Electronic Supplementary Material (ESI) for Organic Chemistry Frontiers.

Electronic Supplementary Information for

Directing group controlled regioselective C-H borylation of 2-arylphenolic compounds at room temperature

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I. General Information

Glassware and stir bars were dried in an oven at 70 °C for at least 12h and then cooled in a desiccator cabinet over Drierite prior to use. Optimization and substrate screen were performed in 20 mL vials. All other reactions were performed in round-bottom flasks sealed with rubber septa. Plastic syringes or pipets were used to transfer liquid reagents. Reactions were stirred magnetically using Teflon-coated, magnetic stir bars. Analytical thin-layer chromatography (TLC) was performed using glass plates pre-coated with 0.25 mm of 230–400 mesh silica gel impregnated with a fluorescent indicator (254 nm and 320 nm). TLC plates were visualized by exposure to ultraviolet light and/or exposure to $KMnO_4$ stain (or phosphomolydic acid, PMA; cerium molybdate stain). Organic solutions were concentrated under reduced pressure using a rotary evaporator. Flash-column chromatography was performed on silica gel (300 or 400 mesh).

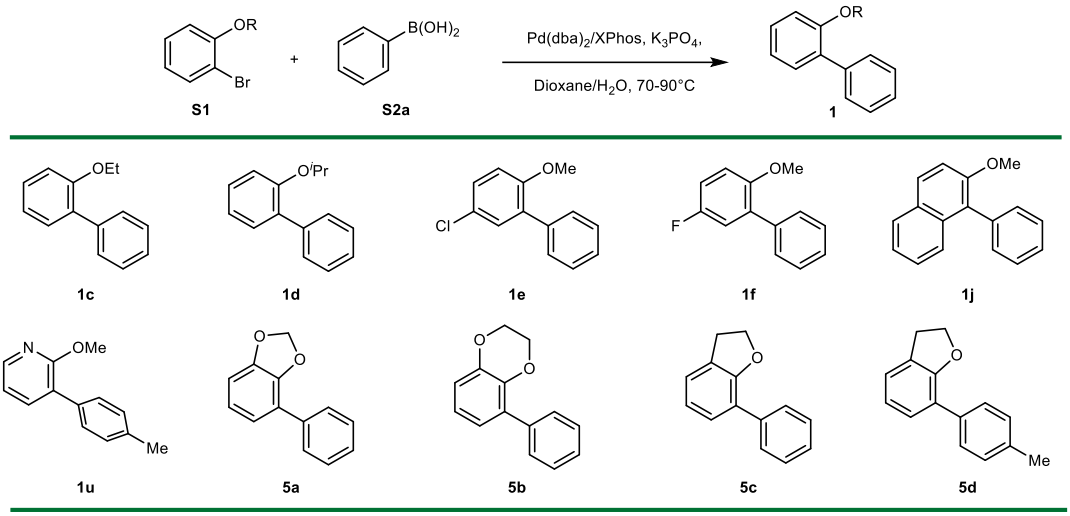
Nuclear magnetic resonance spectra were recorded at ambient temperature (unless otherwise stated) on Bruke 600 or 400 MHz spectrometers. All values for proton chemical shifts are reported in parts per million (δ) and referenced to the residual protium in $CDCl_3$ (δ 7.26) (or DMSO-D_6, δ 2.50). All values for carbon chemical shifts are reported in parts per million (δ) and referenced to the carbon resonances in $CDCl_3$ (δ 77.0) (or DMSO-D_6, 39.52). NMR data are represented as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, quin = quintet, m = multiplet, b = broad), coupling constant (Hz), and integration. Infrared spectroscopic data is reported in wavenumbers (cm^{-1}). High-resolution mass spectra (HRMS) were obtained using a liquid chromatography-electrospray ionization and time-of-flight mass spectrometer.

All the starting materials, catalysts and ligands, including (hetero)aryl halides, (hetero)aryl boronic acids, Pd-catalyst, ligands, bis(pinacolato)diboron, base, Lewis acids and tribromoborane, are commercially available.

II. Starting material synthesis

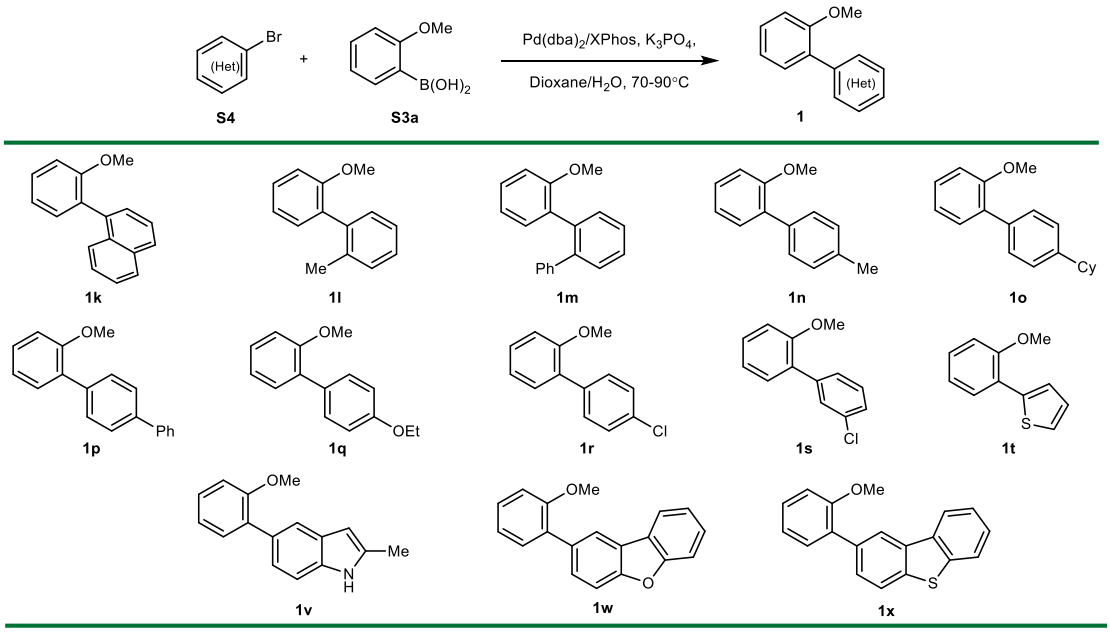
II-1. Compounds **1c**–**1f**, **1j, 1u** and **5a**–**5d** were prepared according to following procedure.

To the mixture of aryl bromide (**S1**, 5.0 or 2.5 mmol, 1.0 equivalent), phenyl boronic acid (**S2a**, 1.5 equivalents), $Pd(dba)_2$ (4 mol%), Xphos (5 mol%), K_3PO_4 (3.0 equivalents) in a round flask under argon balloon was added dioxane/H_2O (20 mL/2mL). Next, the mixture was heated at around 90°C for 12h. The reaction mixture was then cooled room temperature, diluted to with EtOAc (around 100 mL), washed by H_2O (30 mL), NH_4Cl (30 mL) and brine (30 mL), and dried by Na_2SO_4. After filtration and concentration in vacuum, the crude product was purified by silica gel column to afford desired biphenyl product **1** (**Scheme S1**).



Scheme S1. Preparation of starting material **1c**–**1f**, **1j, 1u**, and **5a**–**5d**

II-2. Compound **1k**–**1x** were prepared according to following procedure

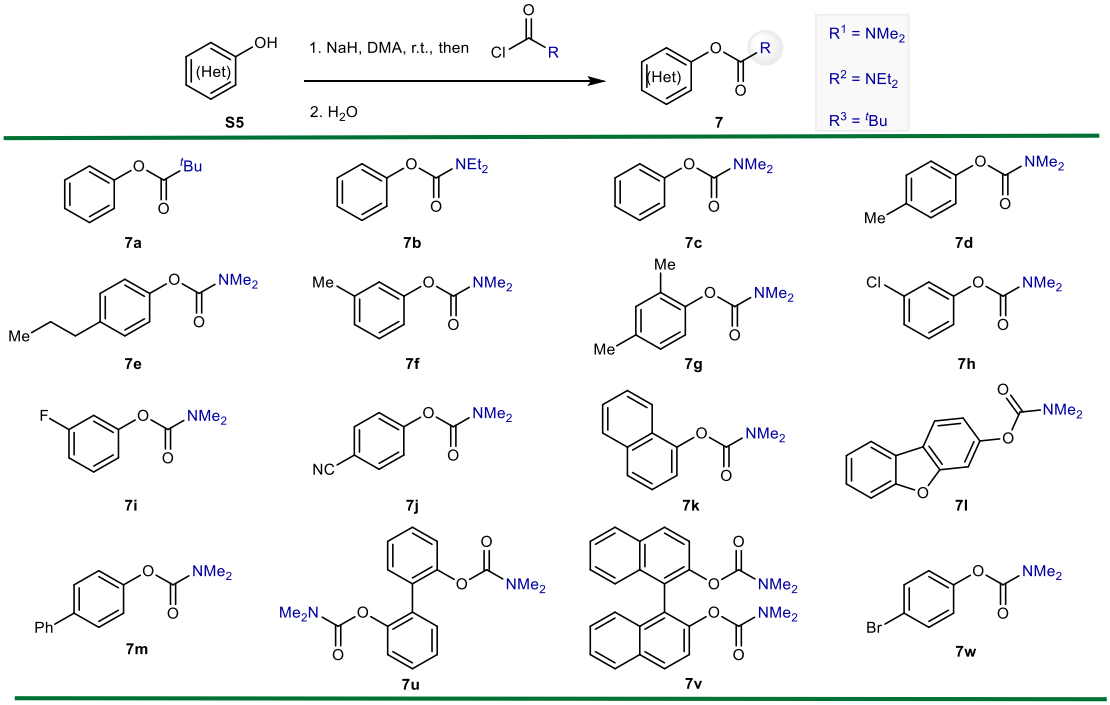


Scheme S2. Preparation of starting material **1k**–**1x**

To the mixture of aryl boronic acid (**S3**, 5.0 mmol, 1.0 equivalent), (hetero)aryl bormide (**S4**, 7.5 mmol, 1.5 equivalents), $Pd(dba)_2$ (4 mol%), Xphos (5 mol%) (or $Pd(dba)_2$ 2 mol%, PPh_3 10 mol% for **1r**, **1s**), K_3PO_4 (3.0 equivalents) in a round flask under argon balloon was added dioxane/H_2O (20 mL/2mL). Next, the mixture was heated to 90℃ for 12h. The reaction mixture was cooled room temperature, dilated to with EtOAc (around 100 mL), washed by H_2O (30 mL), NH_4Cl (30 mL) and brine (30 mL), and then dried by Na_2SO_4. After filtration and concentration, the crude product was purified by silica gel column to afford desired biphenyl product **1** (**Scheme S2**).

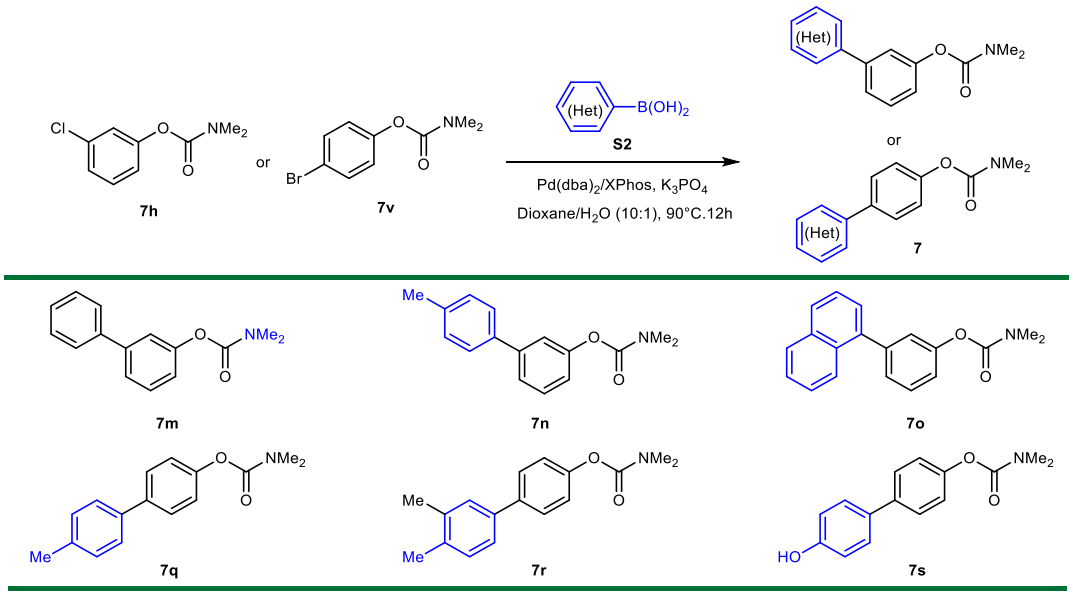
II-3 Compounds **7a**–**7m**, **7u**, **7v** and **7w** were prepared according to following procedure

To a dry flask with NaH (10 mmol, 2.0 equivalents) under argon balloon was added DMA (5 or 10 mL) at room temperature at 0℃. After stirring around 5 min, phenol (**S5**, 5.0 or 10 mmol, 1.0 equivalent) in DMA (5 or 10 mL) was added slowly at 0℃ and continue stirring for around 1 h until no gas generated, followed by adding acyl chloride (**S6**) dropwise. Next, the reaction mixture was stirring from 0℃ to room temperature for overnight, and quenched by adding H_2O (5 mL) dropwise in the open air. The resulted mixture was then diluted with EtOAc (100 mL), washed by H_2O (30 mL×3), brine (30 mL), and dried by Na_2SO_4. The desired product **7** was obtained after filtration, concentration and purification by silica gel column (**Scheme S3**).



Scheme S3. Preparation of starting materials **7a**–**7m**, **7u**, **7v** and **7w**

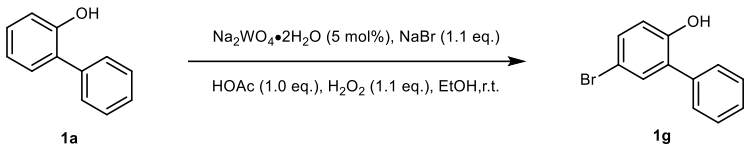
II-4 Compounds **7m**–**7o** and **7q**–**7s** were prepared similarly as described in ***Scheme S1*** with aryl halides were compounds **7h** and **7w** (3.0 mmol scale, 1.0 equivalent), aryl boronic acid (**S2**, 1.5 equivalents), $Pd(dba)_2$ (4 mol%) and XPhos (5 mol%) in dioxane/H_2O (10 mL/1mL) at 90℃ for overnight (**Scheme S4**).



Scheme S4. Preparation of starting material **7l-7n**, and **7p**–**7r**

II-5 Compound **1g** was prepared according to following procedure from compound **1a**.

To the mixture of compound **1a** (851 mg, 5.0 mmol, 1.0 equivalent), $Na_2W_2O_4{\bullet}2H_2O$ (165 mg, 5 mol%) and NaBr (515 mg, 5.0 mmol, 1.0 equivalents) in 100 mL flask was added EtOH (15 mL), followed by adding oxalic acid (900 mg, 10.0 mmol, 2.0 equivalent) and H_2O_2 (35% aq., 0.476 mL, 1.1 equivalents) in the open air. Next, the reaction mixture as stirred at room temperature for overnight until no **1a** left. The resulting mixture was diluted with EtOAc (around 100 mL), washed by H_2O (50 mL×2) and brine (50 mL). The organic layer was then dried by Na_2SO_4, and removed the solvents after filtration. The desired product was obtained as colorless solid (quantitative yield, 1.29g, with trace byproduct) (Scheme S5).

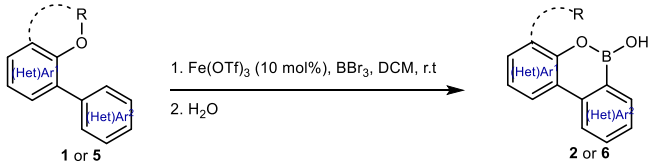


Scheme S5. Preparation of starting material **1g**

III. **General procedure for Lewis acid promoted borylation of phenolic compounds**

III-1. General procedure for $Fe(OTf)_3$ catalyzed borylation of 2-arylphenolic compounds

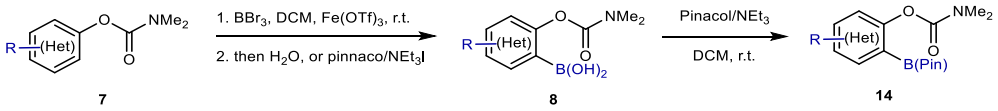
To the mixture of 2-arylphenolic compound (**1** or **5**, 0.5 mmol, 1.0 equivalent) and $Fe(OTf)_3$ (10 mol%) was added anhydrous DCM (2 or 2.5 mL) under argon balloon, followed by adding BBr_3 (2.0 M in DCM, 0.75 mL) at room temperature. Next, the reaction mixture was stirring at room temperature for 12h, quenched by adding H_2O in the open air, and diluted with EtOAc (around 50 mL). The resulted reaction mixture was then washed with H_2O (10 mL×2), brine (10 mL), and dried by Na_2SO_4. The desired product **2** or **6** was isolated by silica gel column of the crude product after removing all the solvents (**Scheme S6**).



Scheme S6. $Fe(OTf)_3$ catalyzed directed borylation of 2-arylphenolic compounds

III-2. General procedure for $Fe(OTf)_3$ catalyzed directed *ortho*-borylation of phenol

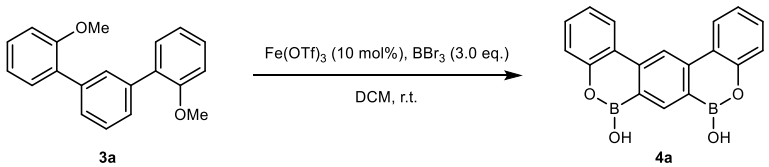
To the mixture of aryl dimethyl carbamate (**7**, 0.5 mmol, 1.0 equivalent) and $Fe(OTf)_3$ (10 mol%) was added anhydrous DCM (2.0 mL) under argon balloon, followed by adding BBr_3 (2.0 in DCM, 0.75 mL) at room temperature. Next, the reaction mixture was stirring at room temperature for 12h, followed by being quenched by H_2O in the open air and diluted with EtOAc (around 50 mL). The resulted reaction mixture was then washed with H_2O (10 mL×2), brine (10 mL), and dried by Na_2SO_4. The desired product **8** was obtained as crude product, and then dissolved in anhydrous DCM (2.0 mL) followed by adding NEt_3 (1.5 mmol, 3.0 equivalents) and pinacol (1.1 mmol, 2.2 equivalents). The reaction mixture continued stirring for overnight and then diluted with EtOAc (around 50 mL). The resulting solution was washed with H_2O (10 mL), Na_2CO_3 (aq., 10 mL×2), brine (10 mL), and dried by Na_2SO_4. The desired boronic ester **14** was obtained after filtration and purified by silica gel column. Notably, products **8j** and **8k** were isolated as boronic acids without further transformation into boronic ester (**Scheme S7**).



Scheme S7. $Fe(OTf)_3$ catalyzed directed *ortho*-borylation of aryl dimethyl carbamate

III-3. Dual directing effects

For substrate **3a**, the dual directed borylation was performed as described in **Scheme S6** (**Scheme S8**).

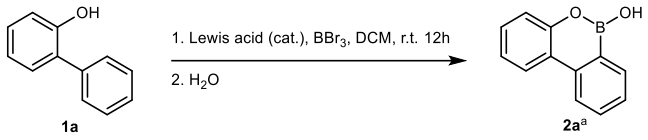


Scheme S8. Borylation of 2,2''-dimethoxy-1,1':3',1''-terphenyl

IV. Condition optimization

IV-1. Borylation of 2-phenylphenol

Table S1. Condition optimization for directed borylation of 2-phenylphenol



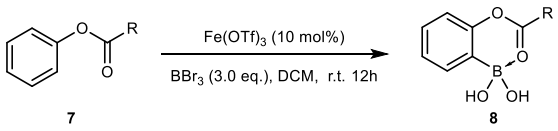
1a **2a**[a]

Entry	Lewis acid (mol%)	BBr_3 (equivalents)	Conversion (%)	Yield (%)
1	none	3.0	0	0
2	$AlCl_3$ (10)	3.0	100	47
3	$AlBr_3$ (10)	3.0	100	53
4	$Al(OTf))_3$ (10)	3.0	66	66
5	$GaCl_3$ (10)	3.0	93	82
6	$InCl_3$ (10)	3.0	100	97
7	$Fe(OTf)_3$ (10)	3.0	100	99
8	$NbCl_5$ (10)	3.0	30	30
9	YCl_3 (10)	3.0	0	0
10	$Sc(OTf)_3$ (10)	3.0	10	10

a. all the reactions were performed with **1a** (0.5 mmol, 1.0 equivalent), LA-catalyst (10 mol%) and BBr_3 (3.0 equivalent) in DCM at room temperature (20-30℃) for 12h. The conversion and yield were determined by ^{1}H-NMR of crude product. The reactions were clean, only desired product and starting material were observed.

IV-2. Directed *ortho*-borylation of phenolic carbamate

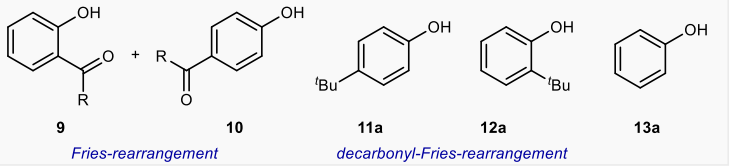
Table S1. Condition optimization for *ortho*-borylation of phenolic ester and carbamate



7 **8**

Entry	R	Ratio by H-NMR			
		8	**9**	**10**	*other byproducts*
1	—^{t}Bu (**7a**)	N.O.	N.O.	N.O.	**11a**: **13a** = 1:0.18
2	—NMe_2 (**7b**)	1	0.11	N.O.	unkonwn byproduct (0.07)
3	—NEt_2 (**7c**)	1	0.10	N.O.	unkonwn byproduct (0.10)
4[a]	—NMe_2 (**7b**)	1	0.17	N.O.	unkonwn byproduct (0.09)

N. O. = not observed, a. without $Fe(OTf)_3$

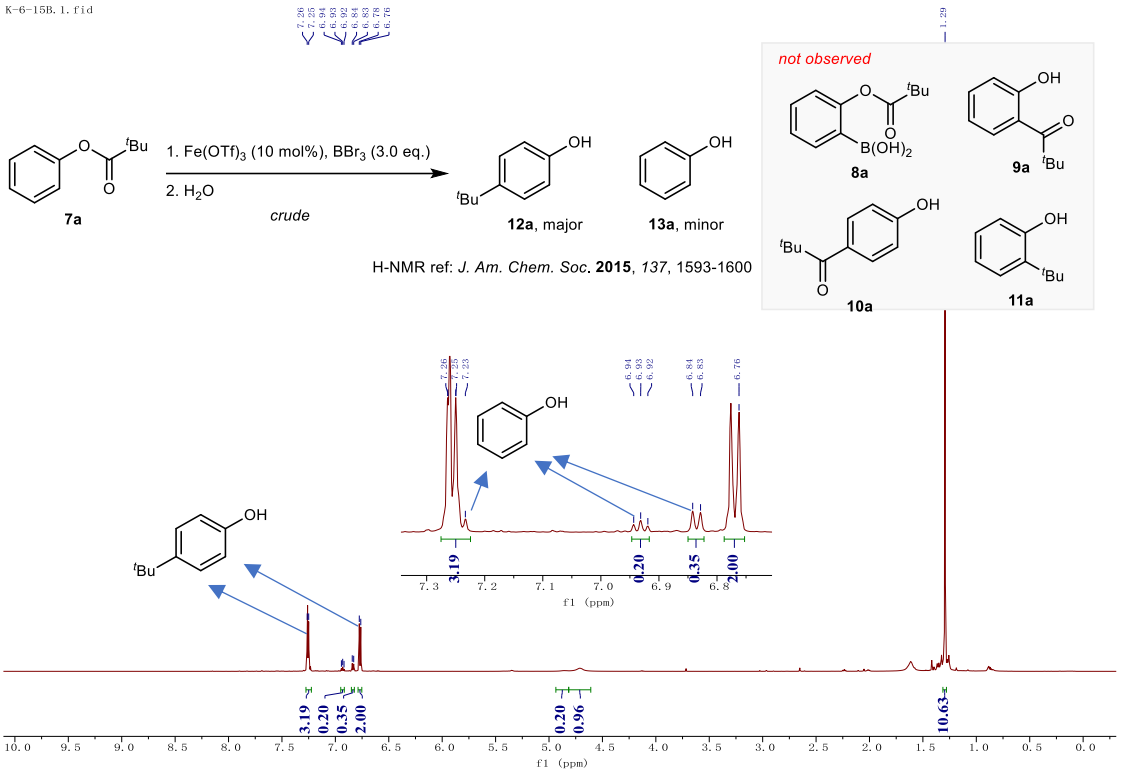


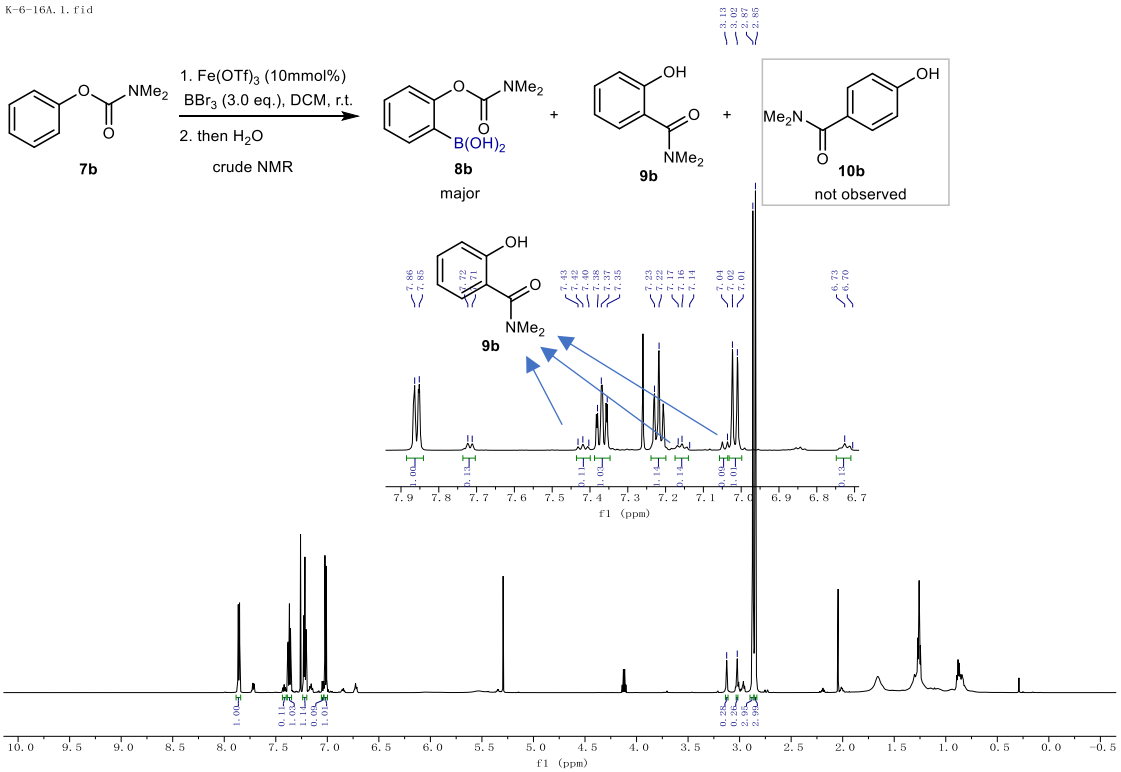
9 **10** **11a** **12a** **13a**

Fries-rearrangement *decarbonyl-Fries-rearrangement*

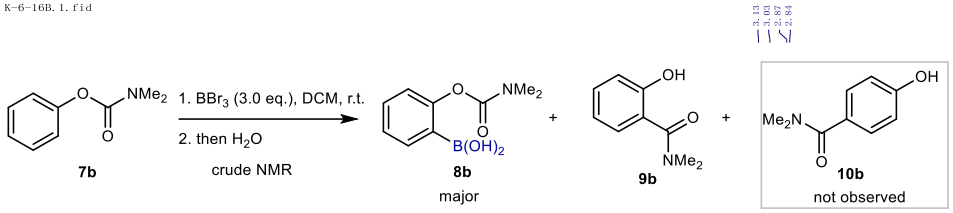
a. all the reactions were performed with **7** (0.5 mmol, 1.0 equivalent), $Fe(OTf)_3$ (10 mol%) and BBr_3 (3.0 equivalent) in DCM at room temperature (20-30℃) for 12h. The ratio of products was determined by ^{1}H-NMR of crude products.

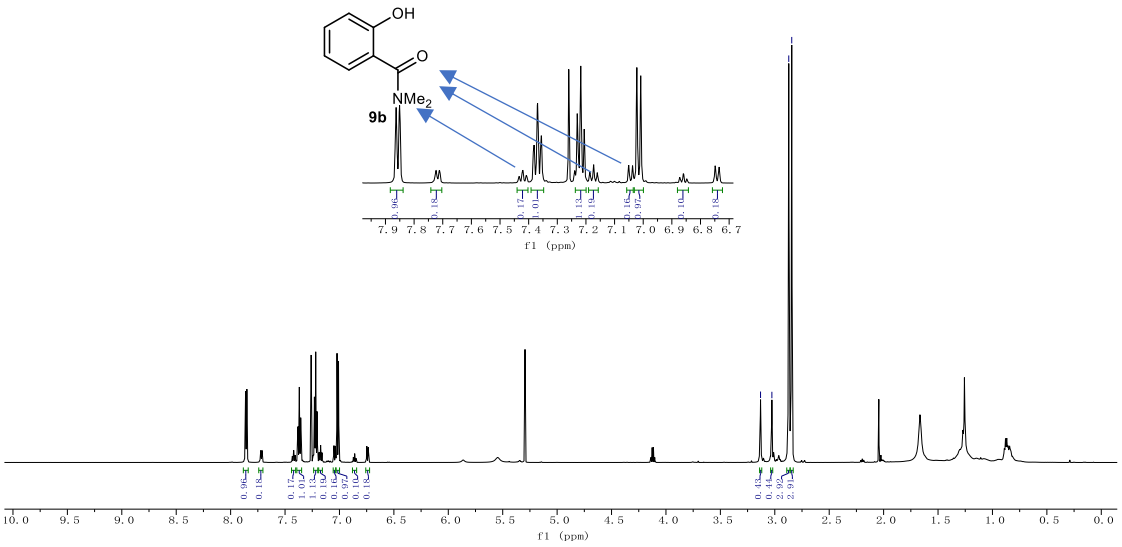
Following are the ^{1}H-NMR of crude products as illustrated in **Table S2**.



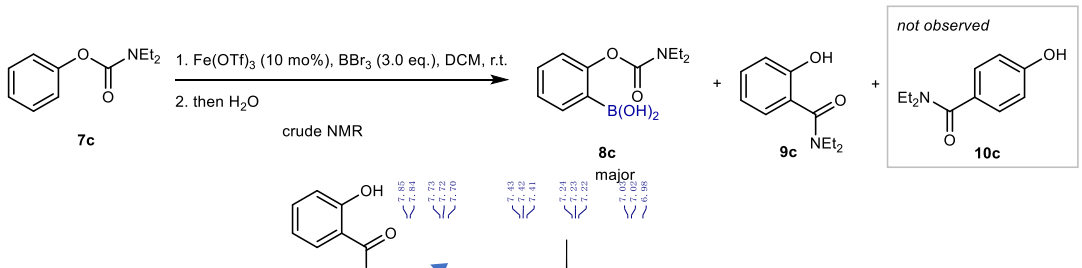


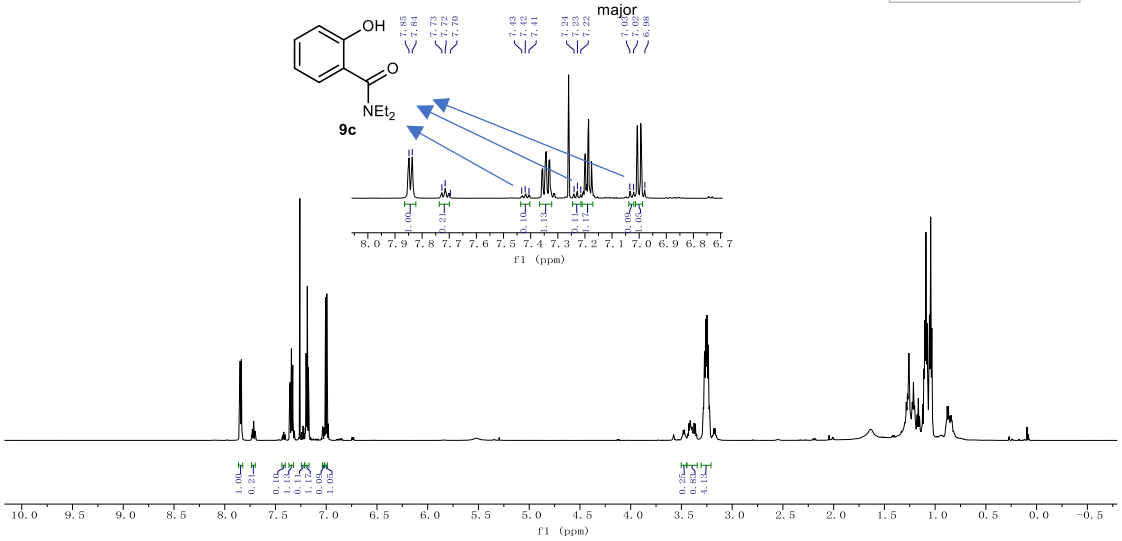
K-6-16B. 1. fid





K-6-96. 1. fid

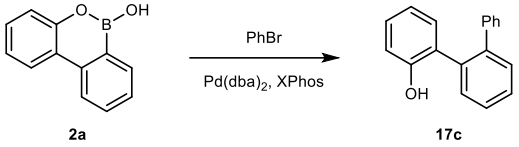




V. Synthetic application

V-1. Suzuki coupling of 6H-dibenzo[c,e][1,2]oxaborinin-6-ol (**2a**)

The Suzuki coupling was performed similarly as described in **Scheme S1** with compound **2a** (98.1 mg, 0.5 mmol), $Pd(dba)_2$ (4 mol%), XPhos (5 mol%) and K_3PO_4 (1.5 mmol, 3.0 equivalents) in dioxane/H_2O (2/0.2 mL) at 90℃ for 16h (**Scheme S9**).

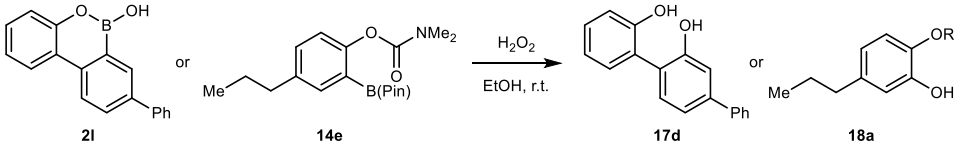


2a **17c**

Scheme S9. Borylation of [1,1':3',1''-terphenyl]-2'-ol

V-2. *Ipso*-hydroxylation of products

To the solution of compound **2l** (113.6 mg, 0.47 mmol) or **14e** (142.3 mg, 0.43 mmol) in EtOH was added H_2O_2 (0.186 mL, 5.0 equivalents) at room temperature. Next, the reaction was stirred at room temperature for around 12h until no starting material left. The reaction solution was then diluted with EtOAc (around 50 mL), washed with H_2O (10 mL), brine (10 mL) and dried by Na_2SO_4. The desired phenol (**17d**, **18a**) was obtained after filtration, concentration and silica gel column (**Scheme S10**).



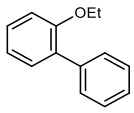
2l **14e** **17d** **18a**

Scheme S10. Borylation of [1,1':3',1''-terphenyl]-2'-ol

VI. Mechanism studies

All the data of mechanism studies were obtained during the condition screening and substrate scope studies. No additional experiments were performed for mechanism studies.

VII. Analytical data of starting materials, intermediates and products

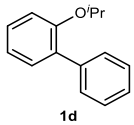


1c

2-ethoxy-1,1'-biphenyl[1] (**1c**) was prepared as shown in **Scheme S1**, obtained as a colorless liquid, quantitative yield (1.0g, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.58 (d, *J* = 8.3 Hz, 2H), 7.41 (t, *J* = 7.7 Hz, 2H), 7.36 – 7.28 (m, 3H), 7.03 (t, *J* = 7.9 Hz, 1H), 6.99 (d, *J* = 8.2 Hz, 1H), 4.05 (q, *J* = 7.0 Hz, 2H), 1.36 (t, *J* = 7.0 Hz, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 156.0, 138.8, 131.0, 129.7, 128.7, 128.0, 126.9, 121.0, 112.8, 64.2, 14.9 (one carbon was buried in other peaks)

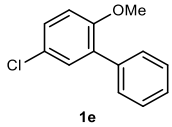


1d

2-isopropoxy-1,1'-biphenyl[1] (**1d**) was prepared as shown in **Scheme S1**, obtained as a pale-yellow liquid, 95% yield (404.2mg, 2.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.56 (d, *J* = 7.5 Hz, 2H), 7.40 (t, *J* = 7.6 Hz, 2H), 7.34 (d, *J* = 7.5 Hz, 1H), 7.33 – 7.30 (m, 1H), 7.28 (d, *J* = 7.9 Hz, 1H), 7.03 (t, *J* = 7.5 Hz, 1H), 7.00 (d, *J* = 8.2 Hz, 1H), 4.44 (q, *J* = 6.1 Hz, 1H), 1.25 (d, *J* = 6.1 Hz, 6H)

^{13}C NMR (101 MHz, Chloroform-d) δ 155.0, 139.1, 132.3, 131.2, 129.7, 128.5, 127.9, 126.8, 121.2, 115.5, 71.1, 22.2

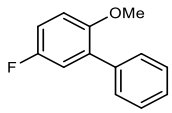


1e

5-chloro-2-methoxy-1,1'-biphenyl[2] (**1e**) was prepared as shown in **Scheme S1**, obtained as a pale-yellow liquid, 91% yield (1.33g, 5.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.52 (s, 1H), 7.40 (d, *J* = 7.5 Hz, 1H), 7.36 – 7.32 (m, 2H), 7.30 – 7.28 (m, 2H), 7.05 – 7.01 (m, 1H), 6.98 (d, *J* = 8.3 Hz, 1H), 3.82 (s, 3H).

^{13}C NMR (151 MHz, Chloroform-d) δ 155.1, 137.2, 132.2, 130.5, 129.4, 128.08, 128.05, 127.4, 125.7, 112.4, 55.9

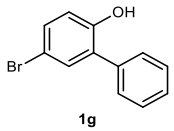


1f

5-fluoro-2-methoxy-1,1'-biphenyl[3] (**1f**) was prepared as shown in **Scheme S1**, obtained as a yellow liquid, 91% yield (3.69g, 20 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.53 (d, *J* = 7.0 Hz, 2H), 7.43 (t, *J* = 7.6 Hz, 2H), 7.36 (t, *J* = 7.4 Hz, 1H), 7.09 – 7.06 (m, 1H), 7.03 – 6.99 (m, 1H), 6.92 (dd, *J* = 9.0, 4.5 Hz, 1H), 3.79 (s, 3H).

^{13}C NMR (151 MHz, Chloroform-d) δ 157.3 (d, J_{C-F} = 238.6 Hz), 157.3 (d, $^{4}J_{C-F}$ = 3.0 Hz), 137.6, 132.2 (d, $^{3}J_{C-F}$ = 7.6 Hz), 129.5, 128.3, 127.5, 117.5 (d, $^{2}J_{C-F}$ = 24.2 Hz), 114.4 (d, $^{2}J_{C-F}$ = 22.6 Hz), 112.5 (d, $^{3}J_{C-F}$ = 9.1 Hz), 56.4

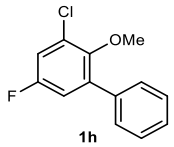


1g

5-bromo-[1,1'-biphenyl]-2-ol[4] (**1g**) was prepared as shown in **Scheme S5**, obtained as a yellow solid, quantitative yield (1.29g, 5.0 mmol scale)

^{1}H NMR (400 MHz, Chloroform-d) δ 7.54 – 7.47 (m, 2H), 7.46 – 7.40 (m, 3H), 7.39 – 7.33 (m, 2H), 6.88 (d, *J* = 8.4 Hz, 1H), 5.23 (b, 1H)

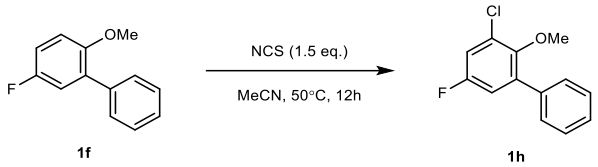
^{13}C NMR (101 MHz, Chloroform-d) δ 151.6, 135.7, 132.6, 131.8, 130.0, 129.4, 128.9, 128.4, 117.6, 112.7



1h

3-chloro-5-fluoro-2-methoxy-1,1'-biphenyl (**1h**) was prepared as following procedure.

To the solution of compound **1f** (808mg, 4.0 mmol, 1.0 equivalent) in MeCN (10 mL) was added NCS (801 mg, 6.0 mmol, 1.5 equivalents). Next, the reaction was stirred at 50℃ for 12h, and diluted with around 100 mL EtOAc. The resulting mixture was then washed with $Na_2S_2O_3$ (aq., 30 mL), H_2O (30 mL), brine (30 mL) and dried by Na_2SO_4. The desired product **1h** was obtained as a colorless liquid, 38% yield (361.7 mg) after filtration, concentration and purified by silica gel column (**Scheme S11**)



1f **1h**

Scheme S11. Preparation of starting material **1h**

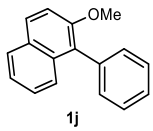
^{1}H NMR (600 MHz, Chloroform-d) δ 7.54 (d, *J* = 7.7 Hz, 2H), 7.44 (t, *J* = 7.5 Hz, 2H), 7.40 (d, *J* = 7.3 Hz, 1H), 7.12 (dd, *J* = 7.5, 2.6 Hz, 1H), 6.99 (dd, *J* = 8.6, 2.6 Hz, 1H), 3.46 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 158.3 (d, J_{C-F} = 246 Hz), 150.1 (d, $^{4}J_{C-F}$ = 3 Hz), 137.8 (d, $^{3}J_{C-F}$ = 9 Hz), 136.8, 129.4 (d, $^{3}J_{C-F}$ = 12 Hz), 129.1, 128.6, 128.2, 116.4 (d, $^{2}J_{C-F}$ = 23 Hz), 116.1 (d, $^{2}J_{C-F}$ = 23 Hz), 60.8

^{19}F NMR (565 MHz, Chloroform-d) δ -116.97

HRMS failed to obtain for some unknown reason. We tried several times.

IR (KBr, cm^{-1}): 1573, 1470, 1410, 1234, 1004, 936, 750

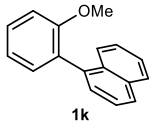


1j

l2-methoxy-1-phenylnaphthalene[5] (**1j**) was prepared as shown in **Scheme S1**, obtained as a yellow solid, 68% yield (3.2g, 20 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.91-7.90 (m, 1H), 7.86 – 7.84 (m, 1H), 7.54-7.51 (m, 3H), 7.45 (t, *J* = 8.0 Hz, 1H), 7.41-7.39 (m, 3H), 7.37-7.35 (m, 2H), 3.86 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 153.9, 136.6, 133.8, 131.1, 129.2, 129.2, 128.3, 128.0, 127.2, 126.4, 125.6, 125.4, 123.7, 114.0, 56.9

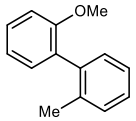


1k

1-(2-methoxyphenyl)naphthalene[6] (**1k**) was prepared as shown in **Scheme S2**, obtained as a brown solid, 79% yield (1.11g, 6.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.81 (d, *J* = 8.2 Hz, 1H), 7.78 (d, *J* = 8.2 Hz, 1H), 7.50 (d, *J* = 8.5 Hz, 1H), 7.47 – 7.43 (m, 1H), 7.40 – 7.28 (m, 4H), 7.21 (d, *J* = 7.4 Hz, 1H), 7.00 (t, *J* = 7.4 Hz, 1H), 6.97 (d, *J* = 8.3 Hz, 1H), 3.62 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 157.2, 136.9, 133.4, 132.1, 131.9, 129.5, 129.0, 128.1, 127.6, 127.3, 126.4, 125.6, 125.5, 125.3, 120.5, 111.0, 55.5

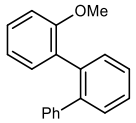


1l

2-methoxy-2'-methyl-1,1'-biphenyl[7] (**1l**) was prepared as shown in **Scheme S2**, obtained as a yellow solid, 44% yield (435mg, 5.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.33 (t, *J* = 9.7 Hz, 1H), 7.22 (s, 1H), 7.19 – 7.16 (m, 1H), 7.16 – 7.12 (m, 1H), 7.01 (d, *J* = 12.2 Hz, 1H), 6.95 (d, *J* = 7.4 Hz, 1H), 3.75 (m, 3H), 2.14 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 156.6, 138.6, 136.8, 131.0, 130.8, 130.0, 129.5, 128.5, 127.3, 125.4, 120.4, 110.6, 55.4, 19.9

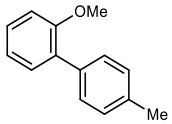


1m

2-methoxy-1,1':2',1''-terphenyl [8] (**1m**) was prepared as shown in **Scheme S2**, obtained as a colorless liquid, 63% yield (820.3mg pure, 5.0 mmol scale).

^{1}H NMR (400 MHz, Chloroform-d) δ 7.45 – 7.37 (m, 4H), 7.25 – 7.11 (m, 7H), 6.92 (t, *J* = 7.8 Hz, 1H), 6.70 (d, *J* = 8.2 Hz, 1H), 3.34 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 156.2, 142.2, 141.7, 137.3, 131.6, 130.9, 130.7, 129.6, 128.9, 128.5, 127.5, 127.4, 127.1, 126.2, 120.4, 110.7, 54.9 (one carbon was buried in other peaks)

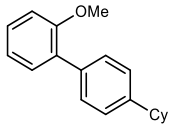


1n

2-methoxy-4'-methyl-1,1'-biphenyl[9] (**1n**) was prepared as shown in **Scheme S2**, obtained as a white solid, 81% yield (803.1mg, 5.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.42 (d, *J* = 7.8 Hz, 2H), 7.30 (d, *J* = 7.5 Hz, 2H), 7.21-7.21 (m, 2H), 7.01 (t, *J* = 7.4 Hz, 1H), 6.97 (d, *J* = 8.1 Hz, 1H), 3.79 (s, 3H), 2.38 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 156.5, 136.6, 135.6, 130.8, 130.7, 129.4, 128.8, 128.4, 120.8, 111.2, 55.6, 21.2



1o

4'-cyclohexyl-2-methoxy-1,1'-biphenyl (**1o**) was prepared as shown in **Scheme S2**, obtained as a white solid, 90% yield (1.19g, 5.0 mmol scale)

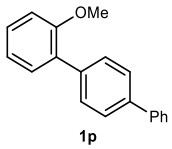
^{1}H NMR (600 MHz, Chloroform-d) δ 7.39 (d, *J* = 8.1 Hz, 2H), 7.26 – 7.24 (m, 1H), 7.22 (t, *J* = 7.8 Hz, 1H), 7.17 (d, *J* = 7.5 Hz, 2H), 6.94 (t, *J* = 7.4 Hz, 1H), 6.90 (d, *J* = 8.2 Hz, 1H), 3.73 (s, 3H), 2.46-2.44 (m, 1H), 1.85 (d, *J* = 12.3 Hz, 2H), 1.78 (d, *J* = 12.6 Hz, 2H), 1.68 (d, *J* = 13.1 Hz, 1H), 1.42-1.32 (m, 4H), 1.23 – 1.16 (m, 1H).

^{13}C NMR (101 MHz, Chloroform-d) δ 156.6, 146.8, 136.0, 131.0, 130.8, 129.5, 128.4, 126.6, 120.9, 111.3, 55.7, 44.4, 34.6, 27.1, 26.4

HRMS for $C_{19}H_{22}NaO^+$ $[M+Na]^+$: 289.1563; found 289.1557

IR (KBr, cm^{-1}):2926, 2847, 1560, 1482, 1464, 1283, 1028, 732

M.p.: 66-69.3℃

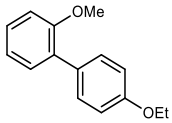


1p

2-methoxy-1,1':4',1''-terphenyl[10] (**1p**) was prepared as shown in **Scheme S2** for 8h, obtained as a white solid, 73 yield (1.9g, 10 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.68-7.64 (m, 6H), 7.48 (t, *J* = 7.6 Hz, 2H), 7.40 (d, *J* = 7.5 Hz, 1H), 7.37 (q, *J* = 7.0 Hz, 2H), 7.08 (t, *J* = 7.4 Hz, 1H), 7.03 (d, *J* = 8.2 Hz, 1H), 3.87 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 156.7, 141.2, 139.9, 137.7, 131.0, 130.4, 130.1, 128.9, 128.8, 127.3, 127.3, 126.9, 121.0, 111.4, 55.7



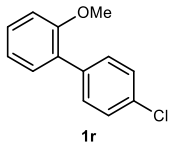
1q

4'-ethoxy-2-methoxy-1,1'-biphenyl[11] (**1q**) was prepared as shown in **Scheme S2**, obtained as a

yellow liquid, 76% yield (861.2mg pure, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.47 (d, *J* = 8.6 Hz, 2H), 7.30 (dd, *J* = 11.1, 7.6 Hz, 2H), 7.02 (t, *J* = 7.4 Hz, 1H), 6.98 (d, *J* = 8.1 Hz, 1H), 6.95 (d, *J* = 8.6 Hz, 2H), 4.08 (q, *J* = 7.0 Hz, 2H), 3.82 (s, 3H), 1.44 (t, *J* = 7.0 Hz, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 158.0, 156.4, 130.7, 130.7, 130.5, 130.4, 128.1, 120.8, 114.0, 111.2, 63.4, 55.5, 14.9

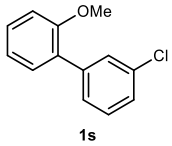


1r

4'-chloro-2-methoxy-1,1'-biphenyl[12] (**1r**) was prepared as shown in **Scheme S2**, obtained as a white solid, 99% yield (1.08g, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.48 (d, *J* = 8.6 Hz, 2H), 7.38 (d, *J* = 8.6 Hz, 2H), 7.36 – 7.33 (m, 1H), 7.30 (dd, *J* = 7.5, 1.7 Hz, 1H), 7.04 (t, *J* = 8.0 Hz, 1H), 7.00 (d, *J* = 7.5 Hz, 1H), 3.82 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 156.3, 136.9, 132.8, 130.8, 130.6, 129.4, 129.0, 128.12, 120.9, 111.3, 55.5

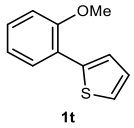


1s

3'-chloro-2-methoxy-1,1'-biphenyl[13] (**1s**) was prepared as shown in **Scheme S2**, obtained as a colorless liquid, quantitative yield (563.2mg, 2.5 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.53 (s, 1H), 7.41 (d, *J* = 7.5 Hz, 1H), 7.36 – 7.32 (m, 2H), 7.30 (d, *J* = 7.6 Hz, 2H), 7.04 (t, *J* = 7.5 Hz, 1H), 6.99 (d, *J* = 8.3 Hz, 1H), 3.83 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 156.3, 140.3, 133.7, 130.7, 129.6, 129.2, 129.2 (two carbons), 127.7, 126.9, 120.9, 111.2, 55.5

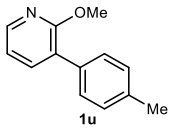


1t

2-(2-methoxyphenyl)thiophene[14] (**1t**) was prepared as shown in **Scheme S2**, obtained as a green liquid, 94% yield (895.6mg, 5.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.68 (d, *J* = 7.7 Hz, 1H), 7.54 (s, 1H), 7.36 (d, *J* = 5.1 Hz, 1H), 7.32 – 7.28 (m, 1H), 7.13 (t, *J* = 4.2 Hz, 1H), 7.06 – 7.01 (m, 2H), 3.96 (s, 3H).

^{13}C NMR (101 MHz, Chloroform-d) δ 155.7, 139.6, 128.7, 128.5, 126.9, 125.5, 125.5, 123.5, 121.1, 111.8, 55.7

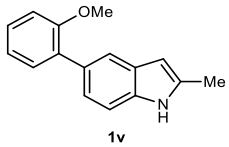


1u

2-methoxy-3-phenylpyridine[15] (**1u**) was prepared as shown in **Scheme S2**, obtained as a yellow liquid, 93% yield (925.4mg, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 8.14 (d, *J* = 5.0 Hz, 1H), 7.58 (d, *J* = 7.3 Hz, 1H), 7.45 (d, *J* = 7.9 Hz, 2H), 7.23 (d, *J* = 7.9 Hz, 2H), 6.95 (dd, *J* = 7.1, 5.1 Hz, 1H), 3.96 (s, 3H), 2.39 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 160.9, 145.4, 138.4, 137.3, 133.8, 129.0, 128.9, 124.6, 117.0, 53.5, 21.2



1v

5-(2-methoxyphenyl)-2-methyl-1H-indole (**1v**) was prepared as shown in **Scheme S2**, obtained as a red-brown solid, 30% yield (357.2mg, 5.0 mmol scale).

