

## Supporting Information for

### **Ir-Catalyzed Intermolecular Asymmetric Allylic Alkylation of $\beta$ -Tetralones**

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200032, China

<sup>†</sup> D.-S.Z. and Z.-L.Z. contributed equally to this work.

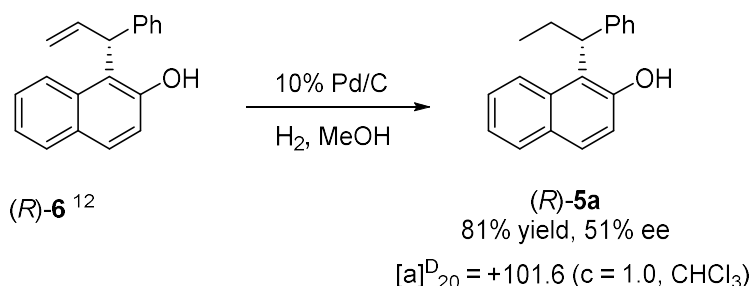
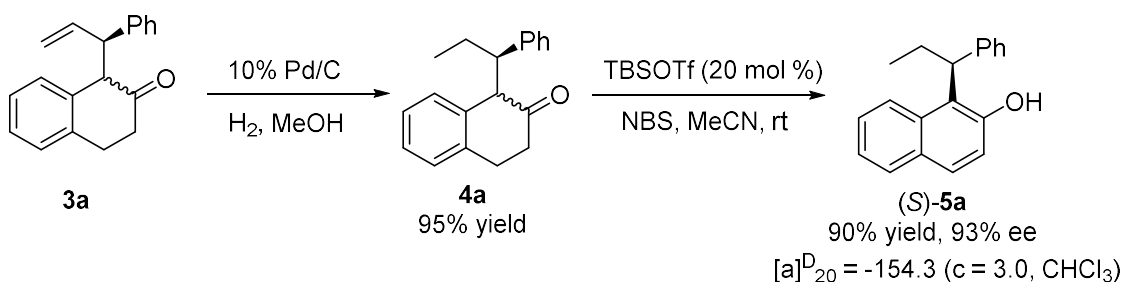
E-mail: qinggu@sioc.ac.cn, slyou@sioc.ac.cn

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**General Methods.** Unless stated otherwise, all reactions were carried out in flame-dried glassware under a dry argon atmosphere. All solvents were purified and dried according to standard methods prior to use.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra were recorded on a Varian instrument (300, 400 MHz and 75, 100 MHz, respectively) and internally referenced to tetramethylsilane signal or residual protio solvent signals. Data for  $^1\text{H}$  NMR are recorded as follows: chemical shift ( $\delta$ , ppm), multiplicity (s = singlet, d = doublet, t = triplet, m = multiplet or unresolved, br = broad singlet, coupling constant(s) in Hz, integration). Data for  $^{13}\text{C}$  NMR are reported in terms of chemical shift ( $\delta$ , ppm).

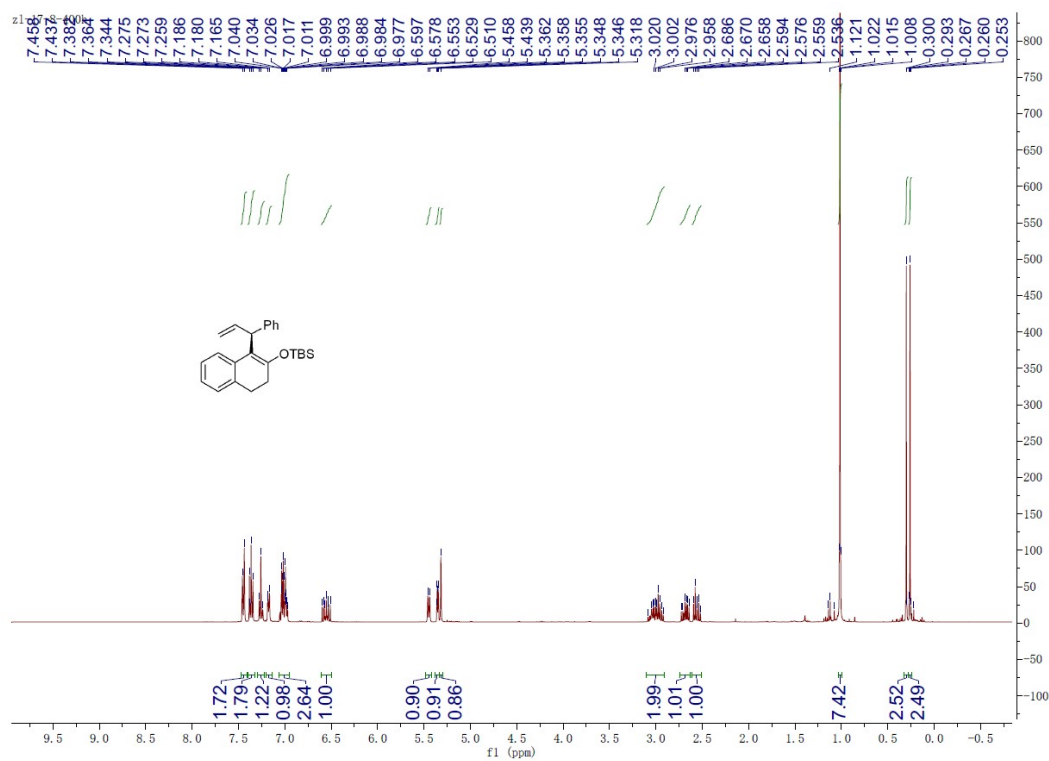
**The absolute configuration of 5a.**



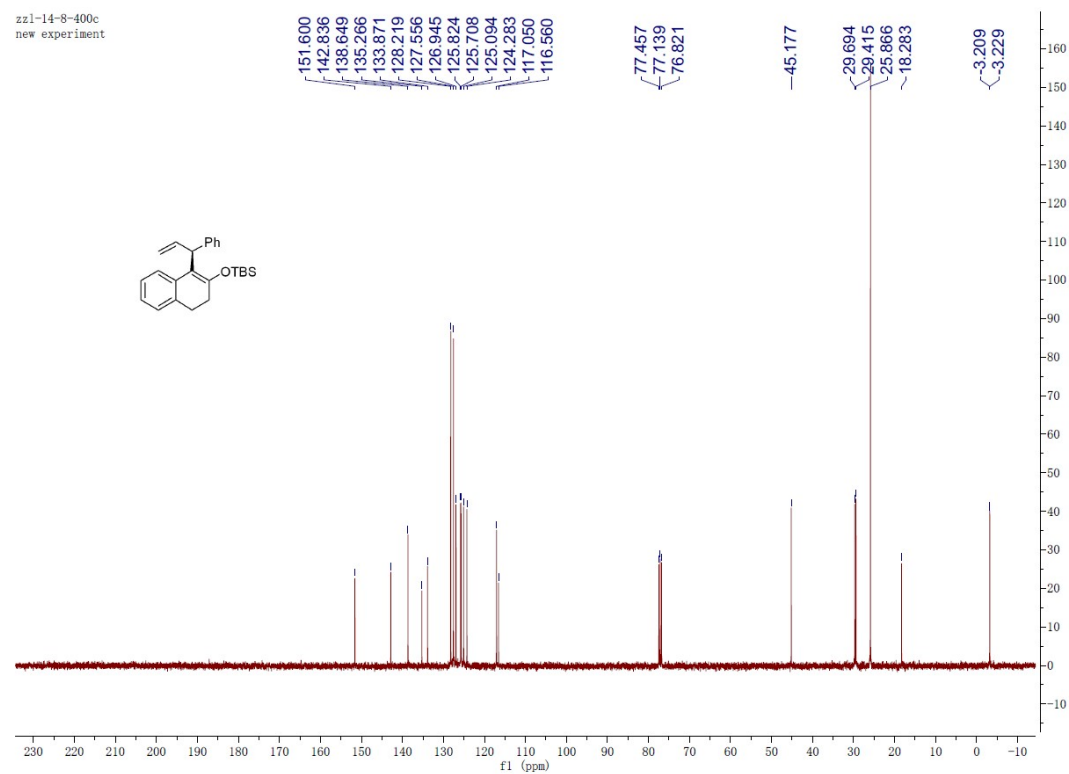
To the known compound (*R*)-**6** (109.0 mg, 0.42 mmol) in methanol (5 mL) was added 10% Pd/C (45.0 mg) and then the reaction flask was charged with 1 atm of hydrogen. The reaction mixture was stirred at room temperature until the starting material disappeared (monitored by TLC). The crude reaction mixture was filtrated with celite and washed with EtOAc, the solvents were removed under reduced pressure. Then the residue was purified by silica gel column chromatography (PE/EtOAc = 20/1 to 10/1) to afford the hydrogenated products (87.8 mg, 81% yield).  $[\alpha]_{\text{D}}^{20} = +101.6$  ( $c = 1.0$ ,  $\text{CHCl}_3$ ).

# Copies of NMR Spectra and HPLC Chromatographs

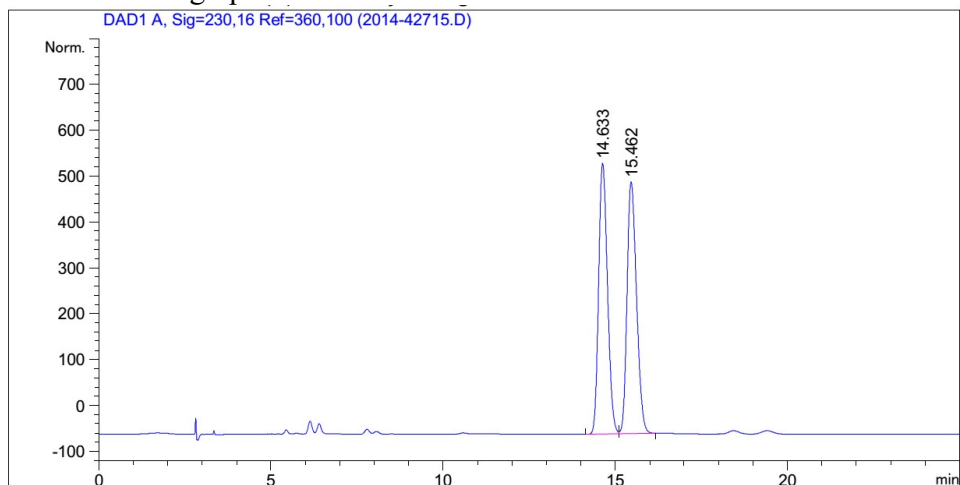
## <sup>1</sup>H NMR Spectra of **3aa**



## <sup>13</sup>C NMR Spectra of **3aa**



# HPLC Chromatograph of 3aa



## Area Percent Report

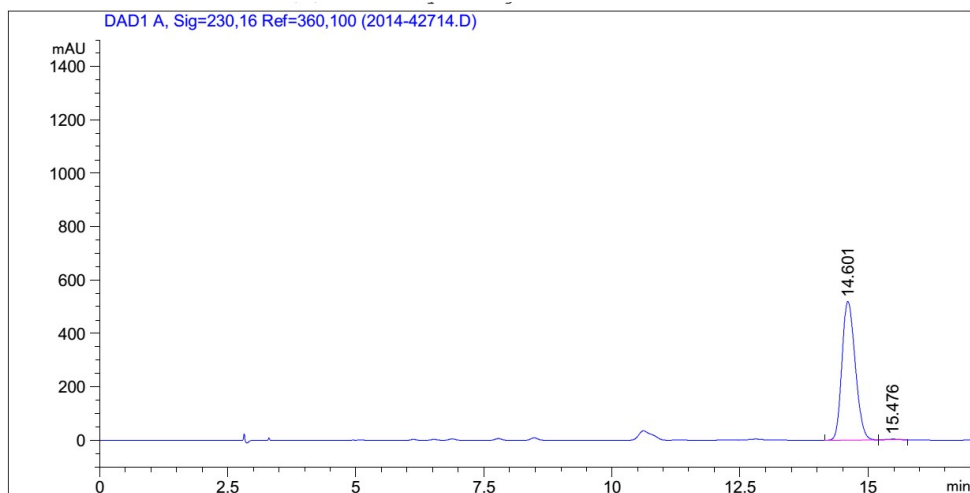
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Dilution : 1.0000  
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=230,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.633	BV	0.2763	8375.16602	469.18622	50.0585
2	15.462	VB	0.2975	8355.59863	436.12189	49.9415

Totals : 1.67308e4 905.30811





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Area Percent Report  
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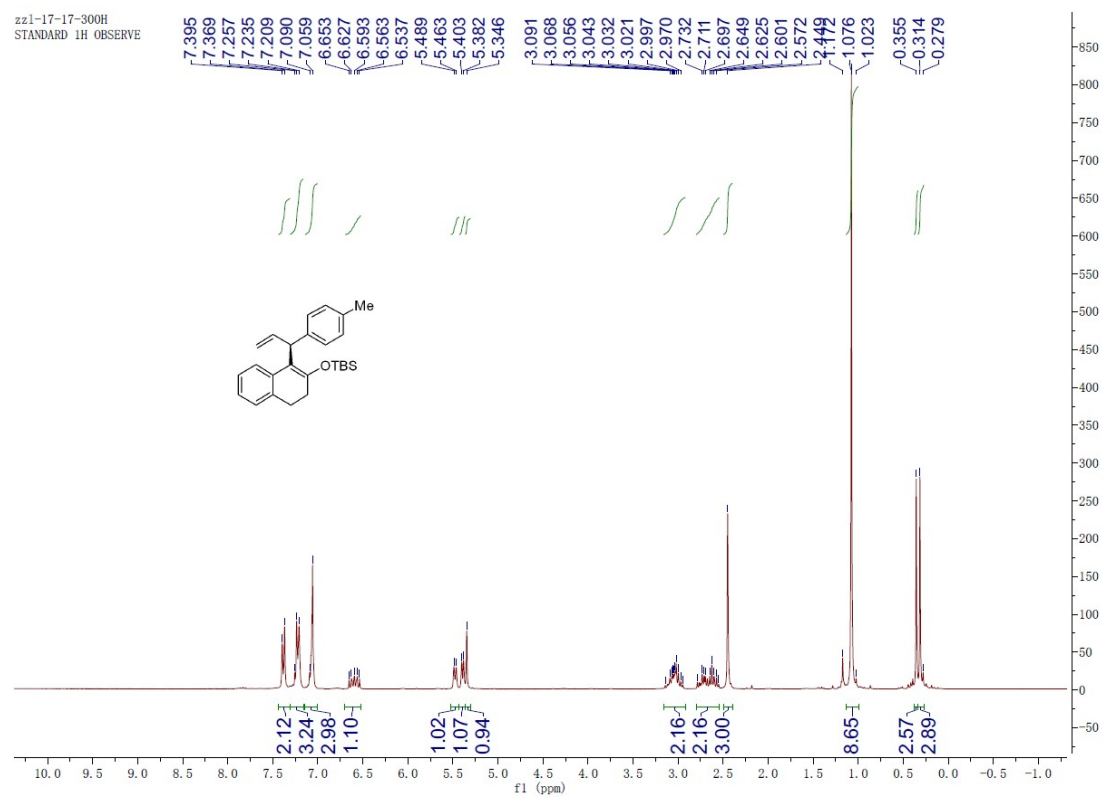
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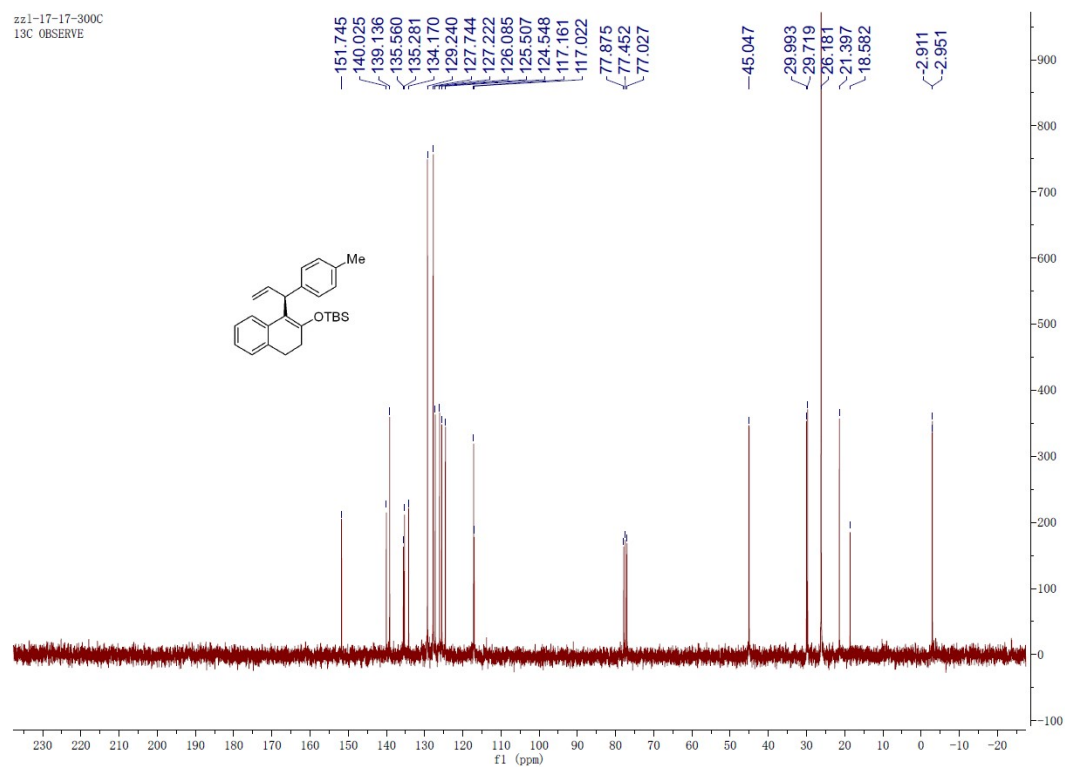
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.601	BV	0.2835	9377.35547	519.82245	99.3670
2	15.476	VV	0.2172	59.73365	3.33096	0.6330

Totals : 9437.08912 523.15340

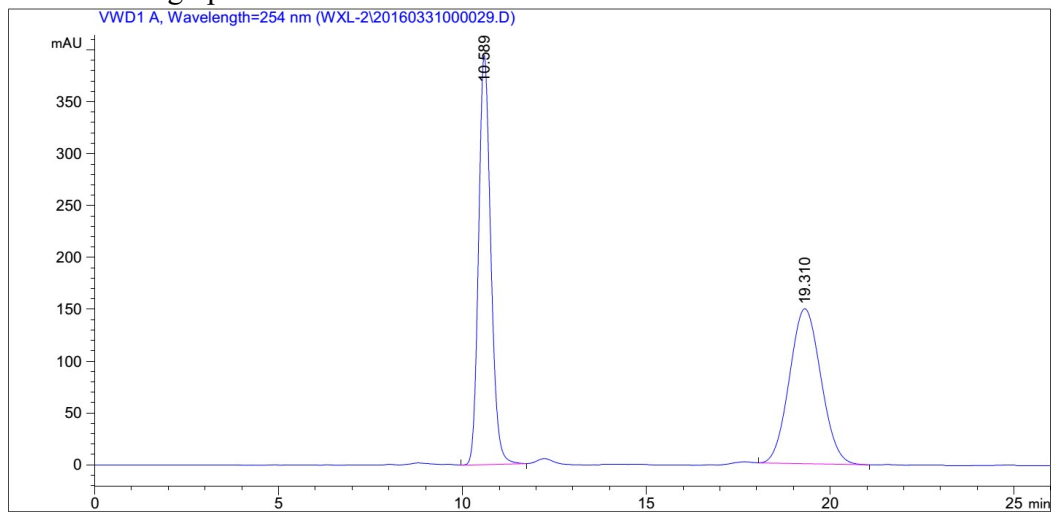
### <sup>1</sup>H NMR Spectra of **3ab**



### <sup>13</sup>C NMR Spectra of **3ab**



# HPLC Chromatograph of 3ab



## Area Percent Report

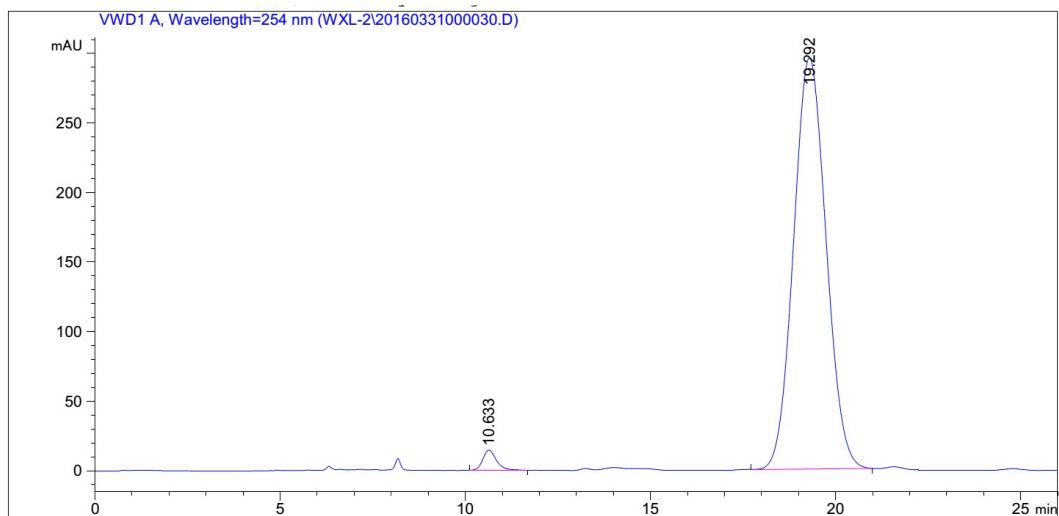
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Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.589	MM	0.3844	9103.72754	394.74692	50.6293
2	19.310	MM	0.9907	8877.43164	149.33922	49.3707

