

Supplementary Material (ESI) for Chemical Communications
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**A general method for making bicyclic compounds with nitrogen at a
bridgehead – application to the halichlorine spiro subunit**

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Spectral data for final products. The symbols s, d, t, q in the
¹³C NMR spectra refer to 0, 1, 2, or 3 attached hydrogens.

Compound **3**: FTIR (CH₂Cl₂ cast) 1732, 1714, 1672 cm⁻¹; ¹H NMR
(CDCl₃, 500 MHz) δ 0.91 (d, *J* = 6.3 Hz, 3 H), 1.07–1.15 (m, 1 H),
1.35–1.57 (m, 7 H), 1.64–1.79 (m, 3 H), 1.86–1.91 (m, 1 H), 1.97–
2.17 (m, 4 H), 2.20–2.26 (m, 1 H), 2.29–2.35 (m, 1 H), 2.96–3.00
(m, 1 H), 3.28–3.32 (m, 1 H), 3.44 (d, *J* = 16.0 Hz, 1 H), 3.59
(s, 3 H), 3.72 (s, 3 H), 6.81–6.83 (m, 1 H); ¹³C NMR (CDCl₃, 125
MHz) δ 20.1 (d), 21.7 (t), 23.6 (t), 29.1 (t), 31.6 (q), 32.61
(t), 32.63 (t), 36.1 (t), 41.1 (t), 47.6 (t), 51.1 (d), 51.5 (q),
52.9 (d), 57.1 (q), 67.2 (s), 129.0 (s), 136.6 (d), 166.5 (s),
174.3 (s); exact mass *m/z* calcd for C₂₀H₃₂NO₄ (M + H) 350.233134,
found 350.233264.

Compound **21**: FTIR (CH₂Cl₂ cast) 1716, 1650 cm⁻¹; [α]_D²² + 195.9
(c 1.1, CH₂Cl₂); ¹H NMR (CDCl₃, 400 MHz) δ 1.38–1.47 (m, 1 H),
1.70–1.92 (m, 2 H), 1.95–2.03 (m, 1 H), 2.06–2.15 (m, 2 H), 2.19
(ABq, •*v*_{AB} = 18.0 Hz, *J* = 9.2 Hz, 1 H), 2.38–2.47 (m, 1 H), 2.82–
2.87 (m, 1 H), 3.21 (dt, *J* = 2.4, 8.8 Hz, 1 H), 3.71 (s, 3 H),
3.78–3.83 (m, 1 H), 6.97–7.00 (m, 1 H); ¹³C NMR (CDCl₃, 100 MHz)

δ 21.4 (t), 30.4 (t), 32.8 (t), 51.5 (t), 51.6 (q), 54.1 (t), 58.7 (d), 129.4 (s), 138.3 (d), 166.3 (s); exact mass m/z calcd for $C_{10}H_{15}NO_2$ 181.11028, found 181.11019.

Compound **26**: FTIR (CH_2Cl_2 cast) 1713, 1661 cm^{-1} ; 1H NMR ($CDCl_3$, 400 MHz) δ 1.17–1.35 (m, 2 H), 1.56–1.80 (m, 4 H), 2.00–2.16 (m, 3 H), 2.21–2.29 (m, 1 H), 2.76–2.82 (m, 1 H), 3.02 (d, J = 11.5 Hz, 1 H), 3.59 (d, J = 16.6 Hz, 1 H), 3.71 (s, 3 H), 6.91–6.93 (m, 1 H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 24.2 (t), 25.8 (t), 33.2 (t), 34.0 (t), 51.5 (q), 53.4 (t), 55.9 (t), 56.4 (d), 128.1 (s), 137.1 (d), 166.1 (s); exact mass m/z calcd for $C_{11}H_{17}NO_2$ 195.12593, found 195.12585.

Compound **32**: FTIR (CH_2Cl_2 cast) 1716, 1660 cm^{-1} ; 1H NMR ($CDCl_3$, 300 MHz) δ 1.21–1.80 (m, 8 H), 2.02–2.38 (m, 2 H), 2.38–2.50 (m, 1 H), 2.68–2.91 (m, 2 H), 3.20 (d, J = 16.5 Hz, 1 H), 3.57 (d, J = 16.5 Hz, 1 H) 3.72 (s, 3 H), 6.91–6.99 (m, 1 H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 24.4 (t), 27.4 (t), 28.7 (t), 33.0 (t), 35.1 (t), 51.5 (d), 54.3 (t), 54.8 (t), 59.0 (q), 129.5 (s), 138.6 (d), 166.2 (s); exact mass m/z calcd for $C_{12}H_{19}NO_2$ 209.14159, found 209.14128.

Compound **38**: FTIR (CH_2Cl_2 cast) 1715, 1664 cm^{-1} ; 1H NMR ($CDCl_3$, 300 MHz) δ 1.32–1.84 (m, 10 H), 1.96–2.30 (m, 2 H), 2.61–2.80 (m, 2 H), 2.80–2.96 (m, 1 H), 3.32 (d, J = 17.0 Hz, 1 H), 3.49 (d, J = 17.0 Hz, 1 H) 3.70 (s, 3 H), 6.94–6.98 (m, 1 H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 26.0 (t), 26.2 (t), 26.6 (t), 27.6 (t), 31.1 (t), 33.1 (t), 50.0 (t), 51.4 (d), 52.3 (t), 56.2 (q), 129.5 (s), 138.6 (d), 166.5 (s); exact mass m/z calcd for $C_{13}H_{21}NO_2$ 223.15723, found 223.15691.