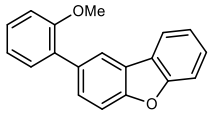
^{1}H NMR (600 MHz, Chloroform-d) δ 9.51 (s, 1H), 8.28 (t, *J* = 3.1 Hz, 1H), 8.19 (dd, *J* = 7.9, 4.6 Hz, 1H), 8.12 (t, *J* = 2.9 Hz, 1H), 7.93 (s, 1H), 7.29 – 7.21 (m, 2H), 7.20 – 7.14 (m, 1H), 6.30 (s, 1H), 2.46 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 156.8, 135.5, 135.4, 132.4, 131.5, 130.1, 129.2, 127.9, 123.1, 120.9, 120.7, 111.4, 109.7, 100.8, 55.7, 13.8

HRMS calculated for $C_{16}H_{14}NO^-$ $[M-H]^-$: 236.1081; found 236.1073

IR (KBr, cm^{-1}): 2289, 2941, 1732, 1467, 1228, 1181, 1031, 790

M.p.: 66.0-76.4℃



1w

2-(2-methoxyphenyl)dibenzo[b,d]furan (**1w**) was prepared as shown in **Scheme S2**, obtained as a yellow oil, quantitative yield (1.48g, 5.0 mmol scale).

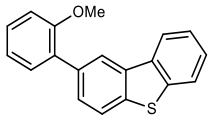
^{1}H NMR (600 MHz, Chloroform-d) δ 8.08 (s, 1H), 7.96 (d, *J* = 7.6 Hz, 1H), 7.65 – 7.56 (m, 3H), 7.45 (t, J = 7.7 Hz, 1H), 7.40 (d, J = 8.8 Hz, 1H), 7.38 – 7.33 (m, 2H), 7.07 (t, J = 7.4 Hz, 1H), 7.03 (d, J = 8.3 Hz, 1H), 3.84 (s, 3H).

^{13}C NMR (101 MHz, Chloroform-d) δ 156.5, 156.5, 155.4, 133.3, 131.2, 130.7, 128.9, 128.6, 127.0, 124.4, 124.1, 122.6, 121.6, 120.9, 120.7, 111.6, 111.3, 111.0, 55.6

HRMS calculated for $C_{19}H_{14}NaO_2^+$ $([M+Na]^+)$: 297.0886; found 297.0877

IR (KBr, cm^{-1}): 3462, 3003, 1596, 1476, 1446, 1255, 1193, 819

M.p.: 78.0-79.1℃



1x

2-(2-methoxyphenyl)dibenzo[b,d]thiophene (**1x**) was prepared as shown in **Scheme S2**, obtained as a yellow solid, quantitative yield (1.65g, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 8.29 (d, *J* = 1.4 Hz, 1H), 8.17 (dd, *J* = 6.3, 2.8 Hz, 1H), 7.89 –

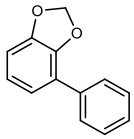
7.85 (m, 2H), 7.64 (dd, *J* = 8.2, 1.5 Hz, 1H), 7.48 – 7.41 (m, 3H), 7.41 – 7.35 (m, 1H), 7.09 (t, *J* = 7.4 Hz, 1H), 7.04 (d, *J* = 8.3 Hz, 1H), 3.84 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 156.5, 139.7, 138.1, 135.7, 135.5, 135.0, 131.1, 130.6, 128.7, 128.5, 126.6, 124.3, 122.8, 122.4, 122.1, 121.6, 120.9, 111.3, 55.6

HRMS calculated for $C_{19}H_{14}NaOS^+$ ([M+Na]$^+$): 313.0658; found 313.0662

IR (KBr, cm^{-1}): 3500, 3009, 2830, 1499, 1467, 1255, 1028, 760, 739

M.p.: 75.3-87.9℃

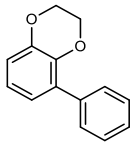


5a

4-phenylbenzo[d][1,3]dioxole[16] (**5a**) was prepared as shown in **Scheme S1**, obtained as a yellow liquid, 83% yield (330.5mg, 2.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.72 (d, *J* = 7.9 Hz, 2H), 7.45 (t, *J* = 7.7 Hz, 2H), 7.35 (t, *J* = 7.4 Hz, 1H), 7.07 (d, *J* = 8.0 Hz, 1H), 6.93 (t, *J* = 7.9 Hz, 1H), 6.83 (d, *J* = 7.7 Hz, 1H), 6.02 (s, 2H)

^{13}C NMR (151 MHz, Chloroform-d) δ 147.8, 144.6, 135.9, 128.5, 127.9, 127.5, 123.0, 122.0, 121.3, 107.6, 100.6

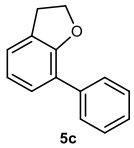


5b

5-phenyl-2,3-dihydrobenzo[b][1,4]dioxine[17] (**5b**) was prepared as shown in **Scheme S1**, obtained as a yellow liquid, 97% yield (411.6mg, 2.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.55 (d, J = 6.7 Hz, 2H), 7.42 (t, J = 7.7 Hz, 2H), 7.34 (t, J = 7.4 Hz, 1H), 6.93 – 6.88 (m, 3H), 4.31 – 4.29 (m, 2H), 4.27 (dd, J = 5.6, 2.1 Hz, 2H).

^{13}C NMR (101 MHz, Chloroform-d) δ 143.8, 140.7, 137.6, 130.9, 128.0, 127.1, 122.8, 121.0, 116.6, 64.3, 64.1

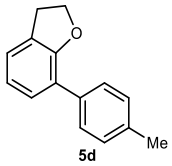


5c

7-phenyl-2,3-dihydrobenzofuran[18] (**5c**) was prepared as shown in **Scheme S1**, obtained as a colorless liquid, quantitative yield (421.6mg, 2.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.70 (d, *J* = 7.1 Hz, 2H), 7.43 (t, *J* = 7.8 Hz, 2H), 7.32 (t, *J* = 7.4 Hz, 1H), 7.29 (d, *J* = 8.2 Hz, 1H), 7.19 (d, *J* = 8.4 Hz, 1H), 6.95 (t, *J* = 7.5 Hz, 1H), 4.62 (t, *J* = 8.8 Hz, 2H), 3.28 (t, *J* = 8.7 Hz, 2H)

^{13}C NMR (101 MHz, Chloroform-d) δ 157.3, 137.5, 128.5 (two carbons), 128.0, 127.9, 127.2, 124.1, 123.7, 121.0, 71.1, 30.0

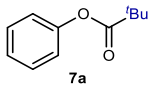


5d

7-(*p*-tolyl)-2,3-dihydrobenzofuran[19] (**5d**) was prepared as shown in **Scheme S1**, obtained as a yellow solid, 81% yield (340.2mg, 2.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.58 (d, *J* = 8.1 Hz, 2H), 7.27 – 7.21 (m, 3H), 7.15 (d, *J* = 7.3 Hz, 1H), 6.91 (t, *J* = 7.5 Hz, 1H), 4.59 (t, *J* = 8.7 Hz, 2H), 3.26 (t, *J* = 8.7 Hz, 2H), 2.37 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 157.1, 136.8, 134.4, 129.0, 128.2, 127.6, 127.6, 123.66, 123.6, 120.8, 70.9, 29.9, 21.2

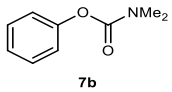


7a

phenyl pivalate (**7a**) was prepared as shown in **Scheme S3**, obtained as a colorless liquid, 75% yield (661.6mg, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.3 (t, *J* = 7.9 Hz, 2H), 7.1 (t, *J* = 7.4 Hz, 1H), 7.0 (d, *J* = 7.7 Hz, 2H), 1.3 (s, 10H).

^{13}C NMR (101 MHz, Chloroform-d) δ 177.1, 151.1, 129.3, 125.5, 121.5, 39.0, 27.1

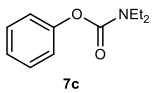


7b

phenyl diethylcarbamate[20] (**7b**) was prepared as shown in **Scheme S3**, obtained as a yellow liquid, 83% yield (681.5mg, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.35 (t, *J* = 7.2 Hz, 2H), 7.19 (t, *J* = 7.3 Hz, 1H), 7.11 (d, *J* = 7.9 Hz, 2H), 3.10 (s, 3H), 3.01 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 155.1, 151.6, 129.3, 125.3, 121.9, 36.8, 36.6

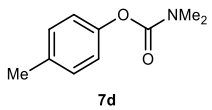


7c

phenyl dimethylcarbamate[21] (**7c**) was prepared as shown in **Scheme S3**, obtained as a yellow liquid, quantitative yield (1.02g, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.35 (t, *J* = 7.7 Hz, 2H), 7.18 (t, *J* = 7.4 Hz, 1H), 7.12 (d, *J* = 7.9 Hz, 2H), 3.44 (d, *J* = 7.2 Hz, 2H), 3.39 (d, *J* = 7.0 Hz, 2H), 1.26 (s, 3H), 1.20 (d, *J* = 7.2 Hz, 2H)

^{13}C NMR (101 MHz, Chloroform-d) δ 154.2, 151.5, 129.2, 125.0, 121.7

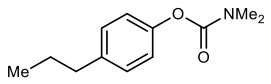


7d

***p*-tolyl dimethylcarbamate**[22] (**7d**) was prepared as shown in **Scheme S3**, obtained as a yellow liquid, 98% yield (881.8mg, 5.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.14 (d, *J* = 8.0 Hz, 2H), 6.98 (dd, *J* = 8.3, 1.6 Hz, 2H), 3.09 (s, 3H), 3.00 (s, 3H), 2.33 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 155.3, 149.4, 134.8, 129.8, 121.6, 36.8, 36.5, 20.9

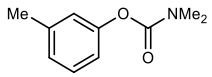


7e

4-propylphenyl dimethylcarbamate[23] (**7e**) was prepared as shown in **Scheme S3**, obtained as a yellow liquid, quantitative yield (1.07g, 5.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.05 (d, *J* = 8.5 Hz, 2H), 6.91 (d, *J* = 8.5 Hz, 2H), 2.99 (s, 3H), 2.91 (s, 3H), 2.50 – 2.45 (m, 2H), 1.55-1,51 (m, 2H), 0.84 (t, *J* = 7.3 Hz, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 155.1, 149.4, 139.5, 129.1, 121.3, 37.4, 36.6, 36.4, 24.5, 13.7

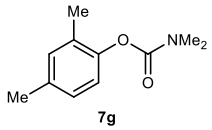


7f

***m*-tolyl dimethylcarbamate**[22] (**7f**) was prepared as shown in **Scheme S3**, obtained as a yellow liquid, quantitative yield (915.1 mg, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.25 (t, *J* = 7.8 Hz, 1H), 7.02 (d, *J* = 7.6 Hz, 1H), 6.96 (s, 1H), 6.93 (d, *J* = 8.1 Hz, 1H), 3.11 (s, 3H), 3.03 (s, 3H), 2.37 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 155.0, 151.4, 139.3, 128.9, 125.9, 122.4, 118.7, 36.6, 36.4, 21.3

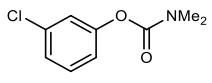


7g

2,4-dimethylphenyl dimethylcarbamate[24] (**7g**) was prepared as shown in **Scheme S3**, obtained as a yellow liquid, quantitative yield (1.03 g, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 6.91 (s, 1H), 6.88 (d, *J* = 8.2 Hz, 1H), 6.83 (d, *J* = 8.1 Hz, 1H), 3.02 (s, 3H), 2.91 (s, 3H), 2.19 (s, 3H), 2.07 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 154.9, 147.7, 134.8, 131.5, 129.8, 127.3, 121.8, 36.7, 36.4, 20.7, 16.0

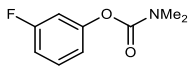


7h

3-chlorophenyl dimethylcarbamate[22] (**7h**) was prepared as shown in **Scheme S3**, obtained as a yellow liquid, quantitative yield (5.7g, 25 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.28 (d, *J* = 8.1 Hz, 1H), 7.17 (d, *J* = 8.5 Hz, 1H), 7.16 (s, 1H), 7.02 (dd, *J* = 8.7, 1.6 Hz, 1H), 3.09 (s, 3H), 3.01 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 154.3, 152.0, 134.4, 129.9, 122.4, 120.1, 36.7, 36.4

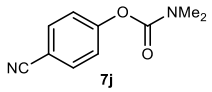


7k

3-fluorophenyl dimethylcarbamate[23] (**7i**) was prepared as shown in **Scheme S3**, obtained a pale-yellow liquid, quantitative yield (1.05g, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.33 – 7.27 (m, 1H), 6.94 – 6.85 (m, 3H), 3.09 (s, 3H), 3.01 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 163.0 (d, J_{C-F} = 163 Hz), 154.5, 152.6 (d, $^3J_{C-F}$ = 7 Hz), 130.0 (d, $^3J_{C-F}$ = 6 Hz), 117.6 (d, $4J_{C-F}$ = 2 Hz), 112.3 (d, $^2J_{C-F}$ = 13 Hz), 110.0 (d, $^2J_{C-F}$ = 16 Hz), 36.9, 36.6

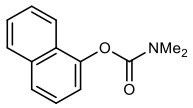


7j

4-cyanophenyl dimethylcarbamate[25] (**7j**) was prepared as shown in **Scheme S3**, obtained as a white solid, quantitative yield (1.03g, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.61 – 7.56 (m, 2H), 7.21 – 7.16 (m, 2H), 3.04 (s, 3H), 2.95 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 155.0, 153.7, 133.6, 122.8, 118.6, 108.9, 36.9, 36.6

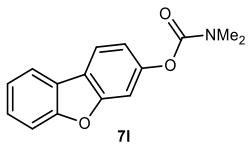


7k

naphthalen-1-yl dimethylcarbamate[22] (**7k**) was prepared as shown in **Scheme S3**, obtained as a brown liquid, quantitative yield (1.26g, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.99 (t, *J* = 7.0 Hz, 2H), 7.87 – 7.83 (m, 1H), 7.72 (d, *J* = 8.2 Hz, 1H), 7.52 – 7.47 (m, 2H), 2.99 (s, 3H), 2.87 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 155.0, 147.4, 134.7, 128.5, 127.5, 126.34, 126.33, 125.6, 125.5, 121.4, 117.9, 37.0, 36.7



7l

dibenzo[b,d]furan-2-yl dimethylcarbamate (**7l**) was prepared as shown in **Scheme S3**, obtained as a white solid, 88% yield (1.12g, 5.0 mmol scale).

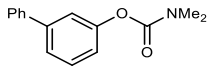
^{1}H NMR (600 MHz, Chloroform-d) δ 7.89 (dt, *J* = 7.6, 1.0 Hz, 1H), 7.71 (d, *J* = 2.4 Hz, 1H), 7.58 – 7.50 (m, 2H), 7.46 (dd, *J* = 8.4, 7.2 Hz, 1H), 7.33 (td, *J* = 7.5 Hz, 1H), 7.19 (dd, *J* = 8.8 Hz, 1H), 3.16 (s, 3H), 3.05 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 156.9, 155.3, 153.4, 147.0, 127.4, 124.8, 124.1, 122.7, 121.0, 120.8, 113.8, 111.8, 111.7, 36.8, 36.5

HRMS calculated for $C_{15}H_{13}NNaO_3^+$ $[M+Na]^+$: 278.0788; found 278.0796

IR (KBr, cm^{-1}): 1707, 1443, 1391, 1218, 1178, 796

M.p.: 97-98.6℃

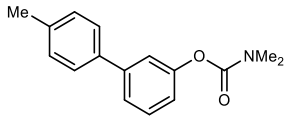


7m

[1,1'-biphenyl]-3-yl dimethylcarbamate[26] (**7m**) was prepared as shown in **Scheme S4**, obtained as a brown liquid, 76% yield (544.1mg, 3.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.59 (d, J = 7.8 Hz, 2H), 7.43 (d, J = 6.2 Hz, 4H), 7.35 (d, J = 2.2 Hz, 2H), 7.13 – 7.10 (m, 1H), 3.13 (s, 3H), 3.04 (s, 3H).

^{13}C NMR (151 MHz, Chloroform-d) δ 155.04, 152.04, 142.73, 140.52, 129.63, 129.62, 128.86, 128.84, 127.64, 127.63, 127.32, 124.08, 120.70, 120.68, 36.84, 36.60

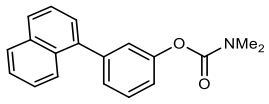


7n

4'-methyl-[1,1'-biphenyl]-3-yl dimethylcarbamate[27] (**7n**) was prepared as shown in **Scheme S4**, obtained as a yellow liquid, 74% yield (567mg, 3.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.49 (d, *J* = 8.1 Hz, 2H), 7.42 – 7.40 (m, 2H), 7.33 (s, 1H), 7.24 (d, *J* = 8.0 Hz, 2H), 7.08 (dt, *J* = 5.4, 2.5 Hz, 1H), 3.13 (s, 3H), 3.03 (s, 3H), 2.39 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 155.1, 152.0, 142.7, 137.6, 137.4, 129.6, 127.1, 123.9, 120.41, 120.38, 36.8, 36.6, 21.2



7o

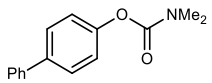
3-(naphthalen-1-yl)phenyl dimethylcarbamate (**7o**) was prepared as shown in **Scheme S4**, obtained as a brown liquid, 76% yield (661.9mg, 3.0 mmol scale).

^{1}H NMR (400 MHz, Chloroform-d) δ 7.94 (d, *J* = 8.2 Hz, 1H), 7.90 (d, *J* = 7.6 Hz, 1H), 7.86 (d, *J* = 8.1 Hz, 1H), 7.55 – 7.42 (m, 5H), 7.34 (d, *J* = 7.9 Hz, 1H), 7.24 – 7.19 (m, 1H), 3.13 (s, 3H), 3.04 (s, 3H).

^{13}C NMR (101 MHz, Chloroform-d) δ 155.0, 151.5, 142.1, 139.4, 133.9, 131.6, 129.1, 128.4, 128.0, 127.1, 127.0, 126.3, 126.1, 125.9, 125.4, 123.5, 120.8, 36.8, 36.6

HRMS calculated for $C_{19}H_{17}NNaO_2^+$ $[M+Na]^+$: 314.1151; found 314.1149

IR (KBr, cm^{-1}): 3049, 2938, 1723, 1488, 1391, 1201, 1178, 893

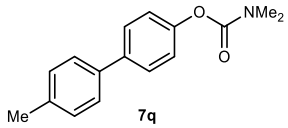


7p

[1,1'-biphenyl]-4-yl dimethylcarbamate[27] (**7p**) was prepared as shown in **Scheme S3**, obtained as a white solid, quantitative yield (5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.58 – 7.55 (m, 4H), 7.42 (t, *J* = 7.7 Hz, 2H), 7.33 (t, *J* = 7.4 Hz, 1H), 7.18 (d, *J* = 8.6 Hz, 2H), 3.11 (s, 3H), 3.03 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 154.8, 150.9, 140.5, 138.2, 128.7, 127.9, 127.1, 127.0, 122.0, 36.6, 36.4



7q

4'-methyl-[1,1'-biphenyl]-4-yl dimethylcarbamate (**7q**) was prepared as shown in **Scheme S4**, obtained as a grey solid, 81% yield (616.6 mg, 3.0 mmol scale).

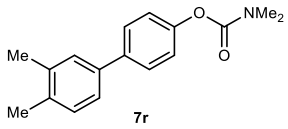
^{1}H NMR (600 MHz, Chloroform-d) δ 7.55 (d, *J* = 8.6 Hz, 2H), 7.46 (d, *J* = 8.1 Hz, 2H), 7.24 (d, *J* = 7.9 Hz, 2H), 7.17 (d, *J* = 8.6 Hz, 2H), 3.12 (s, 3H), 3.03 (s, 3H), 2.39 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 155.1, 150.9, 138.4, 137.8, 137.1, 129.6, 127.9, 127.1, 122.1, 36.8, 36.6, 21.2

HRMS for $C_{16}H_{17}NNaO_2^+$ ([M+Na$^+$]):278.1151; found: 278.1159

IR (KBr, cm^{-1}): 2497, 1737, 1441, 1397, 1207, 1174, 803

M.p.: 113.5-117.5℃



7r

3',4'-dimethyl-[1,1'-biphenyl]-4-yl dimethylcarbamate (**7r**) was prepared according to as shown in **Scheme S4**, obtained as a brown solid, 85% yield (681.4mg, 3.0 mmol scale).

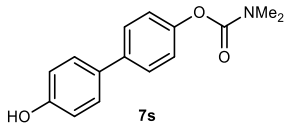
^{1}H NMR (400 MHz, Chloroform-d) δ 7.55 (d, *J* = 8.6 Hz, 2H), 7.35 (s, 1H), 7.31 (d, *J* = 9.5 Hz, 1H), 7.19 (d, *J* = 7.8 Hz, 1H), 7.16 (d, *J* = 8.6 Hz, 2H), 3.12 (s, 3H), 3.03 (s, 3H), 2.33 (s, 3H), 2.30 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 155.12, 150.83, 138.48, 138.33, 137.02, 135.75, 130.17, 128.49, 127.91, 124.58, 122.03, 36.86, 36.60, 20.04, 19.54.

HRMS for $C_{17}H_{19}NNaO_2^+$ ([M+Na$^+$]): 292.1308; found: 292.1309

IR (KBr, cm^{-1}): 3602, 3030, 1714, 1500, 1390, 1213, 868, 812

M.p.: 64.3-67.5℃



7s

4'-hydroxy-[1,1'-biphenyl]-4-yl dimethylcarbamate (**7s**) was prepared as shown in **Scheme S4**, obtained as a yellow solid, 51% yield (390mg, 3.0 mmol scale).

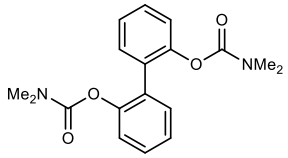
^{1}H NMR (600 MHz, Chloroform-d) δ 9.44 (d, *J* = 2.5 Hz, 1H), 7.96 (d, *J* = 8.9 Hz, 3H), 7.88 – 7.84 (m, 2H), 7.59 (dd, *J* = 9.0, 2.7 Hz, 2H), 7.39 – 7.34 (m, 2H), 3.59 (s, 3H), 3.49 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d + DMSO-D_6) δ 156.6, 154.5, 149.9, 137.7, 131.1, 127.5, 126.8, 121.6, 115.5, 36.3, 36.1

HRMS for $C_{15}H_{15}NNaO_3^+$ ([M+Na]$^+$): 280.0944; found 280.0950

IR (KBr, cm^{-1}): 3393, 2928, 1715, 1612, 1397, 1212, 807

M.p.: 198.4-201.8℃

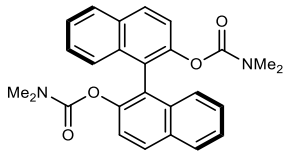


7t

[1,1'-biphenyl]-2,2'-diyl bis(dimethylcarbamate)[28] (**7t**) was prepared as shown in **Scheme S3**, obtained as a yellow liquid, quantitative yield (5.0 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.36 (dd, *J* = 8.2, 1.7 Hz, 2H), 7.30 – 7.26 (m, 4H), 7.22 (t, *J* = 7.4 Hz, 2H), 2.83 (s, 6H), 2.72 (s, 6H).

^{13}C NMR (101 MHz, Chloroform-d) δ 154.5, 149.1, 131.0, 130.9, 128.7, 125.0, 122.6, 36.6, 36.2

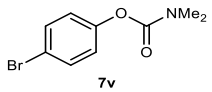


7u

(*R*)-[1,1'-binaphthalene]-2,2'-diyl bis(dimethylcarbamate)[22] (**7u**) was prepared as shown in **Scheme S3**, obtained as a white solid, 98% yield (2.09g, 5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.97 (d, *J* = 8.9 Hz, 2H), 7.91 (dd, *J* = 8.2, 1.1 Hz, 2H), 7.59 (d, *J* = 8.9 Hz, 2H), 7.43 (dt, *J* = 8.1, 3.9 Hz, 2H), 7.32 – 7.28 (m, 4H), 2.67 (s, 6H), 2.20 (s, 6H)

^{13}C NMR (151 MHz, Chloroform-d) δ 154.1, 147.4, 133.3, 131.1, 128.9, 127.8, 126.4, 126.0, 125.2, 123.6, 122.5, 36.3, 35.5

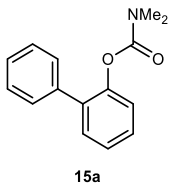


7v

4-bromophenyl dimethylcarbamate[27] (**7v**) was prepared as shown in **Scheme S3**, obtained as a brown liquid, quantitative yield (5.84g, 20 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) (d, *J* = 8.8 Hz, 2H), 7.00 (d, *J* = 8.8 Hz, 2H), 3.09 (s, 3H), 3.00 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 154.4, 150.6, 132.2, 123.5, 118.1, 36.7, 36.4

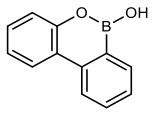


15a

[1,1'-biphenyl]-2-yl dimethylcarbamate[22] (**15a**) was prepared as shown in **Scheme S3**, obtained as a colorless liquid, quantitative yield (5.0 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.43 (d, *J* = 7.7 Hz, 2H), 7.41 – 7.32 (m, 5H), 7.29 – 7.26 (m, 1H), 7.22 (d, *J* = 8.0 Hz, 1H), 2.89 (s, 3H), 2.88 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 154., 148.4, 137.9, 134.8, 130.6, 129.1, 128.3, 128.0, 127.2, 125.6, 123.3, 36.6, 36.2

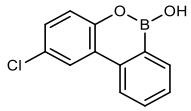


2a

6H-dibenzo[c,e][1,2]oxaborinin-6-ol[29] (**2a**) was prepared as shown in **Scheme S5**, obtained as a white solid, quantitative yield (2.97g, 15 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 8.17 (d, *J* = 8.1 Hz, 1H), 8.14 (d, *J* = 8.0 Hz, 1H), 8.08 (d, *J* = 8.1 Hz, 1H), 7.72 (dd, *J* = 8.6, 7.8 Hz, 1H), 7.48 (t, *J* = 7.3 Hz, 1H), 7.40 – 7.37 (m, 1H), 7.28 (d, *J* = 8.1 Hz, 1H), 7.26 – 7.22 (m, 1H), 4.79 (s, 1H)

^{13}C NMR (151 MHz): 13C NMR (101 MHz, Chloroform-d) δ 151.3, 140.5, 133.5, 132.7, 129.1, 127.4, 123.7, 123.1, 122.8, 121.8, 119.7 (the C-B carbon not seen)



2b

2-chloro-6H-dibenzo[c,e][1,2]oxaborinin-6-ol (**2b**) was prepared as shown in **Scheme S5**, obtained as a white solid, quantitative yield (119.9mg, 0.5 mmol scale).

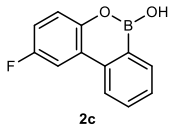
^{1}H NMR (600 MHz, Chloroform-d + DMSO-D_6) δ 8.10 – 8.06 (m, 3H), 7.72 (t, *J* = 7.8 Hz, 1H), 7.51 (t, *J* = 7.4 Hz, 1H), 7.31 (dd, *J* = 8.7, 2.4 Hz, 1H), 7.20 (d, *J* = 8.6 Hz, 1H)

^{13}C NMR (151 MHz, Chloroform-d + DMSO-D_6) δ 150.1, 138.9, 133.7, 132.2, 128.4, 127.7, 127.3, 124.3, 123.2, 121.4, 120.9 (the C-B carbon not seen)

HRMS calculated for $C_{14}H_{13}BClO_3^-$ ([M+2MeOH-2H_2O-H]$^-$): 275.0652; found 275.0694 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate)

IR (KBr, cm^{-1}): 3299, 1556, 1491, 1371, 1098, 776

M.p.: 214.5-220.4℃



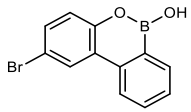
2c

2-fluoro-6H-dibenzo[c,e][1,2]oxaborinin-6-ol [30] (**2c**) was prepared as shown in **Scheme S5**, obtained as a yellow solid, 88% yield (22.7mg, 0.12 mmol scale).

When the reaction was performed in 4.0 mmol scale (**1f**, 1.0 equivalent) with $Fe(OTf)_3$ (100.6 mg, 5 mol%) and BBr_3 (2.0 M in DCM, 4.0 mL, 2.0 equivalents) in 10 mL DCM at around 10℃ for 20h, only 48% yield (413.1mg) of desired boronic acid obtained. While 54% yield of 5-fluoro-[1,1'-biphenyl]-2-ol (from demethylation) were obtained as byproduct.

^{1}H NMR (400 MHz, Chloroform-d) δ 8.08 (d, *J* = 6.9 Hz, 1H), 8.05 (d, *J* = 8.2 Hz, 1H), 7.81 – 7.76 (m, 1H), 7.76 – 7.70 (m, 1H), 7.51 (t, *J* = 7.0 Hz, 1H), 7.23 (dd, *J* = 8.9, 5.0 Hz, 1H), 7.11 – 7.04 (m, 1H), 4.74 (b, 1H)

^{13}C NMR (101 MHz, Chloroform-d) δ 151.4 (d, $J_{C\text{-}F}$ = 82.8 Hz, 1H), 147.2, 139.5, 133.4, 132.7, 127.8, 121.8, 120.6 (d, $^3J_{C\text{-}F}$ = 8.1 Hz, 1H), 115.9 (d, $^2J_{C\text{-}F}$ = 24.2 Hz, 1H), 109.5 (d,$^2J_{C\text{-}F}$ = 24.2 Hz, 1H)

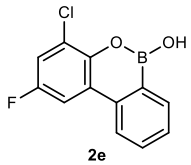


2d

2-bromo-6H-dibenzo[c,e][1,2]oxaborinin-6-ol [31] (**2d**) was prepared as shown in **Scheme S5**, obtained as a white solid, 84% yield (274.9mg, 1.2 mmol scale).

^{1}H NMR (400 MHz, Chloroform-d) δ 8.23 (d, *J* = 2.3 Hz, 1H), 8.08 (t, *J* = 6.7 Hz, 2H), 7.73 (t, *J* = 8.3 Hz, 1H), 7.51 (t, *J* = 7.4 Hz, 1H), 7.48 – 7.42 (m, 1H), 7.15 (d, *J* = 8.6 Hz, 1H), 4.72 (s, 1H)

^{13}C NMR (101 MHz, Chloroform-d + DMSO-D_6) δ 150.45, 138.79, 133.65, 132.18, 131.26, 127.61, 126.16, 124.78, 121.38, 121.23, 114.77 (the B-C not seen)



2e

4-chloro-2-fluoro-6H-dibenzo[c,e][1,2]oxaborinin-6-ol (**2e**) was prepared as shown in **Scheme S5**, obtained as a white solid, 84% yield (104.5mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 8.12 (d, *J* = 7.5 Hz, 1H), 8.03 (d, *J* = 8.1 Hz, 1H), 7.76 – 7.73 (m, 1H), 7.73 – 7.69 (m, 1H), 7.54 (t, *J* = 7.4 Hz, 1H), 7.23 (d, *J* = 7.6 Hz, 1H), 5.20 – 5.15 (br, 1H)

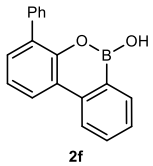
^{13}C NMR (101 MHz, Chloroform-d) δ 156.6 (d, $J_{C\text{-}F}$ = 242 Hz), 143.8 (d, $^4J_{C\text{-}F}$ = 3.0 Hz), 138.5 (d, $^4J_{C\text{-}F}$ = 3.0 Hz), 133.7, 132.2, 128.1, 124.8 (d, $^3J_{C\text{-}F}$ = 8.0 Hz), 124.3 (d, $^3J_{C\text{-}F}$ = 8.0 Hz), 121.7, 116.2 (d, $^2J_{C\text{-}F}$ = 27 Hz), 108.2 (d, $^2J_{C\text{-}F}$ = 24 Hz) (the C-B carbon not seen)

^{19}F NMR (565 MHz, Chloroform-d) δ -119.09.

HRMS calculated for $C_{14}H_{12}BClFO_3^-$ ([M+2MeOH-2H_2O-H]$^-$): 293.0558; found 293.0604 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate)

IR (KBr, cm^{-1}): 3530, 1608, 1654, 1494, 1300, 1160, 826, 776

M.p.: 214.5-220.4℃

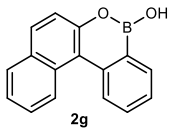


2f

4-phenyl-6H-dibenzo[c,e][1,2]oxaborinin-6-ol[31] (**2f**) was prepared as shown in **Scheme S5**, obtained as a yellow liquid, quantitative yield (138.5mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 8.23 (d, *J* = 8.3 Hz, 1H), 8.17 (d, *J* = 8.1 Hz, 1H), 8.11 – 8.08 (m, 1H), 7.76 – 7.72 (m, 1H), 7.61 (d, *J* = 8.2 Hz, 2H), 7.51 – 7.46 (m, 3H), 7.43 – 7.38 (m, 2H), 7.33 – 7.28 (m, 1H), 4.83 (s, 1H).

^{13}C NMR (151 MHz, Chloroform-d) δ 148.0, 140.7, 138.6, 133.5, 132.7, 132.6, 130.6, 129.9, 128.3, 127.5, 127.4, 123.5, 123.2, 122.6, 122.0 (the C-B carbon not seen).



2g

5H-benzo[c]naphtho[1,2-e][1,2]oxaborinin-5-ol (**2g**) was prepared a as shown in **Scheme S5**, obtained as a yellow liquid, 85% yield (104.8 mg, 0.5 mmol scale).

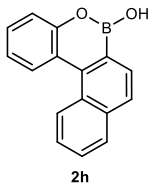
^{1}H NMR (600 MHz, Chloroform-d) δ 8.80 (d, *J* = 8.7 Hz, 1H), 8.57 (d, *J* = 8.2 Hz, 1H), 8.17 (d, *J* = 6.6 Hz, 1H), 7.91 (d, *J* = 8.0 Hz, 1H), 7.82 (d, *J* = 8.7 Hz, 1H), 7.78 – 7.74 (m, 1H), 7.60 – 7.56 (m, 1H), 7.52 (t, *J* = 7.3 Hz, 1H), 7.47 (t, *J* = 7.4 Hz, 1H), 7.42 (d, *J* = 8.7 Hz, 1H), 4.88 (b, 1H)

^{13}C NMR (151 MHz, Chloroform-d) δ 149.6, 140.7, 133.2, 131.8, 131.1, 130.8, 129.7, 128.7, 127.2, 126.6, 126.5, 125.8, 124.2, 120.0, 117.4

HRMS calculated for $C_{18}H_{16}BO_3^-$ ([M+2MeOH-2H_2O-H]$^-$): 291.1198; found 291.1259 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate)

IR (KBr, cm^{-1}): 3442, 1596, 1408, 1340, 1305, 748, 678

M.p.: 73-82.3℃



2h

6H-benzo[e]naphtho[2,1-c][1,2]oxaborinin-6-ol (**2h**) was prepared as shown in **Scheme S5**, obtained as a solid, quantitative yield (0.5 mmol scale).

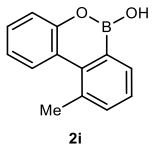
^{1}H NMR (400 MHz, Chloroform-d) δ 8.82 (d, *J* = 9.4 Hz, 1H), 8.46 (d, *J* = 8.0 Hz, 1H), 8.00 (d, *J* = 8.1 Hz, 1H), 7.98 – 7.93 (m, 1H), 7.86 (d, *J* = 8.1 Hz, 1H), 7.64 – 7.56 (m, 2H), 7.44 – 7.35 (m, 2H), 7.27 (d, *J* = 8.3 Hz, 1H), 4.80 (s, 1H)

^{13}C NMR (101 MHz, Chloroform-d) δ 151.7, 140.1, 136.8, 129.3, 129.1, 128.9, 128.5, 127.8, 127.7, 127.1, 126.8, 126.2, 123.7, 122.0, 119.4

HRMS calculated for $C_{18}H_{16}BO_3^-$ ([M+2MeOH-2H_2O-H]$^-$): 291.1198; found 291.1238 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate)

IR (KBr, cm^{-1}): 3442, 1596, 1470, 1408, 1340, 1305, 748, 678

M.p.: 75.2-100.3℃



2i

10-methyl-6H-dibenzo[c,e][1,2]oxaborinin-6-ol (**2i**) was prepared as shown in **Scheme S5**, obtained as a yellow solid, 58% yield (60.2mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 8.29 (d, *J* = 8.2 Hz, 1H), 7.99 (d, *J* = 7.2 Hz, 1H), 7.57 – 7.54 (m, 1H), 7.41 – 7.36 (m, 2H), 7.31 (d, *J* = 8.1, 1H), 7.21 (dd, *J* = 8.5, 7.1 Hz, 1H), 4.71 (br, 1H), 2.89 (s, 3H)

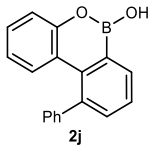
^{13}C NMR (151 MHz, Chloroform-d) δ 151.7, 139.5, 137.2, 134.3, 131.3, 128.3, 128.3, 126.8, 124.7,

121.8, 119.6, 25.7

HRMS calculated for $C_{15}H_{17}BNaO_3^+$ ([M+2MeOH-2H_2O+Na]$^+$): 279.1163; found 279.2259 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate)

IR (KBr, cm^{-1}): 3457, 2959, 1594, 1430, 1386, 1327, 1037, 750, 683

M.p.: 82.6-86.1℃



2j

10-phenyl-6H-dibenzo[c,e][1,2]oxaborinin-6-ol (**2j**) was prepared as shown in **Scheme S5**, obtained as a white solid, 79% yield (107.1mg, 0.5 mmol scale).

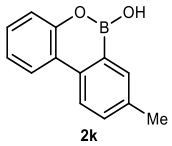
^{1}H NMR (600 MHz, Chloroform-d) δ 8.11 (d, *J* = 7.2 Hz, 1H), 7.55 (d, *J* = 5.8 Hz, 1H), 7.49 (t, *J* = 7.4 Hz, 1H), 7.43 (dt, *J* = 14.5, 6.9 Hz, 3H), 7.38 – 7.36 (m, 2H), 7.24 – 7.17 (m, 3H), 6.72 – 6.68 (m, 1H), 4.78 (b, 1H).

^{13}C NMR (101 MHz, Chloroform-d) δ 151.9, 144.1, 139.6, 138.3, 136.7, 132.7, 129.5, 129.1, 129.1, 128.5, 127.4, 126.7, 123.3, 121.4, 119.5 (one carbon was buried in other peaks)

HRMS calculated for $C_{20}H_{18}BO_3^-$ ([M+2MeOH-2H_2O-H]$^-$): 317.1354; found 317.1395 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate)

IR (KBr, cm^{-1}): 3447, 1590, 1429, 1365, 1330, 861

M.p.: 83.4-93.1℃

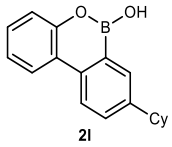


2k

8-methyl-6H-dibenzo[c,e][1,2]oxaborinin-6-ol[32] (**2k**) was prepared as shown in **Scheme S5**, obtained as a gray solid, 95% yield (199.1mg, 1.1 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 8.13 (dd, *J* = 8.0, 1.4 Hz, 1H), 7.99 – 7.95 (m, 2H), 7.38 – 7.35 (m, 1H), 7.30 (d, *J* = 7.5 Hz, 1H), 7.28 – 7.26 (m, 1H), 7.22 (t, *J* = 7.6 Hz, 1H), 4.82 (s, 1H), 2.53 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 151.3, 142.8, 140.4, 133.3, 128.8, 128.5, 123.5, 123.0, 122.5, 122.0, 119.5, 22.3



2l

8-cyclohexyl-6H-dibenzo[c,e][1,2]oxaborinin-6-ol (**2l**) was prepared as shown in **Scheme S5**, obtained as a yellow solid, quantitative yield (140.6 mg, 0.5 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.99 (t, *J* = 7.9 Hz, 2H), 7.80 (s, 1H), 7.46 (d, *J* = 8.2 Hz, 1H), 7.23 (t, *J* = 7.5 Hz, 1H), 7.15 (d, *J* = 7.8 Hz, 1H), 7.10 (t, *J* = 7.3 Hz, 1H), 4.69 (s, 1H), 2.52 (t, *J* = 11.7 Hz, 1H), 1.83 (d, *J* = 12.7 Hz, 2H), 1.77 (d, *J* = 12.8 Hz, 2H), 1.67 (d, *J* = 12.9 Hz, 1H), 1.41 (q, *J* = 12.4

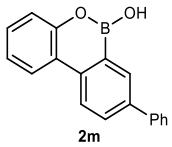
Hz, 2H), 1.32 (q, *J* = 12.9 Hz, 3H), 1.18 (q, *J* = 11.1 Hz, 2H)

^{13}C NMR (151 MHz, Chloroform-d) δ 151.0, 147.3, 138.3, 131.8, 131.3, 128.6, 123.5, 123.3, 122.8, 121.8, 119.6, 44.6, 34.5, 27.0, 26. (the C-B was not seen)

HRMS calculated for $C_{19}H_{21}BNaO_2^+$ ([M+MeOH-H_2O+Na]$^+$): 315.1527; found 315.1522 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding methylborate in situ, and the HRMS was actually obtained as the methylborate)

IR (KBr, cm^{-1}): 3460, 2850, 1611, 1485, 1309, 1035, 752, 682

M.p.: 176.9-180.5℃



2m

8-phenyl-6H-dibenzo[c,e][1,2]oxaborinin-6-ol (**2m**) was prepared as shown in **Scheme S5**, obtained as a white solid, quantitative yield (137.5 mg, 0.5 mmol scale).

When the reaction was performed in 4.0 mmol scale (**1p**, 1.0 equivalent) with $Fe(OTf)_3$ (201.2 mg, 10 mol%) and BBr_3 (2.0 M in DCM, 6.0 mL, 3.0 equivalents) in 10 mL DCM at room temperature for overnight, quantitative yield of product was obtained (1.14 g)

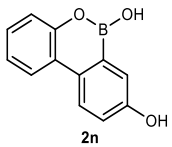
^{1}H NMR (600 MHz, Chloroform-d) δ 8.40 (d, *J* = 2.1 Hz, 1H), 8.15 (d, *J* = 8.4 Hz, 1H), 8.08 (dd, *J* = 8.0 Hz, 1H), 7.87 (dd, *J* = 8.4, 2.1 Hz, 1H), 7.70 – 7.65 (m, 2H), 7.41 (t, *J* = 7.7 Hz, 2H), 7.33 – 7.27 (m, 2H), 7.23 (d, *J* = 8.1 Hz, 1H), 7.15 (dd, *J* = 8.1, 7.2 Hz, 1H)

^{13}C NMR (151 MHz, Chloroform-d + DMSO-d_6) δ 151.4, 140.3, 139.2, 139.1, 131.8, 130.6, 128.6, 127.2, 126.8, 123.4, 122.6, 122.2, 121.8, 119.4 (the C-B cannot seen).

HRMS calculated for $C_{19}H_{15}BNaO_2^+$ ([M+MeOH-H_2O+Na]$^+$): 309.1057; found 309.1043 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding methylborate in situ, and the HRMS was actually obtained as the methylborate)

IR (KBr, cm^{-1}): 3445, 1482, 1391, 1312, 855, 761, 694

M.p.: 257.4-271.2℃



2n

6H-dibenzo[c,e][1,2]oxaborinine-6,8-diol (**2n**) was prepared as shown in **Scheme S5**, obtained as a white solid, 65% yield (150.8 mg, 1.1 mmol scale)

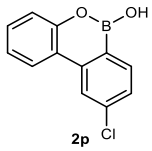
^{1}H NMR (600 MHz, Chloroform-d) δ 8.10 – 8.06 (m, 3H), 7.72 (t, *J* = 7.8 Hz, 1H), 7.51 (t, *J* = 7.4 Hz, 1H), 7.31 (dd, *J* = 8.7, 2.4 Hz, 1H), 7.20 (d, *J* = 8.6 Hz, 1H), 4.82 (s, 1H)

^{13}C NMR (151 MHz, Chloroform-d + DMSO-d_6) δ 149.9, 138.7, 133.6, 132.1, 128.3, 127.5, 127.1, 124.1, 123.0, 121.3, 120.7 (the C-B cannot not seen)

HRMS calculated for $C_{14}H_{14}BO_4^-$ ([M+2MeOH-2H_2O-H]$^-$): 257.0991; found 257.0979 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate)

IR (KBr, cm^{-1}): 3453, 3330, 1614, 1461, 1327, 741

M.p.: 282.7-297.8℃

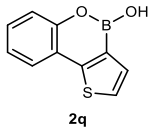


2p

9-chloro-6H-dibenzo[c,e][1,2]oxaborinin-6-ol[30] (**2p**) was prepared as shown in **Scheme S5**, obtained as a white solid, 86% yield (97.9mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 8.11 (d, *J* = 1.8 Hz, 1H), 8.05 (d, *J* = 8.0 Hz, 1H), 8.00 (d, *J* = 8.0 Hz, 1H), 7.43 (d, *J* = 8.0 Hz, 1H), 7.40 (dd, *J* = 8.6, 7.2 Hz, 1H), 7.28 (s, 1H), 7.24 (td, *J* = 8.4, 7.9 Hz, 1H), 4.78 (s, 1H)

^{13}C NMR (151 MHz, Chloroform-d) δ 151.4, 142.1, 139.2, 134.9, 129.7, 127.5, 123.7, 122.9, 121.9, 121.8, 119.7 (the C-B does not show)



2q

4H-benzo[e]thieno[3,2-c][1,2]oxaborinin-4-ol (**2q**) was prepared as shown in **Scheme S5**, obtained as a white solid, 45% yield (44.8mg, 0.5 mmol scale).

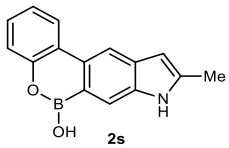
^{1}H NMR (600 MHz, Chloroform-d) δ 7.76 (d, *J* = 7.7 Hz, 1H), 7.47 (d, *J* = 4.8 Hz, 1H), 7.39 (d, *J* = 4.9 Hz, 1H), 7.36 (t, *J* = 7.7 Hz, 1H), 7.32 (d, *J* = 8.1 Hz, 1H), 7.20 (s, 1H), 4.80 (s, 1H)

^{13}C NMR (151 MHz, Chloroform-d) δ 153.7, 150.2, 129.7, 128.6, 125.1, 124.4, 122.8, 121.3, 119.0 (the C-B does not show).

HRMS calculated for $C_{12}H_{13}BKO_3S^+$ $[M+2MeOH-2H_2O+K]^+$: 287.0310; found 287.0234 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate.)

IR (KBr, cm^{-1}): 3342, 1579, 1517, 1451, 1350, 1268, 837, 744

M.p.: 84.4-87.3℃



2s

9-methylbenzo[5,6][1,2]oxaborinino[4,3-f]indol-6(8H)-ol (**2s**) was prepared as shown in **Scheme S5**, obtained as a brown solid, 62% yield (77.2mg, 0.5 mmol scale).

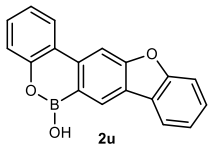
^{1}H NMR (600 MHz, Chloroform-d + DMSO-d_6) δ 9.97 (m, 1H), 8.74 (s, 1H), 8.65 (s, 1H), 8.58 (s, 1H), 8.39 (m, 1H), 7.71 (m, 2H), 7.63 (s, 1H), 6.76 (s, 1H), 2.92 (s, 3H).

^{13}C NMR (151 MHz, Chloroform-d + DMSO-d_6) δ 150.5, 139.0, 135.9, 132.8, 130.9, 126.8, 124.3, 122.8, 121.8, 119.1, 117.2, 114.8, 111.7, 100.0, 29.4, 13.6

HRMS calculated for $C_{16}H_{13}BNO_2^-$ ($[M+MeOH-H_2O-H]^-$): 262.1045; found 262.0934 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the methylborate.)

IR (KBr, cm^{-1}): 3465, 3415, 1455, 1405, 1323, 1302, 866, 748, 698

M.p.: 144.4-162.8℃



2u

benzo[b]benzo[5,6][1,2]oxaborinino[3,4-f]benzofuran-6-ol (**2u**) was prepared as shown in **Scheme S5**, obtained as a white solid, 90% yield (128.5mg, 0.5 mmol scale).

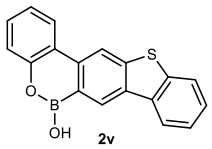
^{1}H NMR (600 MHz, DMSO-D_6 + Chloroform-d) δ 8.53 (d, *J* = 6.9 Hz, 2H), 8.14 (s, 1H), 8.07 (d, *J* = 7.8 Hz, 1H), 7.90 (d, *J* = 7.6 Hz, 1H), 7.40 (d, *J* = 8.2 Hz, 1H), 7.33 (t, *J* = 7.7 Hz, 1H), 7.22 – 7.17 (m, 1H), 7.14 (t, *J* = 7.5 Hz, 1H), 7.08 (d, *J* = 7.9 Hz, 1H), 7.04 (t, *J* = 7.0 Hz, 1H)

^{13}C NMR (101 MHz, DMSO-d_6) δ 156.4, 154.6, 150.7, 135.0, 128.9, 128.7, 127.9, 124.7, 124.1, 123.4, 123.3, 122.6, 122.5, 122.0, 119.3, 115.1, 115.0, 111.9

HRMS calculated for $C_{20}H_{16}BO_4^-$ ([M+2MeOH-2H_2O-H]$^-$): 331.1147; found 331.1199 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate.)

IR (KBr, cm^{-1}): 3466, 1425, 1317, 1187, 1029, 740, 726

M.p.: 203.5-247.5℃



2v

6H-benzo[e]benzo[4',5']thieno[2',3':4,5]benzo[1,2-c][1,2]oxaborinin-6-ol (**2v**) was prepared as shown in **Scheme S5**, obtained as a light yellow solid, 69% yield (104.9mg, 0.5 mmol scale).

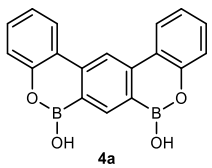
^{1}H NMR (600 MHz, DMSO-d_6) δ 9.55 (m, 1H), 9.37 (m, 1H), 8.73 (s, 1H), 8.65 (d, *J* = 8.6 Hz, 2H), 8.08 (s, 1H), 7.60 (m, 2H), 7.47 – 7.42 (m, 1H), 7.34 – 7.27 (m, 2H)

^{13}C NMR (101 MHz, DMSO-d_6) δ 151.0, 139.7, 138.8, 137.4, 136.2, 135.0, 129.1, 128.1, 127.9, 124.9, 124.3, 123.2, 123.2, 122.7, 122.5, 119.3, 115.5

HRMS calculated for $C_{20}H_{16}BO_3S^-$ ([M+2MeOH-2H_2O-H]$^-$): 347.0919; found 347.0976 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate.)

IR (KBr, cm^{-1}): 3477, 1534, 1464, 1396, 1317, 1311, 1293, 843, 793

M.p.: 250.7-267.9℃



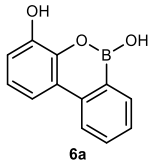
4a

Bis-6H-dibenzo[c,e][1,2]oxaborinin-6-ol(**4a**) was prepared as shown in **Scheme S7**, obtained as a yellow solid, quantitative yield (157.4mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, DMSO-d_6) δ 9.53 (s, 2H), 9.13 (s, 1H), 8.84 (s, 1H), 8.75 (d, *J* = 7.4 Hz, 2H), 7.49 (t, *J* = 7.2 Hz, 2H), 7.30 (d, *J* = 7.7 Hz, 4H)

^{13}C NMR (151 MHz, DMSO-d_6) δ 152.3, 143.3, 140.8, 130.5, 125.6, 124.1, 122.9, 122.9, 119.8, 114.8

HRMS calculate for $C_{20}H_{16}B_2NaO_4^+$ [M+2MeOH-2H_2O+Na^+]: 365.1127; found 365.1197 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate.)
IR (KBr, cm^{-1}): 3471, 1611, 1532, 1381, 1322, 740
M.p.: >316℃

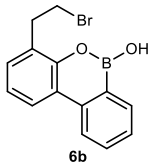


6a

6H-dibenzo[c,e][1,2]oxaborinine-4,6-diol(**6a**) was prepared as shown in **Scheme S5**. 99% yield (104.9mg, from **5a**, 0.5 mmol scale) of desired product was obtained as a purple solid.

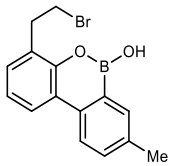
When the reaction of substrate **5b** (0.5 mmol, 1.0 equivalent) was performed with BBr_3 (1.0 M in DCM, 0.75 mL,1.5 equivalents) but without $Fe(OTf)_3$, 44% yield (46.3 mg) of product **6a** was obtained.