Totals : 1.79812e4 544.08614

\*\*\* End of Report \*\*\*



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Area Percent Report  
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Use Multiplier & Dilution Factor with ISTDs

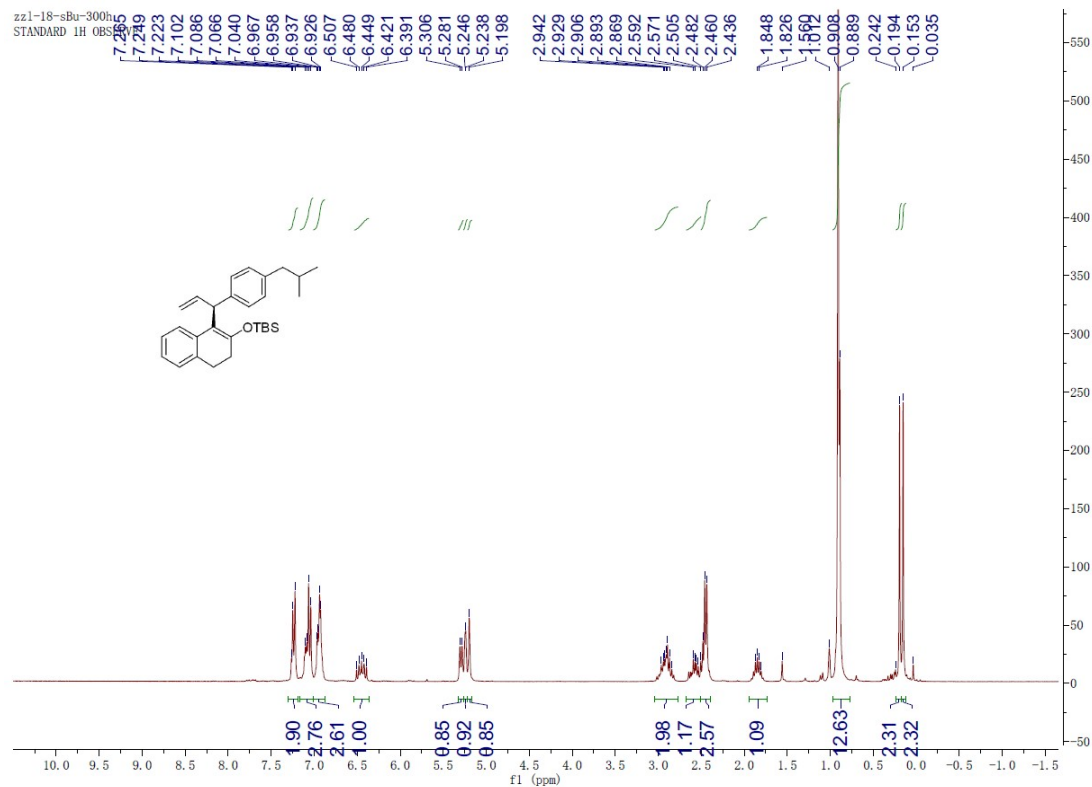
Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.633	MM	0.4231	368.35361	14.50904	2.0014
2	19.292	MM	1.0166	1.80364e4	295.71127	97.9986

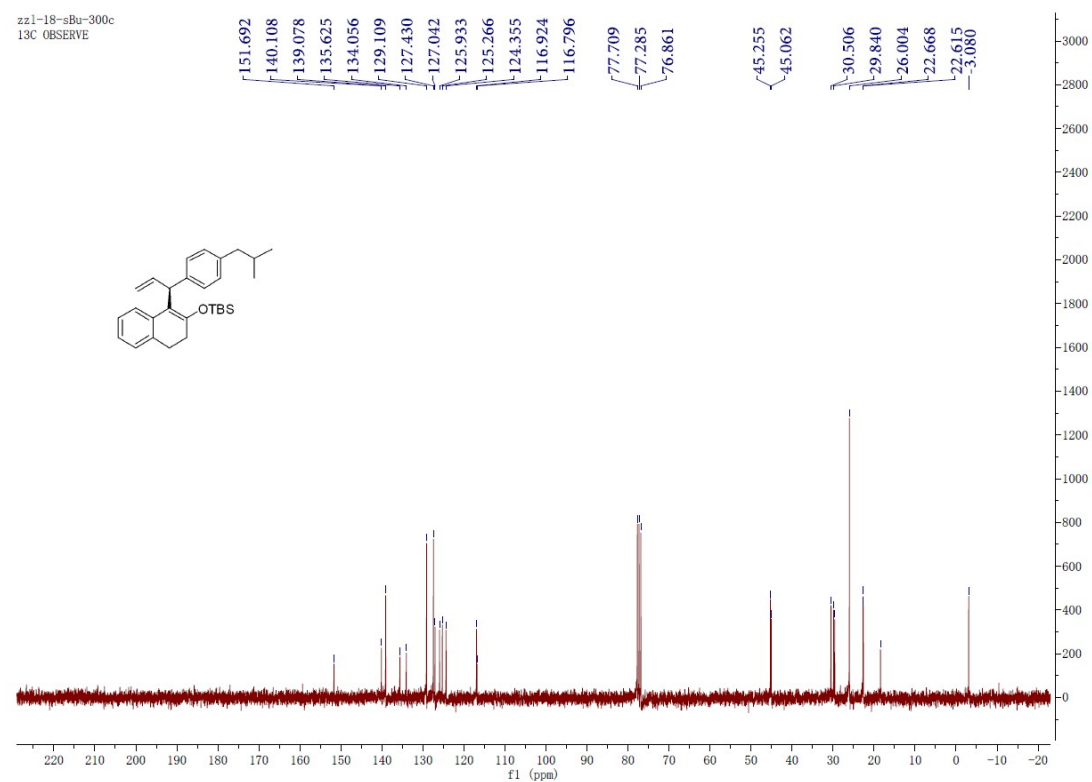
Totals : 1.84047e4 310.22031

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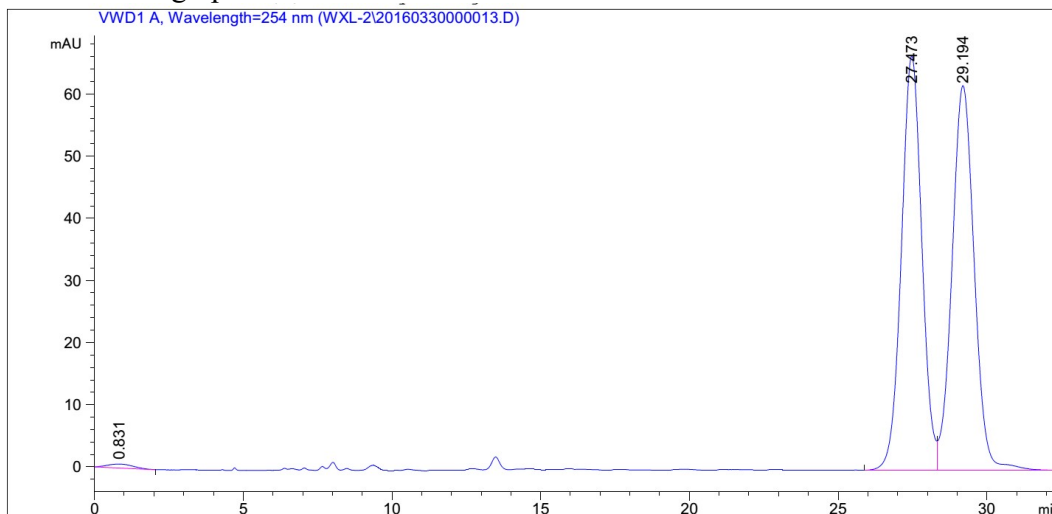
# <sup>1</sup>H NMR Spectra of **3ac**



# <sup>13</sup>C NMR Spectra of **3ac**



# HPLC Chromatograph of 3ac



## Area Percent Report

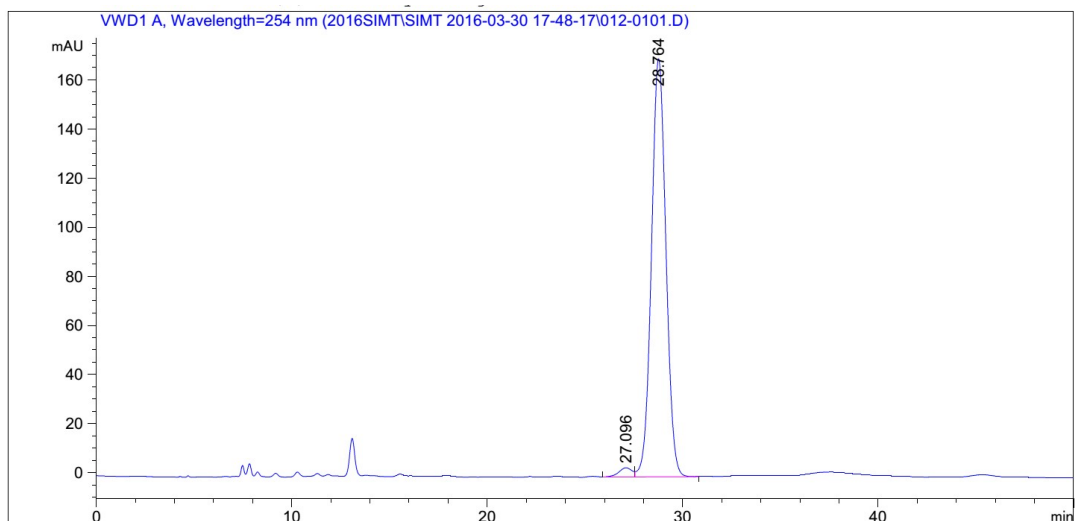
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Multiplier: : 1.0000  
Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	0.831	BB	0.6912	37.95265	6.48108e-1	0.5908
2	27.473	BV	0.7400	3175.83008	66.63687	49.4357
3	29.194	VBA	0.7994	3210.38354	61.86399	49.9735

Totals : 6424.16627 129.14897

\*\*\* End of Report \*\*\*



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Area Percent Report  
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Use Multiplier & Dilution Factor with ISTDs

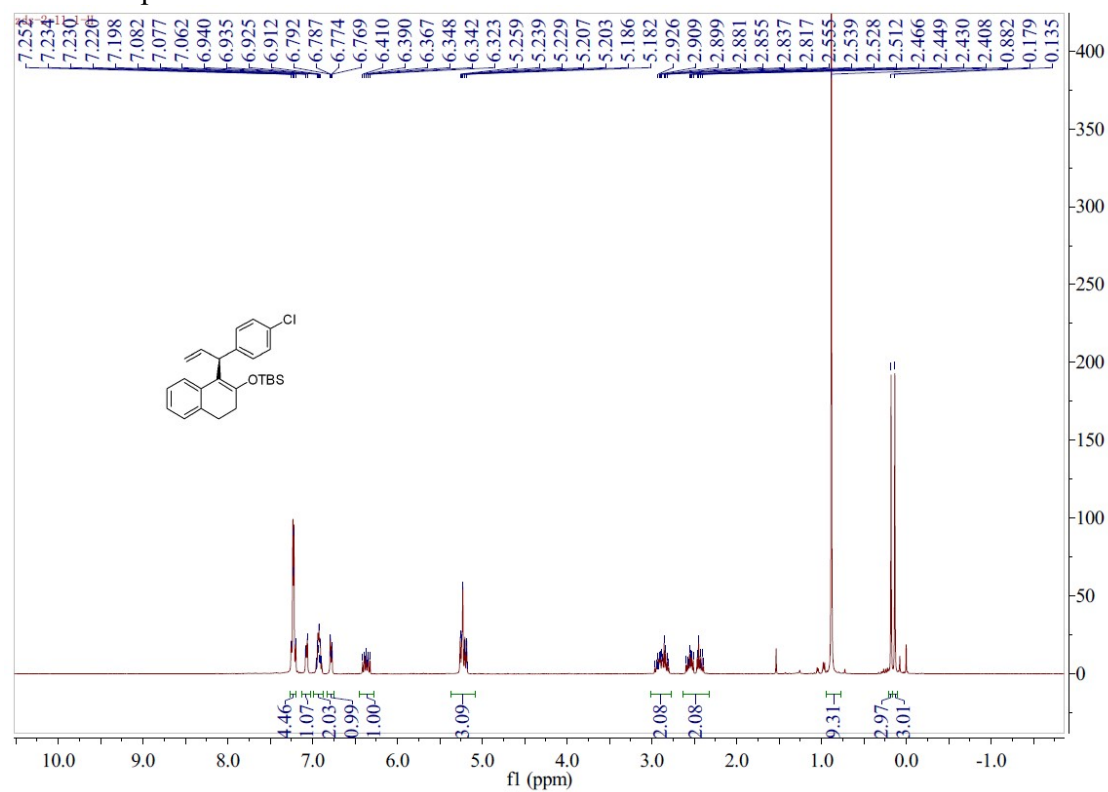
Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	27.096	BV	0.7021	175.10590	3.71368	1.9619
2	28.764	VB	0.7996	8750.02637	170.25859	98.0381

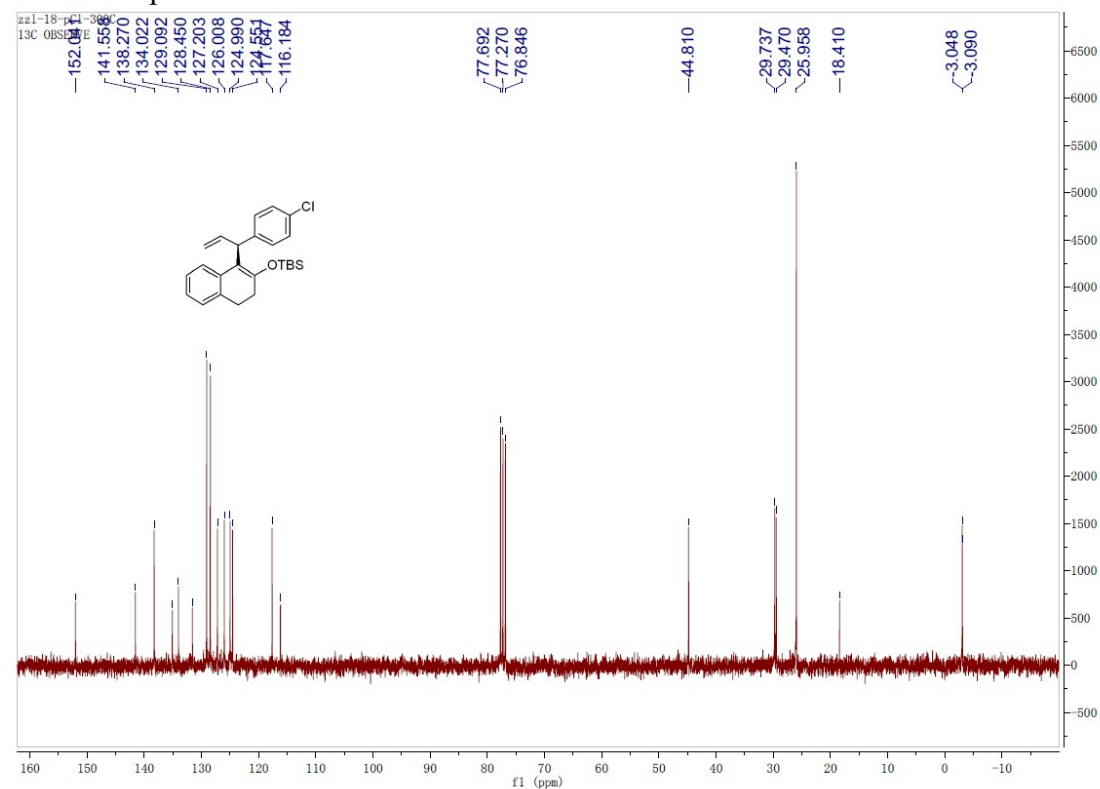
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# <sup>1</sup>H NMR Spectra of **3ad**

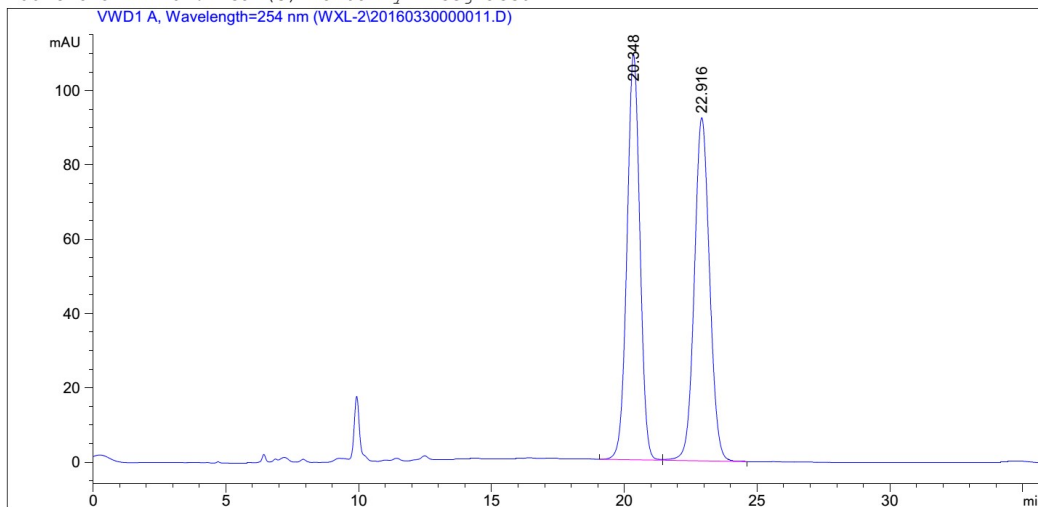


# <sup>13</sup>C NMR Spectra of **3ad**





# HPLC Chromatograph of 3ad



## Area Percent Report

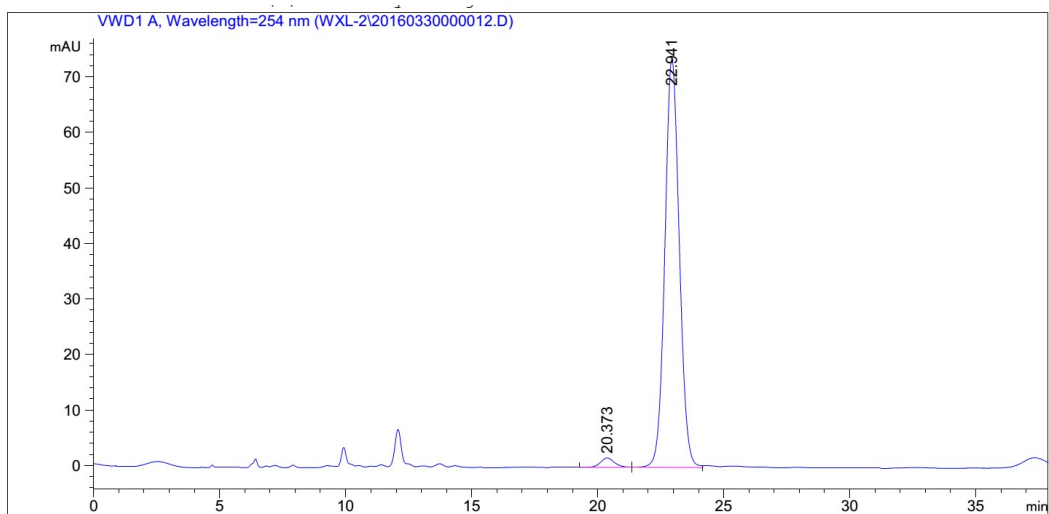
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Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	20.348	BV	0.5246	3689.66162	109.08865	50.0424
2	22.916	VB	0.6173	3683.40356	92.36255	49.9576

Totals : 7373.06519 201.45120

\*\*\* End of Report \*\*\*



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Area Percent Report  
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Use Multiplier & Dilution Factor with ISTDs

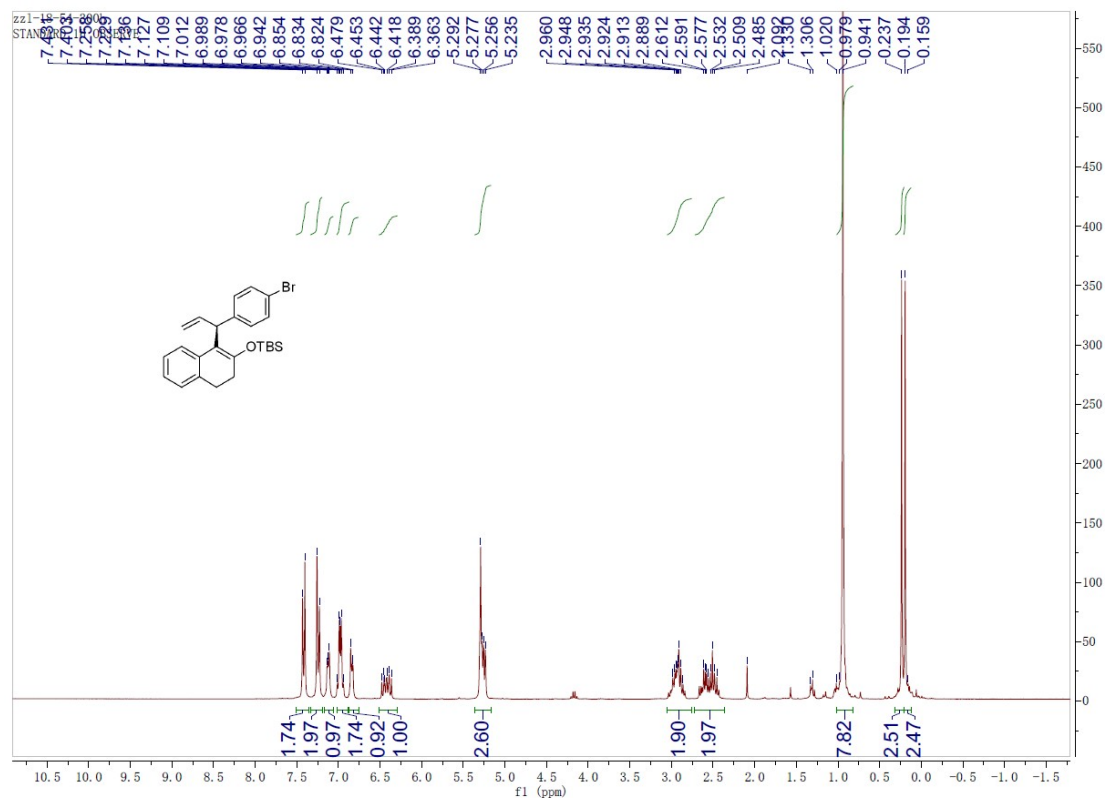
Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	20.373	BB	0.5737	63.56663	1.67125	2.1228
2	22.941	BV	0.6168	2930.89355	73.56261	97.8772

