Supporting Information

$Bi(OTf)_3$-Mediated Tandem Annulation of 1-Aryl Isochroman-3-ones with Oxygenated Arenes. One-Pot Synthesis of Polyoxygenated Homotriptycenes

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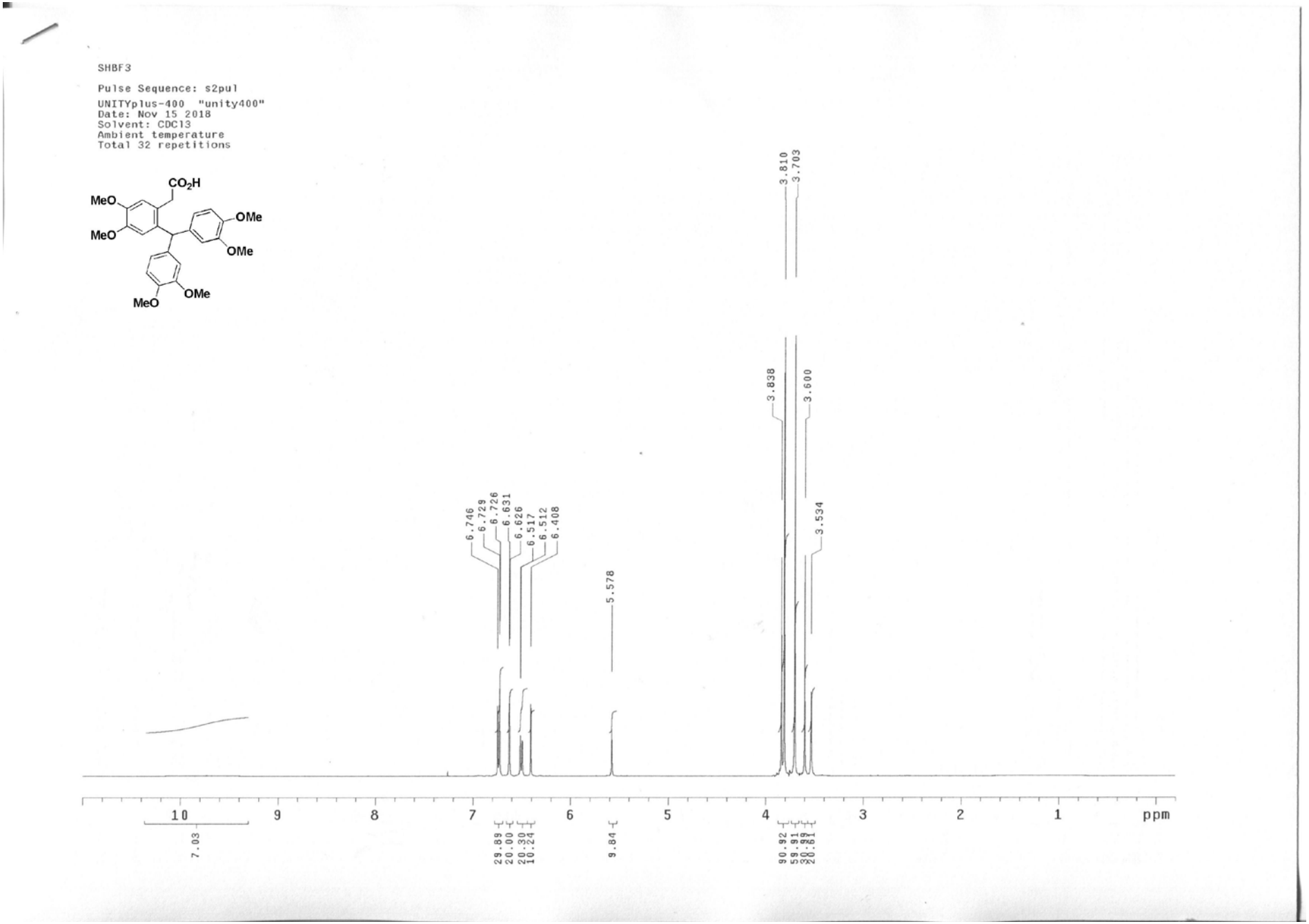
Compound 4a (^{1}H-NMR spectral data)

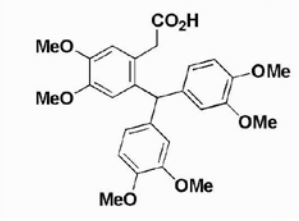


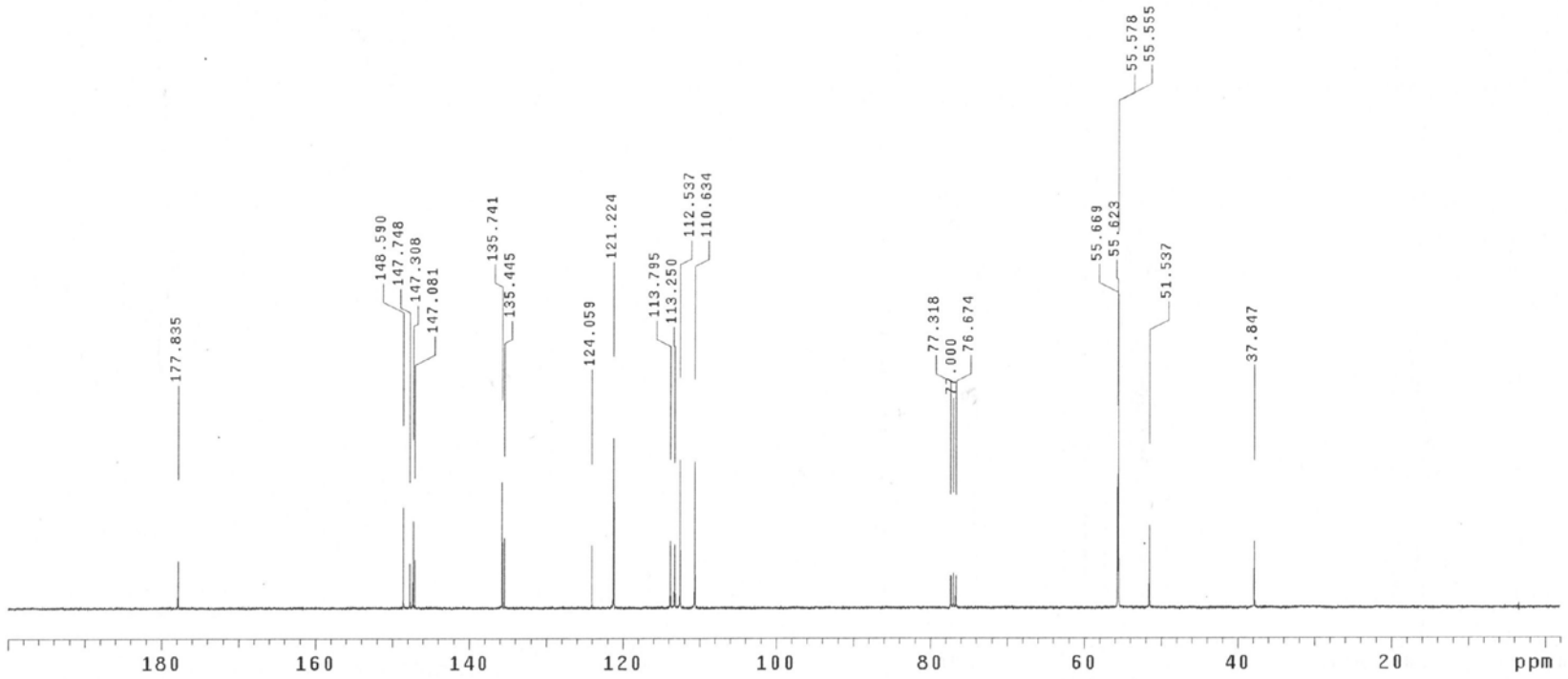
Compound 4a (^{13}C-NMR spectral data)

SHBF3

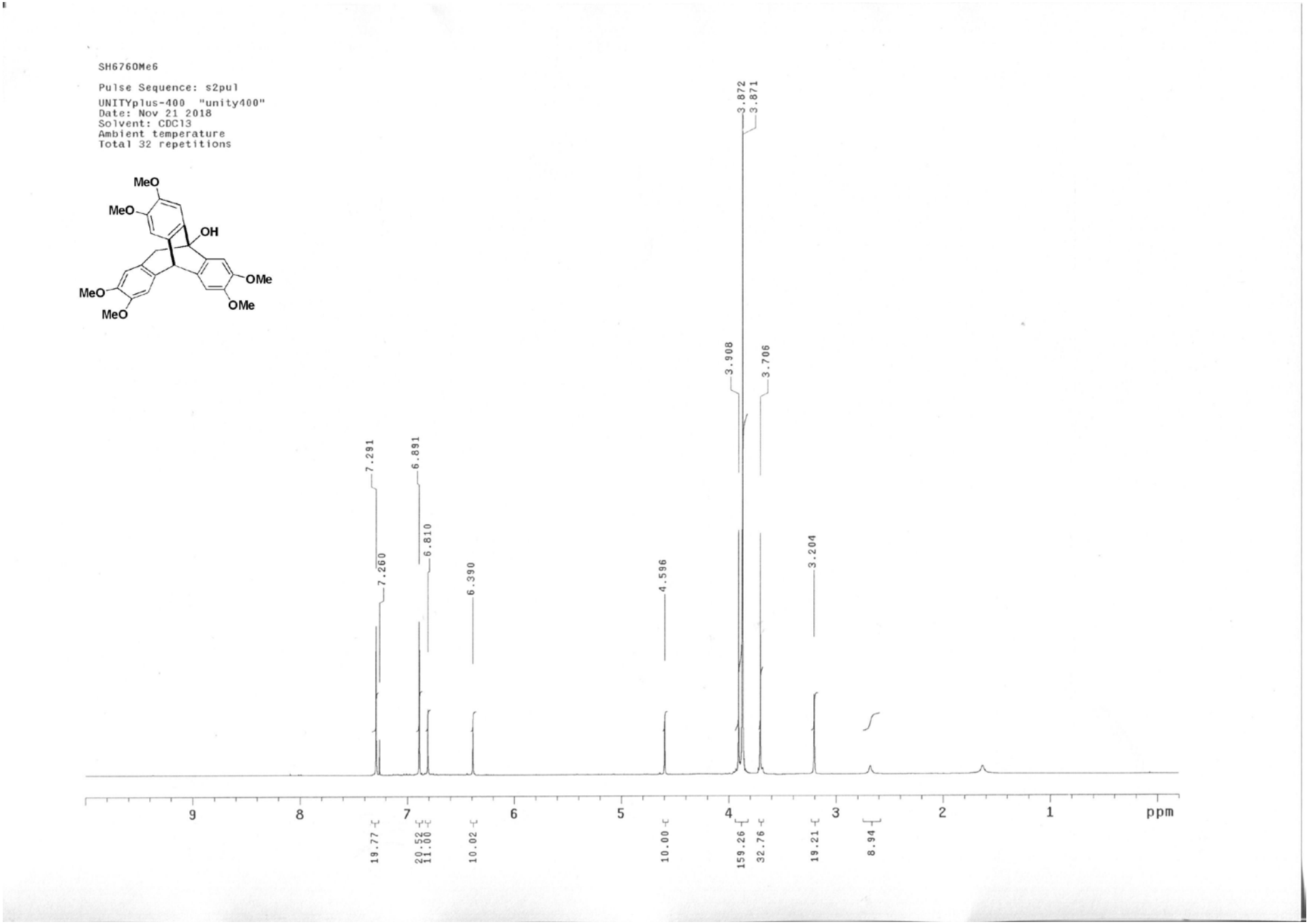
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Nov 15 2018
Solvent: CDCl3
Ambient temperature
Total 480 repetitions

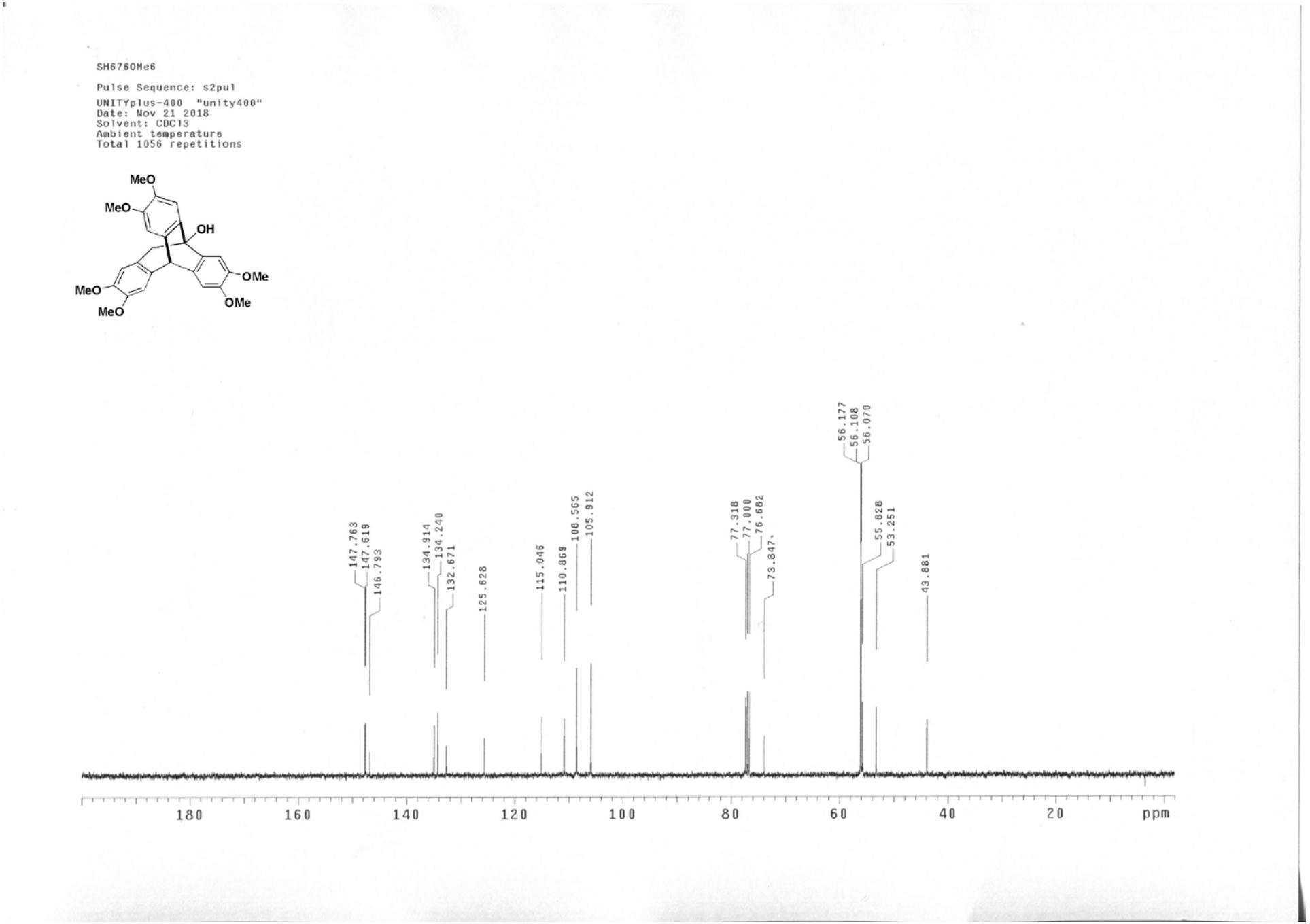




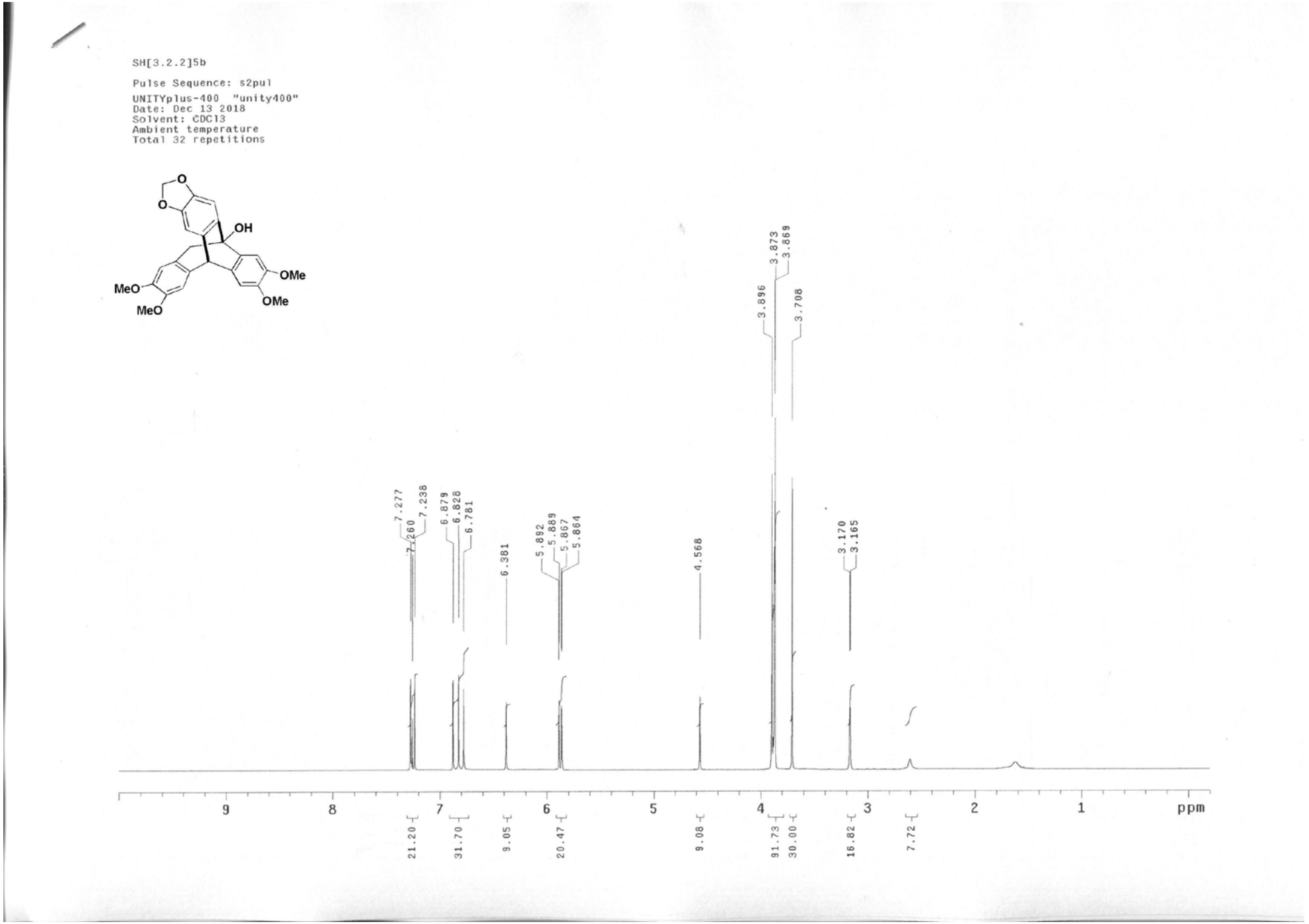
Compound 5a (^{1}H-NMR spectral data)



Compound 5a (^{13}C-NMR spectral data)



Compound 5b (^{1}H-NMR spectral data)

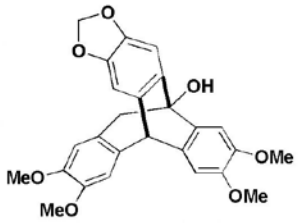


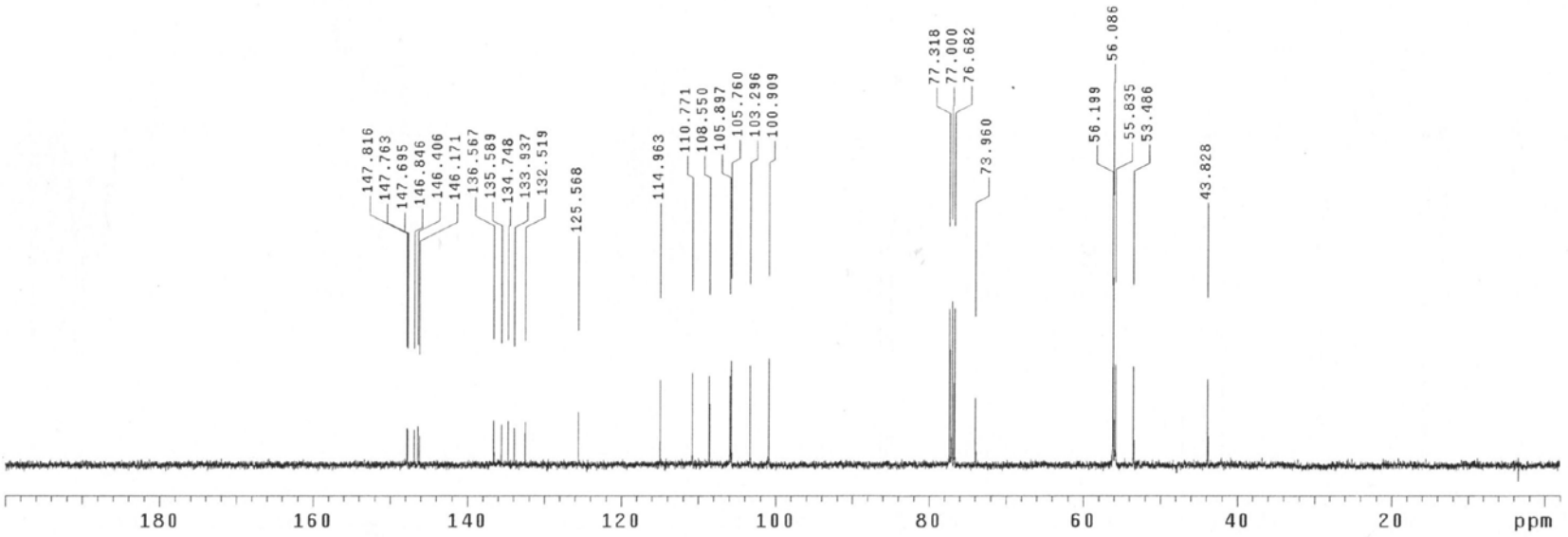
Compound 5b (^{13}C-NMR spectral data)

SH[3.2.2]5b

Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Dec 13 2018
Solvent: CDCl3
Ambient temperature
Total 1648 repetitions





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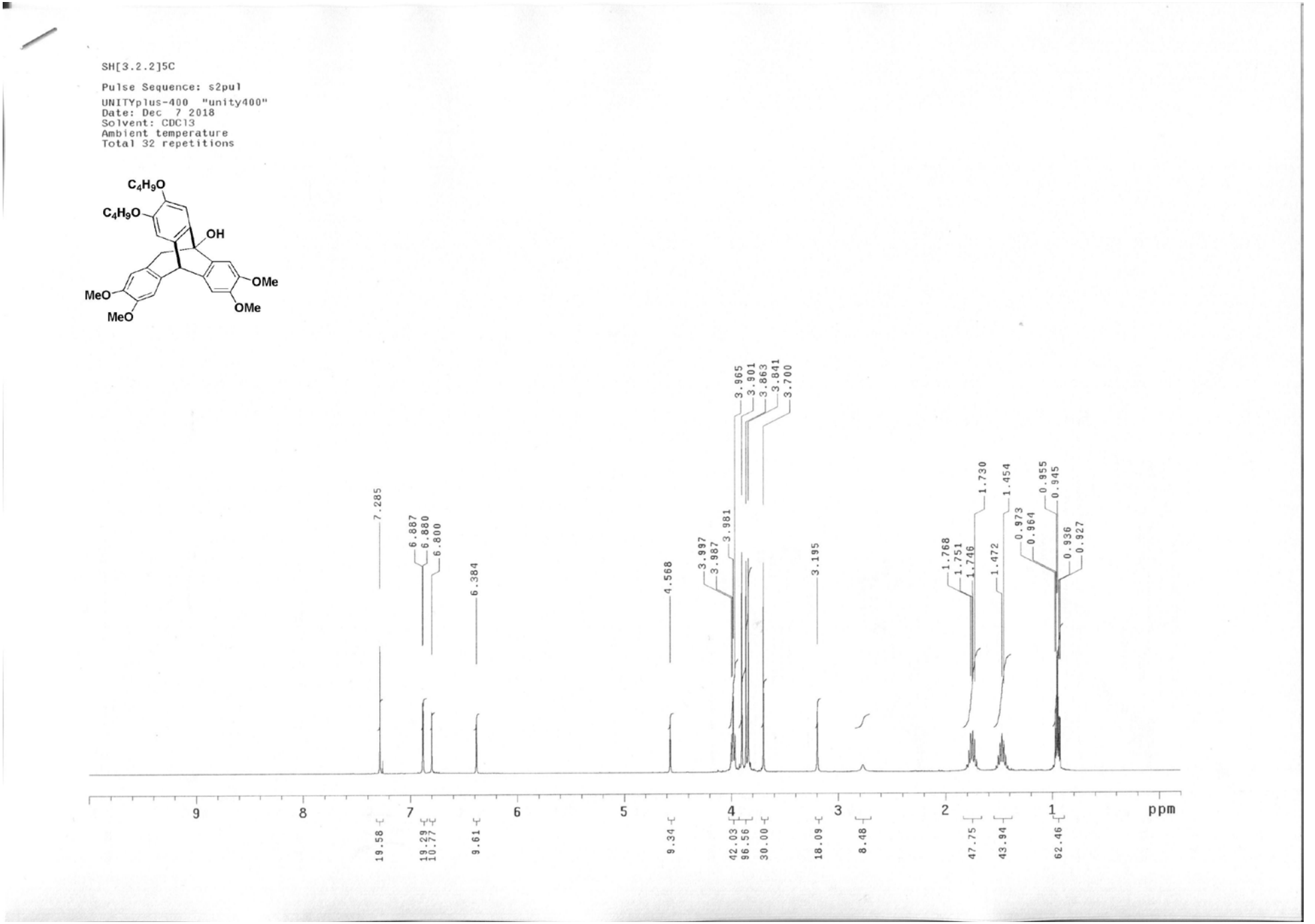

