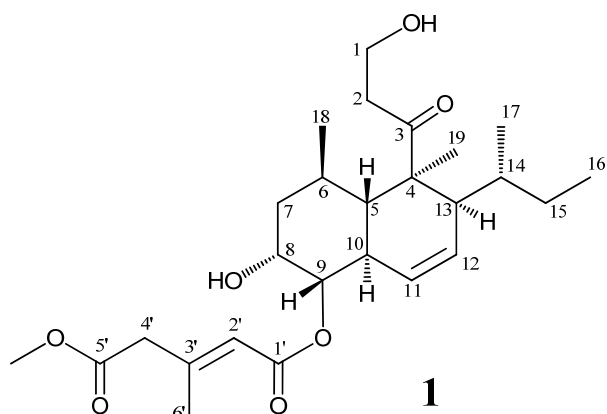


# Supplementary Information



**Figure S1.** Compound 1.

**Table S1.** Spectral data including 2D NMR data for 1.

Position	$\delta_{\text{H}}^{\text{a}}$		$J/\text{Hz}$	$^1\text{H}-^1\text{H}$ COSY	NOE $^{\text{b}}$	$\delta_{\text{C}}$	HMBC (C) $^{\text{c}}$
1A	3.83	ddd	11.5 (2B), 6.2 (2A), 3.5 (2B)	1B, 2A, 2B		58.0	(t) 3
1B	3.89	ddd	11.5 (1B), 6.2 (2B), 3.5 (2A)	1A, 2A, 2B	14		3
2A	2.66	ddd	18.5 (2B), 6.2 (1A), 3.5 (1B)	1A, 1B, 2B	13, 14, 19	41.2	(t) 1, 3
2B	2.87	ddd	18.5 (1B), 6.2 (1B), 3.5 (1A)	1A, 1B, 2A	18, 19		1, 3
3						215.2	(s)
4						52.5	(s)
5	2.06	t	11.5 (6, 10)	6, 10	7 $\beta$ , 9, 15B, 16, 18	43.6	(d) 3, 4, 6, 7, 9, 10, 13
6	1.82	m		5, 7 $\beta$ , 18	10, 19	30.3	(d)
7 $\alpha$	1.86	dt	12.3 (7 $\alpha$ ), 2.5 (6, 8)	7 $\beta$ , 8	18	40.7	(t) 5, 8, 9
7 $\beta$	1.55	td	12.3 (6, 7 $\beta$ ), 2.5 (8)	6, 7 $\alpha$ , 8	5, 9, 18		5, 6
8	4.13	q	2.5 (7 $\alpha$ , 7 $\beta$ , 9)	7 $\alpha$ , 7 $\beta$ , 9		67.6	(d) 6, 10
9	4.78	dd	11.5 (10), 2.5 (8)	8, 10	5, 7 $\beta$ , 11	77.4	(d) 1', 10
10	2.46	tdd	11.5 (5, 9), 5.2 (11), 2.5 (12)	5, 9, 11, 12	6, 19	36.2	(d) 9, 11
11	5.62	br d	10.5 (12)	10, 12, 13	9, 16	125.0	(d) 5, 9, 10, 13
12	5.74	ddd	10.5 (11), 5.2 (13), 2.5 (10)	10, 11, 13	16, 17	124.5	(d) 10, 13
13	1.94	m		11, 12, 14	2A, 17, 19	52.4	(d) 19
14	1.12	m		13, 15A, 15B, 17	1B, 2A, 16	37.2	(t)
15A	0.74	m		14		24.4	(d)
15B	1.50	m		14, 16	5		13, 14, 16, 17
16	0.76	t	7.3 (15)	15B	5, 11, 12, 14, 17	12.5	(q) 14, 15
17	0.92	d	6.6 (14)	14	12, 13, 16	19.1	(q) 14, 15, 16
18	0.60	d	7.0 (6)	6	2B, 5, 7 $\alpha$ , 7 $\beta$	22.3	(q) 5, 6, 7
19	1.26	s			2A, 2B, 6, 10, 13	19.4	(q) 3, 4, 5, 13
1'						164.9	(s)
2'	5.88	s			4'	118.9	(d) 1', 3', 4', 6'
3'						152.0	(s)
4'	3.19	s			2', 6'	45.7	(t) 2', 3', 5', 6'
5'						170.2	(s)
6'	2.27	s			4'	19.2	(q) 2', 3', 4'
5'-OCH <sub>3</sub>	3.73	s				52.2	(q) 5'

<sup>a</sup>  $^1\text{H}$  chemical shift values ( $\delta_{\text{ppm}}$  from SiMe<sub>4</sub>) followed by multiplicity and then the coupling constants ( $J/\text{Hz}$ ). Figures in parentheses indicate the proton coupling with that position; <sup>b</sup> The correlations with geminal and vicinal protons are removed; <sup>c</sup> Long range  $^1\text{H}-^{13}\text{C}$  correlations from H to C observed in the HMBC experiment.

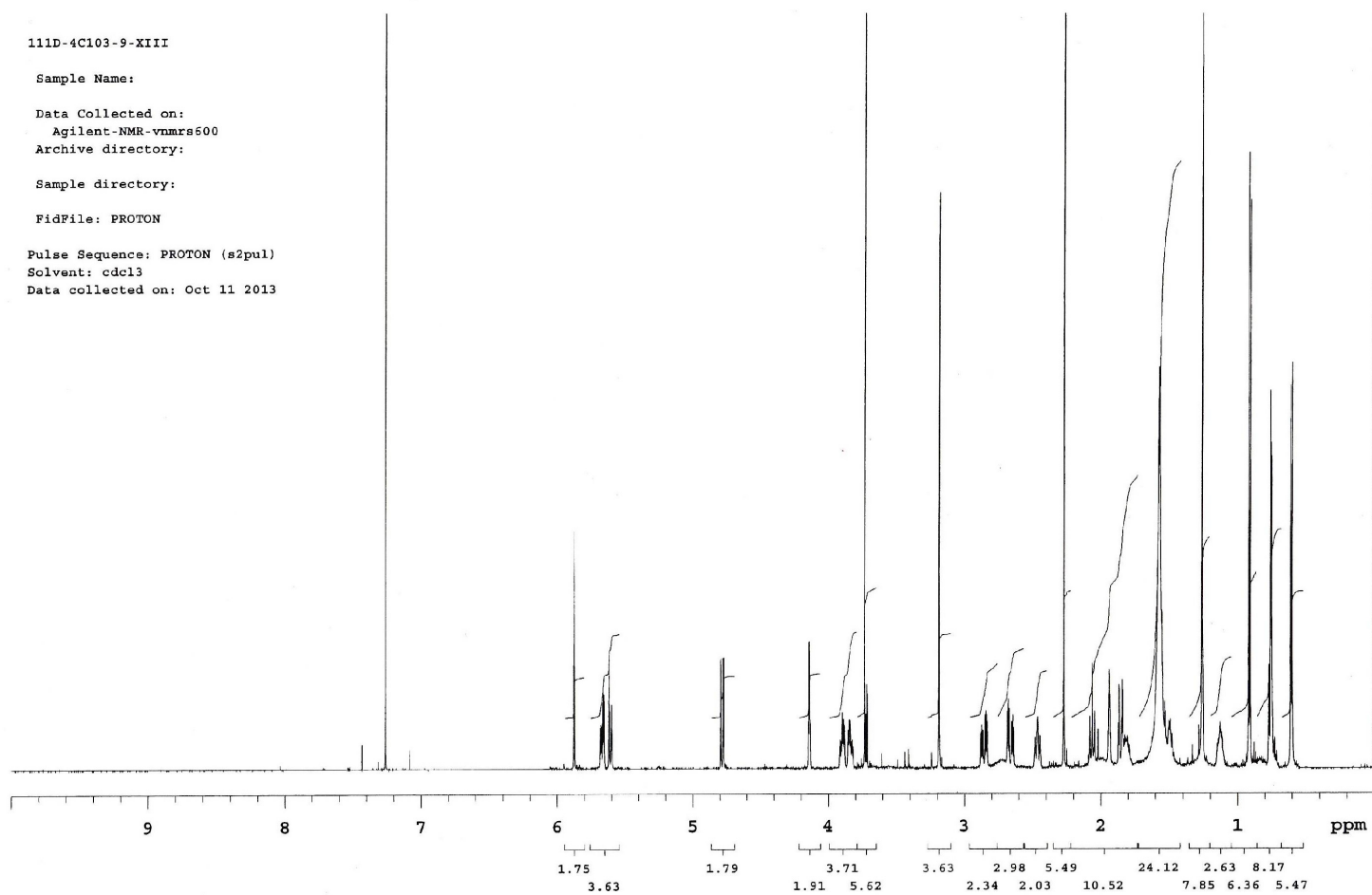


Figure S2.  $^1\text{H}$  NMR spectrum of 1.

111D-4C103-9-XIII  
Sample Name:  
Data Collected on:  
Agilent-NMR-vnmrs600  
Archive directory:  
Sample directory:  
FidFile: CARBON  
Pulse Sequence: CARBON (s2pul)  
Solvent: cdcl3  
Data collected on: Oct 11 2013

