Supplementary Information (SI) for Catalysis Science & Technology.
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Supporting information

for

Electrooxidative C–H/O–H Bond Coupling via Ru Catalysis: Access to Phthalides and Naphtho[1,8-bc]furans

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1. General Information

Commercial suppliers like Spectrochem, Alfa Aesar, and Sigma-Aldrich ordered all chemicals and solvents; without further purification/pre-treatment, we used all chemicals. Thin Layer Chromatography (TLC) monitored the reaction working progress, and the product molecular mass was confirmed by Gas Chromatography-Mass Spectroscopy (GC-MS). Here, we use silica gel plates 60F254 with a thickness of 0.25 mm of TLC to examine the compounds. Purification of final compounds, petroleum ether and ethyl acetate as the solvents used in column chromatography with silica gel (60-120 mesh). For the electrochemical reactions, we used a pear-shaped, undivided cell with two platinum electrodes, each measuring 0.5 cm x 1.5 cm, which was utilized. Using a regulated DC power supply from Metrohm Autolab PGSTAT302N, the constant current electrolysis analyses were carried out, and the data were interpreted using Nova 2.0 software. The infrared spectra of the pure product were obtained in attenuated total reflectance (ATR) mode with a PerkinElmer Spectrum FT-IR spectrometer. ^{1}H, ^{13}C NMR, and ^{19}F spectroscopy analyses of the purified product were conducted on an Agilent Technologies spectrophotometer (^{1}H NMR at 500 or 400 MHz, ^{13}C NMR at 125 or 100 MHz) in $CDCl_3$, with TMS as the internal standard. The chemical shift (δ) and coupling constant (J) values were noted in parts per million (ppm) and hertz (Hz), respectively.

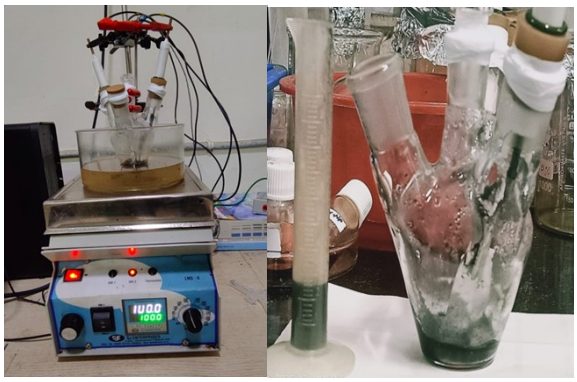


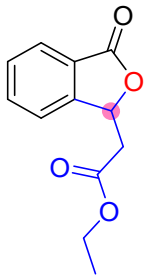
Figure S1: Crude sample obtained after the reaction was completed.

2. Experimental procedure

2.1 Experimental procedure for the synthesis of phthalides[1]

In an oven-dried, pear-shaped, four-necked undivided 100 mL reaction vessel equipped with a magnetic stir bar and fitted with two platinum plates serving as both the anode and cathode, a mixture of substituted benzoic acid (0.5 mmol, 1 equiv), acrylates (1.0 mmol, 2 equiv), KOAc (0.5 mmol), and $[RuCl_2(p\text{-cymene})]_2$ (5 mol%) was added. *n*-Bu_4NPF_6 (0.3 mmol) was used as the supporting electrolyte, and acetonitrile (4–10 mL) was employed as the solvent. The system was sealed, and the reaction mixture was stirred at 100 °C for 6 hours under constant current electrolysis (1.5 mA), and the laboratory room temperature was maintained at 18 °C. After completion, the mixture was allowed to cool to room temperature and was purified by silica gel column chromatography using petroleum ether/ethyl acetate (PE/EA) as the eluent. (In a small reaction vessel was used instead, a condenser was attached to maintain reflux conditions.)

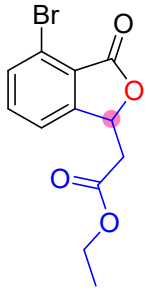
- **Characteristics of the synthesized phthalides**



3a

Ethyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3a)

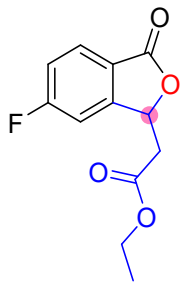
The general procedure was used for benzoic acid (**1a**) and ethyl acrylate (**2a**) to form the product of **3a** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.88 (d, 1H), 7.67 (t, 1H), 7.56 – 7.46 (m, 2H), 5.86 (t, 1H), 4.18 (q, 2H), 2.92 – 2.84 (m, 2H), 1.24 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.90, 169.24, 148.74, 134.29, 129.53, 125.82, 122.08, 77.33, 77.05, 76.82, 61.25, 39.49, 14.08; **IR**(ATR) 2981, 1762, 1732, 1612, 1291, 1210, 1000 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 220(55), 133(92), 145(100).



3b

Ethyl-2-(4-bromo-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3b)

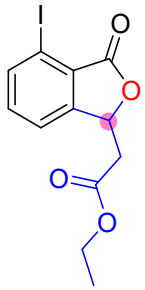
The general procedure was used for 2-bromobenzoic acid (**1b**) and ethyl acrylate (**2a**) to form the product of **3b** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent;**^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.68 (dd, 1H), 7.51 (t, 1H), 7.45 (d, 1H), 5.81 (t, 1H), 4.19 (q, 2H), 2.94 – 2.84 (m, 2H), 1.25 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.06, 167.24, 151.21, 135.21, 134.26, 124.27, 121.11, 77.30, 77.04, 76.79, 75.30, 61.40, 39.36, 14.08; **IR**(ATR) 2924, 1756, 1723, 1597, 1474, 1398, 1189, 1060 cm^{-1}; **GCMS** (EI 70 eV) : m/z = (%) 297(24), 210(61), 223(100).



3c

Ethyl-2-(6-fluoro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3c)

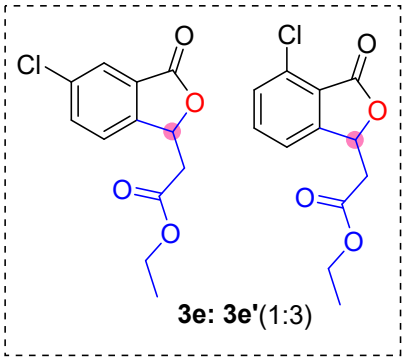
The general procedure was used for 4-fluorobenzoic acid (**1c**) and ethyl acrylate (**2a**) to form the product of **3c** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.91 (dd, 1H), 7.29 – 7.21 (m, 2H), 5.85 (t, 1H), 4.23 (q, 2H), 2.93 (ddd, 2H), 1.29 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.08, 168.70, 151.57, 132.83, 128.20, 117.88, 117.69, 115.76, 115.59, 109.89, 109.69, 77.28, 77.02, 76.77, 76.27, 61.43, 39.21, 14.09; **IR**(ATR) cm^{-1}; 2957, 2924, 1753, 1717, 1597, 1474, 1398, 1189, 1060, 1003; **GCMS** (EI 70 eV): m/z = (%) 238(11), 164(91), 151(100).



3d

Ethyl-2-(4-iodo-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3d)

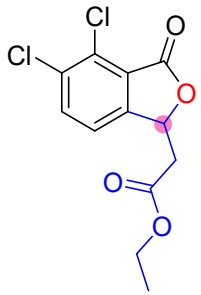
The general procedure was used for 2-iodobenzoic acid (**1d**) and ethyl acrylate (**2a**) to form the product of **3d** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 8.02 (d, 1H), 7.50 (d, 1H), 7.35 (t, 1H), 5.78 (t, 1H), 4.21 (q, 2H), 2.90 (qd, 2H), 1.27 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.11, 167.96, 150.92, 140.94, 134.94, 127.98, 127.04, 121.88, 77.27, 77.02, 76.76, 74.79, 61.42, 39.34, 14.10; **IR**(ATR) 2981, 2936, 1762, 1729, 1594, 1345, 1177, 1009 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 346(67), 272(100), 258(68).



3e: 3e'(1:3)

Ethyl-2-(5-chloro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate/ethyl 2-(4-chloro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3e:3e')

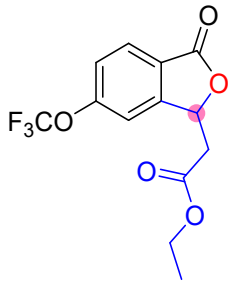
The general procedure was used for 3-chlorobenzoic acid (**1e**) and ethyl acrylate (**2a**) to form the product of 2 regio-isomers **3e : 3e'** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 8.08 (d, 0.33H), 8.00 (d, 0.37H), 7.86 (dd, 1H), 7.66 (d, 1H), 7.54 (t, 1H), 7.43 (t, 0.37H), 5.92 (dd, 1H), 5.87 (t, 0.25H), 4.17 (q, 2H), 3.44 (dd, 1H), 2.92 (ddd, 0.66H), 2.78 (dd, 1H), 1.28 (t, 0.90H), 1.24 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.08, 168.74, 146.93, 145.28, 135.89, 134.68, 134.45, 133.69, 131.25, 130.17, 129.81, 128.60, 128.25, 125.70, 124.31, 123.56, 77.30, 77.04, 76.75, 61.34, 39.24, 36.98, 14.06; **IR**(ATR) 2984, 2933, 1765, 1732, 1642, 1402, 1177, 1009 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 254(13), 180(100), 167(83).



3f

Ethyl-2-(4,5-dichloro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3f)

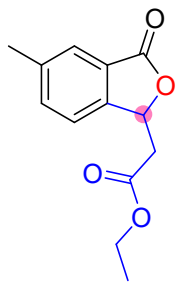
The general procedure was used for 2,3-dichlorobenzoic acid (**1f**) and ethyl acrylate (**2a**) to form the product of **3f** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.76 (d, 1H), 7.39 (d, 1H), 5.80 (t, 1H), 4.21 (q, 2H), 2.92 (ddd, 2H), 1.28 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 168.88 (s), 165.90 (s), 149.23 (s), 135.92 (s), 135.06 (s), 131.78 (s), 124.46 (s), 121.06 (s), 77.28 (s), 77.03 (s), 76.77 (s), 75.06 (s), 61.47 (s), 39.11 (s), 14.08 (s); **IR**(ATR) 2981, 1765, 1723, 1594, 1384, 1183, 1000 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 288(18), 215(100), 145(18).



3g

Ethyl-2-(3-oxo-6-(trifluoromethoxy)-1,3-dihydroisobenzofuran-1-yl)acetate (3g)

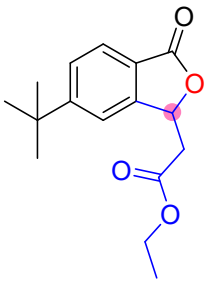
The general procedure was used for 4-(trifluoromethoxy)benzoic acid (**1g**) and ethyl acrylate (**2a**) to the form product of **3g** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 8.15 (d, 1H), 7.95 (d, 1H), 7.39 (d, 1H), 5.88 (t, 1H), 4.22 (q, 2H), 2.94 (ddd, 2H), 1.27 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.02, 168.46, 150.96, 132.20, 127.79, 122.24, 120.25, 114.43, 77.26, 77.01, 76.75, 76.46, 61.50, 39.17, 14.06; **^{19}F NMR** (470 MHz, $CDCl_3$) δ -57.64, -57.71; **IR**(ATR) 2987, 2936, 1771, 1735, 1618, 1381,1159, 1009 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 304(11), 230(100), 217(80).



3h

Ethyl-2-(5-methyl-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3h)

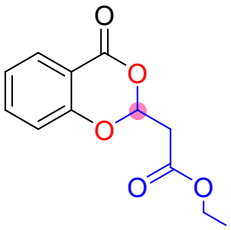
The general procedure was used for 3-methylbenzoic acid (**1h**) and ethyl acrylate (**2a**) to form the product of **3h** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.93 (s, 1H), 7.39 (dt, 2H), 5.85 (t, 1H), 4.13 (dd, 2H), 2.88 (qd, 2H), 1.31 – 1.27 (m, 3H), 1.26 – 1.25 (m, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 171.83, 169.37, 146.15, 138.26, 134.48, 130.65, 128.35, 127.31, 77.27, 76.97, 76.77, 61.26, 60.44, 39.67, 21.24, 14.17; **IR**(ATR) 2970, 1762, 1730, 1614, 1354, 1169, 1006 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 234(5), 160(100), 147(25).



3i

Ethyl-2-(6-(tert-butyl)-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3i)

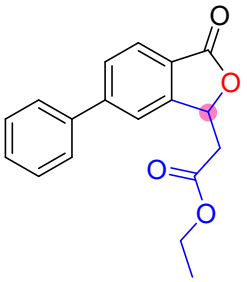
The general procedure was used for 4-(tertbutyl)benzoic acid (**1i**) and ethyl acrylate (**2a**) to form the product of **3i** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 8.04 (d, 1H), 7.83 (d, 1H), 7.60 (d, 1H), 5.87 (t, 1H), 4.23 (q, 2H), 2.91 (dd, 2H), 1.37 (s, 9H), 1.28 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.99, 169.42, 158.78, 149.12, 127.25, 125.41, 123.24, 118.52, 77.29, 77.03, 76.79, 61.25, 39.80, 35.64, 31.21, 14.14; **IR**(ATR) 2963, 2930, 1762, 1735, 1339, 1219, 1174, 1003 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 276(42), 189(59), 202(100).



3j

Ethyl-2-(4-oxo-4H-benzo[d][1,3]dioxin-2-yl)acetate (3j)

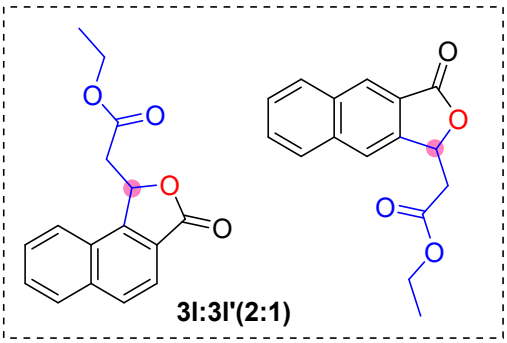
The general procedure was used for 2-hydroxybenzoic acid (**1j**) and ethyl acrylate (**2a**) to form the product of **3j** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.56 (t, 1H), 7.29 (s, 1H), 6.96 (t, 2H), 5.90 (t, 1H), 4.22 (q, 2H), 2.91 (d, 2H), 1.28 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 171.41, 169.12, 156.50, 149.01, 137.17, 115.97, 113.37, 110.91, 78.23, 77.33, 77.07, 76.82, 61.35, 39.34, 14.08; **IR**(ATR) 2927, 1744, 1459, 1186, 1078 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 236(15), 221(100), 191(6).



3k

Ethyl-2-(3-oxo-6-phenyl-1,3-dihydroisobenzofuran-1-yl)acetate (3k)

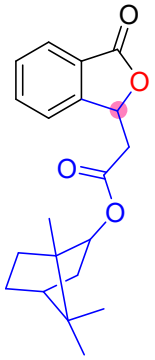
The general procedure was used for 4-phenylbenzoic acid (**1k**) and ethyl acrylate (**2a**) to form the product of **3k** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, DMSO-d_6) δ 8.06 – 8.03 (m, 1H), 7.92 – 7.89 (m, 1H), 7.82 – 7.72 (m, 3H), 7.56 – 7.42 (m, 3H), 5.97 (dd, 1H), 4.11 (q, 2H), 3.40 (dd, 1H), 2.91 (dd, 1H), 1.16 (t, 3H); **^{13}C NMR** (126 MHz, DMSO-d_6) δ 169.81, 167.59, 150.37, 146.54, 139.30, 130.39, 129.56, 127.75, 127.31, 125.80, 121.35, 77.64, 60.82, 40.43, 40.27, 40.10, 39.93, 39.77, 39.60, 39.43, 38.76, 14.43; **IR**(ATR) 2934, 1765, 1428, 1163, 1012 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 296(26), 209(36), 222(100).



3l:3l'(2:1)

Ethyl-2-(3-oxo-1,3-dihydronaphtho[1,2-c]furan-1-yl)acetate/ethyl-2-(3-oxo-1,3-dihydronaphtho[2,3-c]furan-1-yl)acetate (3l: 3l')

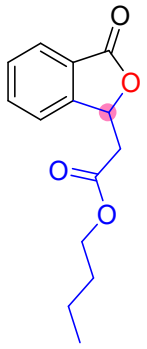
The general procedure was used for 2-naphthoic acid (**1l**) and ethyl acrylate (**2a**) to form the product of 2 regio-isomers **3l: 3l'** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 8.71 (s, 0.36H), 8.49 (s, 0.63H), 8.14 – 7.85 (m, 6H), 7.76 – 7.52 (m, 4H), 6.31 (dd, 0.42H), 6.05 (t, 0.80H), 4.24 (dd, 2H), 3.38 (dd, 0.59H), 3.01 (qd, 2H), 2.75 (dd, 0.59H), 1.29 (t, 2.59H), 1.27 – 1.25 (m, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.30, 142.44, 136.24, 133.29, 132.04, 130.86, 129.89, 129.57, 129.09, 128.60, 128.34, 128.03, 127.79, 127.18, 126.75, 126.51, 125.38, 123.51, 121.12, 120.53, 77.26, 77.00, 76.75, 61.27, 40.13, 14.12; **IR**(ATR) 2924, 1759, 1720, 1633, 1381, 1291, 1171, 1000 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 270(21), 196(100), 182(40).



3m

1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl 2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3m)

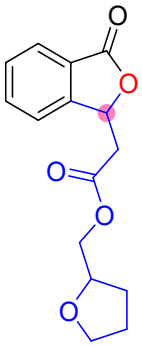
The general procedure was used for benzoic acid (**1a**) and 1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl acrylate (**2b**) to form the product of **3m** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **1H NMR** (500 MHz, CDCl3) δ 8.09 (d, 1H), 7.89 (d, 1H), 7.67 (t, 1H), 7.55 – 7.48 (m, 1H), 5.86 (dd, 1H), 4.76 (ddd, 1H), 2.90 – 2.80 (m, 2H), 1.85 – 1.76 (m, 2H), 1.73 (dd, 1H), 1.69 – 1.64 (m, 1H), 1.58 – 1.51 (m, 1H), 1.18 – 1.11 (m, 1H), 1.10 – 1.03 (m, 1H), 0.92 (s, 3H), 0.82 (dd, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.95, 168.80, 148.78, 134.27, 130.10, 129.53, 128.42, 125.82, 122.06, 82.19, 77.33, 77.10, 76.82, 48.76, 46.91, 44.93, 39.91, 38.65, 33.63, 26.95, 20.03, 19.84, 11.49; **IR**(ATR) 2954, 1765, 1729, 1600, 1390,1288, 1171, 1006 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 328(12), 193(11), 147(3), 133(100).



3n

Butyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3n)

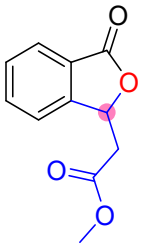
The general procedure was used for benzoic acid (**1a**) and butyl acrylate (**2c**) to form the product of **3n** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.92 (d, 1H), 7.70 (dd, 1H), 7.59 – 7.49 (m, 2H), 5.90 (t, 1H), 4.17 (t, 2H), 2.92 (qd, 2H), 1.65 – 1.59 (m, 2H), 1.41 – 1.33 (m, 2H), 0.93 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.87, 169.31, 148.77, 134.25, 129.52, 125.82, 122.05, 77.27, 77.00, 76.76, 65.16, 39.52, 30.48, 19.03, 13.63; **IR**(ATR) 2927, 1747, 1726, 1633, 1462, 1372, 1165, 1000 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 248(2), 133(100), 147(66).



3o

(tetrahydrofuran-2-yl)methyl 2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3o)

The general procedure was used for benzoic acid (**1a**) and (tetrahydrofuran-2-yl)methyl acrylate (**2d**) to form the product of **3o** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.92 (d, 1H), 7.69 (t, 1H), 7.60 – 7.50 (m, 2H), 5.91 (t, 1H), 4.28 – 4.23 (m, 1H), 4.14 – 4.10 (m, 2H), 3.90 – 3.86 (m, 1H), 3.80 (dd, 1H), 3.02 – 2.91 (m, 2H), 2.06 – 1.99 (m, 1H), 1.95 – 1.89 (m, 2H), 1.61 (dt, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.84, 169.19, 148.66, 134.31, 129.56, 125.84, 122.12, 77.30, 77.12 – 76.64, 76.24, 68.45, 67.14, 39.44, 27.90, 25.63; **IR**(ATR) 2957, 1765, 1732, 1615, 1288, 1168, 1000 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 276(1), 133(6), 173(100), 147(17).



3p

Methyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (3p)

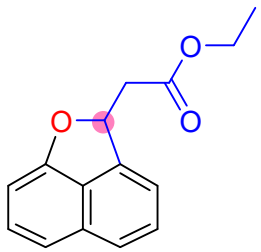
The general procedure was used for benzoic acid (**1a**) and methyl acrylate (**2e**) to form the product of **3p** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.92 (d, 1H), 7.70 (t, 1H), 7.59 – 7.51 (m, 2H), 5.90 (t, 1H), 3.77 (s, 3H), 2.92 (dd, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.76, 148.66, 134.31, 129.58, 125.83, 122.06, 77.30, 77.20, 76.64, 52.20, 39.33; **IR**(ATR) 2924, 1759, 1732, 1615, 1441, 1288, 1168, 1000 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 206(11), 146(100).

2.2 Experimental procedure for the synthesis of naphthofuran[2]

In an oven-dried, pear-shaped, four-necked undivided 100 mL reaction vessel equipped with a magnetic stir bar and fitted with two platinum plates serving as both the anode and cathode, a mixture of 0.5 mmol of 1-naphthol (1 equiv), 1 mmol of acrylates (2 equiv), *n*-Bu_4NPF_6 as electrolyte 0.3 mmol, KOAc as base as 0.5 mmol and $[RuCl_2(p\text{-cymene})]_2$ as catalyst 5 mol% were added. The reaction mixture was stirred with acetonitrile (CH_3CN) as solvent, 4-10 mL. The system was sealed, and the reaction mixture was stirred at 100 °C for 6 hours under constant current electrolysis (1.5 mA).The reaction was carried out under air-conditioned conditions, with the laboratory room temperature maintained at 18 °C. After completion, the

mixture was allowed to cool to room temperature and was purified by silica gel column chromatography using petroleum ether/ethyl acetate (PE/EA) as the eluent.

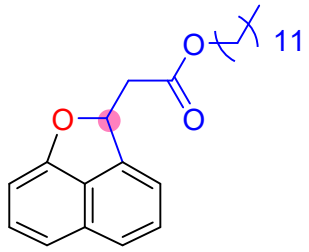
- **Characteristics of the synthesized naphtho[1,8-bc]furan**



5a

Ethyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (5a)

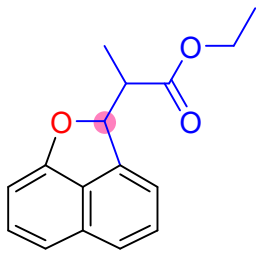
The general procedure was used for 1-naphthol (**4a**) and ethyl acrylate (**2a**) to form the product of **5a** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.66 (d, 1H), 7.52 – 7.47 (m, 1H), 7.42 – 7.37 (m, 1H), 7.26 (d, 1H), 7.21 (d, 1H), 6.71 (d, 1H), 6.41 – 6.31 (m, 1H), 4.25 (dd, 2H), 2.97 (ddd, 2H), 1.28 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 170.00, 160.32, 140.63, 131.76, 129.70, 128.59, 128.07, 123.61, 115.79, 115.58, 101.09, 84.51, 77.27, 77.01, 76.76, 61.04, 40.96, 14.16; **IR**(ATR) 2891, 1732, 1597, 1465, 1372, 1153, 973 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 242(54), 213(23), 196(10), 155 (100)



5b

Dodecyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (5b)

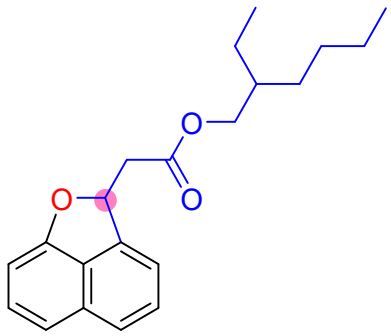
The general procedure was used for 1-naphthol (**4a**) and lauryl acrylate (**2f**) to form the product of **5b** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.68 (d, 1H), 7.56 – 7.48 (m, 1H), 7.42 (t, 1H), 7.29 (d, 1H), 7.23 (d, 1H), 6.75 (d, 1H), 6.39 (t, 1H), 4.22 (t, 2H), 3.01 (ddd, 2H), 1.66 (dd, 2H), 1.33 (d, 18H), 0.94 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 170.05, 160.38, 140.69, 131.81, 129.71, 128.58, 128.11, 123.61, 115.79, 115.59, 101.10, 84.55, 77.39, 77.14, 76.88, 65.23, 40.93, 31.96, 29.85, 29.18, 28.58, 25.91, 22.74, 14.18, **IR**(ATR) 2924, 1735, 1594, 1489, 1378, 1168, 973 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 382(45), 213(100), 168(46), 155(60).



5c

Ethyl-2-(2H-naphtho[1,8-bc]furan-2-yl)propanoate (5c)

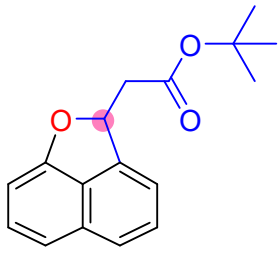
The general procedure was used for 1-naphthol (**4a**) and 2-ethylmethyl acrylate (**2g**) to form the product of **5c** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.66 (d, 1H), 7.51 – 7.45 (m, 1H), 7.39 (t, 1H), 7.25 (d, 1H), 7.15 (d, 1H), 6.71 (d, 1H), 6.28 (d, 1H), 4.25 (q, 2H), 3.04 – 2.95 (m, 1H), 1.19 (t, 3H), 0.88 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 173.14, 160.79, 131.69, 129.65, 128.56, 123.59, 115.93, 115.48, 100.81, 77.26, 77.01, 76.76, 60.97, 45.30, 14.16, 11.56; **IR**(ATR) 2955,1730, 1596, 1465, 1375, 1170, 976 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 256(20), 182(15), 155(100), 127(16).



