Supplementary Information

Photoinduced *meta*-Selective C–H Oxygenation of Arenes

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1. General Consideration:

Reagent Information. All the reactions were carried out in screw cap reaction tubes under aerobic condition, unless otherwise stated. All the chemicals were purchased from Sigma Aldrich, Alfa Aesar and TCI-India. Solvents were bought from commercial sources and were used without further purification. Silica gel (100–200 mesh) was used for column chromatography obtained from Merck. Petroleum ether and ethyl acetate mixture was used as a gradient elution for column chromatography. A gradient elution using petroleum ether and ethyl acetate was performed, based on Merck aluminum TLC sheets (silica gel 60F254).

Analytical Information. All isolated compounds were characterized by ^{1}H NMR, ^{13}C NMR spectroscopy, and HRMS. Unless otherwise stated, all Nuclear Magnetic Resonance spectra were recorded on a Bruker 400 MHz and 500 MHz instrument. NMR spectra are reported in parts per million (ppm), and were measured relative to the signals for residual solvent in the deuterated solvent, unless otherwise stated. All NMR analysis were performed with 1,3,5-trimthoxybenzene as the internal standard. All ^{13}C NMR spectra were obtained with ^{1}H decoupling. High-resolution mass spectra (HRMS) were recorded on a micro-mass ESI TOF (time of flight) mass spectrometer. UV/vis absorption spectra were recorded on Agilent Cary 8454 UV-Vis spectrophotometer, equipped with a temperature control unit at 25 °C. The samples were measured in quartz cuvettes (chamber volume = 3.0 mL) fitted with a stopper.

Description of Reaction Tube:

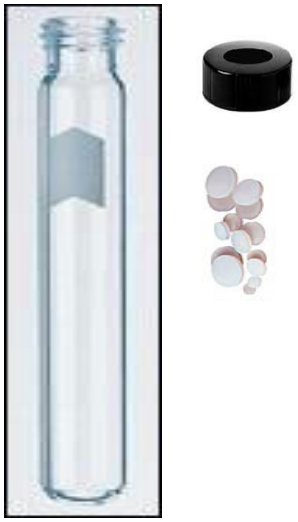


Figure S1. Pictorial description of reaction tube for photoredox acetoxylation: Fisher brand Disposable Borosilicate Glass Tubes (16*125mm) with Threaded End (Fisher Scientific, Order No. 1495935A) [left]; Kimble Black Phenolic Screw Thread Closures with Open Tops (Fisher Scientific Order No. 033407E) [left]; Thermo Scientific National PTFE/Silicone Septa for Sample Screw Thread Caps (Fisher Scientific Order No. 03394A) [left].

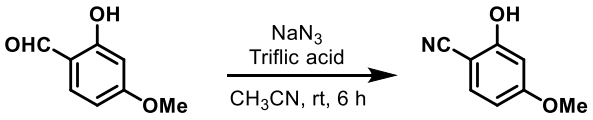
A custom-made light set-up was used with 4 CFL bulbs arranged around the reaction tubes. A fan attached to the apparatus was used to maintain the temperature at (30-35 ^{o}C). For irradiation with CFL bulbs, the reaction tubes were placed between light sources (~ 3 cm distance between the light source and the tube).

Figure S1: Photograph of the light set used for irradiation of the reaction solutions

2. Preparation of starting materials:

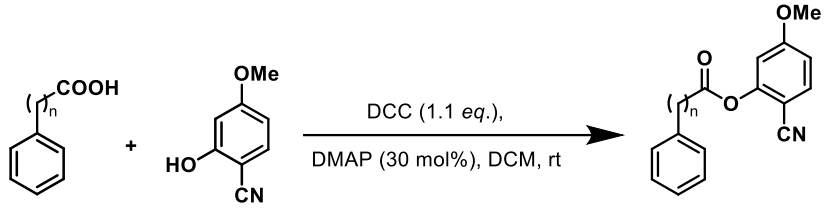
All the starting materials are prepared following our previous literature report (*J. Am. Chem. Soc.* **2022,** *144,* 1929–1940; *Angew. Chem. Int. Ed*. **2017**, *56*, 5272 –5276)

2.A. Synthesis of the directing group:



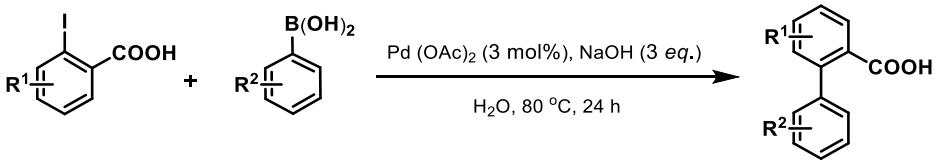
In an oven-dried round bottom flask (250 mL), charged with a stir-bar, corresponding aldehyde (20.0 mmol) and NaN_3 (3.0 equiv.) were taken CH_3CN (60 mL) was added to it and stirred at room temperature for 15 min. After that 3.5 equiv. of triflic acid was added to the mixture in portion wise. After the addition the reaction was allowed to stir at room temperature for 12 h. Upon completion, the solvent was removed under reduced pressure. The solid residue was dissolved in ethyl acetate and washed with saturated $NaHCO_3$ solution (3 times). The organic fraction was then dried over anhydrous Na_2SO_4 and purified through column chromatography.

2.B. General procedure for synthesis of carbonyl ester of phenylacetic acids:



To a stirred solution of carboxylic acid (1 equiv, 5 mmol) and DMAP (0.3 mmol) in 30 mL anhydrous CH_2Cl_2, 2-hydroxy-4-methoxybenzonitrile (1.5 equiv, 7.5 mmol) was added. After 15 minute of stirring, DCC (5.5 mmol) was added to the reaction mixture at 0˚C and then allowed to stir overnight at room temperature. Upon completion of reaction, precipitated urea is then filtered off. Filtrate is evaporated and the residue was dissolved in CH_2Cl_2 and washed with saturated $NaHCO_3$ solution, and then dried over anhydrous Na_2SO_4. The solvent is removed under reduced pressure and the residue was purified by column chromatography on silica gel (eluent: ethyl acetate/petroleum ether) to give the desired ester.

2.C. General procedure for synthesis of biphenyl carbonyl ester:

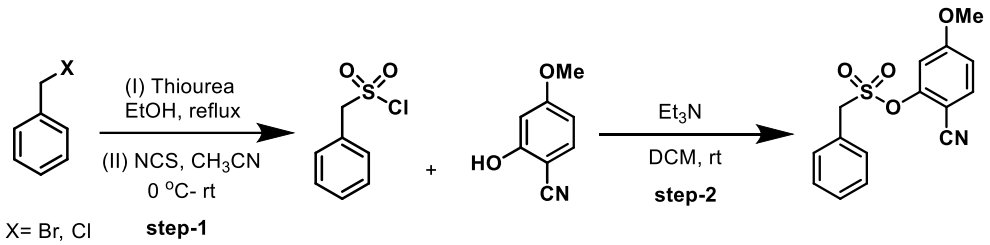


Step 1: A clean, oven-dried screw cap reaction tube with previously placed magnetic stir–bar was charged with 2-iodobenzoic acid derivatives (1 equiv, 3 mmol), corresponding boronic acid (1.2 equiv, 3.6 mmol), sodium hydroxide (3 equiv, 9 mmol) $Pd(OAc)_2$ (3 mol %) and water 9 mL . The reaction tube was evacuated and back filled with nitrogen and this sequence was repeated three additional times. Then it was placed in preheated oil bath at 80 ^oC for 24 h. After completion of the reaction, the reaction was cooled to room temperature and acidify to 3-4 ph. The resulting mixture was extracted with ethyl acetate and the organic layer was dried Over Na_2SO_4. The solvent is removed under reduced pressure and the residue was purified by column chromatography on silica gel (eluent: ethyl acetate/petroleum ether) to give the biphenyl acids.

Step 2: To a stirred solution of biphenyl carboxylic acid (1 equiv, 2 mmol) and DMAP (0.3 mmol) in 10 mL anhydrous CH_2Cl_2, 2-hydroxy-4-methoxybenzonitrile (1.5 equiv, 3.0 mmol)

was added. After 15 minute of stirring, DCC (2.2 mmol) was added to the reaction mixture at 0˚C and then allowed to stir overnight at room temperature. Upon completion of reaction, precipitated urea is then filtered off. The filtrate is evaporated and the residue was dissolved in CH_2Cl_2 and washed with saturated $NaHCO_3$ solution, and then dried over anhydrous Na_2SO_4. The solvent is removed under reduced pressure and the residue was purified by column chromatography on silica gel (eluent: ethyl acetate/petroleum ether) to give the desired ester.

2.D. General synthesis of sulfonyl ester scaffolds:

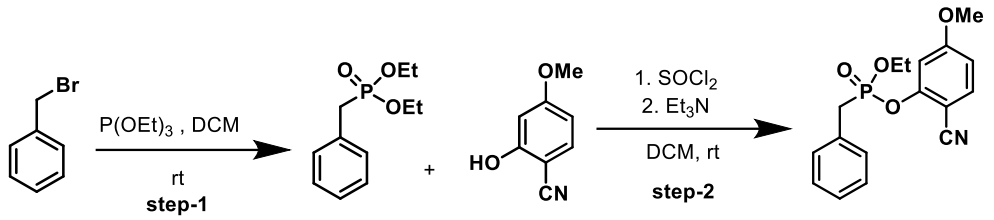


Step 1: Preparation of phenylsulfonyl chloride:

An oven-dried clean round bottom flask was charged with magnetic stir-bar, benzyl chloride/bromide (10.0 mmol) and thiourea (10.0 mmol, 760 mg). 10 mL of absolute ethanol was added and refluxed at 96 °C. After 3 h the reaction was taken out and solvent was evaporated under reduced pressure to obtained white solid thiouric salt. The obtained solid salt was suspended in 14 mL of CH_3CN and 3 mL (2N HCl) was added to it. The mixture was stirred at 0 °C for 15 min. *N*-chlorosuccinimide (NCS) (40.0 mmol; 5.34 g) was added in portion to the suspension in order to obtain a clear solution. The solution was stirred for another 30 min at room temperature. Then the solution was evaporated under reduced pressure to remove the CH_3CN. The remaining aqueous portion was extracted with ethyl acetate and dried over anhydrous Na_2SO_4 and purified by column chromatography using silica gel (100-200 mesh size) and petroleum ether/ ethyl acetate as the eluent.

Step 2: To an ice-cold solution of 2-hydroxy-4-methoxybenzonitrile (5.0 mmol) and TEA (1.5 equiv., 1.04 mL) in 10 mL dichloromethane under nitrogen atmosphere, phenylsulfonyl chloride was added portion wise. Stirring was continued for additional 20 min, after that the ice bath was removed and the reaction mixture was left overnight at room temperature. After completion of the reaction DCM was removed under reduced pressure and the residue was extracted with ethyl acetate (3 x 20 mL). The organic layer was dried over anhydrous Na_2SO_4. After filtration and evaporation of the solvent, the crude mixture was purified by column chromatography using neutral alumina and petroleum ether / ethyl acetate (85/15, v/v) as the eluent.

2.E. General synthesis of Phosphonate ester scaffolds:



Step 1: Preparation of diethyl benzylic phosphonates:

An oven dried clean round bottom flask with magnetic stir-bar was charged with benzyl bromide derivatives (1.0 mmol), $P(OEt)_3$ (1.2 mmol) and 5 mL of dry DCM and stirred at room temperature in the presence of catalytic amount of ZnI_2 (0.2 mmol). After 6 h the reaction was taken out and evaporated under reduced pressure to obtained crude materials which was then purified by column chromatography as petroleum ether / ethyl acetate as the eluent.

Step 2: Preparation of Phosphonyl chloride:

An oven dried clean round bottom flask was charged with magnetic stir-bar and diethyl benzylic phosphonates, and then $SOCl_2$ was added as a solvent amount to the reaction mixture and stirred at reflux condition. After 3 h the excess amount of $SOCl_2$ was removed by rotavapor and the crude phosphonyl chloride derivatives was charged for next step esterification. Under nitrogen atmosphere Et_3N was added to the 2-hydroxy-4-methoxybenzonitrile solution in DCM. The reaction was stirred at 0 °C for 10 mins. Under nitrogen atmosphere Phosphonyl chloride was added to the reaction in portion until effervescence stopped and then transferred to room temperature and stirred overnight. The progress of the reaction was monitored by TLC. Upon completion the reaction was quenched by adding water and the desired compound was extracted with ethyl acetate. Combined organic portion was dried over anhydrous Na_2SO_4. The crude mixture was concentrated under reduced pressure and purified by column chromatography using silica gel (100-200 mesh size) and petroleum ether / ethyl acetate as the eluent.

3. Optimization details for *meta*-selective Acetoxylation of arenes:

Yield and selectivity were determined by ^{1}H NMR analysis of the crude product using TMB as the internal standard.

Table S1: Evaluation of directing groups for *meta*-acetoxylation of arenes:

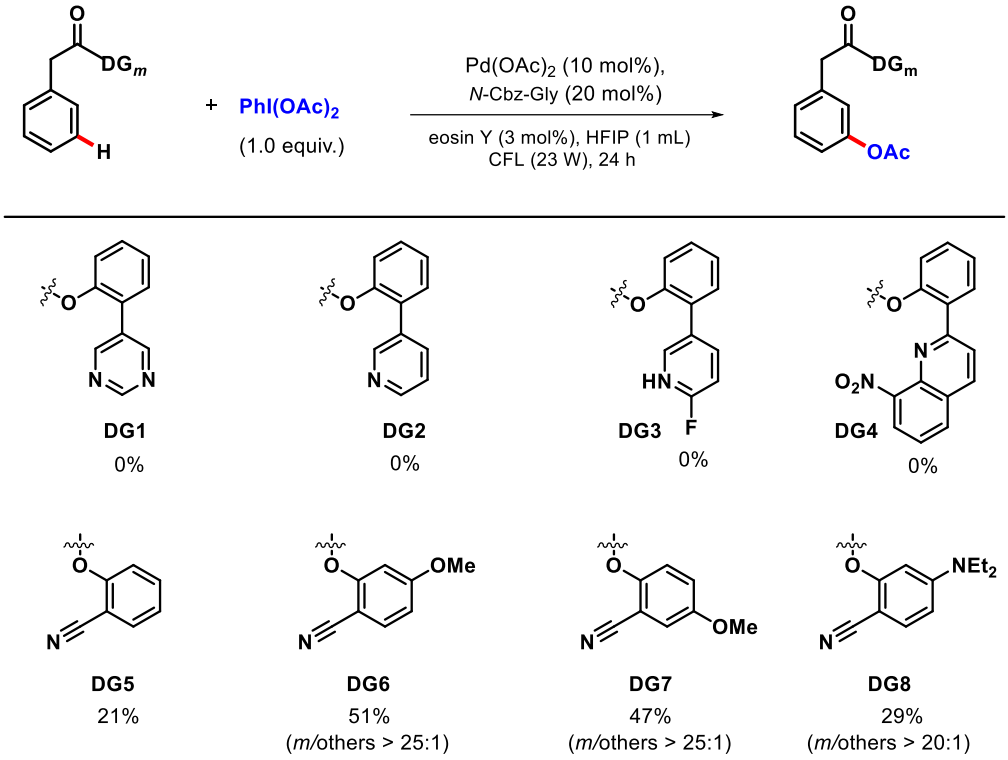
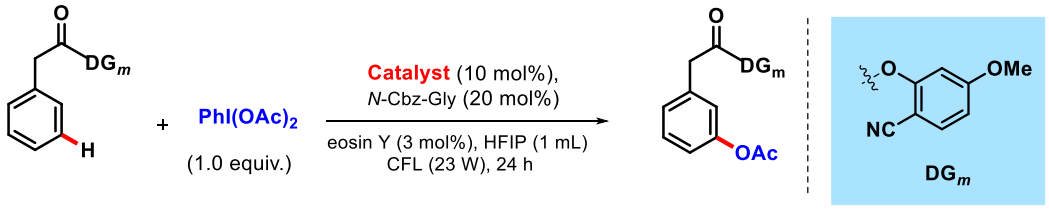


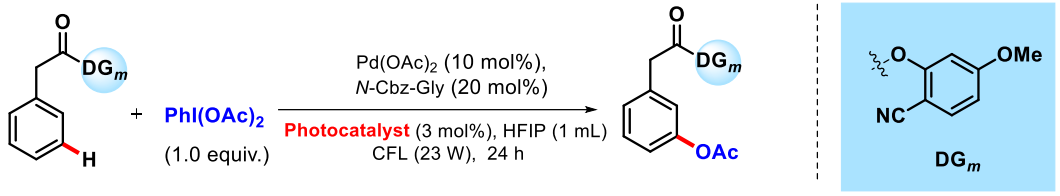
Table S2: Optimization by varying different palladium salts:



Entry	Pd Catalyst	NMR Yield (%)	*meta*:*others*
1	$Pd(TFA)_2$	24	>25:1
2	$Pd(CH_3CN)_2Cl_2$	11	-
3	$Pd(acac)_2$	18	15:1
4	$PdCl_2$	trace	-
5	$Pd(PhCN)_2Cl_2$	trace	-
6	$Pd(COD)Cl_2$	08	-
7	$Pd(dba)Cl_2$	trace	-
8	$Pd(OPiv)_2$	41	>25:1
9	$Pd(PPh_3)_2Cl_2$	13	-

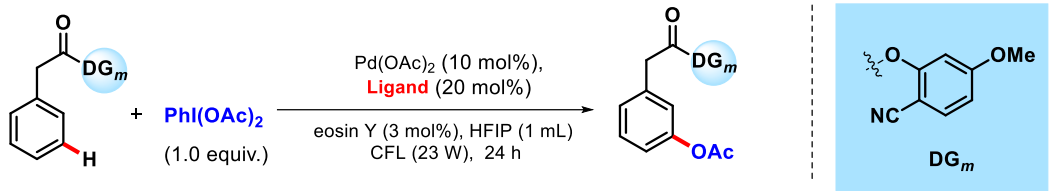
10	$Pd(PPh_3)_4$	trace	-
11	**$Pd(OAc)_2$**	**51%**	**>25:1**

Table S3: Optimization by varying different photocatalyst:



Entry	Photocatalyst	NMR Yield (%)	*meta*:*others*
1	Fluorescein	47	>25:1
2	**eosin Y**	**51**	**>25:1**
3	4-Czipn	35	15:1
4	2,4,6 triphenyl pyrolidinium salt	46	8:1
5	Eosin B	35	20:1
6	1,4 dicyanobenzene	trace	-
7	Rose Bengal	40	18:1
8	Rhodamin B	trace	-
9	$Ru(bpy)_3Cl_2$	30	7:1
10	$Ir[dF(CF_3)ppy]_2(dtbpy))PF_6$	13	17:1

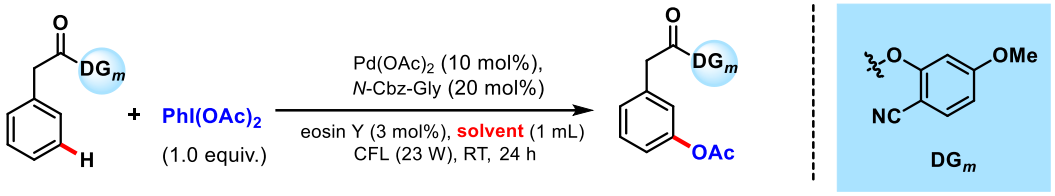
Table S4: Optimization by varying different amnio acid ligands:



Entry	Ligand	NMR Yield (%)	*meta*:*others*
1	*N*-Ac-Gly-OH	41	16:1
2	*N*-Ac-L-Leucine	31	12:1
3	*N*-Ac-L-Valine	35	10:1
4	*N*-Ac-DL-2-Phe-Glycine	36	8:1
5	*N*-Ac-Phe-OH	25	10:1
6	Boc-Gly-OH	38	15:1
7	Fmoc-Gly-OH	40	17:1

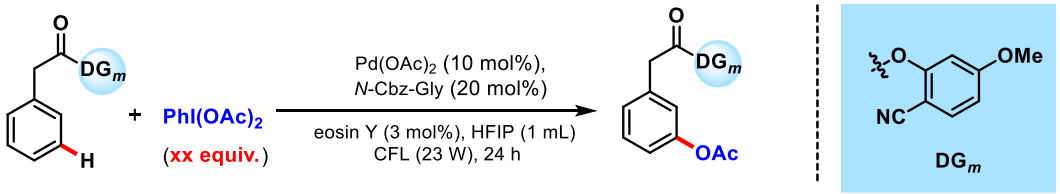
8	**CBz-Gly-OH**	**51**	**>25:1**
9	*N*-Ac-DL-Tryptophan	16	6:1
10	*N*-Ac-4-Hyrdoxy-L-Proline	21	3:1
11	*N*-Ac-DL-Methionine	19	10:1
12	*N*-Ac-L-Histidine Monohydrate	13	7:1
13	*N*-Ac-Glycine Ethyl Ester	58	16:1
14	*N*-Ac-L-Glutamic Acid	23	11:1
15	2-hydroxy pyridine	18	2:1

Table S5: Optimization by varying different solvents:



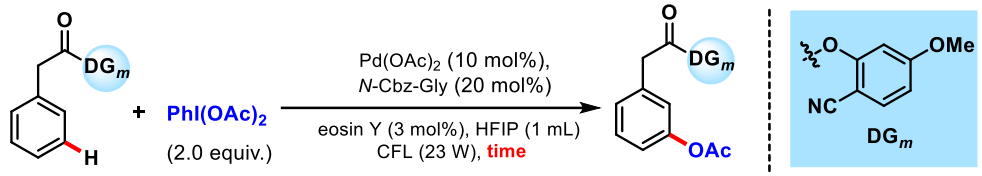
Entry	Solvent	NMR Yield (%)	*meta*:*others*
1	**HFIP**	**51**	**>25:1**
2	DCE	n.d	-
3	HFIP+DCE (1:1)	trace	-
4	CH_3CN	n.d	-
5	^{i}Pr-OH	n.d	-
6	MeOH	trace	-
7	1,4 dioxane	n.d.	-
8	THF	n.d.	-
9	TFA	trace	-
10	HFIP+H_2O (1:1)	n.d.	-
11	HFIP+TFA (8:2)	15	6:1
12	HFIP+AcOH (8:2)	Multiple product	-
13	TFE	14	>20:1

Table S6: Optimization of amount of PIDA:



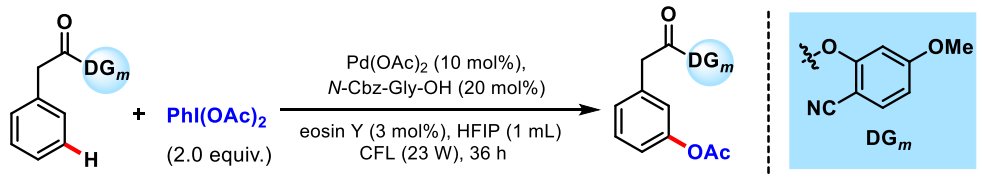
Entry	PIDA amount (equiv.)	NMR Yield (%)	*meta*:*others*
1	1	51	>25:1
2	1.5	65	>25:1
3	**2**	68	**>25:1**
4	2.5	67	>25:1
5	3	64	>25:1
6	3.5	60	>25:1
7	4	58	>25:1
8	PIDA+Ac_2O (1:1) 2	49	>25:1

Table S7: Time optimization:



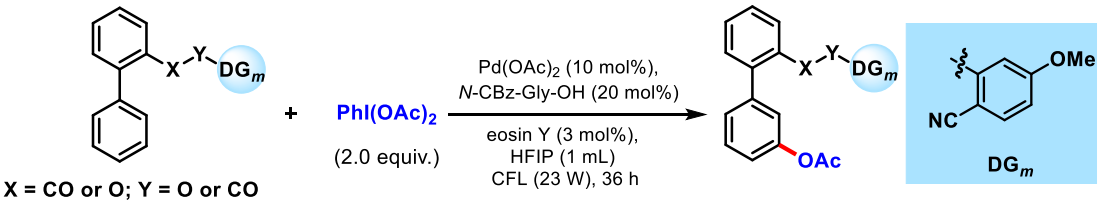
Entry	Time (h)	NMR Yield (%)	*meta*:*others*
1	4	14	>25:1
2	8	22	>25:1
3	12	35	>25:1
4	16	47	>25:1
5	20	52	>25:1
6	24	68	>25:1
7	28	72	>25:1
8	32	75	>25:1
9	**36**	**79**	**>25:1**
10	40	78	>25:1
11	44	79	>25:1

4.A. General procedure for *meta*-acetoxylation of phenylacetic acid derivatives:



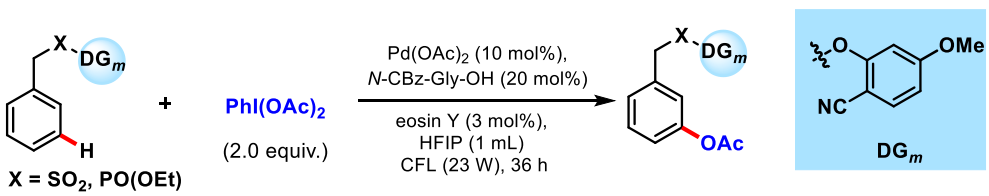
General procedure: In an oven-dried screw capped reaction tube was charged with magnetic stir bar, corresponding ester of phenyl acetic acid (0.1 mmol), $Pd(OAc)_2$ (10 mol%), *N*-Cbz-Gly-OH (20 mol%), eosin Y (3 mol%), and $PhI(OAc)_2$ (0.2 mmol, 2 equiv.) in 1 mL of 1,1,1,3,3,3-hexafluoro-2-propanol (HFIP) were added. The reaction tube was capped and placed 3 cm away from four 23 W house hold CFL bulbs with stirring (1500 rpm) at room temperature for 36 h. The temperature was maintained at approximately (30-35 ^oC) through cooling with a fan. Upon completion the mixture was diluted with ethyl acetate and filtered through a celite pad. The filtrate was evaporation under reduced pressure and the crude mixture was purified by column chromatography using silica (100-200 mesh size) and petroleum ether / ethyl acetate as the eluent.

4.B. General procedure for *meta*-acetoxylation of biphenyl ester/alcohol derivatives:



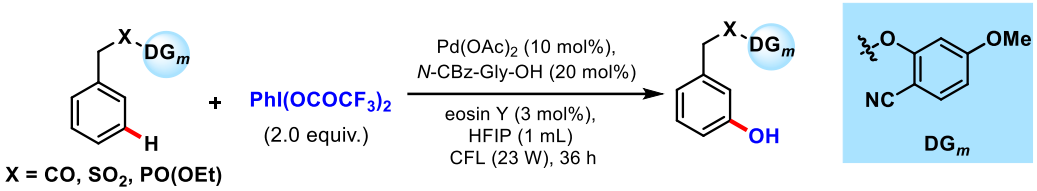
General procedure: In an oven-dried screw capped reaction tube was charged with magnetic stir bar, corresponding biphenyl ester/alcohol (0.1 mmol), $Pd(OAc)_2$ (10 mol%), *N*-Cbz-Gly-OH (20 mol%), eosin Y (3 mol%), and $PhI(OAc)_2$ (0.2 mmol, 2 equiv.) in 1 mL of 1,1,1,3,3,3-hexafluoro-2-propanol (HFIP) were added. The reaction tube was capped and placed 3 cm away from four 23 W house hold CFL bulbs with stirring (1500 rpm) at room temperature for 36 h. The temperature was maintained at approximately (30-35 ^oC) through cooling with a fan. Upon completion the mixture was diluted with ethyl acetate and filtered through a celite pad. The filtrate was evaporation under reduced pressure and the crude mixture was purified by column chromatography using silica (100-200 mesh size) and petroleum ether / ethyl acetate as the eluent.

4.C. General procedure for *meta*-acetoxylation of sulphonyl/phosphonyl ester derivatives:



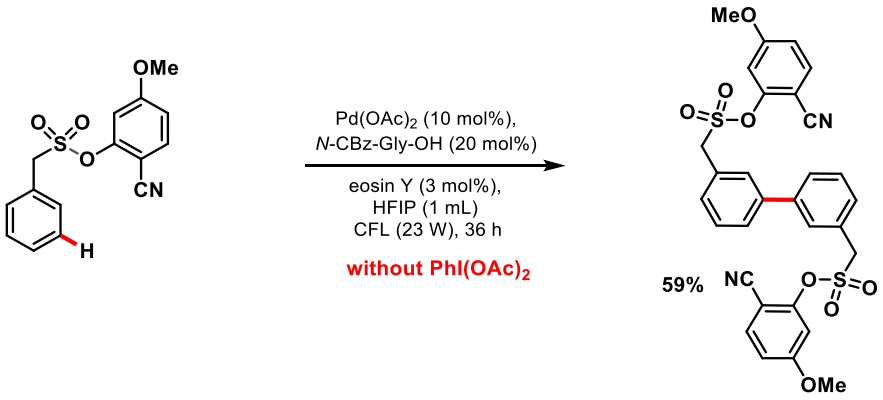
General procedure: In an oven-dried screw capped reaction tube was charged with magnetic stir bar, corresponding sulphonyl/phosphonyl ester (0.1 mmol), $Pd(OAc)_2$ (10 mol%), *N*-Cbz-Gly-OH (20 mol%), eosin Y (3 mol%), and $PhI(OAc)_2$ (0.2 mmol, 2 equiv.) in 1 mL of 1,1,1,3,3,3-hexafluoro-2-propanol (HFIP) were added. The reaction tube was capped and placed 3 cm away from four 23 W house hold CFL bulbs with stirring (1500 rpm) at room temperature for 36 h. The temperature was maintained at approximately (30-35 ^oC) through cooling with a fan. Upon completion the mixture was diluted with ethyl acetate and filtered through a celite pad. The filtrate was evaporation under reduced pressure and the crude mixture was purified by column chromatography using silica (100-200 mesh size) and petroleum ether / ethyl acetate as the eluent.

4.D. General procedure for *meta*-hydroxylation of various arenes derivatives:



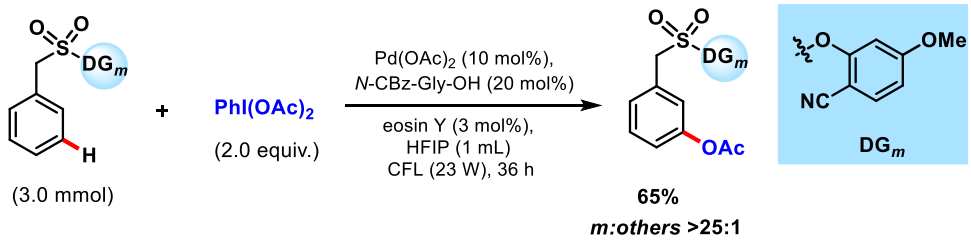
General procedure: In an oven-dried screw capped reaction tube was charged with magnetic stir bar, corresponding sulphonyl/phosphonyl ester (0.1 mmol), $Pd(OAc)_2$ (10 mol%), *N*-Cbz-Gly-OH (20 mol%), eosin Y (3 mol%), and $PhI(OCOCF_3)_2$ (0.2 mmol, 2 equiv.) in 1 mL of 1,1,1,3,3,3-hexafluoro-2-propanol (HFIP) were added. The reaction tube was capped and placed 3 cm away from four 23 W house hold CFL bulbs with stirring (1500 rpm) at room temperature for 36 h. The temperature was maintained at approximately (30-35 ^oC) through cooling with a fan. Upon completion the mixture was diluted with ethyl acetate and filtered through a celite pad. The filtrate was evaporation under reduced pressure and the crude mixture was purified by column chromatography using silica (100-200 mesh size) and petroleum ether / ethyl acetate as the eluent.

4.E. General procedure for *meta-meta* homocoupling:



In an oven-dried screw capped reaction tube was charged with magnetic stir-bar, corresponding sulphonic ester (0.1 mmol), $Pd(OAc)_2$ (10 mol%), *N*-CBz-Gly-OH (20 mol%) and eosin Y (3 mol%), in 1 mL of 1,1,1,3,3,3-Hexafluoro-2-propanol (HFIP) were added. The reaction tube was capped and placed 5 cm away from four 23 W house hold CFL bulbs with stirring (1500 rpm) at room temperature for 36 h. The temperature was maintained at approximately (30 - 35 ^oC) through cooling with a fan. Upon completion the mixture was diluted with ethyl acetate and filtered through a celite pad. The filtrate was evaporated under reduced pressure and the yield was monitored using ^1H NMR signal in presence of 1,3,5-trimethoxybenzene as internal standard. The spectral data of this compound is correlated with the previous literature report. (*J. Am. Chem. Soc.* **2022,** *144***,** 1929–1940).

4.F. General procedure for scaleup reaction:

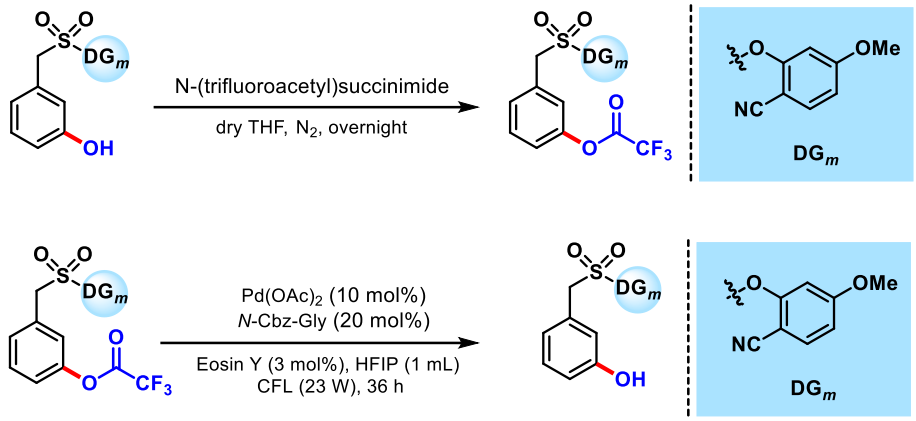


General procedure: In an oven-dried screw capped reaction tube was charged with magnetic stir bar, corresponding sulphonyl ester (3.0 mmol), $Pd(OAc)_2$ (10 mol%), *N*-Cbz-Gly-OH (20 mol%), eosin Y (3 mol%), and $PhI(OAc)_2$ (6.0 mmol, 2 equiv.) in 1 mL of 1,1,1,3,3,3-hexafluoro-2-propanol (HFIP) were added. The reaction tube was capped and placed 3 cm away from four 23 W house hold CFL bulbs with stirring (1500 rpm) at room temperature for 36 h. The temperature was maintained at approximately (30-35 ^oC) through cooling with a fan. Upon completion the mixture was diluted with ethyl acetate and filtered through a celite pad. The filtrate was evaporation under reduced pressure and the crude mixture was purified by column chromatography using silica (100-200 mesh size) and petroleum ether / ethyl acetate as the eluent.

5. Identification of intermediate in *meta*-hydroxylation protocol:

In order to confirm the intermediacy of the *meta*-trifluoroacetoxy moiety, the compound was synthesized separately and administrated under the optimized condition of *meta*-hydroxylation.

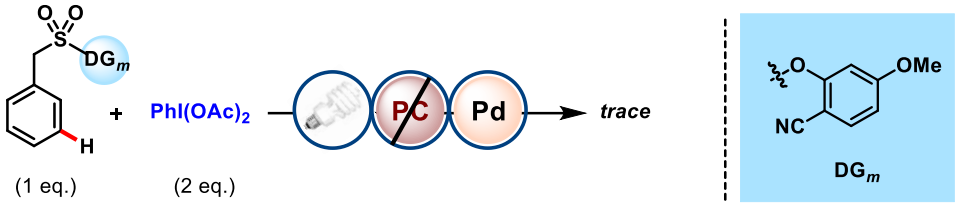
Synthesis of *meta*-trifluoroacetoxy moiety:



The *meta*-hydroxylated compound (0.1 mmol) was dissolved in dry THF (3mL) and *N*-(trifluoroacetyl)succinimide (0.15 mmol) was added to it. The reaction was refluxed overnight under N_2 atmosphere. After the reaction was finished, the precipitated succinimide was filtered off, and solvent was evaporated under reduced pressure forming the trifluoroacetate esters. The crude product was dissolved in diethylether (3 x 5 mL) and filtered to remove the succinimide. The organic part was evaporated to obtain the pure product (yield 88%). The obtained solid compound was directly used under optimized condition (general procedure for *meta*-hydroxylation condition). Formation of hydroxylated product quantitively confirms the in-situ hydrolysis of trifluoroacetylated product.

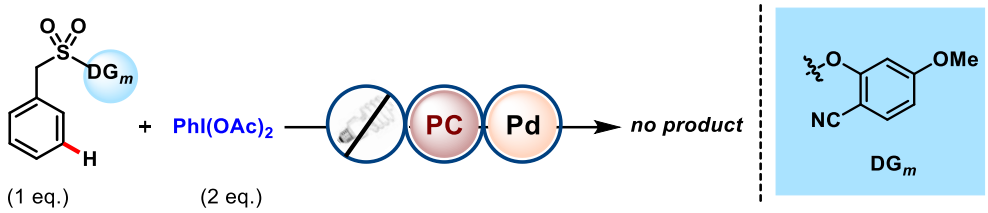
6. Mechanistic Studies:

(I) *Meta*-acetoxylation in the absence of photocatalyst:



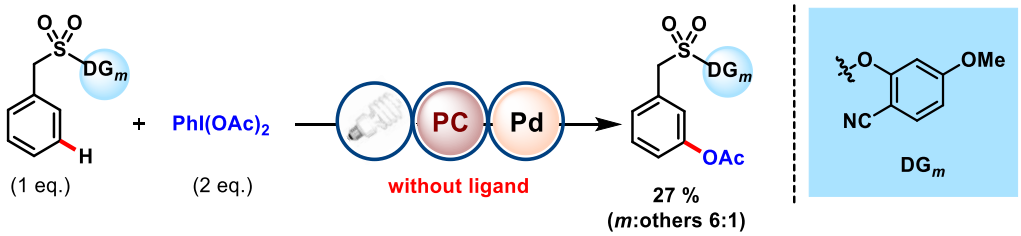
Following the general procedure for *meta*-C–H acetoxylation, the above stated control experiment was performed without photocatalyst in presence of four 23 W house hold CFL bulbs with stirring at (30 - 35 ^{o}C) for 36 h.

(II) *Meta*-acetoxylation in the absence of light:



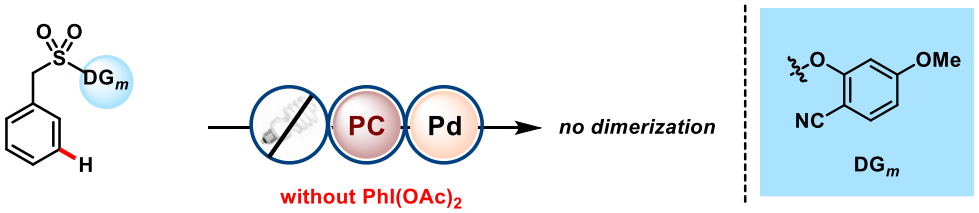
Following the general procedure for *meta*-C–H acetoxylation, the above stated control experiment was performed in absence of CFL bulbs (dark condition) for 36 h.

(III) *Meta*-acetoxylation in the absence of ligand:



Following the general procedure for *meta*-C–H acetoxylation, the above stated control experiment was performed in absence of ligand with four 23 W house hold CFL bulbs with stirring at (30 - 35 ^{o}C) for 36 h.

(IV) *Meta-meta* homo-coupling in the absence of light:



Following the general procedure for *meta-meta* homocoupling, the above stated control experiment was performed in absence of CFL bulbs (dark condition) with stirring for 36 h.

From the above control experiment results it was found that light and photocatalyst obligatory for the transformation.

(V) On/Off experiment:

According to the general procedure for *meta*-C–H acetoxylation, a reaction containing TMB (Trimethoxy-benzene) as internal standard was set up and placed in presence of four 23 W house hold CFL bulbs with stirring (1500 rpm) at room temperature. The reaction was sequentially stirred under visible light irradiation and in the absence of light. Every two hours an aliquot of 50 µL was removed *via* syringe and analyzed by ^{1}H NMR spectroscopy. After a total of 16 h the determined yields were plotted against the reaction time.

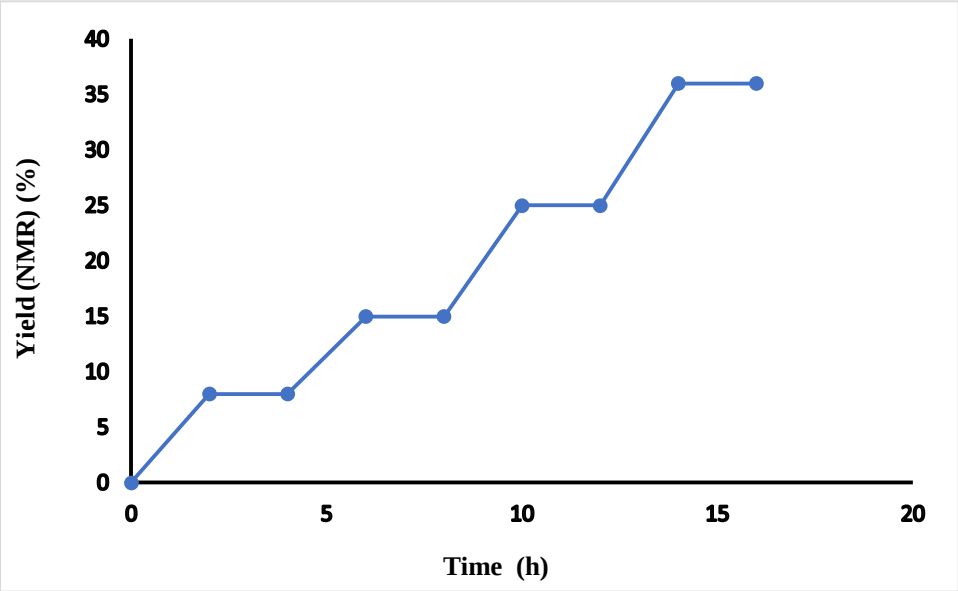
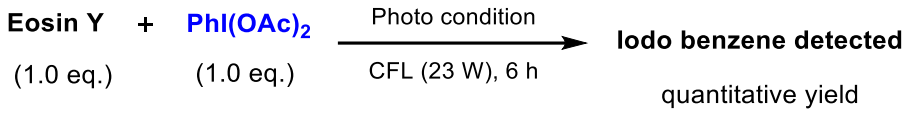


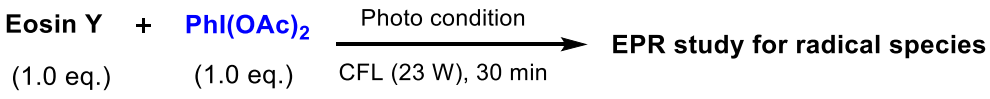
Fig S2: Effect of visible light irradiation

(VI) Detection of radical species in the reaction mixture:



Following the above procedure stated control experiment was performed with four 23 W house hold CFL bulbs with stirring at (30 - 35 ^{o}C) for 6 h. Formation of iodobenzene in quantitative amount supports the decomposition of $PhI(OAc)_2$ in presence of eosin Y and visible light.

(VII) EPR Study



The similar control experiment was performed with four 23 W house hold CFL bulbs and after 30 min it is subjected to EPR study. **The EPR experiments show sign of acetate radical in the mixture and proves our mechanistic hypothesis regarding generation of radical to perform meta-acetylation.**

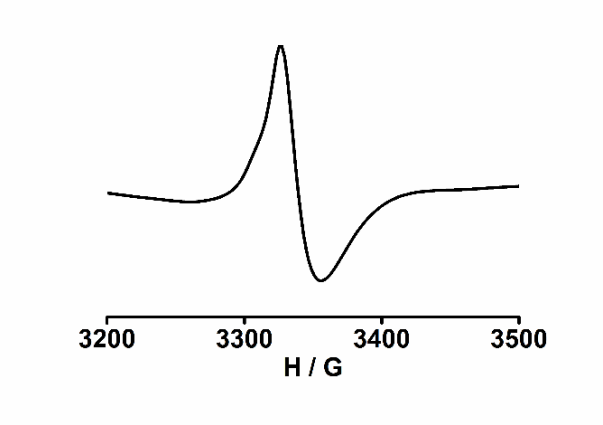
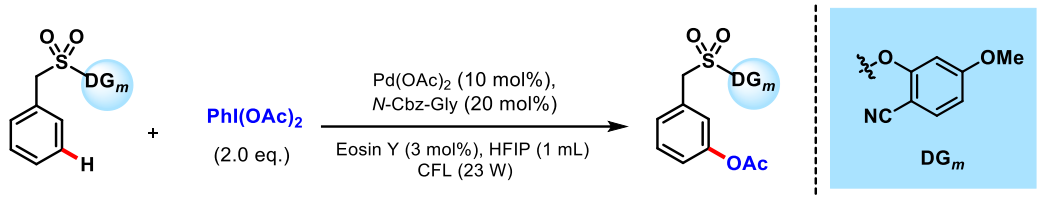


Fig S3: EPR spectra for the mixture of eosin Y, $PhI(OAc)_2$ in HFIP at 100 K after 30 min of visible light irradiation (g = 1.993)



Following the general procedure for *meta*-C–H acetoxylation, the above stated control experiment was performed with four 23 W house hold CFL bulbs for 60 min. to further confirm the formation of acetate radical during the course of the reaction. The similar type of EPR signal was observed as for the above experiment.

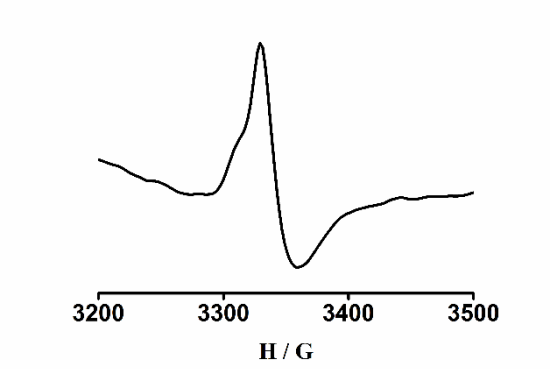
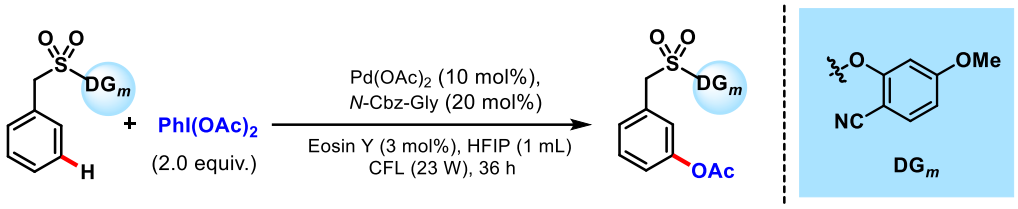


Fig S4: EPR spectra EPR spectra for the mixture of scaffold, ligand, $Pd(OAc)_2$, eosin Y, $PhI(OAc)_2$ in HFIP at 100 K after 60 min of visible light irradiation (g = 2.001)

Above two EPR experiments suggests the formation of radical species and the transformation proceeds through radical pathway.

(VIII) Effect of radical scavenger:



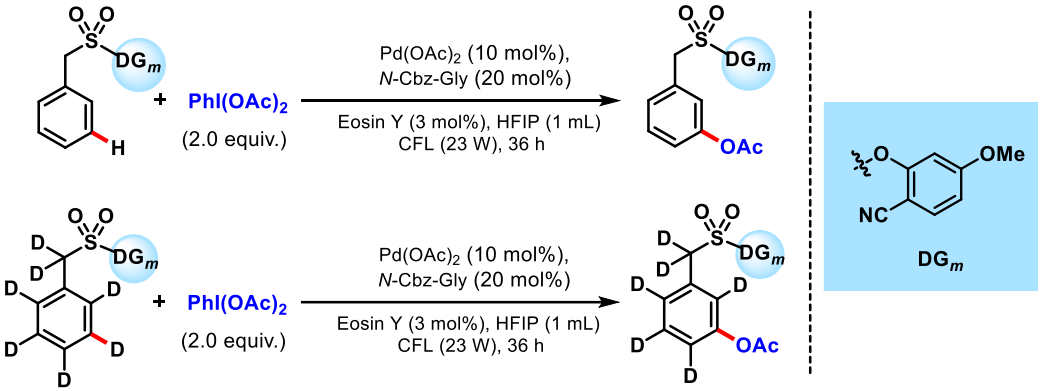
TEMPO (3 eq.), TEMPO = 2,2,6,6-Tetramethylpiperidine-1-oxyl, **no product**

PNB (3 eq.), PNB = Phenyl N-tert-butylnitrone, **no product**

BHT (3 eq.), BHT = Butylated hydroxytoluene, **no product**

Effect on radical scavenger for *meta*-C–H acetoxylation: Following the general procedure for *meta*-C–H olefination, the control experiment was performed with radical inhibitors (0.6 mmol) in presence of four 23 W house hold CFL bulbs with stirring at (30 - 35 ^{o}C) for 36 h. **Complete inhibition of the product formation further assures the involvement of radical species in the transformation**.

7. Kinetic isotope effect experiment:



Following the general procedure for *meta*-C–H acetoxylation, the reaction mixture was monitored for 10 to 60 min. After immediately cooling in a dry ice/alcohol bath, the yield of product was determined by crude ^{1}H NMR using TMB (Trimethoxy benzene) as the internal standard. **Each reaction is performed 3 times and the obtained average yields were plotted as yield [product] vs. time (min)**.

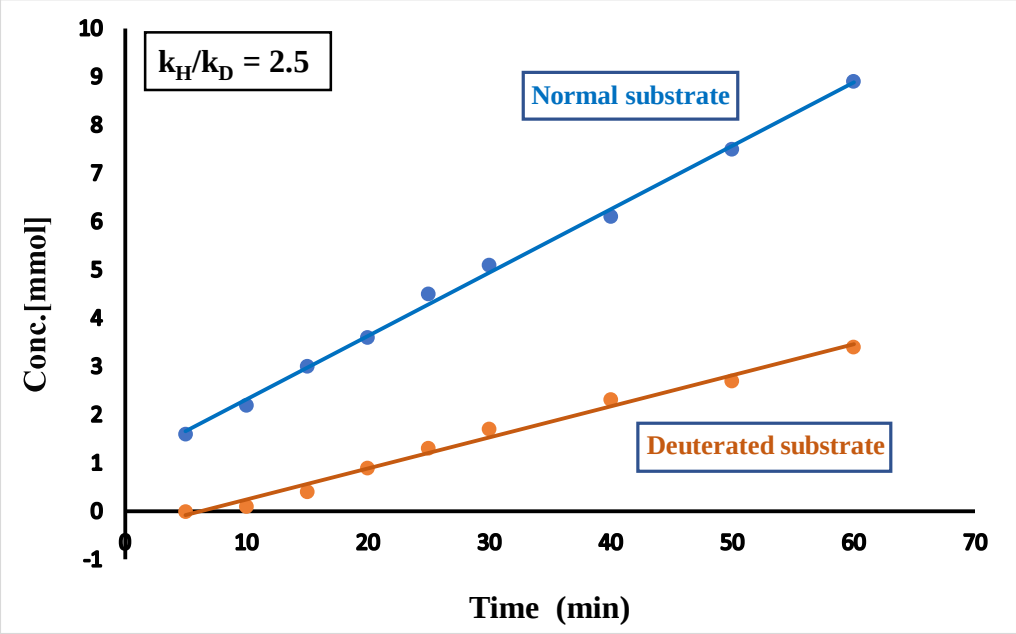


Fig S5: Determination of kinetic isotope effect

Now, Rate = k. [**substrate**]^x [**PhI(OAc)$_2$**]^y

For run 1, initial rate = Rate 1

So, Rate = k_H. [**substrate**]^x [**PhI(OAc)$_2$**]^y

or, 0.1314 = k_H . $[0.05]^x$ $[0.1]^y$

For run, initial rate = Rate 2

So, Rate = k_D. [**deutarated substrate**]^x [**PhI(OAc)$_2$**]^y

or, 0.0520 = k_D. $[0.05]^x$ $[0.1]^y$

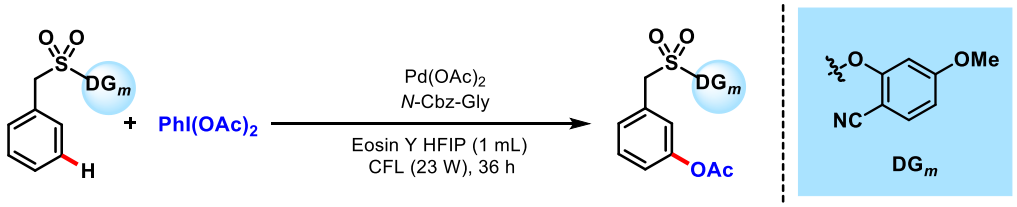
So, k_H / k_D = Rate 1/ Rate 2

or, k_H / k_D = 0.1314 / 0.0520

or, **k_H / k_D = 2.5**

The KIE data shown that the C–H cleavage step is the rate-determined step for the *meta* acetoxylation [K_H/K_D = 2.5].

8. Order determination for *meta*-C–H acetylation:



We can assume the rate of the reaction is dependent on the concentration of palladium catalyst, scaffold and ligand respectively. **Each reaction is performed 3 times and the obtained average yields were plotted as Conc. [mmol] vs. time (min)**.

So, Rate = k. [**substrate**]^{x} [**ligand**]^{y} [**palladium catalyst**]^{z} …….(1)

8.A. Order determination with respect to scaffold-

Run	scaffold (mmol)	$PhI(OAc)_2$ (mmol)	$[Pd(OAc)_2$ (mmol)	*N*-Cbz-Gly (mmol)
1	0.05	0.1	0.005	0.01
2	0.025	0.1	0.005	0.01

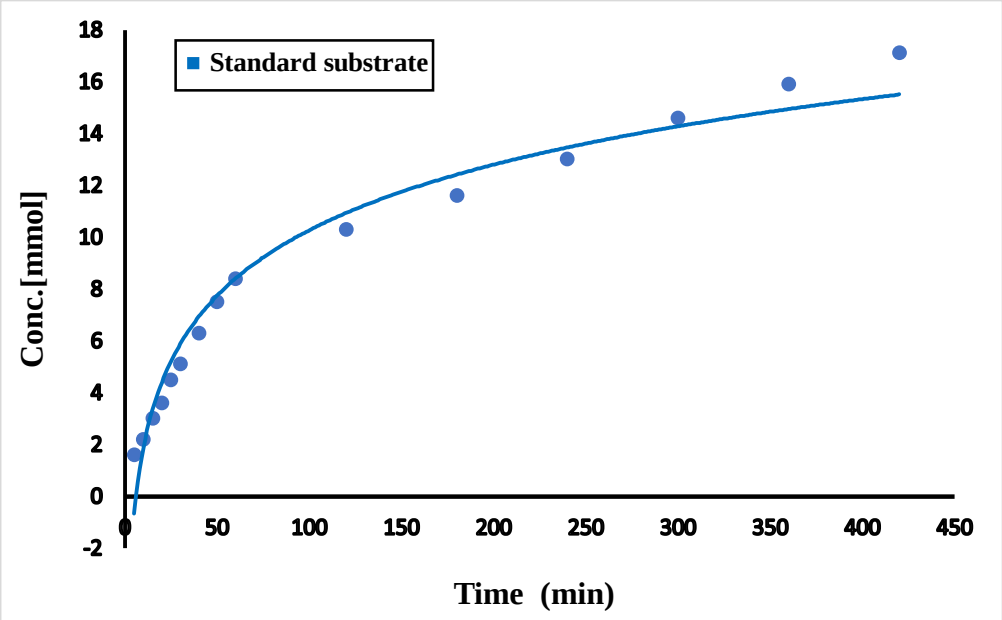


Fig S6. Product formation plot in run 1

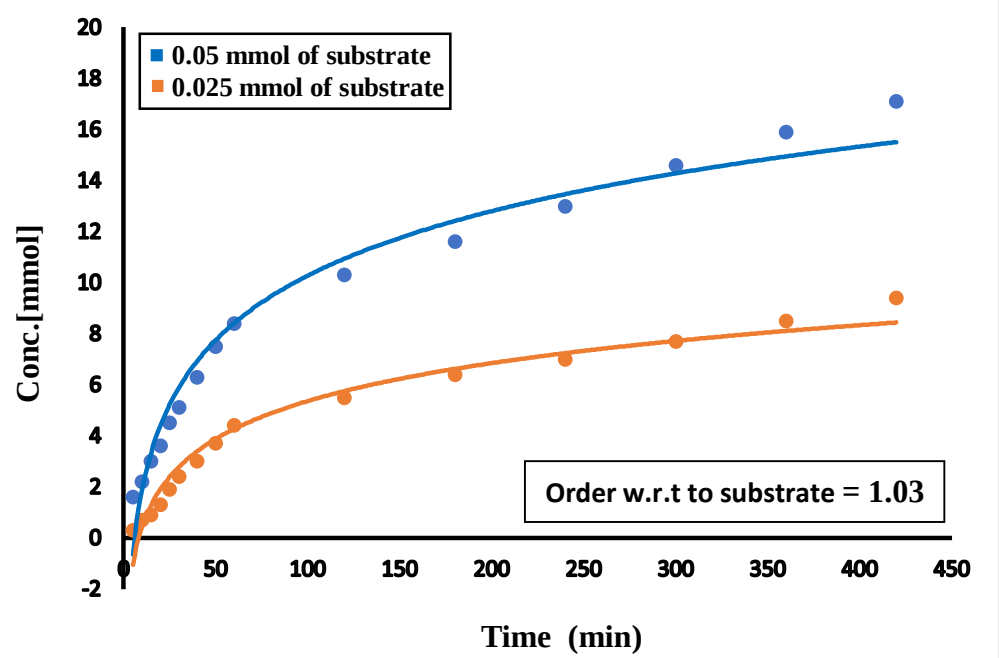


Fig S7. Product formation plot in run 1 and run 2

From the equation (1) we got, Rate = k. [**scaffold**]^{x} [**ligand**]^{y}

For run 1, initial rate = Rate 1

So, Rate 1 = k. [**scaffold**]^{x} [**ligand**]^{y}

or, 0.0257 = k. [0.05]^{x} [0.1]^{y} ……(2)

For run 2, initial rate = Rate 2

So, Rate 2 = k. [**scaffold**]^{x} [**ligand**]^{y}

or, 0.0249 = k. [0.025]^{x} [0.1]^{y} ……(3)

Hence from equation (2) and (3)

We get, [Rate 1/ Rate 2] = [0.05/ 0.025]^{x}

or, x = [log (Rate 1) – log (Rate 2)] / [log (0.05) – log (0.025)]

or, x = [log (0.0257) – log (0.0.249)] / [log (0.05) – log (0.025)]

or, **x = 1.03**

So, order with respect to scaffold is ~ 1

8.B. Order determination with respect to ligand *N*-Cbz-Gly

Run	scaffold (mmol)	$PhI(OAc)_2$ (mmol)	$[Pd(OAc)_2$ (mmol)	*N*-Cbz-Gly (mmol)
1	0.05	0.1	0.005	0.01
2	0.05	0.1	0.005	0.005

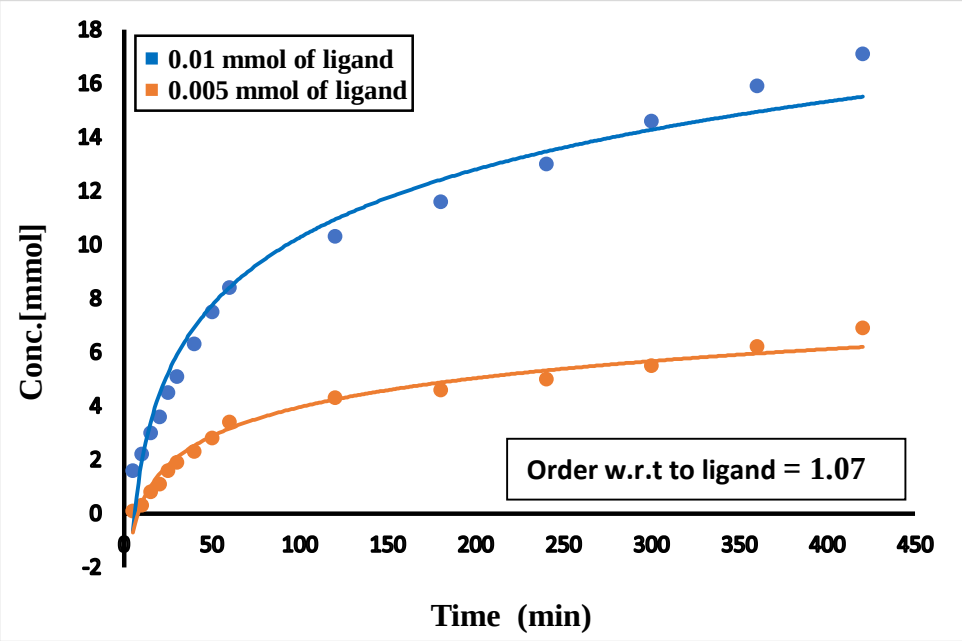


Fig S8. Product formation plot in run 1 and run 3

From the equation (1) we got, Rate = k. [**scaffold**]^{x} [**ligand**]^{y}

For run 1, initial rate = Rate 1

So, Rate 1 = k. [**1a**]^{x} [**2a**]^{y}

or, 0.0257 (mmol^{-1}.min^{-1}) = k . [0.05]^{x} [0.01]^{y} ……(2)

For run 3, initial rate = Rate 3

So, Rate 3 = k. [**scaffold**]^{x} [**ligand**]^{y}

or, 0.0239 (mmol^{-1}.min^{-1}) = k . [0.05]^{x} [0.005]^{y} ……(4)

Hence from equation (2) and (4)

We get, [Rate 1/ Rate 3] = [0.01/ 0.005]^{y}

or, x = [log (Rate 1) – log (Rate 3)] / [log (0.15) – log (0.01)]

or, x = [log (0.0257) – log (0.0239)] / [log (0.15) – log (0.005)]

or, **x = 1.07**

So, order with respect to ligand is ~ 1

8.C. Order determination with respect to palladium catalyst

Run	scaffold (mmol)	PhI(OAc)$_2$ (mmol)	[Pd(OAc)$_2$ (mmol)	*N*-Cbz-Gly (mmol)
1	0.05	0.1	0.005	0.01
2	0.05	0.1	0.0025	0.01

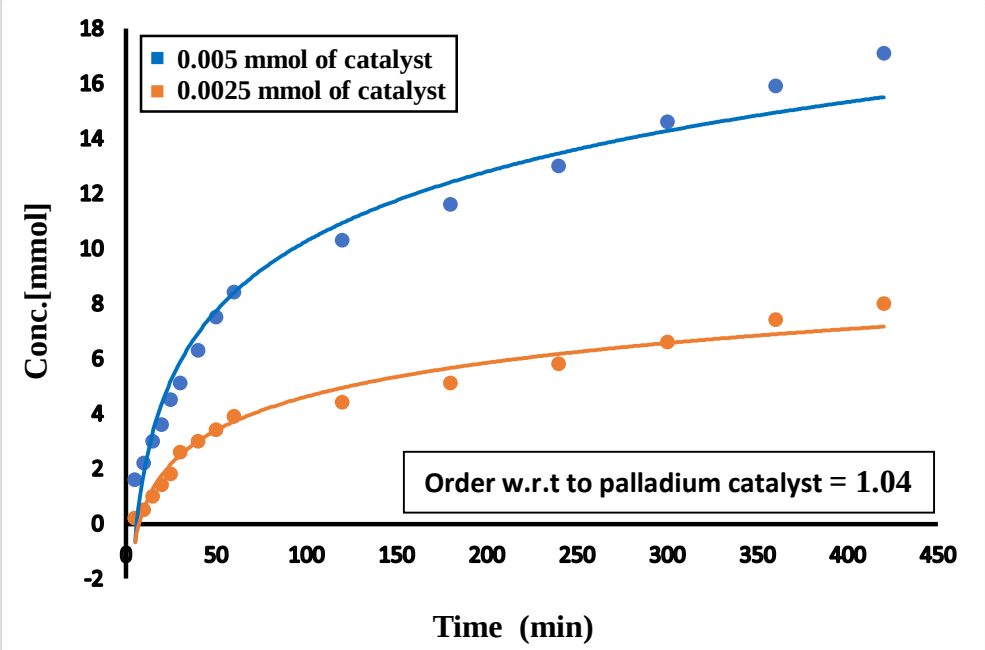


Fig S9. Product formation plot in run 1 and run 4

From the equation (1) we got, Rate = k. [**substrate**]^{x} [**palladium catalyst**]^{z}

For run 1, initial rate = Rate 1

So, Rate 1 = k. [**1a**]^{x} [**3a**]^{z}

or, 0.0257 (mmol^{-1}.min^{-1}) = k . [0.05]^{x} [0.005]^{z} ……(2)

For run 4, initial rate = Rate 4

So, Rate 3 = k. [**substrate**]^{x} [**palladium catalyst**]^{z}

or, 0.0246 (mmol^{-1}.min^{-1}) = k . [0.05]^{x} [0.0025]^{z} ……(5)

Hence from equation (2) and (5)

We get, [Rate 1/ Rate 3] = [0.15/ 0.00125]^{y}

or, x = [log (Rate 1) – log (Rate 3)] / [log (0.005) – log (0.0025)]

or, x = [log (0.0257) – log (0.0246)] / [log (0.005) – log (0.0025)]

or, **x = 1.04**

9. A. UV-visible Absorption experiment:

UV/vis absorption spectra were recorded on Agilent Cary 8454 UV-Vis spectrophotometer, equipped with a temperature control unit at 25 °C. The samples were measured in quartz cuvettes (chamber volume = 3.0 mL fitted with a stopper. Following the general procedure for *meta*-C–H acetoxylation, the UV-visible absorption of the reaction mixture was taken separately, along with individual *meta*-scaffold, *meta*-DG, ligand, eosin Y at the standard reaction in HFIP as a solvent. The best fit spectra have taken as reference and plotted in the below graph.

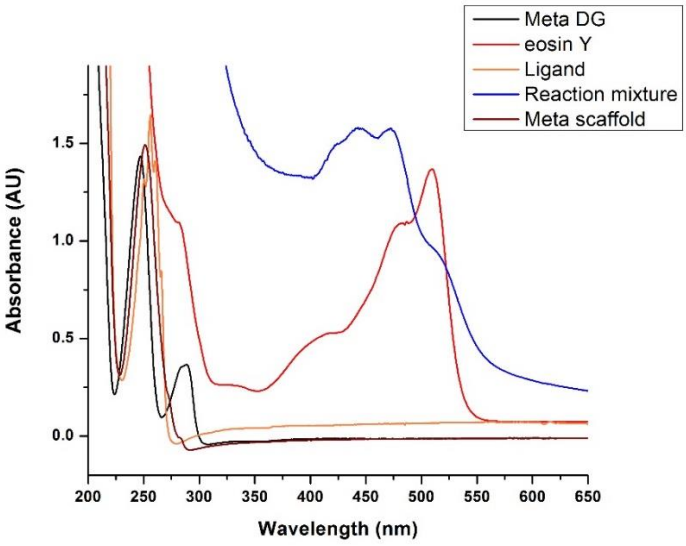


Fig S10: UV-visible absorption spectra of reaction components with reaction mixture

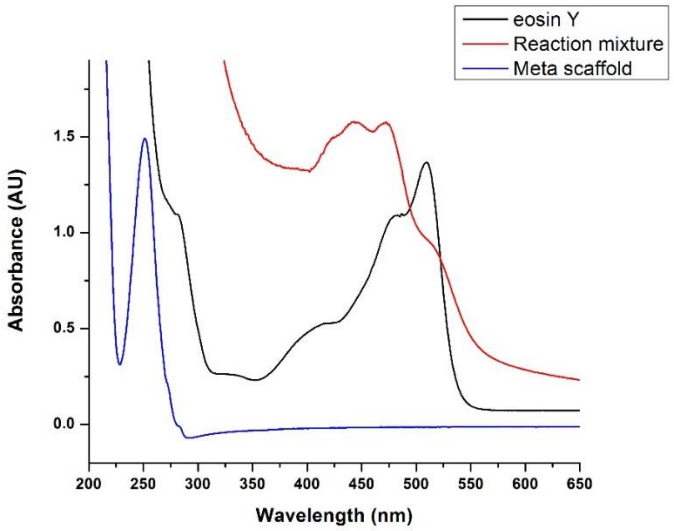


Fig S11: UV-visible absorption spectra of eosin Y, reaction mixture and *meta*-scaffold

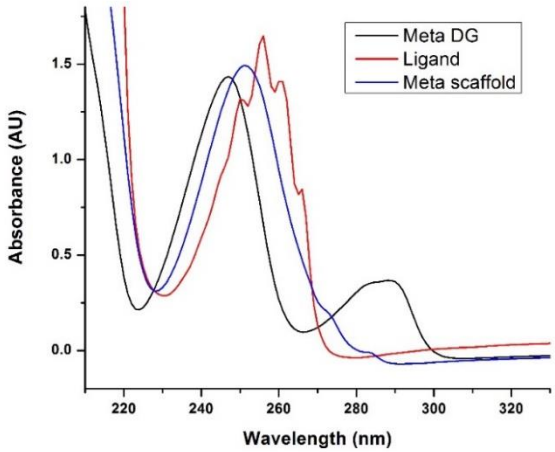


Fig S12: UV-visible absorption spectra of all non-UV component

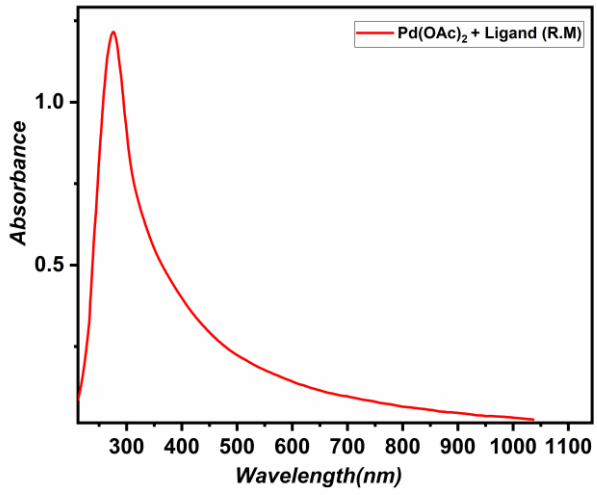


Fig S13. UV/Vis of the $Pd(OAc)_2$/ligand adduct

According to the UV/vis spectra **Fig S11:** there is a broad signal around the range of 440 to 480 nm. **Hence, the species forming in reaction mixture falls in the visible light region and expected to be the light-absorbing species to favour the C–H activation process. Hence, from the present study it may be concluded that for the photo-responsive metallacycle is required and it is a primary requirement for the reaction.**

9. B. Fluorescence Quenching Experiments:

Fluorescence quenching experiments were performed on a Horiba Duetta spectrometer and 1 mm High Precision Cell made of quartz from Hellma Analytics. In a typical experiment, a 2.5 μM solution of eosin Y and 0.2 M solution of palladium catalyst and ligand in HFIP was treated with the appropriate amount of quencher in a screw-top 1.0 cm quartz cuvette. All the reagents were prepared volumetrically in stock solutions. **For case 1**. it was excited at λ = 320 nm and the luminescence was measured over a range of 400 – 700 nm for pd-ligand reaction mixture and *meta*-scaffold and **for case 2**. it was excited at λ = 500 nm and the luminescence was measured over a range of 500 – 750 nm for eosin Y and PIDA. It was clearly found that the pd-ligand reaction mixture was quenched by the *meta*-scaffold (Fig. S13, I). In the latter case as well PIDA has quenched the emission of eosin Y photocatalyst (Fig. S13, II). This clearly indicates light has integral role in C–H activation step.

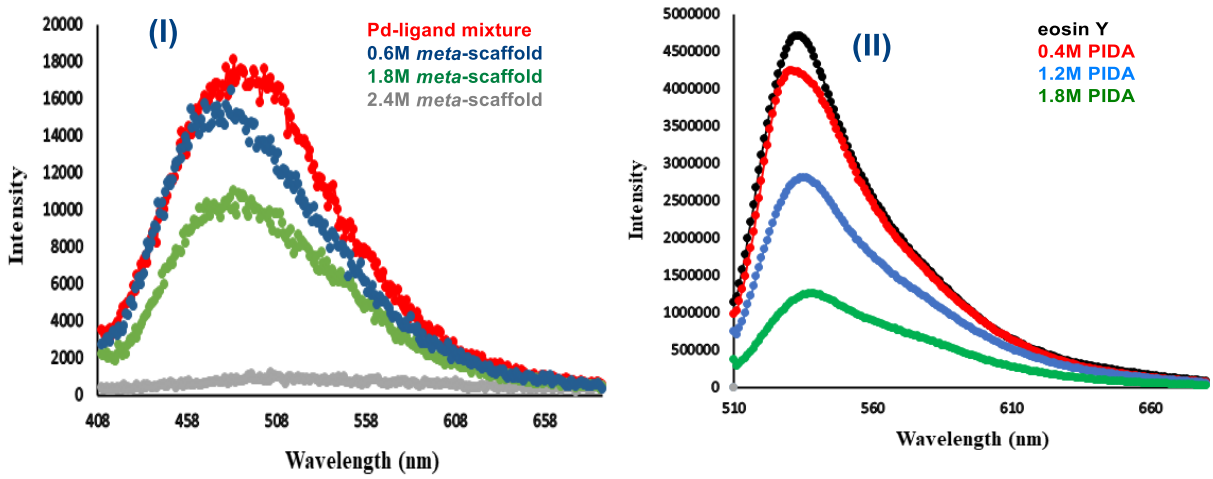


Fig S14. (I) Emission quenching of equimolar mixture of palladium catalyst and ligand by *meta*-scaffold. (II) Emission quenching of eosin Y by PIDA.

10.A. Acetate Monitoring: Upon addition of substrate (1 *eq.*) to the mixture of $Pd(OAc)_2$ (1 eq.), ligand (2.0 *eq.*) and HFIP (2.0 *eq.*), the signal for AcOH intensifies as observed by ^1H

NMR analysis. Notably **same observation was not observed** in absence of ligand signifies that simple $Pd(OAc)_2$ does not release AcOH in presence of substrate in the similar fashion.

