## Supporting Information

**Iodine-catalyzed and solvent-controlled selective electrophilic cyclization and oxidative esterification of ortho-alkynyl aldehydes**

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Experimental Section

**General.** $^1$H and $^{13}$C NMR spectra were recorded at 300 and 75.5 MHz or 400 and 100 MHz respectively. Thin-layer chromatography was performed using commercially prepared 100-mesh silica gel plates, and visualization was effected with short wavelength UV light (254 nm) and a basic KMnO$_4$ solution [3 g of KMnO$_4$ + 20 g of K$_2$CO$_3$ + 5 mL of NaOH (5 %) + 300 mL of H$_2$O]. All melting points are uncorrected. Mass spectra were recorded on a Finnigan TSQ700 triple quadrupole mass spectrometer (Finnigan MAT, San Jose, CA). High resolution mass spectra were recorded on a Kratos MS50TC double focusing magnetic sector mass spectrometer using EI at 70 eV.

**Reagents.** All reagents were used directly as obtained commercially unless otherwise noted. Anhydrous forms of ethyl ether, hexanes, ethyl acetate, and CH$_2$Cl$_2$ were purchased from Merk Chemical Co. 2-Bromobenzaldehyde, terminal alkynes, Et$_3$N and The palladium salts were purchased from Aldrich Chemical Co., Inc.

**Preparation of starting materials:**

(1). **2-chloroquinoline-3-carbaldehydes**$^1$: They were prepared by the reported procedure.$^1$

\[
\begin{align*}
\text{N} & \text{H} \\
\text{CH}_3 & \text{O} \\
\text{N} & \text{CHO} \\
\text{Cl} &
\end{align*}
\]

1. POCl$_3$ (9.0equiv)
2. DMF (3.0equiv)

(2). **2-(alkynyl)quinoline-3-carbaldehydes**$^2$: They were prepared by the Sonogashira coupling reaction of 2-chloroquinoline-3-carbaldehyde with various terminal alkynes.$^2$ All commercially available compounds were used as received.
2-(phenylethynyl)quinoline-3-carbaldehyde (1a). The product was obtained as a white solid - mp 122-124 °C: \(^1\)HNMR (300 MHz, CDCl\(_3\)): \(\delta = 10.8\) (s, 1H), 8.75 (s, 1H), 8.81 (d, \(J = 8.4\)Hz, 1H), 7.97 (d, \(J = 8.1\)Hz, 1H), 7.87 (td, \(J = 1.5\)Hz, 1H), 7.72-7.61 (m, 3H), 7.48-7.42 (m, 3H); \(^{13}\)C NMR (CDCl\(_3\)): \(\delta = 190.81, 150.18, 143.91, 137.17, 133.07, 132.33, 129.88, 129.68, 129.34, 128.84, 128.62, 128.26, 126.44, 121.35, 95.55, 85.55\). MS (ESI) : [M]\(^+\) Calcd for [C\(_{18}\)H\(_{11}\)NO]: 257.0841, found 257.0852.

2-((4-methoxyphenyl)ethynyl)quinoline-3-carbaldehyde (1b). The product was obtained as an orange solid - mp 140-142 °C: \(^1\)HNMR (300 MHz, [D]CDCl\(_3\)): \(\delta = 10.80\) (s, 1H), 8.73 (s, 1H), 8.16 (d, \(J = 8.4\)Hz, 1H), 7.96-7.83 (m, 2H), 7.66-7.59 (m, 3H), 6.95-6.83 (m, 2H), 3.86 (s, 3H); \(^{13}\)C(CDCl\(_3\)): 190.95, 160.86, 150.20, 144.24, 137.05, 133.99, 132.94, 129.63, 129.23, 128.69, 127.98, 126.27, 114.27, 113.28, 96.12, 84.22, 55.37. MS (ESI) : [M]\(^+\) Calcd for [C\(_{19}\)H\(_{13}\)NO\(_2\)]: 287.0946, found 287.0951.