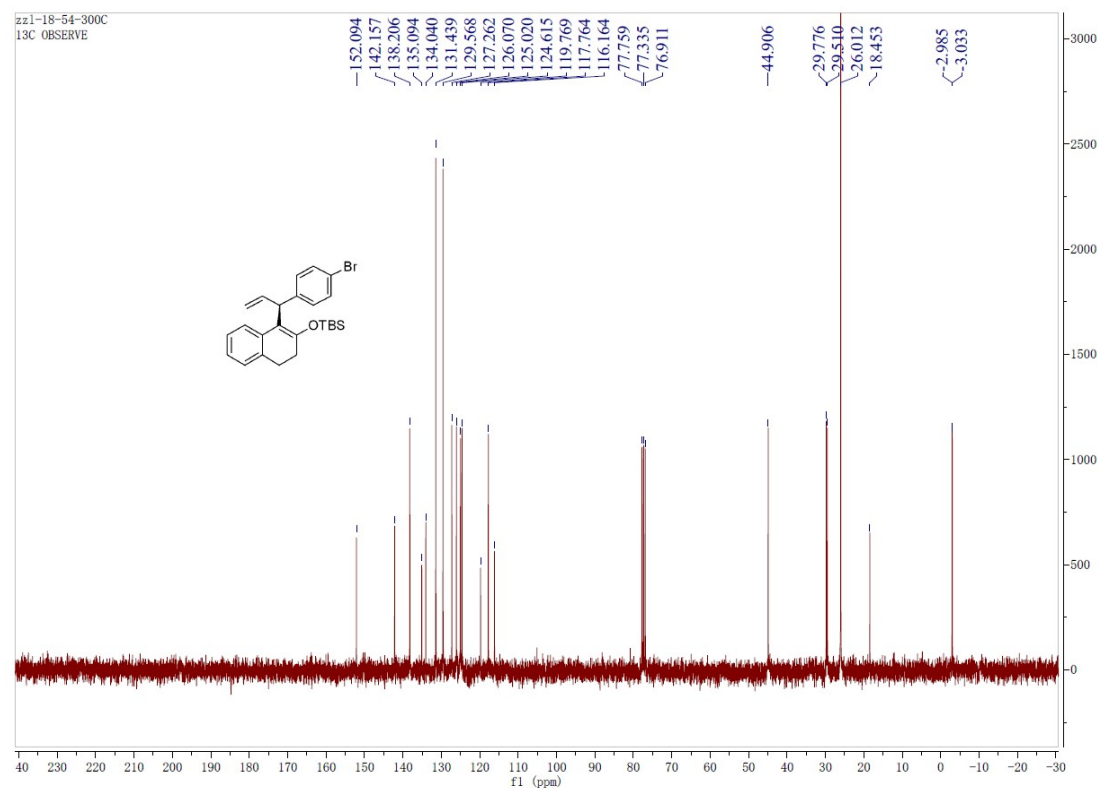
Totals : 2994.46018 75.23386

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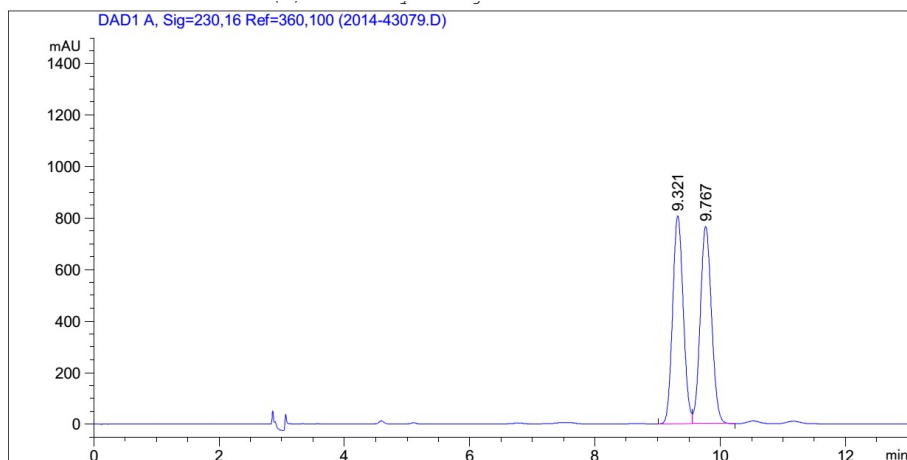
# <sup>1</sup>H NMR Spectra of **3ae**



# <sup>13</sup>C NMR Spectra of **3ae**



# HPLC Chromatograph of 3ae



## Area Percent Report

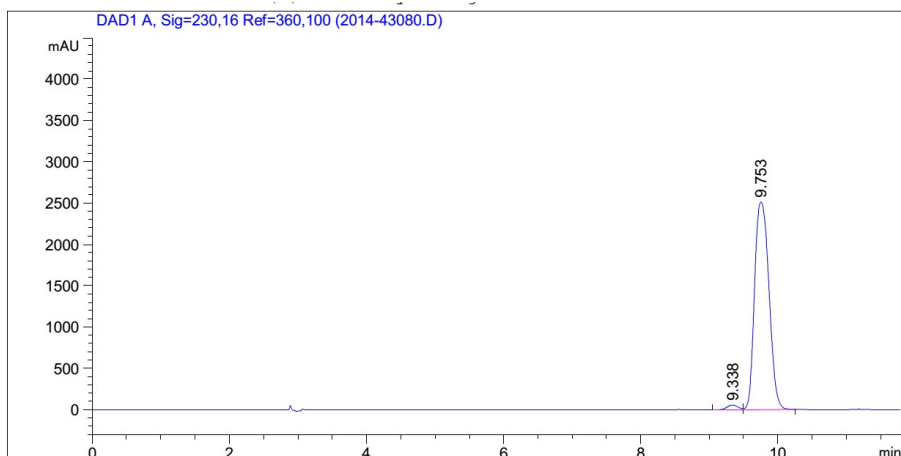
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Dilution : 1.0000  
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=230,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.321	BV	0.1866	9535.45703	808.42139	49.7545
2	9.767	VB	0.1966	9629.57227	766.41718	50.2455

Totals : 1.91650e4 1574.83856

\*\*\* End of Report \*\*\*



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Area Percent Report  
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Do not use Multiplier & Dilution Factor with ISTDs

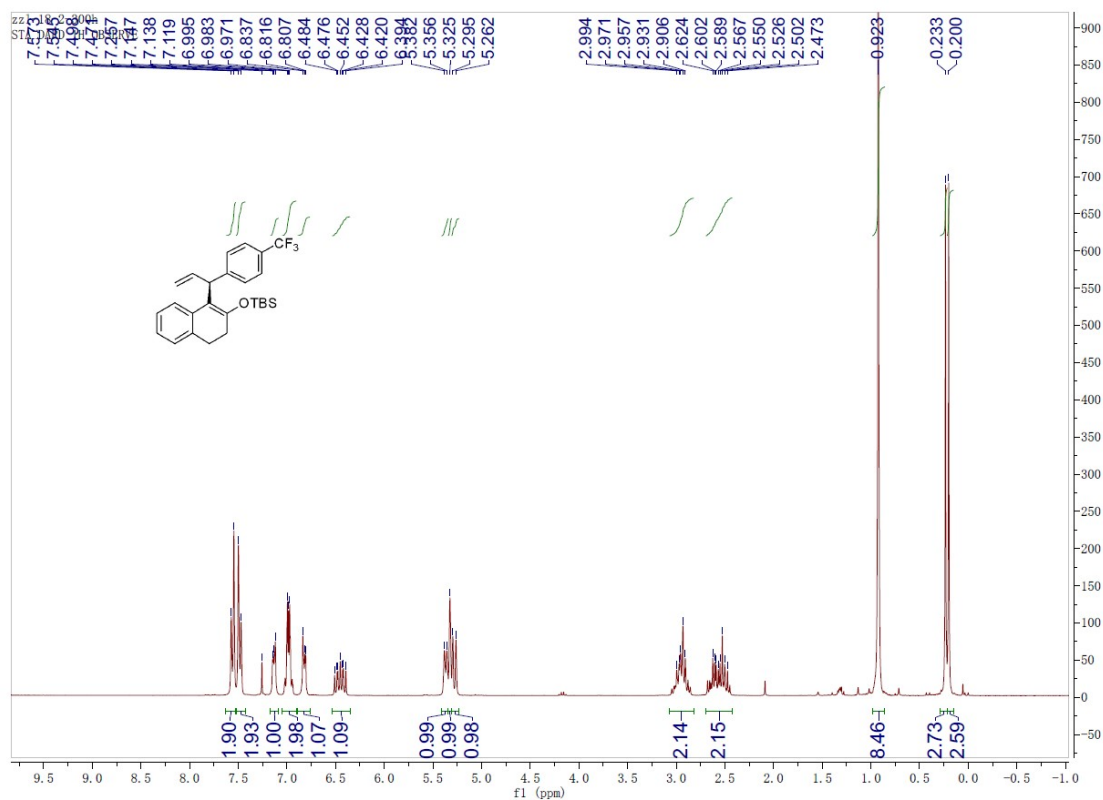
Signal 1: DAD1 A, Sig=230,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.338	MF R	0.1814	655.79309	58.83617	1.7586
2	9.753	FM R	0.2425	3.66343e4	2513.06714	98.2414

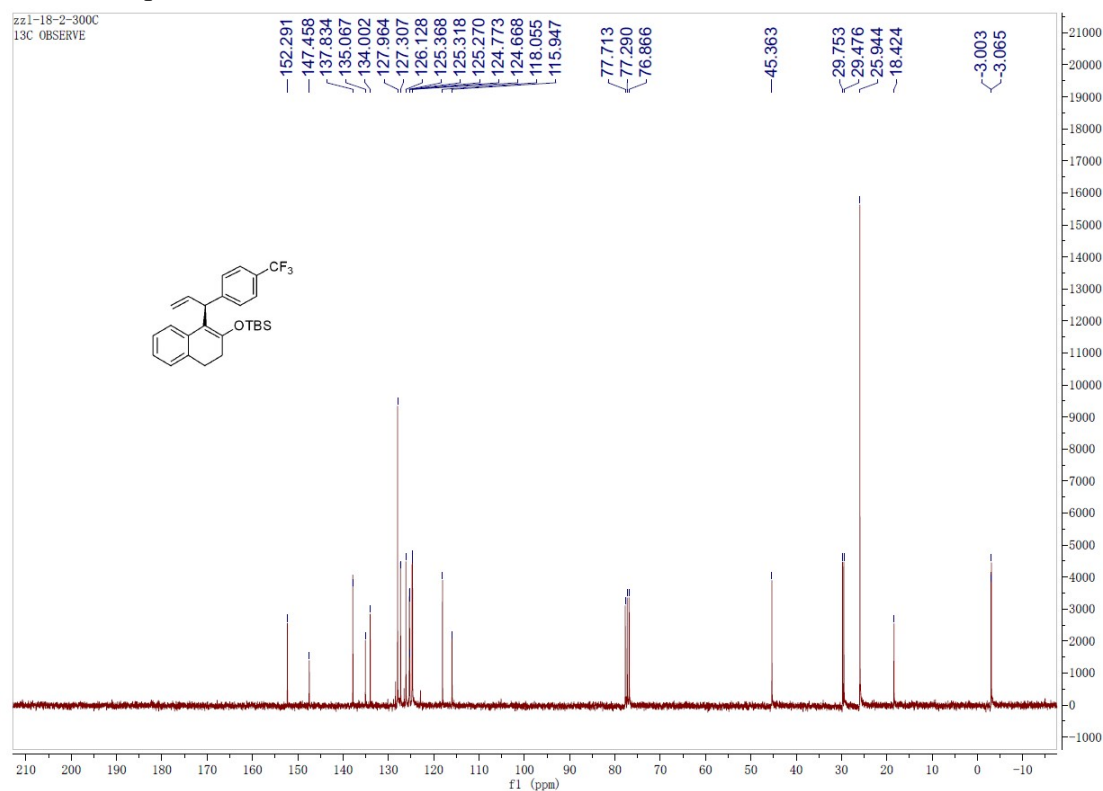
Totals : 3.72900e4 2571.90331

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\*\*\* End of Report \*\*\*

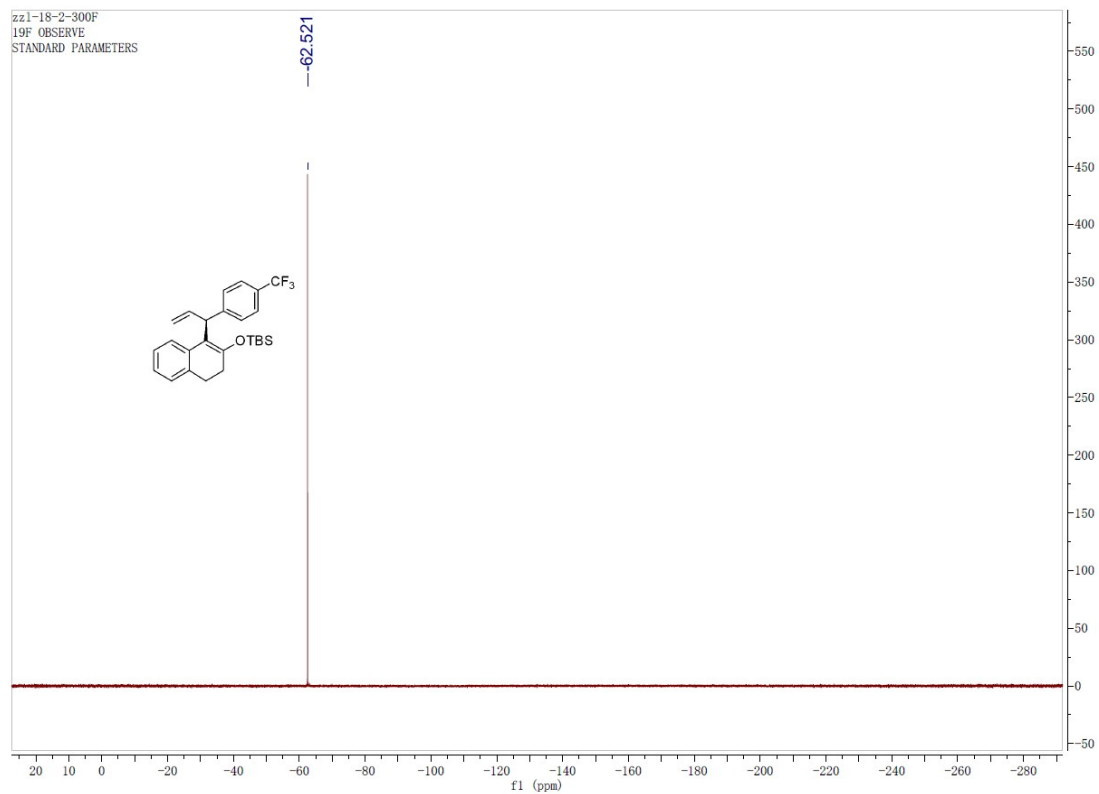
# <sup>1</sup>H NMR Spectra of **3af**



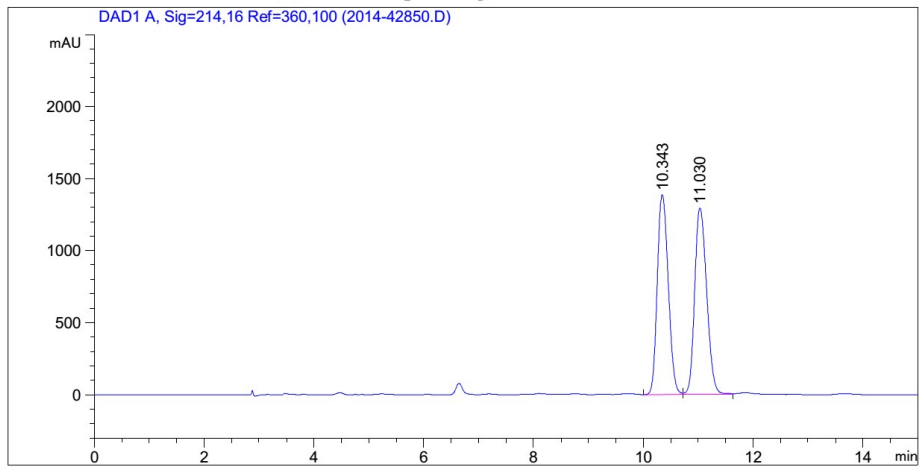
# <sup>13</sup>C NMR Spectra of **3af**



### <sup>19</sup>F NMR Spectra of **3af**



# HPLC Chromatograph of 3af



## Area Percent Report

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Do not use Multiplier & Dilution Factor with ISTDs

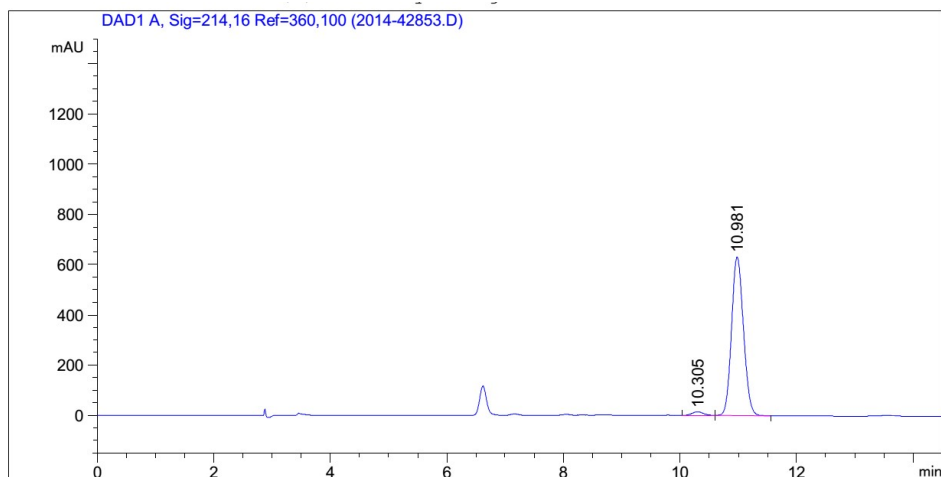
Signal 1: DAD1 A, Sig=214,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.343	BV	0.2203	1.92895e4	1386.64038	49.5342
2	11.030	VV	0.2382	1.96523e4	1293.61340	50.4658

Totals : 3.89418e4 2680.25378

\*\*\* End of Report \*\*\*





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

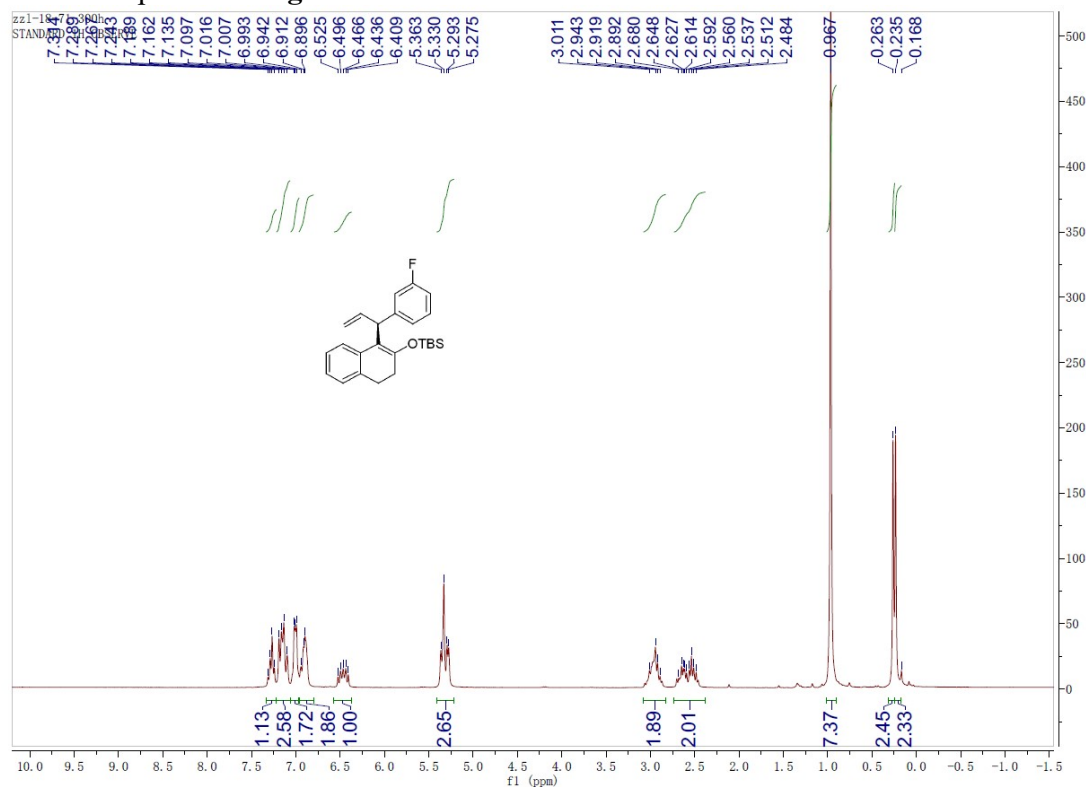
Signal 1: DAD1 A, Sig=214,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.305	BV	0.1956	202.79329	14.82381	2.2024
2	10.981	VB	0.2223	9005.09375	631.86334	97.7976