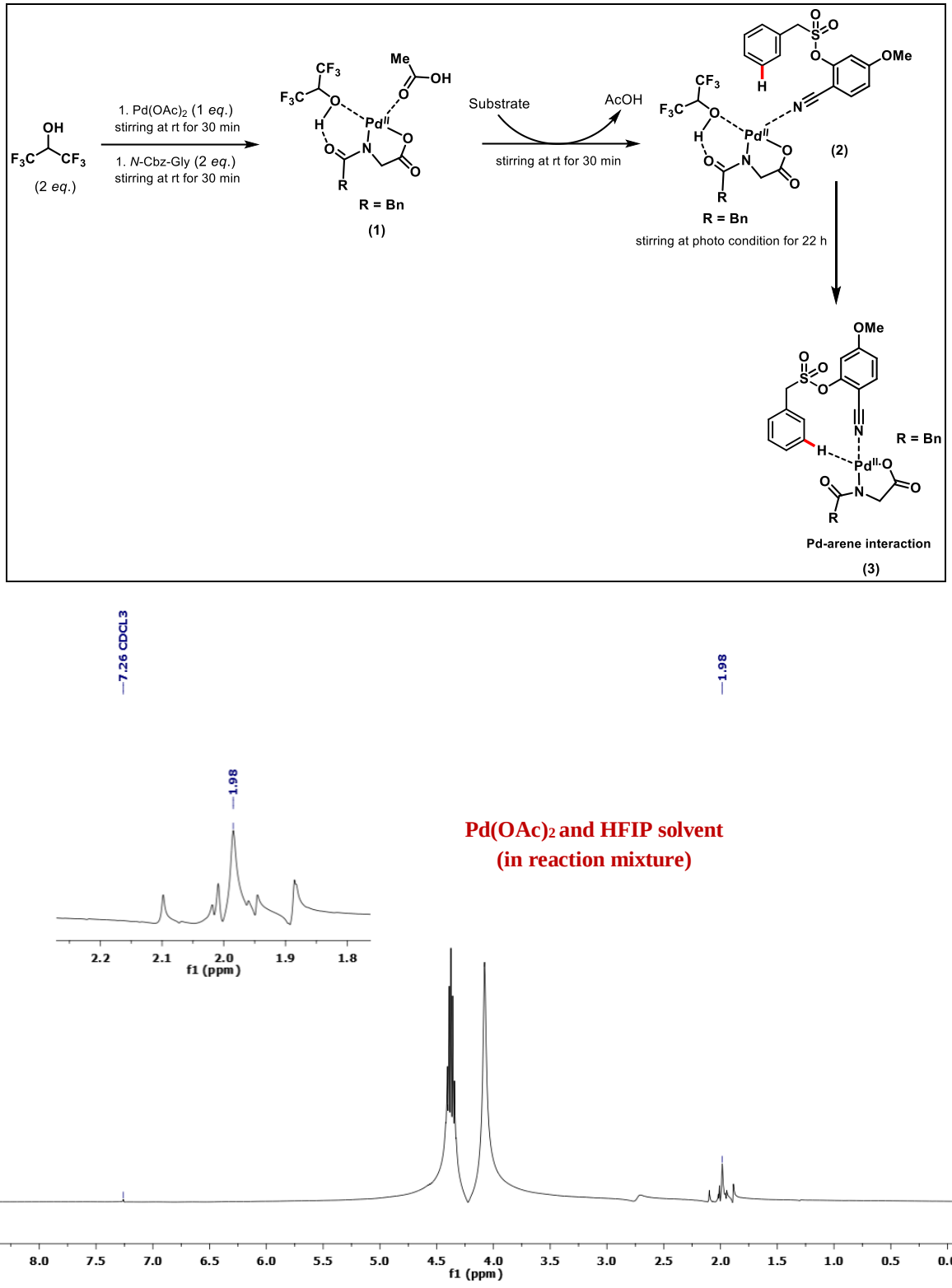


Fig S15. Reaction with $Pd(OAc)_2$ and HFIP solvent

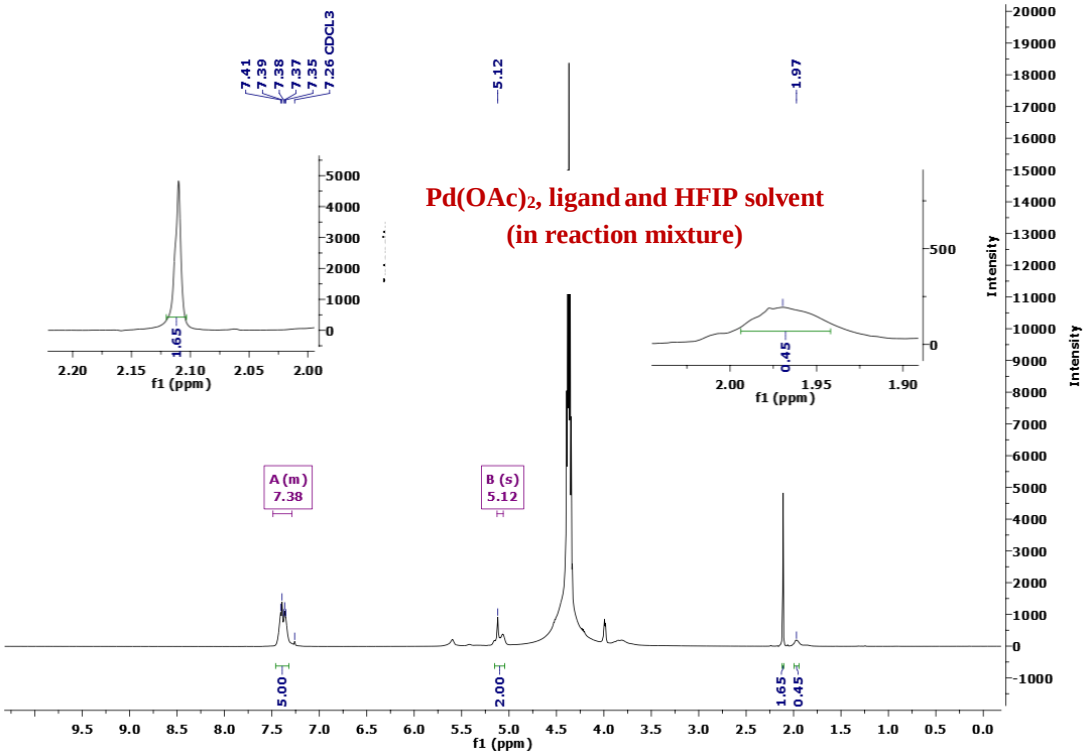


Fig S16. Ligand added in the reaction mixture after 30 min containing $Pd(OAc)_2$ and HFIP solvent

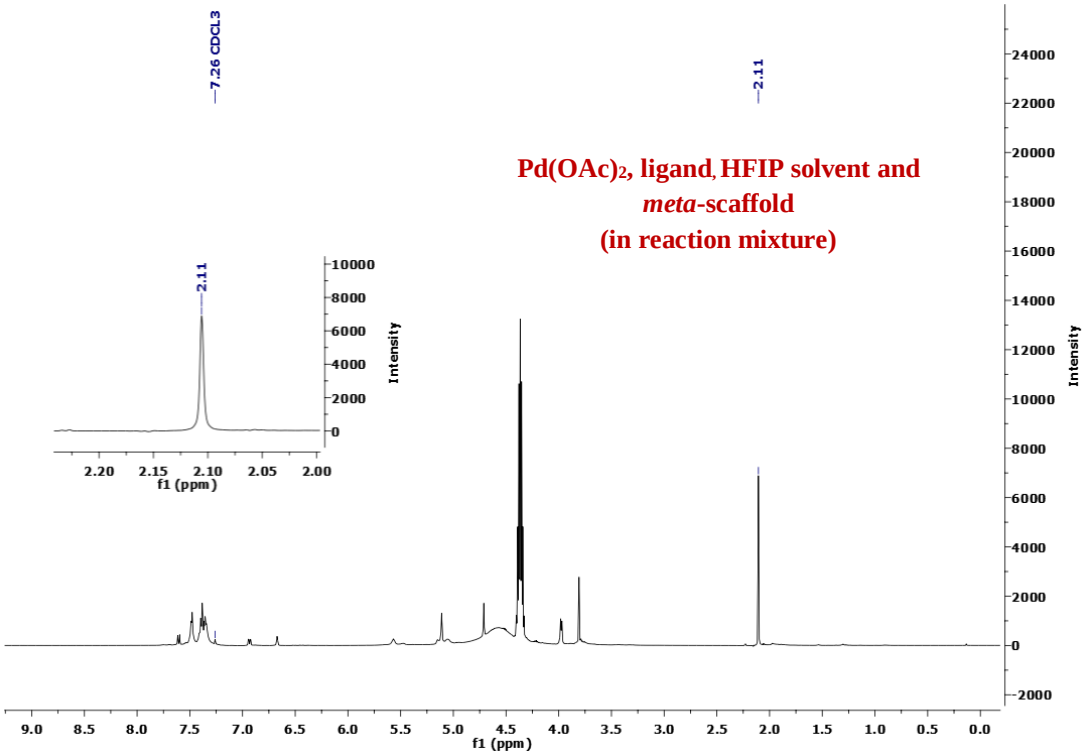


Fig S17. *Meta*-scaffold added in the reaction mixture after 30 min containing $Pd(OAc)_2$, ligand and HFIP solvent respectively

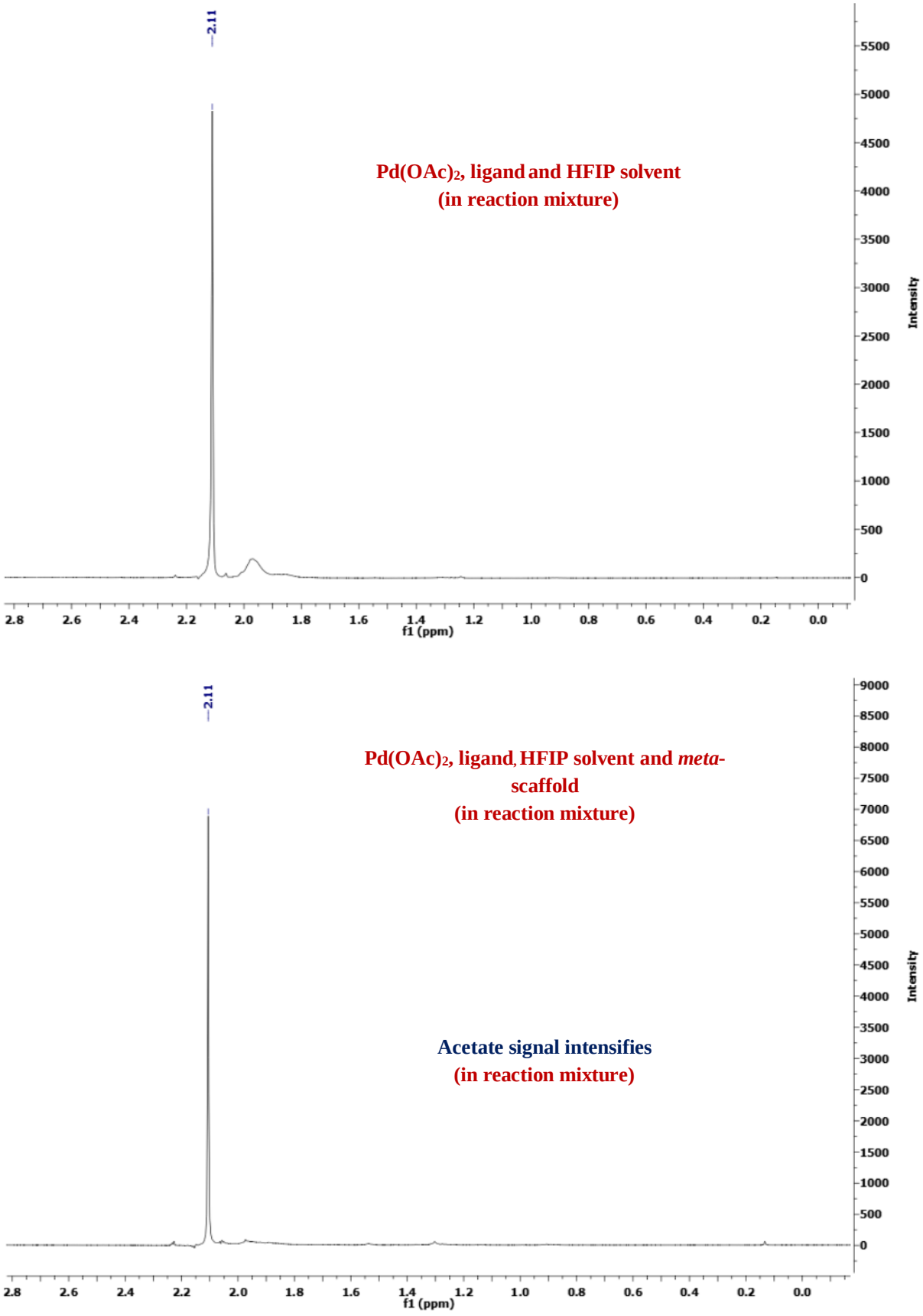


Fig S18. Comparison of acetate intensity before and after adding the *meta*-scaffold

10.B. Role of light in Pd-arene interaction in *meta*-C-H acetoxylation:

In a clean reaction tube HFIP (2 eq.; 6.2 µL) was added to 510 µL of $CDCl_3$ and the ^{1}H-NMR was recorded. In the same reaction tube, model substrate (0.1 mmol), $Pd(OAc)_2$ (0.1 mmol) *N*-CBZ-Gly-OH (0.2 mmol) was added and kept under light with stirring for 6 h and after that NMR of the crude reaction mixture was recorded. Again, afterwards the reaction tube was kept for 22 h under irradiation of light. The reaction was cooled in a salted ice-bath to nearly -20 °C and kept for 30 mins. Any change of the mixture was monitored by ^{1}H-NMR.

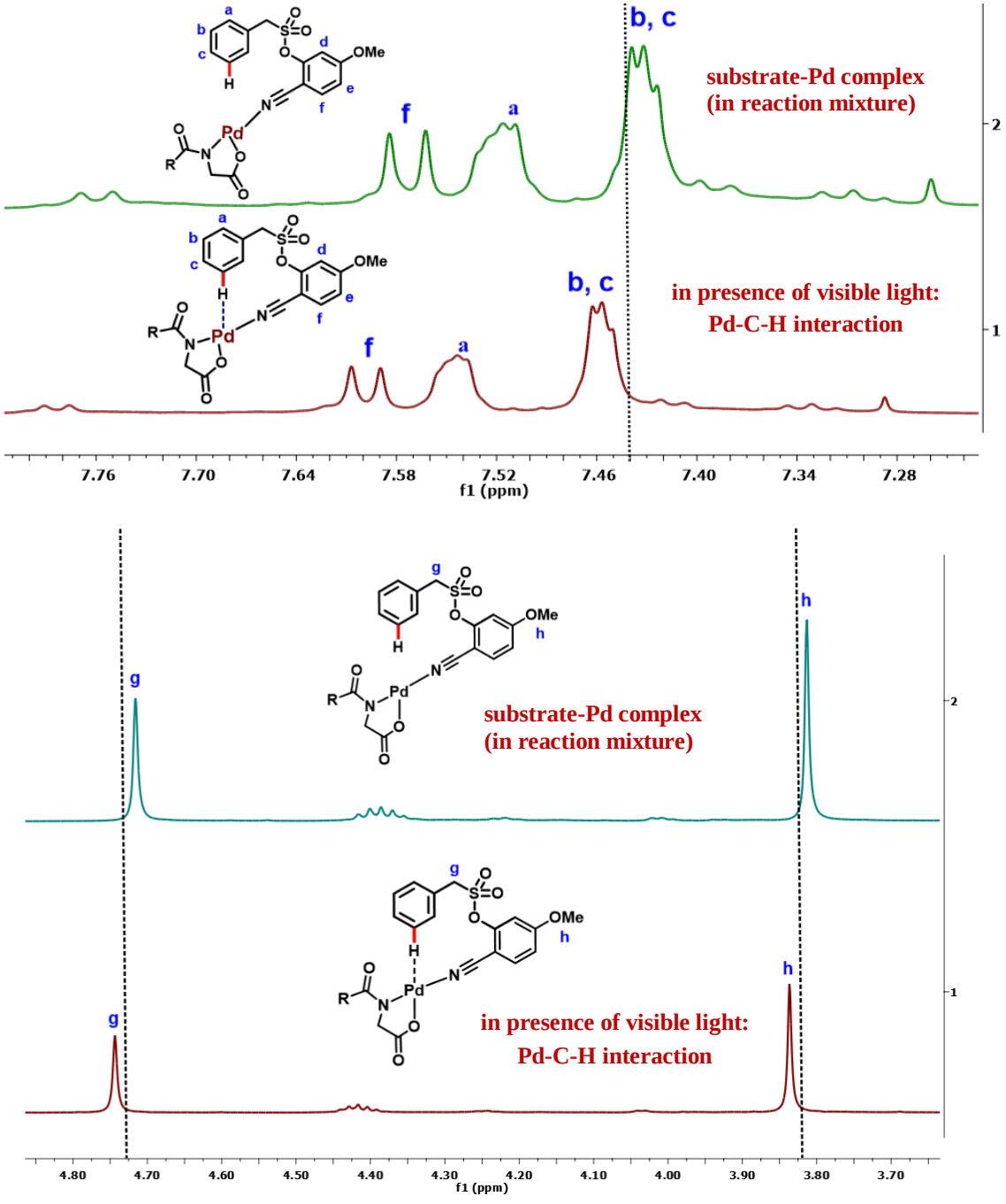


Fig S19. Photoinduced Pd....C-H interaction for *meta*-sulphonyl scaffold

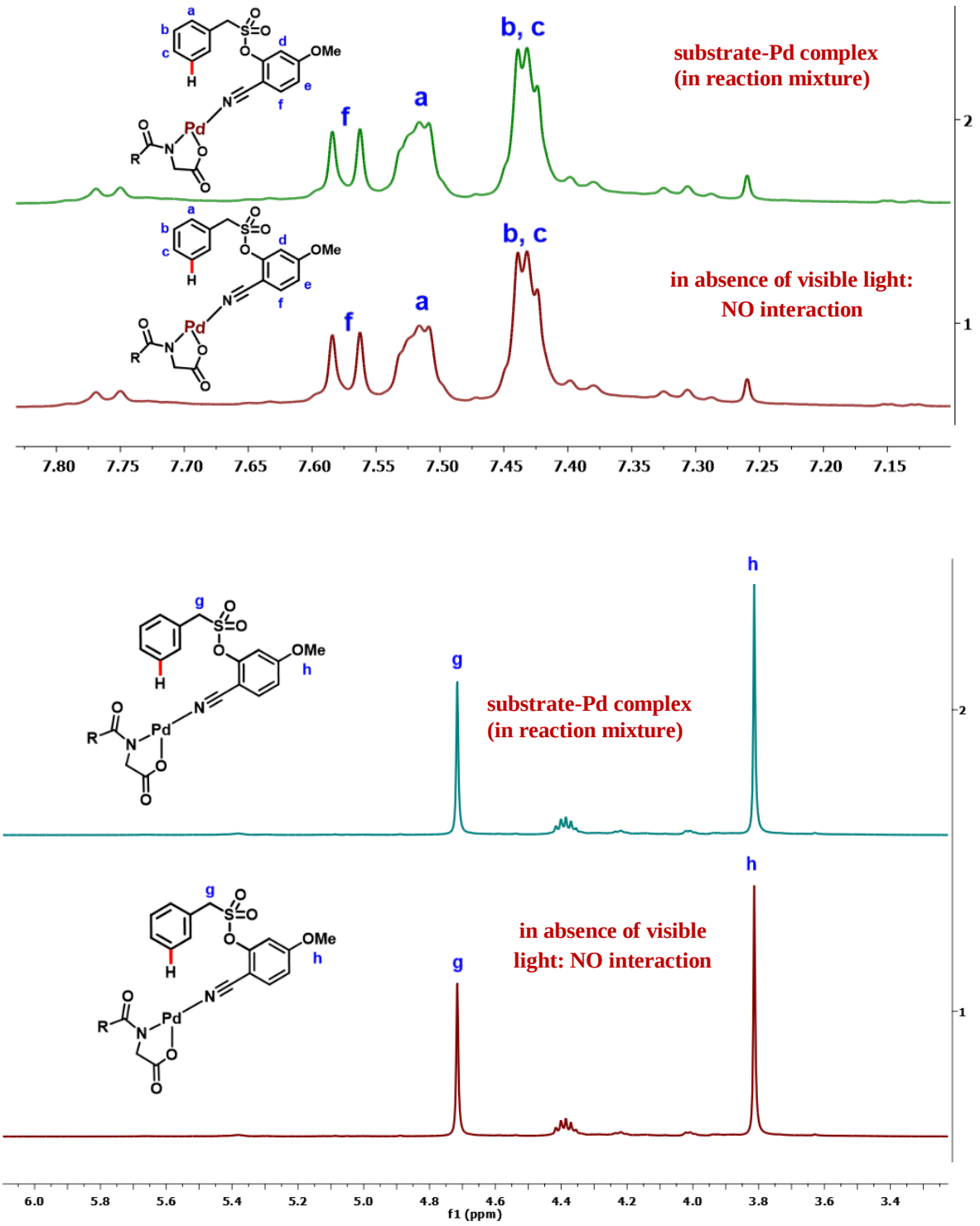


Fig S20. There is no Pd....C–H interaction for *meta*-sulphonyl scaffold in dark condition

10.C. ESI-MS study:

$Pd(OAc)_2$, substrate, ligand, eosin Y in HFIP was irradiated under visible light stirred for 6 h. After that ESI-MS spectrum was recorded. In mass spectrum, a ligand-Pd-substrate-OAc+Na adduct was appeared as a possible intermediate species with desired isotopic pattern.

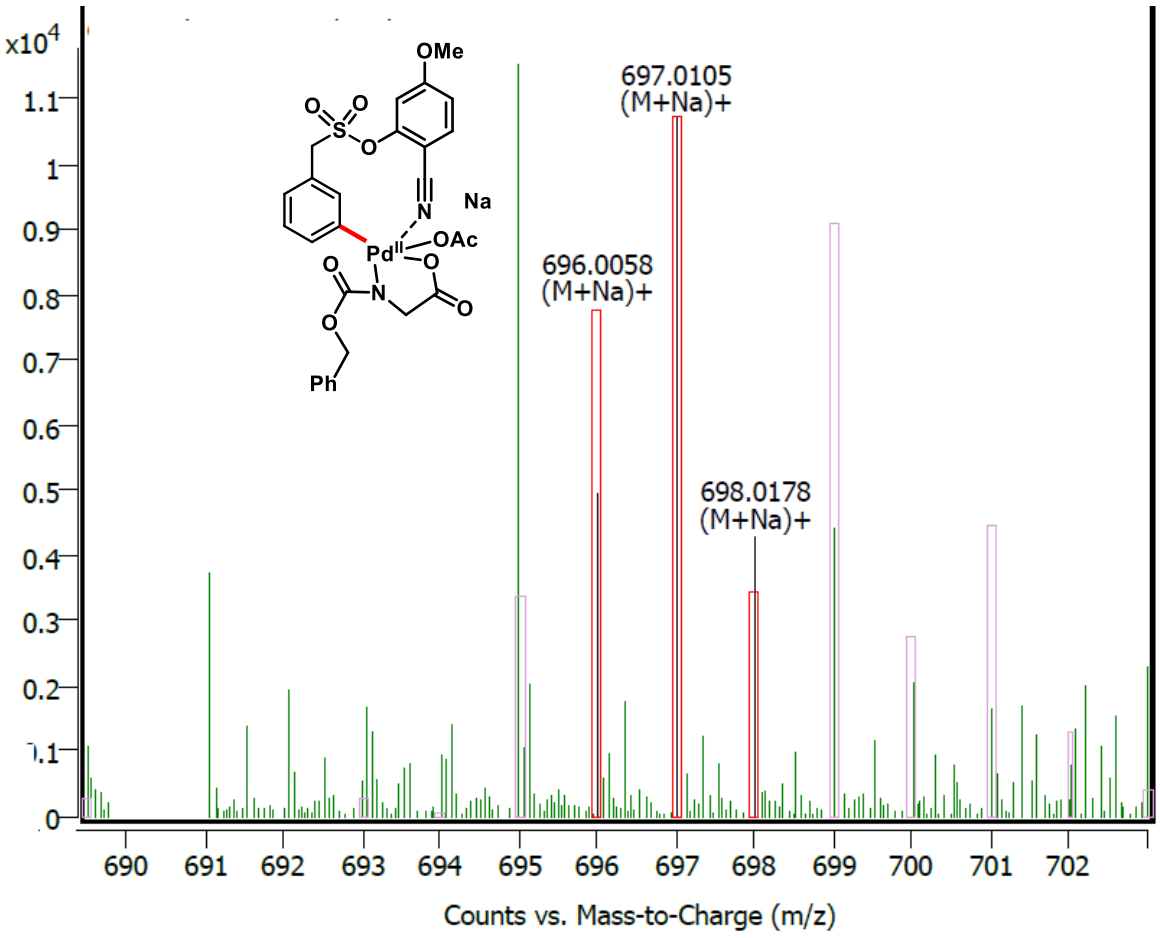
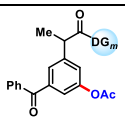
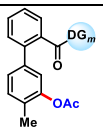
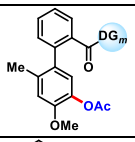
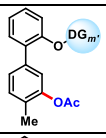
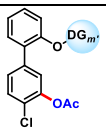
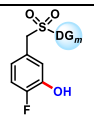
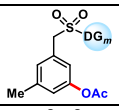
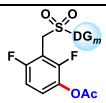
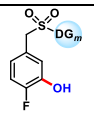


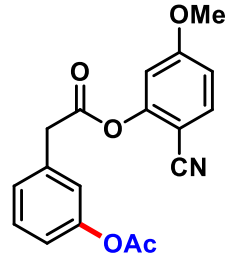
Fig S21: Palladium-Substrate adduct in ESI-MS study in presence of light **[ligand-Pd-substrate-OAc+Na] m/z = 697.0083.**

11. Comparison table between photo and thermal condition

Entry	Products	Photoredox	Thermal (80 °C)
1		(*m:others* >25:1)	(*m:others* = 5:1)
3		(*m:others* = 20:1)	(*m:others* = 2:1) Very poor Yield
14		(*m:others* >25:1)	(*m:others* = 2:1) Very poor Yield
17		(*m:others* >20:1)	(*m:others* = 3:1)
20		(*m:others* >25:1)	(*m:others* = 6:1)
26		(*m:others* >25:1)	(*m:others* 3:1)
31		(*m:others* >25:1)	(*m:others* = 2:1)
32		(*m:others* = 15:1)	(*m:others* = 2:1)
36		(*m:others* >25:1)	No Reaction
35		(*m:others* >25:1)	(*m:others* = 14:1)
37		(*m:others* >25:1)	(*m:others* =15:1)
45		(*m:others* >25:1)	(*m:others* = 19:1)
49		(*m:others* >25:1)	No Reaction
51		(*m:others* >25:1)	(*m:others* =15:1)

TableS8: Comparison table to showcase the superiority of photoinduced protocol over thermal.

12. Characterization data for products.



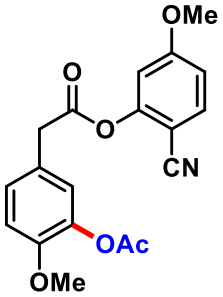
2-Cyano-5-methoxyphenyl 2-(3-acetoxyphenyl)acetate (1)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: Sticky colorless liquid.

Isolated yield: 76% (24.7 mg, 0.076 mmol) (*m*: others >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (d, *J* = 8.7 Hz, 1H), 7.46 – 7.34 (m, 1H), 7.31 – 7.26 (m, 1H), 7.17 (t, *J* = 2.0 Hz, 1H), 7.06 (ddd, *J* = 8.2, 2.3, 1.1 Hz, 1H), 6.82 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.76 (d, *J* = 2.5 Hz, 1H), 3.95 (s, 2H), 3.83 (s, 3H), 2.30 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.60, 168.63, 164.14, 154.12, 151.11, 134.28, 134.20, 129.98, 127.25, 122.97, 121.09, 115.71, 113.01, 109.02, 98.77, 56.14, 40.90, 21.33; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{16}NO_5$ m/z 326.1028 and found m/z 326.1030.



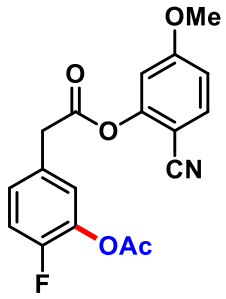
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-4-methoxyphenyl)acetate (2)

Eluent: ethyl acetate/ petroleum ether (22:78 v/v).

Appearance: Sticky yellow gummy.

Isolated yield: 74% (26.3 mg, 0.074 mmol) (*m*: others >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (d, *J* = 8.7 Hz, 1H), 7.25 – 7.21 (m, 1H), 7.11 (d, *J* = 2.2 Hz, 1H), 6.97 (d, *J* = 8.4 Hz, 1H), 6.82 (dd, *J* = 8.7, 2.5 Hz, 1H), 6.75 (d, *J* = 2.4 Hz, 1H), 3.88 (s, 2H), 3.83 (s, 3H), 3.83 (s, 3H), 2.31 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.22, 168.98, 164.13, 154.21, 150.86, 139.97, 134.27, 128.18, 125.14, 124.24, 115.77, 112.99, 112.83, 109.00, 98.77, 56.17, 56.14, 40.21, 20.87; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{19}H_{18}NO_6$ m/z 356.1134 and found m/z 356.1140.



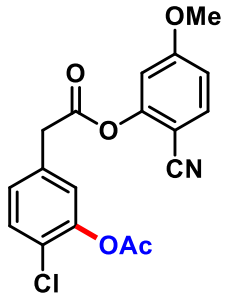
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-4-fluorophenyl)acetate (3)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: Sticky yellow liquid.

Isolated yield: 69% (23.7 mg, 0.069 mmol) (*m*: others = 20:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56 (d, *J* = 8.7 Hz, 1H), 7.25 – 7.12 (m, 3H), 6.83 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.76 (d, *J* = 2.4 Hz, 1H), 3.92 (s, 2H), 3.83 (s, 3H), 2.33 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.55, 168.51, 164.18, 155.05, 154.04, 152.57, 138.40, 138.27, 134.32, 129.21, 129.17, 128.77, 128.47, 128.40, 125.17, 117.27, 117.08, 115.71, 113.01, 109.03, 101.77, 98.72, 56.15, 40.24, 20.71; **^{19}F NMR** (376 MHz, $CDCl_3$) δ – 129.68; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{15}FNO_5$ m/z 344.0934 and found m/z 344.0940.



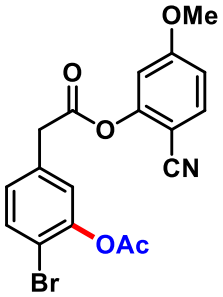
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-4-chlorophenyl)acetate (4)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless semisolid.

Isolated yield: 72% (25.88 mg, 0.072 mmol) (*m*: others >25:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.56 (d, *J* = 8.7 Hz, 1H), 7.45 (d, *J* = 8.1 Hz, 1H), 7.26 – 7.20 (m, 2H), 6.83 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.75 (d, *J* = 2.4 Hz, 1H), 3.93 (s, 2H), 3.83 (s, 3H), 2.35 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 168.68, 168.30, 164.17, 154.00, 147.29, 134.31, 132.71, 130.73, 128.45, 126.56, 125.10, 115.72, 113.06, 108.99, 98.69, 56.16, 40.35, 20.83; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{15}ClNO_5$ m/z 360.0639 and found m/z 360.0645.



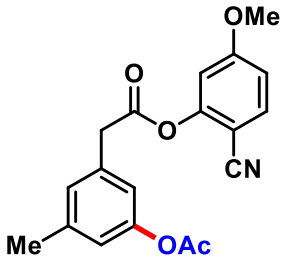
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-4-bromophenyl)acetate (5)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: whitish solid.

Isolated yield: 65% (26.2 mg, 0.065 mmol) (*m*: others >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.67 (d, *J* = 8.2 Hz, 1H), 7.58 (dd, *J* = 8.2, 0.8 Hz, 1H), 7.33 (d, *J* = 2.1 Hz, 1H), 7.30 (dd, *J* = 8.2, 2.2 Hz, 1H), 6.93 – 6.84 (m, 2H), 4.68 (s, 2H), 3.84 (s, 3H), 2.36 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.45, 164.35, 151.68, 148.88, 134.63, 134.19, 130.05, 127.38, 126.59, 118.34, 115.72, 114.21, 109.29, 98.75, 57.74, 56.34, 20.95; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{15}BrNO_5$ m/z 404.0134 and found m/z 404.0132.



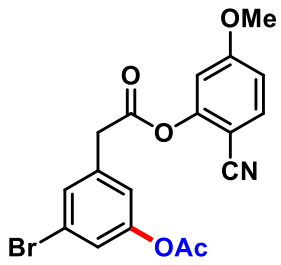
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-5-methylphenyl)acetate (6)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: Sticky yellow liquid.

Isolated yield: 86% (29.15 mg, 0.086 mmol) (*m*: others >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (d, *J* = 8.7 Hz, 1H), 7.12 – 7.04 (m, 1H), 6.96 (s, 1H), 6.87 (s, 1H), 6.82 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.76 (d, *J* = 2.4 Hz, 1H), 3.91 (s, 2H), 3.83 (s, 3H), 2.37 (s, 3H), 2.29 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.72, 168.72, 164.11, 154.10, 150.99, 140.29, 134.25, 133.82, 128.10, 121.69, 119.90, 115.71, 112.96, 109.01, 98.72, 56.10, 40.85, 21.43, 21.30; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{19}H_{18}NO_5$ m/z 340.1185 and found m/z 340.1190.



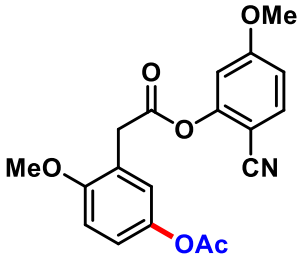
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-5-bromophenyl)acetate (7)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: whitish solid.

Isolated yield: 59% (23.8 mg, 0.059 mmol) (*m*: others = 6:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56 (d, *J* = 8.7 Hz, 1H), 7.43 (d, *J* = 1.7 Hz, 1H), 7.26 (d, *J* = 1.0 Hz, 1H), 7.14 (t, *J* = 1.7 Hz, 1H), 6.84 (dd, *J* = 8.6, 2.4 Hz, 1H), 6.76 (d, *J* = 2.3 Hz, 1H), 3.93 (s, 2H), 3.84 (s, 3H), 2.29 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.09, 164.18, 153.95, 151.44, 135.57, 134.32, 130.30, 129.99, 124.64, 122.75, 122.07, 113.13, 109.00, 98.71, 56.18, 40.44, 21.24; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{15}BrNO_5$ m/z 404.0134 and found m/z 404.0131.



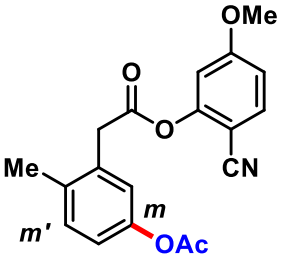
2-Cyano-5-methoxyphenyl 2-(5-acetoxy-2-methoxyphenyl)acetate (8)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: colorless gummy.

Isolated yield: 83% (29.46 mg, 0.083 mmol) (*m*: others >25:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.54 (d, *J* = 8.7 Hz, 1H), 7.06 (d, *J* = 2.9 Hz, 1H), 7.03 (dd, *J* = 8.8, 2.8 Hz, 1H), 6.89 (d, *J* = 8.8 Hz, 1H), 6.81 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.76 (d, *J* = 2.4 Hz, 1H), 3.93 (s, 2H), 3.87 (s, 3H), 3.83 (s, 3H), 2.27 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 170.08, 168.88, 163.99, 155.46, 154.17, 143.96, 134.33, 124.35, 122.75, 121.79, 115.66, 112.71, 111.07, 109.16, 98.81, 56.04, 35.97, 21.23; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{19}H_{18}NO_6$ m/z 356.1134 and found m/z 356.1140.



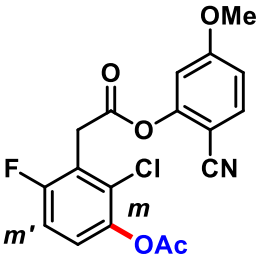
2-Cyano-5-methoxyphenyl 2-(5-acetoxy-2-methylphenyl)acetate (9)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless liquid.

Isolated yield: 74% (25 mg, 0.074 mmol) (*m*: others >25:1) (*m*:*m*' = 12:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54 (d, *J* = 8.7 Hz, 1H), 7.25 – 7.20 (m, 1H), 7.09 (d, *J* = 2.5 Hz, 1H), 6.97 (dd, *J* = 8.3, 2.5 Hz, 1H), 6.82 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.75 (d, *J* = 2.4 Hz, 1H), 3.95 (s, 2H), 3.83 (s, 3H), 2.40 (s, 3H), 2.28 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.78, 168.52, 164.12, 154.07, 149.05, 134.87, 134.29, 132.60, 131.58, 123.52, 121.09, 115.66, 112.98, 109.12, 109.01, 98.80, 56.03, 38.90, 21.25, 19.29; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{19}H_{18}NO_5$ m/z 340.1185 and found m/z 340.1179.



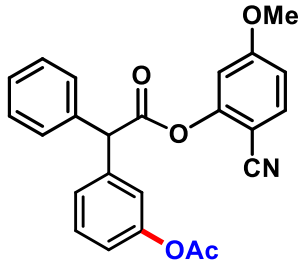
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-2-chloro-6-fluorophenyl)acetate (10)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: Sticky semisolid.

Isolated yield: 67% (25.3 mg, 0.067 mmol) (*m*: others = 22:1) (*m*:*m*' = 6:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (d, *J* = 8.7 Hz, 1H), 7.32 (dd, *J* = 8.8, 1.8 Hz, 1H), 7.21 (dd, *J* = 8.8, 7.8 Hz, 1H), 6.95 (d, *J* = 2.4 Hz, 1H), 6.90 (dd, *J* = 8.7, 2.4 Hz, 1H), 5.02 (d, *J* = 1.7 Hz, 2H), 3.85 (s, 3H), 2.34 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.07, 164.29, 155.29, 152.73, 151.18, 137.68, 137.55, 134.80, 133.66, 128.50, 128.05, 125.99, 125.96, 125.91, 125.87, 115.84, 115.69, 115.23, 114.28, 114.26, 109.40, 109.31, 99.30, 56.32, 50.24, 50.22, 20.63; **^{19}F NMR** (376 MHz, $CDCl_3$) δ – 111.08, - 122.19; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{18}H_{13}ClFNNaO_5$ m/z 400.0364 and found m/z 400.0370.



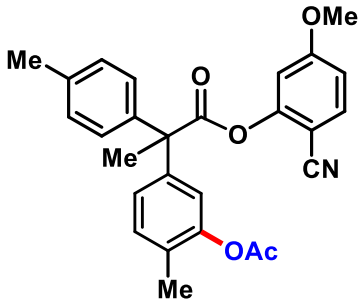
2-Cyano-5-methoxyphenyl 2-(3-acetoxyphenyl)-2-phenylacetate (11)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: Sticky semisolid.

Isolated yield: 62% (24.86 mg, 0.062 mmol) (*m*: others = 18:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (dd, *J* = 8.7, 0.9 Hz, 1H), 7.46 – 7.37 (m, 5H), 7.35 – 7.28 (m, 2H), 7.19 (d, *J* = 2.1 Hz, 1H), 7.13 – 7.03 (m, 1H), 6.82 (ddd, *J* = 8.8, 2.5, 0.8 Hz, 1H), 6.73 (d, *J* = 2.4 Hz, 1H), 5.36 (s, 1H), 3.83 (s, 3H), 2.28 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.87, 169.53, 164.10, 154.01, 151.13, 139.04, 136.98, 134.39, 129.97, 129.16, 128.98, 128.13, 126.53, 122.17, 121.22, 115.69, 113.01, 108.94, 98.86, 56.67, 56.15, 21.35; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{24}H_{20}NO_5$ m/z 402.1341 and found m/z 402.1338.



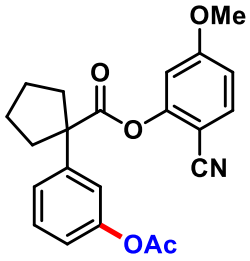
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-4-methylphenyl)-2-(*p*-tolyl)propanoate (12)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: Sticky semisolid.

Isolated yield: 64% (28.35 mg, 0.064 mmol) (*m*: others = 19:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.56 (d, *J* = 8.7 Hz, 1H), 7.34 – 7.25 (m, 3H), 7.24 – 7.15 (m, 3H), 7.09 (d, *J* = 2.0 Hz, 1H), 6.82 (dd, *J* = 8.7, 2.5 Hz, 1H), 6.61 (d, *J* = 2.4 Hz, 1H), 3.83 (s, 3H), 2.38 (s, 3H), 2.31 (s, 3H), 2.22 (s, 3H), 2.12 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 172.88, 169.32, 164.14, 154.57, 149.37, 142.10, 140.09, 137.25, 134.31, 131.15, 129.47, 129.31, 128.15, 125.83, 122.31, 116.03, 112.90, 108.69, 99.03, 56.47, 56.13, 27.29, 21.21, 21.03, 16.06; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{27}H_{26}NO_5$ m/z 444.1811 and found m/z 444.1810.



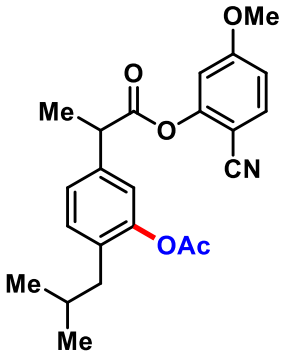
2-Cyano-5-methoxyphenyl 1-(3-acetoxyphenyl)cyclopentane-1-carboxylate (13)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: Sticky colorless gummy.

Isolated yield: 83% (31.5 mg, 0.083 mmol) (*m*: others >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (d, *J* = 8.7 Hz, 1H), 7.43 – 7.35 (m, 2H), 7.22 (td, *J* = 1.8, 1.4, 0.7 Hz, 1H), 7.03 (dt, *J* = 7.0, 2.2 Hz, 1H), 6.78 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.54 (d, *J* = 2.4 Hz, 1H), 3.79 (s, 3H), 2.96 – 2.73 (m, 2H), 2.30 (s, 3H), 2.08 (m, 2H), 2.17 – 2.00 (m, 4H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 173.35, 169.63, 164.13, 154.39, 150.99, 143.92, 134.15, 129.70, 124.61, 120.89, 120.67, 115.65, 112.97, 108.64, 98.82, 59.51, 56.12, 36.39, 23.79, 21.36; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{22}H_{22}NO_5$ m/z 380.1498 and found m/z 380.1493.



2-Cyano-5-methoxyphenyl 2-(3-acetoxy-4-isobutylphenyl)propanoate (14)

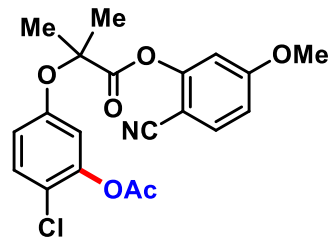
Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless semisolid.

Isolated yield: 71% (28 mg, 0.071 mmol) (*m*: others >25:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.53 (d, *J* = 8.8 Hz, 1H), 7.39 (d, *J* = 1.7 Hz, 1H), 7.24 – 7.20 (m, 1H), 7.11 (d, *J* = 1.6 Hz, 1H), 6.80 (dd, *J* = 8.8, 2.5 Hz, 1H), 6.68 (d, *J* = 2.4 Hz, 1H), 4.02 (q, *J* = 7.1 Hz, 1H), 3.81 (s, 3H), 2.39 (d, *J* = 7.2 Hz, 2H), 2.31 (s, 3H), 1.86 (dt, *J* = 13.5, 6.8 Hz, 1H), 1.67 (d, *J* = 7.2 Hz, 3H), 0.90 (dd, *J* = 6.6, 1.2 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 171.93, 169.59, 164.14, 154.24, 149.53, 138.07, 134.18, 133.01, 131.68, 129.01, 128.82, 125.40, 121.85, 115.74, 113.12, 108.78, 98.80, 56.14, 45.16, 39.52, 29.32, 22.75, 21.18, 18.46;

HRMS (ESI-QTOF): [M+Na]+ calculated for $C_{23}H_{25}NaNO_5$ m/z 418.1630 and found m/z 418.1630.



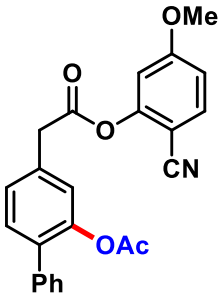
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-4-chlorophenoxy)-2-methylpropanoate (15)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: whitish solid.

Isolated yield: 65% (26.2 mg, 0.065 mmol) (*m*: others >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (d, *J* = 8.7 Hz, 1H), 7.34 (d, *J* = 8.8 Hz, 1H), 6.87 (dd, *J* = 3.2, 2.6 Hz, 1H), 6.85 (t, *J* = 2.9 Hz, 1H), 6.82 (d, *J* = 2.9 Hz, 1H), 6.58 (d, *J* = 2.4 Hz, 1H), 3.84 (s, 3H), 2.33 (s, 3H), 1.82 (s, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 171.62, 168.49, 164.35, 154.75, 153.74, 147.49, 134.35, 130.48, 120.52, 118.25, 115.60, 114.84, 113.52, 108.76, 98.89, 80.19, 56.23, 25.70, 20.87; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{20}H_{18}ClNNaO_6$ m/z 426.0720 and found m/z 426.0725.



2-Cyano-5-methoxyphenyl 2-(2-acetoxy-[1,1'-biphenyl]-4-yl)acetate (16)

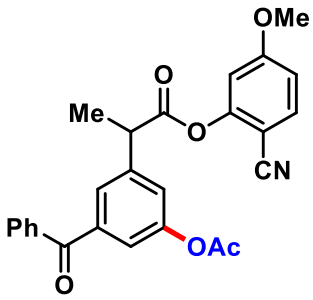
Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: Sticky colorless liquid.

Isolated yield: 73% (29.3 mg, 0.073 mmol) (*m*: others >25:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.64 – 7.54 (m, 3H), 7.50 – 7.42 (m, 3H), 7.31 (t, *J* = 2.0 Hz, 1H), 7.16 (d, *J* = 8.6 Hz, 1H), 7.08 (dt, *J* = 7.3, 2.1 Hz, 1H), 6.83 (dd, *J* = 8.7, 2.5 Hz, 1H), 6.77 (d, *J* = 2.6 Hz, 1H), 4.00 (s, 2H), 3.83 (s, 3H), 2.33 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.79, 169.74, 169.12, 169.08, 164.12, 154.20, 151.30, 150.38, 142.47, 139.92, 139.72, 138.63, 134.34, 132.21, 131.86, 130.23, 130.22, 129.96, 129.73, 128.35, 127.78, 127.72,

124.77, 122.10, 120.71, 120.49, 115.77, 112.89, 112.87, 109.11, 109.09, 98.79, 56.13, 40.86, 21.39; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{24}H_{20}NO_5$ m/z 402.1341 and found m/z 402.1345.



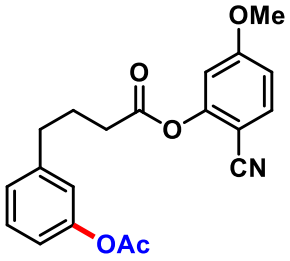
2-Cyano-5-methoxyphenyl 2-(3-acetoxy-5-benzoylphenyl)propanoate (17)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: Sticky colorless liquid.

Isolated yield: 53% (23.5 mg, 0.053 mmol) (*m*: others = >20:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.86 – 7.80 (m, 2H), 7.74 (d, *J* = 1.7 Hz, 1H), 7.60 (t, *J* = 7.4 Hz, 1H), 7.54 (d, *J* = 8.7 Hz, 1H), 7.52 – 7.42 (m, 4H), 6.82 (dd, *J* = 8.8, 2.5 Hz, 1H), 6.72 (d, *J* = 2.4 Hz, 1H), 4.12 (t, *J* = 7.1 Hz, 1H), 3.83 (s, 3H), 2.31 (s, 3H), 1.73 (d, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 195.41, 171.33, 169.34, 164.17, 153.97, 150.93, 141.09, 139.49, 137.21, 134.26, 132.98, 130.30, 128.66, 126.97, 125.30, 123.00, 115.57, 113.16, 108.87, 98.76, 56.18, 45.42, 21.30, 18.53; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{26}H_{22}NO_6$ m/z 444.1447 and found m/z 444.1450.



2-Cyano-5-methoxyphenyl 4-(3-acetoxyphenyl)butanoate (18)

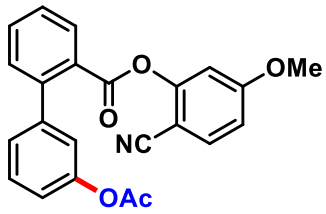
Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless gummy.

Isolated yield: 68% (24 mg, 0.068 mmol) (*m*: others = 10:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56 (dd, *J* = 8.7, 0.9 Hz, 1H), 7.43 – 7.19 (m, 2H), 7.15 – 6.99 (m, 1H), 6.98 – 6.90 (m, 1H), 6.83 (dd, *J* = 8.7, 2.5 Hz, 1H), 6.75 (d, *J* = 2.5 Hz, 1H), 3.84 (s,

3H), 2.77 (t, *J* = 7.6 Hz, 2H), 2.66 (t, *J* = 7.4 Hz, 2H), 2.29 (s, 3H), 2.21 – 2.04 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 170.93, 169.77, 164.14, 154.16, 150.97, 142.90, 138.75, 134.27, 134.08, 129.65, 129.60, 126.26, 121.80, 121.68, 119.50, 115.80, 112.74, 109.21, 101.71, 98.86, 56.07, 34.79, 33.43, 26.13, 21.32; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{20}H_{19}NaNO_5$ m/z 376.1161 and found m/z 376.1165.



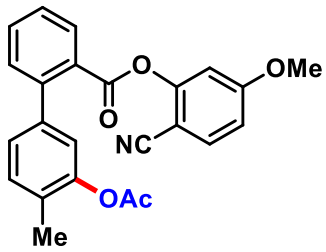
2-Cyano-5-methoxyphenyl 3'-acetoxy-[1,1'-biphenyl]-2-carboxylate (19)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless gummy.

Isolated yield: 81% (31.3 mg, 0.081 mmol) (*m:others* = 20:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.17 – 8.12 (m, 1H), 7.63 (td, *J* = 7.6, 1.2 Hz, 1H), 7.56 – 7.50 (m, 2H), 7.43 (dd, *J* = 10.3, 6.6 Hz, 2H), 7.30 (d, *J* = 7.6 Hz, 1H), 7.18 (dd, *J* = 4.5, 2.8 Hz, 1H), 7.11 (dd, *J* = 8.1, 1.3 Hz, 1H), 6.80 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.56 (d, *J* = 2.4 Hz, 1H), 3.82 (s, 3H), 2.29 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.51, 165.35, 164.18, 154.19, 150.67, 142.62, 142.57, 134.18, 132.70, 131.23, 130.96, 129.38, 128.92, 128.14, 126.39, 122.20, 120.86, 115.91, 113.14, 108.74, 99.05, 56.11, 21.36; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{23}H_{18}NO_5$ m/z 388.1185 and found m/z 388.1190.



2-Cyano-5-methoxyphenyl 3'-acetoxy-4'-methyl-[1,1'-biphenyl]-2-carboxylate (20)

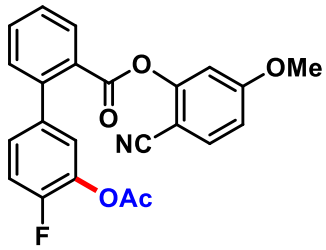
Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless gummy.

Isolated yield: 76% (30.4 mg, 0.076 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.13 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.60 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.56 – 7.47 (m, 2H), 7.44 (dd, *J* = 7.6, 1.3 Hz, 1H), 7.29 (d, *J* = 7.8 Hz, 1H), 7.22 (dd, *J* = 7.8, 1.8 Hz, 1H), 7.11 (d, *J* = 1.8 Hz, 1H), 6.80 (dd, *J* = 8.7, 2.5 Hz, 1H), 6.59 (d, *J* = 2.4 Hz, 1H),

3.81 (s, 3H), 2.31 (s, 3H), 2.21 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.25, 165.43, 164.15, 154.22, 149.26, 142.60, 139.96, 134.13, 132.63, 131.29, 131.11, 130.84, 129.58, 128.86, 127.89, 126.50, 122.47, 115.93, 113.17, 108.76, 99.06, 56.05, 21.00, 16.19; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{24}H_{20}NO_5$ m/z 402.1341 and found m/z 402.1345.



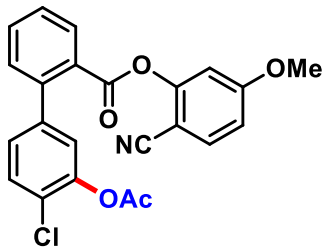
2-Cyano-5-methoxyphenyl 3'-acetoxy-4'-fluoro-[1,1'-biphenyl]-2-carboxylate (21)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: Sticky colorless liquid.

Isolated yield: 68% (27.5 mg, 0.068 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.28 – 8.15 (m, 1H), 7.75 – 7.63 (m, 1H), 7.62 – 7.53 (m, 2H), 7.46 (dd, *J* = 7.7, 1.3 Hz, 1H), 7.37 – 7.23 (m, 3H), 6.86 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.65 (d, *J* = 2.4 Hz, 1H), 3.87 (s, 3H), 2.37 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.38, 165.09, 164.23, 155.11, 154.14, 152.63, 141.98, 137.96, 137.83, 137.75, 137.71, 134.25, 132.84, 131.36, 131.13, 128.73, 128.26, 127.56, 127.49, 124.42, 116.69, 116.51, 115.91, 113.15, 108.77, 99.02, 56.10, 20.70; **^{19}F NMR** (376 MHz, $CDCl_3$) δ -130.03; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{23}H_{16}FNNaO_5$ m/z 428.0910 and found m/z 428.0914.



2-Cyano-5-methoxyphenyl 3'-acetoxy-4'-chloro-[1,1'-biphenyl]-2-carboxylate (22)

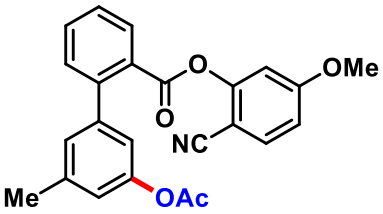
Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: whitish solid.

Isolated yield: 72% (30.3 mg, 0.072 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.20 – 8.10 (m, 1H), 7.63 (dd, *J* = 7.5, 1.4 Hz, 1H), 7.57 – 7.51 (m, 2H), 7.49 (d, *J* = 8.2 Hz, 1H), 7.43 – 7.41 (m, 1H), 7.32 – 7.24 (m, 1H), 7.22 (d, *J* = 2.1 Hz, 1H), 6.82 (dd, *J* = 8.7, 2.5 Hz, 1H), 6.59 (d, *J* = 2.5 Hz, 1H), 3.83 (s, 3H), 2.34 (s, 3H); **^{13}C**

NMR (101 MHz, $CDCl_3$) δ 168.56, 165.00, 164.23, 154.11, 146.85, 141.78, 141.08, 134.21, 132.91, 131.24, 131.18, 130.15, 128.60, 128.44, 127.54, 126.46, 124.30, 115.93, 113.33, 108.64, 98.98, 56.13, 20.83; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{23}H_{17}ClNO_5$ m/z 422.0795 and found m/z 422.0799.



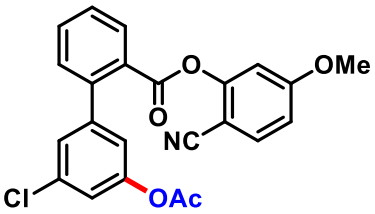
2-Cyano-5-methoxyphenyl 3'-acetoxy-5'-methyl-[1,1'-biphenyl]-2-carboxylate (23)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless gummy.

Isolated yield: 86% (34.5 mg, 0.086 mmol) (*m*:others = 20:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.62 (td, *J* = 7.6, 1.4 Hz, 1H), 7.56 – 7.48 (m, 2H), 7.44 (dd, *J* = 7.6, 1.3 Hz, 1H), 7.14 – 7.07 (m, 1H), 6.98 (s, 1H), 6.92 (d, *J* = 1.4 Hz, 1H), 6.80 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.58 (d, *J* = 2.4 Hz, 1H), 3.82 (s, 3H), 2.40 (s, 3H), 2.27 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.59, 165.45, 164.14, 154.18, 150.55, 142.68, 142.22, 139.61, 134.14, 132.58, 131.12, 130.80, 128.92, 127.97, 127.10, 121.48, 119.23, 115.89, 113.09, 108.70, 99.00, 56.04, 21.53, 21.31; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{24}H_{20}NO_2$ m/z 402.1341 and found m/z 402.1345.



2-Cyano-5-methoxyphenyl 3'-acetoxy-5'-chloro-[1,1'-biphenyl]-2-carboxylate (24)

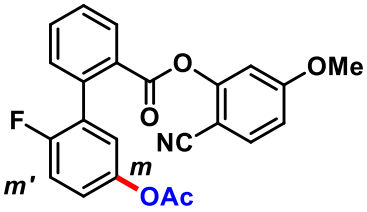
Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: whitish gummy.

Isolated yield: 68% (28.6 mg, 0.068 mmol) (*m*:others = 5:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18 (dd, *J* = 8.0, 1.3 Hz, 1H), 7.64 (td, *J* = 7.6, 1.5 Hz, 1H), 7.59 – 7.49 (m, 2H), 7.42 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.29 (t, *J* = 1.7 Hz, 1H), 7.14 (t, *J* = 2.0 Hz, 1H), 7.10 (dd, *J* = 2.1, 1.5 Hz, 1H), 6.82 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.65 (d, *J* = 2.5 Hz, 1H), 3.84 (s, 3H), 2.28 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.04, 164.94, 164.22, 154.14, 154.11, 150.98, 146.64, 143.57, 141.61, 141.43, 140.20, 134.45, 134.24, 134.18, 132.95,

132.92, 131.27, 131.22, 131.10, 130.46, 128.63, 128.47, 128.45, 126.73, 126.34, 123.63, 121.37, 120.86, 115.85, 113.36, 113.29, 108.61, 108.50, 98.92, 56.12, 21.25; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{23}H_{17}ClNO_5$ m/z 422.0795 and found m/z 422.0790.



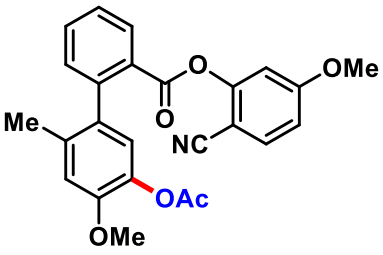
2-Cyano-5-methoxyphenyl 5'-acetoxy-2'-fluoro-[1,1'-biphenyl]-2-carboxylate (25)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless gummy.

Isolated yield: 71% (28.7 mg, 0.071 mmol) (*m:others* >25:1) (*m*:*m'* = 1:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.28 (d, *J* = 7.8 Hz, 1H), 7.73 – 7.63 (m, 1H), 7.63 – 7.52 (m, 2H), 7.44 (ddd, *J* = 7.7, 2.5, 1.3 Hz, 1H), 7.30 – 7.19 (m, 1H), 7.17 – 7.10 (m, 1H), 7.10 – 7.04 (m, 1H), 6.85 – 6.73 (m, 2H), 3.85 (s, 3H), 2.30 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.53, 168.37, 164.32, 164.15, 164.13, 158.19, 155.76, 154.21, 154.16, 152.43, 149.96, 146.65, 136.66, 136.54, 134.26, 134.11, 133.31, 133.25, 131.94, 131.92, 131.23, 131.21, 130.33, 130.19, 129.65, 129.47, 129.04, 128.86, 128.76, 128.33, 128.15, 128.13, 124.33, 124.28, 123.93, 123.89, 123.34, 122.55, 122.46, 116.09, 115.84, 115.74, 113.16, 112.84, 109.16, 109.00, 98.90, 98.74, 56.11, 56.09, 21.24, 20.69; **^{19}F NMR** (376 MHz, $CDCl_3$) δ -119.94, -119.96, -131.66, 131.68; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{23}H_{17}FNO_5$ m/z 406.1091 and found m/z 406.1095.



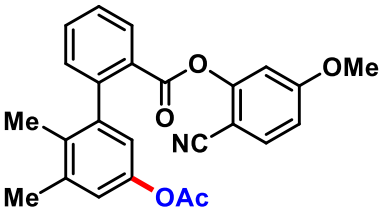
2-Cyano-5-methoxyphenyl 5'-acetoxy-4'-methoxy-2'-methyl-[1,1'-biphenyl]-2-carboxylate (26)

Eluent: ethyl acetate/ petroleum ether (30:70 v/v).

Appearance: colorless solid.

Isolated yield: 77% (33.5 mg, 0.077 mmol) (*m:others* >25:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.20 (dd, *J* = 7.9, 1.4 Hz, 1H), 7.67 – 7.57 (m, 1H), 7.55 – 7.45 (m, 2H), 7.33 (dd, *J* = 7.7, 1.3 Hz, 1H), 6.87 (s, 1H), 6.85 (s, 1H), 6.78 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.51 (d, *J* = 2.4 Hz, 1H), 3.83 (s, 3H), 3.79 (s, 3H), 2.27 (s, 3H), 2.15 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.26, 164.72, 164.14, 154.16, 150.21, 142.42, 137.21, 134.65, 134.02, 133.11, 132.82, 131.65, 130.89, 129.03, 127.87, 123.32, 115.80, 113.84, 113.21, 108.71, 98.87, 56.03, 55.98, 20.82, 20.29; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{25}H_{21}NNaO_6$ m/z 454.1267 and found m/z 454.1270.



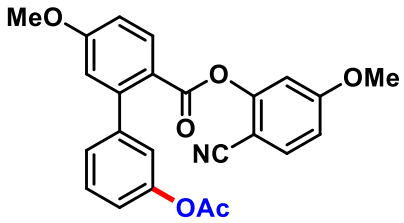
2-Cyano-5-methoxyphenyl 5'-acetoxy-2',3'-dimethyl-[1,1'-biphenyl]-2-carboxylate (27)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless gummy.

Isolated yield: 85% (35.4 mg, 0.085 mmol) (*m*:others >22:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.21 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.63 (td, *J* = 7.5, 1.4 Hz, 1H), 7.56 – 7.48 (m, 2H), 7.33 (dd, *J* = 7.5, 1.4 Hz, 1H), 6.89 (d, *J* = 2.5 Hz, 1H), 6.82 – 6.74 (m, 2H), 6.49 (d, *J* = 2.5 Hz, 1H), 3.80 (s, 3H), 2.30 (s, 3H), 2.24 (s, 3H), 2.01 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.80, 164.54, 164.14, 154.18, 147.84, 143.45, 141.98, 138.26, 134.08, 132.88, 132.20, 131.31, 130.93, 128.71, 127.92, 122.09, 119.68, 115.82, 113.17, 108.75, 98.94, 56.07, 21.30, 20.83, 16.57; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{25}H_{22}NO_5$ m/z 416.1498 and found m/z 416.1496.



2-Cyano-5-methoxyphenyl 3'-acetoxy-5-methoxy-[1,1'-biphenyl]-2-carboxylate (28)

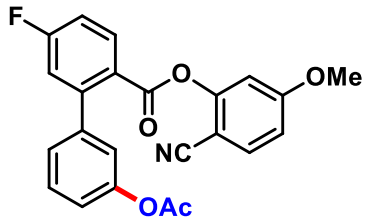
Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: whitish solid.

Isolated yield: 72% (30 mg, 0.072 mmol) (*m*:others = 16:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (d, *J* = 2.7 Hz, 1H), 7.53 (d, *J* = 8.7 Hz, 1H), 7.41 (t, *J* = 7.9 Hz, 1H), 7.35 (d, *J* = 8.5 Hz, 1H), 7.30 – 7.23 (m, 1H), 7.19 – 7.12 (m, 2H), 7.08 (ddd, *J* =

8.1, 2.3, 1.0 Hz, 1H), 6.80 (dd, *J* = 8.7, 2.5 Hz, 1H), 6.57 (d, *J* = 2.4 Hz, 1H), 3.92 (s, 3H), 3.82 (s, 3H), 2.29 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.52, 165.18, 164.18, 159.28, 154.16, 150.65, 142.37, 135.02, 134.14, 132.42, 129.79, 129.30, 126.57, 122.35, 120.53, 119.15, 115.94, 115.29, 113.19, 108.69, 98.99, 56.13, 55.96, 21.37; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{24}H_{20}NO_6$ m/z 418.1291 and found m/z 418.1288.



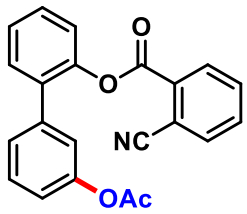
2-Cyano-5-methoxyphenyl 3'-acetoxy-5-fluoro-[1,1'-biphenyl]-2-carboxylate (29)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless gummy.

Isolated yield: 78% (31.6 mg, 0.078 mmol) (*m*:others = 20:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.20 (dd, *J* = 8.7, 5.7 Hz, 1H), 7.53 (d, *J* = 8.7 Hz, 1H), 7.44 (t, *J* = 7.9 Hz, 1H), 7.28 (ddd, *J* = 7.7, 1.7, 1.1 Hz, 1H), 7.21 (ddd, *J* = 8.7, 7.8, 2.6 Hz, 1H), 7.19 – 7.09 (m, 3H), 6.80 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.60 (d, *J* = 2.4 Hz, 1H), 3.82 (s, 3H), 2.29 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.45, 166.20, 164.19, 163.65, 154.08, 150.68, 146.04, 145.95, 141.40, 134.20, 133.92, 133.83, 129.51, 126.12, 124.85, 124.82, 122.03, 121.34, 118.68, 118.46, 115.89, 115.38, 115.16, 113.10, 108.85, 98.97, 56.12, 21.33; **^{19}F NMR** (376 MHz, $CDCl_3$) δ -105.16; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{23}H_{17}FNO_5$ m/z 406.1091 and found m/z 406.1095.



3'-Acetoxy-[1,1'-biphenyl]-2-yl 2-cyanobenzoate (30)

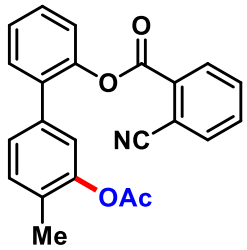
Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: brown gummy.

Isolated yield: 68% (24.2 mg, 0.068 mmol) (*m*:others = 12:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08 – 8.02 (m, 1H), 7.85 – 7.78 (m, 1H), 7.73 – 7.62 (m, 2H), 7.52 – 7.41 (m, 2H), 7.40 – 7.31 (m, 4H), 7.23 (td, *J* = 1.7, 1.0 Hz, 1H), 7.02 (ddd, *J* = 7.5, 2.4, 1.7 Hz, 1H), 2.25 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.47, 162.72, 150.72, 147.53, 138.86, 135.10, 134.15, 133.31, 132.78, 131.85, 131.60, 131.19, 130.27, 129.53, 129.25,

127.05, 126.63, 123.06, 122.56, 121.03, 117.43, 113.49, 21.26; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{22}H_{16}NO_4$ m/z 358.1079 and found m/z 358.1085.



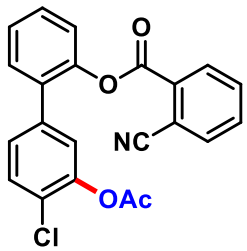
3'-Acetoxy-4'-methyl-[1,1'-biphenyl]-2-yl 2-cyanobenzoate (31)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless liquid.

Isolated yield: 75% (27.8 mg, 0.075 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 – 7.99 (m, 1H), 7.87 – 7.77 (m, 1H), 7.73 – 7.62 (m, 2H), 7.50 – 7.40 (m, 2H), 7.39 – 7.30 (m, 2H), 7.27 – 7.23 (m, 1H), 7.21 (dt, *J* = 7.9, 0.6 Hz, 1H), 7.18 (d, *J* = 1.7 Hz, 1H), 2.27 (s, 3H), 2.14 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.18, 162.75, 149.33, 147.51, 136.29, 135.08, 134.08, 133.27, 132.80, 131.91, 131.63, 131.28, 131.23, 129.73, 128.98, 127.00, 126.71, 123.04, 122.76, 117.49, 113.47, 20.92, 16.11; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{23}H_{18}NO_4$ m/z 372.1236 and found m/z 372.1240.



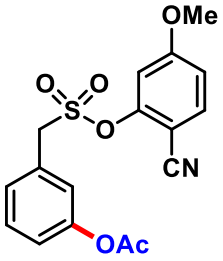
3'-Acetoxy-4'-chloro-[1,1'-biphenyl]-2-yl 2-cyanobenzoate (32)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: whitish solid.

Isolated yield: 66% (25.8 mg, 0.066 mmol) (*m*:others = 15:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 – 8.04 (m, 1H), 7.87 – 7.80 (m, 1H), 7.74 – 7.65 (m, 2H), 7.53 – 7.37 (m, 4H), 7.37 – 7.32 (m, 1H), 7.32 – 7.27 (m, 2H), 2.31 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.46, 162.71, 147.45, 146.99, 137.39, 135.19, 133.46, 133.22, 132.91, 131.94, 131.41, 131.08, 130.39, 129.59, 127.77, 127.18, 126.59, 124.64, 123.19, 117.50, 113.47, 20.76; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{22}H_{15}ClNO_4$ m/z 392.0690 and found m/z 392.0688.



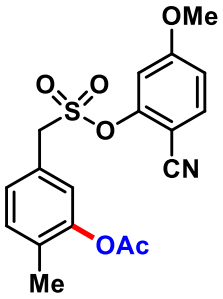
3-(((2-Cyano-5-methoxyphenoxy)sulfonyl)methyl)phenyl acetate (33)

Eluent: ethyl acetate/ petroleum ether (25:750 v/v).

Appearance: colorless gummy.

Isolated yield: 83% (29.9 mg, 0.083 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.66 – 7.52 (m, 1H), 7.51 – 7.36 (m, 2H), 7.29 (s, 1H), 7.18 (dt, *J* = 8.2, 1.8 Hz, 1H), 6.87 (dq, *J* = 4.9, 2.4 Hz, 2H), 4.70 (s, 2H), 3.82 (s, 3H), 2.29 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.28, 164.31, 151.79, 151.21, 134.60, 130.24, 128.67, 128.05, 124.47, 123.11, 115.64, 114.08, 109.28, 98.85, 58.21, 56.29, 21.24; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{17}H_{16}NO_6S$ m/z 362.0698 and found m/z 362.0690.



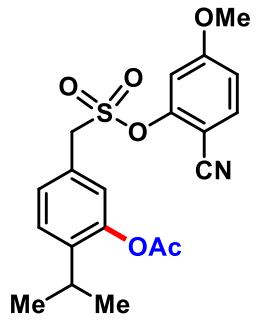
5-(((2-Cyano-5-methoxyphenoxy)sulfonyl)methyl)-2-methylphenyl acetate (34)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: colorless gummy.

Isolated yield: 73% (27.4 mg, 0.073 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61 – 7.52 (m, 1H), 7.36 – 7.27 (m, 2H), 7.21 (d, *J* = 1.5 Hz, 1H), 6.94 – 6.83 (m, 2H), 4.67 (s, 2H), 3.82 (s, 3H), 2.32 (s, 3H), 2.20 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.17, 164.27, 151.82, 149.75, 134.64, 132.23, 131.95, 128.85, 125.27, 124.86, 124.76, 115.70, 114.10, 109.23, 98.81, 58.00, 56.36, 56.19, 20.92, 16.33, 16.23; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{18}NO_6S$ m/z 376.0855 and found m/z 376.0860.



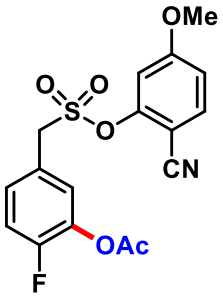
5-(((2-Cyano-5-methoxyphenoxy)sulfonyl)methyl)-2-isopropylphenyl acetate (35)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: Sticky cololess liquid.

Isolated yield: 68% (27.4 mg, 0.068 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (d, *J* = 9.4 Hz, 1H), 7.36 (d, *J* = 1.2 Hz, 2H), 7.19 (s, 1H), 6.92 – 6.81 (m, 2H), 4.67 (s, 2H), 3.83 (s, 3H), 3.06 – 3.00 (m, 1H), 2.32 (s, 3H), 1.21 (d, *J* = 6.9 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.59, 164.30, 151.93, 148.55, 142.14, 134.59, 129.15, 127.75, 125.23, 124.91, 115.68, 114.04, 109.26, 98.86, 58.02, 56.29, 27.64, 22.98, 21.10; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{20}H_{22}NO_6S$ m/z 404.1168 and found m/z 404.1162.



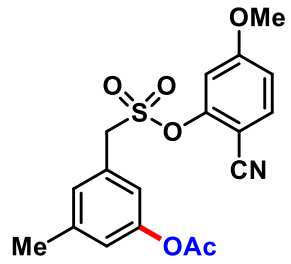
5-(((2-Cyano-5-methoxyphenoxy)sulfonyl)methyl)-2-fluorophenyl acetate (36)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: whitish solid.

Isolated yield: 61% (23.1 mg, 0.061 mmol) (*m:others* >25:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.65 – 7.51 (m, 1H), 7.48 – 7.28 (m, 2H), 7.21 (dd, *J* = 9.8, 8.4 Hz, 1H), 6.88 (d, *J* = 7.4 Hz, 2H), 4.67 (s, 2H), 3.84 (s, 3H), 2.33 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 168.22, 164.32, 156.10, 154.09, 151.67, 138.68, 138.57, 134.63, 130.17, 130.11, 126.83, 126.82, 123.19, 123.16, 117.69, 117.53, 115.71, 114.10, 109.30, 98.69, 57.60, 56.31, 20.64; **^{19}F NMR** (471 MHz, $CDCl_3$) δ -125.93; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{17}H_{14}FNNaO_6S$ m/z 402.0424 and found m/z 402.0428.



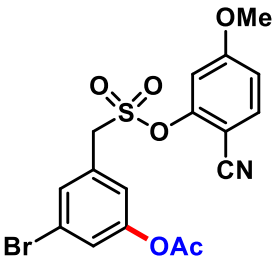
3-(((2-Cyano-5-methoxyphenoxy)sulfonyl)methyl)-5-methylphenyl acetate (37)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: colorless gummy.

Isolated yield: 85% (3.8 mg, 0.085 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (dd, *J* = 8.1, 0.9 Hz, 1H), 7.19 (dt, *J* = 1.6, 0.8 Hz, 1H), 7.08 (t, *J* = 2.0 Hz, 1H), 6.98 (tt, *J* = 1.6, 0.8 Hz, 1H), 6.94 – 6.80 (m, 2H), 4.66 (s, 2H), 3.83 (s, 3H), 2.37 (s, 3H), 2.28 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.49, 164.28, 151.80, 151.05, 140.72, 134.59, 129.48, 127.58, 123.77, 121.49, 115.66, 114.06, 109.24, 98.78, 58.18, 56.28, 21.40, 21.26; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{18}NO_6S$ m/z 376.0855 and found m/z 376.850.



