Supporting Information for

Au(I)-Catalyzed Expeditious Access to Naphtho[2,3-c]furan-1(3-H)-ones from Readily Available Propargylic Ynoates

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1. General Information
Ethyl acetate (ACS grade), hexanes (ACS grade), dichloromethane (ACS grade) were purchased from Fisher Scientific and used without further purification. ACS grade 1,2-dichloroethane were purchased from Acros Organics and used directly. Commercially available reagents were used without further purification. Reactions were monitored by thin layer chromatography (TLC) using Silicycle precoated silica gel plates. Flash column chromatography was performed over Silicycle silica gel (230-400 mesh). $^1$H NMR and $^{13}$C NMR spectra were recorded on a Varian 400 MHz spectrometer. Unity plus spectrometer, using residue solvent peaks as internal standards (CDCl$_3$, $^1$H: 7.26 ppm; $^{13}$C: 77.00 ppm). Mass spectra were recorded with Waters micromass ZQ detector using electrospray method.

2. Synthesis of Compound 1

**General Procedure A: Preparation of Propargylic Ynoates 1:**

Taking substrate 1a for example: To a solution of the propargylic alcohol (2 mmol) and acid (2.2 mmol, 1.1 eq) in CH$_2$Cl$_2$ (10 mL) was added catalytic amount DMAP. The solution was cooled in an ice-water bath and treated with EDCI (2.2 mmol, 1.1 eq). The ice-water bath was removed, and the reaction was stirred at room temperature overnight. The urea formed during the reaction was filtered off and the residue after concentration was purified through silica gel flash column chromatography (eluents: EtOAc and hexanes) to give the desired substrate 1a.

**1,3-diphenylprop-2-yn-1-yl but-2-ynoate (1a)**
Compound 1a was obtained as yellow oil in 96% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.67 – 7.63 (m, 2H), 7.51 – 7.49 (m, 2H), 7.45 – 7.39 (m, 3H), 7.35 – 7.31 (m, 3H), 6.76 (s, 1H), 1.96 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 152.36, 136.22, 131.77, 129.09, 128.80, 128.62, 128.17, 127.83, 121.77, 87.69, 86.91, 84.67, 71.93, 67.36, 3.69.

1-(2-bromophenyl)-3-phenylprop-2-yn-1-yl but-2-ynoate (1b)

Compound 1b was obtained as yellow oil in 87% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.89 (dd, $J$ = 7.8, 1.5 Hz, 1H), 7.61 (d, $J$ = 8.0 Hz, 1H), 7.49 (dd, $J$ = 7.5, 1.8 Hz, 2H), 7.40 (t, $J$ = 7.6 Hz, 1H), 7.35 – 7.19 (m, 5H), 6.98 (s, 1H), 2.00 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 152.10, 135.36, 133.11, 131.95, 130.72, 129.94, 128.99, 128.28, 127.82, 123.52, 121.76, 88.21, 87.10, 83.83, 71.85, 66.92, 3.95.

1-(3-bromophenyl)-3-phenylprop-2-yn-1-yl but-2-ynoate (1c)
Compound 1c was obtained as yellow oil in 86% yield according to general procedure A.

\[^{1}H\text{ NMR}\] (400 MHz, CDCl\(_3\)) \(\delta 7.75\) (t, \(J = 1.7\) Hz, 1H), 7.53 – 7.49 (m, 2H), 7.48 – 7.46 (m, 2H), 7.35 – 7.30 (m, 3H), 7.27 – 7.25 (m, 1H), 6.66 (s, 1H), 1.99 (s, 3H).

\[^{13}C\text{ NMR}\] (101 MHz, CDCl\(_3\)) \(\delta 152.27, 138.49, 132.28, 131.94, 130.90, 130.27, 129.07, 128.31, 126.52, 122.68, 121.62, 88.24, 87.44, 84.03, 71.84, 66.55, 3.91.

1-(4-bromophenyl)-3-phenylprop-2-yn-1-yl but-2-ynoate (1d)

Compound 1d was obtained as yellow oil in 91% yield according to general procedure A.

\[^{1}H\text{ NMR}\] (400 MHz, CDCl\(_3\)) \(\delta 7.60 – 7.43\) (m, 6H), 7.33 (m, 3H), 6.67 (s, 1H), 1.99 (s, 3H).

\[^{13}C\text{ NMR}\] (101 MHz, CDCl\(_3\)) \(\delta 152.34, 135.41, 131.90, 129.64, 129.05, 128.31, 123.40, 121.64, 88.10, 87.33, 84.14, 71.84, 66.76, 3.92.

1-(3-methoxyphenyl)-3-phenylprop-2-yn-1-yl but-2-ynoate (1e)
Compound 1e was obtained as yellow oil in 71% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) δ 7.53 – 7.44 (m, 2H), 7.38 – 7.28 (m, 4H), 7.24 – 7.15 (m, 2H), 6.93 (ddd, $J = 8.2, 2.5, 0.7$ Hz, 1H), 6.72 (s, 1H), 3.84 (s, 3H), 1.98 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) δ 159.78, 152.48, 137.73, 131.91, 129.80, 128.93, 128.30, 121.88, 120.22, 114.85, 113.39, 87.75, 87.11, 84.66, 72.01, 67.35, 55.32, 3.89.

