Supporting Information

Synthesis of seven-membered lactones by regioselective and stereoselective iodolactonization of electron-deficient olefins

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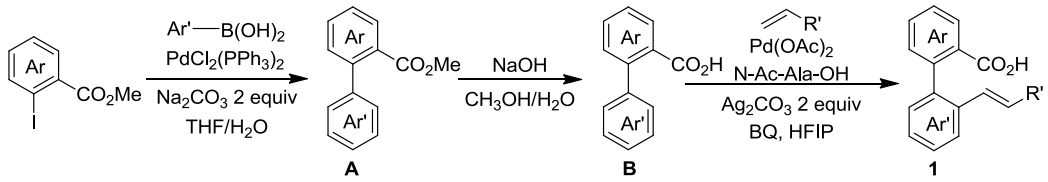
1. General Information

Unless otherwise noted, materials were purchased from Alfa-Aesar, Adamas, Aldrich Inc. and Energy Chemical and used as received. All reactions were carried out in a flame dried, sealed tube under an atmosphere of air. Analytical thin layer chromatography (TLC) was performed on silica gel plates with F-254 indicator and compounds were visualized by irradiation with UV light. Prepared column chromatography was performed on silica gel 60N (spherical and neutral, 1.0 mm thickness). NMR spectra were measured on Varian INOVA600 spectrometer and Bruker Mercury Plus 400 MHz NMR spectrometers. NMR spectras were recorded at 501 MHz and 400 MHz in $CDCl_3$ or DMSO-d_6. ^1H NMR spectras were referenced internally to tetramethylsilane as a standard, and ^{13}C NMR spectras were recorded at 101 MHz and referenced to the solvent resonance. ^1H NMR coupling constants were reported in Hz, and multiplicity was indicated as follows: s (singlet); d (doublet); t (triplet); q (quartet); m (multiplet); dd (doublet of doublets); dt (doublet of triplets); td (triplet of doublets); ddd (doublet of doublet of doublets). High resolution mass spectra (HRMS) were recorded on the Thermo Scientific Exactive Plus equipped with ESI ionization source. The diffraction data of crystals were collected on a Rigaku XtaLAB Synergy CCD diffractometer with graphite monochromated Cu-Ka radiation (λ = 1.54056 Å) at 293K.

2. Experimental Procedures

2.1 General procedure for preparation of substrates 1 and 3

a) General procedure for preparation of substrate 1

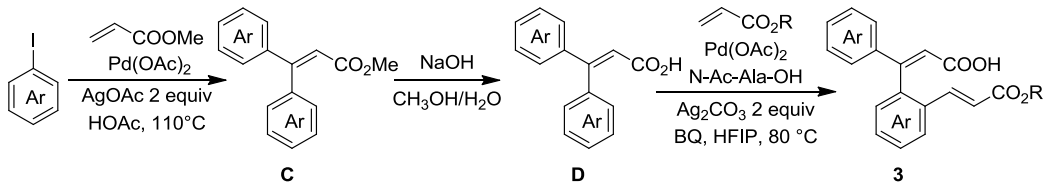


1) A schlenk tube was charged with methyl 2-iodobenzoate (10 mmol), arylboronic acid (12 mmol), Na_2CO_3 (2.1 g, 20 mmol) dissolved in THF (30 mL) and water (15 mL) mixed solvents. The reaction mixture was degassed three times and charged with argon, after which $PdCl_2(PPh_3)_2$ (8 mol%, 0.56 g, 0.8 mmol) was added. The reaction mixture was stirred at 60°C for 12 h and cooled to room temperature. Water (20 mL) was added to the mixture and extracted with CH_2Cl_2 (3×30 mL). The combined organic phases were dried with Na_2SO_4 and the solvent was evaporated via vacuo. Then, the crude product was purified by column chromatography (eluent: PE/EA = 40/1) to give a colorless liquid **A**.

2) The product **A** was dissolved in a solution of NaOH (5.0 equiv) in 30 mL H_2O and 30 mL MeOH and stirred at 50°C for 6 h. After reaction, the reaction mixture was evaporated in vacuo to remove methanol and diluted with H_2O. The aqueous phase was acidified with 3N HCl and then extracted three times with Et_2O. The combined organic phase was washed with H_2O and brine, dried over Na_2SO_4, filtered, and evaporated under reduced pressure to give the desired product **B** as a solid.

3) The carboxylic acid **B** (5 mmol, 1.0 equiv), $Pd(OAc)_2$ (112 mg, 0.5 mmol, 10 mol%), N-acetylalanine (130 mg, 1 mmol, 20 mol%), Ag_2CO_3 (2.77 g, 10 mmol, 2.0 equiv), benzoquinone (540 mg, 1.0 equiv), alkene (25 mmol, 5.0 equiv) and 20 mL HFIP were added to the sealed tube. The tube was sealed with a Teflon lined cap and the reaction mixture was stirred at 80°C for 12 h. After cooling to room temperature, the mixture was filtered over celite, concentrated under vacuum and the residue was purified by column chromatography (eluent: HOAc/EA/PE = 1/5/100) to give the substrate **1**.

b) General procedure for preparation of substrate 3

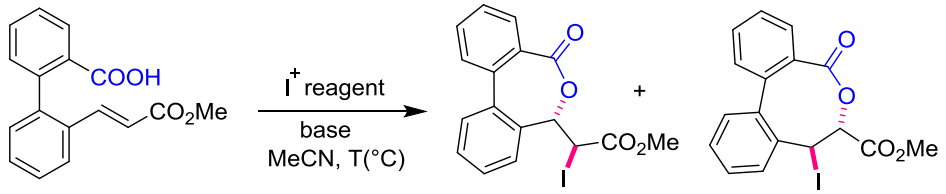


1) A sealed tube was charged with aryl iodide (18 mmol, 1.0 equiv), methyl acrylate (541 mg, 6.3 mmol, 0.35 equiv) and AgOAc (11.5 g, 34 mmol, 2.0 equiv) dissolved in HOAc (15 mL) and stirred at 110°C for overnight. After cooling to room temperature, the mixture was filtered through a pad of silica and washed with H_2O and saturated sodium carbonate solution three times to remove HOAc. The combined organic phases were dried with Na_2SO_4 and the solvent was evaporated via vacuo. Then, the crude product was purified by column chromatography (eluent: PE/EA = 40/1 to give a colorless liquid (**C**).

2) The product **C** was dissolved in a solution of NaOH (5.0 equiv) in 20 mL H_2O and 20 mL MeOH and stirred at 50°C for 6 h. After reaction, the reaction mixture was evaporated in vacuo to remove methanol and diluted with H_2O. The aqueous phase was acidified with 3N HCl and then extracted three times with Et_2O. The combined organic phase was washed with H_2O and brine, dried over Na_2SO_4, filtered, and evaporated under reduced pressure to give the desired product **D** as a solid.

3) The carboxylic acid **D** (2.5 mmol, 1.0 equiv), $Pd(OAc)_2$ (56 mg, 0.25 mmol, 10 mol%), N-acetylalanine (65 mg, 0.5 mmol, 20 mol%), Ag_2CO_3 (1.38 g, 5 mmol, 2.0 equiv), benzoquinone (270 mg, 1.0 equiv), alkene (12.5 mmol, 5.0 equiv) and 10 mL HFIP were added to the sealed tube. The tube was sealed with a Teflon lined cap and the reaction mixture was stirred at 80°C for 12 h. After cooling to room temperature, the mixture was filtered over celite, concentrated under vacuum and the residue was purified by column chromatography (eluent: HOAc/EA/PE = 1/5/100) to give the substrate **3**.

2.2 Optimization of Conditions

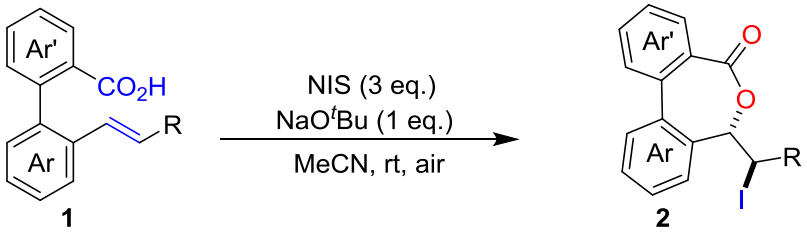


1a **2a** *exo* *endo*

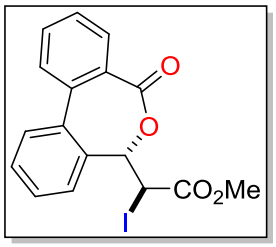
Entry	Base	I^+ reagent	T/°C	Yield of 2a	*dr* of 2a	*exo/endo*
1	K_2CO_3	I_2	100	40%	1.3:1	20:1
2	Cs_2CO_3	I_2	100	57%	1.7:1	> 20:1
3	Li_2CO_3	I_2	100	65%	2:1	> 20:1
4	$KHCO_3$	I_2	100	13%	3:1	13:1
5	$KHSO_4$	I_2	100	51%	4:1	17:1
6	K_2HPO_4	I_2	100	56%	2:1	18:1
7	KOH	I_2	100	42%	1:1	> 20:1
8	NaO^{t}Bu	I_2	100	58%	4:1	19:1
9	none	I_2	100	11%	1:1	6:1
10	NaO^{t}Bu	I_2	80	63%	10:1	13:1
11	NaO^{t}Bu	I_2	60	65%	15:1	14:1
12	NaO^{t}Bu	I_2	rt	70%	18:1	14:1
13[b]	NaO^{t}Bu	NIS	rt	90%	> 20:1	> 20:1
14[c]	NaO^{t}Bu	NIS	rt	88%	> 20:1	> 20:1
15	$KHCO_3$	NIS	rt	76%	> 20:1	> 20:1
16[d]	NaO^{t}Bu	NIS	rt	81%	> 20:1	> 20:1
17	NaO^{t}Bu	---	rt	0%	---	---

[a]Reaction conditions: 1a (0.1 mmol), base (1.0 eq.) iodine reagent (3.0 eq.), in 0.5 mL of MeCN at room temperature under air, 12 h. Yield, dr and exo/endo were determined by ^{1}H NMR analysis. [b]Isolated yield. [c]In Ar condition. [d]1.5 eq. of NIS. Dr = diastereoselectivity.

2.3 General Procedures for Products



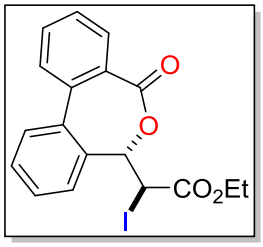
A mixture of **1** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. After reaction, the mixture was filtered through a pad of silica and concentrated under a reduced pressure. Then, the crude product was purified by prepared column chromatography to give the corresponding product.



methyl 2-iodo-2-(7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)acetate (2a)

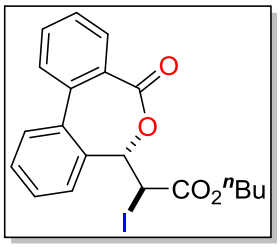
The general procedure was applied to **1a** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (55 mg, 90% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.99 (d, *J* = 7.6 Hz, 1H), 7.75-7.71 (m, 1H), 7.66 (d, *J* = 7.6 Hz, 1H), 7.63 (d, *J* = 7.6 Hz, 1H), 7.59-7.50 (m, 4H), 5.64 (d, *J* = 11.2 Hz, 1H), 5.01 (d, *J* = 11.2 Hz, 1H), 3.86 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.0, 167.9, 139.1, 137.0, 133.0, 131.5, 129.8, 129.7, 128.9, 128.8, 128.3, 125.2, 53.5, 14.6. **^{1}H NMR (501 MHz, DMSO-d$_6$)** δ 7.90 (d, *J* = 7.5 Hz, 1H), 7.86-7.82 (m, 2H), 7.79 (d, *J* = 7.5 Hz, 1H), 7.75 (d, *J* = 6.0 Hz, 1H), 7.68 (t, *J* = 7.0 Hz, 1H), 7.62 (t, *J* = 7.5 Hz, 1H), 7.58-7.55 (m, 1H), 5.47 (d, *J* = 11.5 Hz, 1H), 5.40 (d, *J* = 11.5 Hz, 1H), 3.77 (s, 3H). **^{13}C NMR (101 MHz, DMSO-d$_6$)** δ 171.0, 167.4, 138.2, 136.4, 133.6, 133.0,

130.9, 130.3, 129.5, 129.4, 129.3, 129.2, 128.6, 126.3, 77.5, 53.2, 14.8. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{17}H_{13}O_4INa$): 430.9751, found: 430.9741.



ethyl 2-iodo-2-(7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)acetate (2b)

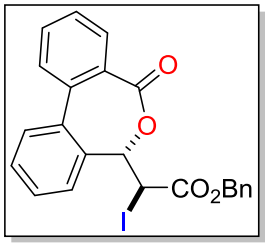
The general procedure was applied to **1b** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (51.3 mg, 81% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.98 (d, *J* = 8.0 Hz, 1H), 7.72 (t, *J* = 7.6 Hz, 1H), 7.67-7.62 (m, 2H), 7.58-7.49 (m, 4H), 5.64 (d, *J* = 11.2 Hz, 1H), 4.99 (d, *J* = 11.2 Hz, 1H), 4.41-4.22 (m, 2H), 1.32 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.4, 168.1, 139.2, 137.2, 133.2, 133.1, 131.6, 130.1, 130.0, 129.8, 129.0, 128.5, 125.3, 62.6, 15.3, 13.9. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{18}H_{15}O_4INa$): 444.9907, found: 444.9883.



butyl 2-iodo-2-(7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)acetate (2c)

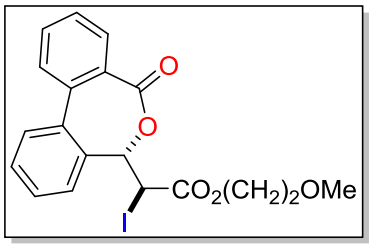
The general procedure was applied to **1c** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (52.6 mg, 78% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 7.97 (d, *J* = 8.0 Hz, 1H), 7.73-7.70 (m, 1H), 7.66-7.61 (m, 2H), 7.57-7.50 (m, 4H), 5.63 (d, *J* = 11.0 Hz, 1H), 4.99 (d, *J* = 11.5 Hz,

1H), 4.34-4.17 (m, 2H), 1.69-1.66 (m, 2H), 1.45-1.40 (m, 2H), 0.96 (t, *J* = 7.5 Hz, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.5, 168.1, 139.2, 137.2, 133.2, 133.1, 131.6, 130.1, 129.8, 129.0, 128.5, 125.3, 66.5, 30.4, 19.2, 15.4, 13.8. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{20}H_{19}O_4I$): 473.0220, found: 473.0193.



benzyl 2-iodo-2-(7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)acetate (2d)

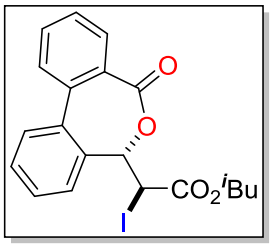
The general procedure was applied to **1d** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (52.9 mg, 73% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.89 (d, *J* = 7.6 Hz, 1H), 7.73-7.69 (m, 1H), 7.63 (t, *J* = 8.8 Hz, 2H), 7.57-7.48 (m, 4H), 7.41-7.40 (m, 5H), 5.63 (d, *J* = 11.6 Hz, 1H), 5.38 (d, *J* = 12.0 Hz, 1H), 5.17 (d, *J* = 12.0 Hz, 1H), 5.05 (d, *J* = 11.6 Hz, 1H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.3, 168.0, 139.2, 137.2, 134.8, 133.1, 131.6, 130.2, 130.0, 129.8, 129.0, 128.8, 128.7, 128.6, 128.5, 125.3, 68.3, 15.2. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{23}H_{17}O_4INa$): 507.0064, found: 507.0041.



2-methoxyethyl 2-iodo-2-(7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)acetate (2e)

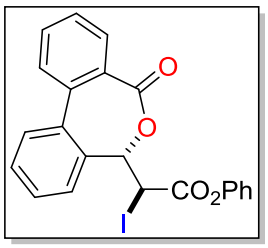
The general procedure was applied to **1e** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.3, PE/EtOAc = 5/1) to afford the title compound as white solid (57.6 mg, 85%

yield). **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.98 (d, *J* = 7.2 Hz, 1H), 7.74-7.70 (m, 1H), 7.64 (m, 2H), 7.58-7.49 (m, 4H), 5.65 (d, *J* = 11.2 Hz, 1H), 5.05 (d, *J* = 11.2 Hz, 1H), 4.49-4.33 (m, 2H), 3.66-3.63 (m, 2H), 3.42 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 169.5, 168.0, 139.2, 137.2, 133.1, 131.6, 130.2, 130.0, 129.8, 129.0, 128.5, 125.3, 70.1, 65.4, 59.2, 15.0. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{19}H_{17}O_5INa$): 475.0013, found: 474.9984.



isobutyl 2-iodo-2-(7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)acetate (2f)

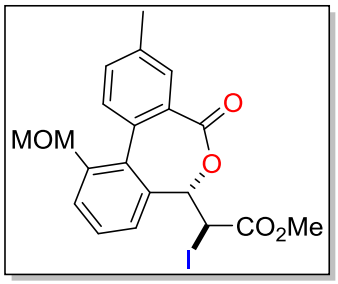
The general procedure was applied to **1f** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (54.6 mg, 81% yield). **^{1}H NMR (501 MHz, $CDCl_3$)** δ 7.96 (d, *J* = 7.5 Hz, 1H), 7.72 (t, *J* = 7.5 Hz, 1H), 7.67-7.61 (m, 2H), 7.57-7.49 (m, 4H), 5.63 (d, *J* = 11.5 Hz, 1H), 5.01 (d, *J* = 11.5 Hz, 1H), 4.04 (ddd, *J* = 63.0 Hz, 10.0 Hz, 6.5 Hz, 2H), 2.05-1.97 (m, 1H), 0.98 (s, 3H), 0.97 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 169.5, 168.1, 139.2, 137.2, 133.2, 133.1, 131.6, 130.1, 129.8, 129.0, 128.5, 125.4, 77.1, 72.6, 27.8, 19.2, 15.3. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{20}H_{19}O_4INa$): 473.0220, found: 473.0193.



phenyl 2-iodo-2-(7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)acetate (2g)

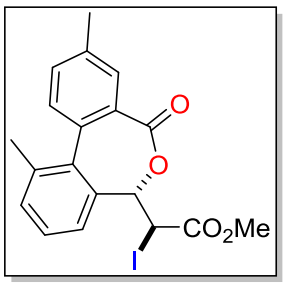
The general procedure was applied to **1g** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an

atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as White solid (56.4 mg, 80% yield). **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.97 (d, *J* = 8 Hz, 1H), 7.71 (t, *J* = 8 Hz, 1H), 7.67-7.63 (m, 2H), 7.59-7.52 (m, 4H), 7.44-7.40 (m, 2H), 7.27 (t, *J* = 7.2 Hz, 1H), 7.20-7.17 (m, 2H), 5.74 (d, *J* = 11.2 Hz, 1H), 5.23 (d, *J* = 11.2 Hz, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 168.1, 167.9, 150.4, 139.2, 137.1, 133.1, 132.9, 131.6, 130.2, 129.8, 129.6, 129.0, 128.5, 126.5, 125.1, 121.1, 14.9. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{22}H_{15}O_4INa$): 492.9907, found: 492.9877.



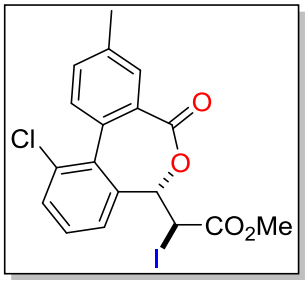
methyl 2-(1,9-dimethyl-7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)-2-iodoacetate (2h)

The general procedure was applied to **1i** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.5, PE/EtOAc = 3/1) to afford the title compound as white solid (27.8 mg, 41% yield). **^{1}H NMR (501 MHz, $CDCl_3$)** δ 7.73 (s, 1H), 7.66 (d, *J* = 7.5 Hz, 1H), 7.58 (d, *J* = 7.5 Hz, 1H), 7.49-7.42 (m, 3H), 5.56 (d, *J* = 11.5 Hz, 1H), 4.95 (d, *J* = 11.0 Hz, 1H), 4.31 (dd, *J* = 69.5 Hz, 11.0 Hz, 2H), 3.83 (s, 3H), 3.38 (s, 3H), 2.49 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 170.3, 168.6, 139.5, 138.3, 137.1, 134.2, 132.6, 132.2, 131.6, 131.0, 130.8, 130.6, 128.1, 124.8, 77.7, 72.9, 58.4, 53.6, 21.2, 14.9. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{20}H_{19}O_5INa$): 489.0196, found: 489.0142.



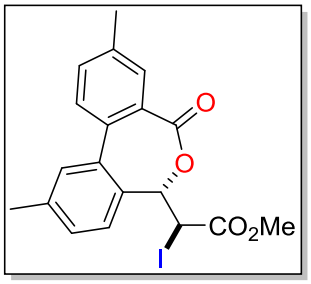
methyl 2-(1,9-dimethyl-7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)-2-iodoacetate (2i)

The general procedure was applied to **1h** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (49 mg, 75% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 7.72 (s, 1H), 7.46-7.42 (m, 2H), 7.39-7.30 (m, 3H), 5.53 (d, *J* = 11.5 Hz, 1H), 4.94 (d, *J* = 11.5 Hz, 1H), 3.83 (s, 3H), 2.48 (s, 3H), 2.37 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.3, 168.7, 139.0, 137.7, 137.3, 134.2, 132.9, 132.5, 132.3, 130.8, 130.6, 127.8, 122.8, 77.9, 53.6, 21.7, 21.2, 15.1. HRMS (ESI) exact mass calculated for [M+Na]$^+$ ($C_{19}H_{17}O_4INa$): 459.0064, found: 459.0039.



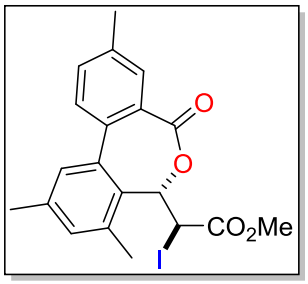
methyl 2-(1-chloro-7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)-2-iodoacetate (2j)

The general procedure was applied to **1j** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (47 mg, 71% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 7.77 (d, *J* = 8.0 Hz, 1H), 7.73 (s, 1H), 7.59-7.57 (m, 1H), 7.49 (d, *J* = 8.0 Hz, 1H), 7.38 (d, *J* = 5.0 Hz, 2H), 5.52 (d, *J* = 11.5 Hz, 1H), 4.91 (d, *J* = 11.5 Hz, 1H), 3.83 (s, 3H), 2.49 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.0, 168.0, 140.0, 136.5, 136.2, 134.0, 132.3, 132.2, 131.3, 130.8, 130.6, 130.1, 129.0, 123.9, 77.6, 53.7, 21.3, 14.7. HRMS (ESI) exact mass calculated for [M+Na]$^+$ ($C_{18}H_{14}O_4ClINa$): 478.9518/ 480.9488, found: 478.9493/ 480.9460.



methyl 2-(2,9-dimethyl-7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)-2-iodoacetate (2k)

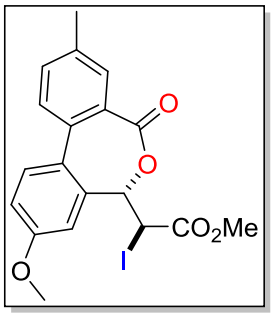
The general procedure was applied to **1k** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (49.7 mg, 76% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 7.78 (s, 1H), 7.55-7.50 (m, 2H), 7.40 (s, 1H), 7.36 (d, *J* = 7.5 Hz, 1H), 7.27 (d, *J* = 8.5 Hz, 1H), 5.59 (d, *J* = 11.0 Hz, 1H), 4.98 (d, *J* = 11.5 Hz, 1H), 3.84 (s, 3H), 2.47 (s, 3H), 2.44 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.3, 168.5, 140.1, 139.1, 134.5, 134.0, 131.9, 130.2, 129.8, 128.9, 125.2, 77.1, 53.6, 21.5, 21.1, 14.9. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{19}H_{17}O_4INa$): 459.0064, found: 459.0036.



Methyl 2-iodo-2-(2,4,9-trimethyl-7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl) acetate (2l)

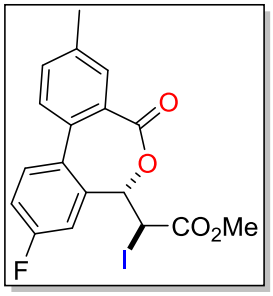
The general procedure was applied to **1l** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (62.7 mg, 93% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 7.68 (s, 1H), 7.51 (dd, *J* = 19.0 Hz, 8.0 Hz, 2H), 7.17 (s, 1H), 7.11 (s, 1H), 6.18 (d, *J* = 12.0 Hz, 1H), 4.49 (d, *J* = 12.0 Hz, 1H), 3.78 (s,

3H), 2.58 (s, 3H), 2.46 (s, 3H), 2.40 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 169.6, 168.2, 140.2, 139.1, 137.6, 137.5, 134.6, 134.3, 131.9, 131.7, 131.0, 130.0, 129.1, 129.0, 76.9, 53.6, 21.3, 21.1, 20.8, 17.5. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{20}H_{19}O_4INa$): 473.0220, found: 473.0192.



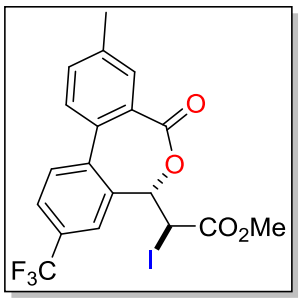
Methyl 2-iodo-2-(3-methoxy-9-methyl-7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl) acetate(2m)

The general procedure was applied to **1m** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.3, PE/EtOAc = 5/1) to afford the title compound as white solid (56.2 mg, 83% yield). **^{1}H NMR (501 MHz, $CDCl_3$)** δ 7.77 (s, 1H), 7.53-7.49 (m, 3H), 7.05 (d, *J* = 8.5 Hz, 1H), 7.00 (s, 1H), 5.60 (d, *J* = 11.0 Hz, 1H), 4.95 (d, *J* = 11.5 Hz, 1H), 3.90 (s, 3H), 3.85 (s, 3H), 2.46 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 170.2, 168.4, 159.5, 138.5, 134.4, 134.2, 134.1, 132.0, 131.6, 130.9, 129.3, 128.7, 115.2, 111.5, 77.1, 55.7, 53.7, 21.1, 14.7. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{19}H_{17}O_5INa$): 475.0013, found: 474.9988.



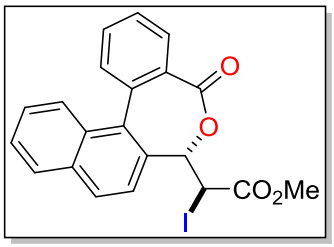
Methyl2-(3-fluoro-9-methyl-7-oxo-5,7-dihydrodibenzo[c,e]oxepin-5-yl)-2-iodoacetate (2n)

The general procedure was applied to **1n** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (54.1 mg, 82% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 7.79 (s, 1H), 7.58 (dd, *J* = 8.5 Hz, 5.5 Hz, 1H), 7.53-7.49 (m, 2H), 7.25-7.19 (m, 2H), 5.59 (d, *J* = 11.0 Hz, 1H), 4.91 (d, *J* = 11.0 Hz, 1H), 3.85 (s, 3H), 2.47 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.0, 168.0, 162.3 (d, *J* = 250.3 Hz), 139.4, 135.3 (d, *J* = 3.3 Hz), 135.1 (d, *J* = 7.4 Hz), 134.2, 133.54, 132.1, 131.5 (d, *J* = 8.4 Hz), 129.5, 128.9, 117.2 (d, *J* = 21.3 Hz), 112.9 (d, *J* = 23.7 Hz), 76.7, 53.7, 21.1, 14.3. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{18}H_{14}FO_4INa$): 462.9813, found: 462.9785.