5d

2-ethylhexyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (5d)

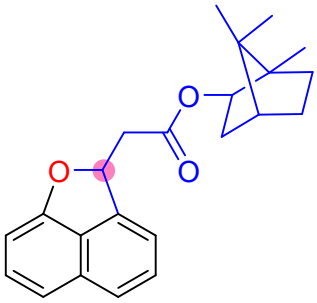
The general procedure was used for 1-naphthol (**4a**) and 2-ethylhexyl acrylate (**2h**) to form the product of **5d** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.64 (d, 1H), 7.51 – 7.45 (m, 1H), 7.38 (t, 1H), 7.25 (d, 1H), 7.19 (d, 1H), 6.70 (d, 1H), 6.37 – 6.32 (m, 1H), 4.15 – 4.07 (m, 2H), 2.98 (ddd, 2H), 1.57 (dd, 1H), 1.36 – 1.27 (m, 8H), 0.91 – 0.87 (m, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 170.21, 160.36, 140.67, 131.79, 129.71, 128.59, 128.09, 123.61, 115.76, 115.58, 101.09, 84.55, 67.47, 40.96, 38.68, 30.30, 28.89, 23.71, 22.97, 14.08; **IR**(ATR) 2930, 1732, 1596, 1465, 1372, 1168, 976 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 326(26), 213(100), 168(31), 155(62).



5e

Tert-butyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (5e)

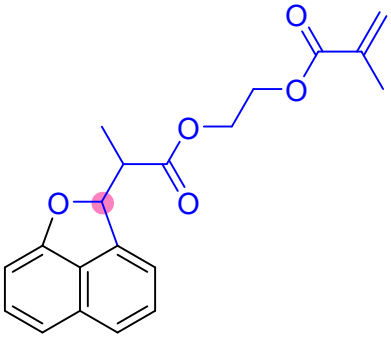
The general procedure was used for 1-naphthol (**4a**) and tert-butyl acrylate (**2i**) to form the product of **5e** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.65 (d, 1H), 7.51 – 7.47 (m, 1H), 7.39 (t, 1H), 7.25 (t, 1H), 7.21 (d, 1H), 6.71 (d, 1H), 6.30 (t, 1H), 2.92 (ddd, 2H), 1.43 (s, 9H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.17, 160.53, 140.91, 131.75, 129.66, 128.56, 128.21, 123.45, 115.76, 115.44, 100.99, 84.77, 81.46, 77.27, 77.02, 76.76, 41.98, 28.00; **IR**(ATR) 2981, 1729, 1594, 1492, 1369, 1150, 906 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 270(45), 213(76), 168(80), 155(100).



5f

1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (5f)

The general procedure was used for 1-naphthol (**4a**) and 1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl acrylate (**2b**) to form the product of **5f** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.65 (d, 1H), 7.49 (t, 1H), 7.39 (t, 1H), 7.28 – 7.24 (m, 1H), 7.20 (d, 1H), 6.70 (d, 1H), 6.34 (d, 1H), 4.82 (ddd, 1H), 3.02 – 2.89 (m, 2H), 1.90 – 1.79 (m, 2H), 1.76 (dd, 1H), 1.73 – 1.68 (m, 1H), 1.62 – 1.54 (m, 1H), 1.23 – 1.16 (m, 1H), 1.15 – 1.07 (m, 1H), 0.94 (d, 3H), 0.88 (d, 3H), 0.84 (d, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.54, 160.37, 140.72, 131.78, 129.71, 128.59, 128.06, 123.59, 115.79, 115.54, 101.08, 84.64, 81.78, 77.32, 77.07, 76.81, 48.73, 46.95, 45.01, 41.34, 38.71, 33.68, 27.02, 20.09, 19.86, 11.51, **IR**(ATR) 2954, 1726, 1597, 1465, 1375, 1165, 976 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 350(5), 155 (50), 81(100).

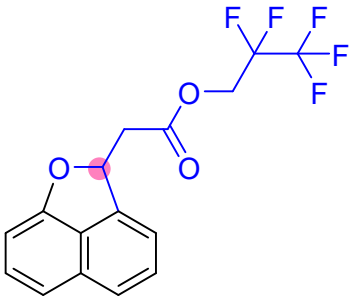


5g

2-((2-(2H-naphtho[1,8-bc]furan-2-yl)propanoyl)oxy)ethyl methacrylate (5g)

The general procedure was used for 1-naphthol (**4a**) and ethane-1,2-diyl bis(2-methylacrylate) acrylate (**2j**) to form the product of **5g** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.65 (d, 1H), 7.47 (dd, 1H), 7.41 – 7.35 (m, 1H), 7.25 (d, 1H), 7.17 (dd, 1H), 6.69 (t, 1H), 6.27 (dd, 1H), 6.14 (s, 1H), 5.59 (d, 1H), 4.49 – 4.44 (m, 2H), 4.40 – 4.35 (m, 2H), 3.10 – 2.99 (m, 1H), 1.94 (s, 3H),

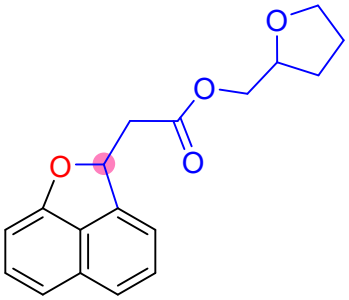
1.18 (d, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 172.85, 167.08, 160.76, 139.59, 135.84, 131.70, 129.69, 128.58, 126.17, 123.67, 115.89, 115.55, 100.83, 88.44, 77.27, 77.02, 76.76, 62.58, 62.24, 45.15, 18.27, 11.27; **IR**(ATR) 2930,1725,1599, 1465, 1370, 1157, 933 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 340(15), 182(75), 155(100), 113(55).



5h

2,2,3,3,3-pentafluoropropyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (5h)

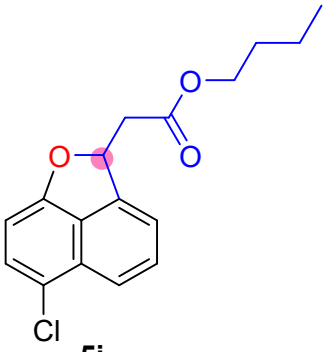
The general procedure was used for 1-naphthol (**4a**) and 2,2,3,3,3-pentafluoropropyl acrylate (**2k**) to form the product of **5h** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.67 (d, 1H), 7.51 – 7.47 (m, 1H), 7.40 (t, 1H), 7.27 (d, 1H), 7.19 (d, 1H), 6.72 (d, 1H), 6.34 (t, 1H), 4.65 (dq, 2H), 3.07 (t, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 168.47, 160.10, 139.93, 131.79, 129.78, 128.62, 127.94, 123.89, 115.79, 101.29, 83.74, 77.28, 77.02, 76.77, 59.45, 40.30; **IR**(ATR) 2930, 1759, 1597, 1489, 1372 1198, 973 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 346(31), 168(33), 155(100), 127(20).



5i

(tetrahydrofuran-2-yl)methyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (5i)

The general procedure was used for 1-naphthol (**4a**) and (tetrahydrofuran-2-yl)methyl acrylate (**2d**) to form the product of **5i** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.66 (d, 1H), 7.51 – 7.46 (m, 1H), 7.39 (t, 1H), 7.28 – 7.25 (m, 1H), 7.21 (d, 1H), 6.71 (d, 1H), 6.40 – 6.33 (m, 1H), 4.32 – 4.26 (m, 1H), 4.18 – 4.10 (m, 2H), 3.89 (dt, 1H), 3.80 (dd, 1H), 3.09 – 2.96 (m, 2H), 2.00 (ddd, 1H), 1.95 – 1.86 (m, 2H), 1.65 – 1.59 (m, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.97, 160.28, 140.50, 131.76, 129.69, 128.62, 128.03, 123.63, 115.84, 115.60, 101.12, 84.42, 77.31, 77.05, 76.80, 76.36, 68.48, 66.96, 40.84, 27.94, 25.67; **IR**(ATR) 2954, 1735, 1597, 1492, 1375, 1168, 904 cm^{-1} ; **GCMS** (EI 70 eV) : m/z = (%) 298 (25), 213(15), 168(100), 155(39).

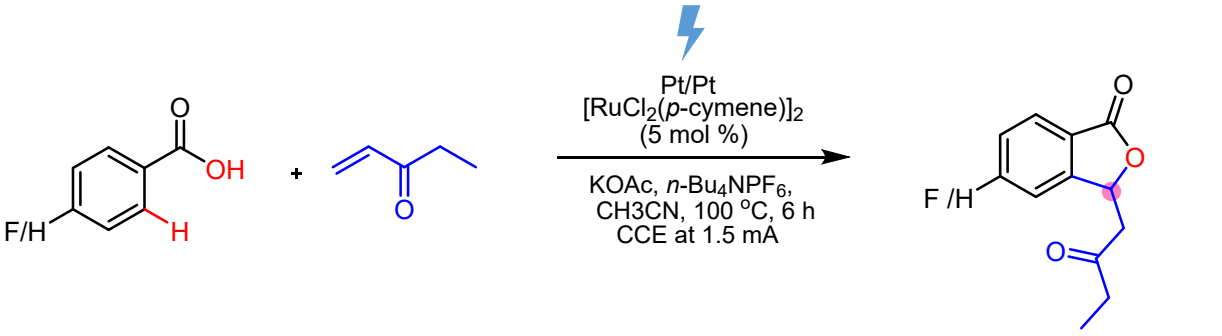


5j

Butyl-2-(6-chloro-2H-naphtho[1,8-bc]furan-2-yl)acetate (5j)

The general procedure was used for 1-naphthol (**4b**) and butyl acrylate (**2c**) to form the product of **5j** and separated by silica gel chromatography using petroleum ether and ethyl acetate as eluent; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.82 (d, 1H), 7.61 – 7.56 (m, 1H), 7.39 (d, 1H), 7.26 (d, 1H), 6.62 (d, 1H), 6.35 (t, 1H), 4.18 (t, 2H), 2.97 (ddd, 2H), 1.63 – 1.57 (m, 2H), 1.35 (dq, 2H), 0.92 (t, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.87, 159.34, 140.79, 129.46, 128.91, 121.24, 119.34, 116.78, 101.52, 85.26, 77.31, 77.06, 76.80, 65.04, 40.71, 30.54, 19.07, 13.68; **IR**(ATR) 2960, 1732, 1597, 1462, 1366, 1165, 976 cm^{-1}; **GCMS** (EI 70 eV): m/z = (%) 304(66), 247(100), 168(55), 139(47).

3. Competitive analysis

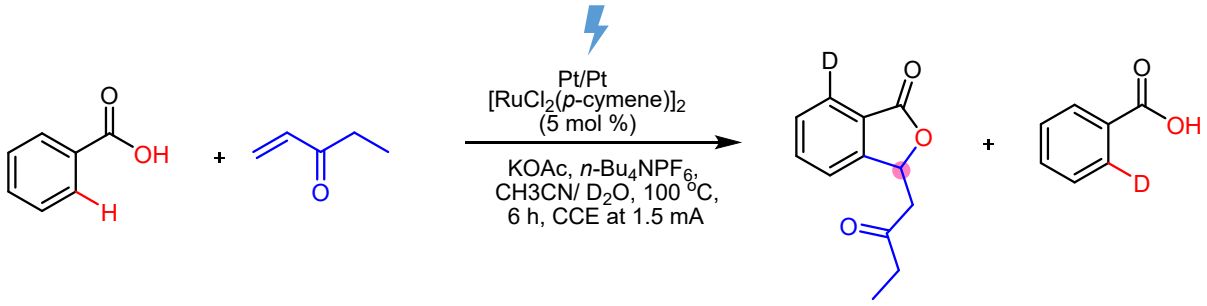


1a/1c **2a** **3a-51 % & 3c-73 %**

In an oven-dried pear-shaped four-necked undivided container with a magnetic stir-bar and fitted with two platinum plates as both anode and cathode, 0.5 mmol of benzoic acid (**1a**, 1 equiv), 4-fluorobenzoic acid (**1c**, 1 equiv), 1 mmol of acrylates (2 equiv), *n*-Bu_4NPF_6 as electrolyte 0.3 mmol, KOAc as base of 0.5 mmol and $[RuCl_2(p\text{-cymene})]_2$ as catalyst 5 mol% were added. The reaction mixture was stirred with acetonitrile (CH_3CN) as solvent, 10 ml, at 100 °C for 6 h. Maintained the electrolysis at a constant current of 1.5 mA during the reaction. When the reaction was completed, the purified **3a** (51 %) and **3c** (73 %) products were separated by silica gel column chromatography using PE/EA.

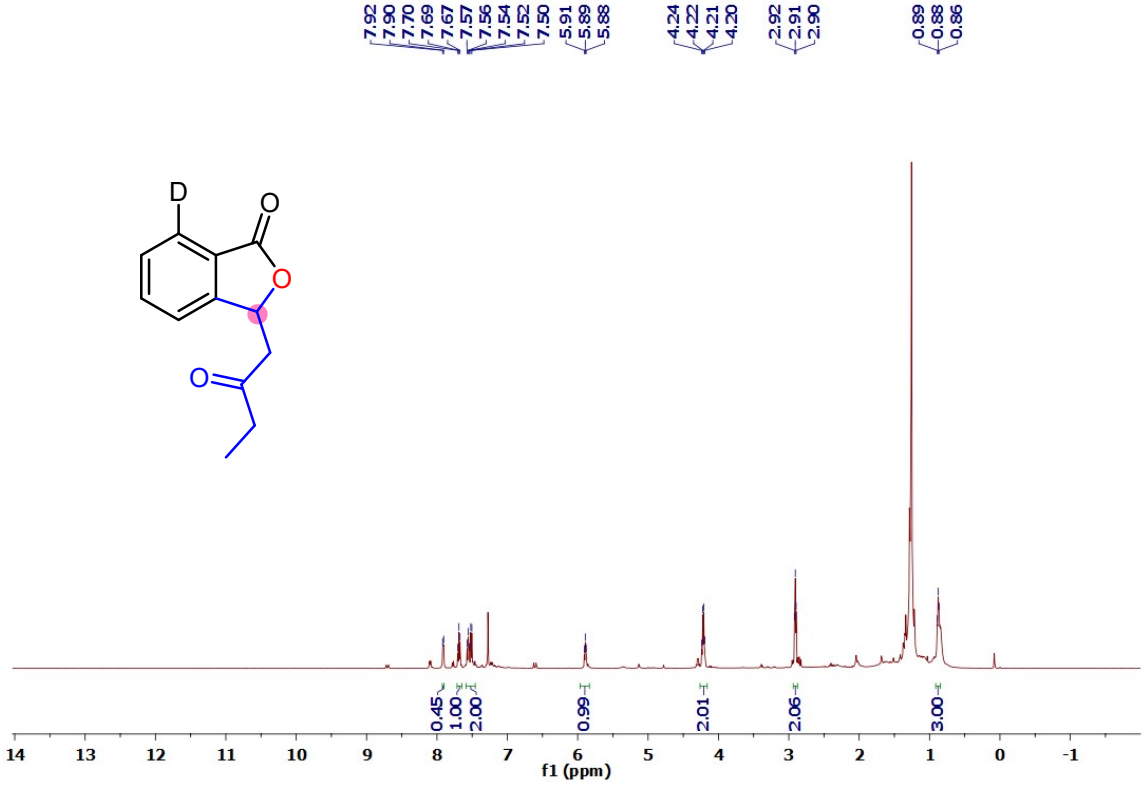
4. D_2O study

a) H/D exchange study of benzoic acid with acrylate

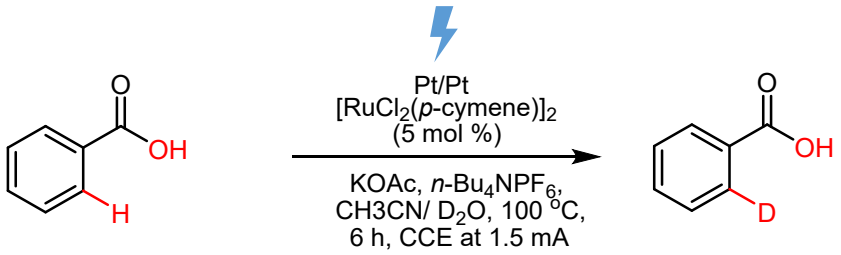


1a **2a** **3a-D,** 55 % **1a-D,** 0 %

In an oven-dried pear-shaped four-necked undivided container with a magnetic stir-bar and fitted with two platinum plates with (0.5 cm^3 X 1.0 cm^3) as both anode and cathode, 0.5 mmol of benzoic acid (**1a**, 1 equiv), 1 mmol of acrylates (**2a**, 2 equiv), *n*-Bu_4NPF_6 as electrolyte 0.3 mmol, KOAc as base of 0.5 mmol and $[RuCl_2(p\text{-cymene})]_2$ as catalyst 5 mol% were added. The reaction mixture was stirred with acetonitrile (CH_3CN) as solvent, 10 ml, at 100 °C for 6 h. Maintained the electrolysis at a constant current of 1.5 mA during the reaction. When the reaction was completed, the purified product **3a-D** (55 %) was separated by silica gel column chromatography using PE/EA.



b) H/D exchange study of benzoic acid without acrylate



1a **1a-D,** 0 %

In an oven-dried pear-shaped four-necked undivided container with a magnetic stir-bar and fitted with two platinum plates as both anode and cathode, 0.5 mmol of benzoic acid (**1a**, 1 equiv), *n*-Bu_4NPF_6 as electrolyte 0.3 mmol, KOAc as base of 0.5 mmol and [$RuCl_2$(*p*-cymene)]$_2$ as catalyst 5 mol% were added. The reaction mixture was stirred with acetonitrile (CH_3CN) as solvent, 10 ml, at 100 °C for 6 h. Maintained the electrolysis at a constant current of 1.5 mA during the reaction. When the reaction was completed, the final product was confirmed by GC-MS spectroscopy.

5. Cyclic Voltammetry

The cyclic voltammetry was carried out with a Metrohm Autolab PGSTAT302N workstation, and the following data analysis was interpret with Nova 2.0 software. A glassy-carbon electrode (3mm diameter, disc-electrode) was used as the working electrode, a Pt wire was used as the counter electrode and a Ag/Ag+ electrode was used as a reference electrode. The measurements were carried out at a scan rate of 100 mVs–1

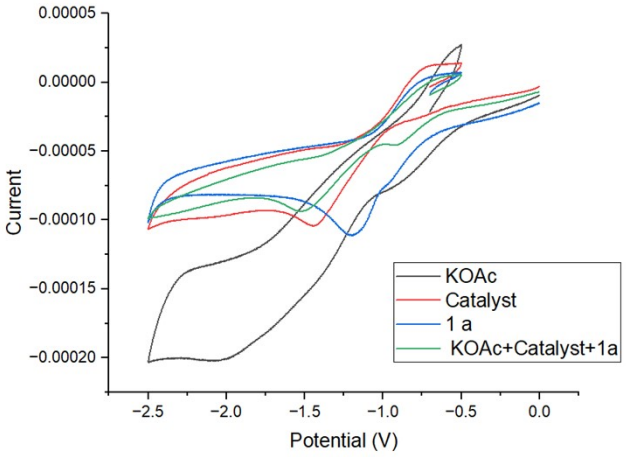
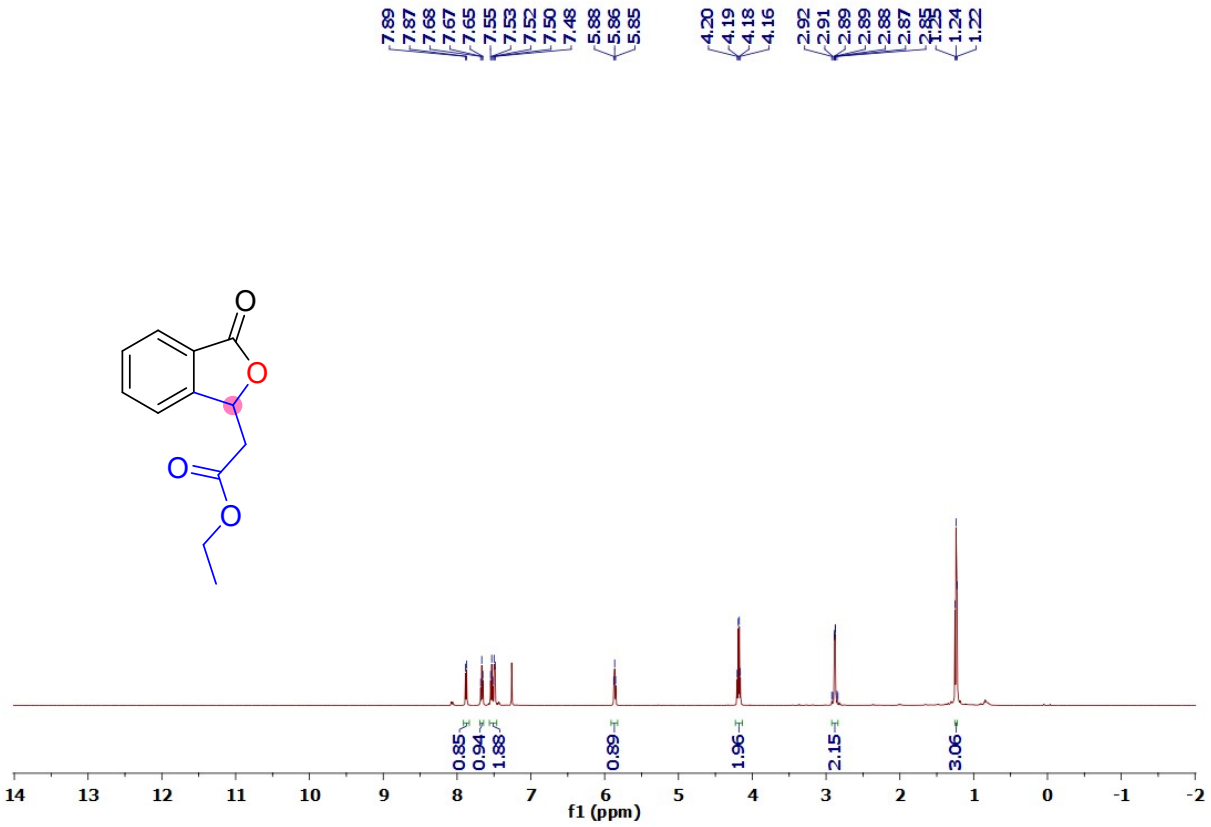


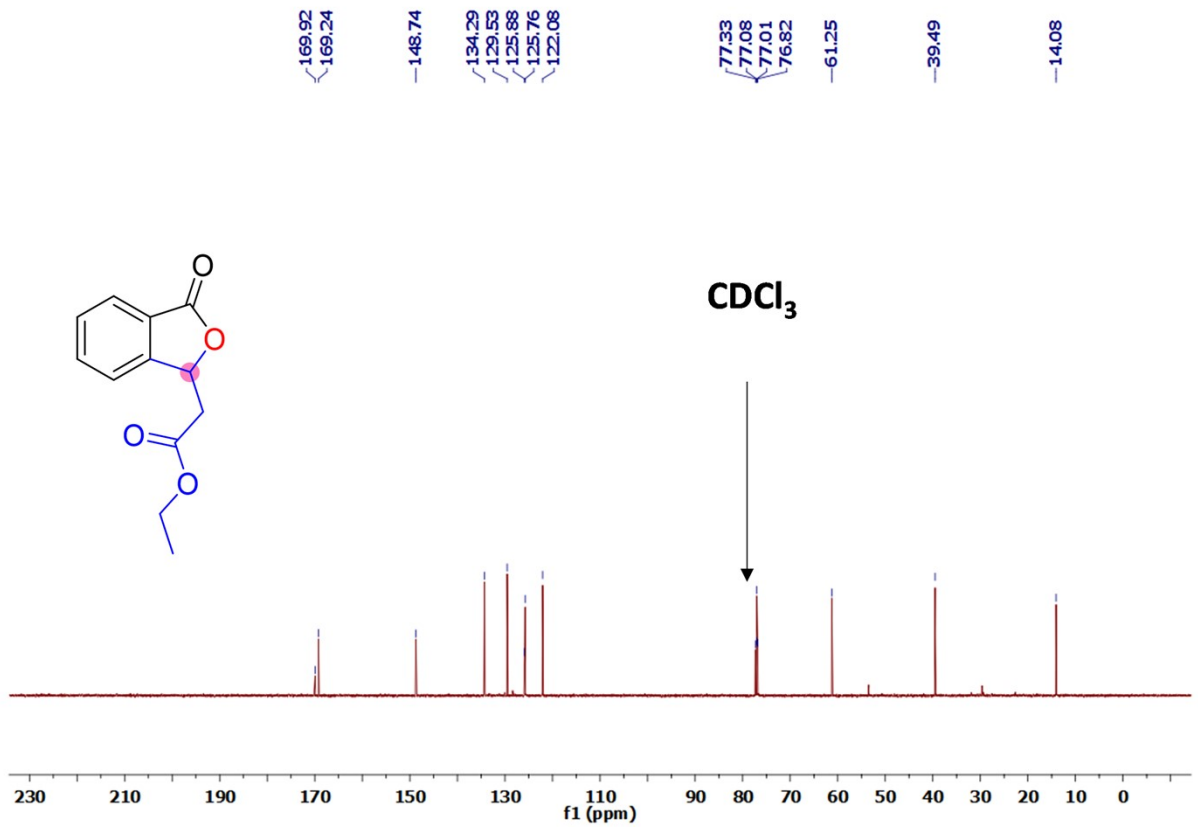
Figure 2: Cyclic voltammograms at 100 mVs-1 in CH_3CN. *n*-Bu_4NPF_6 (0.1 M in CH_3CN), concentrations of **1a** 3.0 mM, Catalyst 1.5 mM, KOAc 12 mM. (black) KOAc, (red) catalyst, (blue) **1a**, (green) KOAc+Catalyst+**1a**.

