

Self-assembly of functionalized lipophilic guanosines into cation-free stacked G-quartets

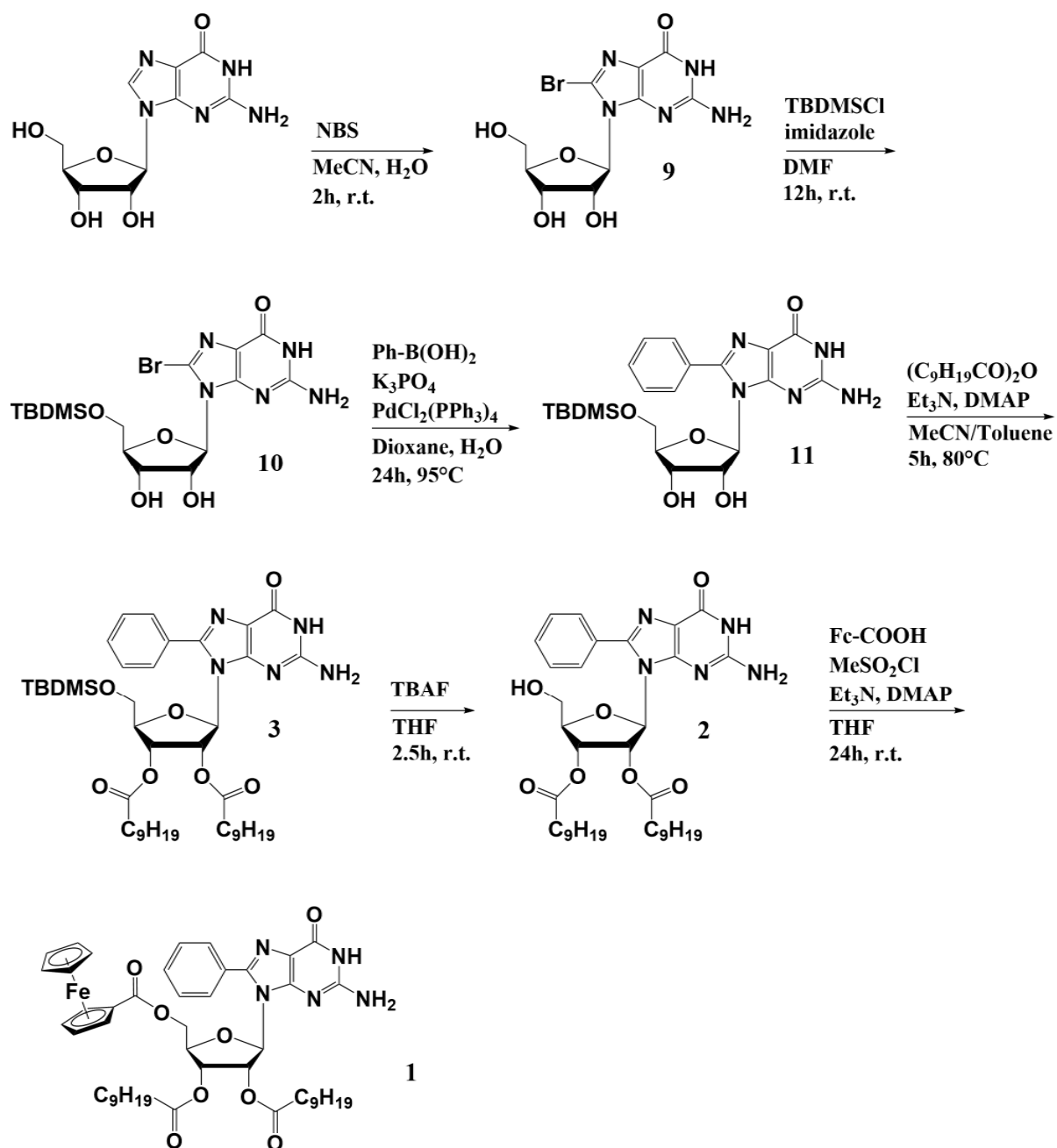
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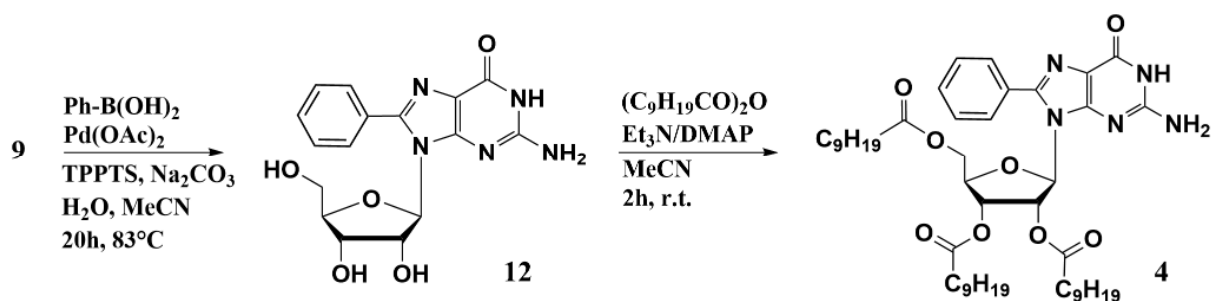
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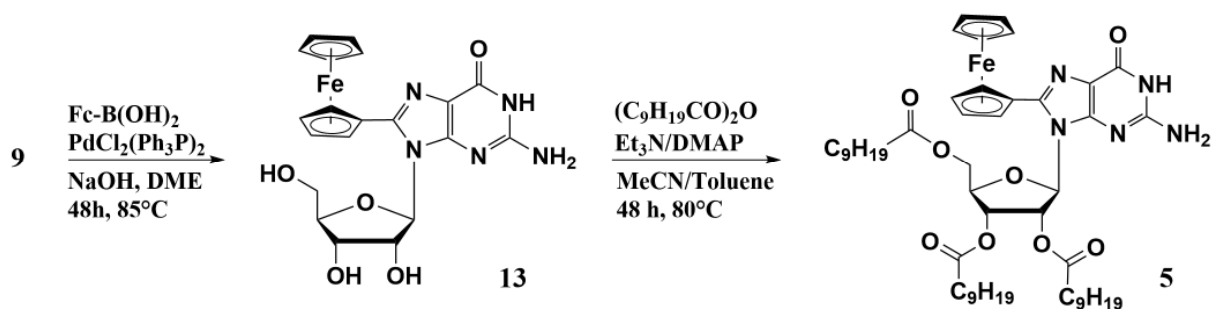
Synthetic schemes



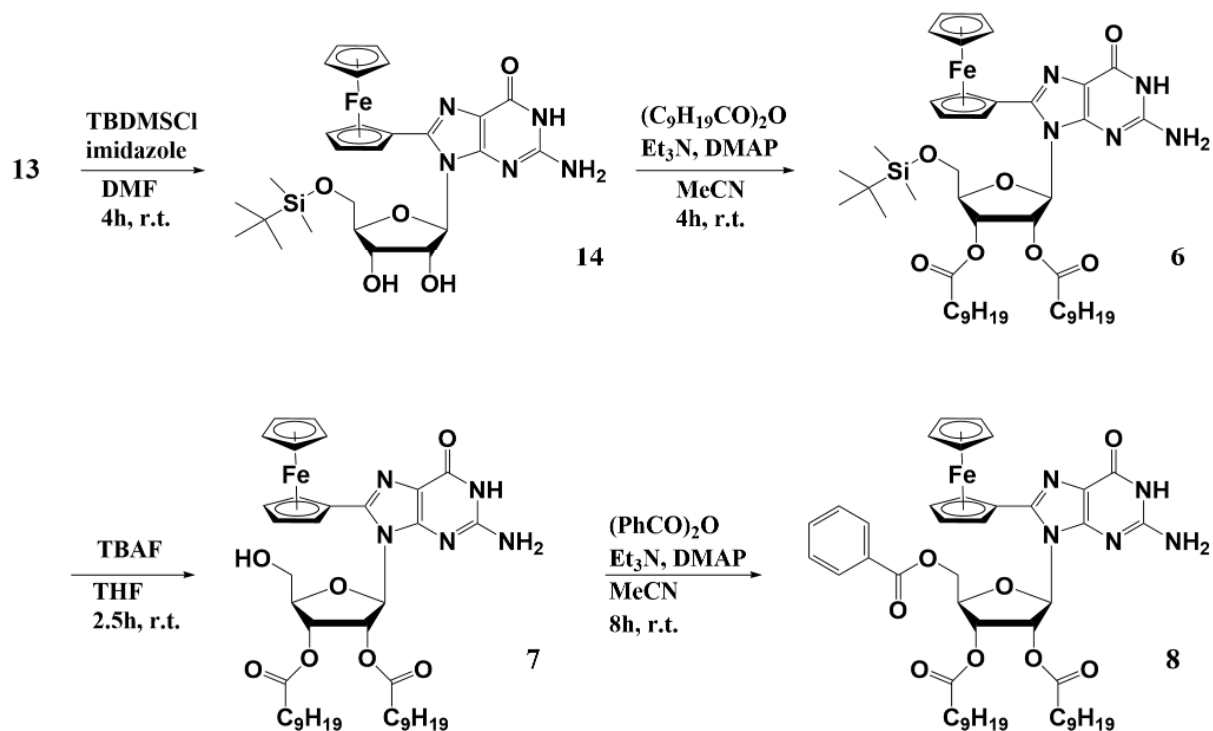
Scheme S1. Synthesis of guanosines **1-3** from commercial guanosine.



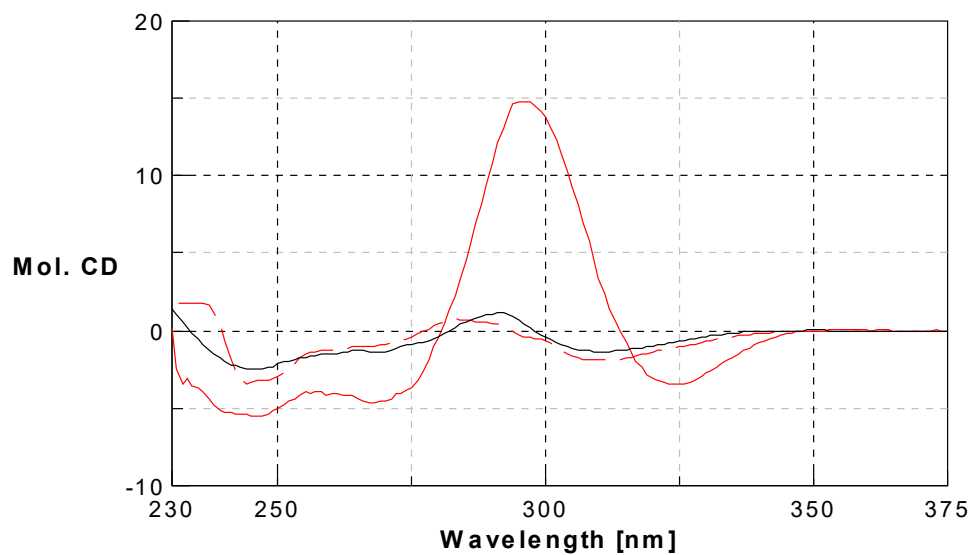
Scheme S2. Synthesis of guanosine **4** (8Ph5C10).



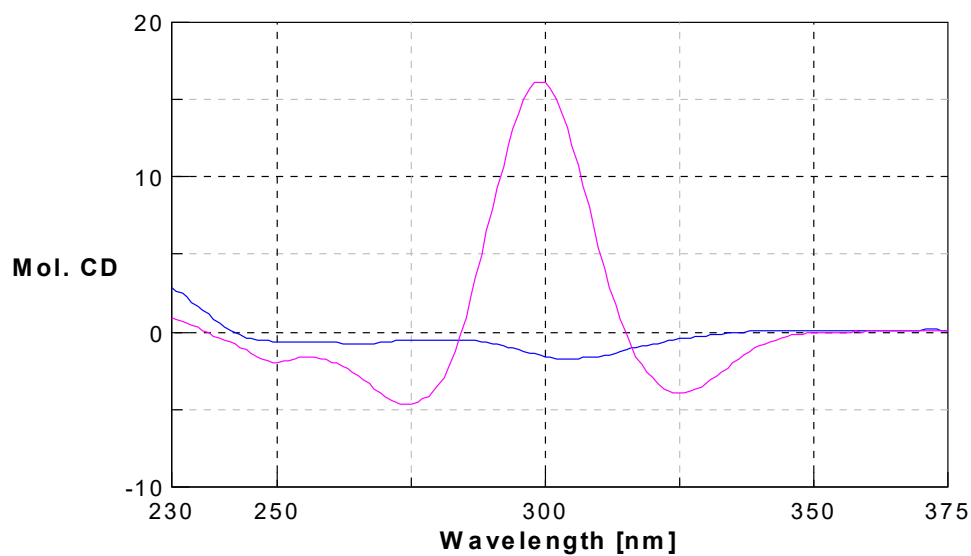
Scheme S3. Synthesis of guanosine **5** (8Fc5C10).



Scheme S4. Synthesis of guanosines **6-8**



CD spectra recorded on 10 mM CH_2Cl_2 solutions of **8Ph5Fc** before (black trace) and after addition of [2.2.2] cryptand (red dotted trace) or excess of KI (red continuous trace). Path length 0.01 cm.



CD spectra recorded on 10 mM CH_2Cl_2 solutions of **8Ph5Si** before (blue trace) and after addition of KI (pink trace). Path length 0.01 cm.

Figure S1. Selected CD spectra showing the behaviour of guanosines **1** and **3** upon addition of [2.2.2] cryptand or excess KI.

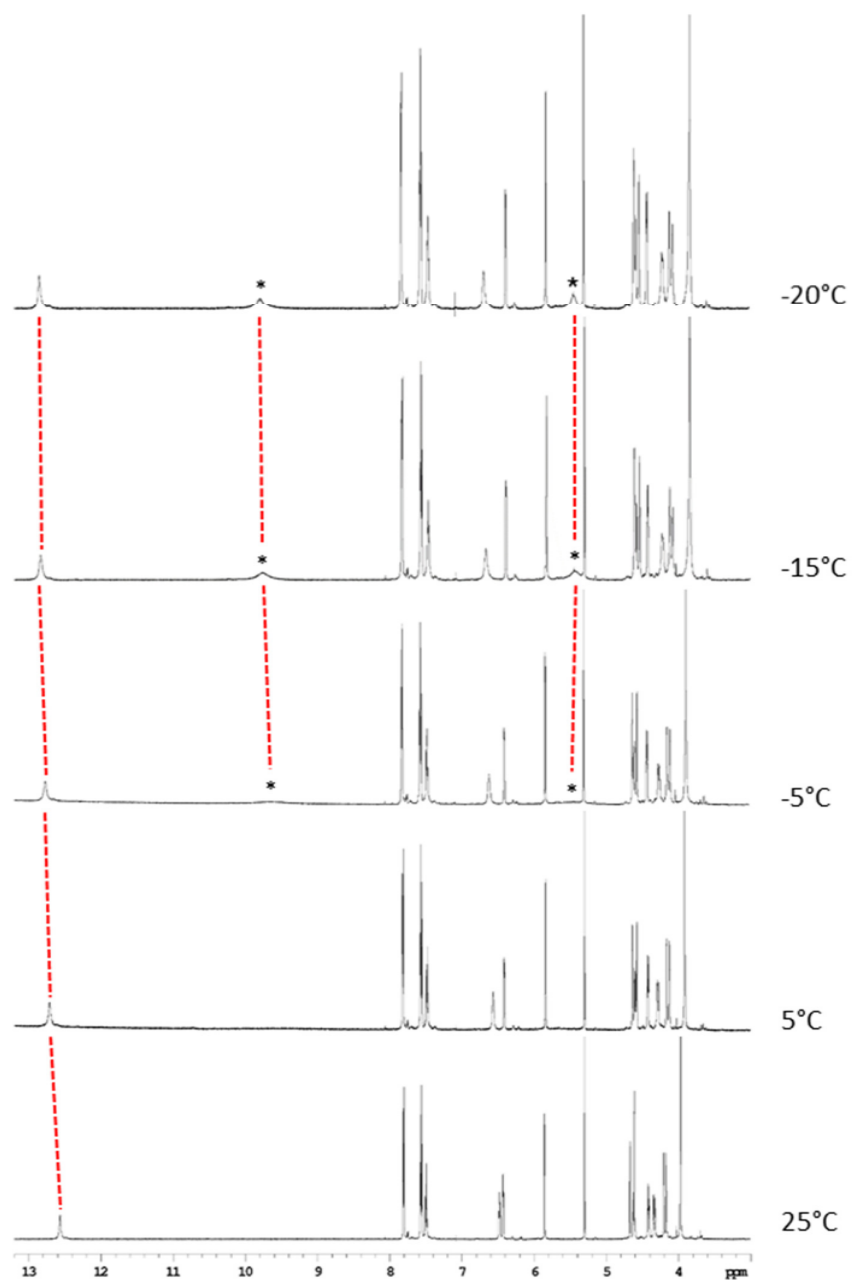


Figure S2. Downfield portion of the 600 MHz ¹H-NMR spectrum of **8Ph5Fc** (4.3 mM) at different temperatures in CD₂Cl₂. Amino protons are marked with asterisks.

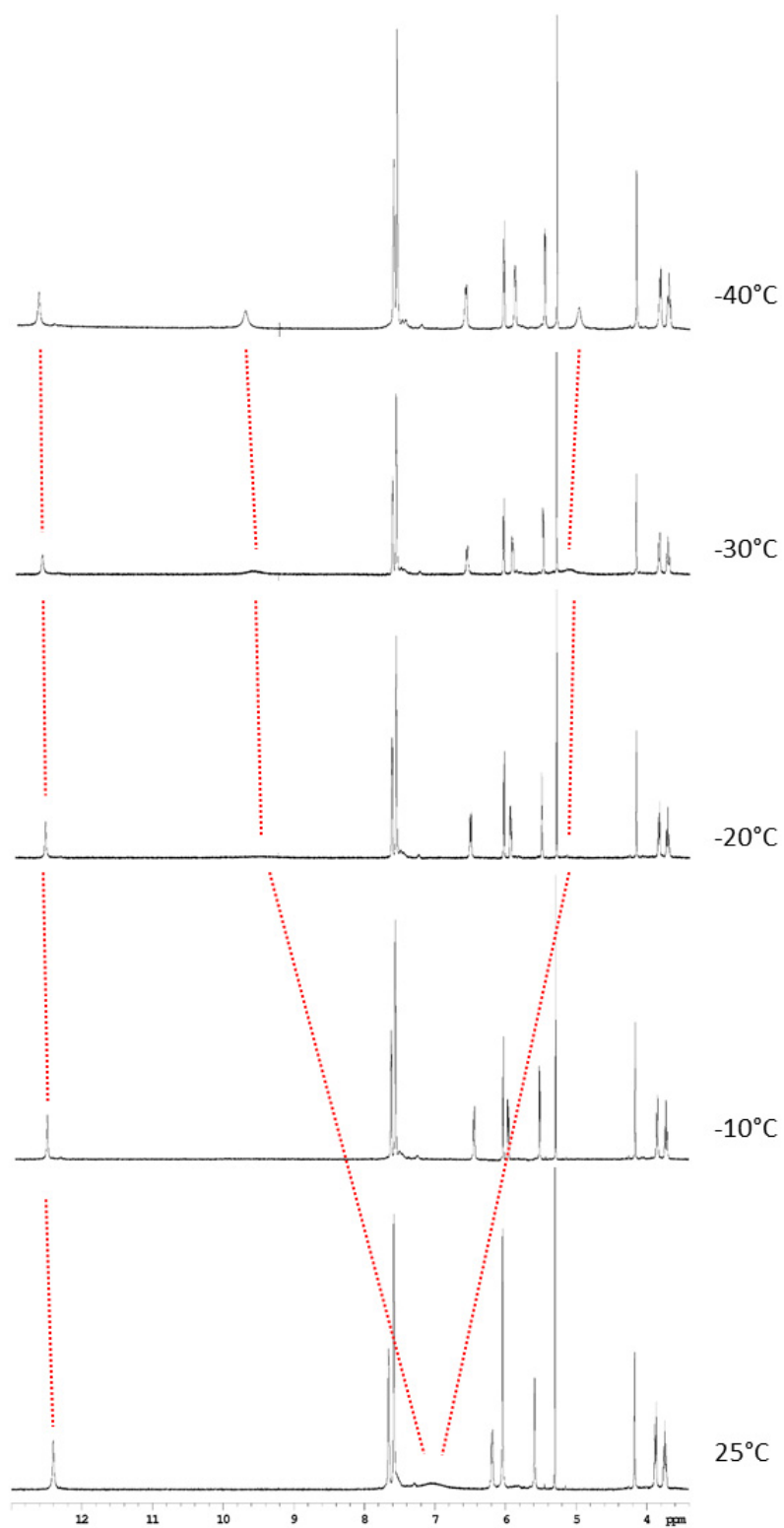


Figure S3. Downfield portion of the 600 MHz ¹H-NMR spectrum of **8Ph5OH** (5 mM) at different temperatures in CD₂Cl₂.

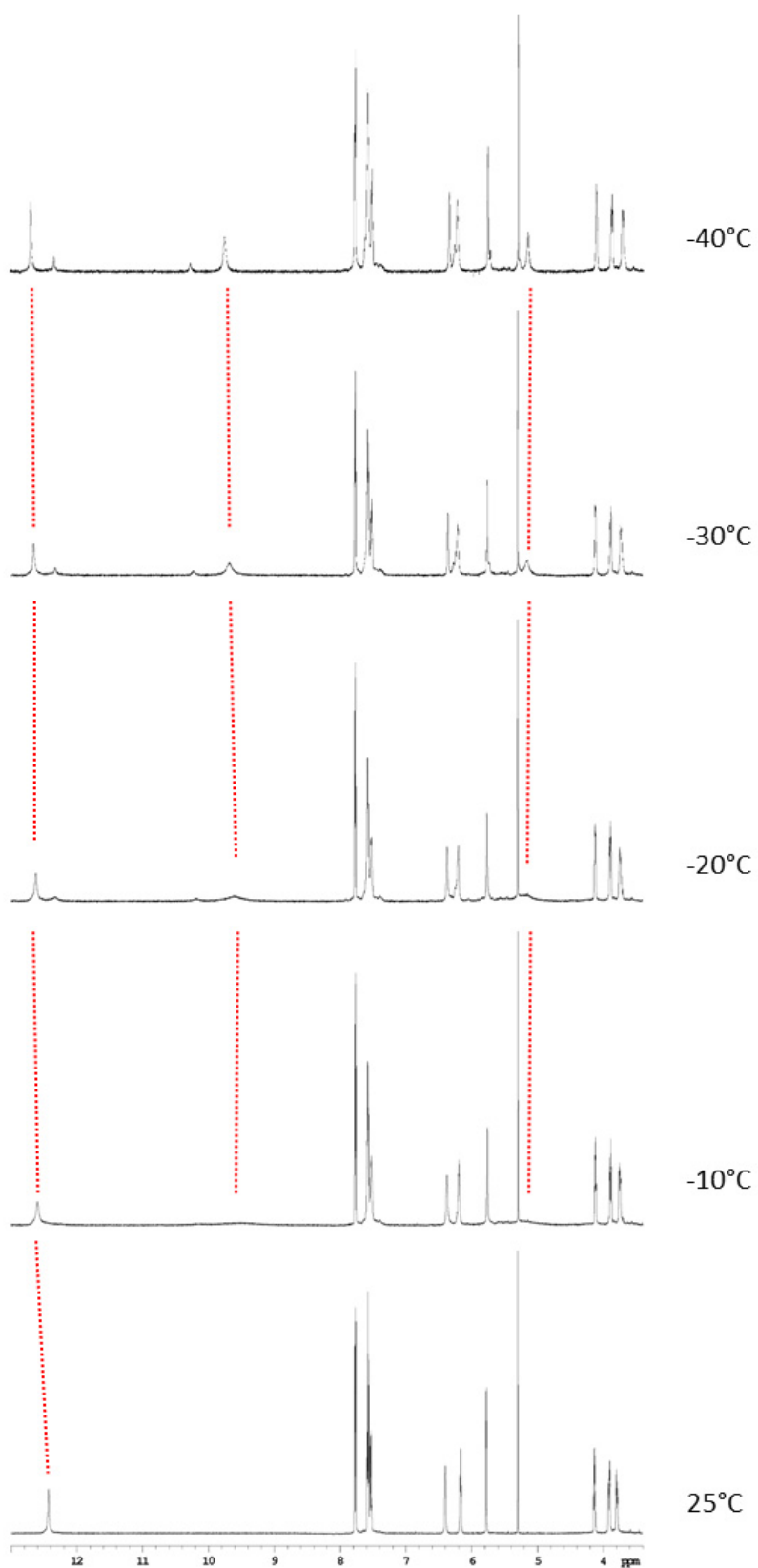


Figure S4. Downfield portion of the 600 MHz ¹H-NMR spectrum of **8Ph5Si** (6 mM) at different temperatures in CD₂Cl₂.

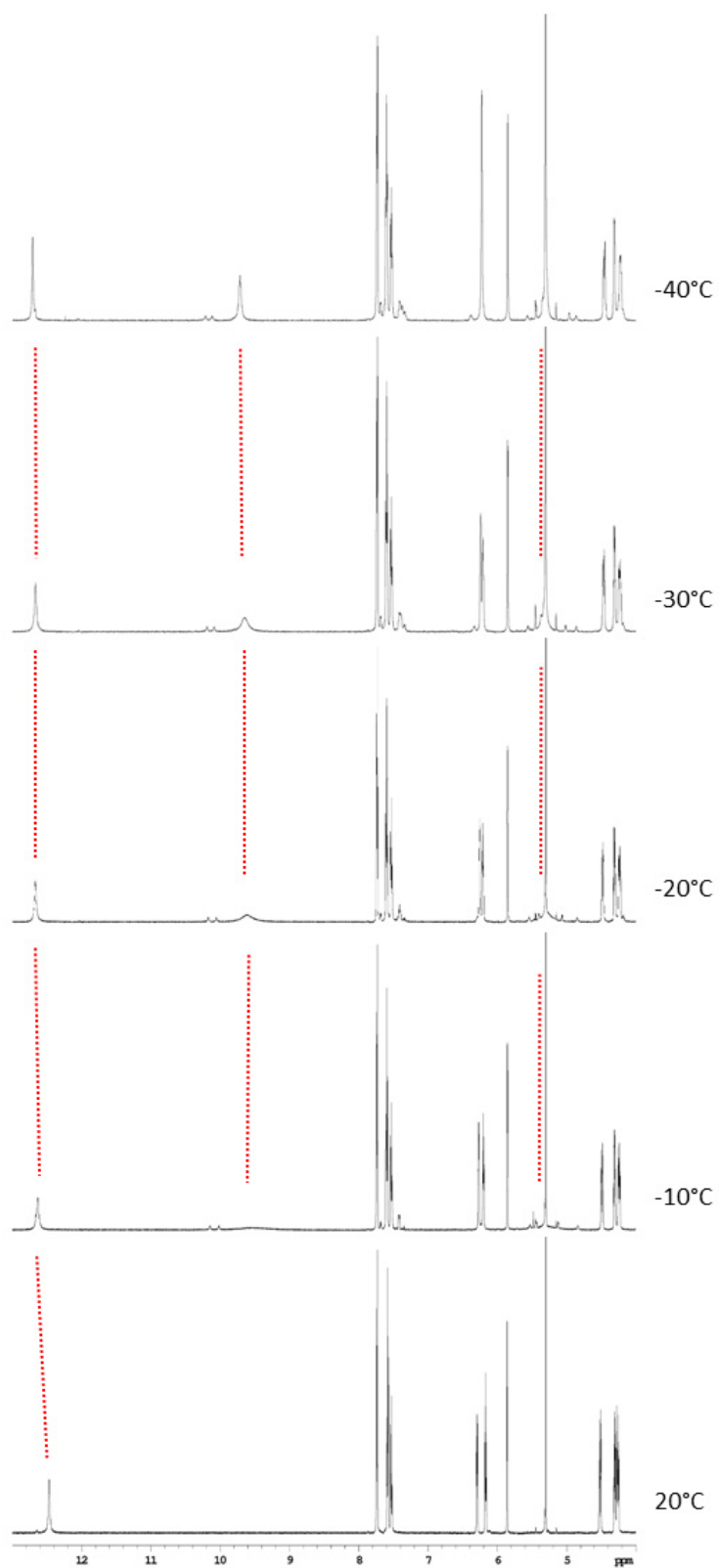


Figure S5. Downfield portion of the 600 MHz ¹H-NMR spectrum of **8Ph5C10** (7 mM) at different temperatures in CD₂Cl₂.

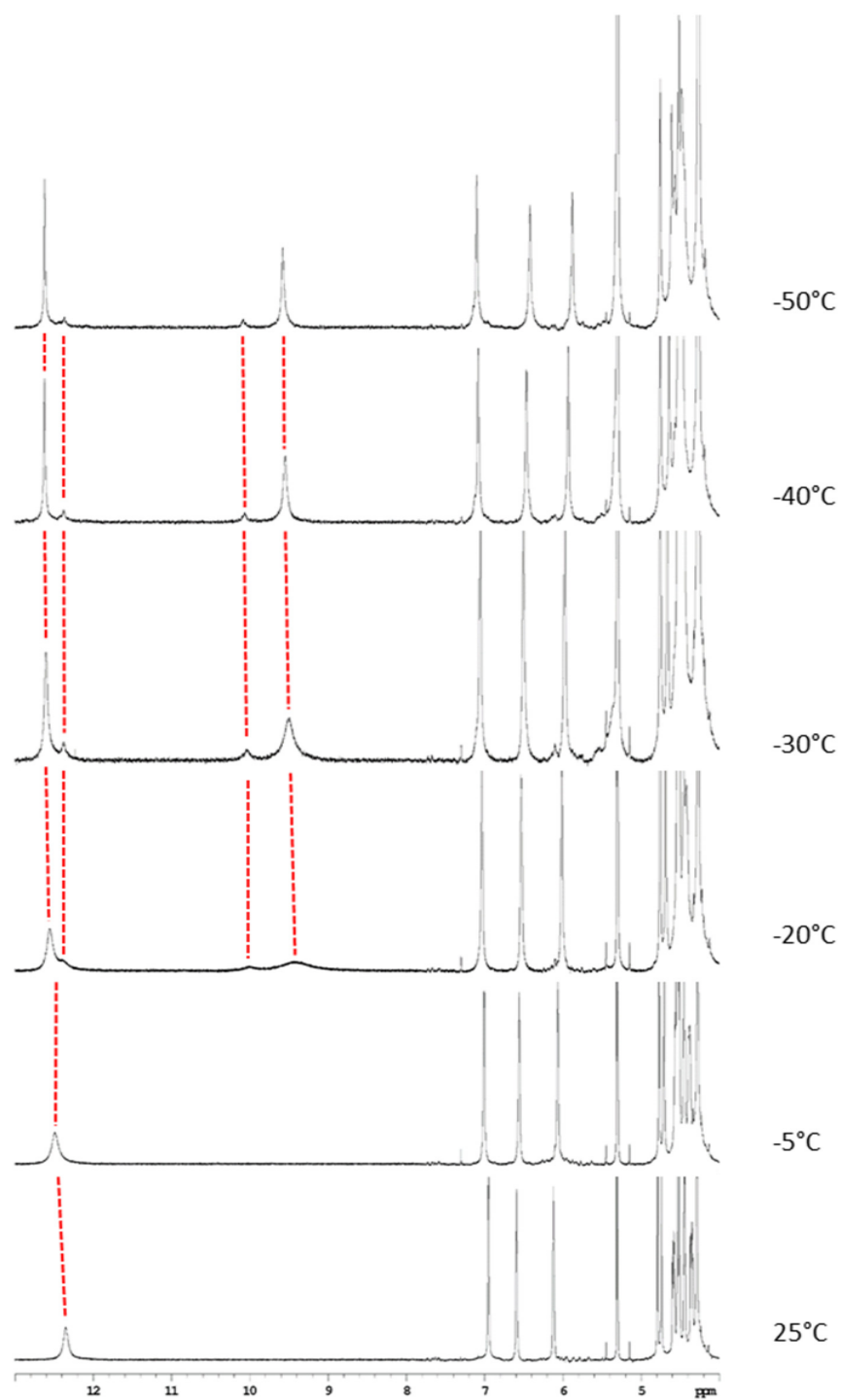


Figure S6. Downfield portion of the 600 MHz ¹H-NMR spectrum of **8Fc5C10** (4.5 mM) at different temperatures in CD₂Cl₂.