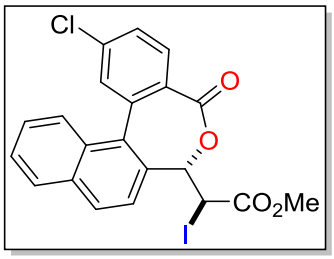
Methyl2-iodo-2-(9-methyl-7-oxo-3-(trifluoromethyl)-5,7-dihydrodibenzo[c,e]oxepin-5-yl)acetate (2o)

The general procedure was applied to **1o** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.5, PE/EtOAc = 5/1) to afford the title compound as white solid (47 mg, 64% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 7.84 (s, 1H), 7.80-7.73 (m, 3H), 7.57 (s, 2H), 5.64 (d, *J* = 11.0 Hz, 1H), 5.00 (d, *J* = 11.5 Hz, 1H), 3.87 (s, 3H), 2.50 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.0, 167.6, 142.7, 140.5, 134.3, 133.9, 133.0, 132.3, 130.3 (q, *J* = 33.1 Hz), 130.1, 129.8, 129.1, 126.9 (q, *J* = 3.1 Hz), 123.3 (q, *J* = 273.5 Hz), 122.8 (q, *J* = 3.7 Hz), 76.6, 53.8, 21.2, 14.2. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{19}H_{14}F_3O_4INa$): 512.9781, found: 512.9751.



methyl 2-iodo-2-(5-oxo-5,7-dihydrobenzo[c]naphtho[1,2-e]oxepin-7-yl)acetate (2p)

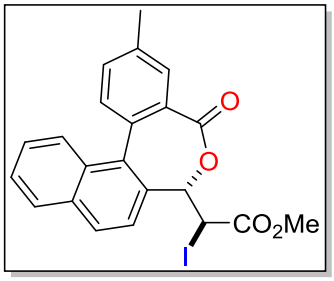
The general procedure was applied to **1p** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (42.6 mg, 62% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 8.03-7.92 (m, 4H), 7.80-7.73 (m, 2H), 7.65-7.54 (m, 3H), 7.50 (t, *J* = 7.5 Hz, 1H), 5.71 (d, *J* = 11.5 Hz, 1H), 5.06 (d, *J* = 11.5 Hz, 1H), 3.85 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.3, 168.3, 136.1, 134.5, 134.5, 131.8, 131.7, 131.5, 131.3, 130.8, 129.2, 128.8, 127.4, 127.1, 126.3, 121.9, 78.0, 53.7, 15.4. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{21}H_{15}O_4INa$): 480.9907, found: 480.9878.



Methyl2-(2-chloro-5-oxo-5,7-dihydrobenzo[c]naphtho[1,2-e]oxepin-7-yl)-2-iodoacetate (2q)

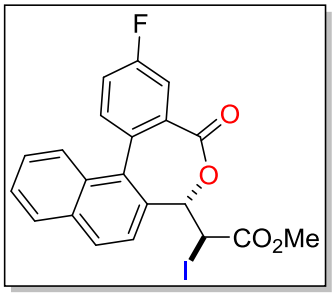
The general procedure was applied to **1q** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (38.3 mg, 52% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 8.01-7.94 (m, 4H), 7.79 (s, 1H), 7.63-7.55 (m, 4H), 5.69 (d, *J* = 11.0 Hz, 1H), 5.05 (d, *J* = 11.5 Hz, 1H), 3.86 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.1, 167.4, 138.0, 136.2, 134.7, 134.5, 132.3, 131.9, 131.6, 131.0,

130.2, 129.8, 129.4, 128.9, 127.9, 127.3, 125.8, 121.9, 78.1, 53.7, 15.1. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{21}H_{14}ClO_4INa$): 514.9518/ 516.9488, found: 514.9518/ 516.9494.



Methyl2-iodo-2-(3-methyl-5-oxo-5,7-dihydrobenzo[c]naphtho[1,2-e]oxepin-7-yl)acetate (2r)

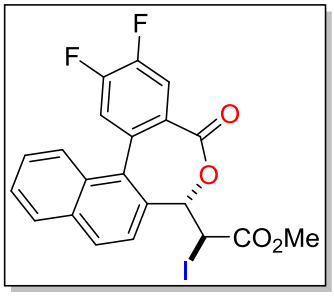
The general procedure was applied to **1r** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as White solid (49.5 mg, 70% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 8.02 (d, *J* = 8.8 Hz, 1H), 7.94 (d, *J* = 8.8 Hz, 1H), 7.91 (d, *J* = 7.6 Hz, 1H), 7.82(s, 1H), 7.67 (d, *J* = 8.0 Hz, 1H), 7.58 (d, *J* = 8.8 Hz, 1H), 7.55-7.52 (m, 2H), 7.49-7.45 (m, 1H), 5.71 (d, *J* = 11.6 Hz, 1H), 5.05 (d, *J* = 11.2 Hz, 1H), 3.85 (s, 3H), 2.52 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.3, 168.5, 139.5, 136.2, 134.5, 132.4, 131.7, 131.6, 131.5, 131.4, 131.0, 128.9, 128.7, 127.3, 127.0, 126.4, 121.9, 78.0, 53.7, 21.3, 15.5. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{22}H_{17}O_4INa$): 495.0064, found: 495.0030.



methyl2-(3-fluoro-5-oxo-5,7-dihydrobenzo[c]naphtho[1,2-e]oxepin-7-yl)-2-iodoacetate (2s)

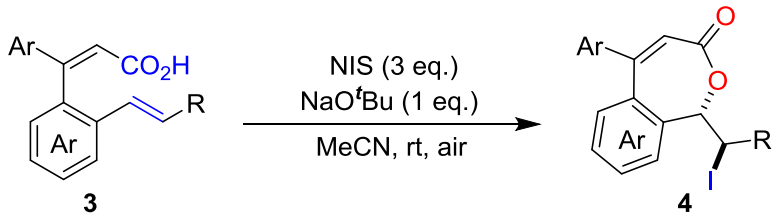
The general procedure was applied to **1s** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an

atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (44.2 mg, 62% yield). **^{1}H NMR (501 MHz, $CDCl_3$)** δ 7.99-7.93 (m, 3H), 7.80 (dd, *J* = 5.5 Hz, 6.0 Hz, 1H), 7.73-7.71 (m, 1H), 7.60-7.45 (m, 4H), 5.70 (d, *J* = 11.5 Hz, 1H), 5.06 (d, *J* = 11.5 Hz, 1H), 3.86 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 170.1, 166.9, 162.4 (d, *J* = 252.8 Hz), 135.2, 134.5, 133.9 (d, *J* = 7.7 Hz), 133.7 (d, *J* = 7.5 Hz), 131.4 (d, *J* = 20.6 Hz), 130.7 (d, *J* = 3.7 Hz), 129.4, 128.9, 127.6, 127.2, 126.0, 121.9, 119.1 (d, *J* = 21.6 Hz), 117.5 (d, *J* = 25.8 Hz), 78.3, 53.8, 15.1. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{21}H_{14}FO_4INa$): 498.9813, found: 498.9780.

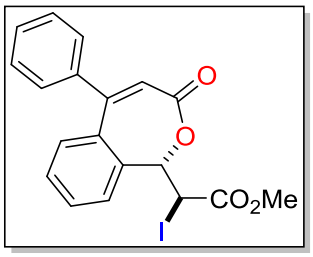


methyl2-(2,3-difluoro-5-oxo-5,7-dihydrobenzo[c]naphtho[1,2-e]oxepin-7-yl)-2-iodoacetate (2t)

The general procedure was applied to **1t** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (61.5 mg, 83% yield). **^{1}H NMR (501 MHz, $CDCl_3$)** δ 8.01-7.94 (m, 3H), 7.88-7.84 (m, 1H), 7.65-7.55 (m, 4H), 5.70 (d, *J* = 11.5 Hz, 1H), 5.05 (d, *J* = 11.0 Hz, 1H), 3.86 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 170.1, 166.1, 151.9 (dd, *J* = 259.0 Hz, 12.8 Hz), 150.3 (dd, *J* = 255.6 Hz, 13.0 Hz), 134.5, 134.1, 132.2 (dd, *J* = 7.1 Hz, 4.3 Hz), 131.7, 131.0, 129.9, 129.0, 128.7 (dd, *J* = 5.5 Hz, 3.5 Hz), 128.0, 127.4, 125.5, 121.9, 120.9 (d, *J* = 18.7 Hz), 120.2 (d, *J* = 19.2 Hz), 78.3, 53.8, 14.9. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{21}H_{13}F_2O_4INa$): 516.9719, found: 516.9690.

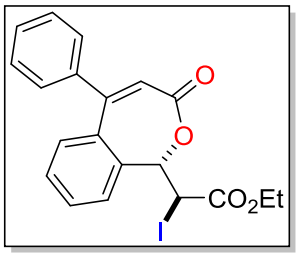


A mixture of **3** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. After reaction, the reaction mixture was filtered through a pad of silica and concentrated under a reduced pressure. The crude product was purified by prepared column chromatography to give the corresponding product **4**.



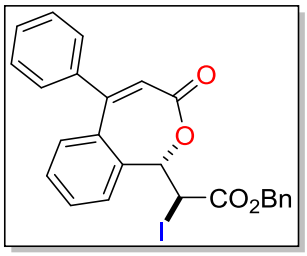
methyl 2-iodo-2-(3-oxo-5-phenyl-1,3-dihydrobenzo[c]oxepin-1-yl)acetate (4a)

The general procedure was applied to **3a** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (50.7 mg, 78% yield). **^{1}H NMR (501 MHz, CDCl$_3$)** δ 7.55-7.50 (m, 2H), 7.49-7.39 (m, 6H), 7.16 (d, *J* = 7.5 Hz, 1H), 6.58 (s, 1H), 5.89 (d, *J* = 11.5 Hz, 1H), 5.02 (d, *J* = 11.0 Hz, 1H), 3.87 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.0, 166.3, 151.5, 140.1, 137.8, 134.4, 131.2, 129.9, 129.4, 129.3, 128.8, 125.6, 120.0, 76.5, 53.7, 15.1. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{19}H_{15}O_4INa$): 456.9907, found: 456.9874.



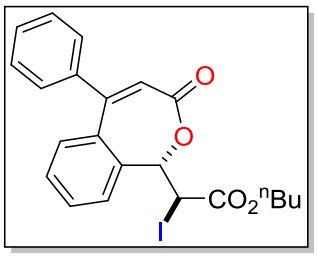
ethyl 2-iodo-2-(3-oxo-5-phenyl-1,3-dihydrobenzo[c]oxepin-1-yl)acetate (4b)

The general procedure was applied to **3b** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (41.6 mg, 62% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.56-7.52 (m, 2H), 7.49-7.39 (m, 6H), 7.16 (d, *J* = 7.6 Hz, 1H), 6.58 (s, 1H), 5.89 (d, *J* = 11.6 Hz, 1H), 5.00 (d, *J* = 11.2 Hz, 1H), 4.41-4.26 (m, 2H), 1.33 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.4, 166.2, 151.5, 140.1, 137.8, 134.5, 131.1, 129.9, 129.8, 129.4, 129.3, 128.8, 125.6, 120.0, 76.6, 62.7, 15.8, 13.9. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{20}H_{17}O_4INa$): 471.0064, found: 471.0031.



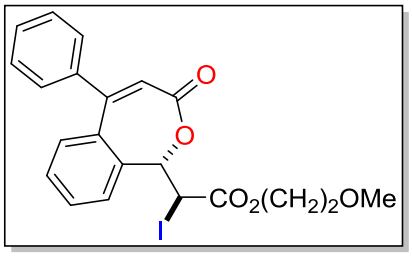
benzyl 2-iodo-2-(3-oxo-5-phenyl-1,3-dihydrobenzo[c]oxepin-1-yl)acetate (4c)

The general procedure was applied to **3c** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.5, PE/EtOAc = 5/1) to afford the title compound as white solid (50.4 mg, 66% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.54-7.44 (m, 4H), 7.43-7.34 (m, 9H), 7.15 (d, *J* = 7.6 Hz, 1H), 6.54 (s, 1H), 5.90 (d, *J* = 11.2 Hz, 1H), 5.34 (d, *J* = 8.0 Hz, 1H), 5.25 (d, *J* = 12.4 Hz, 1H), 5.06 (d, *J* = 11.2 Hz, 1H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.2, 166.2, 151.5, 140.1, 137.8, 134.9, 134.4, 131.2, 129.9, 129.8, 129.4, 129.3, 128.8, 128.7, 128.6, 125.6, 120.0, 76.5, 68.4, 15.7. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{25}H_{19}O_4INa$): 533.0220, found: 533.0197.



butyl 2-iodo-2-(3-oxo-5-phenyl-1,3-dihydrobenzo[c]oxepin-1-yl)acetate (4d)

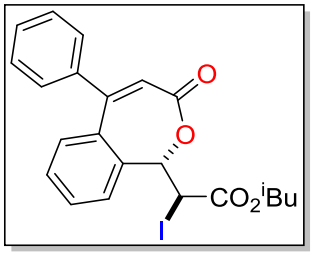
The general procedure was applied to **3d** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (66.4 mg, 93% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.56-7.49 (m, 2H), 7.47-7.37 (m, 6H), 7.16 (d, *J* = 7.6 Hz, 1H), 6.58 (s, 1H), 5.89 (d, *J* = 11.2 Hz, 1H), 5.01 (d, *J* = 11.2 Hz, 1H), 4.35-4.21 (m, 2H), 1.73-1.66 (m, 2H), 1.49-1.40 (m, 2H), 0.96 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.4, 166.2, 151.4, 140.1, 137.8, 134.5, 131.1, 129.9, 129.8, 129.4, 129.3, 128.8, 125.6, 120.0, 76.5, 66.5, 34.4, 19.1, 15.8, 13.8. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{22}H_{21}O_4INa$): 499.0377, found: 499.0345.



2-methoxyethyl 2-iodo-2-(3-oxo-5-phenyl-1,3-dihydrobenzo[c]oxepin-1-yl)acetate (4e)

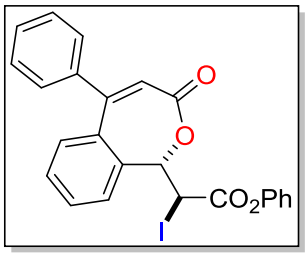
The general procedure was applied to **3e** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.5, PE/EtOAc = 3/1) to afford the title compound as white solid (67.4 mg, 94% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.54-7.39 (m, 8H), 7.16-7.13 (m, 1H), 6.57 (d, *J* = 3.2 Hz, 1H), 5.90 (d, *J* = 11.6 Hz, 1H), 5.06 (d, *J* = 11.2 Hz, 1H), 4.51-4.34 (m, 2H), 3.66-3.62 (m, 2H), 3.41 (t, *J* = 5.6 Hz, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.3,

166.1, 151.4, 140.1, 137.7, 134.4, 131.1, 129.8, 129.4, 129.2, 128.7, 125.5, 120.0, 76.5, 70.1, 65.3, 59.0, 15.4. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{21}H_{19}O_5INa$): 501.0169, found: 501.0136.



isobutyl 2-iodo-2-(3-oxo-5-phenyl-1,3-dihydrobenzo[c]oxepin-1-yl)acetate (4f)

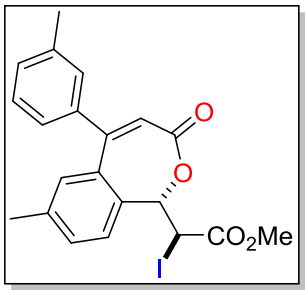
The general procedure was applied to **3f** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (68.5 mg, 78% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.57-7.49 (m, 2H), 7.48-7.38 (m, 6H), 7.16 (d, *J* = 7.6 Hz, 1H), 6.58 (s, 1H), 5.89 (d, *J* = 11.6 Hz, 1H), 5.03 (d, *J* = 11.2 Hz, 1H), 4.12-4.00 (m, 2H), 2.09-1.99 (m, 1H), 1.00 (d, *J* = 1.2 Hz, 3H), 0.99 (d, *J* = 1.0 Hz, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.3, 166.2, 151.4, 140.1, 137.7, 134.5, 131.1, 129.9, 129.8, 129.4, 129.3, 128.8, 125.6, 120.0, 76.5, 72.5, 27.8, 19.2, 15.8. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{22}H_{21}O_4INa$): 499.0377, found: 499.0348.



phenyl 2-iodo-2-(3-oxo-5-phenyl-1,3-dihydrobenzo[c]oxepin-1-yl)acetate (4g)

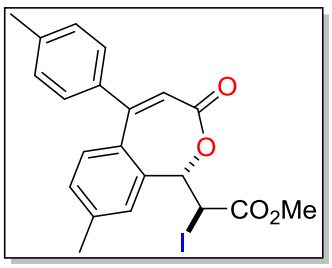
The general procedure was applied to **3g** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (26.8 mg, 36% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.62-7.54 (m, 2H), 7.48-7.41 (m, 8H), 7.29 (d,

J = 7.6 Hz, 1H), 7.20 (d, *J* = 8.0 Hz, 3H), 6.60 (s, 1H), 6.00 (d, *J* = 11.6 Hz, 1H), 5.24 (d, *J* = 11.6 Hz, 1H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 168.1, 166.2, 151.7, 150.5, 140.2, 137.8, 134.3, 131.4, 130.0, 130.0, 129.7, 129.6, 129.3, 128.8, 126.6, 125.5, 121.2, 120.0, 76.7, 15.4. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{24}H_{17}O_4INa$): 519.0064, found: 519.0031.



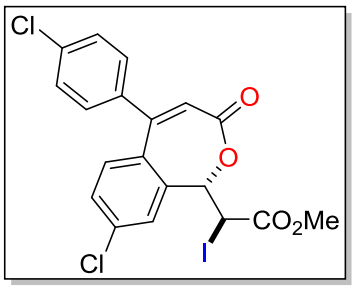
methyl2-iodo-2-(7-methyl-3-oxo-5-(m-tolyl)-1,3-dihydrobenzo[c]oxepin-1-yl)acetate (4h)

The general procedure was applied to **3h** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.5, PE/EtOAc = 5/1) to afford the title compound as white solid (61.6 mg, 89% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.43 (d, *J* = 8.0 Hz, 1H), 7.33-7.28 (m, 3H), 7.22 (s, 1H), 7.18 (d, *J* = 7.2 Hz, 1H), 6.95 (s, 1H), 6.53 (s, 1H), 5.86 (d, *J* = 11.2 Hz, 1H), 5.01 (d, *J* = 11.6 Hz, 1H), 3.86 (s, 3H) , 2.40 (s, 3H) , 2.31 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.1, 166.4, 151.8, 140.2, 139.6, 138.6, 137.8, 131.6, 131.5, 130.6, 129.8, 128.6, 126.5, 125.5, 119.9, 76.5, 53.6, 21.5, 21.3, 15.4. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{21}H_{19}O_4INa$): 485.0220, found: 485.0186.



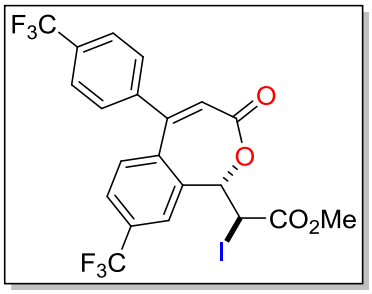
methyl2-iodo-2-(8-methyl-3-oxo-5-(p-tolyl)-1,3-dihydrobenzo[c]oxepin-1-yl)acetate (4i)

The general procedure was applied to **3i** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.5, PE/EtOAc = 5/1) to afford the title compound as white solid (34.6 mg, 50% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.32-7.28 (m, 3H), 7.24-7.19 (m, 3H), 7.05 (d, *J* = 8 Hz, 1H), 6.51 (s, 1H), 5.85 (d, *J* = 11.2 Hz, 1H), 5.00 (d, *J* = 11.2 Hz, 1H), 3.87 (s, 3H) , 2.46 (s, 3H) , 2.42 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 170.1, 166.6, 151.7, 140.2, 140.1, 137.4, 135.2, 134.3, 131.2, 130.1, 129.9, 129.5, 129.3, 126.2, 118.7, 76.5, 21.8, 21.4, 15.4. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{21}H_{19}O_4INa$): 485.0220, found: 485.0194.



methyl2-(8-chloro-5-(4-chlorophenyl)-3-oxo-1,3-dihydrobenzo[c]oxepin-1-yl)-2-iodoacetate (4j)

The general procedure was applied to **3j** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.5, PE/EtOAc = 5/1) to afford the title compound as white solid (72.3 mg, 96% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.53 (d, *J* = 2.0 Hz, 1H), 7.44-7.38 (m, 3H), 7.34 (s, 1H), 7.31 (s, 1H), 7.08 (d, *J* = 8.4 Hz, 1H), 6.56 (s, 1H), 5.83 (d, *J* = 11.2 Hz, 1H), 4.95 (d, *J* = 11.2 Hz, 1H), 3.87 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.7, 165.5, 149.2, 138.0, 136.4, 136.3, 136.2, 135.7, 132.3, 130.5, 129.8, 129.2, 126.4, 120.5, 76.0, 53.8, 14.5. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{19}H_{13}Cl_2O_4INa$): 524.9128/ 526.9098, found: 524.9098/ 526.9068.

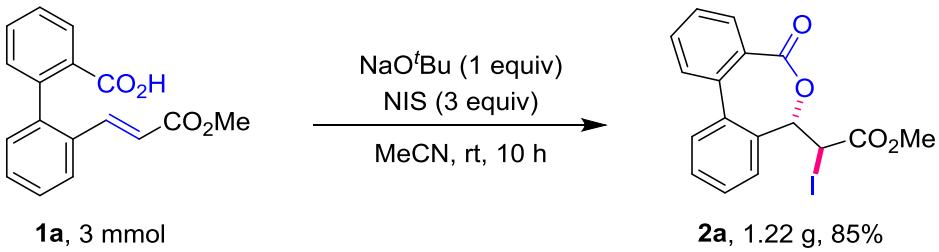


Methyl2-iodo-2-(3-oxo-8-(trifluoromethyl)-5-(4-(trifluoromethyl)phenyl)-1,3-dihydrobenzo[c]oxe-pin-1-yl)acetate (4k)

The general procedure was applied to **3k** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 5/1) to afford the title compound as white solid (70.9 mg, 83% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.81 (s, 1H), 7.74 (d, *J* = 8.4 Hz, 2H), 7.68 (d, *J* = 8.4 Hz, 1H), 7.53 (d, *J* = 8.0 Hz, 2H), 7.27 (s, 1H), 6.71 (s, 1H), 5.92 (d, *J* = 11.2 Hz, 1H), 5.03 (d, *J* = 11.6 Hz, 1H), 3.89 (s, 3H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 169.7, 164.9, 148.5, 142.8, 140.5, 135.5, 132.3 (q, *J* = 33.1 Hz), 132.0 (q, *J* = 34.3 Hz), 131.4, 129.6, 126.5 (q, *J* = 3.5 Hz), 126.1 (q, *J* = 3.5 Hz), 123.8 (q, *J* = 273.4 Hz), 123.5 (q, *J* = 3.7 Hz), 123.4 (q, *J* = 274.0 Hz), 123.0, 76.2, 53.9, 14.3. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{21}H_{13}F_6O_4INa$): 592.9655, found: 592.9616.

2.4 General Procedures for Synthetic Application

a) gram scale reaction



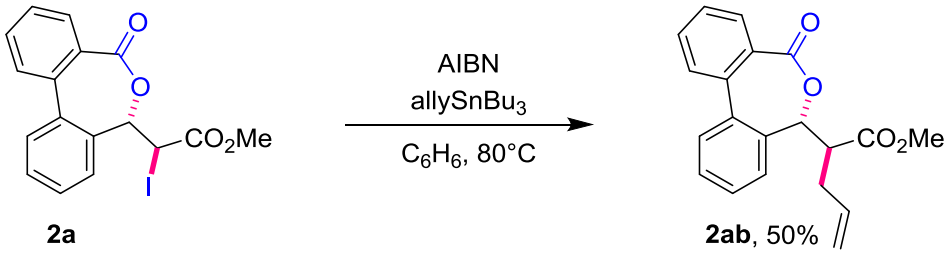
1a, 3 mmol

2a, 1.22 g, 85%

A mixture of **1a** (3 mmol), NIS (9 mmol), NaO^{t}Bu (3 mmol), MeCN (5 mL) in a 35 mL sealed tube was stirred at rt for 10 h under an atmosphere of air. The reaction mixture was filtered through a pad of silica and concentrated under a reduced pressure. The

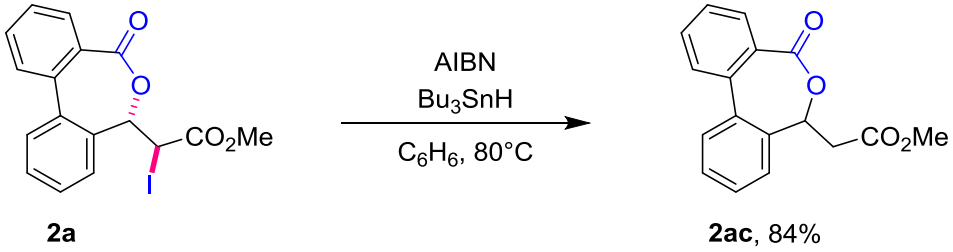
crude product was purified by column chromatography on silica to give the corresponding product **2a** (85%, 1.22g).

b) derivatization of product 2a[1]



2a **2ab**, 50%

A 25 mL Schlenk tube equipped with a magnetic stir bar was charged with iodolactone **2a** (20.4 mg, 0.05 mmol), allylSnBu$_3$ (60 µL, 0.20 mmol), and benzene (1.0 mL), The mixture was degassed (freeze-pump-thaw, 3 cycles) and then heated to 80 ºC. One portion of AIBN (1 mg, 0.05 eq) was added, and the mixture was stirred for 30 minutes. A second portion of AIBN (1 mg, 0.05 eq) was added, and the mixture was stirred for 4 hours until full conversion was achieved. Then the reaction was cooled to room temperature and the mixture was filtered through a pad of silica and concentrated under a reduced pressure. The crude product was purified by prepared column chromatography (R_f = 0.58, PE/EtOAc = 6/1) to yield a colorless oil **2ab** (8.1 mg, 50% yield). **^{1}H NMR (400 MHz, CDCl$_3$)** δ 7.97 (d, *J* = 7.6 Hz, 1H), 7.69 (t, *J* = 7.6 Hz, 1H), 7.63-7-59 (m, 2H), 7.56-7.48 (m, 3H), 7.44-7.40 (m, 1H), 5.84-5.73 (m, 1H), 5.26 (d, *J* = 10.8 Hz, 1H), 5.16 (d, *J* = 16.8 Hz, 1H), 5.09 (d, *J* = 10 .0Hz, 1H), 3.65-3.60 (m, 4H), 2.94-2.88 (m, 1H), 2.63-2.55 (m, 1H). **^{13}C NMR (101 MHz, CDCl$_3$)** δ 172.6, 169.6, 139.0, 137.4, 135.8, 133.5, 132.9, 131.3, 130.4, 129.8, 129.6, 129.1, 128.8, 128.7, 123.5, 118.5, 75.9, 52.1, 46.2, 34.4. HRMS (ESI) exact mass calculated for [M+Na]$^+$ ($C_{20}H_{18}NaO_4$): 345.1097, found: 345.1075.