6. NMR Spectroscopy

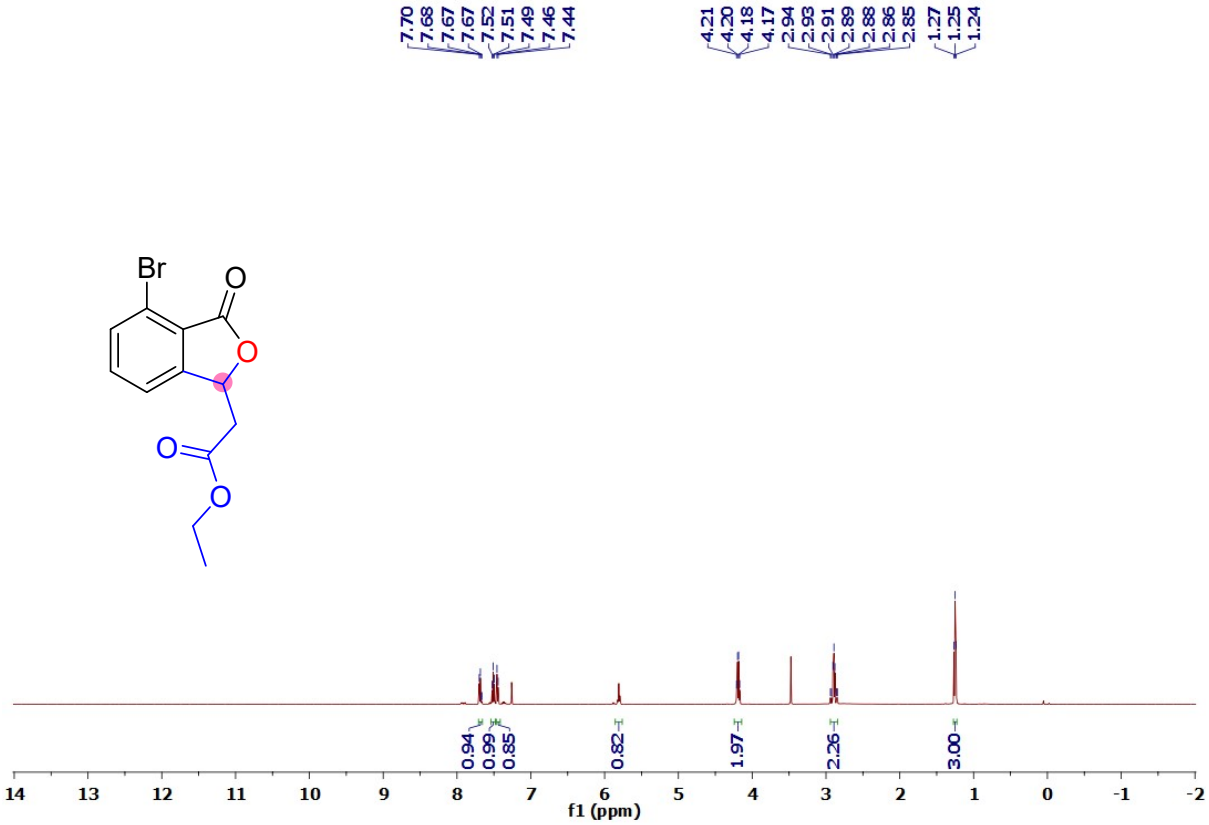
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3a**)



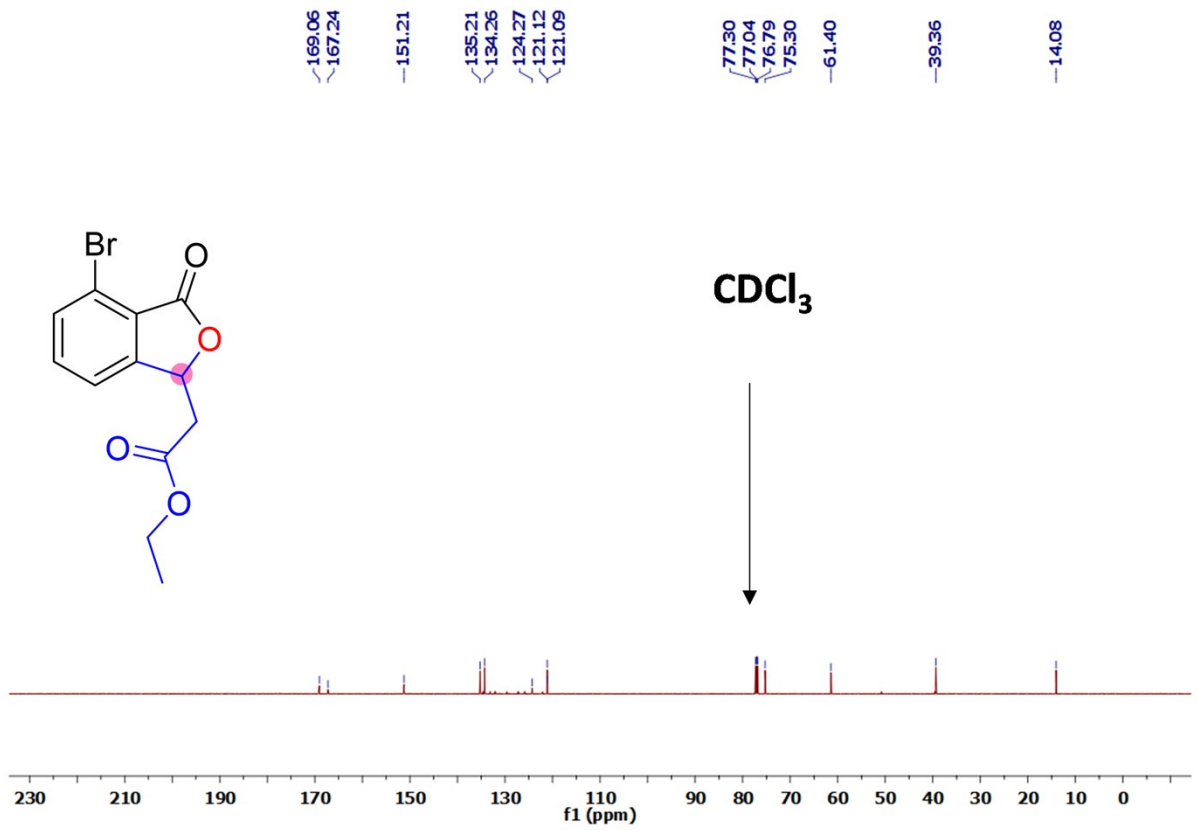
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3a**)



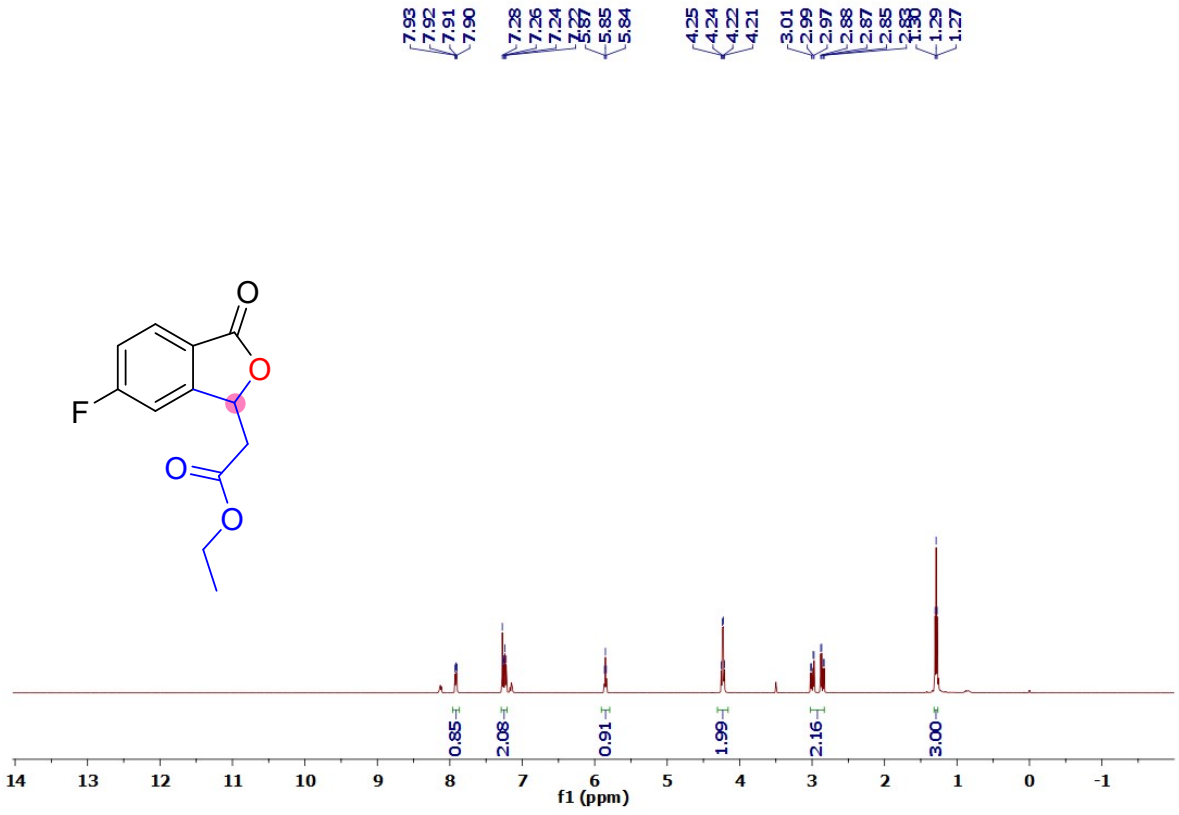
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(4-bromo-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3b**)



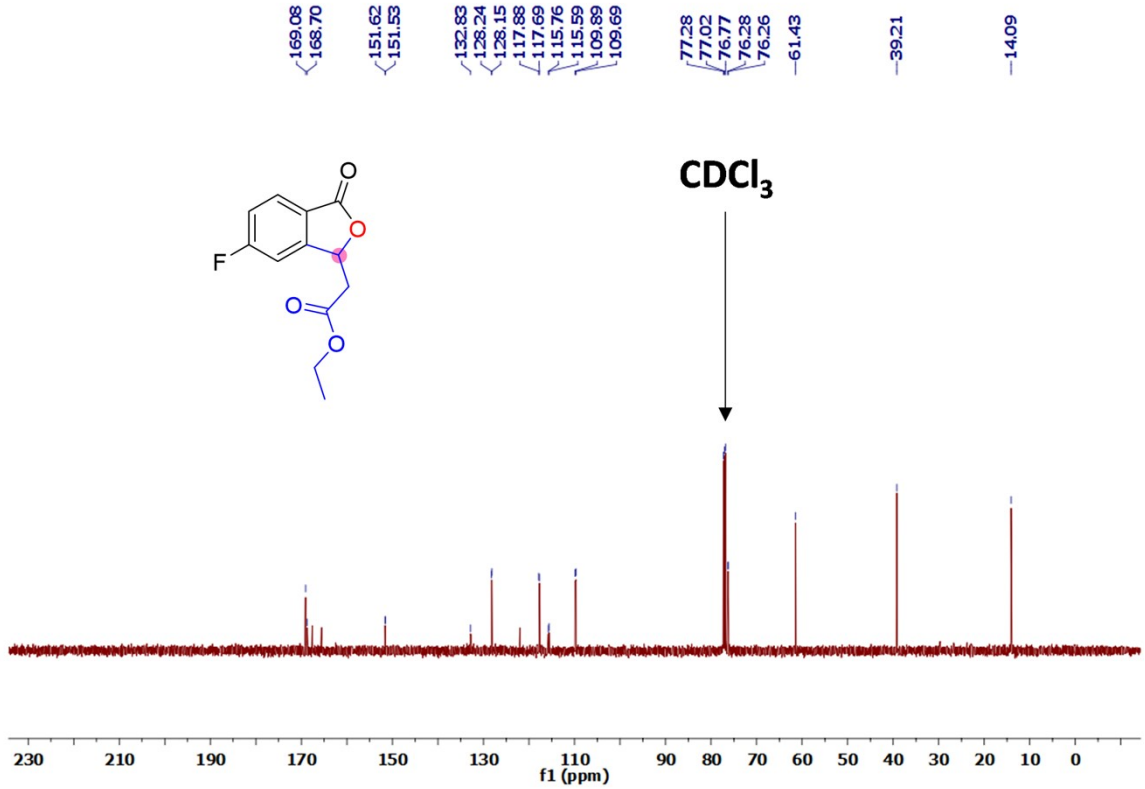
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(4-bromo-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3b**)



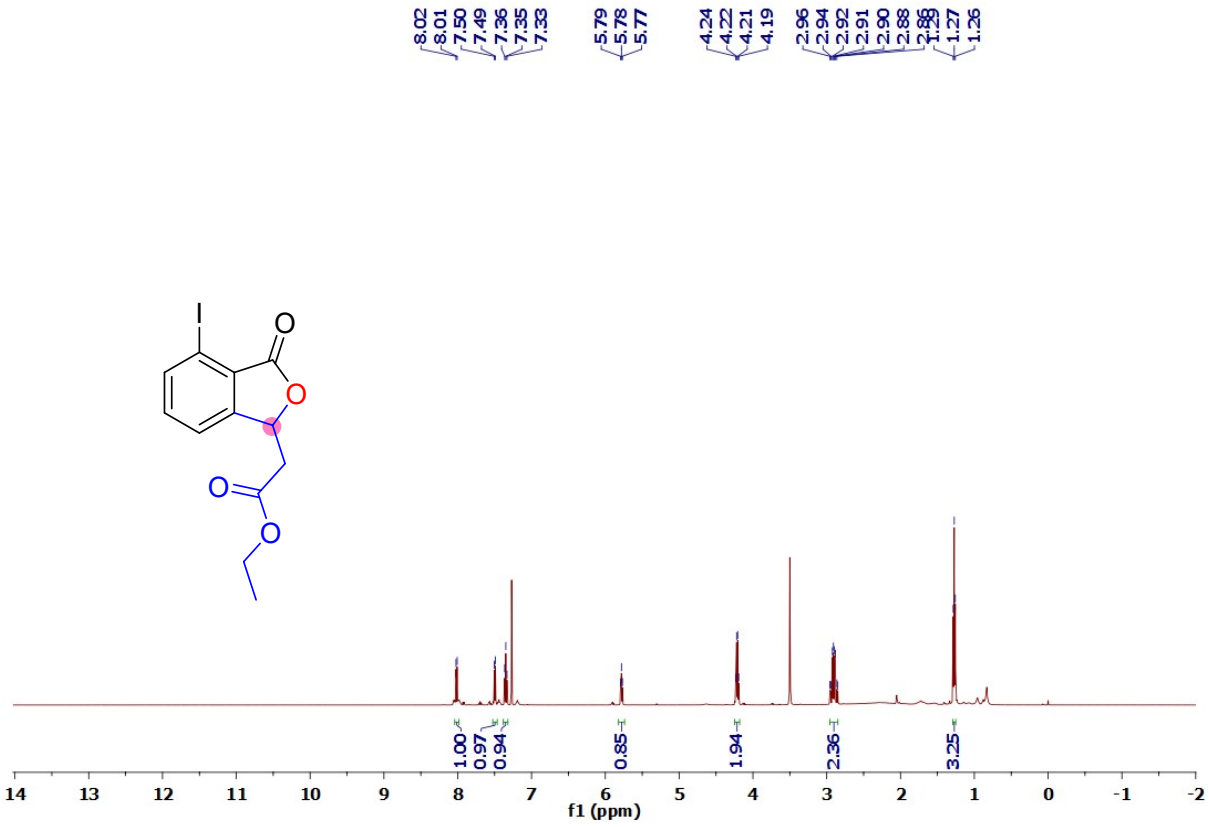
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(6-fluoro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3c**)



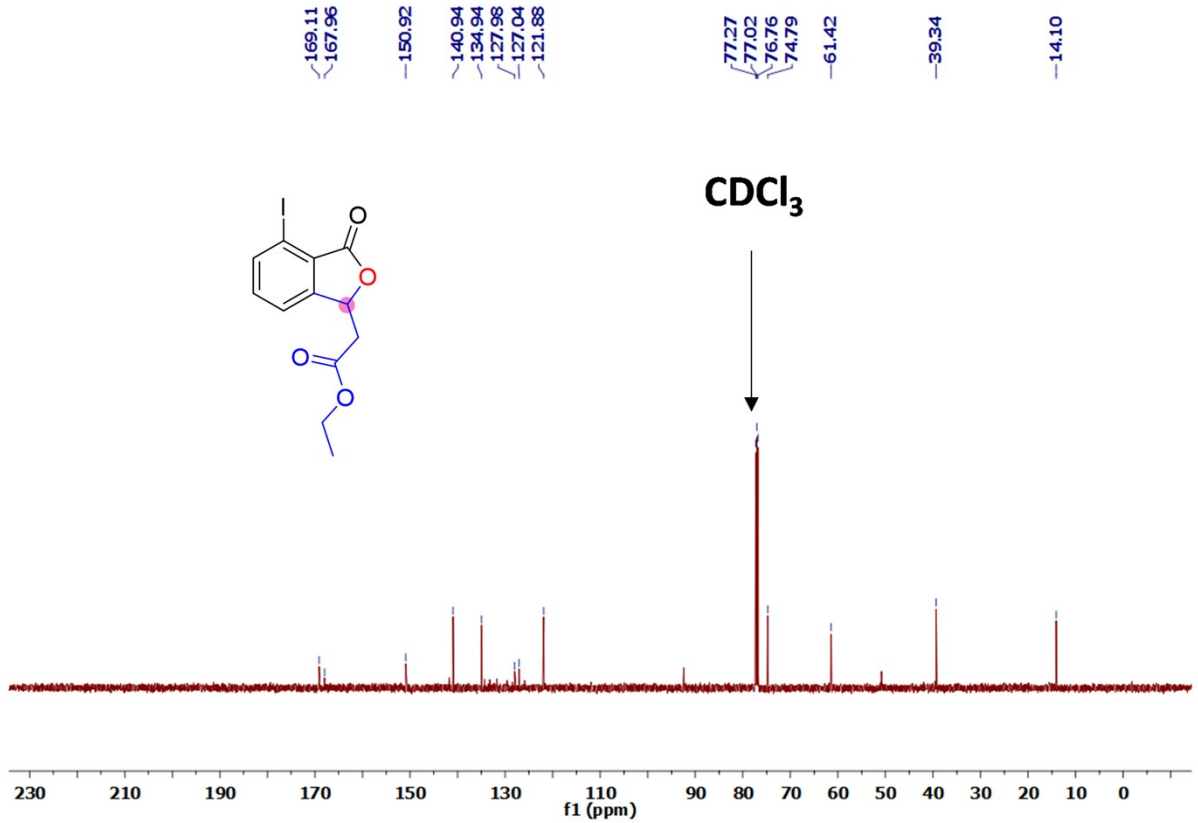
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(6-fluoro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate(**3c**)



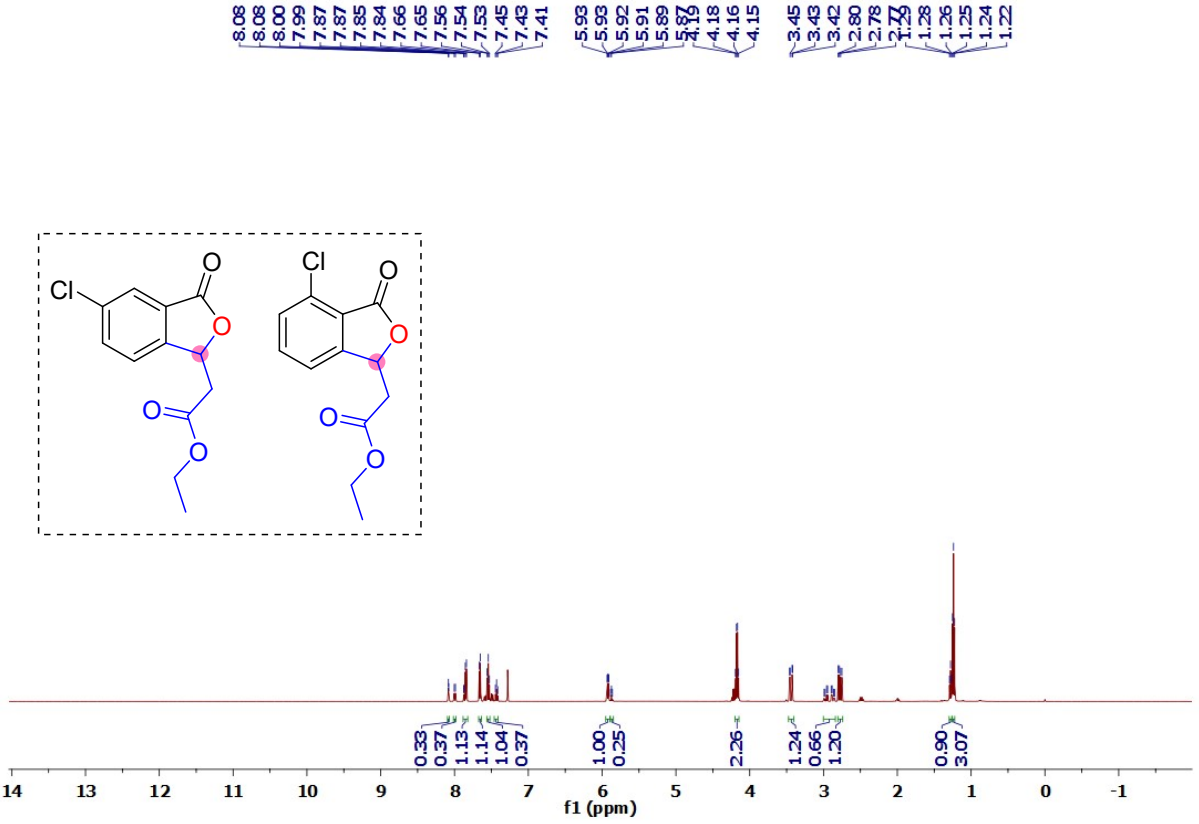
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(4-iodo-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3d**)



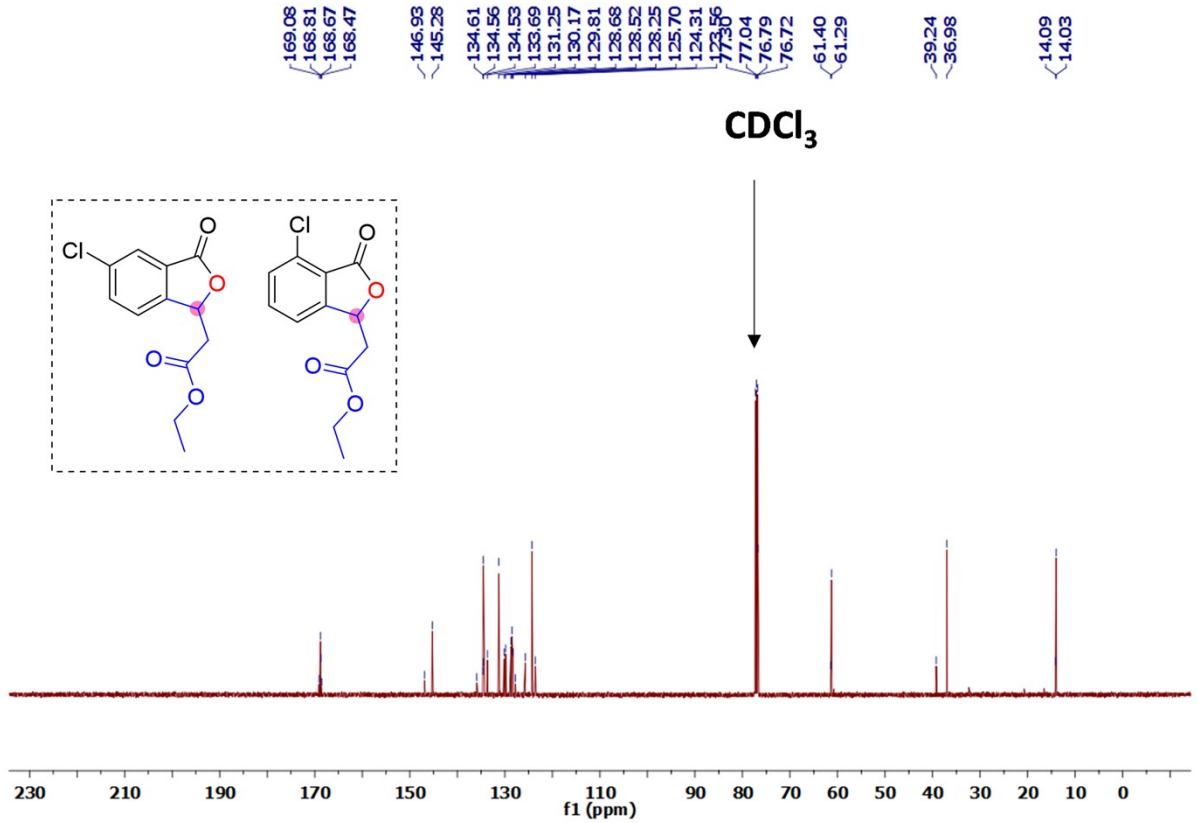
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(4-iodo-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate(**3d**)



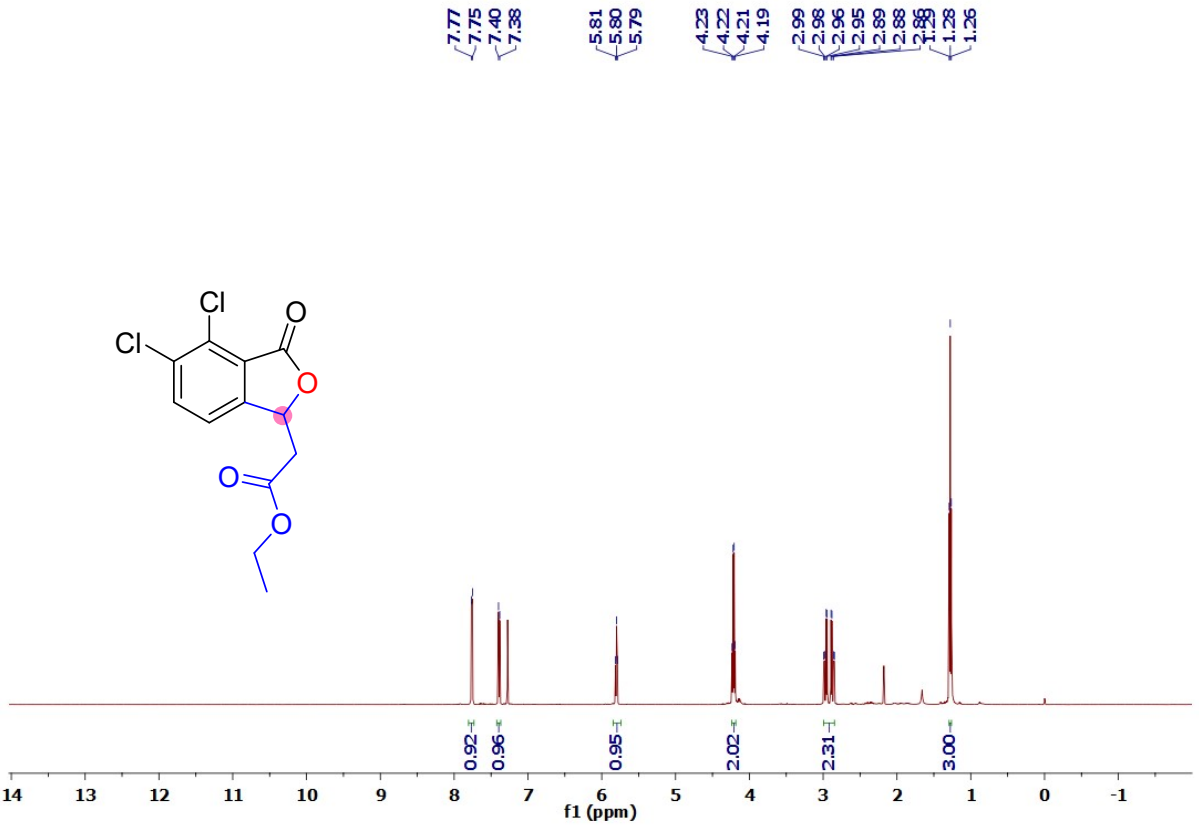
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(5-chloro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate/ethyl 2-(4-chloro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3e:3e'**)



