Supporting Information

Synergy of anodic oxidation and cathodic reduction leads to electrochemical deoxygenative C2 arylation of quinoline N-oxides

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**General information**

Unless otherwise noted, materials were obtained from commercial suppliers and used without further purification. The instrument for electrolysis is dual display potentiostat (DJS-292B) (made in China). The anodic electrode was graphite rod (φ 6 mm) and cathodic electrode was platinum plate (15 mm×15 mm×0.3 mm). Thin layer chromatography (TLC) employed glass 0.25 mm silica gel plates. Flash chromatography columns were packed with 300-400 mesh silica gel in petroleum (boiling point is between 60-90 °C). Gradient flash chromatography was conducted eluting with a continuous gradient from petroleum to the indicated solvent, and they are listed as volume/volume ratios. NMR spectra were recorded on a Bruker spectrometer at 400 MHz (1H NMR), 100 MHz (13C NMR), 376 MHz (19F NMR).
Experimental procedure

General procedure for the preparation of quinoline-N-oxides

\[
\begin{align*}
\text{R} & \quad \text{N} \\
\text{R} & \quad \text{N}
\end{align*}
\]

To a mixture of quinoline (10.0 mmol) in AcOH (20 mL) was added \( \text{H}_2\text{O}_2 \) (30 wt%, 1.40 mL) at room temperature. The reaction mixture was stirred at 70 °C for 36 h, and then was cooled to room temperature. The product was extracted with DCM (3 × 10 mL), and the combined organic layers were dried over \( \text{Na}_2\text{SO}_4 \). The solvent was removed under reduced pressure, and the residue obtained was purified via silica gel chromatography (eluent: ethyl acetate/methanol = 8/1) to afford quinoline N-oxide.

General procedure for the preparation of sulfonyl hydrazides

The hydrazine monohydrate (30 mmol) was added dropwise into the solution of sulfonyl chloride (10 mmol) in THF (50 mL) under nitrogen at 0 °C. Subsequently, the mixture was further stirred at 0 °C for 30 minutes. After the completion of the reaction, the solvent was removed by evaporation, and the residue was extracted with dichloromethane (3 x 20 mL), and the combined organic layer was washed with water, and brine, and dried over \( \text{Na}_2\text{SO}_4 \). Concentration in vacuum followed by silica gel column purification with petroleum ether/ethyl acetate eluent gave the desired product in yields range from 70-95%.

General procedure for electrochemical deoxygenative C2 arylation:

In an oven-dried undivided three-necked bottle (25 mL) equipped with a stir bar, quinoline-N-oxides 1 (0.5 mmol), sulfonyl hydrazides 2 (2 equiv.), and \( \text{nBu}_4\text{NBF}_4 \) (0.1 mmol, 32.9 mg) were combined and added. The bottle was equipped with graphite rod (Ø 6 mm, about 16 mm immersion depth in solution) as the anode and platinum plate (15 mm × 15 mm × 0.3 mm) as the cathode and was then charged with nitrogen. Under the protection of \( \text{N}_2 \), HFIP (1.0 mL), and MeCN (9.0 mL) were injected respectively into the tubes via syringes. The reaction mixture was
stirred and electrolyzed at a constant current of 24 mA at 70 °C for 2.5 h. When the reaction was finished, the pure product was obtained by flash column chromatography on silica gel (petroleum ether/ethyl acetate = 10/1).

**Procedure for gram scale synthesis of 3aa:**
In an oven-dried undivided three-necked bottle equipped with a stir bar, quinoline-\(N\)-oxide 1a (5 mmol, 725 mg), \(p\)-tosylsulfonyl hydrazide 2a (2 equiv., 1.9 g), and \(t\)Bu\(_4\)NBF\(_4\) (1 mmol, 329 mg) were combined and added. The bottle was equipped with graphite rod (\(\phi\) 6 mm, about 16 mm immersion depth in solution) as the anode and platinum plate (15 mm × 15 mm × 0.3 mm) as the cathode and was then charged with nitrogen. Under the protection of \(N_2\), HFIP (10 mL), and MeCN (90 mL) were injected respectively into the tubes via syringes. The reaction mixture was stirred and electrolyzed at a constant current of 24 mA at 70 °C for 25 h. When the reaction was finished, the pure product was obtained by flash column chromatography on silica gel (petroleum ether/ethyl acetate = 10/1).

