Supporting information

C-3 alkylation of oxindoles with alcohols by Pt/CeO_2 catalyst in additive-free conditions

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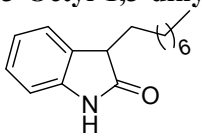
NMR and GCMS analysis

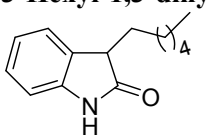
^1H and ^{13}C NMR spectra were recorded using at ambient temperature on JEOL-ECX 600 operating at 600.17 and 150.92 MHz, respectively with tetramethylsilane as an internal standard. All chemical shifts (δ) are reported in ppm and coupling constants (*J*) in Hz. All chemical shifts are reported relative to tetramethylsilane and *d*-solvent peaks (77.00 ppm, chloroform), respectively. Abbreviations used in the NMR experiments: s, singlet d, doublet; t, triplet; q, quartet; m, multiplet. GC-MS spectra were recorded by SHIMADZU QP2010.

3-Octyl-1,3-dihydro-indol-2-one



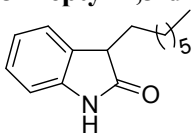
^1H NMR (600 MHz, $CDCl_3$) δ 8.57 (br s, 1H), 7.16-7.13 (m, 2H), 6.98 (t, *J* = 6.9 Hz, 1H), 6.92 (d, *J* = 7.6 Hz, 1H), 3.48 (t, *J* = 6.2 Hz, 1H), 1.96-1.86 (m, 2H), 1.23-1.16 (m, 12 H), 0.88 (t, 3H); ^{13}C NMR (150 MHz, CDCl3) δ 180.6, 141.6, 129.9, 127.7, 124.1, 122.2, 109.6, 46.0, 31.8, 30.5, 29.5, 29.3, 29.2, 25.7, 22.6, 14.0. MS (EI) (*m/z*) (relative intensity) 245 (M^+, 35), 146 (100), 133 (80).

3-Hexyl-1,3-dihydro-indol-2-one



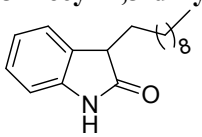
^1H NMR (600 MHz, $CDCl_3$) δ 8.99 (br s, 1H), 7.18-7.12 (m, 2H), 6.93(t, 1H), 6.85 (d, *J* = 7.6 Hz, 1H), 3.40 (t, *J* = 5.8 Hz, 1H), 1.91-1.82 (m, 2H), 1.23-1.16 (m, 8H), 0.77 (t, 3H); ^{13}C NMR (150 MHz, CDCl3) δ 181.0, 141.7, 130.0, 127.8, 124.1, 122.2, 109.8, 46.2, 31.6, 30.6, 29.3, 25.8, 22.6, 14.1. MS (EI) (*m/z*) (relative intensity) 217 (M^+, 27), 146 (95), 133 (100).

3-Heptyl-1,3-dihydro-indol-2-one



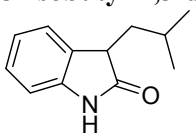
^{1}H NMR (600 MHz, CDCl3) δ 8.99 (br s, 1H), 7.18-7.12 (m, 2H), 6.93 (t, *J* = 7.6 Hz, 1H), 6.85 (d, *J* = 7.6 Hz, 1H), 3.40 (t, 1H), 1.92-1.82 (m, 2H), 1.35-1.13 (m, 10H), 0.78 (t, 3H); ^{13}C NMR (150 MHz, CDCl3) δ 180.9, 141.6, 129.9, 127.7, 124.0, 122.1, 109.7, 46.1, 31.7, 30.5, 29.5, 29.0, 25.7, 22.5, 14.0. MS (EI) (*m/z*) (relative intensity) 231 (M^+, 35), 146 (100), 133 (100).

3-Decyl-1,3-dihydro-indol-2-one



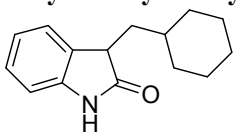
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.09 (br s, 1H), 7.17-7.13 (m, 2H), 6.95(t, 1H), 6.82 (d, *J* = 7.6 Hz, 1H), 3.39 (t, *J* = 5.8 Hz, 1H), 1.95-1.82 (m, 2H), 1.23-1.16 (m, 16 H), 0.81 (t, 3H); ^{13}C NMR (150 MHz, CDCl3) δ 179.9, 141.1, 129.8, 127.5, 123.9, 122.0, 109.2, 45.7, 31.6, 31.3, 30.3, 29.3, 29.3, 29.1, 29.0, 25.6, 22.4, 13.9. MS (EI) (*m/z*) (relative intensity) 273 (M^+, 35), 146 (100), 133 (90).