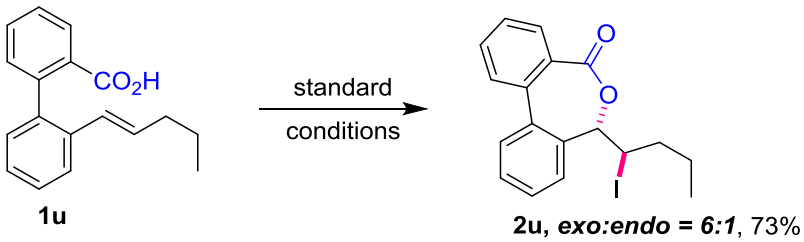


2a **2ac**, 84%

A 25 mL reaction Schlenk tube equipped with a magnetic stir bar was charged with iodolactone **2a** (81.6 mg, 0.20 mmol), Bu_3SnH (110 μL, 0.40 mmol), and benzene (2.0 mL), The mixture was degassed (freeze-pump-thaw, 3 cycles) and then heated to 80 ºC. One portion of AIBN (2 mg, 0.05 eq) was added, and the mixture was stirred for 30 minutes. A second portion of AIBN (2 mg, 0.05 eq) was added, and the mixture was stirred for another 30 minutes until full conversion was achieved. Then the reaction was cooled to room temperature and the mixture was filtered through a pad of silica and concentrated under a reduced pressure. The crude product was purified by prepared column chromato- graphy (R_f = 0.47, PE/EtOAc = 6/1) to yield a colorless oil **2ac** (46.2 mg, 84% yield). **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.00 (d, *J* = 7.2 Hz, 1H), 7.69 (td, *J* = 7.6 Hz, *J* = 1.2 Hz, 1H), 7.64-7.60 (m, 2H), 7.57-7.52 (m, 2H), 7.49-7.41 (m, 2H), 5.65 (dd, *J* = 8.8 Hz, *J* = 5.2 Hz, 1H), 3.73 (s, 3H), 3.38 (dd, *J* = 16.4 Hz, *J* = 8.8 Hz, 1H), 3.20 (dd, *J* = 16.4 Hz, *J* = 5.2 Hz, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 170.4, 169.5, 139.0, 137.2, 135.8, 132.9, 131.7, 130.6, 130.1, 129.5, 129.0, 128.8, 128.8, 123.7, 73.3, 52.4, 36.1. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{17}H_{14}NaO_4$): 305.0784, found: 305.0778.

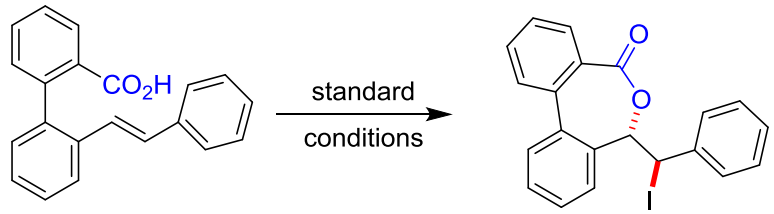
2.5 General Procedures for Mechanistic Experiments

a) evaluate substituent effect on the regioselectivity



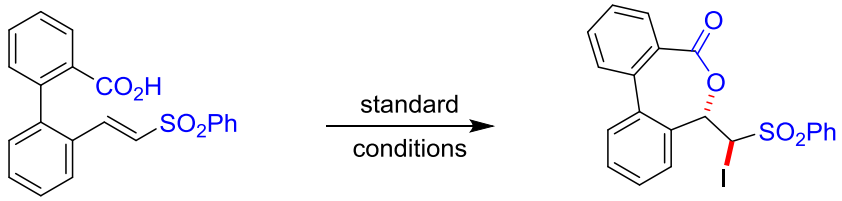
The general procedure was applied to **1u** (0.15 mmol), NIS (0.45 mmol), NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.6, PE/EtOAc = 15/1) to afford the product as light yellow solid (43 mg, 73%

yield). **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.98 (d, *J* = 8.0 Hz, 1H), 7.71 (d, *J* = 7.2 Hz, 1H), 7.67-7.65 (m, 1H), 7.60-7.56 (m, 3H), 7.54-7.51 (m, 1H), 7.50-7.48 (m, 1H), 5.27 (d, *J* = 10.4 Hz, 1H), 4.74 (t, *J* = 10.0 Hz, 1H), 2.27 (s, 1H), 2.00-1.91 (m, 1H), 1.77-1.68 (m, 1H), 1.59-1.48 (m, 1H), 4.74 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 168.6, 138.8, 137.5, 135.1, 132.9, 131.2, 130.1, 129.6, 129.5, 128.8, 128.7, 128.2, 125.4, 37.5, 30.2, 22.5, 13.3. HRMS (ESI) exact mass calculated for $[M+Na]^+$ ($C_{18}H_{17}IO_2Na$): 415.0165, found: 415.0154.



1v **2v, no product**

A mixture of **1v** (0.15 mmol), NIS (0.45 mmol) NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. However, the product **2v** was not observed.



1w **2w, exo:endo = 1.4:1, 34%**

A mixture of **1w** (0.15 mmol), NIS (0.45 mmol) NaO^{t}Bu (0.15 mmol), MeCN (0.5 mL) in a 35 mL sealed tube was stirred at rt for 12 h under an atmosphere of air. The crude product was purified by prepared column chromatography (R_f = 0.3, PE/EtOAc = 3/1) to afford the mixed product (25 mg, 34% yield). **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.03 (d, *J* = 7.6 Hz, 2H), 7.99-7.94 (m, 3H), 7.81-7.55 (m, 1H), 7.73-7.67 (m, 4H), 7.65-7.59 (m, 6H), 7.57-7.41 (m, 9H), 7.38- 7.36 (m, 1H), 5.90 (d, *J* = 10.8 Hz, 1H), 5.68 (d, *J* = 10.8 Hz, 1H), 5.62 (d, *J* = 11.6 Hz, 1H), 5.33 (d, *J* = 11.6 Hz, 1H).

3. DFT Calculations

3.1 Computational Details

All the geometry of reactants, intermediate and transition states were fully optimized by using M06-2X functional[2] with BSI basis set (BSI designates the basis set combination of LANL2DZ[3] for I atom and 6-31G(d,p) for other atoms). Frequency for all species were calculated at the same level in order to verify the intermediate and

transition state. Moreover, aiming to obtain more accuracy thermodynamics, single-point energy calculations were performed at the M06-2X/BSII level (BSII designates the basis set combination of SDD[4] for I atom and 6-311++G(d, p) for other atoms) based on the optimized structures. The bulk solvent effect of CH_3CN were considered by using Truhlar and coworkers' SMD solvation model.[5] All the calculations were carried out using the Gaussian 09 program[6], and all the structures were generated by CYLview.[7]

After the formation of intermediate A, the reaction could accomplish through deprotonation following by carboxylation as exhibited in Figure S2. The deprotonation was proposed to produce an intermediate containing containing zwitterion structure. However, such intermediate is unstable. Thus it tends to isomerize to the intermediate with five-membered ring lactone (see **1A-iso**). The carboxylation could achieve by attacking the C-C-I moiety through both α-C and β-C. The corresponding trantions state is **TS_{AC}-iso** and **TS_{AB}-iso** respectively. Unfortunately, the free energy barrrier of these two peocesses are extremely high (38.2 kcal/mol and 64.6 kcal/mol respectively). As a result, this mechanism is of no importance.

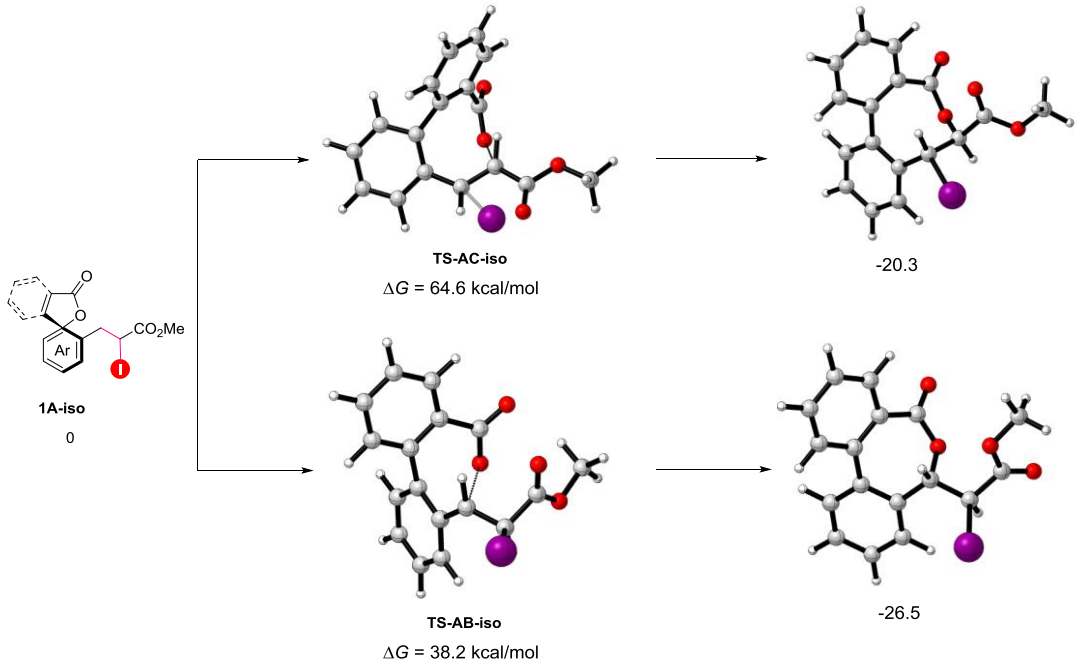
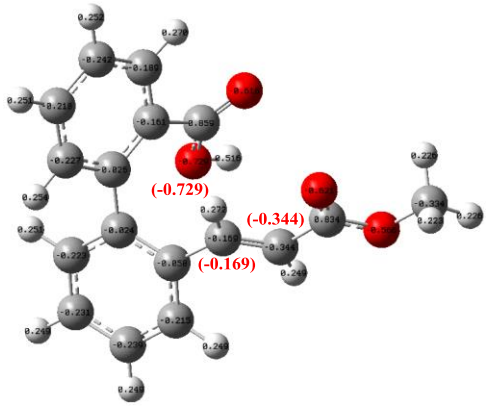
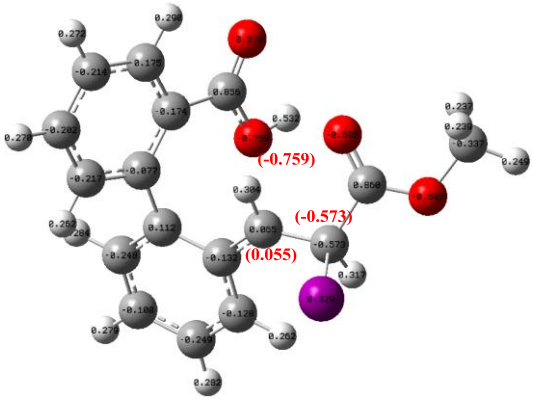


Figure S1. The reaction mechanism takes place through deprotonation following by carboxylation.



1a

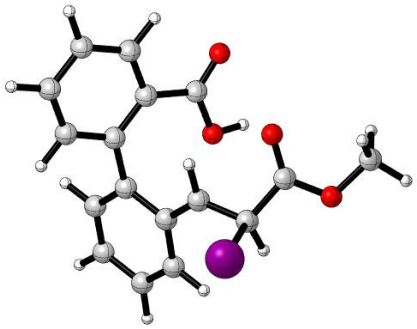


A

Figure S2. The NPA charge of intermediate **1a** and **A**.

3.2 Optimized cartesian coordinates (xyz)

A



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C	-2.33126700	-3.25356700	-1.6968480
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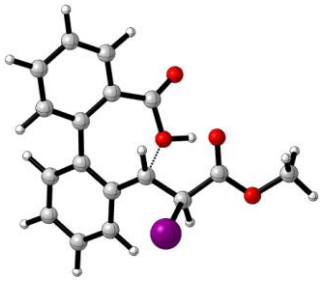
TS-AB



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C	2.57664100	-1.28324300	0.01778000
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C	3.33017900	-2.21162500	0.74791500
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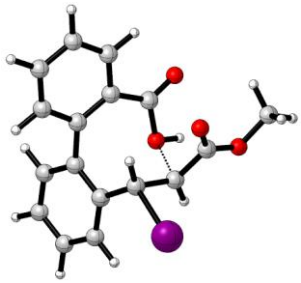
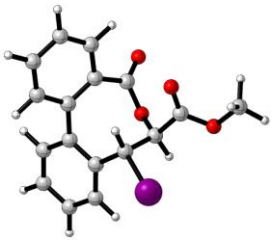
TS-AC



B



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H	-5.24692900	-0.17917600	-2.64180500	H	4.14902600	0.29442700	-3.28991100
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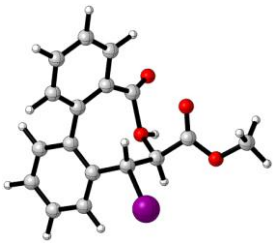
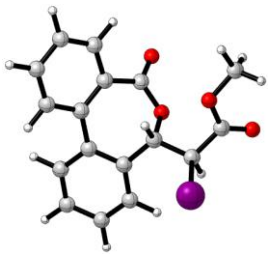
C **2a**





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C	-2.62641700	0.28338700	-0.33467900
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C	-3.52710300	0.55533500	-1.37471000
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H	4.31668400	-0.58008500	3.10522500
H	3.87766200	-2.91484000	2.35563800
C	-0.47445100	0.41159900	0.08517000
C	-0.74563400	-0.54725300	-1.08280500
H	-0.02748300	-0.14386500	0.90850100
H	-1.41516500	-0.07802700	-1.80615000
C	1.43773200	-1.62400200	-1.30308300
O	1.79702900	-2.57226900	-1.94327800
O	0.43559300	-0.83622200	-1.81517300
C	-1.34154200	-1.85754900	-0.57435500
O	-0.74005400	-2.59037100	0.17284200
O	-2.55955000	-2.08638500	-1.05117800
I	-2.39467500	1.03820700	0.91972200
C	-3.17220100	-3.29011500	-0.57684200
H	-4.14546800	-3.33661100	-1.05995200
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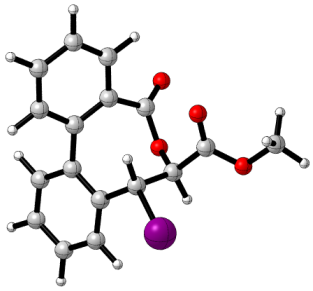
H	-3.27873600	-3.25006600	0.5089670

2a-E



C	0.83659300	3.66095700	-1.43232300
C	-0.04850900	2.70134500	-0.95331800
C	0.42252500	1.52925900	-0.36482700
C	1.80711900	1.30851800	-0.27303000

1A-iso

C	-1.27975900	-0.24200500	-3.38670500
C	-0.33539300	-0.19552800	-2.42813400
C	-0.56232100	0.51375000	-1.17392700
C	-2.01071100	0.85008400	-0.83702800
C	-2.88667100	1.00799700	-2.05393200
C	-2.55900300	0.44780700	-3.22194500
H	-1.08264100	-0.75854700	-4.32032400
H	0.62742600	-0.66998000	-2.58969000
H	-3.82330300	1.53308900	-1.89532200
H	-3.23232900	0.51096800	-4.07028700
C	-2.59736400	-0.22144000	0.07479200

C	-2.94654200	0.37089100	1.27305300
C	-2.79565000	-1.57876000	-0.13975300
C	-3.50362800	-0.35265000	2.32107900
C	-3.34941100	-2.31623400	0.90445100
H	-2.52522200	-2.04560200	-1.08186700
C	-3.70021800	-1.71429300	2.12085700
H	-3.76867800	0.14059400	3.25031600
H	-3.51349100	-3.38120900	0.77508600
H	-4.12957300	-2.32136800	2.91057000
C	0.40709600	0.79475600	-0.28510400
C	1.83103100	0.45807300	-0.47223800
H	0.17264500	1.31178200	0.64127600
H	2.16220900	0.41529400	-1.50723600
C	-2.62747700	1.81443400	1.19223700
O	-2.78763000	2.68355600	1.99904800
O	-2.07843300	2.04364900	-0.04357900
C	2.75207300	1.35262900	0.33155900
O	2.43573700	1.93217800	1.33784000
O	3.96283000	1.41625700	-0.23029200
I	2.24347500	-1.61663500	0.24785700
C	4.91277700	2.20369600	0.49096100
H	5.83413700	2.15815600	-0.08577300
H	4.56076800	3.23304600	0.58047200
H	5.06085900	1.79105800	1.49088500

TS-AB-iso

C	-0.84456200	3.41650200	1.83831500
C	0.01318600	2.56499900	1.20530500
C	-0.48715300	1.48867800	0.40937700
C	-1.91425000	1.25511400	0.32197800
C	-2.76244700	2.15982800	0.99355600
C	-2.24247600	3.19851100	1.73117700
H	-0.47125500	4.25197800	2.41892700
H	1.08624100	2.72037300	1.26305800
H	-3.83425500	2.01410800	0.91989200
H	-2.92023500	3.87876400	2.23889700
C	-2.52975600	0.29234400	-0.63233900
C	-2.53776400	-1.07650800	-0.35444800
C	-3.14012700	0.77126100	-1.79457000
C	-3.12933000	-1.96663200	-1.24257400
C	-3.73898100	-0.12447000	-2.67651000
H	-3.13901300	1.83607400	-2.01021600
C	-3.73352500	-1.49177900	-2.40249600
H	-3.10217500	-3.02162000	-0.98877700
H	-4.20885300	0.24787500	-3.58112300
H	-4.20230200	-2.18347200	-3.09513700
C	0.31410300	0.46345500	-0.04106800
C	1.64837900	0.12670500	0.47497100
H	-0.09528700	-0.26694100	-0.73759600
H	1.97172200	0.73378800	1.31565500
C	-1.86596800	-1.54272200	0.93152300
O	-1.74744100	-2.75189200	1.13024200
O	-1.43180800	-0.57513900	1.64203900
C	1.54254100	-1.35524600	0.87478500
O	1.35034800	-2.23898000	0.08592300
O	1.59626700	-1.45694400	2.18987800
I	3.07839700	0.42133500	-1.14532600
C	1.15270400	-2.72987400	2.70690200
H	0.11386000	-2.88909900	2.40190600
H	1.79237600	-3.52572700	2.32149200
H	1.24775000	-2.64422300	3.78730200

TS-AC-iso

C	1.21623500	-3.82721300	-0.99532300
C	0.23083200	-2.85945100	-1.07566100
C	0.49882900	-1.51043700	-0.79659400
C	1.81010000	-1.11372900	-0.46806600
C	2.79472400	-2.10827300	-0.40480400
C	2.50993300	-3.44568400	-0.64649900
H	0.97947300	-4.86561700	-1.19844300
H	-0.78589300	-3.14592700	-1.33325300
H	3.80596900	-1.80575300	-0.15295900
H	3.29866600	-4.18690700	-0.57094000
C	2.31051100	0.29177200	-0.30957300
C	2.19127800	1.02700800	0.88210700
C	3.09266700	0.80731800	-1.35191400
C	2.85202600	2.25073700	1.00339800
C	3.71584900	2.04472800	-1.23342900
H	3.21183900	0.22260500	-2.25993700
C	3.60074300	2.76742800	-0.04742700
H	2.76641500	2.77552800	1.94972400
H	4.30255900	2.43468900	-2.05892100
H	4.10075000	3.72494800	0.05837800
C	-0.64087200	-0.59297400	-0.95842700
C	-0.69328300	0.76551200	-0.51139700
H	-1.28197900	-0.77896900	-1.82052800
H	0.13350300	1.28778800	-0.06756100
C	1.30274700	0.57730600	2.03761100

O	1.71045900	0.70158500	3.18418800	I	-2.35527300	-0.93101600	0.64168900
O	0.15863500	0.15514500	1.64088100	C	-2.84411800	3.69066300	-0.97217100
C	-1.78137700	1.62662500	-1.10184700	H	-3.83117700	3.23081200	-0.89536200
O	-2.45339100	1.30067100	-2.05024000	H	-2.77834600	4.57733100	-0.34656700
O	-1.84716700	2.79164900	-0.47435000	H	-2.64156200	3.93292700	-2.01690400

4. References:

(1) M. T. Knowe, M. W. Danneman, S. Sun, M. Pink and J. N. Johnston, *J. Am. Chem. Soc.*, 2018, **140**, 1998.

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(4) D. Andrae, U. Häußermann, M. Dolg, H. Stoll and H. Preuß, *Theor. Chim. Acta.*, 1990, **77**, 123.

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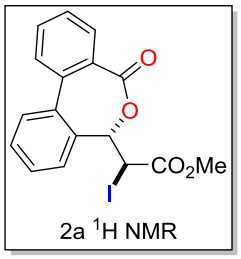
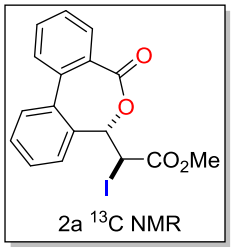
(7) C. Y. Legault, *CYLview*, 1.0b; Université de Sherbrooke: Quebec, Canada, 2009; http://www.cylview.org

5. NMR Spectra



2a ^{1}H NMR



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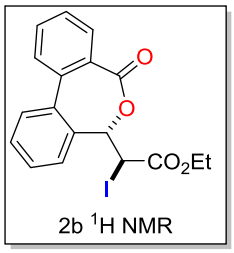

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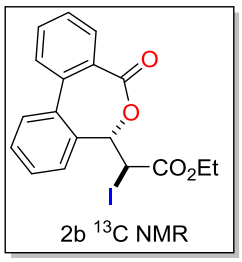

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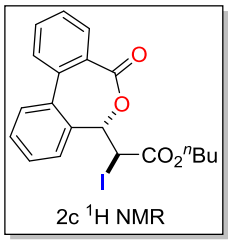

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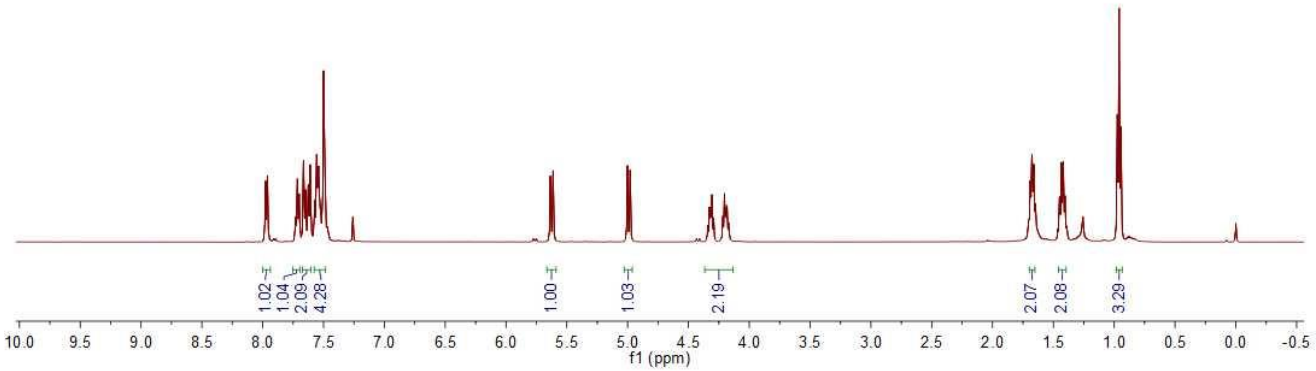

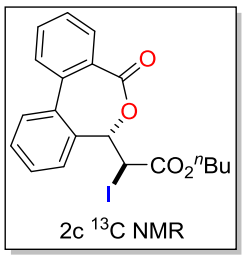

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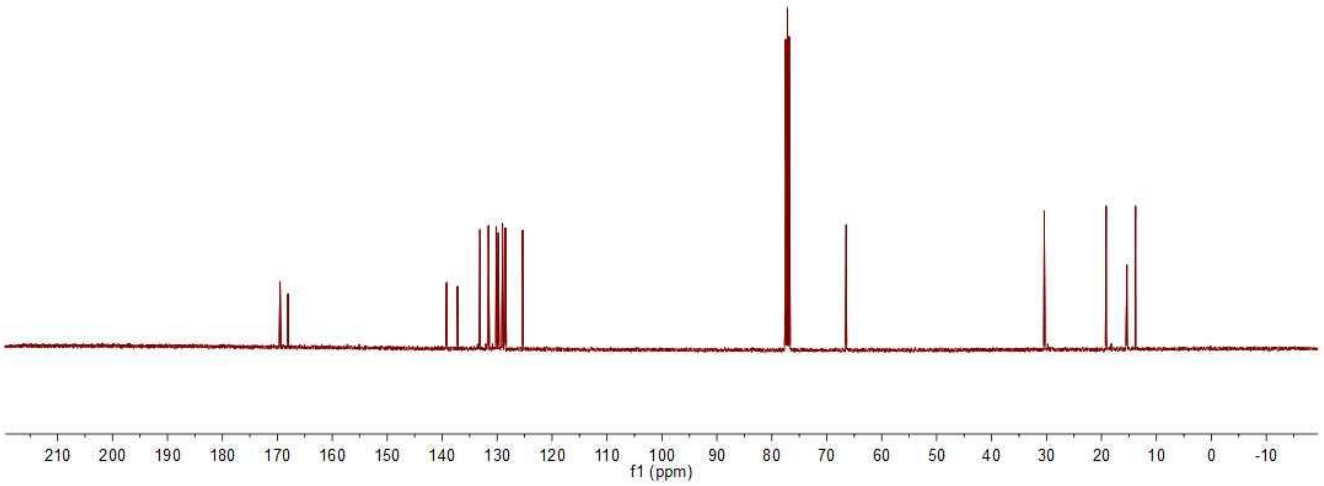

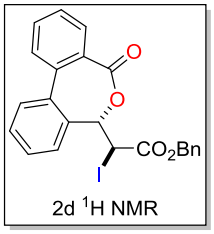

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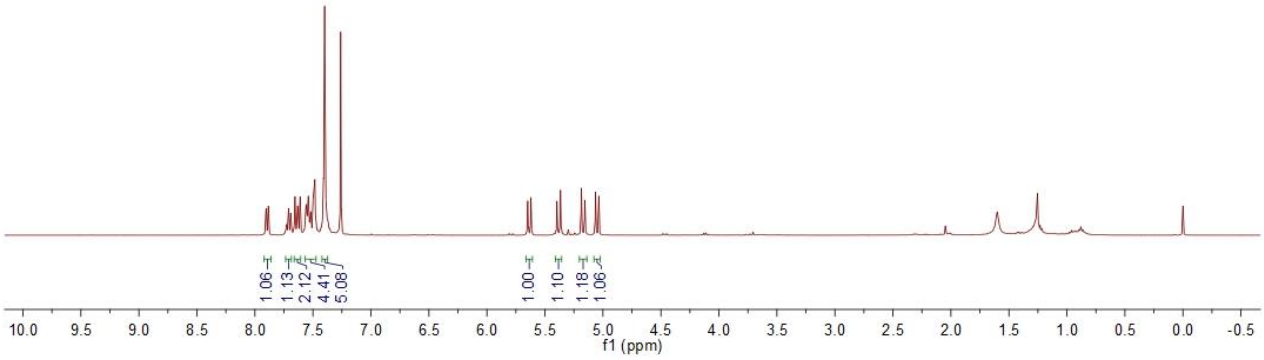