1-(2-fluorophenyl)-3-phenylprop-2-yn-1-yl but-2-ynoate (1f)

Compound 1f was obtained as yellow oil in 89% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) δ 7.78 (td, $J = 7.5, 1.7$ Hz, 1H), 7.53 – 7.45 (m, 2H), 7.42 – 7.29 (m, 4H), 7.22 (td, $J = 7.6, 0.9$ Hz, 1H), 7.11 (ddd, $J = 9.5, 8.3, 0.9$ Hz, 1H), 6.98 (s, 1H), 1.99 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) δ 160.17 (d, $J = 250.8$ Hz), 152.14, 131.95, 131.19 (d, $J = 8.3$ Hz), 129.73 (d, $J = 2.8$ Hz), 129.01, 128.29, 124.41, 123.59 (d, $J = 13.2$ Hz), 121.73, 115.75 (d, $J = 21.0$ Hz), 87.88, 87.11, 83.65, 71.86, 61.52 (d, $J = 5.2$ Hz), 3.90

1-(2-bromo-4-fluorophenyl)-3-phenylprop-2-yn-1-yl but-2-ynoate (1g)
Compound 1g was obtained as yellow oil in 81% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.88 (dd, $J$ = 8.7, 5.9 Hz, 1H), 7.49 (dd, $J$ = 7.5, 1.6 Hz, 2H), 7.42 – 7.27 (m, 4H), 7.12 (td, $J$ = 8.3, 2.6 Hz, 1H), 6.93 (s, 1H), 2.00 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 162.66 (d, $J$ = 253.4 Hz), 152.01, 131.58 (d, $J$ = 3.5 Hz), 131.28 (d, $J$ = 8.9 Hz), 129.09, 128.31, 123.86 (d, $J$ = 9.9 Hz), 121.58, 120.38 (d, $J$ = 24.8 Hz), 115.01 (d, $J$ = 21.2 Hz), 88.42, 87.26, 83.63, 71.74, 66.24, 3.95.

1-(2-bromo-4-methylphenyl)-3-phenylprop-2-yn-1-yl but-2-ynoate (1h)

Compound 1h was obtained as yellow oil in 86% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.77 (d, $J$ = 7.9 Hz, 1H), 7.49 (dd, $J$ = 7.3, 1.8 Hz, 2H), 7.43 (s, 1H), 7.40 – 7.24 (m, 3H), 7.20 (d, $J$ = 7.9 Hz, 1H), 6.97 (s, 1H), 2.34 (s, 3H), 1.98 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 152.17, 141.28, 133.52, 132.37, 131.93, 129.73, 128.99, 128.63, 128.31, 123.28, 121.81, 88.05, 87.00, 84.12, 71.94, 66.82, 20.87, 3.91.

1-(2-bromo-5-chlorophenyl)-3-phenylprop-2-yn-1-yl but-2-ynoate (1i)
Compound 1i was obtained as yellow oil in 82% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.83 (d, $J = 2.5$ Hz, 1H), 7.57 – 7.44 (m, 3H), 7.38 – 7.29 (m, 3H), 7.25 – 7.16 (m, 1H), 6.90 (s, 1H), 2.01 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 151.87, 137.21, 134.17, 133.94, 131.99, 130.69, 129.78, 129.16, 128.32, 121.48, 121.09, 88.54, 87.55, 83.16, 71.67, 66.33, 3.96.

3-phenyl-1-(4-(trifluoromethyl)phenyl)prop-2-yn-1-yl but-2-ynoate (1j)

Compound 1j was obtained as yellow oil in 88% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.74 (d, $J = 8.3$ Hz, 2H), 7.68 (d, $J = 8.3$ Hz, 2H), 7.52 – 7.43 (m, 2H), 7.42 – 7.28 (m, 3H), 6.76 (s, 1H), 2.00 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 152.27, 140.24, 131.95, 131.28 (q, $J = 32.7$ Hz), 129.17, 128.36, 128.21, 125.77 (q, $J = 3.8$ Hz), 124.94, 122.76, 121.56, 88.46, 87.58, 83.94, 71.79, 66.64, 3.89.

1-phenylbut-2-yn-1-yl but-2-ynoate (1k)

Compound 1k was obtained as yellow oil in 72% yield according to general
procedure A.

**1H NMR** (400 MHz, CDCl₃) δ 7.54 – 7.51 (m, 2H), 7.43 – 7.32 (m, 3H), 6.45 (q, J = 2.1 Hz, 1H), 1.97 (s, 3H), 1.91 (d, J = 2.1 Hz, 3H).

**13C NMR** (101 MHz, CDCl₃) δ 152.58, 136.78, 129.00, 128.61, 127.81, 86.64, 84.75, 75.18, 72.11, 67.48, 3.86, 3.82.

### 1-phenylnon-2-yn-1-yl but-2-ynoate (1l)

![1l](image)

Compound 1l was obtained as yellow oil in 82% yield according to general procedure A.

**1H NMR** (400 MHz, CDCl₃) δ 7.58 – 7.52 (m, 2H), 7.48 – 7.32 (m, 3H), 6.50 (t, J = 2.0 Hz, 1H), 2.28 (td, J = 7.2, 2.1 Hz, 2H), 1.98 (s, 3H), 1.55 (dt, J = 14.8, 7.2 Hz, 2H), 1.46 – 1.22 (m, 6H), 0.90 (t, J = 8.3 Hz, 3H).

**13C NMR** (101 MHz, CDCl₃) δ 152.27, 140.24, 131.95, 131.28 (q, J = 32.7 Hz), 129.17, 128.36, 128.21, 125.77 (q, J = 3.8 Hz), 124.94, 122.76, 121.56, 88.46, 87.58, 83.94, 71.79, 66.64, 3.89.

