Supporting Information
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Supporting Information

Microwave-Assisted Metal and Ligand-Free O-Arylation of Quinolones Using Diaryliodonium Salts: An Easy and Rapid Synthesis of Aryloxyquinolines

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1. General Methods and Experimental Procedures

All of the reagents and solvents are commercially available and were used as purchased without any further purification. Some solvents except laboratory reagent grade were dried and purified, when necessary. Reactions were monitored by thin-layer chromatography (TLC) on pre-coated silica gel plates procured from Merck (silica gel 60, F 254, 0.25mm). Products were purified by column chromatography using 100-200 mesh silica gel and eluting with a hexane/ethyl acetate mixture. Melting points of the synthesized compounds were determined in E-Z melting point apparatus and are uncorrected. Mass spectra were recorded using Waters mass spectrometer. NMR (\(^1\)H & \(^13\)C) spectra were recorded in Chloroform-d (CDCl\(_3\)) using Bruker-Avance II (400, 100 MHz) spectrometer and chemical shift are given in δ ppm units with respect to TMS as an internal standard. The proton multiplicities were mentioned as: s = singlet, d = doublet, t = triplet, q = quartet, dd = doublet of doublet and m = multiplet. Infrared spectra were recorded on Shimadzu IR Prestige-21 FT-IR spectrophotometer. Required diaryliodonium salts were synthesized using reported protocol.\(^1\)-\(^3\)
General procedure for the synthesis of 4-methyl-2-aryloxyquinoline (6). A mixture of 4 quinolone (0.62 mmol), diaryliodonium salt (0.62 mmol) and potassium carbonate (260 mg, 1.88 mmol) in toluene (1 mL) was irradiated in a CEM Discover MW reactor (100 W power) at 100 °C for 5 min. Upon completion of the reaction as indicated by TLC, solvent was removed and the residue was taken into dichloromethane (20 mL). To this solution, 20 mL of water was added and allowed to stir at room temperature for 10 min. The organic phase was separated, washed with brine solution (2 × 15 mL), dried over anhydrous Na₂SO₄ and concentrated in vacuo. The crude product thus obtained was purified through a silica gel (100-200) column chromatography to afford pure 4-methyl-2-aryloxyquinolines 6 in 62-81% yields.

4-Methyl-2-phenoxynoline (6a): Off white solid (119 mg, 81%); mp.: 76-77 °C (lit. mp.: 76 °C); ¹H NMR (400 MHz, CDCl₃) δ 7.94 (dd, J = 8.3, 1.2 Hz, 1H), 7.80 (dd, J = 8.4, 0.7 Hz, 1H), 7.66–7.62 (m, 1H), 7.56–7.53 (m, 2H), 7.50–7.46 (m, 1H), 7.28 (s, 1H), 7.18–7.15 (m, 2H), 6.96 (d, J = 0.9 Hz, 1H), 2.71 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 161.0, 153.0, 148.5, 146.2, 132.5, 129.7, 128.4, 126.0, 124.9, 123.7, 123.3, 117.3, 112.7, 18.9; IR (KBr, cm⁻¹): 1612, 1574, 1512, 1481, 1342, 1219, 825, 756; MS (ESI) m/z calcld for C₁₆H₁₇NO: 236.1 (M + H)⁺, found: 236.1.