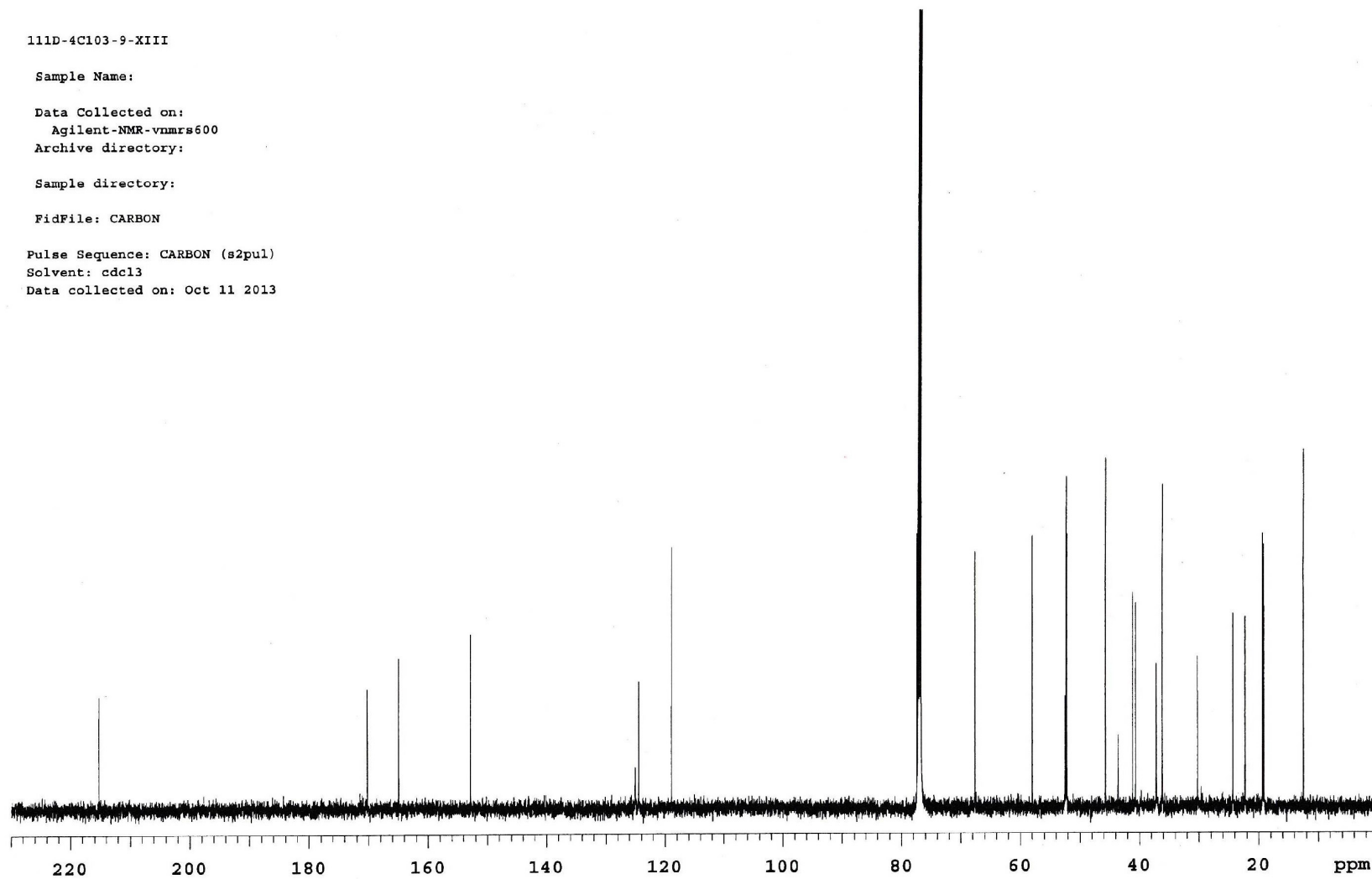
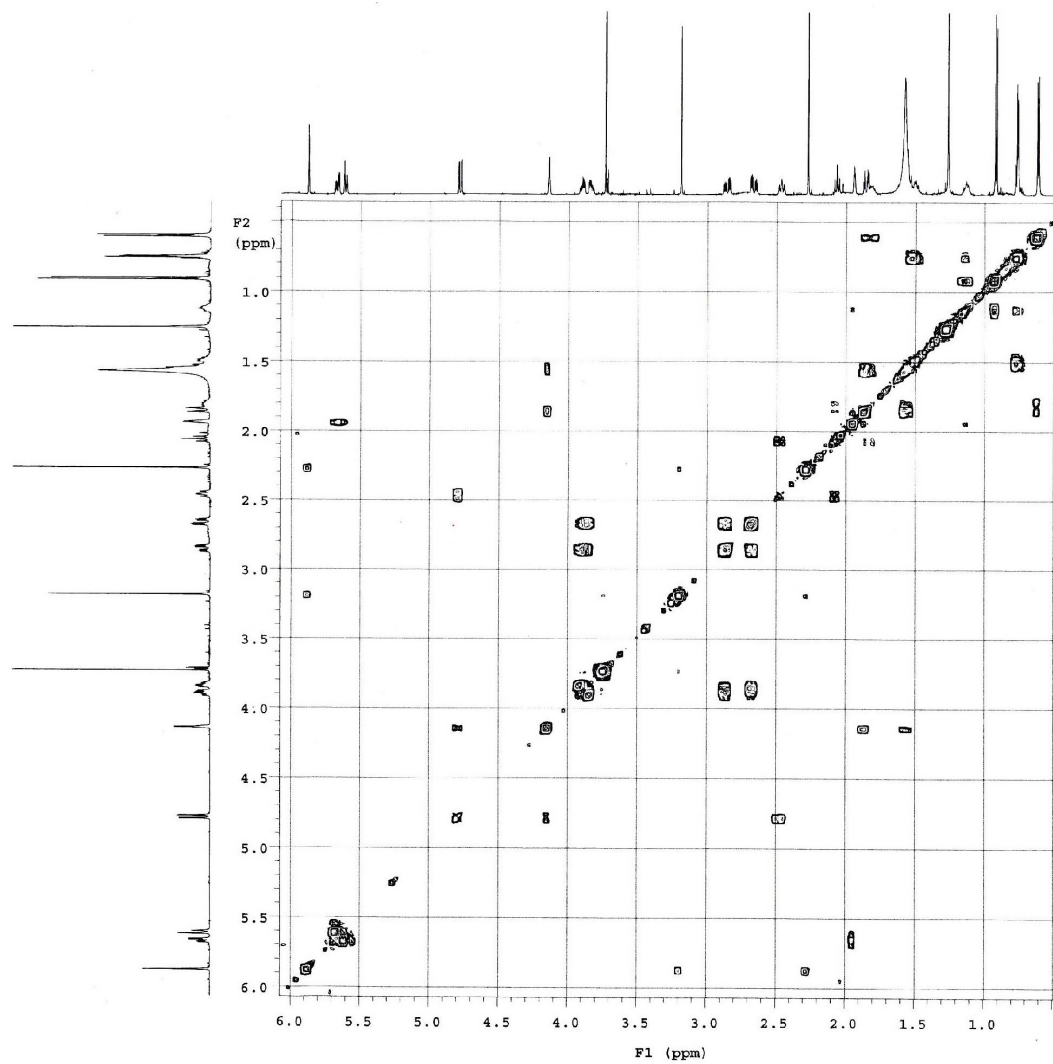


Figure S3. <sup>13</sup>C NMR spectrum of 1.

```
111D-4C103-9-XIII
exp33 gCOSY
SAMPLE          FLAGS
date Oct 11 2013 hs      nn
solvent cdcl3  sspul    y
sample          hglvl    6540
ACQUISITION     SPECIAL
sw 4699.2 temp not used
at 0.150 gain 48
np 1410 spin 0
fb 4000 F2 PROCESSING
ss 32 ab -0.075
dl 1.000 sbs not used
nt 16 fn 2048
2D ACQUISITION F1 PROCESSING
sw1 4699.2 sb1 -0.027
n1 256 sb1 not used
d2 0 proc1 lp
PRESATURATION fn1 2048
satmode n DISPLAY
wet n sp 217.2
TRANSMITTER wp 3423.5
tn H1 sp1 221.8
sfrq 599.898 wp1 3423.5
tof -792.3 rf1 140.7
tpwr 58 rfp 0
pw 9.100 rfil 140.7
GRADIENTS rfpl 0
gzlvk 5458 PLOT
gLE 0.001000 wc 200.0
EDratio 1.000 sc 0
gstab 0.000500 wc2 200.0
DECOUPLER sc2 0
dn C13 vs 583
dm nnn th 2
ai cdc av 2
```

Figure S4.  $^1\text{H}$ - $^1\text{H}$  COSY of 1.

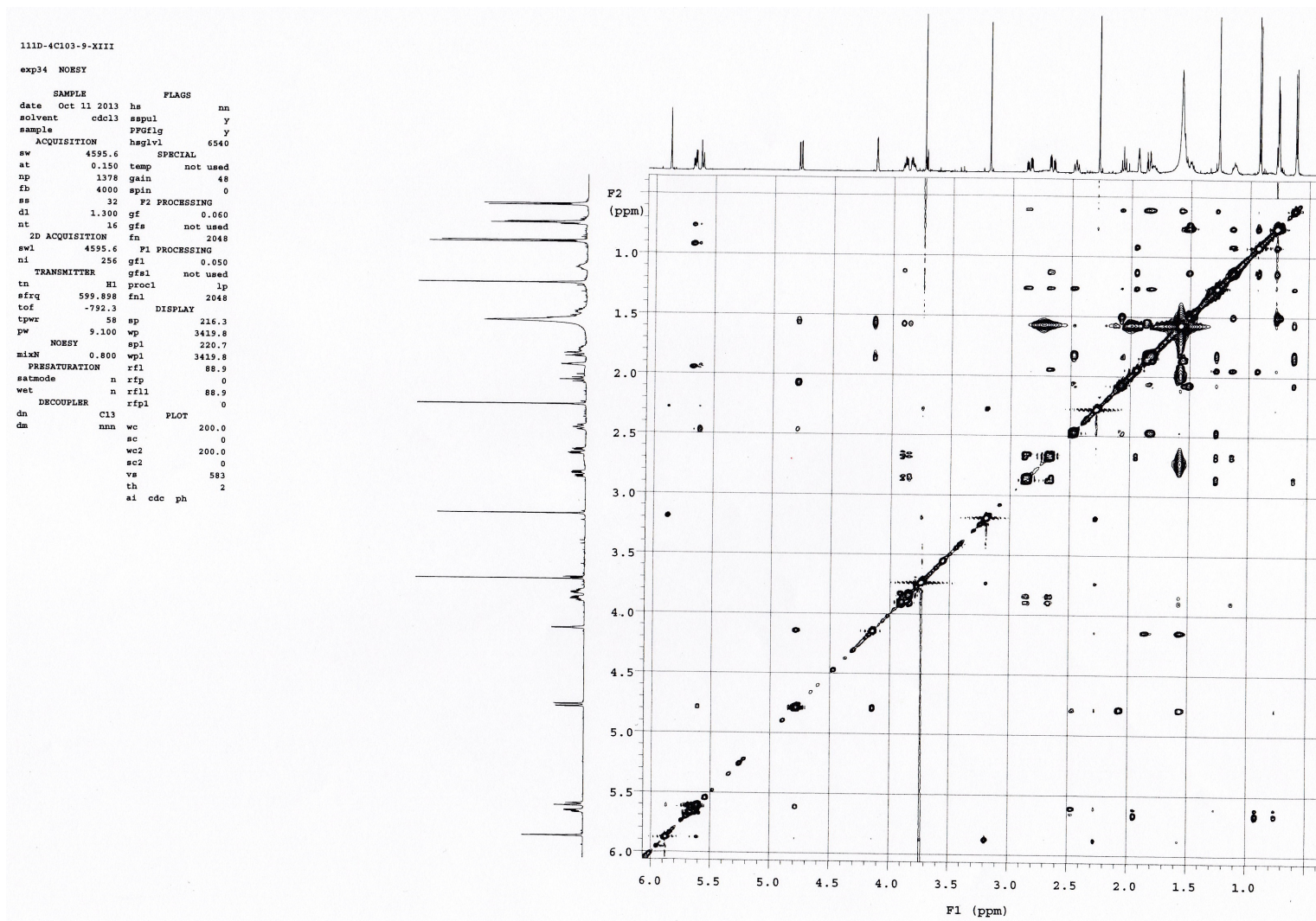


Figure S5. NOESY of 1.

111D-4C103-9-XIII

exp35 gHSQCAD

SAMPLE		FLAGS		ACQUISITION ARRAYS	
date	Oct 11 2013	hs	nm	array	phase
solvent	cdcl3	sspul	y	arraydim	1024
sample		PFGLg			
ACQUISITION	hsg1v1	SPECIAL	6540	i	phase
sw	4595.6			1	1
at	0.150	temp	not used	2	2
np	1378	gain	44		
fb	4000	spin	0		
ss	32	GRADIENTS			
dt	1.500	gzlv1E	5458		
nt		gTE	0.002000		
2D ACQUISITION	EDratio		3.978		
sw1	26393.9	gstab	0.000500		
ni	512	F2 PROCESSING			
phase	arrayed	lb	0.30		
PRESATURATION	gf		0.070		
satmode	n	gfs	not used		
wet	n	fn	4096		
TRANSMITTER	F1 PROCESSING				
tn	H1	ld1	0.32		
zfrq	599.896	gf1	0.009		
tof	-792.3	gf21	not used		
tpwr	58	procl	lp		
pw	9.100	fn1	2048		
DECOUPLER	DISPLAY				
dn	C13	sp	108.5		
dof	-1850.5	wp	3803.5		
dm	nm	sp1	1284.7		
decwave	W40	OnePro-	wp1	18248.9	
		De	rfl	88.9	
dmf	35088	rfp	0		
dpwr	39	rfl1	751.6		
pwxlvl	58	rflp1	0		
pw	9.300	FLOT			
HSQC	wc		250.0		
jlkh	146.0	sc	0		
nullflg	y	wc2	200.0		
mult	2	sc2	0		
ADIBATIC	vs		771		
pwxl80ad	OneProbe-	th	2		
	ad300	a1	cdc	ph	
pwxl80adr	OneProbe-				
	_ad300R				
pwxl80	400.0				
pwxlvl180	53				
pwxl80ref	OneProbe-				
	_ref200				
pwxl80r	1998.8				
pwxlvl180r	44				

