Electronic Supplementary Information

Continuous Flow Synthesis of Functionalized Biaryl Compounds via Benzyne Intermediate

Chaoming Liang, Weixia Lin, Zilong Lin, Runxiang Yu, Yuyan Kang, Xiangmin Sang, Ruihua Cheng, Maolin Sun, Yueyue Ma, Jinxing Ye*

School of Biomedical and Pharmaceutical Sciences, Guangdong University of Technology, Guangzhou 510006, China

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1. General information

All common reagents and solvents were commercially available and used without further purification unless otherwise stated. Tetrahydrofuran was dried over Solvent Purification System before being used. Solvent Purification System were purchased from Beijing Yifeng Technology Co. Ltd. and its specification model is FL-MD-5. ^{1}H NMR, ^{13}C NMR and ^{31}P NMR spectral data were recorded using a Bruker AVANCE III 400. Chemical shifts for protons were reported in parts per million downfield from tetramethylsilane or referenced to residual solvent. NMR data are reported as follows: chemical shift, integration, multiplicity (s: single, d: doublet, t: triplet, q: quadruplet, m: multiplet), coupling constants (*J* in Hz). GC analysis was performed on an Echrom A90 gas chromatograph equipped with a flame ionization detector using a fused silica capillary column. HRMS (ESI) spectra were recorded on a Thermo Fisher Scientific LTQ Orbitrap XL and Thermo Fisher Scientific Orbitrap Velos Pro spectrometer. The HPLC pumps (Y-100, with the cleaning system) with flow rate 0.01-100.00 mL/min, the T-mixers (stainless steel, 1/16" I.D., through hole diameter 0.50 mm) and the stainless steel microtube reactors were purchased from Bejing Xingda Science & Technology Development Co. Ltd. Each part of the microreactor system was connected with stainless steel fittings.

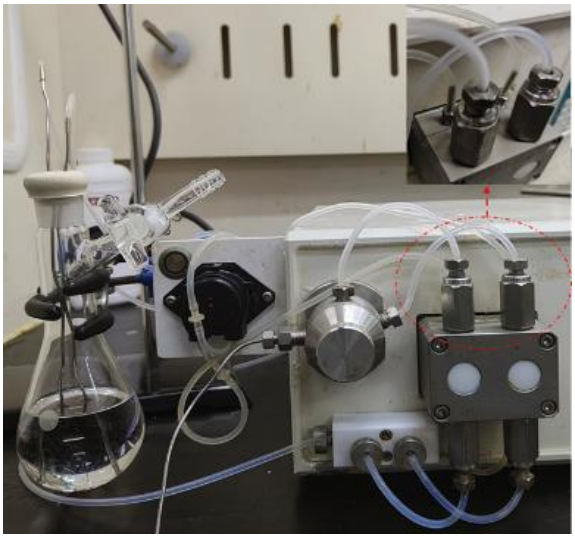
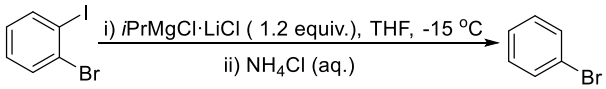


Figure S1. The cleaning system of HPLC pump.

2. Halogen-magnesium exchange reaction in batch



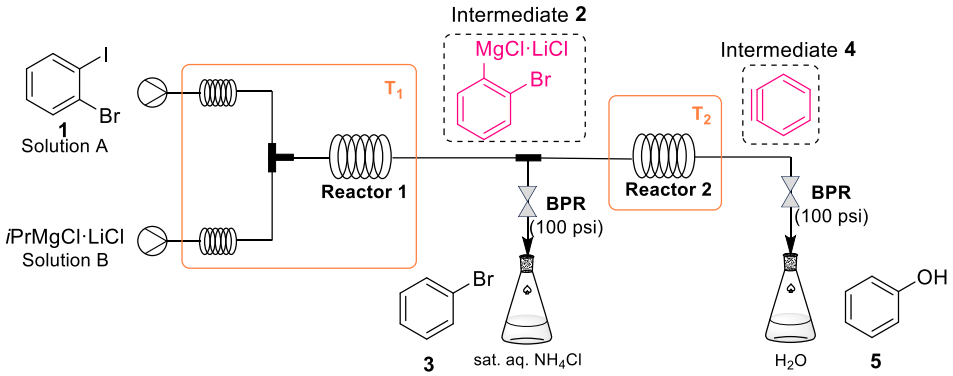
A 15 mL Schlenk tube was charged with 1-bromo-2-iodobenzene (568 mg, 2.0 mmol) and THF (5 mL) under a nitrogen atmosphere and cooled to -15 °C. *i*PrMgCl·LiCl (1.3 M in THF, 2.4 mmol) were added drop wise under vigorous stirring. The reaction mixture was stirred at -15 °C for 5 min, and then sampled for GC analysis with *n*-dodecane as an internal standard, with one measurement every 2 min.

Table S1. The results of sampling detection at different times.

Entry	t (min)	Conv. (%)[a]	Yield (%)[a]
1	5	94	92
2	7	>99	97
3	9	>99	97
4	11	>99	97
5	13	>99	96
6	15	>99	96

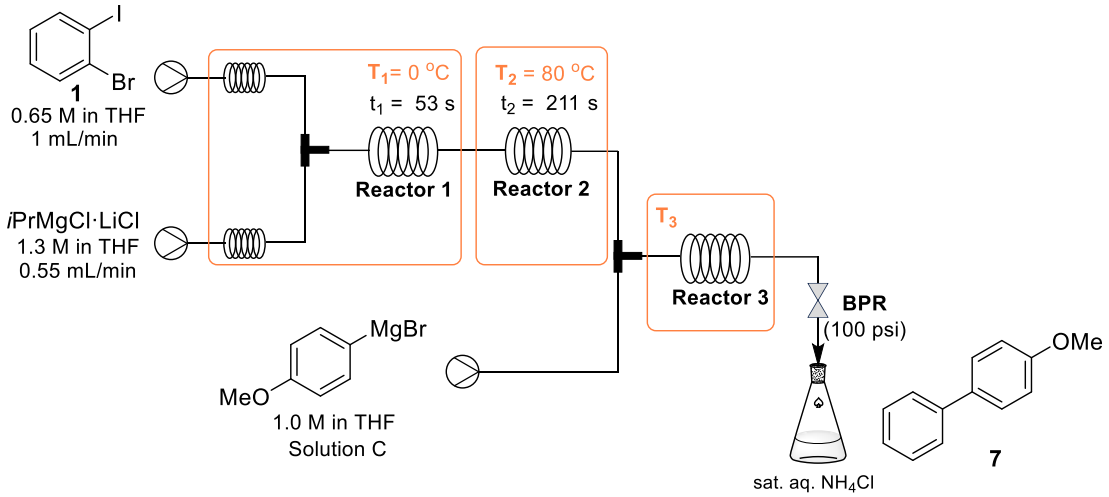
[a] Monitored by GC analysis with *n*-dodecane as an internal standard.

3. The examination of reaction conditions on the synthesis of intermediate 2 and intermediate 4 in continuous flow



The continuous flow system consisted of two HPLC pumps, one T-mixer (stainless steel, 1/16″ I.D., through hole diameter 0.50 mm), and two coil reactors (stainless steel tube, 1/16″ O.D., **Reactor 1** and **Reactor 2**). The **Reactor 1** and **Reactor 2** were dipped in ice bath or oil bath (T_1 ºC and T_2 ºC). A flask containing constantly agitated saturated NH_4Cl solution was placed at the end of the flow system, and the reaction solution was quenched as it was dripped into the flask. Added 1-bromo-2-iodobenzene into the Schlenk bottle under a nitrogen atmosphere, and added a certain amount of preprocessed THF to obtain 0.65 M reaction solution (Solution A). The clarified solution was powered by HPLC pump and entered the T-mixer and mixed the *i*PrMgCl·LiCl (1.3 M in THF, Solution B) which was powered by another HPLC pump. The resulting mixture passed through **Reactor 1** to obtain intermediate **2.** The reaction solution was quenched and then analyzed by GC analysis with *n*-dodecane as an internal standard. The reaction solution passed through **Reactor 2** to obtain intermediate **4**. The reaction solution was quenched and then analyzed by GC analysis with *n*-dodecane as an internal standard.

4. The examination of reaction conditions on the synthesis of 7 in continuous flow



The continuous flow system consisted of three HPLC pumps, two T-mixers (stainless steel, 1/16″ I.D., through hole diameter 0.50 mm), and three coil reactors (stainless steel tube, 1/16″ O.D., **Reactor 1**, **Reactor 2** and **Reactor 3**). The **Reactor 1** and **Reactor 2** were dipped in ice bath (T_1 = 0 °C) and oil bath (T_2 = 80 °C). The **Reactor 3** was dipped in oil bath (T_3 °C). A flask containing constantly agitated saturated NH_4Cl solution was placed at the end of the flow system, and the reaction solution was quenched as it was dripped into the flask. Added 1-bromo-2-iodobenzene into the Schlenk bottle under a nitrogen atmosphere, and added a certain amount of preprocessed THF to obtain 0.65 M reaction solution (Solution A). The clarified solution was powered by HPLC pump and entered the T-mixer at flow rate of 1 mL/min and mixed the *i*PrMgCl·LiCl (1.3 M in THF, Solution B) which was powered by another HPLC pump at flow rate of 0.55 mL/min. The resulting mixture passed through **Reactor 1** with residence time of 53 s and **Reactor 2** with residence time of 211 s, and then mixed with the 4-methoxyphenyl magnesium bromide solution (1.0 M in THF, Solution C) in the T-mixer. The reaction solution passed through **Reactor 3** to obtain **7**. The reaction solution was quenched and then analyzed by GC analysis with *n*-dodecane as an internal standard.

Table S2. Optimization of the conditions for the addition reaction of benzyne with 4-methoxyphenyl magnesium bromide.

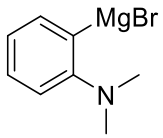
Entry	Solution C[a] (mL/min)	T_3 (°C)	t_3 (s)	Yield[b] (%)
1	1.0	25	64	94
2	1.0	40	64	93
3	1.0	60	64	94
4	0.65	25	75	78
5	0.70	25	73	91
6	0.75	25	71	94
7	0.80	25	70	95
8	0.90	25	67	94
9	0.75	25	27	87
10	0.75	25	36	95
11	0.75	25	54	94

[a] Solution C: 4-Methoxyphenyl magnesium bromide solution (1 M in THF).

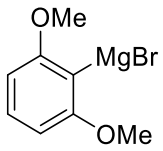
[b] Analyzed by GC with *n*-dodecane as an internal standard.

5. General procedure for synthesis of Grignard reagent

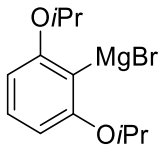
Taked a 100 mL three-necked flask, added Magnesium (30 mmol, 720 mg) and iodine particles under nitrogen atmosphere, and then added 12 mL THF. Used a hot air blower to heat the reaction solution while stirring. Stopped heating while until the reaction solution reached a reflux state and changed color to light white. Then slowly added starting material (20 mmol) in THF solution (18 mL). After the dropwise addition was completed, stirred under reflux for 1 h. Diluted the above solution to 40 mL to obtain an 0.5 mmol/mL Grignard reagent solution.



[2-(dimethylamino)phenyl]magnesium bromide: 2-bromo-*N*,*N*-dimethylbenzenamine (20 mmol, 4.0 g) was used as starting material. The resulting 0.5 mmol/mL solution was used for the synthesis of **8i** by (General procedure for synthesis of **8** in continuous flow).

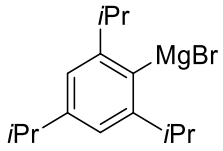


(3,5-dimethoxyphenyl)magnesium bromide: 1-bromo-3,5-dimethoxybenzene (20 mmol, 4.4 g) was used as starting material. The resulting 0.5 mmol/mL solution was used for the synthesis of **8h** by (General procedure for synthesis of **8** in continuous flow).

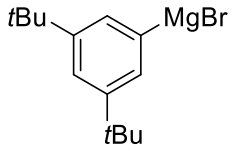


[3,5-bis(1-methylethoxy)phenyl]magnesium bromide: 1-bromo-3,5-bis(1-

methylethoxy)benzene (20 mmol, 5.5 g) was used as starting material. The resulting 0.5 mmol/mL solution was used for the synthesis of **8g** by (General procedure for synthesis of **8** in continuous flow).

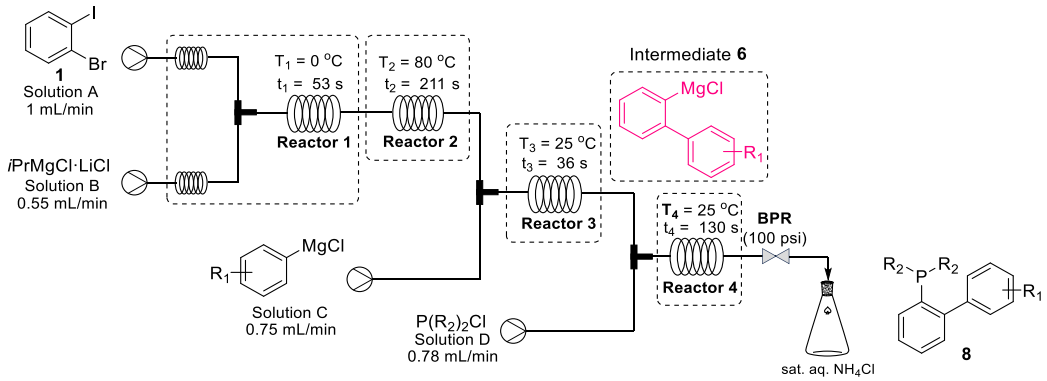


[2,4,6-tris(1-methylethyl)phenyl]magnesium bromide: 2-bromo-1,3,5-tris(1-methylethyl)benzene (20 mmol, 5.7 g) was used as starting material. The resulting 0.5 mmol/mL solution was used for the synthesis of **8j** and **8l** by (General procedure for synthesis of **8** in continuous flow).



[3,5-Bis(1,1-dimethylethyl)phenyl]magnesium bromide: 1-bromo-3,5-bis(1,1-dimethylethyl)benzene (20 mmol, 5.4 g) was used as starting material. The resulting 0.5 mmol/mL solution was used for the synthesis of **10h** by (General procedure for synthesis of **10** in continuous flow).

6. General procedure for synthesis of 8 in continuous flow



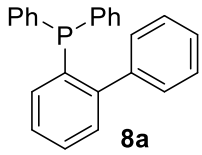
General procedure A:

The continuous flow system consisted of four HPLC pumps, three T-mixers (stainless steel, 1/16″ I.D., through hole diameter 0.50 mm), and four coil reactors (stainless steel tube, 1/16″ O.D., **Reactor 1**, **Reactor 2**, **Reactor 3** and **Reactor 4**). The **Reactor 1** and **Reactor 2** were dipped in ice bath (T_1 = 0 °C) and oil bath (T_2 = 80 °C). The **Reactor 3** and **Reactor 4** were dipped in water bath (T_3 = 25 °C and T_4 =25 °C). A flask containing constantly agitated saturated NH_4Cl solution was placed at the end of the flow system, and the reaction solution was quenched as it was dripped into the flask. Added 1-bromo-2-iodobenzene into the Schlenk bottle under a nitrogen atmosphere, and added a certain amount of preprocessed THF to obtain

Solution A (0.65 M in THF). The clarified solution was powered by HPLC pump and entered the T-mixer at flow rate of 1 mL/min and mixed the *i*PrMgCl·LiCl (1.3 M in THF, Solution B) which was powered by another HPLC pump at flow rate of 0.55 mL/min. The resulting mixture passed through **Reactor 1** with residence time of 53 s and **Reactor 2** with residence time of 211 s, and then mixed with the R_1PhMgX solution (1.0 M in THF, Solution C) in the T-mixer. The reaction solution passed through **Reactor 3** with residence time of 36 s, and then mixed with the $P(R_2)_2Cl$ solution (1.0 M in THF, Solution D) in the T-mixer. The resulting mixture passed through **Reactor 4** with residence time of 130 s, and was then dropped into saturated NH_4Cl solution for quenching. After the continuous flow system reached a stable state, the product solution flowing out for 15 min was collected. The organic phase was separated, the aqueous phase was extracted with CH_2Cl_2, and the mixture was filtered through a pad of flash silica gel topped with a layer of celite, eluting with ethyl acetate (120 mL). The organic phase was concentrated under reduced pressure to provide crude product.

General procedure B:

The experimental operation was the same as General procedure A, but concentration of substrate solution decreased (Solution A: 0.32 M in THF; Solution B: 0.65 M in THF; Solution C: 0.50 M in THF; Solution D: 0.50 M in THF).



8a

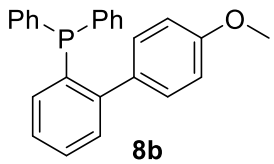
[1,1′-Biphenyl]-2-yldiphenylphosphine (8a):[1] The synthesis was conducted following the experimental conditions described above (General procedure A). Purification via flash chromatography (silica gel, hexane/EA=120/1) afforded **8a** (2.6 g, 79% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.47 (td, J = 7.5, 1.4 Hz, 1H), 7.41-7.31 (m, 8H), 7.29 (dd, J = 5.0, 1.9 Hz, 3H), 7.20-7.10 (m, 6H), 6.97 (dd, J = 6.9, 4.6 Hz, 1H).

^{31}P NMR (162 MHz, DMSO-d_6) δ -14.64.

^{13}C NMR (101 MHz, DMSO-d_6) δ 141.7, 137.7, 137.6, 134.3, 133.8, 133.6, 130.7, 129.9 (d, J = 4.0 Hz), 129.6, 129.2, 129.2, 129.1, 128.1, 127.7.

HRMS (ESI) (m/z): Calcd for $C_{24}H_{20}P$ ([M + H]$^+$): 339.1224, found: 339.1228.



8b

(4′-Methoxy[1,1′-biphenyl]-2-yl)diphenylphosphine (8b):[2] The synthesis was conducted

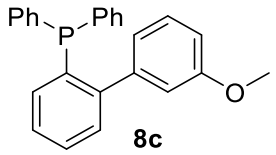
following the experimental conditions described above (General procedure A). Purification via flash chromatography (silica gel, hexane/EA=120/1) afforded **8b** (2.7 g, 75% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 7.24 (d, J = 7.7 Hz, 1H), 7.18 (d, J = 3.9 Hz, 7H), 7.13-7.08 (m, 5H), 7.01 (d, J = 6.4 Hz, 2H), 6.94 (dd, J = 7.6, 3.7 Hz, 1H), 6.68 (d, J = 8.6 Hz, 2H), 3.65 (s, 3H).

^{31}P NMR (162 MHz, Methylene Chloride-d_2) δ -13.72.

^{13}C NMR (101 MHz, Methylene Chloride-d_2) δ 159.0, 148.1 (d, J = 29.0 Hz), 138.0 (d, J = 12.4 Hz), 135.9 (d, J = 14.0 Hz), 134.4, 134.0, 133.8, 131.0 (d, J = 4.0 Hz), 130.4 (d, J = 4.8 Hz), 128.9, 128.5, 128.5, 127.2, 113.0, 55.3.

HRMS (ESI) (m/z): Calcd for $C_{25}H_{22}OP$ ([M + H]$^+$): 369.1330, found: 369.1336.



8c

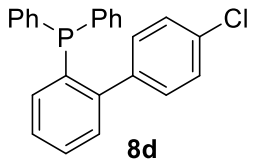
(3′-Methoxy[1,1′-biphenyl]-2-yl)diphenylphosphine (8c): The synthesis was conducted following the experimental conditions described above (General procedure A). Purification via flash chromatography (silica gel, hexane/EA=120/1) afforded **8c** (2.1 g, 58% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 7.27 (d, J = 7.5 Hz, 1H), 7.22-7.13 (m, 11H), 7.04 (d, J = 6.4 Hz, 3H), 6.94 (d, J = 7.4 Hz, 1H), 6.78 (t, J = 7.3 Hz, 1H), 6.74 (d, J = 8.2 Hz, 1H), 3.33 (s, 3H).

^{31}P NMR (162 MHz, Methylene Chloride-d_2) δ -13.10.

^{13}C NMR (101 MHz, Methylene Chloride-d_2) δ 156.7 (d, J = 1.3 Hz), 145.3 (d, J = 32.5 Hz), 137.2 (d, J = 12.2 Hz), 134.2 (d, J = 1.8 Hz), 133.9 (d, J = 20.4 Hz), 133.5 (dd, J = 19.5, 2.5 Hz), 131.3 (d, J = 2.6 Hz), 130.5 (d, J = 5.8 Hz), 129.0, 128.8, 128.6, 128.4 (d, J = 7.0 Hz), 128.2 (d, J = 7.9 Hz), 127.4, 119.8, 110.2, 54.7.

HRMS (ESI) (m/z): Calcd for $C_{25}H_{22}OP$ ([M + H]$^+$): 369.1330, found: 369.1325.



8d

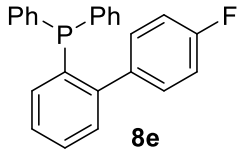
(4′-Chloro[1,1′-biphenyl]-2-yl)diphenylphosphine (8d):[2] The synthesis was conducted following the experimental conditions described above (General procedure A). Purification via flash chromatography (silica gel, hexane/EA=120/1) afforded **8d** (2.6 g, 71% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.46 (td, J = 7.5, 1.4 Hz, 1H), 7.41-7.27 (m, 10H), 7.19 (dd, J = 8.4, 1.1 Hz, 2H), 7.17-7.09 (m, 4H), 6.99 (ddd, J = 7.7, 3.8, 1.3 Hz, 1H).

^{31}P NMR (162 MHz, DMSO-d_6) δ -14.49.

^{13}C NMR (101 MHz, DMSO-d_6) δ 146.7 (d, J = 28.0 Hz), 140.5 (d, J = 5.9 Hz), 137.2 (d, J = 12.4 Hz), 135.6 (d, J = 15.2 Hz), 134.2, 133.8 (d, J = 20.0 Hz), 132.6, 131.7 (d, J = 4.2 Hz), 130.5 (d, J = 4.7 Hz), 129.7, 129.3, 129.2 (d, J = 6.7 Hz), 128.4, 128.1.

HRMS (ESI) (m/z): Calcd for $C_{24}H_{19}ClP$ ($[M + H]^+$): 373.0835, found: 373.0839.



8e

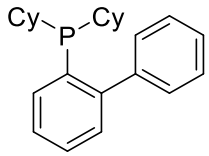
(4′-Fluoro[1,1′-biphenyl]-2-yl)diphenylphosphine (8e):[2] The synthesis was conducted following the experimental conditions described above (General procedure A). Purification via flash chromatography (silica gel, hexane/EA=120/1) afforded **8e** (2.4 g, 68% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.46 (td, J = 7.5, 1.4 Hz, 1H), 7.42-7.28 (m, 8H), 7.20 (dd, J = 7.8, 5.5 Hz, 2H), 7.17-7.05 (m, 6H), 6.96 (ddd, J = 7.7, 3.8, 1.3 Hz, 1H).

^{31}P NMR (162 MHz, DMSO-d_6) δ -14.31.

^{13}C NMR (101 MHz, DMSO-d_6) δ 161.9 (d, J = 244.0 Hz), 146.9 (d, J = 27.9 Hz), 138.0 (dd, J = 5.9, 3.3 Hz), 137.3 (d, J = 12.4 Hz), 135.7 (d, J = 15.0 Hz), 134.1, 133.8 (d, J = 19.9 Hz), 131.8 (dd, J = 8.2, 4.1 Hz), 130.7 (d, J = 4.6 Hz), 129.6, 129.3, 129.2 (d, J = 6.7 Hz), 128.3, 114.9 (d, J = 21.4 Hz).

HRMS (ESI) (m/z): Calcd for $C_{24}H_{19}FP$ ($[M + H]^+$): 357.1130, found: 357.1136.



8f, *CyjohnPhos*

2-(Dicyclohexylphosphino)biphenyl (8f):[3] The synthesis was conducted following the experimental conditions described above (General procedure A). Purification via flash chromatography (silica gel, hexane/EA=60/1) afforded **8f** (2.2 g, 63% yield) of the desired product as white solid.

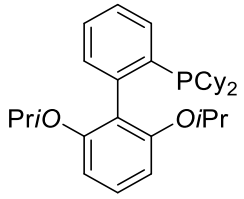
^{1}H NMR (400 MHz, DMSO-d_6) δ 7.62 (dt, J = 5.0, 2.9 Hz, 1H), 7.42-7.39 (m, 2H), 7.36 (d, J = 7.6 Hz, 2H), 7.33-7.28 (m, 1H), 7.23 (dd, J = 8.5, 4.9 Hz, 3H), 1.83 (t, J = 10.6 Hz, 2H), 1.60 (t, J = 5.6 Hz, 8H), 1.47 (d, J = 13.0 Hz, 2H), 1.25-1.05 (m, 6H), 1.02-0.88 (m, 4H).

^{31}P NMR (162 MHz, DMSO-d_6) δ -14.11.

^{13}C NMR (101 MHz, DMSO-d_6) δ 150.4 (d, J = 28.7 Hz), 142.9 (d, J = 6.0 Hz), 133.3 (d, J =

3.2 Hz), 130.9 (d, *J* = 4.5 Hz), 130.4 (d, *J* = 5.1 Hz), 129.0, 127.8, 127.2, 126.9, 34.7 (d, *J* = 15.3 Hz), 30.7 (d, *J* = 18.0 Hz), 29.5 (d, *J* = 9.3 Hz), 27.0, 26.7 (d, *J* = 46.3 Hz).

HRMS (ESI) (m/z): Calcd for $C_{24}H_{32}P$ ($[M + H]^+$): 351.2163, found: 351.2160.



8g, *RuPhos*

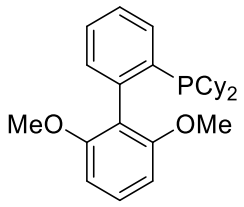
[2′,6′-Bis(1-methylethoxy)[1,1′-biphenyl]-2-yl]dicyclohexylphosphine (8g):[4] The synthesis was conducted following the experimental conditions described above (General procedure B). Recrystallization from anhydrous acetone afforded **8g** (2.2 g, 56% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.51 (dd, *J* = 4.6, 2.2 Hz, 1H), 7.30-7.25 (m, 2H), 7.20 (t, *J* = 8.3 Hz, 1H), 7.09-7.01 (m, 1H), 6.55 (d, *J* = 8.3 Hz, 2H), 4.38 (hept, *J* = 6.0 Hz, 2H), 1.78 (t, *J* = 11.6 Hz, 2H), 1.64 (dt, *J* = 23.1, 10.2 Hz, 10H), 1.25-1.07 (m, 16H), 1.04 (d, *J* = 6.0 Hz, 6H).

^{31}P NMR (162 MHz, Chloroform-*d*) δ -9.16.

^{13}C NMR (101 MHz, Chloroform-*d*) δ 156.3, 143.7 (d, *J* = 32.3 Hz), 136.5 (d, *J* = 17.1 Hz), 131.8 (d, *J* = 3.5 Hz), 131.3 (d, *J* = 6.4 Hz), 128.2, 127.4, 125.5, 123.3 (d, *J* = 6.7 Hz), 106.2, 70.3, 34.4 (d, *J* = 14.1 Hz), 30.1 (d, *J* = 16.5 Hz), 29.7 (d, *J* = 10.4 Hz), 27.6, 27.4, 27.4, 26.6, 22.4, 22.1.

HRMS (ESI) (m/z): Calcd for $C_{30}H_{44}O_2P$ ($[M + H]^+$): 467.3001, found: 467.3008.



8h, *SPhos*

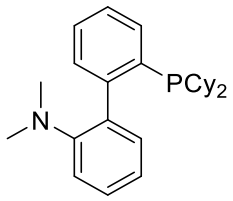
2-Dicyclohexylphosphino-2′,6′-dimethoxybiphenyl (8h):[5] The synthesis was conducted following the experimental conditions described above (General procedure B). Recrystallization from anhydrous acetone afforded **8h** (2.1 g, 53% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.58 (d, *J* = 7.6 Hz, 1H), 7.40 (t, *J* = 7.4 Hz, 1H), 7.37-7.29 (m, 2H), 7.19 (dd, *J* = 9.1, 3.5 Hz, 1H), 6.60 (d, J = 8.4 Hz, 2H), 3.69 (s, 6H), 1.79 (t, *J* = 11.9 Hz, 2H), 1.73-1.59 (m, 10H), 1.31-1.00 (m, 10H).

^{31}P NMR (162 MHz, Chloroform-*d*) δ -9.06.

^{13}C NMR (101 MHz, Chloroform-*d*) δ 157.49, 143.0 (d, *J* = 31.9 Hz), 136.0 (d, *J* = 17.8 Hz), 132.4 (d, *J* = 3.7 Hz), 131.0 (d, *J* = 6.1 Hz), 128.9, 128.3, 126.2, 120.0 (d, *J* = 7.4 Hz), 103.1, 55.3, 34.0 (d, *J* = 13.8 Hz), 30.0 (d, *J* = 16.9 Hz), 29.1 (d, *J* = 9.2 Hz), 27.6, 27.5 (d, *J* = 3.6 Hz), 27.4, 26.6.

HRMS (ESI) (m/z): Calcd for $C_{26}H_{36}O_2P$ ($[M + H]^+$): 411.2375, found: 411.2371.



8i, *DavePhos*

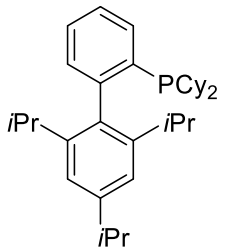
2′-(Dicyclohexylphosphino)-*N*,*N*-dimethyl[1,1′-biphenyl]-2-amine (8i) [3]: The synthesis was conducted following the experimental conditions described above (General procedure B). Recrystallization from anhydrous acetone afforded **8i** (1.9 g, 49% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.56 (d, *J* = 7.2 Hz, 1H), 7.42-7.35 (m, 1H), 7.31 (q, *J* = 5.9 Hz, 3H), 7.05 (dd, *J* = 7.4, 1.8 Hz, 1H), 7.01-6.93 (m, 2H), 2.45 (s, 6H), 2.09-1.96 (m, 1H), 1.83-1.68 (m, 4H), 1.65-1.48 (m, 7H), 1.35-1.18 (m, 4H), 1.17-0.96 (m, 4H), 0.86 (dt, *J* = 41.4, 12.8 Hz, 2H).

^{31}P NMR (162 MHz, Chloroform-*d*) δ -9.73.

^{13}C NMR (101 MHz, Chloroform-*d*) δ 151.5, 149.7 (d, *J* = 30.8 Hz), 135.9 (d, *J* = 5.6 Hz), 135.3 (d, *J* = 20.2 Hz), 132.8 (d, *J* = 3.8 Hz), 132.4, 130.5 (d, *J* = 6.2 Hz), 128.6, 128.2, 125.9, 120.7, 117.3, 43.3, 36.7 (d, *J* = 16.0 Hz), 33.4 (d, *J* = 14.1 Hz), 30.8 (d, *J* = 15.8 Hz), 30.5 (d, *J* = 19.9 Hz), 29.7 (d, *J* = 12.9 Hz), 28.4 (d, *J* = 4.8 Hz), 27.7, 27.5, 27.53 (d, *J* = 10.1 Hz), 27.3 (d, *J* = 11.4 Hz), 26.6 (d, *J* = 27.2 Hz).

HRMS (ESI) (m/z): Calcd for $C_{26}H_{37}NP$ ($[M + H]^+$): 394.2585, found: 394.2589.



8j, *XPhos*

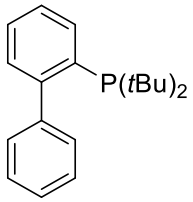
2-Dicyclohexylphosphino-2',4',6'-triisopropylbiphenyl (8j):[7] The synthesis was conducted following the experimental conditions described above (General procedure B). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **8j** (2.8 g, 59% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.60 (d, *J* = 6.9 Hz, 1H), 7.33 (t, *J* = 5.6 Hz, 2H), 7.16 (q, *J* = 2.9, 2.3 Hz, 1H), 7.01 (s, 2H), 2.93 (hept, *J* = 6.9 Hz, 1H), 2.41 (hept, *J* = 6.8 Hz, 2H), 1.90-1.55 (m, 12H), 1.31 (d, *J* = 6.9 Hz, 6H), 1.21 (d, *J* = 6.9 Hz, 16H), 0.97 (d, *J* = 6.7 Hz, 6H).

^{31}P NMR (162 MHz, Chloroform-*d*) δ -12.27.

^{13}C NMR (101 MHz, Chloroform-*d*) δ 147.9, 147.6, 145.0 136.5, 132.4 131.6 (d, *J* = 5.9 Hz), 127.6, 126.1, 120.4 34.6 (d, *J* = 15.6 Hz), 34.1 30.8(d, *J* = 15.6 Hz), 30.6(d, *J* = 1.4 Hz), 29.4 (d, *J* = 12.1 Hz), 27.6 (d, *J* = 11.0 Hz), 27.4(d, *J* = 8.7 Hz), 26.5 25.9, 24.1 22.9 (d, *J* = 1.5 Hz).

HRMS (ESI) (m/z): Calcd for $C_{33}H_{50}P$ ($[M + H]^+$): 477.3572, found: 477.3577.



8k, *JohnPhos*

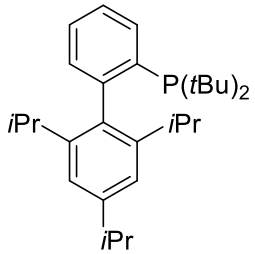
2-(Di-tert-butylphosphino)biphenyl (8k):[7] The synthesis was conducted following the experimental conditions described above (General procedure B). Purification via flash chromatography (silica gel, hexane/EA=60/1) afforded **8k** (1.5 g, 53% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.86 (d, *J* = 7.4 Hz, 1H), 7.37-7.24 (m, 5H), 7.21 (d, *J* = 7.4 Hz, 3H), 1.08 (s, 18H).

^{31}P NMR (162 MHz, Chloroform-*d*) δ 20.23-15.57 (m).

^{13}C NMR (101 MHz, Chloroform-*d*) δ 150.4 150.0, 142.8 (d, *J* = 7.2 Hz), 134.3(d, *J* = 3.2 Hz), 129.6 129.5 (d, *J* = 2.0 Hz), 127.3, 126.1 125.3, 124.7, 31.7(d, *J* = 24.9 Hz), 29.7(d, *J* = 15.4 Hz).

HRMS (ESI) (m/z): Calcd for $C_{20}H_{28}P$ ($[M + H]^+$): 299.1850, found: 299.1856.



8l, *tBuXPhos*

2-Di-t-butylphosphino-2',4',6'-triisopropylbiphenyl (8l):[8] The synthesis was conducted following the experimental conditions described above (General procedure B). Recrystallization from anhydrous acetone afforded **8l** (1.4 g, 33% yield) of the desired product

as white solid.

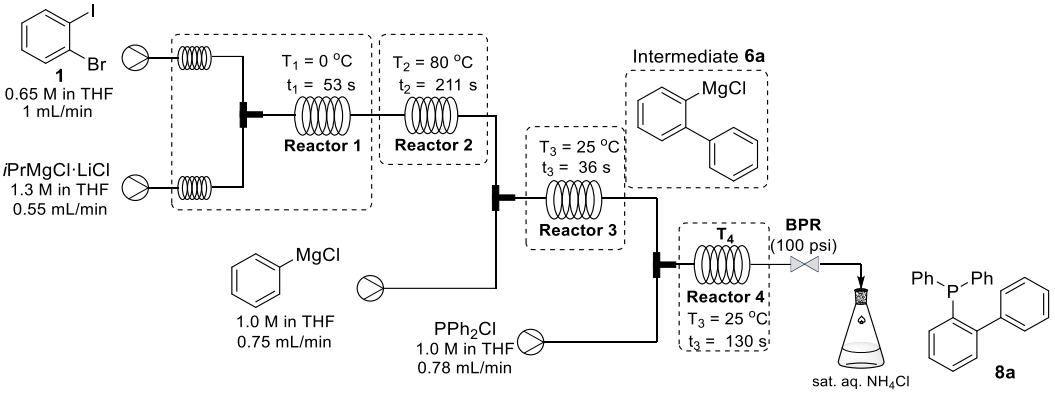
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.89-7.84 (m, 1H), 7.35-7.29 (m, 2H), 7.23-7.18 (m, 1H), 7.00 (s, 2H), 2.93 (p, *J* = 6.9 Hz, 1H), 2.54 (hept, *J* = 6.7 Hz, 2H), 1.31 (d, *J* = 7.0 Hz, 6H), 1.21 (d, *J* = 6.8 Hz, 6H), 1.16 (d, *J* = 11.4 Hz, 18H), 0.97 (d, *J* = 6.7 Hz, 6H).