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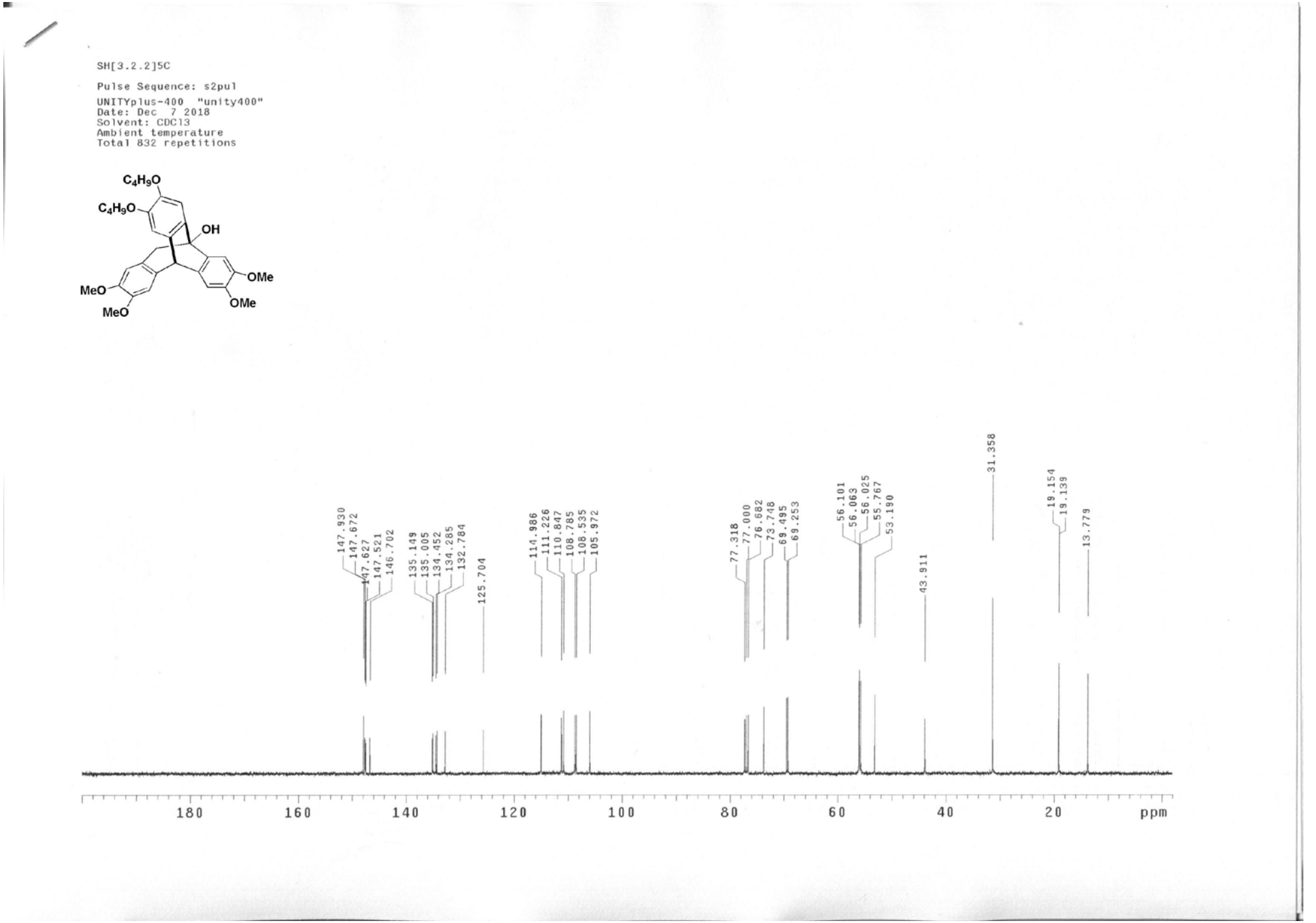
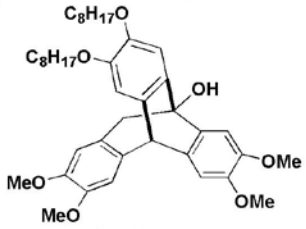
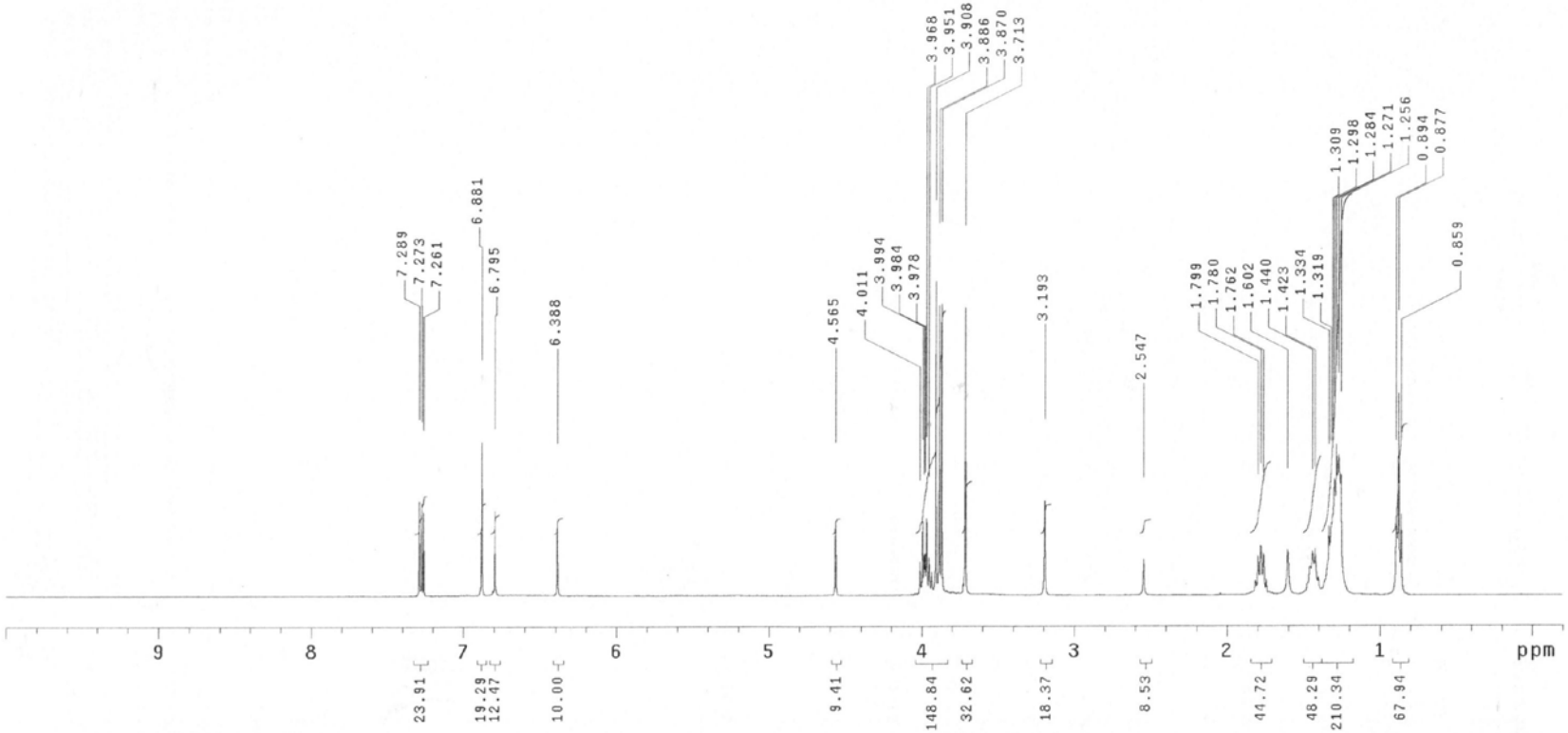


Compound 5d (^{1}H-NMR spectral data)

SH[3.2.2]5d

Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Jan 9 2019
Solvent: CDCl3
Ambient temperature
Total 64 repetitions



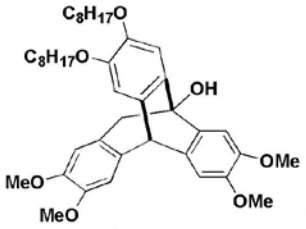


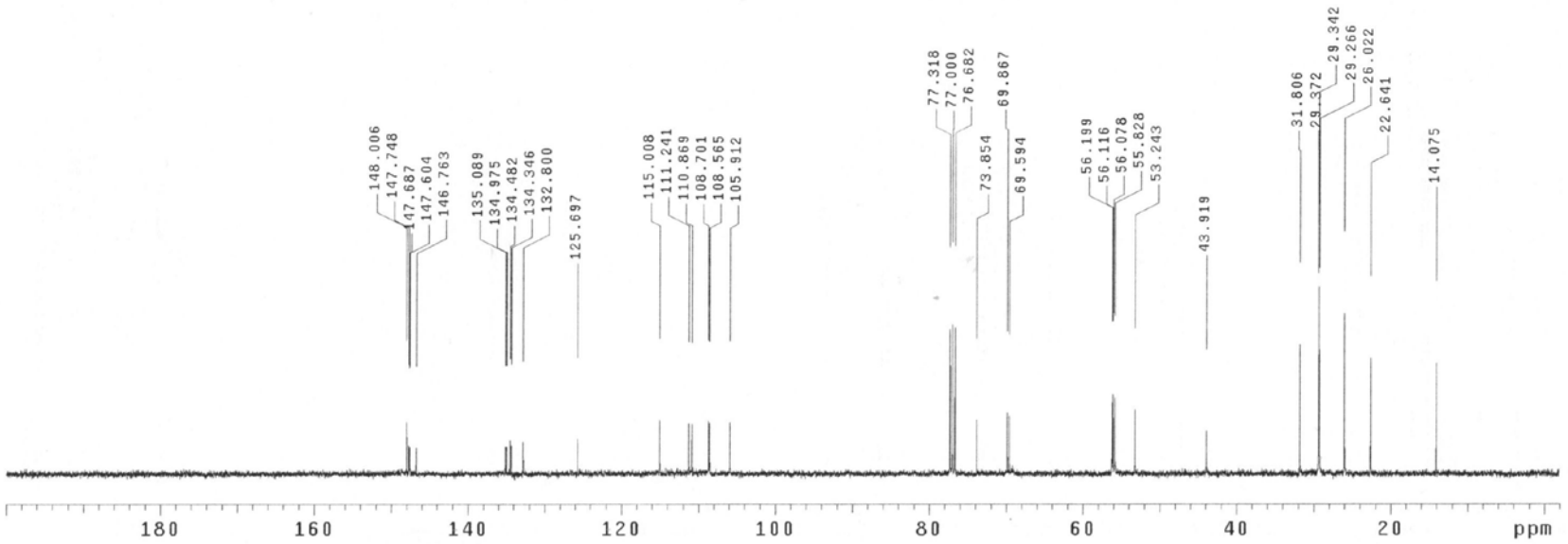
Compound 5d (^{13}C-NMR spectral data)

SH[3.2.2]5d

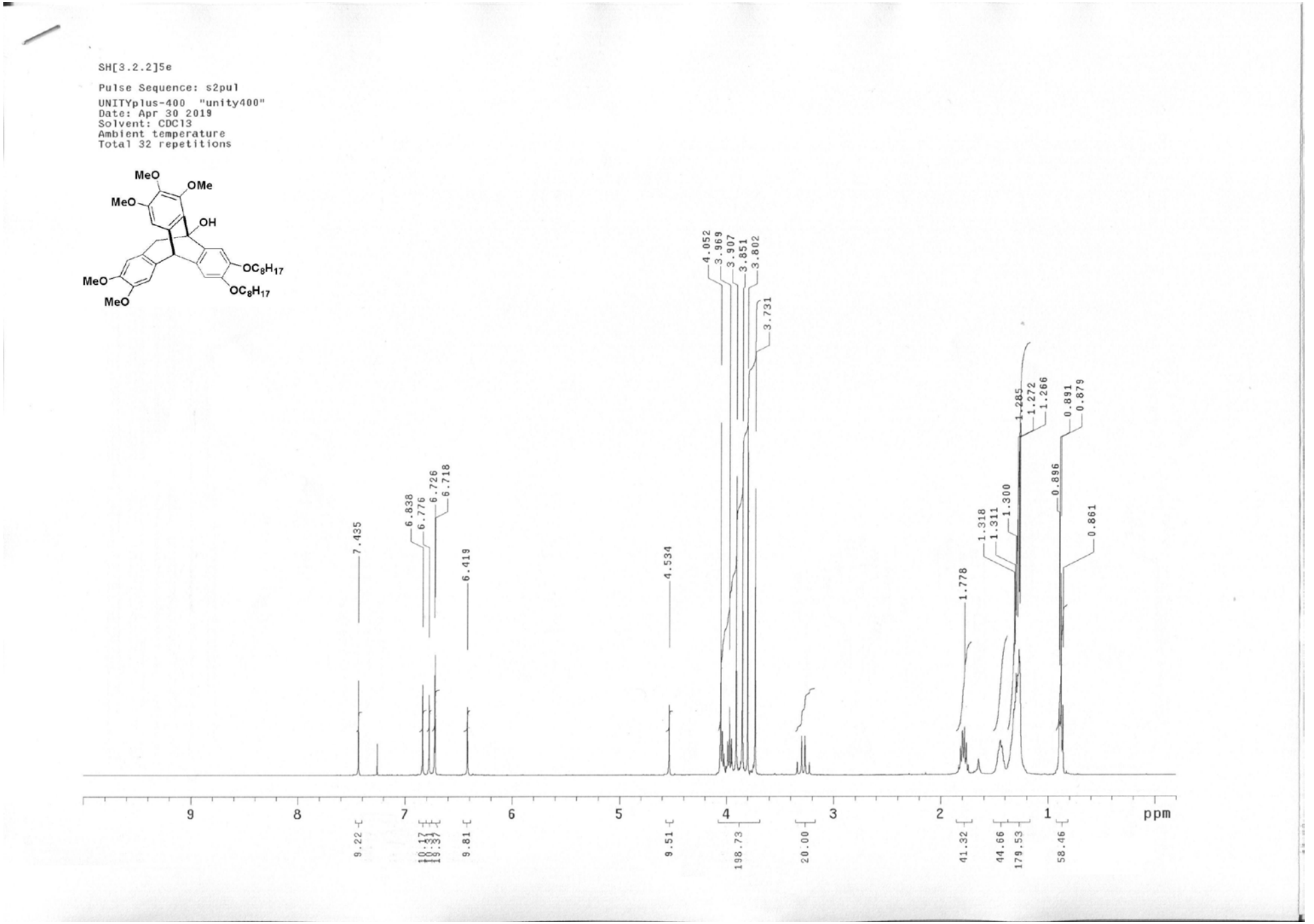
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 9 2019
Solvent: CDCl3
Ambient temperature
Total 2480 repetitions





Compound 5e (^{1}H-NMR spectral data)

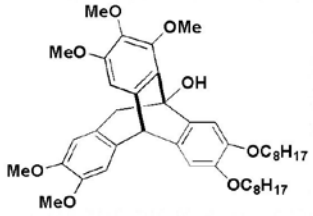


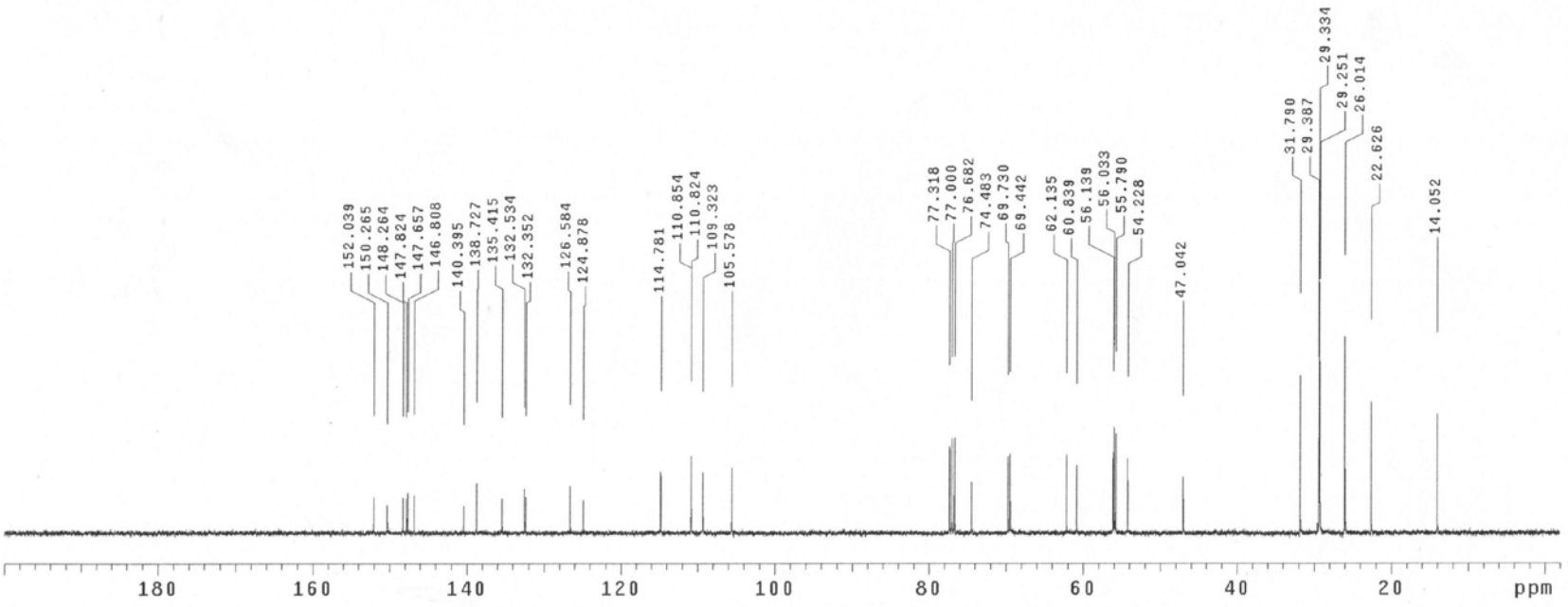
Compound 5e (^{13}C-NMR spectral data)

SH[3.2.2]5e

Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Apr 30 2019
Solvent: CDCl3
Ambient temperature
Total 1040 repetitions

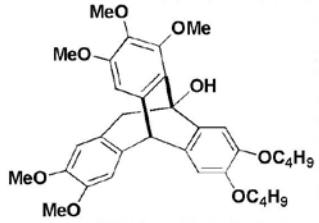


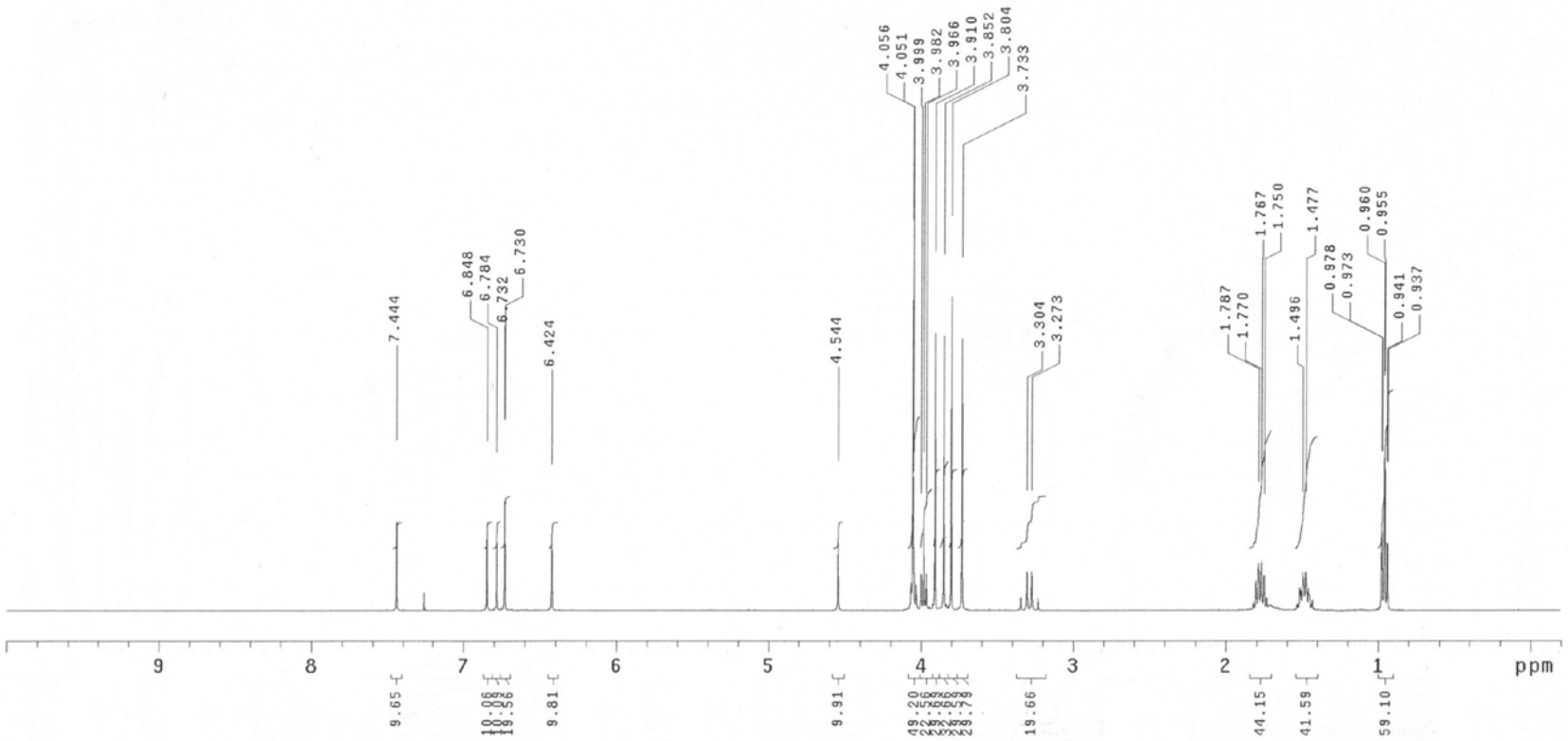


Compound 5f (^{1}H-NMR spectral data)

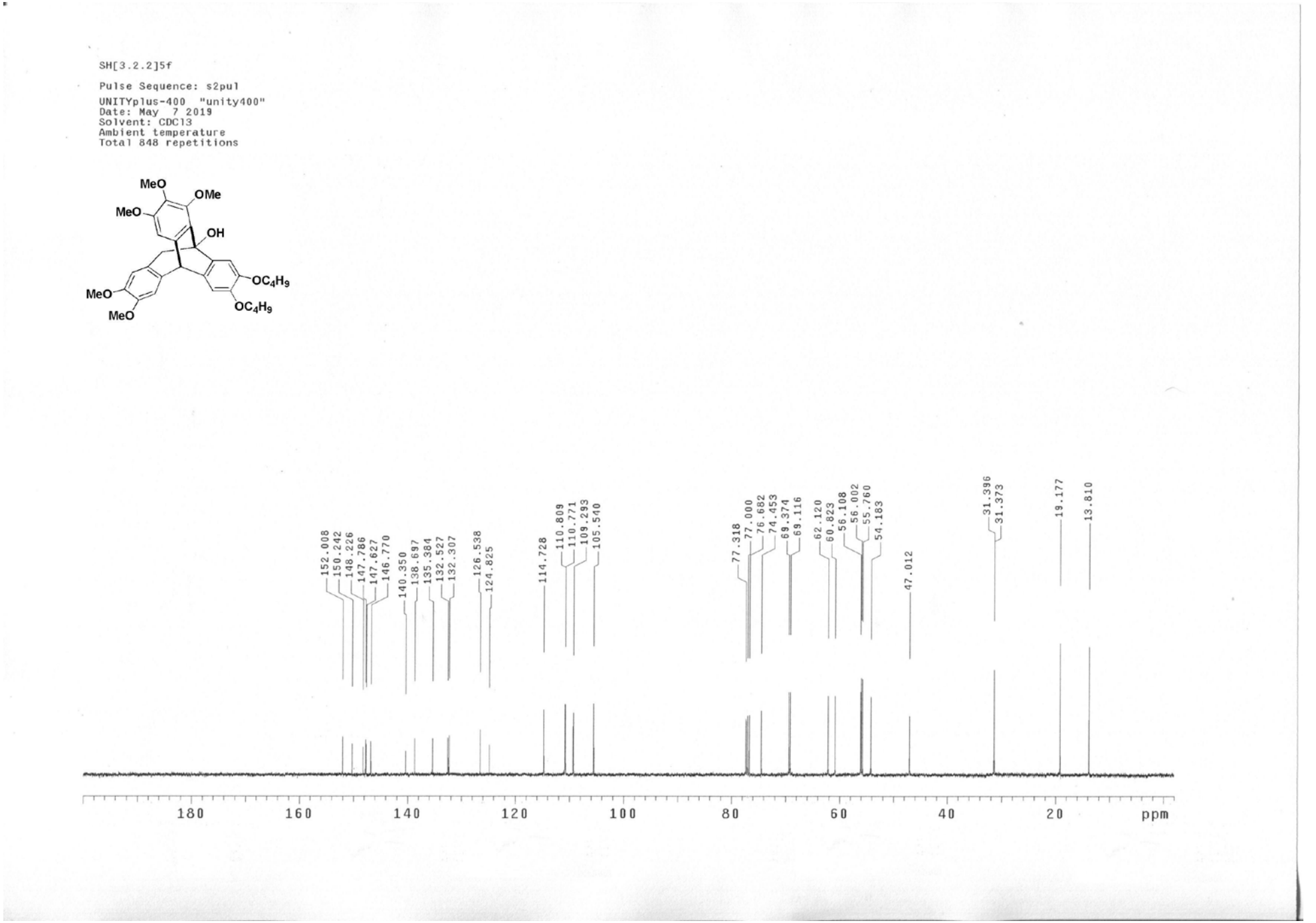
SH[3.2.2]5f

Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: May 7 2019
Solvent: CDCl3
Ambient temperature
Total 32 repetitions





Compound 5f (^{13}C-NMR spectral data)

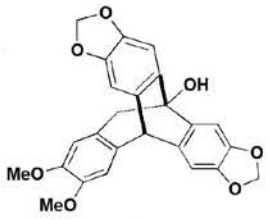


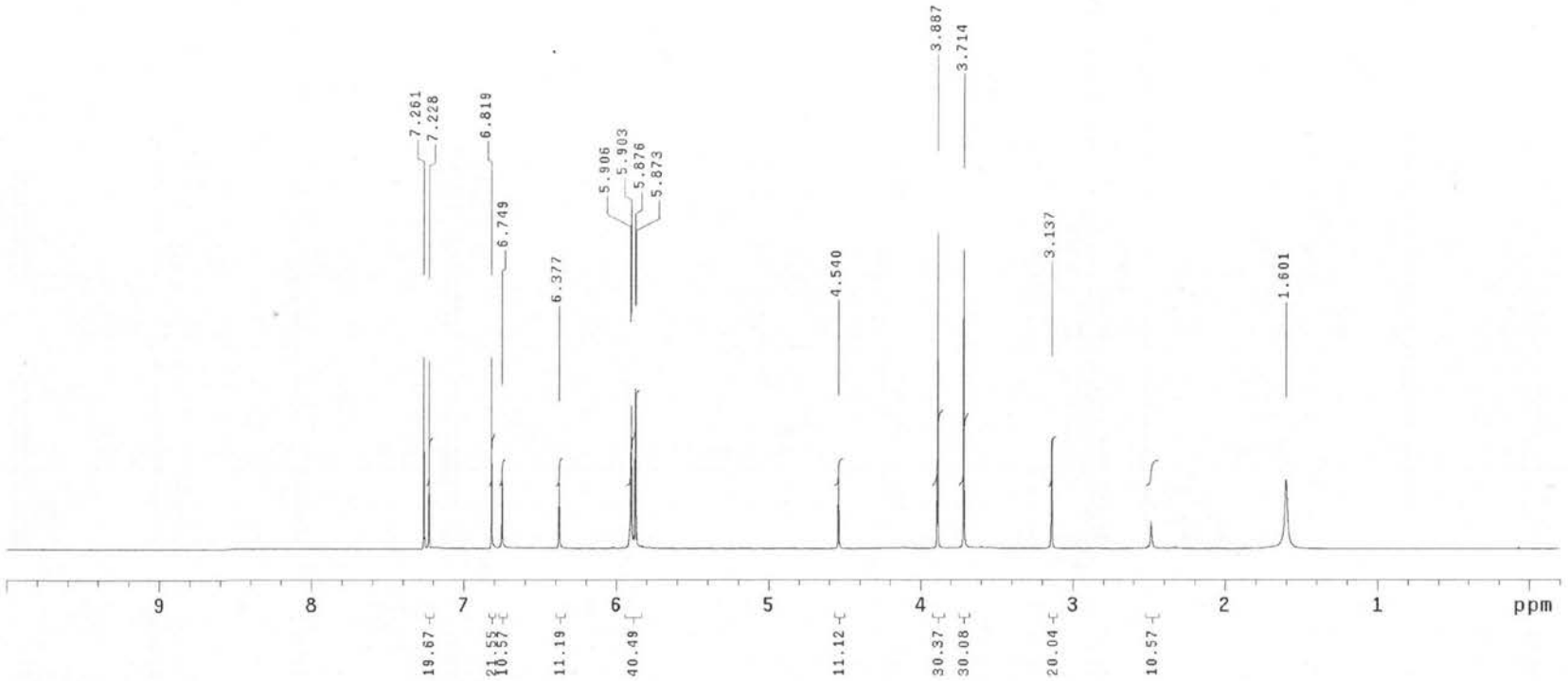
Compound 5g (^{1}H-NMR spectral data)