2-(4-Bromophenoxy)-4-methylquinoiline (6b): Brown solid (143 mg, 73%); mp.: 83-86 °C; ¹H NMR (400 MHz, CDCl₃) δ 7.94 (dd, J = 8.3, 1.1 Hz, 1H), 7.81 (dd, J = 8.4, 0.7 Hz, 1H), 7.67–7.62 (m, 1H), 7.57–7.52 (m, 2H), 7.51–7.45 (m, 1H), 7.19–7.15 (m, 2H), 6.96 (d, J = 0.8 Hz, 1H), 2.71 (t, J = 1.7 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 161.0, 153.0, 148.5, 146.2, 132.5, 129.7, 128.4, 126.0, 124.8, 123.6, 123.2, 117.3, 112.7, 18.9; IR (KBr, cm⁻¹): 1612, 1574, 1512, 1481, 1342, 1227, 825, 756; MS (ESI) m/z calcld for C₁₆H₁₃BrNO: 314.0 (M + H)⁺, found: 314.0.
2-(4-Chlorophenoxy)-4-methylquinoline (6c): Yellow solid (127 mg, 75%); mp: 72-74 ºC; $^1$H NMR (400 MHz, CDCl$_3$) δ 7.94 (dd, $J = 8.3$, 1.1 Hz, 1H), 7.81 (d, $J = 9.5$ Hz, 1H), 7.66–7.62 (m, 1H), 7.50–7.46 (m, 1H), 7.42–7.38 (m, 2H), 7.24–7.20 (m, 2H), 6.96 (s, 1H), 2.71 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) δ 161.1, 152.4, 148.5, 146.2, 129.7, 129.5, 128.4, 126.0, 124.8, 123.6, 122.8, 119.7, 112.7, 19.0; IR (KBr, cm$^{-1}$): 1612, 1582, 1489, 1481, 1342, 1219, 825, 756; MS (ESI) m/z calcd for C$_{16}$H$_{13}$ClNO: 270.1 (M + H)$^+$, found: 270.1.

4-Methyl-2-(p-tolyloxy)quinoline (6d): Colourless oil (97 mg, 62%); $^1$H NMR (400 MHz, CDCl$_3$) δ 7.94–7.92 (m, 1H), 7.89–7.82 (m, 1H), 7.67–7.61 (m, 1H), 7.50–7.43 (m, 1H), 7.36–7.23 (m, 2H), 7.19–7.05 (m, 2H), 6.93 (dd, $J = 5.7$, 0.9 Hz, 1H), 2.69 (dd, $J = 2.5$, 1.0 Hz, 3H), 2.42 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) δ 161.7, 151.6, 148.1, 146.5, 134.1, 130.1, 129.5, 128.4, 124.5, 123.6, 121.2, 118.3, 112.6, 21.0, 19.0; IR (KBr, cm$^{-1}$): 1610, 1584, 1476, 1325, 1176, 1025, 824, 756; MS (ESI) m/z calcd for C$_{17}$H$_{16}$NO: 250.1 (M + H)$^+$, found: 250.1.

2-(Mesityloxy)-4-methylquinoline (6e): Yellow semi-solid (117 mg, 67%); $^1$H NMR (400 MHz, CDCl$_3$) δ 7.94–7.83 (m, 2H), 7.62 (s, 1H), 7.45 (s, 1H), 7.28–7.18 (m, 1H), 6.99 (s, 1H), 6.88 (s, 1H), 2.69 (s, 3H), 2.39 (s, 3H), 2.17 (s, 6H); $^{13}$C NMR (101 MHz, CDCl$_3$) δ 161.1, 148.1, 146.9, 134.5, 130.8, 130.1, 129.3, 128.5, 125.6, 124.2, 123.6, 121.2, 111.1, 20.9, 18.9, 16.7; IR (KBr, cm$^{-1}$): 1612, 1466, 1381, 1342, 1203, 856, 818, 756; MS (ESI) m/z calcd for C$_{19}$H$_{20}$NO: 278.1 (M + H)$^+$, found: 278.1.
2-(4-Methoxyphenoxy)-4-methylquinoline (6f): Light brown solid (108 mg, 65%); mp.: 91-92 °C; \(^1^H\) NMR (400 MHz, CDCl\(_3\)) \(\delta\) 7.92 (dd, \(J = 8.2, 1.0\) Hz, 1H), 7.82 (dd, \(J = 8.4, 0.6\) Hz, 1H), 7.64–7.60 (m 1H), 7.47–7.43 (m, 1H), 7.22–7.17 (m, 2H), 7.00–6.96 (m, 2H), 6.91 (d, \(J = 0.7\) Hz, 1H), 3.87 (s, 3H), 2.69 (d, \(J = 0.9\) Hz, 3H); \(^1^C\) NMR (101 MHz, CDCl\(_3\)) \(\delta\) 161.9, 156.5, 148.1, 147.3, 146.5, 129.5, 128.4, 125.8, 124.5, 123.6, 122.5, 114.6, 112.4, 55.6, 18.9; IR (KBr, cm\(^{-1}\)): 1612, 1574, 1381, 1335, 1203, 1026, 825, 756; MS (ESI) \(m/z\) calcd for C\(_{17}\)H\(_{16}\)NO\(_2\): 266.1 (M + H)\(^+\), found: 266.1.