^{1}H NMR (600 MHz, Chloroform-d + DMSO-D_6) δ 8.39 (s, 1H), 8.07 (d, *J* = 7.3 Hz, 1H), 8.03 (d, *J* = 8.1 Hz, 1H), 7.59 (t, *J* = 7.5 Hz, 1H), 7.53 (d, *J* = 7.9 Hz, 1H), 7.36 (t, *J* = 7.2 Hz, 2H), 6.97 (t, *J* = 7.9 Hz, 1H), 6.91 (d, *J* = 7.6 Hz, 1H)
^{13}C NMR (151 MHz, Chloroform-d + DMSO-D_6) δ 146.1, 139.5, 139.1, 132.9, 131.4, 126.2, 122.4, 121.3, 121.3, 121.0, 114.1, 113.3
HRMS calculated for $C_{14}H_{14}BO_4^-$ ([M+2MeOH-2H_2O-H]$^-$): 257.0991; found 257.0979 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate)
IR (KBr, cm^{-1}): 3447, 3392, 1564, 1500, 1359, 1292, 750
M.p.: >317℃



6b

4-(2-bromoethyl)-6H-dibenzo[c,e][1,2]oxaborinin-6-ol (**6b**) was prepared according to General procedure A, obtained as a gray solid, quantitative yield (349.3mg, 1.1 mmol scale).
^{1}H NMR (600 MHz, Chloroform-d) δ 8.16 (d, *J* = 8.2 Hz, 1H), 8.08 (t, *J* = 6.7 Hz, 2H), 7.74 – 7.70 (m, 1H), 7.48 (t, *J* = 7.3 Hz, 1H), 7.28 (d, *J* = 8.6 Hz, 1H), 7.19 (t, *J* = 7.7 Hz, 1H), 4.88 (s, 1H), 3.68 (t, *J* = 7.7 Hz, 2H), 3.42 (t, *J* = 7.7 Hz, 2H)
^{13}C NMR (101 MHz, Chloroform-d) δ 149.3, 140.5, 133.4, 132.8, 130.3, 128.9, 127.4, 123.2, 122.9, 122.5, 122.0, 34.7, 32.1
HRMS calculate for $C_{15}H_{14}BBrNaO_2^+$ [M+MeOH-H_2O+Na]$^+$: 339.0162; found 339.0153 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding methylborate in situ, and the HRMS was actually obtained as the methylborate)
IR (KBr, cm^{-1}): 3477, 2932, 1603, 1561, 1494, 1368, 1394, 758, 621
M.p.: 157.2-171.9℃



6c

4-(2-bromoethyl)-8-methyl-6H-dibenzo[c,e][1,2]oxaborinin-6-ol (**6c**) was prepared as shown in **Scheme S5**, obtained as a gray solid, quantitative yield (342.3mg, 1.1 mmol).

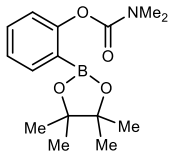
^{1}H NMR (600 MHz, Chloroform-d) δ 8.00 – 7.94 (m, 2H), 7.80 (s, 1H), 7.45 (d, *J* = 8.2 Hz, 1H), 7.17 (d, *J* = 9.9 Hz, 1H), 7.09 (t, *J* = 7.6 Hz, 1H), 4.74 (s, 1H), 3.60 (t, *J* = 7.7 Hz, 2H), 3.33 (t, *J* = 7.7 Hz, 2H), 2.39 (s, 3H)

^{13}C NMR (101 MHz, Chloroform-d) δ 148.8, 137.8, 137.0, 133.8, 133.4, 129.7, 128.6, 123.2, 122.5, 122.3, 121.9, 34.6, 32.0, 21.2 (the C-B did not show)

HRMS calculate for $C_{16}H_{16}BBrNaO_2^+$ $[M+MeOH-H_2O+Na]^+$: 355.0298; found 355.0297 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding methylborate in situ, and the HRMS was actually obtained as the methylborate)

IR (KBr, cm^{-1}): 3395, 2966, 1500, 1322, 1209, 792, 751

M.p.: 177.2 189.5℃

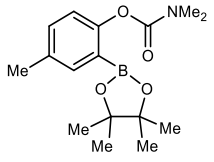


14b

2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl dimethylcarbamate[32] (**14b**) was prepared as shown in **Scheme S6**, obtained as a pale-yellow liquid, 86% yield (125.1mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.76 (d, *J* = 7.4 Hz, 1H), 7.43 (t, *J* = 8.0 Hz, 1H), 7.19 (t, *J* = 7.4 Hz, 1H), 7.07 (d, *J* = 8.1 Hz, 1H), 3.14 (s, 3H), 3.00 (s, 3H), 1.31 (s, 12H)

^{13}C NMR (151 MHz, Chloroform-d) δ 156.4, 155.7, 136.2, 132.3, 124.9, 122.2, 83.5, 36.7, 36.5, 24.9 (the C-B did not show)



14d

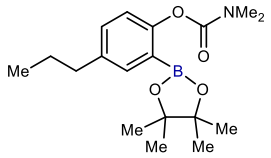
6-hydroxy-6H-dibenzo[c,e][1,2]oxaborinine-3-carbonitrile (**14d**) was prepared as shown in **Scheme S6**, obtained as a yellow liquid, 89% yield (136mg, 0.5 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.56 (s, 1H), 7.23 (d, *J* = 8.1 Hz, 1H), 6.95 (d, *J* = 8.1 Hz, 1H), 3.13 (s, 3H), 2.99 (s, 3H), 2.32 (s, 3H), 1.31 (s, 12H)

^{13}C NMR (151 MHz, Chloroform-d) δ 156.0, 154.4, 136.7, 134.4, 133.0, 122.0, 83.6, 36.8, 36.6, 25.1, 20.8 (the C-B did not show)

HRMS calculated for $C_{16}H_{24}BNNaO_4^+$ ($[M+Na]^+$): 328.1691; found 328.1703

IR (KBr, cm^{-1}): 2981, 1728, 1392, 1351, 1220, 1173, 1070, 857



14e

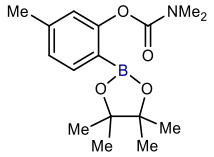
(2-((dimethylcarbamoyl)oxy)-5-propylphenyl)boronic acid (**14e**) was prepared as shown in **Scheme S6**, obtained as a pale-yellow liquid, 97% yield (160.8mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.55 (d, *J* = 2.3 Hz, 1H), 7.23 (d, *J* = 8.2 Hz, 1H), 6.97 (d, *J* = 8.2 Hz, 1H), 3.12 (s, 3H), 2.99 (s, 3H), 2.58 – 2.54 (m, 2H), 1.65 – 1.61 (m, 2H), 1.31 (s, 12H), 0.92 (t, *J* = 7.3 Hz, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 155.8, 154.4, 139.0, 136.0, 132.2, 121.8, 83.4, 37.3, 36.6, 36.4, 24.9, 24.6, 13.8

HRMS calculated for $C_{18}H_{28}BNNaO_4^+$ ([M+Na]$^+$): 356.2004; found 356.2000

IR (KBr, cm^{-1}): 2980, 2928, 1720, 1387, 1213, 1166, 859



14f

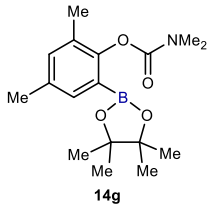
5-methyl-2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl dimethylcarbamate (**14f**) was prepared as shown in **Scheme S6**, obtained as a pale-yellow liquid, quantitative yield (156.3mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.65 (d, *J* = 7.5 Hz, 1H), 7.03 – 6.98 (m, 1H), 6.90 (t, *J* = 1.1 Hz, 1H), 3.12 (s, 3H), 2.99 (s, 3H), 2.34 (s, 3H), 1.30 (s, 12H)

^{13}C NMR (151 MHz, Chloroform-d) δ 156.4, 155.7, 142.9, 136.1, 125.8, 122.9, 83.3, 36.6, 36.4, 24.9, 21.4

HRMS calculated for $C_{16}H_{24}BNNaO_4^+$ ([M+Na]$^+$): 328.1691; found 328.1697

IR (KBr, cm^{-1}): 3500 (br), 2978, 2928, 1725, 1620, 1390, 1168, 1069, 859



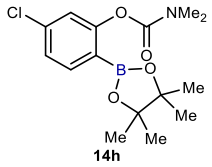
14g

2,4-dimethyl-6-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl dimethylcarbamate (**14g**) was prepared as shown in **Scheme S6**, obtained as a pale-yellow liquid, 95% yield (152mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.39 (s, 1H), 7.09 (s, 1H), 3.14 (s, 3H), 3.00 (s, 3H), 2.28 (s, 3H), 2.16 (s, 3H), 1.30 (s, 12H)

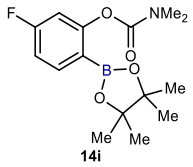
^{13}C NMR (151 MHz, Chloroform-d) δ 155.4, 152.5, 134.6, 134.2, 134.2, 130.1, 83.3, 24.9, 20.6, 16.1 (one carbon cannot be seen)

HRMS calculated for $C_{17}H_{26}BNNaO_4^+$ [M+Na]$^+$: 342.1847; found 342.1842
IR (KBr, cm-1): 3465, 2982, 2929, 1722, 1385, 1362, 1171, 969, 852



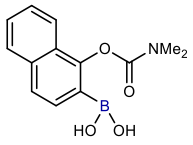
14h

5-chloro-2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl dimethylcarbamate[33] (**14h**) was prepared as shown in **Scheme S6**, obtained as a pale-yellow liquid, 70% yield (101.1 mg, 0.5 mmol scale).
^{1}H NMR (600 MHz, Chloroform-d) δ 7.69 (d, *J* = 7.6 Hz, 1H), 7.18 (d, *J* = 7.3 Hz, 1H), 7.11 (s, 1H), 3.12 (s, 3H), 3.00 (s, 3H), 1.30 (s, 13H)
^{13}C NMR (151 MHz, Chloroform-d) δ 157.0, 155.3, 137.8, 137.1, 125.4, 123.0, 83.8, 36.9, 36.6, 25.1



14i

5-fluoro-2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl dimethylcarbamate[35] (**14i**) was prepared as shown in **Scheme S6**, obtained as a pale-yellow liquid, 89% yield (136.4mg, 0.5 mmol scale).
^{1}H NMR (600 MHz, Chloroform-d) δ 7.74 (t, *J* = 7.5 Hz, 1H), 6.91 (t, *J* = 8.3 Hz, 1H), 6.83 (d, *J* = 9.8 Hz, 1H), 3.13 (s, 3H), 3.00 (s, 3H), 1.30 (s, 13H)
^{13}C NMR (151 MHz, Chloroform-d) δ 165.3 (d, $J_{C\text{-}F}$ = 250.7 Hz), 157.9 (d, $^3J_{C\text{-}F}$ = 10.1 Hz), 155.2, 137.7 (d, $^3J_{C\text{-}F}$ = 6 Hz), 112.3 (d, $^2J_{C\text{-}F}$ = 19.6 Hz), 110.4 (d, $^2J_{C\text{-}F}$ = 24.2 Hz), 83.7, 36.8, 36.6, 25.1
HRMS calculated for $C_{15}H_{21}BFNNaO_4^+$ [M+Na]$^+$: 332.1440; found 332.1451
IR (KBr, cm^{-1}): 3456, 2979, 2962, 1782, 1605, 1388, 1166, 1072, 858

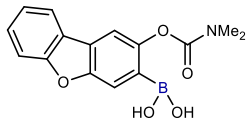


8k

(1-((dimethylcarbamoyl)oxy)naphthalen-2-yl)boronic acid (**8k**) was prepared as shown in **Scheme S6**, obtained as a white solid, 87% yield (112.7mg, 0.5 mmol scale).
^{1}H NMR (600 MHz, Chloroform-d) δ 7.99 (t, *J* = 7.0 Hz, 2H), 7.88 – 7.83 (m, 1H), 7.72 (d, *J* = 8.2 Hz, 1H), 7.53 – 7.46 (m, 2H), 2.99 (s, 3H), 2.87 (s, 3H)
^{13}C NMR (151 MHz, Chloroform-d) δ 156.0, 151.3, 135.5, 130.8, 127.8, 126.5, 126.0, 125.9, 124.6, 121.3, 36.6, 36.3 (the C-B did not show)
HRMS calculated for $C_{15}H_{18}BNNaO_4^+$ ([M+2MeOH-2H_2O+Na]$^+$): 310.1221; found 310.1221 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate.)

IR (KBr, cm^{-1}): 3454, 1720, 1664, 1482, 1352, 1249, 1172, 751

M.p.: 132.2-175.2℃



8l

(2-((dimethylcarbamoyl)oxy)dibenzo[b,d]furan-3-yl)boronic acid (**8l**) was prepared as shown in **Scheme S6**, obtained as a white solid, 76% yield (113.2mg, 0.5 mmol scale).

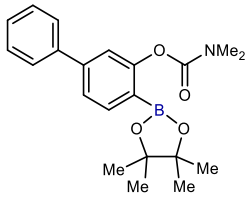
^{1}H NMR (600 MHz, Chloroform-d) δ 8.11 (s, 1H), 7.92 (d, *J* = 7.7 Hz, 1H), 7.65 (s, 1H), 7.58 (d, *J* = 8.2 Hz, 1H), 7.48 (t, *J* = 7.7 Hz, 1H), 7.34 (t, *J* = 7.5 Hz, 1H), 2.96 (s, 3H), 2.95 (s, 3H)

^{13}C NMR (151 MHz, Chloroform-d) δ 157.2, 156.5, 153.8, 151.0, 127.7, 126.0, 124.2, 122.6, 120.9, 117.3, 111.9, 111.6, 111.5, 36.6, 36.2

HRMS calculated for $C_{17}H_{18}BNNaO_5^+$ ([M+2MeOH-2H_2O+Na]$^+$): 350.1170; found 350.1197 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate.)

IR (KBr, cm^{-1}): 3450, 2929, 1728, 1661, 1394, 1265, 1169, 1145, 861, 750

M.p.: 151.3-171.9℃



14m

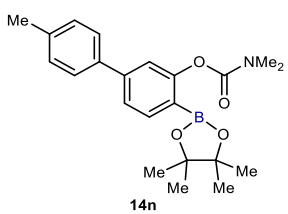
4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)-[1,1'-biphenyl]-3-yl dimethylcarbamate (**14m**) was prepared as shown in **Scheme S6**, obtained as a colorless liquid, 86% yield (156.8mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.83 (d, *J* = 7.7 Hz, 1H), 7.60 (d, *J* = 8.3 Hz, 2H), 7.45 – 7.40 (m, 3H), 7.36 – 7.33 (m, 1H), 7.32 (d, *J* = 1.6 Hz, 1H), 3.16 (s, 3H), 3.02 (s, 3H), 1.33 (s, 12H)

^{13}C NMR (151 MHz, Chloroform-d) δ 156.8, 155.6, 145.3, 140.1, 136.6, 128.7, 127.7, 127.2, 123.5, 120.8, 83.5, 36.7, 36.5, 24.9 (the C-B did not show)

HRMS calculated for $C_{21}H_{26}BNNaO_4^+$ [M+Na]$^+$: 390.1847; found 390.1853

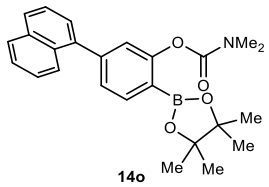
IR (KBr, cm^{-1}): 3500(br), 2981, 1728, 1617, 1384, 1358, 1189, 1081, 862, 769



14n

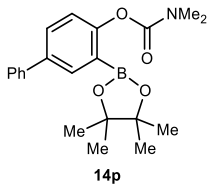
4'-methyl-4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)-[1,1'-biphenyl]-3-yl dimethylcarbamate (**14n**) was prepared as shown in **Scheme S6**, obtained as a yellow liquid, 87% yield (165.9mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.81 (d, *J* = 7.7 Hz, 1H), 7.50 (d, *J* = 7.9 Hz, 2H), 7.42 (d, *J* = 7.7 Hz, 1H), 7.30 (s, 1H), 7.23 (d, *J* = 7.9 Hz, 2H), 3.16 (s, 3H), 3.02 (s, 3H), 2.38 (s, 3H), 1.32 (s, 12H)
^{13}C NMR (151 MHz, Chloroform-d) δ 156.8, 155.7, 145.2, 137.6, 137.2, 136.6, 129.4, 127.0, 126.9, 123.3, 120.5, 83.4, 36.7, 36.5, 24.9, 21.1
HRMS calculated for $C_{22}H_{28}BNNaO_4^+$ [M+Na]$^+$: 404.2004; found 404.2001
IR (KBr, cm^{-1}): 1963, 2931, 1727, 1617, 1389, 1355, 1212, 1145, 812



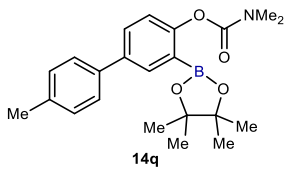
14o

5-(naphthalen-1-yl)-2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl dimethylcarbamate (**14o**) was prepared as shown in **Scheme S6**, obtained as a yellow solid, 84% yield (175.2mg, 0.5 mmol scale).
^{1}H NMR (400 MHz, Chloroform-d) δ 7.92 – 7.81 (m, 4H), 7.51 – 7.44 (m, 2H), 7.44 – 7.38 (m, 2H), 7.33 (d, *J* = 7.6, 1.5 Hz, 1H), 7.21 (d, *J* = 1.4 Hz, 1H), 3.14 (s, 3H), 3.00 (s, 3H), 1.33 (s, 12H)
^{13}C NMR (101 MHz, Chloroform-d) δ 156.2, 155.6, 145.0, 139.2, 136.0, 133.7, 131.3, 128.3, 127.9, 126.9, 126.7, 126.2, 125.9, 125.8, 125.3, 123.8, 83.5, 36.7, 36.5, 25.0 (B-C did not show).
HRMS calculated for $C_{25}H_{28}BNNaO_4^+$ [M+Na]$^+$: 440.2004; found 440.2005
IR (KBr, cm^{-1}): 3383, 1634, 1579, 1333, 1174, 1054, 919, 852
M.p.: 125.1-130.2℃



14p

(4-((dimethylcarbamoyl)oxy)-[1,1'-biphenyl]-3-yl)boronic acid (**14p**) was prepared as shown in **Scheme S6**, obtained as a white solid, 86% yield (104.1mg, 0.5 mmol scale).
^{1}H NMR (600 MHz, Chloroform-d) δ 7.83 (d, *J* = 7.7 Hz, 1H), 7.60 (dd, *J* = 8.3, 1.2 Hz, 2H), 7.45 – 7.40 (m, 3H), 7.34 (t, *J* = 7.4 Hz, 1H), 7.32 (d, *J* = 1.6 Hz, 1H), 3.16 (s, 3H), 3.02 (s, 3H), 1.33 (s, 12H)
^{13}C NMR (151 MHz, Chloroform-d) δ 156.0, 155.8, 140.8, 138.0, 135.1, 131.1, 128.7, 127.4, 127.2, 122.6, 83.7, 36.8, 36.6, 25.1
HRMS calculated for $C_{21}H_{26}BNNaO_4^+$ [M+Na]$^+$: 390.1847; found 390.1848
IR (KBr, cm^{-1}): 3442, 2973, 2929, 1722, 1608, 1388, 1345, 1172, 767
M.p.: 73.5-91.5℃



14q

4'-methyl-3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)-[1,1'-biphenyl]-4-yl

dimethylcarbamate (**14q**) was prepared as shown in **Scheme S6**, obtained as a white solid, 65% yield (124.1mg, 0.5 mmol scale).

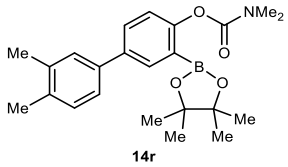
^{1}H NMR (600 MHz, Chloroform-d) δ 7.89 (d, *J* = 2.5 Hz, 1H), 7.55 (dd, *J* = 8.3, 2.5 Hz, 1H), 7.44 – 7.40 (m, 2H), 7.15 (d, *J* = 7.9 Hz, 2H), 7.06 (d, *J* = 8.3 Hz, 1H), 3.08 (s, 3H), 2.94 (s, 3H), 2.31 (s, 3H), 1.25 (s, 12H)

^{13}C NMR (101 MHz, Chloroform-d) δ 155.7, 155.6, 137.8, 137.7, 136.7, 134.7, 130.7, 129.3, 127.0, 122.4, 83.5, 36.7, 36.5, 24.9 (the C-B did not show)

HRMS calculated for $C_{22}H_{28}BNNaO_4^+$ $[M+Na]^+$: 404.2004; found 404.2002

IR (KBr, cm^{-1}): 3453, 2976, 2923, 1708, 1611, 1388, 1169, 1072, 808, 674

M.p.: 104.3-109.6℃



14r

3',4'-dimethyl-3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)-[1,1'-biphenyl]-4-yl dimethylcarbamate (**14r**) was prepared as shown in **Scheme S6**, obtained as a yellow solid, 81% yield (158.6mg, 0.5 mmol scale).

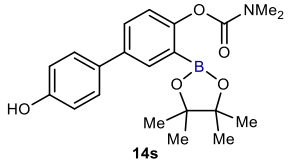
^{1}H NMR (400 MHz, Chloroform-d) δ 7.95 (d, *J* = 2.4 Hz, 1H), 7.63 (d, *J* = 8.4 Hz, 1H), 7.37 (s, 1H), 7.33 (d, *J* = 7.8 Hz, 1H), 7.18 (d, *J* = 7.8 Hz, 1H), 7.12 (d, *J* = 8.3 Hz, 1H), 3.16 (s, 3H), 3.02 (s, 3H), 2.32 (s, 3H), 2.29 (s, 3H), 1.32 (s, 12H)

^{13}C NMR (101 MHz, Chloroform-d) δ 155.8, 155.7, 138.3, 138.1, 136.9, 135.6, 134.8, 130.9, 130.1, 128.6, 124.7, 122.5, 83.7, 36.8, 25.1, 20.0, 19.5 (the C-B did not show)

HRMS calculated for $C_{23}H_{30}BNNaO_4^+$ $[M+Na]^+$: 418.2160; found 418.2157

IR (KBr, cm^{-1}): 2973, 2929, 1719, 1332, 1169, 1069, 963

M.p.: 71.9-76.4℃



14s

4'-hydroxy-3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)-[1,1'-biphenyl]-4-yl dimethylcarbamate (**14s**) was prepared as shown in **Scheme S6**, obtained as a colorless liquid, 38% yield (51.6mg, 0.36 mmol scale).

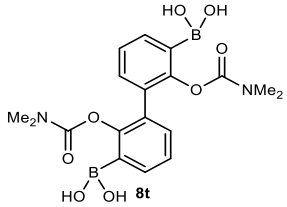
^{1}H NMR (600 MHz, Chloroform-d) δ 7.71 (t, *J* = 1.8 Hz, 1H), 7.37 (d, *J* = 8.4 Hz, 1H), 7.13 – 7.07 (m, 2H), 6.97 (dd, *J* = 8.3 Hz, 1H), 6.62 (s, 1H), 6.42 (dd, *J* = 8.4 Hz, 2H), 3.10 (s, 3H), 2.98 (s, 3H), 1.26 (d, J = 1.5 Hz, 12H)

^{13}C NMR (151 MHz, Chloroform-d) δ 156.7, 156.1, 155.2, 138.3, 134.7, 131.6, 130.6, 128.2, 122.5, 115.5, 83.7, 77.4, 36.9, 25.1

HRMS calculated for $C_{21}H_{26}BNNaO_5^+$ $[M+Na]^+$: 406.1796; found 406.1791

IR (KBr, cm^{-1}): 3260, 2976, 1693, 1614, 1397, 1350, 849, 673

M.p.: 198.4-201.8℃



(2,2'-bis((dimethylcarbamoyl)oxy)-[1,1'-biphenyl]-3,3'-diyl)diboronic acid (**8t**) was prepared as shown in **Scheme S6**, obtained as a white solid, 77% yield (159.6mg, 0.5 mmol scale)

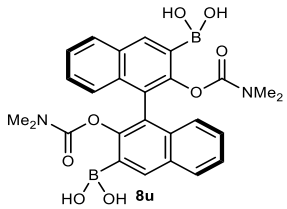
^{1}H NMR (600 MHz, DMSO-d6) δ 7.84 (s, 4H), 7.55 (t, *J* = 4.6 Hz, 2H), 7.20 (d, *J* = 4.5 Hz, 4H), 2.70 (s, 12H)

^{13}C NMR (101 MHz, DMSO-d6) δ 154.7, 151.9, 133.9, 131.9, 130.6, 123.8, 36.2, 35.8

HRMS calculated for $C_{22}H_{30}B_2N_2NaO_8^+$ ([M+4MeOH-4H_2O+Na]$^+$): 494.2117; found 494.2116 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate.)

IR (KBr, cm^{-1}): 3442, 2929, 1710, 1658, 1274, 1201, 750

M.p.: 286-297.5℃



(*R*)-(2,2'-bis((dimethylcarbamoyl)oxy)-[1,1'-binaphthalene]-3,3'-diyl)diboronic acid (**8u**) was prepared as shown in **Scheme S6**, obtained as a yellow solid, quantitative yield (260.6mg, 0.5 mmol scale).

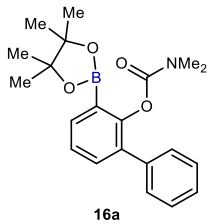
^{1}H NMR (600 MHz, DMSO-d_6) δ 8.24 (s, 2H), 7.99 (d, *J* = 8.2 Hz, 2H), 7.97 (s, 4H), 7.44 (t, *J* = 7.4 Hz, 2H), 7.27 (t, *J* = 8.0 Hz, 2H), 7.01 (d, *J* = 8.5 Hz, 2H), 2.54 (s, 6H), 2.25 (s, 6H)

^{13}C NMR (151 MHz, DMSO-d_6) δ 154.8, 150.2, 135.2, 133.6, 130.3, 130.1, 128.3, 126.6, 125.5, 125.1, 123.0, 36.0, 35.5

HRMS calculated for $C_{30}H_{34}B_2N_2NaO_8^+$ ([M+4MeOH-4H_2O+Na]$^+$): 594.2430; found 594.2437 (The HRMS analysis was performed in MeOH/H_2O, and the boronic acid motif transferred into corresponding dimethylborate in situ, and the HRMS was actually obtained as the dimethylborate.)

IR (KBr, cm^{-1}): 3430, 2932, 1702, 1453, 1172, 750

M.p.: 295.9-299.4℃



3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)-[1,1'-biphenyl]-2-yl dimethylcarbamate (**16a**)

was prepared as shown in **Scheme S6**, obtained as a white solid, 74% yield (136.1mg, 0.5 mmol scale).

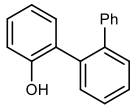
^{1}H NMR (600 MHz, Chloroform-d) δ 7.75 (d, *J* = 7.4 Hz, 1H), 7.46 – 7.39 (m, 3H), 7.39 – 7.33 (m, 2H), 7.32 – 7.27 (m, 1H), 7.24 (d, *J* = 4.4 Hz, 1H), 2.94 – 2.91 (m, 3H), 2.88 (s, 3H), 1.30 (s, 12H)

^{13}C NMR (151 MHz, Chloroform-d) δ 155.5, 153.0, 138.4, 135.5, 135.0, 133.8, 129.4, 128.1, 127.1, 125.3, 83.7, 25.1

HRMS calculated for $C_{21}H_{26}BNNaO_4^+$ ([M+Na]$^+$): 390.1847; found 390.1849

IR (KBr, cm^{-1}): 2982, 2938, 1719, 1385, 1362, 1210, 1169, 764, 674

M.p.: 98.6-100.9℃

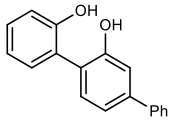


17c

[1,1':2',1''-terphenyl]-2-ol[34] (**17c**) was prepared as shown in **Scheme S8**, obtained as a yellow liquid, quantitative yield (129.8mg, 0.5 mmol scale).

^{1}H NMR (600 MHz, Chloroform-d) δ 7.54 – 7.45 (m, 3H), 7.42 (d, *J* = 7.3 Hz, 1H), 7.21 (s, 3H), 7.17 (dd, *J* = 13.9, 5.8 Hz, 3H), 7.04 (d, *J* = 7.5 Hz, 1H), 6.85 (t, *J* = 7.4 Hz, 1H), 6.80 (d, *J* = 8.1 Hz, 1H)

^{13}C NMR (101 MHz, Chloroform-d) δ 152.5, 141.9, 140.6, 135.2, 131.5 131.3, 130.9, 129.3, 129.1, 128.8, 128.2, 128.1, 127.9, 127.2, 120.6, 115.6

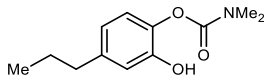


17d

[1,1':4',1''-terphenyl]-2,2'-diol[35] (**17d**) was prepared as shown in **Scheme S9**, obtained as a brown liquid, 94% yield (123mg, 0.47 mmol scale)

^{1}H NMR (600 MHz, Chloroform-d) δ 7.62 (d, *J* = 7.2 Hz, 2H), 7.46 (t, *J* = 7.2 Hz, 2H), 7.40 – 7.31 (m, 4H), 7.31 – 7.27 (m, 2H), 7.10 – 7.03 (m, 2H), 6.10 (s, 1H), 6.04 (s, 1H)

^{13}C NMR (101 MHz, Chloroform-d) δ 153.2, 152.9, 143.1, 140.2, 131.6, 131.4, 130.0, 128.8, 127.7, 127.0, 123.5, 122.6, 121.7, 120.4, 116.7, 115.3



18a

2-hydroxy-4-propylphenyl dimethylcarbamate (**18a**) was prepared as shown in **Scheme S9**, obtained as a yellow liquid, quantitative yield (122.7mg, 0.43 mmol scale).

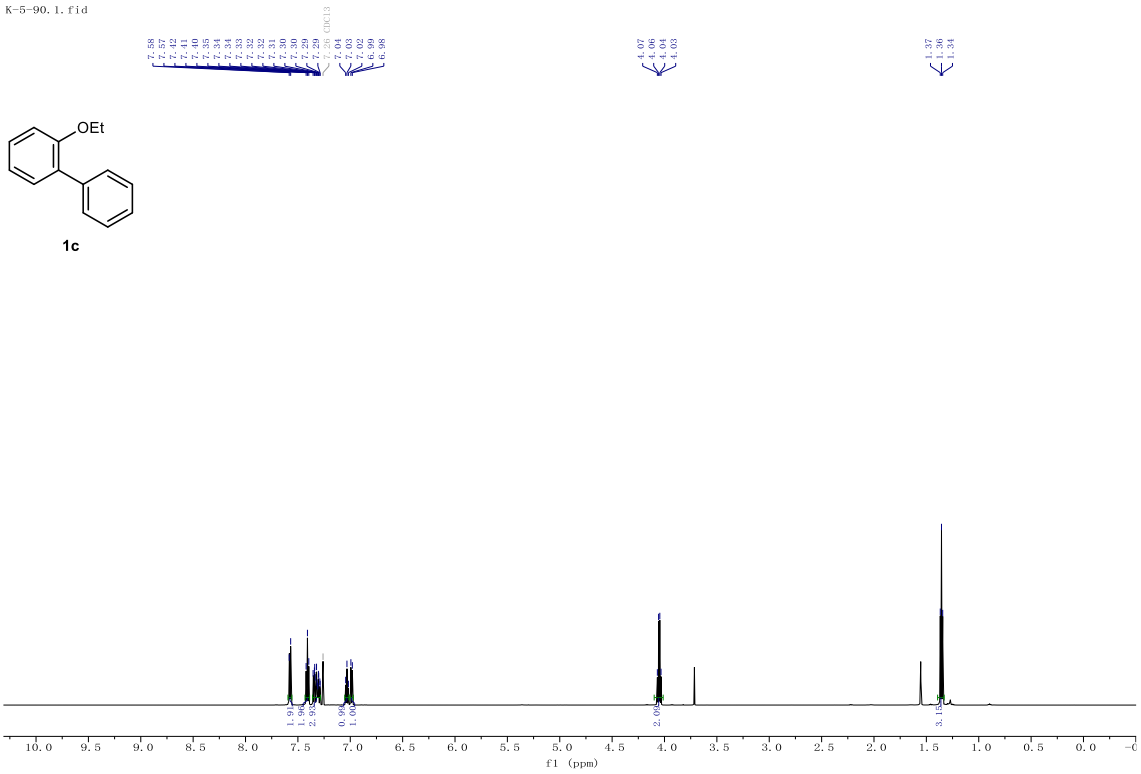
^{1}H NMR (600 MHz, Chloroform-d) δ 6.91 (d, *J* = 8.2 Hz, 1H), 6.84 (d, *J* = 2.1 Hz, 1H), 6.68 (d, *J* = 8.2 Hz, 1H), 3.13 (s, 3H), 3.03 (s, 3H), 2.54 – 2.48 (m, 2H), 1.64 – 1.56 (m, 3H), 0.92 (t, *J* = 7.3 Hz, 3H).

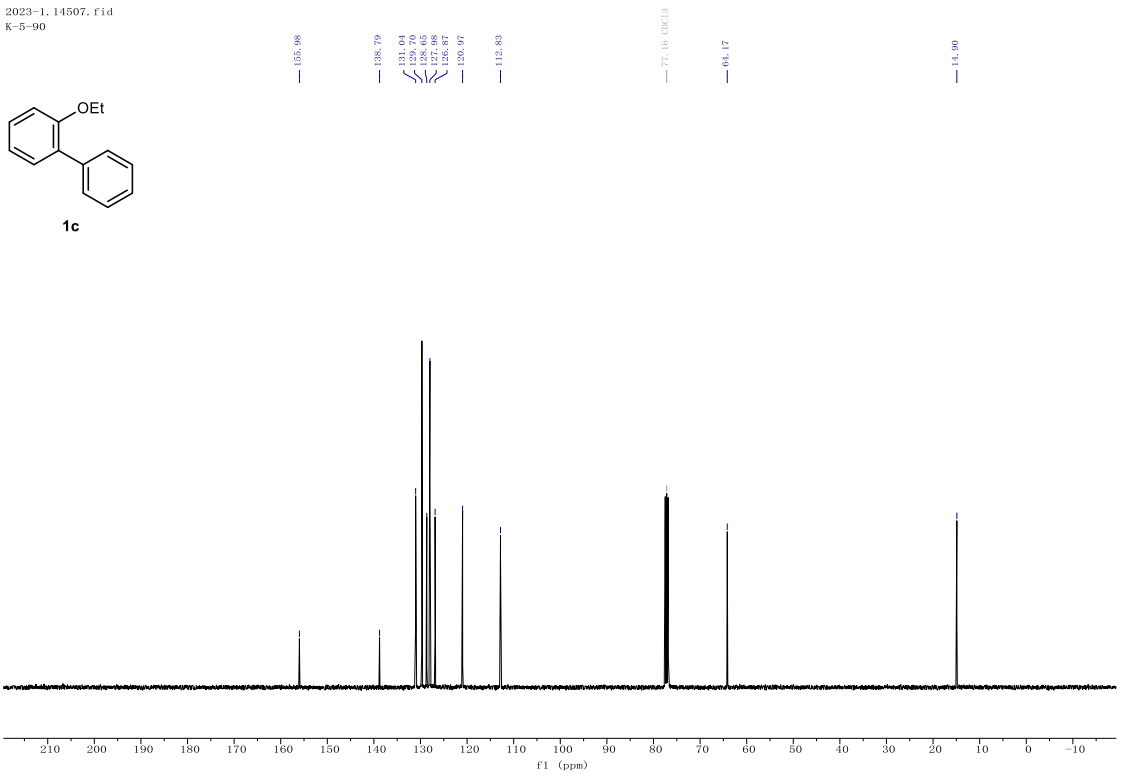
^{13}C NMR (101 MHz, Chloroform-d) δ 147.2, 141.5, 126.5, 121.8, 121.6, 120.9, 119.1, 77.0, 76.7, 37.4, 36.9, 36.7, 24.3, 13.7

HRMS calculated for $C_{12}H_{17}NNaO_3^+$ [M+Na]$^+$ 246.1101; found 246.1100

IR (KBr, cm^{-1}): 3395, 2964, 2929, 1705, 1514, 1394, 1187, 855

VIII. NMR spectrums of starting materials, intermediates, and products





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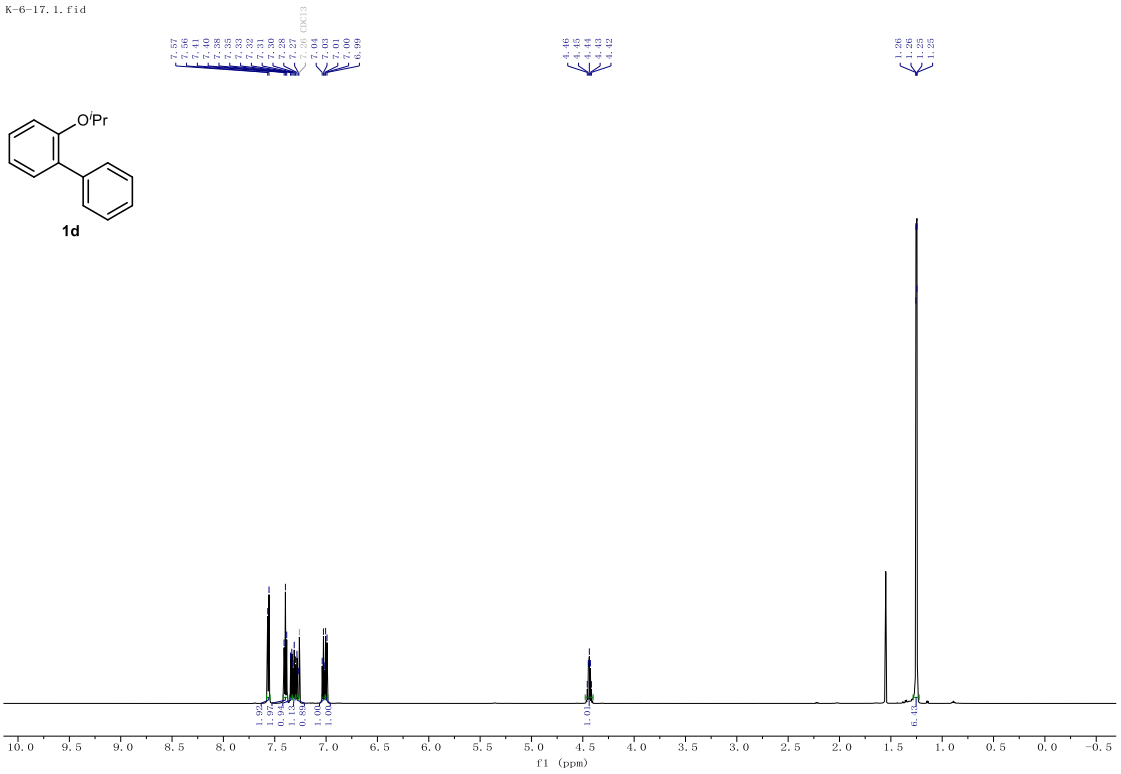

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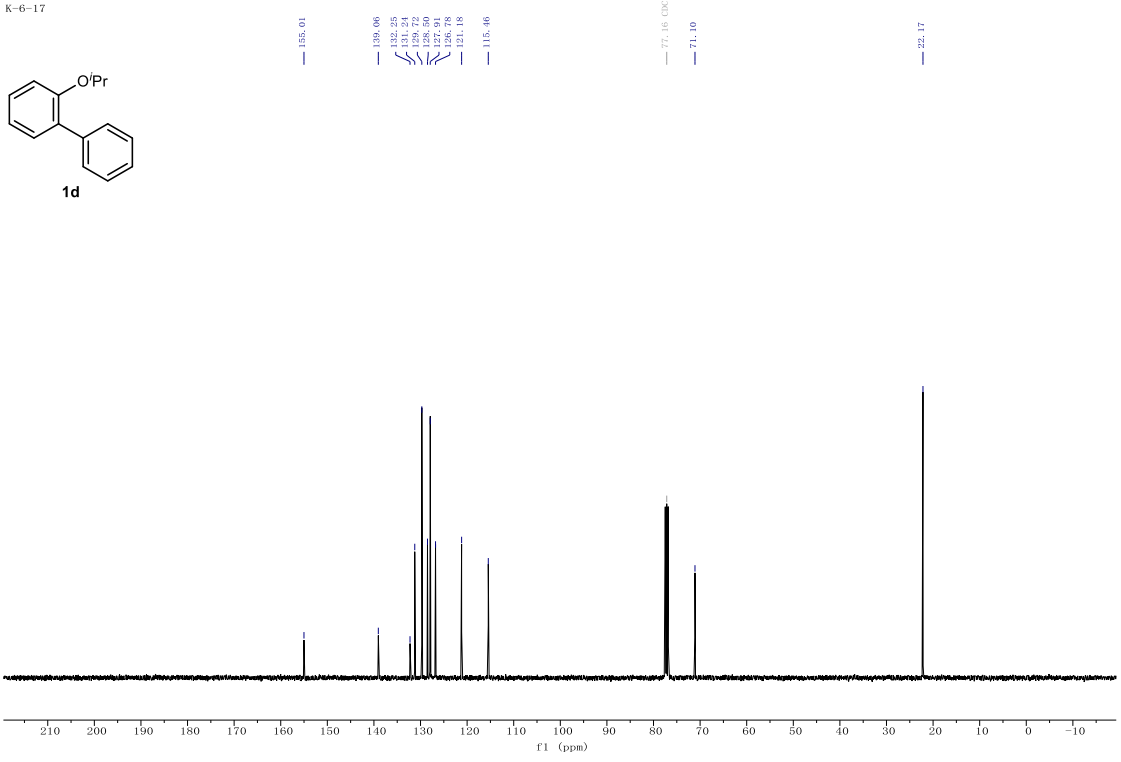

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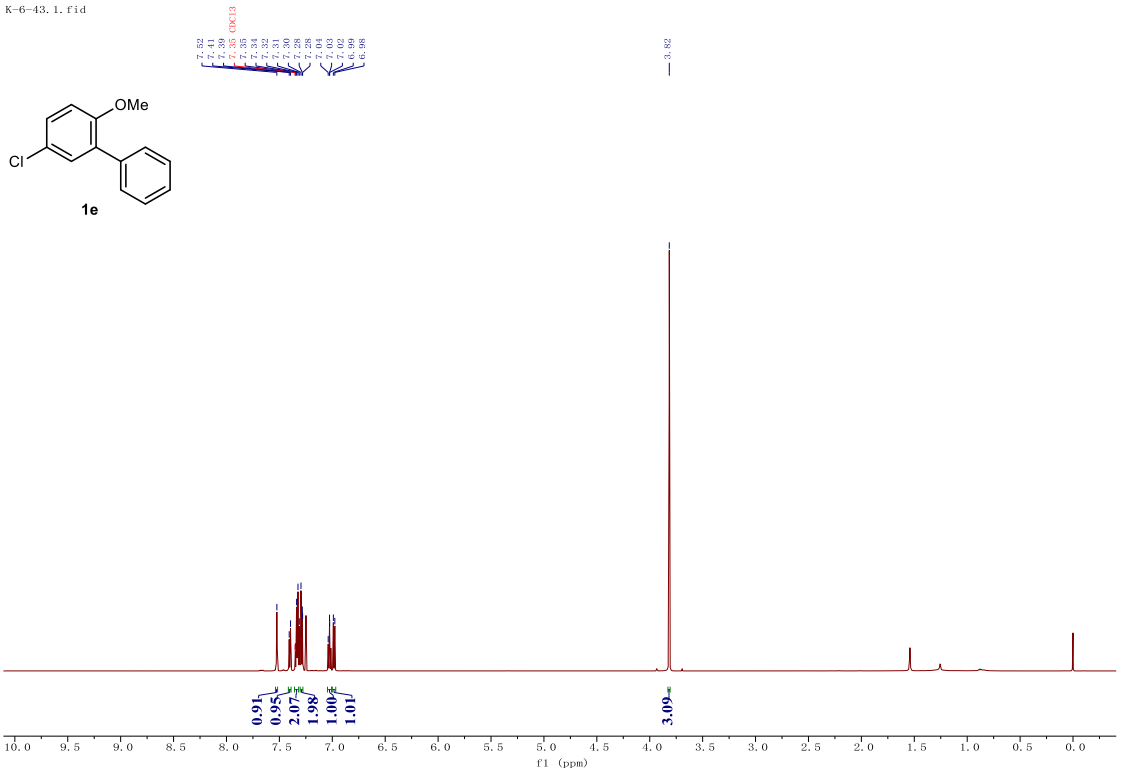

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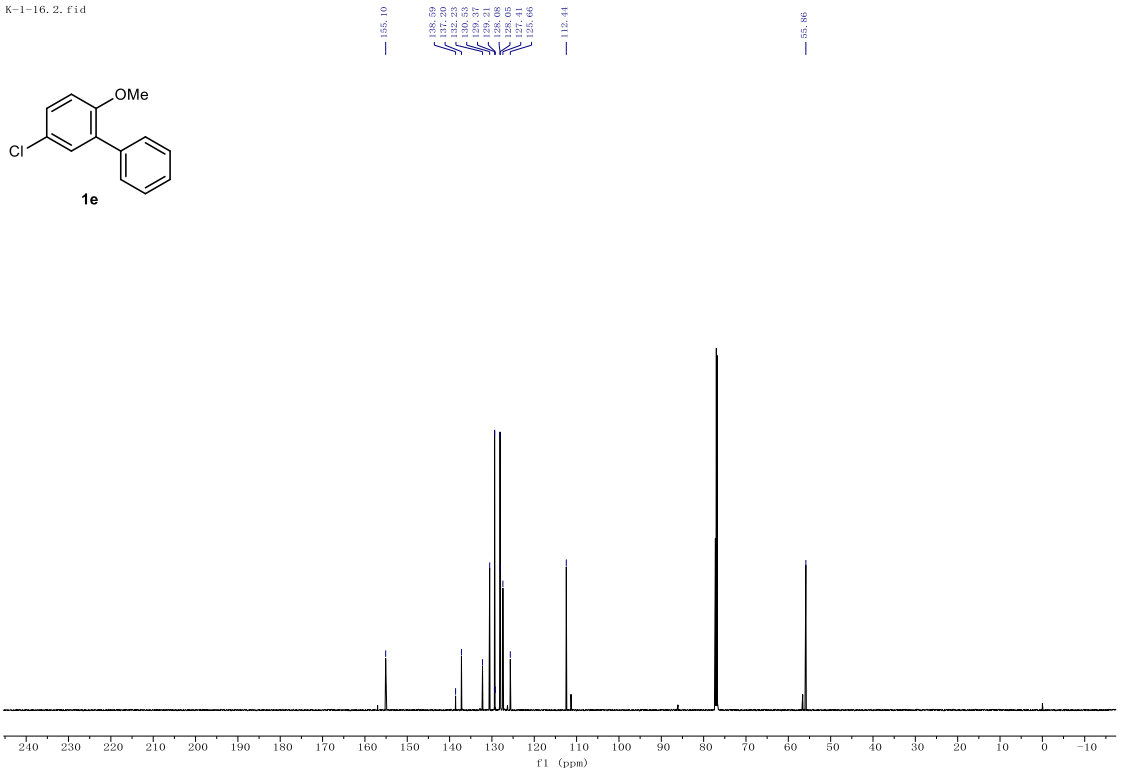

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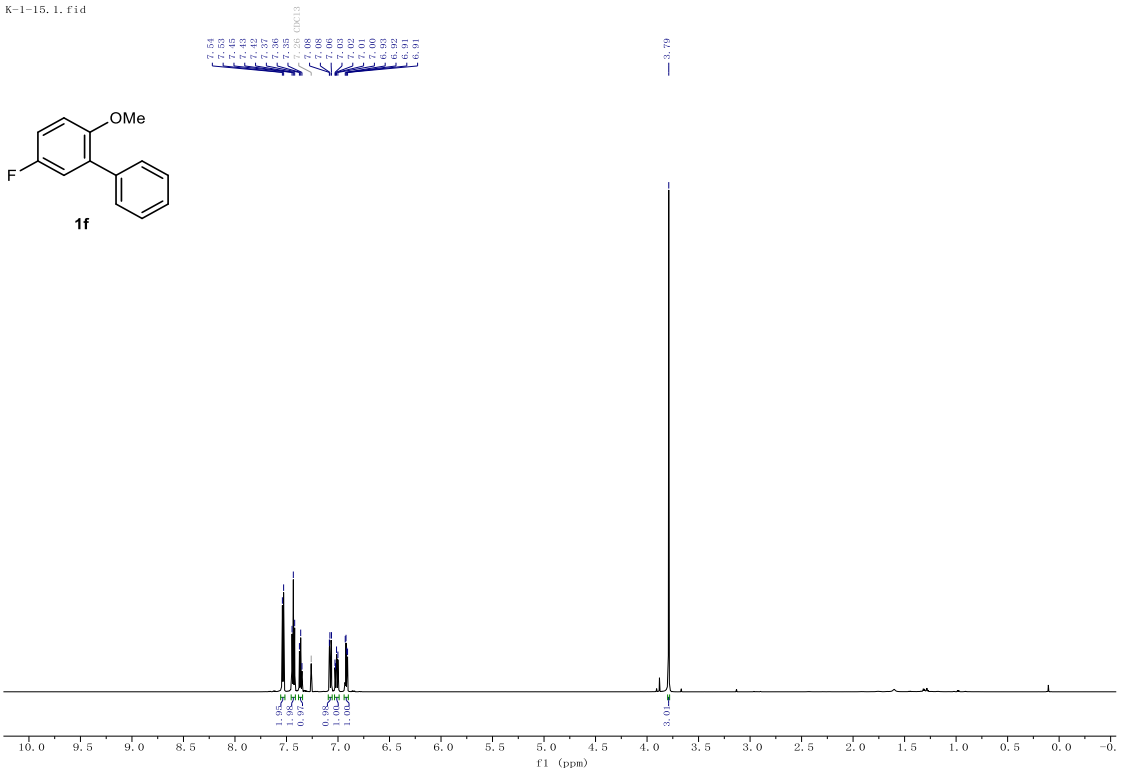

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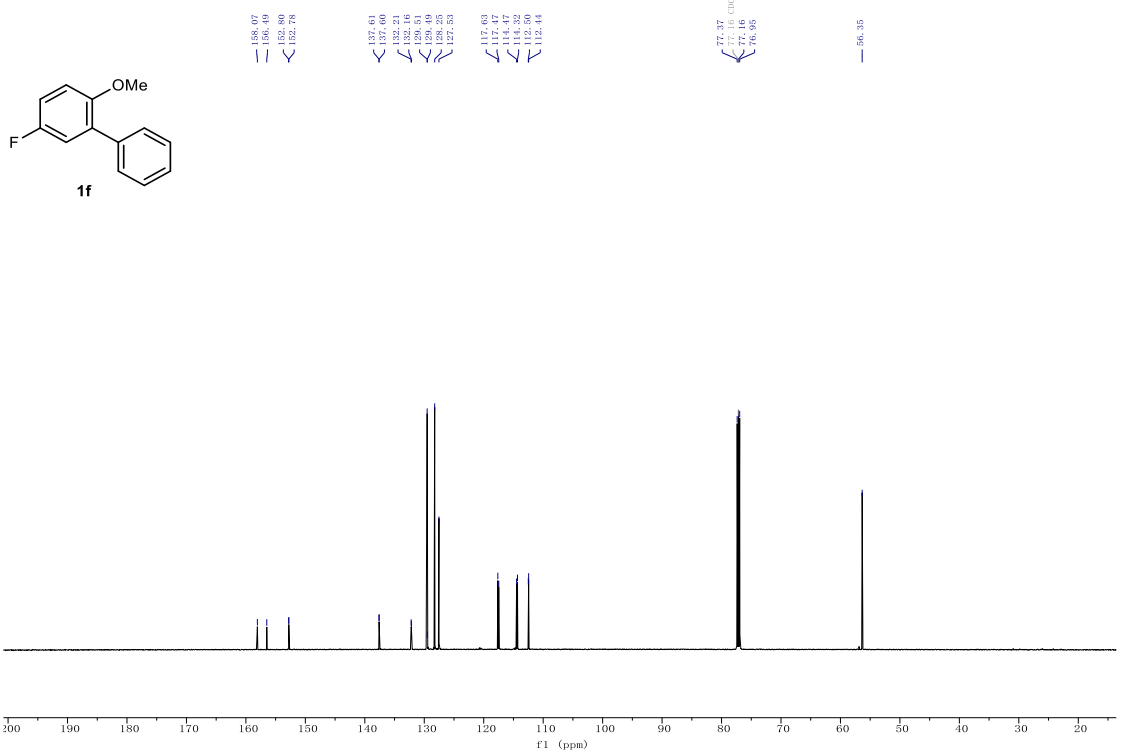

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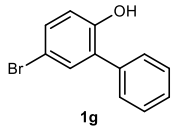
7.50
7.44
7.43
7.42
7.40
7.37
7.37
7.34
7.34
7.32
6.89
6.86

5.23



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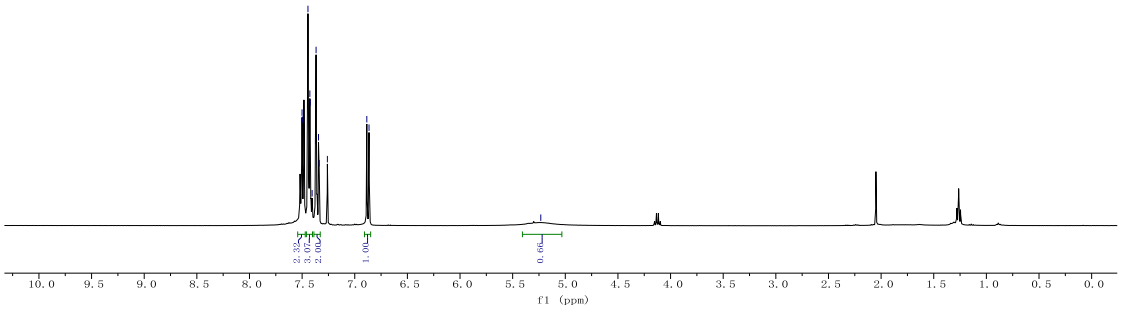

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135.69
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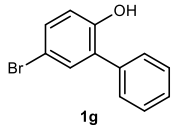
130.04
129.44
128.92
128.42
117.63
112.74

