# Supplementary Information

*for*

## Native carboxyl group assisted C–H acetoxylation of hydrocinnamic and phenylacetic acids

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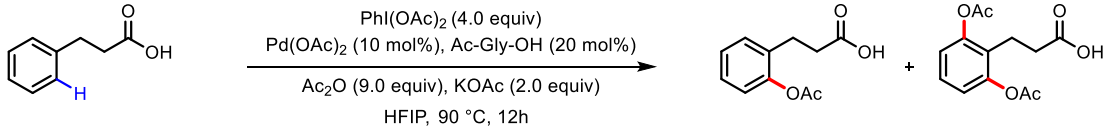
# 1. General Information

Unless otherwise noted, commercially available reagents were purchased from commercial suppliers (such as Strem, Alfa Aesar, J&K Chemical Co, Energy Chemical, Sinocompound and Adamas) and used as received. Solvents were generally dried over 4 Å molecular sieves. Hexafluoroisopropanol (HFIP) was dried over 4 Å molecular sieves and distilled before use. The reaction vessels used for C–H functionalization were 15 mL sealed tube or 50 mL Schlenk tube (Synthware). Purification of products was performed by flash chromatography (FC) using silica gel or preparative thin layer chromatography. $^{1}$H and $^{13}$C NMR spectra were recorded on a Bruker AVANCE III spectrometer (400 MHz and 101 MHz, respectively). Chemical shifts are reported parts per million (ppm) referenced to $CDCl_3$ (δ 7.26 ppm) or MeOD (δ 3.10 ppm) or $(CD_3)_2CO$ (δ 2.05 ppm), tetramethylsilane (TMS, δ 0.00 ppm) for $^{1}$H NMR; $CDCl_3$ (δ 77.16 ppm) or MeOD (δ 49.00 ppm) or $(CD_3)_2CO$ (δ 29.84 ppm, 206.26 ppm) for $^{13}$C NMR. The following abbreviations (or combinations thereof) were used to explain multiplicities: s = singlet, d = doublet, t = triplet, q = quartet, hept = heptaplet, m = multiplet, and br = broad. To distinguish, some $^{13}$C NMR chemical shifts retain two decimal places. High-resolution mass spectra (HRMS) were obtained on an Impact II UHR-TOF mass spectrometry equipped with an ESI source from Bruker at Fujian Institute of Research on the Structure of Matter.

# 2. Experimental Section

## 2.1 Optimization of reaction conditions substrate 1a[a]



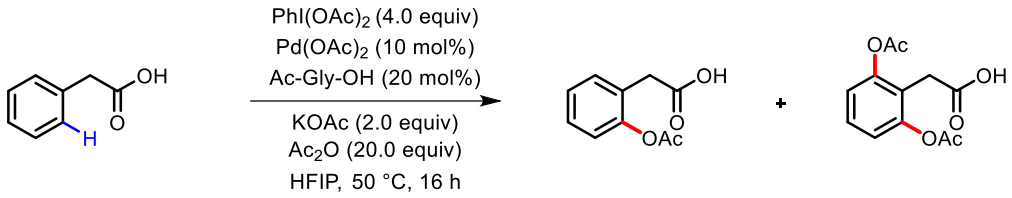

**1a** **2a$_{mono}$** **2a$_{di}$**

| Entry | Deviation from standard conditions | Yield(%)**(mono/di)** |
|---|---|---|
| 1 | None | 72 [50, 22] |
| 2 | $Ac_2O$ (0 equiv） | 47 [19, 28] |
| 3 | $Ac_2O$ (3.0 equiv） | 60 [33, 27] |
| 4 | $Ac_2O$ (6.0 equiv） | 64 [43, 21] |
| 5 | $Ac_2O$ (12.0 equiv） | 62 [48, 14] |
| 6 | $PhI(OAc)_2$ (1.0 equiv) | 45 [38, 7] |
| 7 | $PhI(OAc)_2$ (2.0 equiv) | 57 [43, 14] |
| 8 | $PhI(OAc)_2$ (3.0 equiv) | 63 [42, 21] |

| | | |
|---|---|---|
| 9 | $PhI(OAc)_2$ (5.0 equiv) | 66 [52, 14] |
| 10 | KOPiv instead of KOAc | 60 [46, 14] |
| 11 | LiOAc instead of KOAc | 22 [22, 0] |
| 12 | NaOAc instead of KOAc | 55 [48, 7] |
| 13 | CsOAc instead of KOAc | 55 [41, 14] |
| 14 | $K_2CO_3$ instead of KOAc | 60 [44, 16] |
| 15 | Without KOAc | 12 [12, 0] |
| 16 | 2-Hydroxy-5-bromopyridine instead of Ac-Gly-OH | 16 [16, 0] |
| 17 | 3-nitropyridin-2-ol instead of Ac-Gly-OH | 46 [39, 7] |
| 18 | 2-bromo-3-methylpyridine instead of Ac-Gly-OH | 35 [35, 0] |
| 19 | Fmoc-Gly-OH instead of Ac-Gly-OH | 61 [51, 10] |
| 20 | Ac-DL-Phe-OH instead of Ac-Gly-OH | 62 [53, 9] |
| 21 | Fmoc-L-Phe-OH instead of Ac-Gly-OH | 56[49, 7] |
| 22 | Fmoc-L-Ile-OH instead of Ac-Gly-OH | 62[51, 11] |
| 23 | Without Ac-Gly-OH | 57 [44, 13] |
| 24 | $Pd(OAc)_2$ (5 mol%)<br>Ac-Gly-OH (10 mol%) | 43 [34, 9] |
| 25 | $Pd(OAc)_2$ (5 mol%) | 48 [36, 12] |
| 26 | HFIP 4 mL | 69 [33, 36] |
| 27 | TFE as solvent | 23 [23, 0] |
| 28 | *t*-BuOH as solvent | N.D. |
| 29 | 1,4-dioxane as solvent | N.D. |
| 30 | MeCN as solvent | N.D. |
| 31 | AcOH as solvent | 5 [5, 0] |
| 32 | 70 ℃ | 30 [30, 0] |
| 33 | 80 ℃ | 33 [28, 5] |
| 34 | 100 ℃ | 59 [46, 13] |
| 35 | 18 h | 64 [44, 20] |
| 36 | 24 h | 60 [42, 18] |

[a] Reaction conditions: **1a** (0.2 mmol), $Pd(OAc)_2$ (10 mol %), Ac-Gly-OH (20 mol%), $PhI(OAc)_2$ (4.0 equiv), $Ac_2O$ (9.0 equiv), HFIP (2 mL), 12 h, 90 ℃. Yield was determined by $^1H$ NMR with $CH_2Br_2$ as internal standard.

## 2.2 Optimization of reaction conditions substrate 3a[a]

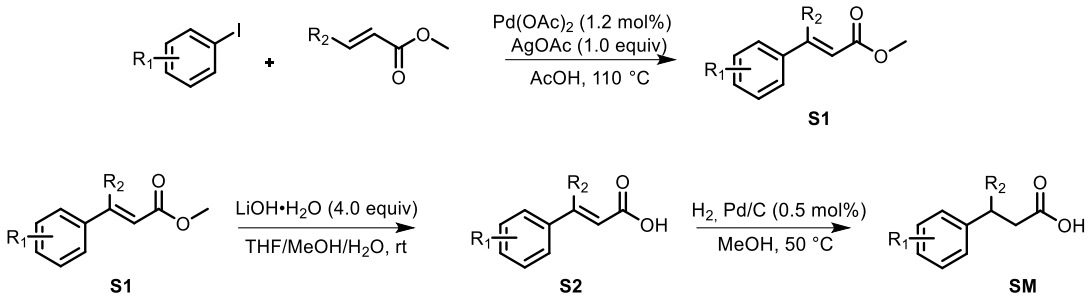



**3a** **$4a_{mono}$** **$4a_{di}$**

| Entry | Deviation from standard conditions | Yield(%)**(mono/di)** |
|---|---|---|
| 1 | None | 76 [55, 21] |
| 2 | $Ac_2O$ (0 equiv） | 29 [0, 29] |
| 3 | $Ac_2O$ (5.0 equiv） | 42 [0, 42] |
| 4 | $Ac_2O$ (10.0 equiv） | 60 [15, 45] |
| 5 | $Ac_2O$ (15.0 equiv） | 68 [36, 32] |
| 6 | $Ac_2O$ (25.0 equiv） | 71 [55, 16] |
| 7 | $PhI(OAc)_2$ (2.0 equiv) | 66 [38, 28] |
| 8 | $PhI(OAc)_2$ (3.0 equiv) | 68 [42, 26] |
| 9 | $PhI(OAc)_2$ (5.0 equiv) | 74 [52, 22] |
| 10 | $PhI(OAc)_2$ (2.0 equiv); $Ac_2O$ (10.0 equiv） | 46 [3, 43] |
| 11 | $PhI(OAc)_2$ (2.0 equiv); $Ac_2O$ (15.0 equiv） | 48 [15, 33] |
| 12 | $PhI(OAc)_2$ (3.0 equiv); $Ac_2O$ (10.0 equiv） | 50 [9, 41] |
| 13 | $PhI(OAc)_2$ (3.0 equiv); $Ac_2O$ (15.0 equiv） | 62 [27, 35] |
| 14 | LiOAc instead of KOAc | 34 [34, 0] |
| 15 | NaOAc instead of KOAc | 52 [41, 11] |
| 16 | CsOAc instead of KOAc | 60 [44, 16] |

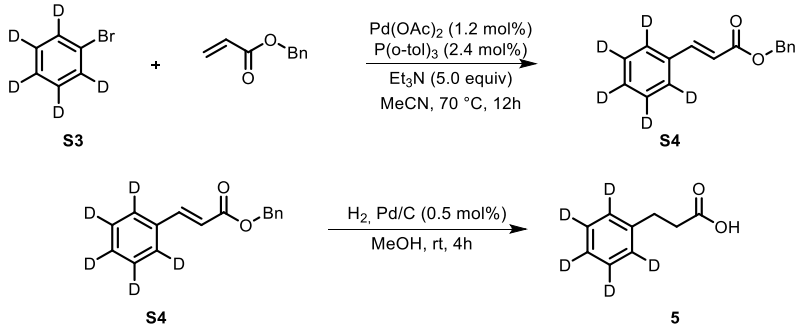
[a] Reaction conditions: **3a** (0.2 mmol), $Pd(OAc)_2$ (10 mol %), Ac-Gly-OH (20 mol%), $PhI(OAc)_2$ (4.0 equiv), $Ac_2O$ (20.0 equiv), HFIP (2 mL), 16 h, 50 ℃. Yield was determined by $^1H$ NMR with $CH_2Br_2$ as internal standard.

## 2.3 General procedures for synthesis of substrates




To a stirred solution of silver acetate (5 mmol) and palladium acetate (0.06 mmol) in acetic acid (10 mL) was added iodobenzene (5 mmol) and ethyl acrylate (6 mmol). The resulting mixture was stirred at 110 ℃ for 6~12 h[S1]. After being cooled to room temperature, the reaction mixture was diluted with 15 mL ethyl acetate. The reaction mixture was filtered over a pad of celite, and concentrated under reduced pressure to give the product **S1**. **S1** was then dissolved in a solution of THF (15 mL), EtOH (10 mL) and $H_2O$ (5 mL). The solution was cooled to 0 ℃ and LiOH·$H_2O$ (4.0 equiv) was added. The mixture was stirred at room temperature for 2 h and then $H_2O$ (10 mL) was added. The solution was extracted with $Et_2O$ (20 mL × 2) and the aqueous phase was acidized with 2N HCl (20 mL). The aqueous phase was extracted with DCM (10 mL × 4). The combined organic phase was dried over anhydrous $Na_2SO_4$ and concentrated under reduced pressure to give compound **S2**. A mixture of **S2** and 60.0 mg of Pd/C (10%) was placed in flask under nitrogen before methanol (30 ml) was carefully added. The resulting suspension was evacuated and then refilled with hydrogen and equipped with a hydrogen balloon, and the reaction mixture was vigorously stirred at room temperature for 4h. The solvent was removed under reduced pressure and the residue was purified by flash silica gel column chromatography with petroleum ether (PE)/EtOAc (EA) (3/1) to give compound hydrocinnamic acids.

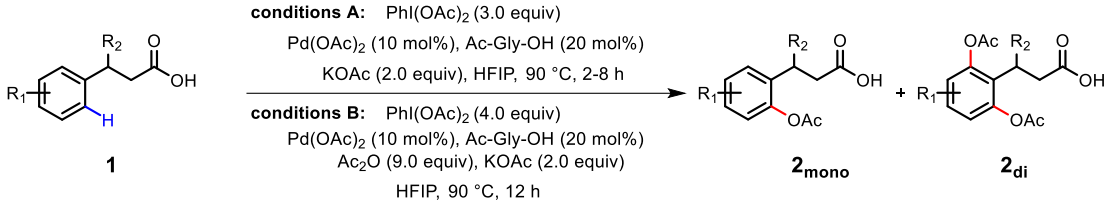
## 2.4 General procedures for synthesis of substrate 5




$Pd(OAc)_2$ (13.5 mg, 0.06 mmol), tri(o-tol)phosphine (36.5 mg, 0.12 mmol) and $Et_3N$ (1.4 mL, 10 mmol) were added to a solution of **S3** (0.21 ml, 2.0 mmol) and benzyl acrylate (0.33 mL, 2.2 mmol) in anhydrous MeCN (10.0 mL). The mixture was stirred at 80 ℃ for 12 h and then cooled to room

temperature. $H_2O$ (10 mL) was added and the aqueous phase was extracted with EA (5 mL × 3). The combined organic phase was dried over anhydrous $Na_2SO_4$ and evaporated under reduced pressure. The residue was purified by flash silica gel chromatography with PE/EA (3/1) to afford **S4**. A mixture of **S4** and 10% palladium over activated charcoal (24.0 mg) was placed under nitrogen before methanol (10 ml) was carefully added. The resulting suspension was placed under vacuum, then under hydrogen (1 atm), and the reaction mixture was vigorously stirred at room temperature for 4h. The solvent was removed under reduced pressure and the residue was purified by flash silica gel column chromatography with petroleum ether (PE)/EtOAc (EA) (3/1) to give compound **5**.

## 2.5 General procedures for synthesis of products

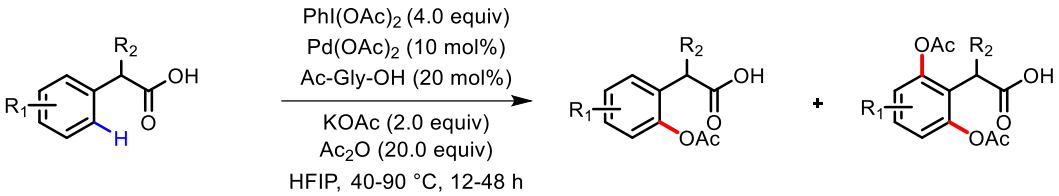



### General procedure A

An oven-dried 15 mL sealed tube (with a Teflon cap) equipped with a magnetic stir bar was charged with compound **1a** (30.0 mg, 0.2 mmol, 1.0 equiv), $PhI(OAc)_2$ (193 mg, 0.6 mmol, 3.0 equiv), $Pd(OAc)_2$ (4.6 mg, 0.02 mmol, 10 mol %), ligand (Ac-Gly-OH, 4.7 mg 0.04 mmol, 20 mol %), KOAc (39.2 mg 0.4 mmol, 2.0 equiv) sequentially. HFIP (2.0 mL) was added to the mixture along the inside wall of the tube. The tube was then capped and placed into a preheated oil bath (90 ℃) or hotplate (90 ℃). [Note: good stirring was important for reproducibility, splashes on the wall of the tube showed adverse effects for the reaction]. The reaction vessel was then cooled to room temperature. Then a 3 N HCl solution (2 mL) was added, and the mixture was extracted with DCM (3 × 5 mL). The organic layers were combined and removed under reduced pressure. The resulting residue was purified by preparative TLC using PE/EA (4/1, with 1% HOAc) as the eluent.

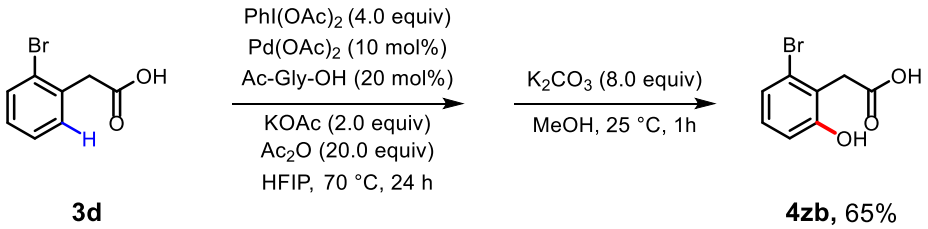
### General procedure B

An oven-dried 15 mL sealed tube (with a Teflon cap) equipped with a magnetic stir bar was charged with compound **1a** (30.0 mg, 0.2 mmol, 1.0 equiv), $PhI(OAc)_2$ (257 mg, 0.8 mmol, 4.0 equiv), $Pd(OAc)_2$ (4.6 mg, 0.02 mmol, 10 mol %), ligand (Ac-Gly-OH, 4.7 mg 0.04 mmol, 20 mol %), KOAc (39.2 mg 0.4 mmol, 2.0 equiv) and $Ac_2O$ (0.172 mL 9 equiv) sequentially. HFIP (2.0 mL) was added to the mixture along the inside wall of the tube. The tube was then capped and placed into a preheated oil bath (90 ℃) or hotplate (90 ℃). [Note: good stirring was important for reproducibility, splashes on the wall of the tube showed adverse effects for the reaction]. The reaction vessel was then cooled to room temperature. Then a 3 N HCl solution (2 mL) was added, and the mixture was extracted with DCM (3 ×5 mL). The organic layers were combined and removed under reduced pressure. The resulting residue was purified by preparative TLC using PE/EA (4/1, with 1% HOAc) as the eluent.



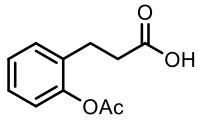

## General procedure C

An oven-dried 15 mL sealed tube (with a Teflon cap) equipped with a magnetic stir bar was charged with compound **3a** (27.6 mg, 0.2 mmol, 1.0 equiv), $PhI(OAc)_2$ (257 mg, 0.8 mmol, 4.0 equiv), $Pd(OAc)_2$ (4.6 mg, 0.02 mmol, 10 mol %), ligand (Ac-Gly-OH, 4.7 mg 0.04 mmol, 20 mol %), KOAc (39.2 mg 0.4 mmol, 2.0 equiv) and $Ac_2O$ (0.382 mL 20 equiv) sequentially. HFIP (2.0 mL) was added to the mixture along the inside wall of the tube. The tube was then capped and placed into a preheated oil bath (40- 90 ℃) or hotplate (40- 90 ℃). [Note: good stirring was important for reproducibility, splashes on the wall of the tube showed adverse effects for the reaction]. The reaction vessel was then cooled to room temperature. Then a 3 N HCl solution (2 mL) was added, and the mixture was extracted with DCM (3 × 5 mL). The organic layers were combined and removed under reduced pressure. The resulting residue was purified by preparative TLC using PE/EA (3/1, with 1% HOAc) as the eluent.




## General procedure D

An oven-dried 15 mL sealed tube (with a Teflon cap) equipped with a magnetic stir bar was charged with compound **3d** (43.0 mg, 0.2 mmol, 1.0 equiv), $PhI(OAc)_2$ diacetate (257 mg, 0.8 mmol, 4.0 equiv), $Pd(OAc)_2$ (4.6 mg, 0.02 mmol, 10 mol %), ligand (Ac-Gly-OH, 4.7 mg 0.04 mmol, 20 mol %), KOAc (39.2 mg 0.4 mmol, 2.0 equiv) and $Ac_2O$ (0.382 mL 20 equiv) sequentially. HFIP (2.0 mL) was added to the mixture along the inside wall of the tube. The tube was then capped and placed into a preheated hotplate (70 ℃). [Note: good stirring was important for reproducibility, splashes on the wall of the tube showed adverse effects for the reaction]. Volatile matter was removed under reduced pressure and the residue was re-dissolved in methanol (2 mL). To the solution was added $K_2CO_3$ (219 mg, 1.6 mmol). The reaction was stirred at room temperature for 1 h. A 3.0 N HCl solution (1 mL) was then added, and the mixture was extracted with DCM (3 × 5 mL). The organic layers were combined and removed under reduced pressure. The resulting residue was purified by preparative TLC using PE/EA (2/1, with 1% HOAc) as the eluent.

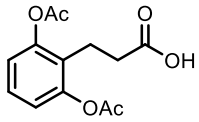


**2a$_{mono}$**

**2a$_{mono}$:** 3-(2-acetoxyphenyl)propanoic acid

The general procedure **A** was followed (2.5h). Pale yellow oil, 8.3 mg, 20% yield. The general procedure **B** was followed. Pale yellow oil, 20.0 mg, 48% yield.

$^1$H NMR (600 MHz, $CDCl_3$) δ 7.29 – 7.20 (m, 2H), 7.18 (td, *J* = 7.5, 1.3 Hz, 1H), 7.03 (dd, *J* = 7.9, 1.4 Hz, 1H). 2.86 (t, *J* = 7.9 Hz, 2H), 2.63 (t, *J* = 7.9 Hz, 2H), 2.32 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 179.1, 169.7, 149.1, 132.1, 130.2, 127.9, 126.5, 122.6, 34.3, 25.3, 21.0. HRMS (ESI) m/z calcd for $C_{11}H_{12}O_4Na^+$ ($M+Na^+$) 231.0628, found 231.0628.

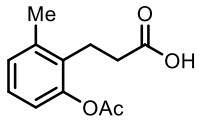


**2a$_{di}$**

**2a$_{di}$:** 3-(2,6-diacetoxyphenyl)propanoic acid

The general procedure **A** was followed (2.5h). Pale yellow oil, 18.4 mg, 36% yield. The general procedure **B** was followed. Pale yellow oil, 9.9 mg, 19% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.27 (t, *J* = 8.1 Hz, 1H), 6.98 (d, *J* = 8.2 Hz, 2H), 2.80 (t, *J* = 8.0 Hz, 2H), 2.55 (t, *J* = 8.0 Hz, 2H), 2.32 (s, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.8, 169.4, 149.9, 127.6, 125.4, 120.4, 33.3, 21.0, 20.2. HRMS (ESI) m/z calcd for $C_{13}H_{14}O_6Na^+$ ($M+Na^+$) 289.0683, found 289.0684.

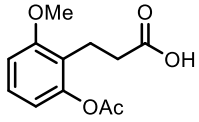


**2b**

**2b:** 3-(2-acetoxy-6-methylphenyl)propanoic acid

The general procedure **B** was followed. White solid, 25.3 mg, 57% yield, M. p.: 98.3-100.2 ℃.

$^1$H NMR (400 MHz, MeOD) δ 7.17 – 7.08 (m, 1H), 7.06 (d, *J* = 7.8 Hz, 1H), 6.86 (d, *J* = 7.9 Hz, 1H), 2.86 (t, *J* = 8.7 Hz, 2H), 2.41 (t, *J* = 8.7 Hz, 2H), 2.36 (s, 3H), 2.30 (s, 3H). $^{13}$C NMR (101 MHz, MeOD) δ 176.7, 171.6, 150.7, 139.3, 132.5, 129.0, 127.9, 121.3, 34.5, 23.5, 20.8, 19.4. HRMS (ESI) m/z calcd for $C_{12}H_{14}O_4Na^+$ ($M+Na^+$) 245.0784, found 245.0784.

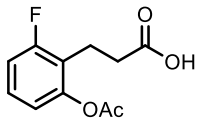


**2c**

**2c:** 3-(2-acetoxy-6-methoxyphenyl)propanoic acid

The general procedure **B** was followed . Pale yellow oil, 21.9 mg, 46% yield.

$^1$H NMR (600 MHz, $CDCl_3$) δ 7.20 (t, *J* = 8.2 Hz, 1H), 6.76 (d, *J* = 8.3 Hz, 1H), 6.67 (d, *J* = 8.1 Hz, 1H), 3.83 (s, 3H), 2.87 (t, *J* = 8.0 Hz, 2H), 2.56 (t, *J* = 8.0 Hz, 2H), 2.33 (s, 3H).$^{13}$C NMR (101 MHz, $CDCl_3$) δ 179.5, 169.9, 158.6, 149.7, 127.6, 121.2, 114.8, 108.1, 55.8, 33.1, 21.0, 19.6. HRMS (ESI) m/z calcd for $C_{12}H_{13}O_5^-$ ($M-H^+$) 237.0768, found 237.0767.

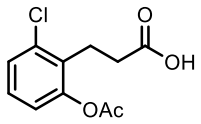



**2d**

**2d:** 3-(2-acetoxy-6-fluorophenyl)propanoic acid

The general procedure **A** was followed (4h, HFIP 4 mL). Pale yellow oil, 25.2 mg, 56% yield.

$^1$H NMR (600 MHz, $CDCl_3$) δ 7.22 (td, *J* = 8.3, 6.3 Hz, 1H), 6.95 (ddd, *J* = 9.4, 8.3, 1.1 Hz, 1H), 6.87 (d, *J* = 8.2 Hz, 1H), 2.90 (t, *J* = 7.8 Hz, 2H), 2.61 (t, *J* = 7.8 Hz, 2H), 2.33 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.8, 169.5, 161.8 (d, $J_{C-F}$ = 246.5 Hz), 149.9 (d, $J_{C-F}$ = 7.4 Hz), 128.0 (d, $J_{C-F}$ = 10.0 Hz), 120.6 (d, $J_{C-F}$ = 18.5 Hz), 118.5 (d, $J_{C-F}$ = 3.4 Hz), 113.2 (d, $J_{C-F}$ = 22.3 Hz), 33.4, 20.9, 19.0 (d, $J_{C-F}$ = 3.1 Hz). $^{19}$F NMR (376 MHz, $CDCl_3$) δ -115.7. HRMS (ESI) m/z calcd for $C_{11}H_{11}FO_4Na^+$ ($M+Na^+$) 249.0534, found 249.0533.

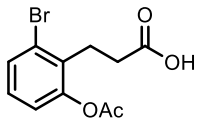



**2e**

**2e:** 3-(2-acetoxy-6-chlorophenyl)propanoic acid

The general procedure **A** was followed (3h). Pale yellow solid, 29.1 mg, 60% yield, M. p.: 98.2-100.1 ℃.

$^1$H NMR (400 MHz, $CDCl_3$)δ 7.28 (dd, *J* = 8.1, 1.3 Hz, 1H)., 7.19 (t, *J* = 8.1 Hz, 1H), 6.98 (dd, *J* = 8.1, 1.3 Hz, 1H), 3.02 (t, *J* = 8.0 Hz, 2H), 2.61 (t, *J* = 8.0 Hz, 2H), 2.34 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.8, 169.6, 149.9, 135.3, 130.9, 128.1, 127.5, 121.5, 32.7, 23.1, 21.0. HRMS (ESI) m/z calcd for $C_{11}H_{11}ClO_4Na^+$ ($M+Na^+$) 265.0238, found 265.0239.

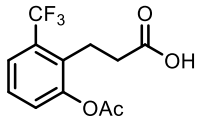



**2f**

**2f:** 3-(2-acetoxy-6-bromophenyl)propanoic acid

The general procedure **A** was followed (4h). Pale yellow solid, 37.2 mg, 65% yield, M. p.: 110.2-111.8 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.45 (dd, *J* = 7.9, 1.2 Hz, 1H), 7.13 (t, *J* = 8.1 Hz, 1H), 7.02 (dd, *J* = 8.2, 1.2 Hz, 1H), 3.05 (t, *J* = 8.0 Hz, 2H), 2.61 (t, *J* = 8.0 Hz, 2H), 2.34 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.9, 169.6, 149.7, 132.5, 130.8, 128.6, 125.3, 122.1, 32.8, 25.7, 21.0. HRMS (ESI) m/z calcd for $C_{11}H_{11}BrO_4Na^+$ ($M+Na^+$) 308.9733, found 308.9737.



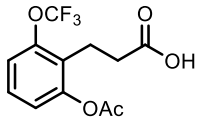

**2g**

**2g:** 3-(2-acetoxy-6-(trifluoromethyl)phenyl)propanoic acid

The general procedure **A** was followed (8h ,HFIP 4 mL). Pale yellow solid, 34.8 mg, 63% yield, M. p.: 65.7-67.3 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.56 (d, $J$ = 7.9 Hz, 1H), 7.38 (t, $J$ = 8.0 Hz, 1H), δ 7.28 (d, $J$ = 8.2 Hz, 1H), 3.06 (t, $J$ = 8.0 Hz, 2H), 2.58 (t, $J$ = 8.0 Hz, 2H), 2.37 (s, 3H).$^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.7, 169.4, 150.3, 131.4, 130.52 (q, $J_{C-F}$ = 30.3 Hz), 127.8, 126.7, 124.1 (q, $J_{C-F}$ = 274.7 Hz), 124.02 (q, $J_{C-F}$ = 5.7 Hz), 34.3, 22.4, 21.0. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -59.5.

HRMS (ESI) m/z calcd for $C_{12}H_{11}F_3O_4Na^+$ ($M+Na^+$) 299.0502, found 299.0505.



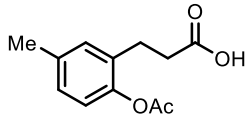

**2h**

**2h:** 3-(2-acetoxy-6-(trifluoromethoxy)phenyl)propanoic acid

The general procedure **A** was followed (4.5h ,HFIP 4 mL). Pale yellow oil, 36.2 mg, 62% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.28 (t, $J$ = 8.3 Hz, 1H), 7.16 (dt, $J$ = 8.4, 1.5 Hz, 1H), 7.03 (dd, $J$ = 8.2, 1.1 Hz, 1H), 2.94 (t, $J$ = 8.0 Hz, 2H), 2.58 (t, $J$ = 8.0 Hz, 2H), 2.34 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.7, 169.4, 150.1, 148.5 (d, $J_{C-F}$ = 1.5 Hz), 128.0, 125.8, 121.2, 120.6 (q, $J_{C-F}$ = 259.7 Hz), 117.9 (d, $J_{C-F}$ = 1.7 Hz), 33.2, 21.0, 19.8. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -57.1.

HRMS (ESI) m/z calcd for $C_{12}H_{11}F_3O_5Na^+$ ($M+Na^+$) 315.0451, found 315.0449.



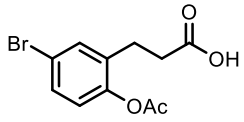

**2i**

**2i:** 3-(2-acetoxy-5-methylphenyl)propanoic acid

The general procedure **B** was followed. Pale yellow oil, 24.0 mg, 54% yield.

$^1$H NMR (400 MHz, MeOD) δ 7.11 (s, 1H), 7.03 (dd, $J$ = 8.2, 2.1 Hz, 1H), 6.89 (d, $J$ = 8.2 Hz, 1H), 2.77 (t, $J$ = 7.8 Hz, 2H), 2.52 (t, $J$ = 7.8 Hz, 2H), 2.30 (s, 3H), 2.29 (s, 3H). $^{13}$C NMR (101 MHz, MeOD) δ 176.5, 171.5, 148.2, 137.0, 133.6, 131.6, 129.0, 123.2, 35.4, 26.5, 20.9, 20.8.

HRMS (ESI) m/z calcd for $C_{12}H_{14}O_4Na^+$ ($M+Na^+$) 245.0784, found 245.0783.

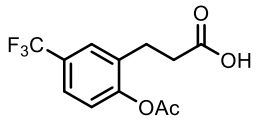



**2j**

**2j:** 3-(2-acetoxy-5-bromophenyl)propanoic acid

The general procedure **A** was followed (4h). Pale yellow solid, 23.1 mg, 40% yield, M. p.: 86.5-88.1 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.43 – 7.34 (m, 2H), 6.94 (d, *J* = 8.5 Hz, 1H), 2.83 (t, *J* = 7.8 Hz, 2H), 2.63 (t, *J* = 7.8 Hz, 2H), 2.32 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.4, 169.4, 148.1, 134.4, 133.1, 130.9, 124.4, 119.4, 34.0, 25.1, 21.0. HRMS (ESI) m/z calcd for $C_{11}H_{11}BrO_4Na^+$ ($M+Na^+$) 308.9733, found 308.9737.

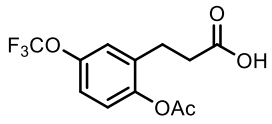



**2k**

**2k:** 3-(2-acetoxy-5-(trifluoromethyl)phenyl)propanoic acid

The general procedure **A** was followed (4h, HFIP 4 mL). Pale yellow solid, 29.1 mg, 53% yield, M. p.: 68.8-70.6 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ7.47 – 7.57 (m, 2H), 7.19 (d, *J* = 8.2 Hz, 1H), 2.92 (t, *J* = 7.7 Hz, 2H), 2.66 (t, *J* = 7.7 Hz, 2H), 2.36 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.50, 169.13, 151.56, 133.13, 128.62 (q, $J_{C-F}$ = 32.7 Hz), 127.50 (q, $J_{C-F}$ = 3.8 Hz), 125.11 (q, $J_{C-F}$ = 3.7 Hz), 123.89 (q, $J_{C-F}$ = 273.2 Hz), 123.31, 33.96, 25.26, 20.99. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -60.4. HRMS (ESI) m/z calcd for $C_{12}H_{11}F_3O_4Na^+$ ($M+Na^+$) 299.0502, found 299.0506.

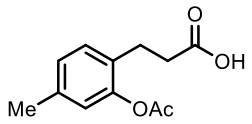



**2l**

**2l:** 3-(2-acetoxy-5-(trifluoromethoxy)phenyl)propanoic acid

The general procedure **A** was followed (4h, HFIP 4 mL). Pale yellow oil, 23.3 mg, 40% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.17 – 7.04 (m, 3H), 2.86 (t, *J* = 7.7 Hz, 2H), 2.64 (t, *J* = 7.7 Hz, 2H), 2.33 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.2, 169.4, 147.3, 146.8 (d, $J_{C-F}$ = 2.2 Hz), 134.1, 123.9, 122.8, 120.7, 120.5 (q, $J_{C-F}$ = 258.6 Hz), 33.9, 25.3, 21.0. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -58.0. HRMS (ESI) m/z calcd for $C_{12}H_{11}F_3O_5Na^+$ ($M+Na^+$) 315.0451, found 315.0448.

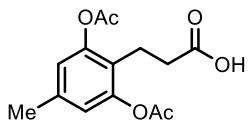



**$2m_{mono}$**

**$2m_{mono}$:** 3-(2-acetoxy-4-methylphenyl)propanoic acid

The general procedure **B** was followed. Pale yellow oil, 12.9 mg, 29% yield.

$^1$H NMR (400 MHz, MeOD) δ 7.17 (d, *J* = 7.8 Hz, 1H), 7.00 (d, *J* = 8.0 Hz, 1H), 6.85 (s, 1H), 2.77 (t, *J* = 7.6 Hz, 2H), 2.51 (t, *J* = 7.8 Hz, 2H), 2.30 (s, 6H). $^{13}$C NMR (101 MHz, MeOD) δ 176.6, 171.4, 150.3, 138.8, 130.9, 130.8, 127.9, 124.0, 35.4, 26.20, 20.9, 20.8. HRMS (ESI) m/z calcd for $C_{12}H_{14}O_4Na^+$ ($M+Na^+$) 245.0784, found 245.0783.

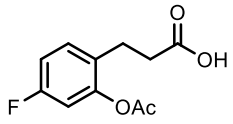



**$2m_{di}$**

**$2m_{di}$:** 3-(2,6-diacetoxy-4-methylphenyl)propanoic acid

The general procedure **B** was followed. Pale yellow solid, 13.0 mg, 23% yield, M. p.: 87.6-89.3 ℃.

$^1$H NMR (400 MHz, MeOD) δ 6.82 (s, 2H), 2.70 (t, *J* = 8.0 Hz, 2H), 2.39 (t, *J* = 8.0 Hz, 2H), 2.31 (s, 3H), 2.30 (s, 6H). $^{13}$C NMR (101 MHz, MeOD) δ 176.4, 171.1, 151.0, 139.1, 124.2, 122.0, 34.4, 21.1, 20.9, 20.7. HRMS (ESI) m/z calcd for $C_{14}H_{16}O_6Na^+$ ($M+Na^+$) 303.0839, found 303.0839.

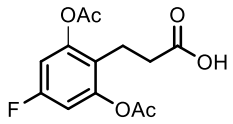



**$2n_{mono}$**

**$2n_{mono}$:** 3-(2-acetoxy-4-fluorophenyl)propanoic acid

The general procedure **A** was followed (2.5h). Pale yellow oil, 20.4 mg, 45% yield.

$^1$H NMR (400 MHz, $CDCl_3$)δ 7.22 (dd, *J* = 8.2, 6.5 Hz, 1H), 6.91 (td, *J* = 8.3, 2.6 Hz, 1H), 6.83 (dd, *J* = 9.1, 2.6 Hz, 1H), 2.83 (t, *J* = 7.7 Hz, 2H), 2.61 (t, *J* = 7.7 Hz, 2H), 2.33 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.8, 169.2, 161.5 (d, $J_{C-F}$ = 248.5 Hz), 149.5 (d, $J_{C-F}$ = 10.7 Hz), 130.9 (d, $J_{C-F}$ = 9.2 Hz), 127.9 (d, $J_{C-F}$ = 3.7 Hz), 113.4 (d, $J_{C-F}$ = 21.0 Hz), 110.5 (d, $J_{C-F}$ = 24.3 Hz), 34.3, 24.8, 21.0. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -112.2. HRMS (ESI) m/z calcd for $C_{11}H_{11}FO_4Na^+$ ($M+Na^+$) 249.0534, found 249.0532.

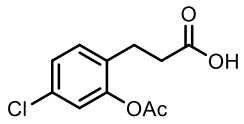



**$2n_{di}$**

**$2n_{di}$:** 3-(2,6-diacetoxy-4-fluorophenyl)propanoic acid

The general procedure **A** was followed (2.5h). Pale yellow solid, 10.3 mg, 18% yield, M. p.: 113.8-115.6 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 6.78 (d, *J* = 8.8 Hz, 2H), 2.76 (t, *J* = 8.0 Hz, 2H), 2.52(m, *J* = 8.0 Hz, 2H), 2.33 (s, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 177.6, 168.9, 159.7, 150.2 (d, $J_{C-F}$ = 12.7 Hz), 121.3, 108.6 (d, $J_{C-F}$ = 24.4 Hz), 33.2, 21.0, 19.9. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -112.1. HRMS (ESI) m/z calcd for $C_{13}H_{13}FO_6Na^+$ ($M+Na^+$) 307.0588, found 307.0581.

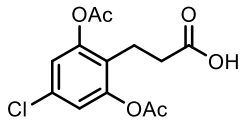



**$2o_{mono}$**

**$2o_{mono}$:** 3-(2-acetoxy-4-chlorophenyl)propanoic acid

The general procedure **A** was followed (3h). Pale yellow solid, 20.6 mg, 43% yield, M. p.: 85.7-87.4 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 9.17 (br s, 1H), 7.24 – 7.12 (m, 2H), 7.08 (s, 1H), 2.82 (t, *J* = 7.6 Hz, 2H), 2.60 (t, *J* = 7.7 Hz, 2H), 2.32 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.8, 169.3, 149.3, 132., 131.0, 130.8, 126.6, 123.1, 34.2, 24.9, 20.9. HRMS (ESI) m/z calcd for $C_{11}H_{11}ClO_4Na^+$ ($M+Na^+$) 265.0238, found 265.0239.

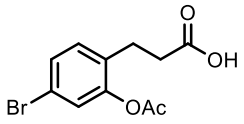



**2o$_{di}$**

**2o$_{di}$:** 3-(2,6-diacetoxy-4-chlorophenyl)propanoic acid

The general procedure **A** was followed (3h). Pale yellow solid, 16.5 mg, 28% yield, M. p.: 88.3-90.2 ℃.

$^{1}$H NMR (600 MHz, $CDCl_3$) δ 7.02 (s, 2H), 2.76 (t, *J* = 7.8 Hz, 2H), 2.51 (t, *J* = 7.8 Hz, 2H),2.32 (s, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.4, 169.0, 150.1, 132.7, 124.3, 121.1, 33.2, 20.9, 20.0. HRMS (ESI) m/z calcd for $C_{13}H_{13}ClO_6Na^+$ ($M+Na^+$) 323.0293, found 323.0291.




**2p$_{mono}$**

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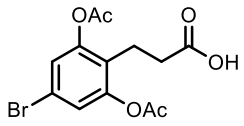
**2p$_{mono}$:** 3-(2-acetoxy-4-bromophenyl)propanoic acid

The general procedure **A** was followed (2.5h). Pale yellow solid, 22.3 mg, 39% yield, M. p.: 78.1-80.2 ℃.

$^{1}$H NMR (400 MHz, $CDCl_3$) δ 7.31 (dd, *J* = 8.2, 2.0 Hz, 1H), 7.23 (s, 1H), 7.14 (d, *J* = 8.2 Hz, 1H), 2.81 (t, *J* = 7.7 Hz, 2H), 2.61 (t, *J* = 7.7 Hz, 2H), 2.32 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.5, 169.2, 149.5, 131.4, 131.3, 129.6, 126.0, 120.33, 34.0, 24.9, 20.9. HRMS (ESI) m/z calcd for $C_{11}H_{11}BrO_4Na^+$ ($M+Na^+$) 308.9733, found 308.9735.

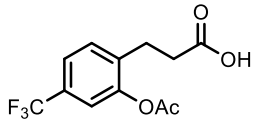



**2p$_{di}$**

**2p$_{di}$:** 3-(2,6-diacetoxy-4-bromophenyl)propanoic acid

The general procedure **A** was followed (2.5h). Pale yellow solid, 17.87 mg, 26% yield, M. p.: 85.6-87.3 ℃.

$^{1}$H NMR (400 MHz, $CDCl_3$) δ 7.17 (s, 2H), 2.75 (t, *J* = 7.8 Hz, 2H), 2.52 (t, *J* = 7.9 Hz, 2H), 2.32 (s, 6H).$^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.3, 169.0, 150.2, 124.8, 123.9, 119.8, 33.0, 20.9, 20.0. HRMS (ESI) m/z calcd for $C_{13}H_{13}BrO_6Na^+$ ($M+Na^+$) 366.9788, found 366.9787.



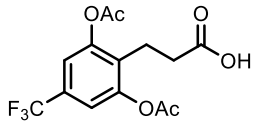

**2q$_{mono}$**

**2q$_{mono}$:** 3-(2-acetoxy-4-(trifluoromethyl)phenyl)propanoic acid

The general procedure **A** was followed (3h, HFIP 4 mL). Pale yellow solid, 22.8 mg, 41% yield, M. p.: 78.9-81.0 ℃.

$^{1}$H NMR (400 MHz, $CDCl_3$) δ 7.45 (d, *J* = 8.0 Hz, 1H), 7.40 (s, 1H), 7.34 (d, *J* = 1.8 Hz, 1H), 2.91 (t, *J* = 7.7 Hz, 2H), 2.66 (t, *J* = 7.7 Hz, 2H), 2.35 (s, 3H). $^{13}$C NMR (101 MHz, CDCl3) δ

178.4, 169.2, 149.1, 136.4, 130.8, 130.3 (q, $J_{C-F}$ = 33.3 Hz), 123.6 (q, $J_{C-F}$ = 273.7 Hz), 123.2 (q, $J_{C-F}$ = 3.7 Hz), 120.1 (q, $J_{C-F}$ = 3.7 Hz), 33.8, 25.2, 20.9. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -62.5. HRMS (ESI) m/z calcd for $C_{12}H_{11}F_3O_4Na^+$ ($M+Na^+$) 299.0502, found 299.0506.

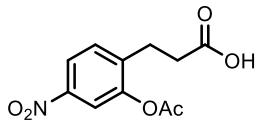



**2q$_{di}$**

**2q$_{di}$:** 3-(2,6-diacetoxy-4-(trifluoromethyl)phenyl)propanoic acid

The general procedure **A** was followed (3h, HFIP 4 mL). Pale yellow solid, 18.8 mg, 28% yield, M. p.: 102.4-104.1 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.27 (s, 2H), 2.84 (t, $J$ = 7.9 Hz, 2H), 2.56 (t, $J$ = 7.8 Hz, 2H), 2.35 (s, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 177.9, 169.0, 150.1, 130.2 (q, $J_{C-F}$ = 273.7 Hz), 129.7, 123.1 (q, $J_{C-F}$ = 273.7 Hz), 117.7 (q, $J_{C-F}$ = 3.6 Hz), 32.8, 20.9, 20.2. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -62.6. HRMS (ESI) m/z calcd for $C_{14}H_{13}F_3O_6Na^+$ ($M+Na^+$) 357.0556, found 357.0554.

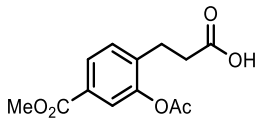



**2r**

**2r:** 3-(2-acetoxy-4-nitrophenyl)propanoic acid

The general procedure **A** was followed (4.5h, HFIP 4 mL). Pale yellow solid, 22.3 mg, 44% yield, M. p.: 130.7-132.3 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 8.06 (d, $J$ = 8.3 Hz, 1H), 7.97 (s, 1H), 7.45 (d, $J$ = 8.4 Hz, 1H), 2.95 (t, $J$ = 7.7 Hz, 2H), 2.68 (t, $J$ = 7.8 Hz, 2H), 2.38 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 177.8, 168.9, 149.1, 147.3, 140.0, 130.8, 121.3, 118.5, 33.5, 25.3, 20.9. HRMS (ESI) m/z calcd for $C_{11}H_{11}NO_6Na^+$ ($M+Na^+$) 276.0479, found 276.0477.

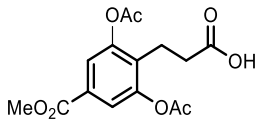



**2s$_{mono}$**

**2s$_{mono}$:** 3-(2-acetoxy-4-(methoxycarbonyl)phenyl)propanoic acid

The general procedure **A** was followed (6h, HFIP 2 mL). Pale yellow oil, 23.7 mg, 45% yield,.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.86 (dd, $J$ = 8.0, 1.7 Hz, 1H), 7.72 (d, $J$ = 1.7 Hz, 1H), 7.34 (d, $J$ = 8.0 Hz, 1H), 3.89 (s, 3H), 2.91 (t, $J$ = 7.7 Hz, 2H), 2.65 (t, $J$ = 7.7 Hz, 2H), 2.35 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.4, 169.4, 166.2, 148.9, 137.6, 130.2, 130.1, 127.6, 124.0, 52.4, 33.8, 25.4, 21.0. HRMS (ESI) m/z calcd for $C_{13}H_{14}NO_6Na^+$ ($M+Na^+$) 289.0683, found 289.0684.

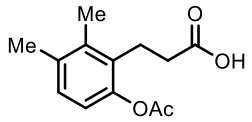



**2s$_{di}$**

**$2s_{di}$:** 3-(2,6-diacetoxy-4-(methoxycarbonyl)phenyl)propanoic acid

The general procedure **A** was followed (6h, HFIP 2 mL). Pale yellow oil, 16.2 mg, 17.3% yield,.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.65 (s, 1H), 3.89 (s, 2H), 2.84 (t, *J* = 7.9 Hz, 1H), 2.55 (t, *J* = 7.9 Hz, 1H), 2.35 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 177.7, 169.2, 165.4, 149.8, 130.8, 130.1, 121.7, 52.6, 32.85, 21.0, 20.4. HRMS (ESI) m/z calcd for $C_{15}H_{16}NO_8Na^+$ ($M+Na^+$) 347.0737, found 347.0737.

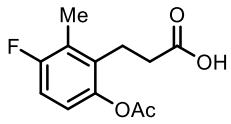



**2t**

**2t:** 3-(6-acetoxy-2,3-dimethylphenyl)propanoic acid

The general procedure **B** was followed (HFIP 4 mL). Pale yellow solid, 24.5 mg, 52% yield, M. p.: 58.4-60.2 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.06 (d, *J* = 8.2 Hz, 1H), 6.80 (d, *J* = 8.2 Hz, 1H), 2.92(t, *J* = 8.0 Hz, 2H), 2.50 (t, *J* = 8.0 Hz, 2H), 2.33 (s, 3H), 2.27 (s, 3H), 2.24 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.8, 170.4, 147.4, 136.4, 135.1, 130.3, 128.9, 119.5, 33.7, 22.7, 21.1, 20.7, 15.6. HRMS (ESI) m/z calcd for $C_{13}H_{15}O_4^-$ ($M-H^+$) 235.0976, found 235.0974.

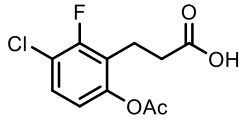



**2u**

**2u:** 3-(6-acetoxy-3-fluoro-2-methylphenyl)propanoic acid

The general procedure **A** was followed (3h ,HFIP 4 mL). Pale yellow oil, 27.4 mg, 57% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 6.92 (d, *J* = 8.9 Hz, 1H), 6.85 (dd, *J* = 8.9, 4.9 Hz, 1H), 2.89 (t, *J* = 7.9 Hz, 2H), 2.51 (t, *J* = 7.9 Hz, 2H), 2.33 (s, 3H), 2.25 (d, *J* = 2.4 Hz, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.5, 170.1, 159.1 (d, $J_{C-F}$ = 242.5 Hz), 144.9 (d, $J_{C-F}$ = 2.8 Hz), 132.7 (d, $J_{C-F}$ = 4.4 Hz), 124.9 (d, $J_{C-F}$ = 17.6 Hz), 120.9 (d, $J_{C-F}$ = 9.2 Hz), 114. 0 (d, $J_{C-F}$ = 25.4 Hz), 33.3, 22.6 (d, $J_{C-F}$ = 2.2 Hz), 20.9 (d, $J_{C-F}$ = 10.2 Hz), 11.0 (d, $J_{C-F}$ = 5.5 Hz). $^{19}$F NMR (376 MHz, $CDCl_3$) δ -117.7. HRMS (ESI) m/z calcd for $C_{12}H_{13}FO_4Na^+$ ($M+Na^+$) 263.0690, found 263.0692.

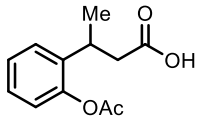



**2v**

**2v:** 3-(6-acetoxy-3-chloro-2-fluorophenyl)propanoic acid

The general procedure **A** was followed (4.5 h ,HFIP 4 mL). Pale yellow solid, 26.4 mg, 51% yield, M. p.: 83.3-85.3 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.05 (d, *J* = 8.5 Hz, 1H), 6.97 (dd, *J* = 8.9, 4.5 Hz, 1H), 3.03 (t, *J* = 8.1 Hz, 2H), 2.61 (t, *J* = 8.1 Hz, 2H), 2.33 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.6, 169.7, 156.3 (d, $J_{C-F}$ = 247.0 Hz), 145.2 (d, $J_{C-F}$ = 3.2 Hz), 132.9, 122.2, 122.0 (d, $J_{C-F}$ = 8.1 Hz), 114.8 (d, $J_{C-F}$ = 23.2 Hz), 32.5, 23.2 (d, $J_{C-F}$ = 2.1 Hz), 20.9. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -115.1. HRMS (ESI) m/z calcd for $C_{11}H_{10}ClFO_4Na^+$ ($M+Na^+$) 283.0144, found 283.0146.

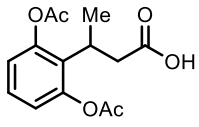



**2w$_{mono}$**

**2w$_{mono}$:** 3-(2-acetoxyphenyl)butanoic acid

The general procedure **A** was followed (2.5h). Pale yellow oil, 12.6 mg, 28% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.32 – 7.27 (m, 1H), 7.25 – 7.20 (m, 2H), 7.07 – 6.99 (m, 1H), 3.44 (dq, *J* = 13.3, 6.8 Hz, 1H), 2.66 (dd, *J* = 15.5, 5.8 Hz, 1H), 2.51 (dd, *J* = 15.5, 8.9 Hz, 1H), 2.34 (s, 3H), 1.29 (d, *J* = 6.9 Hz, 3H).$^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.0, 169.9, 148.2, 137.1, 127.5, 127.2, 126.6, 122.8, 41.8, 29.6, 21.1, 20.6. HRMS (ESI) m/z calcd for $C_{12}H_{14}O_4Na^+$ ($M+Na^+$) 245.0784, found 245.0785.

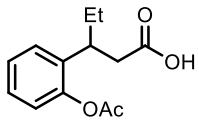



**2w$_{di}$**

**2w$_{di}$:** 3-(2,6-diacetoxyphenyl)butanoic acid

The general procedure **A** was followed (2.5h). Pale yellow solid, 13.5 mg, 24% yield, M. p.: 58.5-60.5 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.23 (d, *J* = 8.5 Hz, 1H), 6.95 (d, *J* = 8.2 Hz, 2H), 3.54 (dq, *J* = 13.7, 6.8 Hz, 1H), 2.76 – 2.61 (m, 2H), 2.34 (s, 6H), 1.27 (d, *J* = 7.2 Hz, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 177.8, 169.4, 149.6, 129.2, 127.4, 121.0, 39.6, 27.5, 21.3, 19.1. HRMS (ESI) m/z calcd for $C_{14}H_{15}O_6^-$ ($M-H^+$) 279.0874, found 279.0874.

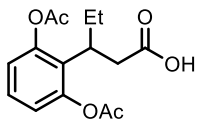



**2x$_{mono}$**

**2x$_{mono}$:** 3-(2-acetoxyphenyl)pentanoic acid

The general procedure **A** was followed (2.5h). Pale yellow oil, 17.4 mg, 37% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.27 – 7.17 (m, 3H), 7.07 – 7.00 (m, 1H), 3.32 – 3.17 (m, 1H), 2.59 (d, *J* = 7.3 Hz, 2H), 2.32 (s, 3H), 1.80 – 1.54 (m, 2H), 0.78 (t, *J* = 7.3 Hz, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.1, 169.8, 148.9, 135.4, 127.7, 127.4, 126.4, 122.8, 40.53, 36.6, 28.2, 21.1, 12.0. HRMS (ESI) m/z calcd for $C_{13}H_{15}O_4^-$ ($M-H^+$) 235.0976, found 235.0975.



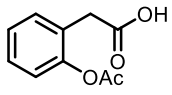

**2x$_{di}$**

**2x$_{di}$:** 3-(2,6-diacetoxyphenyl)pentanoic acid

The general procedure **A** was followed (2.5h). Pale yellow oil, 19.0 mg, 32% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.25 (t, *J* = 8.0 Hz, 1H), 6.95 (d, *J* = 8.2 Hz, 2H), 3.44 – 3.32 (m, 1H), 2.69 (dd, *J* = 7.1, 2.5 Hz, 2H), 2.32 (s, 6H), 1.74 – 1.54 (m, 2H), 0.76 (t, *J* = 7.4 Hz, 3H). $^{13}$C

NMR (101 MHz, $CDCl_3$) δ 178.0, 169.3, 150.0, 127.5, 127.3, 120.9, 38.6, 34.7, 26.8, 21.2, 12.5. HRMS (ESI) m/z calcd for $C_{15}H_{17}O_6^-$ ($M-H^+$) 293.1031, found 293.1031.

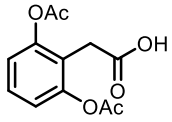


**4a$_{mono}$**

**4a$_{mono}$:** 2-(2-acetoxyphenyl)acetic acid

The general procedure **C** was followed (50 ℃, 16h). Yellow oil, 20.5 mg, 53% yield.

$^1$H NMR (600 MHz, $CDCl_3$) δ 7.44 – 7.28 (m, 2H), 7.22 (td, *J* = 7.4, 1.2 Hz, 1H), 7.12 (d, *J* = 8.1 Hz, 1H), 3.59 (s, 2H), 2.30 (s, 3H). $^{13}$C NMR (151 MHz, $CDCl_3$) δ 176.8, 169.4, 149.2, 131.6, 129.0, 126.4, 126.0, 122.7, 36.3, 21.0. HRMS (ESI) m/z calcd for $C_{10}H_{11}O_4^+$ ($M+H^+$) 195.0652, found 195.0645.

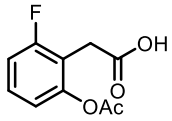


**4a$_{di}$**

**4a$_{di}$:** 2-(2,6-diacetoxyphenyl)acetic acid

The general procedure **C** was followed (50 ℃, 16h). Brown oil, 9.1 mg, 18% yield.

$^1$H NMR (600 MHz, $CDCl_3$) δ 7.34 (t, *J* = 8.2 Hz, 1H), 7.06 (d, *J* = 8.2 Hz, 2H), 3.55 (s, 2H), 2.31 (s, 6H). $^{13}$C NMR (151 MHz, $CDCl_3$) δ 175.1, 169.0, 150.0, 128.6, 120.3, 119.5, 30.4, 21.0. HRMS (ESI) m/z calcd for $C_{12}H_{13}O_6^+$ ($M+H^+$) 253.0707, found 253.0707.

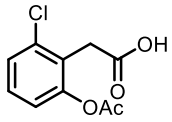


**4b**

**4b**: 2-(2-acetoxy-6-fluorophenyl)acetic acid

The general procedure **C** was followed (70 ℃, 24h). Brown oil, 33.4 mg, 79% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 9.37 (br s, 1H), 7.36 – 7.20 (m, 1H), 7.06 – 6.84 (m, 2H), 3.65 (s, 2H), 2.30 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 168.9, 161.5 (d, $J_{C-F}$ = 247.9 Hz), 150.1 (d, $J_{C-F}$ = 6.4 Hz), 129.0 (d, $J_{C-F}$ = 9.9 Hz), 118.3 (d, $J_{C-F}$ = 3.4 Hz), 114.8 (d, $J_{C-F}$ = 18.4 Hz), 113.1 (d, $J_{C-F}$ = 22.2 Hz), 29.2, 20.8. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -114.6. HRMS (ESI) m/z calcd for $C_{10}H_8FO_4^-$ ($M-H^+$) 211.0412, found 211.0411.

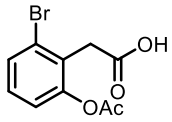


**4c**

**4c**: 2-(2-acetoxy-6-chlorophenyl)acetic acid

The general procedure **C** was followed (70 ℃, 24h). Brown oil, 37.4 mg, 82% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 9.81 (br s, 1H), 7.38 – 7.20 (m, 2H), 7.06 (dd, *J* = 7.9, 1.4 Hz, 1H), 3.81 (s, 2H), 2.31 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 169.0, 150.2, 135.8, 129.0, 127.2, 125.3, 121.3, , 33.4, 20.9. HRMS (ESI) m/z calcd for $C_{10}H_8ClO_4^-$ ($M-H^+$) 227.0117, found 227.0117.

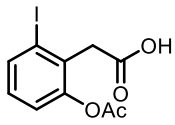



**4d**

**4d**:2-(2-acetoxy-6-bromophenyl)acetic acid

The general procedure **C** was followed (70 ℃, 24h). Pale yellow solid, 42.0 mg, 77% yield, M. p.: 119.9-121.7 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.49 (dd, *J* = 8.0, 1.2 Hz, 1H), 7.20 (t, *J* = 8.1 Hz, 1H), 7.11 (dd, *J* = 8.2, 1.2 Hz, 1H), 3.84 (s, 2H), 2.31 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 175.9, 168.92, 150.0, 130.5, 129.4, 127.0, 126.1, 122.0, 36.1, 20.9. HRMS (ESI) m/z calcd for $C_{10}H_8BrO_4^-$ ($M-H^+$) 272.9757, found 272.9759.

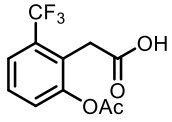



**4e**

**4e:** 2-(2-acetoxy-6-iodophenyl)acetic acid

The general procedure **C** was followed (70 ℃, 24h). White solid, 35.2 mg, 55% yield, M. p.: 125.5-127.5 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.75 (dd, *J* = 7.9, 1.2 Hz, 1H), 7.12 (dd, *J* = 8.1, 1.2 Hz, 1H), 7.05 (d, *J* = 8.0 Hz, 1H), 3.86 (s, 2H), 2.30 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 176.0, 168.9, 149.1, 137.2, 130.2, 130.1, 122.9, 102.1, 41.1, 21.0. HRMS (ESI) m/z calcd for $C_{10}H_{10}IO_4^+$ ($M+H^+$) 320.9618, found 320.9617.

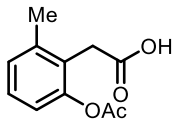



**4f**

**4f:** 2-(2-acetoxy-6-(trifluoromethyl)phenyl)acetic acid

The general procedure **C** was followed (80 ℃, 16h). Pale yellow solid, 39.6 mg, 76% yield, M. p.: 118.2-120.4 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 8.65 (s, 1H), 7.57 (dd, *J* = 7.9, 1.3 Hz, 1H), 7.44 (t, *J* = 8.0 Hz, 1H), 7.36 (d, *J* = 8.1 Hz, 1H), 3.81 (s, 2H), 2.31 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 176.0, 168.7, 150.5, 130.8 (q, $J_{C-F}$ = 30.3 Hz), 128.6, 126.5, 124.8, 123.8 (q, $J_{C-F}$ = 274.7 Hz), 123.6 (q, $J_{C-F}$ = 5.6 Hz), 32.4, 20.9. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -59.6. HRMS (ESI) m/z calcd for $C_{11}H_{10}F_3O_4^+$ ($M+H^+$) 263.0537, found 263.0537.

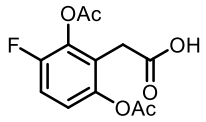



**4g**

**4g:** 2-(2-acetoxy-6- methylphenyl)acetic acid

The general procedure **C** was followed (50 ℃ 16h). White solid, 32.7 mg, 79% yield, M. p.: 84.6-86.7 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.22 (t, *J* = 7.8 Hz, 1H), 7.09 (d, *J* = 7.6 Hz, 1H), 6.95 (d, *J* = 8.0 Hz, 1H), 3.62 (s, 2H), 2.36 (s, 3H), 2.31 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 176.8, 169.5, 149.5, 139.1, 128.2, 128.1, 124.8, 120.2, 32.7, 21.0, 20.0. HRMS (ESI) m/z calcd for $C_{11}H_{11}O_4^-$ ($M-H^+$) 207.0663; found, 207.0664.

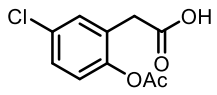



**4h**

**4h:** 2-(2,6-diacetoxy-3-fluorophenyl)acetic acid

The general procedure **C** was followed (70 ℃, 16h). Pale yellow solid, 32.3 mg, 60% yield, M. p.: 123.2-125.1 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.12 (t, *J* = 9.1 Hz, 1H), 7.02 (dd, *J* = 9.1, 4.3 Hz, 1H), 3.54 (s, 2H), 2.33 (s, 3H), 2.29 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 175.2, 169.1, 167.6, 152.2 (d, $J_{C-F}$ = 248.3 Hz), 145.2, 137.6 (d, $J_{C-F}$ = 15.4 Hz), 121.9, 120.8 (d, $J_{C-F}$ = 7.5 Hz), 115.6 (d, $J_{C-F}$ = 20.3 Hz), 30.6, 20.8, 20.2. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -128.7. HRMS (ESI) m/z calcd for $C_{12}H_{12}FO_6^+$ ($M+H^+$) 271.0623, found 271.0617.

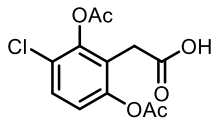



**4i$_{mono}$**

**4i$_{mono}$:** 2-(2-acetoxy-5-chlorophenyl)acetic acid

The general procedure **C** was followed (70 ℃, 16h). White solid, 20.0 mg, 44% yield, M. p.: 98.8-100.3 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 8.03 (br s, 1H), 7.33 – 7.27 (m, 2H), 7.07 (d, *J* = 8.5 Hz, 1H), 3.55 (s, 2H), 2.29 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 175.9, 169.1, 147.7, 131.6, 131.4, 128.9, 127.7, 124.0, 36.0, 20.9. HRMS (ESI) m/z calcd for $C_{10}H_{10}ClO_4^+$ ($M+H^+$) 229.0262, found 229.0265.

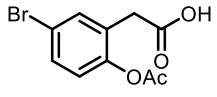



**4i$_{di}$**

**4i$_{di}$:** 2-(2,6-diacetoxy-3-chlorophenyl)acetic acid

The general procedure **C** was followed (70 ℃, 16h). Pale yellow solid, 19.0 mg, 33% yield, M. p.: 93.5-95.1 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.40 (d, *J* = 8.8 Hz, 1H), 7.05 (d, *J* = 8.8 Hz, 1H), 3.54 (s, 2H), 2.36 (s, 3H), 2.29 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 168.7, 167.9, 148.4, 146.6, 129.2, 125.0, 122.2, 121.3, 31.1, 20.9, 20.4. HRMS (ESI) m/z calcd for $C_{12}H_{12}ClO_6^+$ ($M+H^+$) 287.0317, found 287.0310.

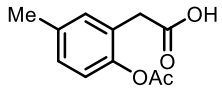



**4j**

**4j:** 2-(2-acetoxy-5-bromophenyl)acetic acid

The general procedure **C** was followed (50 ℃, 24h). Pale yellow solid, 41.3 mg, 76% yield, M. p.: 108.6-110.4 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.49 (dd, *J* = 8.0, 1.2 Hz, 1H), 7.20 (t, *J* = 8.1 Hz, 1H), 7.11 (dd, *J* = 8.2, 1.2 Hz, 1H), 3.84 (s, 2H), 2.31 (s, 3H). $^{13}$C NMR (101 MHz, CDCl3) δ 169.1, 148.3, 134.3, 131.8, 128.2, 124.4, 119.2, 36.0, 20.9. HRMS (ESI) m/z calcd for $C_{10}H_9BrO_4Na^+$ ($M+Na^+$) 294.9576, found 294.9580.

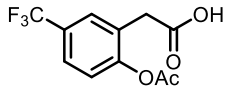



**4k**

**4k:** 2-(2-acetoxy-5-methylphenyl)acetic acid

The general procedure **C** was followed (40 ℃, 16h). Yellow oil, 33.5 mg, 81% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.12 (m, 2H), 6.99 (d, *J* = 8.8 Hz, 1H), 3.54 (s, 2H), 2.33 (s, 3H), 2.28 (s, 3H). $^{13}$C NMR (101 MHz, $CDC_{l3}$) δ 177.0, 169.6, 146.9, 136.1, 132.1, 129.5, 125.6, 122.4, 36.3, 20.93, 20.90. HRMS (ESI) m/z calcd for $C_{11}H_{12}O_4Na^+$ ($M+Na^+$) 231.0628, found 231.0629.

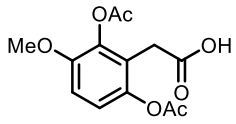



**4l**

**4l:** 2-(2-acetoxy-5-(trifluoromethyl)phenyl)acetic acid

The general procedure **C** was followed (70 ℃, 24h). White solid, 33.3 mg, 64% yield, M. p.: 108.8-110.6 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.60 (m, 2H), 7.36 – 7.17 (m, 1H), 3.65 (s, 2H), 2.32 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 176.2, 168.7, 151.7, 128.8 (q, $J_{C-F}$ = 3.8 Hz), 128.6, 126.9(q, $J_{C-F}$ = 21.7 Hz), 126.2 (q, $J_{C-F}$ = 3.9 Hz), 123.8, 123.4(q, $J_{C-F}$ = 181.8 Hz), 36.1, 20.9. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -62.3. HRMS (ESI) m/z calcd for $C_{11}H_9F_3O_4Na^+$ ($M+Na^+$) 285.0345, found 285.0346.

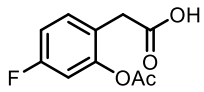



**4m**

**4m:**2-(2,6-diacetoxy-3-methoxyphenyl)acetic acid

The general procedure **C** was followed (50 ℃, 24h). Yellow oil, 20.9 mg, 37% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.88 (br s, 1H), 7.00 (d, *J* = 9.0 Hz, 1H), 6.90 (d, *J* = 9.0 Hz, 1H), 3.80 (s, 3H), 3.50 (s, 2H), 2.30 (s, 3H), 2.27 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 175.3, 169.5, 168.4, 149.3, 142.6, 139.0, 121.0, 120.2, 111.3, 56.3, 30.7, 20.8, 20.4.



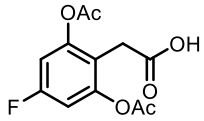

**4n$_{mono}$**

**4n$_{mono}$:** 2-(2-acetoxy-4-fluorophenyl)acetic acid

The general procedure **C** was followed (50 ℃, 48h). Brown oil, 25.3 mg, 60% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.27 (dd, *J* = 8.4, 2.4 Hz,1H), 6.70- 6.788 (m, 2H), 3.55 (s, 2H), 2.29 (s,

3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 176.8, 168.8, 162.2（d, $J_{C-F}$ = 9.8 Hz） 149.7 (d, $J_{C-F}$ = 10.7 Hz), 132.2 (d, $J_{C-F}$ = 9.4 Hz), 121.8 (d, $J_{C-F}$ = 3.7 Hz), 113.4 (d, $J_{C-F}$ = 21.3 Hz), 110.7 (d, $J_{C-F}$ = 24.6 Hz), 35.6, 20.9. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -111.9. HRMS (ESI) m/z calcd for $C_{10}H_9FO_4Na^+$ ($M+Na^+$) 235.0377, found 235.0378.

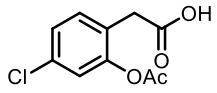



**4n$_{di}$** i

**4n$_{di}$:** 2-(2,6-diacetoxy-4-fluorophenyl)acetic acid

The general procedure **C** was followed (50 ℃, 48h). White solid, 11.8 mg, 22% yield, M. p.: 117.7-119.9 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 6.85 (d, $J$ = 8.8 Hz, 2H), 3.50 (s, 2H), 2.30 (s, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 168.5, 161.4 (d, $J_{C-F}$ = 248.3 Hz), 150.3 (d, $J_{C-F}$ = 12.9 Hz), 115.7, 108.5 (d, $J_{C-F}$ = 24.7 Hz), 30.1, 20.9. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -110.4. HRMS (ESI) m/z calcd for $C_{12}H_{11}FO_6Na^+$ ($M+Na^+$) 293.0432, found 293.0435.

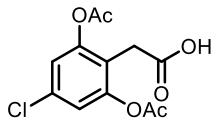



**4o$_{mono}$**

**4o$_{mono}$:** 2-(2-acetoxy-4-chlorophenyl)acetic acid

The general procedure **C** was followed (50 ℃, 48h). Pale yellow solid, 25.5 mg, 56% yield, M. p.: 73.3-75.1 ℃.

$^1$H NMR (400 MHz, $CDCl^3$)δ 7.35 (dd, $J$ = 8.2, 2.0 Hz, 1H), 7.31 (s, 1H), 3.54 (s, 2H), 2.29 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 168.8, 149.5, 134.0, 132.3, 126.6, 124.6, 123.3, 35.8, 20.8. HRMS (ESI) m/z calcd for $C_{10}H_9ClO_4Na^+$ ($M+Na^+$) 251.0082, found 251.0082.

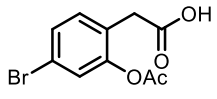



**4o$_{di}$**

**4o$_{di}$:** 2-(2,6-diacetoxy-4-chlorophenyl)acetic acid

The general procedure **C** was followed (50 ℃, 48h). Pale yellow solid, 15.6 mg, 27% yield, M. p.: 135.8-137.7 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.10 (s, 2H), 3.51 (s, 2H), 2.29 (s, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 168.4, 150.1, 133.7, 120.9, 118.3, 30.2, 20.8. HRMS (ESI) m/z calcd for $C_{12}H_{10}ClO_6^-$ ($M-H^+$) 285.0171, found 285.0171.

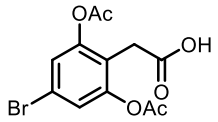



**4p$_{mono}$**

**4p$_{mono}$:** 2-(2-acetoxy-4-bromophenyl)acetic acid

The general procedure **C** was followed (50 ℃, 48h). Pale yellow solid, 28.0 mg, 52% yield, M. p.: 80.6-82.0 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.38 – 7.29 (m, 2H), 7.19 (d, *J* = 8.2 Hz, 1H), 3.54 (s, 2H), 2.29 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 176.4, 168.8, 149.6, 132.6, 129.5, 126.1, 125.1, 121.6, 35.8, 20.8. HRMS (ESI) m/z calcd for $C_{10}H_9BrO_4Na^+$ ($M+Na^+$) 294.9576, found 294.9577.

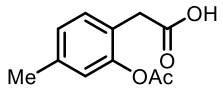



**4p$_{di}$**

**4p$_{di}$:** 2-(2,6-diacetoxy-4-bromophenyl)acetic acid

The general procedure **C** was followed (50 ℃, 48h). Pale yellow solid, 17.4 mg, 26% yield, M. p.: 156.4-158.7 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.25 (s, 2H), 3.50 (s, 2H), 2.30 (s, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 175.2, 168.5, 150.2, 123.8, 120.9, 118.9, 30.3, 20.9. HRMS (ESI) m/z calcd for $C_{12}H_{11}BrO_6Na^+$ ($M+Na^+$) 352.9631, found 352.9633.

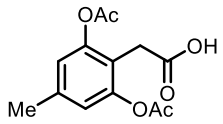



**4q$_{mono}$**

**4q$_{mono}$:** 2-(2-acetoxy-4-methylphenyl)acetic acid

The general procedure **C** was followed (40 ℃, 24h). Pale yellow oil, 23.6 mg, 57% yield.

$^1$H NMR (400 MHz, MeOD) δ 7.20 (d, *J* = 7.8 Hz, 1H), 7.03 (d, *J* = 8.6 Hz, 1H), 6.91 (s, 1H), 3.49 (s, 2H), 2.33 (s, 3H), 2.26 (s, 3H). $^{13}$C NMR (101 MHz, MeOD) δ 174.9, 170.9, 150.5, 139.7, 132.2, 127.8, 125.6, 124.1, 36.8, 21.0, 20.7. HRMS (ESI) m/z calcd for $C_{11}H_{11}O_4^-$ ($M-H^+$) 207.0663; found, 207.0662.