General procedure for the synthesis of 4-aryloxyquinoline (8). To a mixture of quinolone (0.69 mmol), diaryliodonium salt (0.69 mmol) and potassium carbonate (285 mg, 2.07 mmol) was added DMF (2-3 drops) in a 10 mL sealed tube. The reaction contents were irradiated (100 W power) in a CEM Discover MW reactor at 100 °C for 5 min. After completion of the reaction (by TLC), the reaction mixture was cooled, quenched with ice-cold water (20 mL) and extracted with dichloromethane (2 × 20 mL). The combined organic layer was dried over anhydrous Na\(_2\)SO\(_4\) and concentrated in vacuo. The crude product thus obtained was purified through a silica gel (100-200) column-chromatography to afford pure 4-aryloxyquinolines 8 in 55-80% yields.

4-Phenoxyquinoline(8a): Yellow liquid (122 mg, 80%); \(^1^H\) NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.68 (d, \(J = 5.2\) Hz, 1H), 8.44–8.33 (m, 1H), 8.12 (d, \(J = 8.5\) Hz, 1H), 7.78–7.73 (m, 1H), 7.59–7.55 (m, 1H), 7.49–7.44 (m, 2H), 7.33–7.27 (m, 1H), 7.22–7.16 (m, 2H), 6.55 (d, \(J = 5.2\) Hz, 1H); \(^1^C\) NMR (101 MHz, CDCl\(_3\)) \(\delta\) 161.9, 154.4, 151.1, 149.7, 130.3, 130.1, 129.0, 126.1, 125.6, 121.8, 121.5, 121.1, 104.3; IR
(KBr, cm\(^{-1}\)): 1566, 1489, 1420, 1389, 1304, 1211, 771; MS (ESI) m/z calcd for C\(_{15}\)H\(_{12}\)NO: 222.1 (M + H)\(^+\), found: 222.1.

4-(4-Chlorophenoxy)quinoline (8b): Yellow oil (123 mg, 70%); \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.69 (d, \(J = 5.1\) Hz, 1H), 8.33 (dd, \(J = 8.4, 0.9\) Hz, 1H), 8.11 (d, \(J = 8.3\) Hz, 1H), 7.78–7.74 (m, 1H), 7.61–7.55 (m, 1H), 7.45–7.37 (m, 2H), 7.15–7.09 (m, 2H), 6.54 (d, \(J = 5.1\) Hz, 1H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 161.5, 152.9, 151.1, 149.7, 130.9, 130.4, 130.3, 129.1, 126.3, 122.4, 121.7, 121.3, 104.3; IR (KBr, cm\(^{-1}\)): 1597, 1489, 1420, 1389, 1304, 1211, 1088, 849, 756; MS (ESI) m/z calcd for C\(_{15}\)H\(_{10}\)ClNO: 256.0 (M + H)\(^+\), found: 256.0.