**Procedure for cyclic voltammetry (CV):**
Cyclic voltammetry was performed in a three-electrode cell connected to a Schlenk line under nitrogen at room temperature. The working electrode was a steady glassy carbon disk electrode while the counter electrode was a platinum wire. The reference was an Ag/AgCl electrode submerged in saturated aqueous KCl solution. A mixed solvent (MeCN/HFIP = 9/1, 10 mL) containing \(t\)Bu\(_4\)NBF\(_4\) (0.1 mmol) was poured into the electrochemical cell in cyclic voltammetry experiments. The scan rate was 0.10 V/s, ranging from 0 V to 2.5 V.
Figure S1. Cyclic voltammogram: 1a, 0.1 mmol, 2a, 0.1 mmol.
Detailed descriptions for products

2-(p-Tolyl)quinoline (3aa). Yellowish solid (79.2 mg, 72%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.36 (d, $J = 8.5$ Hz, 1H), 8.21–8.14 (m, 2H), 8.02 (d, $J = 8.3$ Hz, 2H), 7.86 (d, $J = 8.2$ Hz, 1H), 7.80–7.75 (m, 1H), 7.68–7.61 (m, 1H), 7.32 (d, $J = 8.1$ Hz, 2H), 2.40 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 158.4, 147.4, 144.7, 138.6, 136.1, 130.9, 130.4, 129.7, 129.1, 129.0, 128.8, 127.6, 117.6, 21.6.

2-(m-Tolyl)quinoline (3ab). Yellowish solid (56 mg, 52%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.38 (d, $J = 8.5$ Hz, 1H), 8.20 (t, $J = 8.1$ Hz, 2H), 7.97–7.85 (m, 3H), 7.79 (ddd, $J = 8.4$, 6.9, 1.4 Hz, 1H), 7.69–7.62 (m, 1H), 7.40 (t, $J = 6.4$ Hz, 2H), 2.42 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 158.2, 147.5, 139.3, 139.0, 138.7, 134.5, 130.9, 130.4, 129.2, 129.1, 128.9, 128.8, 127.7, 126.2, 117.8, 21.3.

2-(o-Tolyl)quinoline (3ac). Canary yellow solid (57.2 mg, 52%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.39 (d, $J = 8.5$ Hz, 1H), 8.31 (dd, $J = 7.9$, 1.1 Hz, 1H), 8.18 (d, $J = 8.6$ Hz, 1H), 8.11 (d, $J = 8.5$ Hz, 1H), 7.89 (d, $J = 7.9$ Hz, 1H), 7.80–7.74 (m, 1H), 7.70–7.62 (m, 1H), 7.50 (td, $J = 7.5$, 1.3 Hz, 1H), 7.42 (t, $J = 7.7$ Hz, 1H), 7.25 (d, $J = 8.5$ Hz, 1H), 2.56 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 158.2, 147.2, 139.1, 138.6, 137.2, 133.8, 132.4, 130.9, 130.6, 130.4, 129.1, 128.9, 127.7, 126.4, 117.7, 20.7.
2-(4-(Tert-butyl)phenyl)quinoline (3ad).

Yellowish solid (80 mg, 62%). ¹H NMR (400 MHz, CDCl₃) δ 8.36 (d, J = 8.5 Hz, 1H), 8.27 – 8.14 (m, 2H), 8.06 (d, J = 8.5 Hz, 2H), 7.87 (d, J = 8.1 Hz, 1H), 7.78 (t, J = 7.7 Hz, 1H), 7.65 (t, J = 7.5 Hz, 1H), 7.54 (d, J = 8.5 Hz, 2H), 1.30 (s, 9H).

¹³C NMR (100 MHz, CDCl₃) δ 158.4, 157.6, 147.4, 138.6, 136.2, 130.9, 130.4, 129.1, 128.8, 128.7, 127.7, 126.1, 117.8, 35.2, 31.0.

![Image of 2-(4-(Tert-butyl)phenyl)quinoline](image)

2-(4-(Fluorophenyl)quinoline (3ae).