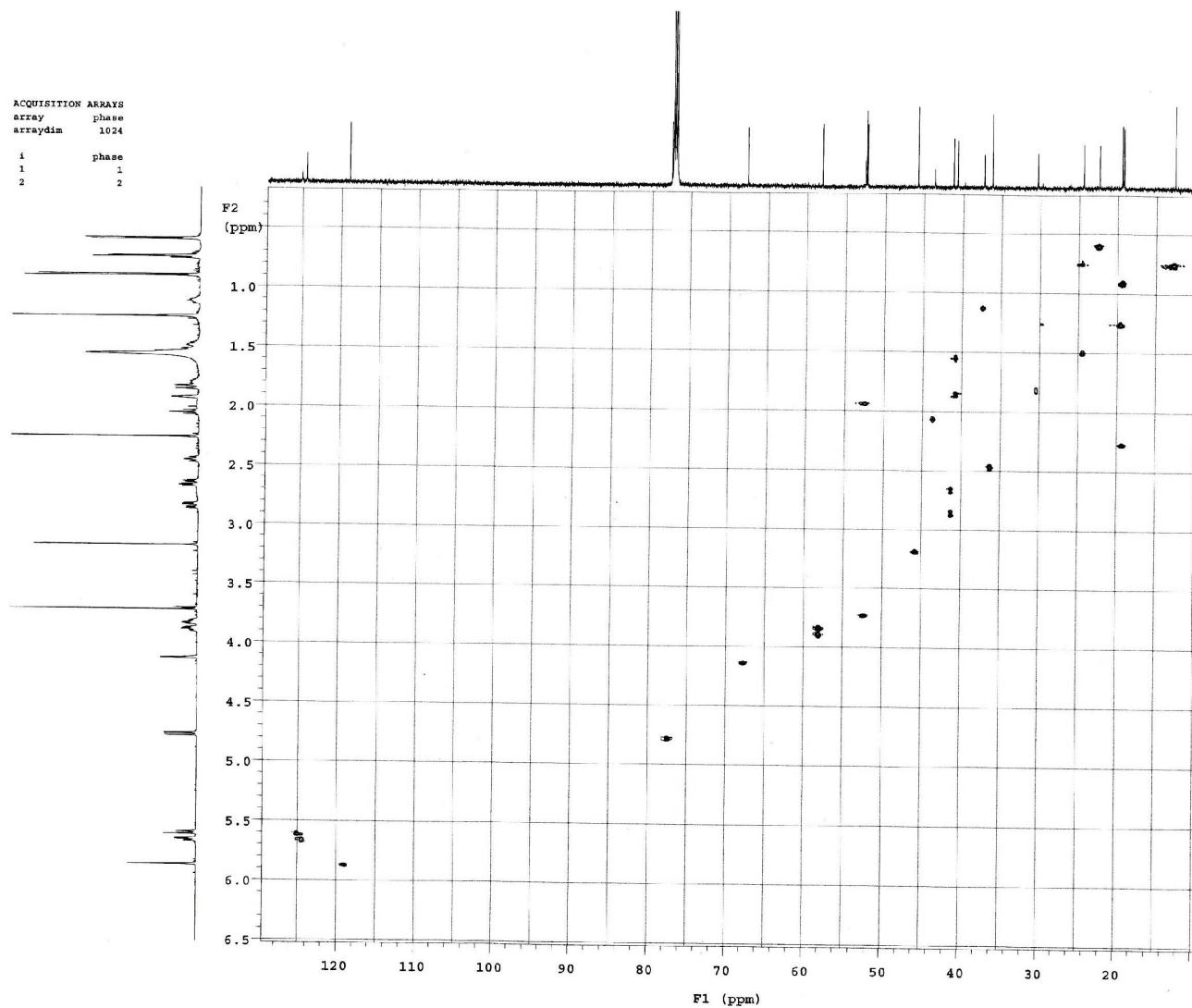


Figure S6. HSQC of 1.

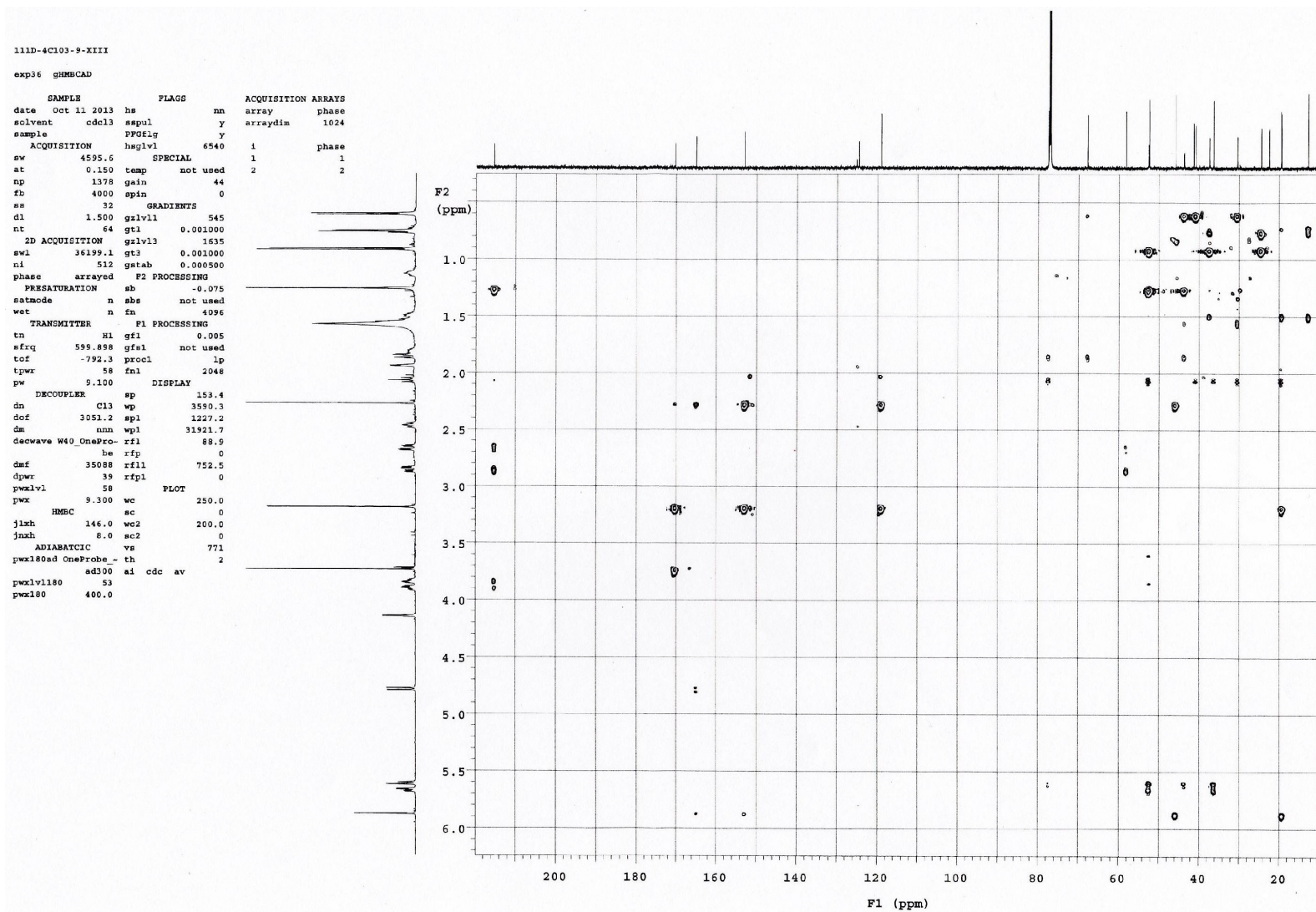


Figure S7. HMBC of 1.

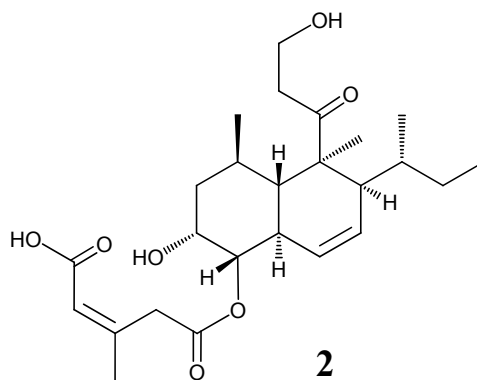


Figure S8. Compound 2.

Table S2. Spectral data including 2D NMR data for 2.

Position	$\delta_{\text{H}}$ <sup>a</sup>		<i>J</i> /Hz	<sup>1</sup> H- <sup>1</sup> H COSY	NOE <sup>b</sup>	$\delta_{\text{C}}$		HMBC (C) <sup>c</sup>
1A	3.84	ddd	10.8 (2B), 6.5 (2A), 3.5 (2B)	1B, 2A, 2B		58.0	(t)	2, 3
1B	3.90	ddd	10.8 (1B), 7.5 (2B), 3.5 (2A)	1A, 2A, 2B	14			2, 3
2A	2.67	ddd	18.5 (2B), 6.5 (1A), 3.5 (1B)	1A, 1B, 2B	13, 14, 19	41.1	(t)	1, 3
2B	2.85	ddd	18.5 (1B), 7.5 (1B), 3.5 (1A)	1A, 1B, 2A	18, 19			1, 3
3						215.2	(s)	
4						52.5	(s)	
5	2.03	t	10.8 (6, 10)	6, 10	7 $\beta$ , 9, 15B, 18	43.4	(d)	3, 4, 6, 7, 9, 10, 13, 19
6	1.73	m		5, 7 $\beta$ , 18	10, 18, 19	30.5	(d)	
7 $\alpha$	1.83	dt	12.0 (7 $\alpha$ ), 3.0 (6, 8)	7 $\beta$ , 8	18	40.1	(t)	5, 8, 9
7 $\beta$	1.53	td	12.0 (6, 7 $\beta$ ), 3.0 (8)	6, 7 $\alpha$ , 8	5, 9, 18			6
8	4.28	q	3.0 (7 $\alpha$ , 7 $\beta$ , 9)	7 $\alpha$ , 7 $\beta$ , 9		66.7	(d)	
9	4.55	dd	12.5 (10), 3.0 (8)	8, 10	5, 7 $\beta$ , 11	78.8	(d)	1'
10	2.47	br t	12.5 (5, 9)	5, 9	6, 19	36.0	(d)	5, 6, 9
11	5.69	dr d	10.8 (12)		9	125.1	(d)	5, 9, 10, 13
12	5.67	dd	10.8 (11), 4.2 (13)	13	16, 17	124.5	(d)	4, 10, 13
13	1.94	m		12, 14	2A, 17, 19	52.3	(d)	4, 5, 14, 15, 17, 19
14	1.12	m		13, 15A, 17	1B, 2A, 16	37.2	(t)	
15A	0.72	m		14, 15B, 17	17	24.5	(d)	14, 16, 17
15B	1.47	m		15A, 16	5			14, 16, 17
16	0.75	t	7.1 (15)	15B	12, 14, 17	12.5	(q)	14, 15
17	0.92	d	7.1 (14)	14	12, 13, 15A, 16	19.2	(q)	14, 15, 16
18	0.59	d	6.0 (6)	6	2B, 5, 7 $\alpha$ , 7 $\beta$	22.3	(q)	5, 6, 7
19	1.26	s			2A, 2B, 6, 10, 13	19.3	(q)	3, 4, 5, 13
1'						170.0	(s)	
2'A	3.29	d	15.2 (2'B)	2'B	6'	39.7	(t)	1', 3', 4', 6'
2'B	3.77	d	15.2 (2'A)	2'A				1', 3', 4', 6'
3'						153.4	(s)	
4'	5.94	s			6'	118.5	(d)	2', 5', 6'
5'						168.9	(s)	
6'	2.08	s			2'A, 4'	27.4	(q)	2', 3', 4'

<sup>a</sup> <sup>1</sup>H chemical shift values ( $\delta$ ppm from SiMe<sub>4</sub>) followed by multiplicity and then the coupling constants (*J*/Hz). Figures in parentheses indicate the proton coupling with that position; <sup>b</sup> The correlations with geminal and vicinal protons are removed; <sup>c</sup> Long range <sup>1</sup>H-<sup>13</sup>C correlations from H to C observed in the HMBC experiment.