3-Isobutyl-1,3-dihydro-indol-2-one



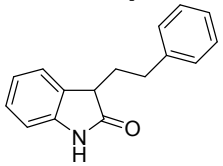
^{1}H NMR (600 MHz, CDCl3) δ 8.51 (br s, 1H), 7.14-7.11 (m, 2H), 6.91 (t, 1H), 6.86 (d, 1H), 3.39 (t,1H), 1.99–1.93 (m, 1H), 1.81–1.77 (m, 1H), 1.64–1.59 (m, 1H), 0.91 (d, 3H), 0.88 (d, 3H); ^{13}C NMR (150 MHz, CDCl3) δ 181.7, 141.5, 130.2, 127.6, 124.2, 122.0, 109.9, 44.3, 39.8, 25.2, 22.9, 22.0. MS (EI) (*m/z*) (relative intensity) 189 (M^+, 60), 133 (100).

3-Cyclohexylmethyl-1,3-dihydro-indol-2-one



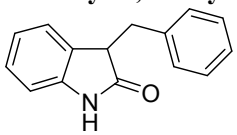
^{1}H NMR (600 MHz, $CDCl_3$) δ 9.06 (br s, 1H), 7.22-7.19 (m, 2H), 7.01 (t, *J* = 7.6 Hz, 1H), 6.91 (d, *J* = 7.6 Hz, 1H), 3.51 (t, *J* = 6.9 Hz, 1H), 1.99–1.93 (m, 1H), 1.90–1.82 (m, 2H), 1.73–1.66 (m, 6H), 1.18-1.28 (m, 3H), 1.02-0.98 (d, 2H); ^{13}C NMR (150 MHz, CDCl3) δ 181.4, 141.4, 130.3, 127.6, 124.3, 122.0, 109.7, 43.5, 38.4, 34.5, 33.6, 32.6, 26.4, 26.1, 26.1. MS (EI) (*m/z*) (relative intensity) 229 (M^+, 20), 146 (40), 133 (100).

3-Phenethyl-1,3-dihydro-indol-2-one



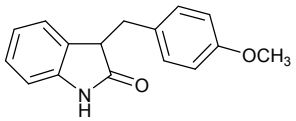
^{1}H NMR (600 MHz, $CDCl_3$) δ 9.60 (br s, 1H), 7.16-7.04 (m,7H), 6.93 (t, 1H), 6.85 (d, *J* = 7.6 Hz, 1H), 3.41 (t, *J* = 6.2 Hz, 1H), 2.67–2.65 (m, 1H), 2.58–2.54 (m, 1H), 2.19–2.16 (m, 2H); ^{13}C NMR (150 MHz, CDCl3) δ 180.9, 141.8, 141.1, 129.4, 128.4, 128.3, 127.8, 125.9, 123.9, 122.2, 109.9, 45.5, 32.1, 31.7. MS (EI) (*m/z*) (relative intensity) 237 (M^+, 75), 207 (100), 133 (75).

3-Benzyl-1,3-dihydroindol-2-one



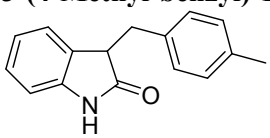
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.57 (br s, 1H), 7.19-7.08 (m, 6H), 6.82(t, *J* = 7.6 Hz, 1H), 6.83 (d, *J* = 7.6 Hz, 1H), 6.66 (d, *J* = 7.6 Hz, 1H), 3.68 (m, *J* = 9.3, 4.5 Hz, 1H), 3.50 (dd, *J* = 13.7, 8.9 Hz, 1H), 2.85 (dd, *J* = 13.7, 8.9 Hz, 1H); ^{13}C NMR (150 MHz, CDCl3) δ 179.5, 141.3, 137.7, 129.4, 128.9, 128.3, 127.9, 126.6, 124.8, 122.0, 109.6, 47.4, 36.5. MS (EI) (*m/z*) (relative intensity) 223 (M^+, 35), 132 (20), 91 (90).