2-(hex-1-ynyl)quinoline-3-carbaldehyde (1c). The product was obtained as a yellow oil: \(^1\)HNMR (300 MHz, [D]CDCl\(_3\)): \(\delta = 10.68\) (s, 1H), 8.68 (s, 1H), 8.11 (d, \(J = 8.1\)Hz, 1H), 7.96-7.83 (m, 2H), 7.66-7.59 (m, 3H), 6.95-6.83 (m, 2H), 3.86 (s, 3H); \(^{13}\)C(CDCl\(_3\)): 190.95, 160.86, 150.20, 144.24, 137.05, 133.99, 132.94, 129.63, 129.23, 128.69, 127.98, 126.27, 114.27, 113.28, 96.12, 84.22, 55.37. MS (ESI) : [M]\(^+\) Calcd for [C\(_{18}\)H\(_{14}\)NO]: 257.0841, found 257.0852.
8.4Hz, 1H), 7.93-7.80 (m, 2H), 7.61-7.56 (m, 2H), 2.59 (t, \( J = 7.2Hz \), 2H), 1.73-1.66 (m, 2H),
1.57-1.47 (m, 2H), 0.97 (t, \( J = 7.2Hz \), 3H); \(^{13}C\) NMR (CDCl\(_3\)): 191, 150.07, 144.47, 136.76,
131.81, 129.57, 129.16, 128.74, 127.88, 126.24, 98.14, 87.79, 30.24, 22.19, 19.35, 13.58. MS
(ESI) :[M]\(^+\) Calcd for [C\(_{16}\)H\(_{15}\)NO] : 237.1154, found 237.1162.

2-(m-tolylethynyl)quinoline-3-carbaldehyde (1d). The product was
obtained as an orange solid - mp 126-128 °C: \(^1\)HNMR (300MHz, [D]CHCl\(_3\)) \( \delta \): 10.81 (s, 1H),
8.74 (s, 1H), 8.17 (d, \( J = 8.7Hz \), 1H), 7.96 (d, \( J = 8.1Hz \), 1H), 7.87 (t, \( J = 7.2Hz \), 1H), 7.63 (t, \( J = 7.2Hz \), 1H), 7.51 (d, \( J = 7.8Hz \), 2H), 7.33-7.24 (m, 2H); \(^{13}C\) NMR (CDCl\(_3\)): 190.90, 150.19,
144.01, 138.37, 137.09, 133.02, 132.86, 130.80, 129.67, 129.41, 129.32, 128.82, 128.50,
128.19, 126.40, 121.13, 95.88, 85.25, 21.25. MS (ESI) :[M]\(^+\) Calcd for [C\(_{19}\)H\(_{13}\)NO]: 271.0997,
found 271.0970.

2-(p-tolylethynyl)quinoline-3-carbaldehyde (1e). The product was
obtained as a white solid- mp 138-140 °C : \(^1\)HNMR (300 MHz, [D]CDCl\(_3\)) : \( \delta \) = 10.78 (s, 1H),
8.71 (s, 1H), 8.15 (d, \( J = 8.7Hz \), 1H), 7.91 (d, \( J = 8.1Hz \), 1H), 7.85-7.79 (d, \( J = 8.4Hz \), 1H),
7.60-7.53 (m, 3H), 7.19-7.15 (m, 2H), 2.34 (s, 3H); \(^{13}C\) NMR (CDCl\(_3\)) : 190.94, 150.22, 144.14,
140.36, 137.07, 133.00, 132.26, 129.67, 129.39, 129.31, 128.80, 128.12, 126.38, 118.26, 96.03,
85.13, 21.70. MS (ESI) :[M]\(^+\) Calcd for [C\(_{19}\)H\(_{13}\)NO]: 271.0997, found : 271.0979.
2-(cyclohexylethynyl)quinoline-3-carbaldehyde (1f). The product was obtained as a white solid- mp 130-132 °C: $^1$HNMR (300 MHz, [D]CDCl$_3$): $\delta$ 8.6 (s, 1H), 8.12 (d, $J = 8.7$Hz, 1H), 7.93 (d, $J = 8.1$Hz, 1H), 7.86-7.80 (m, 1H), 7.58 (td, $J = 0.9$Hz, 7.9Hz, 1H), 2.02-1.97 (m, 2H), 1.82-1.55 (m, 5H), 1.47-1.36 (m, 3H) $^{13}$C NMR (CDCl$_3$): 191.40, 150.10, 144.61, 136.76, 132.83, 129.61, 129.20, 128.77, 127.88, 126.25, 102.02, 77.47, 32.12, 29.90, 25.75, 24.94. MS (ESI) :[M]$^+$ Calcd for [C$_{18}$H$_{17}$NO]: 263.13, found : 263.11.