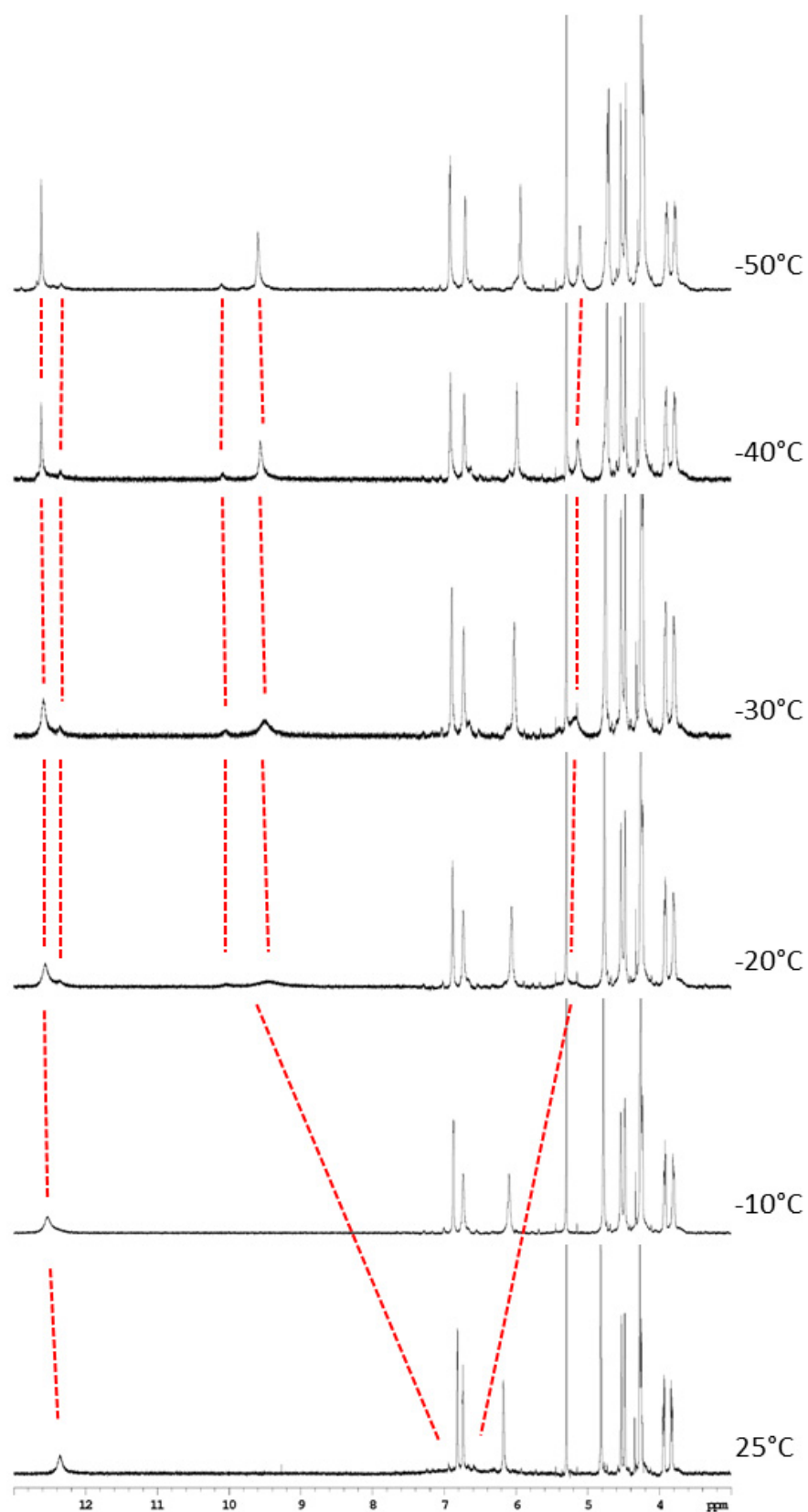


Figure S7. Downfield portion of the 600 MHz ¹H-NMR spectrum of **8Fc5Si** (6 mM) at different temperatures in CD₂Cl₂.

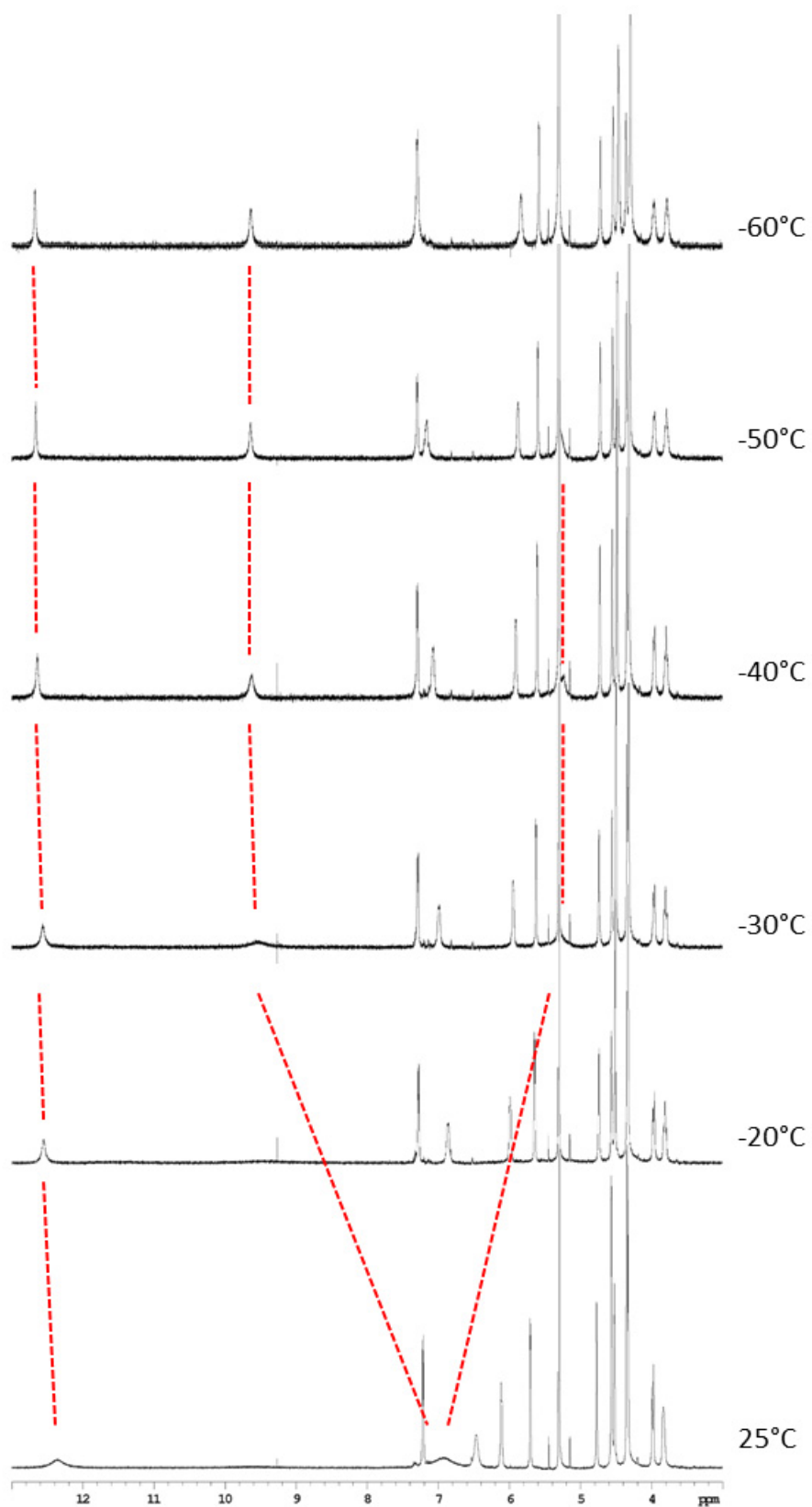


Figure S8. Downfield portion of the 600 MHz ¹H-NMR spectrum of **8Fc5OH** (7 mM) at different temperatures in CD₂Cl₂.

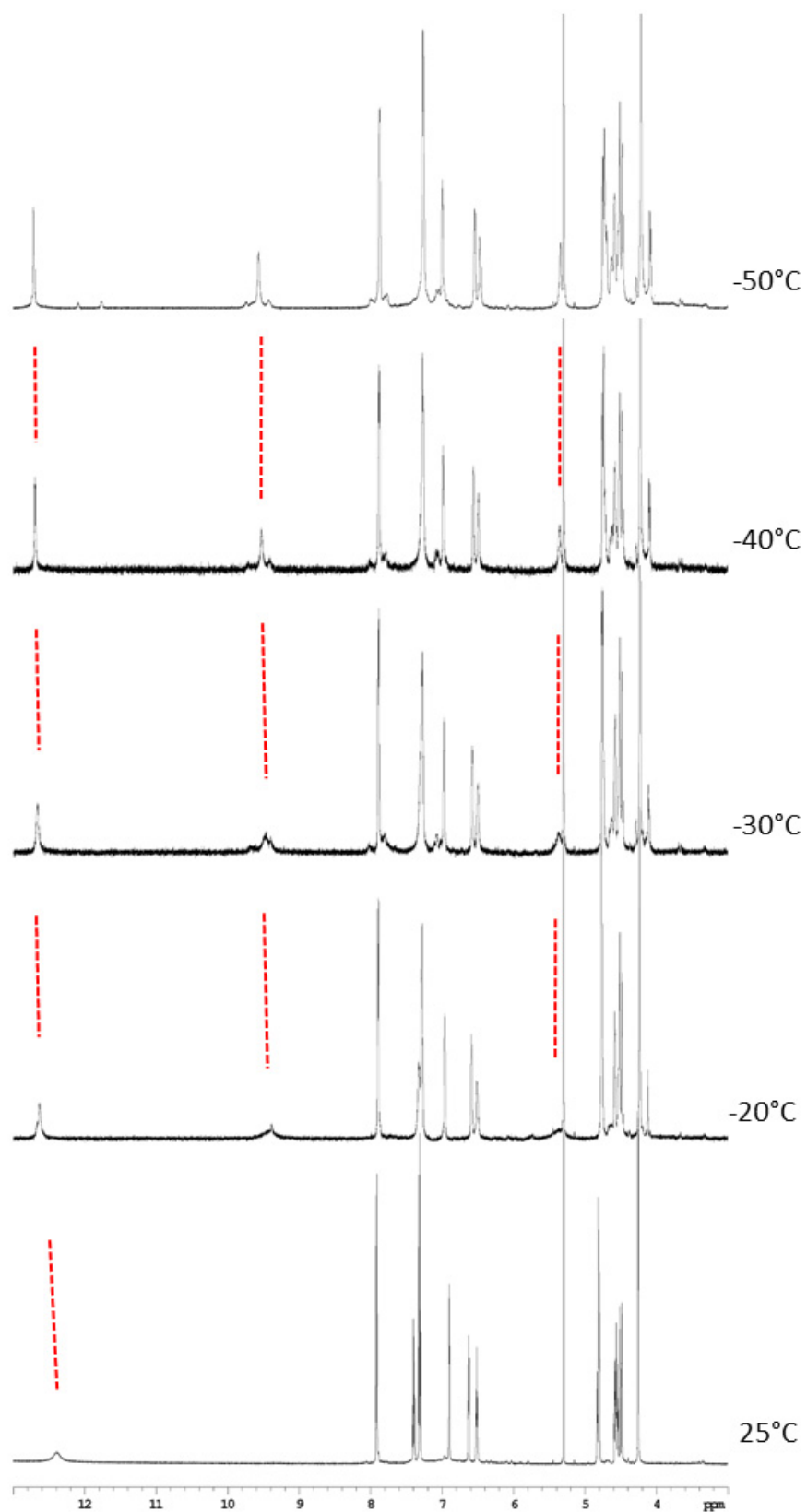


Figure S9. Downfield portion of the 600 MHz ¹H-NMR spectrum of **8Fc5Ph** (4 mM) at different temperatures in CD₂Cl₂.

Table S1. Room temp. chemical shifts* for sugar protons.

	Compound	solvent	$\delta(1')$	$\delta(2')$	$\delta(3')$	δ sequence
a	8Ph5Fc	dmsO	5.808	6.31	5.83	2'>3'>1'
		dcm	5.86	6.43	6.48	3'>2'>1'
b	8Ph5OH	dmsO	5.78	5.496	5.186	1'>2'>3'
		dcm	6.2	6.04	5.588	1'>2'>3'
c	8Ph5Si	dmsO	5.75	6.36	6.17	2'>3'>1'
		dcm	5.75	6.26	5.63	2'>1'>3'
d	8Ph5C10	dmsO	-	-	-	-
		dcm	5.86	6.29	6.16	2'>3'>1'
i	8Fc5C10	dmsO	6.75	6.58	5.74	1'>2'>3'
		dcm	6.95	6.59	6.12	1'>2'>3'
e	8Fc5Si	dmsO	6.747	6.69	5.71	1'>2'>3'
		dcm	6.82	6.74	6.18	1'>2'>3'
f	8Fc5OH	dmsO	6.86	5.61	5.3	1'>2'>3'
		dcm	7.22	6.12	5.71	1'>2'>3'
g	8Fc5Ph	dmsO	6.77	6.63	5.99	1'>2'>3'
		dcm	6.9	6.63	6.51	1'>2'>3'
h	8-Bromo-2,3,5-tri-O-decanoylguanosine 1	dmsO	5.84	6.02	5.68	2'>1'>3'
i	2,3,5-tri-O-decanoylguanosine 2	dmsO	5.96	5.81	5.52	1'>2'>3'
l	2,3,5-tri-O-acetylguanosine	dmsO ³	6.007	5.809	5.515	1'>2'>3'
m	8-Bromoguanosine 9	dmsO ⁴		4.89		
		dmsO	5.68	5.01	4.14	1'>2'>3'
n	Guanosine	dmsO ⁴		4.36		
		dmsO ³	5.723	4.429	4.113	1'>2'>3'

* signals are referenced to residual solvent peak.

1. Prepared as described in Giorgi, T.; Lena, S.; Mariani, P.; Cremonini, M. A.; Masiero, S.; Pieraccini, S.; Rabe, J. P.; Samori, P.; Spada, G. P.; Gottarelli, G. *J. Am. Chem. Soc.* 2003, **125**, 14741
2. Prepared as described in Devetak, M.; Masiero, S.; Pieraccini, S.; Spada, G. P.; Copic, M.; Olenik, I. D. *Appl. Surf. Sci.* 2010, **256**, 2038
3. Spectral Database for Organic Compounds (https://sdbs.db.aist.go.jp/sdbs/cgi-bin/cre_disclaimer.cgi?REQURL=/sdbs/cgi-bin/cre_index.cgi&REFURL=http://www.bing.com/search%3fq=spetra+database+japan&form=PRASU1&src=IE11TR&pc=ASTE)
4. L. E. Buerkle, H. A. von Recumab, S. J. Rowan, *Chem. Sci.*, 2012, **3**, 564 and references cited therein.

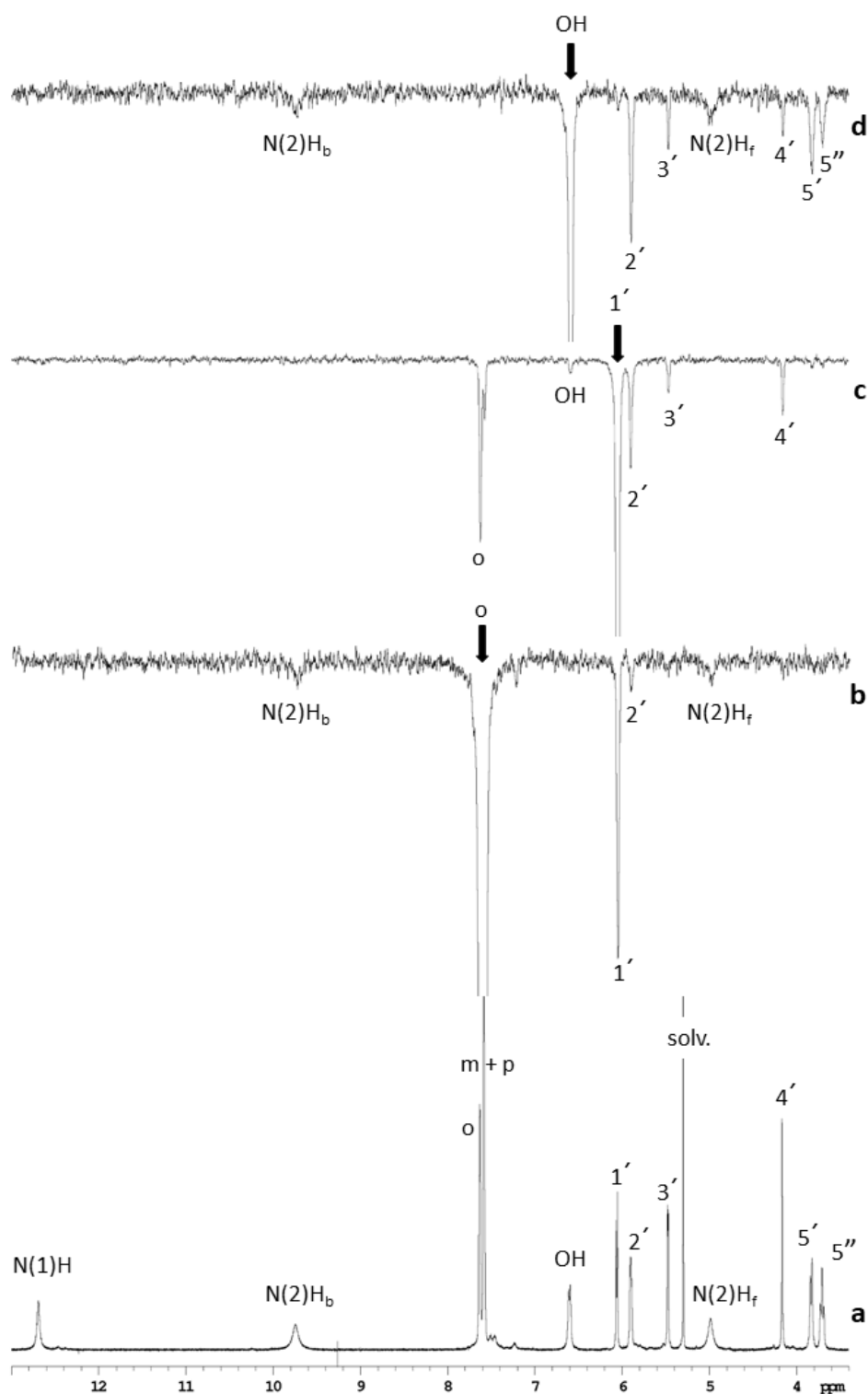


Figure S10. a) Downfield portion of the $600\text{ MHz } ^1\text{H-NMR}$ spectrum of **8Ph5OH** in CD_2Cl_2 (5 mM) and signals assignment (diastereotopic protons were not assigned); b), c), d): selected NOESY-1D spectra of the same sample. Irradiated signals are indicated by an arrow. In each NOE spectrum were used at least 1024 coadded transients, a recycle delay of 1 sec, a mixing time of 0.25 sec and a 20-50Hz shaped pulse. All spectra were recorded at -40°C .

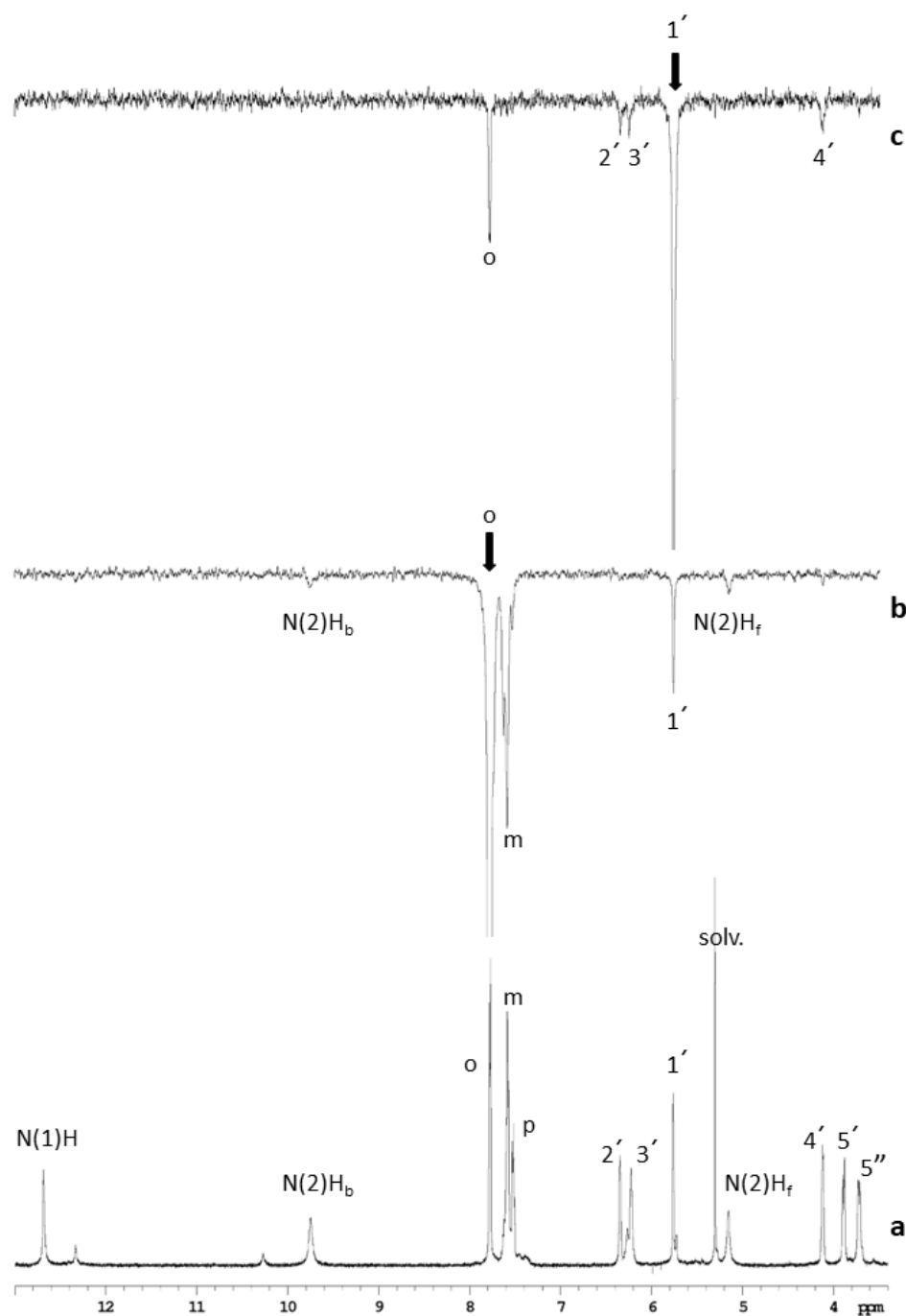


Figure S11. a) Downfield portion of the 600 MHz ^1H -NMR spectrum of **8Ph5Si** in CD_2Cl_2 (6 mM) and signals assignment (diastereotopic protons were not assigned); b), c): selected NOESY-1D spectra of the same sample. Irradiated frequencies are indicated by an arrow. In each NOE spectrum were used at least 512 coadded transients, a recycle delay of 1 sec, a mixing time of 0.2 sec and a 20-50Hz shaped pulse. All spectra were recorded at -40°C .

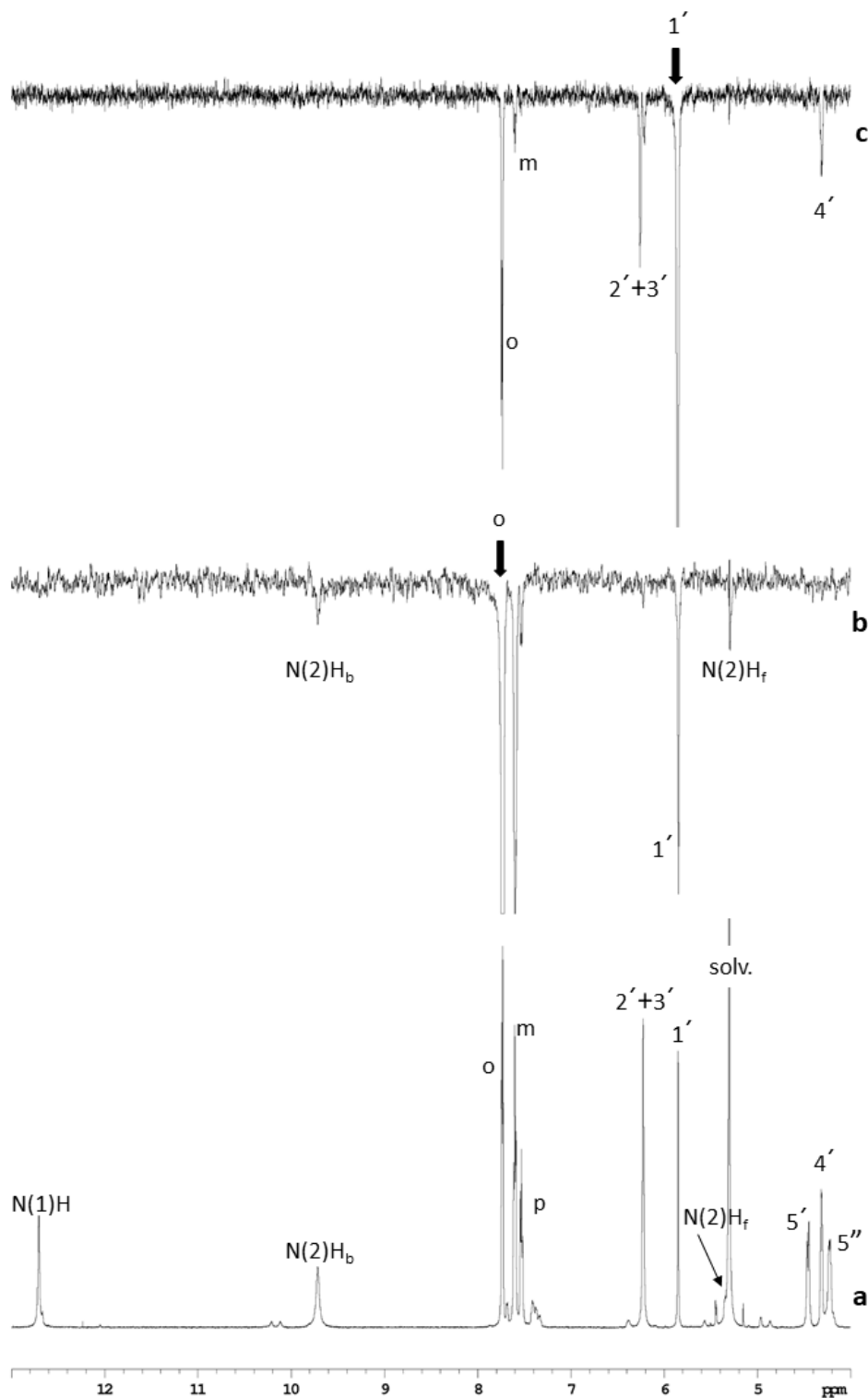


Figure S12. a) Downfield portion of the 600 MHz ^1H -NMR spectrum of **8Ph5C10** in CD_2Cl_2 (7 mM) and signals assignment (diastereotopic protons were not assigned); b), c): selected NOESY-1D spectra of the same sample. Irradiated signals are indicated by an arrow. In each NOE spectrum were used at least 256 coadded transients, a recycle delay of 1 sec, a mixing time of 0.4 sec and a 20-50Hz shaped pulse. All spectra were recorded at -40°C .

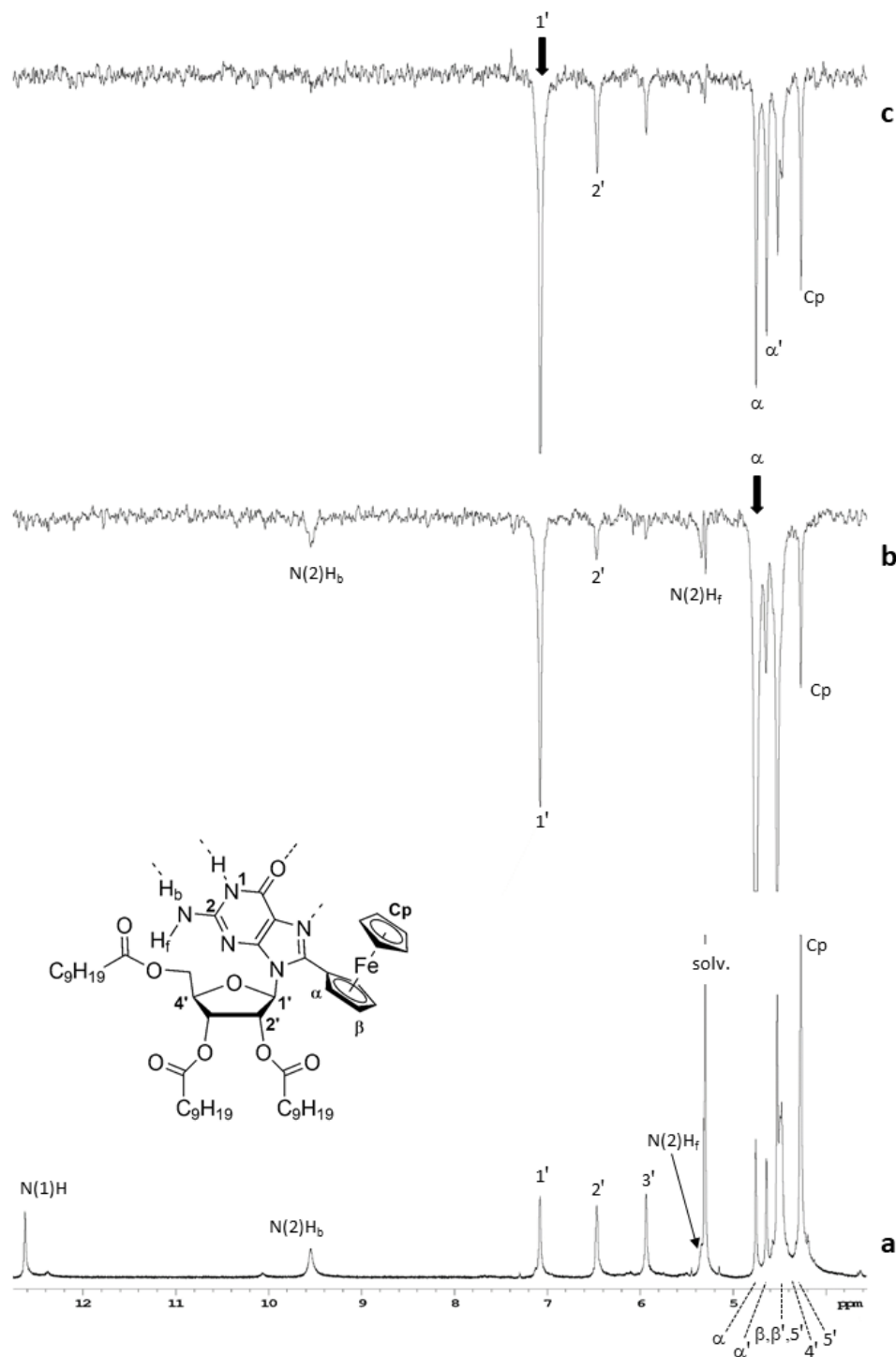


Figure S13. a) Downfield portion of the 600 MHz ^1H -NMR spectrum of **8Fe5C10** in CD_2Cl_2 (4.5mM) and signals assignment (diastereotopic protons were not assigned); b), c): selected NOESY-1D spectra of the same sample. Irradiated frequencies are indicated by an arrow. In each NOE spectrum were used 512 coadded transients, a recycle delay of 0.6 sec, a mixing time of 0.6 sec and a 50Hz shaped pulse. All spectra were recorded at -40°C .