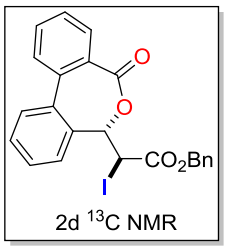

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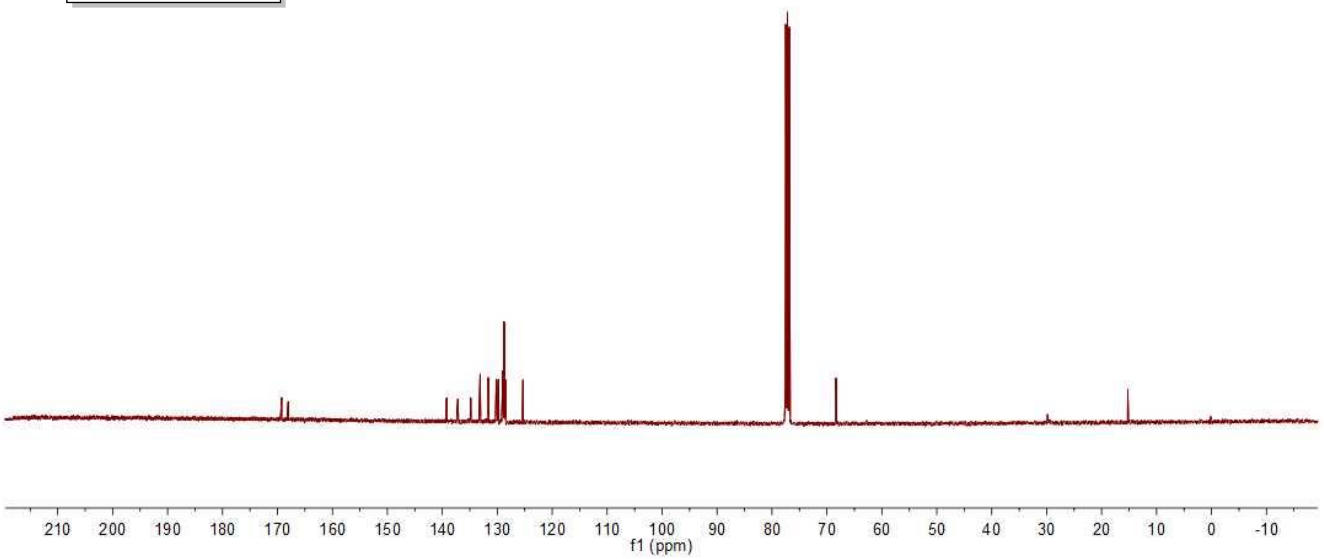

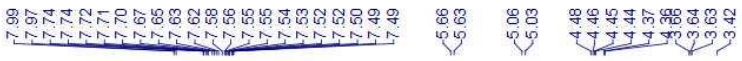
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7.71
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7.67
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7.63
7.62
7.58
7.56
7.55
7.55
7.54
7.53
7.52
7.52
7.50
7.49
7.49
5.66
5.63
5.06
5.03
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4.46
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4.37
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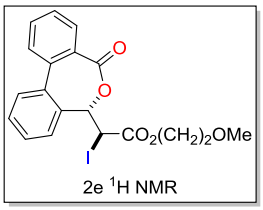
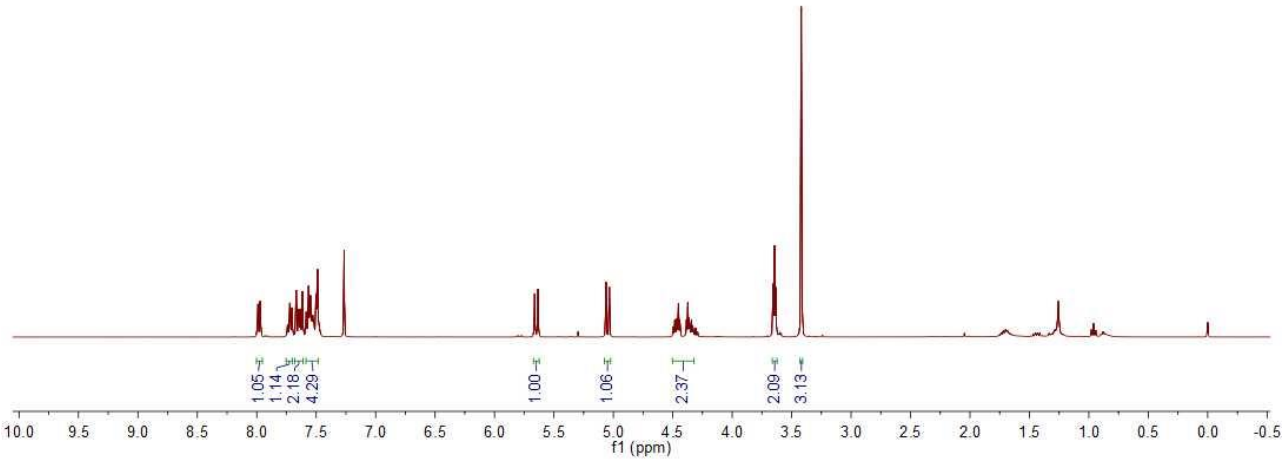
3.64
3.63
3.42


O
O
CO2(CH2)2OMe
I
2e 1H NMR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1.00
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9.5
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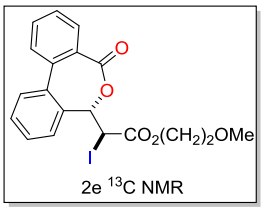
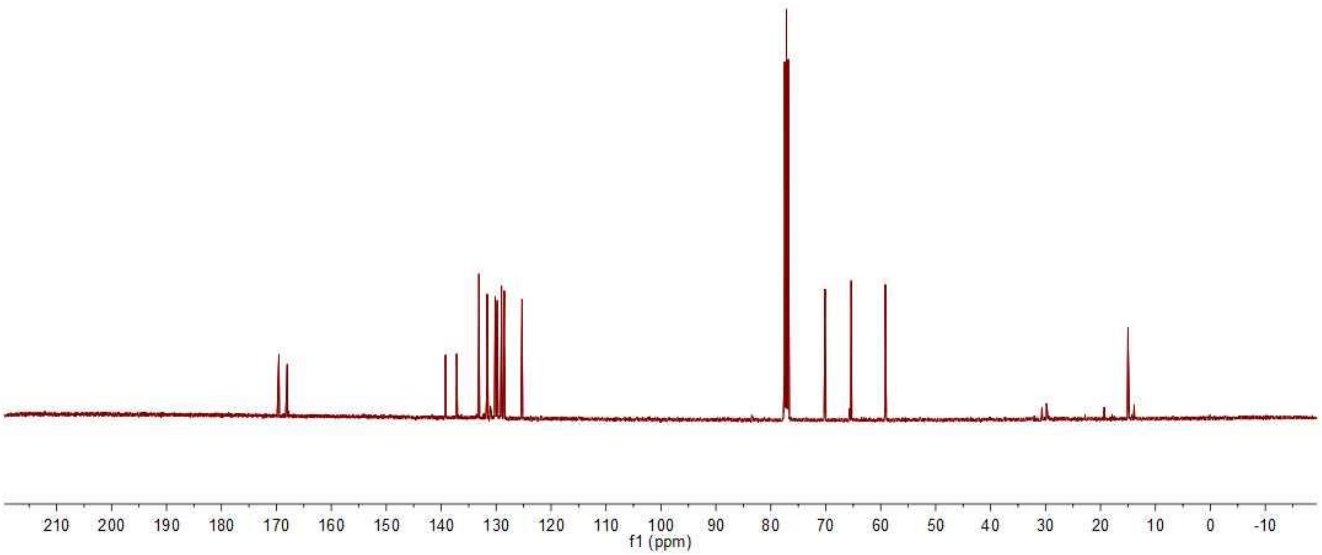
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)


169.54
168.01
139.20
137.17
133.13
131.63
130.16
130.03
129.80
129.01
128.97
128.52
125.28
70.14
65.36
59.15
15.00


O
O
CO2(CH2)2OMe
I
2e 13C NMR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200
190
180
170
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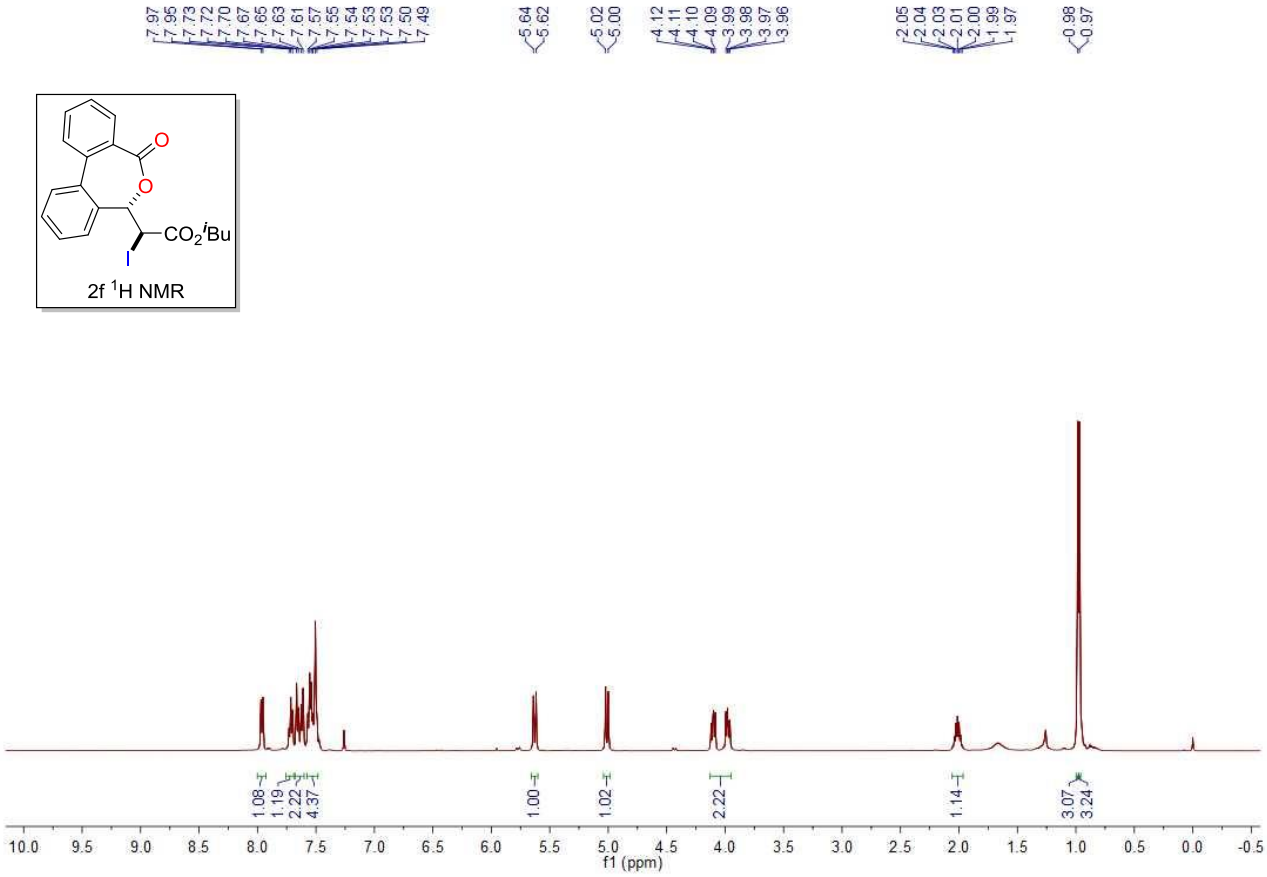
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)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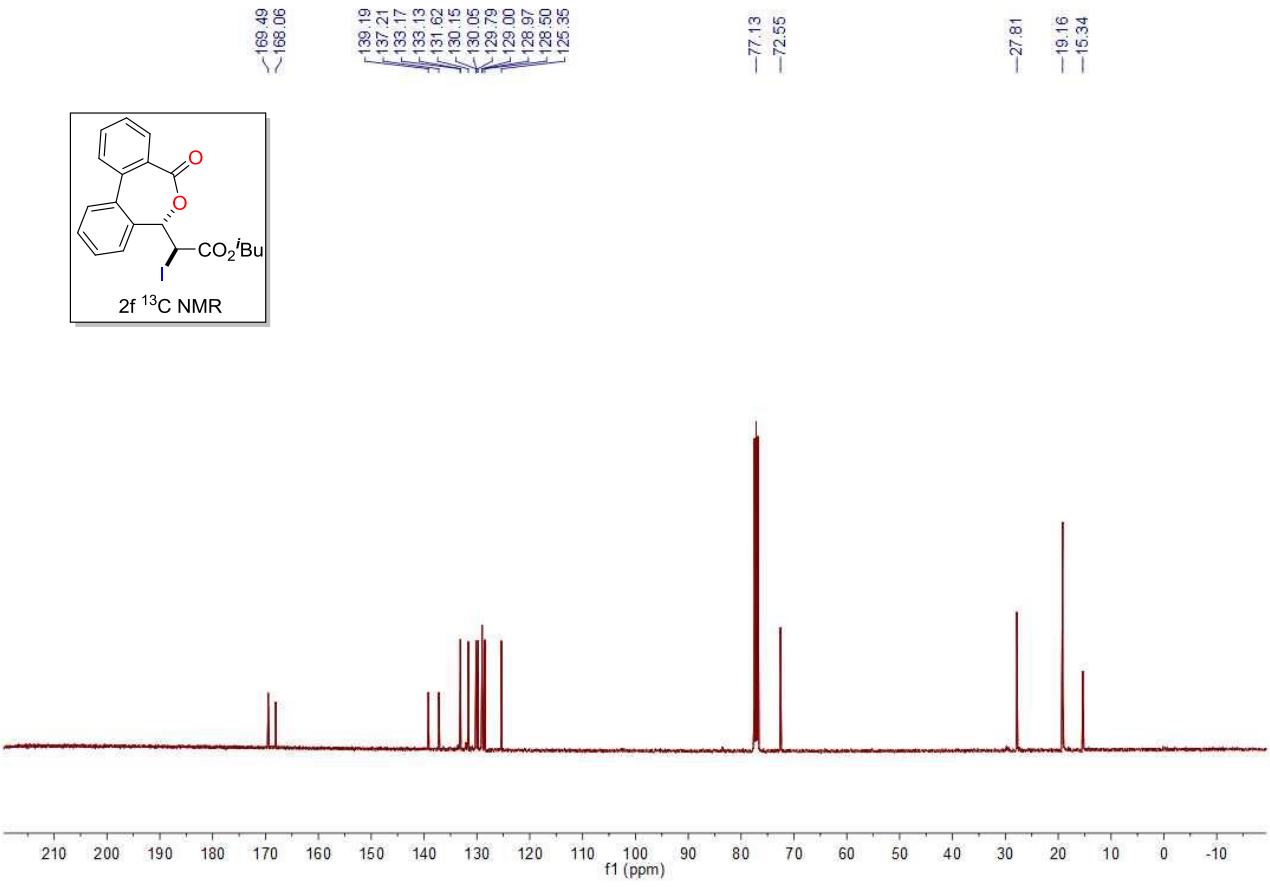
4.09
3.99
3.98
3.97
3.96
2.05
2.04
2.03
2.01
2.00
1.99
1.97
0.98
0.97
O
O
CO2tBu
I
2f 1H NMR
1.08
1.19
2.22
4.37
1.00
1.02
2.22
1.14
3.07
3.24
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)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128.50
125.35
77.13
72.55
27.81
19.16
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O
CO2tBu
I
2f 13C NMR
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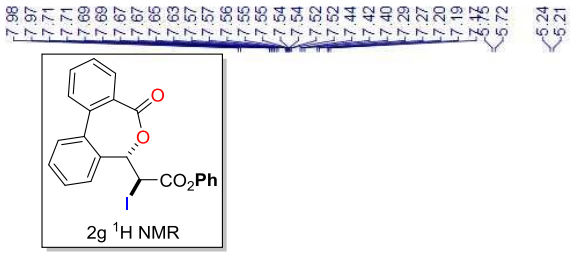
f1 (ppm)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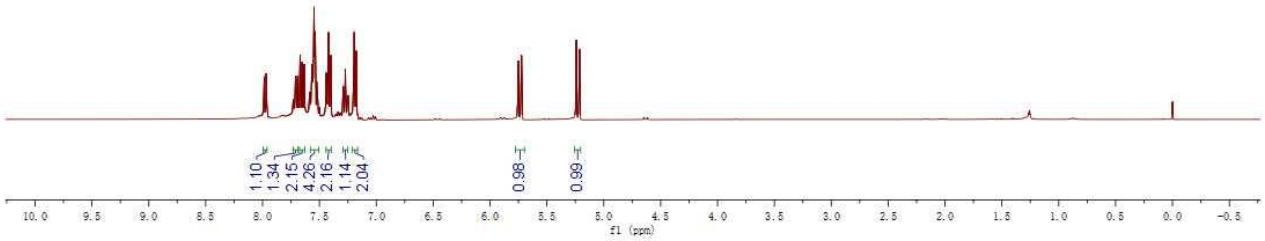
I
2g 1H NMR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8.5
8.0
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6.5
6.0
5.5
5.0
4.5
4.0
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3.0
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2.0
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0.5
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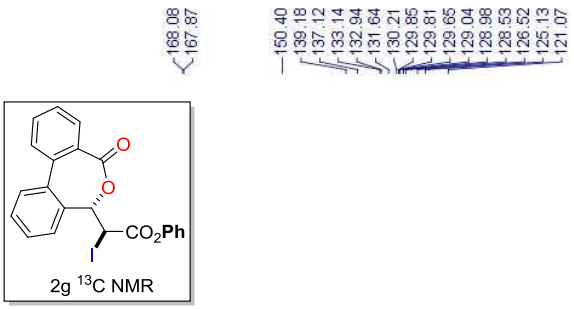
f1 (ppm)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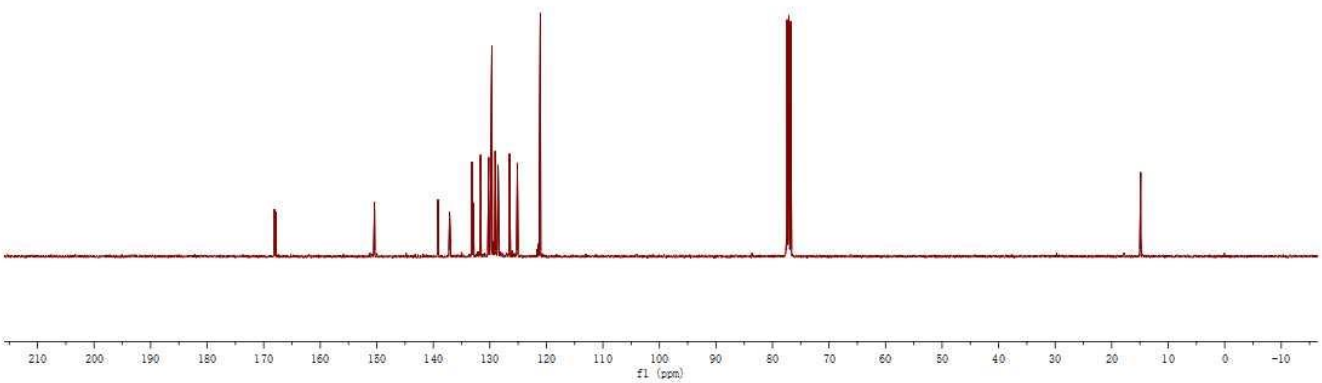
O
O
CO2Ph
I
2g 13C NMR


210
200
190
180
170
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150
140
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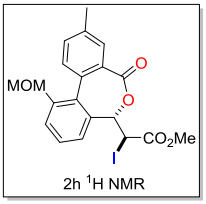
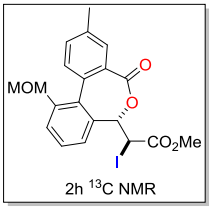
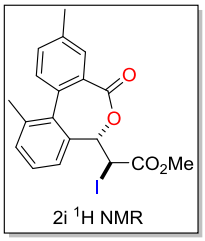
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)



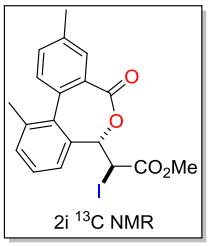
2h ^{1}H NMR



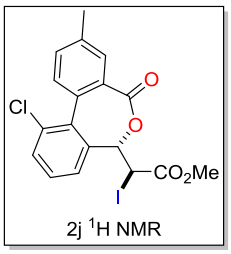
2h ^{13}C NMR



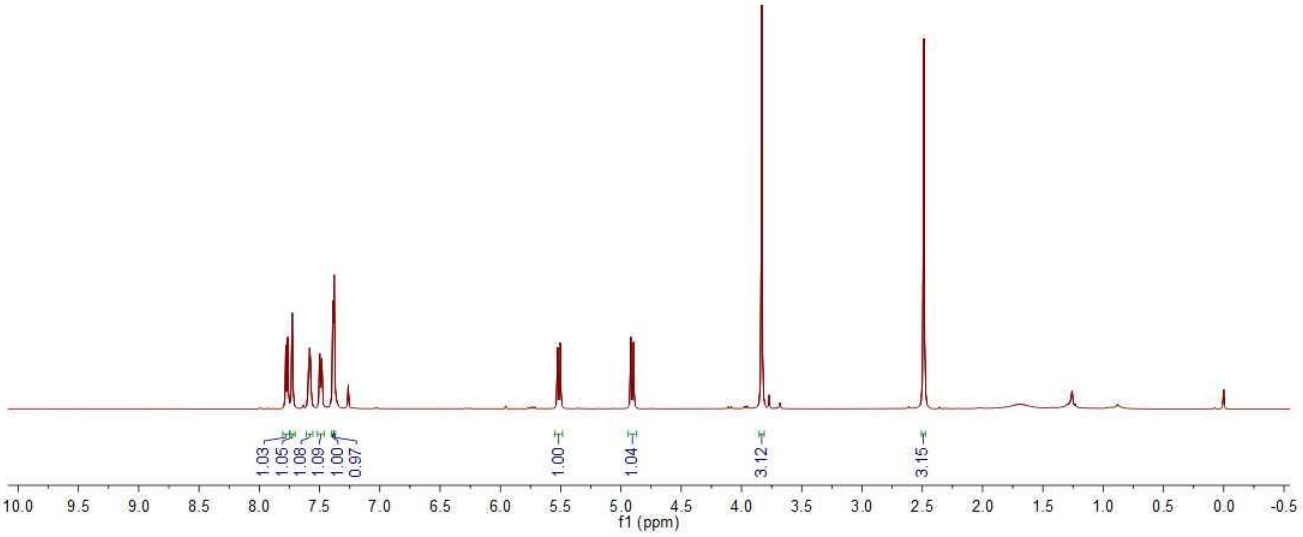
2i ^{1}H NMR

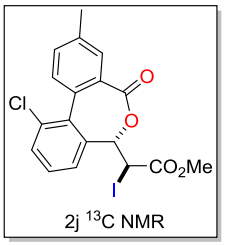


2i ^{13}C NMR

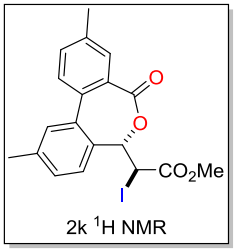


2j ^{1}H NMR



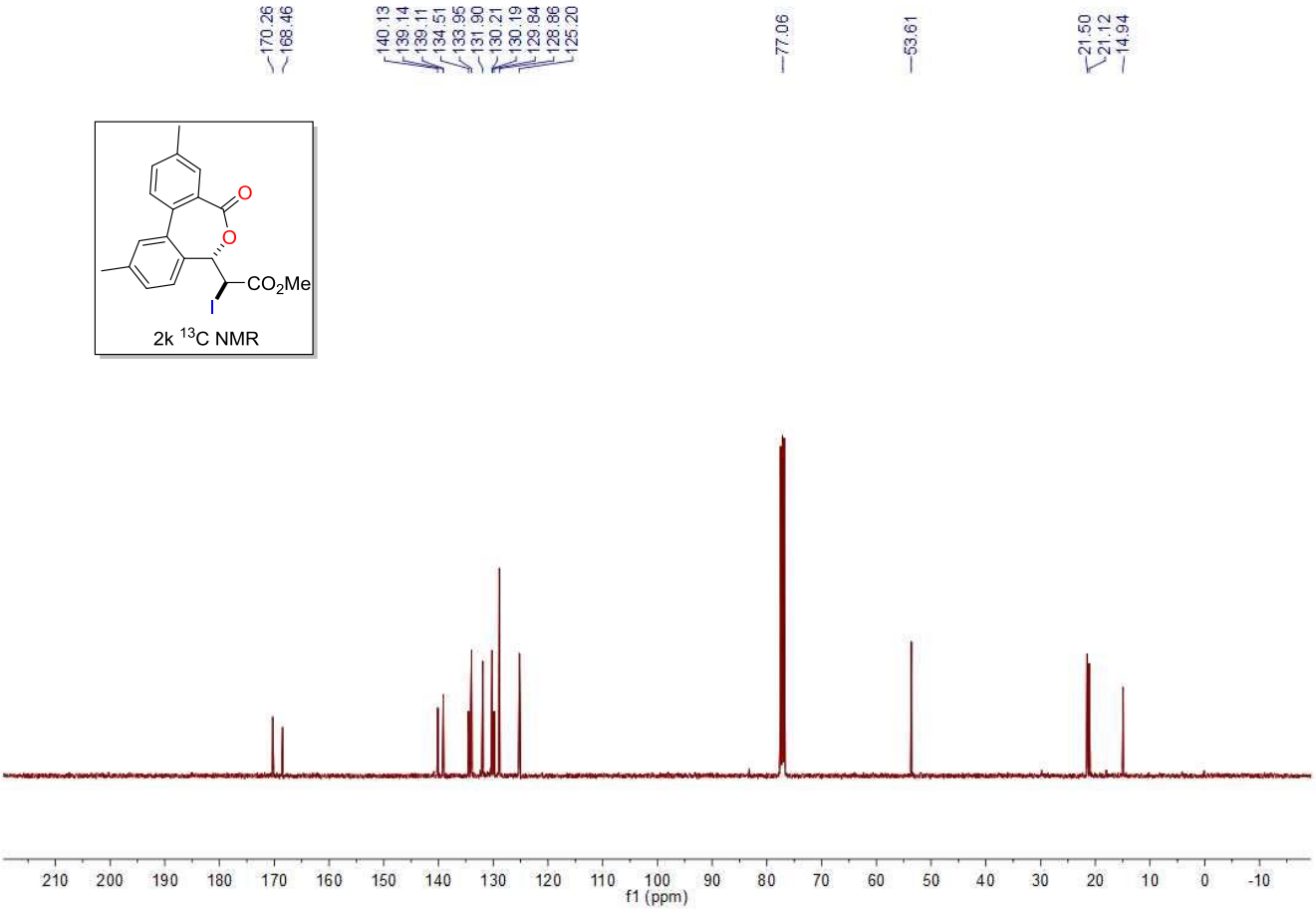


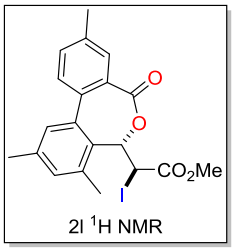
2j ^{13}C NMR



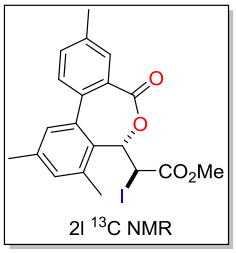
2k ^{1}H NMR

2k ^{13}C NMR

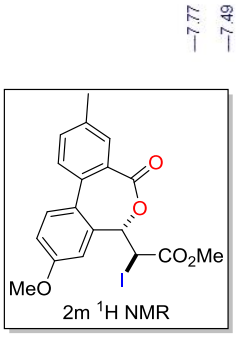




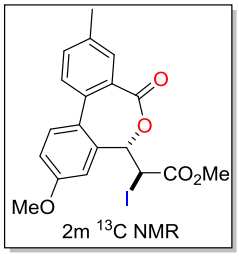
2l ^{1}H NMR



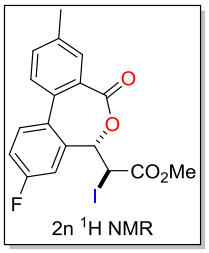
2l ^{13}C NMR



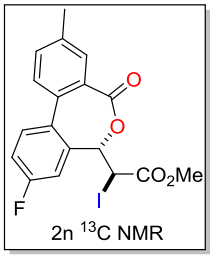
2m ^{1}H NMR



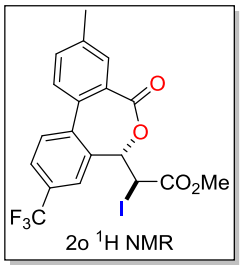
2m ^{13}C NMR


O
O
CO2Me
I
F
2n 1H NMR

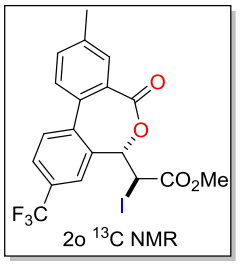
7.79
7.59
7.58
7.58
7.56
7.53
7.51
7.51
7.49
7.25
7.25
7.23
7.23
7.21
7.19
5.60
5.57
4.92
4.89
3.85
2.47
1.00
1.04
2.15
2.17
1.00
1.00
3.09
3.29
f1 (ppm)