Yellowish solid (90.6 mg, 81%). ¹H NMR (400 MHz, CDCl₃) δ 8.40 (d, J = 8.5 Hz, 1H), 8.23 – 8.12 (m, 4H), 7.89 (d, J = 8.2 Hz, 1H), 7.83 – 7.76 (m, 1H), 7.71 – 7.63 (m, 1H), 7.25 – 7.16 (m, 2H). ¹³C NMR (100 MHz, CDCl₃) δ 165.9 (d, J = 256.5 Hz), 158.0, 147.4, 138.8, 135.0, 132.0 (d, J = 9.7 Hz), 131.1, 130.3, 129.3, 128.9, 127.7, 117.4, 116.4 (d, J = 22.7 Hz). ¹⁹F NMR (376 MHz, CDCl₃) δ -103.39.

![Image of 2-(4-(Fluorophenyl)quinoline](image)

2-(4-Bromophenyl)quinoline (3af).

Yellowish solid (64.0 mg, 51%). ¹H NMR (400 MHz, CDCl₃) δ 8.40 (d, J = 8.5 Hz, 1H), 8.20 (d, J = 8.5 Hz, 1H), 8.15 (d, J = 8.5 Hz, 1H), 8.01 (d, J = 8.5 Hz, 2H), 7.89 (d, J = 8.1 Hz, 1H), 7.80 (t, J = 7.6 Hz, 1H), 7.74 – 7.58 (m, 3H). ¹³C NMR (100 MHz, CDCl₃) δ 157.7, 147.4, 138.8, 138.0, 132.3, 131.1, 130.6, 130.3, 129.3, 129.2, 128.8, 127.7, 117.4.

![Image of 2-(4-Bromophenyl)quinoline](image)

2-(4-(Trifluoromethyl)phenyl)quinoline (3ag).

Yellowish solid (56.0 mg, 41%). ¹H NMR (400 MHz, CDCl₃) δ 8.43 (d, J = 8.5 Hz, 1H), 8.30 (d, J = 8.2 Hz, 2H), 8.25 (d, J = 8.5 Hz, 1H), 8.15 (d, J = 8.6 Hz, 1H), 7.90 (d, J = 8.2 Hz, 1H), 7.85 – 7.77 (m, 3H), 7.69 (dd, J = 11.1, 3.9 Hz, 1H). ¹³C NMR (100 MHz, CDCl₃) δ 157.3, 147.4, 142.6, 139.0, 135.2 (q, J = 33.1 Hz), 131.2, 130.2, 129.7,
129.5, 128.9, 127.7, 126.1 (q, $J = 3.6$ Hz), 123.1 (q, $J = 272.0$ Hz), 117.5. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta$ -63.21.

![Image]( attachment)

2-(3-Methoxyphenyl)quinoline (3ah)."$^4$ Yellowish solid (32.9 mg, 28%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.36 (d, $J = 8.5$ Hz, 1H), 8.18 (dd, $J = 8.3$, 5.7 Hz, 2H), 8.07 (d, $J = 8.7$ Hz, 2H), 7.87 (d, $J = 8.2$ Hz, 1H), 7.78 (t, $J = 7.7$ Hz, 1H), 7.65 (t, $J = 7.5$ Hz, 1H), 7.00 (d, $J = 8.7$ Hz, 2H), 3.84 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 163.9, 158.7, 147.4, 138.6, 131.3, 130.9, 130.5, 130.4, 129.0, 128.7, 127.7, 117.5, 114.4, 55.6.

![Image]( attachment)

2-Phenylquinoline (3ai)."$^4$ Yellowish solid (64 mg, 62%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.38 (d, $J = 8.5$ Hz, 1H), 8.24 – 8.13 (m, 4H), 7.87 (d, $J = 8.2$ Hz, 1H), 7.81 – 7.75 (m, 1H), 7.69 – 7.50 (m, 4H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 158.1, 147.4, 139.1, 138.7, 133.7, 131.0, 130.4, 129.2, 129.1, 129.0, 128.8, 127.7, 117.7.

![Image]( attachment)

2-(Thiophen-2-yl)quinoline (3aj)."$^3$ White solid (35 mg, 33%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.40 (d, $J = 8.6$ Hz, 1H), 8.21 (d, $J = 8.5$ Hz, 2H), 7.95 – 7.87 (m, 2H), 7.82 (dd, $J = 11.3$, 4.1 Hz, 1H), 7.76 – 7.65 (m, 2H), 7.17 – 7.11 (m, 1H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 158.0, 147.4, 139.7, 138.8, 135.3, 135.2, 131.1, 130.3, 129.3, 128.9, 127.8, 127.7, 117.3.