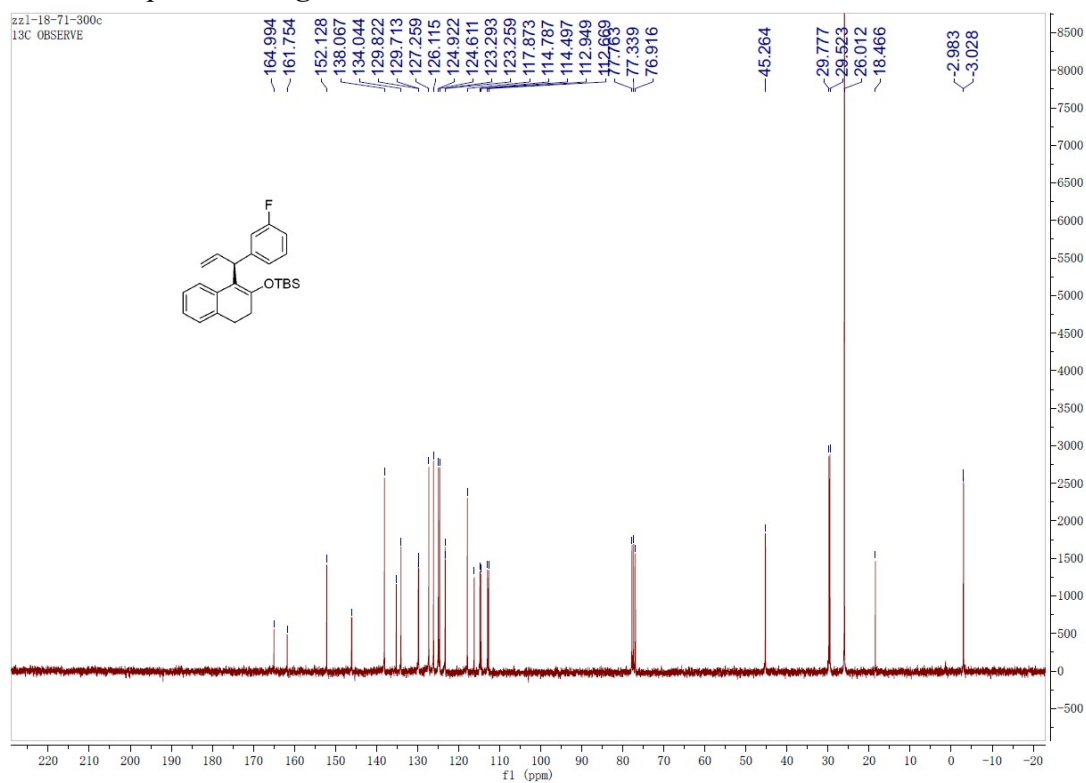
Totals : 9207.88704 646.68715

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\*\*\* End of Report \*\*\*

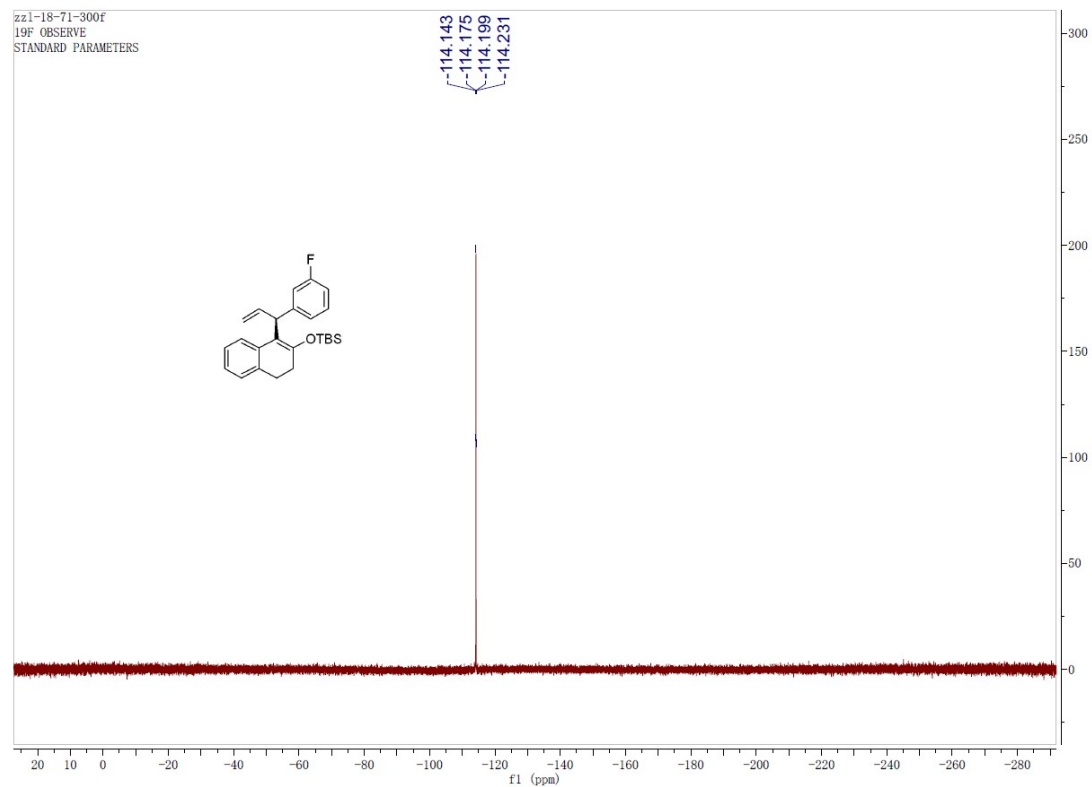
# <sup>1</sup>H NMR Spectra of **3ag**



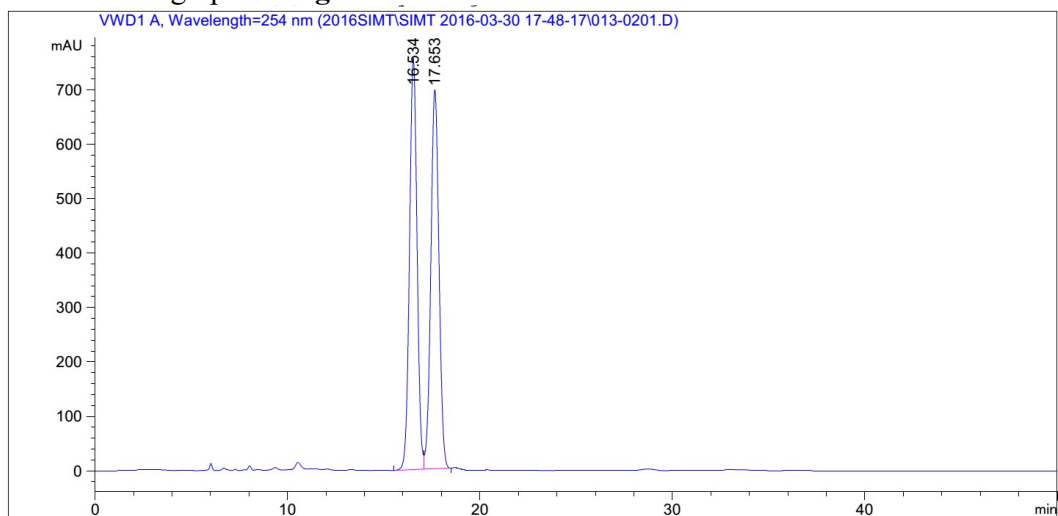
# <sup>13</sup>C NMR Spectra of **3ag**



# <sup>19</sup>F NMR Spectra of **3ag**



# HPLC Chromatograph of 3ag



## Area Percent Report

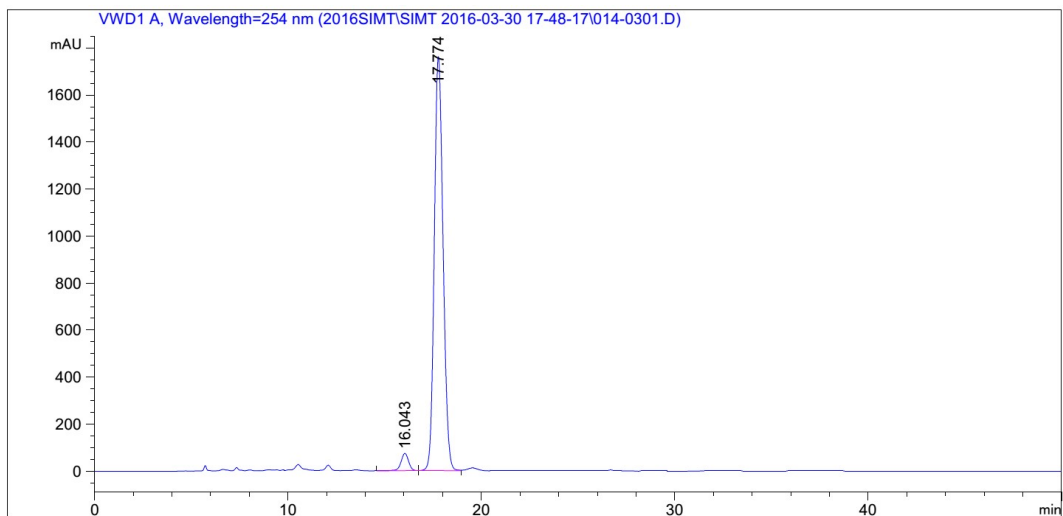
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Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.534	BV	0.4260	2.06015e4	755.74609	50.1901
2	17.653	VB	0.4588	2.04455e4	695.80554	49.8099

Totals : 4.10470e4 1451.55164

\*\*\* End of Report \*\*\*



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Area Percent Report  
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Sorted By : Signal  
Multiplier: : 1.0000  
Dilution: : 1.0000  
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	16.043	BB	0.4204	1997.81897	73.66225	3.4732
2	17.774	BV	0.4879	5.55237e4	1760.82458	96.5268

Totals : 5.75216e4 1834.48684

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\*\*\* End of Report \*\*\*

Chemical structure of compound 10 is shown. The  $^1\text{H}$  NMR spectrum (CDCl<sub>3</sub>) displays peaks corresponding to the structure, with chemical shifts (ppm) listed above the spectrum and integration values below the spectrum.

Chemical shifts (ppm): 7.316, 7.312, 7.309, 7.181, 7.175, 7.165, 7.146, 7.135, 7.118, 7.087, 7.077, 7.065, 7.065, 6.947, 6.942, 6.938, 6.935, 6.928, 6.925, 6.910, 6.810, 6.795, 6.787, 6.372, 6.352, 5.240, 5.222, 5.219, 5.216, 5.193, 2.928, 2.911, 2.900, 2.883, 2.874, 2.857, 2.840, 2.819, 2.568, 2.552, 2.540, 2.524, 2.466, 2.449, 2.431, 2.409, 0.876, -0.177, -0.153.

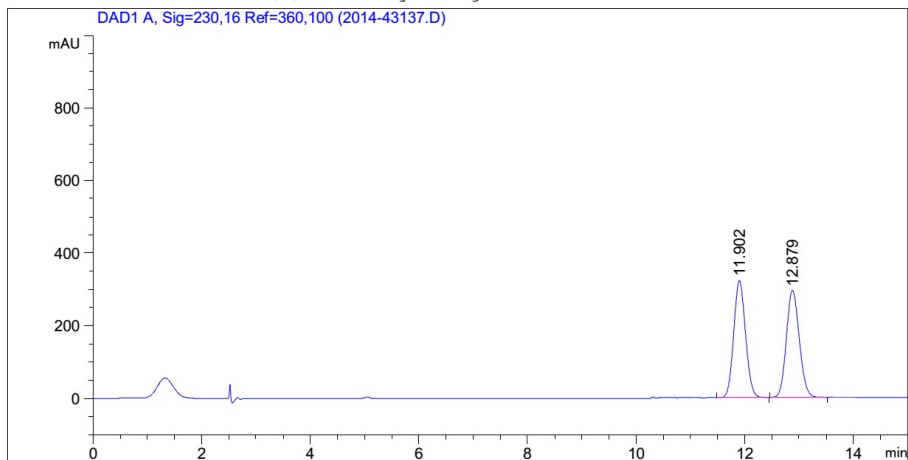
Integration values: 1.09, 4.22, 2.10, 0.99, 1.00, 3.11, 2.12, 2.11, 9.38, 6.03.

Chemical structure of compound 17 is shown in the upper left. The structure is a naphthalene derivative with an OTBS group at position 1, a vinyl group at position 2, and a 4-chlorophenyl group at position 3.

The  $^{13}\text{C}$  NMR spectrum (f1 (ppm)) shows the following chemical shifts (ppm) labeled above the peaks:

- 152.202, 145.514, 138.084, 135.291, 134.533, 134.065, 129.765, 127.868, 127.360, 126.265, 126.007, 124.892, 124.743, 118.019, 116.171
- 77.867, 77.444, 77.020 (solvent triplet)
- 45.445
- 29.884
- 26.216
- 18.544
- 2.865, 2.914

# HPLC Chromatograph of 3ah



## Area Percent Report

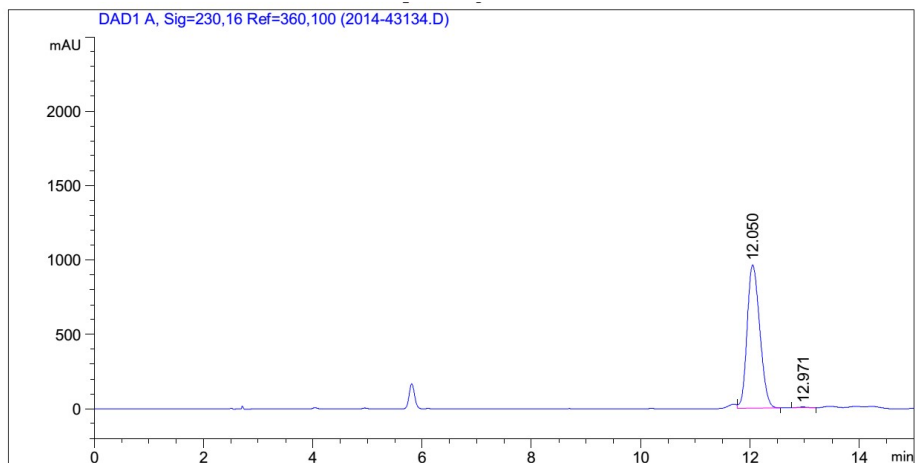
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Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=230,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.902	BB	0.2376	4874.36963	322.02182	49.9506
2	12.879	BB	0.2591	4884.01904	295.01700	50.0494

Totals : 9758.38867 617.03882

\*\*\* End of Report \*\*\*



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

Signal 1: DAD1 A, Sig=230,16 Ref=360,100

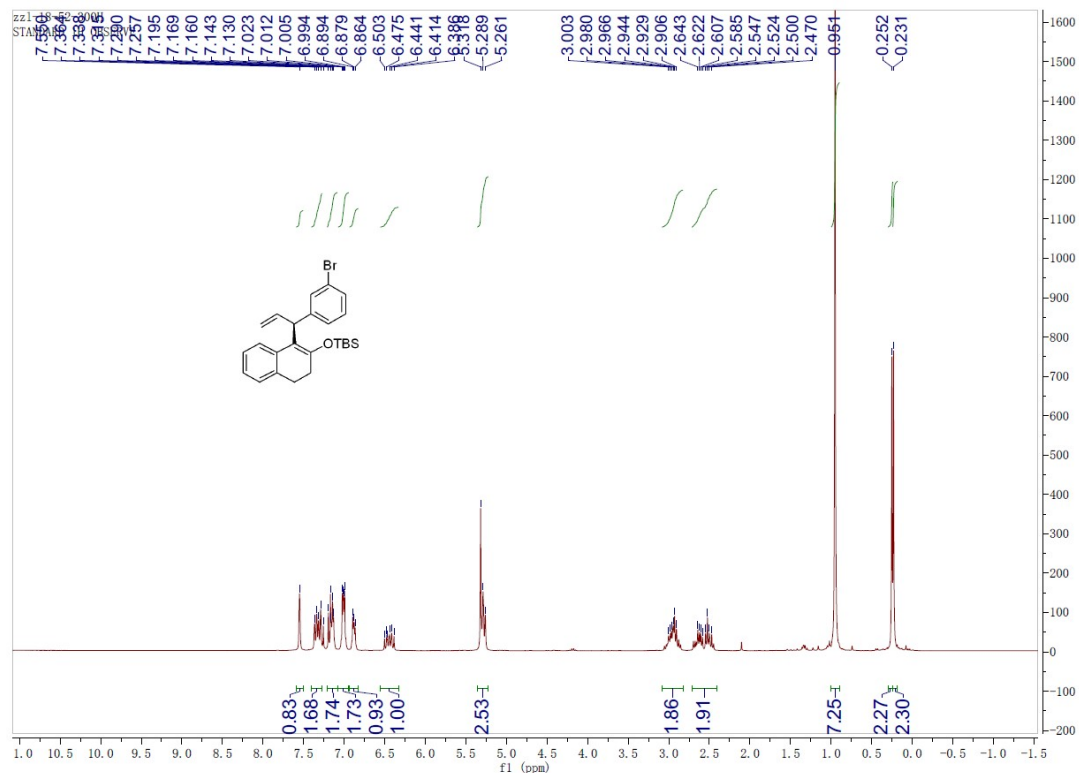
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.050	VB	0.2510	1.55333e4	963.75989	99.4488
2	12.971	MM R	0.2171	86.09091	6.60911	0.5512

Totals : 1.56194e4 970.36899

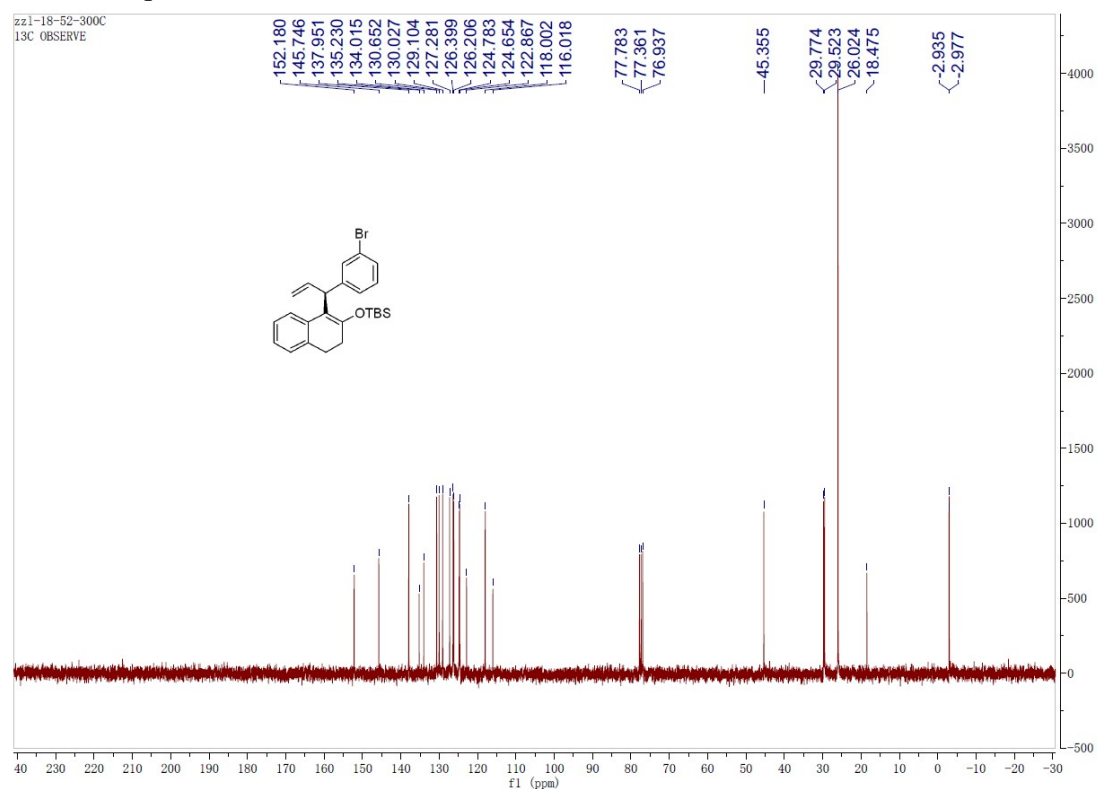
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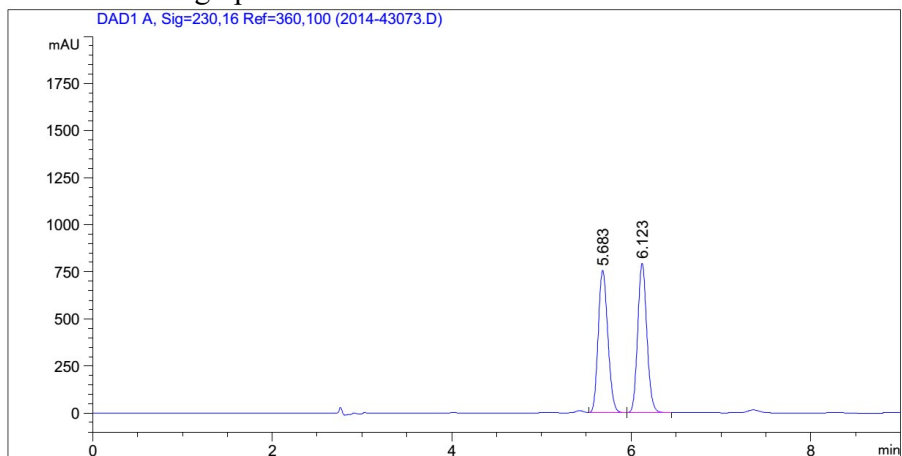
# <sup>1</sup>H NMR Spectra of **3ai**