^{31}P NMR (162 MHz, Chloroform-*d*) δ 21.70 (dd, *J* = 11.6, 7.6 Hz).

^{13}C NMR (101 MHz, Chloroform-*d*) δ 148.6(d, *J* = 33.1 Hz), 147.6 146.2 137.3 136.9 (d, *J* = 5.6 Hz), 136.0 (d, *J* = 2.2 Hz), 132.4 (d, *J* = 6.8 Hz), 127.6 125.3, 120.4 34.0, 32.9, 32.7, 31.1, 30.9, 30.7 (d, *J* = 2.2 Hz), 26.4, 24.1, 22.7 (d, *J* = 1.7 Hz).

HRMS (ESI) (m/z): Calcd for $C_{29}H_{46}P$ ($[M + H]^+$): 425.3259, found: 425.3265.

7. Procedure for the scaled-up synthesis of 8a

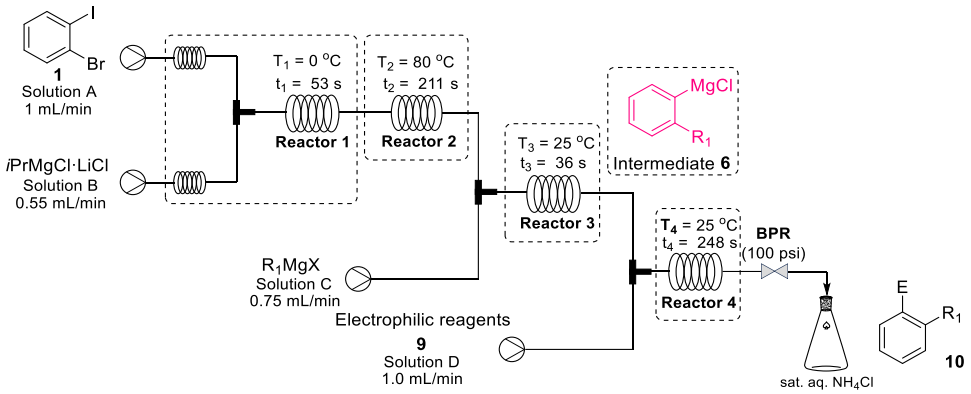


0.65 M solutions of 1-bromo-2-iodobenzene and 1.0 M solutions of PPh_2Cl were prepared using dry THF and dry glassware, while continuously remaining under N_2 atmosphere, this was performed in batch, externally to flow apparatus.

The continuous flow system consisted of four HPLC pumps, three T-mixers (stainless steel, 1/16″ I.D., through hole diameter 0.50 mm), and four coil reactors (stainless steel tube, 1/16″ O.D., **Reactor 1**, **Reactor 2**, **Reactor 3** and **Reactor 4**). The **Reactor 1** and **Reactor 2** were dipped in ice bath (T_1 = 0 ºC) and oil bath (T_2 = 80 ºC). The **Reactor 3** and **Reactor 4** were dipped in water bath (T_3 = 25 ºC and T_4 =25 ºC). A flask containing constantly agitated saturated NH_4Cl solution was placed at the end of the flow system, and the reaction solution was quenched as it was dripped into the flask. 1-Bromo-2-iodobenzene solution (0.65 M in THF) was powered by HPLC pump and entered the T-mixer at flow rate of 1 mL/min and mixed the *i*PrMgCl·LiCl (1.3 M in THF) which was powered by another HPLC pump at flow rate of 0.55 mL/min. The resulting mixture passed through **Reactor 1** with residence time of 53 s and **Reactor 2** with residence time of 211 s, and then mixed with the PhMgCl solution (1.0 M in THF) in the T-mixer. The reaction solution passed through **Reactor 3** with residence time of 36 s, and then mixed with the PPh_2Cl solution (1.0 M in THF) in the T-mixer. The resulting mixture passed through **Reactor 4** with residence time of 130 s. Once the system reached steady state conditions, the reaction mixture was collected for 2 h. The collected reaction mixture was

quenched with saturated NH_4Cl solution. The organic phase was collected. The aqueous phase was then extracted with CH_2Cl_2 (2 × 500 mL), while all the organic phases were dried over Na_2SO_4. Filtration followed by removal of solvent under reduced pressure afforded crude product. Then, the recrystallization from anhydrous methanol afforded pure **8a** (20.3 g, 77% yield) of the desired product as white solid.

8. General procedure for synthesis of 10 in continuous flow



The continuous flow system consisted of four HPLC pumps, three T-mixers (PEEK, 1/16″ I.D., through hole diameter 0.50 mm), and four coil reactors (stainless steel tube, 1/16″ O.D., **Reactor 1**, **Reactor 2**, **Reactor 3** and **Reactor 4**). The **Reactor 1** and **Reactor 2** were dipped in ice bath (T_1 = 0 ºC) and oil bath (T_2 = 80 ºC). The **Reactor 3** and **Reactor 4** were dipped in water bath (T_3 = 25 ºC and T_4 =25 ºC). A flask containing constantly agitated saturated NH_4Cl solution was placed at the end of the flow system, and the reaction solution was quenched as it was dripped into the flask. Added 1-bromo-2-iodobenzene into the Schlenk bottle under a nitrogen atmosphere, and added a certain amount of preprocessed THF to obtain 0.65 M reaction solution (Solution A). The clarified solution was powered by HPLC pump and entered the T-mixer at flow rate of 1 mL/min and mixed the *i*PrMgCl·LiCl (1.3 M in THF, Solution B) which was powered by another HPLC pump at flow rate of 0.55 mL/min. The resulting mixture passed through **Reactor 1** with residence time of 53 s and **Reactor 2** with residence time of 211 s, and then mixed with the R_1MgX solution (1.0 M in THF, Solution C) in the T-mixer. The reaction solution passed through **Reactor 3** with residence time of 36 s, and then mixed with **9** (1.0 M in THF, Solution D) in the T-mixer. The resulting mixture passed through **Reactor 4** with residence time of 248 s, and was then dropped into saturated NH_4Cl solution for quenching. After the continuous flow system reached a stable state, the product solution flowing out for 15 min was collected. The organic phase was separated, the aqueous phase was extracted with CH_2Cl_2 (2 × 30 mL), and all the organic phases were combined and dried over Na_2SO_4. Filtration followed by removal of solvent under reduced pressure afforded crude product. The target product **10** was isolated by flash chromatography (silica gel, hexane /EA).

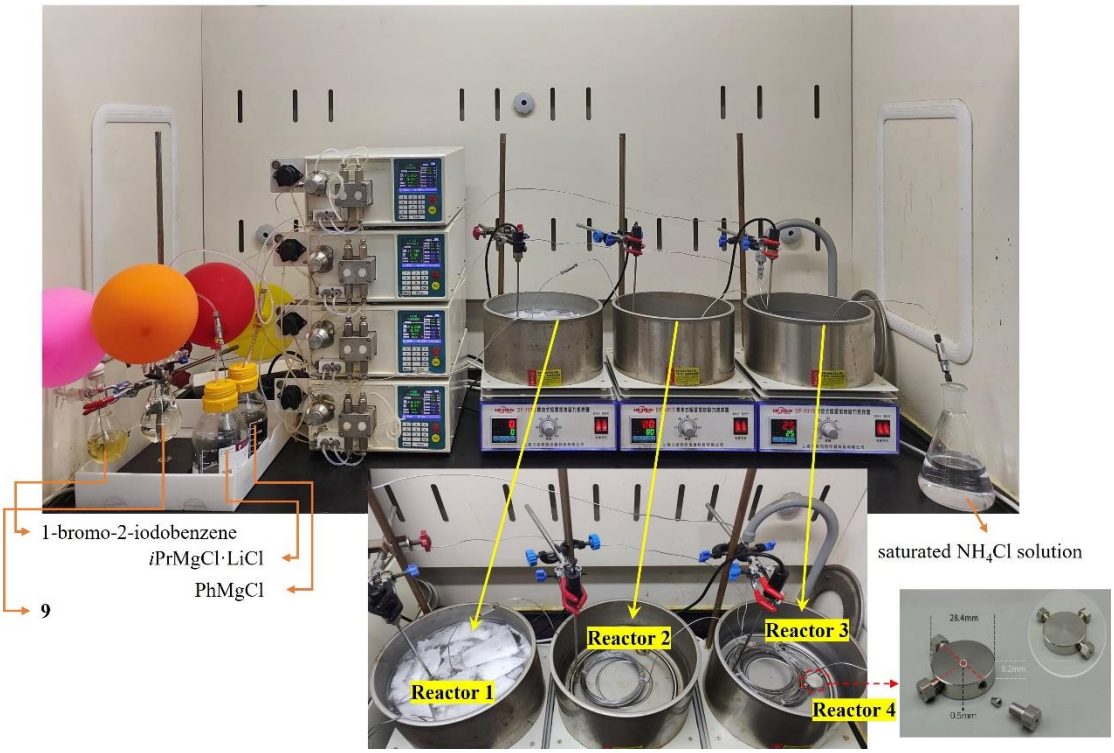
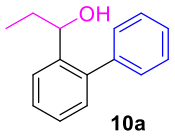
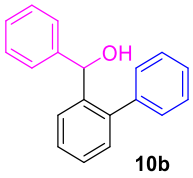
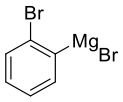
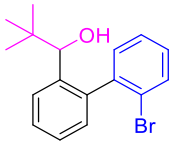
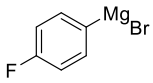
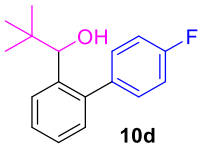
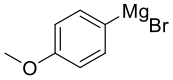
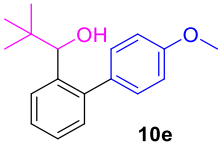
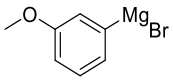
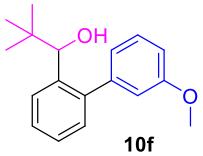
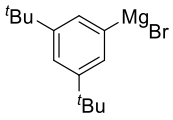
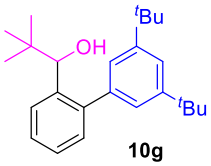
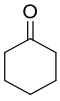
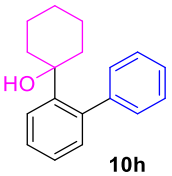
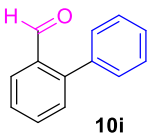
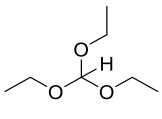
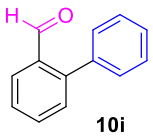
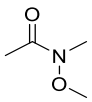
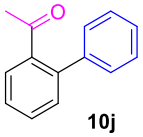
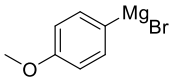
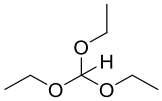
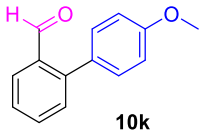
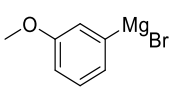
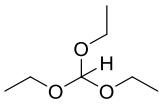
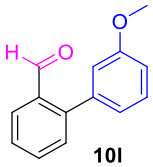
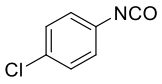
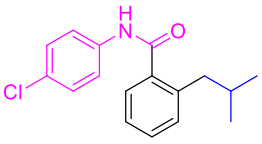
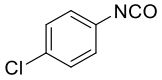
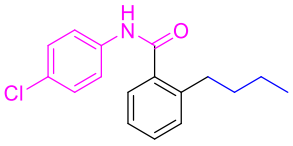
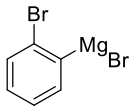
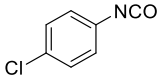
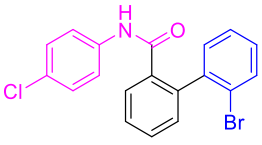
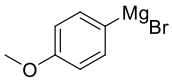
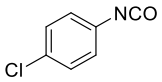
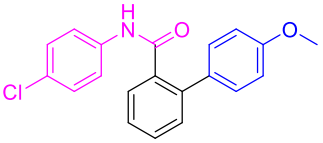
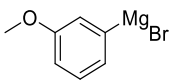
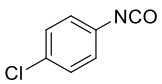
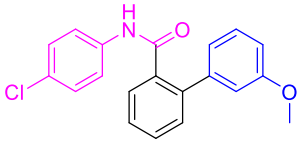
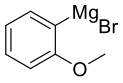
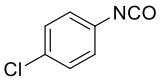
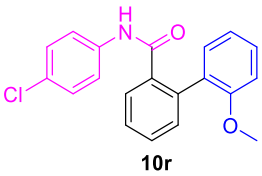
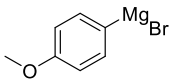
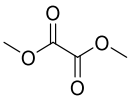
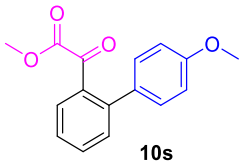


Figure S2. The setup for the synthesis of **10**

Table S3. Synthesis of biaryl derivatives in continuous flow.

Entry	R_1MgX[a]	**9**	Product	Yield[c] (%)
1	PhMgCl	CH_3CH_2CHO	 **10a**	78
2	PhMgCl	PhCHO	 **10b**	83
3		*t*BuCHO	 **10c**	63
4		*t*BuCHO	 **10d**	72
5		*t*BuCHO	 **10e**	75
6		*t*BuCHO	 **10f**	68
7[b]		*t*BuCHO	 **10g**	62
8	PhMgCl		 **10h**	69
9	PhMgCl	DMF	 **10i**	74

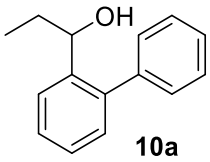
10	PhMgCl		 **10i**	62
11	PhMgCl		 **10j**	79
12			 **10k**	64
13			 **10l**	59
14	*i*BuMgBr		 **10m**	73
15	*n*BuMgBr		 **10n**	74
16			 **10o**	61
17			 **10p**	67
18			 **10q**	61

19			 10r	56
20			 10s	69

[a] The flow rate of the 1-bromo-2-iodobenzene solution (0.65 M in THF), the *i*PrMgCl·LiCl solution (1.3 M in THF), the Grignard reagent solution (1.0 M in THF) and **9** (1.0 M in THF) were 1.0 mL/min, 0.55 mL/min, 0.75 mL/min and 1.0 mL/min.

[b] All solution concentrations were reduced to half of the general operation.

[c] Isolated yields (10 mmol scale).

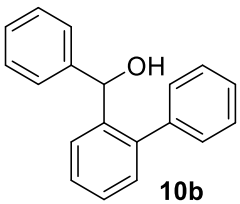

10a

α-Ethyl[1,1′-biphenyl]-2-methanol (10a): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10a** (1.6 g, 78% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.59 (dd, J = 7.8, 1.4 Hz, 1H), 7.45 (t, J = 7.2 Hz, 2H), 7.42-7.35 (m, 2H), 7.33-7.26 (m, 3H), 7.13 (dd, J = 7.6, 1.4 Hz, 1H), 5.02 (d, J = 3.9 Hz, 1H), 4.49 (s, 1H), 1.56-1.44 (m, 2H), 0.66 (t, J = 7.4 Hz, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 143.9, 141.5, 140.4, 129.8, 129.6, 128.6, 127.9, 127.4, 126.9, 126.7, 70.2, 32.1, 10.9.

HRMS (ESI) (m/z): Calcd for $C_{15}H_{17}O$ ($[M + H]^+$): 213.1201, found: 213.1205.


10b

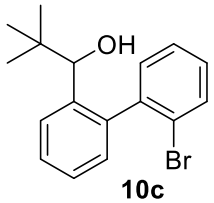
α-Phenyl[1,1′-biphenyl]-2-methanol (10b):[9] The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10b** (2.1 g, 83% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.49 (d, J = 7.7 Hz, 1H), 7.43 (d, J = 8.2 Hz, 2H), 7.33 (d, J

= 6.6 Hz, 3H), 7.23-7.11 (m, 5H), 7.04 (d, *J* = 7.7 Hz, 2H), 5.82 (d, *J* = 4.3 Hz, 1H), 5.76 (d, *J* = 4.3 Hz, 1H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 145.8, 143.0, 141.2, 140.8, 129.9, 129.7, 128.7, 128.3, 128.1, 128.0, 127.6, 127.3, 126.9, 126.6, 70.7.

HRMS (ESI) (m/z): Calcd for $C_{19}H_{17}O$ ($[M + H]^+$): 261.1201, found: 261.1196.



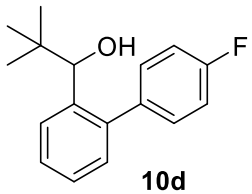
10c

1-(2'-Bromo-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10c): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10c** (1.6 g, 63% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.61 (dd, *J* = 7.9, 1.5 Hz, 1H), 7.51-7.44 (m, 1H), 7.38 (td, *J* = 7.6, 1.5 Hz, 1H), 7.30 (td, *J* = 7.4, 1.4 Hz, 1H), 7.21-7.15 (m, 3H), 7.11 (dd, *J* = 7.6, 1.5 Hz, 1H), 5.22 (d, *J* = 3.8 Hz, 1H), 4.64 (d, *J* = 3.8 Hz, 1H), 0.62 (s, 9H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 141.4, 140.4 (d, *J* = 1.9 Hz), 130.5 (d, *J* = 8.7 Hz), 129.7, 128.9, 127.2, 127.1, 126.3 (d, *J* = 2.7 Hz), 116.9, 116.7, 114.1, 113.9, 74.9, 36.6, 26.6.

HRMS (ESI) (m/z): Calcd for $C_{17}H_{20}BrO$ ($[M + H]^+$): 319.0619, found: 319.0625.



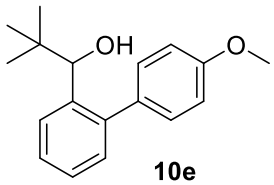
10d

1-(4'-Fluoro-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10d): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10d** (2.3 g, 72% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.59 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.36 (dd, *J* = 9.0, 5.7 Hz, 3H), 7.31-7.24 (m, 3H), 7.09 (dd, *J* = 7.5, 1.5 Hz, 1H), 5.18 (d, *J* = 3.8 Hz, 1H), 4.62 (d, *J* = 3.6 Hz, 1H), 0.61 (s, 9H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 160.4, 141.5, 140.6, 131.9, 131.9, 129.9, 128.8, 127.0 (d, *J* = 2.2 Hz), 115.5, 115.3, 75.0, 36.7, 26.6.

HRMS (ESI) (m/z): Calcd for $C_{17}H_{20}FO$ ($[M + H]^+$): 259.1420, found: 259.1424.



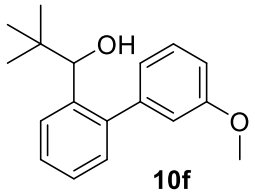
10e

1-(4'-Methoxy-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10e): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10e** (2.0 g, 75% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.57 (dd, J = 7.8, 1.5 Hz, 1H), 7.32 (td, J = 7.5, 1.6 Hz, 1H), 7.28-7.21 (m, 3H), 7.06 (dd, J = 7.5, 1.5 Hz, 1H), 6.99 (d, J = 8.8 Hz, 2H), 4.69 (s, 1H), 3.79 (s, 3H), 1.99 (s, 1H), 0.61 (s, 9H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 158.4, 141.5, 141.5, 134.8, 131.1, 130.0, 128.7, 126.9, 126.5, 114.0, 74.9, 55.5, 36.6, 26.9.

HRMS (ESI) (m/z): Calcd for $C_{18}H_{23}O_2$ ([M + H]$^+$): 271.1620, found: 271.1625.



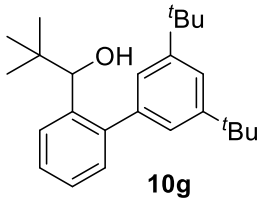
10f

1-(3'-Methoxy-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10f): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10f** (1.8 g, 68% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.62 (d, J = 7.8 Hz, 1H), 7.35 (t, J = 6.6 Hz, 2H), 7.27 (t, J = 7.5 Hz, 1H), 7.11 (dd, J = 7.5, 1.5 Hz, 1H), 6.96-6.86 (m, 3H), 5.20 (d, J = 3.8 Hz, 1H), 4.73 (d, J = 3.8 Hz, 1H), 3.78 (s, 3H), 0.64 (s, 9H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 159.4, 144.0, 141.6, 141.4, 129.7, 129.6, 128.8, 126.9, 126.8, 122.4, 115.9, 112.4, 75.0, 55.5, 36.5, 26.6.

HRMS (ESI) (m/z): Calcd for $C_{18}H_{23}O_2$ ([M + H]$^+$): 271.1620, found: 271.1616.



10g

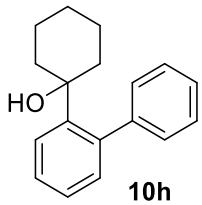
1-(3',5'-Di-tert-butyl-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10g): The synthesis was conducted following the experimental conditions was the same as General procedure A, but concentration of substrate solution decreased (Solution A: 0.32 M in THF; Solution B:

0.65 M in THF; Solution C: 0.50 M in THF; Solution D: 0.50 M in THF). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10g** (2.1 g, 62% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.61 (dd, J = 7.8, 1.5 Hz, 1H), 7.35-7.29 (m, 2H), 7.25 (t, J = 7.4 Hz, 1H), 7.18 (s, 2H), 7.13 (dd, J = 7.5, 1.5 Hz, 1H), 5.15 (d, J = 3.7 Hz, 1H), 4.75 (d, J = 3.7 Hz, 1H), 1.31 (s, 18H), 0.58 (s, 9H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 150.2, 142.7, 141.8, 141.5, 129.6, 128.8, 126.8, 126.4, 124.6, 119.6, 74.9, 36.5, 35.0, 31.7, 26.5.

HRMS (ESI) (m/z): Calcd for $C_{25}H_{37}O$ ($[M + H]^+$): 353.2766, found: 353.2761.



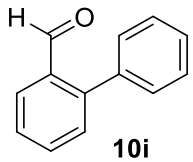
10h

1-([1,1'-Biphenyl]-2-yl)cyclohexan-1-ol (10h): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=60/1) afforded **10h** (1.7 g, 69% yield) of the desired product as colorless oil.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.81 (d, J = 8.1 Hz, 1H), 7.37-7.31 (m, 4H), 7.27-7.22 (m, 2H), 7.20 (td, J = 7.4, 1.3 Hz, 1H), 6.92 (dd, J = 7.5, 1.5 Hz, 1H), 4.45 (s, 1H), 1.61-1.39 (m, 7H), 1.24 (q, J = 3.8 Hz, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 148.1, 144.9, 140.7, 132.3, 130.0, 127.6, 127.5, 127.0 (d, J = 7.7 Hz), 126.0, 73.4, 38.4, 25.5, 22.2.

HRMS (ESI) (m/z): Calcd for $C_{18}H_{21}O$ ($[M + H]^+$): 253.1514, found: 253.1519.



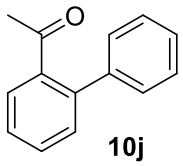
10i

[1,1'-Biphenyl]-2-carbaldehyde (10i):[10] The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10i** (1.3 g, 74% yield) of the desired product as yellowish oil.

^{1}H NMR (400 MHz, Chloroform-d) δ 9.99 (s, 1H), 8.03 (dd, J = 7.8, 1.4 Hz, 1H), 7.65 (td, J = 7.5, 1.5 Hz, 1H), 7.48 (dt, J = 14.6, 7.6 Hz, 5H), 7.39 (dd, J = 7.6, 1.8 Hz, 2H).

^{13}C NMR (101 MHz, Chloroform-d) δ 192.5, 146.0, 137.8, 133.7, 133.6, 130.8, 130.1, 128.4, 128.1, 127.8, 127.6.

HRMS (ESI) (m/z): Calcd for $C_{13}H_{11}O$ ($[M + H]^+$): 183.0732, found: 183.0736.



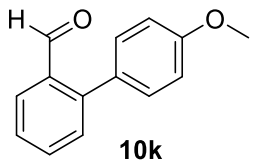
10j

1-[1,1′-Biphenyl]-2-ylethanone (10j):[11] The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10j** (1.5 g, 79% yield) of the desired product as yellow oil.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.59 (t, *J* = 7.5 Hz, 2H), 7.44 (ddt, *J* = 19.7, 11.4, 7.5 Hz, 5H), 7.31 (d, *J* = 6.6 Hz, 2H), 2.12 (s, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 203.8, 140.9, 140.3, 131.3, 130.8, 129.1, 129.1, 128.2, 128.2, 128.0, 30.7.

HRMS (ESI) (m/z): Calcd for $C_{14}H_{13}O$ ($[M + H]^+$): 197.0888, found: 197.0882.



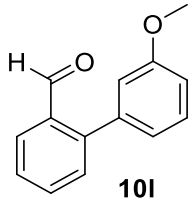
10k

4'-methoxy-[1,1'-biphenyl]-2-carbaldehyde (10k):[12] The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=20/1) afforded **10k** (1.3 g, 64% yield) of the desired product as yellowish solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 9.43 (s, 1H), 7.48 (d, *J* = 8.8 Hz, 2H), 7.22 (dd, *J* = 7.6, 1.7 Hz, 1H), 7.14-7.09 (m, 1H), 6.96 (d, *J* = 8.8 Hz, 2H), 6.92 (dd, *J* = 8.1, 1.2 Hz, 1H), 6.85 (td, *J* = 7.5, 1.3 Hz, 1H), 3.78 (s, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 158.5, 154.6, 131.3, 130.6, 130.5, 128.4, 127.9, 119.9, 116.4, 113.9, 55.5.

HRMS (ESI) (m/z): Calcd for $C_{14}H_{13}O_2$ ($[M + H]^+$): 213.0837, found: 213.0833.



10l

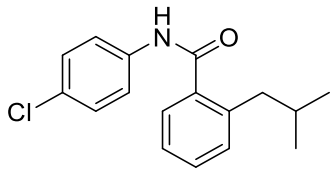
3'-methoxy-[1,1'-biphenyl]-2-carbaldehyde (10l):[13] The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=50/1) afforded **10l** (1.2 g, 59% yield) of the desired

product as yellow oil.

^{1}H NMR (400 MHz, DMSO-d_6) δ 9.50 (s, 1H), 7.31 (t, J = 7.9 Hz, 1H), 7.26 (dd, J = 7.6, 1.8 Hz, 1H), 7.19-7.13 (m, 1H), 7.13-7.07 (m, 2H), 6.94 (dd, J = 8.1, 1.2 Hz, 1H), 6.90-6.82 (m, 2H), 3.78 (s, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 159.3, 154.7, 140.4, 130.8, 129.4, 129.0, 128.0, 121.9, 119.8, 116.5, 115.3, 112.4, 55.4.

HRMS (ESI) (m/z): Calcd for $C_{14}H_{13}O_2$ ([M + H]$^+$): 213.0837, found: 213.0842.



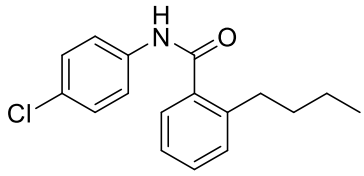
10m

***N*-(4-chlorophenyl)-2-isobutylbenzamide (10m)**: The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=5/1~1/1) afforded **10m** (2.1 g, 73% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 10.76 (s, 1H), 7.60-7.54 (m, 2H), 7.52-7.48 (m, 2H), 7.39 (dd, J = 8.8, 3.3 Hz, 4H), 3.92 (d, J = 6.2 Hz, 2H), 1.82-1.74 (m, 1H), 0.72 (d, J = 6.7 Hz, 6H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 154.8, 151.4, 137.3, 137.0, 132.8 (d, J = 5.0 Hz), 130.7, 129.3, 129.2, 128.0, 121.7, 73.0, 27.6, 19.0.

HRMS (ESI) (m/z): Calcd for $C_{17}H_{19}ClNO$ ([M + H]$^+$): 288.1077, found: 288.1070.



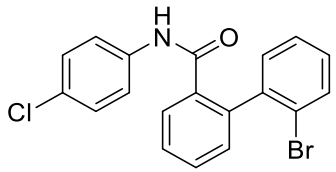
10n

2-Butyl-*N*-(4-chlorophenyl)benzamide (10n): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=5/1~1/1) afforded **10n** (2.1 g, 74% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 10.46 (s, 1H), 7.78 (d, J = 8.9 Hz, 2H), 7.45-7.38 (m, 4H), 7.34-7.30 (m, 2H), 2.78-2.68 (m, 2H), 1.61-1.48 (m, 2H), 1.33-1.25 (m, 2H), 0.84 (t, J = 7.4 Hz, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 168.6, 140.6, 138.7, 137.3, 130.3, 130.1, 129.1, 127.7, 127.6, 126.1, 121.6, 33.6, 32.7, 22.4, 14.2.

HRMS (ESI) (m/z): Calcd for $C_{17}H_{19}ClNO$ ([M + H]$^+$): 288.1077, found: 288.1083.



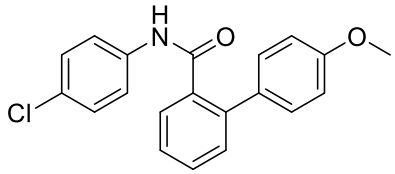
10o

2'-Bromo-*N*-(4-chlorophenyl)-[1,1'-biphenyl]-2-carboxamide (10o): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=5/1~1/1) afforded **10o** (2.3 g, 61% yield) of the desired product as white solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 10.43 (s, 1H), 7.59 (dd, J = 16.2, 8.0 Hz, 4H), 7.55-7.49 (m, 2H), 7.45-7.37 (m, 1H), 7.34 (d, J = 8.8 Hz, 2H), 7.28-7.21 (m, 2H), 7.18-7.11 (m, 1H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 168.1, 138.4, 137.3, 130.7, 130.6, 130.5, 130.4, 129.1, 128.3, 128.3, 127.7, 125.0 (d, J = 2.8 Hz), 121.6, 115.7, 115.4, 114.7, 114.5.

HRMS (ESI) (m/z): Calcd for $C_{19}H_{14}BrClNO$ ($[M + H]^+$): 385.9869, found: 385.9872.



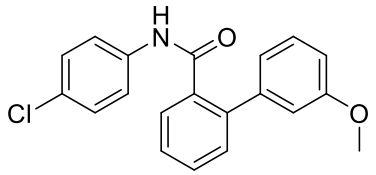
10p

***N*-(4-chlorophenyl)-4'-methoxy-[1,1'-biphenyl]-2-carboxamide (10p)**: The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=5/1~1/1) afforded **10p** (2.2 g, 67% yield) of the desired product as yellowish solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 10.36 (s, 1H), 7.57 (dd, J = 16.9, 8.0 Hz, 4H), 7.48-7.42 (m, 2H), 7.36 (dd, J = 11.0, 8.7 Hz, 4H), 6.94 (d, J = 8.7 Hz, 2H), 3.74 (s, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 168.6, 159.1, 139.3, 138.5, 137.1, 132.7, 130.3, 130.3, 129.9, 129.0, 128.2, 127.5, 127.2, 121.5, 114.3, 55.6.

HRMS (ESI) (m/z): Calcd for $C_{20}H_{17}ClNO_2$ ($[M + H]^+$): 338.0870, found: 338.0874.



10q

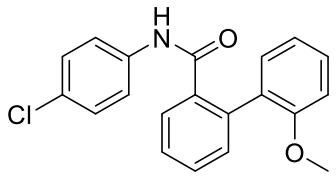
***N*-(4-chlorophenyl)-3'-methoxy-[1,1'-biphenyl]-2-carboxamide (10q)**: The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=5/1~1/1) afforded **10q** (2.0 g, 61%

yield) of the desired product as yellowish solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 10.44 (s, 1H), 7.65-7.59 (m, 4H), 7.57-7.51 (m, 2H), 7.41-7.37 (m, 2H), 7.33 (t, J = 8.1 Hz, 1H), 7.07-7.02 (m, 2H), 6.92 (ddd, J = 8.3, 2.5, 1.0 Hz, 1H), 3.74 (s, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 168.4, 159.5, 141.8, 139.5, 138.5, 137.4, 130.3 (d, J = 3.2 Hz), 129.9, 129.0, 128.2, 127.8, 127.6, 121.5, 121.1, 114.2, 113.6, 55.4.

HRMS (ESI) (m/z): Calcd for $C_{20}H_{17}ClNO_2$ ([M + H]$^+$): 338.0870, found: 338.0866.



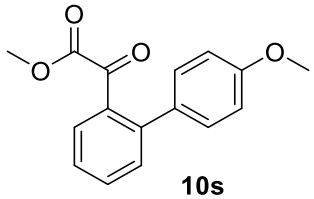
10r

***N*-(4-chlorophenyl)-2'-methoxy-[1,1'-biphenyl]-2-carboxamide (10r)**: The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=5/1~1/1) afforded **10r** (1.9 g, 56% yield) of the desired product as yellowish solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 10.23 (s, 1H), 7.70-7.64 (m, 3H), 7.60 (dd, J = 7.6, 1.6 Hz, 1H), 7.53 (dd, J = 7.6, 1.4 Hz, 1H), 7.41 (d, J = 7.6 Hz, 1H), 7.37 (d, J = 8.8 Hz, 2H), 7.32 (d, J = 7.5 Hz, 2H), 7.04 (t, J = 7.5 Hz, 1H), 6.99 (d, J = 7.9 Hz, 1H), 3.59 (s, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 168.1, 156.3, 139.0, 137.8, 137.2, 131.5, 130.9, 130.4, 129.4, 129.1, 128.9, 127.8, 127.5, 127.1, 121.3, 120.9, 111.2, 55.5.

HRMS (ESI) (m/z): Calcd for $C_{20}H_{17}ClNO_2$ ([M + H]$^+$): 338.0870, found: 338.0876.



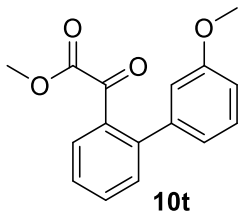
10s

Methyl 2-(4'-methoxy-[1,1'-biphenyl]-2-yl)-2-oxoacetate (10s): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=60/1~30/1) afforded **10s** (1.8 g, 69% yield) of the desired product as yellowish solid.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.80-7.69 (m, 2H), 7.56 (td, J = 7.6, 1.2 Hz, 1H), 7.50 (d, J = 7.7 Hz, 1H), 7.21 (d, J = 8.6 Hz, 2H), 7.02 (d, J = 8.7 Hz, 2H), 3.81 (s, 3H), 3.32 (s, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 189.4, 163.0, 160.0, 142.9, 134.3, 133.7, 131.5, 131.1, 130.6, 130.3, 127.9, 114.6, 55.8, 52.8.

HRMS (ESI) (m/z): Calcd for $C_{16}H_{15}O_4$ ([M + H]$^+$): 271.0892, found: 271.0897.



10t

Methyl 2-(3'-methoxy-[1,1'-biphenyl]-2-yl)-2-oxoacetate (10t): The synthesis was conducted following the experimental conditions described above (General procedure). Purification via flash chromatography (silica gel, hexane/EA=60/1~30/1) afforded **10t** (1.5 g, 57% yield) of the desired product as yellowish solid.

