

**Highly Enantioselective Hydrogenation of *o*-Alkoxy Tetrasubstituted Enamides
Catalyzed by a Rh/(*R,S*)-JosiPhos Catalyst**

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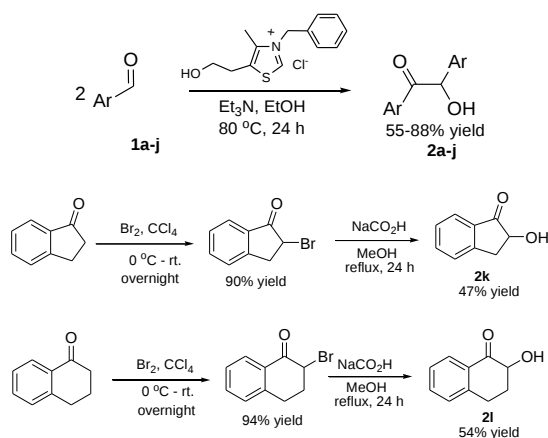
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1. Experimental Section

General Information

Unless otherwise noted, all reagents and solvents were purchased from commercial suppliers and used without further purification. NMR spectra were recorded on Bruker ADVANCE III (400 MHz) spectrometers for ^1H NMR and ^{13}C NMR. CDCl_3 was the solvent used for the NMR analysis, with tetramethylsilane as the internal standard. Optical rotation was determined using a Perkin Elmer 343 polarimeter. HPLC analysis was conducted on an Agilent 1260 Series instrument. Column Chromatography was performed with silica gel Merck 60 (300-400 mesh). All new products were further characterized by HRMS. A positive ion mass spectrum of sample was acquired on a Thermo LTQ-FT mass spectrometer with an electrospray ionization source.

2. General procedure for the synthesis of compounds 2a-l



Procedure 1:

Preparation of Benzoin

Typically, the reactions were carried out as follows: An oven-dried 100 mL Schlenk tube equipped with a magnetic stir bar was charged with aromatic aldehyde (30 mmol) and NHC precursor (1.5 mmol) in 20 mL of ethanol, and then sealed tightly with a rubber septum. The tube was evacuated and backfilled with argon three times. Et_3N (9 mmol) was added via a syringe. The mixture was stirred for 24 h at 80 $^\circ\text{C}$ under N_2 . After the reaction was completed, the mixture was concentrated and extracted with ethyl acetate (3×50 mL), washed with water and brine three times, and then dried with anhydrous Na_2SO_4 . The solvent was removed under reduced pressure. The residue was purified by preparative thin-layer chromatography eluting with petroleum ether/ethyl acetate (4:1) and dichloromethane to give the corresponding products (**2a-j**).

Procedure 2:

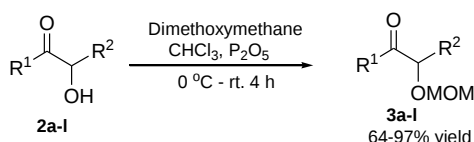
General procedure for bromoketone synthesis

To a solution of the appropriate ketone (50 mmol) in CHCl_3 (150 mL), Br_2 (50 mmol, 2.6 mL) was added dropwise whilst cooling in an ice bath. The mixture was stirred overnight, then poured onto H_2O (100 mL) and the organic phase was separated, washed with 5% $\text{Na}_2\text{S}_2\text{O}_3$, and H_2O . After drying over MgSO_4 and evaporation of the solvent, the corresponding bromoketone was obtained almost quantitatively. The resulting products were used in the next step without further purification¹.

Sodium formate (150 mmol) was dissolved in ethanol (100 mL), and bromoketone (37.5

mmol) was added. The resulting mixture was stirred at reflux (78 °C) for 24 h, and then the mixture was filtered hot and concentrated in vacuo. The residue was purified by preparative thin-layer chromatography eluting with petroleum ether/ethyl acetate (4:1) to give the corresponding products(**2k** and **2l**) ².

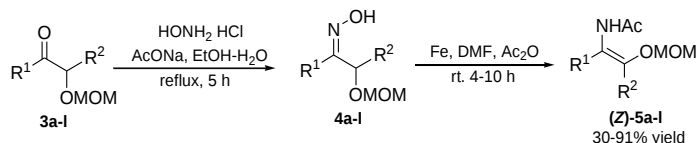
3. General procedure for the synthesis of compounds **3a-l**



Procedure:

To a mixture of 20 mmol of ketoalcohol and 4.0 g of phosphorus pentoxide in 60 mL of dry chloroform, 60 mL of dry dimethoxymethane was added dropwise. The reaction was stirred at room temperature for 3 h. The reaction mixture then was poured into 100 mL of cold, half-saturated, aqueous sodium carbonate and the black oil remaining in the flask was rinsed with the aqueous sodium carbonate. The aqueous layer was extracted with three 60 mL portions of CH₂Cl₂, the CH₂Cl₂ layer was washed with brine, dried over Na₂SO₄, and concentrated under reduced pressure. The crude product was purified by column chromatography on silica gel (10% EA/PE,) to afford the title compounds(**3a-l**) ³.

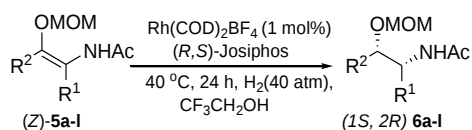
4. General procedure for the synthesis of compounds **5a-l**



A mixture of MOM protected ketoalcohol (**3a-l**) (10 mmol), H₂NOH • HCl (20 mmol) and NaOAc (20 mmol) in 2:1 EtOH:H₂O (80 mL) was heated at reflux for 4 - 6 h. When the reaction was complete, H₂O (60 mL) was added and the resulting mixture was concentrated and extracted with EtOAc (3 × 30 mL). The combined extracts were washed with H₂O (30 mL), brine (30 mL), dried (Na₂SO₄), and then concentrated under vacuum. The residue (**4a-l**) was used directly in next step without further purification.

To a solution mixture of oxime and Ac₂O (9 mL) in DMF (15 mL) at rt was added Fe powder (10.5 g) followed by Me₃SiCl (2 drops). The red suspension was stirred at rt for 4 - 10 h. When the reaction was complete (TLC), Et₂O (60 mL) was added, and the mixture was filtered through a Celite pad and washed with CH₂Cl₂. The filter was concentrated, and the residue was purified by flash chromatography on silica gel with EtOAc/hexane (1/4-1/1, V/V) for elution to afforded **5a-l**. Samples were further purified by recrystallization from EtOAc/hexane ⁴.

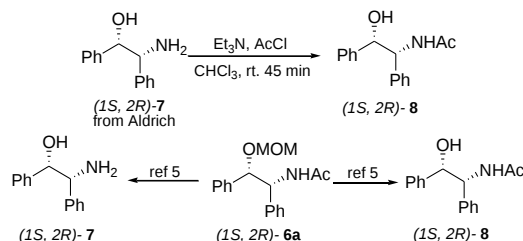
5. General procedure for asymmetric hydrogenation of compound **5a-l**



The reaction was carried out with 0.05 mmol of substrate at 40 °C under a 40 atm H₂ pressure in 2 mL solvent for 24 h with a substrate/[Rh(COD)₂]BF₄/ligand ratio of 1/0.01/0.011. And then

the hydrogen was released slowly and the catalyst was removed through the silicon column. The enantiomeric excess was directly determined by chiral HPLC under the following conditions.

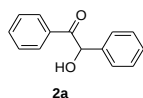
Racemic mixture sample synthesis: The reaction was carried out with 0.05 mmol of substrate at rt. under a 40 atm H₂ pressure in 2 mL methanol for 24 h with 15 mg Pd/C (30% wt. loading) or with substrate/[Rh(COD)₂]BF₄/Taniphos ratio of 1/0.01/0.011 at 40°C under a 40 atm H₂ pressure in 2 mL MeOH. And then the hydrogen was released slowly and the catalyst was removed through the silicon column.



To assure the absolute configuration, commercial available (1*S*,2*R*)-2-amino-1,2-diphenylethanol **7** was acetylated and product **8** was obtained. Meanwhile, deprotection of **6a** by refluxing in 3 M HCl gave the enantiomerically pure product **8**. The HPLC results of **8** thus permitted the absolute configuration of **6a** to be assigned as (1*S*, 2*R*). In addition, when **6a** was hydrolyzed in 6 M HCl, the corresponding enantiomeric β-amino alcohol **7** was obtained in quantitative yield.⁵

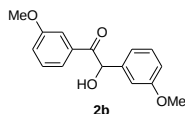
6. NMR, optical rotation and HRMS Data of all compounds.

2-hydroxy-1,2-diphenylethanone ⁶



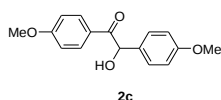
Yield 78%, light yellow oil; *R*_f = 0.20 (PE/ether = 5:1); ¹H NMR (400 MHz, CDCl₃) δ 7.97 – 7.93 (m, 2H), 7.57 – 7.52 (m, 1H), 7.44 – 7.29 (m, 7H), 6.00 (s, 1H), 4.64 (s, 1H).

2-hydroxy-1,2-bis(3-methoxyphenyl)ethanone ⁷

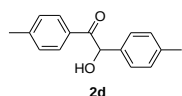


Yield 55%, light yellow solid; *R*_f = 0.15 (PE/ether = 6:1); ¹H NMR (400 MHz, CDCl₃): δ 7.57 – 7.45 (m, 2H), 7.30 (dt, *J*=21.1, 8.0, 2H), 7.10 (ddd, *J*=8.3, 2.6, 0.7, 1H), 6.96 (d, *J*=7.6, 1H), 6.90 – 6.81 (m, 2H), 5.92 (d, *J*=5.4, 1H), 4.57 (d, *J*=6.0, 1H), 3.83 (s, 3H), 3.79 (s, 3H).

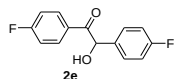
2-hydroxy-1,2-bis(4-methoxyphenyl)ethanone ⁶



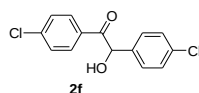
Yield 56%, light yellow solid; *R*_f = 0.23 (PE/AcOEt = 4:1); ¹H NMR (400 MHz, CDCl₃): ¹H NMR (400 MHz, CDCl₃) δ 7.91 (d, *J*=8.9, 2H), 7.27 (d, *J*=8.7, 2H), 6.84 (d, *J*=8.5, 4H), 5.88 (s, 1H), 4.71 (s, 1H), 3.77 (d, *J*=1.1, 3H), 3.71 (d, *J*=1.0, 3H).

2-hydroxy-1,2-di-*p*-tolylethanone ⁶

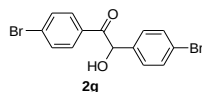
Yield 68%, light yellow oil; R_f = 0.35 (PE/ether = 5:1); ^1H NMR (400 MHz, CDCl_3): ^1H NMR (400 MHz, CDCl_3) δ 7.85 (d, J =8.0, 2H), 7.28 – 7.18 (m, 4H), 7.15 (d, J =7.6, 2H), 5.93 (s, 1H), 4.60 (s, 1H), 2.38 (s, 3H), 2.31 (s, 3H).

1,2-bis(4-fluorophenyl)-2-hydroxyethanone ⁶

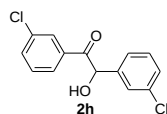
Yield 88%, light yellow solid; R_f = 0.22 (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3): ^1H NMR (400 MHz, CDCl_3) δ 8.00 – 7.91 (m, 2H), 7.33 (m, 2H), 7.08 (m, 4H), 5.93 (d, J =5.8, 1H), 4.56 (d, J =5.9, 1H).

1,2-bis(4-chlorophenyl)-2-hydroxyethanone ⁶

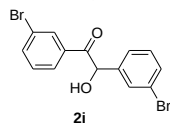
Yield 73%, light yellow solid; R_f = 0.18 (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 7.90 – 7.82 (m, 2H), 7.42 (d, J =8.7, 2H), 7.34 (d, J =8.6, 2H), 7.28 (t, J =5.0, 2H), 5.91 (s, 1H), 4.54 (s, 1H).

1,2-bis(4-bromophenyl)-2-hydroxyethanone ⁶

Yield 72%, light yellow solid; R_f = 0.25 (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 7.77 (d, J =8.7, 2H), 7.58 (d, J =8.7, 2H), 7.48 (d, J =8.5, 2H), 7.21 (d, J =8.4, 2H), 5.89 (d, J =5.9, 1H), 4.53 (d, J =5.9, 1H).

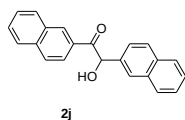
1,2-bis(3-chlorophenyl)-2-hydroxyethanone ⁸

Yield 77%, light yellow solid; R_f = 0.23 (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 7.93-7.22 (m, 8H), 5.91 (d, J =6.0, 1H), 4.52 (d, J =5.3, 1H).

1,2-bis(3-bromophenyl)-2-hydroxyethanone ⁹

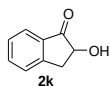
Yield 64%, light yellow solid; R_f = 0.25 (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 8.10 – 7.22 (m, 8H), 5.89 (d, J =5.7, 1H), 4.51 (d, J =6.0, 1H).

2-hydroxy-2-(naphthalen-2-yl)-1-(naphthalen-3-yl)ethanone ⁸



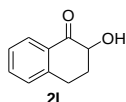
Yield 65%, light yellow solid; $R_f = 0$. (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 8.55 (s, 1H), 8.05 (dd, $J=8.6, 1.6$, 1H), 7.99 (s, 1H), 7.93 – 7.74 (m, 6H), 7.63 – 7.42 (m, 5H), 6.35 (d, $J=6.1$, 1H), 4.89 (d, $J=6.1$, 1H).

2,3-dihydro-2-hydroxyinden-1-one ¹⁰



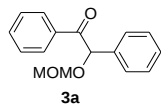
Yield 47%, yellow oil; $R_f = 0.20$ (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 7.69 (d, $J=7.7$, 1H), 7.59 (td, $J=7.6, 1.1$, 1H), 7.47 – 7.29 (m, 2H), 4.58 (dd, $J=7.9, 5.0$, 1H), 4.22 (s, 1H), 3.54 (dd, $J=16.6, 7.9$, 1H), 3.00 (dd, $J=16.6, 5.0$, 1H).

3,4-dihydro-2-hydroxynaphthalen-1(2H)-one ¹¹



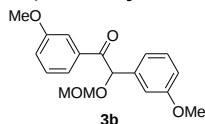
Yield 54%, yellow oil; $R_f = 0.21$ (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 8.05 (dd, $J=7.8, 1.3$, 1H), 7.60 – 7.47 (m, 1H), 7.41 – 7.22 (m, 2H), 4.49 – 4.33 (m, 1H), 4.00 (s, 1H), 3.24 – 2.98 (m, 2H), 2.60 – 2.47 (m, 1H), 2.12 – 1.95 (m, 1H).

2-(methoxymethoxy)-1,2-diphenylethanone ¹²



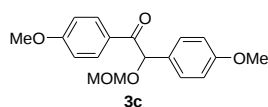
Yield 90%, White solid; $R_f = 0.53$ (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 7.25-7.15 (m, 8H), 4.82 (s, 2H), 3.58 (s, 3H), 2.20 (s, 1H).

2-(methoxymethoxy)-1,2-bis(3-methoxyphenyl)ethanone



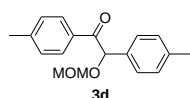
Yield 90%; yellow oil; $R_f = 0.55$ (PE/ AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 8.02 – 7.92 (m, 2H), 7.40 (d, $J=8.7$, 2H), 6.93 – 6.81 (m, 4H), 5.96 (s, 1H), 4.75 (s, 2H), 3.82 (s, 3H), 3.77 (s, 3H), 3.38 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3): δ 194.92, 163.47, 159.78, 131.30, 129.45, 128.25, 127.99, 114.34, 113.71, 94.72, 79.03, 55.93, 55.43, 55.24. HRMS-ESI⁺(m/z): $\text{C}_{18}\text{H}_{21}\text{O}_5$ [$\text{M}+\text{H}$]⁺ calcd for 317.1389, found 317.1388.

2-(methoxymethoxy)-1,2-bis(4-methoxyphenyl)ethanone



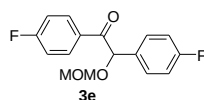
Yield 87%; yellow oil; $R_f = 0.25$ (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 7.63 – 7.49 (m, 2H), 7.29 (, 2H), 7.05 (m, 3H), 6.85 (m 1H), 5.97 (s, 1H), 4.78 (s, 2H), 3.81 (s, 3H), 3.78 (s, 3H), 3.37 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 196.19, 159.99, 159.65, 137.36, 136.31, 129.97, 129.48, 121.62, 120.35, 119.86, 114.39, 113.20, 113.03, 95.08, 79.99, 56.04, 55.39, 55.26. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{21}\text{O}_5$ [M+H] $^+$ calcd for 317.1389, found 317.1388.

2-(methoxymethoxy)-1,2-di-*p*-tolylethanone



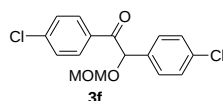
Yield 67%; yellow oil; $R_f = 0.74$ (PE/AcOEt = 10:1); ^1H NMR (400 MHz, CDCl_3) δ 7.91 (t, $J=7.8$, 2H), 7.37 (d, $J=8.1$, 2H), 7.19 (dd, $J=13.5$, 8.0, 4H), 6.00 (s, 1H), 4.77 (s, 2H), 3.39 (s, 3H), 2.37 (s, 3H), 2.33 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 196.06, 144.07, 138.52, 133.04, 132.55, 129.66, 129.20, 129.12, 128.04, 94.84, 79.57, 55.96, 21.68, 21.21. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{21}\text{O}_3$ [M+H] $^+$ calcd for 285.1491, found 285.1490.

1,2-bis(4-fluorophenyl)-2-(methoxymethoxy)ethanone



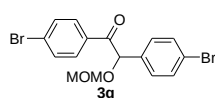
Yield 90%; yellow solid; $R_f = 0.65$ (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 8.09 – 7.98 (m, 2H), 7.51 – 7.41 (m, 2H), 7.07 (dt, $J=10.6$, 8.7, 4H), 5.91 (s, 1H), 4.80 – 4.72 (m, 2H), 3.35 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 194.95, 166.98, 164.43, 164.06, 161.60, 131.81, 129.50, 116.12, 115.88, 115.64, 95.32, 79.74, 56.13. ^{19}F NMR (377 MHz, CDCl_3) δ -104.14, -112.76. HRMS-ESI $^+$ (m/z): $\text{C}_{16}\text{H}_{15}\text{F}_2\text{O}_3$ [M+H] $^+$ calcd for 293.0989, found 293.0987.

1,2-bis(4-chlorophenyl)-2-(methoxymethoxy)ethanone



Yield 91%; yellow solid; $R_f = 0.54$ (PE/AcOEt = 10:1); ^1H NMR (400 MHz, CDCl_3) δ 7.96 – 7.89 (m, 2H), 7.43 – 7.32 (m, 6H), 5.87 (s, 1H), 4.80 – 4.75 (m, 2H), 3.34 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 195.25, 139.90, 134.75, 134.26, 133.00, 130.55, 129.24, 128.93, 128.92, 95.48, 80.04, 56.23. HRMS-ESI $^+$ (m/z): $\text{C}_{16}\text{H}_{15}\text{Cl}_2\text{O}_3$ [M+H] $^+$ calcd for 325.0398, found 325.0393.

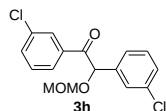
1,2-bis(4-bromophenyl)-2-(methoxymethoxy)ethanone



Yield 88%; yellow solid; $R_f = 0.34$ (PE/AcOEt = 10:1); ^1H NMR (400 MHz, CDCl_3) δ 7.84 (d, $J = 8.6$ Hz, 2H), 7.54 (dd, $J = 22.6$, 8.6 Hz, 4H), 7.35 (d, $J = 8.4$ Hz, 2H), 5.85 (s, 1H), 4.82 – 4.73 (m, 2H),

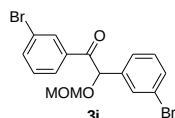
3.34 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 195.41, 134.76, 133.39, 132.20, 131.93, 130.64, 129.18, 128.72, 122.97, 95.52, 80.14, 56.25. HRMS-ESI $^+$ (m/z): $\text{C}_{16}\text{H}_{15}\text{Br}_2\text{O}_3$ $[\text{M}+\text{H}]^+$ calcd for 414.9367, found 414.9367.

1,2-bis(3-chlorophenyl)-2-(methoxymethoxy)ethanone



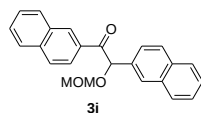
Yield 97%; yellow solid; R_f = 0.79 (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 7.98 (s, 1H), 7.85 (dd, J =7.8, 0.9, 1H), 7.54 – 7.47 (m, 2H), 7.41 – 7.29 (m, 4H), 5.86 (s, 1H), 4.78 (s, 2H), 3.35 (d, J =1.9, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 195.09, 137.58, 136.25, 134.97, 133.39, 130.27, 129.92, 129.08, 127.57, 127.26, 125.68, 95.64, 80.14, 56.31. HRMS-ESI $^+$ (m/z): $\text{C}_{16}\text{H}_{15}\text{Cl}_2\text{O}_3$ $[\text{M}+\text{H}]^+$ calcd for 325.0398, found 325.0393.

1,2-bis(3-bromophenyl)-2-(methoxymethoxy)ethanone



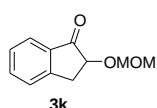
Yield 90%; yellow solid; R_f = 0.84 (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 8.25 – 7.10 (m, 8H), 5.85 (s, 1H), 4.78 (s, 2H), 3.35 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 194.97, 137.80, 136.37, 132.02, 130.49, 130.16, 127.70, 126.15, 123.06, 95.65, 80.05, 56.34. HRMS-ESI $^+$ (m/z): $\text{C}_{16}\text{H}_{15}\text{Br}_2\text{O}_3$ $[\text{M}+\text{H}]^+$ calcd for 414.9367, found 414.9367.

2-(methoxymethoxy)-2-(naphthalen-2-yl)-1-(naphthalen-3-yl)ethanone



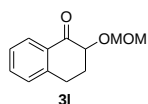
Yield 96%; yellow solid; R_f = 0.74 (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 8.62 (s, 1H), 8.12 – 8.03 (m, 2H), 7.94 (d, J =8.0, 1H), 7.89 – 7.77 (m, 5H), 7.67 (dd, J =8.5, 1.7, 1H), 7.62 – 7.45 (m, 4H), 6.36 (s, 1H), 4.89 (s, 2H), 3.44 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 196.49, 135.56, 133.44, 133.31, 133.28, 132.44, 132.32, 131.00, 129.76, 128.95, 128.69, 128.43, 128.16, 127.72, 127.62, 126.79, 126.58, 126.43, 125.15, 124.56, 95.22, 80.31, 56.20. HRMS-ESI $^+$ (m/z): $\text{C}_{24}\text{H}_{21}\text{O}_3$ $[\text{M}+\text{H}]^+$ calcd for 357.1491, found 357.1490.

2,3-dihydro-2-(methoxymethoxy)inden-1-one



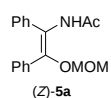
Yield 64%; yellow oil; R_f = 0.94 (DCM); ^1H NMR (400 MHz, CDCl_3) δ 7.75 (d, J =7.6, 1H), 7.61 (t, J =7.5, 1H), 7.44 – 7.35 (m, 2H), 5.01 (d, J =6.7, 1H), 4.84 (d, J =6.7, 1H), 4.56 – 4.44 (m, 1H), 3.55 (dd, J =16.7, 7.8, 1H), 3.47 (s, 3H), 3.04 (dd, J =16.7, 4.8, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ 203.68, 150.64, 135.62, 134.59, 127.91, 126.64, 124.25, 96.55, 77.26, 55.83, 34.13. HRMS-ESI $^+$ (m/z): $\text{C}_{11}\text{H}_{13}\text{O}_3$ $[\text{M}+\text{H}]^+$ calcd for 193.0865, found 193.0864.

3,4-dihydro-2-(methoxymethoxy)naphthalen-1(2H)-one



Yield 78%; Pale-yellow oil; $R_f = 0.48$ (PE/AcOEt = 4:1); ^1H NMR (400 MHz, CDCl_3) δ 8.00 (t, $J=7.0$, 1H), 7.51 – 7.39 (m, 1H), 7.28 (q, $J=7.2$, 1H), 7.22 (dd, $J=8.4$, 4.5, 1H), 4.96 – 4.86 (m, 1H), 4.85 – 4.79 (m, 1H), 4.36 (ddd, $J=11.8$, 7.2, 4.5, 1H), 3.46 – 3.33 (m, 3H), 3.07 (d, $J=4.1$, 2H), 2.39 (ddd, $J=12.2$, 6.0, 2.7, 1H), 2.27 – 2.10 (m, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ 196.50, 143.35, 133.60, 131.84, 128.59, 127.58, 126.74, 95.96, 77.02, 55.69, 30.20, 27.68. HRMS-ESI $^+$ (m/z): $\text{C}_{12}\text{H}_{15}\text{O}_3$ $[\text{M}+\text{H}]^+$ calcd for 207.1021, found 207.1016.

N-((Z)-2-(methoxymethoxy)-1,2-diphenylvinyl)acetamide



Yield 78%; White solid; $R_f = 0.33$ (PE/AcOEt = 1:1); ^1H NMR (400 MHz, CDCl_3) δ 7.62 (s, 1H), 7.20-7.16 (m, 10H), 5.33 (s, 1H), 4.82 (s, 2H), 3.58 (s, 3H), 2.15 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 168.28, 145.94, 143.76, 133.16, 130.22, 129.28, 128.11, 127.88, 127.24, 95.97, 57.29, 23.96. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{20}\text{NO}_3$ $[\text{M}+\text{H}]^+$ calcd for 298.1443, found 298.1448. The structure of (Z)-5a was determined by X-Ray (Figure 1)

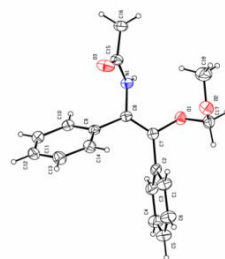
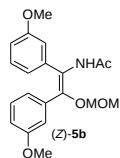


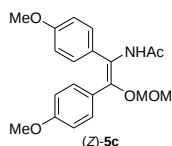
Figure 1. the X-ray structure of (Z)-5a

(Z)-N-[2-Methoxymethoxy-1,2-bis-(3-methoxy-phenyl)-vinyl]-acetamide



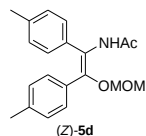
Yield 35%; White solid; $R_f = 0.30$ (PE/AcOEt = 1:1); ^1H NMR (400 MHz, CDCl_3) δ 7.76 (s, 1H), 7.05 (dd, $J=13.5$, 6.3, 2H), 6.72 (dd, $J=21.1$, 11.6, 6H), 4.79 (s, 2H), 3.58 (s, 3H), 3.56 (s, 3H), 3.51 (s, 3H), 2.05 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 173.65, 168.53, 159.17, 158.99, 144.45, 136.80, 134.80, 129.36, 128.93, 123.56, 123.51, 122.59, 115.14, 114.54, 113.20, 95.93, 57.19, 55.02, 23.71. HRMS-ESI $^+$ (m/z): $\text{C}_{20}\text{H}_{24}\text{NO}_5$ $[\text{M}+\text{H}]^+$ calcd for 358.1654, found 358.1666.

(Z)-N-[2-Methoxymethoxy-1,2-bis-(4-methoxy-phenyl)-vinyl]-acetamide



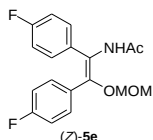
Yield 53%; White solid; $R_f = 0.31$ (PE/AcOEt = 1:1); ^1H NMR (400 MHz, CDCl_3) δ 7.63 (s, 1H), 7.08 (t, $J=8.8$, 4H), 6.79 – 6.63 (m, 4H), 4.78 (s, 2H), 3.75 (d, $J=8.6$, 6H), 3.53 (s, 3H), 2.11 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 174.49, 162.74, 159.23, 158.43, 143.40, 131.42, 131.30, 130.92, 130.47, 127.62, 126.97, 125.74, 122.47, 115.21, 112.83, 95.79, 55.15, 36.58, 31.48. HRMS-ESI $^+$ (m/z): $\text{C}_{20}\text{H}_{24}\text{NO}_5$ [$\text{M}+\text{H}$] $^+$ calcd for 358.1654, found 358.1666.

(Z)-N-(2-Methoxymethoxy-1,2-di-*p*-tolyl-vinyl)-acetamide



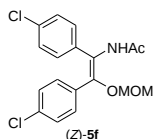
Yield 30%; Colorless oil; $R_f = 0.32$ (PE/AcOEt = 1:1) ^1H NMR (400 MHz, CDCl_3) δ 7.60 (s, 1H), 7.07 (d, $J=8.0$, 4H), 7.00 (t, $J=10.2$, 4H), 4.80 (s, 2H), 3.56 (s, 3H), 2.31 (s, 3H), 2.29 (s, 3H), 2.13 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 168.28, 143.68, 137.99, 136.88, 132.25, 130.03, 129.27, 129.04, 128.85, 128.69, 128.06, 126.79, 125.52, 123.41, 122.60, 95.88, 57.25, 23.97, 21.32. HRMS-ESI $^+$ (m/z): $\text{C}_{20}\text{H}_{24}\text{NO}_5$ [$\text{M}+\text{H}$] $^+$ calcd for 326.1756, found 326.1751.

(Z)-N-[1,2-Bis-(4-fluoro-phenyl)-2-methoxymethoxy-vinyl]-acetamide



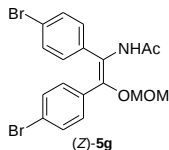
Yield 91%; White solid; $R_f = 0.43$ (PE/AcOEt = 1:1) ^1H NMR (400 MHz, CDCl_3) δ 7.64 (s, 1H), 7.13 (dd, $J=7.6$, 5.6, 4H), 6.95 – 6.85 (m, 4H), 4.80 (s, 2H), 3.56 (s, 3H), 2.13 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 168.32, 163.68, 163.12, 161.18, 160.65, 142.73, 132.05, 131.97, 130.95, 129.21, 123.32, 115.48, 115.26, 115.17, 114.95, 95.86, 57.18, 23.94. ^{19}F NMR (377 MHz, CDCl_3) δ = -112.18, -114.30. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{18}\text{F}_2\text{NO}_3$ [$\text{M}+\text{H}$] $^+$ calcd for 334.1255, found 334.1259.

(Z)-N-[1,2-Bis-(4-chloro-phenyl)-2-methoxymethoxy-vinyl]-acetamide



Yield 84%; White solid; $R_f = 0.38$ (PE/AcOEt = 1:1); ^1H NMR (400 MHz, CDCl_3) δ 7.66 (s, 1H), 7.21-7.09 (m, 8H), 4.80 (s, 2H), 3.56 (s, 3H), 2.13 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 168.35, 142.76, 134.34, 133.35, 131.61, 131.40, 130.50, 128.61, 128.35, 127.08, 123.82, 96.05, 57.23, 23.92. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{18}\text{Cl}_2\text{NO}_3$ [$\text{M}+\text{H}$] $^+$ calcd for 366.0664, found 366.0658.

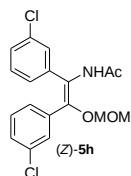
(Z)-N-[1,2-Bis-(4-bromo-phenyl)-2-methoxymethoxy-vinyl]-acetamide



Yield 81%; Yellow solid; $R_f = 0.48$ (PE/AcOEt = 1:1); ^1H NMR (400 MHz, CDCl_3) δ 7.66 (s, 1H),

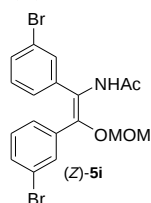
7.34 (dd, $J=15.5, 8.1$, 4H), 7.04 (d, $J=7.9$, 4H), 4.79 (s, 2H), 3.56 (s, 3H), 2.13 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 168.64, 142.79, 140.99, 139.45, 138.37, 133.75, 131.64, 131.30, 130.77, 127.38, 123.94, 122.61, 121.54, 96.06, 57.25, 23.92. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{18}\text{Br}_2\text{NO}_3$ [$\text{M}+\text{H}$] $^+$ calcd for 455.9633, found 455.9625.

(Z)-N-[1,2-Bis-(3-chloro-phenyl)-2-methoxymethoxy-vinyl]-acetamide



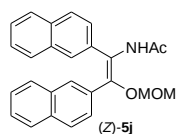
Yield 77%; White solid; R_f = 0.37 (PE/AcOEt = 1:1); ^1H NMR (400 MHz, CDCl_3) δ 7.67 (s, 1H), 7.28 – 6.90 (m, 8H), 4.81 (s, 2H), 3.57 (s, 3H), 2.14 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 167.98, 142.89, 136.60, 134.91, 134.25, 129.77, 129.45, 129.22, 128.94, 128.65, 128.50, 125.95, 124.12, 96.18, 57.27, 23.85. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{18}\text{Cl}_2\text{NO}_3$ [$\text{M}+\text{H}$] $^+$ calcd for 366.0664, found 366.0658.

(Z)-N-[1,2-Bis-(3-bromo-phenyl)-2-methoxymethoxy-vinyl]-acetamide



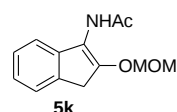
Yield 75%; Yellow solid; R_f = 0.58 (PE/AcOEt = 1:1); ^1H NMR (400 MHz, CDCl_3) δ 7.65 (s, 1H), 7.44 – 7.32 (m, 4H), 7.09 – 6.99 (m, 4H), 4.81 (s, 2H), 3.57 (s, 3H), 2.15 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 168.38, 142.87, 136.87, 135.17, 132.64, 131.77, 131.57, 130.61, 129.69, 129.49, 128.95, 128.18, 124.03, 122.31, 122.06, 96.19, 57.27, 23.89. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{18}\text{Br}_2\text{NO}_3$ [$\text{M}+\text{H}$] $^+$ calcd for 455.9633, found 455.9625.

(Z)-N-(2-Methoxymethoxy-1,2-di-naphthalen-2-yl-vinyl)-acetamide



Yield 62%; White solid; R_f = 0.28 (PE/AcOEt = 1:1) ^1H NMR (400 MHz, CDCl_3) δ 7.81 (s, 2H), 7.75 (d, $J=6.0$, 2H), 7.68 (d, $J=7.4$, 2H), 7.59 (d, $J=8.5$, 2H), 7.45 – 7.41 (m, 2H), 7.22 (s, 2H), 4.90 (s, 2H), 3.63 (s, 3H), 2.21 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 168.45, 133.18, 132.99, 132.67, 131.00, 129.52, 128.22, 128.14, 127.62, 127.59, 127.51, 127.34, 126.57, 126.25, 125.88, 96.36, 57.40, 24.03. HRMS-ESI $^+$ (m/z): $\text{C}_{26}\text{H}_{24}\text{NO}_3$ [$\text{M}+\text{H}$] $^+$ calcd for 398.1749, found 398.1756.

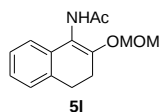
N-(2-Methoxymethoxy-3H-inden-1-yl)-acetamide



Yield 44%; White solid; R_f = 0.22 (PE/AcOEt = 1:1) ^1H NMR (400 MHz, CDCl_3) δ 7.24 (dt, $J=29.6$, 12.2, 4H), 7.09 (d, $J=8.4$, 1H), 5.15 (s, 2H), 3.53 (s, 3H), 3.51 (d, $J=4.9$, 2H), 2.23 (s, 3H). ^{13}C NMR

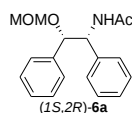
(100 MHz, CDCl₃) δ 168.85, 154.92, 152.00, 141.17, 134.37, 126.62, 118.71, 116.87, 114.65, 94.95, 56.46, 34.61, 23.36. HRMS-ESI⁺(m/z): C₁₃H₁₆NO₃ [M+H]⁺ calcd for 234.1130, found 234.1132

N-(2-Methoxymethoxy-3,4-dihydro-naphthalen-1-yl)-acetamide



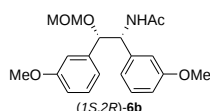
Yield 56%; White solid; R_f = 0.17 (PE/AcOEt = 1:1) ¹H NMR (400 MHz, CDCl₃) δ 7.26 – 7.03 (m, 4H), 6.69 (d, *J*=118.0, 1H), 5.06 (d, *J*=11.0, 2H), 3.48 (s, 3H), 2.96 (td, *J*=8.1, 4.1, 2H), 2.64 (q, *J*=8.3, 2H), 2.07 (d, *J*=117.3, 3H). ¹³C NMR (100 MHz, CDCl₃) δ 174.39, 169.25, 151.23, 149.65, 133.64, 132.60, 132.44, 132.31, 127.22, 127.01, 126.92, 126.43, 126.27, 125.78, 121.84, 121.40, 115.50, 115.04, 93.75, 93.42, 56.57, 56.40, 27.98, 27.89, 23.82, 23.71, 23.39, 20.12. HRMS-ESI⁺(m/z): C₁₄H₁₈NO₃ [M+H]⁺ calcd for 248.1283, found 248.1287.

(1*S*, 2*R*)-N-(2-Methoxymethoxy-1,2-diphenyl-ethyl)-acetamide



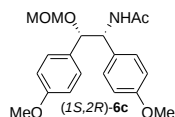
White solid, melting point: 63-65 °C, yield: 99%, 93% ee; [α]_D²⁰ = 85.8 (c = 0.4, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak OD-H column, hexane: isopropanol = 95:5; flow rate = 1.0 mL/min; UV detection at 254 nm; t_R = 14.1 min (minor), 20.2 min (major). ¹H NMR (400 MHz, CDCl₃) δ 7.25 (d, *J*=3.6, 4H), 7.15 – 7.01 (m, 4H), 6.41 (d, *J*=8.1, 1H), 5.28 (dd, *J*=8.1, 4.8, 1H), 5.01 (d, *J*=4.8, 1H), 4.60 (dd, *J*=21.6, 6.6, 2H), 3.33 (s, 3H), 1.99 (s, 3H). ¹³C NMR (100 MHz, CDCl₃) δ 169.04, 137.99, 137.56, 128.15, 128.07, 127.99, 127.93, 127.45, 127.34, 94.91, 80.79, 57.76, 55.84, 23.45. HRMS-ESI⁺(m/z): C₁₈H₂₁NNaO₃⁺ [M+Na]⁺ calcd for 322.1419, found 322.1419.

(1*S*, 2*R*)-N-[2-Methoxymethoxy-1,2-bis-(3-methoxy-phenyl)-ethyl]-acetamide



Colorless oil, yield: 98%, 91% ee; [α]_D²⁰ = 7.6 (c = 0.4, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak OD-H column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 220 nm; t_R = 12.2 min (minor), 17.8 min (major). ¹H NMR (400 MHz, CDCl₃) δ 7.17 (td, *J*=7.9, 2.6, 2H), 6.82 – 6.68 (m, 4H), 6.67 – 6.63 (m, 1H), 6.54 (s, 1H), 6.37 (d, *J*=8.6, 1H), 5.25 (dd, *J*=8.6, 4.7, 1H), 4.97 (d, *J*=4.7, 1H), 4.61 (dd, *J*=20.5, 6.6, 2H), 3.73 (s, 3H), 3.67 (s, 3H), 3.35 (s, 3H), 2.00 (s, 3H). ¹³C NMR (100 MHz, CDCl₃) δ 169.04, 159.34, 159.15, 139.58, 139.10, 129.10, 128.91, 120.45, 119.71, 114.09, 114.02, 112.83, 112.32, 94.95, 80.57, 57.60, 55.89, 55.19, 55.13, 23.47. HRMS-ESI⁺(m/z): C₂₀H₂₅NNaO₅⁺ [M+Na]⁺ calcd for 382.1630, found 382.1630.

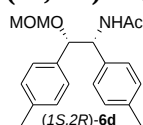
(1*S*, 2*R*)-N-[2-Methoxymethoxy-1,2-bis-(4-methoxy-phenyl)-ethyl]-acetamide



Colorless oil, yield: 99%, 94% ee; $[\alpha]_D^{20} = -2$ ($c = 0.4$, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak OD-H column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 220 nm; $t_R = 14.6$ min (major), 16.4 min (minor).

^1H NMR (400 MHz, CDCl_3) δ 7.06 (d, $J=8.7$, 2H), 6.96 (d, $J=8.6$, 2H), 6.78 (dd, $J=8.7$, 5.3, 4H), 6.34 (d, $J=8.6$, 1H), 5.17 (dd, $J=8.6$, 4.7, 1H), 4.92 (d, $J=4.7$, 1H), 4.57 (dd, $J=18.2$, 6.6, 2H), 3.79 (s, 6H), 3.33 (s, 3H), 1.98 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 168.95, 159.21, 158.80, 130.27, 129.60, 129.31, 128.64, 113.40, 113.30, 94.66, 80.40, 57.25, 55.81, 55.22, 55.18, 23.48. HRMS-ESI $^+$ (m/z): $\text{C}_{20}\text{H}_{25}\text{NNaO}_5^+$ [$\text{M}+\text{Na}$] $^+$ calcd for 382.1630, found 382.1630.

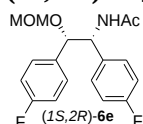
(1S, 2R)-N-(2-Methoxymethoxy-1,2-di-p-tolyl-ethyl)-acetamide



Colorless oil, yield: 99%, 96% ee; $[\alpha]_D^{20} = -0.7$ ($c = 0.3$, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak IC column, hexane: isopropanol = 80:20; flow rate = 1.0 mL/min; UV detection at 225 nm; $t_R = 12.2$ min (minor), 16.0 min (major).

^1H NMR (400 MHz, CDCl_3) δ 7.04 (dd, $J=14.7$, 7.5, 6H), 6.95 (d, $J=8.0$, 2H), 6.29 (d, $J=7.0$, 1H), 5.23 (dd, $J=8.7$, 4.8, 1H), 4.95 (d, $J=4.7$, 1H), 4.58 (dd, $J=19.7$, 6.6, 2H), 3.33 (s, 3H), 2.33 (s, 6H), 1.98 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 168.92, 137.60, 136.96, 135.13, 134.47, 128.76, 128.64, 128.00, 127.35, 94.76, 80.67, 57.43, 55.80, 23.50, 21.19, 21.15. HRMS-ESI $^+$ (m/z): $\text{C}_{20}\text{H}_{25}\text{NNaO}_3^+$ [$\text{M}+\text{Na}$] $^+$ calcd for 350.1732, found 350.1732.

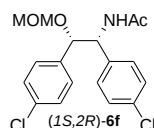
(1S, 2R)-N-[1,2-Bis-(4-fluoro-phenyl)-2-methoxymethoxy-ethyl]-acetamide



White solid, melting point: 183-184 °C, yield: 97%, 95% ee; $[\alpha]_D^{20} = 36.2$ ($c = 0.4$, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak IC column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 220 nm; $t_R = 12.8$ min (major), 13.8 min (minor).

^1H NMR (400 MHz, CDCl_3) δ 7.10 – 7.06 (m, 2H), 7.01 – 6.91 (m, 6H), 6.49 (d, $J=8.4$, 1H), 5.16 (dd, $J=8.5$, 4.6, 1H), 4.97 (d, $J=4.6$, 1H), 4.58 (dd, $J=30.6$, 6.6, 2H), 3.36 (s, 3H), 2.01 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 169.03, 163.63, 163.38, 161.18, 160.94, 133.40, 133.37, 133.35, 133.32, 129.93, 129.85, 128.89, 128.81, 115.21, 114.99, 114.92, 114.71, 95.01, 80.15, 57.27, 55.95, 23.41. ^{19}F NMR (377 MHz, CDCl_3) δ -113.91, -114.83. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{20}\text{F}_2\text{NO}_3^+$ [$\text{M}+\text{H}$] $^+$ calcd for 336.1406, found 336.1404.

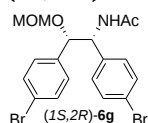
(1S, 2R)-N-[1,2-Bis-(4-chloro-phenyl)-2-methoxymethoxy-ethyl]-acetamide



White solid, melting point: 190-193 °C, yield: 99%, 98% ee; $[\alpha]_D^{20} = 37.2$ (c = 0.4, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak IC column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 220 nm; $t_R = 12.8$ min (major), 15.2 min (minor).

^1H NMR (400 MHz, CDCl_3) δ 7.22 (dd, $J=8.4, 5.6$, 4H), 7.00 (dd, $J=27.0, 8.4$, 4H), 6.50 (d, $J=8.4$, 1H), 5.16 (dd, $J=8.5, 4.5$, 1H), 4.97 (d, $J=4.5$, 1H), 4.59 (dd, $J=35.7, 6.6$, 2H), 3.37 (s, 3H), 2.01 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 169.07, 136.04, 135.97, 133.91, 133.44, 129.67, 128.51, 128.41, 128.13, 95.19, 80.17, 57.27, 56.02, 23.40. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{19}\text{Cl}_2\text{NNaO}_3^+$ $[\text{M}+\text{Na}]^+$ calcd for 390.0640, found 390.0640.

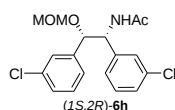
(1*S*, 2*R*)-N-[1,2-Bis-(4-bromo-phenyl)-2-methoxymethoxy-ethyl]-acetamide



White solid, melting point: 186-188°C, yield: 99%, 96.7% ee; $[\alpha]_D^{20} = 45.5$ (c = 0.4, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak IC column, hexane: isopropanol = 80:20; flow rate = 1.0 mL/min; UV detection at 220 nm; $t_R = 6.9$ min (major), 8.0 min (minor).

^1H NMR (400 MHz, CDCl_3) δ 7.42 – 7.33 (m, 4H), 6.98 (d, $J=8.4$, 2H), 6.91 (d, $J=8.4$, 2H), 6.50 – 6.40 (d, $J=8.4$, 1H), 5.15 (dd, $J=8.5, 4.4$, 1H), 4.96 (d, $J=4.4$, 1H), 4.59 (dd, $J=37.3, 6.6$, 2H), 3.38 (s, 3H), 2.02 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 169.04, 136.53, 136.41, 131.37, 131.09, 130.01, 128.82, 122.13, 121.65, 95.24, 80.21, 57.27, 56.04, 23.41. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{19}\text{Br}_2\text{NNaO}_3^+$ $[\text{M}+\text{Na}]^+$ calcd for 479.9609, found 479.9609.