# <sup>13</sup>C NMR Spectra of **3ai**



# HPLC Chromatograph of 3ai



## Area Percent Report

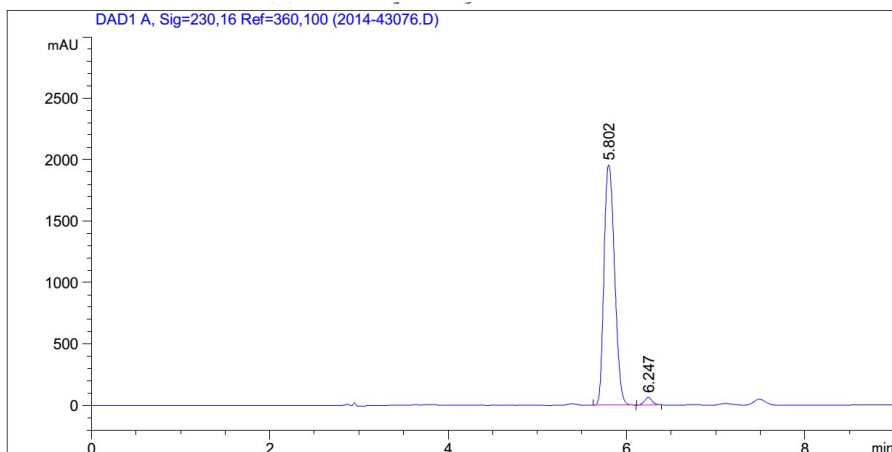
Sorted By : Signal  
Multiplier : 1.0000  
Dilution : 1.0000  
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=230,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.683	VB	0.1158	5622.43994	755.64978	49.9701
2	6.123	BB	0.1097	5629.17090	793.93402	50.0299

Totals : 1.12516e4 1549.58380

\*\*\* End of Report \*\*\*



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Area Percent Report  
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Sorted By : Signal  
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Do not use Multiplier & Dilution Factor with ISTDs

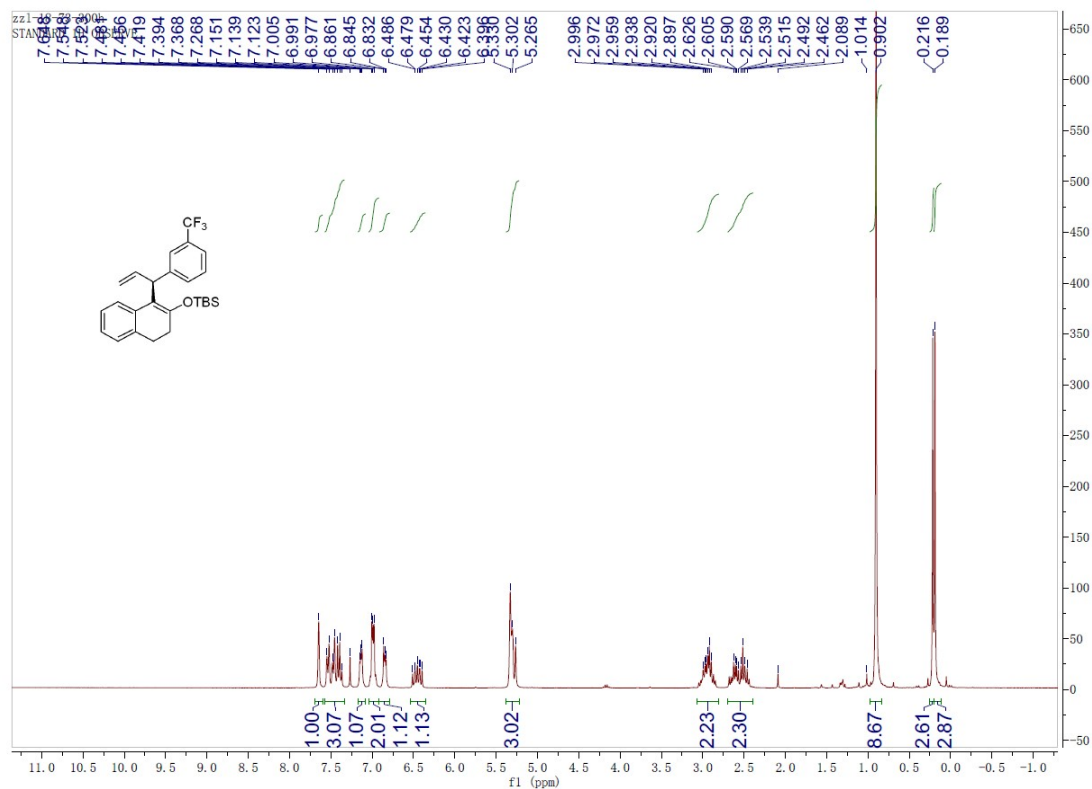
Signal 1: DAD1 A, Sig=230,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.802	BV	0.1314	1.61569e4	1956.34985	97.7690
2	6.247	MM R	0.0910	368.68527	61.78312	2.2310

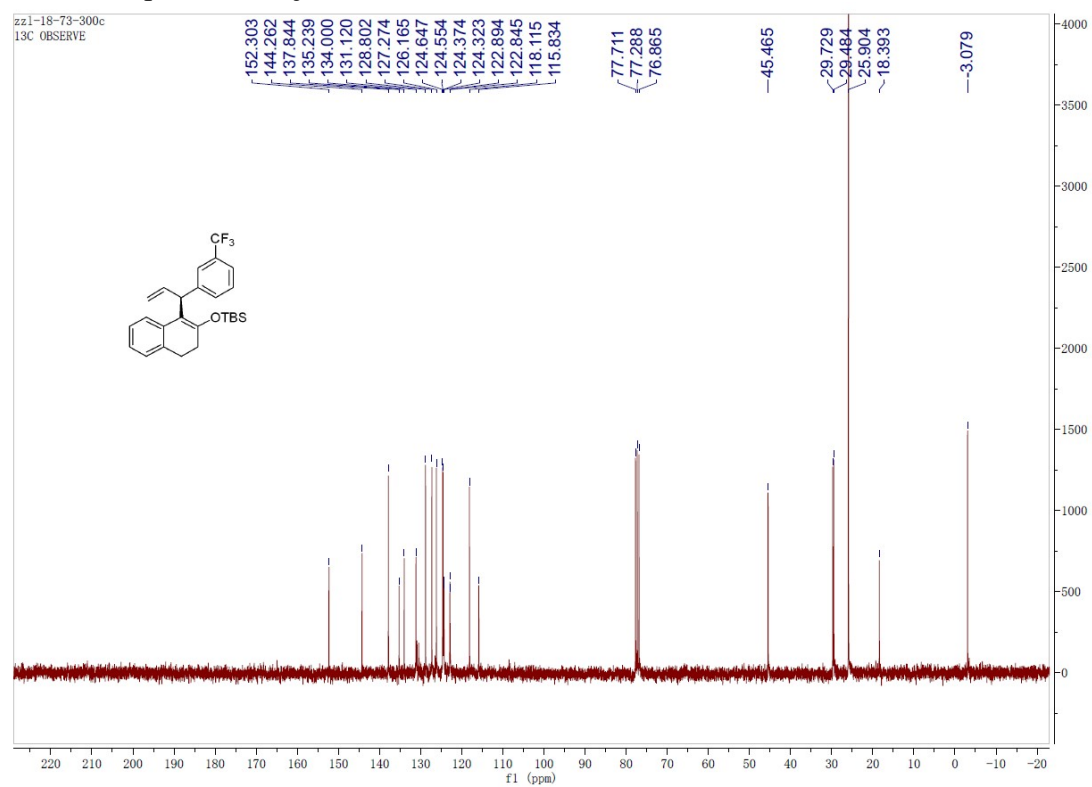
Totals : 1.65256e4 2018.13298

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\*\*\* End of Report \*\*\*

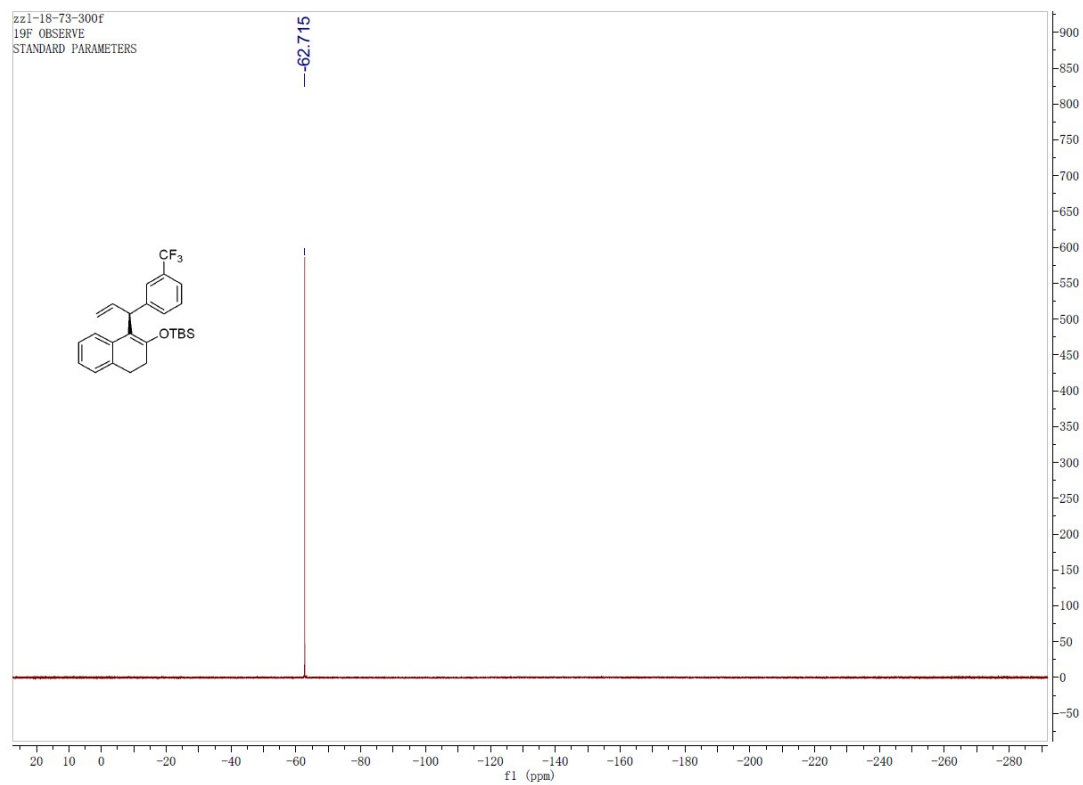
### <sup>1</sup>H NMR Spectra of **3aj**



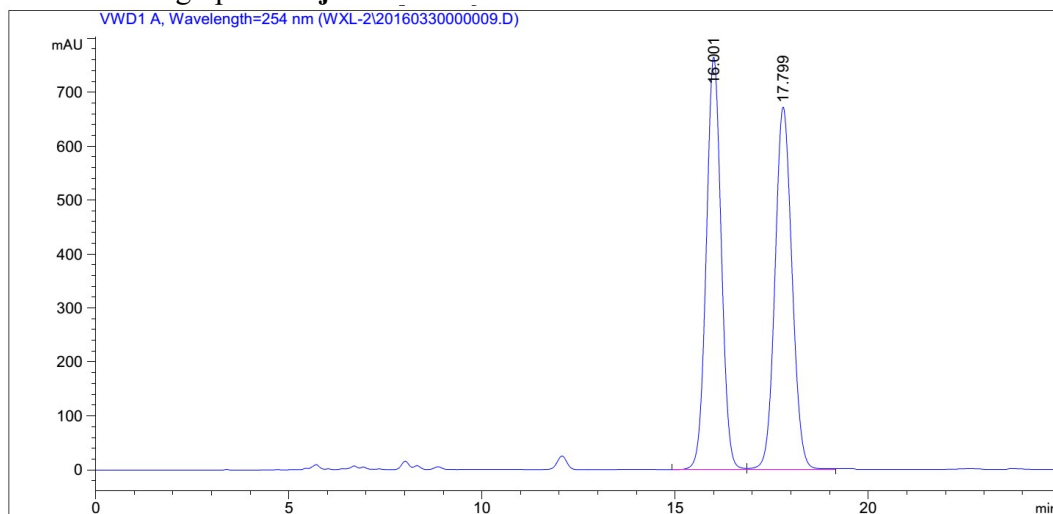
### <sup>13</sup>C NMR Spectra of **3aj**



# <sup>19</sup>F NMR Spectra of **3aj**



# HPLC Chromatograph of 3aj



## Area Percent Report

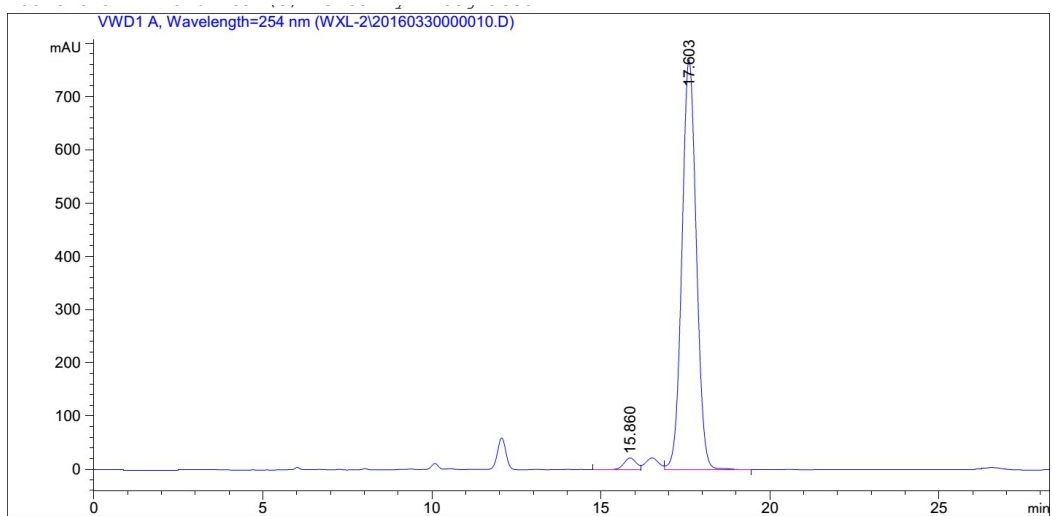
Sorted By : Signal  
Multiplier: : 1.0000  
Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.001	BV	0.4178	2.05708e4	764.84332	49.8934
2	17.799	VV	0.4766	2.06587e4	672.08362	50.1066

Totals : 4.12295e4 1436.92694

\*\*\* End of Report \*\*\*



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Area Percent Report  
=====

Sorted By : Signal  
Multiplier: : 1.0000  
Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

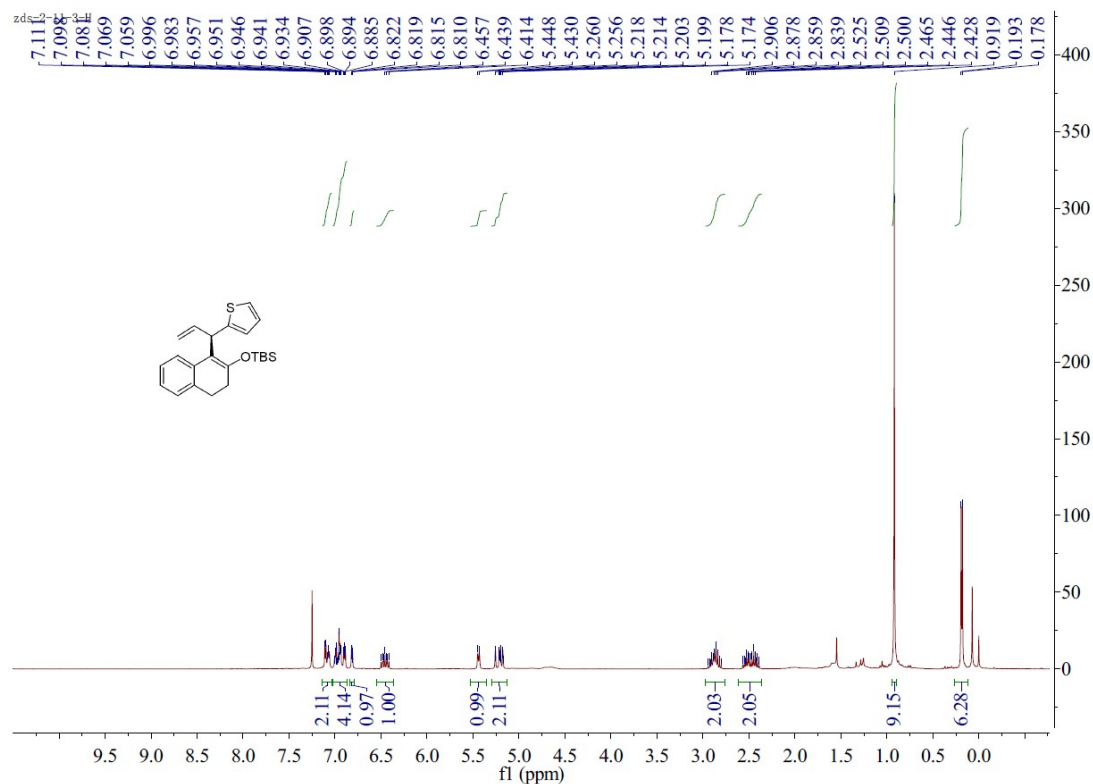
Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.860	BV	0.3935	570.91980	22.08888	2.4418
2	17.603	VB	0.4617	2.28098e4	769.77924	97.5582

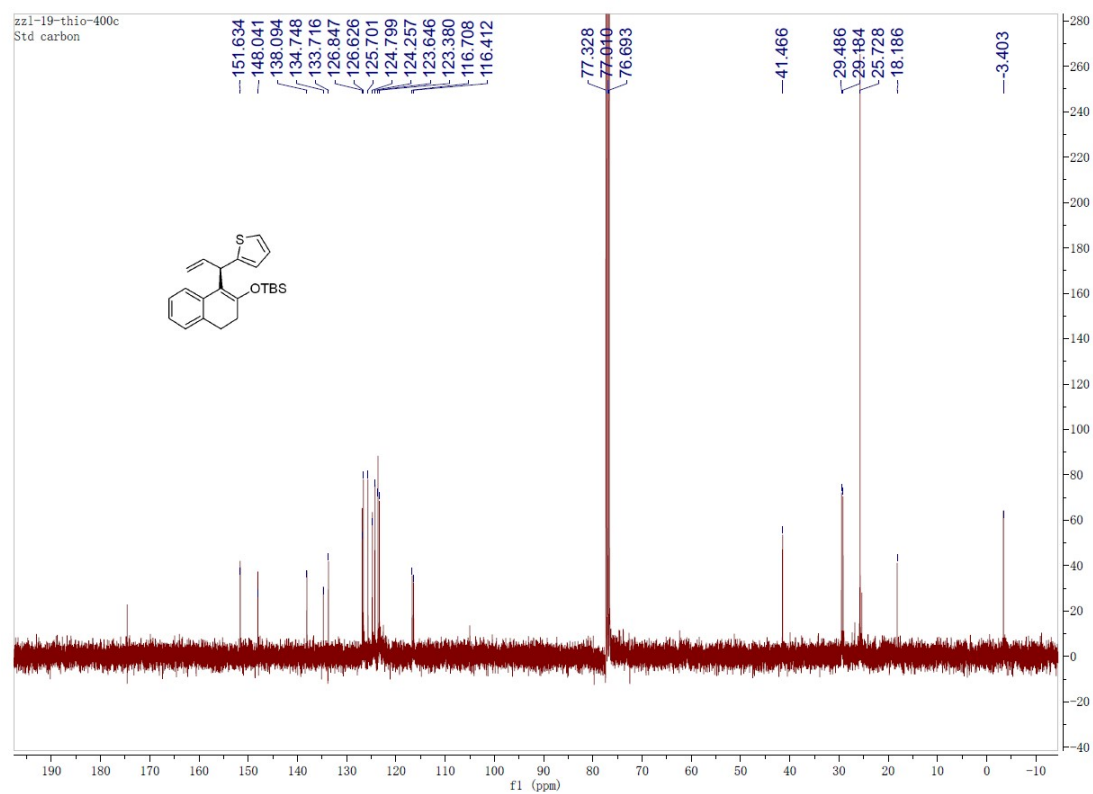
Totals : 2.33807e4 791.86812

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\*\*\* End of Report \*\*\*

# <sup>1</sup>H NMR Spectra of **3ak**

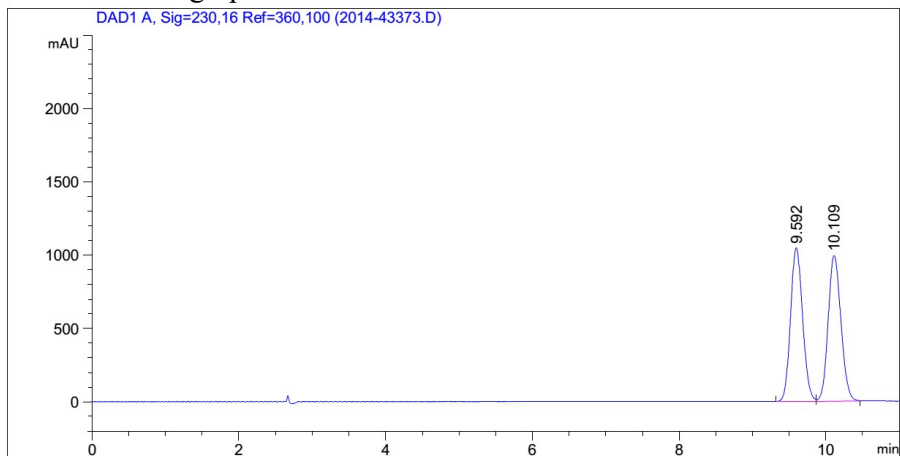


# <sup>13</sup>C NMR Spectra of **3ak**





# HPLC Chromatograph of 3ak



## Area Percent Report

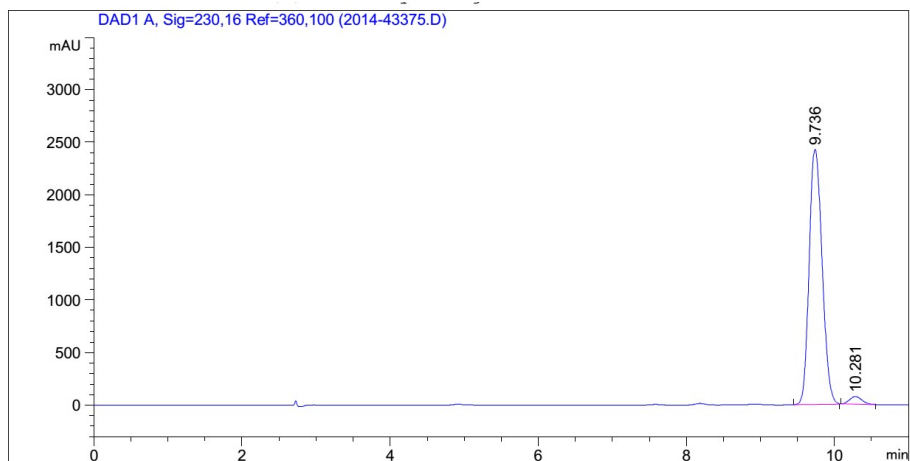
Sorted By : Signal  
Multiplier : 1.0000  
Dilution : 1.0000  
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=230,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.592	BV	0.1783	1.19552e4	1046.10632	49.9215
2	10.109	VV	0.1872	1.19928e4	990.58411	50.0785