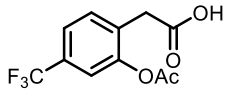



**4q$_{di}$**

**4q$_{di}$:** 2-(2,6-diacetoxy-4-methylphenyl)acetic acid

The general procedure **C** was followed (40 ℃, 24h). Pale yellow solid, 12.6 mg, 24% yield.

$^1$H NMR (400 MHz, MeOD) δ 6.88 (s, 2H), 3.44 (S, 2H), 2.34 (s, 3H), 2.28 (s, 6H). $^{13}$C NMR (101 MHz, MeOD) δ 174.0, 170.6, 151.1, 139.7, 121.8, 119.07, 31.0, 21.1, 20.7. HRMS (ESI) m/z calcd for C13H14O6Na+ ($M+Na^+$) 289.0683, found 289.0683.



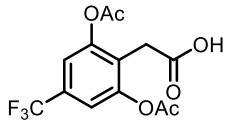

**4r$_{mono}$**

**4r$_{mono}$:** 2-(2-acetoxy-4-(trifluoromethyl)phenyl)acetic acid

The general procedure **C** was followed (60 ℃, 24h). White solid, 33.8 mg, 65% yield, M. p.: 111.4-113.1 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.51 – 7.43 (m, 2H), 7.42 (s, 1H), 3.65 (s, 2H), 2.31 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 168.9, 149.3, 132.2, 131.4 (q, $J_{C-F}$ = 33.4 Hz), 130.1, 123.5, (q, $J_{C-F}$ = 273.7 Hz) 123.1 (q, $J_{C-F}$ = 3.6 Hz), 120.2 (q, $J_{C-F}$ = 3.9 Hz), 119.4, 36.1, 20.8. $^{19}$F NMR (376 MHz, $CDCl_3$) δ

-62.6. HRMS (ESI) m/z calcd for $C_{11}H_9F_3O_4Na^+$ ($M+Na^+$) 285.0345, found 285.0346.

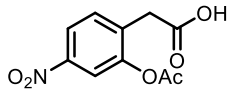



**4r$_{di}$**

**4r$_{di}$:** 2-(2,6-diacetoxy-4-(trifluoromethyl)phenyl)acetic acid

The general procedure **C** was followed (60 ℃, 24h). White solid, 8.4 mg, 13% yield, M. p.: 141.2-143.1 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.35 (s, 2H), 3.59 (s, 2H), 2.32 (s, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 174.7, 168.5, 150.2, 131.0 (q, $J_{C-F}$ = 34.0 Hz), 123.6, 123.1 (q, $J_{C-F}$ = 273.7 Hz), 117.6 (q, $J_{C-F}$ = 3.8 Hz), 30.5, 20.8. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -62.8. HRMS (ESI) m/z calcd for $C_{13}H_{11}F_3O_6Na^+$ ($M+Na^+$) 343.0400, found 343.0401.

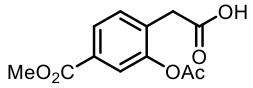



**4s**

**4s:** 2-(2-acetoxy-4-nitrophenyl)acetic acid

The general procedure **C** was followed (70 ℃, 24h). White solid, 21.1 mg, 44% yield, M. p.: 133.6-135.7 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 8.09 (dd, $J$ = 8.4, 2.3 Hz, 1H), 8.04 (d, $J$ = 2.3 Hz, 1H), 7.51 (d, $J$ = 4.0 Hz, 1H), 3.70 (s, 2H), 2.35 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 175.5, 168.5, 149.4, 148.0, 133.3, 132.2, 121.2, 118.5, 36.1, 20.8. HRMS (ESI) m/z calcd for $C_{10}H_9NO_6Na^+$ ($M+Na^+$) 262.0322, found 262.0322.

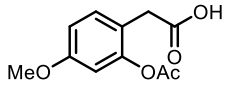



**4t**

**4t:** 2-(2-acetoxy-4-(methoxycarbonyl)phenyl)acetic acid

The general procedure **C** was followed (50 ℃, 16h). Pale yellow oil, 30.0 mg, 61% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.90 (dd, $J$ = 7.9, 1.7 Hz, 1H), 7.79 (d, $J$ = 1.7 Hz, 1H), 7.41 (d, $J$ = 8.0 Hz, 1H), 3.91 (s, 3H), 3.64 (s, 2H), 2.32 (s, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 176.1, 169.0, 166.1, 149.1, 131.1, 131.1, 131.0, 127.5, 124.0, 52.5, 36.3, 20.9 (d, $J$ = 6.0 Hz). HRMS (ESI) m/z calcd for $C_{12}H_{12}O_6Na^+$ ($M+Na^+$) 275.0526, found 275.0528.

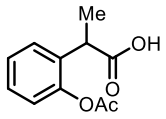



**4u**

**4u:** 2-(2-acetoxy-4-(methoxycarbonyl)phenyl)acetic acid

The general procedure **C** was followed (50 ℃, 16h). Pale yellow oil, 12.5 mg, 28% yield.

$^1$H NMR (600 MHz, $(CD_3)_2CO$) δ 7.28 (d, $J$ = 8.5 Hz, 1H), 6.80 (dd, $J$ = 8.5, 2.7 Hz, 1H), 6.72 (d, $J$ = 2.6 Hz, 1H), 3.78 (s, 3H), 3.48 (s, 2H), 2.25 (s, 3H). $^{13}$C NMR (151 MHz, $(CD_3)_2CO$) δ 172.4, 169.2, 160.4, 151.1, 132.6, 120.4, 112.2, 109.3, 55.8, 35.7, 20.8. HRMS (ESI) m/z calcd for $C_{11}H_{12}O_5Na^+$ ($M+Na^+$) 247.0577, found 247.0578.

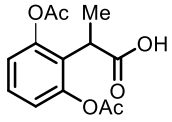



**4v$_{mono}$**

**4v$_{mono}$:** 2-(2-acetoxyphenyl)propanoic acid

The general procedure **C** was followed (50 ℃, 16h). Pale yellow oil, 24.1 mg, 58% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.38 (dd, *J* = 7.5, 1.8 Hz, 1H), 7.31 (td, *J* = 7.6, 1.7 Hz, 1H), 7.24(td, *J* = 7.6, 1.6 Hz, 1H), 7.09 (dd, *J* = 8.0, 1.4 Hz, 1H), 3.86 (q, *J* = 7.2 Hz, 1H), 2.30 (s, 3H), 1.49 (d, *J* = 7.2 Hz, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 180.0, 169.5, 148.4, 132.0, 128.7, 128.5, 126.5, 122.8, 39.7, 20.9, 17.1. HRMS (ESI) m/z calcd for $C_{11}H_{12}O_4Na^+$ ($M+Na^+$) 231.0628, found 231.0627.

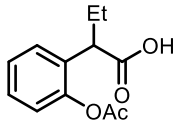



**4t$_{di}$**

**4v$_{di}$:** 2-(2,6-diacetoxyphenyl)propanoic acid

The general procedure **C** was followed (50 ℃, 16h). Pale yellow solid, 16.0 mg, 30% yield, M. p.: 101.5-103.7 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.30 (t, *J* = 8.2 Hz, 1H), 7.03 (d, *J* = 8.2 Hz, 2H), 3.90 (q, *J* = 7.1 Hz, 1H), 2.28 (s, 6H), 1.35 (d, *J* = 7.2 Hz, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.5, 169.0, 149.0, 127.98, 125.9, 120.5, 36.0, 20.8, 15.6. HRMS (ESI) m/z calcd for $C_{13}H_{13}O_6^-$ ($M-H^+$) 265.0718, found, 265.0718.

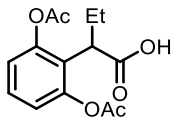



**4w$_{mono}$**

**4w$_{mono}$:** 2-(2-acetoxyphenyl)butanoic acid

The general procedure **C** was followed (50 ℃, 16h). Pale yellow oil, 14.6 mg, 33% yield.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.39 (dd, *J* = 7.6, 1.8 Hz, 1H), 7.30 (td, *J* = 7.7, 1.8 Hz, 1H), 7.23 (td, *J* = 7.5, 1.4 Hz, 1H), 7.08 (dd, *J* = 7.9, 1.4 Hz, 1H), 3.63 (t, *J* = 7.6 Hz, 1H), 2.31 (s, 3H), 2.17 – 2.02 (m, 1H), 1.87 – 1.70 (m, 1H), 0.90 (t, *J* = 7.3 Hz, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 169.6, 148.7, 130.6, 129.1, 128.5, 126.5, 122.9, 46.8, 25.2, 21.0, 12.2. HRMS (ESI) m/z calcd for $C_{12}H_{13}O_4^-$ ($M-H^+$) 221.0819; found, 221.0819.



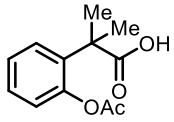

**4w$_{di}$**

**4w$_{di}$:** 2-(2,6-diacetoxyphenyl)butanoic acid

The general procedure **C** was followed (50 ℃, 16h). Yellow solid, 35.3 mg, 63% yield, M. p.: 116.2-118.7 ℃.

$^1$H NMR (400 MHz, $CDCl_3$) δ 7.31 (t, *J* = 8.2 Hz, 1H), 7.04 (d, *J* = 8.2 Hz, 2H), 3.77 – 3.68 (m, 1H), 2.27 (s, 6H), 2.16 – 2.06 (m, 1H), 1.63 (dt, *J* = 13.8, 7.6 Hz, 1H), 0.82 (t, *J* = 7.5 Hz, 3H). $^{13}$C NMR

(101 MHz, $CDCl_3$) δ 178.1, 169.0, 149.4, 128.1, 124.3, 120.6, 43.2, 23.4, 20.9, 12.3. HRMS (ESI) m/z calcd for $C_{14}H_{15}O_6^-$ ($M-H^+$) 279.0874; found, 279.0874.

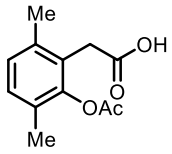



**4x**

**4x:** 2-(2-acetoxyphenyl)-2-methylpropanoic acid

The general procedure **C** was followed (50 ℃, 16h). White solid, 32.4 mg, 73% yield, M. p.: 122.1-124.0 ℃.

$^1H$ NMR (400 MHz, $CDCl_3$) δ 7.43 (dd, *J* = 7.7, 1.7 Hz, 1H), 7.35 – 7.28 (td, *J* = 7.9, 2.0 Hz, 1H), 7.28 – 7.21 (td, *J* = 7.9, 1.2 Hz, 1H), 7.14 (dd, *J* = 7.9, 1.5 Hz, 1H), 2.23 (s, 3H), 1.54 (s, 6H). $^{13}C$ NMR (101 MHz, $CDCl_3$) δ 183.2, 169.1, 148.0, 136.1, 128.1, 126.2, 126.1, 123.3, 44.5, 25.9, 21.0. HRMS (ESI) m/z calcd for $C_{12}H_{14}O_4Na^+$ ($M+Na^+$) 245.0784, found 245.0785.

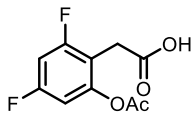



**4y**

**4y:** 2-(2-acetoxy-3,6-dimethylphenyl)acetic acid

The general procedure **C** was followed (70 ℃, 16h). White solid, 28.2 mg, 64% yield, M. p.: 128.2-130.4 ℃.

$^1H$ NMR (400 MHz, $CDCl_3$) δ 7.08 (d, *J* = 7.8 Hz, 1H), 7.02 (d, *J* = 7.8 Hz, 1H), 3.57 (s, 2H), 2.34 (s, 3H), 2.32 (s, 3H), 2.12 (s, 3H). $^{13}C$ NMR (101 MHz, $CDCl_3$) δ 177.0, 169.1, 148.3, 136.4, 130.0, 128.1, 128.1, 125.0, 33.0, 20.6, 19.7, 16.4. HRMS (ESI) m/z calcd for $C_{12}H_{13}O_4^-$ ($M-H^+$) 221.0819; found, 221.0820.

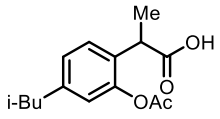



**4z**

**4z:** 2-(2-acetoxy-4,6-difluorophenyl)acetic acid

The general procedure **C** was followed (90 ℃, 12h). Pale yellow solid, 20.7 mg, 45% yield, M. p.: 93.3-95.1 ℃.

$^1H$ NMR (400 MHz, $CDCl_3$) δ 8.78 (br, 1H), 6.79 – 6.75 (m, 2H), 3.60 (s, 2H), 2.30 (s, 3H). $^{13}C$ NMR (101 MHz, $CDCl_3$) δ 175.9, 168.4, 162.9 (dd, $J_{C-F}$ = 37.7, 14.9 Hz), 160.5 (dd, $J_{C-F}$ = 37.4, 14.7 Hz), 150.5 (dd, $J_{C-F}$ = 13.2, 8.5 Hz), 110.9 (dd, $J_{C-F}$ = 18.9, 4.4 Hz), 106.8 (dd, $J_{C-F}$ = 24.9, 4.0 Hz), 101.9 (t, $J_{C-F}$ = 26.0 Hz), 28.8 (d, $J_{C-F}$ = 3.2 Hz), 20.8. $^{19}F$ NMR (376 MHz, $CDCl_3$) δ -110.4 (d, *J* = 6.7 Hz), -113.4 (d, *J* = 7.2 Hz). HRMS (ESI) m/z calcd for $C_{10}H_7F_2O_4^-$ ($M-H^+$) 229.0318; found, 229.0317.



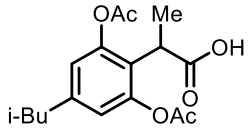

**4za$_{mono}$**

**4za$_{mono}$:** 2-(2-acetoxy-4-isobutylphenyl)propanoic acid

The general procedure **C** was followed (50 ℃, 16h). Pale yellow oil, 16.5 mg, 31% yield.

$^1H$ NMR (400 MHz, $CDCl_3$) δ 7.26 (d, *J* = 8.0 Hz, 1H), 7.01 (d, *J* = 8.0 Hz, 1H), 6.87 (s, 1H), 3.80 (q, *J*

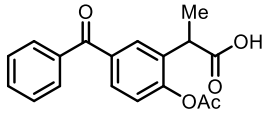
= 7.2 Hz, 1H), 2.45 (d, *J* = 7.1 Hz, 2H), 2.28 (s, 3H), 1.91 – 1.78 (m, 1H), 1.46 (d, *J* = 7.2 Hz, 3H), 0.90 (d, *J* = 6.6 Hz, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 179.9, 169.6, 148.1, 142.5, 129.1, 128.2, 127.4, 123.3, 45.0, 39.4, 30.2, 22.5, 21.0, 17.2. HRMS (ESI) m/z calcd for $C_{15}H_{20}O_4Na^+$ ($M+Na^+$) 287.1254, found 287.1250.




**4za$_{di}$**

**4za$_{di}$:** 2-(2,6-diacetoxy-4-isobutylphenyl)propanoic acid

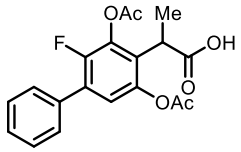
The general procedure **C** was followed (50 ℃, 16h). Pale yellow oil, 29.1 mg, 45% yield.
$^1$H NMR (400 MHz, $CDCl_3$) δ 6.81 (s, 2H), 3.83 (q, *J* = 7.1 Hz, 1H), 2.45 (d, *J* = 7.1 Hz, 2H), 2.26 (s, 6H), 1.84 (dt, *J* = 13.5, 6.8 Hz, 1H), 1.33 (d, *J* = 7.2 Hz, 3H), 0.90 (d, *J* = 6.6 Hz, 6H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.7, 169.2 (d, *J* = 1.6 Hz), 148.7, 142.4, 123.0, 121.2, 44.9, 36.0, 30.0, 22.4 (d, *J* = 1.6 Hz), 20.9, 15.7. HRMS (ESI) m/z calcd for $C_{17}H_{22}O_6Na^+$ ($M+Na^+$) 345.1309, found 345.1309.




**4zb**

**4zb:** 2-(2-acetoxy-5-benzoylphenyl)propanoic acid

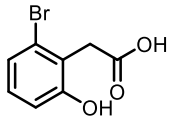
The general procedure **C** was followed (70 ℃, 24h). Pale yellow oil, 43.3 mg, 69% yield.
$^1$H NMR (400 MHz, $CDCl_3$) δ 7.89 (s, 1H), 7.79 (dd, *J* = 8.1, 1.3 Hz, 2H), 7.74 (dd, *J* = 8.4, 2.1 Hz, 1H), 7.59 (t, *J* = 7.5 Hz, 1H), 7.48 (t, *J* = 7.6 Hz, 2H), 7.23 (d, *J* = 8.4 Hz, 1H), 3.93 (q, *J* = 7.2 Hz, 1H), 2.33 (s, 3H), 1.53 (d, *J* = 7.3 Hz, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 195.6, 179.4, 168.8, 151.7, 137.3, 135.5, 132.7, 132.4, 131.0, 130.6, 130.1, 128.5, 122.8, 39.9, 20.9, 16.9. HRMS (ESI) m/z calcd for $C_{18}H_{15}O_5^-$ ($M-H^+$) 311.0925; found, 311.0918.




**4zc**

**4zc:** 2-(3,5-diacetoxy-2-fluoro-[1,1'-biphenyl]-4-yl)propanoic acid

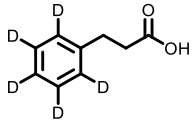
The general procedure **C** was followed (70 ℃, 16h). Yellow oil, 44.2 mg, 61% yield.
$^1$H NMR (400 MHz, $CDCl_3$) δ 7.82 (br, 1H), 7.57 – 7.49 (m, 2H), 7.48 – 7.35 (m, 3H), 7.14 (d, *J* = 6.3 Hz, 1H), 3.94 (q, *J* = 7.1 Hz, 1H), 2.32 (d, *J* = 19.6 Hz, 6H), 1.41 (d, *J* = 7.2 Hz, 3H). $^{13}$C NMR (101 MHz, $CDCl_3$) δ 178.1, 169.2, 167.8, 149.5 (d, $J_{C-F}$ = 250.5 Hz), 144.0 (d, $J_{C-F}$ = 3.5 Hz), 137.4 (d, $J_{C-F}$ = 16.1 Hz), 134.0, 129.3 (d, $J_{C-F}$ = 13.4 Hz), 129.1 (d, $J_{C-F}$ = 2.8 Hz), 128.7, 128.5, 127.0, 121.8 (d, $J_{C-F}$ = 3.4 Hz), 36.4, 20.8, 20.2, 15.6. $^{19}$F NMR (376 MHz, $CDCl_3$) δ -133.6. HRMS (ESI) m/z calcd for $C_{19}H_{16}FO_6^-$ ($M-H^+$) 359.0936; found, 359.0936.




**4zd**

**4zd:** 2-(2-bromo-6-hydroxyphenyl)acetic acid

The general procedure **D** was followed. White solid, 29.9 mg, 65% yield, M. p.: 130.1-132.1 ℃.
$^{1}$H NMR (400 MHz, MeOD) δ 7.04 (d, *J* = 8.0 Hz, 1H), 6.98 (t, *J* = 8.0 Hz, 1H), 6.77 (d, *J* = 8.1 Hz, 1H), 3.82 (s, 2H). $^{13}$C NMR (101 MHz, MeOD) δ 173.7, 156.9, 128.7, 125.7, 123.0, 122.2, 113.7, 34.9.



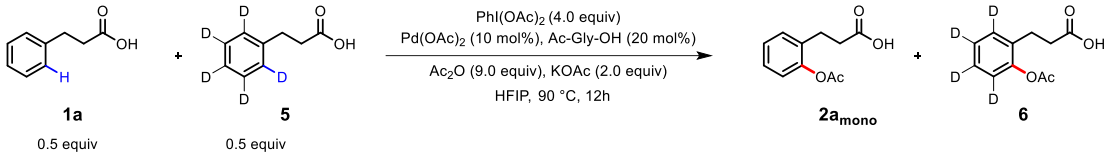

**5**

**5:** 3-(phenyl-d5)propanoic acid

$^{1}$H NMR (600 MHz, $CDCl_3$) δ 2.97 (t, *J* = 7.8 Hz,2H), 2.70 (t, *J* = 7.8 Hz, 2H).

## 2.6 Mechanistic studies

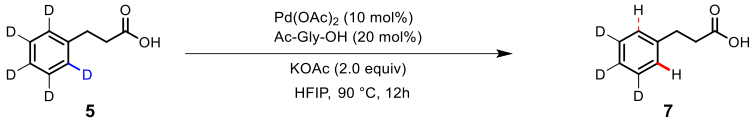
### Results from the kinetic isotope experiments with 1a and 5a:

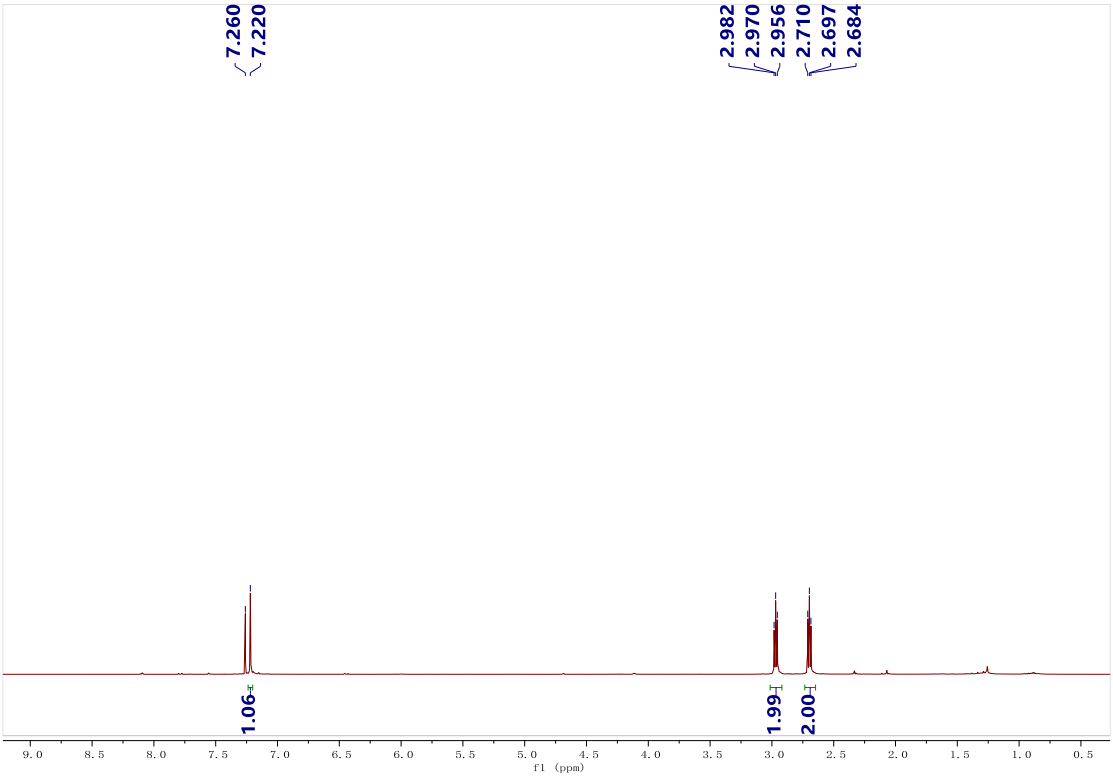


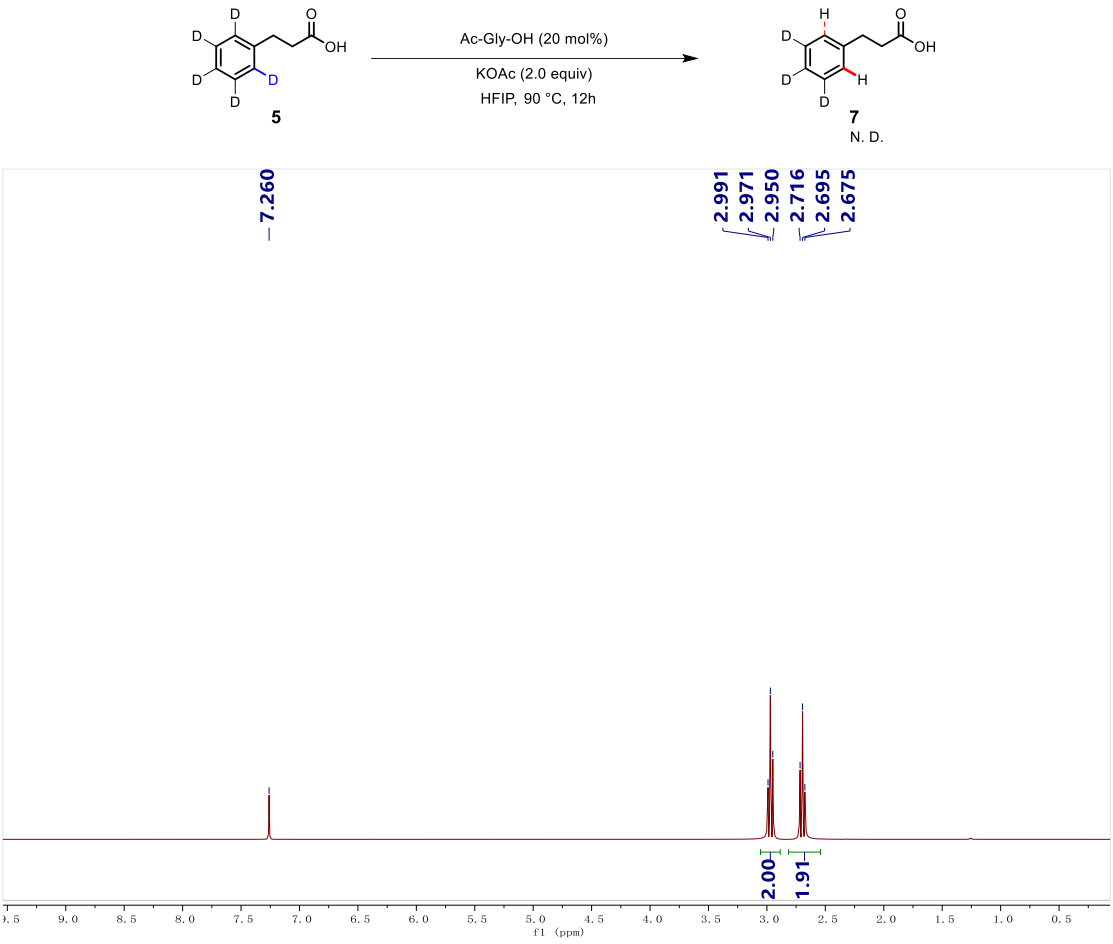

| Entry[a] | Time (min) | % Conv. **2a** | % Conv. **2y** | $k_H$ ([M]/min) | $K_D$ ([M]/min) | $k_H/k_D$ |
|---|---|---|---|---|---|---|
| 1 | 60 | 20.0 | 6.7 | $3.3\times10^{-4}$ | $1.1\times10^{-4}$ | 2.99 |
| 2 | 60 | 19.0 | 5.7 | $3.2\times10^{-4}$ | $9.5\times10^{-5}$ | 3.33 |
| 3 | 60 | 18.4 | 5.7 | $3.3\times10^{-4}$ | $9.5\times10^{-5}$ | 3.23 |
| Average | | | | | | 3.18 |

[a] The conversion was determined by $^1$H NMR analysis of the crude reaction mixture, as discussed in the preceding section.

### Results from the reversibility experiments of 5:



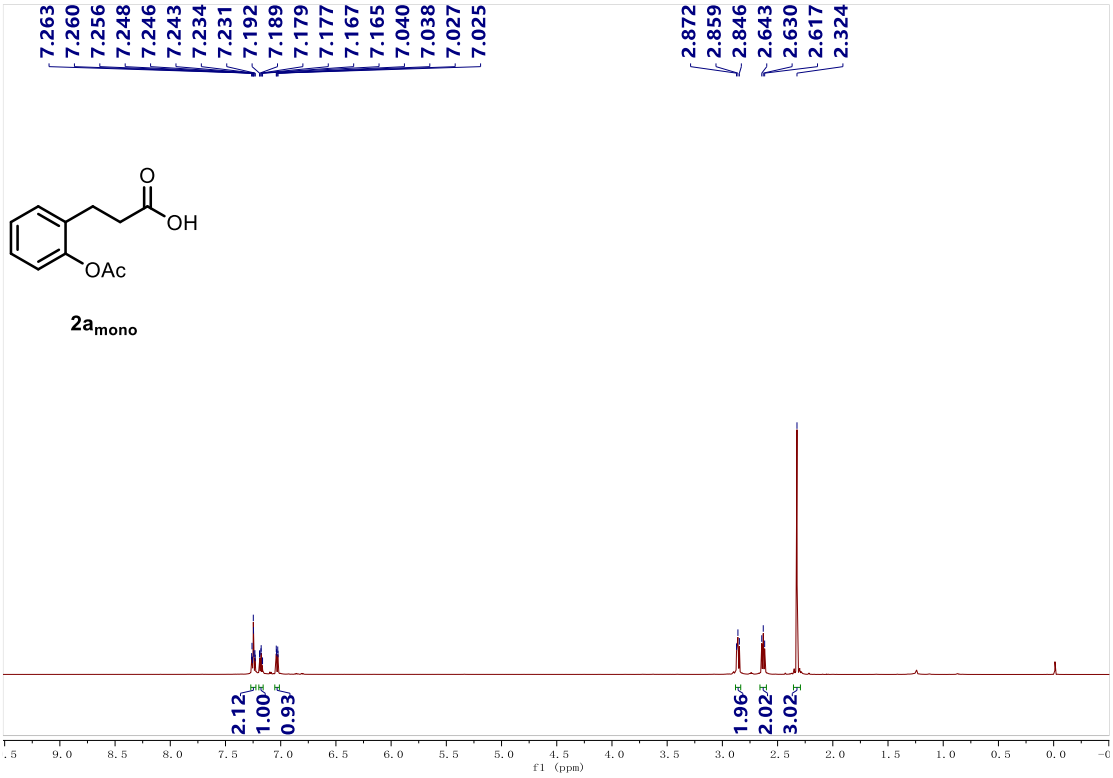



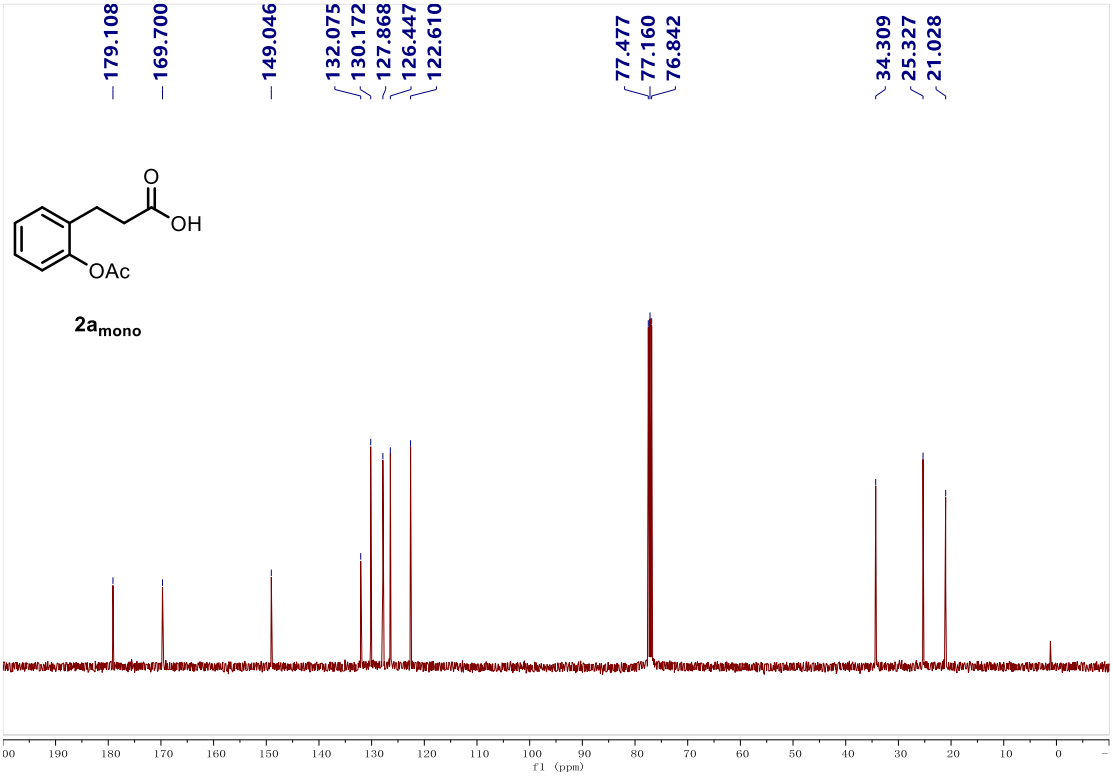


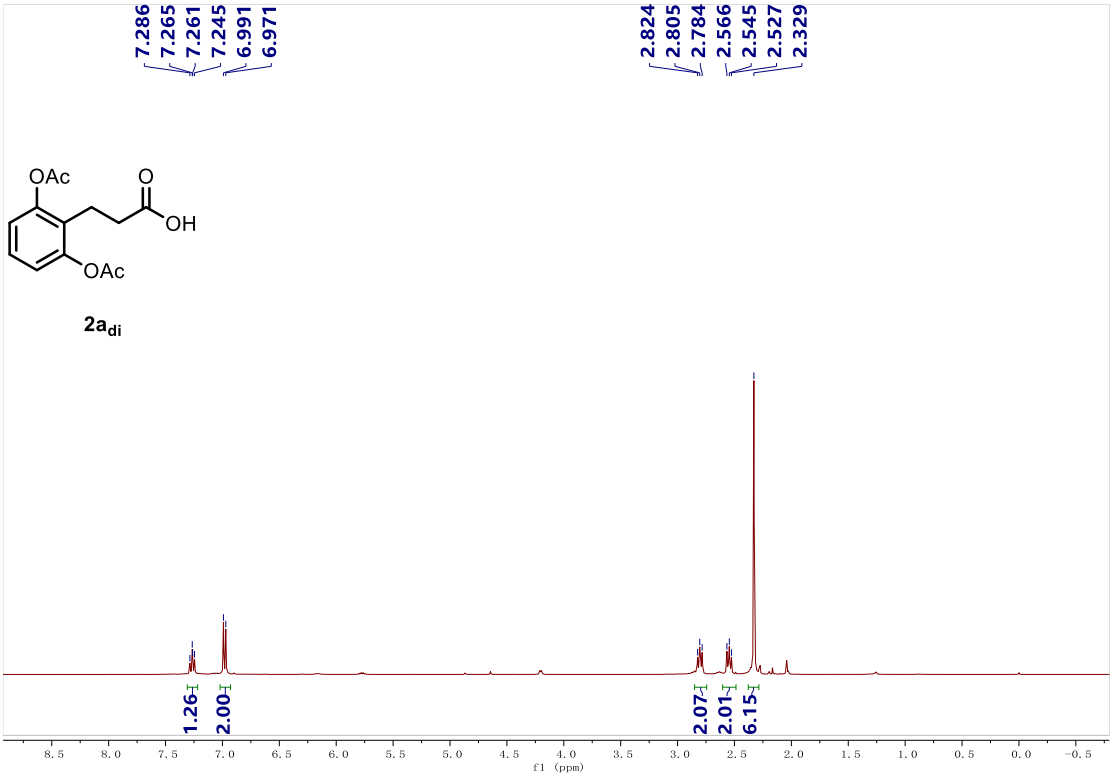

# 3. References

[S1]Daichao Xu; Chunxin Lu; Wanzhi Chen. *Tetrahedron Lett.* **2012**, *68*, 1466.

# 4. NMR Spectrc of Compounds

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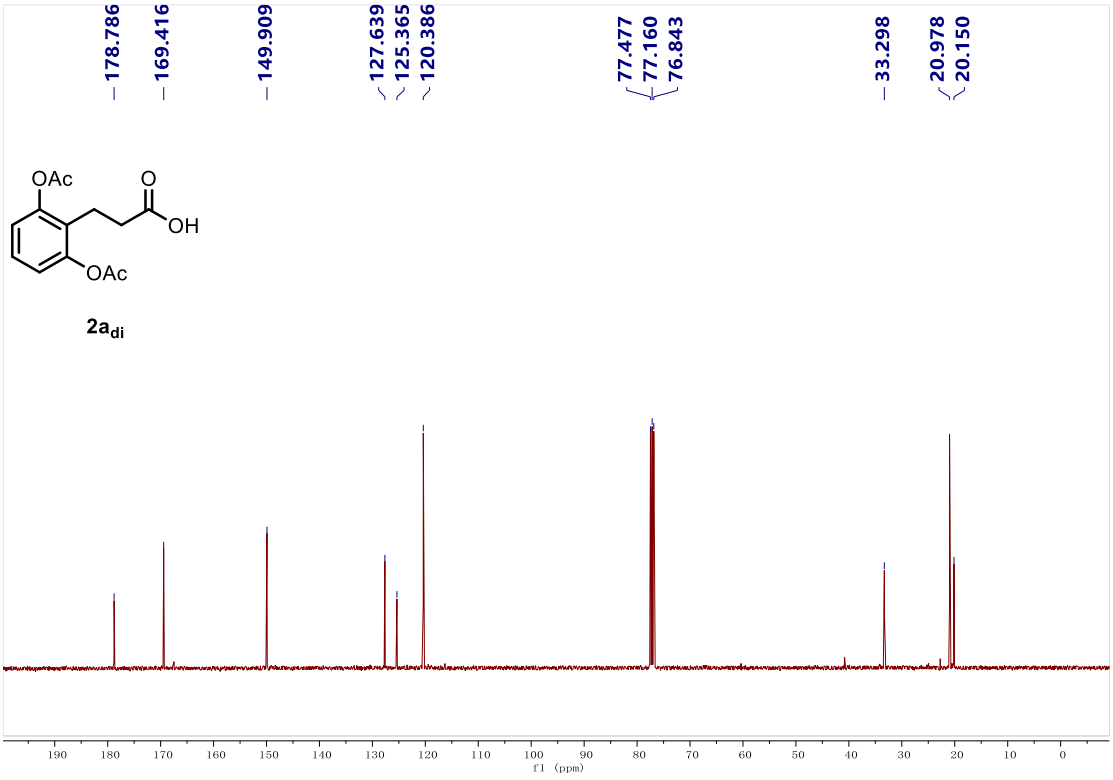
7.261
7.245
6.991
6.971
2.824
2.805
2.784
2.566
2.545
2.527
2.329
OAc
O
OH
OAc
1.26
2.00
2.07
2.01
6.15
f1 (ppm)

**2a$_{di}$**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169.416
149.909
127.639
125.365
120.386
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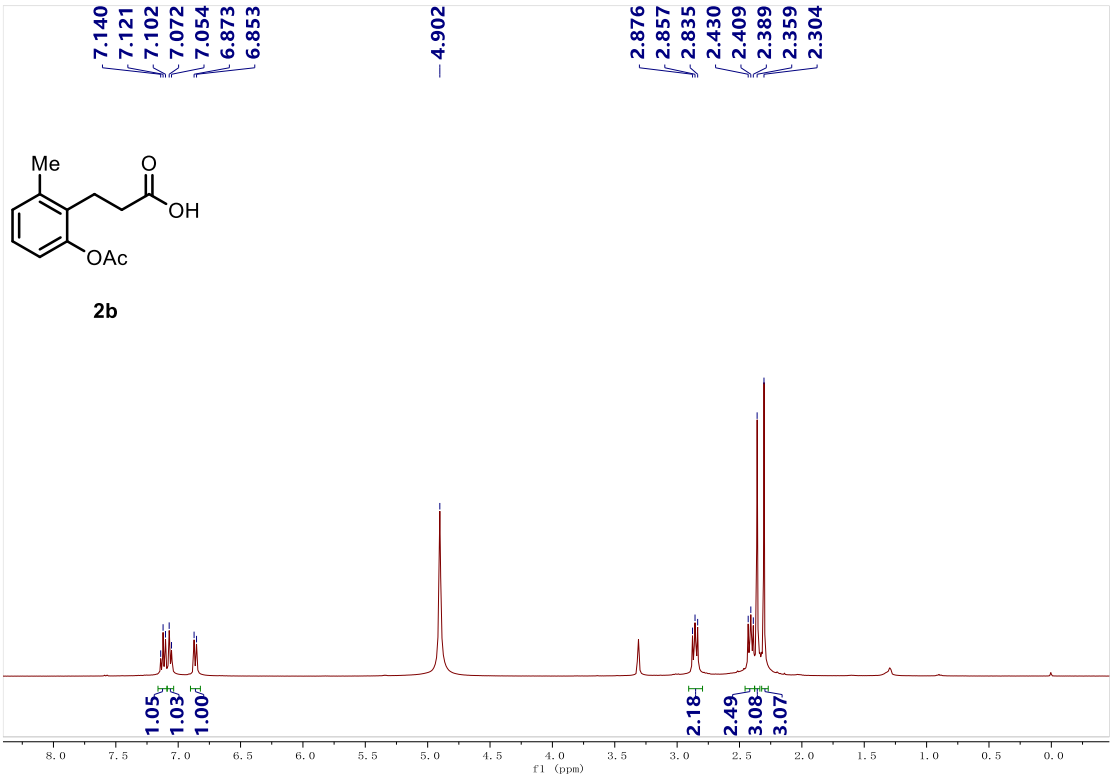
77.160
76.843
33.298
20.978
20.150
OAc
O
OH
OAc
f1 (ppm)

**2a$_{di}$**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7.121
7.102
7.072
7.054
6.873
6.853
4.902
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2.857
2.835
2.430
2.409
2.389
2.359
2.304
Me
O
OH
OAc
2b
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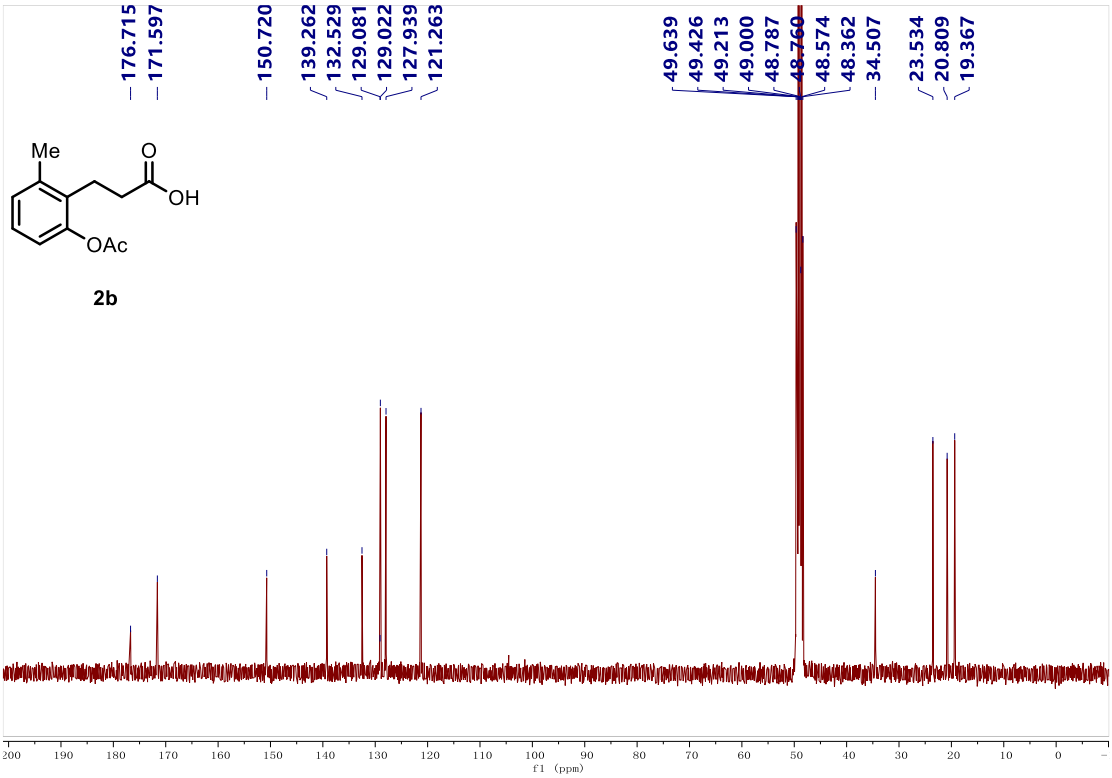
1.03
1.00
2.18
2.49
3.08
3.07
f1 (ppm)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129.081
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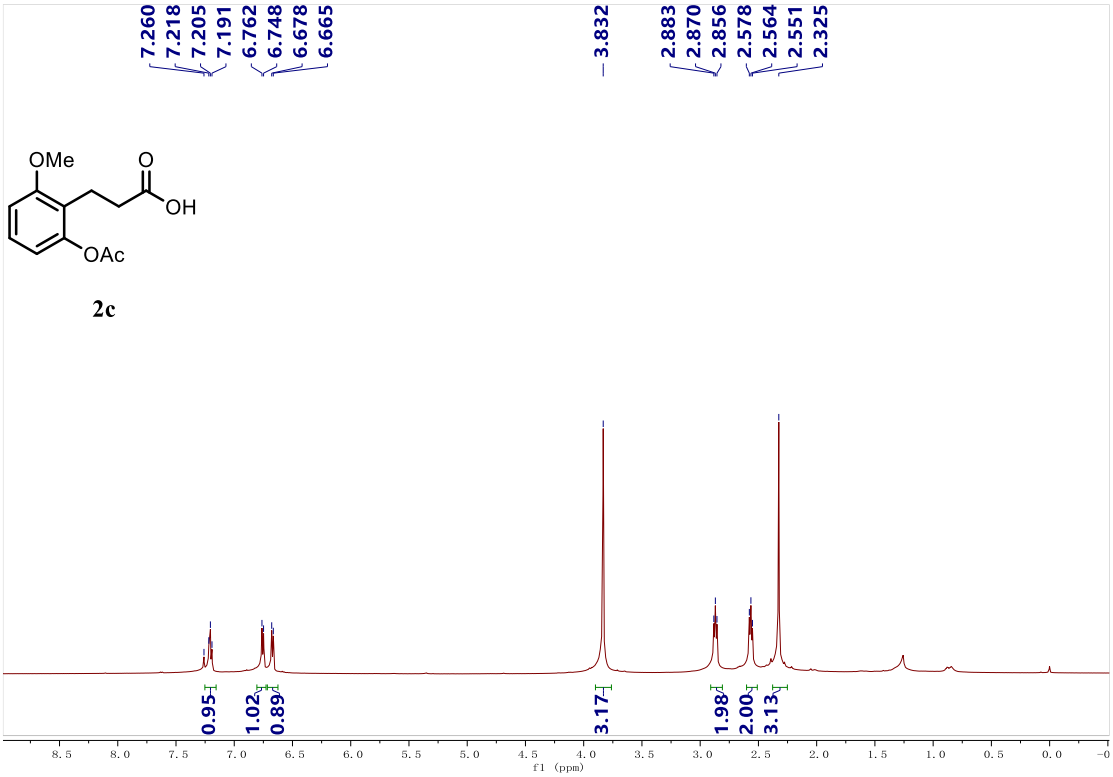
49.639
49.426
49.213
49.000
48.787
48.760
48.574
48.362
34.507
23.534
20.809
19.367
Me
O
OH
OAc
2b
f1 (ppm)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6.762
6.748
6.678
6.665
3.832
2.883
2.870
2.856
2.578
2.564
2.551
2.325
OMe
O
OH
OAc
0.95
1.02
0.89
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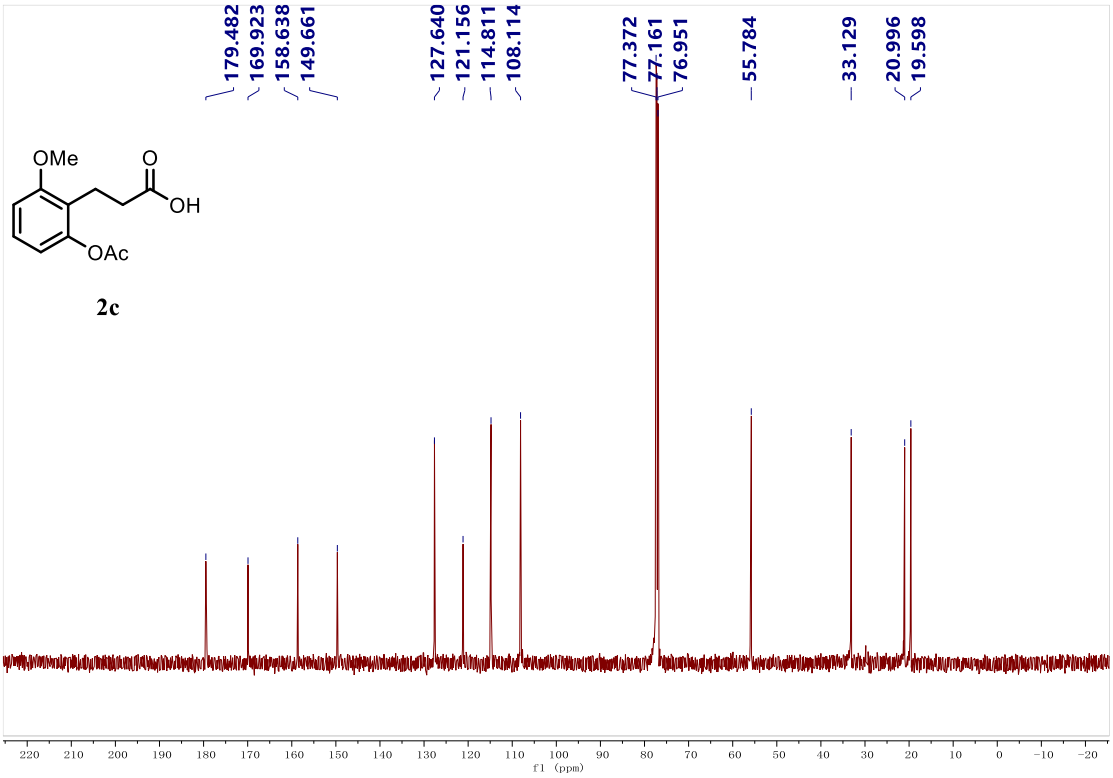
1.98
2.00
3.13
f1 (ppm)

**2c**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121.156
114.811
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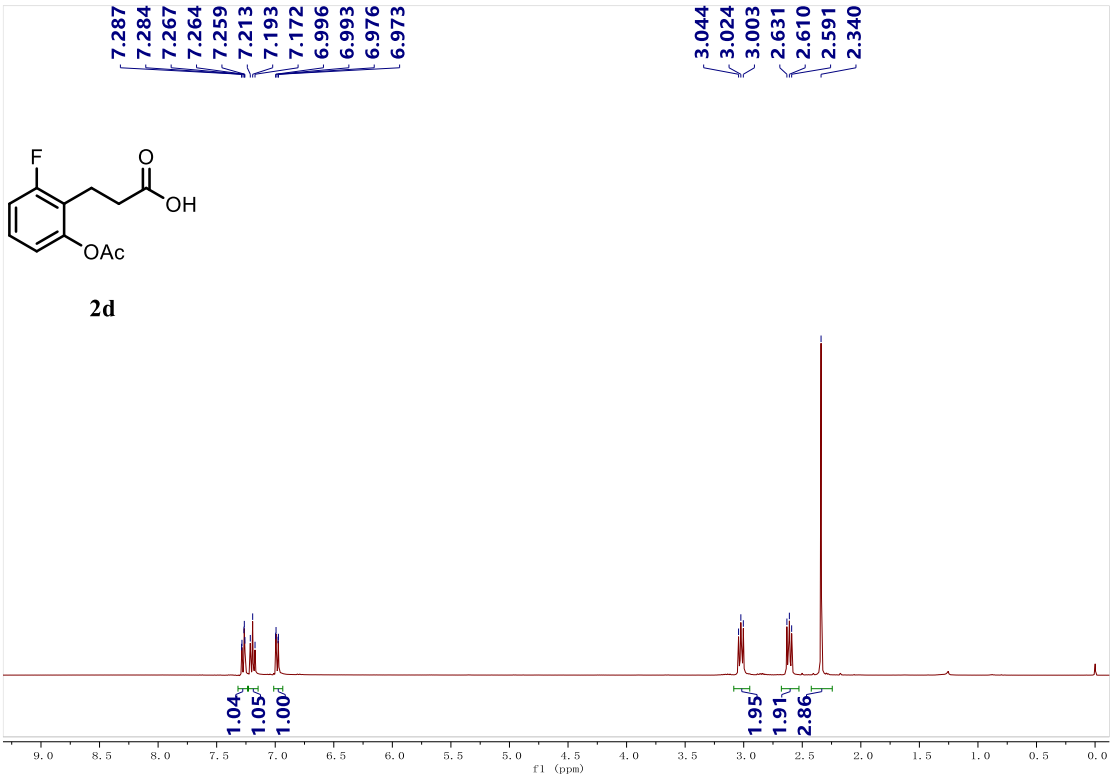
76.951
55.784
33.129
20.996
19.598
OMe
O
OH
OAc
f1 (ppm)

**2c**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7.172
6.996
6.993
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6.973
3.044
3.024
3.003
2.631
2.610
2.591
2.340
F
O
OH
OAc
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1.05
1.00
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1.91
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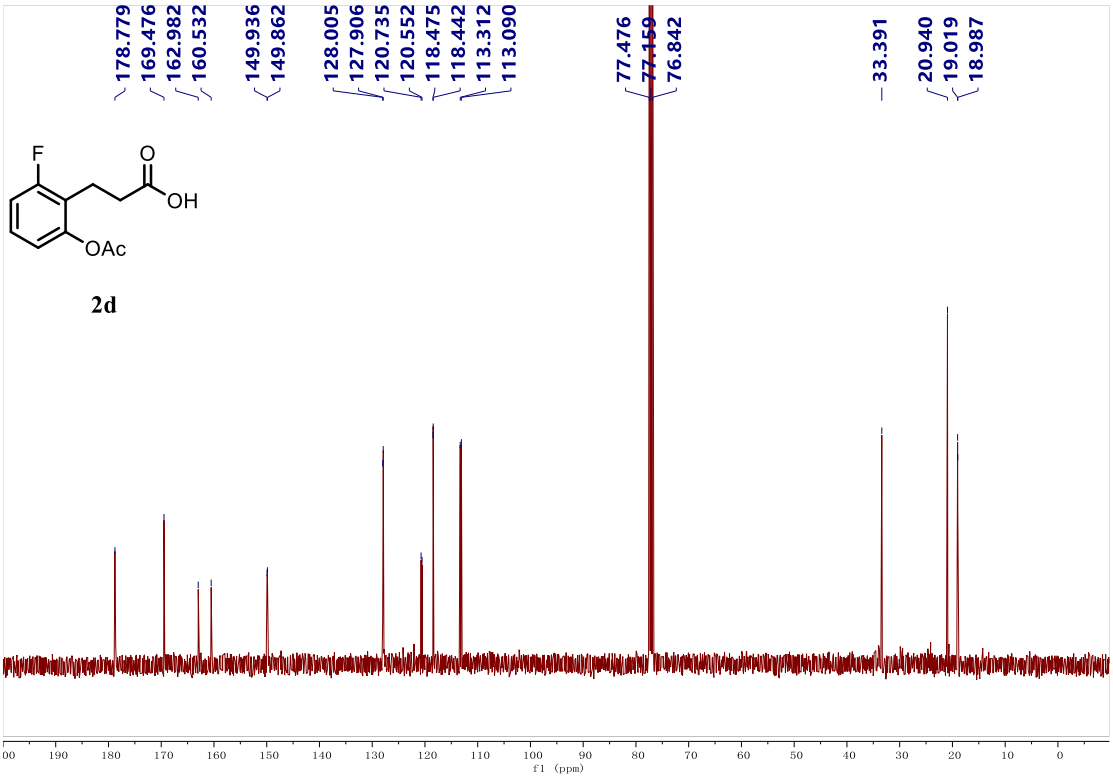
f1 (ppm)

**2d**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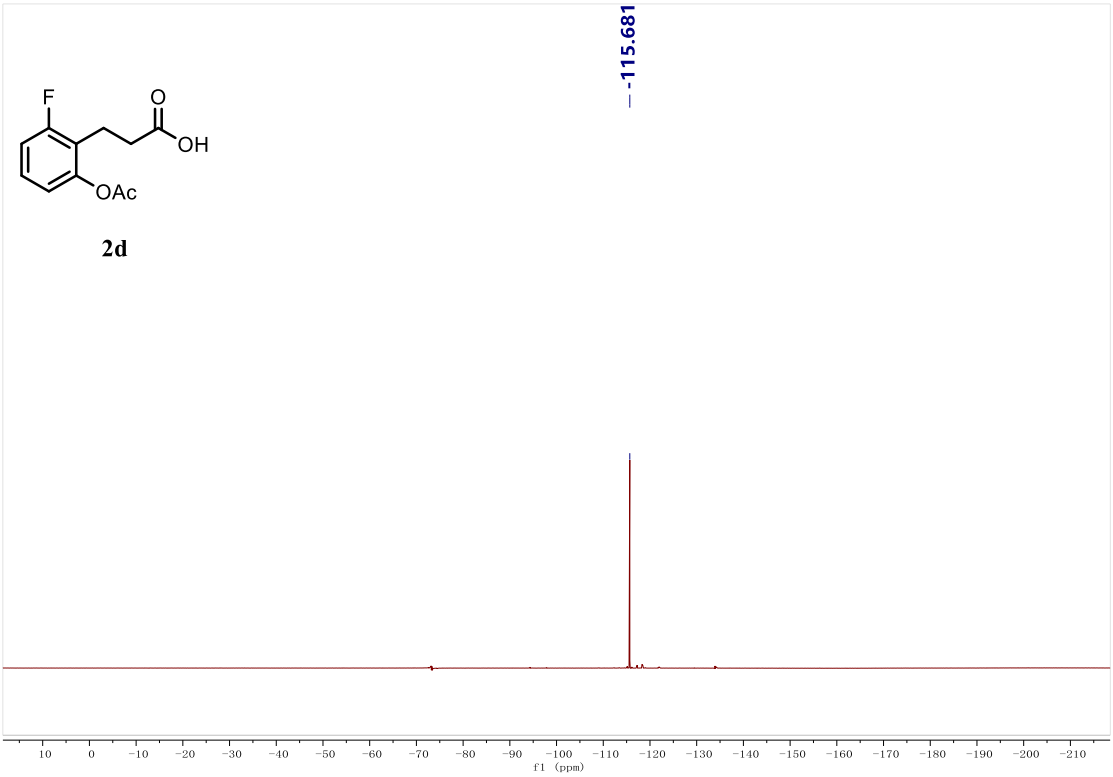
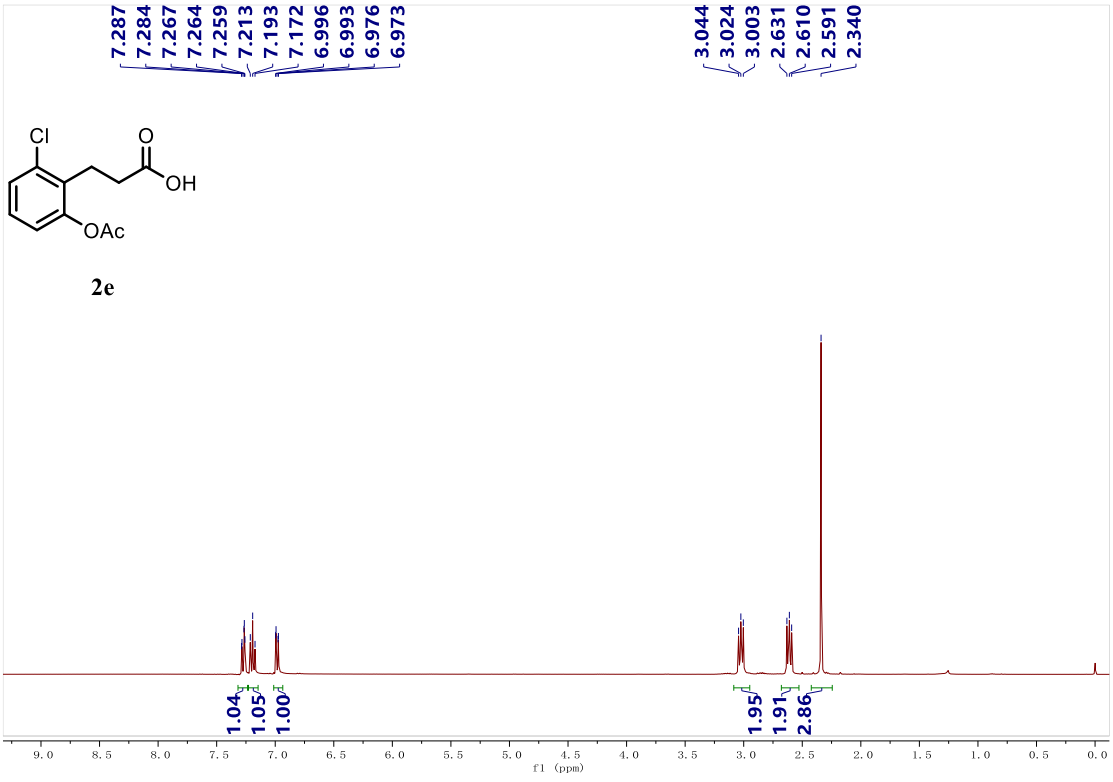
162.982
160.532
149.936
149.862
128.005
127.906
120.735
120.552
118.475
118.442
113.312
113.090
77.476
77.159
76.842
33.391
20.940
19.019
18.987
F
O
OH
OAc
f1 (ppm)

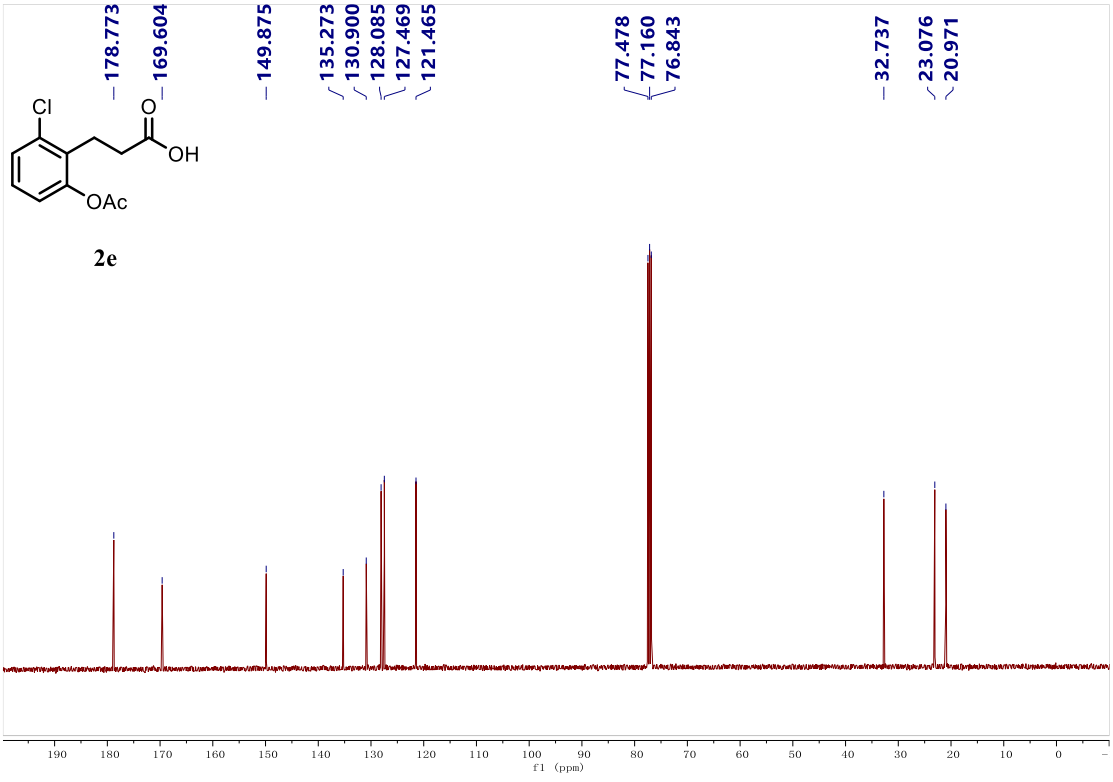
**2d**


F
O
OH
OAc
-115.681
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

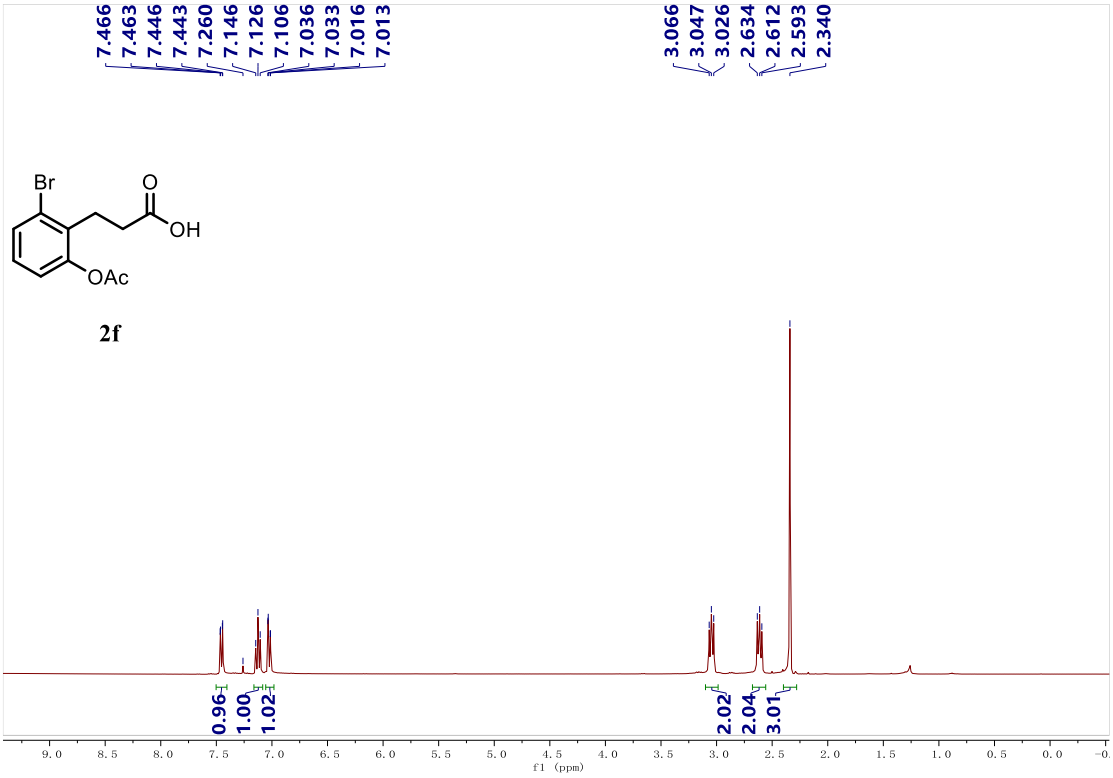
**2d**


7.287
7.284
7.267
7.264
7.259
7.213
7.193
7.172
6.996
6.993
6.976
6.973
3.044
3.024
3.003
2.631
2.610
2.591
2.340
Cl
O
OH
OAc
1.04
1.05
1.00
1.95
1.91
2.86
f1 (ppm)

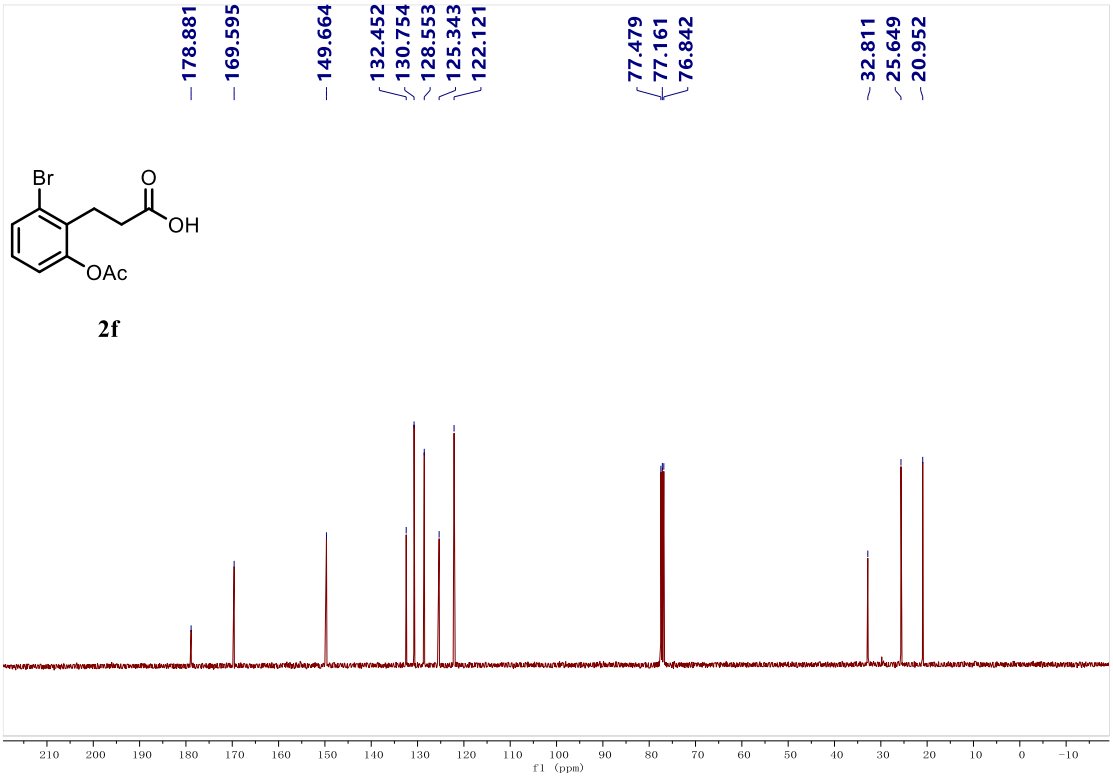
**2e**


178.773
169.604
149.875
135.273
130.900
128.085
127.469
121.465
77.478
77.160
76.843
32.737
23.076
20.971
Cl
O
OH
OAc
f1 (ppm)

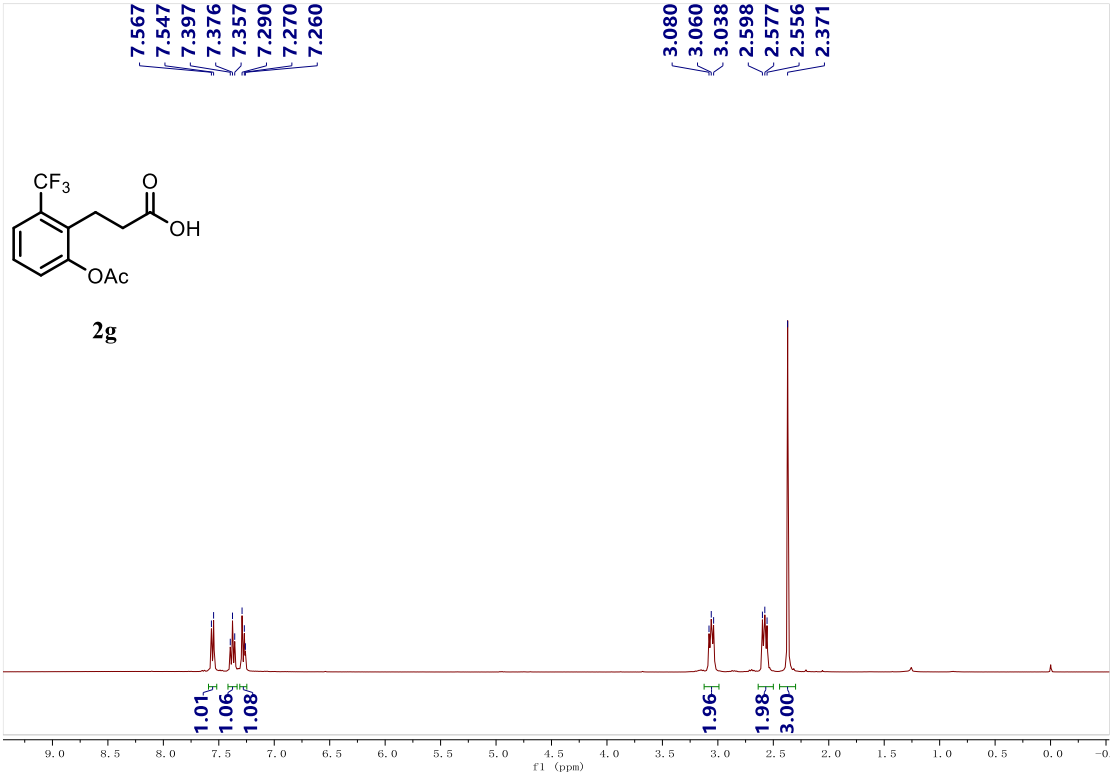
**2e**

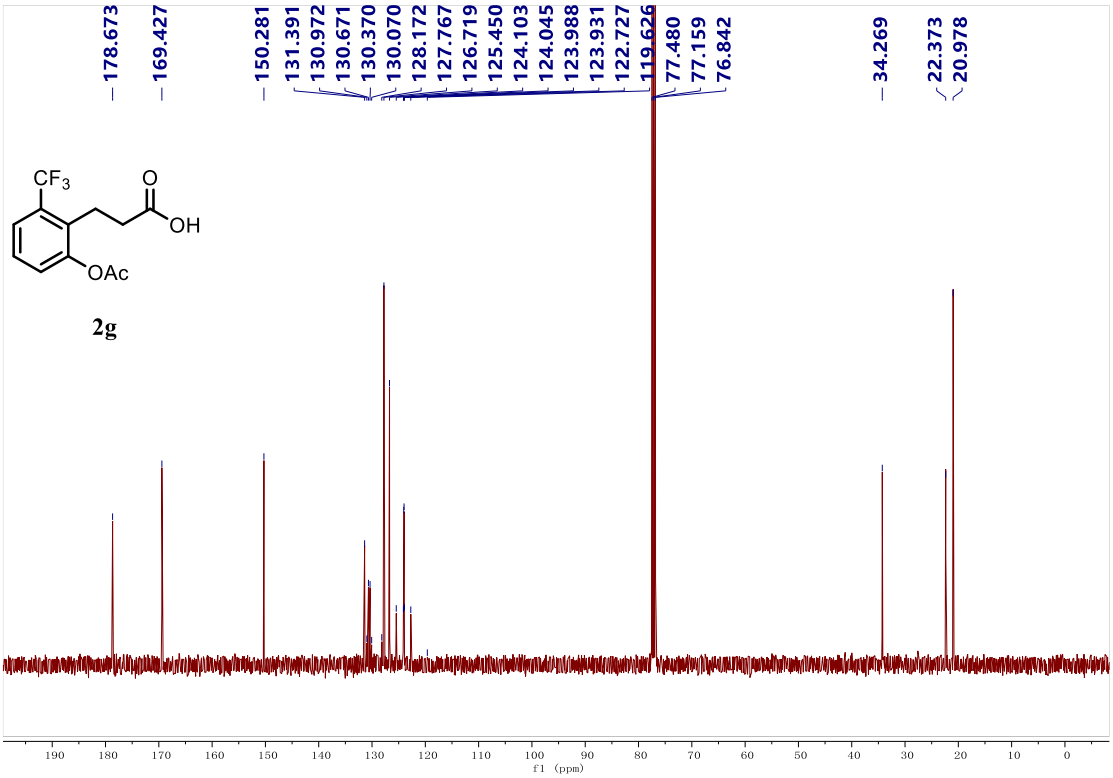

7.466
7.463
7.446
7.443
7.260
7.146
7.126
7.106
7.036
7.033
7.016
7.013
3.066
3.047
3.026
2.634
2.612
2.593
2.340
Br
O
OH
OAc
0.96
1.00
1.02
2.02
2.04
3.01
f1 (ppm)