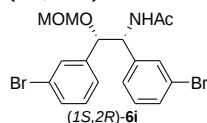
(1*S*, 2*R*)-N-[1,2-Bis-(3-chloro-phenyl)-2-methoxymethoxy-ethyl]-acetamide



White solid, melting point: 130-131 °C, yield: 98%, 97% ee; $[\alpha]_D^{20} = 65.5$ (c = 0.4, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak IC column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 220 nm; $t_R = 12.5$ min (major), 14.0 min (minor).

^1H NMR (400 MHz, CDCl_3) δ 7.21 (ddd, $J=17.8, 8.1, 4.8$, 5H), 7.05 (s, 1H), 6.93 (dd, $J=16.2, 7.6$, 2H), 6.45 (d, $J=8.4$, 1H), 5.18 (dd, $J=8.5, 4.7$, 1H), 4.97 (d, $J=4.7$, 1H), 4.61 (dd, $J=36.1, 6.6$, 2H), 3.37 (s, 3H), 2.03 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 169.06, 139.63, 139.48, 134.22, 133.90, 129.50, 129.15, 128.35, 128.14, 127.84, 127.35, 126.74, 125.28, 95.25, 80.13, 57.36, 56.05, 23.40. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{19}\text{Cl}_2\text{NNaO}_3^+$ $[\text{M}+\text{Na}]^+$ calcd for 390.0640, found 390.0640.

(1*S*, 2*R*)-N-[1,2-Bis-(3-bromo-phenyl)-2-methoxymethoxy-ethyl]-acetamide

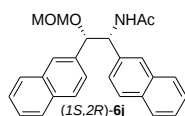


White solid, melting point: 126-128 °C, yield: 99%, 99.9 % ee; $[\alpha]_D^{20} = 53.6$ (c = 0.25, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak IA column, hexane: isopropanol

= 90:10; flow rate = 1.0 mL/min; UV detection at 220 nm; t_R = 8.1 min (minor), 9.3 min (major).

^1H NMR (400 MHz, CDCl_3) δ 7.42 – 6.95 (m, 8H), 6.51 (d, $J=8.4$, 1H), 5.16 (dd, $J=8.5$, 4.8, 1H), 4.94 (d, $J=4.8$, 1H), 4.60 (dd, $J=33.8$, 6.6, 2H), 3.35 (s, 3H), 2.01 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 169.12, 139.89, 139.79, 131.30, 131.04, 130.77, 130.34, 129.79, 129.45, 127.21, 125.76, 122.35, 122.11, 95.21, 80.05, 57.35, 56.04, 23.39. HRMS-ESI $^+$ (m/z): $\text{C}_{18}\text{H}_{19}\text{Br}_2\text{NNaO}_3^+$ $[\text{M}+\text{Na}]^+$ calcd for 479.9609, found 479.9609.

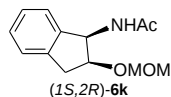
(1*S*, 2*R*)-N-(2-Methoxymethoxy-1,2-di-naphthalen-2-yl-ethyl)-acetamide



White solid, melting point: 152-153 °C, yield: 99%, 94 % ee; $[\alpha]_{\text{D}}^{20}$ = 83.3 (c = 0.3, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak IA column, hexane: isopropanol = 95:5; flow rate = 1.0 mL/min; UV detection at 210 nm; t_R = 24.9 min (major), 32.5 min (minor).

^1H NMR (400 MHz, CDCl_3) δ 7.84 – 7.71 (m, 6H), 7.65 (d, $J=14.5$, 3H), 7.48 (ddd, $J=9.4$, 4.7, 2.3, 4H), 7.32 (dd, $J=8.5$, 1.6, 1H), 7.12 (dd, $J=8.5$, 1.7, 1H), 6.46 (d, $J=8.6$, 1H), 5.58 (dd, $J=8.6$, 5.0, 1H), 5.28 (d, $J=4.9$, 1H), 4.66 (dd, $J=23.7$, 6.7, 2H), 3.34 (s, 3H), 2.01 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 169.07, 135.63, 135.09, 133.13, 133.01, 132.88, 132.80, 128.88, 127.98, 127.94, 127.69, 127.66, 127.56, 127.22, 126.86, 126.17, 126.13, 125.97, 125.85, 125.20, 124.95, 94.97, 80.97, 57.83, 55.94, 23.51. HRMS-ESI $^+$ (m/z): $\text{C}_{26}\text{H}_{25}\text{NNaO}_3^+$ $[\text{M}+\text{Na}]^+$ calcd for 422.1732, found 422.1732.

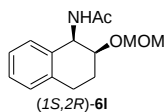
N-(2-Methoxymethoxy-indan-1-yl)-acetamide



White solid, melting point: 135-137 °C, yield: 98%, 55.5 % ee; $[\alpha]_{\text{D}}^{20}$ = -10 (c = 0.25, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak IA column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 220 nm; t_R = 14.8 min (major), 17.4 min (minor).

^1H NMR (400 MHz, CDCl_3) δ 7.32 – 7.24 (m, 4H), 6.29 (d, $J=8.1$, 1H), 5.57 (dd, $J=8.1$, 5.3, 1H), 4.72 (dd, $J=28.9$, 6.7, 2H), 4.56 (dt, $J=5.4$, 3.4, 1H), 3.38 (s, 3H), 3.09 (d, $J=3.3$, 2H), 2.14 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 170.17, 141.34, 139.61, 128.05, 127.11, 124.99, 124.08, 95.68, 78.69, 56.15, 55.62, 37.24, 23.43. HRMS-ESI $^+$ (m/z): $\text{C}_{13}\text{H}_{17}\text{NNaO}_3^+$ $[\text{M}+\text{Na}]^+$ calcd for 258.1106, found 258.1106.

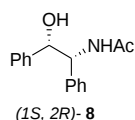
N-(2-Methoxymethoxy-1,2,3,4-tetrahydro-naphthalen-1-yl)-acetamide



White solid, melting point: 151-153 °C, yield: 98%, 3.7 % ee; $[\alpha]_{\text{D}}^{20}$ = -10 (c = 0.25, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak IA column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 220 nm; t_R = 13.5 min (major), 15.9 min

(minor).

^1H NMR (400 MHz, CDCl_3) δ 7.29 (dd, $J=5.7, 3.3$, 1H), 7.22 – 7.17 (m, 2H), 7.13 (dd, $J=5.3, 3.7$, 1H), 6.33 (d, $J=9.1$, 1H), 5.36 (dd, $J=9.5, 3.7$, 1H), 4.76 (dd, $J=16.5, 6.8$, 2H), 4.14 (ddd, $J=5.7, 3.9, 1.8$, 1H), 3.40 (s, 3H), 3.09 – 2.74 (m, 2H), 2.21 (dtd, $J=14.1, 5.8, 3.7$, 1H), 2.14 (s, 3H), 2.02 – 1.92 (m, 1H). ^{13}C NMR(100 MHz, CDCl_3) δ 170.01, 136.26, 135.01, 128.52, 127.70, 127.13, 126.40, 95.59, 73.62, 55.75, 49.89, 25.84, 24.71, 23.55. HRMS-ESI $^+$ (m/z): $\text{C}_{14}\text{H}_{19}\text{NNaO}_3^+$ $[\text{M}+\text{Na}]^+$ calcd for 272.1263, found 272.1263.



White solid, yield: 99%, 99 % ee; $[\alpha]_{\text{D}}^{20} = 9.25$ ($c = 0.4$, EtOH); The enantiomeric excess was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 254 nm; $t_{\text{R}} = 15.2$ min (minor), 18.6 min (major).

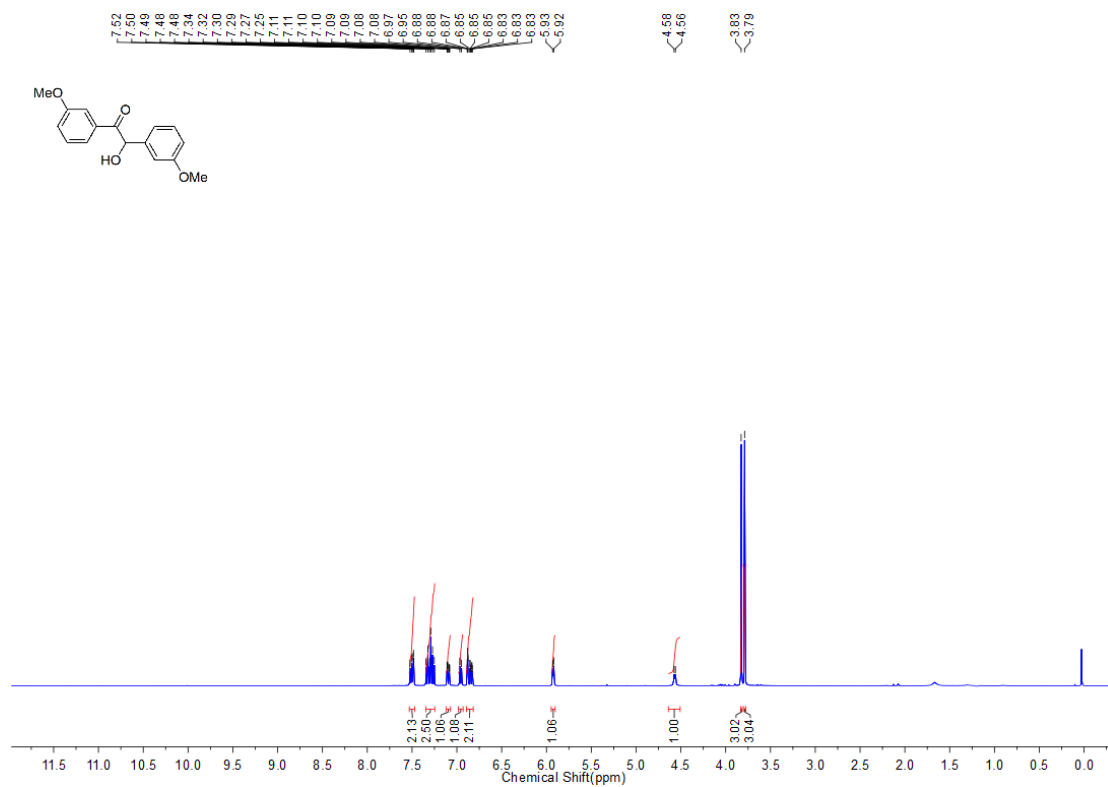
^1H NMR (400 MHz, $\text{d}^6\text{-DMSO}$) δ 8.28 (d, $J=9.2$, 1H), 7.33 – 7.14 (m, 10H), 5.44 (d, $J=4.9$, 1H), 4.94 (dd, $J=9.2, 7.1$, 1H), 4.75 (dd, $J=7.0, 5.0$, 1H), 1.71 (s, 3H). ^{13}C NMR(100 MHz, DMSO) δ 168.39, 143.70, 141.03, 128.80, 127.97, 127.86, 127.35, 127.14, 127.02, 75.37, 58.79, 23.08. HRMS-ESI $^+$ (m/z): $\text{C}_{16}\text{H}_{17}\text{NNaO}_2^+$ $[\text{M}+\text{Na}]^+$ calcd for 278.1157, found 278.1157.

7. References

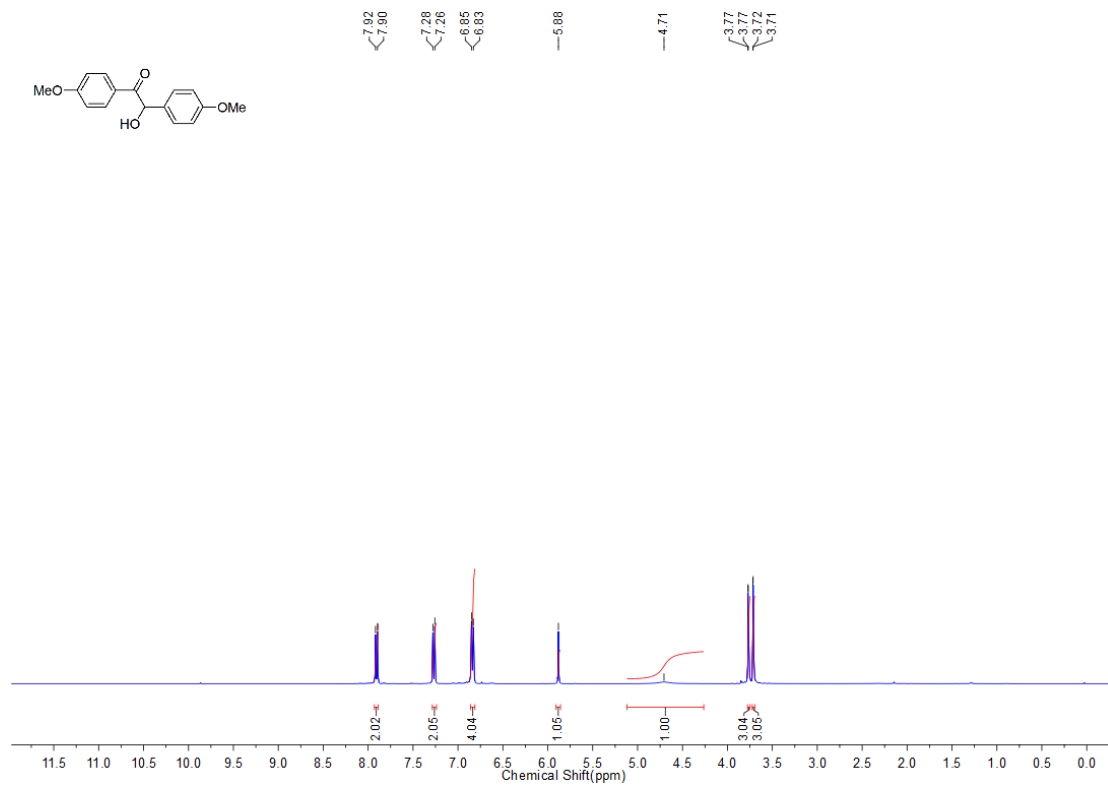
- (1) Prokopowicz, M.; Młynarz, P.; Kafarski, P. *Tetrahedron Lett.* **2009**, 50, 7314.
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2a-¹HNMR

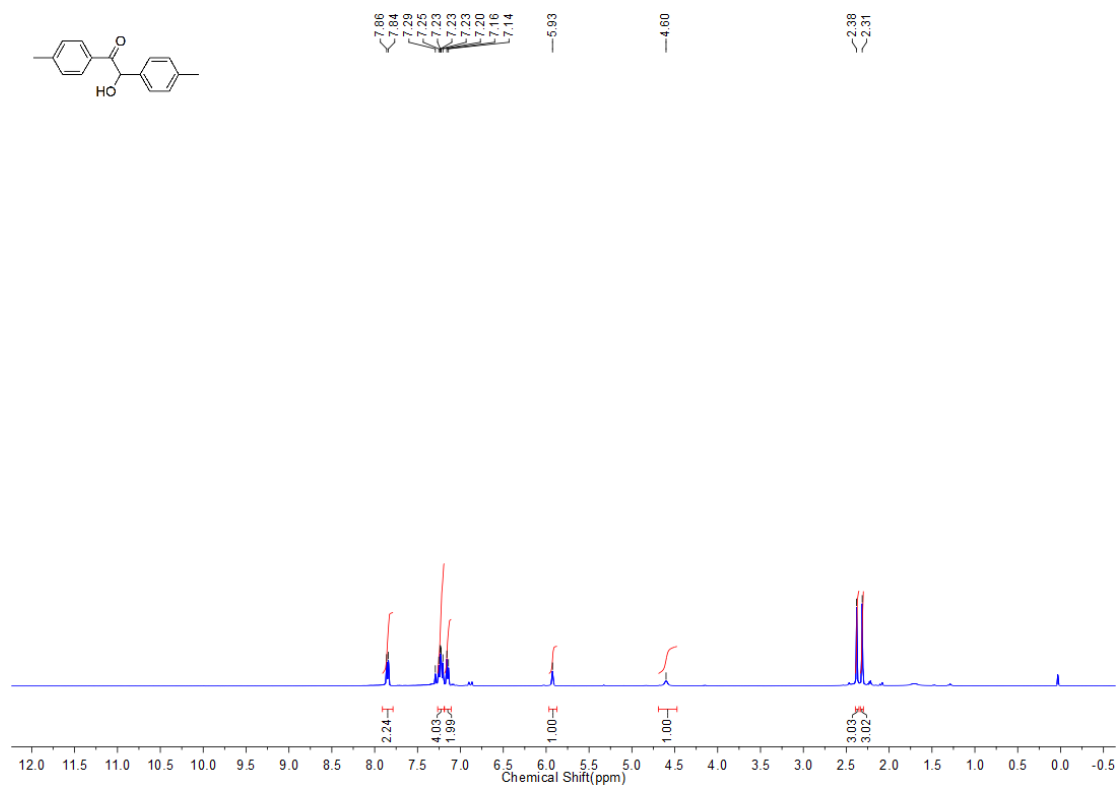




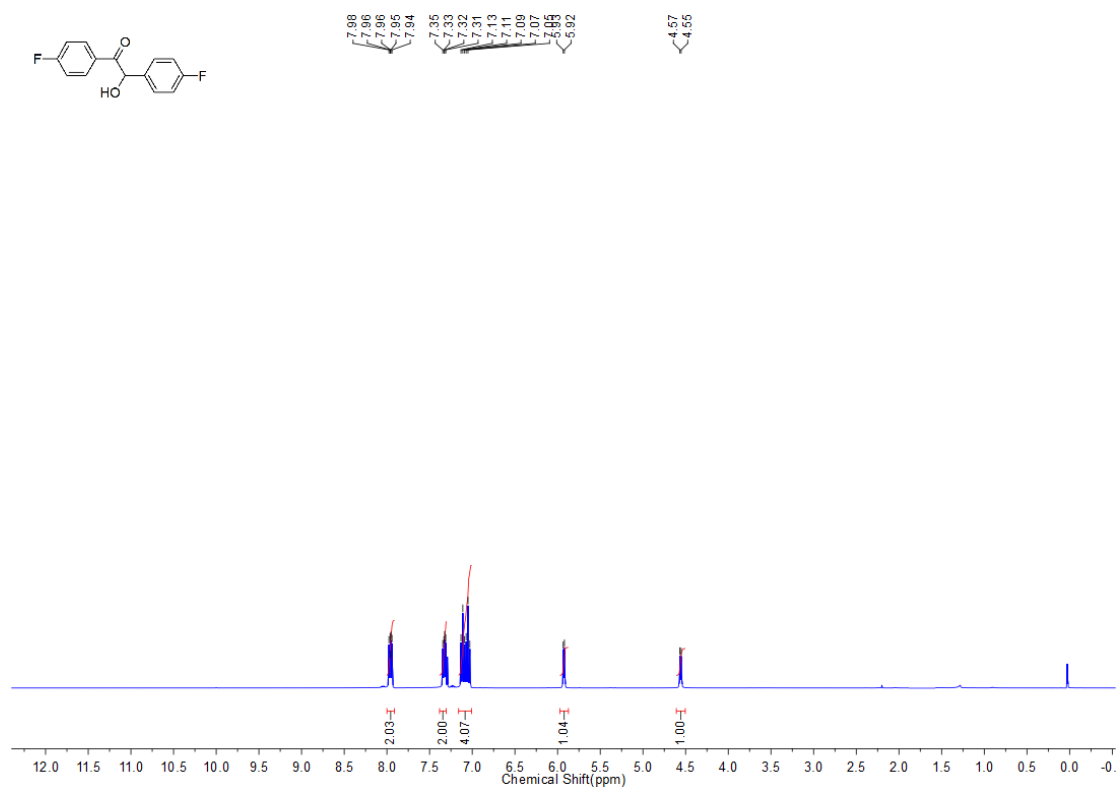
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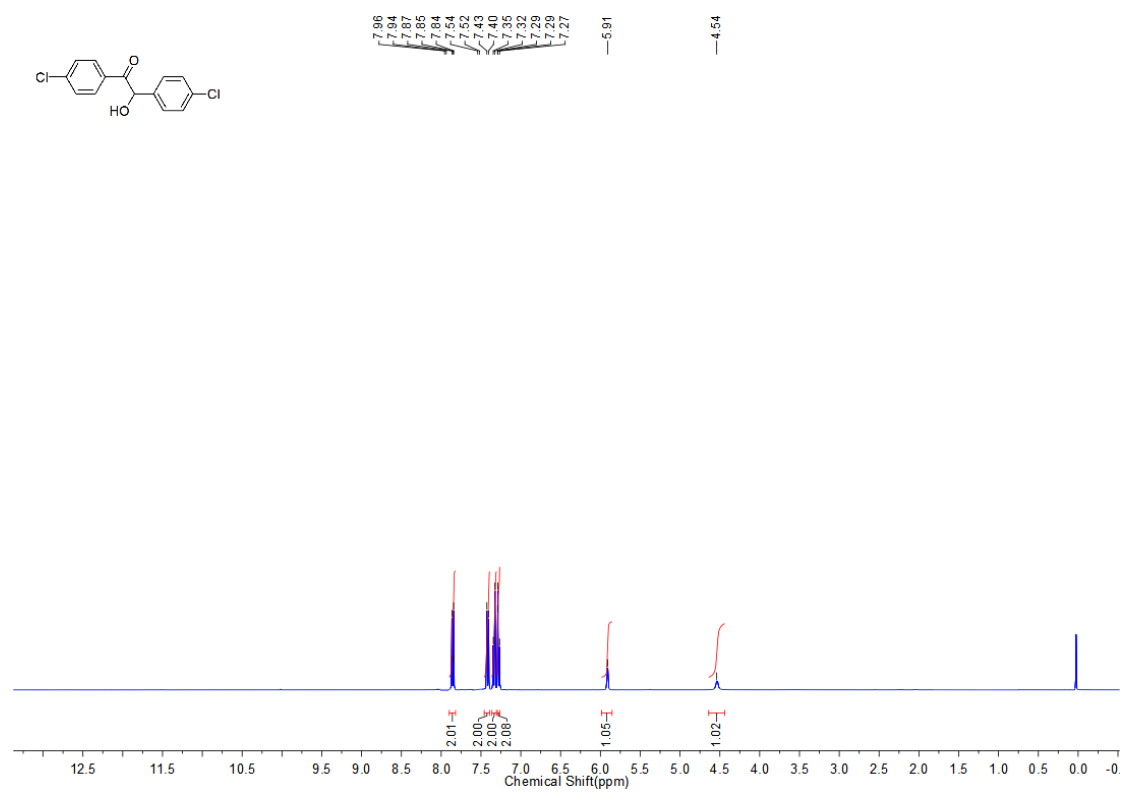
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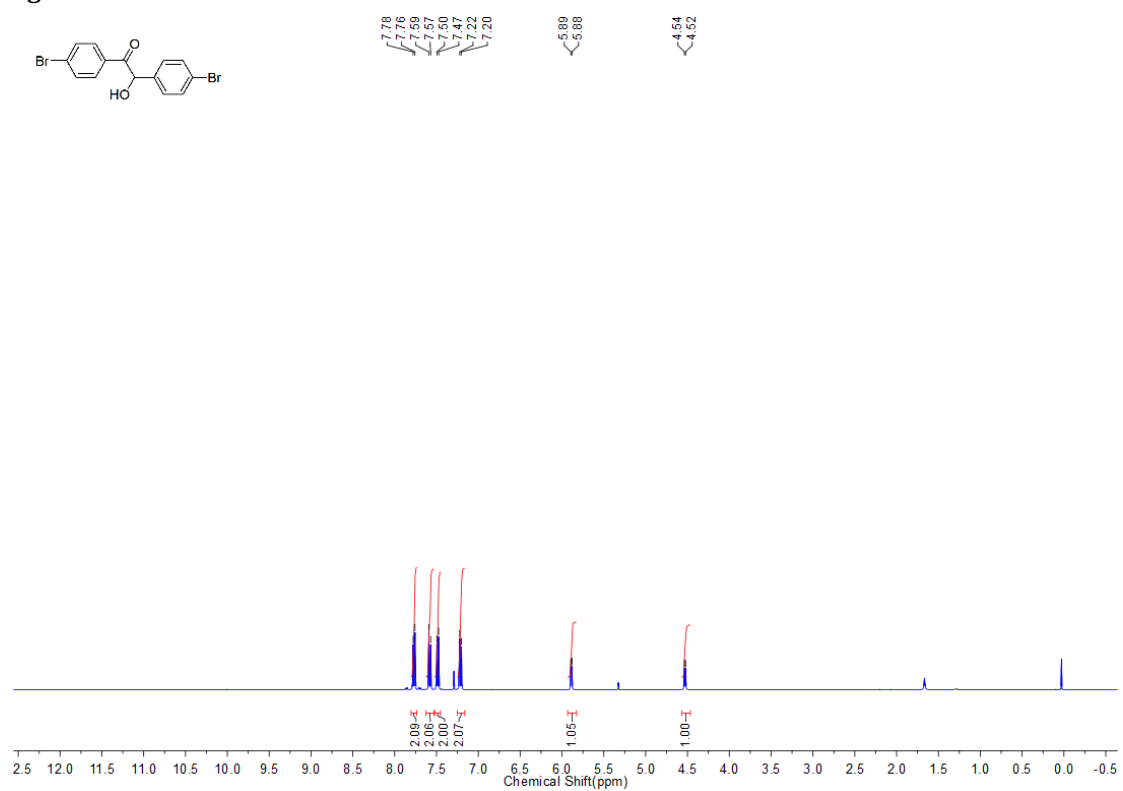
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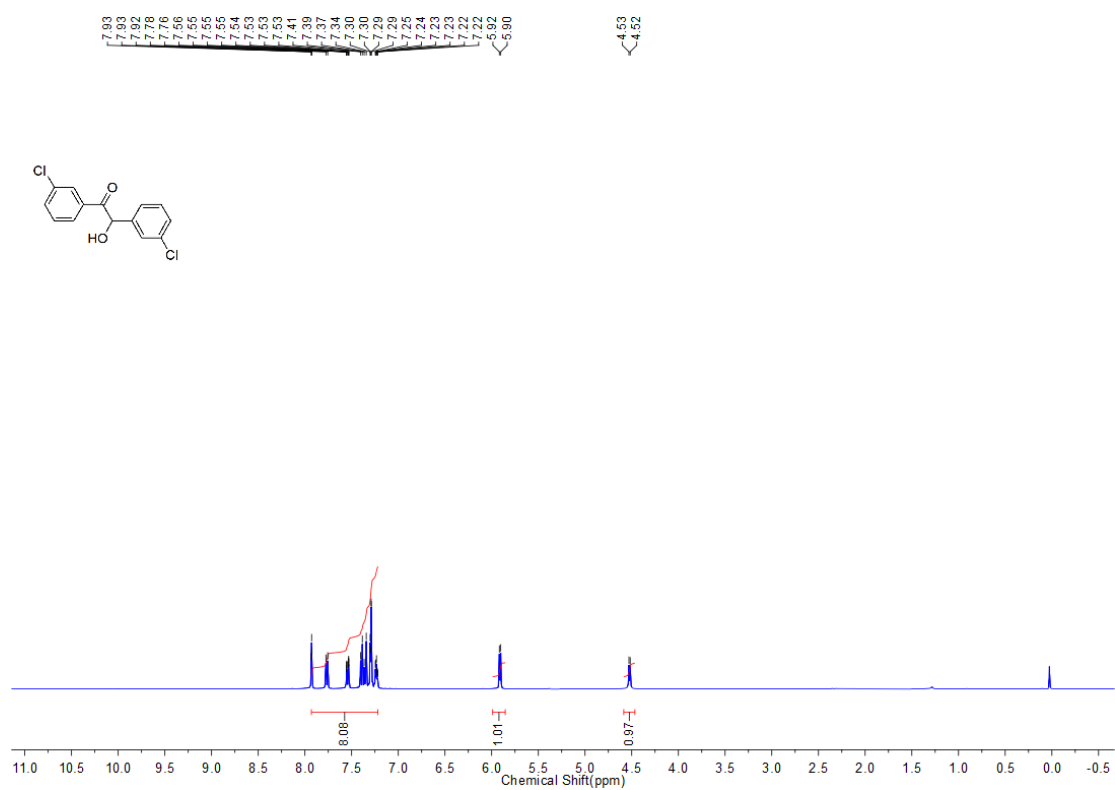
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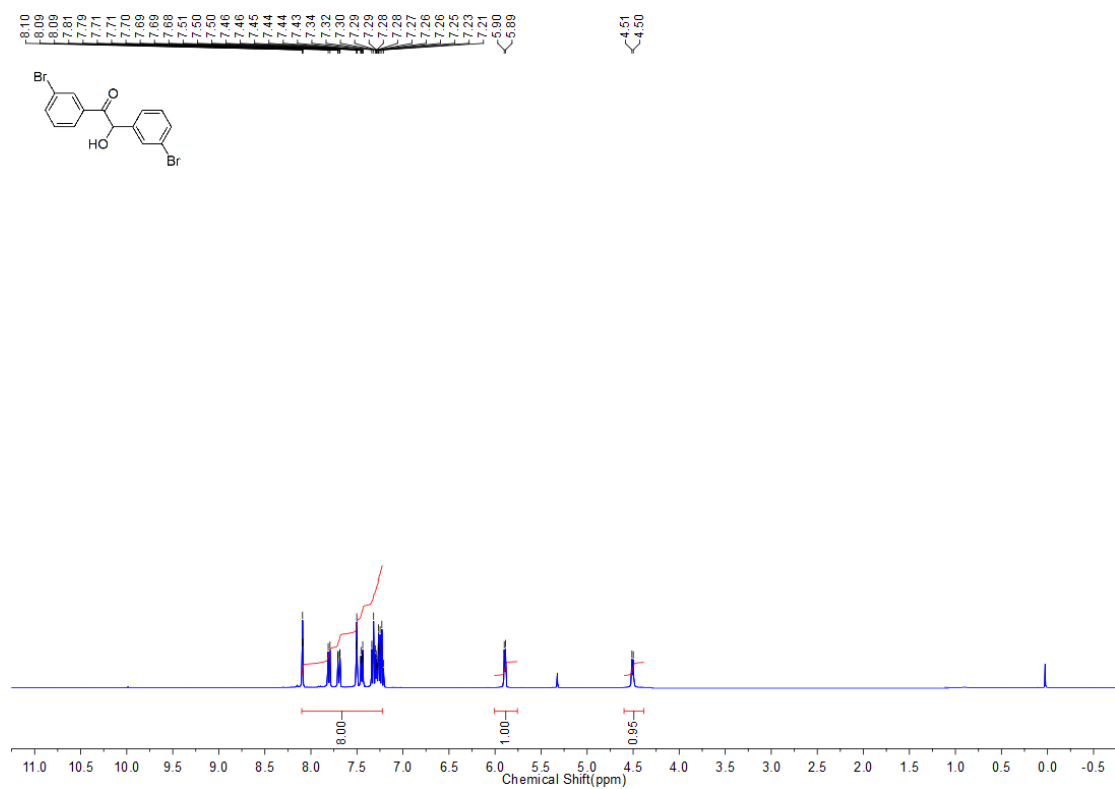
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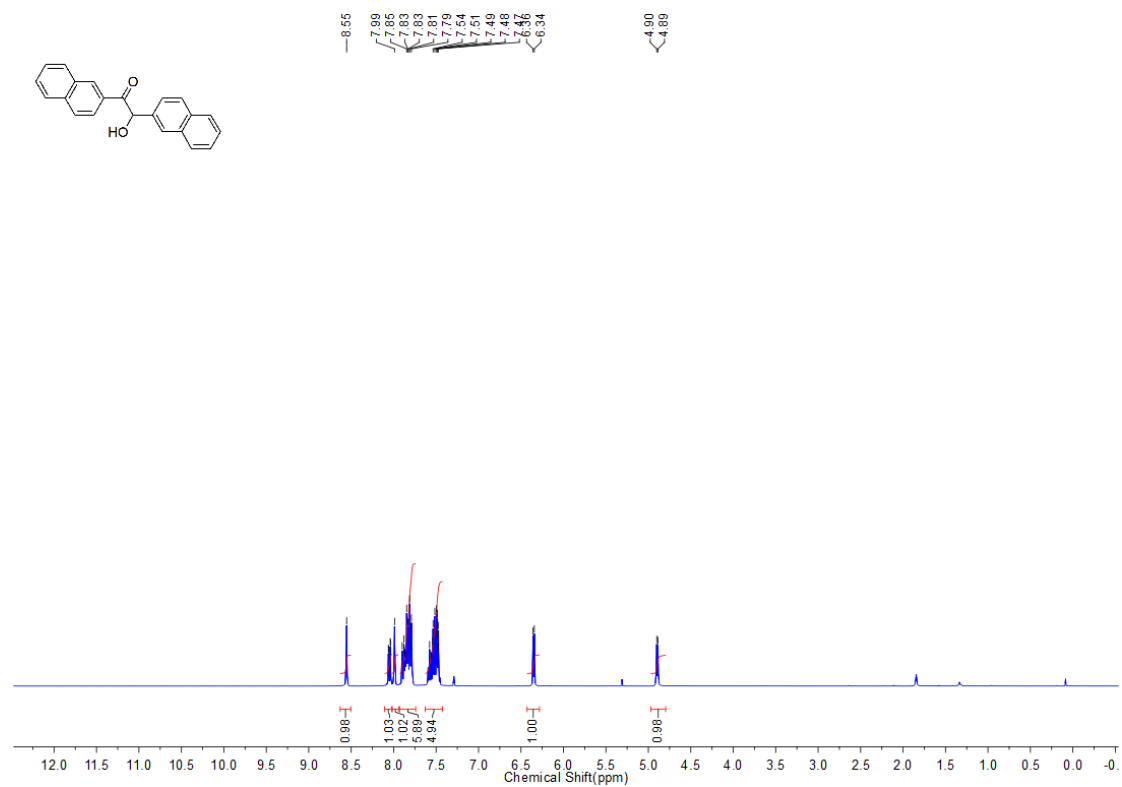
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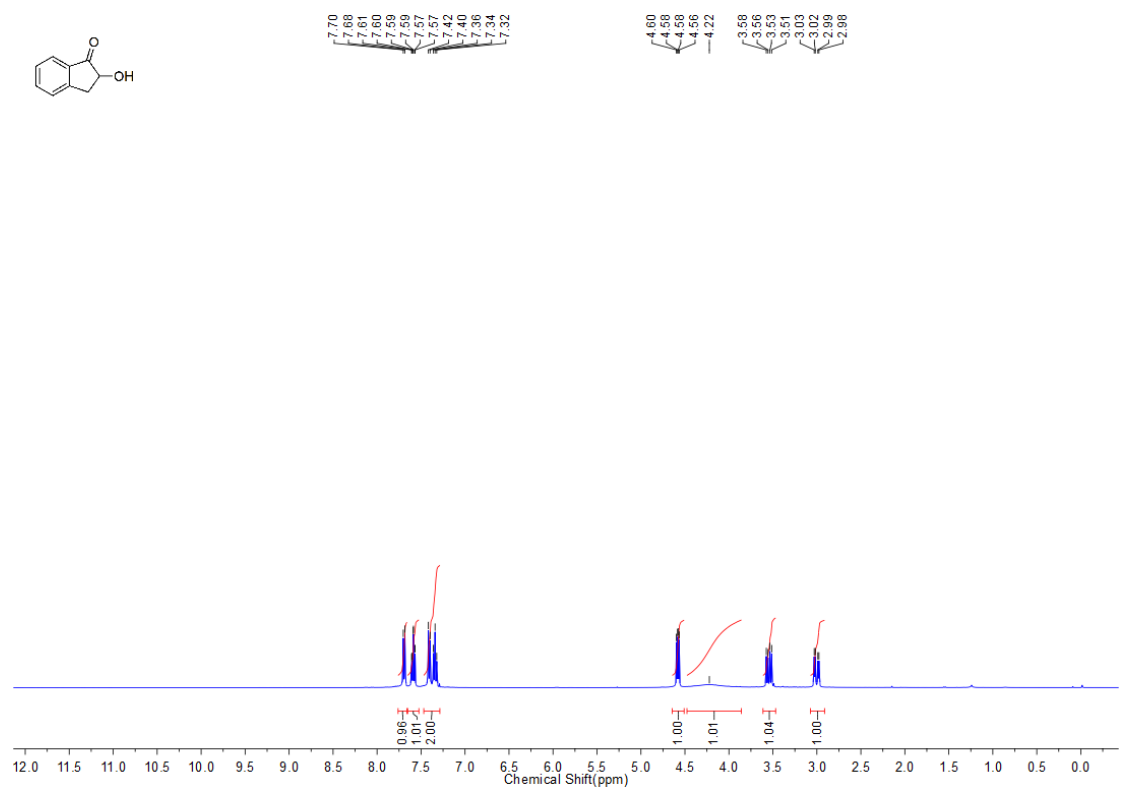
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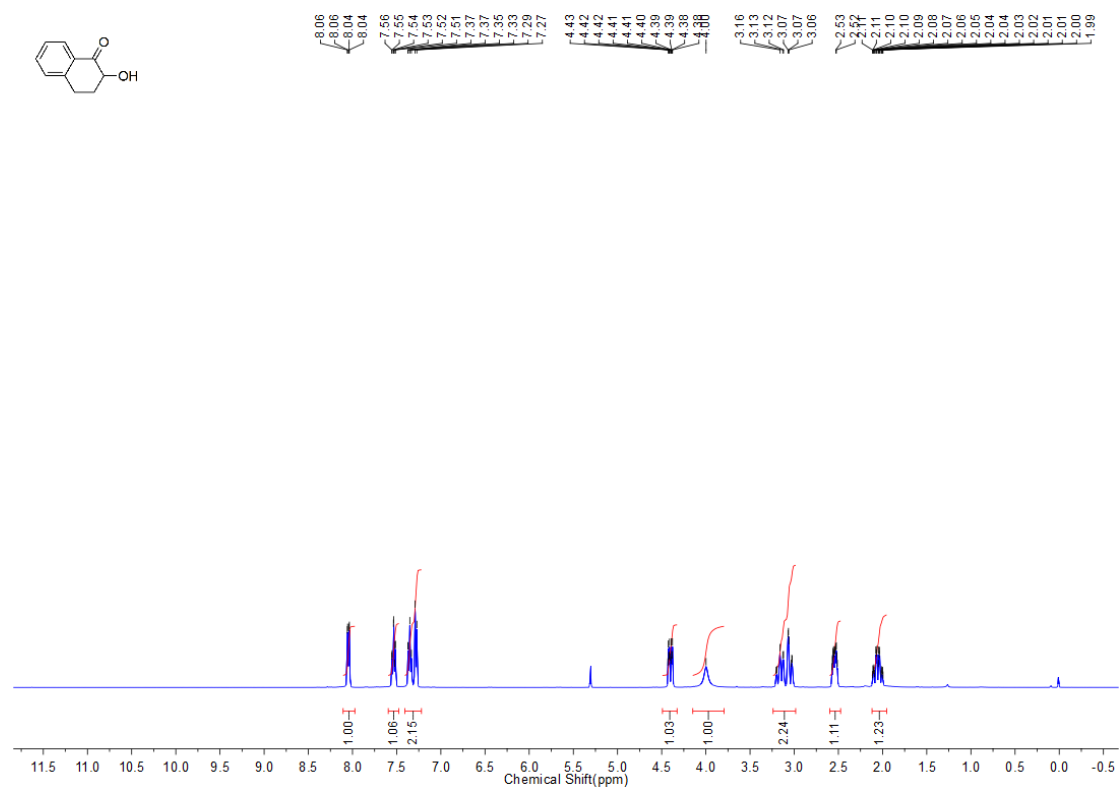
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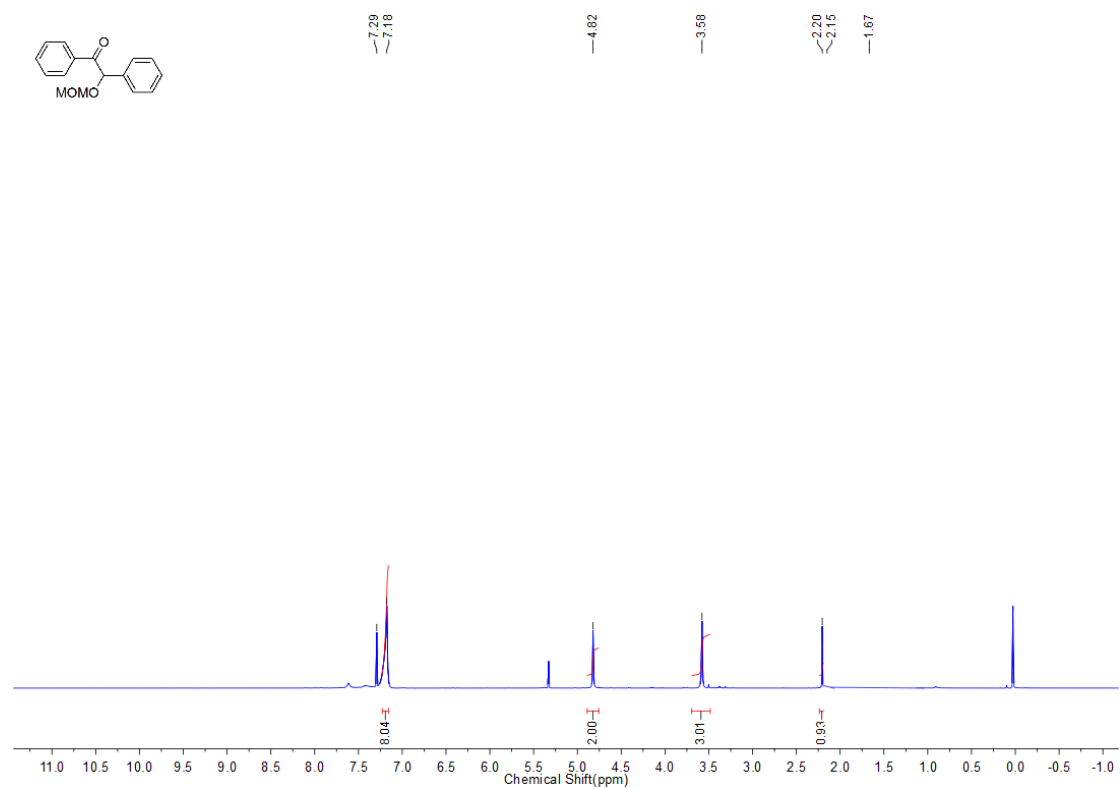
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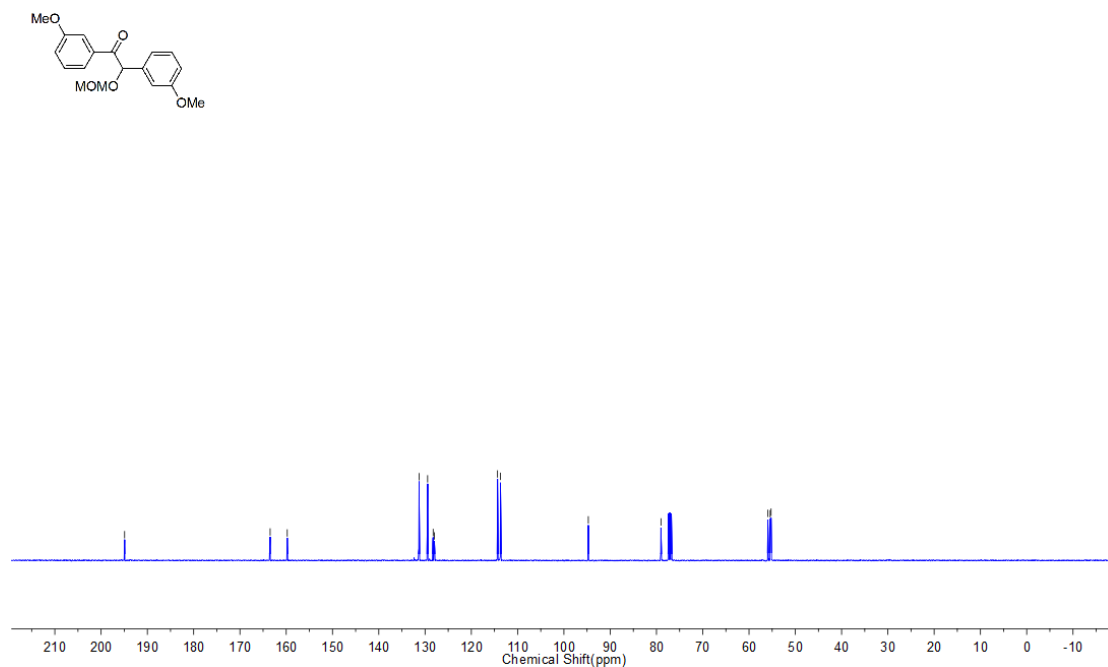
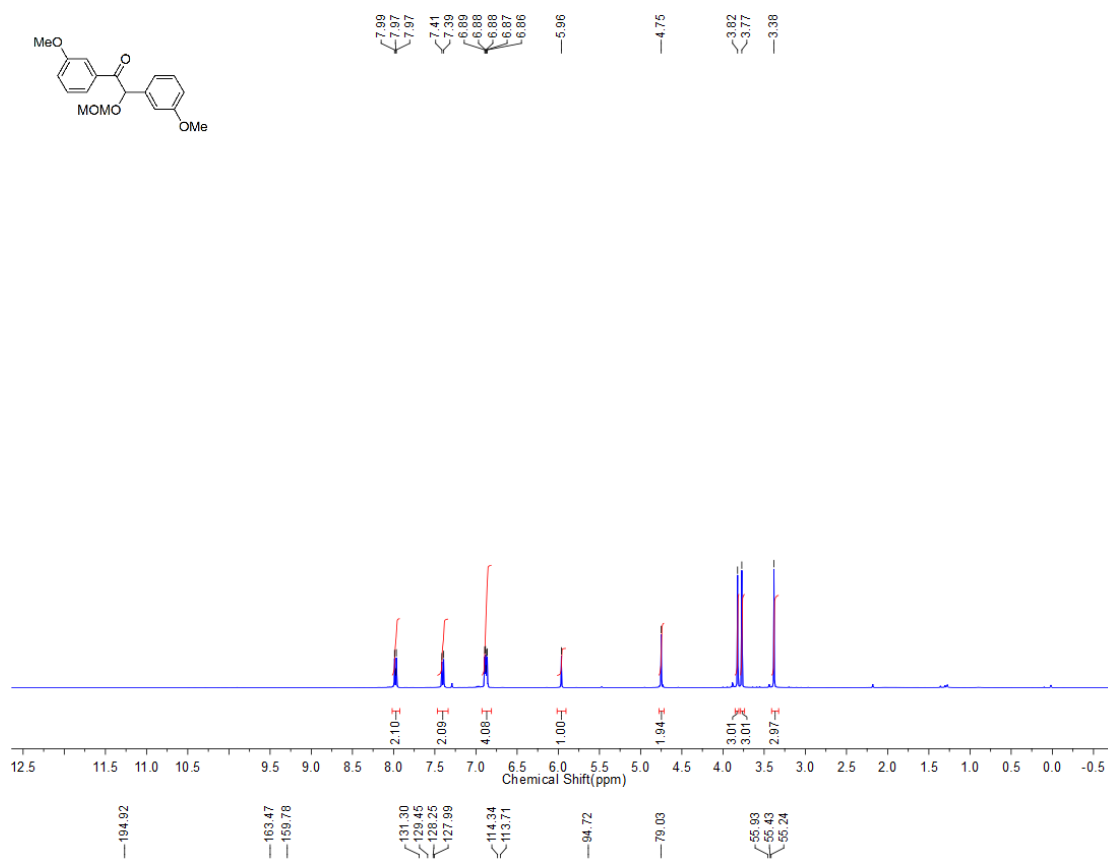
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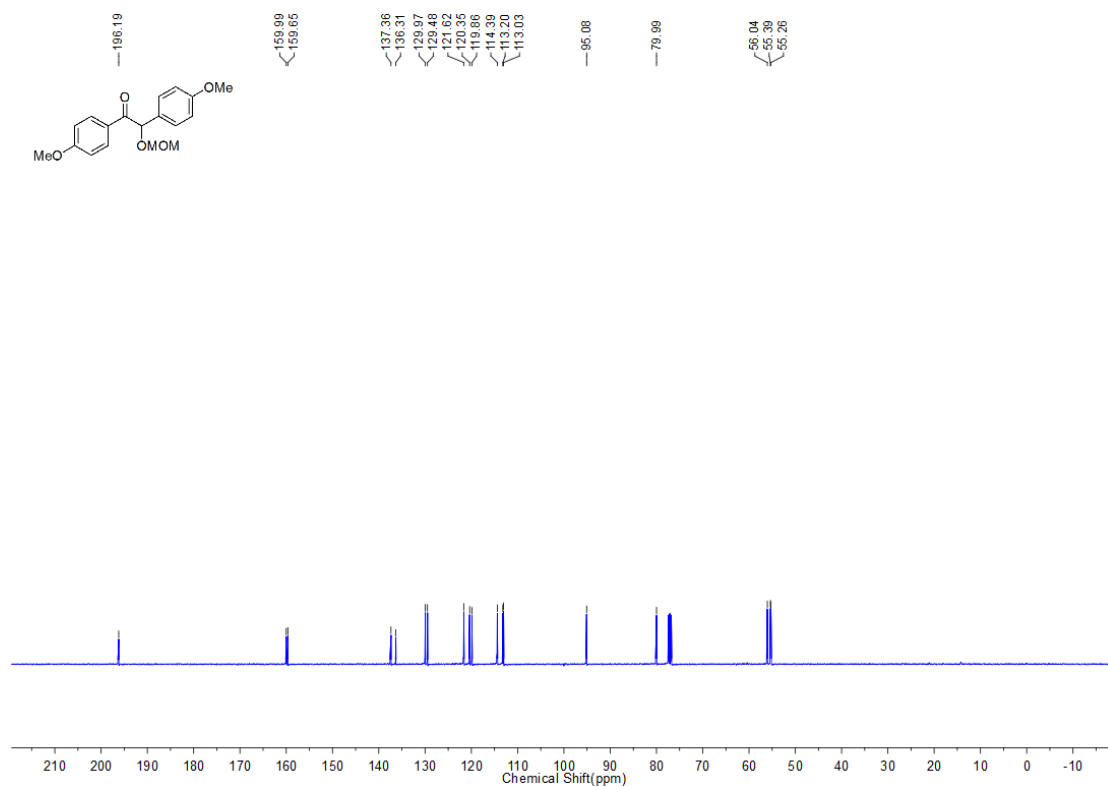
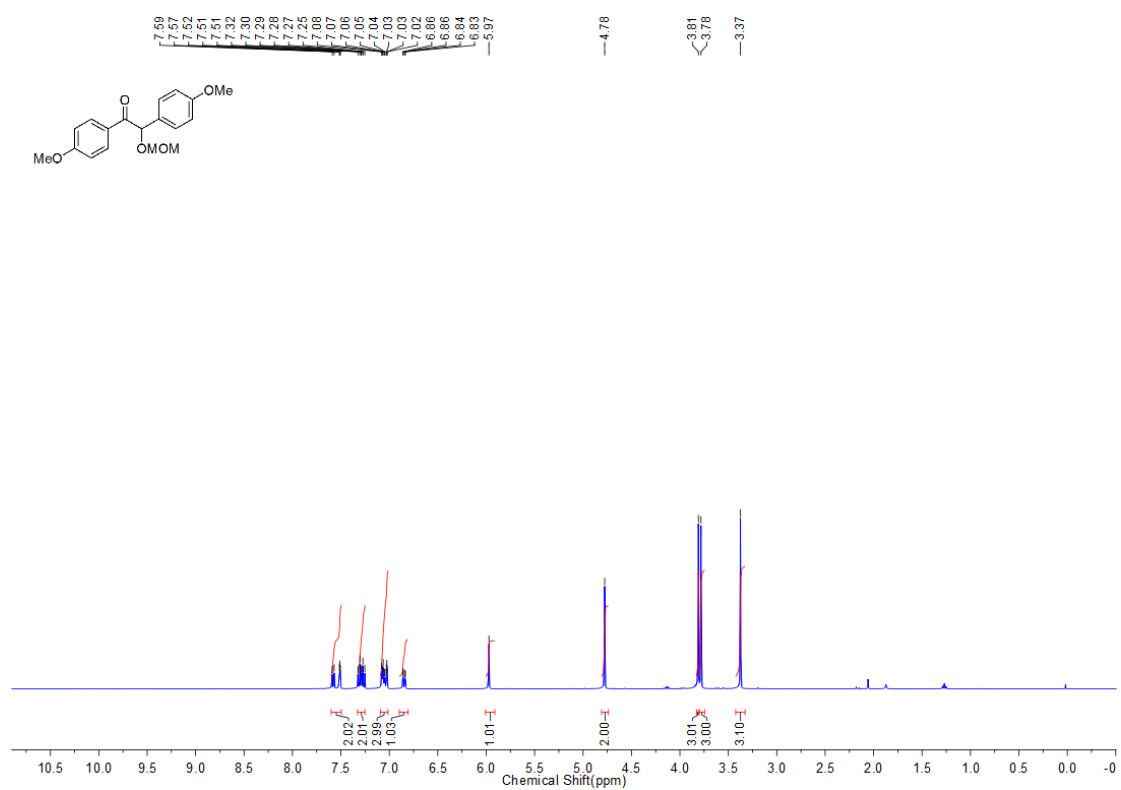
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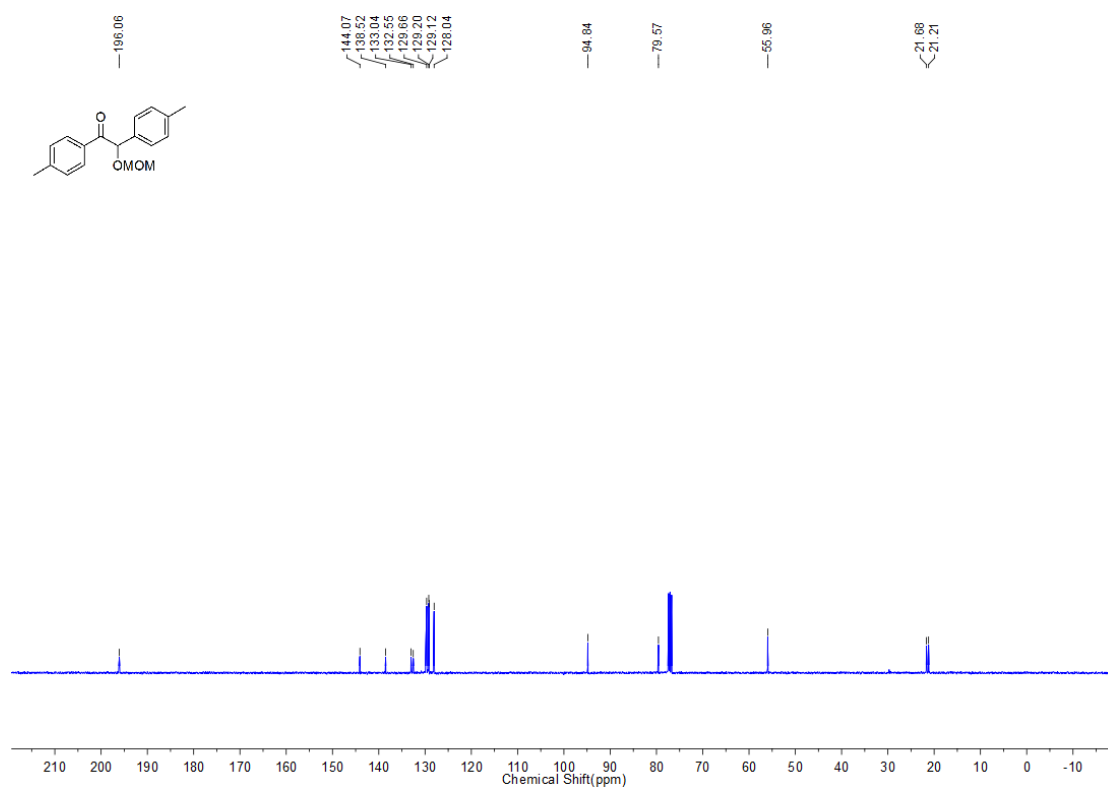
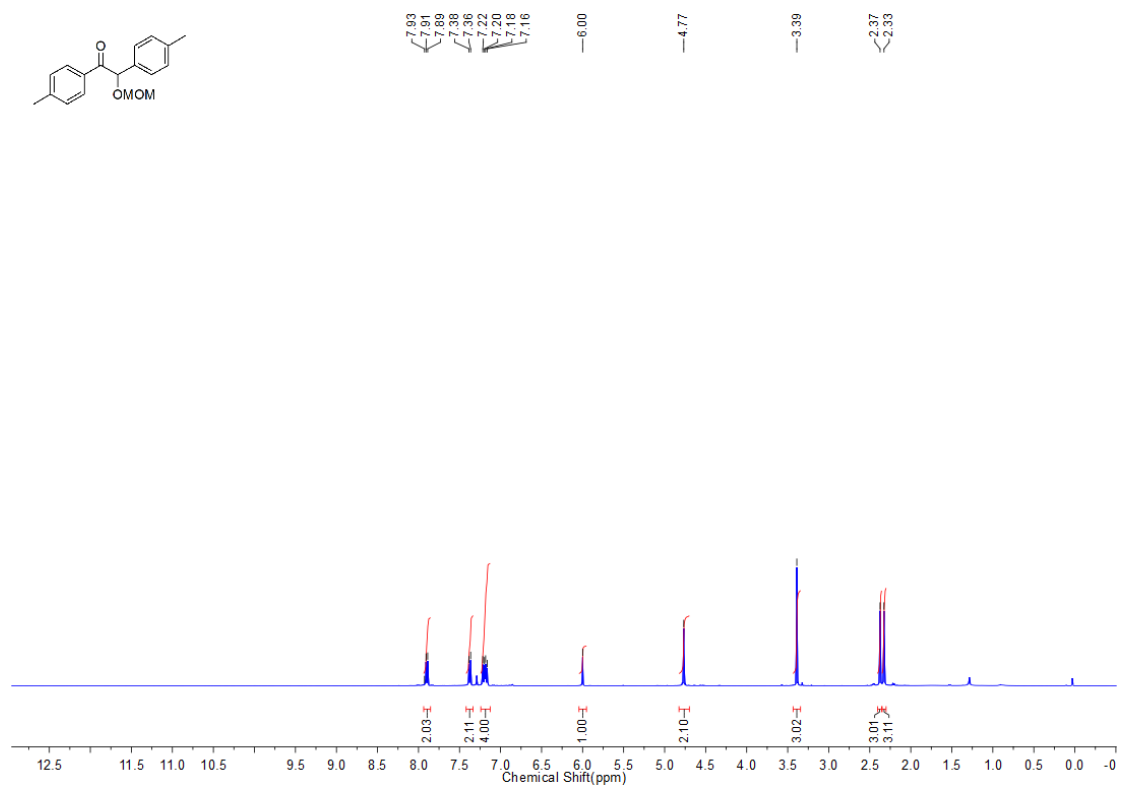
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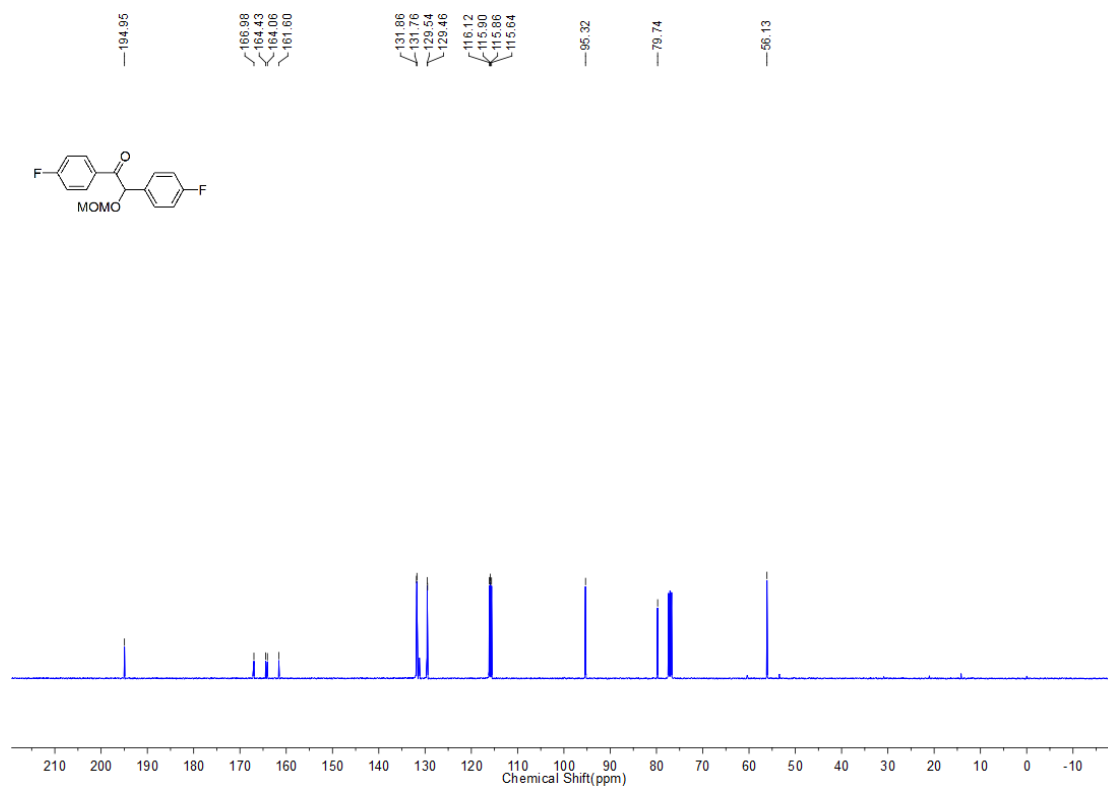
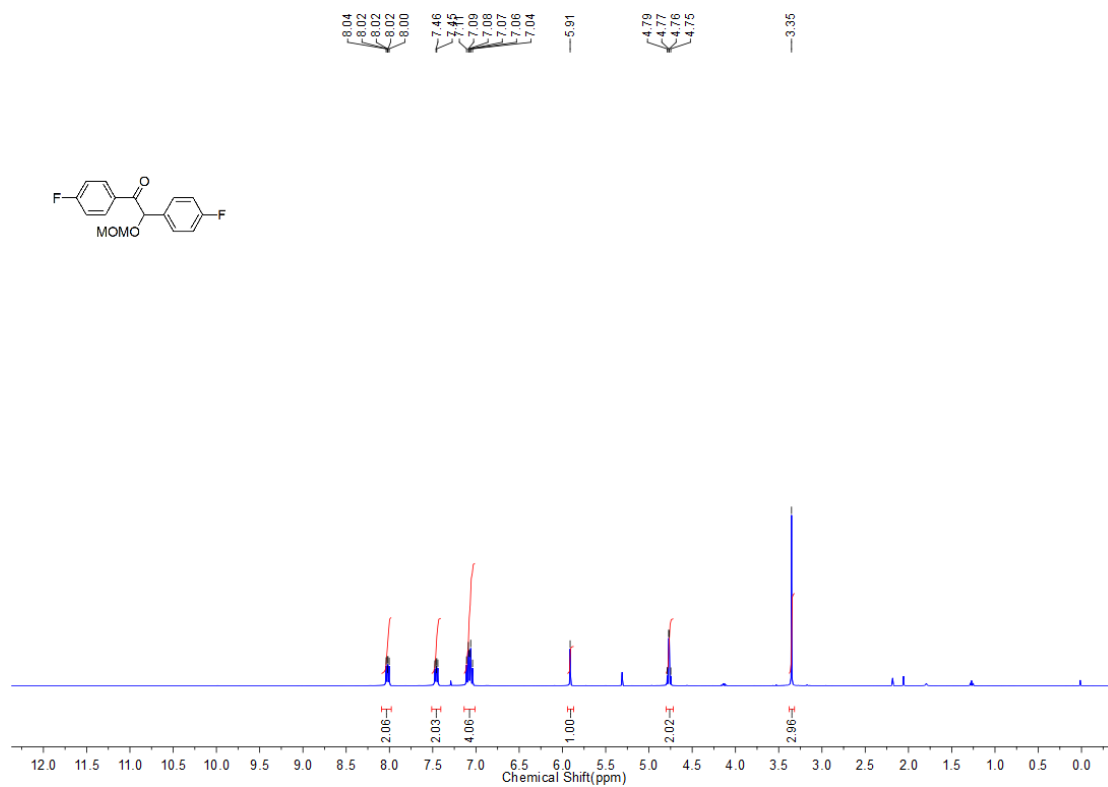
3c-¹HNMR and ¹³CNMR