Totals : 2.39481e4 2036.69043

\*\*\* End of Report \*\*\*



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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

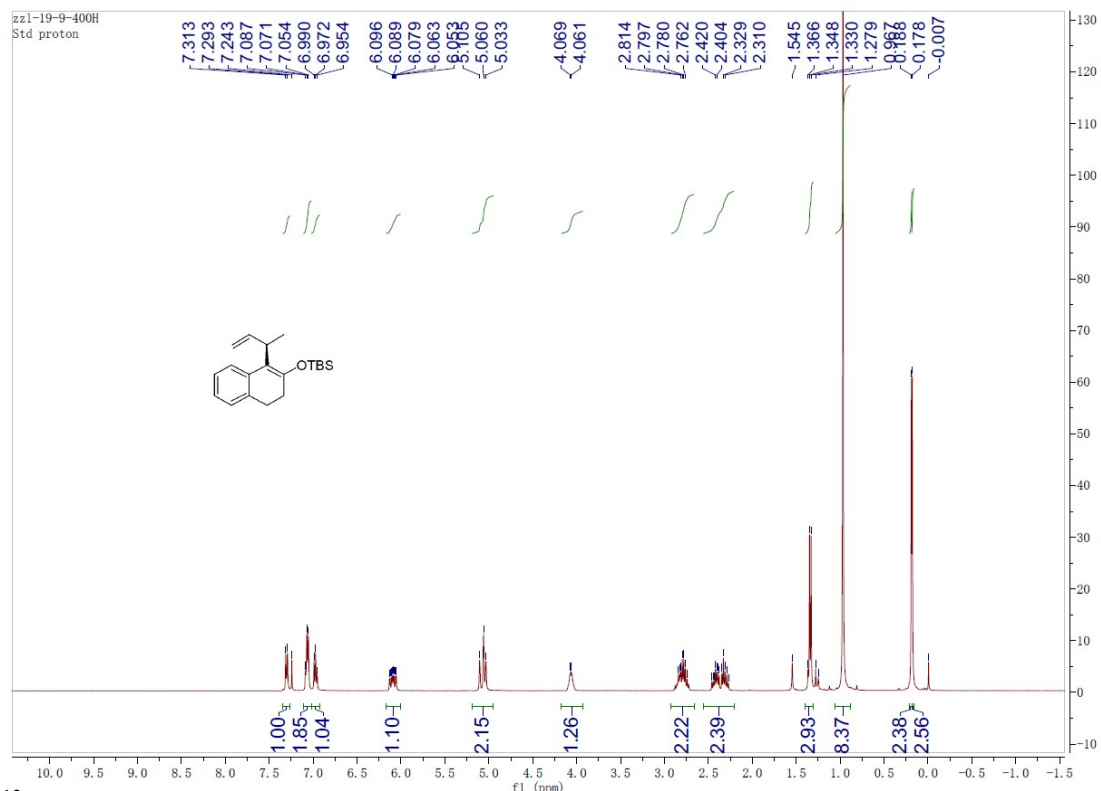
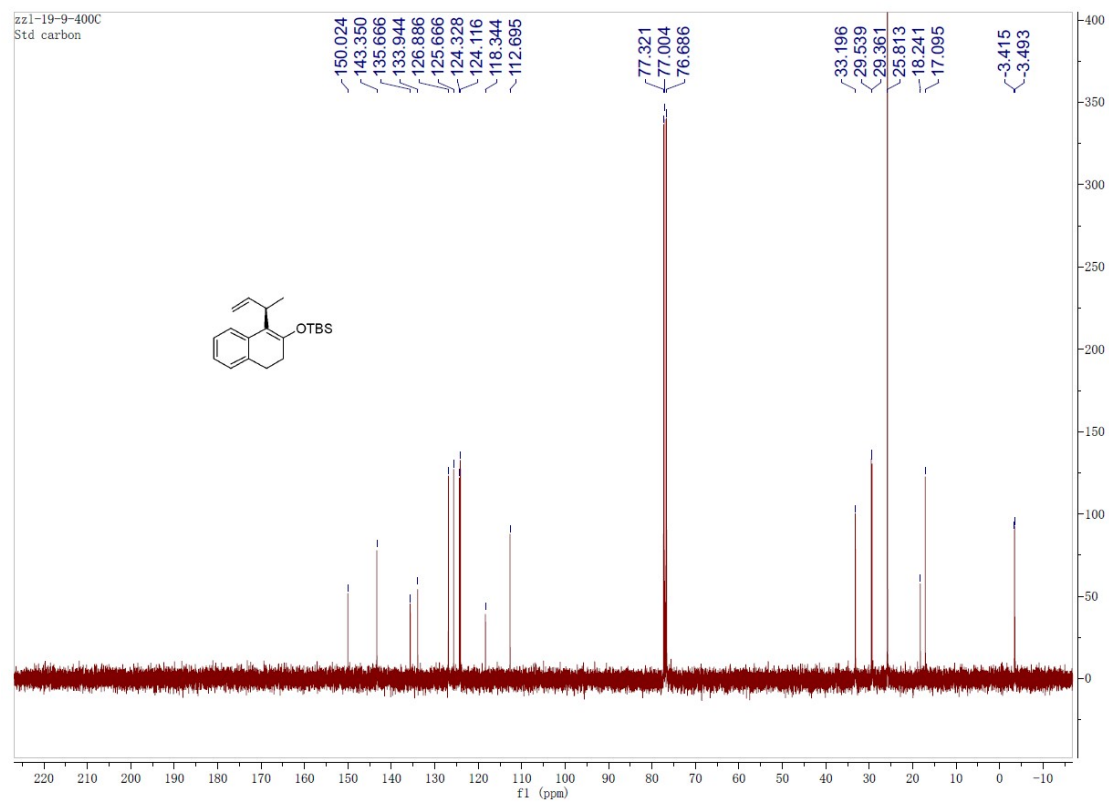
Signal 1: DAD1 A, Sig=230,16 Ref=360,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.736	MM R	0.2013	2.95429e4	2429.39087	97.2732
2	10.281	MM R	0.1763	828.16418	72.45634	2.7268

Totals : 3.03711e4 2501.84721

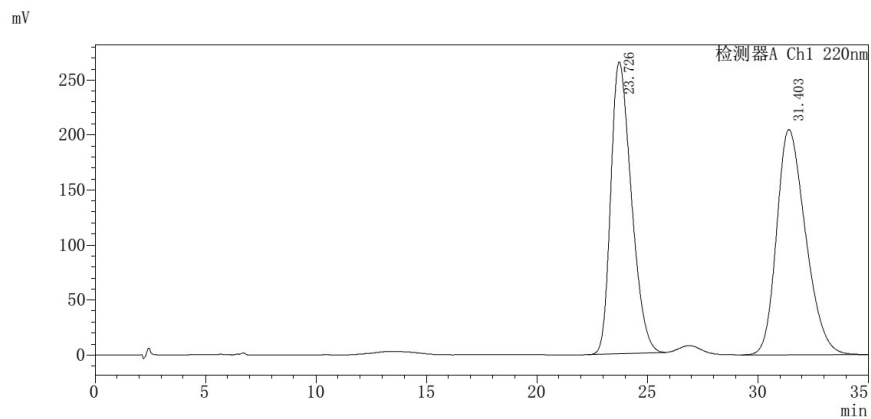
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\*\*\* End of Report \*\*\*

### <sup>1</sup>H NMR Spectra of **3al**

<sup>13</sup>C NMR Spectra of **3al**

## HPLC Chromatograph of **3a**

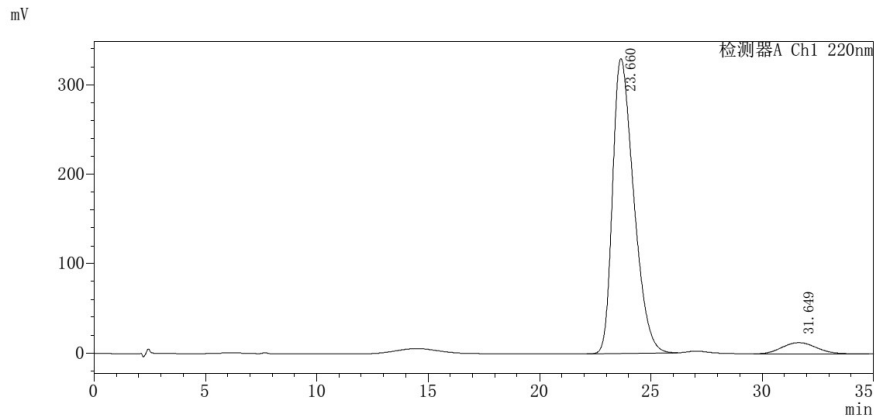
< Chromatogram >



<Column Performance Report>

Peak No.	Time	Area	Area %	Plate number	Tailing	Resolution
1	23.726	17227258	48.074	1.333	340.81	265422
2	31.403	18607559	51.926	1.268	340.81	204790

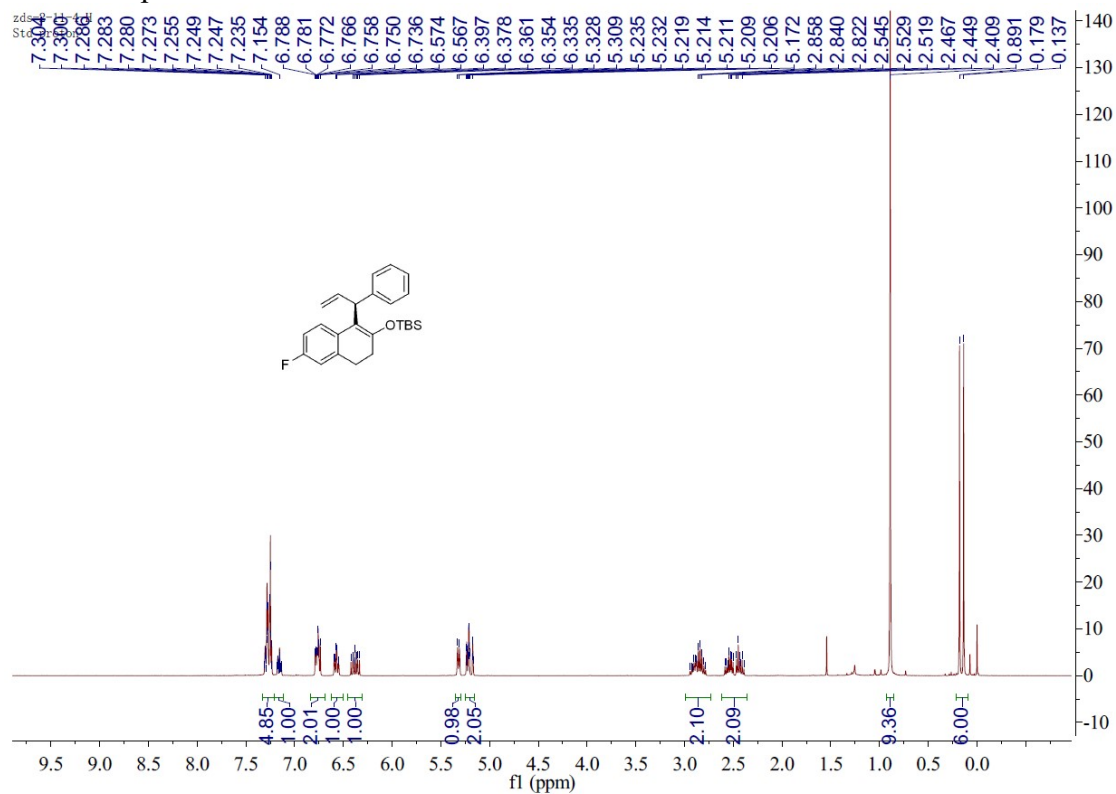
< Chromatogram >



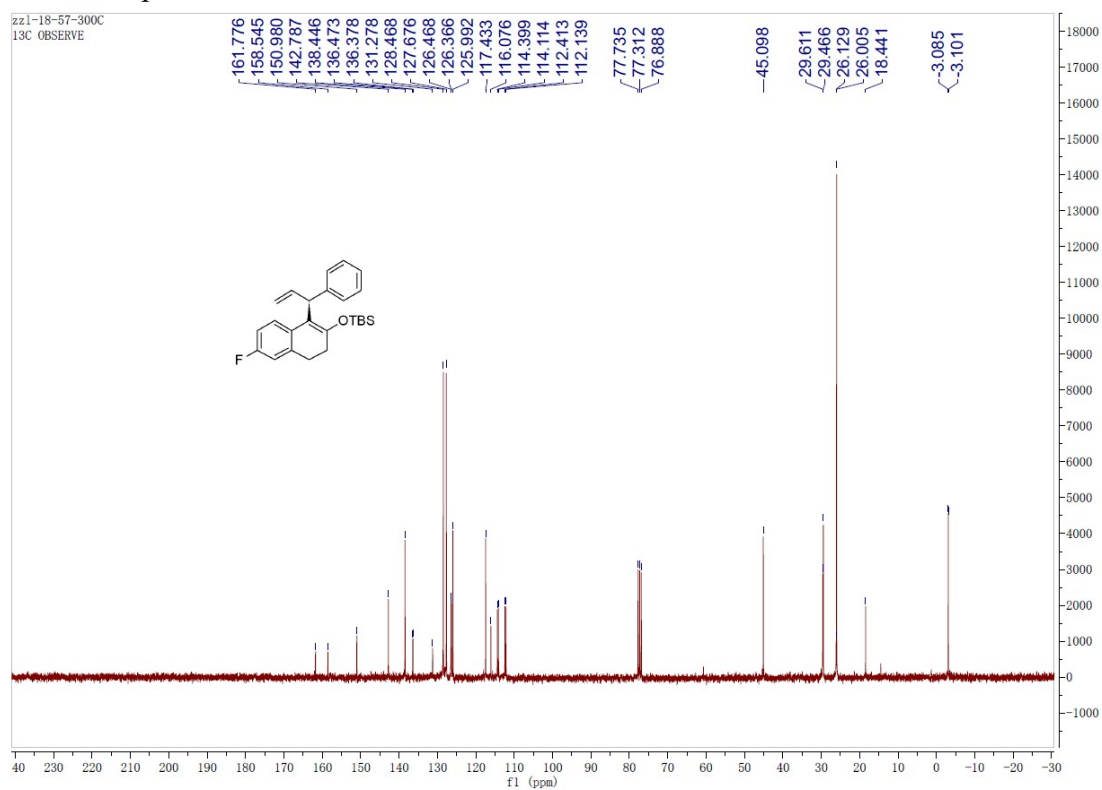
<Column Performance Report>

Peak No.	Time	Area	Area %	Plate number	Tailing	Resolution
1	23.660	21779776	94.130	1.409	268.10	329821
2	31.649	1358213	5.870	1.111	268.10	12501

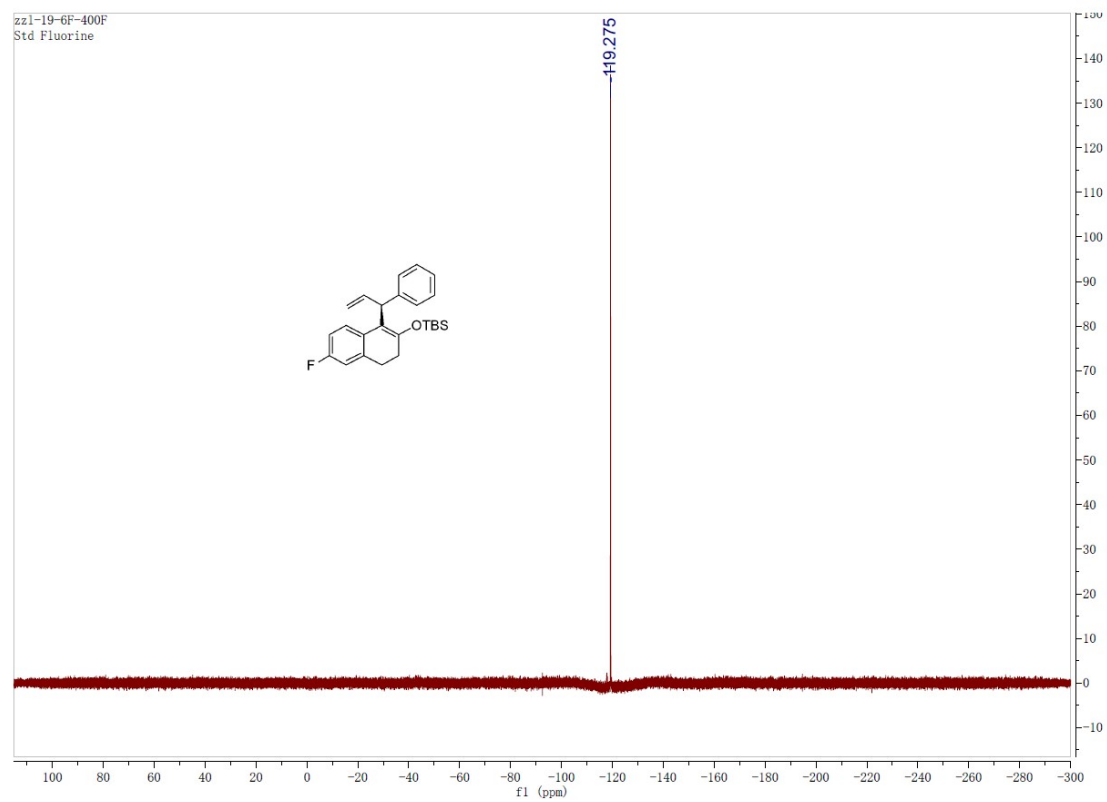
# <sup>1</sup>H NMR Spectra of **3ba**



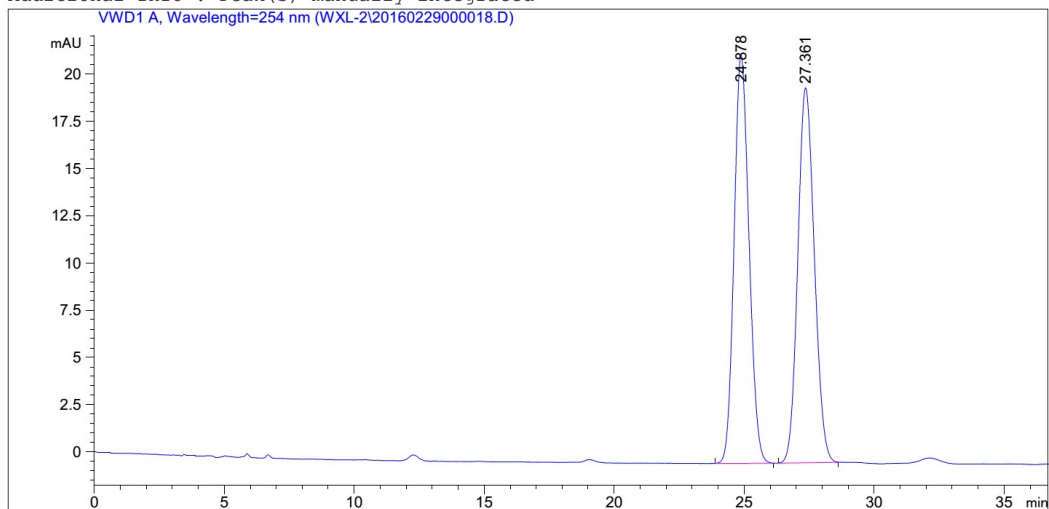
# <sup>13</sup>C NMR Spectra of **3ba**



# <sup>19</sup>F NMR Spectra of **3ba**



# HPLC Chromatograph of 3ba



## Area Percent Report

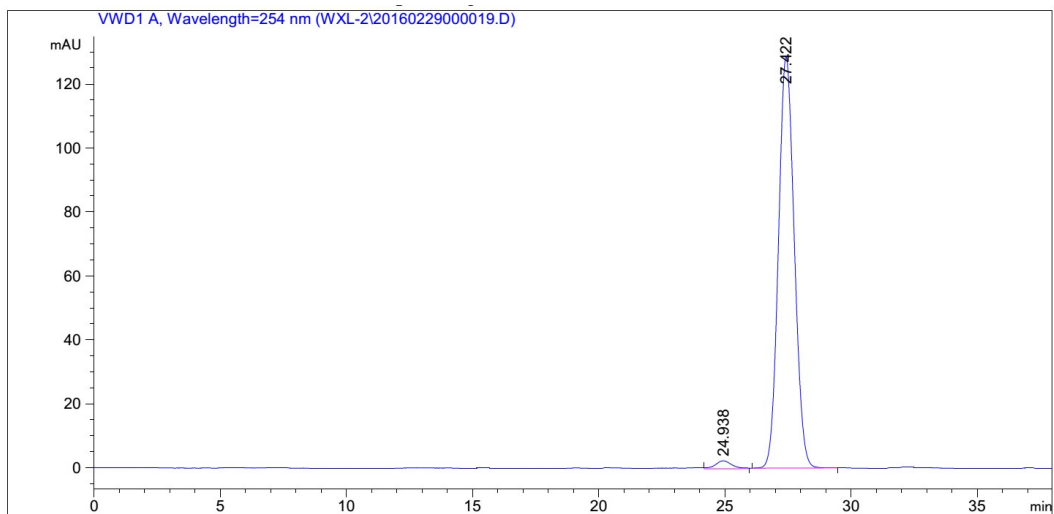
Sorted By : Signal  
Multiplier: : 1.0000  
Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	24.878	VV	0.6062	859.69354	21.58390	49.4910
2	27.361	VV	0.6636	877.37518	19.83303	50.5090