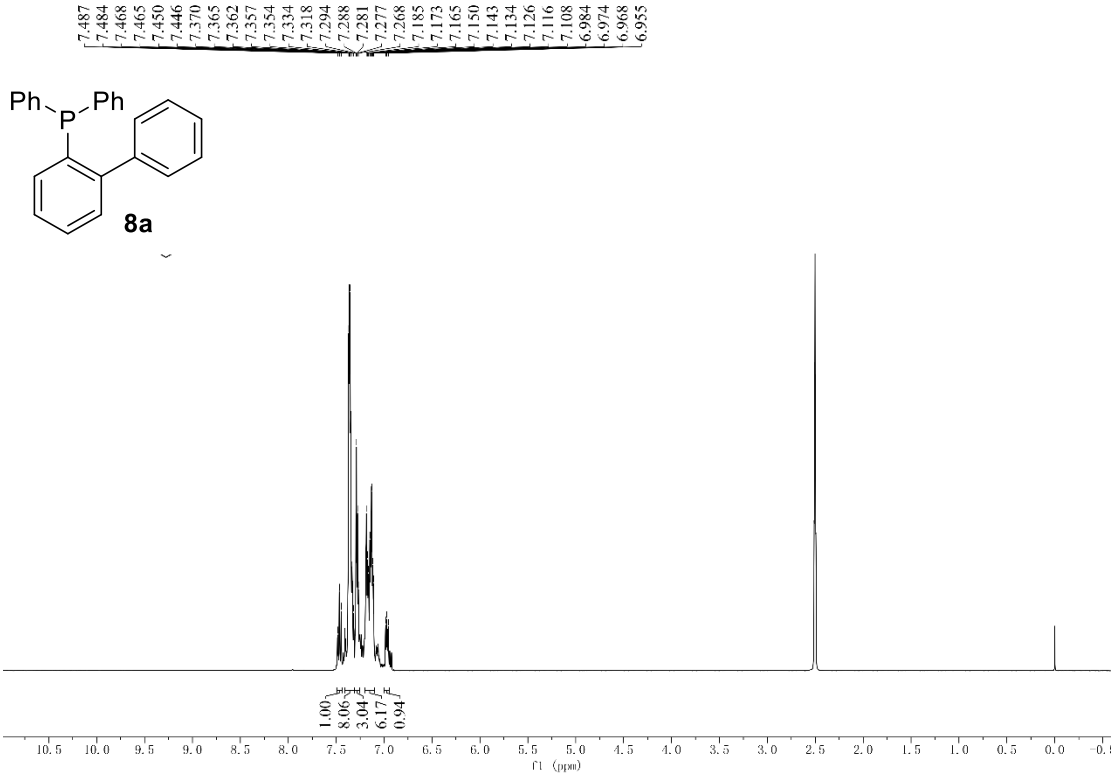
^{1}H NMR (400 MHz, DMSO-d_6) δ 7.77 (dd, J = 16.5, 7.6 Hz, 2H), 7.59 (dd, J = 12.6, 7.6 Hz, 2H), 7.37 (t, J = 8.2 Hz, 1H), 7.01 (dd, J = 7.8, 2.1 Hz, 1H), 6.85 (d, J = 1.7 Hz, 2H), 3.80 (s, 3H), 3.31 (s, 3H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 189.2, 162.7, 159.8, 142.9, 140.6, 134.4, 133.7, 130.4, 130.4, 130.4, 128.4, 122.1, 115.1, 114.6, 55.6, 52.8.

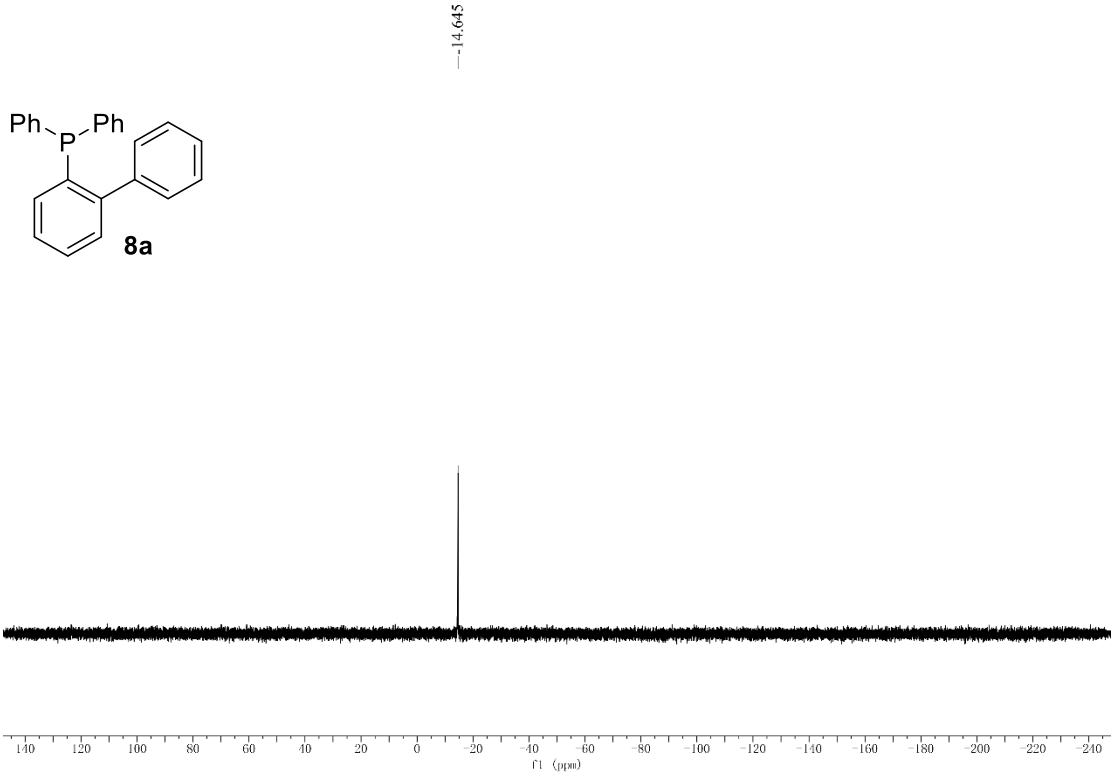
HRMS (ESI) (m/z): Calcd for $C_{16}H_{15}O_4$ ($[M + H]^+$): 271.0892, found: 271.0887.

9. ^{1}H NMR and ^{13}C NMR spectra of compounds

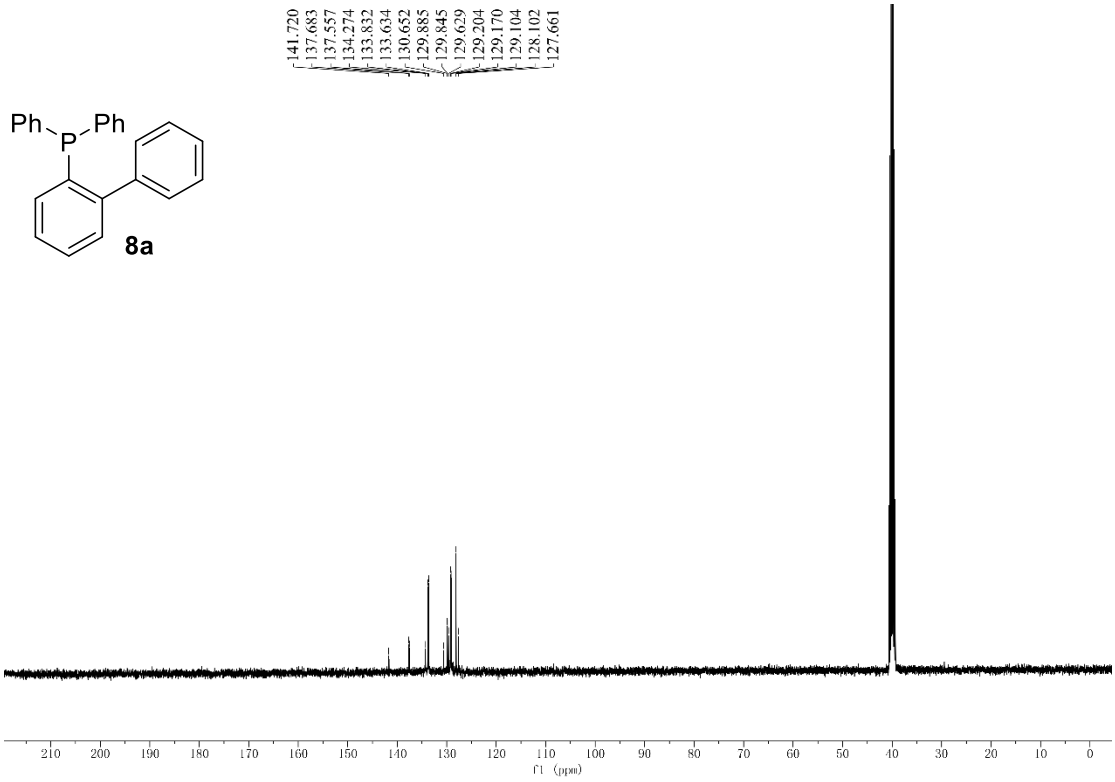
^{1}H NMR (400 MHz, DMSO-d_6) of **[1,1′-Biphenyl]-2-yldiphenylphosphine (8a)**.



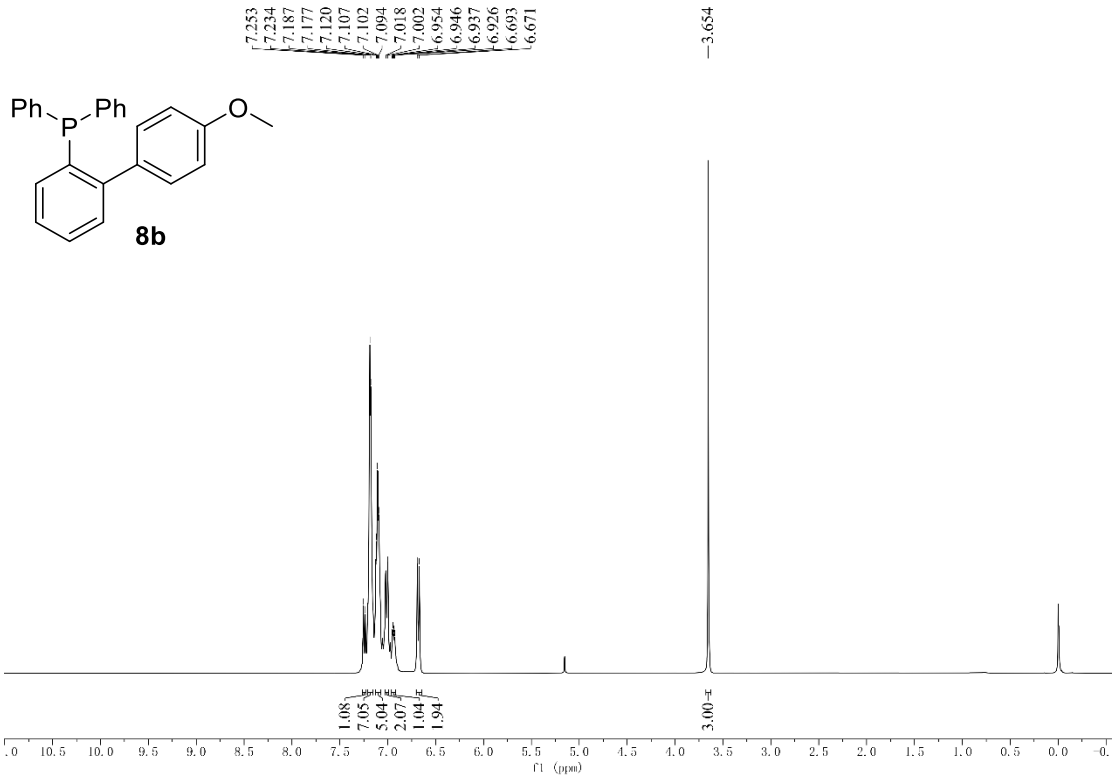
^{31}P NMR (162 MHz, DMSO-d_6) of **[1,1′-Biphenyl]-2-yldiphenylphosphine (8a)**.



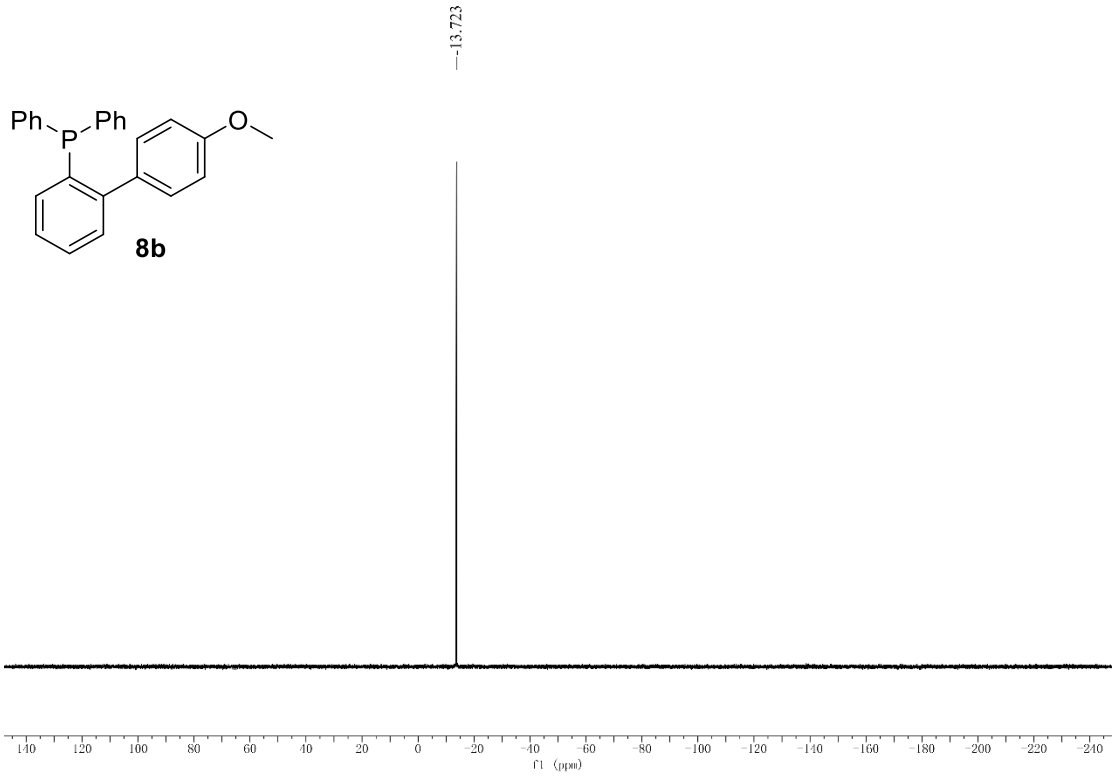
^{13}C NMR (101 MHz, DMSO-d_6) of **[1,1′-Biphenyl]-2-yldiphenylphosphine (8a)**.



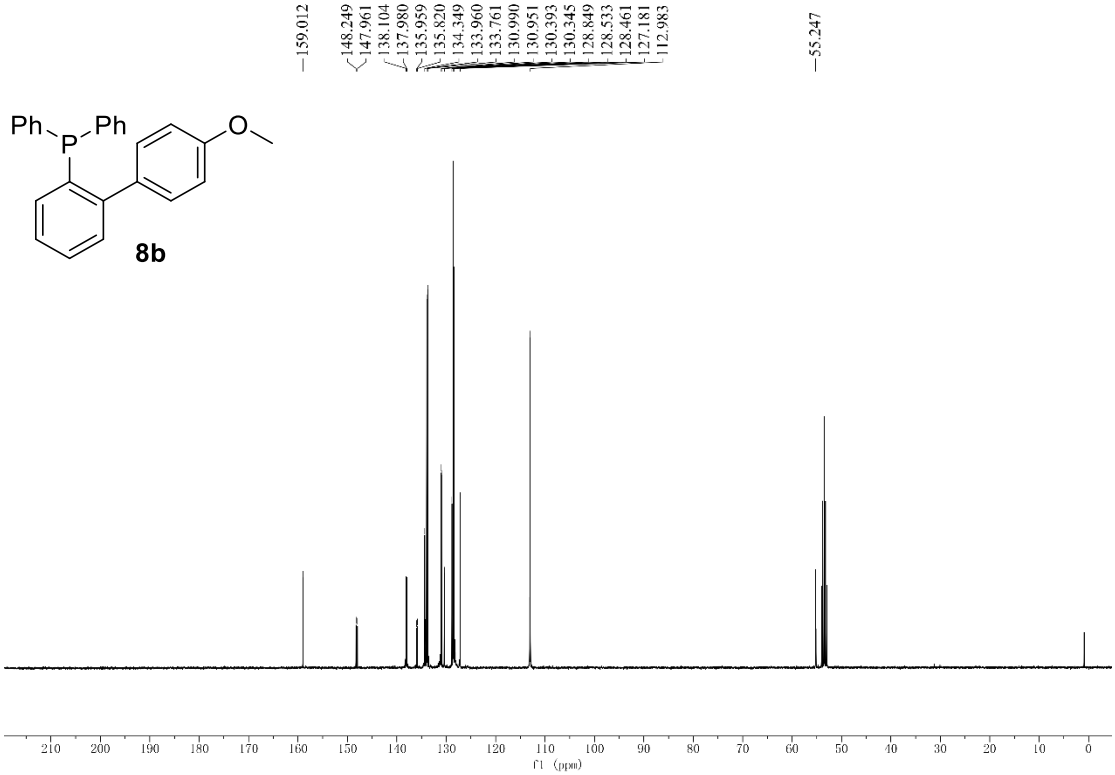
^{1}H NMR (400 MHz, Methylene Chloride-d_2) of **(4′-Methoxy[1,1′-biphenyl]-2-yl)diphenylphosphine (8b)**.



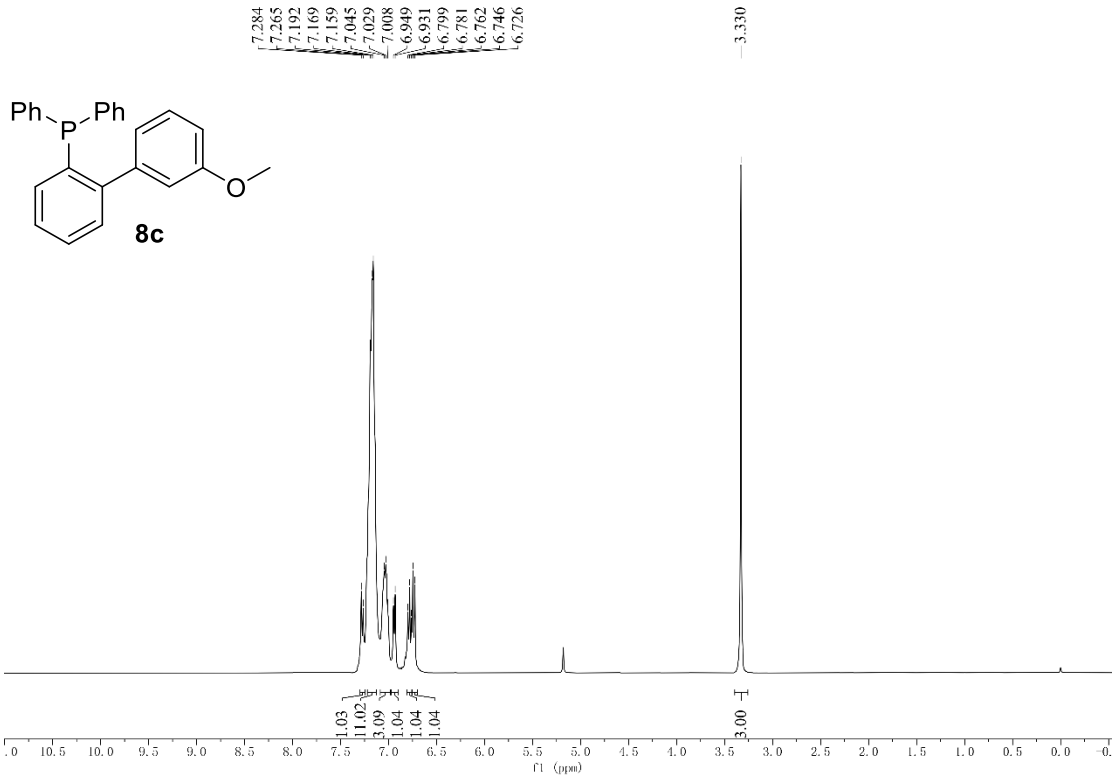
^{31}P NMR (162 MHz, Methylene Chloride-d_2) of**(4′-Methoxy[1,1′-biphenyl]-2-yl)diphenylphosphine (8b)**.



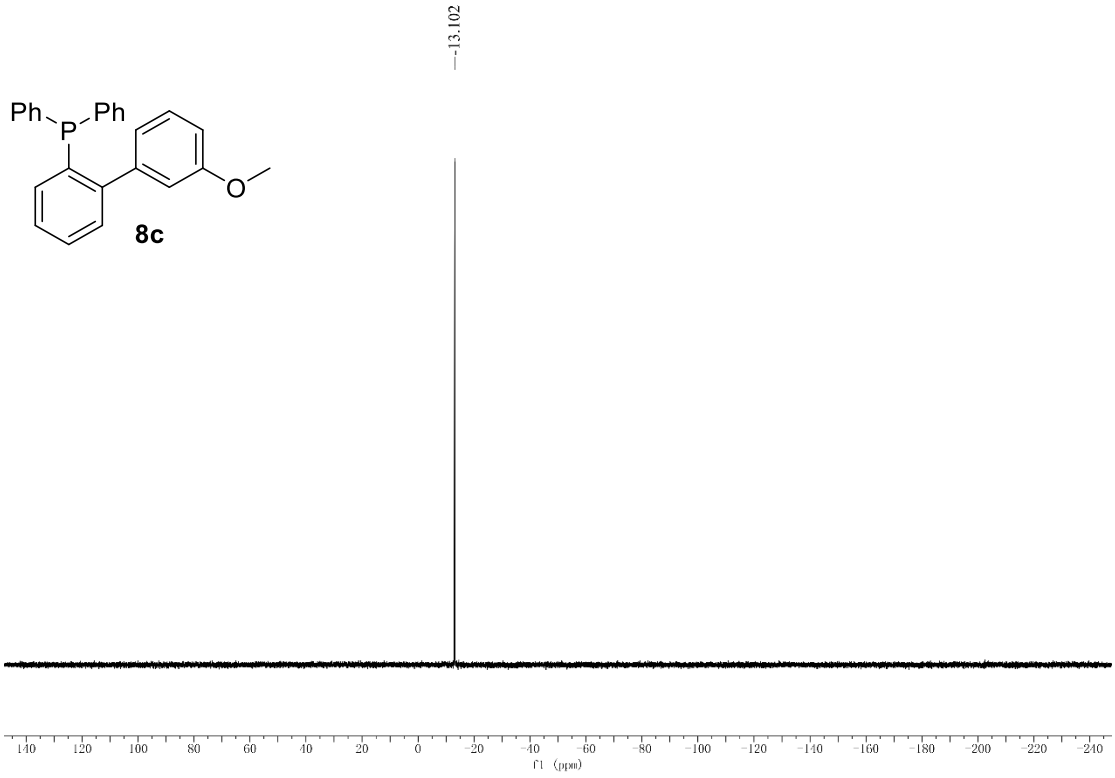
^{13}C NMR (101 MHz, Methylene Chloride-d_2) of **(4′-Methoxy[1,1′-biphenyl]-2-yl)diphenylphosphine (8b)**.



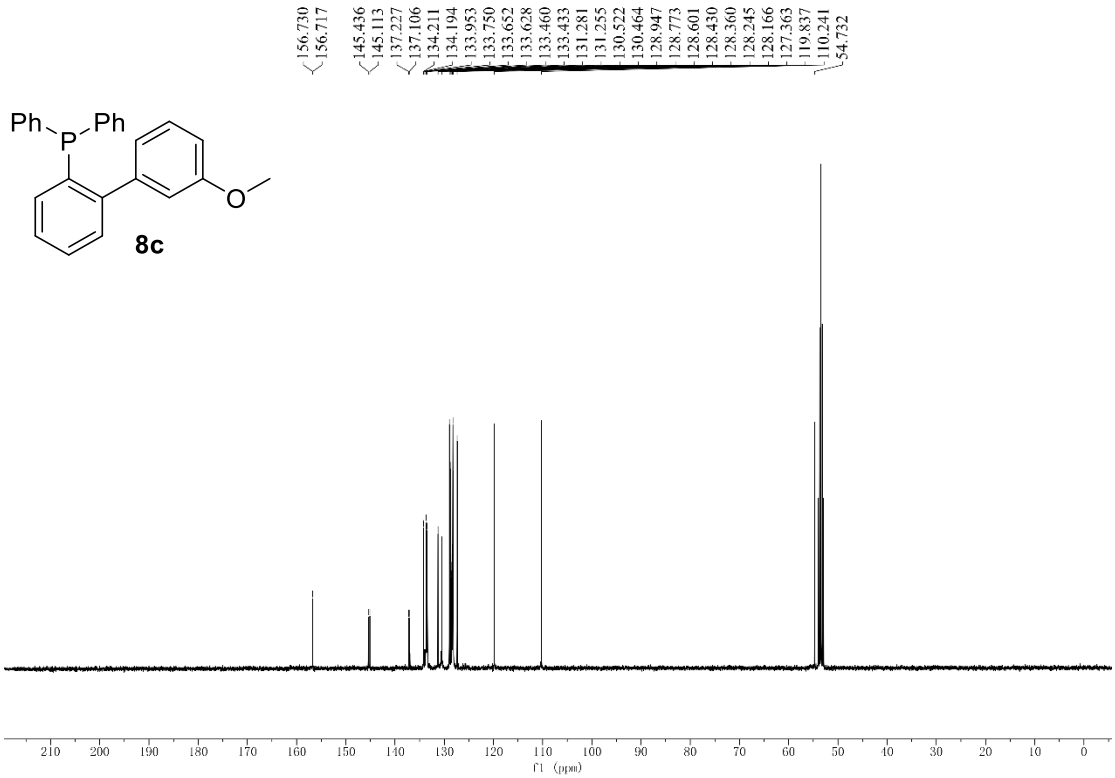
^{1}H NMR (400 MHz, Methylene Chloride-d_2) of **(3′-Methoxy[1,1′-biphenyl]-2-yl)diphenylphosphine (8c)**.



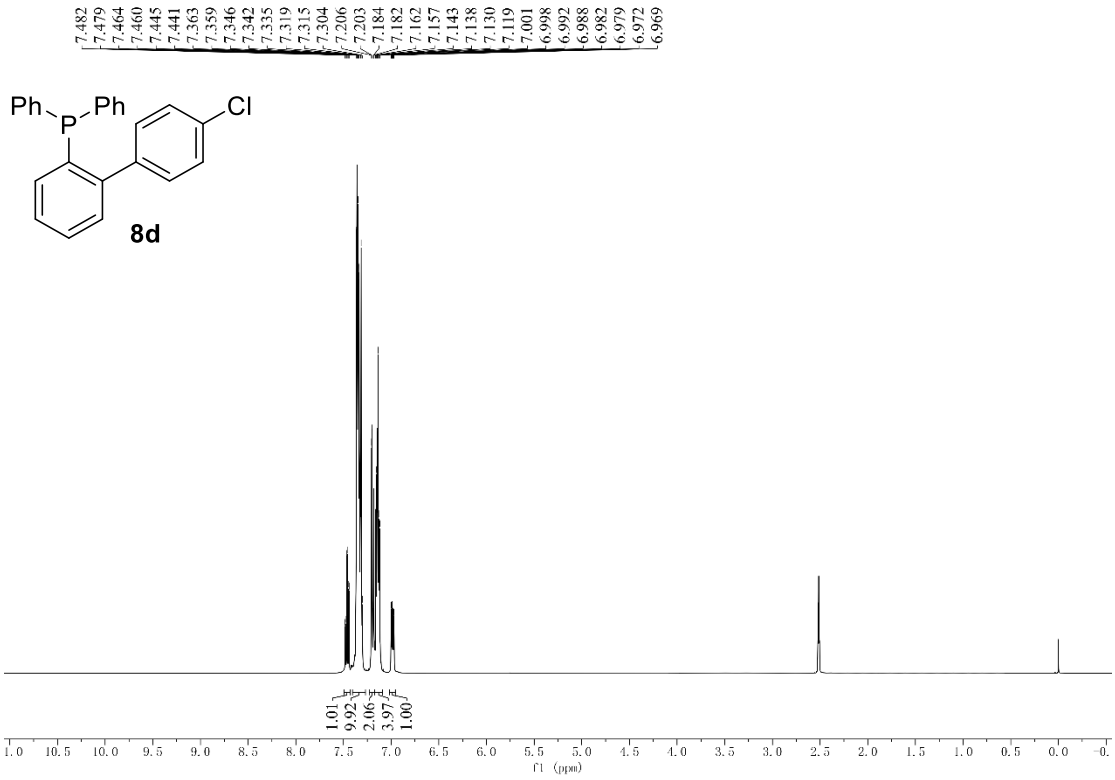
^{31}P NMR (162 MHz, Methylene Chloride-d_2) of **(3′-Methoxy[1,1′-biphenyl]-2-yl)diphenylphosphine (8c)**.



^{13}C NMR (101 MHz, Methylene Chloride-d_2) of **(3′-Methoxy[1,1′-biphenyl]-2-yl)diphenylphosphine (8c)**.

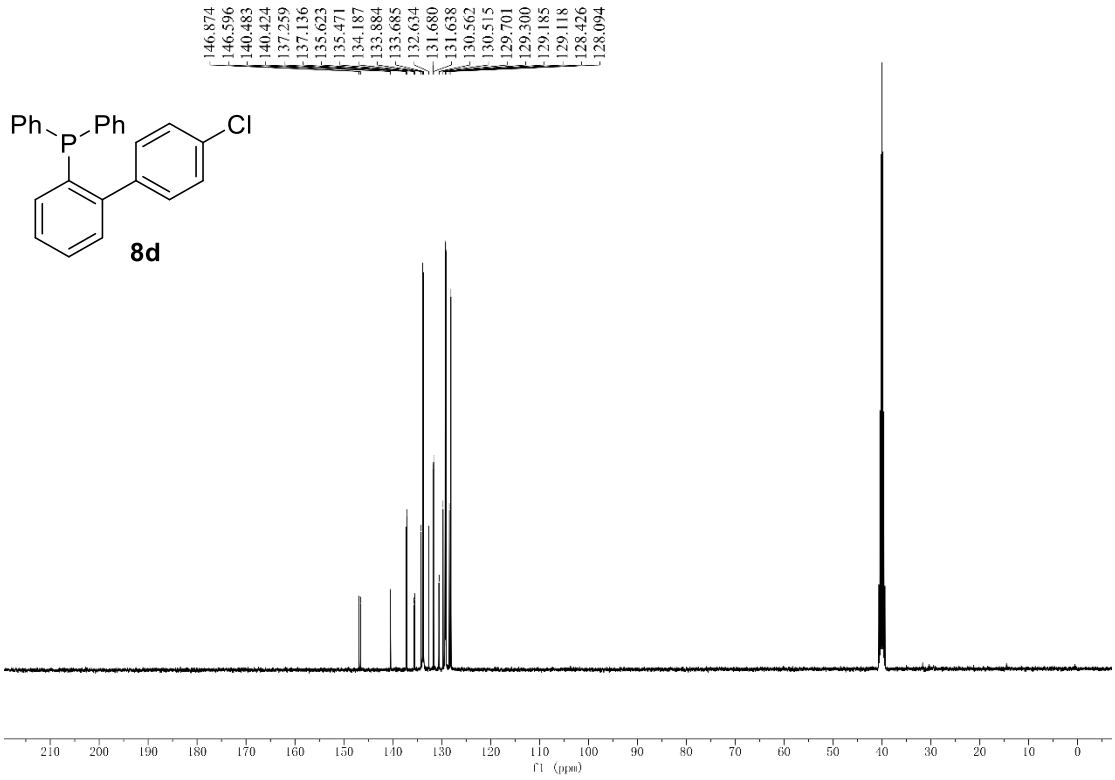


^{1}H NMR (400 MHz, DMSO-d_6) of **(4′-Chloro[1,1′-biphenyl]-2-yl)diphenylphosphine (8d)**.

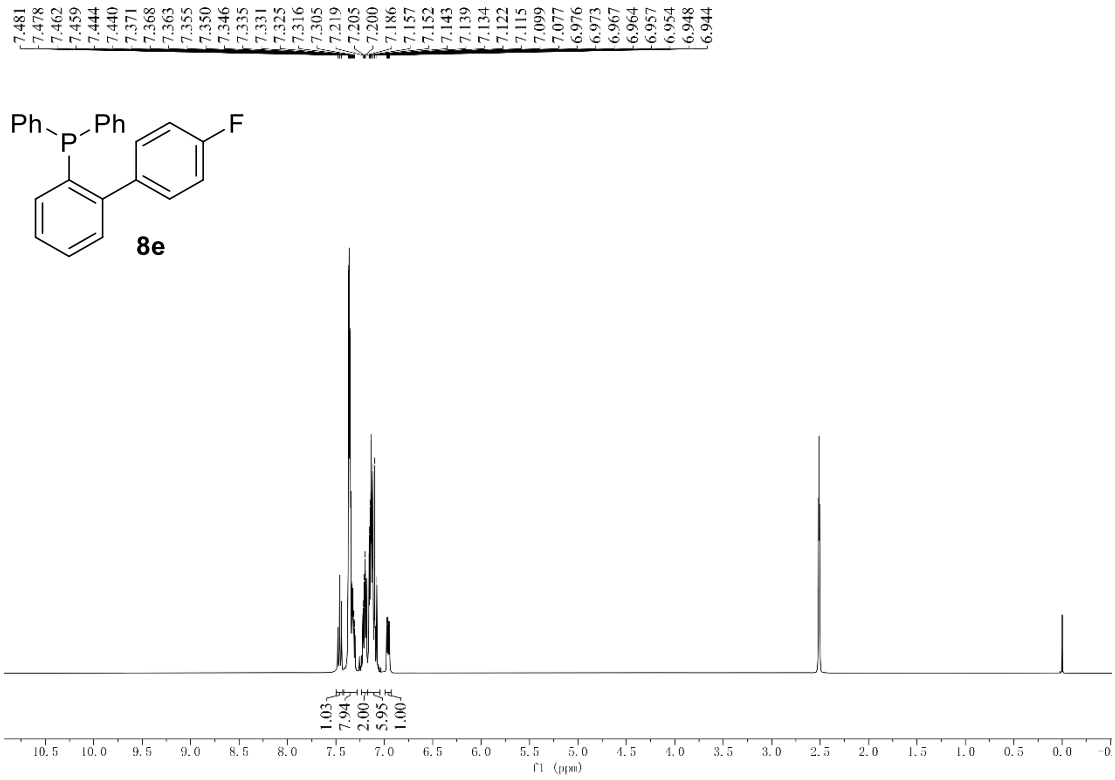


^{31}P NMR (162 MHz, DMSO-d_6) of **(4′-Chloro[1,1′-biphenyl]-2-yl)diphenylphosphine (8d)**.