### 3-cyclohexyl-1-phenylprop-2-yn-1-yl but-2-ynoate (1m)

![1m](image)

Compound 1m was obtained as yellow oil in 84% yield according to general procedure A.

**1H NMR** (400 MHz, CDCl₃) δ 7.55 (dt, J = 8.4, 2.2 Hz, 2H), 7.46 – 7.33 (m, 3H), 6.53 (d, J = 1.8 Hz, 1H), 2.54 – 2.32 (m, 1H), 1.97 (s, 3H), 1.86 – 1.78 (m, 2H), 1.77 – 1.67 (m, 2H), 1.58 – 1.45 (m, 3H), 1.41 – 1.24 (m, 3H).
13C NMR (101 MHz, CDCl3) δ 152.59, 136.95, 128.95, 128.57, 127.93, 93.12, 86.52, 75.93, 72.21, 67.51, 32.30, 32.28, 29.09, 25.83, 24.76, 3.85.

1,5-diphenylpent-2-yn-1-yI but-2-ynoate (1n)

Compound 1n was obtained as yellow oil in 95% yield according to general procedure A.

1H NMR (400 MHz, CDCl3) δ 7.46 (m, 2H), 7.40 – 7.33 (m, 3H), 7.32 – 7.26 (m, 2H), 7.24 – 7.18 (m, 3H), 6.46 (t, J = 2.0 Hz, 1H), 2.85 (t, J = 7.5 Hz, 2H), 2.57 (td, J = 7.4, 2.0 Hz, 2H), 1.98 (s, 3H).

13C NMR (101 MHz, CDCl3) δ 152.56, 140.29, 136.56, 128.97, 128.56, 128.49, 128.39, 127.87, 126.32, 88.27, 86.66, 76.76, 72.09, 67.38, 34.62, 21.06, 3.88.

7-(benzyloxy)-1-phenylhept-2-yn-1-yI but-2-ynoate (1o)

Compound 1o was obtained as yellow oil in 91% yield according to general procedure A.

1H NMR (400 MHz, CDCl3) δ 7.53 (dd, J = 7.5, 1.8 Hz, 2H), 7.43 – 7.26 (m, 8H), 6.47 (s, 1H), 4.49 (s, 2H), 3.49 (t, J = 6.1 Hz, 2H), 2.31 (td, J = 6.8, 1.9 Hz, 2H), 1.96 (s, 3H), 1.75 – 1.61 (m, 4H).

13C NMR (101 MHz, CDCl3) δ 152.55, 138.51, 136.76, 128.96, 128.58, 128.33, 127.85, 127.58, 127.48, 88.84, 86.59, 76.17, 72.81, 71.81, 69.66, 67.45, 28.82, 25.08, 18.66, 3.86.

1-phenyl-5-((tetrahydro-2H-pyran-2-yl)oxy)pent-2-yn-1-yI but-2-ynoate (1p)
Compound 1p was obtained as yellow oil in 88% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.53 (dd, $J = 7.4$, 1.9 Hz, 2H), 7.44 – 7.29 (m, 3H), 6.47 (d, $J = 1.8$ Hz, 1H), 4.64 (t, $J = 3.3$ Hz, 1H), 3.96 – 3.76 (m, 2H), 3.62 – 3.42 (m, 2H), 2.58 (td, $J = 7.0$, 2.0 Hz, 2H), 1.97 (s, 3H), 1.89 – 1.43 (m, 6H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 152.51, 136.56, 129.00, 128.57, 127.85, 98.66, 98.62, 86.69, 86.00, 76.90, 72.05, 67.29, 65.23, 65.20, 62.02, 30.47, 25.38, 20.38, 19.23, 3.85.

$6$-((tert-butyldimethylsilyl)oxy)-1-phenylhex-2-yn-1-yl but-2-ynoate (1q)

Compound 1q was obtained as yellow oil in 86% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.54 (dd, $J = 7.6$, 1.6 Hz, 2H), 7.38 (dt, $J = 6.9$, 4.1 Hz, 3H), 6.49 (t, $J = 2.0$ Hz, 1H), 3.70 (t, $J = 6.1$ Hz, 2H), 2.38 (td, $J = 7.1$, 2.1 Hz, 2H), 1.97 (s, 3H), 1.78 – 1.70 (m, 2H), 0.90 (s, 9H), 0.06 (s, 6H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 152.50, 136.78, 128.96, 128.57, 127.81, 88.67, 86.53, 76.17, 72.12, 67.40, 61.41, 31.31, 25.91, 18.28, 15.25, 3.78, -5.39.

1-phenyl-3-(m-tolyl)prop-2-yn-1-yl but-2-ynoate (1s)
Compound 1s was obtained as yellow oil in 71% yield according to general procedure A.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.62 (d, $J = 6.3$ Hz, 2H), 7.44 – 7.37 (m, 3H), 7.33 – 7.27 (m, 2H), 7.18 (dd, $J = 17.9$, 7.6 Hz, 2H), 6.72 (s, 1H), 2.33 (s, 3H), 1.99 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 152.52, 137.97, 136.38, 132.47, 129.77, 129.16, 128.96, 128.70, 128.15, 127.97, 121.71, 87.98, 86.90, 84.33, 72.04, 67.52, 21.15, 3.88.