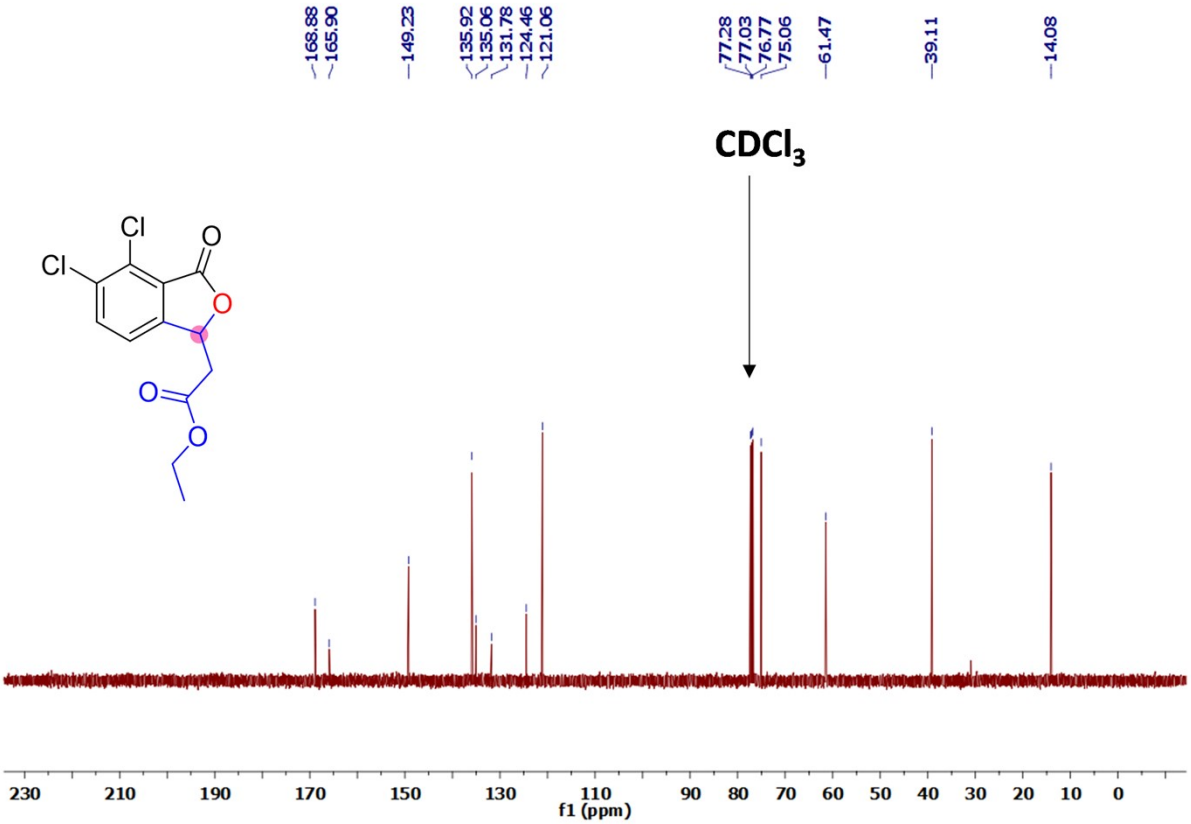
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(5-chloro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate/ethyl 2-(4-chloro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3e:3e'**)



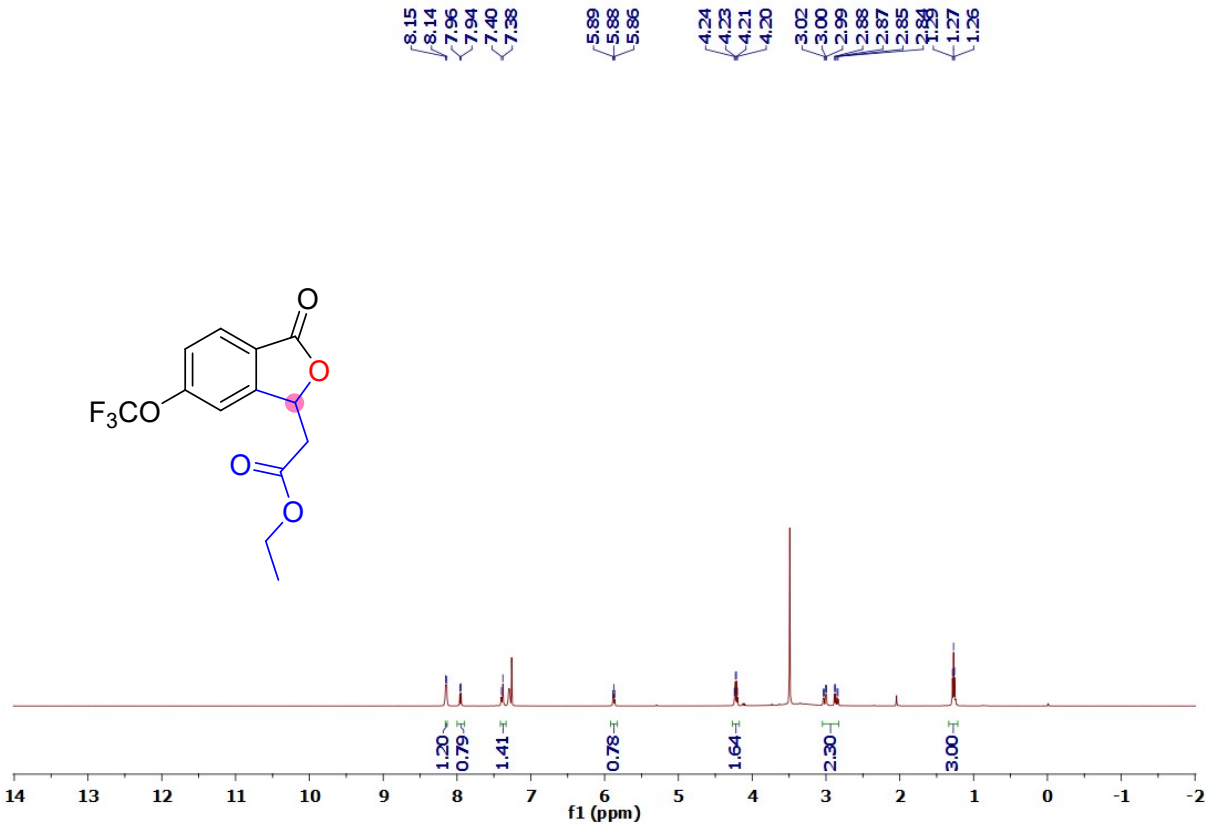
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(4,5-dichloro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3f**)



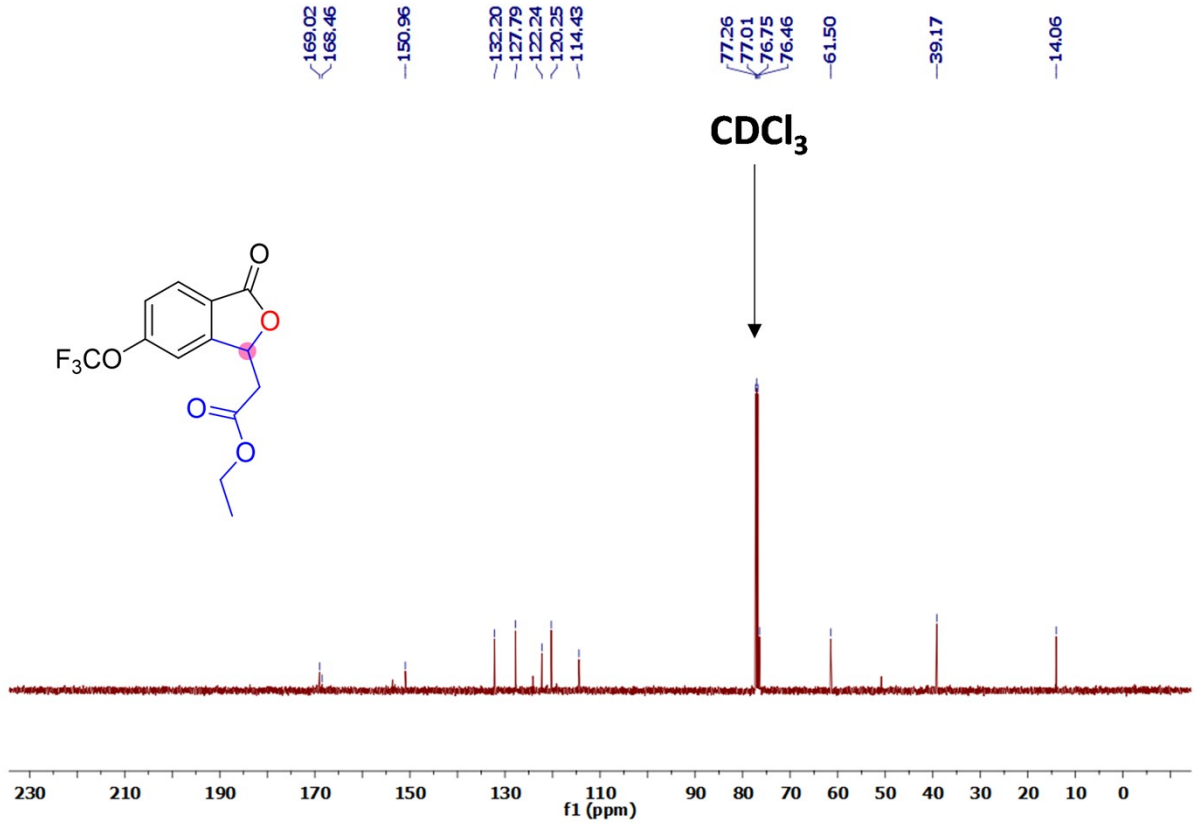
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(4,5-dichloro-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3f**)



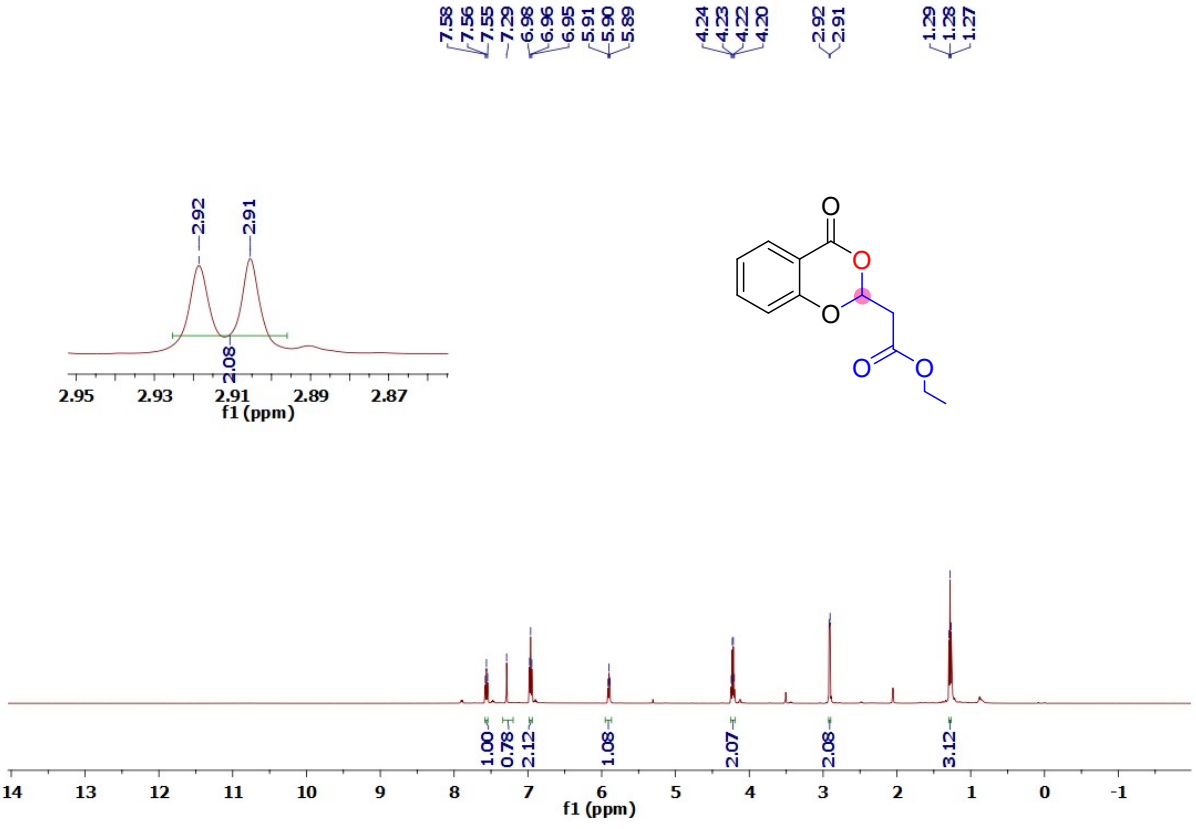
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(3-oxo-6-(trifluoromethoxy)-1,3-dihydroisobenzofuran-1-yl)acetate (**3g**)



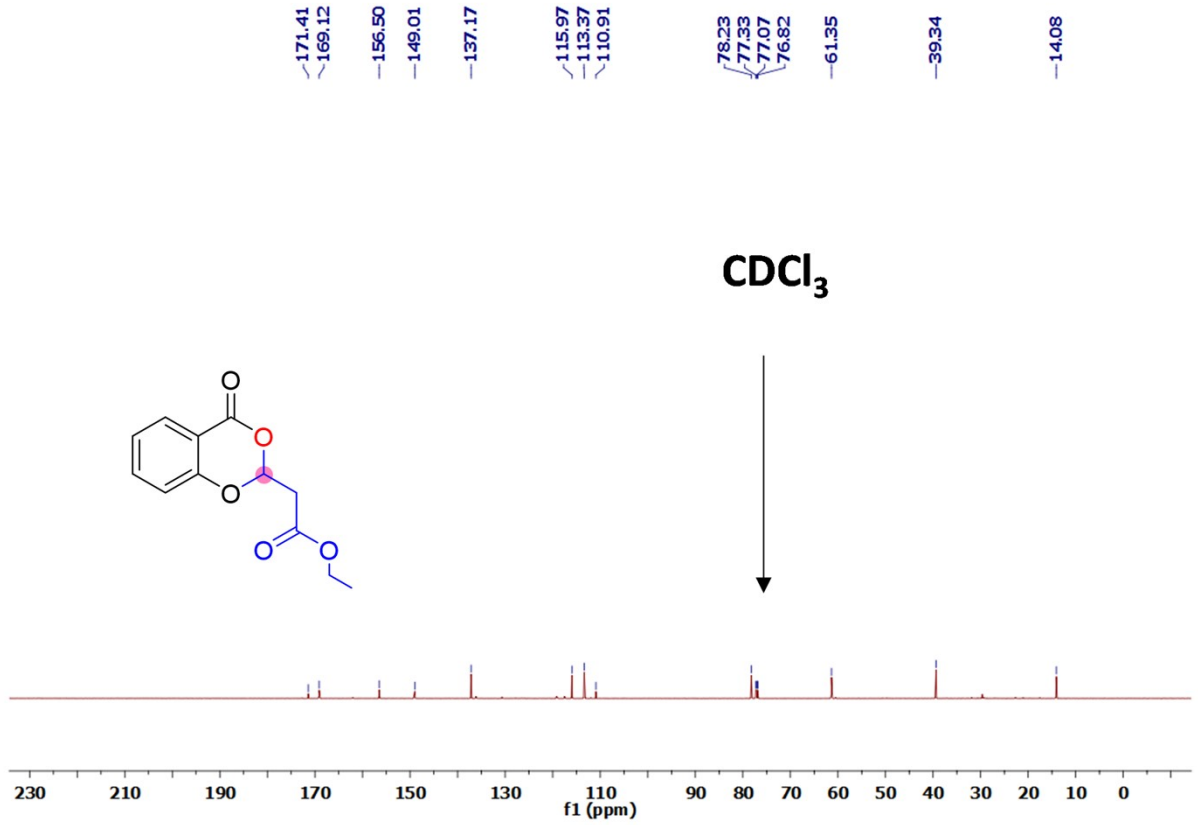
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(3-oxo-6-(trifluoromethoxy)-1,3-dihydroisobenzofuran-1-yl)acetate (**3g**)



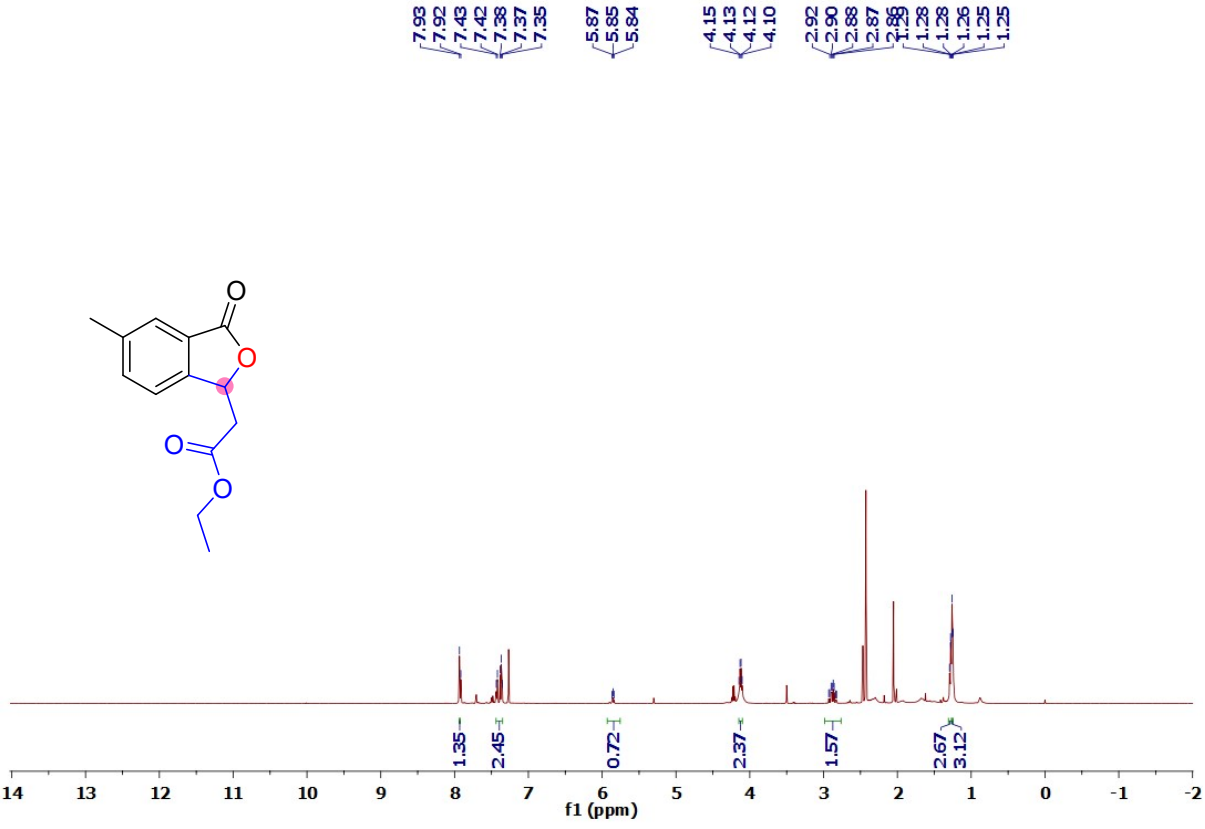
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(4-oxo-4H-benzo[d][1,3]dioxin-2-yl)acetate (**3h**)



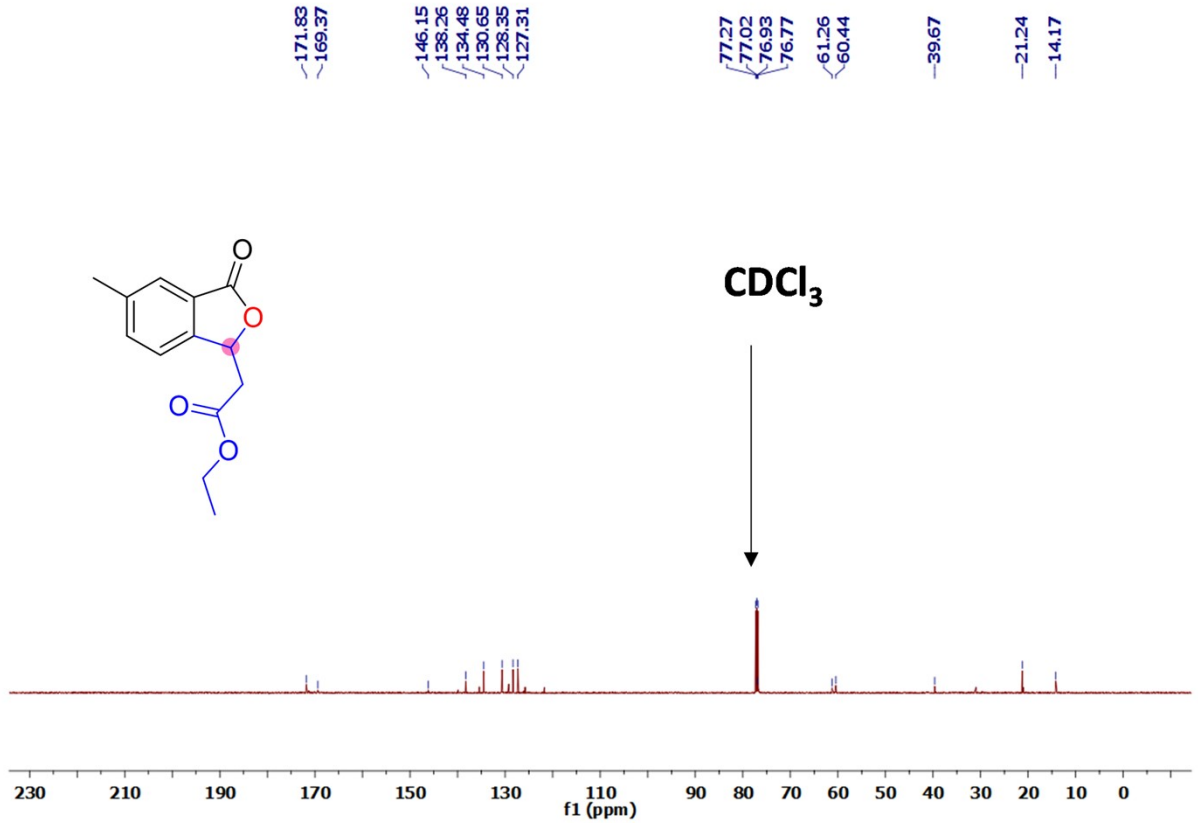
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(4-oxo-4H-benzo[d][1,3]dioxin-2-yl)acetate (**3h**)



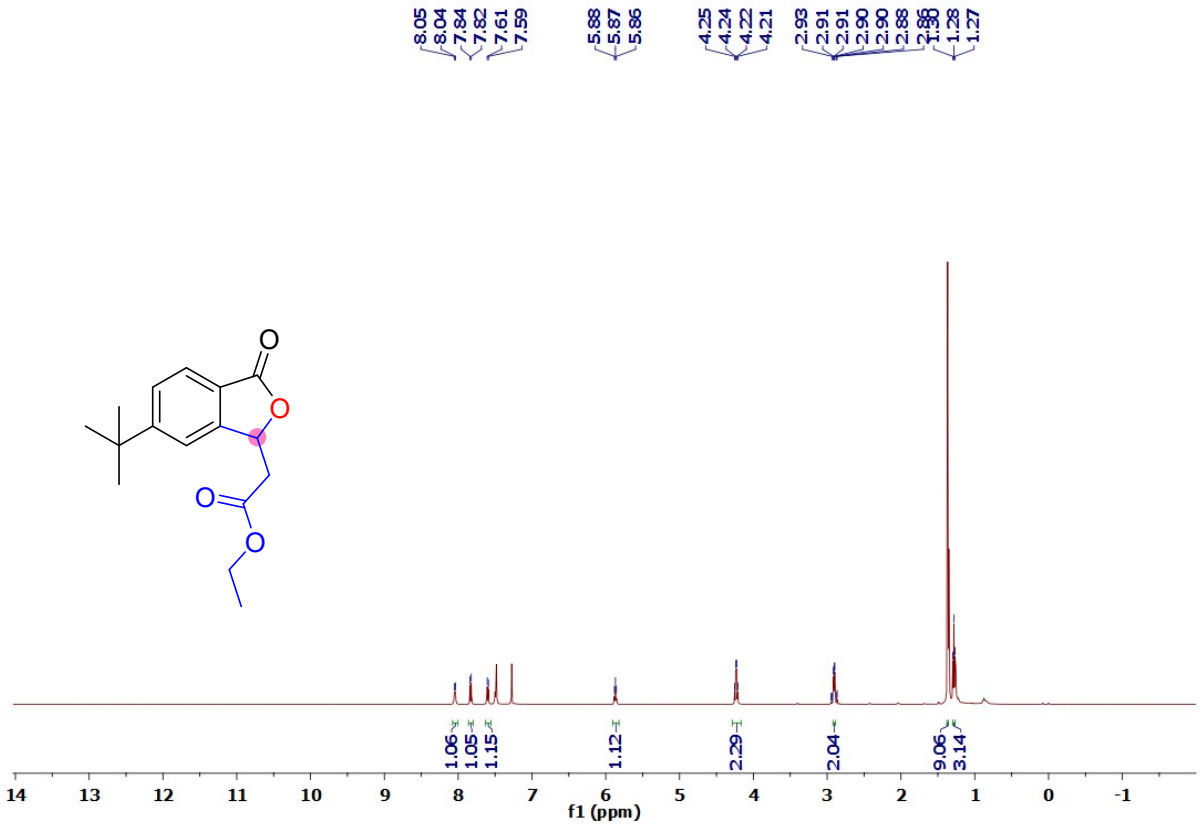
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(5-methyl-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3i**)