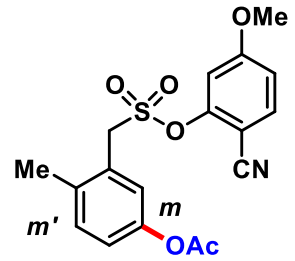
3-Bromo-5-(((2-cyano-5-methoxyphenoxy)sulfonyl)methyl)phenyl acetate (38)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: whitish solid.

Isolated yield: 51% (22.4 mg, 0.051 mmol) (*m*:*others* = 8:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (dt, *J* = 8.8, 1.1 Hz, 1H), 7.53 (t, *J* = 1.6 Hz, 1H), 7.37 (t, *J* = 1.9 Hz, 1H), 7.30 – 7.24 (m, 1H), 6.96 – 6.86 (m, 2H), 4.66 (s, 2H), 3.85 (s, 3H), 2.30 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.91, 164.36, 151.63, 151.51, 134.64, 131.51, 129.48, 126.59, 123.48, 123.03, 115.66, 114.25, 109.36, 98.79, 57.58, 56.35, 21.20; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{17}H_{15}BrNO_6S$ m/z 439.9803 and found m/z 439.9799.



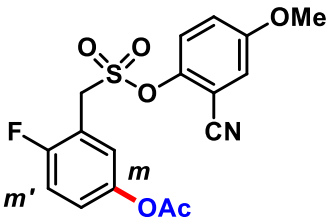
3-(((2-Cyano-5-methoxyphenoxy)sulfonyl)methyl)-4-methylphenyl acetate (39)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: colorless gummy.

Isolated yield: 79% (29.6 mg, 0.079 mmol) (*m:others* >25:1) (*m*:*m*' = 9:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62 – 7.55 (m, 1H), 7.27 (d, *J* = 7.9 Hz, 1H), 7.24 (d, *J* = 2.5 Hz, 1H), 7.07 (dd, *J* = 8.3, 2.5 Hz, 1H), 6.94 – 6.74 (m, 2H), 4.76 (s, 2H), 3.82 (s, 3H), 2.47 (s, 3H), 2.28 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.57, 164.31, 151.66, 149.12, 136.41, 134.62, 134.59, 132.13, 126.15, 125.25, 123.19, 115.65, 114.16, 109.36, 98.97, 56.29, 55.83, 21.24, 19.33; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{18}NO_6S$ m/z 376.0855 and found m/z 376.0850.



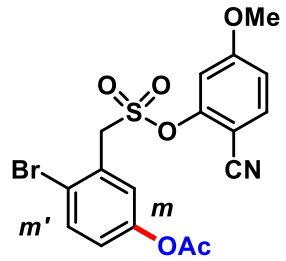
3-(((2-Cyano-4-methoxyphenoxy)sulfonyl)methyl)-4-fluorophenyl acetate (40)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: colorless gummy.

Isolated yield: 74% (28.0 mg, 0.074 mmol) (*m:others* >25:1) (*m*:*m'* = 1:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.49 – 7.40 (m, 1H), 7.34 (dt, *J* = 6.1, 1.4 Hz, 1H), 7.32 – 7.30 (m, 1H), 7.30 – 7.27 (m, 2H), 7.24 – 7.20 (m, 2H), 7.19 – 7.15 (m, 2H), 7.13 (d, *J* = 3.0 Hz, 2H), 7.10 (m, *J* = 9.0, 3.1, 1.9 Hz, 4H), 4.80 – 4.70 (m, 3H), 3.82 (s, 6H), 2.31 (d, *J* = 18.2 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.37, 168.29, 160.17, 158.26, 157.69, 154.57, 152.05, 146.85, 146.82, 143.24, 143.20, 138.85, 138.72, 130.01, 129.99, 125.78, 125.76, 125.62, 125.10, 125.01, 124.92, 124.88, 124.83, 120.56, 118.08, 118.06, 117.09, 116.85, 116.19, 116.06, 115.50, 115.34, 114.94, 108.35, 108.30, 56.25, 51.22, 51.19, 51.14, 51.11, 21.15, 20.64; **^{19}F NMR** (376 MHz, $CDCl_3$) δ – 119.12, - 130.24; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{17}H_{15}FNO_6S$ m/z 380.0604 and found m/z 380.0604.



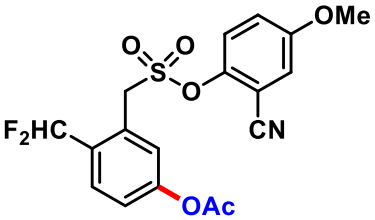
4-Bromo-3-(((2-cyano-5-methoxyphenoxy)sulfonyl)methyl)phenyl acetate (41)

Eluent: ethyl acetate/ petroleum ether (30:70 v/v).

Appearance: whitish solid.

Isolated yield: 69% (30.3 mg, 0.069 mmol) (*m:others* >25:1) (*m*:*m'* = 1.7:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (dd, *J* = 32.0, 8.8 Hz, 2H), 7.51 – 7.41 (m, 1H), 7.10 (dd, *J* = 8.8, 2.8 Hz, 1H), 6.99 – 6.87 (m, 2H), 4.98 (s, 2H), 3.84 (s, 3H), 2.32 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.05, 168.58, 164.31, 151.52, 151.46, 150.26, 149.42, 134.73, 134.70, 134.49, 130.60, 128.90, 128.71, 128.34, 128.08, 126.33, 125.23, 124.88, 122.53, 120.70, 115.52, 114.21, 114.18, 109.24, 98.95, 98.92, 58.04, 57.79, 56.33, 21.23, 20.99; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{17}H_{15}BrNO_6S$ m/z 441.2720 and found m/z 441.2725.



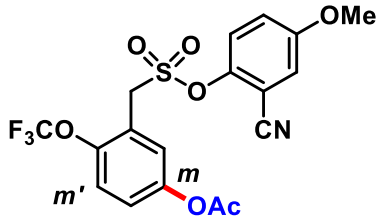
3-(((2-Cyano-4-methoxyphenoxy)sulfonyl)methyl)-4-(difluoromethyl)phenyl acetate (42)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: whitish solid.

Isolated yield: 74% (30.4 mg, 0.074 mmol) (*m:others* >25:1) (*m*:*m'* = 2:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 (d, *J* = 2.7 Hz, 1H), 7.32 (dd, *J* = 8.7, 0.8 Hz, 1H), 7.27 (d, *J* = 8.8 Hz, 1H), 7.19 (dd, *J* = 8.9, 2.8 Hz, 1H), 7.15 – 7.08 (m, 2H), 6.54 (t, *J* = 73.3 Hz, 1H), 4.79 (s, 2H), 3.83 (s, 3H), 2.30 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.29, 158.28, 147.97, 147.84, 143.14, 126.14, 124.91, 124.89, 124.62, 120.77, 120.56, 120.23, 119.04, 118.88, 118.10, 118.08, 116.45, 116.27, 114.99, 108.27, 56.32, 56.28, 56.23, 51.96, 21.22, 21.17; **^{19}F NMR** (376 MHz, $CDCl_3$) δ – 80.46, - 80.48; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{16}F_2NO_6S$ m/z 412.0666 and found m/z 412.0670.



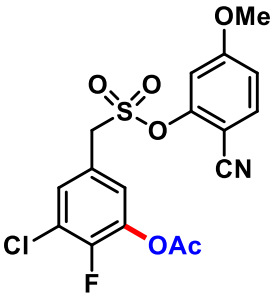
3-(((2-Cyano-4-methoxyphenoxy)sulfonyl)methyl)-4-(trifluoromethoxy)phenyl acetate (43)

Eluent: ethyl acetate/ petroleum ether (30:70 v/v).

Appearance: Sticky colorless gummy.

Isolated yield: 70% (31.1 mg, 0.070 mmol) (*m:others* >25:1) (*m*:*m'* = 1.2:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 (d, *J* = 2.8 Hz, 1H), 7.40 – 7.34 (m, 1H), 7.31 (dd, *J* = 8.8, 0.6 Hz, 1H), 7.23 (dd, *J* = 9.0, 2.8 Hz, 1H), 7.16 – 7.07 (m, 2H), 4.78 (s, 2H), 3.83 (s, 3H), 2.31 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.16, 158.31, 148.76, 145.73, 143.03, 126.17, 124.93, 124.67, 121.32, 120.77, 120.56, 118.10, 114.92, 108.37, 56.20, 51.77, 21.20; **^{19}F NMR** (376 MHz, $CDCl_3$) δ – 57.11; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{18}H_{15}F_3NO_7S$ m/z 446.0521 and found m/z 446.0525.



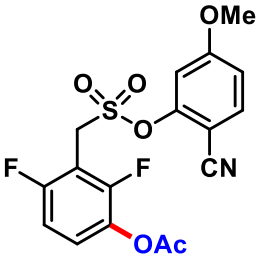
3-Chloro-5-(((2-cyano-5-methoxyphenoxy)sulfonyl)methyl)-2-fluorophenyl acetate (44)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: whitish solid.

Isolated yield: 52% (21.5 mg, 0.052 mmol) (*m:others* = >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.67 – 7.53 (m, 1H), 7.47 (dd, *J* = 6.0, 2.3 Hz, 1H), 7.28 (dd, *J* = 6.2, 2.2 Hz, 1H), 7.06 – 6.80 (m, 2H), 4.64 (s, 2H), 3.86 (s, 3H), 2.35 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 167.86, 164.41, 152.85, 151.60, 150.32, 139.61, 139.48, 134.66, 130.52, 128.77, 128.34, 125.30, 123.38, 123.33, 123.15, 115.69, 114.23, 109.42, 98.74, 57.31, 56.36, 20.60; **^{19}F NMR** (376 MHz, $CDCl_3$) δ – 126.46; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{17}H_{14}ClFNO_6S$ m/z 414.0214 and found m/z 414.0220.



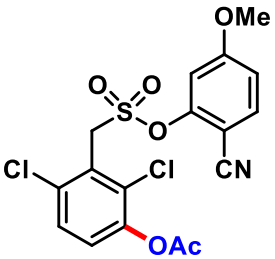
3-(((2-Cyano-5-methoxyphenoxy)sulfonyl)methyl)-2,4-difluorophenyl acetate (45)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: whitish solid.

Isolated yield: 74% (29.37 mg, 0.074 mmol) (*m:others* >25:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.58 (d, *J* = 8.7 Hz, 1H), 7.27 – 7.20 (m, 1H), 7.02 (td, *J* = 8.8, 2.0 Hz, 1H), 6.95 (d, *J* = 2.4 Hz, 1H), 6.89 (dd, *J* = 8.8, 2.4 Hz, 1H), 4.86 (s, 2H), 3.84 (s, 3H), 2.33 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 168.32, 164.27, 160.02, 159.98, 157.97, 154.42, 154.37, 152.38, 152.33, 151.16, 134.81, 128.76, 128.33, 126.04, 126.02, 125.96, 125.94, 115.17, 114.23, 111.88, 111.84, 111.69, 111.66, 109.30, 105.61, 99.20, 56.32, 46.70, 20.60; **^{19}F NMR** (471 MHz, $CDCl_3$) δ -114.08, -124.31, -124.33; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{17}H_{13}F_2NaNO_6S$ m/z 420.0329 and found m/z 420.0335.



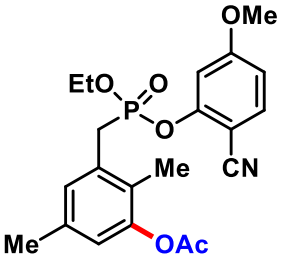
2,4-Dichloro-3-(((2-cyano-5-methoxyphenoxy)sulfonyl)methyl)phenyl acetate (46)

Eluent: ethyl acetate/ petroleum ether (25:75 v/v).

Appearance: whitish solid.

Isolated yield: 78% (33.5 mg, 0.078 mmol) (*m:others* >25:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.59 (d, *J* = 8.8 Hz, 1H), 7.46 (d, *J* = 8.8 Hz, 1H), 7.21 (d, *J* = 8.8 Hz, 1H), 6.95 (d, *J* = 2.4 Hz, 1H), 6.90 (dd, *J* = 8.8, 2.4 Hz, 1H), 5.24 (s, 2H), 3.85 (s, 3H), 2.36 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.33, 164.29, 151.21, 146.85, 134.78, 134.66, 130.92, 129.20, 125.89, 125.84, 115.34, 114.34, 109.43, 99.29, 56.33, 54.33, 20.80; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{17}H_{13}Cl_2NaNO_6S$ m/z 451.9738 and found m/z 451.9740.



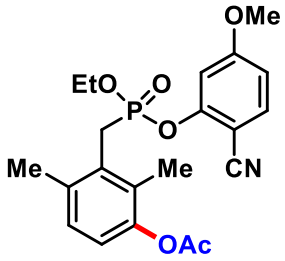
3-(((2-Cyano-5-methoxyphenoxy)(ethoxy)phosphoryl)methyl)-2,5-dimethylphenyl acetate (47)

Eluent: ethyl acetate/ petroleum ether (30:70 v/v).

Appearance: colorless gummy.

Isolated yield: 75% (31.4 mg, 0.075 mmol) (*m*: others = 20:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 (d, *J* = 8.7 Hz, 1H), 7.06 (s, 1H), 6.74 (d, *J* = 7.8 Hz, 2H), 6.70 (dd, *J* = 8.7, 2.3 Hz, 1H), 4.16 (dq, *J* = 14.3, 7.1 Hz, 2H), 3.72 (s, 3H), 3.44 (d, *J* = 22.2 Hz, 2H), 2.29 (s, 3H), 2.26 (s, 3H), 2.16 (s, 3H), 1.26 (t, *J* = 7.0 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.48, 164.28, 154.35, 154.28, 149.77, 136.71, 134.19, 130.21, 130.14, 129.86, 129.82, 126.84, 122.18, 122.14, 116.18, 112.27, 106.35, 97.13, 64.06, 64.00, 55.99, 32.28, 31.17, 21.00, 20.92, 16.42, 16.37, 12.61; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{21}H_{25}NO_6P$ m/z 418.1419 and found m/z 418.1415.



3-(((2-Cyano-5-methoxyphenoxy)(ethoxy)phosphoryl)methyl)-2,4-dimethylphenyl acetate (48)

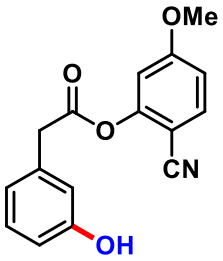
Eluent: ethyl acetate/ petroleum ether (30:70 v/v).

Appearance: colorless gummy.

Isolated yield: 82% (34.2 mg, 0.082 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 (dd, *J* = 8.7, 0.9 Hz, 1H), 7.05 (d, *J* = 8.2 Hz, 1H), 6.85 (dd, *J* = 8.2, 2.8 Hz, 1H), 6.70 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.65 (d, *J* = 1.2 Hz, 1H), 4.51 – 3.96 (m, 2H), 3.70 (d, *J* = 0.7 Hz, 3H), 3.55 (d, *J* = 22.5 Hz, 2H), 2.44 (d, *J* = 1.9 Hz, 3H), 2.29 (s, 3H), 2.24 (d, *J* = 2.0 Hz, 3H), 1.23 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.56, 164.28, 154.13, 154.04, 148.03, 147.98, 136.05, 135.99, 134.19, 130.37, 130.31, 129.28,

129.18, 128.83, 128.79, 121.20, 121.16, 116.15, 112.45, 106.45, 106.42, 97.26, 97.20, 64.01, 63.93, 56.01, 29.93, 28.54, 20.97, 20.78, 20.77, 16.37, 16.31, 13.46, 13.44; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{21}H_{25}NO_6P$ m/z 418.1419 and found m/z 418.1426.



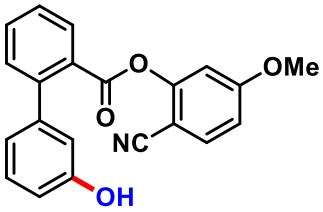
2-Cyano-5-methoxyphenyl 2-(3-hydroxyphenyl)acetate (49)

Eluent: ethyl acetate/ petroleum ether (30:70 v/v).

Appearance: colorless gummy.

Isolated yield: 73% (207 mg, 0.073 mmol) (*m*:others >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (d, *J* = 8.6 Hz, 1H), 7.22 (t, *J* = 7.9 Hz, 1H), 6.96 (t, *J* = 2.1 Hz, 1H), 6.91 (dt, *J* = 7.5, 1.2 Hz, 1H), 6.85 – 6.78 (m, 3H), 6.14 (s, 1H), 3.88 (s, 2H), 3.83 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.08, 164.23, 156.46, 154.25, 134.34, 134.05, 130.21, 121.79, 116.74, 115.92, 115.16, 112.87, 109.13, 98.33, 56.13, 41.16; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{16}H_{14}NO_4$ m/z 284.0923 and found m/z 284.0922.



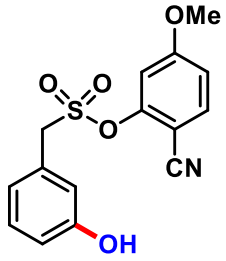
2-Cyano-5-methoxyphenyl 3'-hydroxy-[1,1'-biphenyl]-2-carboxylate (50)

Eluent: ethyl acetate/ petroleum ether (30:70 v/v).

Appearance: sticky colorless gummy.

Isolated yield: 60% (20.7 mg, 0.060 mmol) (*m*:others = 20:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04 (dd, *J* = 8.1, 1.4 Hz, 1H), 7.69 – 7.59 (m, 1H), 7.57 (d, *J* = 8.7 Hz, 1H), 7.52 – 7.44 (m, 2H), 7.36 – 7.28 (m, 2H), 7.12 – 6.96 (m, 2H), 6.88 (ddd, *J* = 8.2, 2.4, 1.1 Hz, 1H), 6.83 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.62 (d, *J* = 2.4 Hz, 1H), 3.83 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.83, 164.54, 156.00, 154.52, 143.39, 141.84, 134.54, 132.58, 131.13, 130.62, 130.05, 129.14, 127.59, 120.53, 116.89, 116.72, 115.37, 113.14, 108.98, 99.19, 56.15; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{21}H_{16}NO_4$ m/z 346.1079 and found m/z 346.1085.



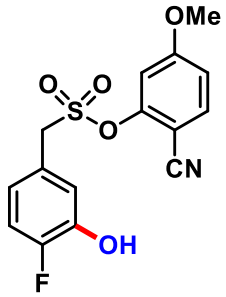
2-Cyano-5-methoxyphenyl (3-hydroxyphenyl)methanesulfonate (51)

Eluent: ethyl acetate/ petroleum ether (35:65 v/v).

Appearance: brown gummy.

Isolated yield: 65% (21 mg, 0.065 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (d, *J* = 8.7 Hz, 1H), 7.37 – 7.20 (m, 1H), 7.07 (t, *J* = 2.0 Hz, 1H), 7.03 (dt, *J* = 7.6, 1.2 Hz, 1H), 6.99 – 6.89 (m, 2H), 6.86 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.11 (s, 1H), 4.66 (s, 2H), 3.84 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.41, 156.55, 152.01, 134.71, 130.55, 127.72, 123.37, 118.34, 117.24, 115.93, 113.82, 108.80, 98.11, 58.62, 56.32; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{15}H_{13}NNaO_5S$ m/z 342.0412 and found m/z 342.0415.



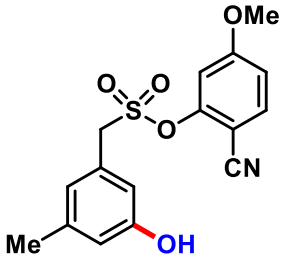
2-Cyano-5-methoxyphenyl (4-fluoro-3-hydroxyphenyl)methanesulfonate (53)

Eluent: ethyl acetate/ petroleum ether (35:65 v/v).

Appearance: whitish solid.

Isolated yield: 61% (20.5 mg, 0.059 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (d, *J* = 8.7 Hz, 1H), 7.21 (dd, *J* = 8.1, 2.3 Hz, 1H), 7.12 (dd, *J* = 10.3, 8.4 Hz, 1H), 7.01 (ddd, *J* = 8.4, 4.4, 2.2 Hz, 1H), 6.95 (d, *J* = 2.4 Hz, 1H), 6.88 (dd, *J* = 8.8, 2.4 Hz, 1H), 5.76 (s, 1H), 4.63 (s, 2H), 3.85 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.39, 153.38, 151.89, 150.98, 144.42, 144.28, 134.69, 123.87, 123.80, 123.22, 123.19, 120.49, 120.46, 116.66, 116.47, 115.82, 113.96, 109.14, 98.45, 58.12, 56.34; **^{19}F NMR** (376 MHz, $CDCl_3$) δ – 138.21; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{15}H_{13}FNO_5S$ m/z 338.0498 and found m/z 338.0493.



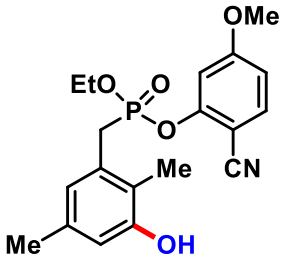
2-Cyano-5-methoxyphenyl (3-hydroxy-5-methylphenyl)methanesulfonate (52)

Eluent: ethyl acetate/ petroleum ether (35:65 v/v).

Appearance: colorless gummy.

Isolated yield: 72% (24 mg, 0.072 mmol) (*m*:others = 20:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56 (d, *J* = 8.7 Hz, 1H), 6.94 (d, *J* = 2.4 Hz, 1H), 6.85 (dt, *J* = 8.2, 2.0 Hz, 3H), 6.72 (td, *J* = 1.5, 0.7 Hz, 1H), 5.99 (s, 1H), 4.61 (s, 2H), 3.83 (s, 3H), 2.30 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.39, 156.44, 152.06, 140.87, 134.68, 127.34, 124.23, 117.89, 115.93, 115.44, 113.79, 108.79, 98.13, 58.64, 56.31, 21.46; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{16}H_{16}NO_5S$ m/z 334.0749 and found m/z 334.0755.



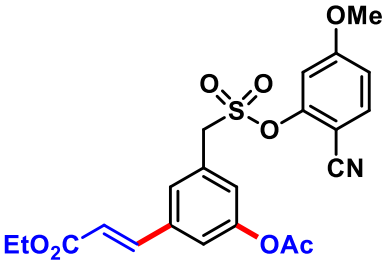
2-Cyano-5-methoxyphenyl ethyl (3-hydroxy-2,5-dimethylbenzyl)phosphonate (54)

Eluent: ethyl acetate/ petroleum ether (40:60 v/v).

Appearance: brown solid.

Isolated yield: 73% (27.5 mg, 0.073 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 (dd, *J* = 8.7, 0.9 Hz, 1H), 6.73 (dd, *J* = 2.4, 1.2 Hz, 1H), 6.71 – 6.64 (m, 2H), 6.44 (t, *J* = 2.2 Hz, 1H), 4.28 – 4.11 (m, 2H), 3.69 (s, 3H), 3.42 (d, *J* = 22.0 Hz, 2H), 2.20 (d, *J* = 1.9 Hz, 3H), 2.13 (s, 3H), 1.28 (td, *J* = 7.1, 0.5 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.30, 154.86, 154.82, 154.37, 154.28, 136.33, 136.29, 134.18, 129.33, 129.24, 123.88, 123.82, 121.04, 120.97, 116.18, 115.31, 115.27, 112.32, 106.33, 106.30, 97.09, 97.03, 64.10, 64.02, 55.96, 32.29, 30.92, 20.94, 16.43, 16.36, 11.88, 11.86; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{19}H_{23}NO_5P$ m/z 376.1314 and found m/z 376.1320.



Ethyl (*E*)-3-(3-acetoxy-5-(((2-cyano-5-methoxyphenoxy)sulfonyl)methyl)phenyl)acrylate (55)

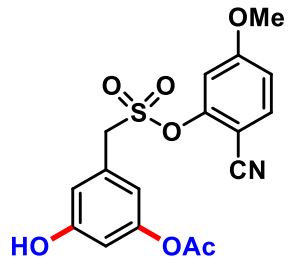
Procedure: In an oven-dried screw capped reaction tube was charged with magnetic stirbar, corresponding sulphonic ester (0.1 mmol), $Pd(OAc)_2$ (10 mol%), *N*-CBz-Gly-OH (20 mol%), eosin Y (3 mol%), and olefin (0.2 mmol, 2 equiv.) in 1 mL of 1,1,1,3,3,3-hexafluoro-2-propanol (HFIP) were added. The reaction tube was capped and placed 3 cm away from four 23 W house hold CFL bulbs with stirring (1500 rpm) at room temperature for 28 h. The temperature was maintained at approximately (30-35 ^oC) through cooling with a fan. Upon completion the mixture was diluted with ethyl acetate and filtered through a celite pad. The filtrate was evaporation under reduced pressure and the crude mixture was purified by column chromatography using silica (100- 200 mesh size) and petroleum ether / ethyl acetate as the eluent.

Eluent: ethyl acetate/ petroleum ether (35:65 v/v).

Appearance: Sticky yellow gummy.

Isolated yield: 75% (34.5 mg, 0.075 mmol) (*m:others* >25:1)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63 (d, *J* = 16.0 Hz, 1H), 7.58 (dd, *J* = 8.4, 0.6 Hz, 1H), 7.53 (t, *J* = 1.6 Hz, 1H), 7.32 (dt, *J* = 5.9, 2.0 Hz, 2H), 6.95 – 6.85 (m, 2H), 6.46 (d, *J* = 16.0 Hz, 1H), 4.72 (s, 2H), 4.26 (q, *J* = 7.1 Hz, 2H), 3.84 (s, 3H), 2.32 (s, 3H), 1.33 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.18, 166.59, 164.36, 151.71, 151.55, 142.52, 137.09, 134.64, 128.74, 128.19, 125.91, 122.19, 120.87, 115.71, 114.21, 109.38, 98.80, 60.96, 58.02, 56.35, 21.29, 14.47; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{22}H_{22}NO_8S$ m/z 460.1066 and found m/z 460.1070.



3-(((2-Cyano-5-methoxyphenoxy)sulfonyl)methyl)-5-hydroxyphenyl acetate (56)

Procedure: In an oven dried reaction tube, charged with magnetic stir-bar, $Pd(OAc)_2$ (10 mol%), For-Gly-OH (25 mol%) and *meta*-acetoxylated suphonic ester substrate (0.1 mmol) were added. The hydroxylating agent $PhI(TFA)_2$ (0.4 mmol) was added to the reaction mixture followed by the HFIP (1 mL). The reaction tube was capped and stirred at room temperature for 15 mins and then placed to a preheated oil-bath at 70 °C for 24 h. Upon completion, the reaction was taken out to cool and diluted with ethyl acetate. The solution was filtered through celite bed. The filtrate was evaporated under reduced pressure and passed through the column for purification. Petroleum ether and ethyl acetate mixture was used as the Eluent.

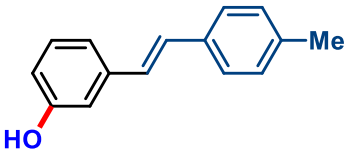
Eluent: ethyl acetate/ petroleum ether (45:55 v/v).

Appearance: brown solid.

Isolated yield: 61% (23.0 mg, 0.061 mmol) (*m:others* = 16:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.57 (d, *J* = 8.7 Hz, 1H), 6.97 (d, *J* = 2.4 Hz, 2H), 6.87 (dd, *J* = 8.8, 2.4 Hz, 1H), 6.81 (d, *J* = 1.8 Hz, 1H), 6.70 (t, *J* = 2.1 Hz, 1H), 6.07 (s, 1H), 4.62 (s, 2H), 3.85 (s, 3H), 2.28 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 169.27, 164.44, 157.35, 152.11, 151.95, 134.73, 128.43, 116.59, 116.14, 113.84, 111.08, 108.69, 58.30, 56.35, 21.33; **HRMS** (ESI-QTOF): [M+Na]+ calculated for $C_{17}H_{15}NaNO_7S$ m/z 400.0467 and found m/z 400.0463.

General Procedure for Julia Olefination Reaction: To a flame dried round bottomed flask equipped with magnetic stir-bar, freshly prepared LDA (2(M)) and dry THF (6 mL) was added. The solution was cooled to -78 °C. Separately a solution of benzaldehyde and the *meta*-functionalized compound (0.1 mmol) in dry THF (6 mL) was prepared and slowly added to the LDA/THF solution at -78 °C. The reaction mixture was stirred overnight while warmed it to room temperature. Upon completion the reaction was quenched with saturated NH_4Cl solution and extracted with ethyl acetate. The organic portion was dried over anhydrous Na_2SO_4, concentrated under reduced pressure and purified through column chromatography



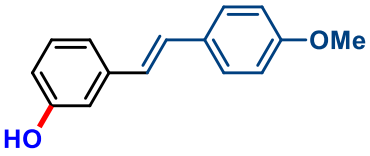
(*E*)-3-(4-Methylstyryl)phenol (57)

Eluent: ethyl acetate/ petroleum ether (15:85 v/v).

Appearance: colorless gummy.

Isolated yield: 92% (19.3 mg, 0.092 mmol)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.42 (d, *J* = 8.1 Hz, 2H), 7.24 (dd, *J* = 8.5, 7.3 Hz, 1H), 7.18 (d, *J* = 7.8 Hz, 2H), 7.13 – 7.08 (m, 1H), 7.04 (d, *J* = 11.3 Hz, 2H), 7.00 (dd, *J* = 2.8, 1.7 Hz, 1H), 6.75 (ddt, *J* = 7.9, 2.6, 1.3 Hz, 1H), 4.95 (s, 1H), 2.38 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 155.90, 139.50, 137.88, 134.54, 130.06, 129.61, 129.34, 127.41, 126.69, 119.59, 114.68, 114.66, 113.06, 113.04, 21.46; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{15}H_{15}O$ m/z 211.1123 and found m/z 211.1125.



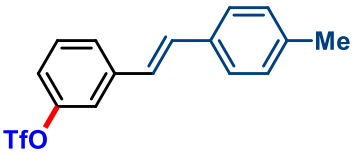
(*E*)-3-(4-Methoxystyryl)phenol (58)

Eluent: ethyl acetate/ petroleum ether (20:80 v/v).

Appearance: colorless solid.

Isolated yield: 90% (20.3 mg, 0.090 mmol)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44 (d, *J* = 8.6 Hz, 2H), 7.22 (t, *J* = 7.8 Hz, 1H), 7.11 – 7.00 (m, 2H), 6.97 (dd, *J* = 2.6, 1.6 Hz, 1H), 6.93 – 6.88 (m, 3H), 6.72 (ddd, *J* = 8.0, 2.5, 0.9 Hz, 1H), 4.87 (s, 1H), 3.83 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 159.60, 156.00, 139.67, 130.21, 130.04, 128.94, 128.01, 126.39, 119.43, 114.48, 114.38, 112.92, 55.56; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{15}H_{15}O_2$ m/z 227.1072 and found m/z 227.1075.



Procedure: To a solution of (*E*)-3-styrylphenol (1 equiv) in dry dichloromethane anhydrous pyridine (1.5 equiv.) was added at 0 °C and stirred for 15 min, followed by triflic anhydride (2.0 equiv) was added. After allowing the reaction mixture to attain room temperature, the reaction mixture was stirred for overnight. The reaction was quenched with saturated aqueous bicarbonate solution and extracted with DCM. The organic layer was dried over sodium sulfate, concentrated to dryness under reduced pressure, and purified by column chromatography using petroleum ether as eluent. Pure compound was isolated as colorless liquid in 92% yield.

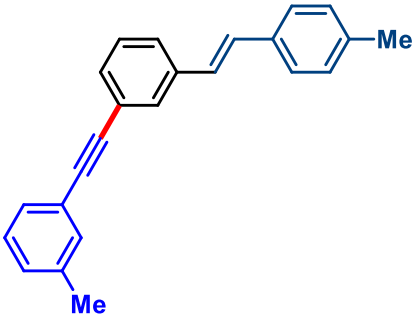
(*E*)-3-(4-Methylstyryl)phenyl trifluoromethanesulfonate (59)

Eluent: ethyl acetate/ petroleum ether (10:80 v/v).

Appearance: whitish solid.

Isolated yield: 95% (32.5 mg, 0.095 mmol)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.50 (dt, *J* = 7.8, 1.4 Hz, 1H), 7.42 (t, *J* = 8.0 Hz, 3H), 7.38 (t, *J* = 2.1 Hz, 1H), 7.22 – 7.18 (m, 2H), 7.17 – 7.12 (m, 1H), 7.11 – 6.96 (m, 2H), 2.38 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 150.26, 140.62, 138.65, 133.83, 131.39, 130.54, 129.74, 126.92, 126.42, 125.66, 119.85, 118.96, 21.52; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{16}H_{14}F_3O_3S$ m/z 343.0616 and found m/z 343.0620.



(*E*)-1-Methyl-3-((3-(4-methylstyryl)phenyl)ethynyl)benzene (60)

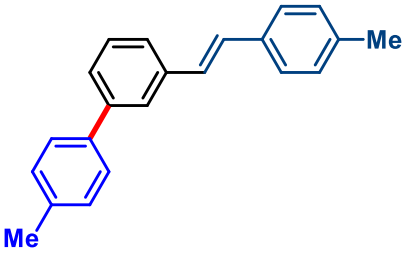
Procedure: Aryl triflate (**59**, 0.1 mmol, 1.0 equiv), 3-ethynyltoluene (0.15 mmol, 1.5 equiv), $Pd(OAc)_2$ (10 mol%, 0.01 mmol, 2.2 mg), PPh_3 (20 mol%, 0.02 mmol, 5.2 mg) and K_3PO_4 (0.15 mmol, 1.5 equiv, 31.8 mg) was taken in a reaction tube and 2 mL of DMSO was added under N_2 atmosphere. The reaction mixture was stirred for 24 h at 80 °C. After completion of the reaction the reaction mixture was diluted with water and extracted with diethyl ether. The organic layer was washed with brine and dried over Na_2SO_4. Evaporation of the solvent followed by purification have been done by column chromatography and the pure compound (**60**) was isolated as solid using petroleum ether as the eluent.

Eluent: ethyl acetate/ petroleum ether (5:95 v/v).

Appearance: whitish gummy.

Isolated yield: 82% (25.4 mg, 0.082 mmol)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.53 – 7.48 (m, 1H), 7.43 (dd, *J* = 8.0, 1.8 Hz, 4H), 7.40 (dd, *J* = 9.1, 2.3 Hz, 2H), 7.19 (dd, *J* = 7.9, 4.9 Hz, 3H), 7.17 – 7.12 (m, 2H), 7.11 (d, *J* = 5.2 Hz, 1H), 7.06 (s, 1H), 2.38 (s, 3H), 2.38 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 150.26, 140.62, 138.64, 138.25, 138.00, 137.91, 134.51, 133.84, 132.44, 131.39, 130.62, 130.54, 129.74, 129.65, 129.64, 129.61, 129.43, 128.92, 128.87, 128.48, 127.01, 126.92, 126.72, 126.53, 126.42, 125.66, 123.91, 123.22, 119.84, 118.96, 89.81, 89.19, 21.52, 21.48; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{24}H_{21}$ m/z 309.1643 and found m/z 309.1650.



(*E*)-4'-Methyl-3-(4-methylstyryl)-1,1'-biphenyl (61)

Procedure: In an oven dried reaction tube charged with magnetic stir bar, triflate (**59**, 0.1 mmol, 1.0 equiv), $Pd(PPh_3)_2Cl_2$ (10 mol%, 0.01 mmol, 7.0 mg), PPh_3 (20 mol%, 0.02 mmol, 5.2 mg), K_2CO_3 (0.2 mmol, 2.0 equiv, 27.6 mg) and aryl boronic acid (0.15 mmol, 1.5 equiv) have been taken. The reaction tube was closed by a screw cap for evacuation and back filled with N_2 for three times. Then 2 mL of dry toluene was added to the reaction mixture and placed in a preheated oil bath at 100 °C. The reaction mixture was stirred vigorously for 24 h. The reaction mixture was allowed to cool to room temperature and filtered through the celite pad. The filtrate was concentrated under reduced pressure and pure product was isolated by column chromatography using petroleum ether as the eluent.

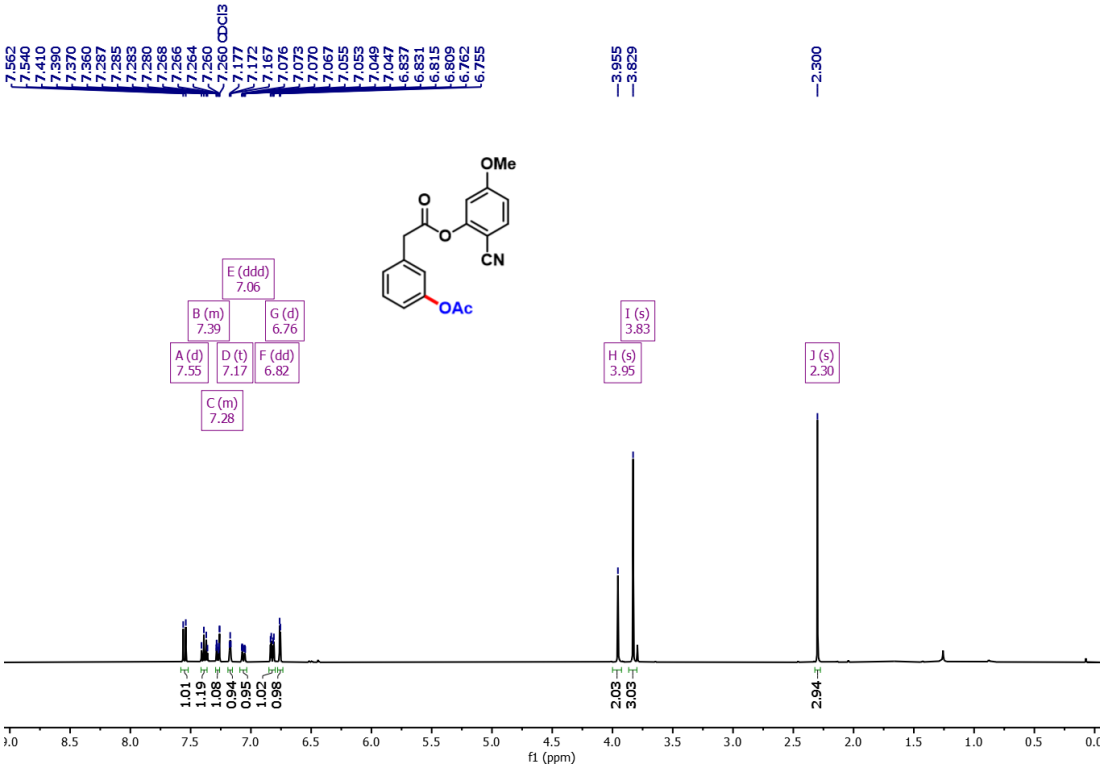
Eluent: ethyl acetate/ petroleum ether (5:95 v/v).

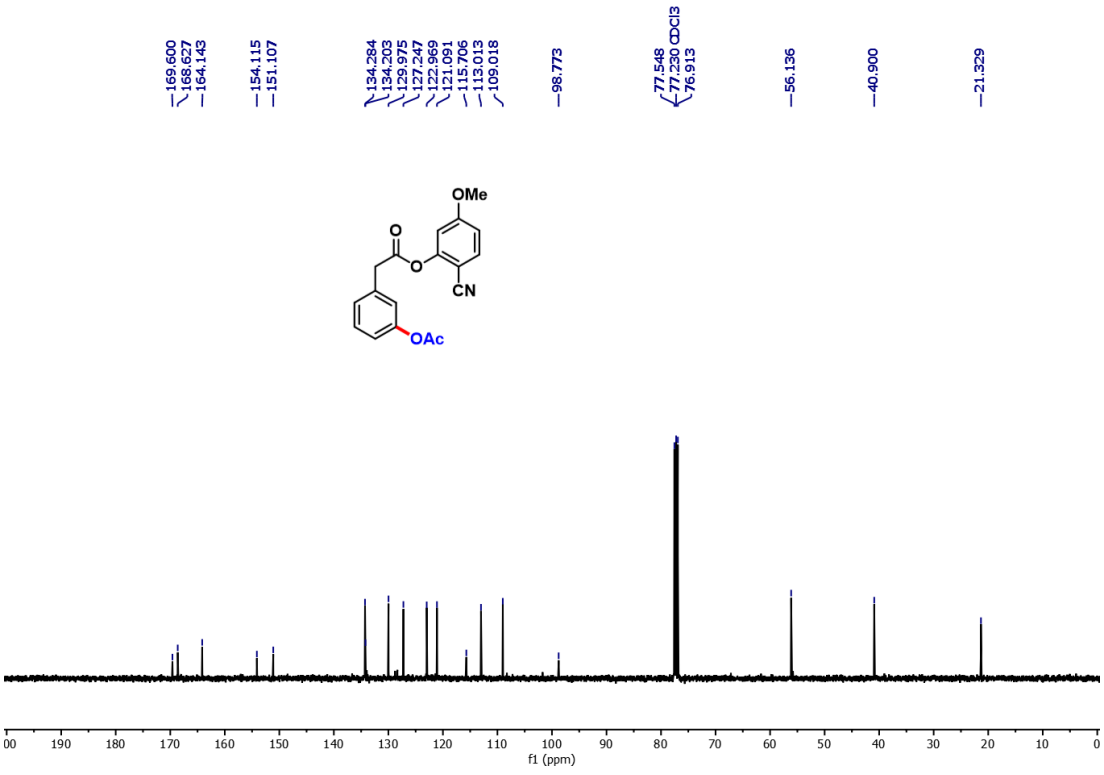
Appearance: colorless liquid.

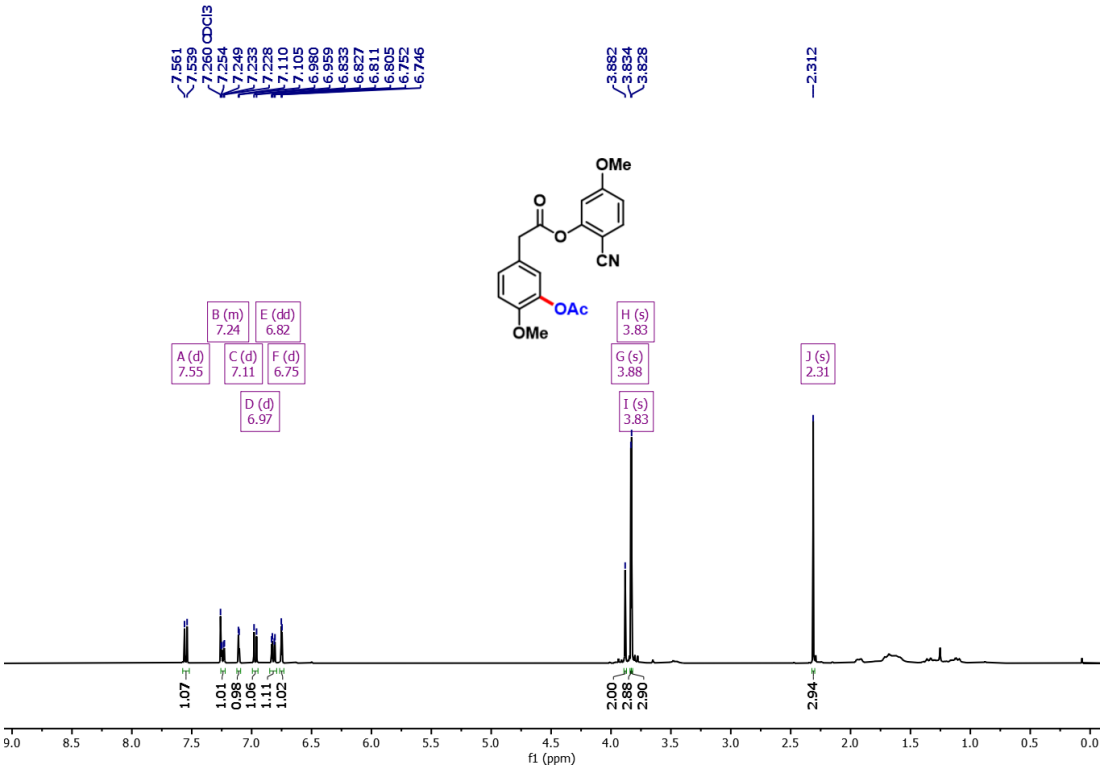
Isolated yield: 87% (27 mg, 0.087 mmol)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.71 (t, *J* = 1.8 Hz, 1H), 7.54 (d, *J* = 8.2 Hz, 2H), 7.50 – 7.41 (m, 5H), 7.28 (d, *J* = 7.9 Hz, 2H), 7.19 (dd, *J* = 7.9, 4.1 Hz, 2H), 7.14 (d, *J* = 2.1 Hz, 2H), 2.42 (s, 3H), 2.38 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 141.80, 138.48, 138.15, 137.80, 137.37, 134.74, 131.42, 130.54, 129.75, 129.70, 129.63, 129.23, 129.11, 127.89, 127.24, 126.93, 126.68, 126.42, 126.36, 125.69, 125.36, 125.20, 119.85, 118.97, 21.48, 21.34; **HRMS** (ESI-QTOF): [M+H]+ calculated for $C_{22}H_{21}$ m/z 285.1643 and found m/z 285.1640.

13. NMR spectra of the products.



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6.833
6.827
6.811
6.805
6.752
6.746
3.882
3.834
3.828
2.312
OMe
O
O
CN
OAc
OMe
B (m) 7.24
E (dd) 6.82
A (d) 7.55
C (d) 7.11
F (d) 6.75
D (d) 6.97
H (s) 3.83
G (s) 3.88
I (s) 3.83
J (s) 2.31
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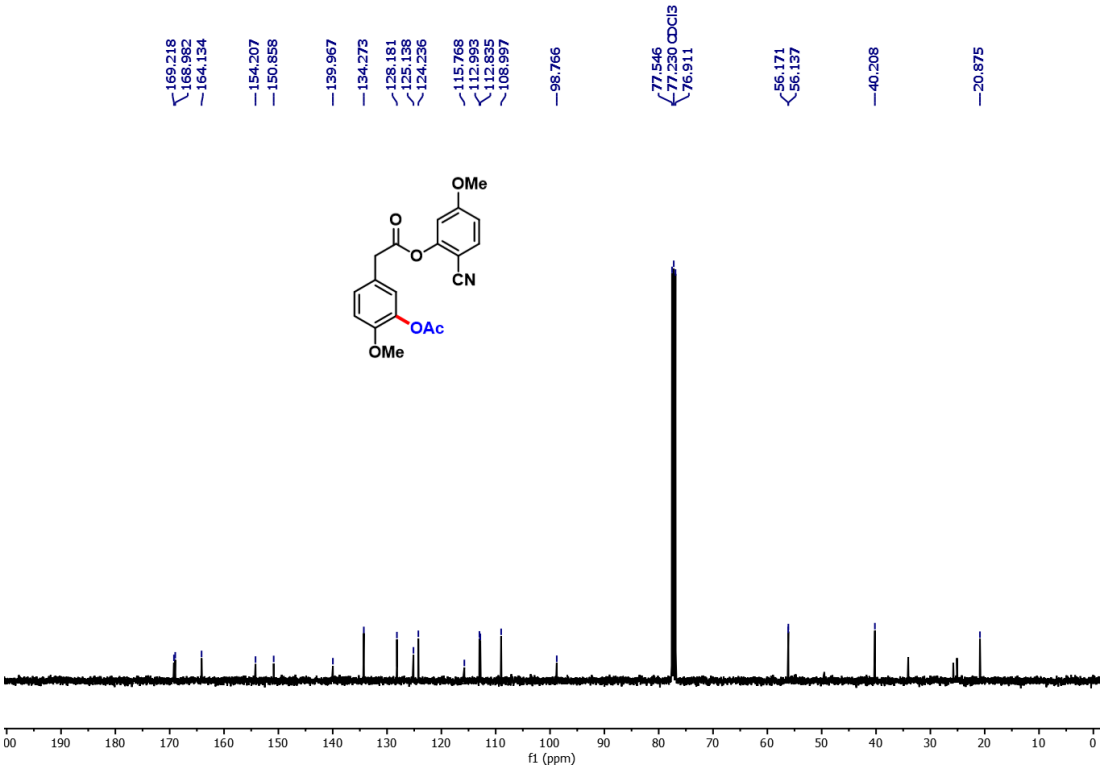
0.98
1.06
1.11
1.02
2.00
2.88
2.90
2.94
f1 (ppm)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124.236
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108.997
98.766
77.546
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56.137
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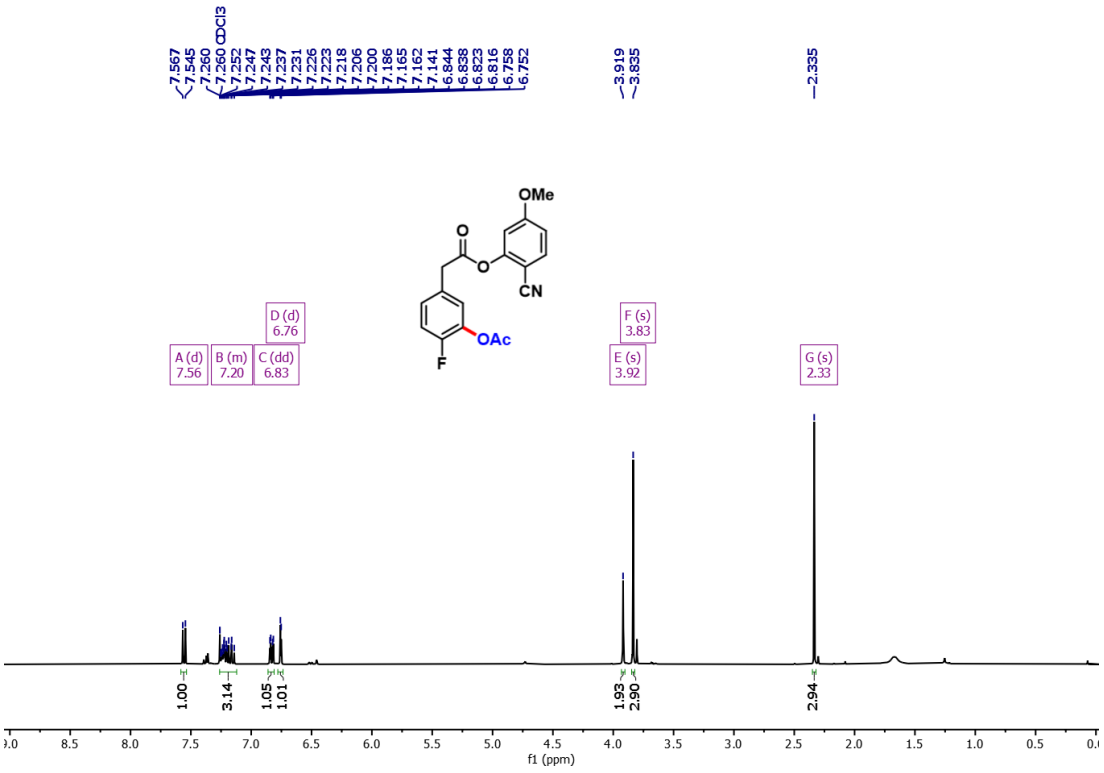
O
O
CN
OAc
OMe
f1 (ppm)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7.141
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6.758
6.752
3.919
3.835
2.335
OMe
O
O
CN
OAc
F
A (d) 7.56
B (m) 7.20
C (dd) 6.83
D (d) 6.76
E (s) 3.92
F (s) 3.83
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1.01
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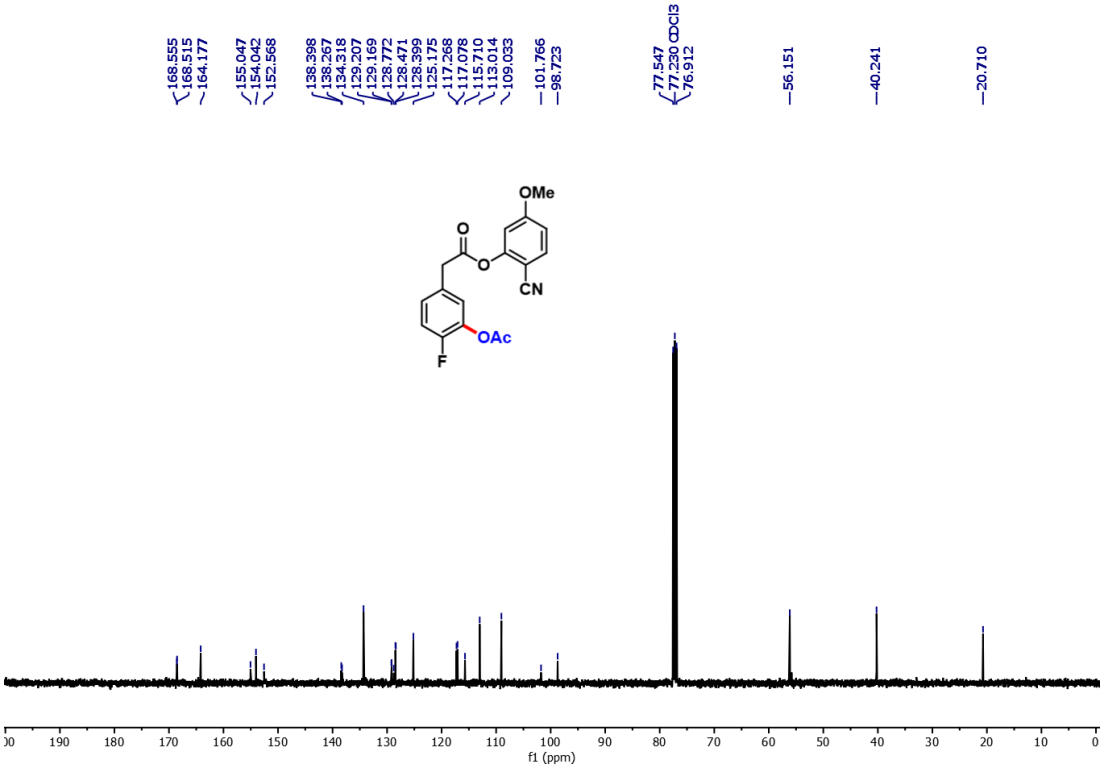
2.94
f1 (ppm)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154.042
152.568
138.398
138.267
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128.399
125.175
117.268
117.078
115.710
113.014
109.033
101.766
98.723
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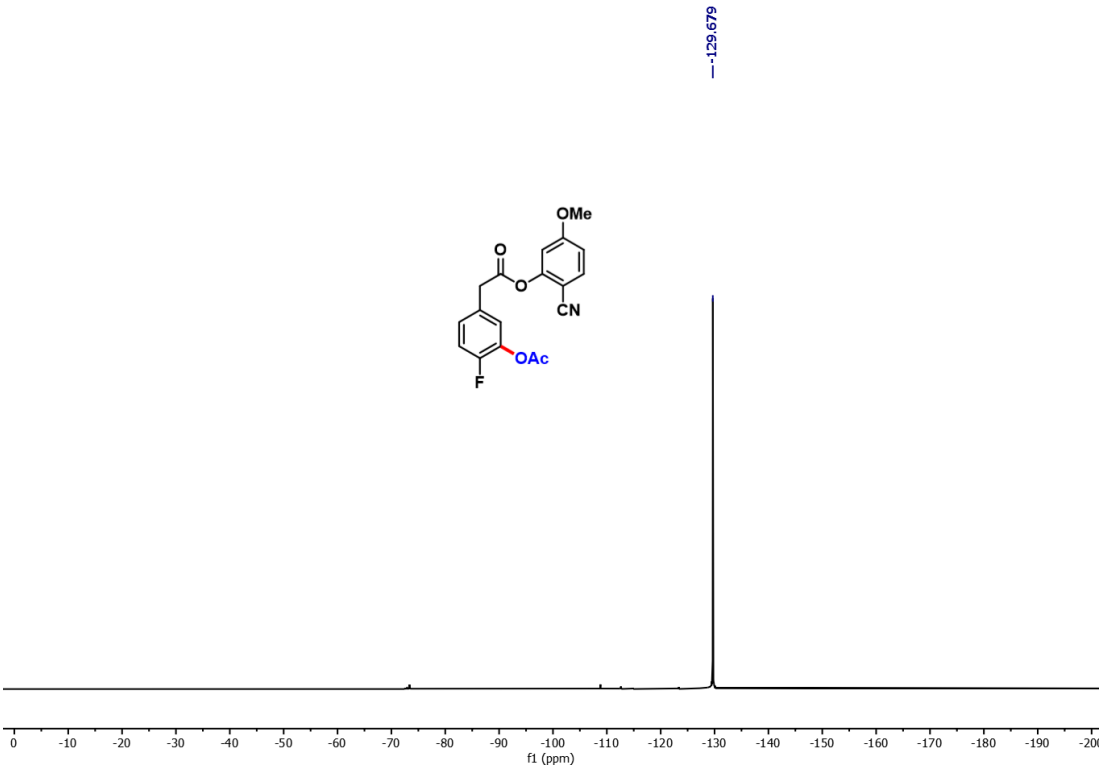
CN
OAc
F
f1 (ppm)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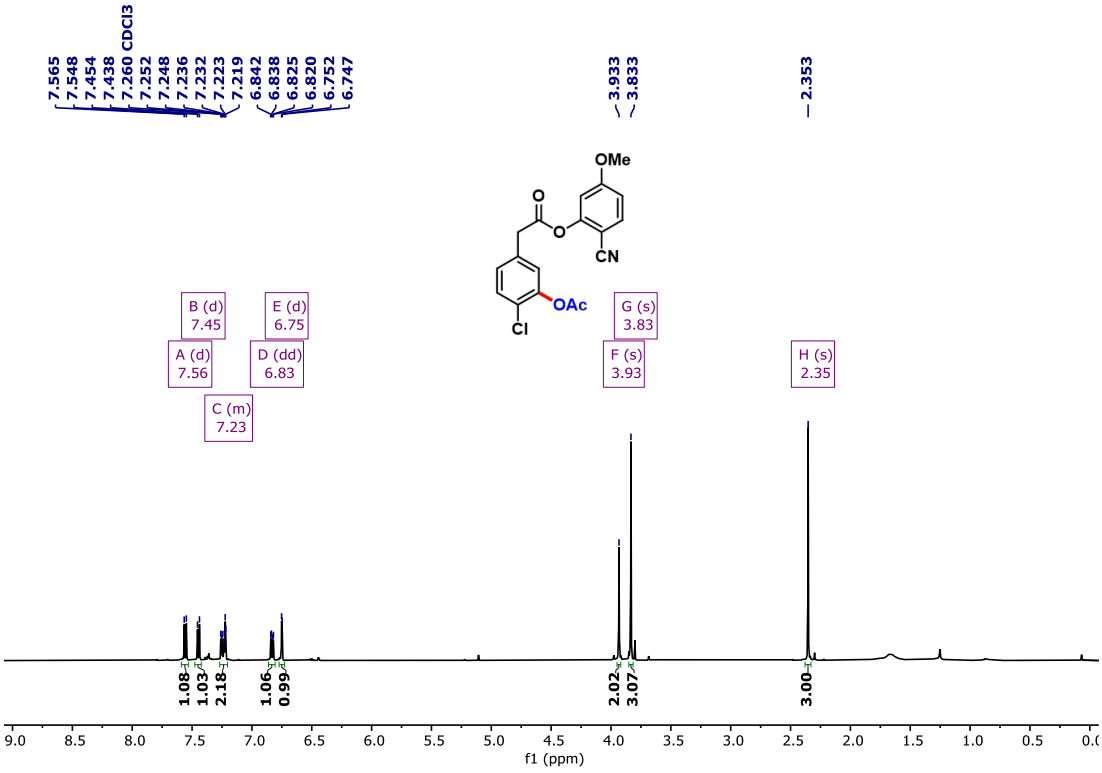
f1 (ppm)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6.838
6.825
6.820
6.752
6.747
3.933
3.833
2.353
OMe
O
O
CN
OAc
Cl
B (d) 7.45
E (d) 6.75
G (s) 3.83
A (d) 7.56
D (dd) 6.83
F (s) 3.93
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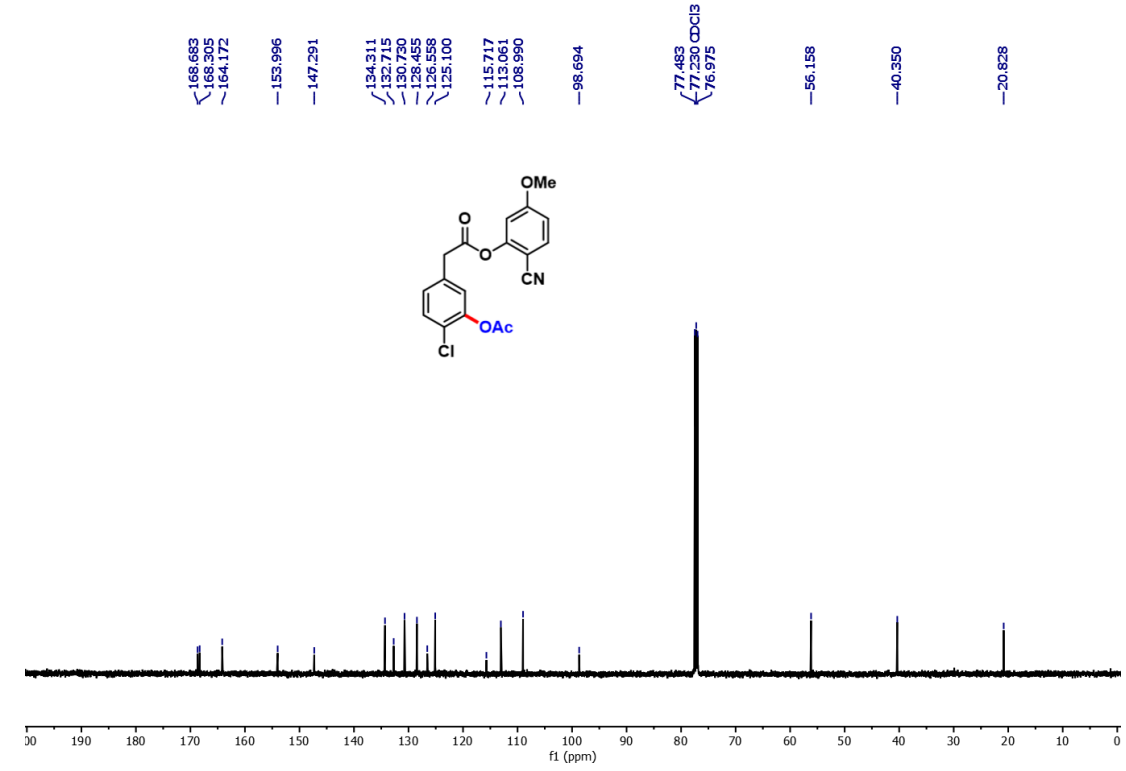
3.00
f1 (ppm)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108.990
98.694
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OMe
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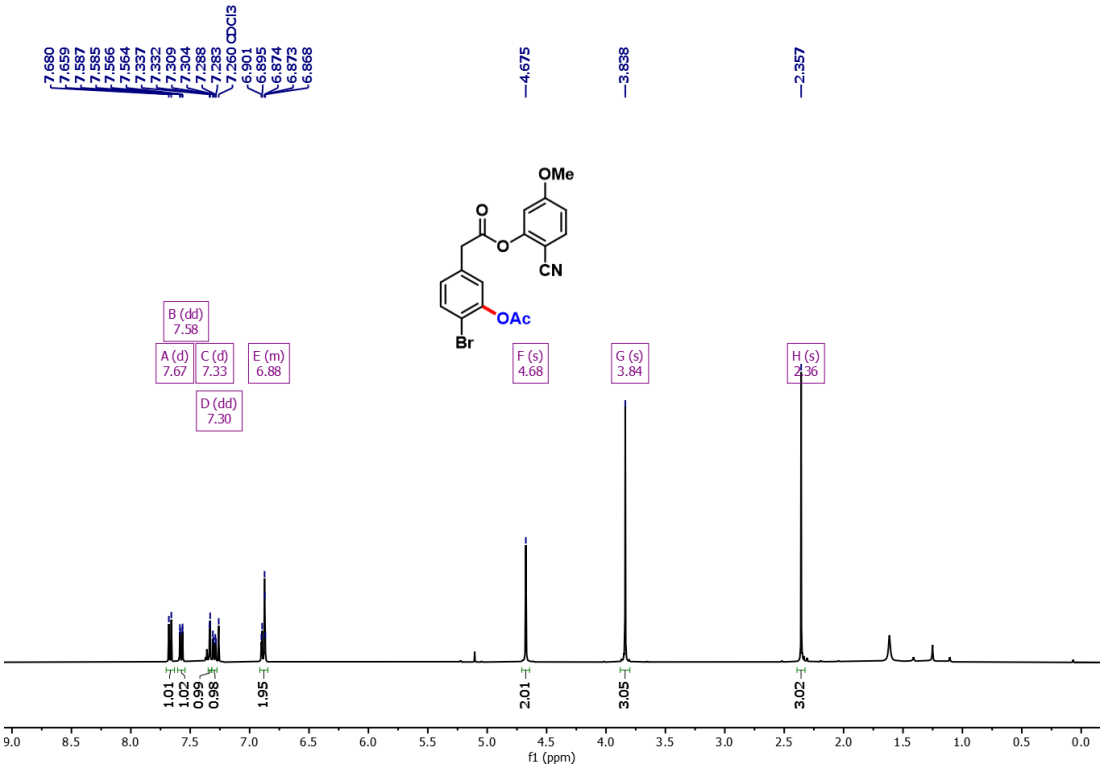
CN
OAc
Cl
f1 (ppm)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7.304
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6.901
6.895
6.874
6.873
6.868
4.675
3.838
2.357
OMe
O
O
CN
OAc
Br
B (dd) 7.58
A (d) 7.67
C (d) 7.33
D (dd) 7.30
E (m) 6.88
F (s) 4.68
G (s) 3.84
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2.01
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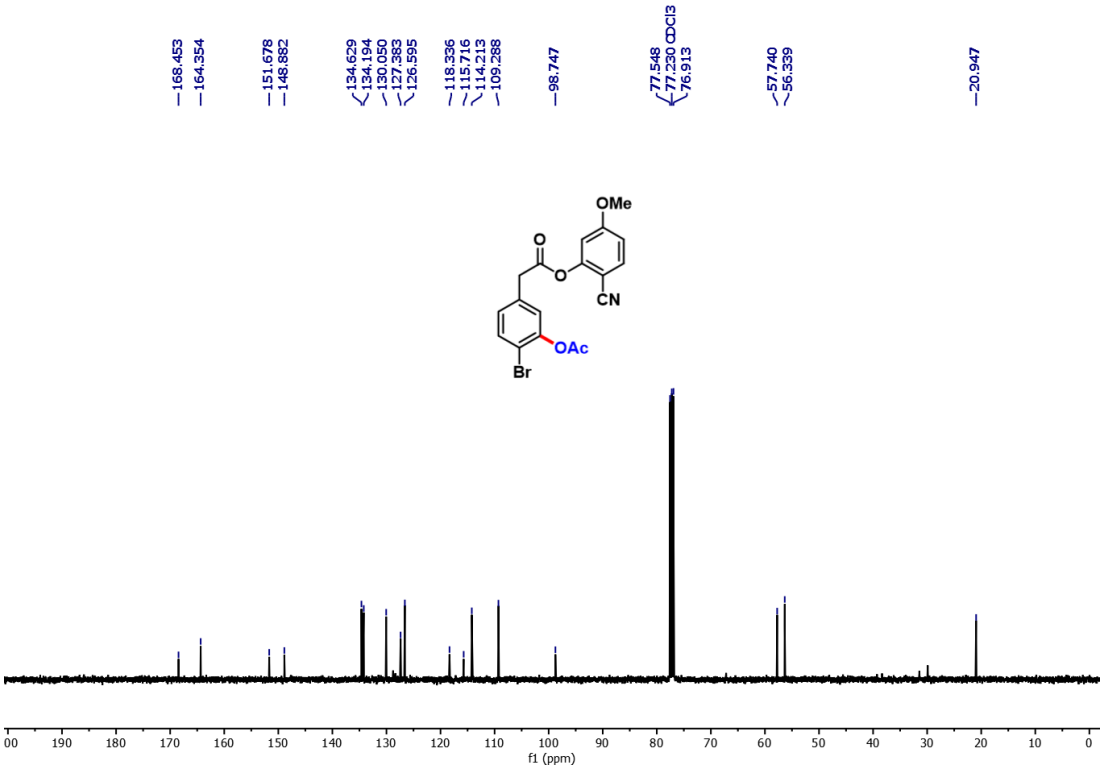
3.02
f1 (ppm)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98.747
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O
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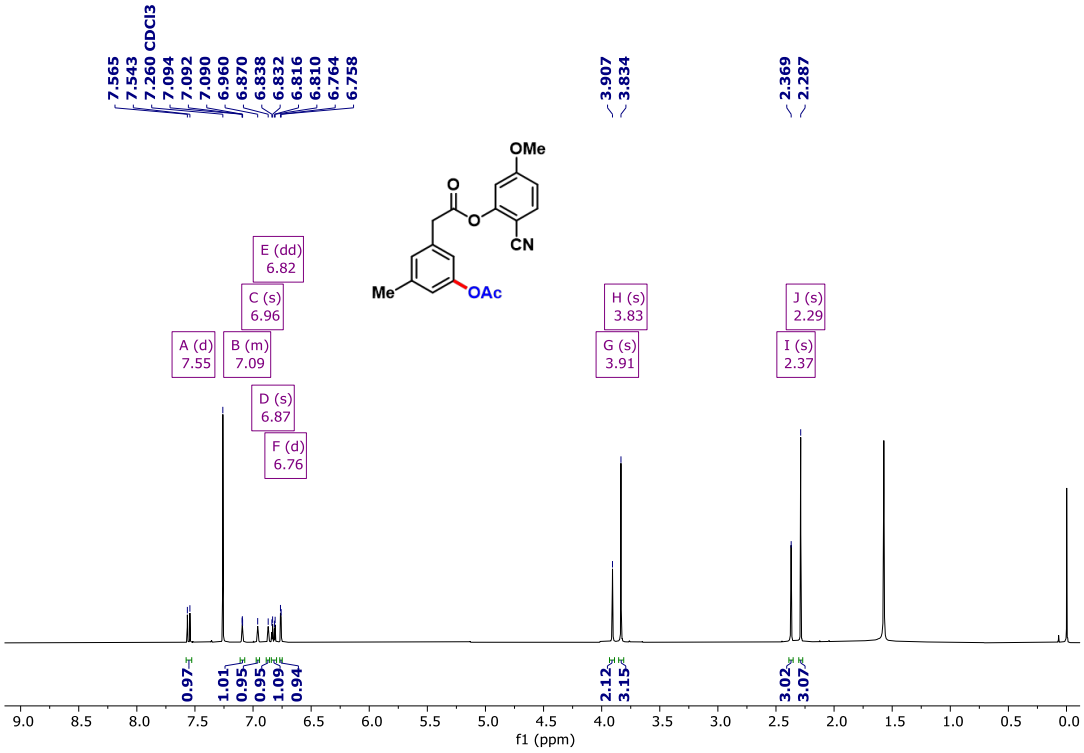
CN
OAc
Br
f1 (ppm)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6.764
6.758
3.907
3.834
2.369
2.287
OMe
O
O
CN
Me
OAc
E (dd)
6.82
C (s)
6.96
A (d)
7.55
B (m)
7.09
D (s)
6.87
F (d)
6.76
H (s)
3.83
G (s)
3.91
J (s)
2.29
I (s)
2.37
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1.01
0.95
0.95
1.09
0.94
2.12
3.15
3.02
3.07
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
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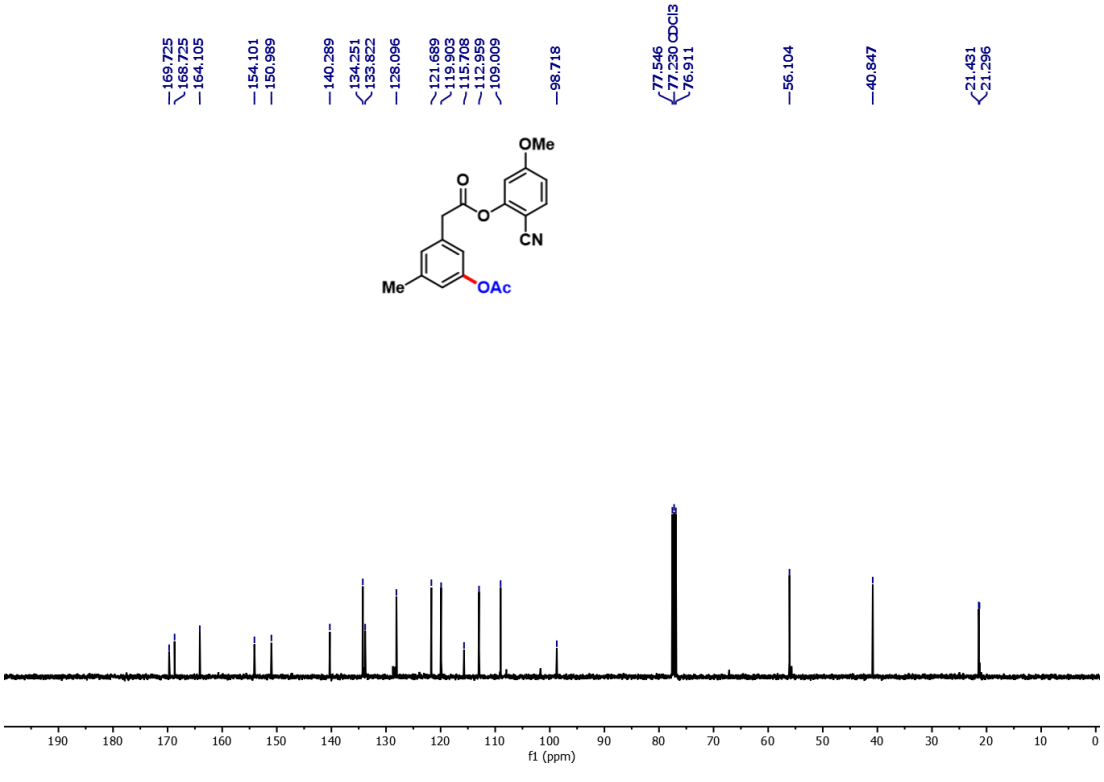
1.0
0.5
0.0
f1 (ppm)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140.289
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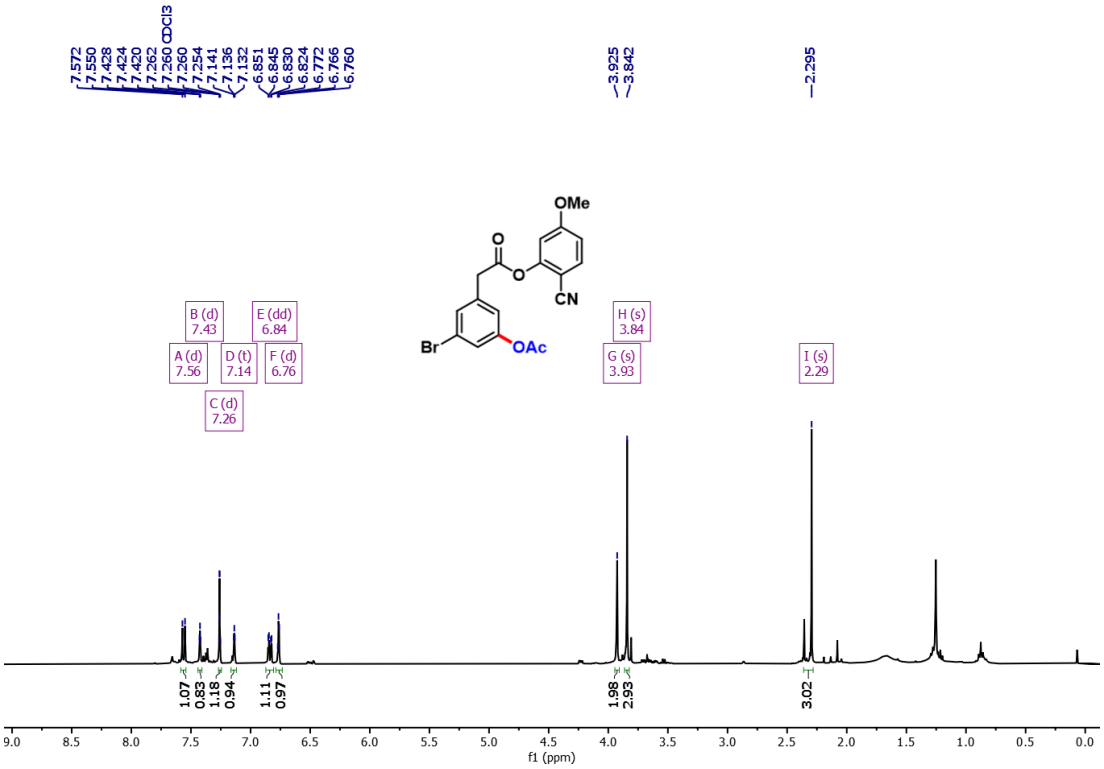
133.822
128.096
121.689
119.903
115.708
112.959
109.009
98.718
77.546
77.230 CDCl3
76.911
56.104
40.847
21.431
21.296
OMe
O
O
CN
Me
OAc
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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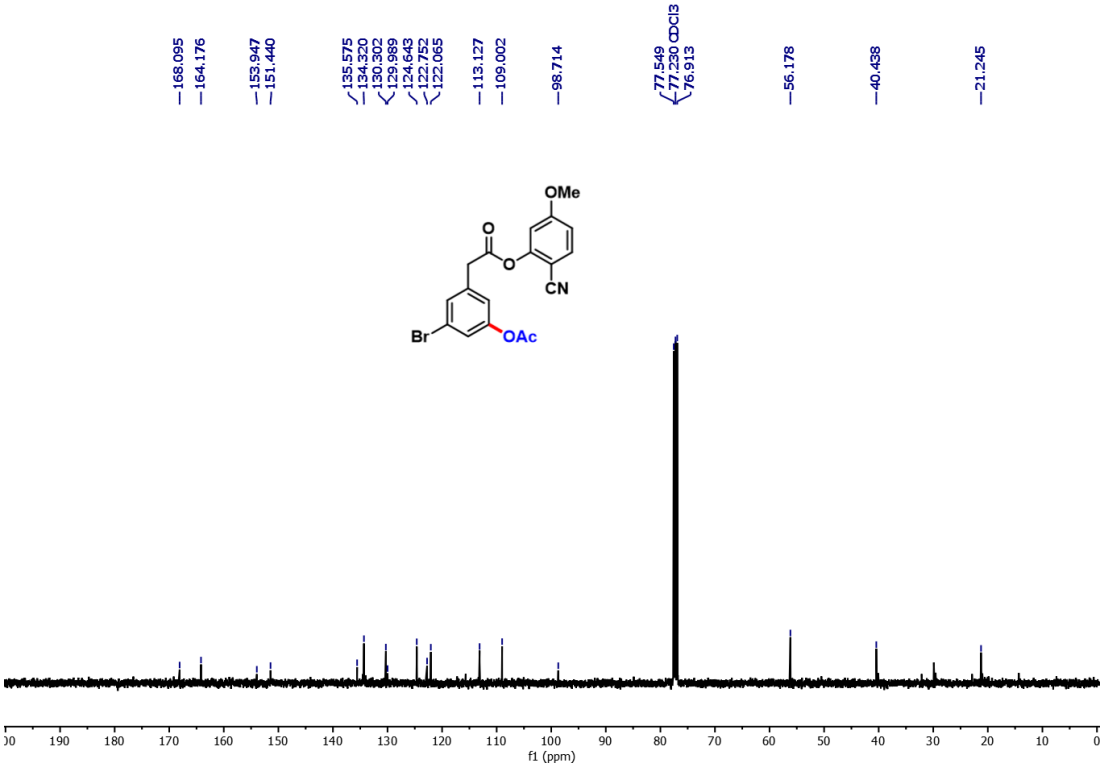
7.550
7.428
7.424
7.420
7.262
CDCl3
7.260
7.254
7.141
7.136
7.132
6.851
6.845
6.830
6.824
6.772
6.766
6.760
3.925
3.842
2.295
OMe
O
O
CN
Br
OAc
B (d) 7.43
E (dd) 6.84
H (s) 3.84
A (d) 7.56
D (t) 7.14
F (d) 6.76
G (s) 3.93
I (s) 2.29
C (d) 7.26
1.07
0.83
1.18
0.94
1.11
0.97
1.98
2.93
3.02
f1 (ppm)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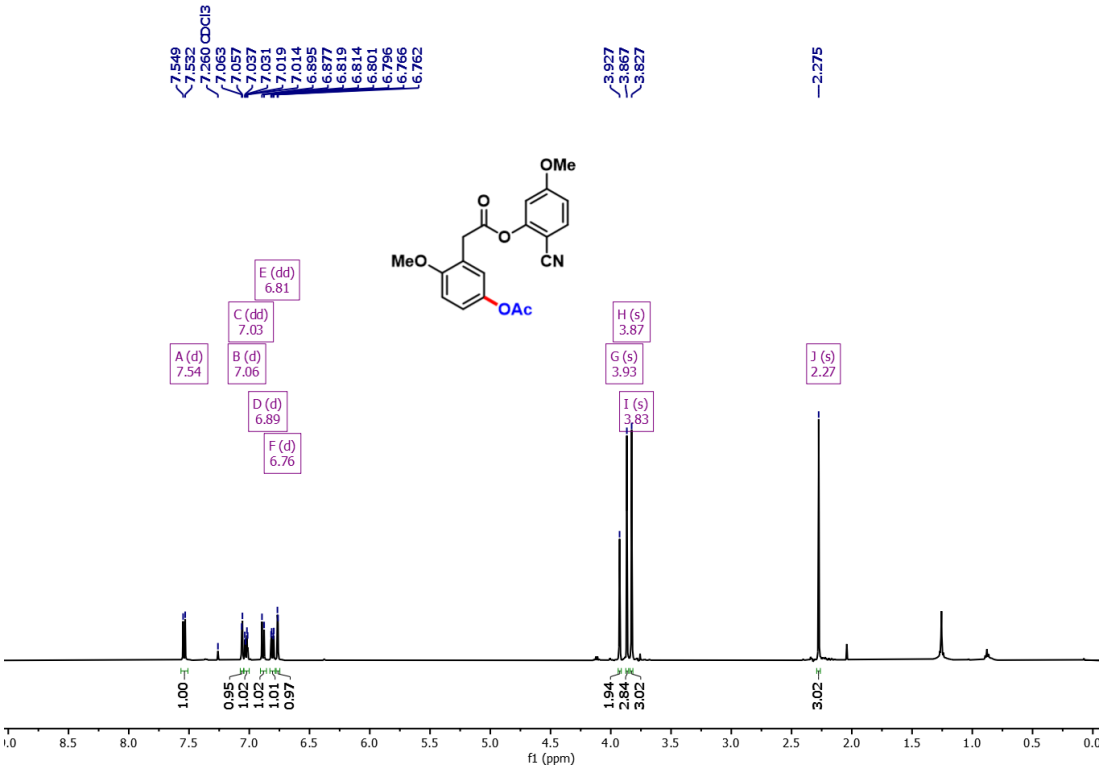
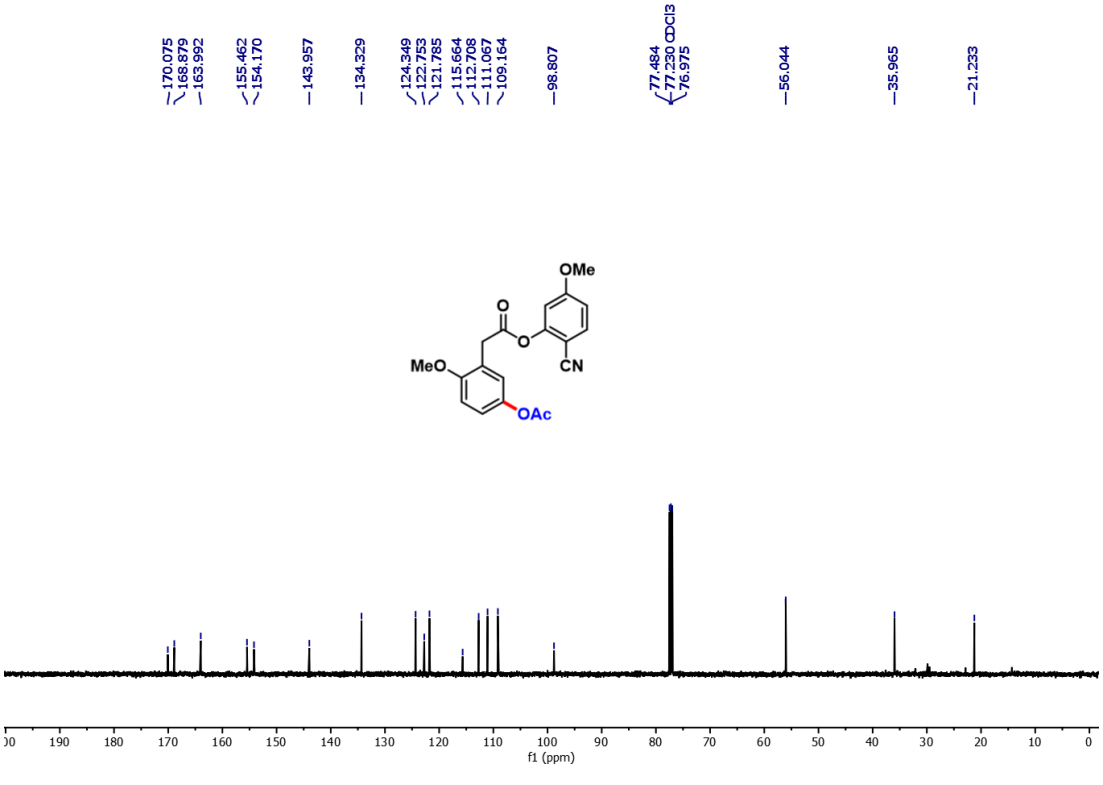
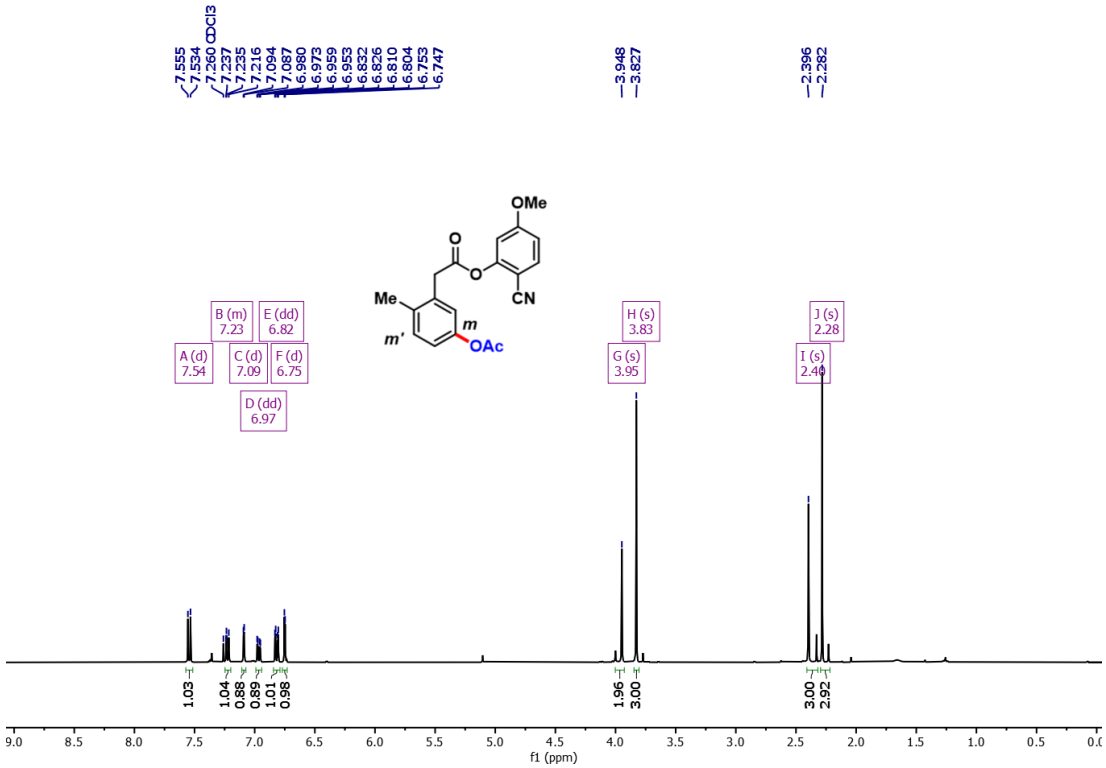
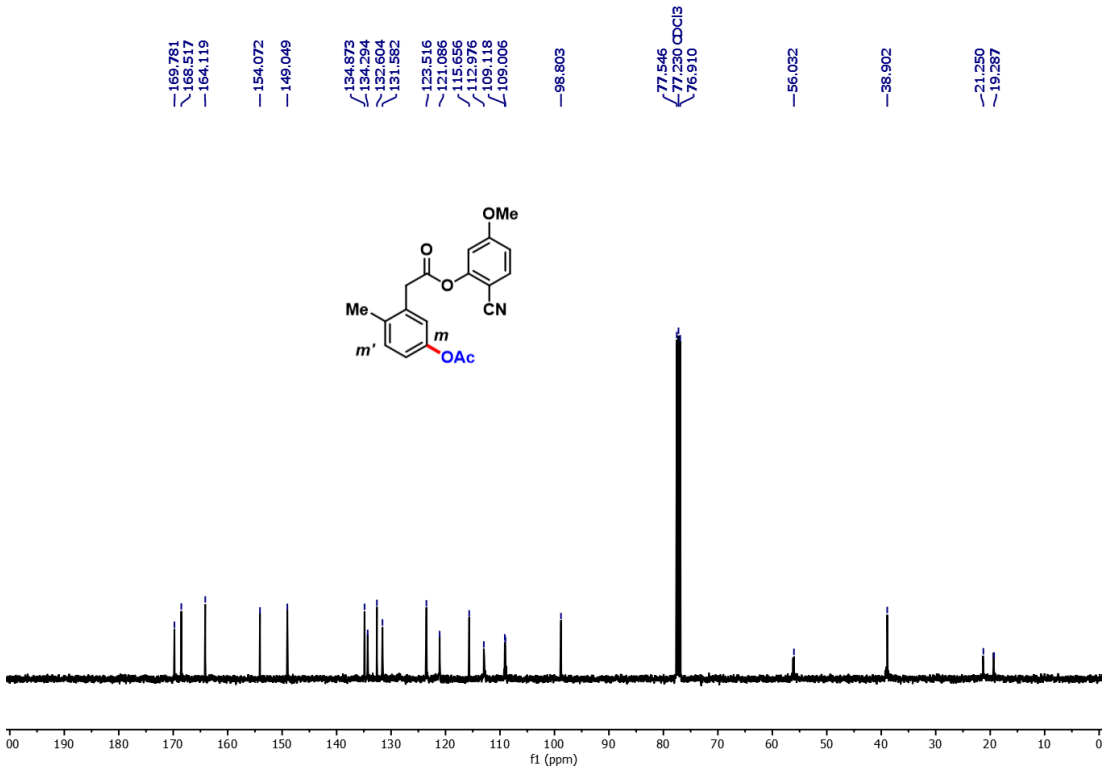
164.176
153.947
151.440
135.575
134.320
130.302
129.989
124.643
122.752
122.065
113.127
109.002
98.714
77.549
CDCl3
77.230
76.913
56.178
40.438
21.245
OMe
O
O
CN
Br
OAc
f1 (ppm)