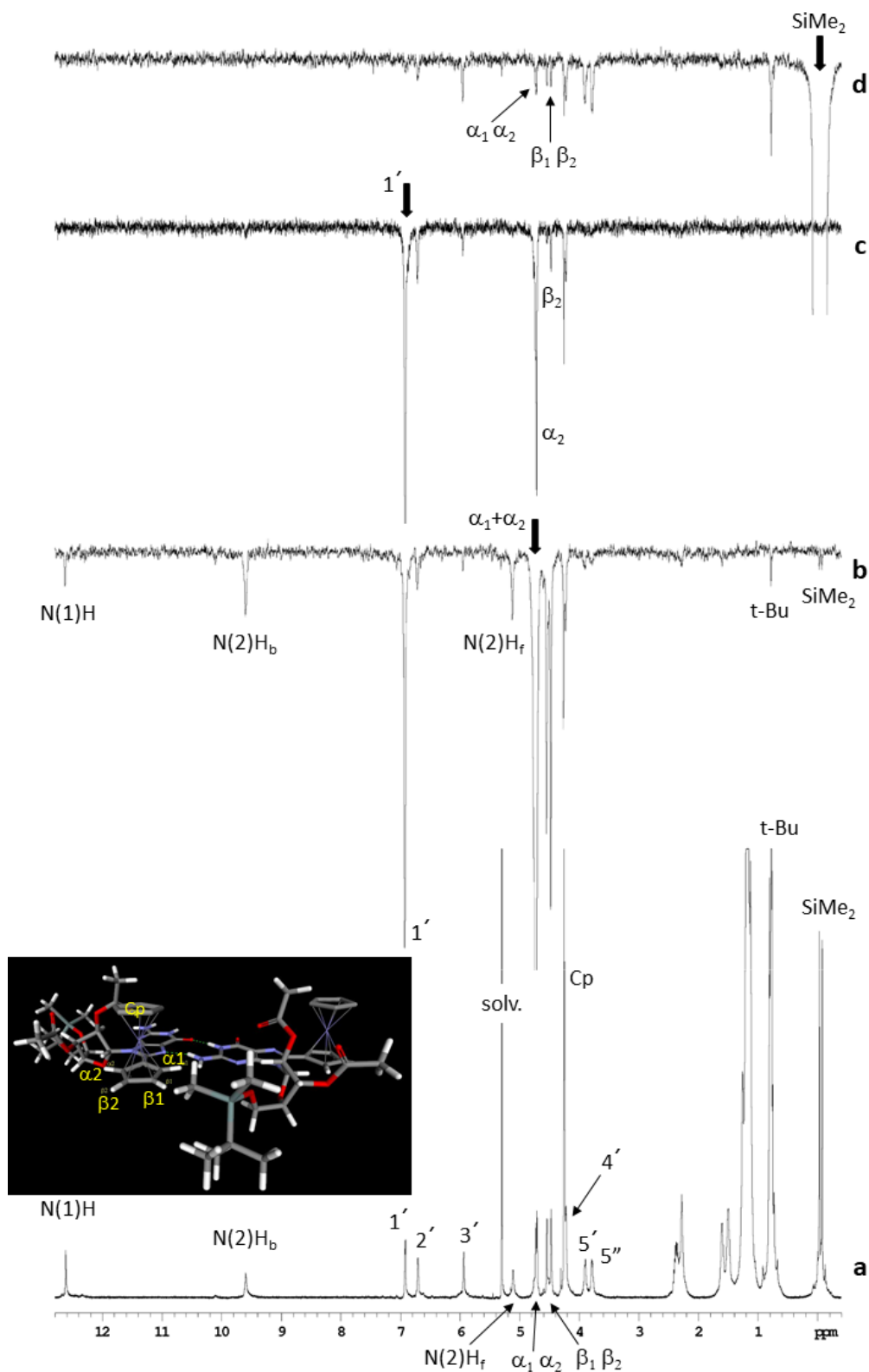


Figure S14. a) 600 MHz ^1H -NMR spectrum of **8Fc5Si** in CD_2Cl_2 (6 mM) and signals assignment (sugar diastereotopic protons were not assigned); b), c), d): selected NOESY-1D spectra of the same sample. Irradiated signals are indicated by an arrow. See inset for proton labeling. In each NOE spectrum were used at least 256 coadded transients, a recycle delay of 1 sec, a mixing time of 0.35 sec and a 20-80Hz shaped pulse. All spectra were recorded at -50°C .

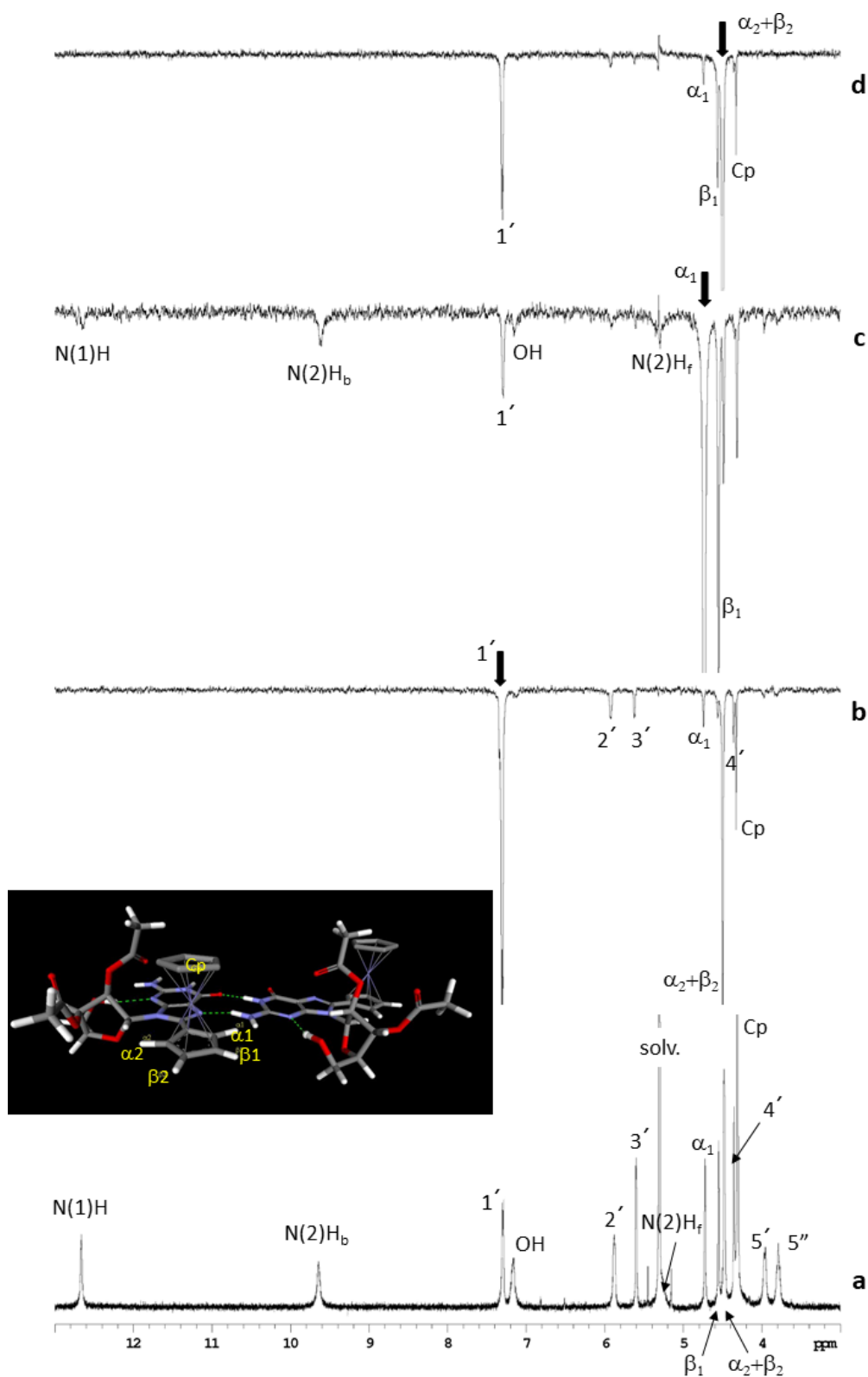


Figure S15. a) Downfield portion of the 600 MHz ^1H -NMR spectrum of **8Fc5OH** in CD_2Cl_2 (7 mM) and signals assignment (ribose diastereotopic protons were not assigned); b), c), d): selected NOESY-1D spectra of the same sample. Irradiated frequencies are indicated by an arrow. See inset for proton labeling. In each NOE spectrum were used at least 128 coadded transients, a recycle delay of 1 sec, a mixing time of 0.4 sec and a 20-50Hz shaped pulse. All spectra were recorded at -50°C .

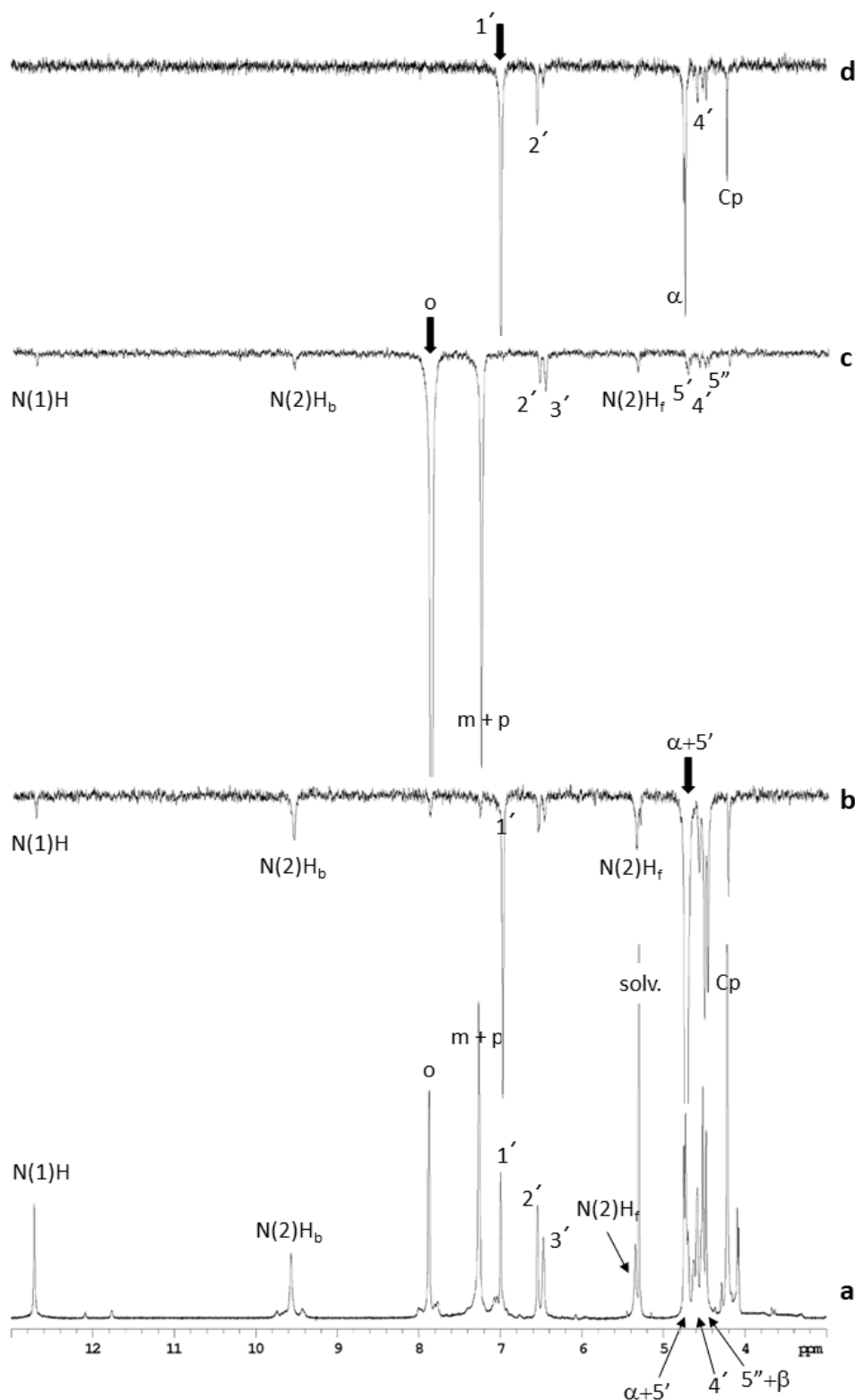


Figure S16. a) Downfield portion of the 600 MHz ^1H -NMR spectrum of **8Fc5Ph** in CD_2Cl_2 (4 mM) and signals assignment (diastereotopic protons were not assigned); b), c), d): selected NOESY-1D spectra of the same sample. Irradiated protons are indicated by an arrow. In each NOE spectrum were used at least 256 coadded transients, a recycle delay of 1 sec, a mixing time of 0.4 sec and a 20-50Hz shaped pulse. All spectra were recorded at -50°C .

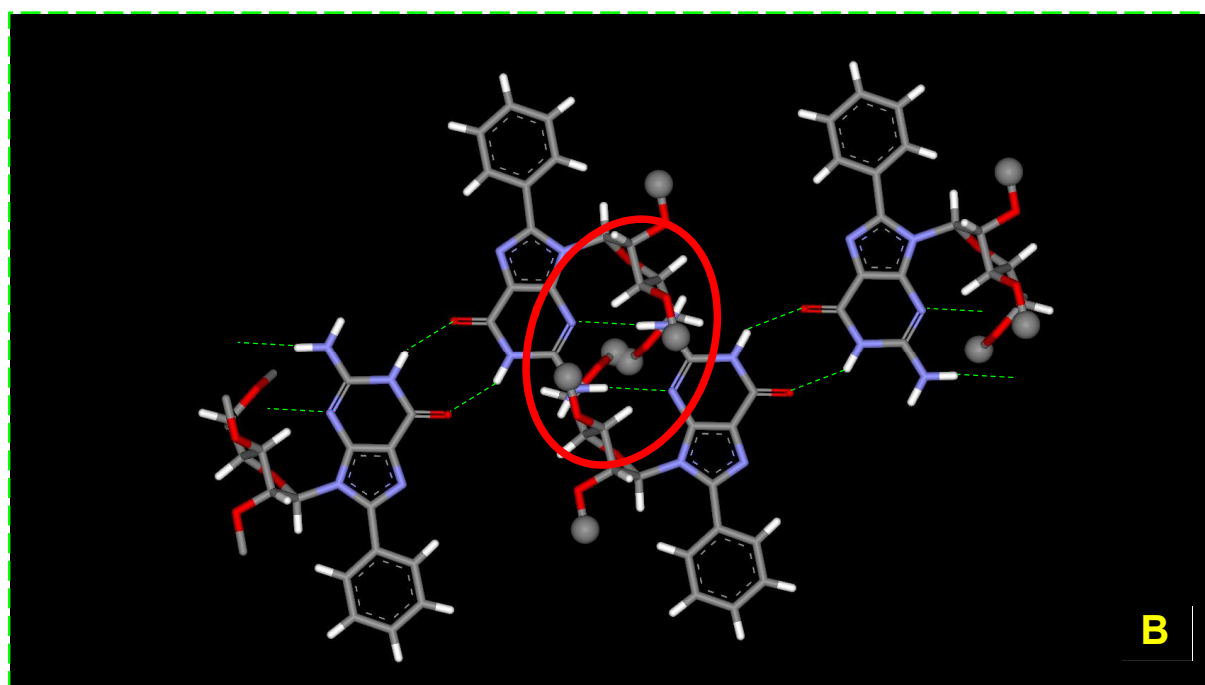
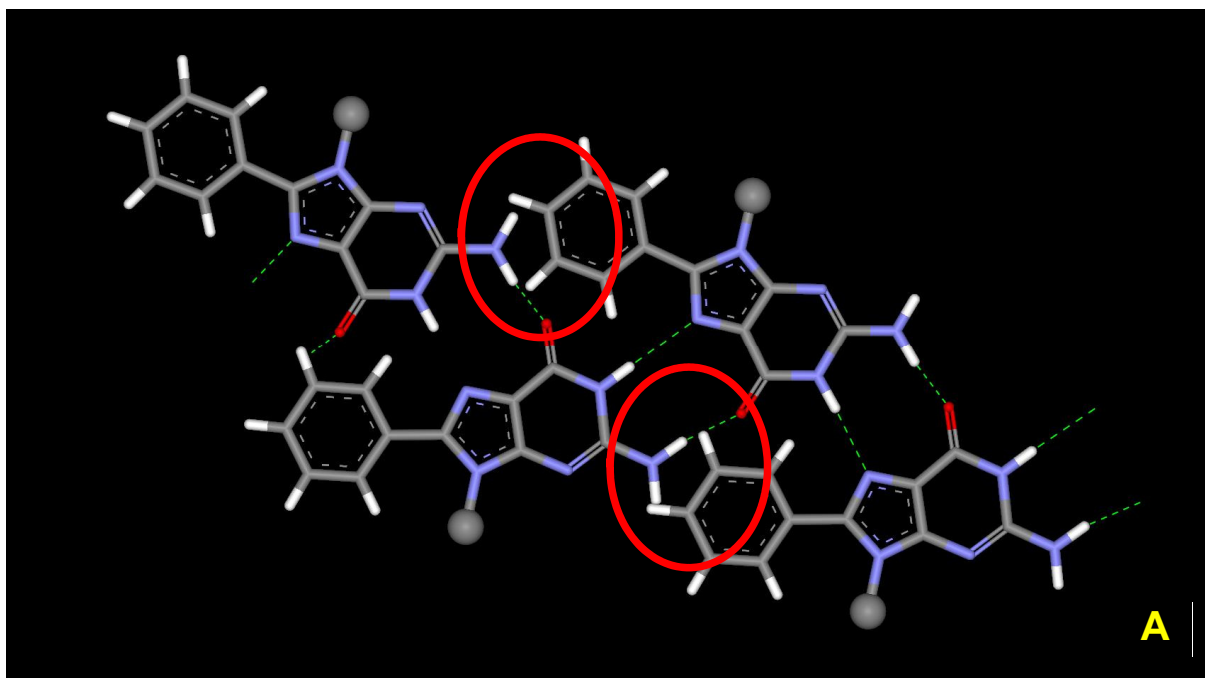


Figure S17. Sketches of ribbon-like structures A and B hypothetically formed by 8-substituted guanosine in syn conformation. Sterically overcrowded areas are circled. Furthermore, both structures are incompatible with observed NOEs.

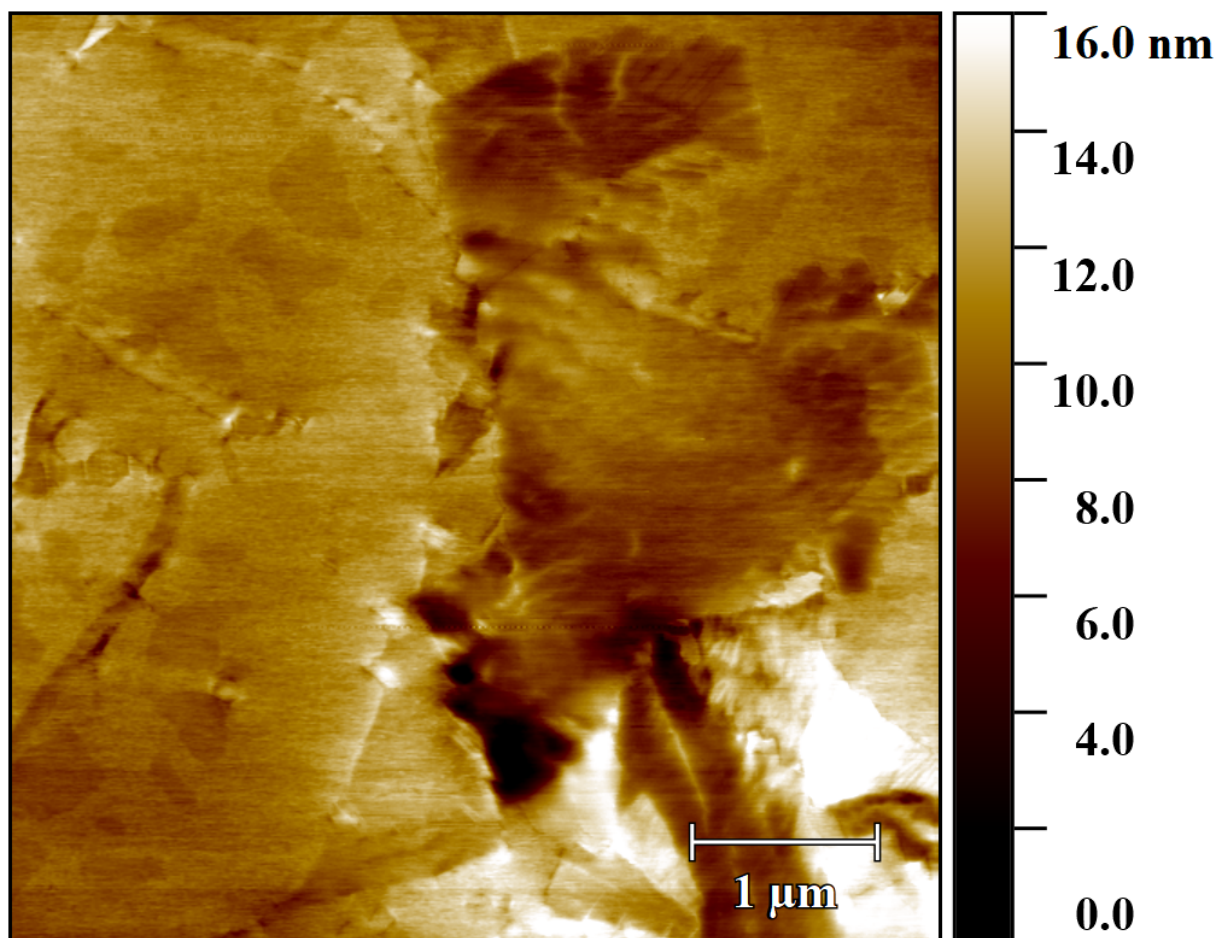
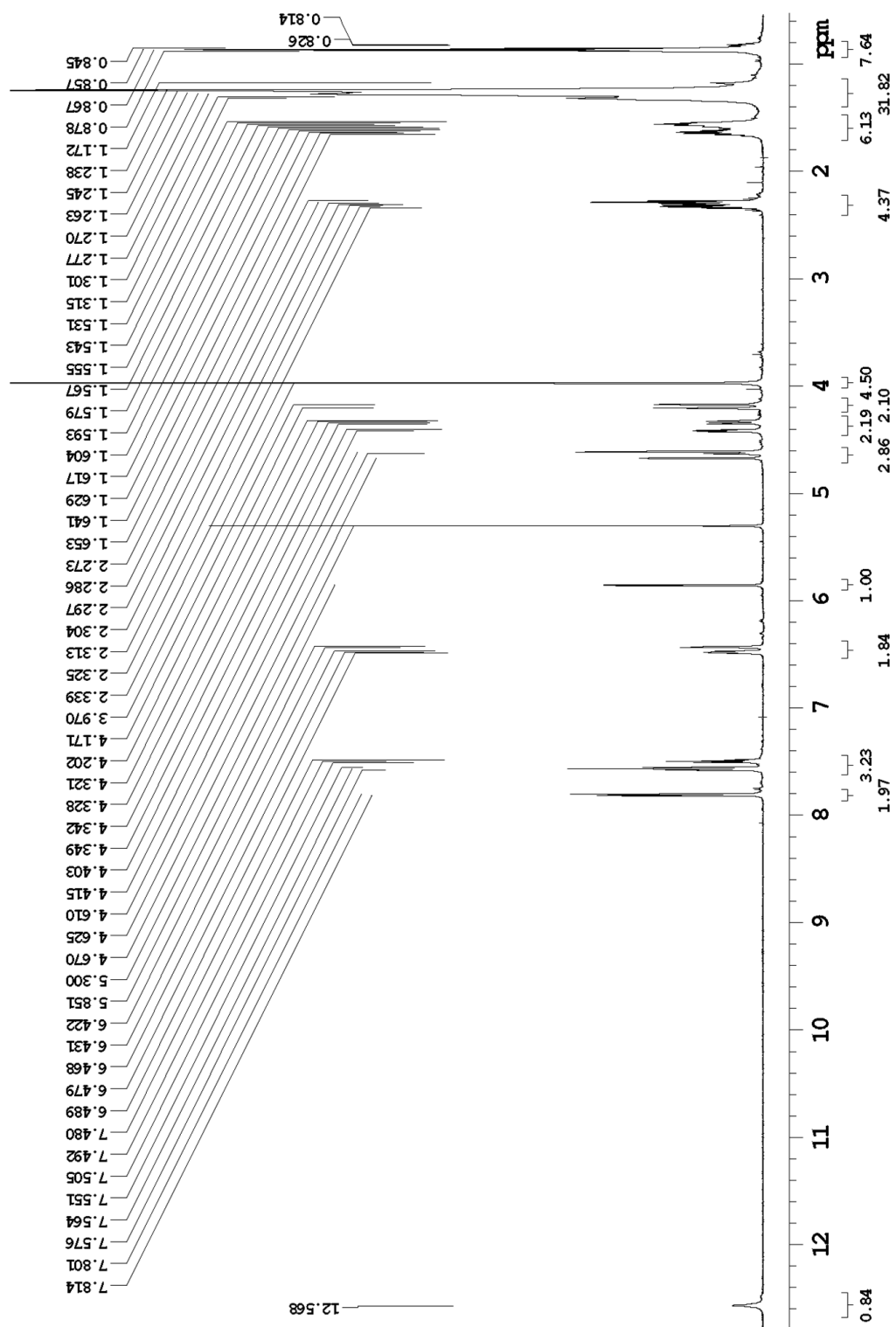
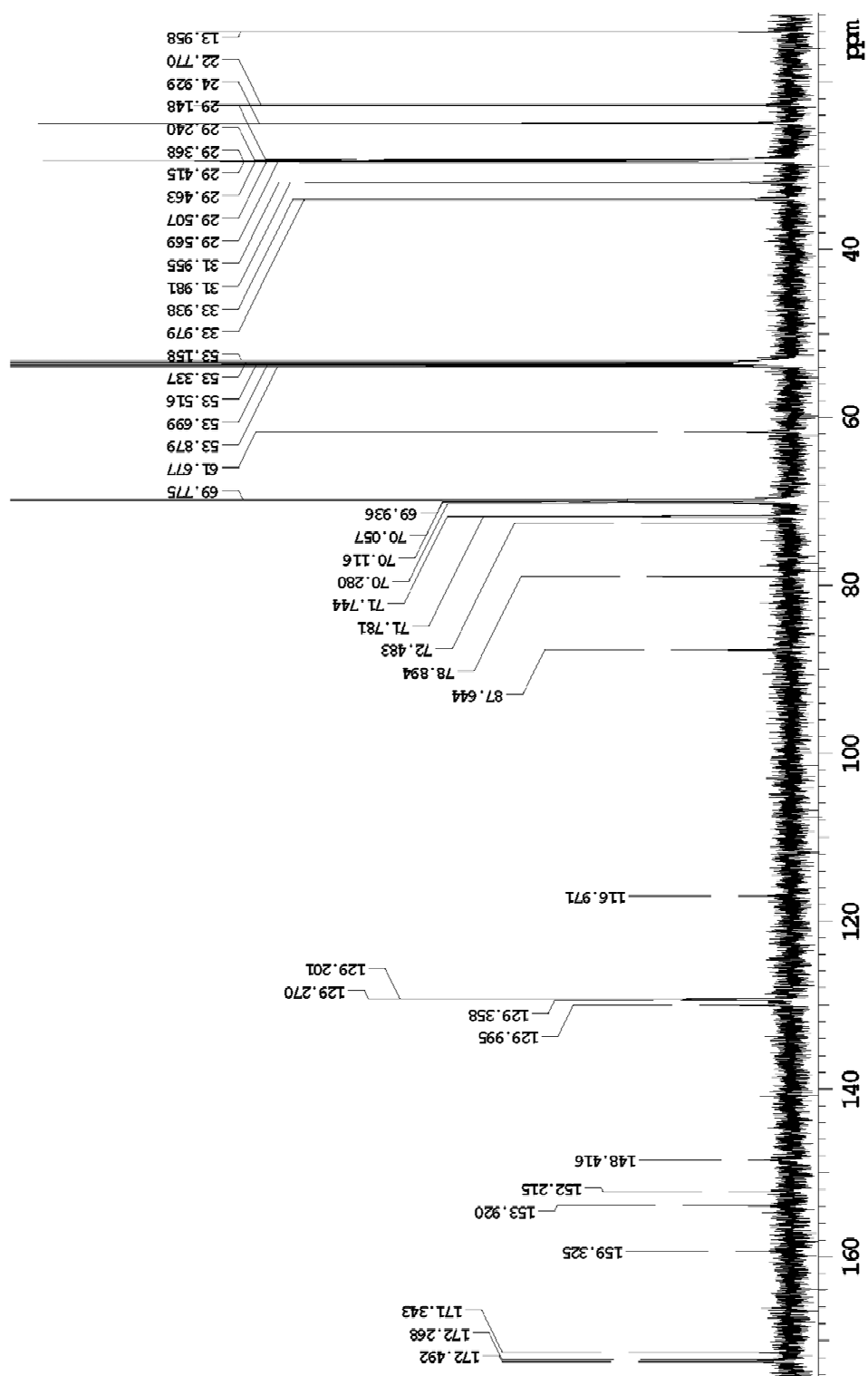


Figure S18. AFM image of the amorphous film obtained from **8Ph5C10** by drop-casting from CH_2Cl_2 .



¹H-NMR (CD₂Cl₂, 600 MHz) of **8Ph5Fc**



$^{13}\text{C}\{^1\text{H}\}$ NMR (CD₂Cl₂, 600 MHz) of **8Ph5Fc**

i600 std parameters

File:

Temp. 25.0 C / 298.1 K
Operator: sargnac

Relax. delay 1.000 sec
Acq. time 0.213 sec
Width 9611.9 Hz
2D Width 9611.9 Hz
2 repetitions
256 increments

OBSERVE H1, 599.7287472 MHz

DATA PROCESSING

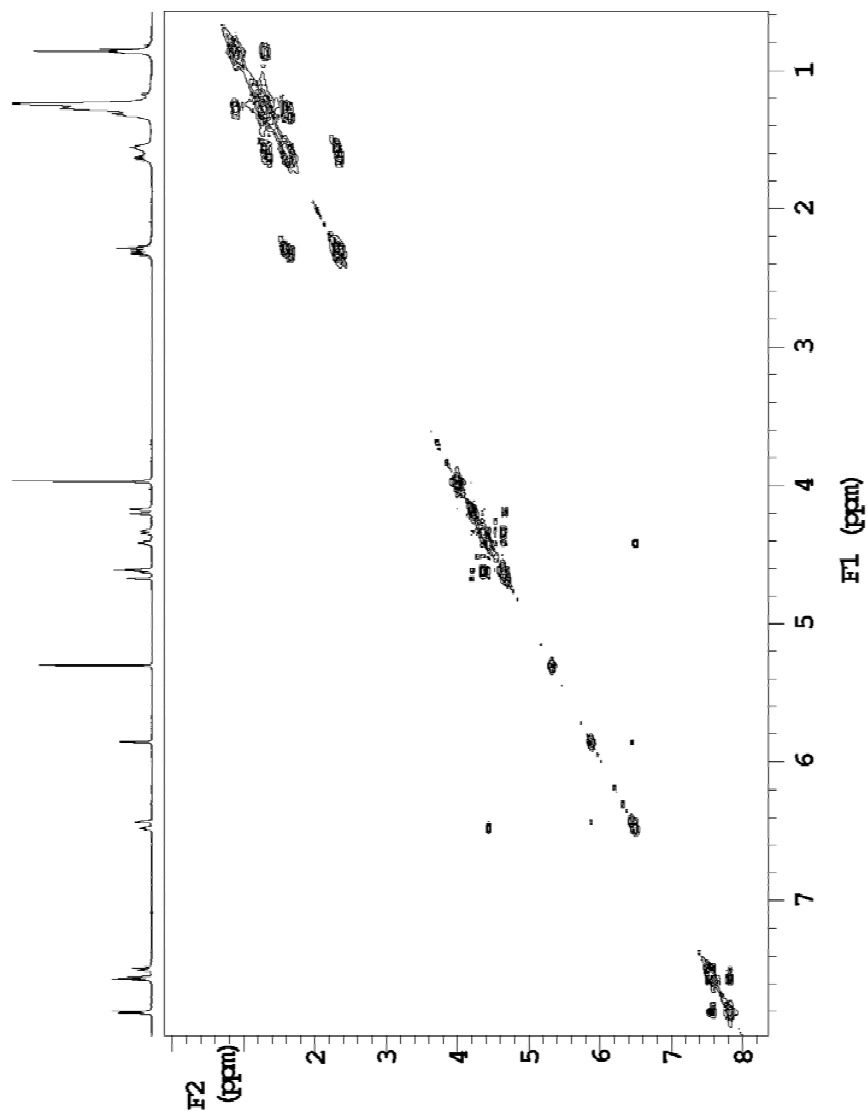
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F1 DATA PROCESSING

Sine bell 0.027 sec

FT size 4096 x 4096

Total time 0 min 0 sec



gCOSY spectrum (CD₂Cl₂, 600 MHz) of **8Ph5Fc**

i600 std parameters

File:

Temp. 25.0 C / 298.1 K
Operator: sangrac

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Acq. time 0.199 sec
Width 9611.9 Hz
2D Width 25632.8 Hz
8 repetitions

2 x 256 increments
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DECOUPLE CL3, 150.8132215 MHz