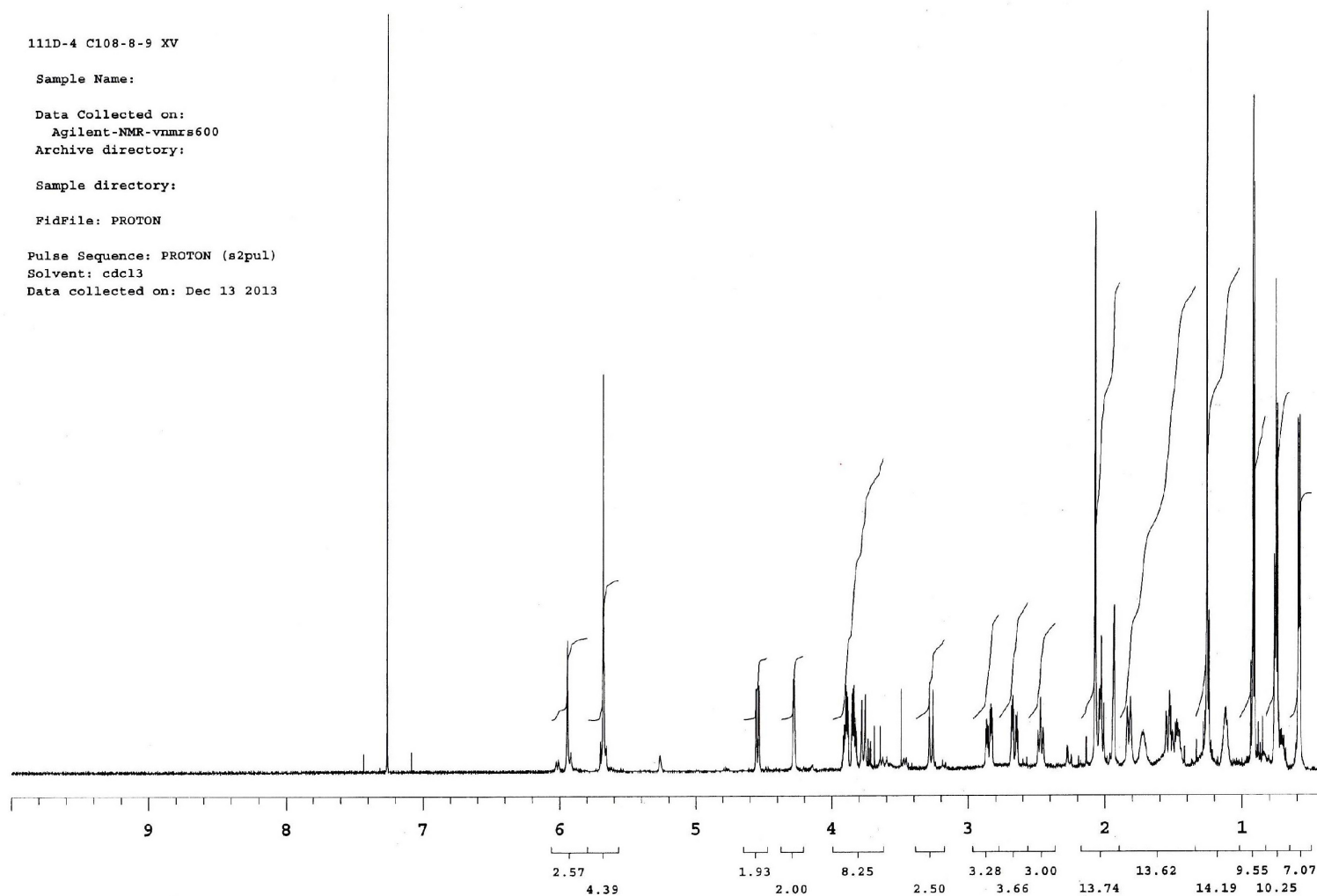


Figure S9.  $^1\text{H}$  NMR spectrum of 2.

111D-4 C108-8-9 XV  
Sample Name:  
Data Collected on:  
Agilent-NMR-vnmrs600  
Archive directory:  
Sample directory:  
FidFile: CARBON  
Pulse Sequence: CARBON (s2pul)  
Solvent: cdcl3  
Data collected on: Dec 13 2013

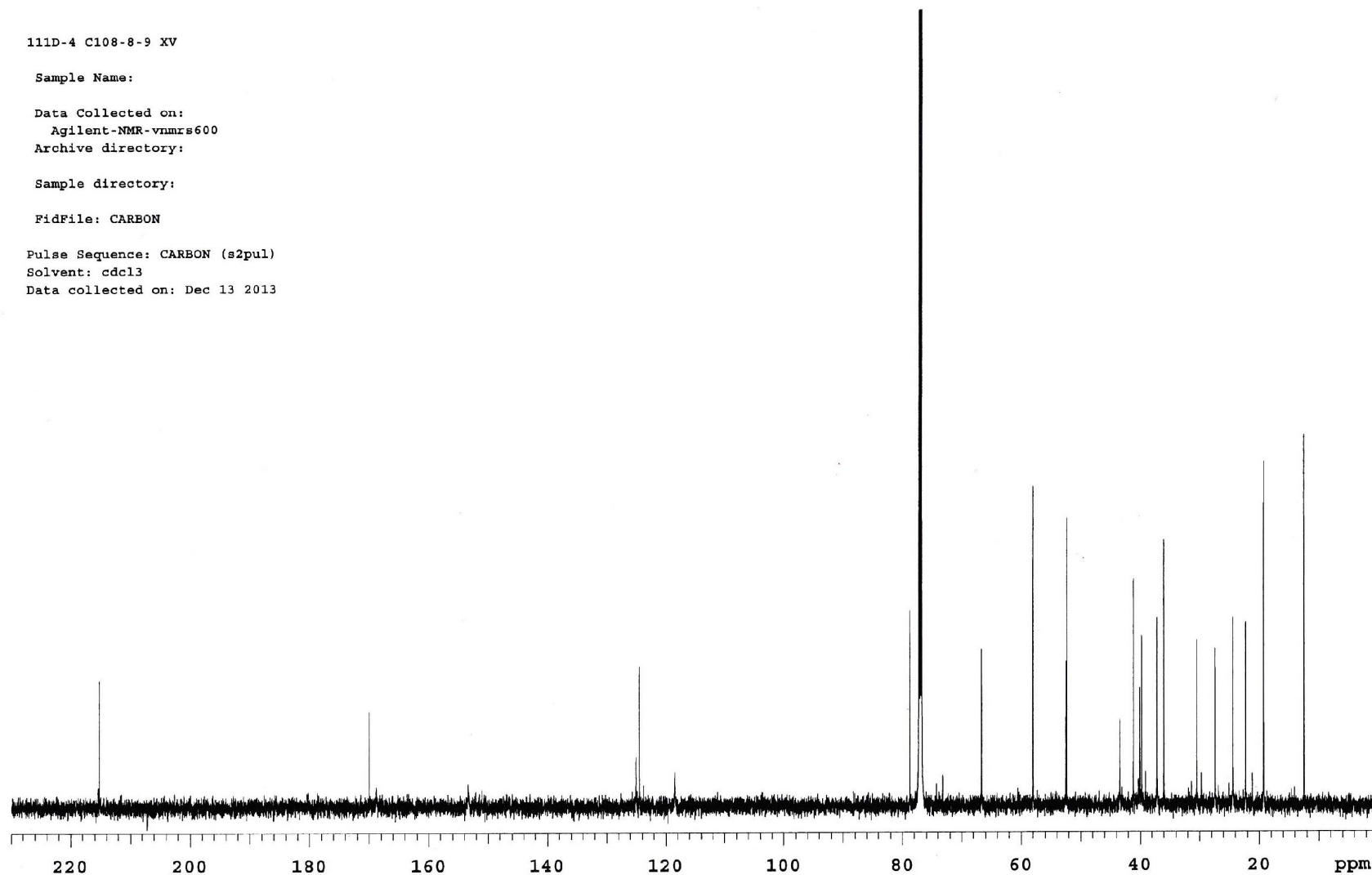
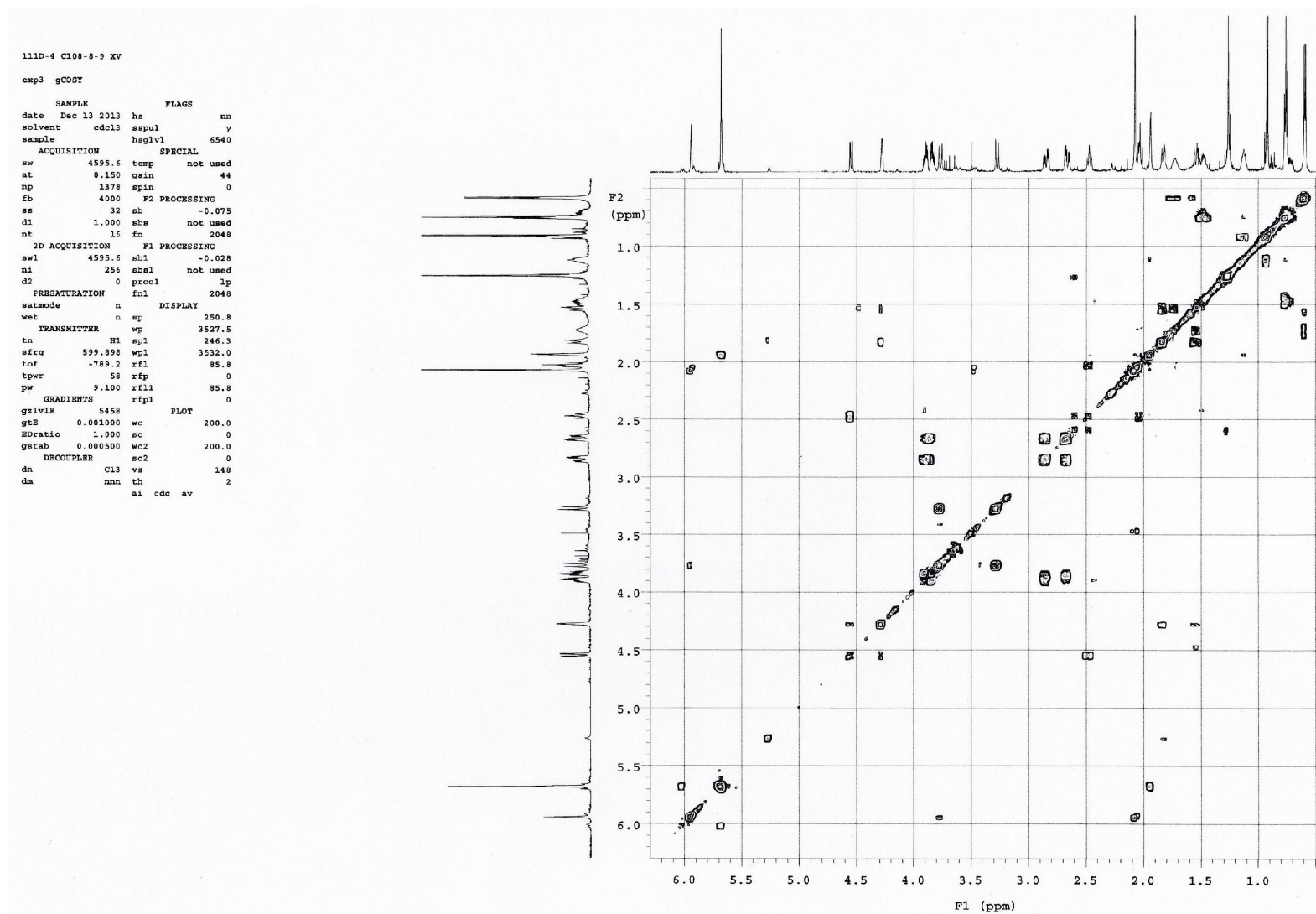


Figure S10. <sup>13</sup>C NMR spectrum of 2.

Figure S11.  $^1\text{H}$ - $^1\text{H}$  COSY of 2.