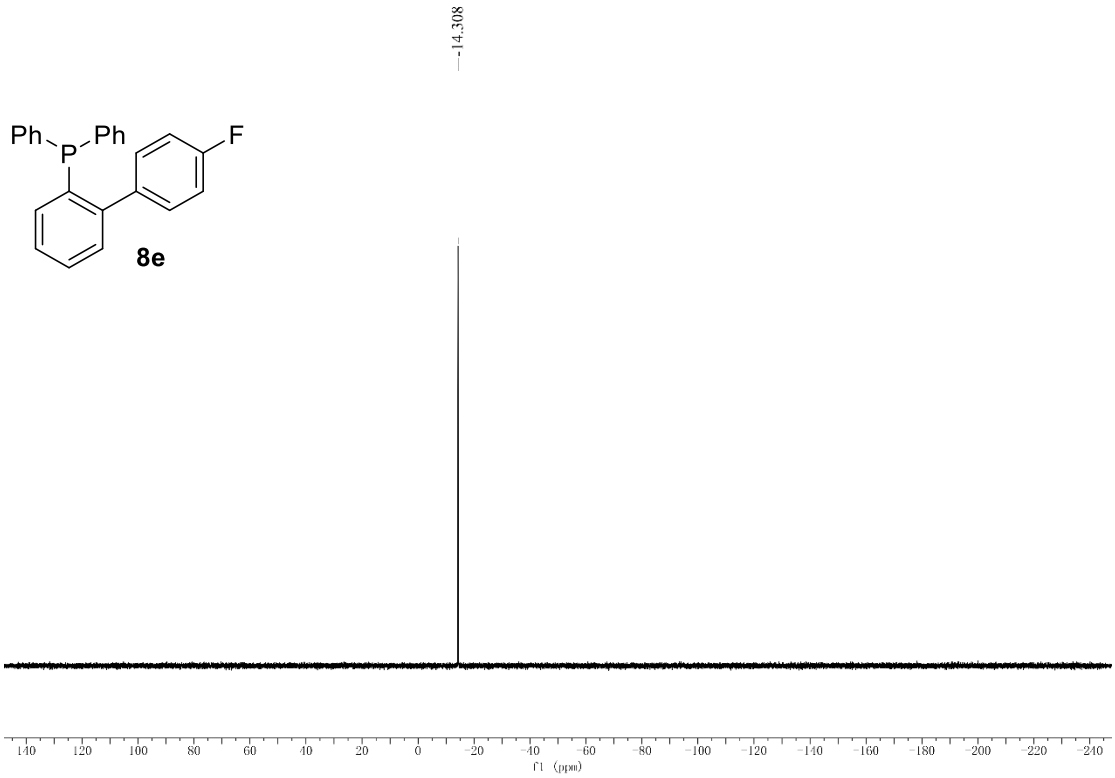
^{13}C NMR (101 MHz, DMSO-d_6) of **(4′-Chloro[1,1′-biphenyl]-2-yl)diphenylphosphine (8d)**.



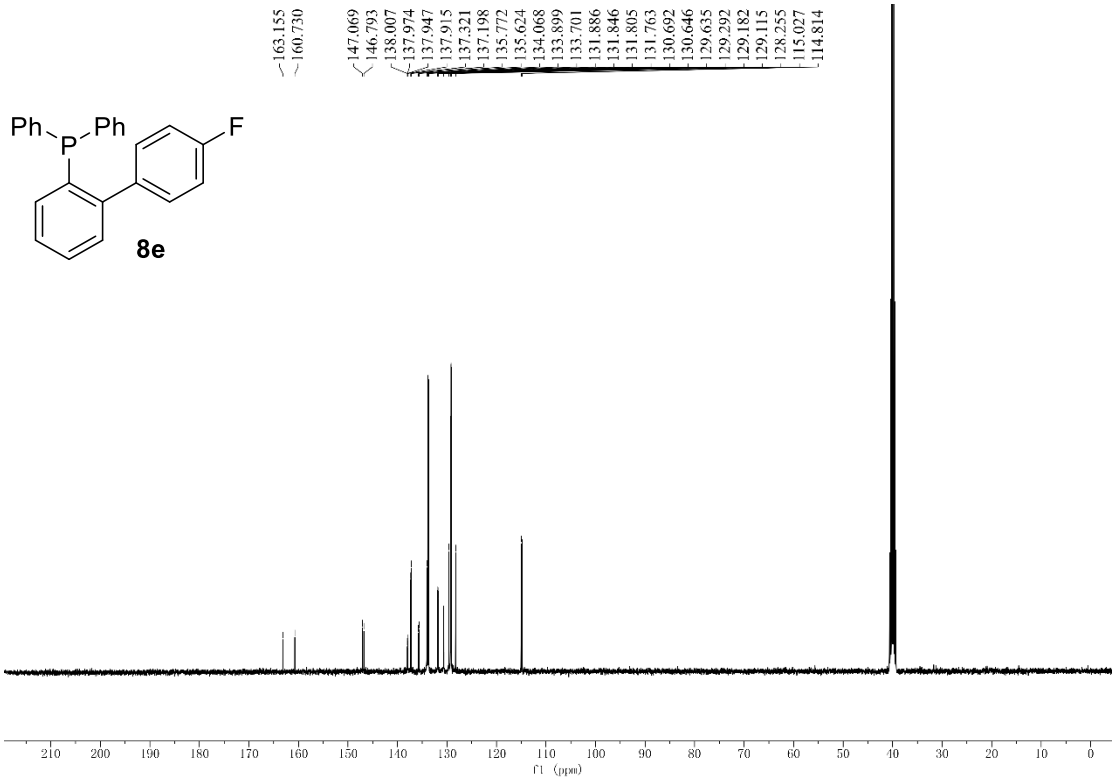
^{1}H NMR (400 MHz, DMSO-d_6) of **(4′-Fluoro[1,1′-biphenyl]-2-yl)diphenylphosphine (8e)**.



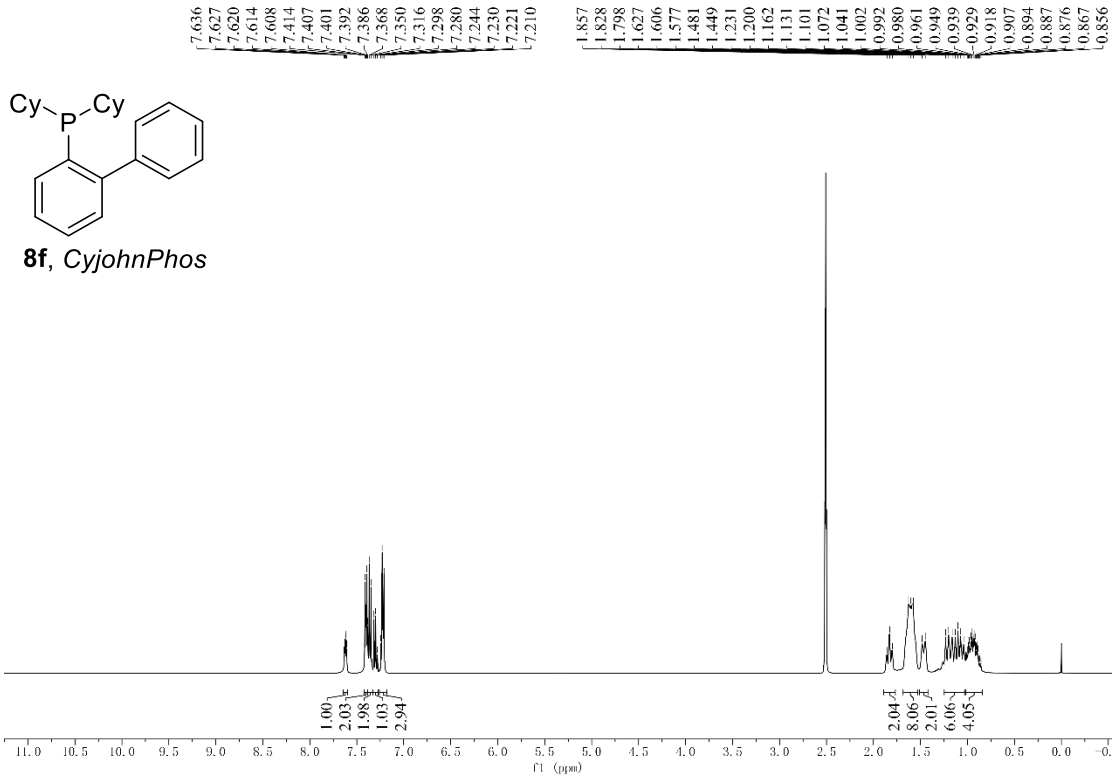
^{31}P NMR (162 MHz, DMSO-d_6) of **(4′-Fluoro[1,1′-biphenyl]-2-yl)diphenylphosphine (8e)**.



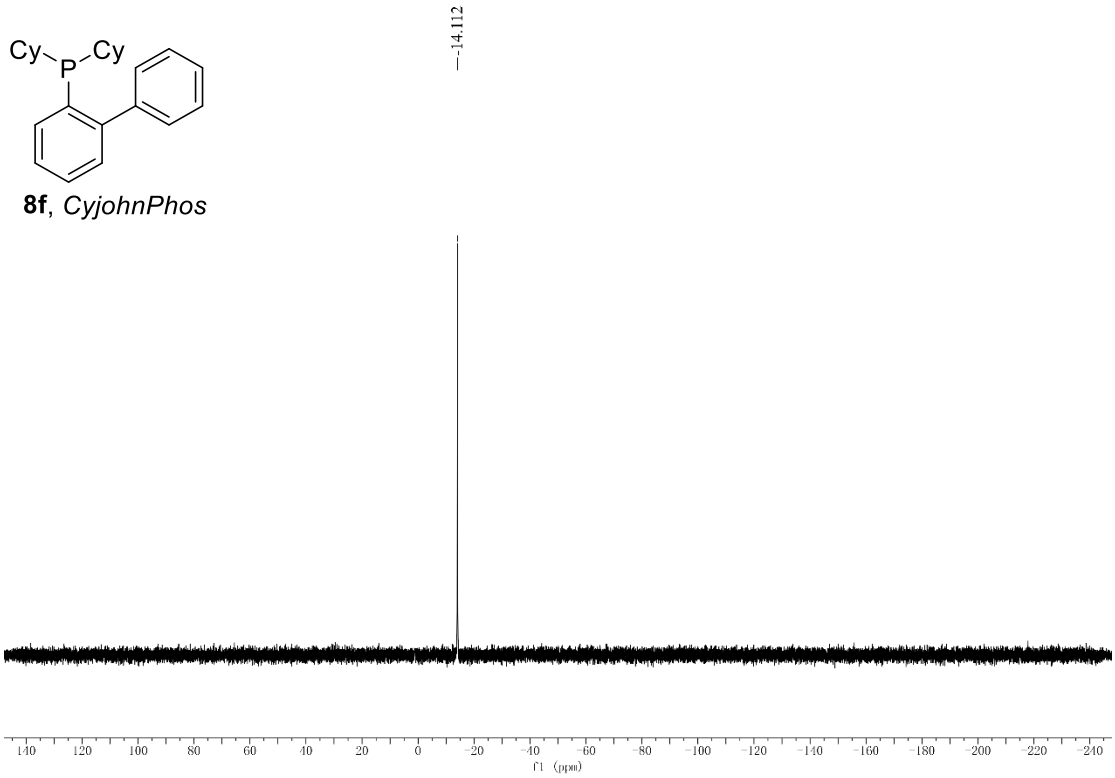
^{13}C NMR (101 MHz, DMSO-d_6) of **(4′-Fluoro[1,1′-biphenyl]-2-yl)diphenylphosphine (8e)**.



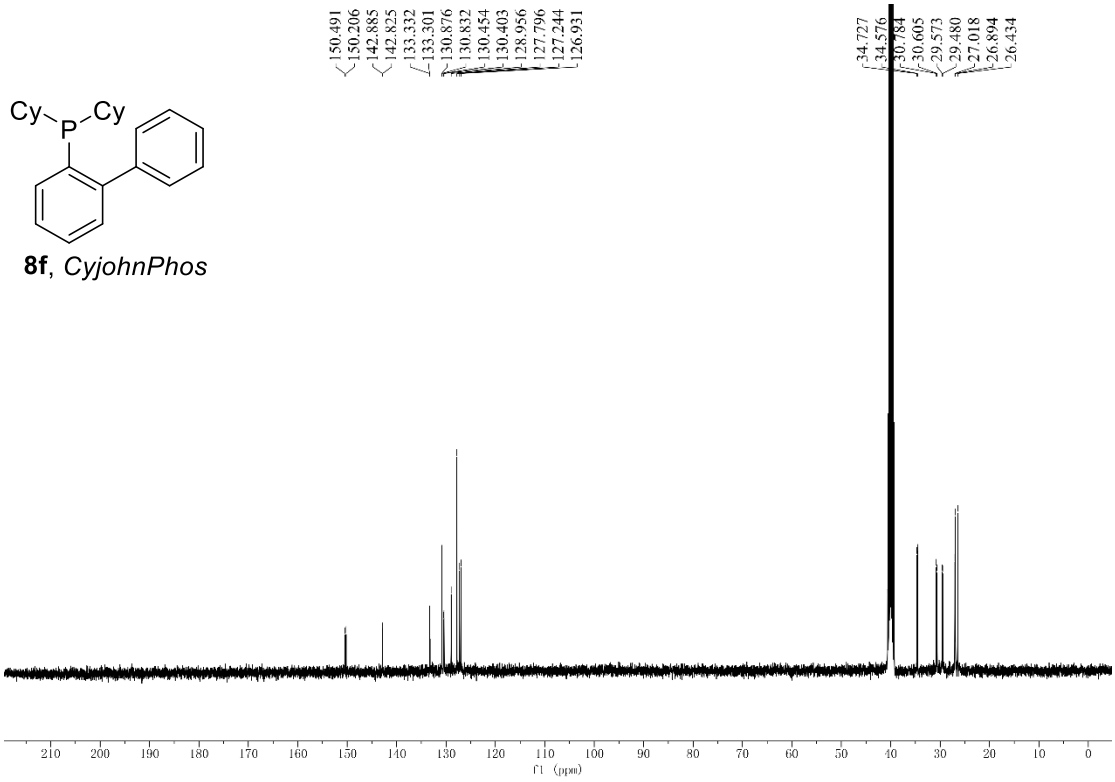
^{1}H NMR (400 MHz, DMSO-d_6) of **2-(Dicyclohexylphosphino)biphenyl (8f)**.



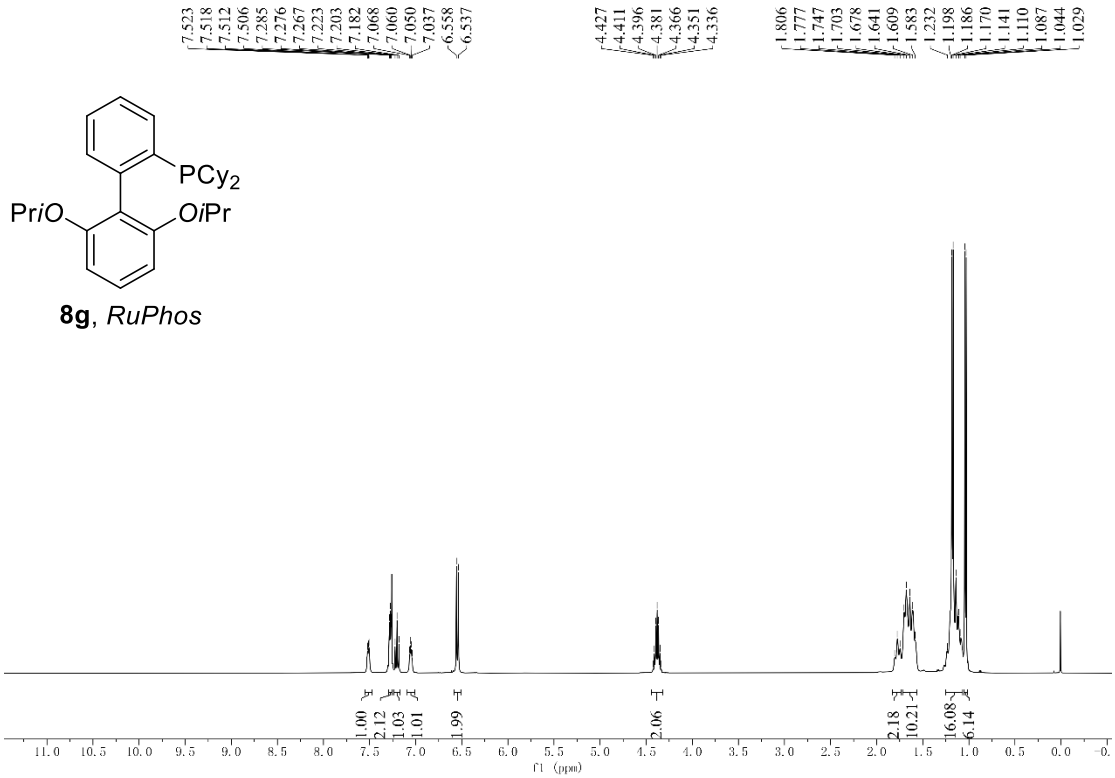
^{31}P NMR (162 MHz, DMSO-d_6) of **2-(Dicyclohexylphosphino)biphenyl (8f)**.



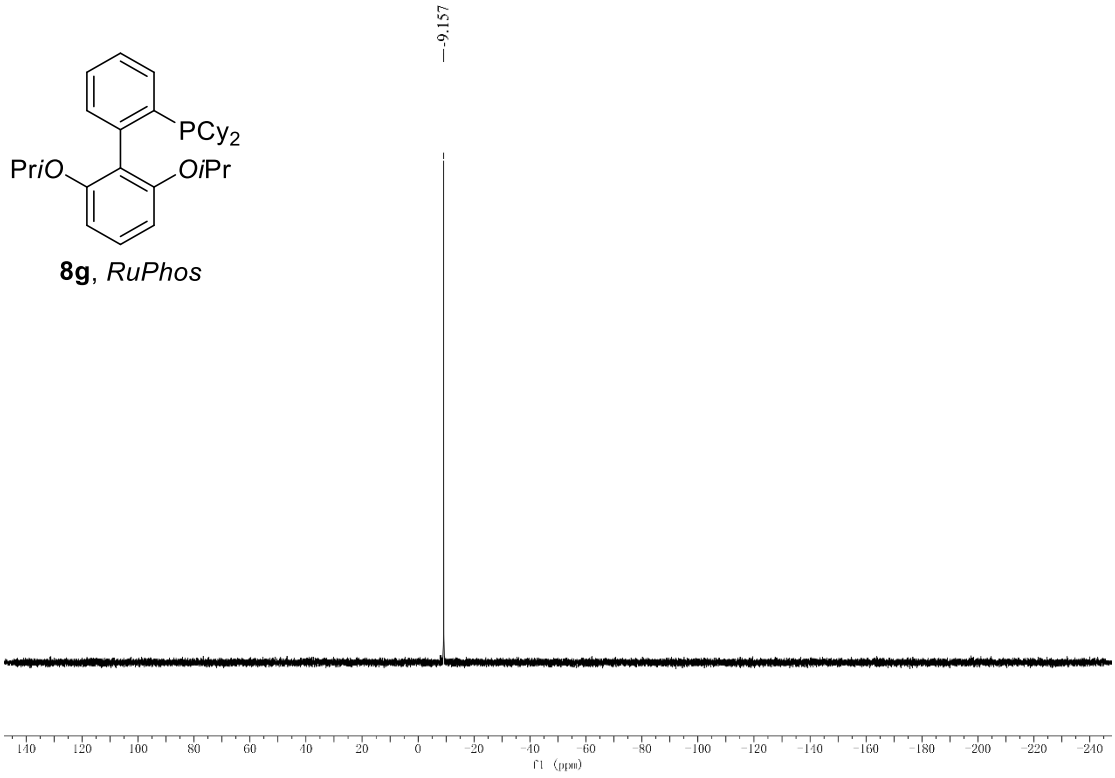
^{13}C NMR (101 MHz, DMSO-d_6) of **2-(Dicyclohexylphosphino)biphenyl (8f)**.



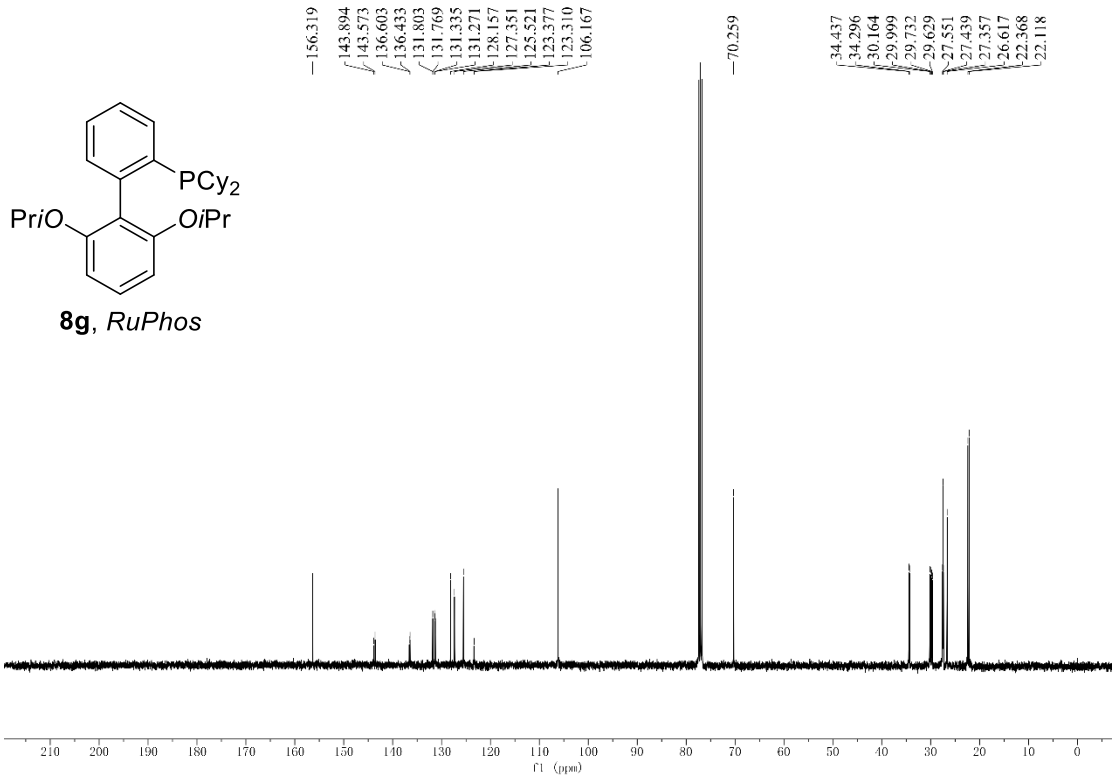
^{1}H NMR (400 MHz, Chloroform-*d*) of **[2′,6′-Bis(1-methylethoxy)[1,1′-biphenyl]-2-yl]dicyclohexylphosphine (8g)**.



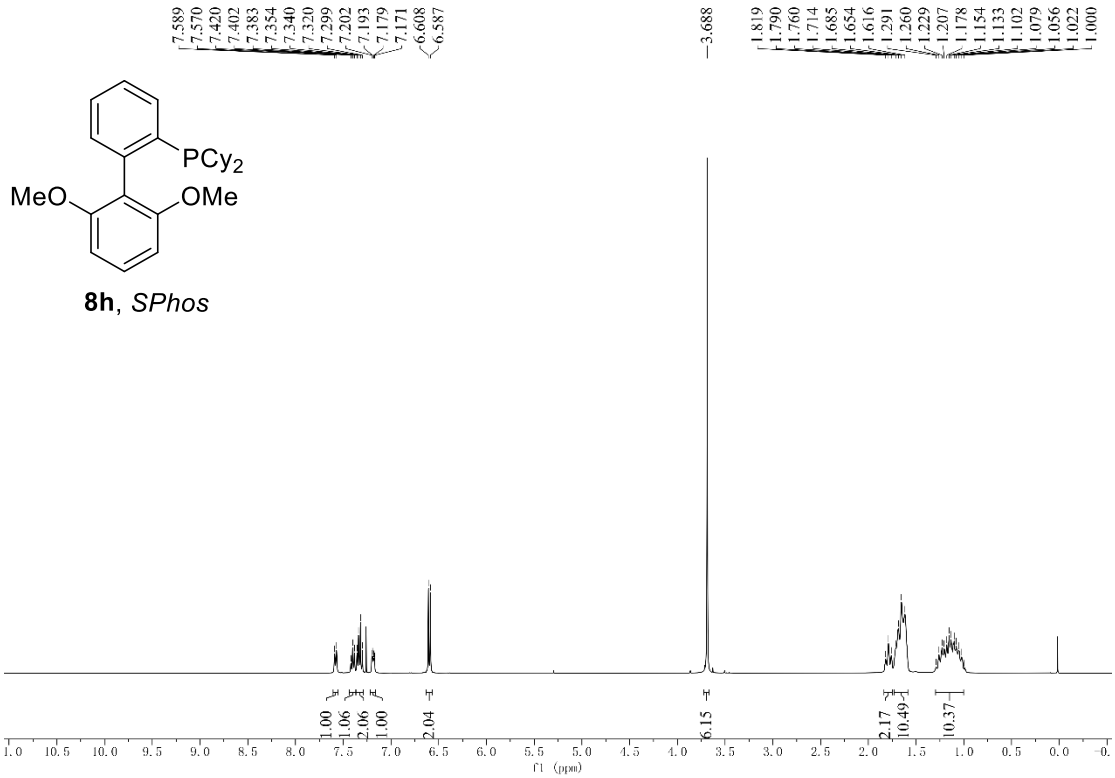
^{31}P NMR (162 MHz, Chloroform-*d*) of **[2′,6′-Bis(1-methylethoxy)[1,1′-biphenyl]-2-yl]dicyclohexylphosphine (8g)**.



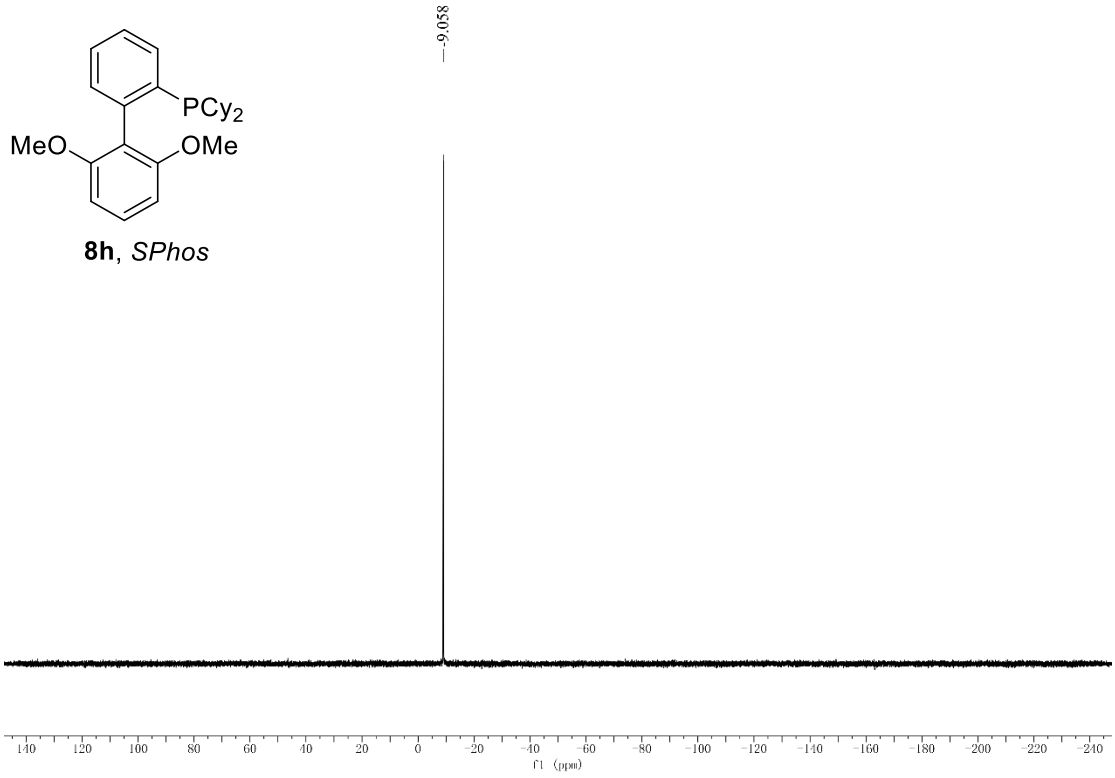
^{13}C NMR (101 MHz, Chloroform-*d*) of **[2′,6′-Bis(1-methylethoxy)[1,1′-biphenyl]-2-yl]dicyclohexylphosphine (8g)**.



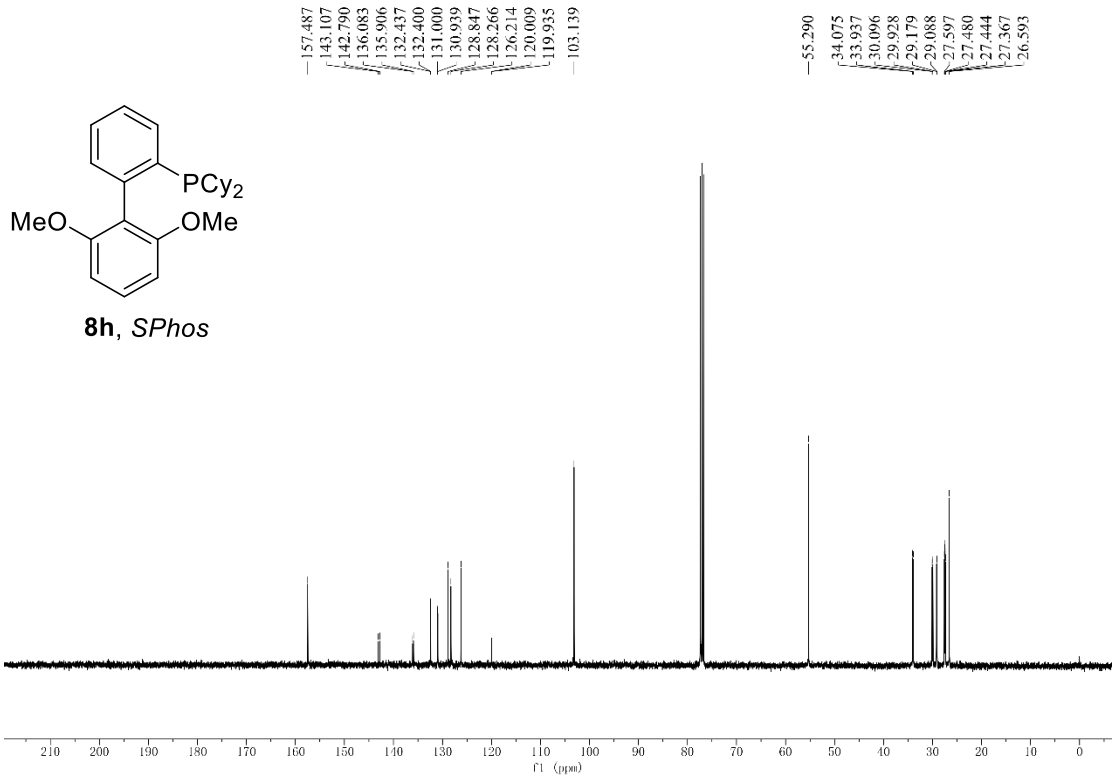
^{1}H NMR (400 MHz, Chloroform-*d*) of **2-Dicyclohexylphosphino-2′,6′-dimethoxybiphenyl (8h)**.



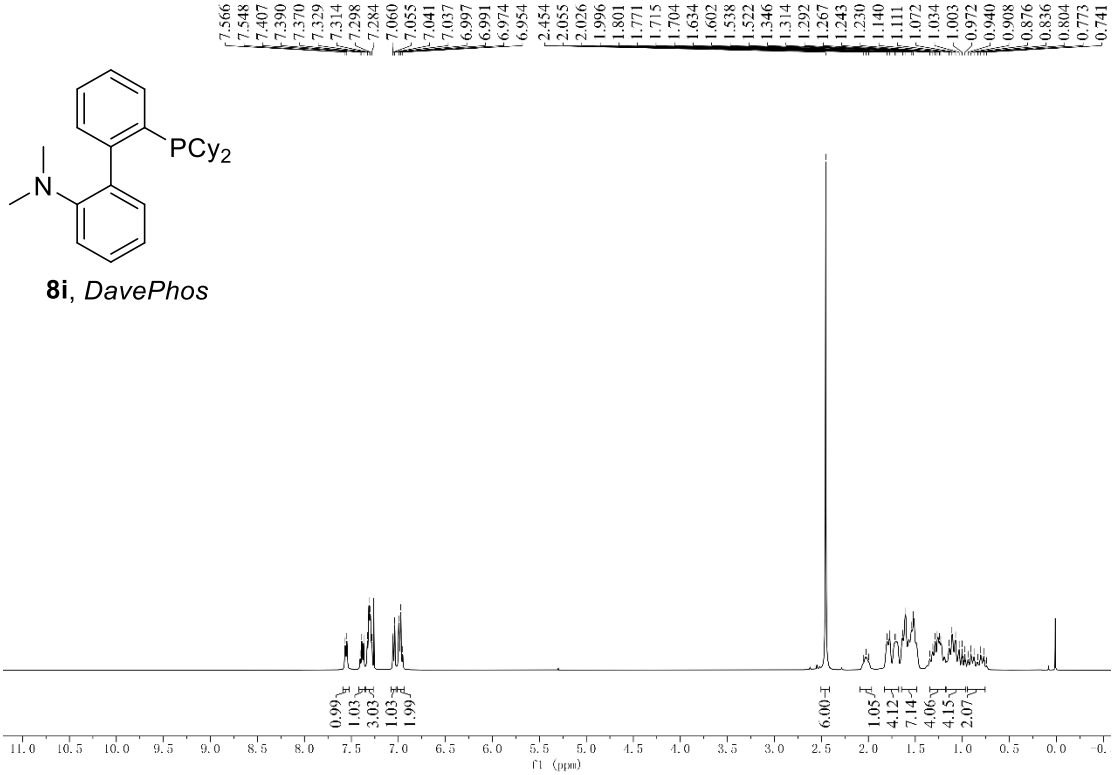
^{31}P NMR (162 MHz, Chloroform-*d*) of **2-Dicyclohexylphosphino-2′,6′-dimethoxybiphenyl (8h)**.



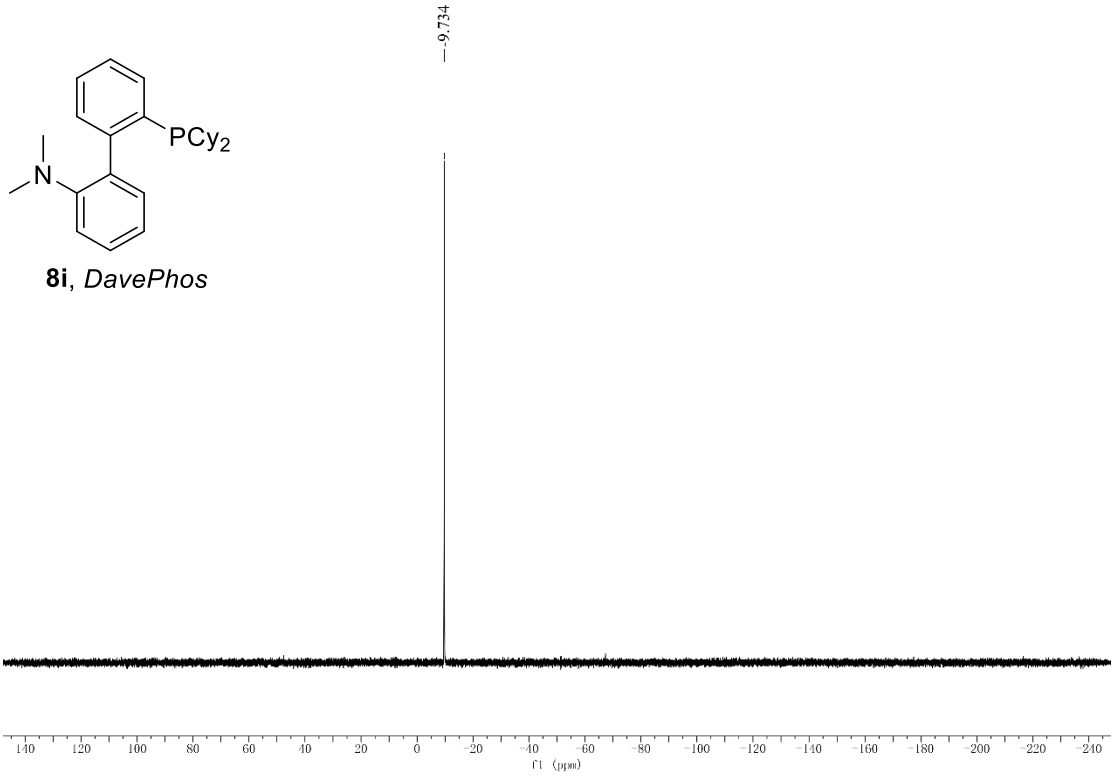
^{13}C NMR (101 MHz, Chloroform-*d*) of **2-Dicyclohexylphosphino-2′,6′-dimethoxybiphenyl (8h)**.