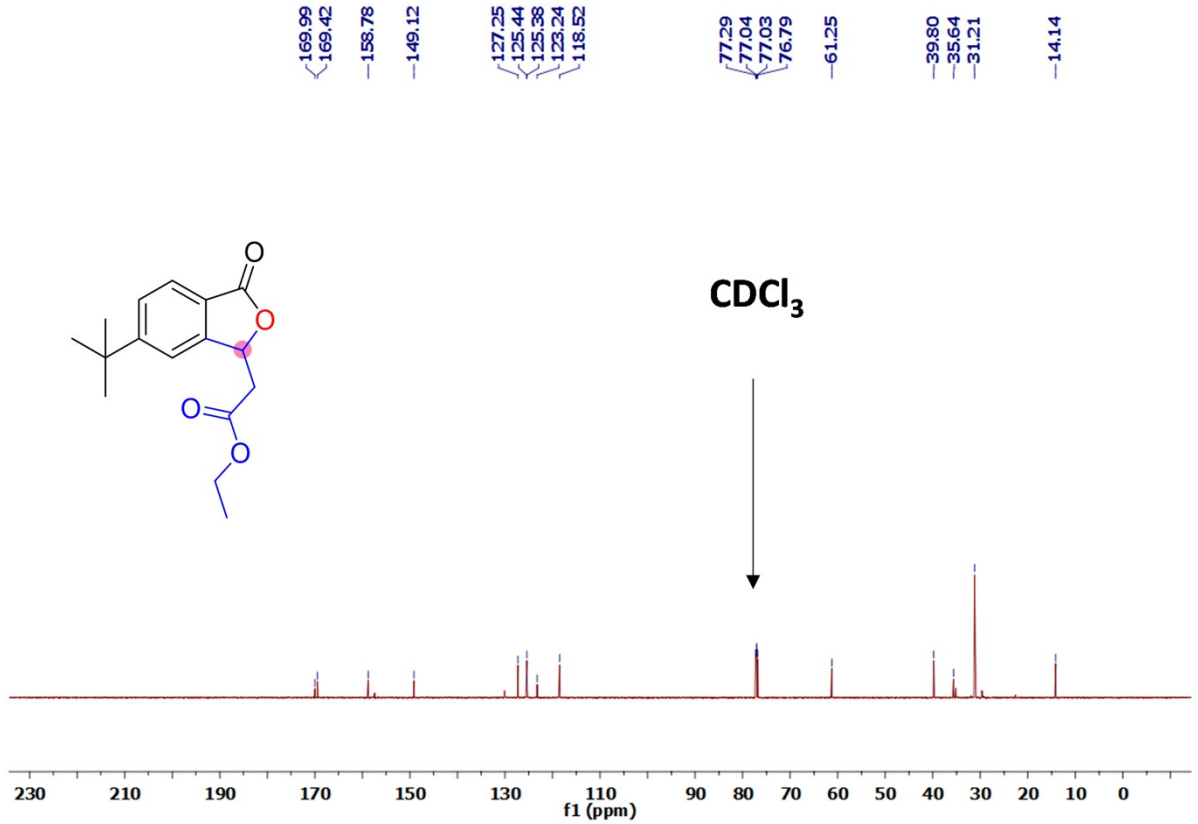
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(5-methyl-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3i**)



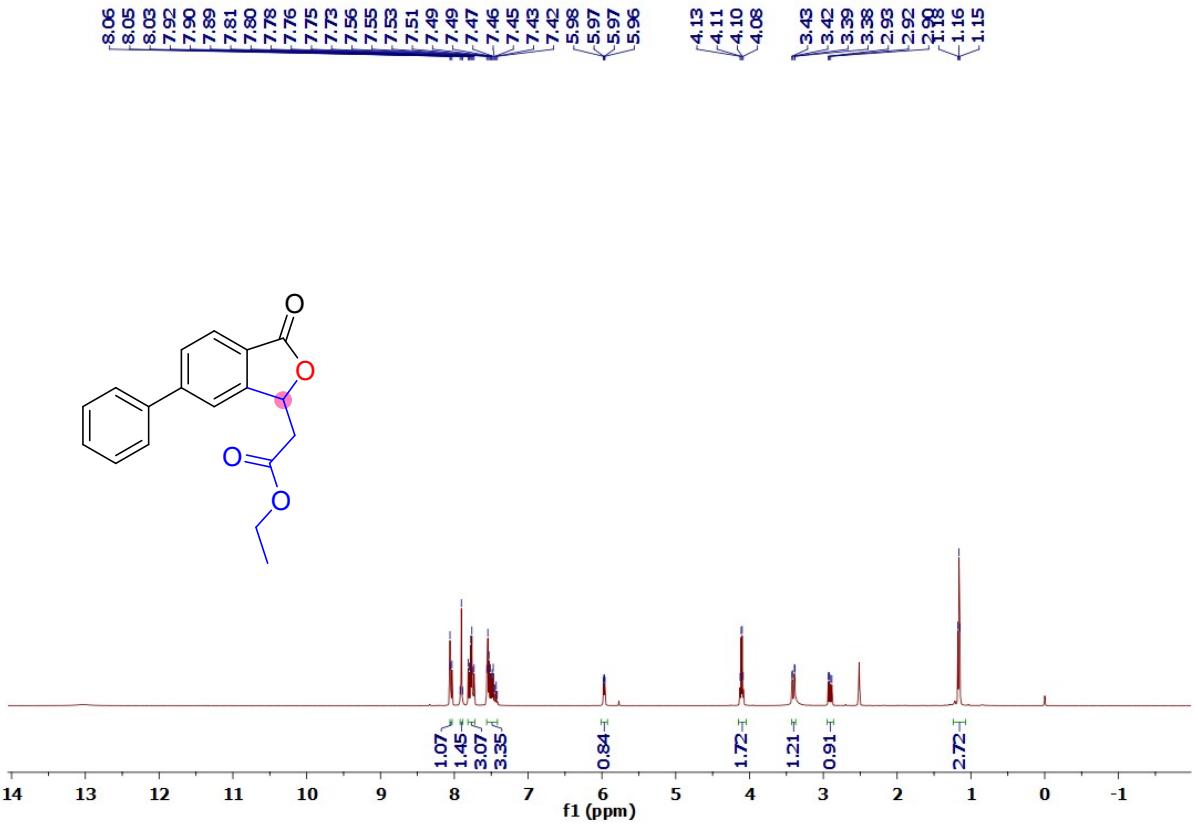
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(6-(tert-butyl)-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3j**)



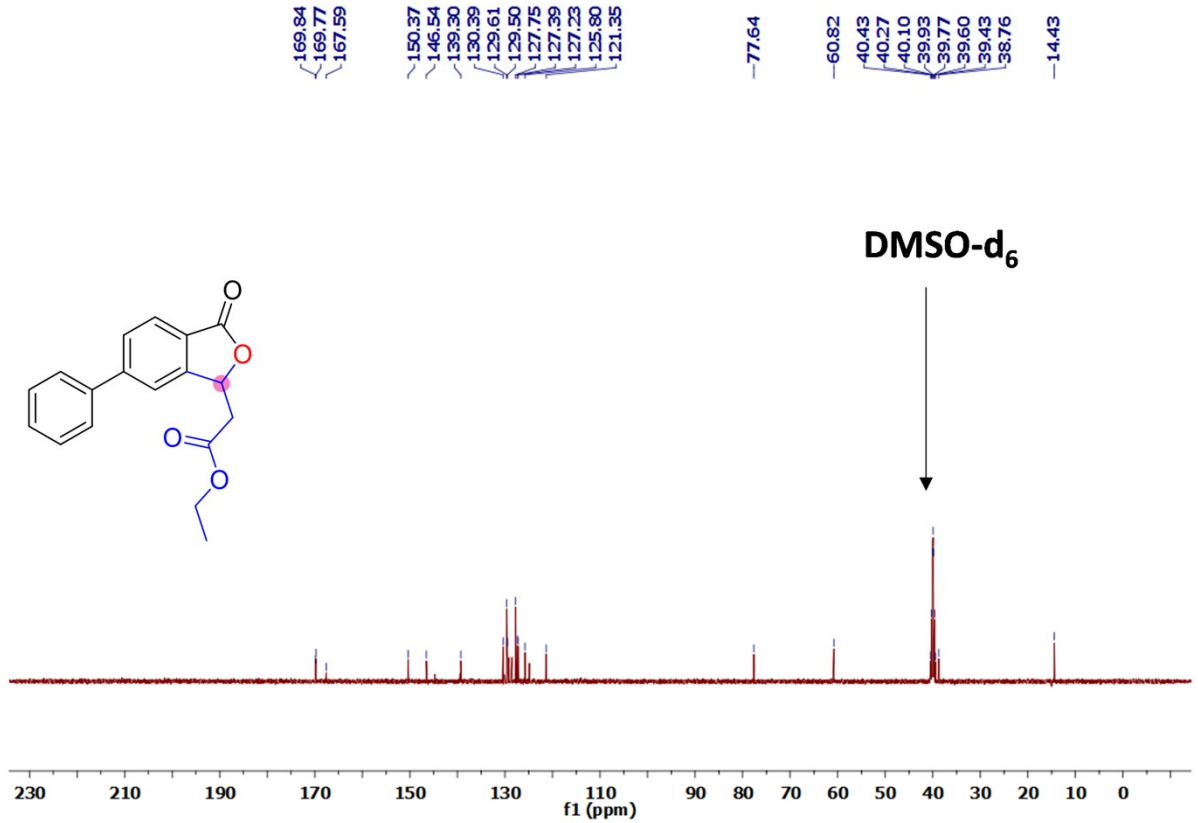
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(6-(tert-butyl)-3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3j**)



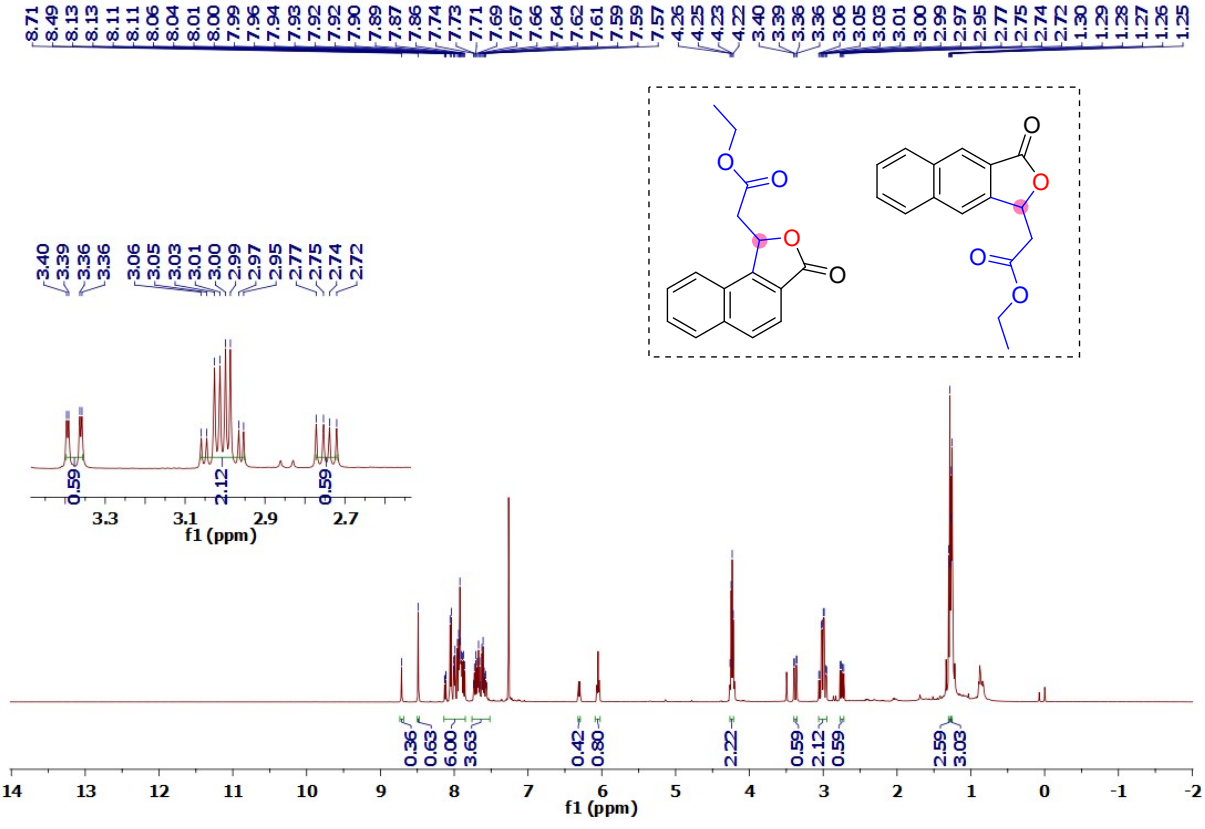
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(3-oxo-6-phenyl-1,3-dihydroisobenzofuran-1-yl)acetate (**3k**)



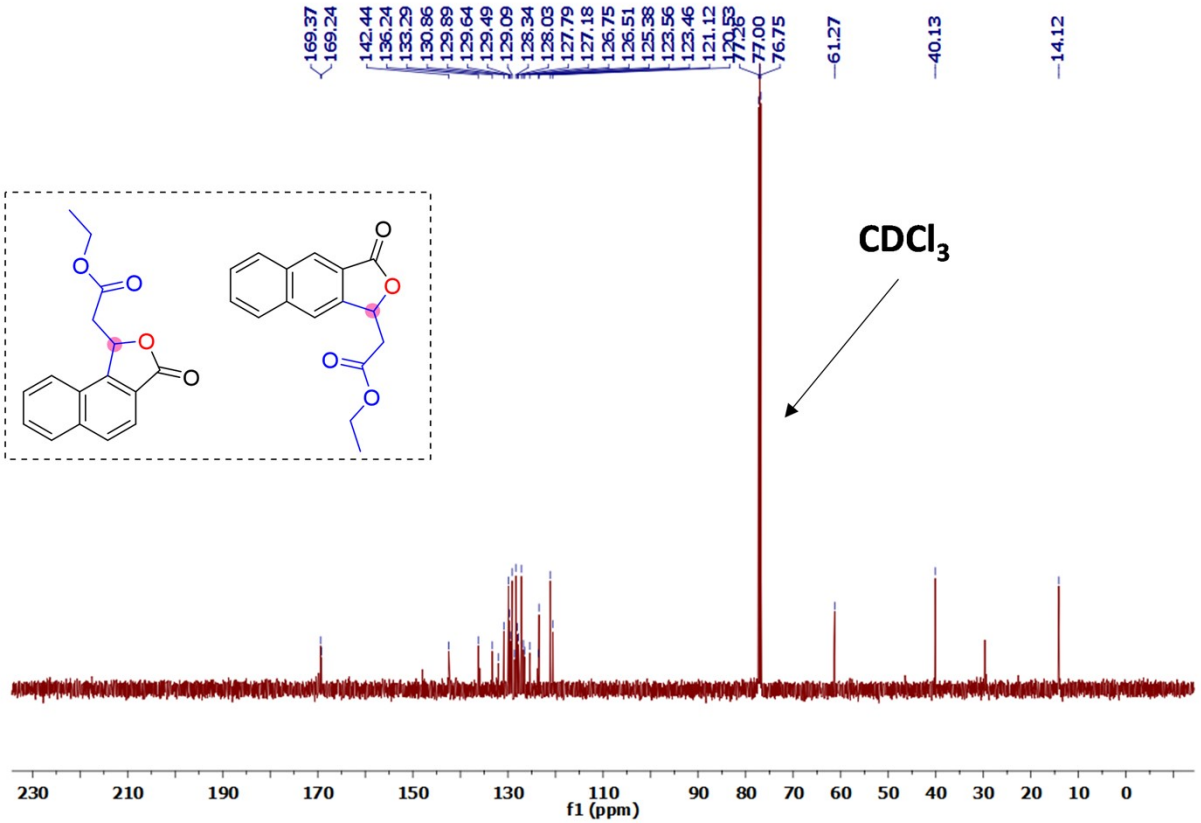
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(3-oxo-6-phenyl-1,3-dihydroisobenzofuran-1-yl)acetate (**3k**)



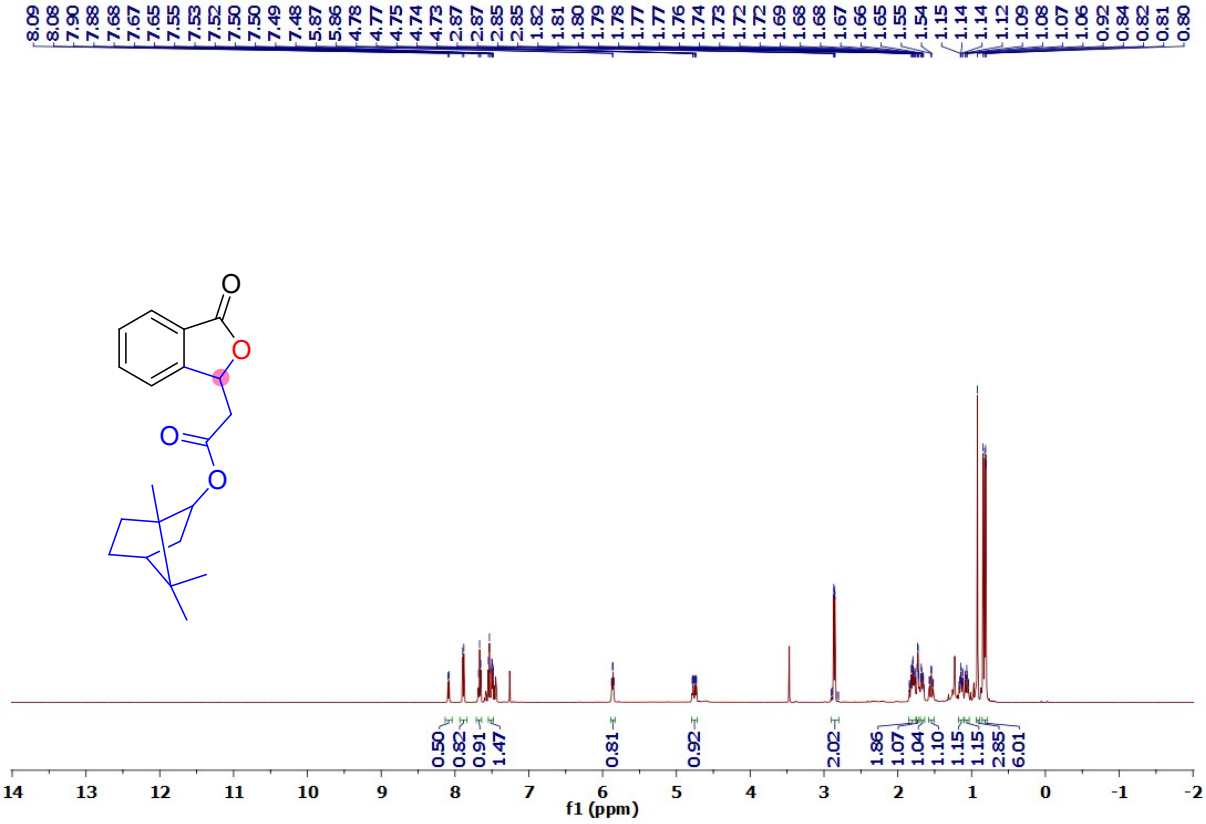
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(3-oxo-1,3-dihydronaphtho[1,2-c]furan-1-yl)acetate/ethyl 2-(3-oxo-1,3-dihydronaphtho[2,3-c]furan-1-yl)acetate (**3l: 3l'**)



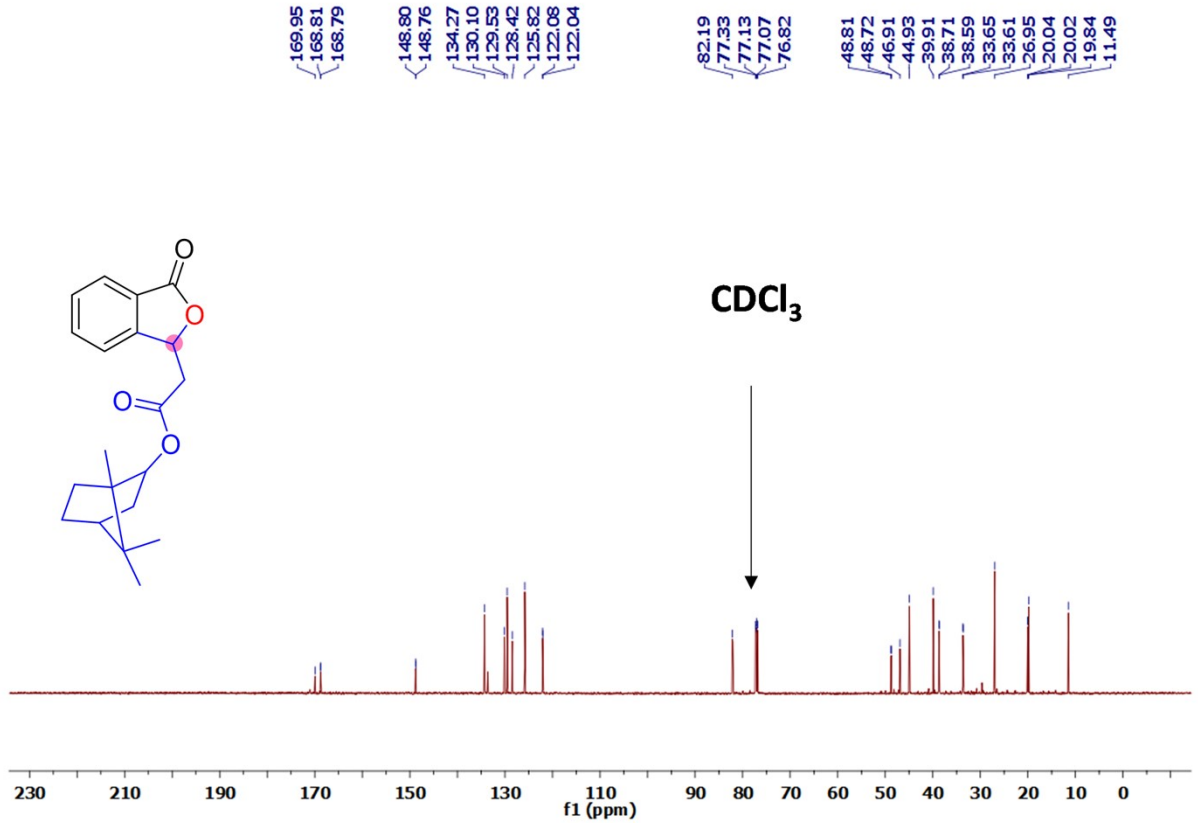
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(3-oxo-1,3-dihydronaphtho[1,2-c]furan-1-yl)acetate/ethyl 2-(3-oxo-1,3-dihydronaphtho[2,3-c]furan-1-yl)acetate (**3l: 3l'**)



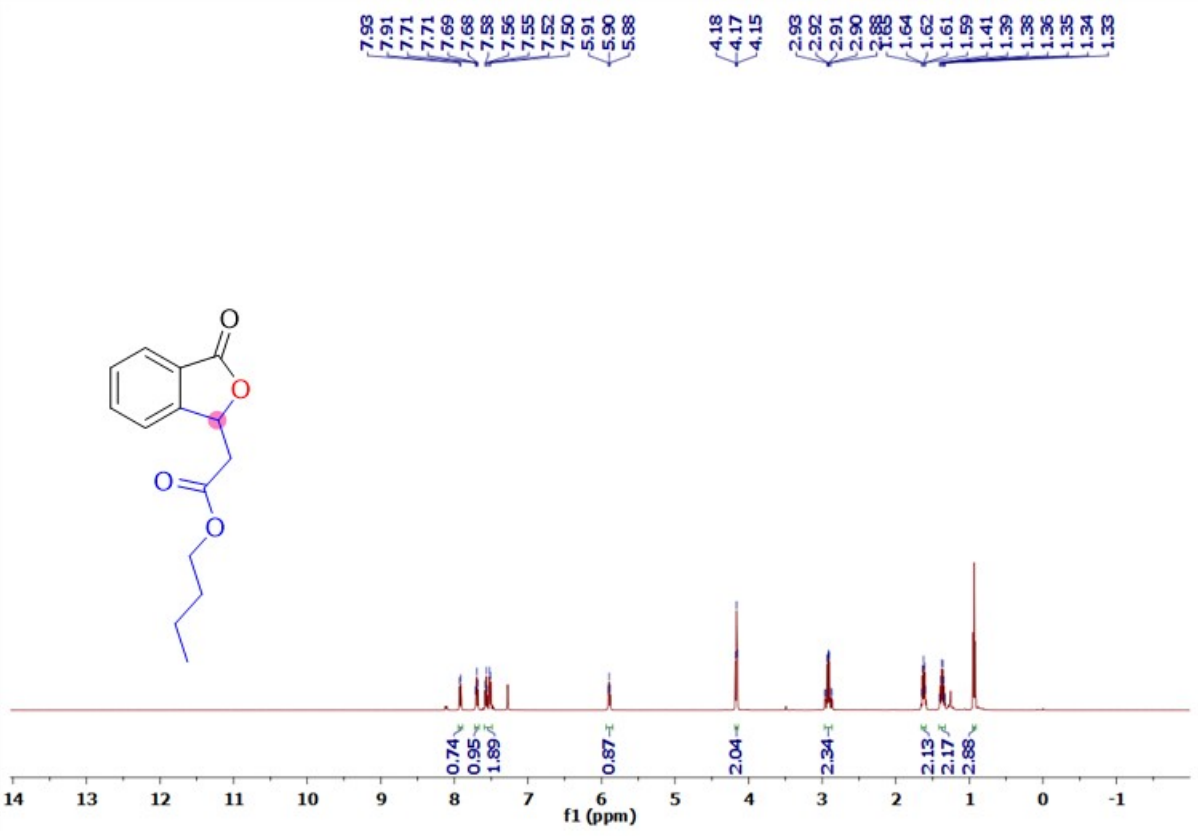
^{1}H NMR (500 MHz, $CDCl_3$) of 1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl 2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3m**)