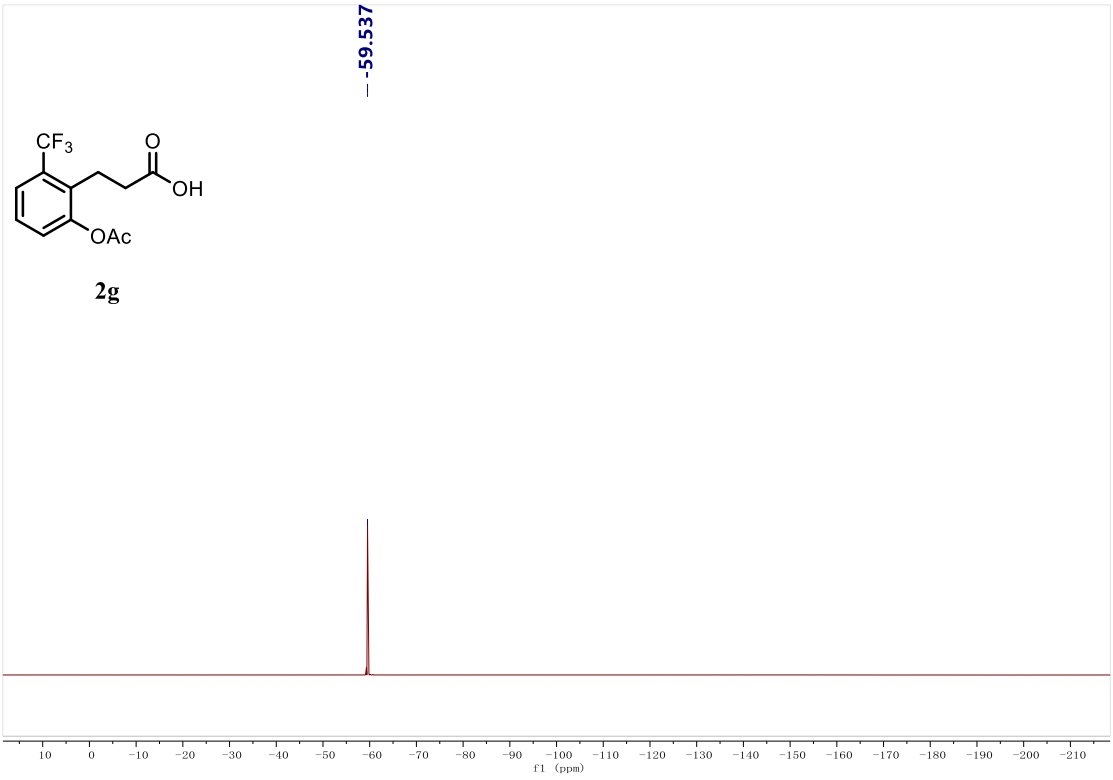
**2f**


178.881
169.595
149.664
132.452
130.754
128.553
125.343
122.121
77.479
77.161
76.842
32.811
25.649
20.952
Br
O
OH
OAc
f1 (ppm)

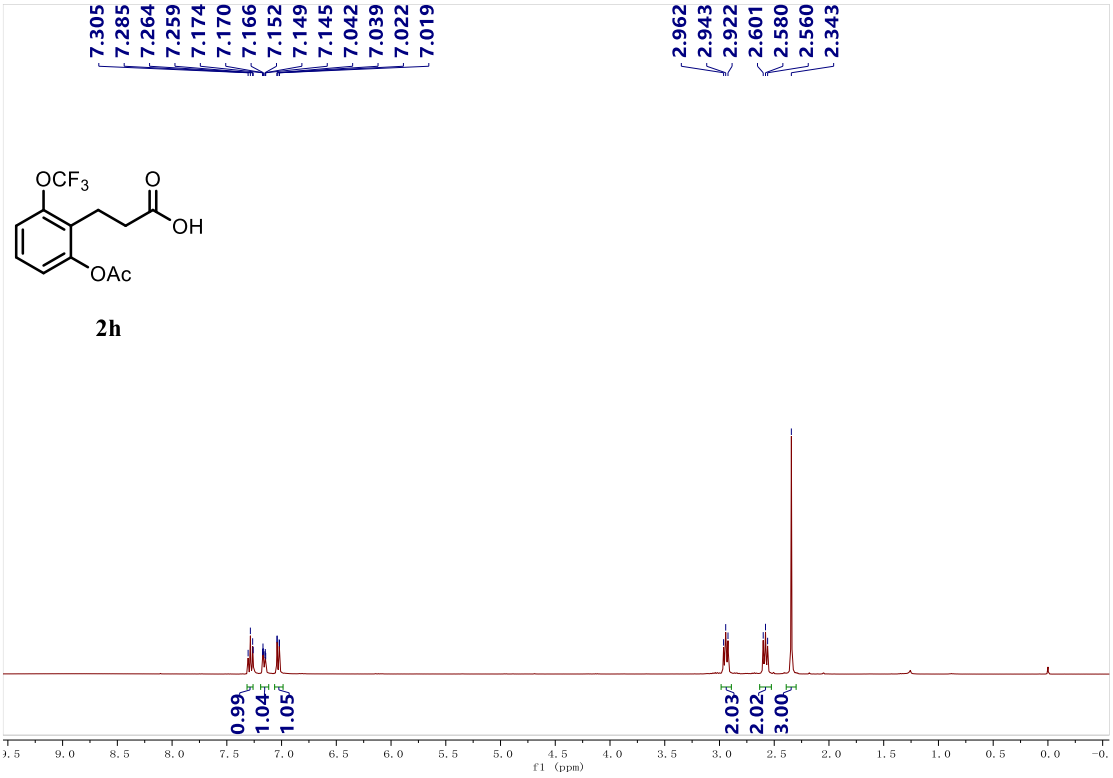
**2f**


7.567
7.547
7.397
7.376
7.357
7.290
7.270
7.260
3.080
3.060
3.038
2.598
2.577
2.556
2.371
CF3
O
OH
OAc
2g
1.01
1.06
1.08
1.96
1.98
3.00
f1 (ppm)

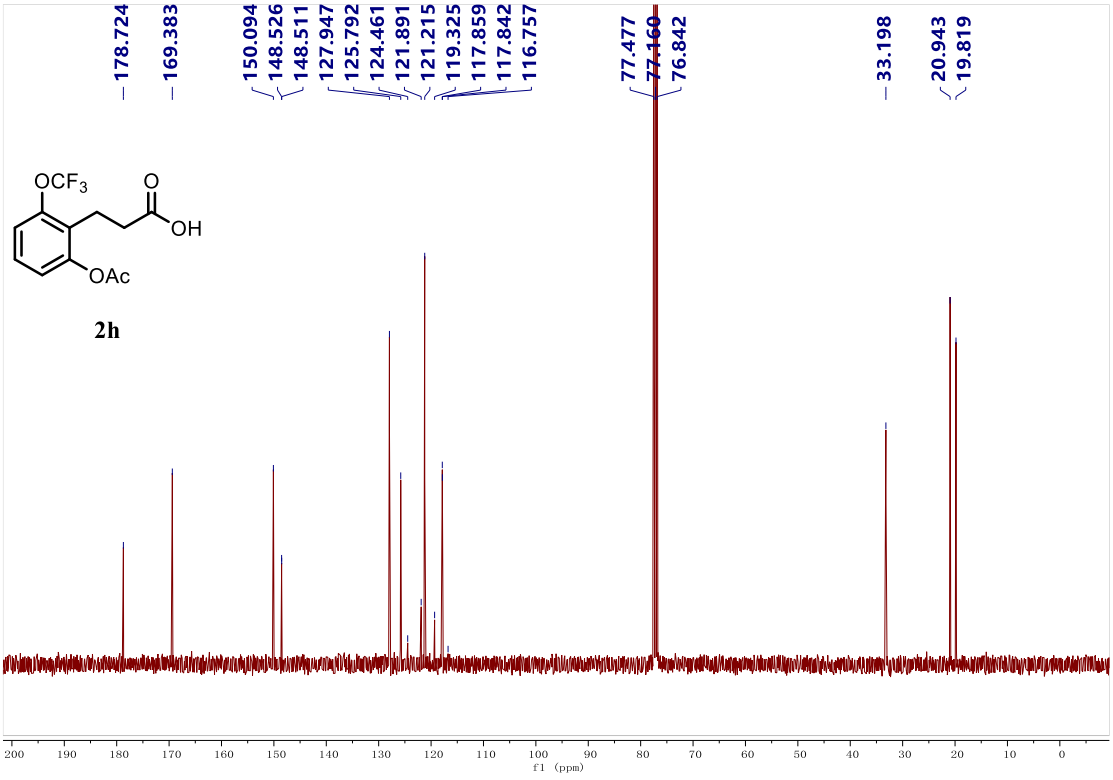

178.673
169.427
150.281
131.391
130.972
130.671
130.370
130.070
128.172
127.767
126.719
125.450
124.103
124.045
123.988
123.931
122.727
119.626
77.480
77.159
76.842
34.269
22.373
20.978
CF3
O
OH
OAc
2g
f1 (ppm)


-59.537
CF3
O
OH
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

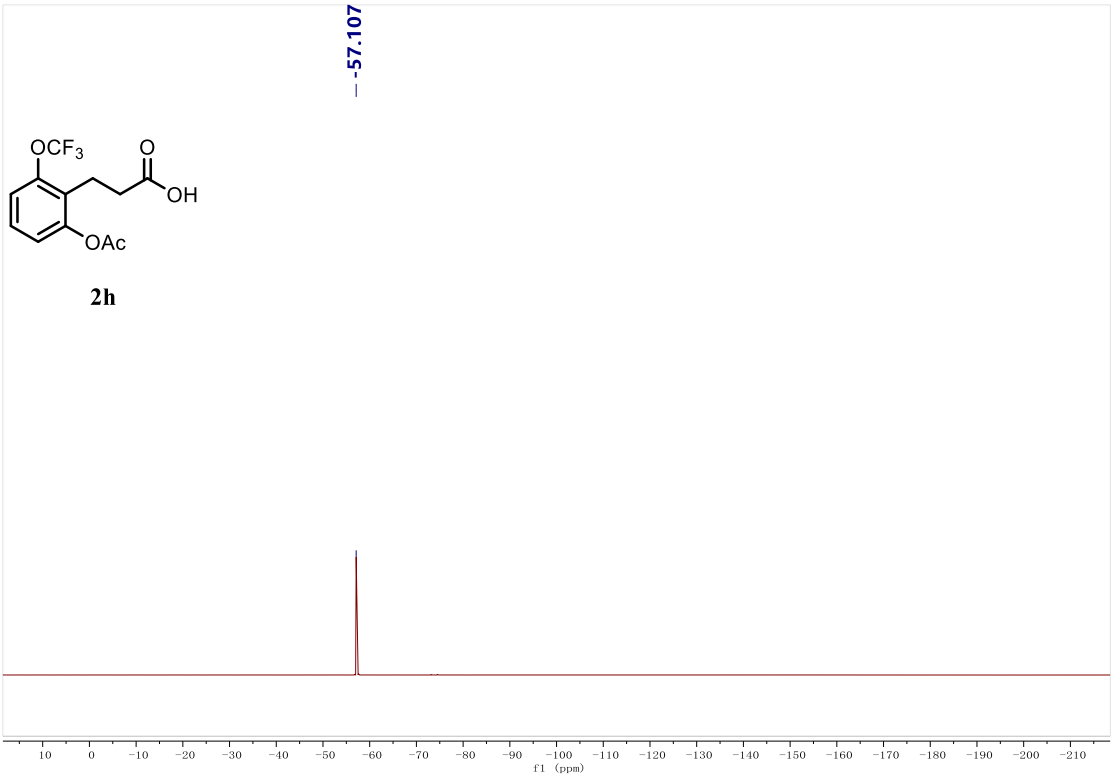
**2g**


7.305
7.285
7.264
7.259
7.174
7.170
7.166
7.152
7.149
7.145
7.042
7.039
7.022
7.019
2.962
2.943
2.922
2.601
2.580
2.560
2.343
OCF3
O
OH
OAc
0.99
1.04
1.05
2.03
2.02
3.00
f1 (ppm)

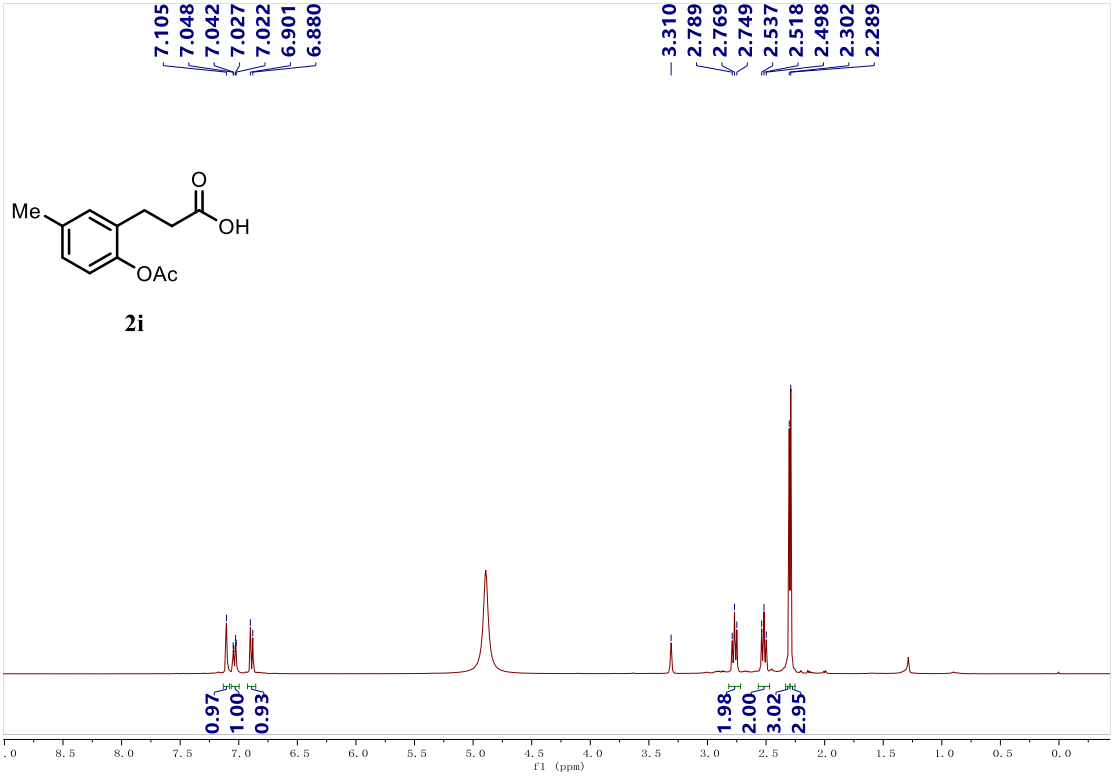
**2h**


178.724
169.383
150.094
148.526
148.511
127.947
125.792
124.461
121.891
121.215
119.325
117.859
117.842
116.757
77.477
77.160
76.842
33.198
20.943
19.819
OCF3
O
OH
OAc
f1 (ppm)

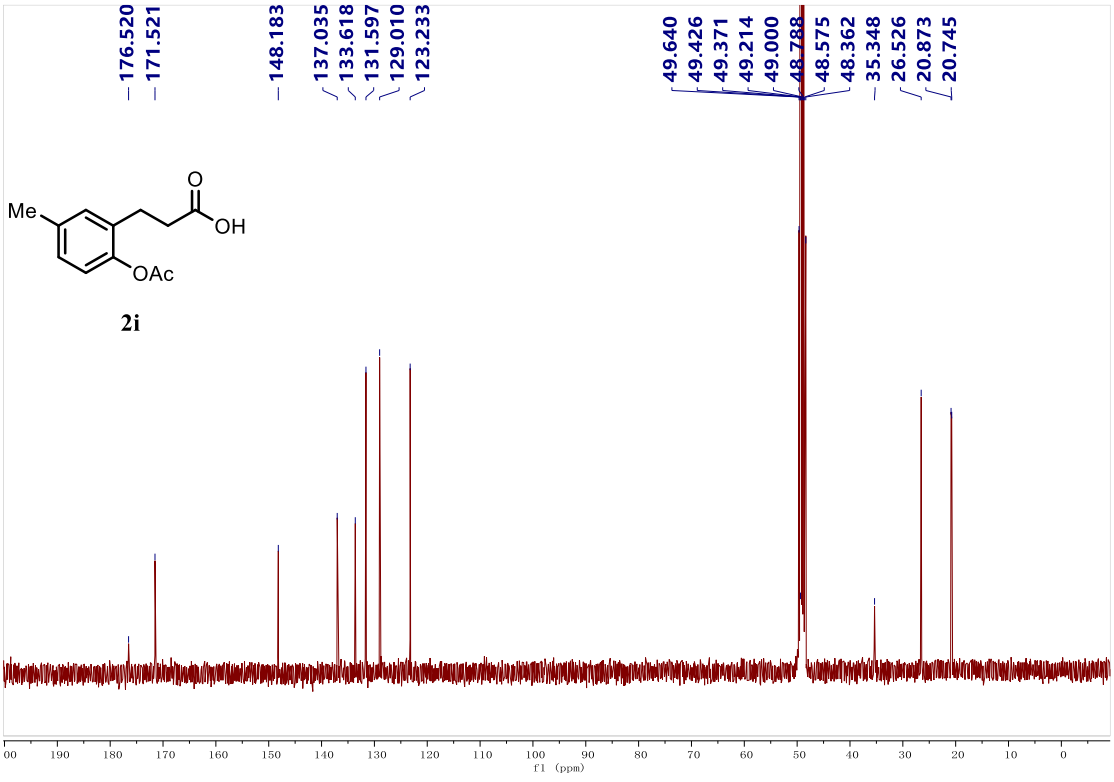
**2h**


-57.107
OCF3
O
OH
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

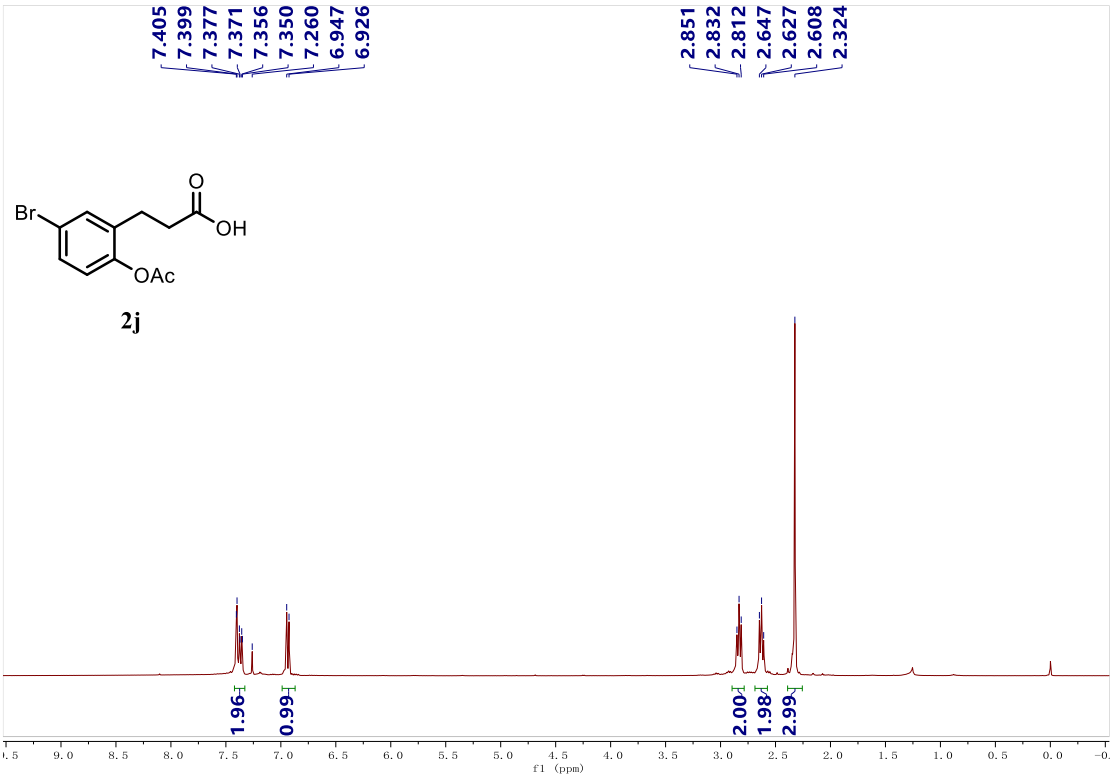
**2h**

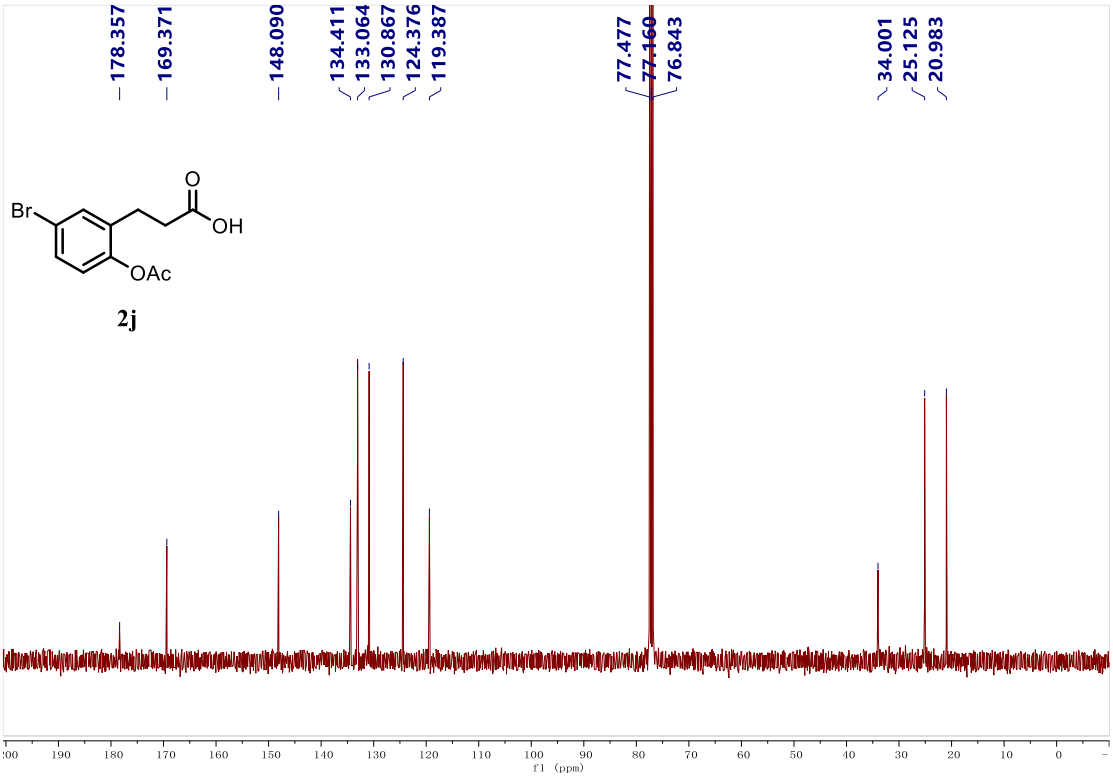

7.105
7.048
7.042
7.027
7.022
6.901
6.880
3.310
2.789
2.769
2.749
2.537
2.518
2.498
2.302
2.289
Me
O
OH
OAc
0.97
1.00
0.93
1.98
2.00
3.02
2.95
f1 (ppm)

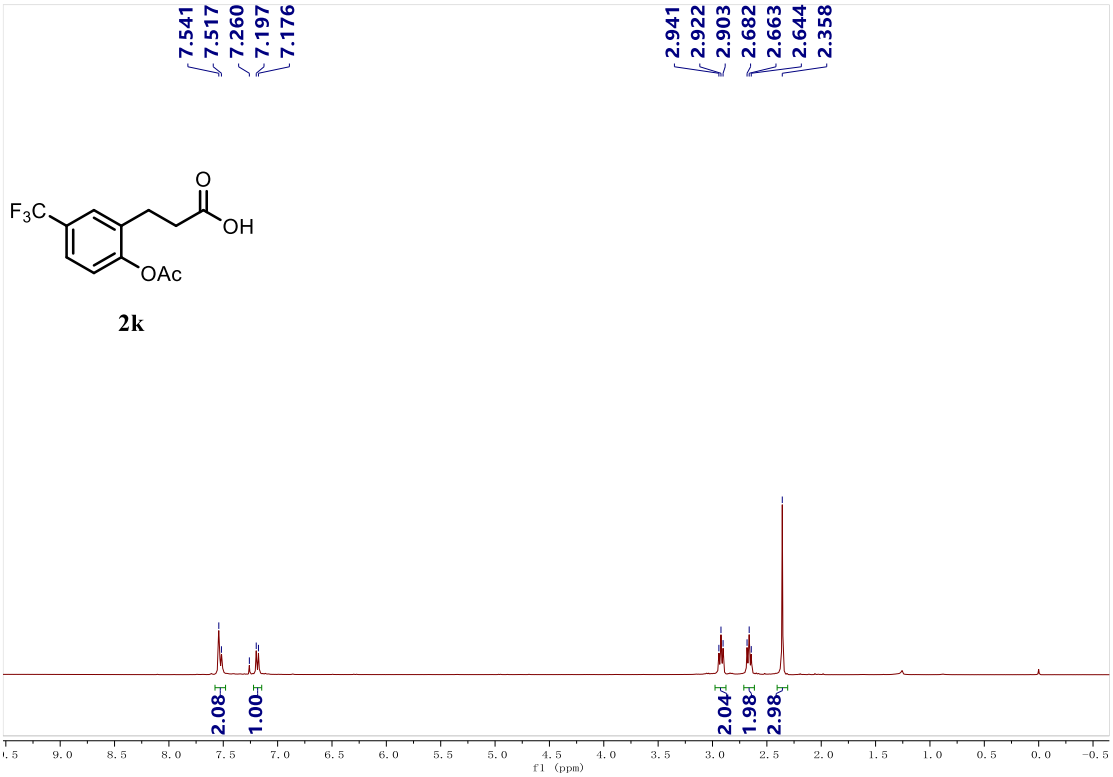
**2i**


176.520
171.521
148.183
137.035
133.618
131.597
129.010
123.233
49.640
49.426
49.371
49.214
49.000
48.788
48.575
48.362
35.348
26.526
20.873
20.745
Me
O
OH
OAc
f1 (ppm)

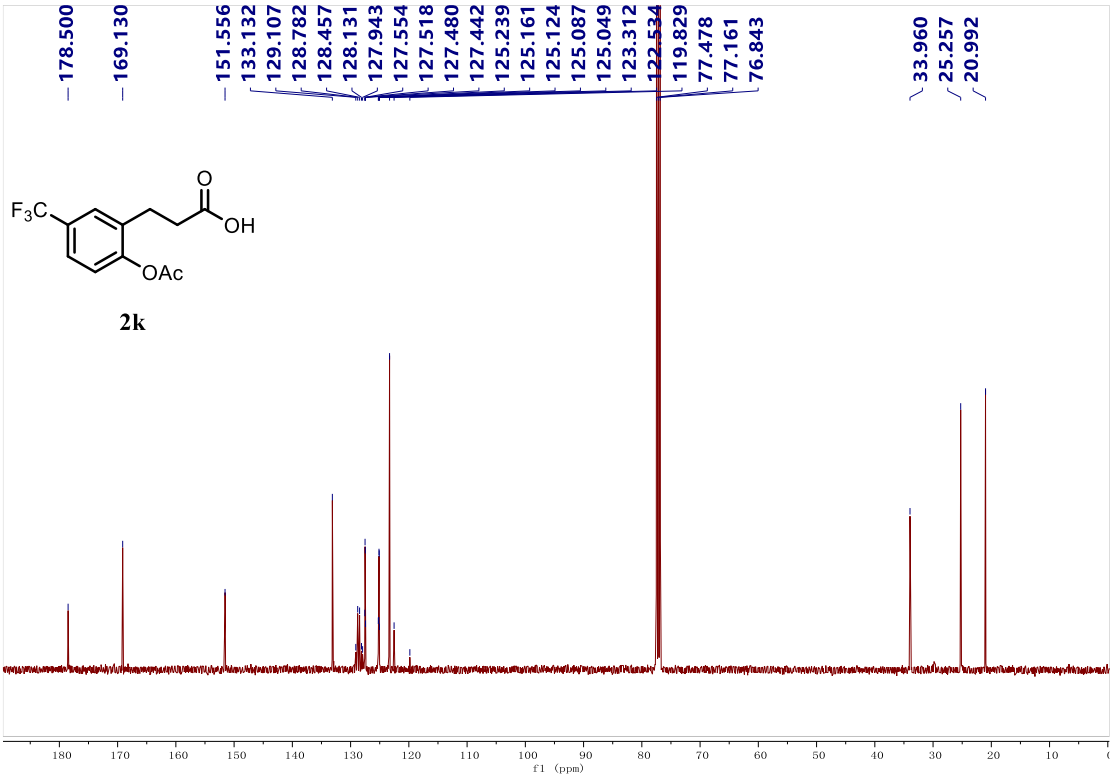
**2i**


7.405
7.399
7.377
7.371
7.356
7.350
7.260
6.947
6.926
2.851
2.832
2.812
2.647
2.627
2.608
2.324
Br
O
OH
OAc
2j
1.96
0.99
2.00
1.98
2.99
f1 (ppm)

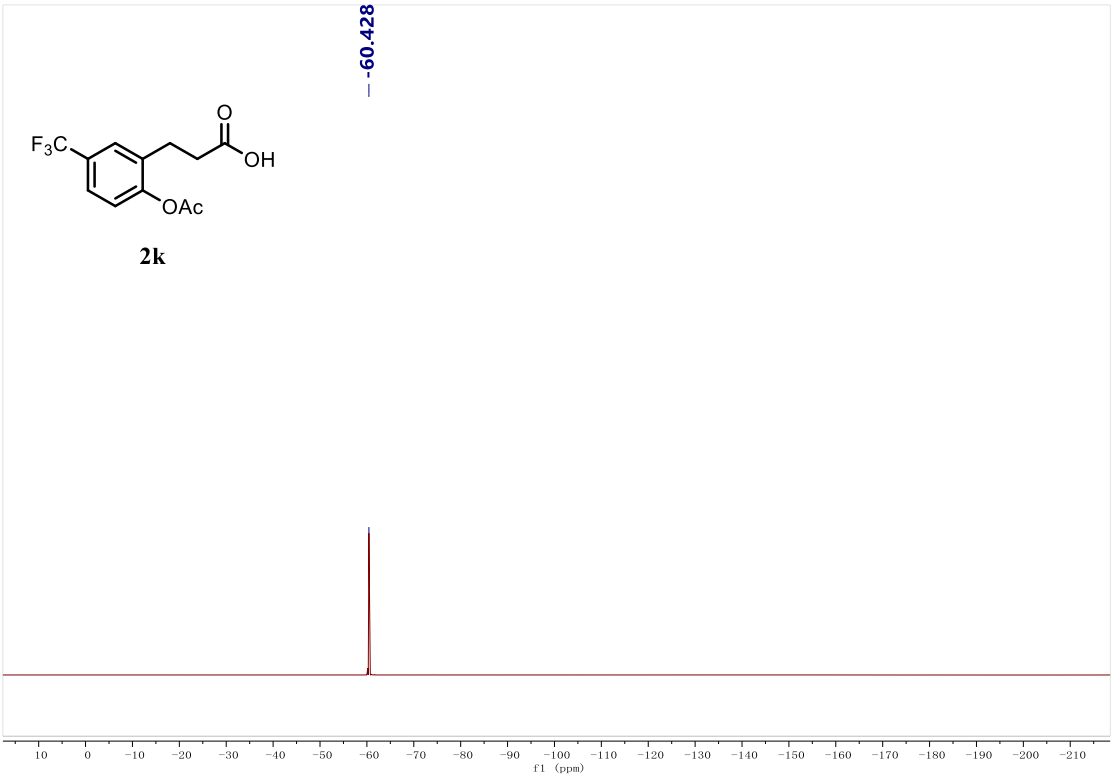

178.357
169.371
148.090
134.411
133.064
130.867
124.376
119.387
77.477
77.160
76.843
34.001
25.125
20.983
Br
O
OH
OAc
2j
f1 (ppm)


7.541
7.517
7.260
7.197
7.176
2.941
2.922
2.903
2.682
2.663
2.644
2.358
O
F3C
OH
OAc
2.08
1.00
2.04
1.98
2.98
f1 (ppm)

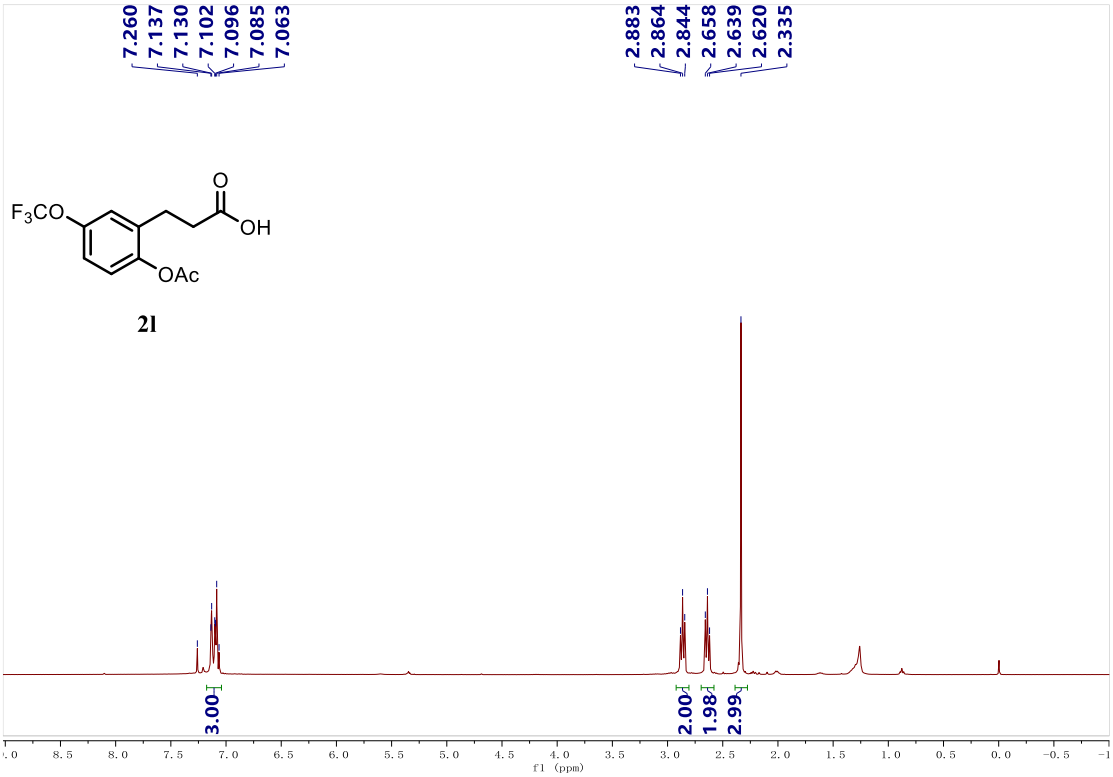
**2k**

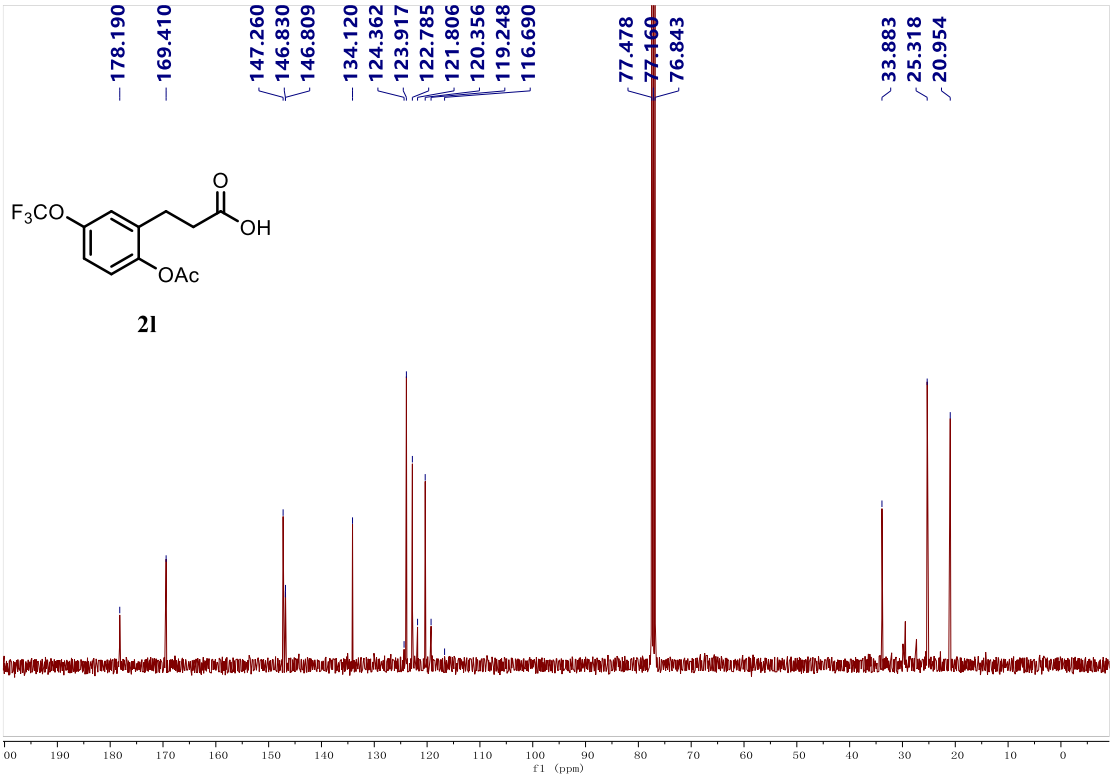

178.500
169.130
151.556
133.132
129.107
128.782
128.457
128.131
127.943
127.554
127.518
127.480
127.442
125.239
125.161
125.124
125.087
125.049
123.312
122.534
119.829
77.478
77.161
76.843
33.960
25.257
20.992
O
F3C
OH
OAc
f1 (ppm)

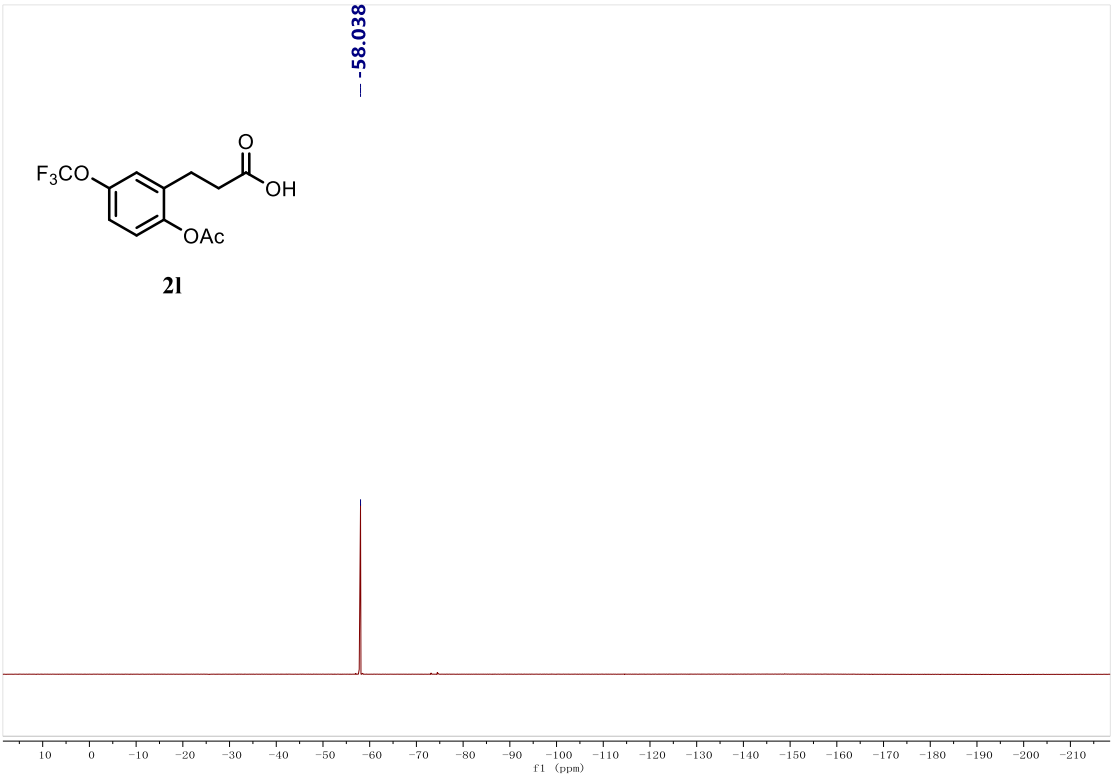
**2k**


-60.428
F3C
O
OH
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

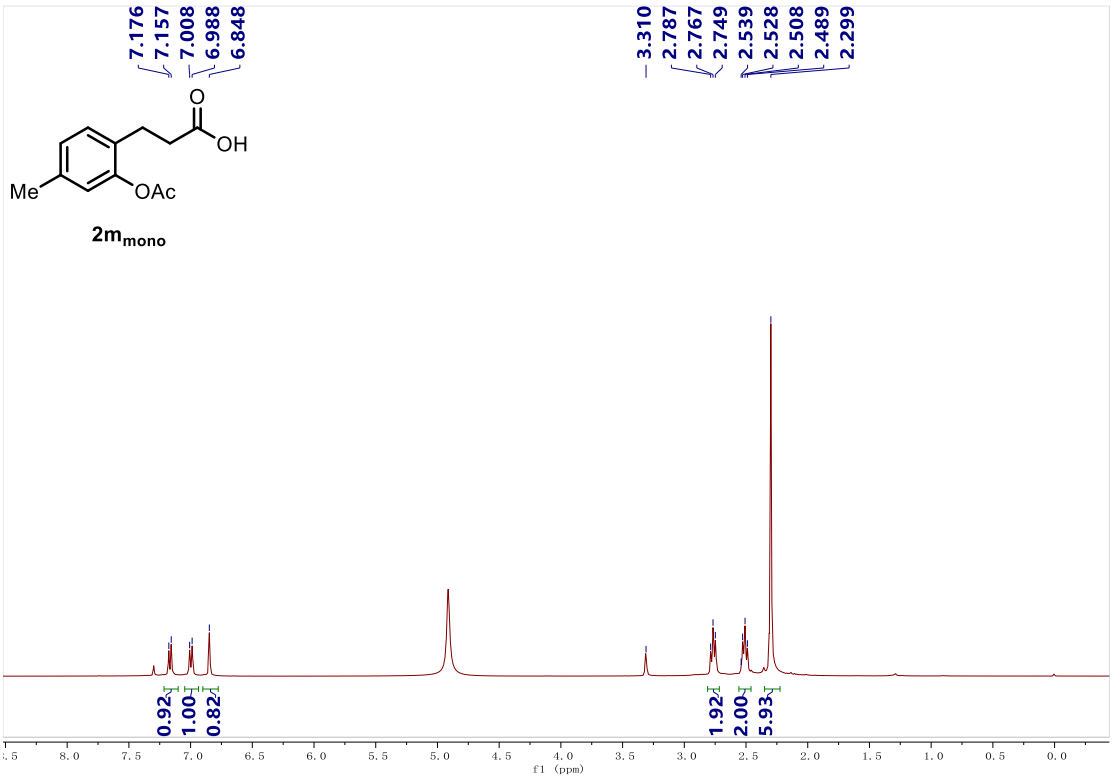
**2k**

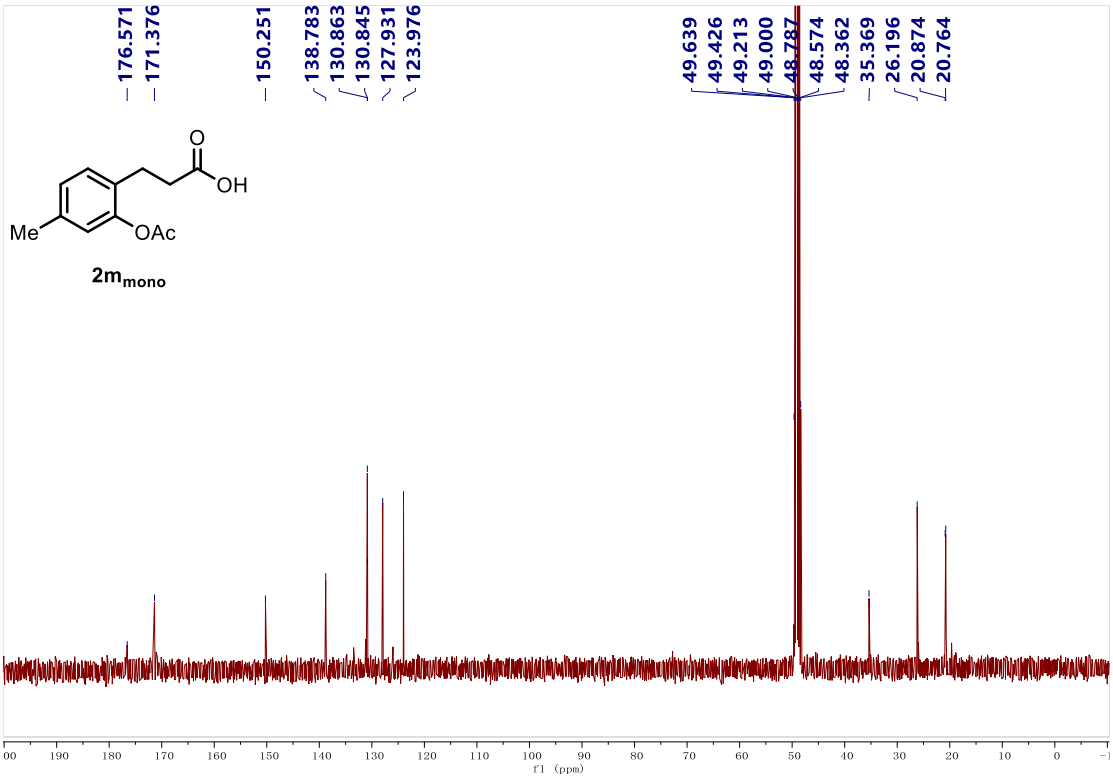

7.260
7.137
7.130
7.102
7.096
7.085
7.063
2.883
2.864
2.844
2.658
2.639
2.620
2.335
O
F3CO
OH
OAc
21
3.00
2.00
1.98
2.99
f1 (ppm)

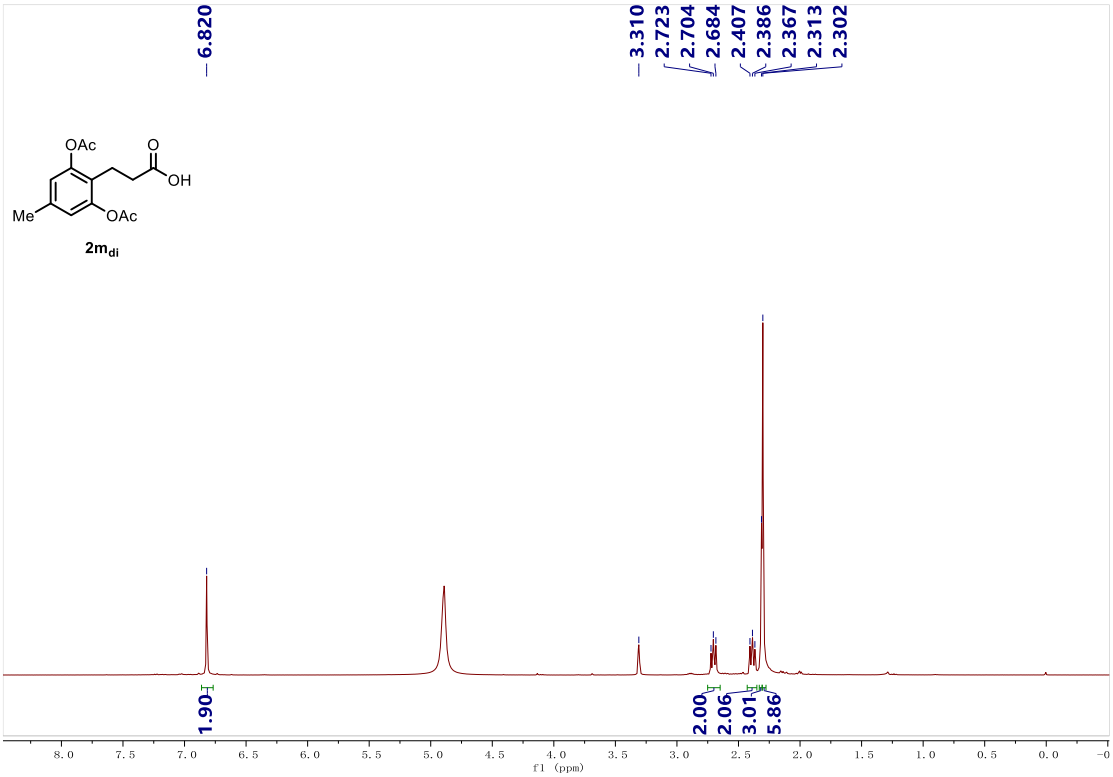

178.190
169.410
147.260
146.830
146.809
134.120
124.362
123.917
122.785
121.806
120.356
119.248
116.690
77.478
77.160
76.843
33.883
25.318
20.954
O
F3CO
OH
OAc
21
f1 (ppm)

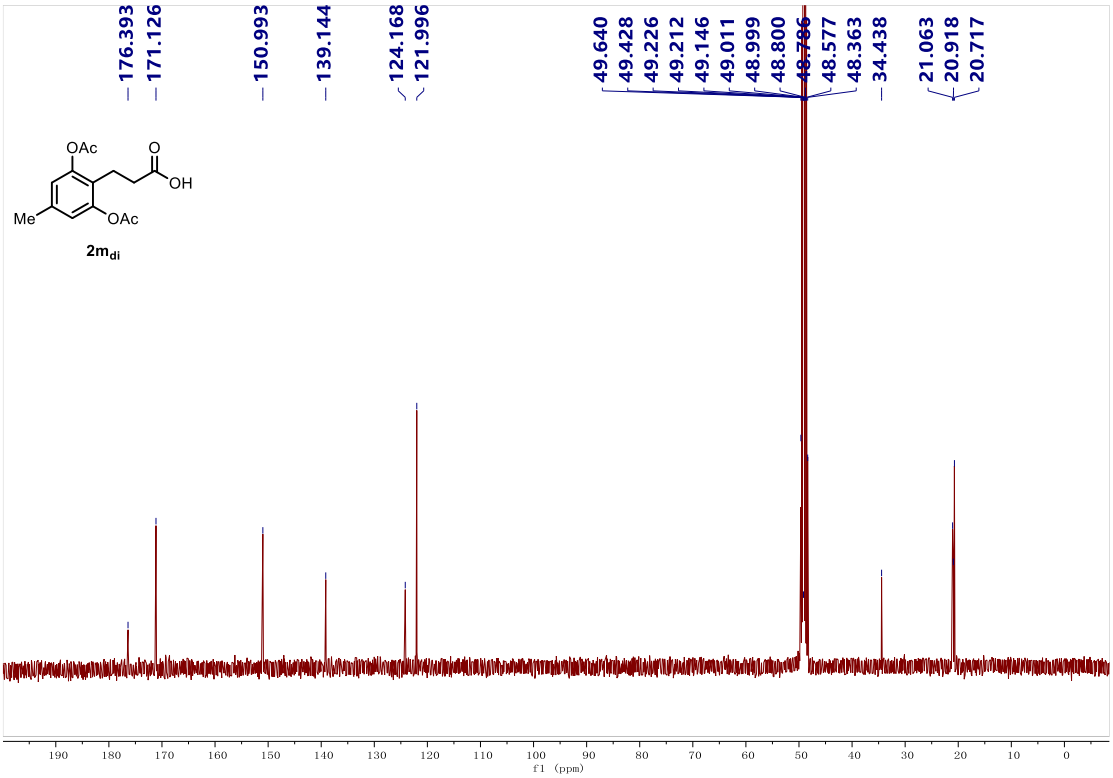

-58.038
F3CO
O
OH
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

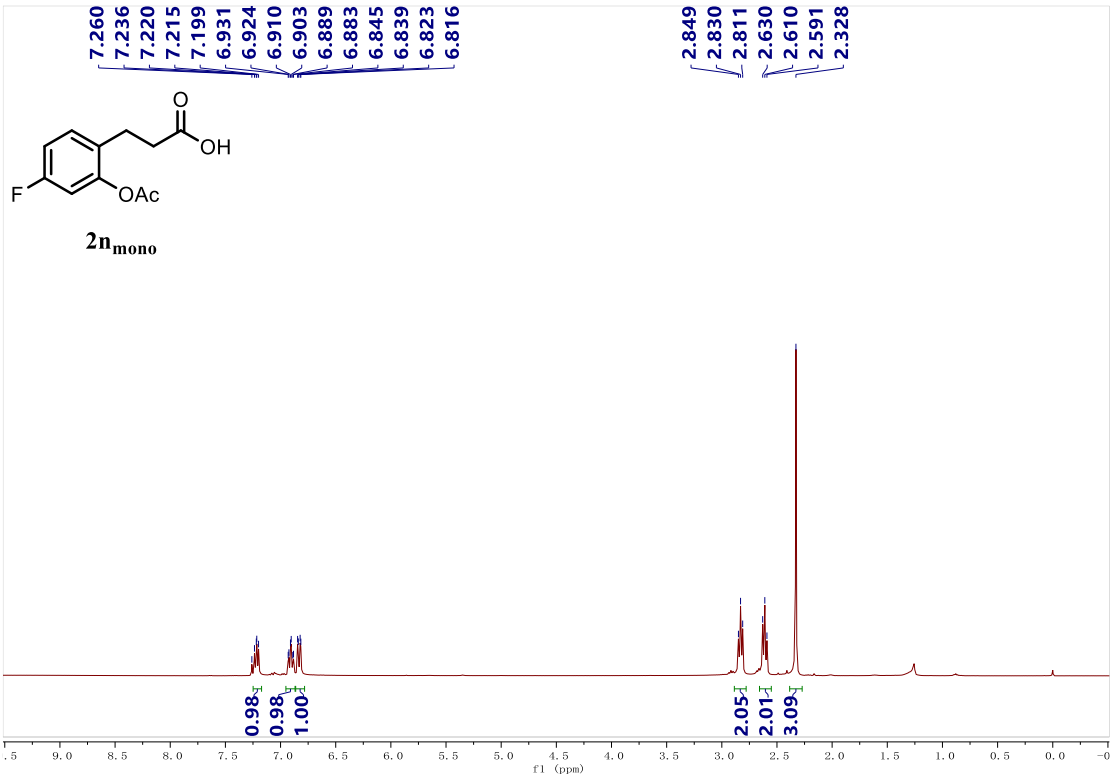
**2l**


7.176
7.157
7.008
6.988
6.848
3.310
2.787
2.767
2.749
2.539
2.528
2.508
2.489
2.299
O
OH
Me
OAc
2m mono
0.92
1.00
0.82
1.92
2.00
5.93
f1 (ppm)

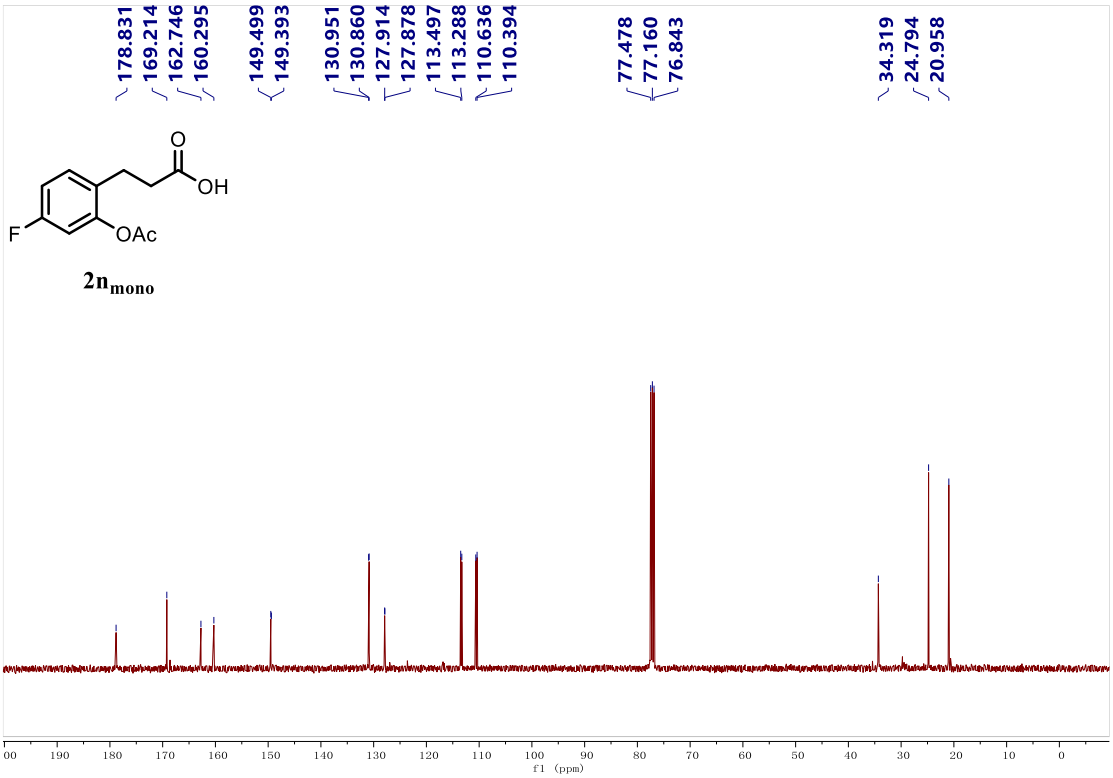

176.571
171.376
150.251
138.783
130.863
130.845
127.931
123.976
49.639
49.426
49.213
49.000
48.787
48.574
48.362
35.369
26.196
20.874
20.764
O
OH
Me
OAc
2m mono
f1 (ppm)


6.820
3.310
2.723
2.704
2.684
2.407
2.386
2.367
2.313
2.302
OAc
O
OH
Me
OAc
2m_di
1.90
2.00
2.06
3.01
5.86
f1 (ppm)

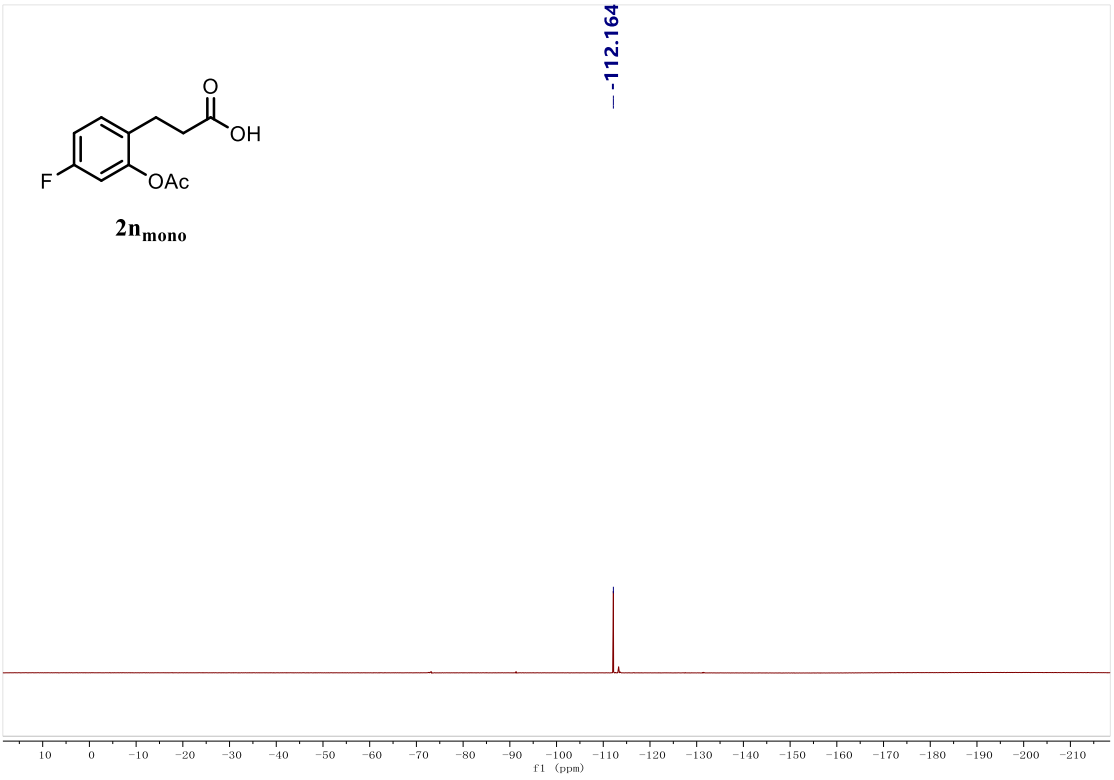

176.393
171.126
150.993
139.144
124.168
121.996
49.640
49.428
49.226
49.212
49.146
49.011
48.999
48.800
48.786
48.577
48.363
34.438
21.063
20.918
20.717
OAc
O
OH
Me
OAc
2m_di
f1 (ppm)



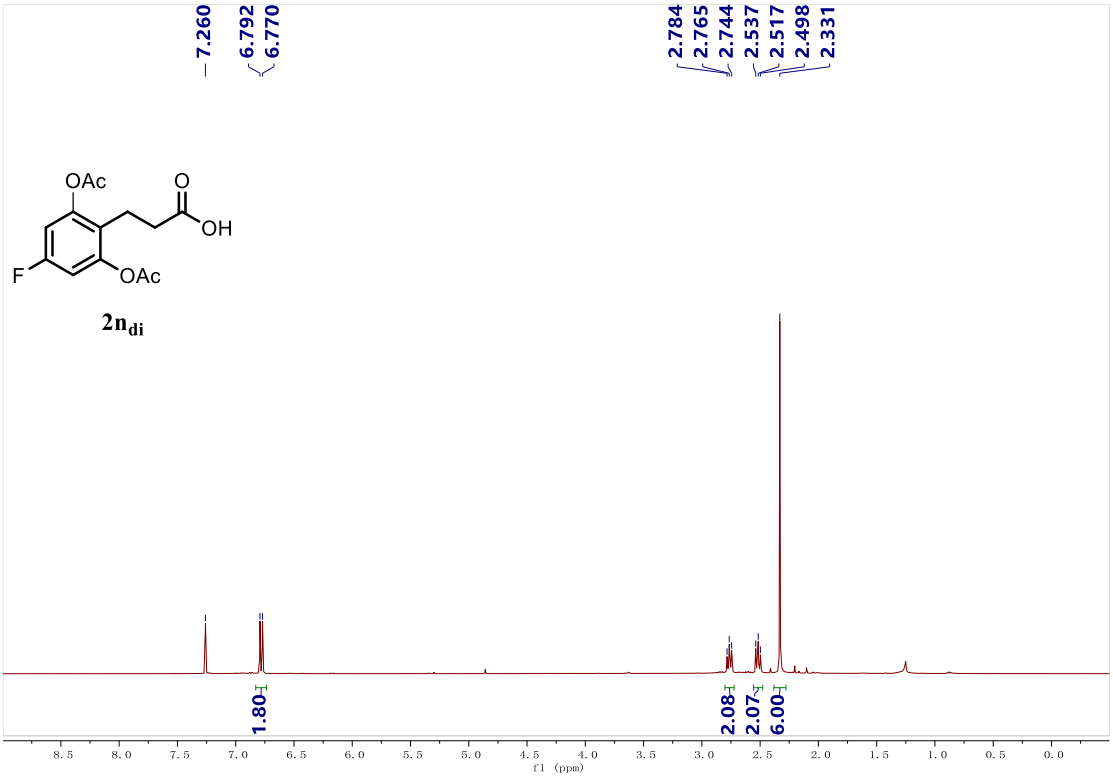

**2n$_{mono}$**



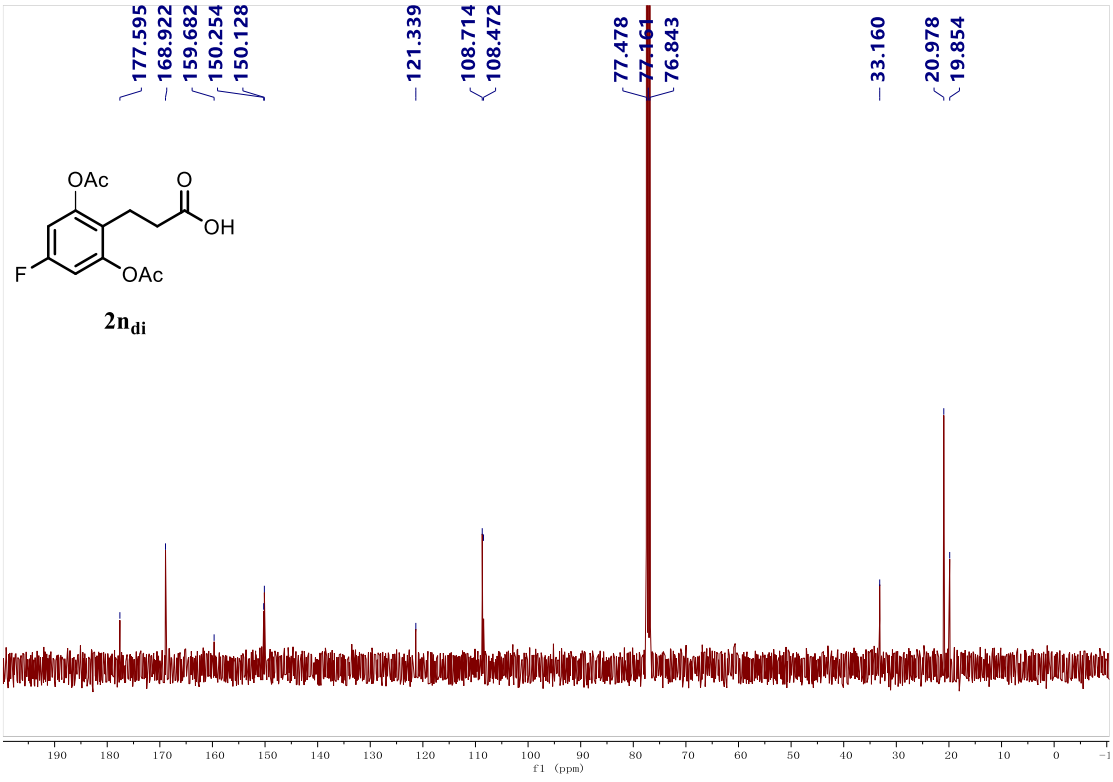

**2n$_{mono}$**


-112.164
O
OH
F
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

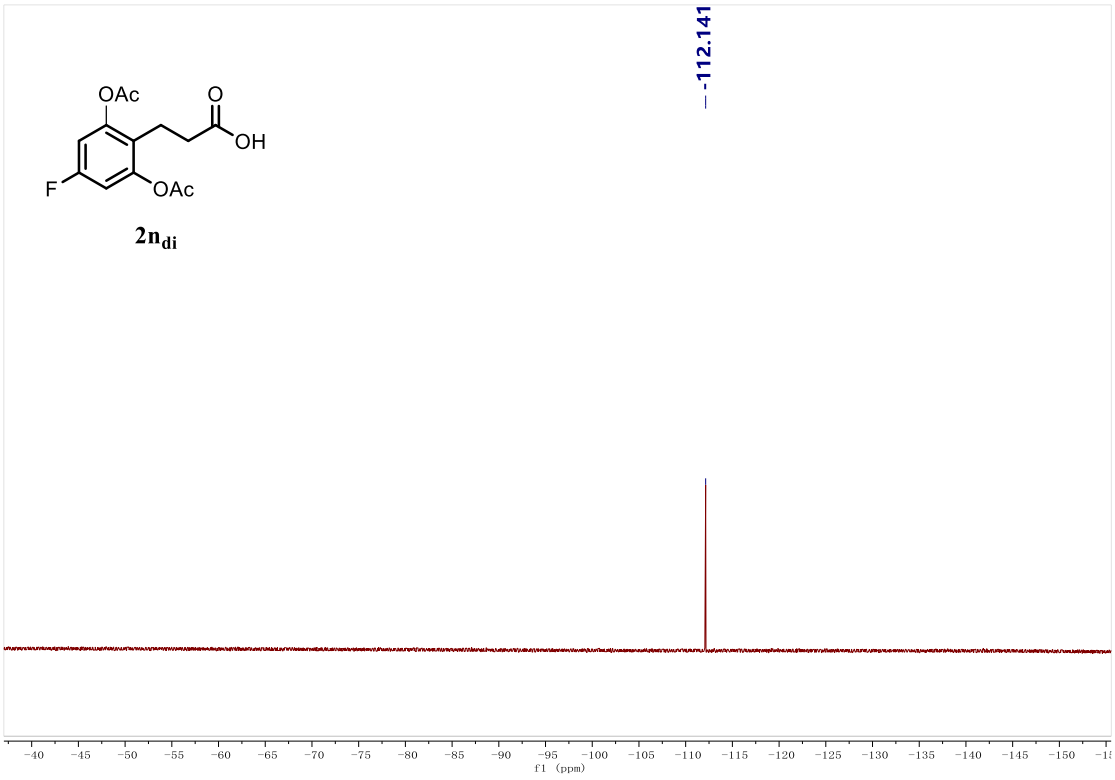
**2n$_{mono}$**


7.260
6.792
6.770
2.784
2.765
2.744
2.537
2.517
2.498
2.331
OAc
O
OH
F
OAc
1.80
2.08
2.07
6.00
f1 (ppm)