4-(4-t-Butylphenoxy)quinoline (8c): Pale yellow solid (105 mg, 55%); mp.: 80-83 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.72–8.67 (m, 1H), 8.44–8.37 (m, 1H), 8.12 (d, \(J = 8.5\) Hz, 1H), 7.81–7.76 (m, 1H), 7.63–7.59 (m, 1H), 7.53–7.48 (m, 2H), 7.18–7.10 (m, 2H), 6.59 (t, \(J = 4.9\) Hz, 1H), 1.39 (s, 9H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 162.2, 151.8, 151.1, 149.6, 148.7, 130.1, 128.9, 127.1, 126.1, 121.9, 121.5, 120.5, 104.1, 34.6, 31.5; IR (KBr, cm\(^{-1}\)): 1589, 1497, 1420, 1389, 1257, 1211, 833, 764; MS (ESI) m/z calcd for C\(_{19}\)H\(_{20}\)NO: 278.2 (M + H)\(^+\), found: 278.2.

4-(3-Methylphenoxy)quinoline (8d): Pale yellow liquid (94 mg, 58%); \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.69 (d, \(J = 5.2\) Hz, 1H), 8.39 (dd, \(J = 8.4, 0.9\) Hz, 1H), 8.12 (d, \(J = 8.4\) Hz, 1H), 7.80–7.76 (m, 1H), 7.64–7.57 (m, 1H), 7.40–7.33 (m, 1H), 7.16–7.10 (m, 1H), 7.06–6.97 (m, 2H), 6.59 (t, \(J = 5.0\) Hz, 1H), 2.42 (s, 3H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 162.0, 154.3, 151.1, 149.6, 140.6, 130.1, 130.0, 129.0, 126.4, 126.1, 121.9, 121.7, 121.5, 118.0, 104.3, 21.4; IR (KBr, cm\(^{-1}\)): 1589,
1566, 1504, 1420, 1396, 1257, 1157, 933, 711; MS (ESI) m/z calcd for C_{16}H_{14}NO: 236.1 (M+H)^+, found: 236.0.

4-(Mesityloxy)quinoline (8e): Pale yellow oil (134 mg, 74%) ¹H NMR (400 MHz, CDCl₃) δ 8.63 (d, J = 5.2 Hz, 1H), 8.49 (dd, J = 8.3, 0.9 Hz, 1H), 8.14 (d, J = 8.3 Hz, 1H), 7.80–7.76 (m, 1H), 7.63–7.59 (m, 1H), 6.98 (d, J = 0.4 Hz, 2H), 6.31 (d, J = 5.2 Hz, 1H), 6.33 (d, 1H), 2.35 (s, 3H), 2.10 (s, 6H); ¹³C NMR (101 MHz, CDCl₃) δ 160.7, 151.3, 149.6, 147.9, 135.5, 130.4, 130.0, 129.9, 129.0, 125.9, 121.8, 120.9, 102.1, 20.8, 15.9; IR (KBr,cm⁻¹): 1582, 1485, 1392, 1203, 896, 848, 746; MS (ESI) m/z calcd for C_{16}H_{15}NO: 252.1 (M+H)^+, found: 252.1.

4-(4-Methoxyphenoxy)quinoline (8f): Brown solid (95 mg, 55%); mp.: 70–71 °C (lit.⁵ mp.: 70-71 °C); ¹H NMR (400 MHz, CDCl₃) δ 8.66 (d, J = 5.2 Hz, 1H), 8.39 (d, J = 7.9 Hz, 1H), 8.11 (d, J = 8.2 Hz, 1H), 7.76 (t, J = 7.7 Hz, 1H), 7.58 (t, J = 7.1 Hz, 1H), 7.13 (d, J = 9.1 Hz, 2H), 6.99 (d, J = 9.1 Hz, 2H), 6.51 (d, J = 5.2 Hz, 1H), 3.86 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 162.6, 157.3, 151.1, 149.6, 147.5, 130.1, 129.0, 126.0, 122.2, 121.8, 121.4, 115.3, 103.6, 55.7; IR (KBr,cm⁻¹): 1589, 1497, 1389, 1250, 1203, 1041, 887, 841, 771; MS (ESI) m/z calcd for C_{16}H_{14}NO: 252.1 (M+H)^+, found: 252.1.