![Image]( attachment)

2-(Pyridin-3-yl)quinoline (3ak)."$^3$ Yellowish solid (65.9 mg, 64%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 9.34 (d, $J = 1.7$ Hz, 1H), 8.83 (dd, $J = 4.9$, 1.5 Hz, 1H), 8.48 – 8.41 (m, 2H), 8.25 (d, $J = 8.5$ Hz,
1H), 8.13 (d, J = 8.6 Hz, 1H), 7.91 (d, J = 8.2 Hz, 1H), 7.84 – 7.77 (m, 1H), 7.72 – 7.66 (m, 1H), 7.55 – 7.47 (m, 1H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 157.5, 154.1, 150.1, 147.4, 139.0, 136.9, 135.6, 131.3, 130.3, 129.5, 129.0, 127.8, 123.6, 117.3.

3-Methyl-2-(p-tolyl)quinoline (3ba). Yellowish solid (76.9 mg, 67%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.04 (d, J = 2.8 Hz, 1H), 7.98 – 7.89 (m, 3H), 7.79 – 7.72 (m, 1H), 7.68 – 7.54 (m, 2H), 7.39 – 7.32 (m, 2H), 2.86 (d, J = 3.8 Hz, 3H), 2.46 (d, J = 3.8 Hz, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 157.0, 144.6, 144.4, 139.8, 135.8, 129.9, 129.7, 129.4, 129.3, 128.9, 128.5, 126.6, 21.6, 18.8.

4-Methyl-2-(p-tolyl)quinoline (3ca). Yellowish solid (83.3 mg, 72%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.16 (d, J = 8.5 Hz, 1H), 8.05 – 7.98 (m, 4H), 7.78 – 7.72 (m, 1H), 7.69 – 7.63 (m, 1H), 7.32 (d, J = 8.1 Hz, 2H), 2.78 (s, 3H), 2.40 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 158.0, 147.8, 147.2, 144.6, 136.3, 131.1, 130.5, 129.7, 129.0, 128.8, 128.7, 123.8, 118.0, 21.6, 19.1.

6-Methyl-2-(p-tolyl)quinoline (3da). Yellowish solid (83.3 mg, 72%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.25 (d, J = 8.5 Hz, 1H), 8.14 (d, J = 8.5 Hz, 1H), 8.03 (dd, J = 17.9, 8.4 Hz, 3H), 7.64 – 7.58 (m, 2H), 7.32 (d, J = 8.1 Hz, 2H), 2.54 (s, 3H), 2.39 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 157.5, 146.1, 144.6, 139.5, 137.7, 136.4, 133.3, 130.0, 129.7, 129.0, 128.9, 126.4, 117.7, 21.7, 21.6. HRMS (EI) Calcd for C$_{17}$H$_{15}$N [M$^+$]: 233.1204 Found: m/z 233.1199.
7-Methyl-2-\((p\text{-tolyl})\)quinoxaline (3ea). Yellowish solid (74.1 mg, 62%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.30 (d, $J = 8.5$ Hz, 1H), 8.12 (d, $J = 8.5$ Hz, 1H), 8.01 (d, $J = 8.3$ Hz, 2H), 7.94 (s, 1H), 7.75 (d, $J = 8.4$ Hz, 1H), 7.47 (dd, $J = 8.4$, 1.3 Hz, 1H), 7.32 (d, $J = 8.1$ Hz, 2H), 2.54 (s, 3H), 2.39 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 158.3, 147.7, 144.6, 141.6, 138.2, 136.3, 131.4, 129.7, 129.2, 129.0, 127.2, 126.9, 116.8, 21.8, 21.6. HRMS (ESI) Calcd for C$_{17}$H$_{16}$N [M+H$^+$]: 234.1277 Found: m/z 234.1284.