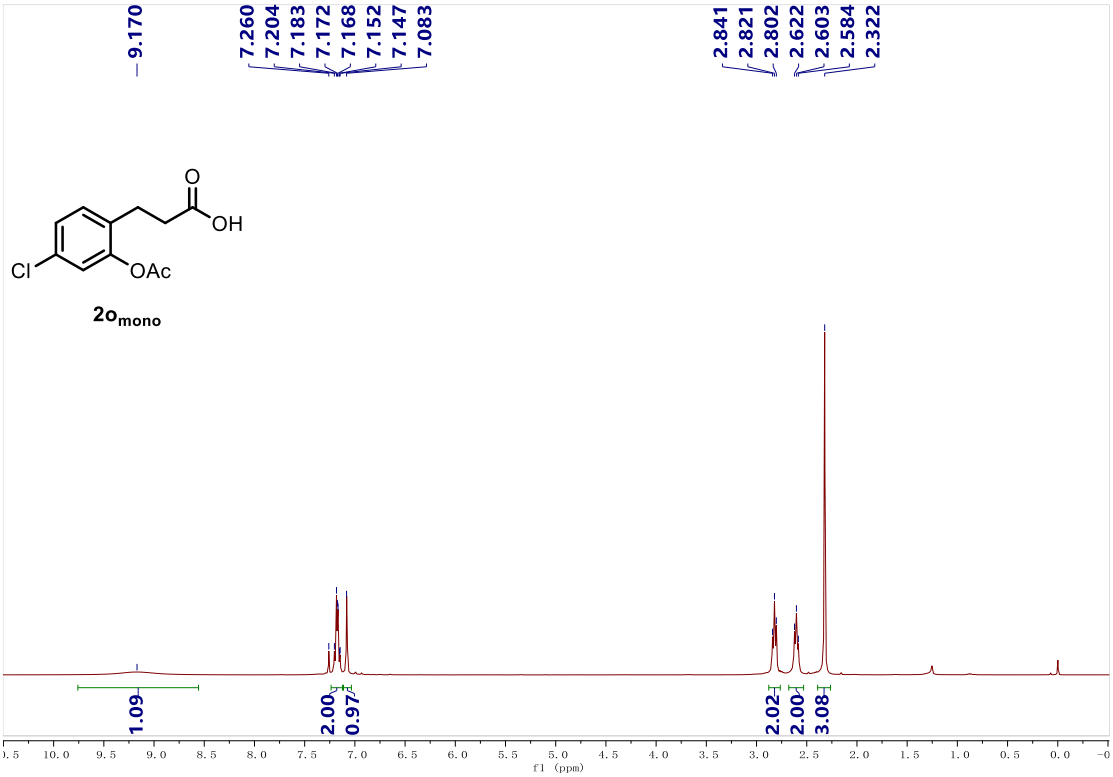
**2n$_{di}$**

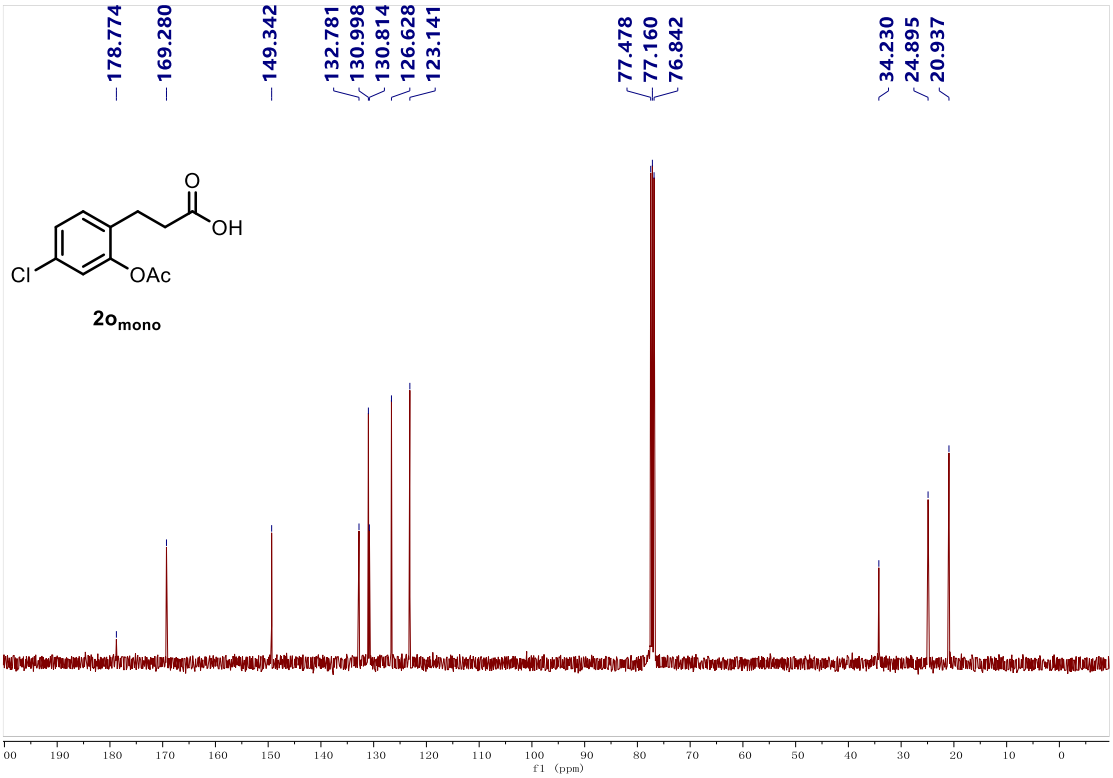

177.595
168.922
159.682
150.254
150.128
121.339
108.714
108.472
77.478
77.161
76.843
33.160
20.978
19.854
OAc
O
OH
F
OAc
f1 (ppm)

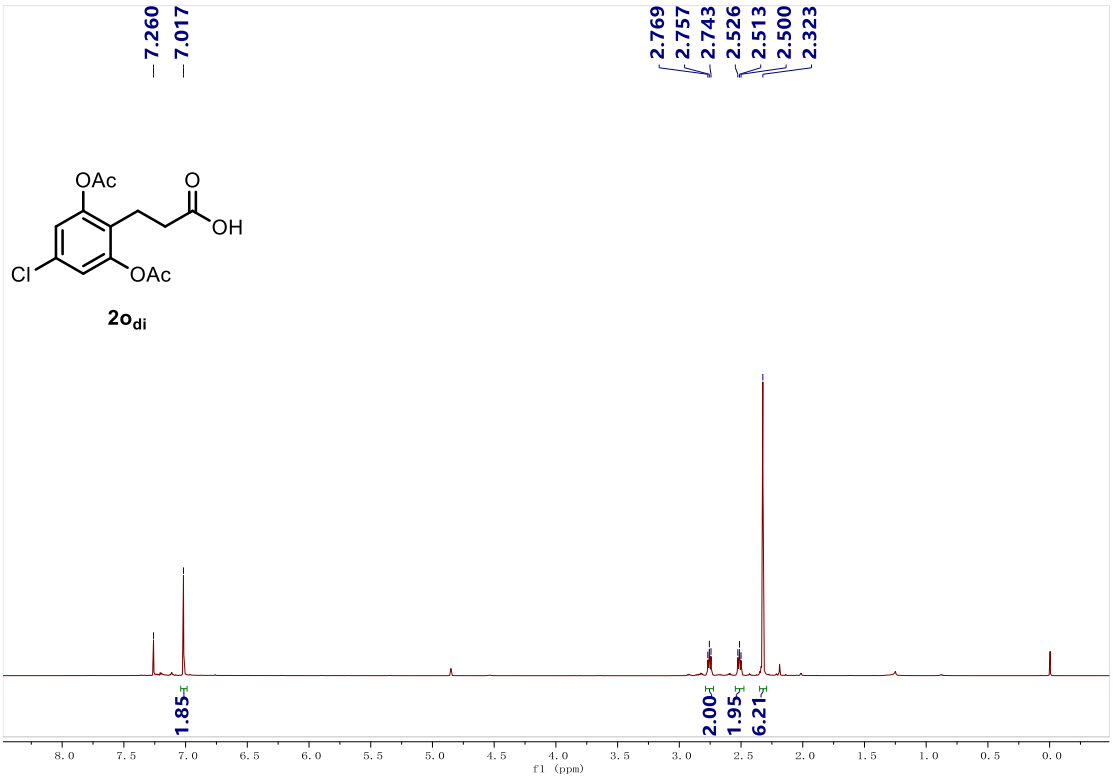
**2n$_{di}$**


OAc
O
OH
F
OAc
-112.141
−40 −45 −50 −55 −60 −65 −70 −75 −80 −85 −90 −95 −100 −105 −110 −115 −120 −125 −130 −135 −140 −145 −150
f1 (ppm)

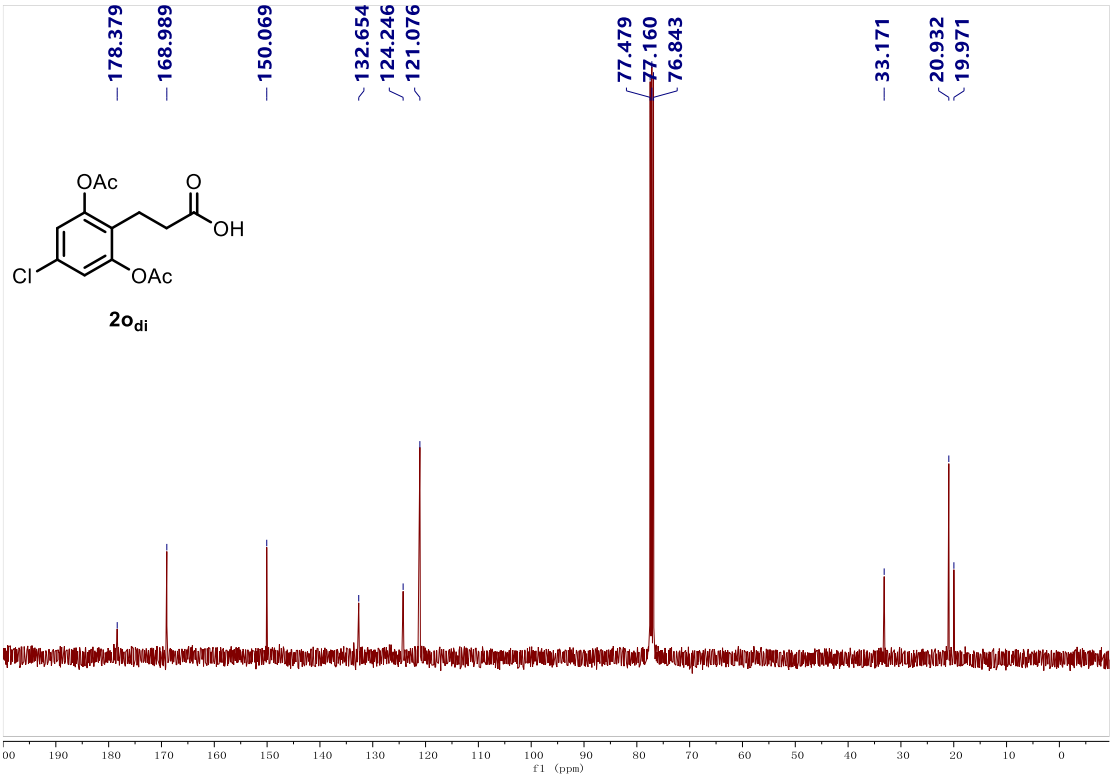
**$2n_{di}$**


9.170
7.260
7.204
7.183
7.172
7.168
7.152
7.147
7.083
2.841
2.821
2.802
2.622
2.603
2.584
2.322
O
OH
Cl
OAc
2o mono
1.09
2.00
0.97
2.02
2.00
3.08
f1 (ppm)

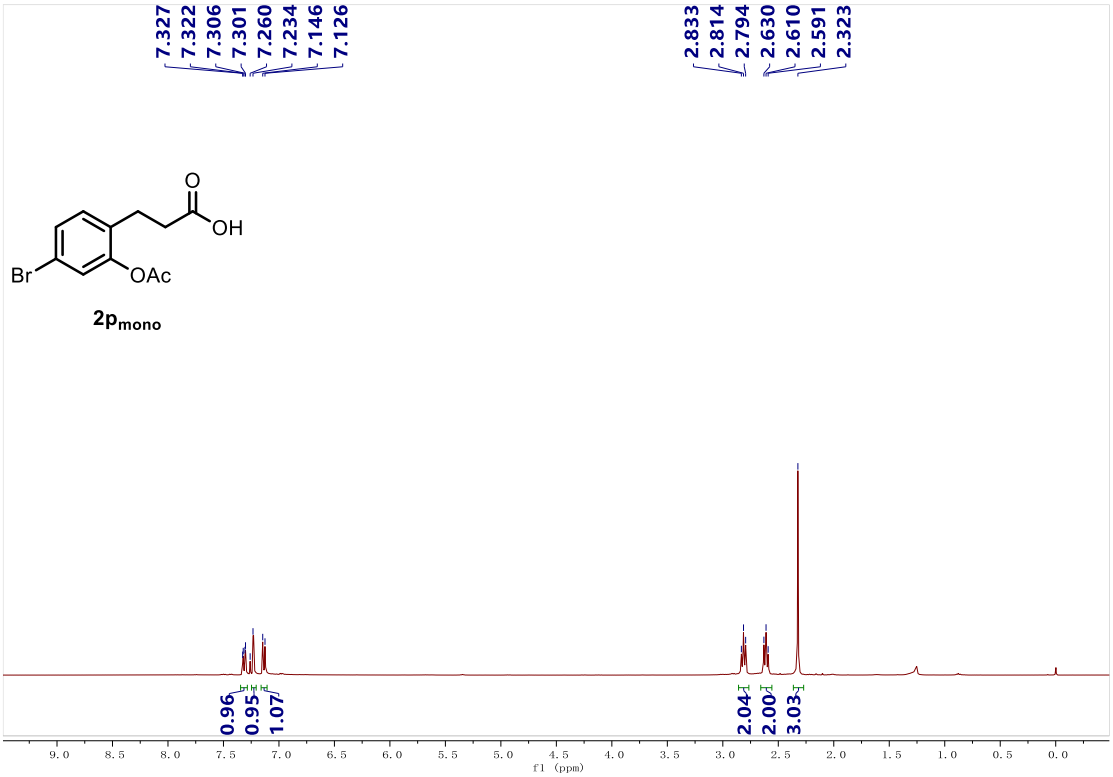

178.774
169.280
149.342
132.781
130.998
130.814
126.628
123.141
77.478
77.160
76.842
34.230
24.895
20.937
O
OH
Cl
OAc
2o mono
f1 (ppm)

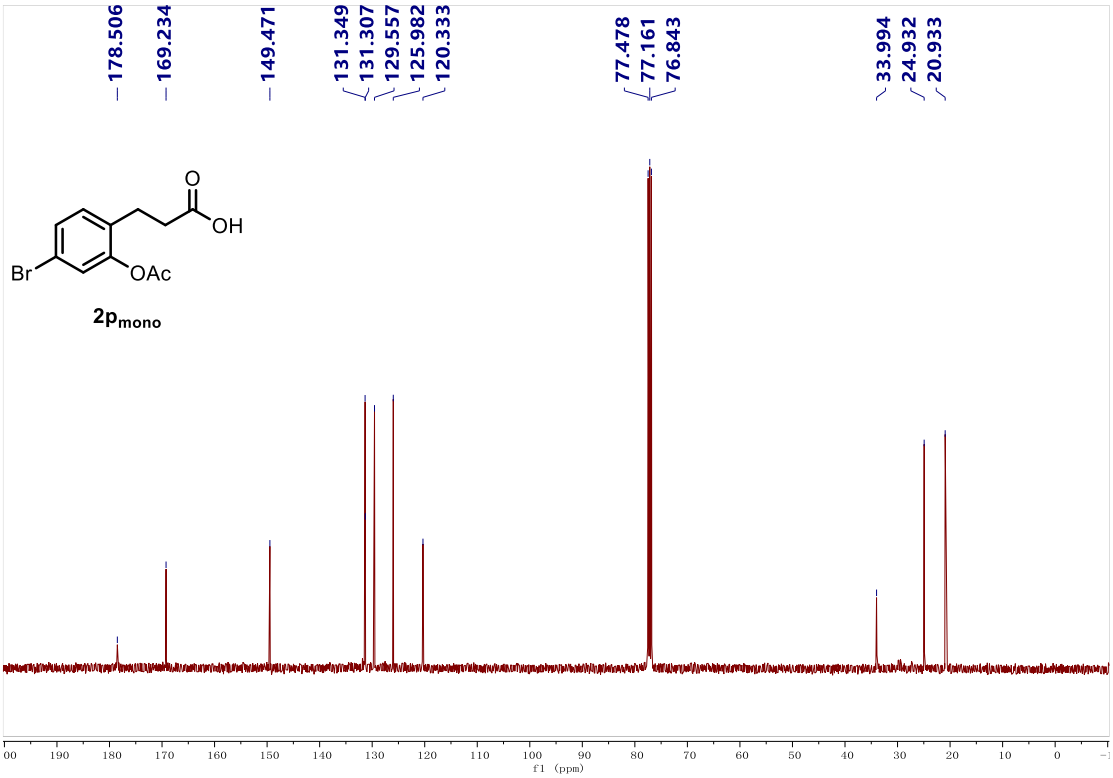

7.260
7.017
2.769
2.757
2.743
2.526
2.513
2.500
2.323
OAc
O
OH
Cl
OAc
1.85
2.00
1.95
6.21
f1 (ppm)

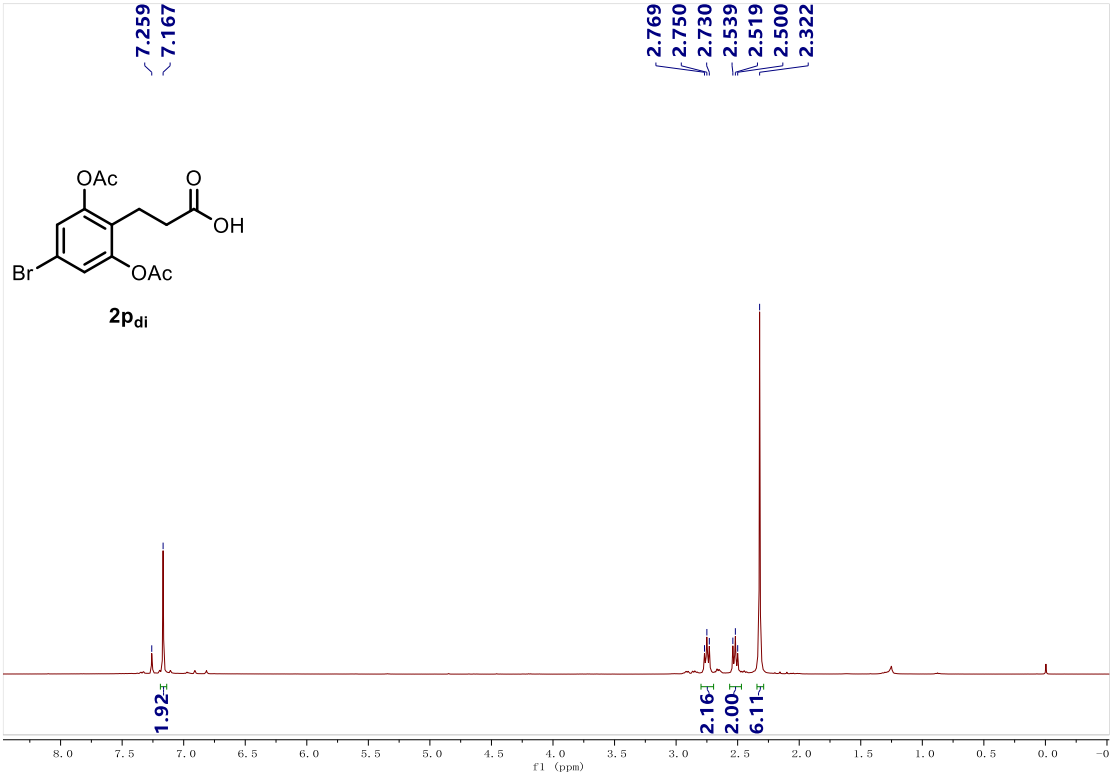
**2o$_{di}$**


178.379
168.989
150.069
132.654
124.246
121.076
77.479
77.160
76.843
33.171
20.932
19.971
OAc
O
OH
Cl
OAc
f1 (ppm)

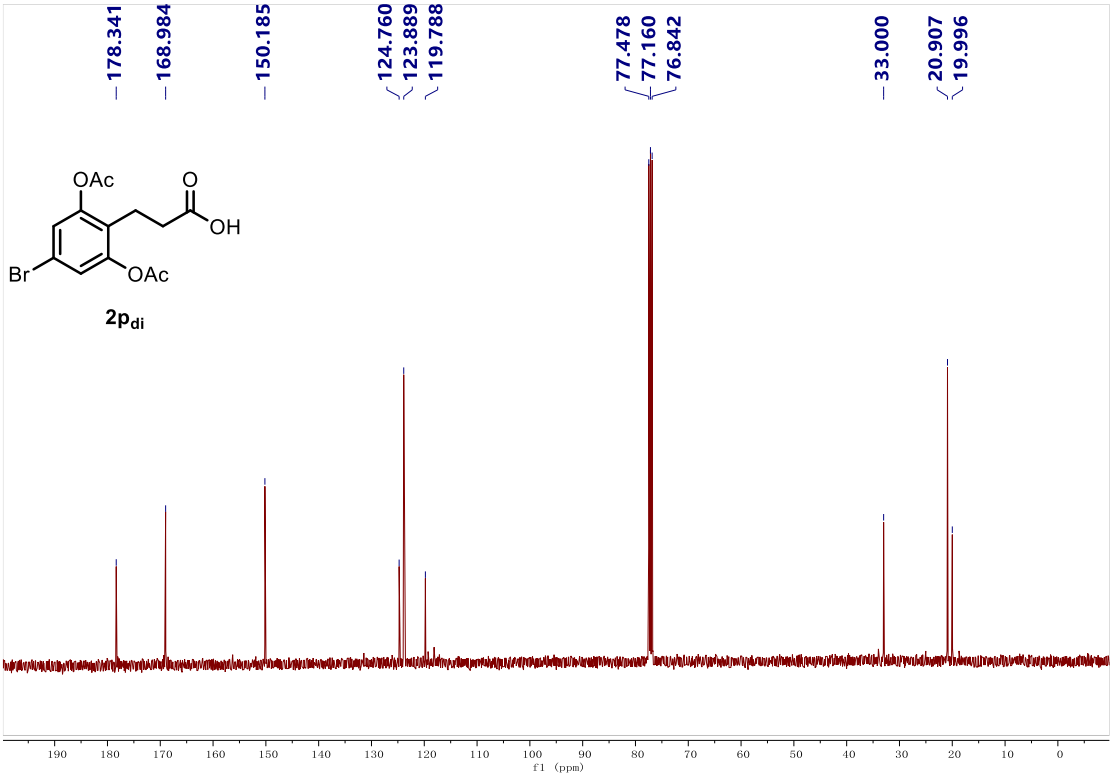
**2o$_{di}$**


7.327
7.322
7.306
7.301
7.260
7.234
7.146
7.126
2.833
2.814
2.794
2.630
2.610
2.591
2.323
O
OH
Br
OAc
2p mono
0.96
0.95
1.07
2.04
2.00
3.03
f1 (ppm)

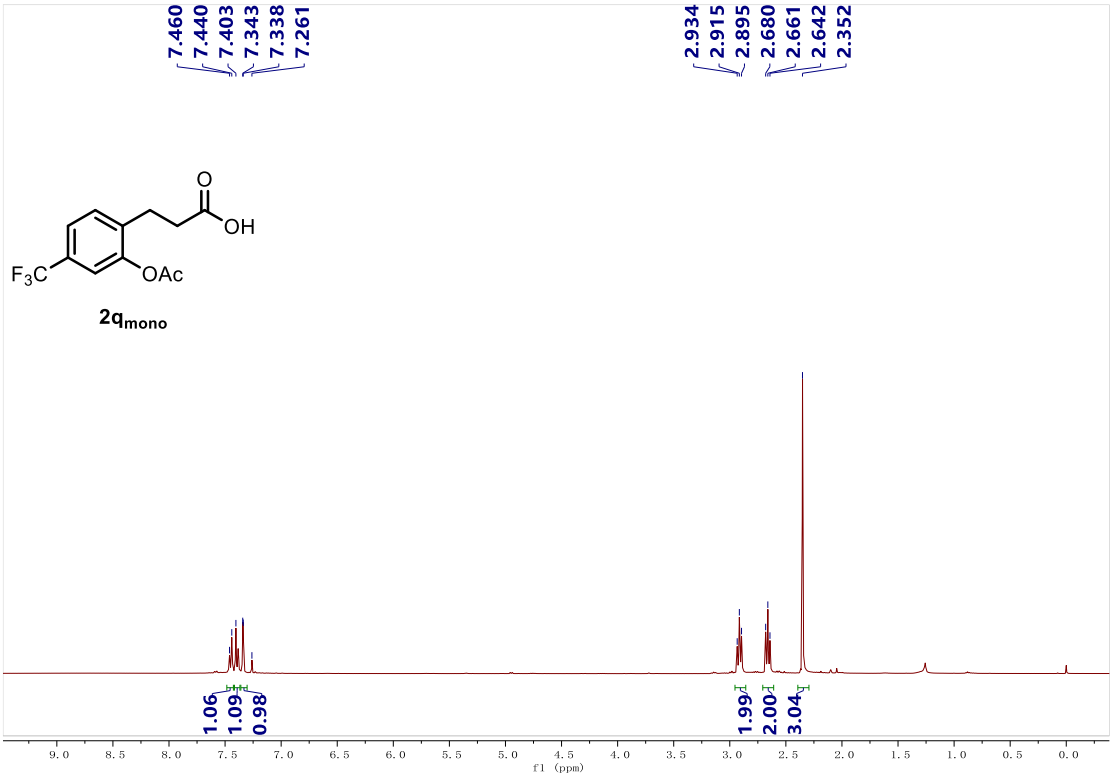

178.506
169.234
149.471
131.349
131.307
129.557
125.982
120.333
77.478
77.161
76.843
33.994
24.932
20.933
O
OH
Br
OAc
2p mono
f1 (ppm)

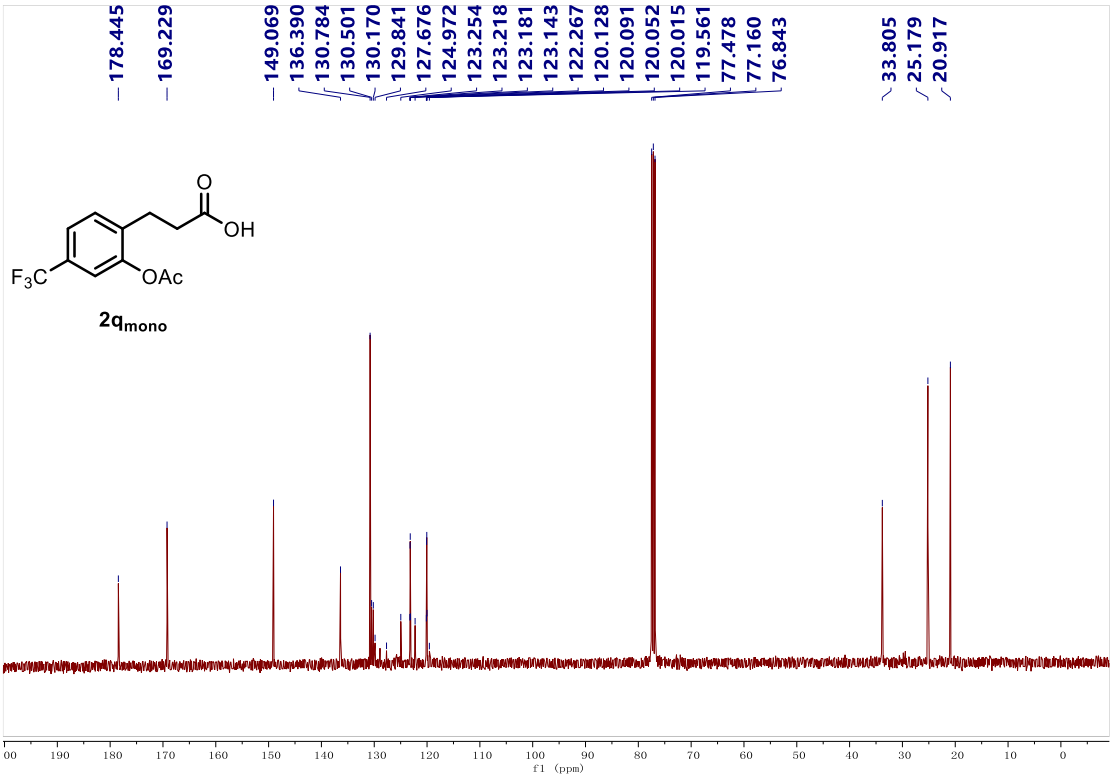

7.259
7.167
2.769
2.750
2.730
2.539
2.519
2.500
2.322
OAc
O
OH
Br
OAc
1.92
2.16
2.00
6.11
f1 (ppm)

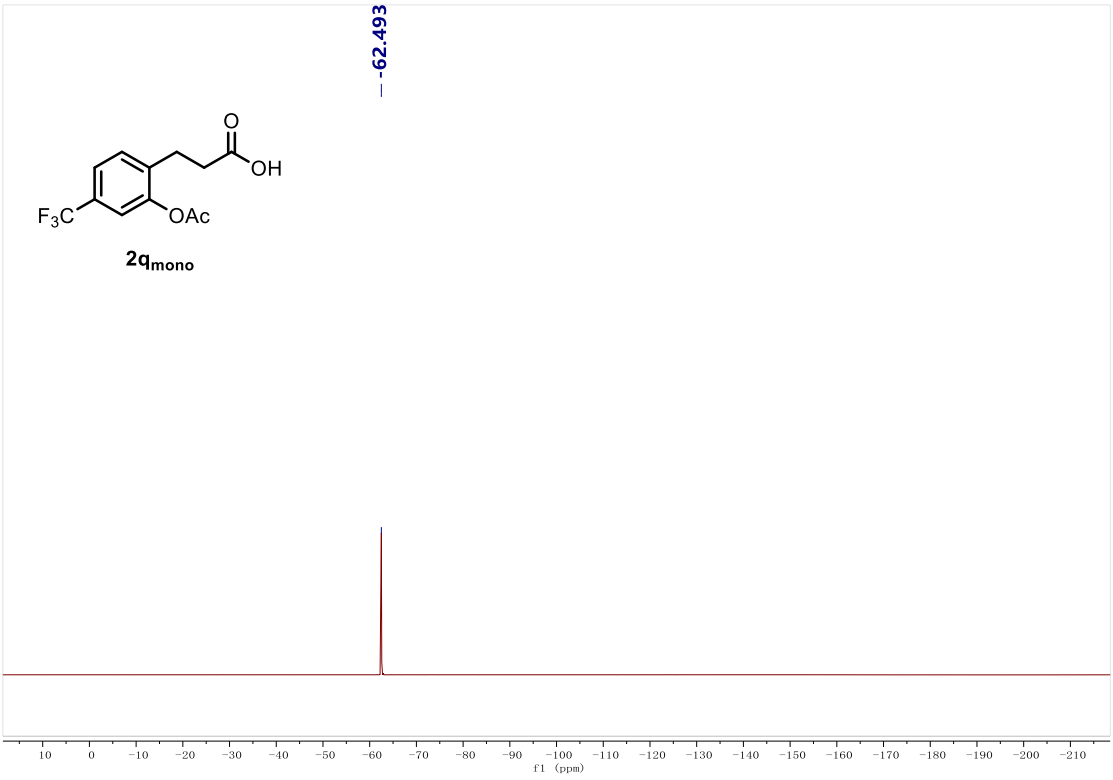
**2p$_{di}$**

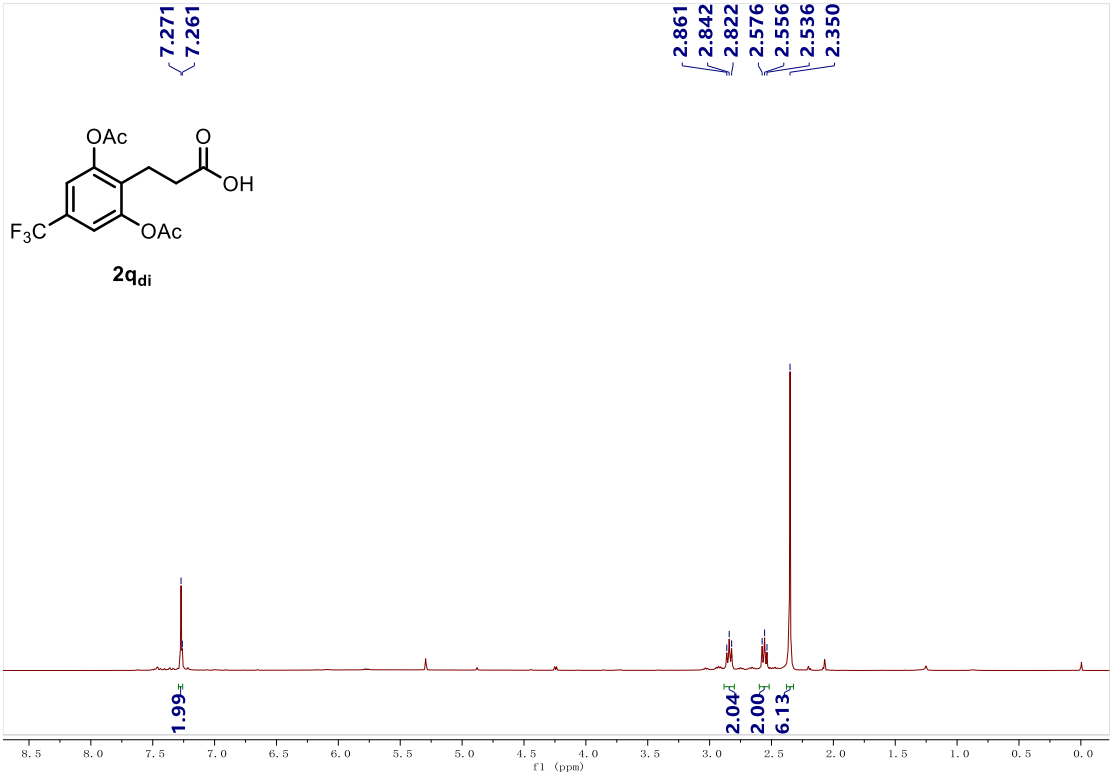

178.341
168.984
150.185
124.760
123.889
119.788
77.478
77.160
76.842
33.000
20.907
19.996
OAc
O
OH
Br
OAc
f1 (ppm)

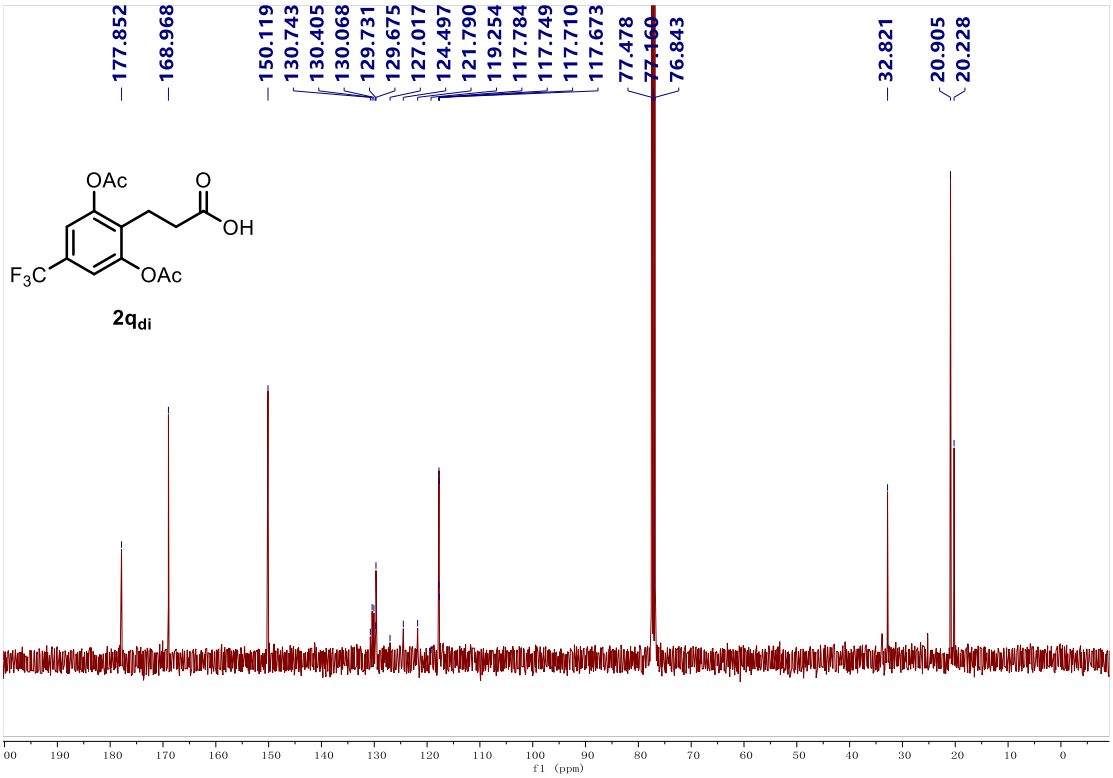
**2p$_{di}$**

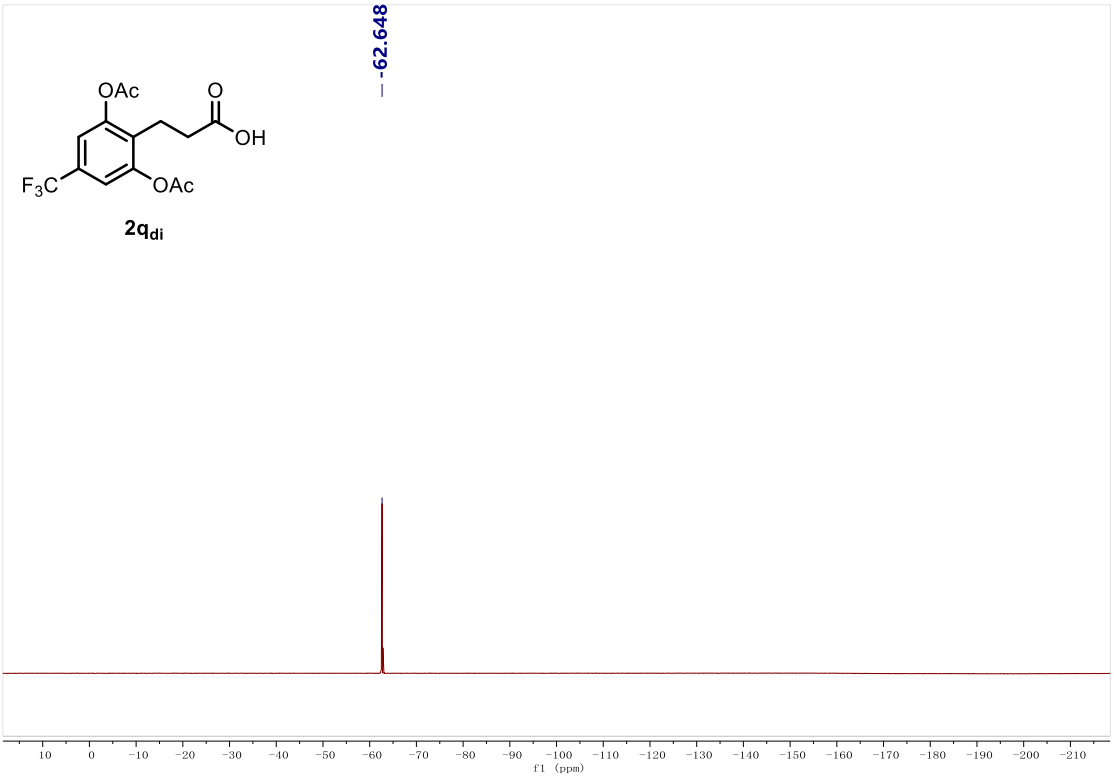

7.460
7.440
7.403
7.343
7.338
7.261
2.934
2.915
2.895
2.680
2.661
2.642
2.352
O
OH
F3C
OAc
2qmono
1.06
1.09
0.98
1.99
2.00
3.04
f1 (ppm)

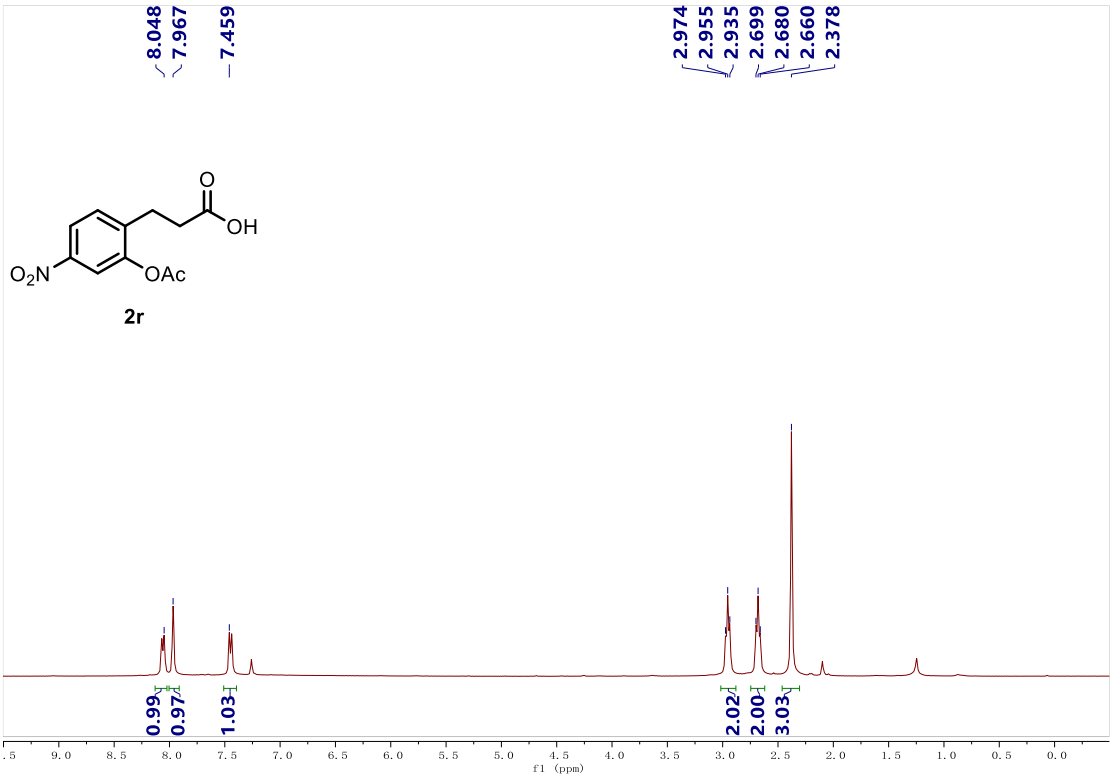

178.445
169.229
149.069
136.390
130.784
130.501
130.170
129.841
127.676
124.972
123.254
123.218
123.181
123.143
122.267
120.128
120.091
120.052
120.015
119.561
77.478
77.160
76.843
33.805
25.179
20.917
O
OH
F3C
OAc
2qmono
f1 (ppm)

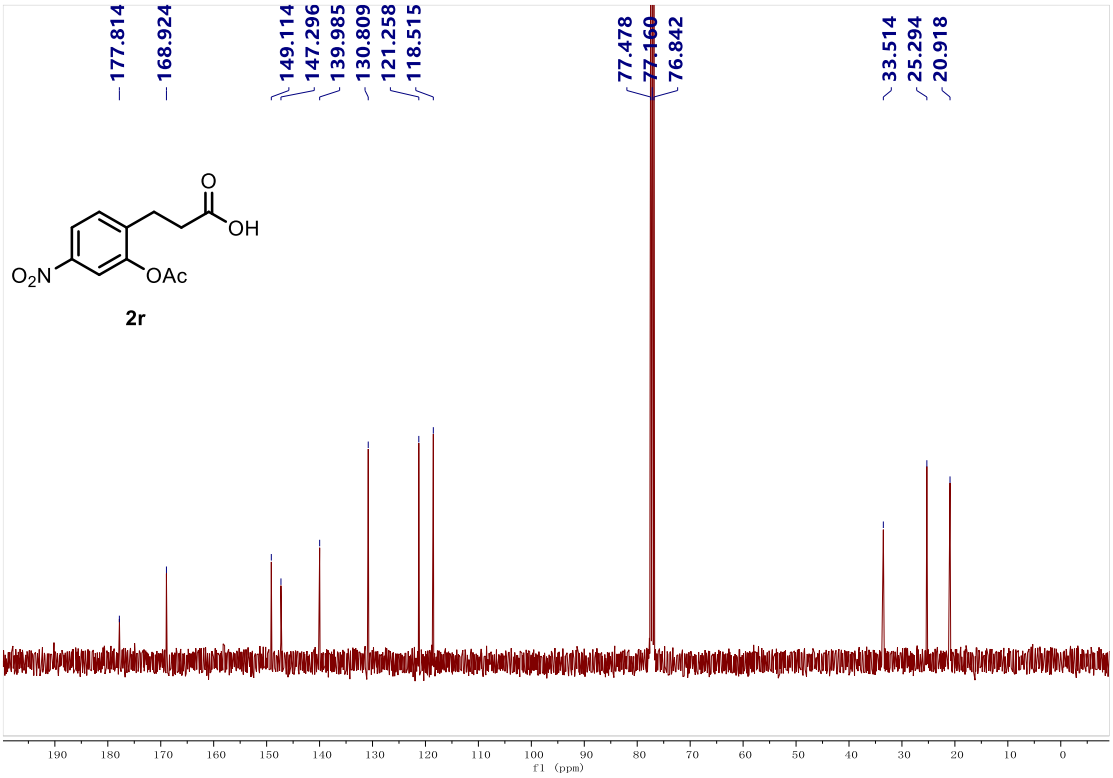

-62.493
O
OH
F3C
OAc
2qmono
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

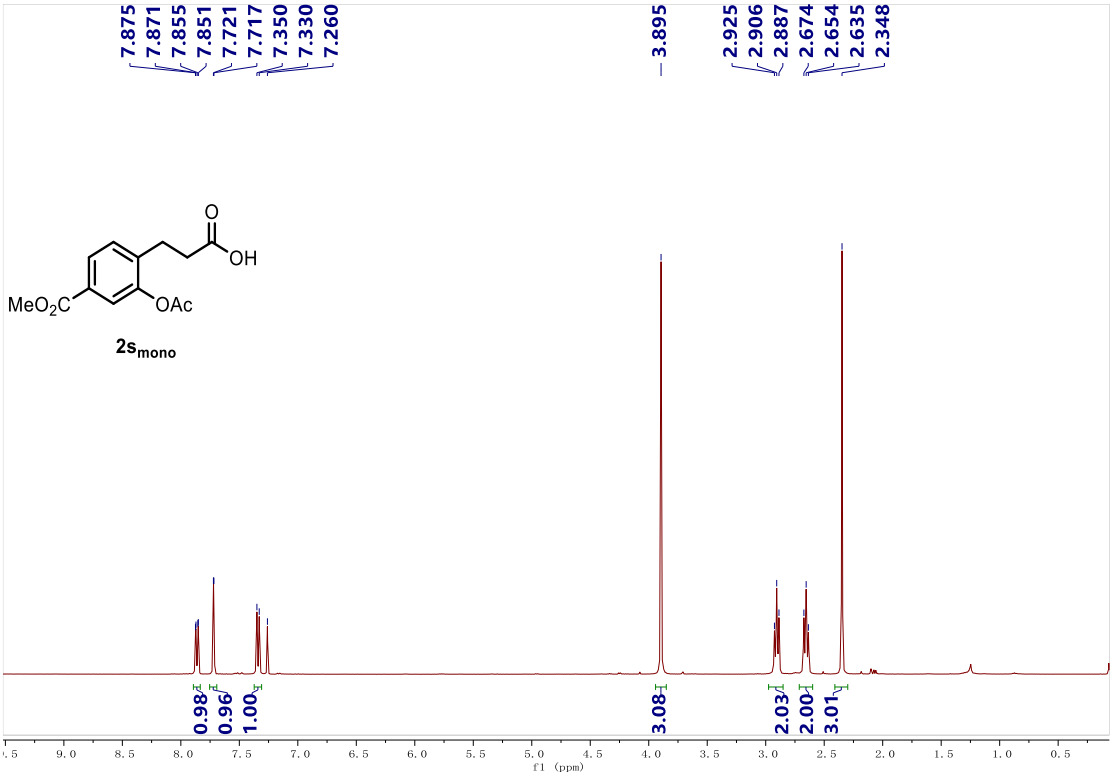

7.271
7.261
2.861
2.842
2.822
2.576
2.556
2.536
2.350
OAc
O
OH
F3C
OAc
2qdi
1.99
2.04
2.00
6.13
f1 (ppm)

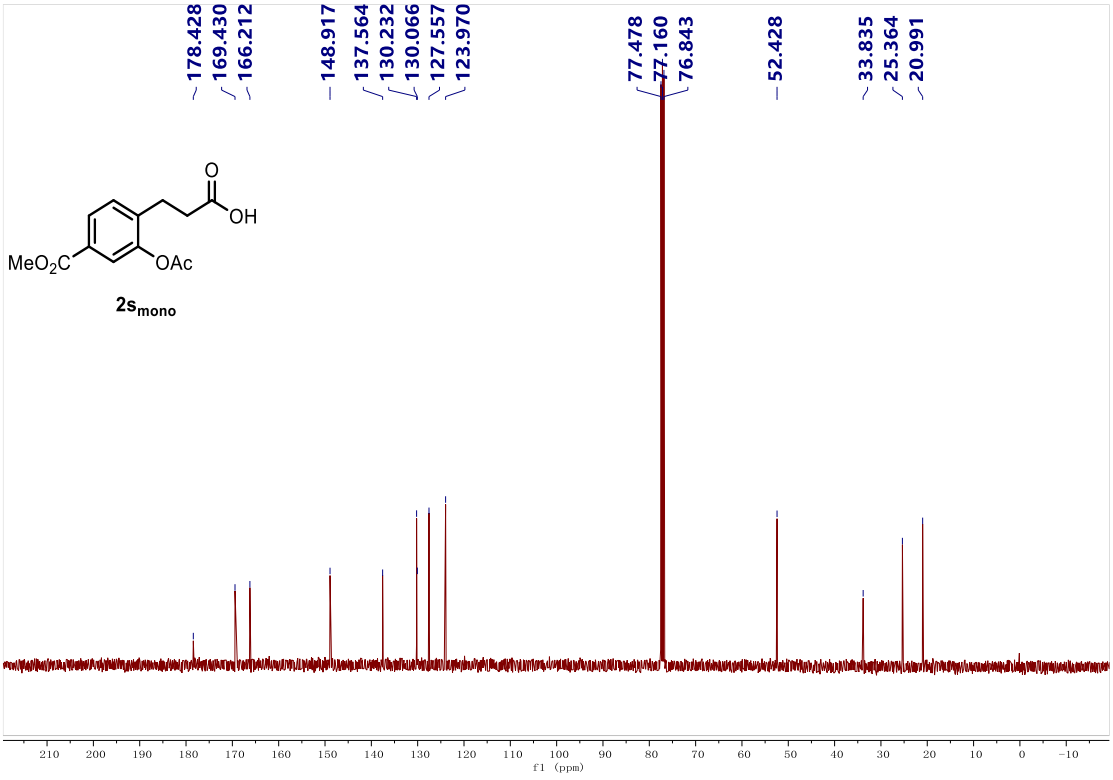

177.852
168.968
150.119
130.743
130.405
130.068
129.731
129.675
127.017
124.497
121.790
119.254
117.784
117.749
117.710
117.673
77.478
77.160
76.843
32.821
20.905
20.228
OAc
O
OH
F3C
OAc
2qdi
f1 (ppm)

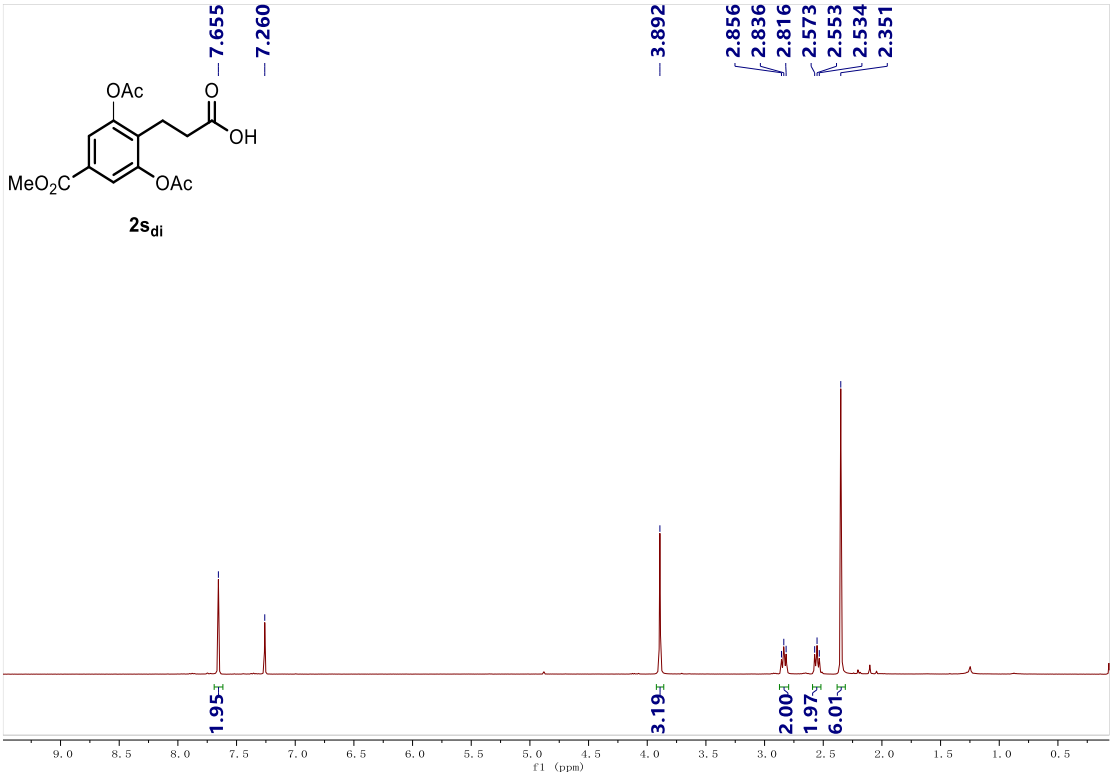

-62.648
OAc
O
OH
F3C
OAc
2qdi
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)


8.048
7.967
7.459
2.974
2.955
2.935
2.699
2.680
2.660
2.378
O
OH
O2N
OAc
2r
0.99
0.97
1.03
2.02
2.00
3.03
f1 (ppm)

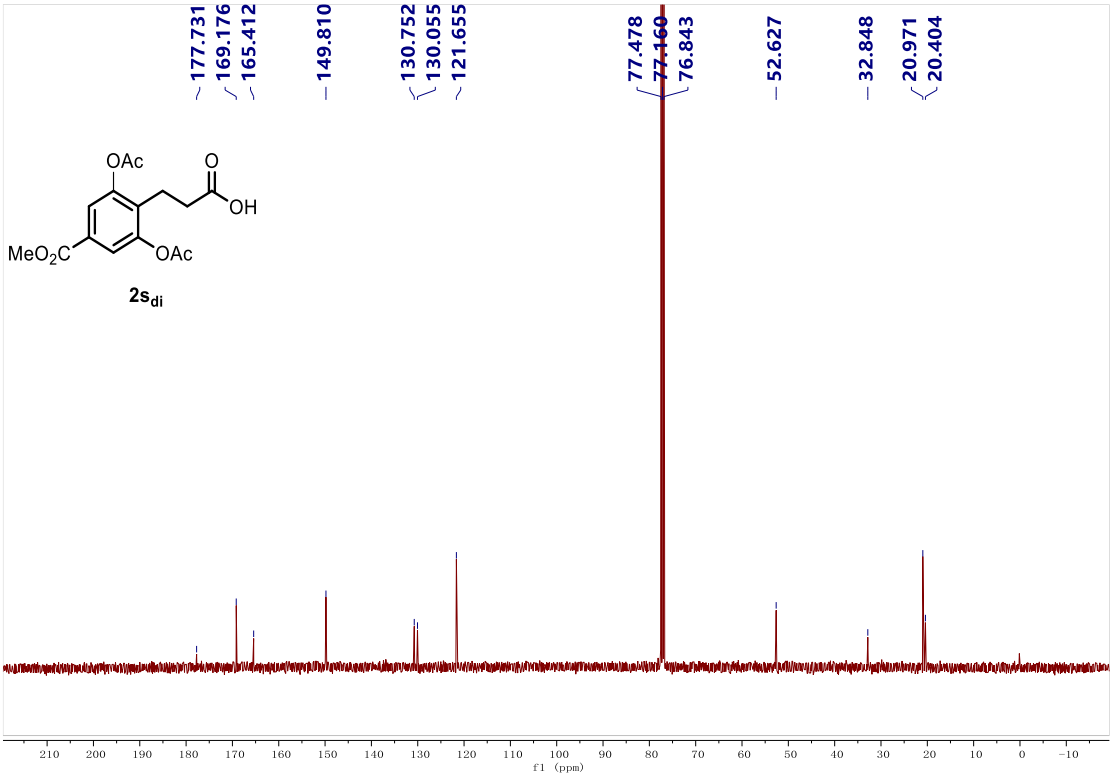

177.814
168.924
149.114
147.296
139.985
130.809
121.258
118.515
77.478
77.160
76.842
33.514
25.294
20.918
O
OH
O2N
OAc
2r
f1 (ppm)


7.875
7.871
7.855
7.851
7.721
7.717
7.350
7.330
7.260
3.895
2.925
2.906
2.887
2.674
2.654
2.635
2.348
O
OH
MeO2C
OAc
2smono
0.98
0.96
1.00
3.08
2.03
2.00
3.01
f1 (ppm)

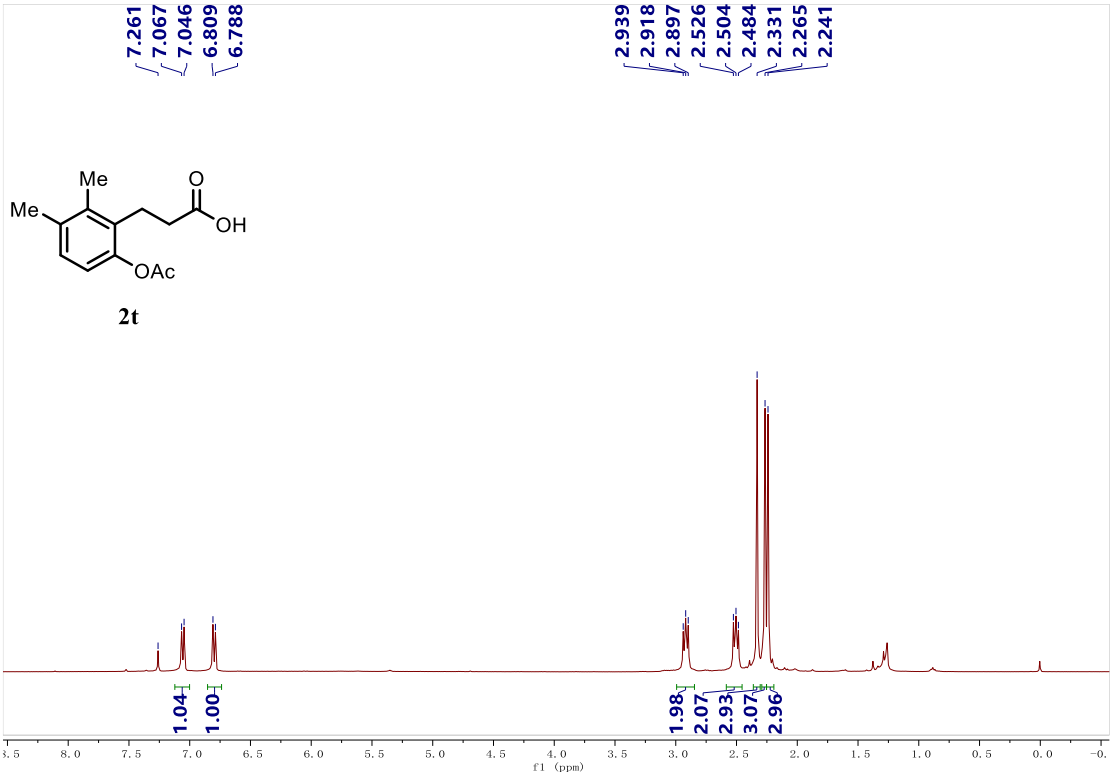

178.428
169.430
166.212
148.917
137.564
130.232
130.066
127.557
123.970
77.478
77.160
76.843
52.428
33.835
25.364
20.991
O
OH
MeO2C
OAc
2smono
f1 (ppm)


7.655
7.260
3.892
2.856
2.836
2.816
2.573
2.553
2.534
2.351
OAc
O
OH
MeO2C
OAc
1.95
3.19
2.00
1.97
6.01
f1 (ppm)

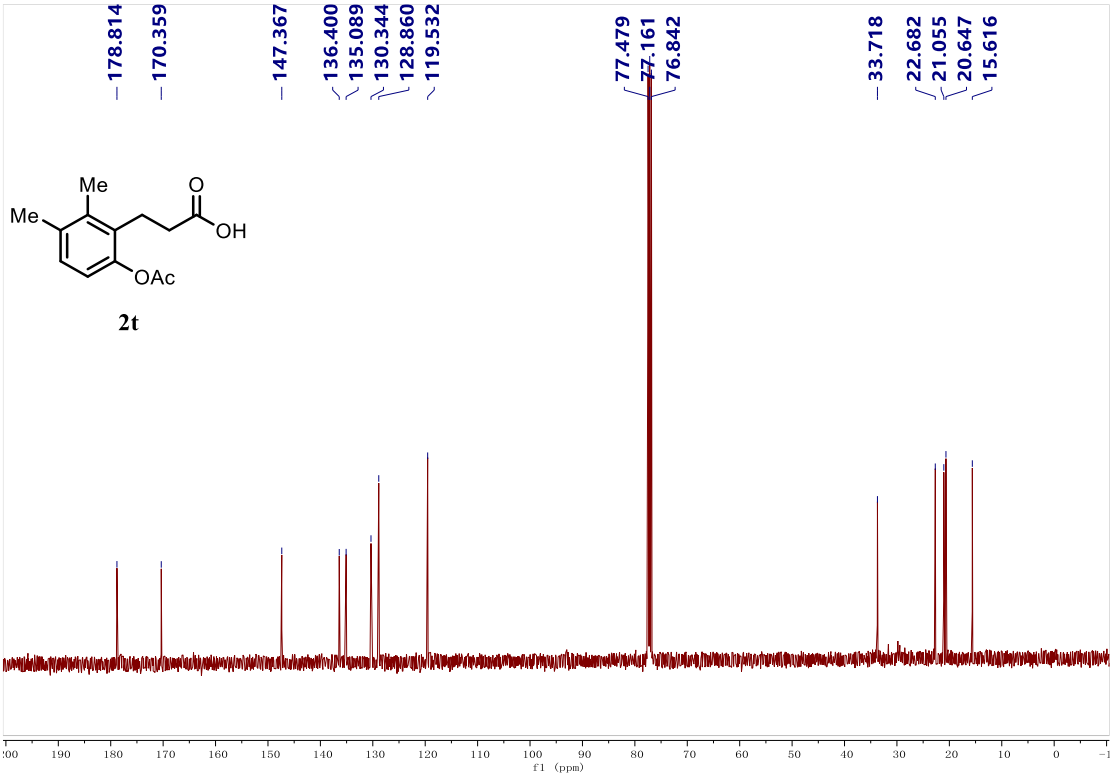
**2s$_{di}$**


177.731
169.176
165.412
149.810
130.752
130.055
121.655
77.478
77.160
76.843
52.627
32.848
20.971
20.404
OAc
O
OH
MeO2C
OAc
f1 (ppm)

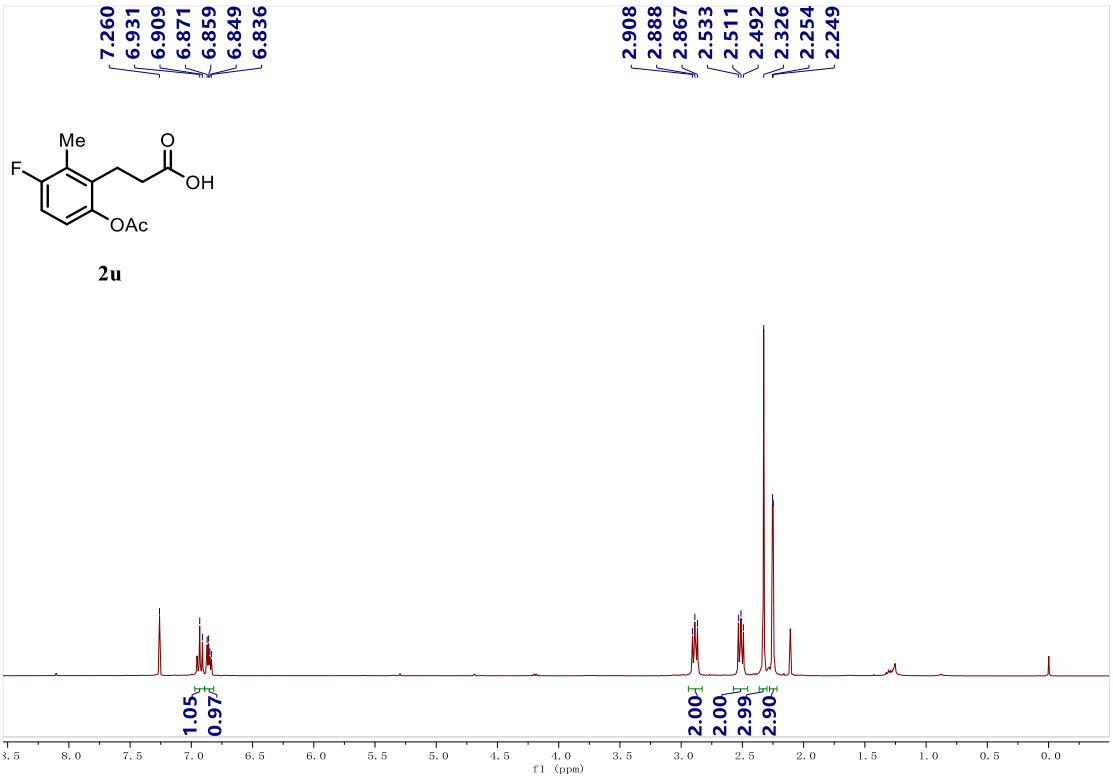
**2s$_{di}$**

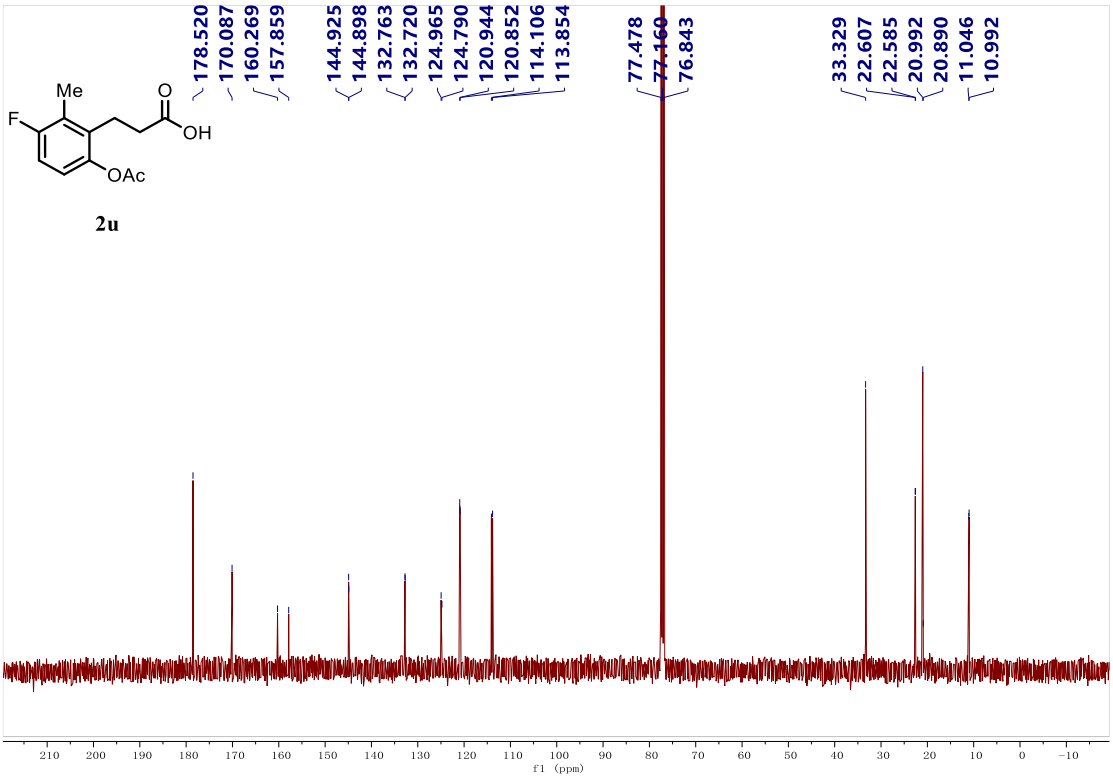

7.261
7.067
7.046
6.809
6.788
2.939
2.918
2.897
2.526
2.504
2.484
2.331
2.265
2.241
Me
Me
O
OH
OAc
1.04
1.00
1.98
2.07
2.93
3.07
2.96
f1 (ppm)

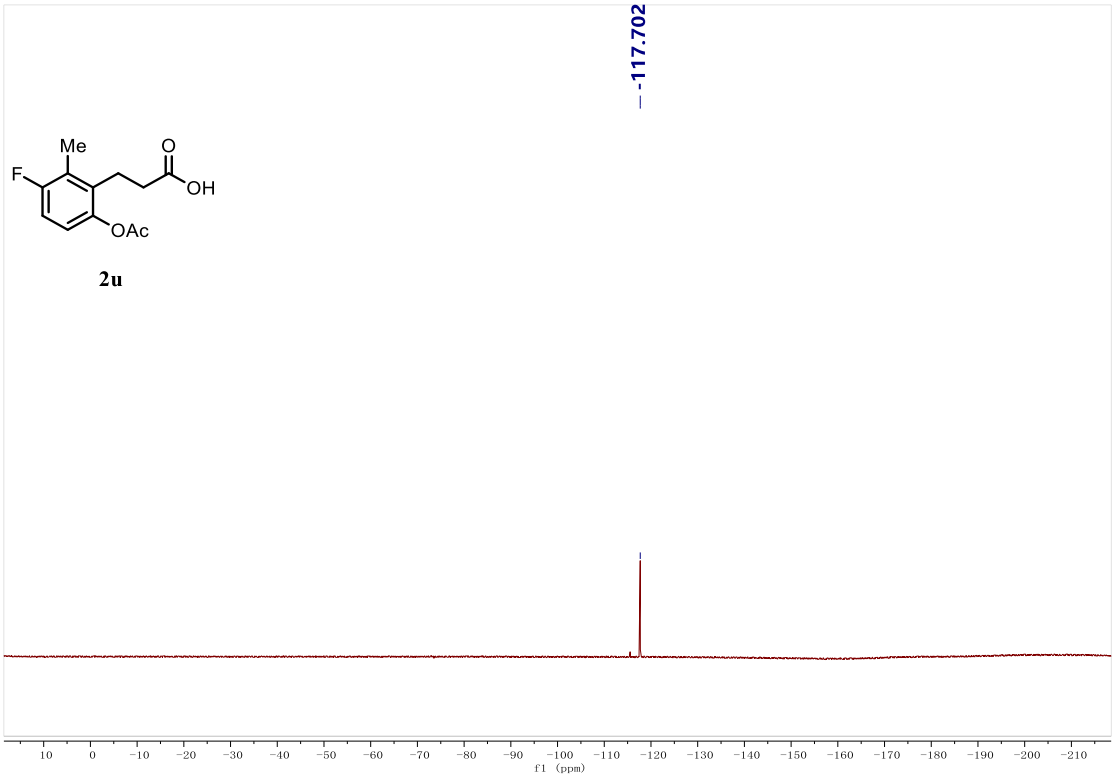
**2t**


178.814
170.359
147.367
136.400
135.089
130.344
128.860
119.532
77.479
77.161
76.842
33.718
22.682
21.055
20.647
15.616
Me
Me
O
OH
OAc
f1 (ppm)

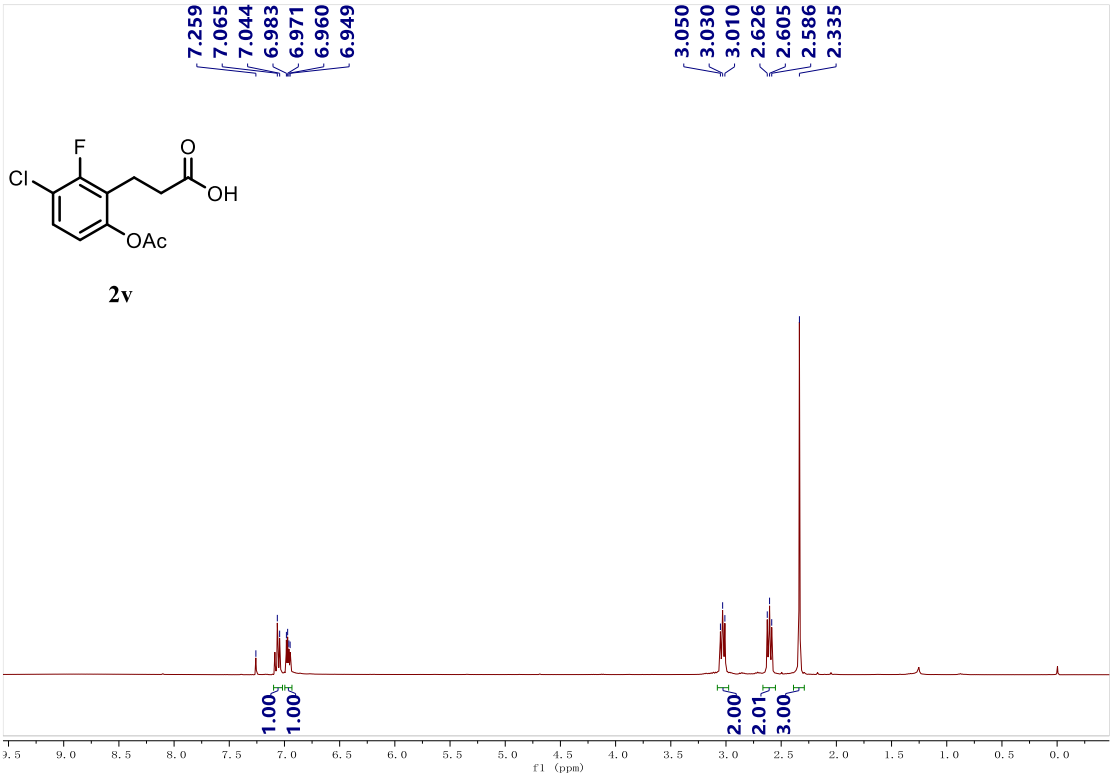
**2t**


7.260
6.931
6.909
6.871
6.859
6.849
6.836
2.908
2.888
2.867
2.533
2.511
2.492
2.326
2.254
2.249
Me
O
F
OH
OAc
2u
1.05
0.97
2.00
2.00
2.99
2.90
f1 (ppm)