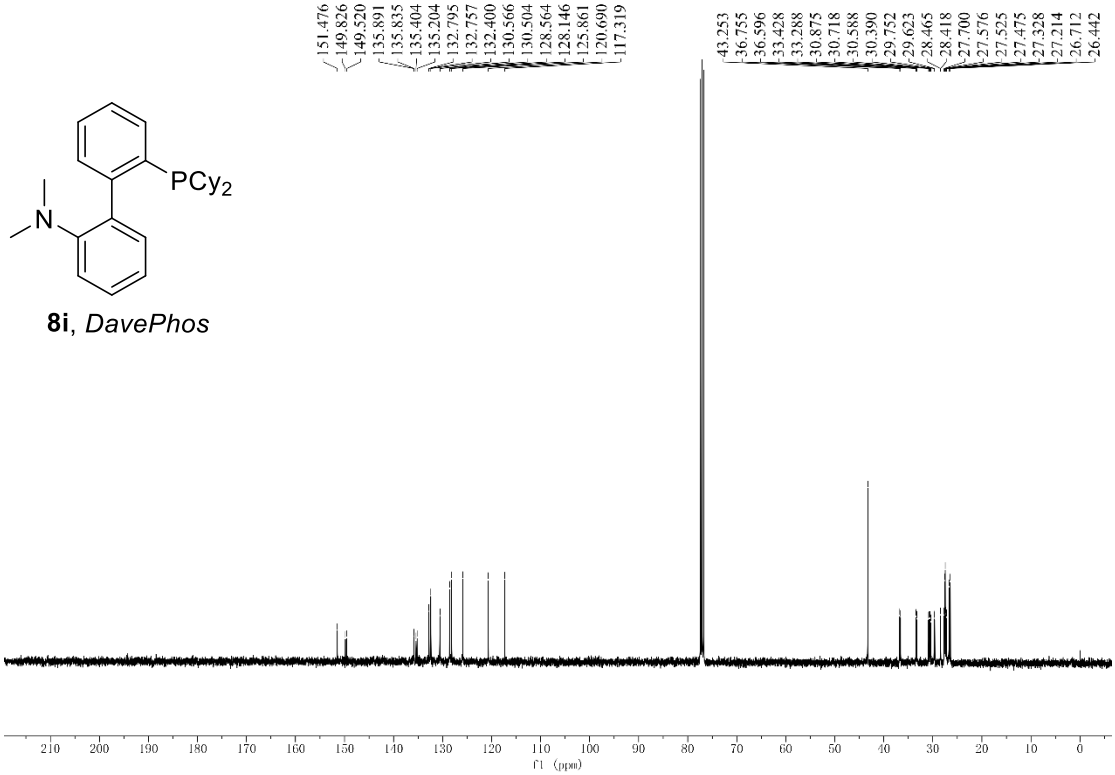
^{1}H NMR (400 MHz, Chloroform-*d*) of **2′-(Dicyclohexylphosphino)-*N*,*N*-dimethyl[1,1′-biphenyl]-2-amine (8i)**.



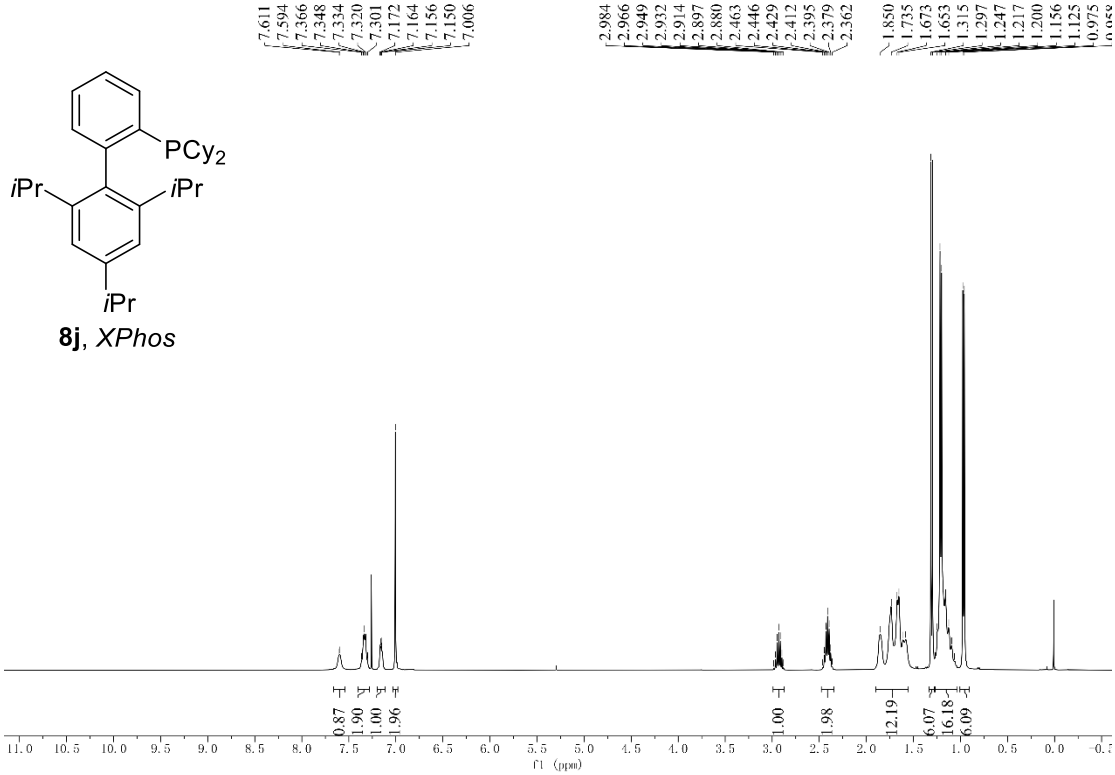
^{31}P NMR (162 MHz, Chloroform-*d*) of **2′-(Dicyclohexylphosphino)-*N*,*N*-dimethyl[1,1′-biphenyl]-2-amine (8i)**.



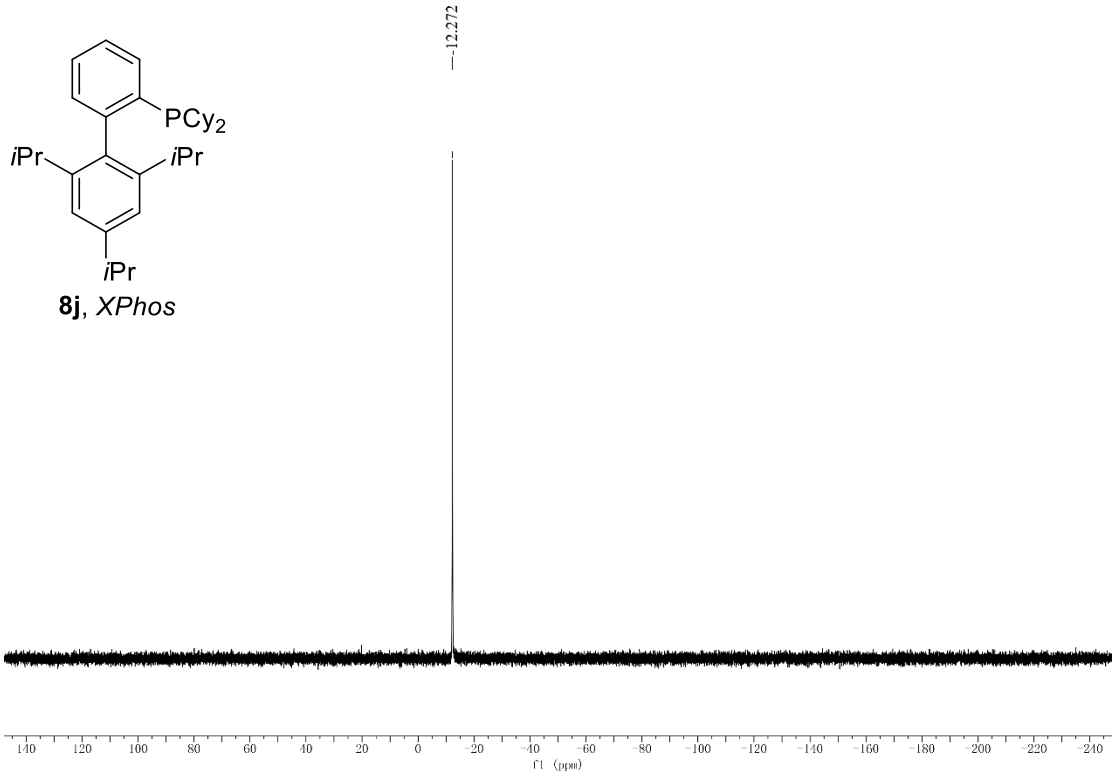
^{13}C NMR (101 MHz, Chloroform-*d*) of **2′-(Dicyclohexylphosphino)-*N*,*N*-dimethyl[1,1′-biphenyl]-2-amine (8i)**.



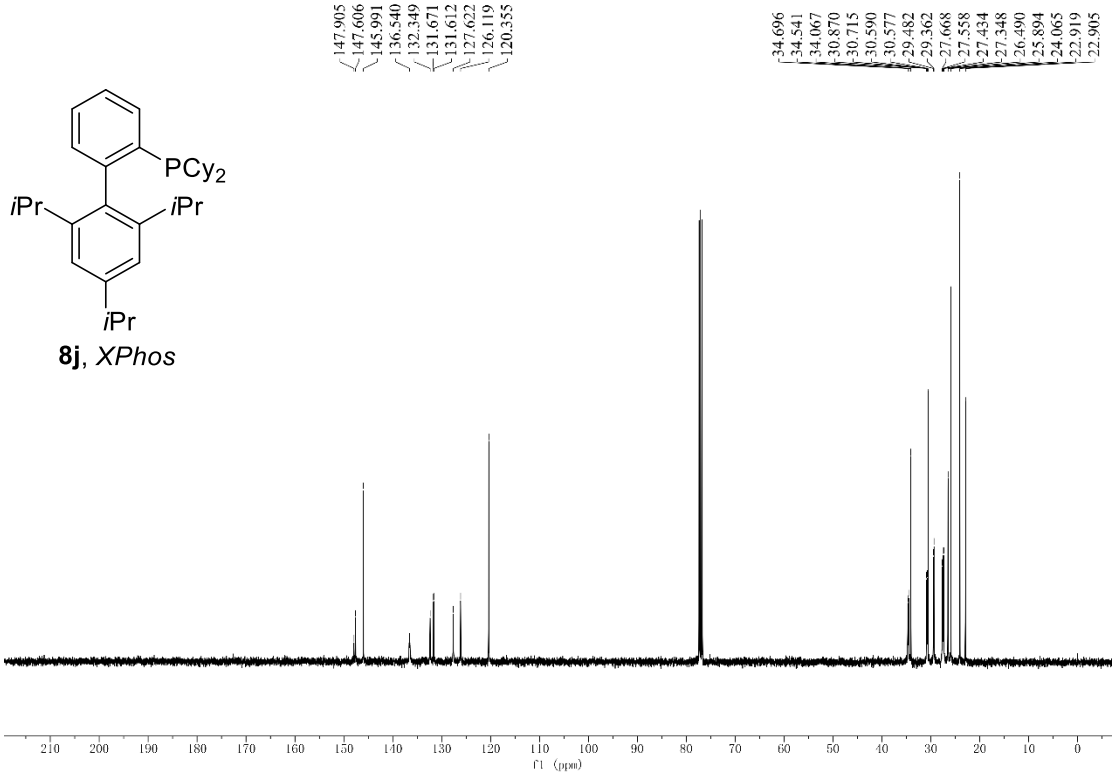
^{1}H NMR (400 MHz, Chloroform-*d*) of **2-Dicyclohexylphosphino-2',4',6'-triisopropylbiphenyl (8j)**.



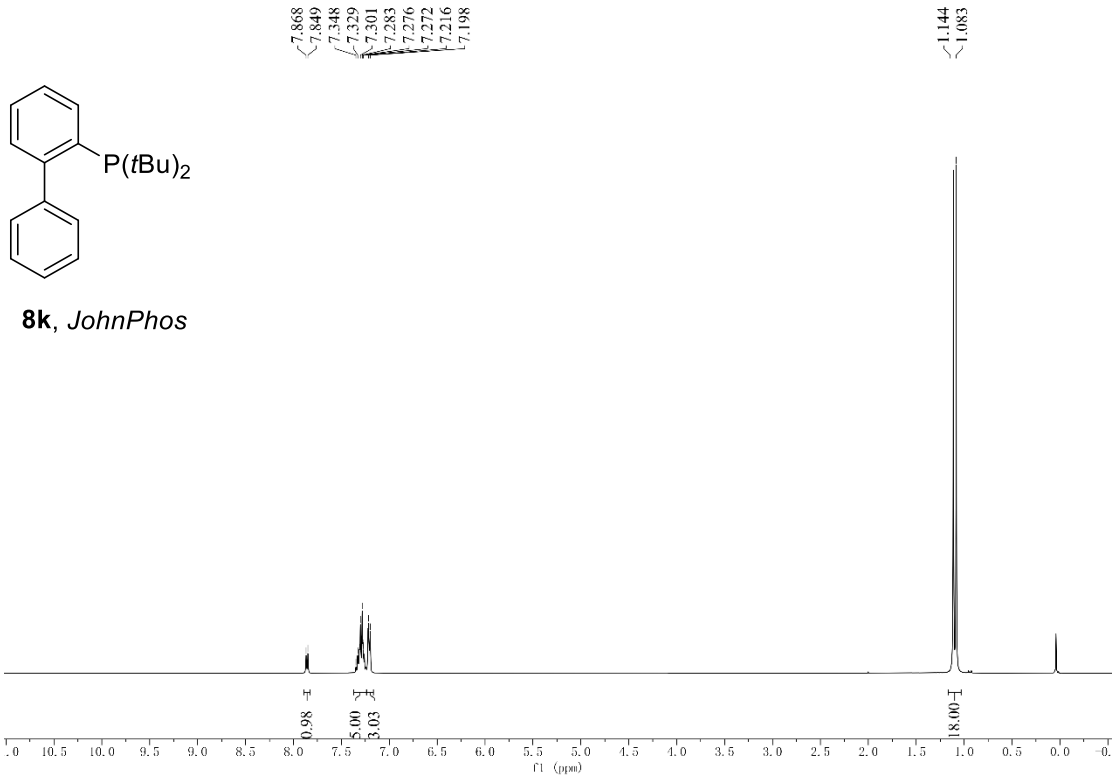
^{31}P NMR (162 MHz, Chloroform-*d*) of **2-Dicyclohexylphosphino-2',4',6'-triisopropylbiphenyl (8j)**.



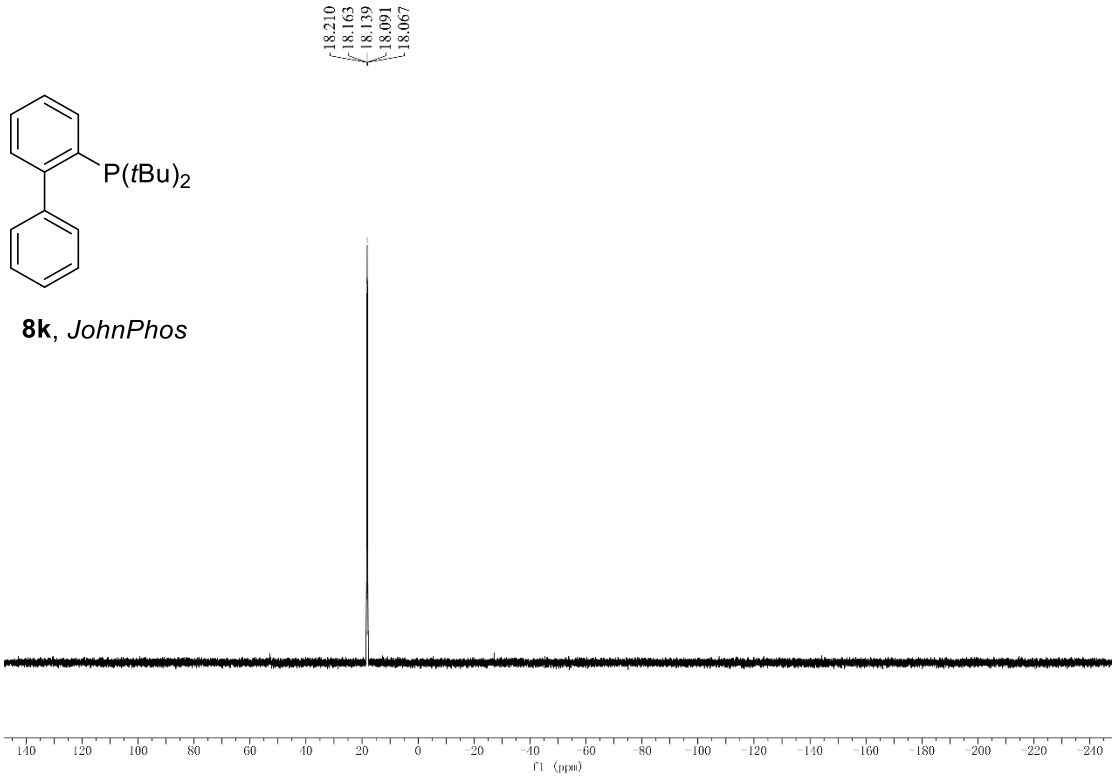
^{13}C NMR (101 MHz, Chloroform-*d*) of **2-Dicyclohexylphosphino-2',4',6'-triisopropylbiphenyl (8j)**.



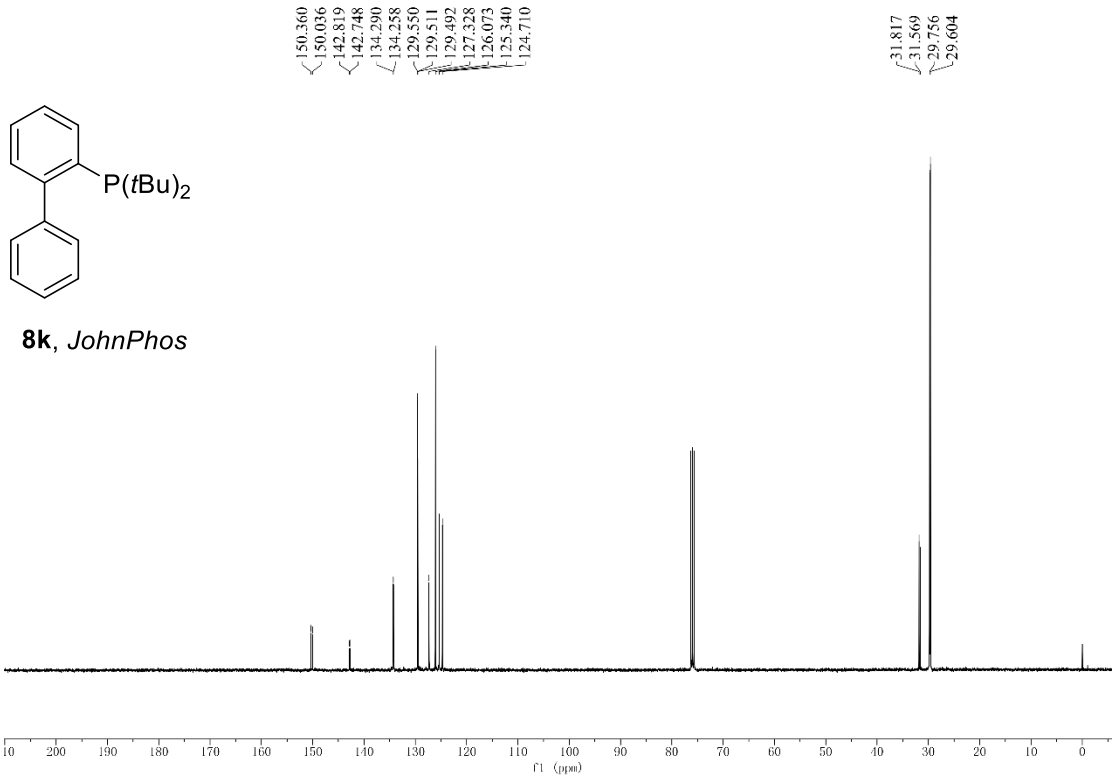
^{1}H NMR (400 MHz, Chloroform-*d*) of **2-(Di-tert-butylphosphino)biphenyl (8k)**.



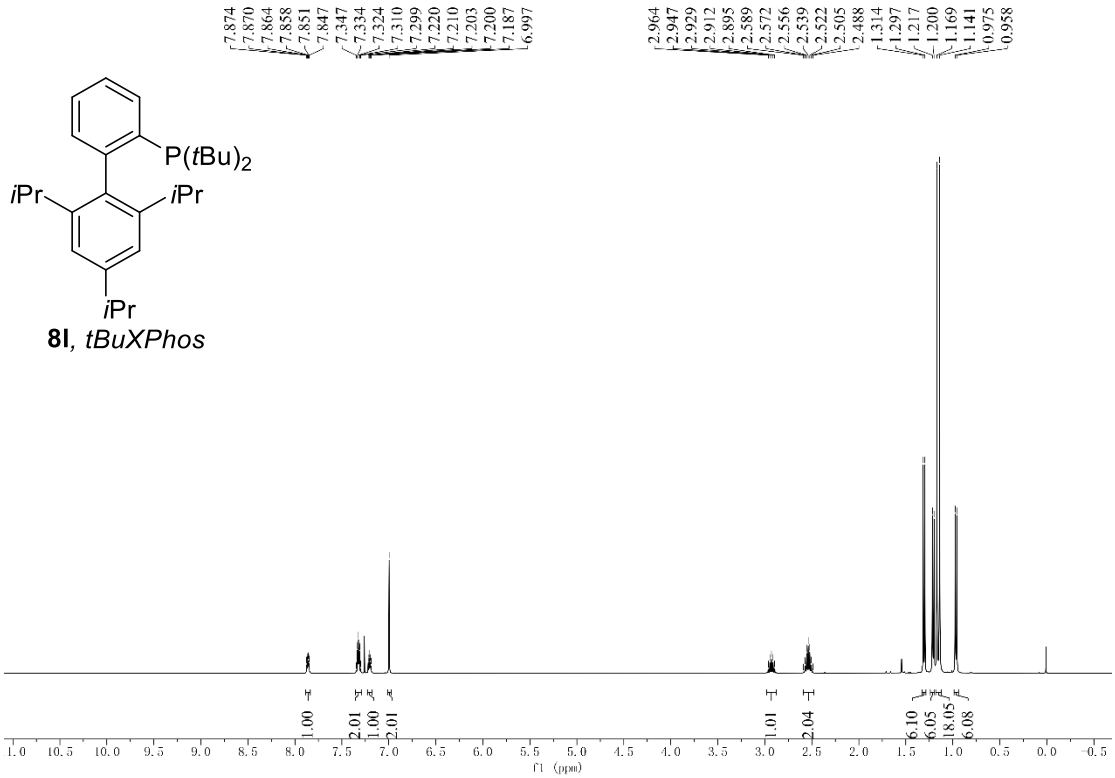
^{31}P NMR (162 MHz, Chloroform-*d*) of **2-(Di-tert-butylphosphino)biphenyl (8k)**.



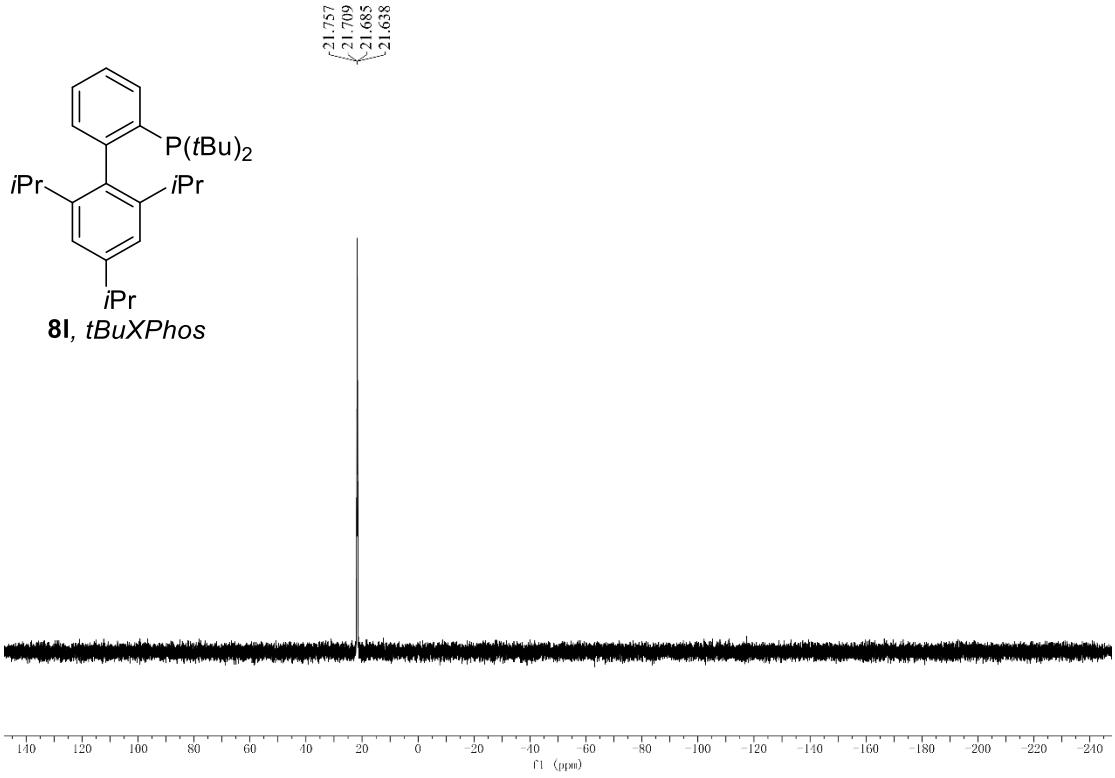
^{13}C NMR (101 MHz, Chloroform-*d*) of **2-(Di-tert-butylphosphino)biphenyl (8k)**.



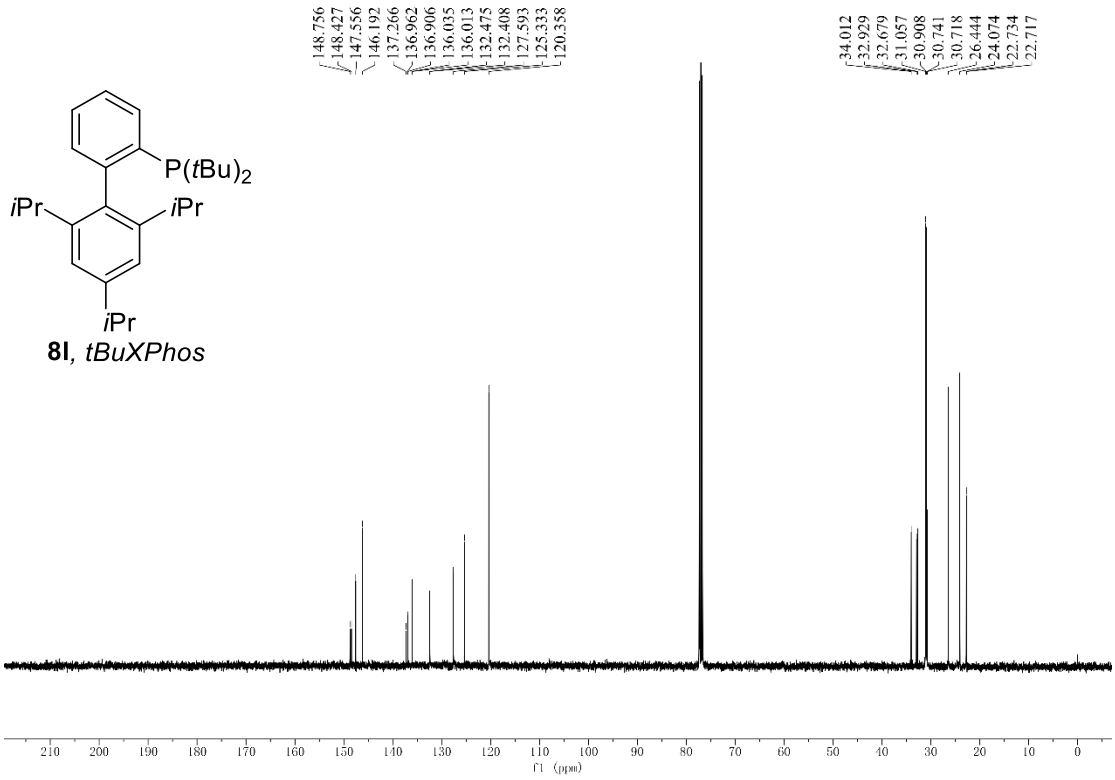
^{1}H NMR (400 MHz, Chloroform-*d*) of **2-Di-t-butylphosphino-2',4',6'-triisopropylbiphenyl (8l)**.



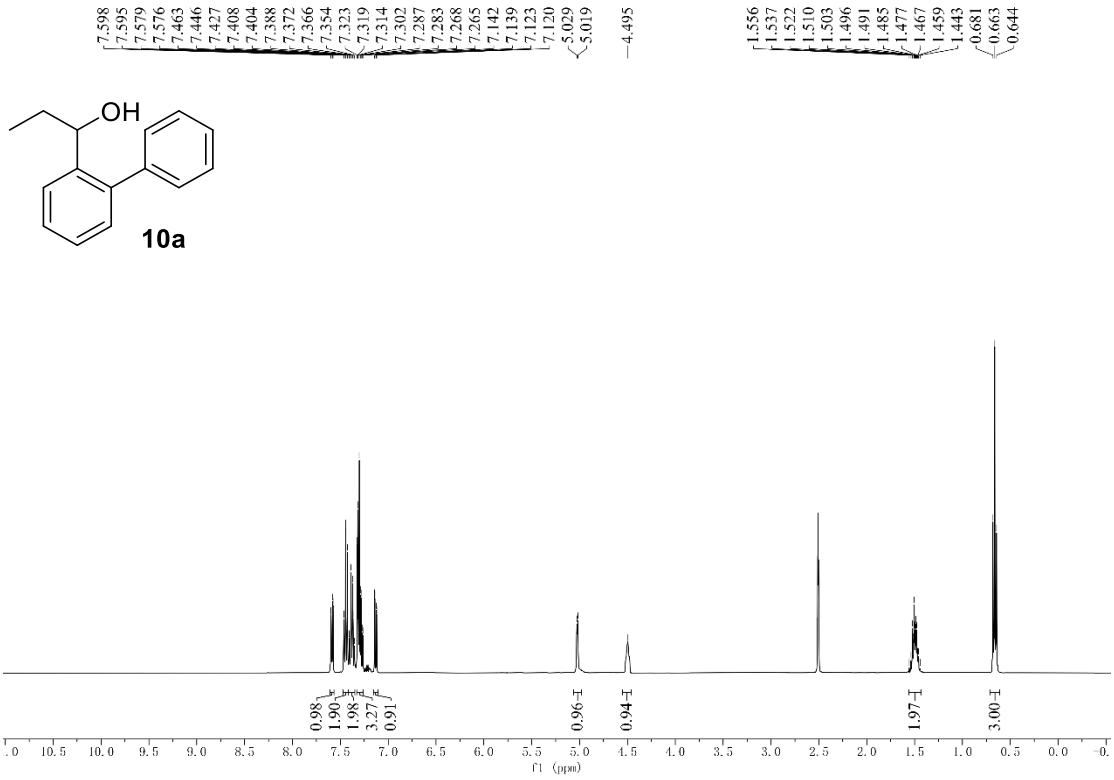
^{31}P NMR (162 MHz, Chloroform-*d*) of **2-Di-t-butylphosphino-2',4',6'-triisopropylbiphenyl (8l)**.



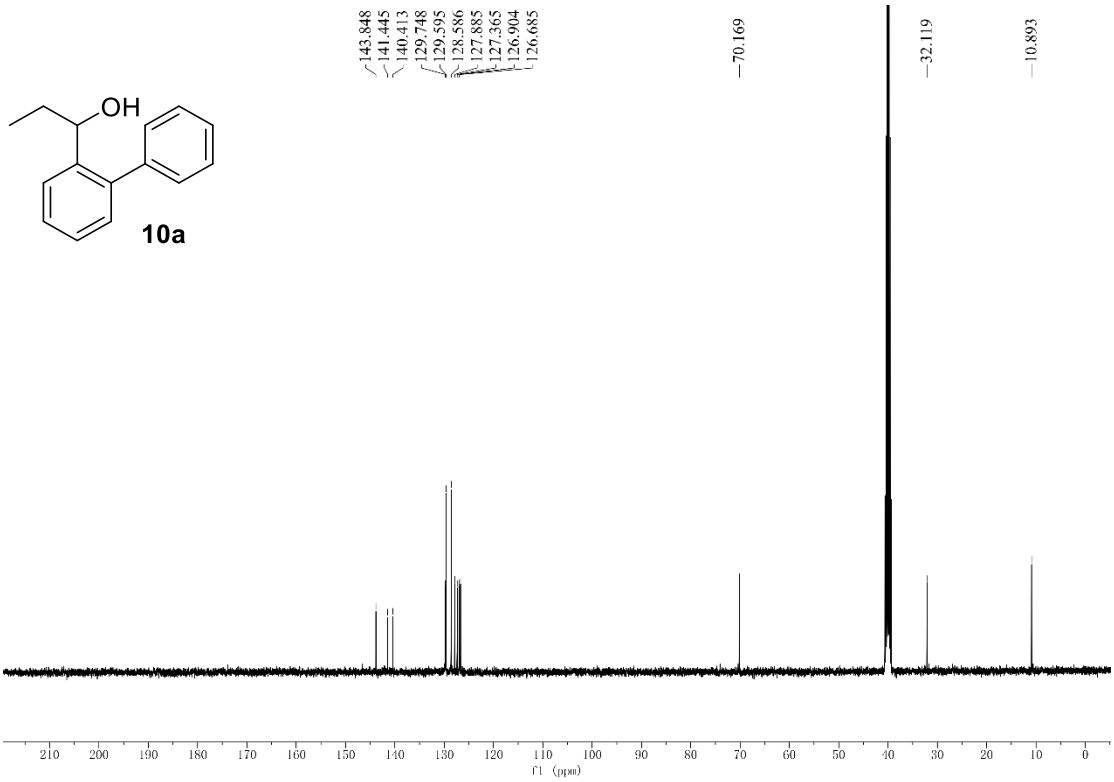
^{13}C NMR (101 MHz, Chloroform-*d*) of **2-Di-t-butylphosphino-2',4',6'-triisopropylbiphenyl (8l)**.