77.32
77.00
76.68



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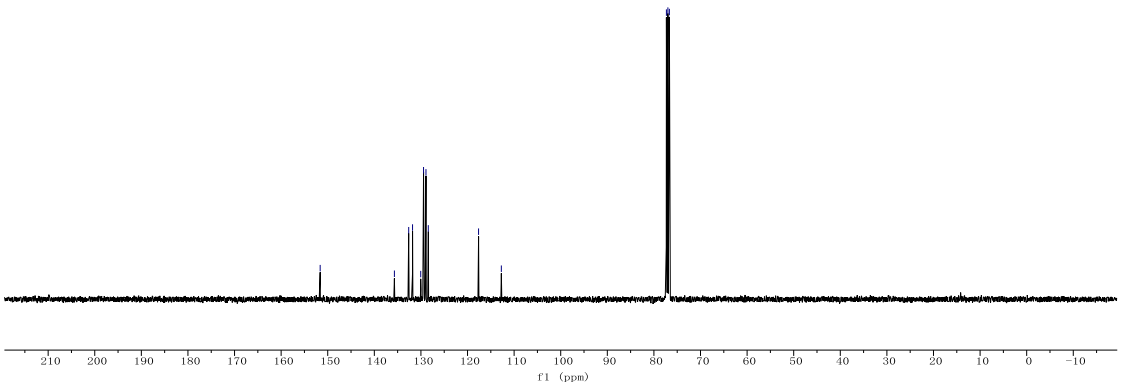

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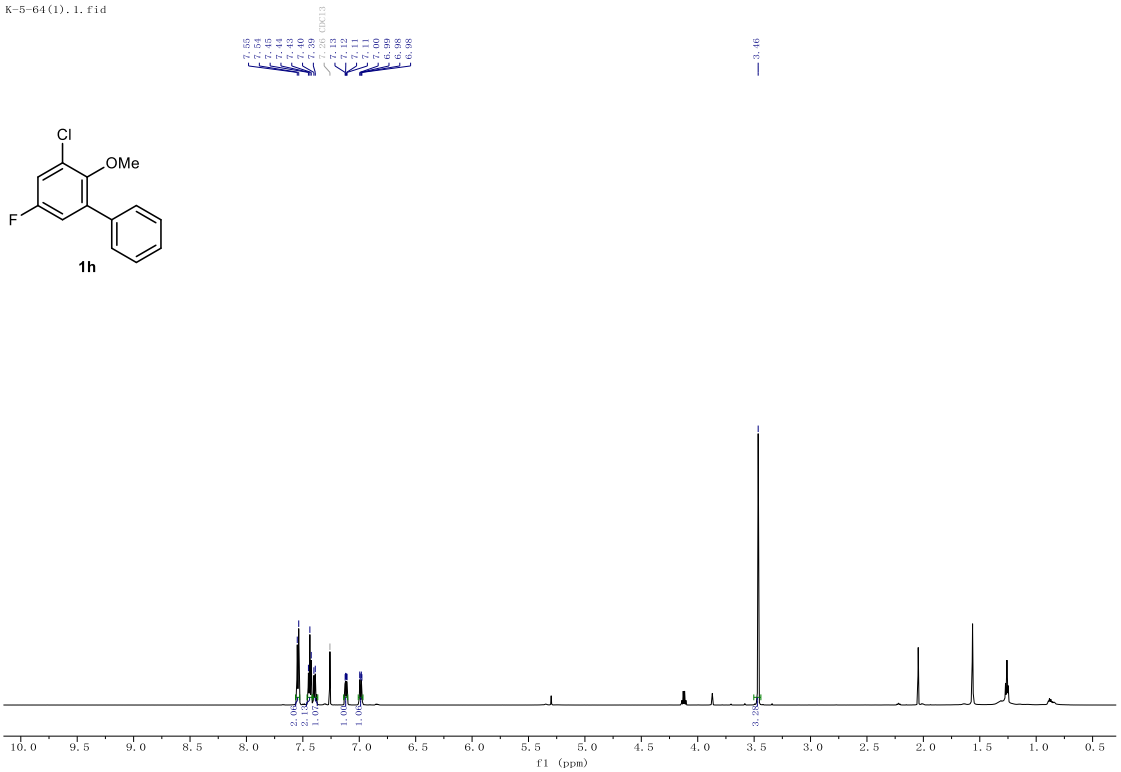

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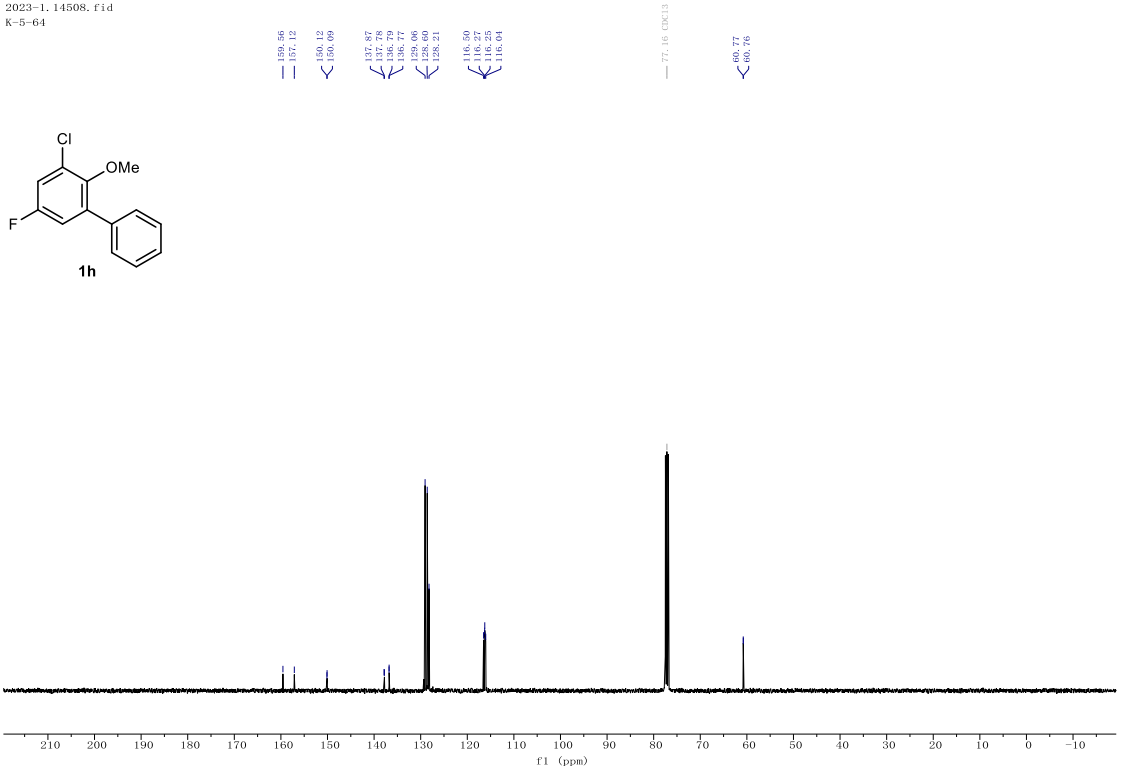

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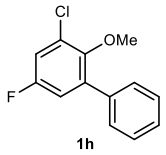

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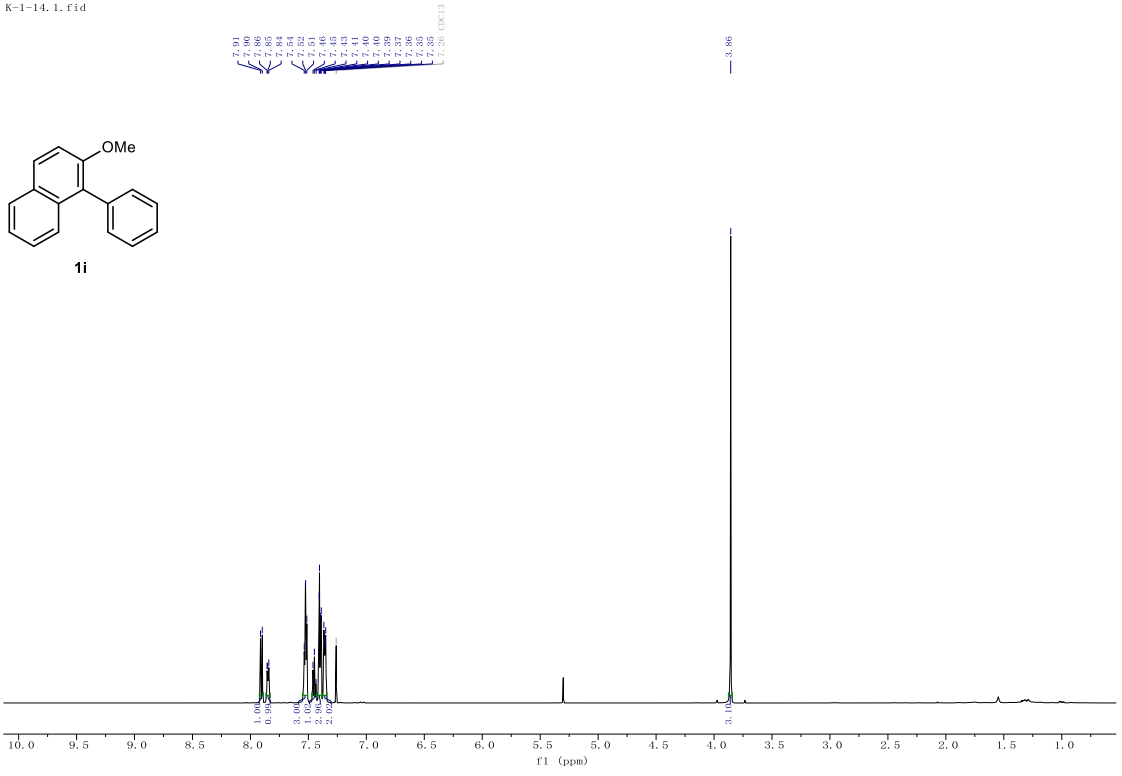

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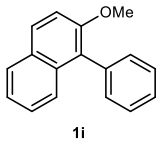

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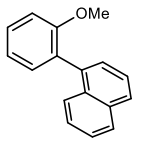

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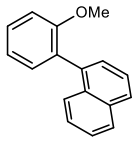

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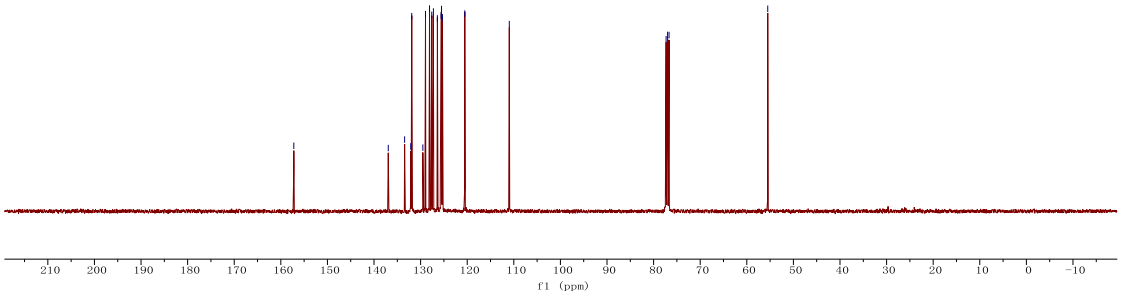

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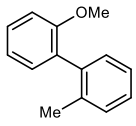

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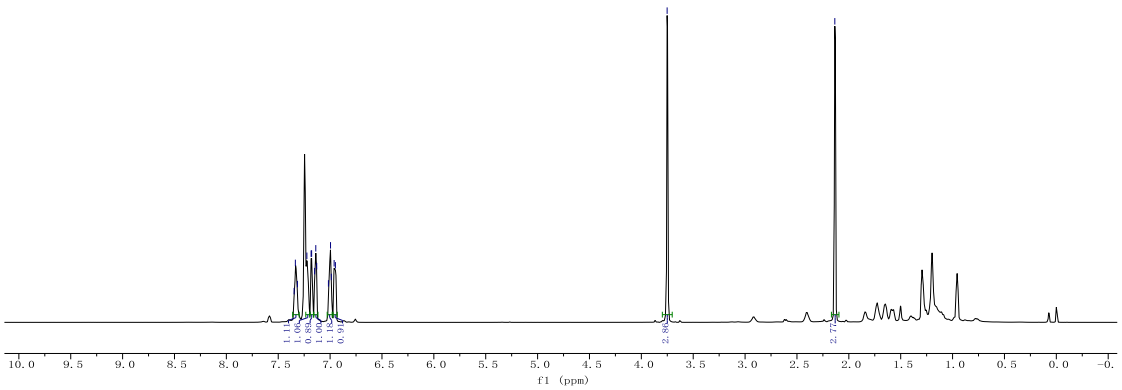

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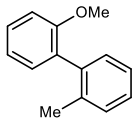

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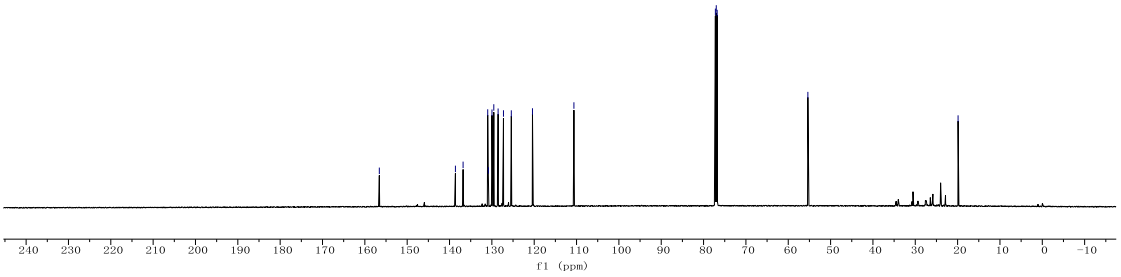

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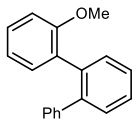

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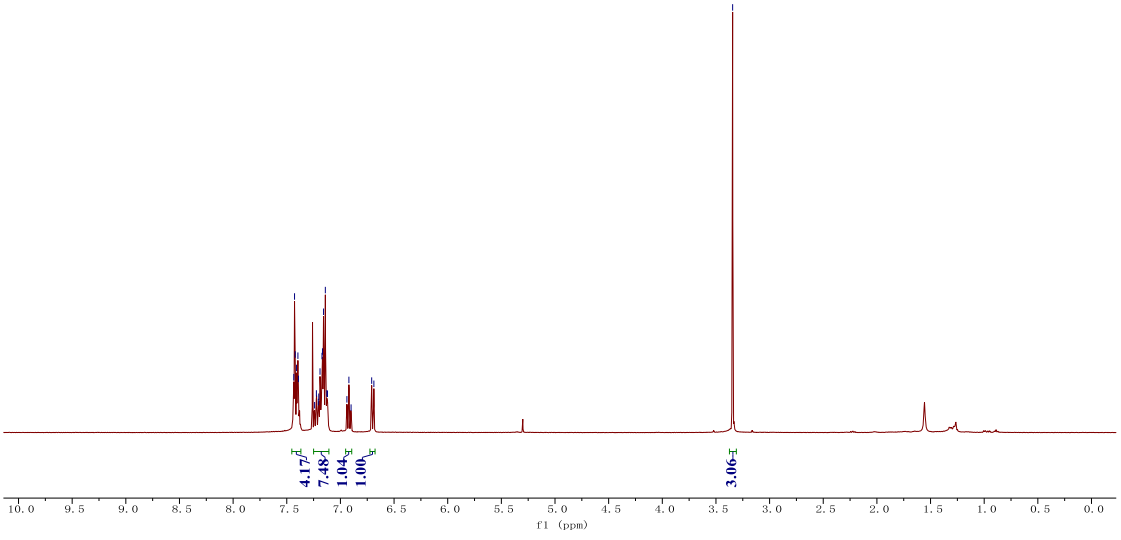

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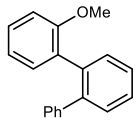

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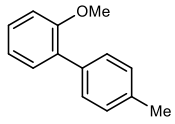

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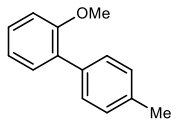

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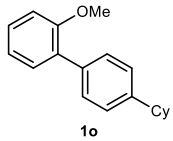

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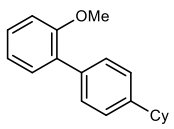

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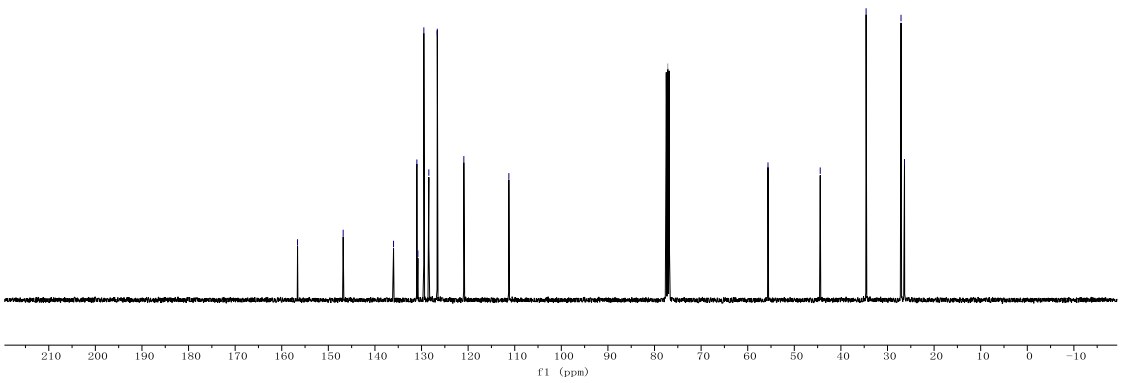

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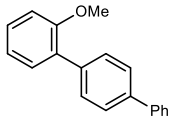

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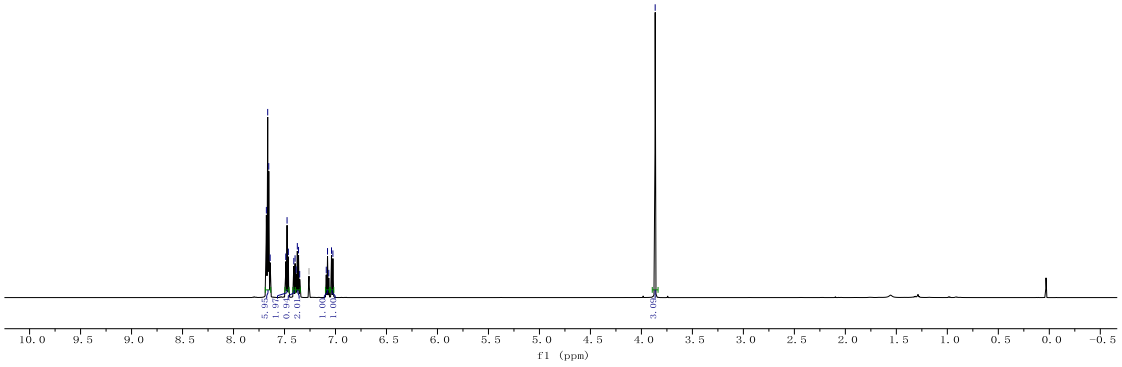

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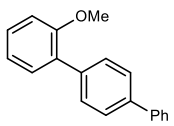

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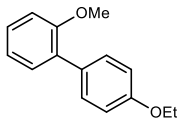

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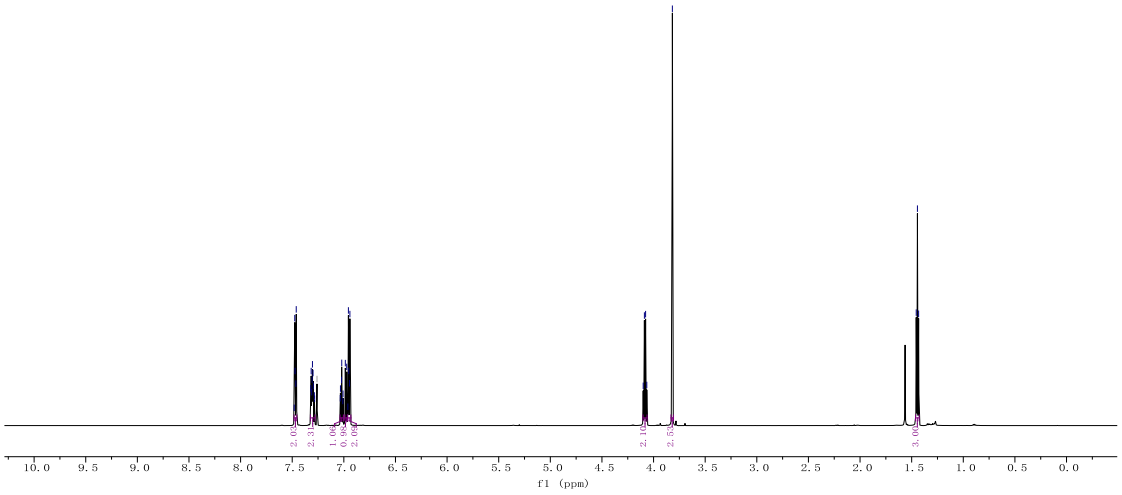

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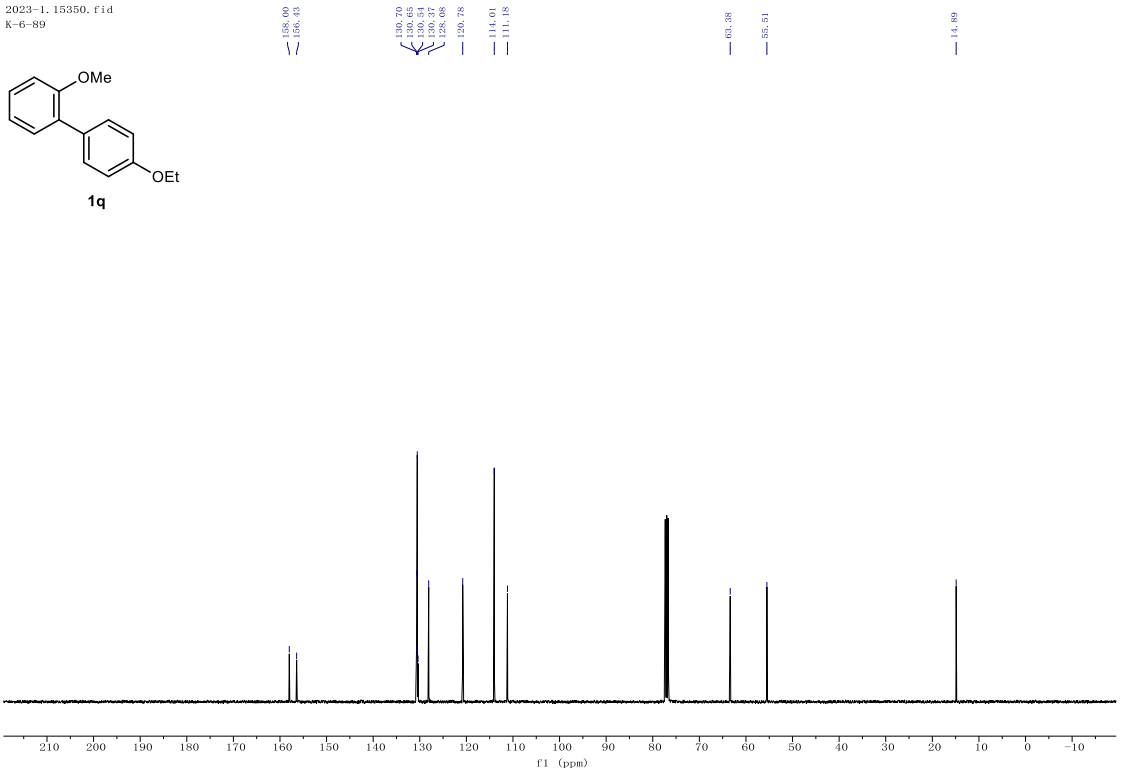

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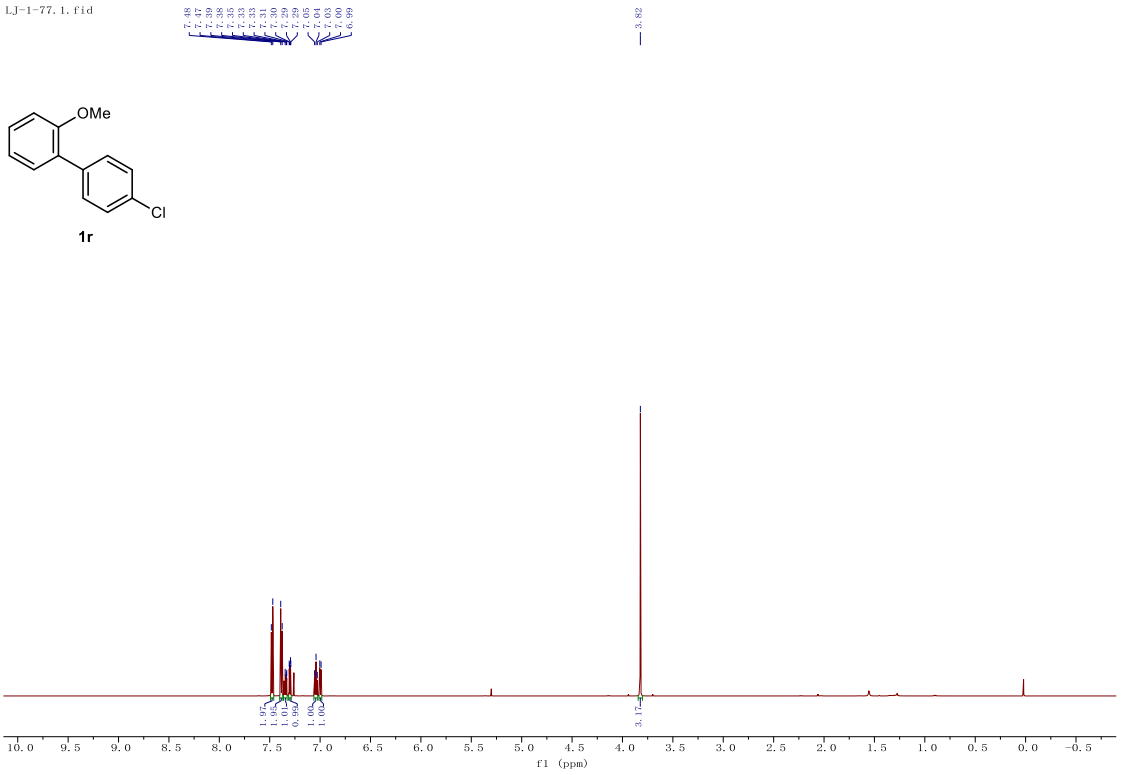

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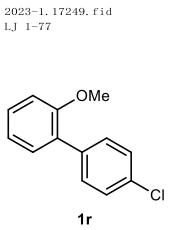

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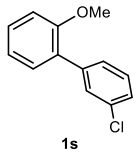

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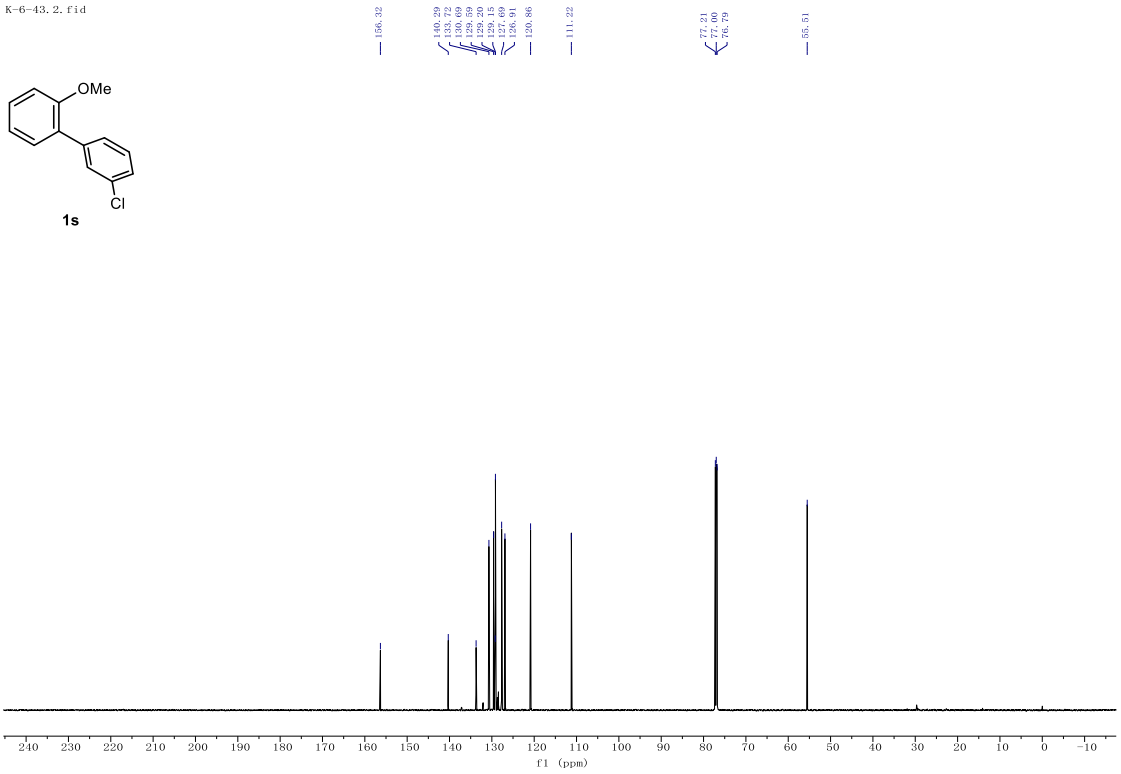

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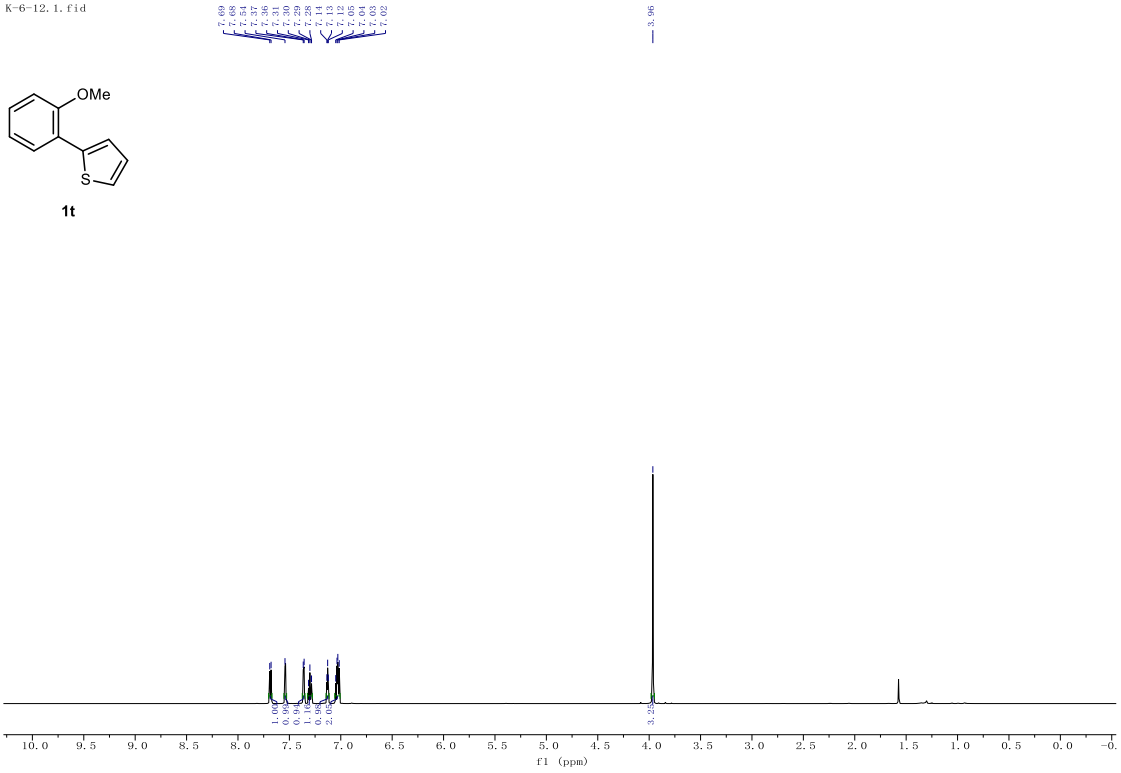

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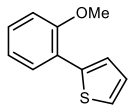

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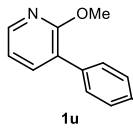

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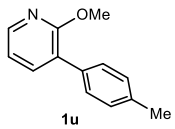

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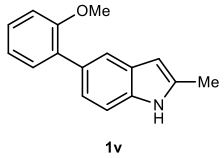

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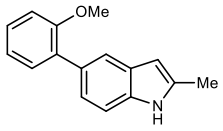

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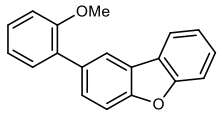

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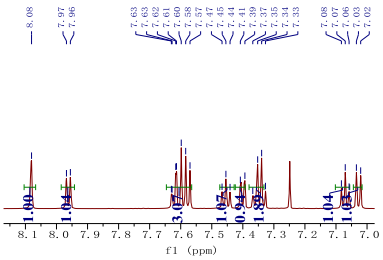

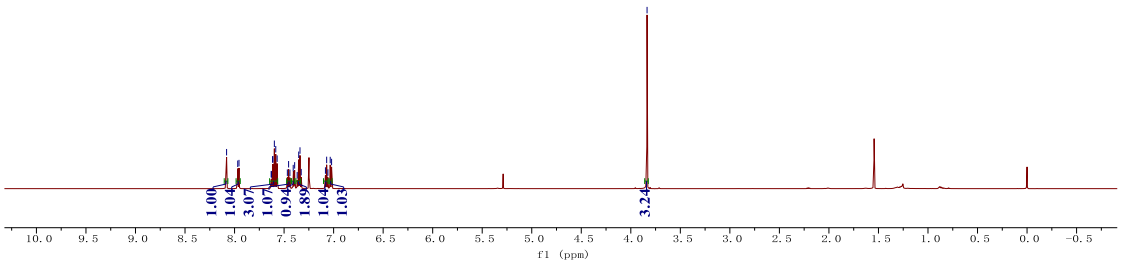

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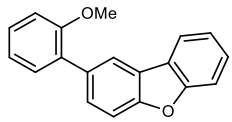

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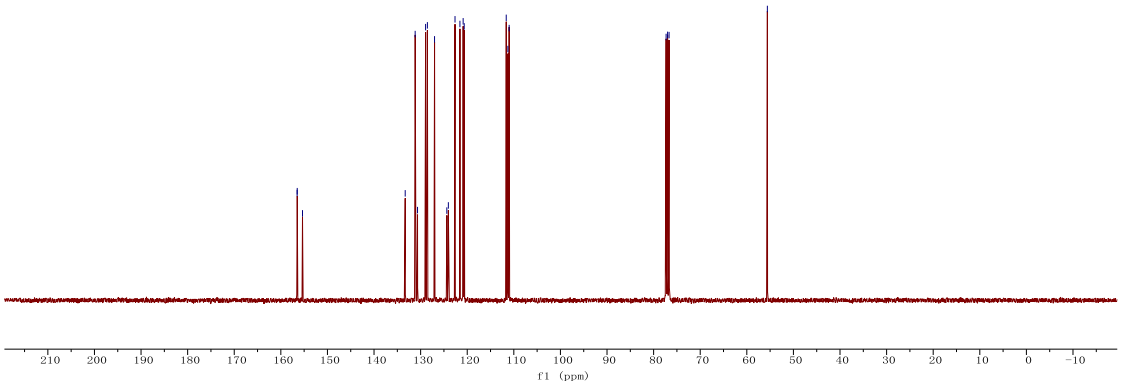

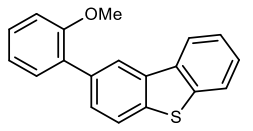

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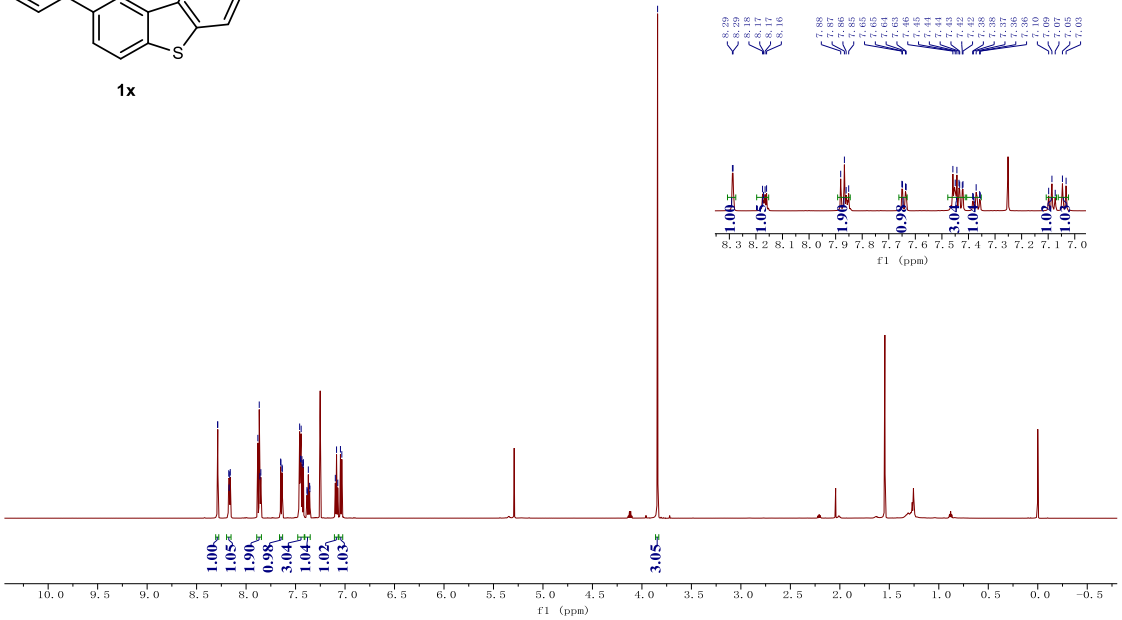

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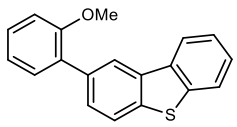

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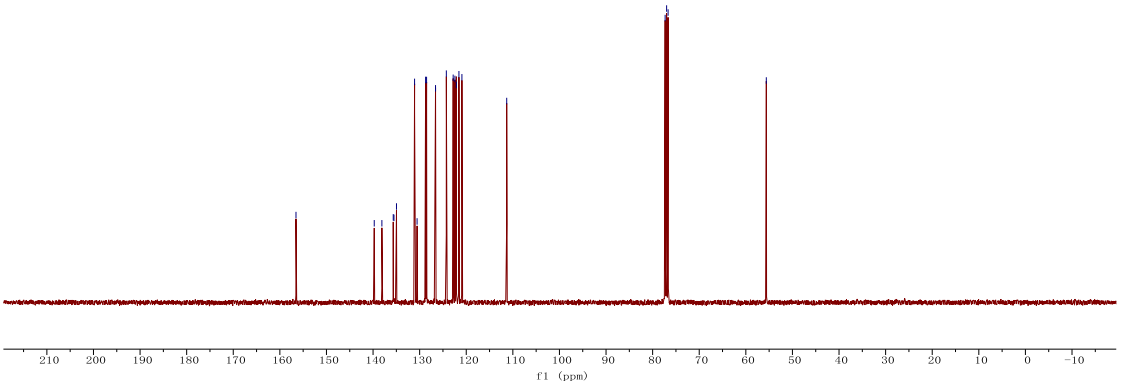

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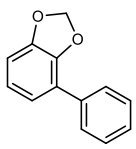

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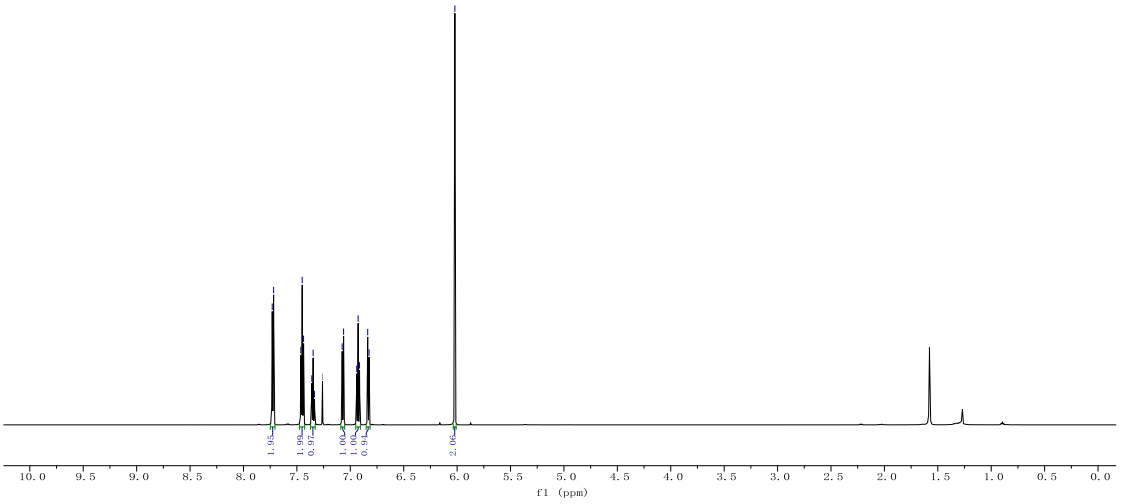

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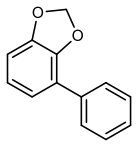

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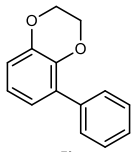

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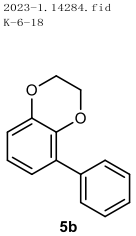

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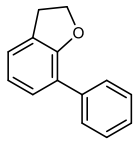

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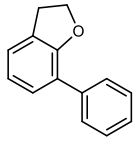

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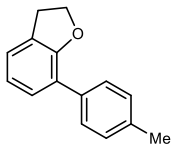

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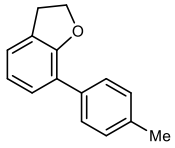

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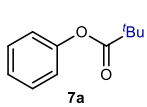

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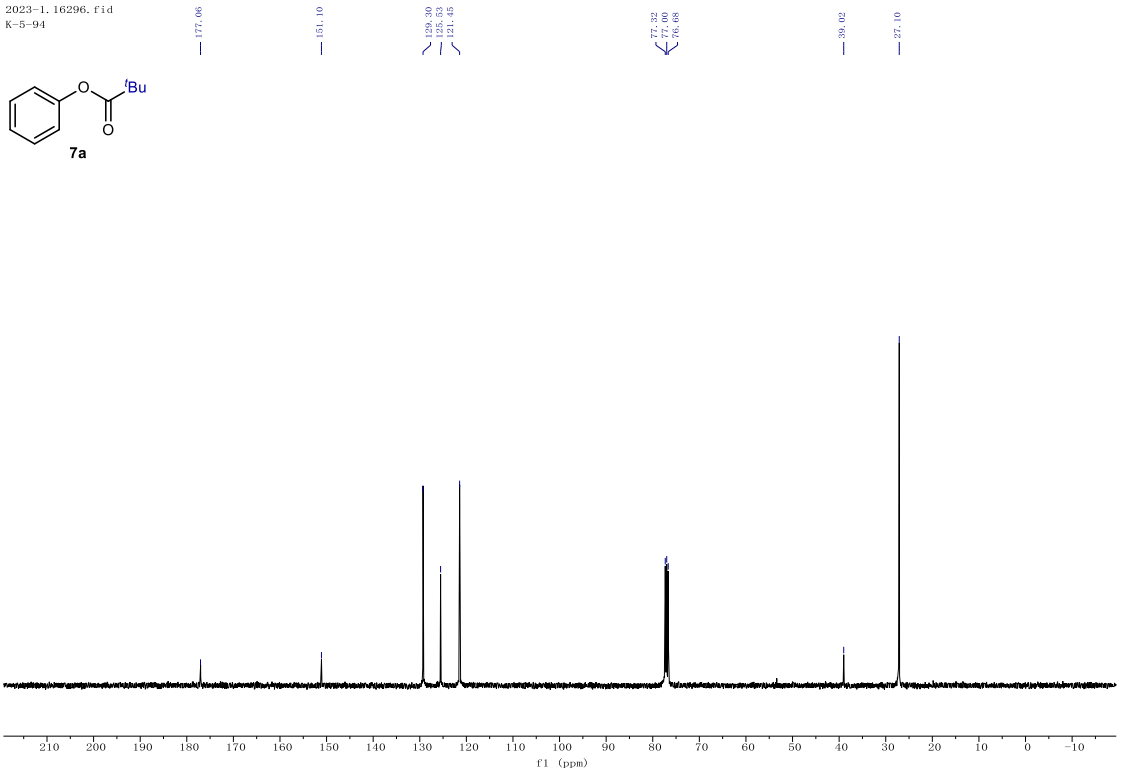

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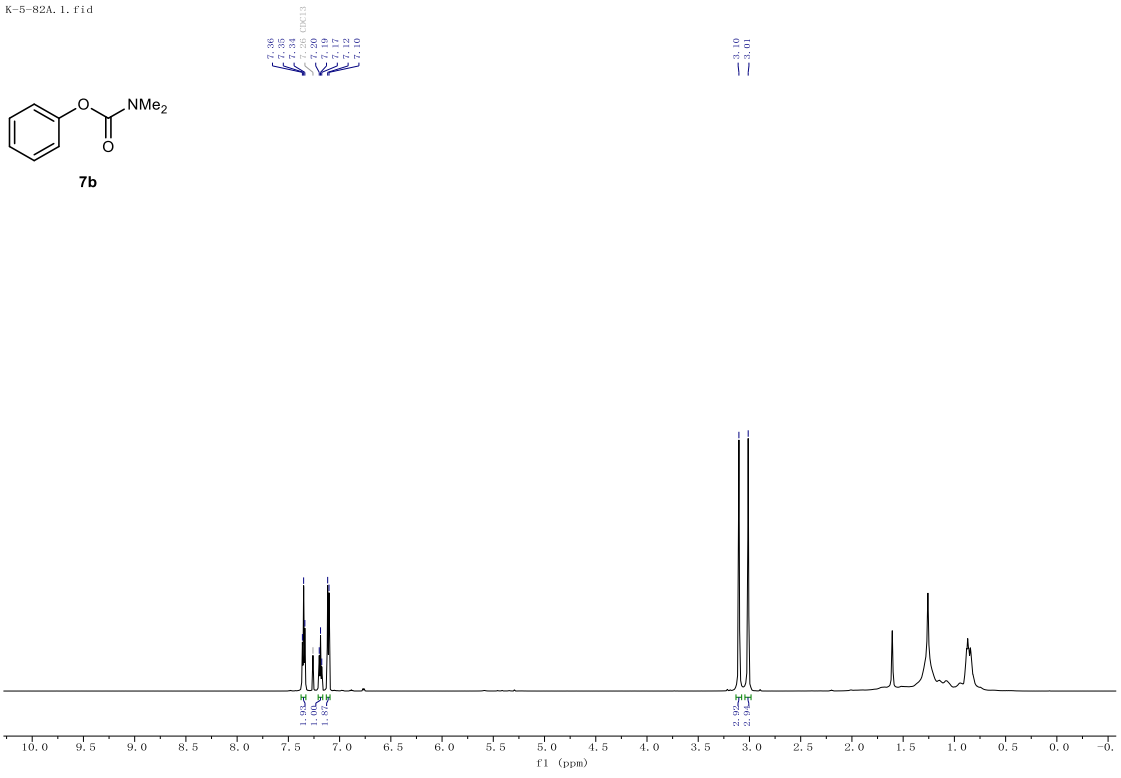

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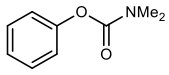

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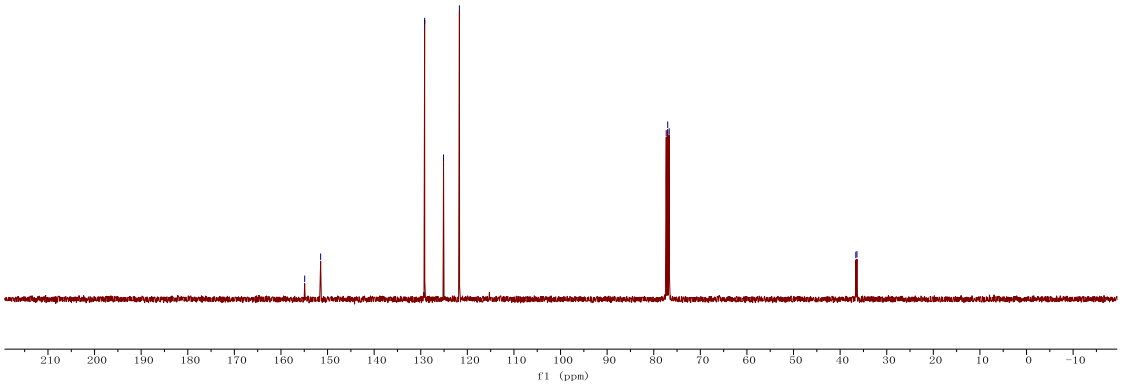

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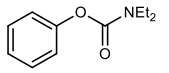

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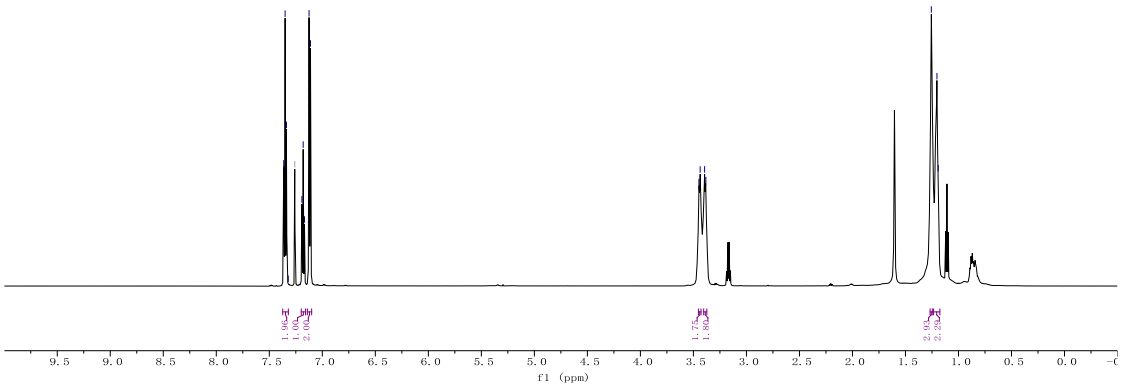

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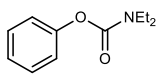

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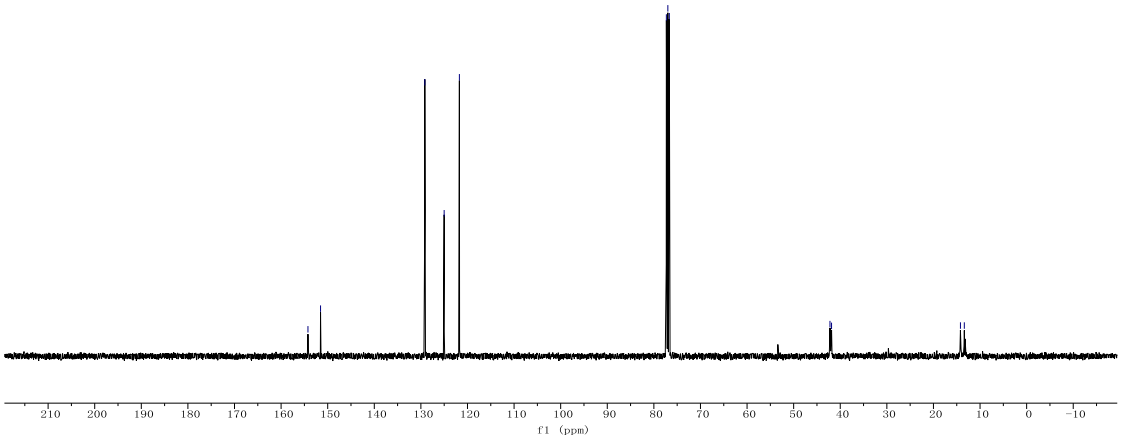

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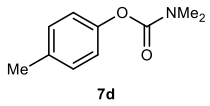

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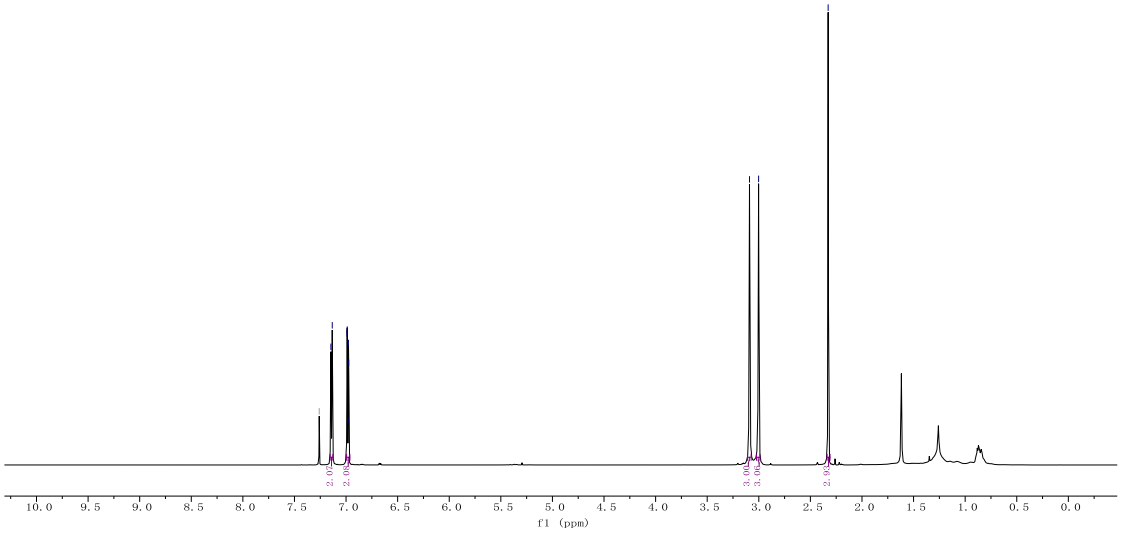