SH[3.2.2]5g

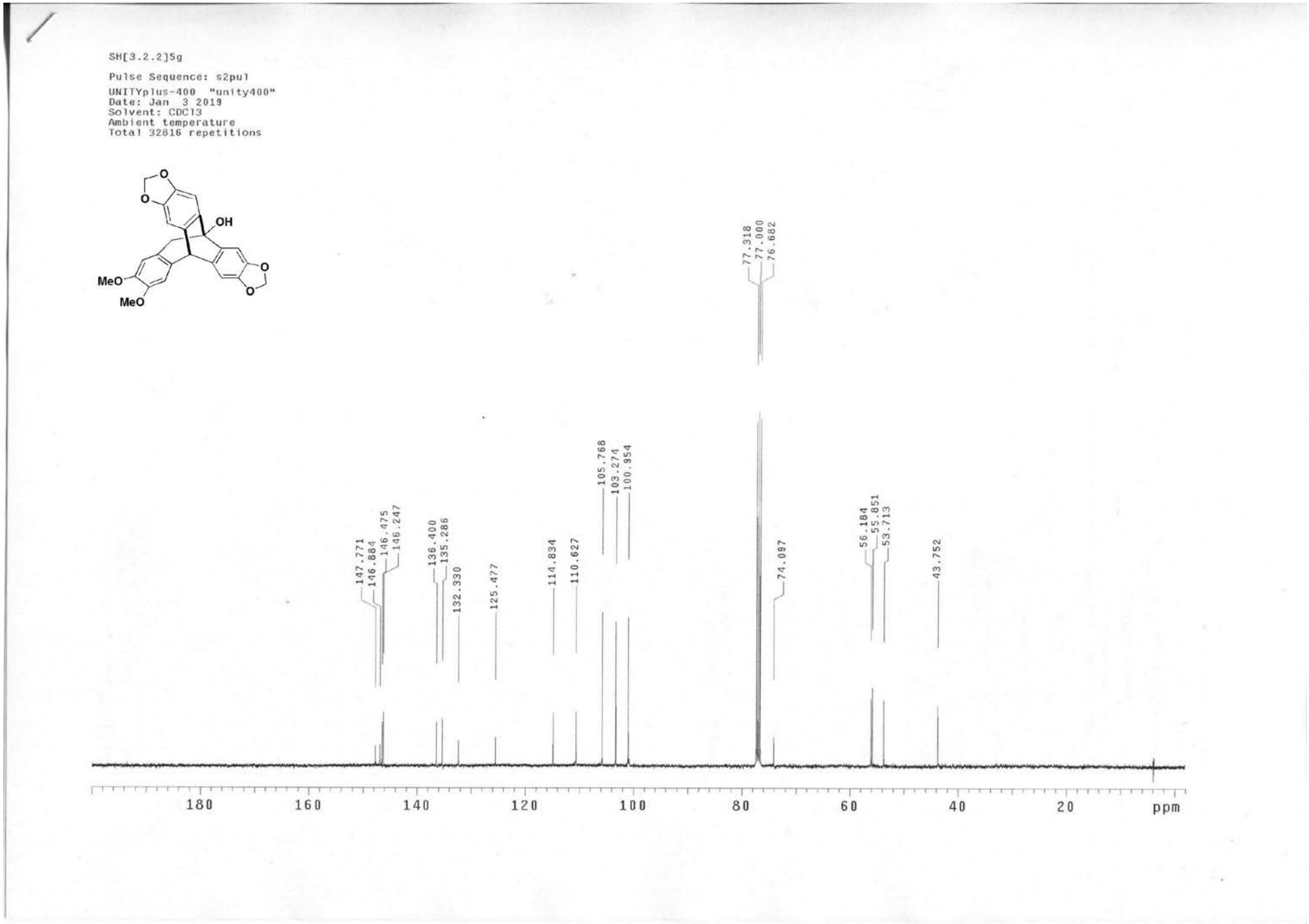
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 3 2019
Solvent: CDCl3
Ambient temperature
Total 64 repetitions





Compound 5g (^{13}C-NMR spectral data)

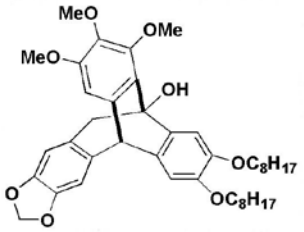


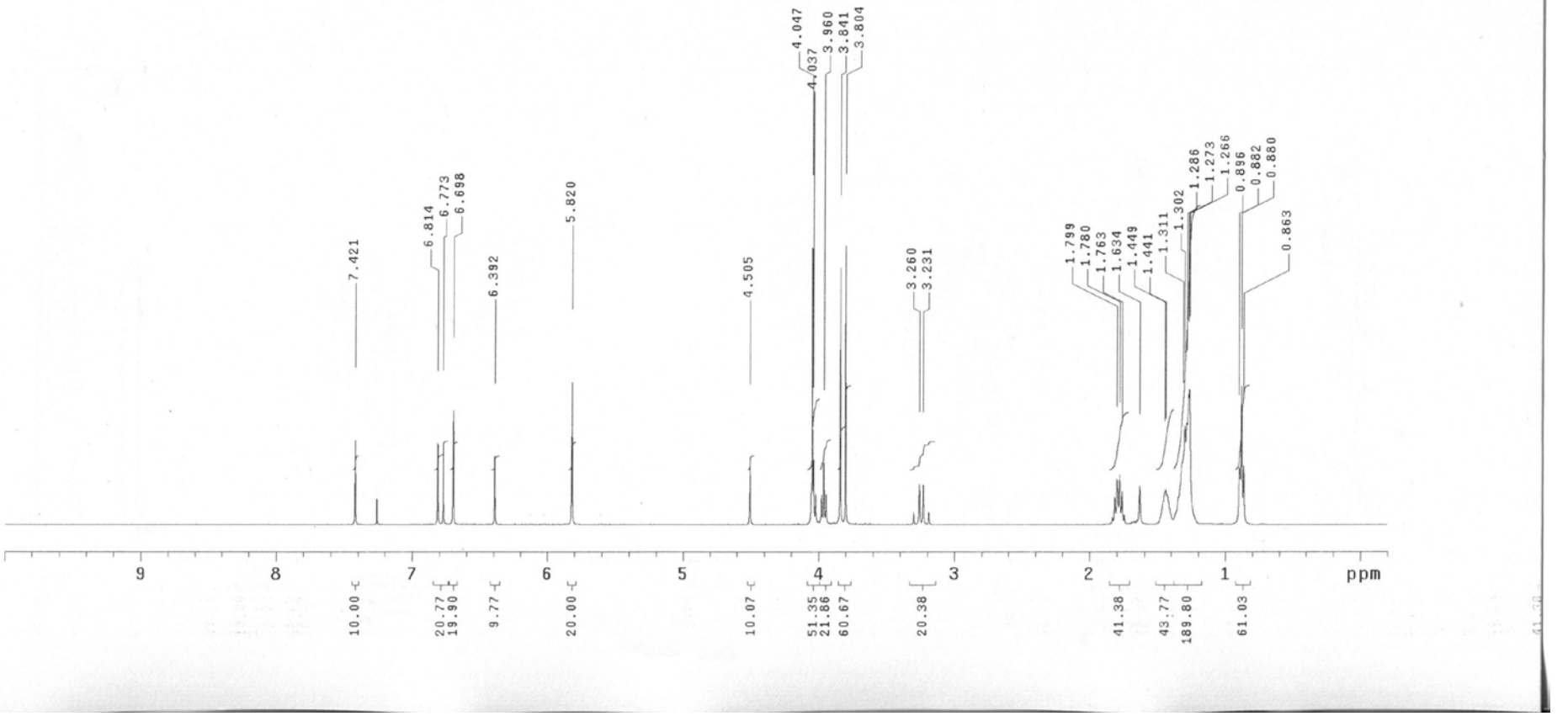
Compound 5h (^{1}H-NMR spectral data)

SH[3.2.2]5h

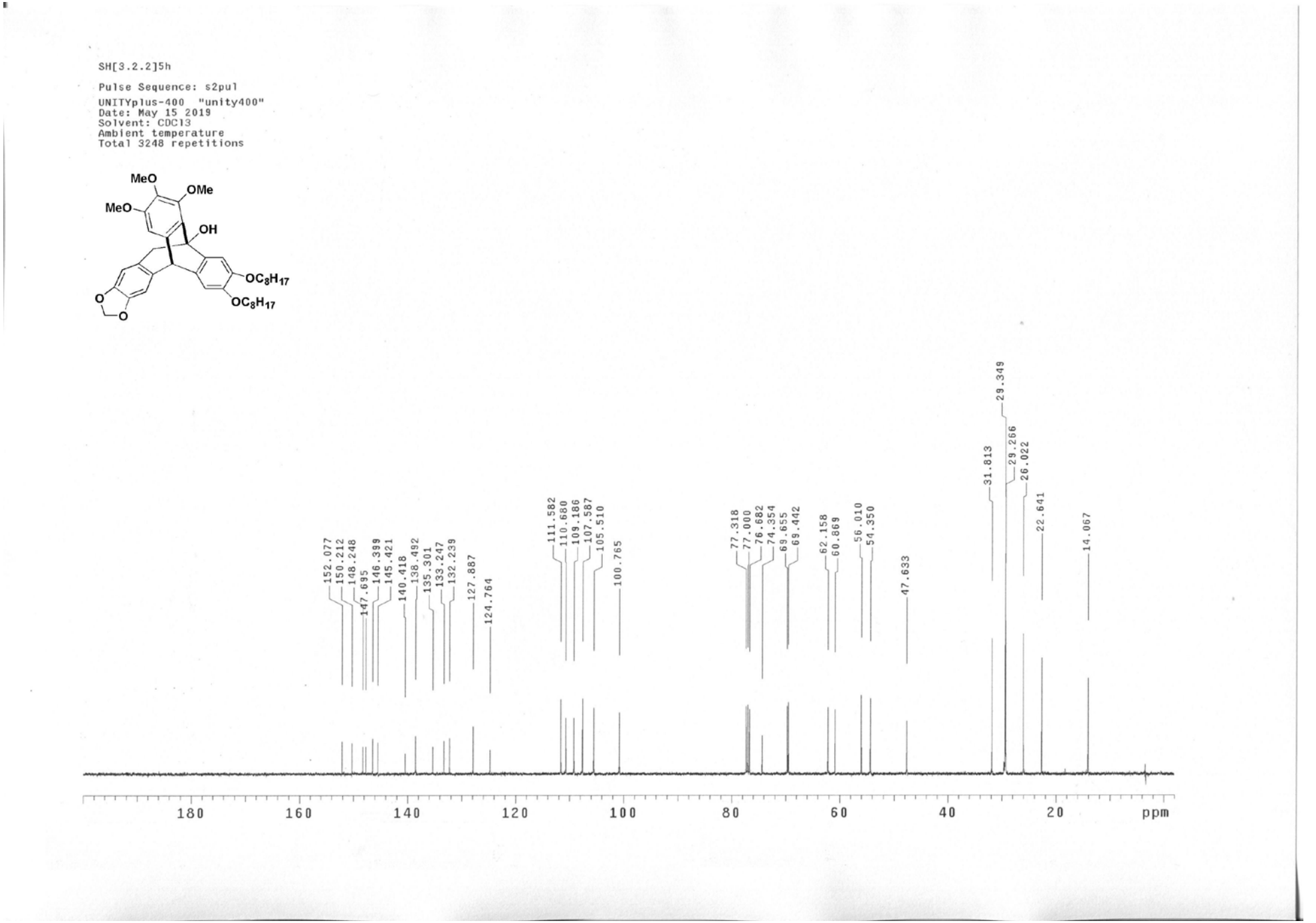
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: May 15 2019
Solvent: CDCl3
Ambient temperature
Total 32 repetitions

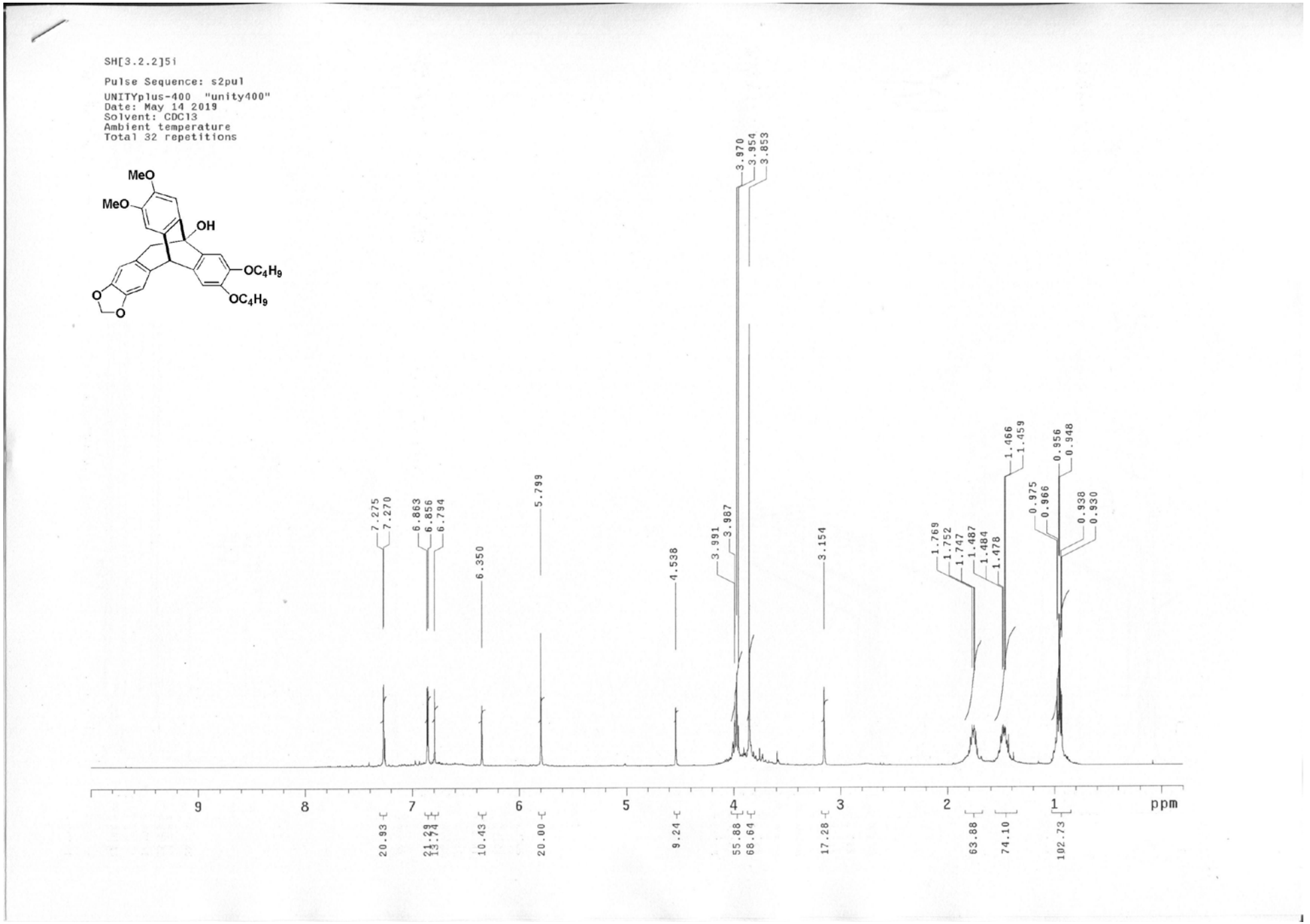




Compound 5h (^{13}C-NMR spectral data)



Compound 5i (^{1}H-NMR spectral data)

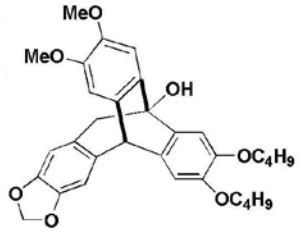


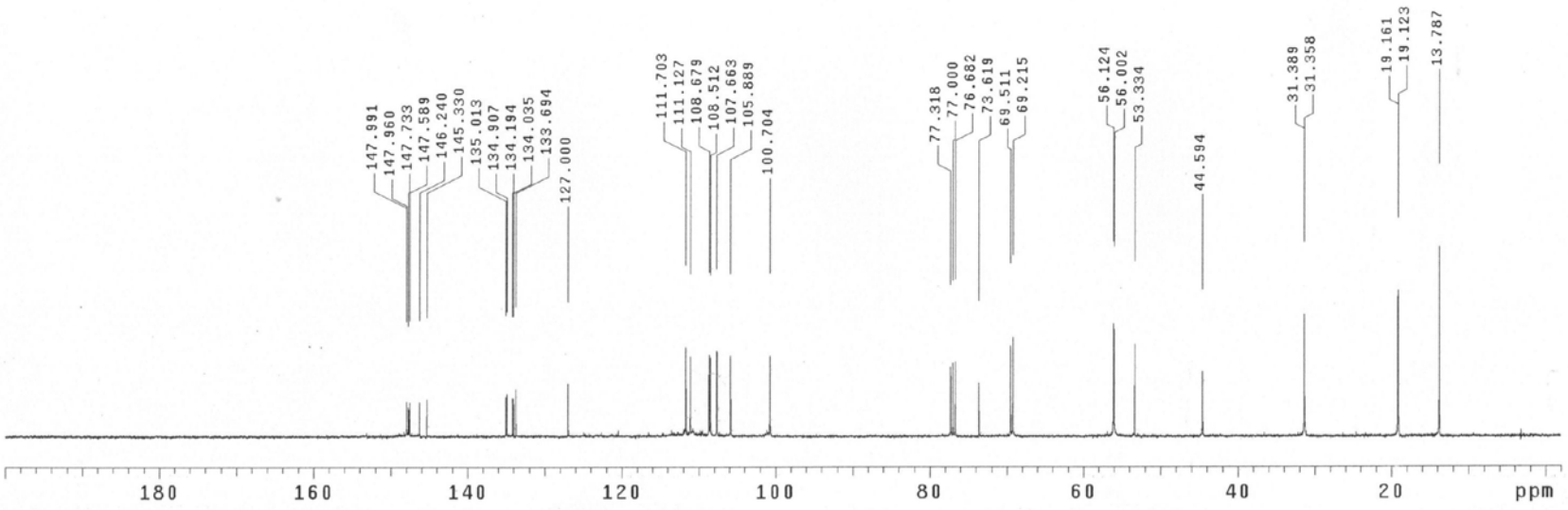
Compound 5i (^{13}C-NMR spectral data)

SH[3.2.2]5i

Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: May 14 2019
Solvent: CDCl3
Ambient temperature
Total 5360 repetitions





Compound 5j (^{1}H-NMR spectral data)

SH[3.2.]5j

Pulse Sequence: s2pul

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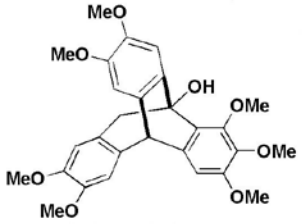
Date: Jan 29 2019
Solvent: CDCl3
Ambient temperature
Total 32 repetitions



Compound 5j (^{13}C-NMR spectral data)

SH[3.2.]5j

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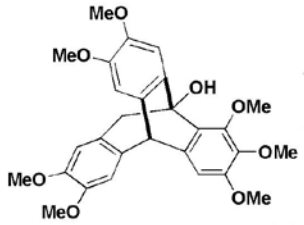
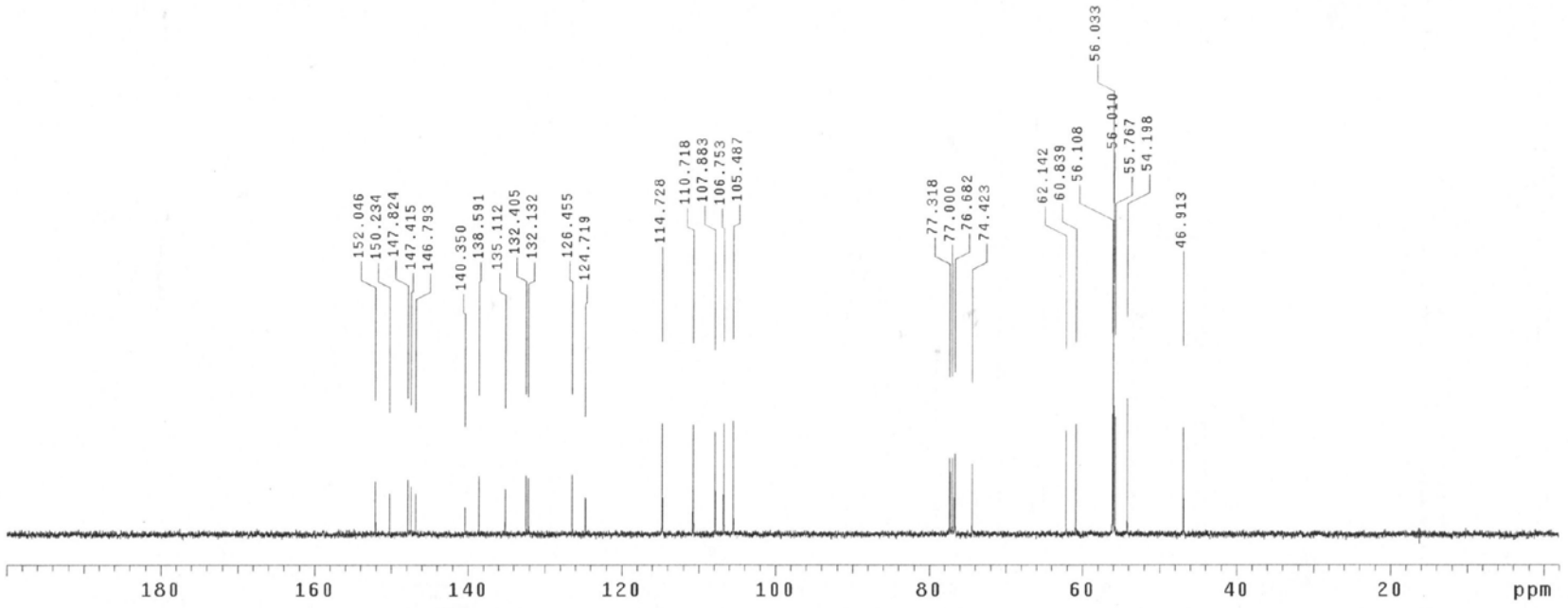
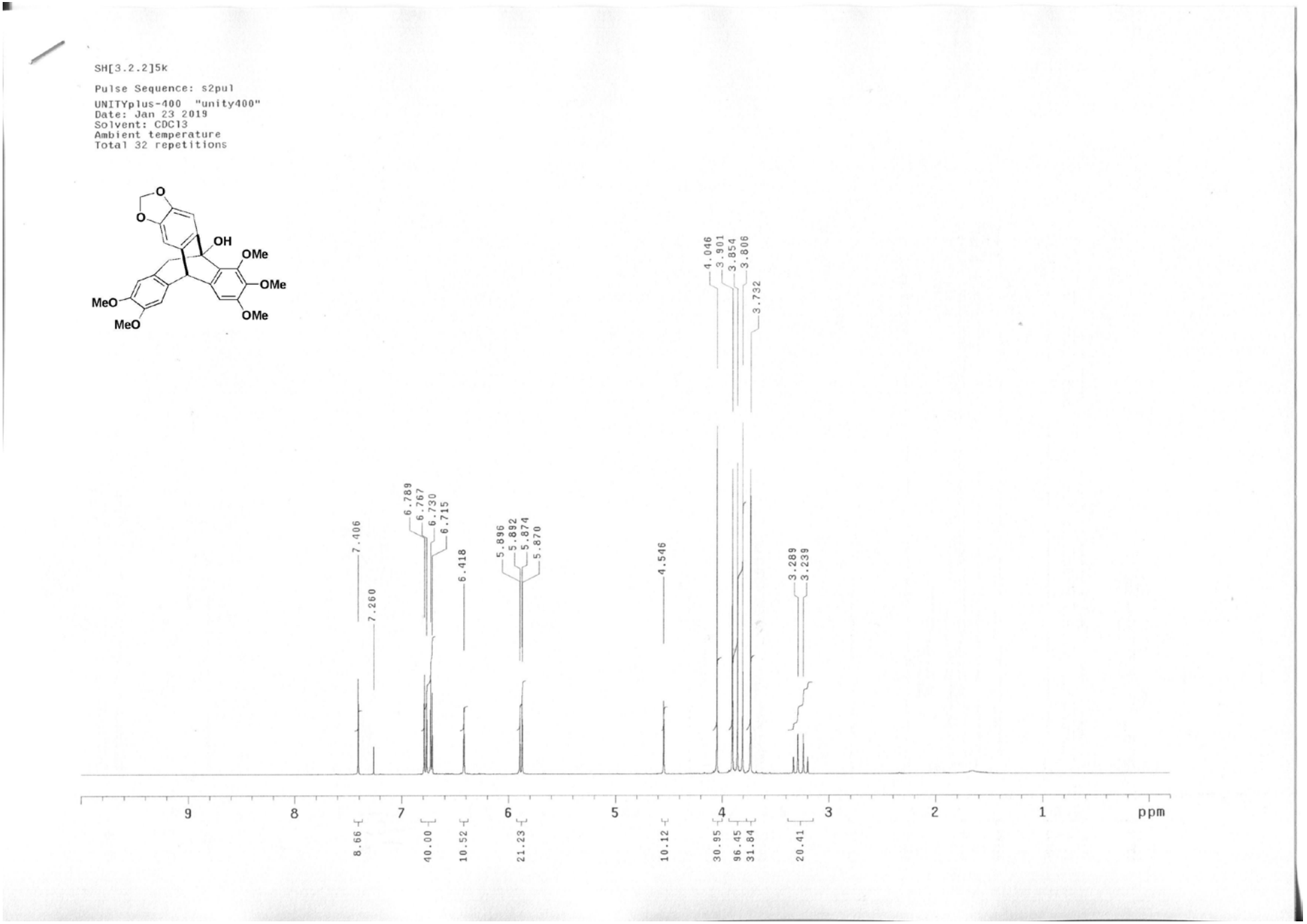
Date: Jan 29 2019
Solvent: CDCl3
Ambient temperature
Total 768 repetitions