1-phenyl-3-(o-tolyl)prop-2-yn-1-yl but-2-yonoate (1t)

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.63 (dd, $J = 7.7$, 1.5 Hz, 2H), 7.47 – 7.39 (m, 4H), 7.25 – 7.18 (m, 2H), 7.16 – 7.11 (m, 1H), 6.76 (s, 1H), 2.44 (s, 3H), 1.99 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 152.55, 140.72, 136.42, 132.24, 129.43, 129.16, 128.89, 128.70, 127.98, 125.48, 121.70, 88.55, 86.85, 86.83, 72.05, 67.68, 20.67, 3.89.

1,3-diphenylprop-2-yn-1-yl hex-2-yonoate (1y)

Compound 1y was obtained as yellow oil in 86% yield according to general procedure A.
**1H NMR** (400 MHz, CDCl₃) δ 7.65 – 7.61 (m, 2H), 7.52 – 7.47 (m, 2H), 7.45 – 7.38 (m, 3H), 7.36 – 7.31 (m, 3H), 6.74 (s, 1H), 2.31 (t, J = 7.1 Hz, 2H), 1.61 (dd, J = 14.5, 7.2 Hz, 2H), 1.01 (t, J = 7.4 Hz, 3H).

**13C NMR** (101 MHz, CDCl₃) δ 152.65, 136.38, 131.91, 129.16, 128.87, 128.70, 128.25, 127.99, 121.94, 90.93, 87.74, 84.79, 72.79, 67.42, 20.98, 20.69, 13.48.

1,3-diphenylprop-2-yn-1-yl 3-phenylpropiolate (1z)

![Image of compound 1z]

Compound 1z was obtained as yellow oil in 88% yield according to general procedure A.

**1H NMR** (400 MHz, CDCl₃) δ 7.69 (dd, J = 7.8, 1.4 Hz, 2H), 7.63 – 7.57 (m, 2H), 7.56 – 7.50 (m, 2H), 7.49 – 7.42 (m, 4H), 7.35 (m, 5H), 6.84 (s, 1H).

**13C NMR** (101 MHz, CDCl₃) δ 152.95, 136.26, 133.06, 131.96, 130.80, 129.32, 128.97, 128.80, 128.57, 128.31, 128.10, 121.88, 119.40, 88.00, 87.55, 84.68, 80.27, 67.80.

### 3. Synthesis of Compound 2

**General Procedure B: Au(I)-catalyzed formation of Naphtho[2,3-c]furan-1(3H)-ones**

![Image of reaction scheme]

Taking substrate 2a for example: To a solution of 1a in DCE (0.1 M) was added the Au catalyst, NaBAR₄, and 4Å MS. The reaction mixture was stirred at 80 °C for 2 hours. The resulting mixture was concentrated and the residue was purified through silica gel flash column chromatography (eluents: EtOAc and hexanes) to give the
desired product 2a.

9-methyl-3-phenynaphtho[2,3-c]furan-1(3H)-one (2a)

\[
\begin{align*}
\text{Compound } 2a \text{ was obtained as a white solid in 95% yield according to general procedure B.} \\
^1H \text{ NMR (400 MHz, CDCl}_3\text{)} \delta 8.27 (dd, J = 6.3, 3.5 Hz, 1H), 7.83 (dq, J = 6.8, 3.4 Hz, 1H), 7.68 – 7.59 (m, 2H), 7.56 (s, 1H), 7.49 – 7.31 (m, 5H), 6.47 (s, 1H), 3.19 (s, 3H). \\
^{13}C \text{ NMR (101 MHz, CDCl}_3\text{)} \delta 170.86, 143.47, 139.33, 137.65, 135.96, 133.02, 129.11, 128.90, 128.82, 128.57, 127.05, 126.73, 125.52, 120.02, 119.73, 81.26, 12.55. \\
HRMS m/z (ESI) Calcd for C_{19}H_{14}O_2Na [M+Na^+]\text{, 297.0886, found 297.0882.}
\end{align*}
\]

5-bromo-9-methyl-3-phenynaphtho[2,3-c]furan-1(3H)-one (2b)

\[
\begin{align*}
\text{Compound } 2b \text{ was obtained as a white solid in 88% yield according to general procedure B.} \\
^1H \text{ NMR (400 MHz, CDCl}_3\text{)} \delta 8.35 (d, J = 8.6 Hz, 1H), 8.12 (s, 1H), 8.01 (d, J = 8.6 Hz, 1H), 7.55 (t, J = 8.6 Hz, 1H), 7.52 – 7.41 (m, 5H), 6.60 (s, 1H), 3.28 (s, 1H). \\
^{13}C \text{ NMR (101 MHz, CDCl}_3\text{)} \delta 170.15, 144.78, 139.78, 137.27, 134.69, 134.58, 132.81, 129.35, 129.09, 127.17, 126.98, 125.49, 123.77, 119.47, 81.57, 12.86. \\
HRMS m/z (ESI) Calcd for C_{19}H_{14}BrO_2Na [M+Na^+]\text{, 374.9991, found 374.9998.}
\end{align*}
\]

6-bromo-9-methyl-3-phenynaphtho[2,3-c]furan-1(3H)-one (2c) and 8-bromo-9-methyl-3-phenynaphtho[2,3-c]furan-1(3H)-one (2c')

\[
\begin{align*}
\text{6-bromo-9-methyl-3-phenynaphtho[2,3-c]furan-1(3H)-one (2c) and 8-bromo-9-methyl-3-phenynaphtho[2,3-c]furan-1(3H)-one (2c')} \\
\end{align*}
\]
Compound 2c was obtained as a white solid in 86% combined yield according to general procedure B.