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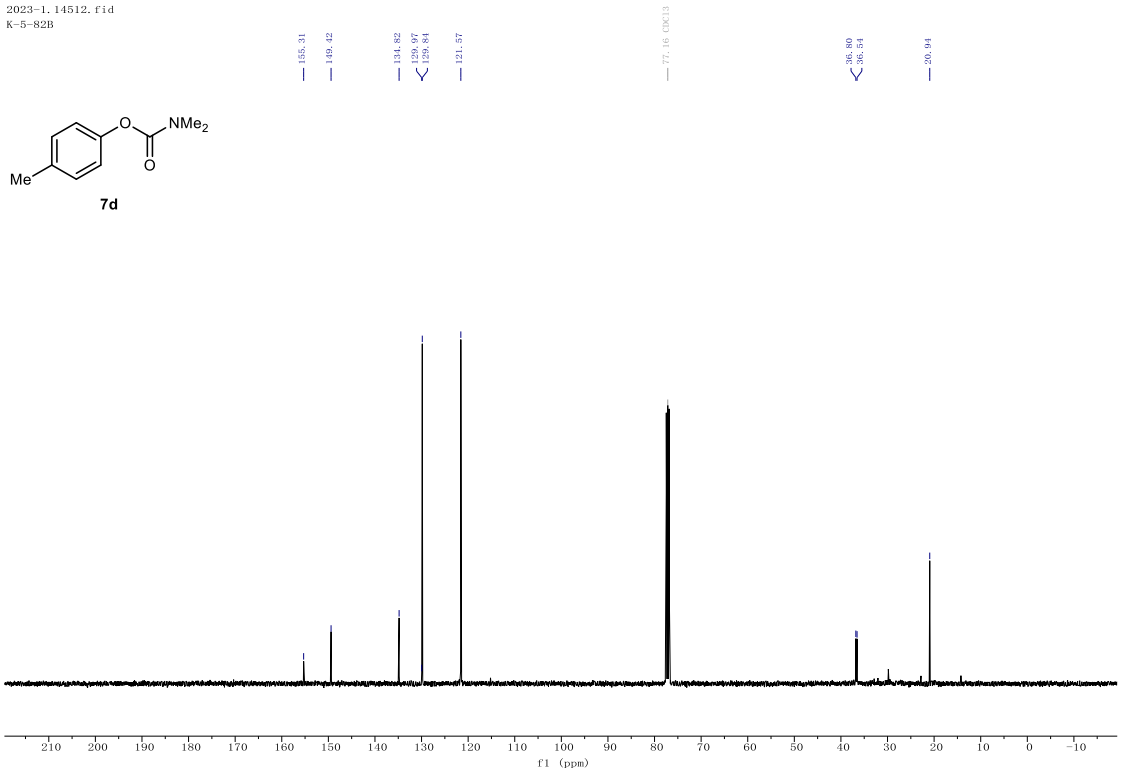

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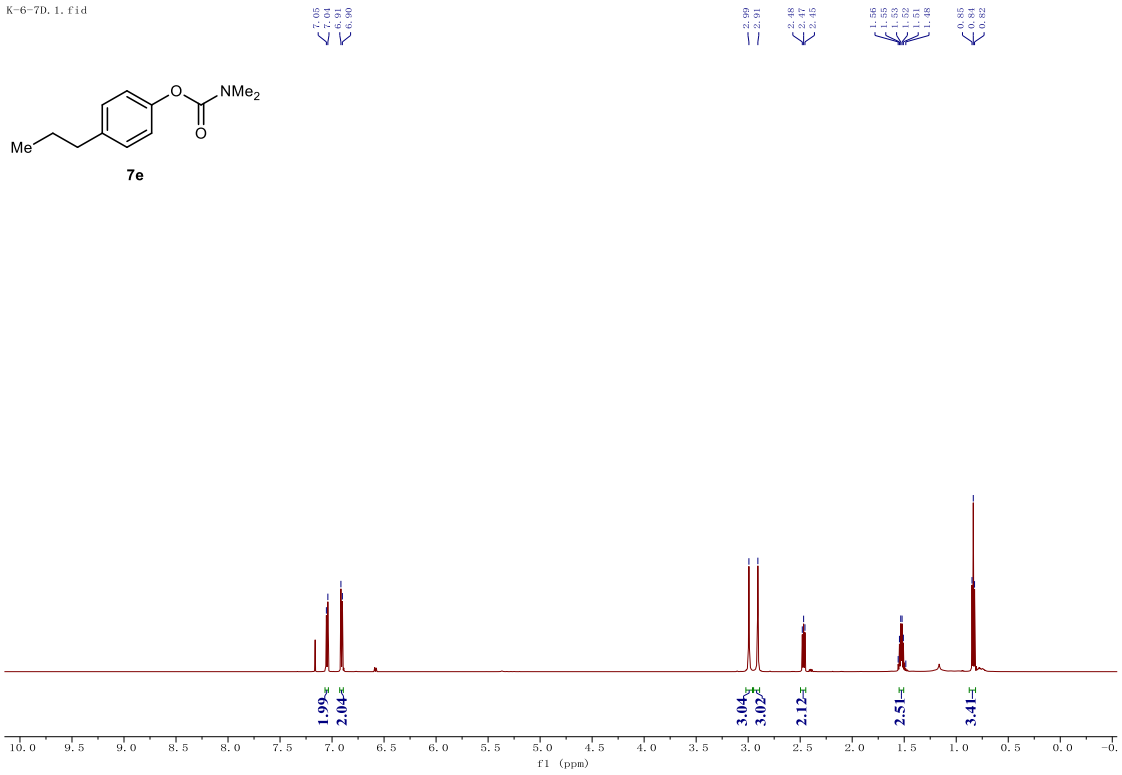

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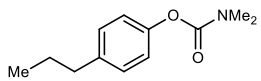

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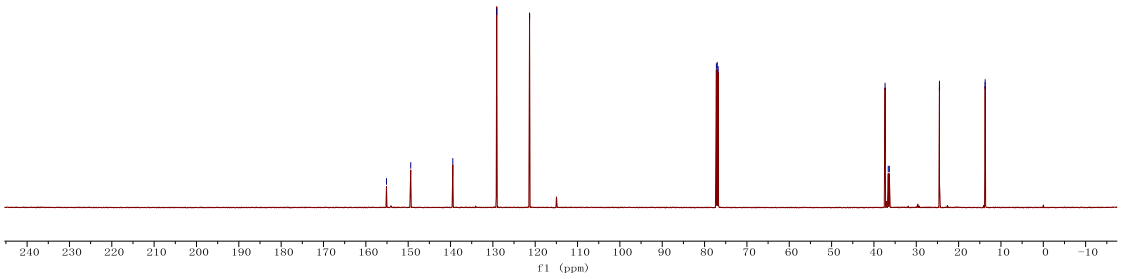

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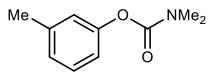

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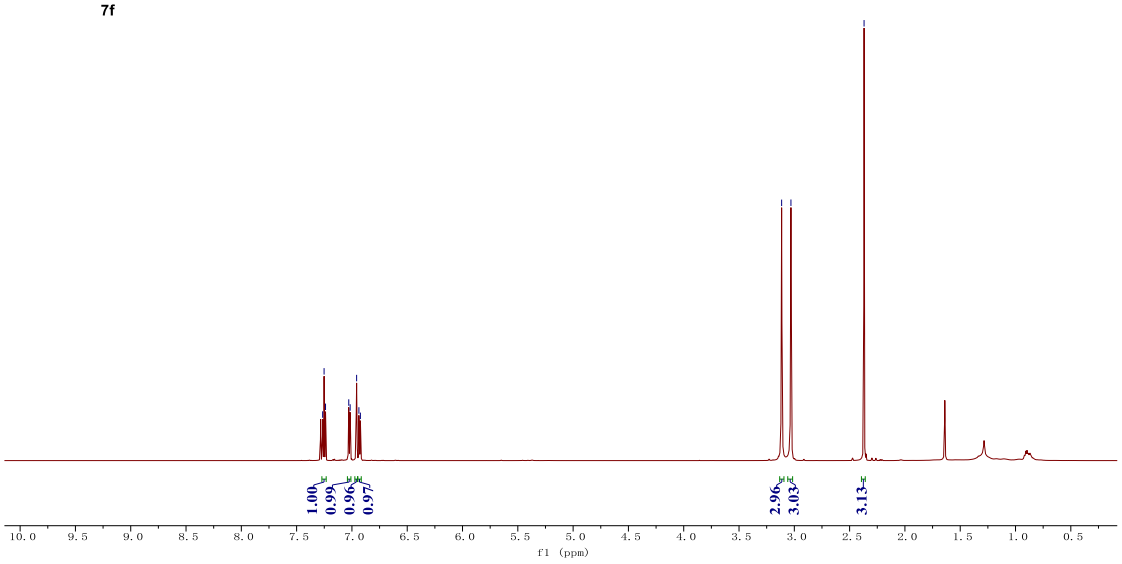

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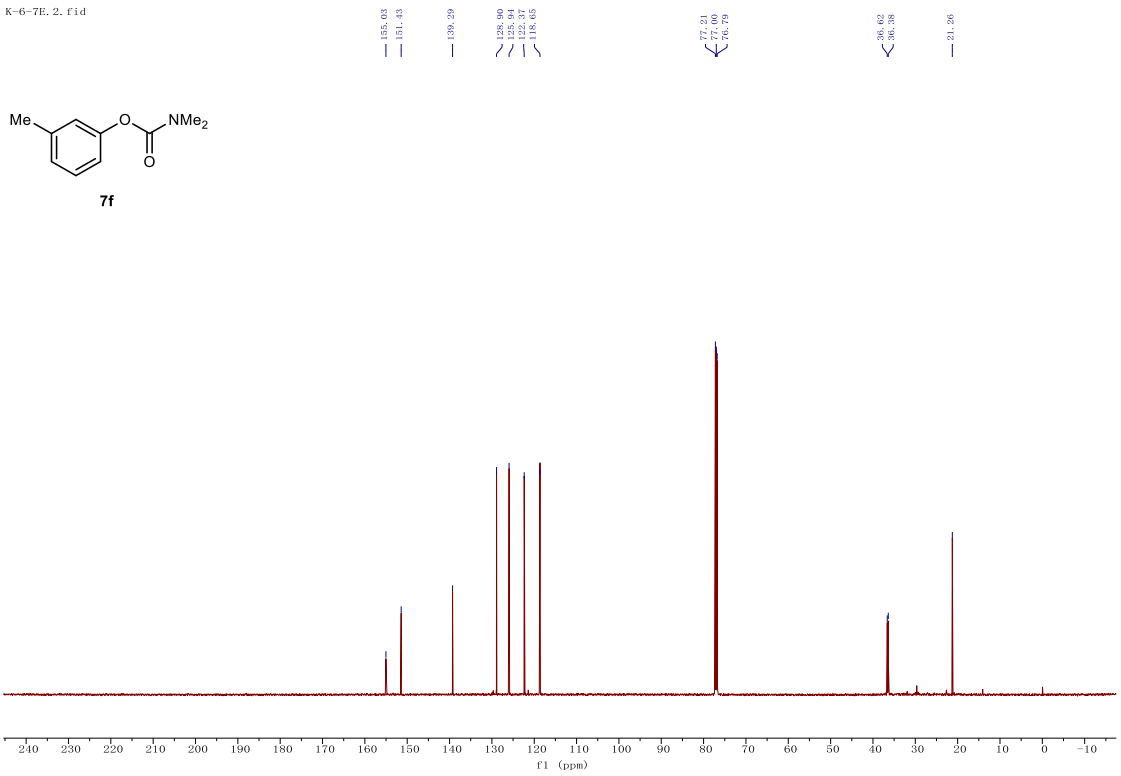

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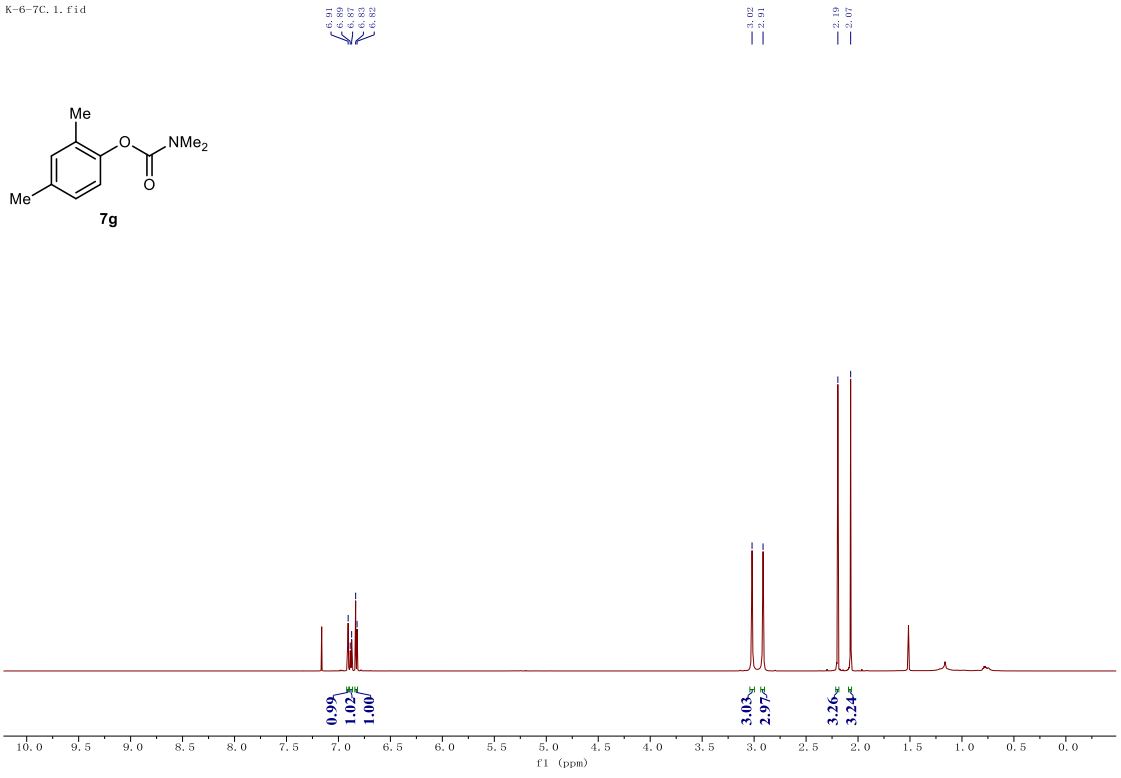

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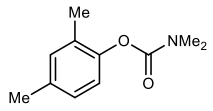

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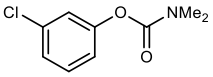

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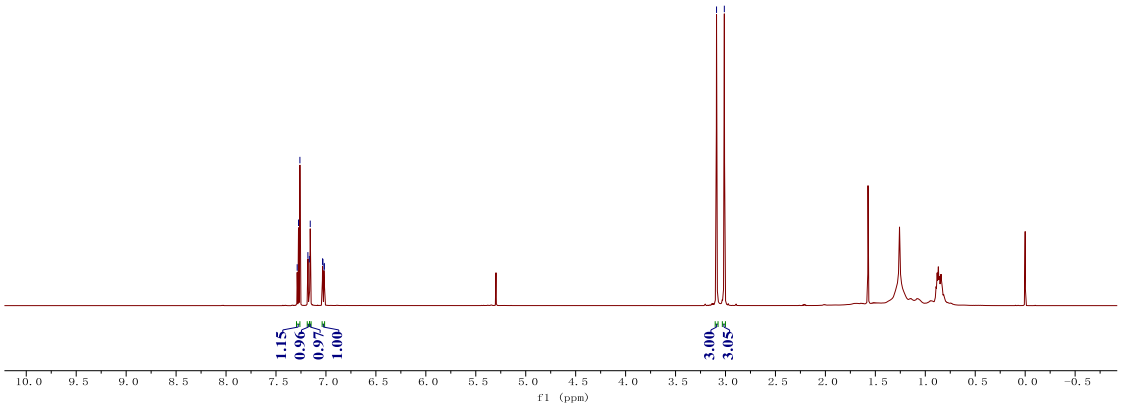

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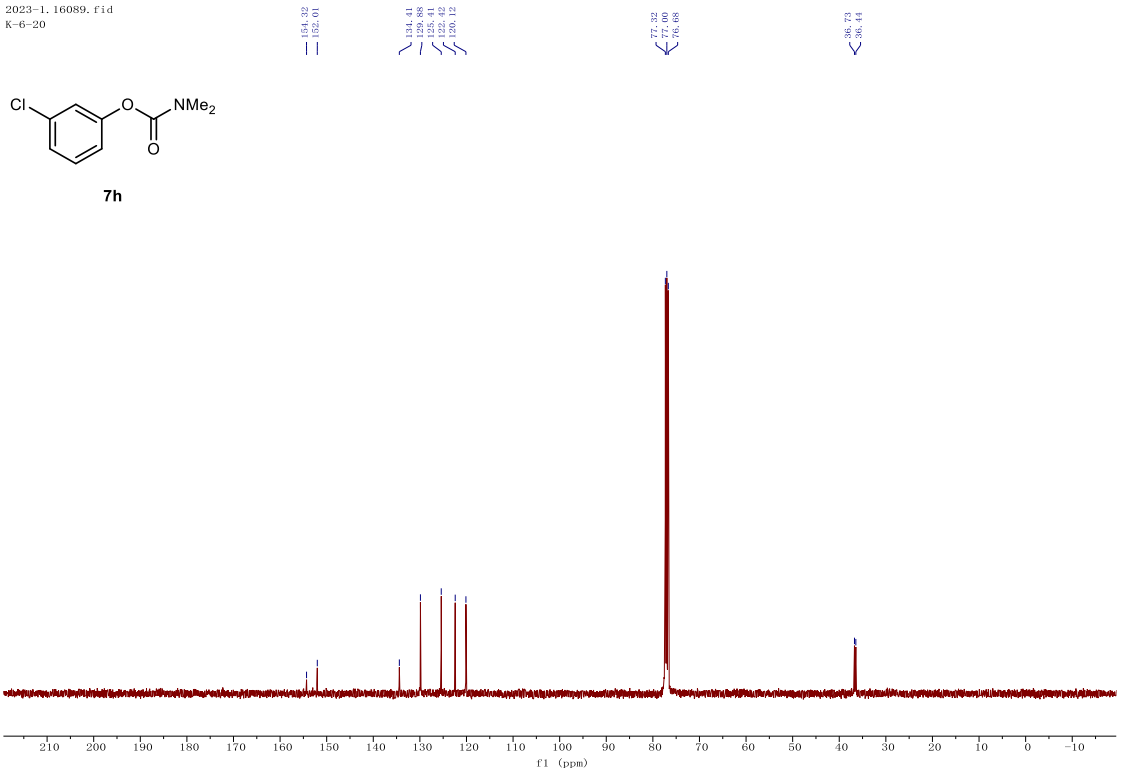

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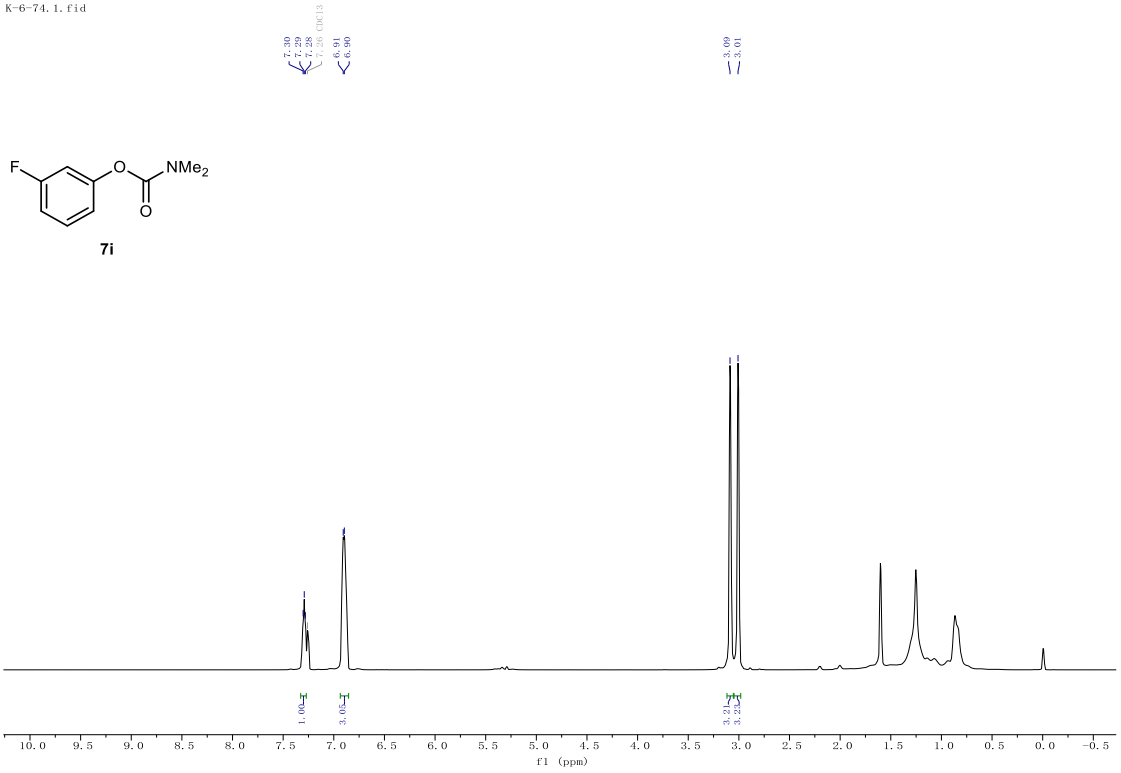

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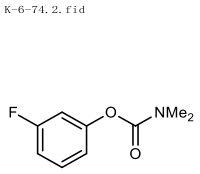

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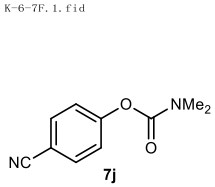

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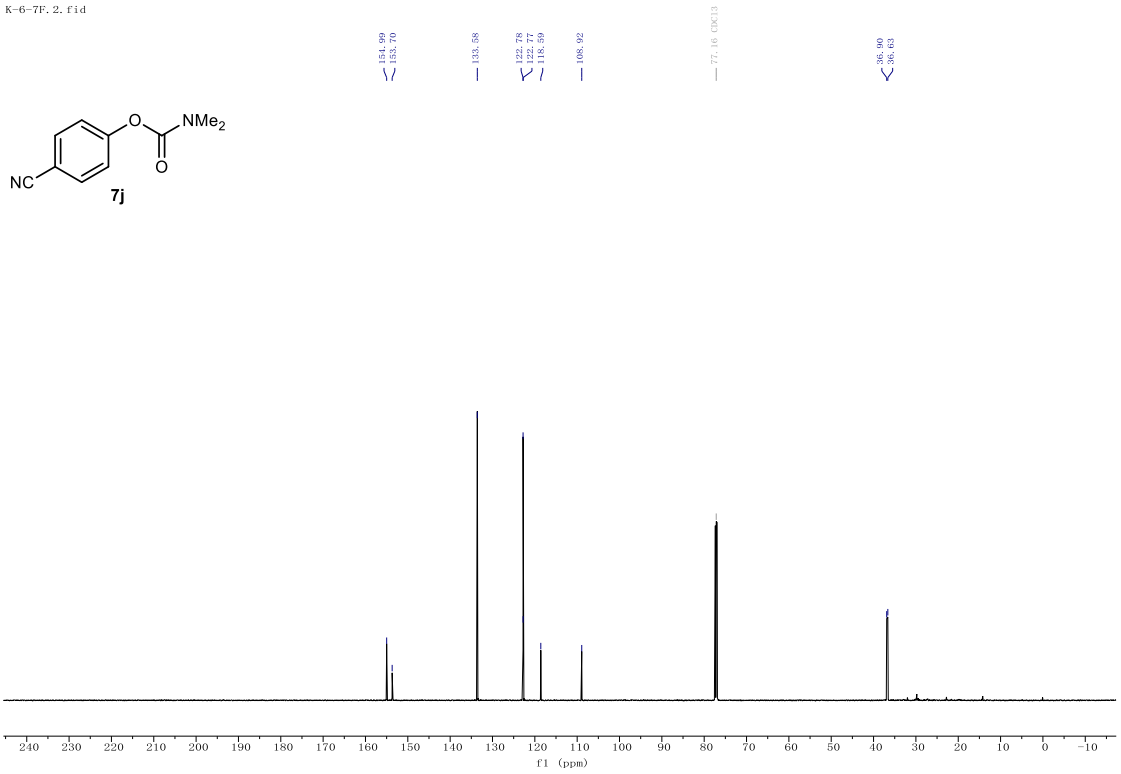

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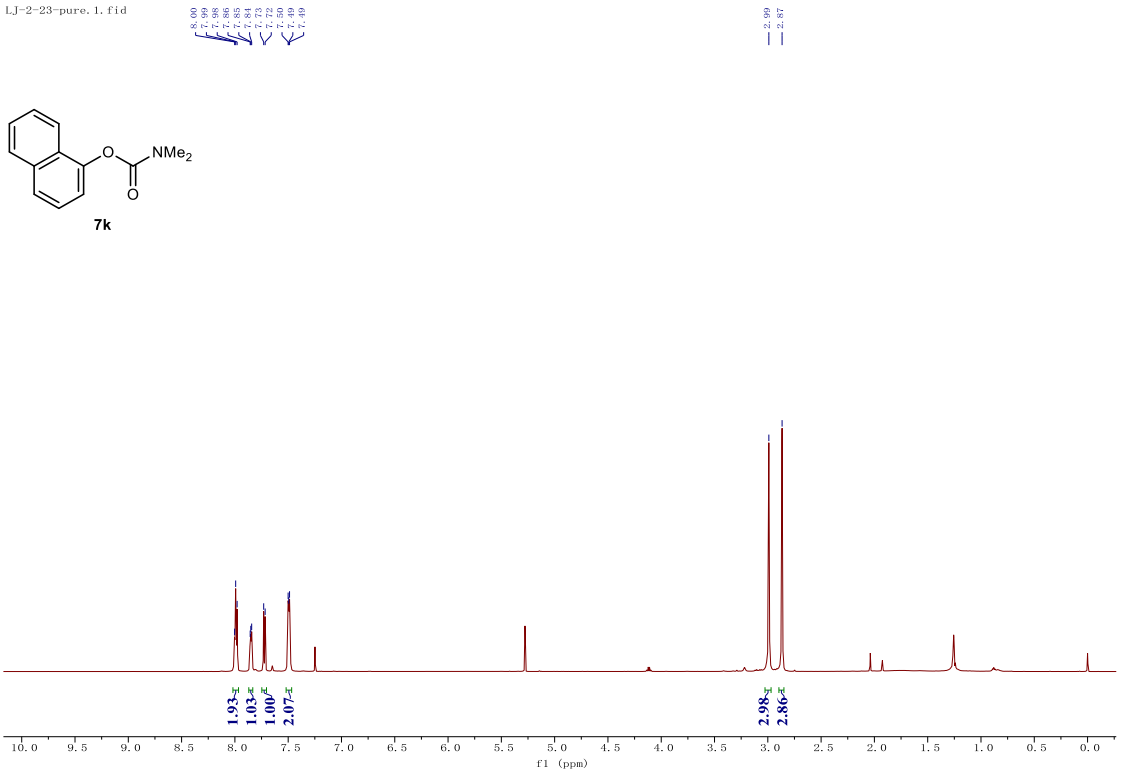

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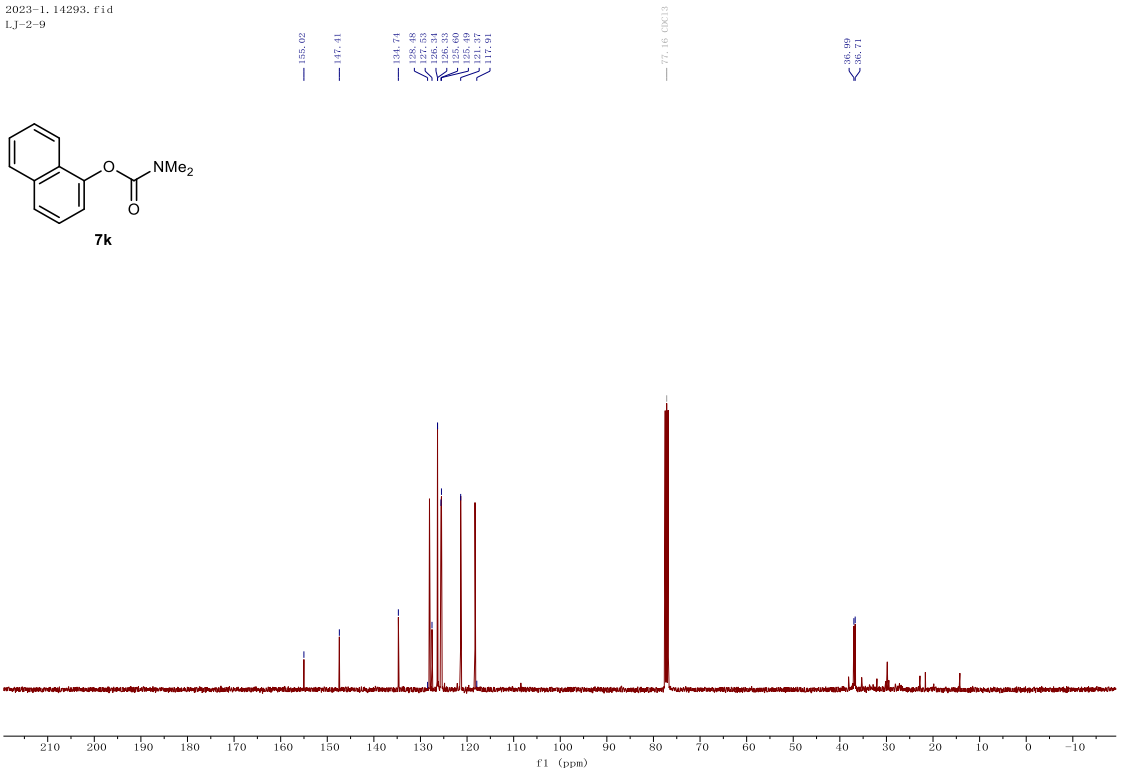

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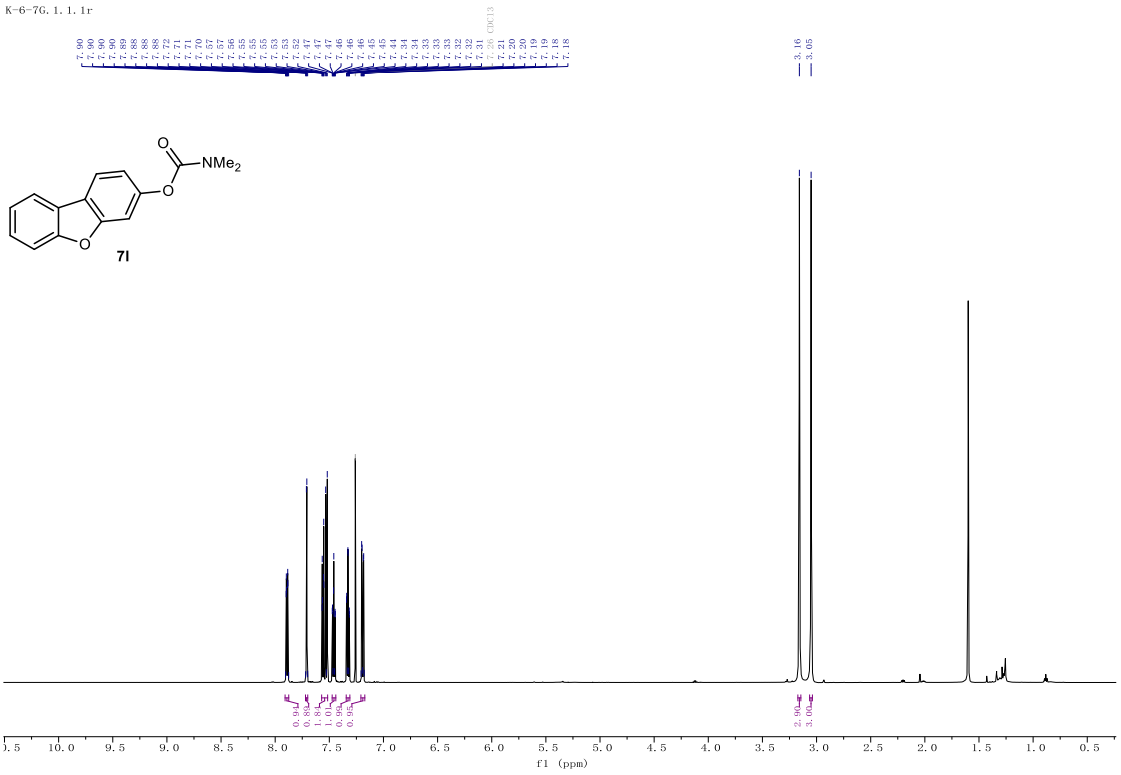

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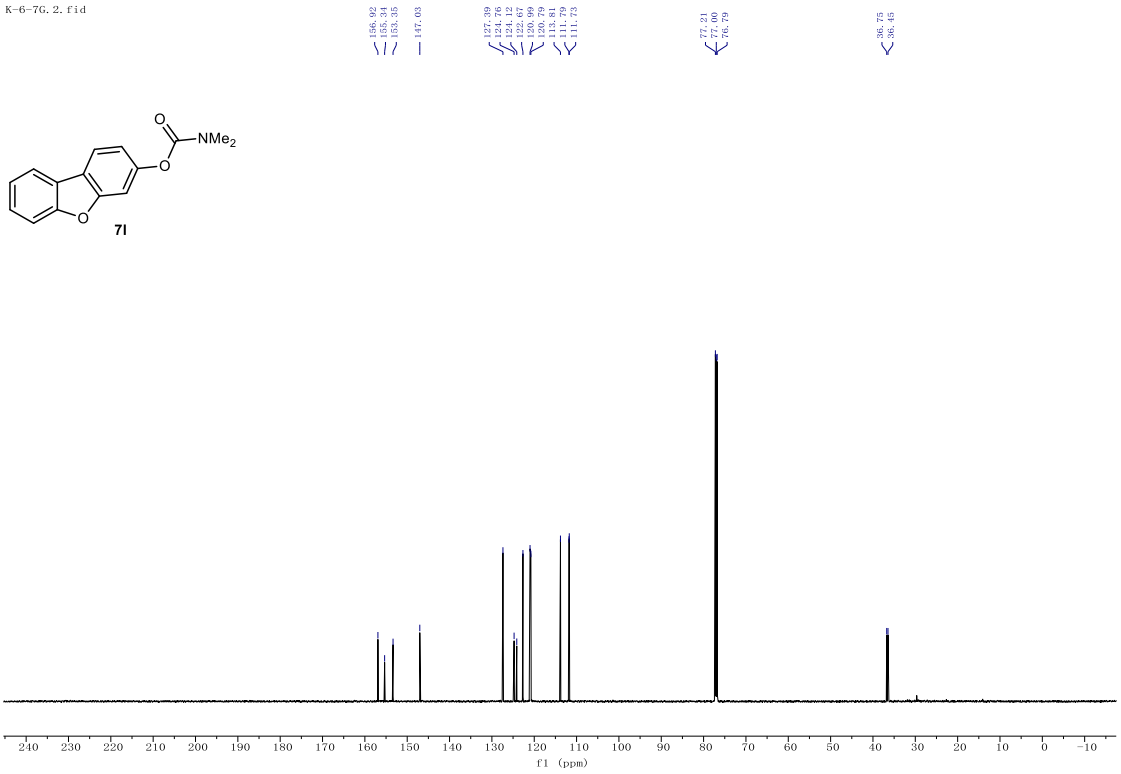

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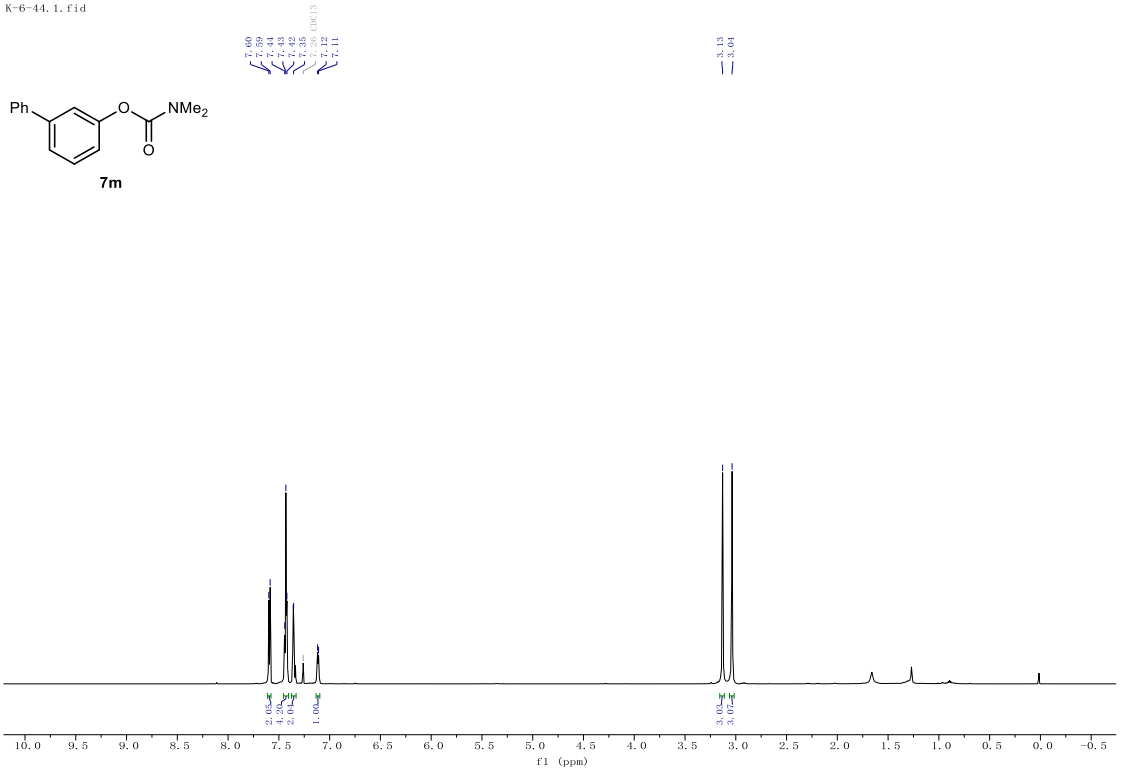

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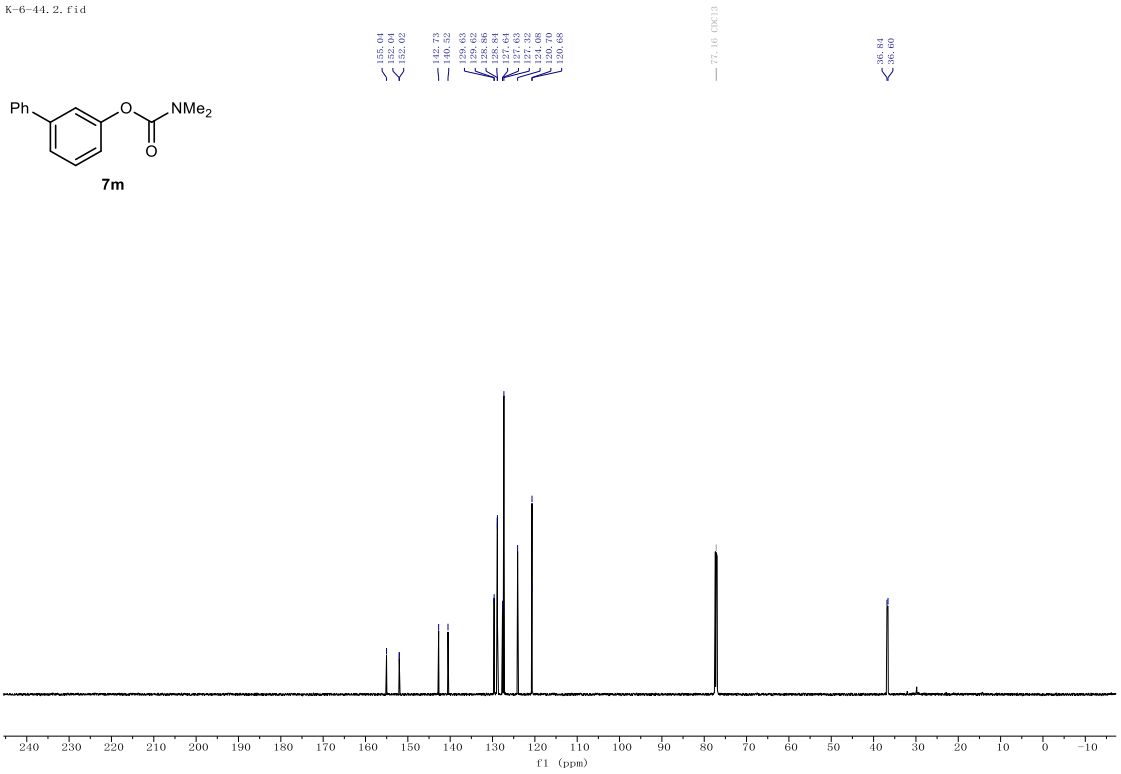

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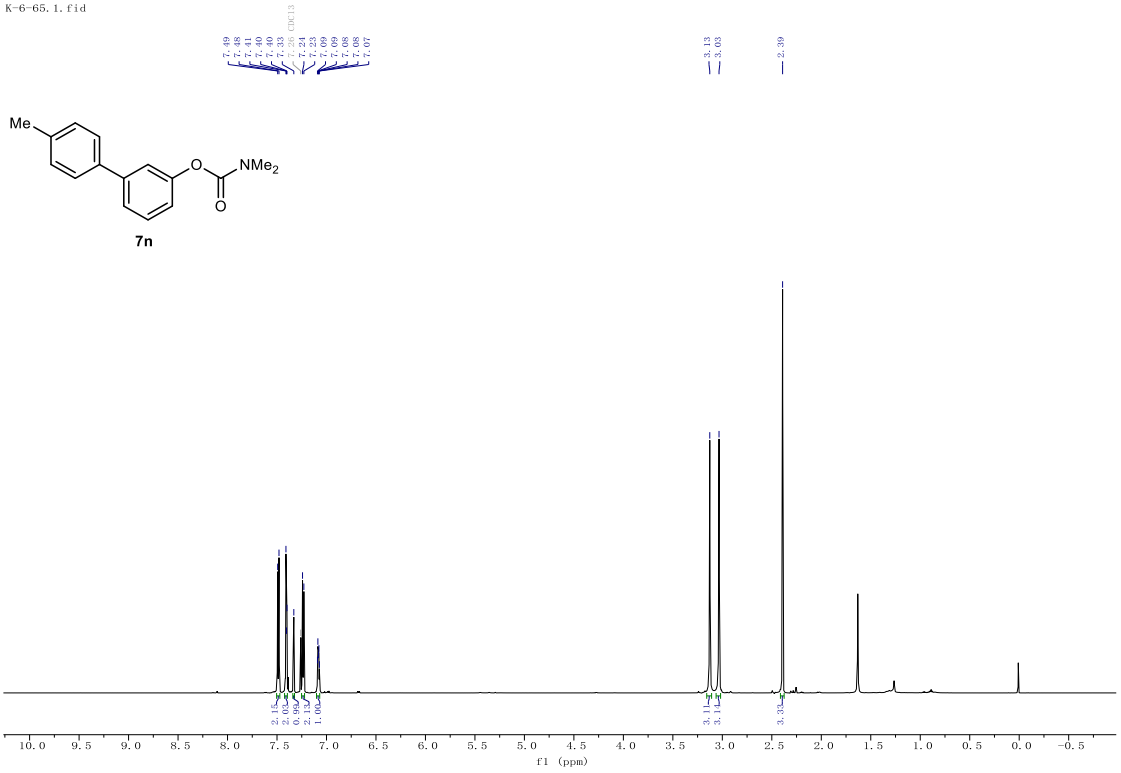

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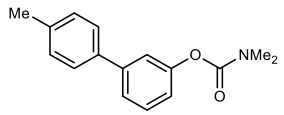

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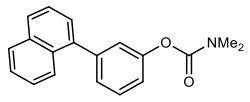

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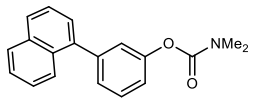

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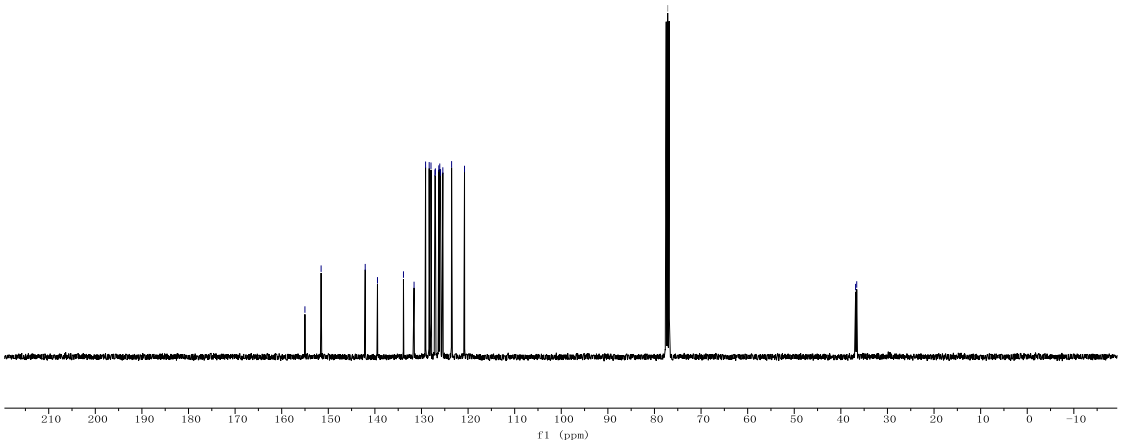

K-6-49.1.fid

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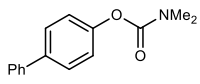

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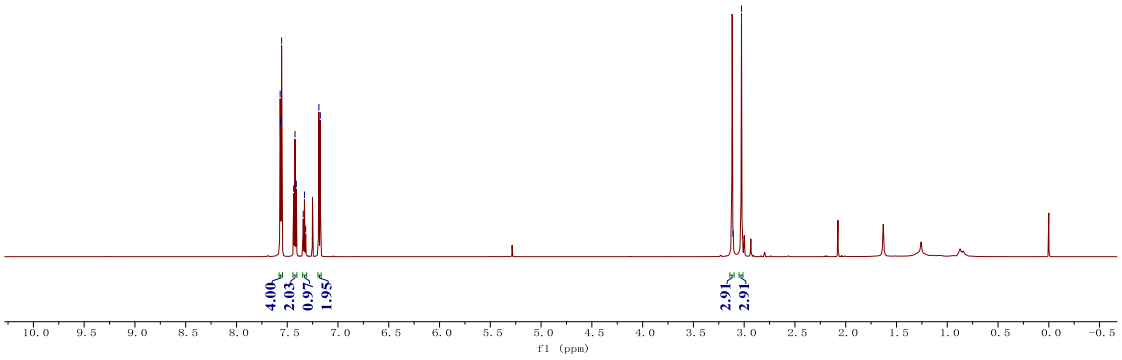

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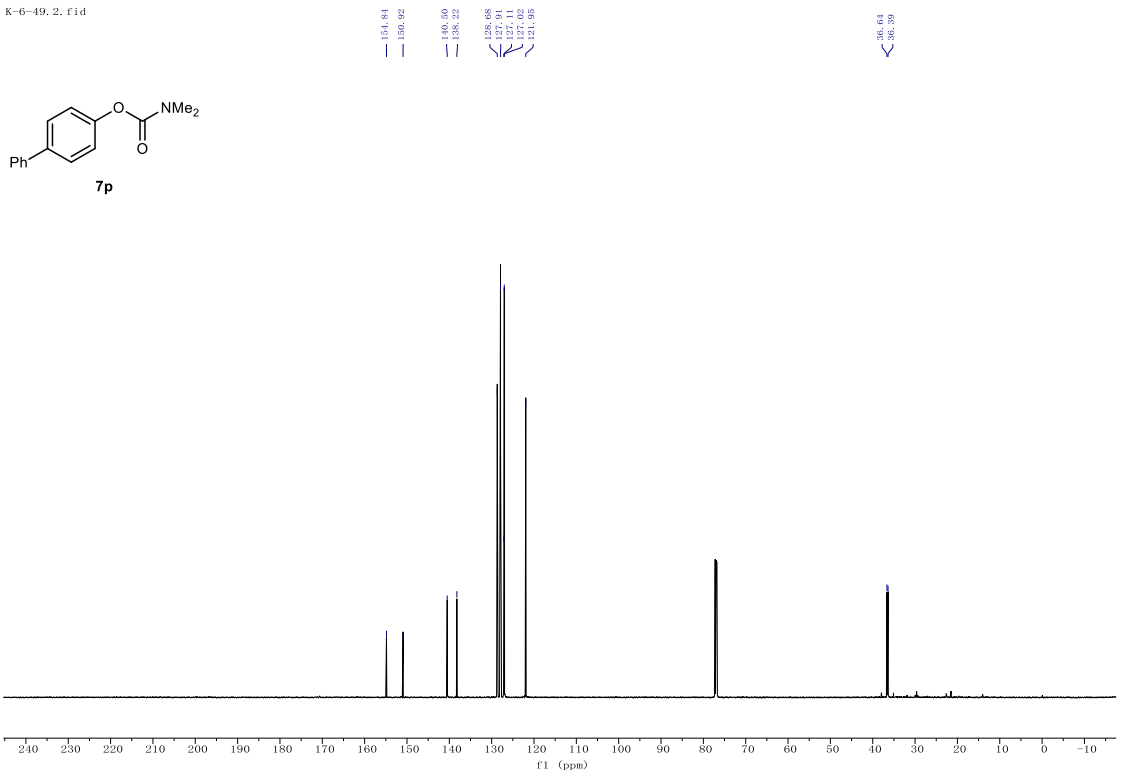

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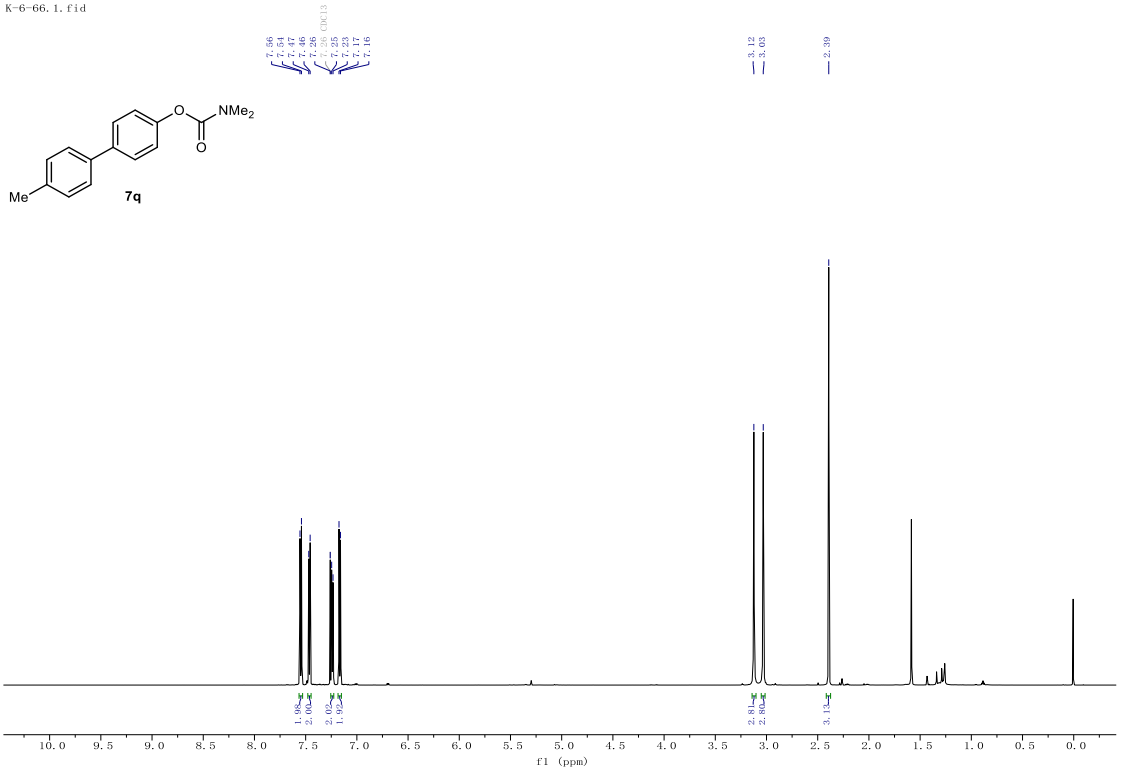