Compound 5k (^{1}H-NMR spectral data)



Compound 5k (^{13}C-NMR spectral data)

SH[3.2.2]5k

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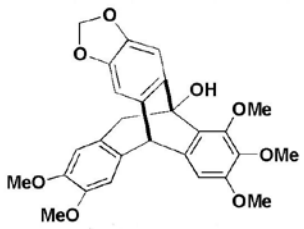
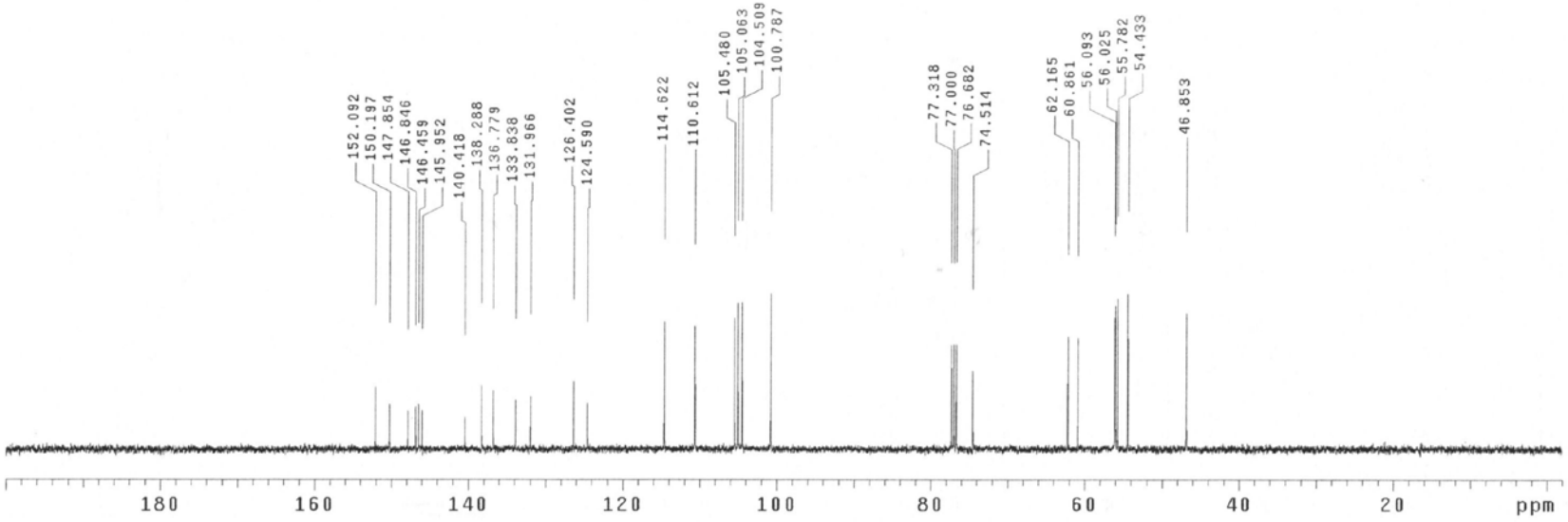
Solvent: CDCl3
Ambient temperature
Total 944 repetitions





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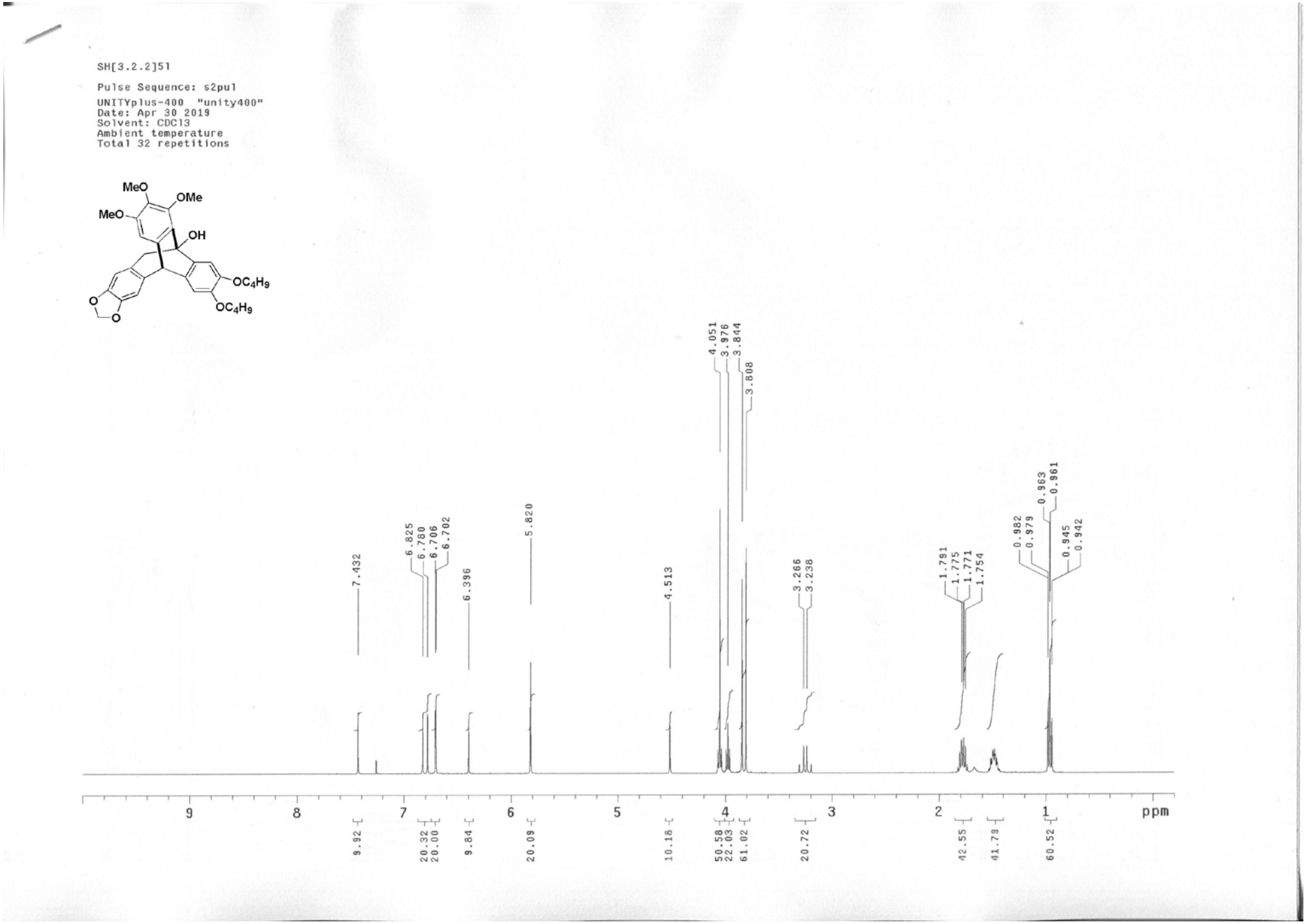
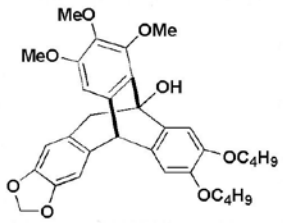


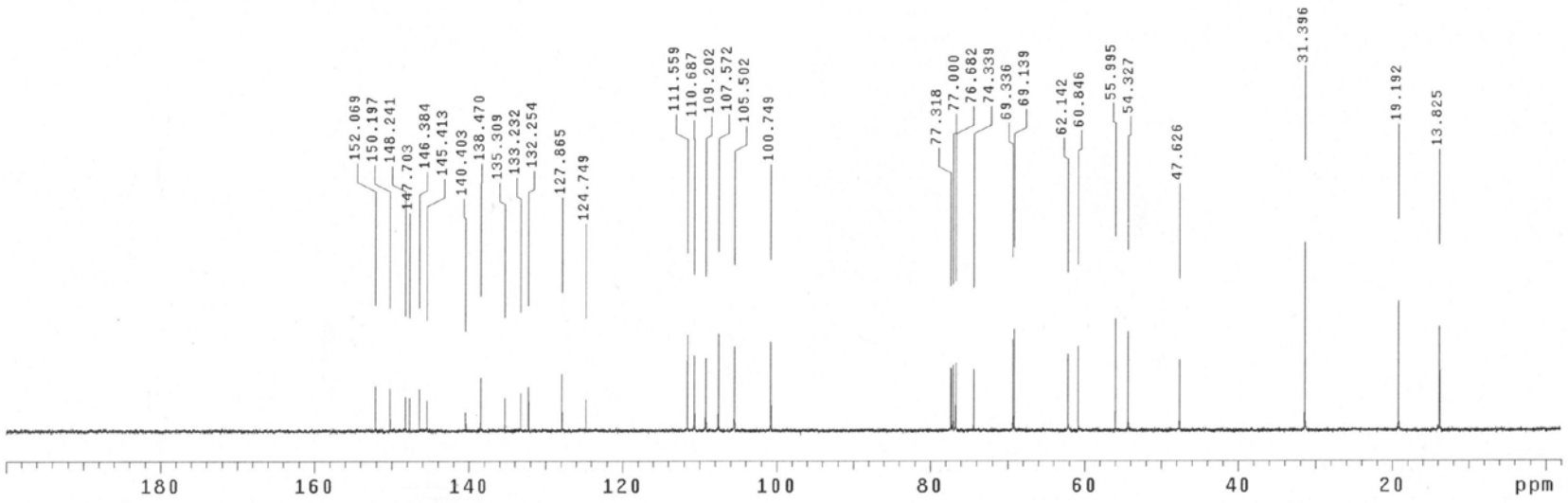
Compound 5l (^{13}C-NMR spectral data)

SH[3.2.2]51

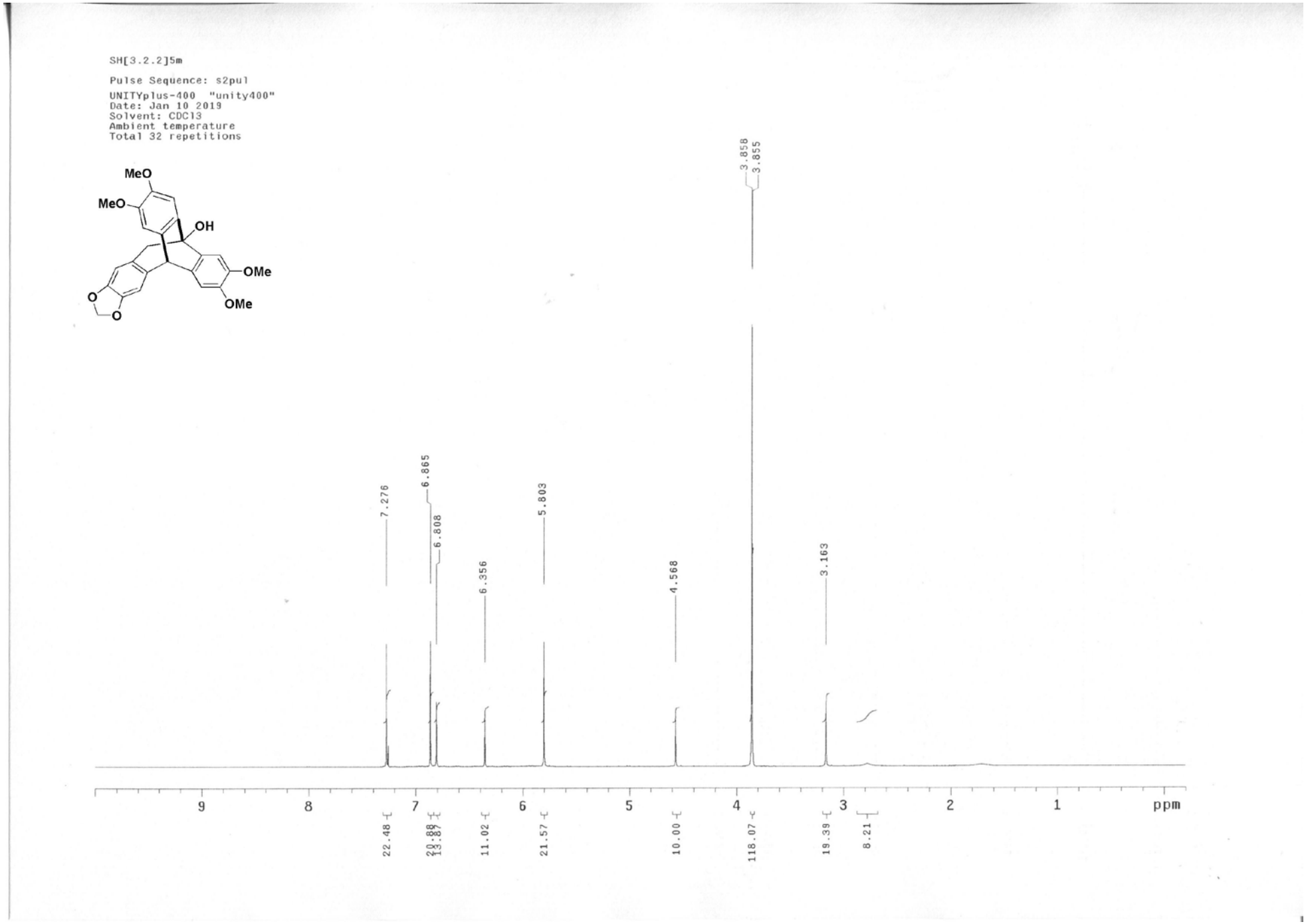
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Apr 30 2019
Solvent: CDCl3
Ambient temperature
Total 1024 repetitions





Compound 5m (^{1}H-NMR spectral data)

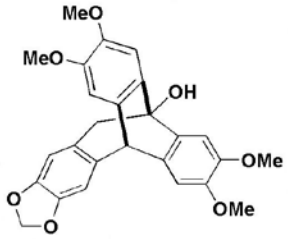


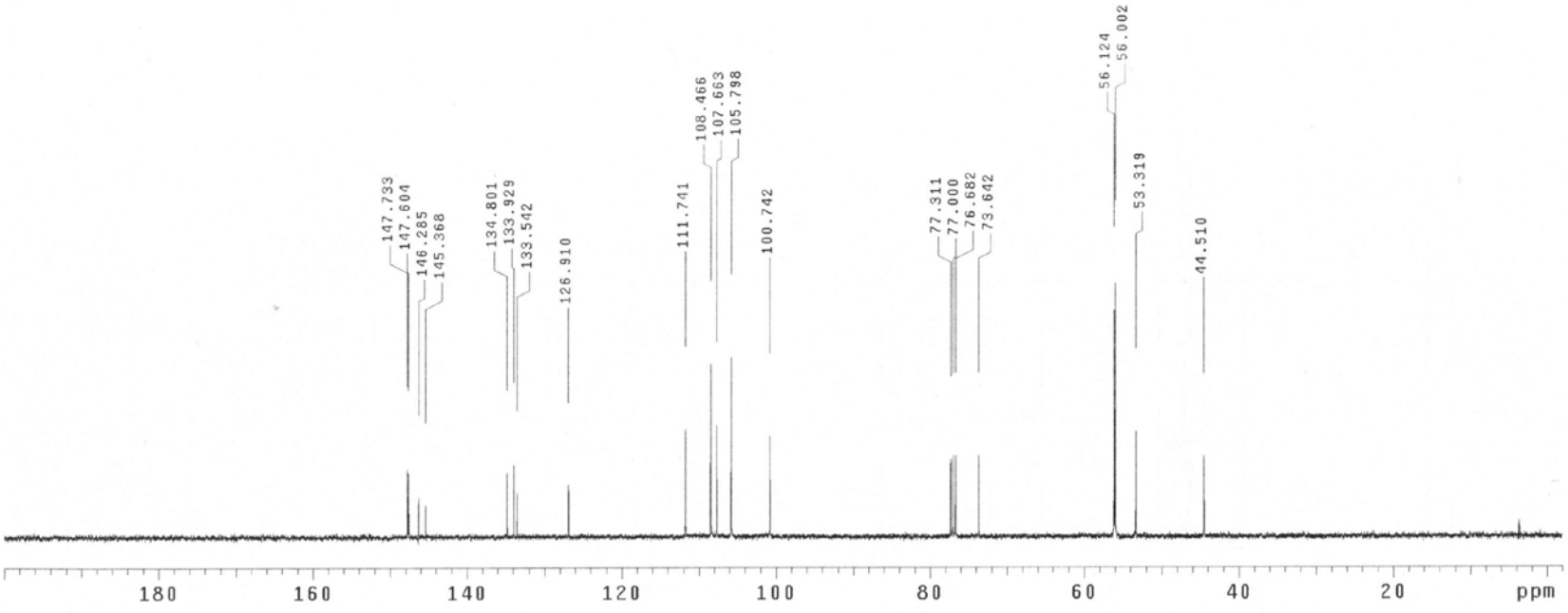
Compound 5m (^{13}C-NMR spectral data)

SH[3.2.2]5m

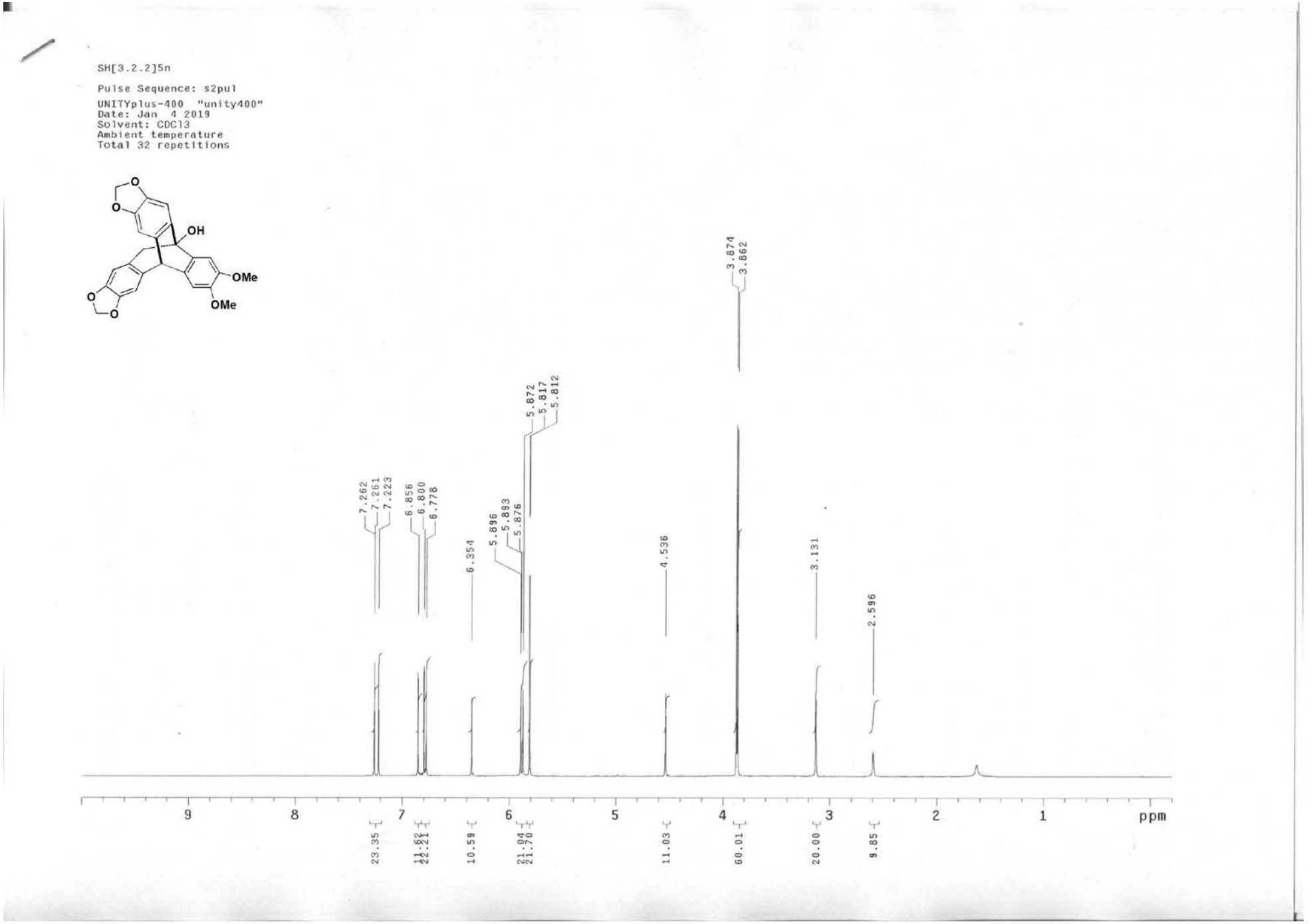
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 10 2019
Solvent: CDCl3
Ambient temperature
Total 1168 repetitions





Compound 5n (^{1}H-NMR spectral data)

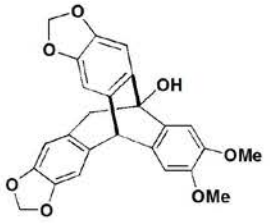


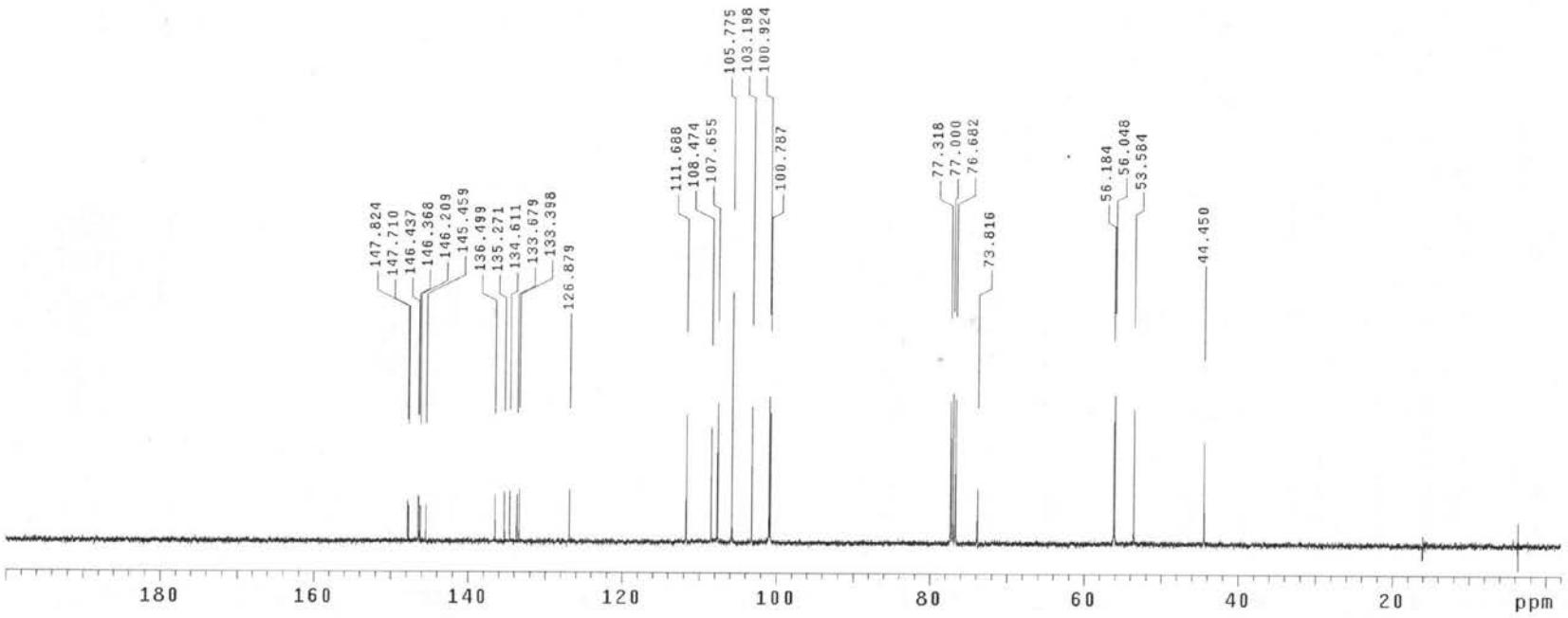
Compound 5n (^{13}C-NMR spectral data)

SH[3.2.2]5n

Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 4 2019
Solvent: CDCl3
Ambient temperature
Total 2432 repetitions



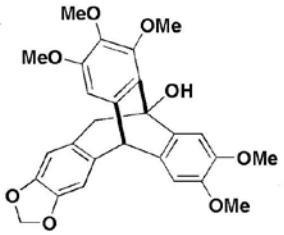


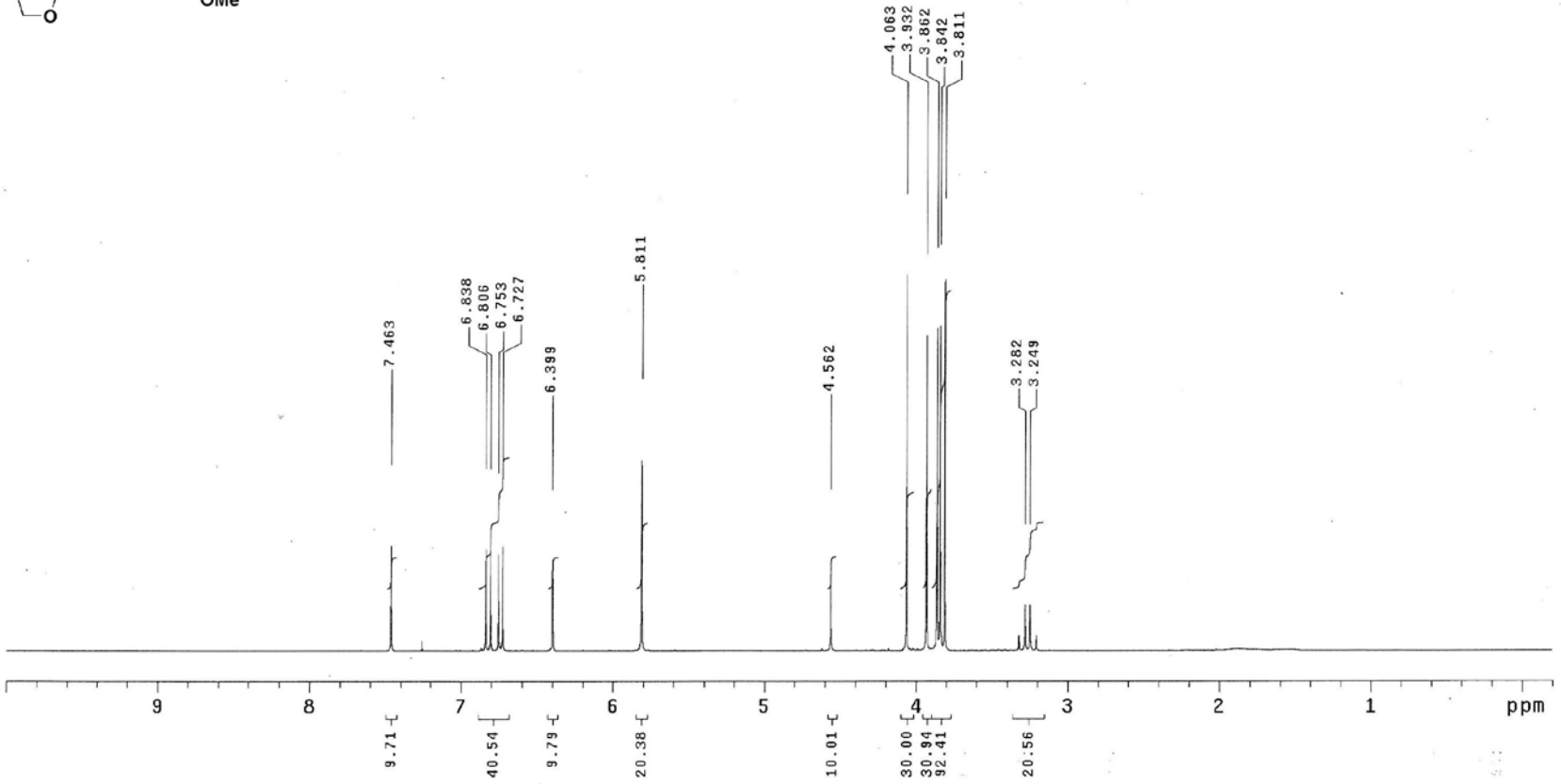
Compound 5o (^{1}H-NMR spectral data)