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.48, 170.44, 144.71, 143.87, 141.78, 139.58, 138.88, 137.26, 137.00, 134.88, 131.62, 131.56, 130.80, 130.18, 129.42, 129.24, 128.97, 128.45, 127.18, 127.00, 126.96, 123.30, 122.22, 121.68, 121.03, 120.43, 118.84, 81.16, 80.22, 18.01, 12.53.

HRMS m/z (ESI) Calcd for C$_{19}$H$_{14}$BrO$_2$Na [M+Na$^+$], 374.9991, found 374.9998.

7-bromo-9-methyl-3-phenylnaphtho[2,3-c]furan-1(3H)-one (2d)

Compound 2d was obtained as a white solid in 71% yield according to general procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.41 (d, $J = 0.7$ Hz, 1H), 7.69 (m, 2H), 7.53 (s, 1H), 7.45 – 7.30 (m, 5 H), 6.45 (s, 1H), 3.14 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.38, 143.95, 138.40, 137.29, 134.35, 134.25, 131.93, 130.30, 129.24, 128.97, 127.96, 127.00, 121.18, 120.97, 119.75, 81.26, 12.53.

HRMS m/z (ESI) Calcd for C$_{19}$H$_{14}$BrO$_2$Na [M+Na$^+$], 374.9991, found 374.9998.

6-methoxy-9-methyl-3-phenylnaphtho[2,3-c]furan-1(3H)-one (2e) and 8-methoxy-9-methyl-3-phenylnaphtho[2,3-c]furan-1(3H)-one (2e')
Compounds 2e and 2e’ were obtained as a white solid in 91% combined according to general procedure B.

$^{13}$C NMR (101 MHz, CDCl$_3$) δ 171.03, 171.01, 160.09, 159.61, 144.65, 144.04, 142.18, 139.12, 138.61, 137.99, 137.80, 137.72, 129.06, 129.03, 128.86, 128.39, 127.11, 127.03, 127.00, 125.75, 121.14, 119.97, 119.68, 119.35, 118.30, 118.05, 106.39, 105.98, 81.08, 80.32, 55.42, 55.39, 17.11, 12.59.

HRMS m/z (ESI) Calcd for C$_{20}$H$_{16}$O$_3$Na [M+Na$^+$], 327.0992, found 327.0995.

5-fluoro-9-methyl-3-phenylnaptho[2,3-c]furan-1(3H)-one (2f)

Compound 2f was obtained as a white solid in 81% yield according to general procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) δ 8.05 (d, $J$ = 8.7 Hz, 1H), 7.85 (s, 1H), 7.63 – 7.50 (m, 1H), 7.48 – 7.27 (m, 6H), 6.49 (s, 1H), 3.19 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) δ 170.49, 158.93 (d, $J$ = 252.5 Hz), 143.82 (d, $J$ = 1.7 Hz), 139.29 (d, $J$ = 2.6 Hz), 137.28, 134.57 (d, $J$ = 4.0 Hz), 129.22, 128.98, 126.97, 126.45 (d, $J$ = 8.5 Hz), 126.37 (d, $J$ = 16.4 Hz), 121.40 (d, $J$ = 4.2 Hz), 120.92, 112.63 (d, $J$ = 6.8 Hz), 112.14 (d, $J$ = 19.9 Hz), 81.40, 12.84.

HRMS m/z (ESI) Calcd for C$_{19}$H$_{15}$O$_2$BFNa [M+Na$^+$], 315.0792, found 315.0791.

5-bromo-7-fluoro-9-methyl-3-phenylnaptho[2,3-c]furan-1(3H)-one (2g)
Compound \(2g\) was obtained as a white solid in 96% yield according to general procedure B.

\(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.00 (s, 1H), 7.87 (dd, \(J = 10.2, 2.3\) Hz, 1H), 7.77 (dd, \(J = 10.2, 2.4\) Hz, 1H), 7.44 – 7.31 (m, 5H), 6.50 (s, 1H), 3.13 (s, 3H).

\(^1^3\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 170.04, 159.70 (d, \(J = 251.3\) Hz), 144.12 (d, \(J = 2.8\) Hz), 138.83 (d, \(J = 6.3\) Hz), 137.01, 134.77 (d, \(J = 8.8\) Hz), 131.82, 129.34, 129.05, 127.05, 124.56 (d, \(J = 10.4\) Hz), 123.33 (d, \(J = 28.2\) Hz), 121.79, 119.38 (d, \(J = 1.7\) Hz), 109.17 (d, \(J = 21.2\) Hz), 81.46, 12.80.

HRMS m/z (ESI) Calcd for C\(_{19}\)H\(_{12}\)O\(_2\)BrFNa [M+Na\(^+\)], 392.9897, found 392.9894.

5-bromo-7,9-dimethyl-3-phenylnaphtho[2,3-c]furan-1(3H)-one (2h)

Compound \(2h\) was obtained as a white solid in 91% yield according to general procedure B.

\(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.00 (s, 1H), 7.96 (s, 1H), 7.80 (s, 1H), 7.44 – 7.32 (m, 5H), 6.49 (s, 1H), 3.16 (s, 3H), 2.56 (s, 3H).