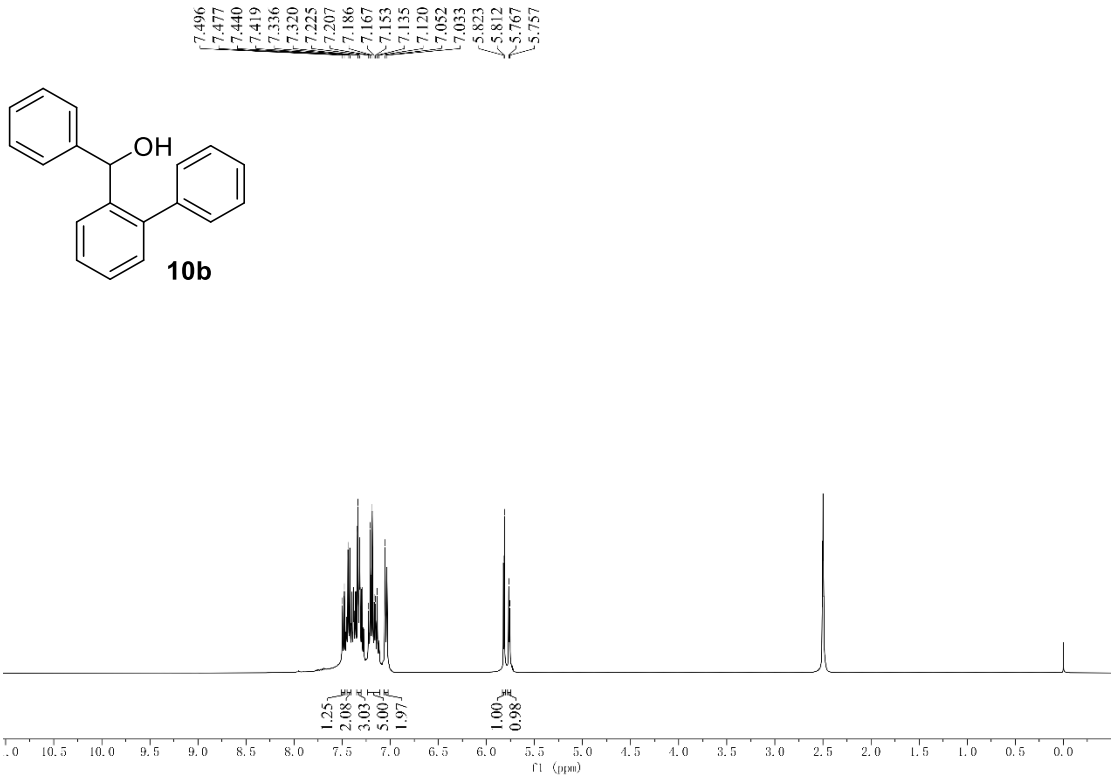
^{1}H NMR (400 MHz, DMSO-d_6) of ***α*-Ethyl[1,1′-biphenyl]-2-methanol (10a)**.



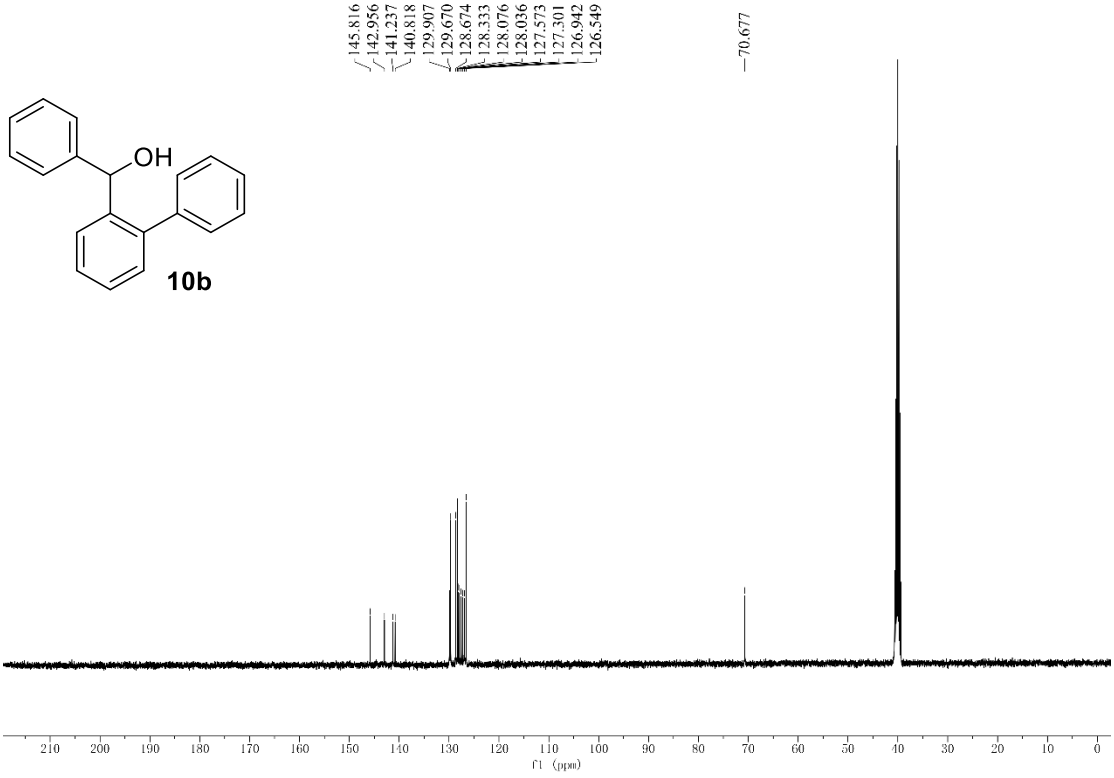
^{13}C NMR (101 MHz, DMSO-d_6) of **α-Ethyl[1,1′-biphenyl]-2-methanol (10a)**.



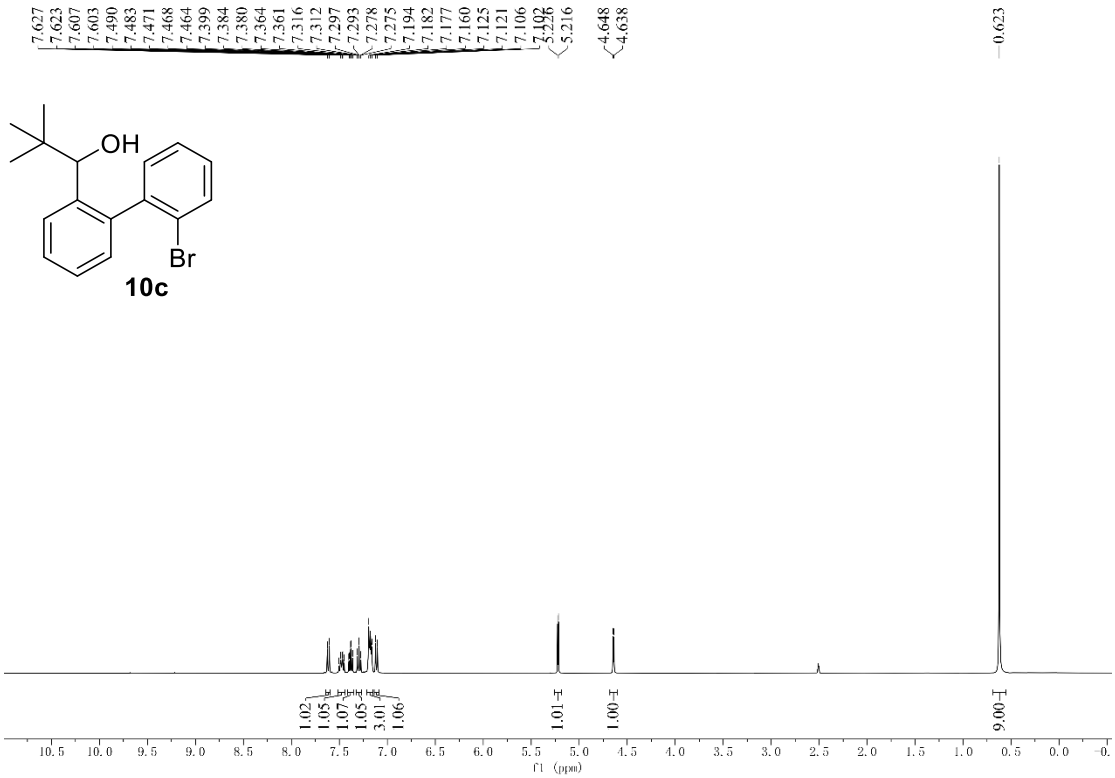
^{1}H NMR (400 MHz, DMSO-d_6) of **α-Phenyl[1,1′-biphenyl]-2-methanol (10b)**.



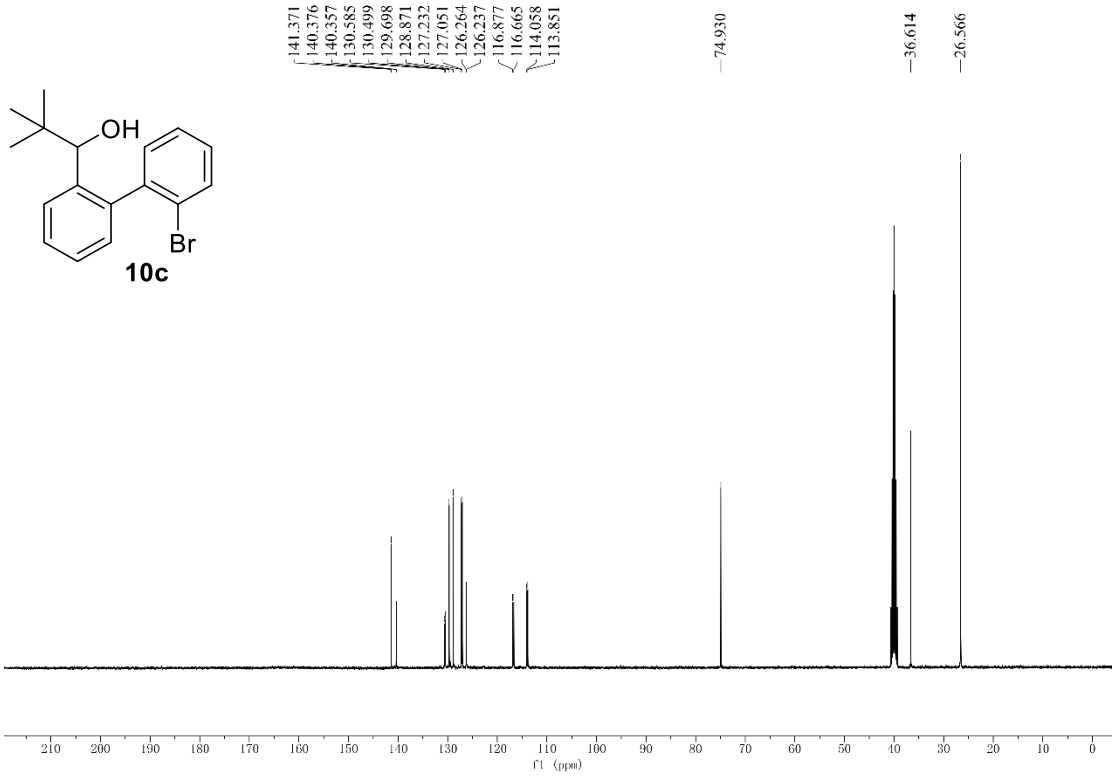
^{13}C NMR (101 MHz, DMSO-d_6) of **α-Phenyl[1,1′-biphenyl]-2-methanol (10b)**.



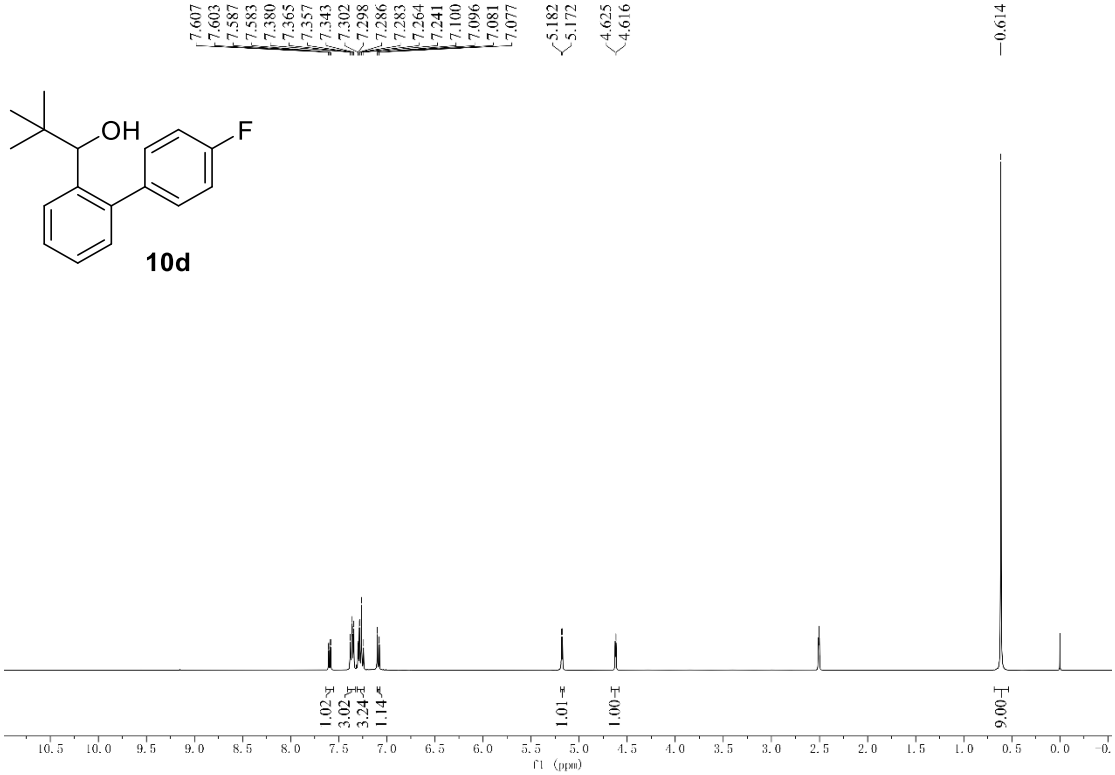
^{1}H NMR (400 MHz, DMSO-d_6) of **1-(2'-Bromo-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10c)**.



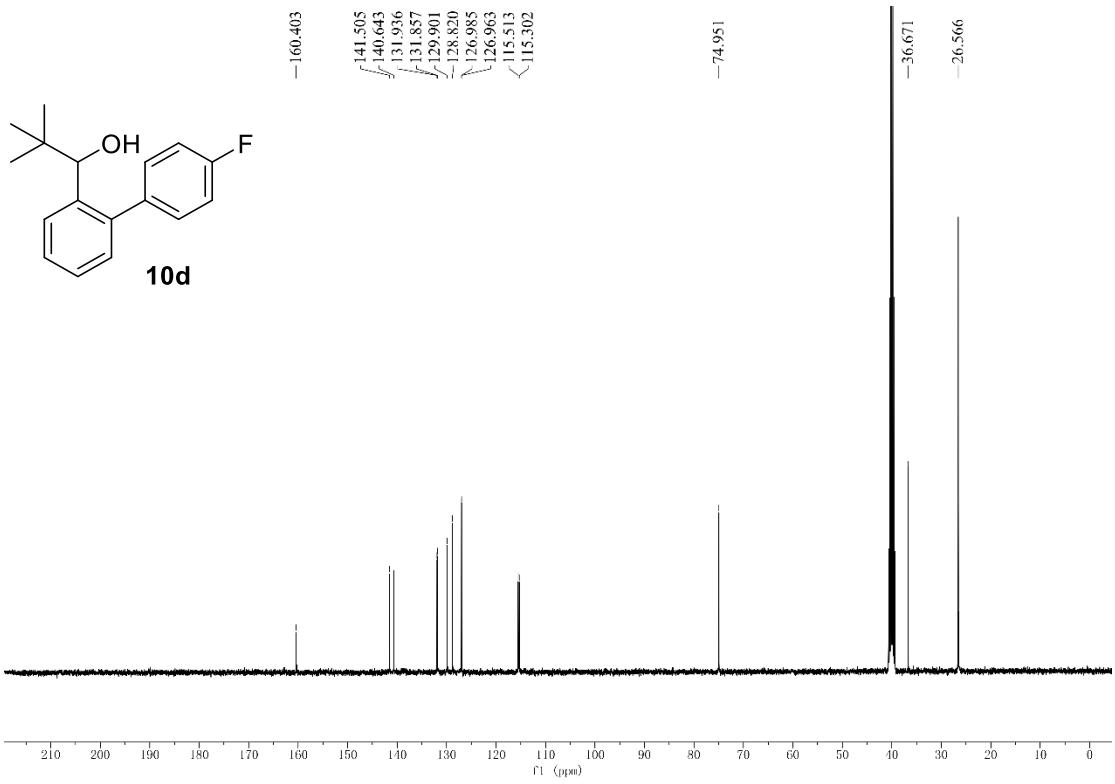
^{13}C NMR (101 MHz, DMSO-d_6) of **1-(2'-Bromo-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10c)**.



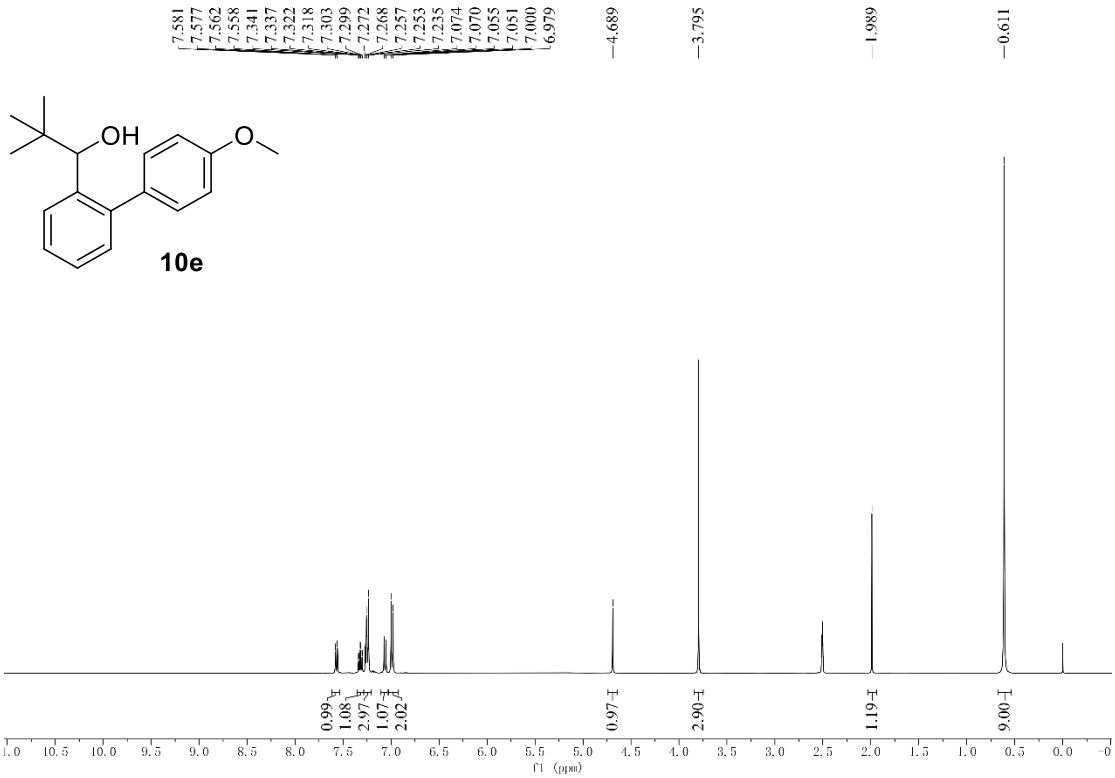
^{1}H NMR (400 MHz, DMSO-d_6) of **1-(4'-Fluoro-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10d)**.



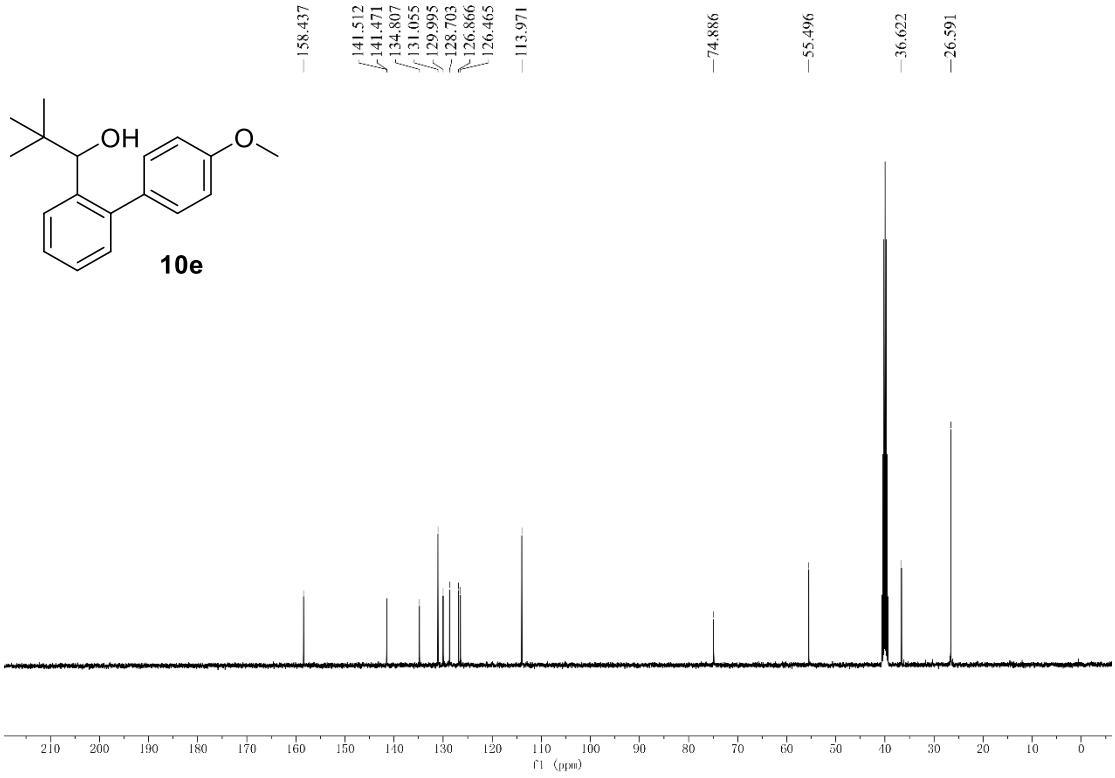
^{13}C NMR (101 MHz, DMSO-d_6) of **1-(4'-Fluoro-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10d)**.



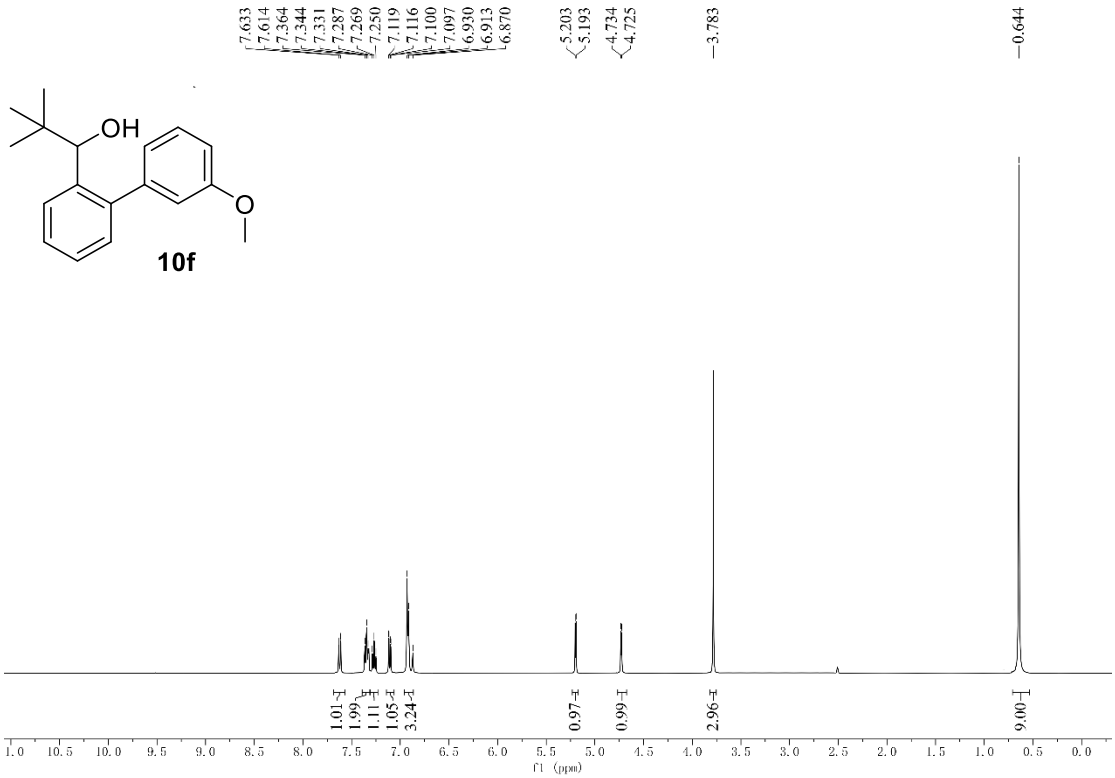
^{1}H NMR (400 MHz, DMSO-d_6) of **1-(4'-Methoxy-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10e)**.



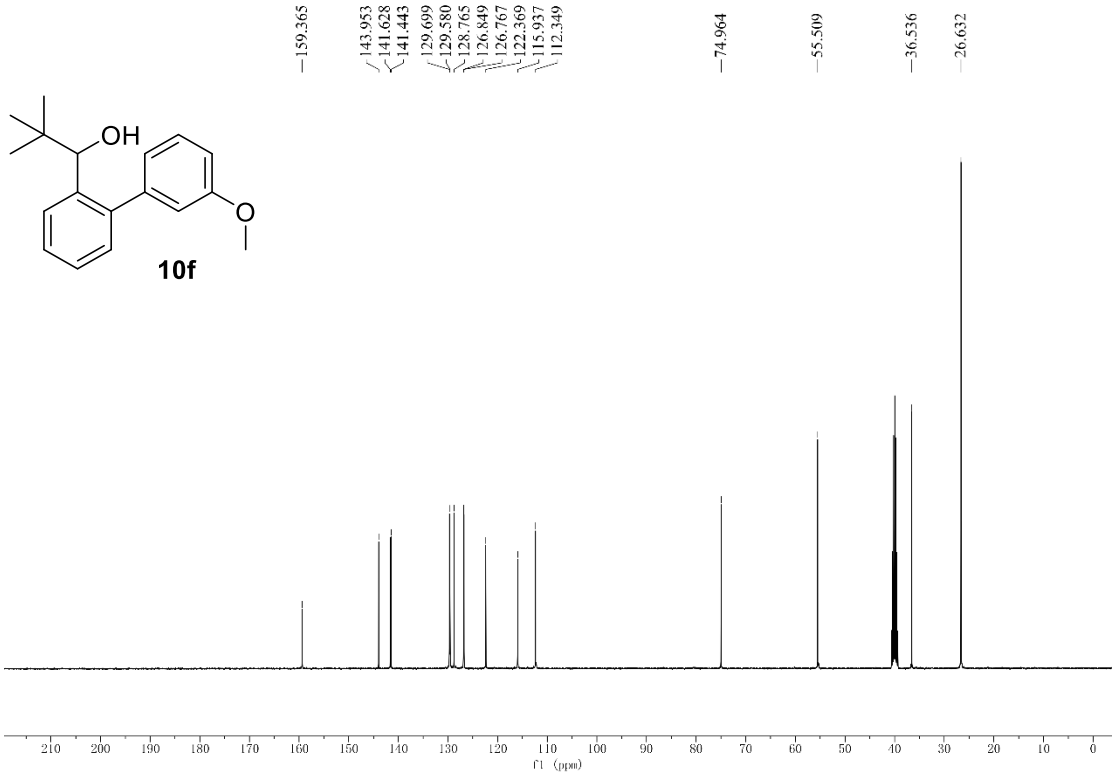
^{13}C NMR (101 MHz, DMSO-d_6) of **1-(4'-Methoxy-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10e)**.



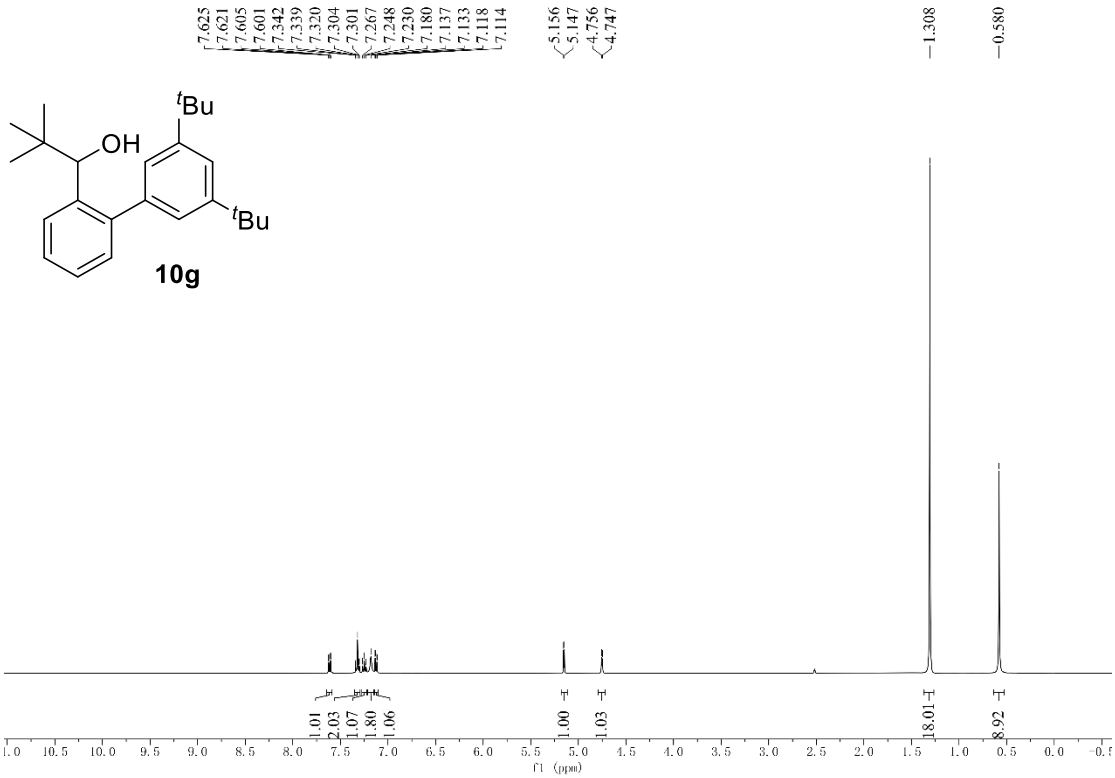
^{1}H NMR (400 MHz, DMSO-d_6) of **1-(3'-Methoxy-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10f)**.



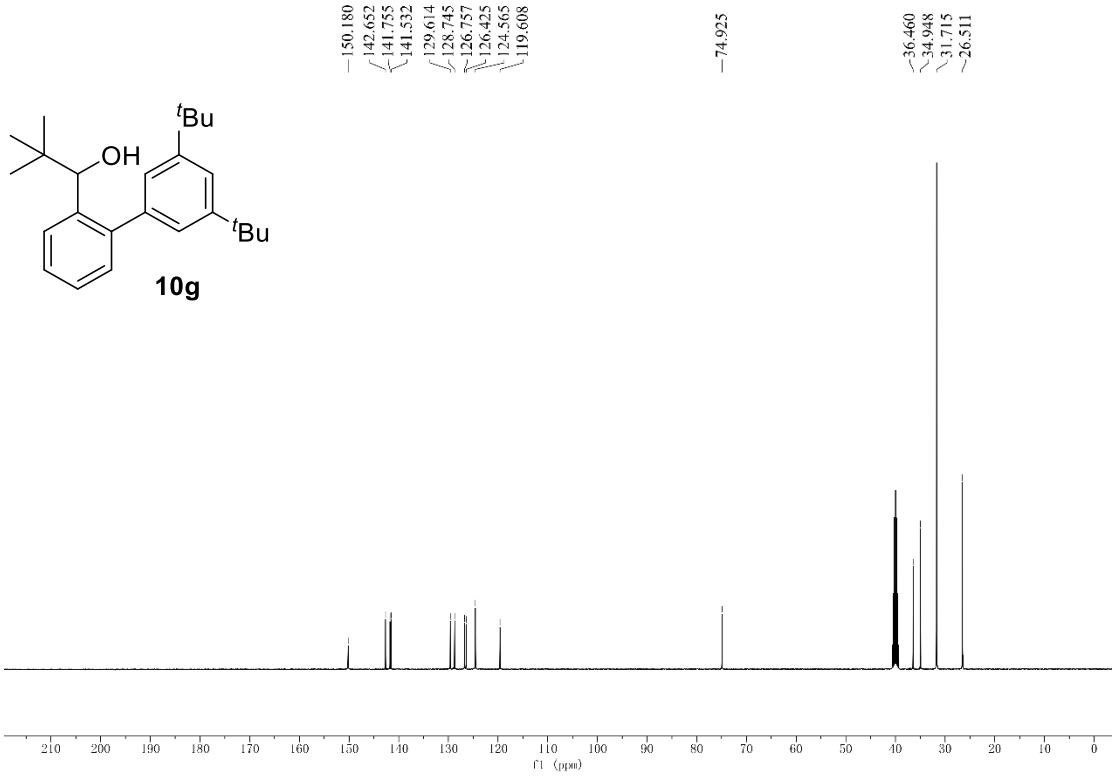
^{13}C NMR (101 MHz, DMSO-d_6) of **1-(3'-Methoxy-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10f)**.



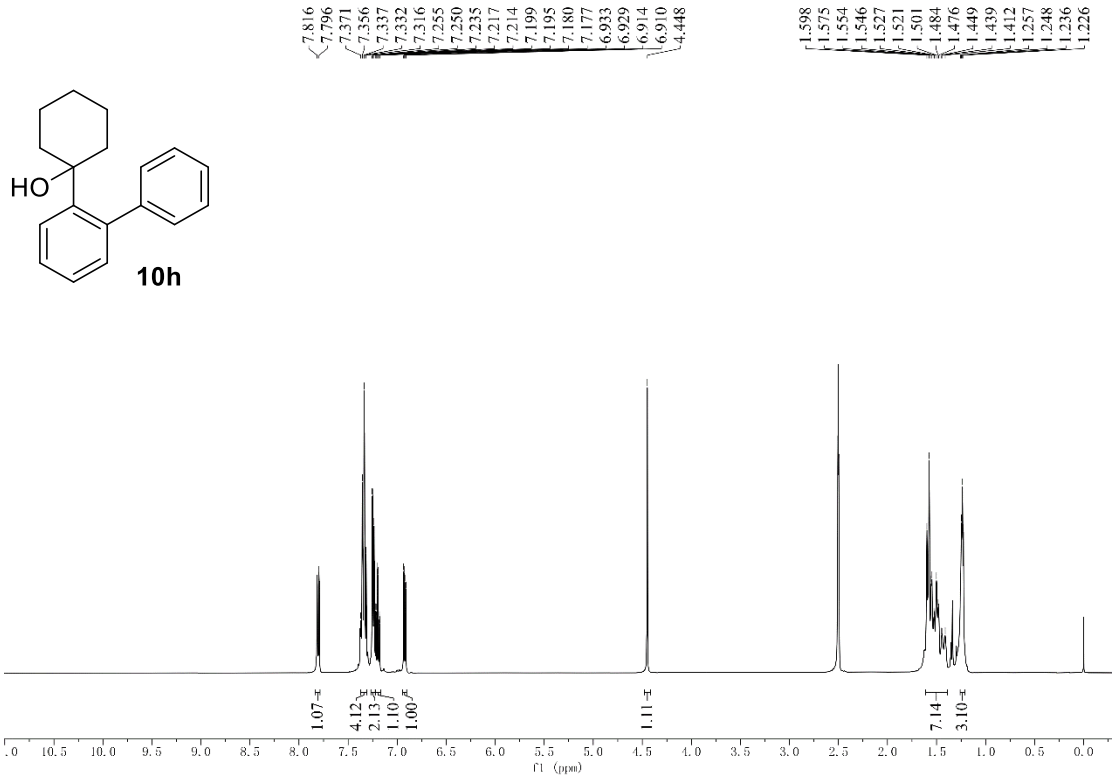
^{1}H NMR (400 MHz, DMSO-d_6) of **1-(3',5'-Di-tert-butyl-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10g)**.