6-methoxy-2-(phenylethynyl)quinoline-3-carbaldehyde (1g). The product was obtained as a yellow solid- mp 164-166 °C: $^1$HNMR (300MHz, [D]CHCl$_3$) $\delta$: 10.78 (s, 1H), 8.61 (s, 1H), 8.06 (d, $J = 9.3$Hz, 1H), 7.70-7.67 (m, 2H), 7.52-7.41 (m, 4H), 7.17 (d, $J = 2.7$ Hz, 1H), 3.96 (s, 3H). $^{13}$C NMR (CDCl$_3$): 191.04, 159.00, 146.59, 141.46, 135.33, 132.21, 130.77, 129.64, 129.07, 128.56, 127.75, 126.29, 121.58, 106.25, 94.73, 85.56, 55.77. MS (ESI) :[M]$^+$ Calcd for [C$_{19}$H$_{13}$NO$_2$] : 287.09, found : 287.13.

2-(thiophen-3-ylethynyl)quinoline-3-carbaldehyde (1h). The product was obtained as a white solid - mp 122-124 °C: $^1$HNMR (300MHz, [D]CHCl$_3$) $\delta$: 10.78 (s, 1H), 7.97 (d, $J = 8.4$Hz, 1H), 7.88 (td, $J = 1.5$Hz, 1H), 7.79-7.78 (m, 1H), 7.63 (td, $J = 0.9$ Hz, 1H), 7.39-7.33 (m, 2H); $^{13}$C NMR (CDCl$_3$): 190.79, 150.21, 143.94, 137.17, 133.06, 131.60, 129.99,
129.68, 129.32, 128.76, 128.21, 126.41, 125.98, 120.52, 90.84, 85.38. MS (ESI) : [M]⁺ Calcd for [C₁₆H₉NOS] : 263.0405, found : 263.0450.

2-(3,3-dimethylbut-1-ynyl)quinoline-3-carbaldehyde (1i). The product was obtained as a dirty white solid- mp 118-120 °C: ¹H NMR (300MHz, [D]CHCl₃ ) δ: 8.7 (s, 1H), 8.14 (d, J = 8.4Hz, 1H), 7.91 (td, J = 0.6Hz, 7.5Hz, 1H), 7.86-7.81 (m, 1H), 7.60 (td, J = 0.6Hz, 7.5Hz, 1H) . ¹³C NMR (CDCl₃): 191.40, 150.06, 144.58, 136.77, 132.83, 129.63, 128.75, 127.88, 126.25, 105.82, 76.08, 30.57, 28.40. MS (ESI): [M]⁺ Calcd for [C₁₆H₁₅NO] : 237.12, found: 237.20.

General procedure for the synthesis of 4-iodo-1H-pyrano[4,3-b]quinolines (2a-b). Into a solution of the 2-(alkynyl)quinoline-3-carbaldehyde (0.25 mmol), K₂CO₃ (2.5 equiv) and the nucleophile (1.2 equiv) in CH₂Cl₂ (2.0 mL), I₂ (2.5 equiv) was added and the solution was stirred at room temperature until the total disappearance of the starting material as determined by TLC analysis. The reaction mixture was then quenched with satd aq Na₂S₂O₃ (5.0 mL) and water (5.0 mL). The resulting solution was extracted using ethyl acetate. The combined organic extracts were dried over anhydrous Na₂SO₄ and concentrated under vacuum. The crude product was purified by flash column chromatography (neutral aluminum oxide, hexane/EtOAc) to afford pure compounds.