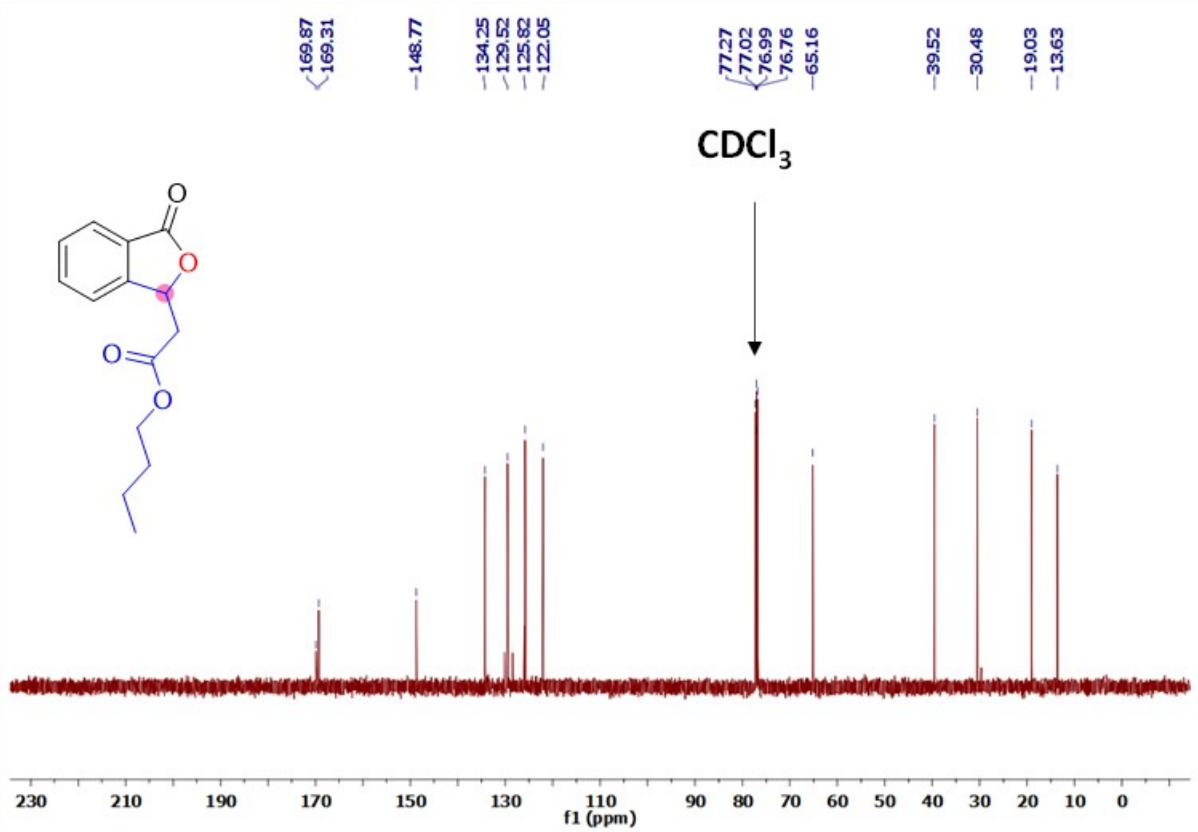
^{13}C NMR (126 MHz, $CDCl_3$) of 1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl 2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3m**)



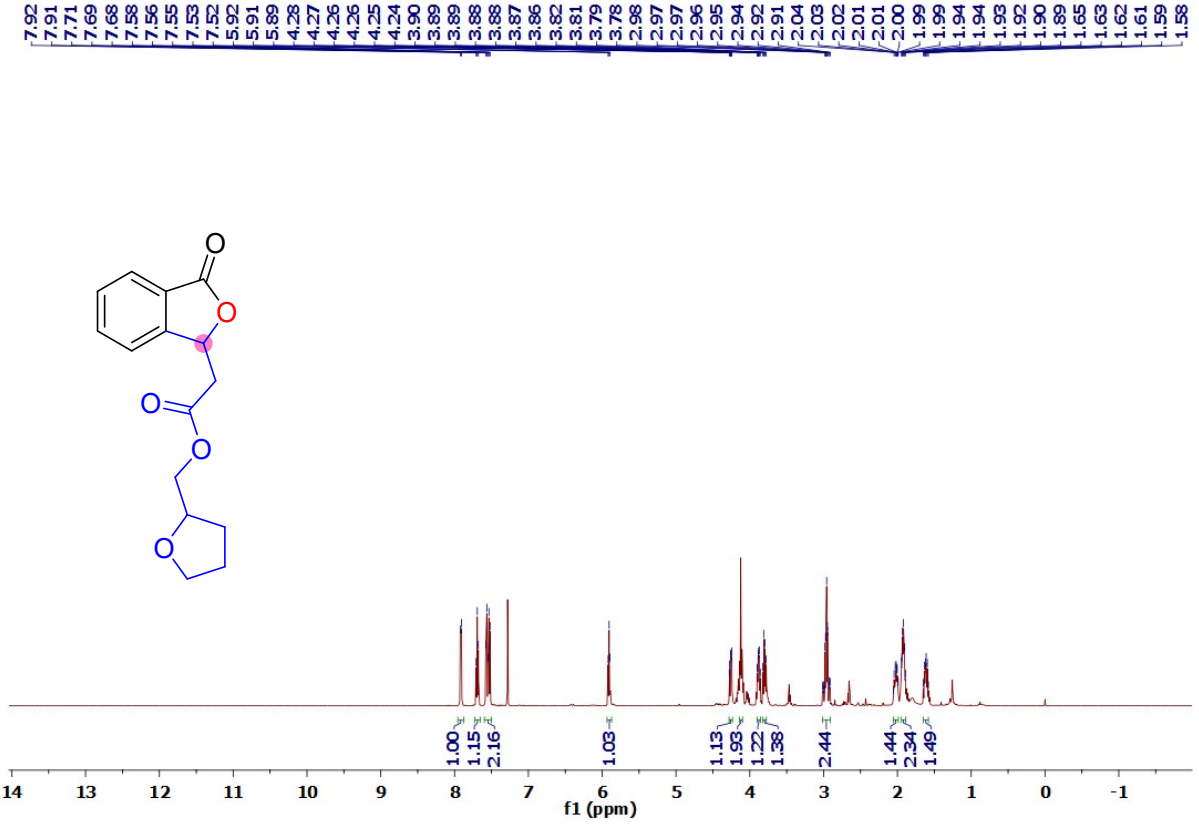
^{1}H NMR (500 MHz, $CDCl_3$) of Butyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3n**)



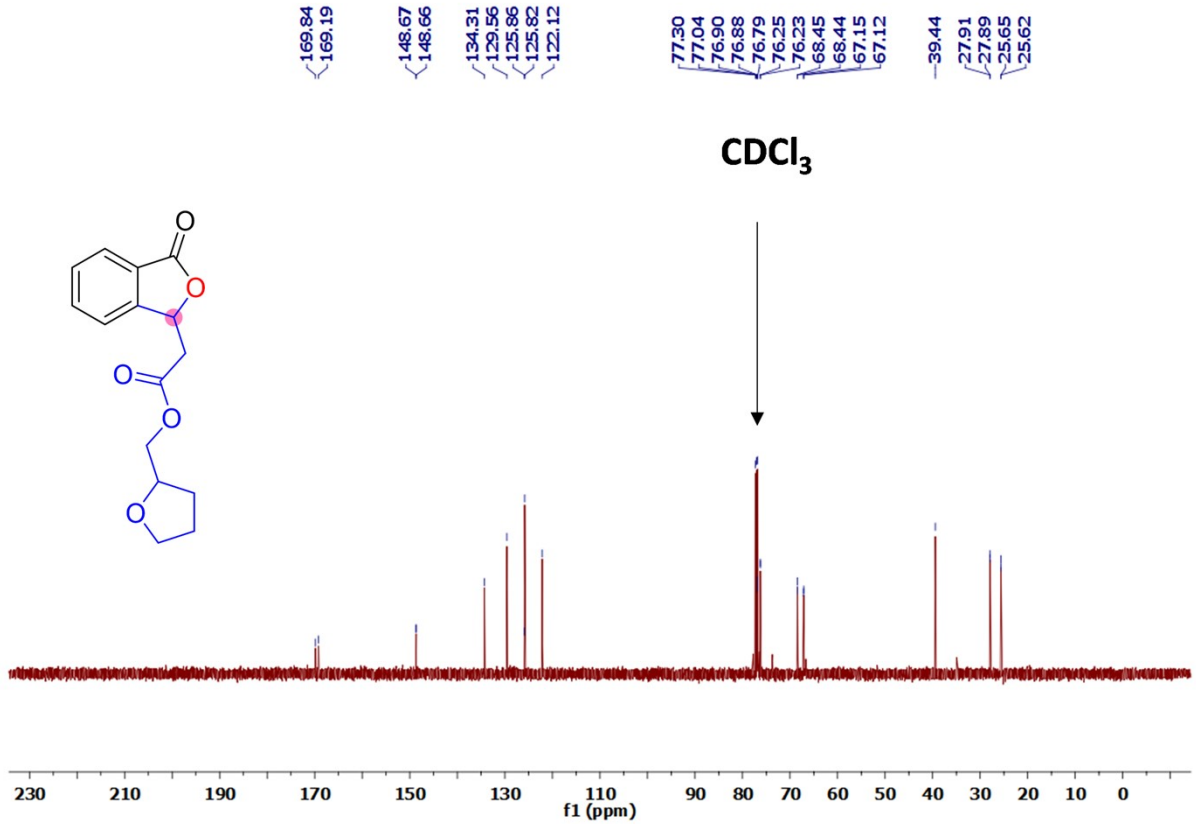
^{13}C NMR (126 MHz, $CDCl_3$) of butyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3n**)



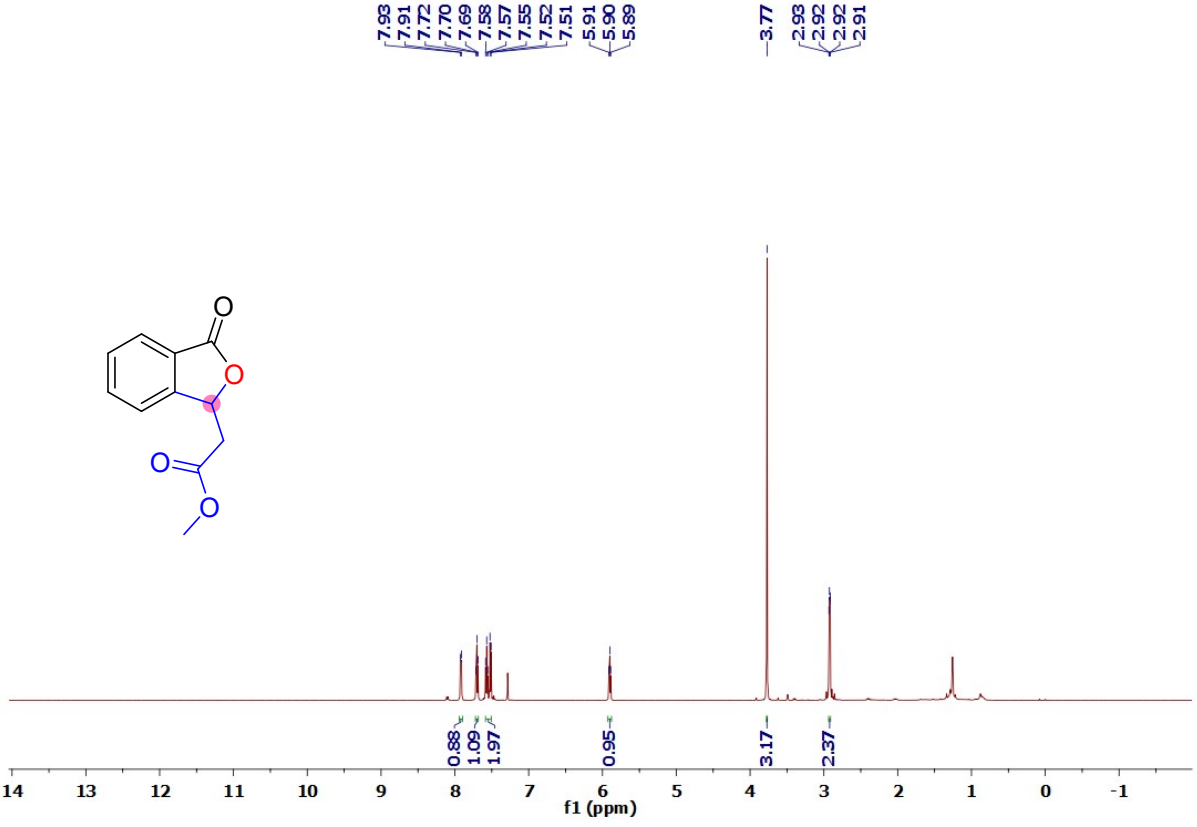
^{1}H NMR (500 MHz, $CDCl_3$) of (tetrahydrofuran-2-yl)methyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3o**)



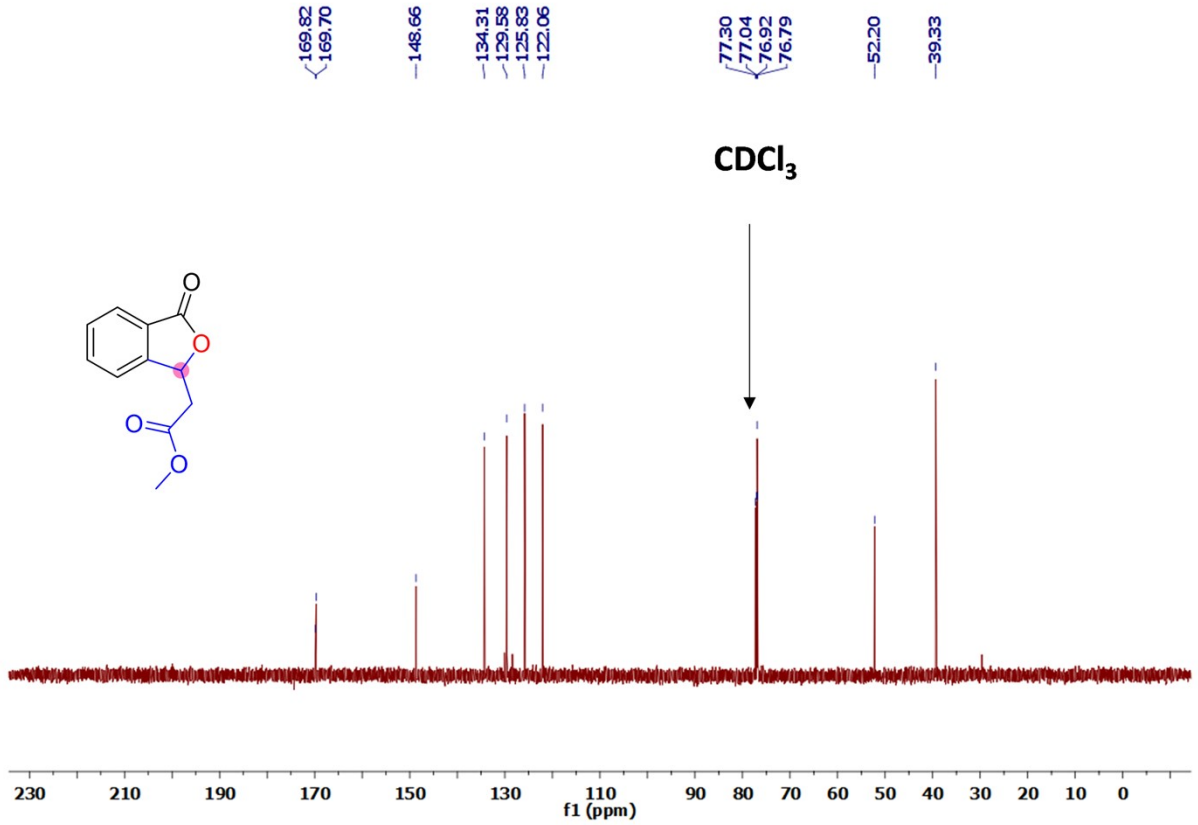
^{13}C NMR (126 MHz, $CDCl_3$) of (tetrahydrofuran-2-yl)methyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3o**)



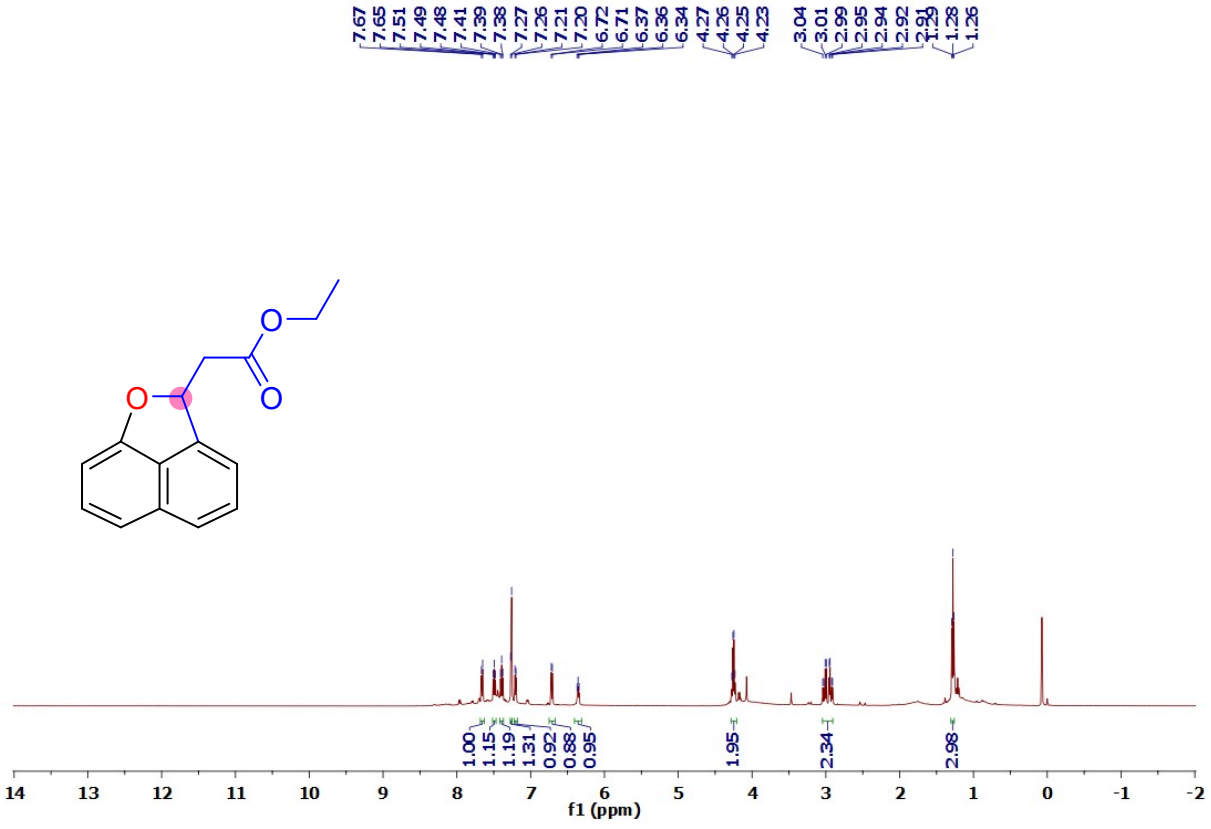
^{1}H NMR (500 MHz, $CDCl_3$) of methyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3p**)



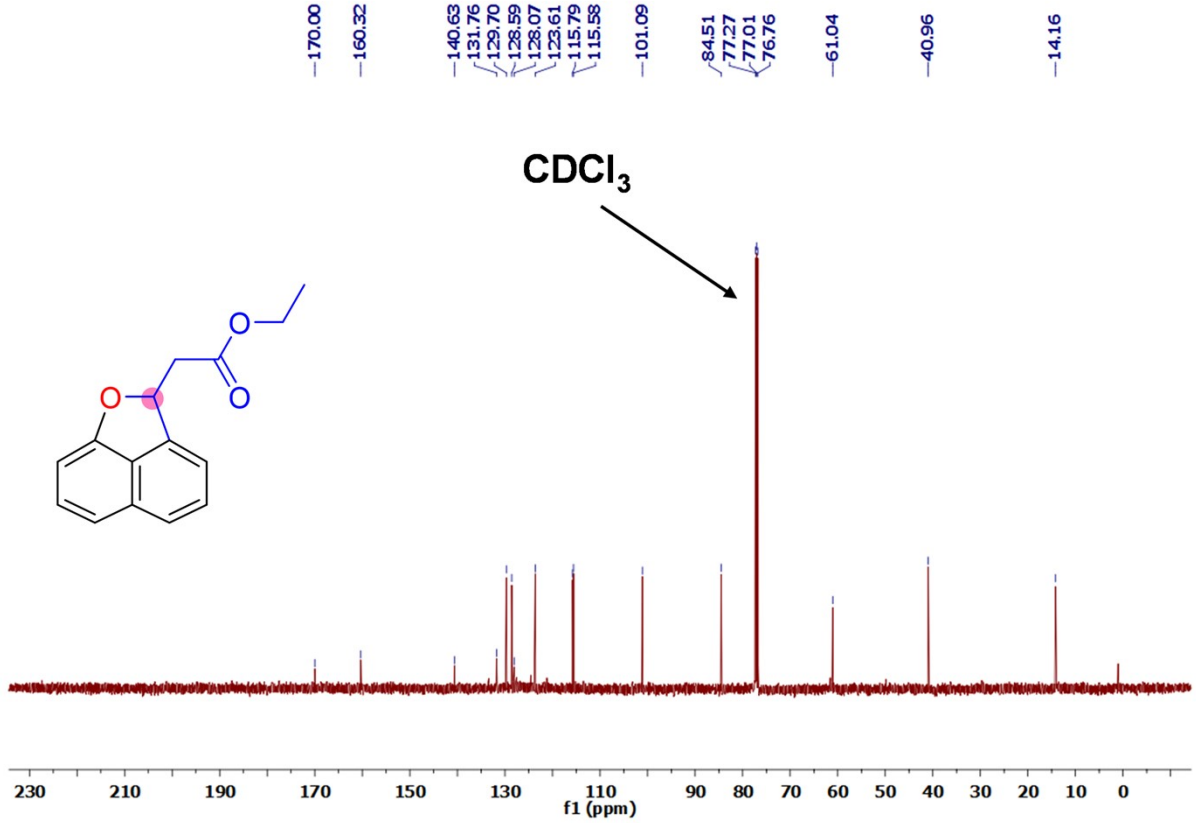
^{13}C NMR (126 MHz, $CDCl_3$) of methyl-2-(3-oxo-1,3-dihydroisobenzofuran-1-yl)acetate (**3p**)



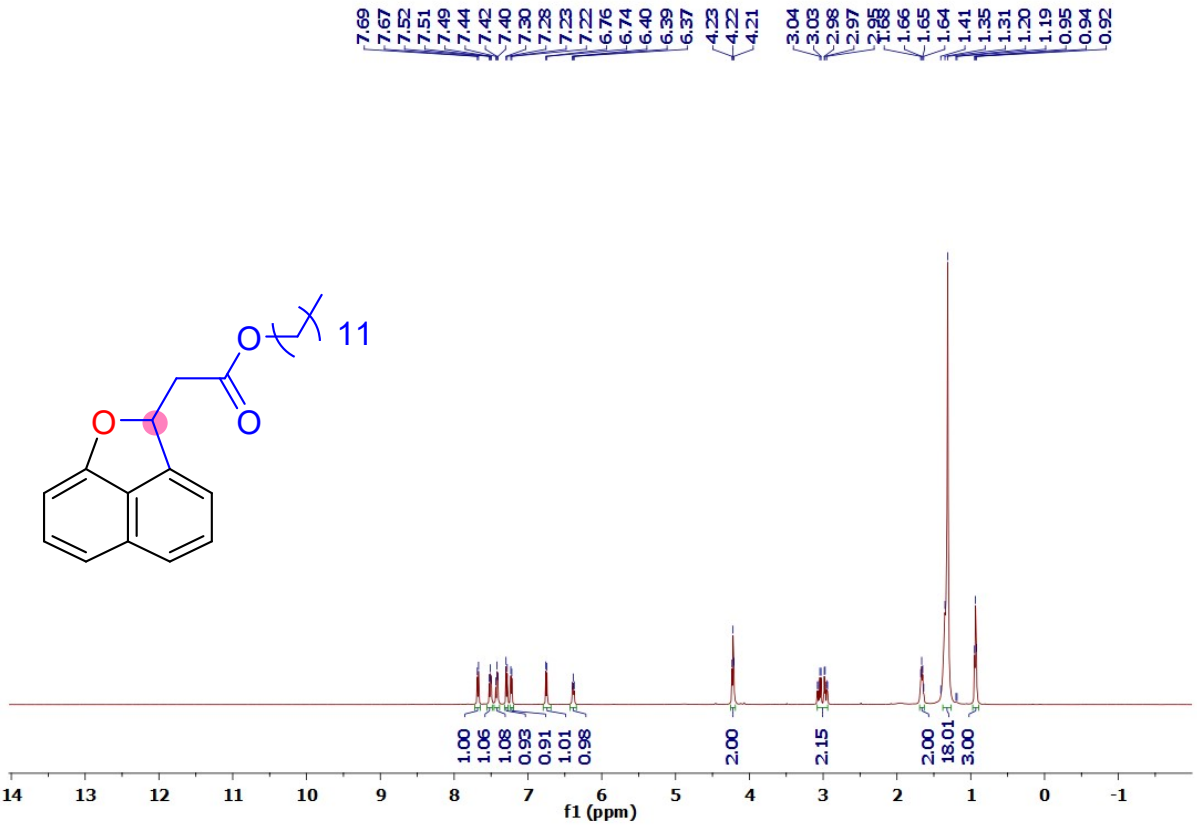
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5a**)



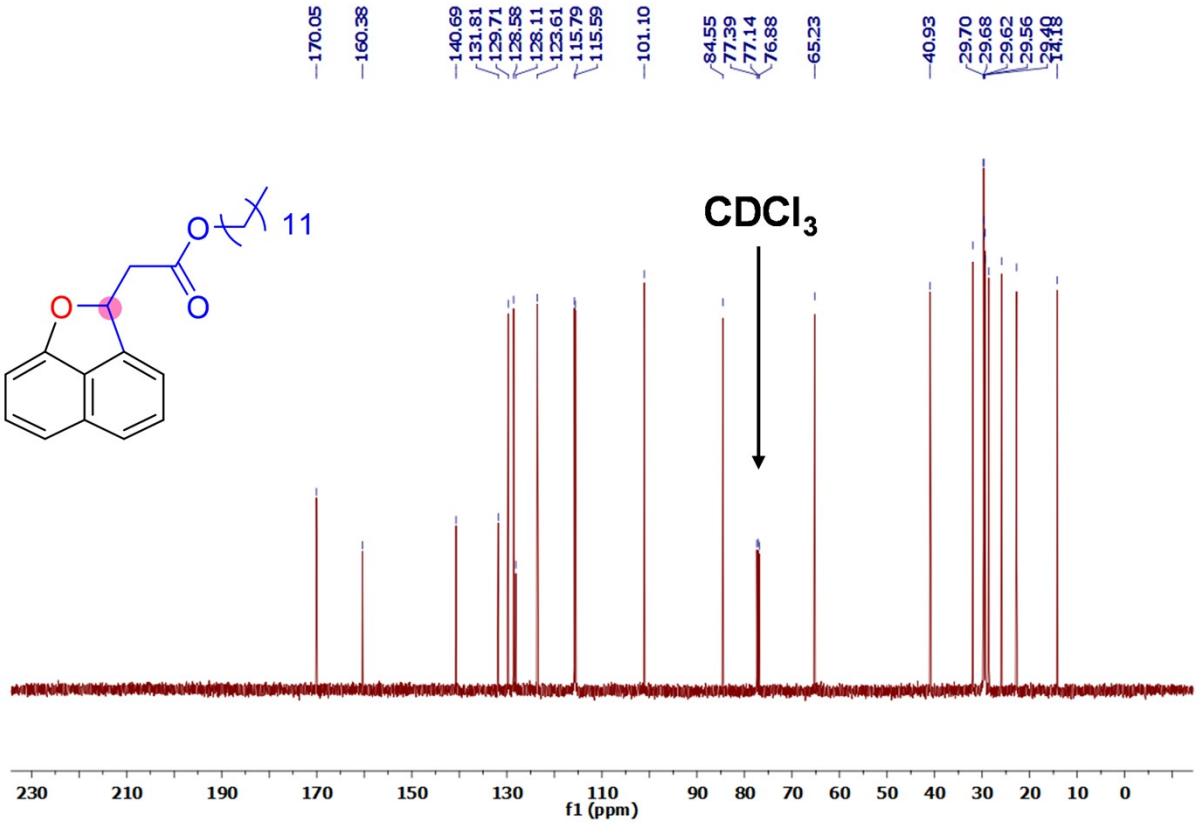
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5a**)