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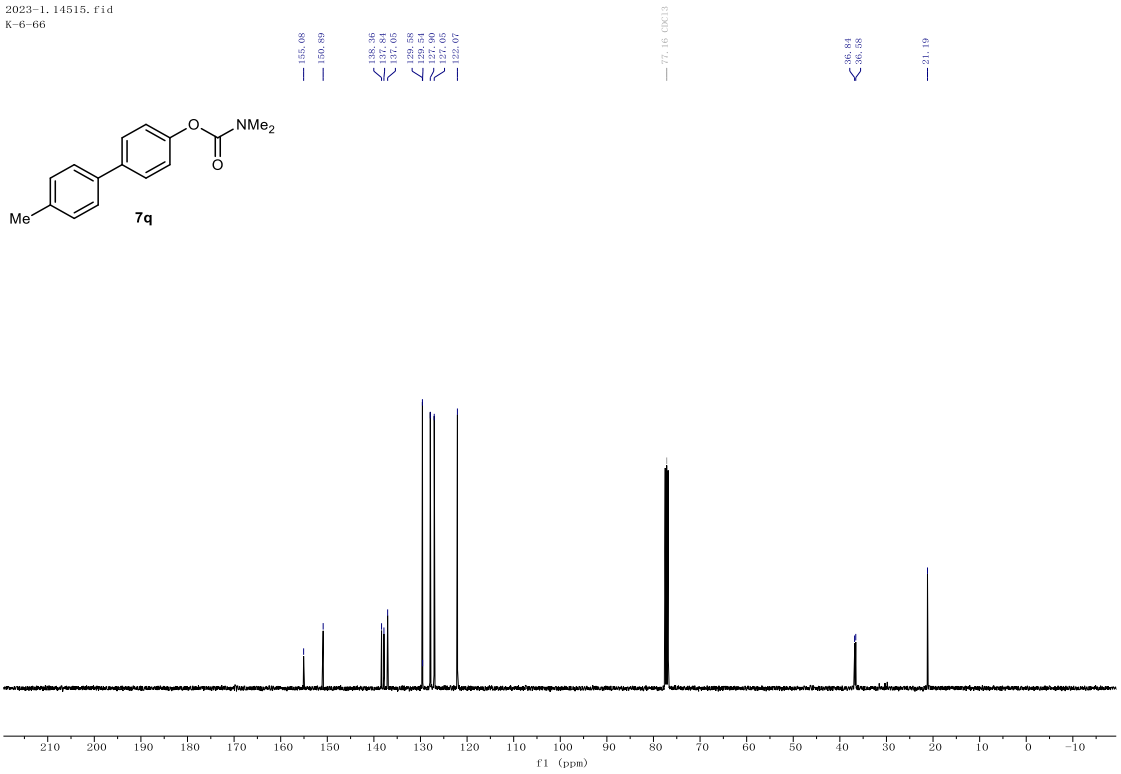
K-6-66



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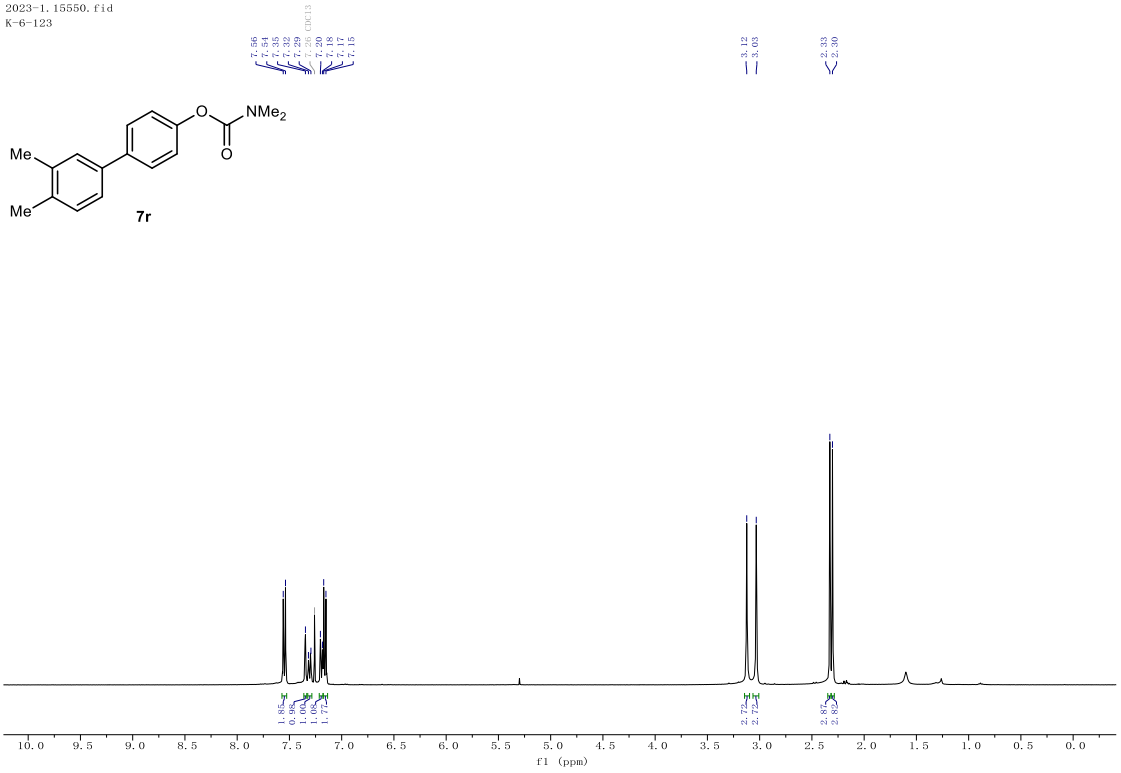
K-6-123



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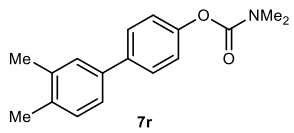

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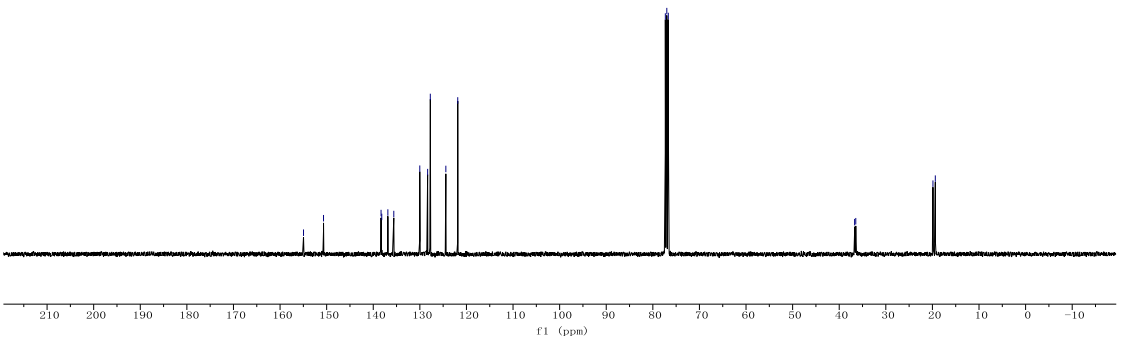
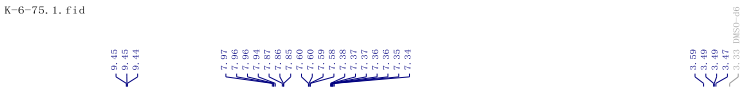
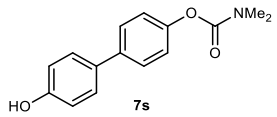


K-6-75.1.fid





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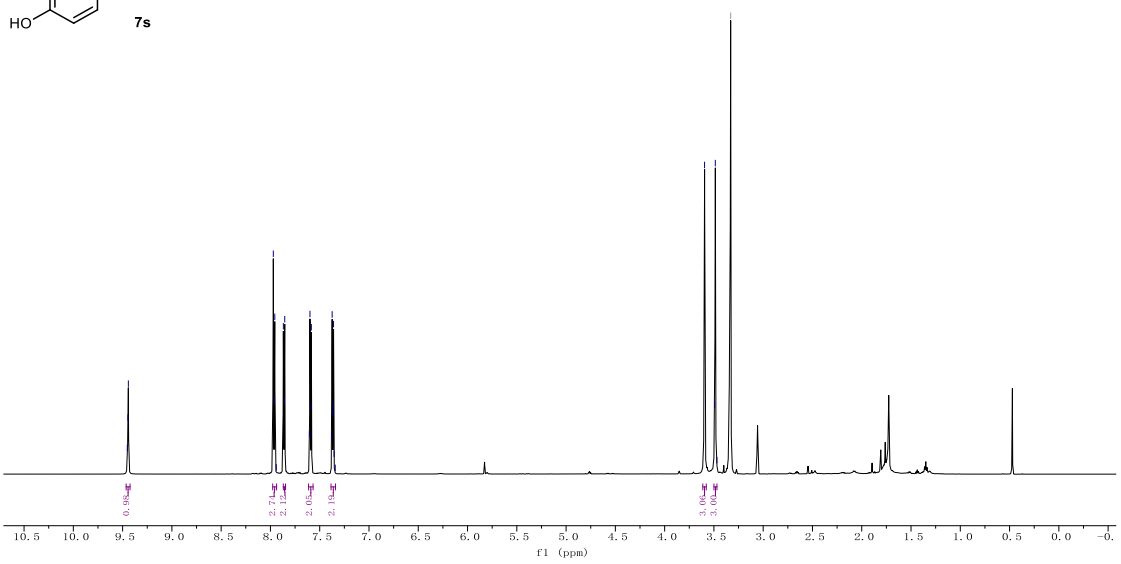
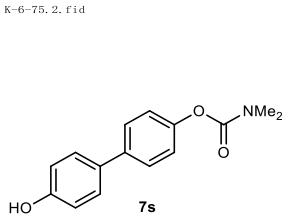


K-6-75.2.fid



7s

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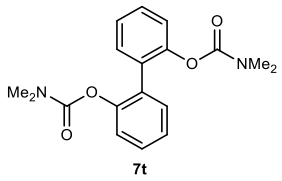
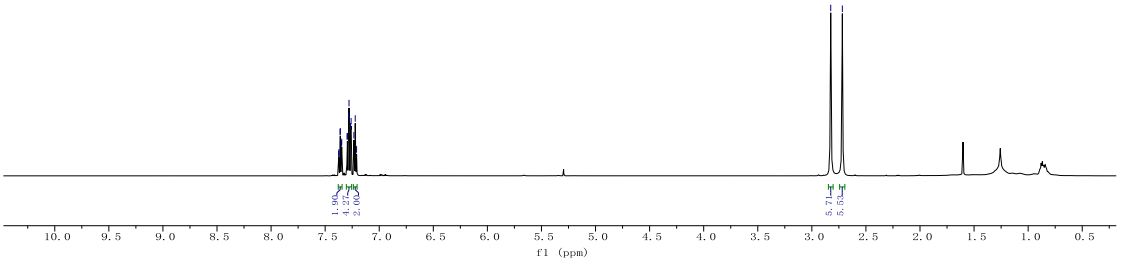


7t



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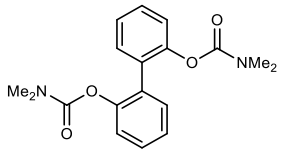
K-5-82E



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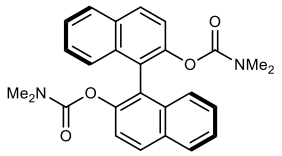
K-6-19-B



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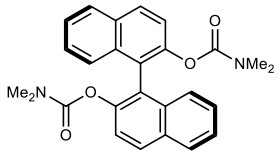

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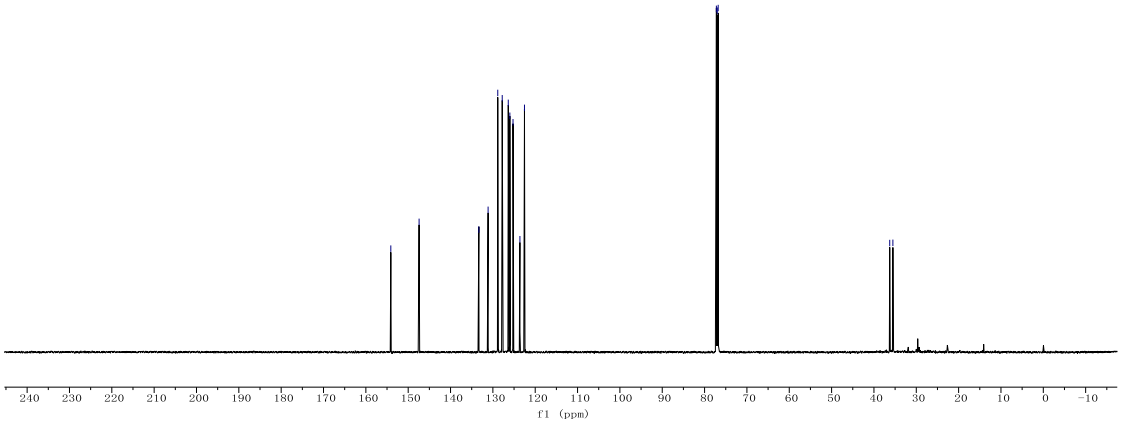

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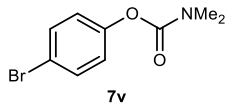
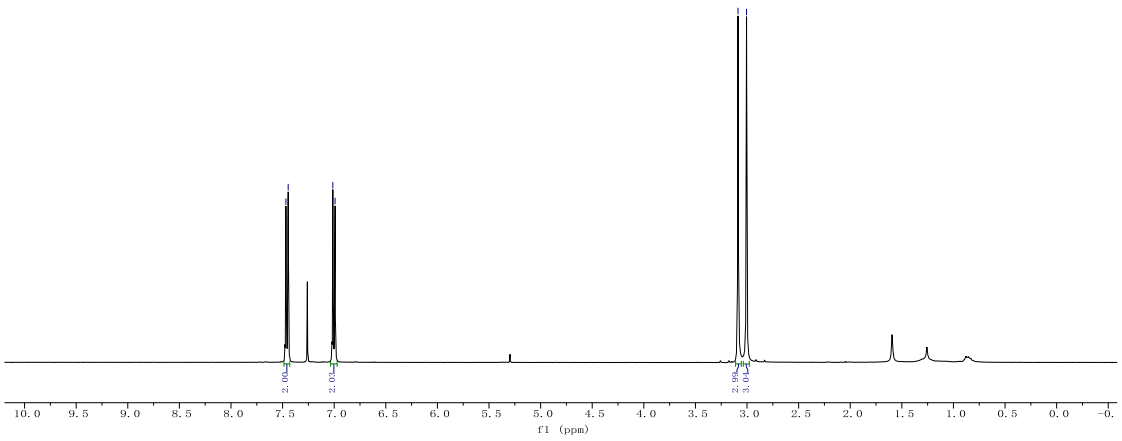
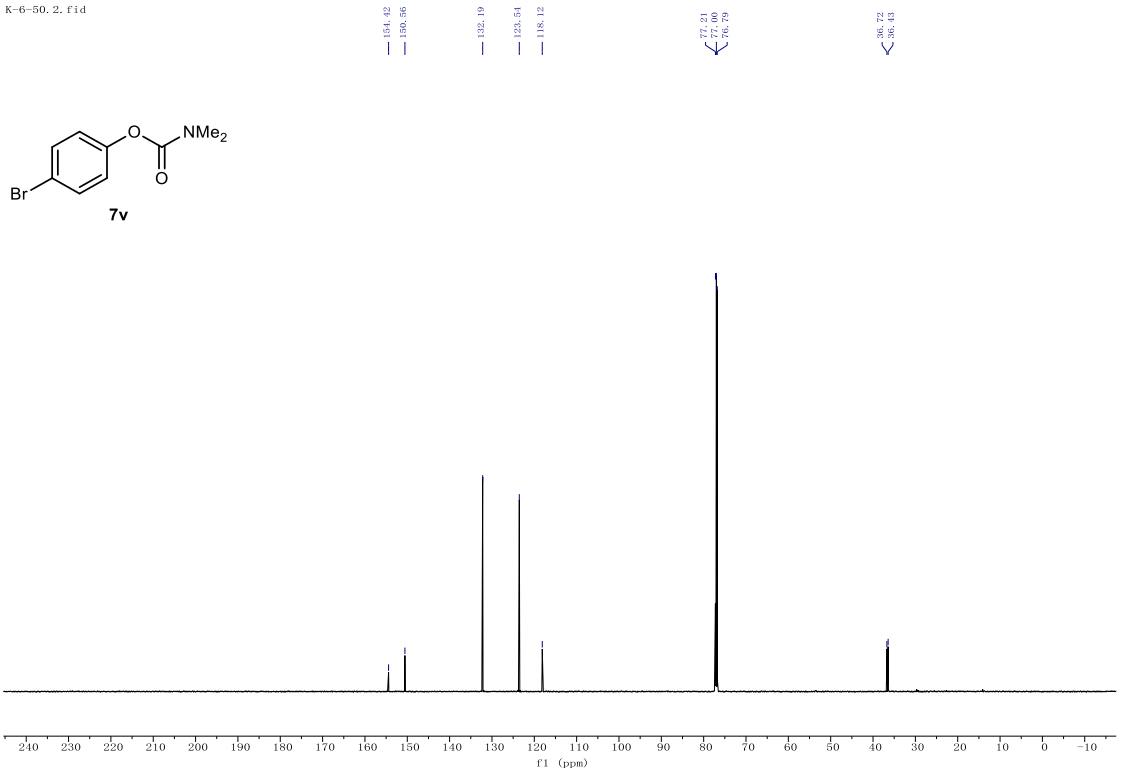
K-6-50



7v

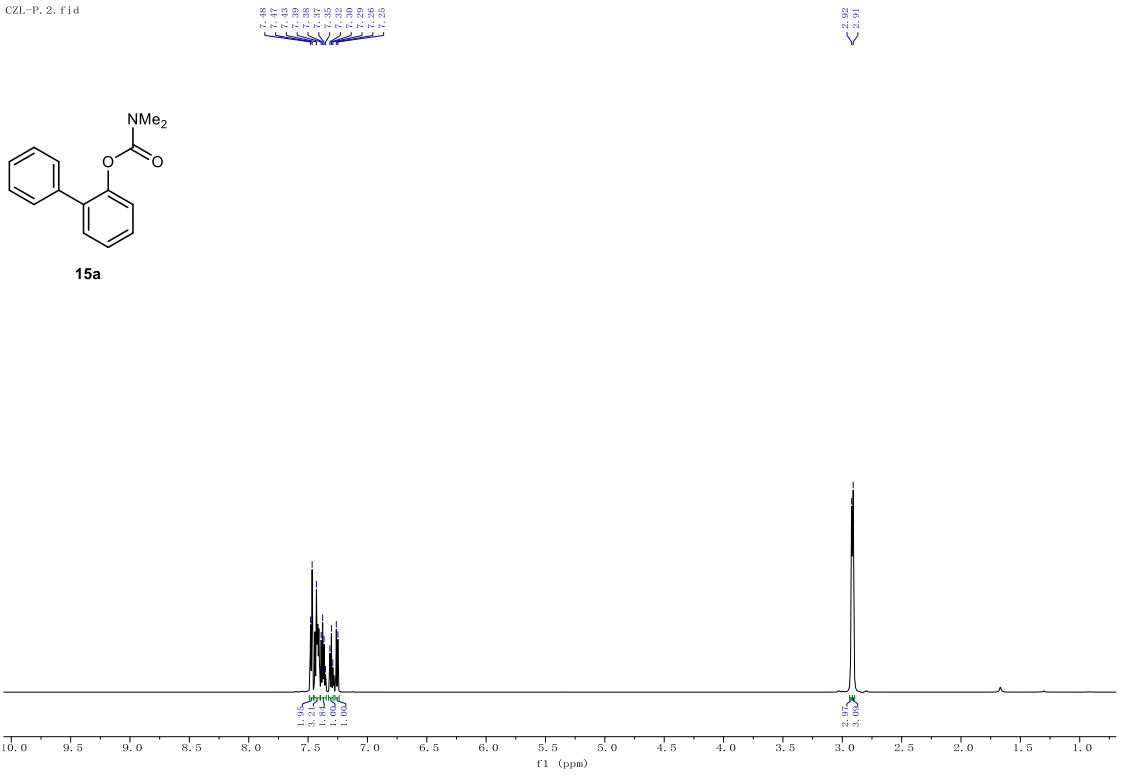


K-6-50.2.fid



7v

CZL-P.2.fid



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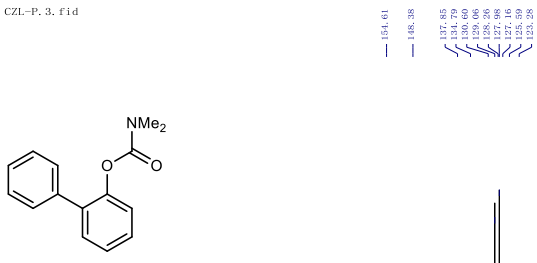
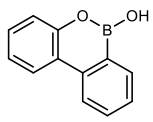


15a

K-6-120.1.fid



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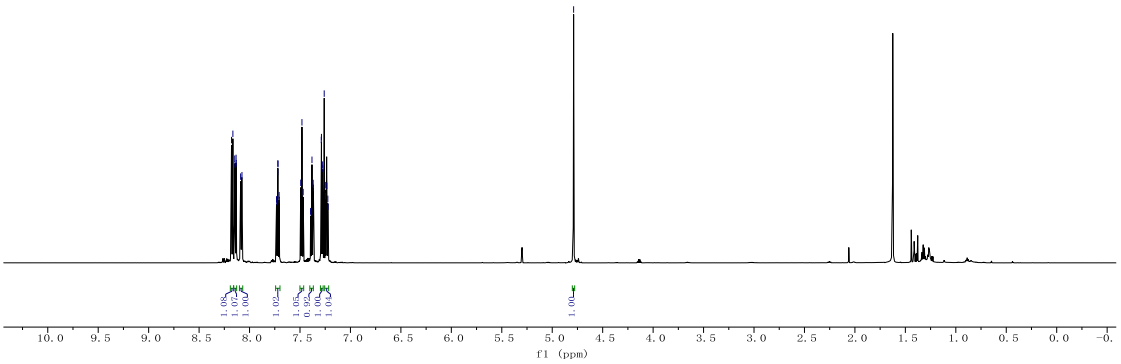
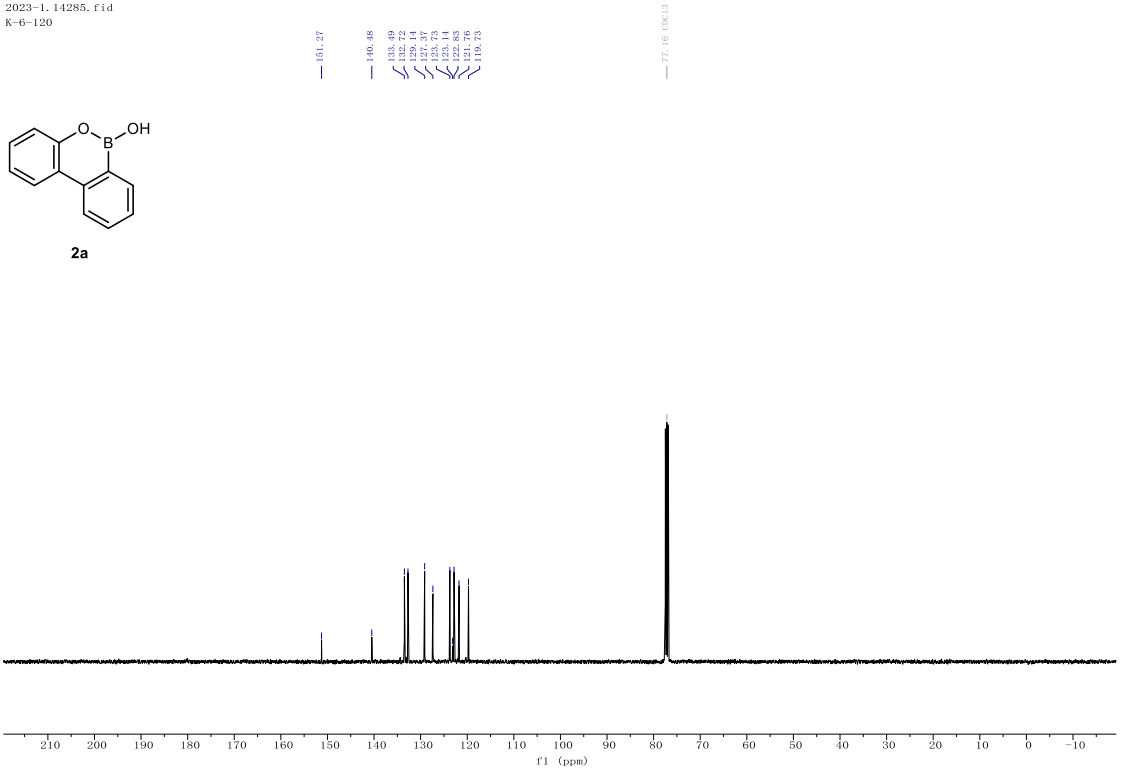


2023-1.14285.fid
K-6-120



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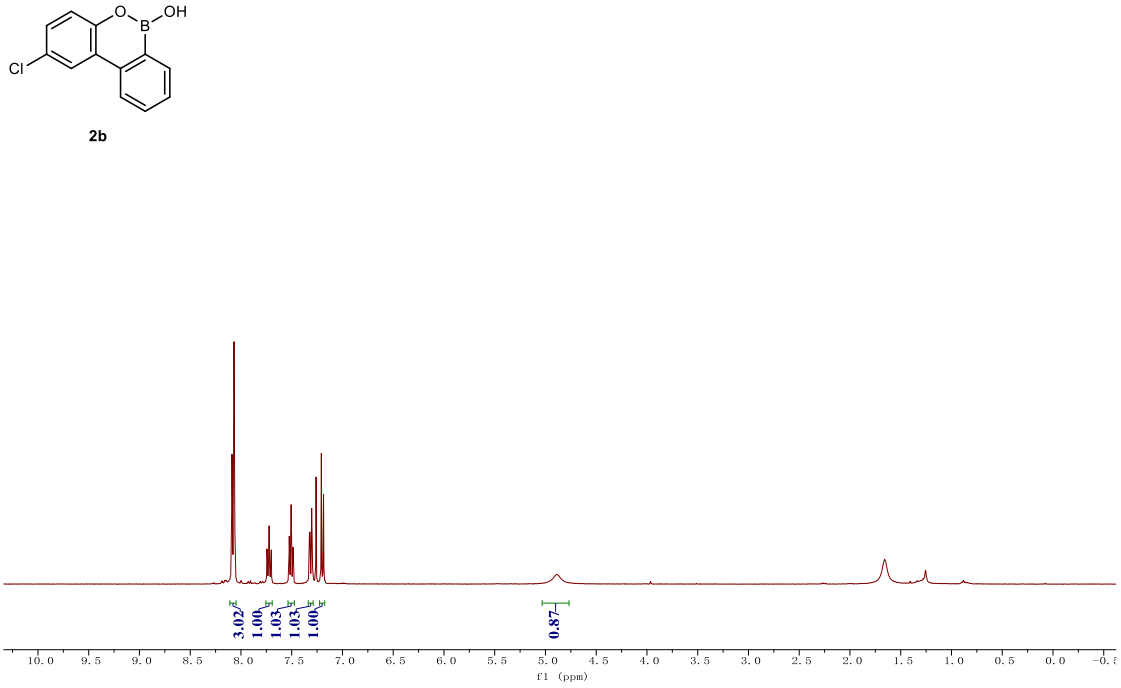
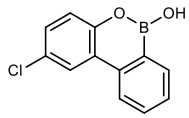
K 6-01



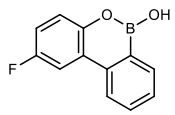
2b

K-6-30.2.fid



2b

2023-1.15711.fid
K-6-139P



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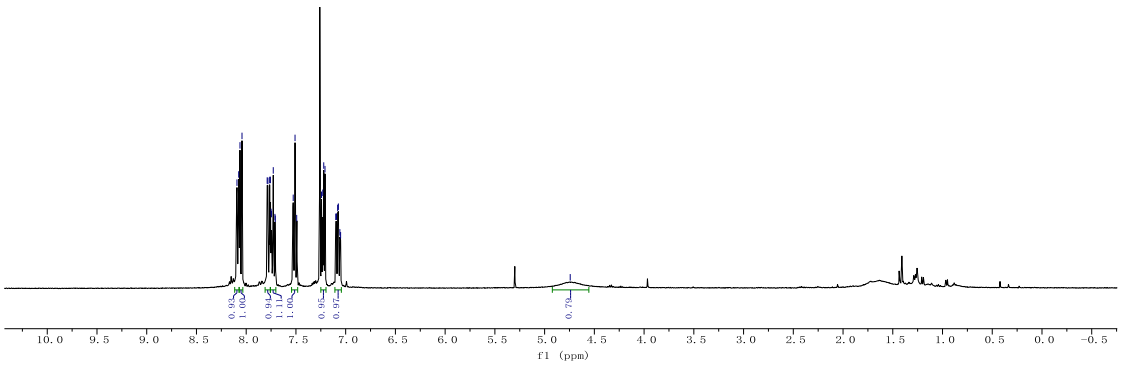

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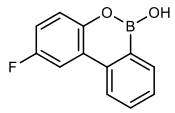
K-6-139



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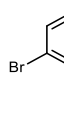
K-6-142P



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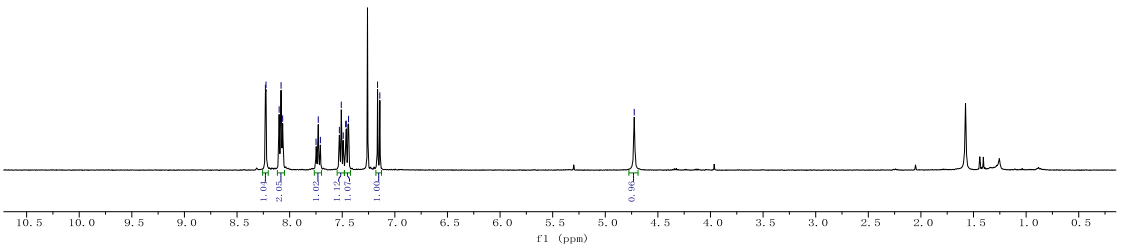

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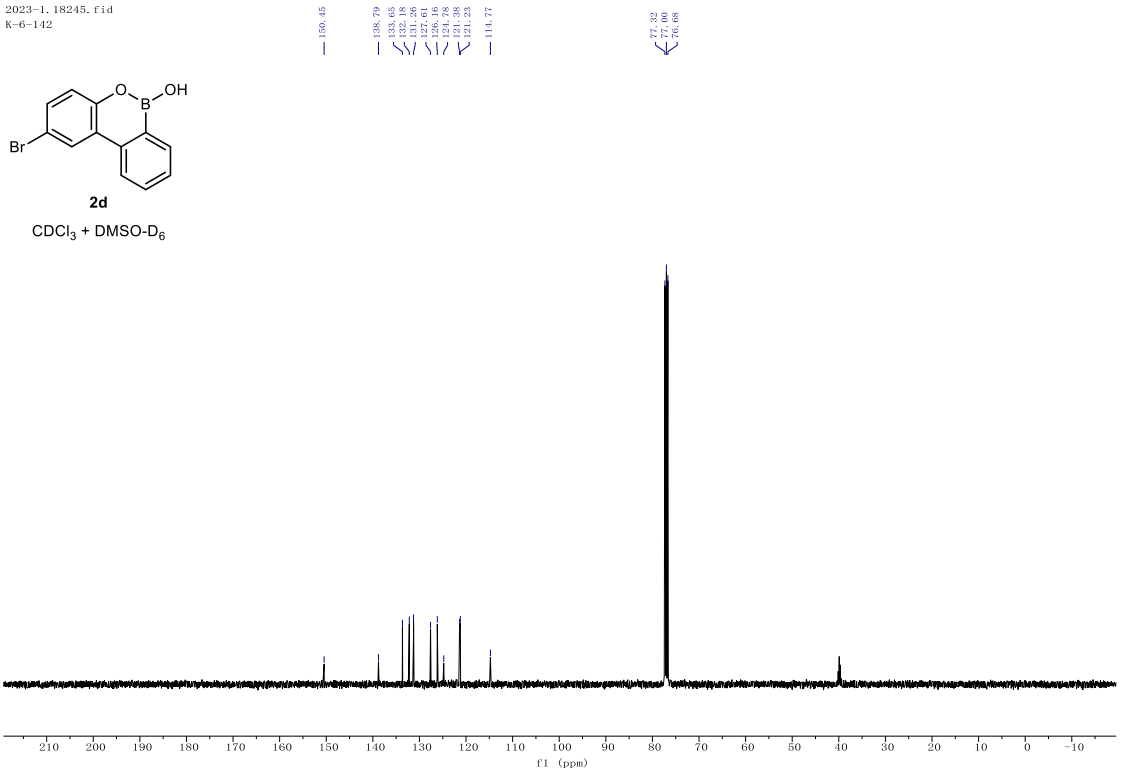
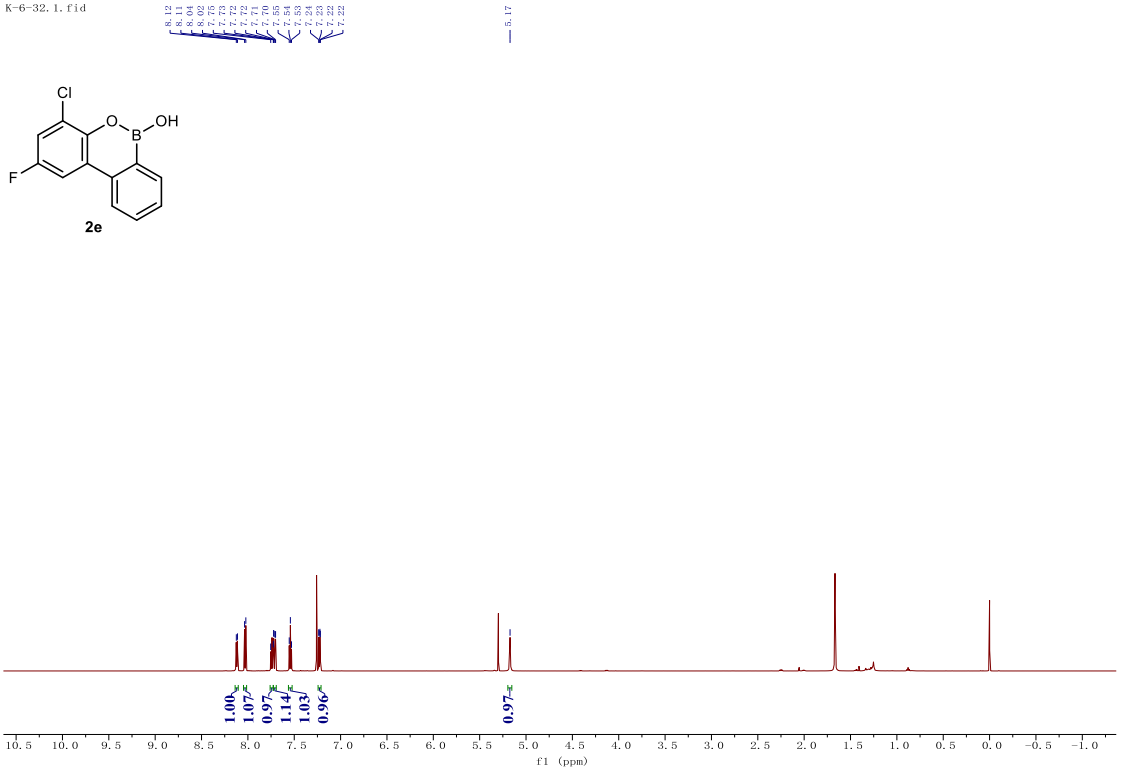


2d

$CDCl_3$ + DMSO-D_6

K-6-32.1.fid



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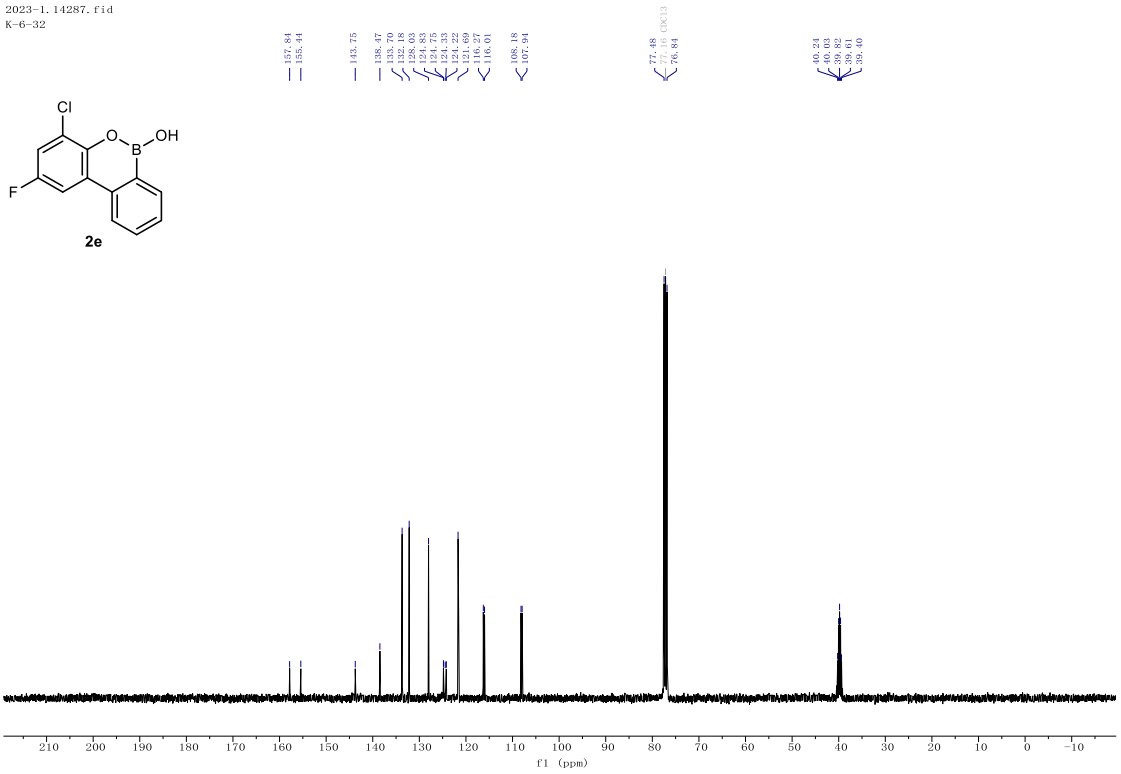
K-6-32



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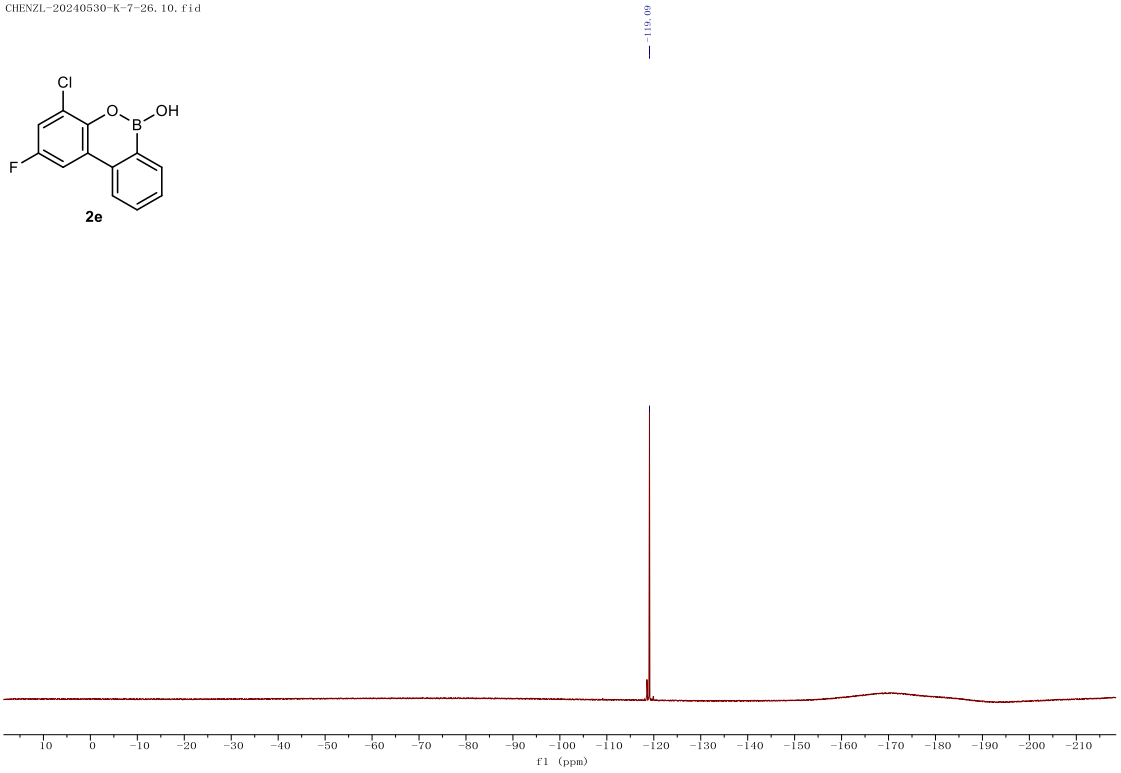
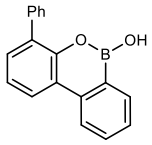


2024-1.10519.fid
K 6-60



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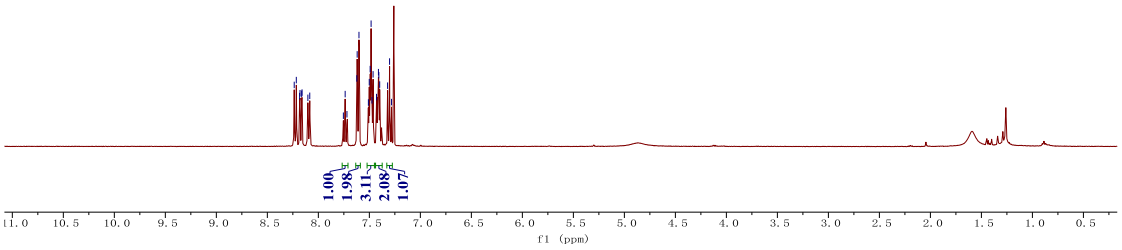
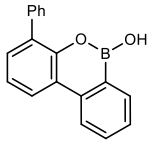


K-6-60.2.fid



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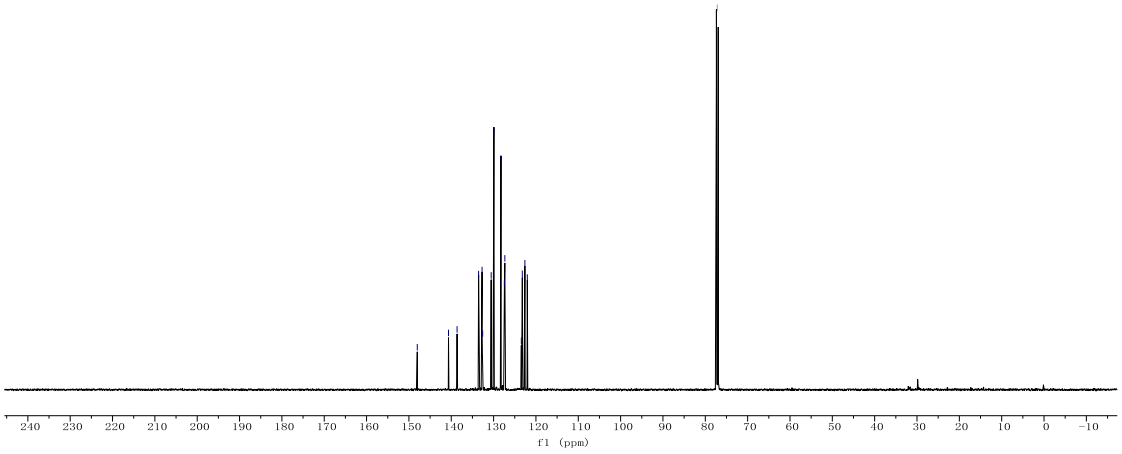
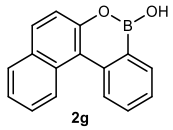


2024-1.10517.fid
K 7-14



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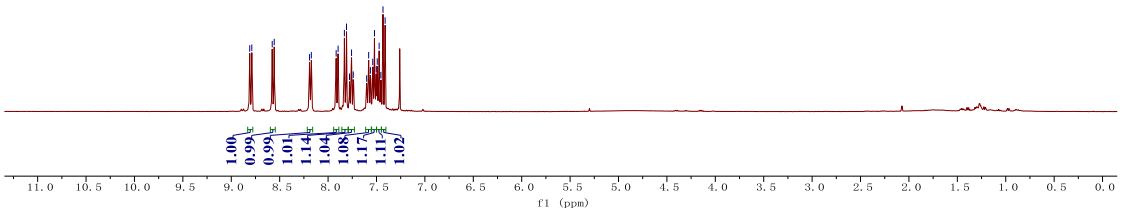
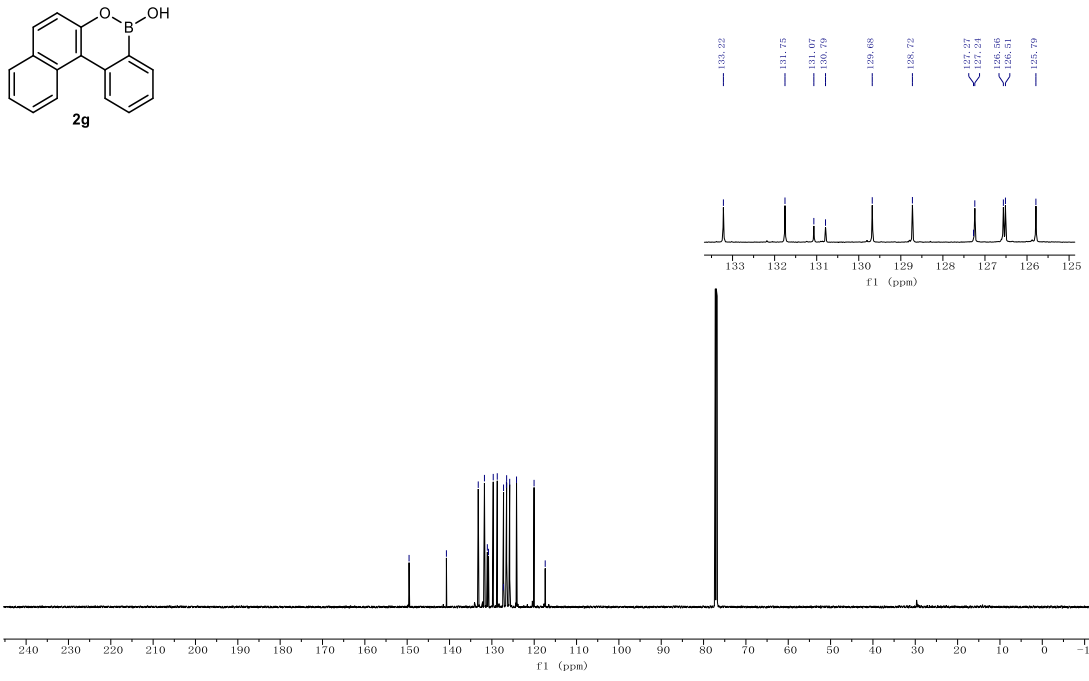
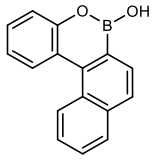


K-6-28.2.fid



2g

2023-1.14140.fid
LJ 2-120



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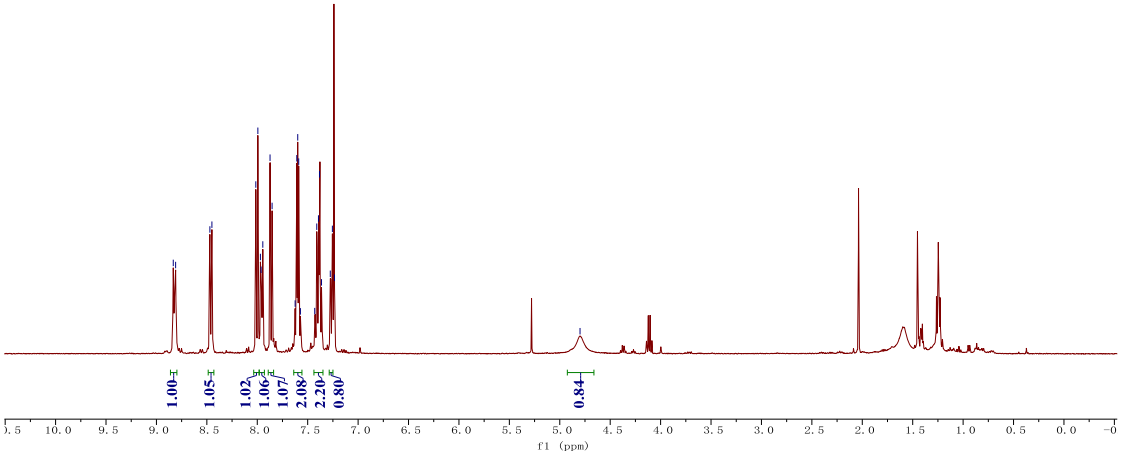

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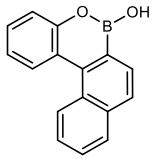
LJ-2-120



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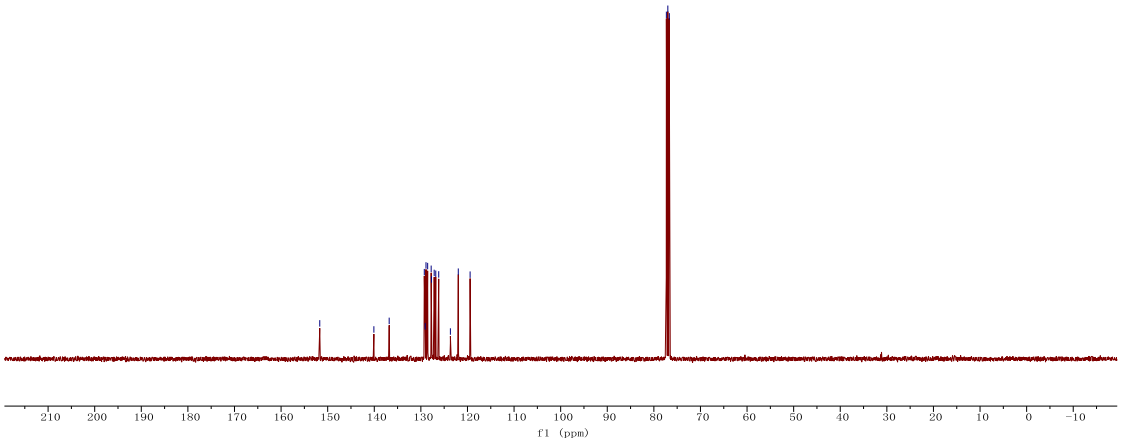
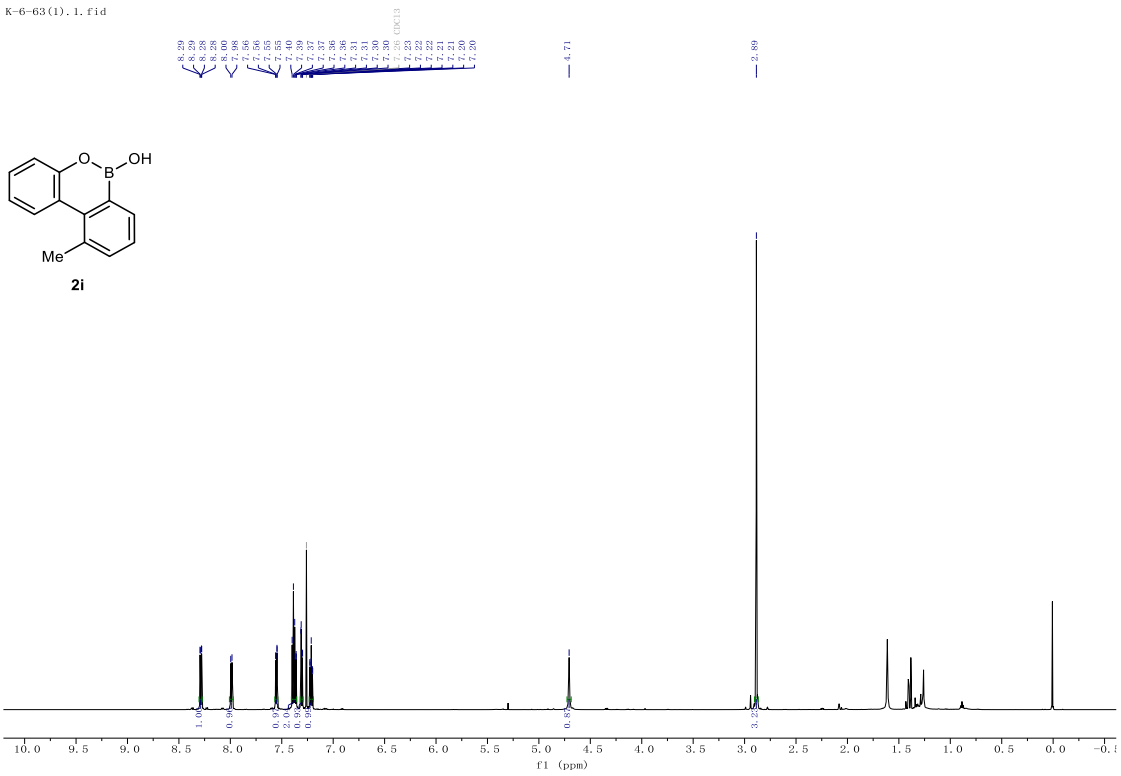
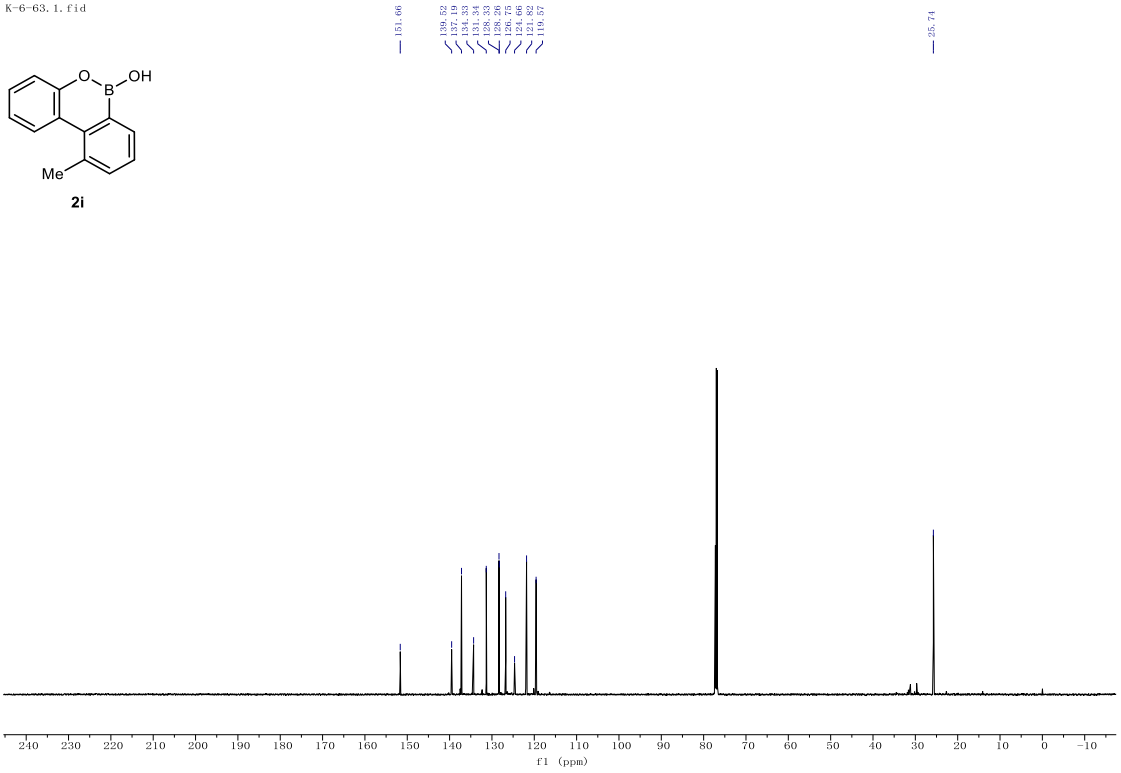