4-iodo-1-methoxy-3-phenyl-1H-pyrano[4,3-b]quinoline(2a). The product was obtained as a yellow solid- mp 116-118 °C: ¹H NMR (300MHz, [D]CHCl₃ ) δ : 8.20
(d, J = 8.7Hz, 1H), 7.97 (s, 1H), 7.82 (d, J = 8.1Hz, 1H), 7.75-7.70 (m, 3H), 7.53-7.45 (m, 4H), 6.22 (s, 1H), 3.71 (s, 3H); ¹³C NMR (CDCl₃) : 157.69, 148.85, 147.82, 136.98, 133.12, 130.28, 129.92, 129.84, 129.53, 127.50, 126.39, 121.83, 100.45, 78.01, 77.23, 56.47. HRMS (ESI) : [M]⁺ Calcd for [C₁₉H₁₄INO₂] : 415.0069, found : 415.0073.

4-iodo-1-methoxy-3-(4-methoxyphenyl)-1H-pyrano[4,3-b]quinoline (2b). The product was obtained as yellow solid - mp 130-132 °C : ¹H NMR (300MHz, [D]CHCl₃) δ: 8.19 (d, J = 8.4Hz, 1H), 7.95 (s, 1H), 7.81 (d, J = 8.1Hz, 1H), 7.74-7.69 (m, 3H), 7.49 (td, J = 0.9, 6.9 Hz, 1H), 6.99-6.95 (m, 2H) 6.21 (s, 1H), 3.85 (s, 3H), 3.69 (s, 3H); ¹³C NMR (CDCl₃): 159.70, 156.35, 147.83, 147.19, 131.93, 130.69, 129.20, 128.44, 128.10, 126.47, 126.38, 125.24, 120.91, 112.21, 99.41, 76.21, 55.45, 54.35. HRMS (ESI): [M]⁺ Calcd for [C₂₀H₁₆INO₃] : 445.0175, found : 445.034.

**General procedure for the synthesis of alkyl 2-(alkynyl)quinoline-3-carboxylates (3a-i):** To a solution of I₂ (2.5 equiv) in 30 equiv nucleophile were added 2-(alkynyl)quinoline-3-carbaldehyde (0.25 mmol), K₂CO₃ (2.5 equiv) . The resulting reaction mixture was heated under an Ar atmosphere at 70 °C until the total disappearance of the starting material as determined by TLC analysis. The reaction mixture was then quenched with satd aq Na₂S₂O₃ (5.0 mL) and water (5.0 mL). The resulting solution was extracted using ethyl acetate. The combined organic extracts were dried over anhydrous Na₂SO₄ and concentrated under vacuum. The crude product was purified by flash column chromatography (neutral aluminum oxide, hexane/EtOAc) to afford pure compounds.
Methyl 2-(phenylethynyl)quinoline-3-carboxylate (3a). The product was obtained as orange solid- mp 96-98 °C: ¹H NMR (300MHz, [D]CHCl₃) δ: 8.8 (s, 1H), 8.16 (d, J = 8.1Hz, 1H), 7.89 (d, J = 8.1Hz, 1H), 7.83 (td, J = 1.2, 7.2 Hz, 1H), 7.73-7.70 (m, 2H), 7.60 (t, J = 7.8Hz, 1H), 7.4-7.38 (m, 3H), 4.04 (s, 3H); ¹³C NMR (CDCl₃): 165.65, 149.05, 141.62, 139.77, 132.40, 132.24, 129.30, 129.18, 128.55, 128.40, 127.93, 125.83, 125.56, 123.39, 93.46, 88.47, 52.64. HRMS (ESI): [M]⁺ Calcd for [C₁₉H₁₃NO₂]: 287.0946, found: 287.0949.

Methyl 2-(hex-1-ynyl)quinoline-3-carboxylate (3b). The product was obtained as orange oil: ¹H NMR (300MHz, [D]CHCl₃) δ: 8.70 (s, 1H), 8.10 (d, J = 8.4Hz, 1H), 7.85-7.75 (m, 2H), 7.55 (t, J = 6.9Hz, 1H), 3.99 (s, 3H), 2.57 (t, J = 7.2Hz, 2H), 1.75-1.65 (m, 2H), 1.60-1.50 (m, 2H), 0.97 (t, J = 7.2Hz, 3H); ¹³C NMR (CDCl₃): δ 164.88, 147.86, 140.88, 138.39, 130.95, 127.96, 127.37, 126.55, 124.58, 124.53, 94.90, 78.90, 51.43, 29.35, 21.09, 18.54, 12.62. HRMS (ESI): [M]⁺ Calcd for [C₁₇H₁₇NO₂]: 267.1259, found: 267.1261.

