988, 911.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.69–7.62 (m, 4H), 7.44–7.32 (m, 6H), 5.45 (d,  $J = 12.0$  Hz, 1H), 5.06 (d,  $J = 12.0$  Hz, 1H), 4.95 (d,  $J = 3.7$  Hz, 1H), 4.87 (dd,  $J = 10.3, 3.7$  Hz, 1H), 3.85 (ddd,  $J = 10.2, 5.1, 2.3$  Hz, 1H), 3.73–3.64 (m, 2H), 3.39 (s, 3H), 2.06 (s, 3H), 1.98 (s, 3H), 1.87 (s, 3H), 1.04 (s, 9H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.2, 170.15, 169.4, 135.6, 135.6, 129.7, 129.67, 127.7, 127.6, 96.5, 77.3, 77.03, 76.8, 71.0, 70.5, 69.9, 68.9, 62.6, 55.1, 26.7, 20.7, 20.7, 20.5, 19.2.

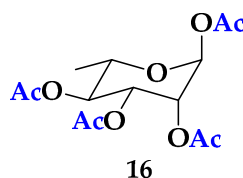
IR (film,  $\text{cm}^{-1}$ ): 2933, 2859, 1749, 1428, 1368, 1220, 1113, 1034, 738.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.45–7.40 (m, 6H), 7.31–7.26 (m, 6H), 7.24–7.19 (m, 3H), 5.42 (t,  $J$  = 6.0 Hz, 1H), 5.06 (dd,  $J$  = 10.2, 9.5 Hz, 1H), 5.01 (d,  $J$  = 3.7 Hz, 1H), 4.92 (dd,  $J$  = 10.3, 3.7 Hz, 1H), 3.91 (ddd,  $J$  = 10.3, 5.3, 2.1 Hz, 1H), 3.45 (s, 3H), 3.17 (dd,  $J$  = 10.4, 2.2 Hz, 1H), 3.10 (dd,  $J$  = 10.4, 5.4 Hz, 1H), 2.08 (s, 3H), 1.98 (s, 3H), 1.71 (s, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.2, 170.2, 169.2, 143.6, 128.7, 127.8, 127.0, 96.5, 86.6, 77.2, 77.0, 76.8, 71.01, 70.4, 69.0, 68.6, 62.1, 55.2, 20.8, 20.7, 20.5.

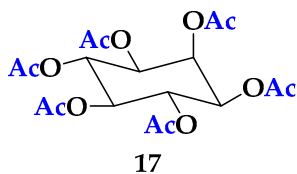
IR (film,  $\text{cm}^{-1}$ ): 3015, 1750, 1491, 1449, 1368, 1246, 1222, 1036, 908.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 5.97 (d,  $J$  = 1.9 Hz, 1H), 5.26 (dd,  $J$  = 10.1, 3.5 Hz, 1H), 5.21 (dd,  $J$  = 3.5, 2.0 Hz, 1H), 5.07 (t,  $J$  = 6.0 Hz, 1H), 3.93 – 3.86 (m, 1H), 2.13 (s, 3H), 2.12 (s, 3H), 2.02 (s, 3H), 1.96 (s, 3H), 1.19 (d,  $J$  = 6.3 Hz, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.0, 169.7, 169.73, 168.3, 90.57, 77.2, 77.0, 76.8, 70.4, 68.7, 68.7, 68.6, 20.8, 20.7, 20.7, 20.6, 17.4.

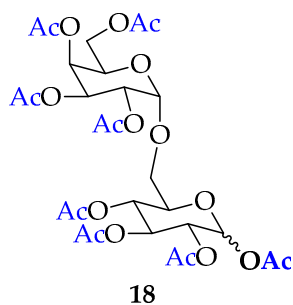
IR (film,  $\text{cm}^{-1}$ ): 2988, 1744, 1433, 1369, 1210, 1147, 1026, 970.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 5.55 (t,  $J$  = 2.8 Hz, 1H), 5.45 (t,  $J$  = 10.2 Hz, 2H), 5.15 (t,  $J$  = 9.8 Hz, 1H), 5.07 (dd,  $J$  = 10.5, 2.8 Hz, 2H), 2.16 (s, 3H), 1.97 (s, 9H), 1.95 (s, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 169.8, 169.7, 169.6, 169.4, 77.3, 77.0, 76.8, 70.9, 69.4, 68.4, 68.1, 20.7, 20.5, 20.4.