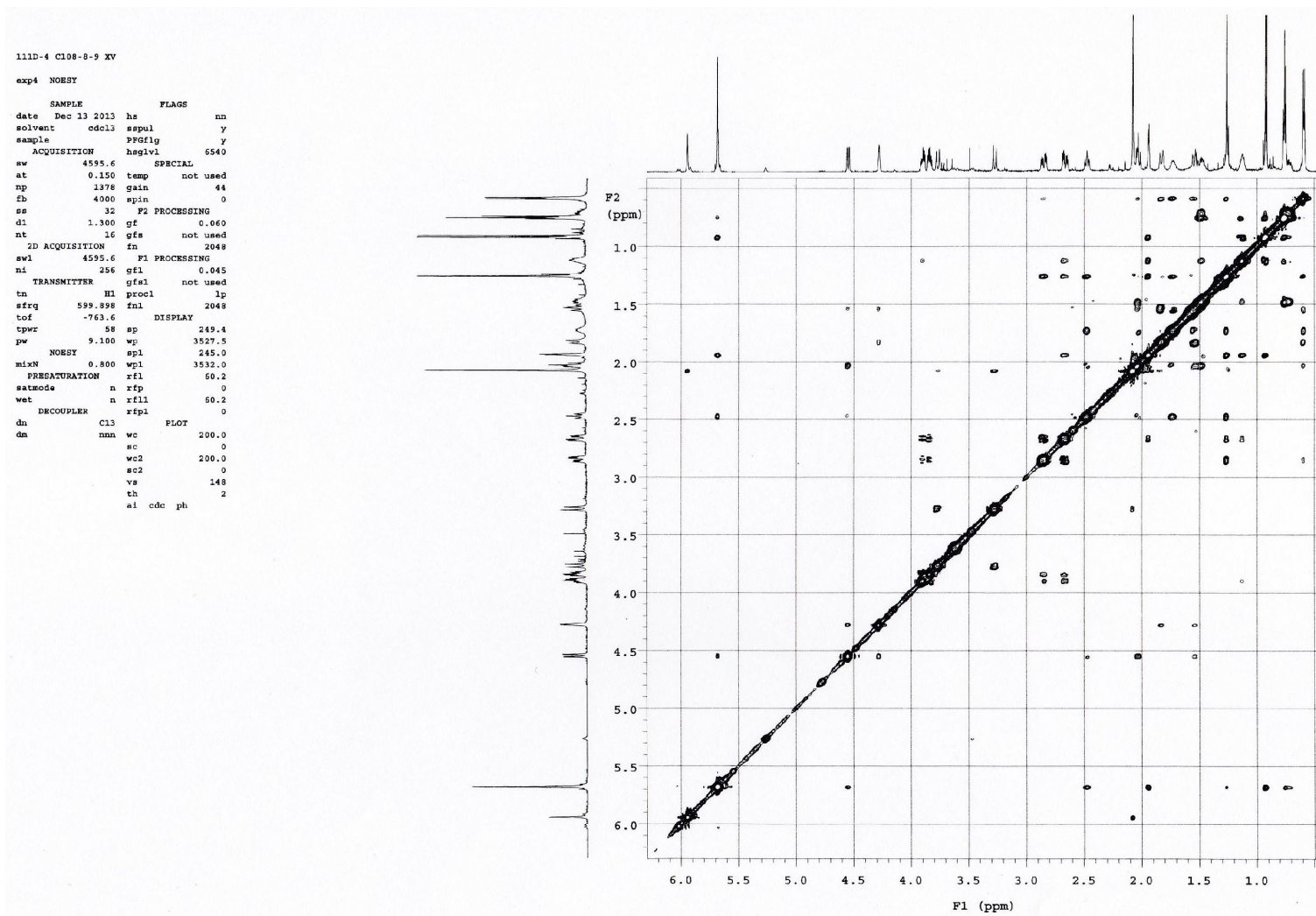


Figure S12. NOESY of 2.

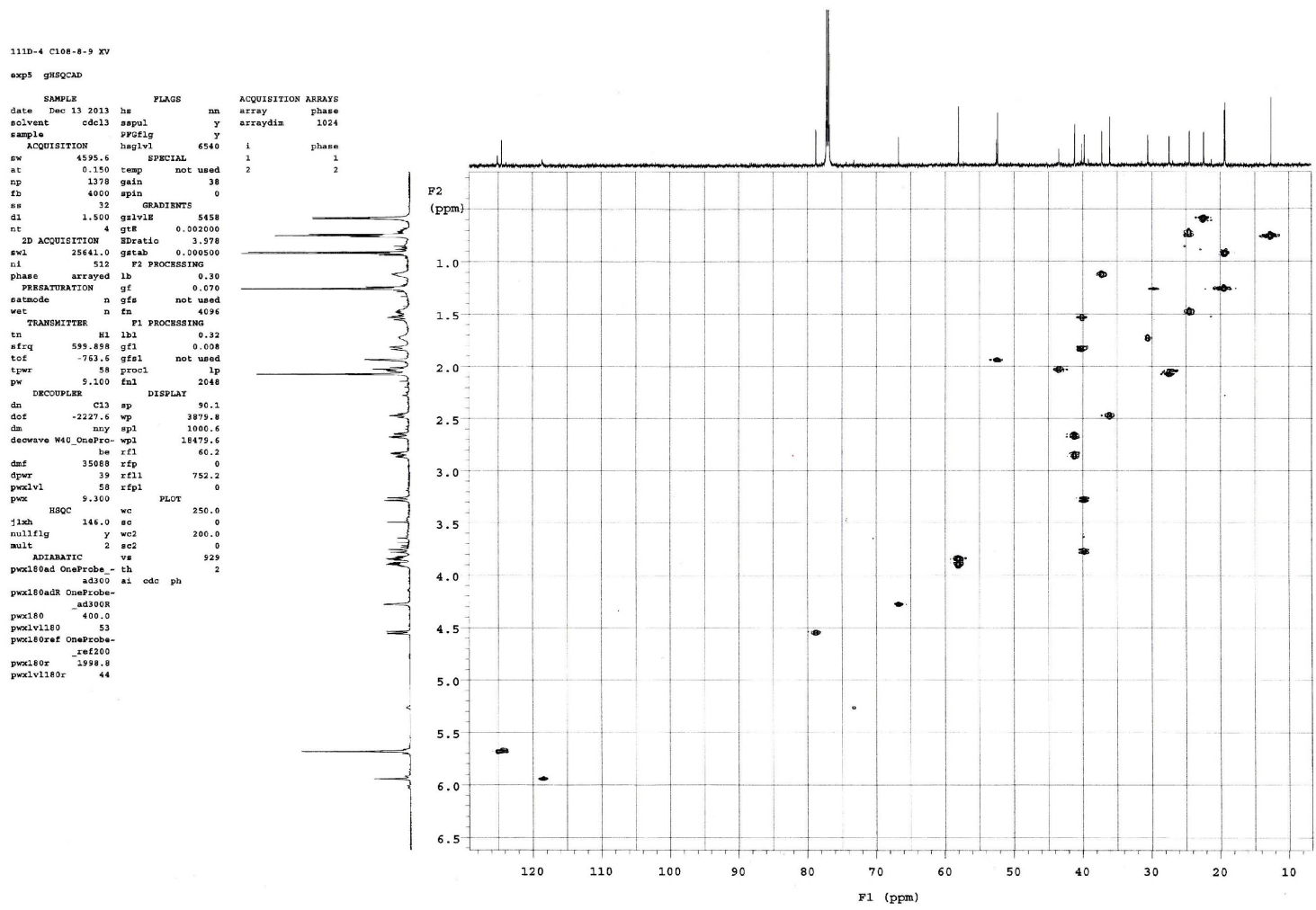


Figure S13. HSQC of 2.

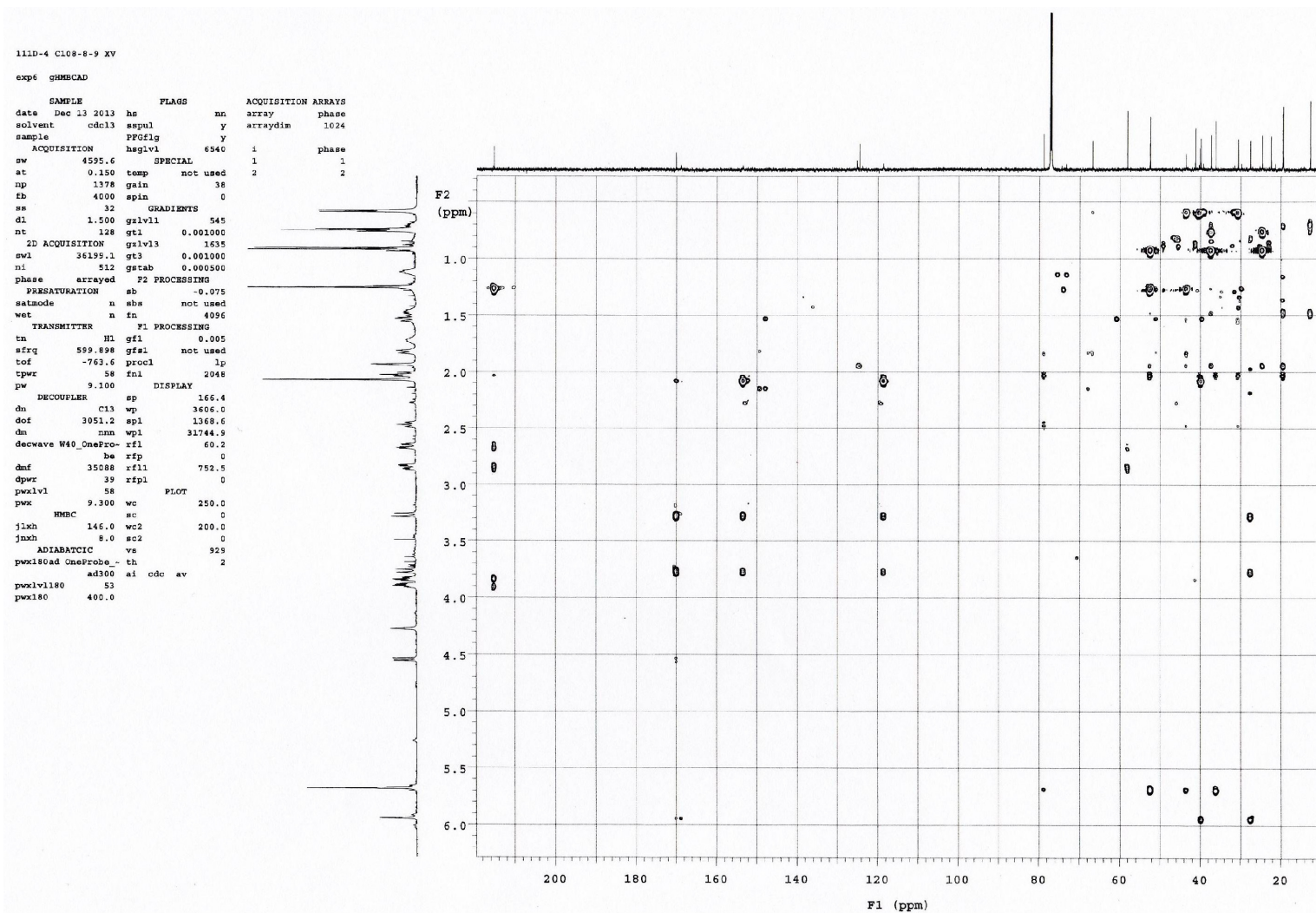


Figure S14. HMBC of 2.