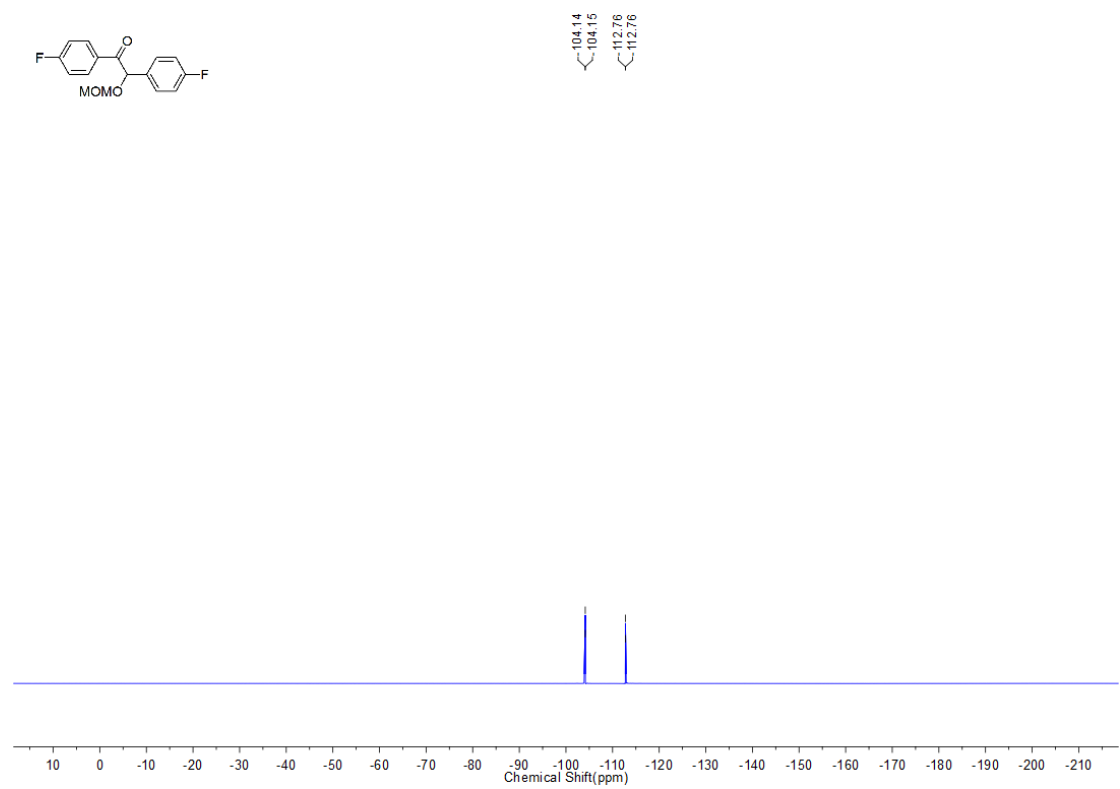


3d-¹H NMR and ¹³C NMR

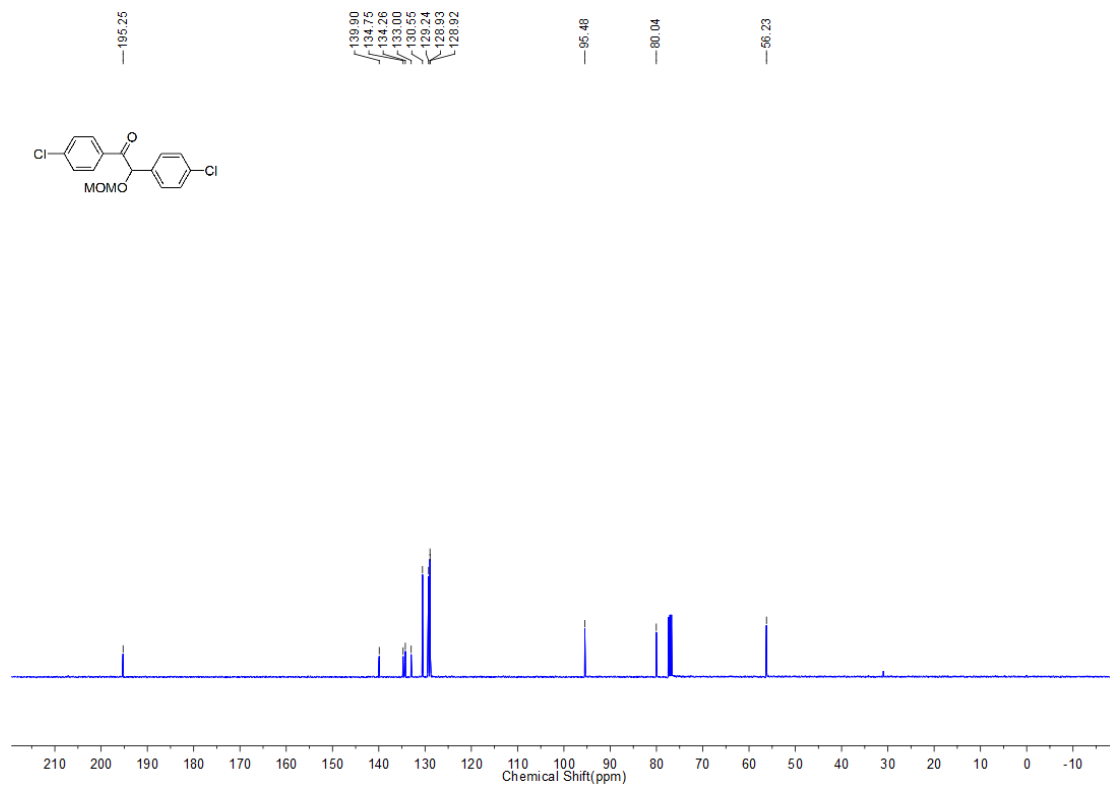
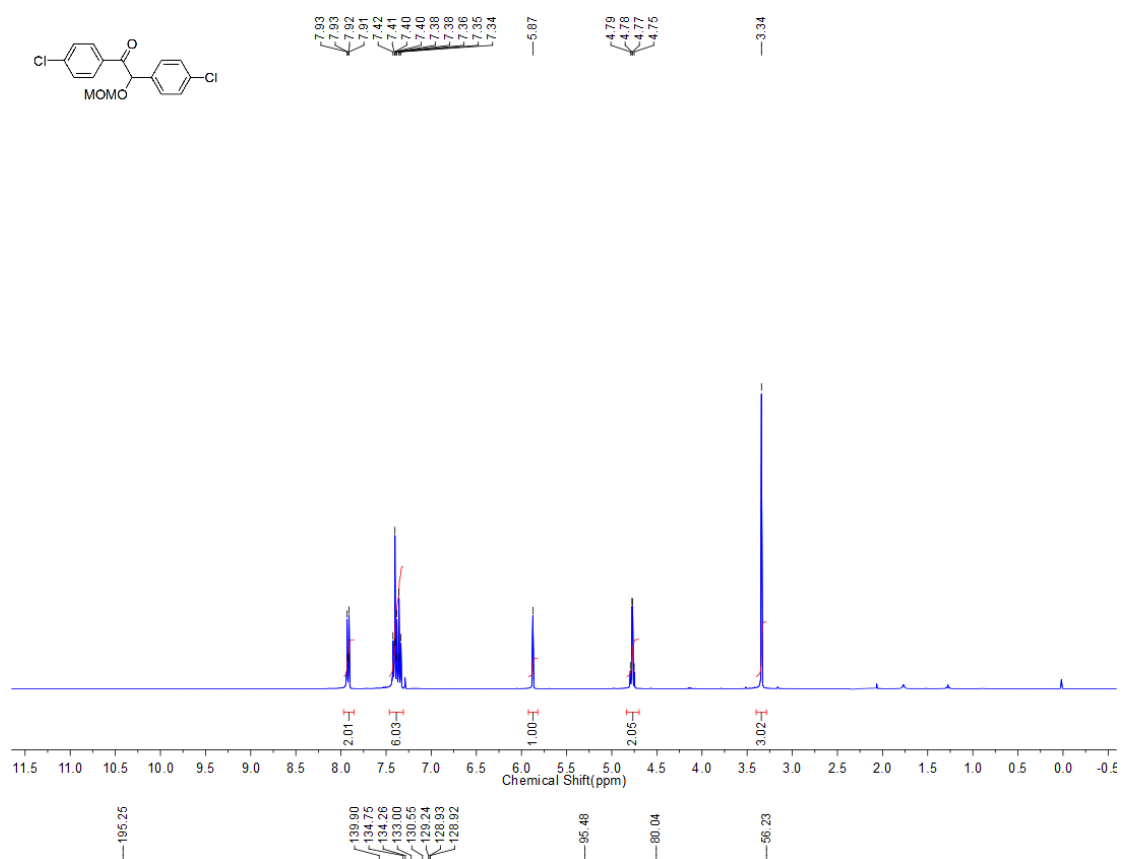


3e-¹H NMR, ¹³C NMR and ¹⁹F NMR

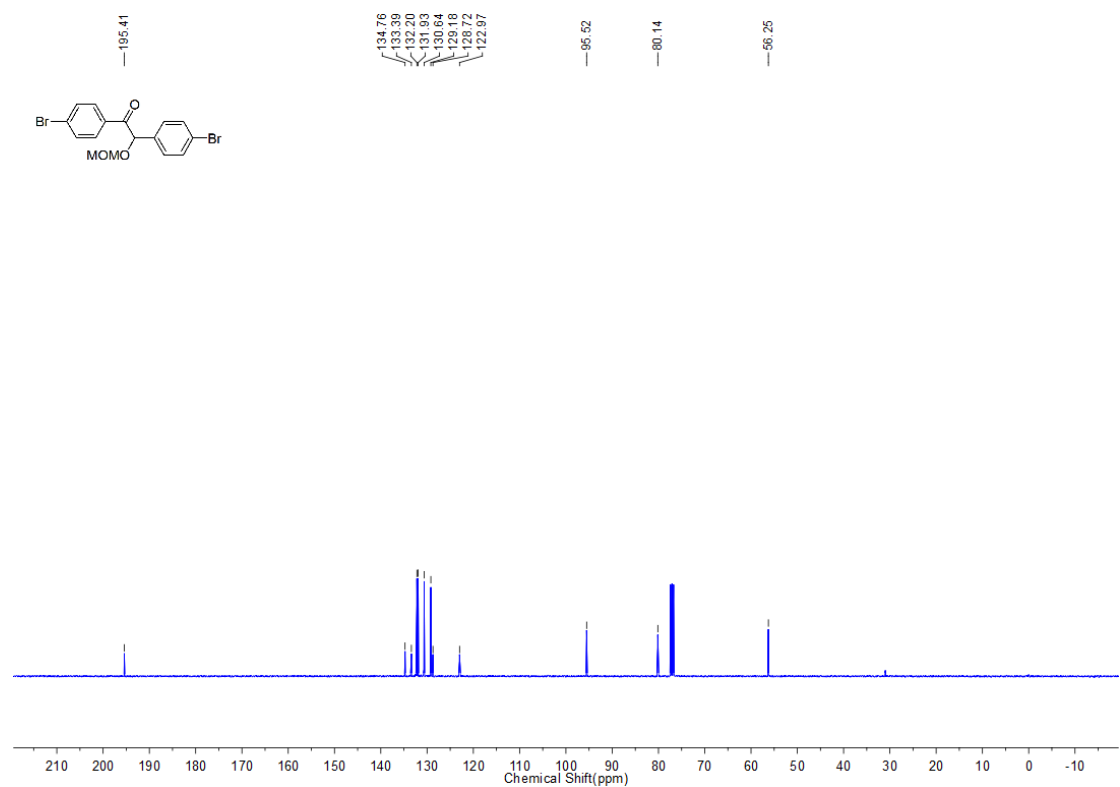
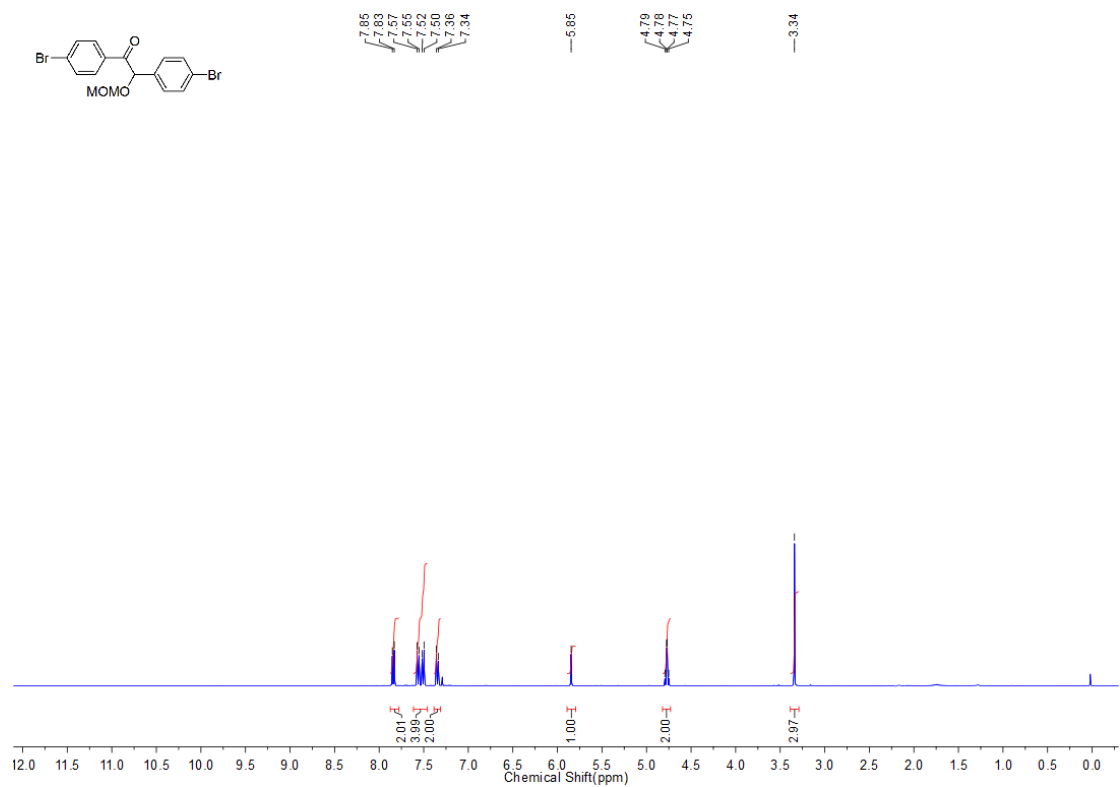




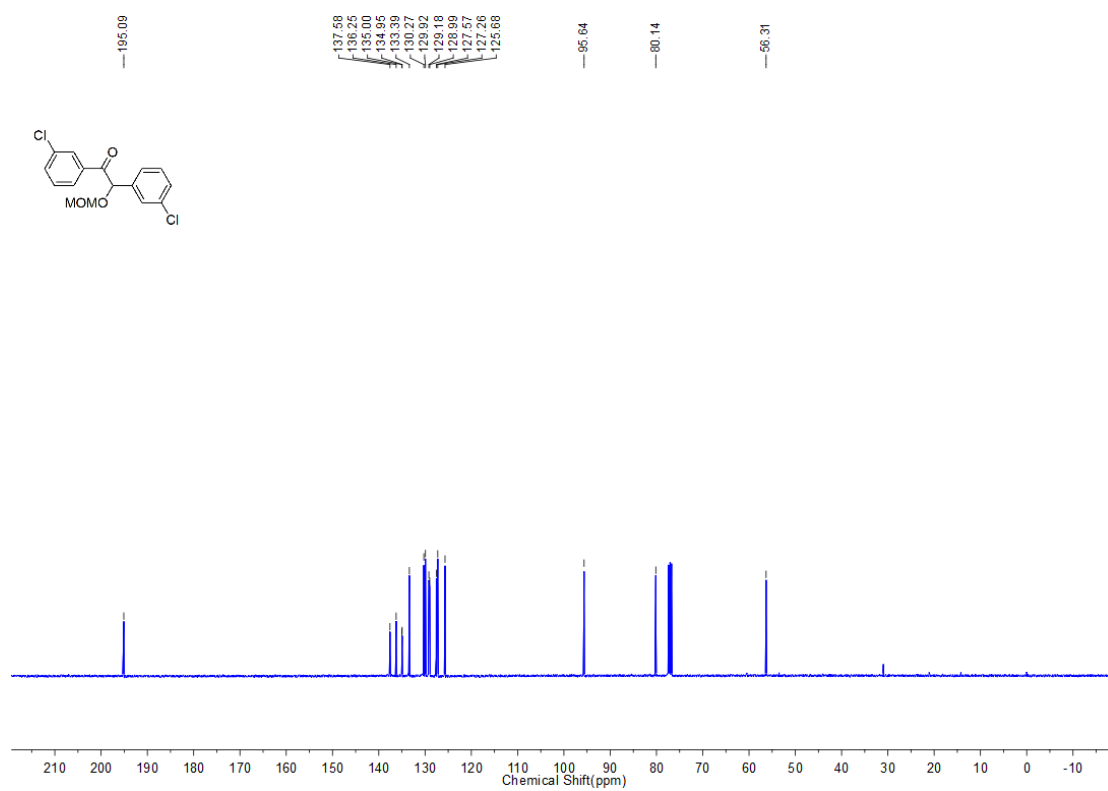
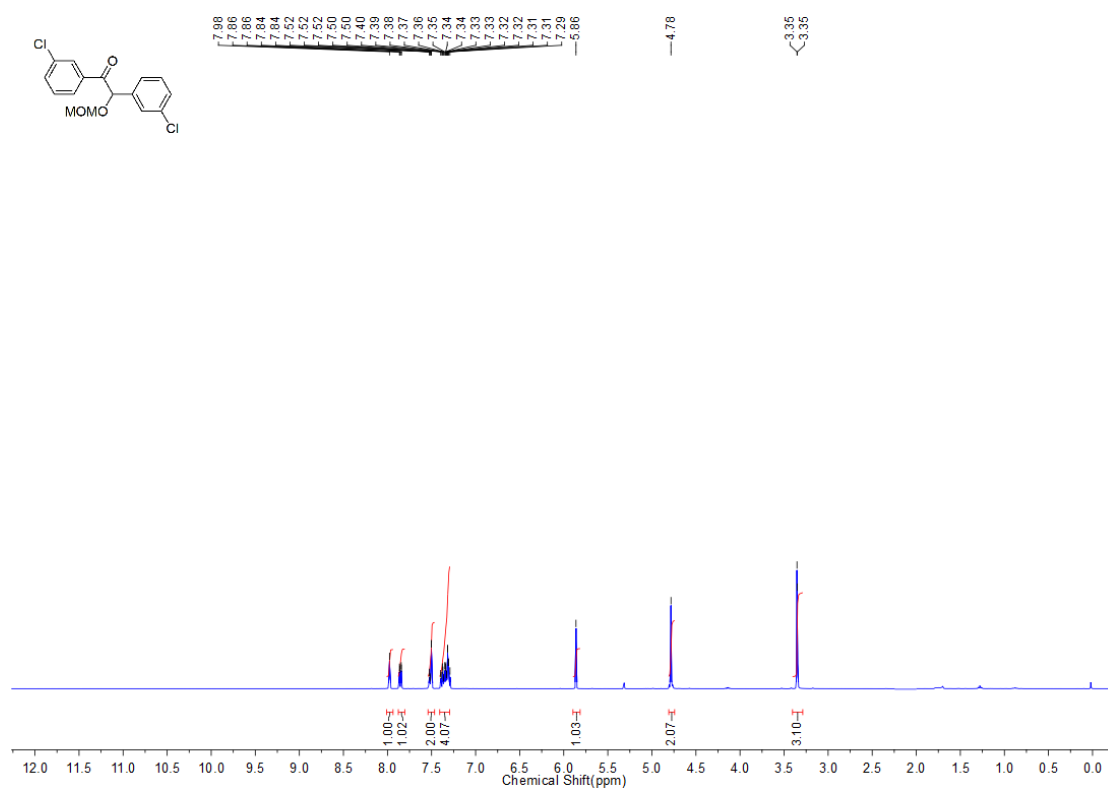
3f- ^1H NMR and ^{13}C NMR



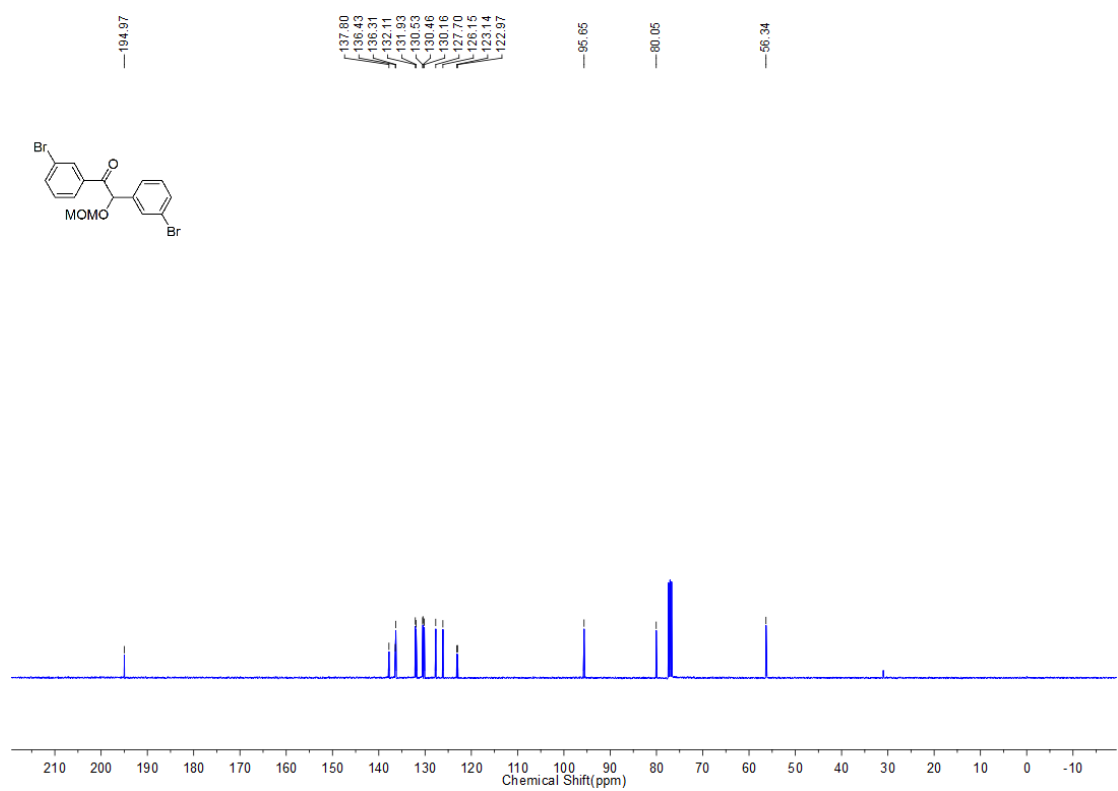
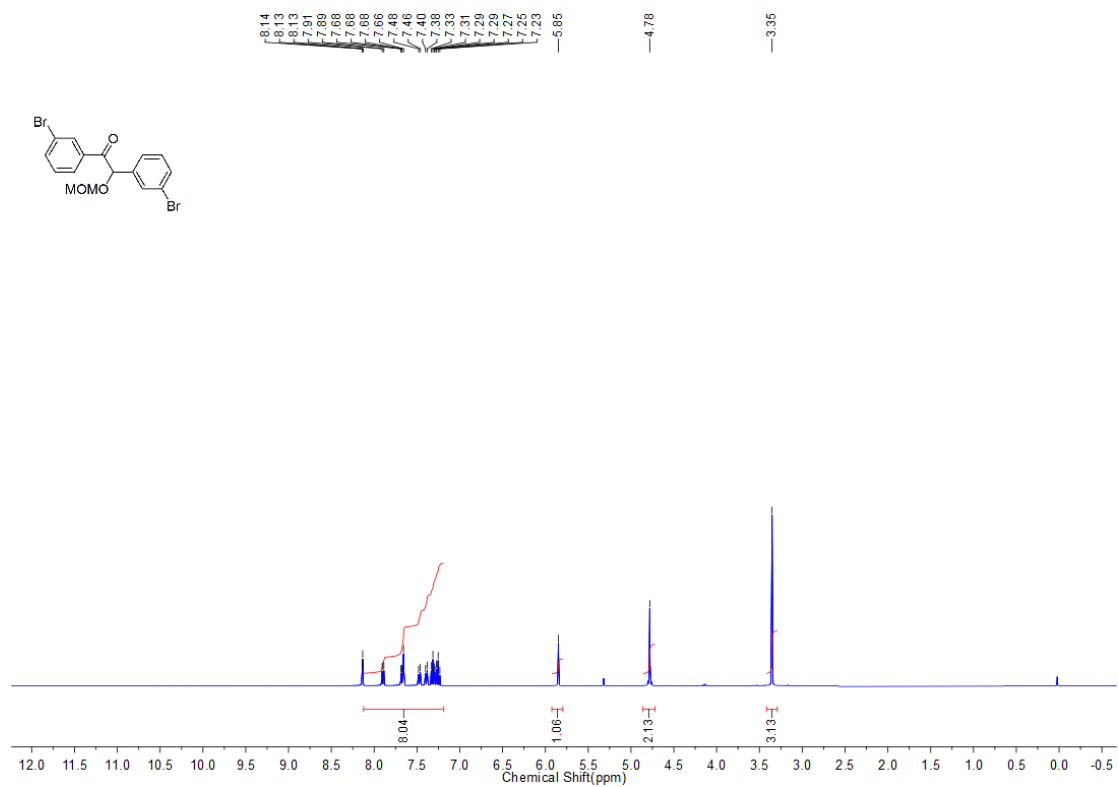
3g-¹H NMR and ¹³C NMR