O
O
CO2Me
I
F
2n 13C NMR

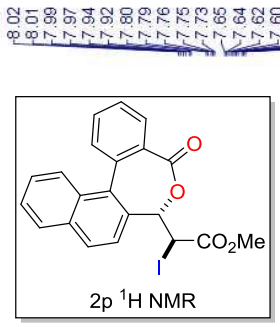
169.97
167.98
163.51
161.03
139.40
135.14
135.07
134.18
133.53
132.10
131.50
131.42
129.46
117.13
113.00
112.76
76.66
53.72
21.12
14.32
f1 (ppm)



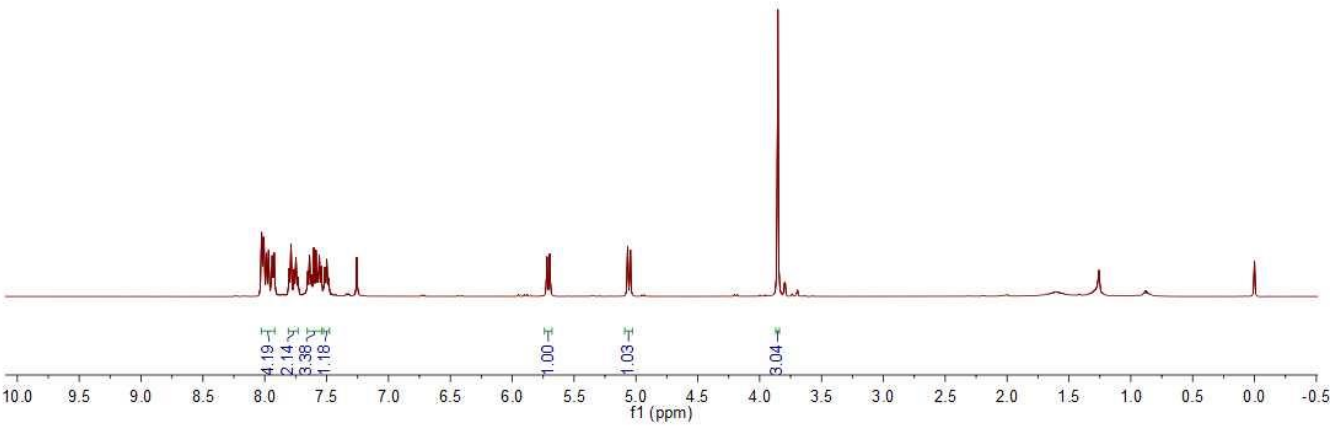
2o ^{1}H NMR

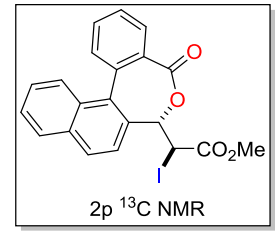


2o ^{13}C NMR

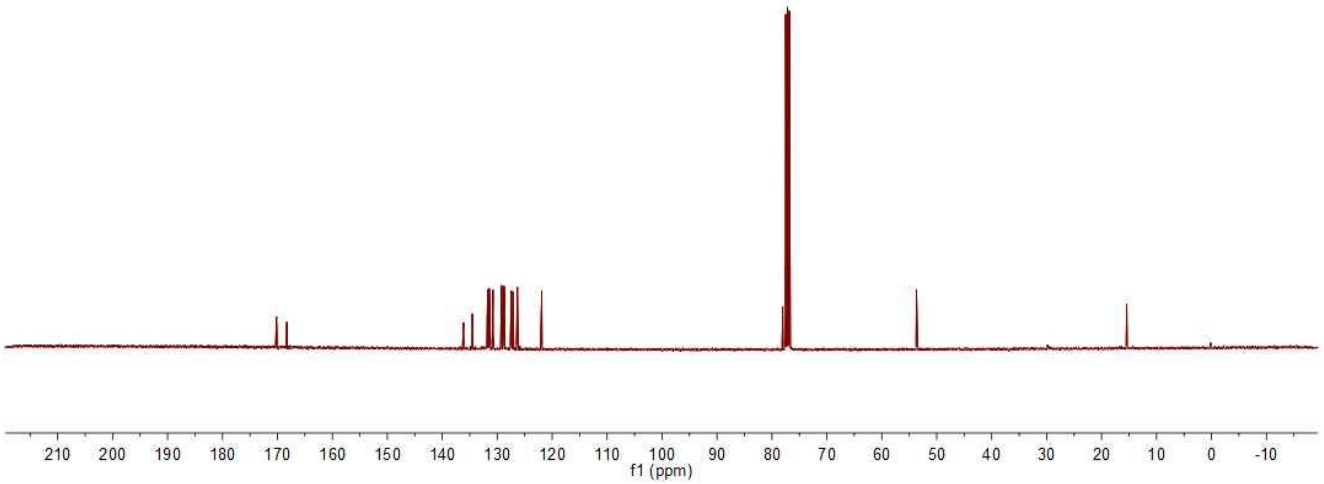


2p ^{1}H NMR

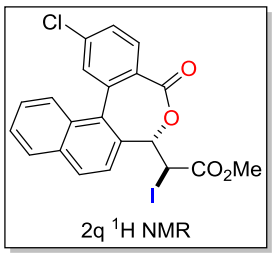


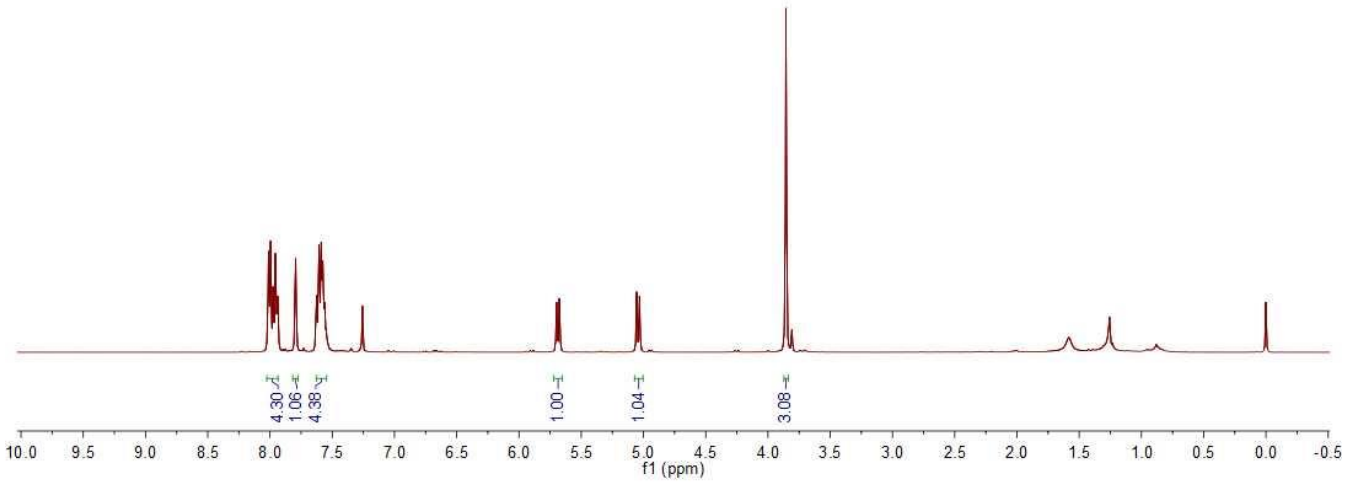


2p ^{13}C NMR




8.01
8.00
7.98
7.96
7.94
7.79
7.63
7.61
7.59
7.58
7.56
7.55
5.70
5.68
5.05
5.03
3.86


Cl
O
O
CO2Me
I
2q 1H NMR


4.30
1.06
4.38
1.00
1.04
3.08
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)


170.09
167.40
137.97
136.20
134.74
134.49
132.29
131.88
131.56
131.03
130.18
129.84
129.42
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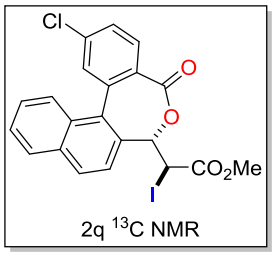
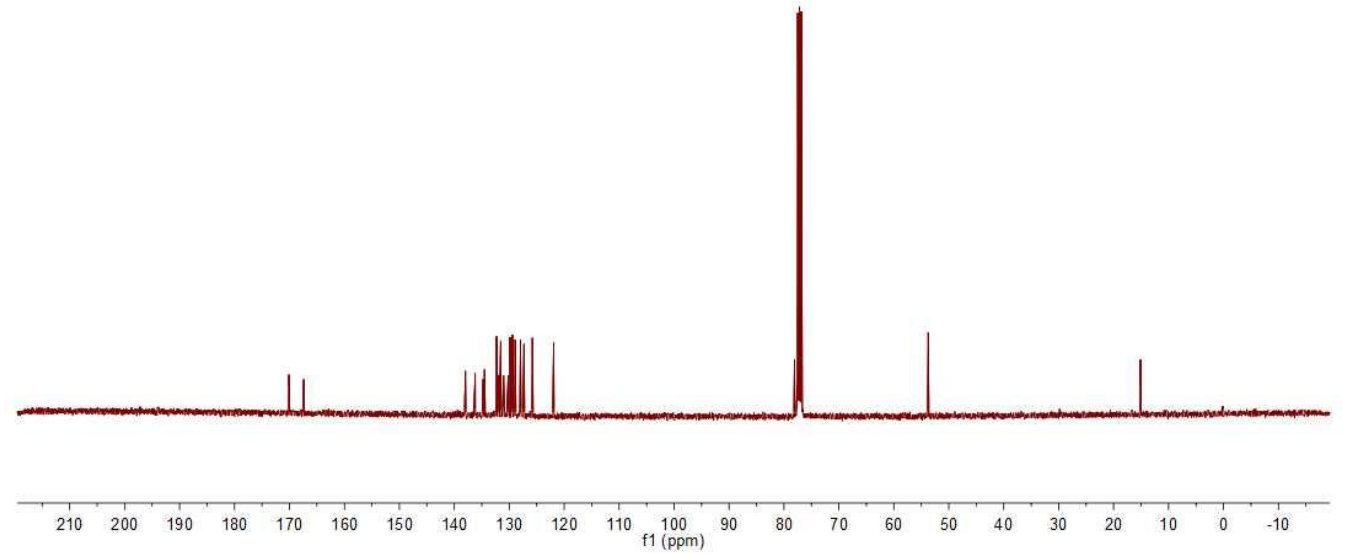
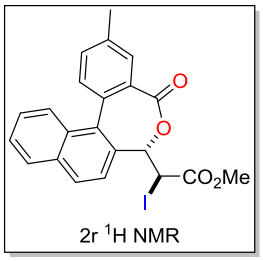
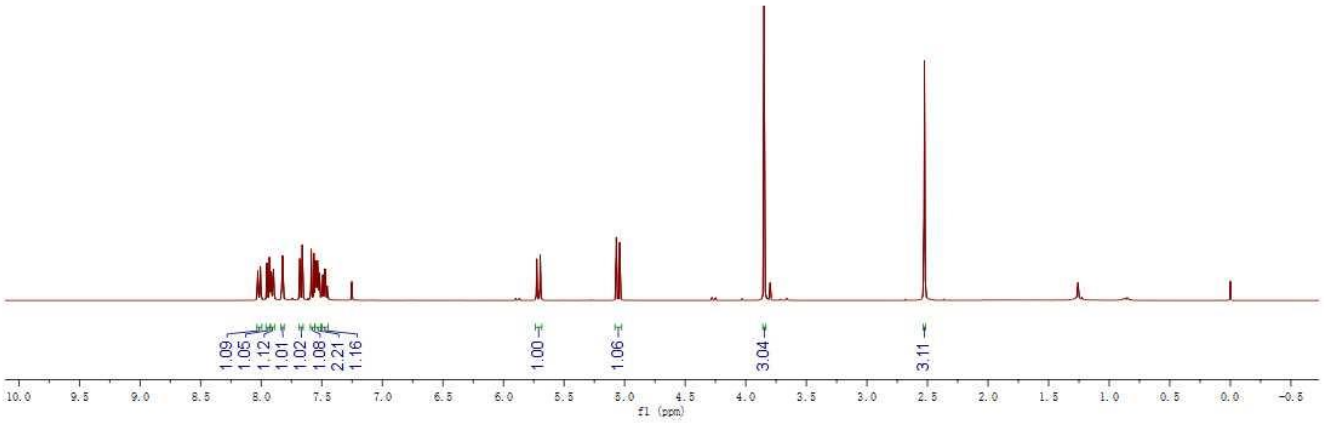
127.32
125.78
121.91
78.08
53.73
15.11

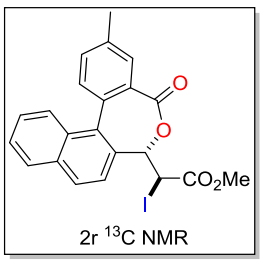

Cl
O
O
CO2Me
I
2q 13C NMR


210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

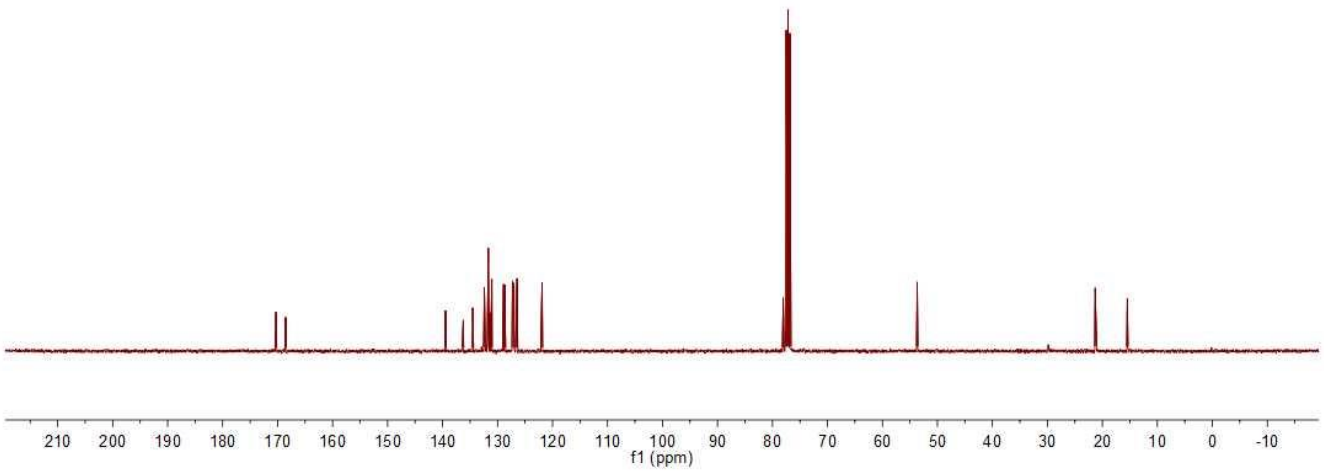


2r ^{1}H NMR

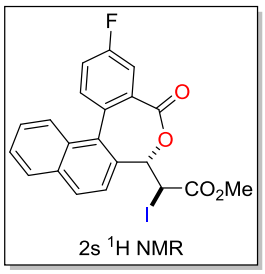


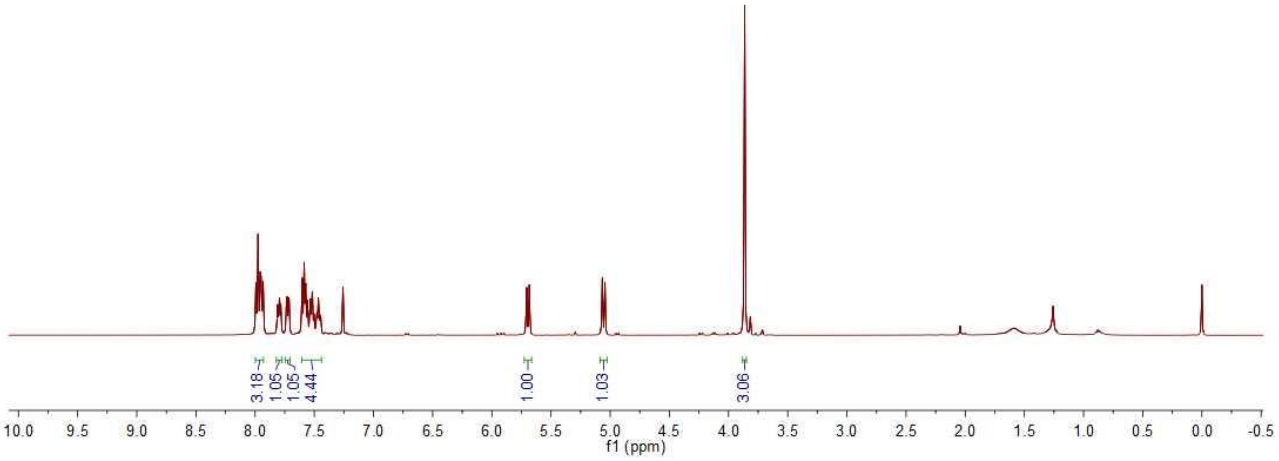


2r ^{13}C NMR

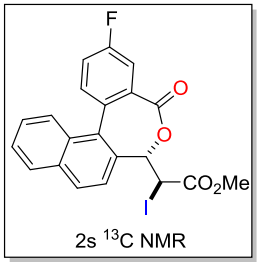


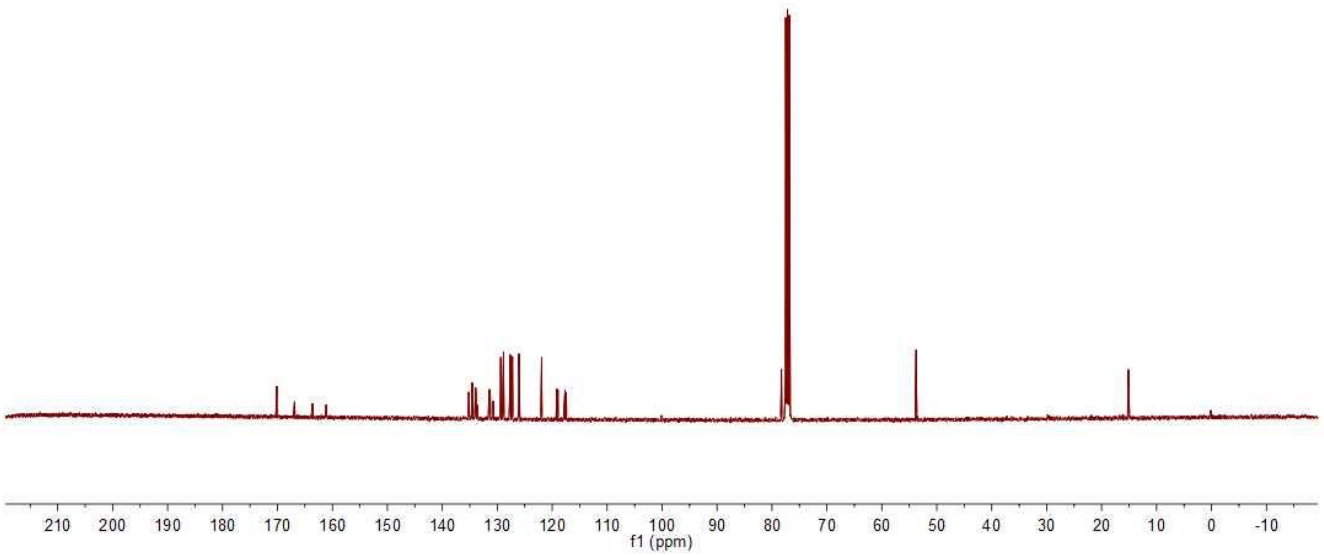

7.99
7.98
7.96
7.95
7.93
7.81
7.80
7.79
7.78
7.73
7.73
7.72
7.71
7.60
7.59
7.57
7.56
7.53
7.52
7.50
7.48
7.48
7.47
7.46
7.45
7.45
5.71
5.68
5.07
5.04
3.86

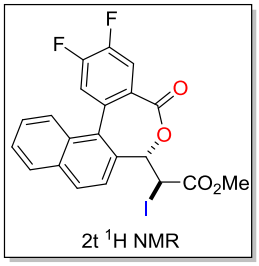

F
O
O
CO2Me
I
2s 1H NMR


3.18
1.05
1.05
4.44
1.00
1.03
3.06
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)

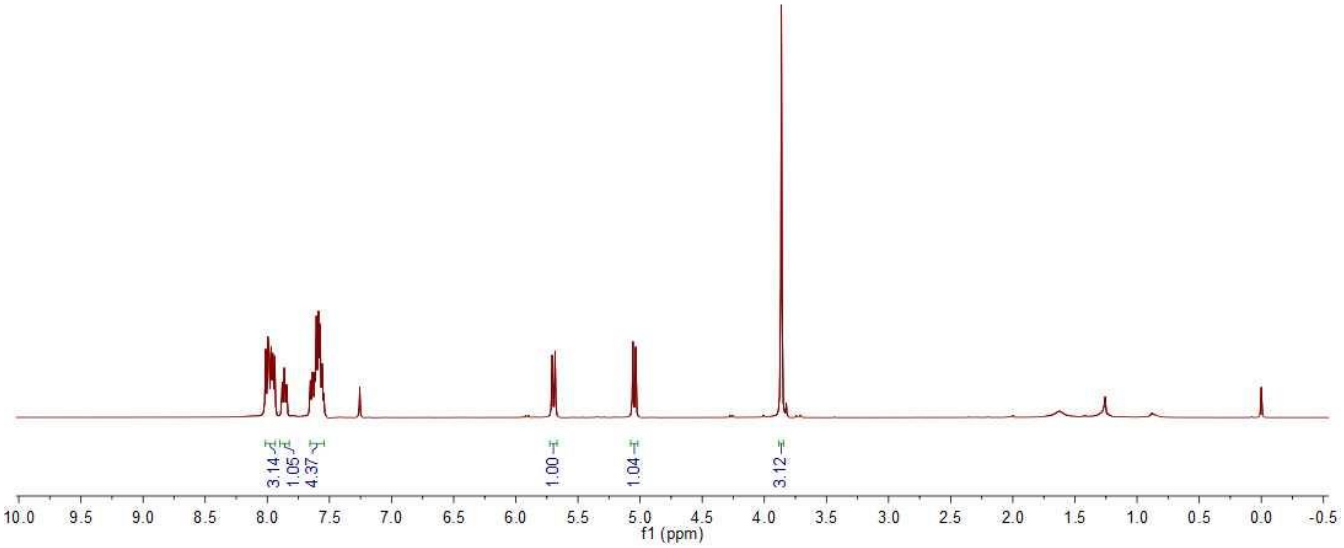

170.14
166.90
163.63
161.13
135.18
134.54
133.96
133.88
133.70
133.62
131.49
131.28
130.73
130.69
129.35
128.86
127.64
127.23
126.04
121.93
119.17
118.95
117.66
117.43
78.26
53.75
15.12