6-Isopropyl-2-\((p\text{-tolyl})\)quinoxaline (3fa). Yellowish solid (84.0 mg, 66%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.29 (d, $J = 8.5$ Hz, 1H), 8.13 (dd, $J = 20.3$, 8.7 Hz, 2H), 8.00 (d, $J = 8.3$ Hz, 2H), 7.71 – 7.62 (m, 2H), 7.31 (d, $J = 8.1$ Hz, 2H), 3.13 – 3.06 (m, 1H), 2.39 (s, 3H), 1.33 (d, $J = 6.9$ Hz, 6H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 157.5, 150.2, 146.4, 144.6, 138.1, 136.5, 131.0, 130.2, 129.7, 129.0, 128.9, 123.6, 117.7, 34.2, 23.6, 21.6. HRMS (ESI) Calcd for C$_{19}$H$_{20}$N [M+H$^+$]: 262.1590 Found: m/z 262.1589.

6-Fluoro-2-\((p\text{-tolyl})\)quinoxaline (3ga). Yellowish solid (72 mg, 61%), $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.32 (d, $J = 8.6$ Hz, 1H), 8.25 – 8.14 (m, 2H), 8.01 (d, $J = 8.2$ Hz, 2H), 7.61 – 7.52 (m, 1H), 7.48 (dd, $J = 8.5$, 2.6 Hz, 1H), 7.34 (d, $J = 8.1$ Hz, 2H), 2.41 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 144.7 (d, $J = 148.0$ Hz), 138.0, 137.9, 136.0, 133.2, 133.1, 129.8, 129.1, 121.7, 121.4, 118.5, 110.9, 110.6, 21.6. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta$ -108.40. HRMS (ESI) Calcd for C$_{18}$H$_{13}$FN [M+H$^+$]: 238.1207 Found: m/z 238.1209.
6-Chloro-2-(p-tolyl)quinoline (3ha). Yellowish solid (38.0 mg, 30%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.28 (d, $J = 8.6$ Hz, 1H), 8.21 (d, $J = 8.6$ Hz, 1H), 8.10 (d, $J = 9.1$ Hz, 1H), 8.01 (d, $J = 8.3$ Hz, 2H), 7.86 (d, $J = 2.2$ Hz, 1H), 7.71 (dd, $J = 9.1$, 2.3 Hz, 1H), 7.34 (d, $J = 8.1$ Hz, 2H), 2.41 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 158.7, 145.8, 145.0, 137.7, 135.9, 135.2, 132.0, 131.9, 129.8, 129.3, 129.1, 126.3, 118.6, 21.6.

6-Bromo-2-(p-tolyl)quinoline (3ia). Yellowish solid (92 mg, 62%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.24 (dd, $J = 26.6$, 8.6 Hz, 2H), 8.08 – 7.97 (m, 4H), 7.84 (dd, $J = 9.0$, 1.9 Hz, 1H), 7.34 (d, $J = 8.1$ Hz, 2H), 2.41 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 158.8, 146.0, 145.0, 137.6, 135.8, 134.5, 131.9, 129.8, 129.7, 129.1, 123.5, 118.6, 21.6. HRMS (EI) Calcd for C$_{16}$H$_{12}$BrN [$M^+$]: 297.0153 Found: m/z 297.0158.

6-Methoxy-2-(p-tolyl)quinoline (3ja). Yellowish solid (71 mg, 57%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.20 (d, $J = 8.6$ Hz, 1H), 8.12 (d, $J = 8.5$ Hz, 1H), 8.02 (dd, $J = 15.9$, 8.7 Hz, 3H), 7.47 – 7.37 (m, 1H), 7.29 (t, $J = 8.8$ Hz, 2H), 7.08 (d, $J = 2.5$ Hz, 1H), 3.93 (s, 3H), 2.38 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 159.8, 155.8, 144.6, 143.6, 136.8, 136.6, 131.8, 130.4, 129.7, 128.9, 124.2, 118.2, 104.7, 55.7, 21.6. HRMS (EI) Calcd for C$_{17}$H$_{15}$NO [$M^+$]: 249.1154 Found: m/z 249.1160.