Power 45 dB

on during acquisition
off during delay
W40 Triple modulated

DATA PROCESSING

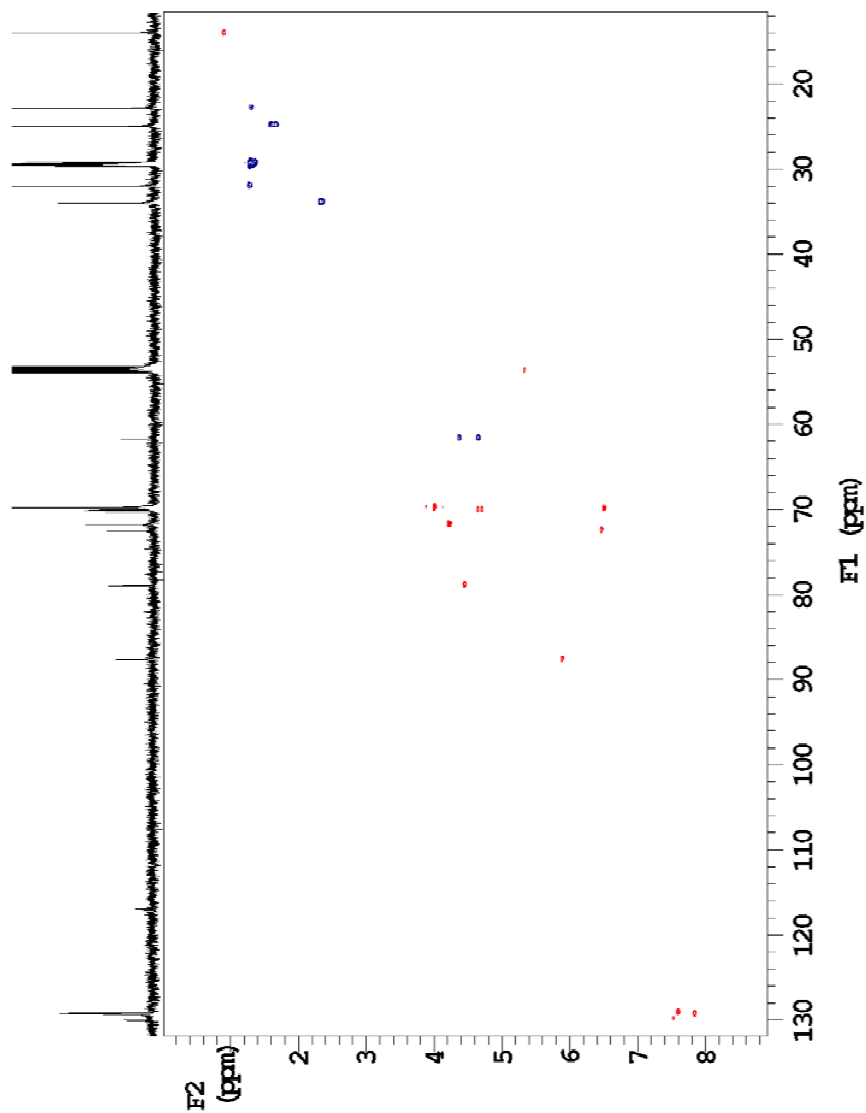
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Total time 0 min 0 sec



i600 std parameters

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Operator: sargnac

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2D Width 36199.1 Hz
16 repetitions

256 increments
CESERVE HL, 599.7287678 MHz

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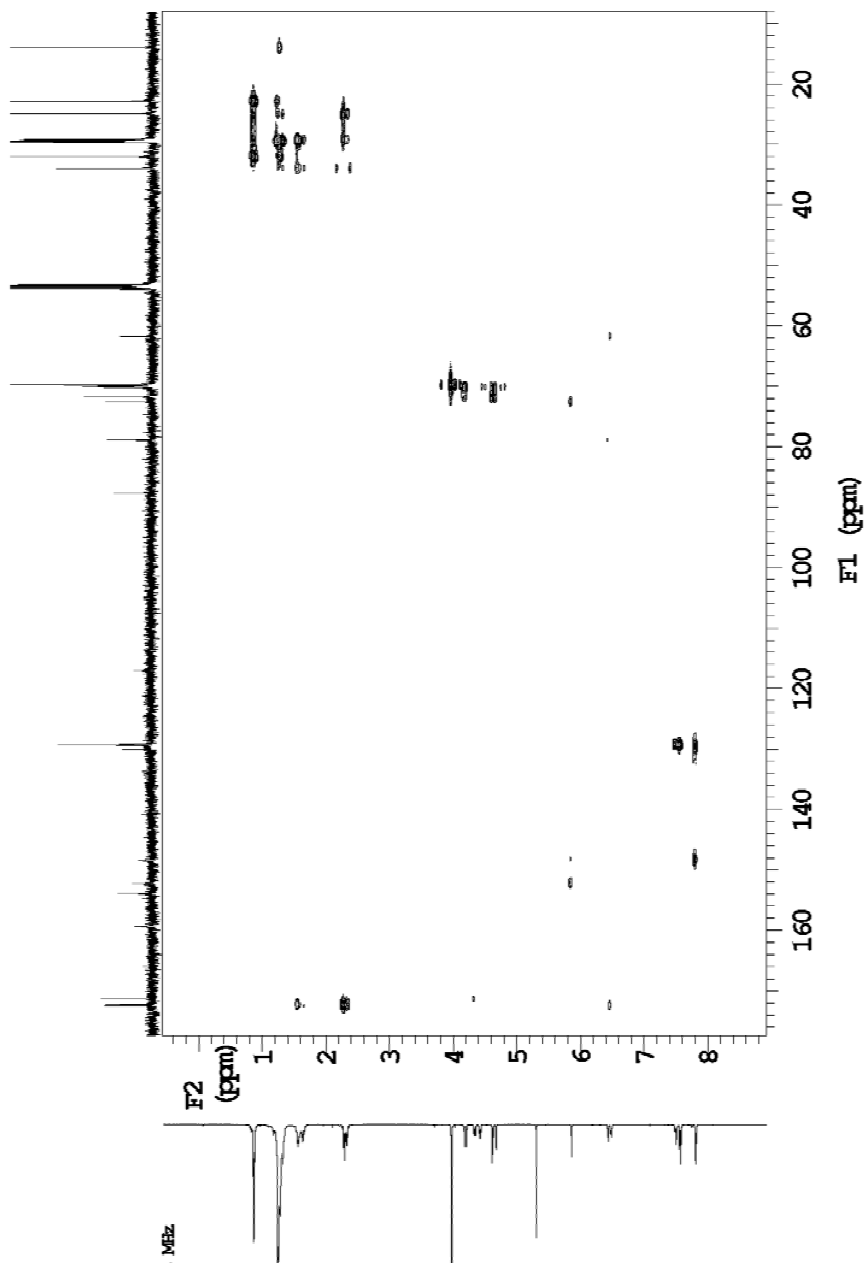
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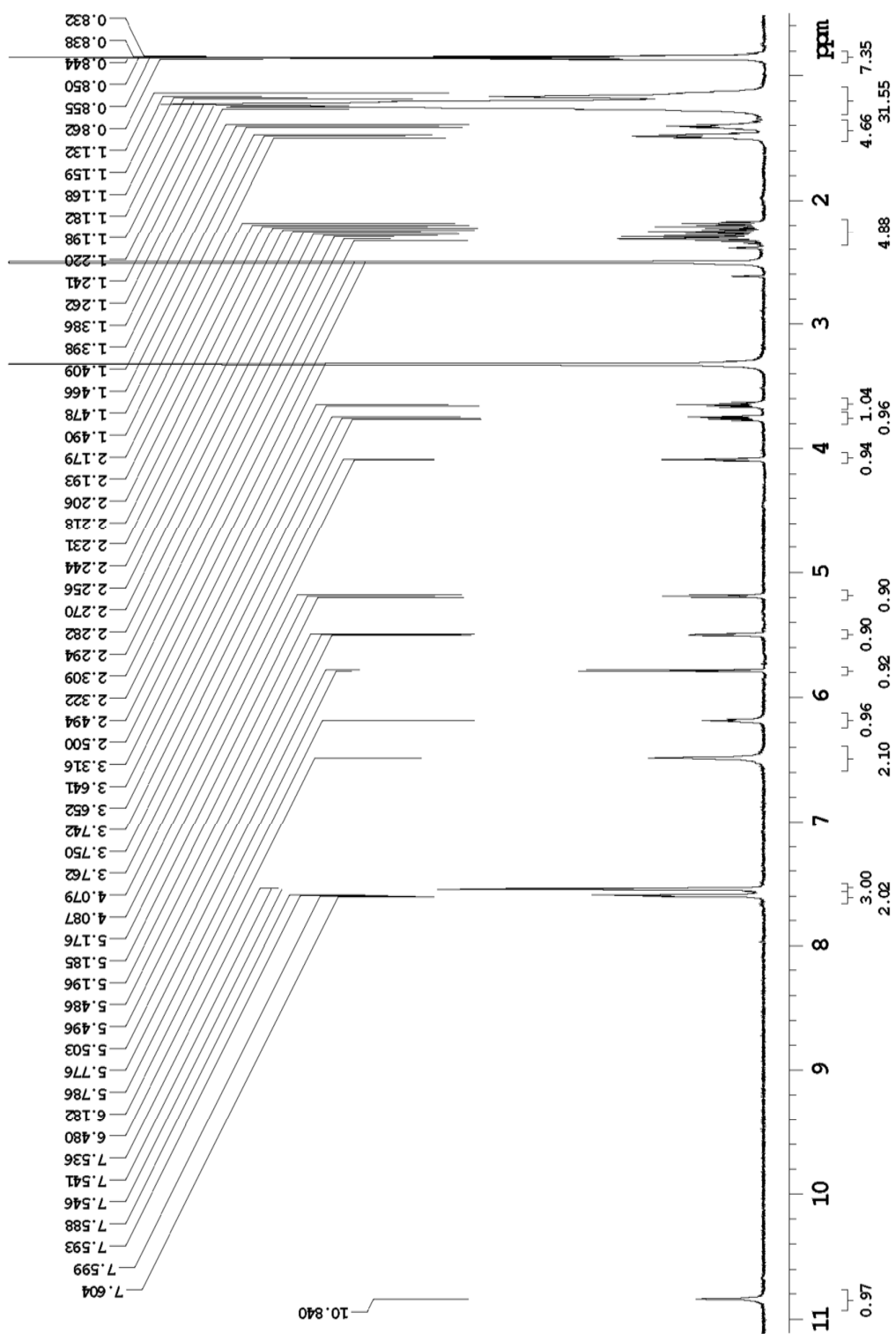
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FT size 4096 x 2048

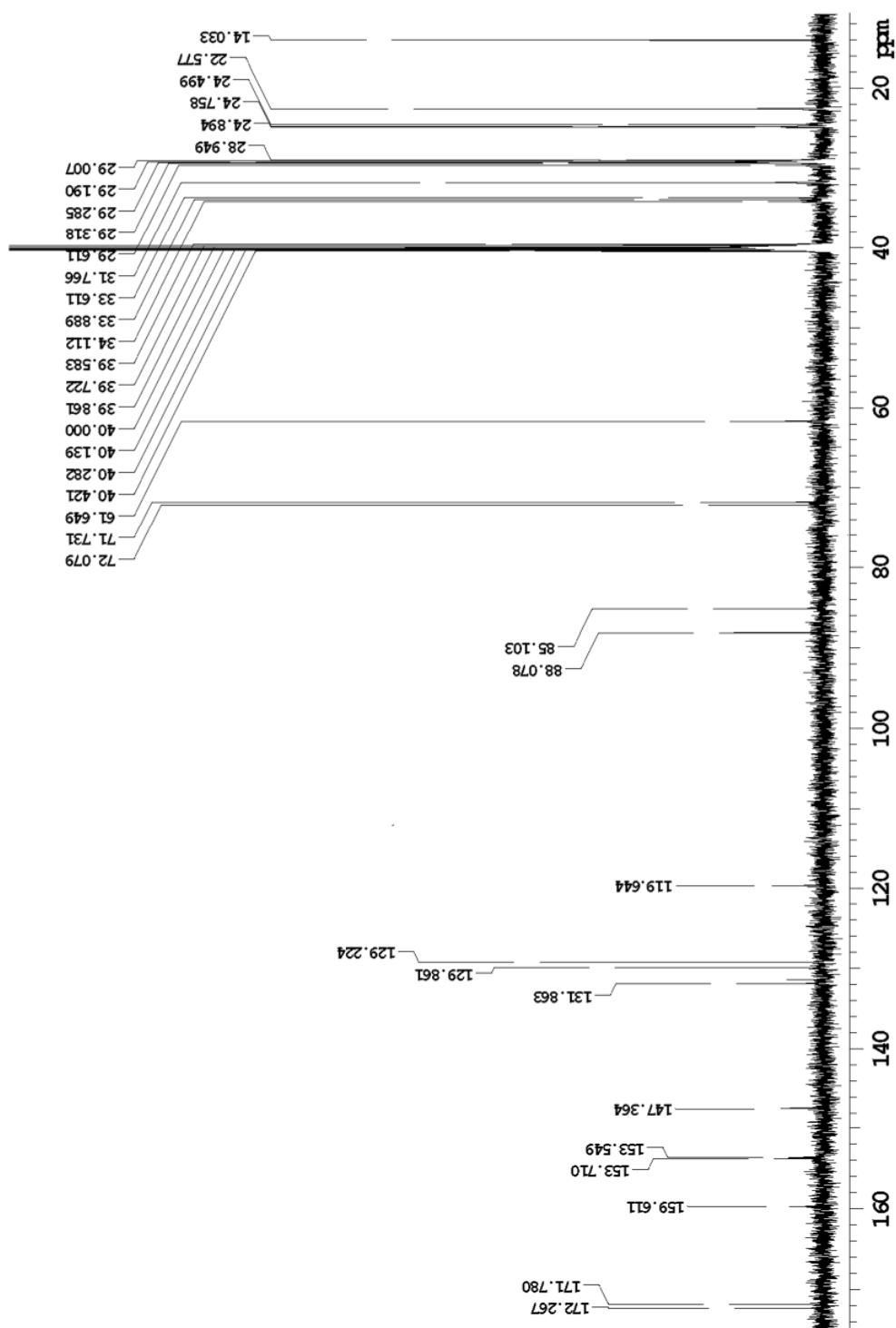
Total time 0 min 0 sec



gHMBC spectrum (CD_2Cl_2 , 600 MHz) of **8Ph5Fc**



¹H-NMR (dms0-d₆, 600 MHz) of **8Ph5OH**



$^{13}\text{C}\{^1\text{H}\}$ NMR (dms0-d₆, 600 MHz) of **8Ph5OH**

i600 std parameters

File:

Temp. 10.0 C / 283.1 K
Operator: sargnac

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2D Width 9611.9 Hz
2 repetitions
200 increments

OBSERVE H1, 599.7352686 MHz

DATA PROCESSING

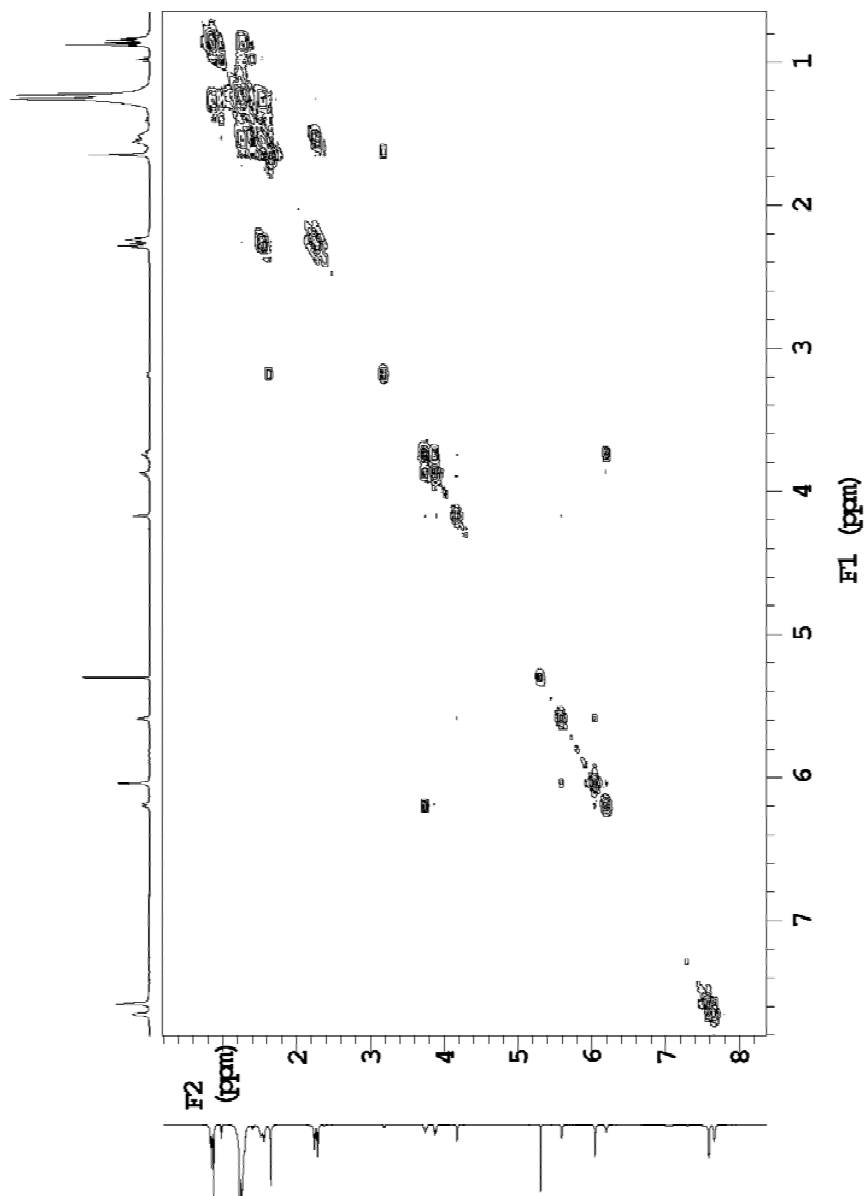
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F1 DATA PROCESSING

Sine bell 0.021 sec

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Total time 0 min 0 sec



gCOSY spectrum (CD₂Cl₂, 600 MHz) of **8Ph5OH**

i600 std parameters

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Temp. 25.0 C / 298.1 K
Operator: sangiac

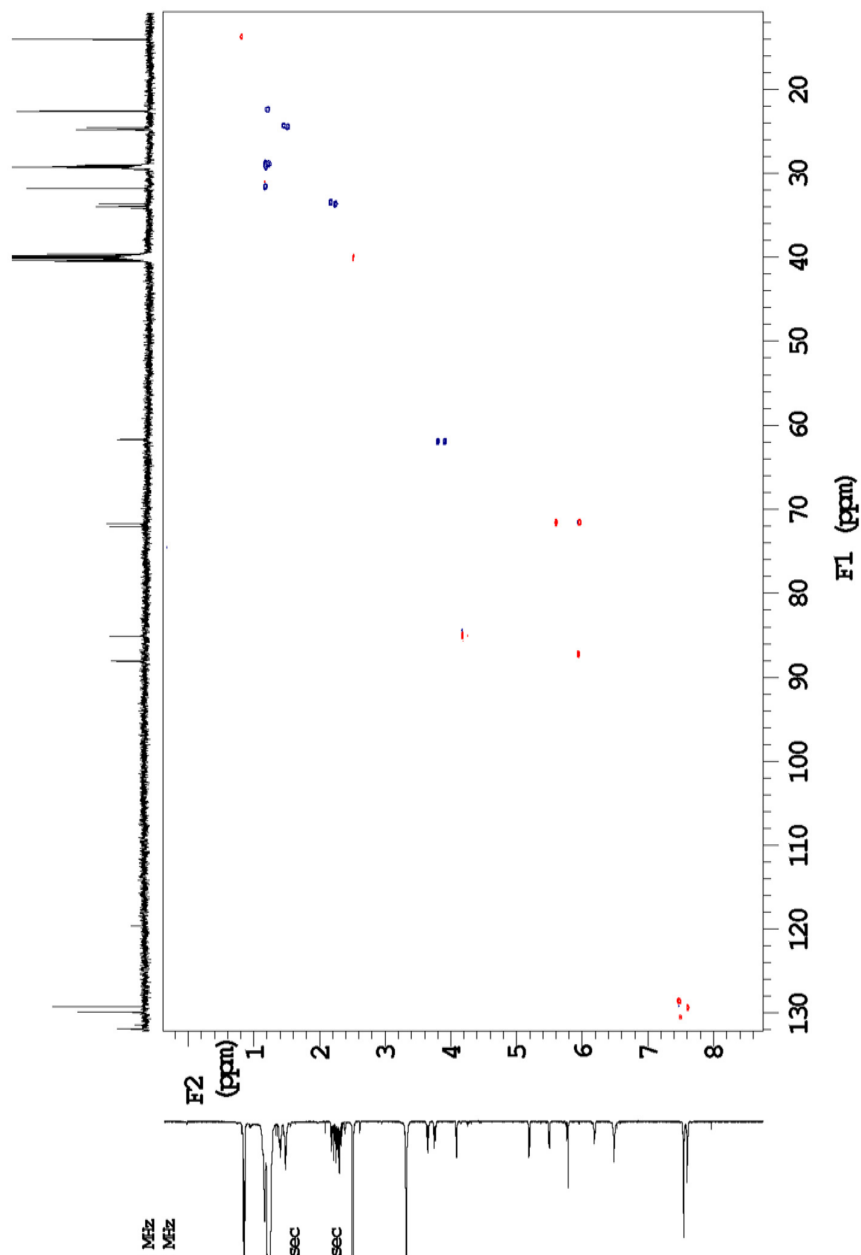
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Acq. time 0.199 sec
Width 9611.9 Hz
2D Width 25632.8 Hz
32 repetitions

2 x 256 increments
OBSERVE H1, 599.7340972 MHz
DECOUPLE C13, 150.8145701 MHz
Power 45 dB

on during acquisition
off during delay
W40 Triple modulated

DATA PROCESSING

Gauss apodization 0.092 sec
F1 DATA PROCESSING
Gauss apodization 0.009 sec
FT size 8192 x 2048
Total time 0 min 0 sec



gHSQC spectrum (dmsso- d_6 , 600 MHz) of **8Ph5OH**

i600 std parameters

File:

Temp. 25.0 C / 298.1 K

Operator: sangiac

Relax. delay 1.200 sec

Mixing 0.080 sec

Acq. time 0.128 sec

Width 9611.9 Hz

2D Width 36199.1 Hz

64 repetitions

256 increments

OBSERVE HL, 599.7340871 MHz

DATA PROCESSING

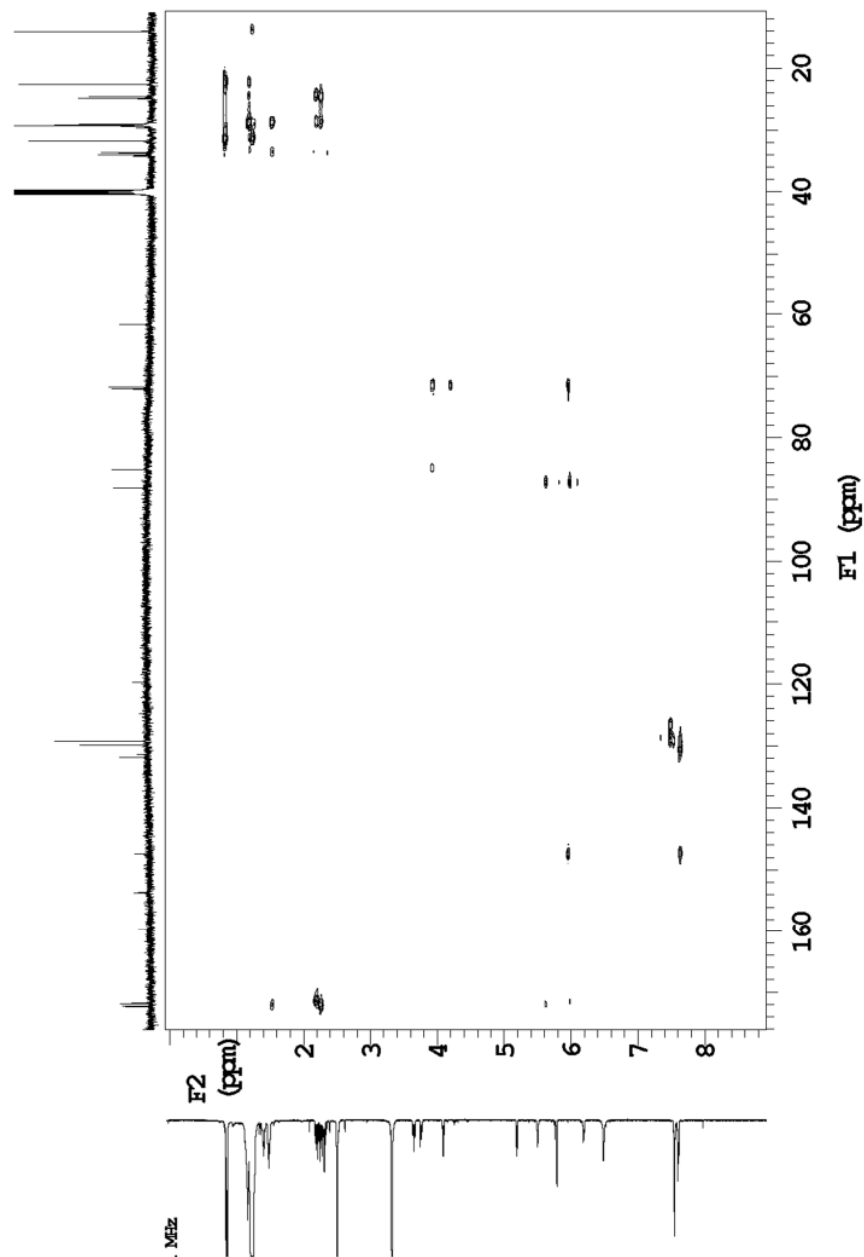
Sine ball 0.064 sec

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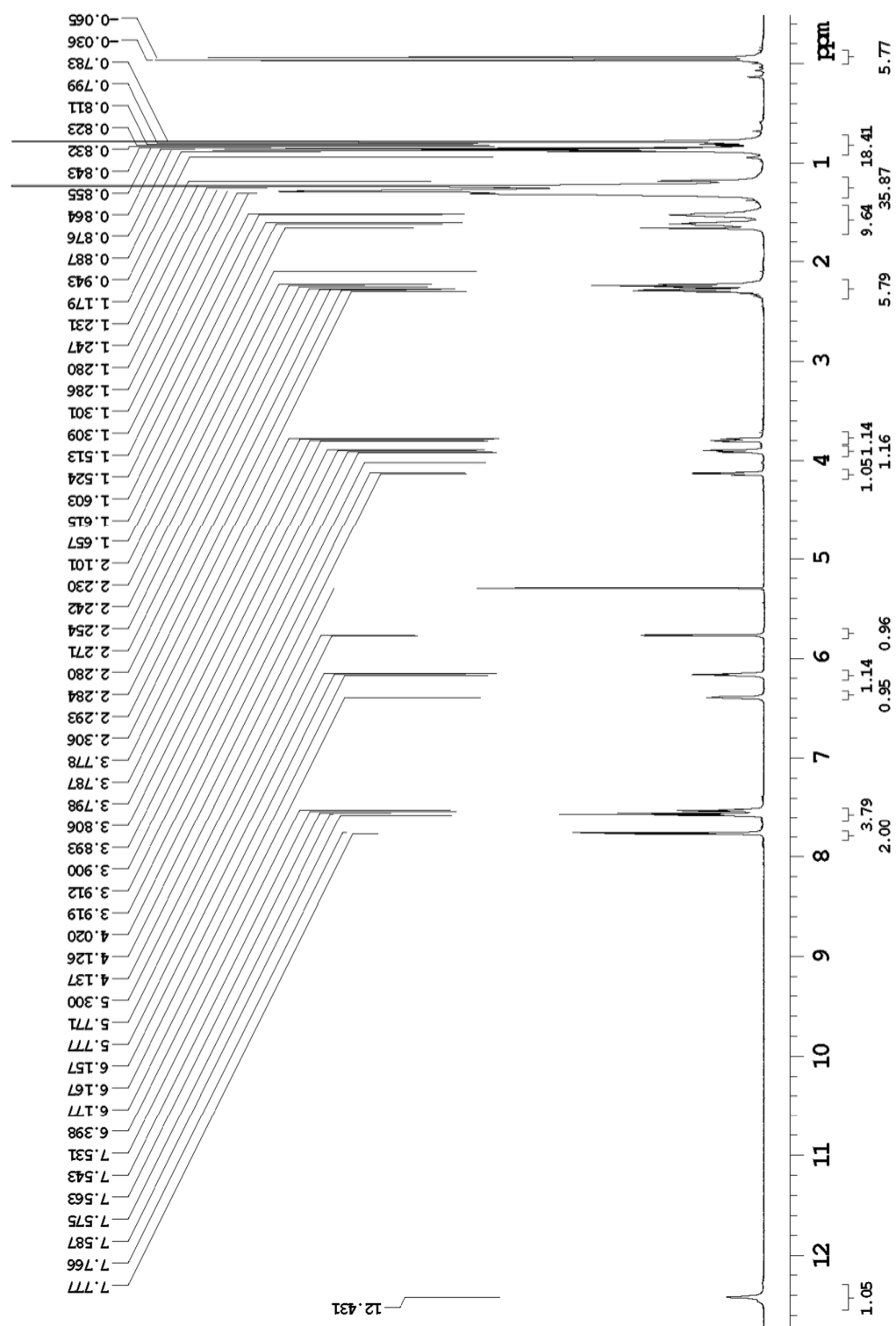
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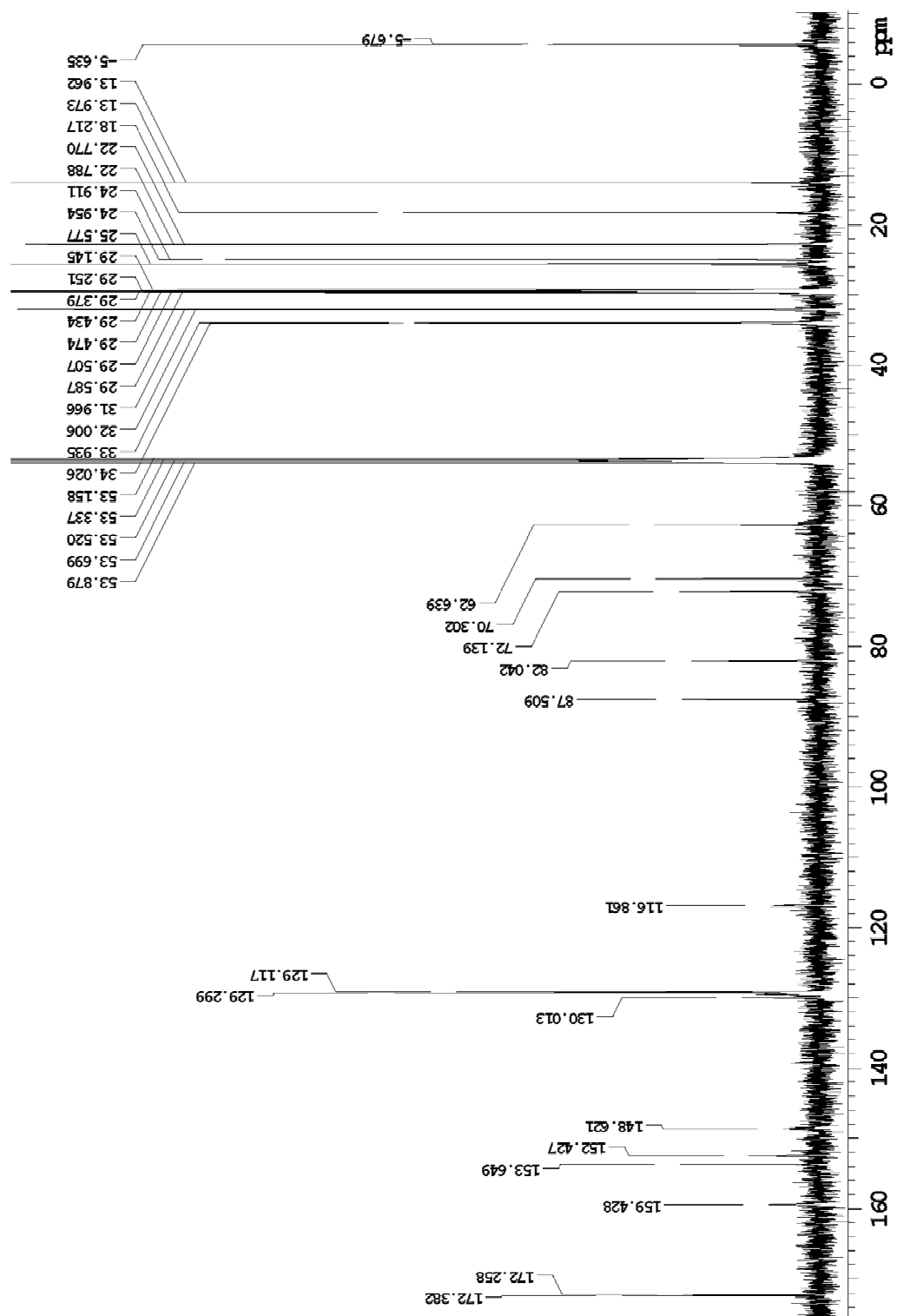
Total time 0 min 0 sec



gHMBC spectrum (dms0-d₆, 600 MHz) of **8Ph5OH**



¹H-NMR (CD₂Cl₂, 600 MHz) of **8Ph5Si**



$^{13}\text{C}\{^1\text{H}\}$ NMR (CD₂Cl₂, 600 MHz) of **8Ph5Si**

i600 std parameters

File:

Temp. 25.0 C / 298.1 K

Operator: sangiac

Relax. delay 1.000 sec

Mixing 0.080 sec

Acq. time 0.213 sec

Width 9611.9 Hz

2D Width 9611.9 Hz

2 repetitions

256 increments

CBSERVE H1, 599, 7352616 MHz

DATA PROCESSING

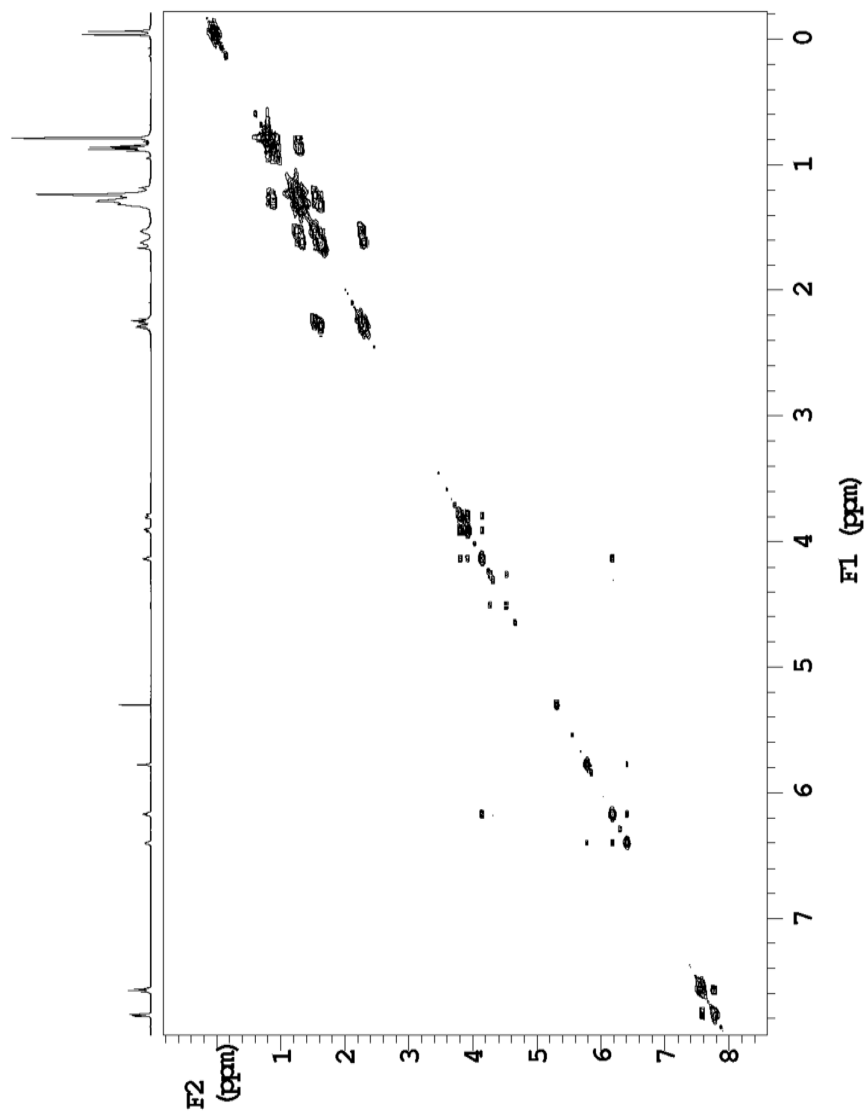
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F1 DATA PROCESSING

Sine ball 0.027 sec

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Total time 0 min 0 sec



gCOSY spectrum (CD_2Cl_2 , 600 MHz) of **8Ph5Si**

i600 std parameters

File:

Temp. 25.0 C / 298.1 K

Operator: sangiac

Relax. delay 1.000 sec

Acq. time 0.199 sec

Width 9611.9 Hz

2D Width 25632.8 Hz

4 repetitions

2 x 200 increments

OBSERVE H1, 599.7352613 MHz

DECOUPLE C13, 150.8148596 MHz

Power 46 dB

on during acquisition

off during delay

W40 Triple modulated

DATA PROCESSING

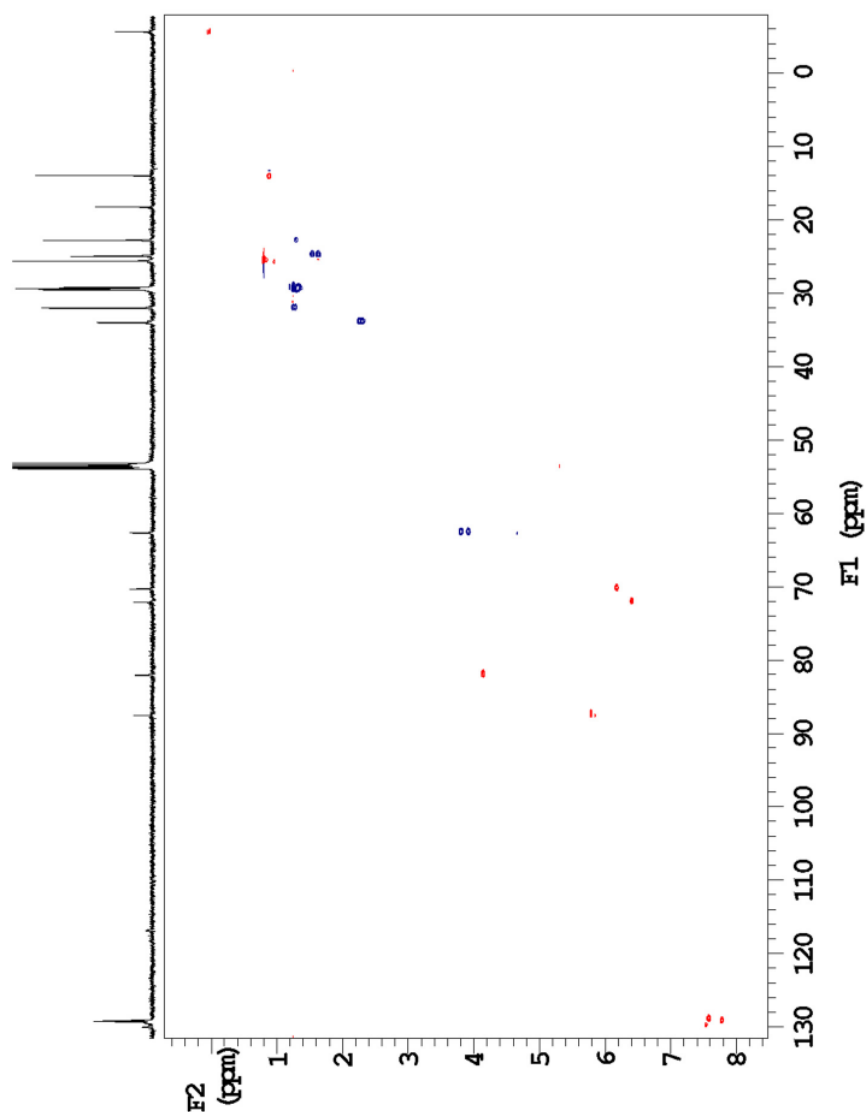
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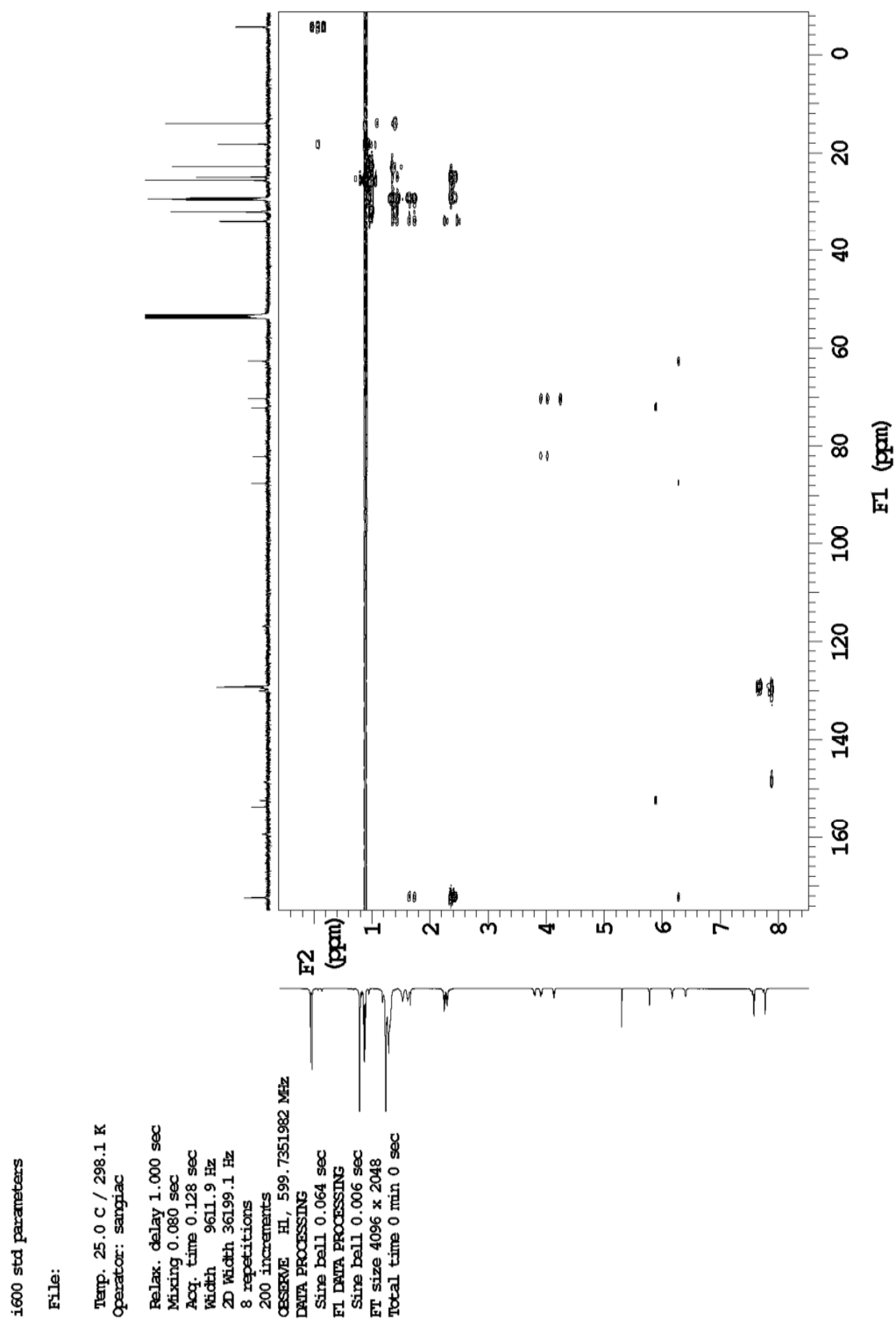
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Gauss apodization 0.007 sec

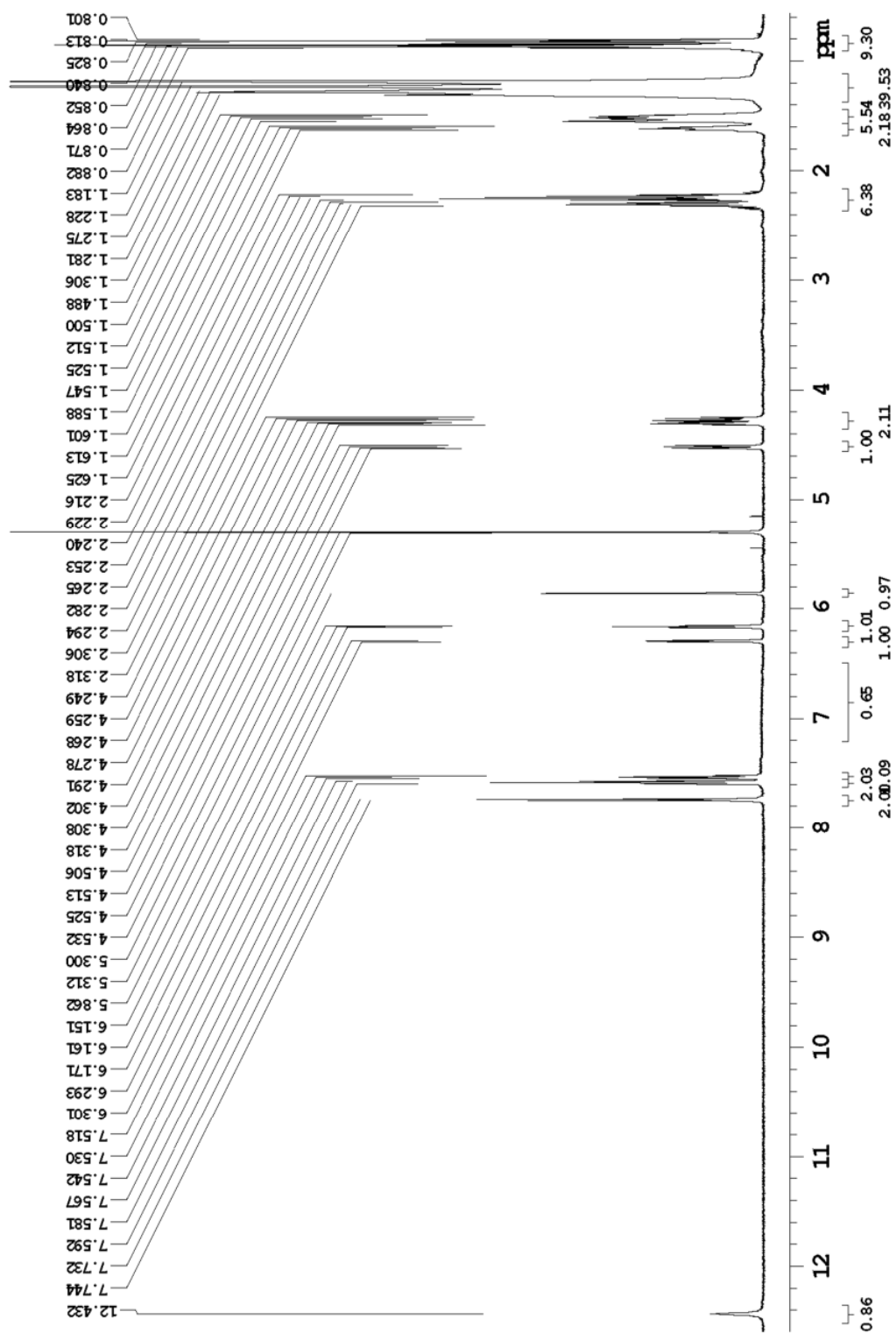
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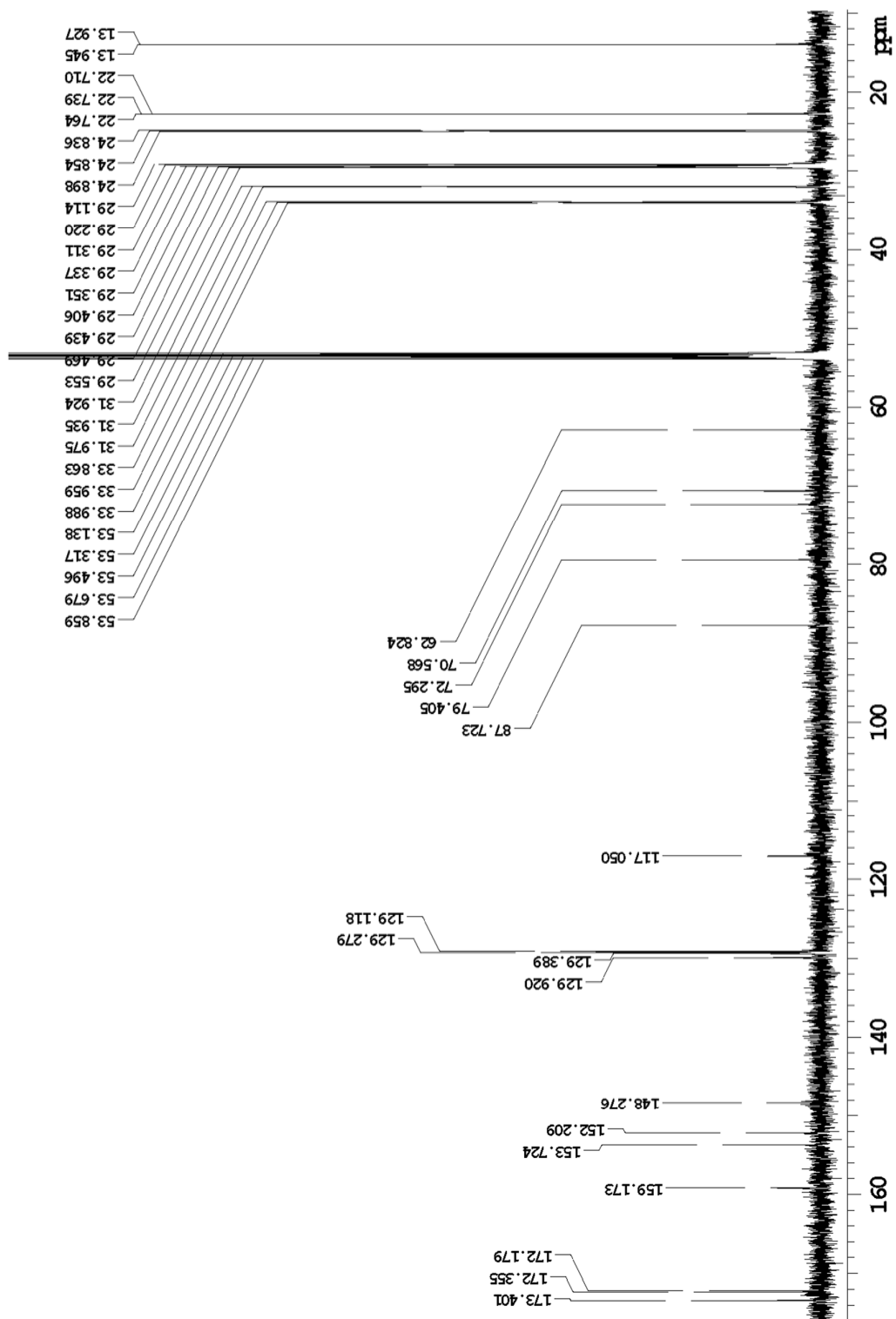




gHMBC spectrum (CD_2Cl_2 , 600 MHz) of **8Ph5Si**



¹H-NMR (CD₂Cl₂, 600 MHz) of **8Ph5C10**

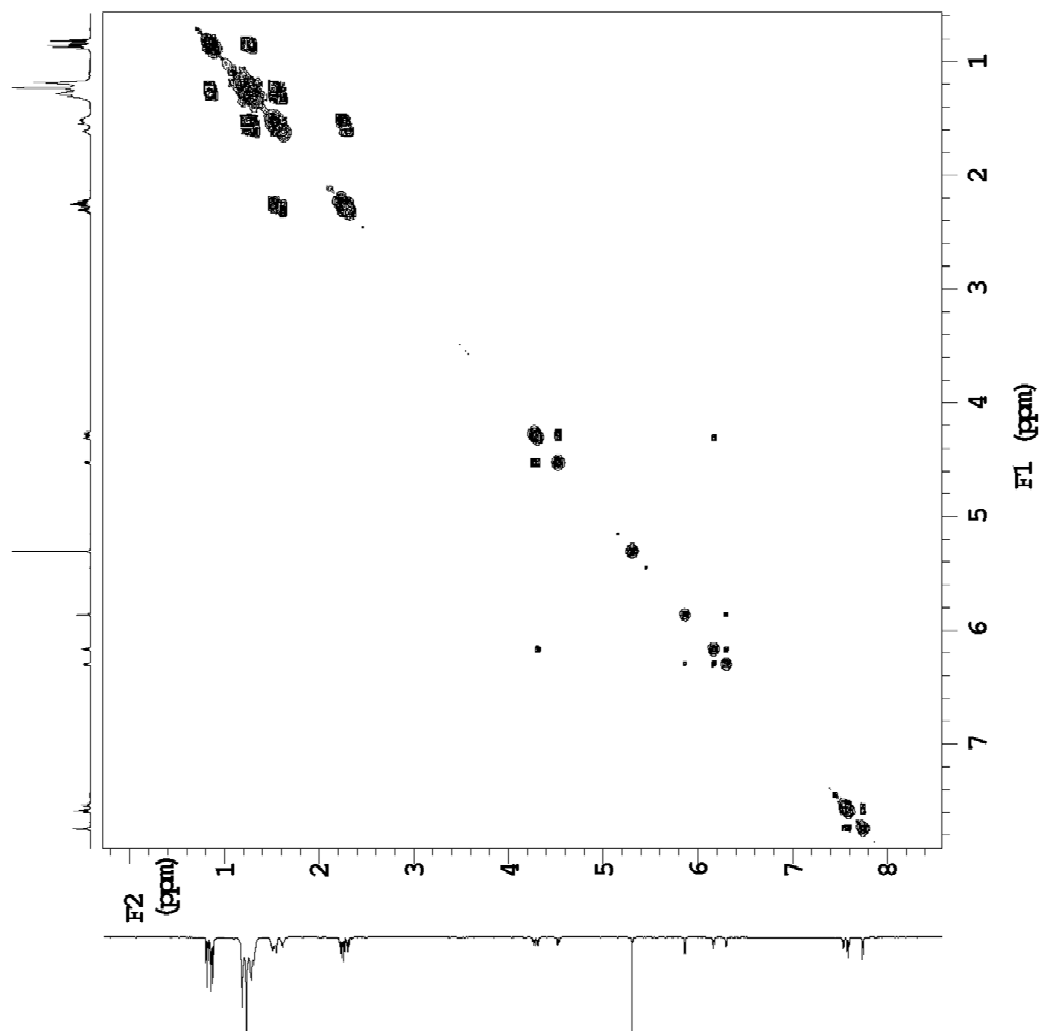


$^{13}\text{C}\{^1\text{H}\}$ NMR (CD_2Cl_2 , 600 MHz) of **8Ph5C10**

STANDARD PROTON PARAMETERS

File:

Temp. 25.0 C / 298.1 K
 Operator: samplac
 Relax. delay 1.000 sec
 Acq. time 0.213 sec
 Width 9611.9 Hz
 2D Width 9611.9 Hz
 2 repetitions
 200 increments
 OBSERVE HL 599.7352635 MHz
 DATA PROCESSING
 Sine bell 0.107 sec
 F1 DATA PROCESSING
 Sine bell 0.021 sec
 F1 size 4096 x 4096
 Total time 0 min 0 sec



gCOSY spectrum (CD₂Cl₂, 600 MHz) of **8Ph5C10**

STANDARD PROTON PARAMETERS

File:

Temp. 25.0 C / 298.1 K

Operator: sangiac

Relax. delay 1.000 sec

Acq. time 0.199 sec

Width 9611.9 Hz

2D Width 25632.8 Hz

4 repetitions

2 x 200 increments

OBSERVE HL 599.7352625 MHz

DECOUPLE CL3, 150.8148596 MHz

Power: 45 dB

on during acquisition

off during delay

W40 Triple modulated

DATA PROCESSING

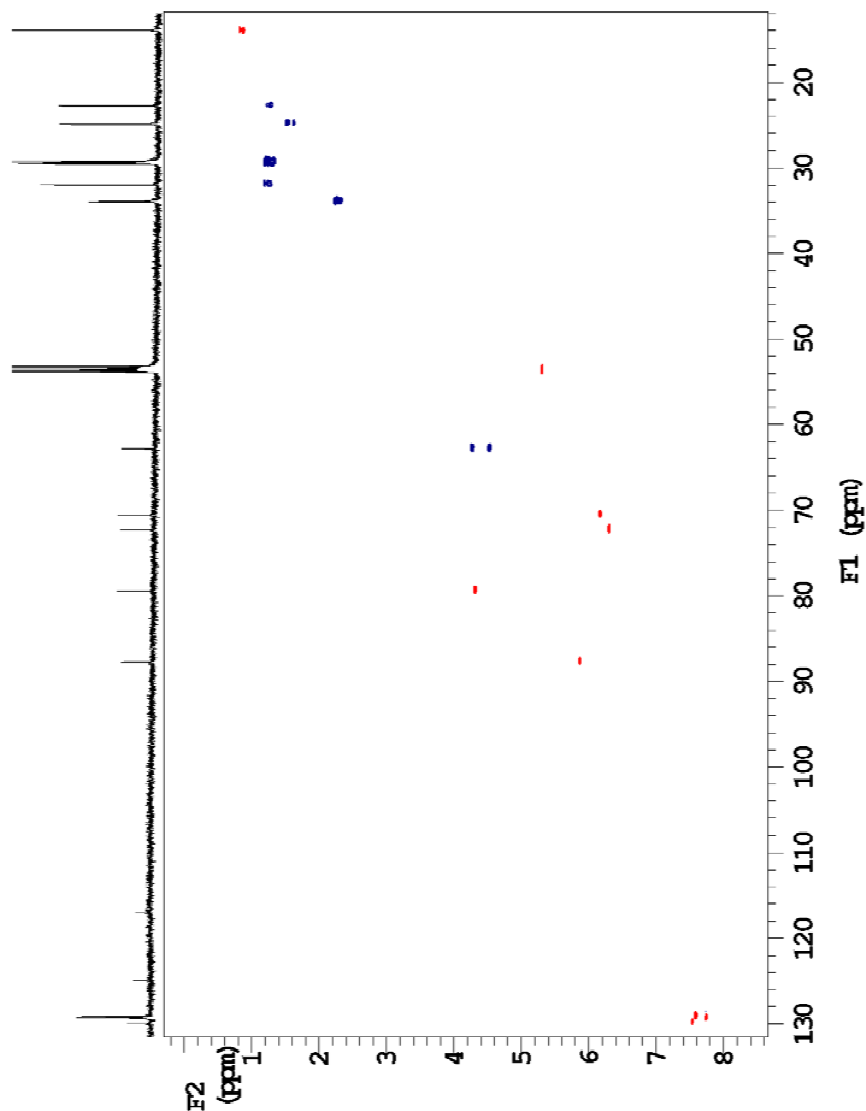
Gauss apodization 0.092 sec

F1 DATA PROCESSING

Gauss apodization 0.007 sec

FT size 8192 x 2048

Total time 0 min 0 sec



gHSQC spectrum (CD₂Cl₂, 600 MHz) of **8Ph5C10**

STANDARD PROTON PARAMETERS

File:

Temp. 25.0 C / 298.1 K
Operator: sangiac

Relax. delay 1.000 sec
Mixing 0.080 sec
Acq. time 0.128 sec
Width 9611.9 Hz
2D Width 36199.1 Hz
16 repetitions