K-6-63(1).1.fid



2i

K-6-63.1.fid



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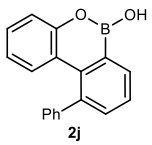
2024-1.10516.fid
K 7-54



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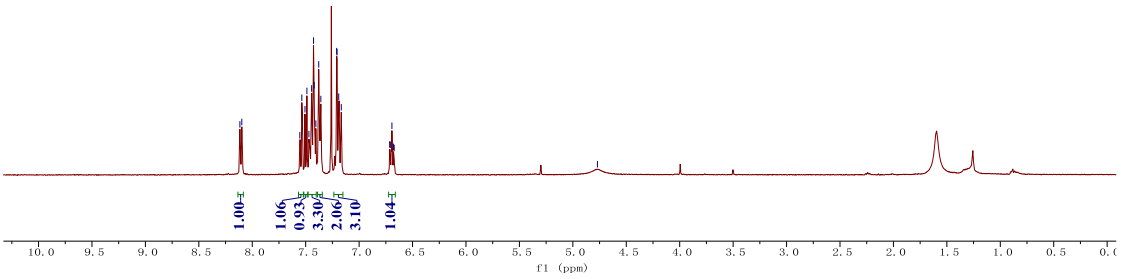
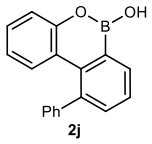


2023-1.15338.fid
K-6-68



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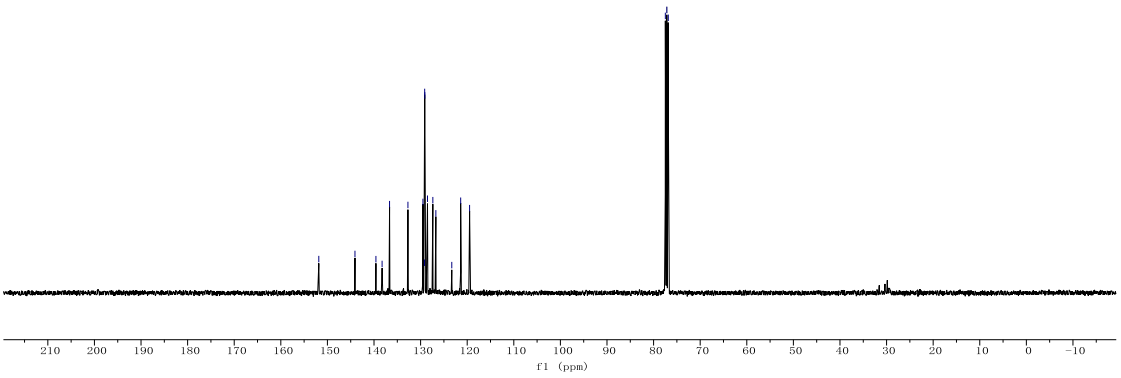
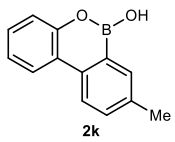


K-6-31.1.fid



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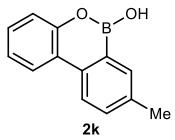
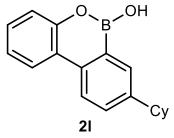
K-6-31.2.fid



2k

K-6-6.1.1.1r



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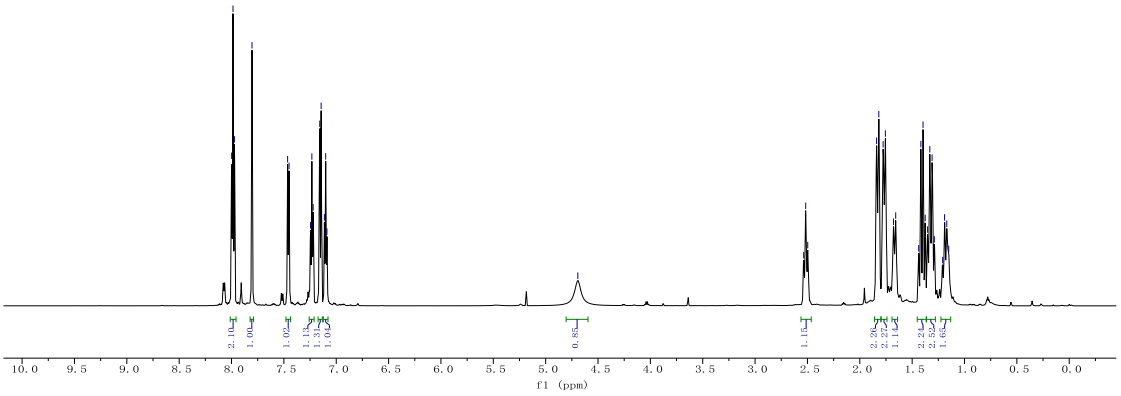
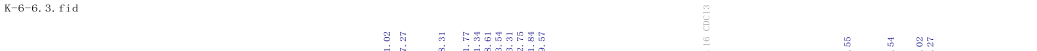
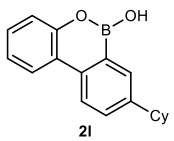


K-6-6.3.fid





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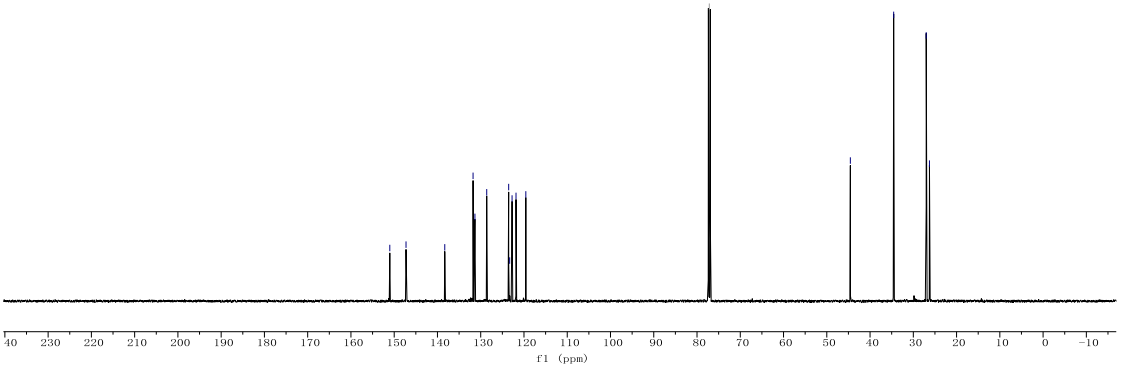
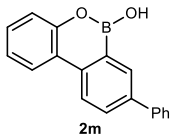
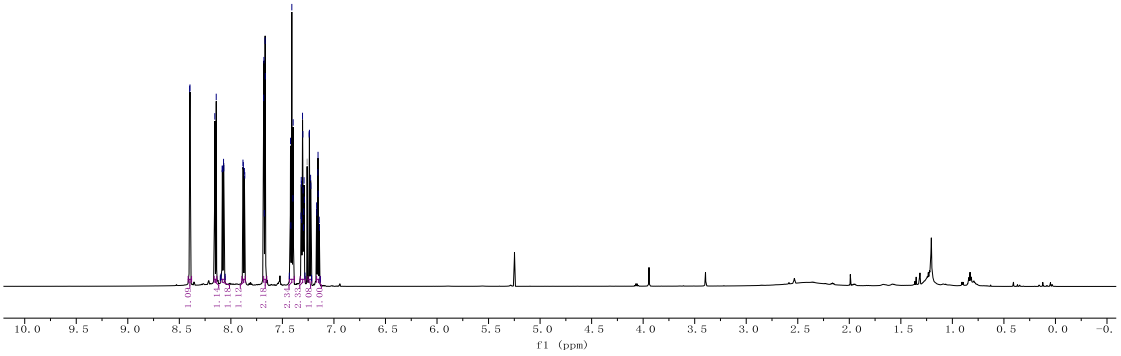


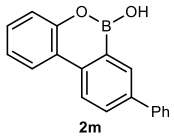
K-6-29.1.fid



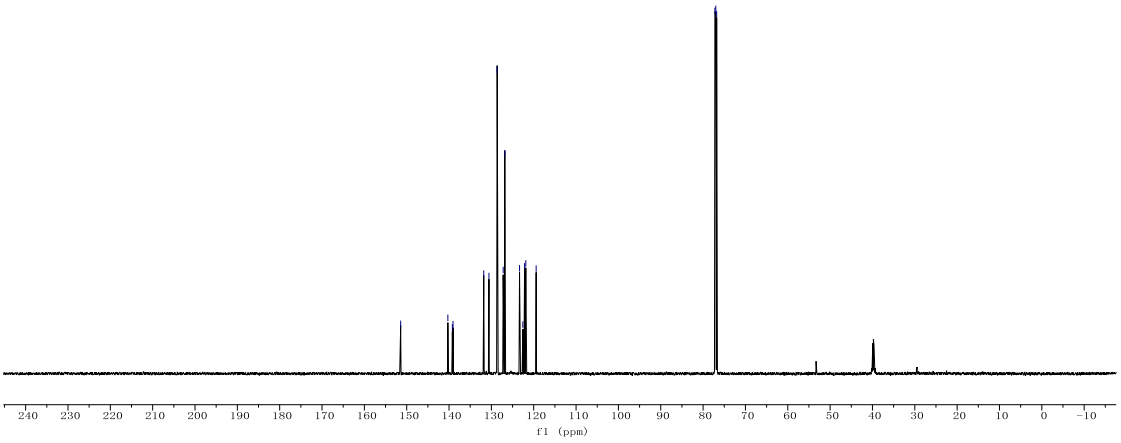
2m



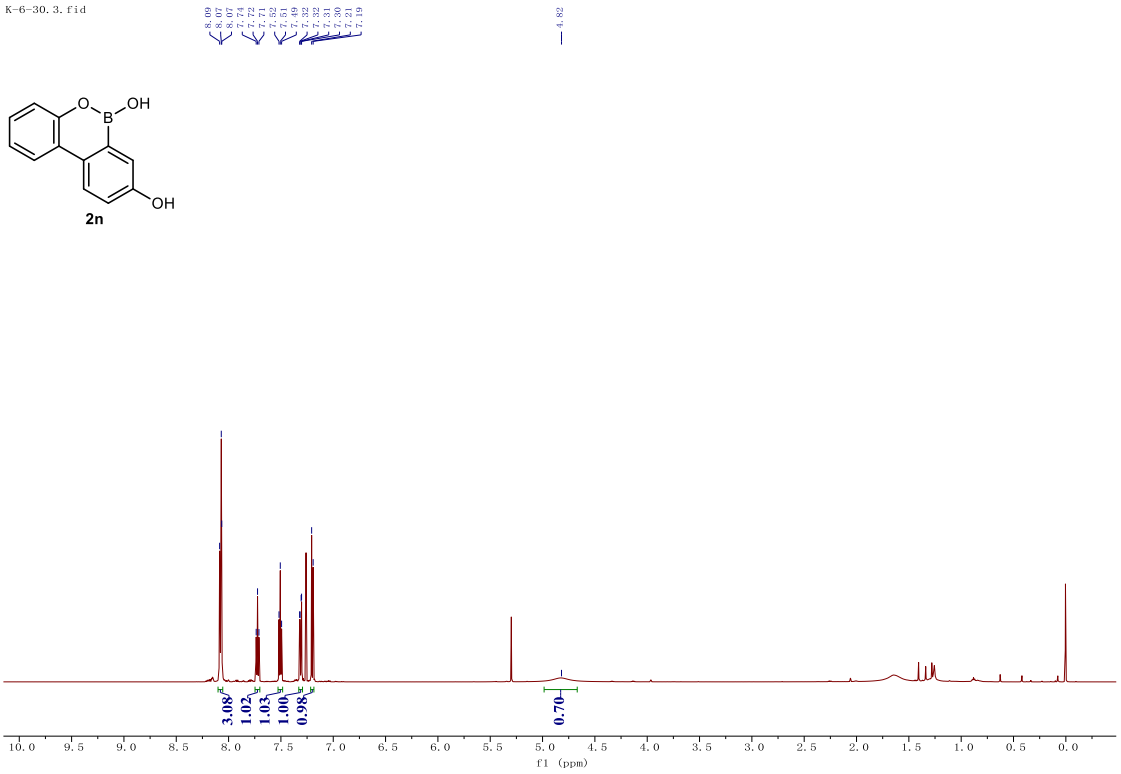
K-6-29.2.fid



2m



K-6-30.3.fid



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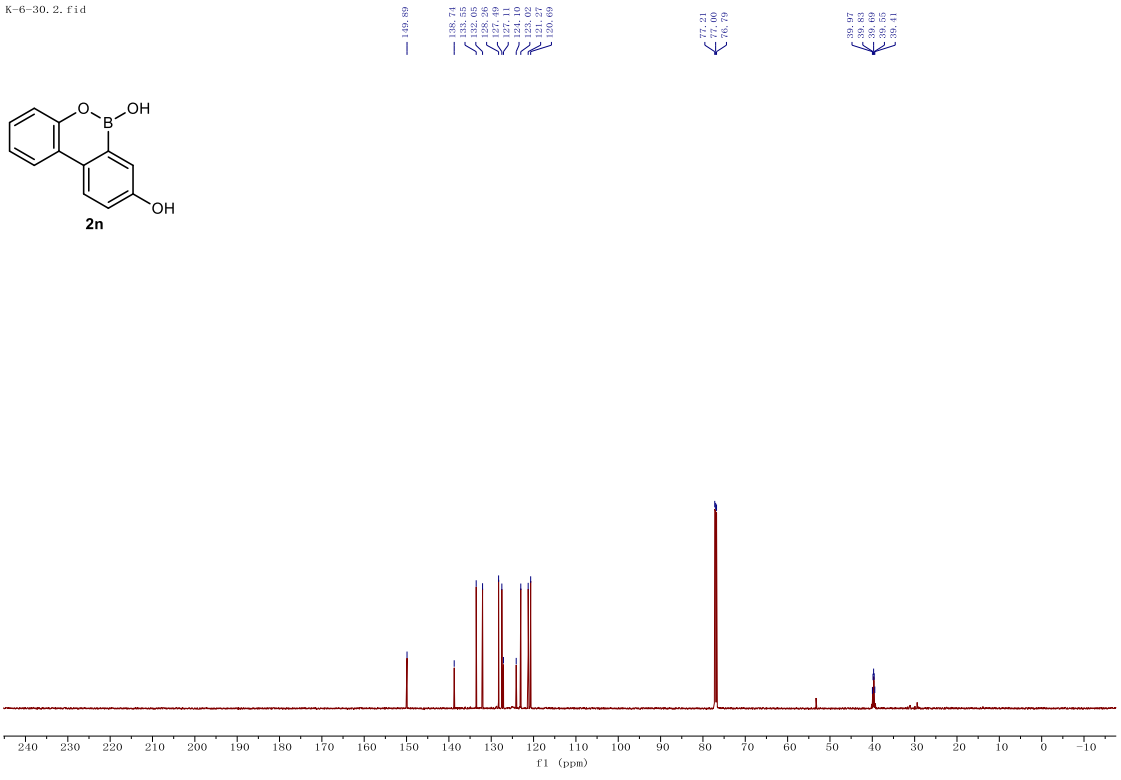
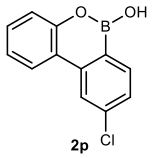
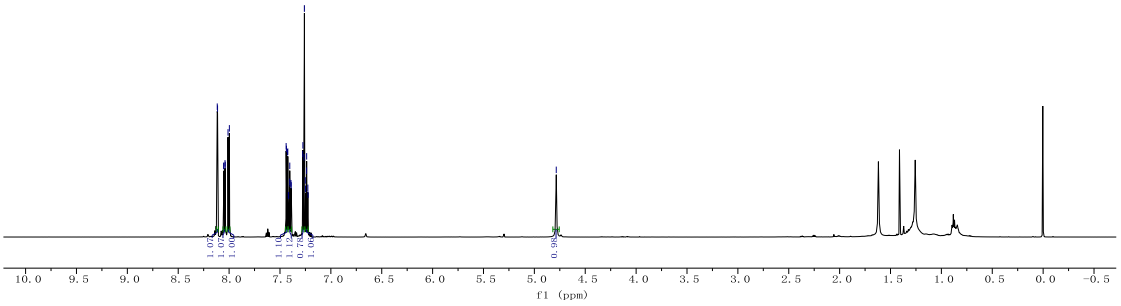


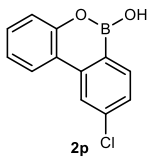
K-6-61(2).1.fid



2p



K-6-61.1.fid



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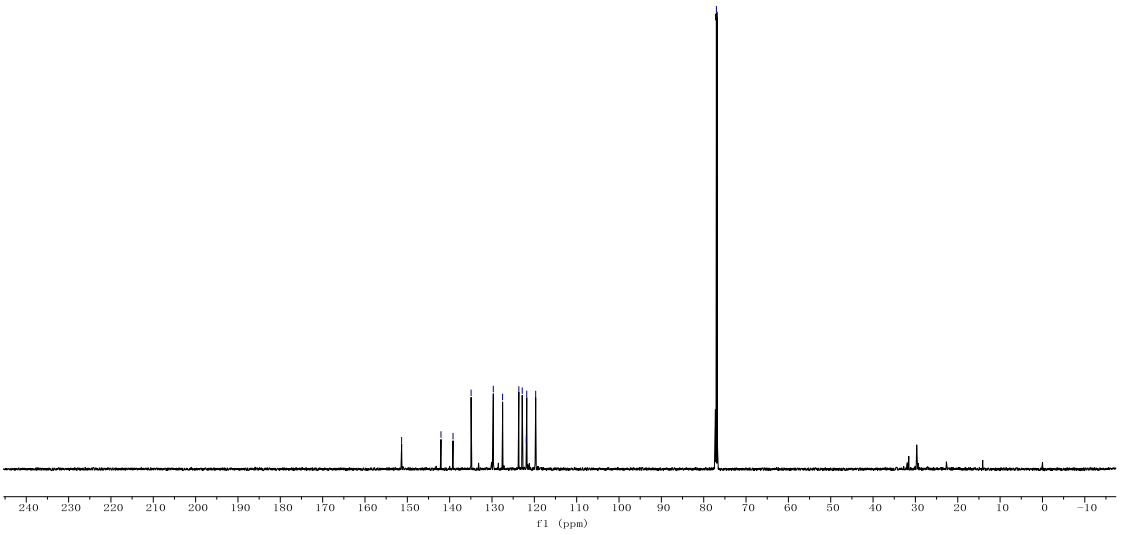
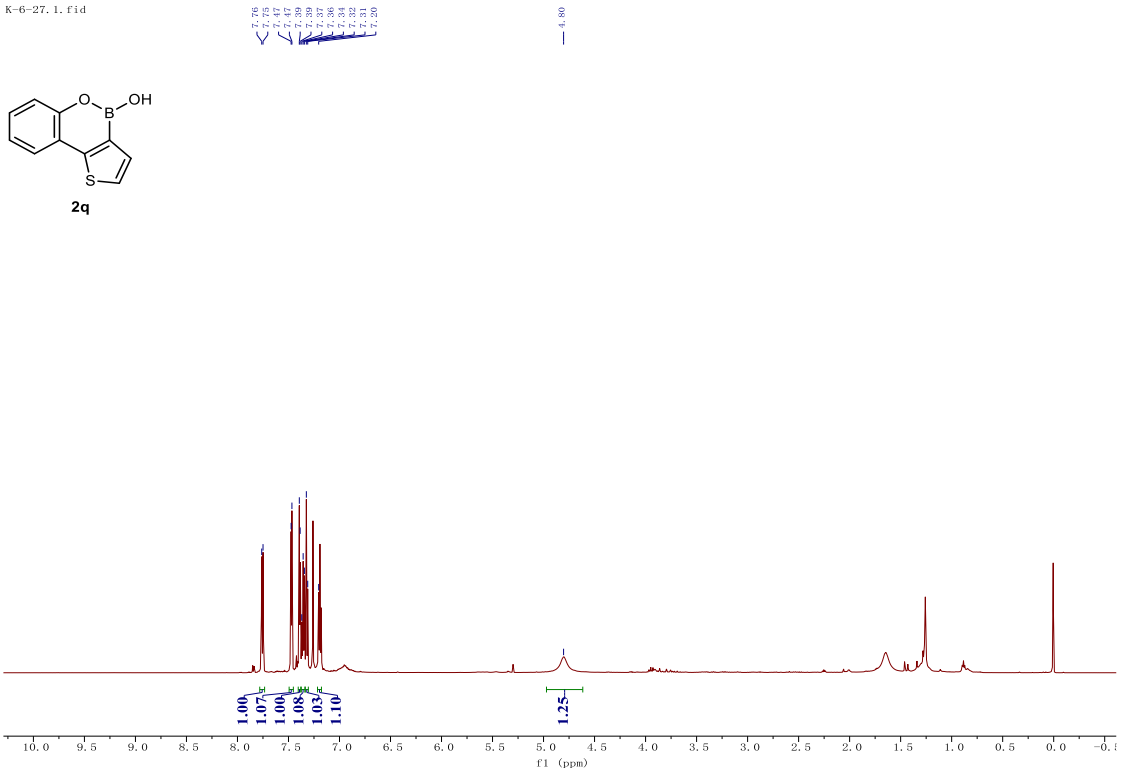
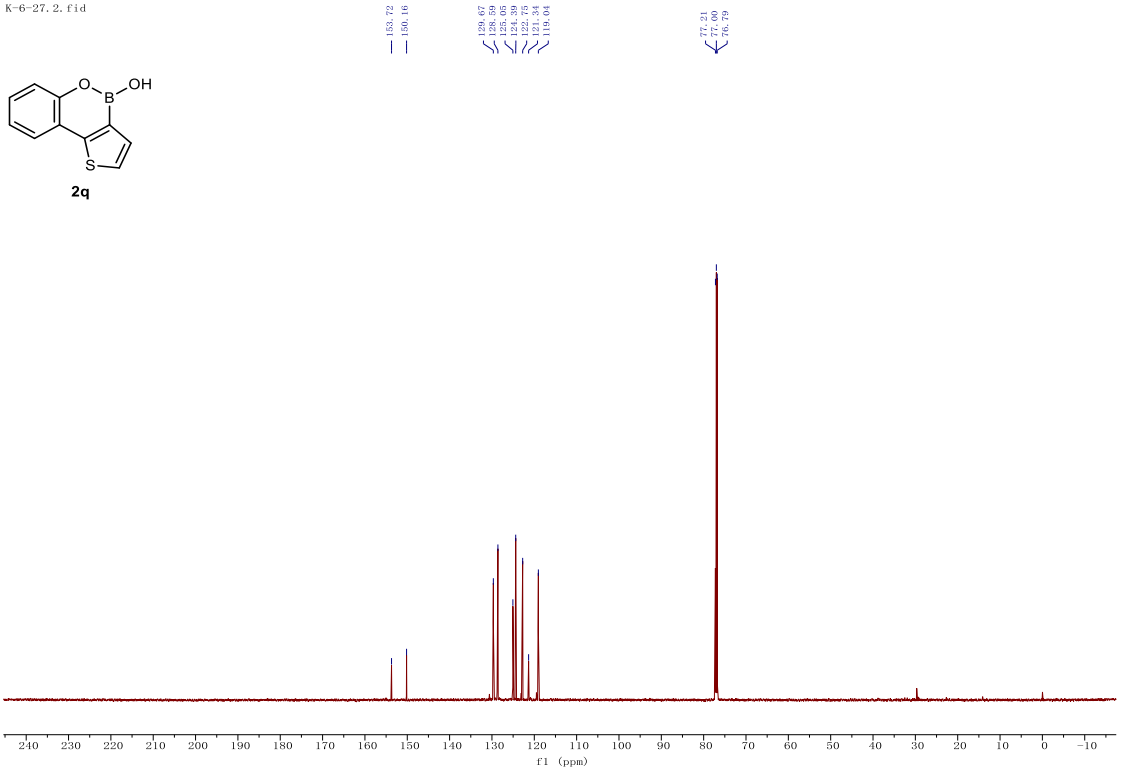


K-6-27.1.fid



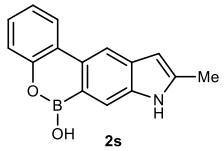
2q

K-6-27.2.fid



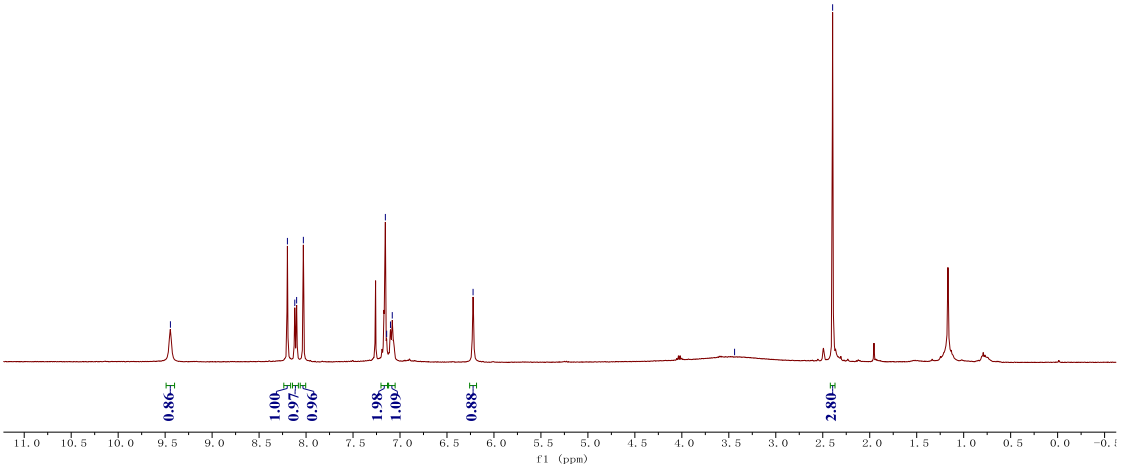
2q

2024-1.10507.fid
LJ 2-35-2

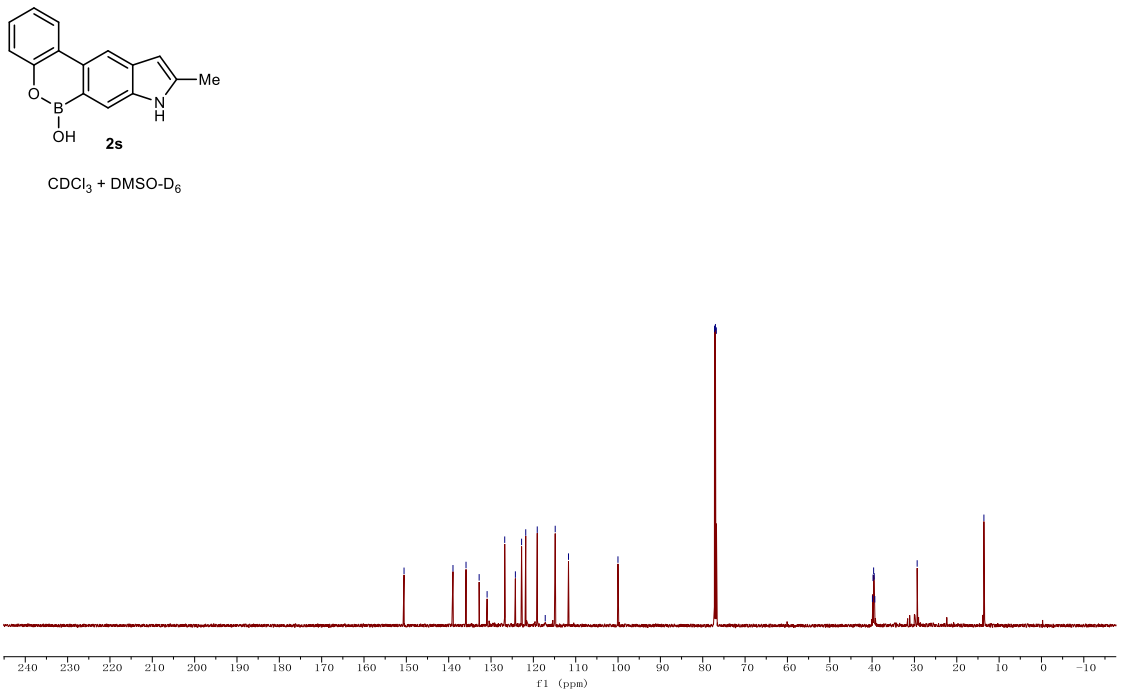


2s

$CDCl_3$ + DMSO-D_6



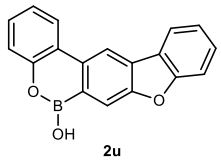
LJ-2-21-2.2.fid



2s

$CDCl_3$ + DMSO-D_6

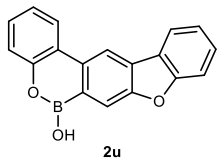
LJ-2-40.1.fid



2u

DMSO-D_6+$CDCl_3$

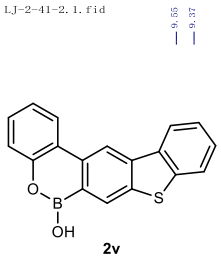
2023-1.14300.fid
LJ 2-40



2u

DMSO-D_6+$CDCl_3$

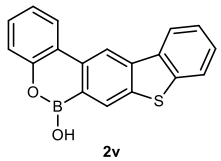
LJ-2-41-2.1.fid



2v

DMSO-D_6

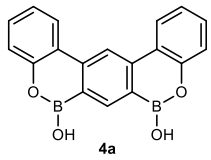
2023-1.14301.fid
LJ 2-41-2



2v

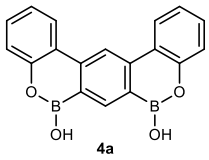
DMSO-D_6

2023-1.15551.fid
K-6-59



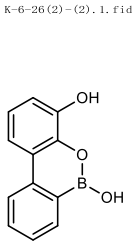
4a

K-6-59.3.fid

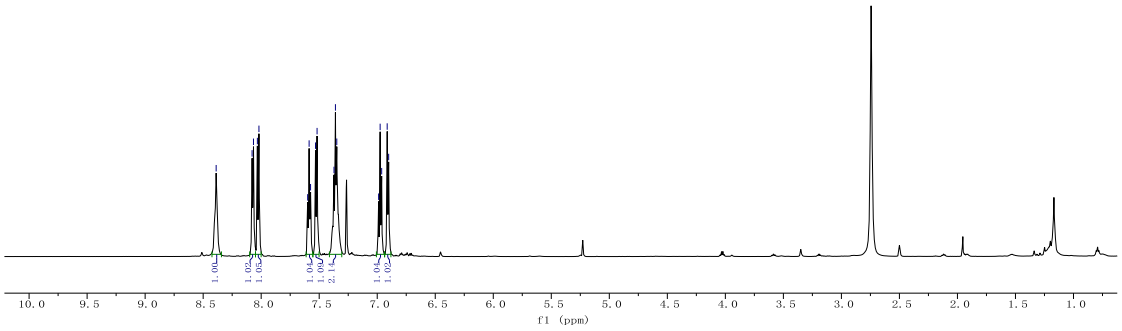


4a

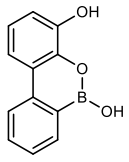
K-6-26(2)-(2).1.fid



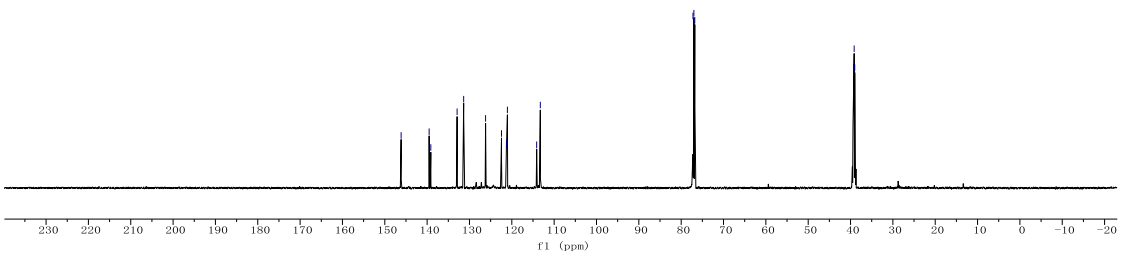
6a



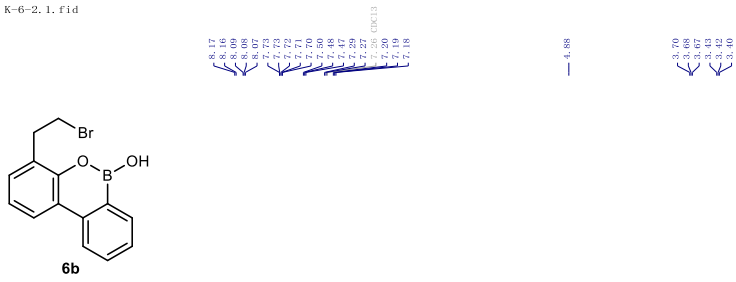
K-6-26(2)-(2).2.fid



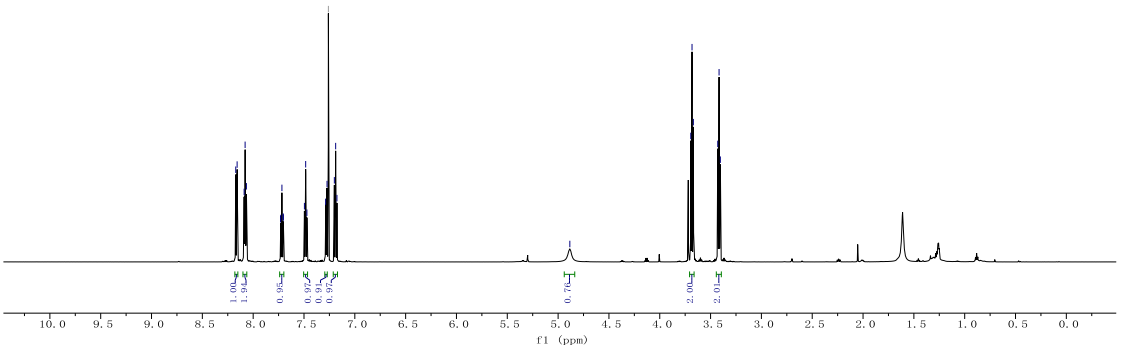
6a



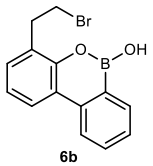
K-6-2.1.fid



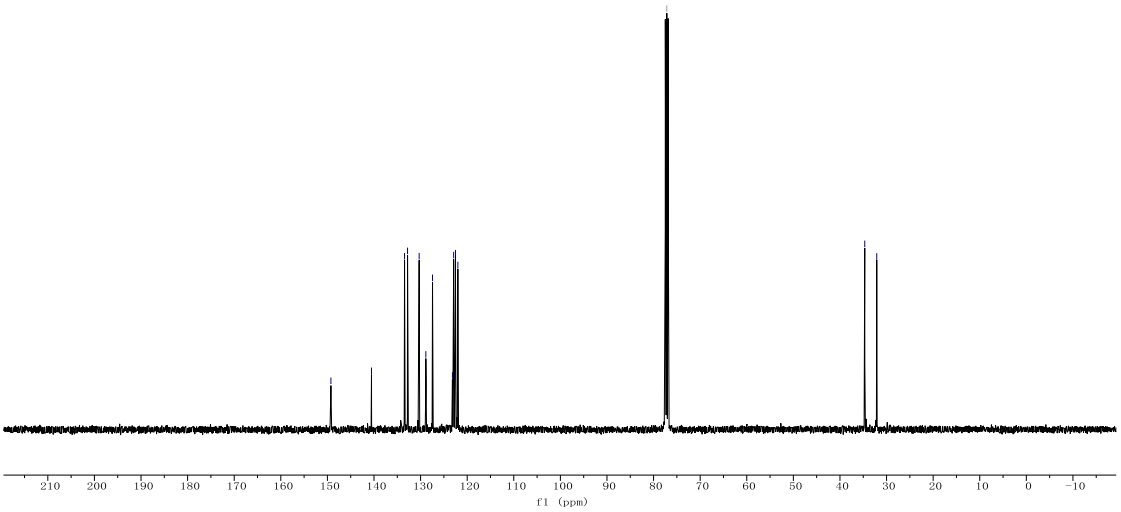
6b



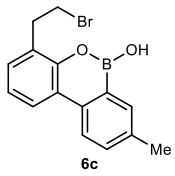
2023-1.15339.fid
K-6-2



6b

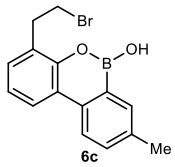


K-6-125.1.fid



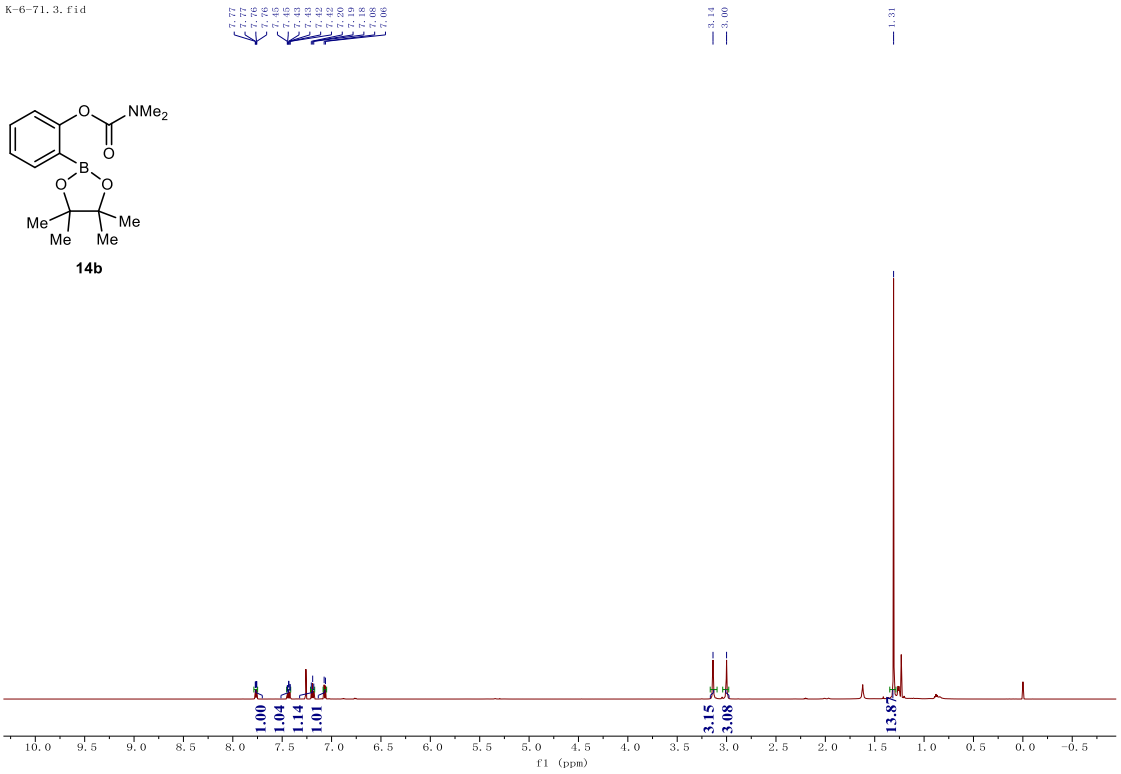
6c

2023-1.16299.fid
K-6-125



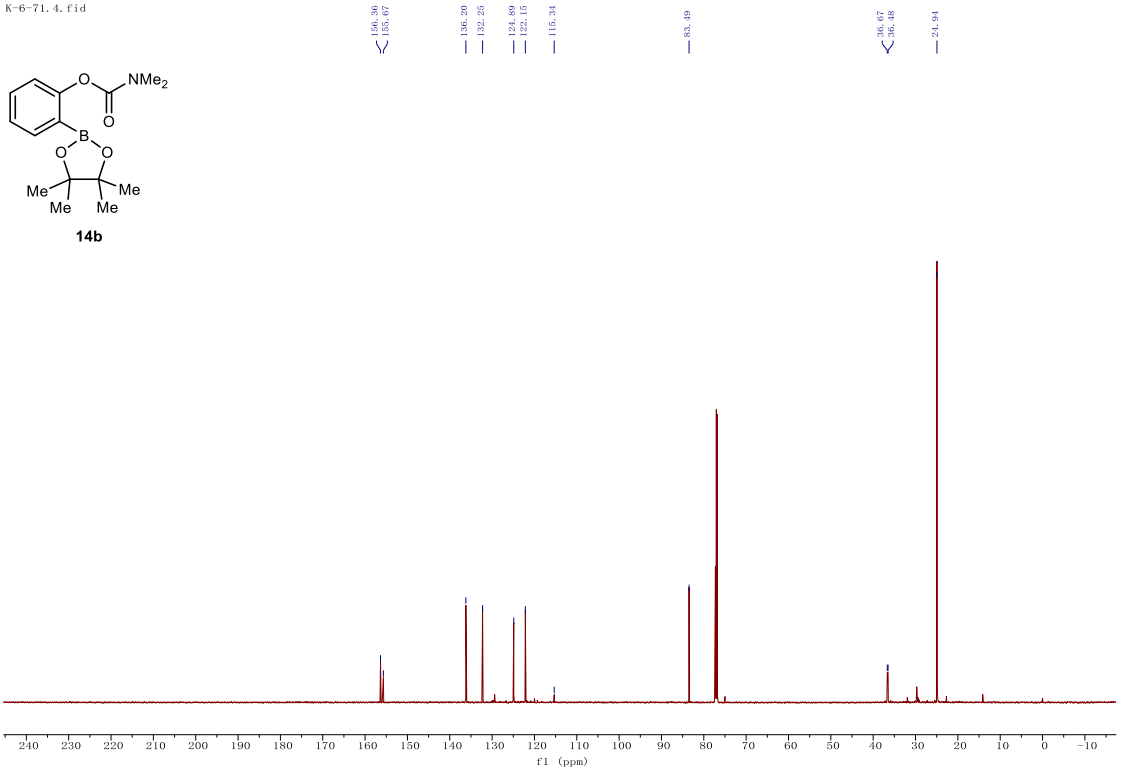
6c

K-6-71.3.fid



14b

K-6-71.4.fid



14b

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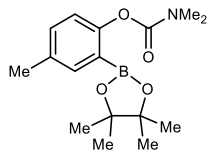

14d

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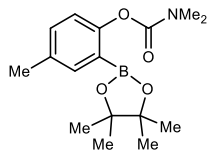

14d

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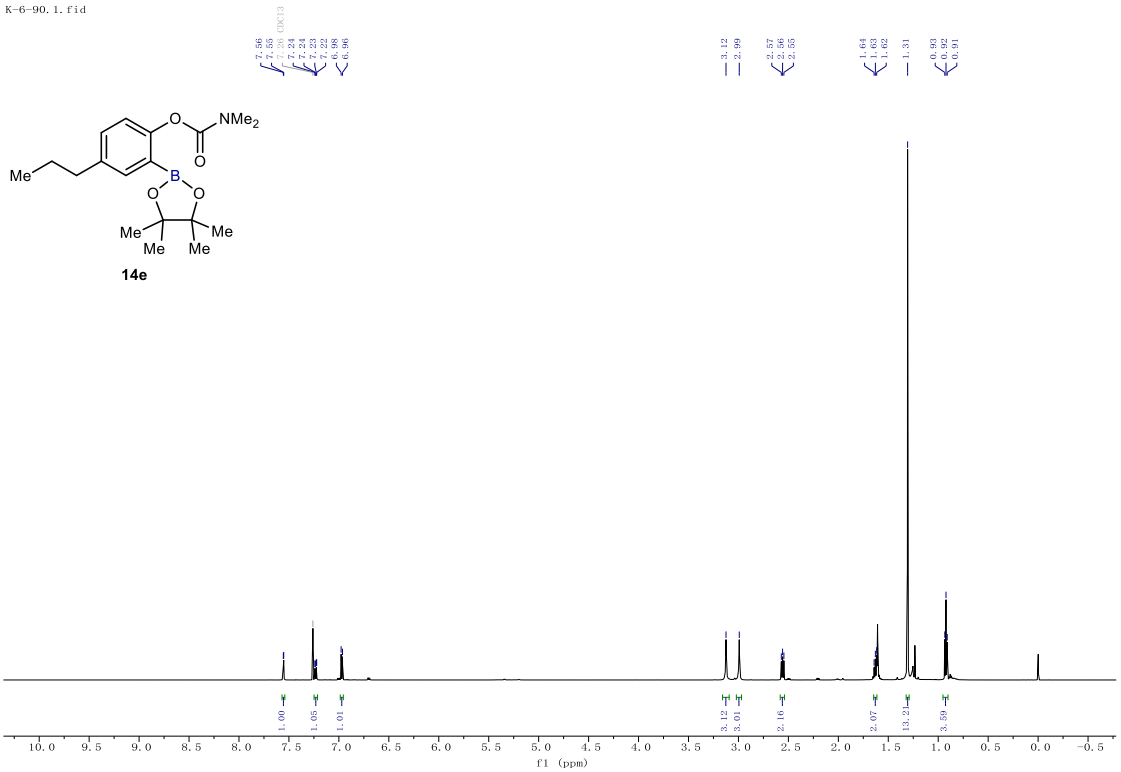

14e

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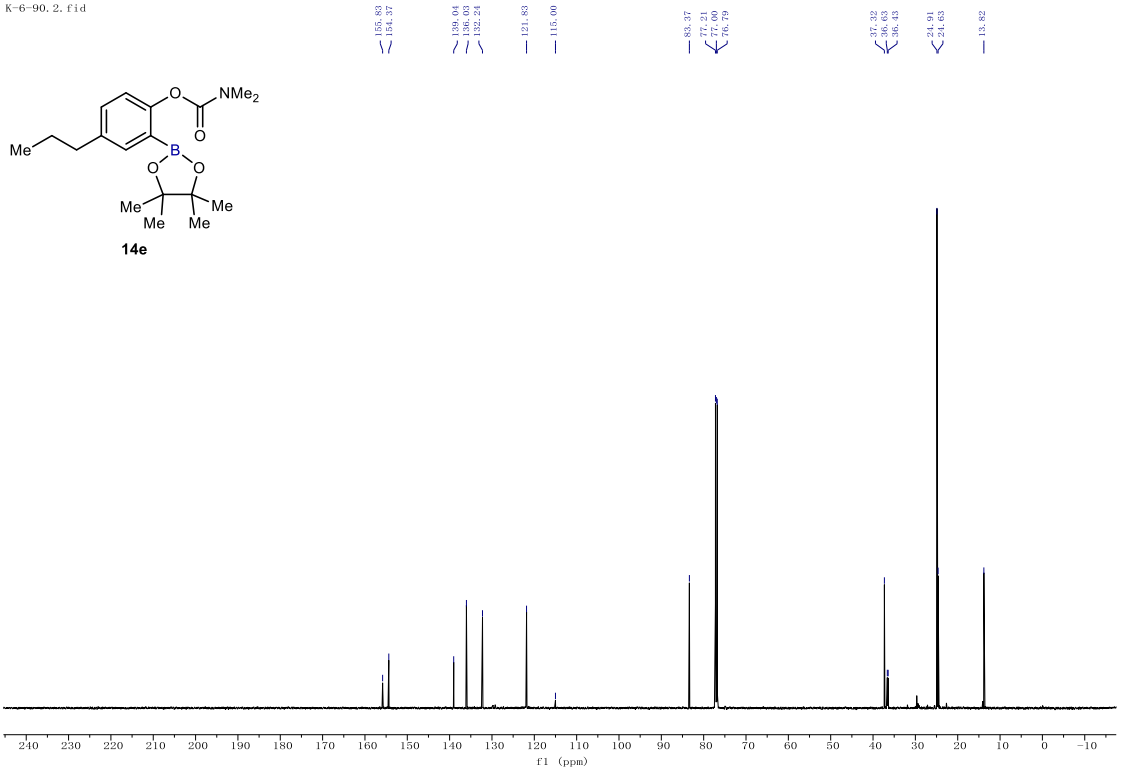

14e

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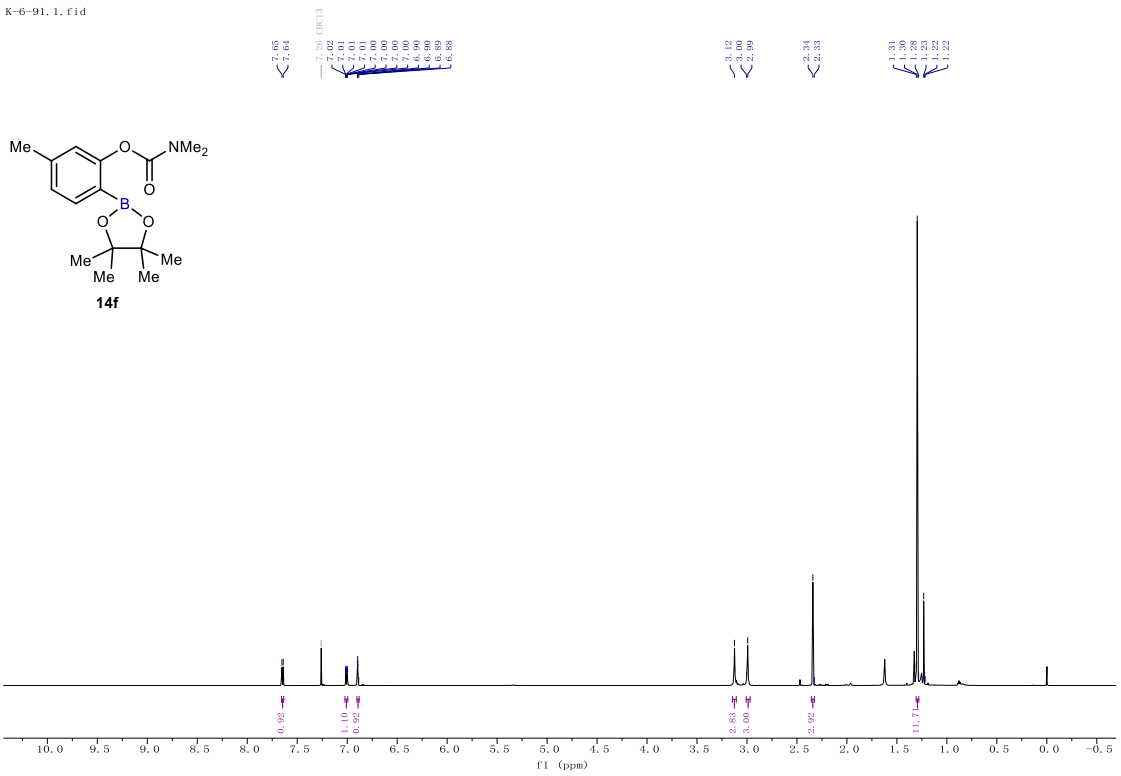