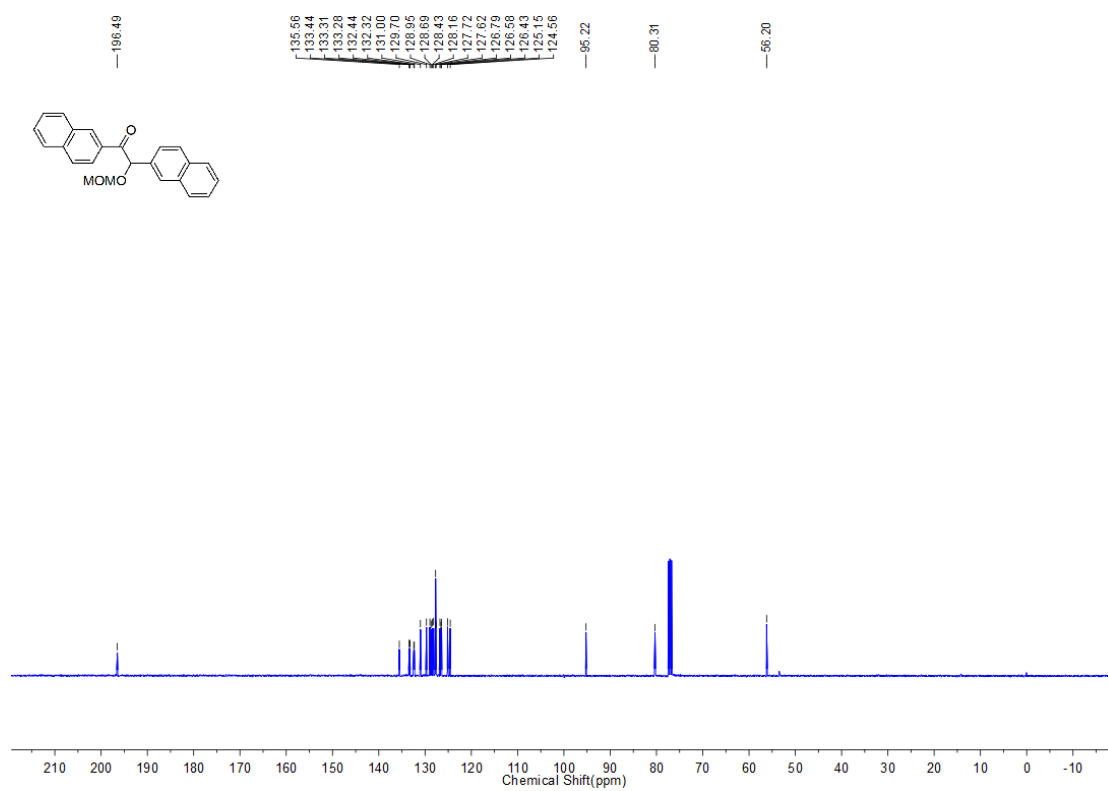
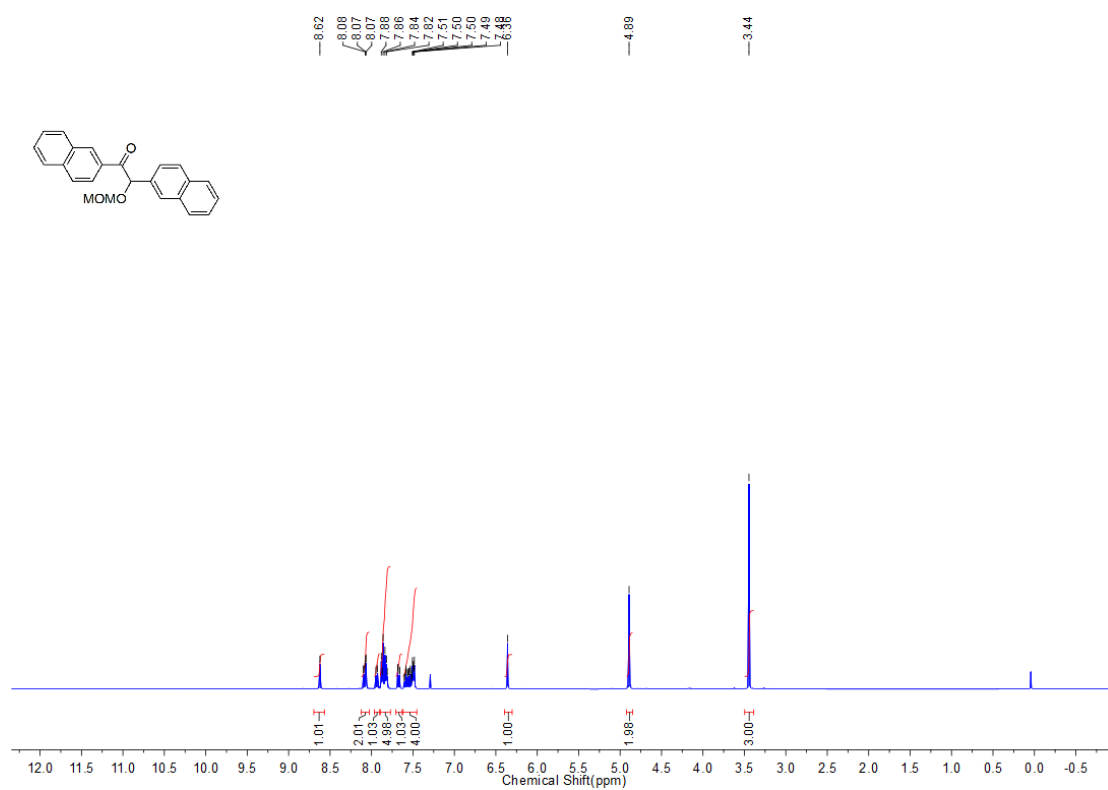
3h-¹H NMR and ¹³C NMR



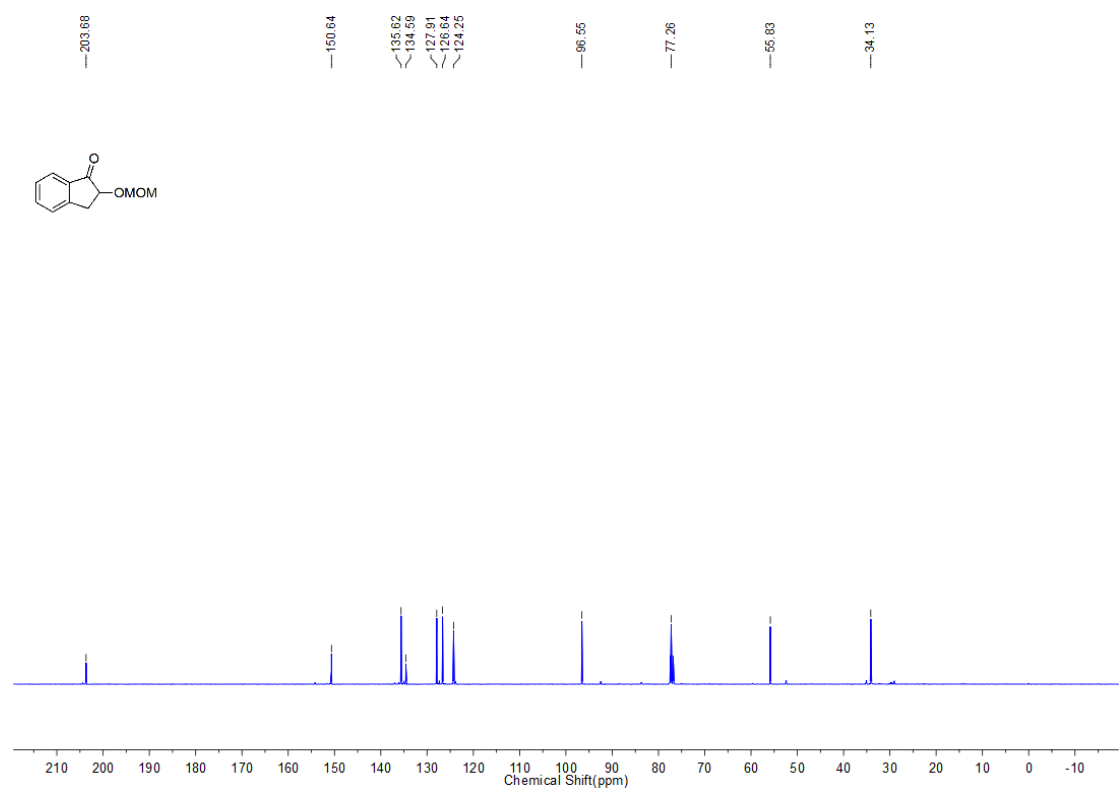
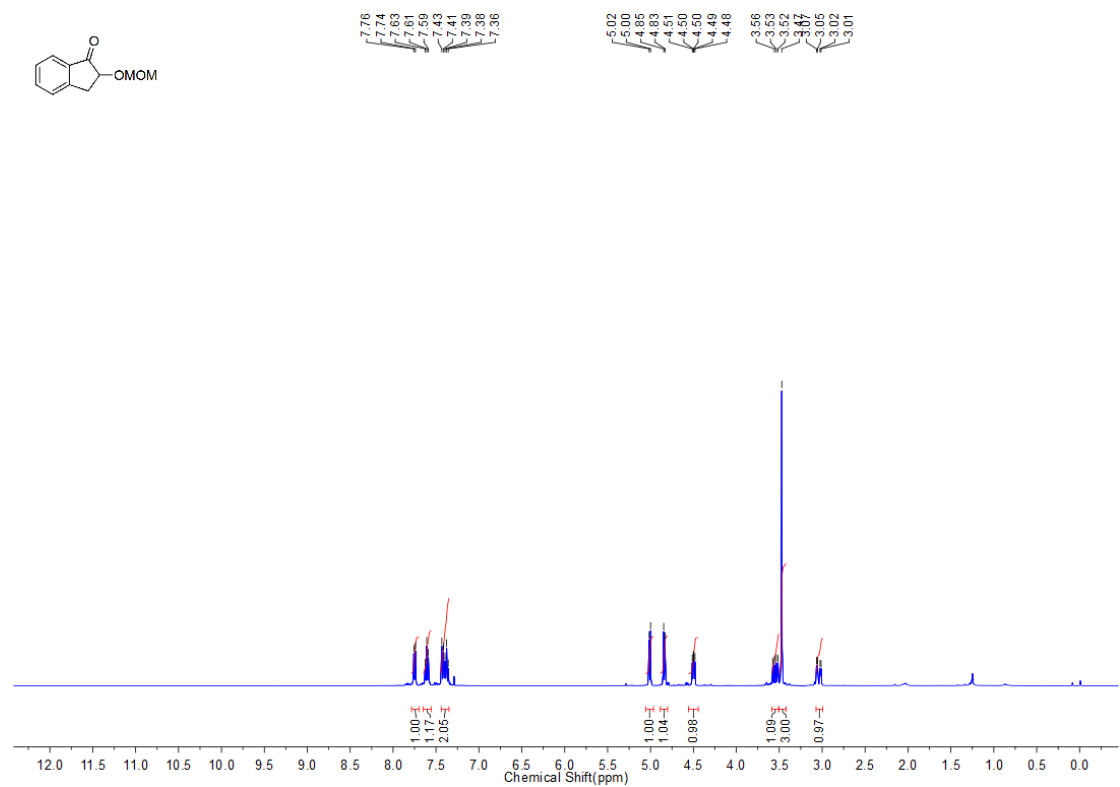
³i-¹HNMR and ¹³CNMR



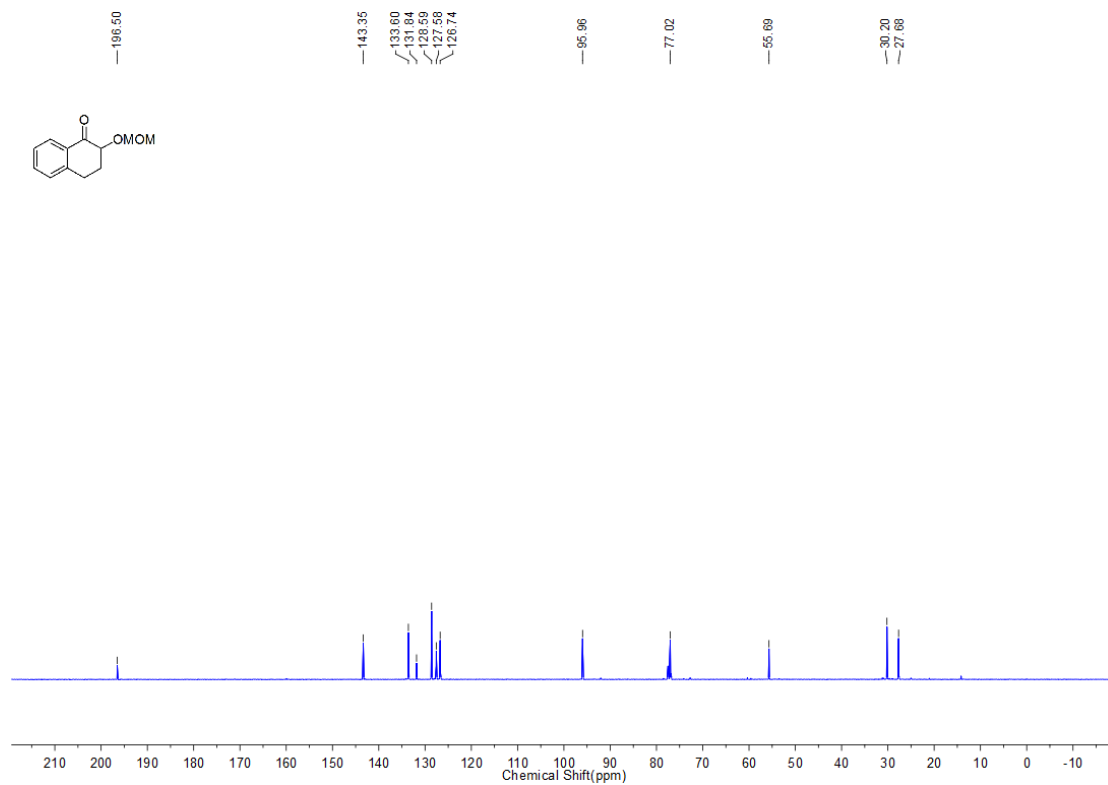
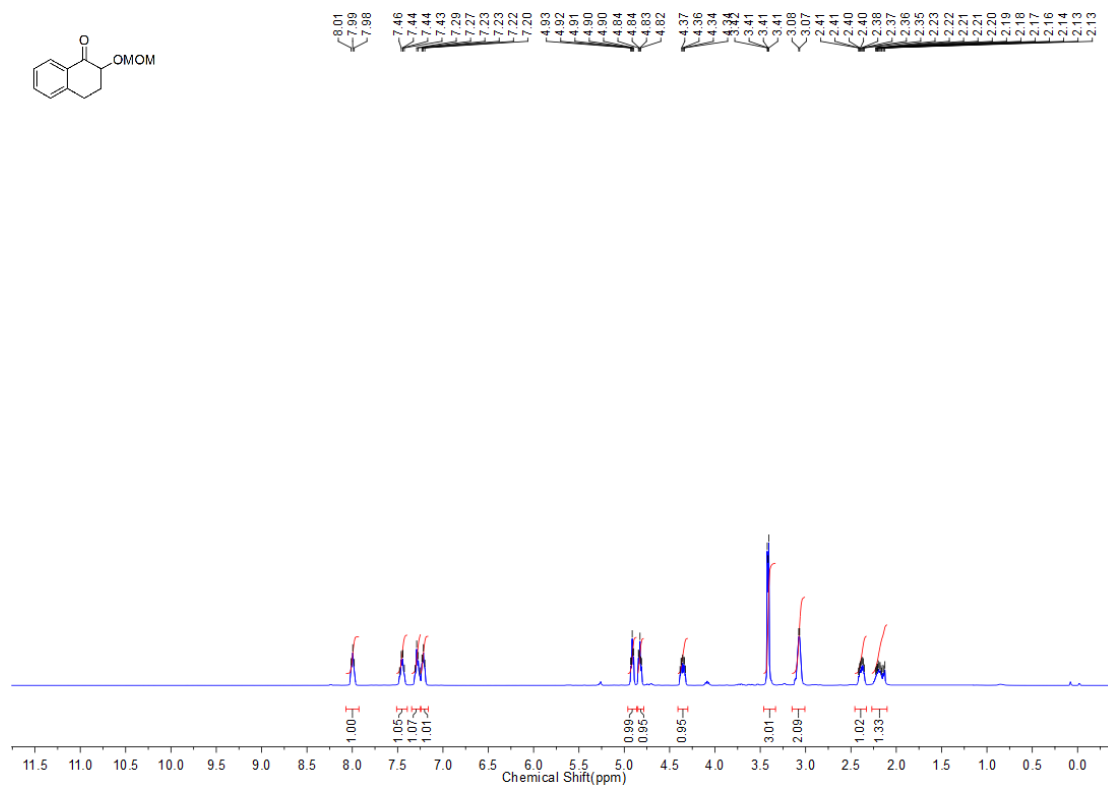
3j-¹H NMR and ¹³C NMR



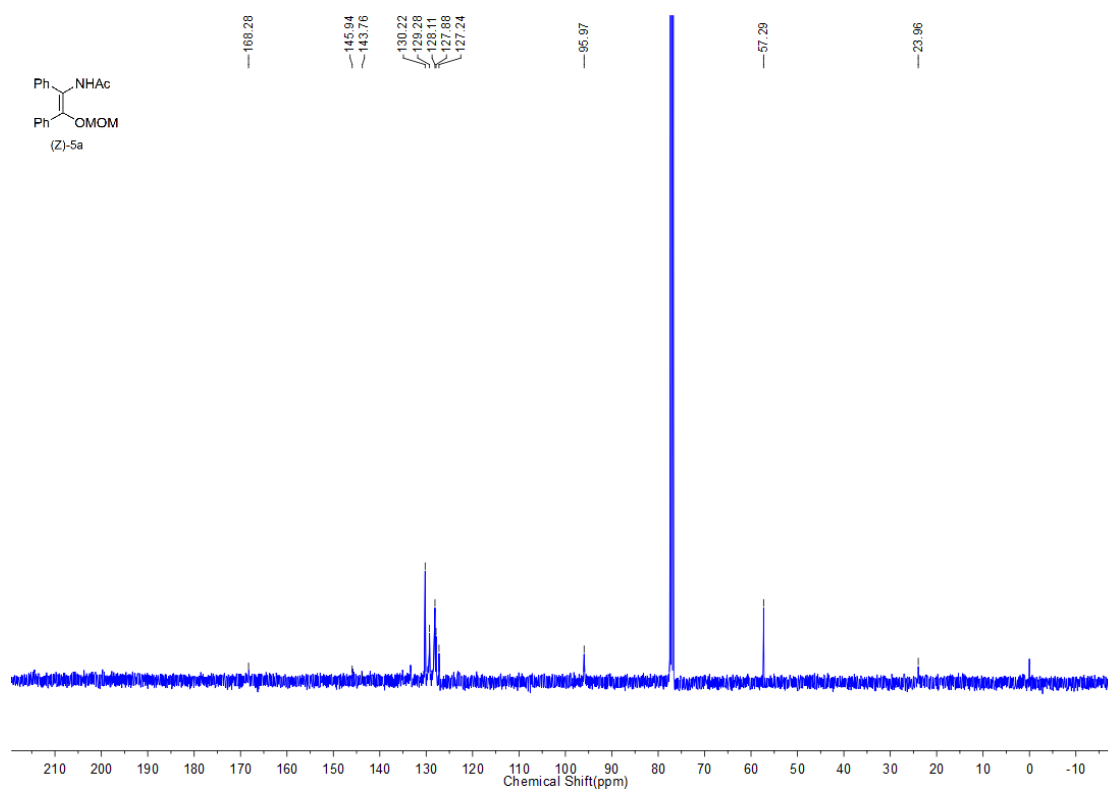
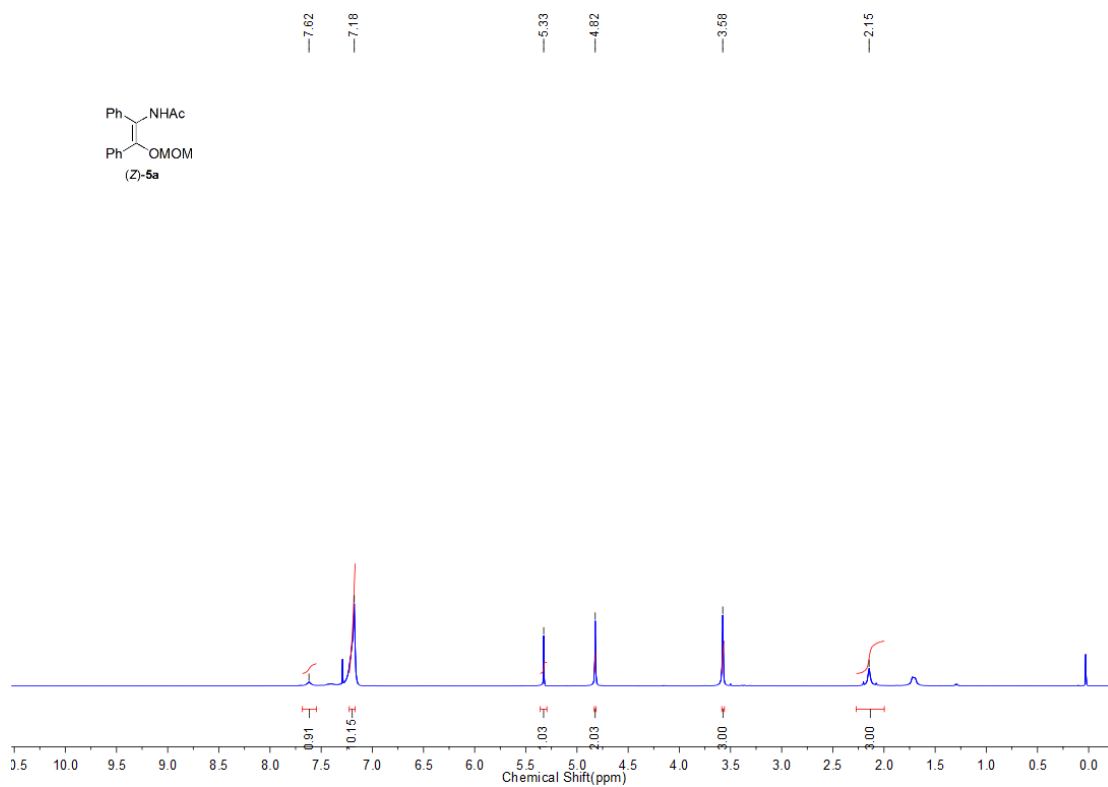
3k-¹HNMR and ¹³CNMR



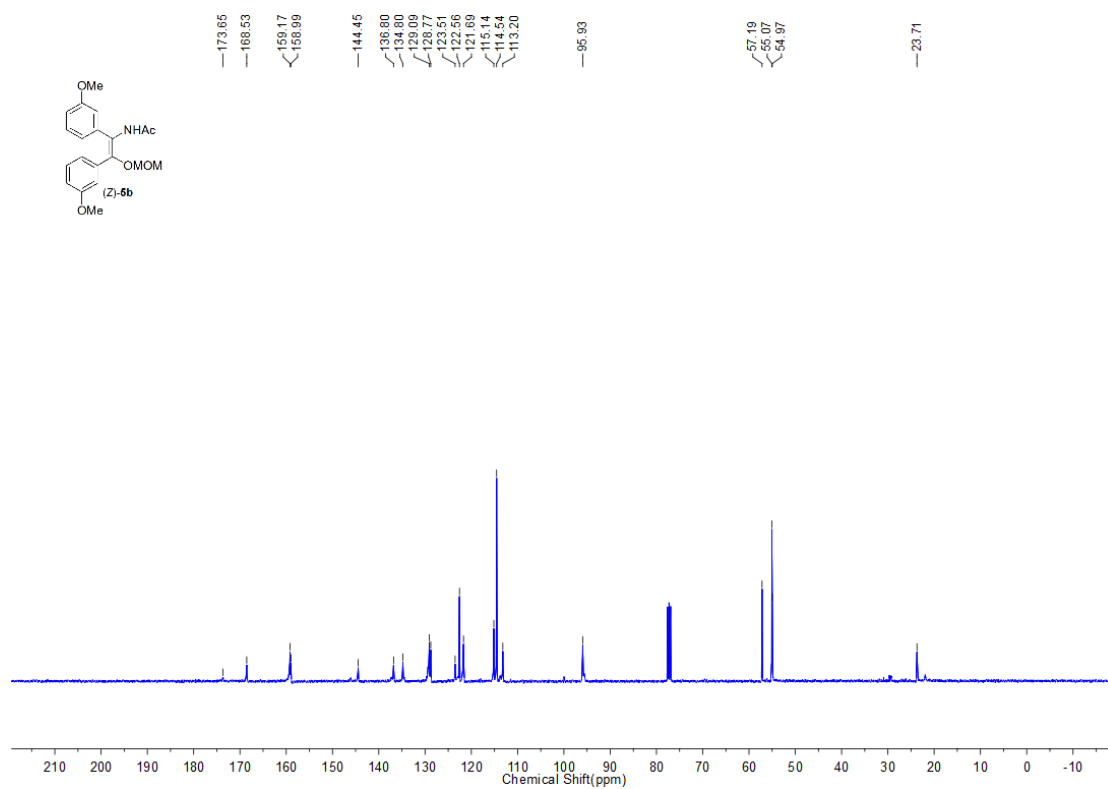
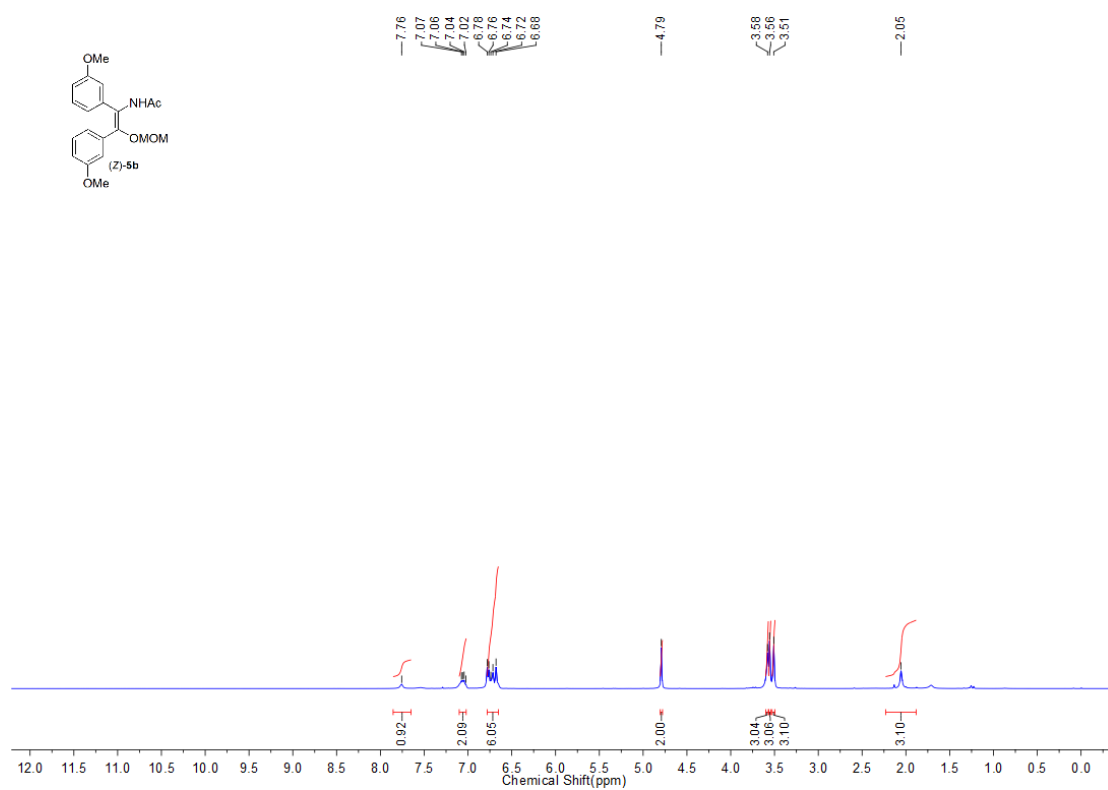
^1H -NMR and ^{13}C -NMR



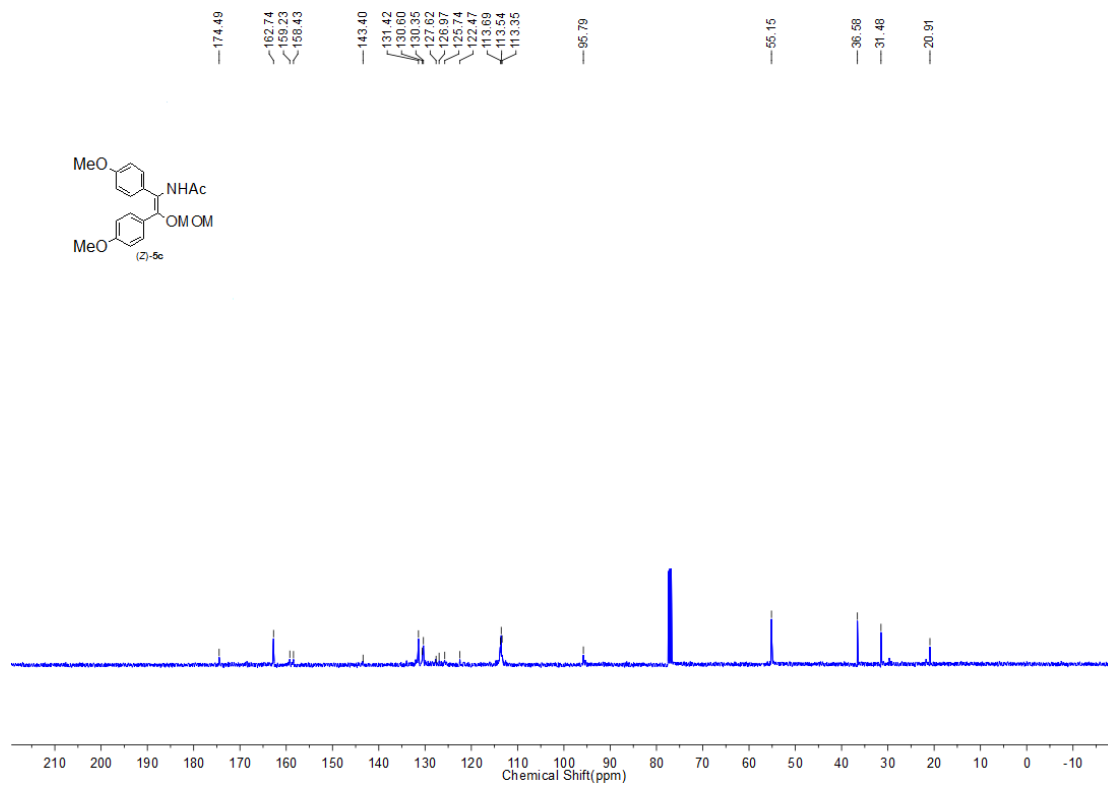
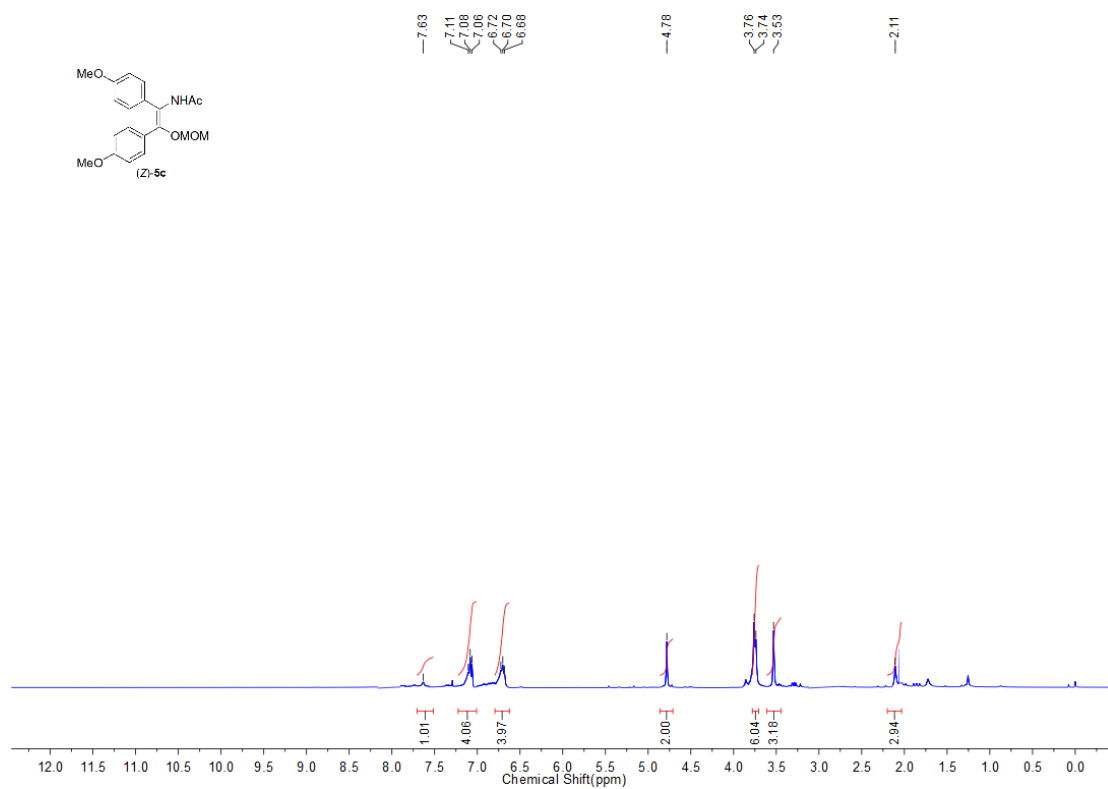
5a-¹HNMR and ¹³CNMR



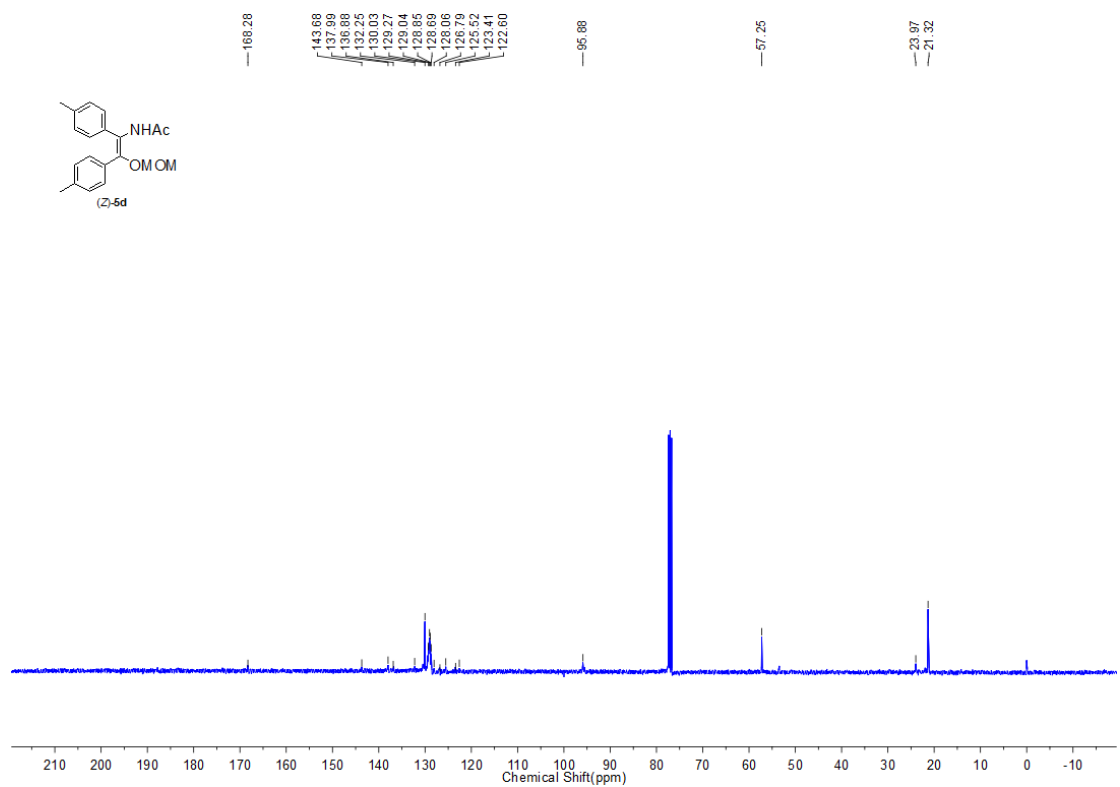
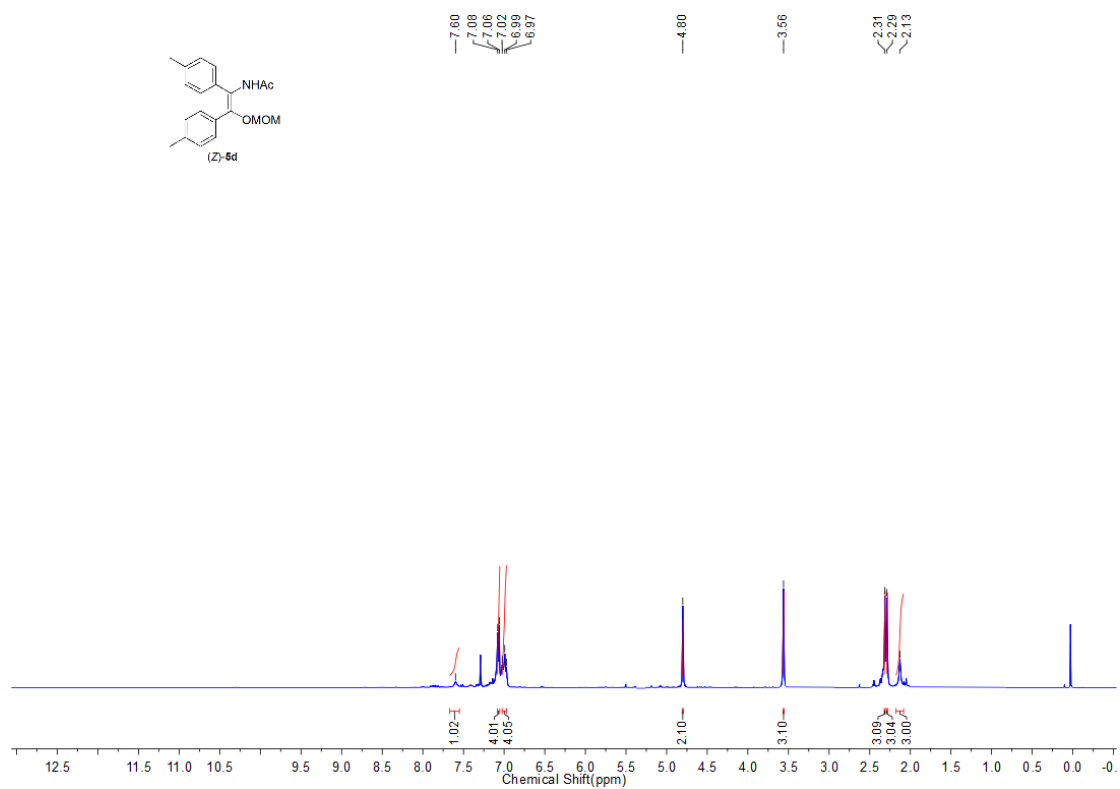
5b-¹HNMR and ¹³CNMR



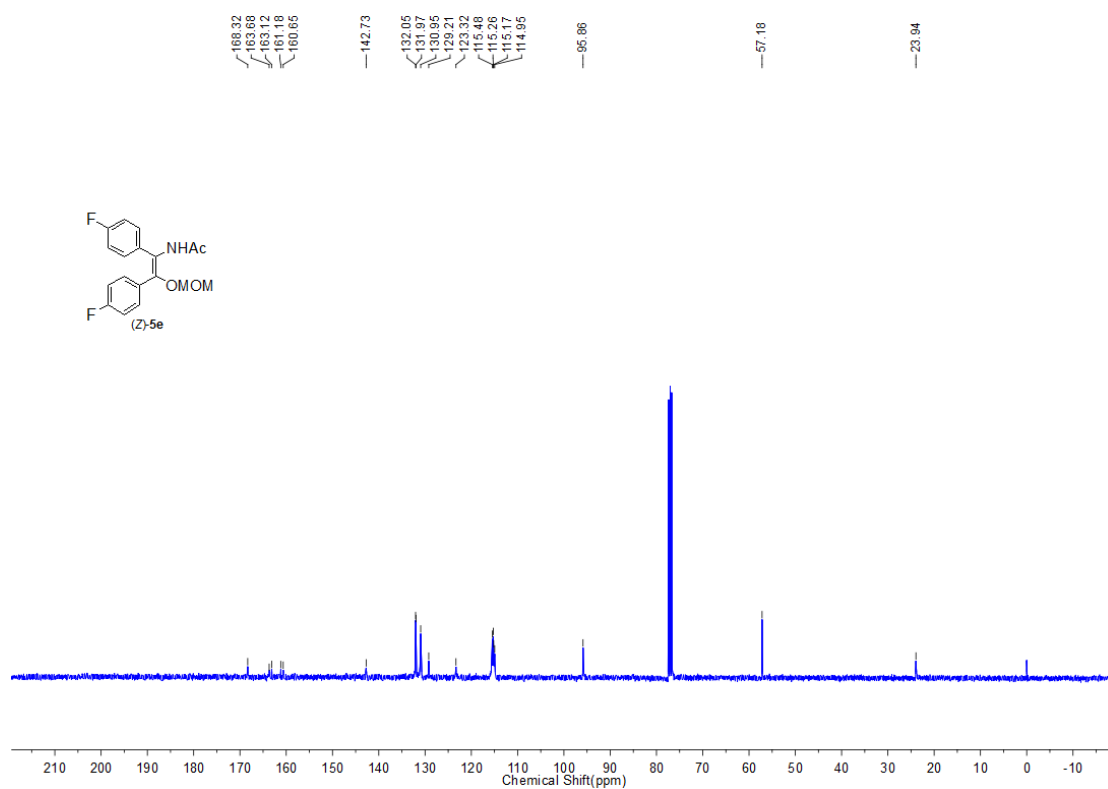
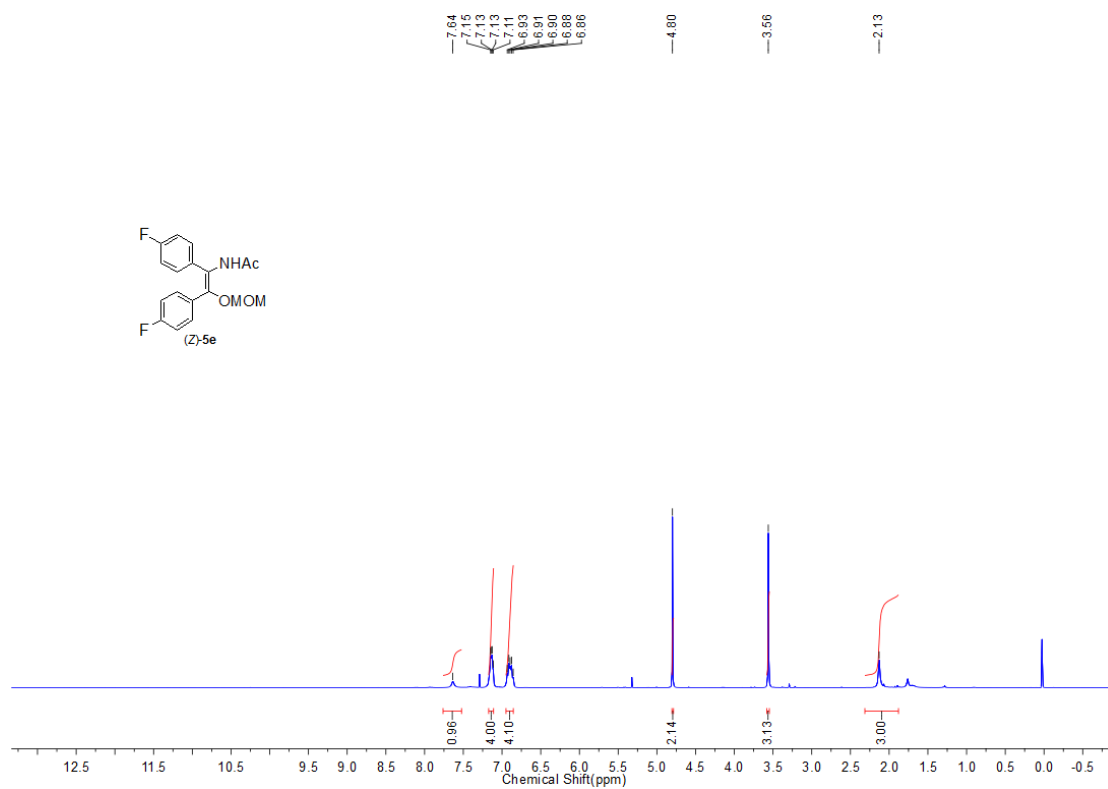
5c-¹HNMR and ¹³CNMR