Methyl 2-(m-tolylethynyl)quinoline-3-carboxylate (3c). The product was obtained as orange solid- mp 104-106 °C: ¹H NMR (300MHz, [D]CHCl₃) δ: 8.79 (s, 1H), 8.16 (d, J = 8.7Hz, 1H), 7.89-7.79 (m, 2H), 7.62-7.51 (m, 3H), 7.30-7.19 (m, 2H), 4.04 (s, 3H), 2.37 (s, 3H); ¹³C NMR (CDCl₃): 165.66, 149.05, 141.69, 139.73, 138.07, 132.91, 132.20,
130.23, 129.51, 129.16, 128.53, 128.34, 127.87, 125.78, 125.52, 122.17, 93.73, 88.16, 52.63, 21.27. HRMS (ESI): [M]$^+$ Calcd for $[C_{20}H_{15}NO_2]: 301.1103$, found: 301.1110.

**Ethyl 2-(p-tolylethynyl)quinoline-3-carboxylate (3d).** The product was obtained as orange solid - mp 94-96 °C: $^1$HNMR (300MHz, [D]CHCl$_3$) $\delta$: 8.78 (s, 1H), 8.16 (d, $J = 8.4$Hz, 1H), 7.91-7.79 (m, 2H), 7.62-7.57 (m, 3H), 7.27-7.18 (m, 2H), 4.50 (q, $J = 6.9$Hz, 2H), 2.41 (s, 3H), 1.41 (t, $J = 7.2$Hz, 3H); $^{13}$C NMR (CDCl$_3$): $\delta$ 165.38, 149.00, 141.76, 139.55, 132.95, 132.26, 132.10, 129.18, 129.14, 128.51, 127.79, 125.92, 125.81, 119.34, 93.76, 88.04, 61.74, 21.68, 14.40. HRMS (ESI): [M]$^+$ Calcd for $[C_{21}H_{17}NO_2]: 315.1259$, found: 315.1261.

**Methyl 2-(cyclohexylethynyl)quinoline-3-carboxylate (3e).** The product was obtained as orange solid - mp 70-74 °C: $^1$HNMR (300MHz, [D]CHCl$_3$) $\delta$: 8.71 (s, 1H), 8.11 (d, $J = 8.4$Hz, 1H), 7.85 (d, $J = 8.1$Hz, 1H), 7.78 (td, $J = 8.4$Hz, 1.5Hz, 1H), 7.56 (t, $J = 6.9$Hz, 1H), 3.99 (s, 1H), 2.79-2.70 (m, 1H), 2.00-1.84 (m, 2H), 1.82-1.54 (m, 5H), 1.45-1.31 (m, 3H). $^{13}$C NMR (CDCl$_3$): 166.11, 148.87, 141.93, 139.41, 131.95, 129.03, 128.40, 127.55, 125.87, 125.62, 99.65, 79.90, 52.48, 32.17, 30.03, 29.70, 25.88, 24.93. HRMS (ESI): [M]$^+$ Calcd for $[C_{19}H_{19}NO_2]: 293.14$, found: 293.22.
Methyl 6-methoxy-2-(phenylethynyl)quinoline-3-carboxylate (3f). The product was obtained as yellow solid - mp 152-154 °C: $^1$HNMR (300MHz, [D]CHCl$_3$) $\delta$: 8.68 (s, 1H), 8.05 (d, $J = 9.3$Hz, 1H), 7.71-7.69 (m, 2H), 7.469 (dd, $J = 9.3$Hz, 2.1Hz, 1H), 7.39-7.37 (m, 3H), 7.12 (d, $J = 2.4$Hz, 1H), 4.03 (s, 1H), 3.94 (m, 1H). $^{13}$C NMR (CDCl$_3$): 165.83, 158.82, 145.33, 139.00, 138.18, 132.25, 130.63, 129.04, 128.34, 127.07, 125.84, 125.23, 122.59, 105.50, 92.54, 88.49, 55.68, 52.55. HRMS (ESI): [M]$^+$ Calcd for [C$_{20}$H$_{15}$NO$_3$] : 317.11, found: 317.15.