SH[3.2.2]5o

Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Feb 18 2019
Solvent: CDCl3
Ambient temperature
Total 32 repetitions



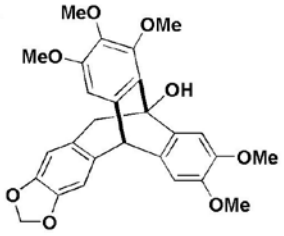


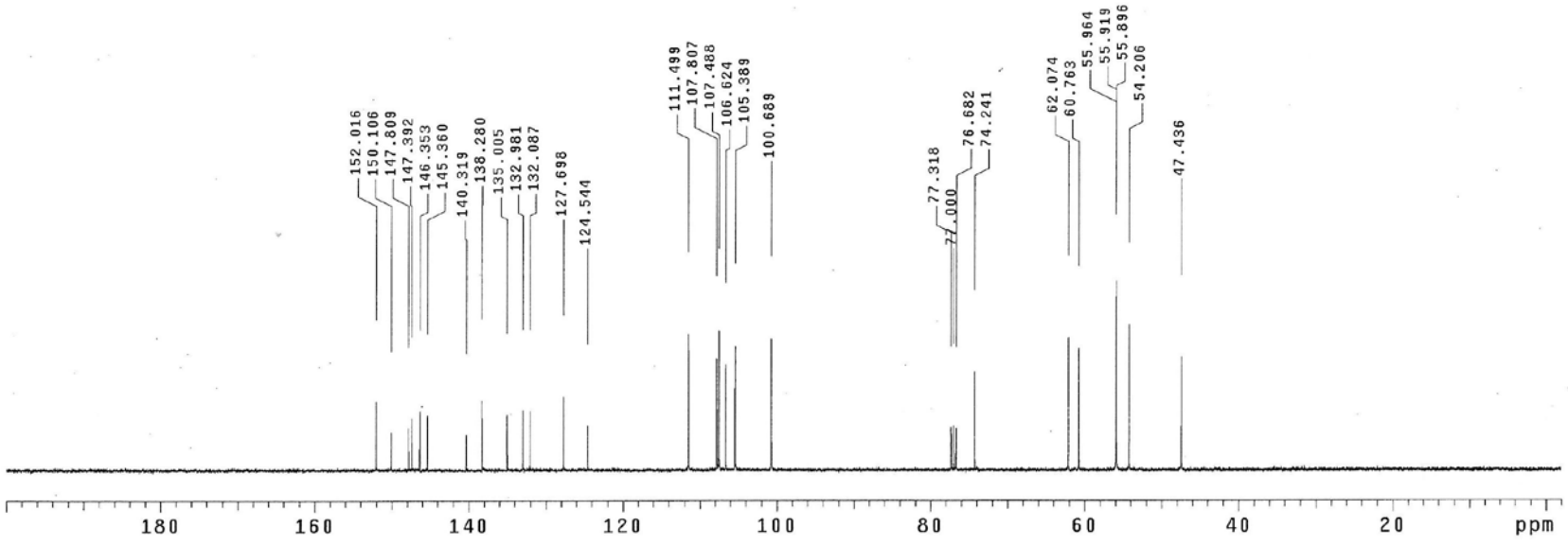
Compound 5o (^{13}C-NMR spectral data)

SH[3.2.2]5o

Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Feb 18 2019
Solvent: CDCl3
Ambient temperature
Total 480 repetitions



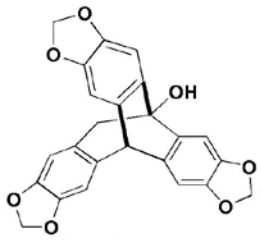


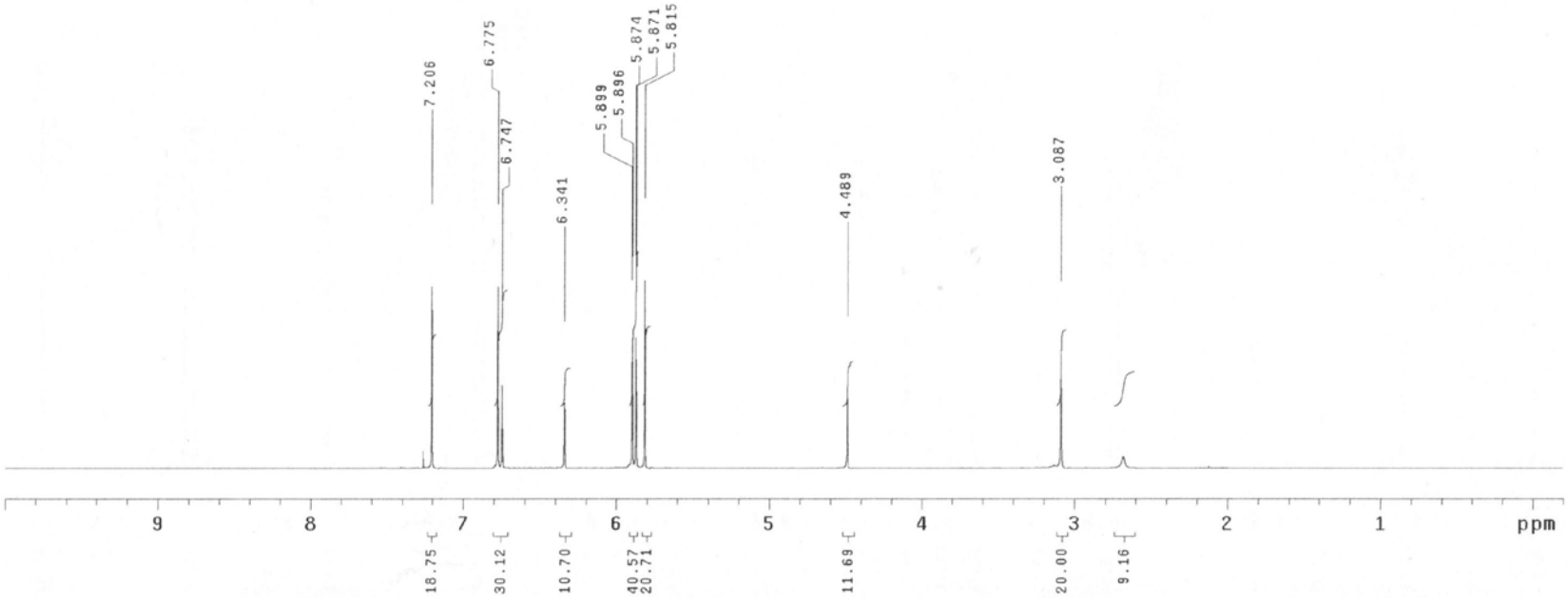
Compound 5p (^{1}H-NMR spectral data)

SH[3.2.2]5p

Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 23 2019
Solvent: CDCl3
Ambient temperature
Total 32 repetitions



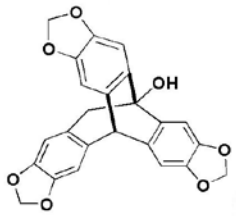


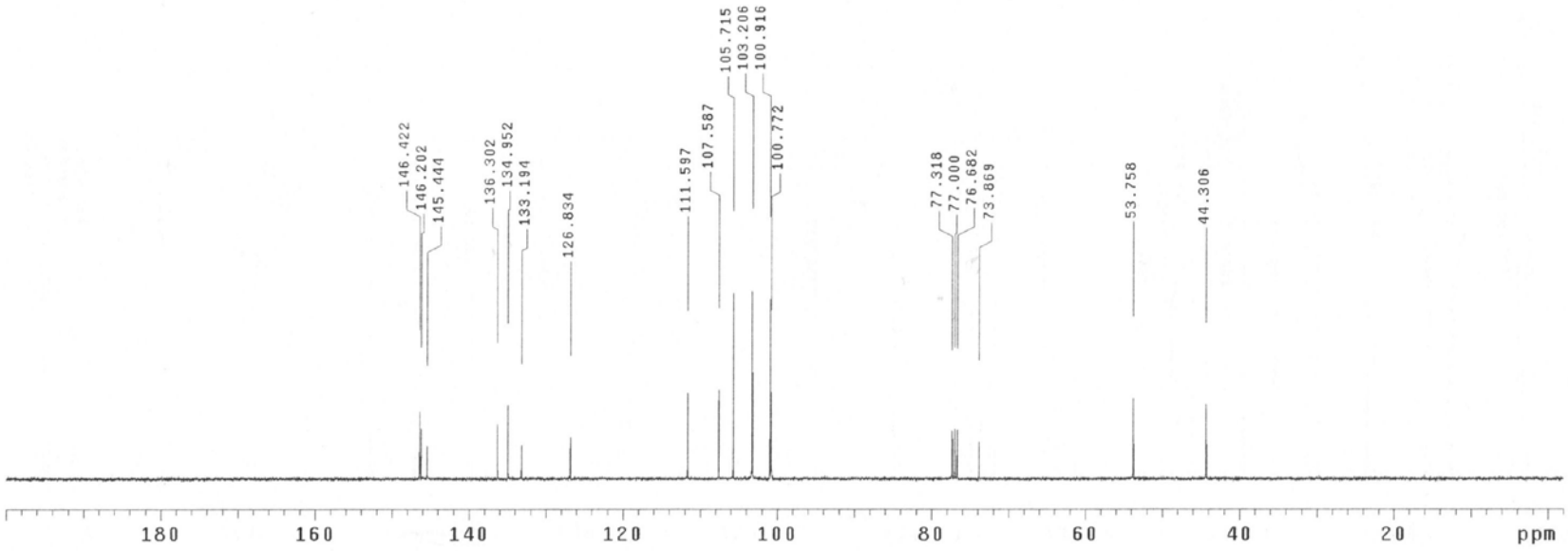
Compound 5p (^{13}C-NMR spectral data)

SH[3.2.2]5p

Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 23 2019
Solvent: CDCl3
Ambient temperature
Total 768 repetitions



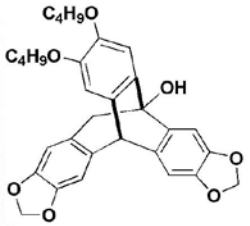


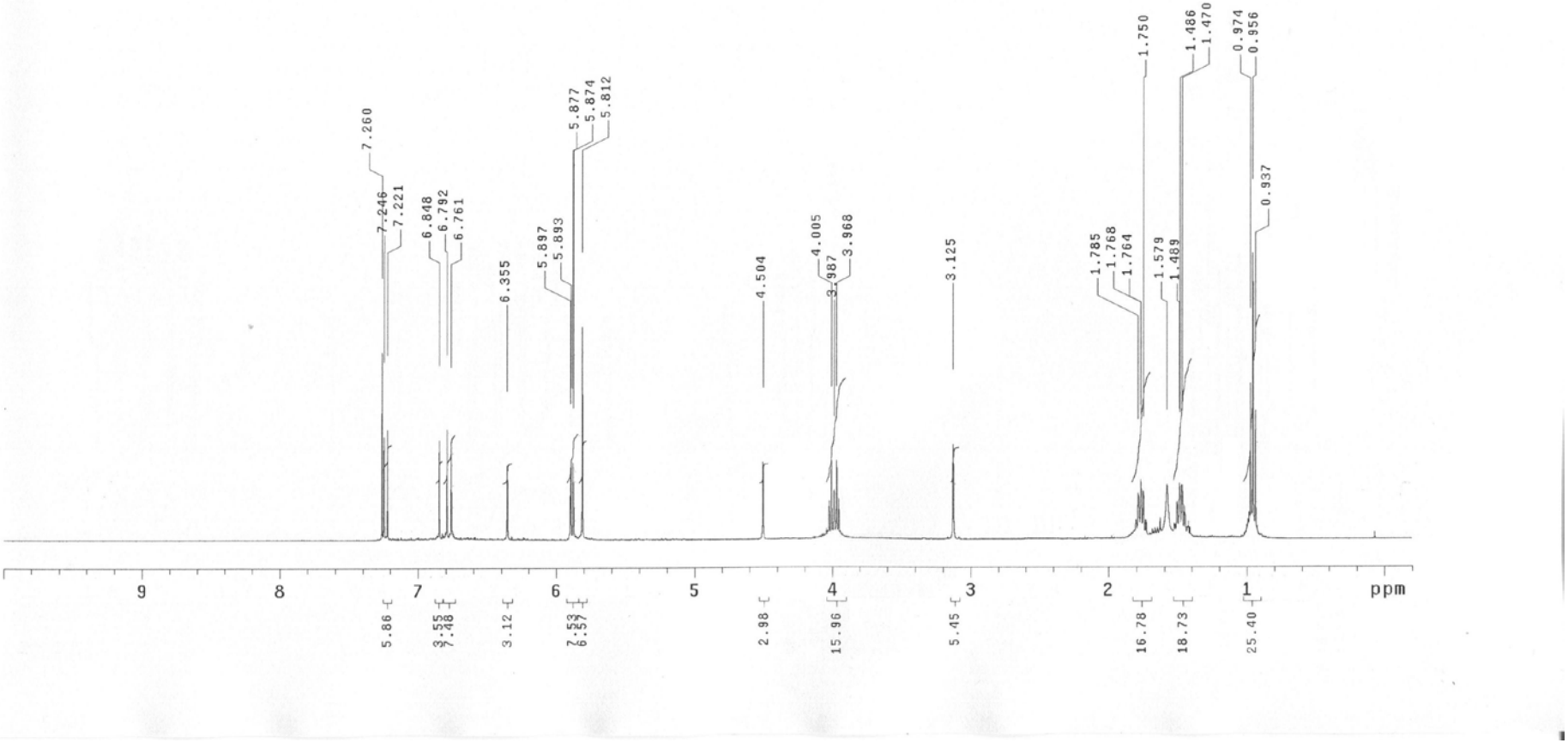
Compound 5q (^{1}H-NMR spectral data)

SH[3.2.2]5q

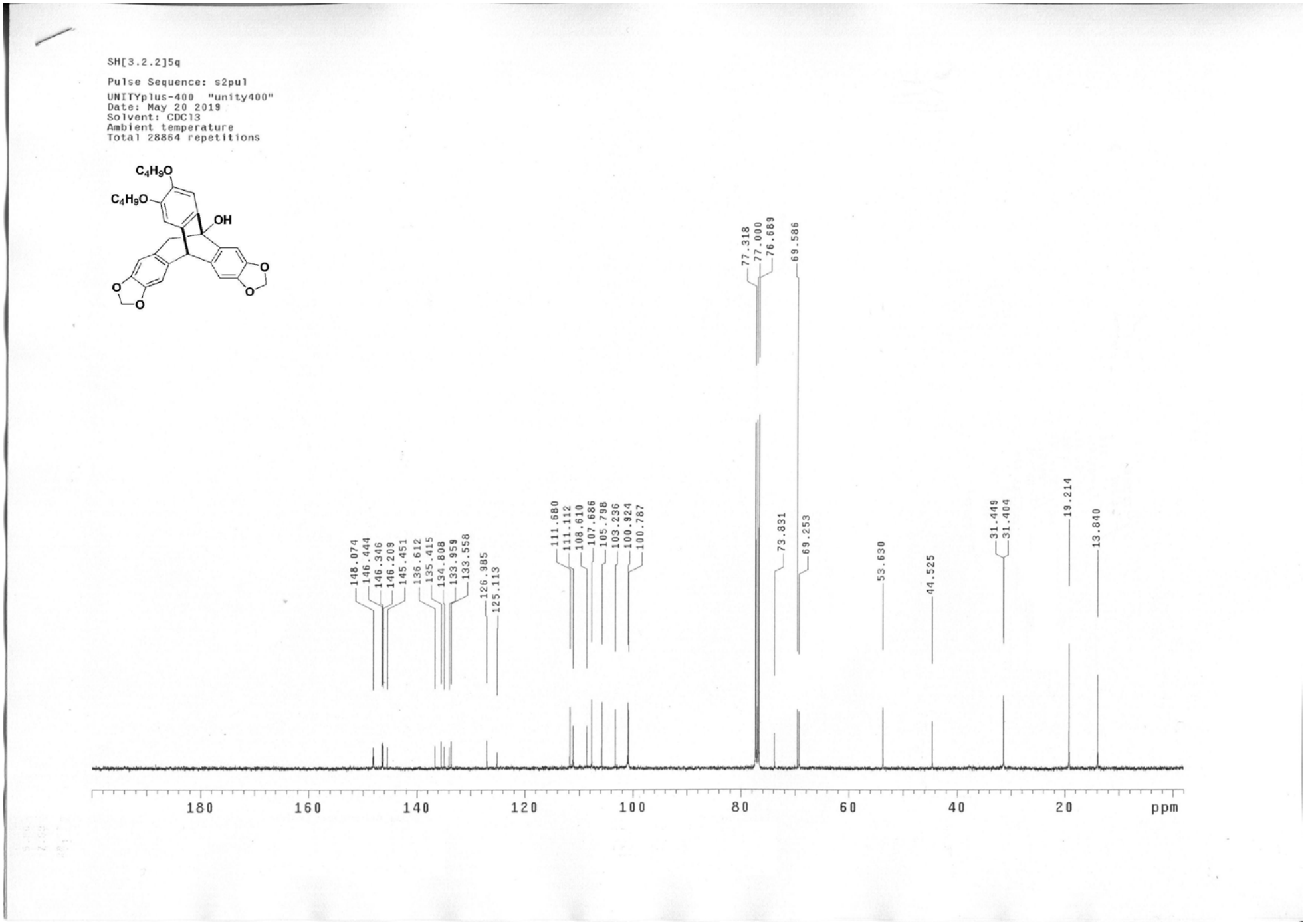
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: May 20 2019
Solvent: CDCl3
Ambient temperature
Total 64 repetitions

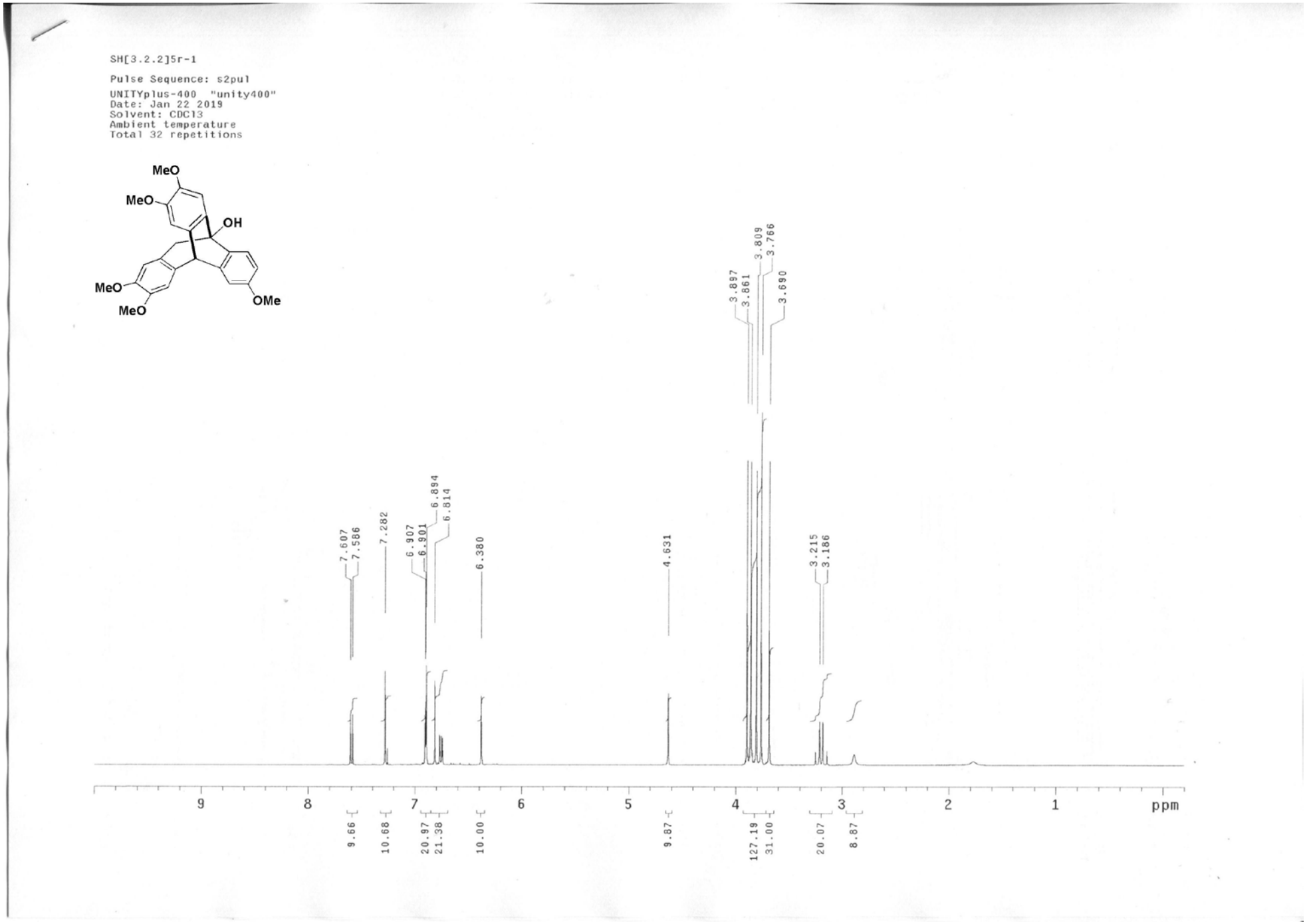




Compound 5q (^{13}C-NMR spectral data)



Compound 5r (^{1}H-NMR spectral data)

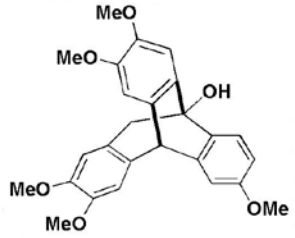


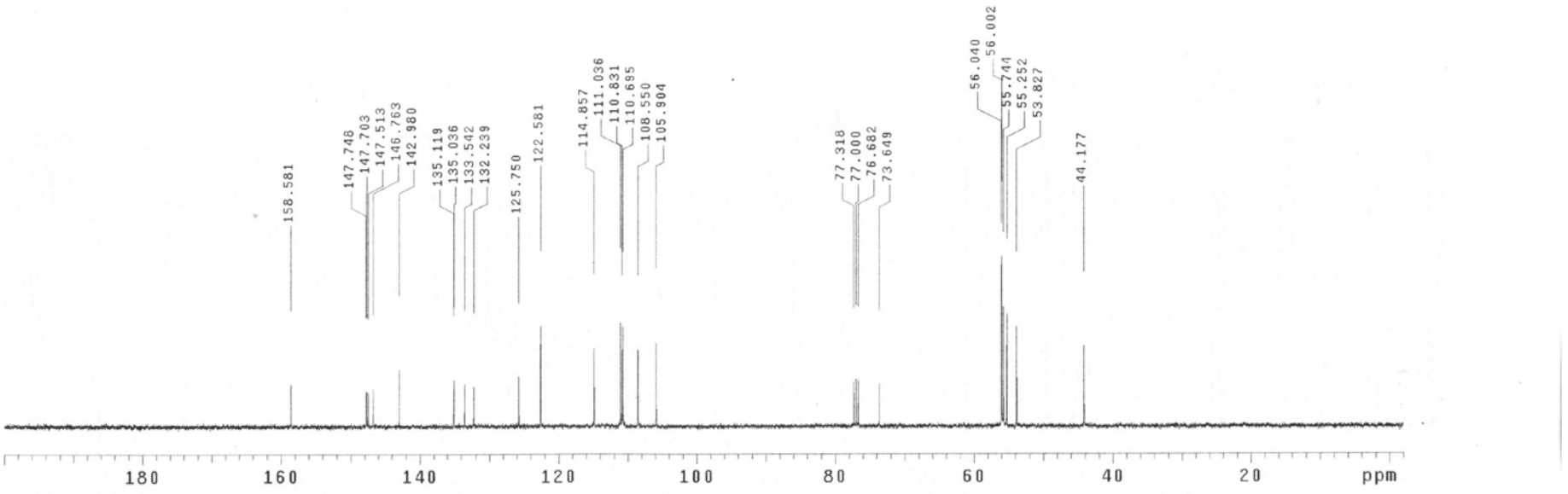
Compound 5r (^{13}C-NMR spectral data)