7.549
7.532
7.260 CDCl3
7.063
7.057
7.037
7.031
7.019
7.014
6.895
6.877
6.819
6.814
6.801
6.796
6.766
6.762
3.927
3.867
3.827
2.275
OMe
O
O
MeO
CN
OAc
E (dd)
6.81
C (dd)
7.03
A (d)
7.54
B (d)
7.06
D (d)
6.89
F (d)
6.76
H (s)
3.87
G (s)
3.93
I (s)
3.83
J (s)
2.27
1.00
0.95
1.02
1.02
1.01
0.97
1.94
2.84
3.02
3.02
f1 (ppm)


170.075
168.879
163.992
155.462
154.170
143.957
134.329
124.349
122.753
121.785
115.664
112.708
111.067
109.164
98.807
77.484
77.230 CDCl3
76.975
56.044
35.965
21.233
OMe
O
O
MeO
CN
OAc
f1 (ppm)


7.555
7.534
7.260 CDCl3
7.237
7.235
7.216
7.094
7.087
6.980
6.973
6.959
6.953
6.832
6.826
6.810
6.804
6.753
6.747
3.948
3.827
2.396
2.282
OMe
O
O
CN
Me
m
m'
OAc
B (m)
7.23
E (dd)
6.82
A (d)
7.54
C (d)
7.09
F (d)
6.75
D (dd)
6.97
H (s)
3.83
G (s)
3.95
J (s)
2.28
I (s)
2.40
1.03
1.04
0.88
0.89
1.01
0.98
1.96
3.00
3.00
2.92
f1 (ppm)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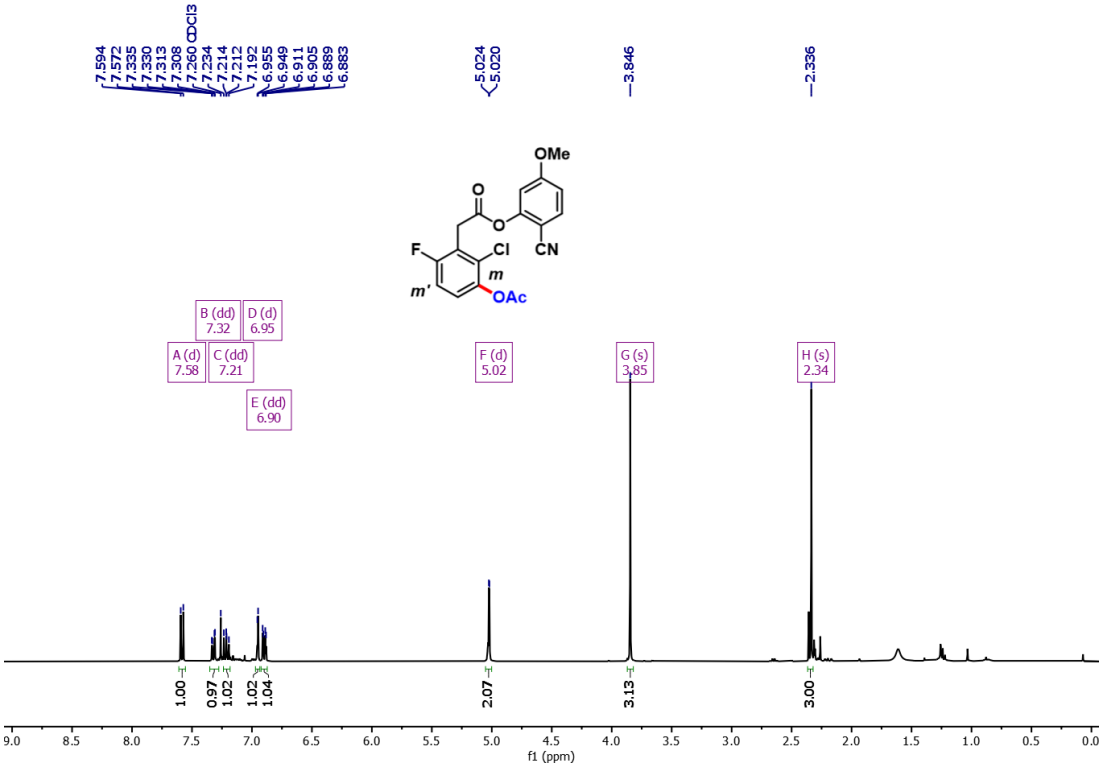
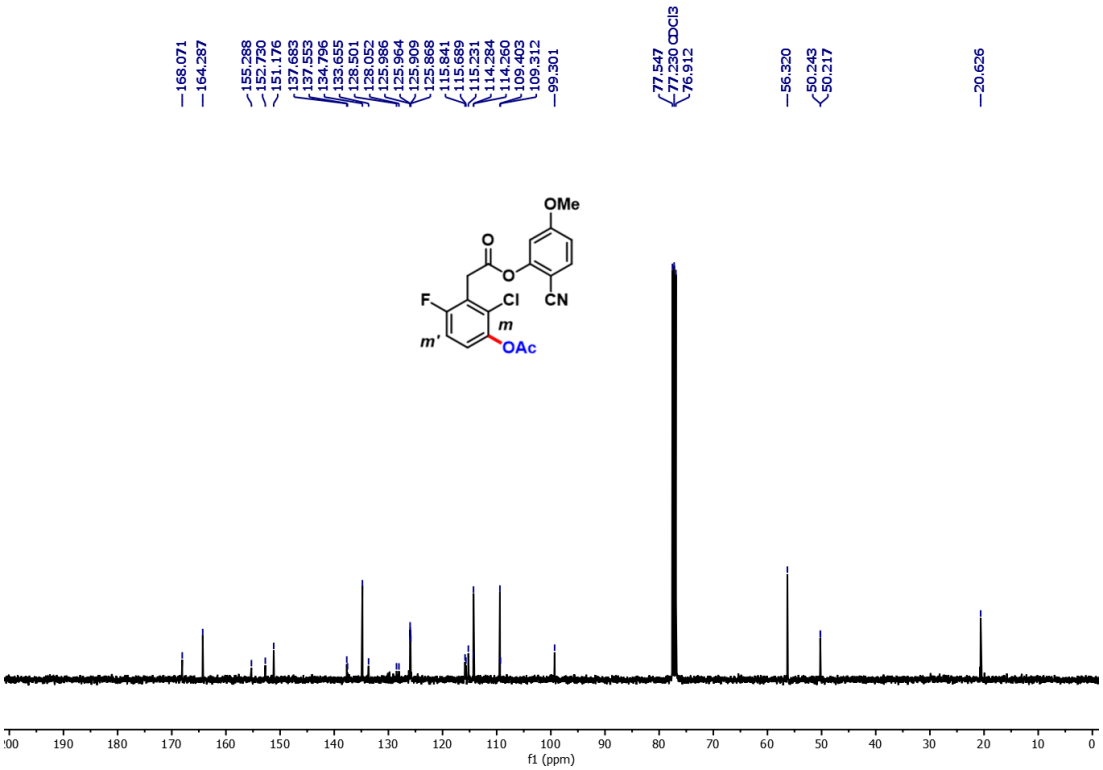
164.119
154.072
149.049
134.873
134.294
132.604
131.582
123.516
121.086
115.656
112.976
109.118
109.006
98.803
77.546
77.230 CDCl3
76.910
56.032
38.902
21.250
19.287
OMe
O
O
CN
Me
m
m'
OAc
f1 (ppm)


7.594
7.572
7.335
7.330
7.313
7.308
7.260 CDCl3
7.234
7.214
7.212
7.192
6.955
6.949
6.911
6.905
6.889
6.883
5.024
5.020
3.846
2.336
OMe
O
O
F
Cl
CN
m
m'
OAc
B (dd) 7.32
D (d) 6.95
A (d) 7.58
C (dd) 7.21
E (dd) 6.90
F (d) 5.02
G (s) 3.85
H (s) 2.34
1.00
0.97
1.02
1.02
1.04
2.07
3.13
3.00
f1 (ppm)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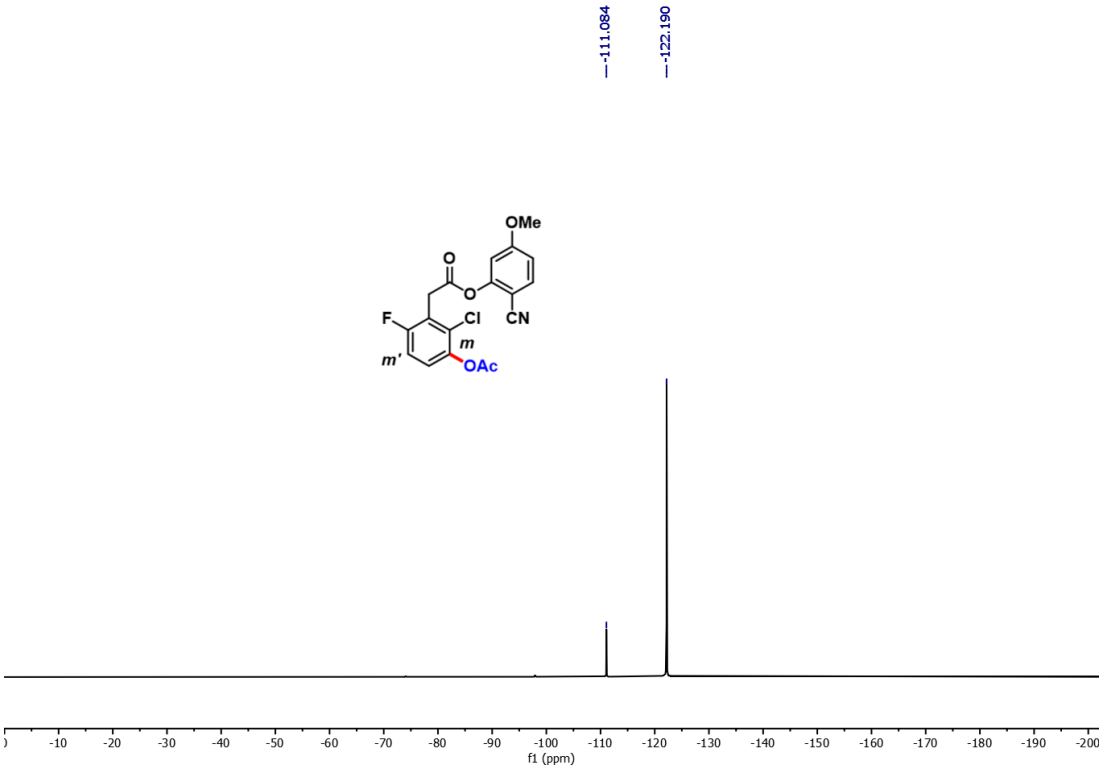
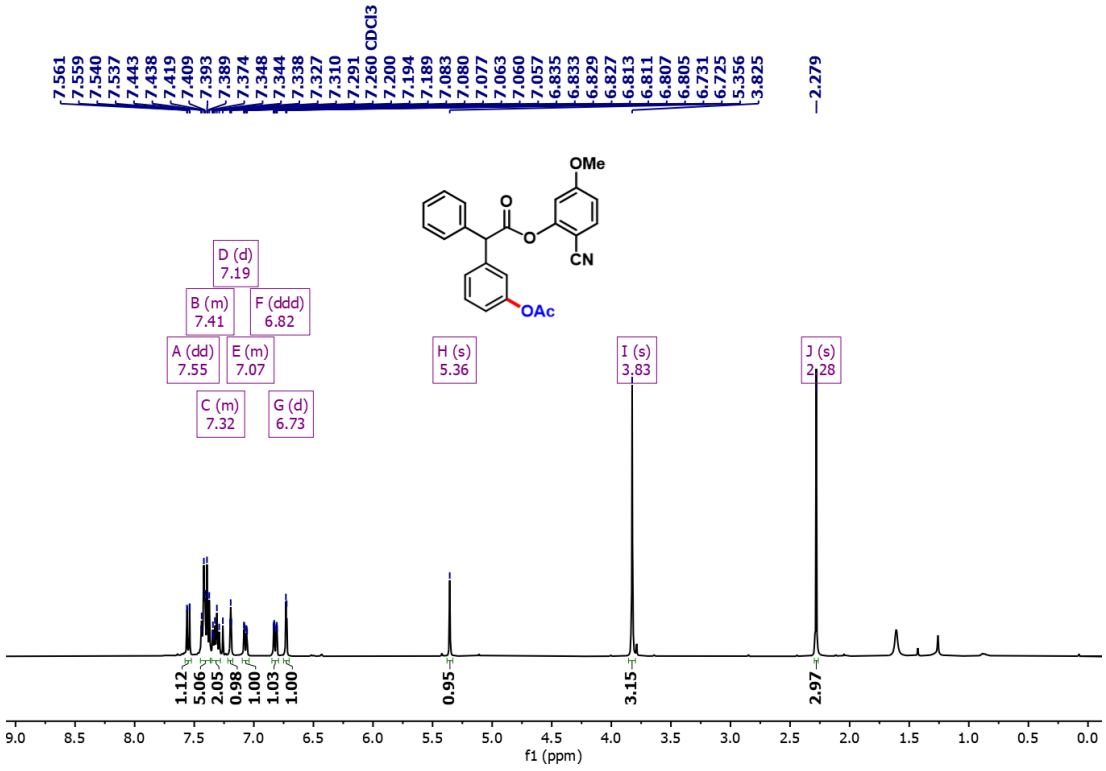
164.287
155.288
152.730
151.176
137.683
137.553
134.796
133.655
128.501
128.052
125.986
125.964
125.909
125.868
115.841
115.689
115.231
114.284
114.260
109.403
109.312
99.301
77.547
77.230 CDCl3
76.912
56.320
50.243
50.217
20.626
OMe
O
O
F
Cl
CN
m
m'
OAc
f1 (ppm)


-111.084
-122.190
OMe
O
O
F
Cl
CN
m
m'
OAc
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
f1 (ppm)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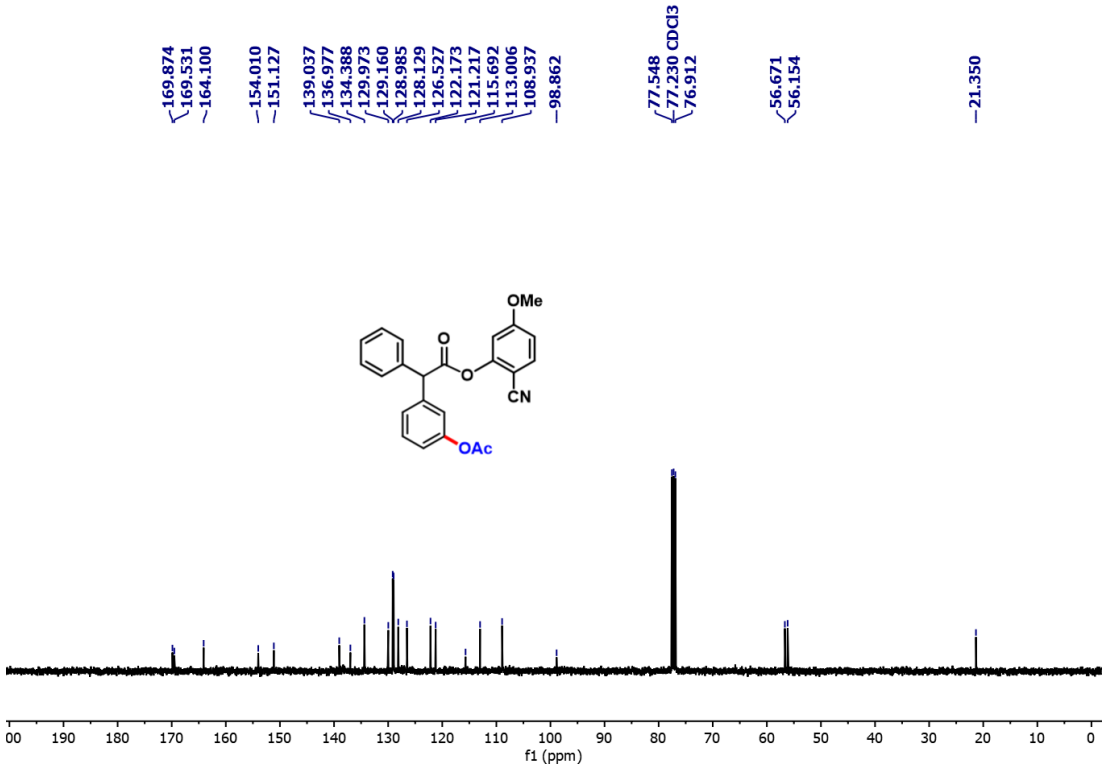
7.540
7.537
7.443
7.438
7.419
7.409
7.393
7.389
7.374
7.348
7.344
7.338
7.327
7.310
7.291
7.260 CDCl3
7.200
7.194
7.189
7.083
7.080
7.077
7.063
7.060
7.057
6.835
6.833
6.829
6.827
6.813
6.811
6.807
6.805
6.731
6.725
5.356
3.825
2.279
OMe
O
O
CN
OAc
D (d) 7.19
B (m) 7.41
F (ddd) 6.82
A (dd) 7.55
E (m) 7.07
C (m) 7.32
G (d) 6.73
H (s) 5.36
I (s) 3.83
J (s) 2.28
1.12
5.06
2.05
0.98
1.00
1.03
1.00
0.95
3.15
2.97
f1 (ppm)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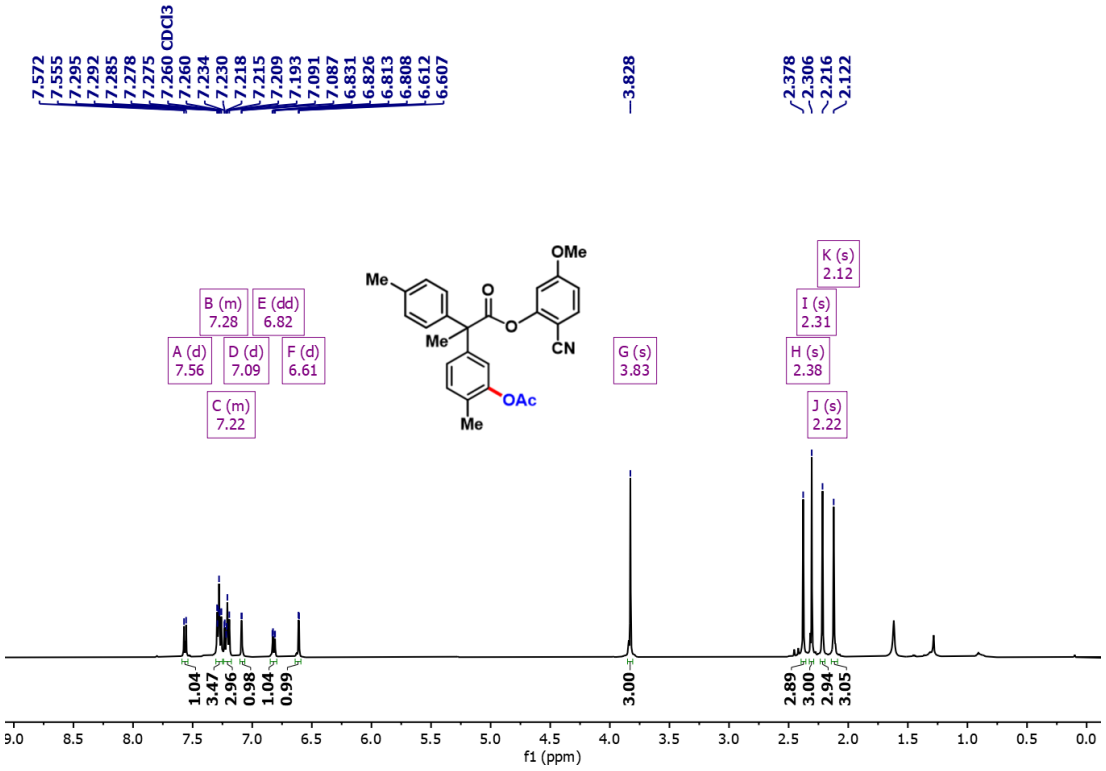
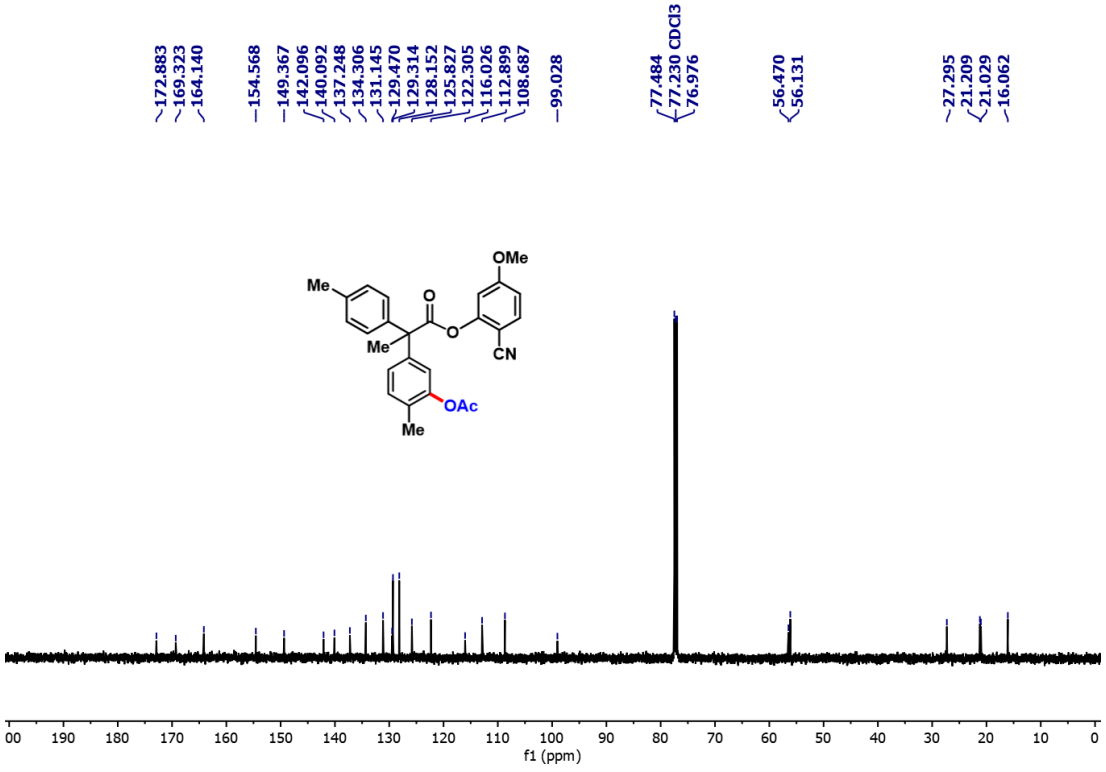
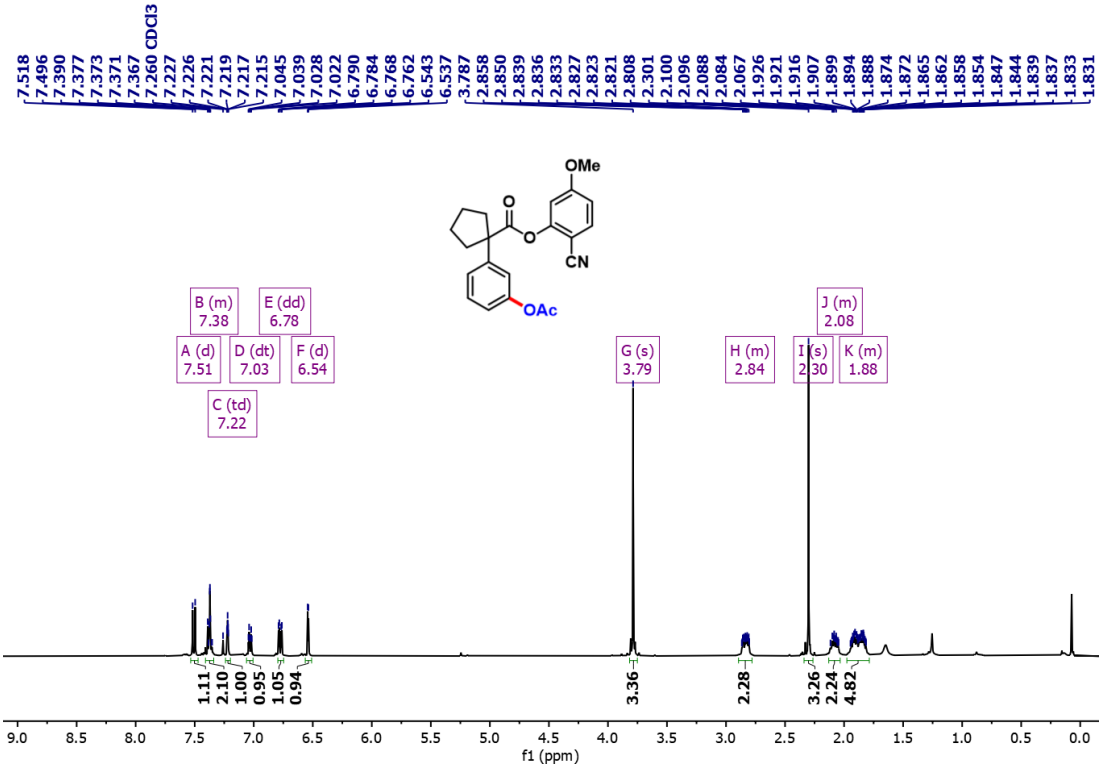
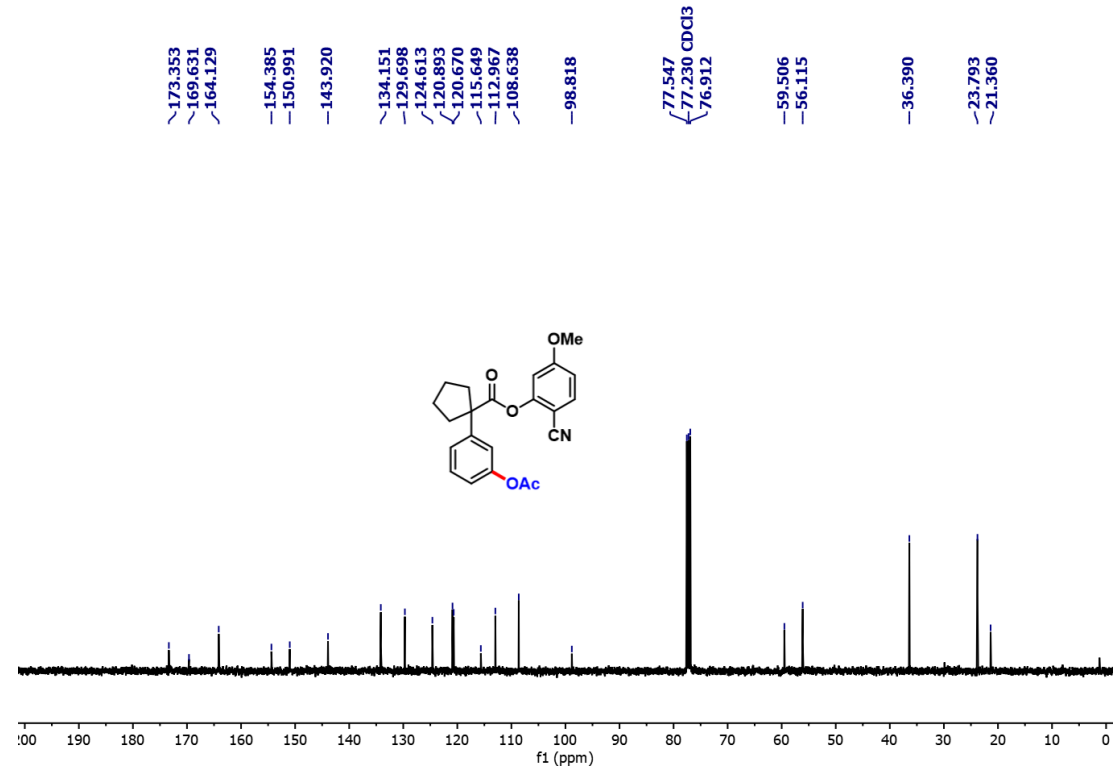
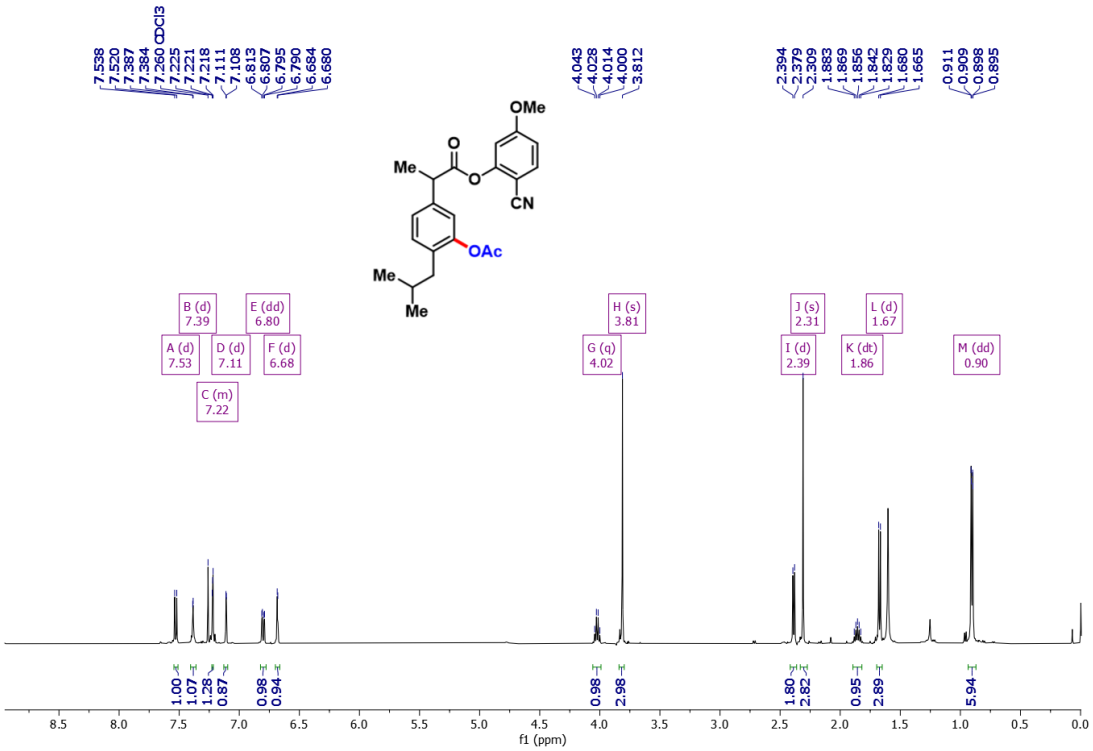
154.010
151.127
139.037
136.977
134.388
129.973
129.160
128.985
128.129
126.527
122.173
121.217
115.692
113.006
108.937
98.862
77.548
77.230 CDCl3
76.912
56.671
56.154
21.350
OMe
O
O
CN
OAc
f1 (ppm)


7.572
7.555
7.295
7.292
7.285
7.278
7.275
7.260 CDCl3
7.260
7.234
7.230
7.218
7.215
7.209
7.193
7.091
7.087
6.831
6.826
6.813
6.808
6.612
6.607
3.828
2.378
2.306
2.216
2.122
OMe
Me
O
O
CN
Me
OAc
Me
B (m) 7.28
E (dd) 6.82
A (d) 7.56
D (d) 7.09
F (d) 6.61
C (m) 7.22
G (s) 3.83
K (s) 2.12
I (s) 2.31
H (s) 2.38
J (s) 2.22
1.04
3.47
2.96
0.98
1.04
0.99
3.00
2.89
3.00
2.94
3.05
f1 (ppm)


172.883
169.323
164.140
154.568
149.367
142.096
140.092
137.248
134.306
131.145
129.470
129.314
128.152
125.827
122.305
116.026
112.899
108.687
99.028
77.484
77.230 CDCl3
76.976
56.470
56.131
27.295
21.209
21.029
16.062
OMe
Me
O
O
CN
Me
OAc
Me
f1 (ppm)


7.518 7.496 7.390 7.377 7.373 7.371 7.367 7.260 CDCl3 7.227 7.226 7.221 7.219 7.217 7.215 7.045 7.039 7.028 7.022 6.790 6.784 6.768 6.762 6.543 6.537 3.787 2.858 2.850 2.839 2.836 2.833 2.827 2.823 2.821 2.808 2.301 2.100 2.096 2.088 2.084 2.067 1.926 1.921 1.916 1.907 1.899 1.894 1.888 1.874 1.872 1.865 1.862 1.858 1.854 1.847 1.844 1.839 1.837 1.833 1.831
OMe
O
O
CN
OAc
B (m) 7.38
E (dd) 6.78
A (d) 7.51
D (dt) 7.03
F (d) 6.54
C (td) 7.22
G (s) 3.79
H (m) 2.84
J (m) 2.08
I (s) 2.30
K (m) 1.88
1.11 2.10 1.00 0.95 1.05 0.94 3.36 2.28 3.26 2.24 4.82
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)


173.353 169.631 164.129 154.385 150.991 143.920 134.151 129.698 124.613 120.893 120.670 115.649 112.967 108.638 98.818 77.547 77.230 CDCl3 76.912 59.506 56.115 36.390 23.793 21.360
OMe
O
O
CN
OAc
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)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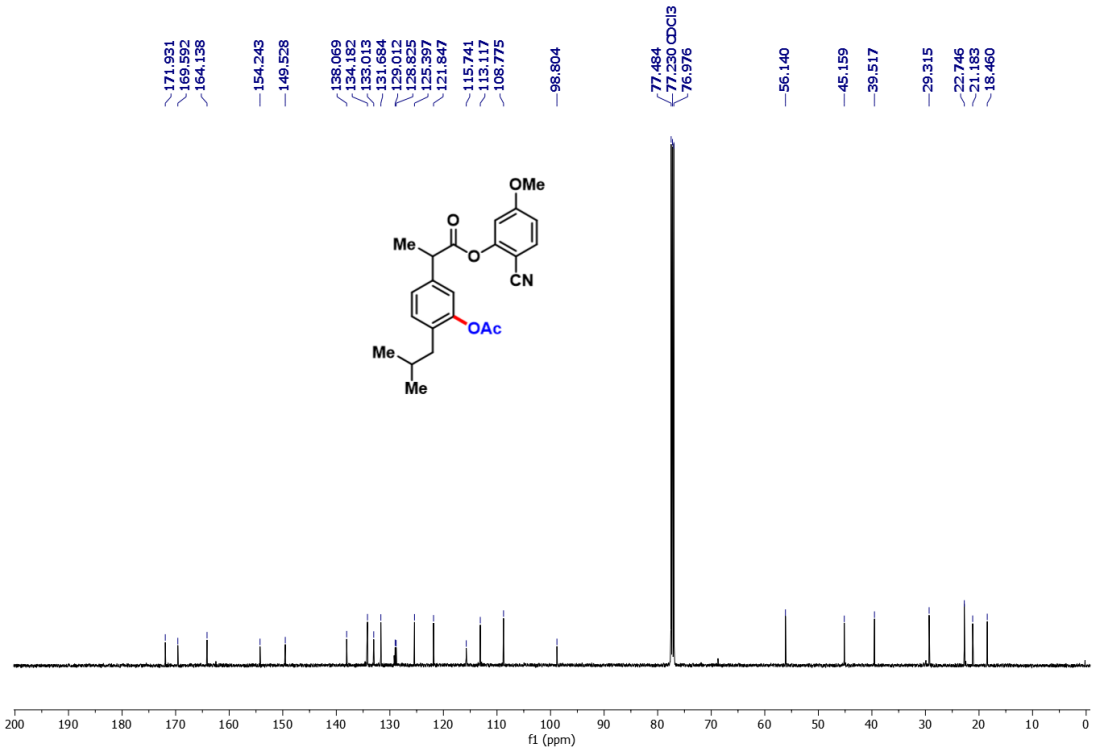
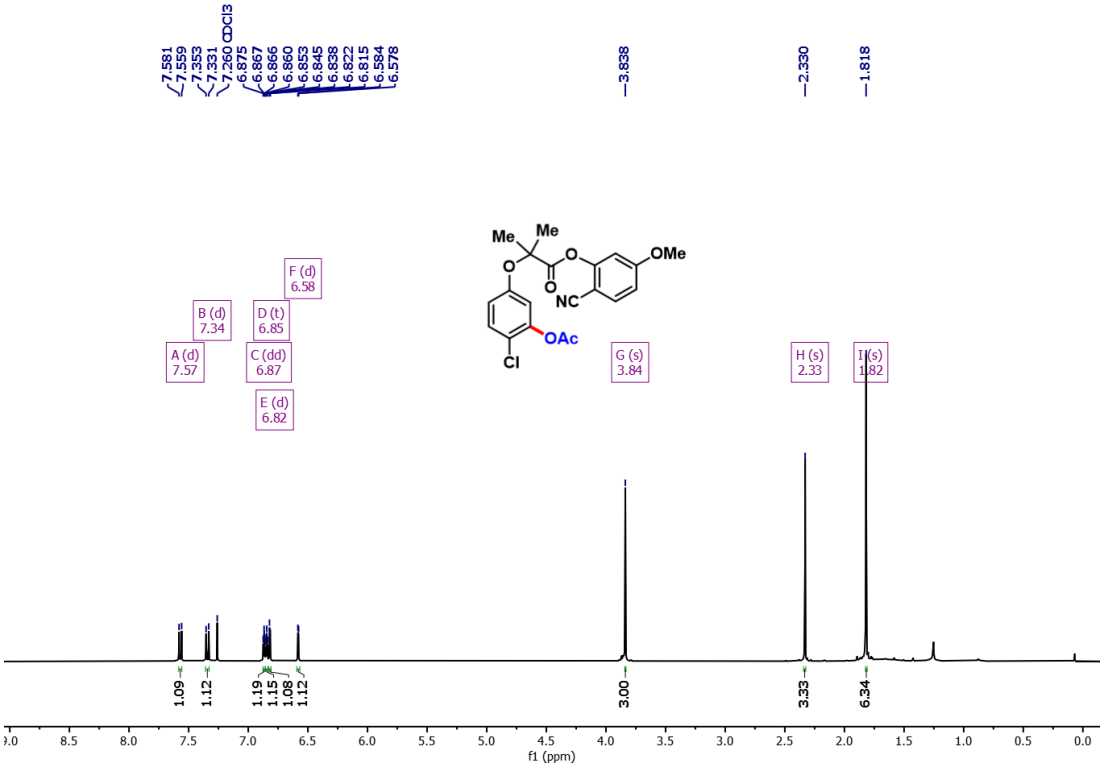
7.520
7.387
7.384
7.260 CDCl3
7.225
7.221
7.218
7.111
7.108
6.813
6.807
6.795
6.790
6.684
6.680
4.043
4.028
4.014
4.000
3.812
2.394
2.379
2.309
1.883
1.869
1.856
1.842
1.829
1.680
1.665
0.911
0.909
0.898
0.895
OMe
O
Me
O
CN
OAc
Me
Me
B (d) 7.39
E (dd) 6.80
A (d) 7.53
D (d) 7.11
F (d) 6.68
C (m) 7.22
H (s) 3.81
G (q) 4.02
J (s) 2.31
L (d) 1.67
I (d) 2.39
K (dt) 1.86
M (dd) 0.90
1.00
1.07
1.28
0.87
0.98
0.94
0.98
2.98
1.80
2.82
0.95
2.89
5.94
f1 (ppm)


171.931
169.592
164.138
154.243
149.528
138.069
134.182
133.013
131.684
129.012
128.825
125.397
121.847
115.741
113.117
108.775
98.804
77.484
77.230 CDCl3
76.976
56.140
45.159
39.517
29.315
22.746
21.183
18.460
OMe
O
Me
O
CN
OAc
Me
Me
f1 (ppm)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7.331
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6.867
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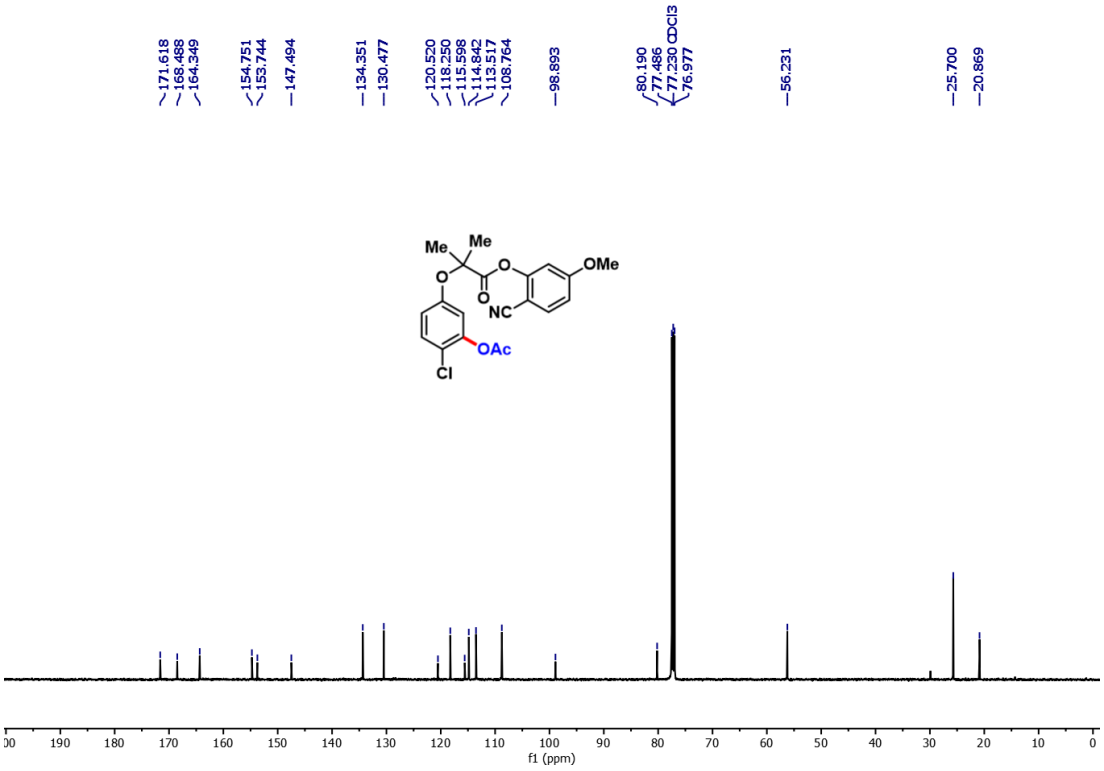
6.860
6.853
6.845
6.838
6.822
6.815
6.584
6.578
3.838
2.330
1.818
Me
Me
O
O
O
OMe
O
NC
OAc
Cl
A (d) 7.57
B (d) 7.34
C (dd) 6.87
D (t) 6.85
E (d) 6.82
F (d) 6.58
G (s) 3.84
H (s) 2.33
I (s) 1.82
1.09
1.12
1.19
1.15
1.08
1.12
3.00
3.33
6.34
f1 (ppm)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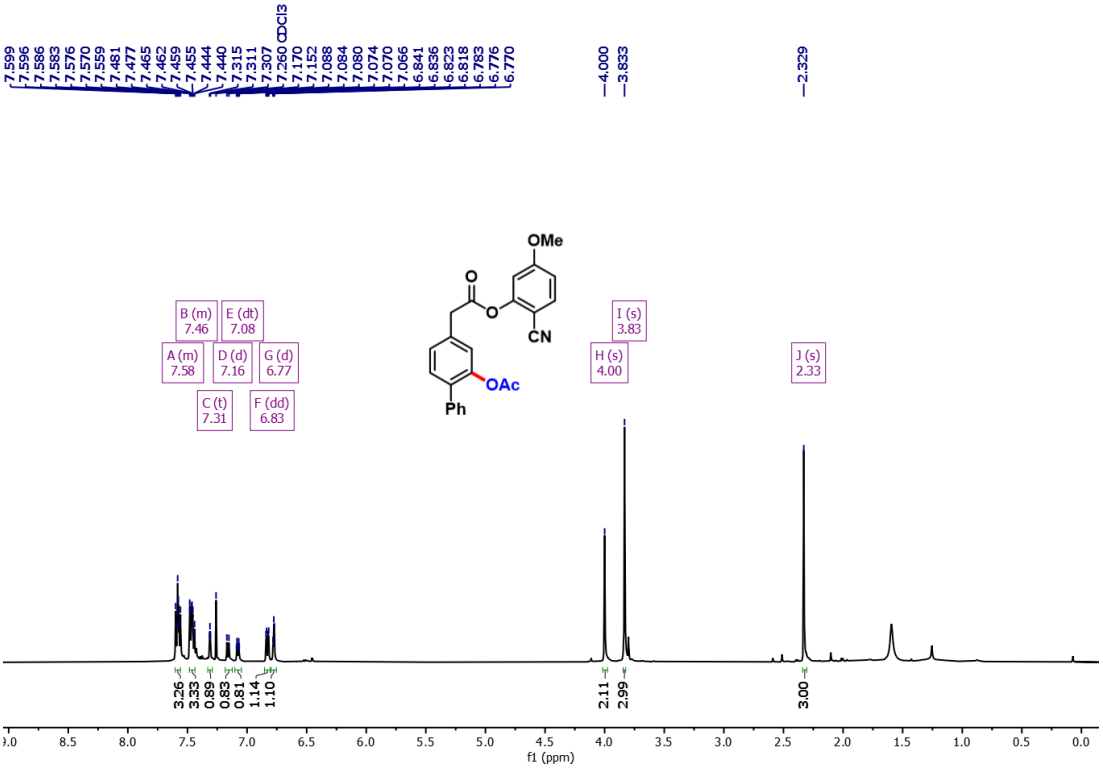
164.349
154.751
153.744
147.494
134.351
130.477
120.520
118.250
115.598
114.842
113.517
108.764
98.893
80.190
77.486
77.230 CDCl3
76.977
56.231
25.700
20.869
Me
Me
O
O
O
OMe
O
NC
OAc
Cl
f1 (ppm)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7.586
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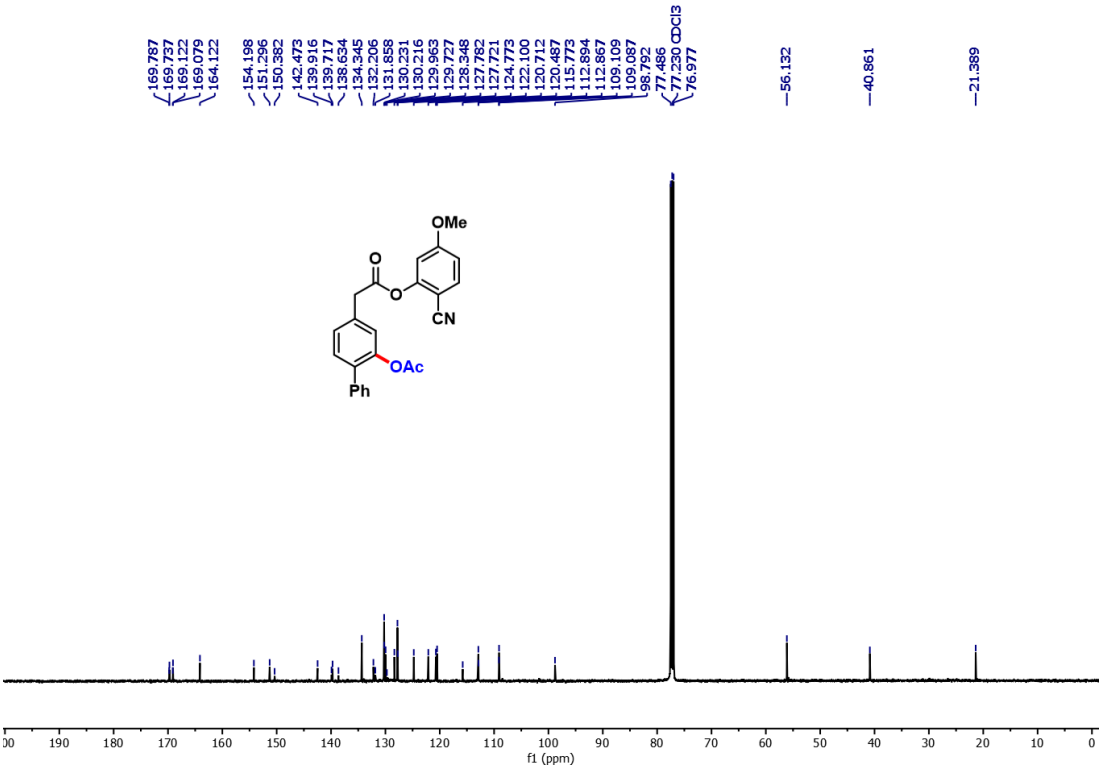
7.576
7.570
7.559
7.481
7.477
7.465
7.462
7.459
7.455
7.444
7.440
7.315
7.311
7.307
7.260 CDCl3
7.170
7.152
7.088
7.084
7.080
7.074
7.070
7.066
6.841
6.836
6.823
6.818
6.783
6.776
6.770
4.000
3.833
2.329
B (m) 7.46
E (dt) 7.08
A (m) 7.58
D (d) 7.16
G (d) 6.77
C (t) 7.31
F (dd) 6.83
I (s) 3.83
H (s) 4.00
J (s) 2.33
OMe
O
O
CN
OAc
Ph
3.26
3.33
0.89
0.83
0.81
1.14
1.10
2.11
2.99
3.00
f1 (ppm)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169.122
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164.122
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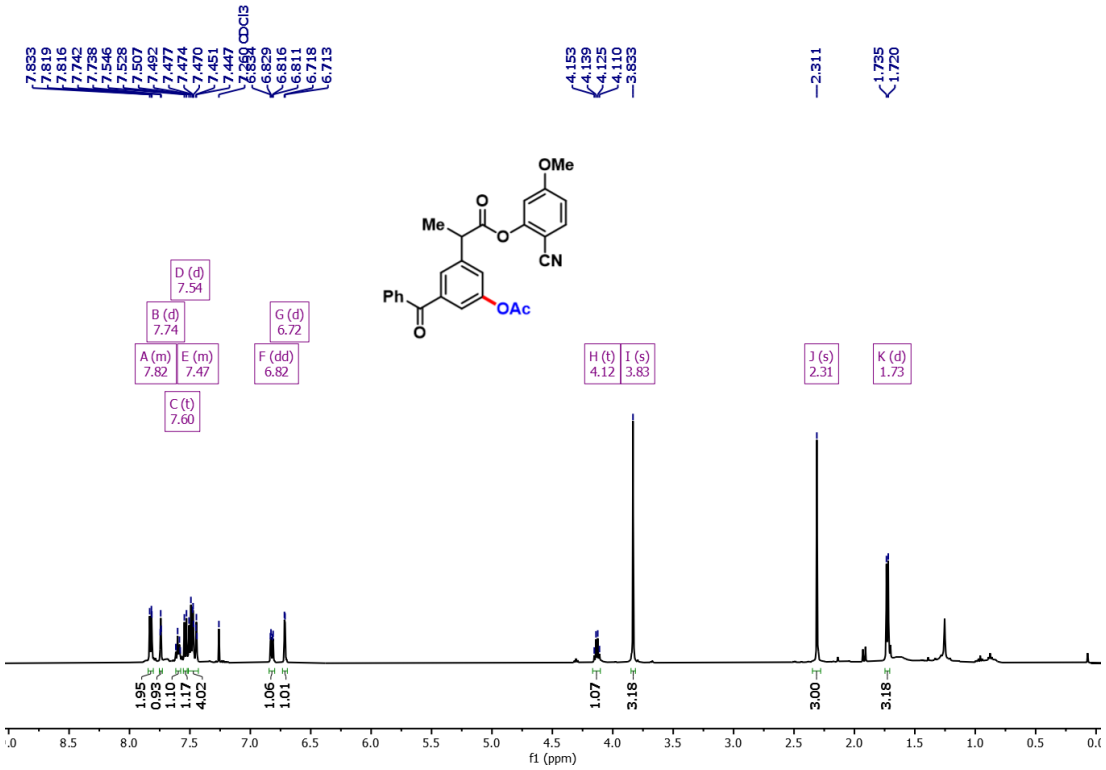
151.296
150.382
142.473
139.916
139.717
138.634
134.345
132.206
131.858
130.231
130.216
129.963
129.727
128.348
127.782
127.721
124.773
122.100
120.712
120.487
115.773
112.894
112.867
109.109
109.087
98.792
77.486
77.230 CDCl3
76.977
56.132
40.861
21.389
OMe
O
O
CN
OAc
Ph
f1 (ppm)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7.819
7.816
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7.546
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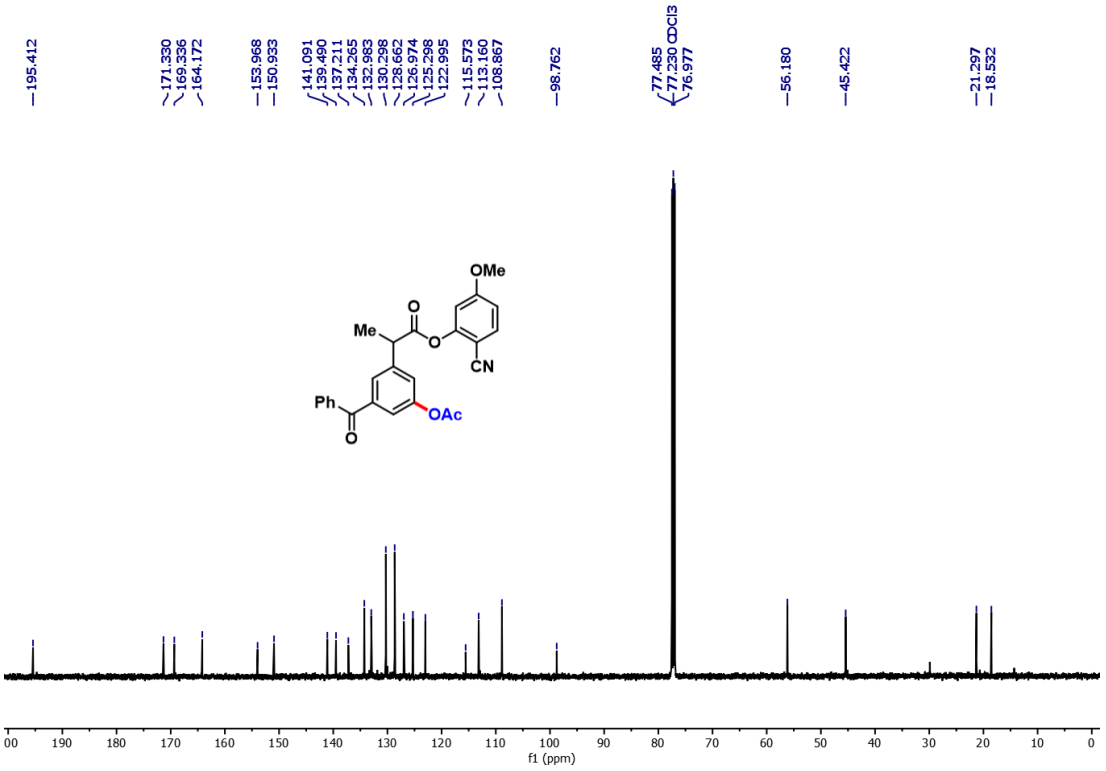
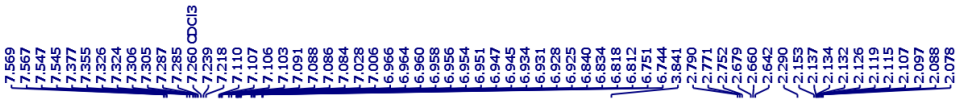
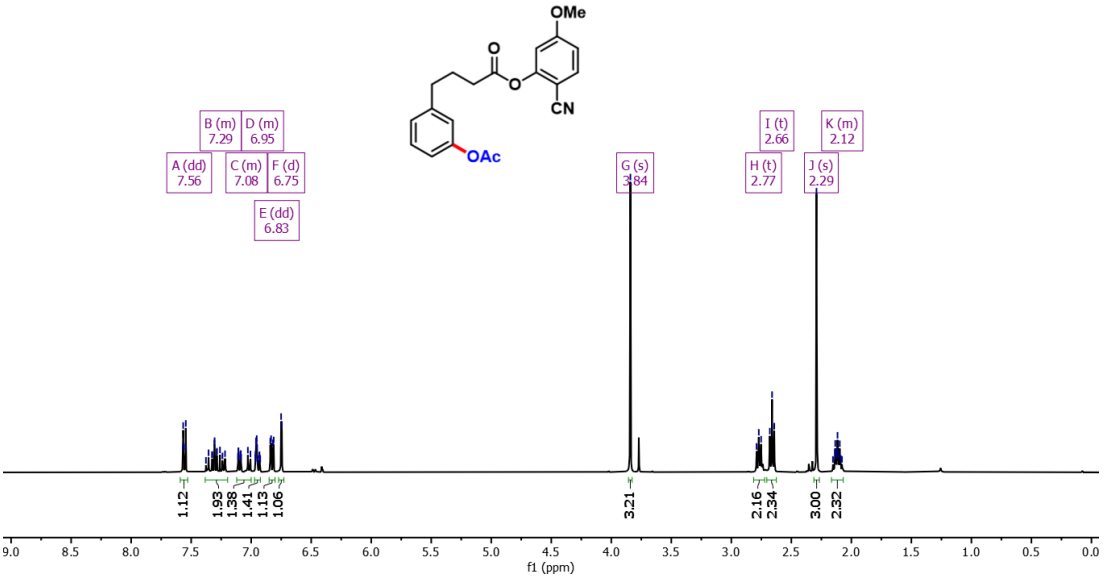
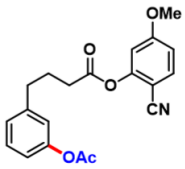
7.507
7.492
7.477
7.474
7.470
7.451
7.447
7.260 CDCl3
6.834
6.829
6.816
6.811
6.718
6.713
4.153
4.139
4.125
4.110
3.833
2.311
1.735
1.720
OMe
Me
O
O
CN
Ph
O
OAc
D (d) 7.54
B (d) 7.74
A (m) 7.82
E (m) 7.47
C (t) 7.60
G (d) 6.72
F (dd) 6.82
H (t) 4.12
I (s) 3.83
J (s) 2.31
K (d) 1.73
1.95
0.93
1.10
1.17
4.02
1.06
1.01
1.07
3.18
3.00
3.18
f1 (ppm)