Methyl 2-(thiophen-3-ylethynyl)quinoline-3-carboxylate (3g). The product was obtained as orange solid- mp 86-88 °C: $^1$HNMR (300MHz, [D]CHCl$_3$) $\delta$: 8.79 (s, 1H), 8.14 (d, $J = 8.4$Hz, 1H), 7.89-7.76 (m, 2H), 7.59 (t, $J = 7.2$Hz, 1H), 7.36-7.31 (m, 2H), 4.03 (s, 3H); $^{13}$C NMR (CDCl$_3$): $\delta$ 165.48, 148.96, 141.56, 149.73, 132.19, 130.99, 130.12, 129.04, 128.49, 127.81, 125.68, 125.46, 125.25, 121.47, 88.72, 88.12, 52.53. HRMS (ESI): [M]$^+$ Calcd for [C$_{17}$H$_{11}$NO$_2$S] : 293.0510, found : 293.0570.

Methyl 2-(3,3-dimethylbut-1-ynyl)quinoline-3-carboxylate (3h). The product was obtained as yellow solid - mp 50-54 °C: $^1$HNMR (300MHz, [D] CHCl$_3$) $\delta$: 8.70 (s,1H), 8.125 (d, $J = 8.4$Hz, 1H), 7.86-7.76 (m, 2H), 7.56 (t, $J = 7.2$Hz, 1H), 3.05 (s, 1H), 1.42 (s, 9H). $^{13}$C NMR (CDCl$_3$): 166.23, 148.81, 141.84, 139.42, 131.91, 129.07, 128.40, 127.56,
126.13, 125.63, 103.28, 78.63, 52.46, 30.59, 28.30. HRMS (ESI): [M]$^+\text{ Calcd for [C}_{17}\text{H}_{17}\text{NO}_{2}]:$
267.13, found: 267.18.

**Ethyl 2-(phenylethynyl)quinoline-3-carboxylate (3i).** The product was obtained as yellow solid- mp 90-92 °C: $^1\text{HNMR (300MHz, [D]CHCl}_3) \delta$: 8.80 (s, 1H), 8.17( d, $J = 8.7\text{Hz}, 1H)$, 7.99-7.81 (m, 2H), 7.72-7.59 (m, 3H), 7.40-7.38 (m, 3H), 4.50 (q, $J = 7.2\text{Hz}, 2H)$, 1.45 (t, $J = 7.2\text{Hz}, 3H)$; $^{13}\text{C NMR (CDCl}_3) : \delta 165.29, 148.99, 139.60, 132.32, 132.15, 129.23, 129.17, 128.52, 128.38, 127.90, 125.91, 122.41, 93.46, 88.47, 61.76, 14.38. HRMS (ESI): [M]$^+$ Calcd for [C$_{20}$H$_{15}$NO$_2$] : 301.1103, found : 301.1119.

**General procedure for the synthesis of 4-iodo-3-aryl-1H-pyrano[4,3-b]quinolin-1-one (4a-e):** To a solution of I$_2$ (2.5 equiv) in CH$_2$Cl$_2$ (2.0 mL) were added 2-(alkynyl) quinoline-3-carbaldehyde (0.25 mmol). The resulting reaction mixture was stirred under an Ar atmosphere at room temperature until the total disappearance of the starting material as determined by TLC analysis. The reaction mixture was then quenched with satd aq Na$_2$S$_2$O$_3$ (5.0 mL) and water (5.0 mL). The resulting solution was extracted using ethyl acetate. The combined organic extracts were dried over anhydrous Na$_2$SO$_4$ and concentrated under vacuum. The crude product was purified by recrystallization.

**4-iodo-3-phenyl-1H-pyrano[4,3-b]quinolin-1-one (4a).** The product was obtained as orange solid – mp 224-226 °C: $^1\text{HNMR (300MHz, [D] CHCl}_3) \delta$: 9.12 (s, 1H), 8.29
(d, J = 8.7Hz, 1H), 8.04 (d, J = 8.4Hz, 1H), 7.94 (t, J = 7.5Hz, 1H), 7.83-7.82 (m, 2H), 7.67 (t, J = 7.5Hz, 1H), 7.52-7.50 (m, 3H); 13C NMR (CDCl3): δ 161.64, 157.66, 151.64, 150.54, 140.73, 134.78, 133.64, 130.56, 130.03, 129.66, 129.09, 128.09, 127.79, 127.41, 114.23, 81.67. HRMS (ESI): [M]+ Calcd for [C18H10INO2] : 398.9756, found : 399.9750.