SH[3.2.2]5r-1

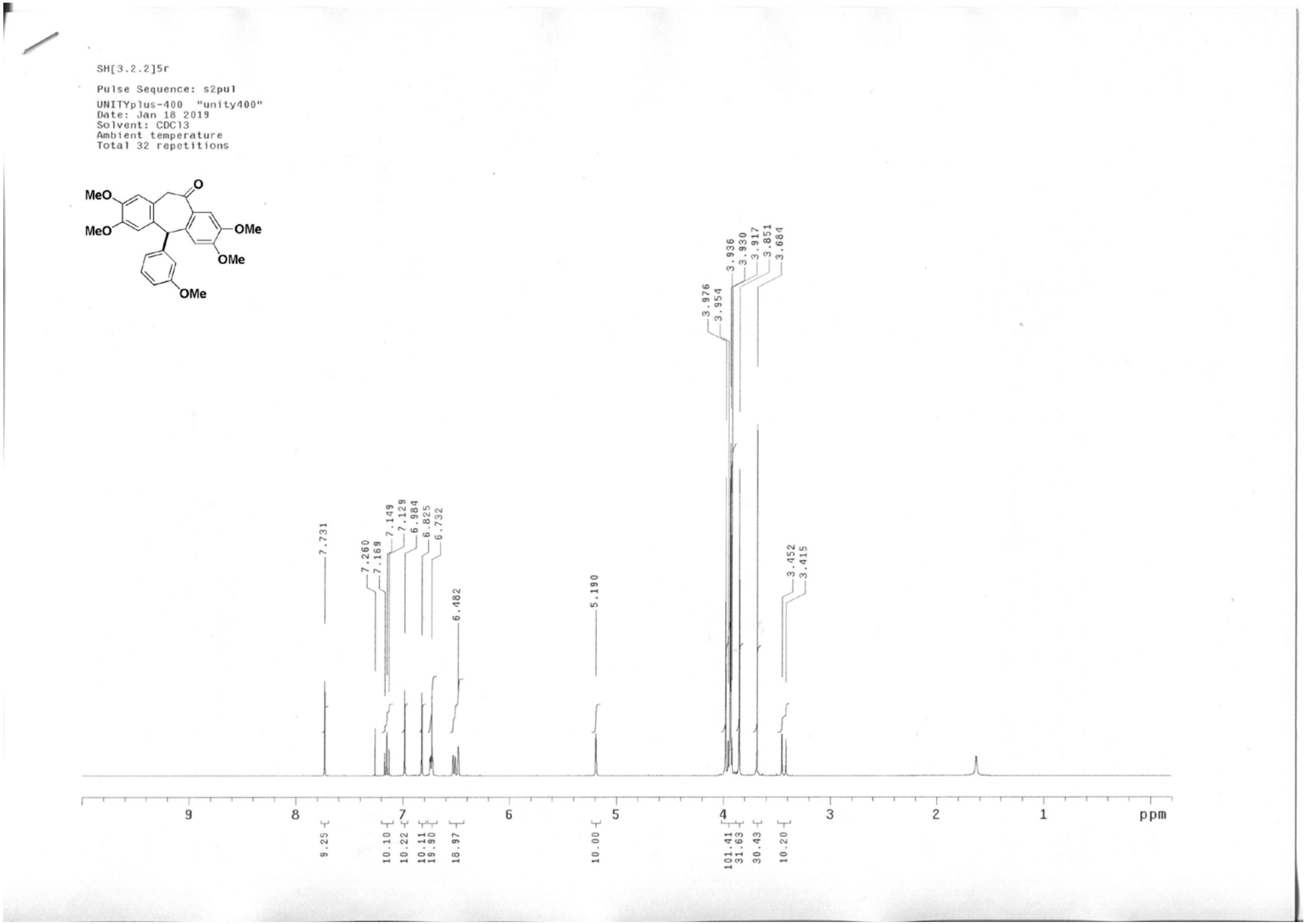
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 22 2019
Solvent: CDCl3
Ambient temperature
Total 464 repetitions





Compound 5r-1 (^{1}H-NMR spectral data)

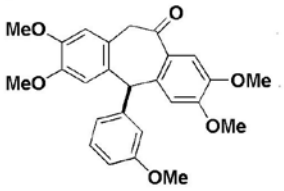


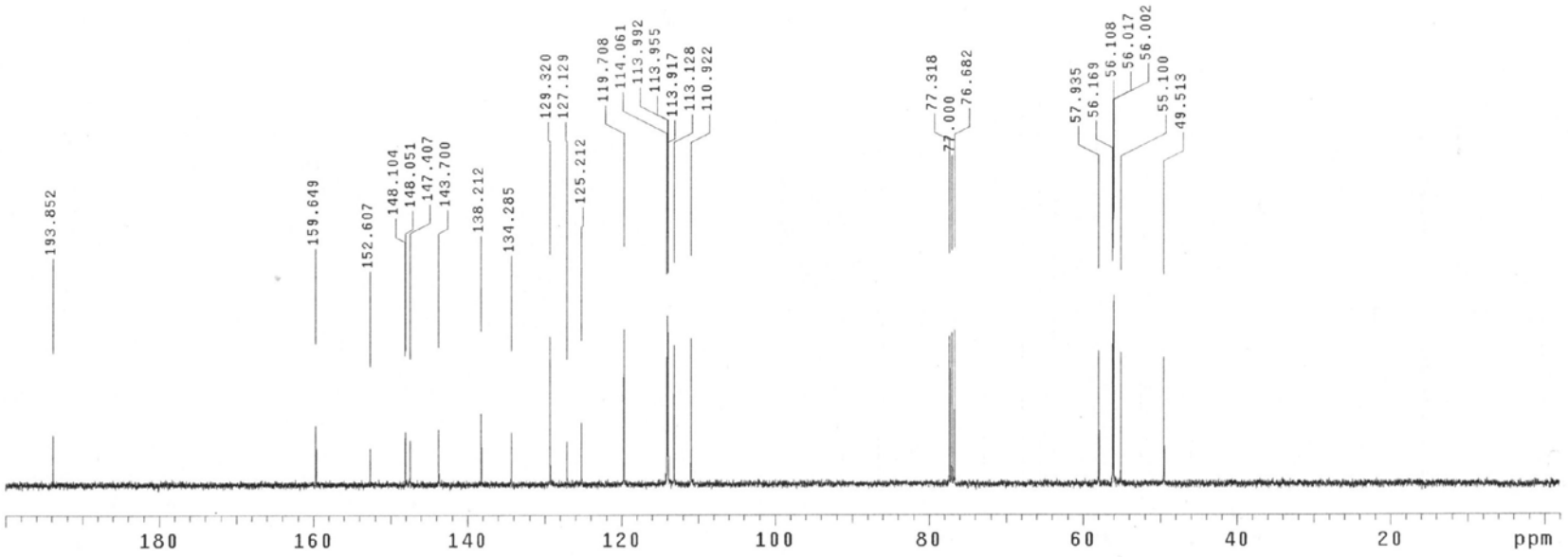
Compound 5r-1 (^{13}C-NMR spectral data)

SH[3.2.2]5r

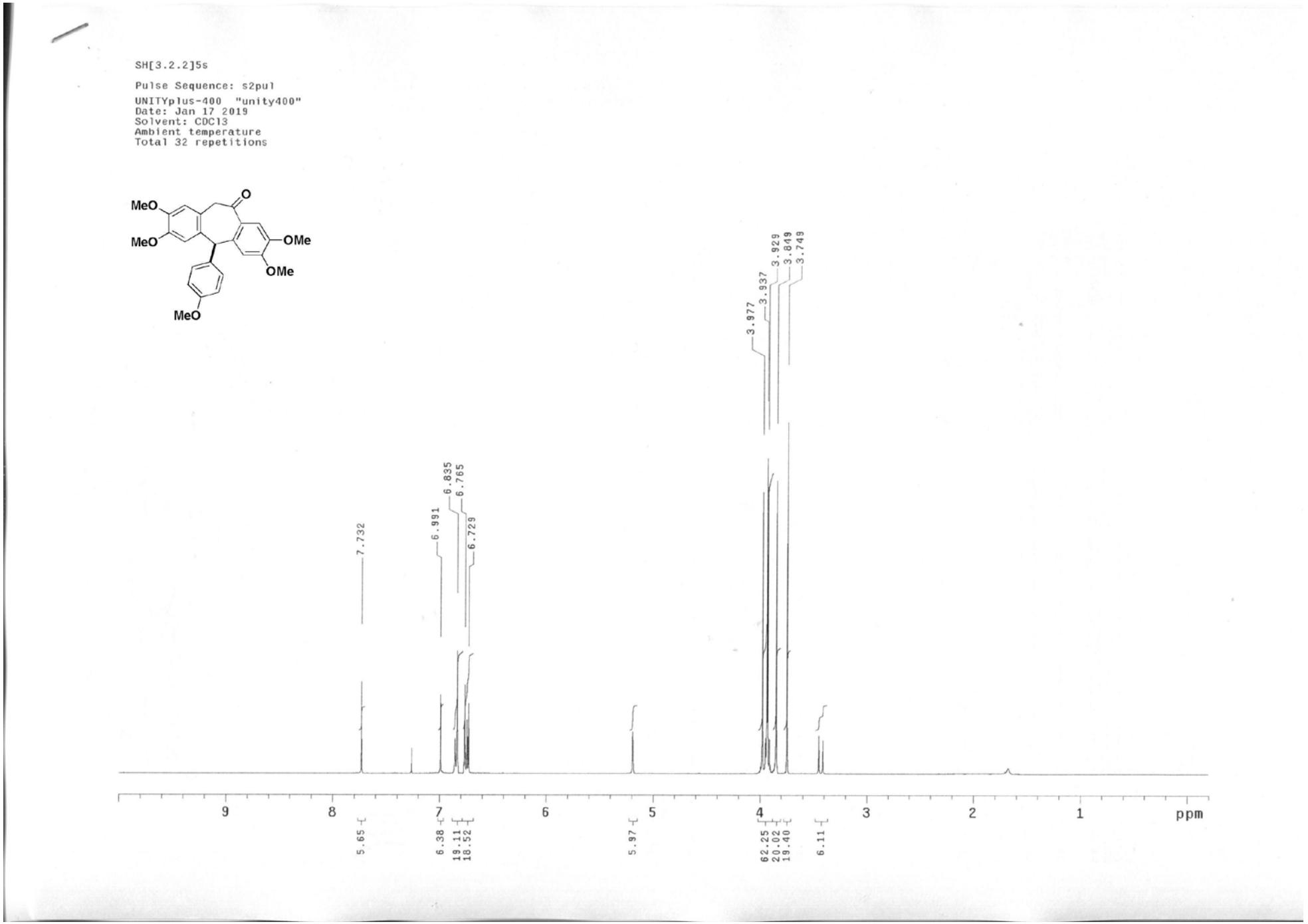
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 18 2019
Solvent: CDCl3
Ambient temperature
Total 2544 repetitions





Compound 5s-1 (^{1}H-NMR spectral data)

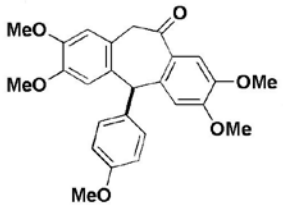


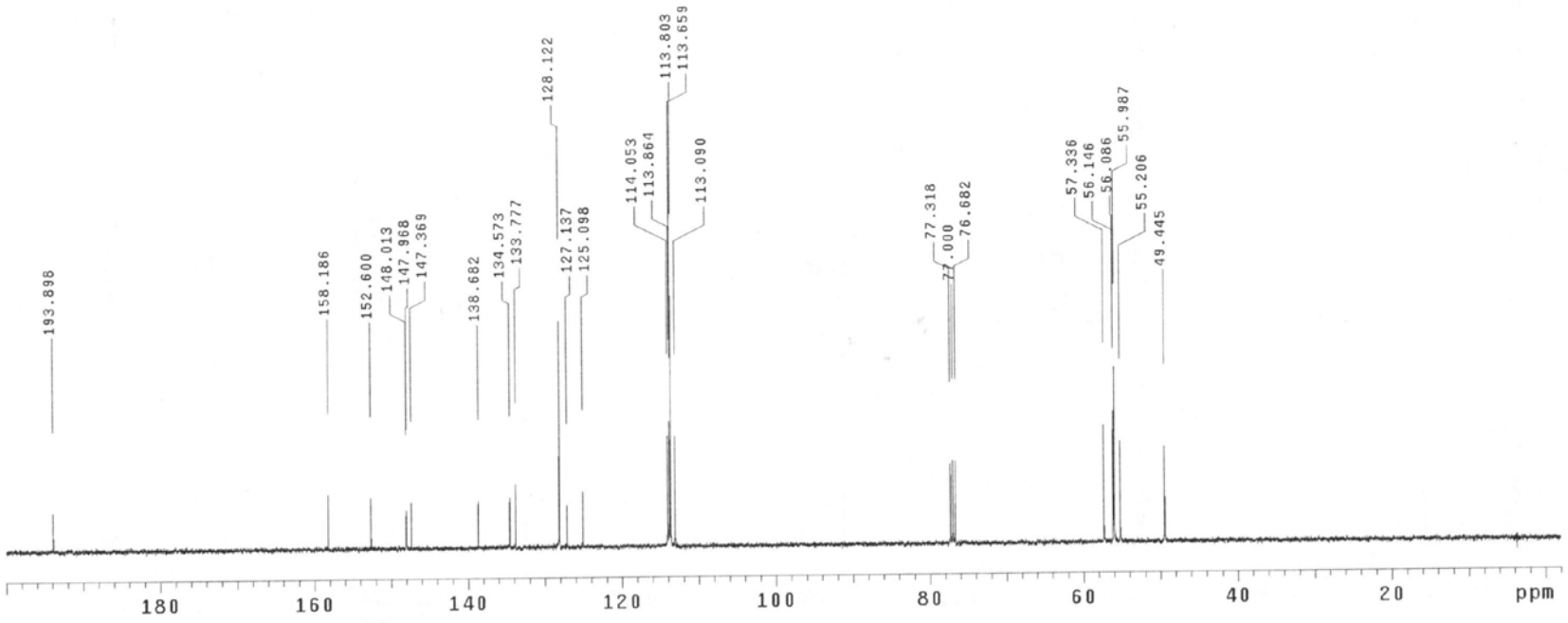
Compound 5s-1 (^{13}C-NMR spectral data)

SH[3.2.2]5s

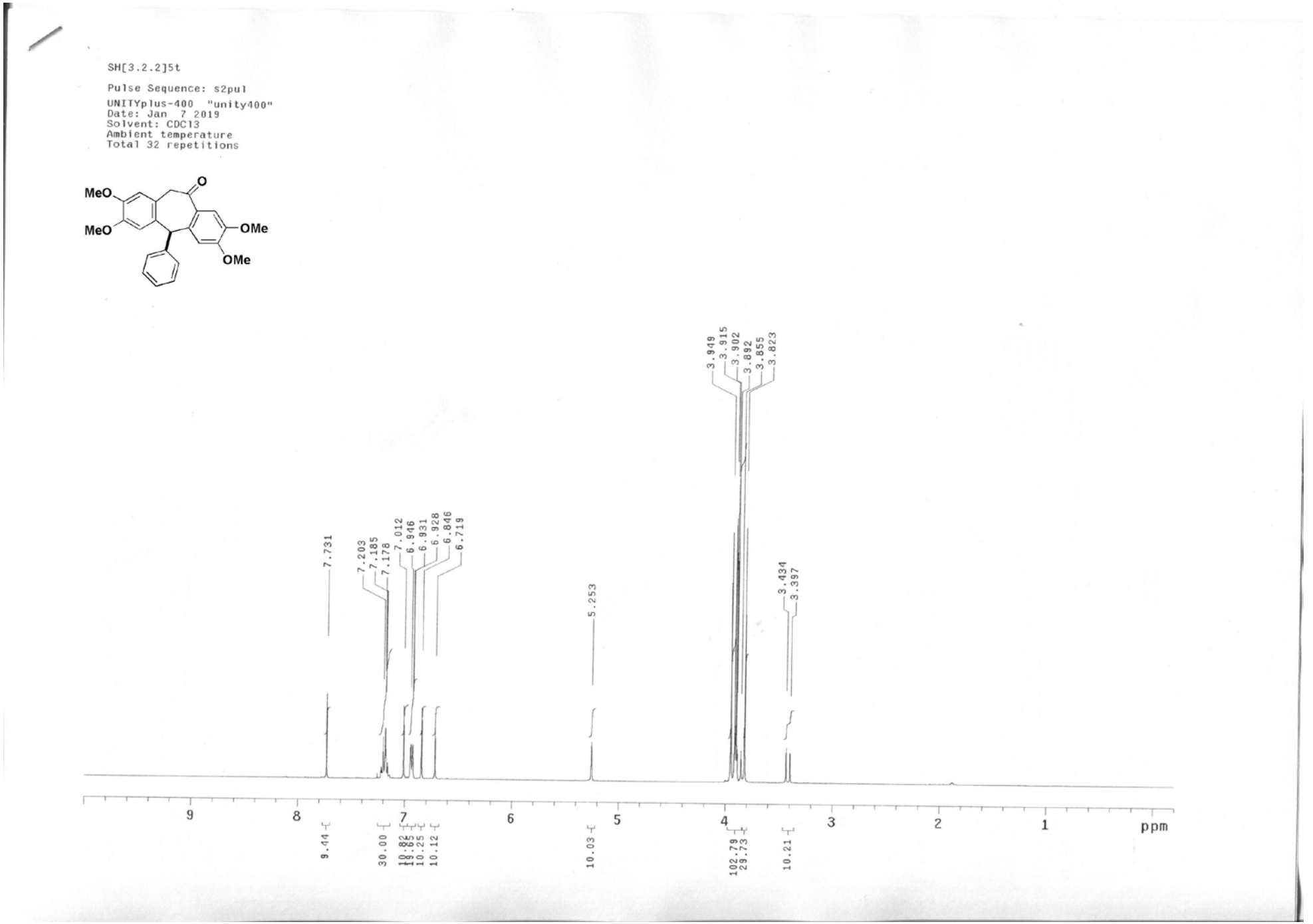
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 17 2019
Solvent: CDCl3
Ambient temperature
Total 1088 repetitions





Compound 5t-1 (^{1}H-NMR spectral data)

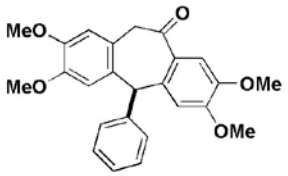


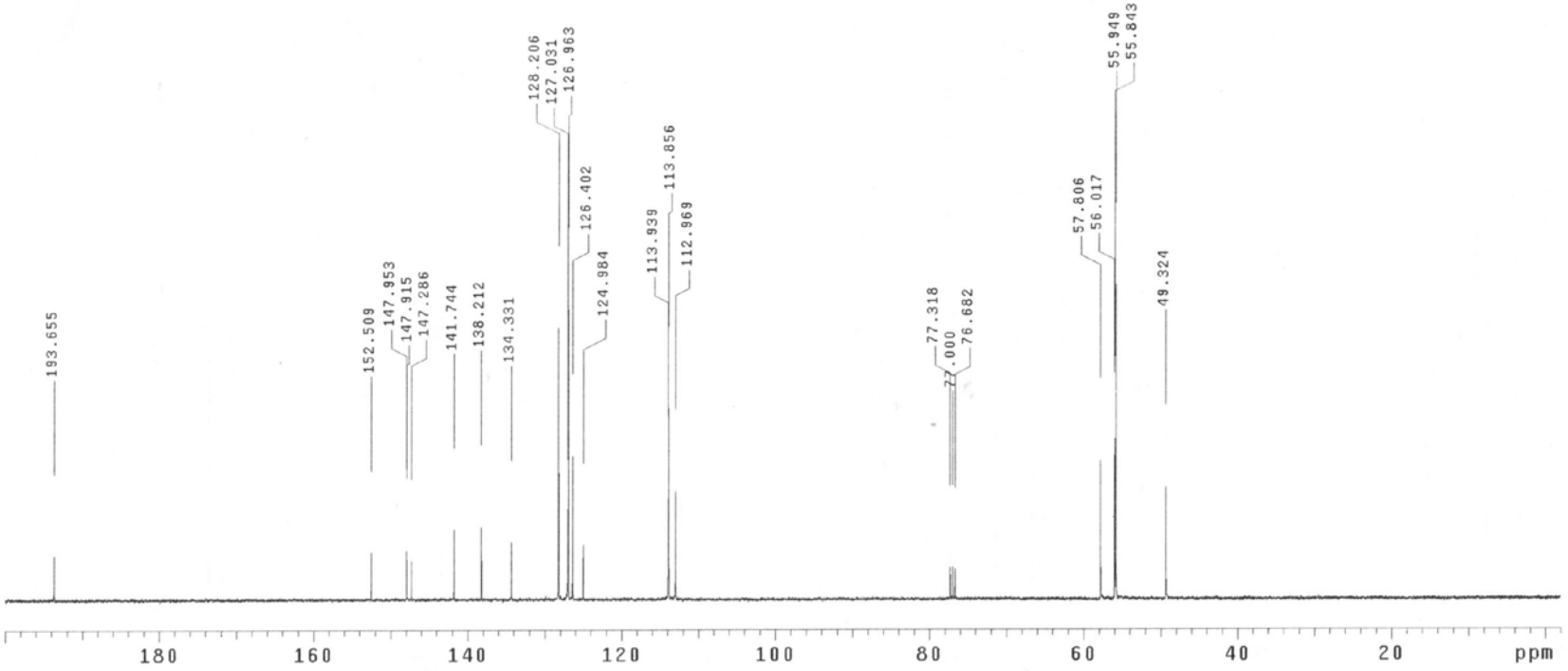
Compound 5t-1 (^{13}C-NMR spectral data)

SH[3.2.2]5t

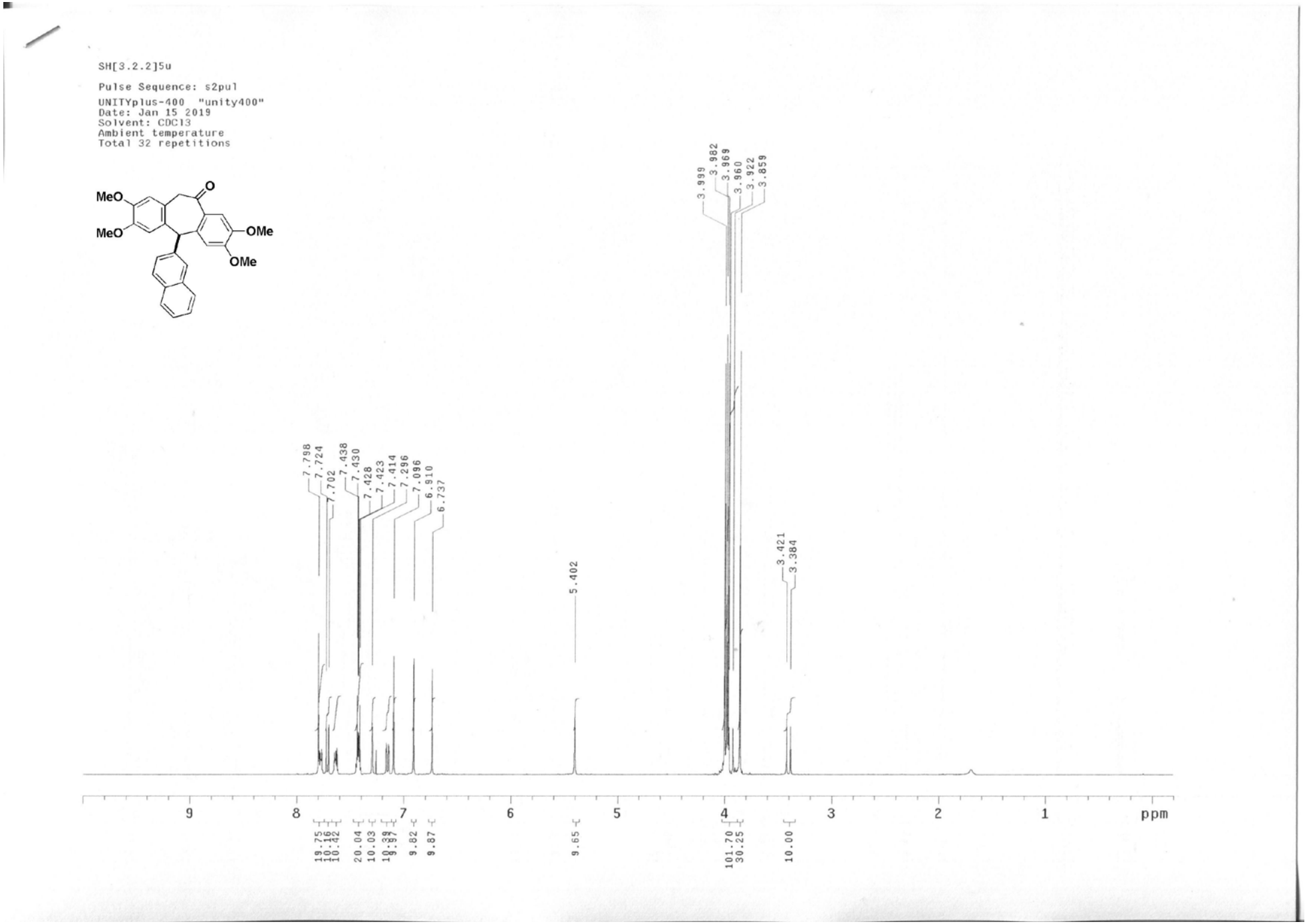
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 7 2019
Solvent: CDCl3
Ambient temperature
Total 240 repetitions





Compound 5u-1 (^{1}H-NMR spectral data)

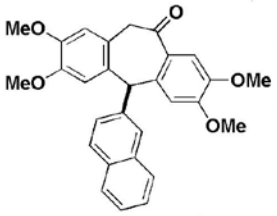


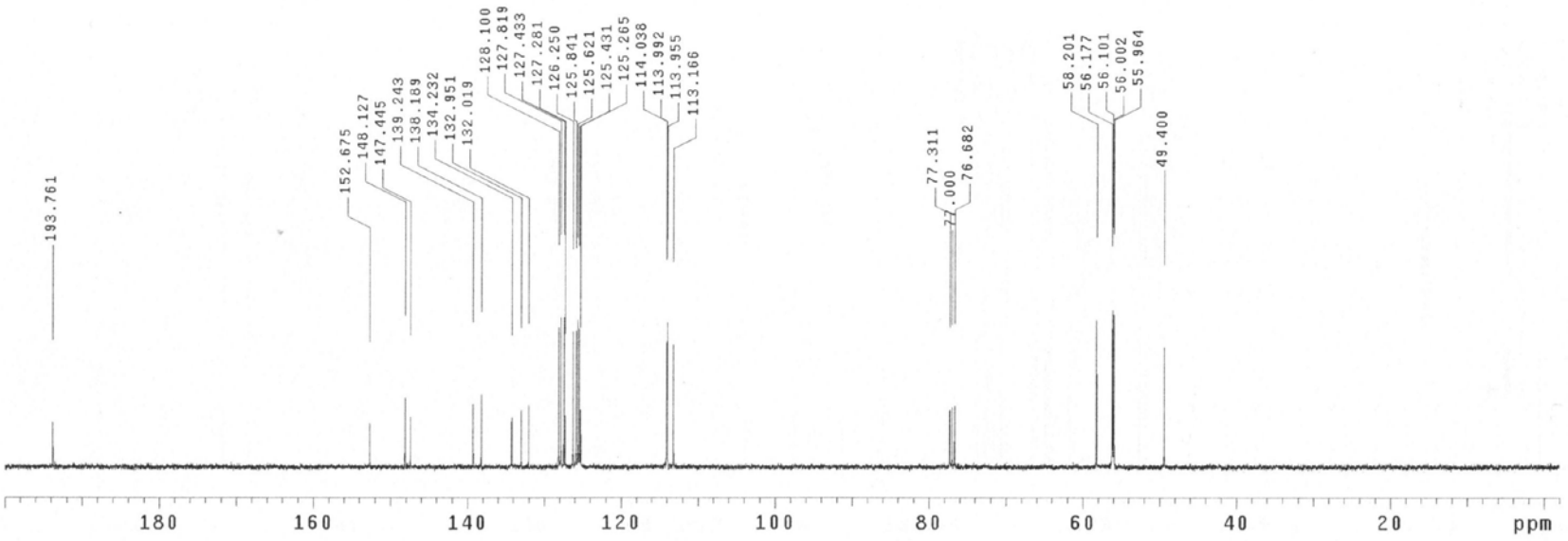
Compound 5u-1 (^{13}C-NMR spectral data)