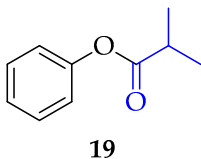
IR (film,  $\text{cm}^{-1}$ ): 2945, 1749, 1432, 1367, 1211, 1039, 909.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 6.22 (d,  $J = 3.7$  Hz, 1H), 5.62 (d,  $J = 8.3$  Hz, 1H), 5.44–5.38 (m, 2H), 5.30–5.25 (m, 2H), 5.19 (t,  $J = 9.5$  Hz, 1H), 5.12–5.07 (m, 3H), 5.05–5.00 (m, 2H), 4.97 (dd,  $J = 10.3, 3.7$  Hz, 1H), 4.18–4.11 (m, 1H), 4.05–3.98 (m, 4H), 3.73 (ddd,  $J = 10.0, 4.4, 2.5$  Hz, 1H), 3.66 (dd,  $J = 11.6, 4.6$  Hz, 1H), 3.57 (dd,  $J = 11.7, 2.5$  Hz, 1H), 3.53 (dd,  $J = 11.6, 2.5$  Hz, 1H), 2.14 (s, 3H), 2.08 (s, 1H), 2.08 (s, 3H), 2.07–2.07 (m, 1H), 2.06 (s, 3H), 2.05 (s, 1H), 2.00 (s, 3H), 1.99 (s, 1H), 1.99 (s, 1H), 1.98 (s, 3H), 1.97 (s, 1H), 1.97 (s, 3H), 1.96 (s, 3H), 1.95 (s, 1H), 1.93 (s, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.5, 170.4, 170.3, 170.3, 170.1, 170.09, 170.0, 169.76, 169.72, 169.6, 169.2, 169.18, 169.16, 168.8, 168.6, 96.3, 96.0, 91.5, 88.9, 77.3, 77.0, 76.8, 73.4, 72.8, 70.4, 70.2, 69.8, 69.2, 68.4, 68.2, 68.02, 68.0, 67.4, 67.3, 66.4, 66.3, 65.7, 65.6, 61.7, 61.5, 20.8, 20.7, 20.6, 20.58, 20.57, 20.54, 20.5, 20.48, 20.46, 20.4.

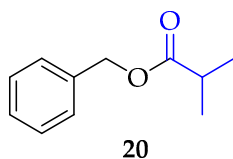
IR (film,  $\text{cm}^{-1}$ ): 2941, 1743, 1433, 1370, 1210, 1155, 1035, 937.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.41–7.35 (m, 2H), 7.24–7.20 (m, 1H), 7.10–7.05 (m, 2H), 2.86–2.77 (m, 1H), 1.32 (d,  $J = 7.0$  Hz, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 175.7, 150.9, 129.4, 125.6, 121.5, 77.3, 77.1, 76.9, 34.2, 18.9.

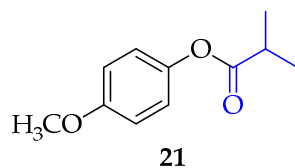
IR (film,  $\text{cm}^{-1}$ ): 3100, 2977, 2938, 1755, 1595, 1494, 1470, 1198, 1180, 1162, 1129.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.38–7.35 (m, 4H), 7.34–7.30 (m, 1H), 5.13 (s, 2H), 2.65–2.57 (m, 1H), 1.21 (d,  $J = 7.0$  Hz, 7H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 176.8, 128.5, 128.1, 127.9, 77.4, 77.1, 76.9, 66.0, 34.0, 19.0.