3-butyl-4-iodo-1H-pyrano[4,3-b]quinolin-1-one (4b). The product was obtained as yellow solid – mp 198-200 °C: 1HNMR (300MHz, [D]CHCl3 ) δ: 9.07 (s, 1H), 8.26 (d, J = 8.7Hz, 1H), 8.01 (d, J = 8.1Hz, 1H), 7.92 (td, J = 1.2, 6.9Hz, 1H), 7.637 (td, J = 0.9, 8.1Hz, 1H), 3.05 (t, J = 7.5Hz, 2H), 1.84-1.75 (m, 2H), 1.55-143 (m, 2H), 0.99 (t, J = 7.2Hz, 3H); 13C NMR (CDCl3): δ 161.92, 161.80, 151.59, 150.24, 140.70, 133.53, 129.07, 127.48, 127.17, 114.03, 81.21, 37.45, 29.21, 22.29, 13.80. HRMS (ESI): [M]+ Calcd for [C16H14INO2] : 379.0069, found : 379.0062.

4-iodo-3-p-tolyl-1H-pyrano[4,3-b]quinolin-1-one (4c). The product was obtained as orange solid- mp 228-230 °C: 1HNMR (300MHz, [D]CHCl3 ) δ: 9.13 (s, 1H), 8.29 (d, J = 8.4Hz, 1H), 8.05 (d, J = 7.8Hz, 1H), 7.94 (td, J = 1.5, 6.9Hz, 1H), 7.75 (d, J = 8.1Hz, 2H), 7.68-7.64 (m, 1H), 7.31 (d, J = 7.8Hz, 2H), 2.45 (s, 3H); 13C NMR (CDCl3): δ 161.77, 157.82, 151.70, 150.71, 140.99, 140.71, 133.61, 131.90, 130.01, 129.68, 129.10, 128.78, 127.73, 127.41, 114.25, 81.23, 21.60. HRMS (ESI): [M]+ Calcd for [C19H12INO2] : 412.9913, found : 413.9925.
3-cyclohexyl-1H-pyrano[4,3-b]quinolin-1-one (4d). The product was obtained as orange solid – mp 180-182 °C : $^1$H NMR (300MHz, [D]CHCl$_3$) $\delta$: 9.05 (s, 1H), 8.25 (d, $J = 8.4$Hz, 1H), 8.00 (d, $J = 8.1$Hz, 1H), 7.93-7.88 (m, 1H), 7.62 (td, $J = 0.9$Hz, 8.1 Hz, 1H), 1.95-1.88 (m, 4H), 1.79-1.60 (m, 3H), 1.50-1.28 (m, 3H). $^{13}$C NMR (CDCl$_3$): 164.15, 162.00, 151.59, 150.41, 140.67, 133.50, 129.56, 129.06, 127.43, 127.19, 114.33, 80.42, 46.61, 29.39, 25.93, 25.58. HRMS (ESI): [M]+ Calcd for [C$_{18}$H$_{17}$NO$_2$]: 279.13, found : 279.22.

4-iodo-3-phenyl-1H-isochromen-1-one (4e). The product was obtained as white solid – mp 136-138 °C : $^1$H NMR (300MHz, [D]CHCl$_3$) $\delta$: 8.31 (dd, $J = 8.1$Hz, 1H), 7.91-7.80 (m, 1H), 7.83 (td, $J = 1.2$, 6.0Hz, 1H), 7.72-7.66 (m, 2H), 7.62-7.56 (m, 1H), 7.49-7.47 (m, 3H); $^{13}$C NMR (CDCl$_3$): $\delta$ 161.57, 154.82, 138.19, 135.73, 135.26, 131.51, 130.21, 130.00, 129.76, 129.27, 128.10, 120.29, 77.44. MS (ESI): [M]$^+$ Calcd for [C$_{15}$H$_9$IO$_2$] : 347.9647, found : 348.9649.

REFERENCES:


4b