3-(4-Methoxy-benzyl)-1,3-dihydro-indol-2-one



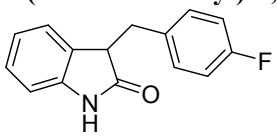
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.66 (br s, 1H), 7.16 (t, *J* = 7.6 Hz, 1H), 7.08 (d, *J* = 8.2 Hz, 2H), 6.92 (t, *J* = 7.6 Hz, 1H), 6.85 (d, 1H), 6.81-6.78 (m, 3H), 3.77 (s, 3H), 3.72 (dd, *J* = 8.9,4.8 Hz, 1H), 3.43 (dd, *J* = 13.7, 4.8 Hz, 1H), 2.91 (dd, *J* = 13.7, 8.9 Hz, 1H); ^{13}C NMR (150 MHz, CDCl3) δ 180.0, 158.4, 141.7, 130.5, 129.9, 129.2, 128.0, 124.9, 122.1, 113.8, 109.9, 55.3, 47.9, 35.9. MS (EI) (*m/z*) (relative intensity) 253 (M^+, 5), 208(30), 144(20).

3-(4-Methyl-benzyl)-1,3-dihydroindol-2-one



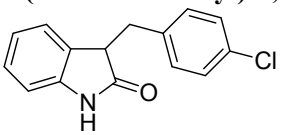
^{1}H NMR (600 MHz, $CDCl_3$) δ 7.44 (br s, 1H), 7.16 (t, *J* = 7.6 Hz, 1H), 7.06 (br s, 4H), 6.91 (t, *J* = 7.6 Hz, 1H), 6.80-6.78 (m, 2H), 3.72 (dd, *J* = 8.9,4.8 Hz, 1H), 3.43 (dd, *J* = 13.7, 4.8 Hz, 1H), 2.91 (dd, *J* = 13.7, 8.9 Hz, 1H), 2.32 (s, 3H); ^{13}C NMR (150 MHz, CDCl3) δ 178.6, 141.0, 136.1, 134.5, 129.2, 129.1, 129.0, 127.8, 124.9, 122.0, 109.3, 47.3, 36.1, 21.0. MS (EI) (*m/z*) (relative intensity) 237 (M^+, 20), 105 (100).

3-(4-Fluoro-benzyl)-1,3-dihydroindol-2-one



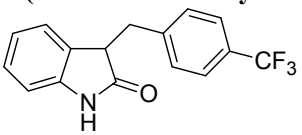
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.93 (br s, 1H), 7.17 (t, *J* = 7.6 Hz, 1H), 7.03-7.01 (m, 2H), 6.86-6.80 (m, 3H), 6.77-6.73 (m, 2H), 3.63 (dd, *J* = 8.6, 4.5 Hz, 1H), 3.32 (dd, *J* = 14.1, 4.5 Hz 1H), 2.89 (dd, *J* = 13.7, 8.9 Hz, 1H); ^{13}C NMR (150 MHz, CDCl3) δ 179.6, 162.4, 160.8, 141.4, 133.1, 130.8, 130.8, 128.6, 128.0, 124.6, 122.0, 115.1, 114.9, 109.8, 47.5, 35.6. MS (EI) (*m/z*) (relative intensity) 241 (M^+, 100), 213 (75), 159 (70), 33 (85).

3-(4-Chloro-benzyl)-1,3-dihydroindol-2-one



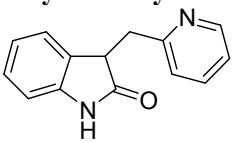
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.25 (bs, 1H), 7.22-7.17 (m, 3H), 7.08 (d, *J* = 8.2 Hz, 2H), 6.95 (t, *J* = 7.6 Hz,1H), 6.82 (d, 2H), 3.73 (dd, *J* = 8.2, 4.8 Hz,1H), 3.40 (dd, *J* = 13.7, 4.8 Hz, 1H), 3.00 (dd, *J* = 13.7, 8.9 Hz, 1H); ^{13}C NMR (150 MHz, CDCl3) δ 179.0, 141.0, 135.7, 132.3, 130.5, 128.5, 128.2, 127.9, 124.4, 121.9, 109.5, 47.3, 35.5. MS (EI) (*m/z*) (relative intensity) 257 (M^+, 25), 132 (25), 125 (100).