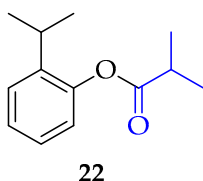
IR (film,  $\text{cm}^{-1}$ ) 3035, 2975, 1733, 1478, 1470, 1456, 1388, 1343, 1258, 1188, 1147.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 6.98 (d,  $J = 9.1$  Hz, 2H), 6.87 (d,  $J = 9.1$  Hz, 2H), 3.78 (s, 3H), 2.81–2.72 (m, 1H), 1.30 (d,  $J = 7.0$  Hz, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 176.0, 157.2, 144.4, 122.2, 114.4, 77.3, 77.0, 76.8, 55.5, 34.1, 18.9.

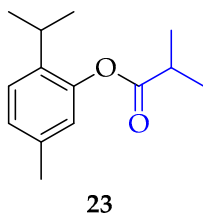
IR (film,  $\text{cm}^{-1}$ ): 3005, 2976, 2838, 1753, 1505, 1468, 1247, 1169, 1177, 1128, 1095, 1033.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.37–7.34 (m, 1H), 7.26–7.20 (m, 2H), 7.04–7.00 (m, 1H), 3.13–3.06 (m, 1H), 2.92–2.84 (m, 1H), 1.39 (d,  $J = 7.0$  Hz, 6H), 1.26 (d,  $J = 7.0$  Hz, 7H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 175.6, 148.3, 140.2, 126.6, 126.5, 126.1, 122.2, 77.4, 77.1, 76.9, 34.3, 27.3, 22.9, 19.0.

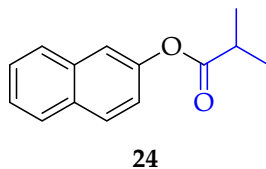
IR (film,  $\text{cm}^{-1}$ ): 3013, 2968, 2875, 1754, 1489, 1470, 1449, 1217, 1174, 1128, 1083.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.21 (d,  $J = 7.9$  Hz, 1H), 7.05–7.02 (m, 1H), 6.81 (d,  $J = 1.0$  Hz, 1H), 3.03–2.97 (m, 1H), 2.89–2.81 (m, 1H), 2.33 (s, 3H), 1.36 (d,  $J = 7.0$  Hz, 6H), 1.22 (d,  $J = 6.9$  Hz, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 175.7, 148.0, 137.0, 136.4, 126.9, 126.2, 122.7, 77.3, 77.1, 76.9, 34.3, 27.0, 22.9, 20.8, 19.0.

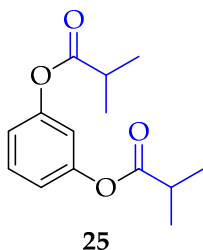
IR (film,  $\text{cm}^{-1}$ ): 3015, 2967, 1755, 1506, 1469, 1230, 1182, 1150, 1128, 1095.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.89–7.84 (m, 2H), 7.82 (d,  $J = 7.8$  Hz, 1H), 7.59 (d,  $J = 2.2$  Hz, 1H), 7.53–7.45 (m, 2H), 7.25 (dd,  $J = 8.8, 2.3$  Hz, 1H), 2.93–2.84 (m, 1H), 1.39 (d,  $J = 7.0$  Hz, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 175.8, 148.6, 133.8, 131.4, 129.3, 127.8, 127.6, 126.5, 125.6, 121.2, 118.4, 77.30, 77.08, 76.9, 34.3, 19.0.