SH[3.2.2]5u

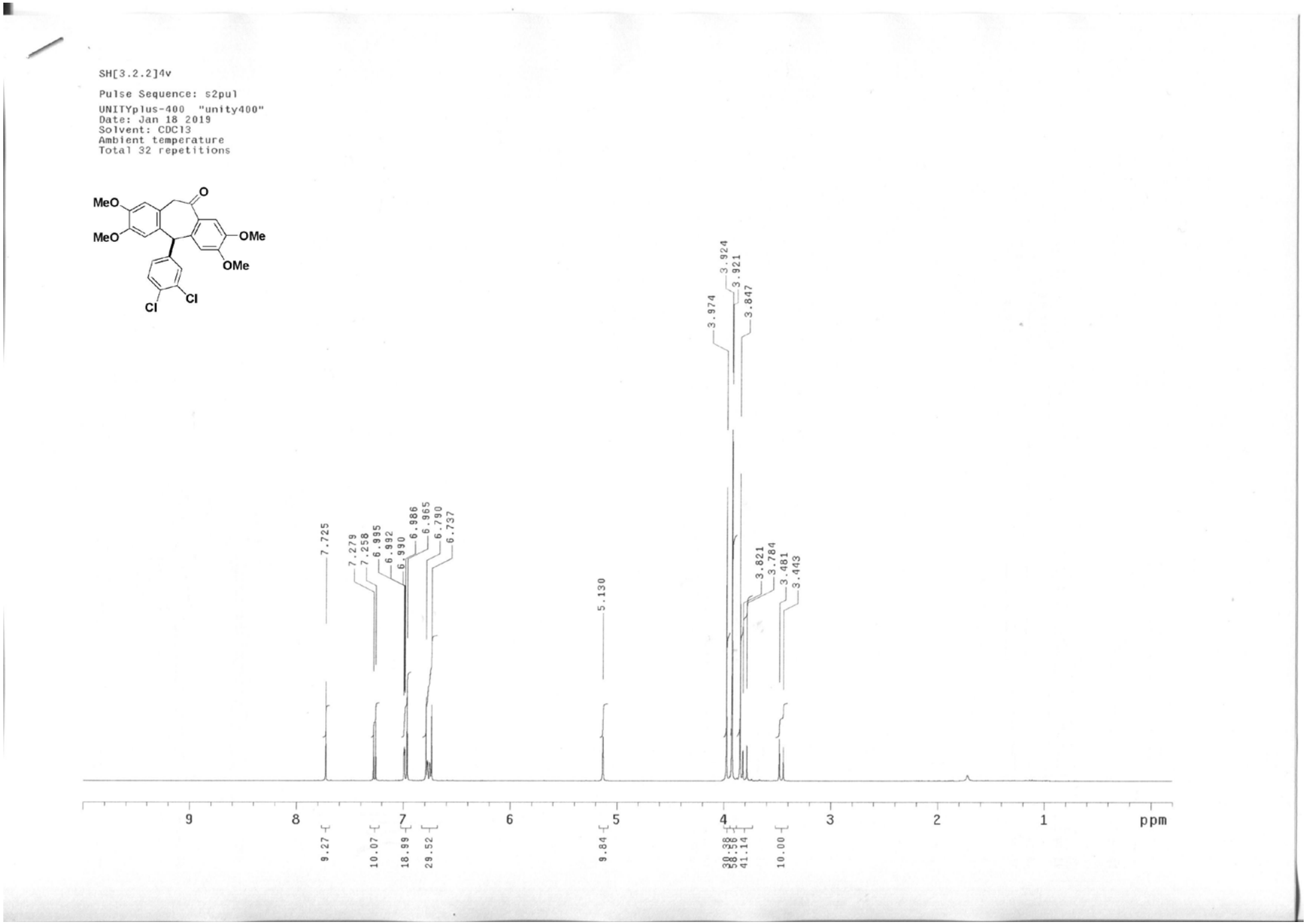
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 15 2019
Solvent: CDCl3
Ambient temperature
Total 640 repetitions





Compound 5v-1 (^{1}H-NMR spectral data)

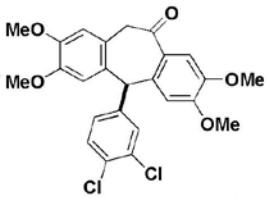


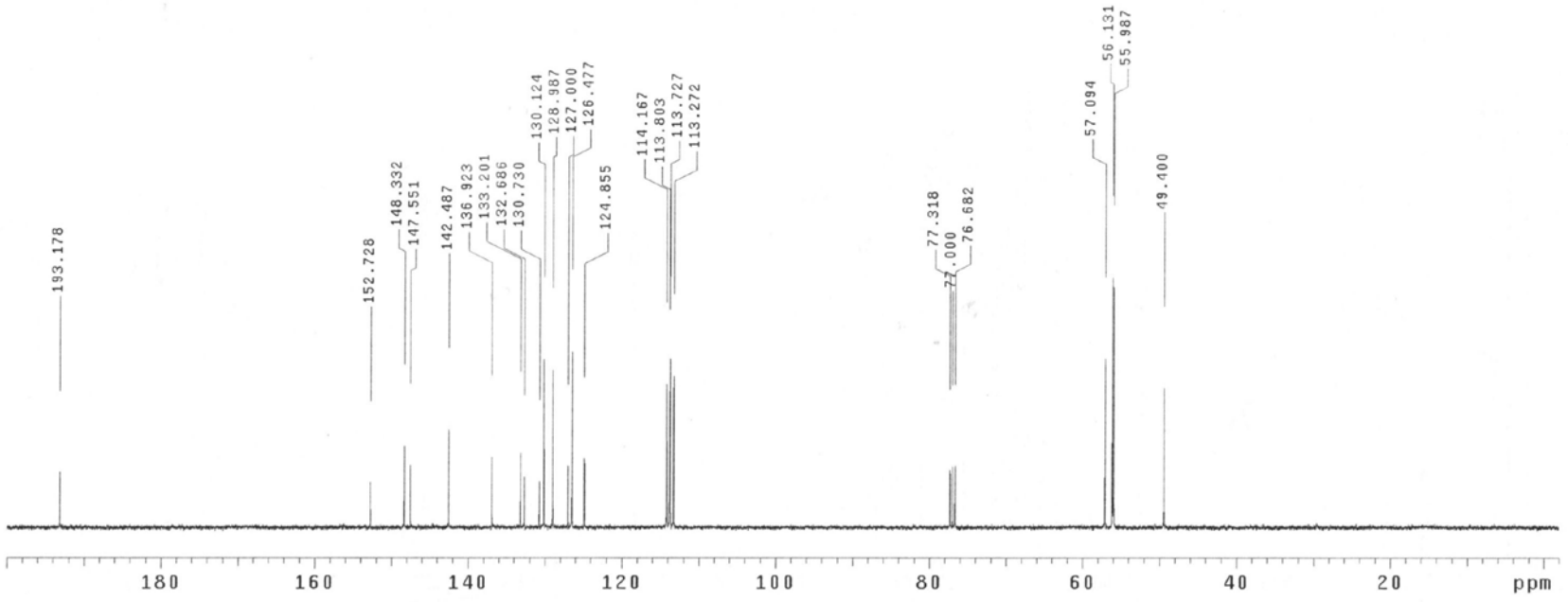
Compound 5v-1 (^{13}C-NMR spectral data)

SH[3.2.2]4v

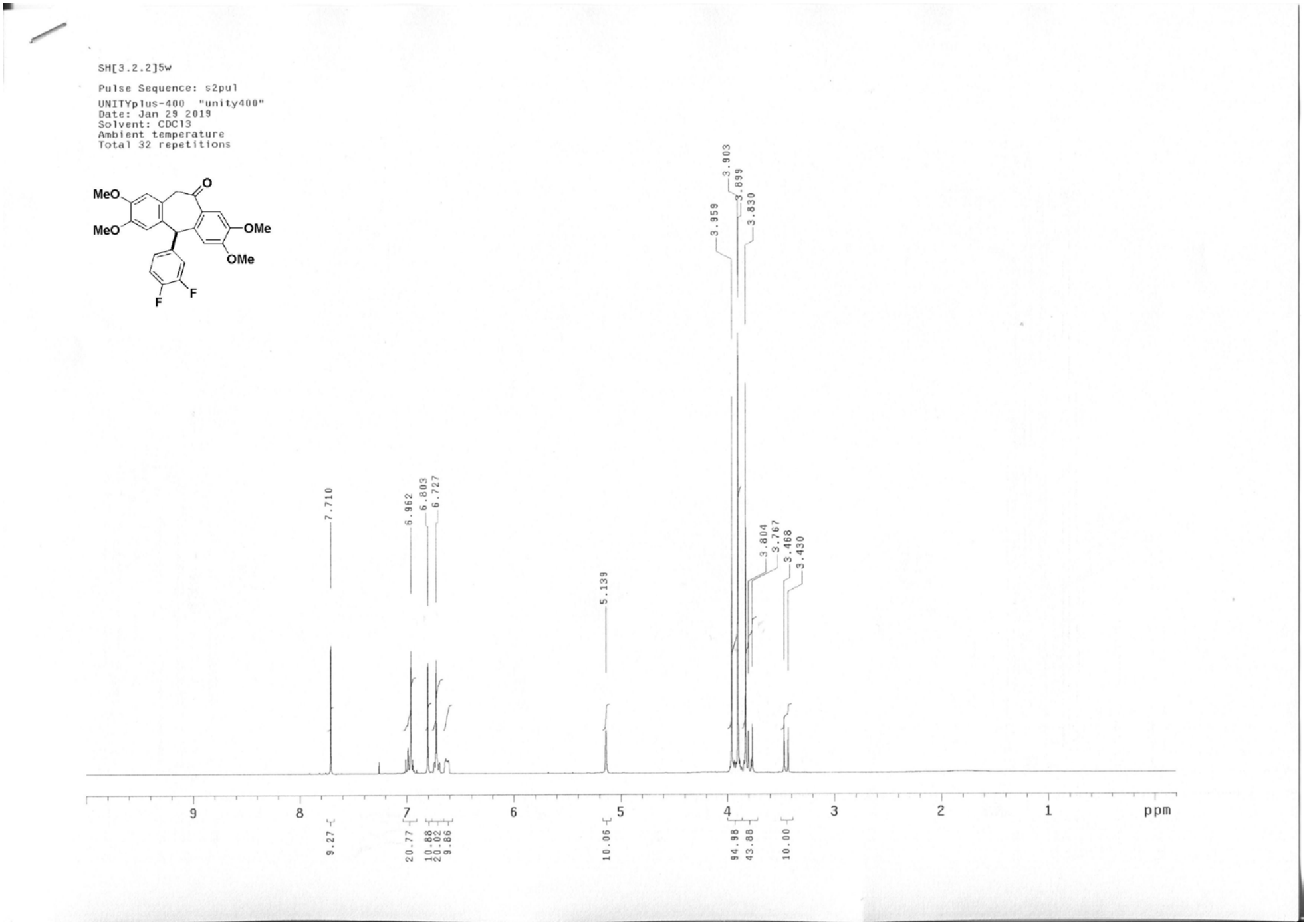
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 18 2019
Solvent: CDCl3
Ambient temperature
Total 1040 repetitions





Compound 5w-1 (^{1}H-NMR spectral data)

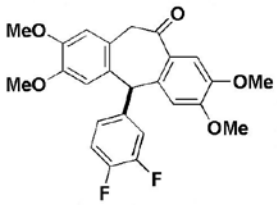


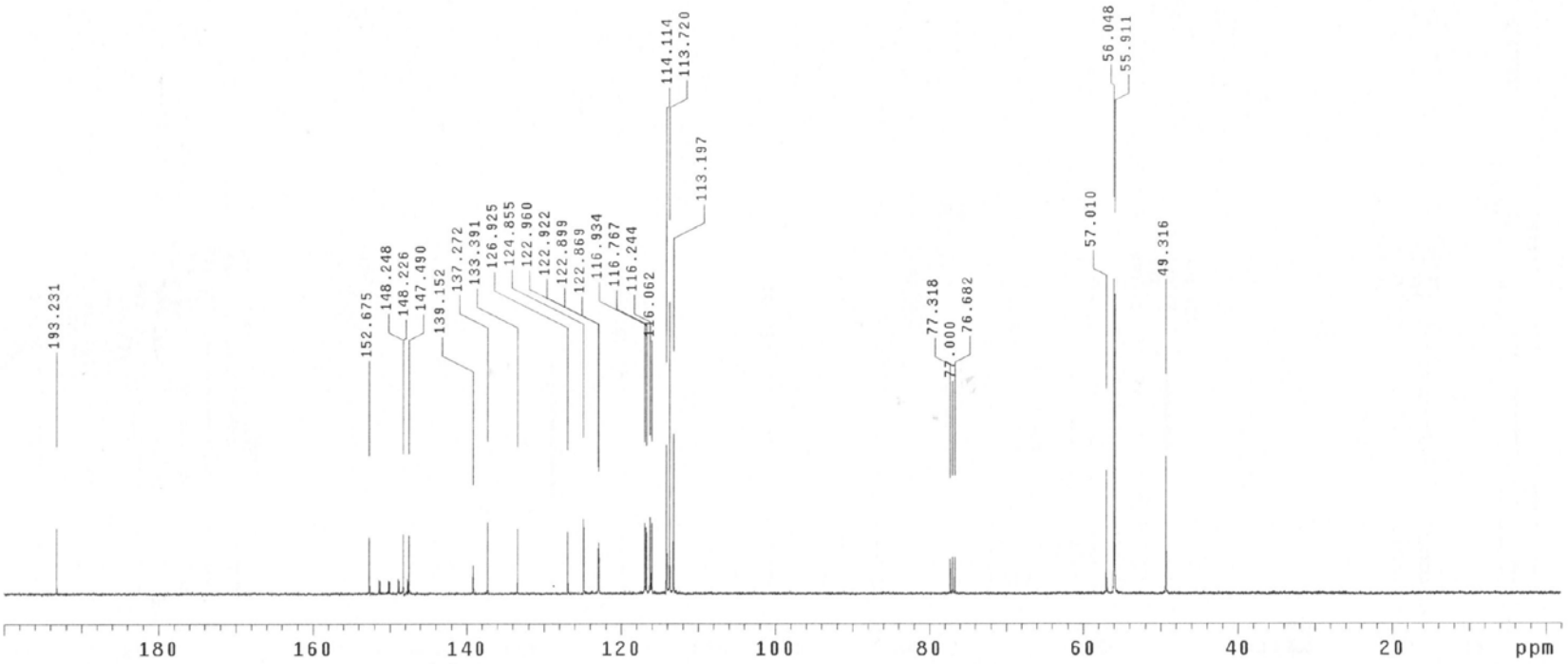
Compound 5w-1 (^{13}C-NMR spectral data)

SH[3.2.2]5w

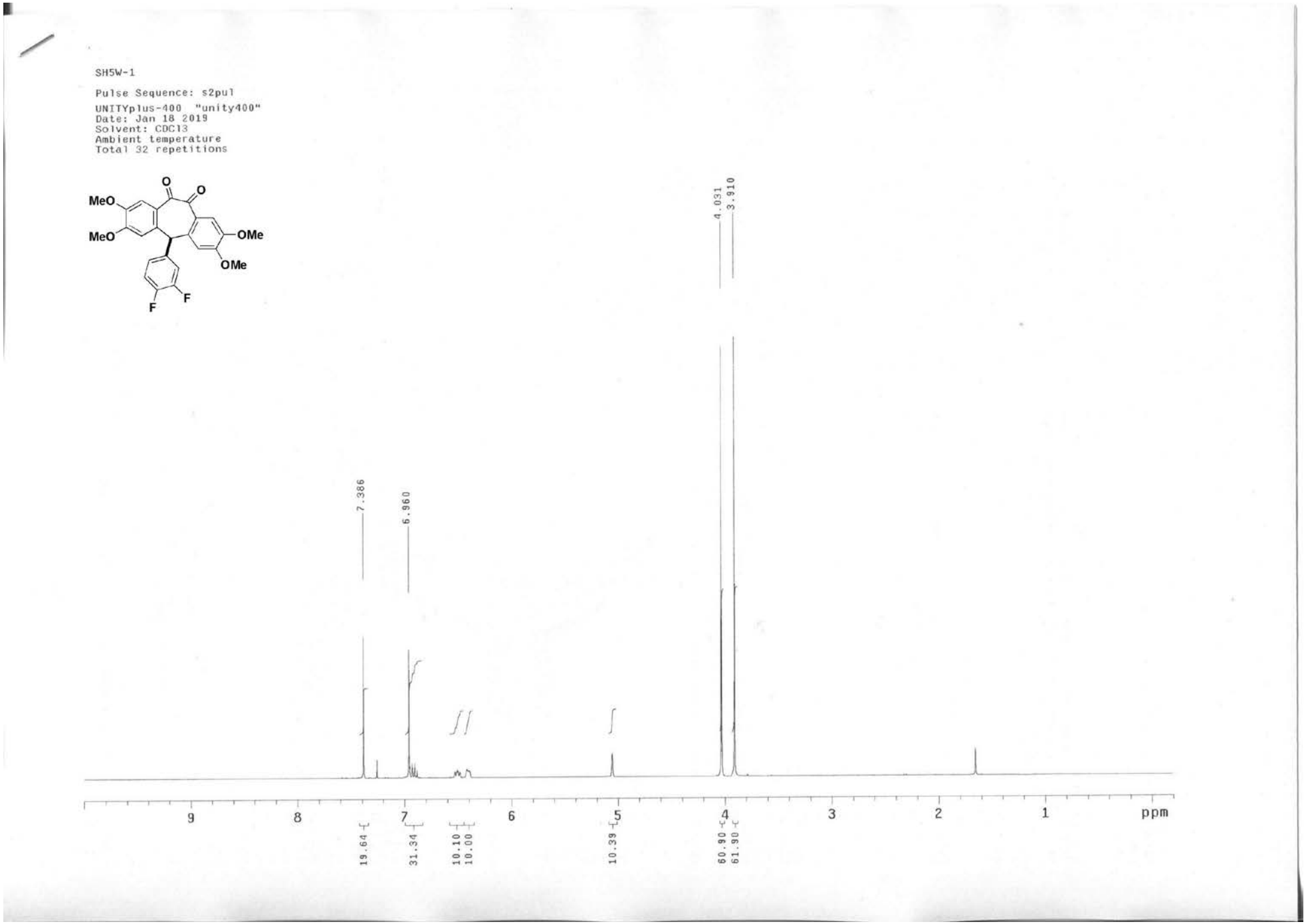
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Jan 29 2019
Solvent: CDCl3
Ambient temperature
Total 1152 repetitions

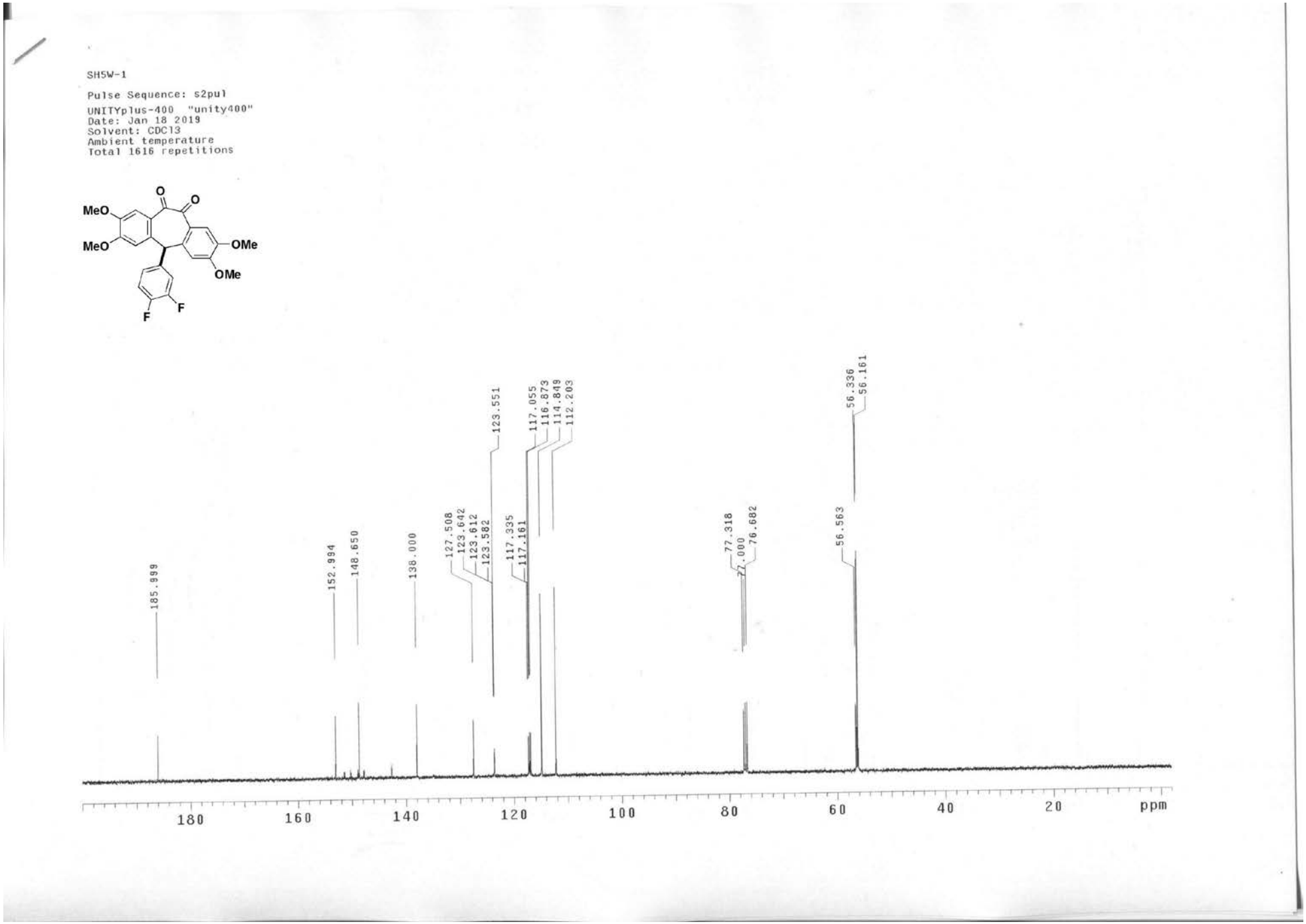




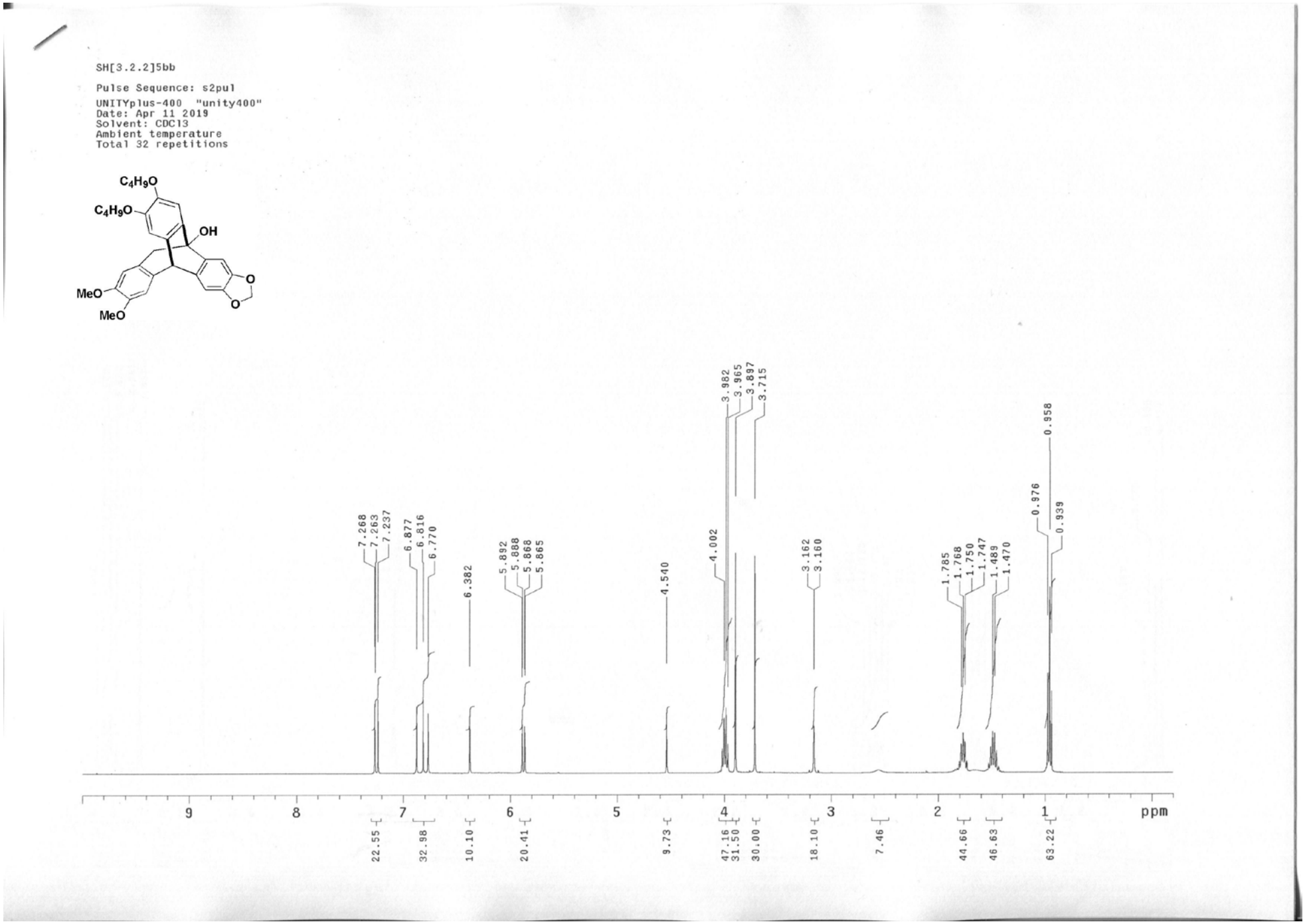
Compound 5w-2 (^{1}H-NMR spectral data)



Compound 5w-2 (^{13}C-NMR spectral data)



Compound 5x (^{1}H-NMR spectral data)