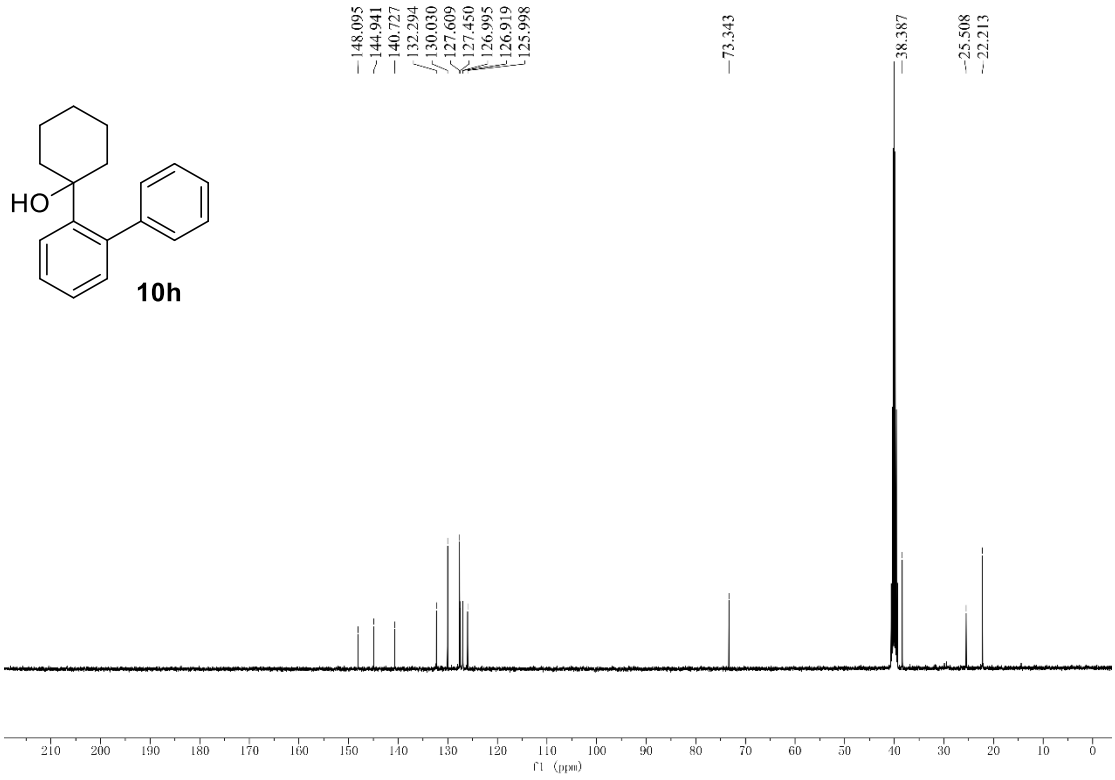
^{13}C NMR (101 MHz, DMSO-d_6) of **1-(3',5'-Di-tert-butyl-[1,1'-biphenyl]-2-yl)-2,2-dimethylpropan-1-ol (10g)**.



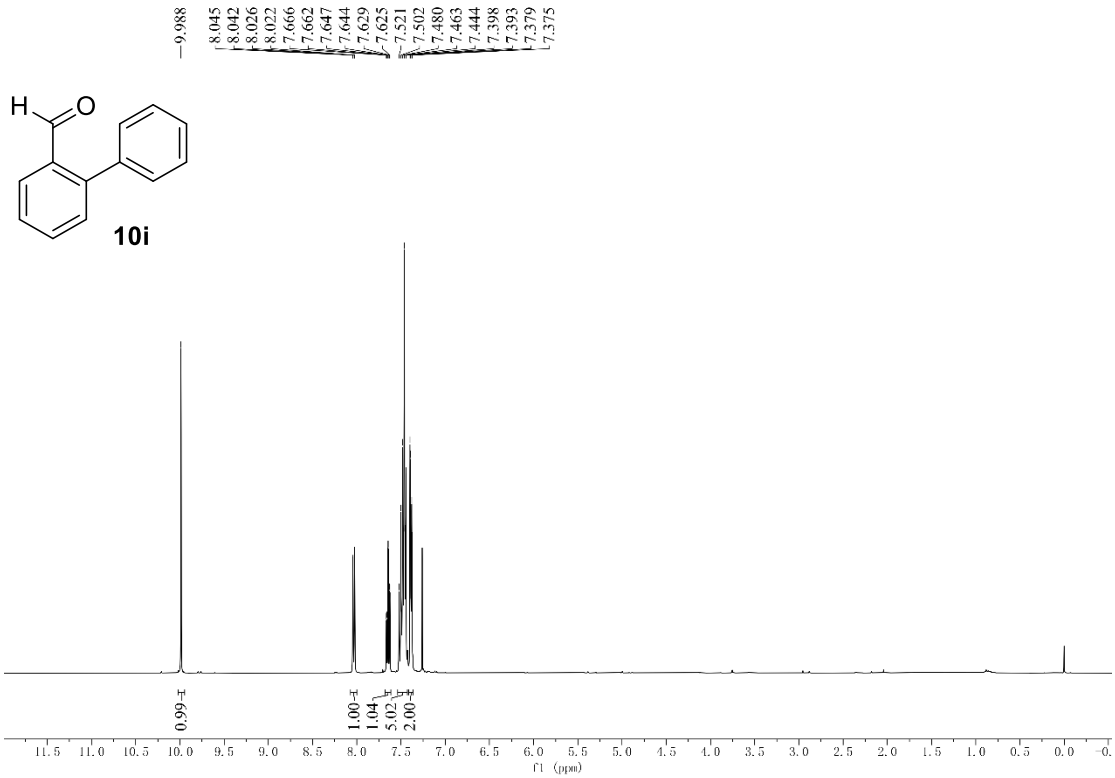
^{1}H NMR (400 MHz, DMSO-d_6) of **1-([1,1'-Biphenyl]-2-yl)cyclohexan-1-ol (10h)**.



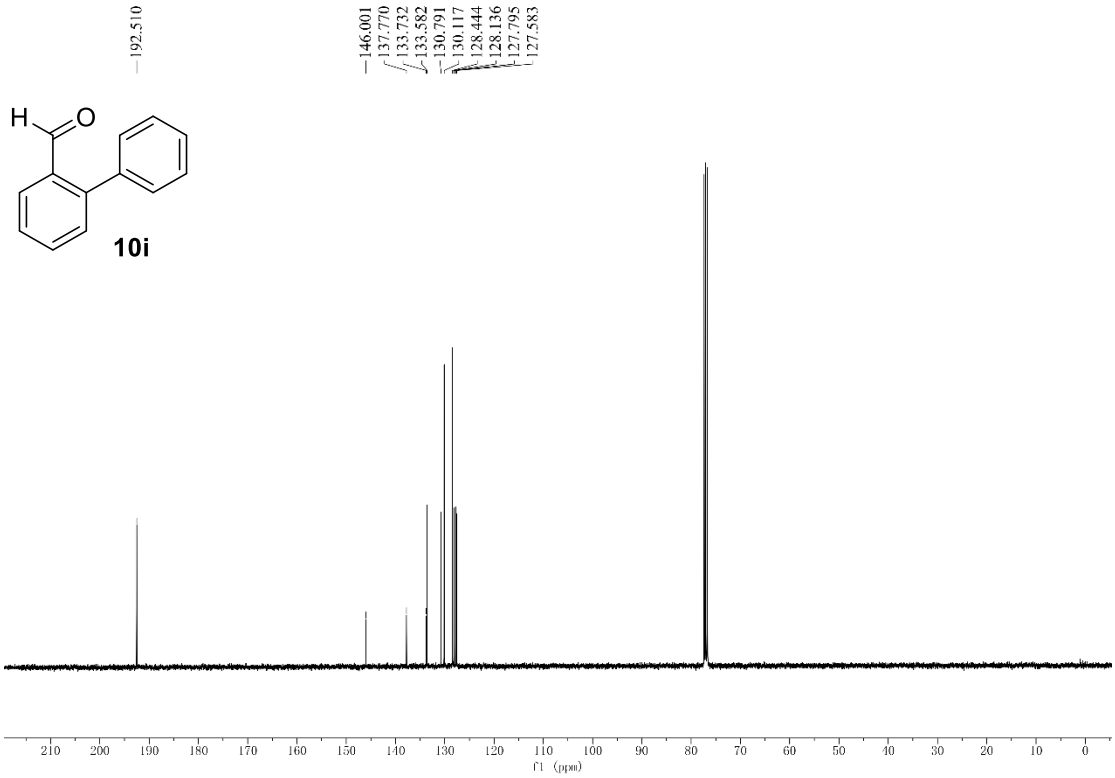
^{13}C NMR (101 MHz, DMSO-d_6) of **1-([1,1'-Biphenyl]-2-yl)cyclohexan-1-ol (10h)**.



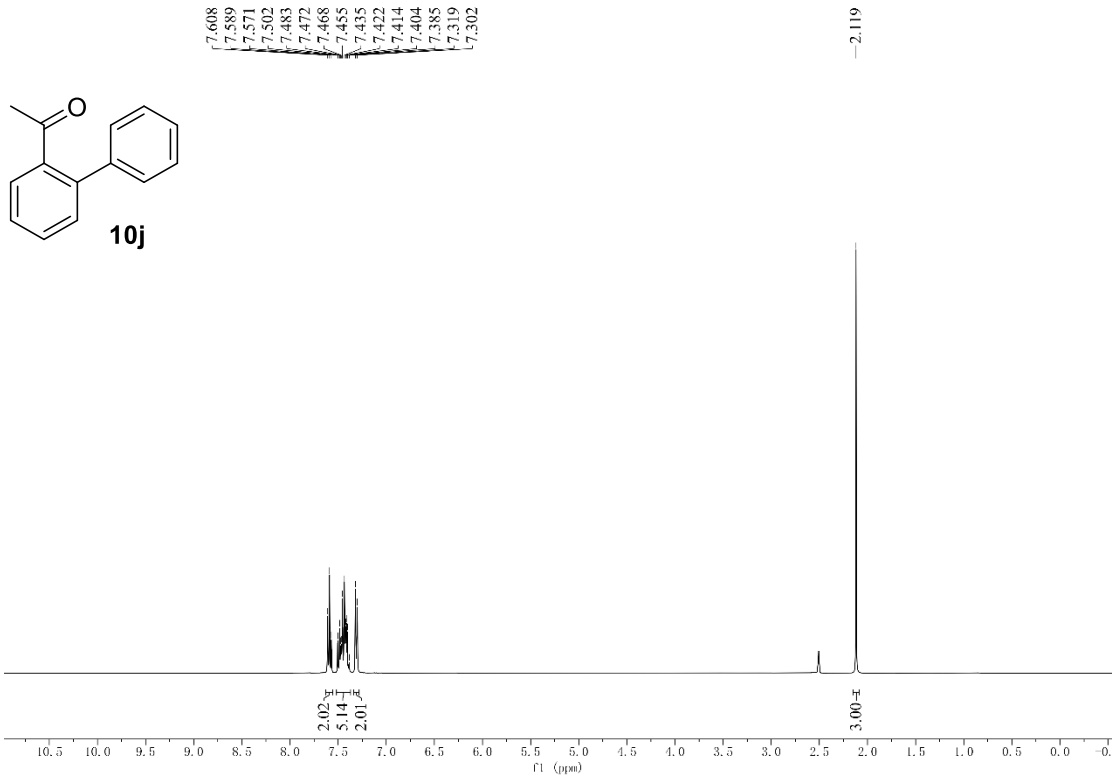
^{1}H NMR (400 MHz, Chloroform-*d*) of **[1,1'-Biphenyl]-2-carbaldehyde (10i)**.



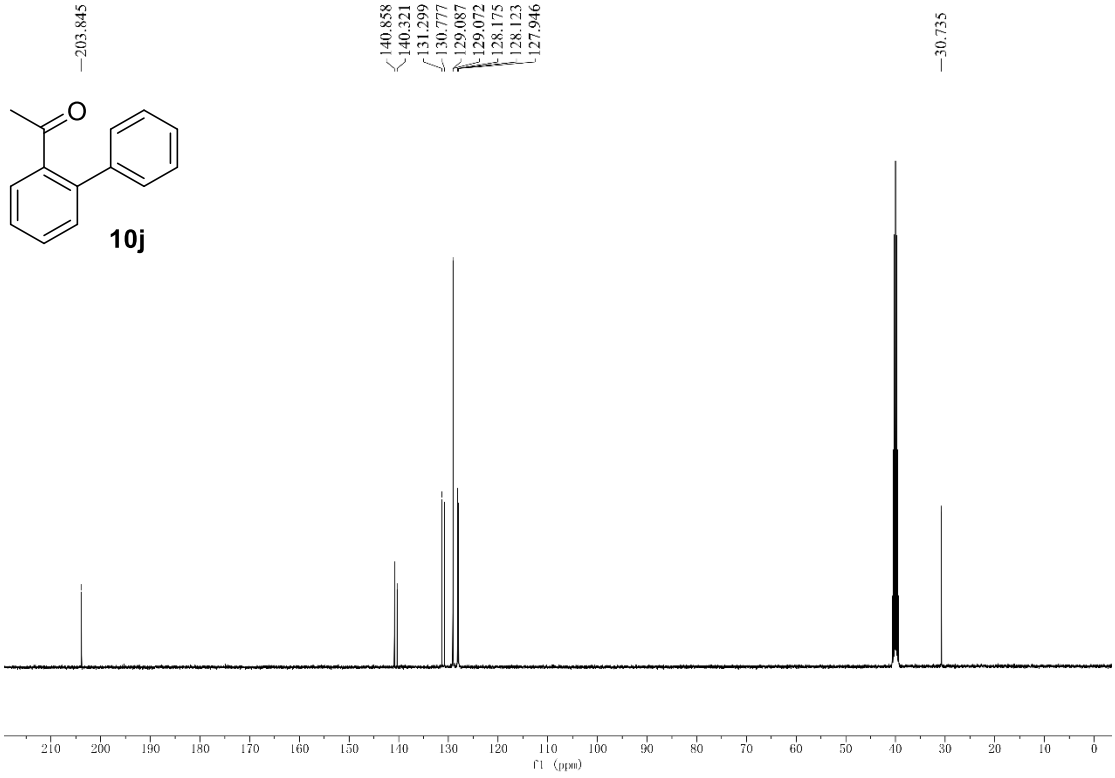
^{13}C NMR (101 MHz, Chloroform-*d*) of **[1,1'-Biphenyl]-2-carbaldehyde (10i)**.



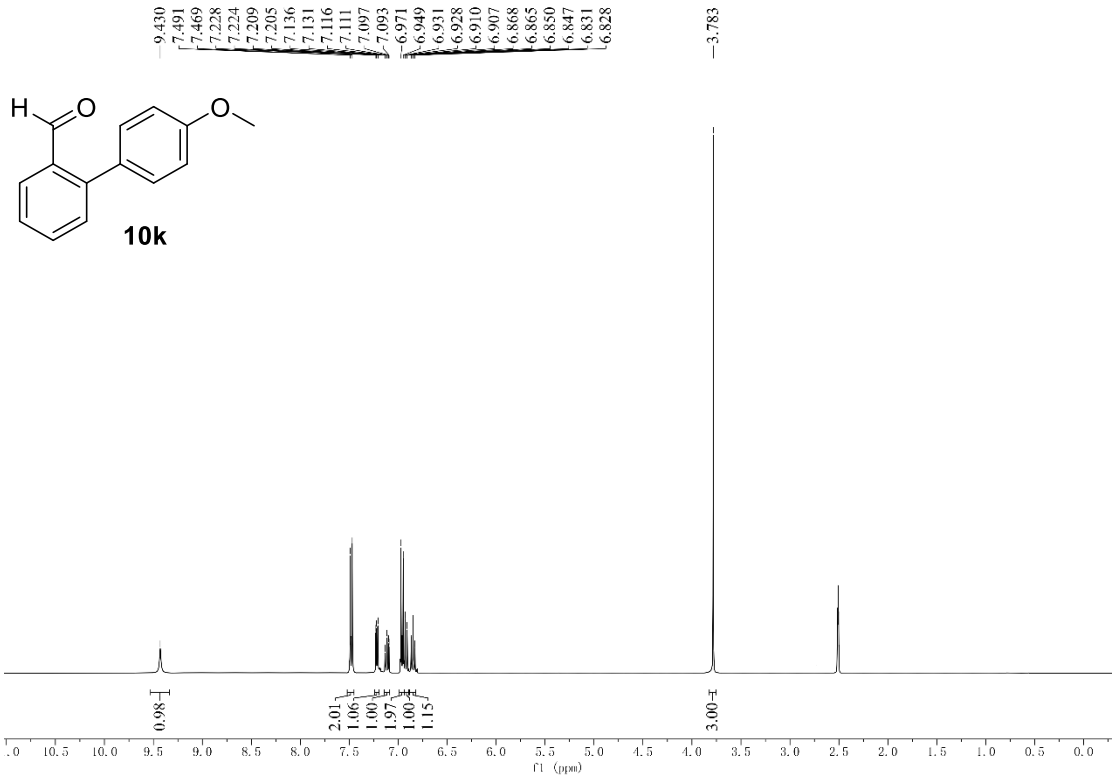
^{1}H NMR (400 MHz, DMSO-d_6) of **1-[1,1′-Biphenyl]-2-ylethanone (10j)**.



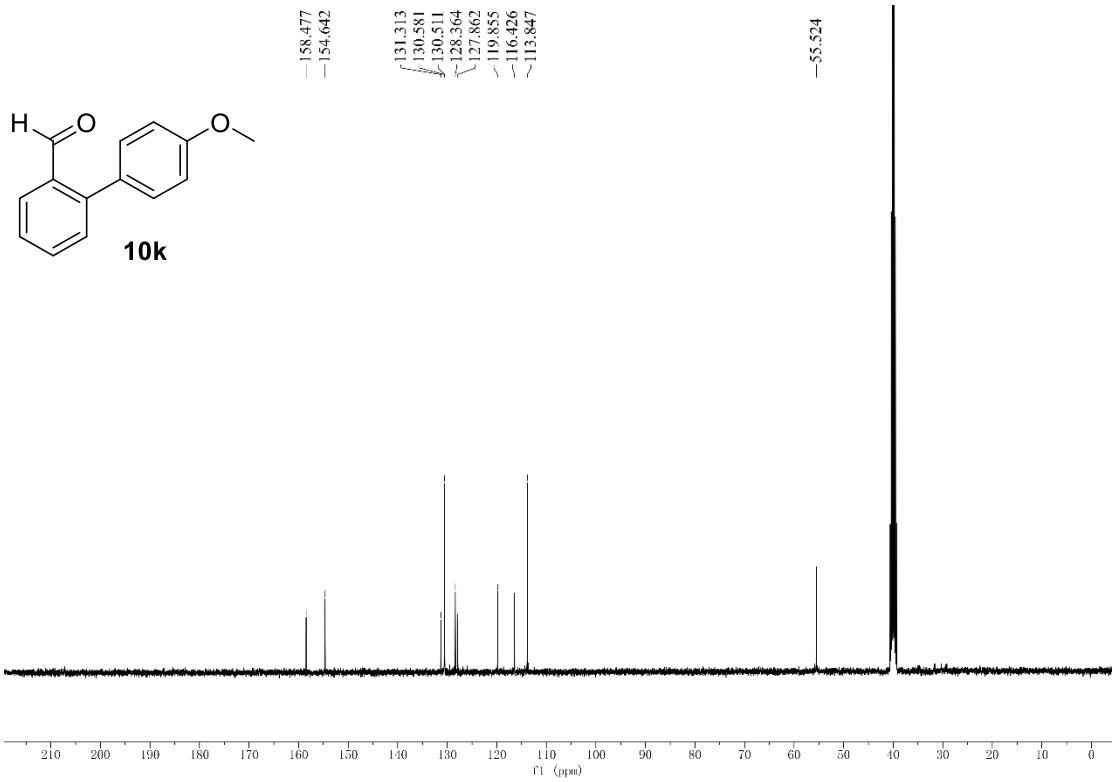
^{13}C NMR (101 MHz, DMSO-d_6) of **1-[1,1′-Biphenyl]-2-ylethanone (10j)**.



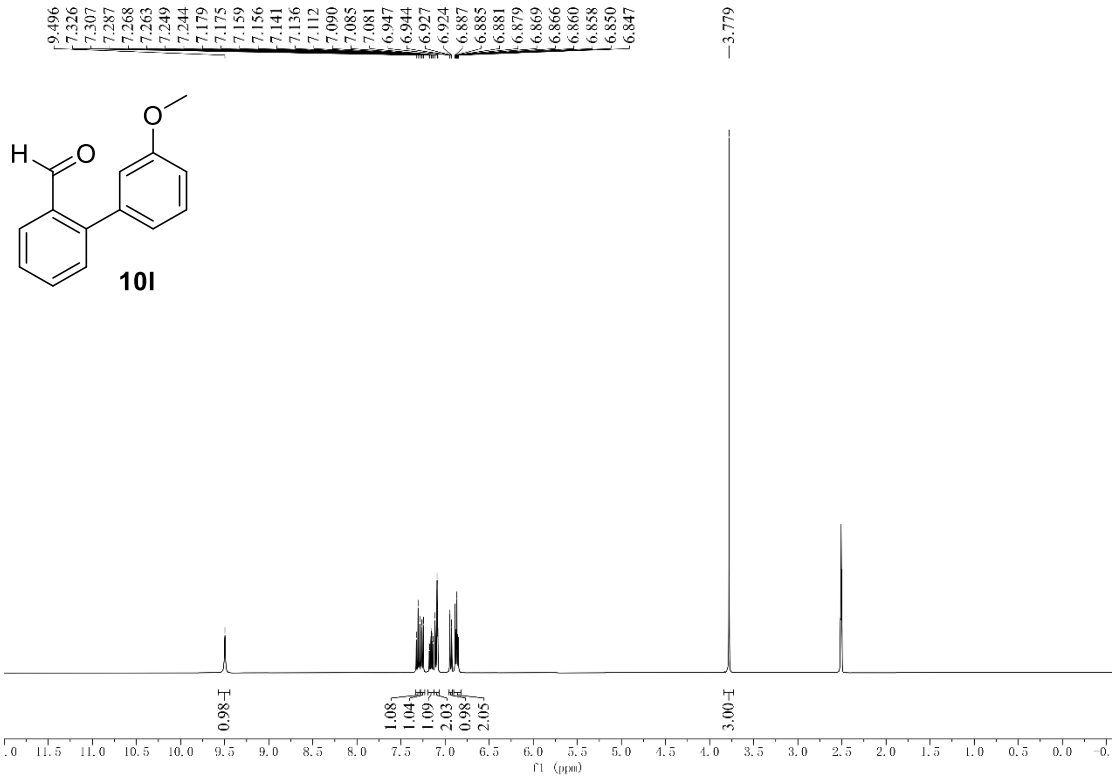
^{1}H NMR (400 MHz, DMSO-d_6) of **4'-methoxy-[1,1'-biphenyl]-2-carbaldehyde (10k)**.



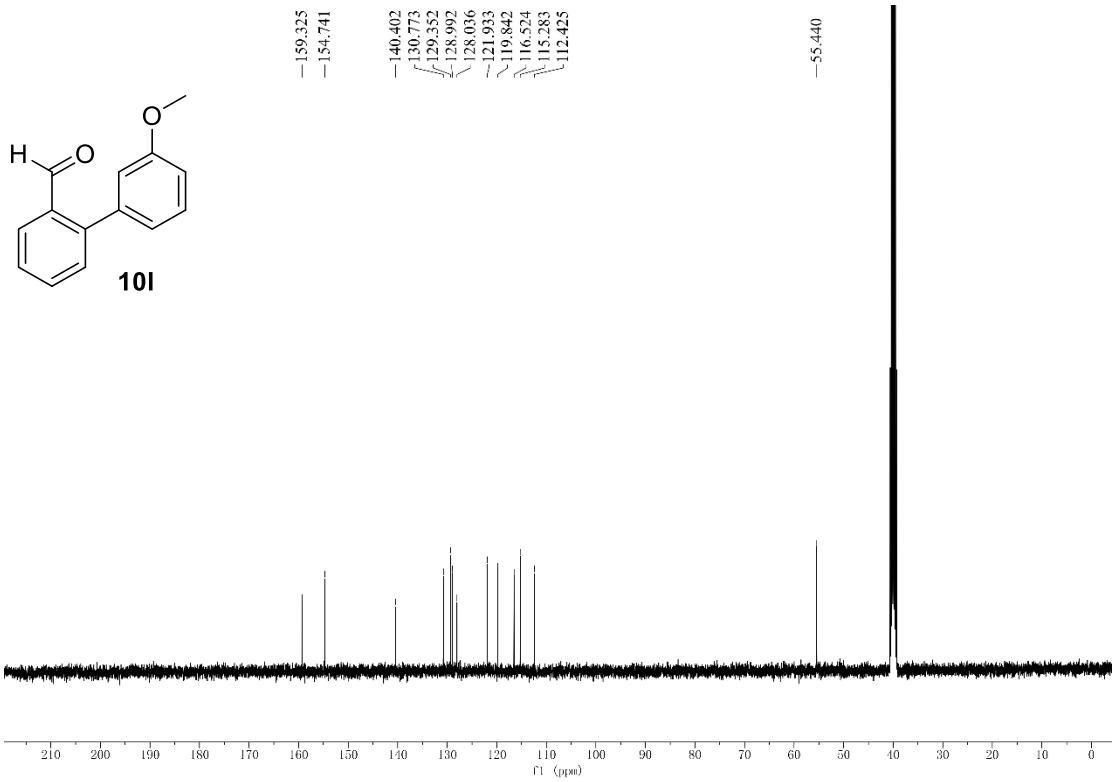
^{13}C NMR (101 MHz, DMSO-d_6) of **4'-methoxy-[1,1'-biphenyl]-2-carbaldehyde (10k)**.



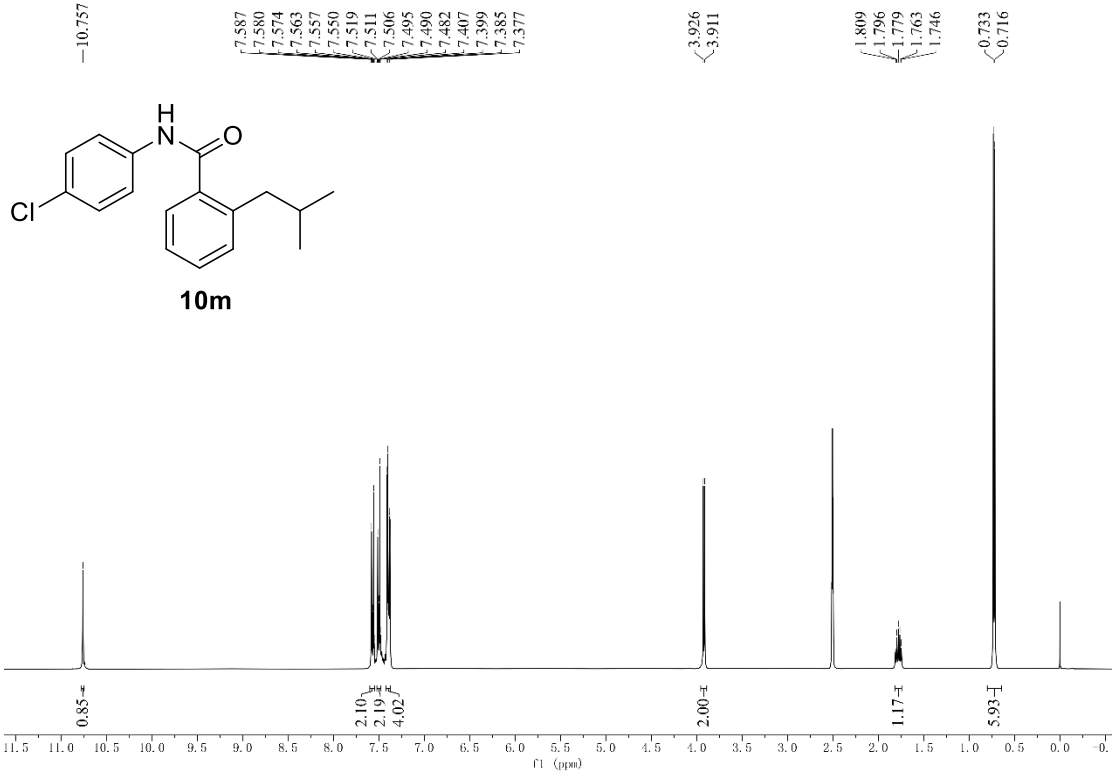
^{1}H NMR (400 MHz, DMSO-d_6) of **3'-methoxy-[1,1'-biphenyl]-2-carbaldehyde (10l)**.



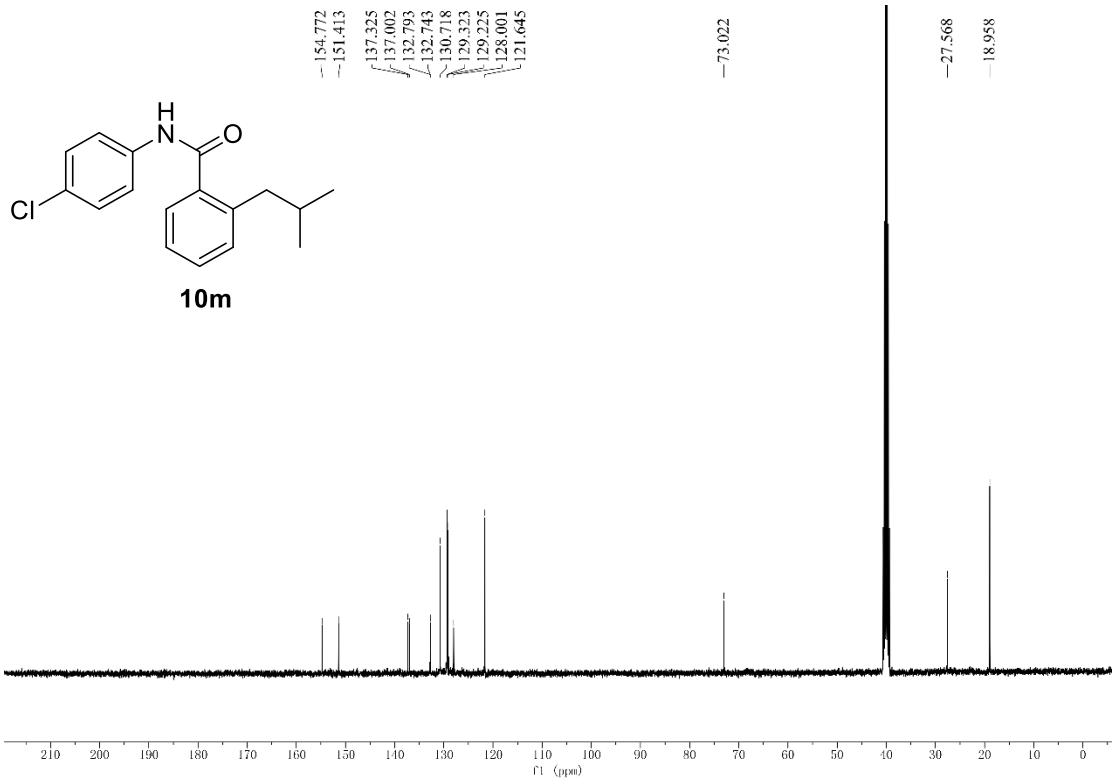
^{13}C NMR (101 MHz, DMSO-d_6) of **3'-methoxy-[1,1'-biphenyl]-2-carbaldehyde (10l)**.



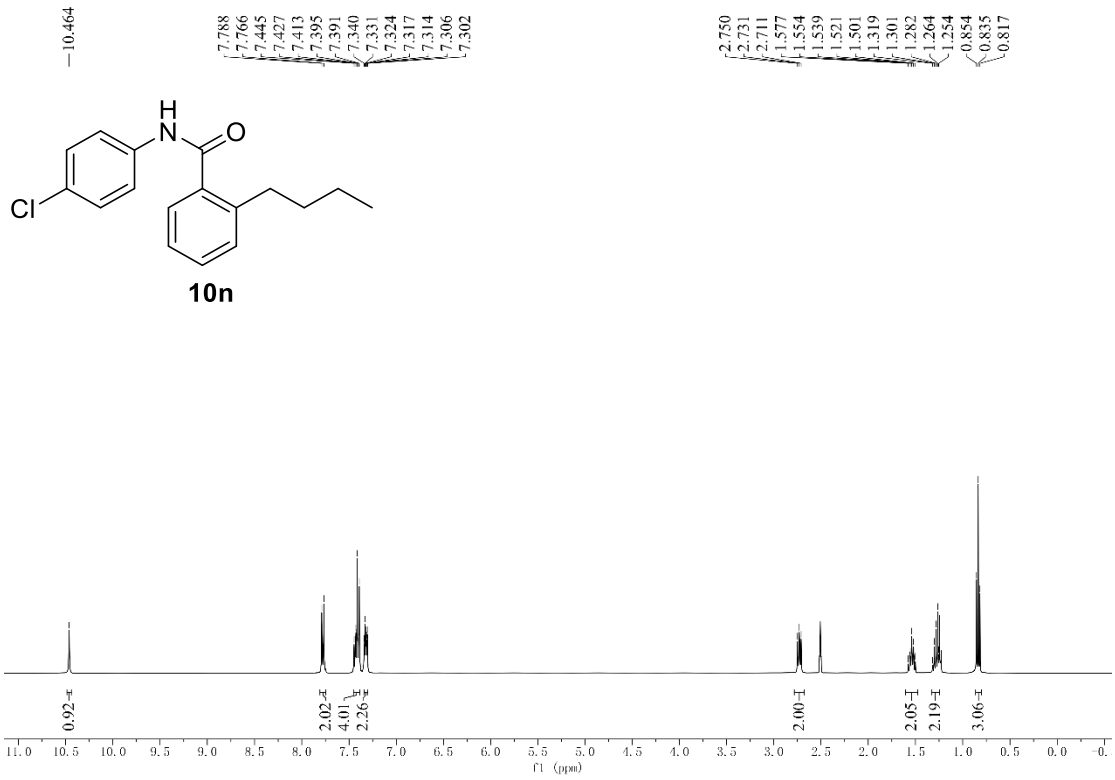
^{1}H NMR (400 MHz, DMSO-d_6) of ***N*-(4-chlorophenyl)-2-isobutylbenzamide (10m)**.



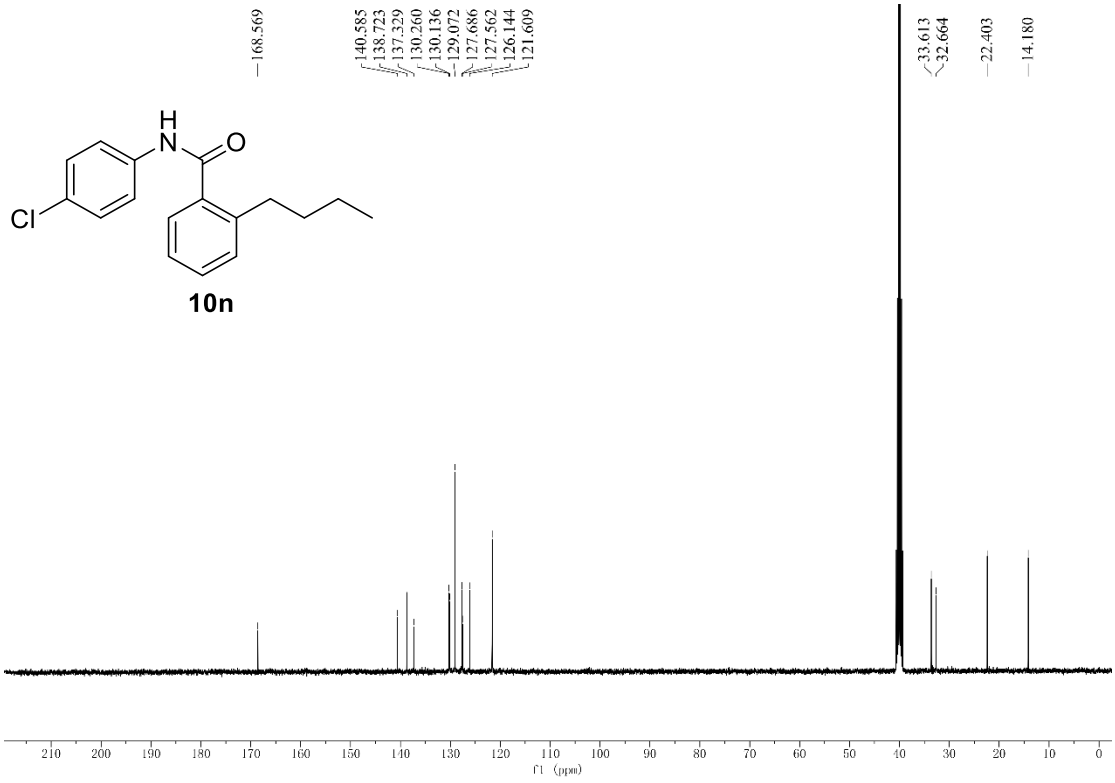
^{13}C NMR (101 MHz, DMSO-d_6) of ***N*-(4-chlorophenyl)-2-isobutylbenzamide (10m)**.