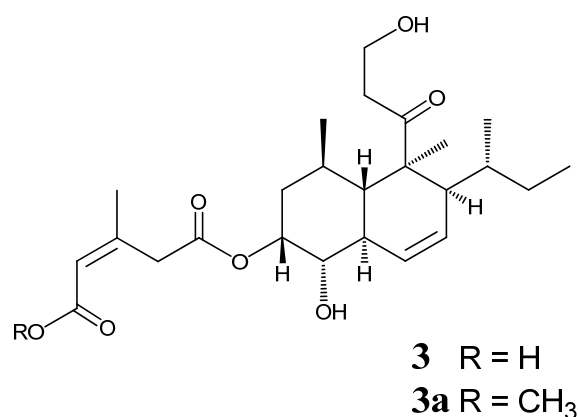
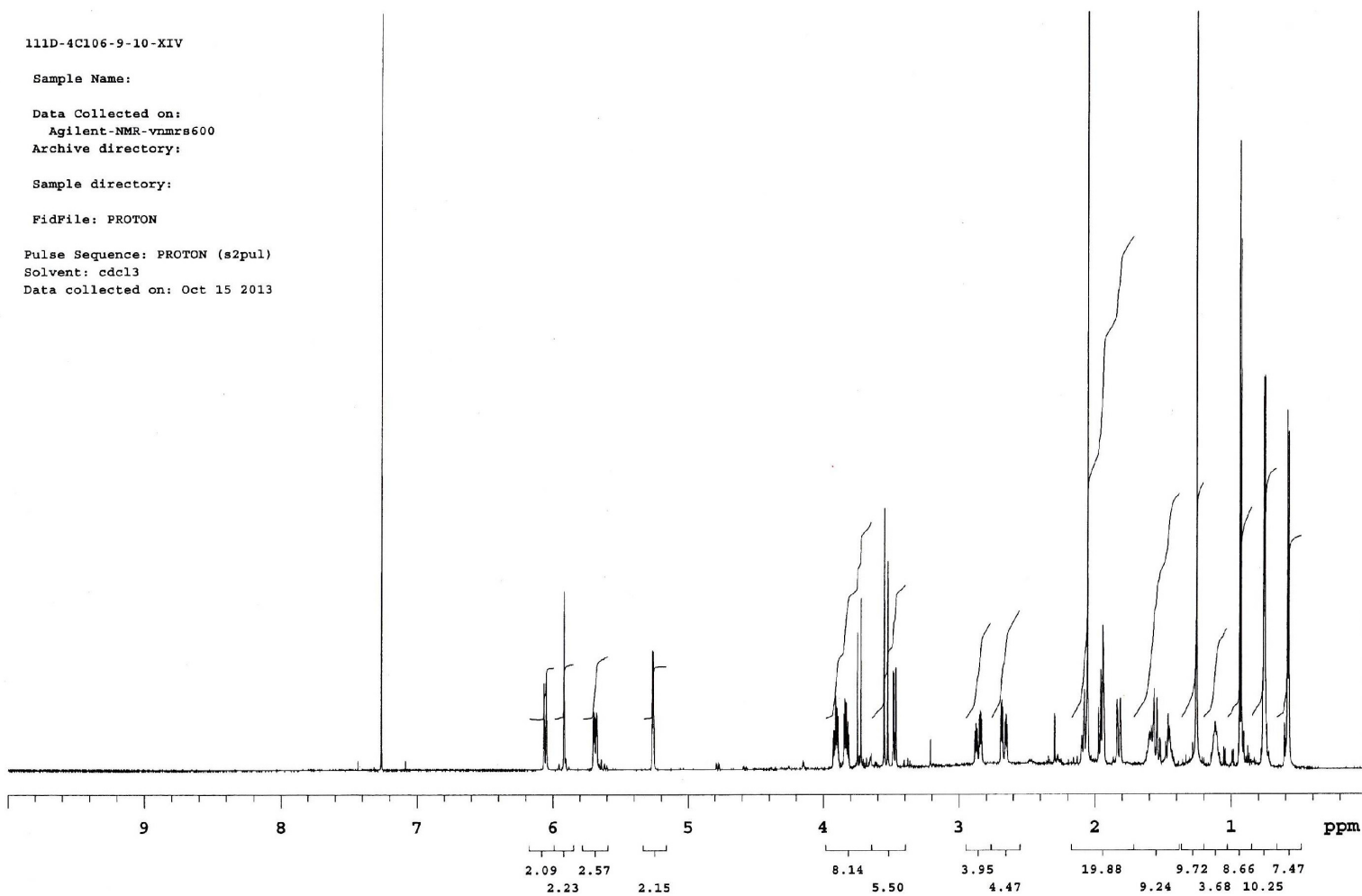


Figure S15. Compound 3.

Table S3. Spectral data including 2D NMR data for 3.

Position	$\delta_{\text{H}}^{\text{a}}$		$J/\text{Hz}$	$^1\text{H}-^1\text{H}$ COSY	NOE <sup>b</sup>	$\delta_{\text{C}}$	HMBC (C) <sup>c</sup>
1A	3.83	ddd	11.8 (2B), 6.5 (2A), 3.5 (2B)	1B, 2A, 2B		58.0 (t)	3
1B	3.91	ddd	11.8 (1B), 6.5 (2B), 3.5 (2A)	1A, 2A, 2B	14		3
2A	2.67	ddd	18.5 (2B), 6.5 (1A), 3.5 (1B)	1A, 1B, 2B	13, 14, 19	41.2 (t)	1, 3
2B	2.86	ddd	18.5 (1B), 6.5 (1B), 3.5 (1A)	1A, 1B, 2A	18, 19		1, 3
3						215.2 (s)	
4						52.5 (s)	
5	1.96	t	10.8 (6, 10)	6, 10	7 $\beta$ , 9, 15B, 18	43.1 (d)	3, 4, 6, 7, 9, 10, 13, 19
6	1.59	m		5, 7 $\beta$ , 18	10, 19	31.4 (d)	18
7 $\alpha$	1.83	dt	12.0 (7 $\alpha$ ), 3.0 (6, 8)	7 $\beta$ , 8	18	39.1 (t)	5, 8, 9
7 $\beta$	1.55	td	12.0 (6, 7 $\beta$ ), 3.0 (8)	6, 7 $\alpha$ , 8	5, 9, 18		6
8	5.26	q	3.0(7 $\alpha$ , 7 $\beta$ , 9)	7 $\alpha$ , 7 $\beta$ , 9		73.3 (d)	
9	3.48	dd	10.8 (10), 3.0 (8)	8, 10	5, 7 $\beta$ , 11	74.2 (d)	8, 10
10	2.08	tdd	10.8 (5, 9), 4.2 (11), 2.4 (12)	5	6, 19	40.4 (d)	9
11	6.06	dt	10.8 (12), 4.2 (11, 13)	12, 13	9	125.9 (d)	5, 9, 10, 13
12	5.69	ddd	10.8 (11), 4.2 (13), 2.4 (10)	11, 13	16, 17	123.7 (d)	10, 13, 14
13	1.94	m		11, 12, 14	2A, 17, 19	52.4 (d)	4, 12, 19
14	1.12	m		13, 15A, 17	1B, 2A, 16	37.2 (t)	
15A	0.74	m		14	17	24.4 (d)	16
15B	1.47	m		16	5		14, 16, 17
16	0.76	t	7.3 (15)	15B	12, 14, 17	12.5 (q)	14, 15
17	0.93	d	7.2 (14)	14	12, 13, 15A, 16	19.2 (q)	14, 15, 16
18	0.59	d	6.0 (6)	6	2B, 5, 7 $\alpha$ , 7 $\beta$	22.3 (q)	5, 6, 7
19	1.25	s			2A, 2B, 6, 10, 13	19.3 (q)	3, 4, 5, 13
1'						169.8 (s)	
2'A	3.54	d	15.2 (2'B)		6'	39.6 (t)	1', 3', 4', 6'
2'B	3.73	d	15.2 (2'A)		6'		1', 3', 4', 6'
3'						153.9 (s)	
4	5.92	s			6'	118.1 (d)	2', 5', 6'
5'						168.9 (s)	
6'	2.05	s			2'A, 2'B, 4'	26.9 (q)	2', 3', 4'

<sup>a</sup>  $^1\text{H}$  chemical shift values ( $\delta_{\text{ppm}}$  from SiMe<sub>4</sub>) followed by multiplicity and then the coupling constants ( $J/\text{Hz}$ ). Figures in parentheses indicate the proton coupling with that position; <sup>b</sup> The correlations with geminal and vicinal protons are removed; <sup>c</sup> Long range  $^1\text{H}-^{13}\text{C}$  correlations from H to C observed in the HMBC experiment.

Figure S16.  $^1\text{H}$  NMR spectrum of 3.



111D-4C106-9-10-XIV

Sample Name:

Data Collected on:  
Agilent-NMR-vnmrs600  
Archive directory:

Sample directory:

FidFile: CARBON

Pulse Sequence: CARBON (s2pul)  
Solvent: cdcl3  
Data collected on: Oct 15 2013

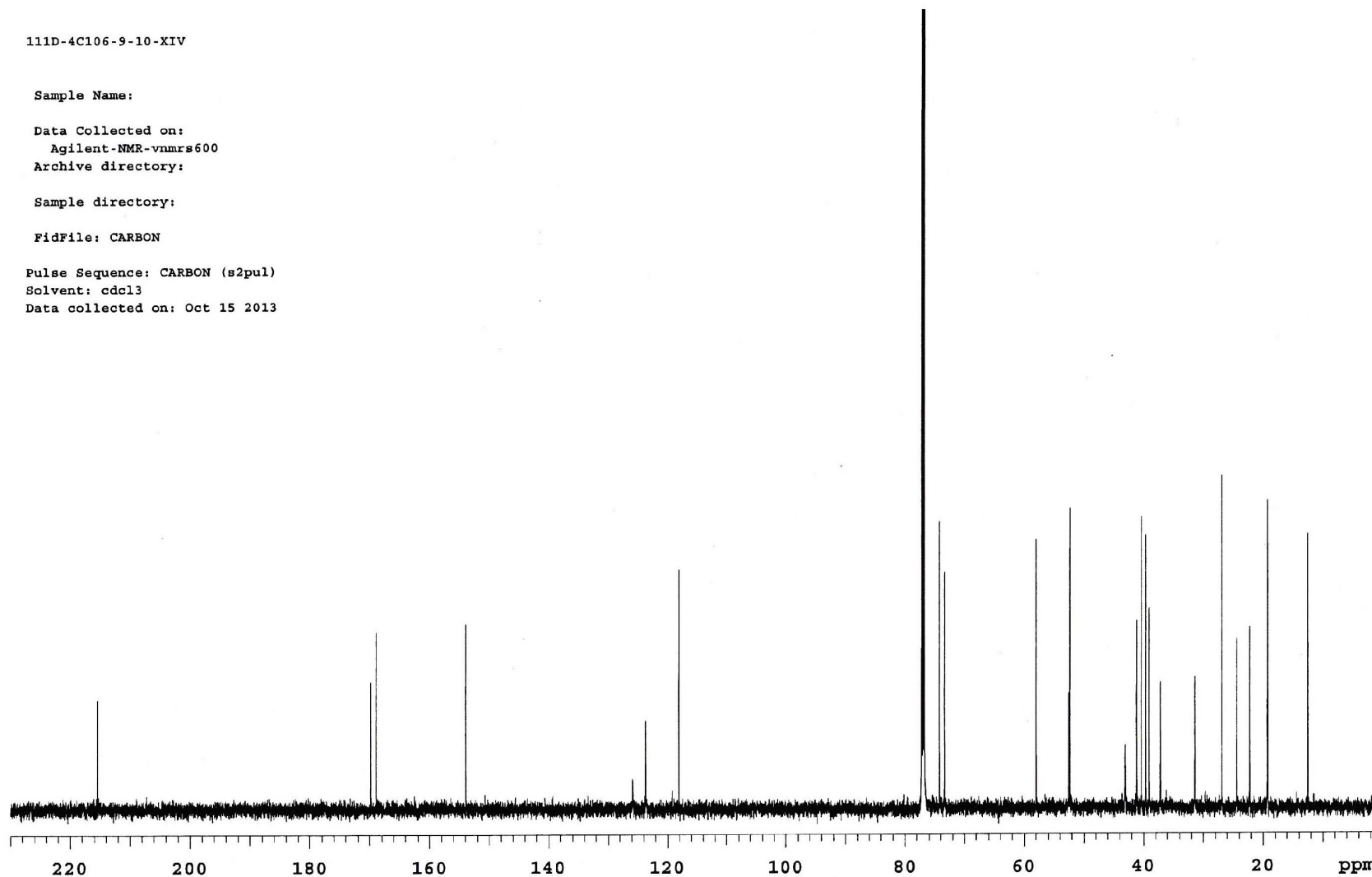


Figure S17. <sup>13</sup>C NMR spectrum of 3.



```
111D-4C106-9-10-XIV
exp34 NOESY
SAMPLE          FLAGS
date Oct 15 2013  hs      nn
solvent cdcl3    sapul   y
sample          PPGFlg   y
ACQUISITION     hsglv1   6540
sw 4595.6       SPECIAL
at 0.150        temp    not used
np 1378         gain    42
fb 4000         spin    0
ss 32          F2 PROCESSING
d1 1.300        gf      0.070
nt 16          gfe    not used
2D ACQUISITION  fn      2048
sw1 4595.6     F1 PROCESSING
ni 256         gf1    0.045
TRANSMITTER     gfs1   not used
tn H1          procl  lp
sfrq 599.890   fml    2048
tot -787.4     DISPLAY
tpwr 58        sp     194.8
pw 9.100      wp     3639.7
mixN NOESY     sp1    190.3
w1 0.800     wp1    3648.6
PRESATURATION   rfl    83.4
satmode n      rfp    0
wet n        rll    83.4
DECOUPLER      rfp1   0
dn C13        PLOT
dm nnn       wc     200.0
                sc     0
                wc2    200.0
                sc2     0
                vs     316
                th     2
                ai     odc ph
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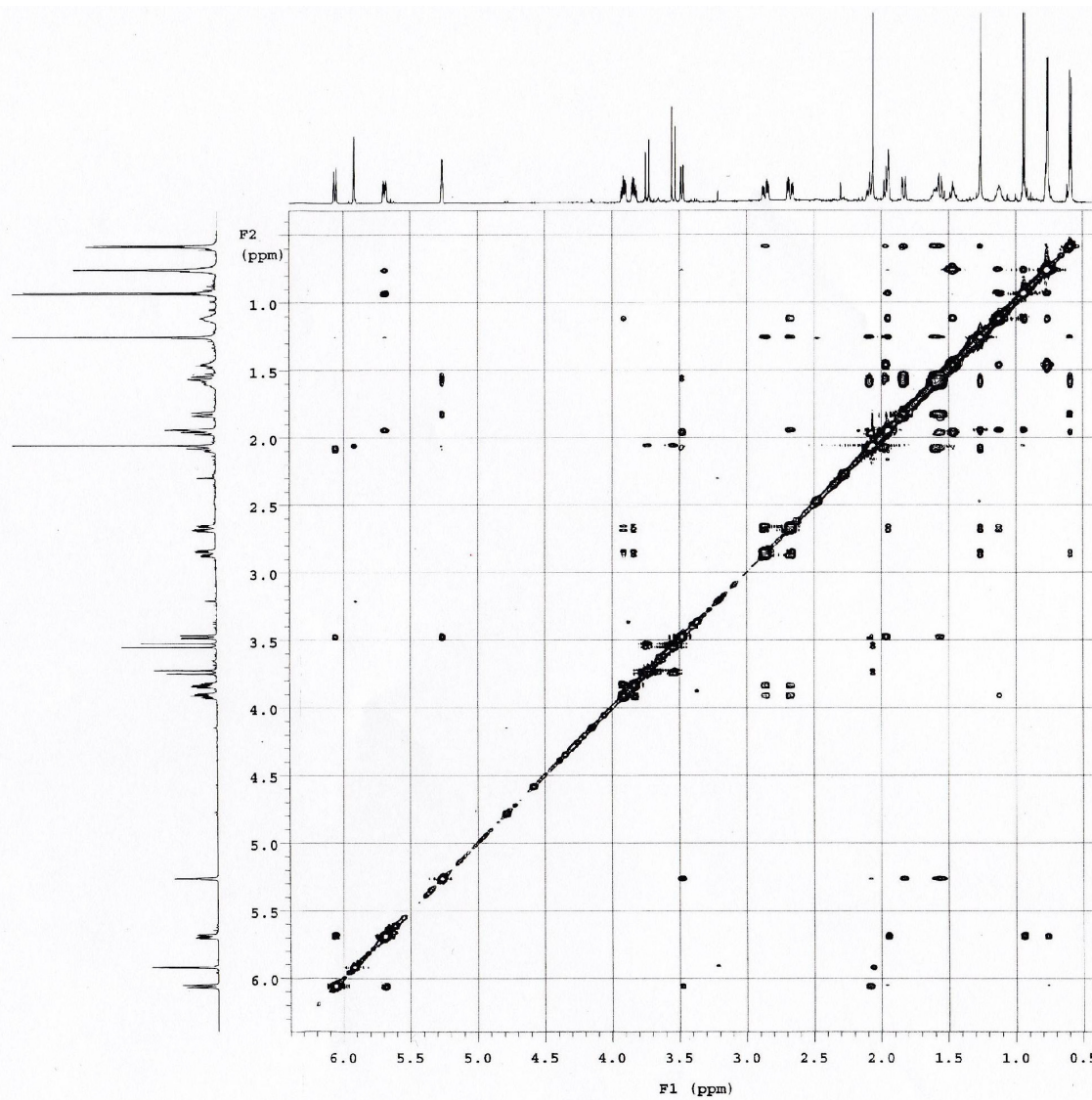


Figure S19. NOESY of 3.

```

111D-4C106-9-10-XIV
exp35 gHSQCAD

SAMPLE          FLAGS          ACQUISITION ARRAYS
date Oct 15 2013 hs          mn          array      phase
solvent cdcl3  sspul         y          arraydim    1024
sample          ACQUISITION hsglv1    6540       i          phase
sv 4595.6          SPECIAL      1          1
at 0.150          temp        not used   2          2
np 1378           gain        36
fb 4000           spin        0
ss 32             GRADIENTS   0
dl 1.500          gzlvlE     5458
nt 4              gtE        0.002000
2D ACQUISITION  ERratio    3.978
sw1 22624.4       gstab      0.000500
n1 512            F2 PROCESSING
phase arrayed    lb          0.30
PRESATURATION   gf         0.070
stmde n          gfs        not used
wet n           fn         4096

TRANSMITTER      F1 PROCESSING
tn H1           lb1        0.32
strq 599.898    gf1        0.008
tof -787.4      gfl        not used
tpwr 58         procl      lp
pw 9.100       fnl        2048

DECOUPLER        DISPLAY
dn C13          sp          -11.6
dof -3736.1     wp          4057.0
dm mny         sp1        1147.7
decwave W40_OneProc- wp1        18426.5
                        ba        rfl        83.4
daf 35089      rfp        0
dpwr 39        rfil1     752.4
pwx1v1 58       rfp1      0
pwx 9.300      PLOT

HSQC              wc          250.0
j1xh 146.0     sc          0
nullflg y       wc2        200.0
mult 2         sc2        0
ADIABATIC         vs          716
pwx180ad OneProbe- ch          2
                        ad300    ai odc ph
pwx180adR OneProbe- ad300R
pwx180 400.0
pwx1v1160 53
pwx180ref OneProbe- _ref200
pwx180r 1998.8
pwx1v1180r 44

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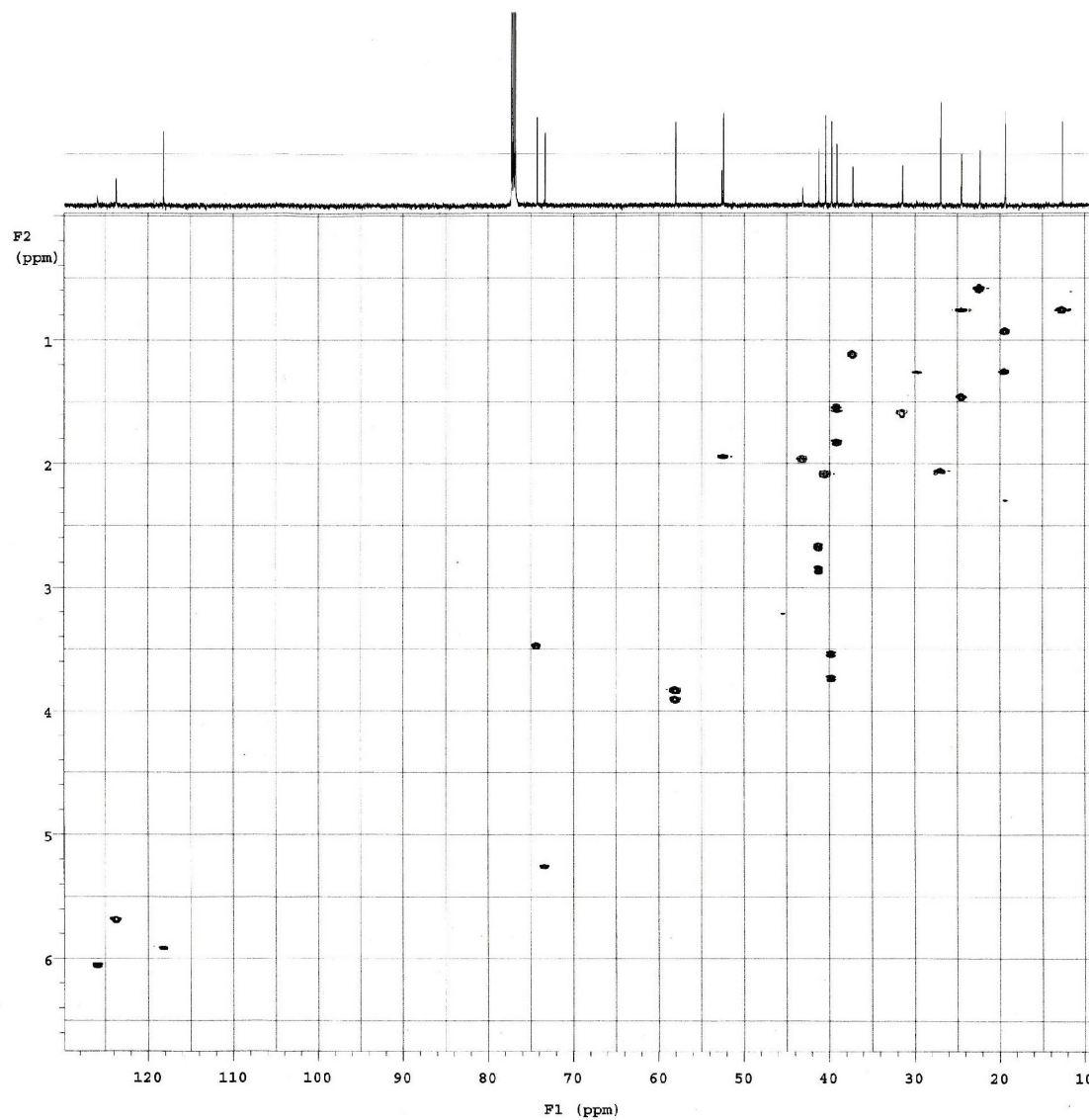


Figure S20. HSQC of 3.

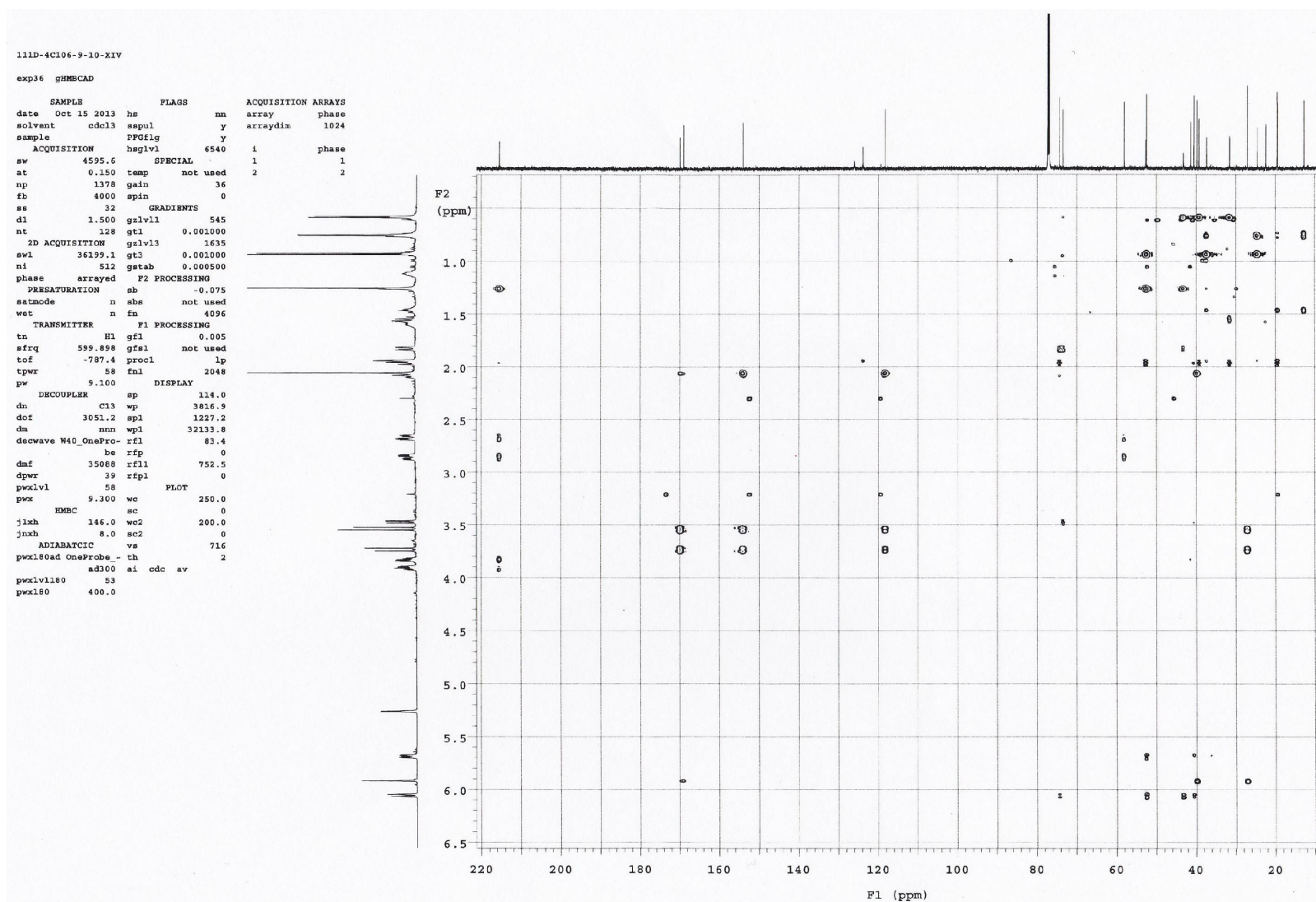


Figure S21. HMBC of 3.