3-(4-Trifluoromethyl-benzyl)-1,3-dihydroindol-2-one



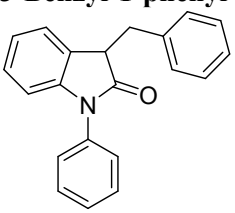
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.28 (br s, 1H), 7.41 (d, 2H), 7.19 (d, 2H), 7.11 (t, 1H), 6.95 (t, 1H), 6.78-6.75 (m, 2H), 3.69 (dd, *J* = 8.9, 4.8 Hz, 1H), 3.40 (dd, *J* = 13.7, 4.8, 1H), 3.01 (dd, *J* = 14.1, 8.6 1H); ^{13}C NMR (150 MHz, CDCl3) δ 179.0, 141.8, 141.4, 129.9, 128.4, 125.4, 124.8, 122.4, 110.0, 47.2, 36.3. MS (EI) (*m/z*) (relative intensity) 291 (M^+, 40), 133 (100).

3-Pyridin-2-ylmethyl-1,3-dihydro-indol-2-one



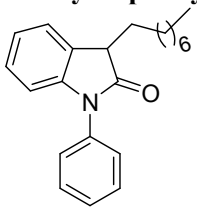
^{1}H NMR (600 MHz, $CDCl_3$) δ 9.02 (br s, 1H), 8.57 (d, 1H), 7.60 (t, 1H), 7.15 (m, 3H), 6.85 (m, 2H), 6.7 (d, *J* = 8.9 Hz,1H), 4.13 (dd, *J* = 8.6, 5.2 Hz, 1H), 3.60 (dd, *J* = 14.4, 5.5, 1H); ^{13}C NMR (150 MHz, CDCl3) δ 180.1, 158.0, 149.2, 148.1, 136.3, 129.2, 127.8, 123.9, 121.9, 121.7, 109.7, 45.5, 38.5. MS (EI) (*m/z*) (relative intensity) 224 (M^+, 100), 180 (50), 146 (25).

3-Benzyl-1-phenyl-1,3-dihydro-indol-2-one



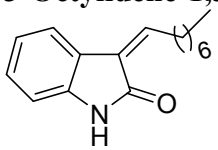
^{1}H NMR (600 MHz, $CDCl_3$) δ 7.38 (t, 2H), 7.28 (t, 1H), 7.15-7.10 (m, 5H), 7.06-7.02 (m, 3H), 6.90-6.86 (m, 2H), 6.55 (d, *J* = 7.6, 1H), 381 (dd, *J* = 8.2, 4.1, 1H), 3.41 (dd, *J* = 13.4, 4.5, 1H), 3.06 (dd, *J* = 13.7, 8.2, 1H); ^{13}C NMR (150 MHz, CDCl3) δ 176.1, 144.0, 136.9, 134.1, 129.2, 127.8, 127.7, 127.5, 126.4, 126.3, 124.4, 122.2, 108.8, 46.9, 36.8. MS (EI) (*m/z*) (relative intensity) 299 (M^+, 85), 208 (90), 180 (50), 91 (100).

3-Octyl-1-phenyl-1,3-dihydro-indol-2-one



^{1}H NMR (600 MHz, $CDCl_3$) δ 7.40 (t, 2H) 7.30-7.27 (m, 3H), 7.20 (d, 1H), 7.08 (t, *J* = 7.9 Hz, 1H), 6.97 (t, *J* = 7.6 Hz,1H), 6.70 (d, *J* = 7.6 Hz, 1H), 3.52 (t, *J* = 5.8 Hz, 1H), 2.00-1.90 (m, 2H), 1.40-1.15 (m, 12 H), 0.77 (t, 3H); ^{13}C NMR (150 MHz, CDCl3) δ 180.6, 141.6, 129.9, 127.7, 124.1, 122.2, 109.6, 46.0,31.8, 30.5, 29.5, 29.3, 29.2,25.7, 22.6, 14.0. MS (EI) (*m/z*) (relative intensity) 321 (M^+, 50), 222 (100), 209 (80), 180 (30).

3-Octylidene-1,3-dihydro-indol-2-one



^{1}H NMR (600 MHz, $CDCl_3$) δ 8.57 (br s, 1H), 7.32 (d, 1H), 7.11 (t, 1H), 6.92 (t, 1H), 6.84 (t, *J* = 7.9 Hz, 1H), 6.77 (d, *J* = 7.6 Hz, 1H), 2.92 (m, *J* = 7.6 Hz, 2H), 1.50-1.48 (m, 2H), 1.36-1.18(m, 8H), 0.81 (t, 3H); ^{13}C NMR (150 MHz, CDCl3) δ 169.6, 143.9, 139.2, 128.4, 127.0, 123.7, 121.7, 119.1, 109.6, 31.7, 30.5, 29.3, 25.7, 22.6, 14.0. MS (EI) (*m/z*) (relative intensity) 243 (M^+, 20), 146 (75), 133 (60).