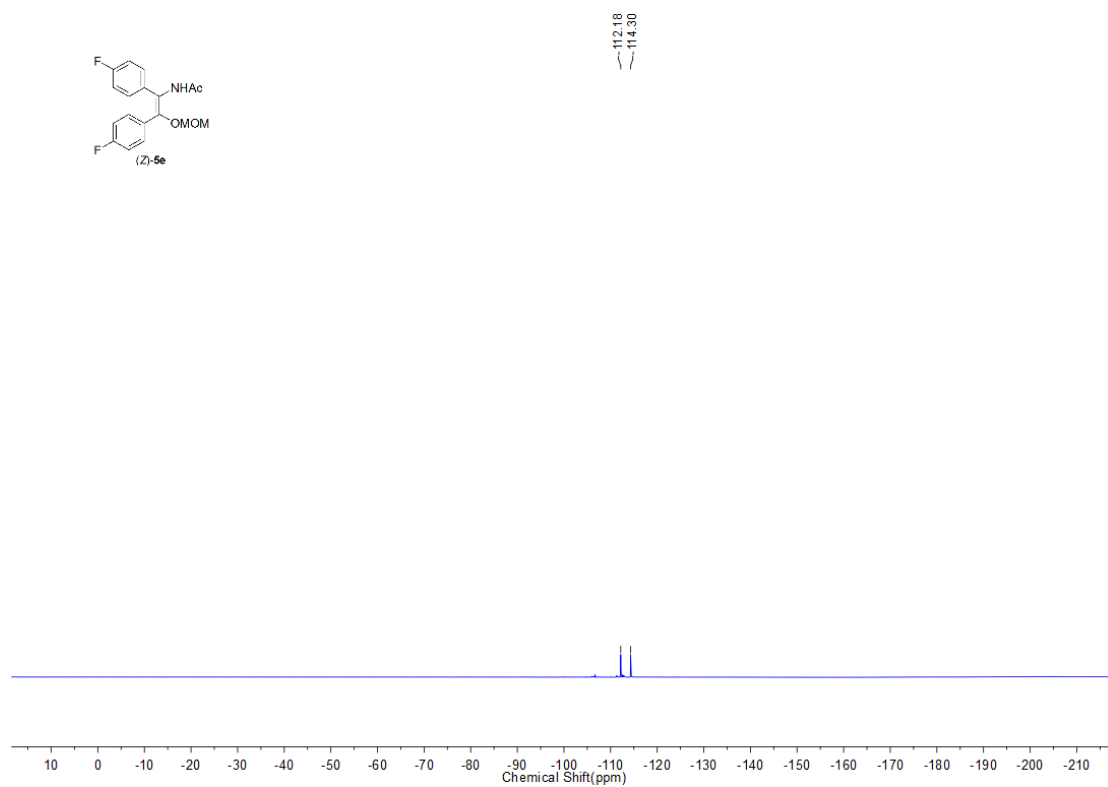


5d-¹HNMR and ¹³CNMR

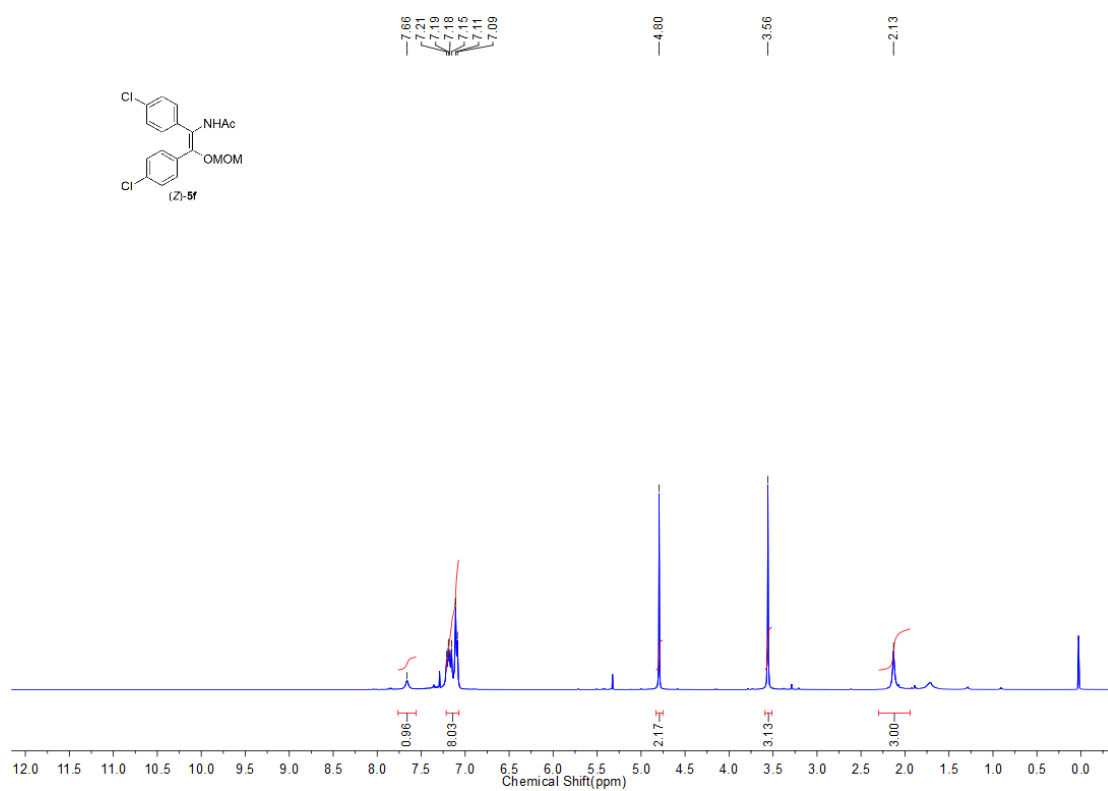


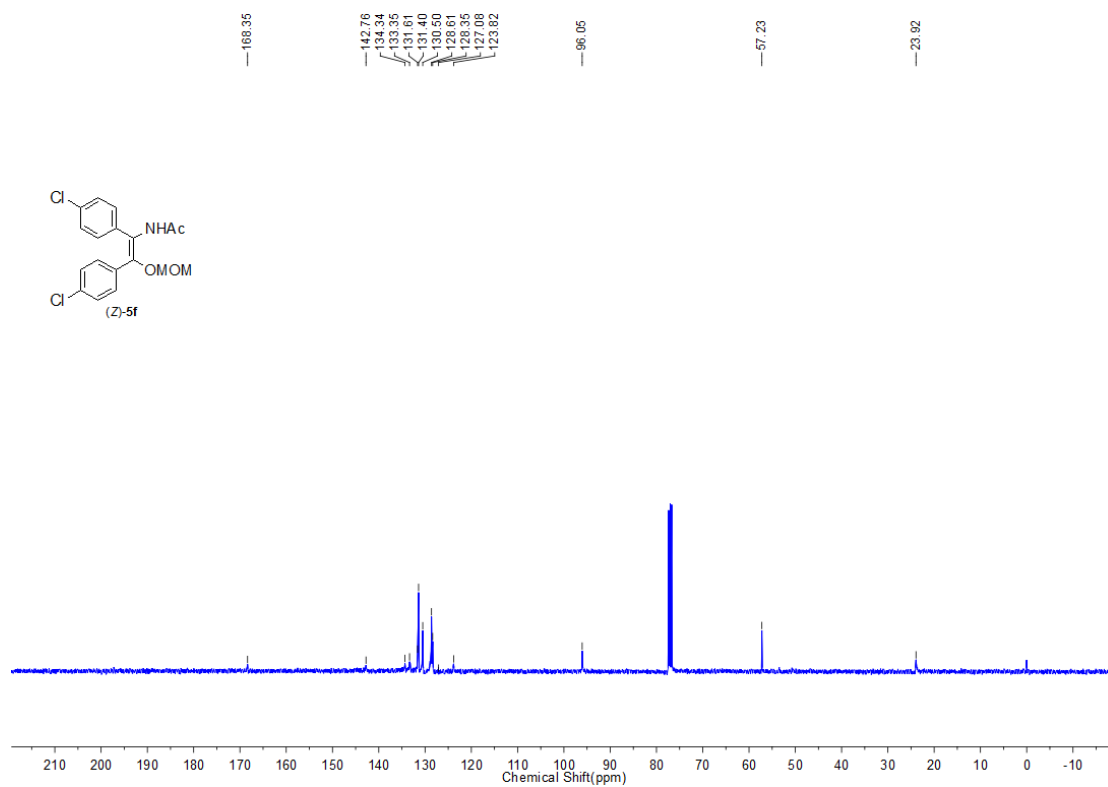
5e-¹HNMR, ¹³CNMR and ¹⁹FNMR



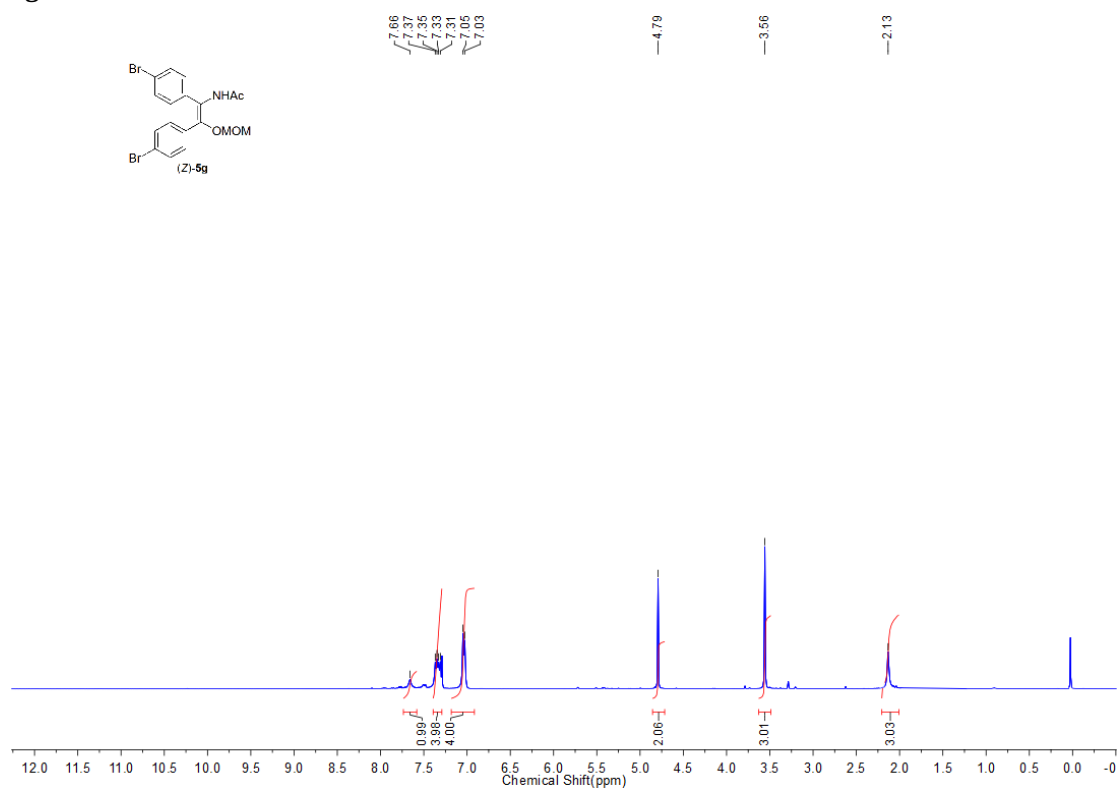


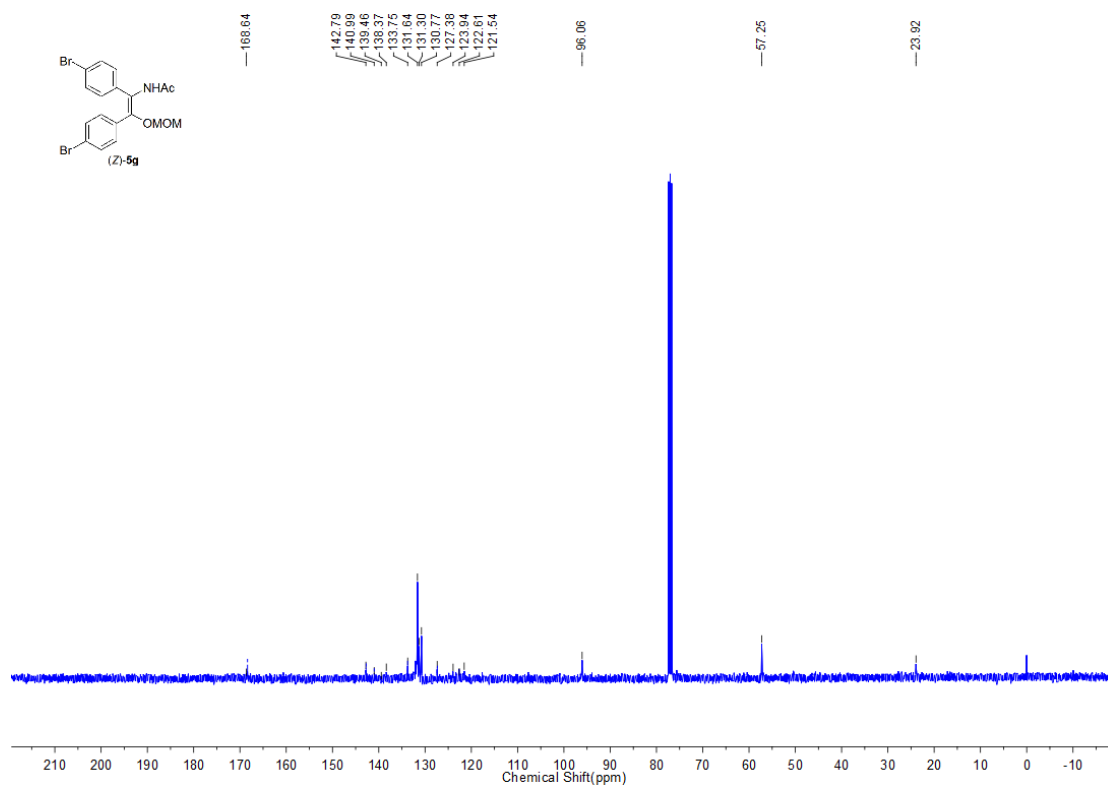
5f- ^1H NMR and ^{13}C NMR



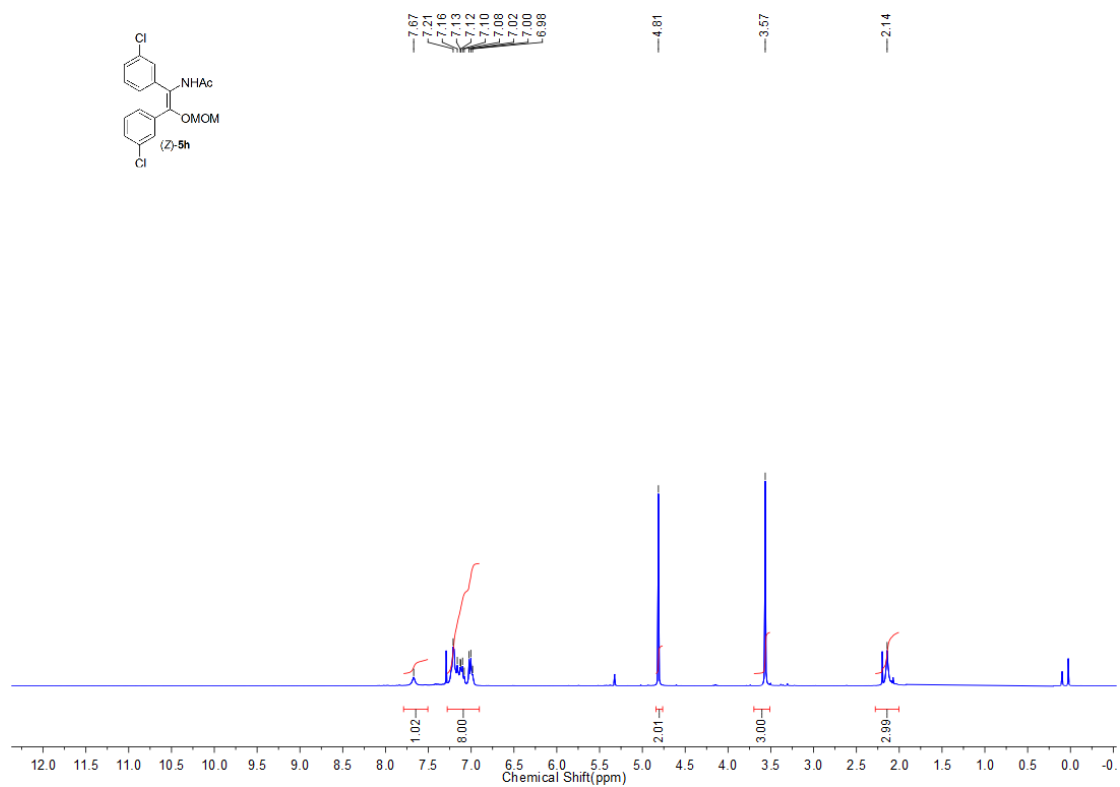


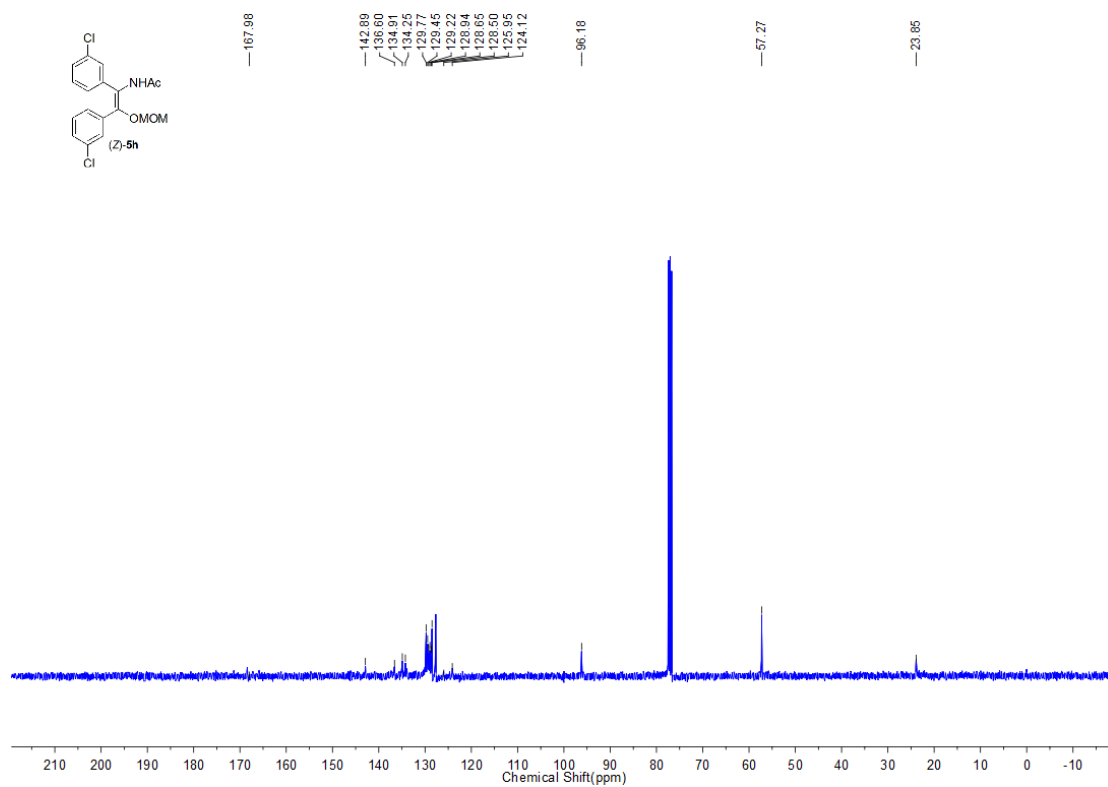
5g-¹H NMR and ¹³C NMR



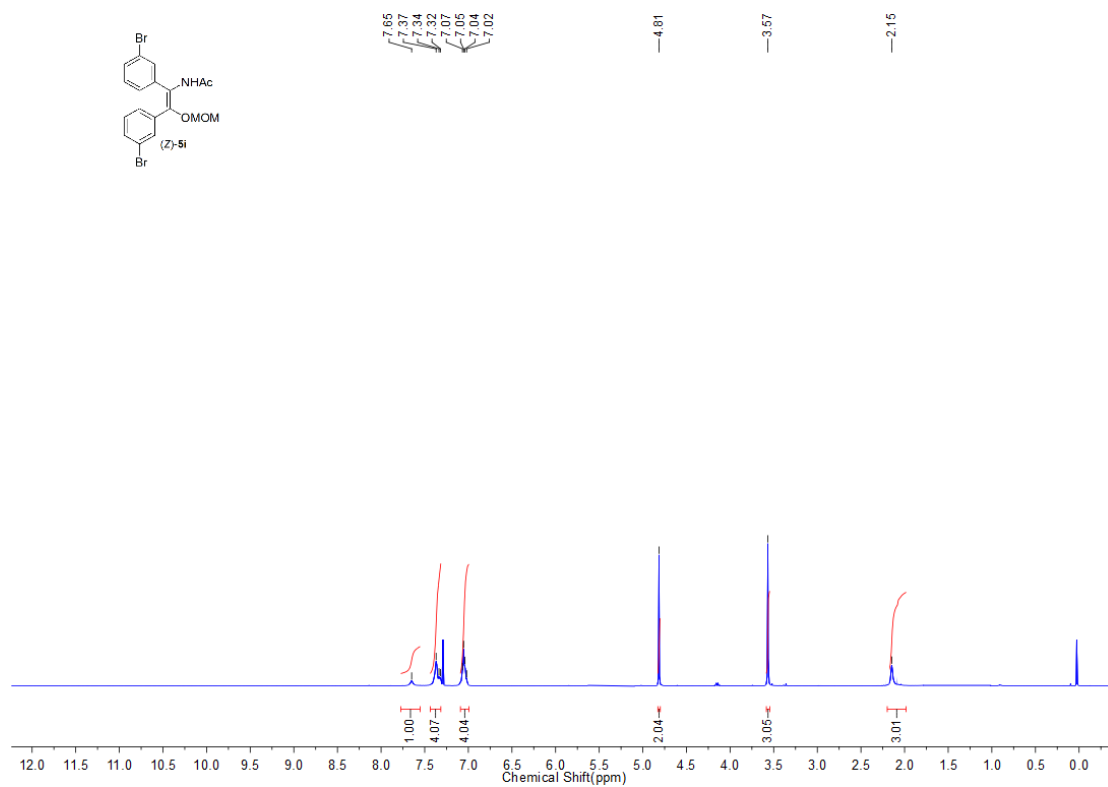


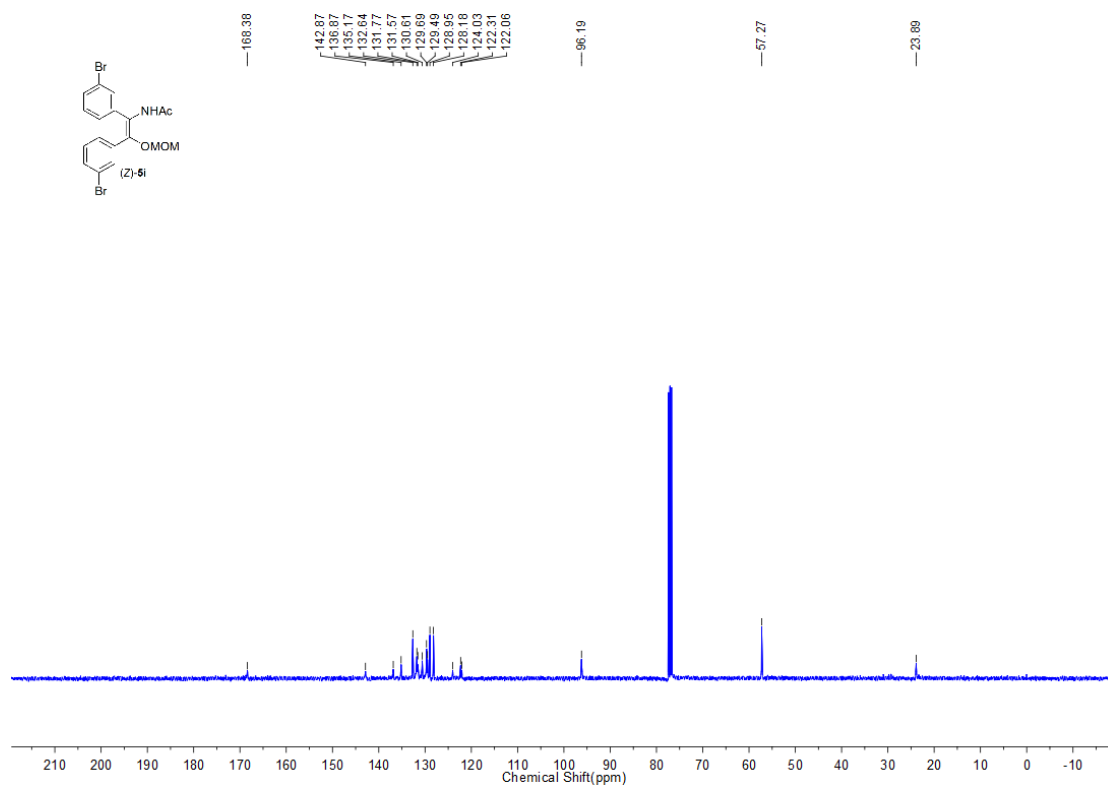
5h-¹H NMR and ¹³C NMR



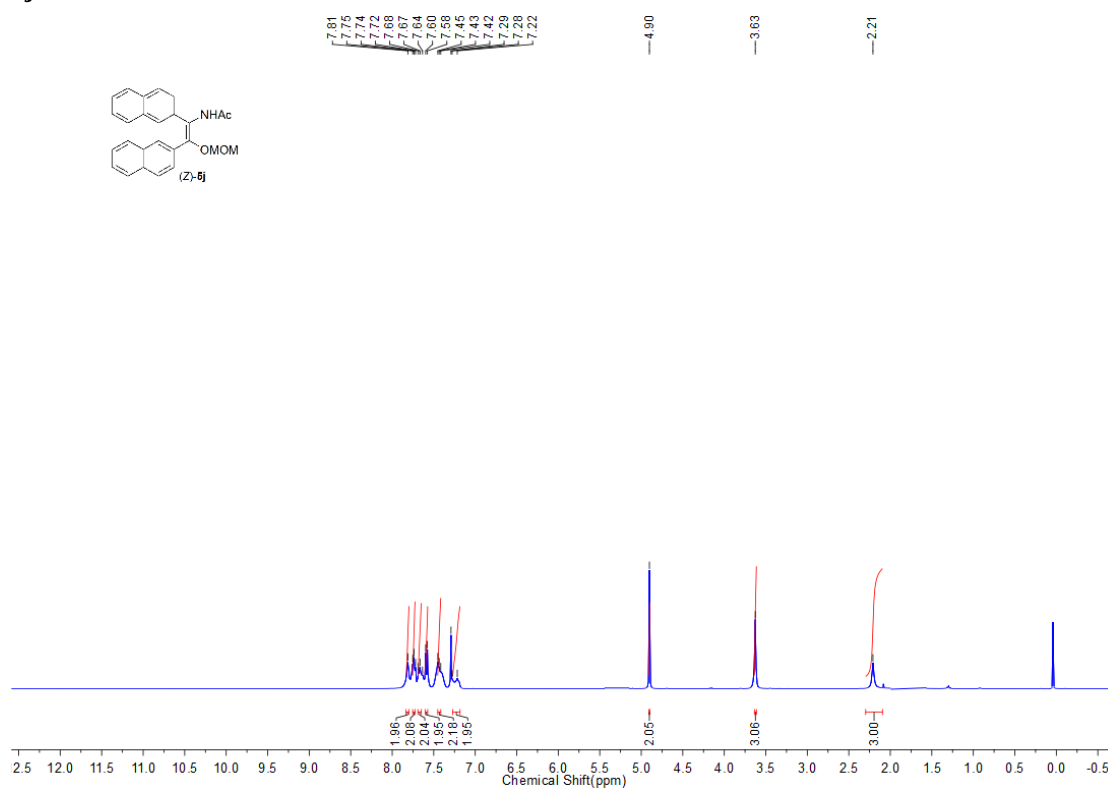


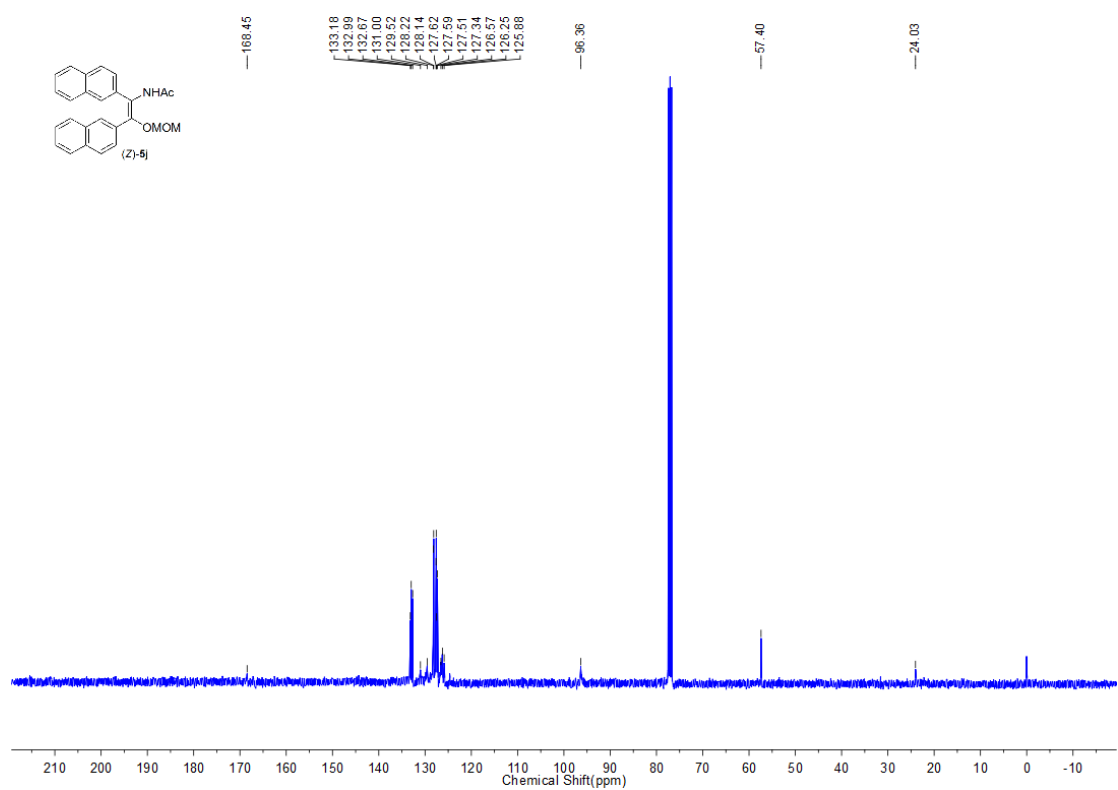
5i-¹H NMR and ¹³C NMR



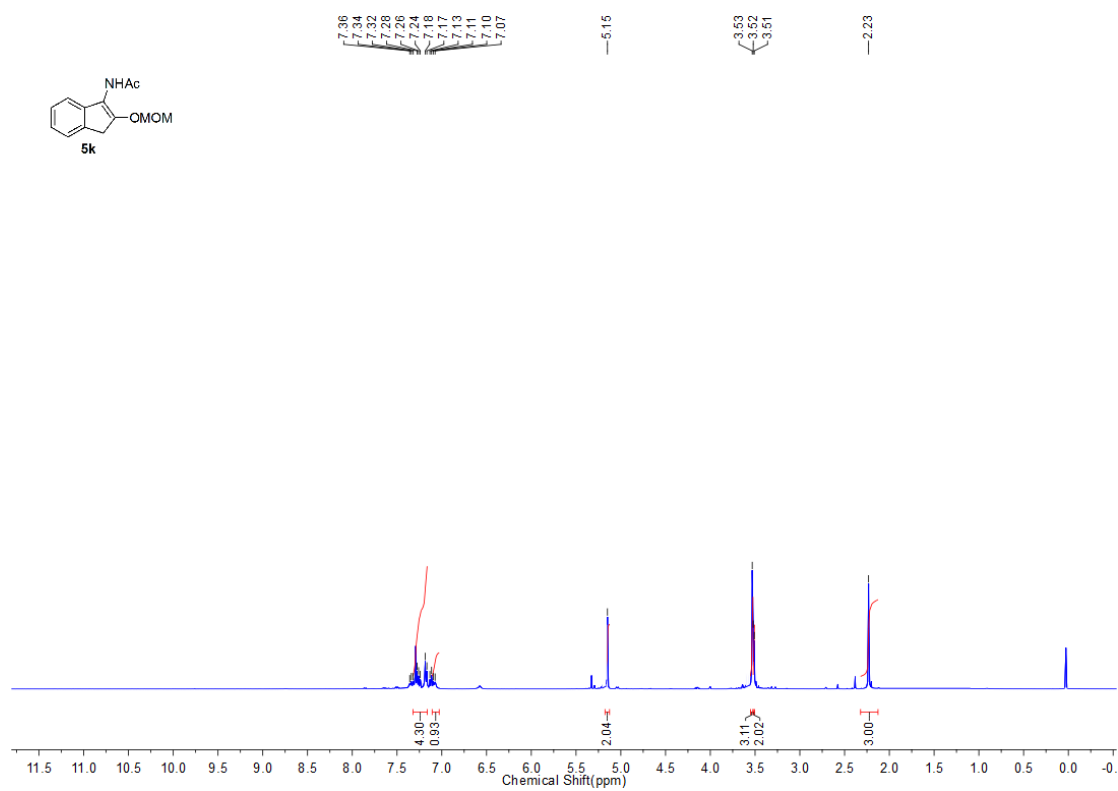


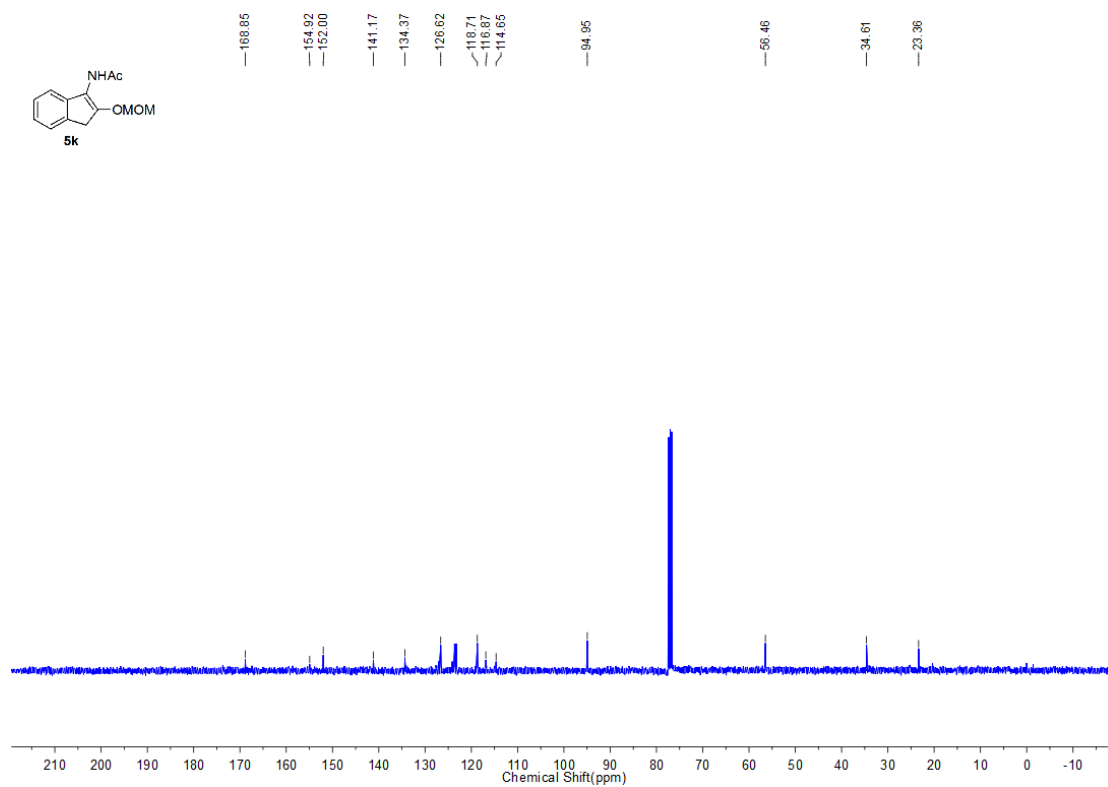
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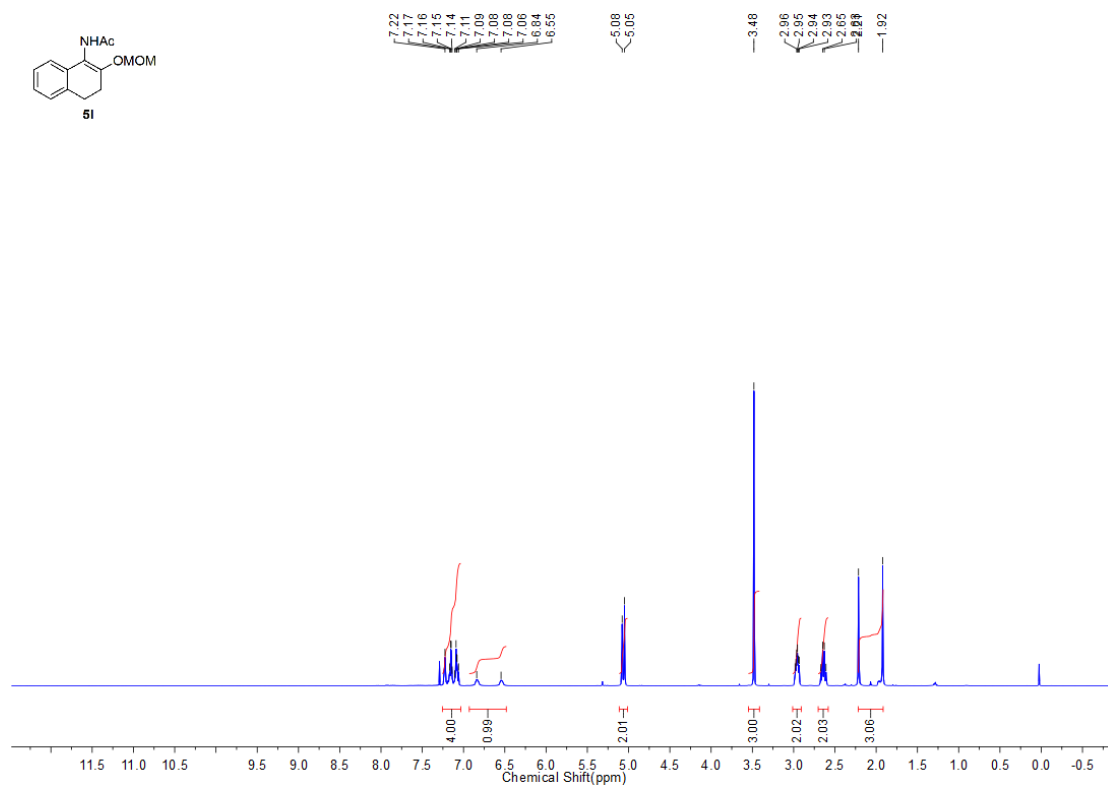