14f

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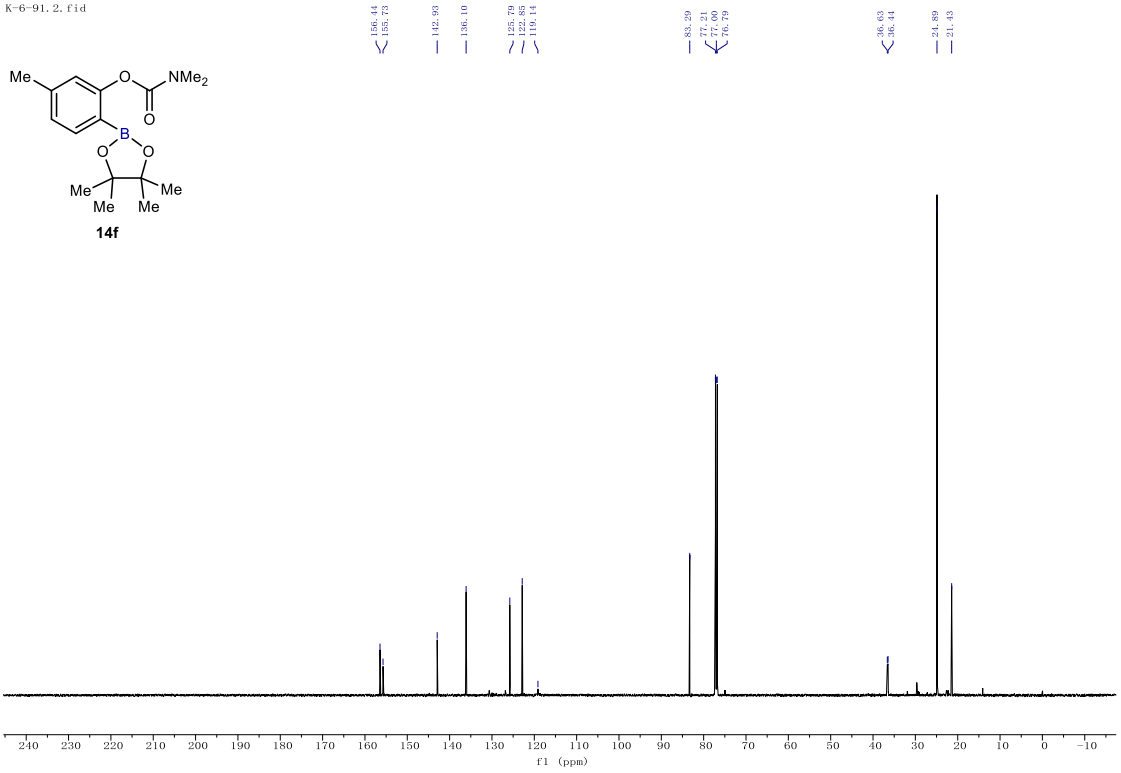

14f

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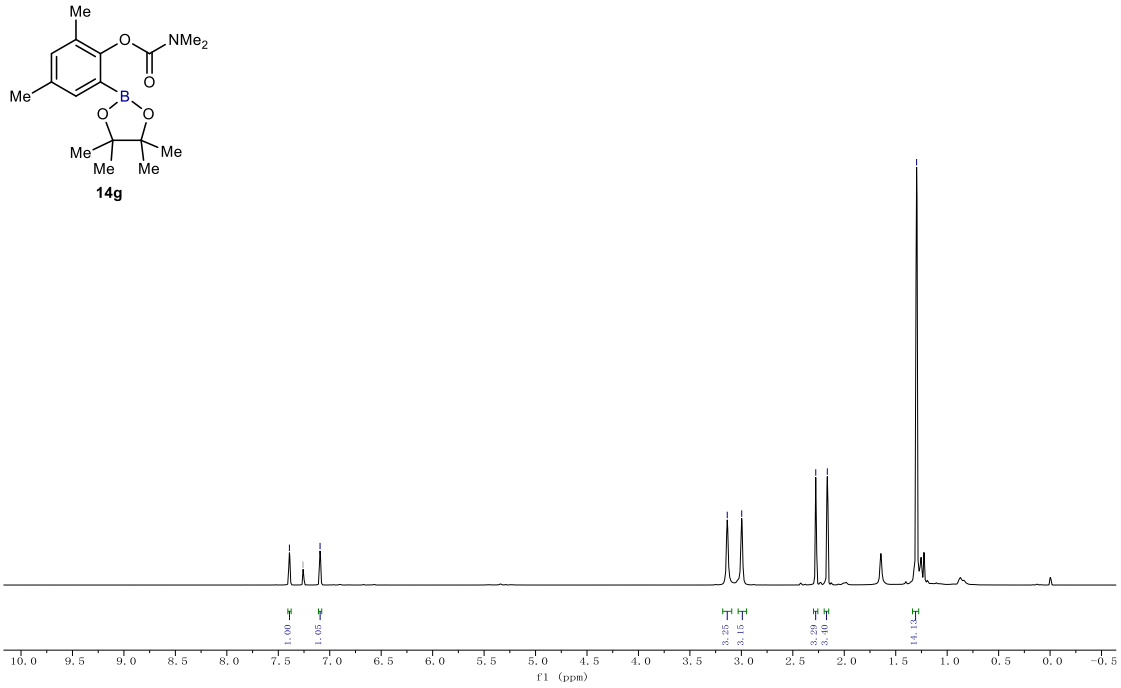
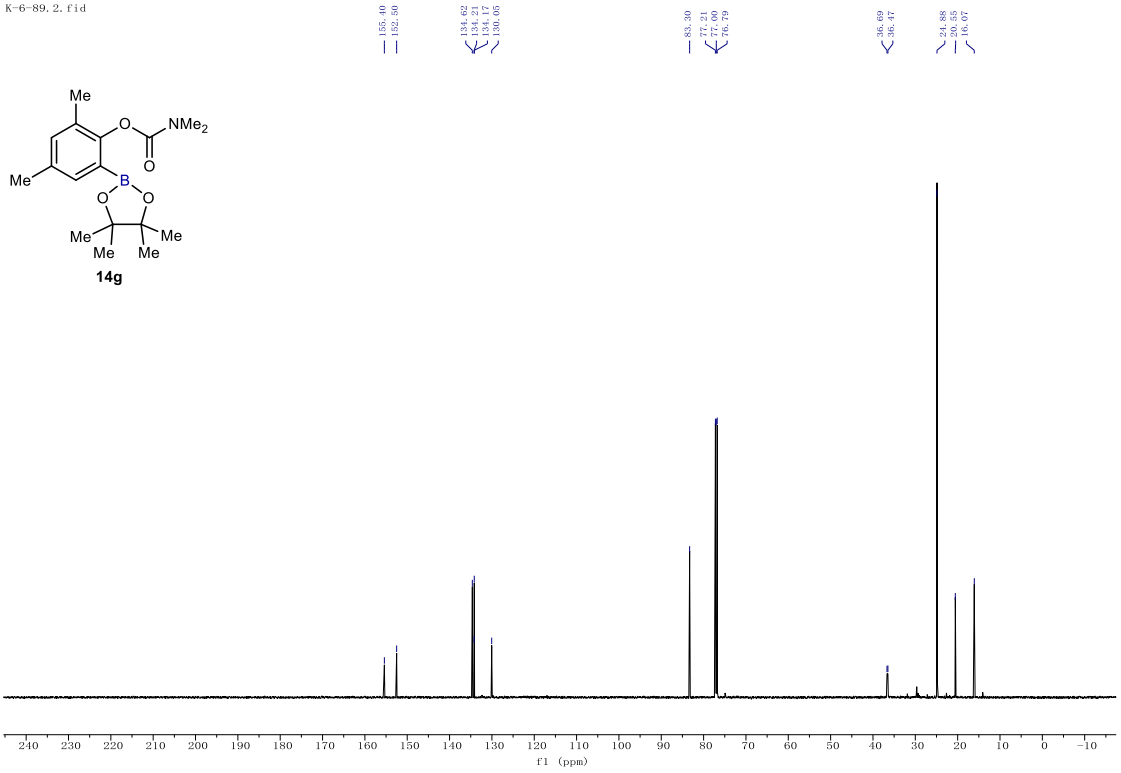


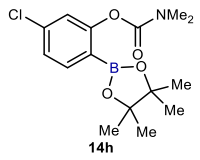
14g

K-6-89.2.fid



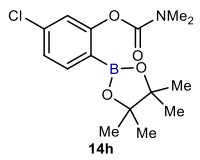
14g

K-6-103.1.fid



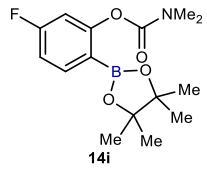
14h

K-6-103.2.fid



14h

K-6-95.2.fid



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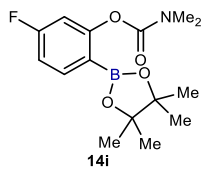
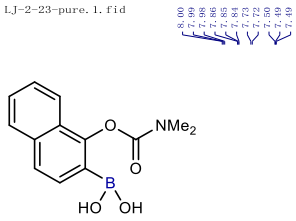
K-6-95.3.fid

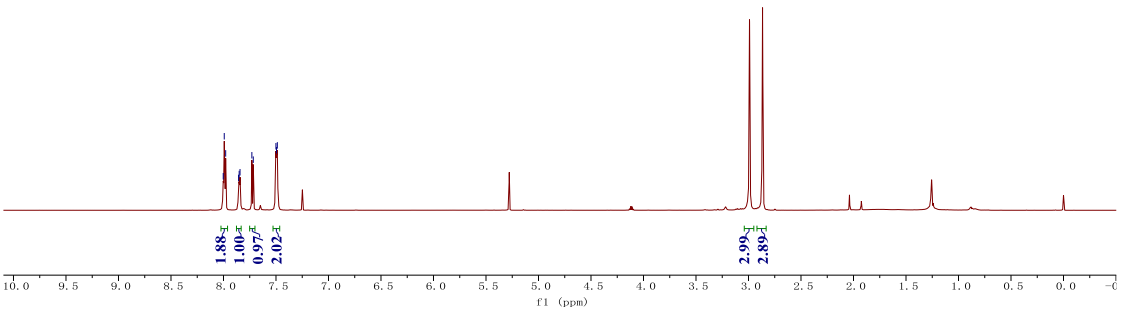


14i

LJ-2-23-pure.1.fid



8k



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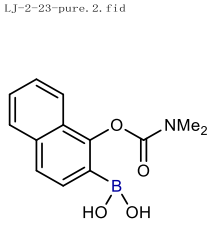
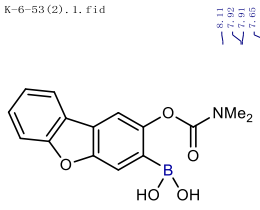
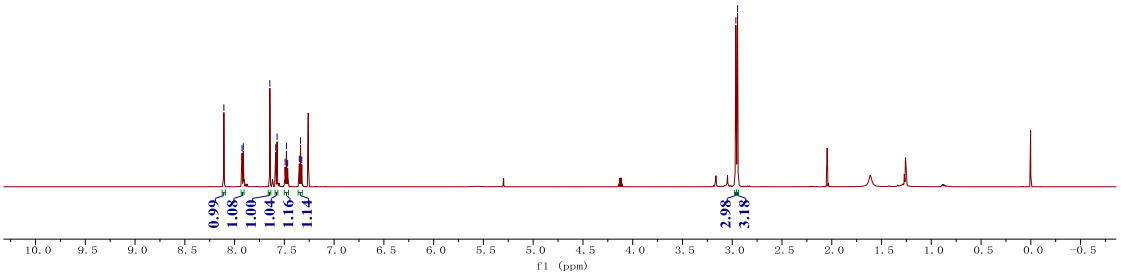


8k

K-6-53(2).1.fid



8l



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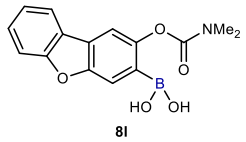
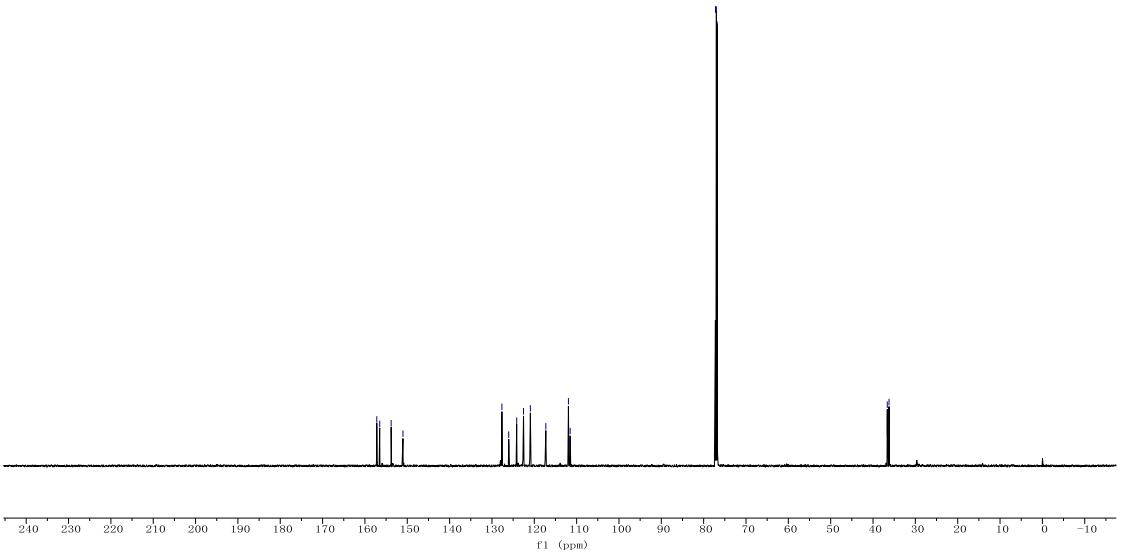
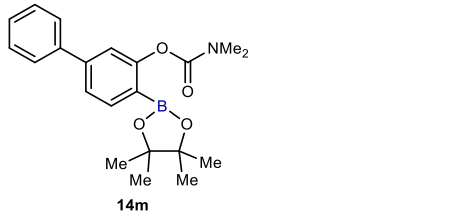


8l



K-6-77.2.fid



14m

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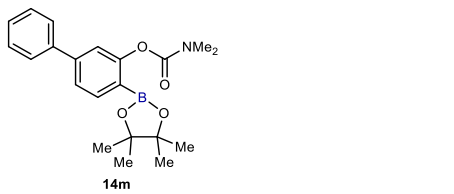
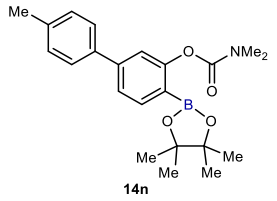


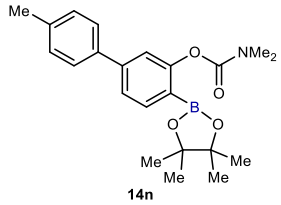
14m

K-6-78(2).1.fid



14n

K-6-78(2).2.fid



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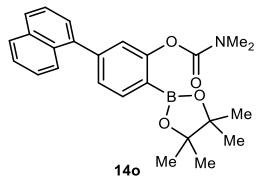

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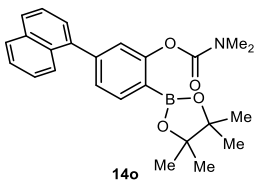

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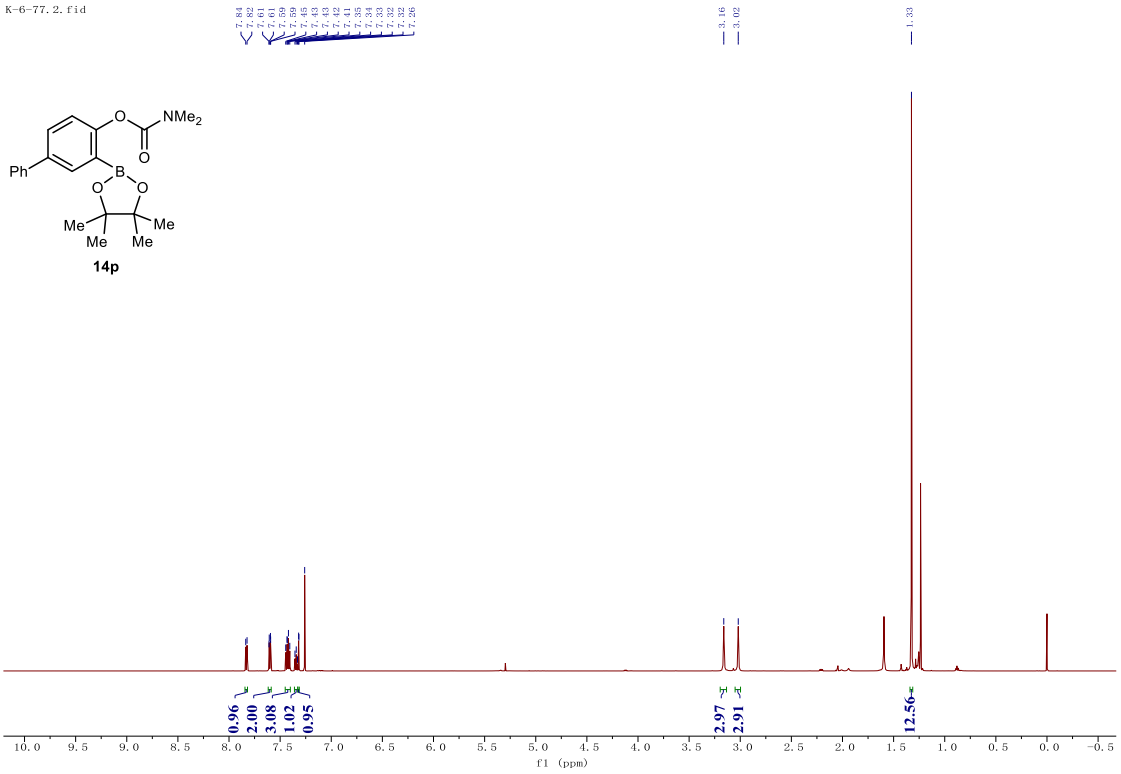

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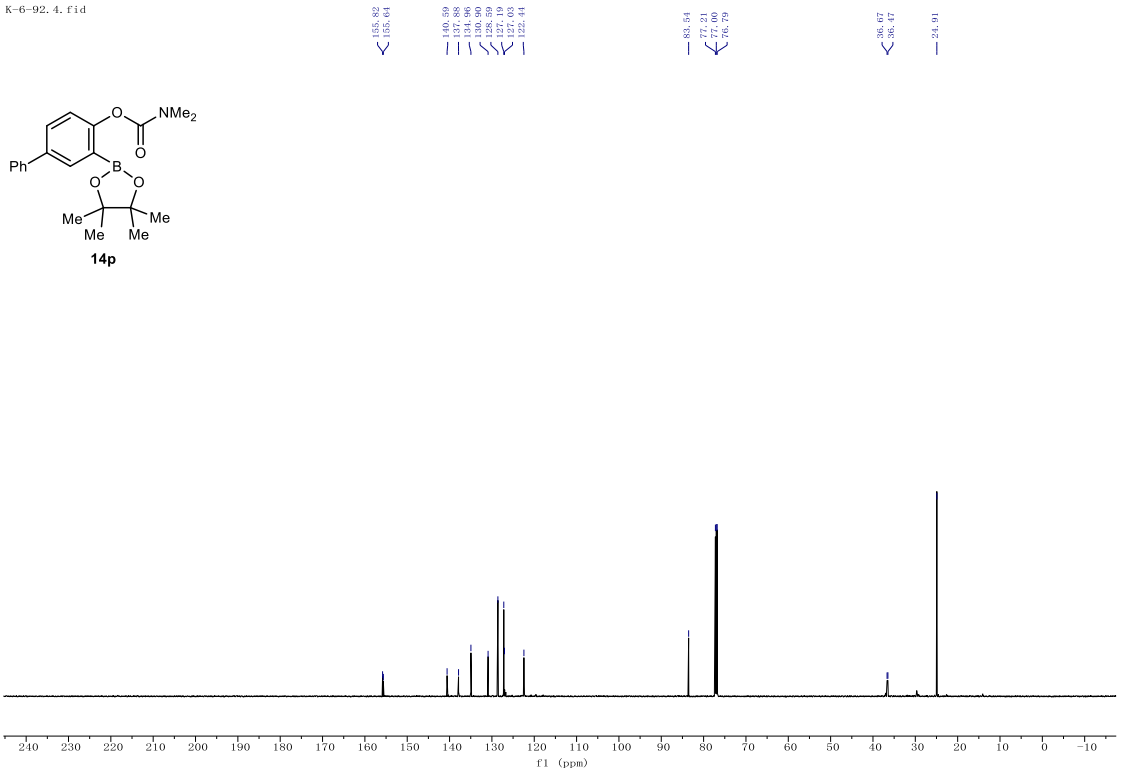

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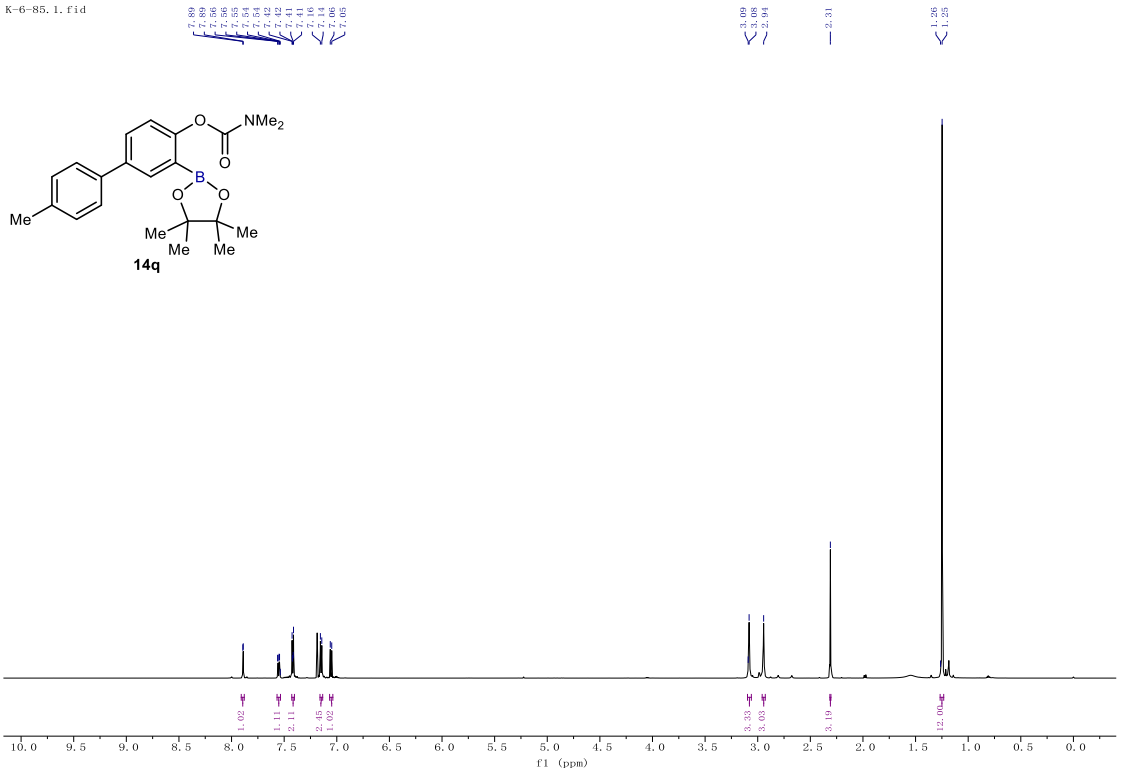

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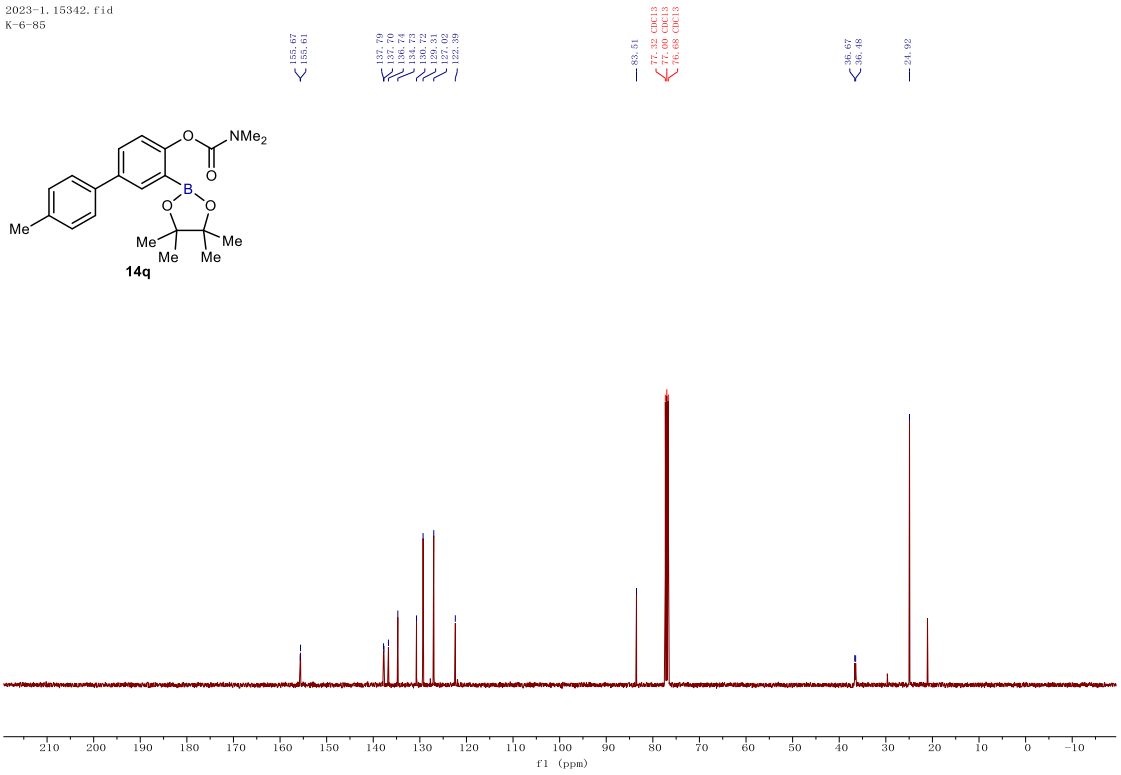

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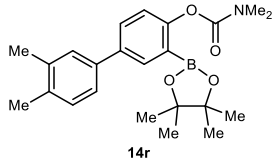

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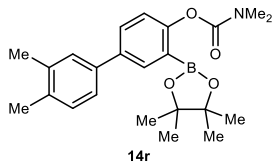

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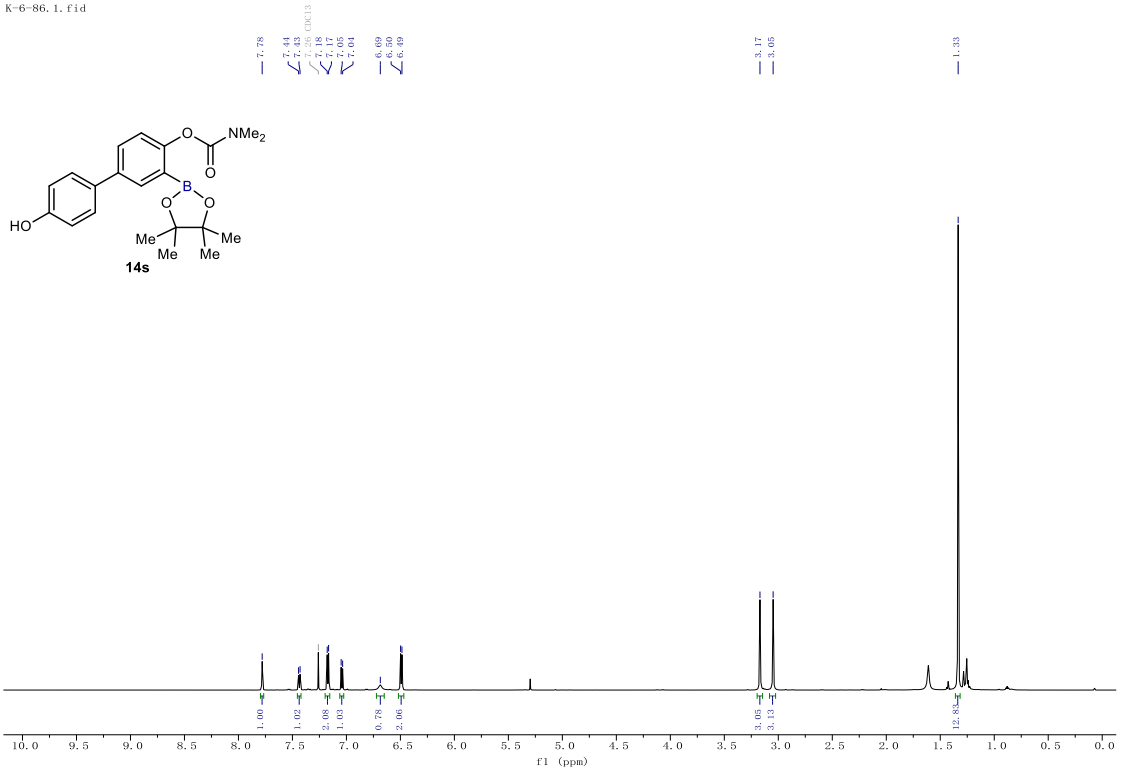

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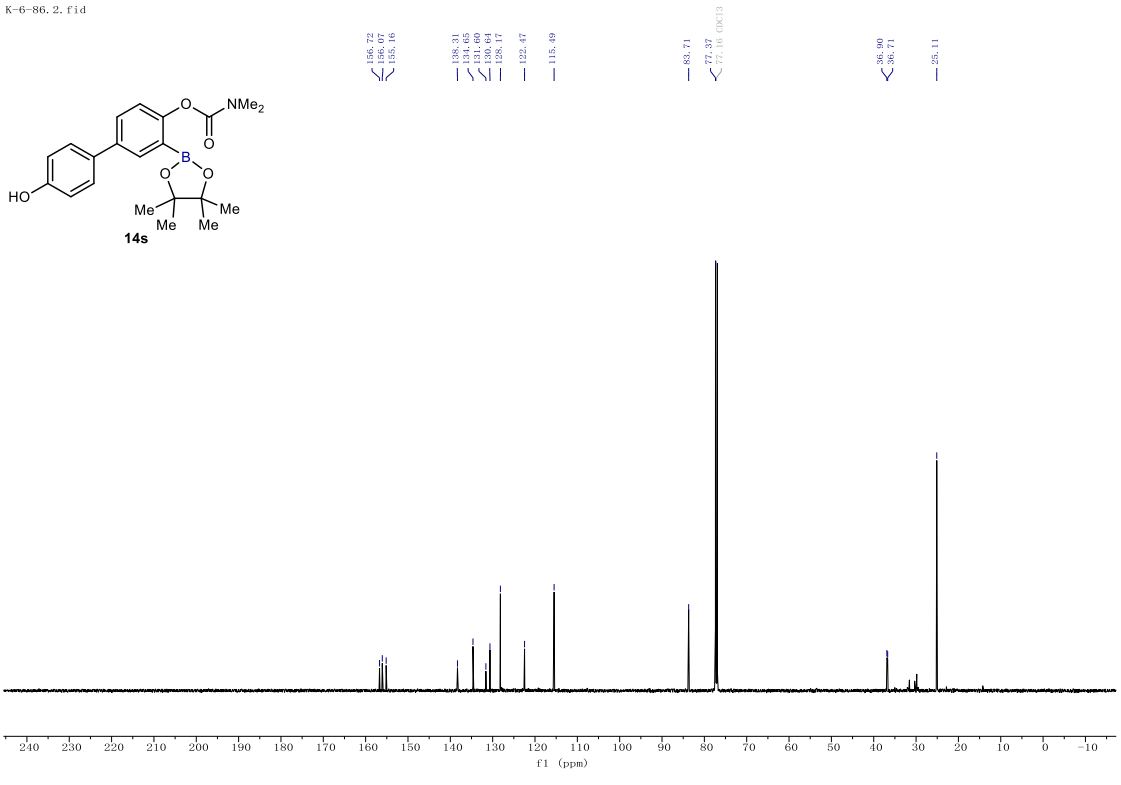

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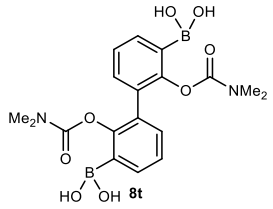
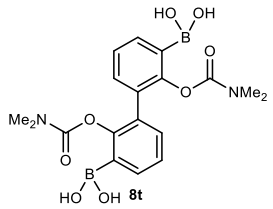


8t

2023-1.15337.fid
K-6-4-6



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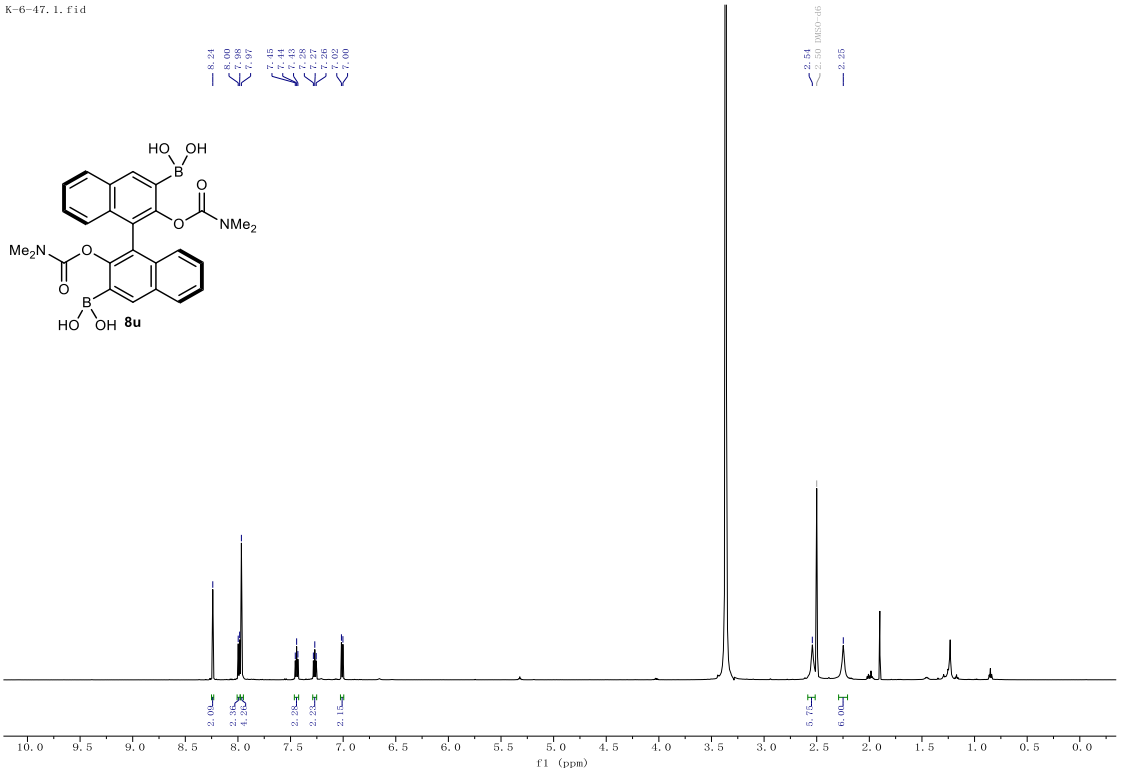
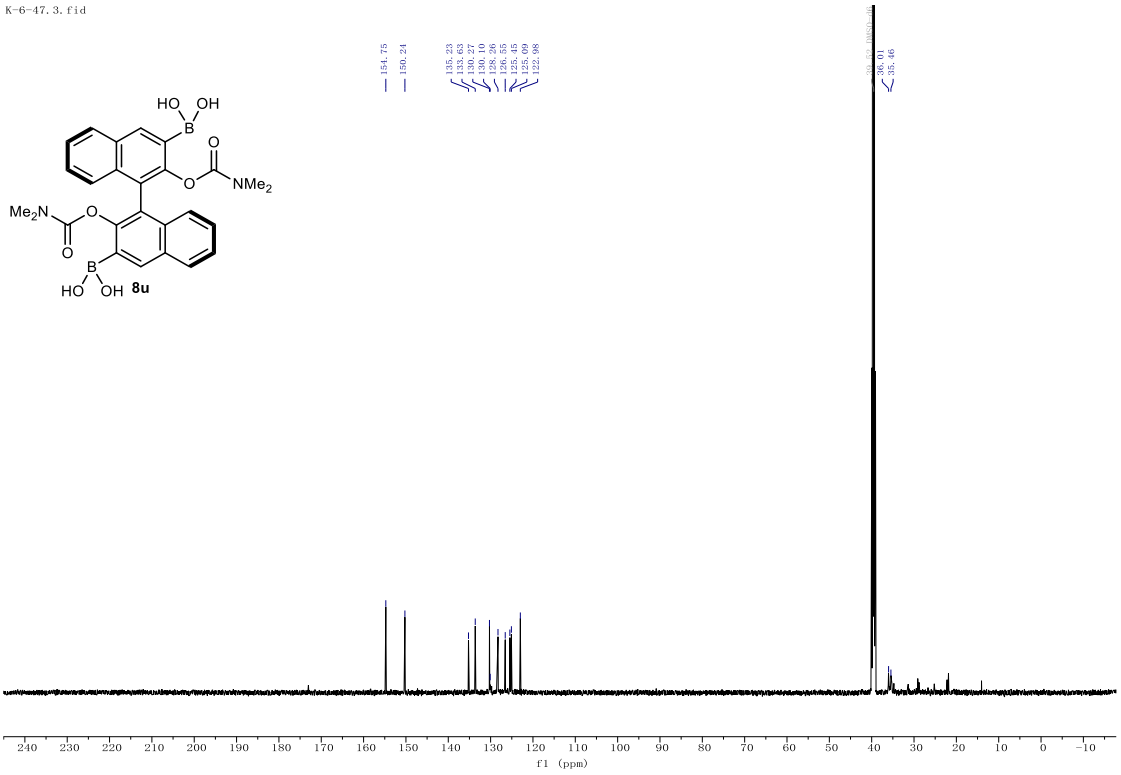
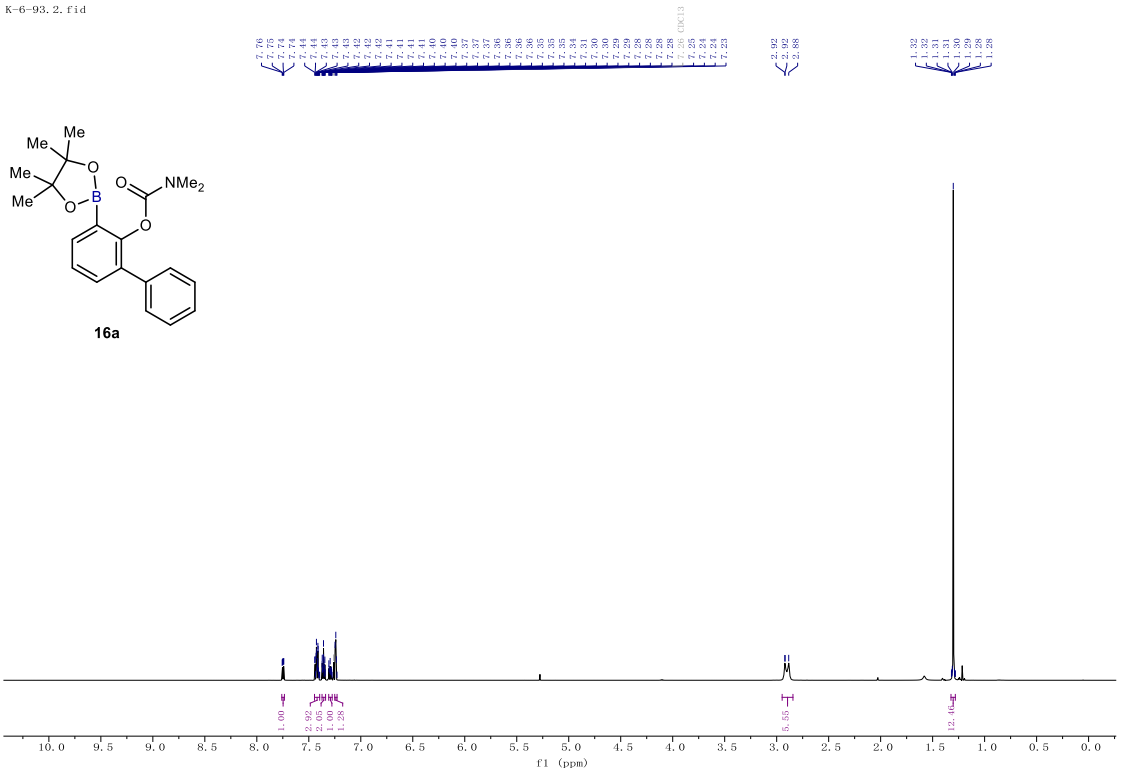

K-6-47.1.fid
8.24
8.00
7.98
7.97
7.45
7.44
7.43
7.28
7.27
7.26
7.02
7.00
2.54
2.50 DMSO-d6
2.25
HO OH
B
O
O
NMe2
Me2N
O
O
B
HO OH
8u
2.00
2.35
4.20
2.28
2.23
2.15
5.70
6.00
f1 (ppm)


K-6-47.3.fid
154.75
150.24
135.23
133.63
130.27
130.10
128.26
126.55
125.45
125.09
122.98
DMSO-d6
38.01
35.46
HO OH
B
O
O
NMe2
Me2N
O
O
B
HO OH
8u
f1 (ppm)

K-6-93.2.fid



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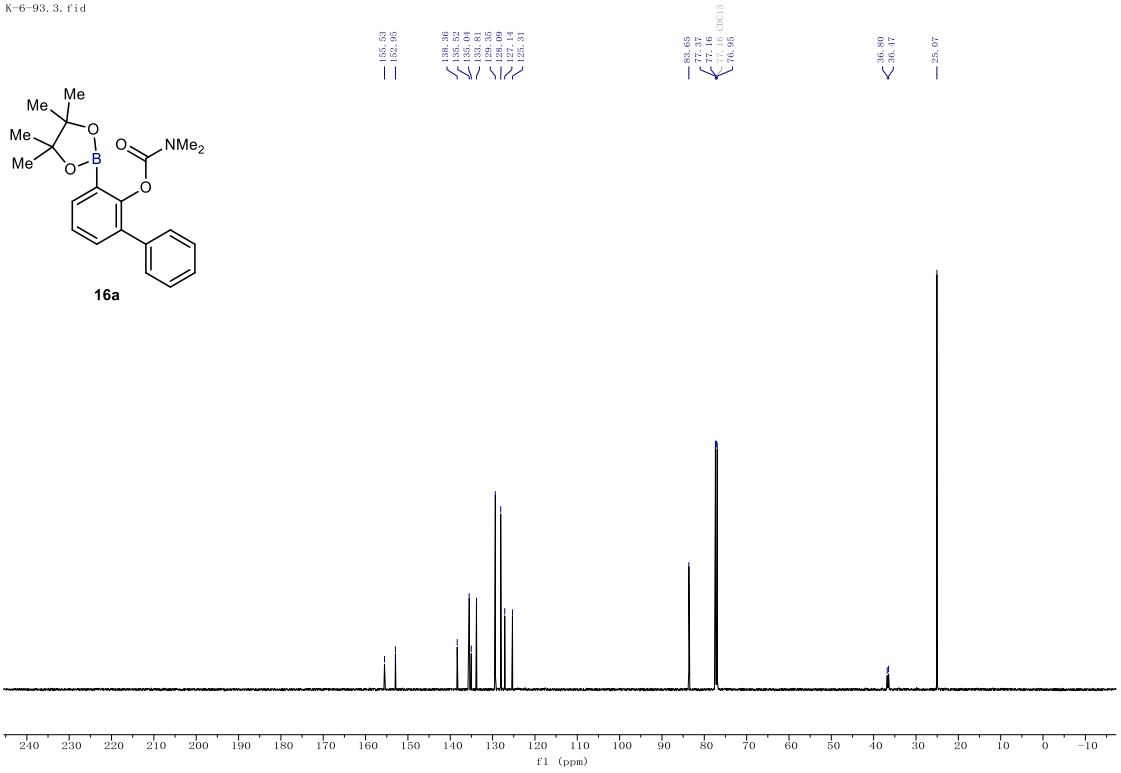

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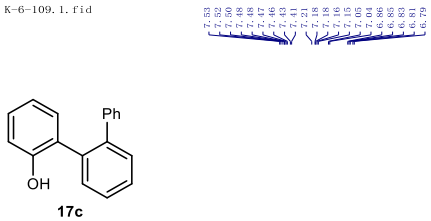
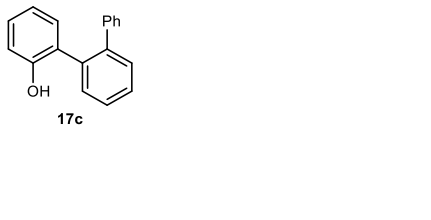


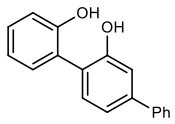
17c

2023-1.15345.fid
K-6-109



17c

K-6-108.1.fid



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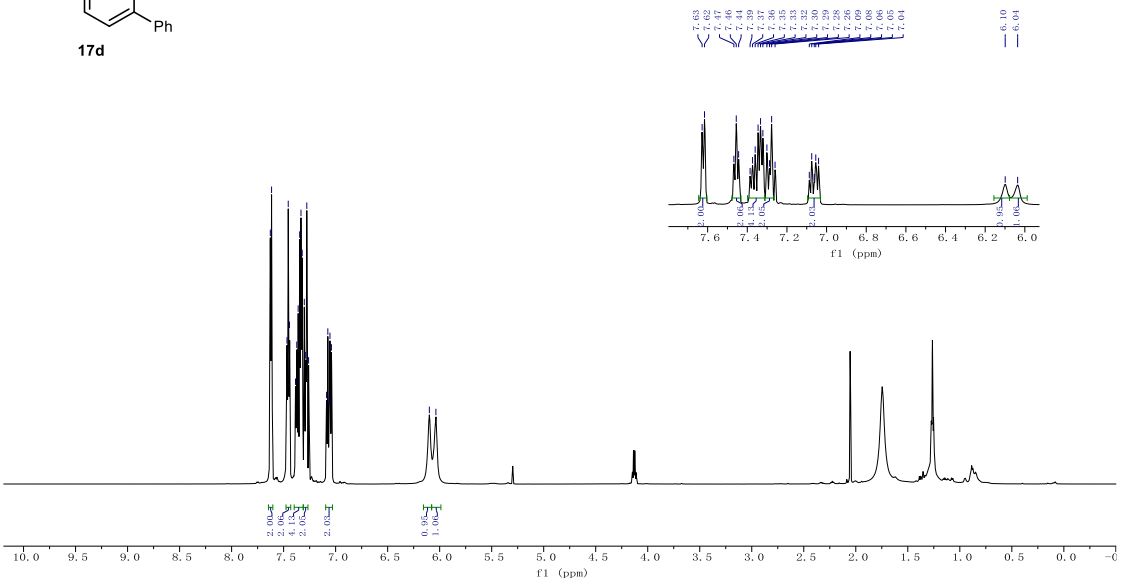
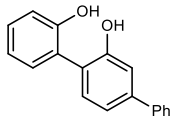


2023-1.16298.fid
K-6-108



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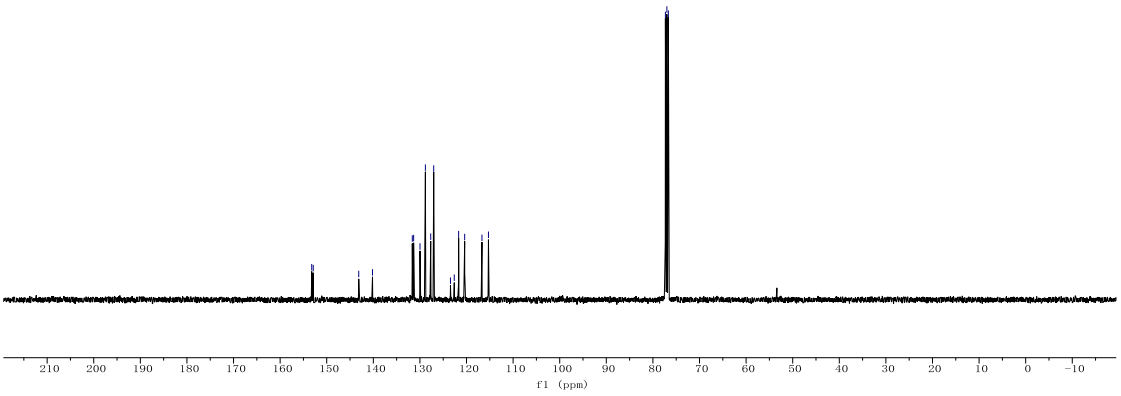

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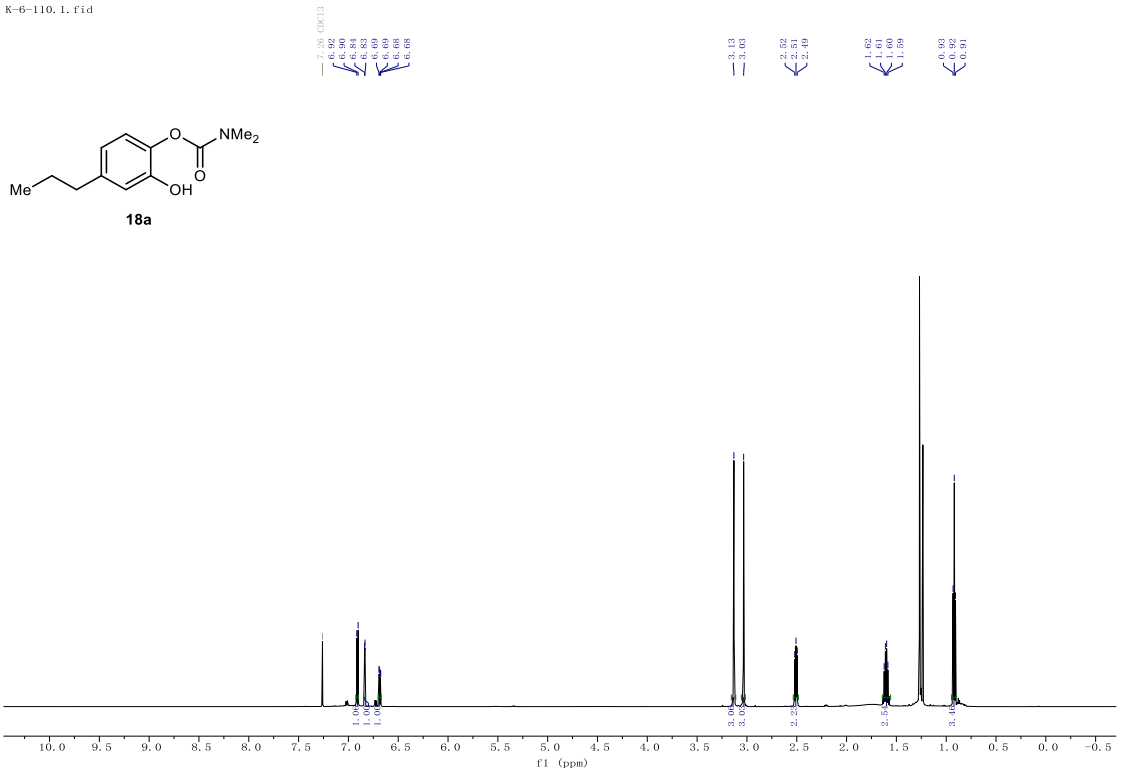
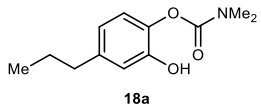
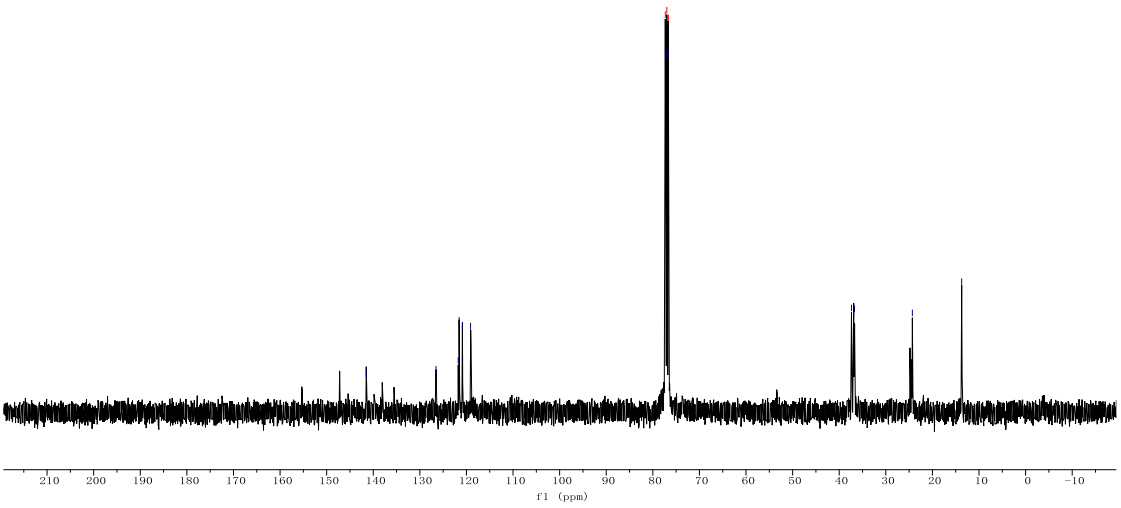


18a

2023-1.16294.fid
K-6-110



18a



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