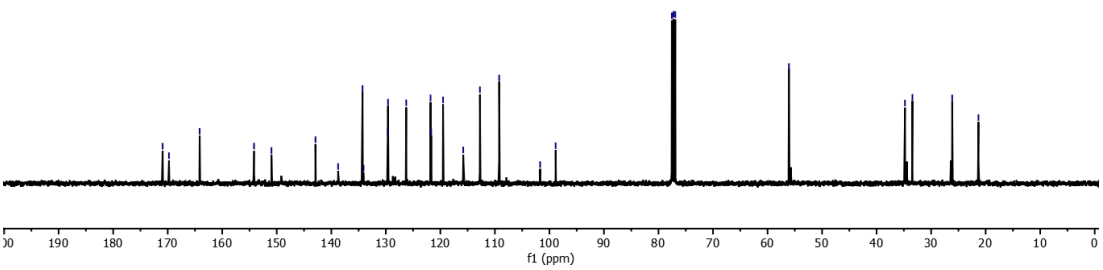

195.412
171.330
169.336
164.172
153.968
150.933
141.091
139.490
137.211
134.265
132.983
130.298
128.662
126.974
125.298
122.995
115.573
113.160
108.867
98.762
77.485
77.230 CDCl3
76.977
56.180
45.422
21.297
18.532
OMe
Me
O
O
CN
Ph
O
OAc
f1 (ppm)

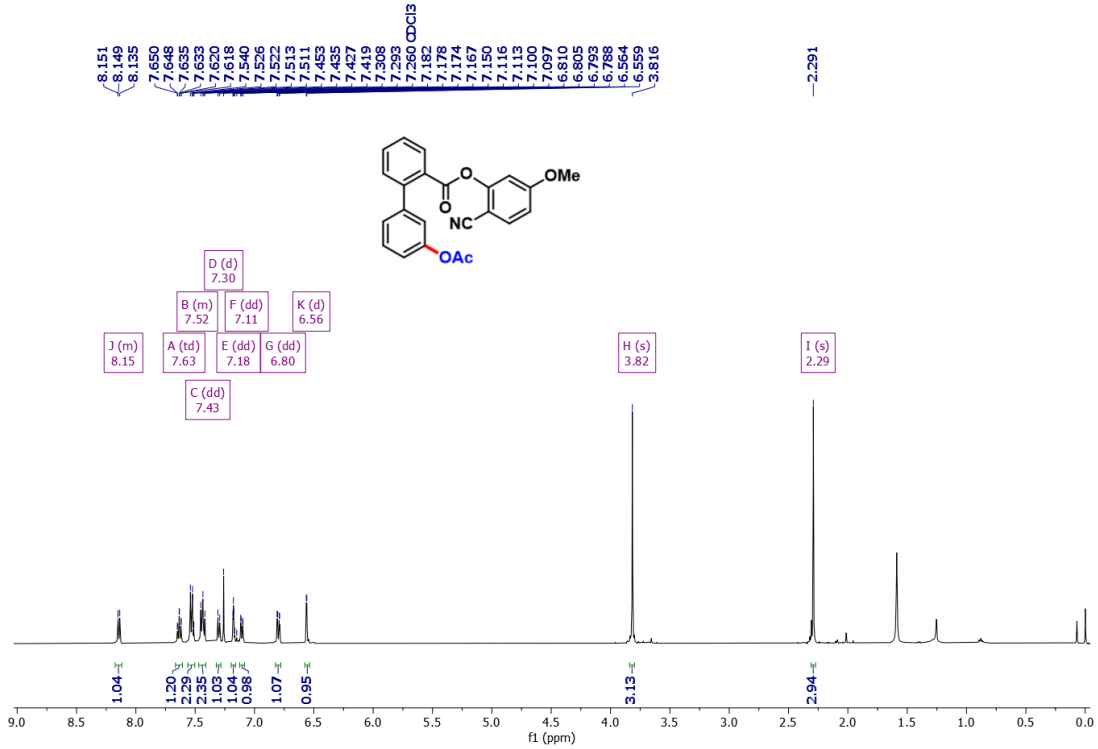

7.569
7.567
7.547
7.545
7.377
7.355
7.326
7.324
7.306
7.305
7.287
7.285
CDCl3
7.260
7.239
7.218
7.110
7.107
7.106
7.103
7.091
7.088
7.086
7.084
7.028
7.006
6.966
6.964
6.960
6.958
6.956
6.954
6.951
6.947
6.945
6.934
6.931
6.928
6.925
6.840
6.834
6.818
6.812
6.751
6.744
3.841
2.790
2.771
2.752
2.679
2.660
2.642
2.290
2.153
2.137
2.134
2.132
2.126
2.119
2.115
2.107
2.097
2.088
2.078

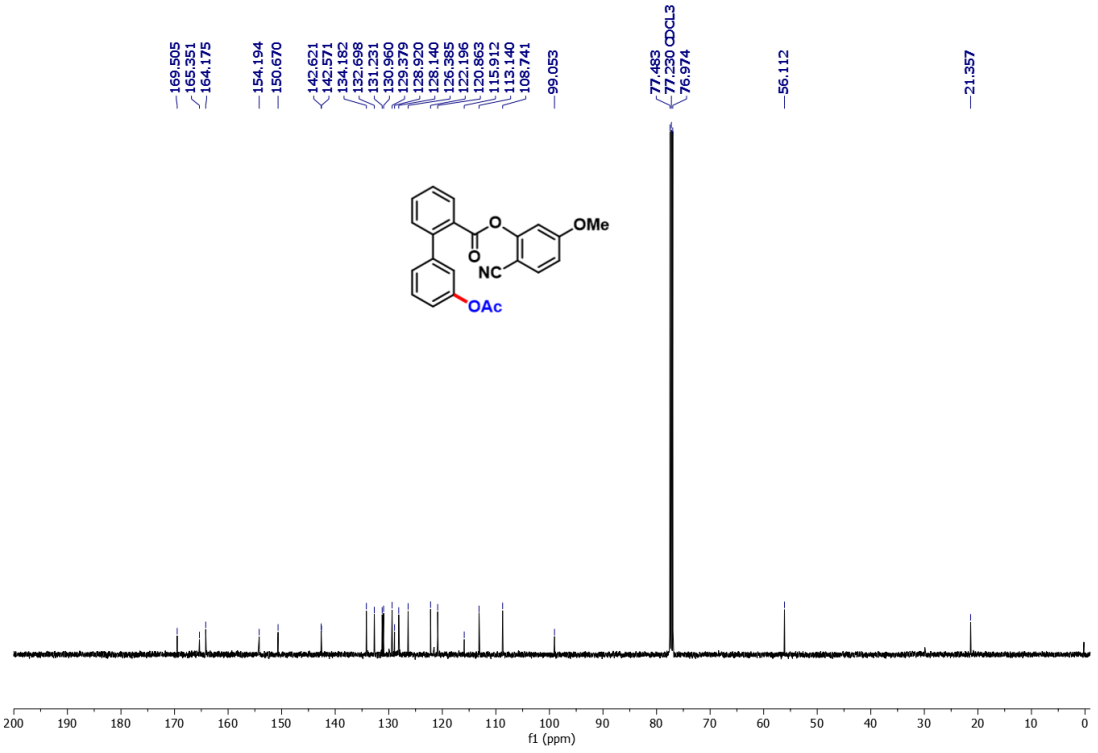

OMe
O
O
CN
OAc
B (m) 7.29
D (m) 6.95
A (dd) 7.56
C (m) 7.08
F (d) 6.75
E (dd) 6.83
G (s) 3.84
I (t) 2.66
K (m) 2.12
H (t) 2.77
J (s) 2.29
1.12
1.93
1.38
1.41
1.13
1.06
3.21
2.16
2.34
3.00
2.32
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

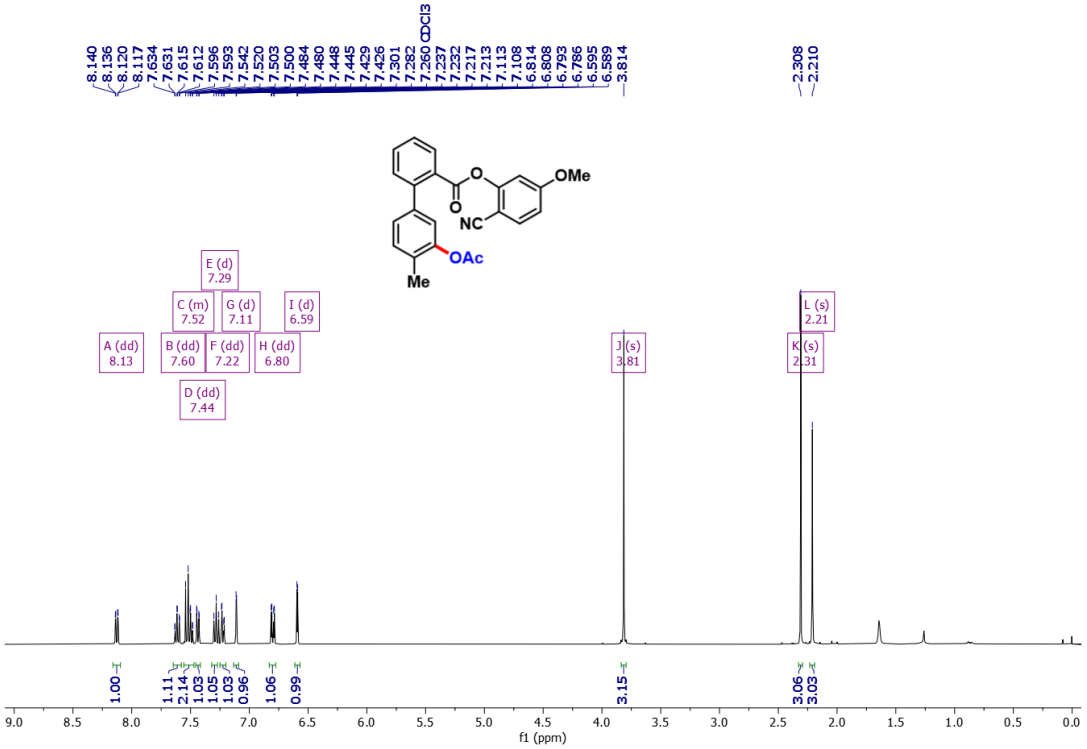

170.927
169.770
164.138
154.164
150.974
142.903
138.752
134.272
134.081
129.652
129.601
126.258
121.799
121.677
119.504
115.902
112.744
109.212
101.706
98.862
77.550
77.230
CDCl3
76.914
56.075
34.795
33.432
26.135
21.317

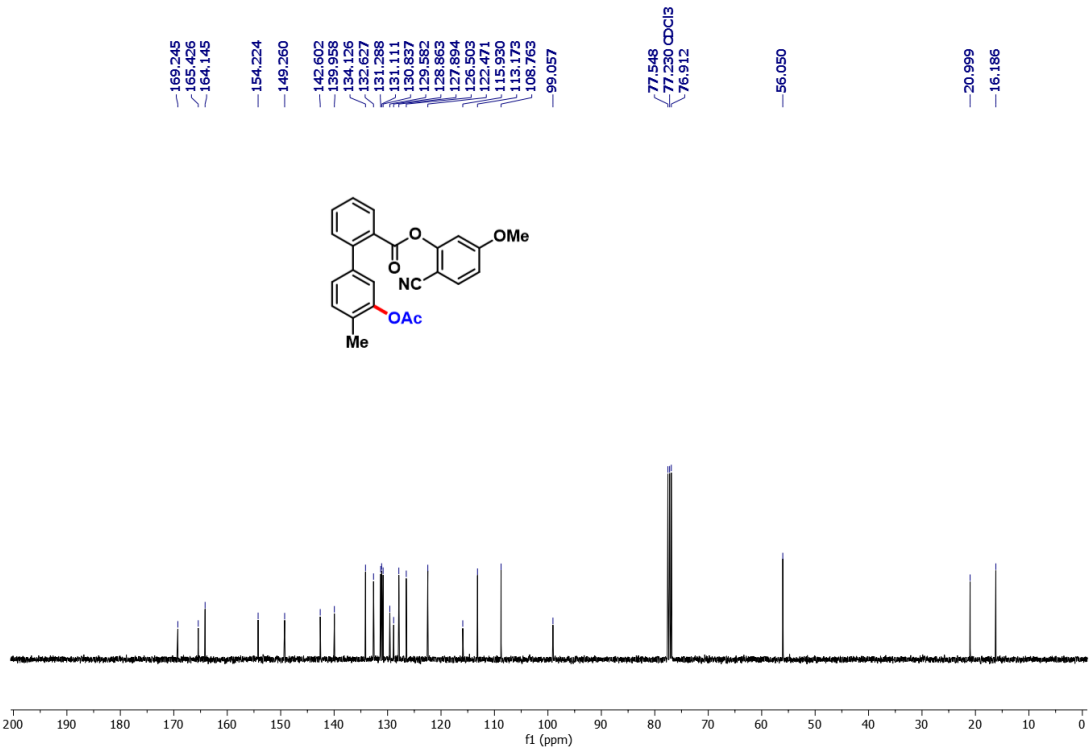

OMe
O
O
CN
OAc

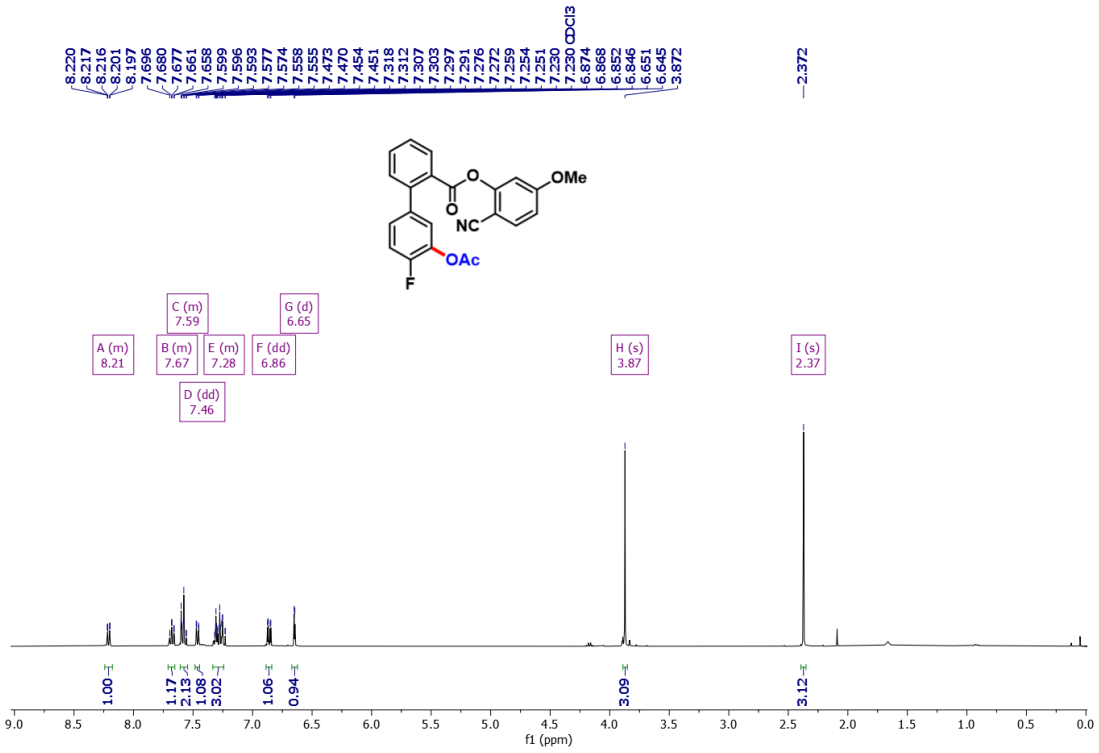

190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

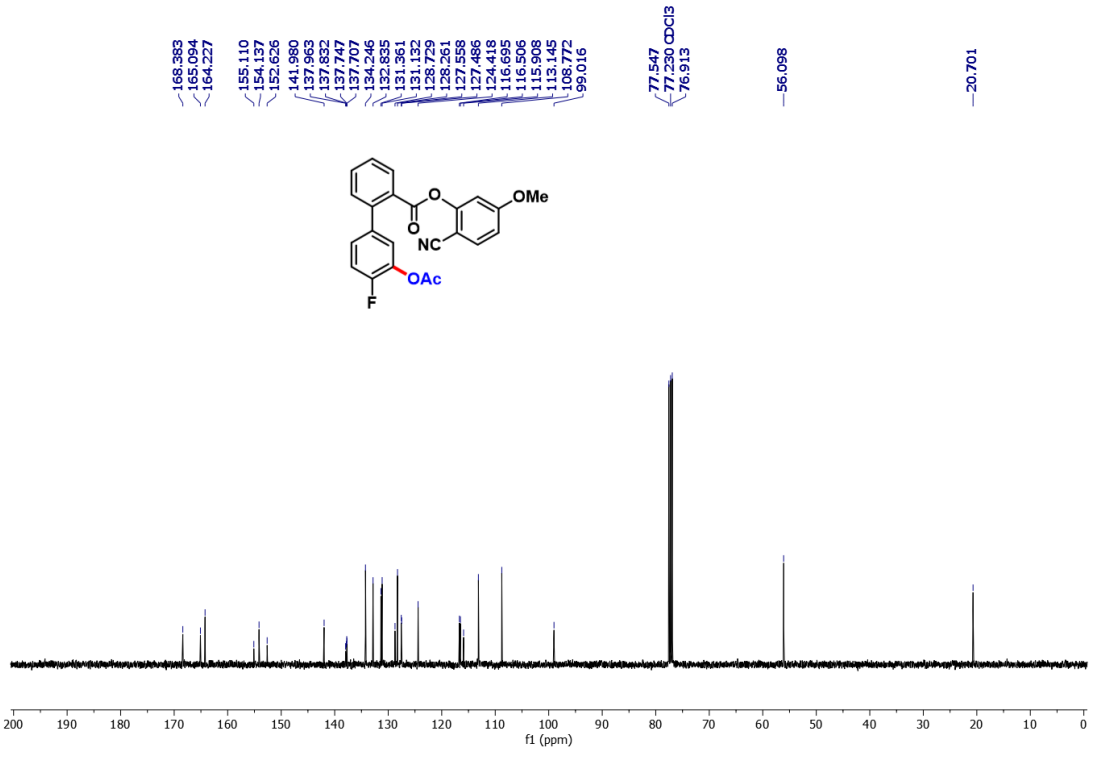

8.151
8.149
8.135
7.650
7.648
7.635
7.633
7.620
7.618
7.540
7.526
7.522
7.513
7.511
7.453
7.435
7.427
7.419
7.308
7.293
7.260 CDCl3
7.182
7.178
7.174
7.167
7.150
7.116
7.113
7.100
7.097
6.810
6.805
6.793
6.788
6.564
6.559
3.816
2.291
OMe
NC
OAc
D (d) 7.30
B (m) 7.52
F (dd) 7.11
K (d) 6.56
J (m) 8.15
A (td) 7.63
E (dd) 7.18
G (dd) 6.80
C (dd) 7.43
H (s) 3.82
I (s) 2.29
1.04
1.20
2.29
2.35
1.03
1.04
0.98
1.07
0.95
3.13
2.94
f1 (ppm)

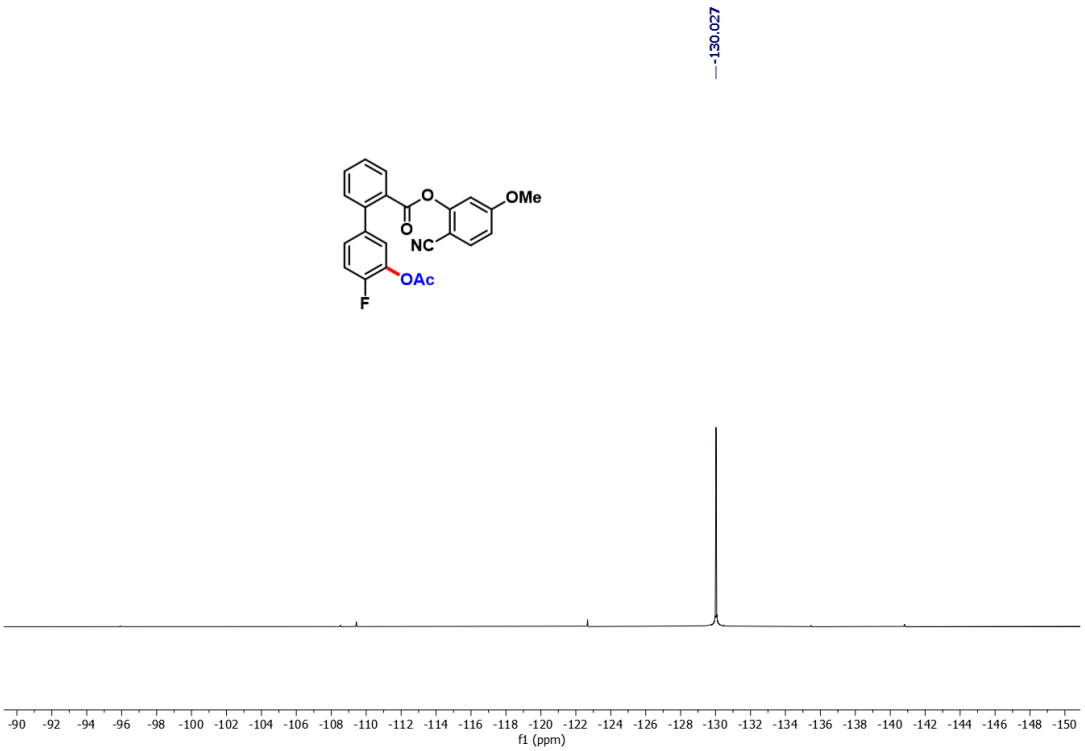

169.505
165.351
164.175
154.194
150.670
142.621
142.571
134.182
132.698
131.231
130.960
129.379
128.920
128.140
126.385
122.196
120.863
115.912
113.140
108.741
99.053
77.483
77.230 CDCL3
76.974
56.112
21.357
OMe
NC
OAc
f1 (ppm)

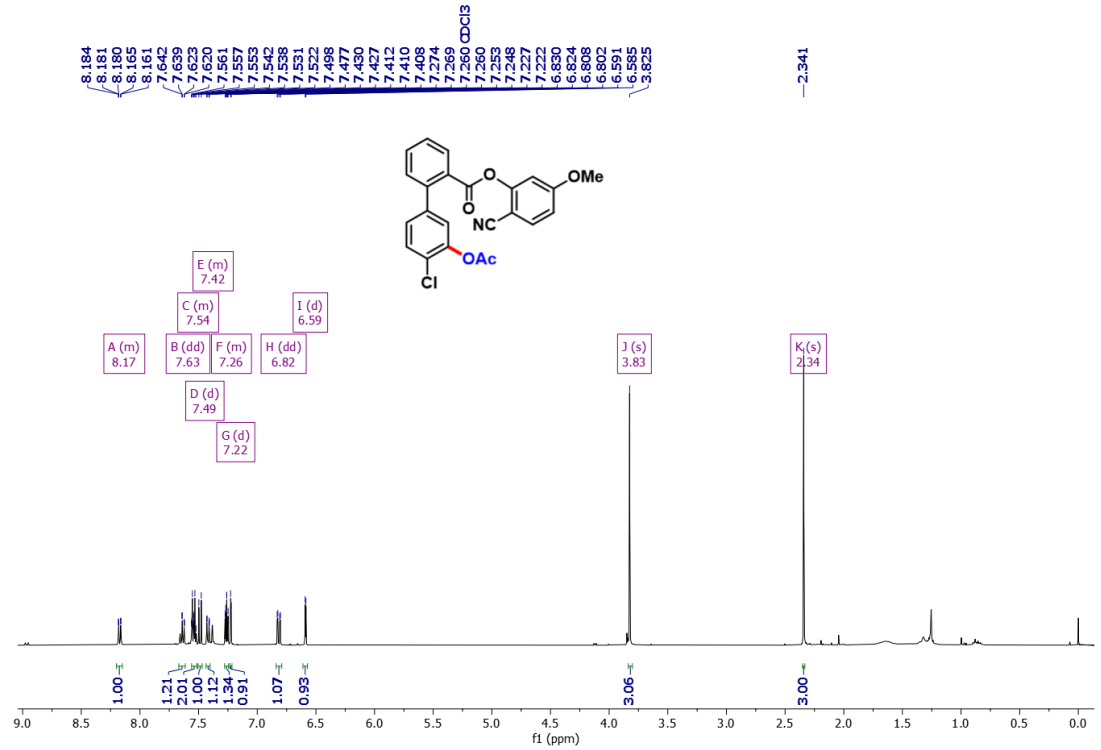

8.140
8.136
8.120
8.117
7.634
7.631
7.615
7.612
7.596
7.593
7.542
7.520
7.503
7.500
7.484
7.480
7.448
7.445
7.429
7.426
7.301
7.282
CDCl3
7.260
7.237
7.232
7.217
7.213
7.113
7.108
6.814
6.808
6.793
6.786
6.595
6.589
3.814
2.308
2.210
OMe
O
O
NC
OAc
Me
E (d) 7.29
C (m) 7.52
G (d) 7.11
I (d) 6.59
A (dd) 8.13
B (dd) 7.60
F (dd) 7.22
H (dd) 6.80
D (dd) 7.44
J (s) 3.81
L (s) 2.21
K (s) 2.31
1.00
1.11
2.14
1.03
1.05
1.03
0.96
1.06
0.99
3.15
3.06
3.03
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

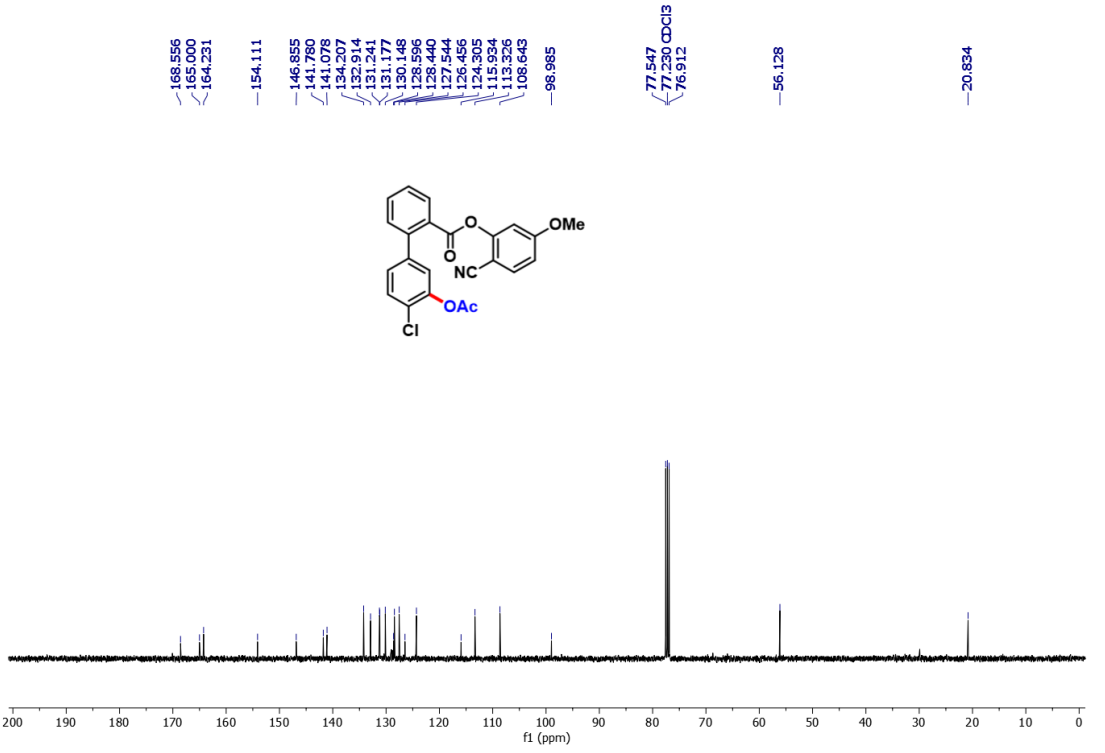

169.245
165.426
164.145
154.224
149.260
142.602
139.958
134.126
132.627
131.288
131.111
130.837
129.582
128.863
127.894
126.503
122.471
115.930
113.173
108.763
99.057
77.548
CDCl3
77.230
76.912
56.050
20.999
16.186
OMe
O
O
NC
OAc
Me
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

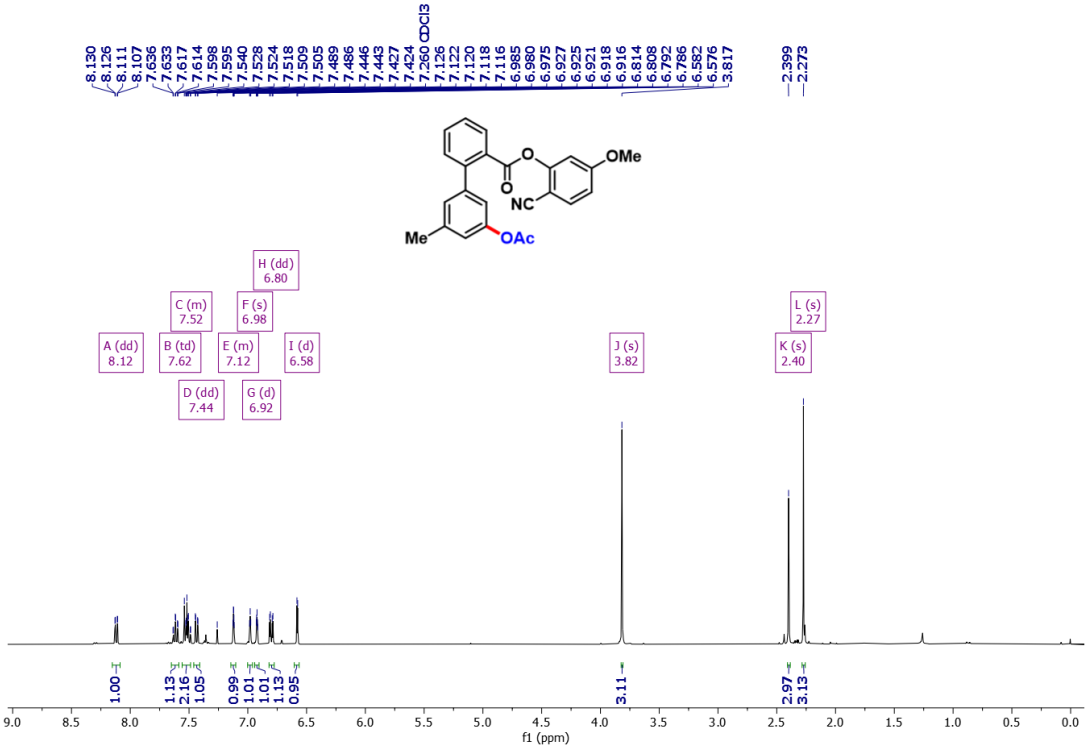

8.220
8.217
8.216
8.201
8.197
7.696
7.680
7.677
7.661
7.658
7.599
7.596
7.593
7.577
7.574
7.558
7.555
7.473
7.470
7.454
7.451
7.318
7.312
7.307
7.303
7.297
7.291
7.276
7.272
7.259
7.254
7.251
7.230 CDCl3
6.874
6.868
6.852
6.846
6.651
6.645
3.872
2.372
OMe
O
O
NC
OAc
F
A (m) 8.21
B (m) 7.67
C (m) 7.59
D (dd) 7.46
E (m) 7.28
F (dd) 6.86
G (d) 6.65
H (s) 3.87
I (s) 2.37
1.00
1.17
2.13
1.08
3.02
1.06
0.94
3.09
3.12
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

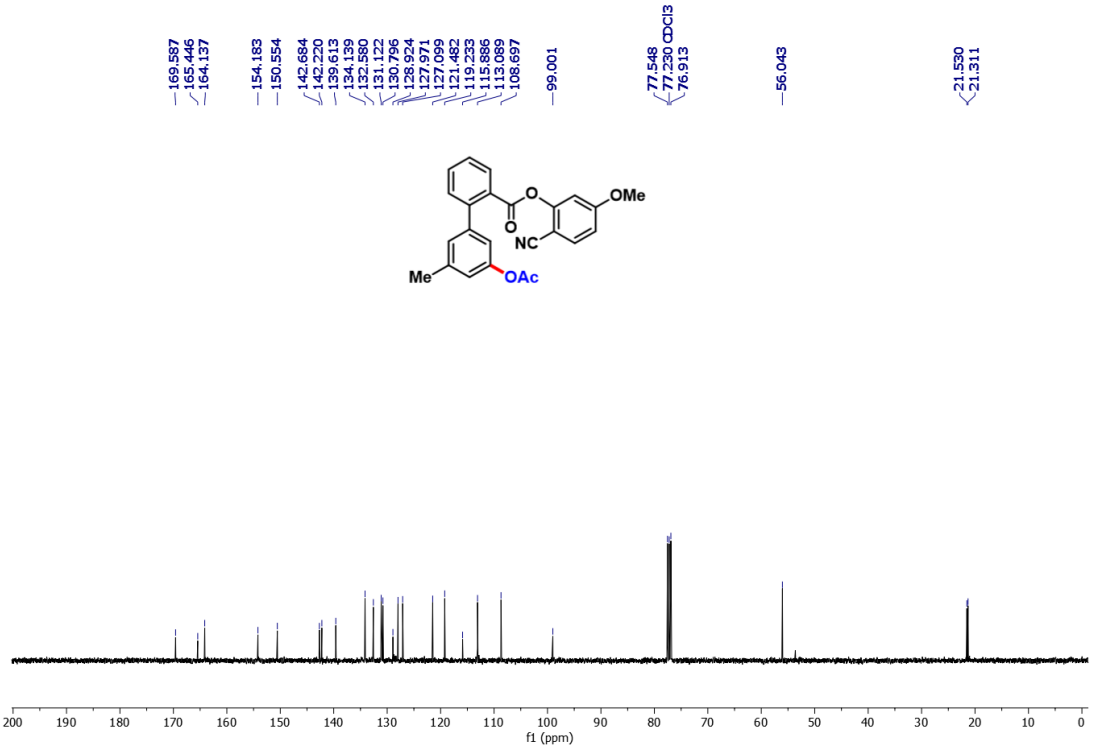

168.383
165.094
164.227
155.110
154.137
152.626
141.980
137.963
137.832
137.747
137.707
134.246
132.835
131.361
131.132
128.729
128.261
127.558
127.486
124.418
116.695
116.506
115.908
113.145
108.772
99.016
77.547
77.230 CDCl3
76.913
56.098
20.701
OMe
O
O
NC
OAc
F
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


-130.027
OMe
NC
OAc
F
-90 -92 -94 -96 -98 -100 -102 -104 -106 -108 -110 -112 -114 -116 -118 -120 -122 -124 -126 -128 -130 -132 -134 -136 -138 -140 -142 -144 -146 -148 -150
f1 (ppm)

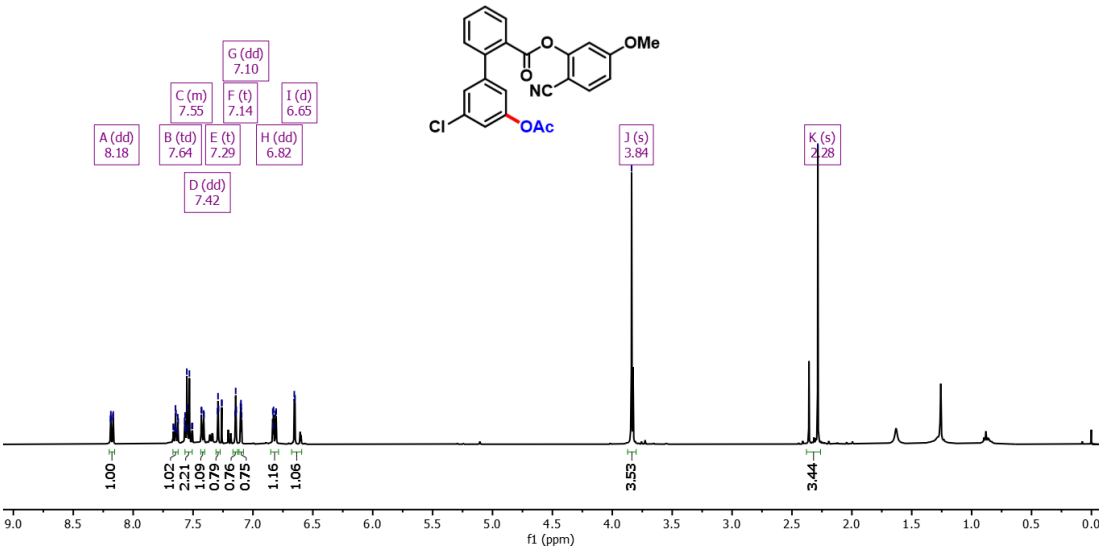

8.184
8.181
8.180
8.165
8.161
7.642
7.639
7.623
7.620
7.561
7.557
7.553
7.542
7.538
7.531
7.522
7.498
7.477
7.430
7.427
7.412
7.410
7.408
7.274
7.269
CDCl3
7.260
7.260
7.253
7.248
7.227
7.222
6.830
6.824
6.808
6.802
6.591
6.585
3.825
2.341
OMe
O
O
NC
OAc
Cl
E (m) 7.42
C (m) 7.54
I (d) 6.59
A (m) 8.17
B (dd) 7.63
F (m) 7.26
H (dd) 6.82
J (s) 3.83
K (s) 2.34
D (d) 7.49
G (d) 7.22
1.00
1.21
2.01
1.00
1.12
1.34
0.91
1.07
0.93
3.06
3.00
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


168.556
165.000
164.231
154.111
146.855
141.780
141.078
134.207
132.914
131.241
131.177
130.148
128.596
128.440
127.544
126.456
124.305
115.934
113.326
108.643
98.985
77.547
77.230
CDCl3
76.912
56.128
20.834
OMe
O
O
NC
OAc
Cl
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

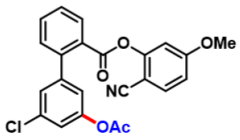

8.130
8.126
8.111
8.107
7.636
7.633
7.617
7.614
7.598
7.595
7.540
7.528
7.524
7.518
7.509
7.505
7.489
7.486
7.446
7.443
7.427
7.424
CDCl3
7.260
7.126
7.122
7.120
7.118
7.116
6.985
6.980
6.975
6.927
6.925
6.921
6.918
6.916
6.814
6.808
6.792
6.786
6.582
6.576
3.817
2.399
2.273
OMe
O
O
NC
Me
OAc
H (dd) 6.80
C (m) 7.52
F (s) 6.98
L (s) 2.27
A (dd) 8.12
B (td) 7.62
E (m) 7.12
I (d) 6.58
J (s) 3.82
K (s) 2.40
D (dd) 7.44
G (d) 6.92
1.00
1.13
2.16
1.05
0.99
1.01
1.01
1.13
0.95
3.11
2.97
3.13
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

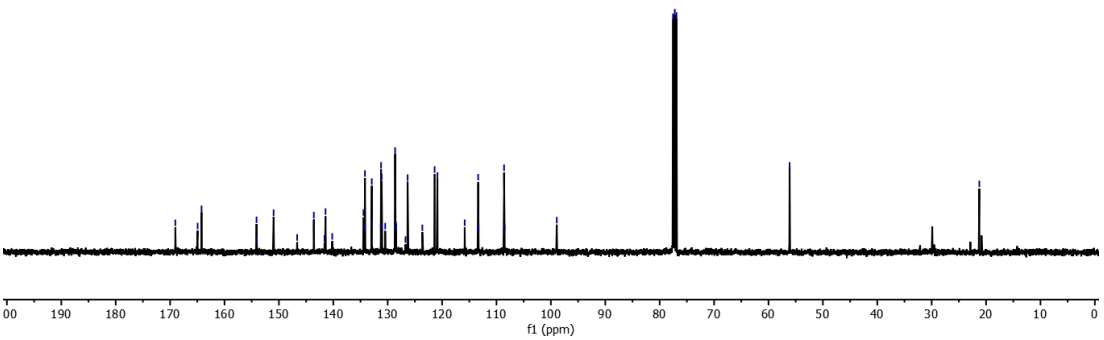

169.587
165.446
164.137
154.183
150.554
142.684
142.220
139.613
134.139
132.580
131.122
130.796
128.924
127.971
127.099
121.482
119.233
115.886
113.089
108.697
99.001
77.548
CDCl3
77.230
76.913
56.043
21.530
21.311
OMe
O
O
NC
Me
OAc
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

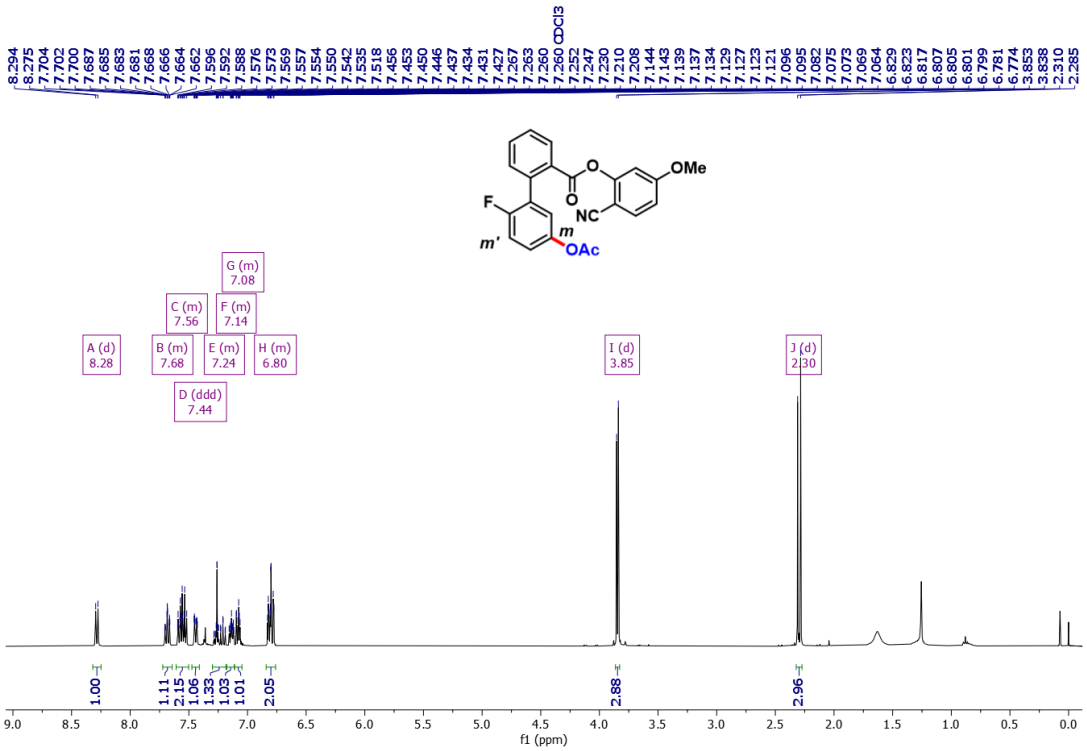

8.189
8.186
8.185
8.170
8.166
7.665
7.662
7.651
7.646
7.643
7.632
7.628
7.624
7.570
7.567
7.562
7.552
7.547
7.543
7.530
7.510
7.505
7.431
7.428
7.412
7.411
7.409
7.296
7.292
7.287
7.260
CDCl3
7.260
7.149
7.144
7.139
7.104
7.100
7.098
7.095
6.834
6.832
6.828
6.812
6.806
6.655
6.649
3.839
2.284


A (dd) 8.18
B (td) 7.64
C (m) 7.55
D (dd) 7.42
E (t) 7.29
F (t) 7.14
G (dd) 7.10
H (dd) 6.82
I (d) 6.65
J (s) 3.84
K (s) 2.28
OMe
O
O
NC
Cl
OAc
1.00
1.02
2.21
1.09
0.79
0.76
0.75
1.16
1.06
3.53
3.44
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


169.040
164.937
164.217
154.143
154.112
150.978
146.644
143.574
141.612
141.427
140.197
134.449
134.239
134.179
132.950
132.925
131.265
131.219
131.101
130.457
128.633
128.474
128.452
126.729
126.337
123.631
121.370
120.857
115.847
113.365
113.292
108.606
108.499
98.916
77.548
77.230
CDCl3
76.913
56.118
21.246


OMe
O
O
NC
Cl
OAc


00
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


8.294
8.275
7.704
7.702
7.700
7.687
7.685
7.683
7.681
7.668
7.666
7.664
7.662
7.596
7.592
7.588
7.576
7.573
7.569
7.557
7.554
7.550
7.542
7.535
7.518
7.456
7.453
7.450
7.446
7.437
7.434
7.431
7.427
7.267
7.263
7.260
CDCl3
7.260
7.252
7.247
7.230
7.210
7.208
7.144
7.143
7.139
7.137
7.134
7.129
7.127
7.123
7.121
7.096
7.095
7.082
7.075
7.073
7.069
7.064
6.829
6.823
6.817
6.807
6.805
6.801
6.799
6.781
6.774
3.853
3.838
2.310
2.285
OMe
O
O
NC
F
m'
m
OAc
A (d) 8.28
B (m) 7.68
C (m) 7.56
D (ddd) 7.44
E (m) 7.24
F (m) 7.14
G (m) 7.08
H (m) 6.80
I (d) 3.85
J (d) 2.30
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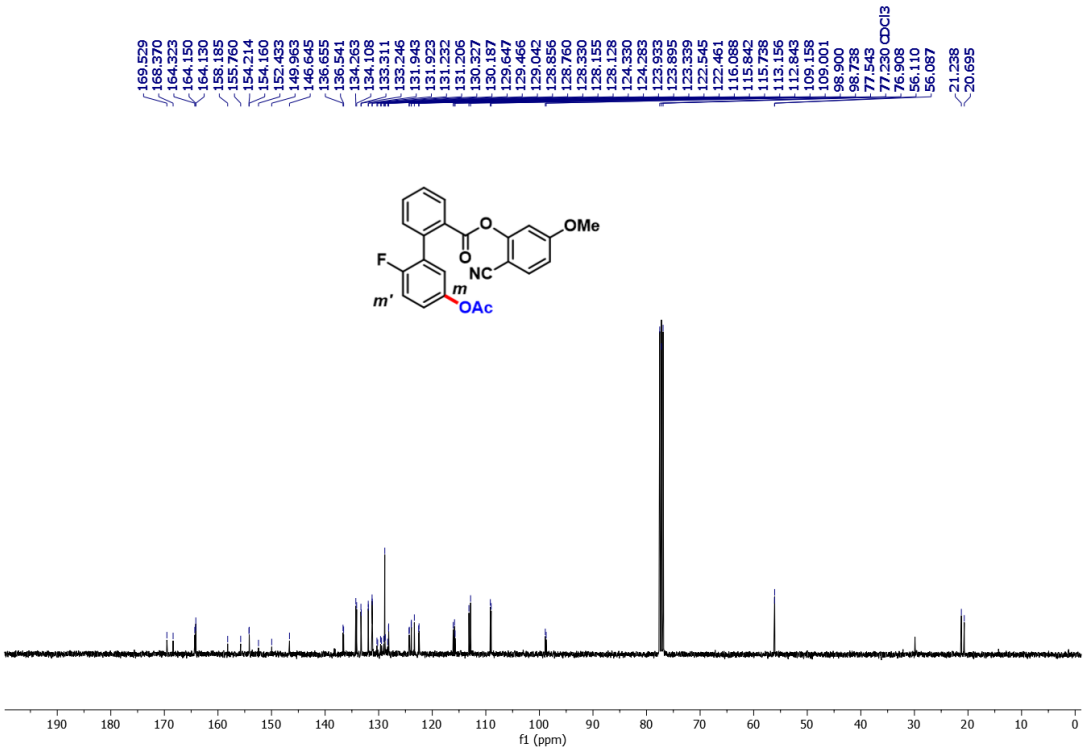
1.11
2.15
1.06
1.33
1.03
1.01
2.05
2.88
2.96
f1 (ppm)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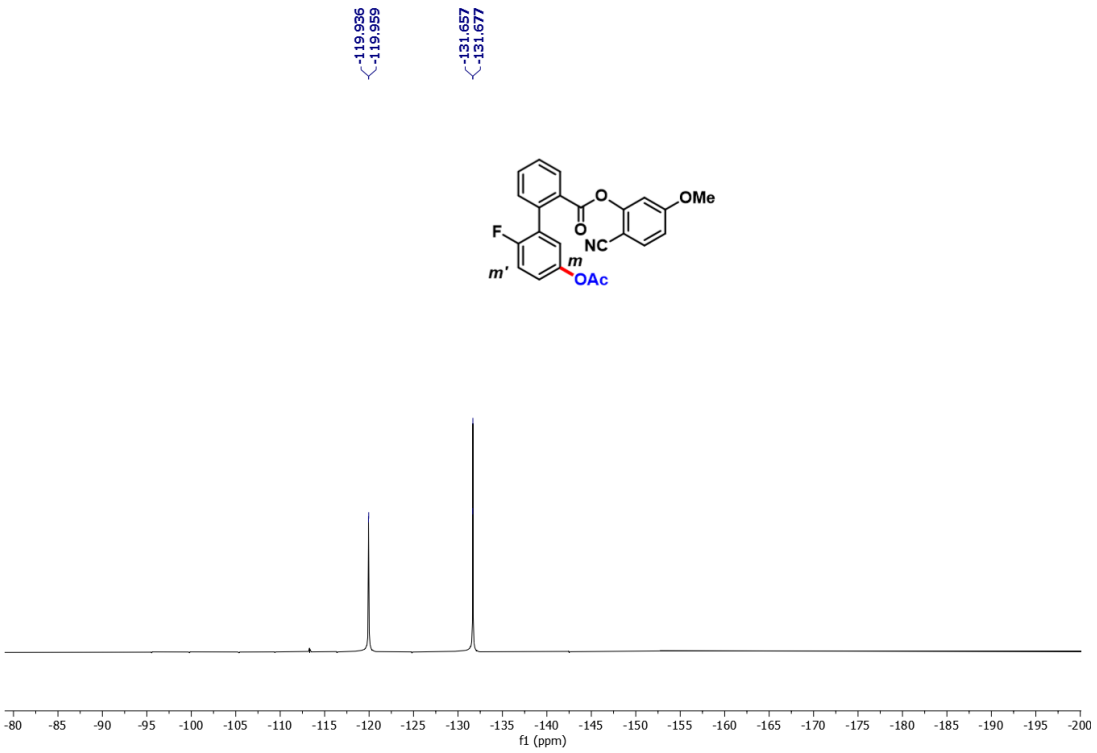
168.370
164.323
164.150
164.130
158.185
155.760
154.214
154.160
152.433
149.963
146.645
136.655
136.541
134.263
134.108
133.311
133.246
131.943
131.923
131.232
131.206
130.327
130.187
129.647
129.466
129.042
128.856
128.760
128.330
128.155
128.128
124.330
124.283
123.933
123.895
123.339
122.545
122.461
116.088
115.842
115.738
113.156
112.843
109.158
109.001
98.900
98.738
77.543
CDCl3
77.230
76.908
56.110
56.087
21.238
20.695
OMe
O
O
NC
F
m'
m
OAc
f1 (ppm)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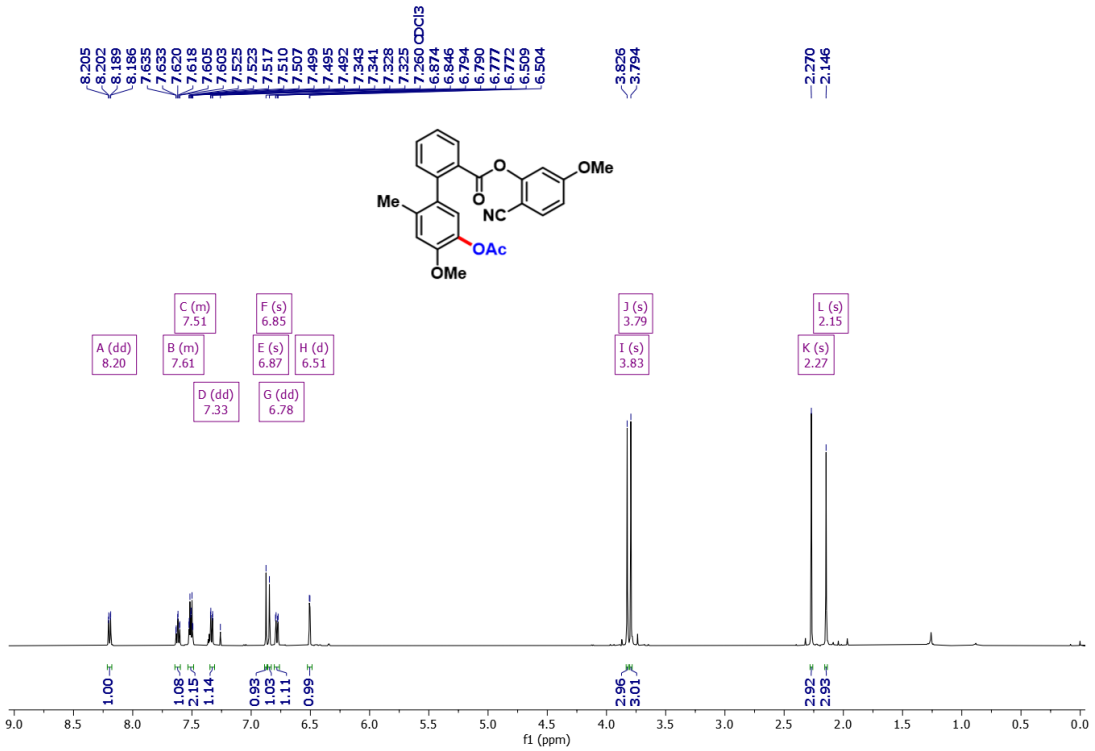
-119.959
-131.657
-131.677
F
m'
m
OAc
O
O
NC
OMe
-80 -85 -90 -95 -100 -105 -110 -115 -120 -125 -130 -135 -140 -145 -150 -155 -160 -165 -170 -175 -180 -185 -190 -195 -200
f1 (ppm)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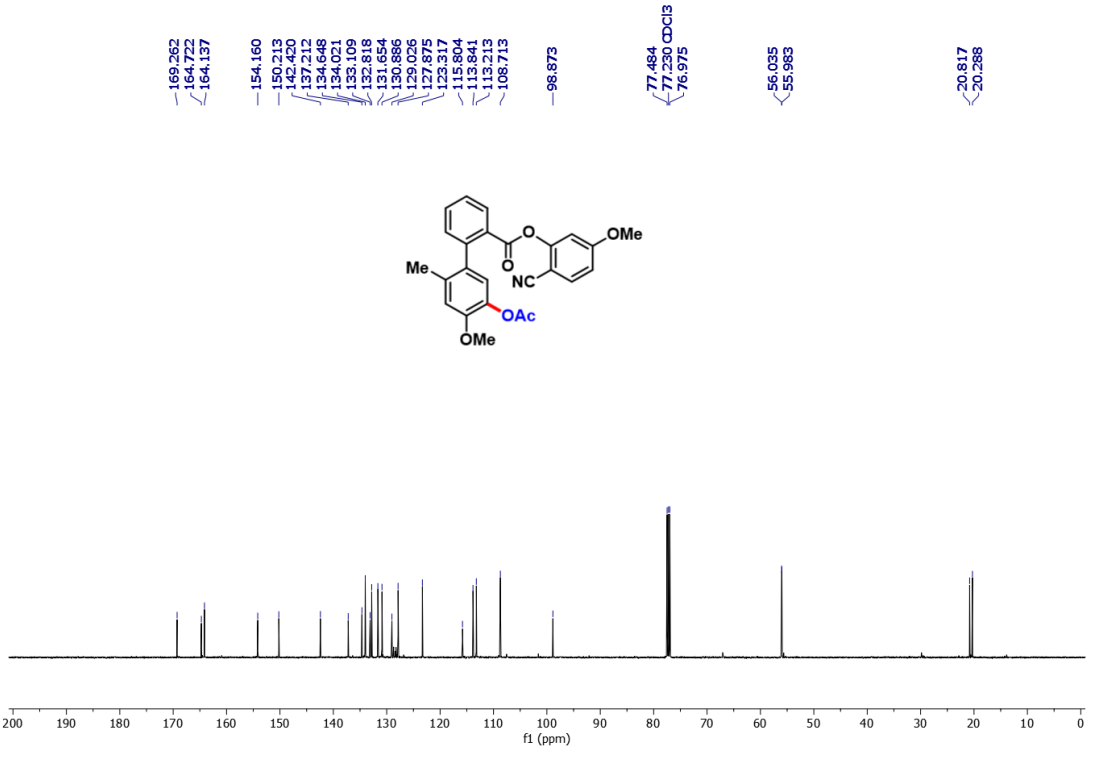
7.633
7.620
7.618
7.605
7.603
7.525
7.523
7.517
7.510
7.507
7.499
7.495
7.492
7.343
7.341
7.328
7.325
7.260 CDCl3
6.874
6.846
6.794
6.790
6.777
6.772
6.509
6.504
3.826
3.794
2.270
2.146
Me
O
O
NC
OMe
OAc
OMe
A (dd) 8.20
B (m) 7.61
C (m) 7.51
D (dd) 7.33
E (s) 6.87
F (s) 6.85
G (dd) 6.78
H (d) 6.51
I (s) 3.83
J (s) 3.79
K (s) 2.27
L (s) 2.15
1.00
1.08
2.15
1.14
0.93
1.03
1.11
0.99
2.96
3.01
2.92
2.93
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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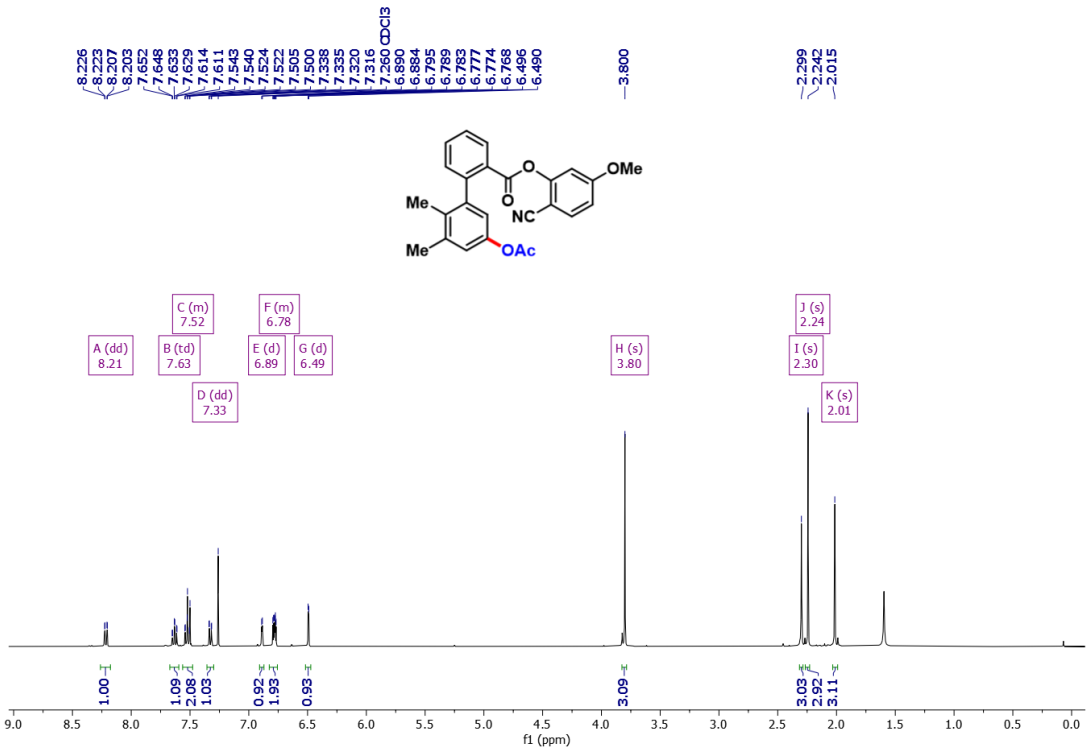
164.722
164.137
154.160
150.213
142.420
137.212
134.648
134.021
133.109
132.818
131.654
130.886
129.026
127.875
123.317
115.804
113.841
113.213
108.713
98.873
77.484
77.230 CDCl3
76.975
56.035
55.983
20.817
20.288
Me
O
O
NC
OMe
OAc
OMe
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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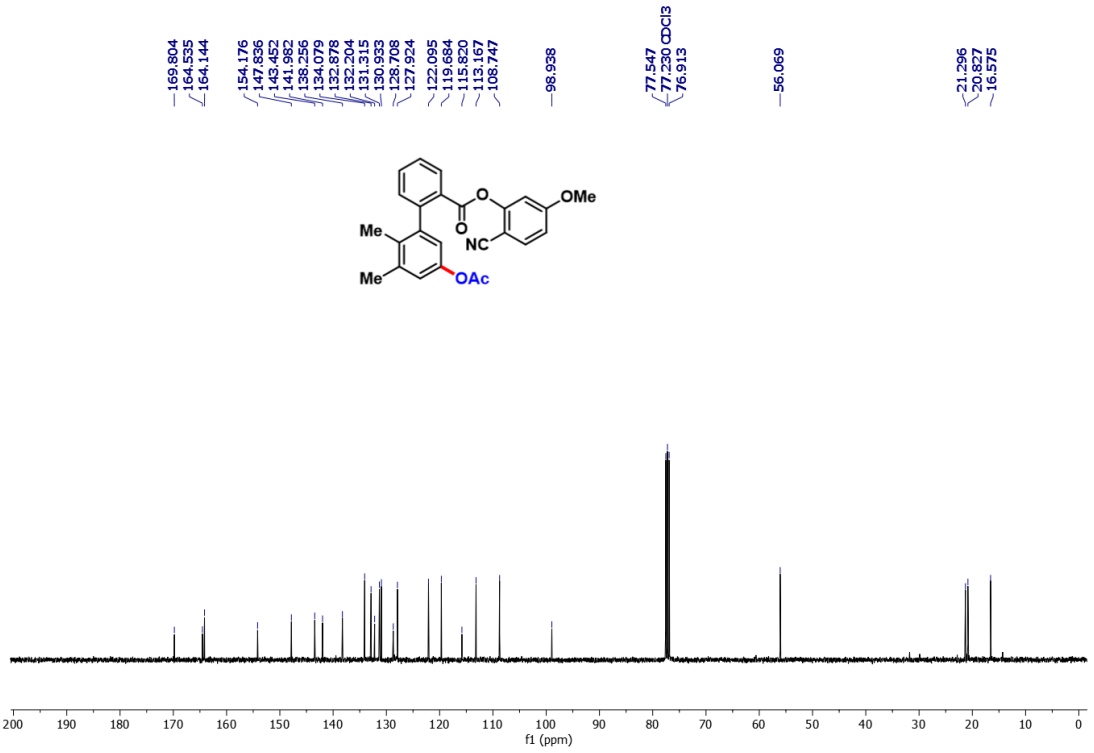
8.223
8.207
8.203
7.652
7.648
7.633
7.629
7.614
7.611
7.543
7.540
7.524
7.522
7.505
7.500
7.338
7.335
7.320
7.316
CDCl3
7.260
6.890
6.884
6.795
6.789
6.783
6.777
6.774
6.768
6.496
6.490
3.800
2.299
2.242
2.015
O
OMe
O
NC
Me
Me
OAc
C (m) 7.52
F (m) 6.78
J (s) 2.24
A (dd) 8.21
B (td) 7.63
E (d) 6.89
G (d) 6.49
H (s) 3.80
I (s) 2.30
D (dd) 7.33
K (s) 2.01
1.00
1.09
2.08
1.03
0.92
1.93
0.93
3.09
3.03
2.92
3.11
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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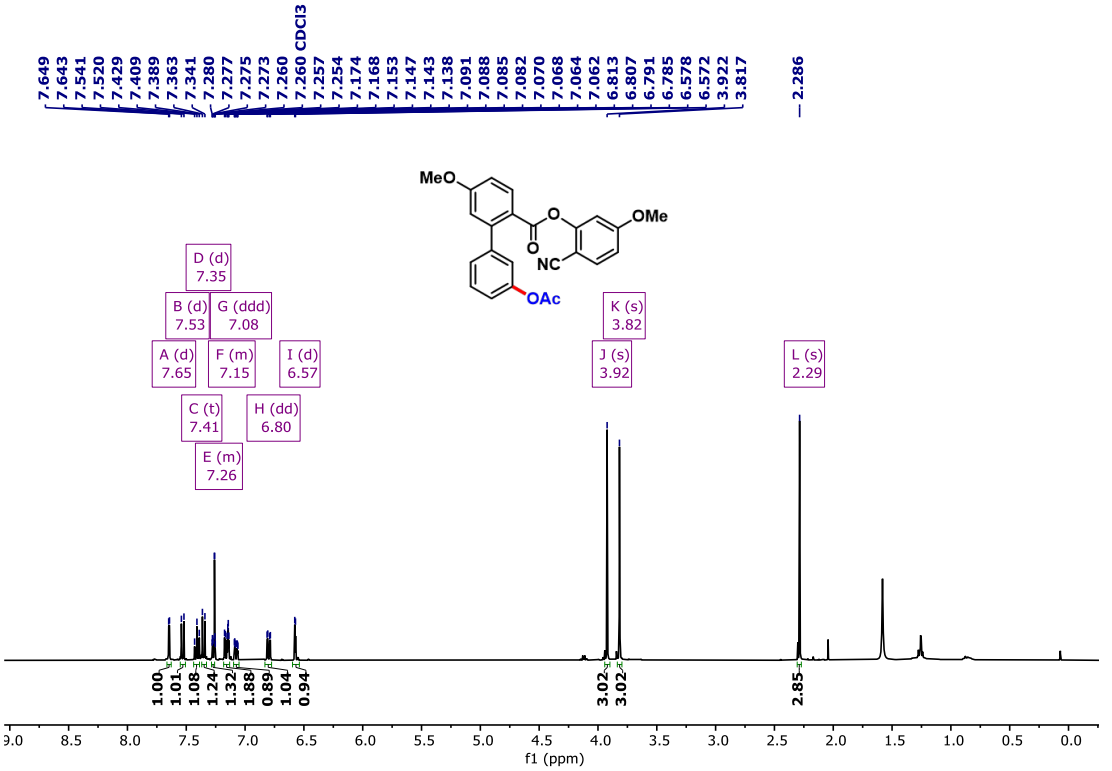
164.144
154.176
147.836
143.452
141.982
138.256
134.079
132.878
132.204
131.315
130.933
128.708
127.924
122.095
119.684
115.820
113.167
108.747
98.938
77.547
77.230
CDCl3
76.913
56.069
21.296
20.827
16.575
O
OMe
O
NC
Me
Me
OAc
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)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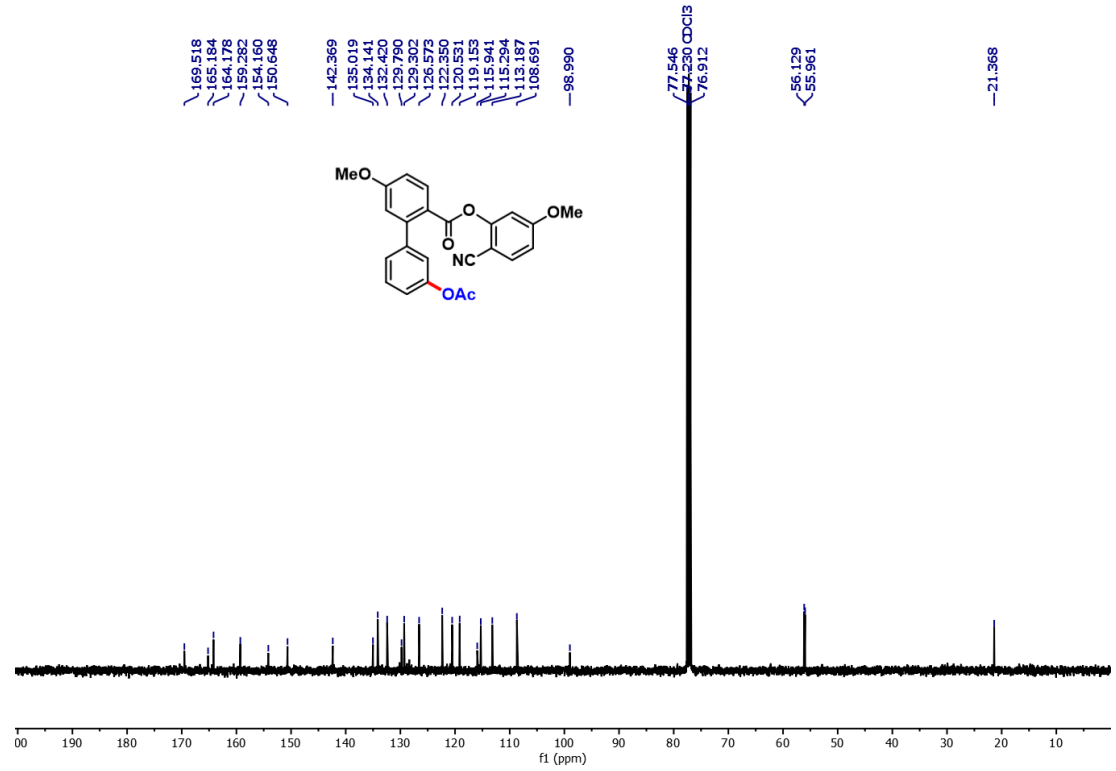
7.643
7.541
7.520
7.429
7.409
7.389
7.363
7.341
7.280
7.277
7.275
7.273
7.260 CDCl3
7.257
7.254
7.174
7.168
7.153
7.147
7.143
7.138
7.091
7.088
7.085
7.082
7.070
7.068
7.064
7.062
6.813
6.807
6.791
6.785
6.578
6.572
3.922
3.817
2.286
MeO
OMe
O
O
NC
OAc
D (d) 7.35
B (d) 7.53
G (ddd) 7.08
A (d) 7.65
F (m) 7.15
I (d) 6.57
C (t) 7.41
H (dd) 6.80
E (m) 7.26
K (s) 3.82
J (s) 3.92
L (s) 2.29
1.00
1.01
1.08
1.24
1.32
1.88
0.89
1.04
0.94
3.02
3.02
2.85
f1 (ppm)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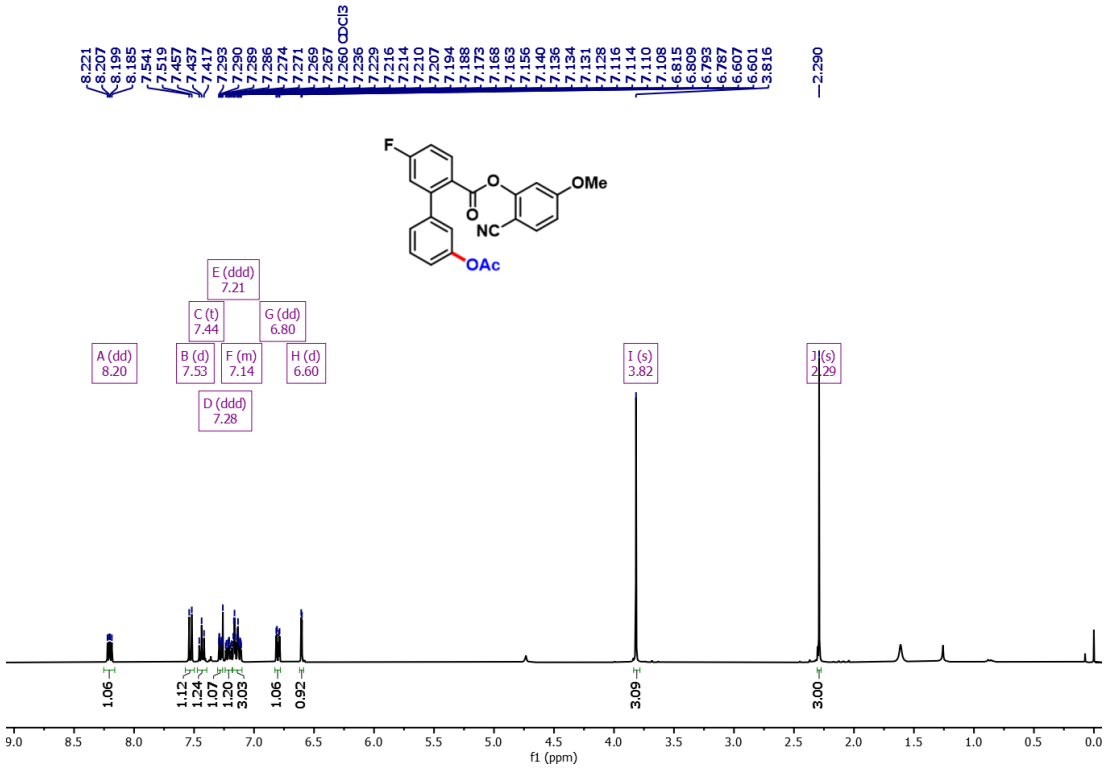
159.282
154.160
150.648
142.369
135.019
134.141
132.420
129.790
129.302
126.573
122.350
120.531
119.153
115.941
115.294
113.187
108.691
98.990
77.546
77.230 CDCl3
76.912
56.129
55.961
21.368
MeO
OMe
O
O
NC
OAc
f1 (ppm)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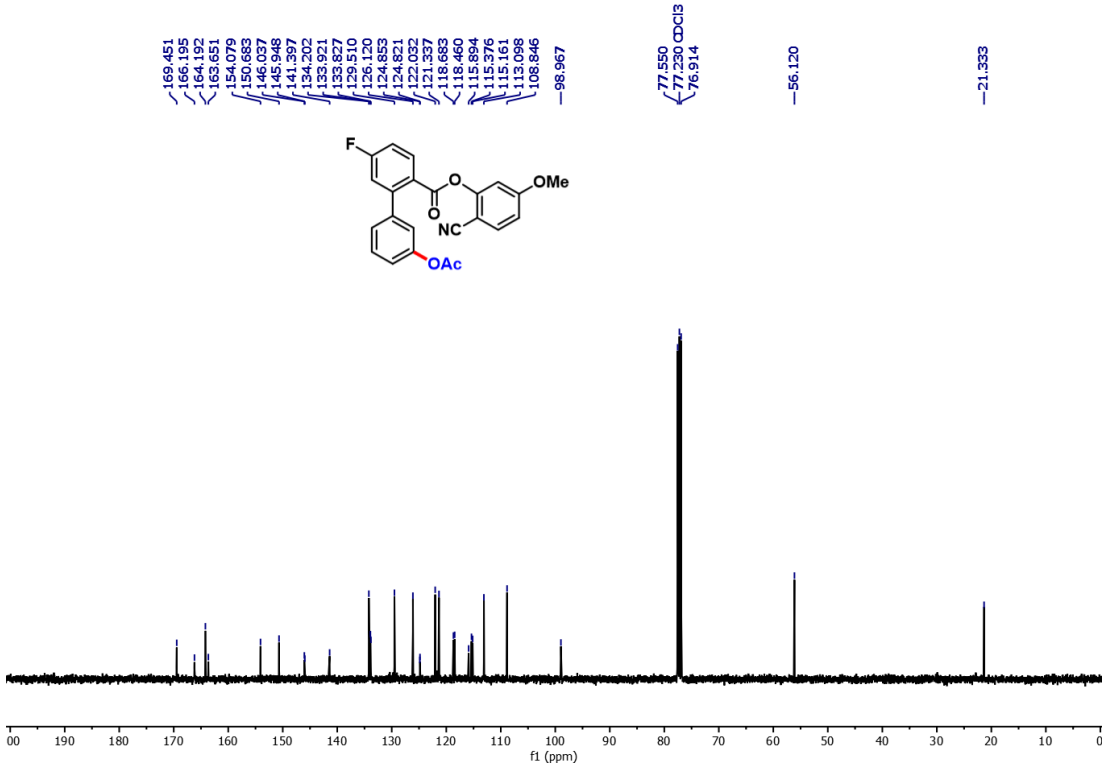
8.207
8.199
8.185
7.541
7.519
7.457
7.437
7.417
7.293
7.290
7.289
7.286
7.274
7.271
7.269
7.267
CDCl3
7.260
7.236
7.229
7.216
7.214
7.210
7.207
7.194
7.188
7.173
7.168
7.163
7.156
7.140
7.136
7.134
7.131
7.128
7.116
7.114
7.110
7.108
6.815
6.809
6.793
6.787
6.607
6.601
3.816
2.290
F
O
OMe
O
NC
OAc
E (ddd)
7.21
C (t)
7.44
G (dd)
6.80
A (dd)
8.20
B (d)
7.53
F (m)
7.14
H (d)
6.60
D (ddd)
7.28
I (s)
3.82
J (s)
2.29
1.06
1.12
1.24
1.07
1.20
3.03
1.06
0.92
3.09
3.00
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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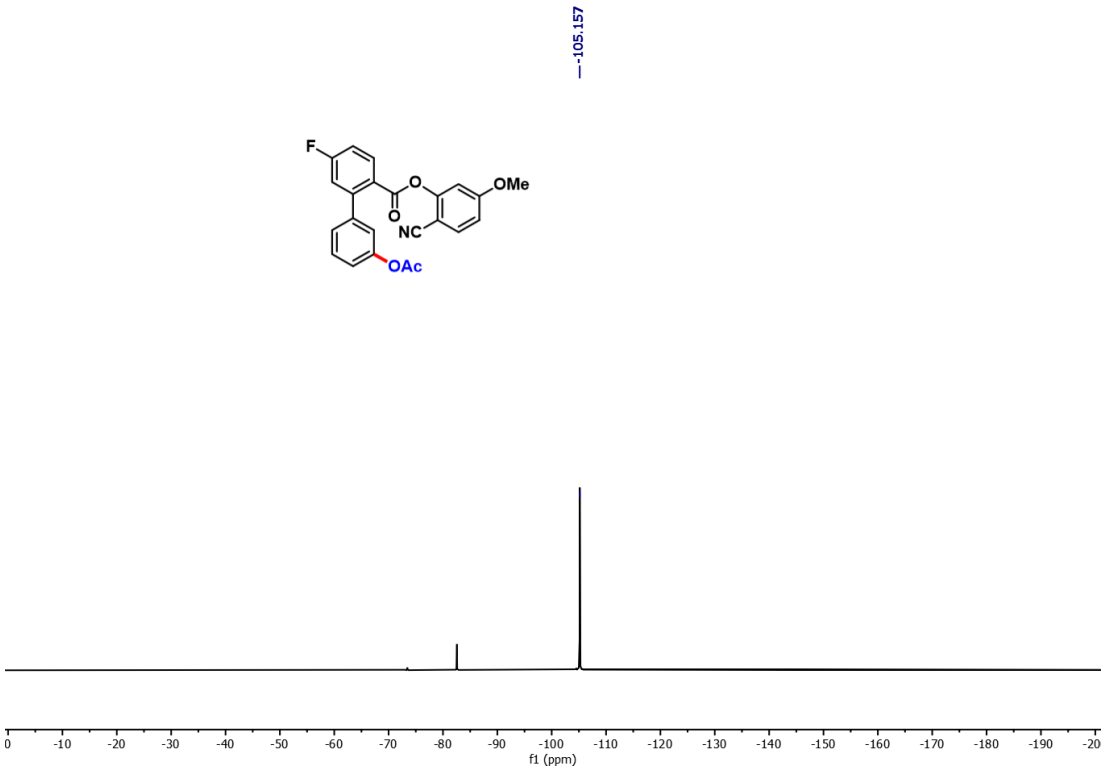
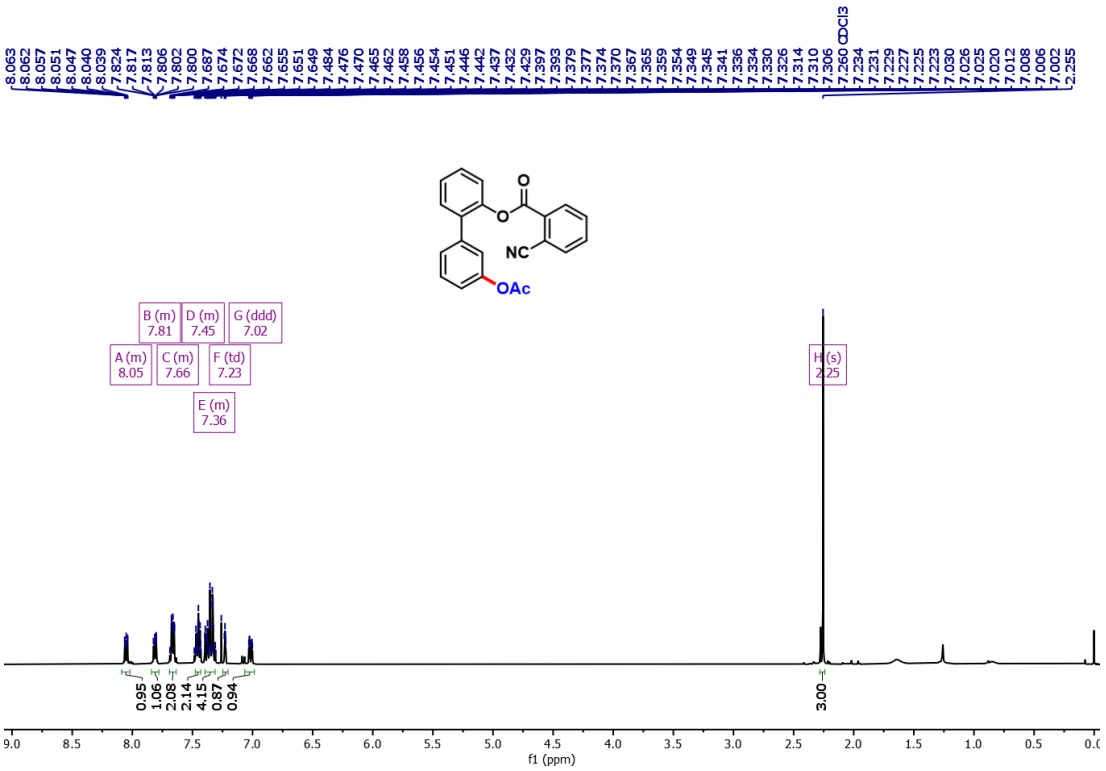
164.192
163.651
154.079
150.683
146.037
145.948
141.397
134.202
133.921
133.827
129.510
126.120
124.853
124.821
122.032
121.337
118.683
118.460
115.894
115.376
115.161
113.098
108.846
98.967
77.550
CDCl3
77.230
76.914
56.120
21.333
F
O
OMe
O
NC
OAc
00
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