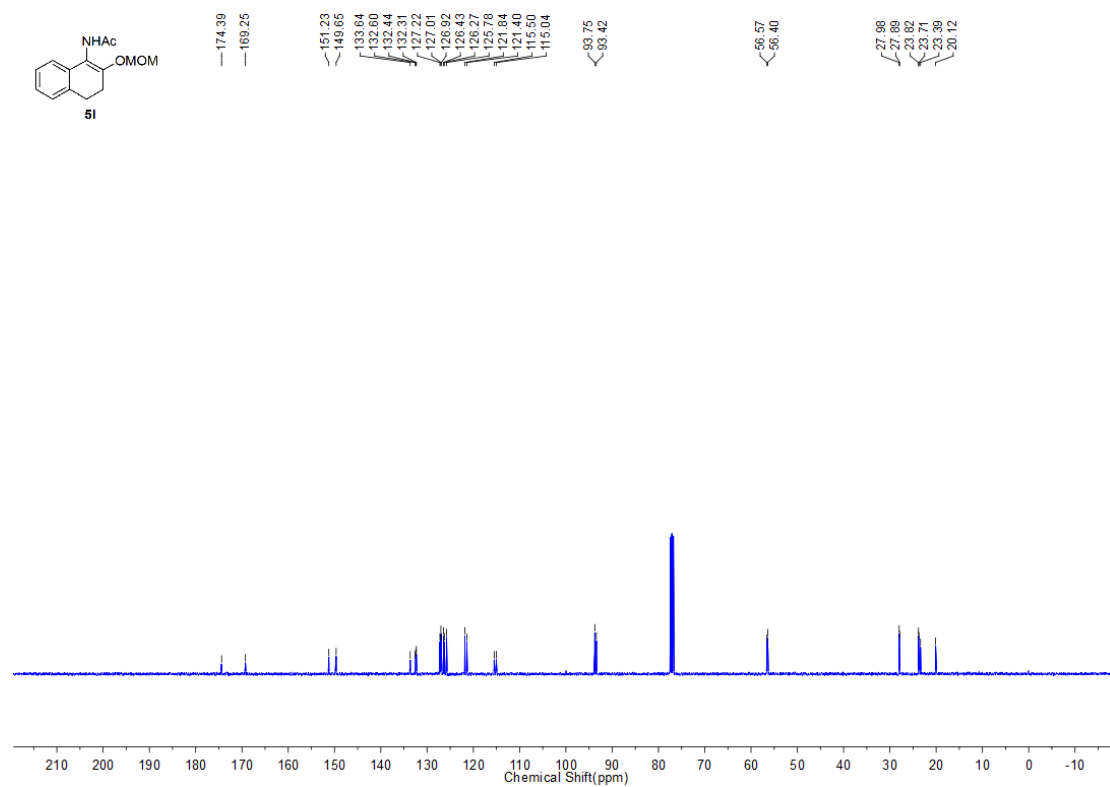
5k-¹H NMR and ¹³C NMR



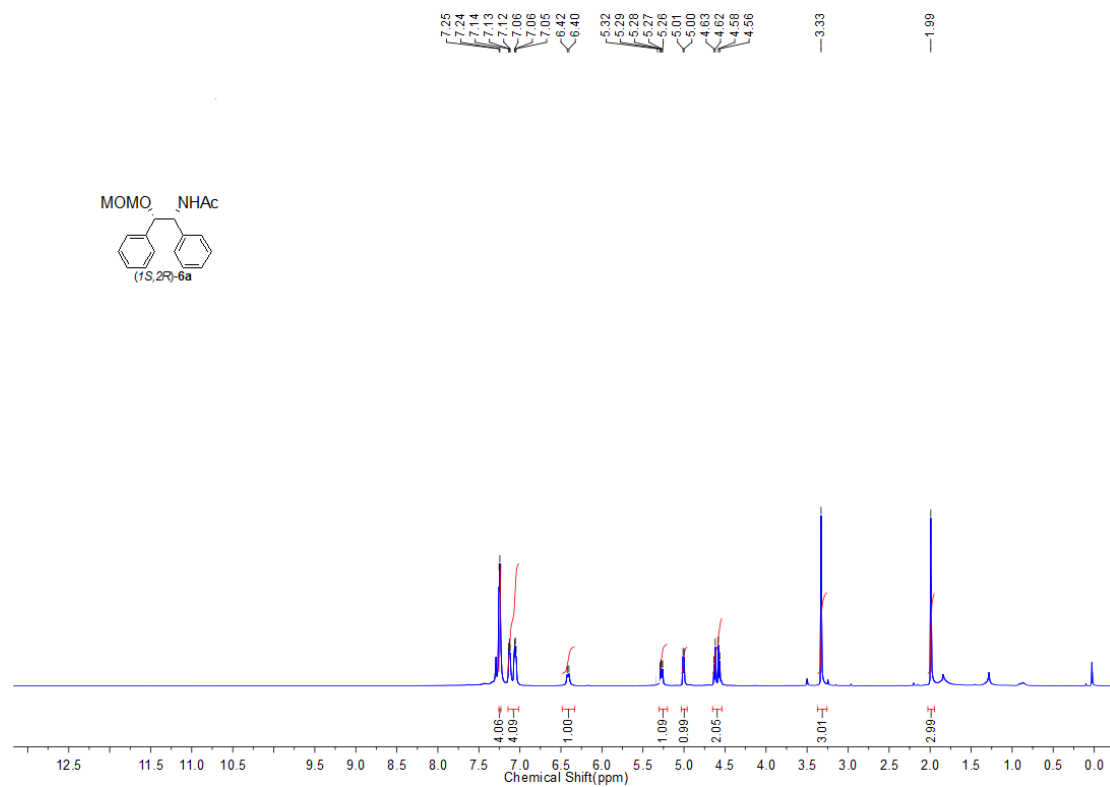


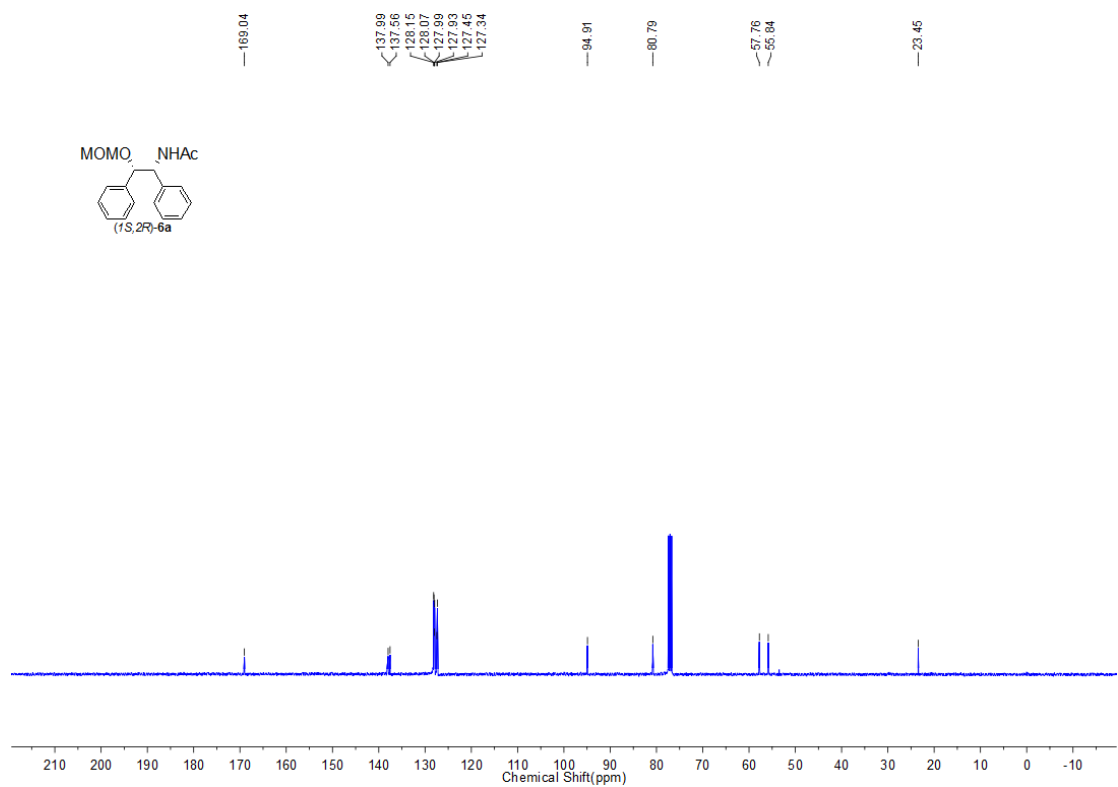
5l-¹H NMR and ¹³C NMR



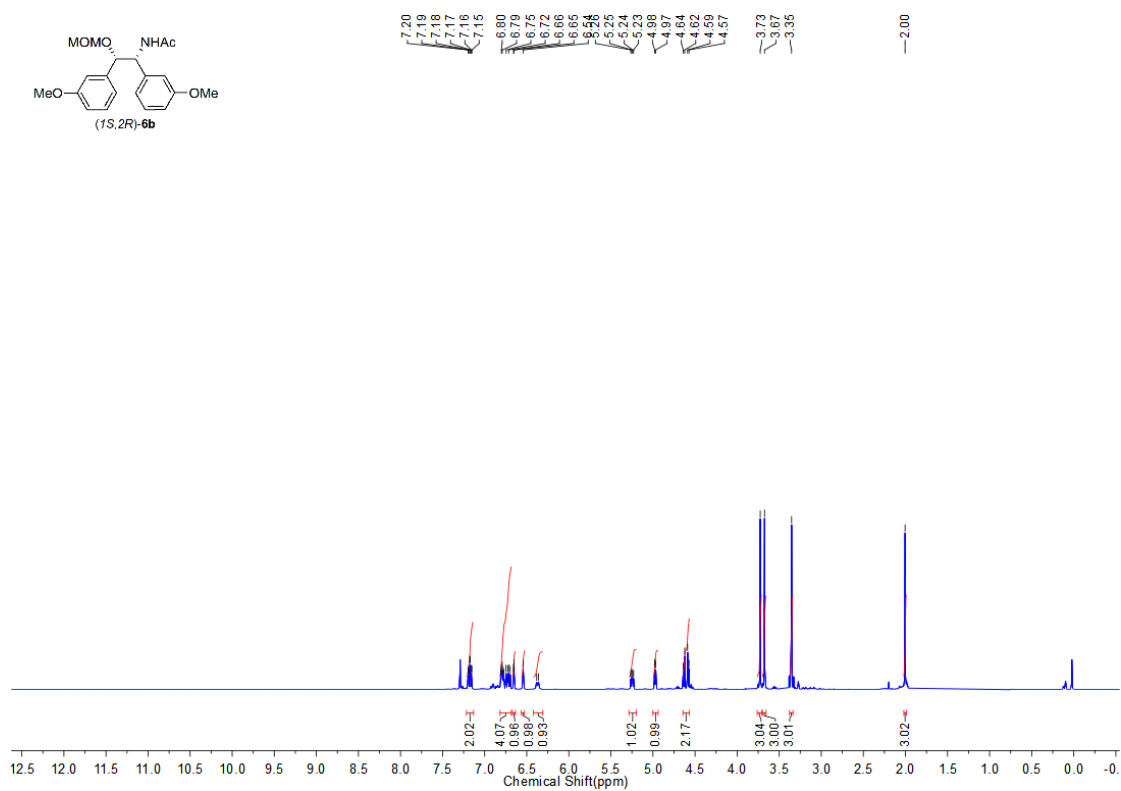


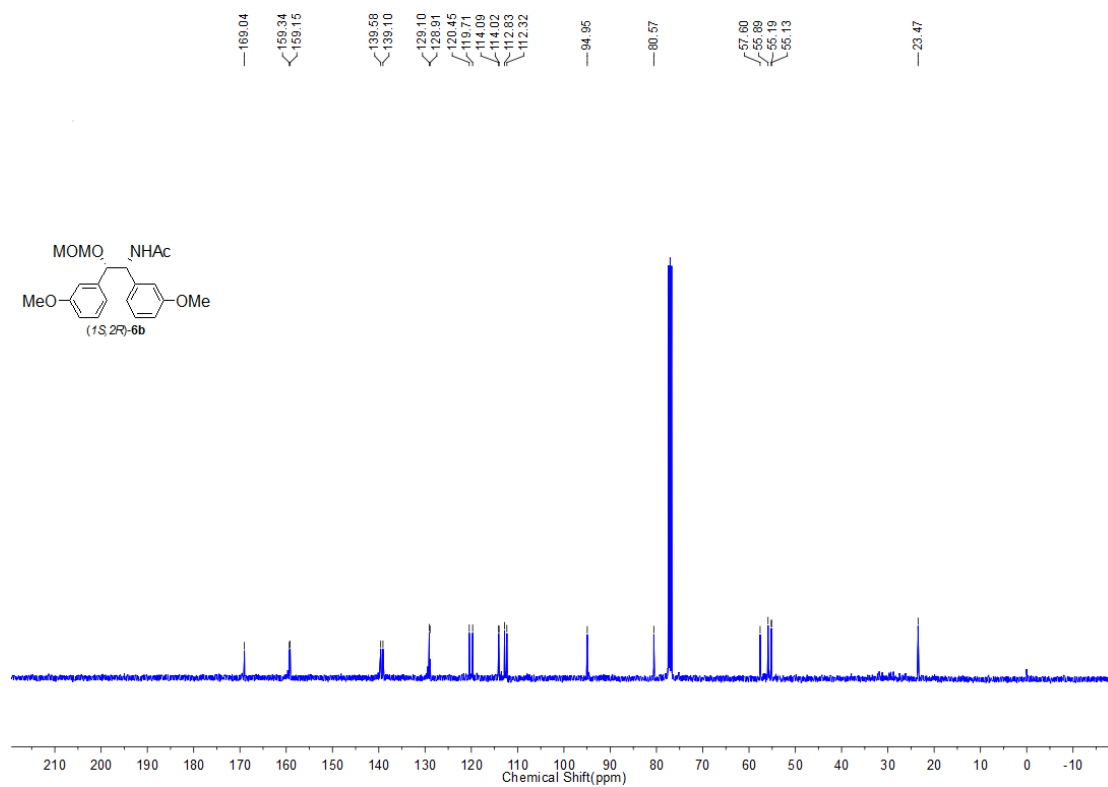
6a- ^1H NMR and ^{13}C NMR



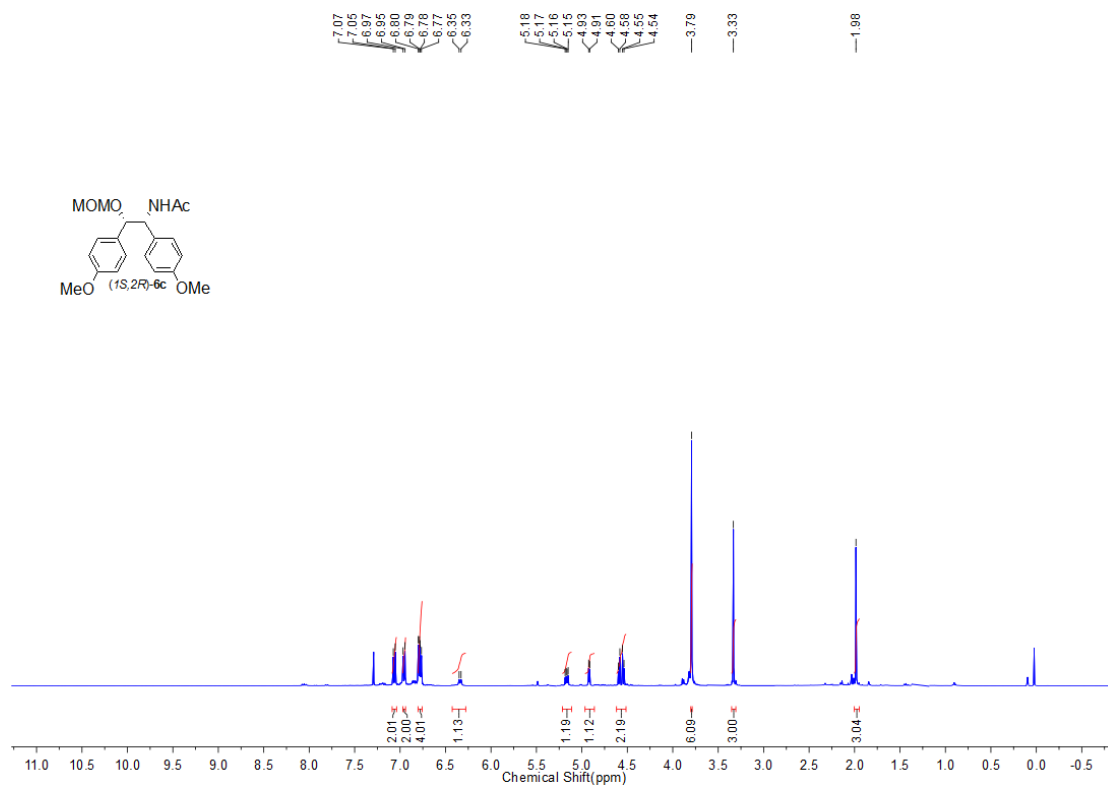


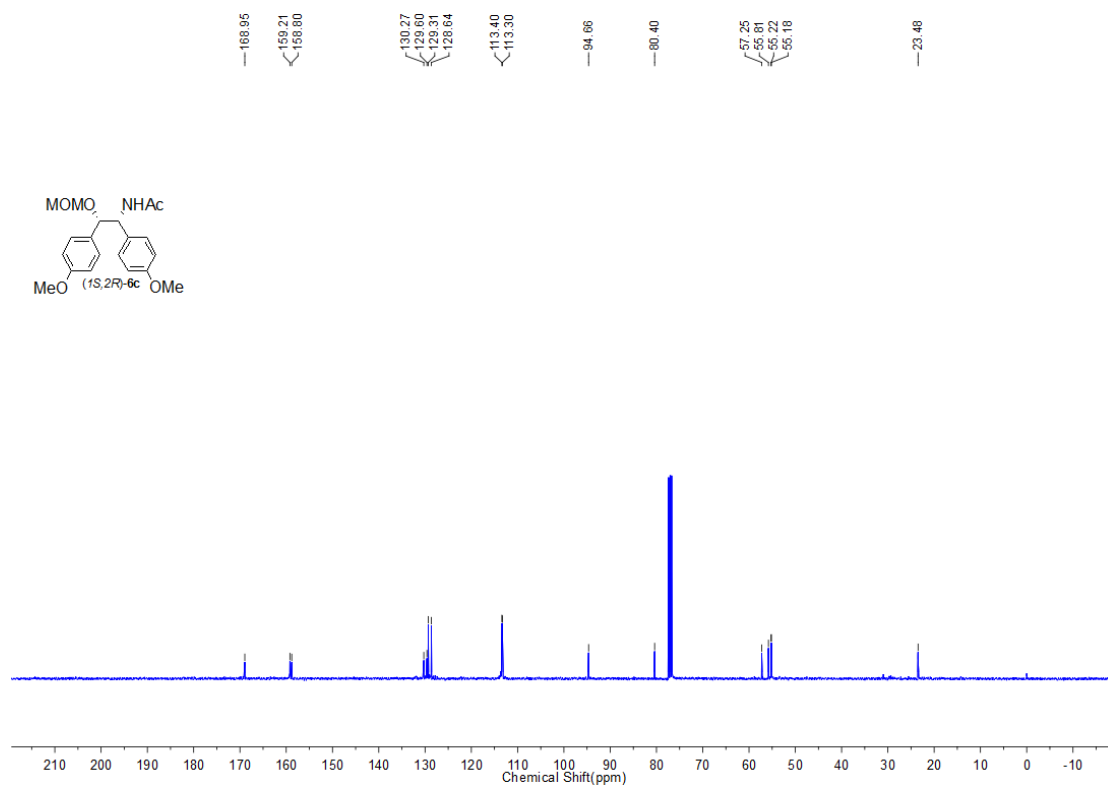
6b-¹HNMR and ¹³CNMR



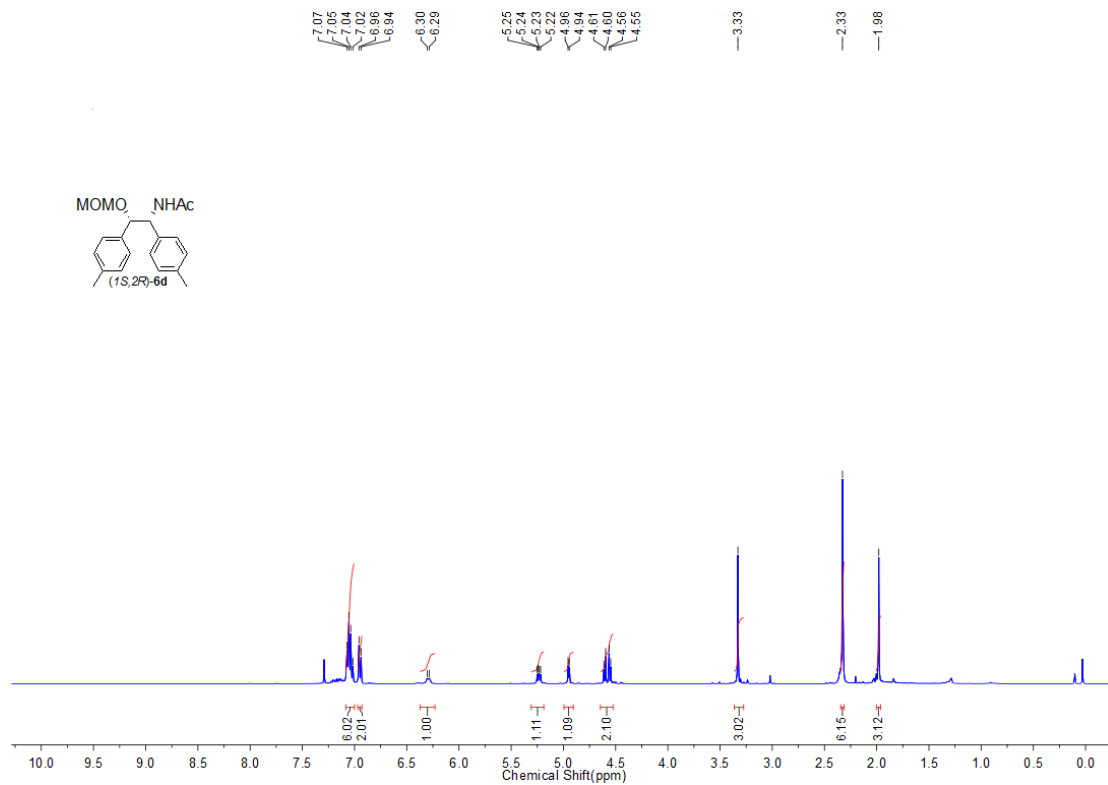


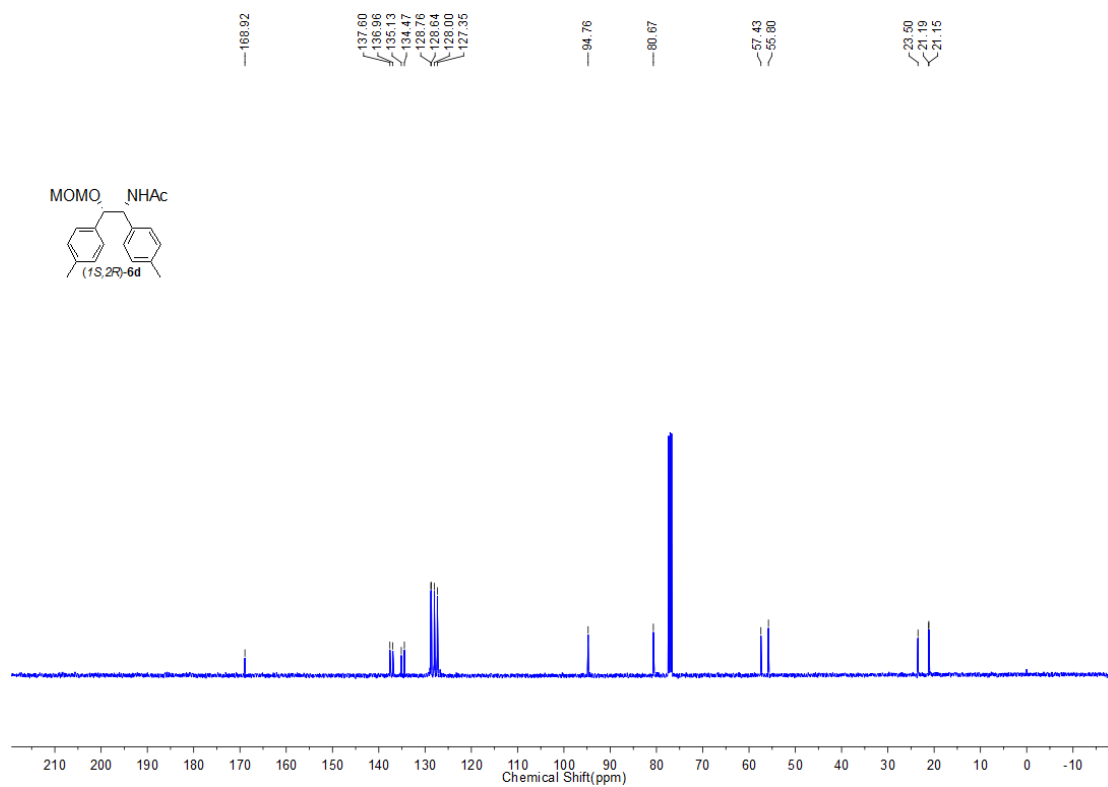
6c- ^1H NMR and ^{13}C NMR



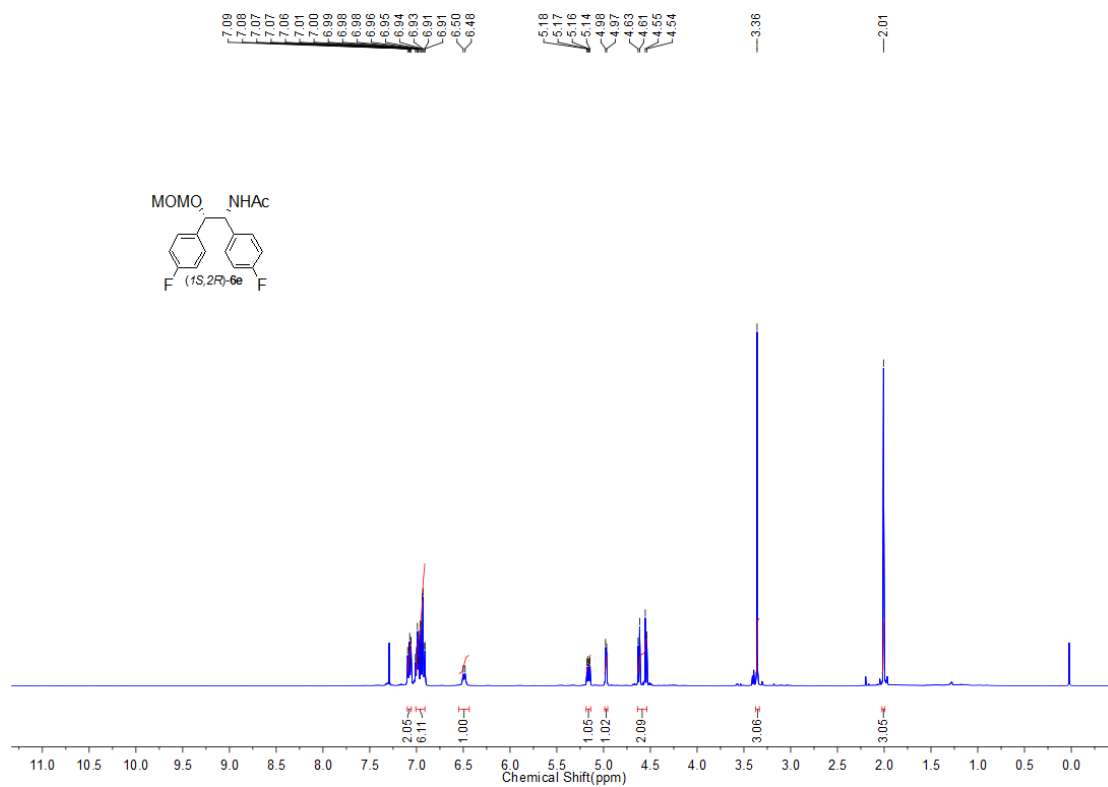


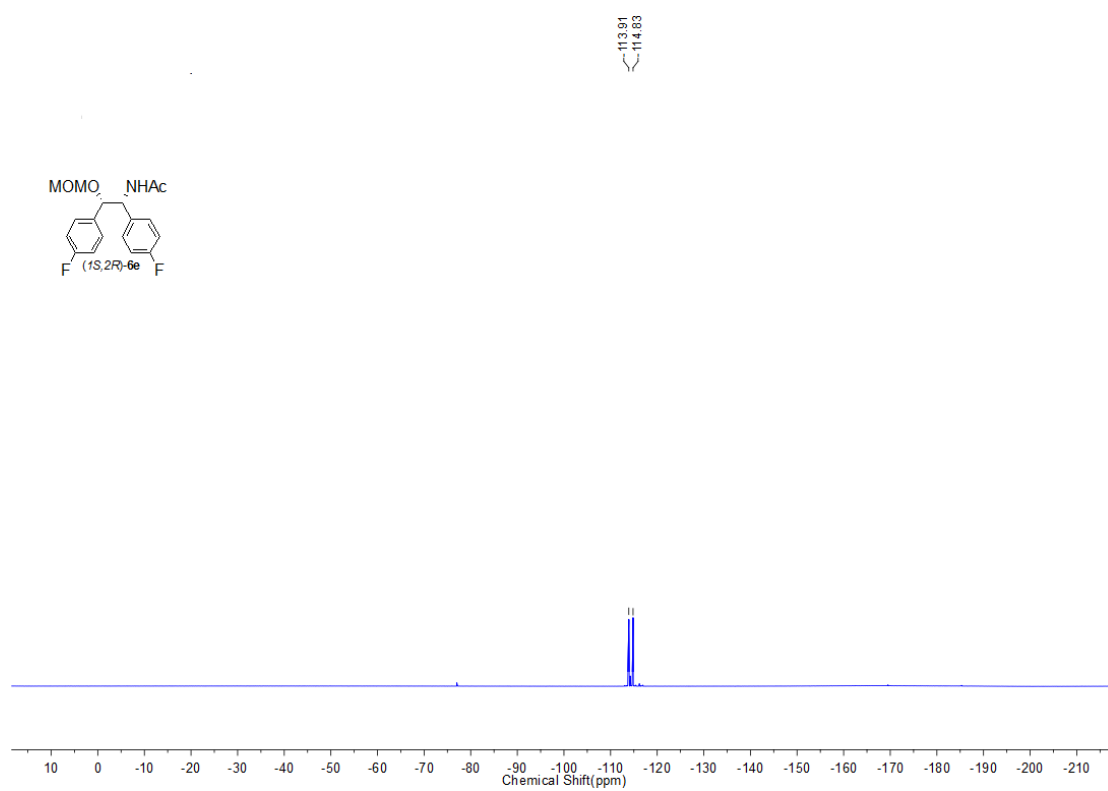
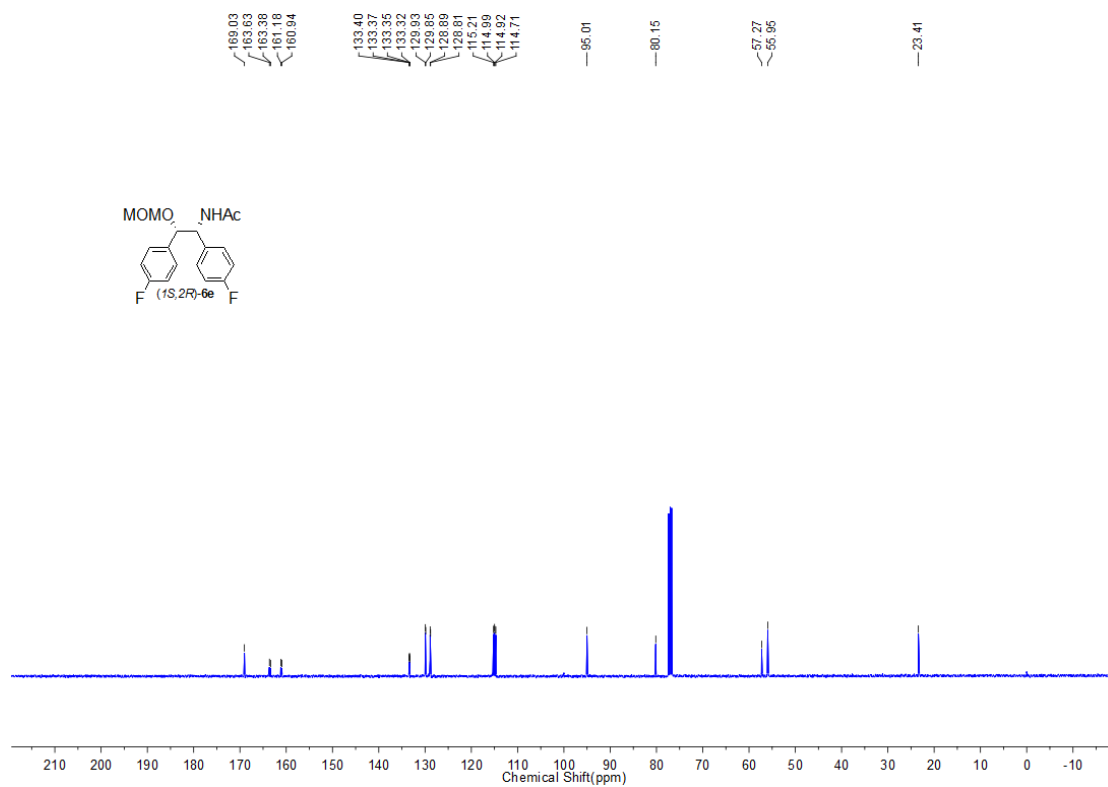
6d-¹H NMR and ¹³C NMR



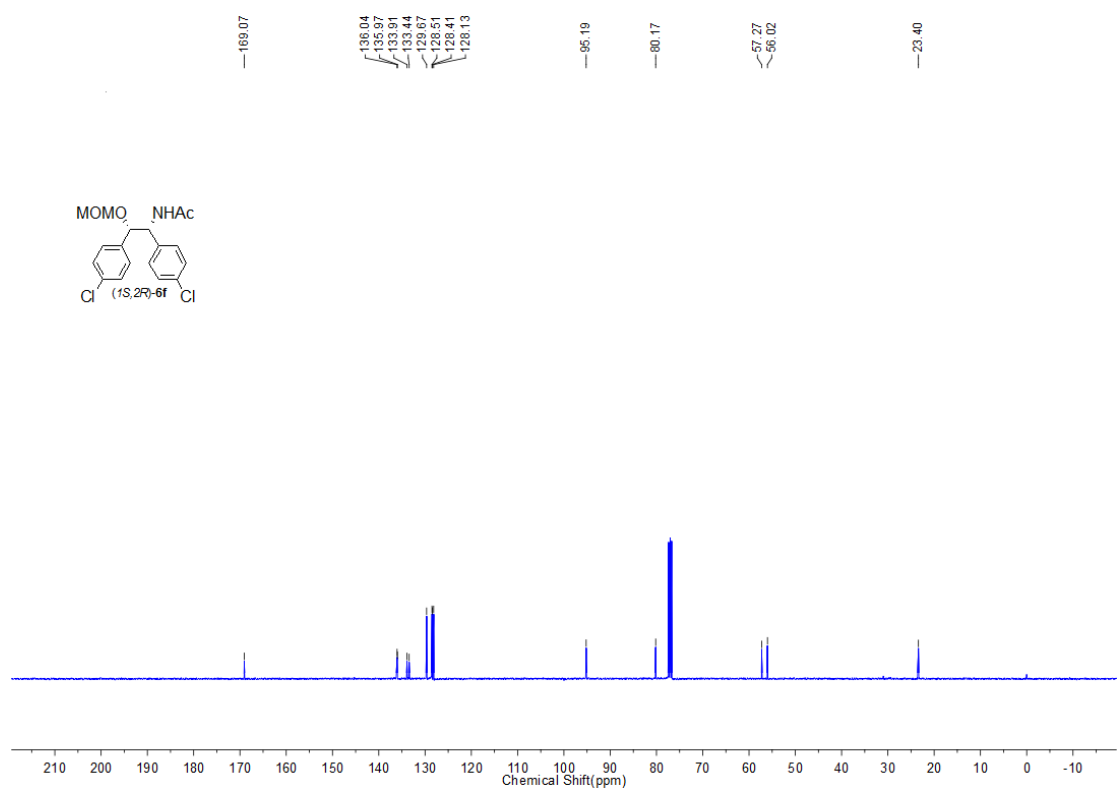
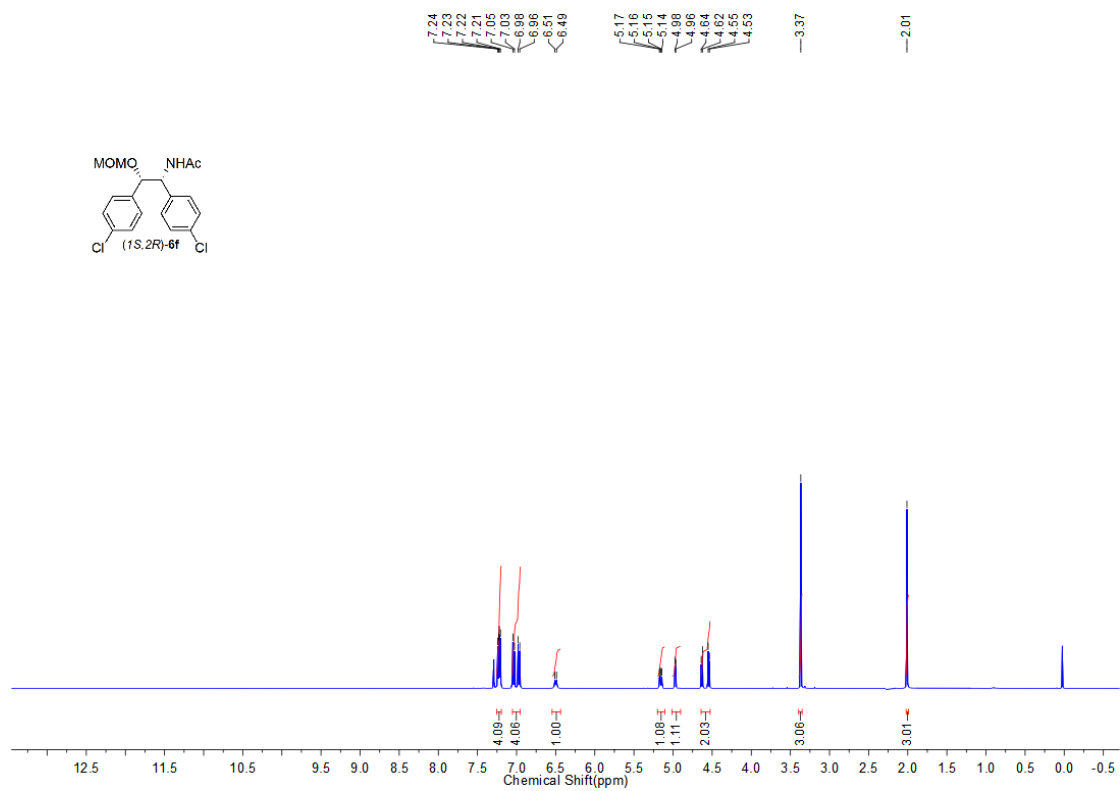


$6e$ - ^1H NMR, ^{13}C NMR and ^{19}F NMR

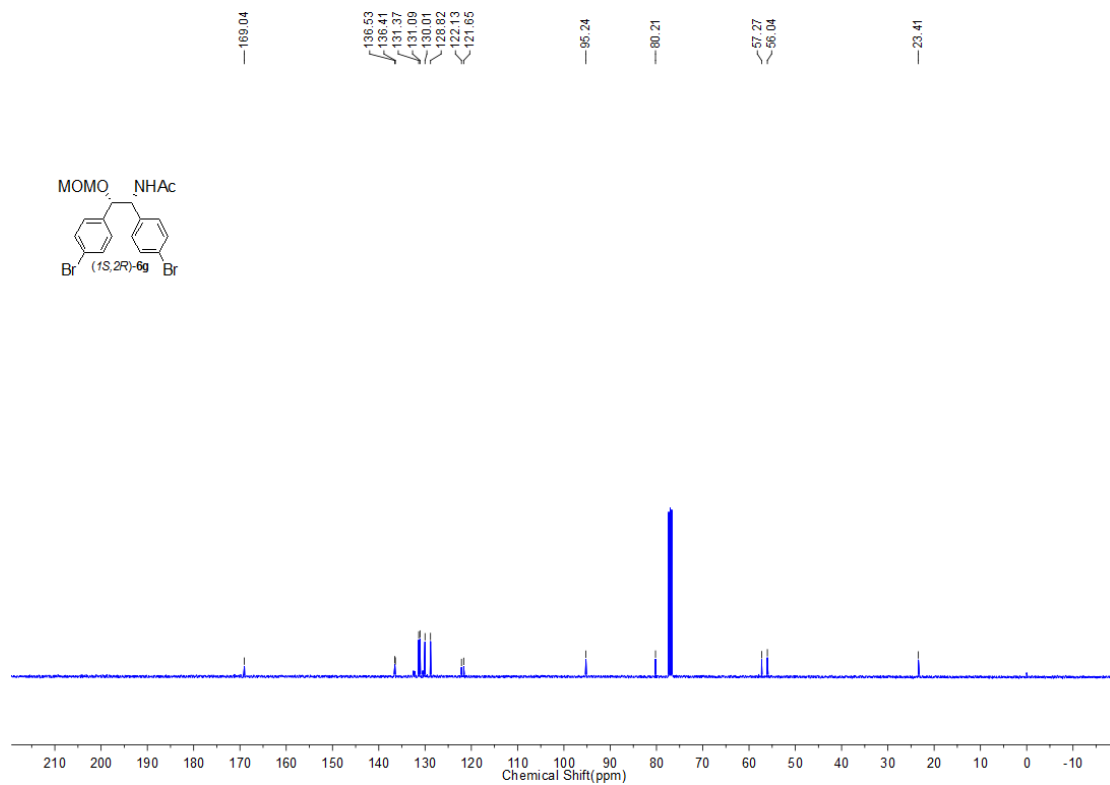
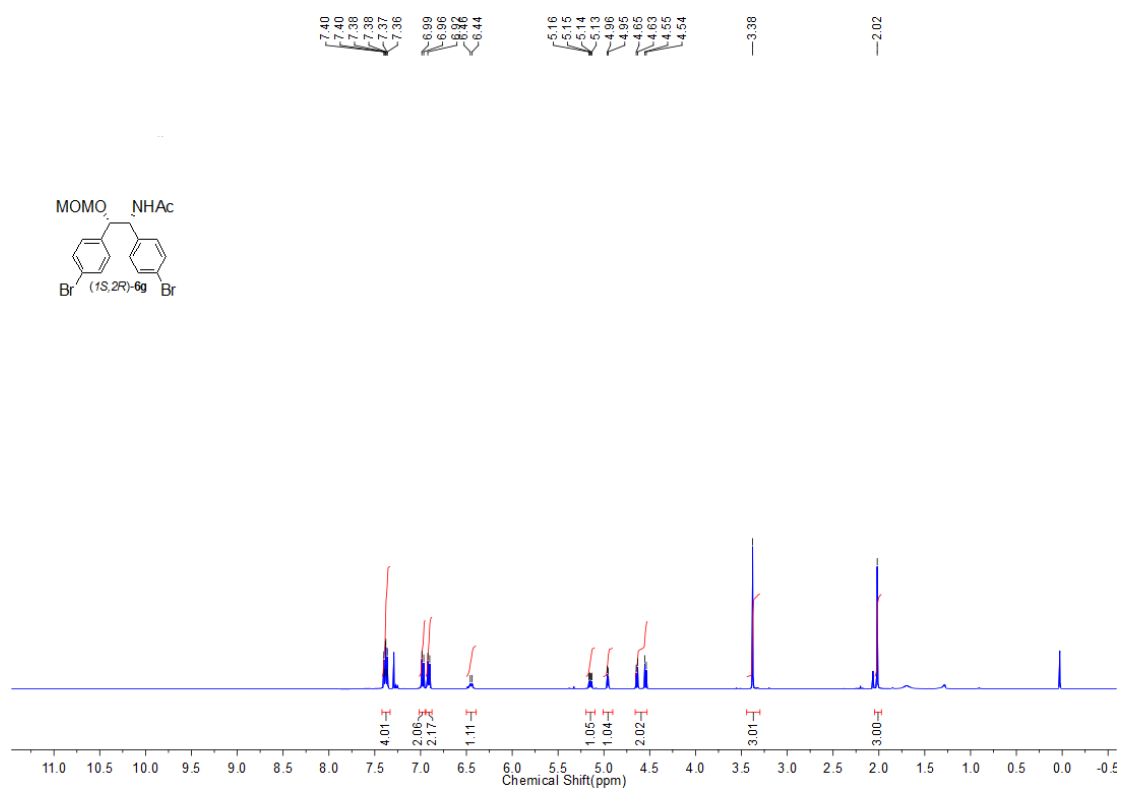




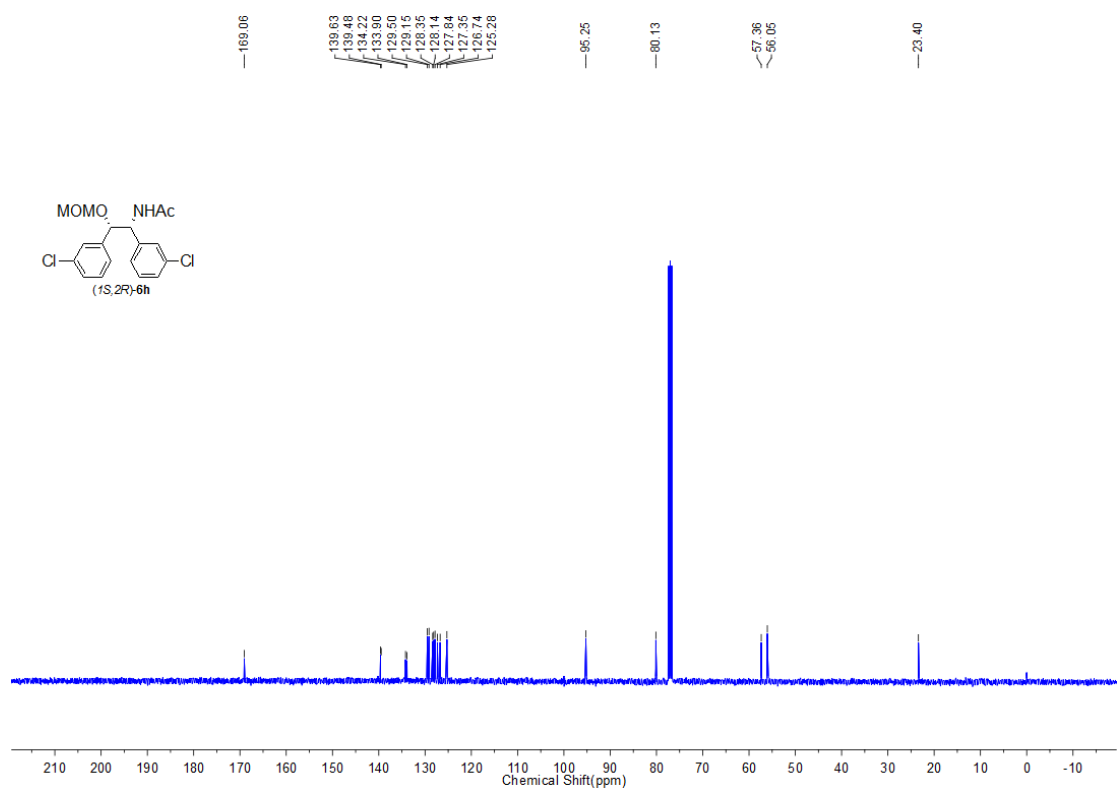
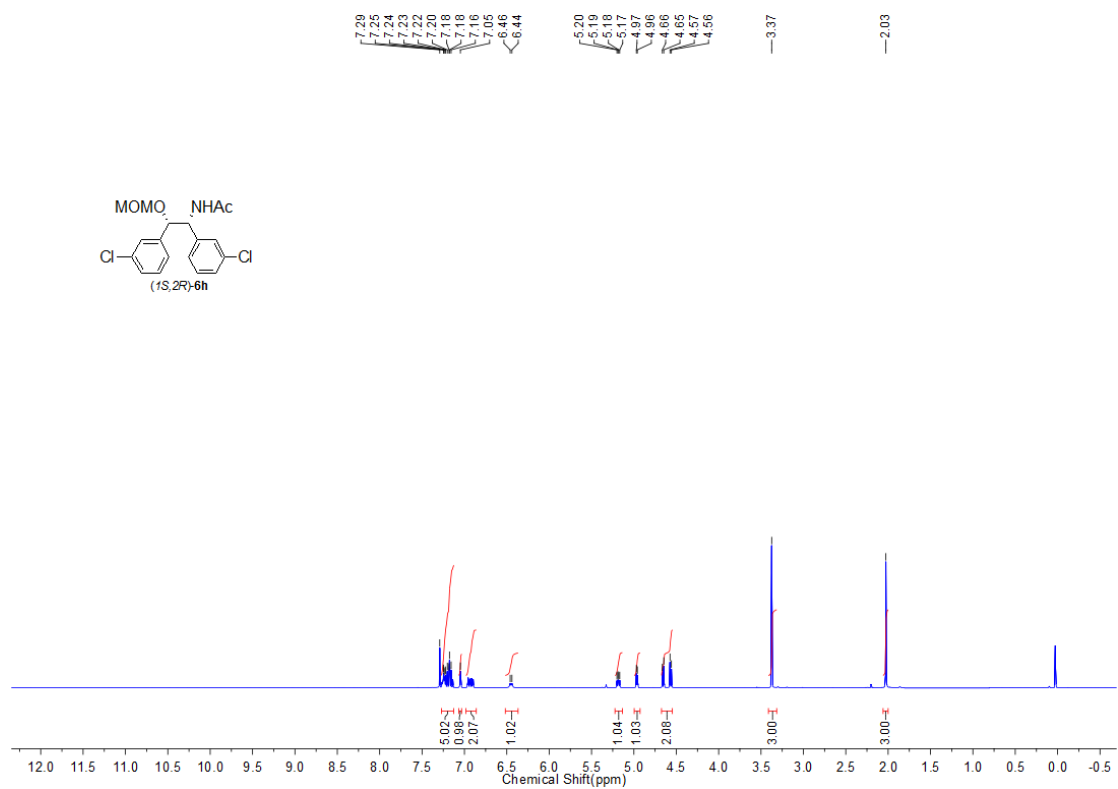
6f-¹HNMR and ¹³CNMR



6g-¹HNMR and ¹³CNMR

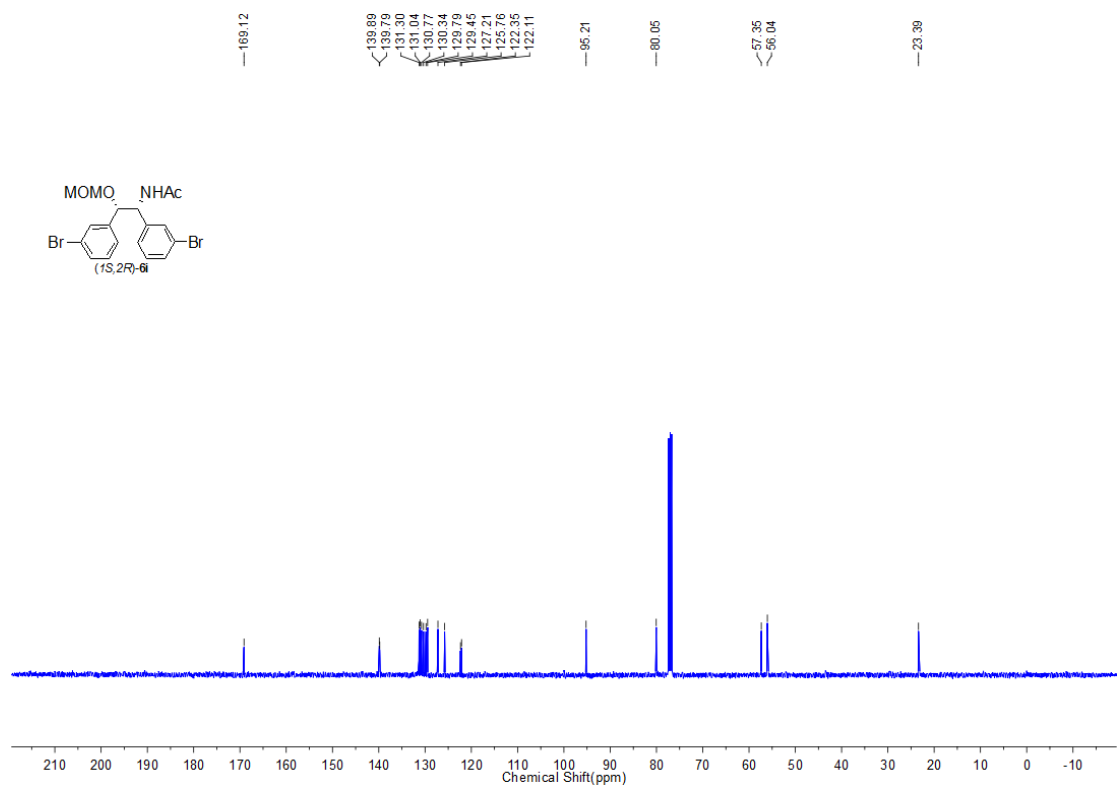


6h-¹HNMR and ¹³CNMR

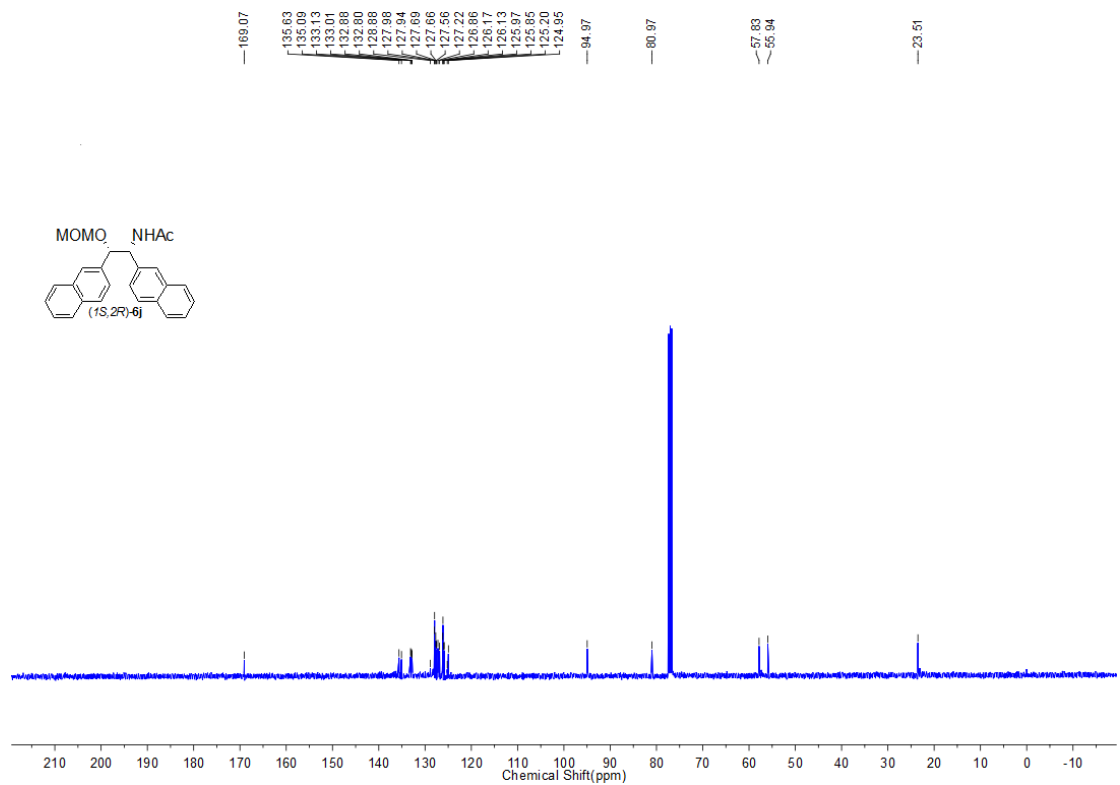
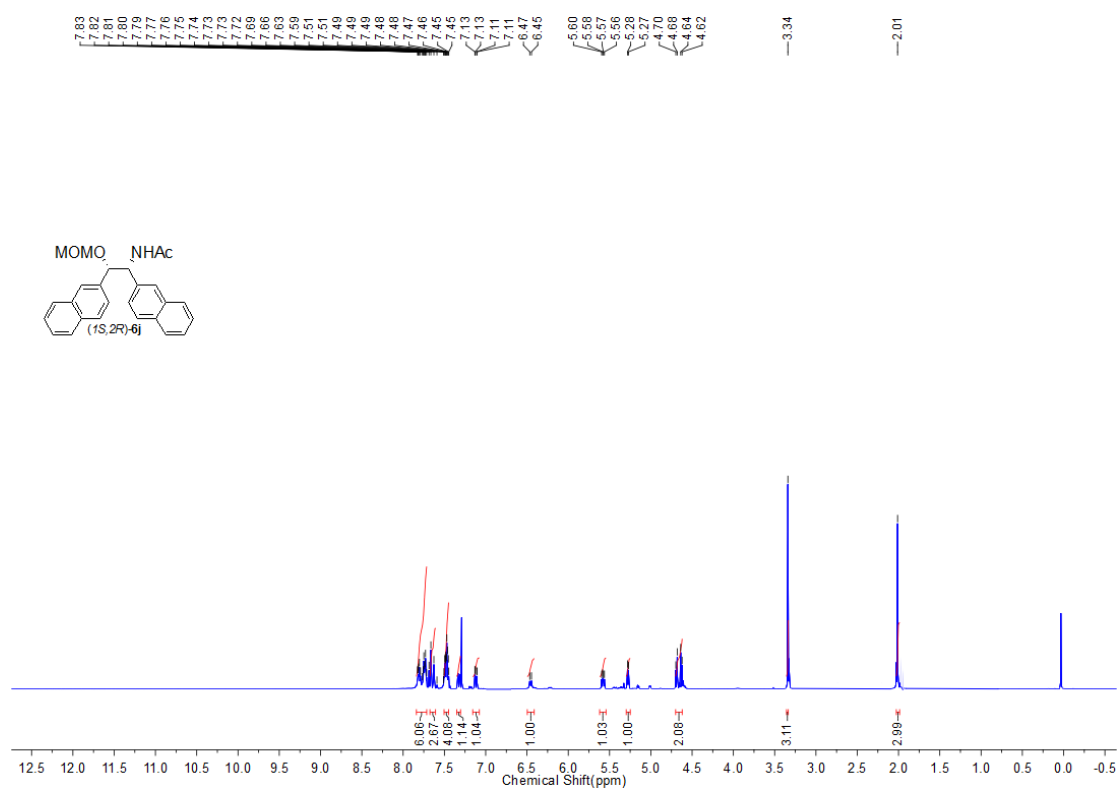


Chemical structure of (1*S*,2*R*)-6: A chiral molecule with a central carbon atom bonded to a MOMO group, an NHAc group, and two 4-bromophenyl rings.