3-Bromo-4-phenoxyquinoline (8g): Brown solid (136 mg, 60%); mp.: 113-115 °C; ¹H NMR (400 MHz, CDCl₃) δ 8.94 (s, 1H), 8.09 (d, J = 8.5 Hz, 1H), 7.90 (dd, J = 8.4, 0.9 Hz, 1H), 7.69–7.67 (m, 1H), 7.49–7.42 (m, 1H), 6.81–6.68 (m, 4H), 3.70 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 155.6, 155.3, 153.4, 151.3, 149.0, 130.2, 129.6, 127.6, 122.3, 116.5, 114.9, 55.7; IR (KBr,cm-1): 1589, 1497, 1250, 1203, 1041, 841, 771; MS (ESI) m/z calcd for C_{16}H_{13}BrNO: 330.0 (M+H)^+, found: 330.0.
3-Bromo-4-(4-chlorophenoxy)quinoline (8h): Off-white solid (175 mg, 76%); mp.: 117-118 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 9.03 (s, 1H), 8.18 (d, \(J = 8.5\) Hz, 1H), 7.94–7.92 (m, 1H), 7.81–7.78 (m, 1H), 7.59–7.55 (m, 1H), 7.29 (d, \(J = 2.3\) Hz, 1H), 7.27 (d, \(J = 2.3\) Hz, 1H), 6.83–6.79 (m, 2H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 155.6, 154.7, 153.3, 149.0, 130.4, 129.9, 129.8, 128.1, 127.9, 122.0, 116.9; IR (KBr, cm\(^{-1}\)): 1574, 1481, 1242, 1211, 1065, 833, 764; MS (ESI) \(m/z\) calcd for C\(_{15}\)H\(_{10}\)BrClNO 334.0 (M + H)\(^+\), found: 334.0.

3-Bromo-4-phenoxyquinoline (8i): White solid (165 mg, 80%); mp.: 82-83 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 9.04 (s, 1H), 8.17 (d, \(J = 8.5\) Hz, 1H), 7.97 (dd, \(J = 8.4, 0.7\) Hz, 1H), 7.80–7.76 (m, 1H), 7.57–7.53 (m, 1H), 7.36–7.29 (m, 2H), 7.15–7.06 (m, 1H), 6.93–6.84 (m, 2H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 157.1, 155.1, 153.3, 149.0, 130.3, 129.7, 127.7, 124.8, 123.0, 122.2, 115.6, 110.6; IR (KBr, cm\(^{-1}\)): 1574, 1489, 1381, 1242, 1203, 741; MS (ESI) \(m/z\) calcd for C\(_{15}\)H\(_{11}\)BrNO: 300.0 (M + H)\(^+\), found: 300.0.

4-Phenoxy-2-phenylquinoline (8j): Off-white solid (156 mg, 76%); mp.: 69-71 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.39 (d, \(J = 8.2\) Hz, 1H), 8.20 (d, \(J = 8.5\) Hz, 1H), 7.98 (d, \(J = 7.0\) Hz, 2H), 7.80 (t, \(J = 7.4\) Hz, 1H), 7.59 (t, \(J = 7.5\) Hz, 1H), 7.54–7.44 (m, 6H), 7.34 (t, \(J = 7.3\) Hz, 1H), 7.26 (s, 1H), 7.06 (s, 1H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 162.4, 158.6, 154.6, 149.8, 139.8, 139.0, 130.3, 129.4, 129.3, 128.7, 127.5, 125.9, 125.5, 121.7, 121.0, 120.6, 102.5; IR (KBr, cm\(^{-1}\)): 1589, 1481, 1412, 1350, 1211, 918, 764, 694; MS (ESI) \(m/z\) calcd for C\(_{21}\)H\(_{16}\)NO: 298.1 (M + H)\(^+\), found: 298.1.
General procedure for the synthesis of benzofuro[3,2-c]quinolines (12): A mixture of 3-bromo-4-aryloxyquinoline (1 mmol), and the palladium (II) chloride (10 mol%) in triethylamine was heated at 90 °C for 4 h. After the consumption of starting material as indicated by TLC, reaction contents were cooled, added ice-cold water (10 mL) and extracted with dichloromethane (2 × 15 mL). Combined organic layer was dried over anhydrous Na₂SO₄ and the solvent was removed under reduced pressure. The residue thus obtained was purified by a silica-gel column chromatography to afford pure benzofuro[3,2-c]quinolines 12 in 80-83% yields.