-105.157
F
O
O
NC
OMe
OAc
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-20
f1 (ppm)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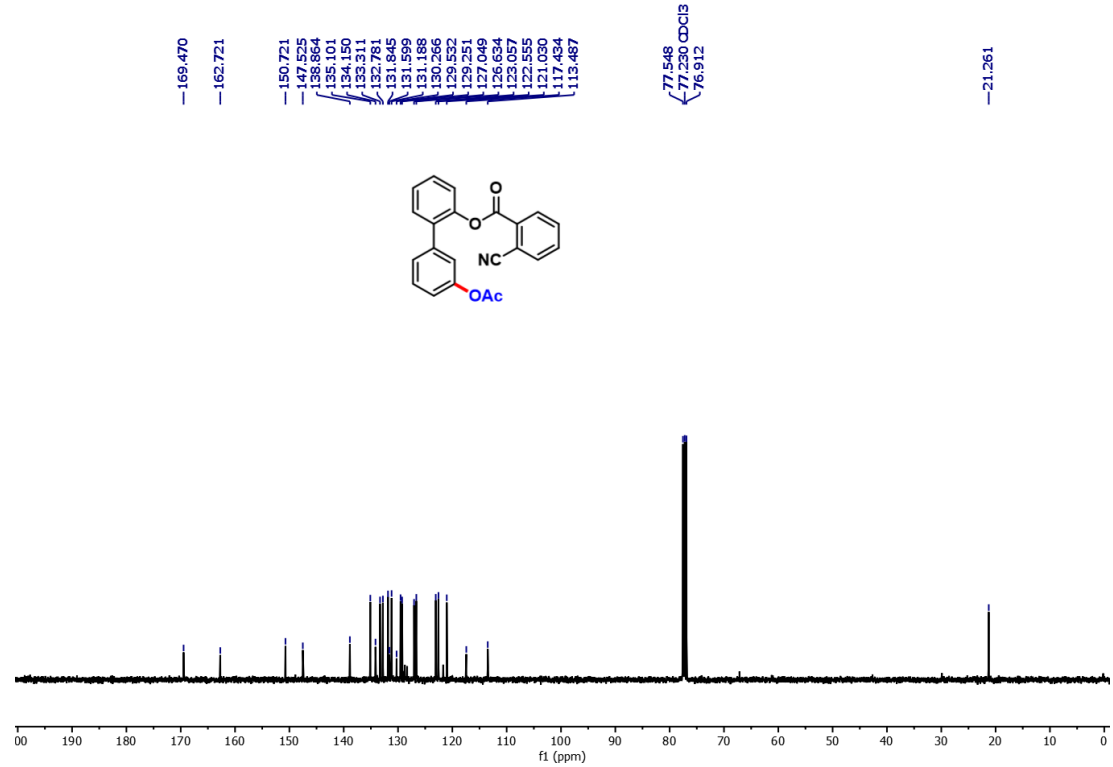
O
O
NC
OAc
B (m) 7.81
D (m) 7.45
G (ddd) 7.02
A (m) 8.05
C (m) 7.66
F (td) 7.23
E (m) 7.36
H (s) 2.25
0.95
1.06
2.08
2.14
4.15
0.87
0.94
3.00
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)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147.525
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134.150
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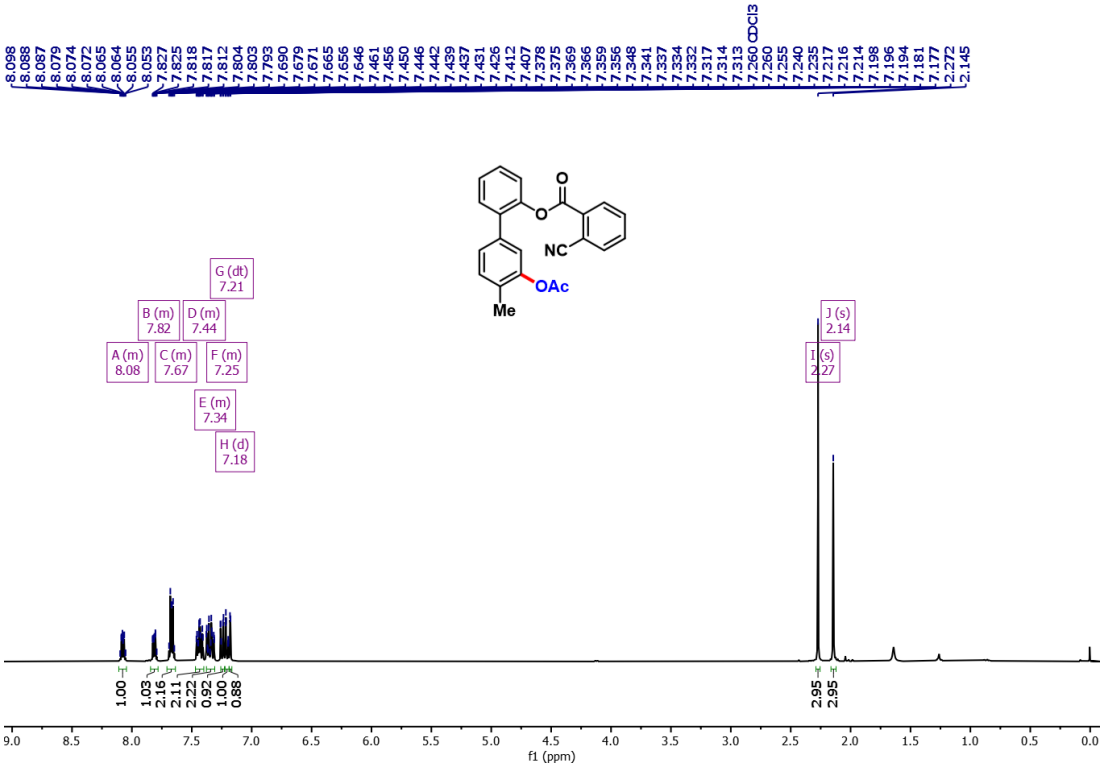
132.781
131.845
131.599
131.188
130.266
129.532
129.251
127.049
126.634
123.057
122.555
121.030
117.434
113.487
77.548
77.230 CDCl3
76.912
21.261
O
O
NC
OAc
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)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8.064
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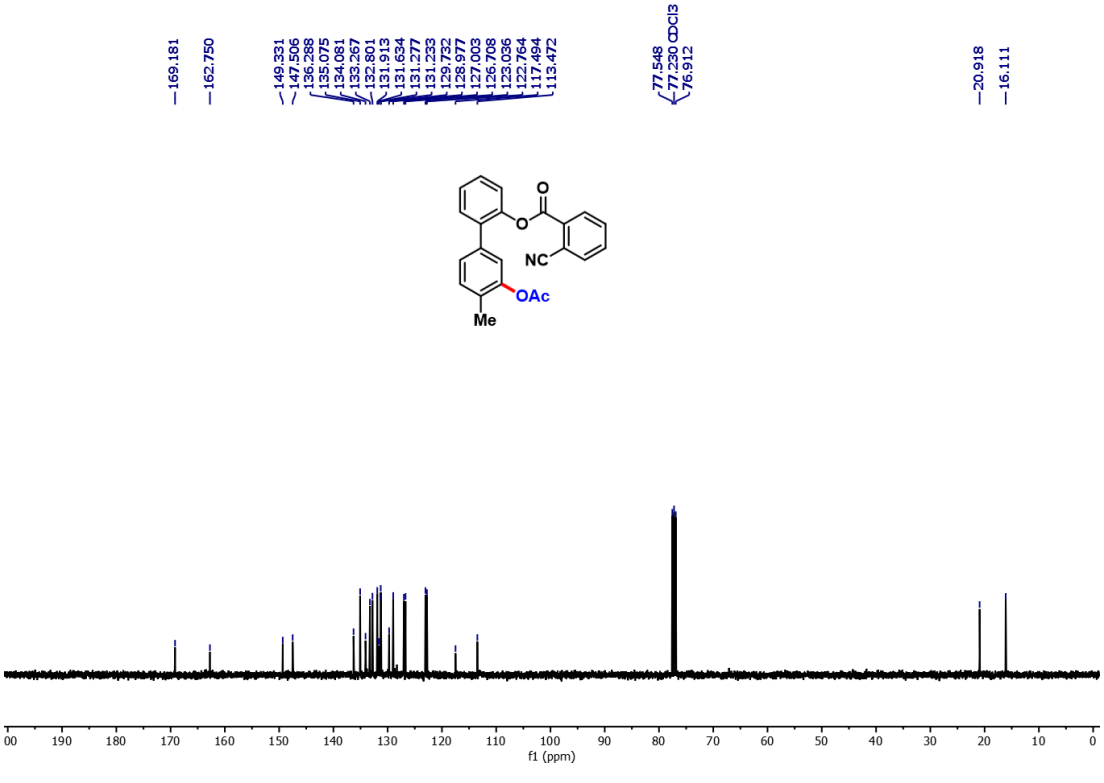
8.053
7.827
7.825
7.818
7.817
7.812
7.804
7.803
7.793
7.690
7.679
7.671
7.665
7.656
7.646
7.461
7.456
7.450
7.446
7.442
7.439
7.437
7.431
7.426
7.412
7.407
7.378
7.375
7.369
7.366
7.359
7.356
7.348
7.341
7.337
7.334
7.332
7.317
7.314
7.313
7.260 CDCl3
7.260
7.255
7.240
7.235
7.217
7.216
7.214
7.198
7.196
7.194
7.181
7.177
2.272
2.145
O
O
NC
OAc
Me
G (dt) 7.21
B (m) 7.82
D (m) 7.44
A (m) 8.08
C (m) 7.67
F (m) 7.25
E (m) 7.34
H (d) 7.18
J (s) 2.14
I (s) 2.27
1.00
1.03
2.16
2.11
2.22
0.92
1.00
0.88
2.95
2.95
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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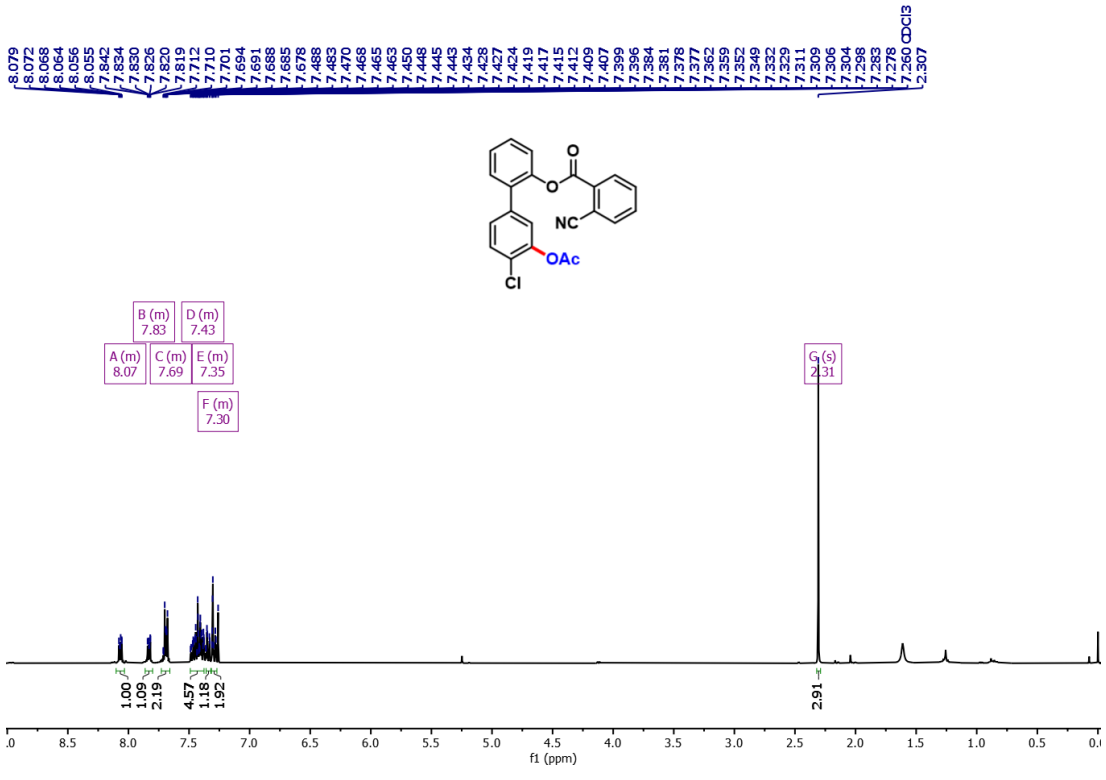
131.277
131.233
129.732
128.977
127.003
126.708
123.036
122.764
117.494
113.472
77.548
77.230 CDCl3
76.912
20.918
16.111
O
O
NC
OAc
Me
00
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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8.055
7.842
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7.826
7.820
7.819
7.712
7.710
7.701
7.694
7.691
7.688
7.685
7.678
7.488
7.483
7.470
7.468
7.465
7.463
7.450
7.448
7.445
7.443
7.434
7.428
7.427
7.424
7.419
7.417
7.415
7.412
7.409
7.407
7.399
7.396
7.384
7.381
7.378
7.377
7.362
7.359
7.352
7.349
7.332
7.329
7.311
7.309
7.306
7.304
7.298
7.283
7.278
7.260 CDCl3
2.307
O
O
NC
OAc
Cl
B (m) 7.83
D (m) 7.43
A (m) 8.07
C (m) 7.69
E (m) 7.35
F (m) 7.30
G (s) 2.31
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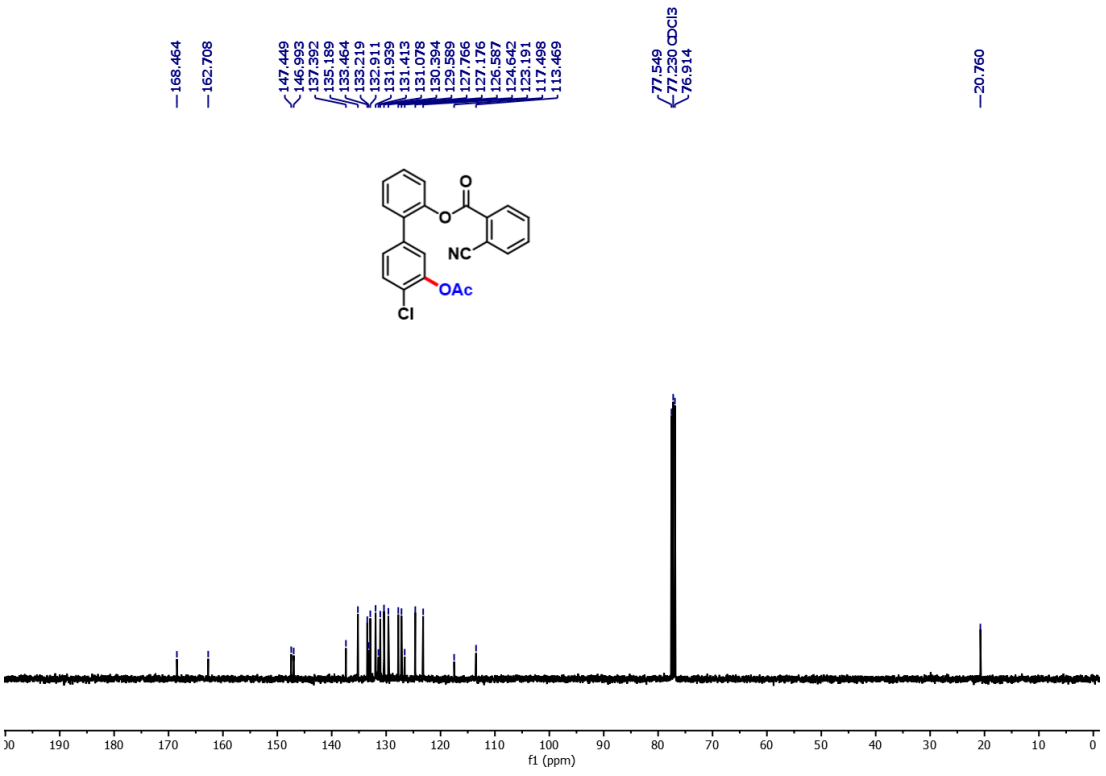
1.09
2.19
4.57
1.18
1.92
2.91
f1 (ppm)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129.589
127.766
127.176
126.587
124.642
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113.469
77.549
77.230 CDCl3
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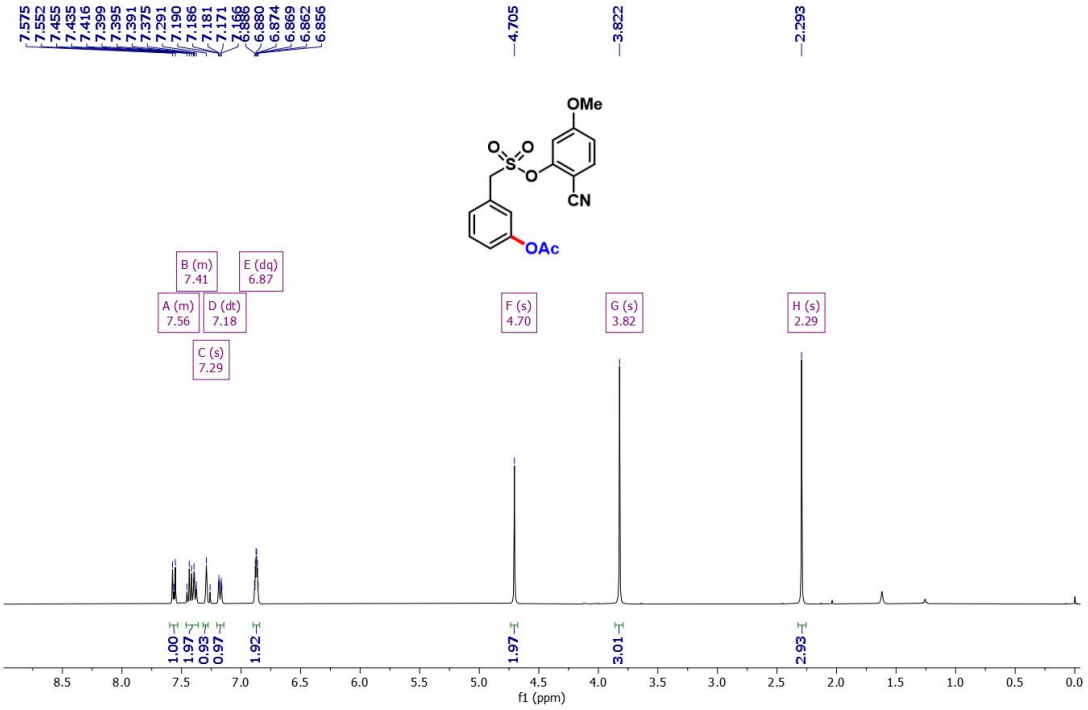
20.760
O
O
NC
OAc
Cl
f1 (ppm)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7.435
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7.399
7.395
7.391
7.375
7.291
7.190
7.186
7.181
7.171
7.166
6.886
6.880
6.874
6.869
6.862
6.856
4.705
3.822
2.293
OMe
CN
OAc
B (m) 7.41
E (dq) 6.87
A (m) 7.56
D (dt) 7.18
C (s) 7.29
F (s) 4.70
G (s) 3.82
H (s) 2.29
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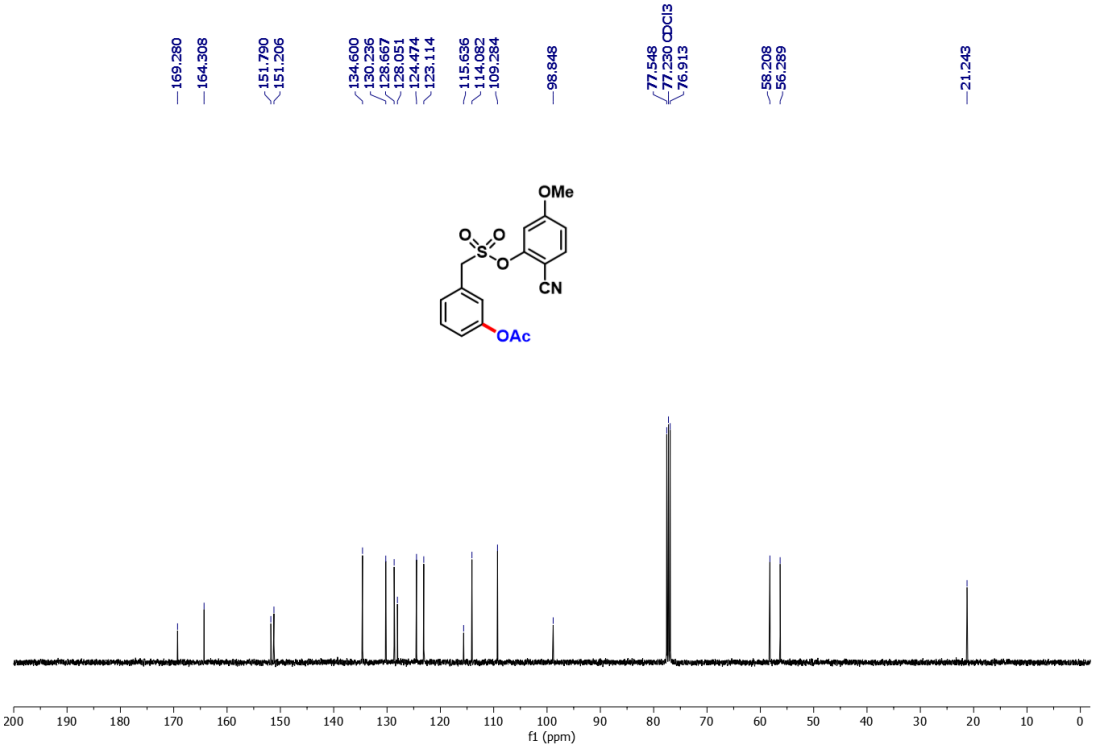
1.97
0.93
0.97
1.92
1.97
3.01
2.93
f1 (ppm)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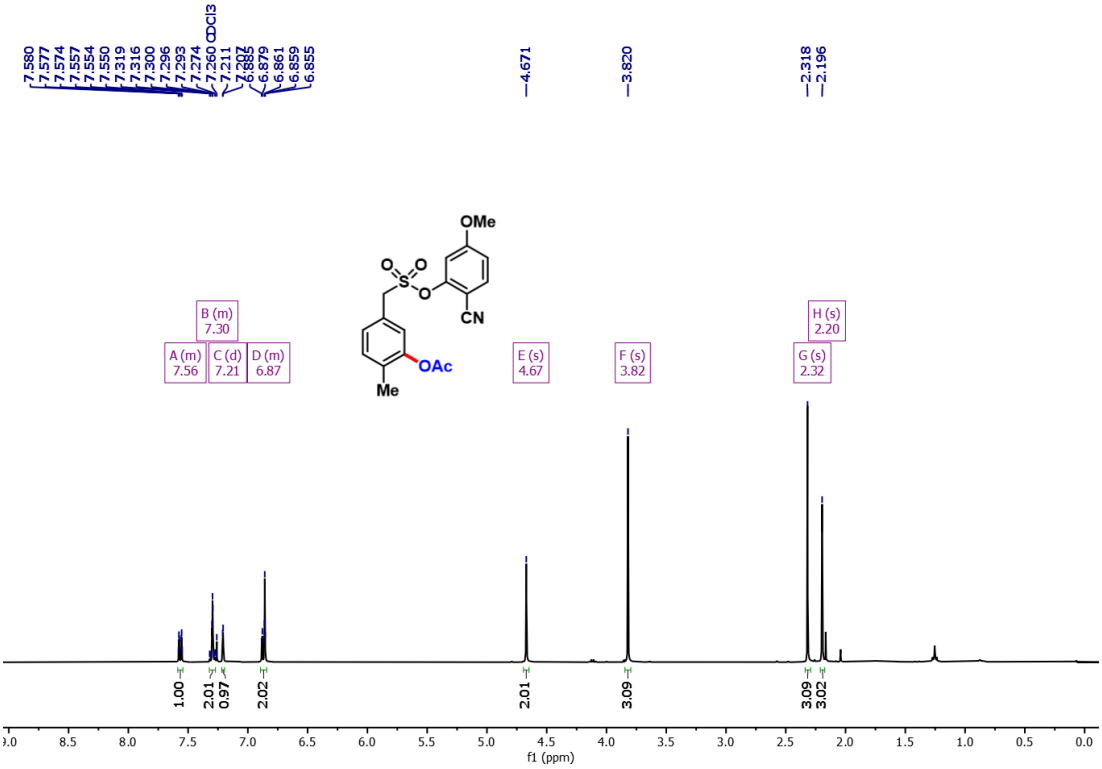
164.308
151.790
151.206
134.600
130.236
128.667
128.051
124.474
123.114
115.636
114.082
109.284
98.848
77.548
77.230 CDCl3
76.913
58.208
56.289
21.243
OMe
CN
OAc
f1 (ppm)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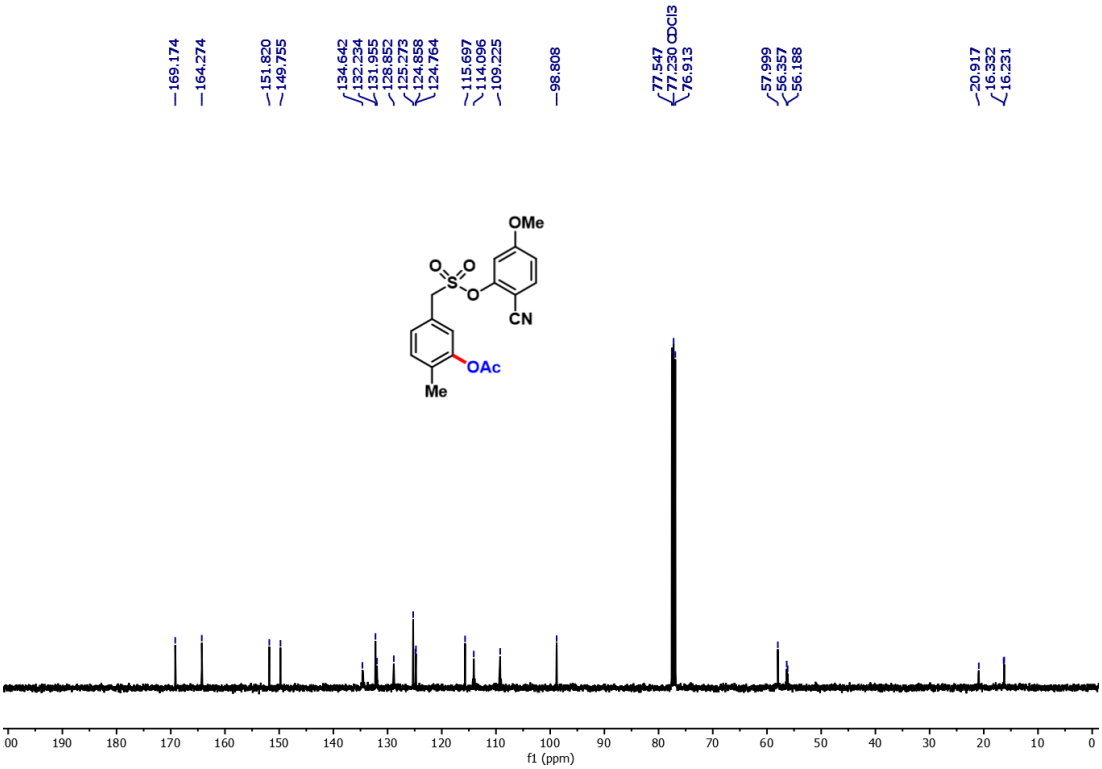
7.577
7.574
7.557
7.554
7.550
7.319
7.316
7.300
7.296
7.293
7.274
7.260 CDCl3
7.211
7.207
6.885
6.879
6.861
6.859
6.855
4.671
3.820
2.318
2.196
OMe
CN
OAc
Me
B (m) 7.30
A (m) 7.56
C (d) 7.21
D (m) 6.87
E (s) 4.67
F (s) 3.82
H (s) 2.20
G (s) 2.32
1.00
2.01
0.97
2.02
2.01
3.09
3.09
3.02
f1 (ppm)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164.274
151.820
149.755
134.642
132.234
131.955
128.852
125.273
124.858
124.764
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114.096
109.225
98.808
77.547
77.230 CDCl3
76.913
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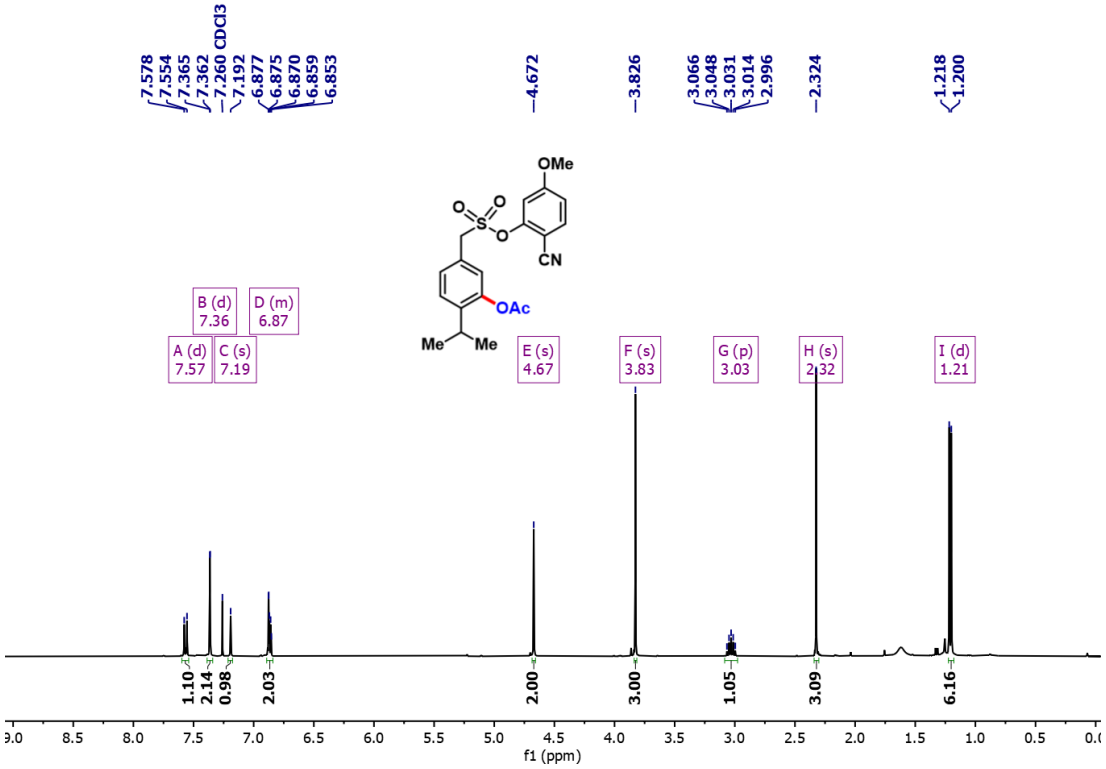
56.357
56.188
20.917
16.332
16.231
OMe
CN
OAc
Me
f1 (ppm)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7.554
7.365
7.362
7.260 CDCl3
7.192
6.877
6.875
6.870
6.859
6.853
4.672
3.826
3.066
3.048
3.031
3.014
2.996
2.324
1.218
1.200
OMe
CN
OAc
Me
Me
B (d) 7.36
D (m) 6.87
A (d) 7.57
C (s) 7.19
E (s) 4.67
F (s) 3.83
G (p) 3.03
H (s) 2.32
I (d) 1.21
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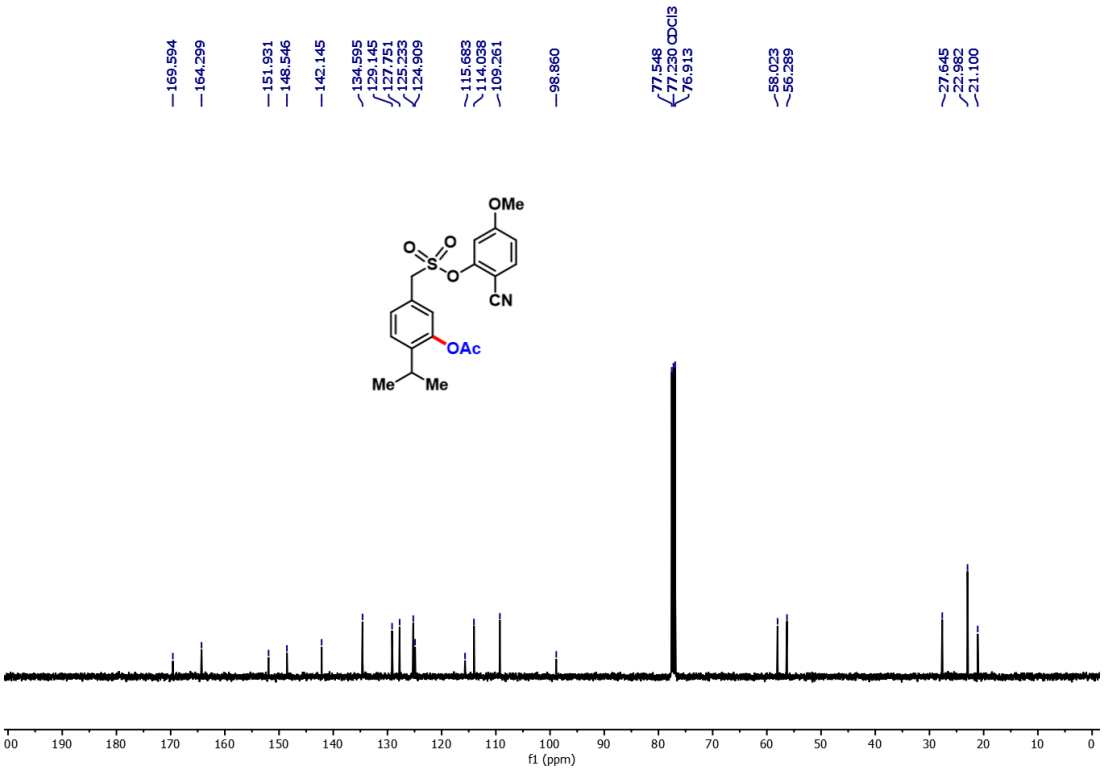
2.14
0.98
2.03
2.00
3.00
1.05
3.09
6.16
f1 (ppm)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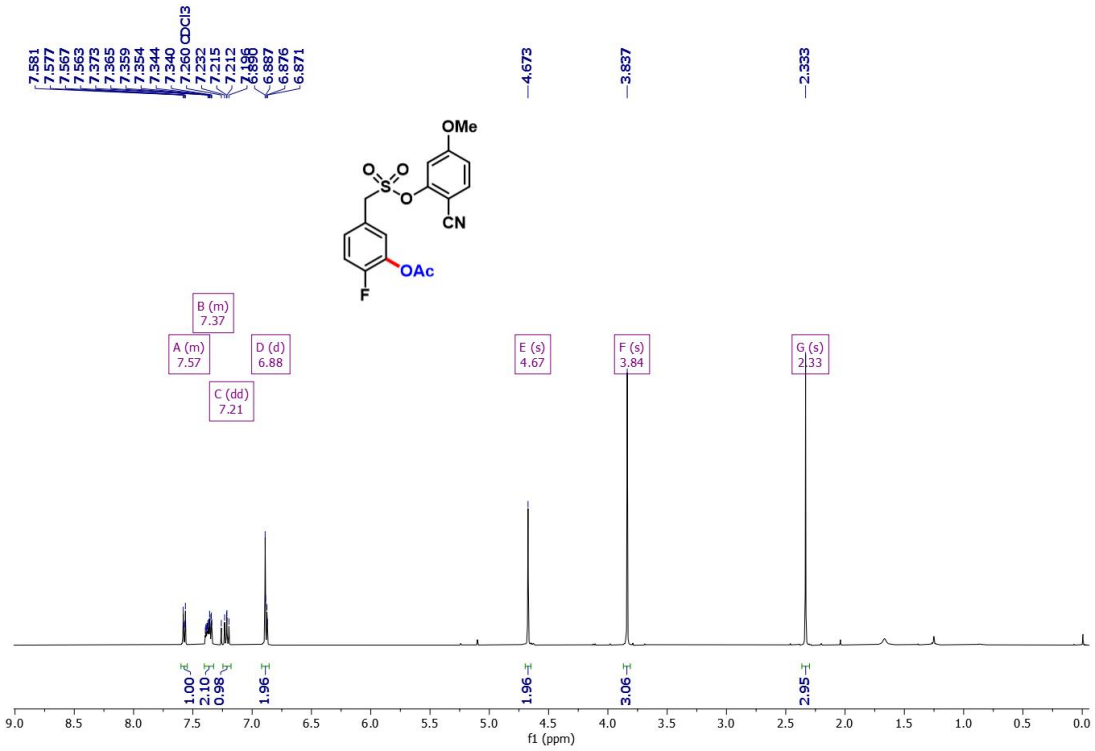
164.299
151.931
148.546
142.145
134.595
129.145
127.751
125.233
124.909
115.683
114.038
109.261
98.860
77.548
77.230 CDCl3
76.913
58.023
56.289
27.645
22.982
21.100
OMe
CN
OAc
Me
Me
f1 (ppm)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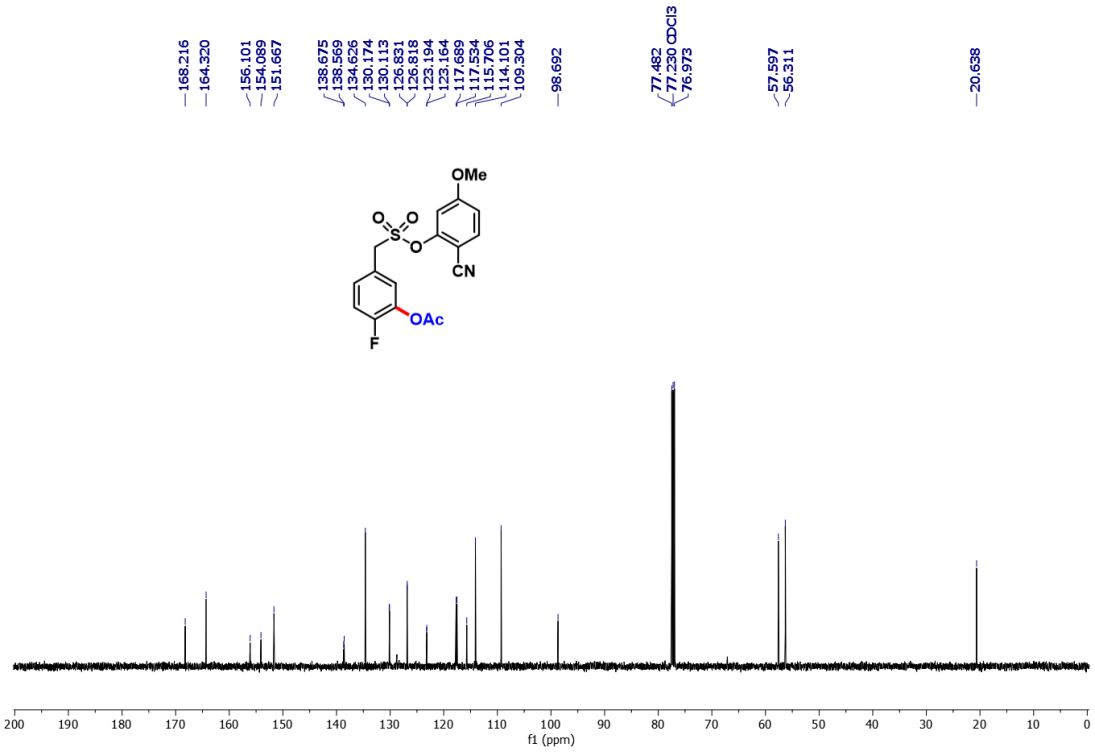
7.577
7.567
7.563
7.373
7.365
7.359
7.354
7.344
7.340
7.260 CDCl3
7.232
7.215
7.212
7.196
6.890
6.887
6.876
6.871
4.673
3.837
2.333
OMe
CN
OAc
F
B (m)
7.37
A (m)
7.57
D (d)
6.88
C (dd)
7.21
E (s)
4.67
F (s)
3.84
G (s)
2.33
1.00
2.10
0.98
1.96
1.96
3.06
2.95
f1 (ppm)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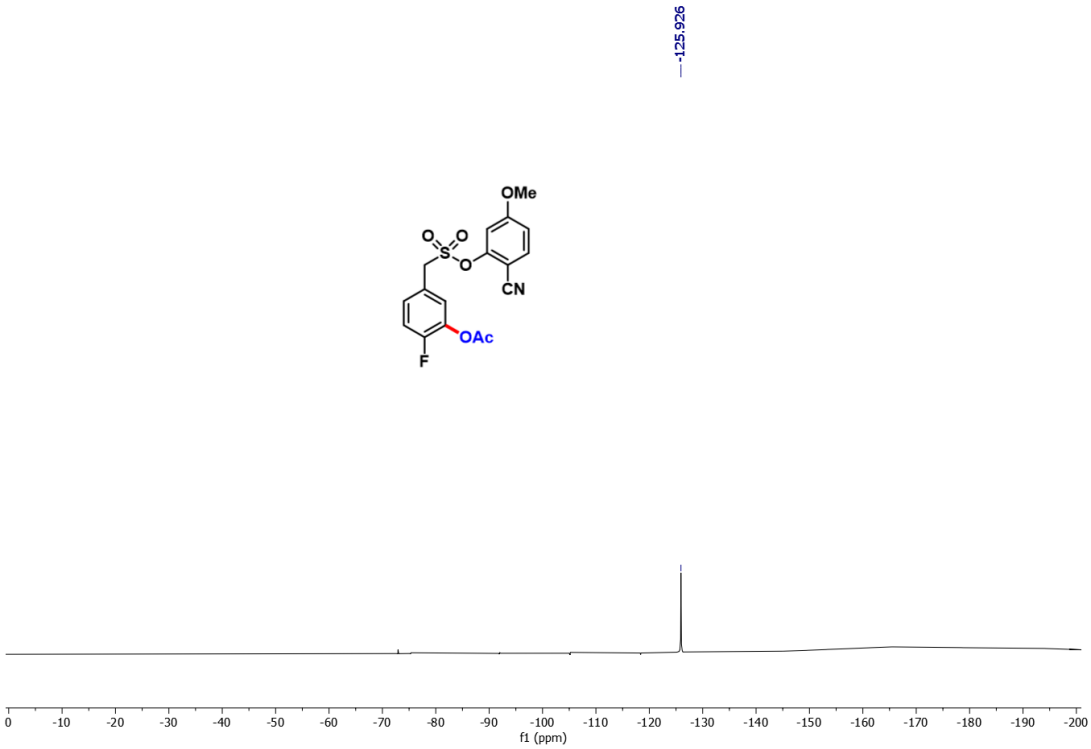
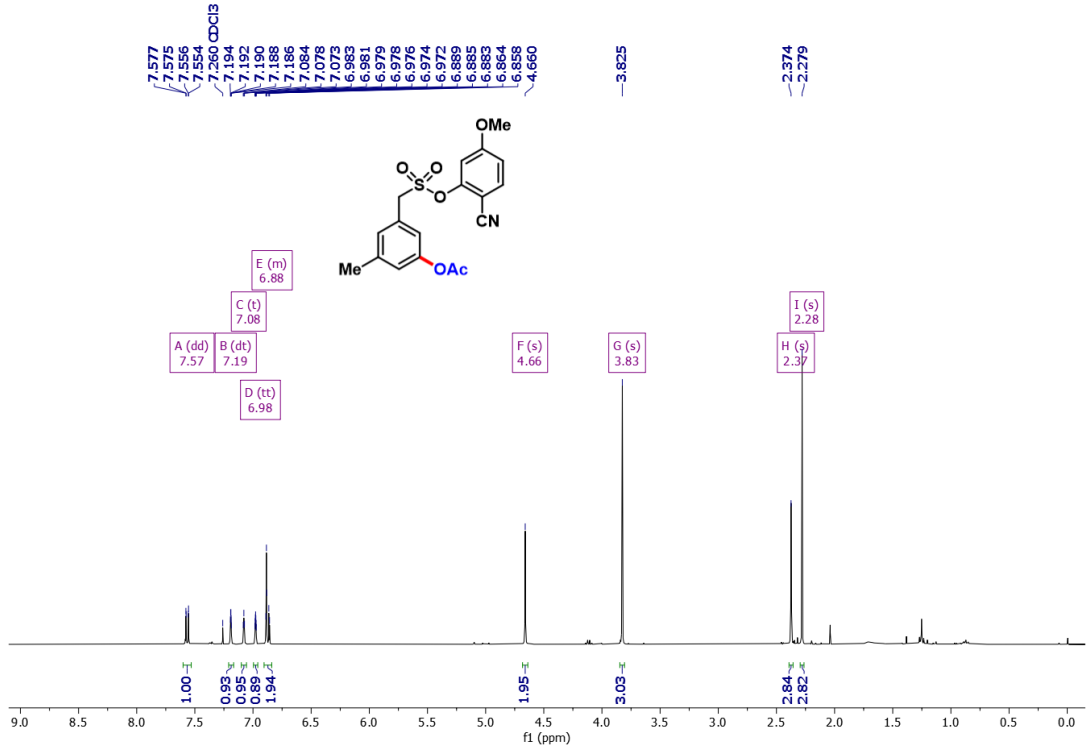
164.320
156.101
154.089
151.667
138.675
138.569
134.626
130.174
130.113
126.831
126.818
123.194
123.164
117.689
117.534
115.706
114.101
109.304
98.692
77.482
77.230 CDCl3
76.973
57.597
56.311
20.638
OMe
CN
OAc
F
f1 (ppm)


-125.926
OMe
O
S
O
O
CN
OAc
F
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
f1 (ppm)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7.575
7.556
7.554
7.260 CDCl3
7.194
7.192
7.190
7.188
7.186
7.084
7.078
7.073
6.983
6.981
6.979
6.978
6.976
6.974
6.972
6.889
6.885
6.883
6.864
6.858
4.660
3.825
2.374
2.279
OMe
CN
Me
OAc
E (m) 6.88
C (t) 7.08
A (dd) 7.57
B (dt) 7.19
D (tt) 6.98
F (s) 4.66
G (s) 3.83
I (s) 2.28
H (s) 2.37
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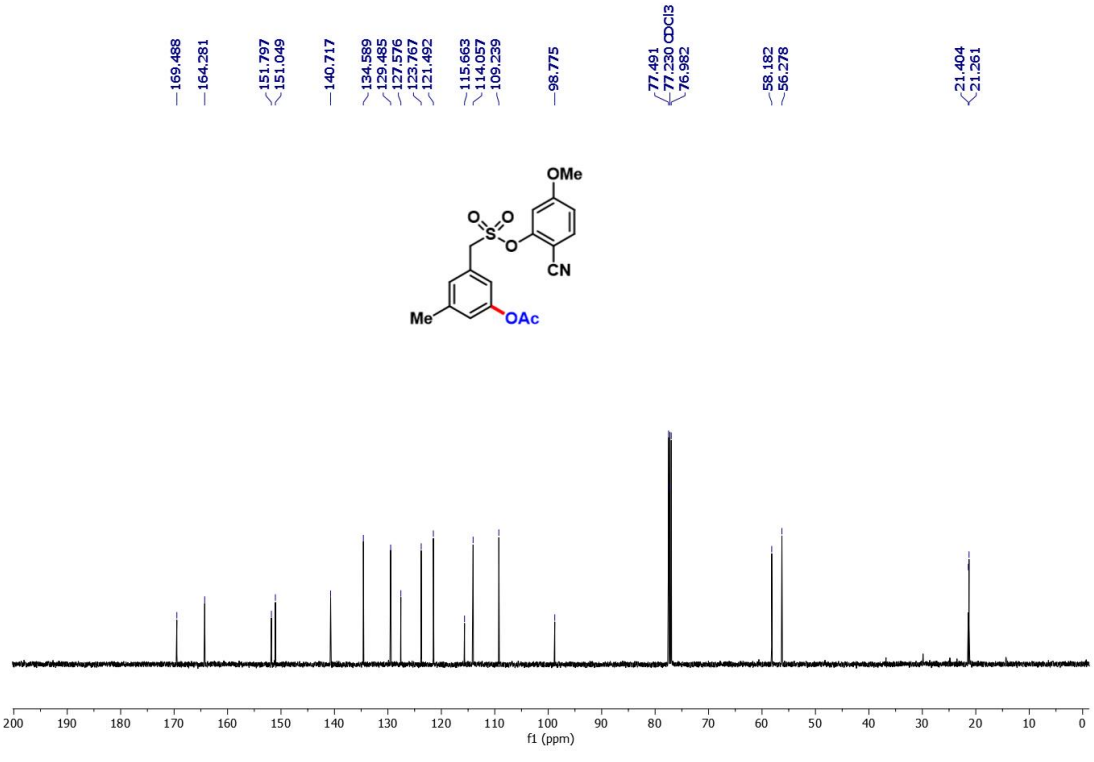
0.93
0.95
0.89
1.94
1.95
3.03
2.84
2.82
f1 (ppm)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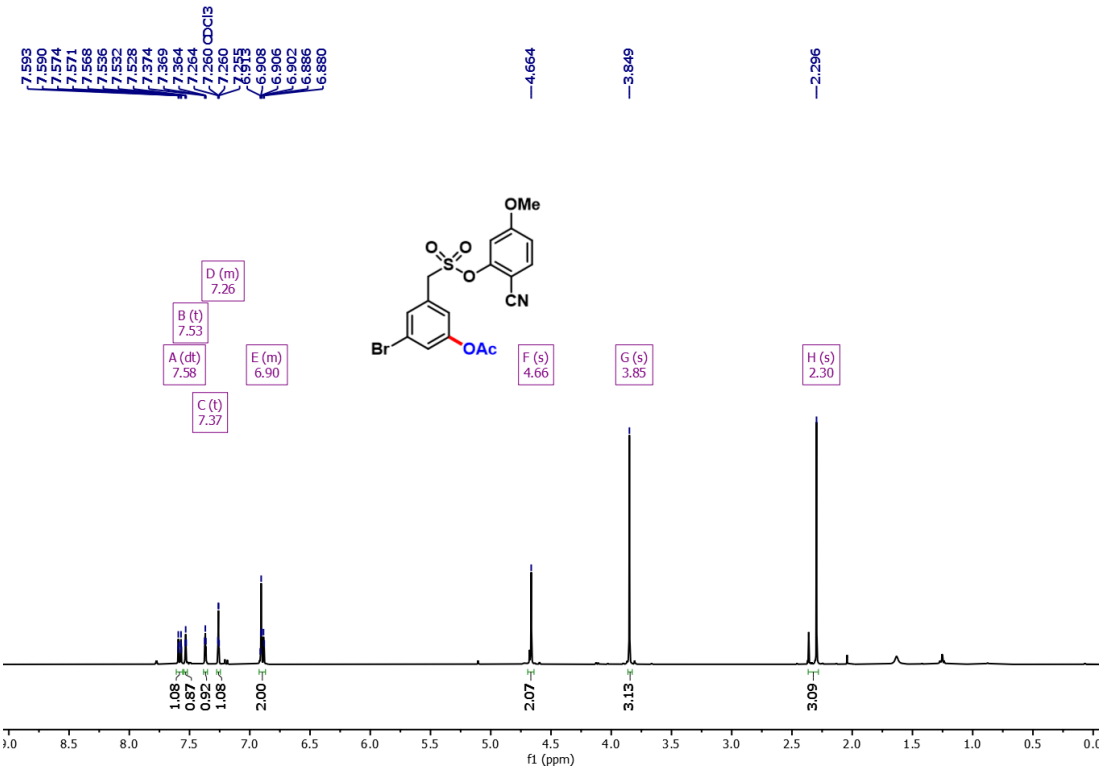
151.797
151.049
140.717
134.589
129.485
127.576
123.767
121.492
115.663
114.057
109.239
98.775
77.491
77.230 CDCl3
76.982
58.182
56.278
21.404
21.261
OMe
CN
Me
OAc
f1 (ppm)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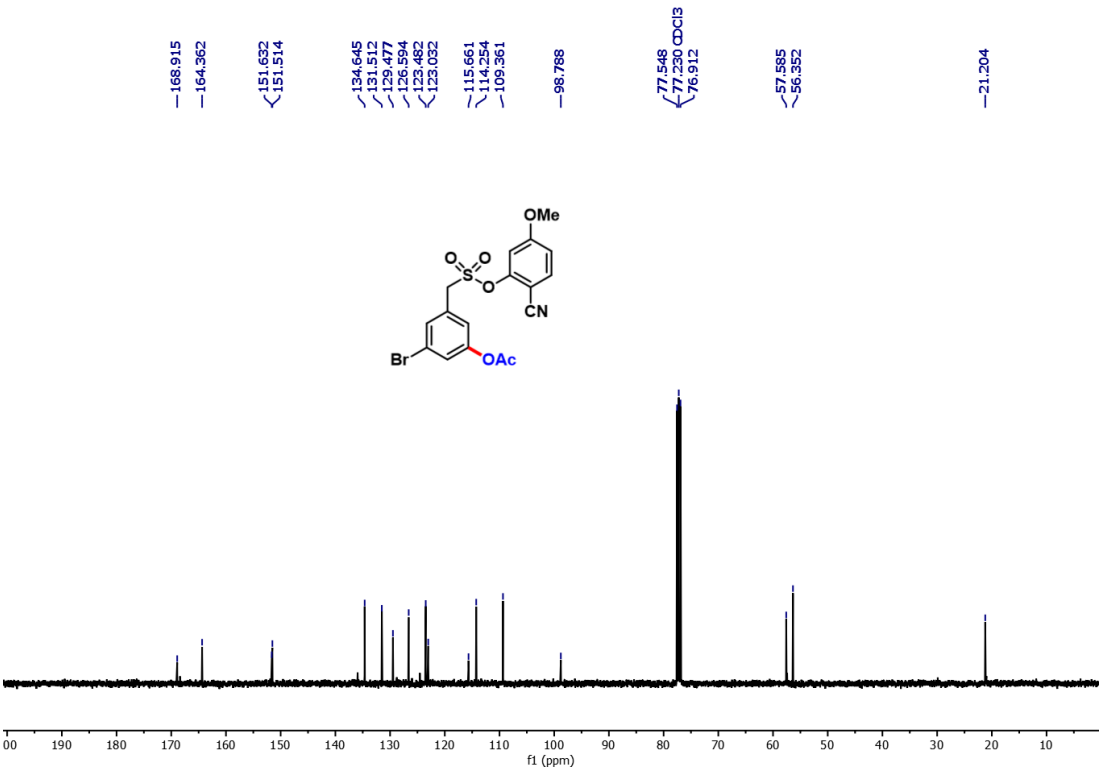
7.590
7.574
7.571
7.568
7.536
7.532
7.528
7.374
7.369
7.364
7.264
CDCl3
7.260
7.255
6.913
6.908
6.906
6.902
6.886
6.880
4.664
3.849
2.296
OMe
CN
Br
OAc
D (m) 7.26
B (t) 7.53
A (dt) 7.58
E (m) 6.90
C (t) 7.37
F (s) 4.66
G (s) 3.85
H (s) 2.30
1.08
0.87
0.92
1.08
2.00
2.07
3.13
3.09
f1 (ppm)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151.632
151.514
134.645
131.512
129.477
126.594
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123.032
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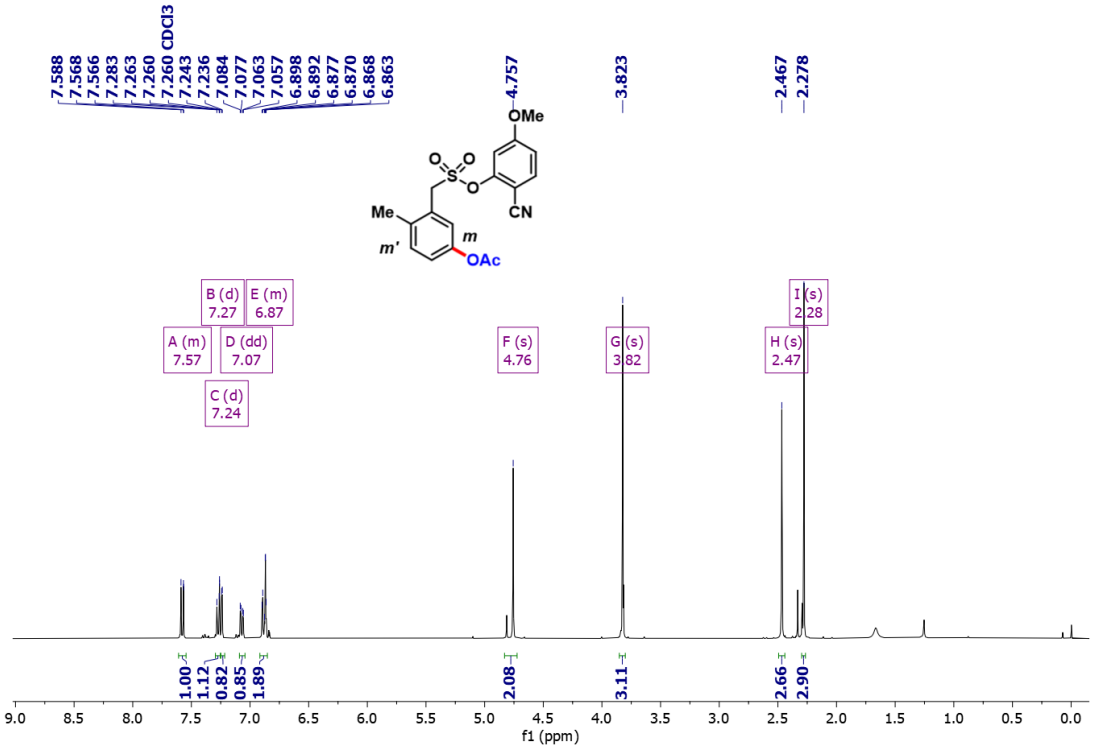
114.254
109.361
98.788
77.548
77.230
CDCl3
76.912
57.585
56.352
21.204
OMe
CN
Br
OAc
f1 (ppm)