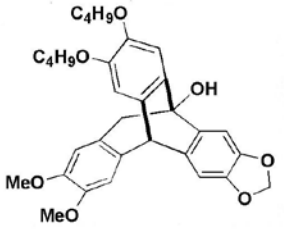


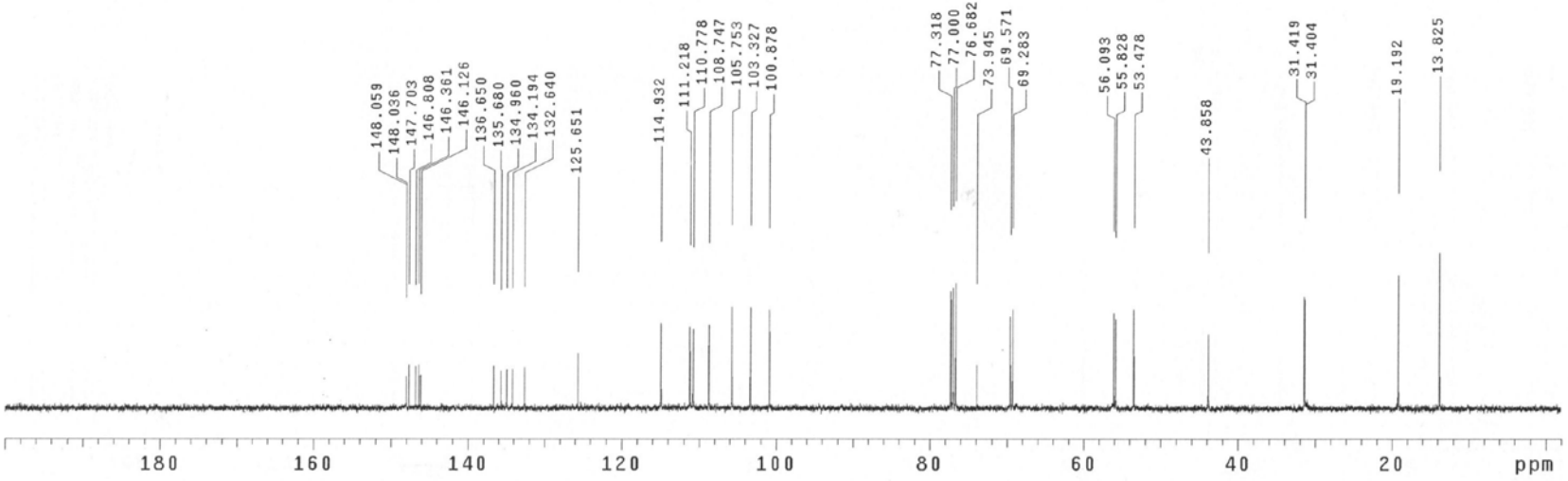
Compound 5x (^{13}C-NMR spectral data)

SH[3.2.2]5bb

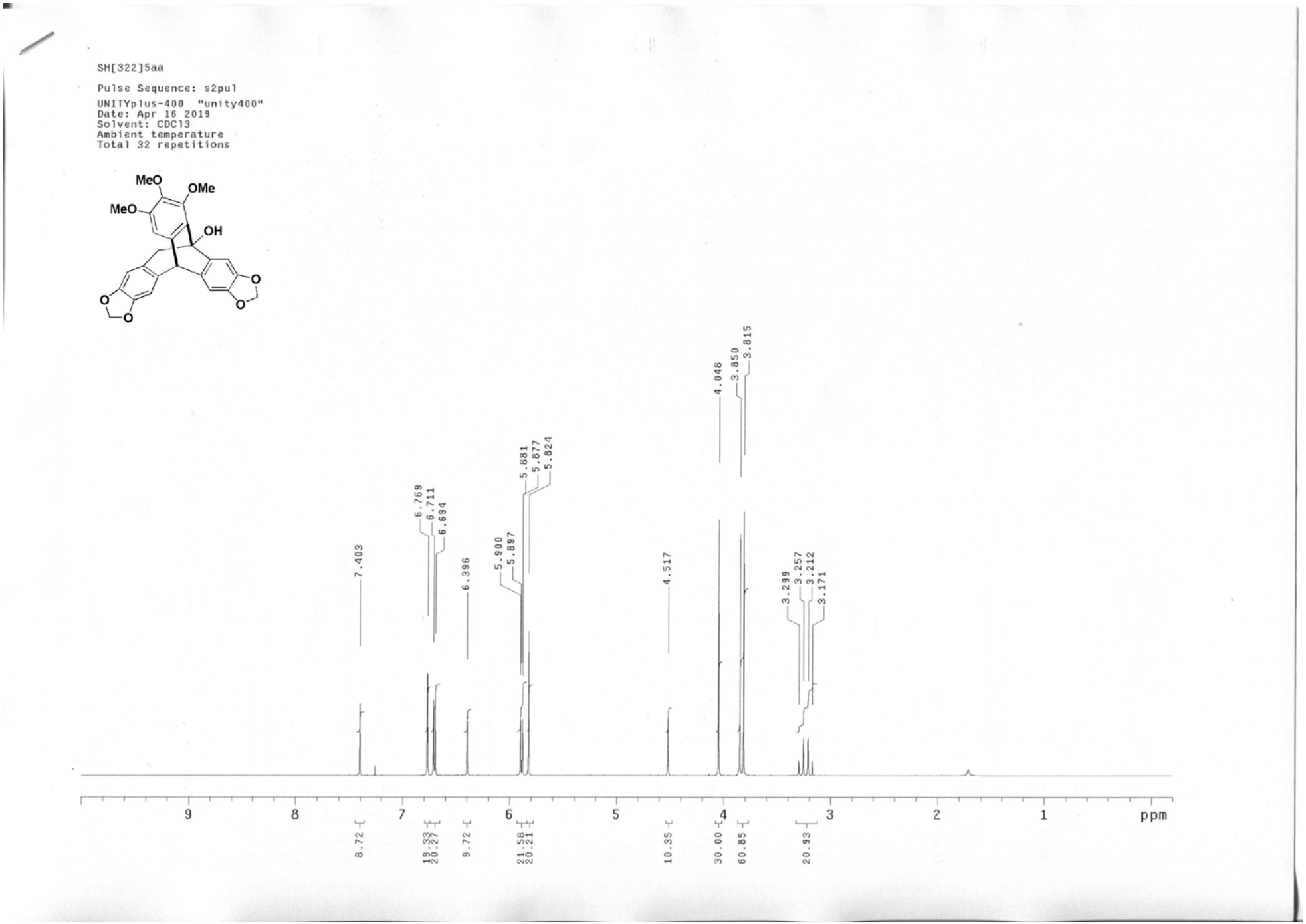
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Apr 11 2019
Solvent: CDCl3
Ambient temperature
Total 1824 repetitions





Compound 5y (^{1}H-NMR spectral data)

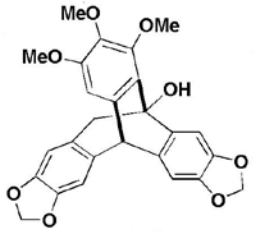


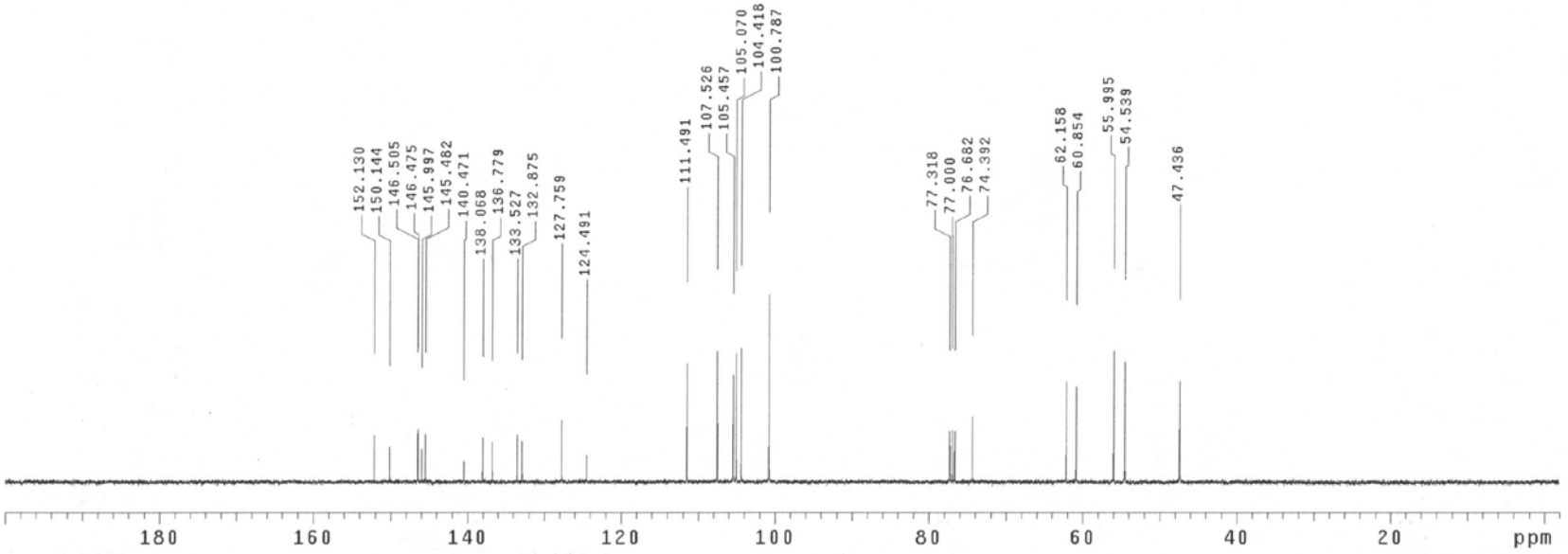
Compound 5y (^{13}C-NMR spectral data)

SH[322]5aa

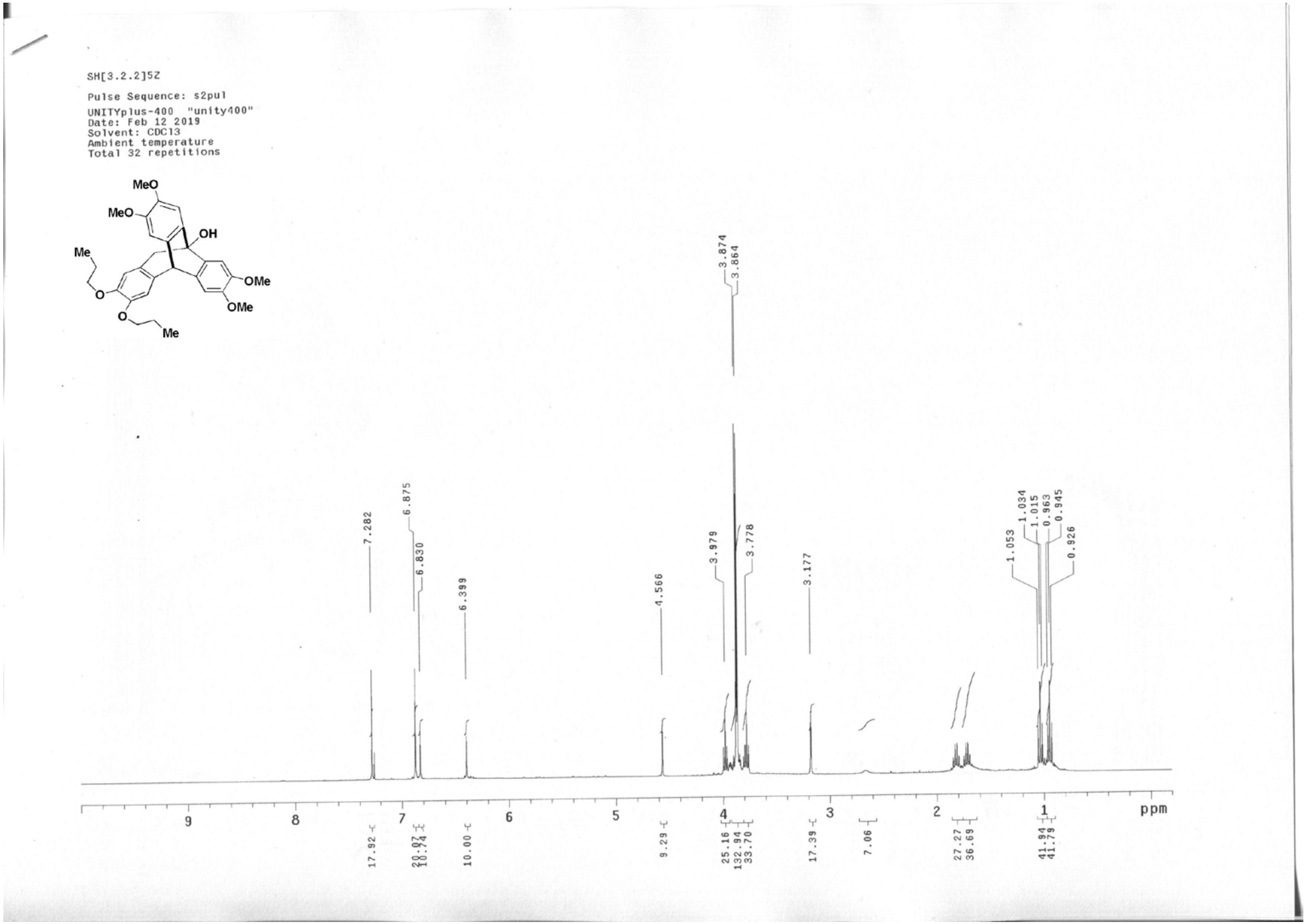
Pulse Sequence: s2pul

UNITYplus-400 "unity400"
Date: Apr 16 2019
Solvent: CDCl3
Ambient temperature
Total 464 repetitions

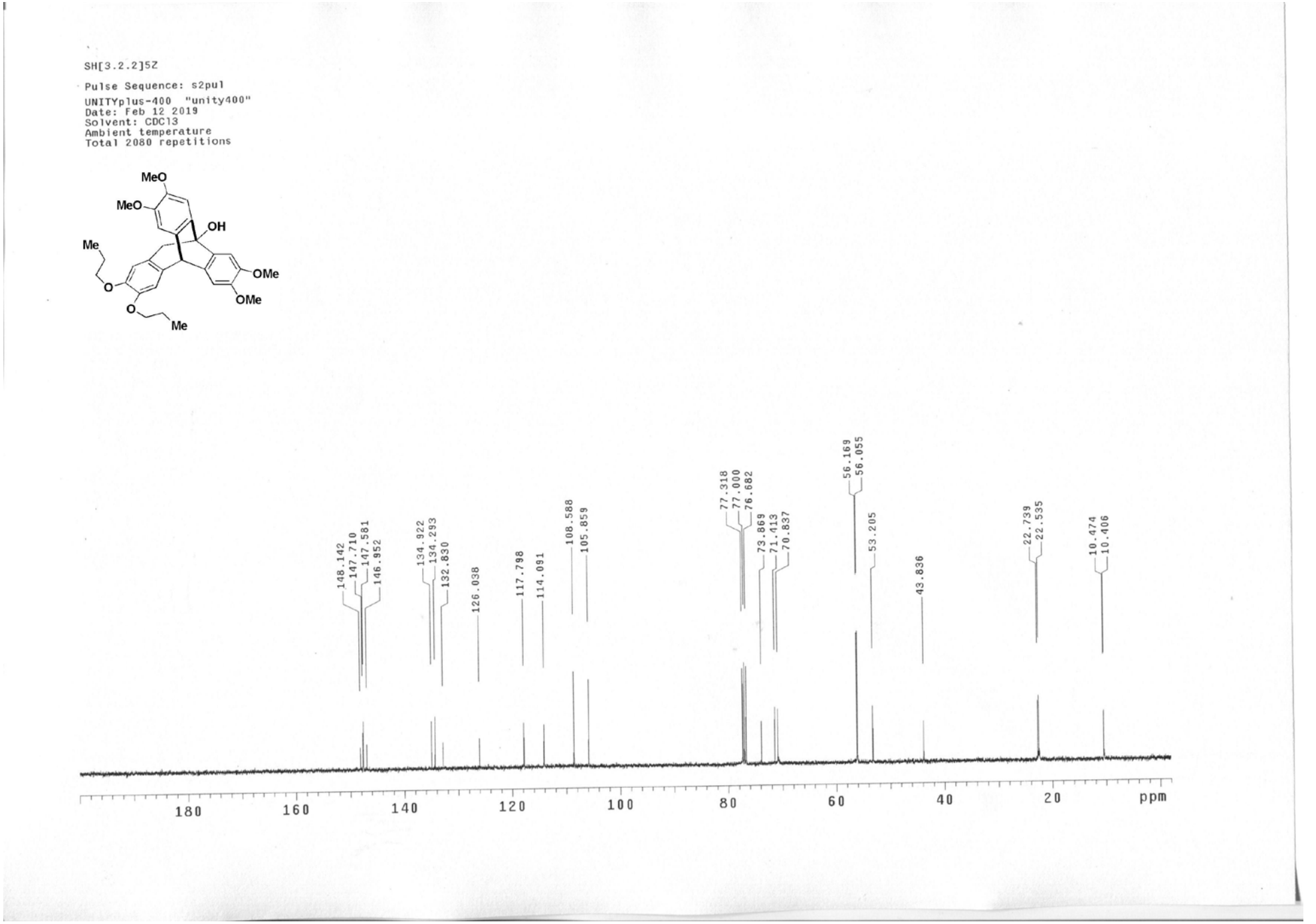




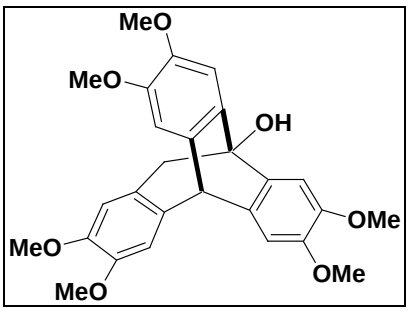
Compound 5z (^{1}H-NMR spectral data)



Compound 5z (^{13}C-NMR spectral data)

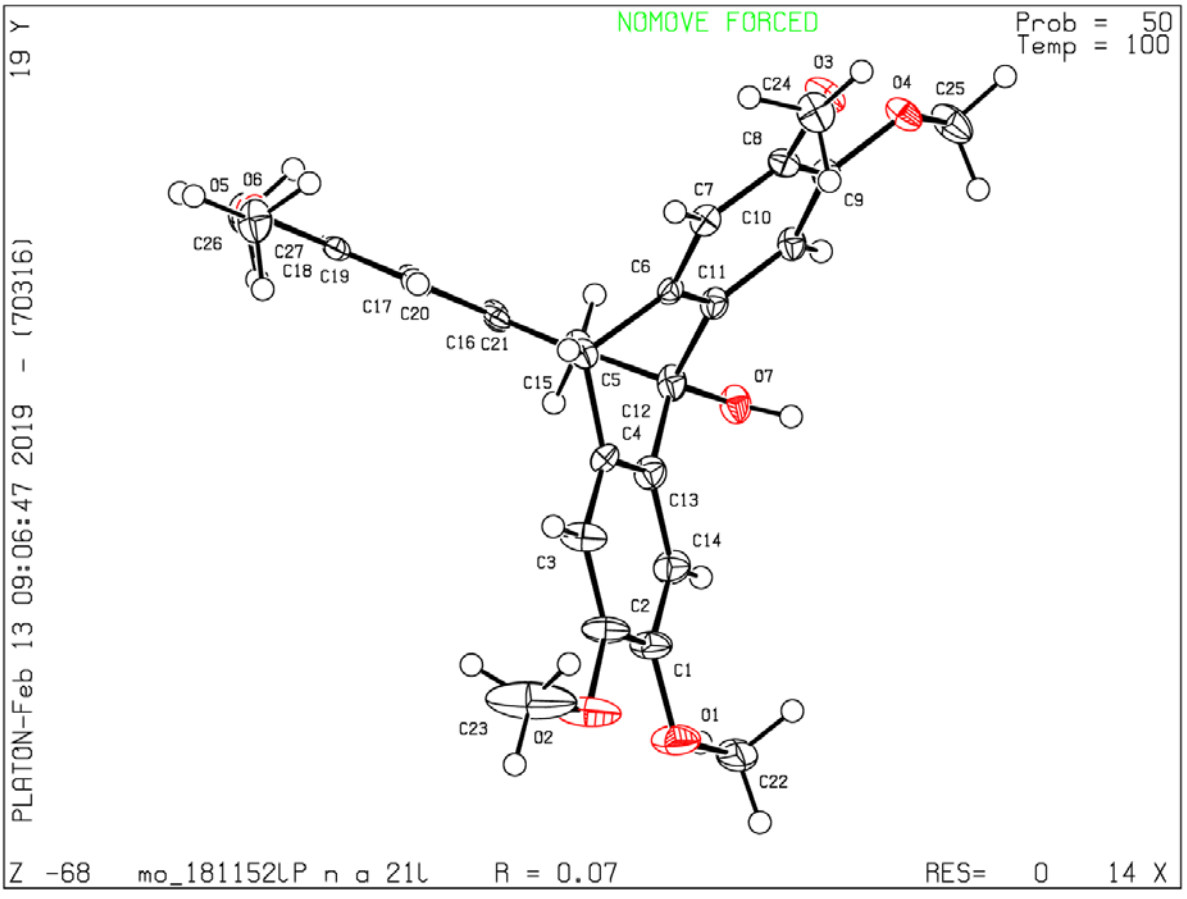


X-ray crystal data of compound 5a (CCDC 1938168)



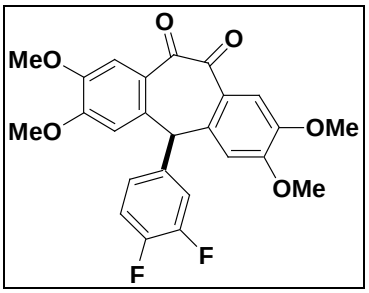
Sample preparation : A solution of compound **5a** (30 mg) in CH_2Cl_2 (10 mL) was placed in a tube (10 mL). EtOAc (2 mL) was added slowly to the vial with a dropper. The vial was closed with little cotton and kept at room temperature for 2 days. Then, colorless prisms were observed.

Crystal measurement : X-ray crystal structures were determined with a Bruker Enraf-Nonius single-crystal diffractometer (CAD4, Kappa CCD). Thermal ellipsoids are drawn at 50% probability level.



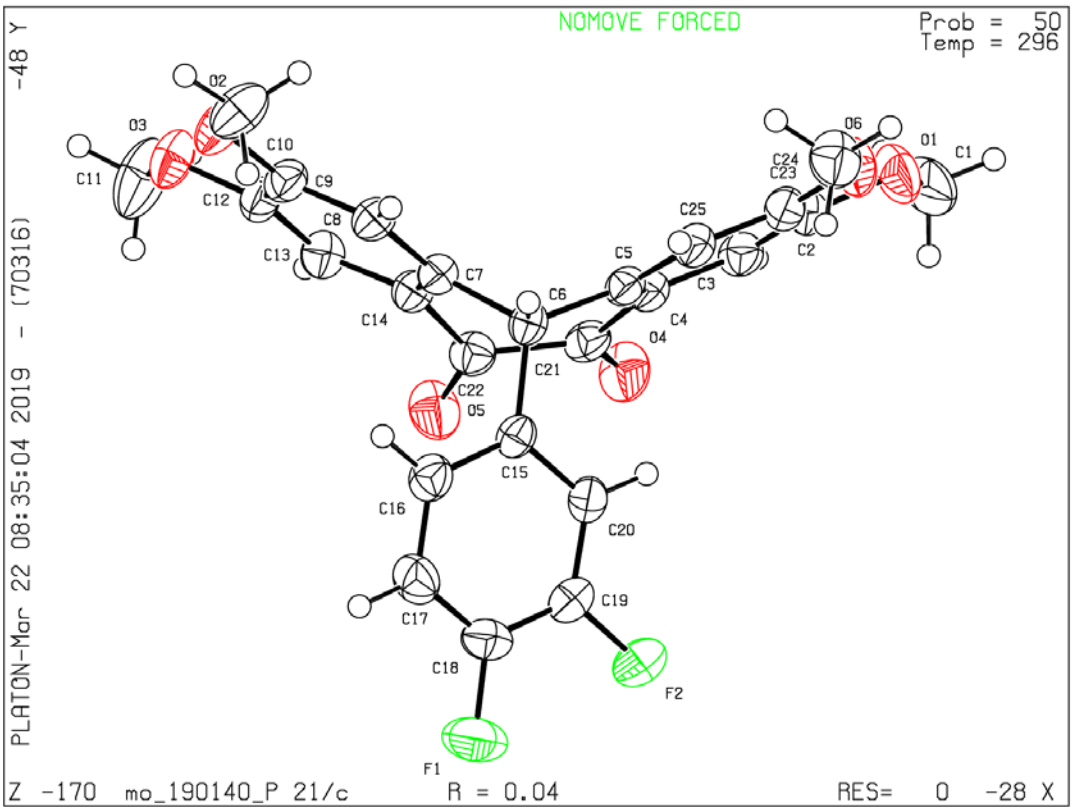
Empirical formula	C27 H28 O7	
Formula weight	464.49	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	P n a 21	
Unit cell dimensions	a = 15.2055(18) Å	α = 90°.
	b = 17.986(2) Å	β = 90°.
	c = 8.4082(11) Å	γ = 90°.
Volume	2299.5(5) $Å^3$	
Z	4	
Density (calculated)	1.342 Mg/m^3	
Absorption coefficient	0.097 mm^{-1}	
F(000)	984	
Crystal size	0.10 x 0.08 x 0.02 mm^3	
Theta range for data collection	1.754 to 26.510°.	
Index ranges	-19<=h<=18, -22<=k<=21, -10<=l<=10	
Reflections collected	24767	
Independent reflections	4680 [R(int) = 0.0980]	
Completeness to theta = 25.242°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.7454 and 0.6687	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	4680 / 1 / 315	
Goodness-of-fit on F^2	1.053	
Final R indices [I>2sigma(I)]	R1 = 0.0690, wR2 = 0.1332	
R indices (all data)	R1 = 0.1004, wR2 = 0.1476	
Absolute structure parameter	-2(2)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.401 and -0.249 $e.Å^{-3}$	

X-ray crystal data of compound 5w-2 (CCDC 1938169)



Sample preparation : A solution of compound **5w-2** (30 mg) in CH_2Cl_2 (10 mL) was placed in a tube (10 mL). EtOAc (2 mL) was added slowly to the vial with a dropper. The vial was closed with little cotton and kept at room temperature for 2 days. Then, colorless prisms were observed.

Crystal measurement : X-ray crystal structures were determined with a Bruker Enraf-Nonius single-crystal diffractometer (CAD4, Kappa CCD). Thermal ellipsoids are drawn at 50% probability level.



Empirical formula	C25 H20 F2 O6	
Formula weight	454.41	
Temperature	296(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	$P2_1/c$	
Unit cell dimensions	a = 11.9481(8) Å	α = 90°.
	b = 15.6973(9) Å	β = 111.052(3)°.
	c = 12.0408(7) Å	γ = 90°.
Volume	2107.6(2) $Å^3$	
Z	4	
Density (calculated)	1.432 Mg/m^3	
Absorption coefficient	0.113 mm^{-1}	
F(000)	944	
Crystal size	0.17 x 0.14 x 0.06 mm^3	
Theta range for data collection	1.826 to 26.446°.	
Index ranges	-13<=h<=14, -19<=k<=19, -15<=l<=12	
Reflections collected	29528	
Independent reflections	4328 [R(int) = 0.0422]	
Completeness to theta = 25.242°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.7454 and 0.6846	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	4328 / 0 / 302	
Goodness-of-fit on F^2	1.004	
Final R indices [I>2sigma(I)]	R1 = 0.0407, wR2 = 0.0917	
R indices (all data)	R1 = 0.0725, wR2 = 0.1061	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.150 and -0.160 $e.Å^{-3}$	