Benzofuro[3,2-c]quinoline (12a): Brown solid (181 mg, 83%); mp.: 123-126 °C; ¹H NMR (400 MHz, CDCl₃) δ 9.44 (s, 1H), 8.36 (d, J = 9.1 Hz, 1H), 8.21 (d, J = 8.5 Hz, 1H), 8.04 (d, J = 8.3 Hz, 1H), 7.75–7.69 (m, 2H), 7.64 (t, J = 7.5 Hz, 1H), 7.49 (t, J = 7.5 Hz, 1H), 7.42 (t, J = 7.5 Hz, 1H); ¹³C NMR (101 MHz, CDCl₃) δ 157.5, 156.0, 147.4, 144.4, 129.9, 129.3, 127.3, 127.0, 124.1, 122.7, 120.8, 120.7, 117.2, 116.3, 112.2; IR (KBr, cm⁻¹): 1566, 1504, 1466, 1364, 1304, 1241, 1188, 1049, 864, 748; MS (ESI) m/z calcd for C₁₅H₁₀NO: 220.1 (M + H)⁺, found: 220.1.

8-Methoxybenzofuro[3,2-c]quinoline (12b): Brown solid (181 mg, 80%); mp.: 160-162 °C; ¹H NMR (400 MHz, CDCl₃) δ 9.36 (s, 1H), 8.30 (dd, J = 8.1, 0.9 Hz, 1H), 8.17 (d, J = 8.4 Hz, 1H), 7.73–7.66 (m, 1H), 7.63–7.57 (m, 1H), 7.55 (d, J = 9.0 Hz, 1H), 7.44 (d, J = 2.5 Hz, 1H), 7.03 (dd, J = 9.0, 2.6 Hz, 1H), 3.87 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 158.1, 156.8, 150.7, 147.3, 144.3, 129.8, 129.3, 127.0, 123.2, 120.8, 117.3, 116.6, 115.6, 112.6, 103.3, 56.1; IR (KBr, cm⁻¹): 1597, 1504, 1466, 1250, 1095, 1034, 833, 764; MS (ESI) m/z calcd for C₁₆H₁₂NO₂: 250.1 (M + H)⁺, found: 250.1.
8-Chlorobenzofuro[3,2-c]quinoline (12c): Pale yellow solid (227 mg, 82%); mp.: >300 °C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 9.45 (s, 1H), 8.40 (d, $J = 8.2$ Hz, 1H), 8.28 (d, $J = 8.5$ Hz, 1H), 8.07 (d, $J = 2.1$ Hz, 1H), 7.85–7.82 (m, 1H), 7.75–7.65 (m, 2H), 7.51 (dd, $J = 8.8$, 2.1 Hz, 1H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 158.2, 154.2, 147.6, 144.2, 129.9, 129.8, 127.3, 127.3, 124.1, 120.8, 120.5, 117.0, 115.5, 113.1; IR (KBr, cm$^{-1}$): 1504, 1458, 1366, 1311, 1196, 1065, 864, 818, 756; MS (ESI) $m/z$ calcd for C$_{15}$H$_9$ClNO: 254.0 (M + H)$^+$, found: 254.0.
Copies of NMR ($^1$H & $^{13}$C) Spectra:

$^1$H NMR Spectrum of 4-methyl-2-phenoxyquinoline (6a)
$^{13}$C NMR Spectrum of 4-methyl-2-phenoxyquinoline (6a)
$^1$H NMR Spectrum of 2-(4-bromophenoxy)-4-methylquinoline (6b)
$^{13}$C NMR Spectrum of 2-(4-bromophenoxy)-4-methylquinoline (6b)
$^1$H NMR Spectrum of 2-(4-chlorophenoxy)-4-methylquinoline (6c)
$^{13}$C NMR Spectrum of 2-(4-chlorophenoxy)-4-methylquinoline (6c)
$^1$H NMR Spectrum of 4-methyl-2-(p-tolyloxy)quinoline (6d)
$^{13}$C NMR Spectrum of 4-methyl-2-(p-tolyloxy)quinoline (6d)
$^1$H NMR Spectrum of 2-(mesityloxy)-4-methylquinoline (6e)
$^{13}$C NMR Spectrum of 2-(mesityloxy)-4-methylquinoline (6e)
$^1$H NMR Spectrum of 2-(4-methoxyphenoxy)-4-methylquinoline (6f)
$^{13}$C NMR Spectrum of 2-(4-methoxyphenoxy)-4-methylquinoline (6f)
$^1$H NMR Spectrum of 4-phenoxyquinoline (8a)
$^{13}$C NMR Spectrum of 4-phenoxyquinoline(8a)
$^{1}$H NMR Spectrum of 4-(4-chlorophenoxy)quinoline (8b)
$^{13}$C NMR Spectrum of 4-(4-chlorophenoxy)quinoline (8b)
\(^1\)H NMR Spectrum of 4-(4-t-butylphenoxy)quinoline (8c)
$^{13}$C NMR Spectrum of 4-(4-tert.butylphenoxy)quinoline(8c)
\(^1\)H NMR Spectrum of 4-(3-methylphenoxy)quinoline (8d)
$^{13}$C NMR Spectrum of 4-(3-methylphenoxy)quinoline (8d)
$^1$H NMR Spectrum of 4-(mesityloxy)quinoline (8e)
$^{13}$C NMR Spectrum of 4-(mesityloxy)quinoline (8e)
$^1$H NMR Spectrum of 4-(4-methoxyphenoxy)quinoline (8f)
$^{13}$C NMR Spectrum of 4-(4-methoxylphenoxy)quinoline (8f)
$^1$H NMR Spectrum of 3-bromo-4-(4-methoxyphenoxy)quinoline (8g)
$^{13}$C NMR Spectrum of 3-bromo-4-(4-methoxyphenoxy)quinoline (8g)
$^1$H NMR Spectrum of 3-bromo-4-(4-chlorophenoxy)quinoline (8h)
$^{13}$C NMR Spectrum of 3-bromo-4-(4-chlorophenoxy)quinoline (8h)
$^1$H NMR Spectrum of 3-bromo-4-phenoxyquinoline (8i)
$^{13}\text{C}$ NMR Spectrum of 3-bromo-4-phenoxyquinoline (8i)
^{1}H NMR Spectrum of 4-phenoxy-2-phenylquinoline (8j)
$^{13}$C NMR Spectrum of 4-phenoxy-2-phenylquinoline (8j)
$^1$H NMR Spectrum of benzofuro[3,2-c]quinoline (12a)
$^{13}$C NMR Spectrum of benzofuro[3,2-c]quinoline (12a)
$^1$H NMR Spectrum of 8-methoxybenzofuro[3,2-c]quinoline (12b)
$^{13}$C NMR Spectrum of 8-methoxybenzofuro[3,2-c]quinoline (12b)
$^1$H NMR Spectrum of 8-chlorobenzofuro[3,2-c]quinoline (12c)
\(^{13}\)C NMR Spectrum of 8-chlorobenzofuro[3,2-c]quinoline (12c)
References