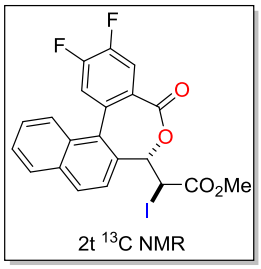

F
O
O
CO2Me
I
2s 13C NMR


210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

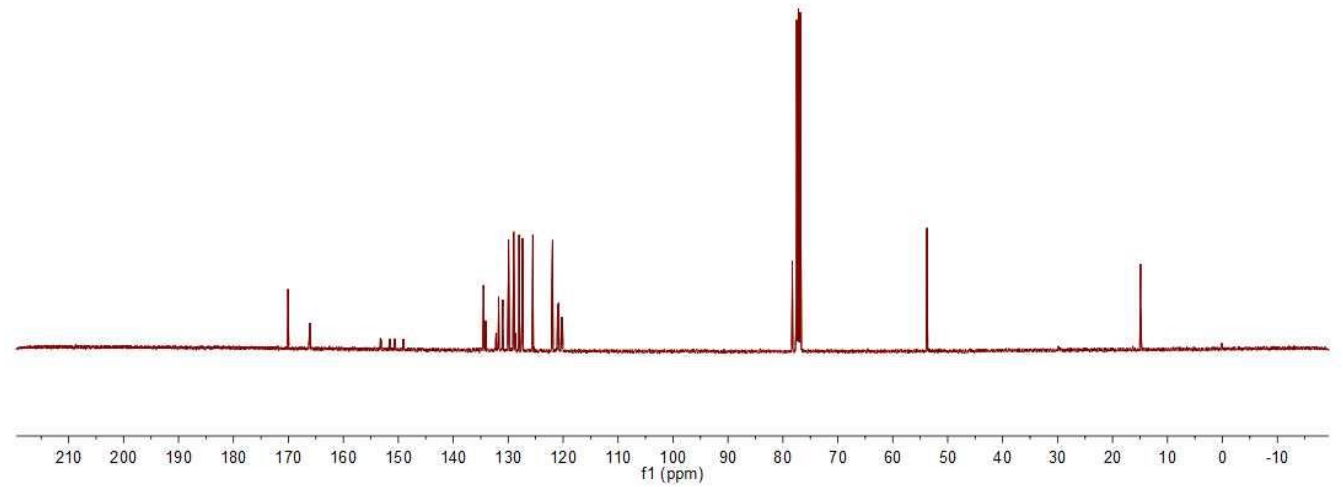


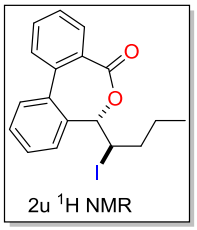
2t ^{1}H NMR



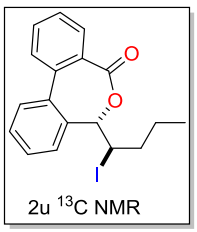


2t ^{13}C NMR

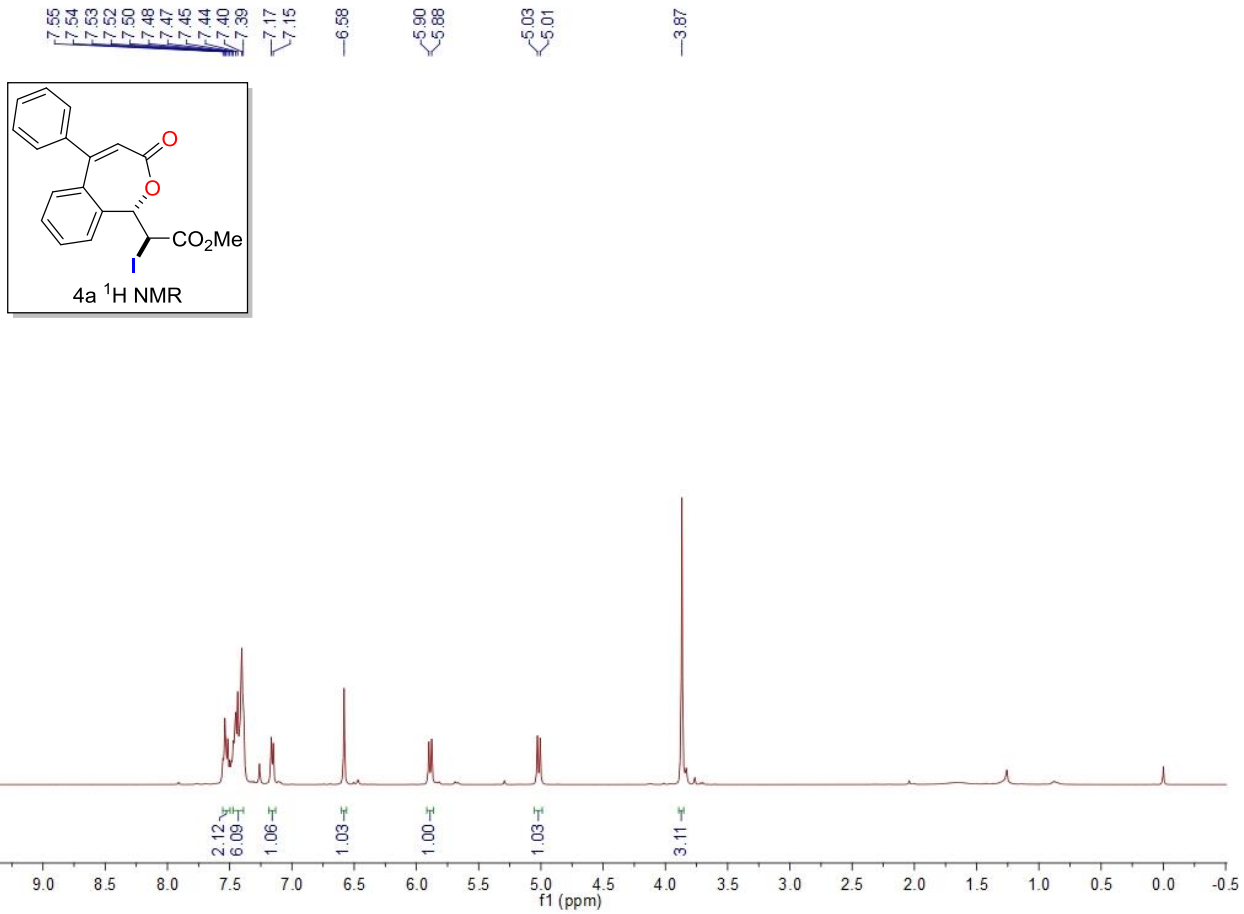


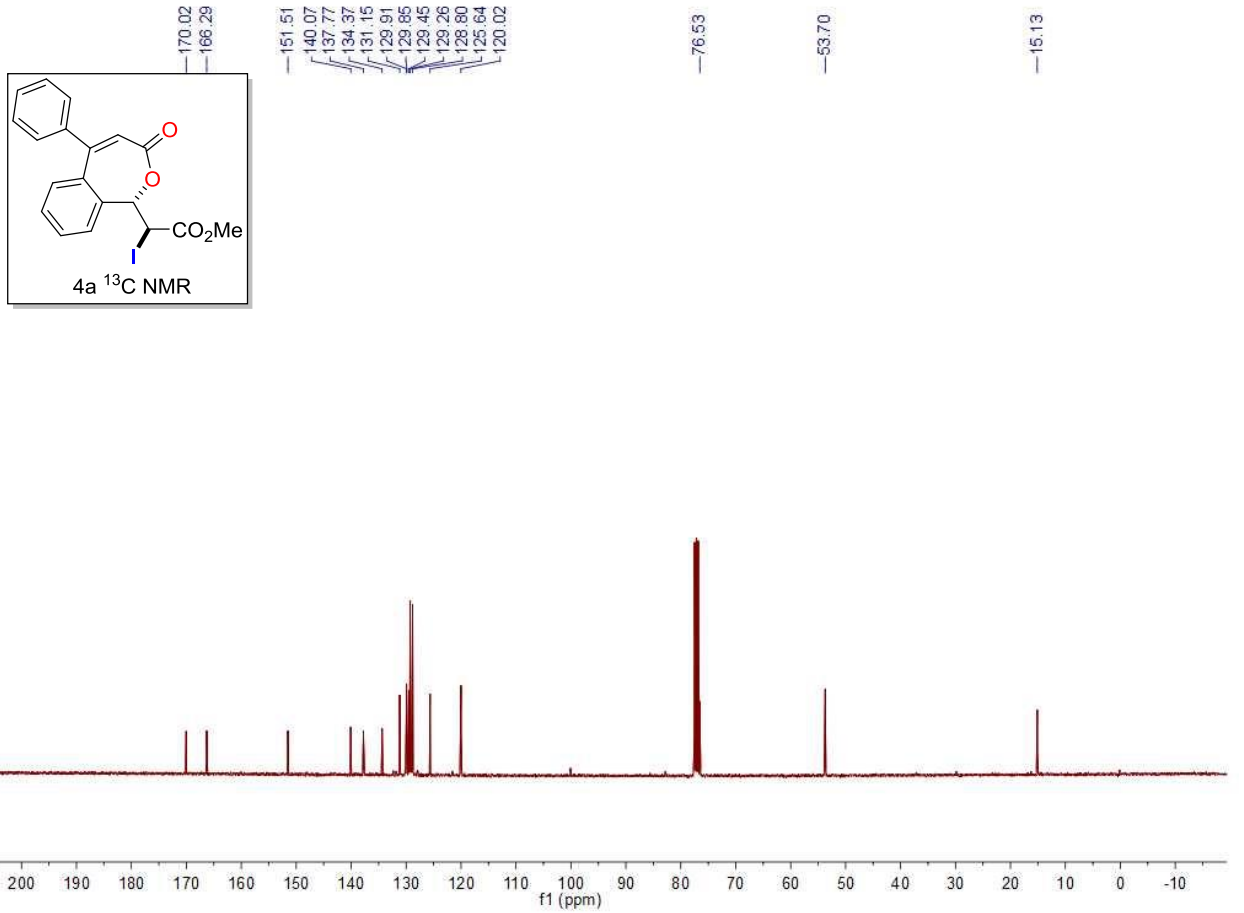


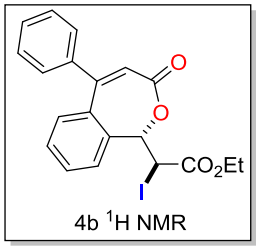
2u ^{1}H NMR



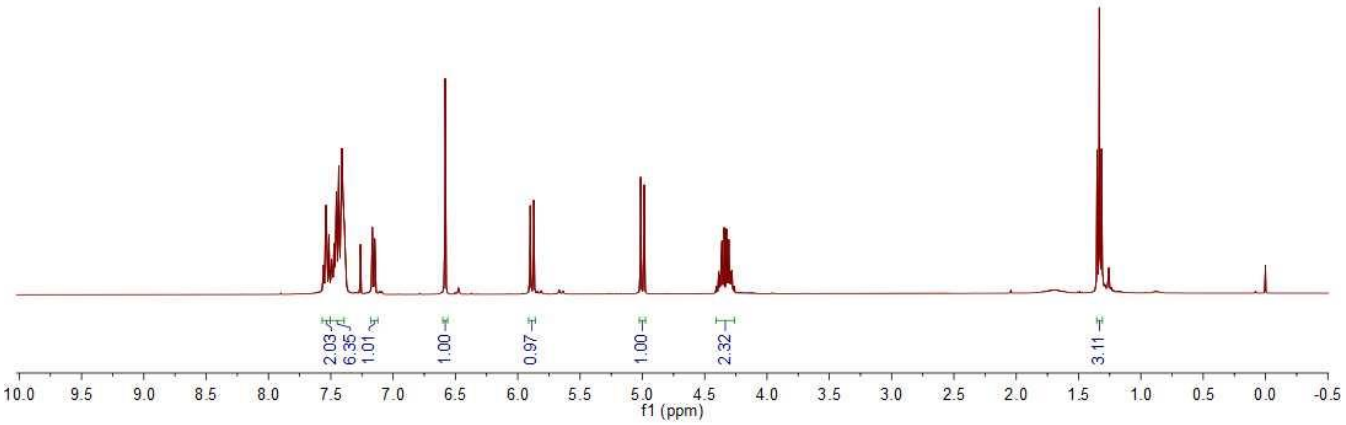
2u ^{13}C NMR


7.55
7.54
7.53
7.52
7.50
7.48
7.47
7.45
7.44
7.40
7.39
7.17
7.15
6.58
5.90
5.88
5.03
5.01
3.87
O
O
CO2Me
I
4a 1H NMR
2.12
6.09
1.06
1.03
1.00
1.03
3.11
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)

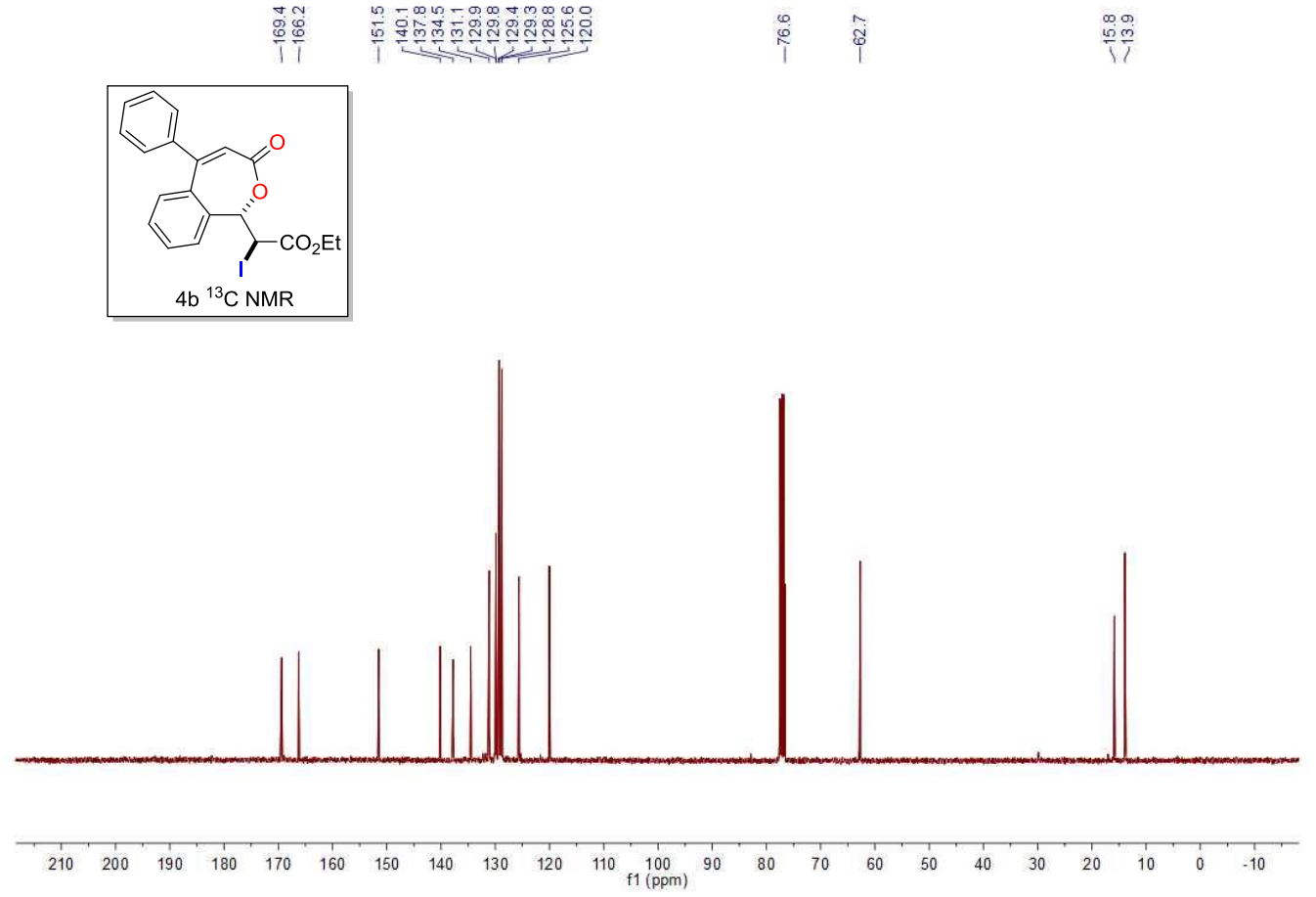

170.02
166.29
151.51
140.07
137.77
134.37
131.15
129.91
129.85
129.45
129.26
128.80
125.64
120.02
76.53
53.70
15.13
O
O
CO2Me
I
4a 13C NMR
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

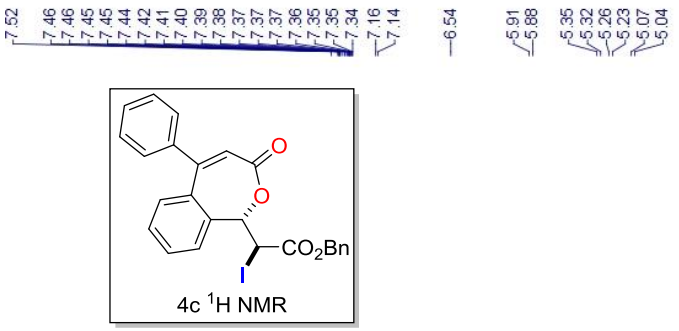


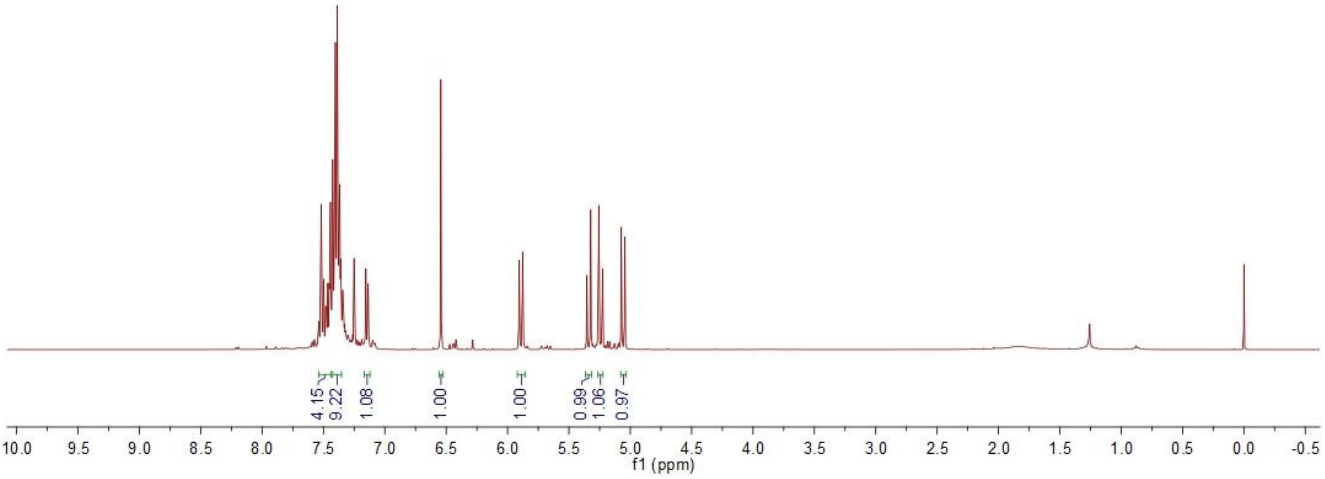
4b ^{1}H NMR

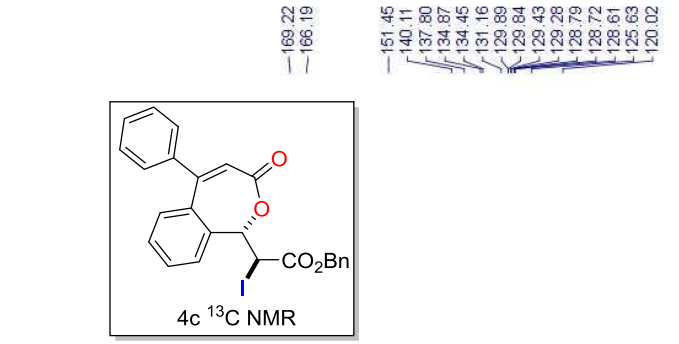


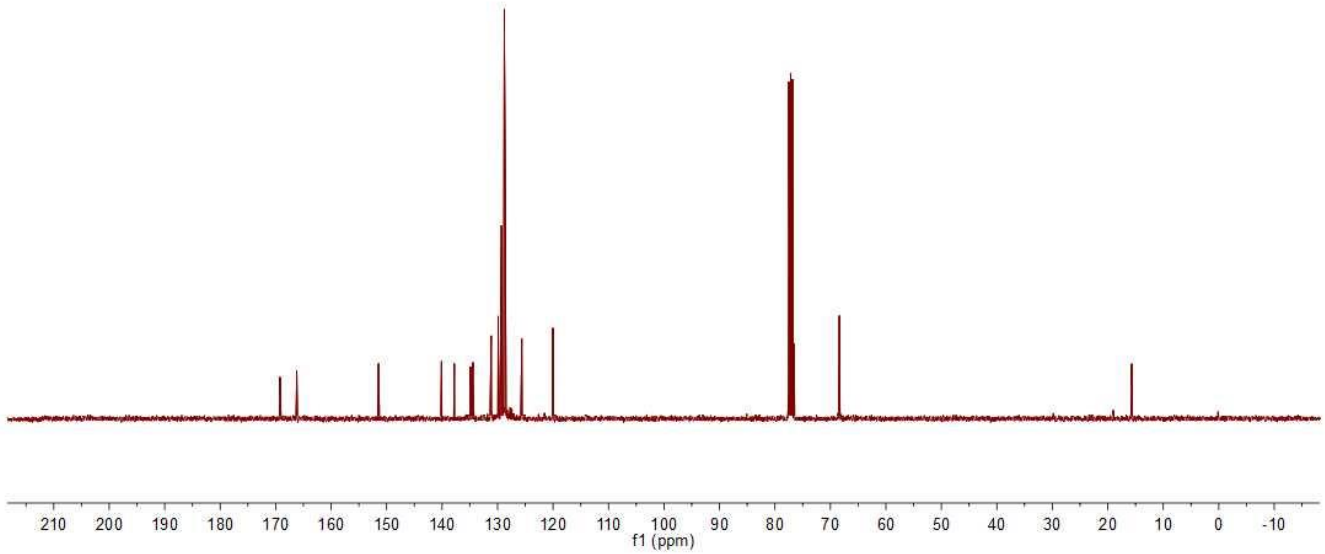
4b ^{13}C NMR



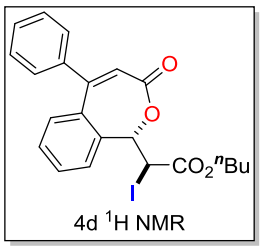

7.52
7.46
7.46
7.45
7.45
7.44
7.42
7.41
7.40
7.39
7.38
7.37
7.37
7.37
7.36
7.35
7.35
7.34
7.16
7.14
6.54
5.91
5.88
5.35
5.32
5.26
5.23
5.07
5.04
O
O
CO2Bn
I
4c 1H NMR

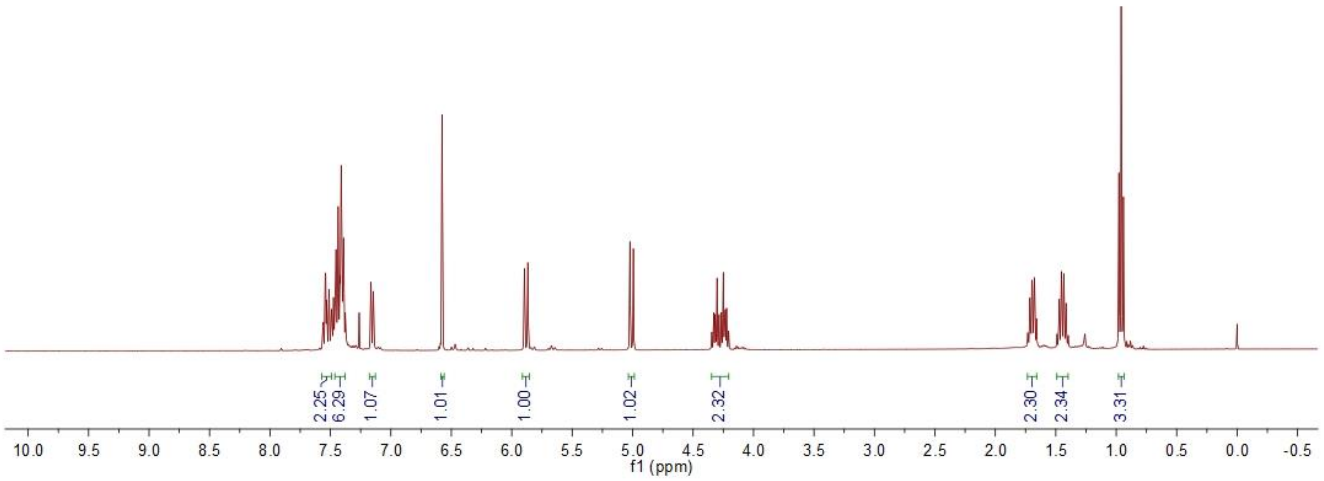

4.15
9.22
1.08
1.00
1.00
0.99
1.06
0.97
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)

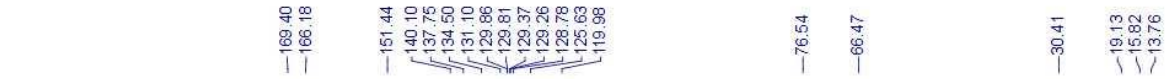

169.22
166.19
151.45
140.11
137.80
134.87
134.45
131.16
129.89
129.84
129.43
129.28
128.79
128.72
128.61
125.63
120.02
76.52
68.38
15.70
O
O
CO2Bn
I
4c 13C NMR

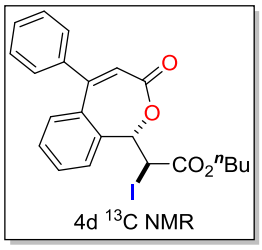

210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

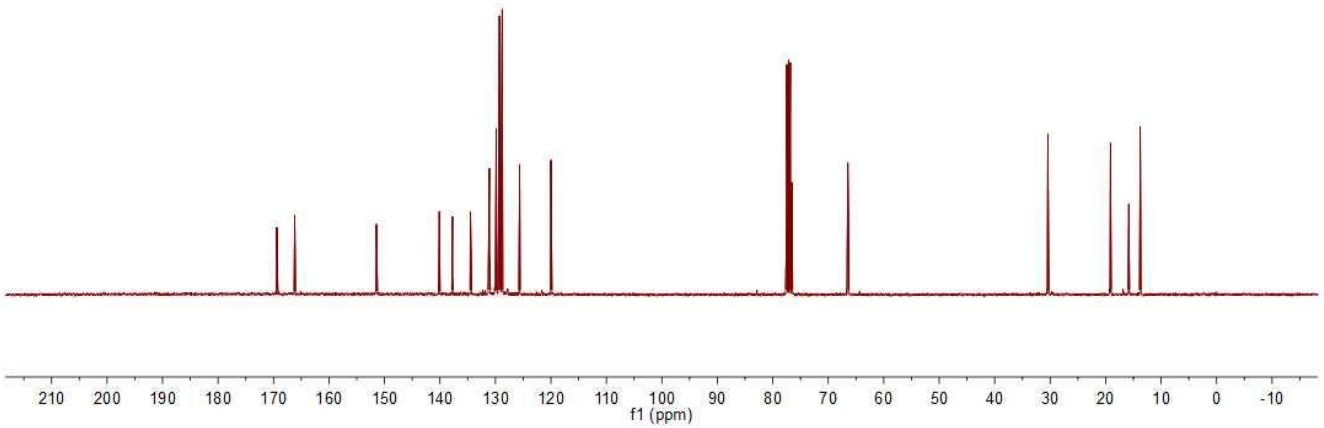

7.53
7.51
7.51
7.49
7.49
7.47
7.46
7.46
7.45
7.44
7.43
7.42
7.41
7.41
7.41
7.39
7.39
7.37
7.16
7.14
6.58
5.90
5.87
5.02
4.99
4.30
4.28
4.27
4.25
4.24
4.23
4.22
4.21
1.73
1.73
1.71
1.71
1.70
1.69
1.68
1.68
1.66
1.43
0.98
0.96
0.94

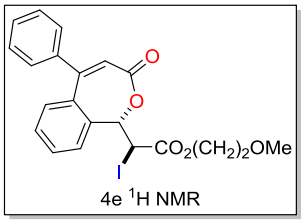

O
O
CO2nBu
I
4d 1H NMR


2.25
6.29
1.07
1.01
1.00
1.02
2.32
2.30
2.34
3.31
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)

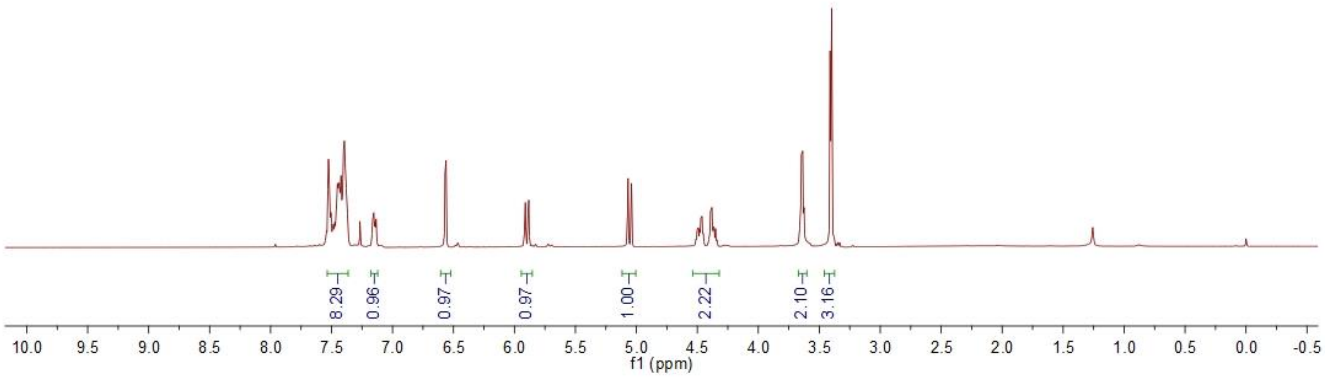

169.40
166.18
151.44
140.10
137.75
134.50
131.10
129.86
129.81
129.37
129.26
128.78
125.63
119.98
76.54
66.47
30.41
19.13
15.82
13.76