Totals : 1737.06873 41.41693

\*\*\* End of Report \*\*\*



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Area Percent Report  
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Sorted By : Signal  
Multiplier: : 1.0000  
Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

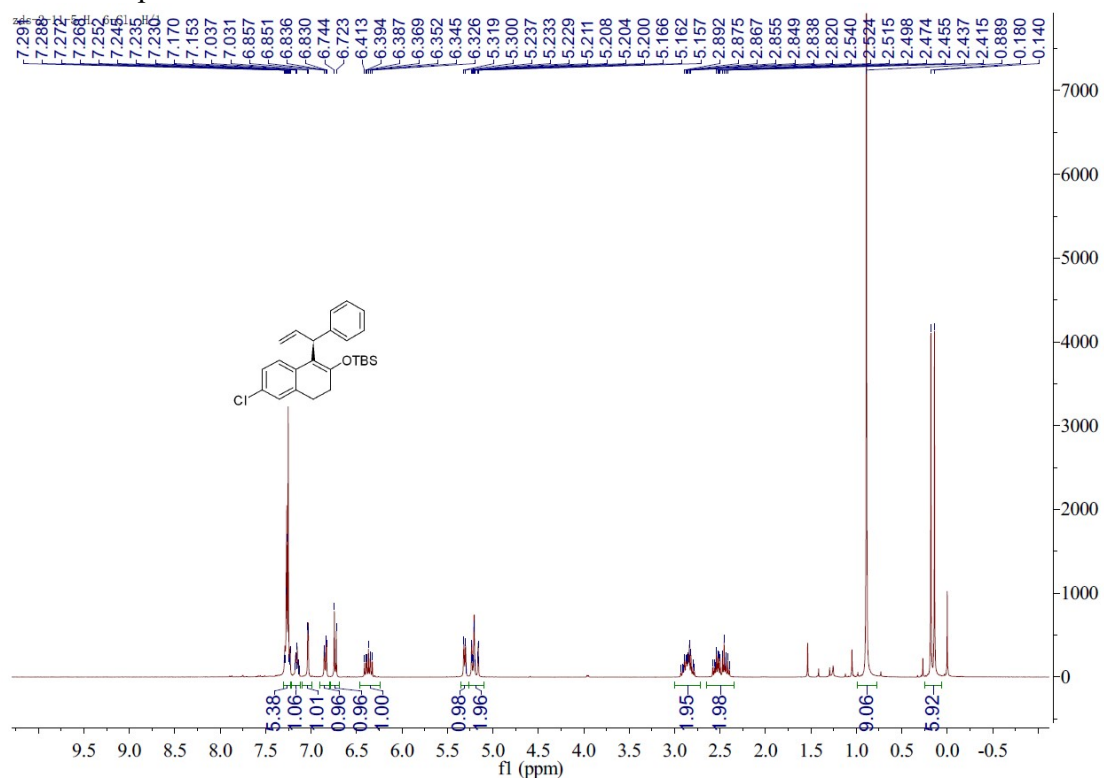
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	24.938	MM	0.7584	112.52441	2.47294	1.9673
2	27.422	MM	0.7270	5607.18848	128.54735	98.0327

Totals : 5719.71288 131.02029

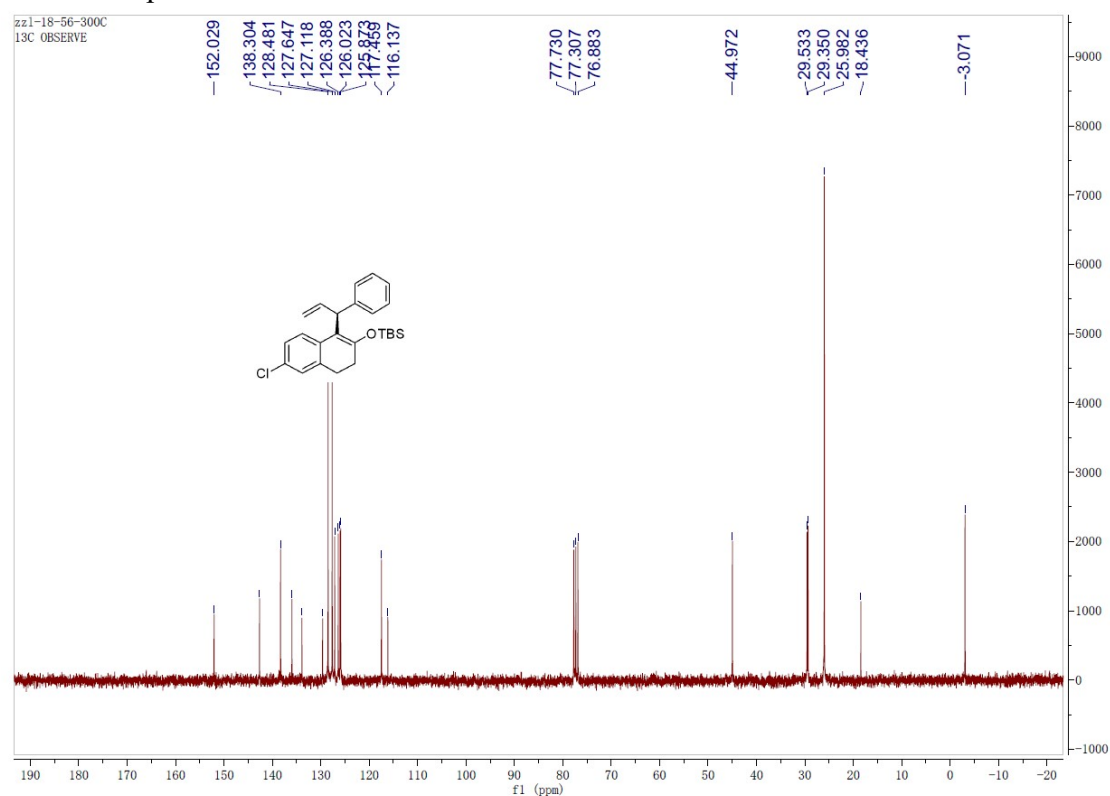
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\*\*\* End of Report \*\*\*



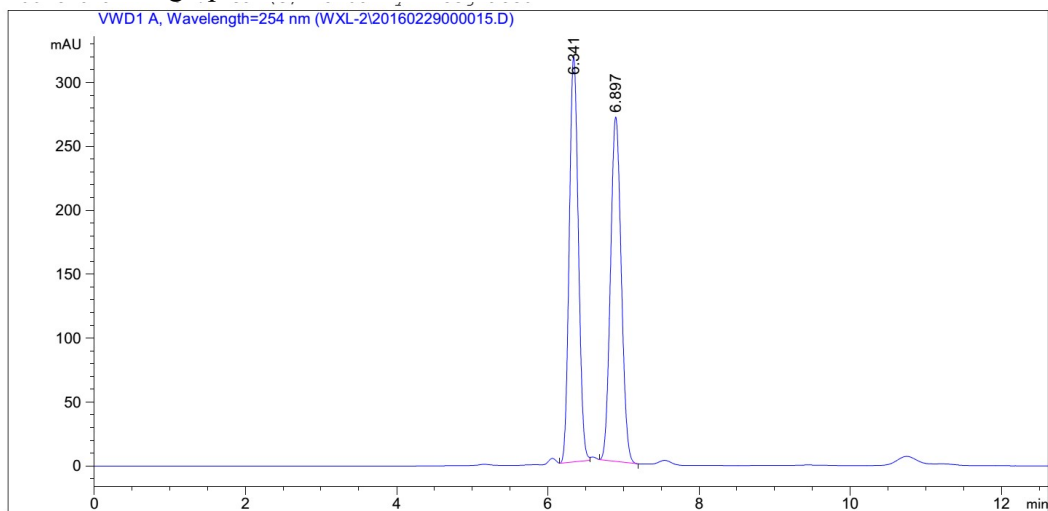
# <sup>1</sup>H NMR Spectra of **3ca**



# <sup>13</sup>C NMR Spectra of **3ca**



# HPLC Chromatograph of 3ca



## Area Percent Report

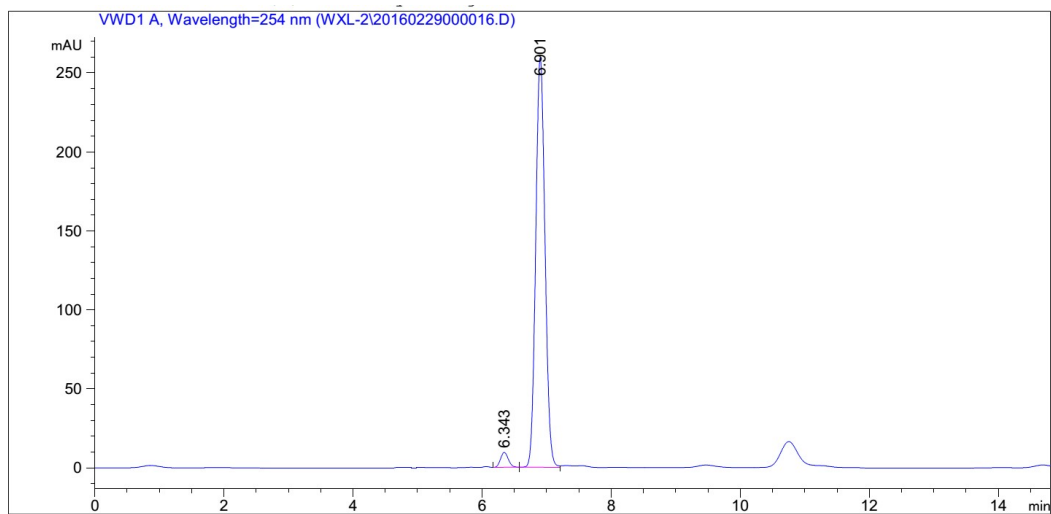
Sorted By : Signal  
Multiplier: : 1.0000  
Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.341	BV	0.1322	2656.67944	317.21860	49.9812
2	6.897	BB	0.1550	2658.67334	269.61063	50.0188

Totals : 5315.35278 586.82922

\*\*\* End of Report \*\*\*



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 Area Percent Report  
 =====

Sorted By : Signal  
 Multiplier: : 1.0000  
 Dilution: : 1.0000  
 Use Multiplier & Dilution Factor with ISTDs

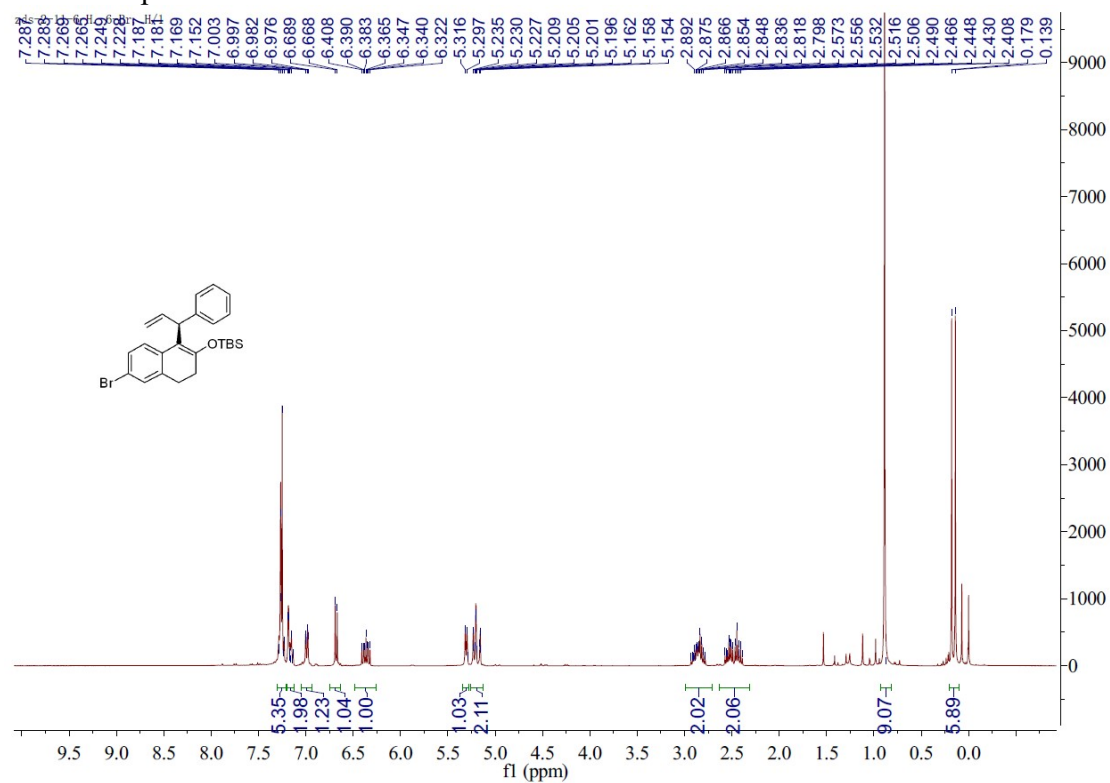
Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.343	BB	0.1317	78.79822	9.41176	2.9536
2	6.901	BV	0.1564	2589.11401	259.51157	97.0464

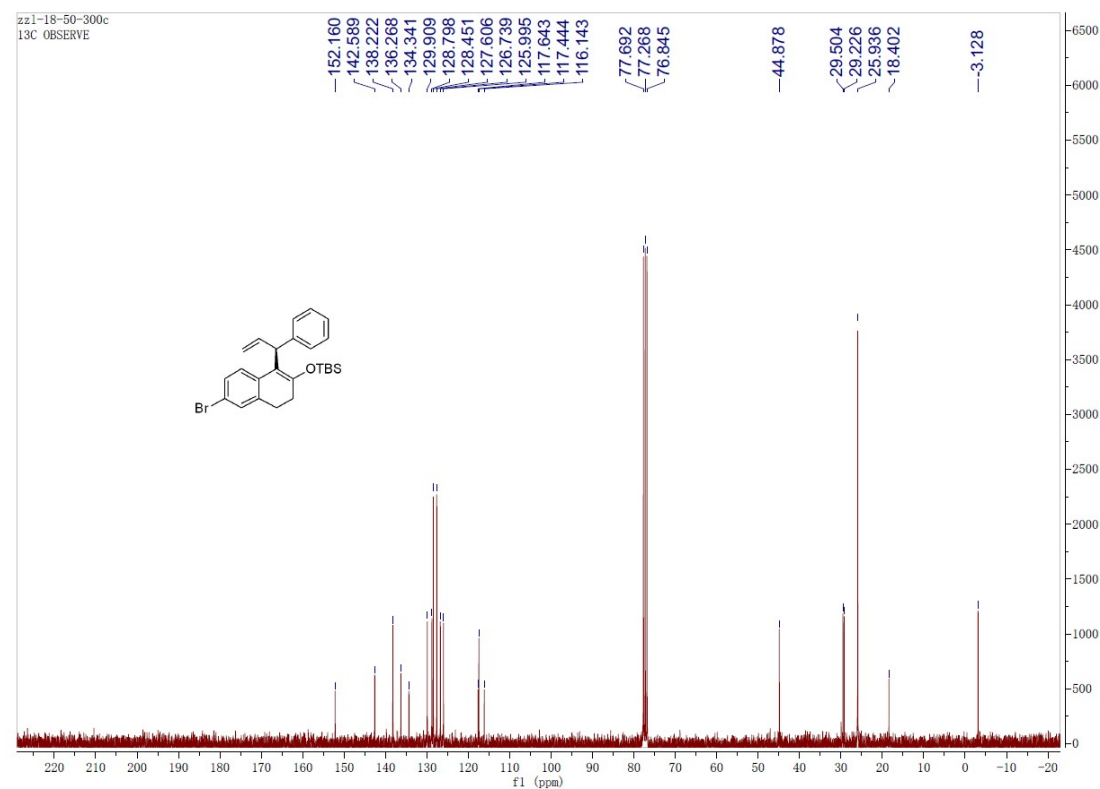
Totals : 2667.91223 268.92332

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 \*\*\* End of Report \*\*\*

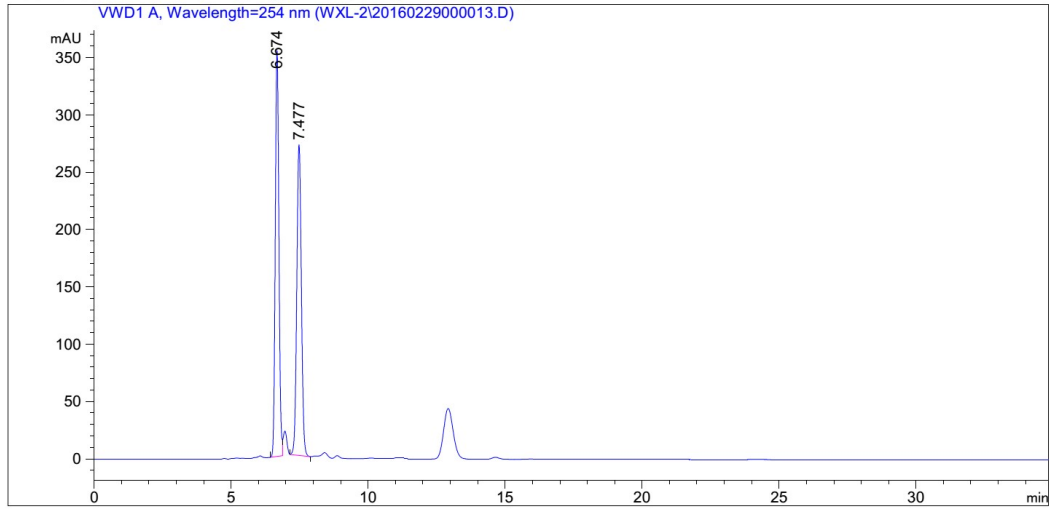
# <sup>1</sup>H NMR Spectra of **3da**



# <sup>13</sup>C NMR Spectra of **3da**



# HPLC Chromatograph of 3da



## Area Percent Report

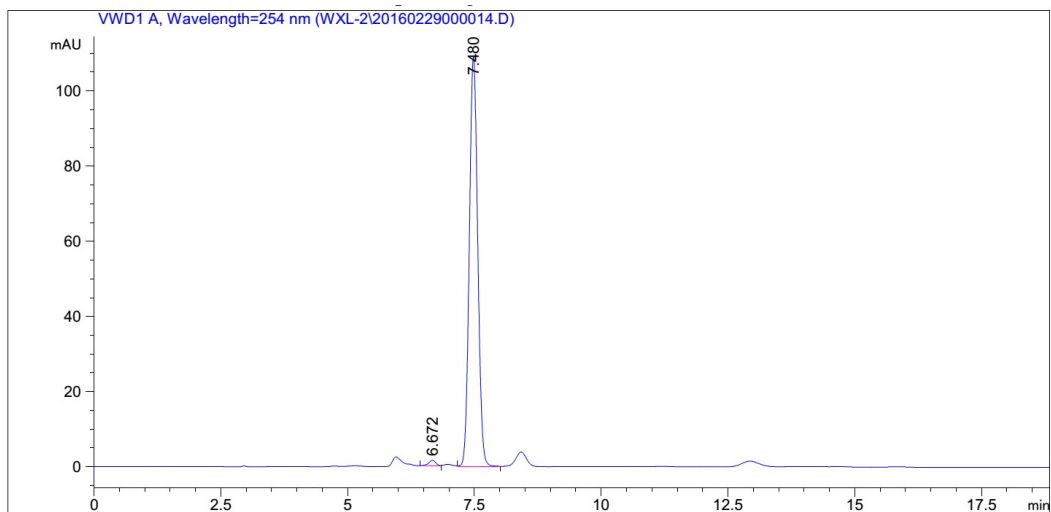
Sorted By : Signal  
Multiplier: : 1.0000  
Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.674	BV	0.1440	3262.19849	354.00357	50.9179
2	7.477	BB	0.1809	3144.58740	271.00266	49.0821

Totals : 6406.78589 625.00623

\*\*\* End of Report \*\*\*



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Area Percent Report  
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Sorted By : Signal  
Multiplier: : 1.0000  
Dilution: : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