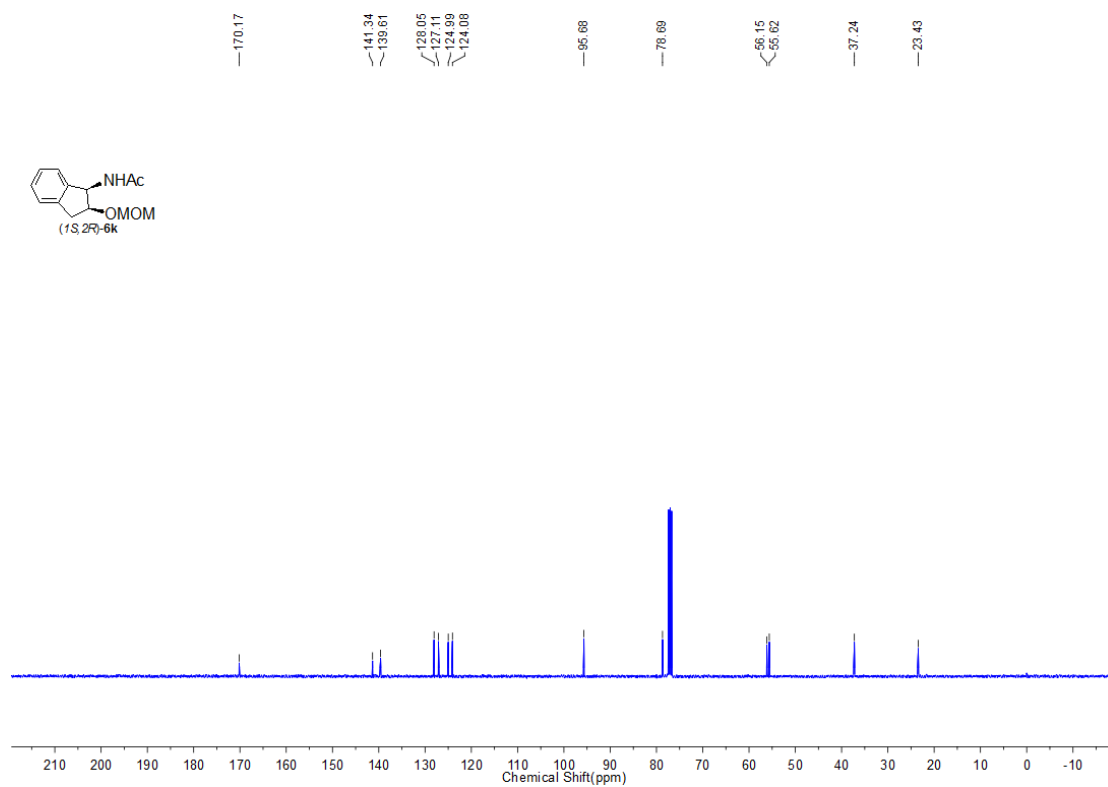
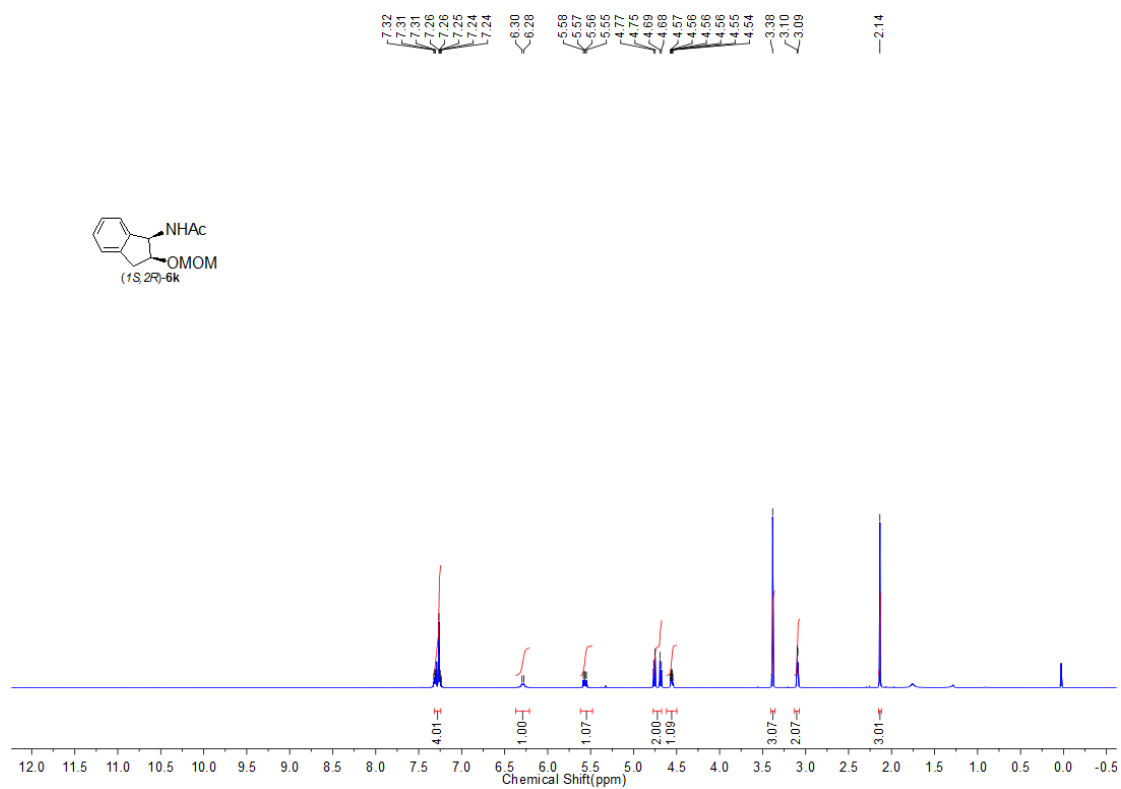
¹H NMR spectrum (CDCl₃) showing peaks at 7.41, 7.40, 7.38, 7.33, 7.21, 7.16, 7.14, 7.12, 7.10, 7.08, 7.00, 6.98, 6.97, 6.95, 6.52, 6.50, 5.19, 5.18, 5.16, 5.15, 4.95, 4.94, 4.85, 4.63, 4.56, 4.55, 3.35, and 2.01 ppm. Integration values are provided for several peaks: 8.02, 1.00, 1.02, 1.00, 2.08, 3.04, and 3.00.



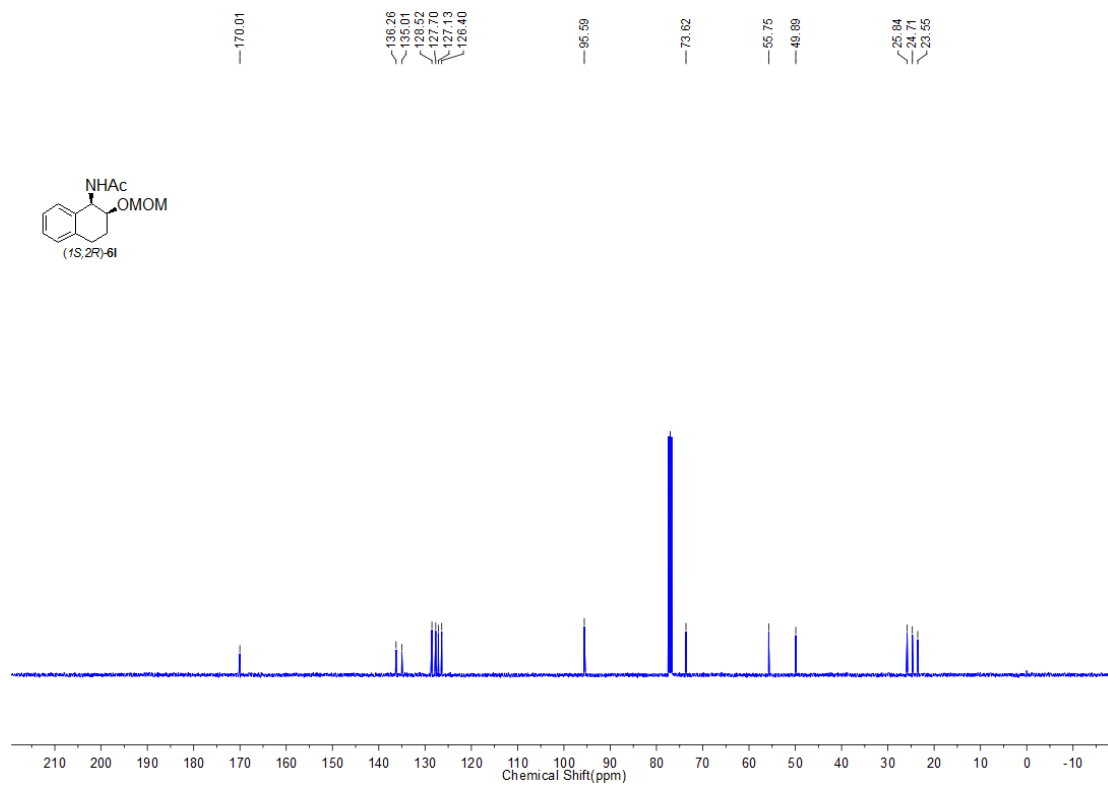
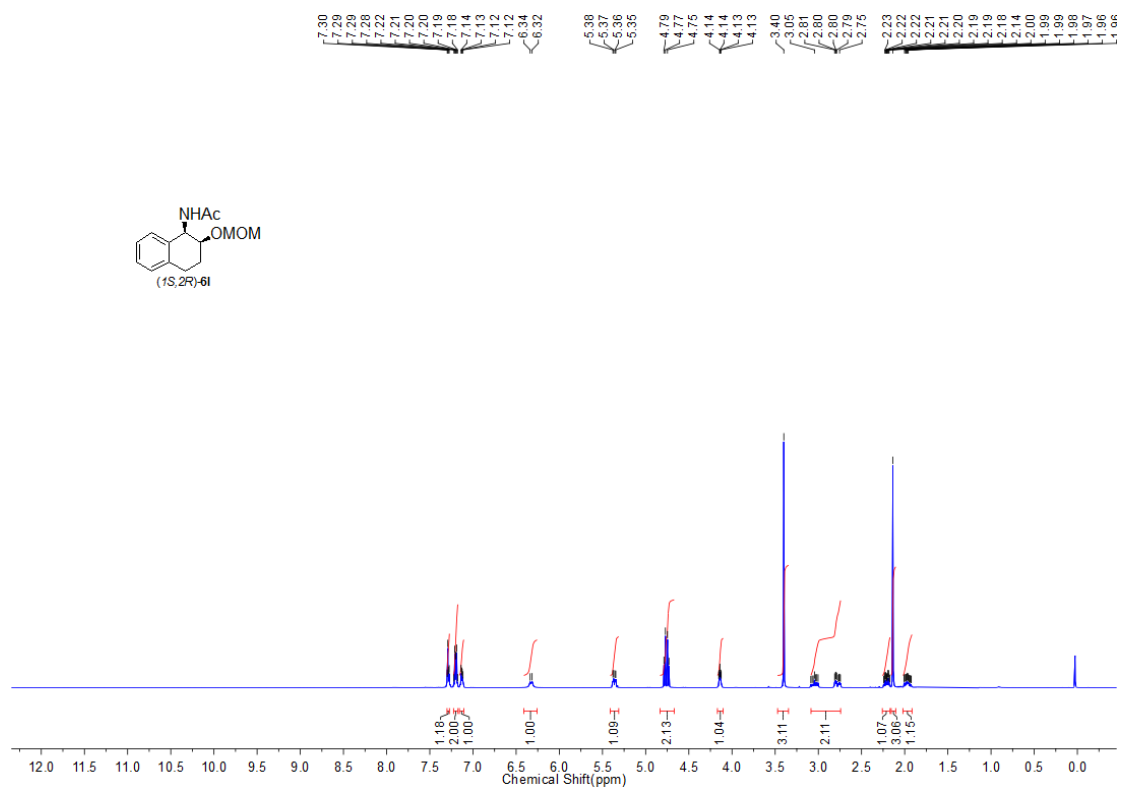
6j-¹HNMR and ¹³CNMR



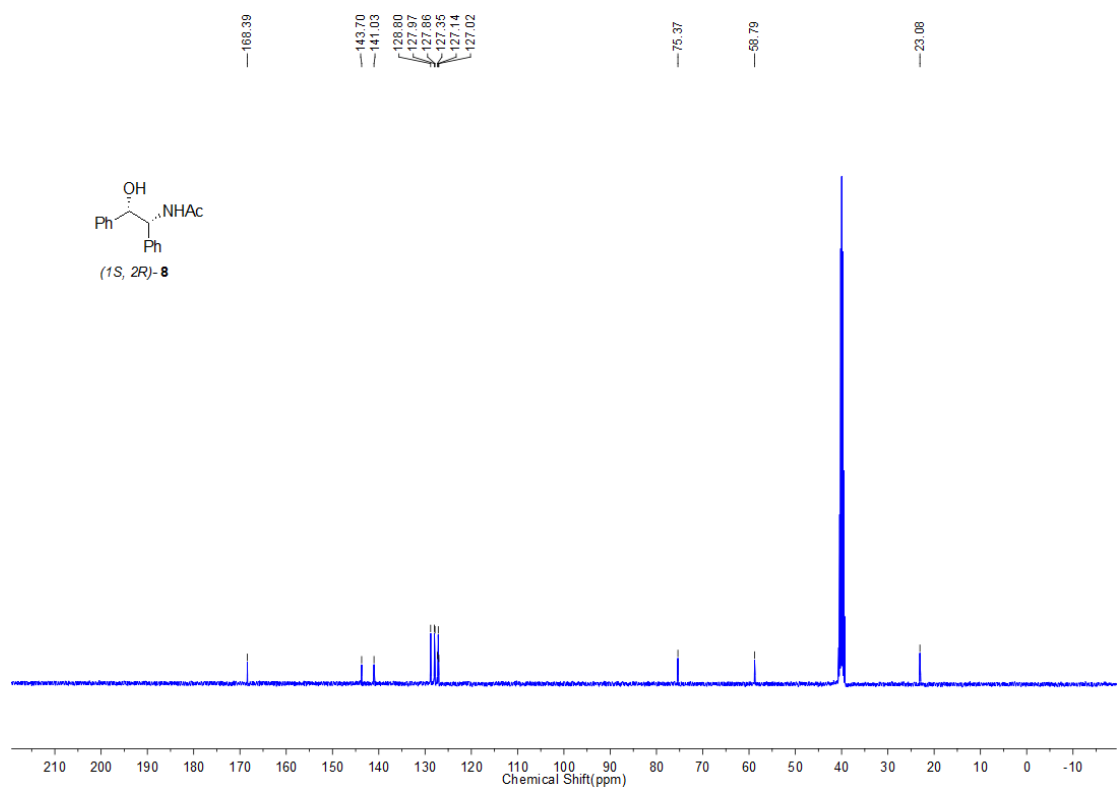
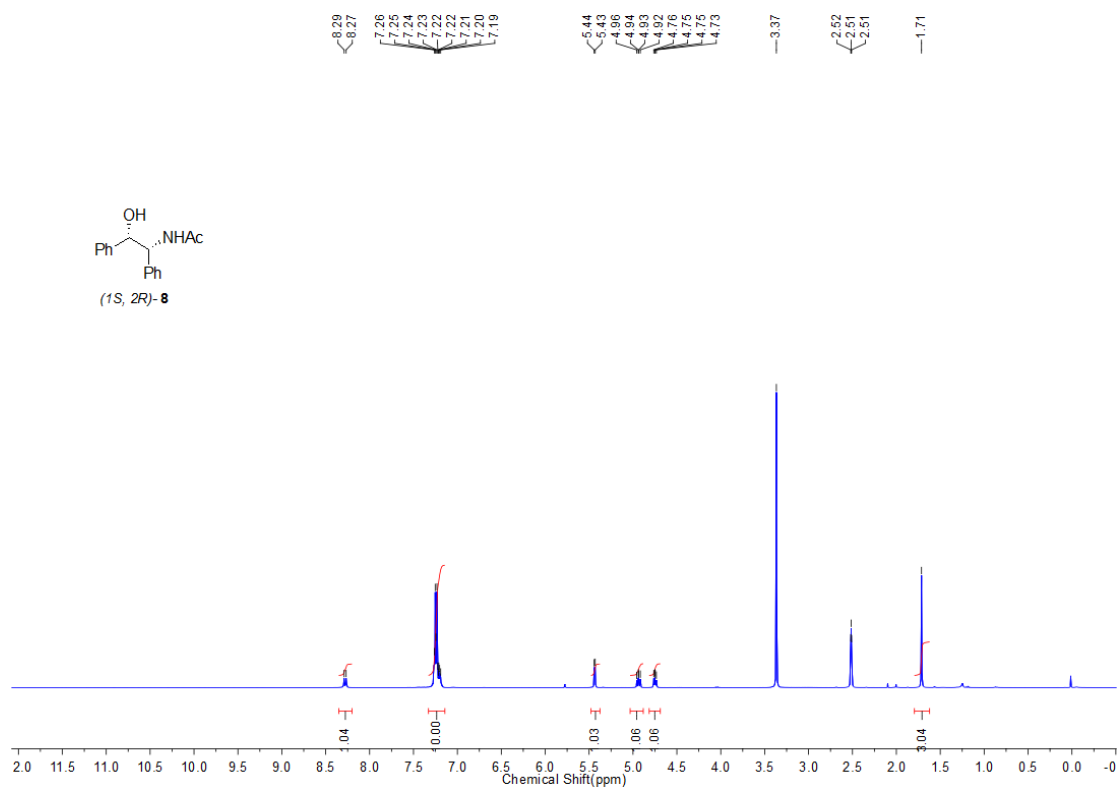
6k-¹HNMR and ¹³CNMR