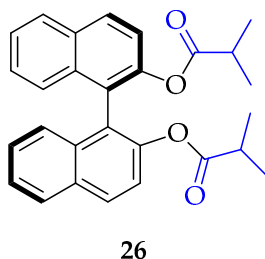
IR (film,  $\text{cm}^{-1}$ ): 3060, 2976, 2937, 2877, 1751, 1632, 1601, 1511, 1465, 1387, 1350, 1208, 1127, 1091.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.35 (t,  $J$  = 8.2 Hz, 1H), 6.95 (dd,  $J$  = 8.2, 2.2 Hz, 2H), 6.89 (t,  $J$  = 2.2 Hz, 1H), 2.81–2.73 (m, 2H), 1.29 (d,  $J$  = 7.0 Hz, 12H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 175.1, 151.4, 129.6, 118.7, 115.3, 77.2, 77.0, 76.8, 34.1, 18.8.

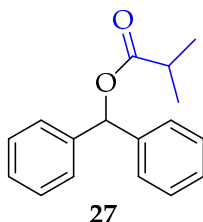
IR (film,  $\text{cm}^{-1}$ ): 3010, 2977, 2879, 1758, 1601, 1485, 1470, 1388, 1231, 1125, 1089.



$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.98 (d,  $J$  = 8.9 Hz, 1H), 7.92 (d,  $J$  = 8.3 Hz, 1H), 7.45 (ddd,  $J$  = 8.1, 7.3, 4.6 Hz, 1H), 7.42 (d,  $J$  = 8.9 Hz, 1H), 7.33–7.27 (m, 2H), 2.38–2.30 (m, 1H), 0.72 (d,  $J$  = 7.0 Hz, 3H), 0.63 (d,  $J$  = 7.0 Hz, 3H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 175.0, 146.8, 133.4, 131.5, 129.3, 127.9, 126.7, 126.1, 125.6, 123.6, 121.9, 77.25, 77.0, 76.8, 33.8, 18.1, 18.07.

IR (film,  $\text{cm}^{-1}$ ): 3059, 2974, 2936, 2876, 1753, 1509, 1468, 1209, 1091, 1046, 804, 751.

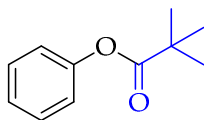


$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.40–7.33 (m, 8H), 7.31–7.26 (m, 2H), 6.90 (s, 1H), 2.75–2.63 (m, 1H), 1.24 (d,  $J$  = 7.0 Hz, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 175.9, 140.1, 128.5, 128.4, 127.8, 127.3, 127.0, 77.3, 77.1, 76.8, 76.5, 34.2, 18.9.



IR (film,  $\text{cm}^{-1}$ ): 3032, 2974, 2935, 2876, 1733, 1496, 1455, 1387, 1249, 1186, 1146.

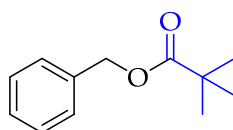


**28**

$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.41–7.35 (m, 2H), 7.24–7.19 (m, 1H), 7.08–7.03 (m, 2H), 1.36 (s, 9H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 177.2, 151.1, 129.4, 125.6, 121.5, 77.2, 77.0, 76.8, 39.0, 27.1.

IR (film,  $\text{cm}^{-1}$ ): 3005, 2975, 2875, 1748, 1595, 1494, 1479, 1278, 1194, 1162, 1113.

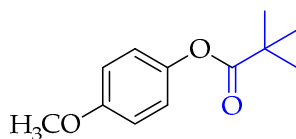


**29**

$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.38–7.28 (m, 5H), 5.11 (s, 2H), 1.23 (s, 9H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 178.3, 136.5, 128.5, 127.9, 127.6, 77.2, 77.0, 76.8, 66.0, 38.8, 27.2.

IR (film,  $\text{cm}^{-1}$ ): 3035, 2874, 2873, 1728, 1498, 1480, 1456, 1397, 1366, 1280, 1141.

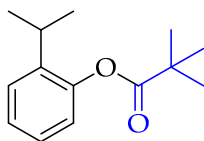


**30**

$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 6.96 (d,  $J = 9.1$  Hz, 2H), 6.87 (d,  $J = 9.1$  Hz, 2H), 3.78 (s, 3H), 1.34 (s, 9H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 177.4, 157.1, 144.6, 122.2, 114.4, 77.3, 77.1, 76.8, 55.6, 39.0, 27.1.