3-Methoxy-2-(p-tolyl)quinoline (3ka). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.11 (d, $J = 9.0$ Hz, 1H), 7.96 (d, $J = 8.1$ Hz, 2H), 7.74 (dd, $J = 5.9$, 3.1 Hz, 1H), 7.58 (dd, $J = 12.2$, 8.4 Hz, 3H), 7.32 (d, $J = 8.1$ Hz, 2H), 3.96 (s, 3H), 2.44 (s, 3H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 150.4, 148.8, 144.5,
141.3, 136.4, 130.9, 130.4, 129.5, 129.4, 129.2 128.0, 126.2, 116.1, 56.1, 21.6. **HRMS (EI)** Calcd for C_{17}H_{15}NO [M^+]: 249.1154 Found: m/z 249.1162.

![8-Ethoxy-2-\((\rho\text{-tolyl})\)quinoline (3la)](image)

Yellowish solid (89 mg, 68%). \(^1\text{H NMR}\) (400 MHz, CDCl\(_3\)) \(\delta\) 8.30 (d, \(J = 8.5\) Hz, 1H), 8.18 (d, \(J = 8.5\) Hz, 1H), 8.09 (d, \(J = 8.1\) Hz, 2H), 7.52 (t, \(J = 8.0\) Hz, 1H), 7.40 (d, \(J = 8.2\) Hz, 1H), 7.33 (d, \(J = 8.0\) Hz, 2H), 7.07 (d, \(J = 7.7\) Hz, 1H), 4.21 (q, \(J = 6.9\) Hz, 2H), 2.41 (s, 3H), 1.53 (t, \(J = 6.9\) Hz, 3H). \(^{13}\text{C NMR}\) (100 MHz, CDCl\(_3\)) \(\delta\) 157.2, 155.5, 144.6, 139.6, 138.2, 136.0, 130.1, 129.6, 129.5, 129.3, 119.2, 117.5, 111.1, 65.0, 21.6, 14.7. **HRMS (EI)** Calcd for C_{18}H_{17}NO [M^+]: 263.1310 Found: m/z 263.1318

![2-Tosylethene-1,1-diyl)dibenzene (5a)](image)

\(^1\text{H NMR}\) (400 MHz, CDCl\(_3\)) \(\delta\) 7.47 (d, \(J = 8.0\) Hz, 2H), 7.36 (dd, \(J = 13.4, 6.9\) Hz, 2H), 7.29 (t, \(J = 7.3\) Hz, 4H), 7.20 (d, \(J = 7.8\) Hz, 2H), 7.12 (dd, \(J = 18.3, 7.8\) Hz, 4H), 6.99 (s, 1H), 2.36 (s, 3H). \(^{13}\text{C NMR}\) (100 MHz, CDCl\(_3\)) \(\delta\) 154.6, 143.7, 139.1, 138.5, 135.5, 130.1, 129.7, 129.2, 128.9, 128.7, 128.5, 128.1, 127.7, 127.6, 21.5.
References:


Copies of $^1$H NMR, $^{13}$C NMR and $^{19}$F NMR spectra

2-(p-Tolyl)quinolone (3aa)
2-(m-Olyl)quinolone (3ab)
2-(o-Tolyl)quinolone (3ac)
2-(4-(Tert-butyl)phenyl)quinoline (3ad)
2-(4-Fluorophenyl)quinolone (3ae)
2-((4-Bromophenyl)sulfonyl)quinoline (3af)
2-(4-(Trifluoromethyl)phenyl)quinolone (3ag)
2-(4-Methoxyphenyl)quinoline (3ah)

\[ \text{Chemical Structure Image} \]

\[ \text{NMR Spectrum Image} \]

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2-Phenylquinoline (3ai)
2-(Thiophen-2-yl)quinoline (3aj)
3-Methyl-2-(phenylsulfonyl)quinolone (3ak)
3-Methyl-2-(p-tolyl)quinoline (3ba)
4-Methyl-2-(p-tolyl)quinolone (3ca)
6-Methyl-2-(p-tolyl)quinolone (3da)
6-Isopropyl-2-\((p\text{-tolyl)}quinolone (3fa)
6-Fluoro-2-(p-toly)quinoline (3ga)
6-Chloro-2-(p-tolyl)quinoline (3ha)
6-Bromo-2-(p-tolyl)quinoline (3ia)
6-Methoxy-2-(p-tolyl)quinoline (3ja)
3-Methoxy-2-(p-tolyl)quinoline (3ka)
8-Ethoxy-2-(p-tolyl)quinoline (3la)
(2-Tosylethene-1,1-diyl)dibenzene (5a)