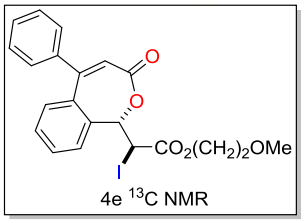

O
O
CO2nBu
I
4d 13C NMR


210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

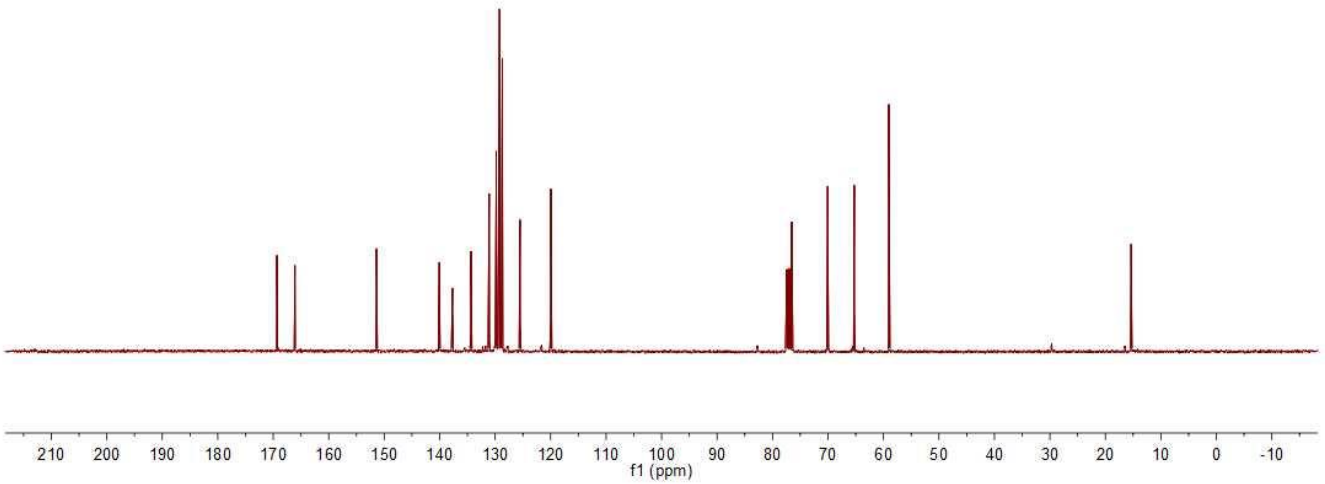


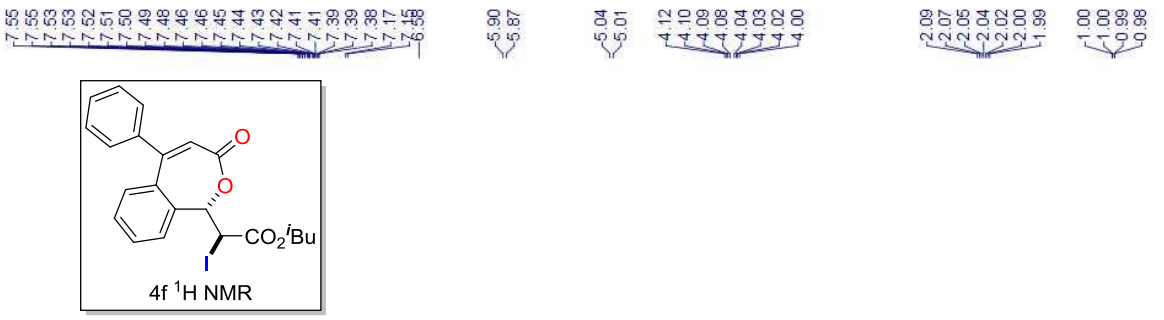
4e ^{1}H NMR



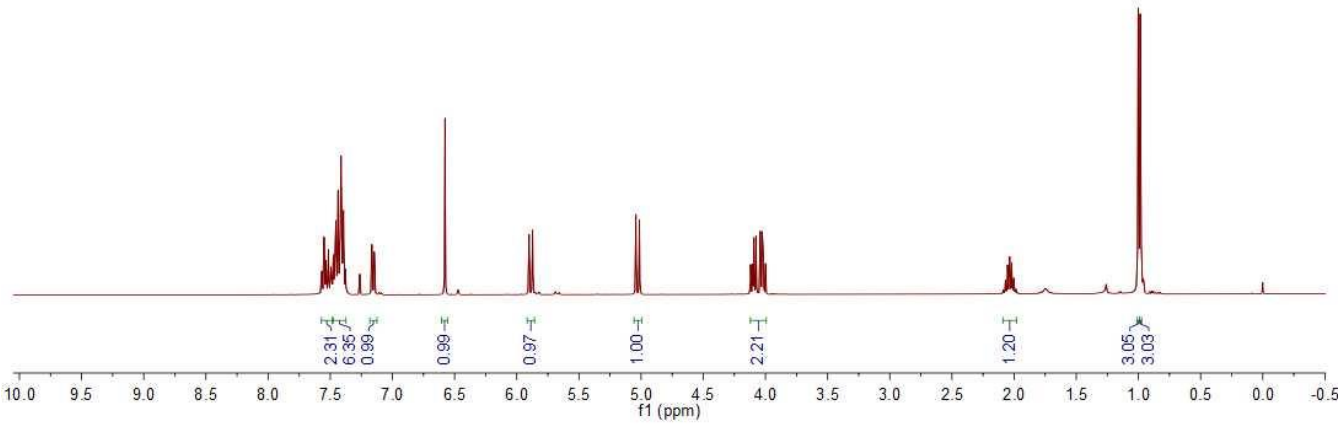


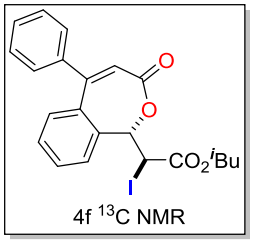
4e ^{13}C NMR



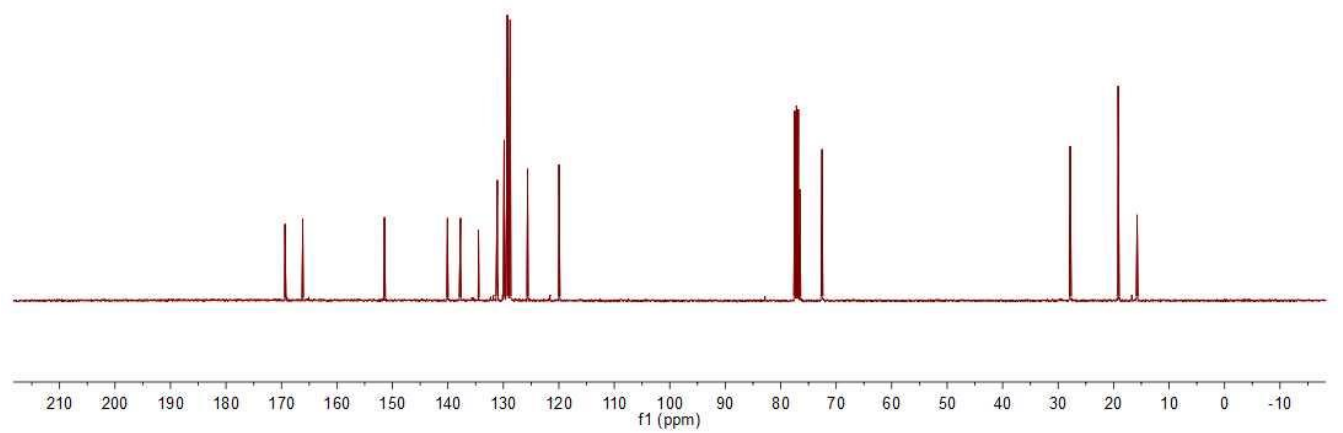


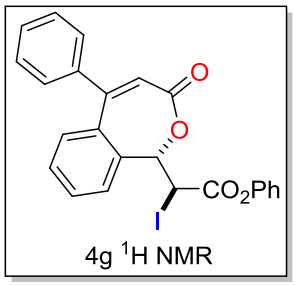
4f ^{1}H NMR



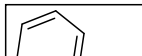


4f ^{13}C NMR

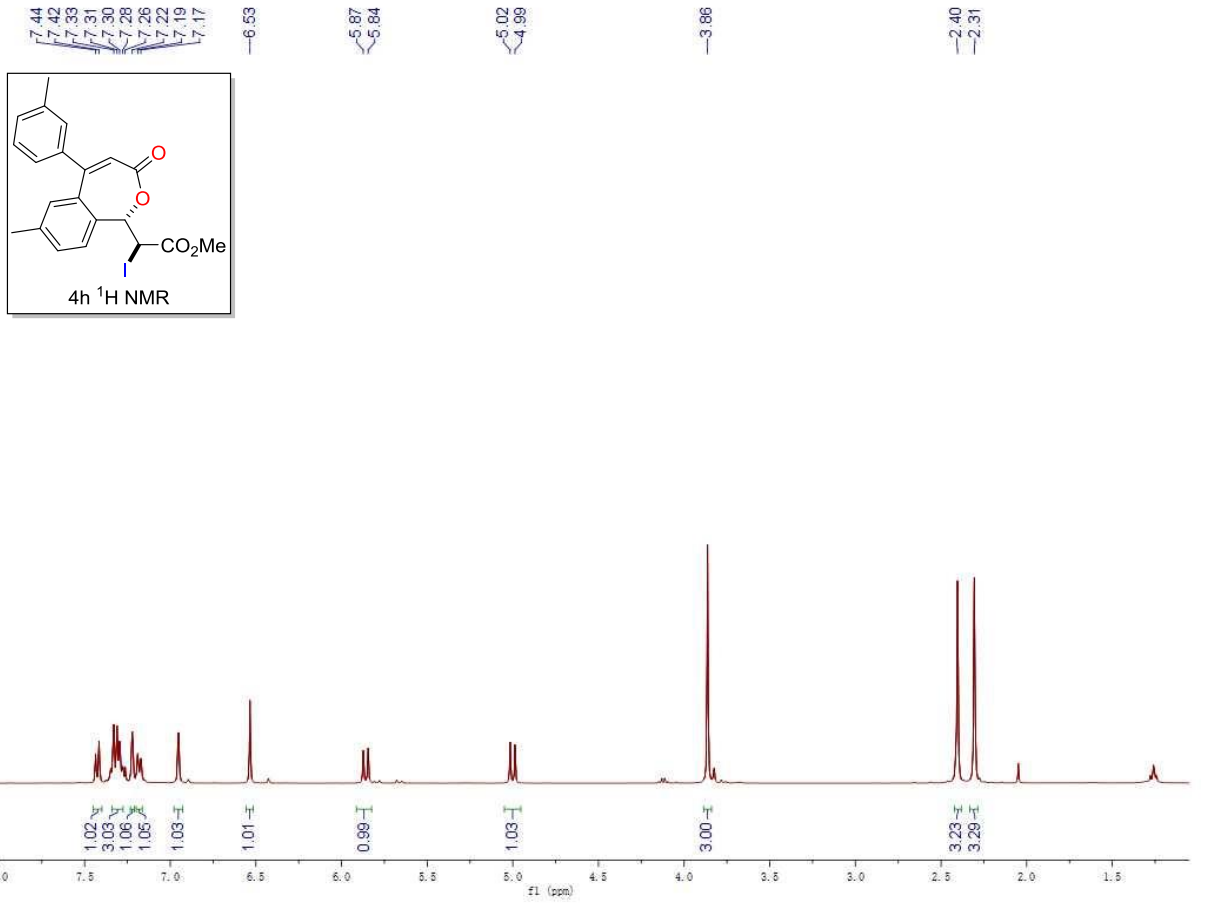


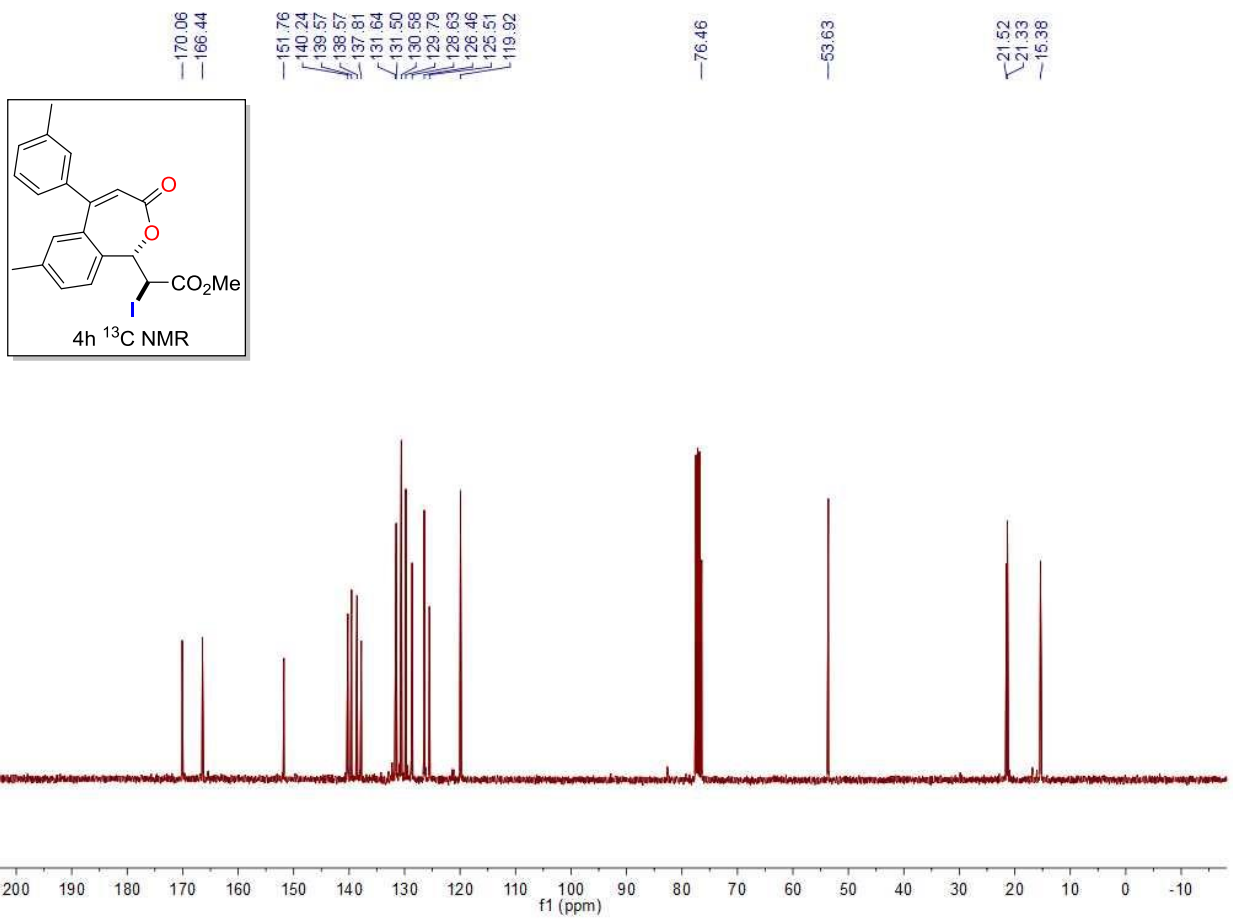


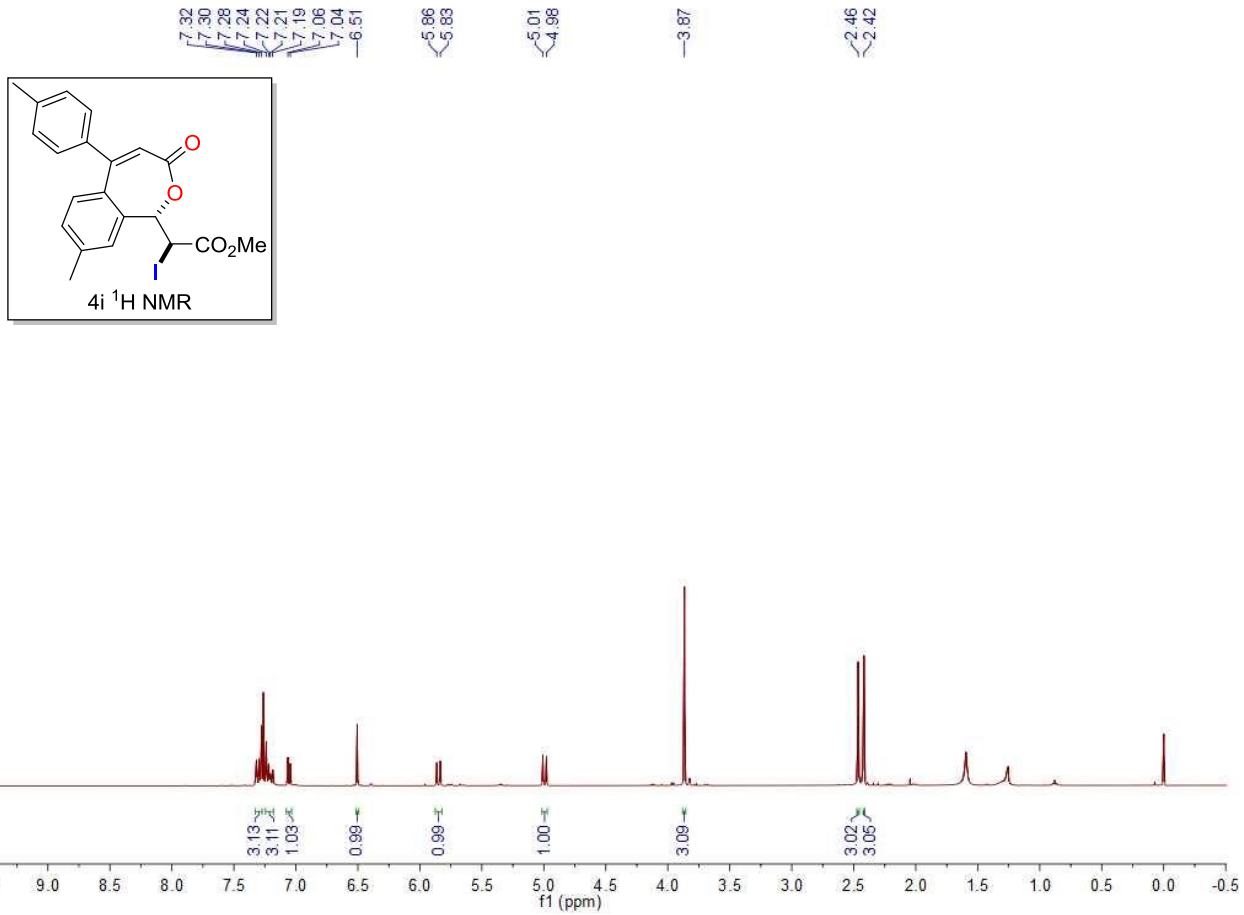
4g ^{1}H NMR

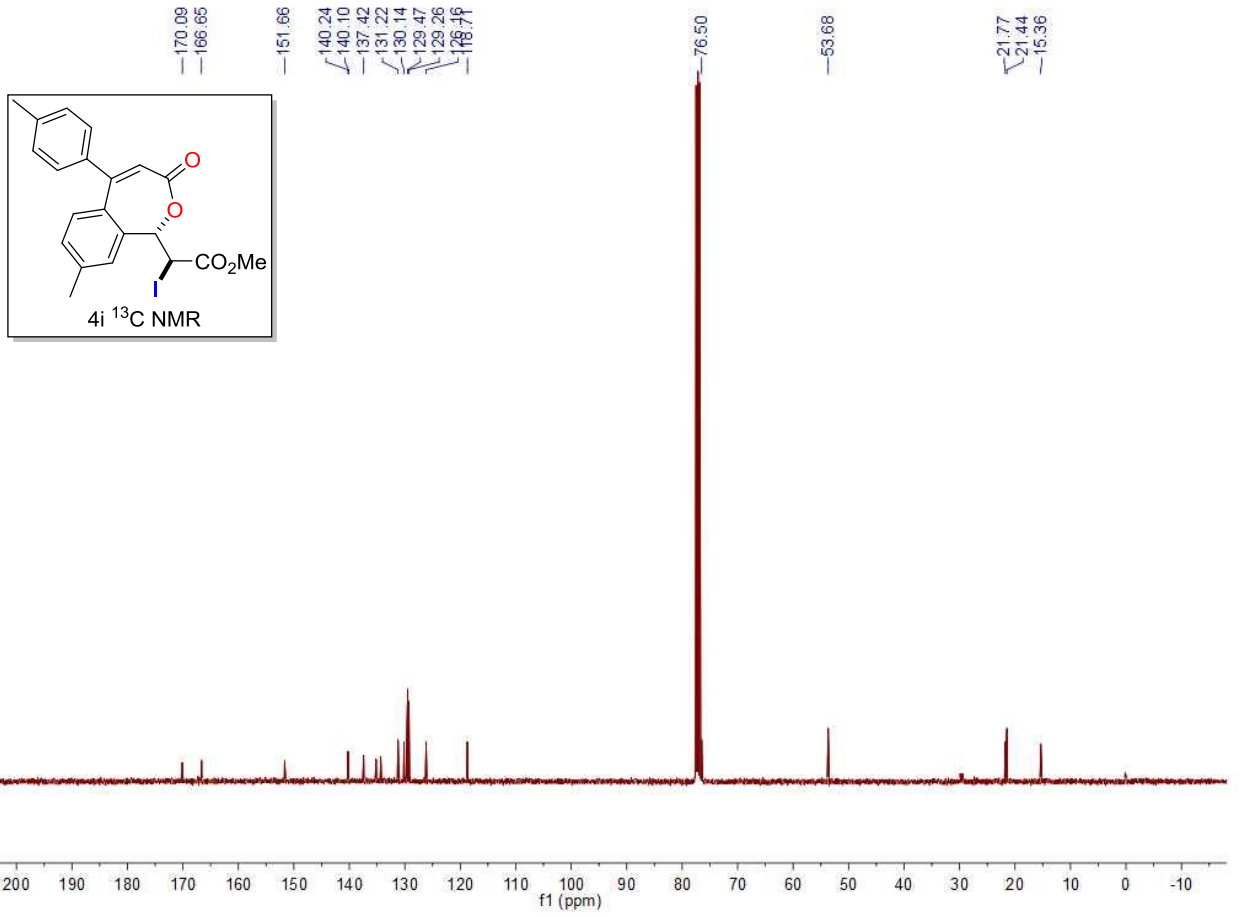


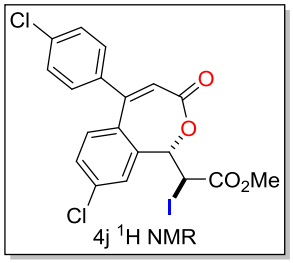
4g ^{13}C NMR


7.44
7.42
7.33
7.31
7.30
7.28
7.26
7.22
7.19
7.17
6.53
5.87
5.84
5.02
4.99
3.86
2.40
2.31
O
O
CO2Me
I
4h 1H NMR
1.02
3.03
1.06
1.05
1.03
1.01
0.99
1.03
3.00
3.23
3.29
f1 (ppm)

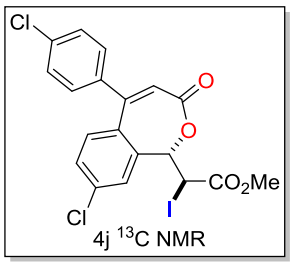

170.06
166.44
151.76
140.24
139.57
138.57
137.81
131.64
131.50
130.58
129.79
128.63
126.46
125.51
119.92
76.46
53.63
21.52
21.33
15.38
O
O
CO2Me
I
4h 13C NMR
f1 (ppm)


7.32
7.30
7.28
7.24
7.22
7.21
7.19
7.06
7.04
6.51
5.86
5.83
5.01
4.98
3.87
2.46
2.42
O
O
CO2Me
I
4i 1H NMR
3.13
3.11
1.03
0.99
0.99
1.00
3.09
3.02
3.05
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)

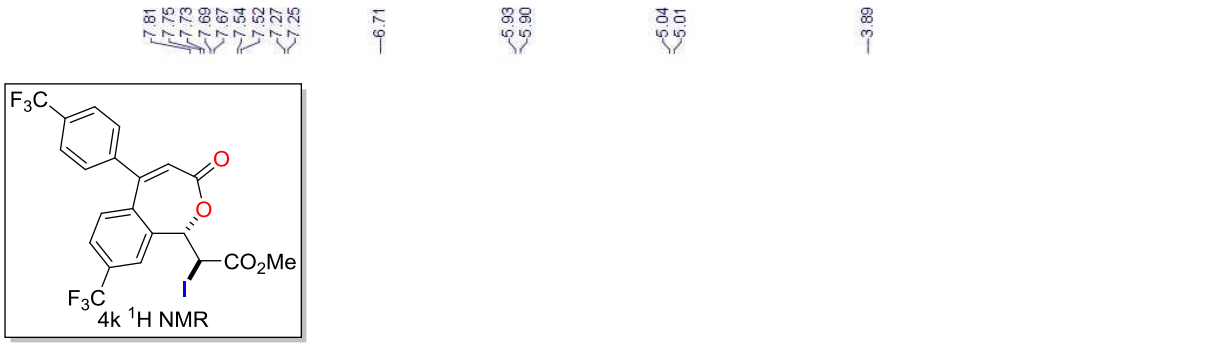

170.09
166.65
151.66
140.24
140.10
137.42
131.22
130.14
129.47
129.26
76.50
53.68
21.77
21.44
15.36
O
O
CO2Me
I
4i 13C NMR
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


Cl
O
O
CO2Me
I
Cl
4j 1H NMR

7.53
7.53
7.44
7.42
7.40
7.40
7.38
7.38
7.33
7.31
7.09
7.07
6.56
5.84
5.81
4.96
4.93
3.87
1.08
3.20
1.05
1.01
1.02
1.02
1.00
1.05
3.03
f1 (ppm)


Cl
O
O
CO2Me
I
Cl
4j 13C NMR

169.71
165.47
149.21
138.03
136.42
136.33
136.22
135.70
132.27
130.49
129.84
129.24
126.36
120.51
76.00
53.77
14.54
f1 (ppm)