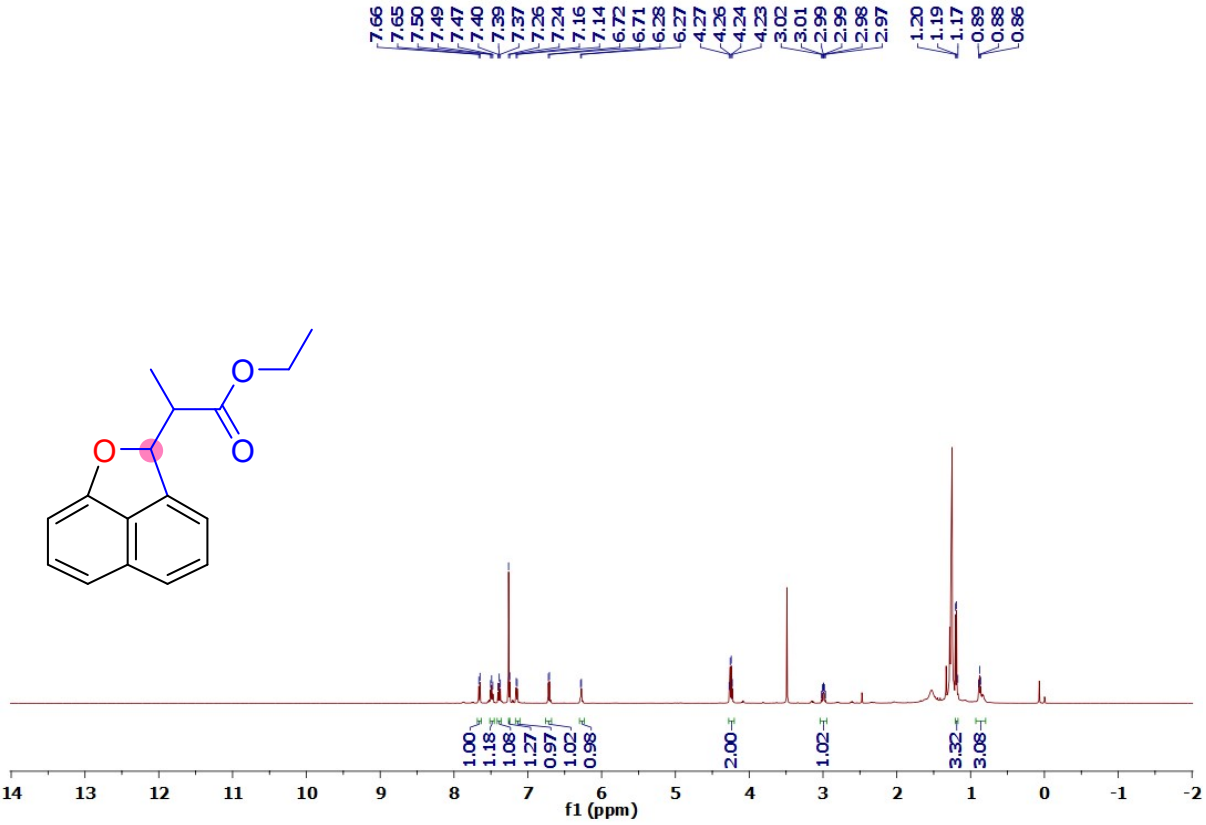
^{1}H NMR (500 MHz, $CDCl_3$) of e dodecyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5b**)



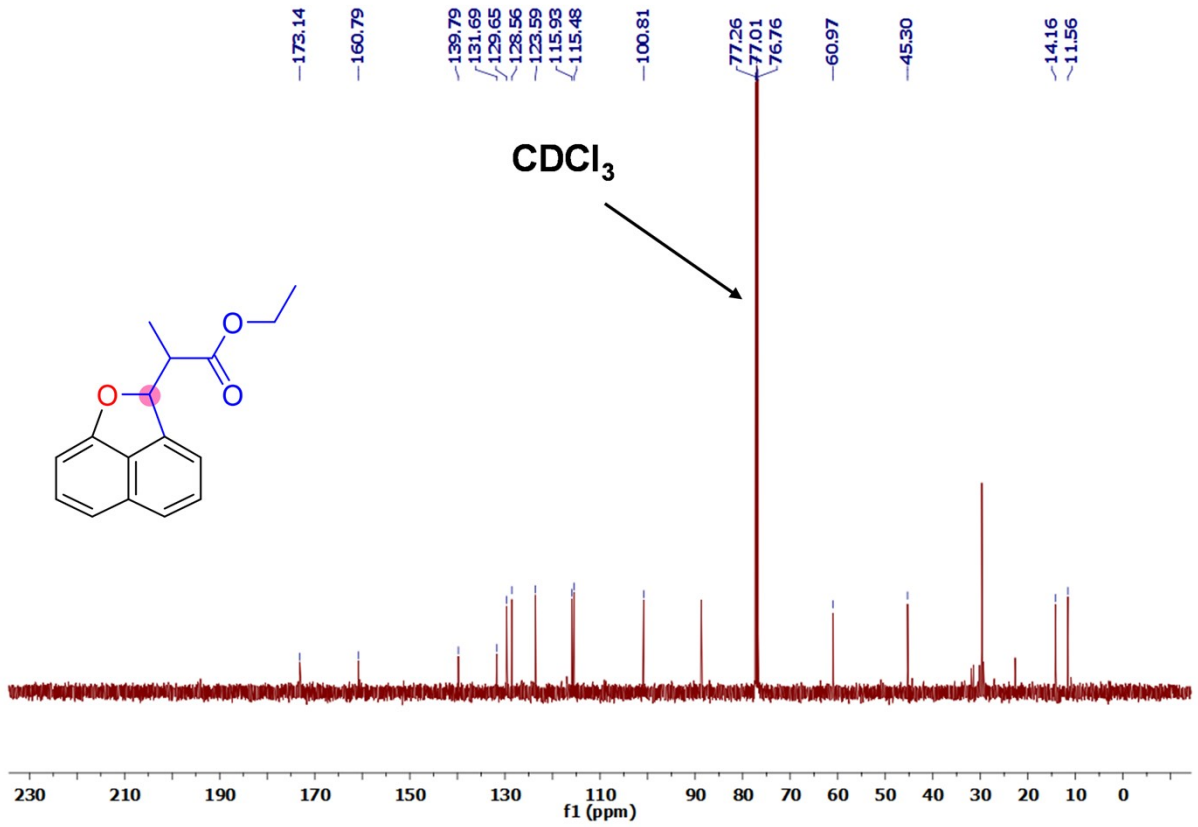
^{13}C NMR (126 MHz, $CDCl_3$) of dodecyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5b**)



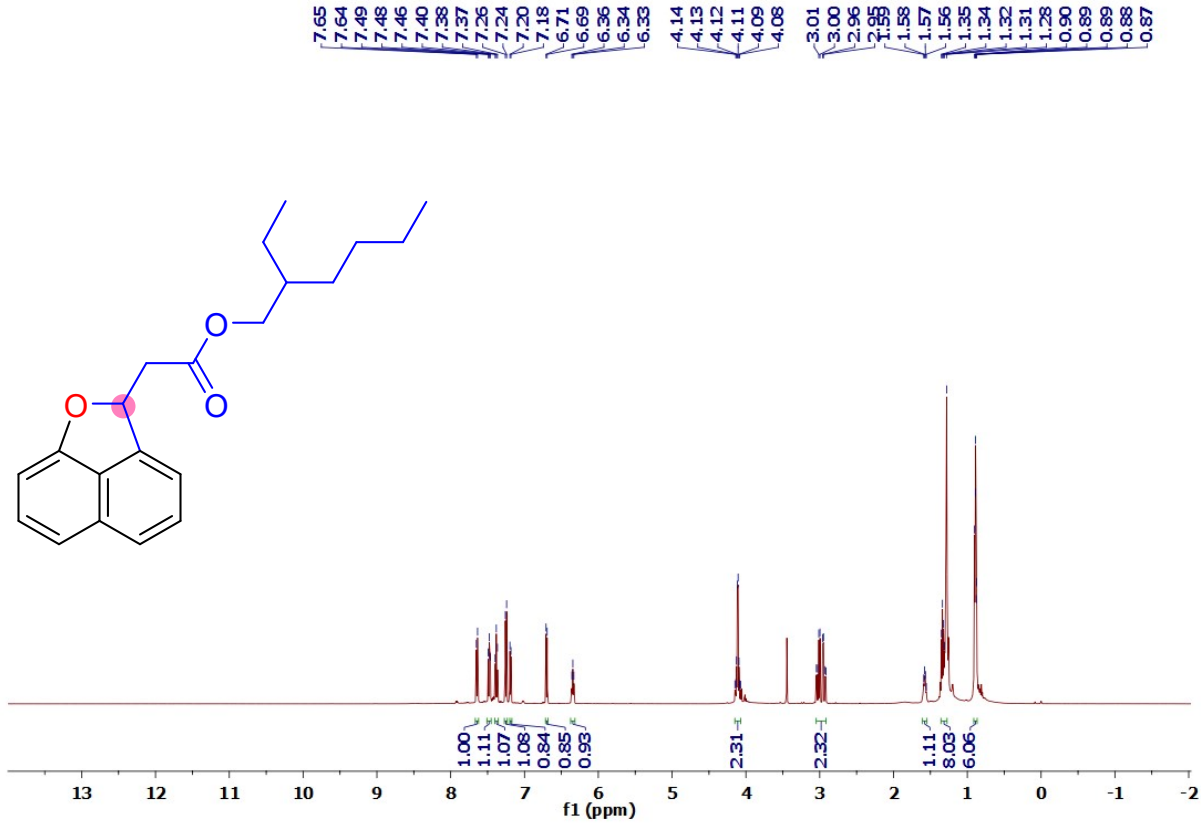
^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(2H-naphtho[1,8-bc]furan-2-yl)propanoate (**5c**)



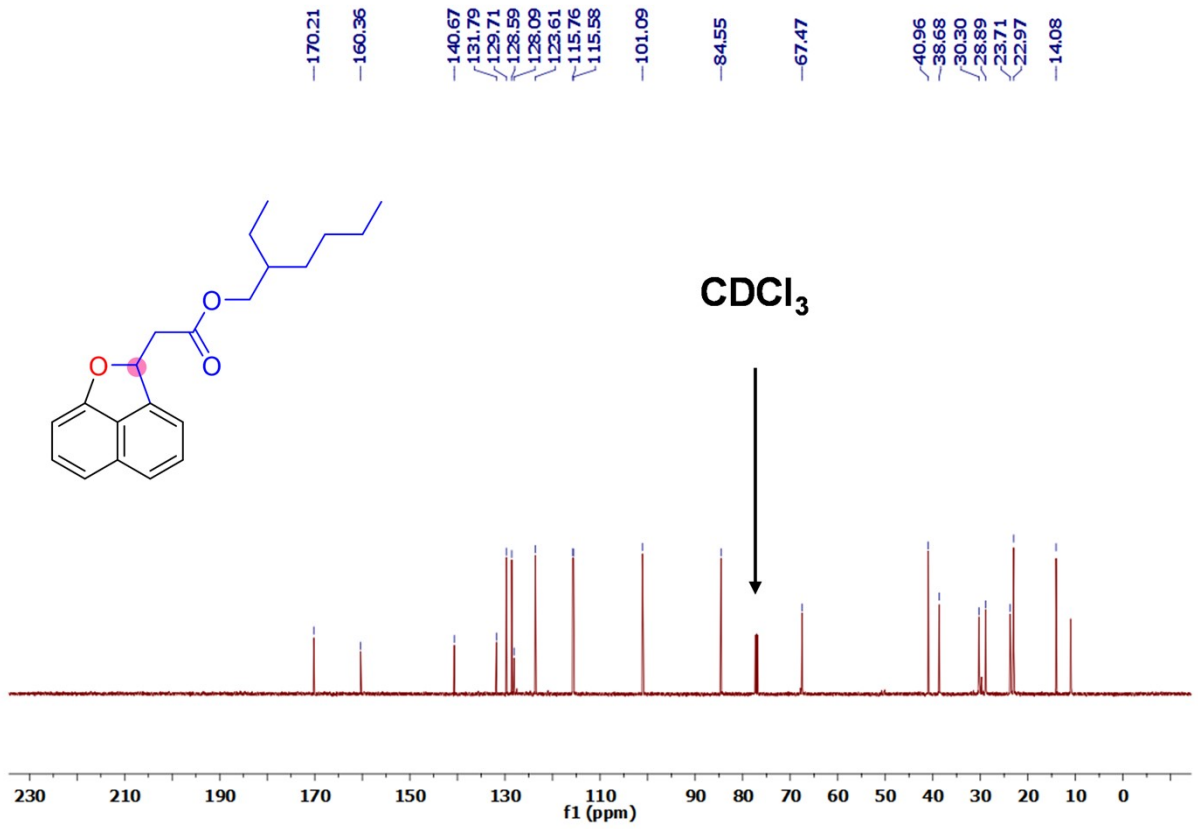
^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(2H-naphtho[1,8-bc]furan-2-yl)propanoate (**5c**)



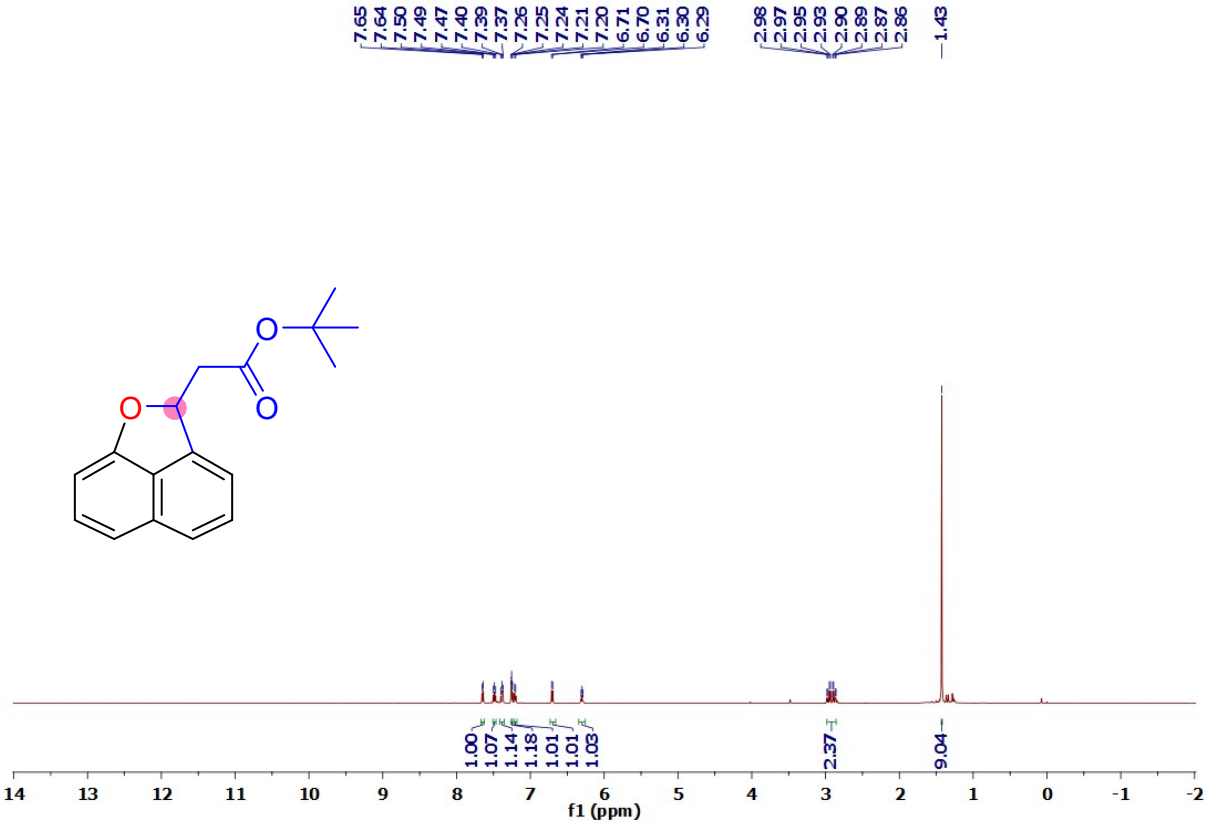
^{1}H NMR (500 MHz, $CDCl_3$) of 2-ethylhexyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5d**)



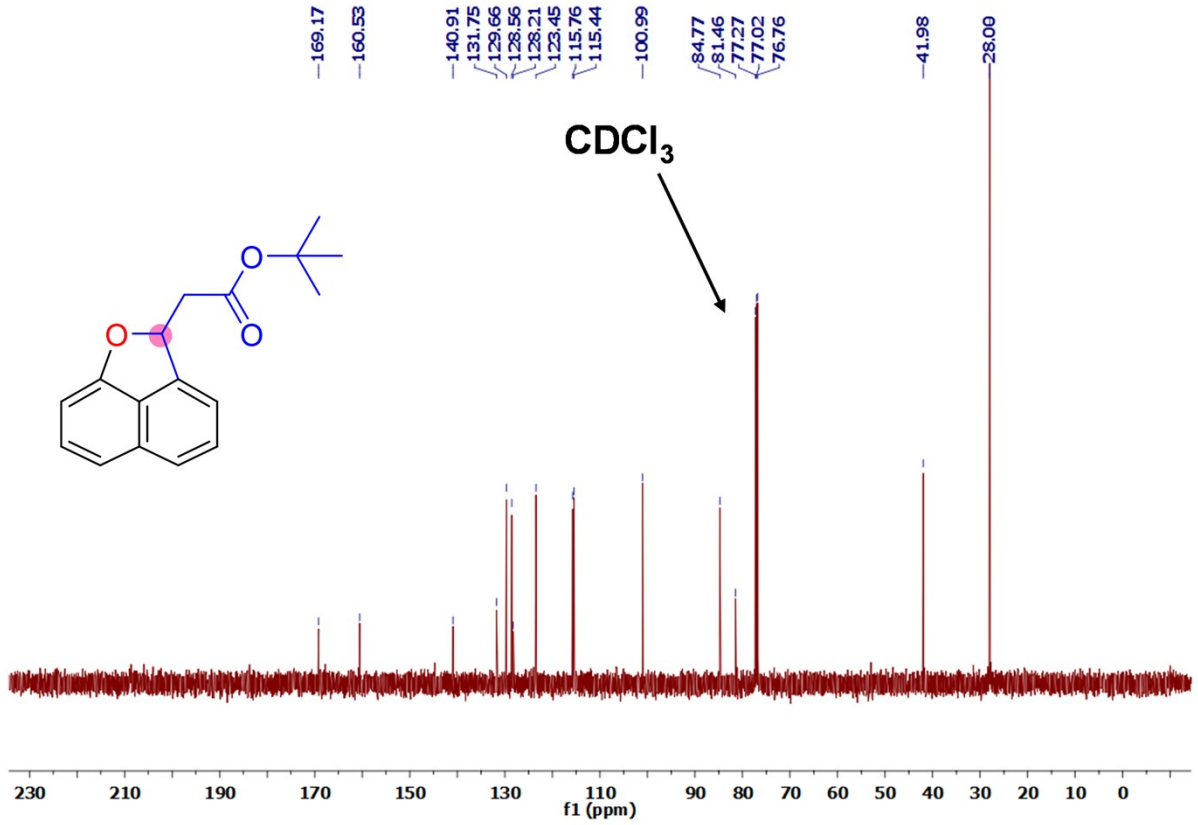
^{13}C NMR (126 MHz, $CDCl_3$) of 2-ethylhexyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5d**)



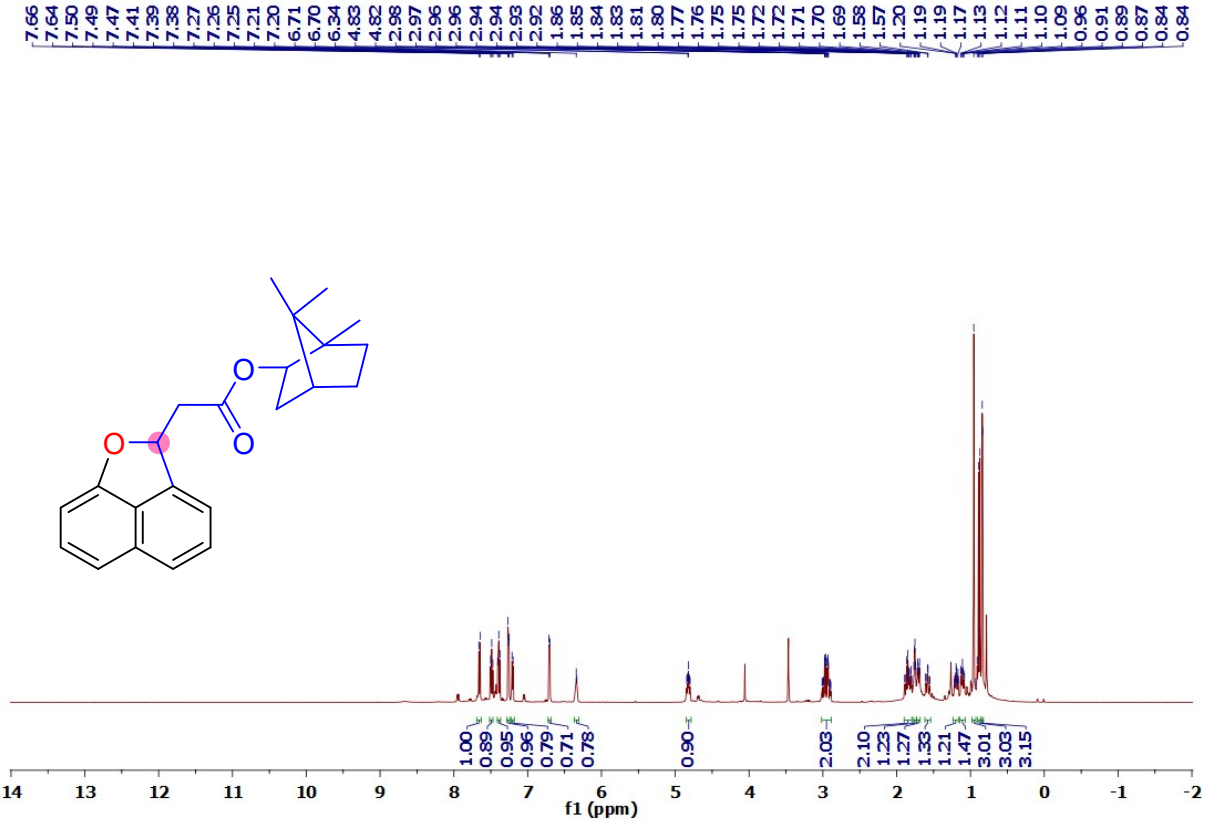
^{1}H NMR (500 MHz, $CDCl_3$) of tert-butyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5e**)



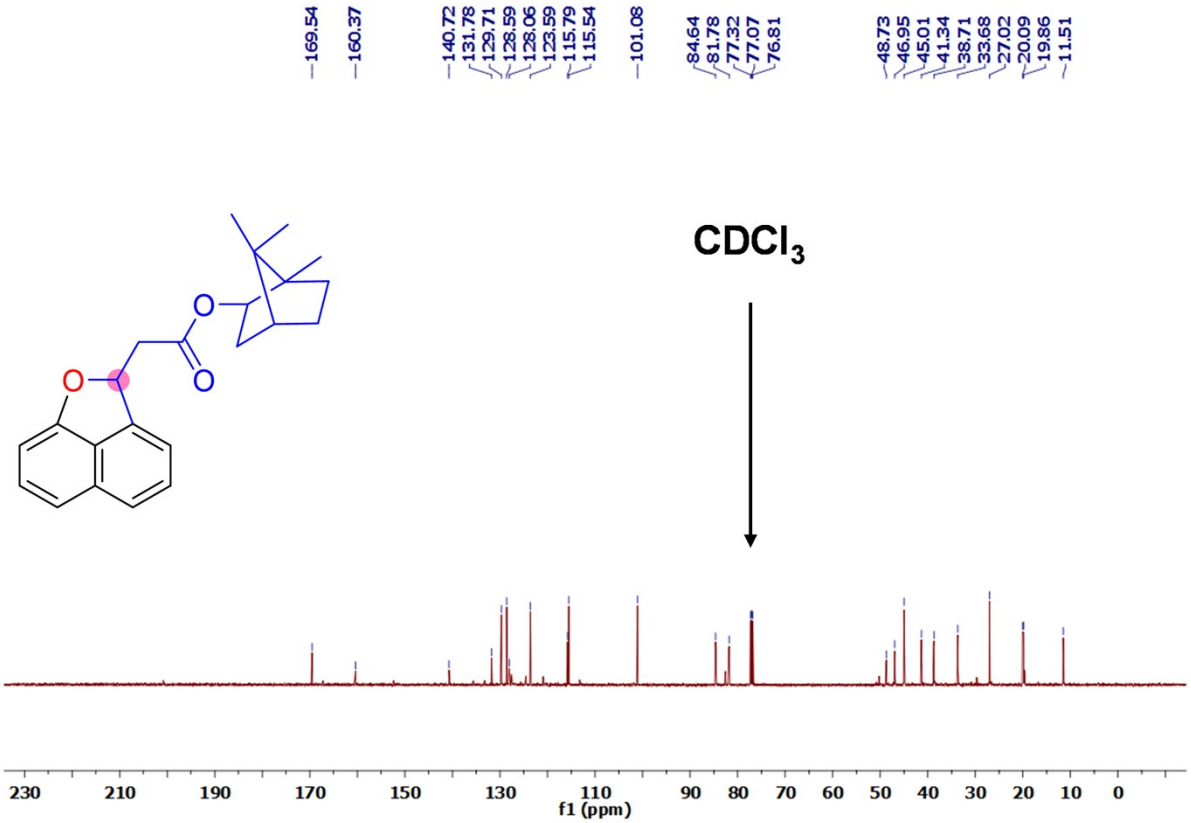
^{13}C NMR (126 MHz, $CDCl_3$) of tert-butyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5e**)