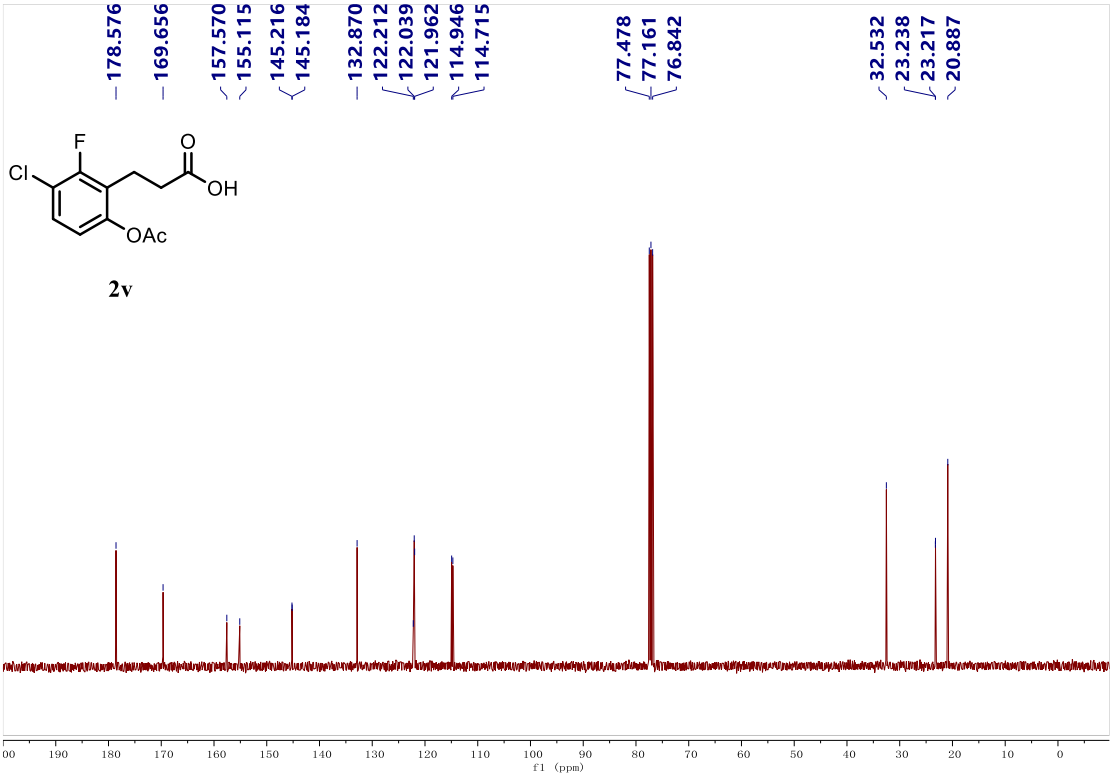

178.520
170.087
160.269
157.859
144.925
144.898
132.763
132.720
124.965
124.790
120.944
120.852
114.106
113.854
77.478
77.160
76.843
33.329
22.607
22.585
20.992
20.890
11.046
10.992
Me
O
F
OH
OAc
2u
f1 (ppm)


-117.702
Me
O
F
OH
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

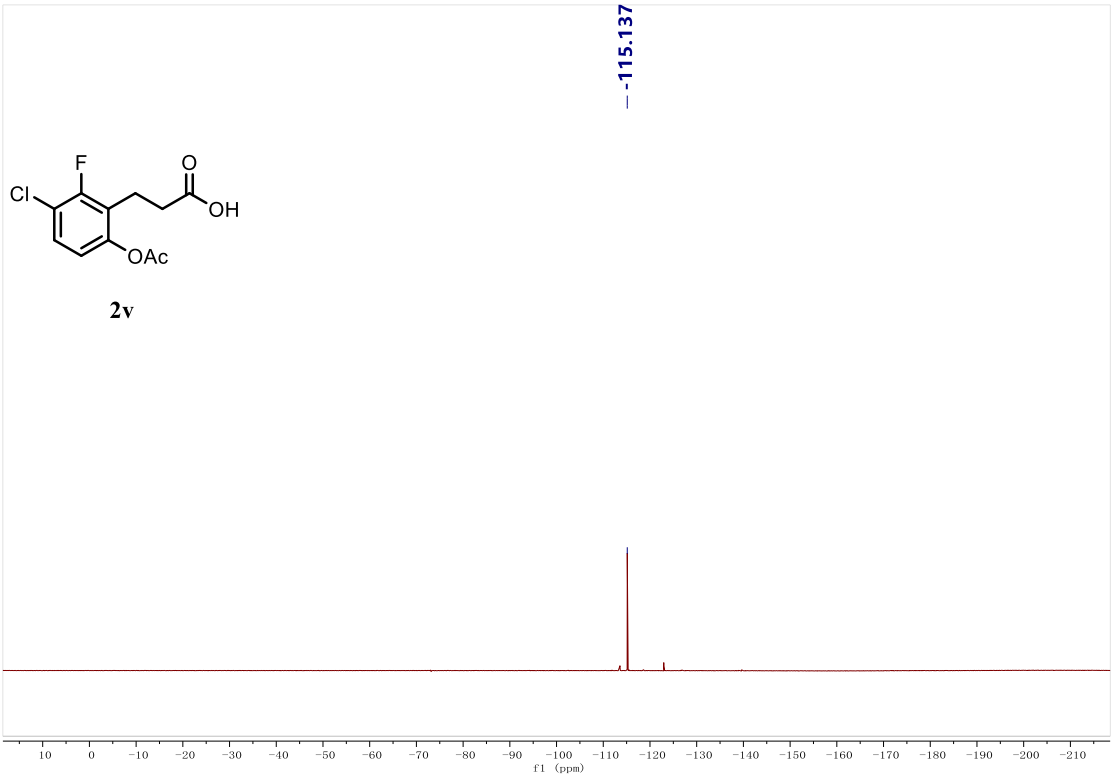
**2u**


7.259
7.065
7.044
6.983
6.971
6.960
6.949
3.050
3.030
3.010
2.626
2.605
2.586
2.335
F
O
Cl
OH
OAc
1.00
1.00
2.00
2.01
3.00
f1 (ppm)

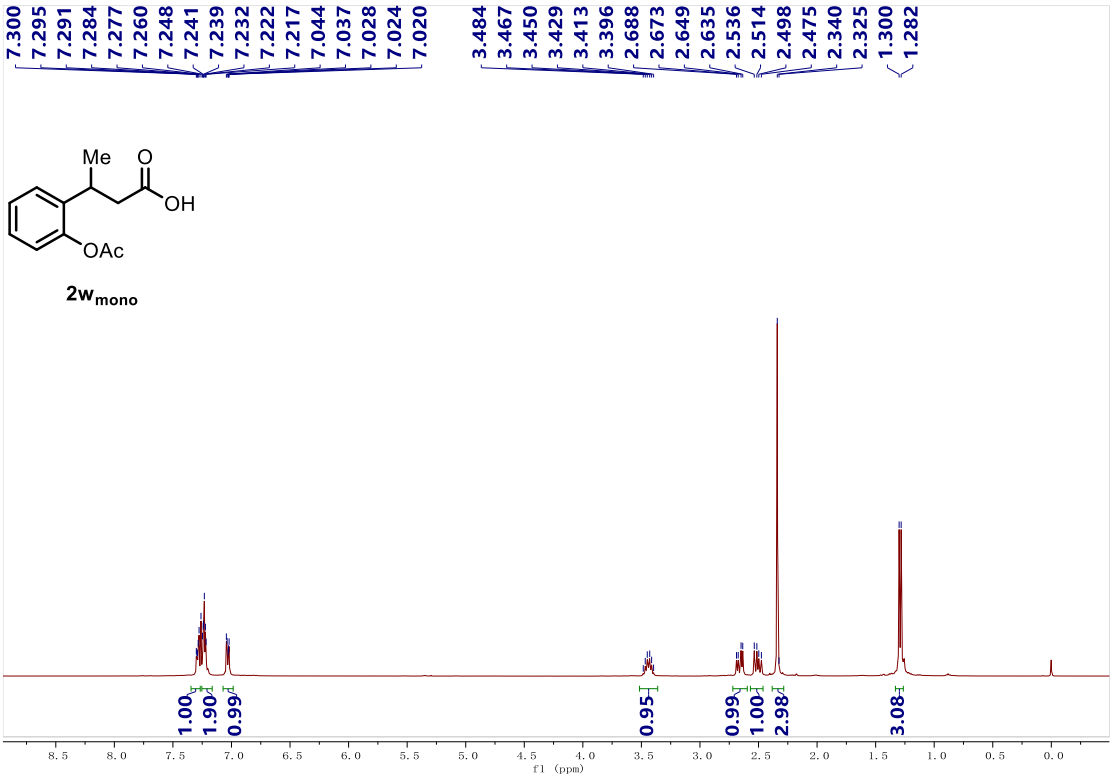
**2v**


178.576
169.656
157.570
155.115
145.216
145.184
132.870
122.212
122.039
121.962
114.946
114.715
77.478
77.161
76.842
32.532
23.238
23.217
20.887
F
O
Cl
OH
OAc
f1 (ppm)

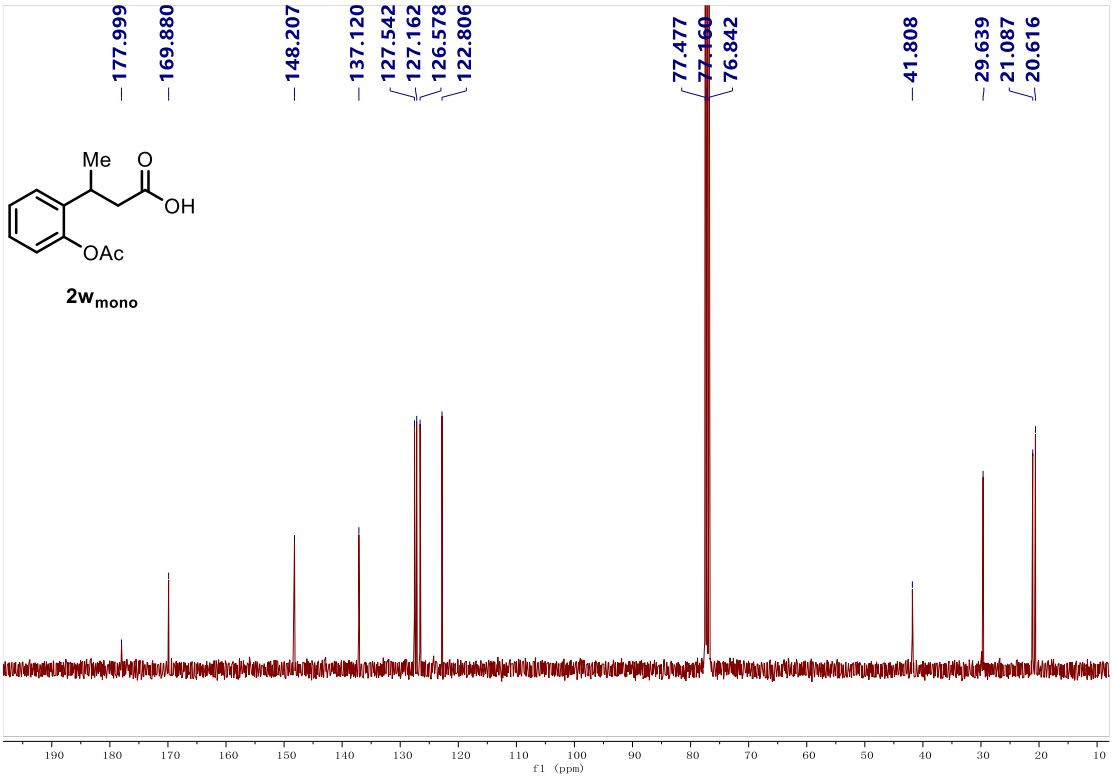
**2v**


-115.137
F
O
Cl
OH
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

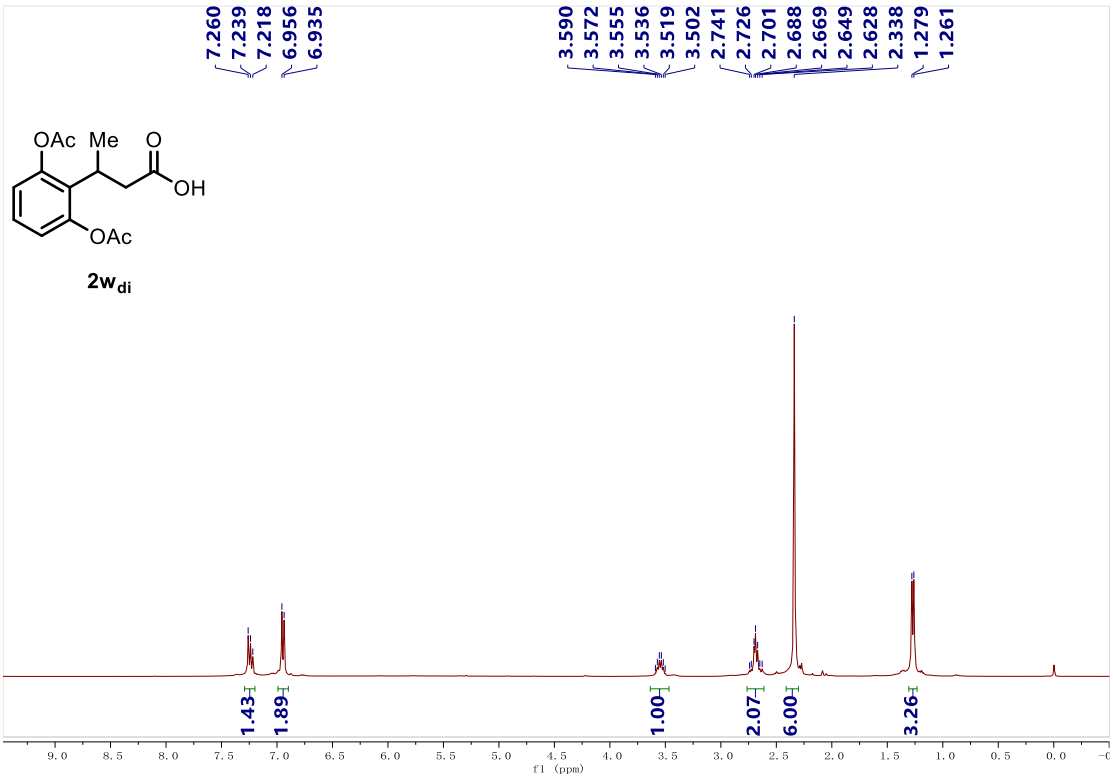
**2v**



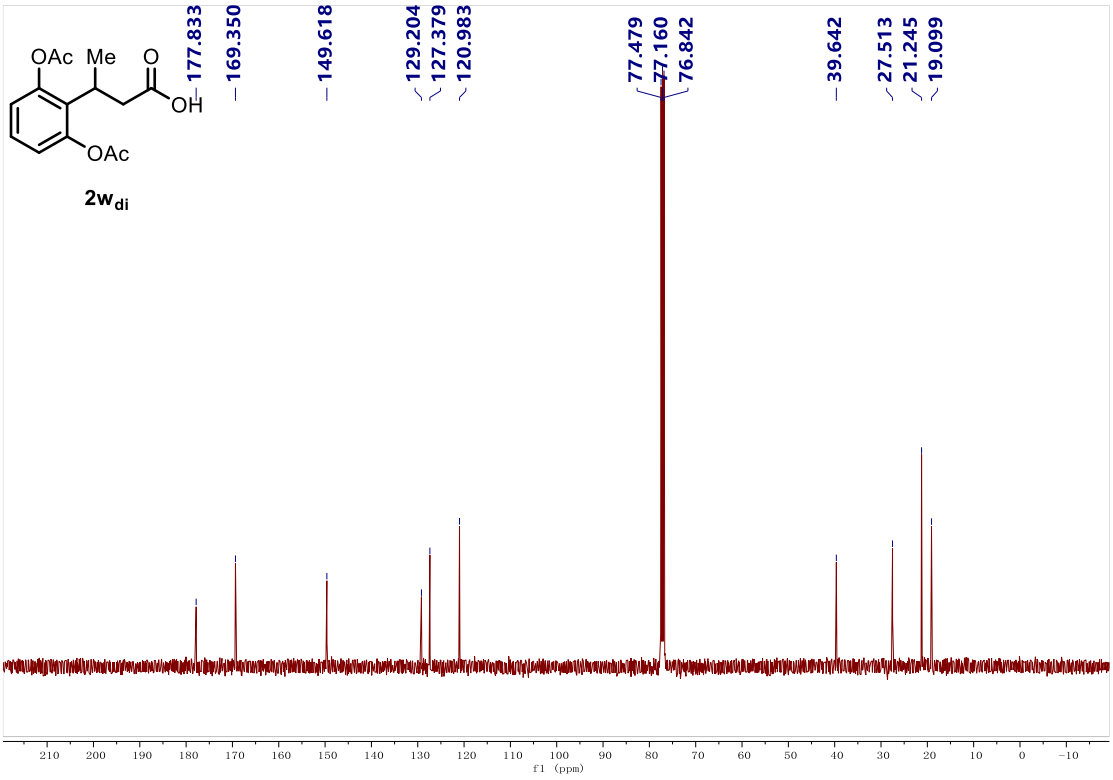

**2w$_{mono}$**



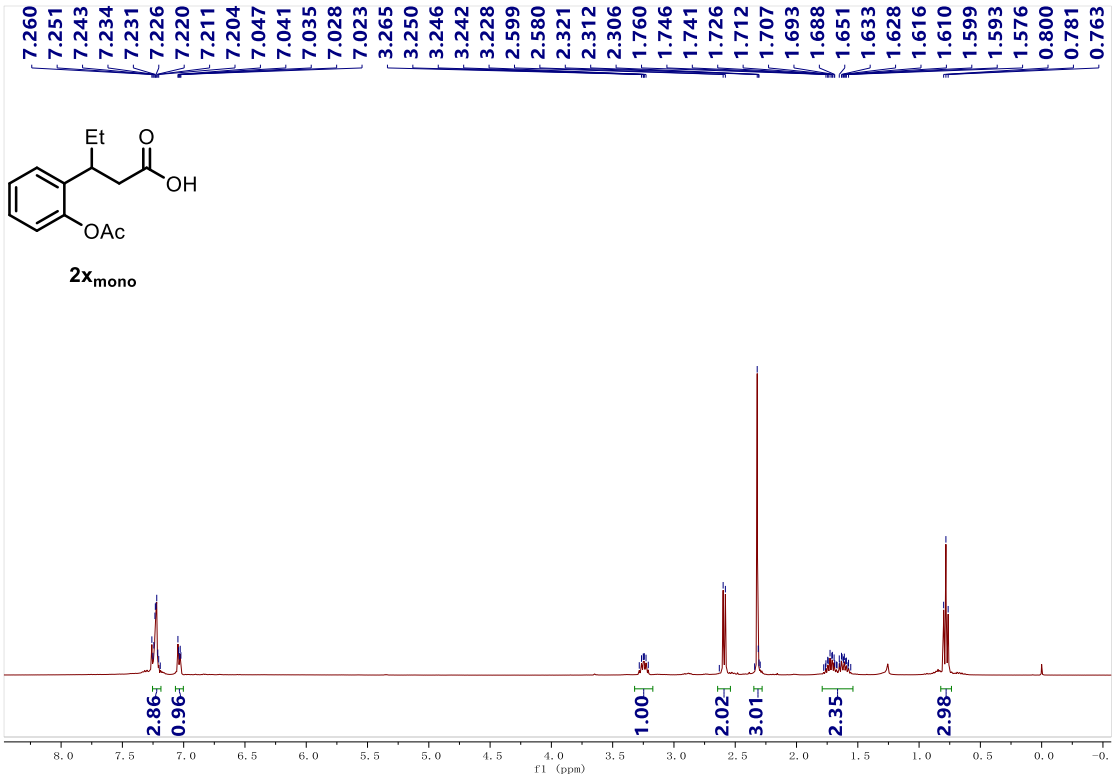

**2w$_{mono}$**


7.260
7.239
7.218
6.956
6.935
3.590
3.572
3.555
3.536
3.519
3.502
2.741
2.726
2.701
2.688
2.669
2.649
2.628
2.338
1.279
1.261
OAc
Me
O
OH
OAc
1.43
1.89
1.00
2.07
6.00
3.26
f1 (ppm)

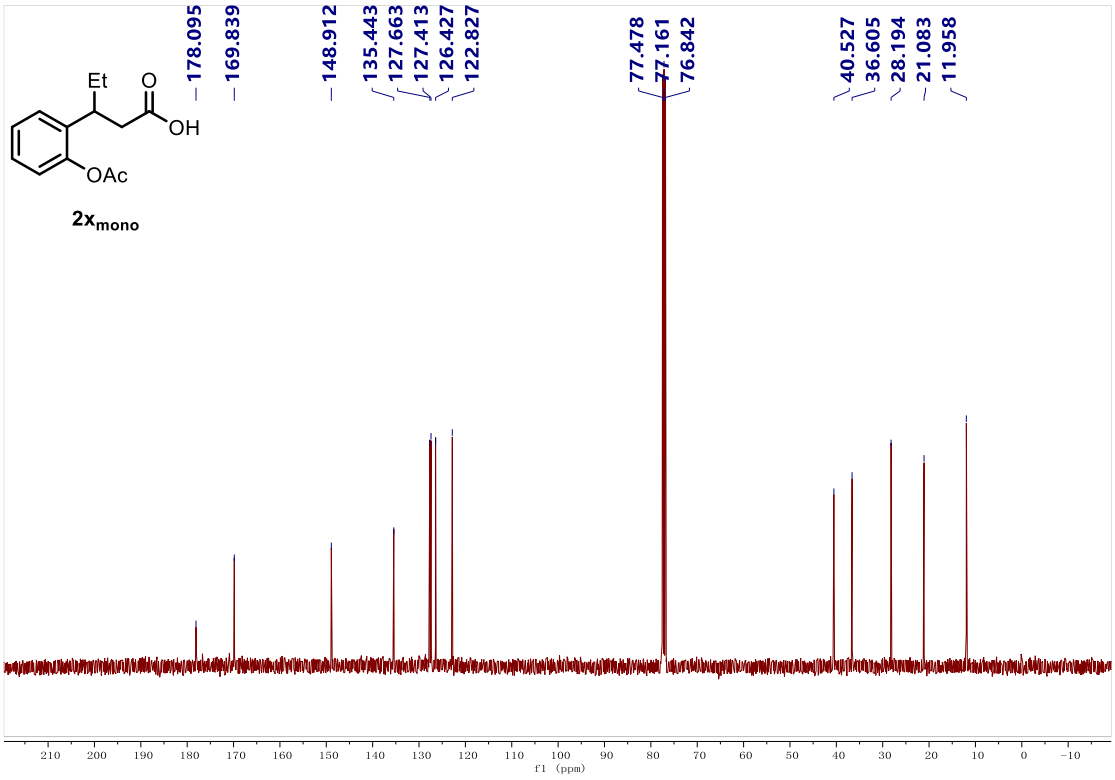
**2w$_{di}$**


177.833
169.350
149.618
129.204
127.379
120.983
77.479
77.160
76.842
39.642
27.513
21.245
19.099
OAc
Me
O
OH
OAc
f1 (ppm)

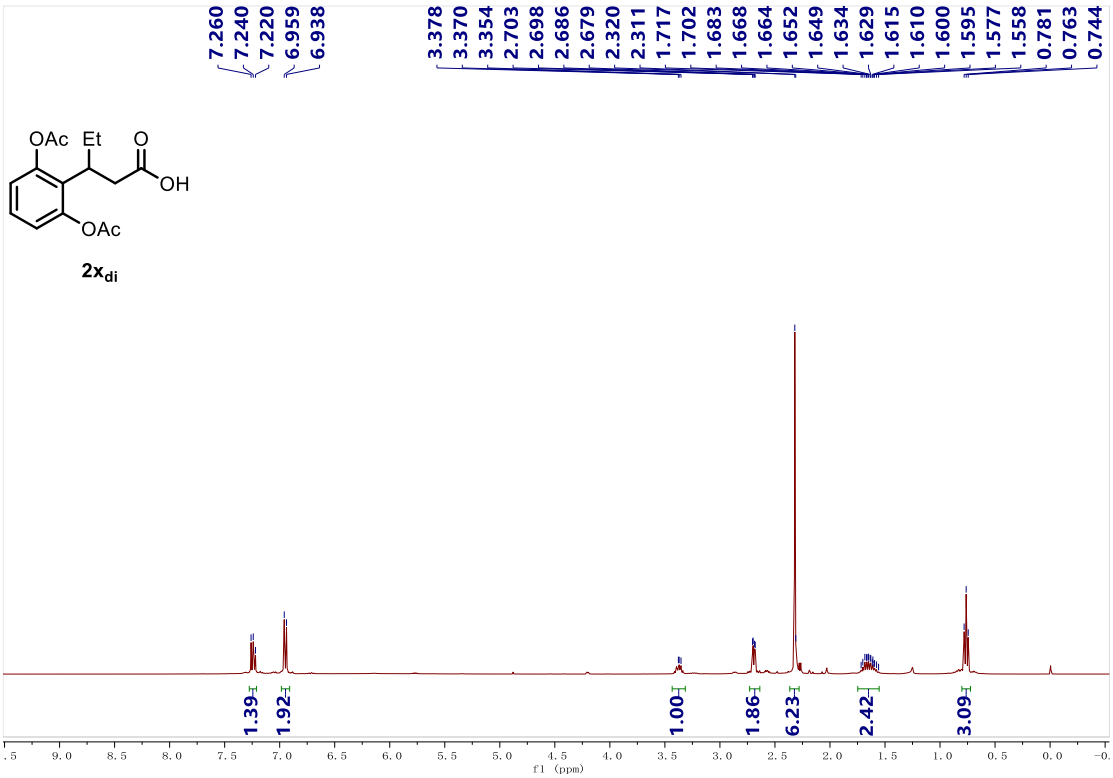
**2w$_{di}$**

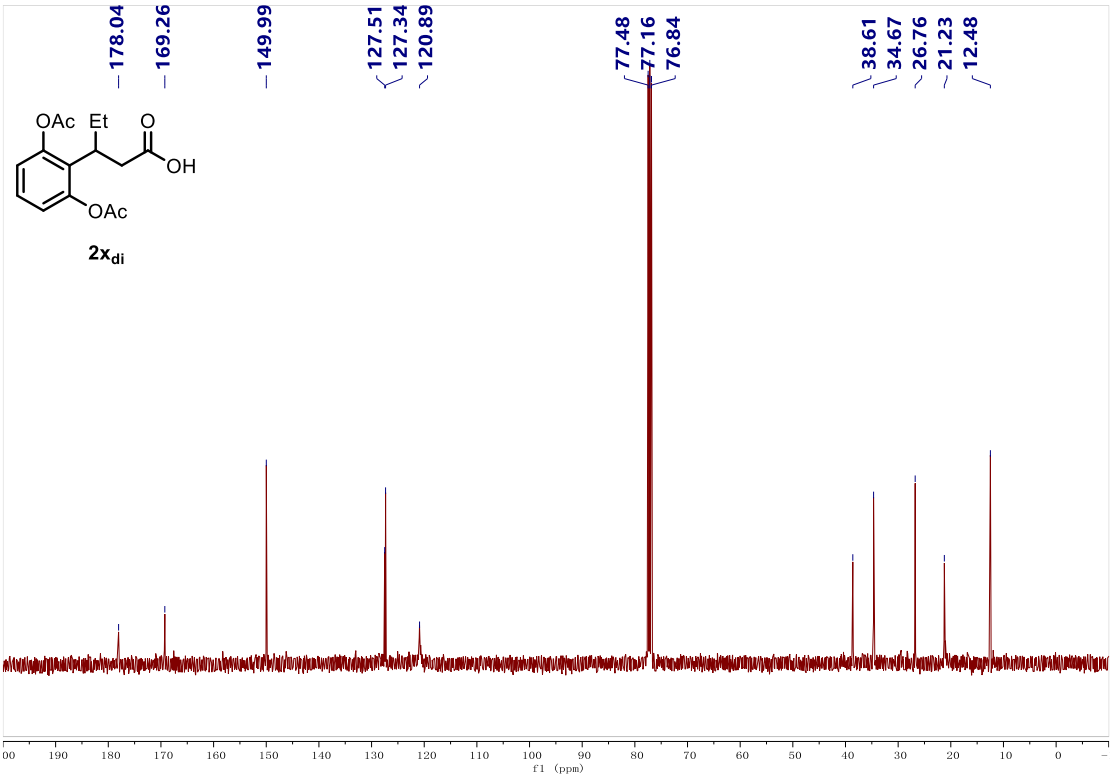


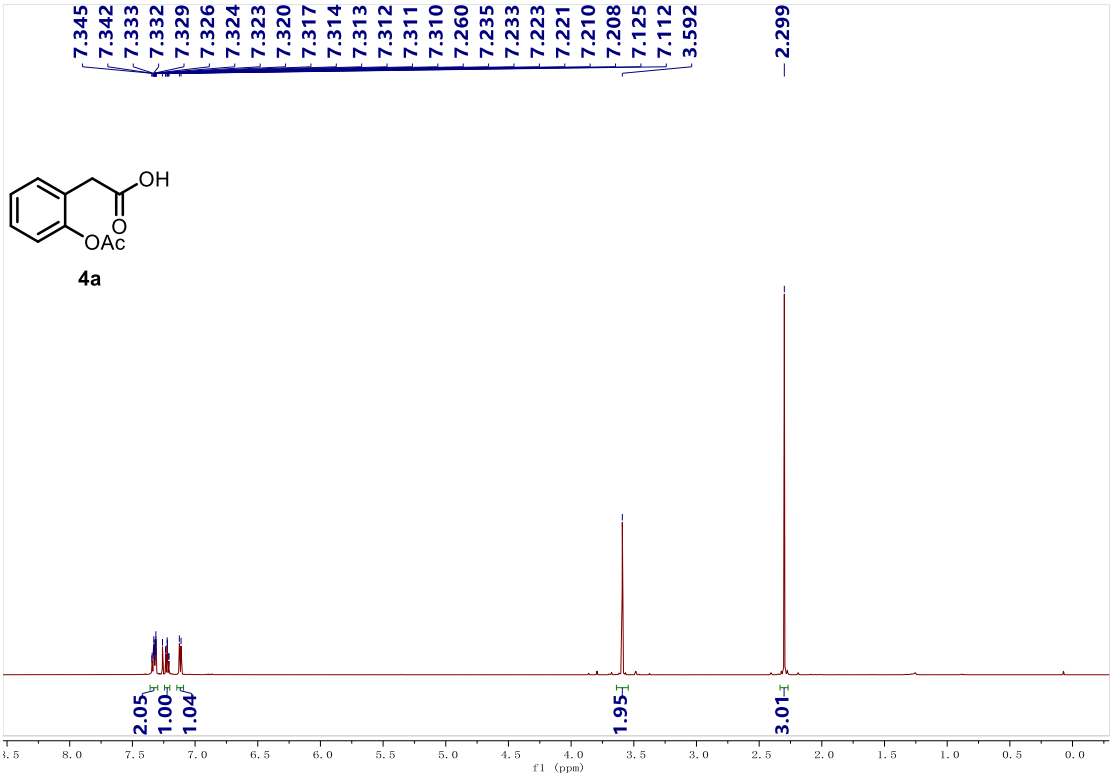

**2x$_{mono}$**

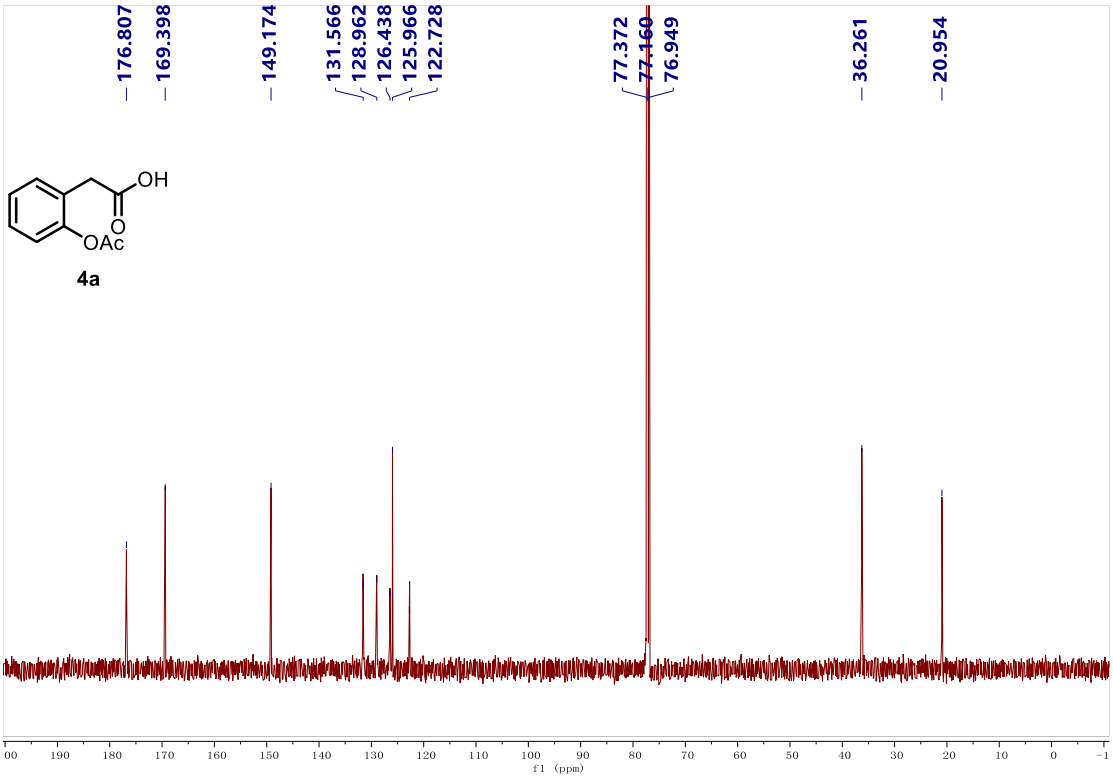


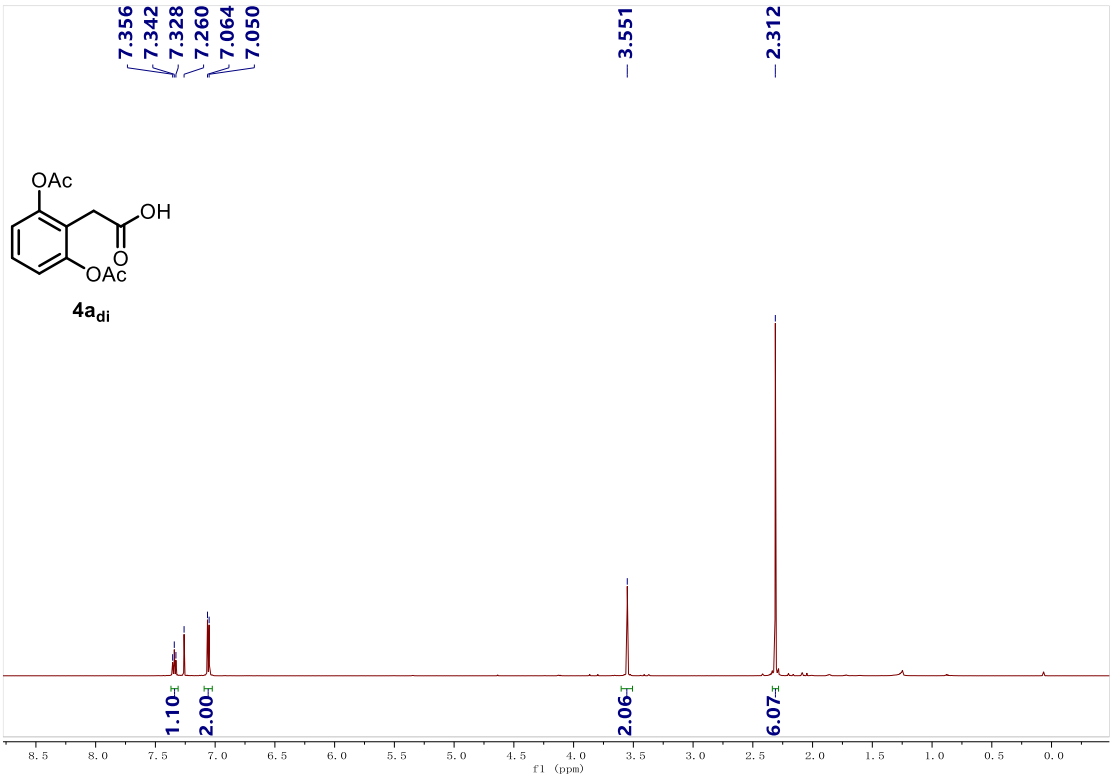

**2x$_{mono}$**

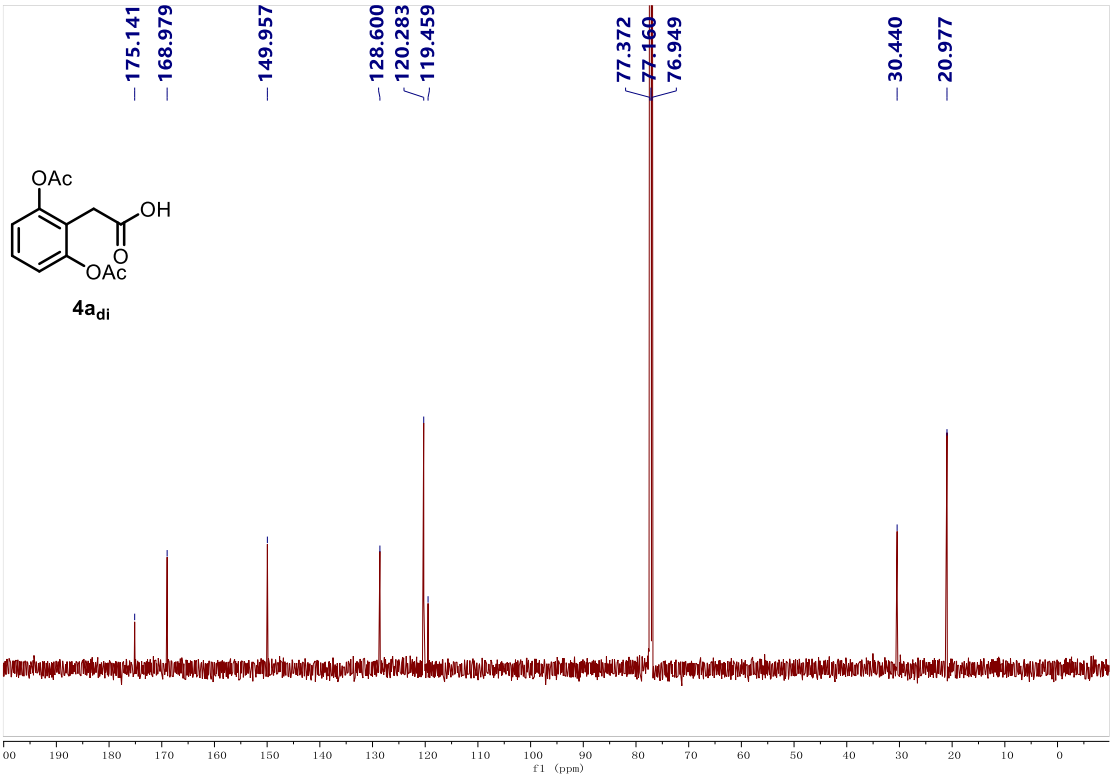

7.260
7.240
7.220
6.959
6.938
3.378
3.370
3.354
2.703
2.698
2.686
2.679
2.320
2.311
1.717
1.702
1.683
1.668
1.664
1.652
1.649
1.634
1.629
1.615
1.610
1.600
1.595
1.577
1.558
0.781
0.763
0.744
OAc Et O
OH
OAc
2x di
1.39
1.92
1.00
1.86
6.23
2.42
3.09
f1 (ppm)

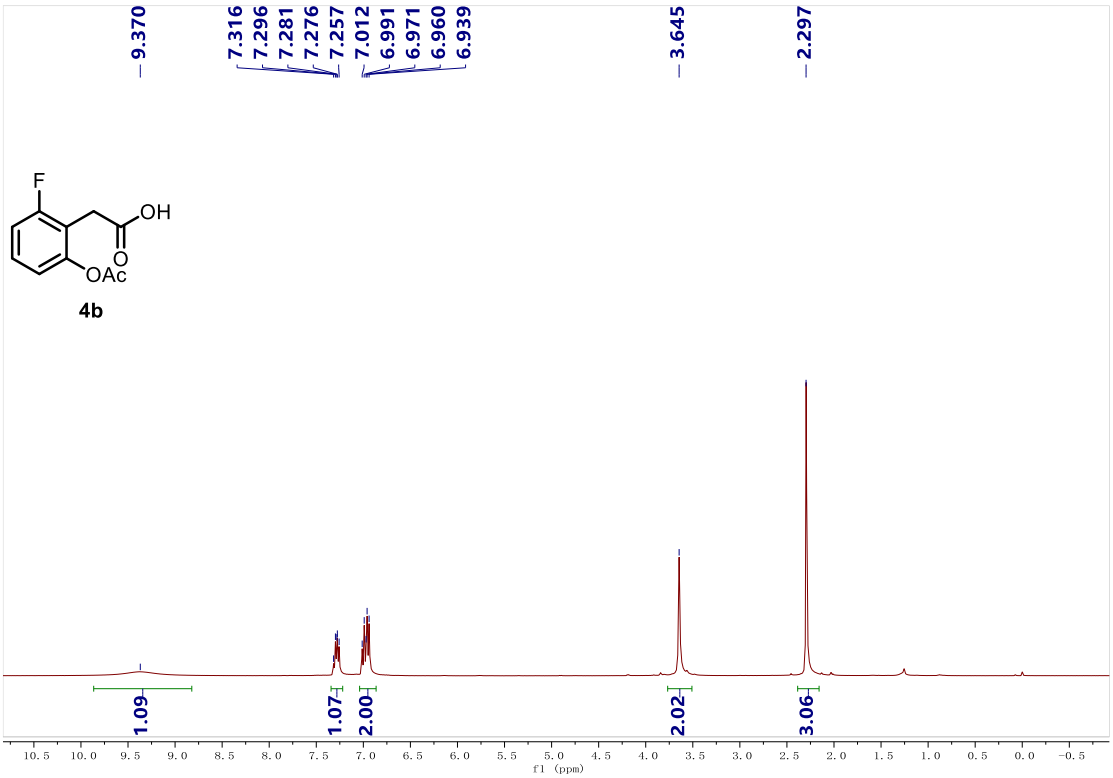

178.04
169.26
149.99
127.51
127.34
120.89
77.48
77.16
76.84
38.61
34.67
26.76
21.23
12.48
OAc Et O
OH
OAc
2x di
f1 (ppm)

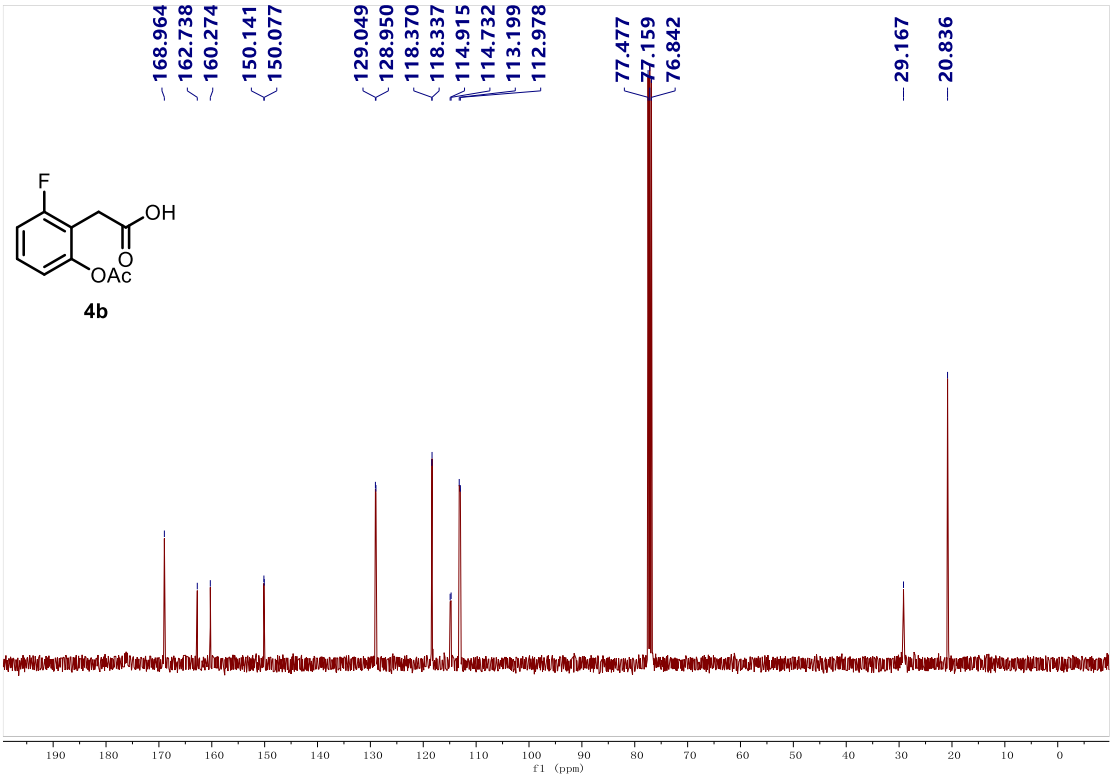

7.345
7.342
7.333
7.332
7.329
7.326
7.324
7.323
7.320
7.317
7.314
7.313
7.312
7.311
7.310
7.260
7.235
7.233
7.223
7.221
7.210
7.208
7.125
7.112
3.592
2.299
OH
O
OAc
4a
2.05
1.00
1.04
1.95
3.01
f1 (ppm)

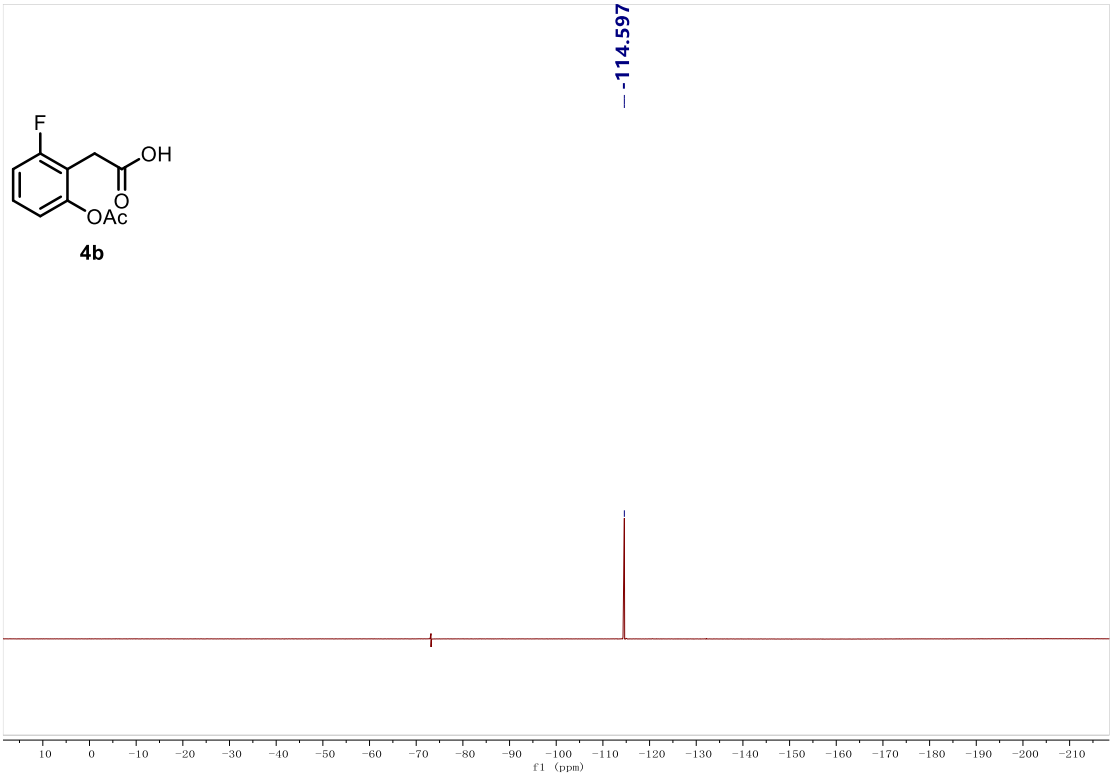

176.807
169.398
149.174
131.566
128.962
126.438
125.966
122.728
77.372
77.160
76.949
36.261
20.954
OH
O
OAc
4a
f1 (ppm)

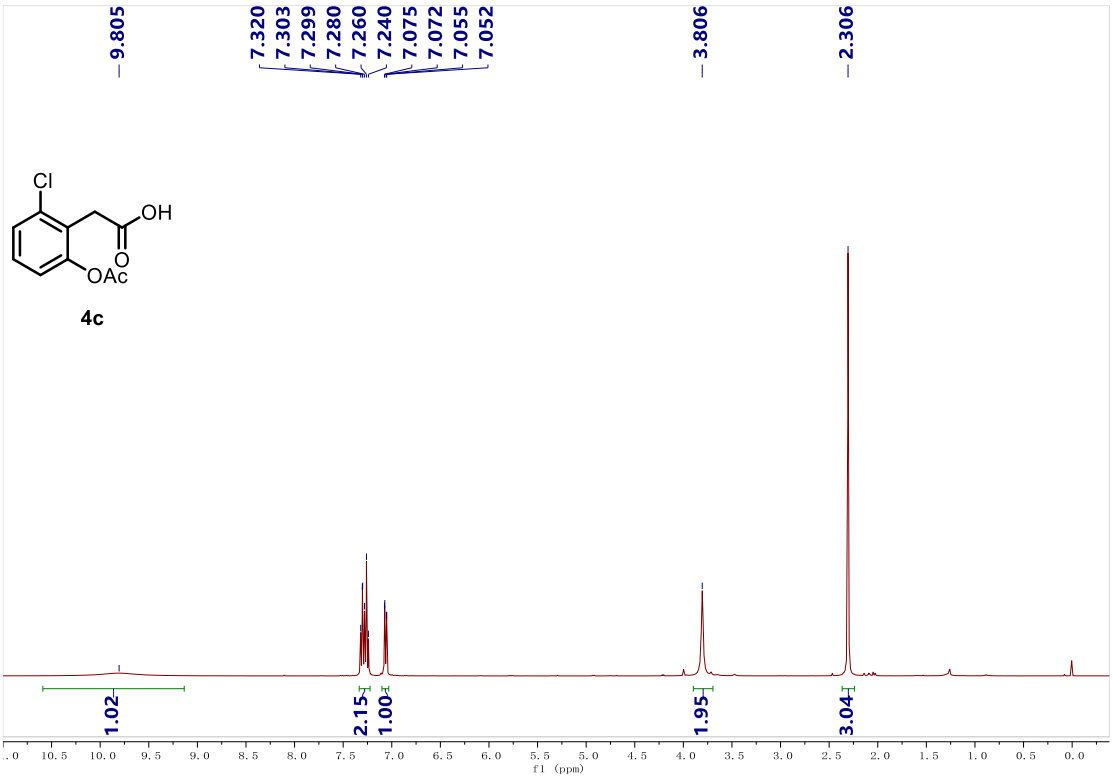

7.356
7.342
7.328
7.260
7.064
7.050
3.551
2.312
OAc
OH
O
OAc
4a di
1.10
2.00
2.06
6.07
f1 (ppm)

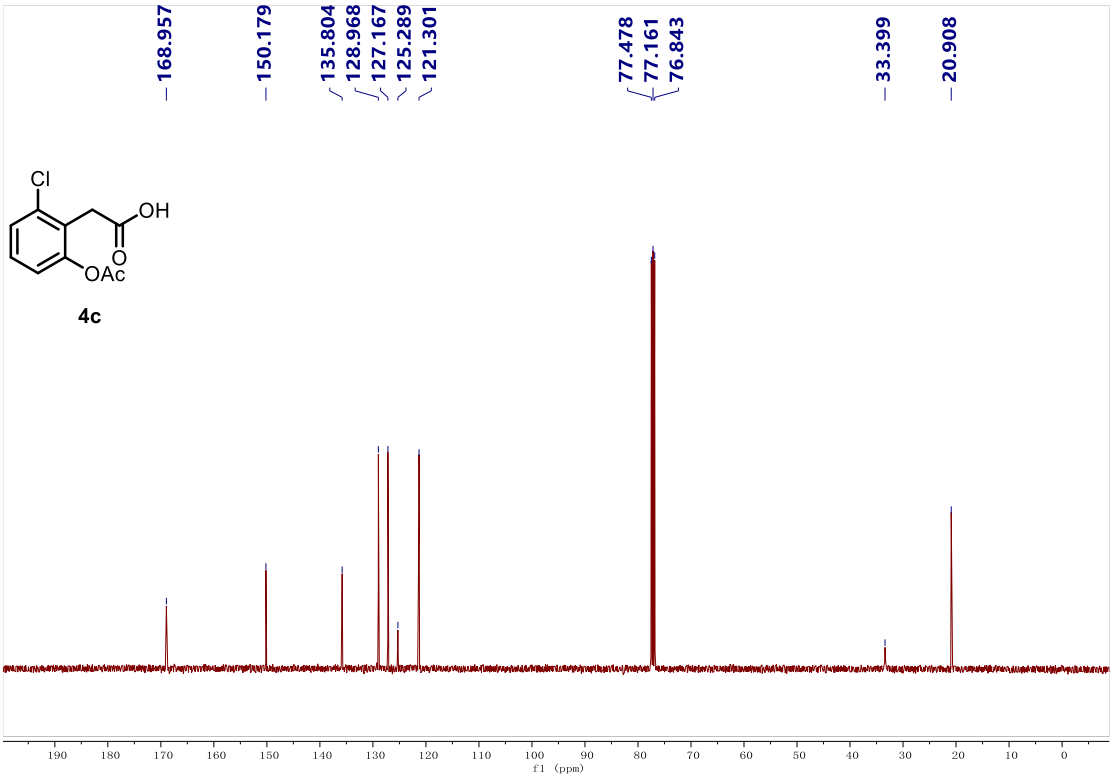

175.141
168.979
149.957
128.600
120.283
119.459
77.372
77.160
76.949
30.440
20.977
OAc
OH
O
OAc
4a di
f1 (ppm)

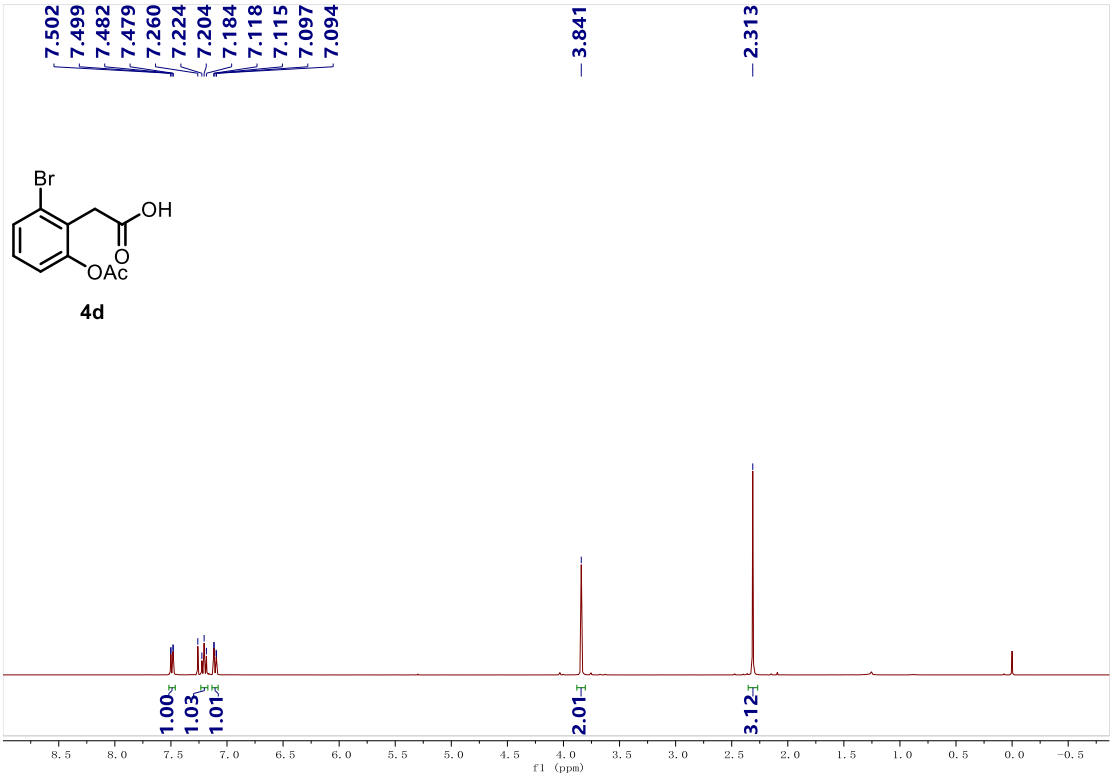

9.370
7.316
7.296
7.281
7.276
7.257
7.012
6.991
6.971
6.960
6.939
3.645
2.297
F
OH
O
OAc
4b
1.09
1.07
2.00
2.02
3.06
f1 (ppm)

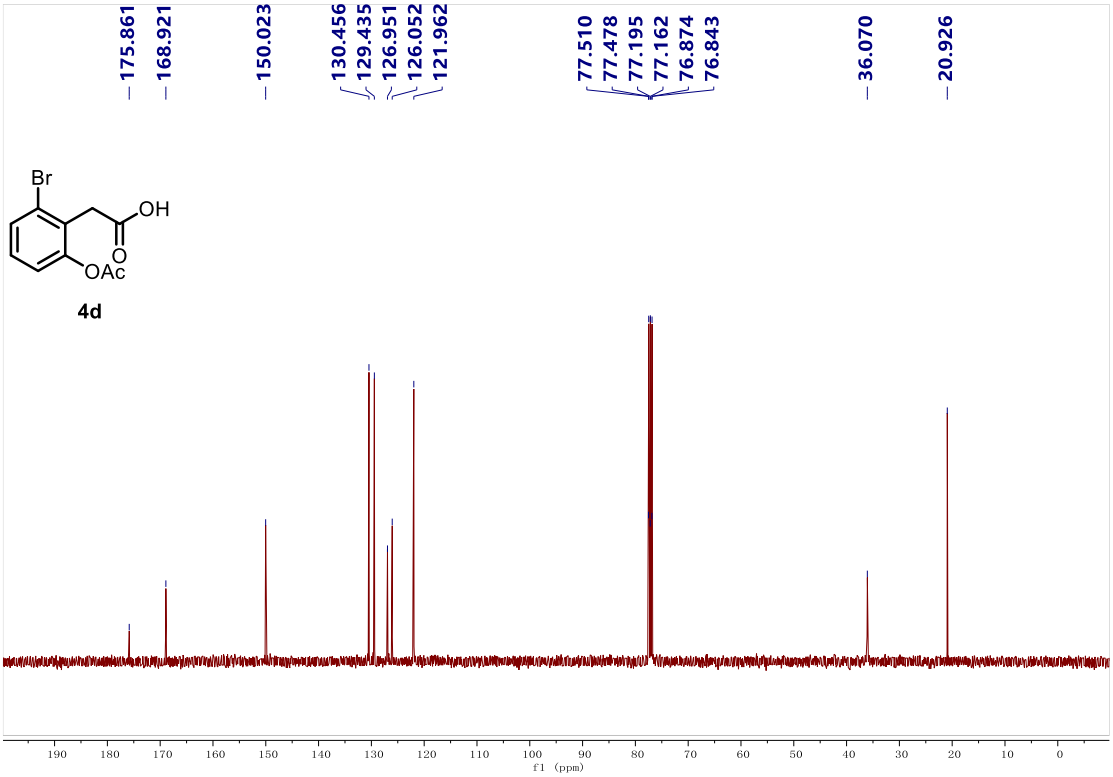

168.964
162.738
160.274
150.141
150.077
129.049
128.950
118.370
118.337
114.915
114.732
113.199
112.978
77.477
77.159
76.842
29.167
20.836
F
OH
O
OAc
4b
f1 (ppm)

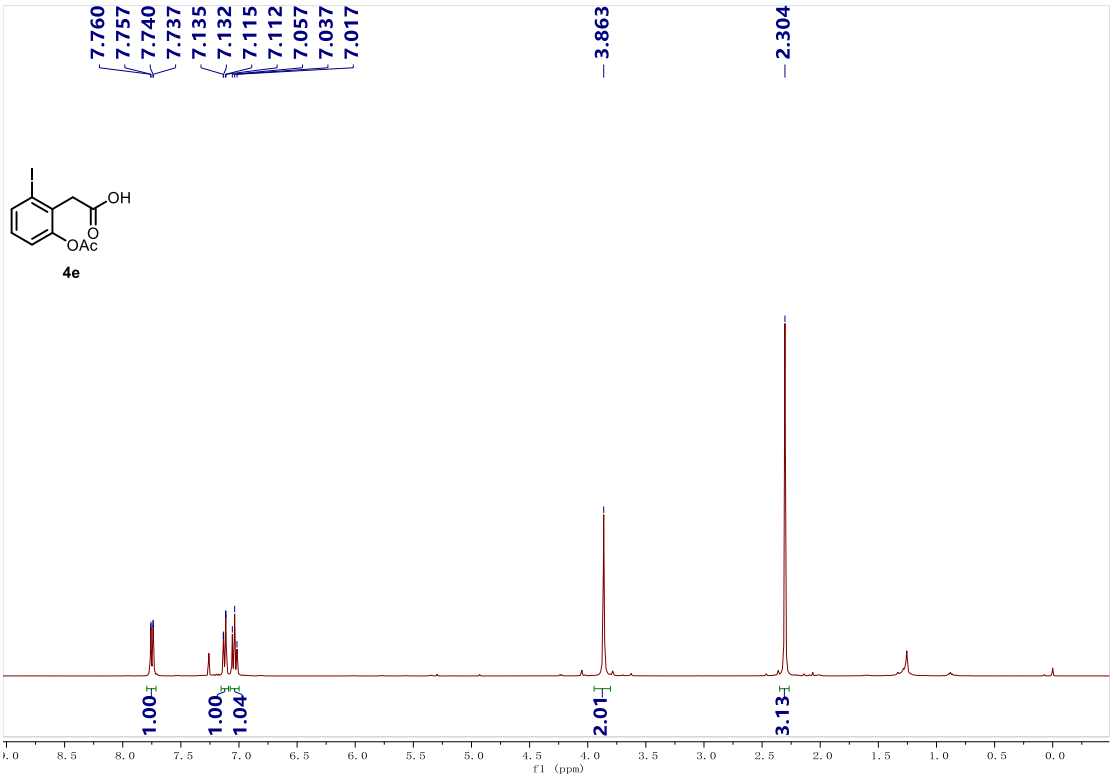

-114.597
F
OH
O
OAc
4b
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

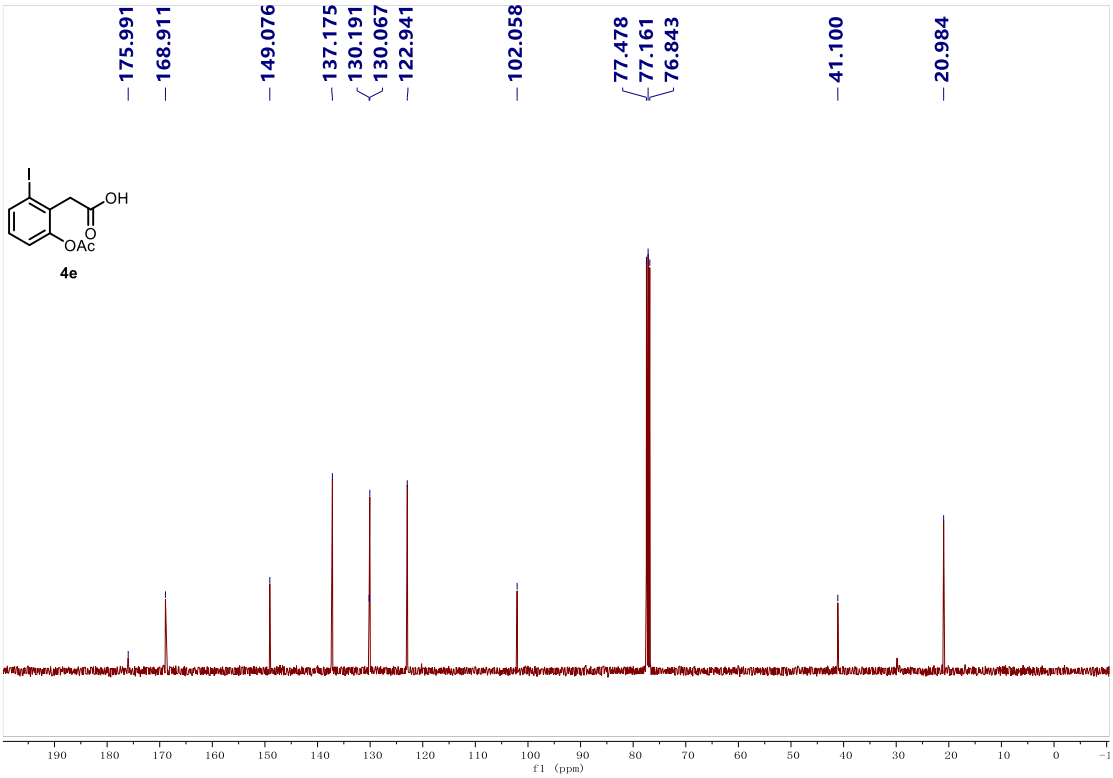

9.805
7.320
7.303
7.299
7.280
7.260
7.240
7.075
7.072
7.055
7.052
3.806
2.306
Cl
OH
O
OAc
4c
1.02
2.15
1.00
1.95
3.04
f1 (ppm)

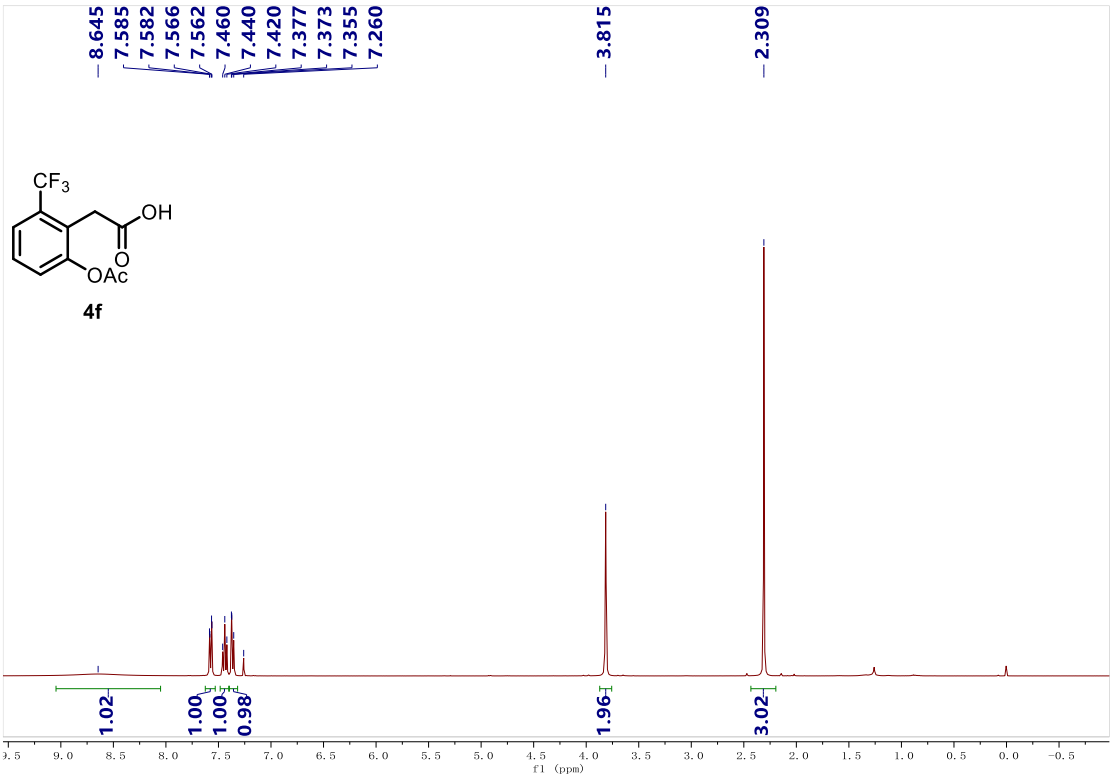

168.957
150.179
135.804
128.968
127.167
125.289
121.301
77.478
77.161
76.843
33.399
20.908
Cl
OH
O
OAc
4c
f1 (ppm)

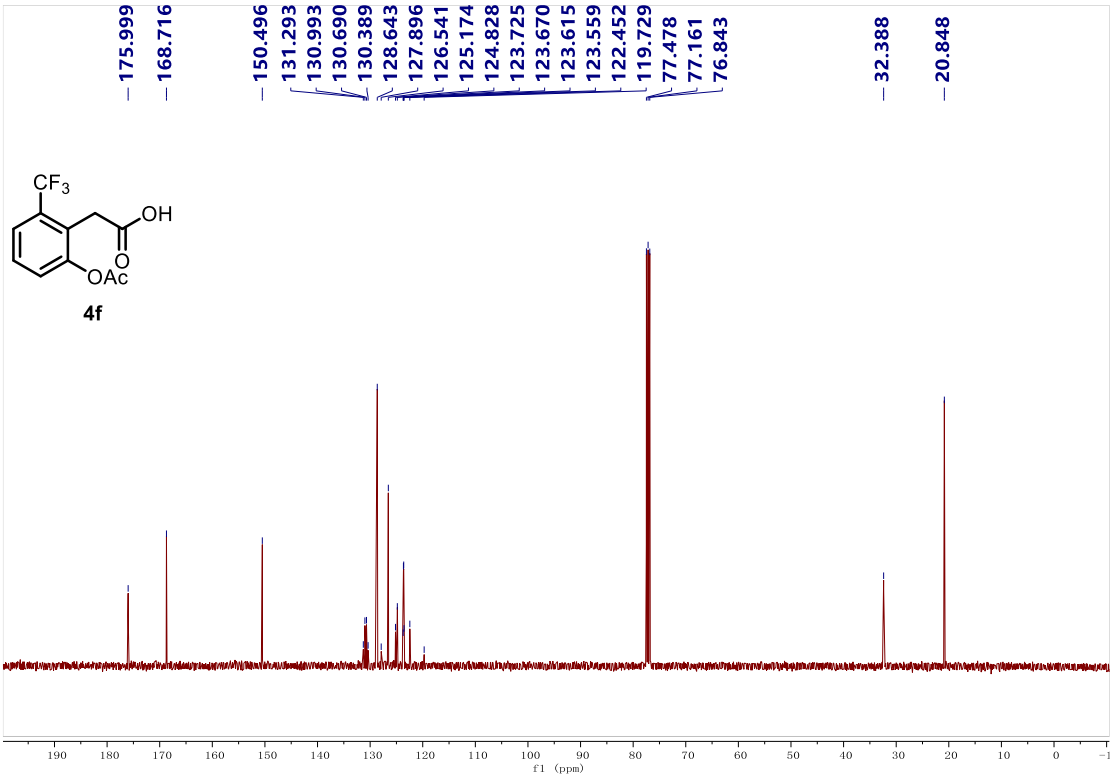

7.502
7.499
7.482
7.479
7.260
7.224
7.204
7.184
7.118
7.115
7.097
7.094
3.841
2.313
Br
OH
O
OAc
4d
1.00
1.03
1.01
2.01
3.12
f1 (ppm)