Table S4. Spectral data including 2D NMR data for 3a.

Position	$\delta_{\text{H}}$ <sup>a</sup>	$J/\text{Hz}$	<sup>1</sup> H- <sup>1</sup> H COSY	NOE <sup>b</sup>	$\delta_{\text{C}}$	HMBC (C) <sup>c</sup>
1A	3.84 m		1B, 2A, 2B		58.0 (t)	
1B	3.90 m		1A, 2A, 2B			
2A	2.67 ddd	18.5 (2B), 6.0 (1A), 3.0 (1B)	1A, 1B, 2B	13, 14, 19	41.2 (t)	3
2B	2.85 ddd	18.5 (1B), 6.0 (1B), 3.0 (1A)	1A, 1B, 2A	18, 19		1, 3
3					215.5 (s)	
4					52.6 (s)	
5	1.96 t	10.2 (6, 10)	6, 10	7 $\beta$ , 9, 15B, 18	43.1 (d)	4, 6, 7, 9, 10, 19
6	1.60 m		5, 7 $\alpha$ , 18		31.4 (d)	
7 $\alpha$	1.84 dt	12.0 (7 $\alpha$ ), 3.0 (6, 8)	6, 7 $\beta$ , 8	18	39.1 (t)	9
7 $\beta$	1.58 m		7 $\alpha$ , 8	5, 9, 18		6
8	5.26 q	3.0 (7 $\alpha$ , 7 $\beta$ , 9)	7 $\alpha$ , 7 $\beta$ , 9		73.5 (d)	
9	3.46 m		8, 10	5, 7 $\beta$ , 11	74.2 (d)	
10	2.06 m		5	19	40.5 (d)	
11	6.09 m		12	9	126.0 (d)	5, 13
12	5.69 m		11, 13	16, 17	123.6 (d)	
13	1.94 m		12	2A, 17, 19	52.4 (d)	5, 19
14	1.12 m		15A, 17	2A, 16	37.2 (t)	
15A	0.76 m		14		24.4 (d)	
15B	1.46 m		16	5		16, 17
16	0.76 t	7.3 (15)	15B	12, 14, 17	12.5 (q)	14, 15
17	0.93 d	7.2 (14)	14	12, 13, 16	19.2 (q)	14, 15, 16
18	0.59 d	6.0 (6)	6	2B, 5, 7 $\alpha$ , 7 $\beta$	22.3 (q)	5, 6, 7
19	1.26 s			2A, 2B, 10, 13	19.3 (q)	3, 4, 5, 13
1'					170.0 (s)	
2'A	3.60 d	15.2 (2'B)	2'B	6'	39.5 (t)	1', 3', 4', 6'
2'B	3.72 d	15.2 (2'A)	2'A	6'		1', 3', 4', 6'
3'					152.1 (s)	
4	5.88 s			6'	118.4 (d)	2', 5', 6'
5'					167.0 (s)	
6'	2.03 s			2'A, 2'B, 4'	26.6 (q)	2', 3', 4'
5'-OCH <sub>3</sub>	3.68	s			51.3	(q), 5'

<sup>a</sup> <sup>1</sup>H chemical shift values ( $\delta_{\text{ppm}}$  from SiMe<sub>4</sub>) followed by multiplicity and then the coupling constants ( $J/\text{Hz}$ ). Figures in parentheses indicate the proton coupling with that position; <sup>b</sup> The correlations with geminal and vicinal protons are removed; <sup>c</sup> Long range <sup>1</sup>H-<sup>13</sup>C correlations from H to C observed in the HMBC experiment.

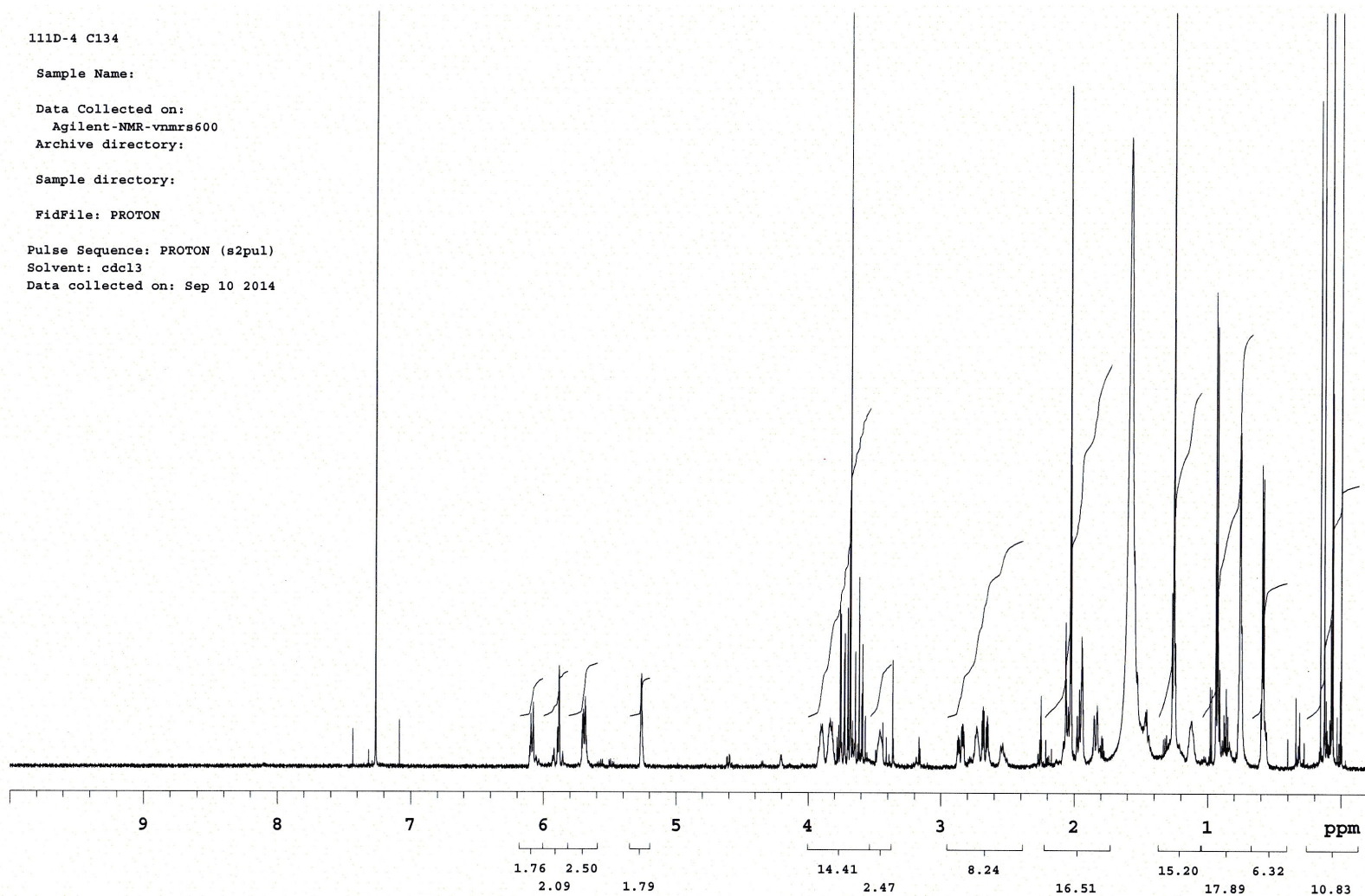
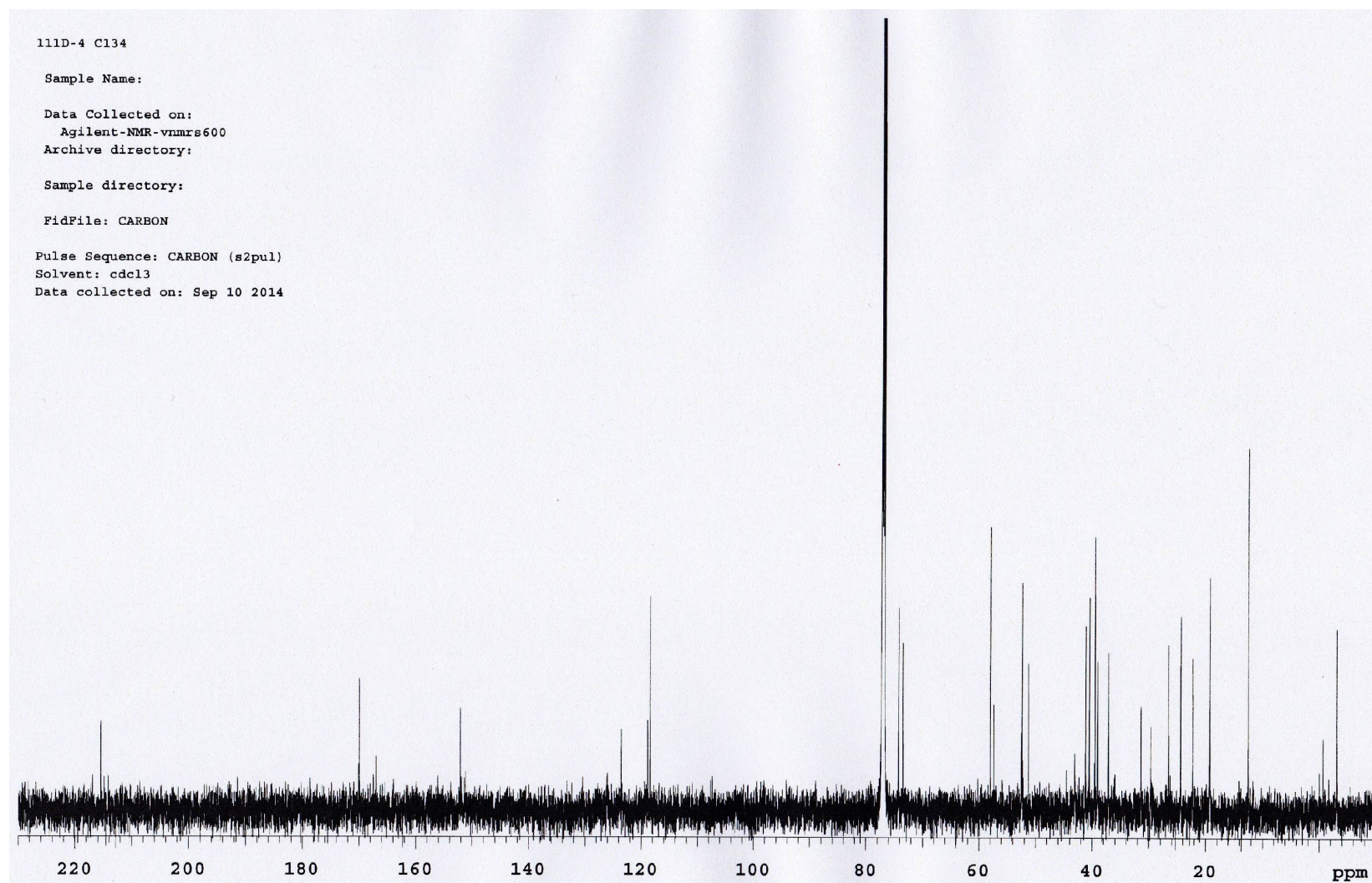


Figure S22.  $^1\text{H}$  NMR spectrum of 3a.



**Figure S23.**  $^{13}\text{C}$  NMR spectrum of 3a.