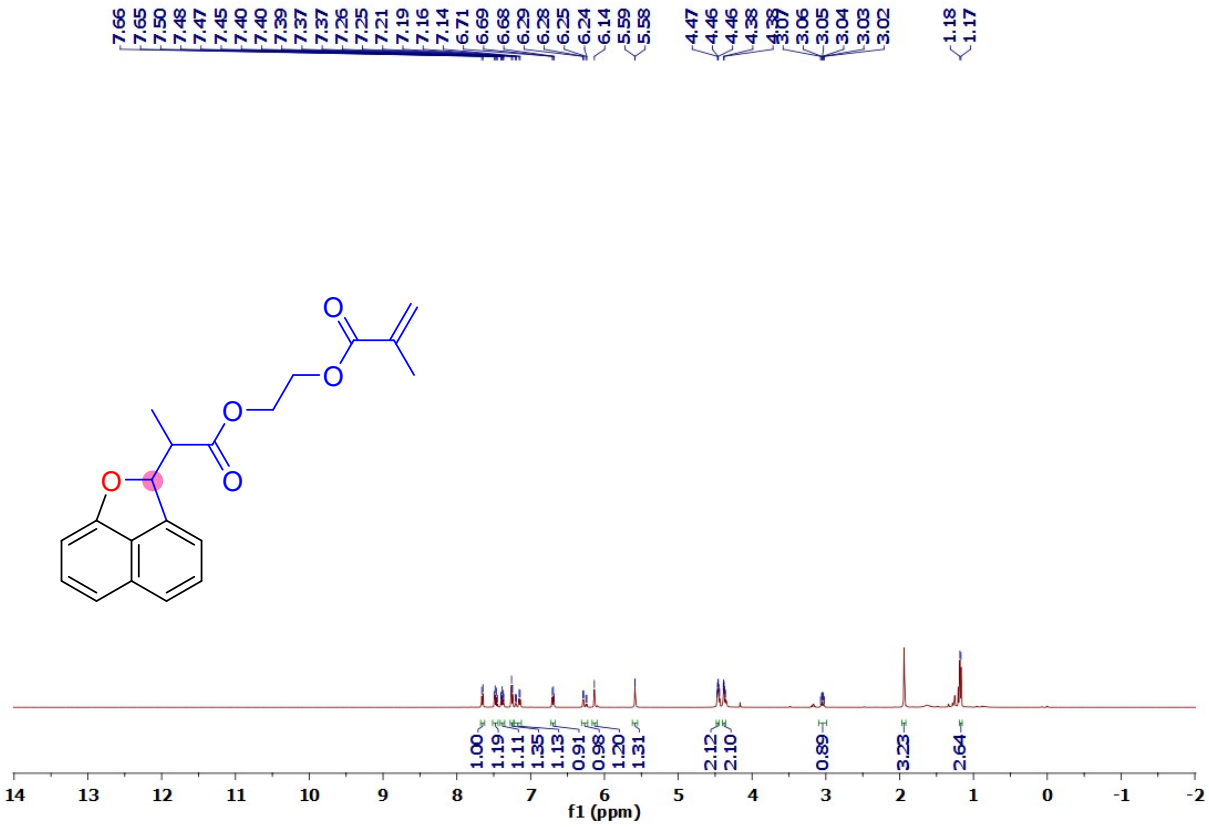
^{1}H NMR (500 MHz, $CDCl_3$) of (1R,2R,4R)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl 2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5f**)



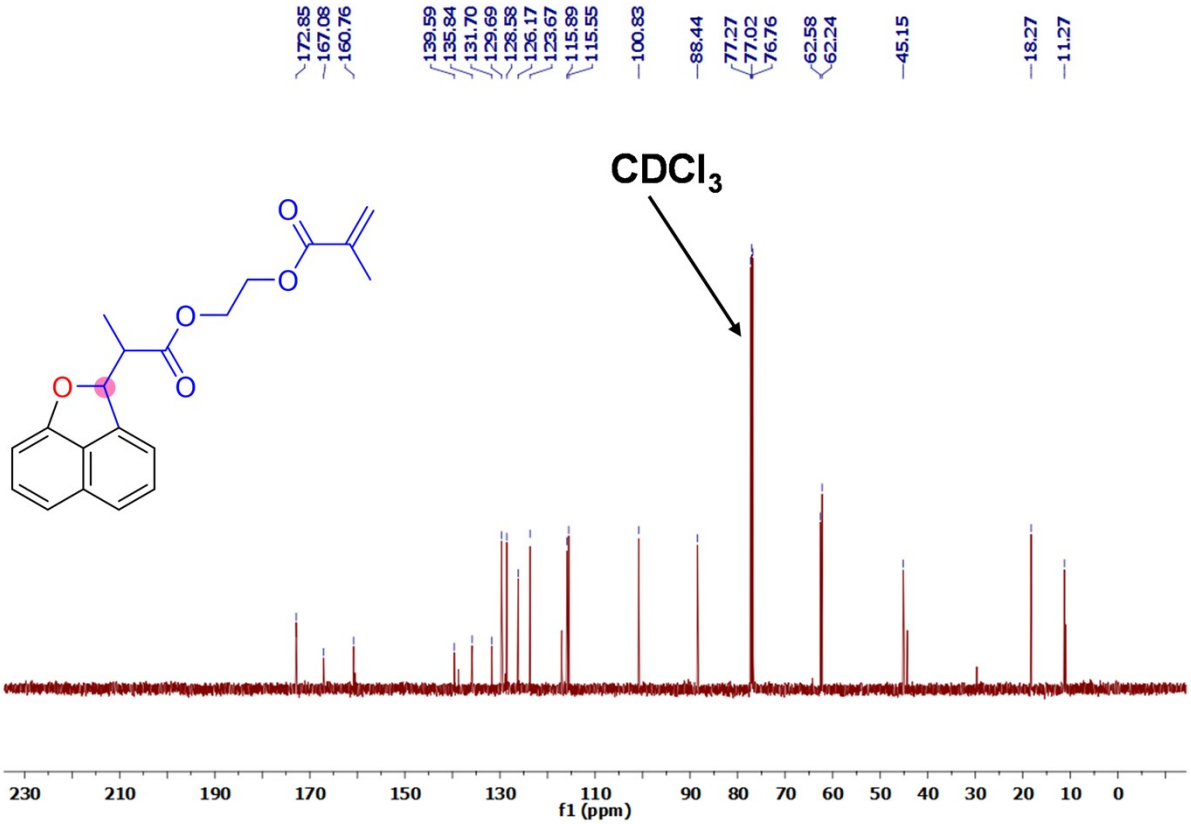
^{13}C NMR (126 MHz, $CDCl_3$) of (1R,2R,4R)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl 2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5f**)



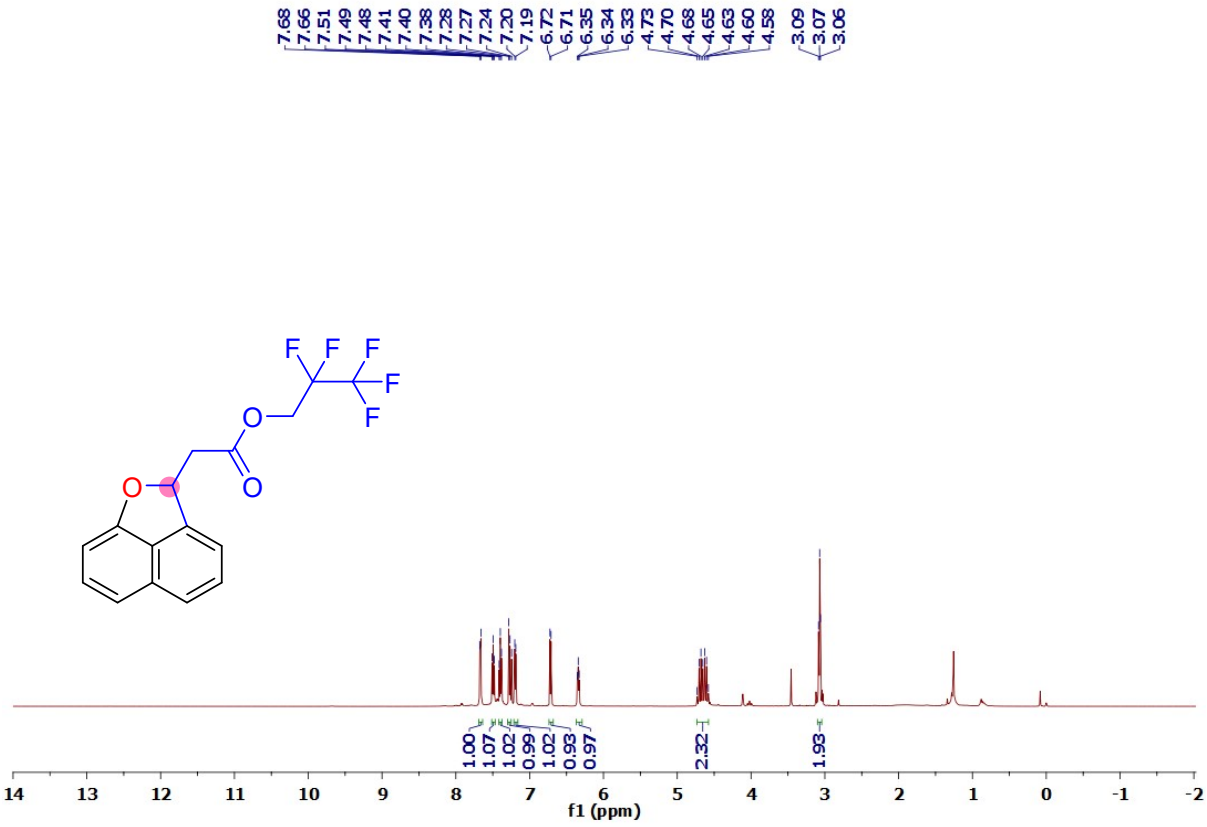
^{1}H NMR (500 MHz, $CDCl_3$) of 2-((2-(2H-naphtho[1,8-bc]furan-2-yl)propanoyl)oxy)ethyl methacrylate (**5g**)



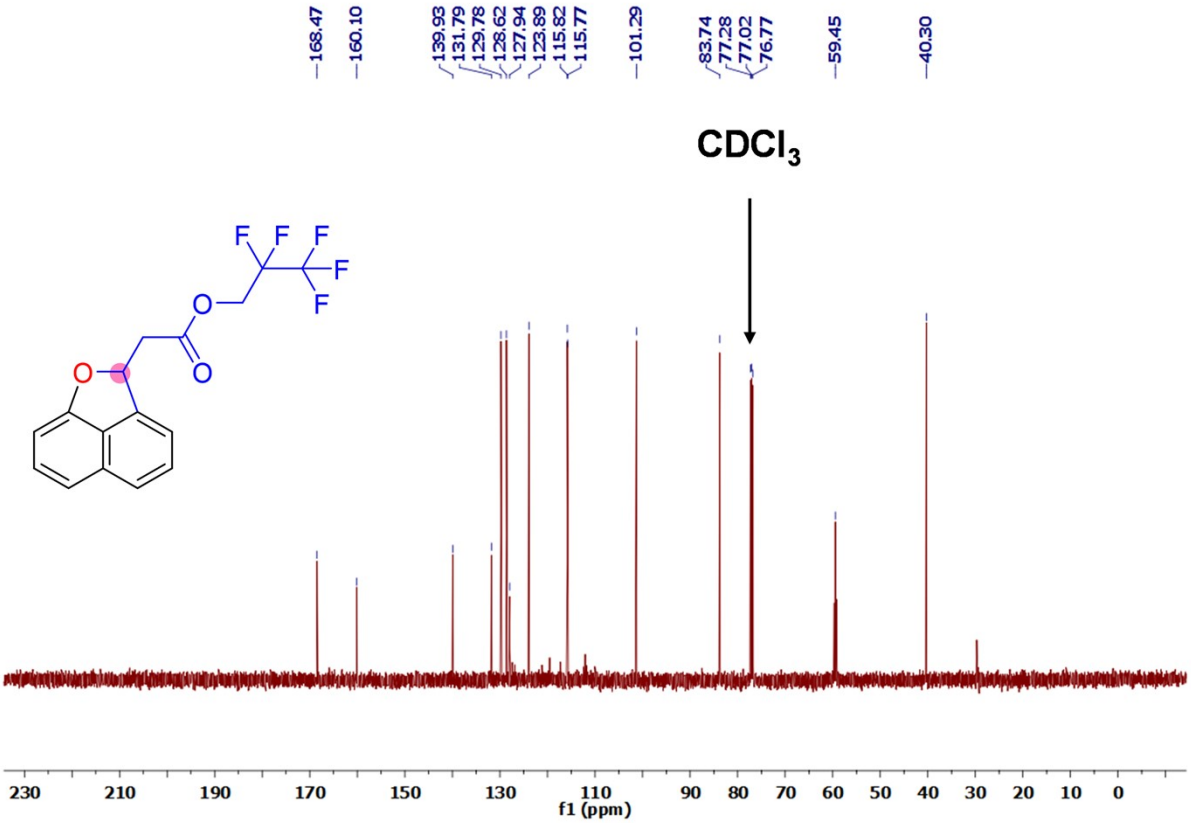
^{13}C NMR (126 MHz, $CDCl_3$) of 2-((2-(2H-naphtho[1,8-bc]furan-2-yl)propanoyl)oxy)ethyl methacrylate (**5g**)



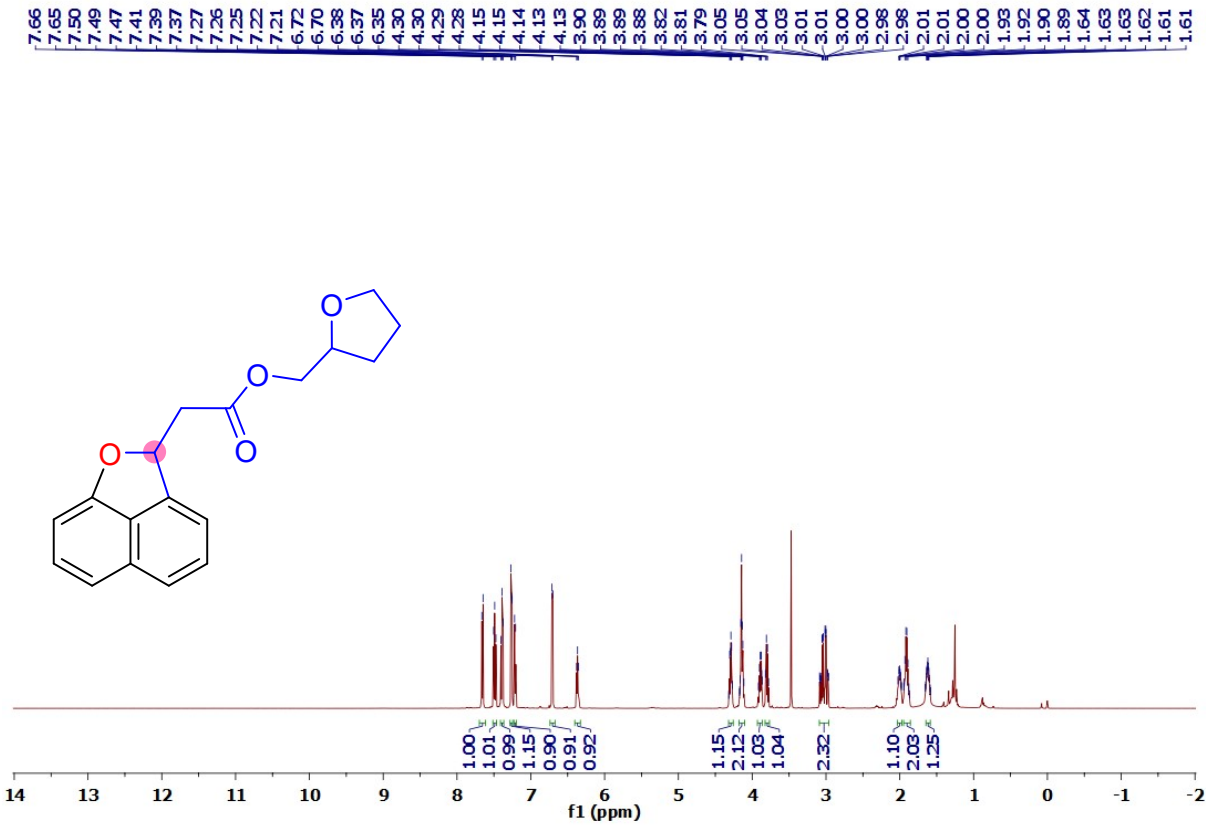
^{1}H NMR (500 MHz, $CDCl_3$) of 2,2,3,3,3-pentafluoropropyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5h**)



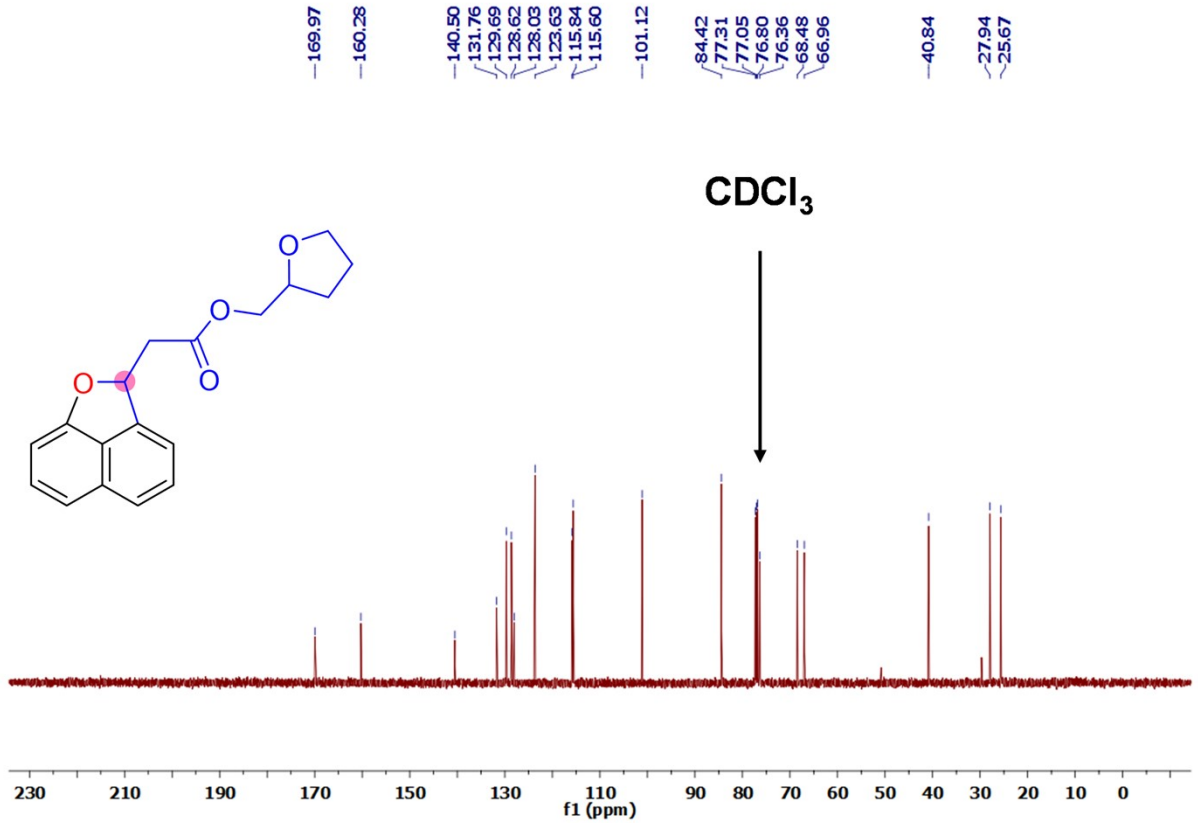
^{13}C NMR (126 MHz, $CDCl_3$) of 2,2,3,3,3-pentafluoropropyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5h**)



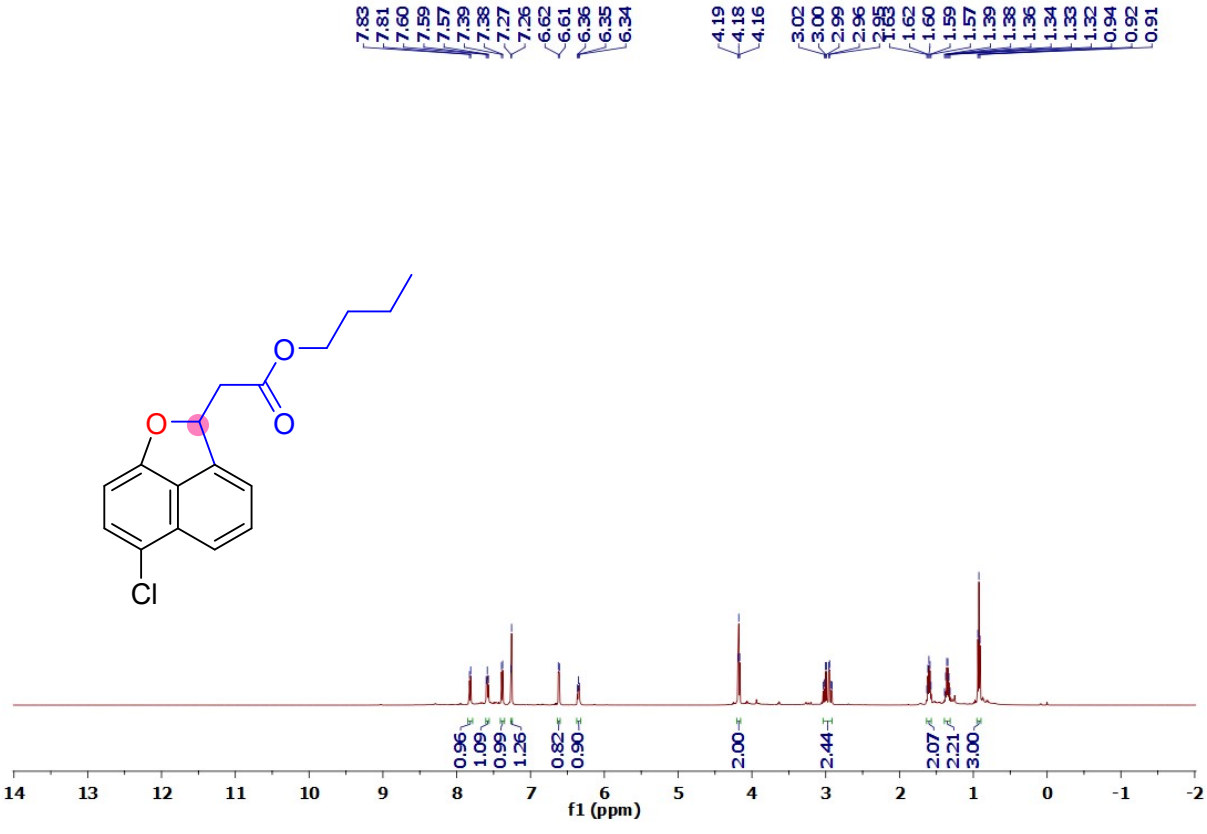
^{1}H NMR (500 MHz, $CDCl_3$) of (tetrahydrofuran-2-yl)methyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5i**)



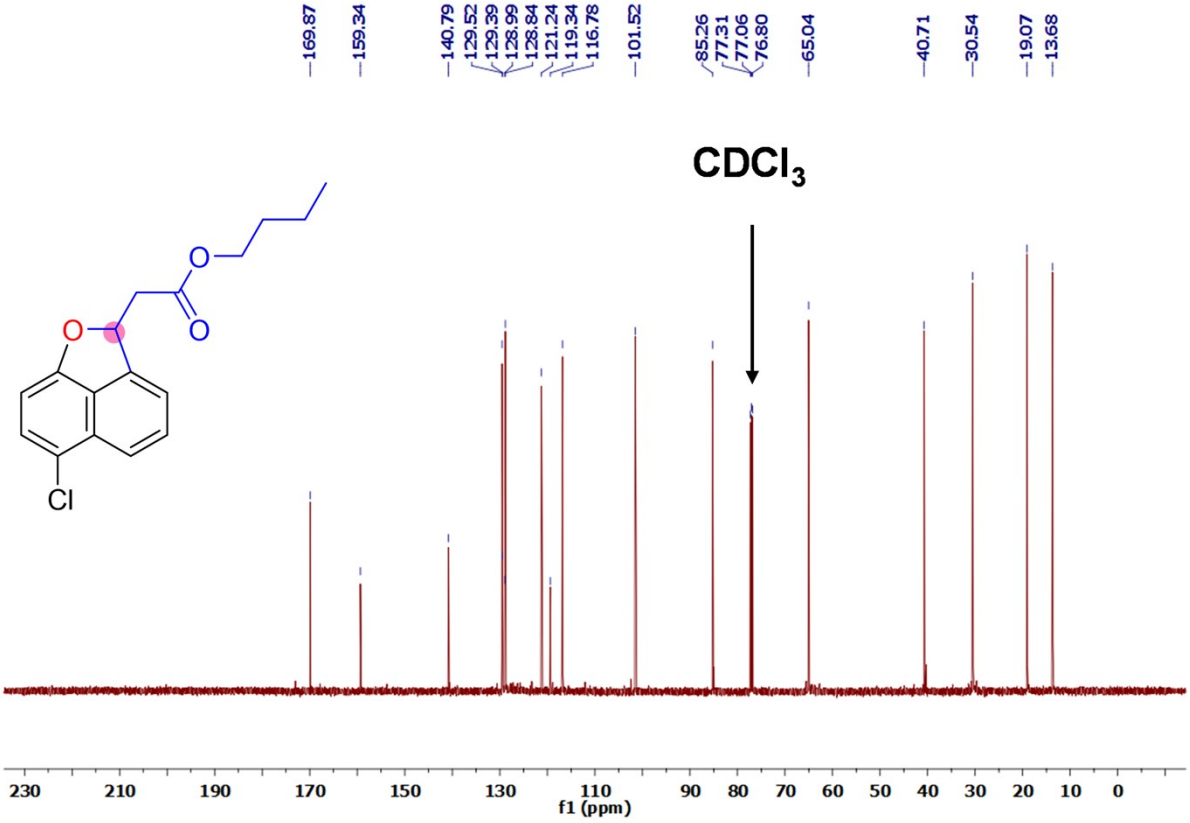
^{13}C NMR (126 MHz, $CDCl_3$) of (tetrahydrofuran-2-yl)methyl-2-(2H-naphtho[1,8-bc]furan-2-yl)acetate (**5i**)



^{1}H NMR (500 MHz, $CDCl_3$) of ethyl-2-(6-chloro-2H-naphtho[1,8-bc]furan-2-yl)acetate (**5j**)



^{13}C NMR (126 MHz, $CDCl_3$) of ethyl-2-(6-chloro-2H-naphtho[1,8-bc]furan-2-yl)acetate (**5j**)



7. References

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2. N. Patil, K. Subramanian and B. M. Bhanage, *Org. Biomol. Chem.*, 2024, **22**, 8743