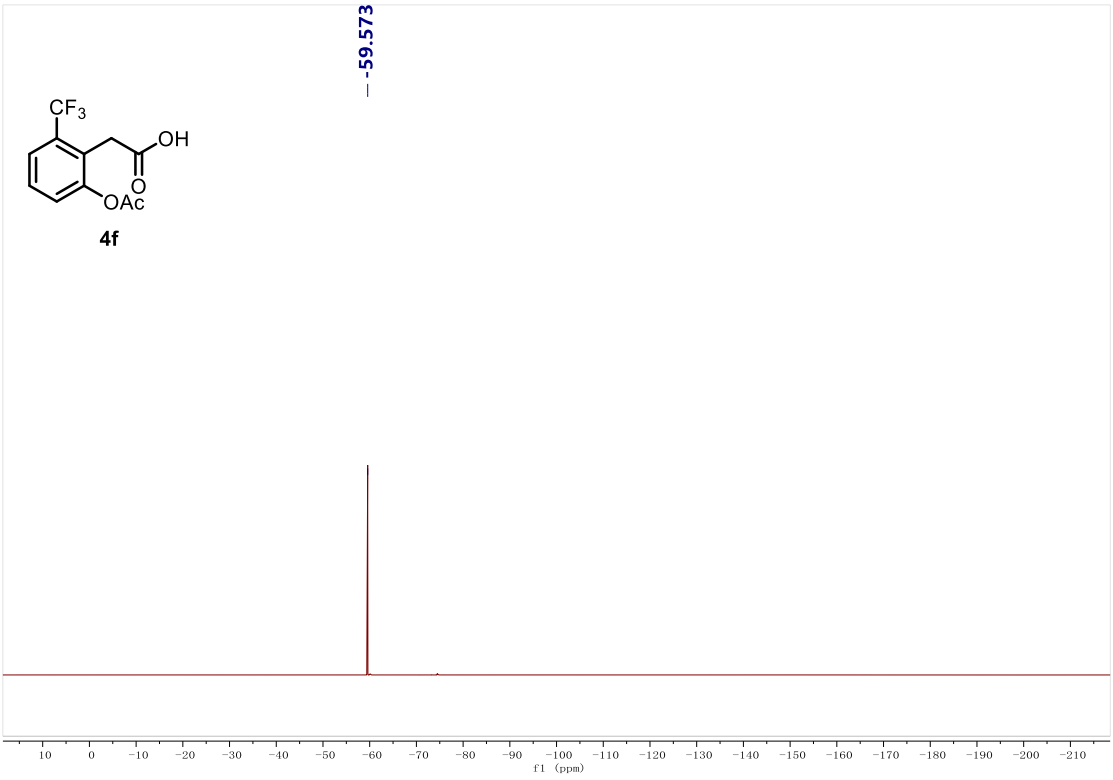

175.861
168.921
150.023
130.456
129.435
126.951
126.052
121.962
77.510
77.478
77.195
77.162
76.874
76.843
36.070
20.926
Br
OH
O
OAc
4d
f1 (ppm)


7.760
7.757
7.740
7.737
7.135
7.132
7.115
7.112
7.057
7.037
7.017
3.863
2.304
OH
O
OAc
4e
1.00
1.00
1.04
2.01
3.13
f1 (ppm)

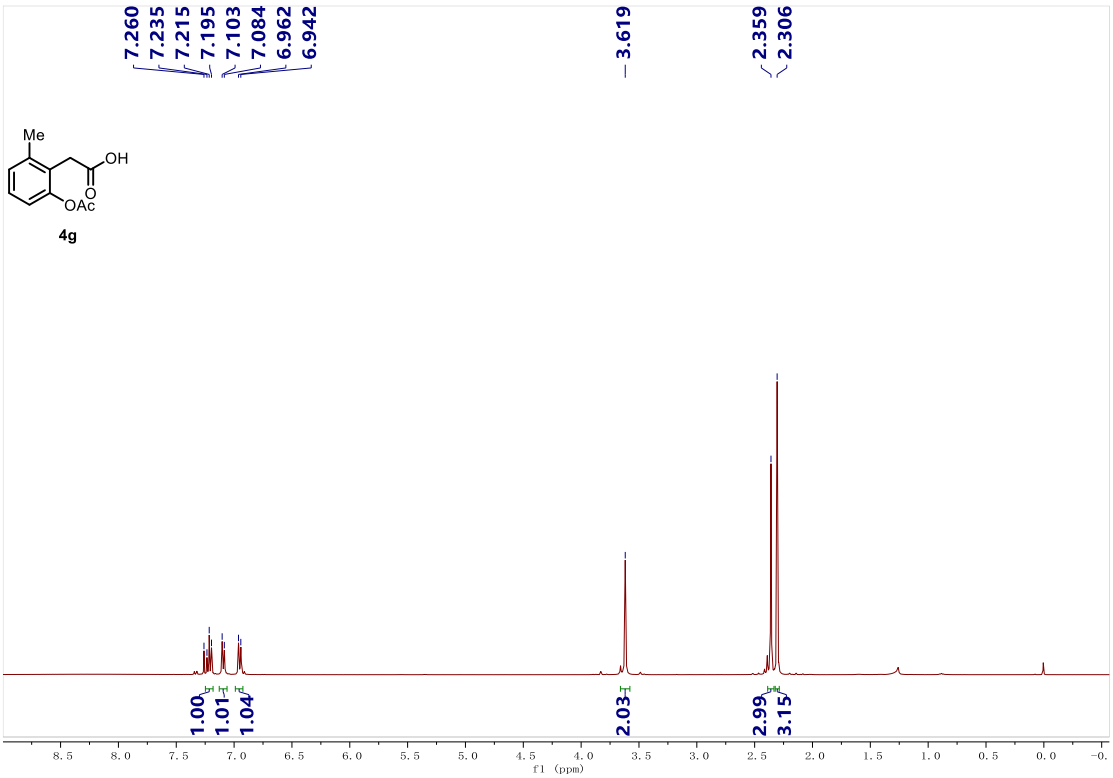

175.991
168.911
149.076
137.175
130.191
130.067
122.941
102.058
77.478
77.161
76.843
41.100
20.984
OH
O
OAc
4e
f1 (ppm)

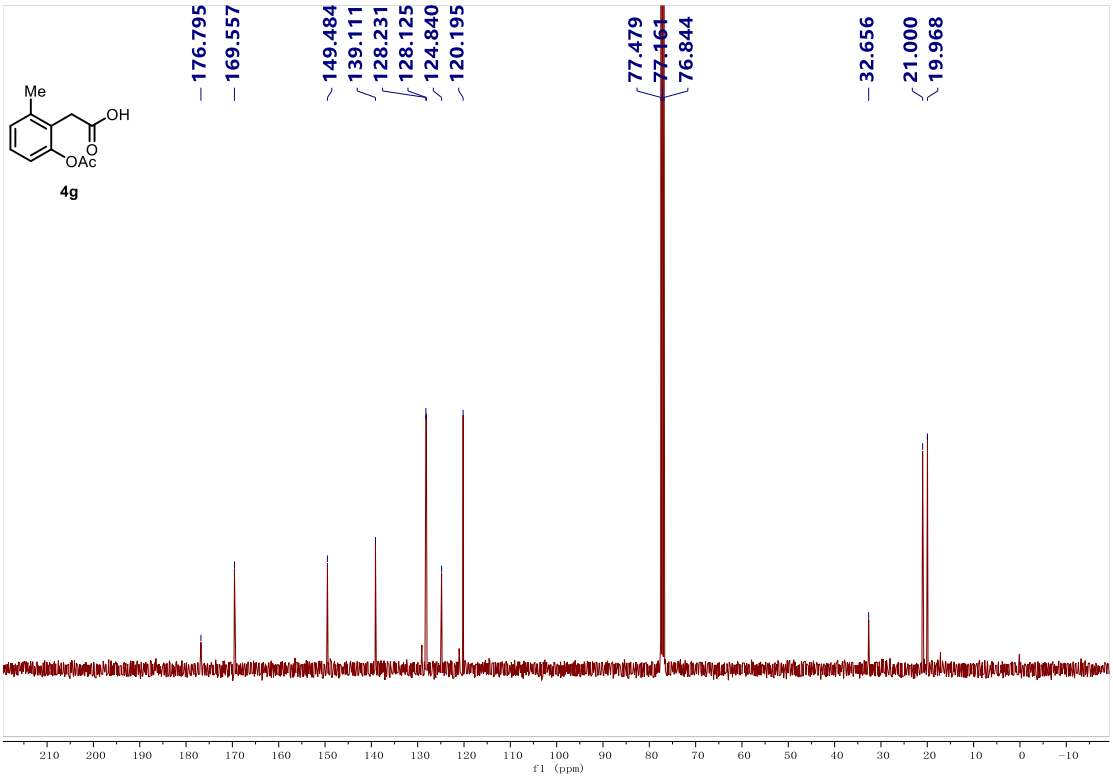

8.645
7.585
7.582
7.566
7.562
7.460
7.440
7.420
7.377
7.373
7.355
7.260
3.815
2.309
CF3
OH
O
OAc
4f
1.02
1.00
1.00
0.98
1.96
3.02
f1 (ppm)

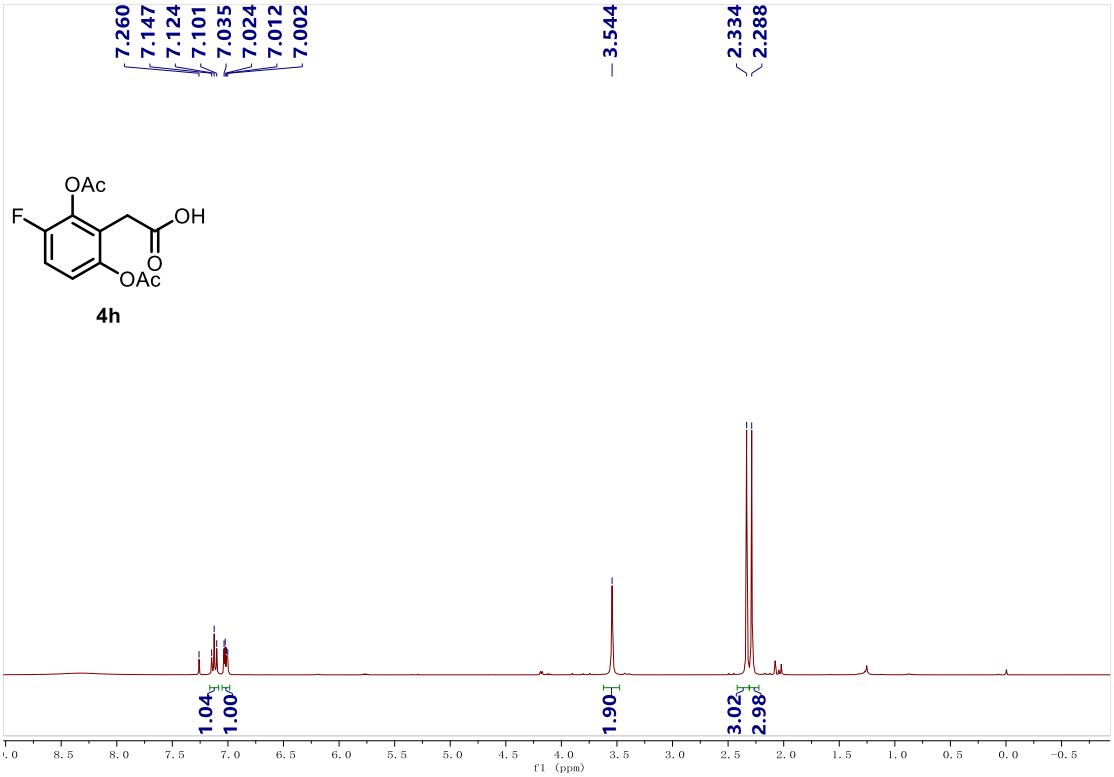

175.999
168.716
150.496
131.293
130.993
130.690
130.389
128.643
127.896
126.541
125.174
124.828
123.725
123.670
123.615
123.559
122.452
119.729
77.478
77.161
76.843
32.388
20.848
CF3
OH
O
OAc
4f
f1 (ppm)

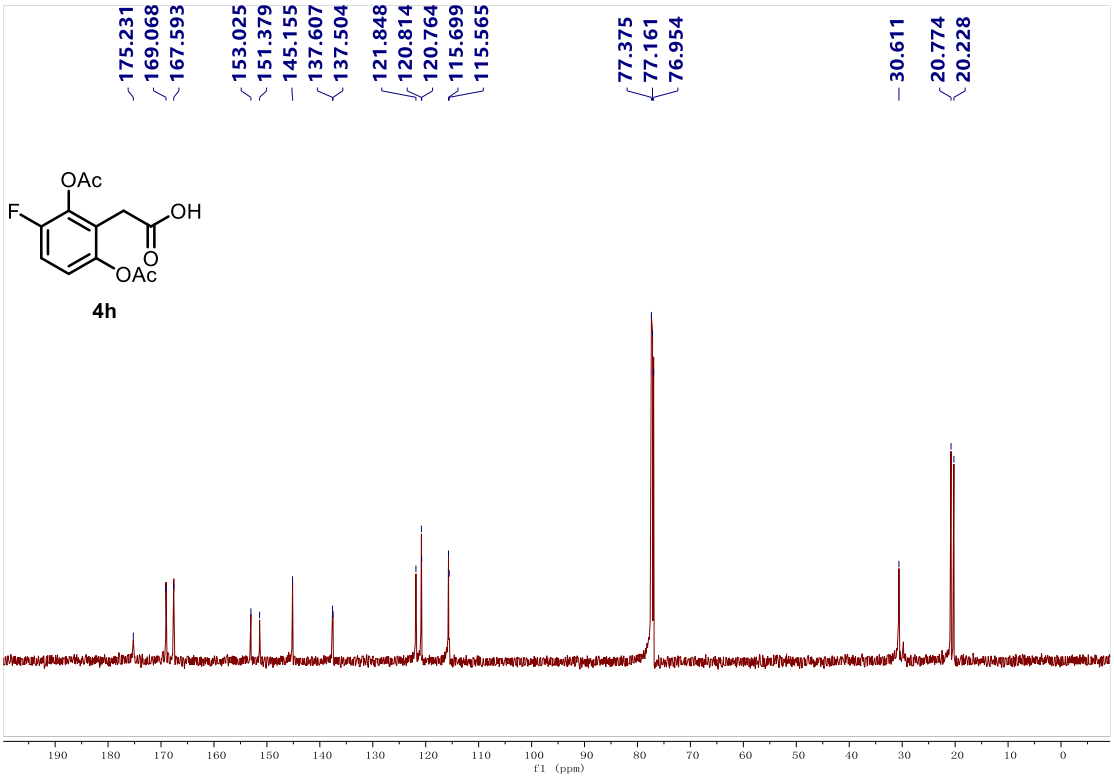

-59.573
CF3
OH
O
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

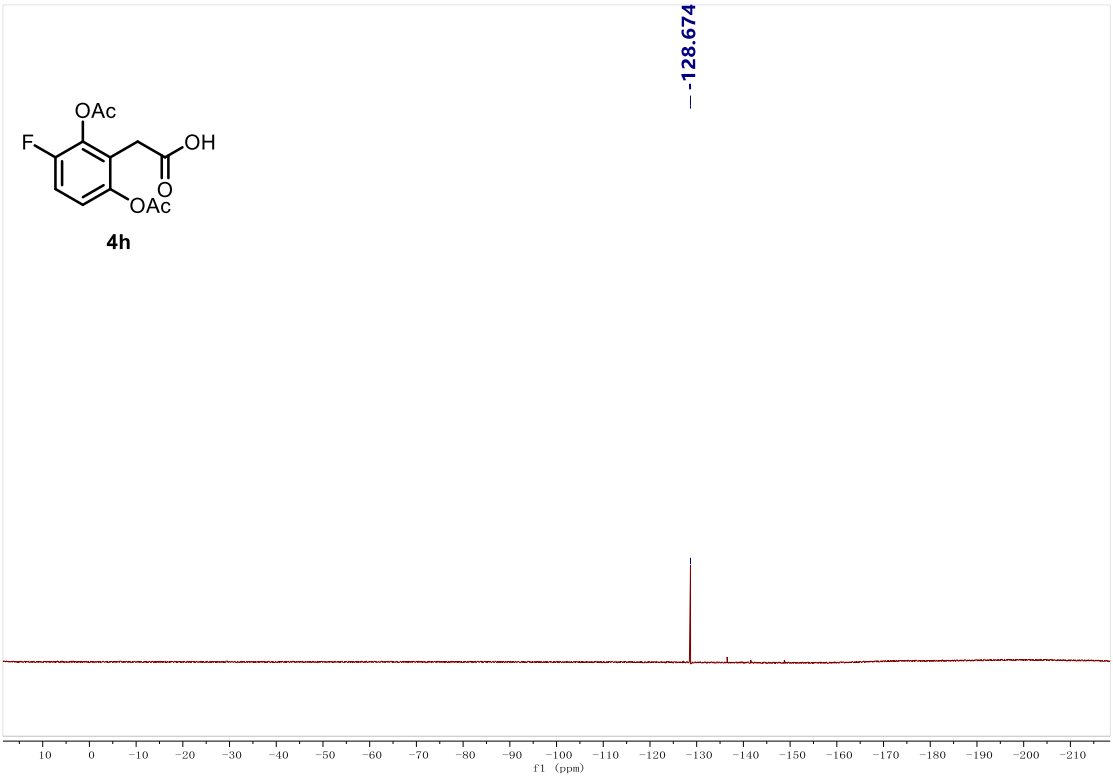
**4f**


7.260
7.235
7.215
7.195
7.103
7.084
6.962
6.942
3.619
2.359
2.306
Me
OH
O
OAc
4g
1.00
1.01
1.04
2.03
2.99
3.15
f1 (ppm)

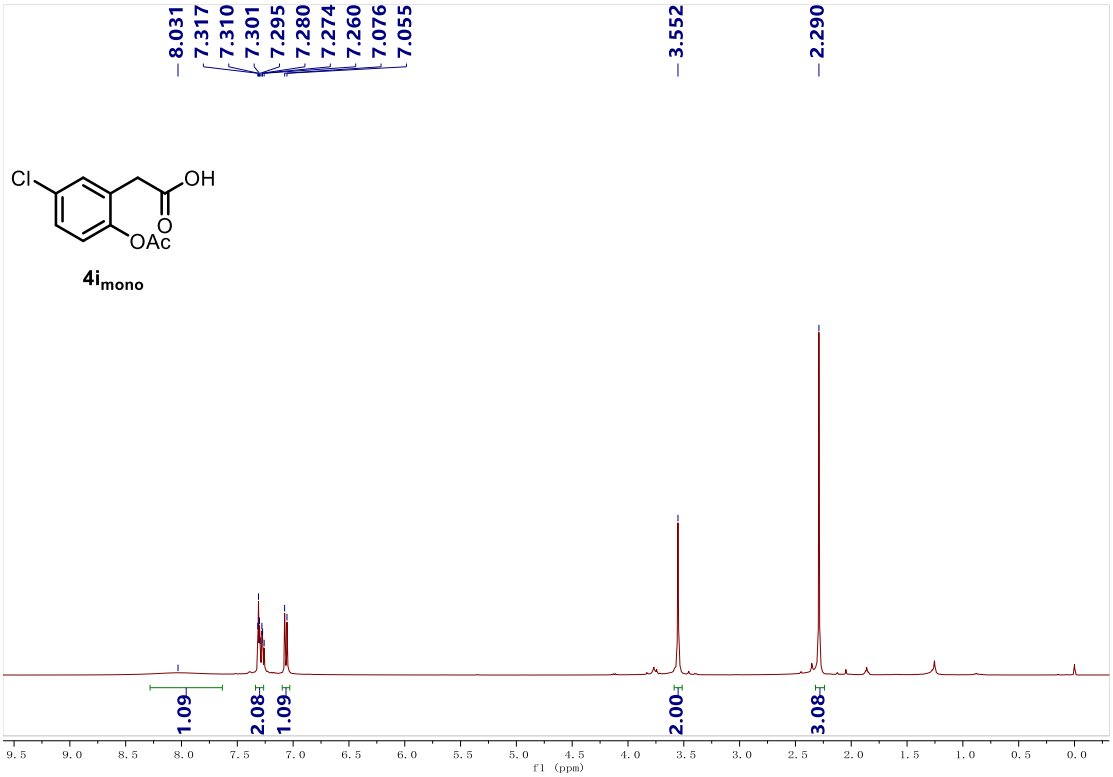

176.795
169.557
149.484
139.111
128.231
128.125
124.840
120.195
77.479
77.161
76.844
32.656
21.000
19.968
Me
OH
O
OAc
4g
f1 (ppm)

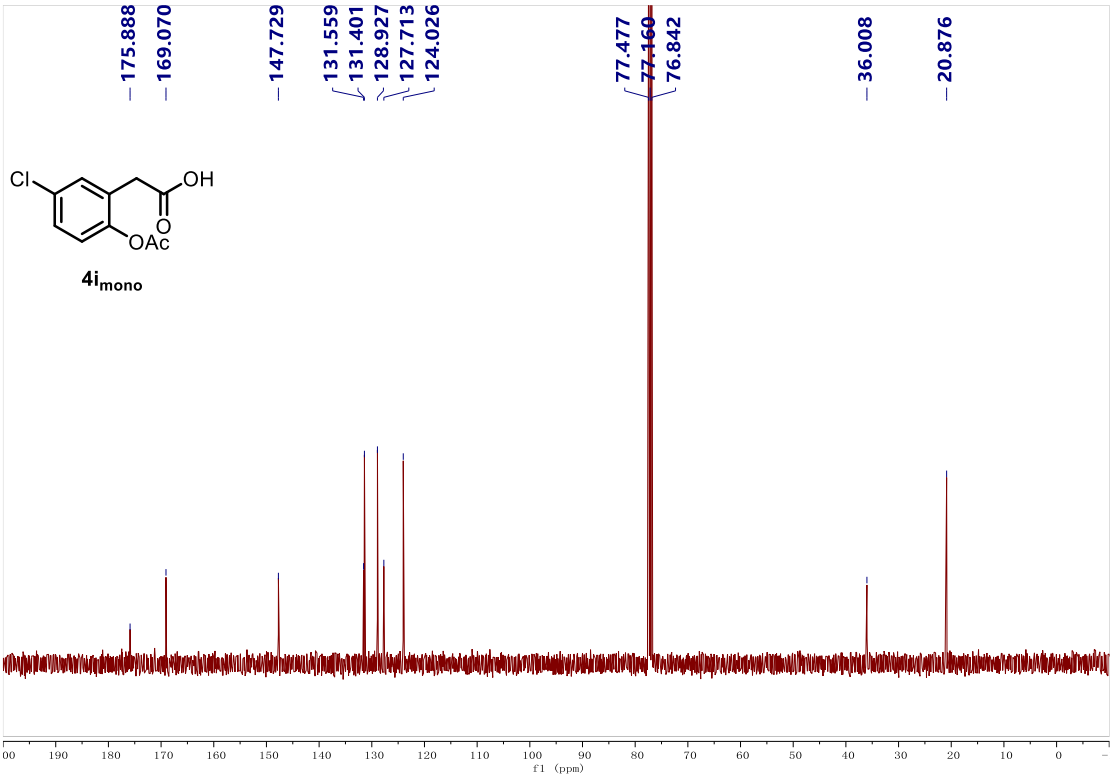

7.260
7.147
7.124
7.101
7.035
7.024
7.012
7.002
3.544
2.334
2.288
OAc
F
OH
O
OAc
4h
1.04
1.00
1.90
3.02
2.98
f1 (ppm)

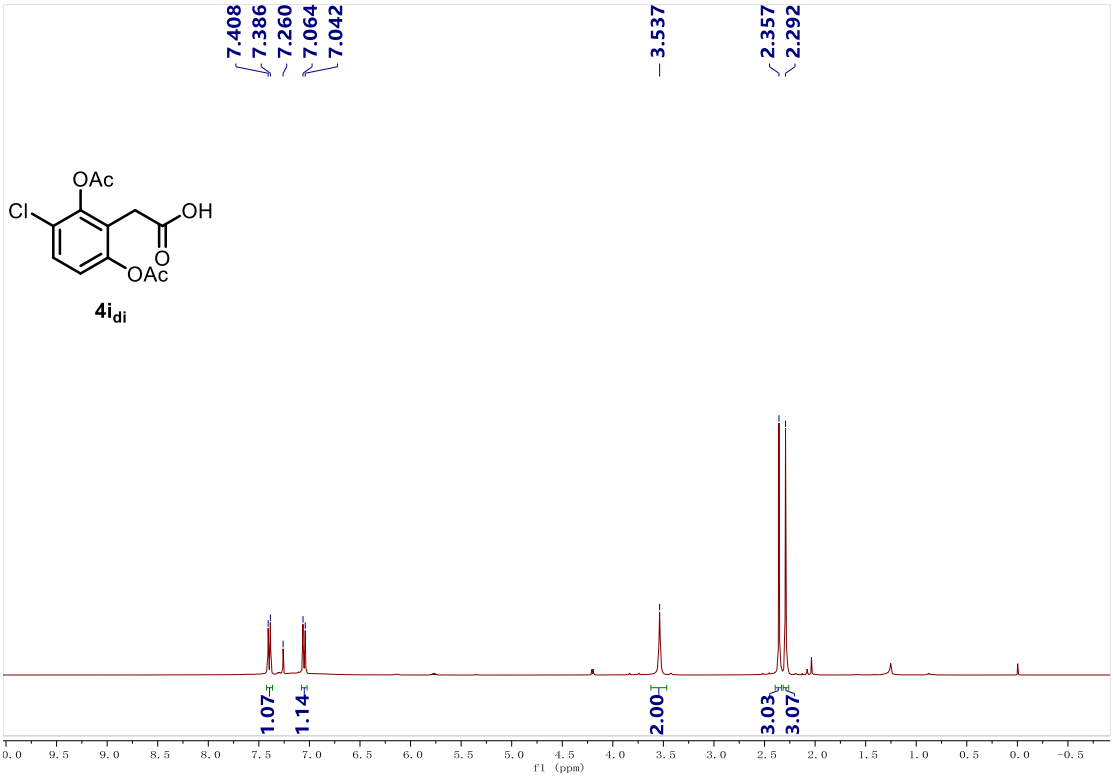

175.231
169.068
167.593
153.025
151.379
145.155
137.607
137.504
121.848
120.814
120.764
115.699
115.565
77.375
77.161
76.954
30.611
20.774
20.228
OAc
F
OH
O
OAc
4h
f1 (ppm)


-128.674
OAc
F
OH
O
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

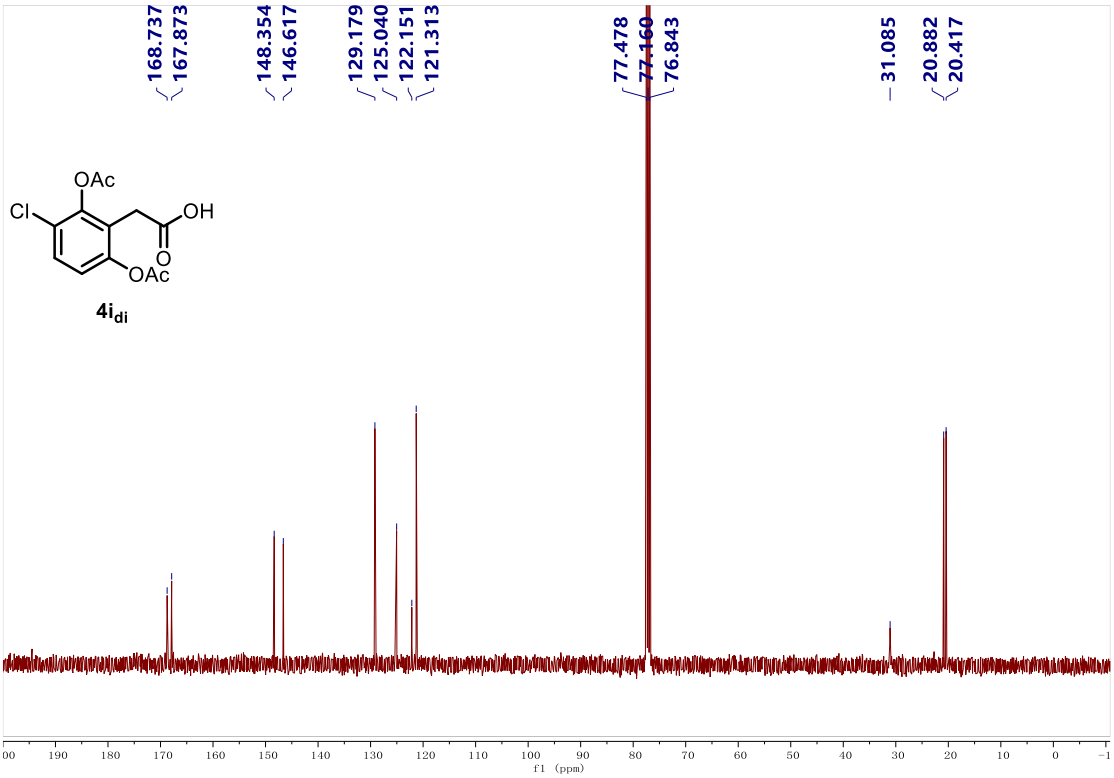
**4h**


8.031
7.317
7.310
7.301
7.295
7.280
7.274
7.260
7.076
7.055
3.552
2.290
Cl
OH
O
OAc
4imono
1.09
2.08
1.09
2.00
3.08
f1 (ppm)

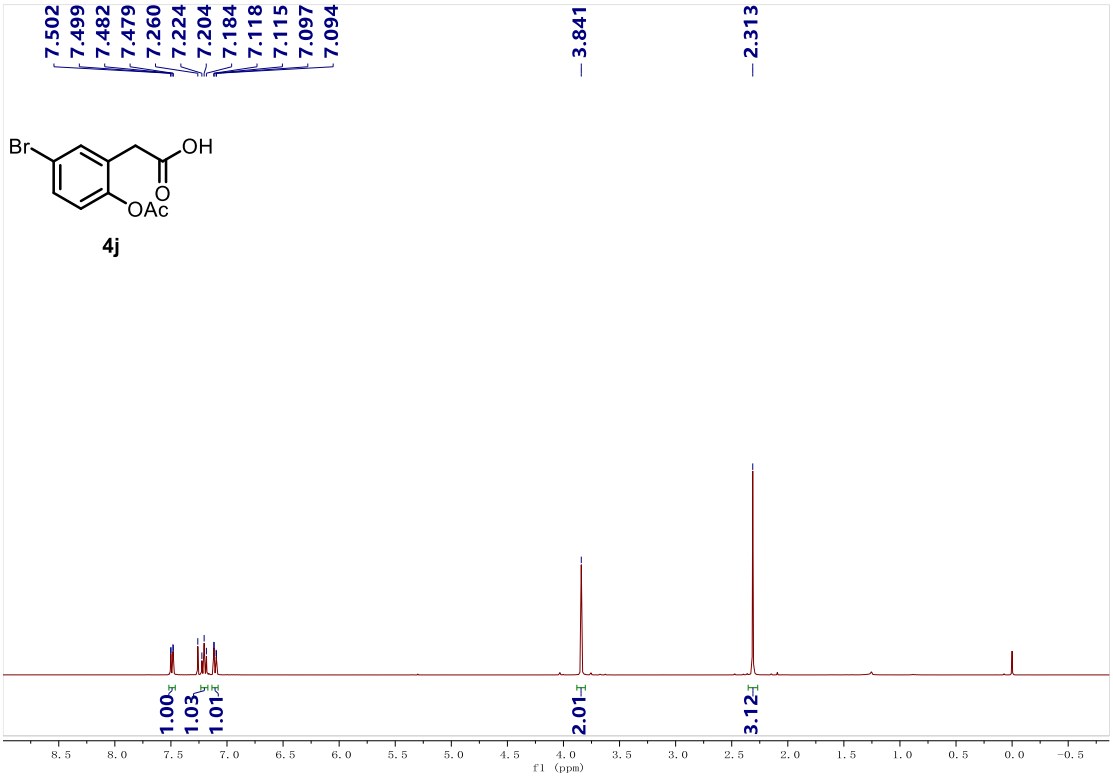

175.888
169.070
147.729
131.559
131.401
128.927
127.713
124.026
77.477
77.160
76.842
36.008
20.876
Cl
OH
O
OAc
4imono
f1 (ppm)

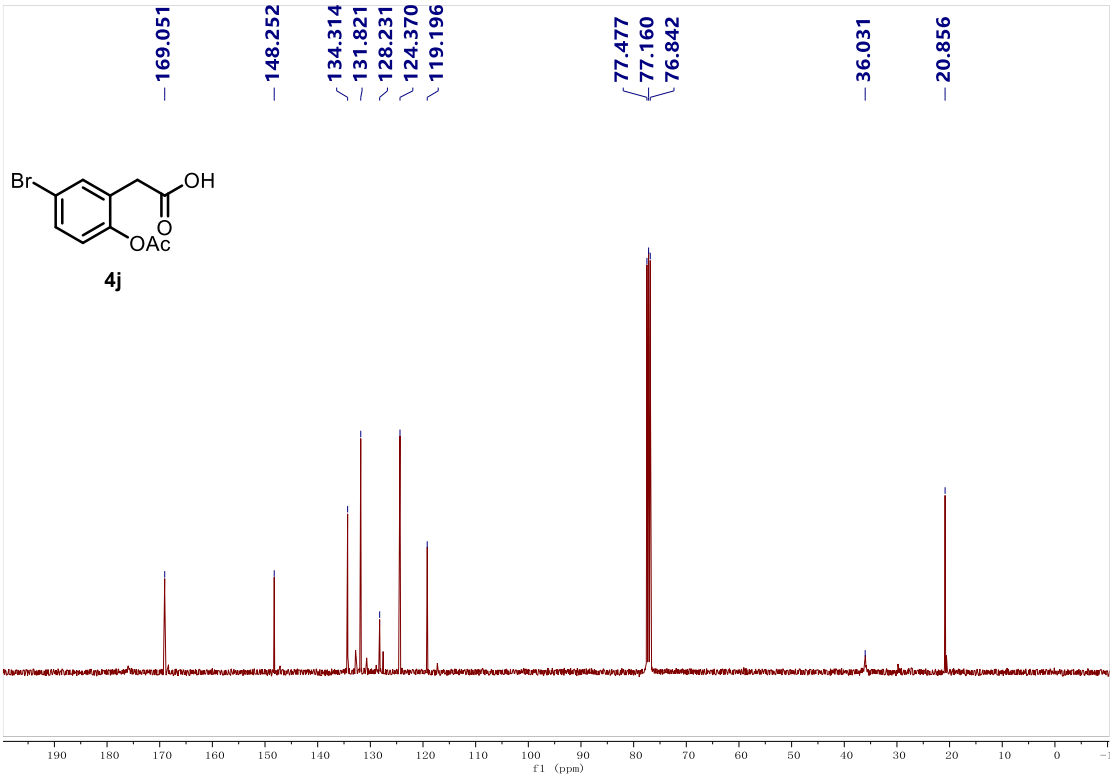

7.408
7.386
7.260
7.064
7.042
3.537
2.357
2.292
OAc
Cl
OH
O
OAc
1.07
1.14
2.00
3.03
3.07
f1 (ppm)

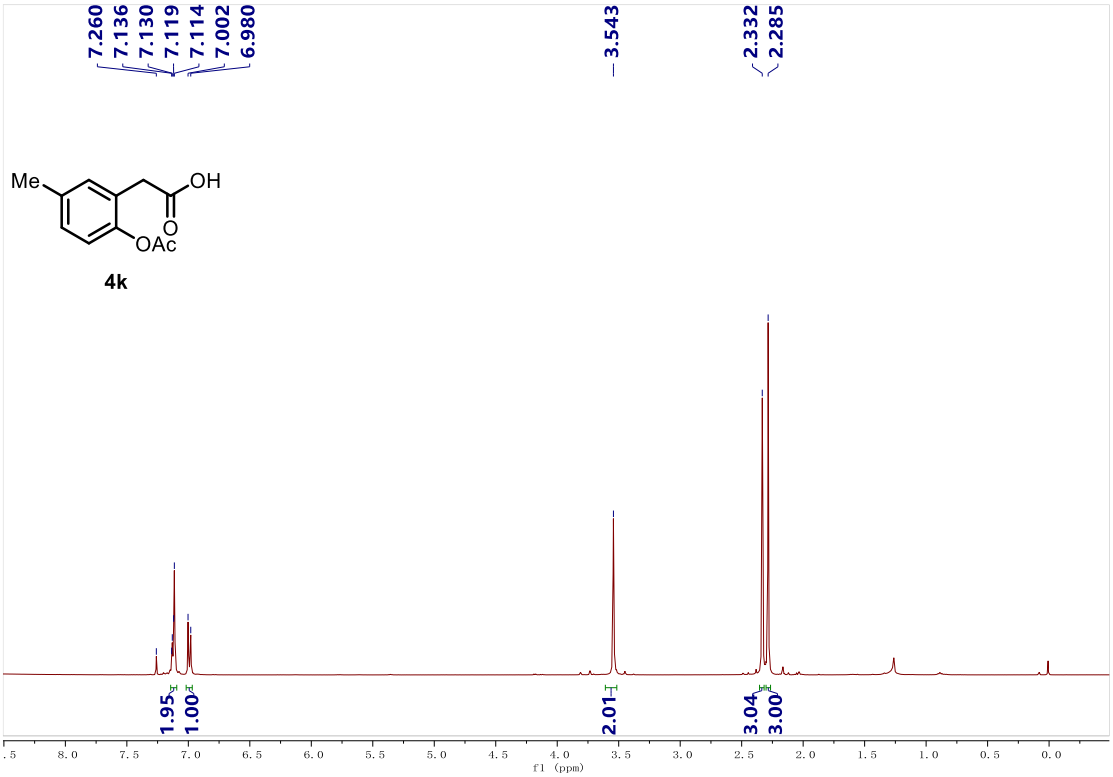
**4i$_{di}$**


168.737
167.873
148.354
146.617
129.179
125.040
122.151
121.313
77.478
77.160
76.843
31.085
20.882
20.417
OAc
Cl
OH
O
OAc
f1 (ppm)

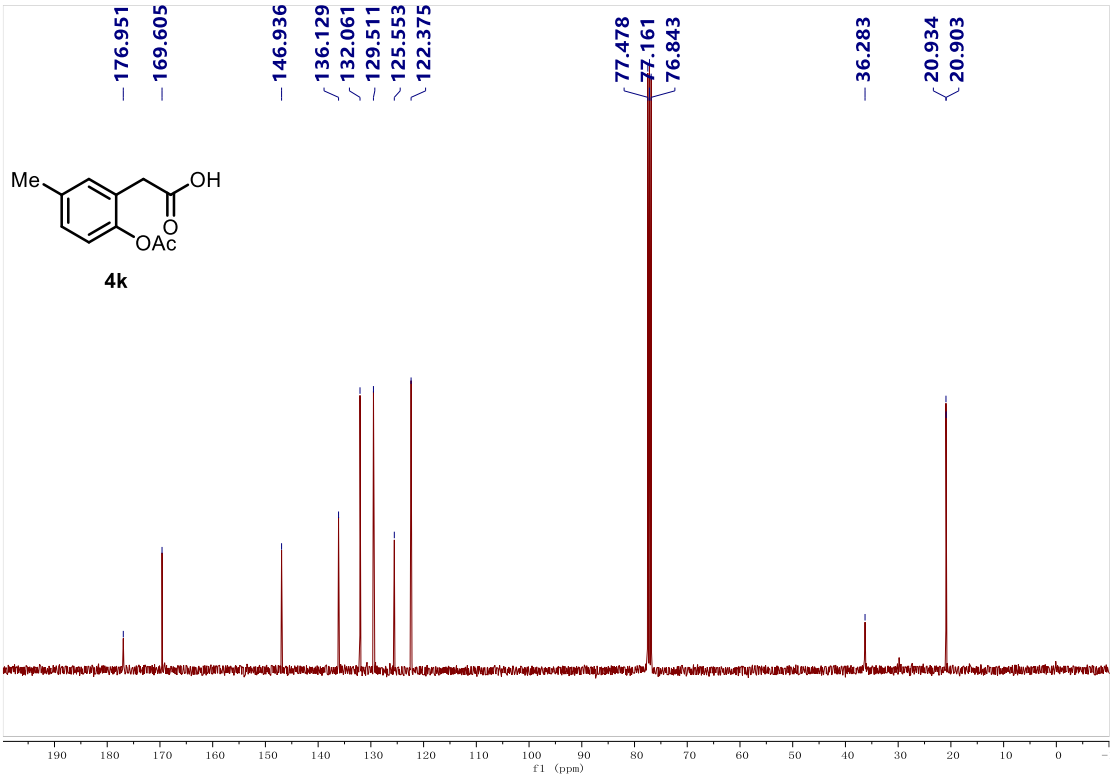
**4i$_{di}$**


7.502
7.499
7.482
7.479
7.260
7.224
7.204
7.184
7.118
7.115
7.097
7.094
3.841
2.313
Br
OH
O
OAc
4j
1.00
1.03
1.01
2.01
3.12
f1 (ppm)

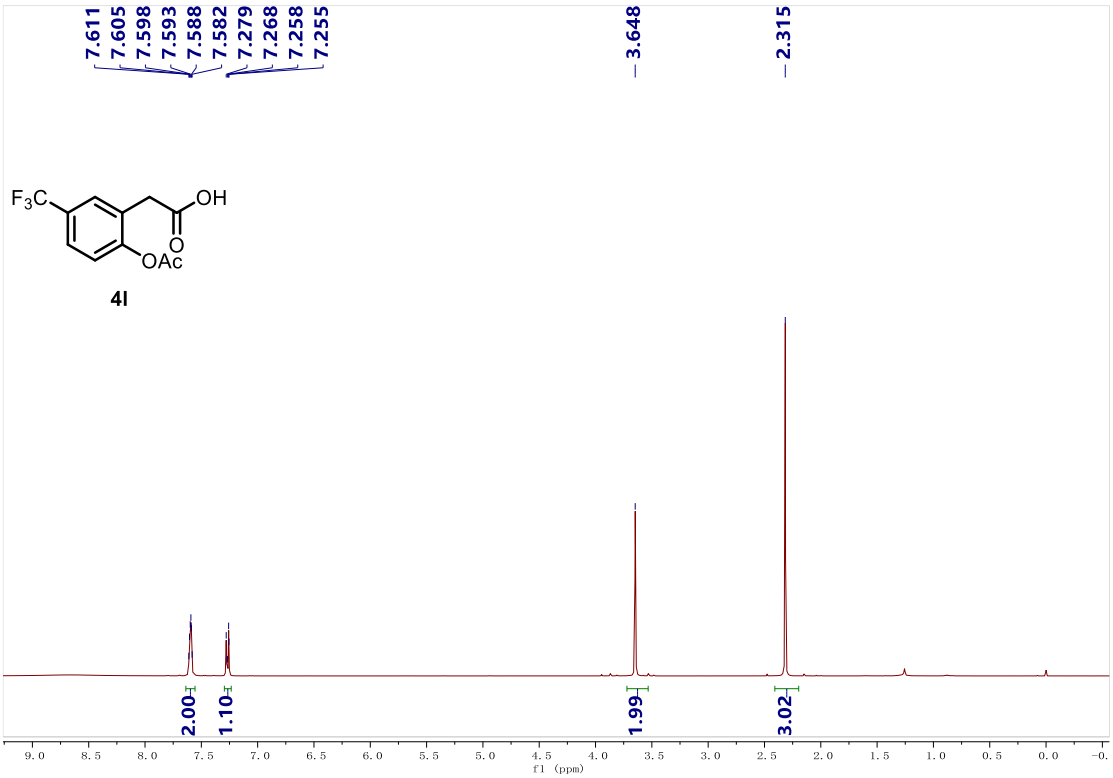

169.051
148.252
134.314
131.821
128.231
124.370
119.196
77.477
77.160
76.842
36.031
20.856
Br
OH
O
OAc
4j
f1 (ppm)

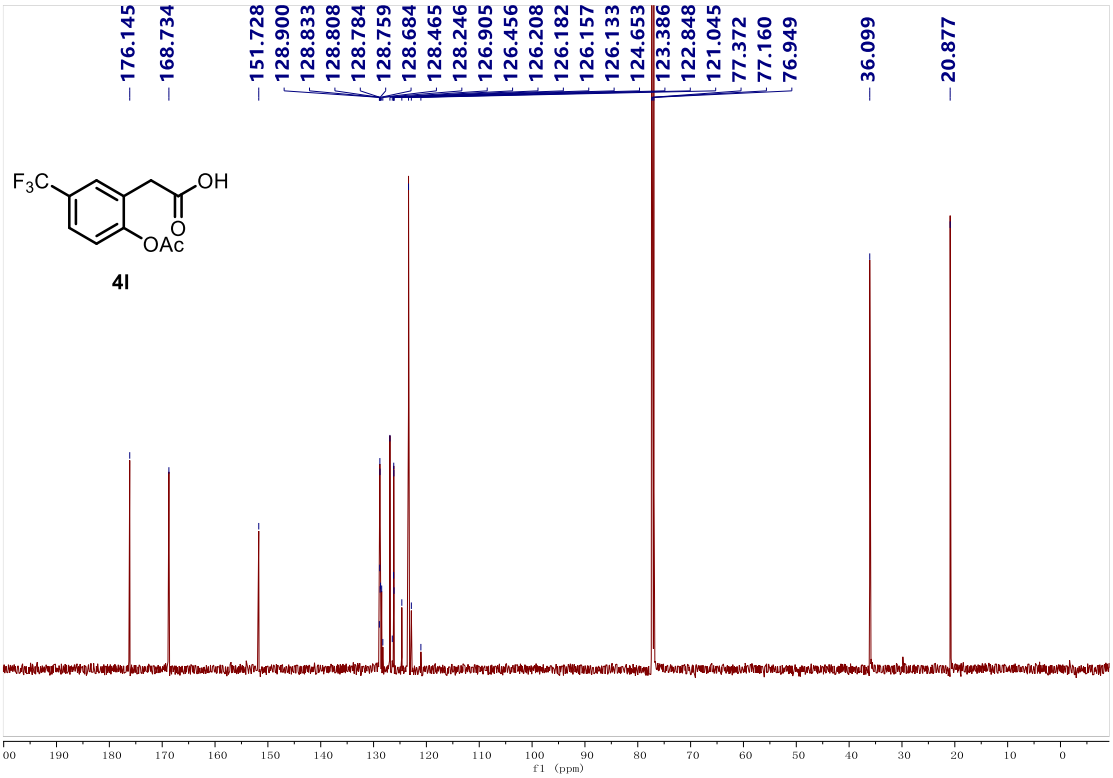

7.260
7.136
7.130
7.119
7.114
7.002
6.980
3.543
2.332
2.285
Me
OH
O
OAc
1.95
1.00
2.01
3.04
3.00
f1 (ppm)

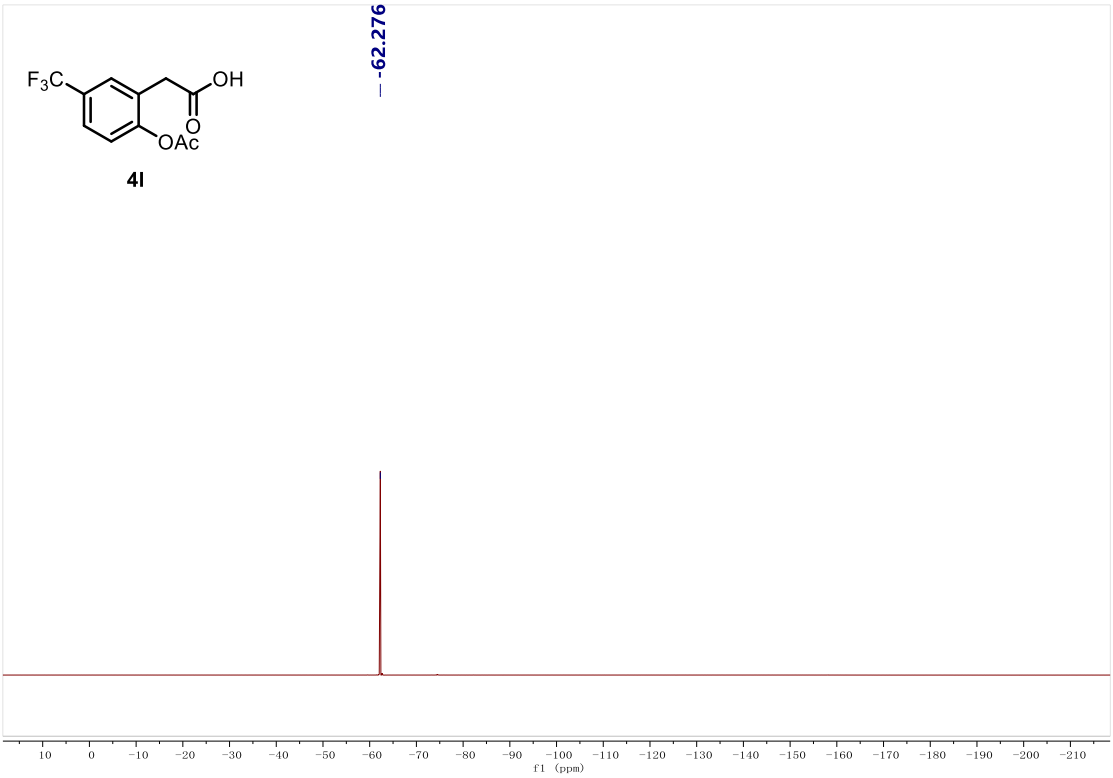
**4k**


176.951
169.605
146.936
136.129
132.061
129.511
125.553
122.375
77.478
77.161
76.843
36.283
20.934
20.903
Me
OH
O
OAc
f1 (ppm)

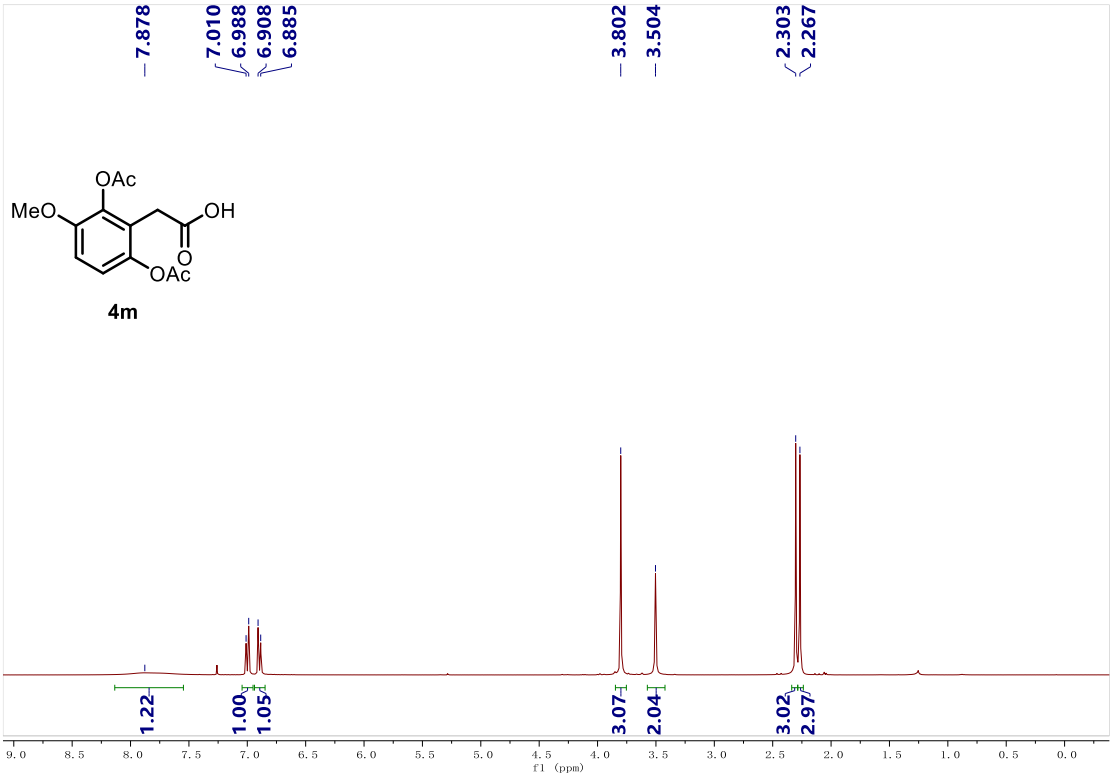
**4k**


7.611
7.605
7.598
7.593
7.588
7.582
7.279
7.268
7.258
7.255
3.648
2.315
F3C
OH
O
OAc
4l
2.00
1.10
1.99
3.02
f1 (ppm)

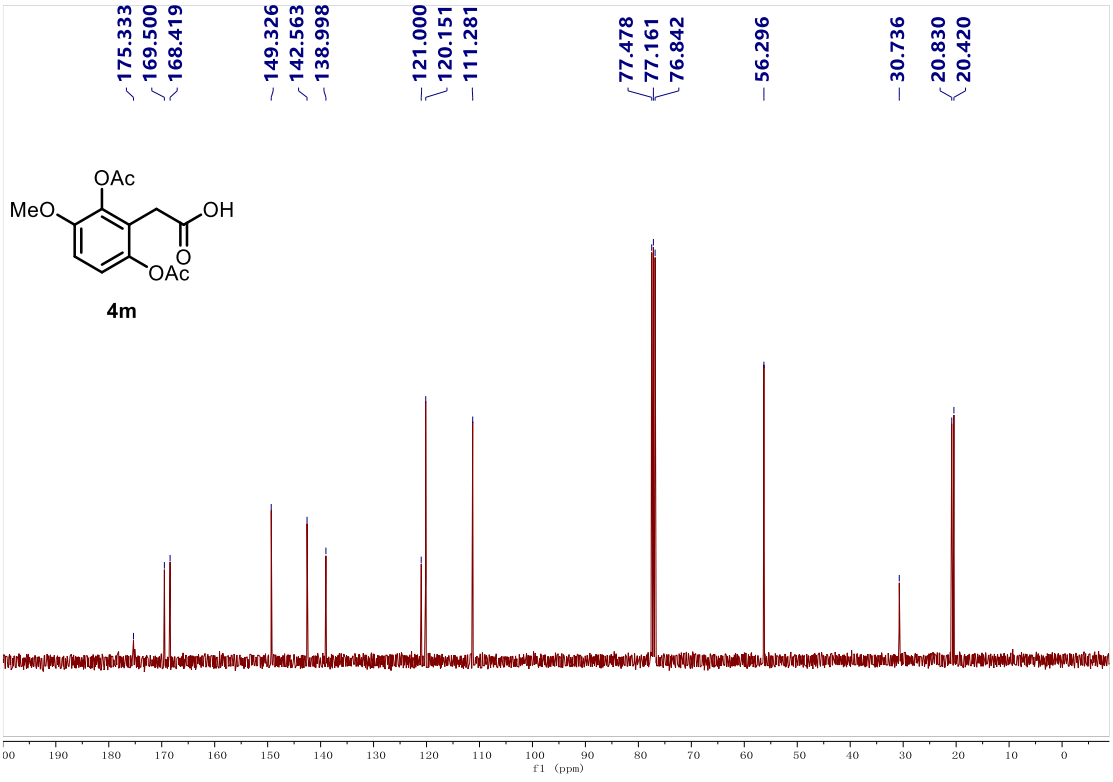

176.145
168.734
151.728
128.900
128.833
128.808
128.784
128.759
128.684
128.465
128.246
126.905
126.456
126.208
126.182
126.157
126.133
124.653
123.386
122.848
121.045
77.372
77.160
76.949
36.099
20.877
F3C
OH
O
OAc
4l
f1 (ppm)


F3C
OH
O
OAc
-62.276
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

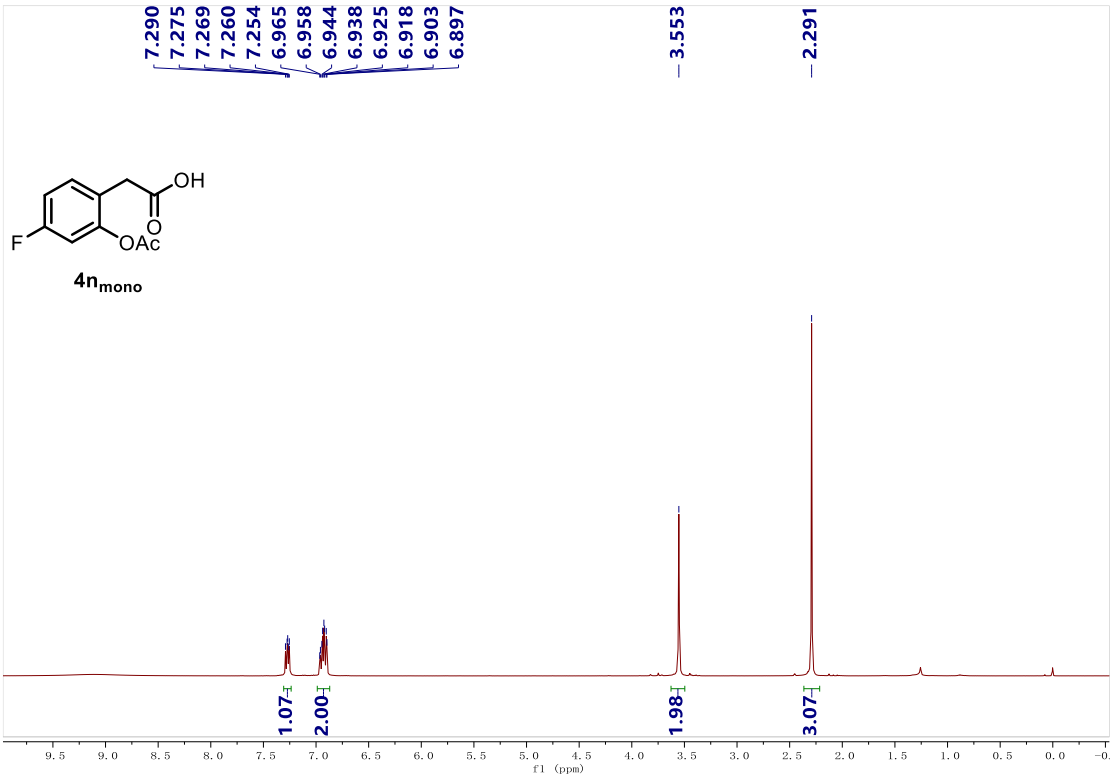
**4l**


7.878
7.010
6.988
6.908
6.885
3.802
3.504
2.303
2.267
OAc
MeO
OH
O
OAc
1.22
1.00
1.05
3.07
2.04
3.02
2.97
f1 (ppm)

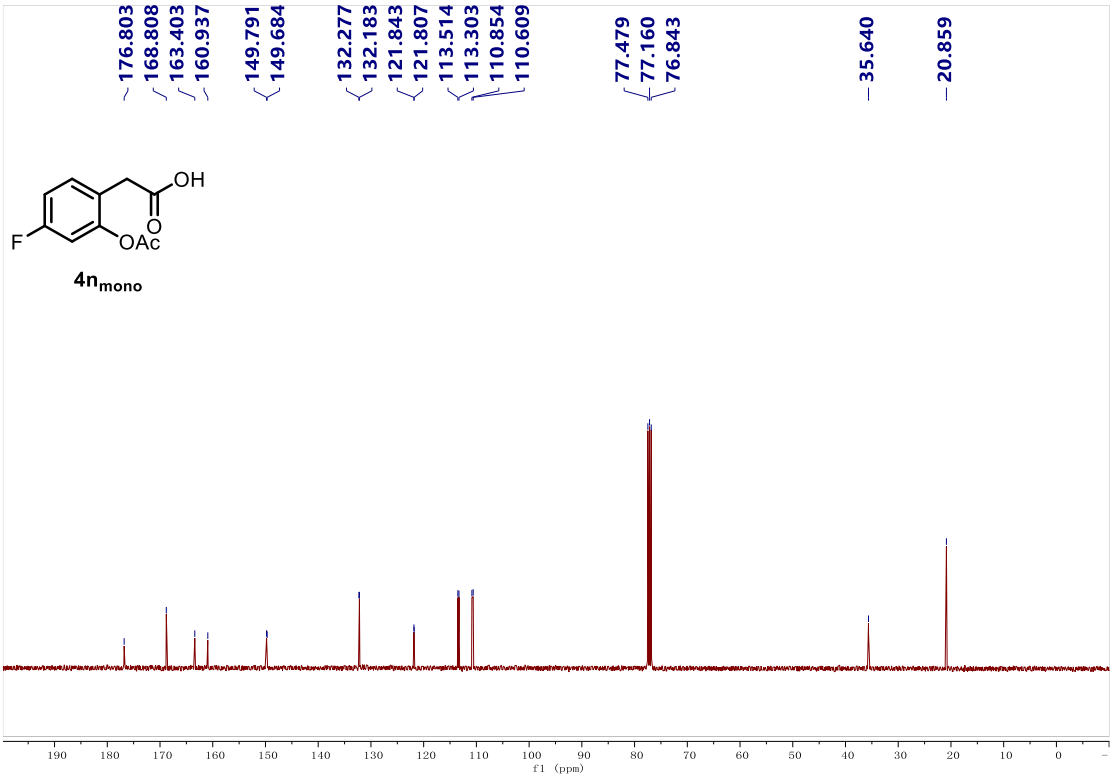
**4m**


175.333
169.500
168.419
149.326
142.563
138.998
121.000
120.151
111.281
77.478
77.161
76.842
56.296
30.736
20.830
20.420
OAc
MeO
OH
O
OAc
f1 (ppm)

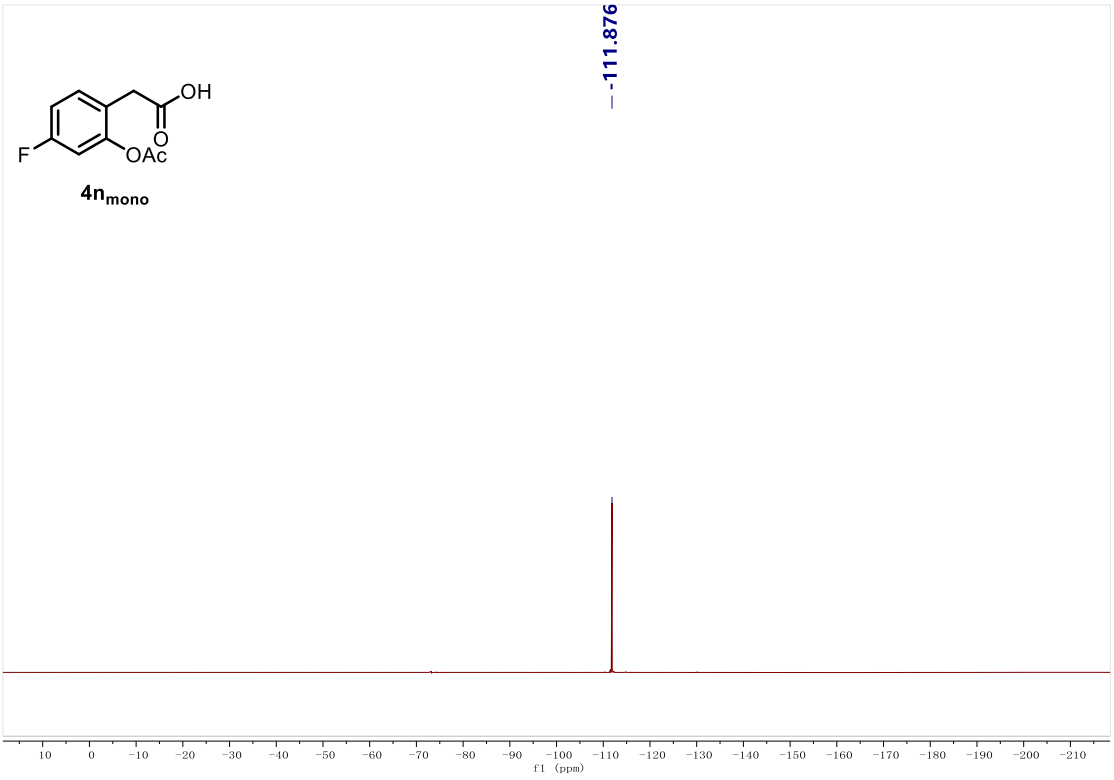
**4m**



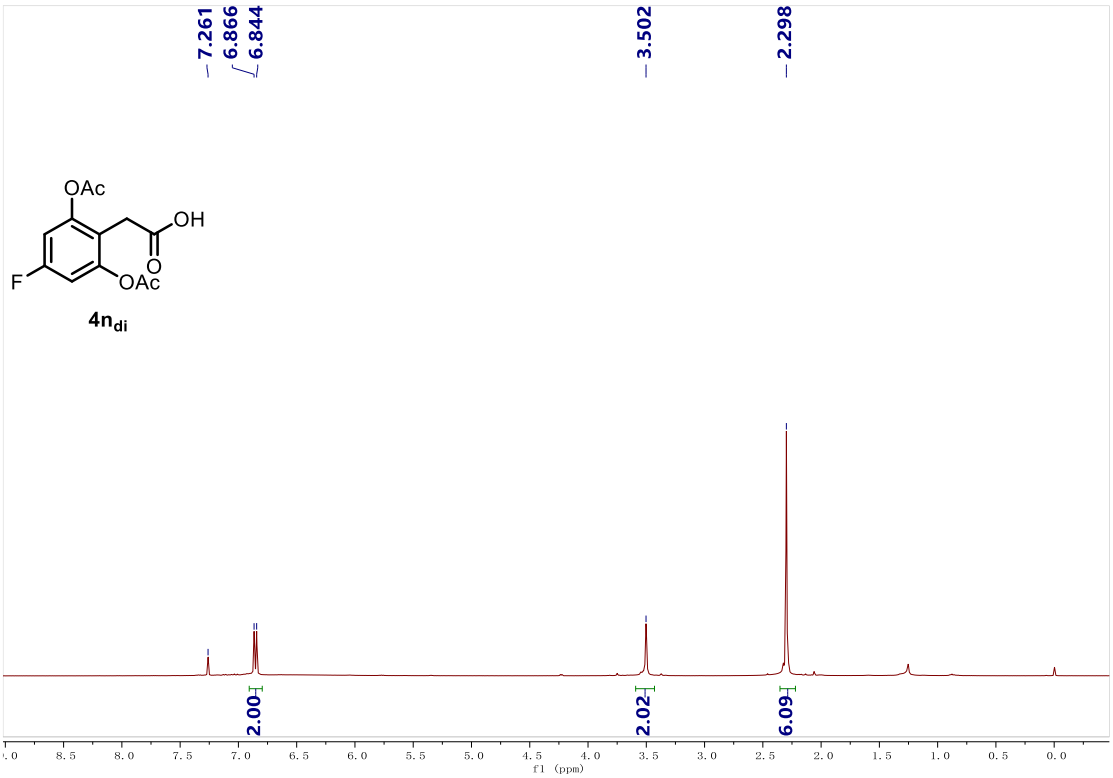

**4n$_{mono}$**



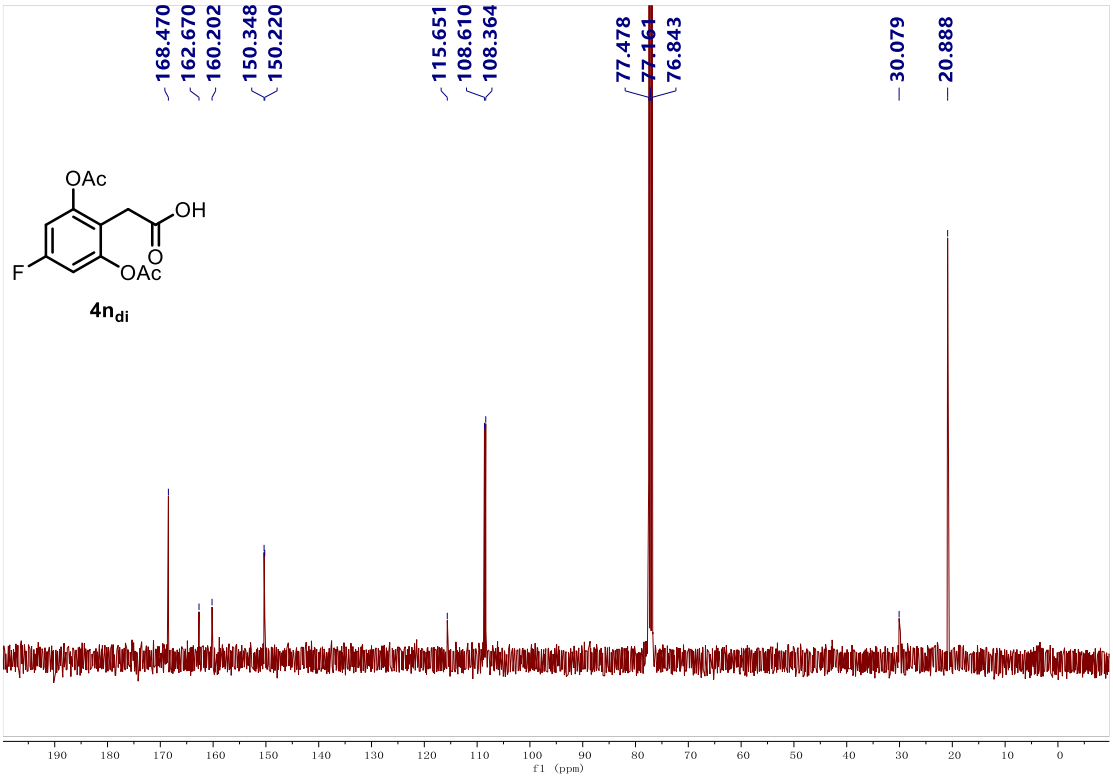

**4n$_{mono}$**


OH
O
F
OAc
-111.876
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

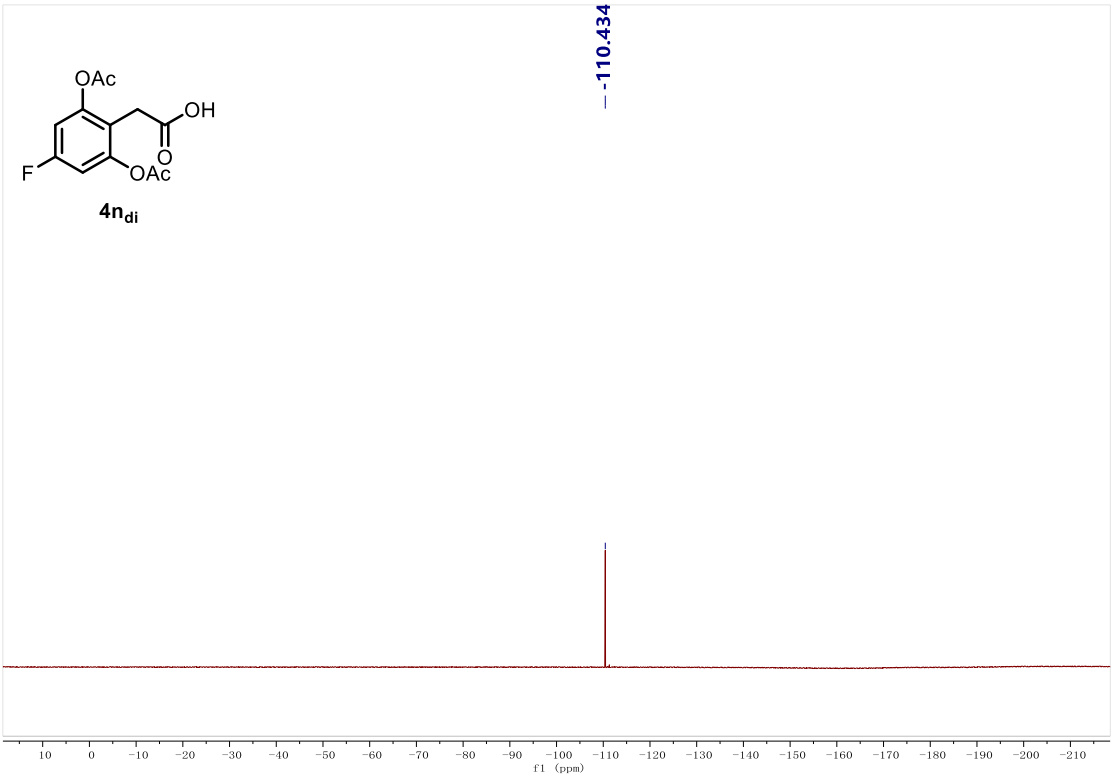
**4n$_{mono}$**


7.261
6.866
6.844
3.502
2.298
OAc
OH
O
F
OAc
2.00
2.02
6.09
f1 (ppm)