7.588
7.568
7.566
7.283
7.263
7.260
7.260 CDCl3
7.243
7.236
7.084
7.077
7.063
7.057
6.898
6.892
6.877
6.870
6.868
6.863
4.757
3.823
2.467
2.278
OMe
CN
Me
m'
m
OAc
B (d) 7.27
E (m) 6.87
A (m) 7.57
D (dd) 7.07
C (d) 7.24
F (s) 4.76
G (s) 3.82
I (s) 2.28
H (s) 2.47
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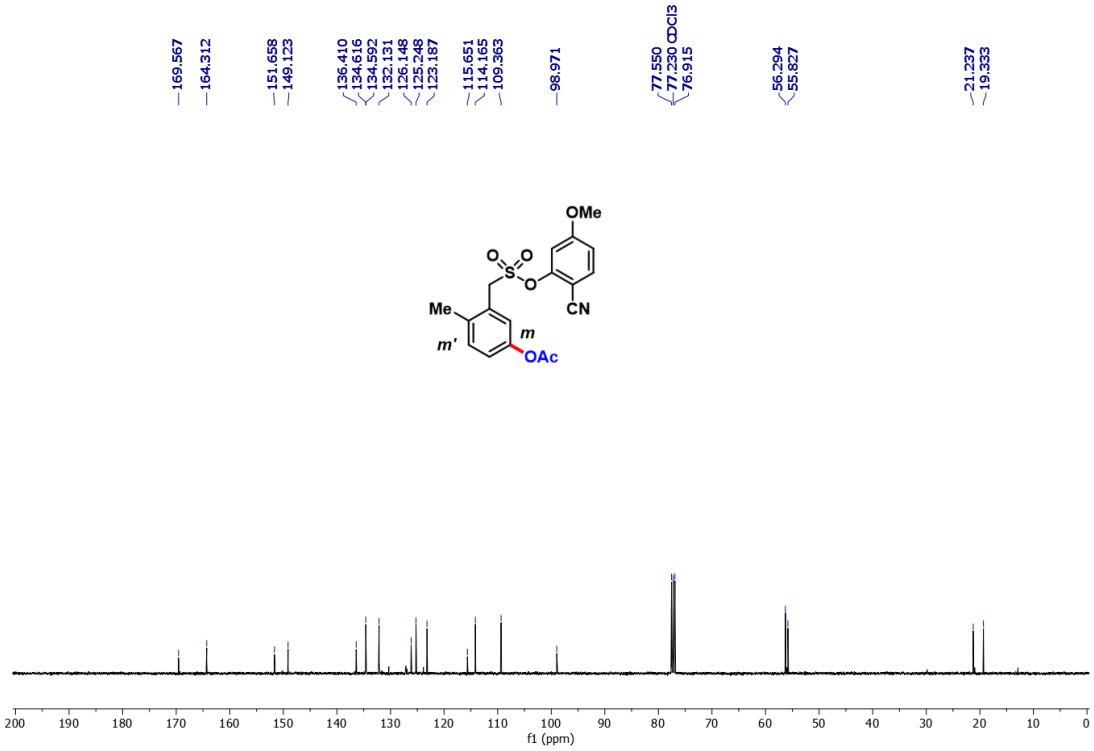
1.12
0.82
0.85
1.89
2.08
3.11
2.66
2.90
f1 (ppm)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151.658
149.123
136.410
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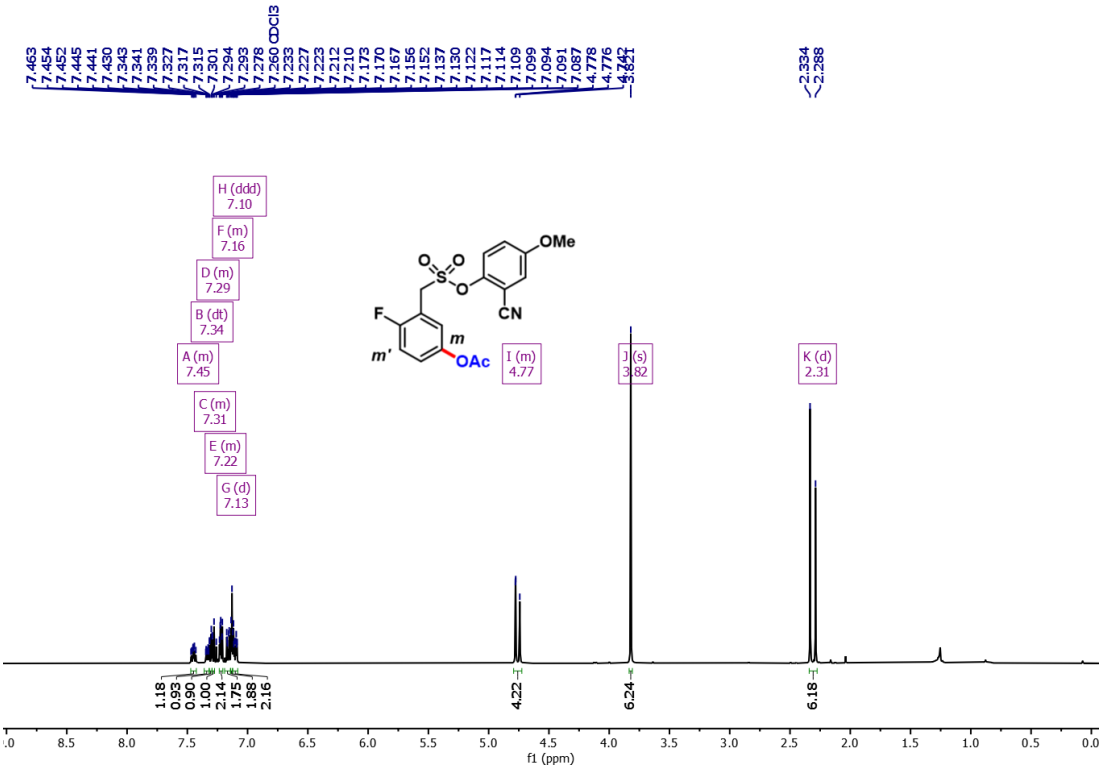
132.131
126.148
125.248
123.187
115.651
114.165
109.363
98.971
77.550
77.230 CDCl3
76.915
56.294
55.827
21.237
19.333
OMe
CN
Me
m'
m
OAc
f1 (ppm)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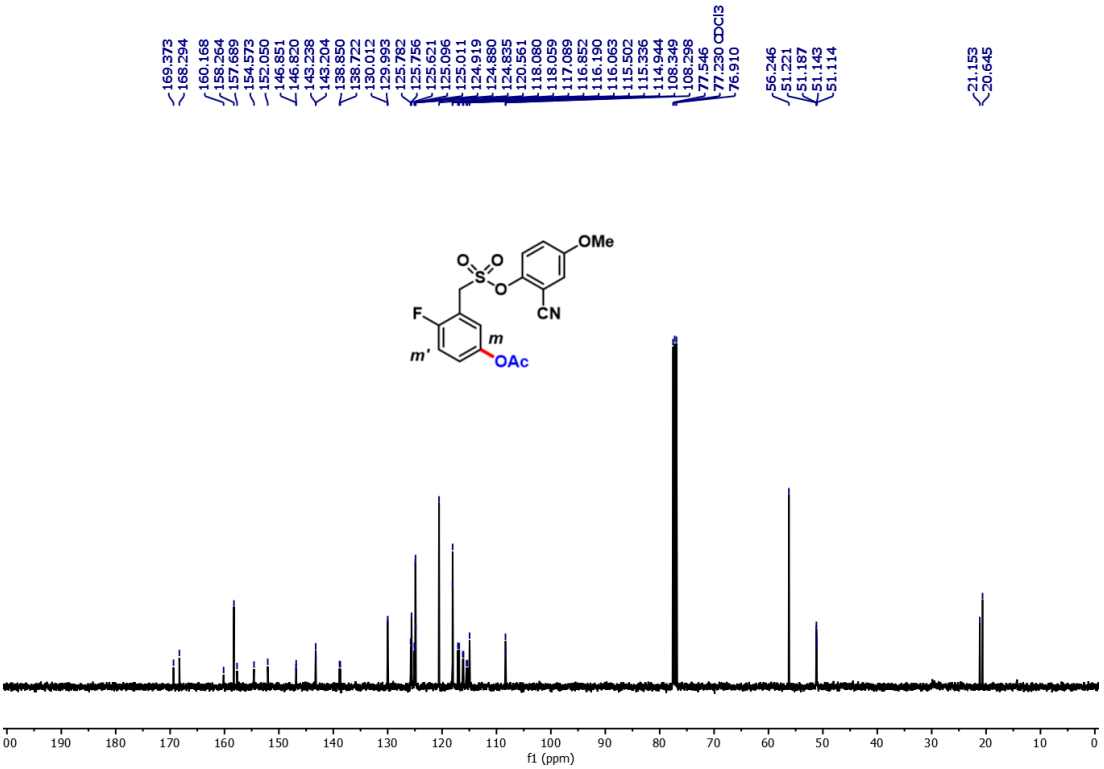
7.441
7.430
7.343
7.341
7.339
7.327
7.317
7.315
7.301
7.294
7.293
7.278
CDCl3
7.260
7.233
7.227
7.223
7.212
7.210
7.173
7.170
7.167
7.156
7.152
7.137
7.130
7.122
7.117
7.114
7.109
7.099
7.094
7.091
7.087
4.778
4.776
4.821
2.334
2.288
H (ddd) 7.10
F (m) 7.16
D (m) 7.29
B (dt) 7.34
A (m) 7.45
C (m) 7.31
E (m) 7.22
G (d) 7.13
I (m) 4.77
J (s) 3.82
K (d) 2.31
OMe
CN
F
m
m'
OAc
1.18
0.93
0.90
1.00
2.14
1.75
1.88
2.16
4.22
6.24
6.18
f1 (ppm)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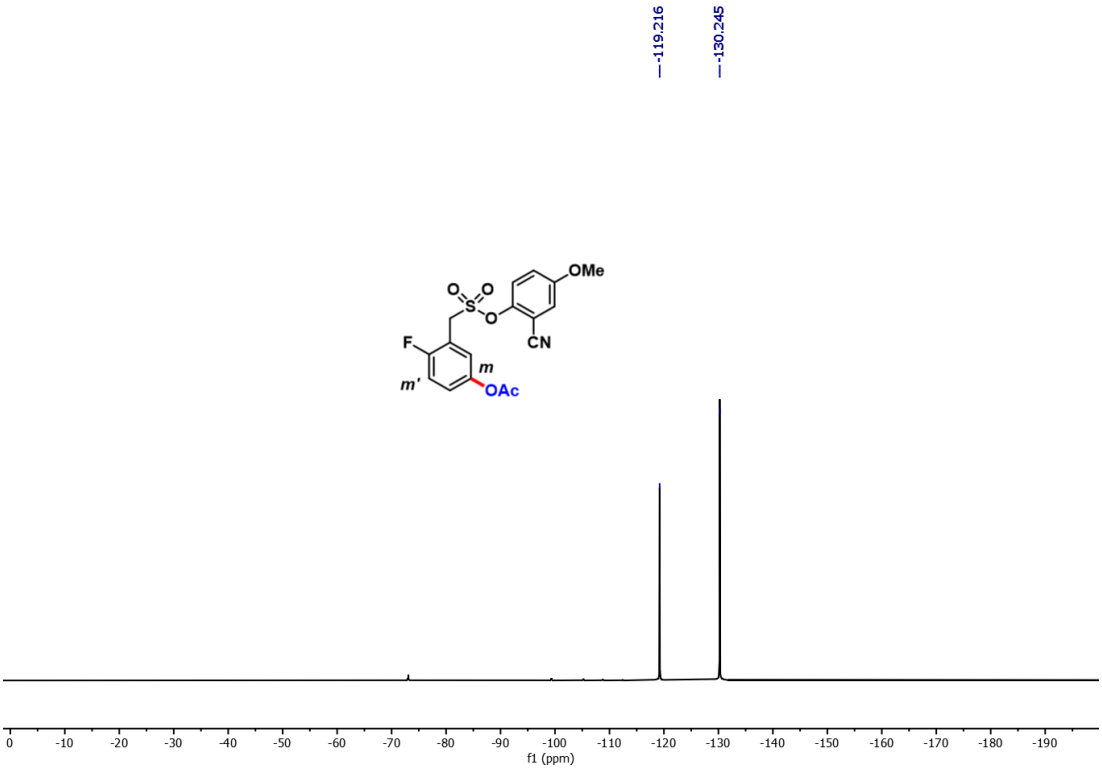
146.851
146.820
143.238
143.204
138.850
138.722
130.012
129.993
125.782
125.756
125.621
125.096
125.011
124.919
124.880
124.835
120.561
118.080
118.059
117.089
116.852
116.190
116.063
115.502
115.336
114.944
108.349
108.298
77.546
CDCl3
77.230
76.910
56.246
51.221
51.187
51.143
51.114
21.153
20.645
OMe
CN
F
m
m'
OAc
f1 (ppm)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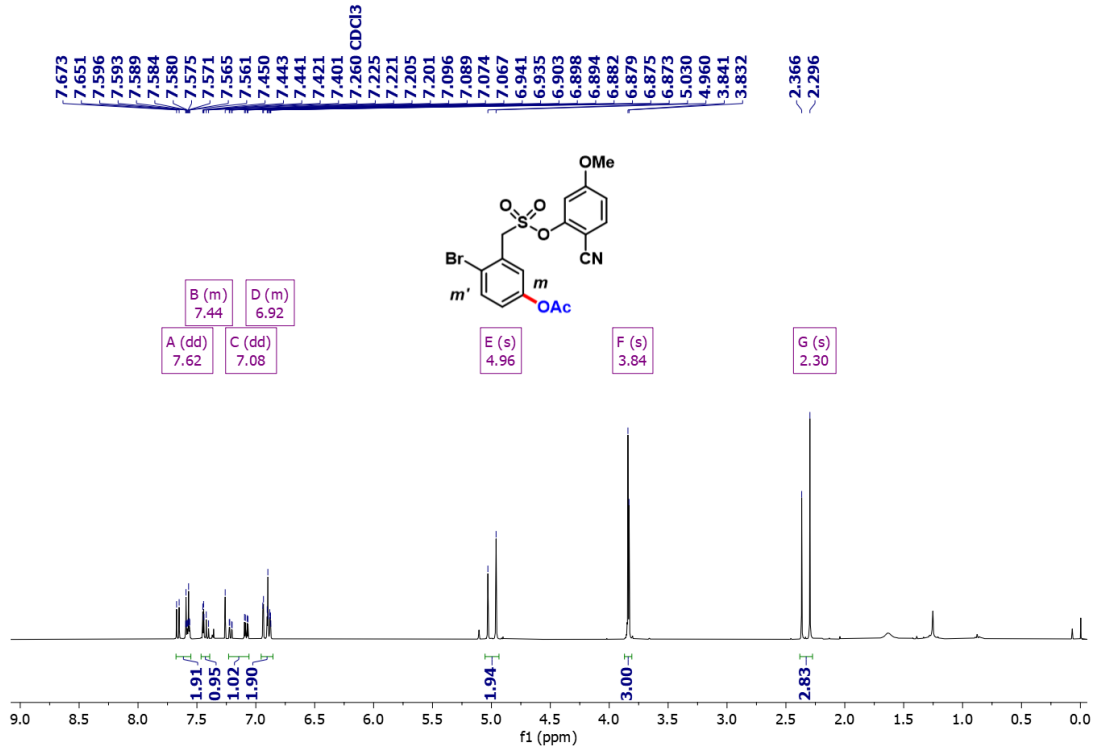
-130.245
OMe
CN
F
m
m'
OAc
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
f1 (ppm)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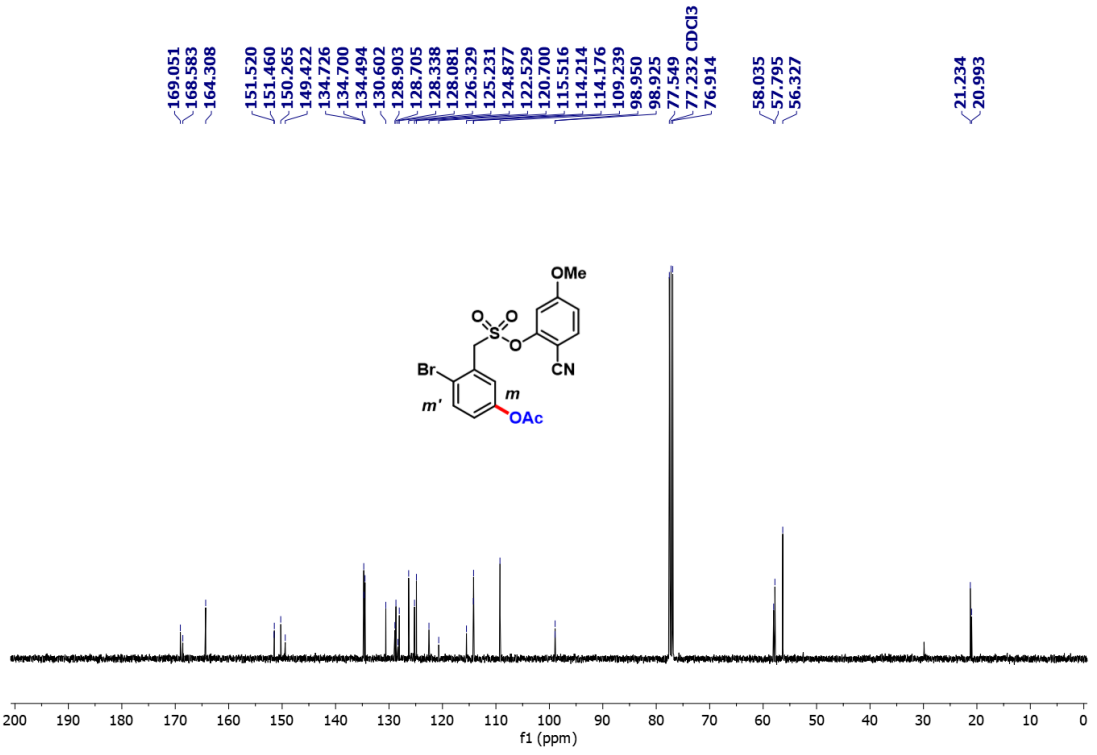
7.575
7.571
7.565
7.561
7.450
7.443
7.441
7.421
7.401
7.260 CDCl3
7.225
7.221
7.205
7.201
7.096
7.089
7.074
7.067
6.941
6.935
6.903
6.898
6.894
6.882
6.879
6.875
6.873
5.030
4.960
3.841
3.832
2.366
2.296
OMe
O
S
O
O
Br
CN
m'
m
OAc
B (m) 7.44
D (m) 6.92
A (dd) 7.62
C (dd) 7.08
E (s) 4.96
F (s) 3.84
G (s) 2.30
1.91
0.95
1.02
1.90
1.94
3.00
2.83
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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134.726
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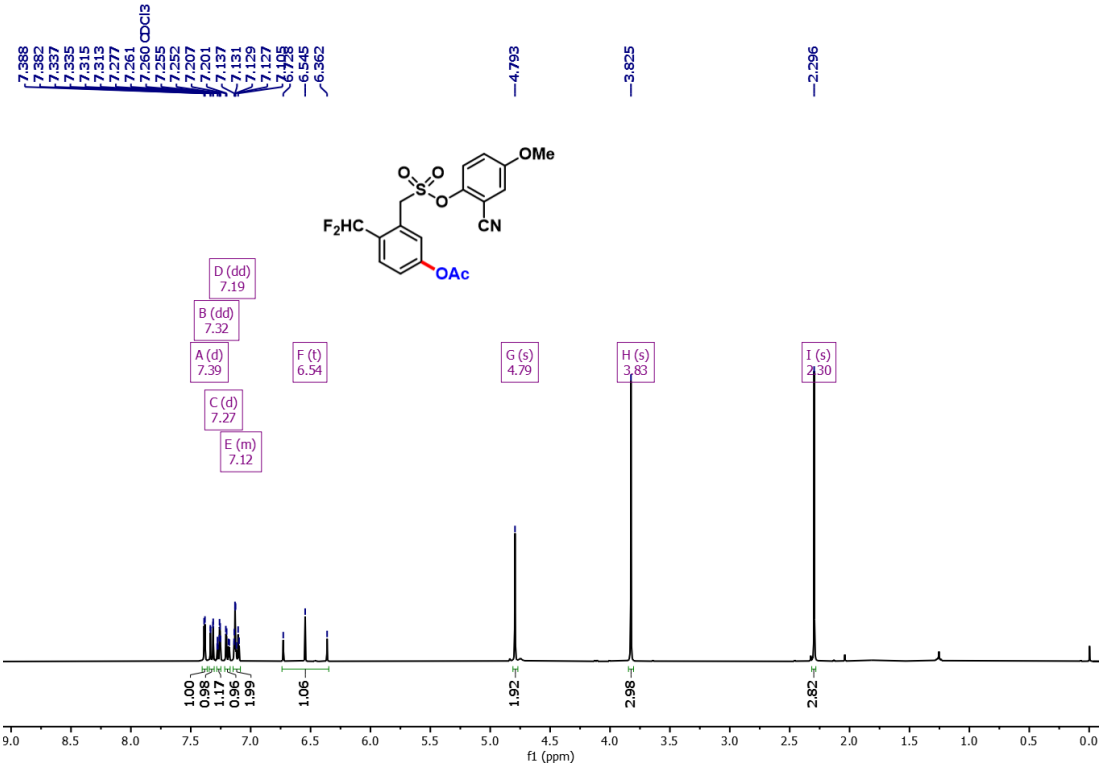
134.494
130.602
128.903
128.705
128.338
128.081
126.329
125.231
124.877
122.529
120.700
115.516
114.214
114.176
109.239
98.950
98.925
77.549
77.232 CDCl3
76.914
58.035
57.795
56.327
21.234
20.993
OMe
O
S
O
O
Br
CN
m'
m
OAc
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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7.335
7.315
7.313
7.277
7.261
7.260 CDCl3
7.255
7.252
7.207
7.201
7.137
7.131
7.129
7.127
6.728
6.545
6.362
4.793
3.825
2.296
OMe
CN
F2HC
OAc
D (dd) 7.19
B (dd) 7.32
A (d) 7.39
F (t) 6.54
G (s) 4.79
H (s) 3.83
I (s) 2.30
C (d) 7.27
E (m) 7.12
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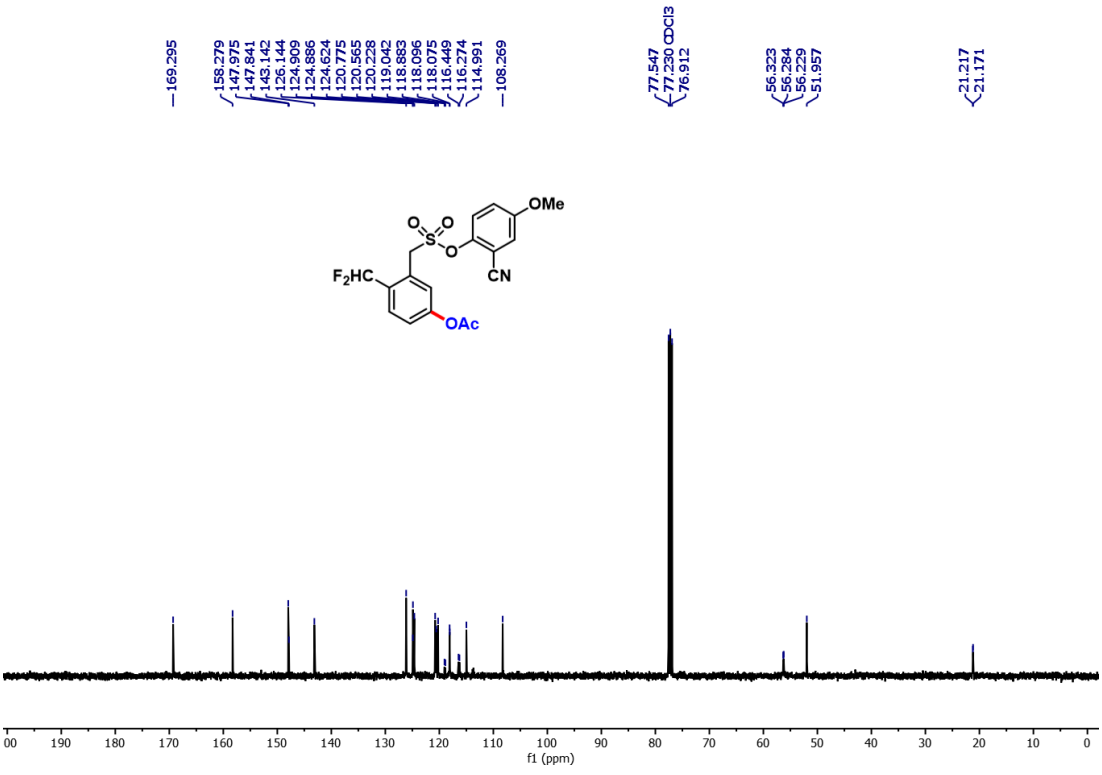
1.17
0.96
1.99
1.06
1.92
2.98
2.82
f1 (ppm)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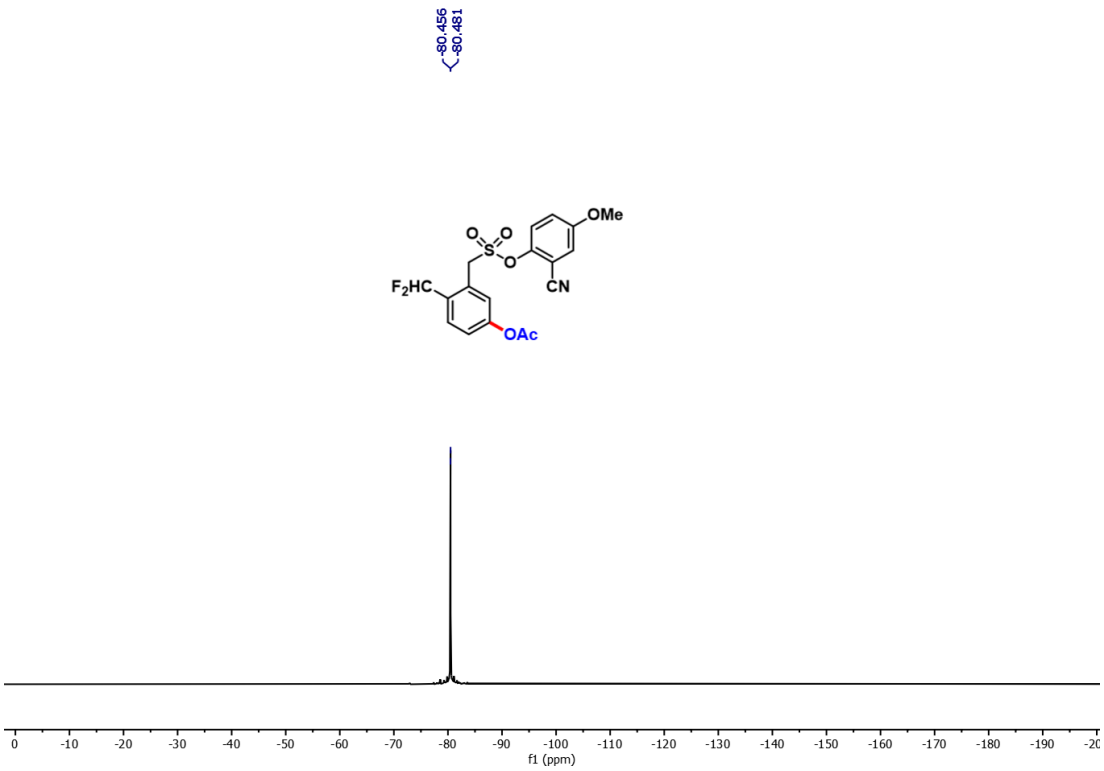
126.144
124.909
124.886
124.624
120.775
120.565
120.228
119.042
118.883
118.096
118.075
116.449
116.274
114.991
108.269
77.547
77.230 CDCl3
76.912
56.323
56.284
56.229
51.957
21.217
21.171
OMe
CN
F2HC
OAc
f1 (ppm)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-80.481
OMe
CN
F2HC
OAc
0
-10
-20
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-40
-50
-60
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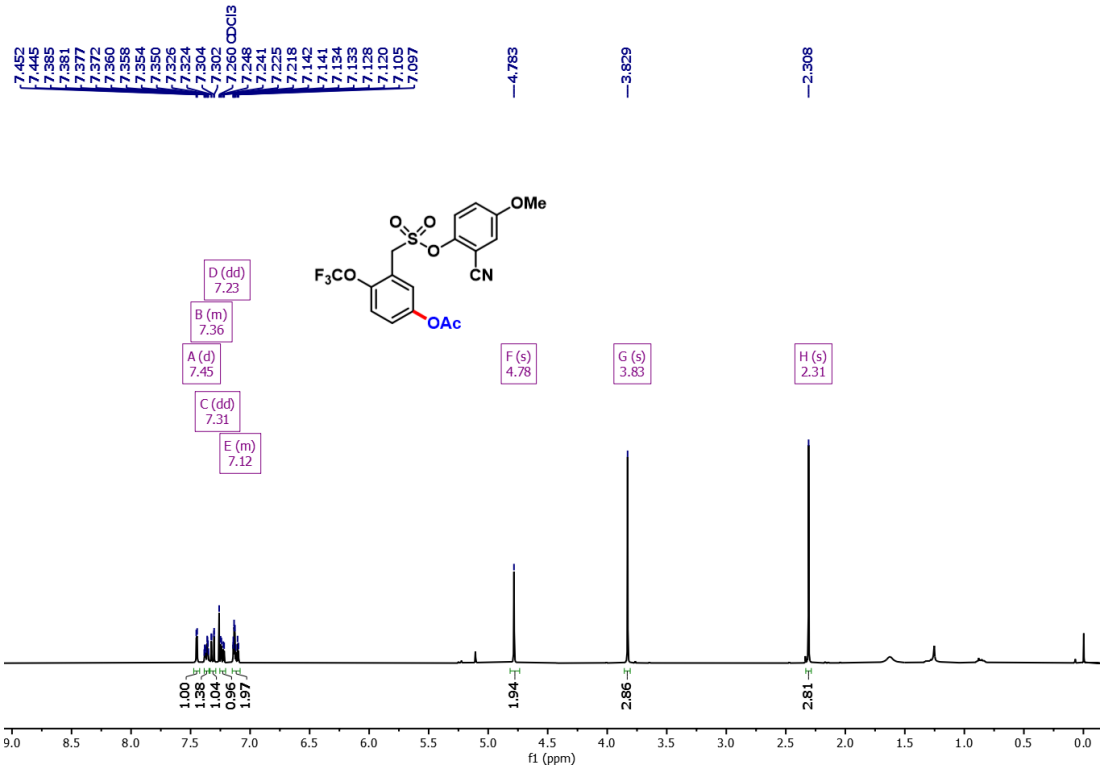
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
f1 (ppm)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7.377
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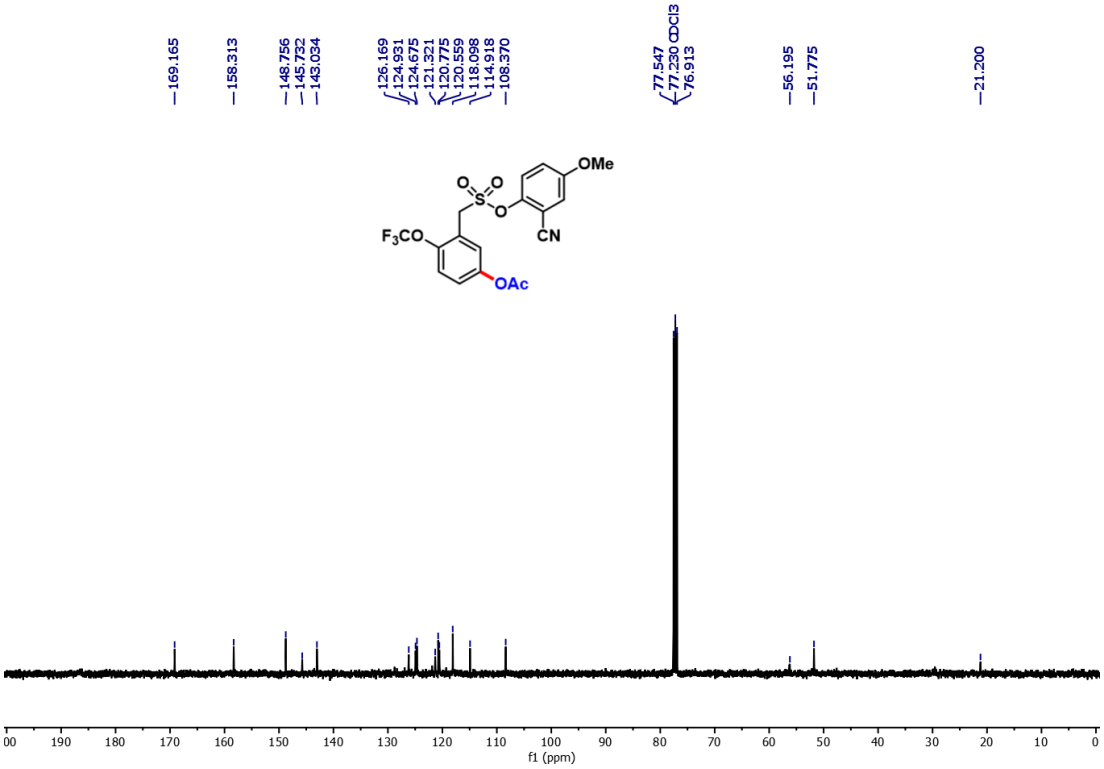
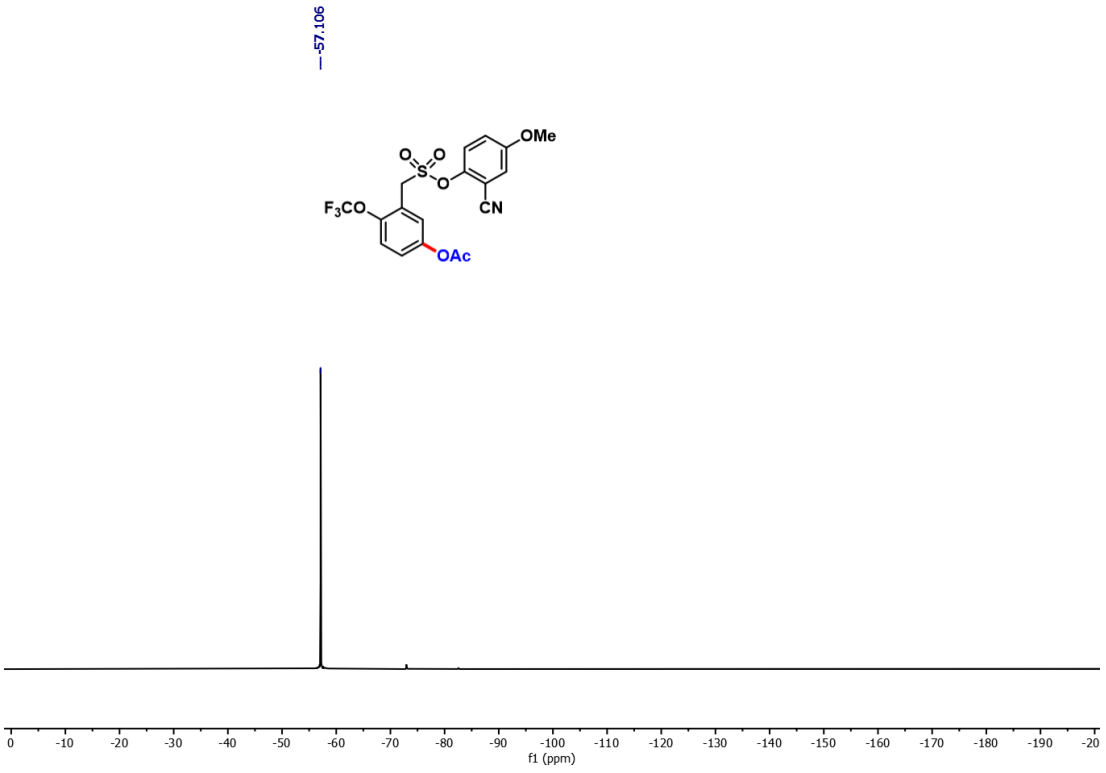
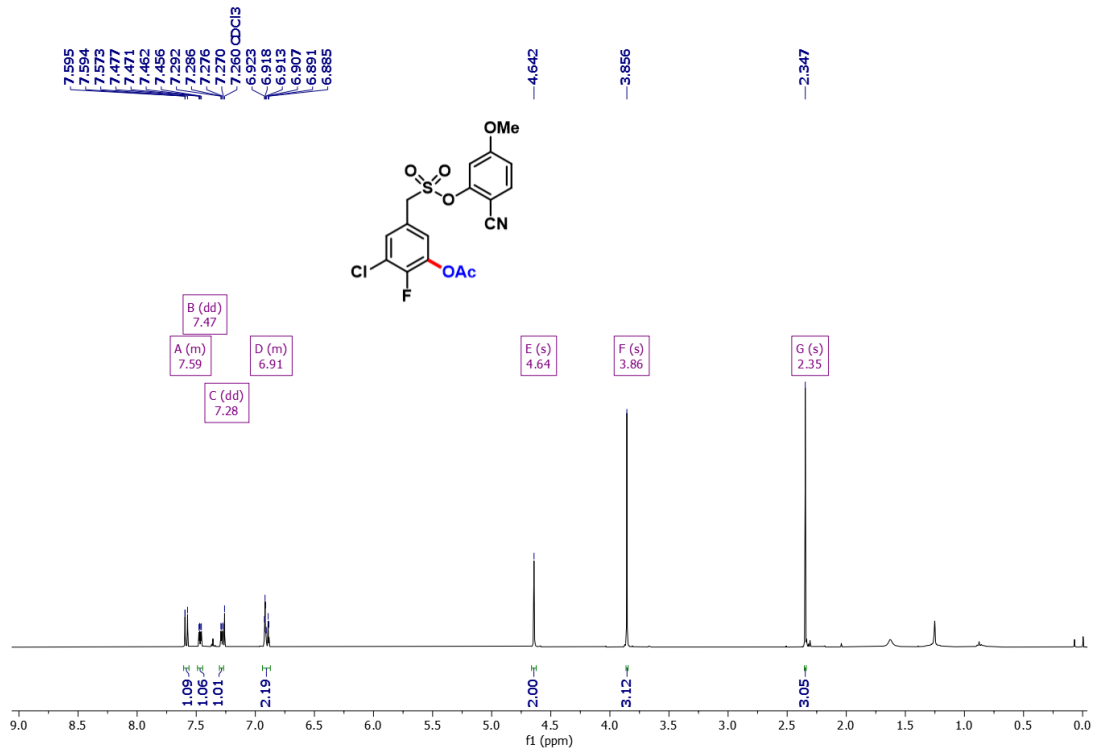
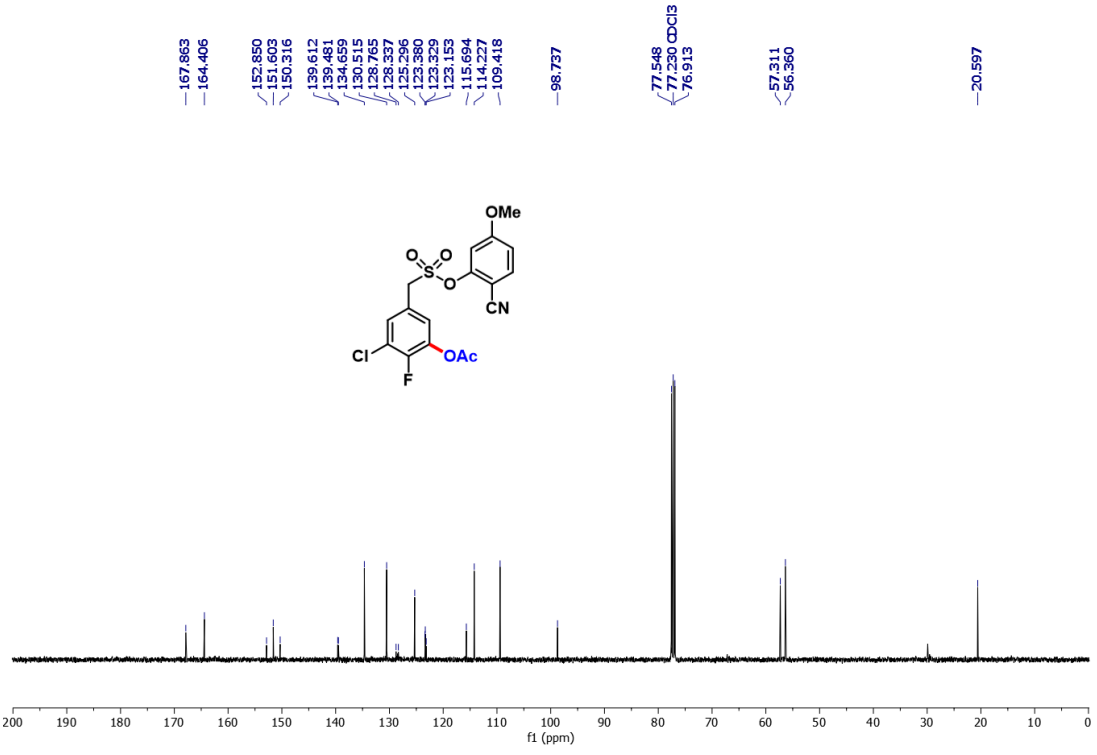
7.326
7.324
7.304
7.302
CDCl3
7.260
7.248
7.241
7.225
7.218
7.142
7.141
7.134
7.133
7.128
7.120
7.105
7.097
4.783
3.829
2.308
OMe
CN
F3CO
OAc
D (dd) 7.23
B (m) 7.36
A (d) 7.45
C (dd) 7.31
E (m) 7.12
F (s) 4.78
G (s) 3.83
H (s) 2.31
1.00
1.38
1.04
0.96
1.97
1.94
2.86
2.81
f1 (ppm)


169.165
158.313
148.756
145.732
143.034
126.169
124.931
124.675
121.321
120.775
120.559
118.098
114.918
108.370
77.547
77.230
CDCl3
76.913
56.195
51.775
21.200
OMe
CN
F3CO
OAc
f1 (ppm)


-57.106
OMe
CN
F3CO
OAc
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-20
f1 (ppm)


7.595
7.594
7.573
7.477
7.471
7.462
7.456
7.292
7.286
7.276
7.270
7.260 CDCl3
6.923
6.918
6.913
6.907
6.891
6.885
4.642
3.856
2.347
OMe
CN
O
S
O
O
Cl
OAc
F
B (dd)
7.47
A (m)
7.59
C (dd)
7.28
D (m)
6.91
E (s)
4.64
F (s)
3.86
G (s)
2.35
1.09
1.06
1.01
2.19
2.00
3.12
3.05
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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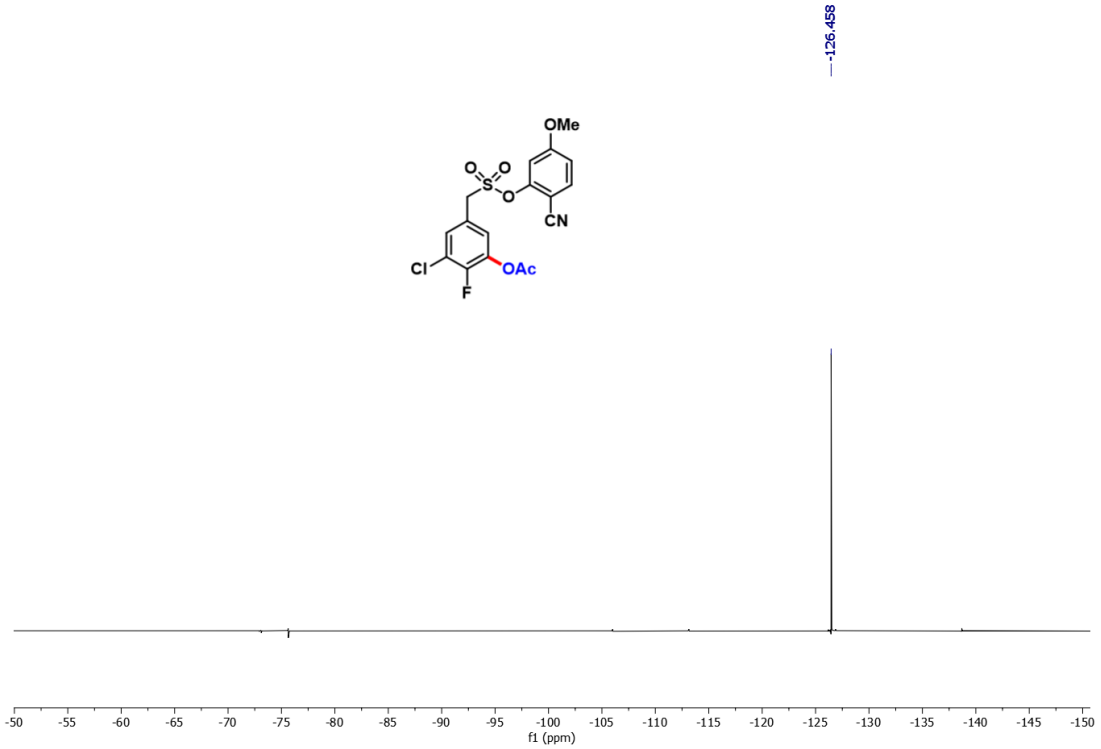
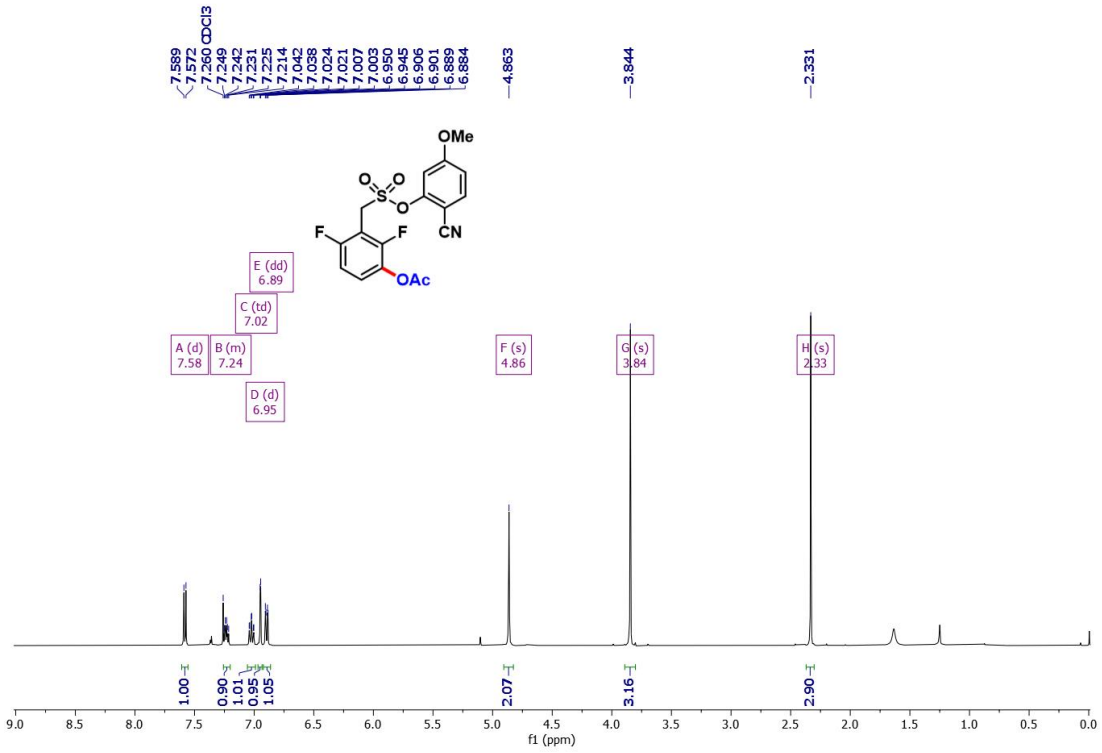
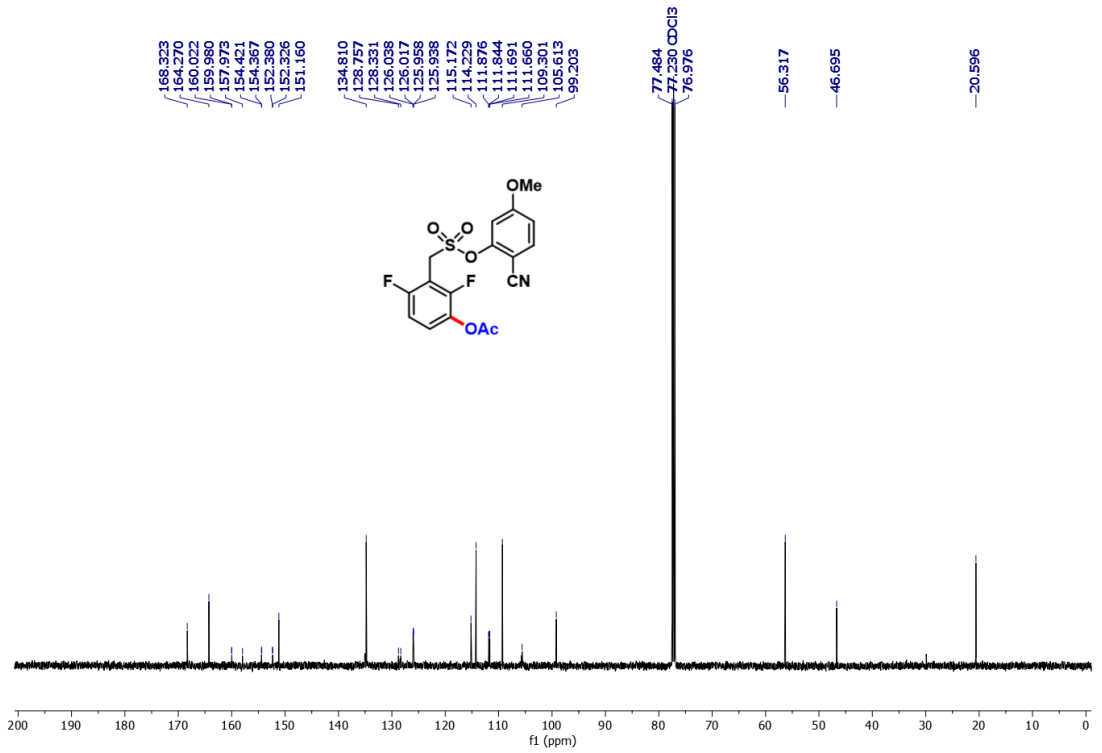
164.406
152.850
151.603
150.316
139.612
139.481
134.659
130.515
128.765
128.337
125.296
123.380
123.329
123.153
115.694
114.227
109.418
98.737
77.548
77.230 CDCl3
76.913
57.311
56.360
20.597
OMe
CN
O
S
O
O
Cl
OAc
F
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


-126.458
OMe
CN
Cl
OAc
F
-50 -55 -60 -65 -70 -75 -80 -85 -90 -95 -100 -105 -110 -115 -120 -125 -130 -135 -140 -145 -150
f1 (ppm)


7.589
7.572
CDCl3
7.260
7.249
7.242
7.231
7.225
7.214
7.042
7.038
7.024
7.021
7.007
7.003
6.950
6.945
6.906
6.901
6.889
6.884
4.863
3.844
2.331
OMe
O
O
S
O
F
F
CN
OAc
E (dd)
6.89
C (td)
7.02
A (d)
7.58
B (m)
7.24
D (d)
6.95
F (s)
4.86
G (s)
3.84
H (s)
2.33
1.00
0.90
1.01
0.95
1.05
2.07
3.16
2.90
f1 (ppm)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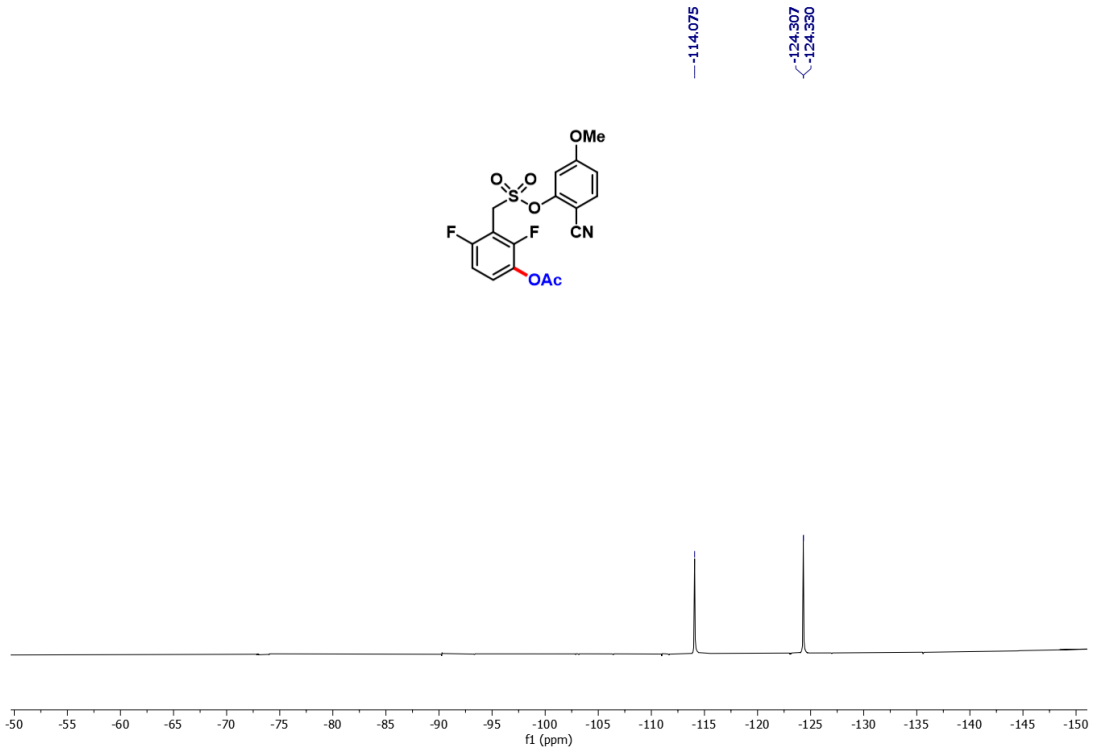
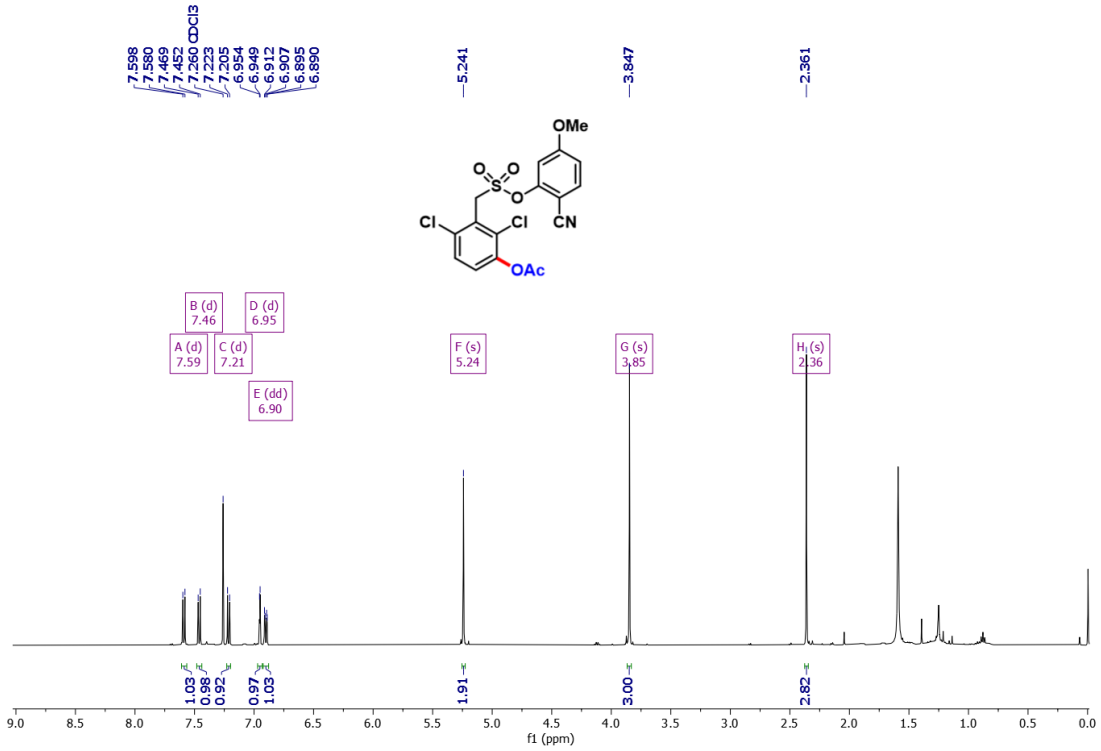
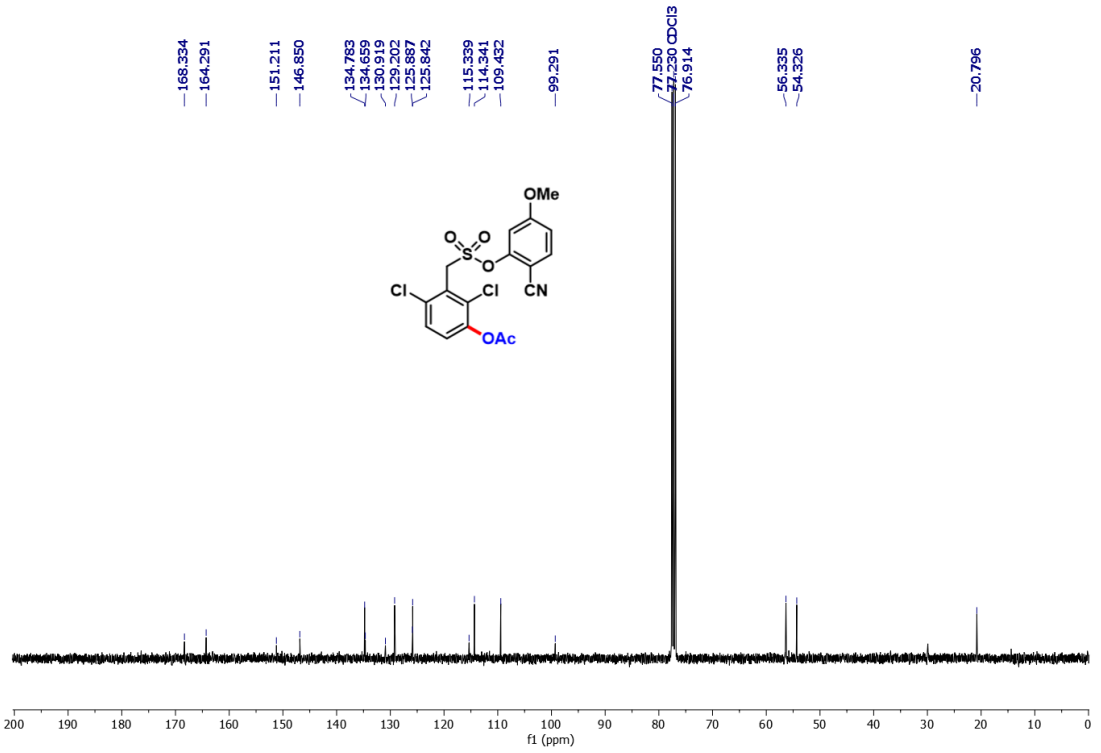
164.270
160.022
159.980
157.973
154.421
154.367
152.380
152.326
151.160
134.810
128.757
128.331
126.038
126.017
125.958
125.938
115.172
114.229
111.876
111.844
111.691
111.660
109.301
105.613
99.203
77.484
77.230
CDCl3
76.976
56.317
46.695
20.596
OMe
O
O
S
O
F
F
CN
OAc
f1 (ppm)


-114.075
-124.307
-124.330
OMe
O
O
S
O
F
F
CN
OAc
-50
-55
-60
-65
-70
-75
-80
-85
-90
-95
-100
-105
-110
-115
-120
-125
-130
-135
-140
-145
-150
f1 (ppm)


7.598
7.580
7.469
7.452
7.260 CDCl3
7.223
7.205
6.954
6.949
6.912
6.907
6.895
6.890
5.241
3.847
2.361
OMe
O
S
O
O
Cl
Cl
CN
OAc
B (d) 7.46
D (d) 6.95
A (d) 7.59
C (d) 7.21
E (dd) 6.90
F (s) 5.24
G (s) 3.85
H (s) 2.36
1.03
0.98
0.92
0.97
1.03
1.91
3.00
2.82
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)


168.334
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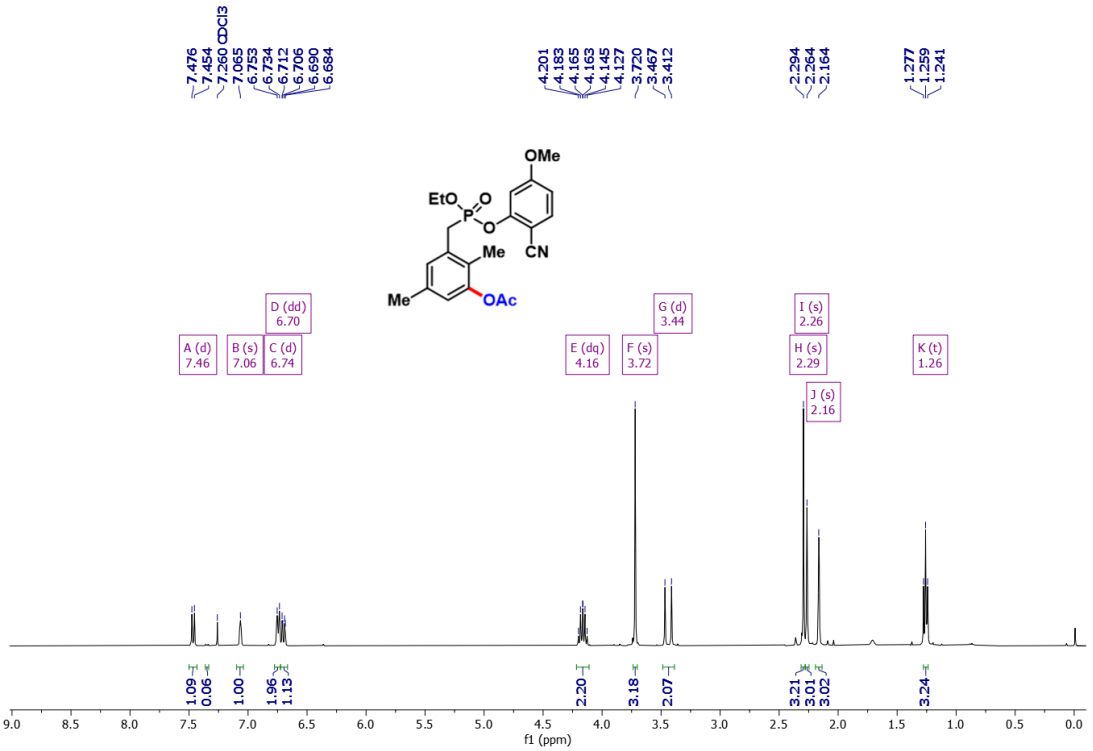
151.211
146.850
134.783
134.659
130.919
129.202
125.887
125.842
115.339
114.341
109.432
99.291
77.550
77.230 CDCl3
76.914
56.335
54.326
20.796
OMe
O
S
O
O
Cl
Cl
CN
OAc
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)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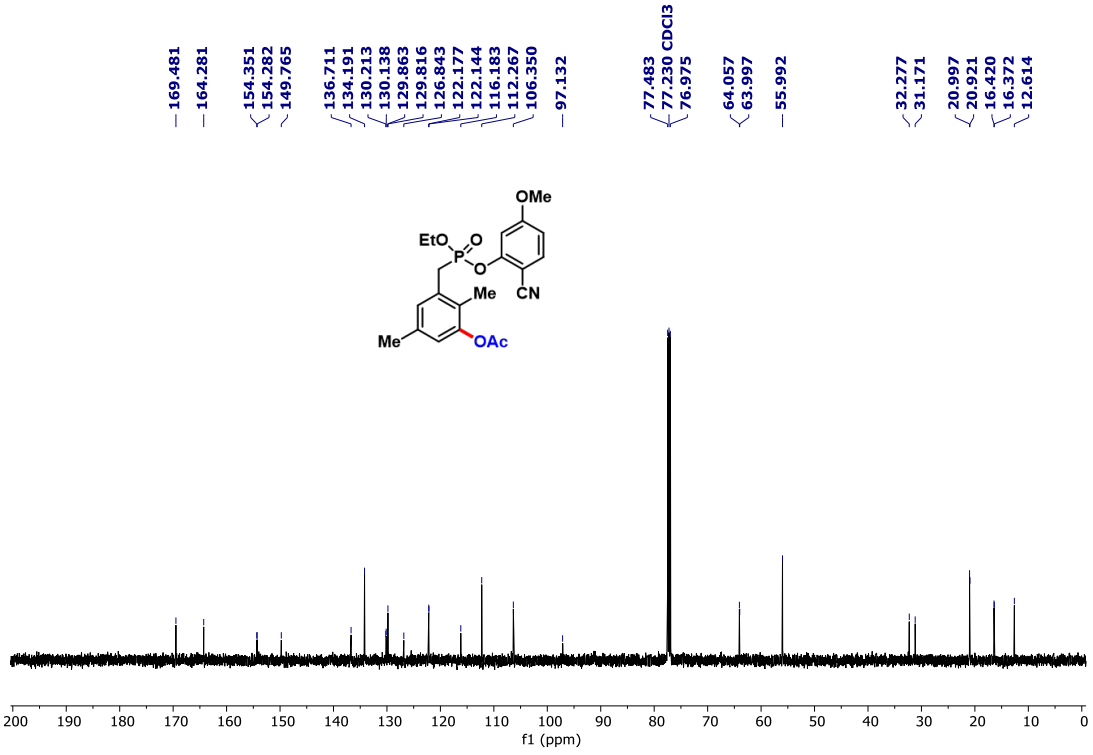
7.454
7.260 CDCl3
7.065
6.753
6.734
6.712
6.706
6.690
6.684
4.201
4.183
4.165
4.163
4.145
4.127
3.720
3.467
3.412
2.294
2.264
2.164
1.277
1.259
1.241
OMe
EtO
P
O
O
Me
CN
Me
OAc
A (d) 7.46
B (s) 7.06
C (d) 6.74
D (dd) 6.70
E (dq) 4.16
F (s) 3.72
G (d) 3.44
H (s) 2.29
I (s) 2.26
J (s) 2.16
K (t) 1.26
1.09
0.06
1.00
1.96
1.13
2.20
3.18
2.07
3.21
3.01
3.02
3.24
f1 (ppm)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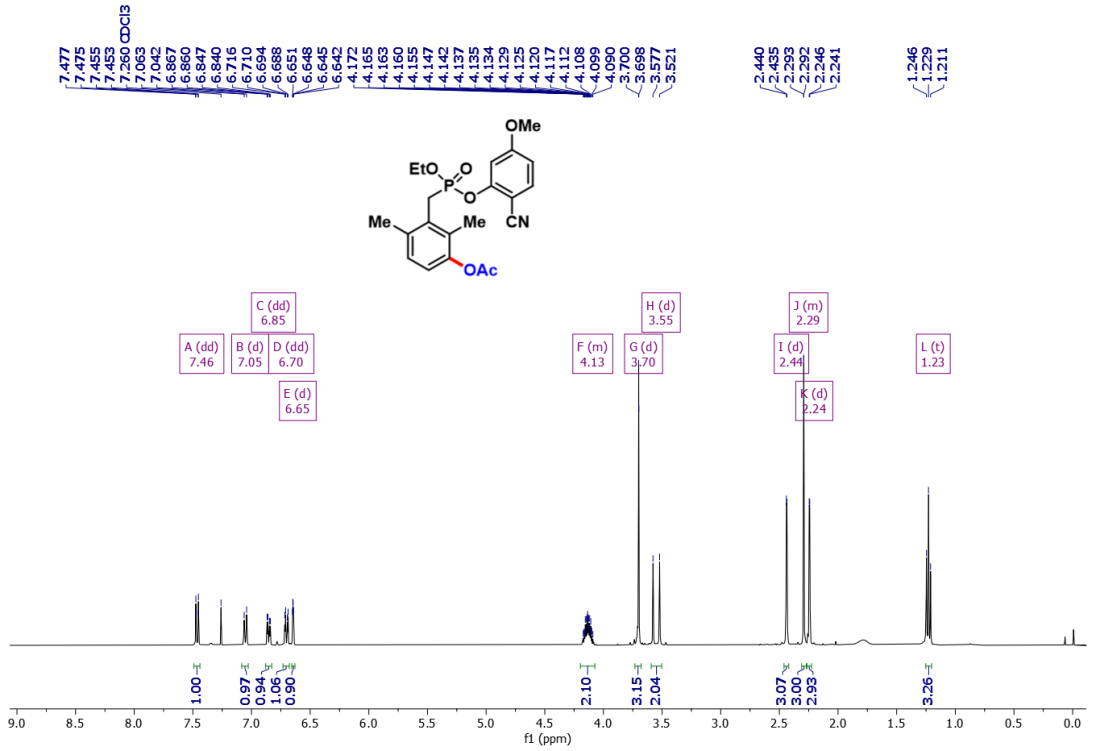
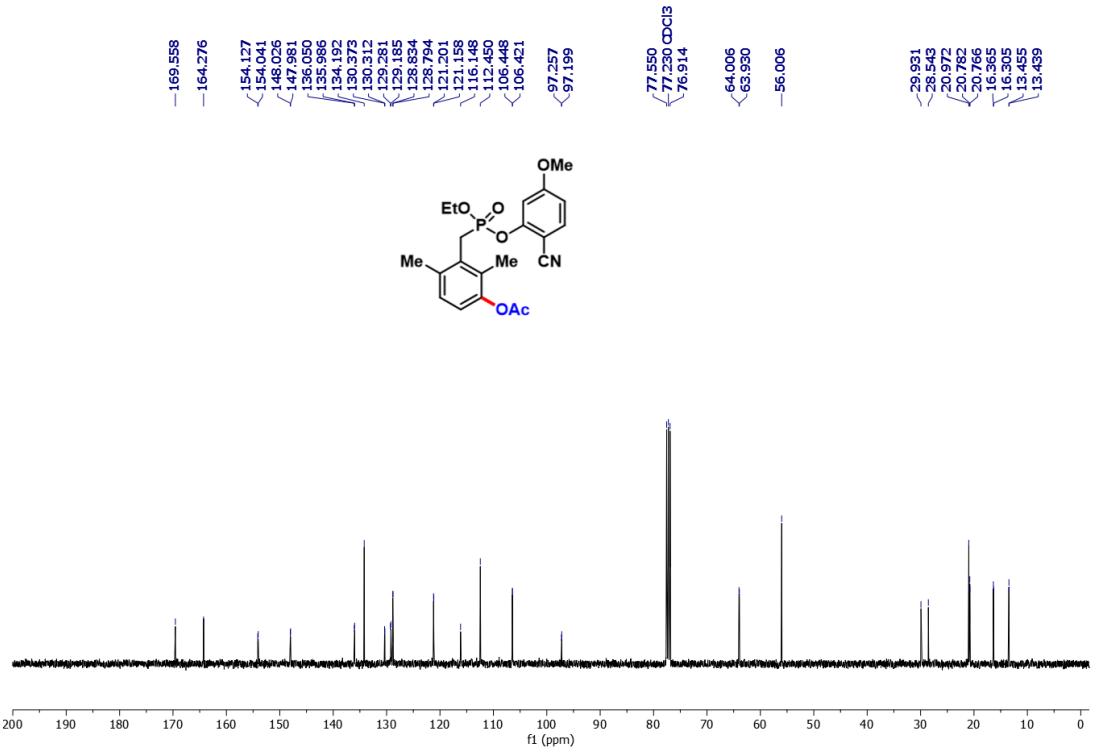
164.281
154.351
154.282
149.765
136.711
134.191
130.213
130.138
129.863
129.816
126.843
122.177
122.144
116.183
112.267
106.350
97.132
77.483
77.230 CDCl3
76.975
64.057
63.997
55.992
32.277
31.171
20.997
20.921
16.420
16.372
12.614
OMe
EtO
P
O
O
Me
CN
Me
OAc
f1 (ppm)