\(^1^3\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 170.51, 143.80, 138.78, 137.01, 134.78, 134.51, 132.83, 129.19, 128.96, 127.07, 124.49, 123.29, 120.88, 119.09, 81.44, 21.65, 12.72.

HRMS m/z (ESI) Calcd for C\(_{20}\)H\(_{15}\)O\(_2\)BrNa [M+Na\(^+\)], 389.0148, found 389.0143.

5-bromo-8-chloro-9-methyl-3-phenylnaphtho[2,3-c]furan-1(3H)-one (2i)
Compound 2i was obtained as a white solid in 90% yield according to general procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.11 (s, 1H), 7.78 (d, $J$ = 8.0 Hz, 1H), 7.50 (d, $J$ = 8.0 Hz, 1H), 7.37 (m, 5H), 6.46 (s, 1H), 3.56 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 169.99, 145.26, 142.11, 136.90, 136.75, 133.91, 132.35, 132.17, 130.41, 129.38, 129.09, 127.01, 123.07, 122.63, 120.64, 80.52, 17.81.

HRMS m/z (ESI) Calcd for C$_{19}$H$_{12}$O$_2$BrClNa [M+Na$^+$], 408.9601, found 408.9603.

9-methyl-3-phenyl-7-(trifluoromethyl)naphtho[2,3-c]furan-1(3H)-one (2j)

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.56 (s, 1H), 7.95 (d, $J$ = 8.7 Hz, 1H), 7.78 (d, $J$ = 8.7 Hz, 1H), 7.63 (s, 1H), 7.46 – 7.30 (m, 5H), 6.50 (s, 1H), 3.24 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.13, 145.70, 140.48, 137.09, 132.08, 130.01, 129.34, 129.02, 128.63 (q, $J$ = 32.7 Hz), 126.99, 125.36, 124.09 (q, $J$ = 3.0 Hz), 123.28 (q, $J$ = 4.6 Hz), 122.64, 121.38, 121.38, 119.80, 81.27, 12.58.

HRMS m/z (ESI) Calcd for C$_{20}$H$_{13}$O$_2$F$_3$Na [M+Na$^+$], 365.0760, found 365.0761.

3,9-dimethylnaphtho[2,3-c]furan-1(3H)-one (2k)

Compound 2k was obtained as a white solid in 61% yield according to general procedure B.
procedure B.

1H NMR (400 MHz, CDCl₃) δ 8.25 (d, J = 8.4 Hz, 1H), 7.93 – 7.89 (m, 1H), 7.66 (s, 1H), 7.66 – 7.60 (m, 2H), 5.80 – 5.42 (m, 1H), 3.13 (s, 3H), 1.70 (d, J = 6.7 Hz, 3H).

13C NMR (101 MHz, CDCl₃) δ 170.82, 145.04, 139.26, 135.90, 132.94, 128.71, 128.48, 126.54, 125.53, 120.38, 118.12, 77.26, 77.00, 76.75, 76.16, 21.22, 12.46.

HRMS m/z (ESI) Calcd for C₁₄H₁₂O₂Na [M+Na⁺], 235.0730, found 235.0731.

3-hexyl-9-methylnaphtho[2,3-c]furan-1(3H)-one (2l)

 Compound 2l was obtained as a white solid in 92% yield according to general procedure B.

1H NMR (400 MHz, CDCl₃) δ 8.26 (d, J = 8.3 Hz, 1H), 7.92 (d, J = 8.3 Hz, 1H), 7.71 – 7.55 (m, 3H), 5.55 (dd, J = 7.5, 4.0 Hz, 1H), 3.15 (s, 3H), 2.20 – 1.97 (m, 1H), 1.93 – 1.72 (m, 1H), 1.70 – 1.15 (m, 8H), 0.89 (t, J = 7.0 Hz, 3H).

13C NMR (101 MHz, CDCl₃) δ 171.04, 143.94, 139.18, 135.84, 132.95, 128.72, 128.44, 126.48, 125.52, 120.77, 118.25, 79.84, 35.58, 31.62, 29.06, 24.69, 22.55, 14.03, 12.47.

HRMS m/z (ESI) Calcd for C₁₉H₂₂O₂Na [M+Na⁺], 305.1512, found 305.1514.

3-cyclohexyl-9-methylnaphtho[2,3-c]furan-1(3H)-one (2m)

 Compound 2m was obtained as a white solid in 80% yield according to general procedure B.

1H NMR (400 MHz, CDCl₃) δ 8.24 (dd, J = 8.3, 0.9 Hz, 1H), 7.99 – 7.83 (m, 1H),
7.72 – 7.54 (m, 3H), 5.39 (d, $J = 3.0$ Hz, 2H), 3.13 (s, 4H), 1.98 (ddd, $J = 15.0$, 8.0, 3.4 Hz, 1H), 1.91 (d, $J = 12.5$ Hz, 1H), 1.83 (dd, $J = 8.7$, 5.6 Hz, 1H), 1.74 – 1.63 (m, 2H), 1.47 – 1.07 (m, 6H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 171.04, 143.94, 139.18, 135.84, 132.95, 128.72, 128.44, 126.48, 125.52, 120.77, 118.25, 79.84, 35.58, 31.62, 29.06, 24.69, 22.55, 14.03, 12.47.

HRMS m/z (ESI) Calcd for C$_{19}$H$_{20}$O$_2$Na [M+Na$^+$], 303.1356, found 303.1354.