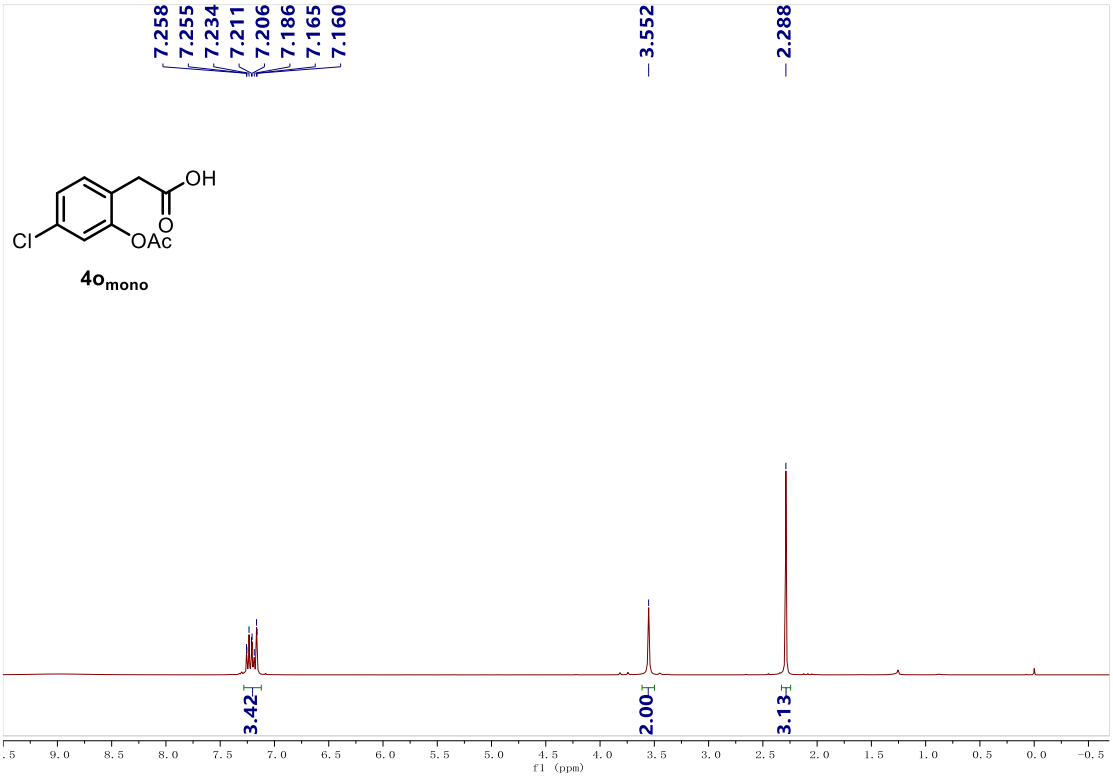
**4n$_{di}$**

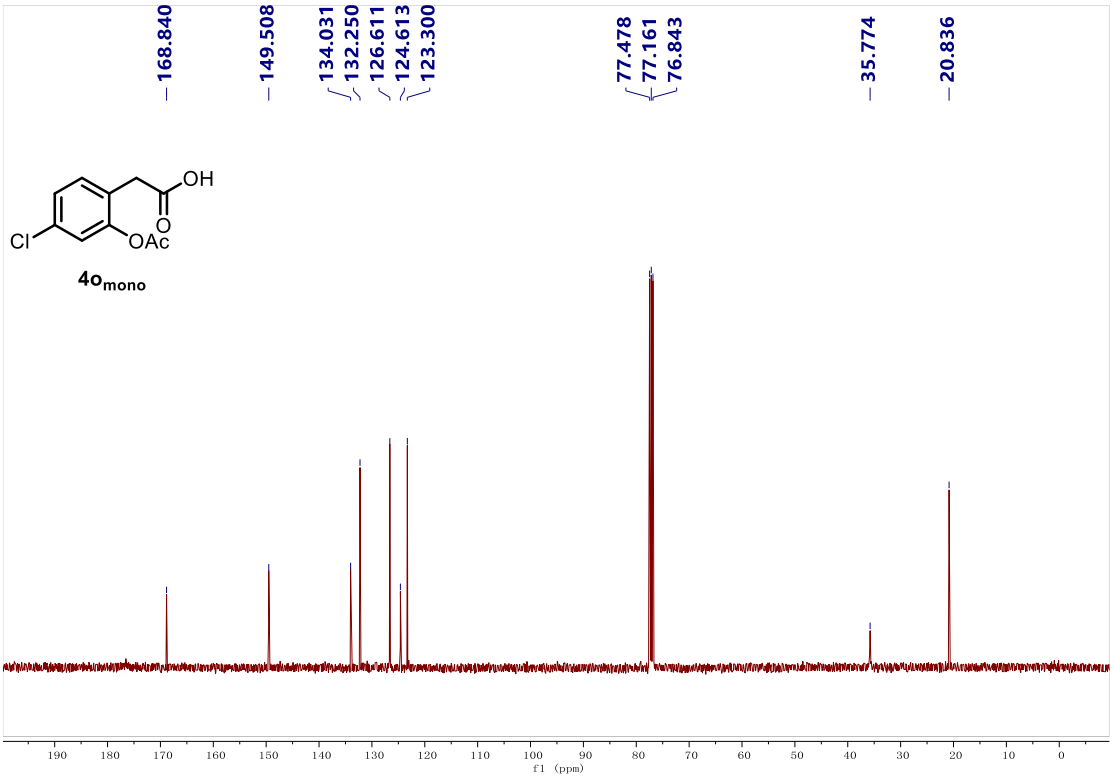

168.470
162.670
160.202
150.348
150.220
115.651
108.610
108.364
77.478
77.161
76.843
30.079
20.888
OAc
OH
O
F
OAc
f1 (ppm)

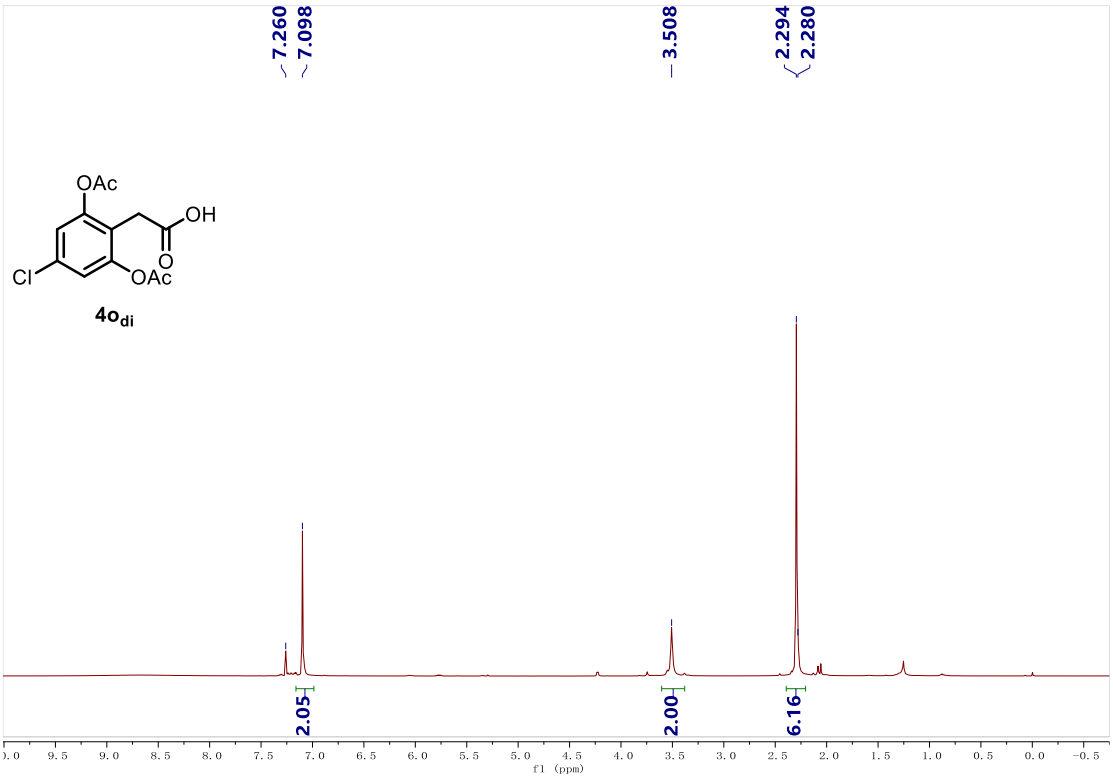
**4n$_{di}$**

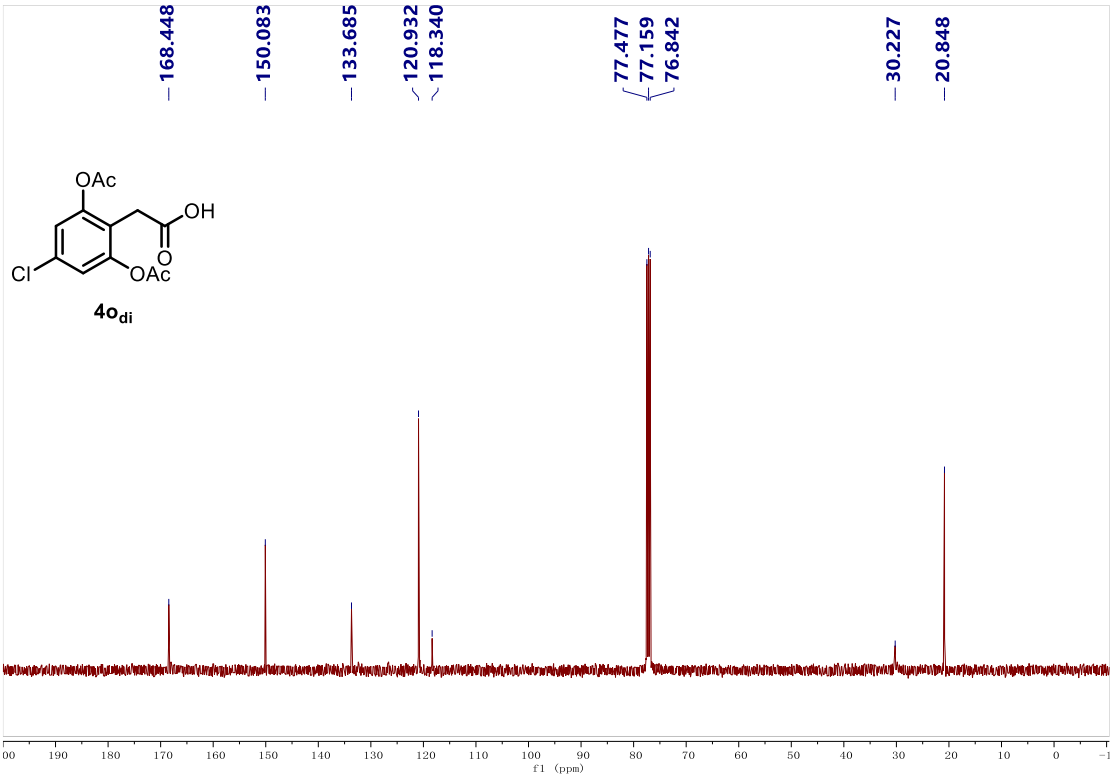

OAc
OH
O
F
OAc
-110.434
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

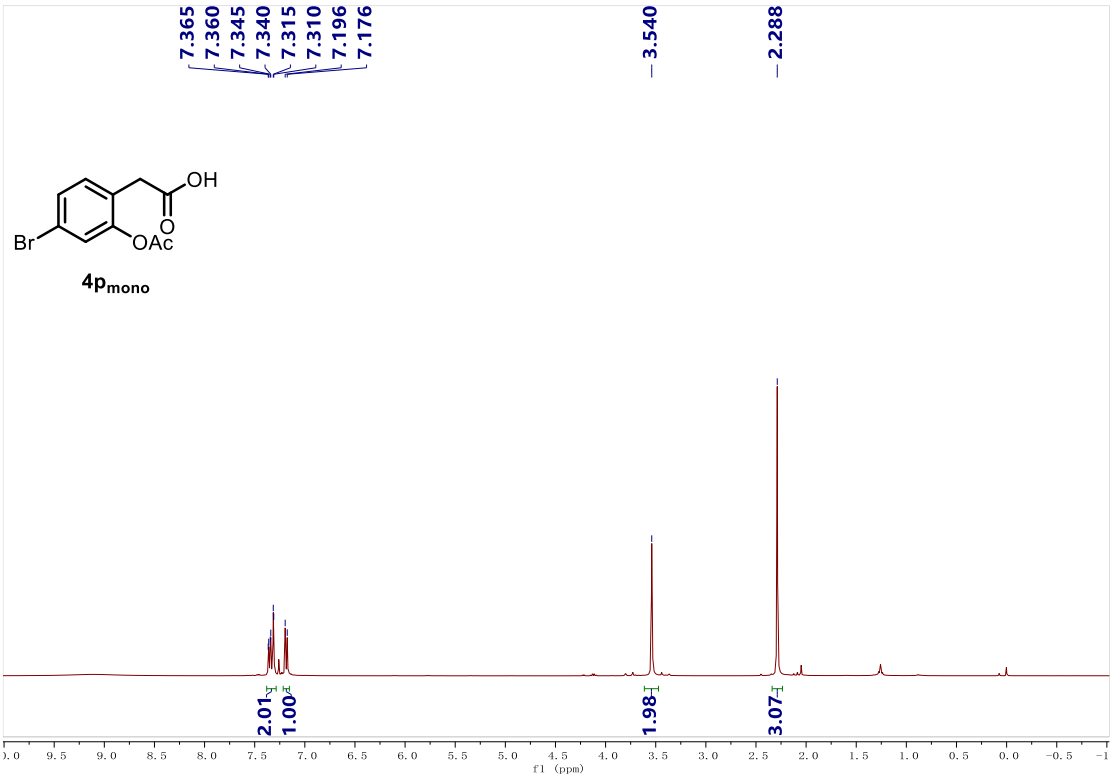
**4n$_{di}$**


7.258
7.255
7.234
7.211
7.206
7.186
7.165
7.160
3.552
2.288
OH
O
Cl
OAc
4o mono
3.42
2.00
3.13
f1 (ppm)

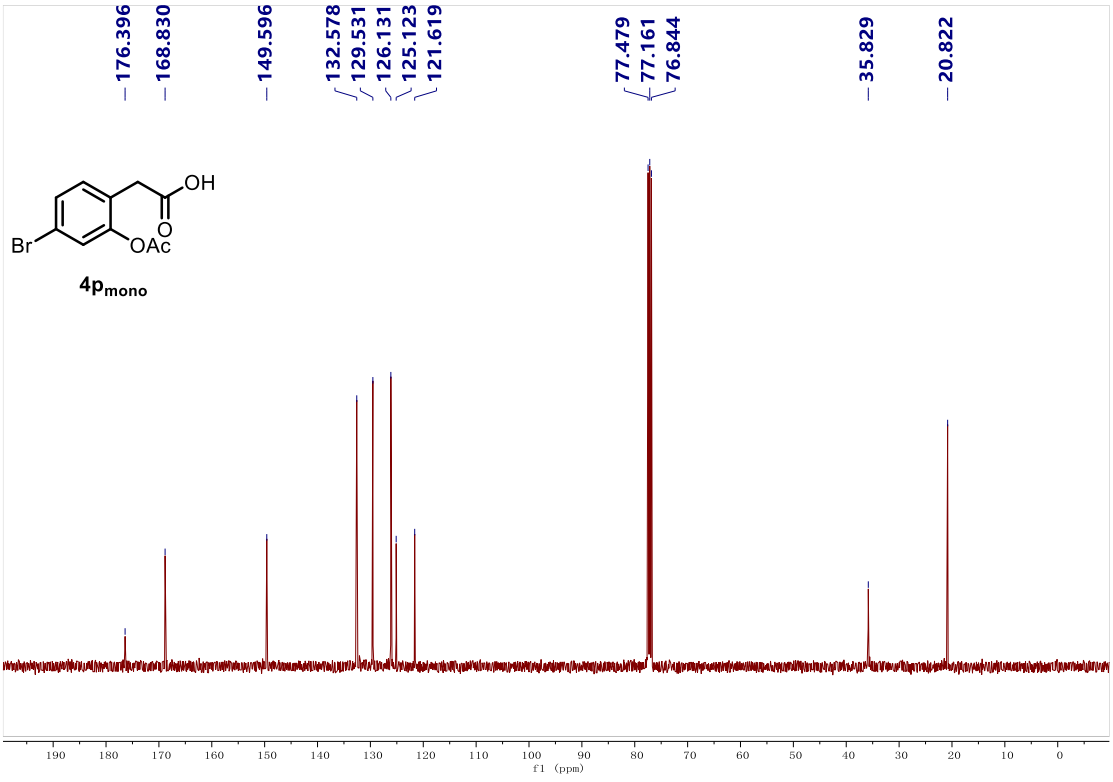

168.840
149.508
134.031
132.250
126.611
124.613
123.300
77.478
77.161
76.843
35.774
20.836
OH
O
Cl
OAc
4o mono
f1 (ppm)


7.260
7.098
3.508
2.294
2.280
OAc
OH
O
Cl
OAc
4o_di
2.05
2.00
6.16
f1 (ppm)

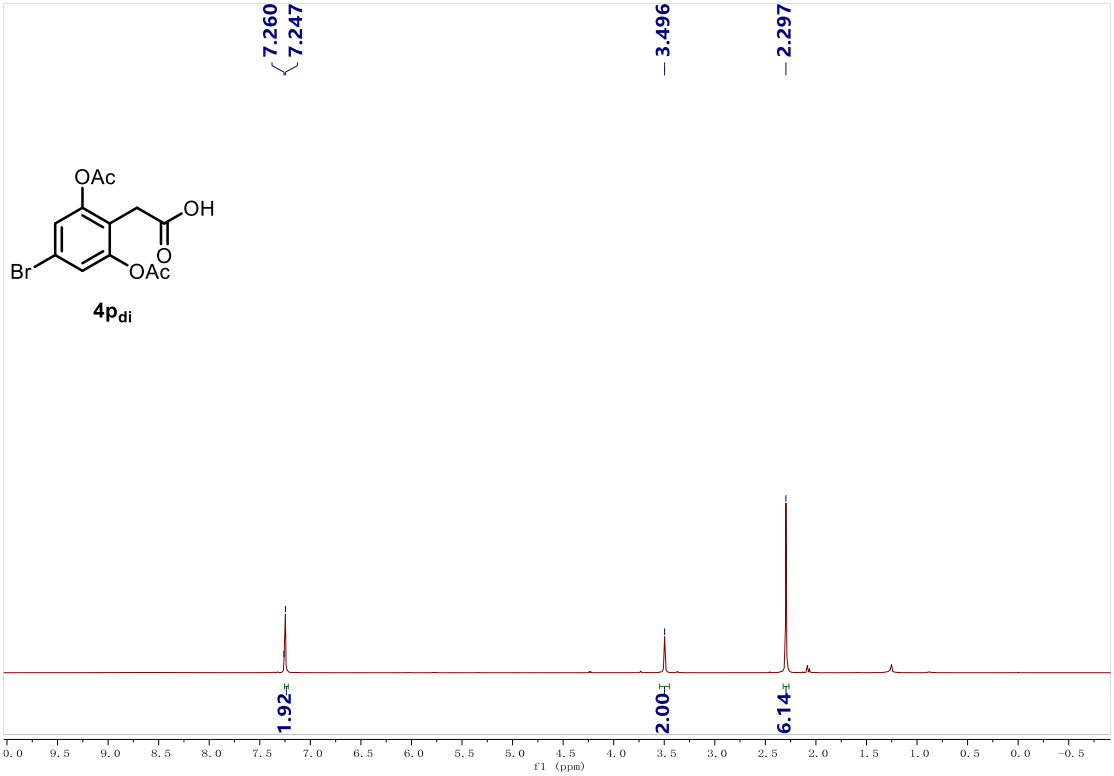

168.448
150.083
133.685
120.932
118.340
77.477
77.159
76.842
30.227
20.848
OAc
OH
O
Cl
OAc
4o_di
f1 (ppm)



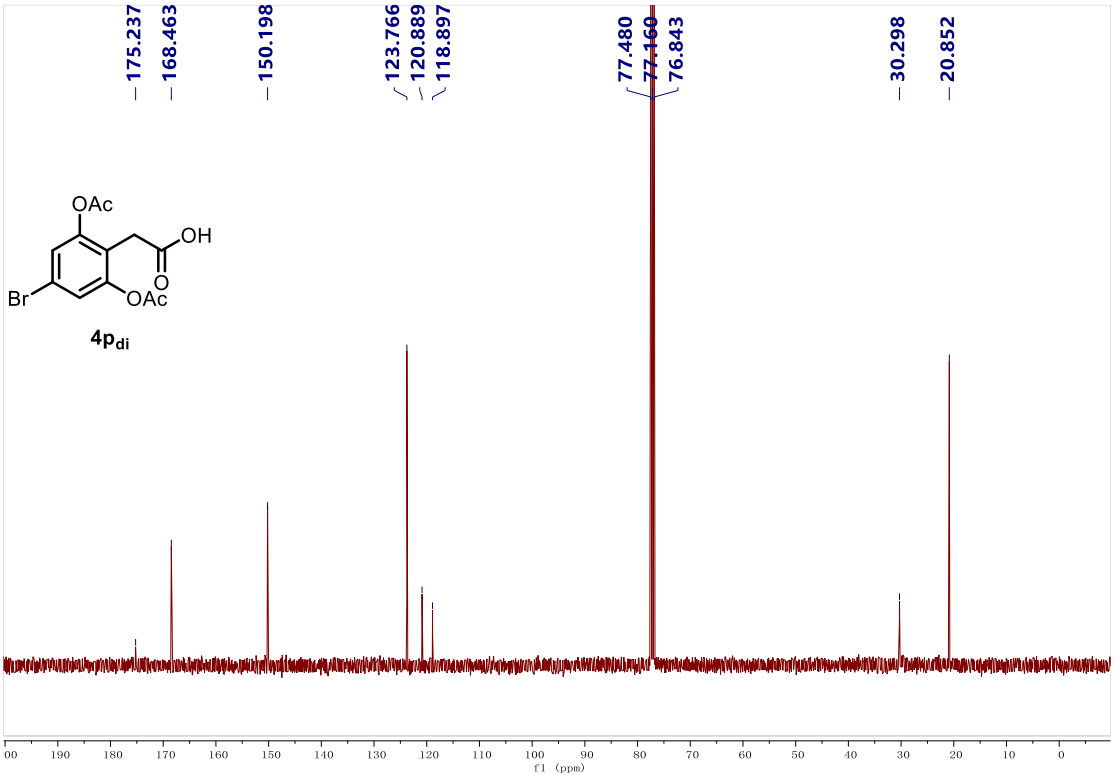

**4p$_{mono}$**



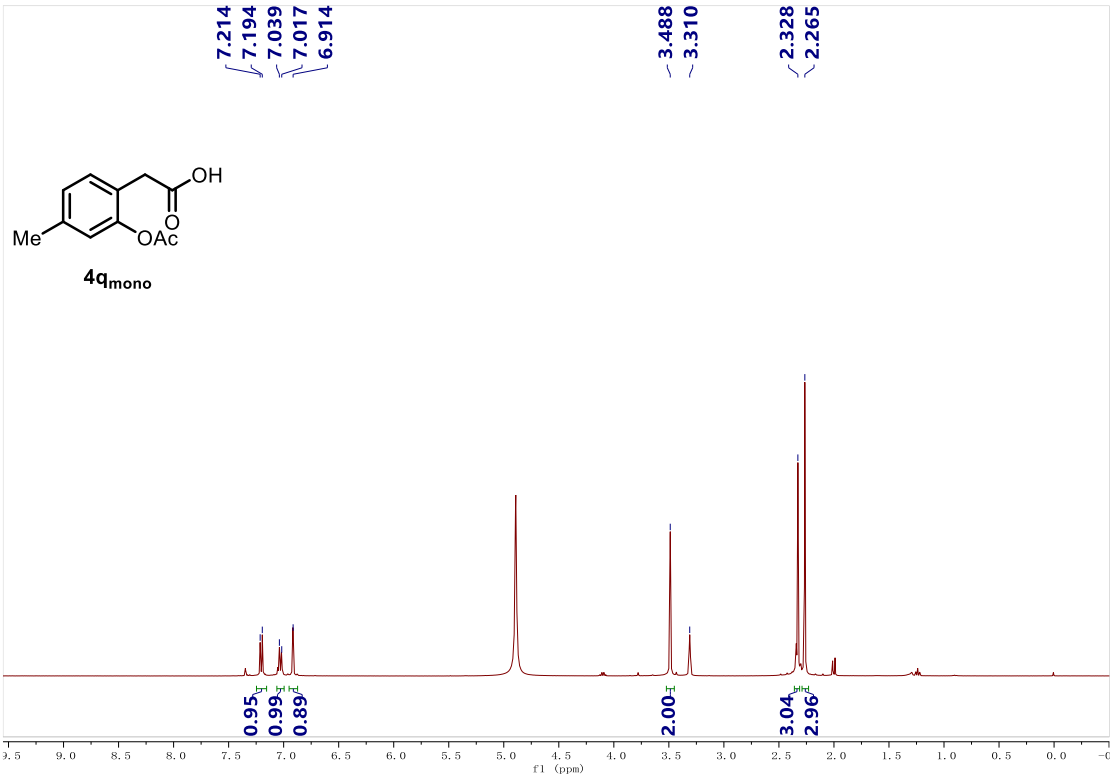

**4p$_{mono}$**

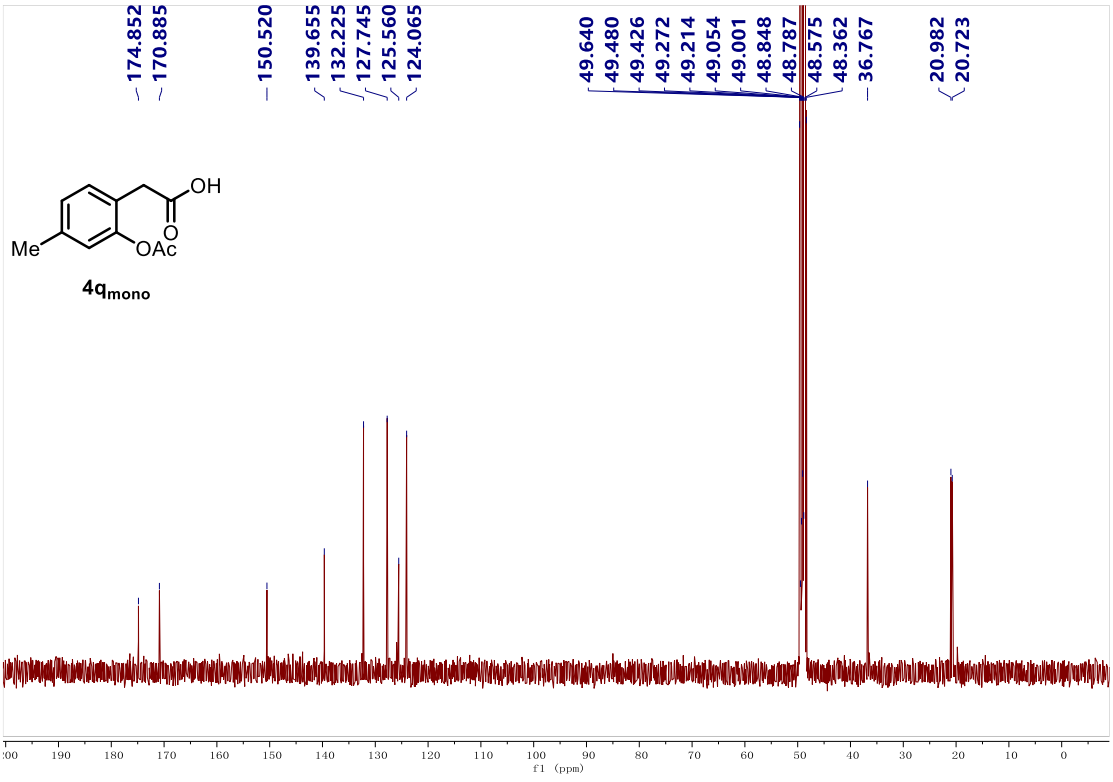

7.260
7.247
3.496
2.297
OAc
OH
O
Br
OAc
1.92
2.00
6.14
f1 (ppm)

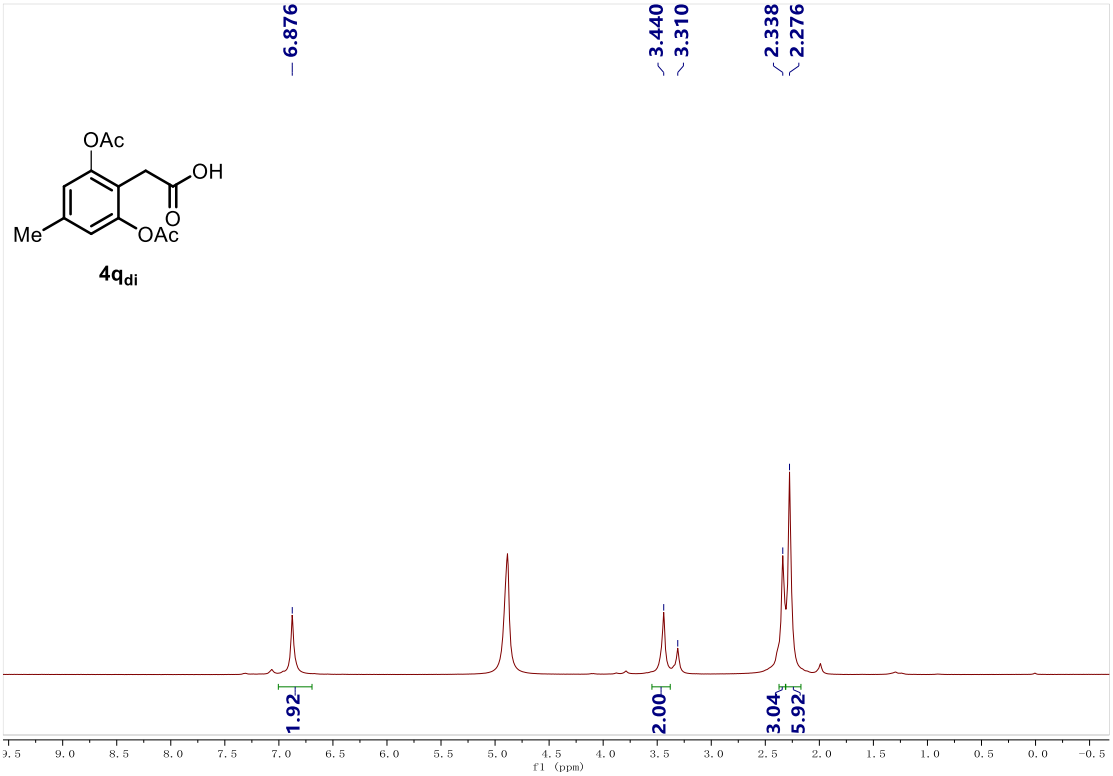
**4p$_{di}$**

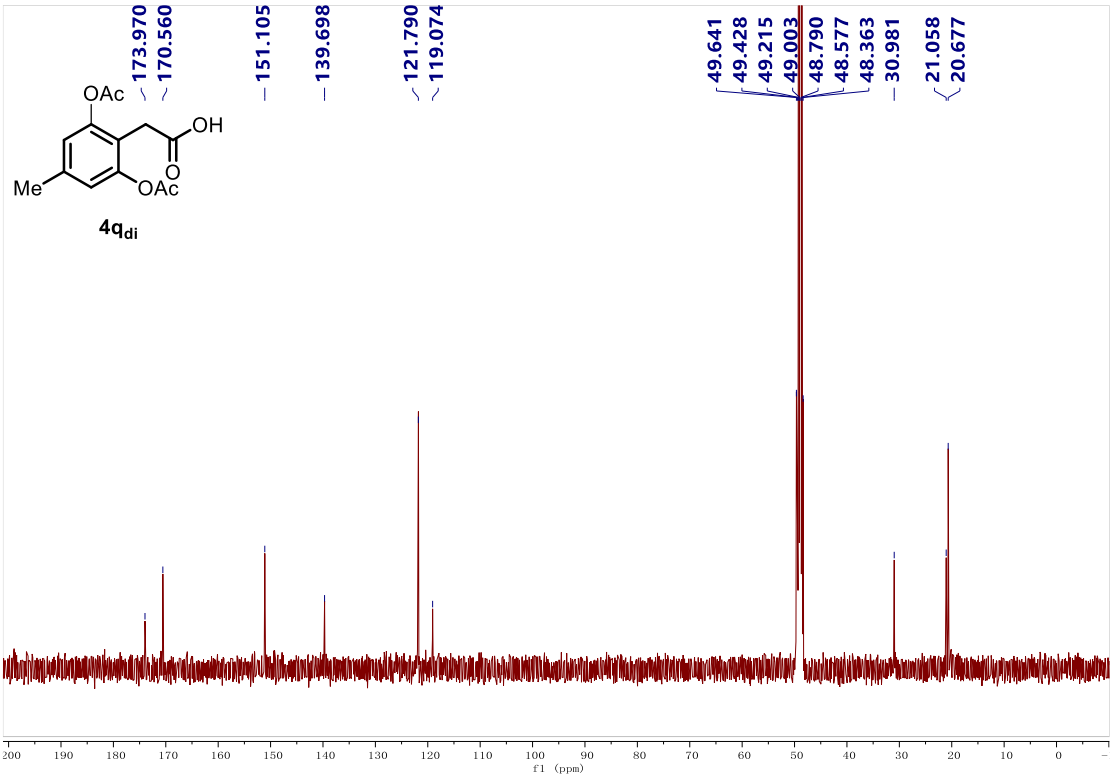

175.237
168.463
150.198
123.766
120.889
118.897
77.480
77.160
76.843
30.298
20.852
OAc
OH
O
Br
OAc
f1 (ppm)

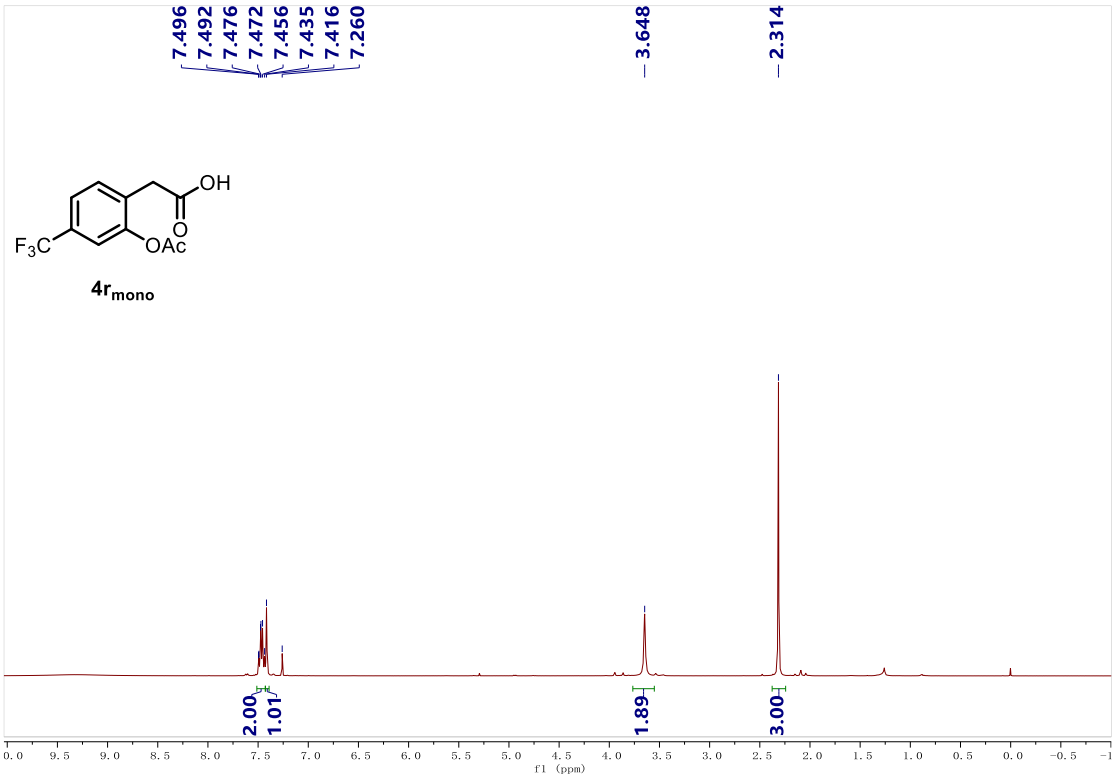
**4p$_{di}$**

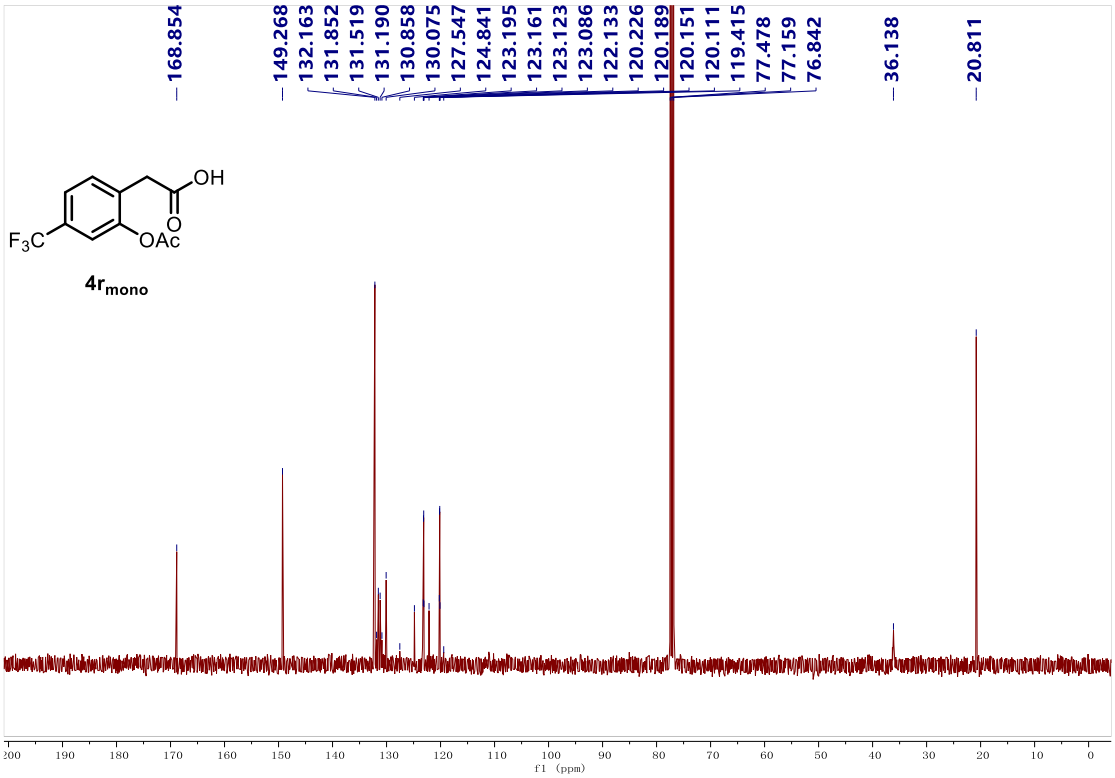

7.214
7.194
7.039
7.017
6.914
3.488
3.310
2.328
2.265
OH
O
Me
OAc
4q mono
0.95
0.99
0.89
2.00
3.04
2.96
f1 (ppm)

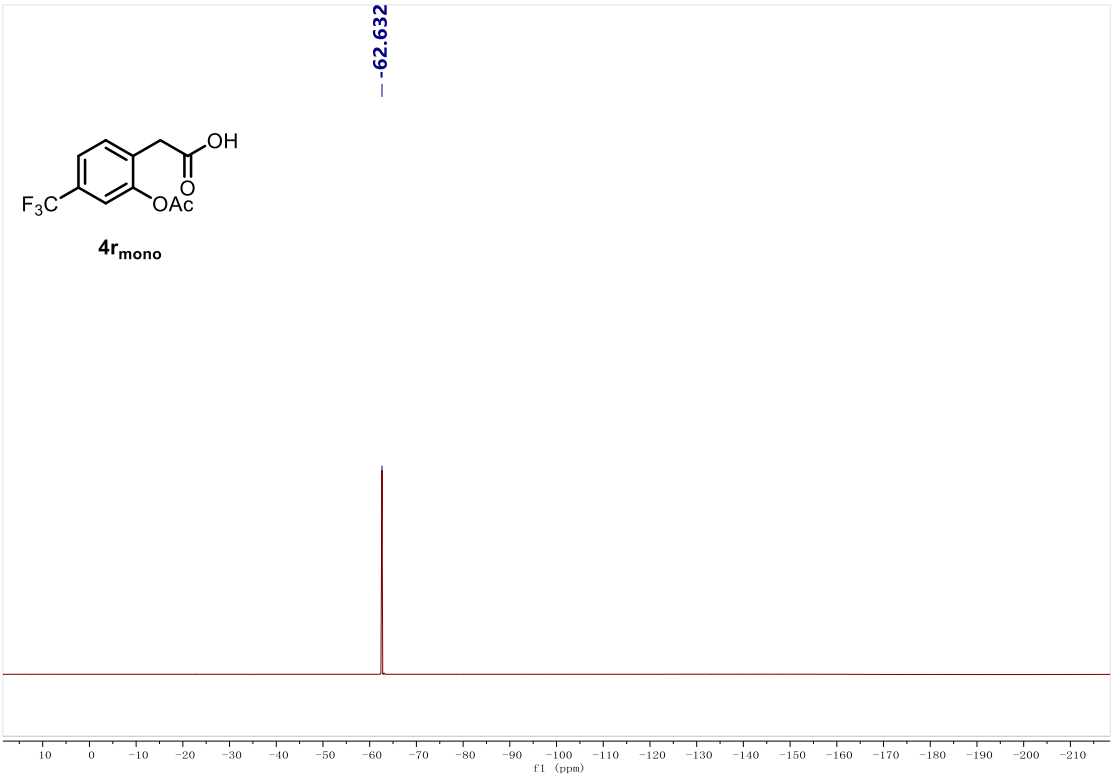

174.852
170.885
150.520
139.655
132.225
127.745
125.560
124.065
49.640
49.480
49.426
49.272
49.214
49.054
49.001
48.848
48.787
48.575
48.362
36.767
20.982
20.723
OH
O
Me
OAc
4q mono
f1 (ppm)


6.876
3.440
3.310
2.338
2.276
OAc
OH
O
Me
OAc
4q di
1.92
2.00
3.04
5.92
f1 (ppm)

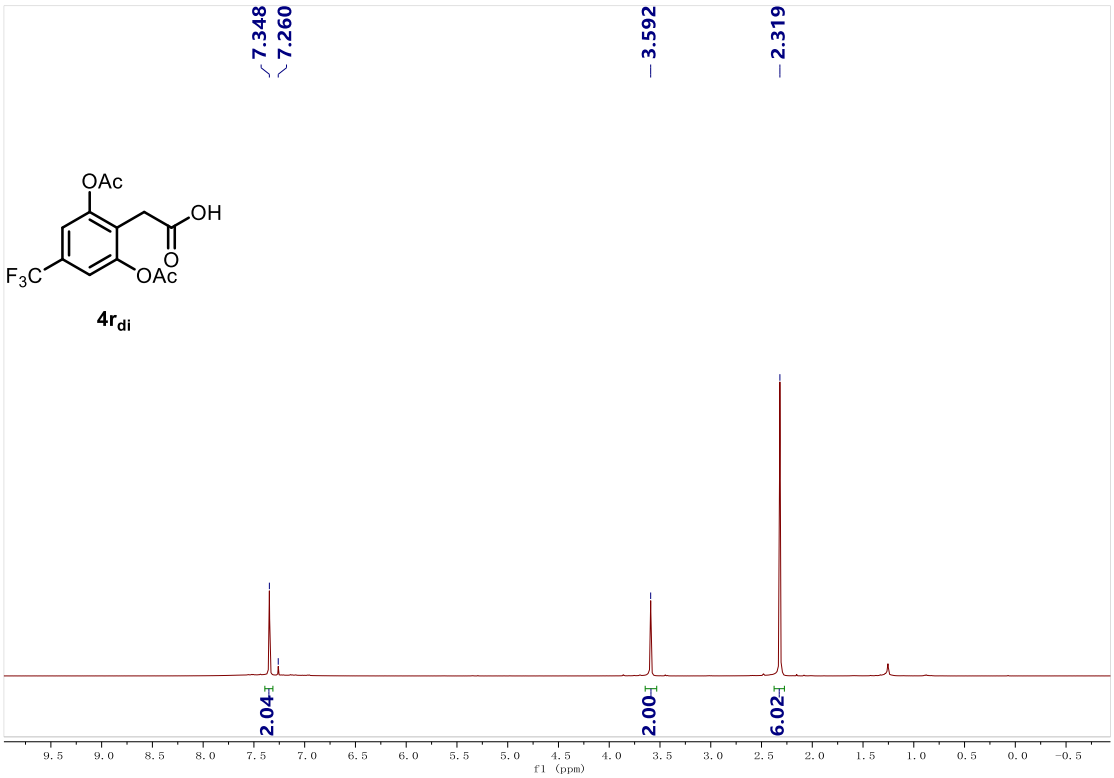

173.970
170.560
151.105
139.698
121.790
119.074
49.641
49.428
49.215
49.003
48.790
48.577
48.363
30.981
21.058
20.677
OAc
OH
O
Me
OAc
4q di
f1 (ppm)

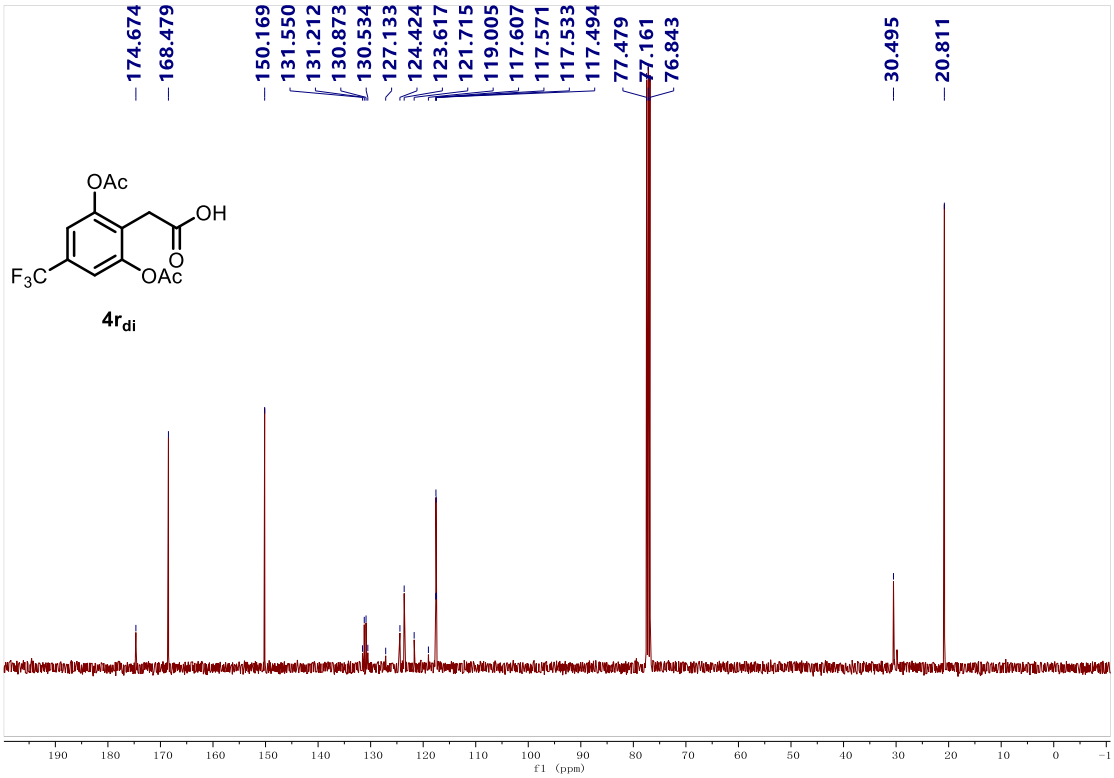

7.496
7.492
7.476
7.472
7.456
7.435
7.416
7.260
3.648
2.314
OH
O
F3C
OAc
4rmono
2.00
1.01
1.89
3.00
f1 (ppm)

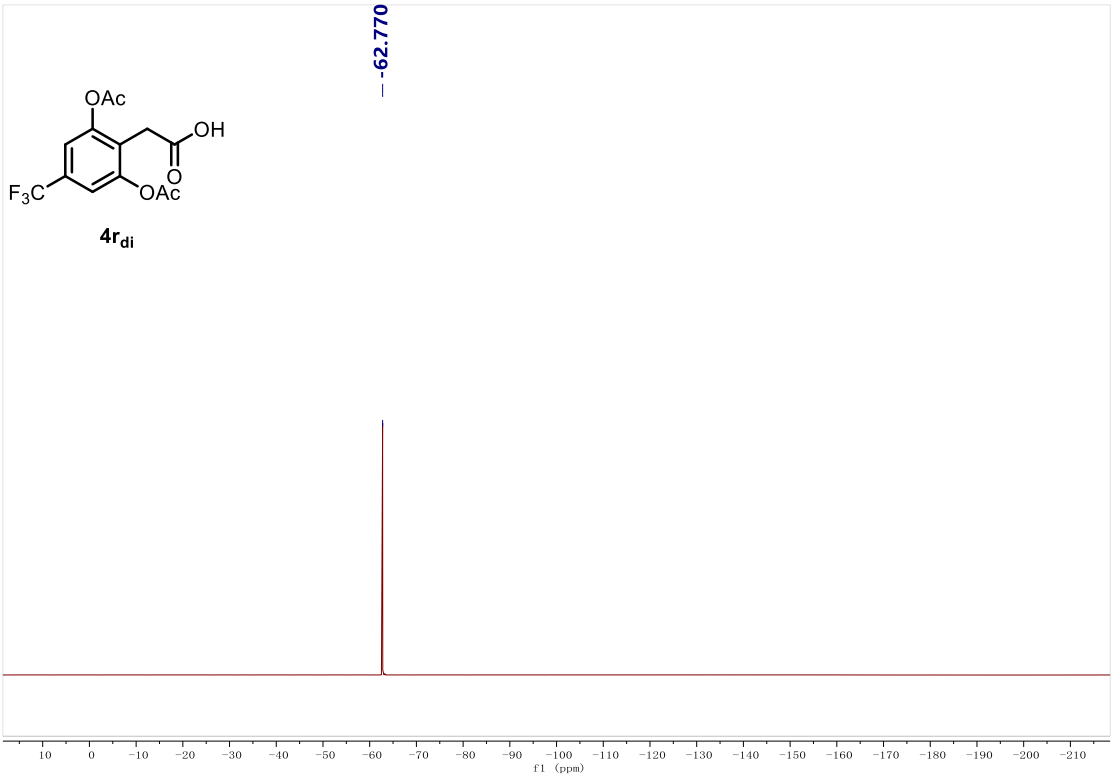

168.854
149.268
132.163
131.852
131.519
131.190
130.858
130.075
127.547
124.841
123.195
123.161
123.123
123.086
122.133
120.226
120.189
120.151
120.111
119.415
77.478
77.159
76.842
36.138
20.811
OH
O
F3C
OAc
4rmono
f1 (ppm)


-62.632
OH
O
F3C
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

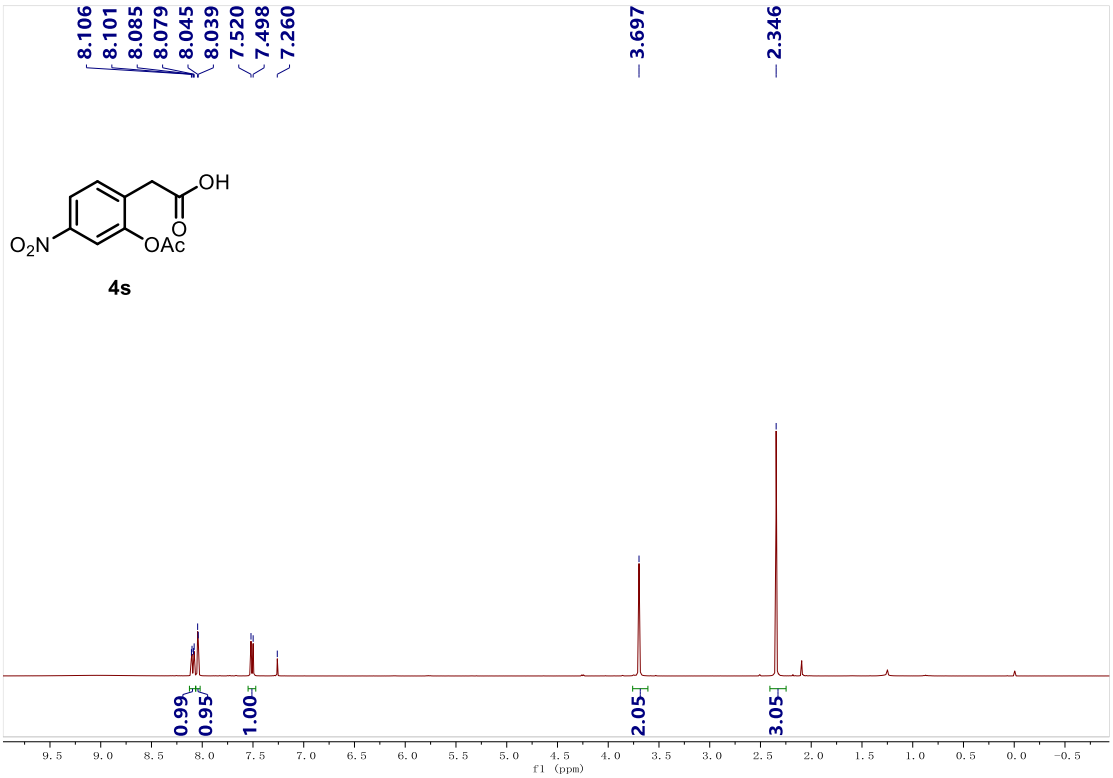
**4r$_{mono}$**

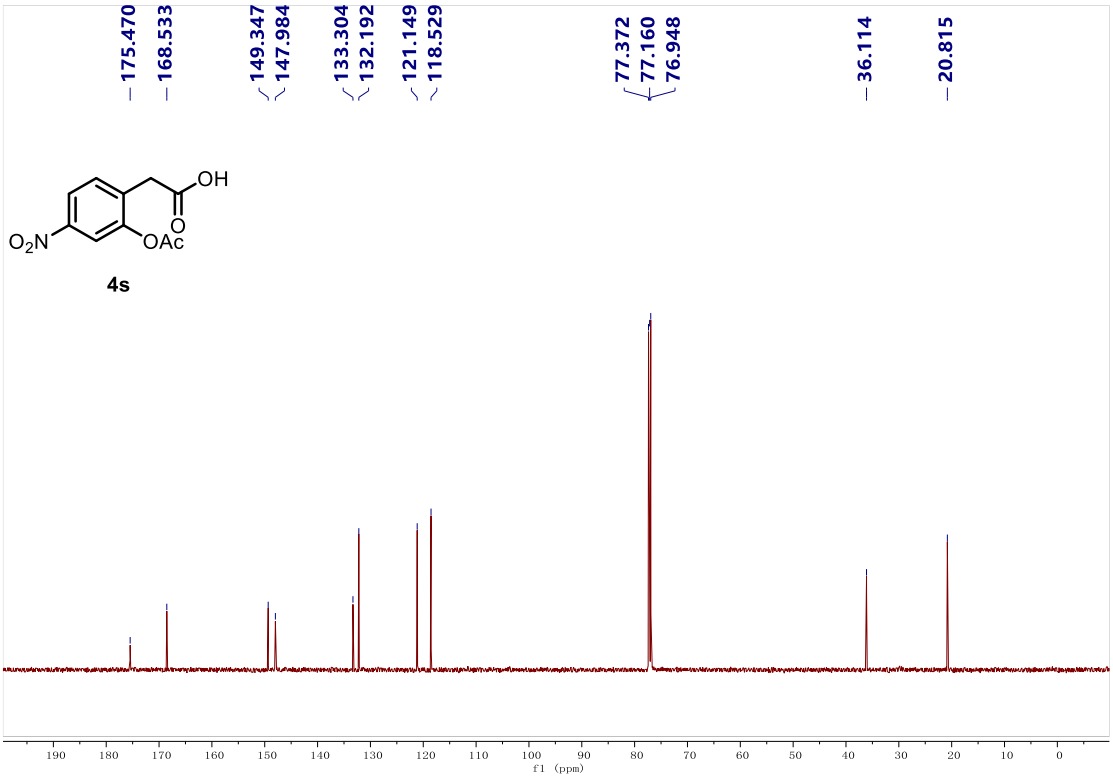

7.348
7.260
3.592
2.319
OAc
OH
O
F3C
OAc
4rdi
2.04
2.00
6.02
f1 (ppm)

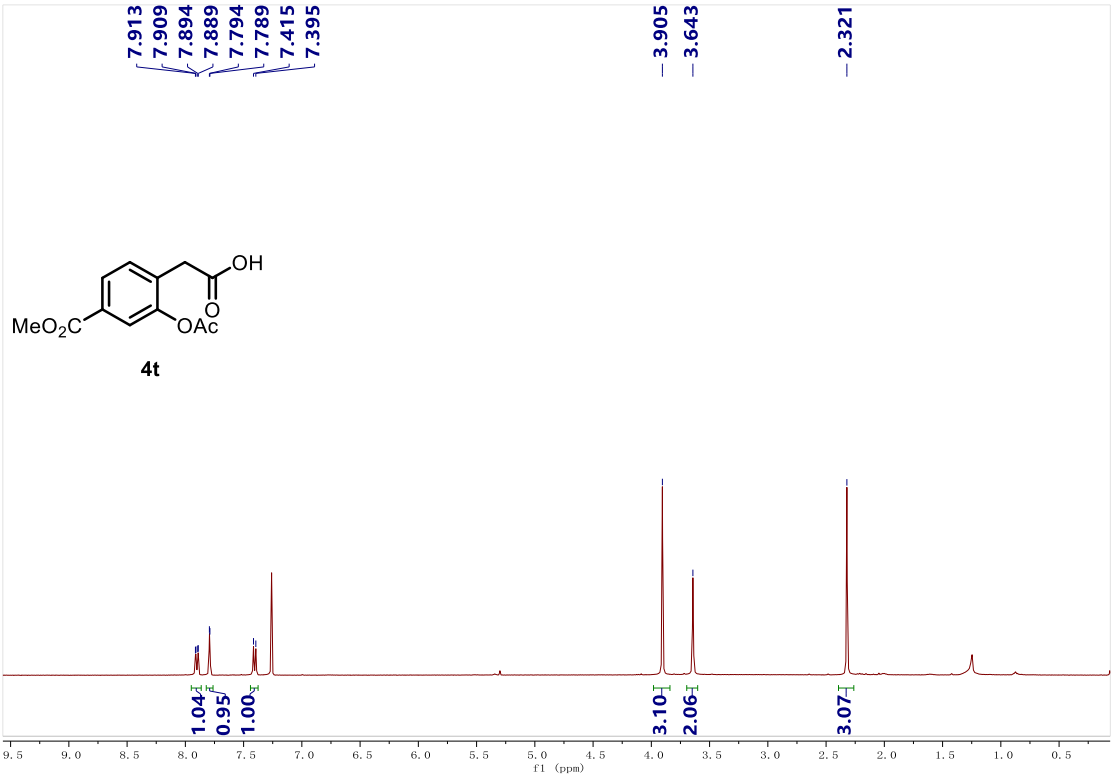

174.674
168.479
150.169
131.550
131.212
130.873
130.534
127.133
124.424
123.617
121.715
119.005
117.607
117.571
117.533
117.494
77.479
77.161
76.843
30.495
20.811
OAc
OH
O
F3C
OAc
4rdi
f1 (ppm)

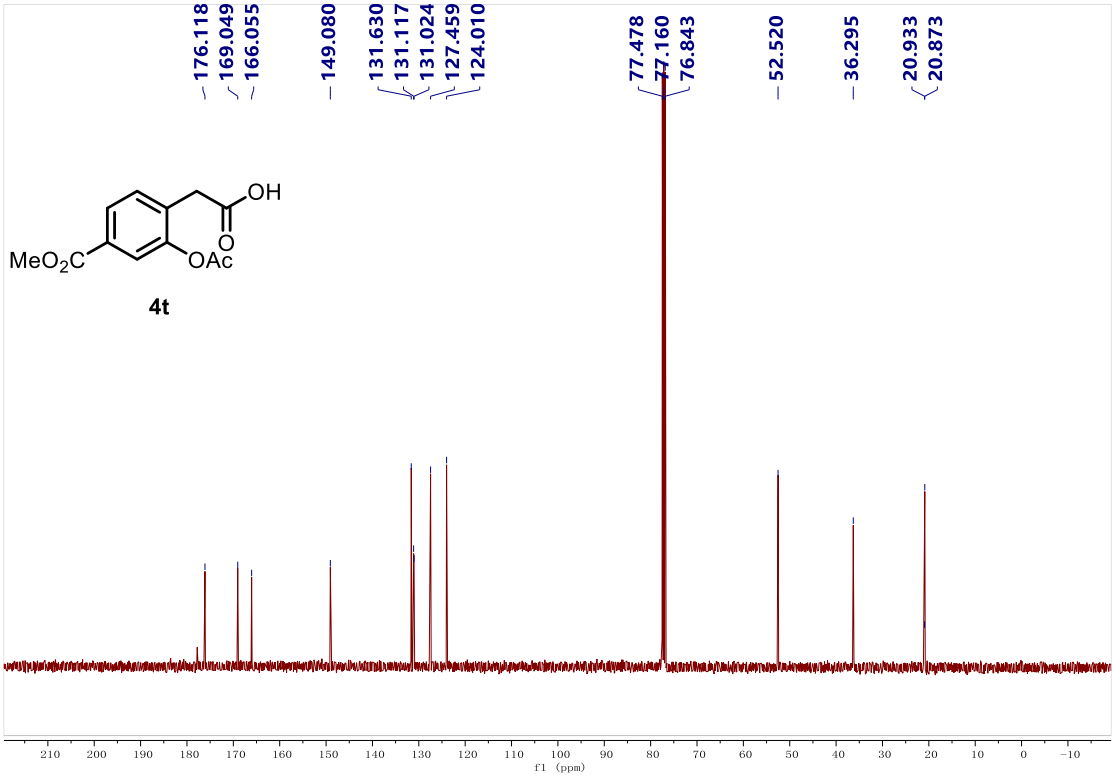

-62.770
OAc
OH
O
F3C
OAc
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

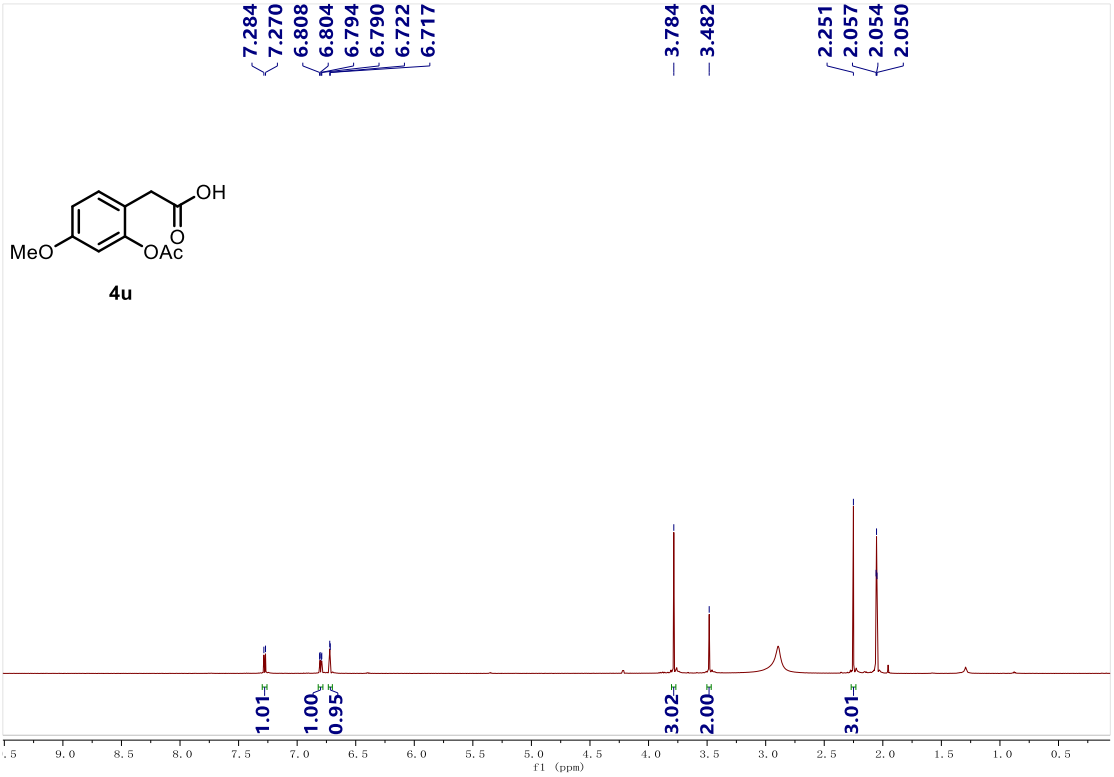
**4r$_{di}$**

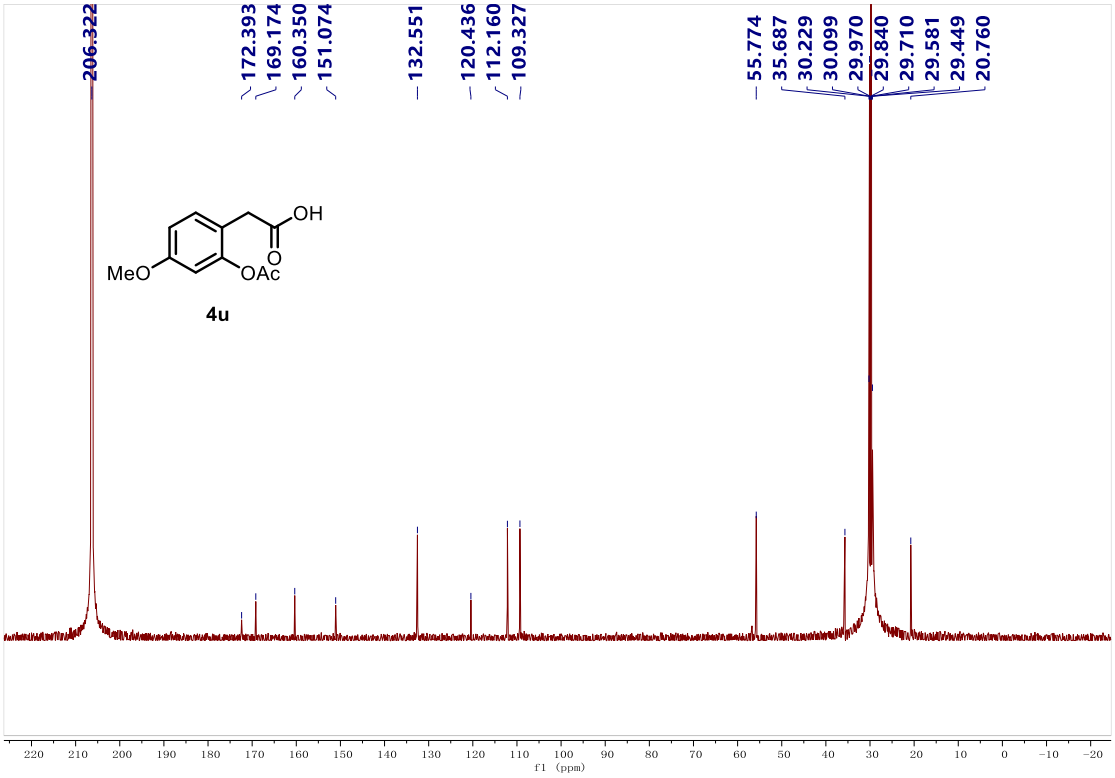

8.106
8.101
8.085
8.079
8.045
8.039
7.520
7.498
7.260
3.697
2.346
OH
O
O2N
OAc
4s
0.99
0.95
1.00
2.05
3.05
f1 (ppm)

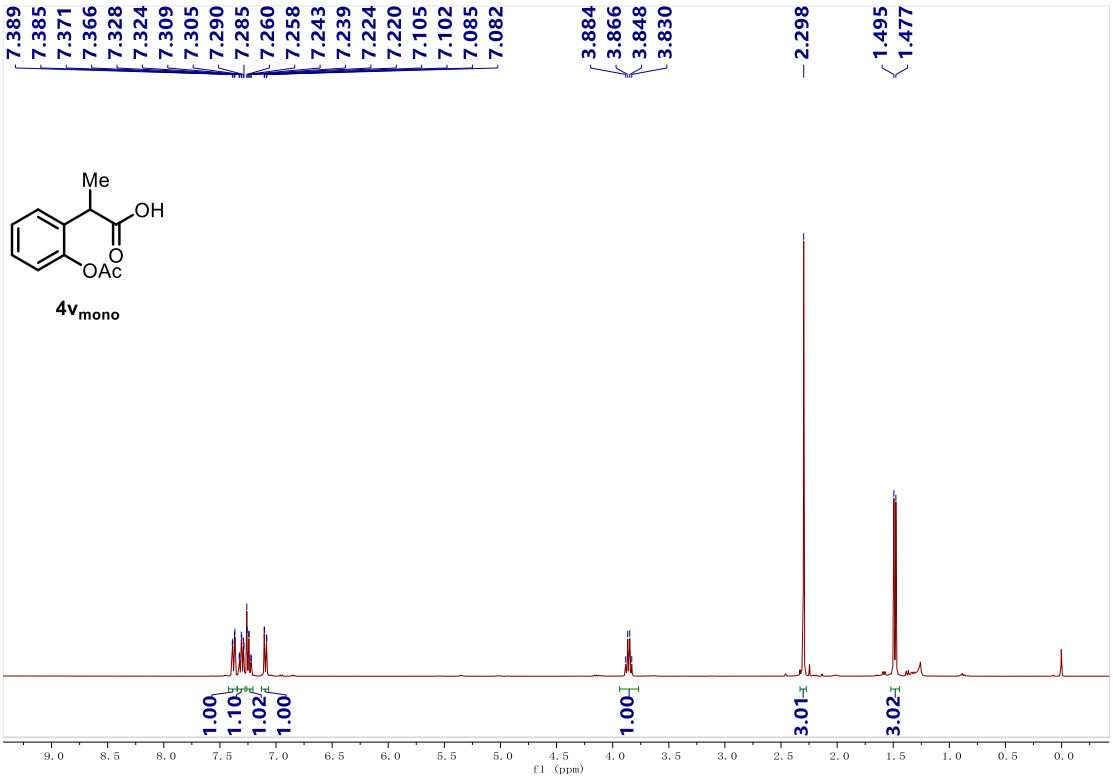

175.470
168.533
149.347
147.984
133.304
132.192
121.149
118.529
77.372
77.160
76.948
36.114
20.815
OH
O
O2N
OAc
4s
f1 (ppm)

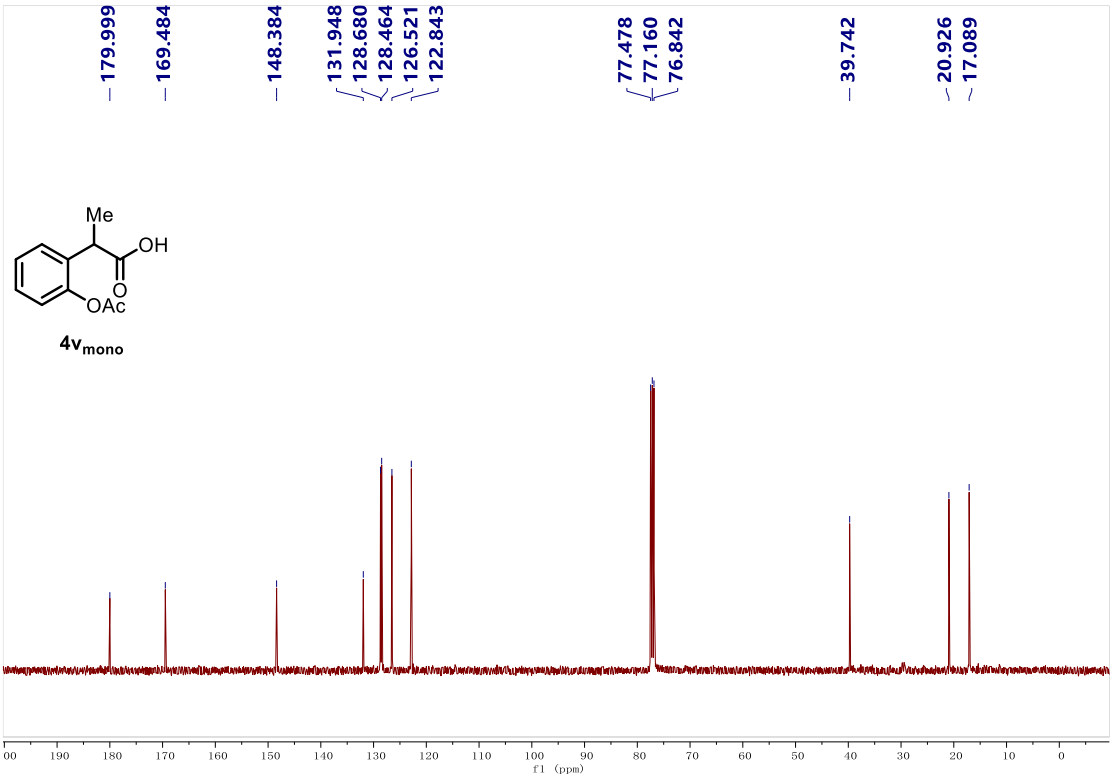

7.913
7.909
7.894
7.889
7.794
7.789
7.415
7.395
3.905
3.643
2.321
OH
O
MeO2C
OAc
4t
1.04
0.95
1.00
3.10
2.06
3.07
f1 (ppm)

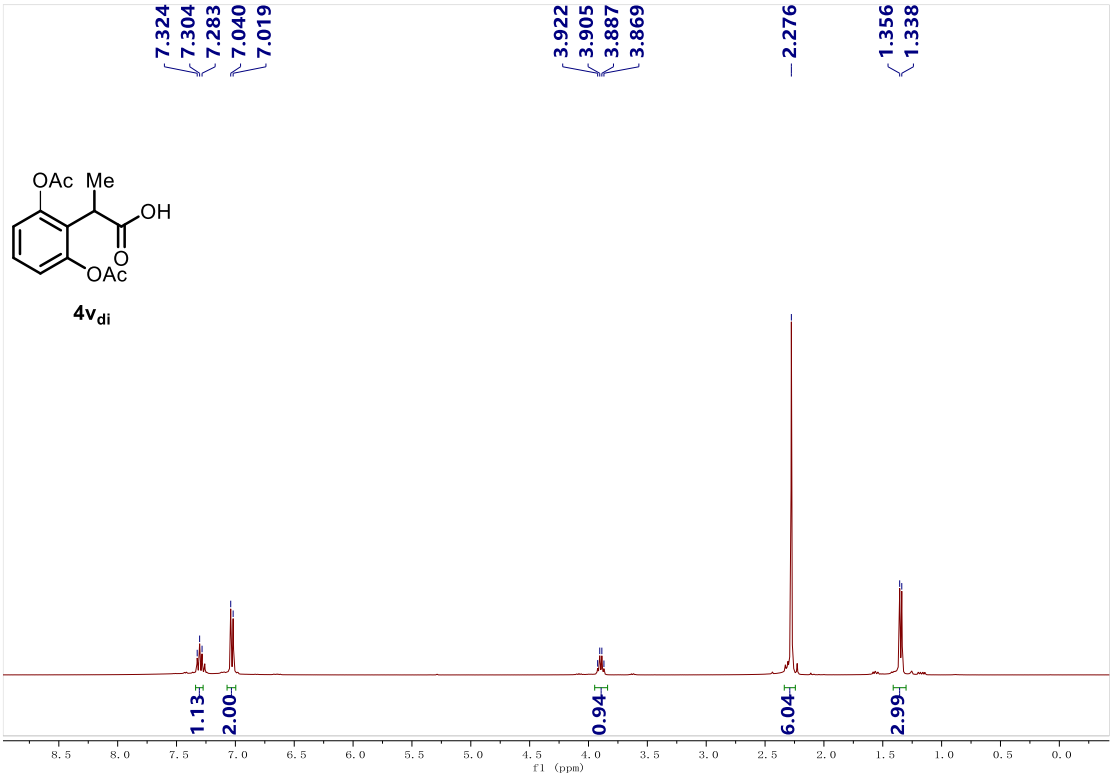

176.118
169.049
166.055
149.080
131.630
131.117
131.024
127.459
124.010
77.478
77.160
76.843
52.520
36.295
20.933
20.873
OH
O
MeO2C
OAc
4t
f1 (ppm)