6l-¹HNMR and ¹³CNMR



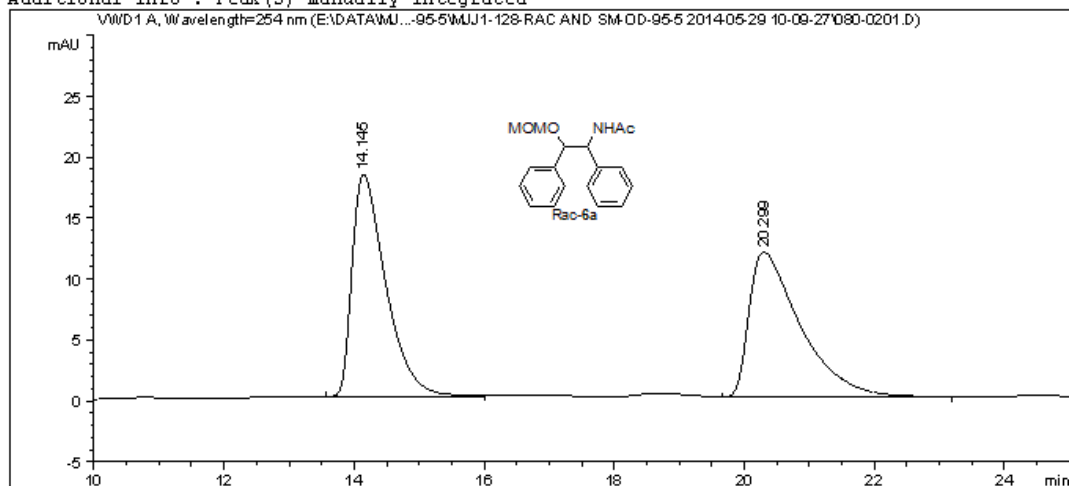
8-¹HNMR and ¹³CNMR



6a

Data File E:\DATA\MJ...-OD-95-5\MJJ1-128-RAC AND SM-OD-95-5 2014-05-29 10-09-27\080-0201.D
Sample Name: MJJ-1-116-Pd/C

```
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Acq. Operator   : SYSTEM                      Seq. Line :    2
Acq. Instrument : 1260HPLC-VWD                Location  : Vial 80
Injection Date  : 5/29/2014 10:47:05 AM       Inj       :    1
                                           Inj Volume: 5.000 µl
Acq. Method     : E:\DATA\MJJ\MJJ1-128-RACANDSM-OD-95-5\MJJ1-128-RAC AND SM-OD-95-5 2014-
05-29 10-09-27\OD-5-95-10ML-254-30MIN-ANXIXIANGSUAN.M
Last changed    : 5/29/2014 10:11:34 AM by SYSTEM
Analysis Method : E:\DATA\MJJ\MJJ1-128-RACANDSM-OD-95-5\MJJ1-128-RAC AND SM-OD-95-5 2014-
05-29 10-09-27\OD-5-95-10ML-254-30MIN-ANXIXIANGSUAN.M (Sequence Method)
Last changed    : 7/29/2014 8:16:09 PM by SYSTEM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
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Area Percent Report

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Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.145	BB	0.5419	654.17352	18.22038	50.0425
2	20.299	BB	0.8050	653.06256	11.90392	49.9575

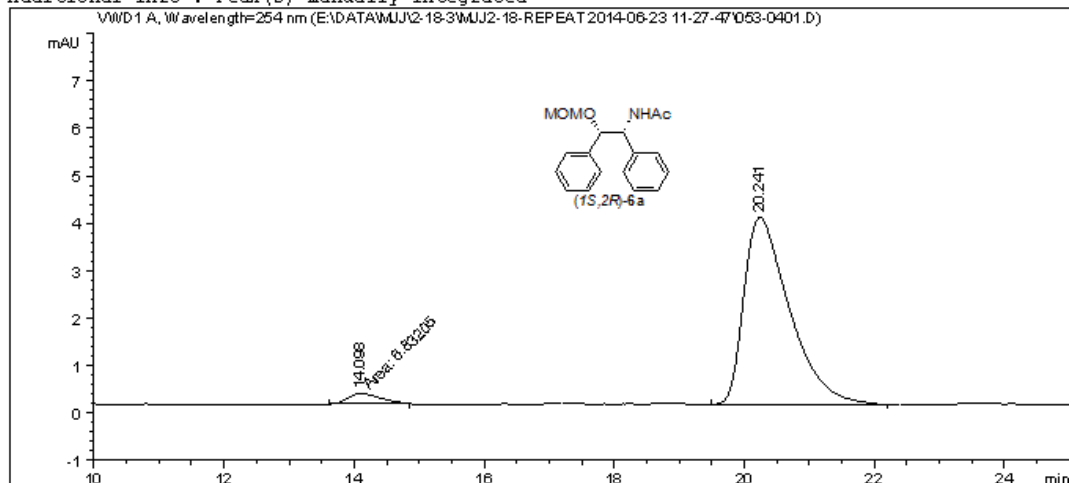
Totals : 1307.23608 30.12431

*** End of Report ***

Data File E:\DATA\MJJ\2-18-3\MJJ2-18-REPEAT 2014-06-23 11-27-47\053-0401.D
Sample Name: mjj2-18-3

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    4
Acq. Instrument : 1260HPLC-VWD                Location  : Vial 53
Injection Date  : 6/23/2014 1:11:54 PM        Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\2-18-3\MJJ2-18-REPEAT 2014-06-23 11-27-47\0D-5-95-10ML-254-
30MIN-ANXIXIANGSUAN.M
Last changed    : 6/23/2014 12:31:51 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\2-18-3\MJJ2-18-REPEAT 2014-06-23 11-27-47\0D-5-95-10ML-254-
30MIN-ANXIXIANGSUAN.M (Sequence Method)
Last changed    : 7/29/2014 8:13:43 PM by SYSTEM
                (modified after loading)
Additional Info : Peak(s) manually integrated
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Area Percent Report

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Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
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Signal 1: VWD1 A, Wavelength=254 nm

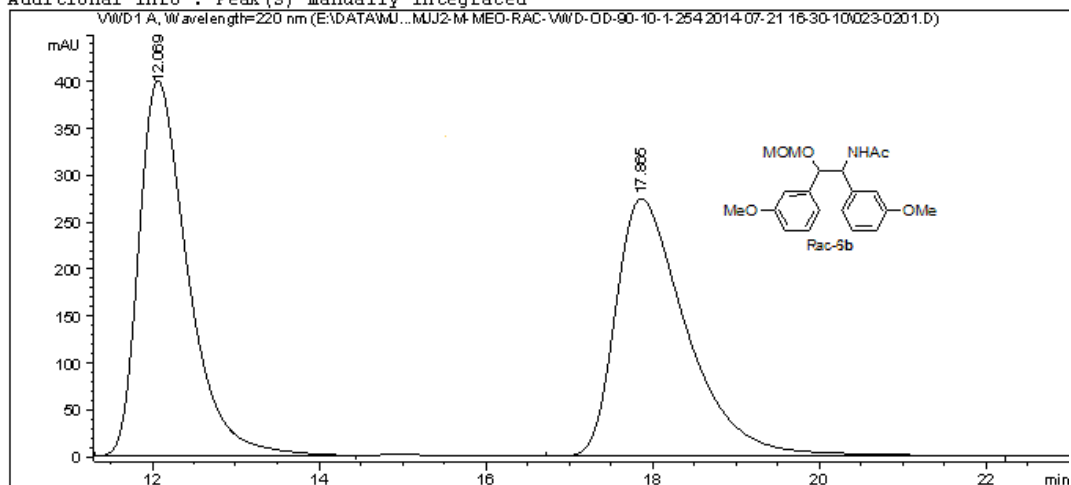
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.098	MM	0.5482	6.83205	2.07697e-1	3.4492
2	20.241	BB	0.6938	191.24403	3.93622	96.5508

Totals : 198.07608 4.14392

*** End of Report ***

Data File E:\DATA\MJ...54\MJJ2-M-MEO-RAC-VWD-OD-90-10-1-254 2014-07-21 16-30-10\023-0201.D
Sample Name: m-MeO-RAC

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    2
Acq. Instrument : 1260HPLC-VWD                Location  : Vial 23
Injection Date  : 7/21/2014 4:44:44 PM        Inj       :    1
                                           Inj Volume: 5.000 µl
Acq. Method     : E:\DATA\MJJ\MJJ2-M-MEO-RAC-VWD-OD-90-10-1-254\MJJ2-M-MEO-RAC-VWD-OD-90-
10-1-254 2014-07-21 16-30-10\VWD-OD-10-90-10ML-254-40MIN.M
Last changed    : 7/21/2014 5:06:46 PM by SYSTEM
                  (modified after loading)
Analysis Method : E:\DATA\MJJ\MJJ2-M-MEO-RAC-VWD-OD-90-10-1-254\MJJ2-M-MEO-RAC-VWD-OD-90-
10-1-254 2014-07-21 16-30-10\VWD-OD-10-90-10ML-254-40MIN.M (Sequence
Method)
Last changed    : 7/29/2014 8:29:03 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
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=====
Area Percent Report
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Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=220 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.069	BB	0.6142	1.61918e4	400.06192	49.8382
2	17.865	BB	0.8931	1.62970e4	274.72644	50.1618

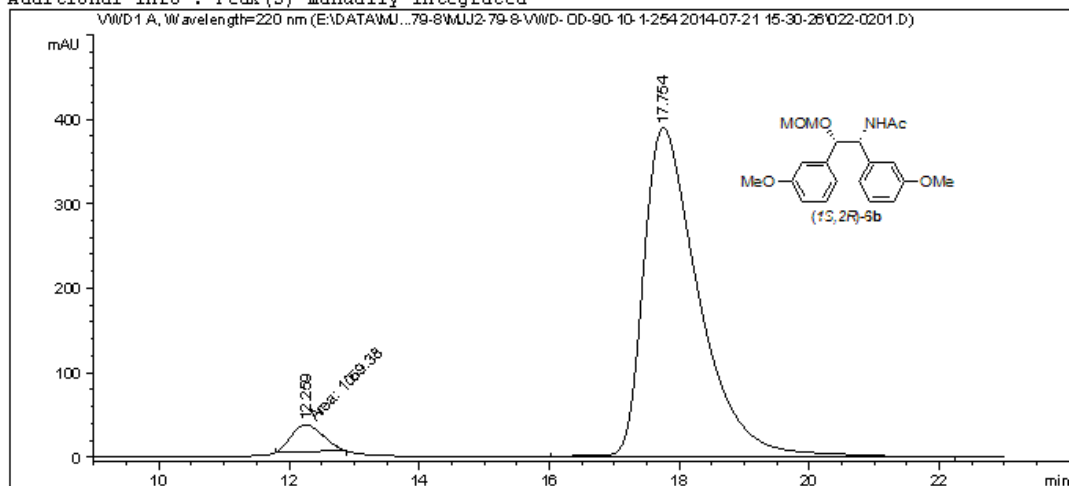
Totals : 3.24888e4 674.78836

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*** End of Report ***

Data File E:\DATA\MJ...J2-79-8\MJJ2-79-8-VWD-OD-90-10-1-254 2014-07-21 15-30-26\022-0201.D
Sample Name: MJJ2-79-8

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    2
Acq. Instrument : 1260HPLC-VWD                Location  : Vial 22
Injection Date  : 7/21/2014 4:04:05 PM        Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ2-79-8\MJJ2-79-8-VWD-OD-90-10-1-254 2014-07-21 15-30-26
                  \VWD-OD-10-90-10ML-254-40MIN.M
Last changed    : 7/21/2014 4:26:41 PM by SYSTEM
                  (modified after loading)
Analysis Method : E:\DATA\MJJ\MJJ2-79-8\MJJ2-79-8-VWD-OD-90-10-1-254 2014-07-21 15-30-26
                  \VWD-OD-10-90-10ML-254-40MIN.M (Sequence Method)
Last changed    : 7/29/2014 8:33:12 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
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Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=220 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.259	MM	0.5624	1059.37708	31.39373	4.4290
2	17.754	BB	0.8823	2.28598e4	388.60159	95.5710

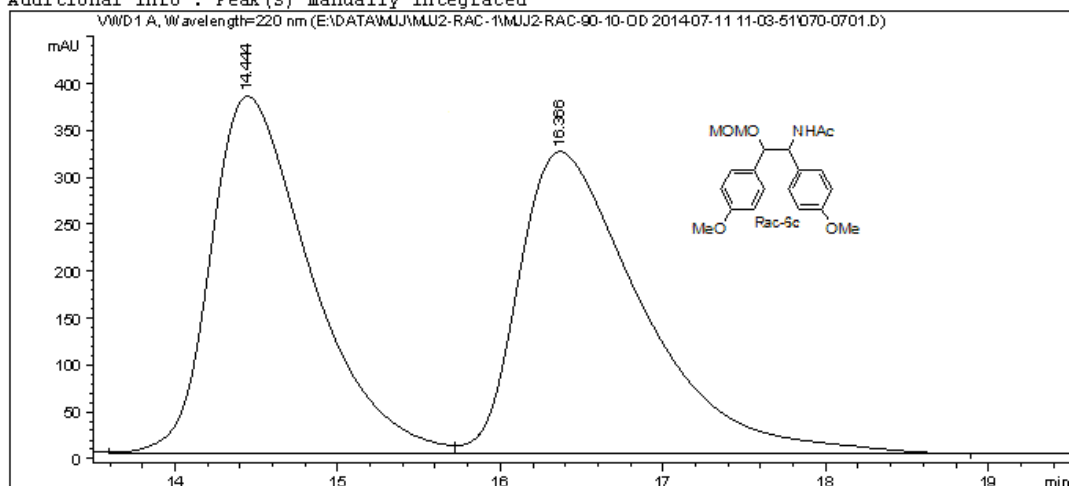
Totals : 2.39192e4 419.99532

*** End of Report ***

Data File E:\DATA\MJJ\MJJ2-RAC-1\MJJ2-RAC-90-10-0D 2014-07-11 11-03-51\070-0701.D
Sample Name: p-MeO-RAC

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    7
Acq. Instrument : 1260HPLC-VWD                Location  : Vial 70
Injection Date  : 7/11/2014 2:10:24 PM        Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ2-RAC-1\MJJ2-RAC-90-10-0D 2014-07-11 11-03-51\VWD-0D-10-
                  90-10ML-254-40MIN.M
Last changed    : 7/11/2014 11:04:28 AM by SYSTEM
Analysis Method : E:\DATA\MJJ\MJJ2-RAC-1\MJJ2-RAC-90-10-0D 2014-07-11 11-03-51\VWD-0D-10-
                  90-10ML-254-40MIN.M (Sequence Method)
Last changed    : 7/29/2014 8:52:02 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



=====
Area Percent Report
=====

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=220 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.444	BV	0.6438	1.61888e4	380.18555	48.8983
2	16.366	VB	0.7948	1.69184e4	321.55014	51.1017

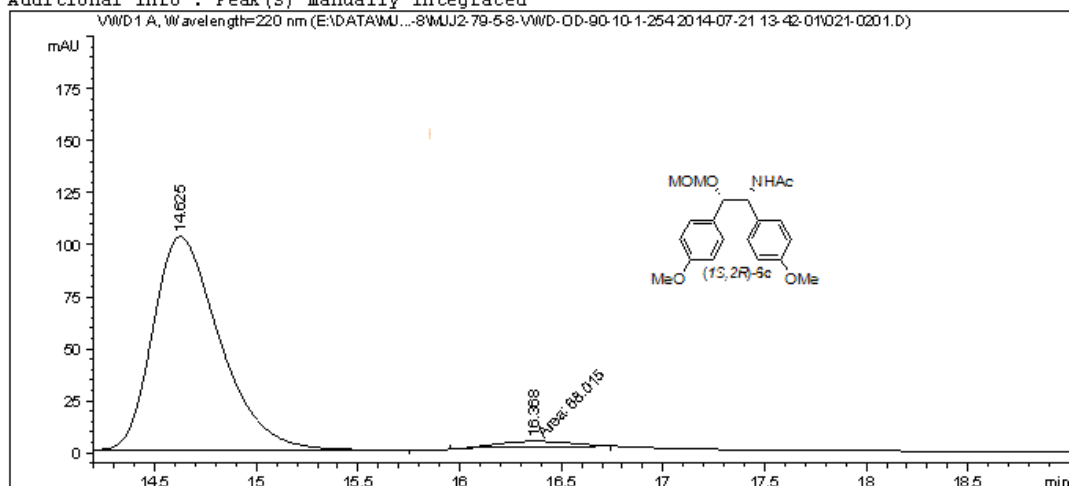
Totals : 3.31072e4 701.73569

=====
*** End of Report ***

Data File E:\DATA\MJ...9-5-8\MJJ2-79-5-8-VWD-OD-90-10-1-254 2014-07-21 13-42-01\021-0201.D
Sample Name: MJJ2-79-5

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    2
Acq. Instrument : 1260HPLC-VWD                Location  : Vial 21
Injection Date  : 7/21/2014 2:17:21 PM        Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ2-79-5-8\MJJ2-79-5-8-VWD-OD-90-10-1-254 2014-07-21 13-42-
                  01\VWD-OD-10-90-10ML-254-40MIN.M
Last changed    : 7/21/2014 1:42:51 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\MJJ2-79-5-8\MJJ2-79-5-8-VWD-OD-90-10-1-254 2014-07-21 13-42-
                  01\VWD-OD-10-90-10ML-254-40MIN.M (Sequence Method)
Last changed    : 7/29/2014 8:57:19 PM by SYSTEM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=220 nm

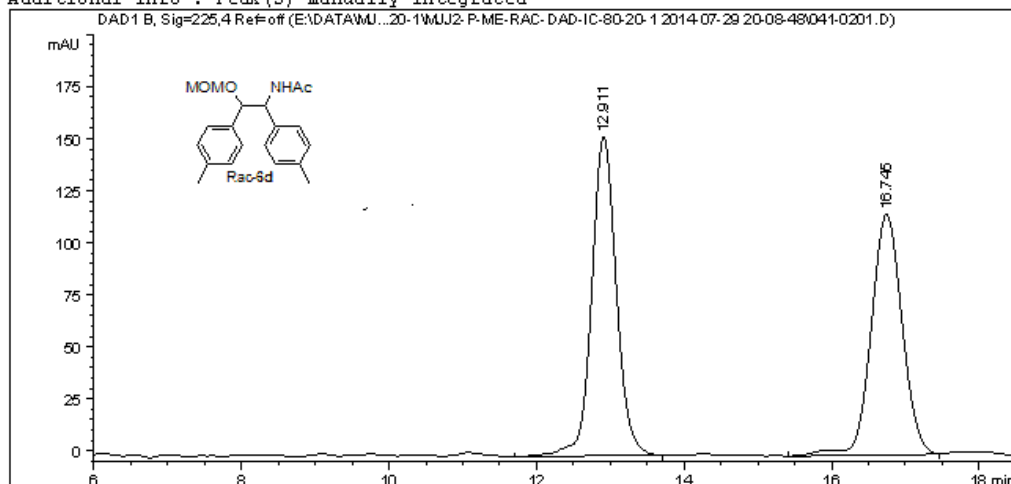
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.625	VB	0.3502	2349.18213	102.56336	97.1862
2	16.368	MM	0.4119	68.01497	2.75231	2.8138

Totals : 2417.19710 105.31567

*** End of Report ***

Data File E:\DATA\MJ...80-20-1\MJJ2-P-ME-RAC-DAD-IC-80-20-1 2014-07-29 20-08-48\041-0201.D
Sample Name: MJJ-p-Me-rac

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    2
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 41
Injection Date  : 7/29/2014 9:02:14 PM        Inj       :    1
                                           Inj Volume: 5.000 µl
Acq. Method     : E:\DATA\MJJ\MJJ2-P-ME-RAC-DAD-IC-80-20-1\MJJ2-P-ME-RAC-DAD-IC-80-20-1
                2014-07-29 20-08-48\DAD-IC(1-2)-80-20-1-50MIN.M
Last changed    : 7/29/2014 9:41:41 PM by SYSTEM
                (modified after loading)
Analysis Method : E:\DATA\MJJ\MJJ2-P-ME-RAC-DAD-IC-80-20-1\MJJ2-P-ME-RAC-DAD-IC-80-20-1
                2014-07-29 20-08-48\DAD-IC(1-2)-80-20-1-50MIN.M (Sequence Method)
Last changed    : 7/30/2014 9:39:41 AM by SYSTEM
                (modified after loading)
Additional Info : Peak(s) manually integrated
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=225,4 Ref=off

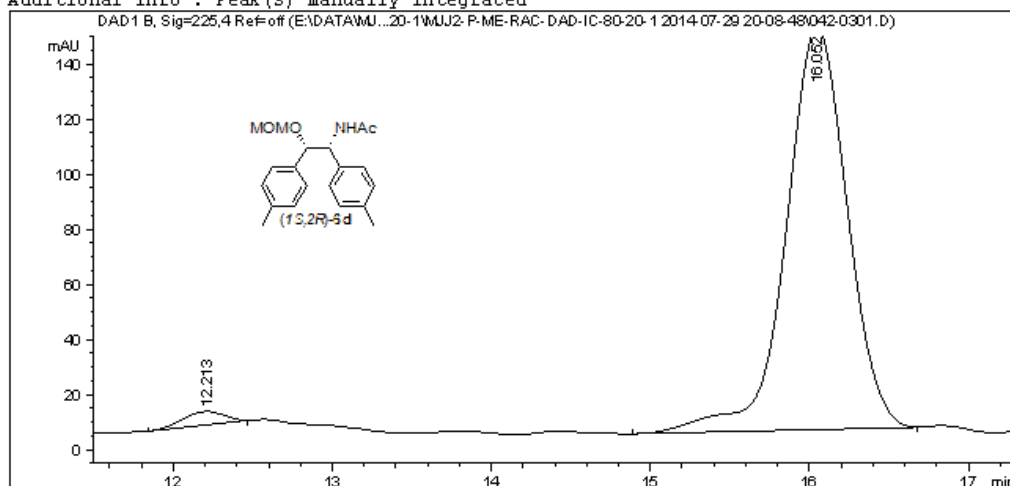
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.911	BB	0.3545	3549.43506	153.11302	51.2515
2	16.745	BB	0.4527	3376.08691	115.59296	48.7485

Totals : 6925.52197 268.70599

*** End of Report ***

Data File E:\DATA\MJ...80-20-1\MJJ2-P-ME-RAC-DAD-IC-80-20-1 2014-07-29 20-08-48\042-0301.D
Sample Name: MJJ-p-Me-2-76-6guanghuo

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    3
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 42
Injection Date  : 7/29/2014 9:43:13 PM        Inj       :    1
                                           Inj Volume: 5.000 µl
Acq. Method     : E:\DATA\MJJ\MJJ2-P-ME-RAC-DAD-IC-80-20-1\MJJ2-P-ME-RAC-DAD-IC-80-20-1
                  2014-07-29 20-08-48\DAD-IC(1-2)-80-20-1-50MIN.M
Last changed    : 7/29/2014 9:41:41 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\MJJ2-P-ME-RAC-DAD-IC-80-20-1\MJJ2-P-ME-RAC-DAD-IC-80-20-1
                  2014-07-29 20-08-48\DAD-IC(1-2)-80-20-1-50MIN.M (Sequence Method)
Last changed    : 7/30/2014 9:44:20 AM by SYSTEM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=225,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.213	BB	0.2886	86.85423	4.76583	2.1791
2	16.052	BB	0.4115	3898.97949	146.04292	97.8209

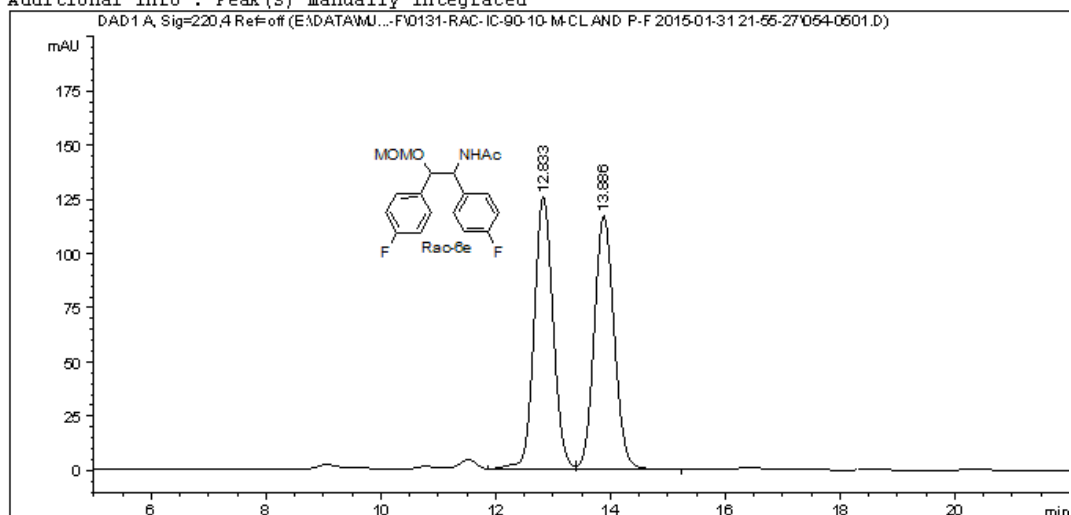
Totals : 3985.83372 150.80875

*** End of Report ***

Data File E:\DATA\MJJ\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31 21-55-27\054-0501.D
Sample Name: -p-F-RAC

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    5
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 54
Injection Date  : 2/1/2015 12:37:49 AM        Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\0131-IC-90-10-P-F\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31
                  21-55-27\0131DAD-IC(1-6) 90-10-1M-50MIN.M
Last changed    : 1/31/2015 10:05:12 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\0131-IC-90-10-P-F\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31
                  21-55-27\0131DAD-IC(1-6) 90-10-1M-50MIN.M (Sequence Method)
Last changed    : 2/1/2015 4:03:26 PM by SYSTEM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.833	BV	0.3564	2881.05542	125.21026	50.6009
2	13.886	VB	0.3751	2812.62720	116.72780	49.3991

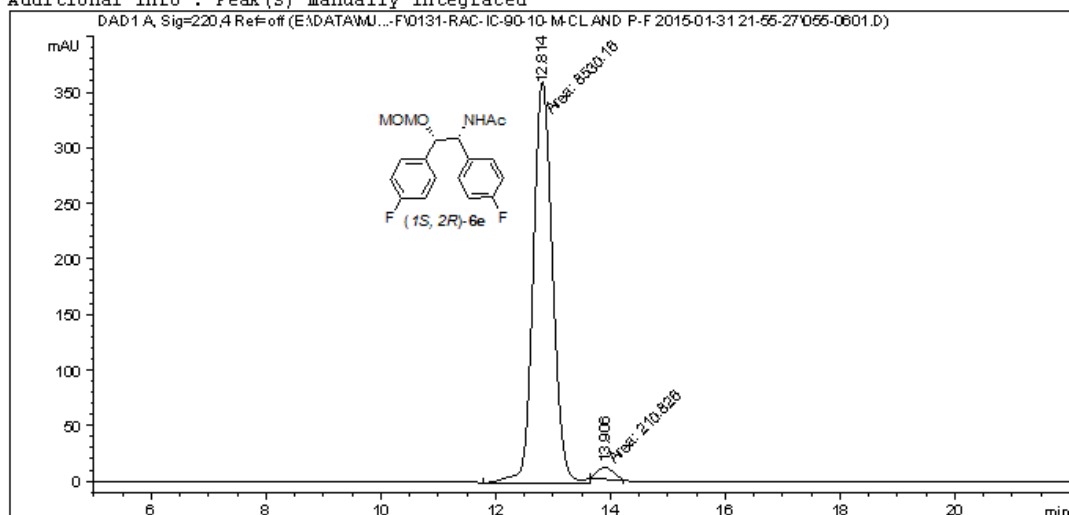
Totals : 5693.68262 241.93806

*** End of Report ***

Data File E:\DATA\MJJ\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31 21-55-27\055-0601.D
Sample Name: p-F-guanghuo

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    6
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 55
Injection Date  : 2/1/2015 1:28:47 AM          Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\0131-IC-90-10-P-F\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31
                  21-55-27\0131DAD-IC(1-6) 90-10-1M-50MIN.M
Last changed    : 1/31/2015 10:05:12 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\0131-IC-90-10-P-F\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31
                  21-55-27\0131DAD-IC(1-6) 90-10-1M-50MIN.M (Sequence Method)
Last changed    : 2/1/2015 4:06:03 PM by SYSTEM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

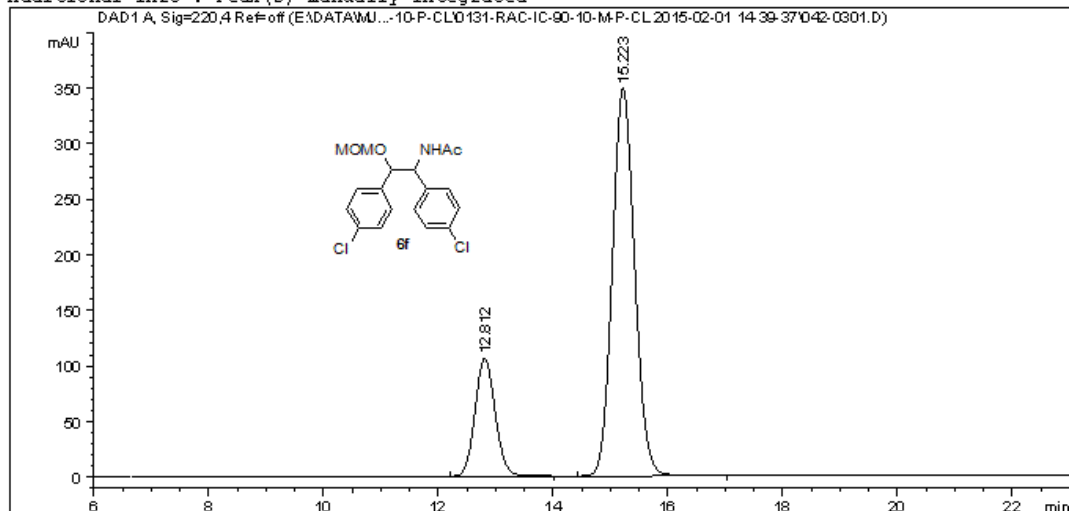
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.814	MM	0.3934	8530.15918	361.39908	97.5881
2	13.906	MM	0.3320	210.82556	10.58286	2.4119

Totals : 8740.98474 371.98194

*** End of Report ***

Data File E:\DATA\MJJ\0131-RAC-IC-90-10-M-P-CL 2015-02-01 14-39-37\042-0301.D
Sample Name: p-Cl-taniphos

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    3
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 42
Injection Date  : 2/1/2015 3:09:36 PM          Inj       :    1
                                           Inj Volume: 5.000 µl
Acq. Method     : E:\DATA\MJJ\0131-IC-90-10-P-CL\0131-RAC-IC-90-10-M-P-CL 2015-02-01 14-39-37\0131DAD-IC(1-6) 90-10-1M-50MIN.M
Last changed    : 2/1/2015 3:33:04 PM by SYSTEM (modified after loading)
Analysis Method : E:\DATA\MJJ\0131-IC-90-10-P-CL\0131-RAC-IC-90-10-M-P-CL 2015-02-01 14-39-37\0131DAD-IC(1-6) 90-10-1M-50MIN.M (Sequence Method)
Last changed    : 2/1/2015 4:10:28 PM by SYSTEM (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.812	BB	0.3779	2576.48706	105.89034	21.5155
2	15.223	BB	0.4185	9398.52734	348.61456	78.4845

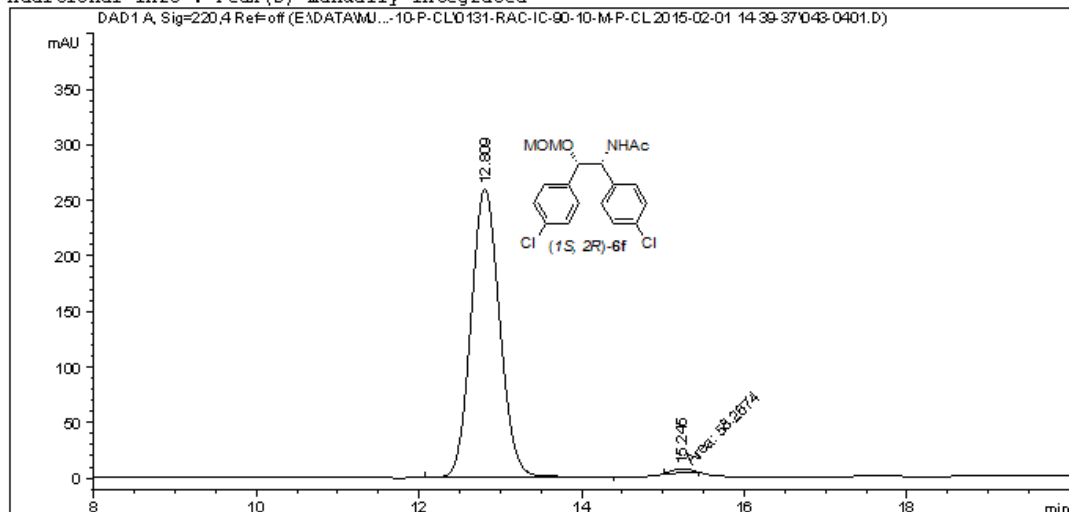
Totals : 1.19750e4 454.50490

*** End of Report ***

Data File E:\DATA\MJ\...-90-10-P-CL\0131-RAC-IC-90-10-M-P-CL 2015-02-01 14-39-37\043-0401.D
Sample Name: p-Cl-guanghuo

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    4
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 43
Injection Date  : 2/1/2015 3:38:15 PM         Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\0131-IC-90-10-P-CL\0131-RAC-IC-90-10-M-P-CL 2015-02-01 14-39
                  -37\0131DAD-IC(1-6) 90-10-1M-50MIN.M
Last changed    : 2/1/2015 3:33:04 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\0131-IC-90-10-P-CL\0131-RAC-IC-90-10-M-P-CL 2015-02-01 14-39
                  -37\0131DAD-IC(1-6) 90-10-1M-50MIN.M (Sequence Method)
Last changed    : 2/1/2015 4:14:33 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.809	BB	0.3807	6333.91357	259.53040	99.0885
2	15.245	MM	0.2630	58.26743	3.69264	0.9115

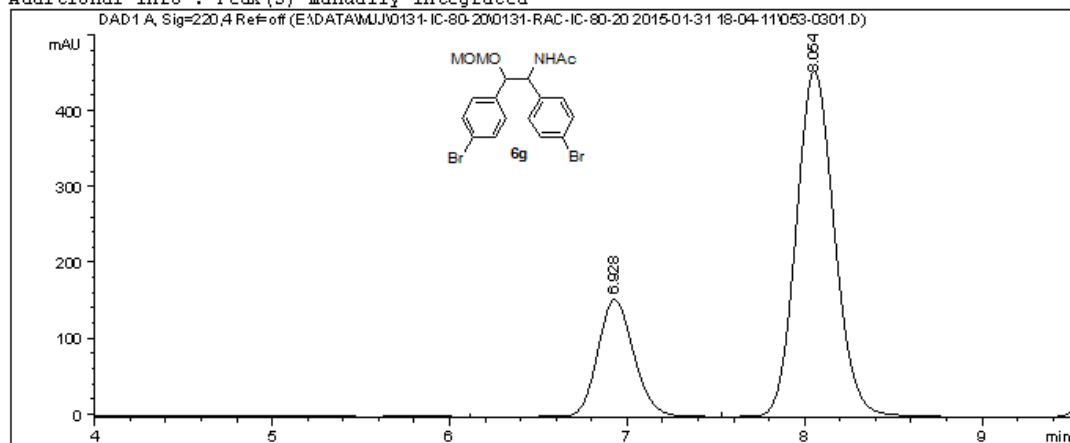
Totals : 6392.18101 263.22304

*** End of Report ***

Data File E:\DATA\MJJ\0131-IC-80-20\0131-RAC-IC-80-20 2015-01-31 18-04-11\053-0301.D
Sample Name: p-Br-taniphos

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    3
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 53
Injection Date  : 1/31/2015 6:45:37 PM        Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\0131-IC-80-20\0131-RAC-IC-80-20 2015-01-31 18-04-11\0131DAD-
                  IC(1-6) 80-20-1M-50MIN.M
Last changed    : 1/31/2015 7:08:03 PM by SYSTEM
                  (modified after loading)
Analysis Method : E:\DATA\MJJ\0131-IC-80-20\0131-RAC-IC-80-20 2015-01-31 18-04-11\0131DAD-
                  IC(1-6) 80-20-1M-50MIN.M (Sequence Method)
Last changed    : 2/1/2015 3:42:11 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.928	BB	0.2237	2226.95239	154.94534	24.5852
2	8.054	BB	0.2329	6831.15430	455.58731	75.4148

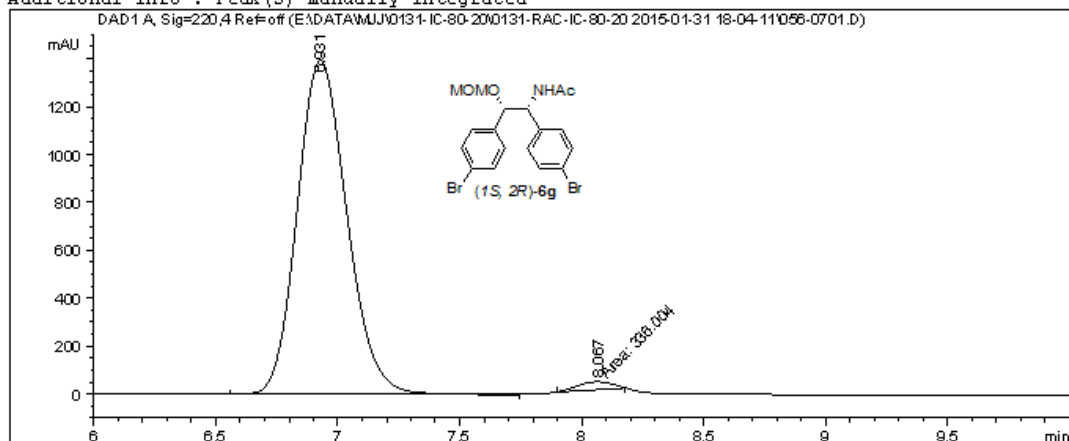
Totals : 9058.10669 610.53265

*** End of Report ***

Data File E:\DATA\MJJ\0131-IC-80-20\0131-RAC-IC-80-20 2015-01-31 18-04-11\056-0701.D
Sample Name: p-Br-GUANGHUO

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    7
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 56
Injection Date  : 1/31/2015 8:11:13 PM        Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\0131-IC-80-20\0131-RAC-IC-80-20 2015-01-31 18-04-11\0131DAD-
                  IC(1-6) 80-20-1M-50MIN.M
Last changed    : 1/31/2015 8:24:42 PM by SYSTEM
                  (modified after loading)
Analysis Method : E:\DATA\MJJ\0131-IC-80-20\0131-RAC-IC-80-20 2015-01-31 18-04-11\0131DAD-
                  IC(1-6) 80-20-1M-50MIN.M (Sequence Method)
Last changed    : 2/1/2015 3:47:55 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.931	BV	0.2209	1.97092e4	1394.16833	98.3238
2	8.067	MM	0.1676	336.00443	33.42018	1.6762

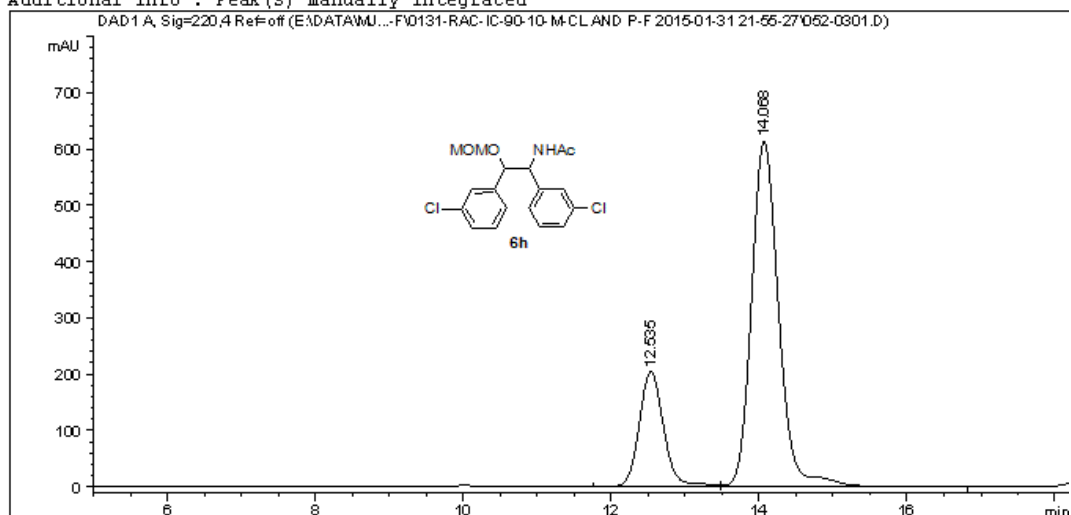
Totals : 2.00452e4 1427.58851

*** End of Report ***

Data File E:\DATA\MJ...0-P-F\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31 21-55-27\052-0301.D
Sample Name: m-Cl-taniphos

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    3
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 52
Injection Date  : 1/31/2015 10:55:53 PM       Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\0131-IC-90-10-P-F\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31
                  21-55-27\0131DAD-IC(1-6) 90-10-1M-50MIN.M
Last changed    : 1/31/2015 10:05:12 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\0131-IC-90-10-P-F\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31
                  21-55-27\0131DAD-IC(1-6) 90-10-1M-50MIN.M (Sequence Method)
Last changed    : 2/1/2015 3:54:18 PM by SYSTEM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.535	BV	0.3564	4743.02979	204.66808	23.2599
2	14.068	VB	0.3933	1.56484e4	614.00427	76.7401

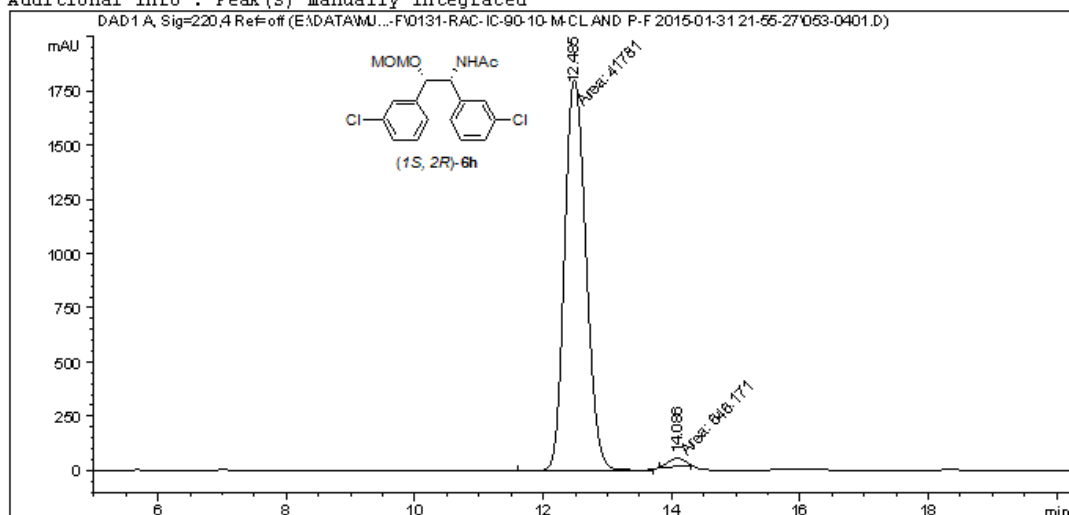
Totals : 2.03914e4 818.67235

*** End of Report ***

Data File E:\DATA\MJJ\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31 21-55-27\053-0401.D
Sample Name: m-Cl-guanghuo

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    4
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 53
Injection Date  : 1/31/2015 11:46:52 PM       Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\0131-IC-90-10-P-F\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31
                  21-55-27\0131DAD-IC(1-6) 90-10-1M-50MIN.M
Last changed    : 1/31/2015 10:05:12 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\0131-IC-90-10-P-F\0131-RAC-IC-90-10-M-CL AND P-F 2015-01-31
                  21-55-27\0131DAD-IC(1-6) 90-10-1M-50MIN.M (Sequence Method)
Last changed    : 2/1/2015 3:59:58 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.485	MM	0.3866	4.17810e4	1801.20874	98.4770
2	14.086	MM	0.2895	646.17072	37.19807	1.5230

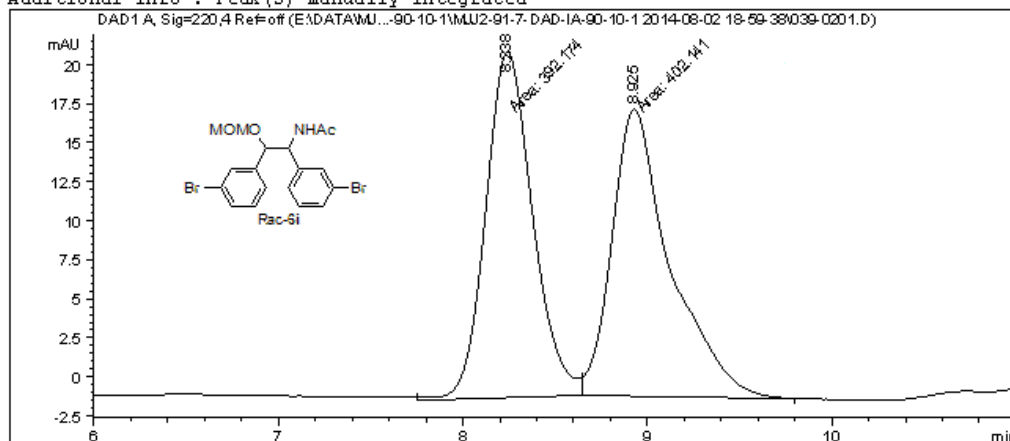
Totals : 4.24272e4 1838.40681

*** End of Report ***

Data File E:\DATA\MJ...-IA-90-10-1\MJJ2-91-7-DAD-IA-90-10-1 2014-08-02 18-59-38\039-0201.D
Sample Name: 2-91-7

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    2
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 39
Injection Date  : 8/2/2014 7:29:54 PM          Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ-2-91-7-DAD-IA-90-10-1\MJJ2-91-7-DAD-IA-90-10-1 2014-08-
                  02 18-59-38\DAD-IA(1-2)90-10-1-40MIN.M
Last changed    : 8/2/2014 7:30:47 PM by SYSTEM
                  (modified after loading)
Analysis Method : E:\DATA\MJJ\MJJ-2-91-7-DAD-IA-90-10-1\MJJ2-91-7-DAD-IA-90-10-1 2014-08-
                  02 18-59-38\DAD-IA(1-2)90-10-1-40MIN.M (Sequence Method)
Last changed    : 8/2/2014 9:29:01 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.238	MM	0.2951	392.17450	22.14897	49.3727
2	8.925	MM	0.3641	402.14066	18.40795	50.6273

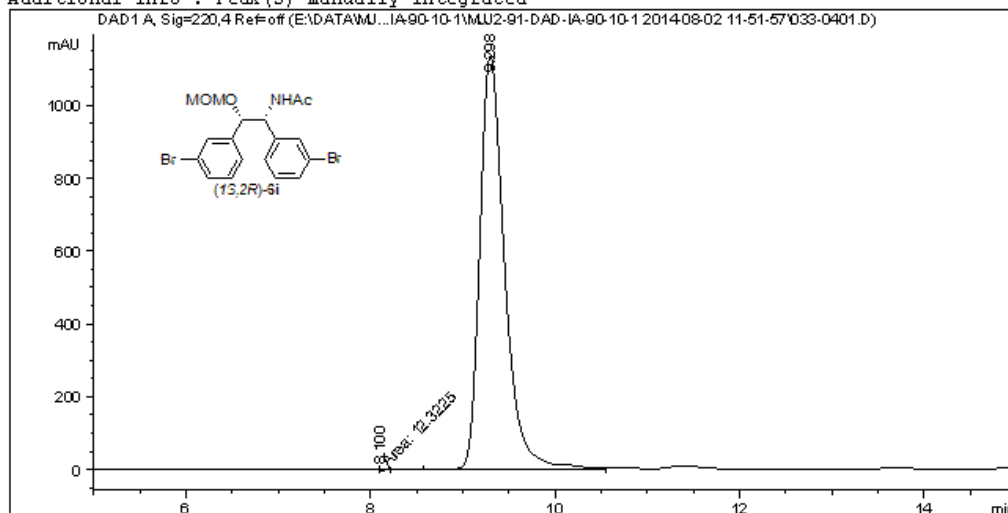
Totals : 794.31516 40.55692

*** End of Report ***

Data File E:\DATA\MJ...AD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11-51-57\033-0401.D
Sample Name: MJJ2-91-6

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    4
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 33
Injection Date  : 8/2/2014 1:28:47 PM          Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ-2-91-DAD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11
                  -51-57\DAD-IA(1-2)90-10-1-40MIN.M
Last changed    : 8/2/2014 2:02:42 PM by SYSTEM
                  (modified after loading)
Analysis Method : E:\DATA\MJJ\MJJ-2-91-DAD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11
                  -51-57\DAD-IA(1-2)90-10-1-40MIN.M (Sequence Method)
Last changed    : 8/2/2014 5:08:13 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.100	MM	0.0250	12.32251	6.65275	0.0585
2	9.298	BB	0.2822	2.10537e4	1136.19031	99.9415

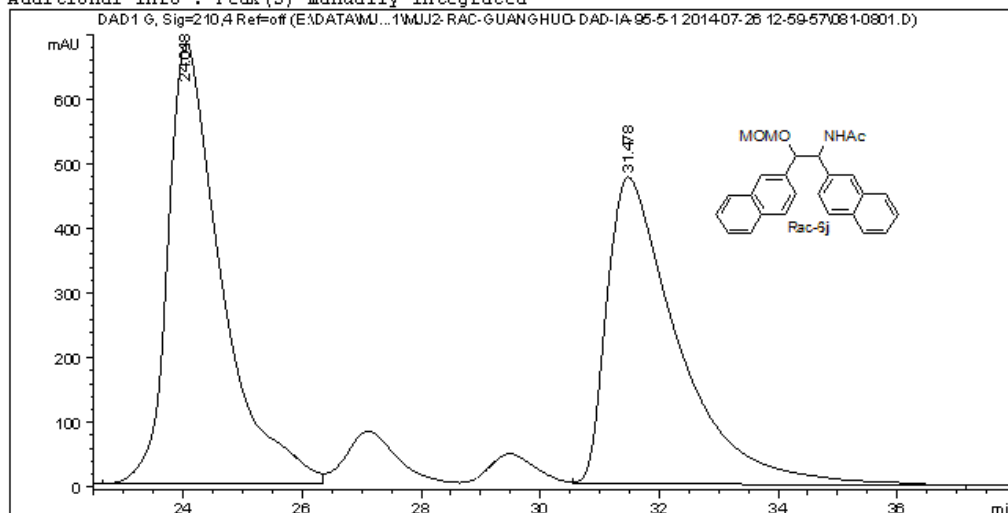
Totals : 2.10660e4 1142.84305

*** End of Report ***

Data File E:\DATA\MJ...-5-1\MJJ2-RAC-GUANGHUO-DAD-IA-95-5-1 2014-07-26 12-59-57\081-0801.D
Sample Name: 2-naphthyl-rac

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    8
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 81
Injection Date  : 7/26/2014 5:13:05 PM        Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ2-RAC-GUANGHUO-IA-95-5-1\MJJ2-RAC-GUANGHUO-DAD-IA-95-5-1
                  2014-07-26 12-59-57\DAD-IA(1-2) 95-5-1-40MIN.M
Last changed    : 7/26/2014 6:02:21 PM by SYSTEM
                  (modified after loading)
Analysis Method : E:\DATA\MJJ\MJJ2-RAC-GUANGHUO-IA-95-5-1\MJJ2-RAC-GUANGHUO-DAD-IA-95-5-1
                  2014-07-26 12-59-57\DAD-IA(1-2) 95-5-1-40MIN.M (Sequence Method)
Last changed    : 7/26/2014 6:39:49 PM by SYSTEM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



=====
Area Percent Report
=====

Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 G, Sig=210,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	24.048	BV	0.9134	4.23942e4	681.81897	51.7426
2	31.478	VB	1.2063	3.95386e4	474.41559	48.2574

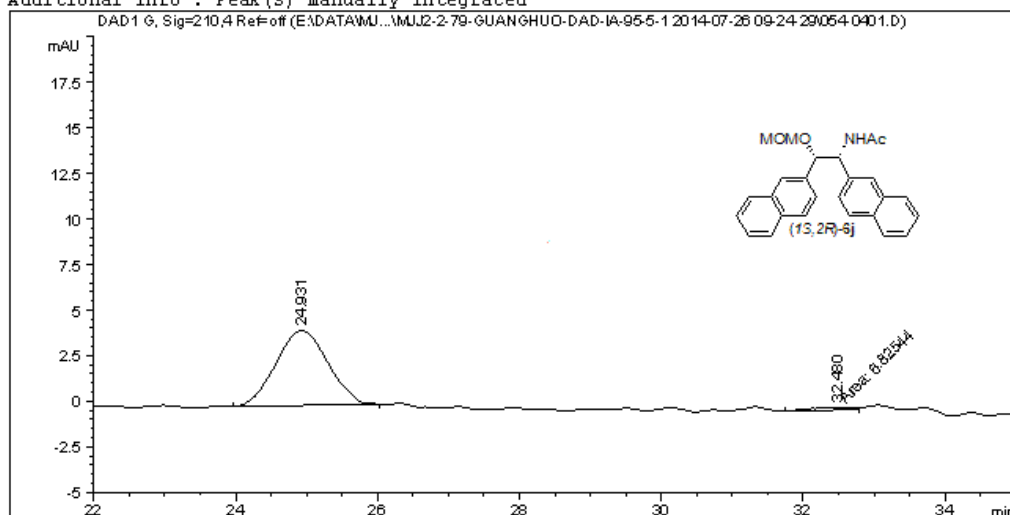
Totals : 8.19329e4 1156.23456

=====
*** End of Report ***

Data File E:\DATA\MJ...5-1\MJJ2-2-79-GUANGHUO-DAD-IA-95-5-1 2014-07-26 09-24-29\054-0401.D
Sample Name: 2-naphthyl-2-79-2

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    4
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 54
Injection Date  : 7/26/2014 11:36:37 AM       Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ2-RAC-IA-95-5-1\MJJ2-2-79-GUANGHUO-DAD-IA-95-5-1 2014-07-
                26 09-24-29\DAD-IA(1-2)95-5-1-40MIN.M
Last changed    : 7/26/2014 11:35:41 AM by SYSTEM
Analysis Method : E:\DATA\MJJ\MJJ2-RAC-IA-95-5-1\MJJ2-2-79-GUANGHUO-DAD-IA-95-5-1 2014-07-
                26 09-24-29\DAD-IA(1-2)95-5-1-40MIN.M (Sequence Method)
Last changed    : 7/26/2014 5:59:47 PM by SYSTEM
                (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 G, Sig=210,4 Ref=off

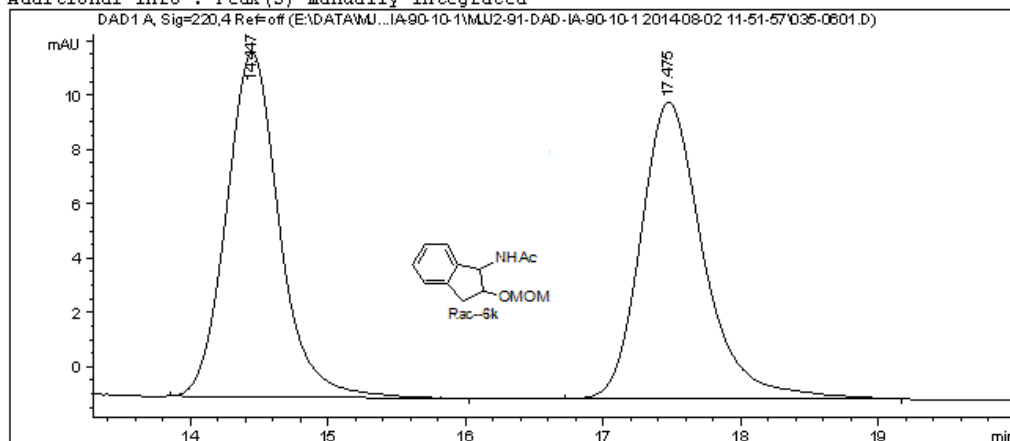
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	24.931	BB	0.6090	208.45700	4.11503	96.8295
2	32.480	MM	0.6838	6.82544	1.66368e-1	3.1705

Totals : 215.28244 4.28140

*** End of Report ***

Data File E:\DATA\MJ...AD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11-51-57\035-0601.D
Sample Name: MJJ2-91-8

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    6
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 35
Injection Date  : 8/2/2014 2:32:04 PM          Inj       :    1
                                           Inj Volume: 5.000 µl
Acq. Method     : E:\DATA\MJJ\MJJ-2-91-DAD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11
                  -51-57\DAD-IA(1-2)90-10-1-40MIN.M
Last changed    : 8/2/2014 3:03:15 PM by SYSTEM
                  (modified after loading)
Analysis Method : E:\DATA\MJJ\MJJ-2-91-DAD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11
                  -51-57\DAD-IA(1-2)90-10-1-40MIN.M (Sequence Method)
Last changed    : 8/5/2014 9:04:07 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.447	BB	0.4130	338.37167	12.69372	49.4007
2	17.475	BB	0.4781	346.58203	10.92610	50.5993

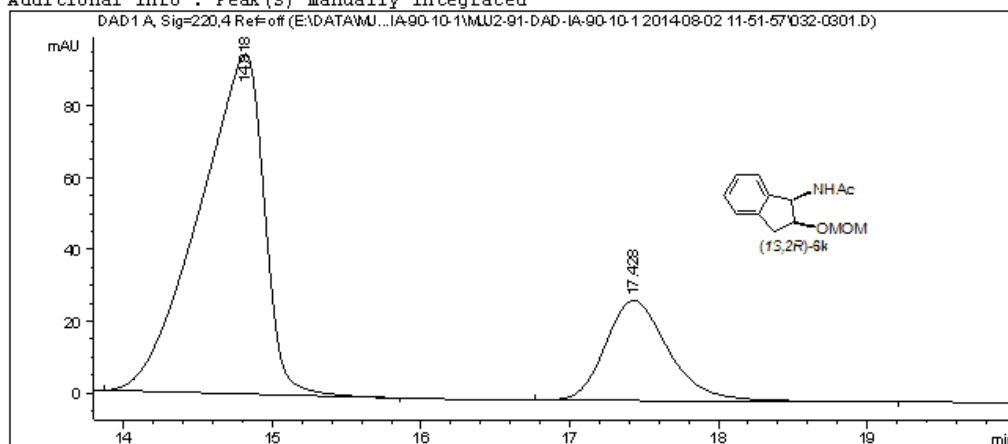
Totals : 684.95370 23.61982

*** End of Report ***

Data File E:\DATA\MJ...AD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11-51-57\032-0301.D
Sample Name: MJJ2-91-5

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    3
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 32
Injection Date  : 8/2/2014 12:57:51 PM        Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ-2-91-DAD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11
                  -51-57\DAD-IA(1-2)90-10-1-40MIN.M
Last changed    : 8/2/2014 12:10:03 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\MJJ-2-91-DAD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11
                  -51-57\DAD-IA(1-2)90-10-1-40MIN.M (Sequence Method)
Last changed    : 8/5/2014 9:08:11 PM by SYSTEM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.818	BB	0.4340	2874.39136	94.73719	77.7175
2	17.428	BB	0.4521	824.12299	27.94347	22.2825

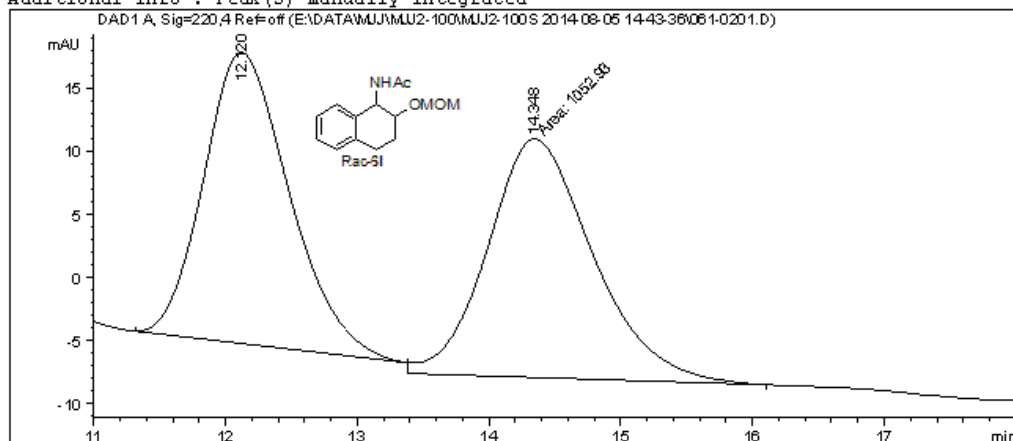
Totals : 3698.51434 122.68066

*** End of Report ***

Data File E:\DATA\MJJ\MJJ2-100\MJJ2-100S 2014-08-05 14:43:36\061-0201.D
Sample Name: MJJ2-100-1

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    2
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 61
Injection Date  : 8/5/2014 3:14:18 PM          Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ2-100\MJJ2-100S 2014-08-05 14:43:36\DAD-IA(1-2)90-10-1-40MIN.M
Last changed    : 8/5/2014 3:14:38 PM by SYSTEM
                  (modified after loading)
Analysis Method : E:\DATA\MJJ\MJJ2-100\MJJ2-100S 2014-08-05 14:43:36\DAD-IA(1-2)90-10-1-40MIN.M (Sequence Method)
Last changed    : 8/5/2014 9:01:01 PM by SYSTEM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.120	BB	0.6756	1041.88562	23.12486	49.7364
2	14.348	MM	0.9272	1052.92822	18.92574	50.2636

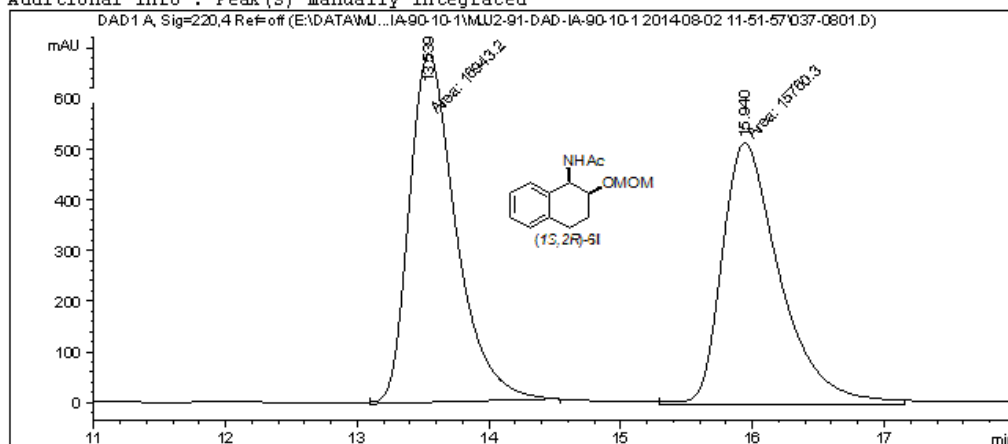
Totals : 2094.81384 42.05061

*** End of Report ***

Data File E:\DATA\MJ...AD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11-51-57\037-0801.D
Sample Name: 2-91-4

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    8
Acq. Instrument : 1260HPLC-DAD                Location  : Vial 37
Injection Date  : 8/2/2014 3:35:11 PM          Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : E:\DATA\MJJ\MJJ-2-91-DAD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11
                  -51-57\DAD-IA(1-2)90-10-1-40MIN.M
Last changed    : 8/2/2014 3:03:15 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\MJJ-2-91-DAD-IA-90-10-1\MJJ2-91-DAD-IA-90-10-1 2014-08-02 11
                  -51-57\DAD-IA(1-2)90-10-1-40MIN.M (Sequence Method)
Last changed    : 8/5/2014 9:14:51 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

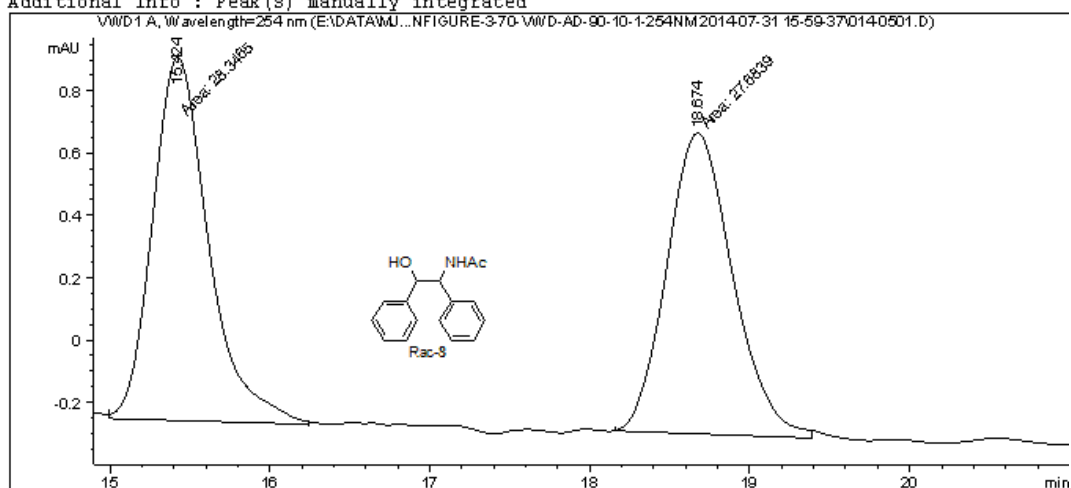
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.539	MM	0.4099	1.69432e4	688.87848	51.8085
2	15.940	MM	0.5084	1.57603e4	516.67731	48.1915

Totals : 3.27035e4 1205.55579

*** End of Report ***

Data File E:\DATA\MJ...-CONFIGURE-3-70-VWD-AD-90-10-1-254NM 2014-07-31 15-59-37\014-0501.D
Sample Name: 3-70

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    5
Acq. Instrument : 1260HPLC-VWD                Location  : Vial 14
Injection Date  : 7/31/2014 6:19:36 PM        Inj       :    1
                                           Inj Volume: 5.000 µl
Acq. Method     : E:\DATA\MJJ\MJJ-CONFIGURE-3-70-VWD-AD-90-10-1-254NM 2014-07-31 15-59-37\AD-10-90-10ML-254NM-30MIN-ANXIXIANGSUAN.M
Last changed    : 7/31/2014 4:16:46 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\MJJ-CONFIGURE-3-70-VWD-AD-90-10-1-254NM 2014-07-31 15-59-37\AD-10-90-10ML-254NM-30MIN-ANXIXIANGSUAN.M (Sequence Method)
Last changed    : 7/31/2014 7:26:20 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=254 nm

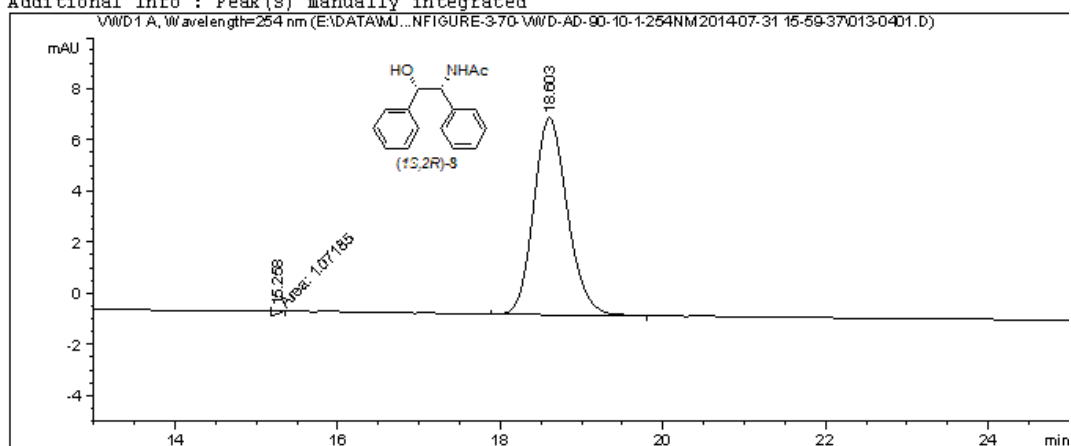
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.424	MM	0.4047	28.34655	1.16743	50.5913
2	18.674	MM	0.4770	27.68392	9.67327e-1	49.4087

Totals : 56.03047 2.13476

*** End of Report ***

Data File E:\DATA\MJ...-CONFIGURE-3-70-VWD-AD-90-10-1-254NM 2014-07-31 15-59-37\013-0401.D
Sample Name: 1S,2R PURE

```
=====
Acq. Operator   : SYSTEM                      Seq. Line :    4
Acq. Instrument : 1260HPLC-VWD                Location  : Vial 13
Injection Date  : 7/31/2014 5:38:52 PM        Inj       :    1
                                           Inj Volume: 5.000 µl
Acq. Method     : E:\DATA\MJJ\MJJ-CONFIGURE-3-70-VWD-AD-90-10-1-254NM 2014-07-31 15-59-37\AD-10-90-10ML-254NM-30MIN-
ANXIXIANGSUAN.M
Last changed    : 7/31/2014 4:16:46 PM by SYSTEM
Analysis Method : E:\DATA\MJJ\MJJ-CONFIGURE-3-70-VWD-AD-90-10-1-254NM 2014-07-31 15-59-37\AD-10-90-10ML-254NM-30MIN-
ANXIXIANGSUAN.M (Sequence Method)
Last changed    : 8/3/2014 10:00:34 PM by SYSTEM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Area Percent Report

```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.258	MM	0.1179	1.07185	1.14812e-1	0.4813
2	18.603	BB	0.4423	221.63786	7.71237	99.5187

Totals : 222.70971 7.82718

*** End of Report ***