9-methyl-3-phenethylnaphtho[2,3-c]furan-1(3H)-one (2n)

![Structure of 2n]

Compound 2n was obtained as a white solid in 88% yield according to general procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.28 – 8.22 (m, 1H), 7.91 – 7.85 (m, 1H), 7.68 – 7.57 (m, 3H), 7.35 – 7.15 (m, 5H), 5.53 (dd, $J = 8.5$, 3.0 Hz, 1H), 3.14 (s, 3H), 2.96 – 2.79 (m, 2H), 2.49 – 2.36 (m, 1H), 2.11 (m, 1H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.94, 143.58, 140.78, 139.38, 135.84, 132.99, 128.72, 128.55, 128.55, 128.53, 126.57, 126.19, 125.53, 120.61, 118.27, 78.77, 37.50, 31.18, 12.49.

HRMS m/z (ESI) Calcd for C$_{21}$H$_{18}$O$_2$Na [M+Na$^+$], 325.1199, found 325.1194.

9-methyl-3-phenethylnaphtho[2,3-c]furan-1(3H)-one (2o)

![Structure of 2o]

Compound 2o was obtained as a white solid in 76% yield according to general
procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) δ 8.25 (d, $J = 8.3$ Hz, 1H), 7.89 (d, $J = 7.7$ Hz, 1H), 7.70 – 7.52 (m, 3H), 7.36 – 7.26 (m, 5H), 5.53 (dd, $J = 7.7$, 4.0 Hz, 1H), 4.54 – 4.46 (m, 2H), 3.55 – 3.43 (m, 2H), 3.13 (s, 3H), 2.14 (ddd, $J = 14.4$, 8.0, 2.9 Hz, 1H), 1.89 – 1.80 (m, 1H), 1.76 – 1.59 (m, 4H).

$^{13}$C NMR (101 MHz, CDCl$_3$) δ 170.95, 143.71, 139.19, 138.46, 135.81, 132.93, 128.72, 128.44, 128.33, 127.62, 127.51, 126.50, 125.49, 120.66, 118.29, 79.65, 72.91, 69.95, 35.32, 29.41, 21.63, 12.45.

HRMS m/z (ESI) Calcd for C$_{24}$H$_{24}$O$_3$Na [M+Na$^+$], 383.1618, found 383.1614.

9-methyl-3-(2-((tetrahydro-2H-pyran-2-yl)oxy)ethyl)naphtho[2,3-c]furan-1(3H)-one (2p)

![Compound 2p]

Compound 2p was obtained as a white solid in 91% yield according to general procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) δ 8.25 (d, $J = 8.8$ Hz, 1H), 8.08 – 7.87 (m, 1H), 7.72 (d, $J = 7.1$ Hz, 1H), 7.70 – 7.51 (m, 2H), 5.74 (dd, $J = 8.8$, 3.4 Hz, 1H), 4.63 (d, $J = 2.9$ Hz, 1H), 4.22 – 3.38 (m, 5H), 3.13 (s, 3H), 2.51 – 2.35 (m, 1H), 2.03 (ddd, $J = 14.5$, 9.2, 4.6 Hz, 1H), 1.85 – 1.67 (m, 2H), 1.67 – 1.44 (m, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) δ 170.89, 170.87, 143.78, 143.76, 139.28, 139.26, 135.87, 135.84, 132.97, 128.78, 128.75, 128.48, 126.54, 125.50, 125.50, 120.56, 120.51, 118.56, 118.52, 99.74, 98.62, 77.06, 76.86, 63.52, 63.01, 62.78, 62.15, 36.18, 36.07, 30.70, 30.57, 25.40, 25.39, 19.80, 19.37, 12.46.

HRMS m/z (ESI) Calcd for C$_{20}$H$_{24}$O$_4$Na [M+Na$^+$], 349.1410, found 349.1412.

3-(3-((tert-butyldimethylsilyl)oxy)propyl)-9-methylnaphtho[2,3-c]furan-1(3H)-one (2q)
Compound 2q was obtained as a white solid in 80% yield according to general procedure B.

\(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.32 – 8.22 (m, 1H), 8.00 – 7.88 (m, 1H), 7.68 (s, 1H), 7.68 – 7.60 (m, 2H), 5.60 (dd, \(J = 7.1, 4.2\) Hz, 1H), 3.86 – 3.44 (m, 2H), 3.15 (s, 3H), 2.29 – 2.22 (m, 1H), 2.04 – 1.87 (m, 1H), 1.84 – 1.64 (m, 2H), 0.91 (s, 9H), 0.06 (s, 3H), 0.05 (s, 3H).

\(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 170.97, 143.78, 139.22, 135.85, 132.97, 128.75, 128.46, 126.52, 125.51, 120.75, 118.37, 79.65, 62.45, 32.05, 27.81, 25.94, 18.32, 12.47, -5.33.

HRMS m/z (ESI) Calcd for C\(_{22}\)H\(_{30}\)O\(_3\)SiNa [M+Na\(^+\)], 393.1856, found 393.1857.

3-(2-hydroxyethyl)-9-methylnaptho[2,3-c]furan-1(3H)-one (2r)

Compound 2r was obtained as a white solid in 79% yield according to general procedure B.