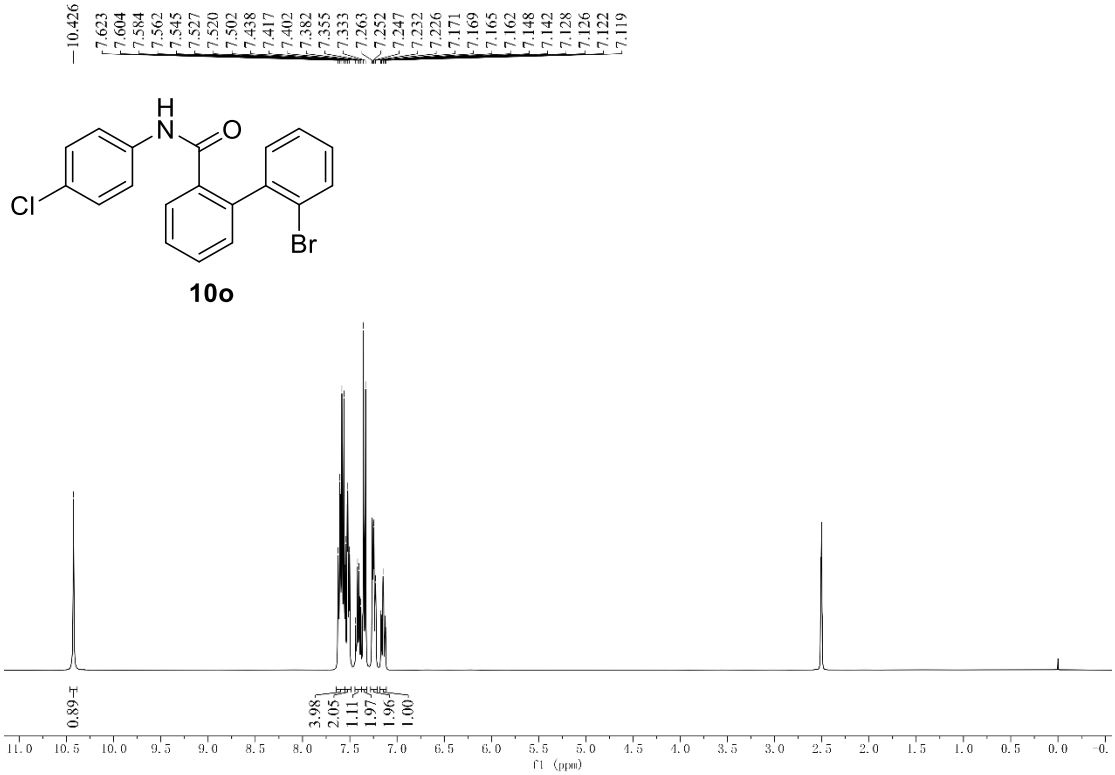
^{1}H NMR (400 MHz, DMSO-d_6) of **2-Butyl-*N*-(4-chlorophenyl)benzamide (10n)**.



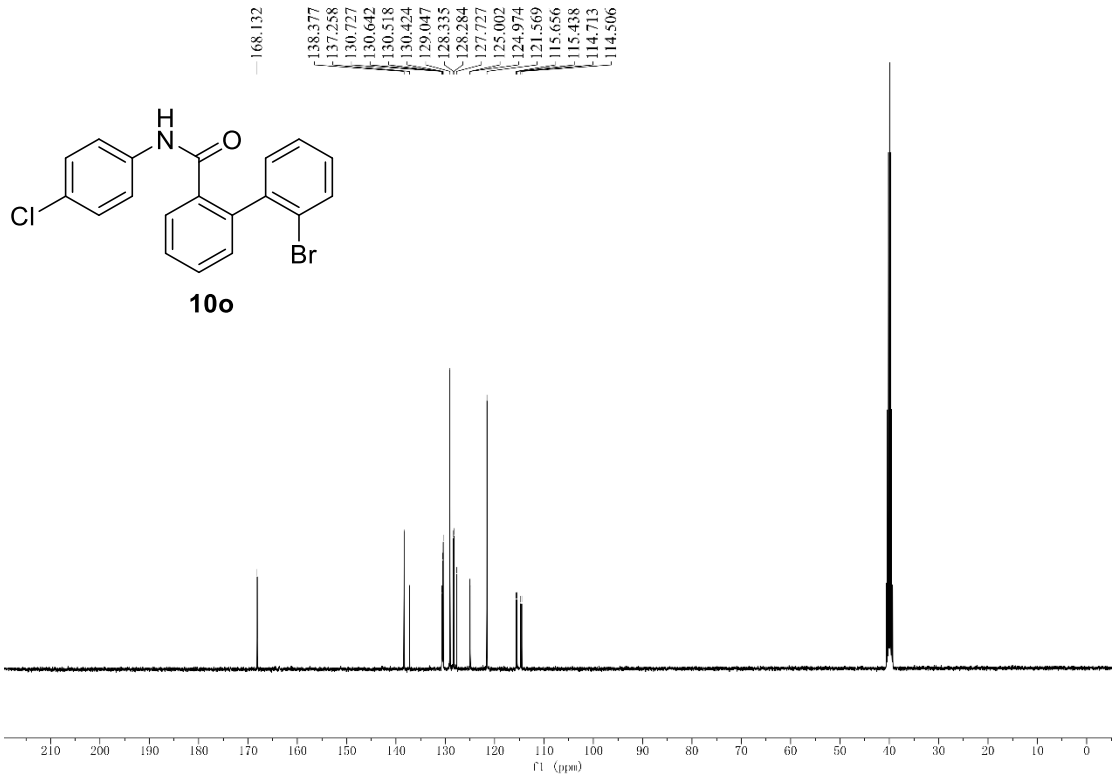
^{13}C NMR (101 MHz, DMSO-d_6) of **2-Butyl-*N*-(4-chlorophenyl)benzamide (10n)**.



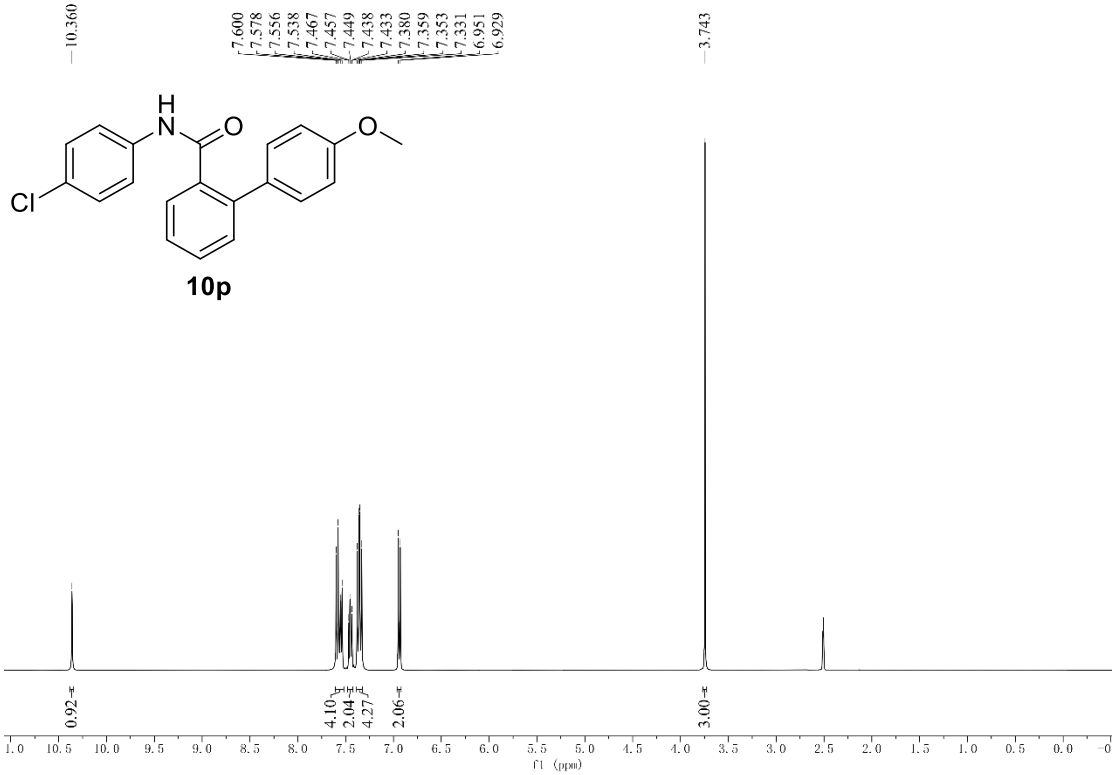
^{1}H NMR (400 MHz, DMSO-d_6) of **2'-Bromo-*N*-(4-chlorophenyl)-[1,1'-biphenyl]-2-carboxamide (10o)**.



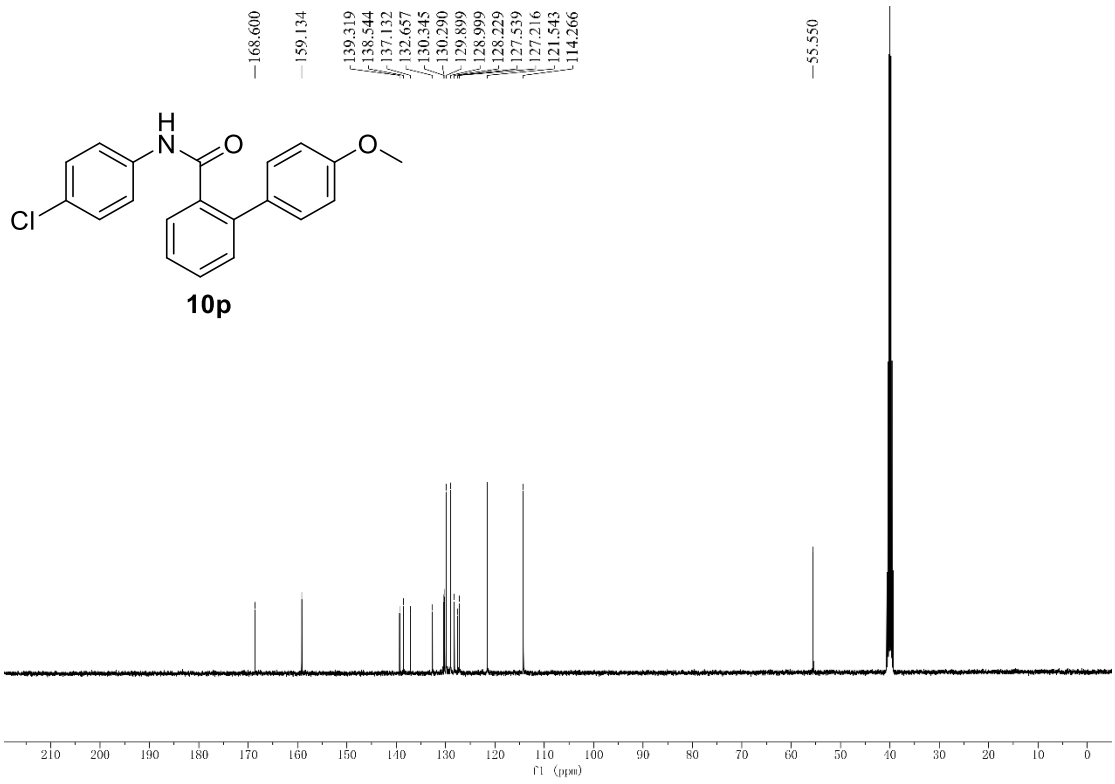
^{13}C NMR (101 MHz, DMSO-d_6) of **2'-Bromo-*N*-(4-chlorophenyl)-[1,1'-biphenyl]-2-carboxamide (10o)**.



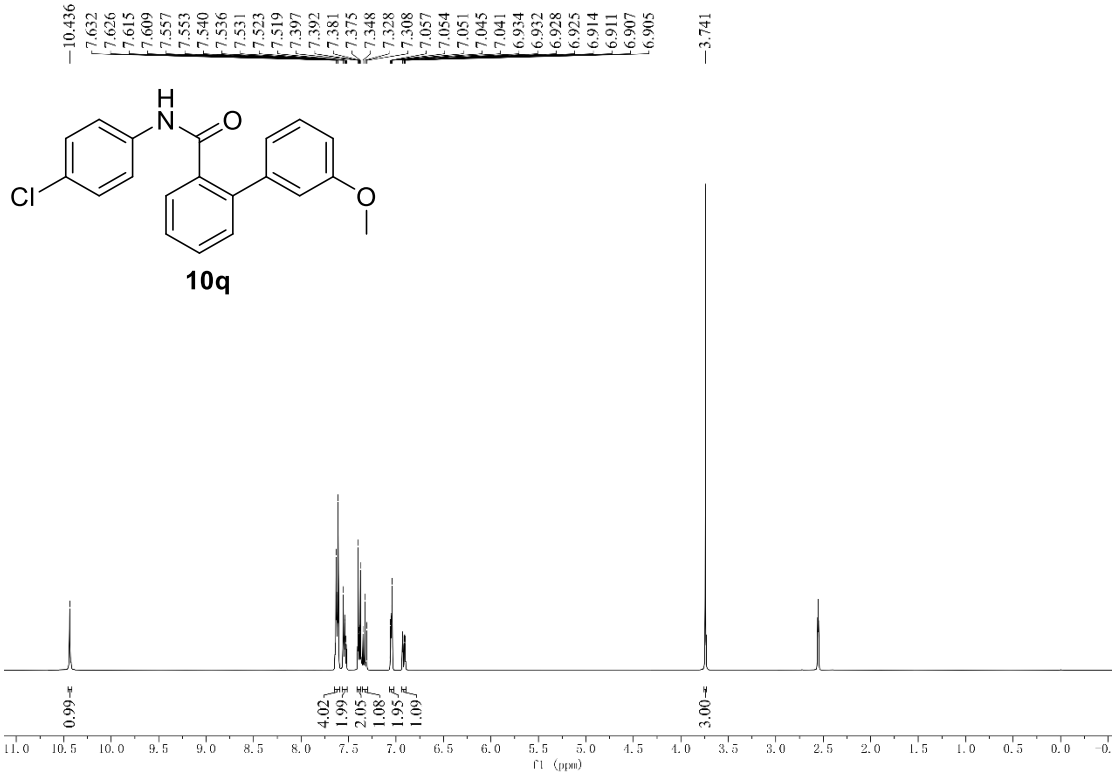
^{1}H NMR (400 MHz, DMSO-d_6) of ***N*-(4-chlorophenyl)-4'-methoxy-[1,1'-biphenyl]-2-carboxamide (10p)**.



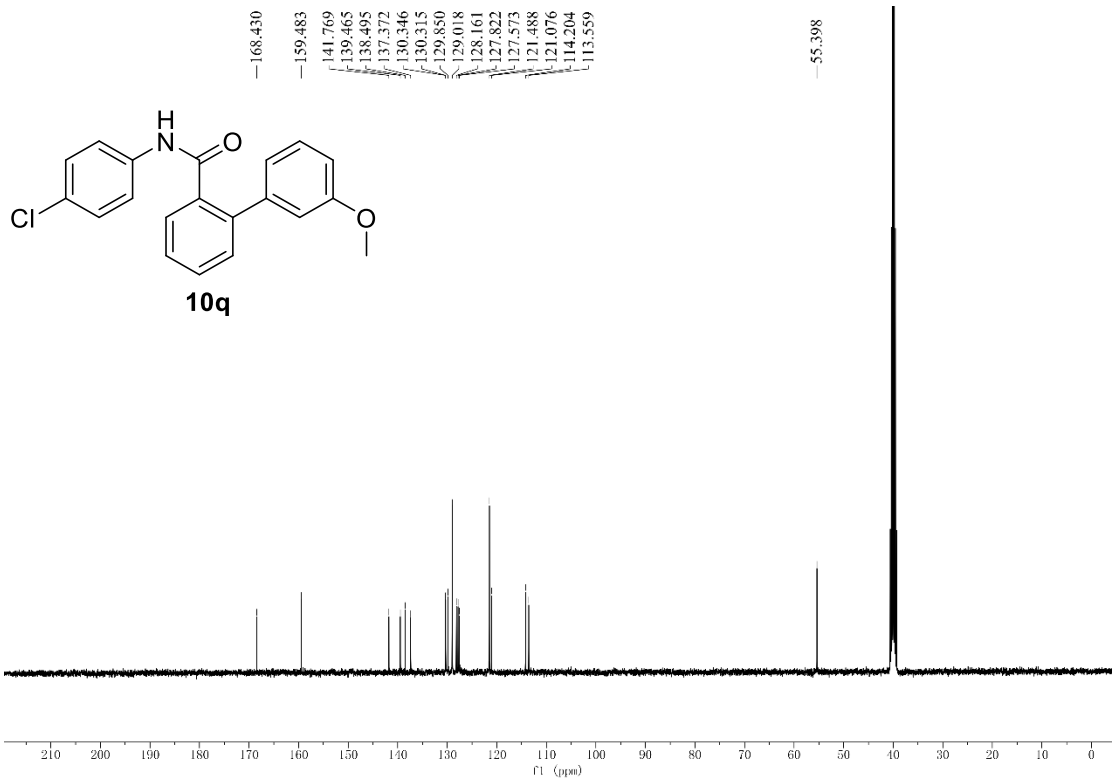
^{13}C NMR (101 MHz, DMSO-d_6) of ***N*-(4-chlorophenyl)-4'-methoxy-[1,1'-biphenyl]-2-carboxamide (10p)**.



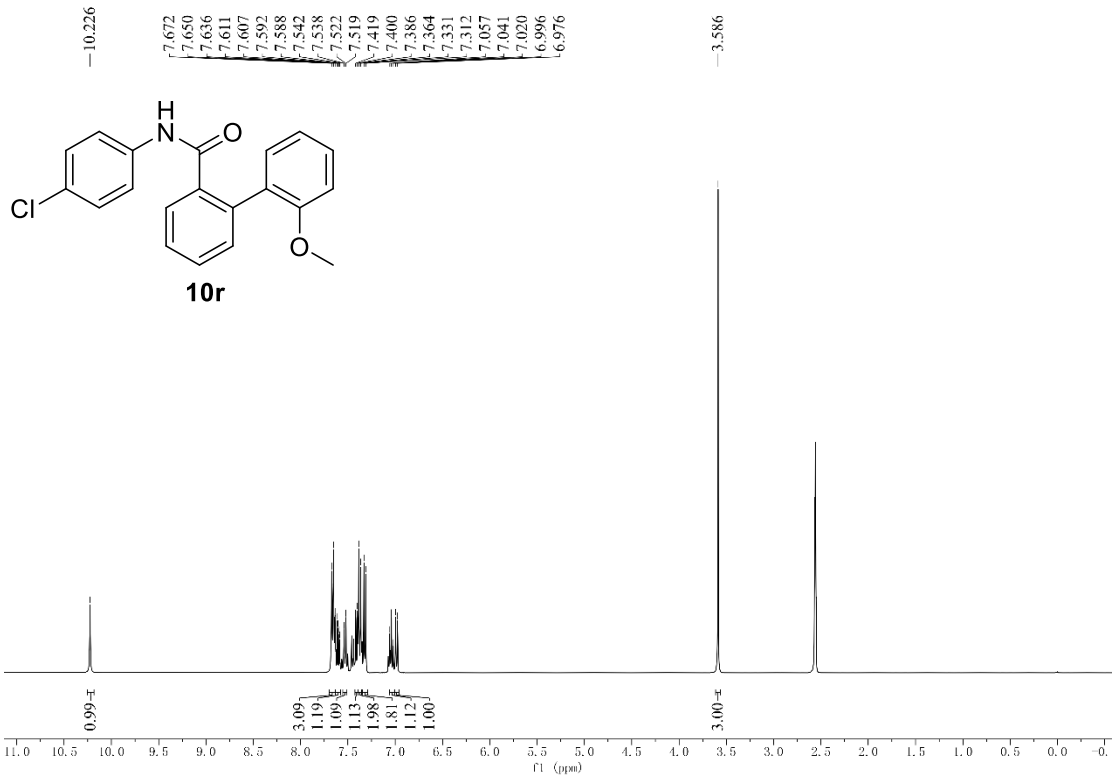
^{1}H NMR (400 MHz, DMSO-d_6) of ***N*-(4-chlorophenyl)-3'-methoxy-[1,1'-biphenyl]-2-carboxamide (10q)**.



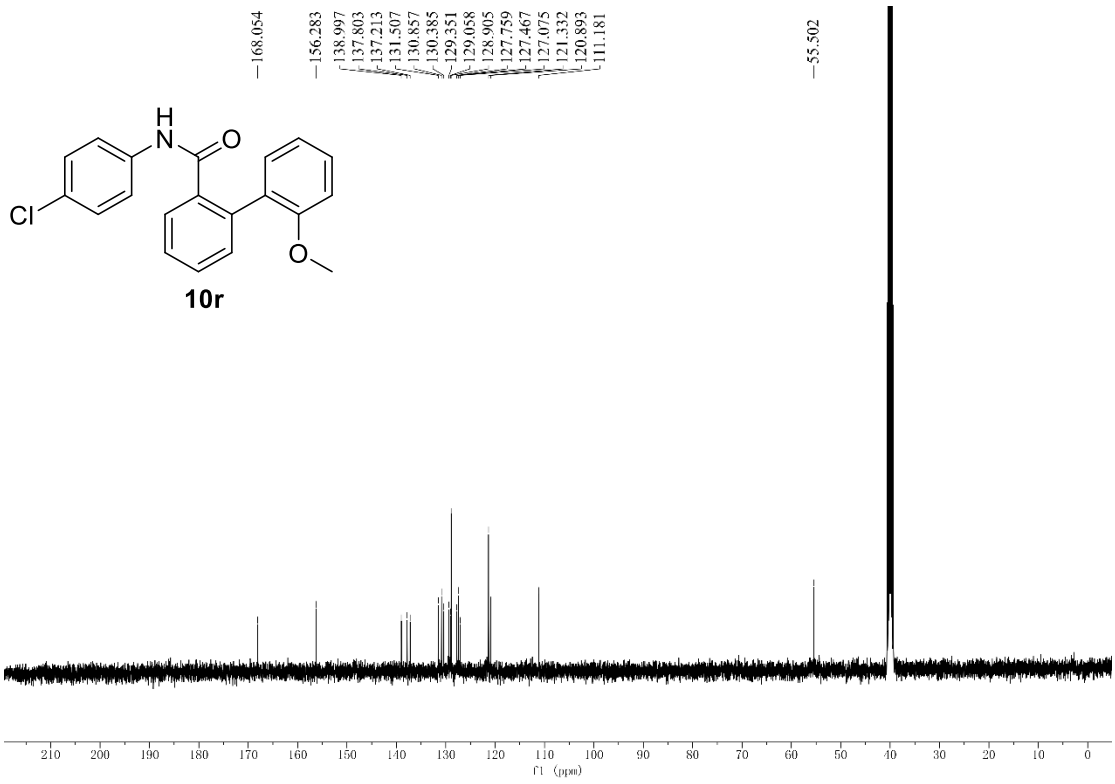
^{13}C NMR (101 MHz, DMSO-d_6) of ***N*-(4-chlorophenyl)-3'-methoxy-[1,1'-biphenyl]-2-carboxamide (10q)**.



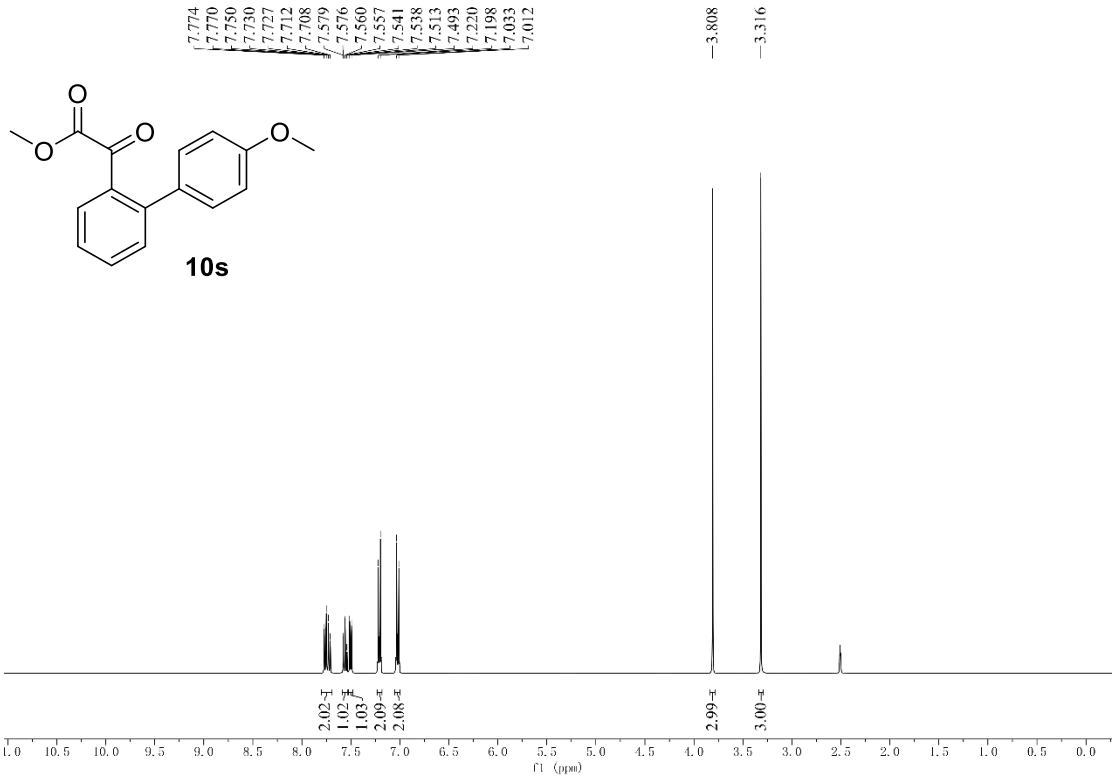
^{1}H NMR (400 MHz, DMSO-d_6) of ***N*-(4-chlorophenyl)-2'-methoxy-[1,1'-biphenyl]-2-carboxamide (10r)**.



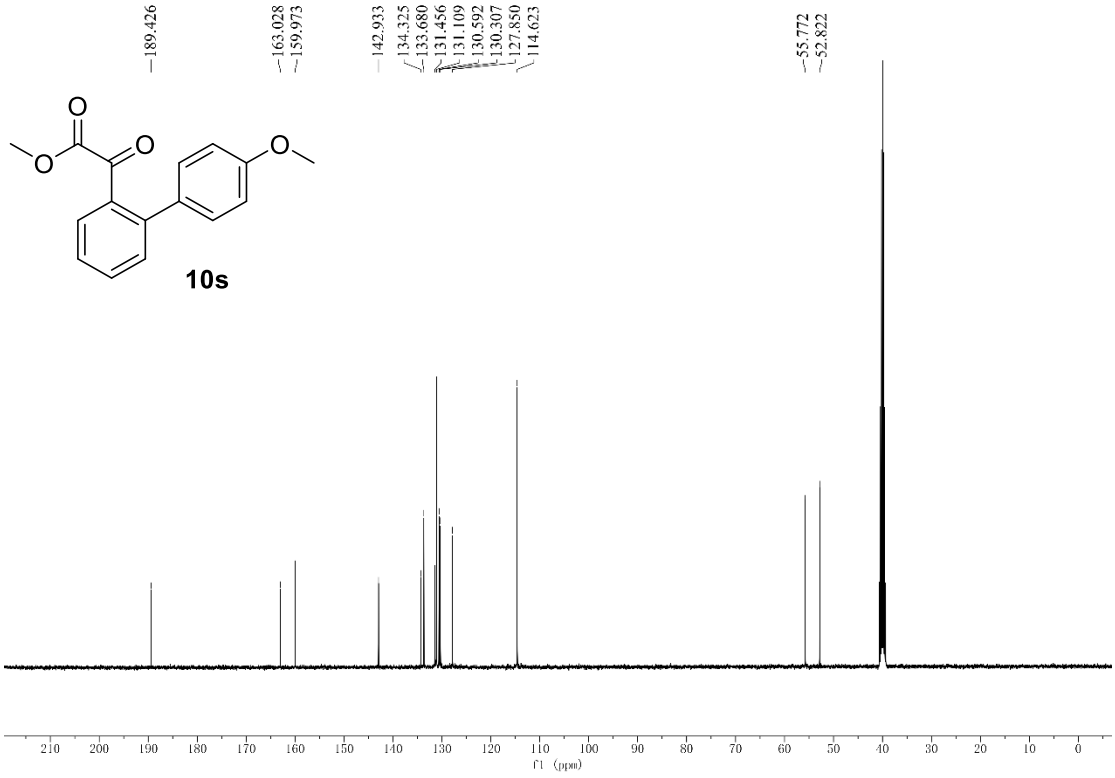
^{13}C NMR (101 MHz, DMSO-d_6) of ***N*-(4-chlorophenyl)-2'-methoxy-[1,1'-biphenyl]-2-carboxamide (10r)**.



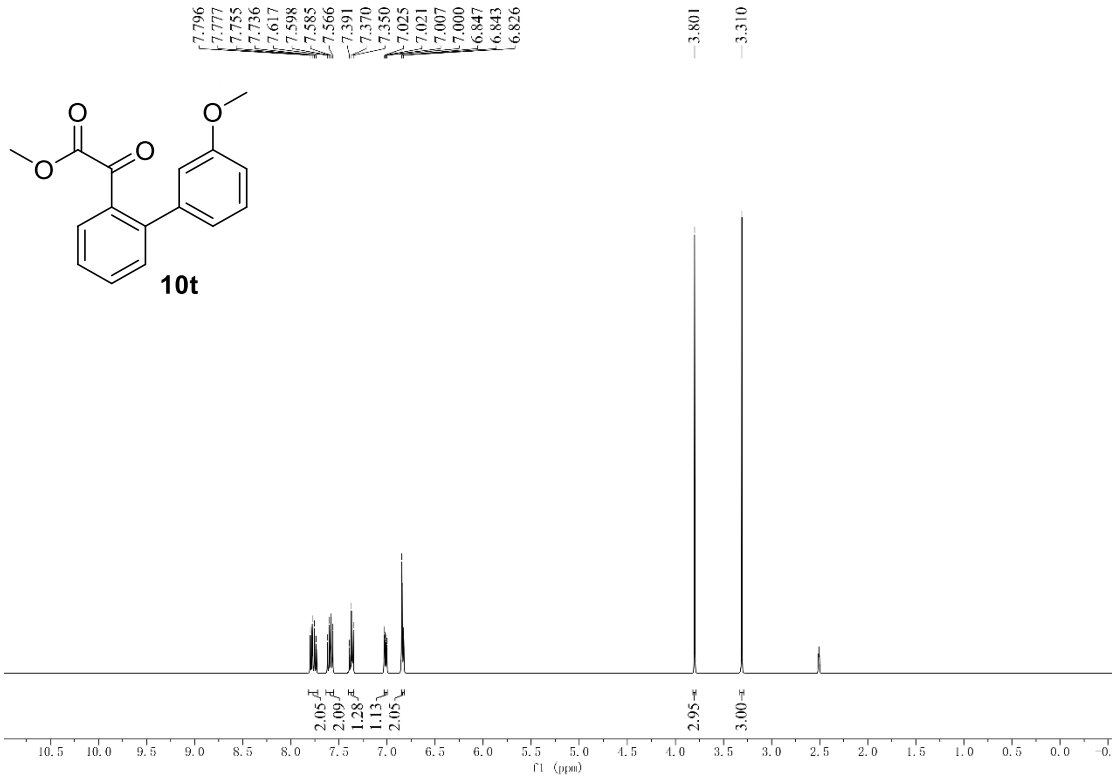
^{1}H NMR (400 MHz, DMSO-d_6) of **Methyl 2-(4'-methoxy-[1,1'-biphenyl]-2-yl)-2-oxoacetate (10s)**.



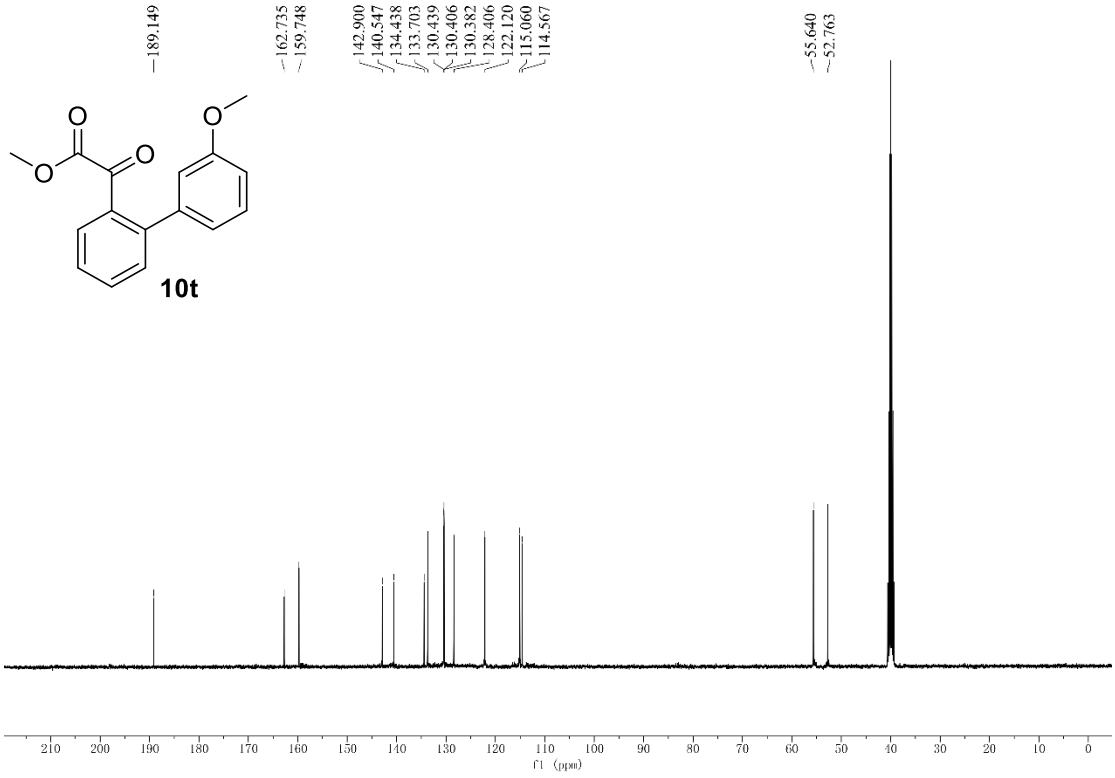
^{13}C NMR (101 MHz, DMSO-d_6) of **Methyl 2-(4'-methoxy-[1,1'-biphenyl]-2-yl)-2-oxoacetate (10s)**.



^{1}H NMR (400 MHz, DMSO-d_6) of **Methyl 2-(3'-methoxy-[1,1'-biphenyl]-2-yl)-2-oxoacetate (10t)**.



^{13}C NMR (101 MHz, DMSO-d_6) of **Methyl 2-(3'-methoxy-[1,1'-biphenyl]-2-yl)-2-oxoacetate (10t)**.



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