7.81
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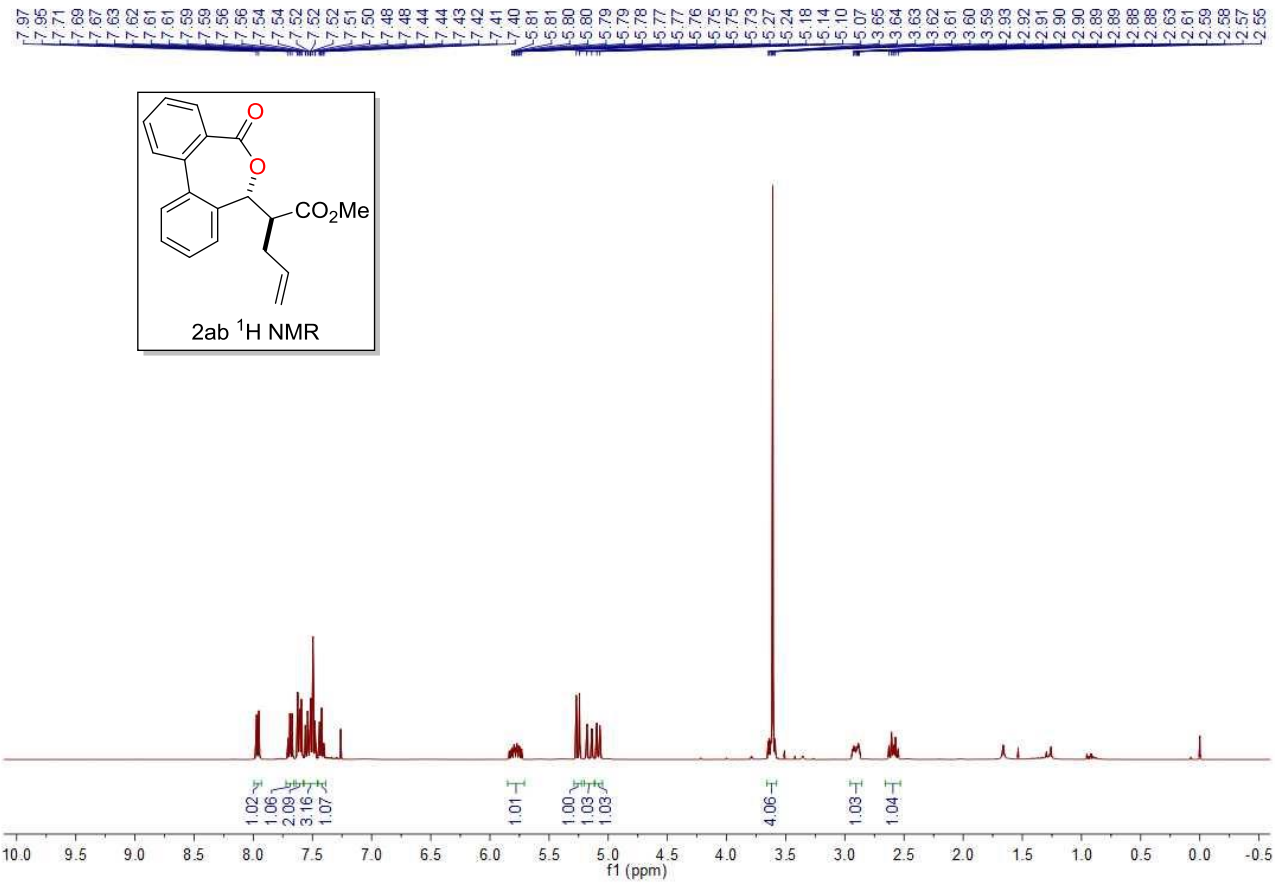
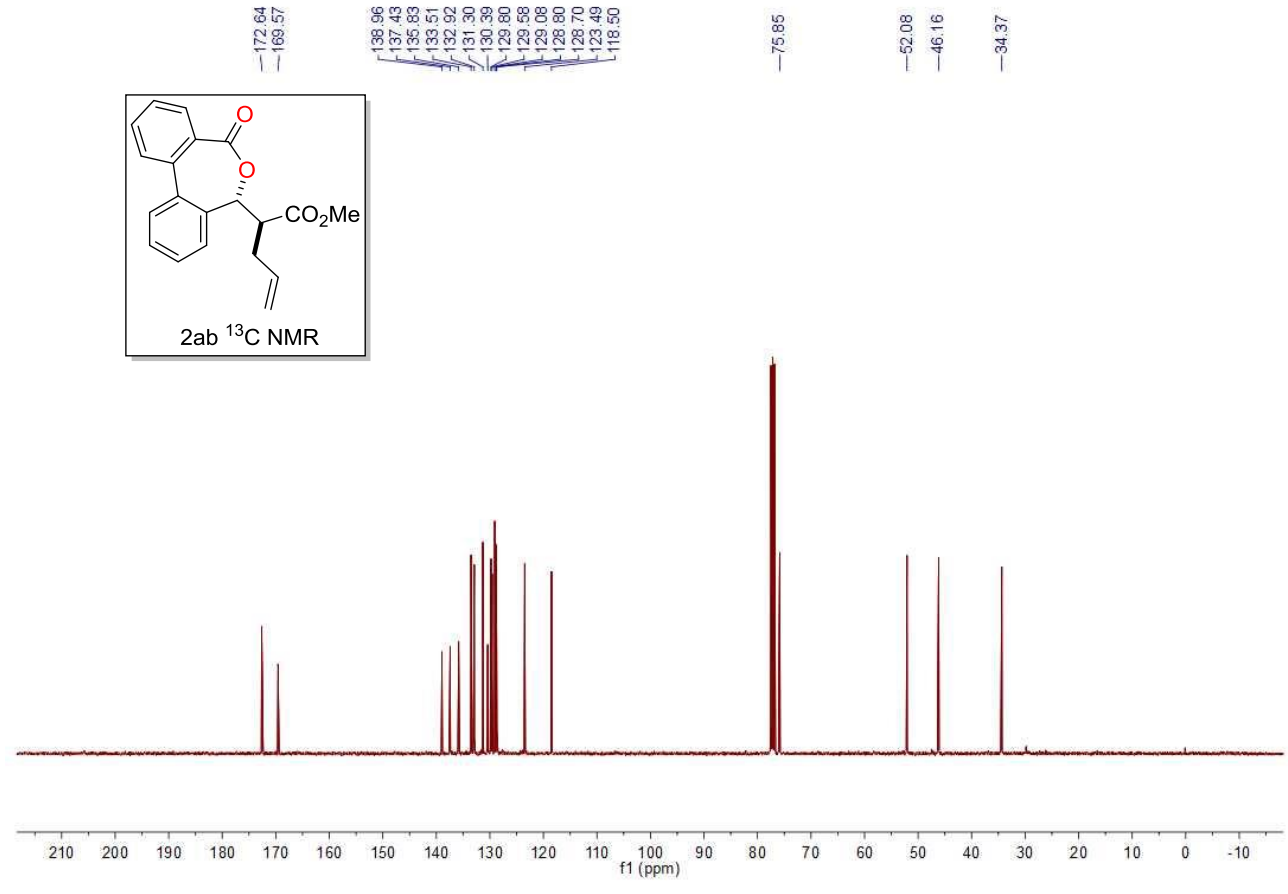
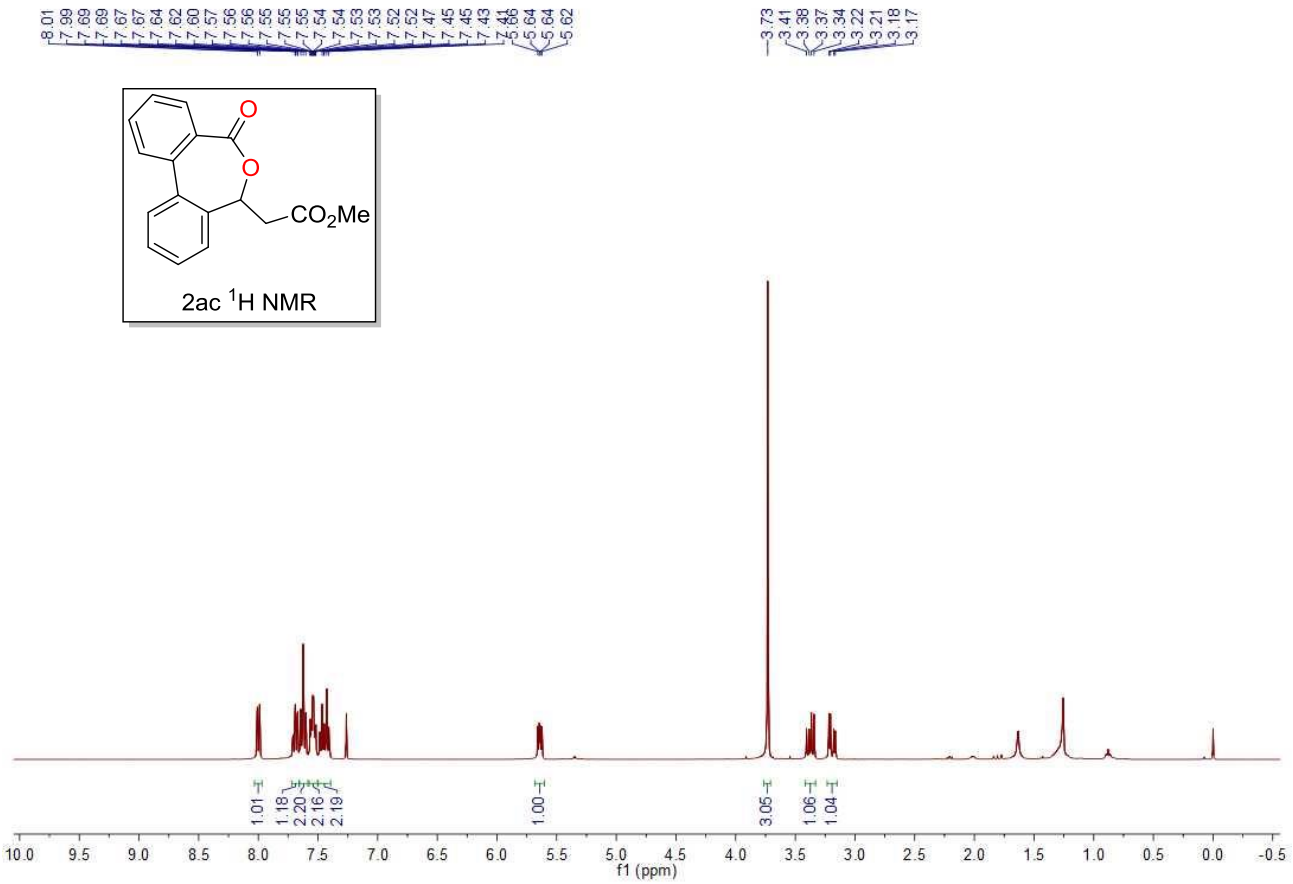
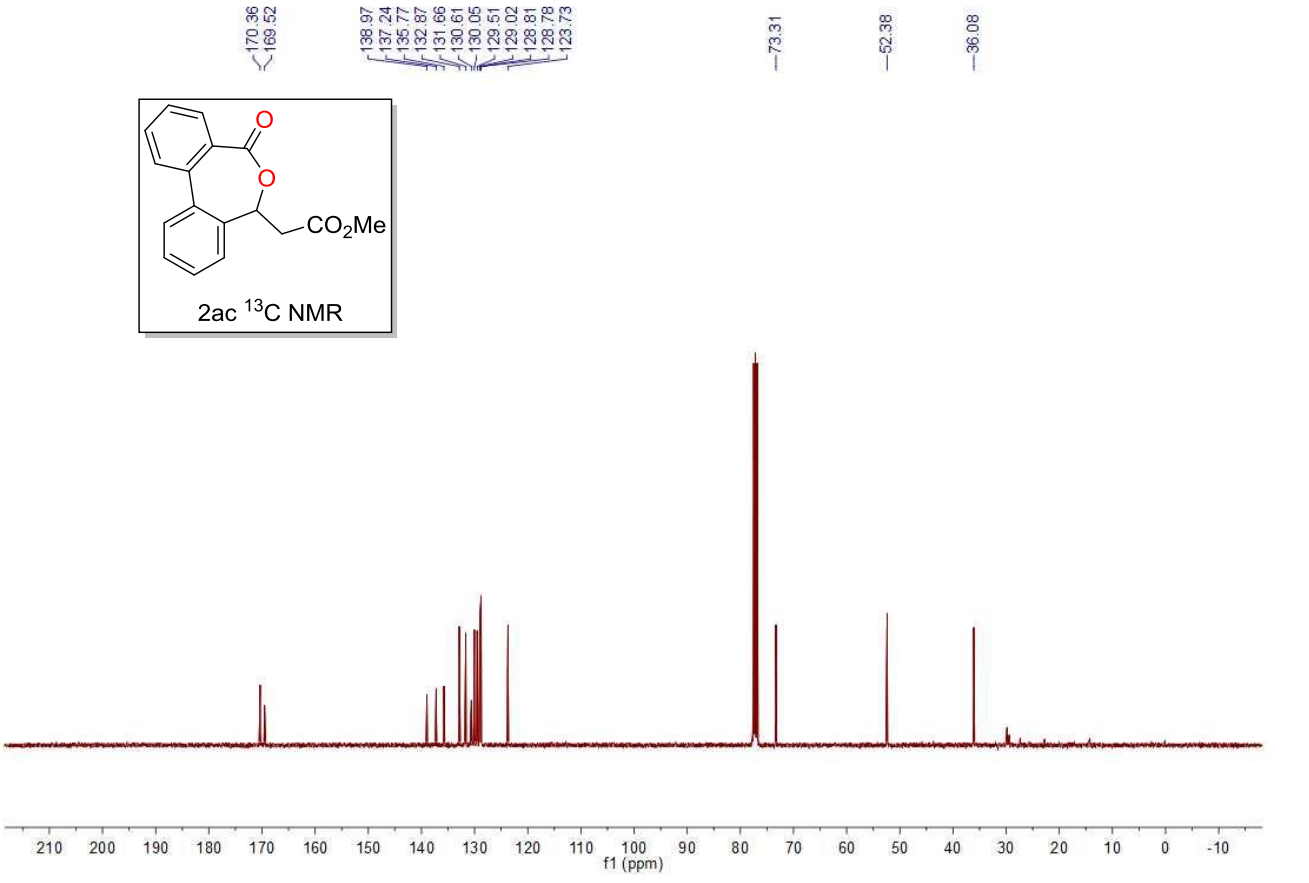
7.73
7.69
7.67
7.54
7.52
7.27
7.25
6.71
5.93
5.90
5.04
5.01
3.89
F3C
O
O
CO2Me
I
F3C
4k 1H NMR
1.01
2.07
1.06
2.04
1.08
1.00
1.04
1.02
3.07
f1 (ppm)

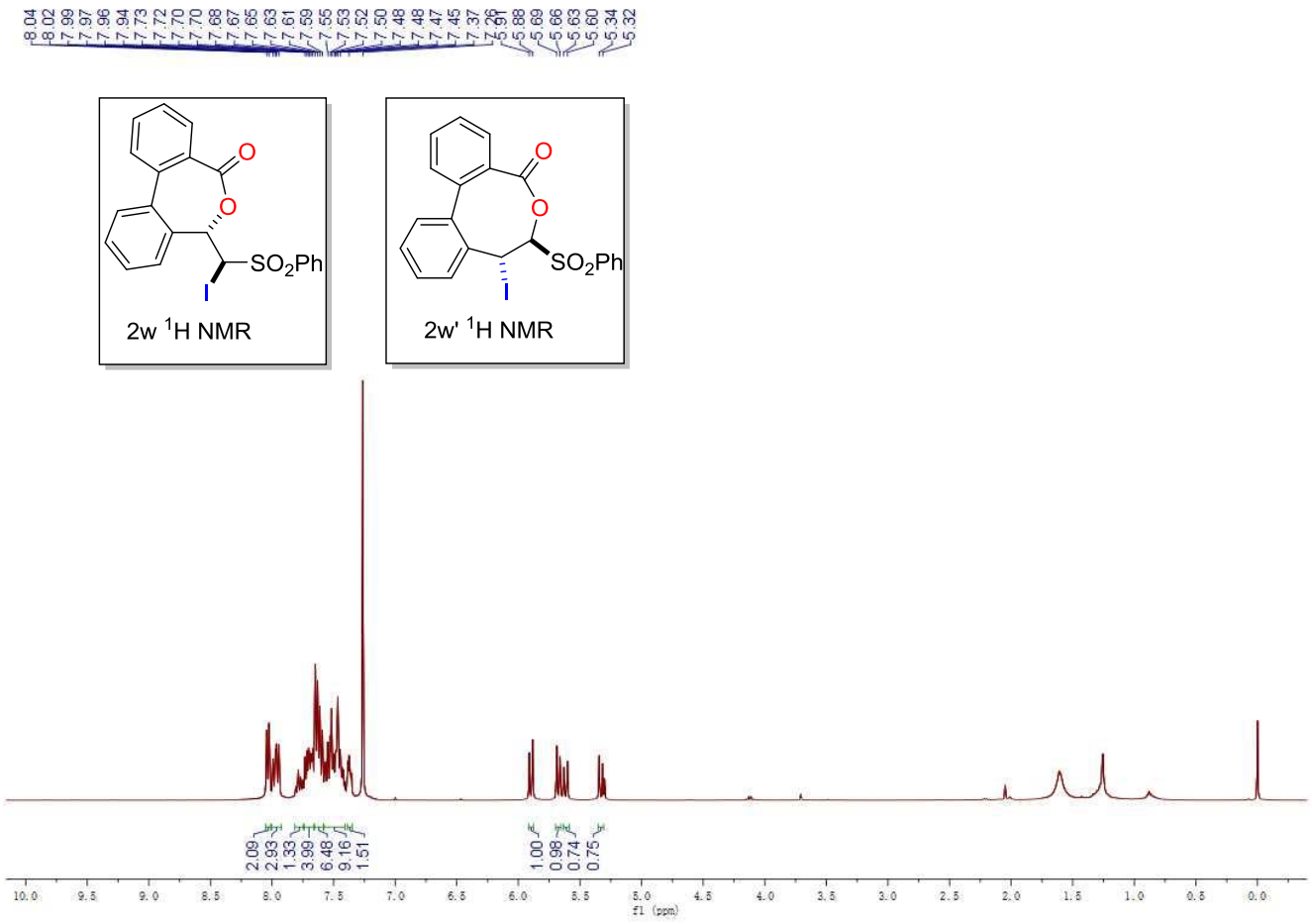

169.70
164.87
148.54
142.81
140.46
135.51
132.46
132.21
132.13
131.88
131.45
129.61
126.54
126.51
126.47
126.19
126.15
126.12
126.08
125.17
124.78
123.48
123.44
123.40
122.98
122.46
122.07
76.16
53.89
14.33
F3C
O
O
CO2Me
I
F3C
4k 13C NMR
f1 (ppm)


O
O
CO2Me
2ab 1H NMR
f1 (ppm)


O
O
CO2Me
2ab 13C NMR
f1 (ppm)

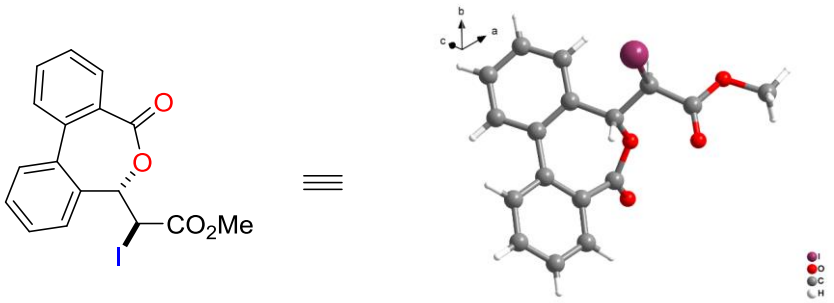

2ac ^{1}H NMR
f1 (ppm)


2ac ^{13}C NMR
f1 (ppm)



6. Crystallographic Data

X-ray data for 2a (CCDC 1918655)

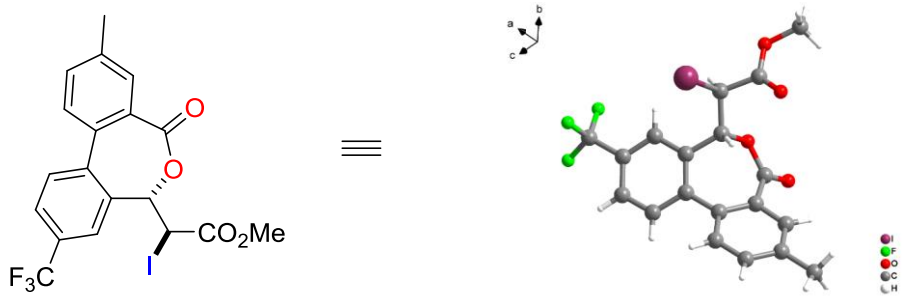


compound	2a
formula	$C_{17}H_{13}IO_4$
formula weight	408.17
T (K)	100.00(10)
crystal system	triclinic
space group	*P*-1
a (Å)	9.5534(3)
b (Å)	9.6302(3)

c (Å)	10.2451(2)
α (°)	74.922(2)
β (°)	85.722(2)
γ (°)	61.931(3)
V (Å^3)	801.80(4)
Z	2
D_c.(g cm^{-3})	1.691
μ (mm^{-1})	15.828
reflns coll.	16140
unique reflns	3261
R_{int}	0.0586
$^aR_1$ [I ≥ 2σ(I)]	0.0378
$^bwR_2$ (all data)	0.1075
GOF	1.081

$^aR_1 = \Sigma||F_o| - |F_c||/\Sigma|F_o|$, $^bwR_2 = [\Sigma w(F_o^2 - F_c^2)^2/\Sigma w(F_o^2)^2]^{1/2}$

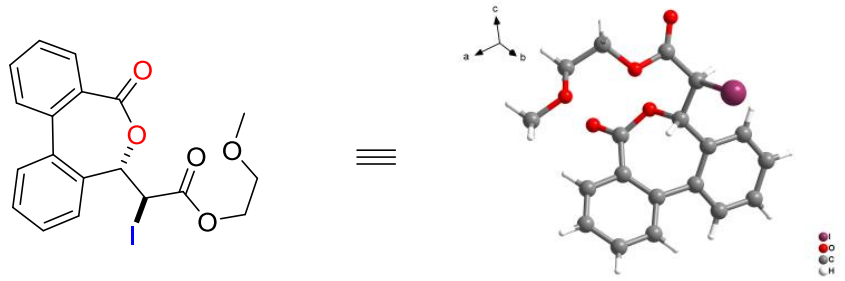
X-ray data for 2o (CCDC 1973725)



compound	**2o**
formula	$C_{19}H_{14}F_3IO_4$
formula weight	490.20
T (K)	99.99(10)
crystal system	monoclinic
space group	*Cc*
a (Å)	9.2645(2)
b (Å)	22.2327(6)
c (Å)	18.2492(5)
α (°)	90
β (°)	101.504(3)
γ (°)	90
V (Å^3)	3683.36(17)
Z	18
D_c.(g cm^{-3})	1.768
μ (mm^{-1})	1.790
reflns coll.	28911
unique reflns	8822
R_{int}	0.0755
$^aR_1$ [I ≥ 2σ(I)]	0.0494
$^bwR_2$ (all data)	0.1251
GOF	1.003

$^aR_1 = \Sigma||F_o| - |F_c||/\Sigma|F_o|$, $^bwR_2 = [\Sigma w(F_o^2 - F_c^2)^2/\Sigma w(F_o^2)^2]^{1/2}$

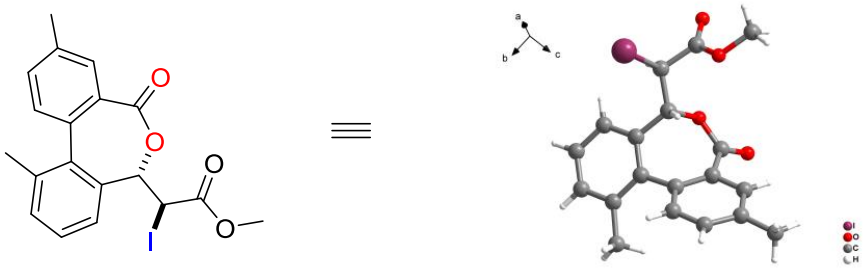
X-ray data for 2e (CCDC 1944538)



compound	2e
formula	$C_{19}H_{17}IO_5$
formula weight	452.22
T (K)	99.98(10)
crystal system	triclinic
space group	P-1
a (Å)	9.8357(2)
b (Å)	10.4353(3)
c (Å)	10.4634(3)
α (°)	111.642(2)
β (°)	106.312(2)
γ (°)	106.245(2)
V (Å^3)	865.10(4)
Z	2
D_c.(g cm^{-3})	1.736
μ (mm^{-1})	1.878
reflns coll.	13105
unique reflns	4297
R_{int}	0.0539
$^aR_1$ [I ≥ 2σ(I)]	0.0317
$^bwR_2$ (all data)	0.0762
GOF	1.024

$^aR_1 = \Sigma||F_o| - |F_c||/\Sigma|F_o|$, $^bwR_2 = [\Sigma w(F_o^2 - F_c^2)^2/\Sigma w(F_o^2)^2]^{1/2}$

X-ray data for 2i (CCDC 1944537)

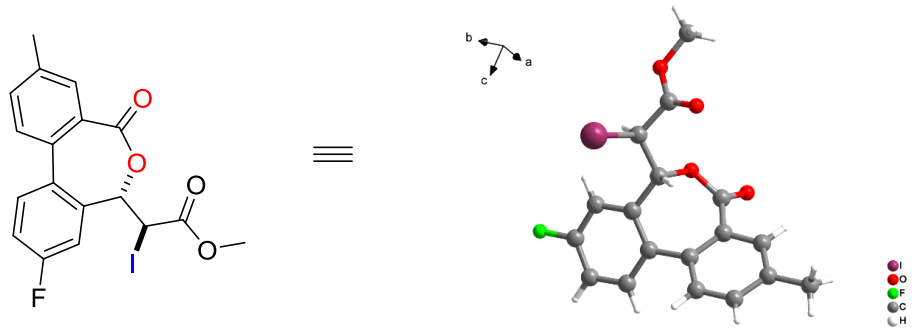


compound	2i
formula	$C_{19}H_{17}IO_4$
formula weight	436.22
T (K)	99.99(10)
crystal system	monoclinic
space group	$P2_1$-n

a (Å)	10.5655(4)
b (Å)	14.9260(5)
c (Å)	11.4963(4)
α (°)	90
β (°)	107.437(4)
γ (°)	90
V (Å^3)	1729.66(11)
Z	4
D_c.(g cm^{-3})	1.675
μ (mm^{-1})	1.871
reflns coll.	14543
unique reflns	4229
R_{int}	0.0467
[a]R_1 [I ≥ 2σ(I)]	0.0363
[b]wR_2 (all data)	0.0900
GOF	1.048

[a]$R_1 = \Sigma||F_o| - |F_c||/\Sigma|F_o|$, [b]$wR_2 = [\Sigma w(F_o^2 - F_c^2)^2/\Sigma w(F_o^2)^2]^{1/2}$

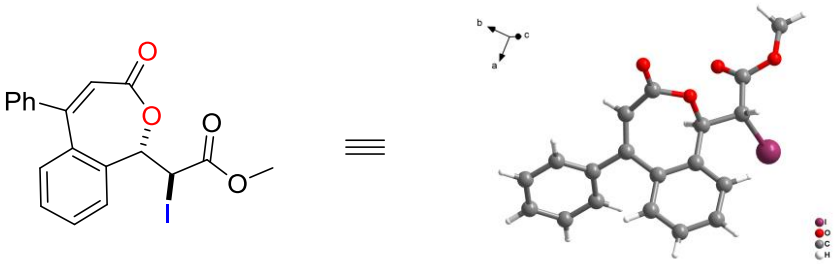
X-ray data for 2n (CCDC 1974644)



compound	2n
formula	$C_{18}H_{14}FIO_4$
formula weight	440.19
T (K)	100.02(10)
crystal system	orthorhombic
space group	$P2_12_12_1$
a (Å)	8.7643(3)
b (Å)	9.1745(3)
c (Å)	20.1935(8)
α (°)	90
β (°)	90
γ (°)	90
V (Å^3)	1623.72(10)
Z	4
D_c.(g cm^{-3})	1.801
μ (mm^{-1})	2.002
reflns coll.	9747
unique reflns	3767
R_{int}	0.0460
[a]R_1 [I ≥ 2σ(I)]	0.0333
[b]wR_2 (all data)	0.0597
GOF	1.021

[a]$R_1 = \Sigma||F_o| - |F_c||/\Sigma|F_o|$, [b]$wR_2 = [\Sigma w(F_o^2 - F_c^2)^2/\Sigma w(F_o^2)^2]^{1/2}$

X-ray data for 4a (CCDC 1944536)



compound	4a
formula	$C_{19}H_{15}IO_4$
formula weight	434.21
T (K)	99.98(10)
crystal system	monoclinic
space group	$P2_1$-n
a (Å)	8.09310(10)
b (Å)	13.1306(2)
c (Å)	15.5266(2)
α (°)	90
β (°)	95.488(2)
γ (°)	90
V (Å^3)	1642.41(4)
Z	4
D_c.(g cm^{-3})	1.756
μ (mm^{-1})	15.498
reflns coll.	9809
unique reflns	2932
R_{int}	0.0586
$^aR_1$ [I ≥ 2σ(I)]	0.0449
$^bwR_2$ (all data)	0.1260
GOF	1.068

$^aR_1 = \Sigma||F_o| - |F_c||/\Sigma|F_o|$, $^bwR_2 = [\Sigma w(F_o^2 - F_c^2)^2/\Sigma w(F_o^2)^2]^{1/2}$