\(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.18 (d, \(J = 8.3\) Hz, 1H), 7.84 (d, \(J = 7.7\) Hz, 1H), 7.63 (s, 1H), 7.57 (ddt, \(J = 16.5, 6.8, 1.2\) Hz, 2H), 5.67 (dd, \(J = 9.5, 3.0\) Hz, 1H), 3.95 (ddd, \(J = 10.8, 8.3, 4.8\) Hz, 1H), 3.89 (dt, \(J = 10.8, 5.4\) Hz, 1H), 3.06 (s, 3H), 2.33 (tdd, \(J = 8.5, 5.6, 3.4\) Hz, 1H), 1.92 (ddt, \(J = 14.6, 9.8, 5.0\) Hz, 1H), 1.72 (br, 1H).

\(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 170.70, 143.57, 139.49, 135.84, 132.97, 128.74, 128.58, 126.63, 125.50, 120.23, 118.38, 77.20, 59.13, 38.46, 12.47.

HRMS m/z (ESI) Calcd for C\(_{15}\)H\(_{14}\)O\(_3\)Na [M+Na\(^+\)], 265.0835, found 265.0837.
9-methyl-3-(m-tolyl)naphtho[2,3-c]furan-1(3H)-one (2s)

Compound 2s was obtained as a white solid in 80% yield according to general procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) δ 8.26 (dd, $J = 6.3$, 3.5 Hz, 1H), 7.82 (dd, $J = 6.2$, 3.4 Hz, 1H), 7.63 – 7.59 (m, 2H), 7.54 (s, 1H), 7.27 (t, $J = 7.6$ Hz, 1H), 7.16 (dd, $J = 11.5$, 7.7 Hz, 2H), 7.11 (s, 1H), 6.41 (s, 1H), 3.18 (s, 3H), 2.32 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) δ 170.89, 143.61, 139.24, 138.74, 137.57, 135.98, 133.01, 129.87, 128.83, 128.74, 128.51, 127.52, 126.67, 125.50, 124.16, 120.07, 119.69, 81.34, 21.35, 12.53.

HRMS m/z (ESI) Calcd for C$_{20}$H$_{16}$O$_2$Na [M+Na$^+$], 311.1043, found 311.1041.

9-methyl-3-(o-tolyl)naphtho[2,3-c]furan-1(3H)-one (2t)

Compound 2t was obtained as a white solid in 68% yield according to general procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) δ 8.29 (dd, $J = 6.2$, 3.5 Hz, 1H), 7.84 (dd, $J = 6.2$, 3.4 Hz, 1H), 7.66 – 7.60 (m, 2H), 7.56 (s, 1H), 7.27 (t, $J = 4.1$ Hz, 2H), 7.13 (dd, $J = 8.3$, 4.5 Hz, 1H), 7.02 (d, $J = 7.7$ Hz, 1H), 6.74 (s, 1H), 3.19 (s, 3H), 2.53 (s, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) δ 170.93, 143.10, 139.36, 137.09, 135.93, 135.29, 133.05, 131.08, 129.18, 128.85, 128.58, 127.55, 126.72, 126.37, 125.56, 120.81, 119.75, 79.10, 19.45, 12.55.

HRMS m/z (ESI) Calcd for C$_{20}$H$_{16}$O$_2$Na [M+Na$^+$], 311.1043, found 311.1041.
3-phenyl-9-propynaphtho[2,3-c]furan-1(3H)-one (2y)

Compound 2y was obtained as a white solid in 78% yield according to general procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.29 (dd, $J = 6.3$, 3.6 Hz, 1H), 7.85 – 7.81 (m, 1H), 7.64 – 7.57 (s, 2H), 7.56 (s, 1H), 7.45 – 7.28 (m, 5H), 6.46 (d, $J = 0.6$ Hz, 1H), 3.77 – 3.66 (dd, $J = 15.1$, 7.6 Hz, 2H), 1.12 (t, $J = 7.3$ Hz, 3H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.43, 144.18, 143.59, 137.71, 136.39, 132.28, 129.08, 128.96, 128.89, 128.44, 127.04, 126.62, 125.52, 119.84, 119.74, 81.21, 28.07, 24.78, 14.32.

HRMS m/z (ESI) Calcd for C$_{21}$H$_{16}$O$_2$Na [M+Na$^+$], 325.1199, found 325.1195.

3,9-diphenynaphtho[2,3-c]furan-1(3H)-one (2z)

Compound 2z was obtained as a white solid in 84% yield according to general procedure B.

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.90 (d, $J = 8.2$ Hz, 1H), 7.83 (d, $J = 8.5$ Hz, 1H), 7.76 (s, 1H), 7.61 (dd, $J = 11.1$, 3.9 Hz, 1H), 7.57 (m, 3H), 7.53 – 7.35 (m, 8H), 6.53 (s, 1H).

$^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 169.00, 143.61, 142.15, 137.58, 136.33, 134.35, 132.87, 130.17, 130.01, 129.17, 128.94, 128.69, 128.36, 128.27, 128.08, 128.07, 128.03, 127.06, 126.92, 121.38, 119.73, 81.14.

HRMS m/z (ESI) Calcd for C$_{24}$H$_{18}$O$_2$Na [M+Na$^+$], 359.1043, found 359.1048.
4. X-ray of compound 2f

The data can be obtained free of charge from The Cambridge Crystallographic Data Centre (CCDC 1855919) via [www.ccdc.cam.ac.uk/data_request/cif](http://www.ccdc.cam.ac.uk/data_request/cif).

![Ortep drawing of compound 2f.](image)

Figure S1. Ortep drawing of compound 2f.

### Table S1: Crystallographic Details for 2f

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2q

TBSO