IR (film,  $\text{cm}^{-1}$ ): 3014, 2973, 1748, 1506, 1481, 1464, 1248, 1192, 1113, 1032.

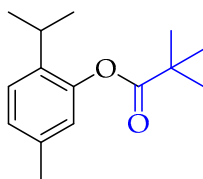


**31**

$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.38–7.31 (m, 1H), 7.27–7.19 (m, 2H), 7.02–6.97 (m, 1H), 3.14–3.03 (m, 1H), 1.43 (s, 9H), 1.26 (d,  $J = 7.0$  Hz, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 177.09, 148.43, 140.13, 126.56, 126.38, 126.03, 122.16, 77.32, 77.11, 76.90, 39.15, 27.22, 22.83.

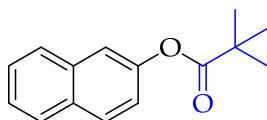
IR (film,  $\text{cm}^{-1}$ ): 3005, 2965, 2873, 1748, 1481, 1450, 1367, 1365, 1276, 1216, 1178, 1114, 1082.

**32**

$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.20 (d,  $J = 7.9$  Hz, 1H), 7.02 (d,  $J = 7.4$  Hz, 1H), 6.79 (s, 1H), 3.04–2.95 (m, 1H), 2.33 (s, 3H), 1.40 (s, 9H), 1.21 (d,  $J = 7.0$  Hz, 6H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 177.1, 148.3, 137.0, 136.4, 126.8, 126.1, 122.6, 77.3, 77.0, 76.8, 39.1, 27.2, 26.9, 22.9, 20.8.

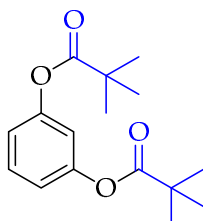
IR (film,  $\text{cm}^{-1}$ ): 3007, 2964, 2873, 1749, 1506, 1480, 1460, 1243, 1149, 1115.

**33**

$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.88–7.84 (m, 2H), 7.82 (d,  $J = 8.0$  Hz, 1H), 7.57 (d,  $J = 2.3$  Hz, 1H), 7.52–7.45 (m, 2H), 7.23 (dd,  $J = 8.8, 2.3$  Hz, 1H), 1.44 (s, 9H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ ):  $\delta$  (ppm) 177.2, 148.8, 133.8, 131.4, 129.3, 127.8, 127.6, 126.5, 125.6, 121.2, 118.4, 77.3, 77.1, 76.9, 39.2, 27.2.

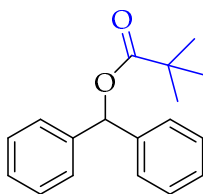
IR (film,  $\text{cm}^{-1}$ ): 3020, 2972, 1747, 1631, 1600, 1510, 1464, 1480, 1364, 1280, 1243, 1212, 1158, 1133, 1110.

**34**

$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.34 (t,  $J = 8.2$  Hz, 1H), 6.93 (dd,  $J = 8.2, 2.2$  Hz, 2H), 6.86 (t,  $J = 2.2$  Hz, 1H), 1.34 (s, 18H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 176.6, 151.6, 129.7, 118.7, 115.4, 39.1, 27.1.

IR (film,  $\text{cm}^{-1}$ ): 3050, 2975, 2876, 1752, 1600, 1479, 1398, 1367, 1269, 1244, 1119, 1096.



35

$^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.41–7.31 (m, 9H), 7.31–7.26 (m, 2H), 6.86 (s, 1H), 1.28 (s, 9H).

$^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 177.2, 142.2, 140.6, 128.5, 128.4, 127.7, 127.4, 127.3, 126.9, 80.0, 77.3, 77.0, 76.8, 76.6, 38.9, 27.1.

IR (film,  $\text{cm}^{-1}$ ): 3019, 2973, 1731, 1496, 1479, 1455, 1396, 1278, 1140.