7.284
7.270
6.808
6.804
6.794
6.790
6.722
6.717
3.784
3.482
2.251
2.057
2.054
2.050
OH
O
MeO
OAc
4u
1.01
1.00
0.95
3.02
2.00
3.01
f1 (ppm)

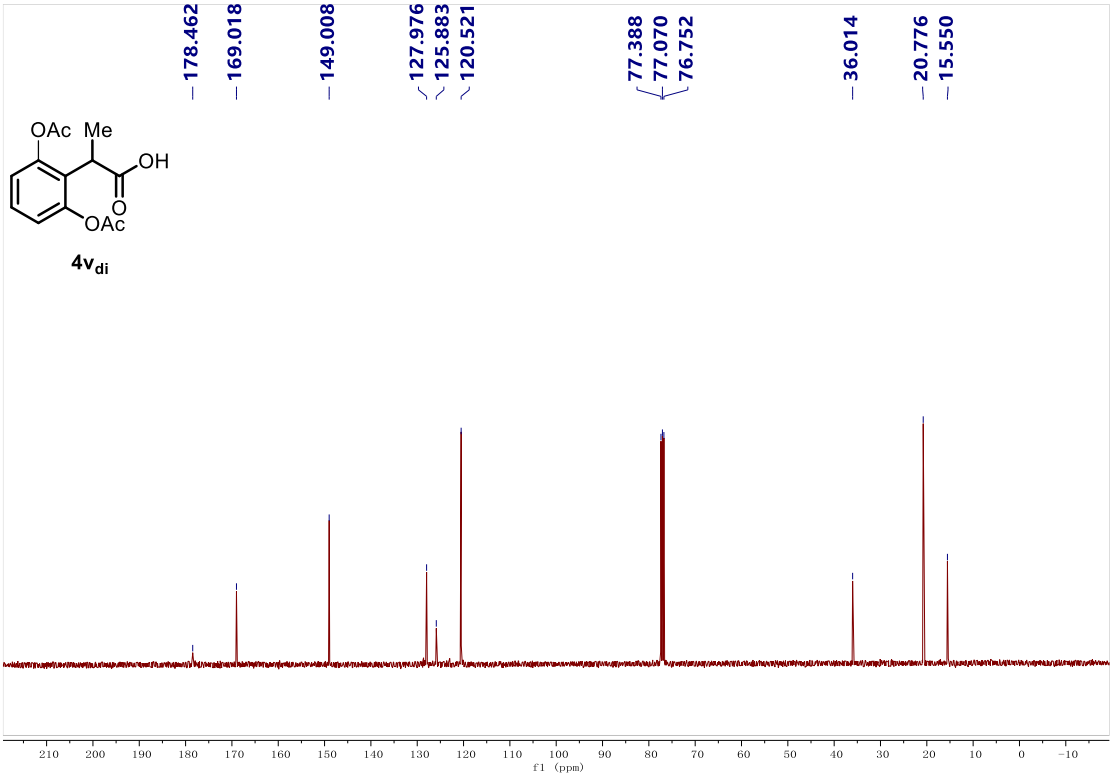

206.322
172.393
169.174
160.350
151.074
132.551
120.436
112.160
109.327
55.774
35.687
30.229
30.099
29.970
29.840
29.710
29.581
29.449
20.760
OH
O
MeO
OAc
4u
f1 (ppm)


7.389
7.385
7.371
7.366
7.328
7.324
7.309
7.305
7.290
7.285
7.260
7.258
7.243
7.239
7.224
7.220
7.105
7.102
7.085
7.082
3.884
3.866
3.848
3.830
2.298
1.495
1.477
Me
OH
O
OAc
4v mono
1.00
1.10
1.02
1.00
1.00
3.01
3.02
f1 (ppm)

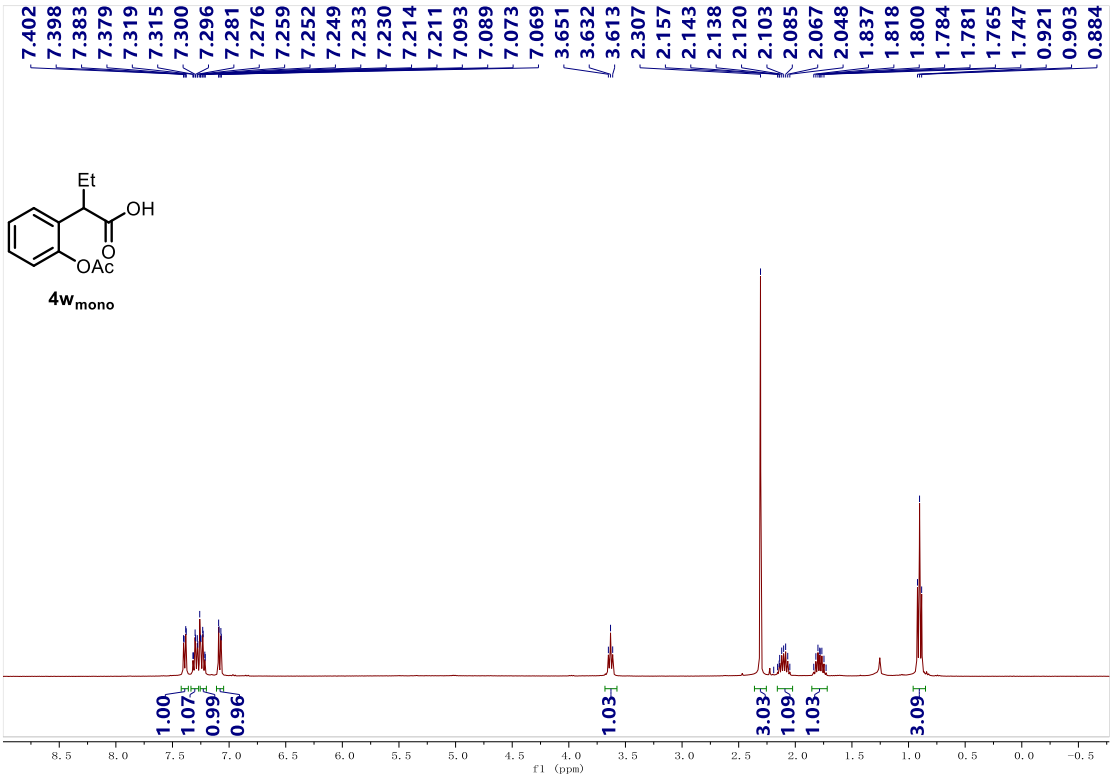

179.999
169.484
148.384
131.948
128.680
128.464
126.521
122.843
77.478
77.160
76.842
39.742
20.926
17.089
Me
OH
O
OAc
4v mono
f1 (ppm)

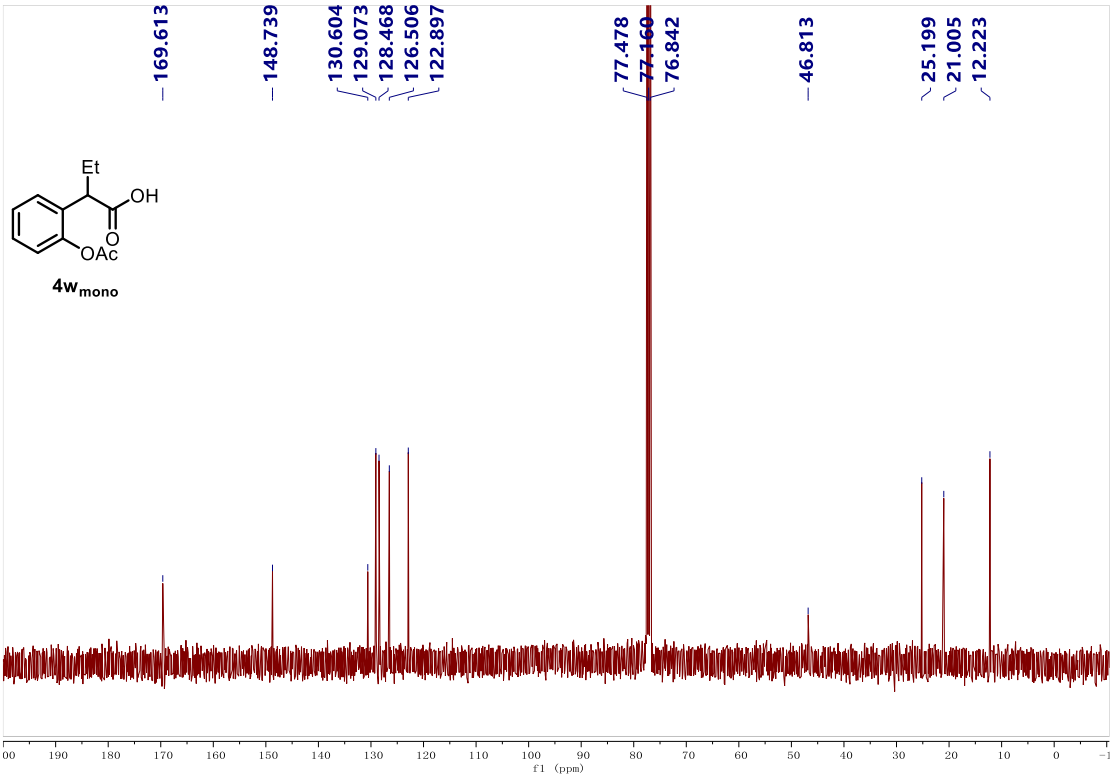

7.324
7.304
7.283
7.040
7.019
3.922
3.905
3.887
3.869
2.276
1.356
1.338
OAc Me
OH
O
OAc
1.13
2.00
0.94
6.04
2.99
f1 (ppm)

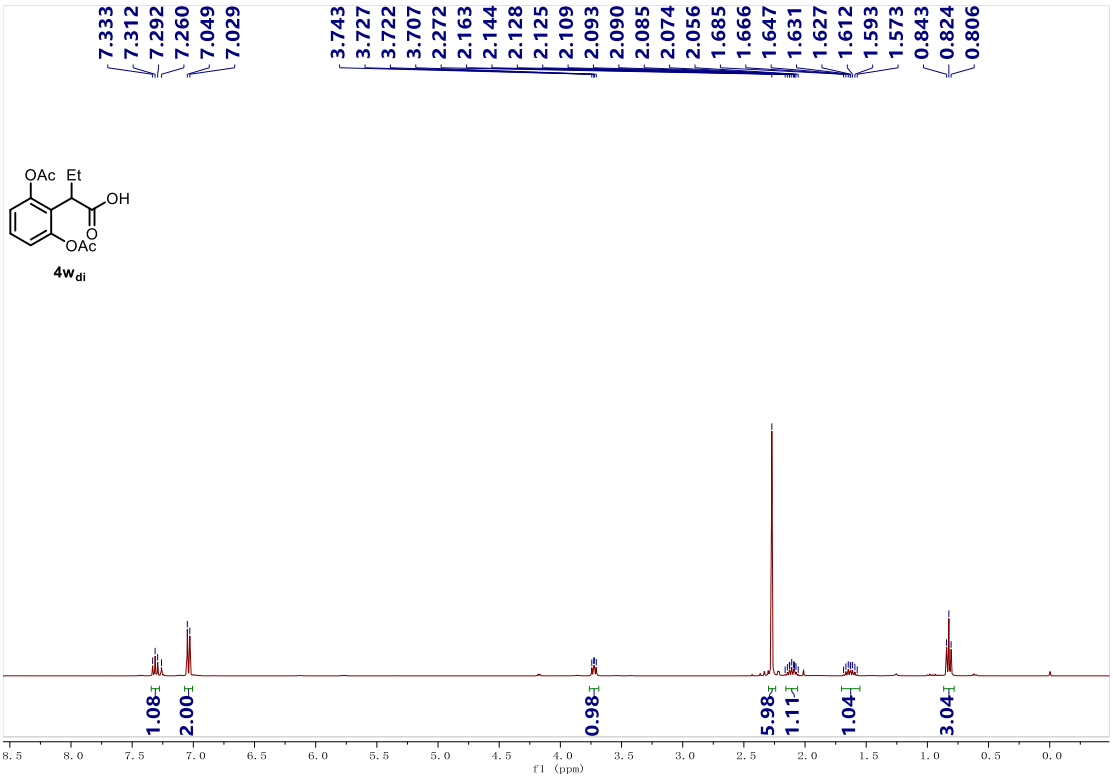
**4v$_{di}$**

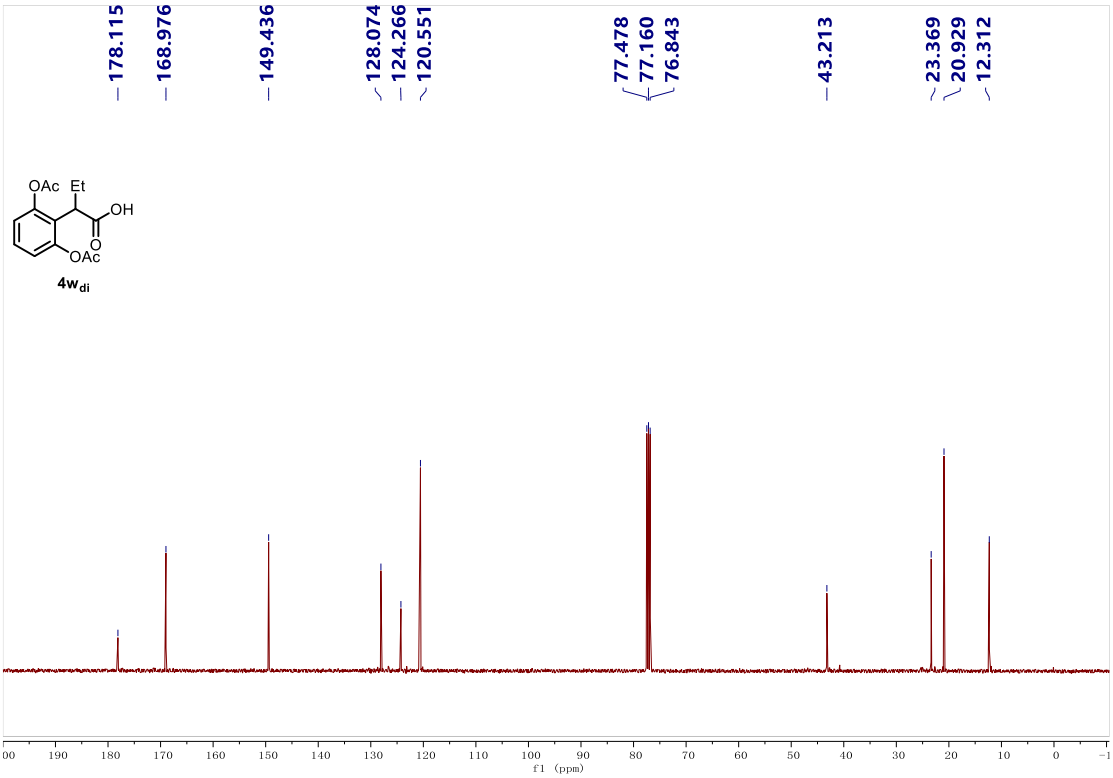

178.462
169.018
149.008
127.976
125.883
120.521
77.388
77.070
76.752
36.014
20.776
15.550
OAc Me
OH
O
OAc
f1 (ppm)

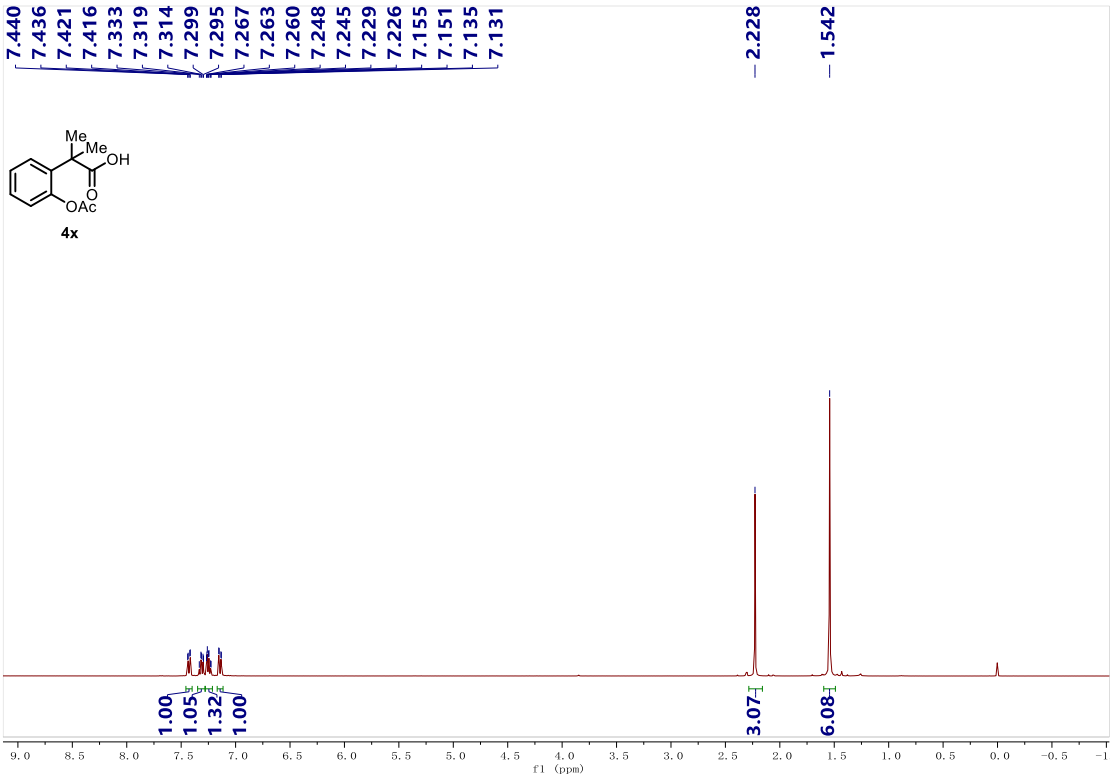
**4v$_{di}$**

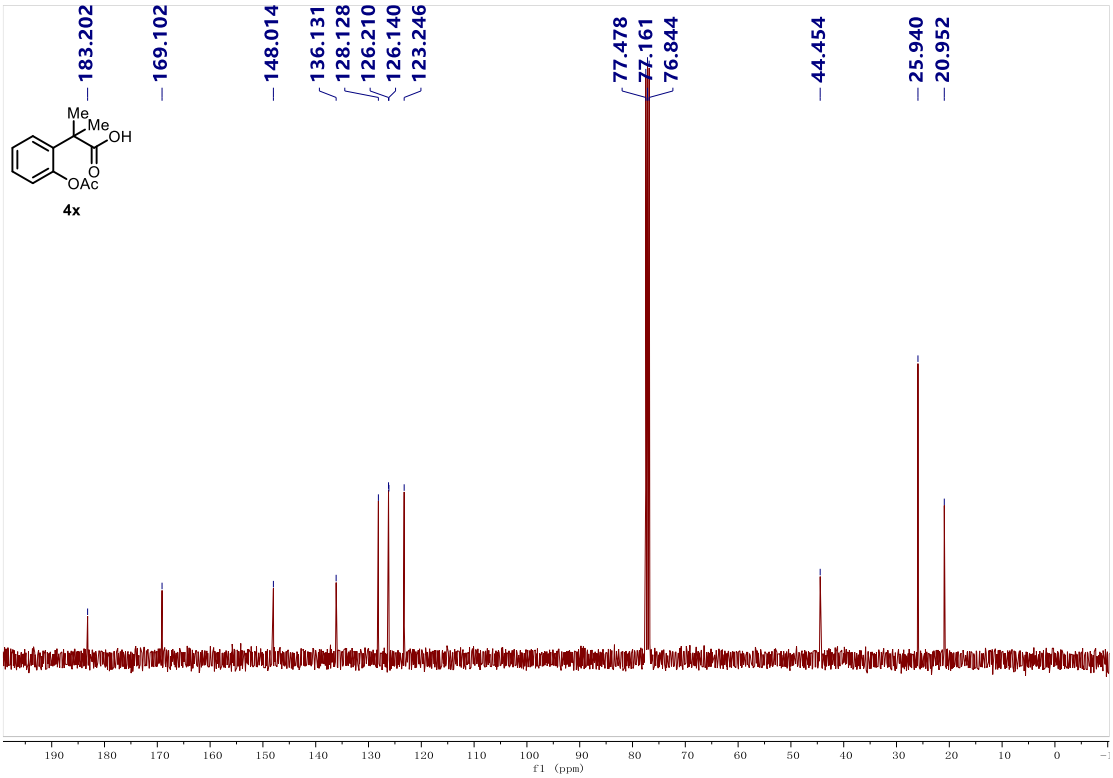

7.402 7.398 7.383 7.379 7.319 7.315 7.300 7.296 7.281 7.276 7.259 7.252 7.249 7.233 7.230 7.214 7.211 7.093 7.089 7.073 7.069 3.651 3.632 3.613 2.307 2.157 2.143 2.138 2.120 2.103 2.085 2.067 2.048 1.837 1.818 1.800 1.784 1.781 1.765 1.747 0.921 0.903 0.884
Et
OH
O
OAc
4w mono
1.00 1.07 0.99 0.96 1.03 3.03 1.09 1.03 3.09
f1 (ppm)

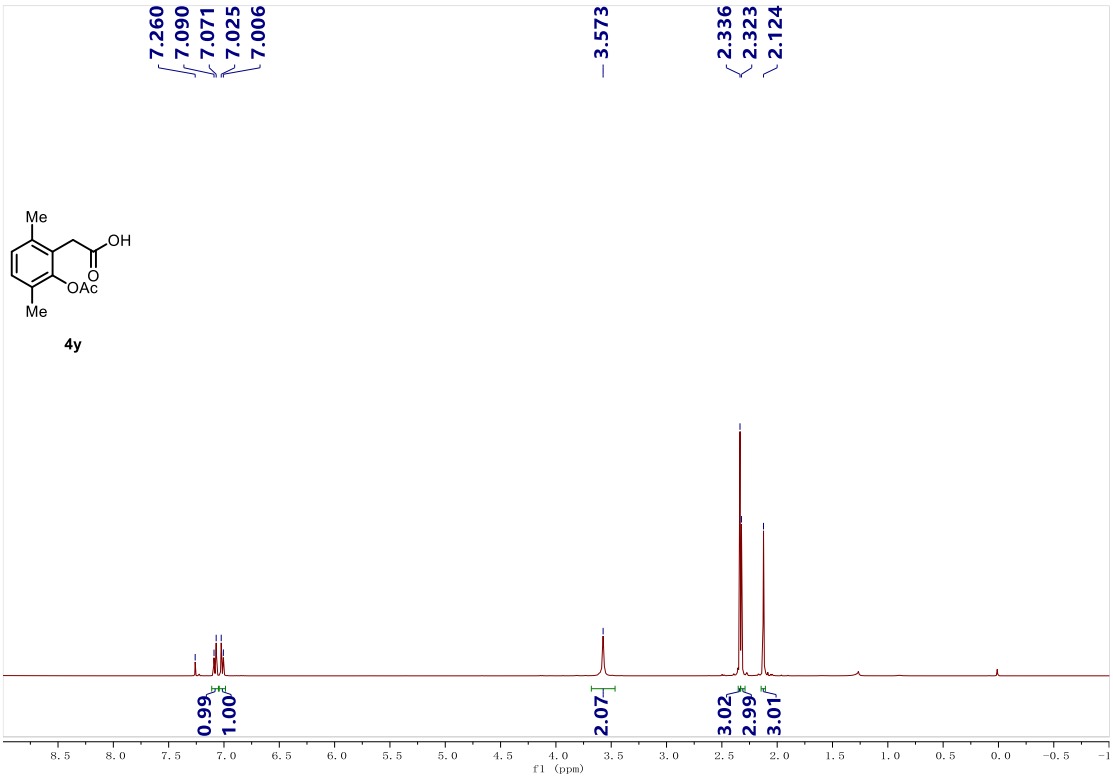

169.613 148.739 130.604 129.073 128.468 126.506 122.897 77.478 77.160 76.842 46.813 25.199 21.005 12.223
Et
OH
O
OAc
4w mono
f1 (ppm)

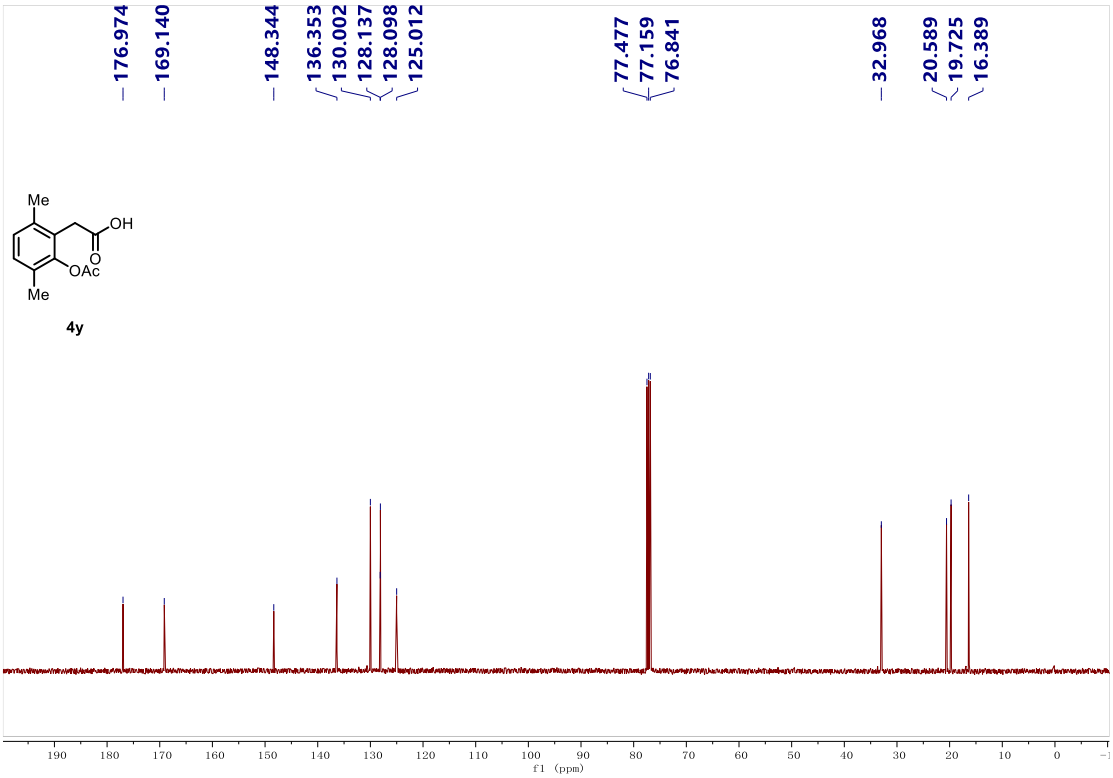

7.333
7.312
7.292
7.260
7.049
7.029
3.743
3.727
3.722
3.707
2.272
2.163
2.144
2.128
2.125
2.109
2.093
2.090
2.085
2.074
2.056
1.685
1.666
1.647
1.631
1.627
1.612
1.593
1.573
0.843
0.824
0.806
OAc Et
OH
O
OAc
4w di
1.08
2.00
0.98
5.98
1.11
1.04
3.04
f1 (ppm)

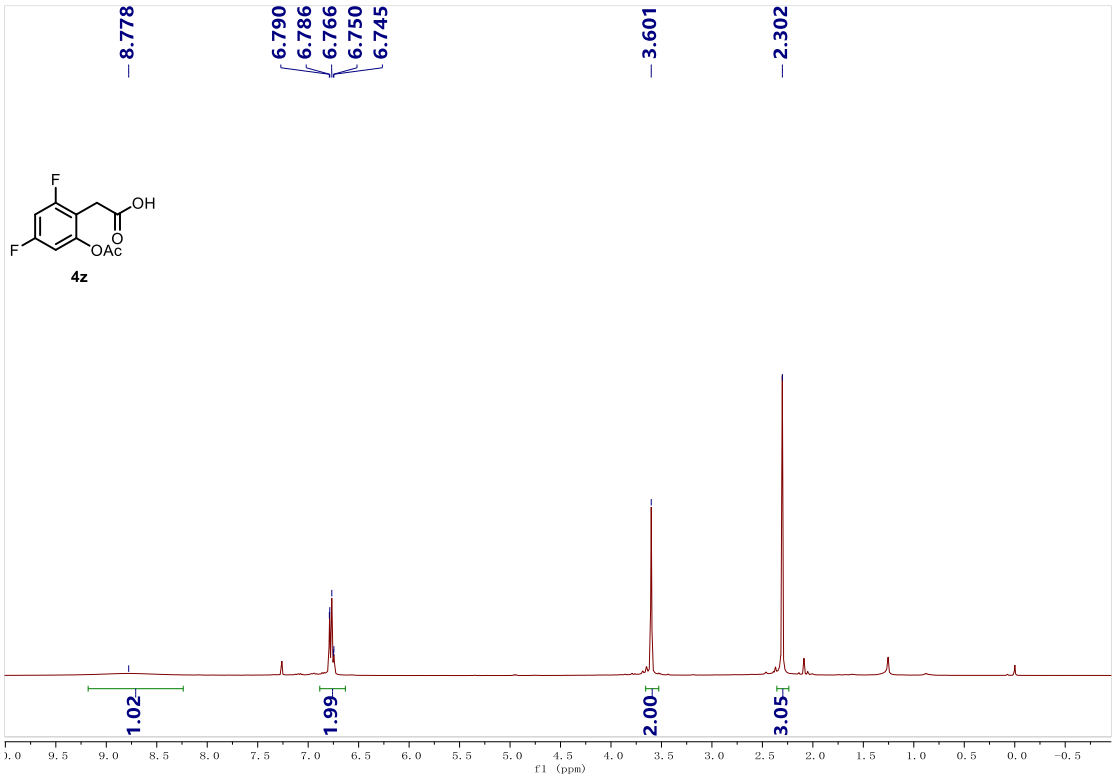

178.115
168.976
149.436
128.074
124.266
120.551
77.478
77.160
76.843
43.213
23.369
20.929
12.312
OAc Et
OH
O
OAc
4w di
f1 (ppm)

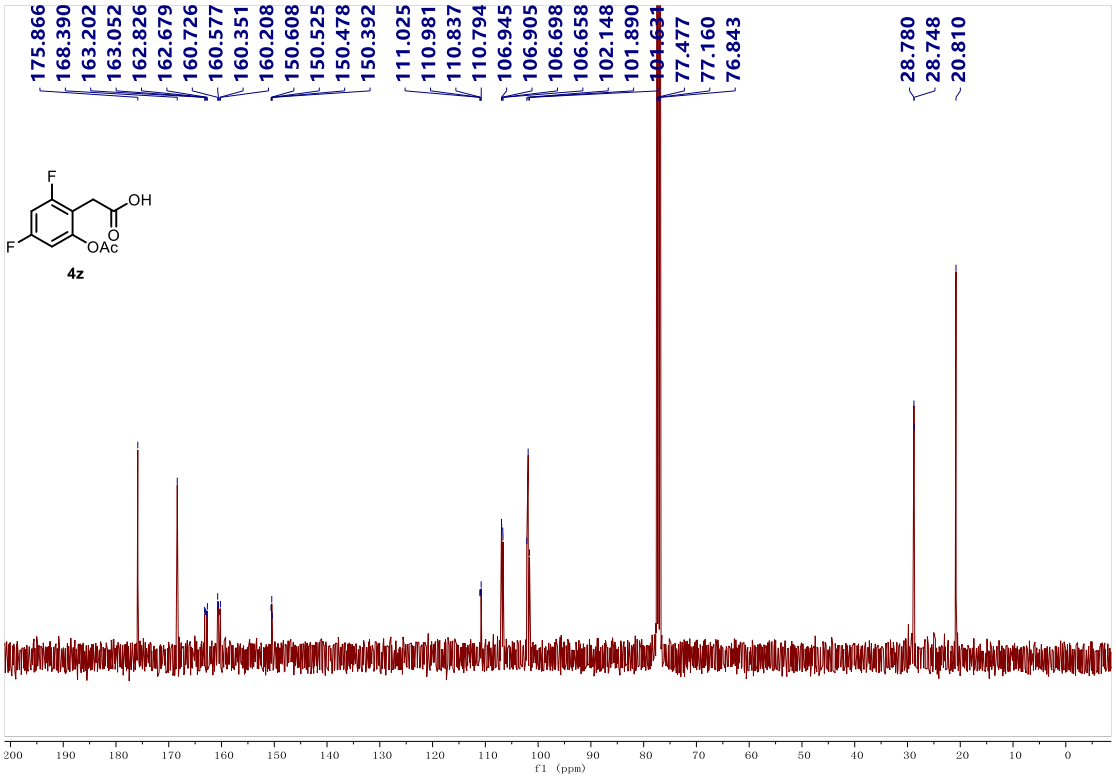

7.440
7.436
7.421
7.416
7.333
7.319
7.314
7.299
7.295
7.267
7.263
7.260
7.248
7.245
7.229
7.226
7.155
7.151
7.135
7.131
2.228
1.542
Me
Me
OH
O
OAc
4x
1.00
1.05
1.32
1.00
3.07
6.08
f1 (ppm)

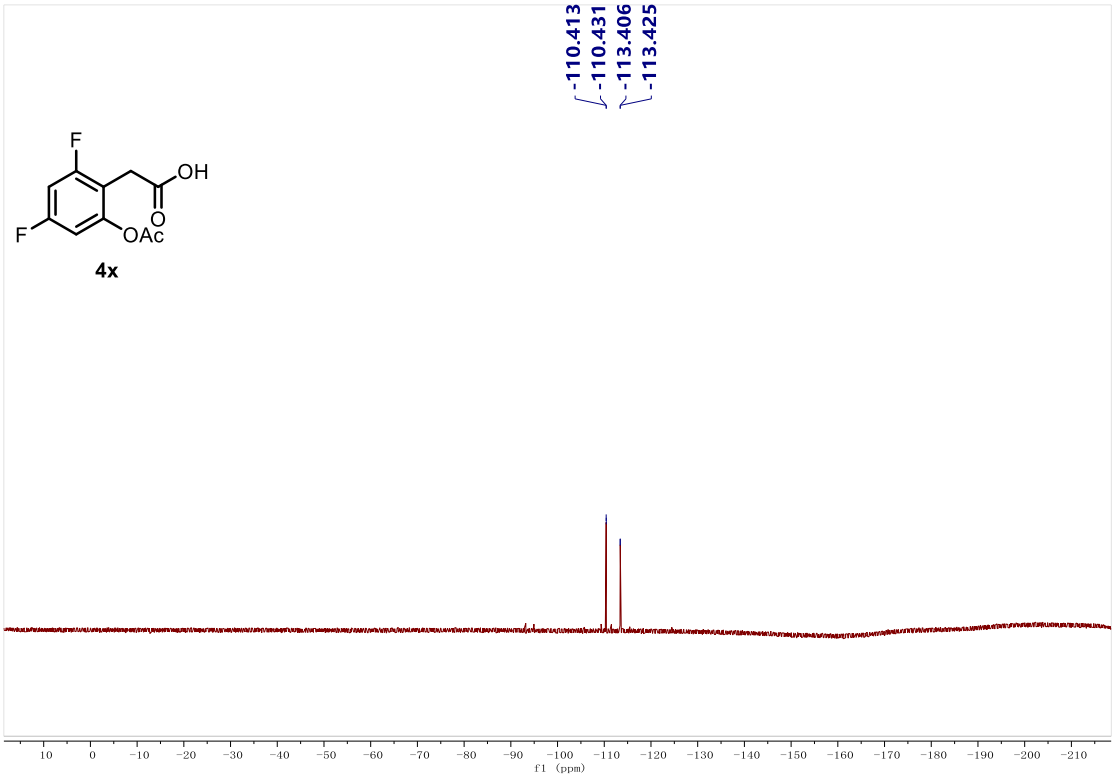

183.202
169.102
148.014
136.131
128.128
126.210
126.140
123.246
77.478
77.161
76.844
44.454
25.940
20.952
Me
Me
OH
O
OAc
4x
f1 (ppm)

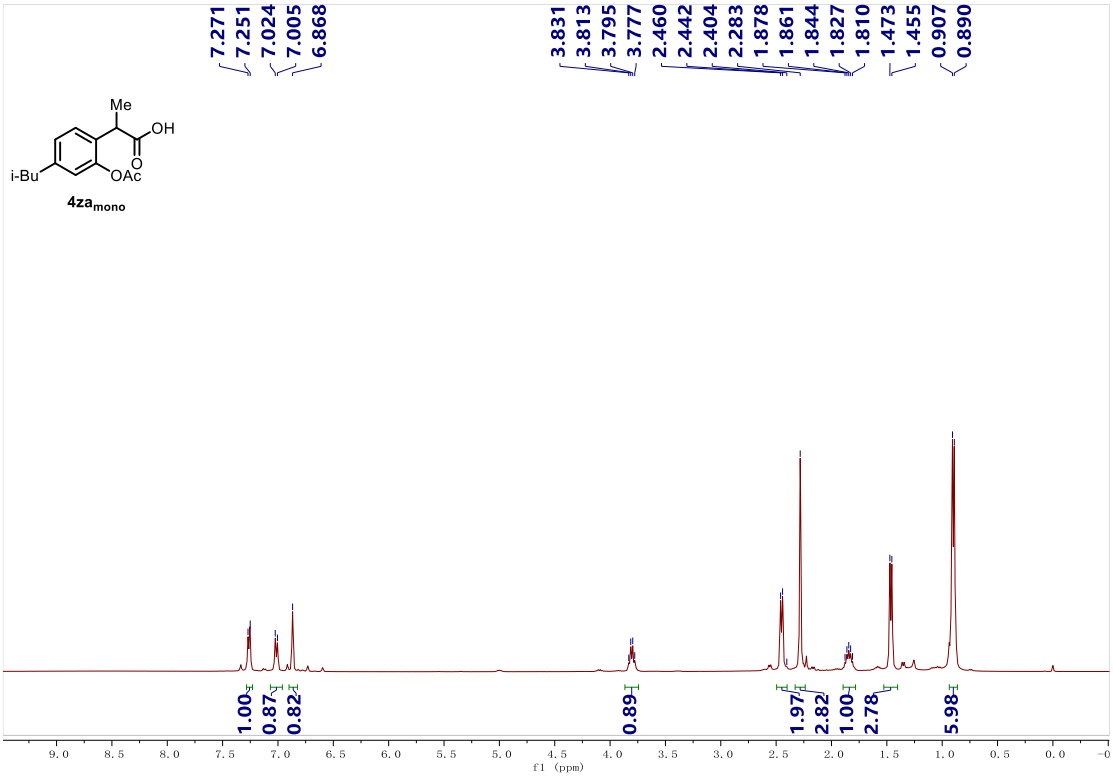

7.260
7.090
7.071
7.025
7.006
3.573
2.336
2.323
2.124
Me
OH
O
OAc
Me
4y
0.99
1.00
2.07
3.02
2.99
3.01
f1 (ppm)

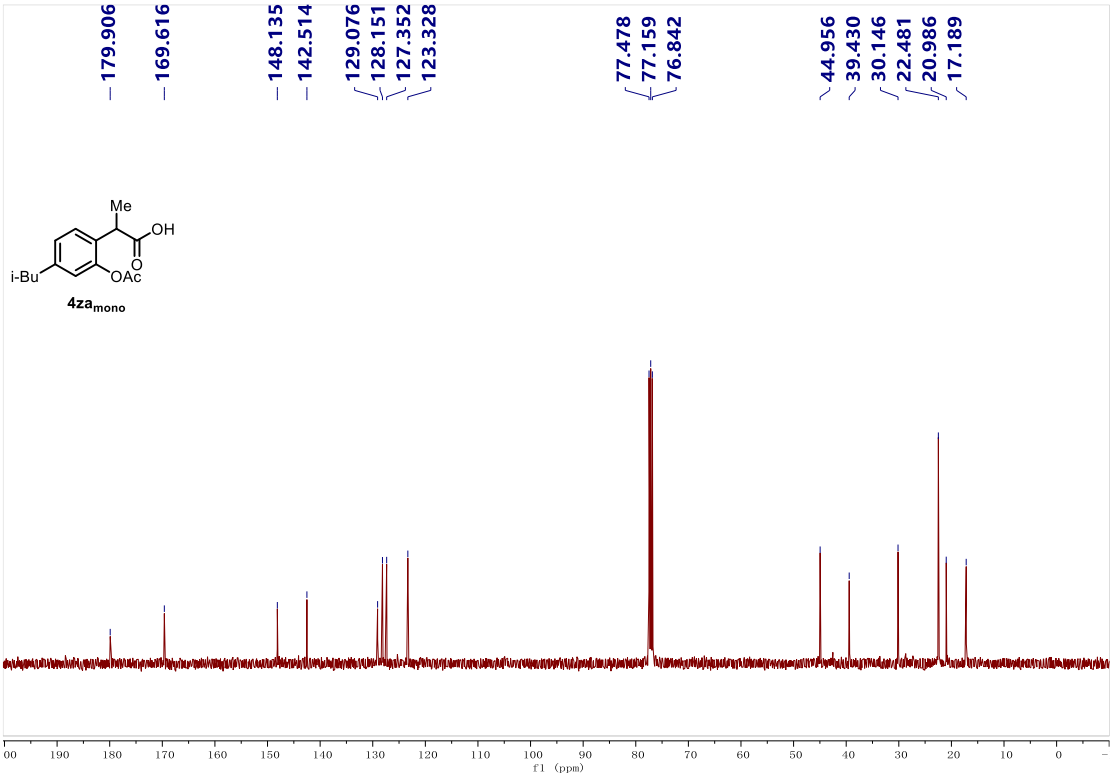

176.974
169.140
148.344
136.353
130.002
128.137
128.098
125.012
77.477
77.159
76.841
32.968
20.589
19.725
16.389
Me
OH
O
OAc
Me
4y
f1 (ppm)

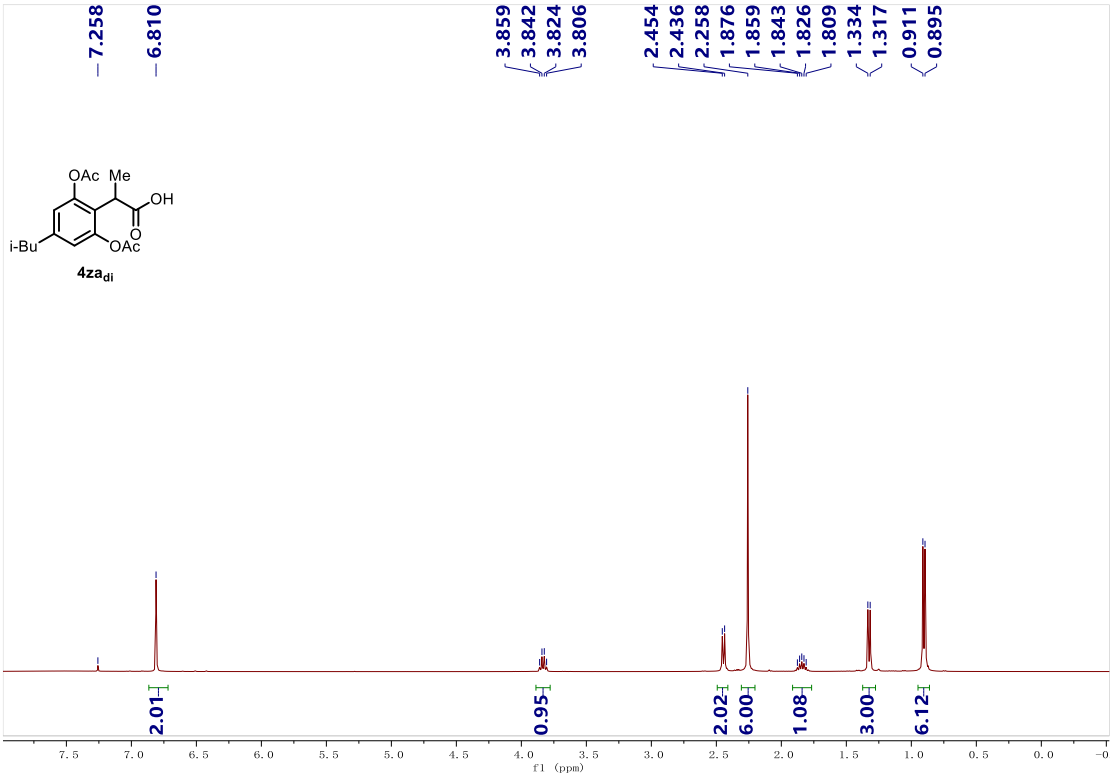

8.778
6.790
6.786
6.766
6.750
6.745
3.601
2.302
F
OH
O
F
OAc
4z
1.02
1.99
2.00
3.05
f1 (ppm)

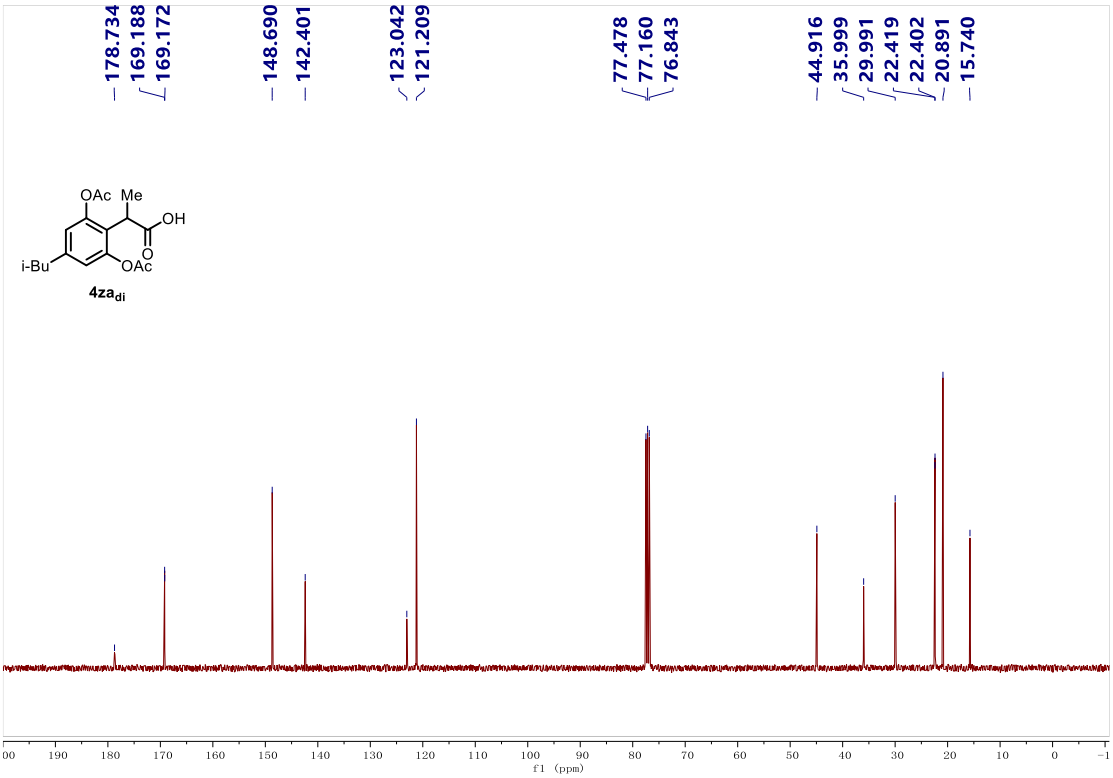

175.866
168.390
163.202
163.052
162.826
162.679
160.726
160.577
160.351
160.208
150.608
150.525
150.478
150.392
111.025
110.981
110.837
110.794
106.945
106.905
106.698
106.658
102.148
101.890
101.631
77.477
77.160
76.843
28.780
28.748
20.810
F
OH
O
F
OAc
4z
f1 (ppm)

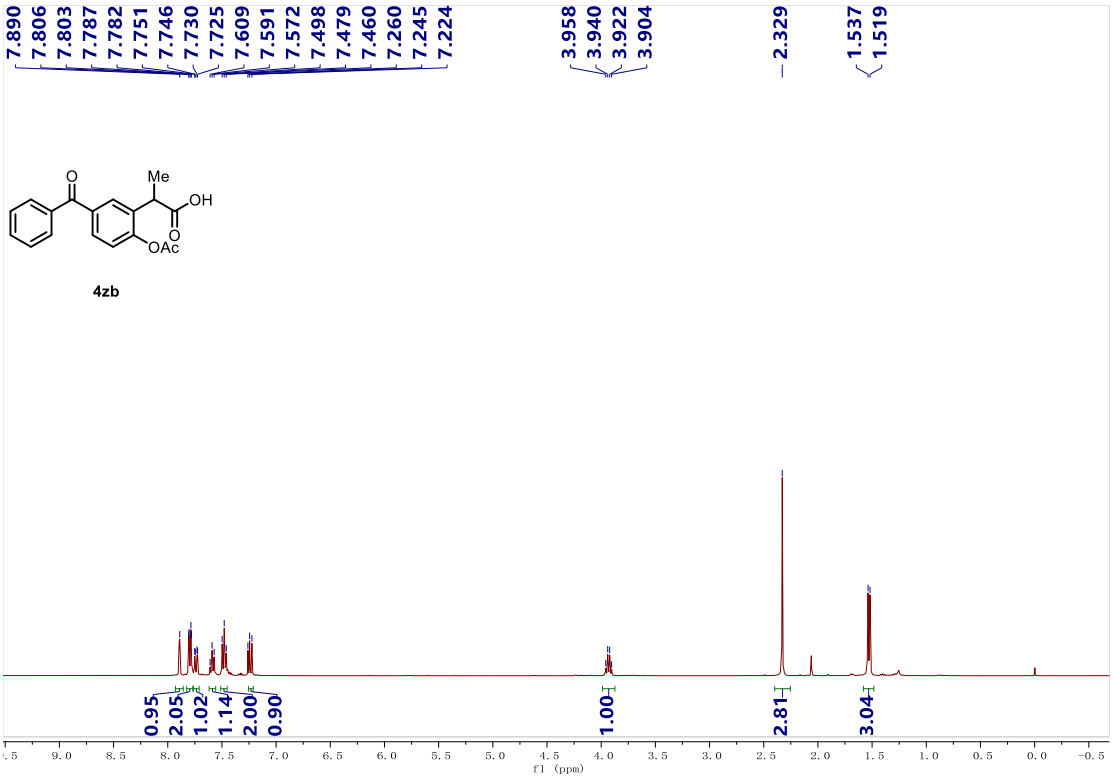

-110.413
-110.431
-113.406
-113.425
F
OH
O
F
OAc
4x
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

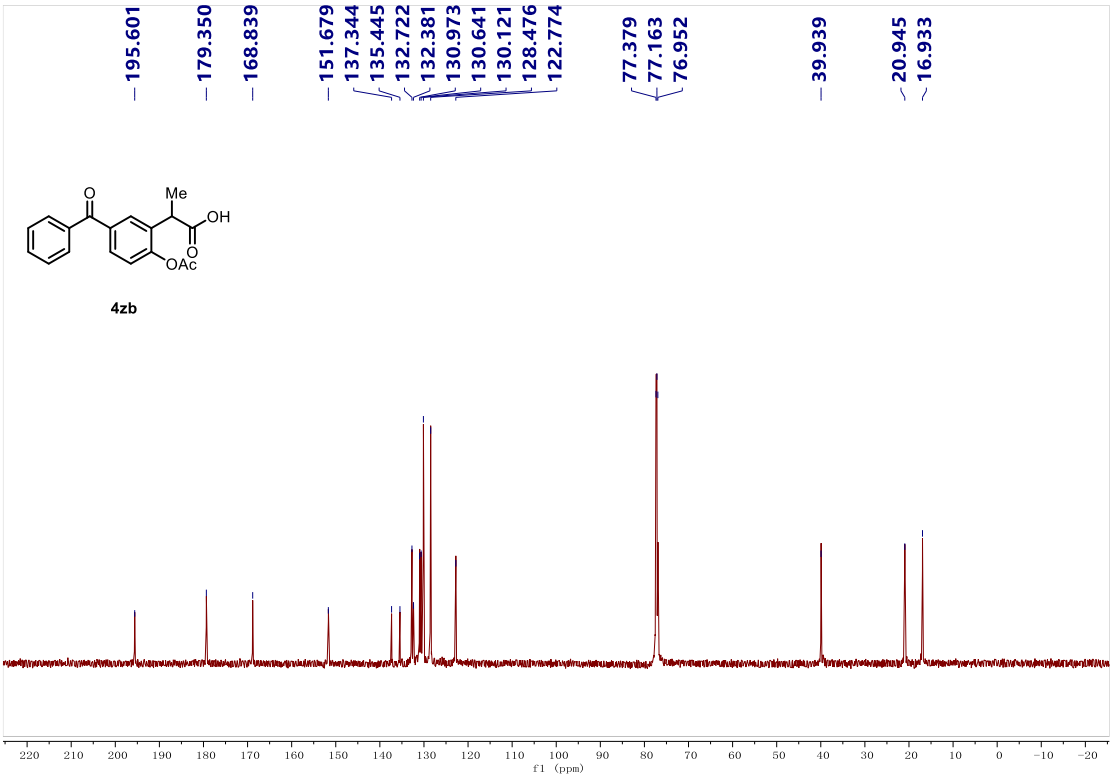

7.271
7.251
7.024
7.005
6.868
3.831
3.813
3.795
3.777
2.460
2.442
2.404
2.283
1.878
1.861
1.844
1.827
1.810
1.473
1.455
0.907
0.890
Me
OH
O
OAc
i-Bu
4za_mono
1.00
0.87
0.82
0.89
1.97
2.82
1.00
2.78
5.98
f1 (ppm)

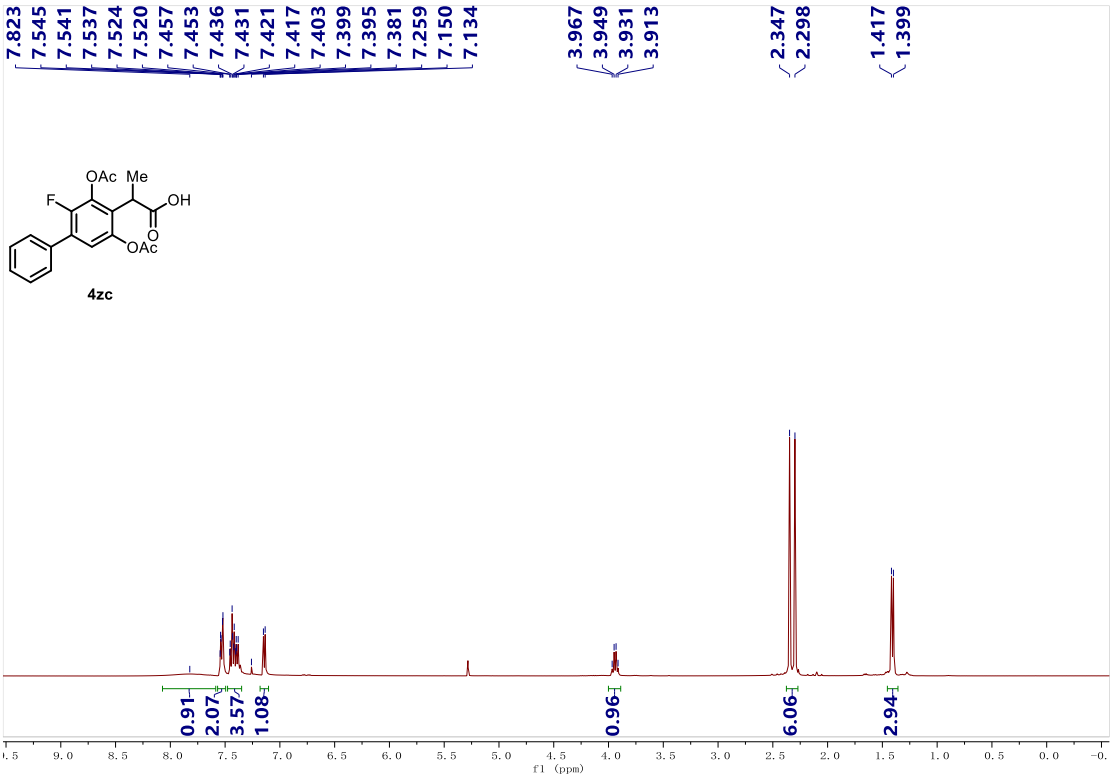

179.906
169.616
148.135
142.514
129.076
128.151
127.352
123.328
77.478
77.159
76.842
44.956
39.430
30.146
22.481
20.986
17.189
Me
OH
O
OAc
i-Bu
4za_mono
f1 (ppm)

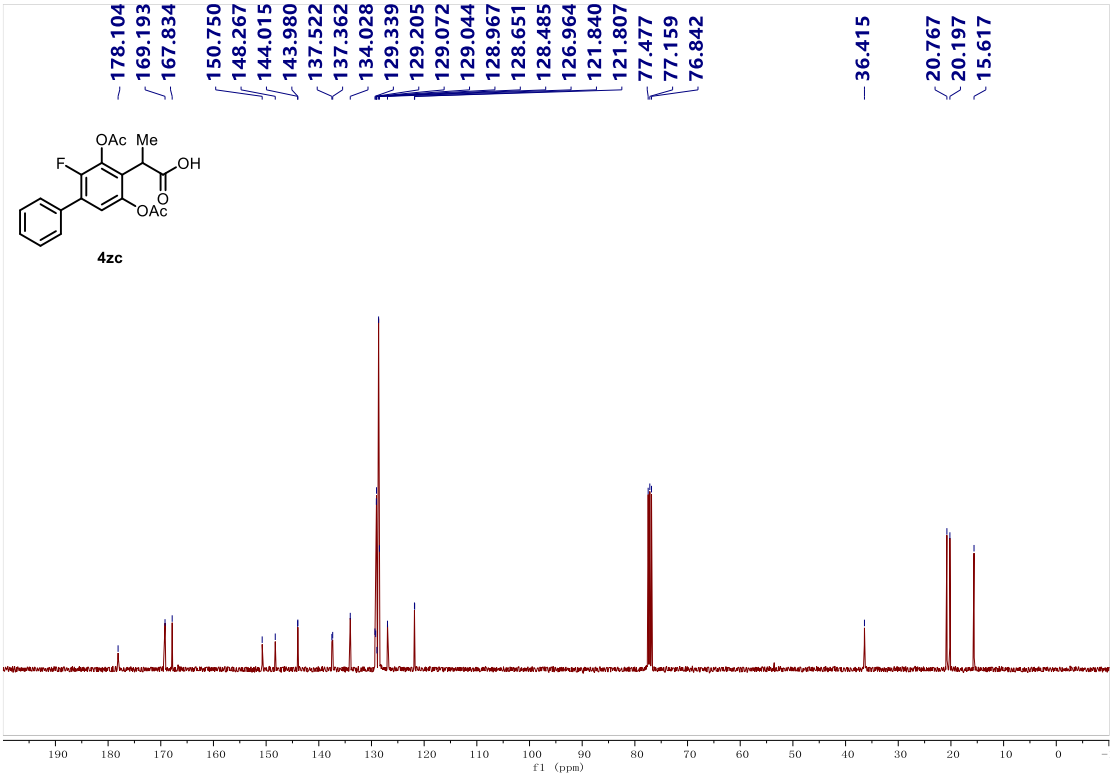

7.258
6.810
3.859
3.842
3.824
3.806
2.454
2.436
2.258
1.876
1.859
1.843
1.826
1.809
1.334
1.317
0.911
0.895
OAc Me
OH
i-Bu
OAc
O
4za_di
2.01
0.95
2.02
6.00
1.08
3.00
6.12
f1 (ppm)

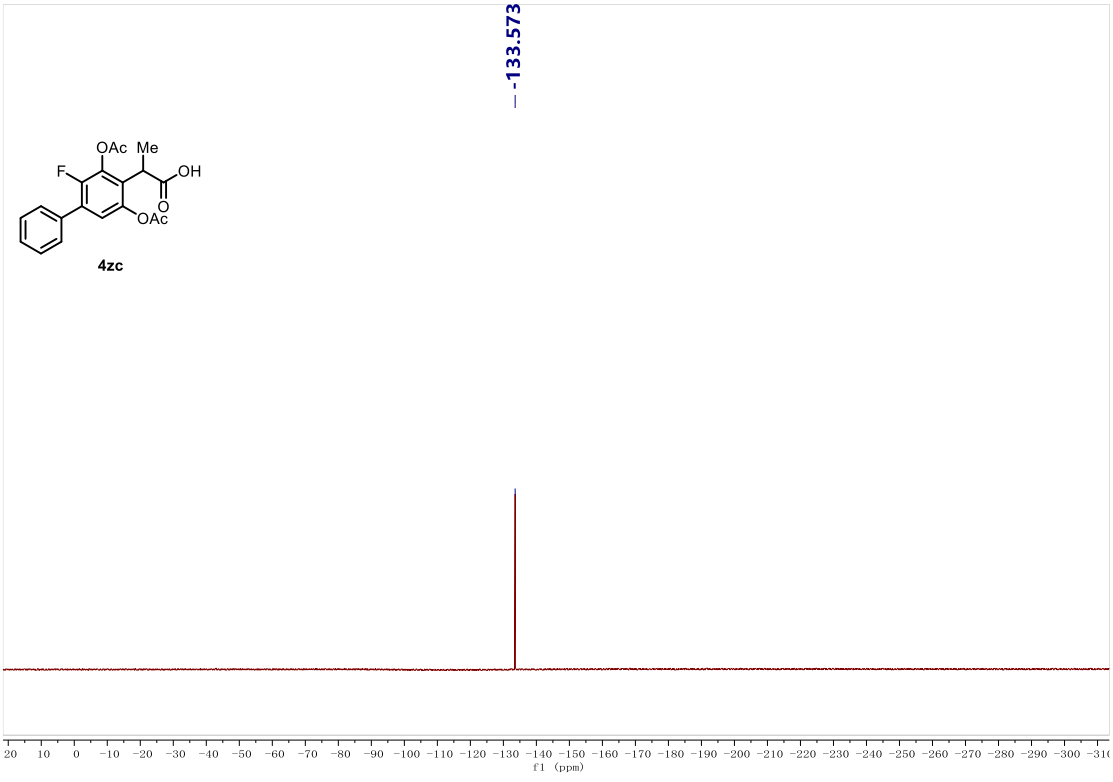

178.734
169.188
169.172
148.690
142.401
123.042
121.209
77.478
77.160
76.843
44.916
35.999
29.991
22.419
22.402
20.891
15.740
OAc Me
OH
i-Bu
OAc
O
4za_di
f1 (ppm)

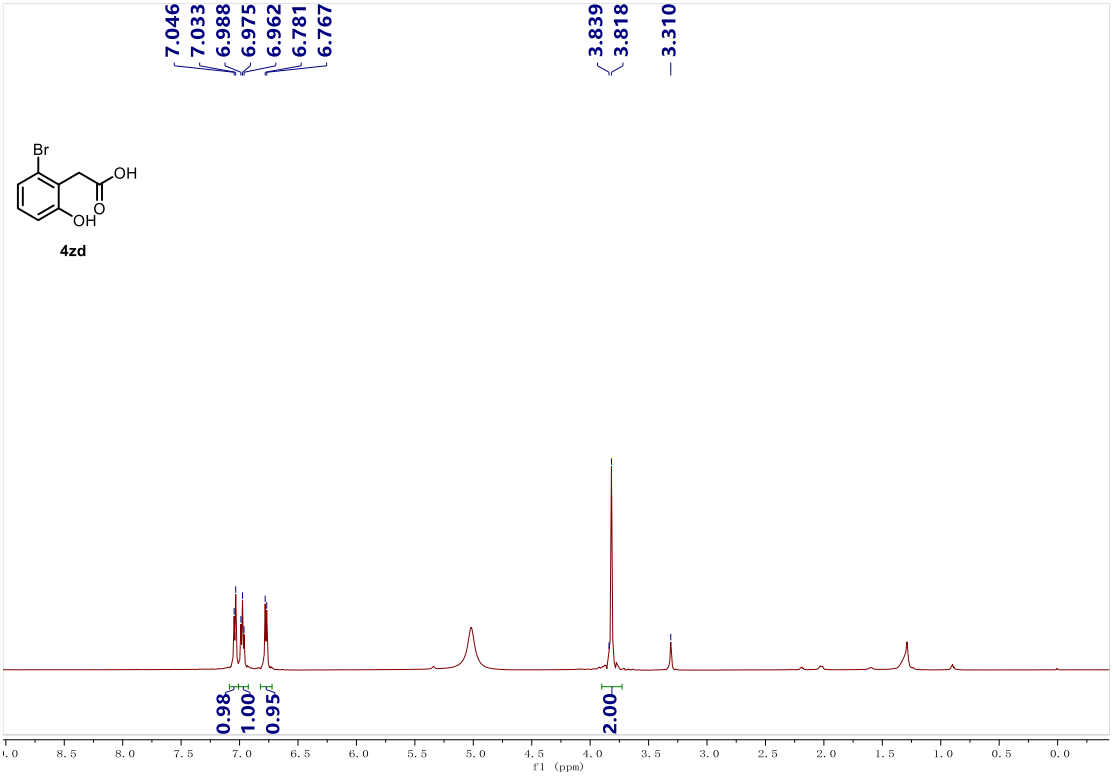

7.890
7.806
7.803
7.787
7.782
7.751
7.746
7.730
7.725
7.609
7.591
7.572
7.498
7.479
7.460
7.260
7.245
7.224
3.958
3.940
3.922
3.904
2.329
1.537
1.519
Me
OH
O
OAc
4zb
0.95
2.05
1.02
1.14
2.00
0.90
1.00
2.81
3.04
f1 (ppm)

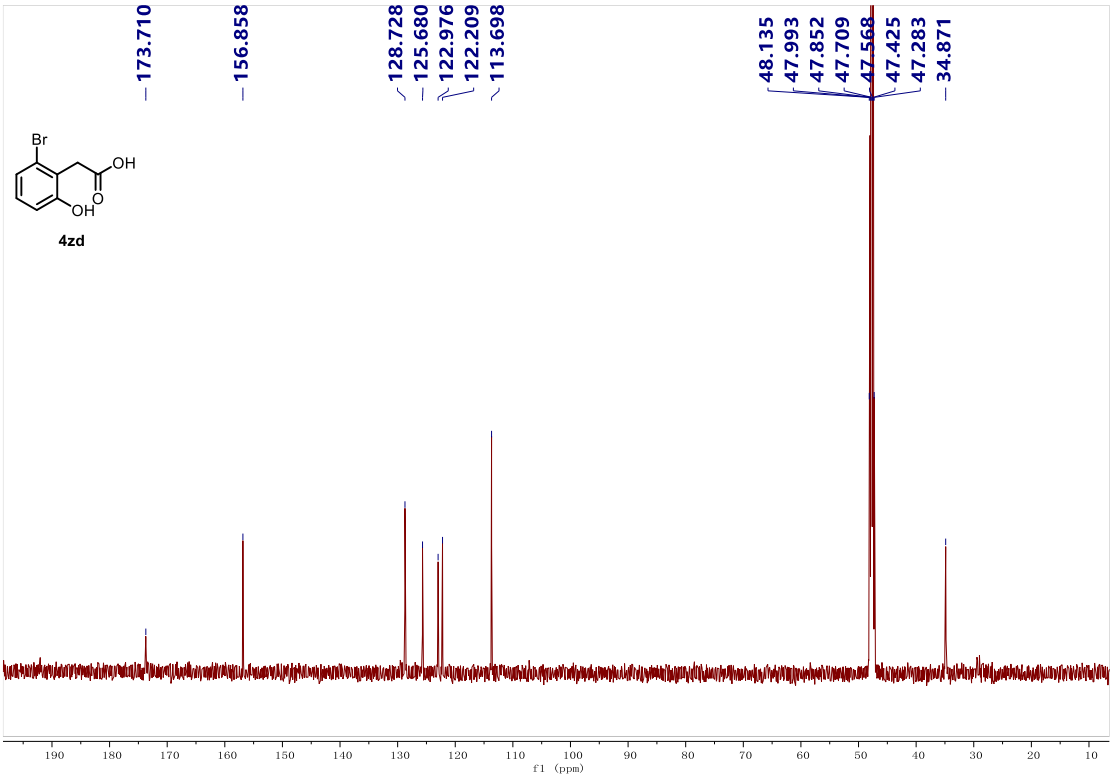

195.601
179.350
168.839
151.679
137.344
135.445
132.722
132.381
130.973
130.641
130.121
128.476
122.774
77.379
77.163
76.952
39.939
20.945
16.933
Me
OH
O
OAc
4zb
f1 (ppm)

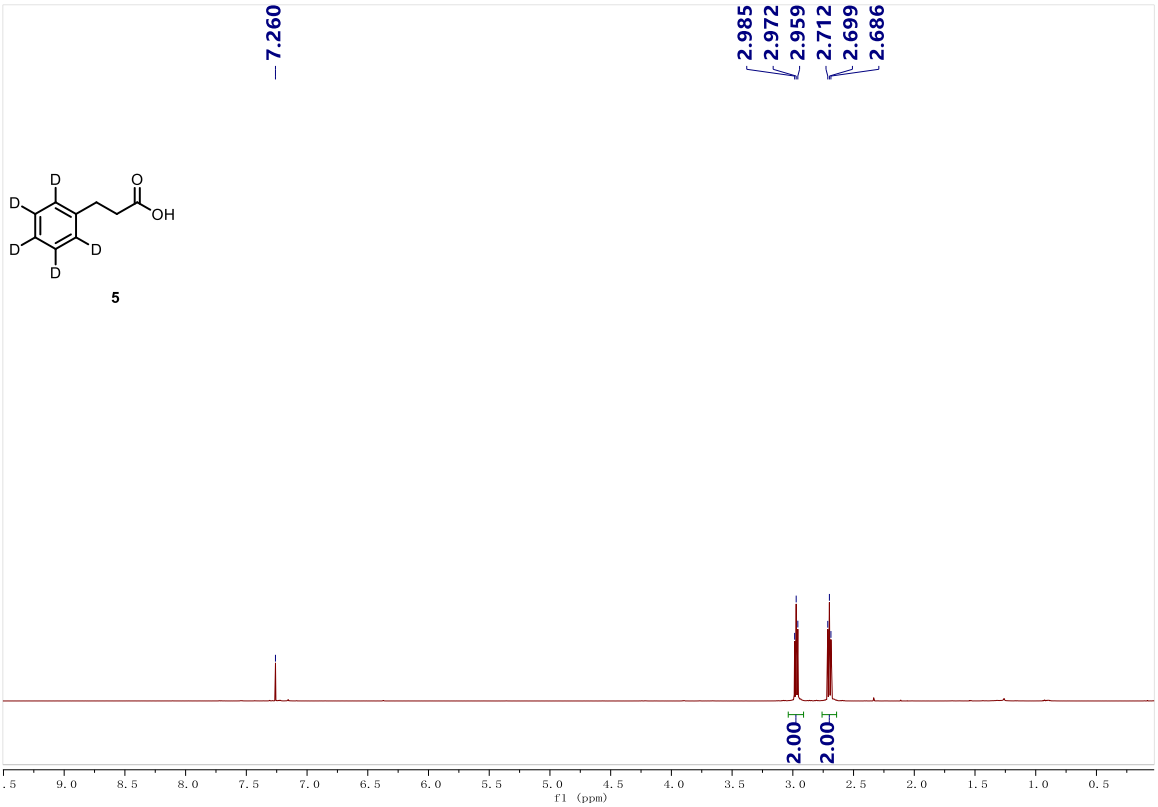

7.823
7.545
7.541
7.537
7.524
7.520
7.457
7.453
7.436
7.431
7.421
7.417
7.403
7.399
7.395
7.381
7.259
7.150
7.134
3.967
3.949
3.931
3.913
2.347
2.298
1.417
1.399
OAc
Me
F
OH
O
OAc
4zc
0.91
2.07
3.57
1.08
0.96
6.06
2.94
f1 (ppm)


178.104
169.193
167.834
150.750
148.267
144.015
143.980
137.522
137.362
134.028
129.339
129.205
129.072
129.044
128.967
128.651
128.485
126.964
121.840
121.807
77.477
77.159
76.842
36.415
20.767
20.197
15.617
OAc
Me
F
OH
O
OAc
4zc
f1 (ppm)


-133.573
OAc
Me
F
OH
O
OAc
4zc
20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240 -250 -260 -270 -280 -290 -300 -310
f1 (ppm)


7.046
7.033
6.988
6.975
6.962
6.781
6.767
3.839
3.818
3.310
Br
OH
OH
O
4zd
0.98
1.00
0.95
2.00
f1 (ppm)


173.710
156.858
128.728
125.680
122.976
122.209
113.698
48.135
47.993
47.852
47.709
47.568
47.425
47.283
34.871
Br
OH
OH
O
4zd
f1 (ppm)


7.260
2.985
2.972
2.959
2.712
2.699
2.686
D
D
D
D
D
O
OH
5
2.00
2.00
f1 (ppm)