7.477
7.475
7.455
7.453
7.260 CDCl3
7.063
7.042
6.867
6.860
6.847
6.840
6.716
6.710
6.694
6.688
6.651
6.648
6.645
6.642
4.172
4.165
4.163
4.160
4.155
4.147
4.142
4.137
4.135
4.134
4.129
4.125
4.120
4.117
4.112
4.108
4.099
4.090
3.700
3.698
3.577
3.521
2.440
2.435
2.293
2.292
2.246
2.241
1.246
1.229
1.211
OMe
EtO
P
O
O
Me
Me
CN
OAc
A (dd) 7.46
B (d) 7.05
C (dd) 6.85
D (dd) 6.70
E (d) 6.65
F (m) 4.13
G (d) 3.70
H (d) 3.55
I (d) 2.44
J (m) 2.29
K (d) 2.24
L (t) 1.23
1.00
0.97
0.94
1.06
0.90
2.10
3.15
2.04
3.07
3.00
2.93
3.26
f1 (ppm)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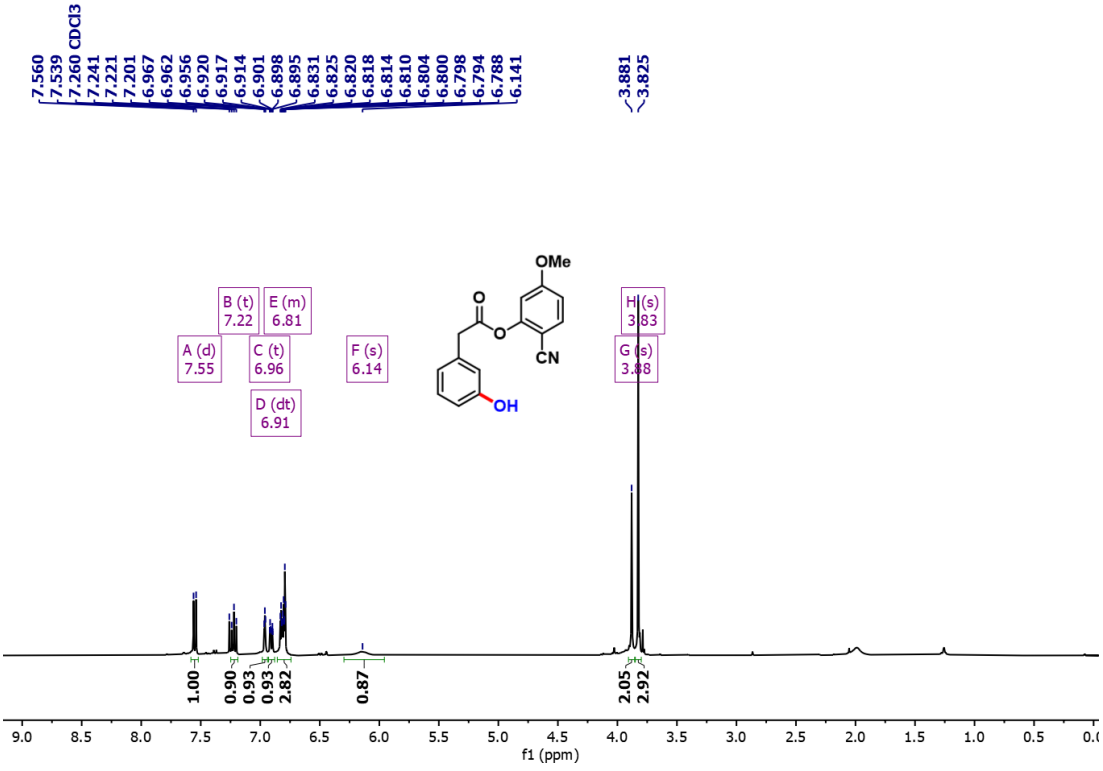
130.373
130.312
129.281
129.185
128.834
128.794
121.201
121.158
116.148
112.450
106.448
106.421
97.257
97.199
77.550 CDCl3
77.230
76.914
64.006
63.930
56.006
29.931
28.543
20.972
20.782
20.766
16.365
16.305
13.455
13.439
OMe
EtO
P
O
O
Me
Me
CN
OAc
f1 (ppm)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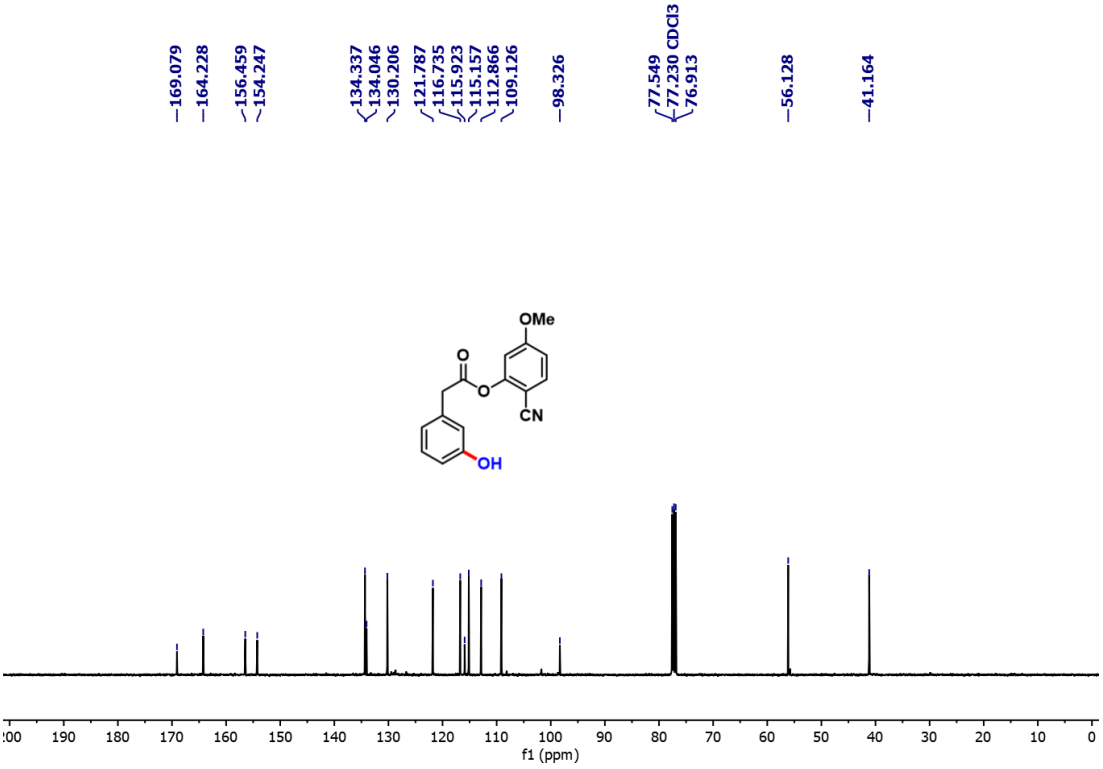
7.539
7.260 CDCl3
7.241
7.221
7.201
6.967
6.962
6.956
6.920
6.917
6.914
6.901
6.898
6.895
6.831
6.825
6.820
6.818
6.814
6.810
6.804
6.800
6.798
6.794
6.788
6.141
3.881
3.825
B (t) 7.22
E (m) 6.81
A (d) 7.55
C (t) 6.96
D (dt) 6.91
F (s) 6.14
H (s) 3.83
G (s) 3.48
OMe
O
O
CN
OH
1.00
0.90
0.93
0.93
2.82
0.87
2.05
2.92
f1 (ppm)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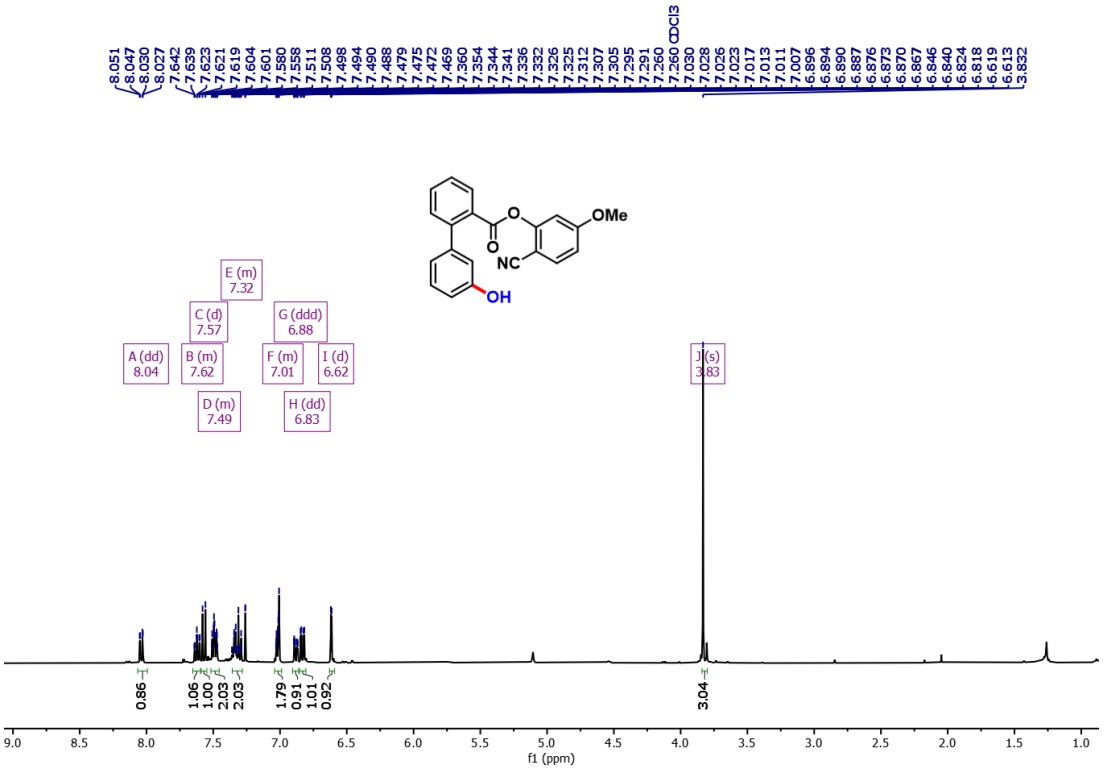
156.459
154.247
134.337
134.046
130.206
121.787
116.735
115.923
115.157
112.866
109.126
98.326
77.549
77.230 CDCl3
76.913
56.128
41.164
OMe
O
O
CN
OH
f1 (ppm)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8.047
8.030
8.027
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7.639
7.623
7.621
7.619
7.604
7.601
7.580
7.558
7.511
7.508
7.498
7.494
7.490
7.488
7.479
7.475
7.472
7.469
7.360
7.354
7.344
7.341
7.336
7.332
7.326
7.325
7.312
7.307
7.305
7.295
7.291
7.260 CDCl3
7.030
7.028
7.026
7.023
7.017
7.013
7.011
7.007
6.896
6.894
6.890
6.887
6.876
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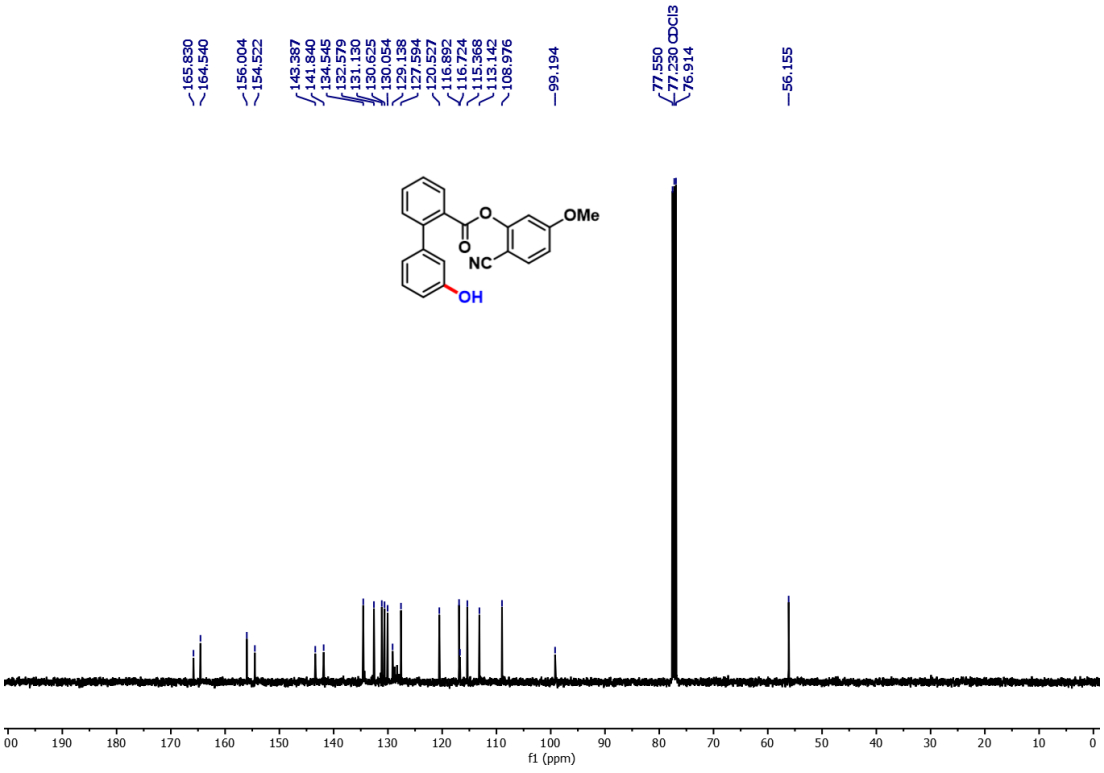
6.846
6.840
6.824
6.818
6.619
6.613
3.832
OMe
O
O
NC
OH
E (m)
7.32
C (d)
7.57
G (ddd)
6.88
A (dd)
8.04
B (m)
7.62
F (m)
7.01
I (d)
6.62
D (m)
7.49
H (dd)
6.83
J (s)
3.83
0.86
1.06
1.00
2.03
2.03
1.79
0.91
1.01
0.92
3.04
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
f1 (ppm)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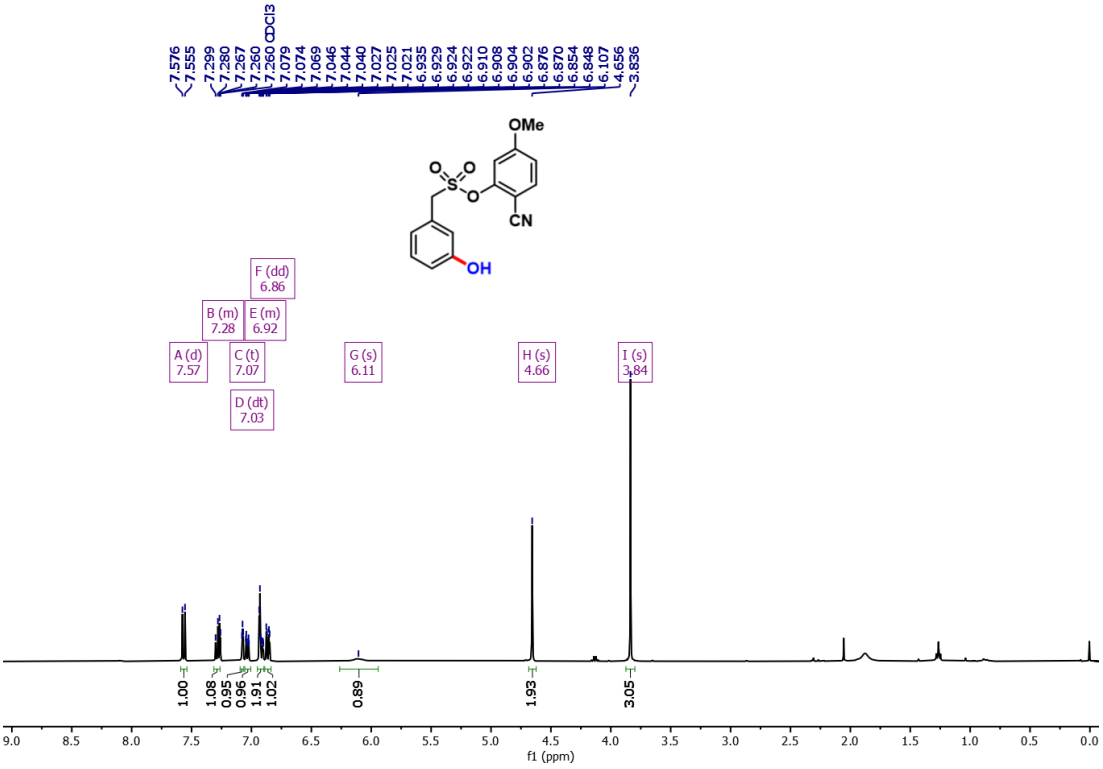
141.840
134.545
132.579
131.130
130.625
130.054
129.138
127.594
120.527
116.892
116.724
115.368
113.142
108.976
99.194
77.550
77.230 CDCl3
76.914
56.155
OMe
O
O
NC
OH
00
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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7.555
7.299
7.280
7.267
7.260 CDCl3
7.079
7.074
7.069
7.046
7.044
7.040
7.027
7.025
7.021
6.935
6.929
6.924
6.922
6.910
6.908
6.904
6.902
6.876
6.870
6.854
6.848
6.107
4.656
3.836
OMe
CN
OH
F (dd) 6.86
B (m) 7.28
E (m) 6.92
A (d) 7.57
C (t) 7.07
G (s) 6.11
H (s) 4.66
I (s) 3.84
D (dt) 7.03
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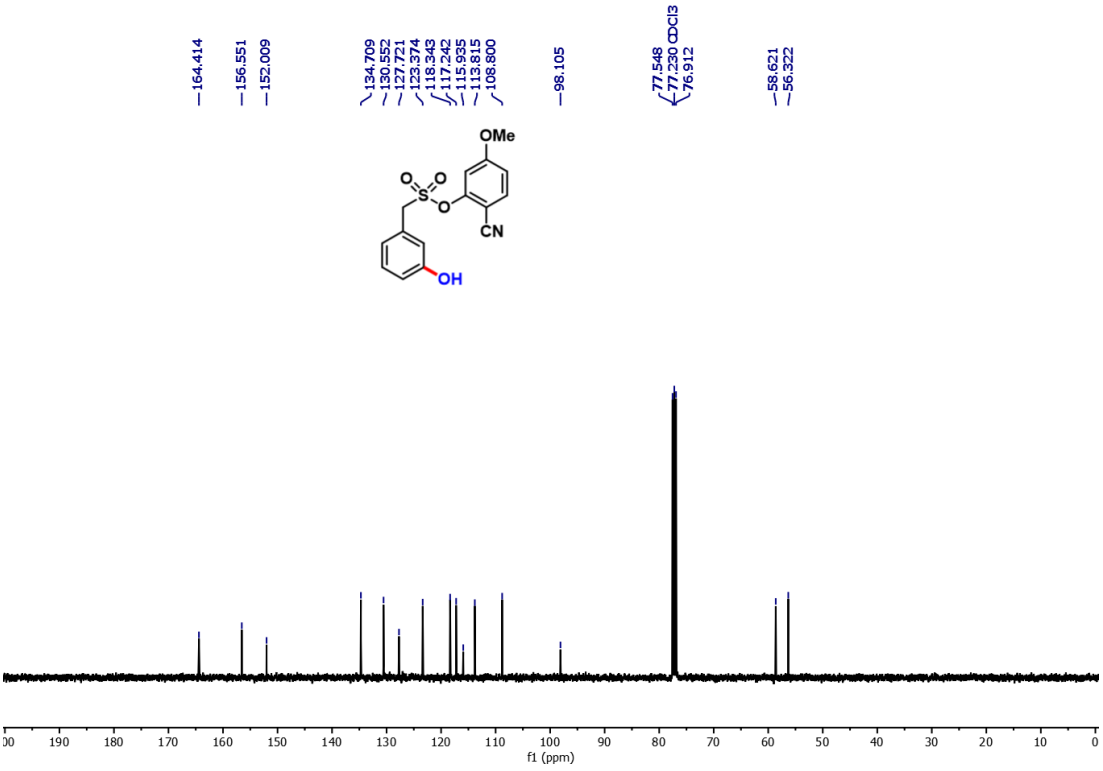
1.08
0.95
0.96
1.91
1.02
0.89
1.93
3.05
f1 (ppm)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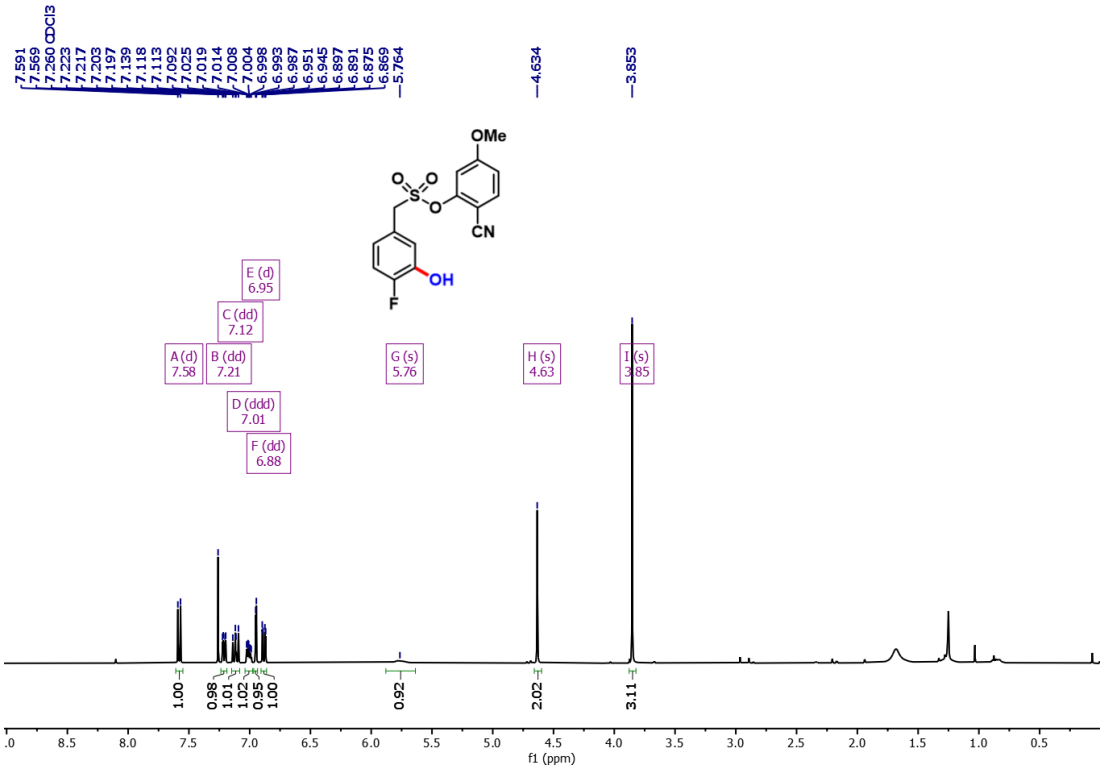
152.009
134.709
130.552
127.721
123.374
118.343
117.242
115.935
113.815
108.800
98.105
77.548
77.230 CDCl3
76.912
58.621
56.322
OMe
CN
OH
f1 (ppm)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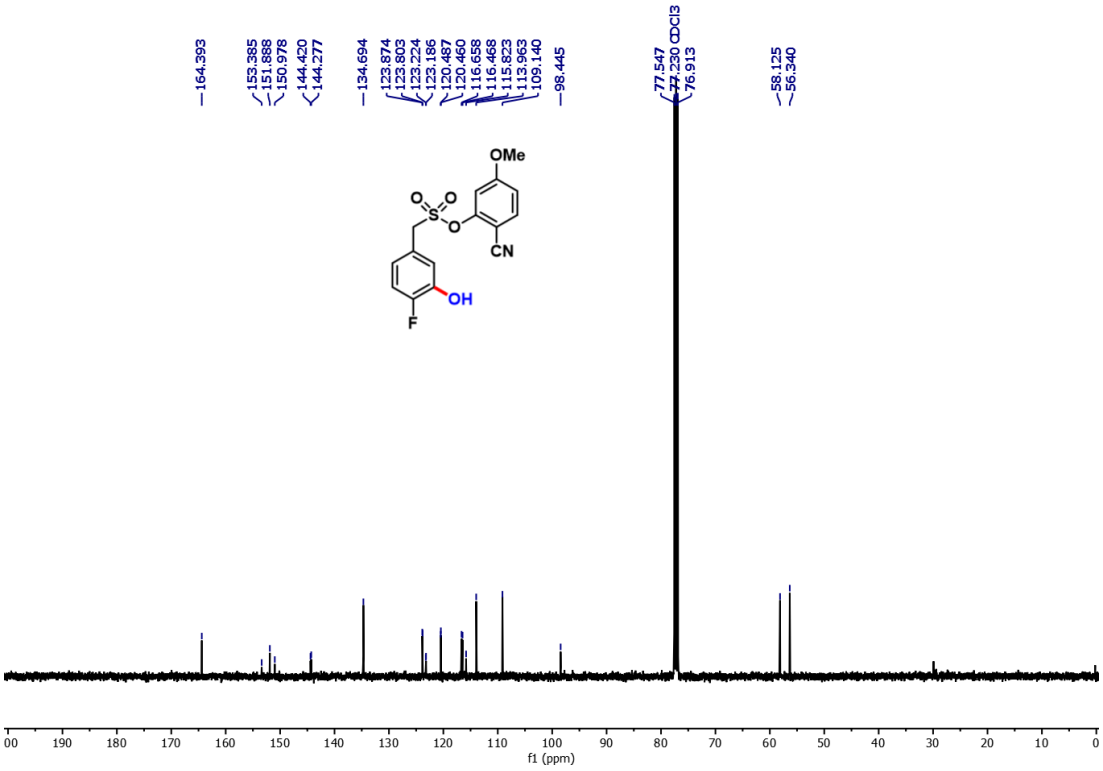
7.569
7.260 CDCl3
7.223
7.217
7.203
7.197
7.139
7.118
7.113
7.092
7.025
7.019
7.014
7.008
7.004
6.998
6.993
6.987
6.951
6.945
6.897
6.891
6.875
6.869
5.764
4.634
3.853
OMe
CN
OH
F
E (d) 6.95
C (dd) 7.12
A (d) 7.58
B (dd) 7.21
G (s) 5.76
H (s) 4.63
I (s) 3.85
D (ddd) 7.01
F (dd) 6.88
1.00
0.98
1.01
1.02
0.95
1.00
0.92
2.02
3.11
f1 (ppm)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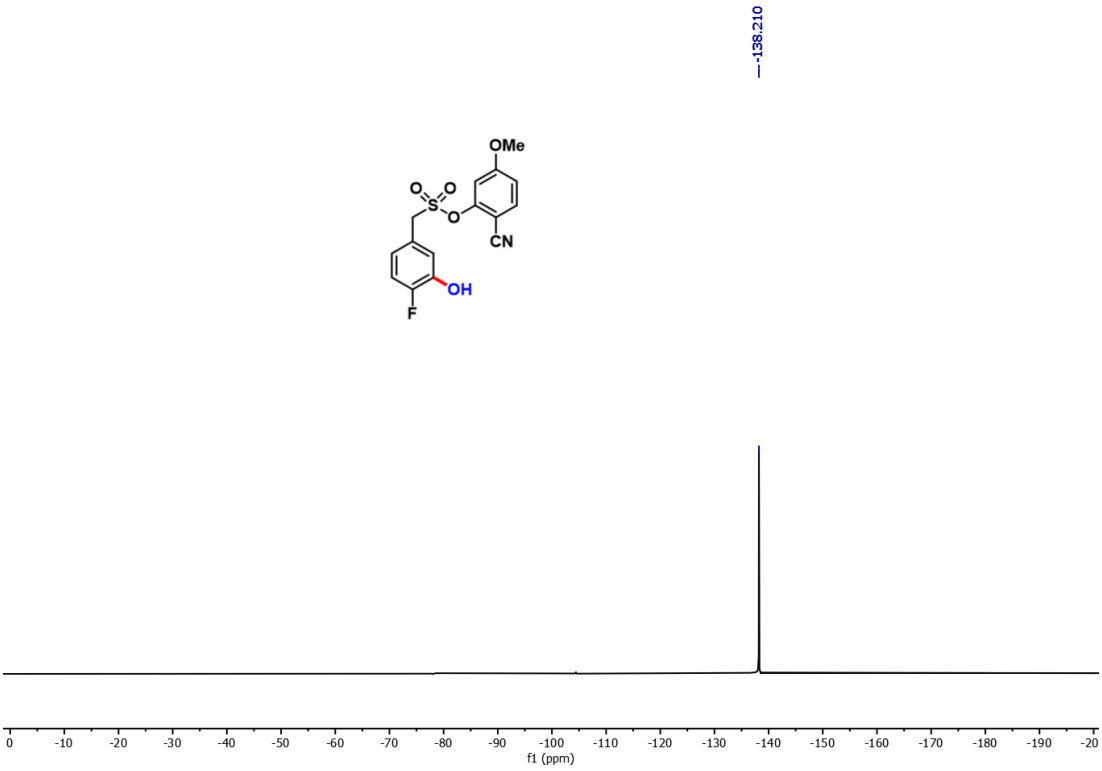
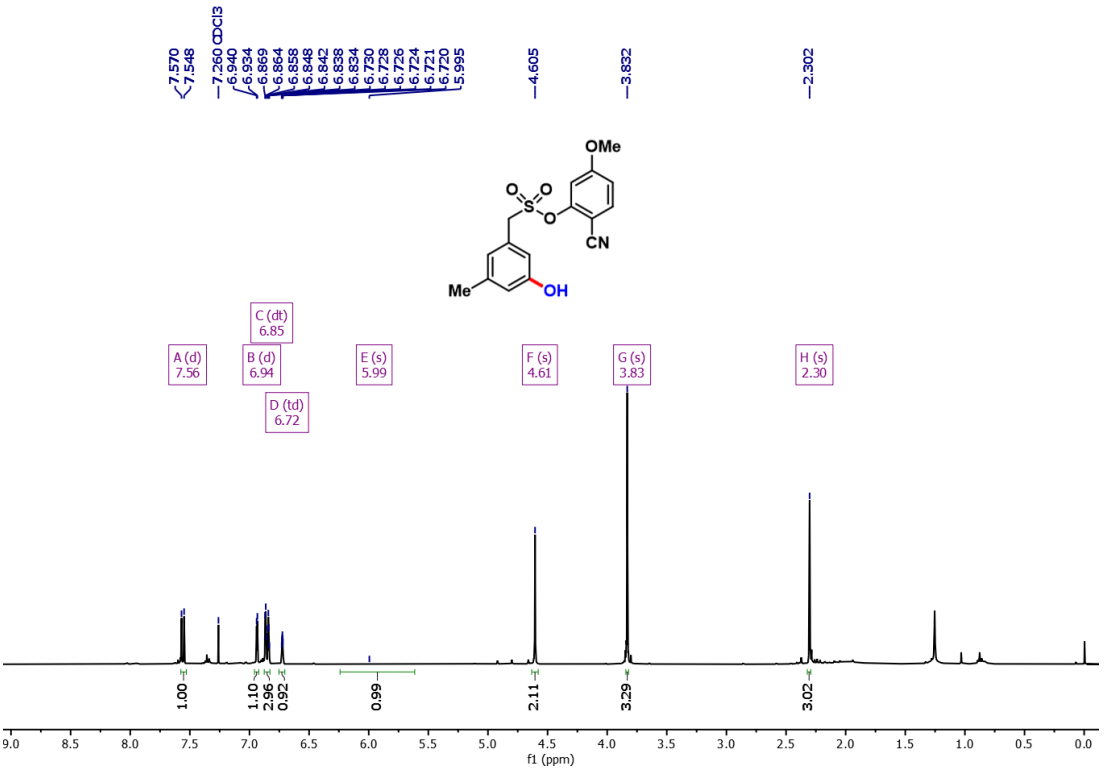
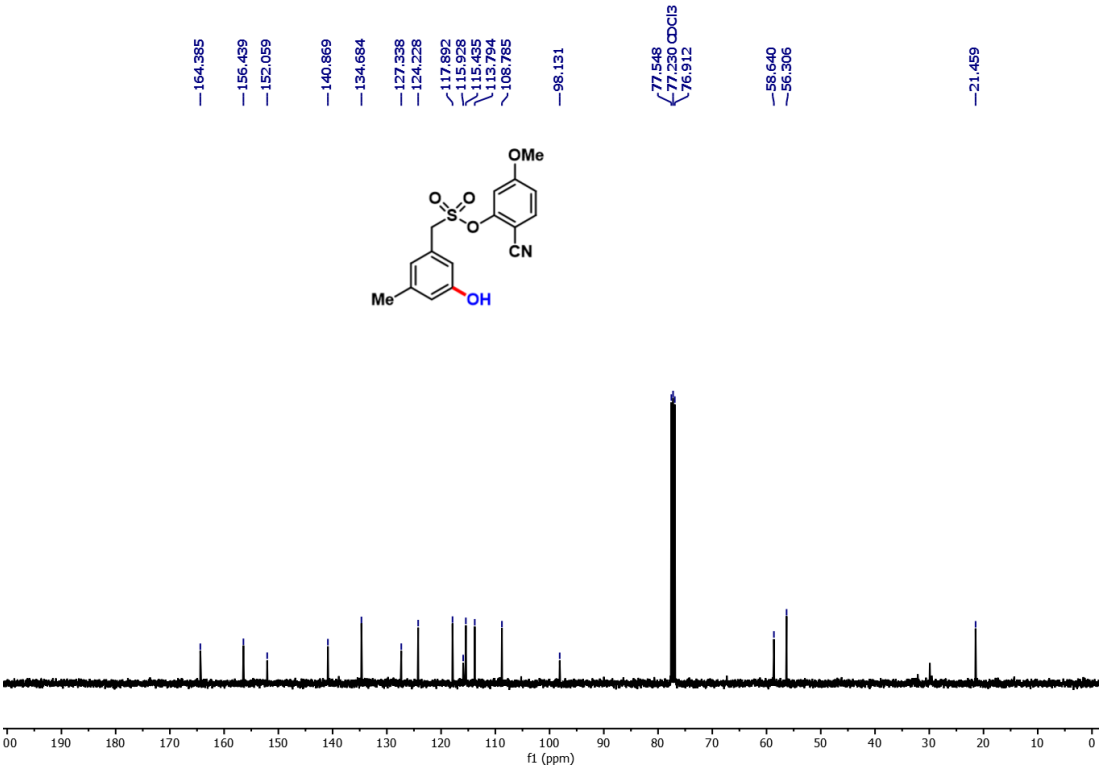
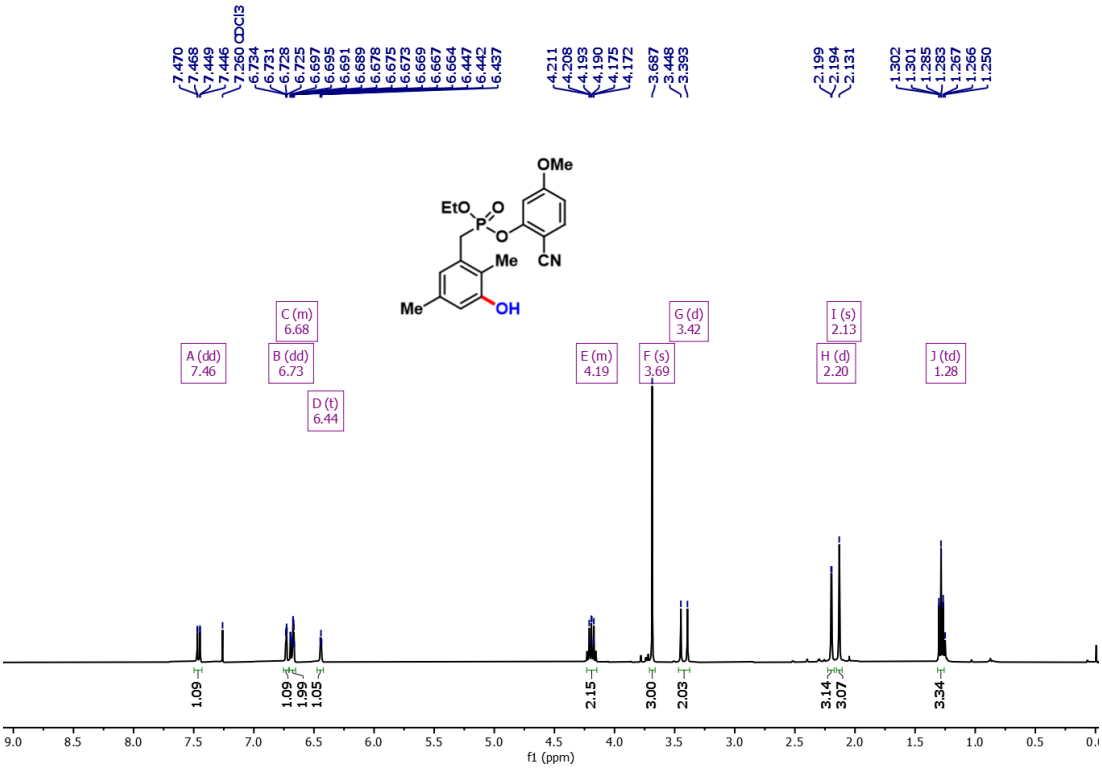
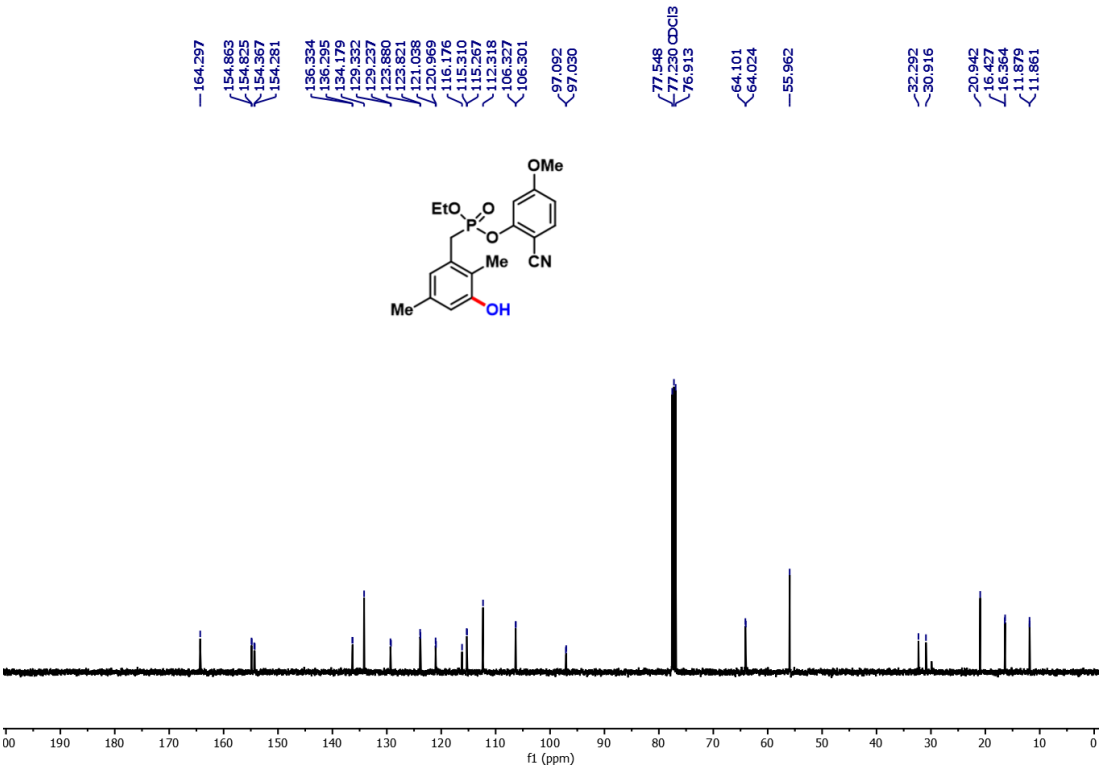
150.978
144.420
144.277
134.694
123.874
123.803
123.224
123.186
120.487
120.460
116.658
116.468
115.823
113.963
109.140
98.445
77.547
77.230 CDCl3
76.913
58.125
56.340
OMe
CN
OH
F
f1 (ppm)

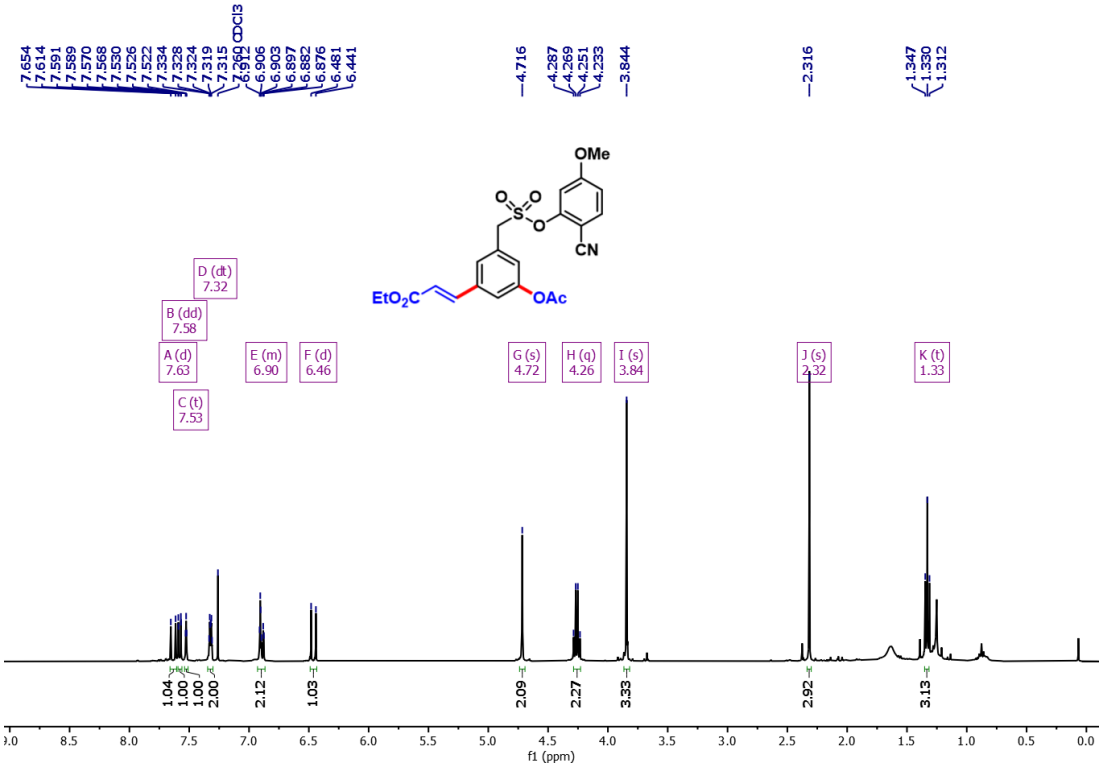

-138.210
OMe
O
S
O
O
CN
OH
F
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-20
f1 (ppm)

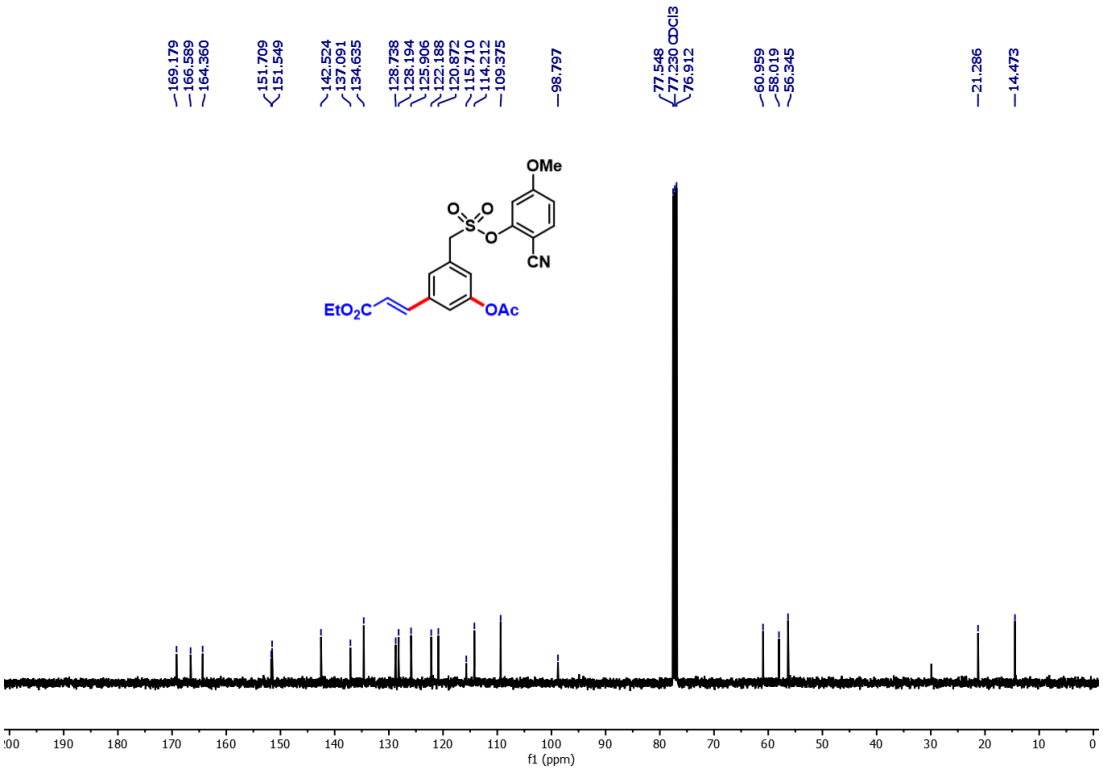

7.570
7.548
7.260 CDCl3
6.940
6.934
6.869
6.864
6.858
6.848
6.842
6.838
6.834
6.730
6.728
6.726
6.724
6.721
6.720
5.995
4.605
3.832
2.302
OMe
CN
Me
OH
A (d) 7.56
B (d) 6.94
C (dt) 6.85
D (td) 6.72
E (s) 5.99
F (s) 4.61
G (s) 3.83
H (s) 2.30
1.00
1.10
2.96
0.92
0.99
2.11
3.29
3.02
f1 (ppm)

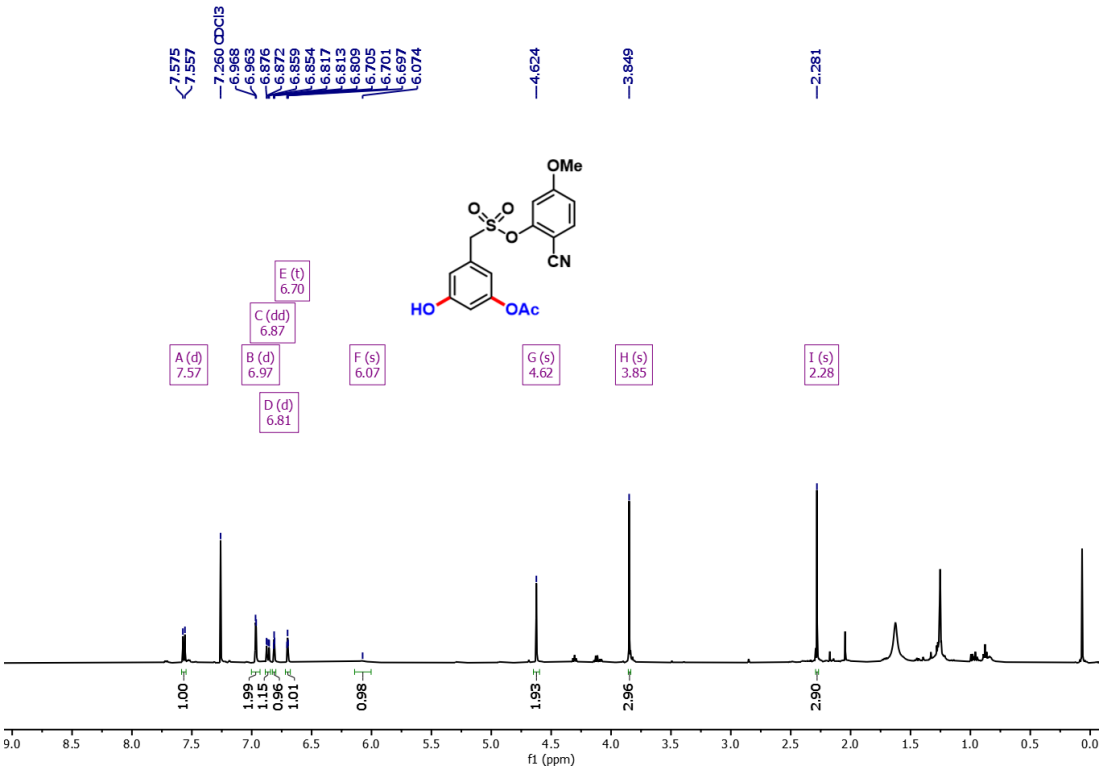

164.385
156.439
152.059
140.869
134.684
127.338
124.228
117.892
115.928
115.435
113.794
108.785
98.131
77.548
77.230 CDCl3
76.912
58.640
56.306
21.459
OMe
CN
Me
OH
f1 (ppm)

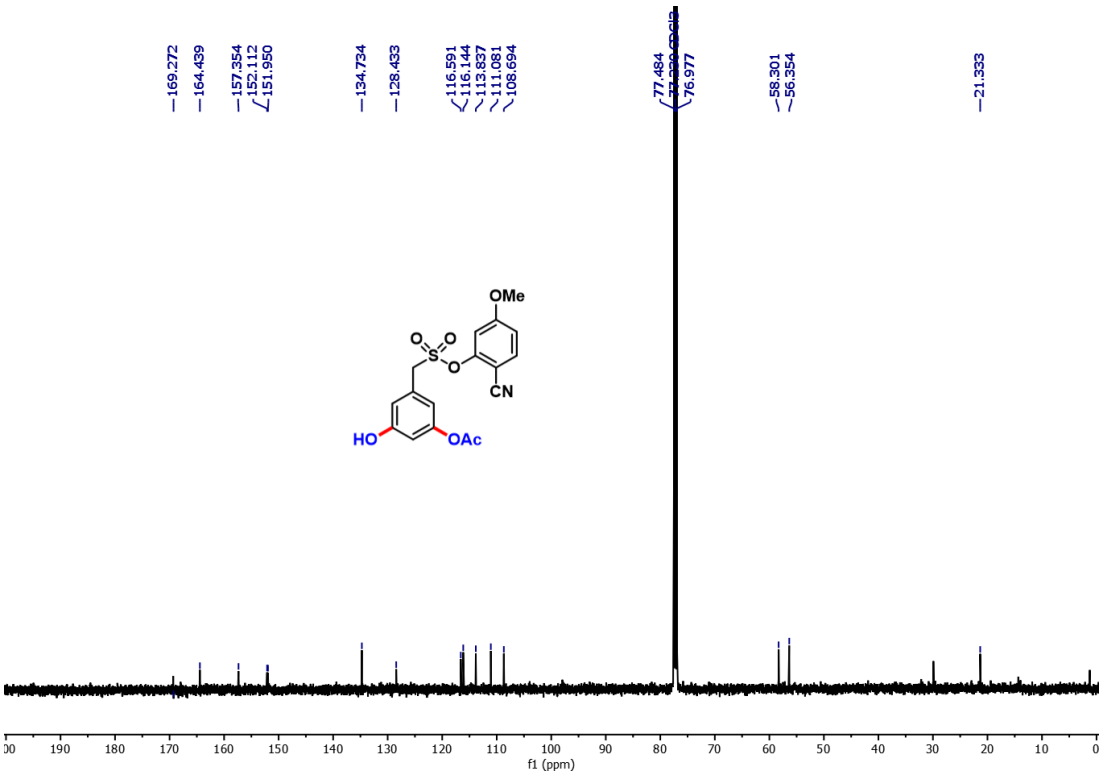

7.470
7.468
7.449
7.446
7.260 CDCl3
6.734
6.731
6.728
6.725
6.697
6.695
6.691
6.689
6.678
6.675
6.673
6.669
6.667
6.664
6.447
6.442
6.437
4.211
4.208
4.193
4.190
4.175
4.172
3.687
3.448
3.393
2.199
2.194
2.131
1.302
1.301
1.285
1.283
1.267
1.266
1.250
OMe
EtO
P
O
O
Me
CN
Me
OH
A (dd) 7.46
B (dd) 6.73
C (m) 6.68
D (t) 6.44
E (m) 4.19
F (s) 3.69
G (d) 3.42
H (d) 2.20
I (s) 2.13
J (td) 1.28
1.09
1.09
1.99
1.05
2.15
3.00
2.03
3.14
3.07
3.34
f1 (ppm)

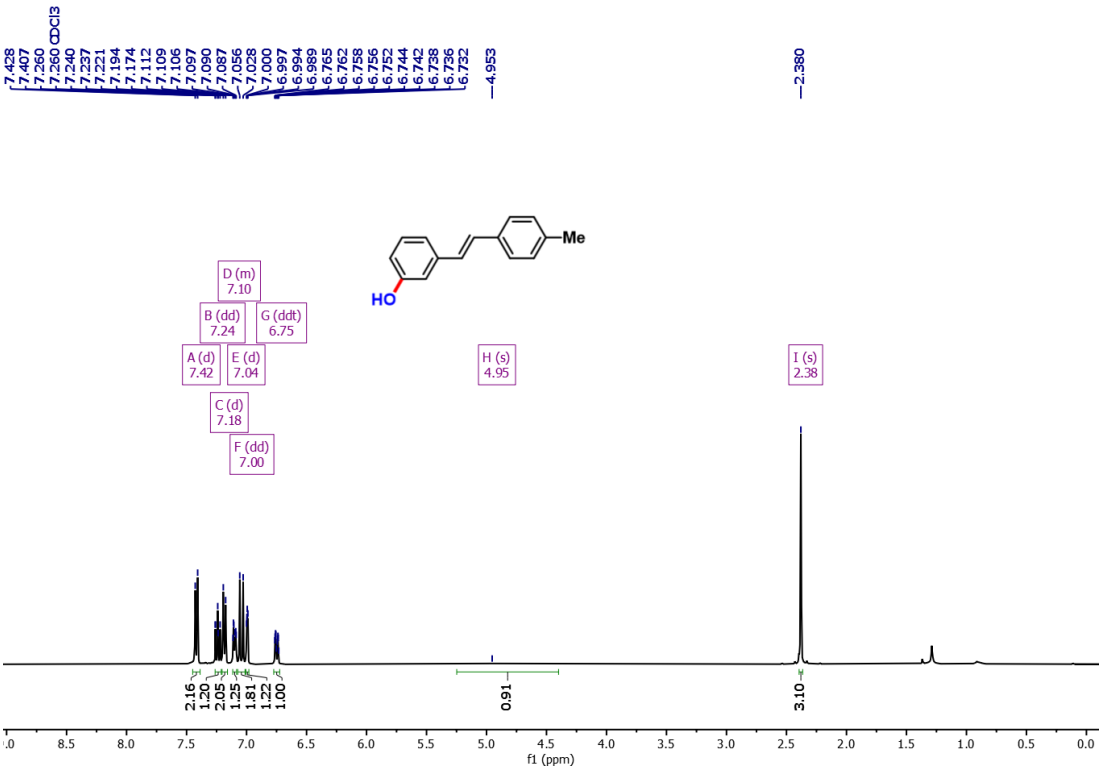

164.297
154.863
154.825
154.367
154.281
136.334
136.295
134.179
129.332
129.237
123.880
123.821
121.038
120.969
116.176
115.310
115.267
112.318
106.327
106.301
97.092
97.030
77.548
77.230 CDCl3
76.913
64.101
64.024
55.962
32.292
30.916
20.942
16.427
16.364
11.879
11.861
OMe
EtO
P
O
O
Me
CN
Me
OH
f1 (ppm)

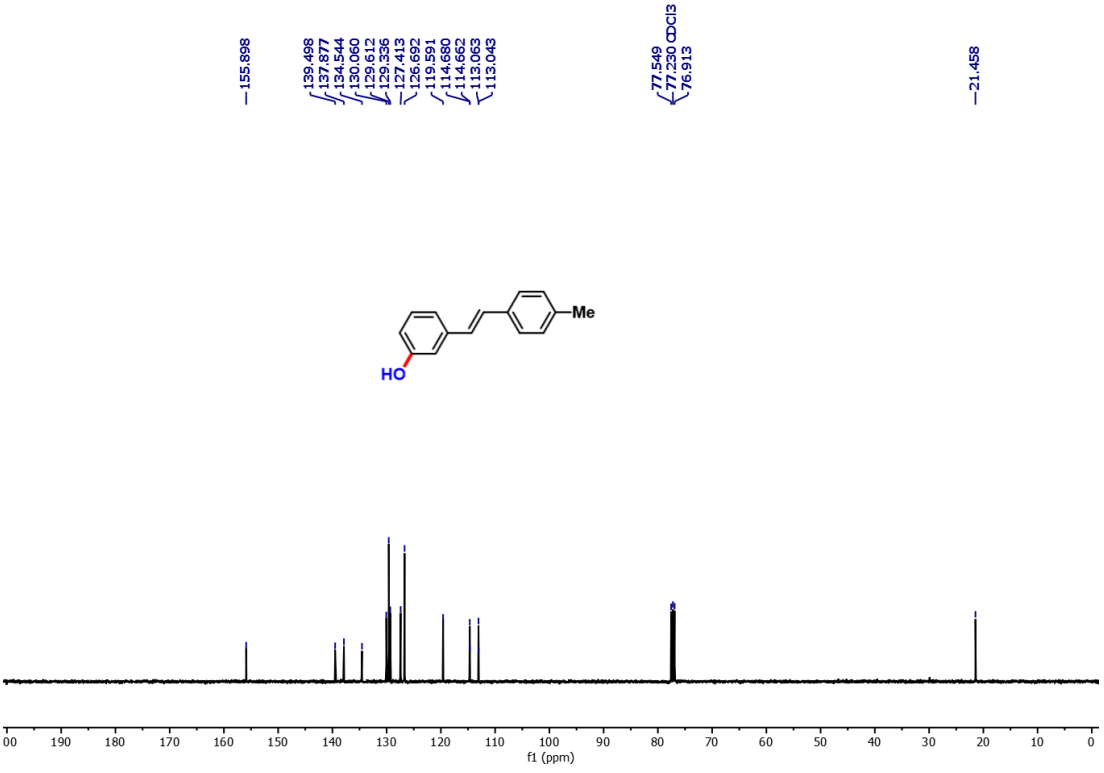

7.654
7.614
7.591
7.589
7.570
7.568
7.530
7.526
7.522
7.334
7.328
7.324
7.319
7.315
CDCl3
6.906
6.903
6.897
6.882
6.876
6.481
6.441
4.716
4.287
4.269
4.251
4.233
3.844
2.316
1.347
1.330
1.312
OMe
CN
EtO2C
OAc
D (dt) 7.32
B (dd) 7.58
A (d) 7.63
C (t) 7.53
E (m) 6.90
F (d) 6.46
G (s) 4.72
H (q) 4.26
I (s) 3.84
J (s) 2.32
K (t) 1.33
1.04
1.00
1.00
2.00
2.12
1.03
2.09
2.27
3.33
2.92
3.13
f1 (ppm)

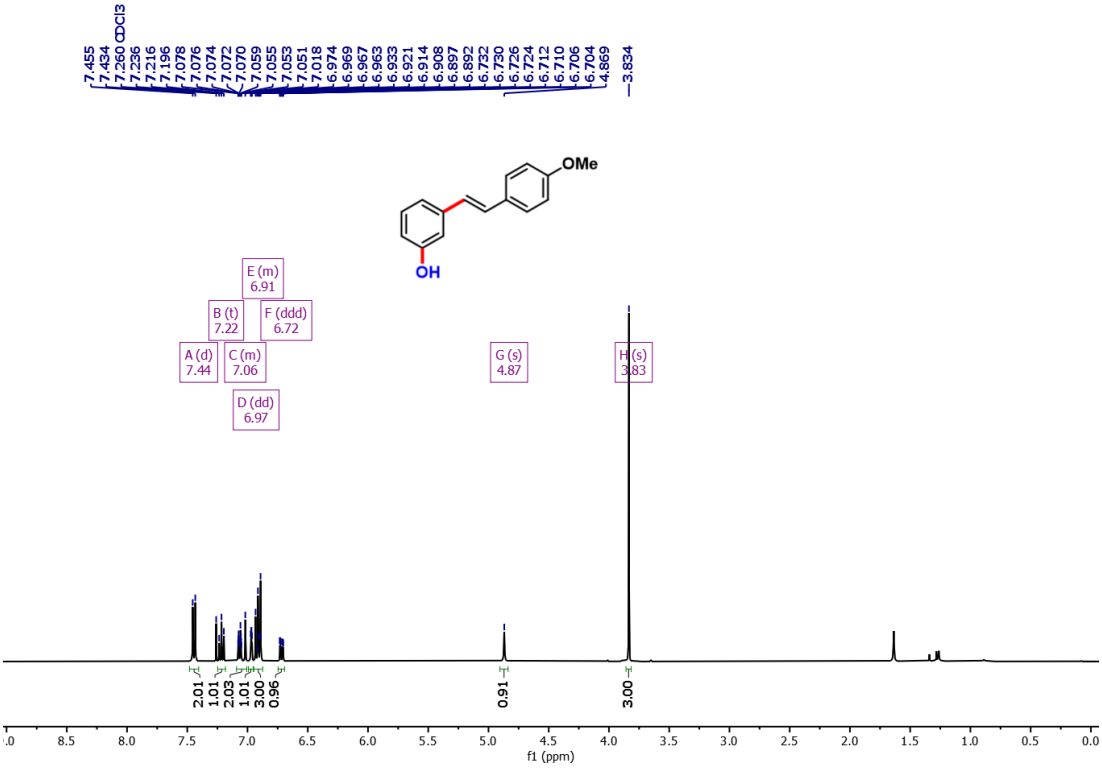

169.179
166.589
164.360
151.709
151.549
142.524
137.091
134.635
128.738
128.194
125.906
122.188
120.872
115.710
114.212
109.375
98.797
77.548
77.230 CDCl3
76.912
60.959
58.019
56.345
21.286
14.473
OMe
CN
EtO2C
OAc
f1 (ppm)

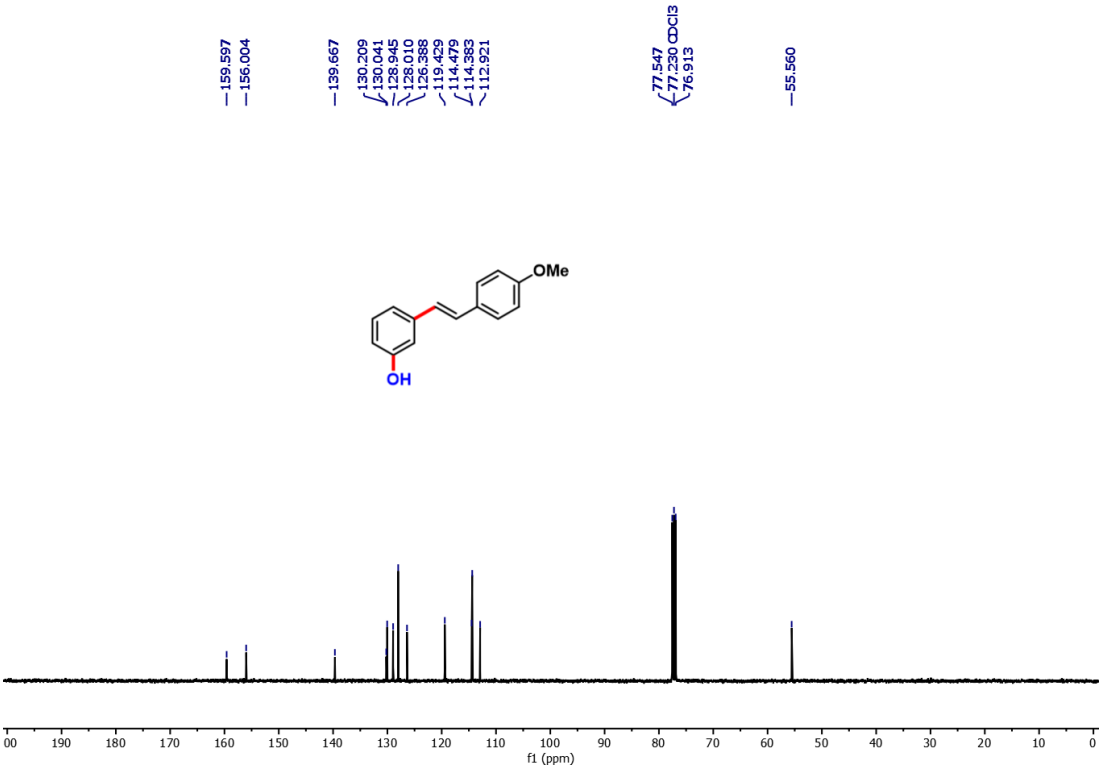

7.575
7.557
7.260 CDCl3
6.968
6.963
6.876
6.872
6.859
6.854
6.817
6.813
6.809
6.705
6.701
6.697
6.074
4.624
3.849
2.281
OMe
CN
HO
OAc
E (t) 6.70
C (dd) 6.87
A (d) 7.57
B (d) 6.97
F (s) 6.07
G (s) 4.62
H (s) 3.85
I (s) 2.28
D (d) 6.81
1.00
1.99
1.15
0.96
1.01
0.98
1.93
2.96
2.90
f1 (ppm)

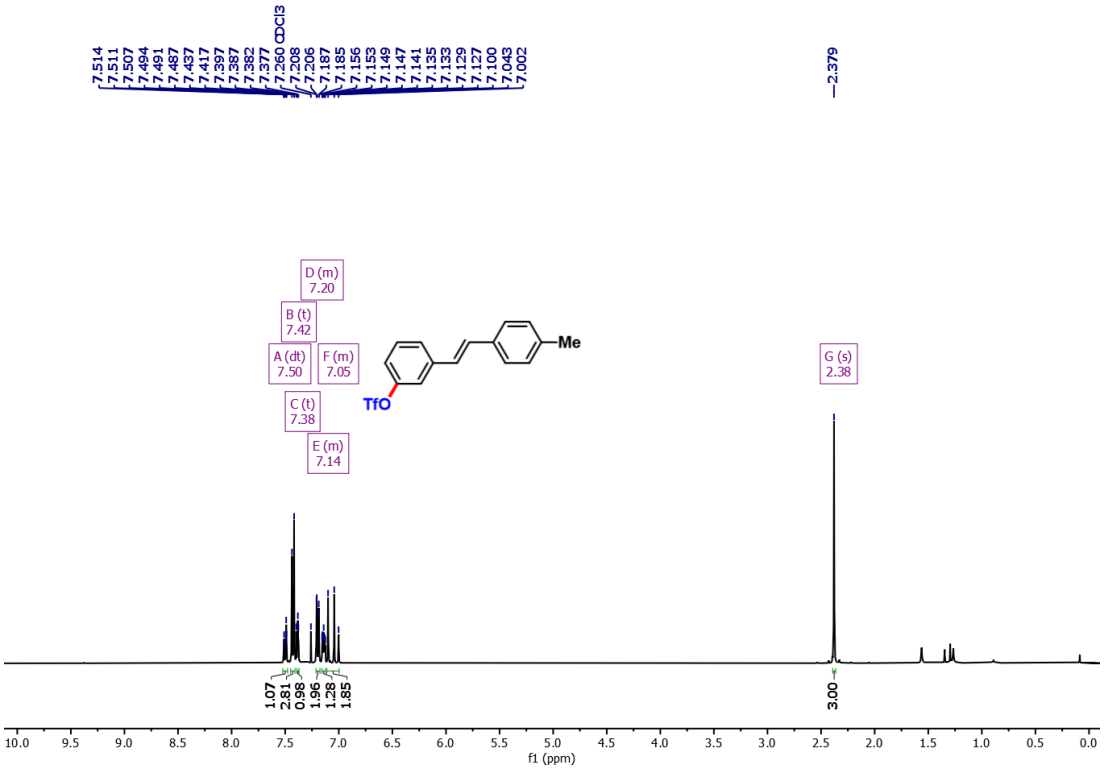

169.272
164.439
157.354
152.112
151.950
134.734
128.433
116.591
116.144
113.837
111.081
108.694
77.484
76.977
58.301
56.354
21.333
OMe
CN
HO
OAc
f1 (ppm)

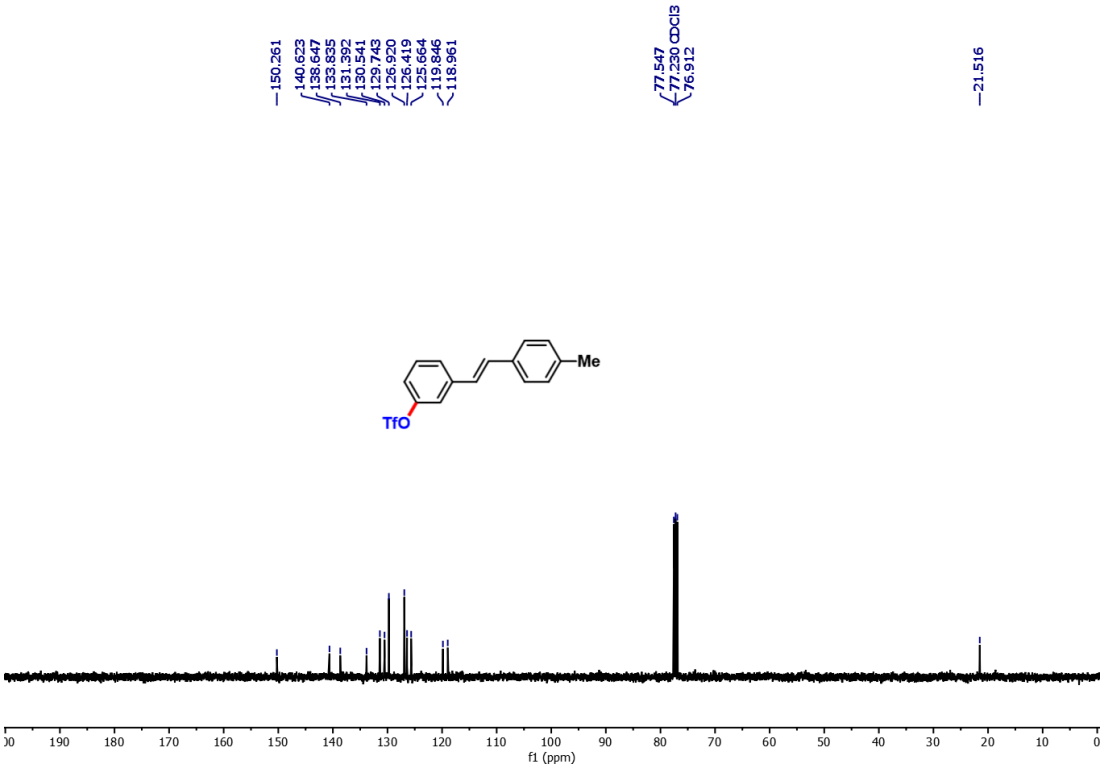

7.428
7.407
7.260 CDCl3
7.240
7.237
7.221
7.194
7.174
7.112
7.109
7.106
7.097
7.090
7.087
7.056
7.028
7.000
6.997
6.994
6.989
6.765
6.762
6.758
6.756
6.752
6.744
6.742
6.738
6.736
6.732
4.953
2.380
Me
HO
D (m) 7.10
B (dd) 7.24
G (ddt) 6.75
A (d) 7.42
E (d) 7.04
C (d) 7.18
F (dd) 7.00
H (s) 4.95
I (s) 2.38
2.16
1.20
2.05
1.25
1.81
1.22
1.00
0.91
3.10
f1 (ppm)

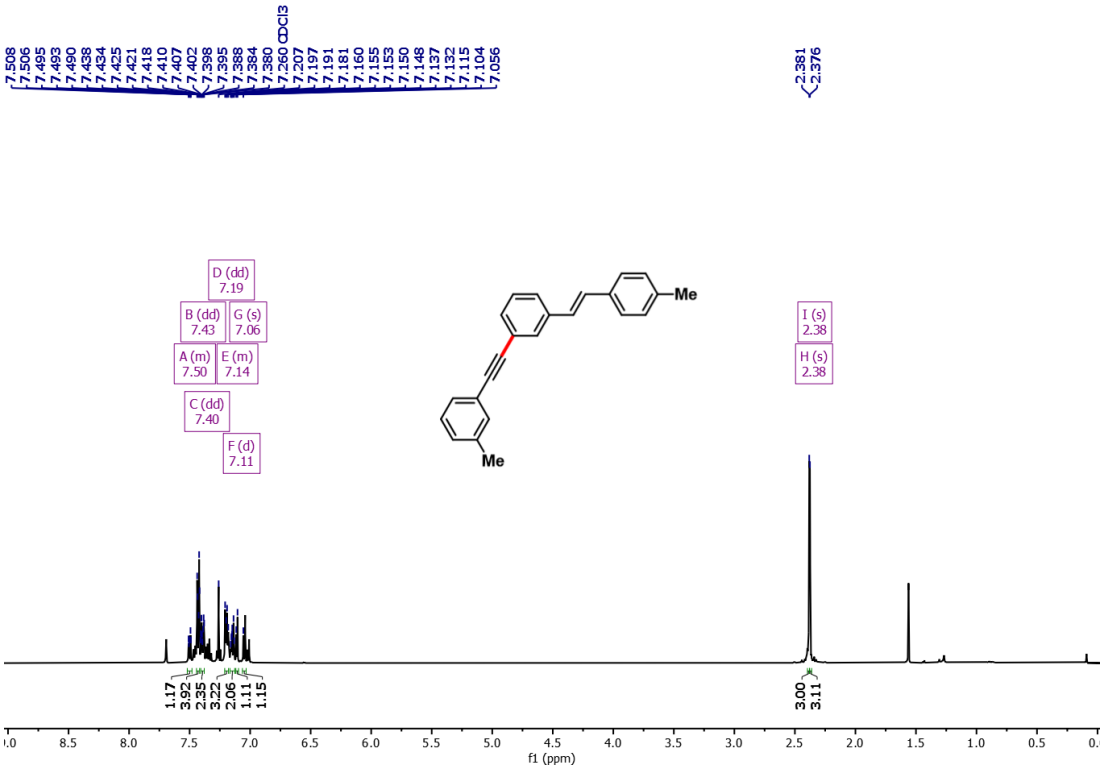

155.898
139.498
137.877
134.544
130.060
129.612
129.336
127.413
126.692
119.591
114.680
114.662
113.063
113.043
77.549
77.230 CDCl3
76.913
21.458
Me
HO
f1 (ppm)

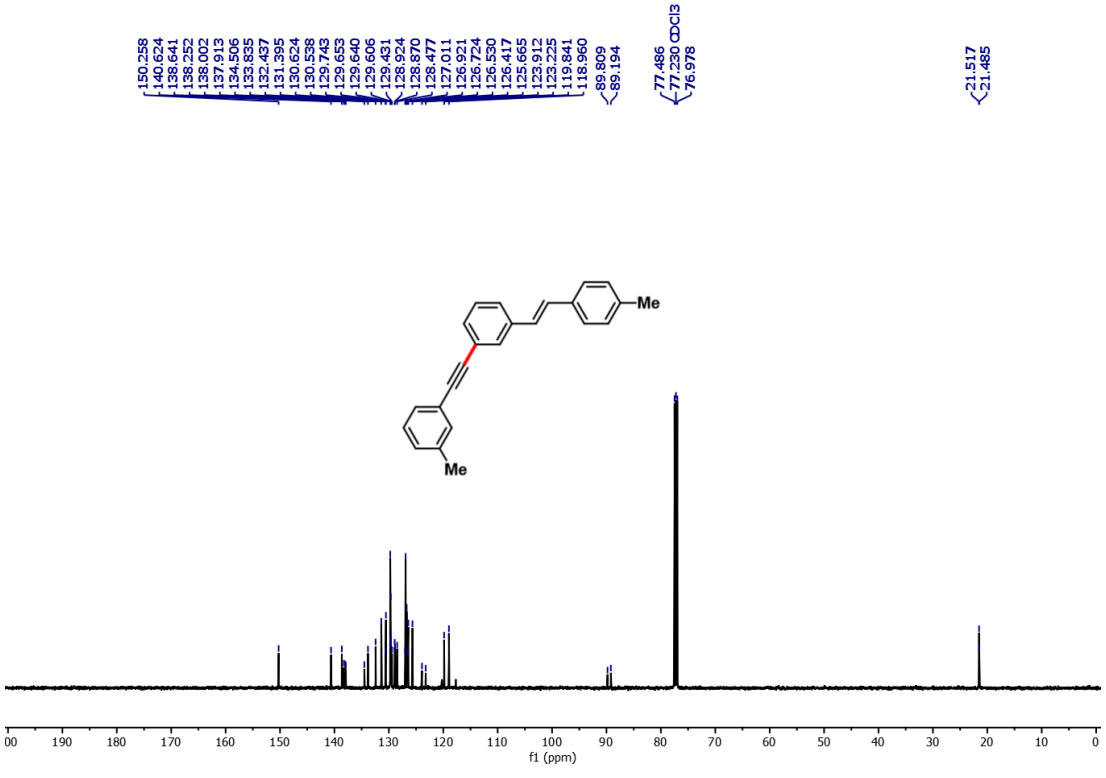

7.455
7.434
7.260 CDCl3
7.236
7.216
7.196
7.078
7.076
7.074
7.072
7.070
7.059
7.055
7.053
7.051
7.018
6.974
6.969
6.967
6.963
6.933
6.921
6.914
6.908
6.897
6.892
6.732
6.730
6.726
6.724
6.712
6.710
6.706
6.704
4.869
3.834
OMe
OH
E (m) 6.91
B (t) 7.22
F (ddd) 6.72
A (d) 7.44
C (m) 7.06
D (dd) 6.97
G (s) 4.87
H (s) 3.83
2.01
1.01
2.03
1.01
3.00
0.96
0.91
3.00
f1 (ppm)

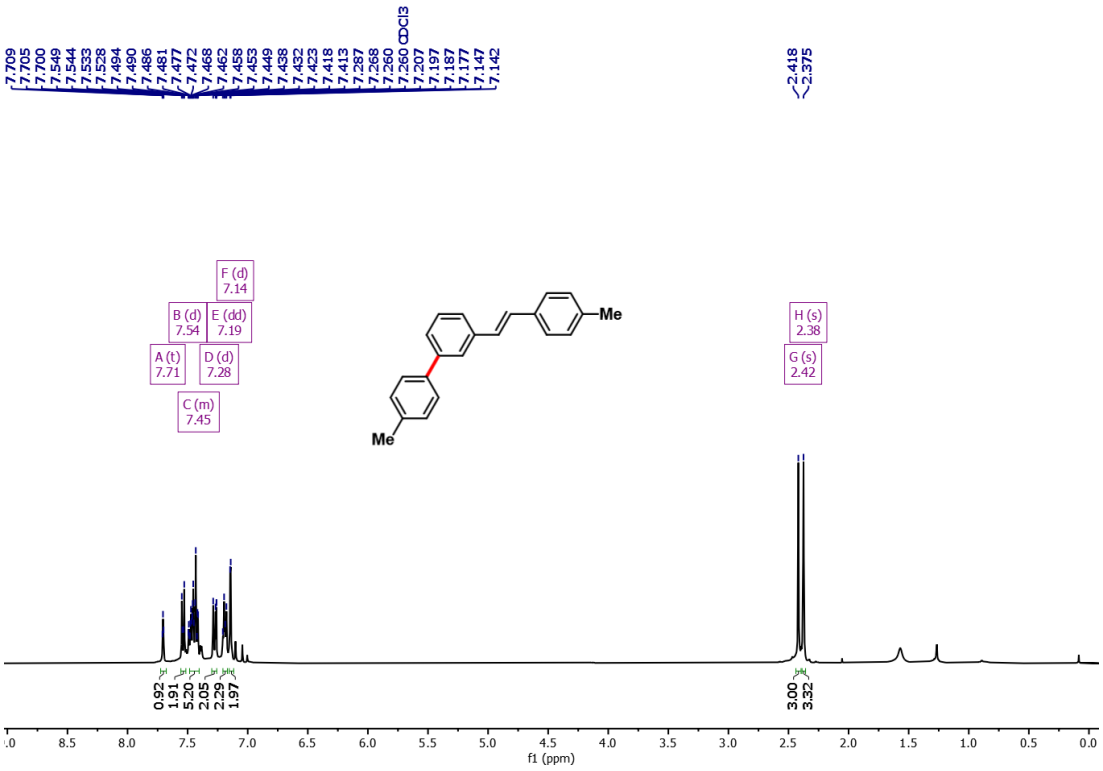

159.597
156.004
139.667
130.209
130.041
128.945
128.010
126.388
119.429
114.479
114.383
112.921
77.547
77.230 CDCl3
76.913
55.560
OMe
OH
f1 (ppm)

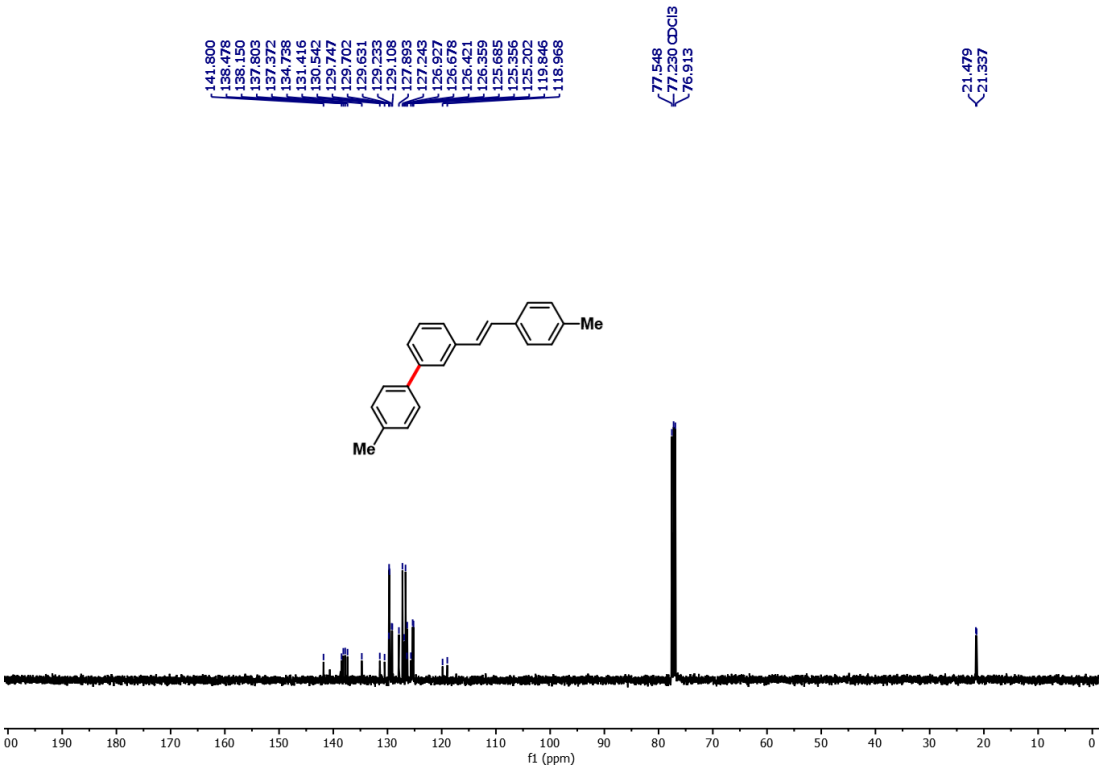

7.514
7.511
7.507
7.494
7.491
7.487
7.437
7.417
7.397
7.387
7.382
7.377
7.260 CDCl3
7.208
7.206
7.187
7.185
7.156
7.153
7.149
7.147
7.141
7.135
7.133
7.129
7.127
7.100
7.043
7.002
2.379
D (m) 7.20
B (t) 7.42
A (dt) 7.50
F (m) 7.05
C (t) 7.38
E (m) 7.14
G (s) 2.38
Me
TfO
1.07
2.81
0.98
1.96
1.28
1.85
3.00
f1 (ppm)


150.261
140.623
138.647
133.835
131.392
130.541
129.743
126.920
126.419
125.664
119.846
118.961
77.547
77.230 CDCl3
76.912
21.516
Me
TfO
f1 (ppm)


7.508
7.506
7.495
7.493
7.490
7.438
7.434
7.425
7.421
7.418
7.410
7.407
7.402
7.398
7.395
7.388
7.384
7.380
CDCl3
7.260
7.207
7.197
7.191
7.181
7.160
7.155
7.153
7.150
7.148
7.137
7.132
7.115
7.104
7.056
2.381
2.376
D (dd) 7.19
B (dd) 7.43
G (s) 7.06
A (m) 7.50
E (m) 7.14
C (dd) 7.40
F (d) 7.11
Me
Me
I (s) 2.38
H (s) 2.38
1.17
3.92
2.35
3.22
2.06
1.11
1.15
3.00
3.11
f1 (ppm)


150.258
140.624
138.641
138.252
138.002
137.913
134.506
133.835
132.437
131.395
130.624
130.538
129.743
129.653
129.640
129.606
129.431
128.924
128.870
128.477
127.011
126.921
126.724
126.530
126.417
125.665
123.912
123.225
119.841
118.960
89.809
89.194
77.486
77.230
CDCl3
76.978
21.517
21.485
Me
Me
f1 (ppm)


7.709
7.705
7.700
7.549
7.544
7.533
7.528
7.494
7.490
7.486
7.481
7.477
7.472
7.468
7.462
7.458
7.453
7.449
7.438
7.432
7.423
7.418
7.413
7.287
7.268
7.260 CDCl3
7.207
7.197
7.187
7.177
7.147
7.142
2.418
2.375
F (d) 7.14
B (d) 7.54
E (dd) 7.19
A (t) 7.71
D (d) 7.28
C (m) 7.45
Me
Me
H (s) 2.38
G (s) 2.42
0.92
1.91
5.20
2.05
2.29
1.97
3.00
3.32
f1 (ppm)


141.800
138.478
138.150
137.803
137.372
134.738
131.416
130.542
129.747
129.702
129.631
129.233
129.108
127.893
127.243
126.927
126.678
126.421
126.359
125.685
125.356
125.202
119.846
118.968
77.548
77.230 CDCl3
76.913
21.479
21.337
Me
Me
f1 (ppm)