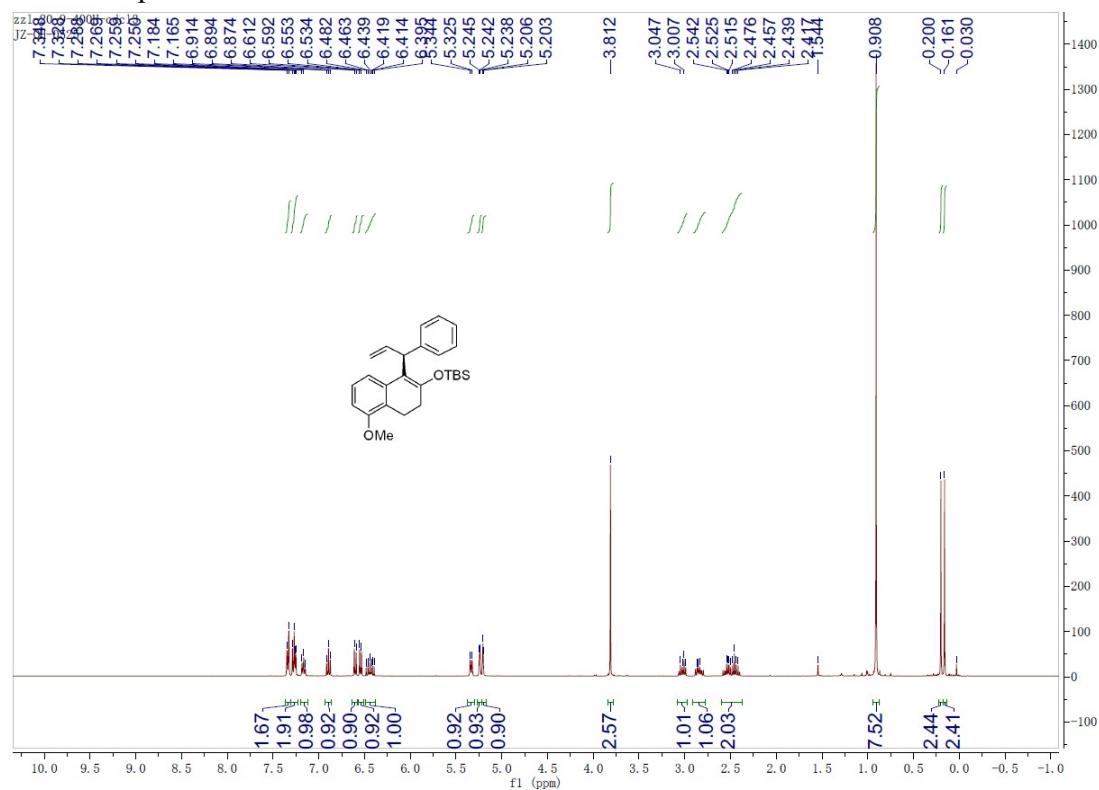
Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.672	MM	0.1633	14.30629	1.46009	1.1286
2	7.480	VB	0.1797	1253.34546	108.95834	98.8714

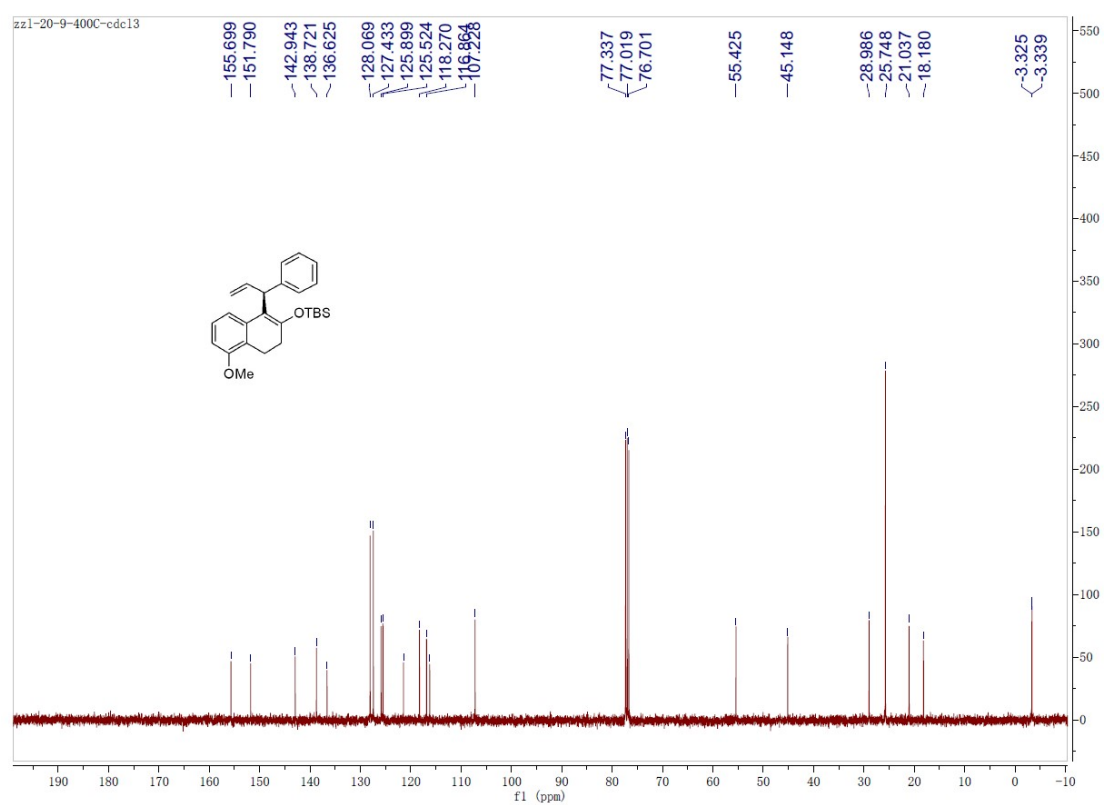
Totals : 1267.65175 110.41843

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\*\*\* End of Report \*\*\*

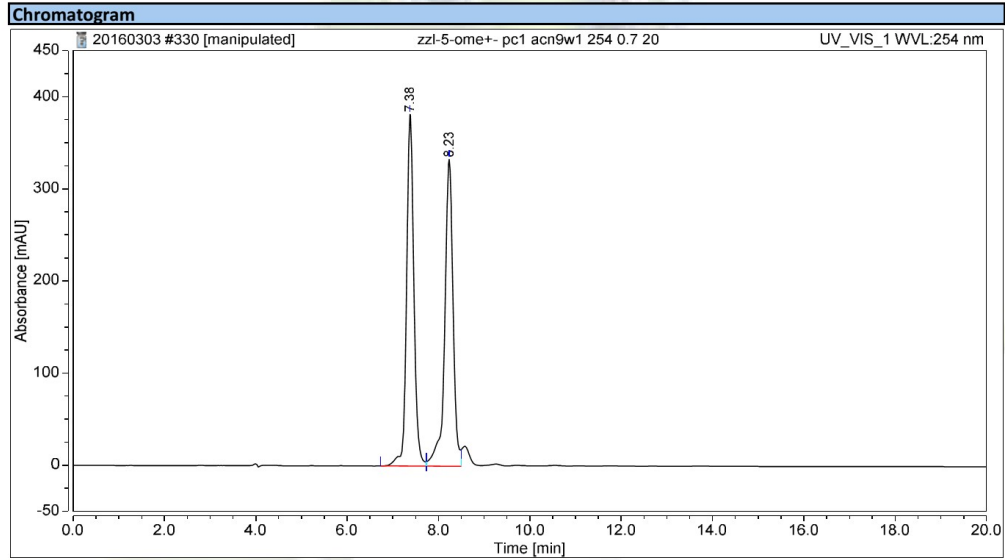
# <sup>1</sup>H NMR Spectra of **3ea**



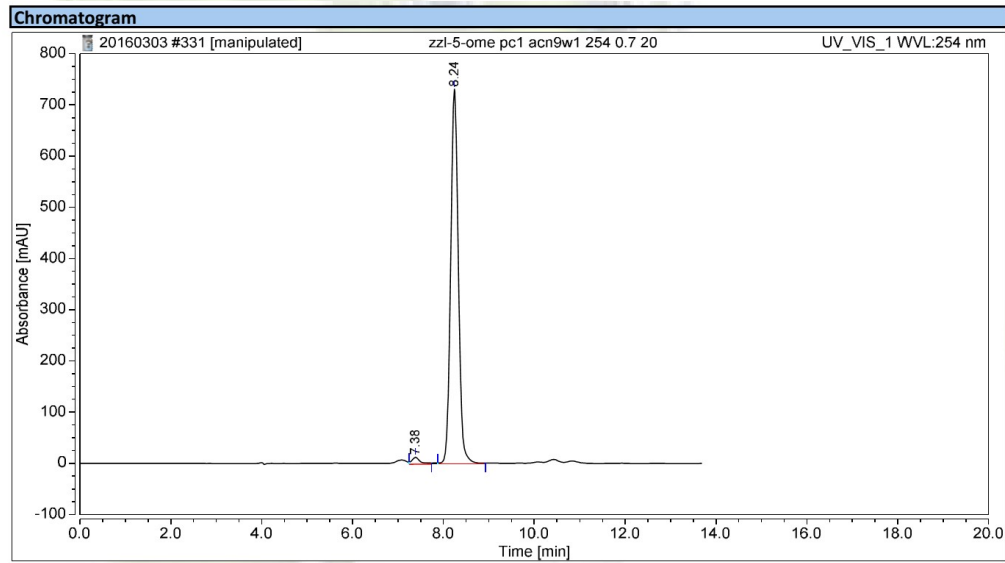
# <sup>13</sup>C NMR Spectra of **3ea**



# HPLC Chromatograph of 3ea



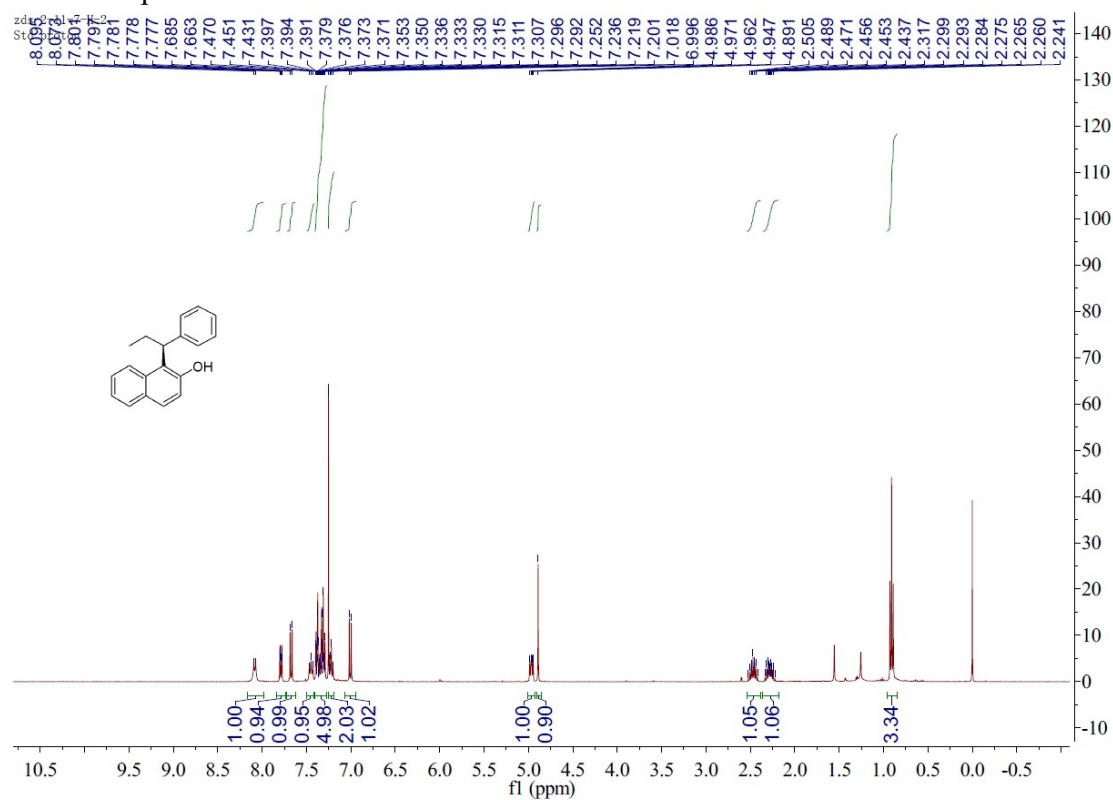
Integration Results				
No.	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	7.377	70.375	381.693	49.91
2	8.233	70.628	332.905	50.09
Total:		141.003	714.598	100.00



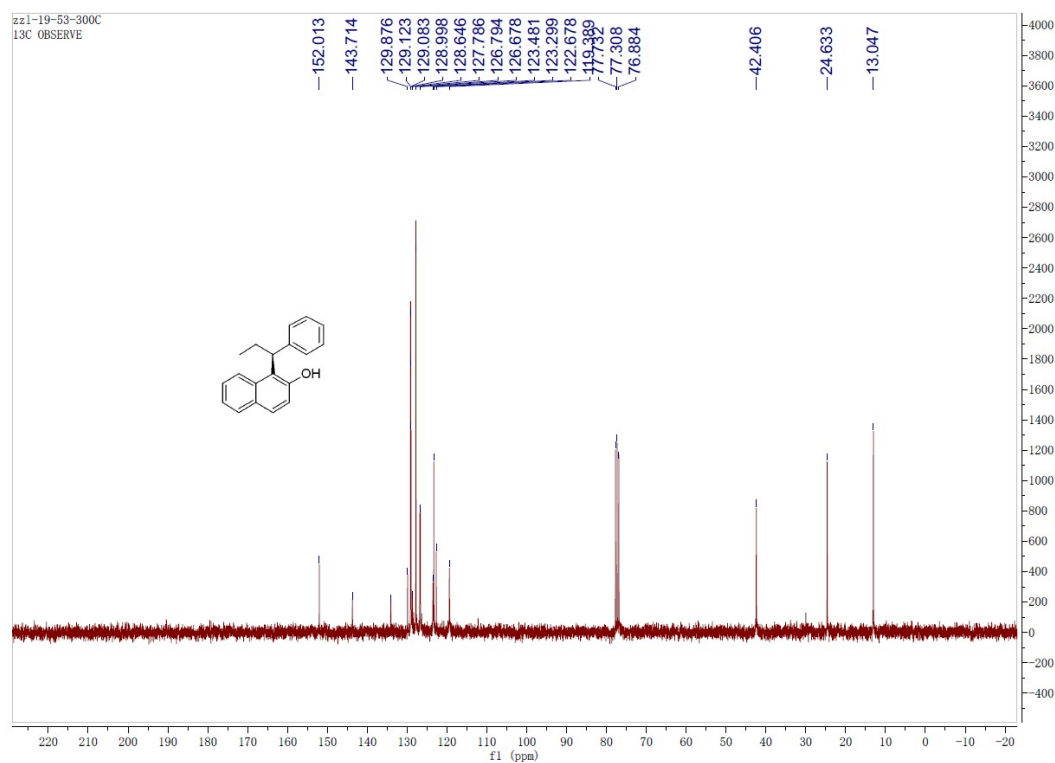
Integration Results				
No.	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	7.383	2.994	13.627	2.06
2	8.240	142.666	732.048	97.94
Total:		145.660	745.675	100.00



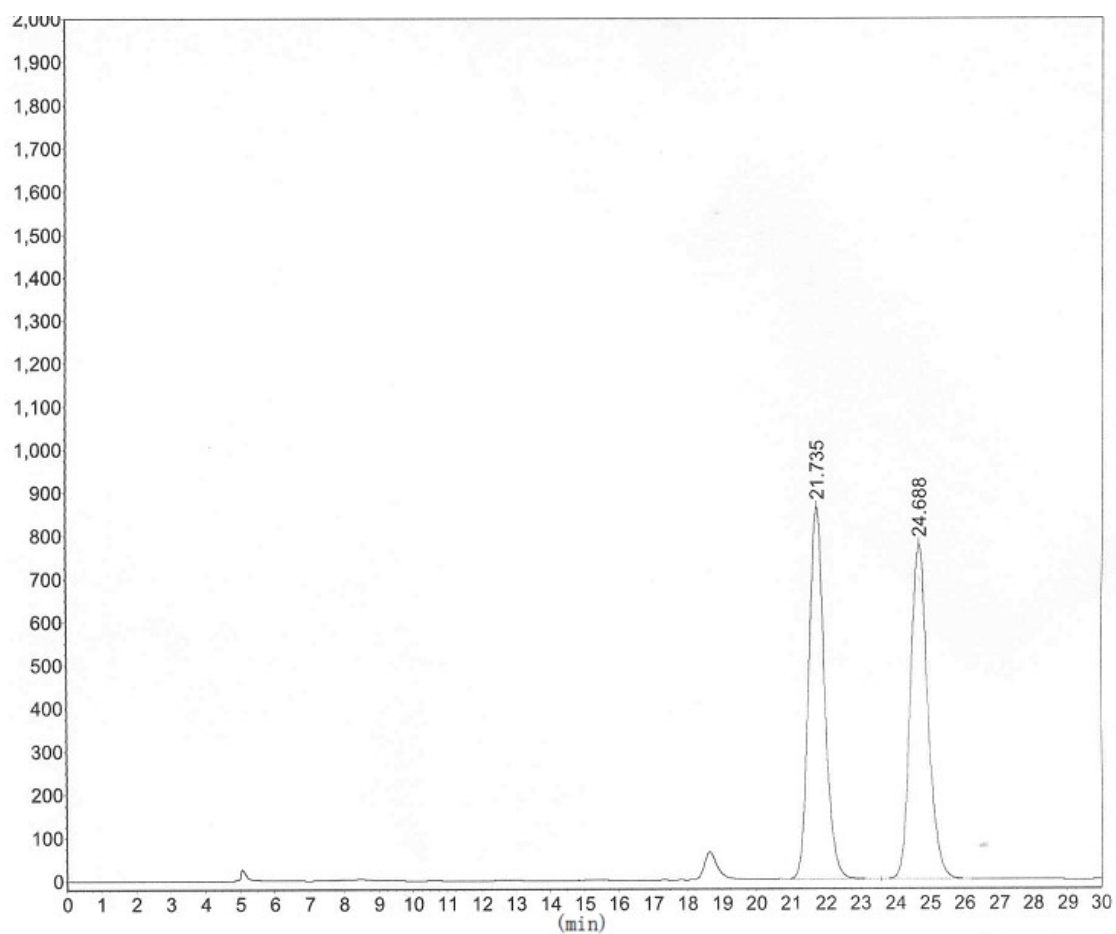
# <sup>1</sup>H NMR Spectra of **5aa**



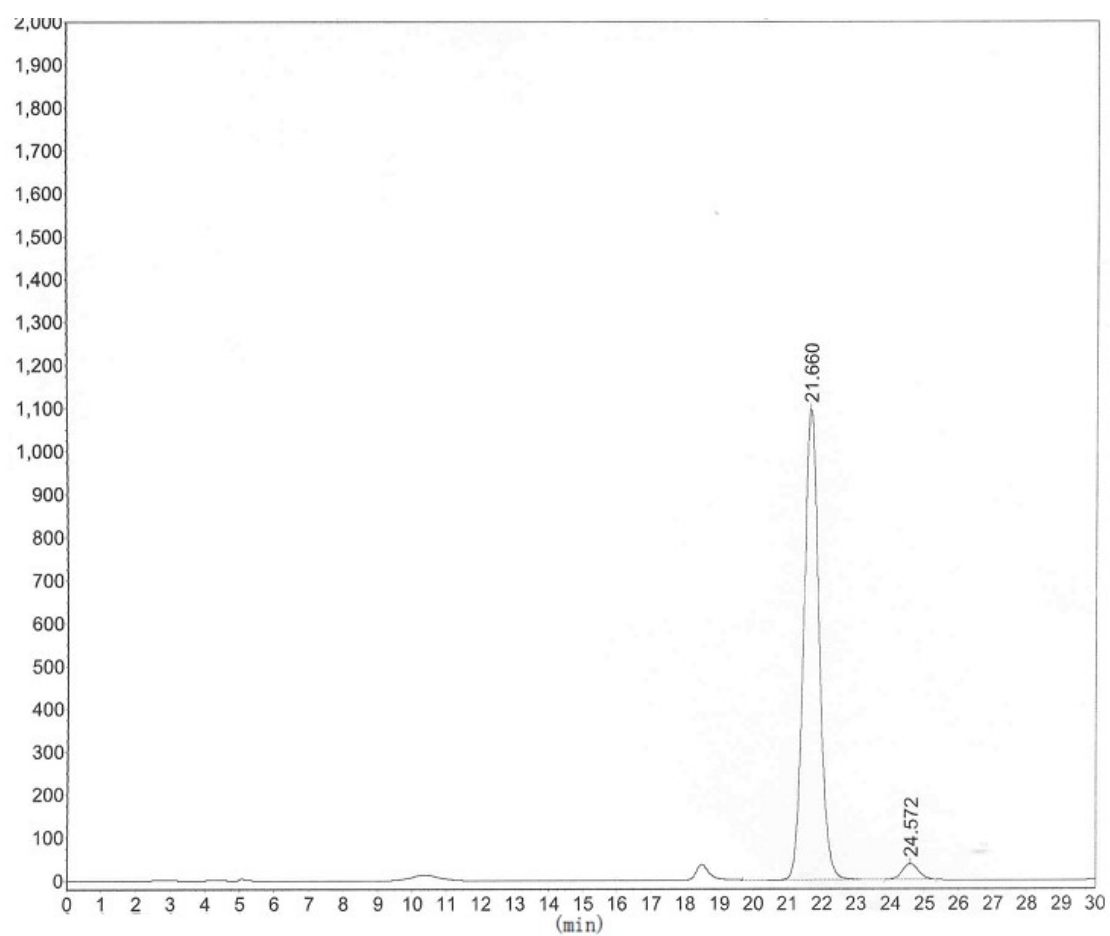
# <sup>13</sup>C NMR Spectrum of **5aa**



# HPLC Chromatograph of 5aa



Peak No.	R. Time	Peak Height	Peak Area	Percent
1	21.735	866498.188	27373732.000	50.1438
2	24.688	777935.250	27216754.000	49.8562
<b>Total</b>		1644433.438	54590486.000	100.0000



Peak No.	R. Time	Peak Height	Peak Area	Percent
1	21.660	1097043.750	34004288.000	96.6084
2	24.572	36563.223	1193778.500	3.3916
<b>Total</b>		1133606.973	35198066.500	100.0000