256 increments
OBSERVE HL, 599.7352679 MHz

DATA PROCESSING

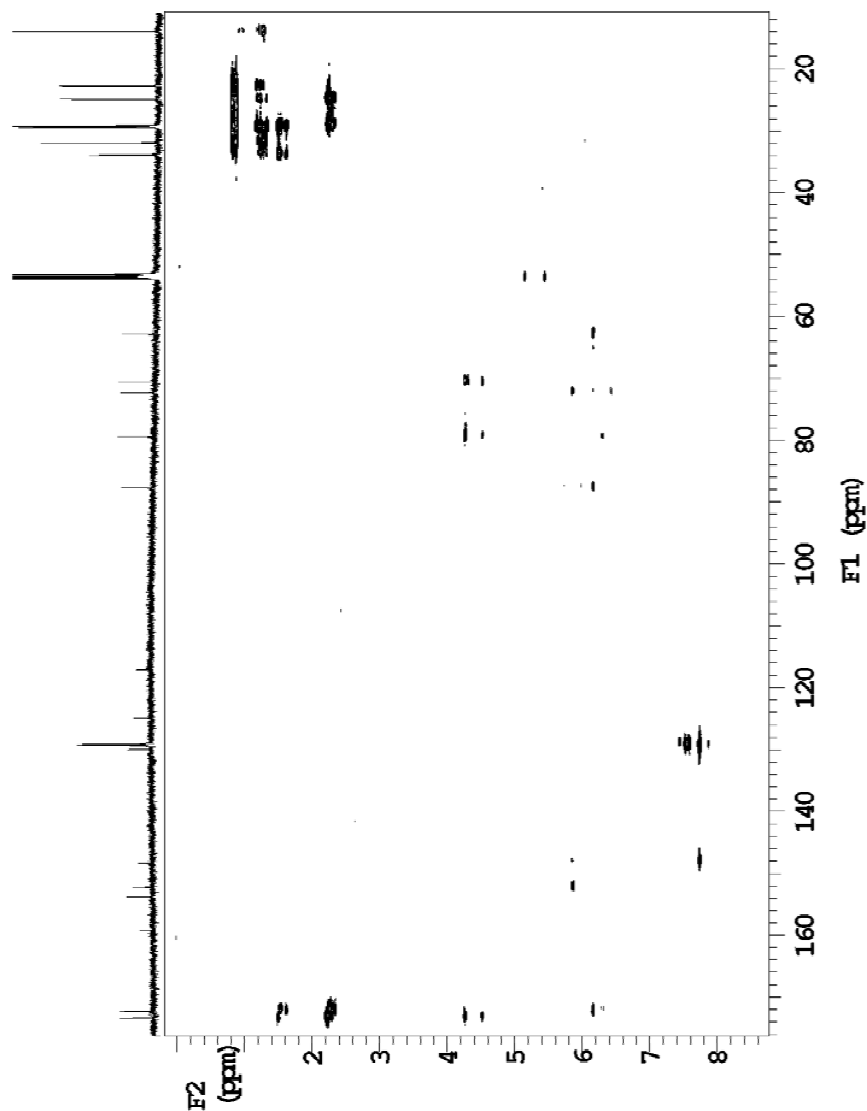
Sine ball 0.064 sec

F1 DATA PROCESSING

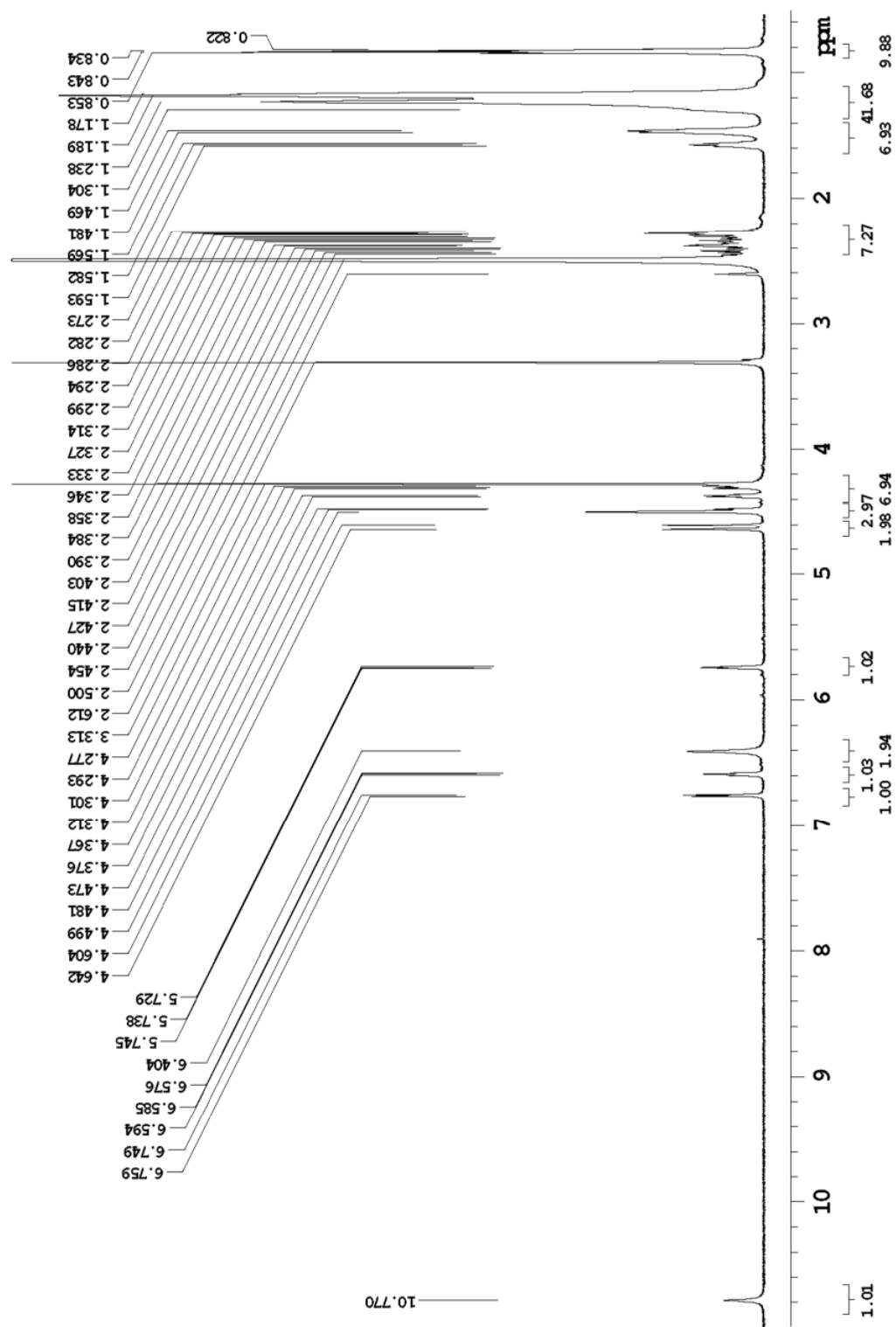
Sine ball 0.007 sec

FT size 4096 x 2048

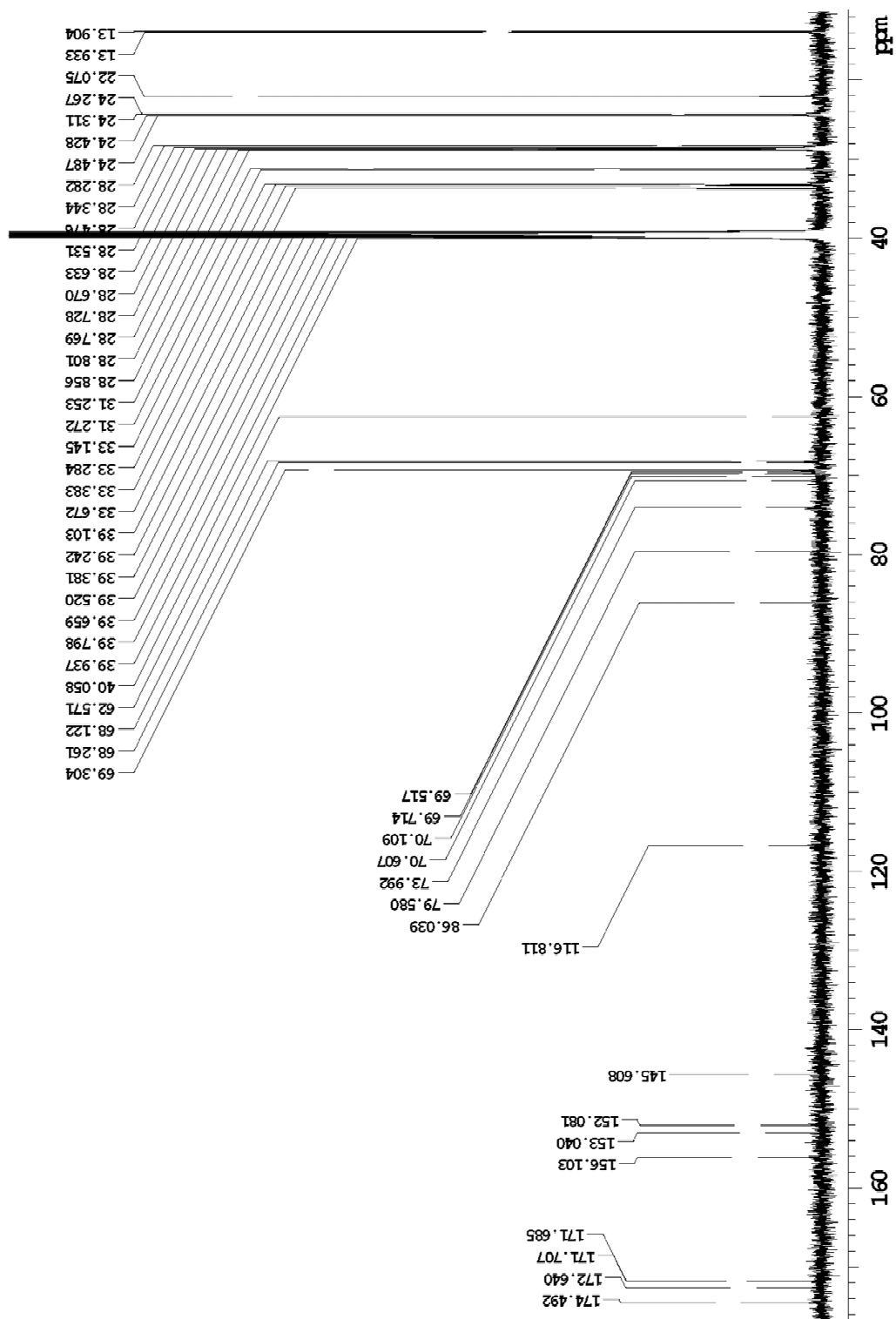
Total time 0 min 0 sec



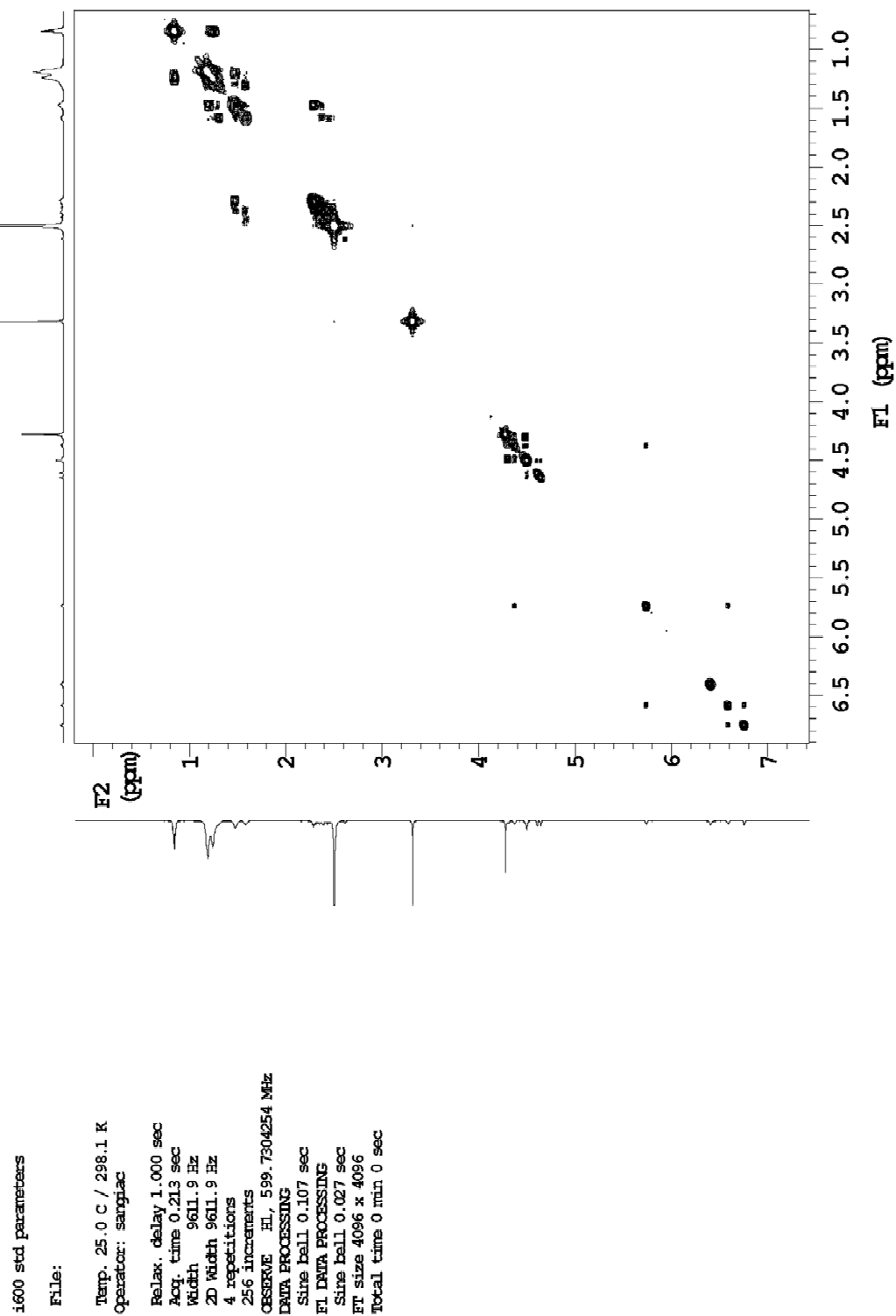
gHMBC spectrum (CD₂Cl₂, 600 MHz) of **8Ph5C10**



¹H-NMR (dms0-d₆, 600 MHz) of **8Fc5C10**



¹³C{¹H} NMR (dms0-d₆, 600 MHz) of **8Fc5C10**



gCOSY spectrum (dms0-d₆, 600 MHz) of **8Fc5C10**

i600 std parameters

File:

Temp. 25.0 C / 298.1 K
Operator: sangiac

Relax. delay 1.000 sec
Acq. time 0.199 sec
Width 9611.9 Hz
2D Width 25632.8 Hz
8 repetitions
2 x 256 increments

OBSERVE H1, 599.7304200 MHz
DECODE C13, 150.813683 MHz
Power 43 dB

on during acquisition
off during delay
W40 Triple modulated

DATA PROCESSING

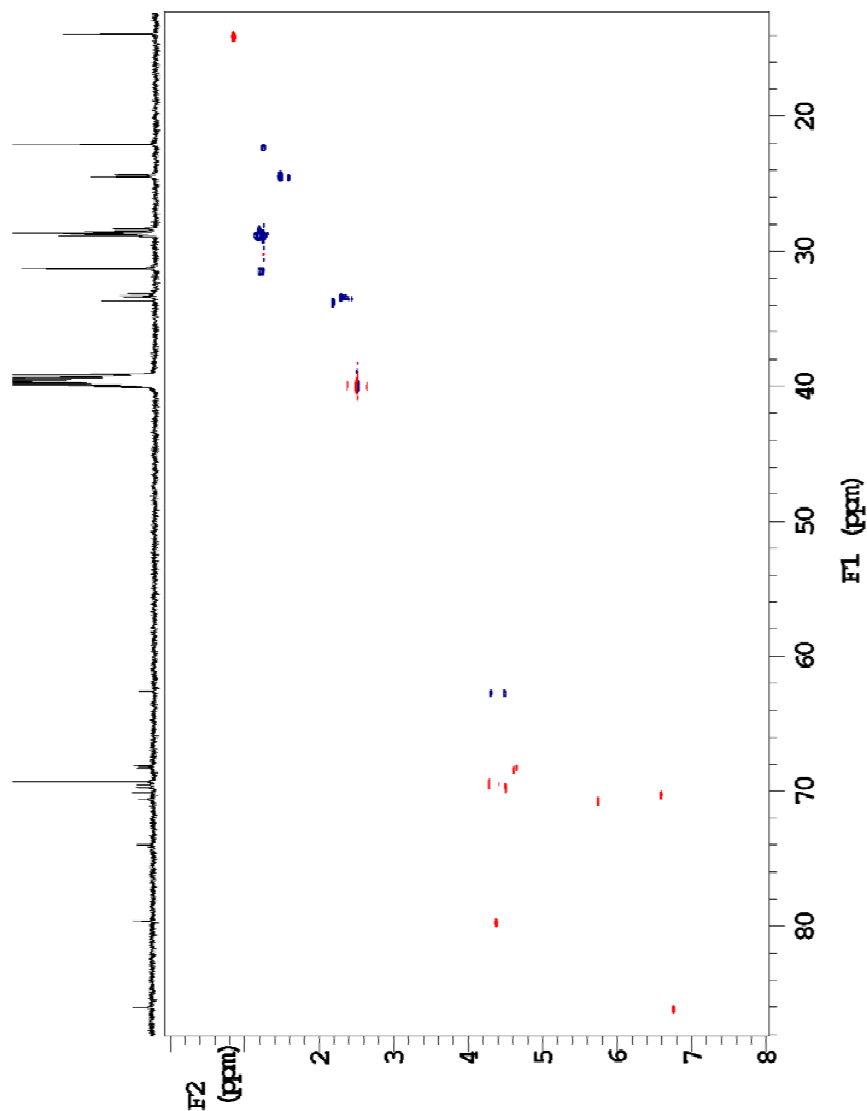
Gauss apodization 0.092 sec

F1 DATA PROCESSING

Gauss apodization 0.009 sec

FT size 8192 x 2048

Total time 0 min 0 sec



gHSQC spectrum (dms0-d₆, 600 MHz) of **8Fc5C10**

i600 std parameters

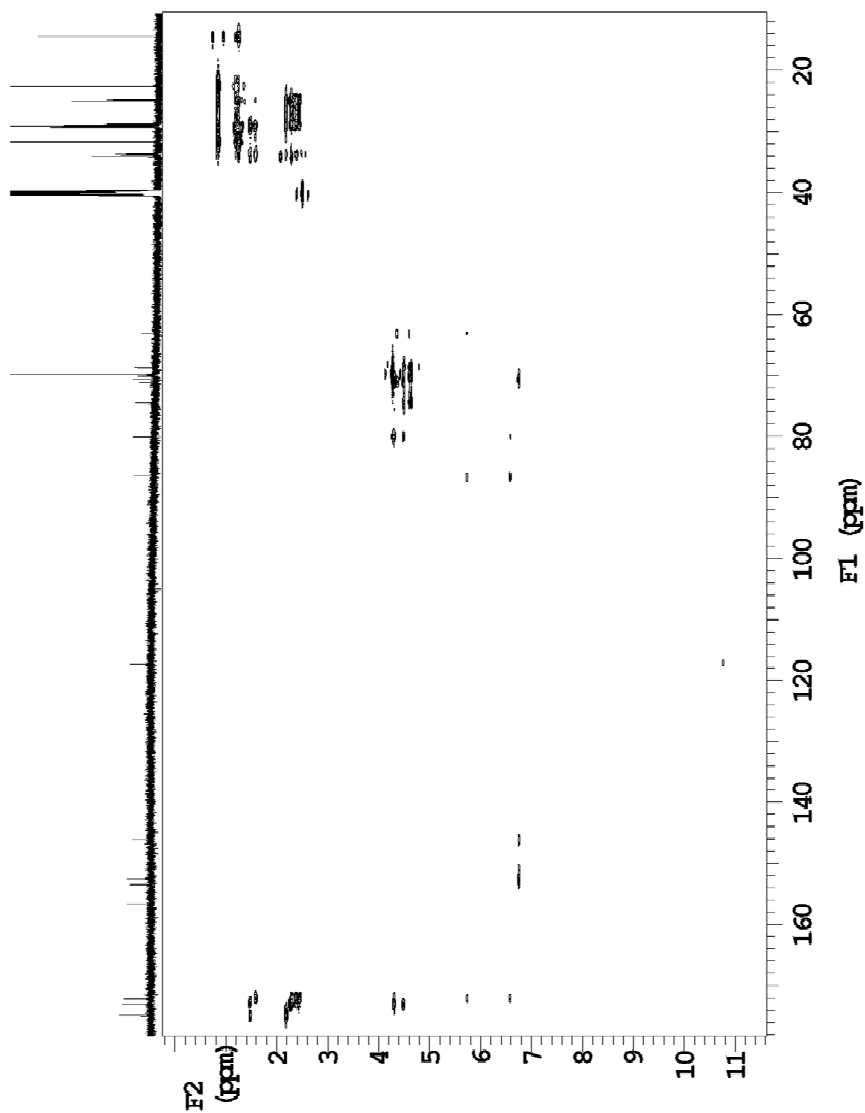
File:

Temp. 25.0 C / 298.1 K
Operator: samplac

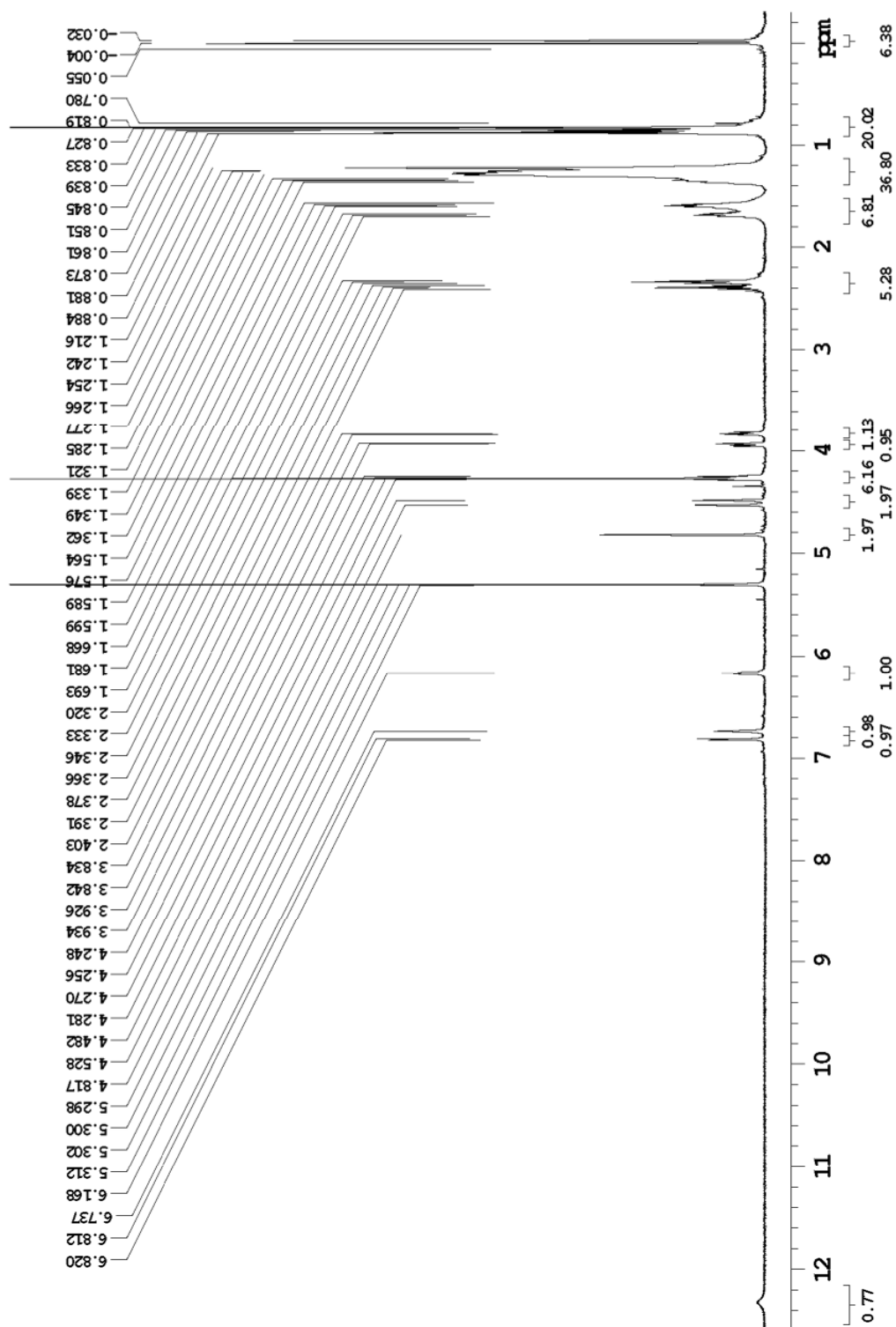
Relax. delay 1.000 sec
Mixing 0.080 sec
Acq. time 0.128 sec
Width 9611.9 Hz
2D Width 36199.1 Hz
32 repetitions

256 increments
OBSERVE HL, 599.7304284 MHz

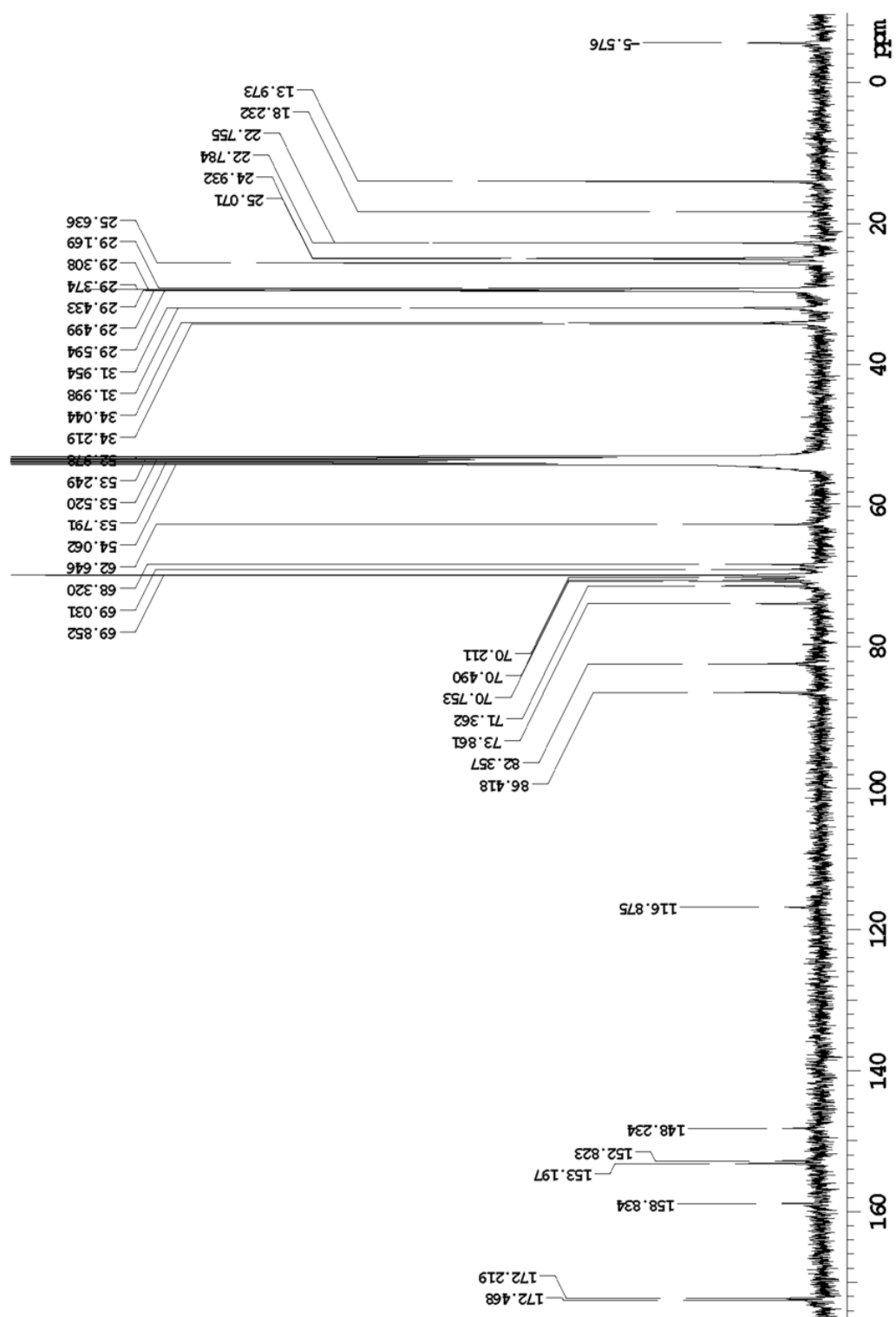
DATA PROCESSING
Sine bell 0.064 sec
F1 DATA PROCESSING
Sine bell 0.007 sec
F1 size 4096 x 2048
Total time 0 min 0 sec



gHMBC spectrum (dms0-d₆, 600 MHz) of **8Fc5C10**



¹H-NMR (CD₂Cl₂, 600 MHz) of **8Fc5Si**



$^{13}\text{C}\{^1\text{H}\}$ NMR (CD_2Cl_2 , 600 MHz) of **8Fc5Si**

Std proton

File:

Temp. 25.0 C / 298.1 K
Operator: sargiac

Relax. delay 1.000 sec
Acq. time 0.213 sec
Width 9611.9 Hz
2D Width 9611.9 Hz
2 repetitions
200 increments

OBSERVE HL, 599.7352614 MHz

DATA PROCESSING

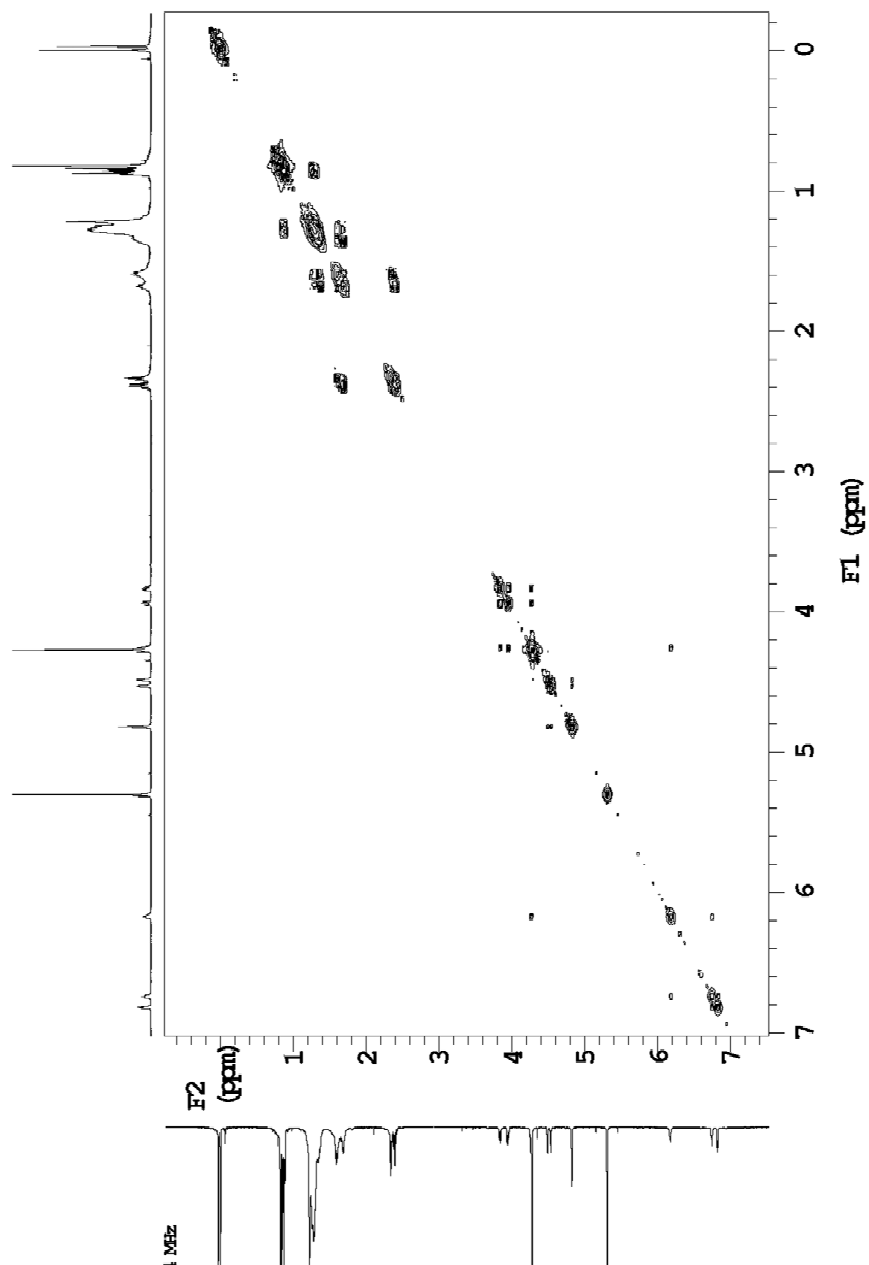
Sine bell 0.107 sec

F1 DATA PROCESSING

Sine bell 0.021 sec

F1 size 4096 x 4096

Total time 0 min 0 sec



gCOSY spectrum (CD_2Cl_2 , 600 MHz) of **8Fc5Si**

Std Proton parameters

File:

Temp. 25.0 C / 298.1 K
Operator: sandracat
INVA-600 "FRET"

Relax. delay 1.301 sec
Acq. time 0.199 sec
Width 6398.0 Hz
2D Width 17094.0 Hz
8 repetitions
2 x 200 increments

OBSERVE H1, 399.9253434 MHz
DECOUPLE CL3, 100.5688497 MHz

Power 46 dB
on during acquisition
off during delay
GARE-1 modulated

DATA PROCESSING

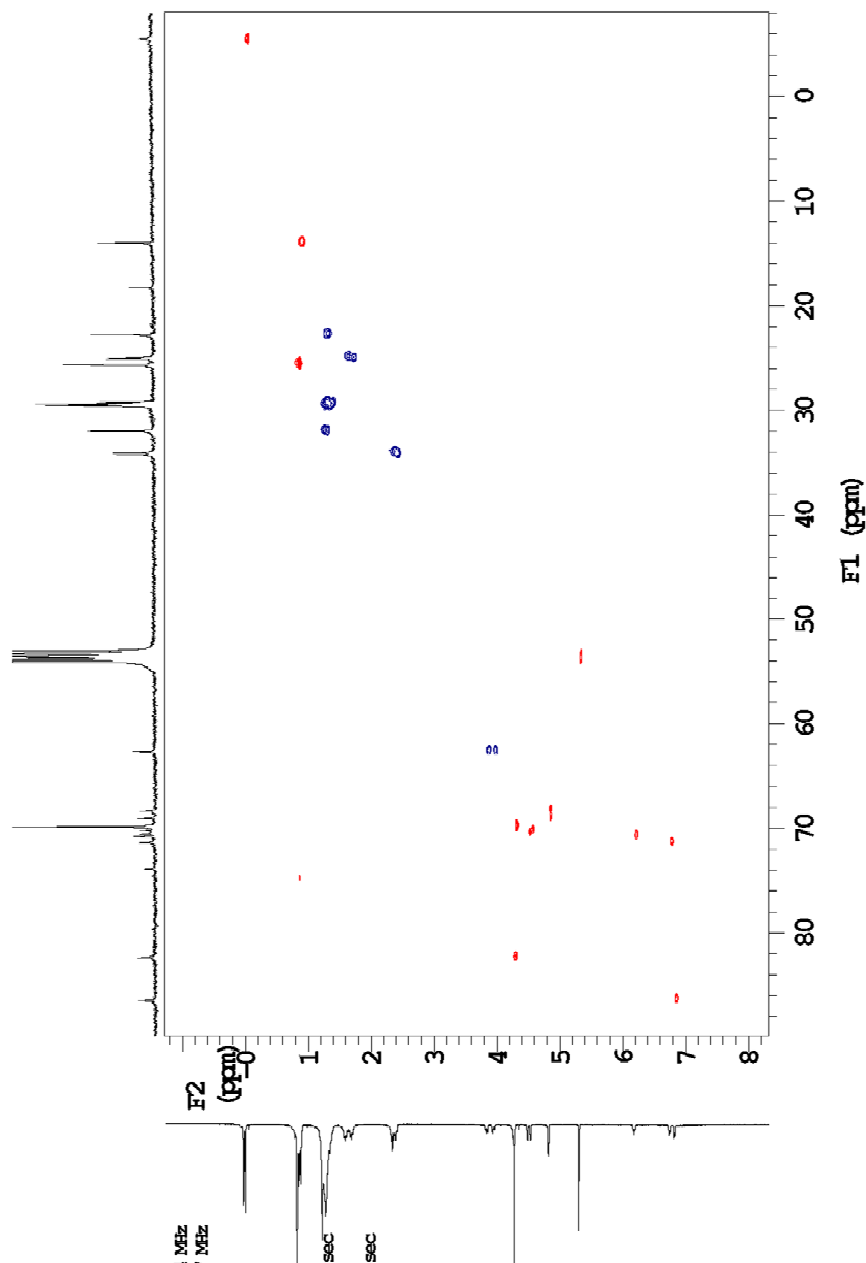
Gauss apodization 0.092 sec

F1 DATA PROCESSING

Gauss apodization 0.011 sec

FT size 4096 x 2048

Total time 0 min 0 sec



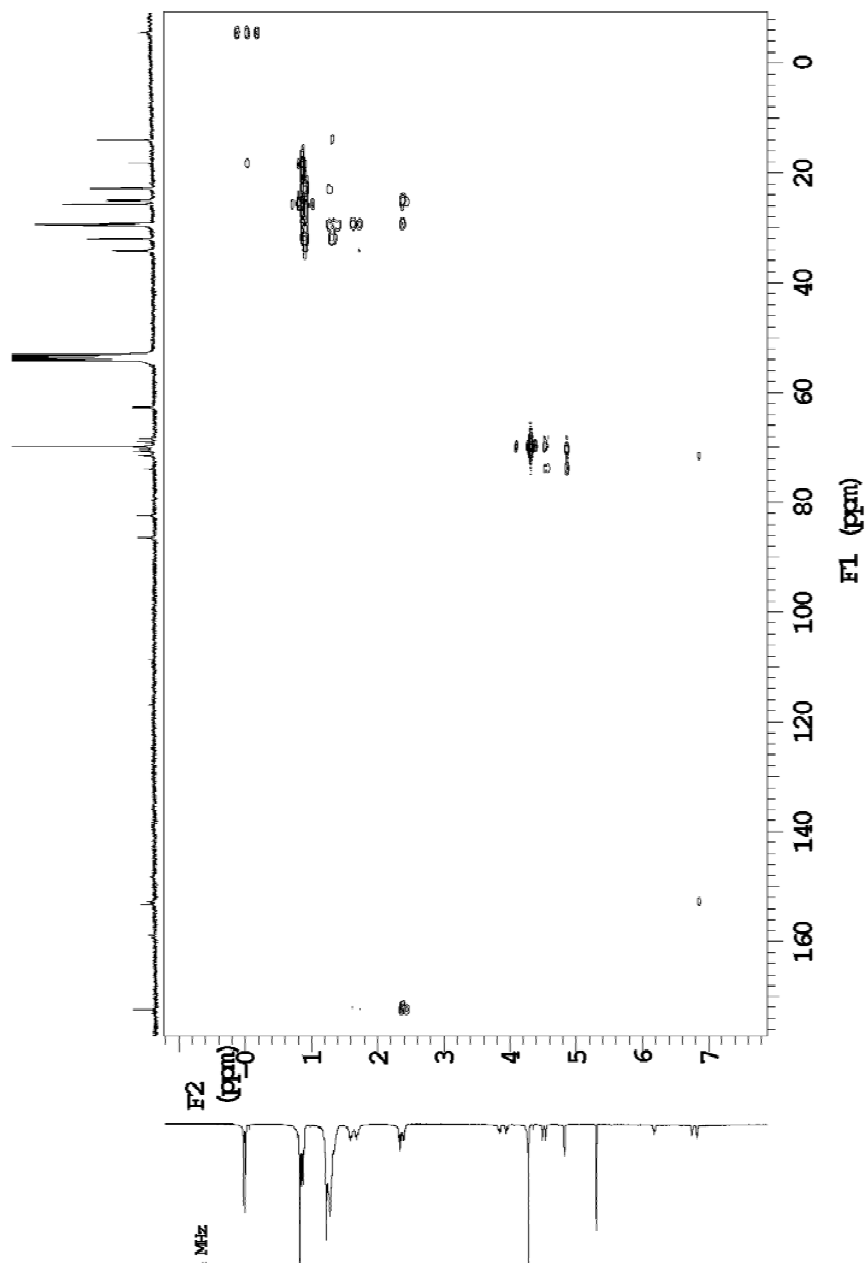
Std Proton parameters

File:

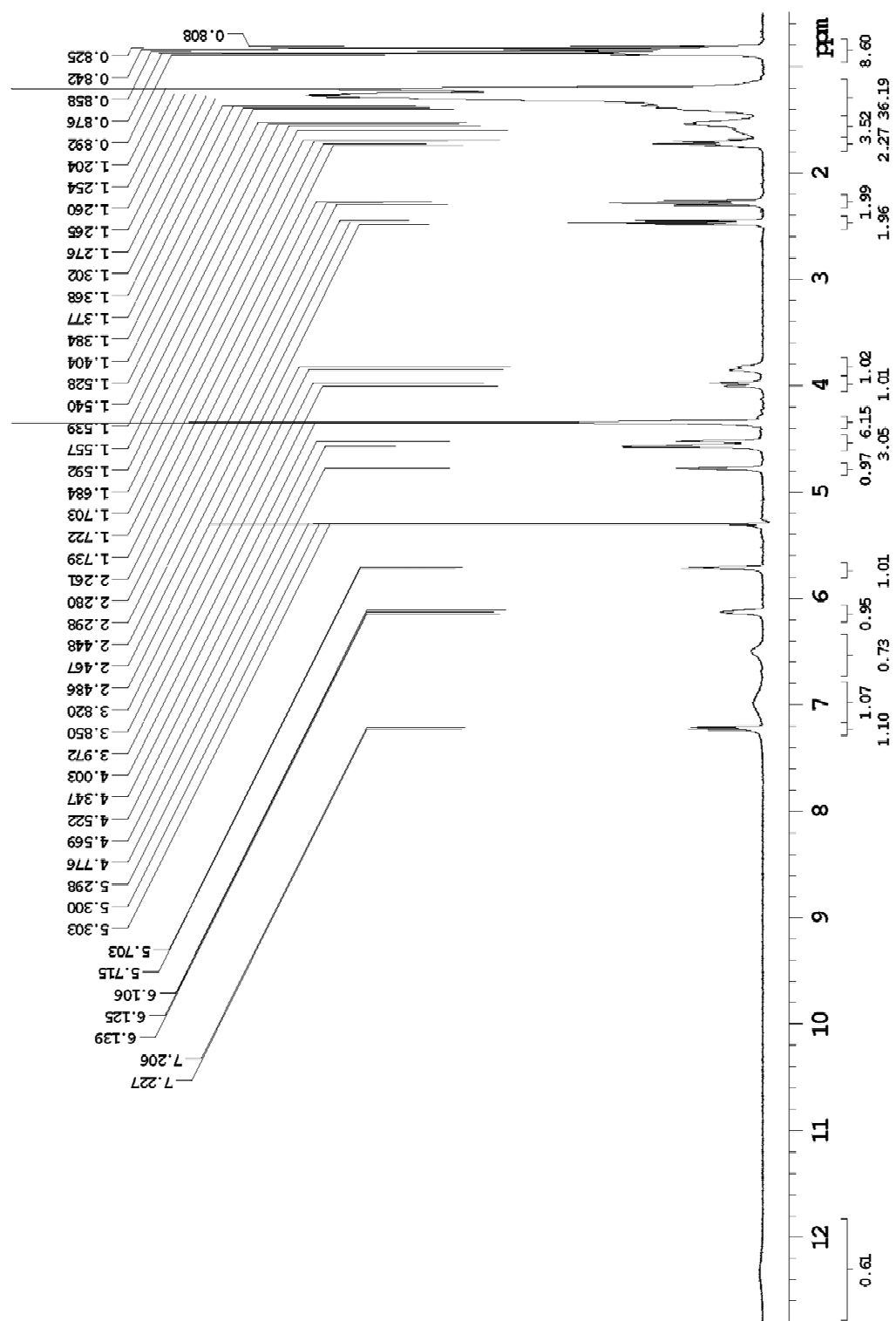
Temp. 25.0 C / 298.1 K
Operator: sandorat
INVA-600 "FHEL"

Relax. delay 1.500 sec
Mixing 0.080 sec
Acq. time 0.128 sec
Width 6398.0 Hz
ZD Width 24132.7 Hz
16 repetitions
200 increments

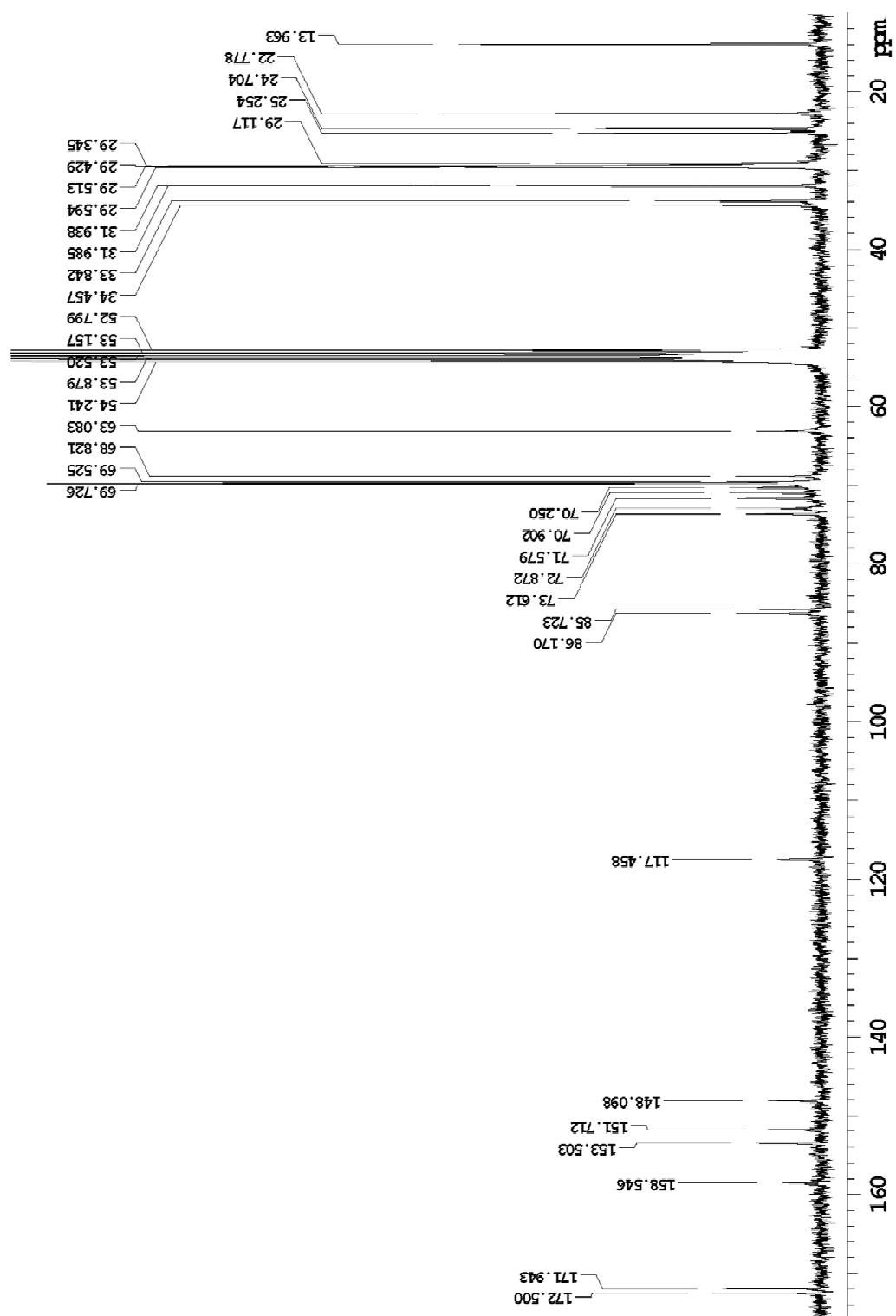
OBSERVE HL, 399.9253434 MHz
DATA PROCESSING
Sine bell 0.064 sec
F1 DATA PROCESSING
Sine bell 0.008 sec
F1 size 4096 x 2048
Total time 0 min 0 sec



gHMBC spectrum (CD₂Cl₂, 600 MHz) of **8Fc5Si**



¹H-NMR (CD₂Cl₂, 600 MHz) of **8Fc5OH**



$^{13}\text{C}\{^1\text{H}\}$ NMR (CD₂Cl₂, 600 MHz) of **8Fc5OH**.

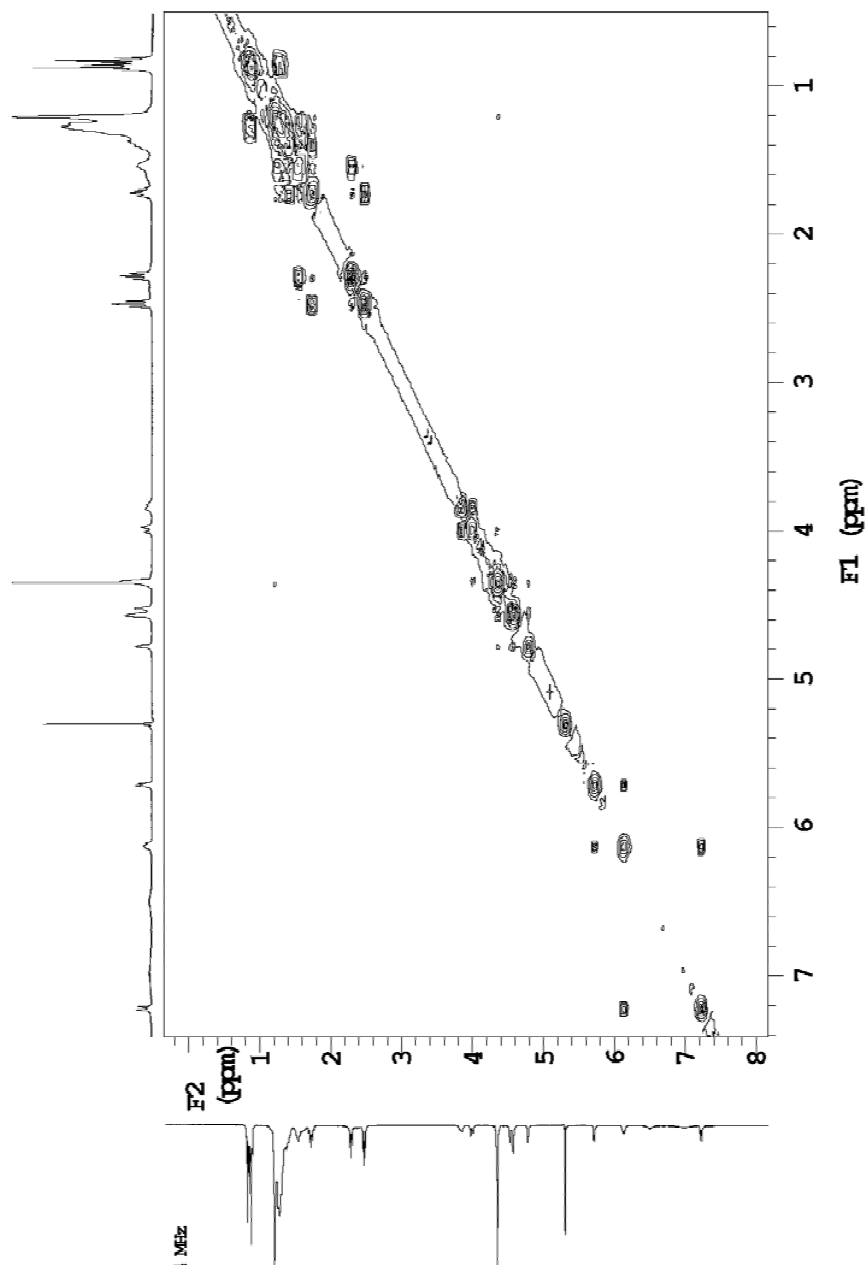
Std Proton parameters

File:

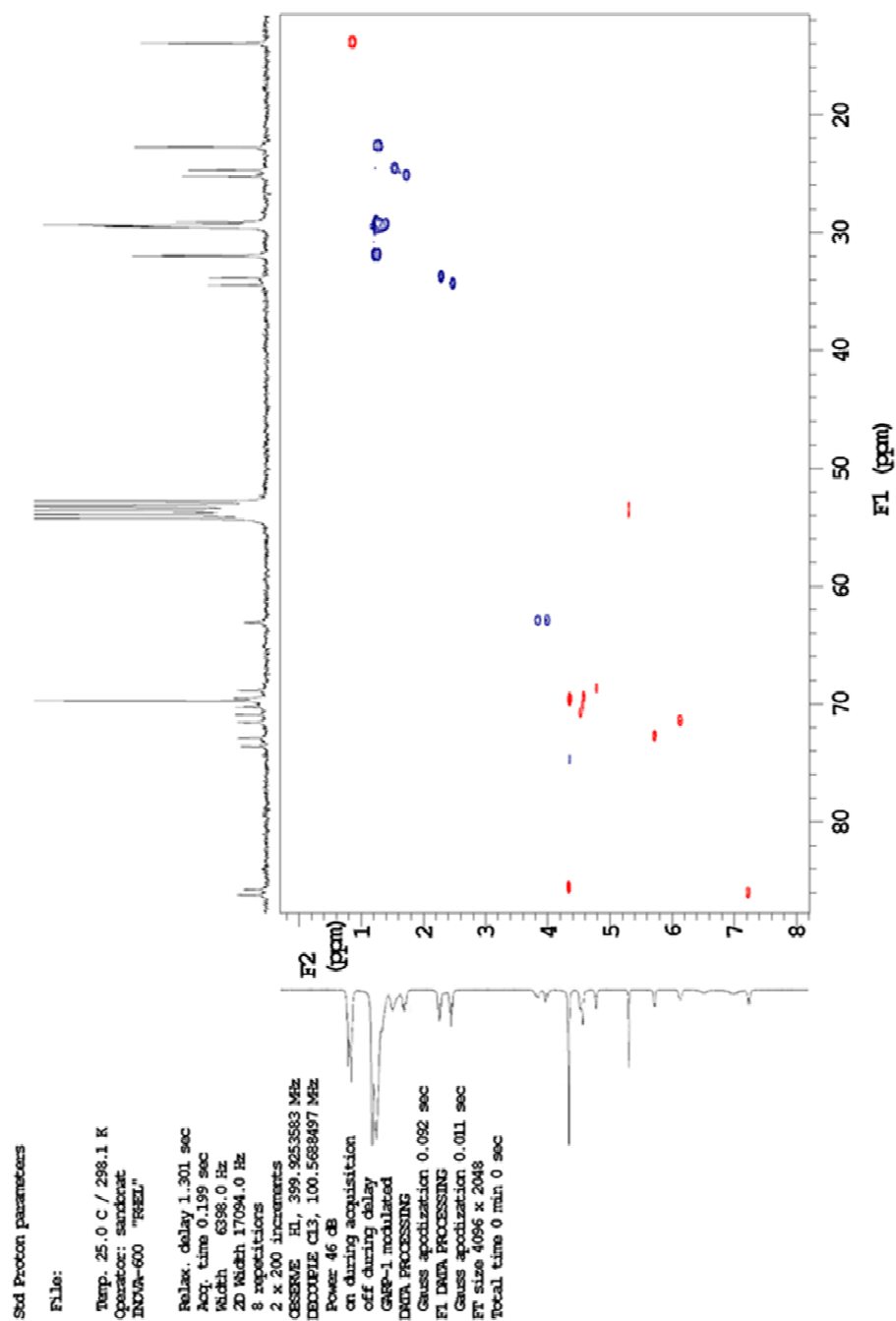
Temp. 25.0 C / 298.1 K
Operator: sardnat
INOVA-600 "RHEL"

Relax. delay 1.301 sec
Acq. time 0.160 sec
Width 6398.0 Hz
2D Width 6398.0 Hz
4 repetitions
128 increments

OBSERVE HL, 399.9253544 MHz
DATA PROCESSING
Sine bell 0.080 sec
F1 DATA PROCESSING
Sine bell 0.020 sec
F1 size 2048 x 2048
Total time 0 min 0 sec



gCOSY spectrum (CD₂Cl₂, 600 MHz) of **8Fc5OH**



gHSQC spectrum (CD_2Cl_2 , 600 MHz) of **8Fc5OH**

Standard Proton Parameters - i300@fci.unibo.it

File:

Temp. 25.0 C / 298.1 K
Operator: sargiac
INOVA-600 "REL"

Relax. delay 2.000 sec
Mixing 0.080 sec
Acq. time 0.200 sec
Width 4800.5 Hz
2D Width 18107.7 Hz

32 repetitions

256 increments

CESRHS HL 300.0321273 MHz

DATA PROCESSING

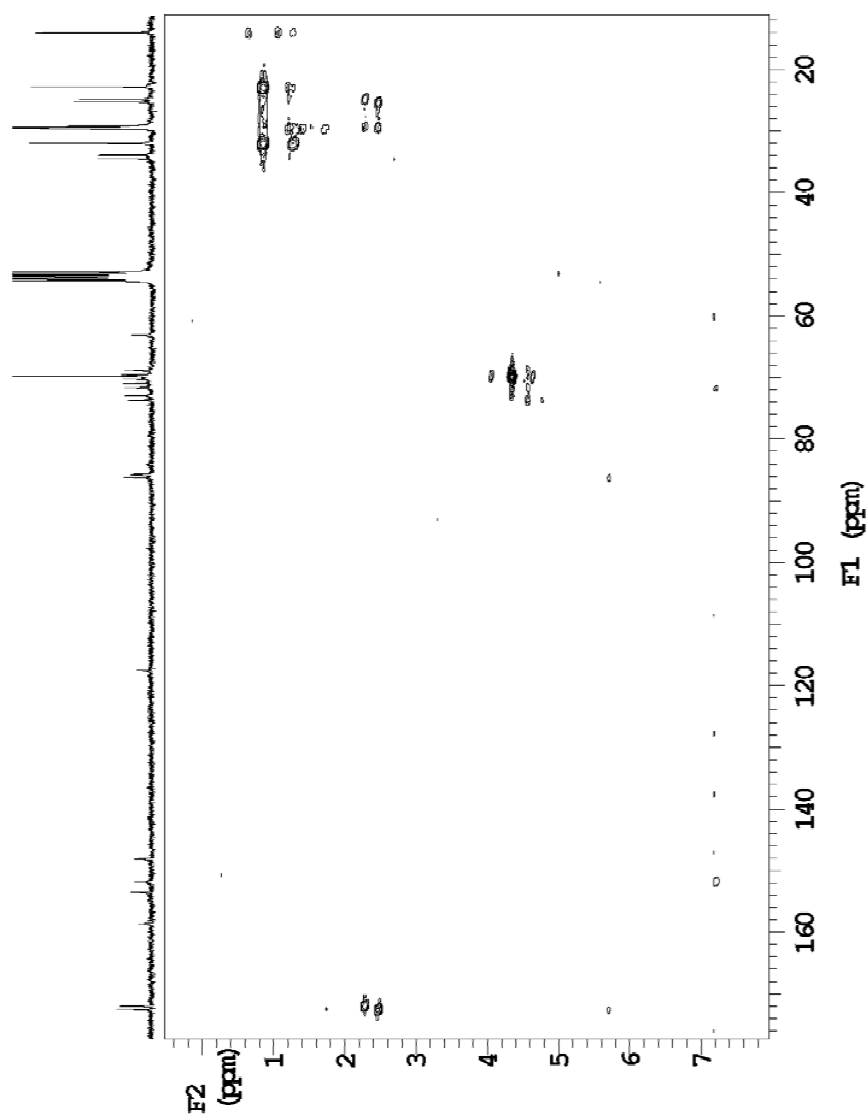
Sine ball 0.100 sec

F1 DATA PROCESSING

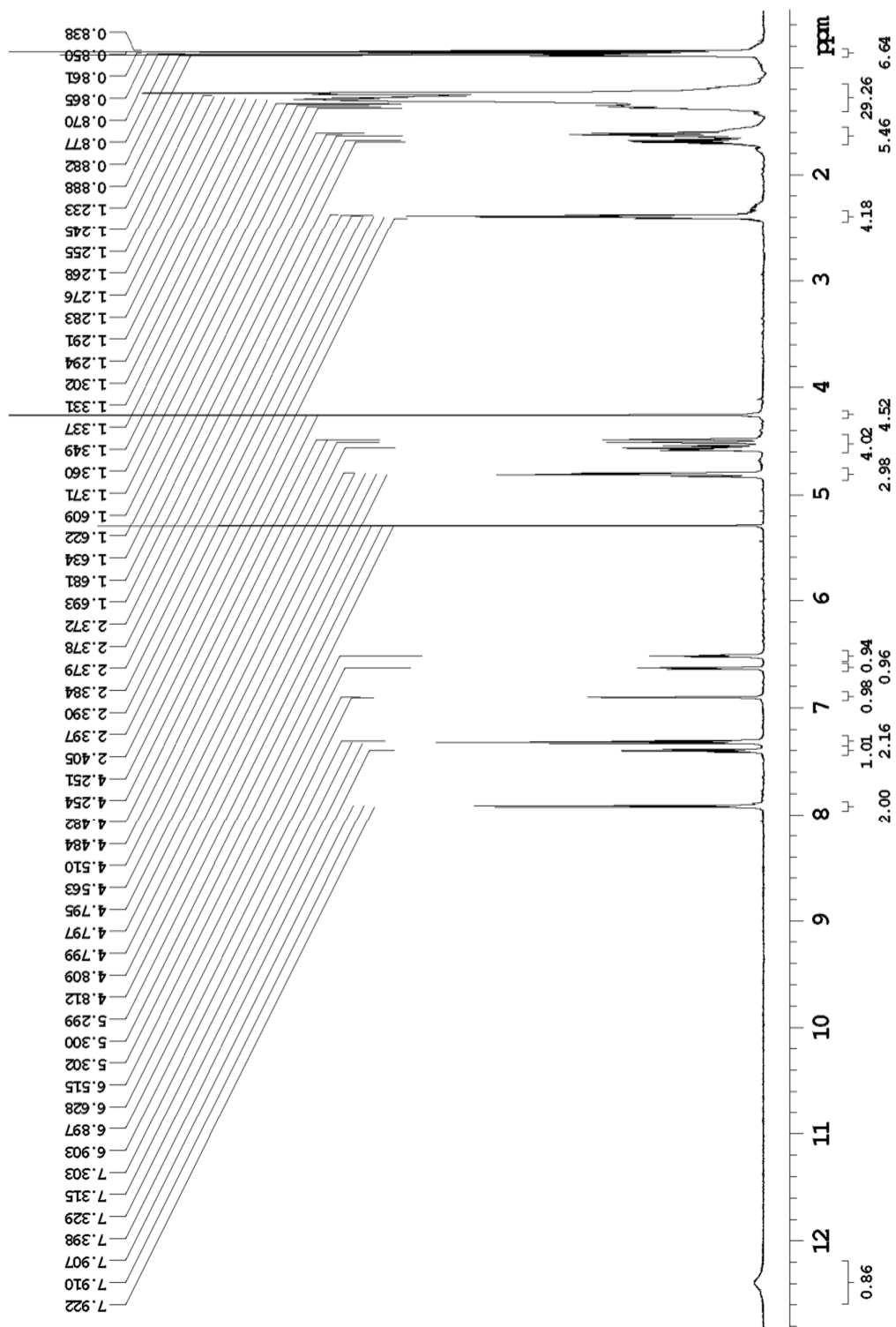
Sine ball 0.014 sec

FT size 4096 x 2048

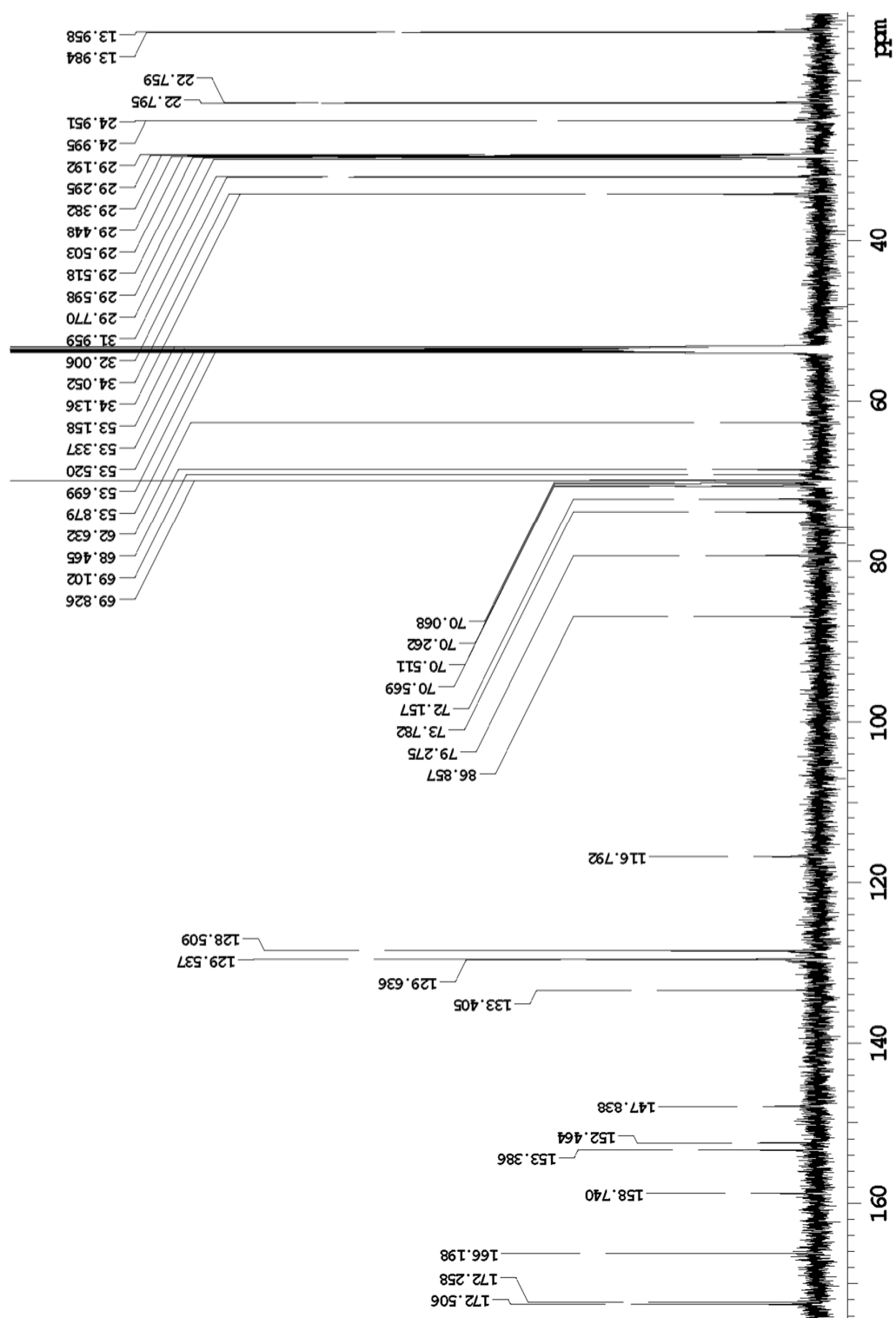
Total time 0 min 0 sec



gHMBC spectrum (CD_2Cl_2 , 600 MHz) of **8Fc5OH**



¹H-NMR (CD₂Cl₂, 600 MHz) of **8Fc5Ph**



$^{13}\text{C}\{^1\text{H}\}$ NMR (CD₂Cl₂, 600 MHz) of **8Fc5Ph**.

1600 std parameters

File:

Temp. 25.0 C / 298.1 K

Operator: sangiac

Relax. delay 1.000 sec

Acq. time 0.213 sec

Width 9611.9 Hz

2D Width 9611.9 Hz

8 repetitions

200 increments

OBSERVE HL, 599.7352630 MHz

DATA PROCESSING

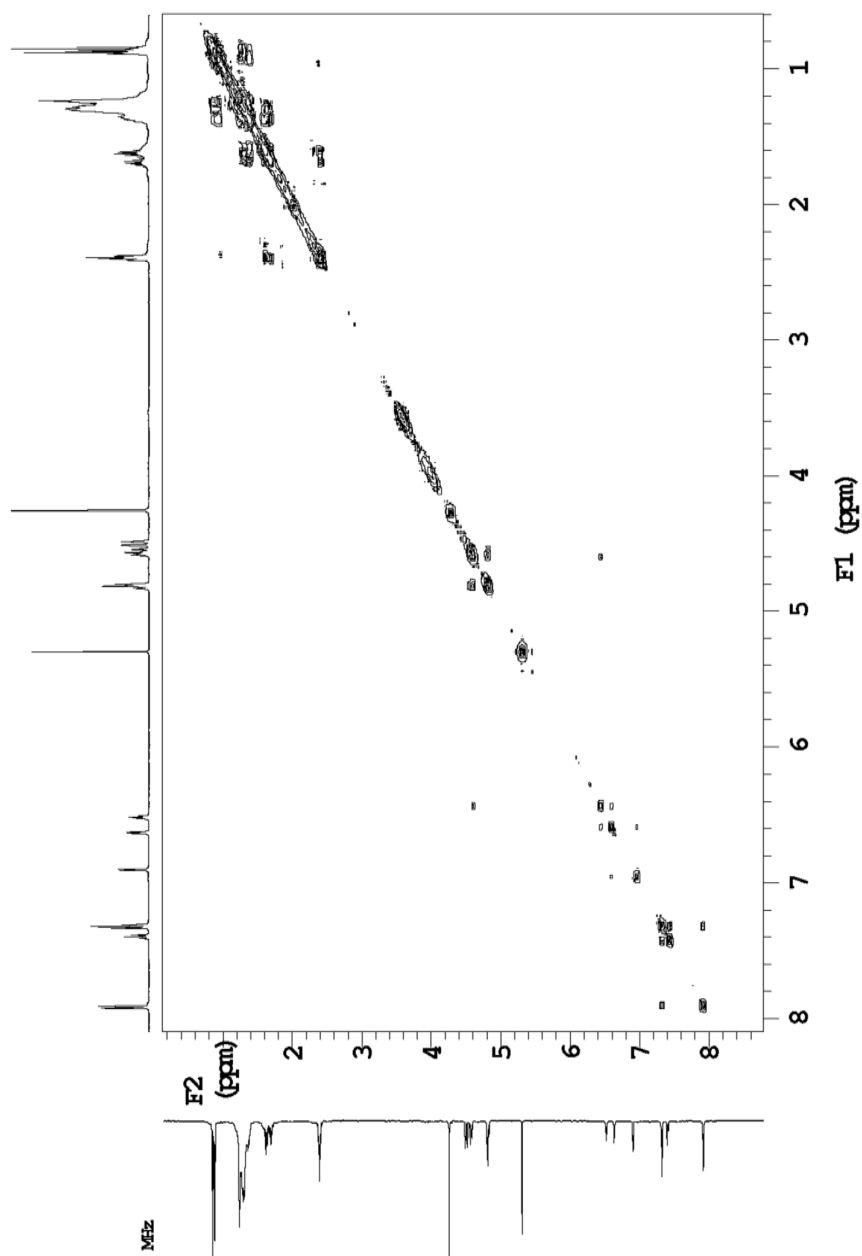
Sine ball 0.107 sec

F1 DATA PROCESSING

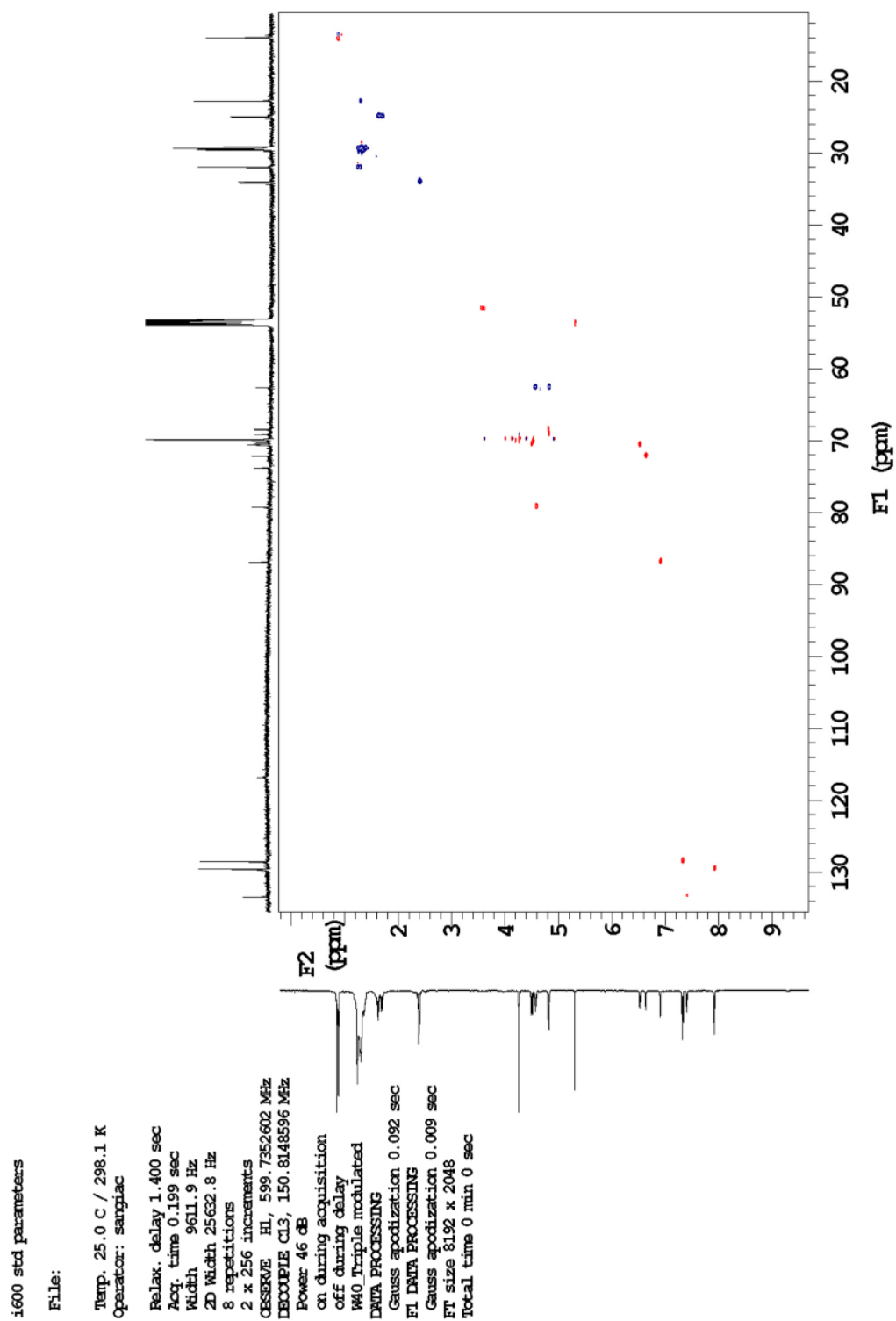
Sine ball 0.021 sec

FT size 4096 x 4096

Total time 0 min 0 sec



gCOSY spectrum (CD₂Cl₂, 600 MHz) of **8Fc5Ph**



gHSQC spectrum (CD_2Cl_2 , 600 MHz) of **8Fc5Ph**

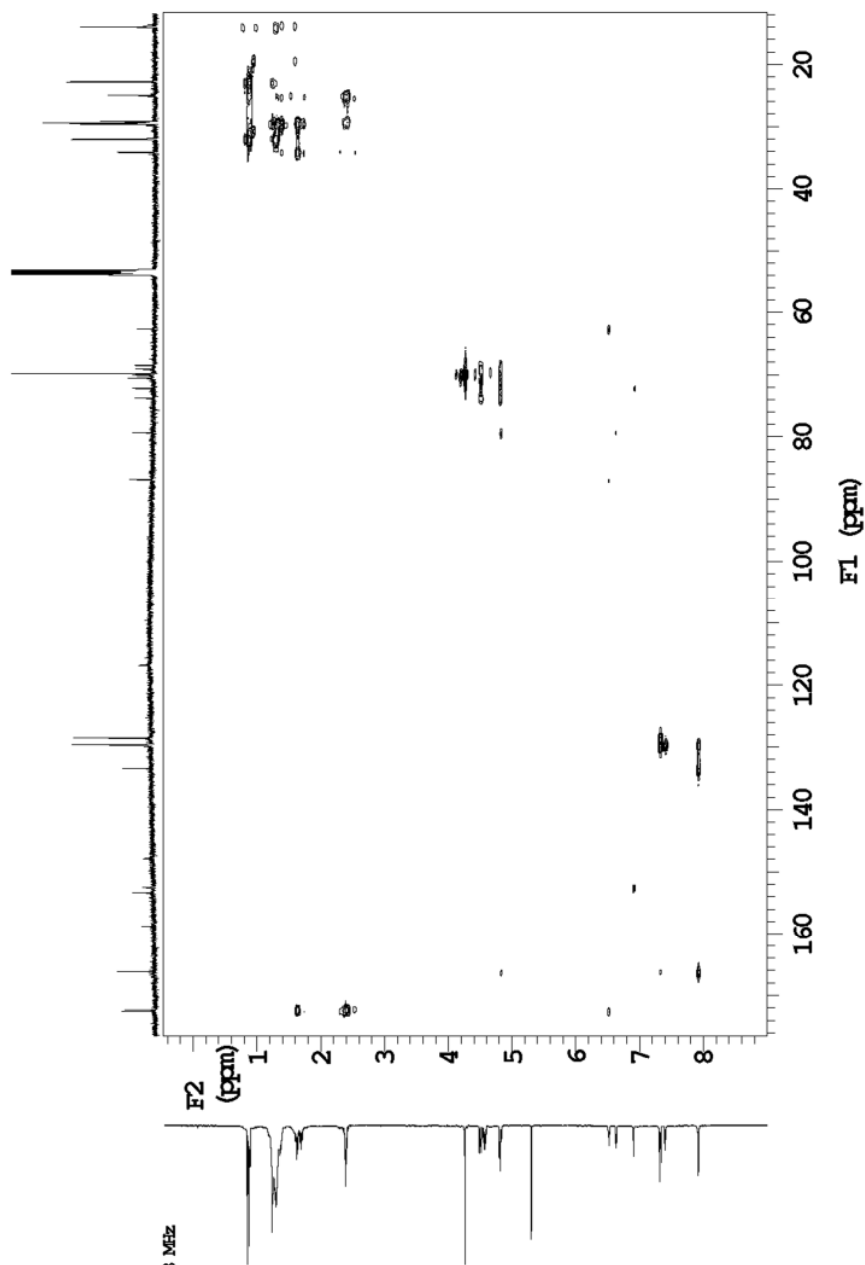
i600 std parameters

File:

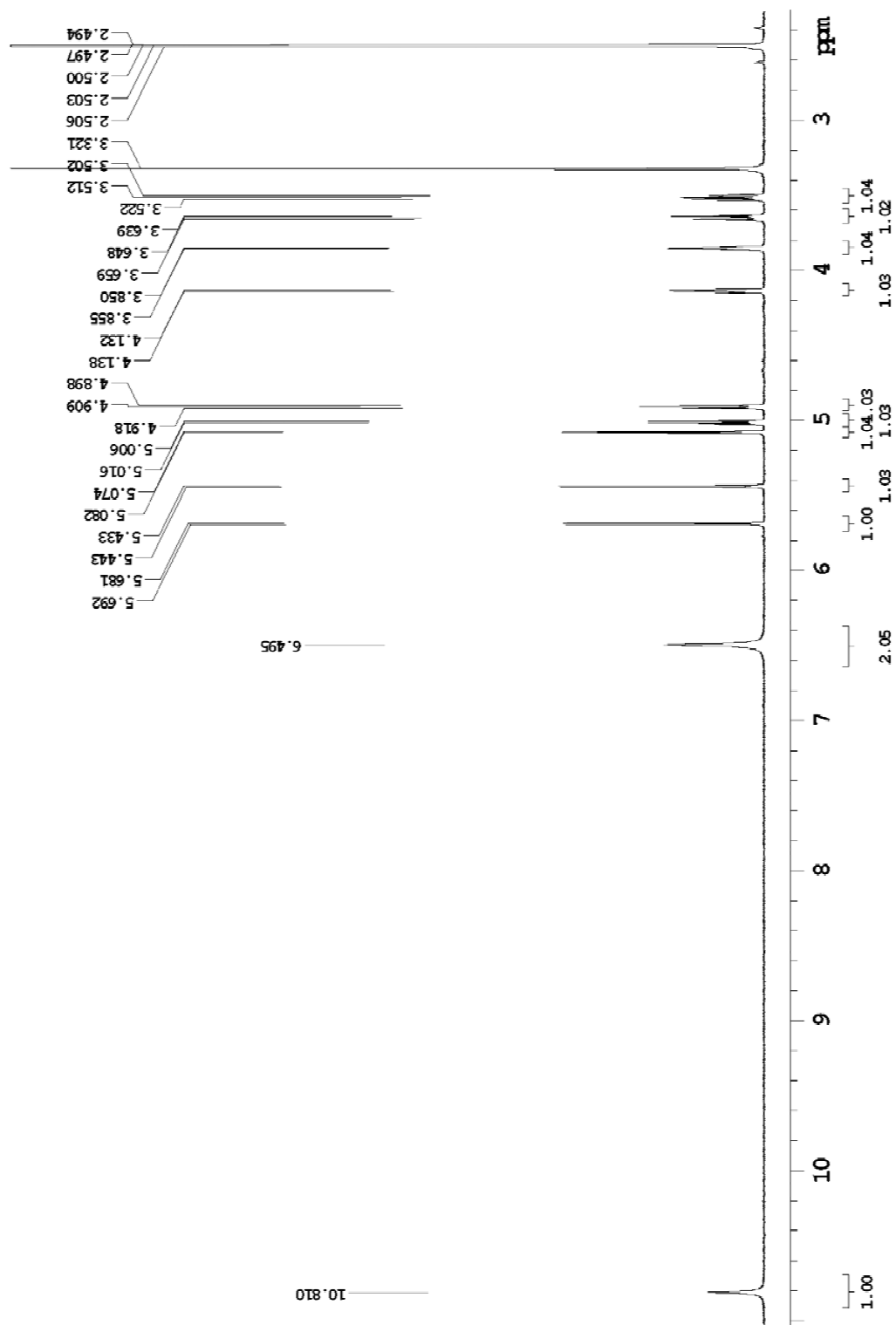
Temp. 25.0 C / 298.1 K
Operator: sangiac

Relax. delay 1.400 sec
Mixing 0.080 sec
Acq. time 0.128 sec
Width 9611.9 Hz
2D Width 36199.1 Hz
16 repetitions
256 increments

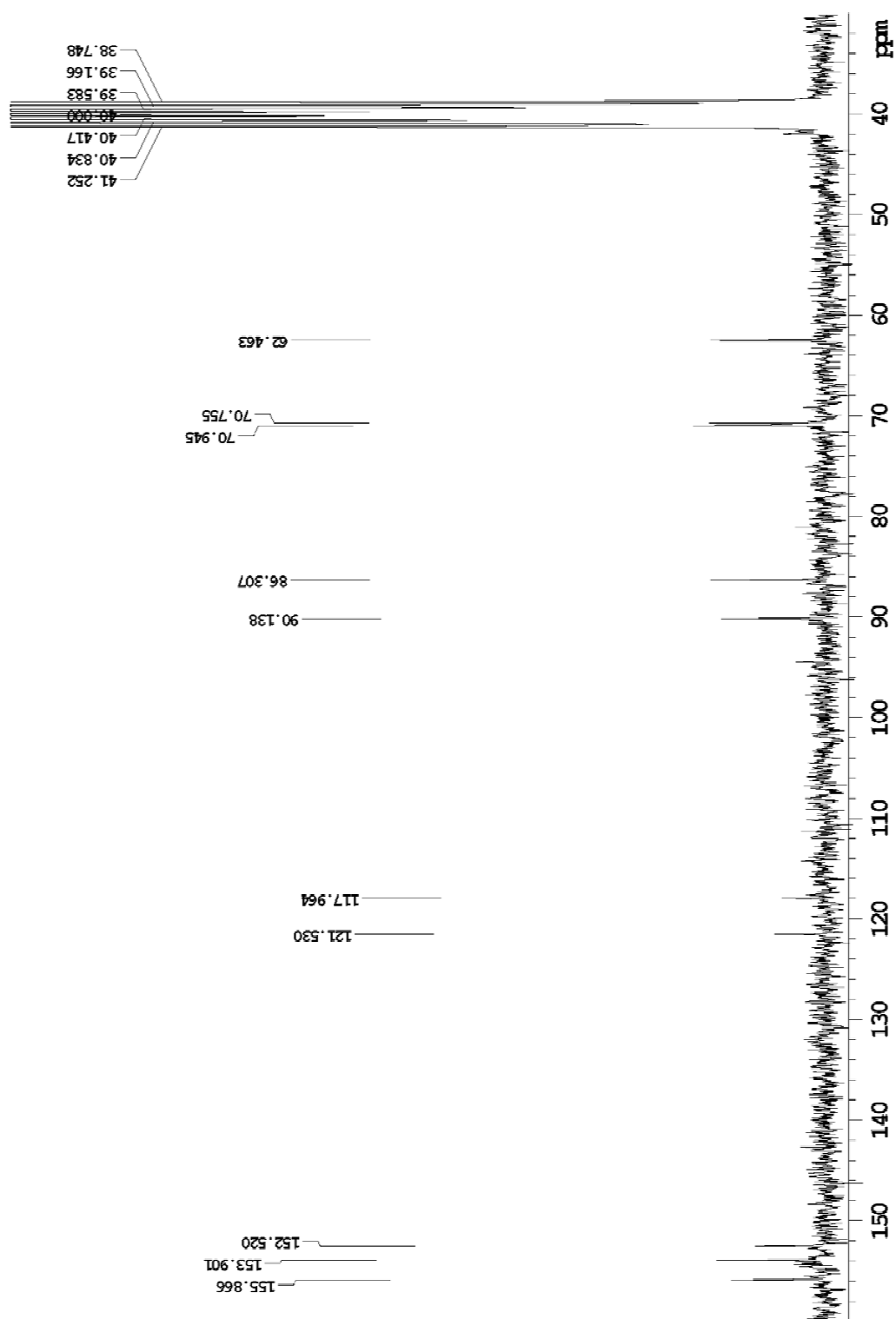
OBSERVE H1, 599.7352598 MHz
DATA PROCESSING
Sine bell 0.064 sec
F1 DATA PROCESSING
Sine bell 0.007 sec
F1 size 4096 x 2048
Total time 0 min 0 sec



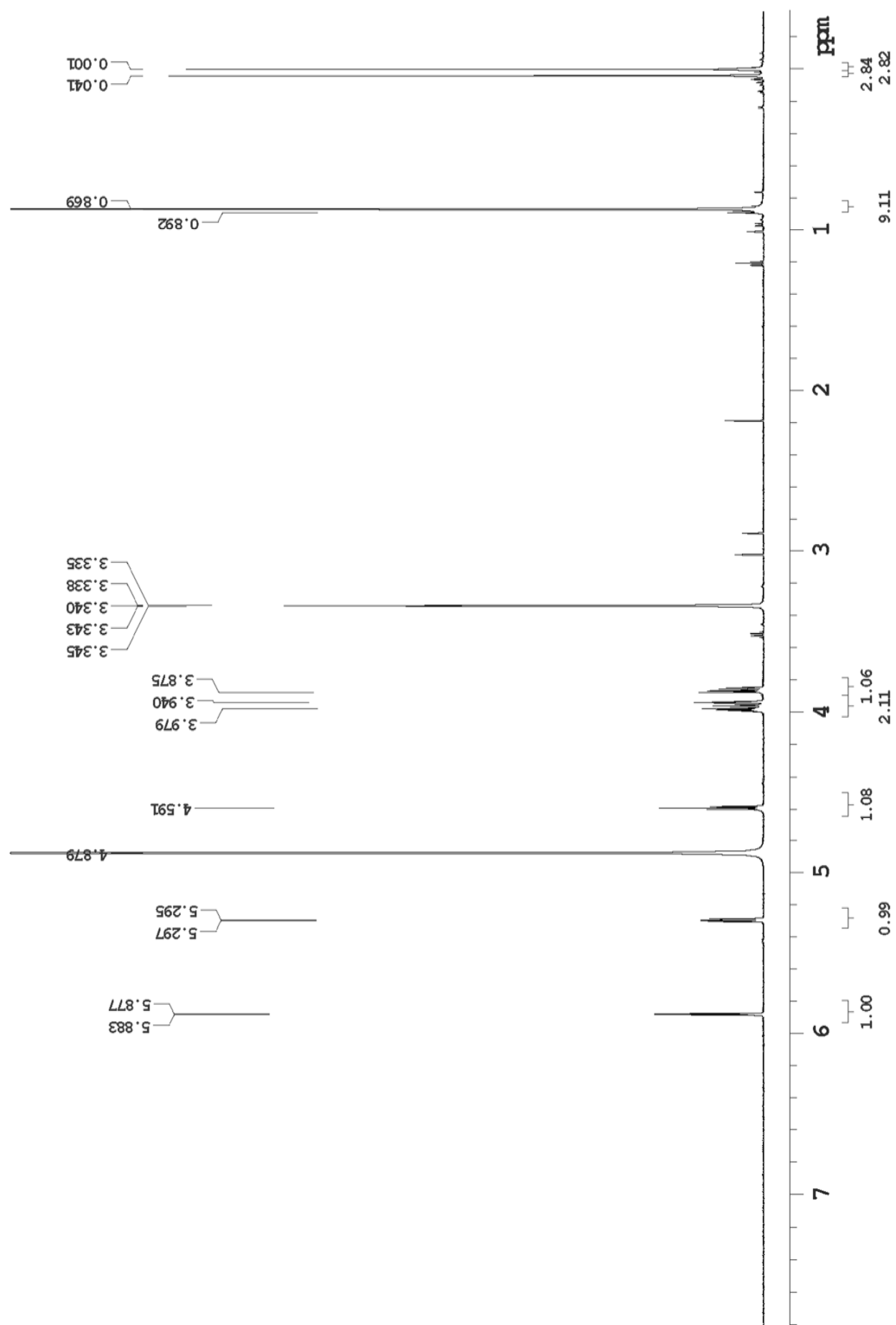
gHMBC spectrum (CD_2Cl_2 , 600 MHz) of **8Fc5P**



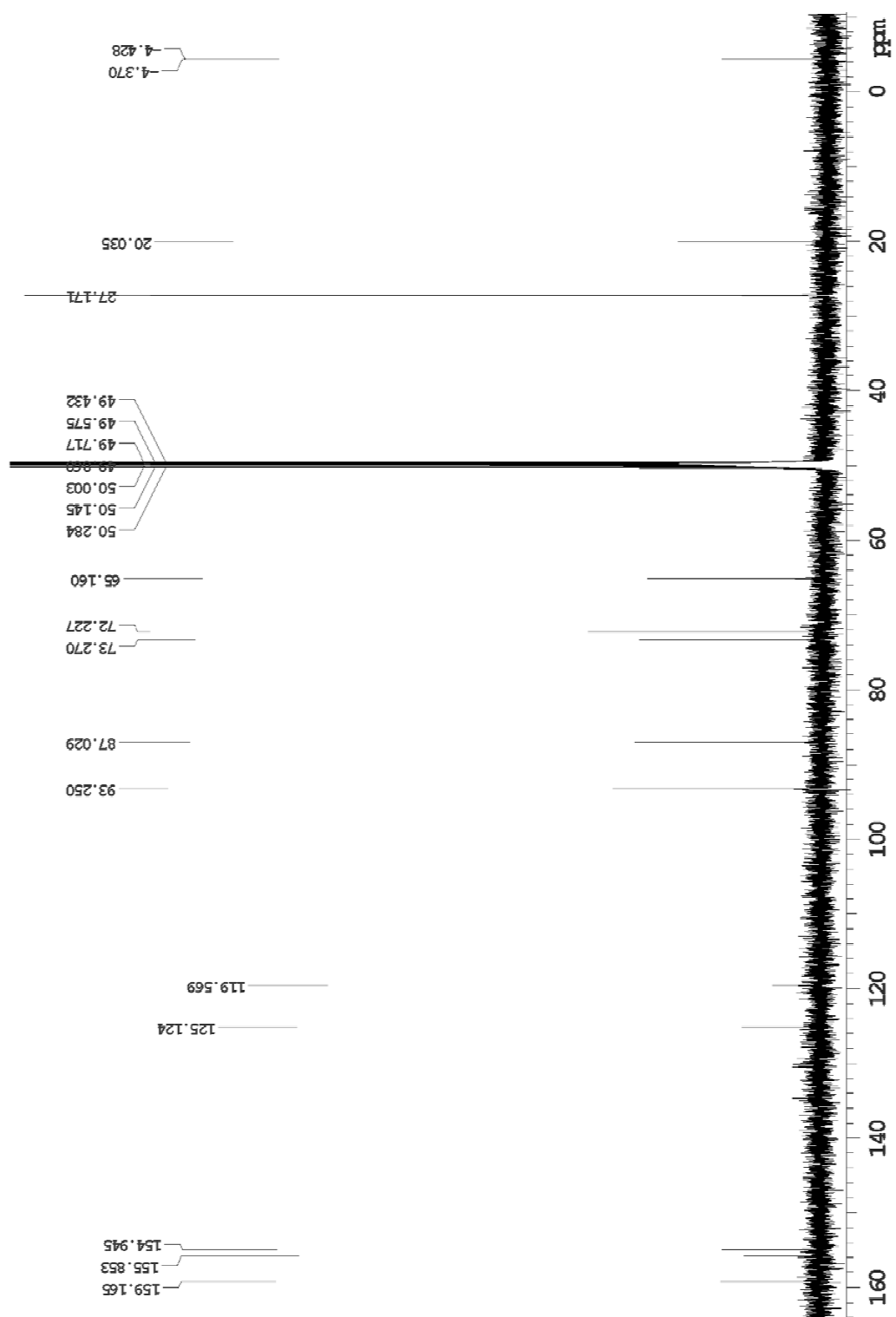
¹H-NMR (dms0-d₆, 600 MHz) of **9**



$^{13}\text{C}\{^1\text{H}\}$ NMR (dms0-d₆, 75 MHz) of **9**

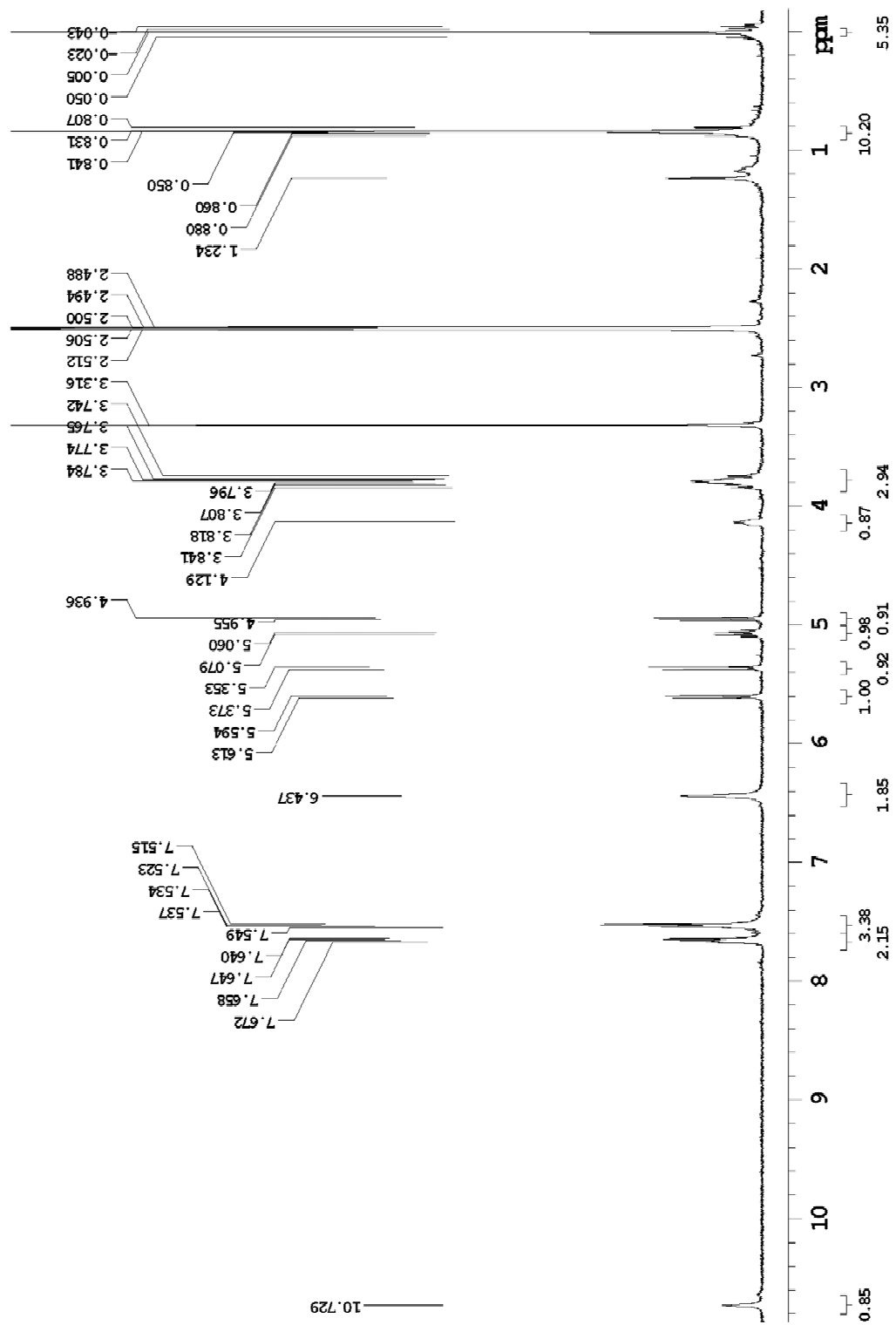


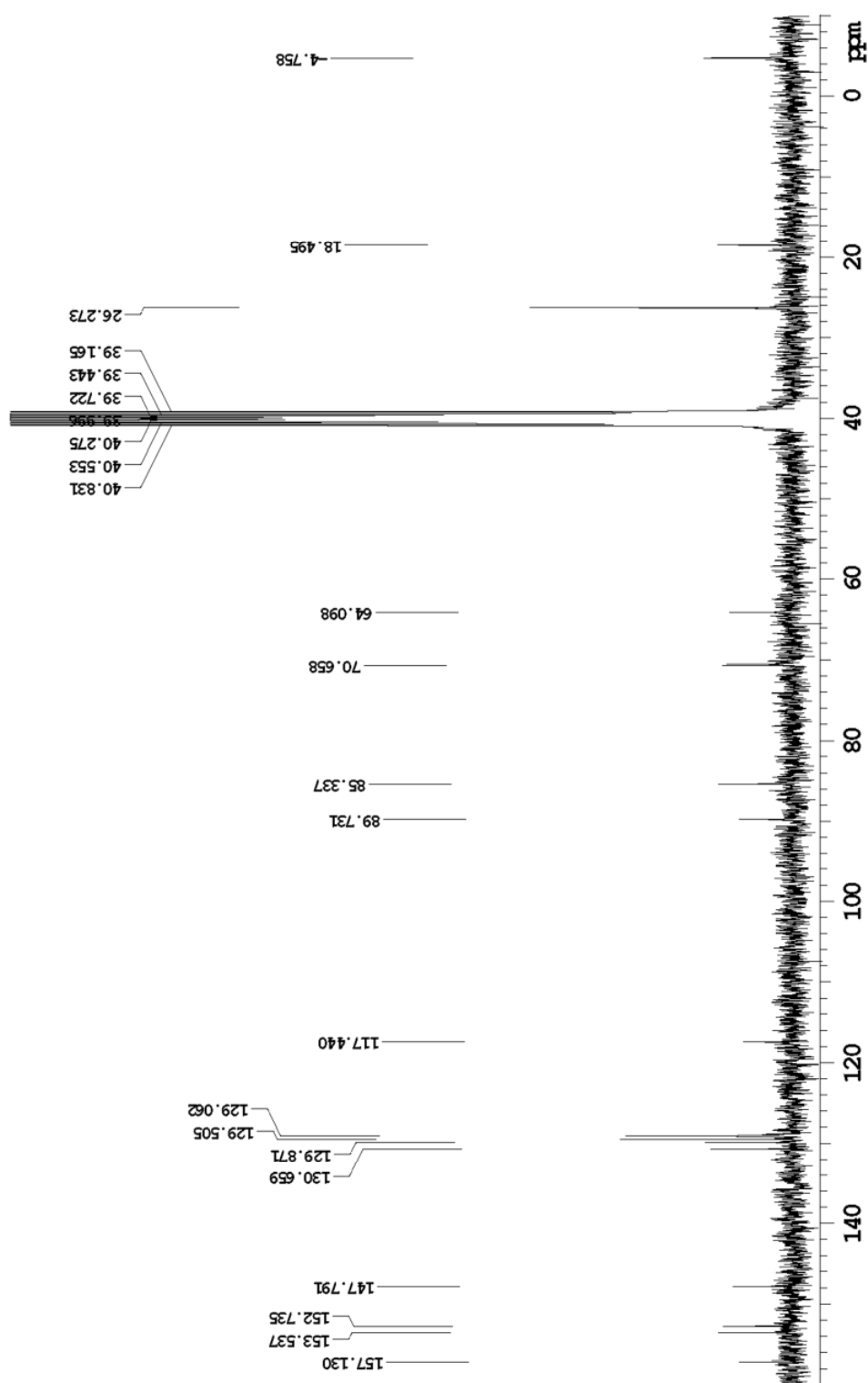
¹H-NMR (CD₃OD, 600 MHz) of **10**



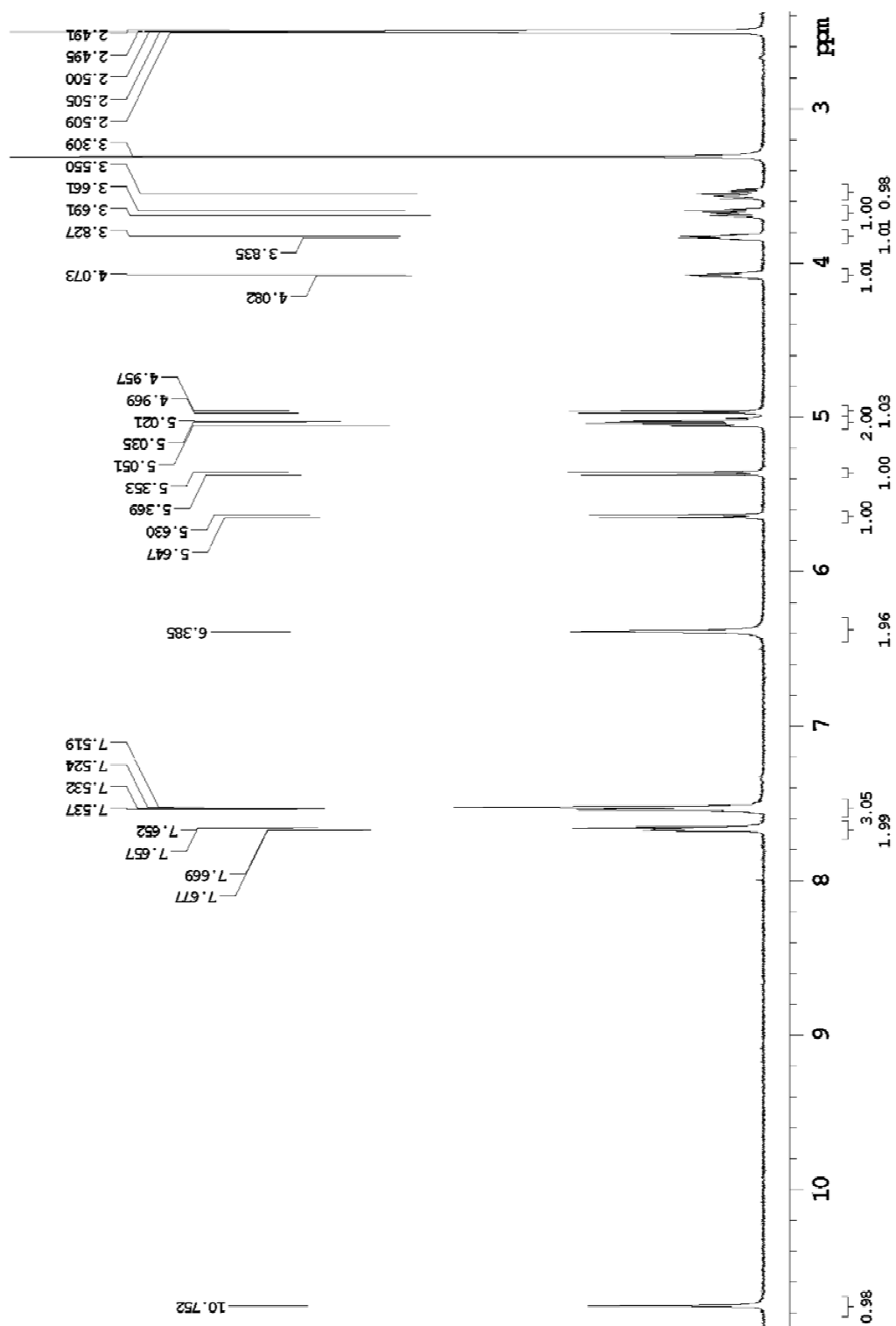
$^{13}\text{C}\{^1\text{H}\}$ NMR (CD₃OD, 151 MHz) of **10**

¹H-NMR (dmso-d₆, 600 MHz) of **11**

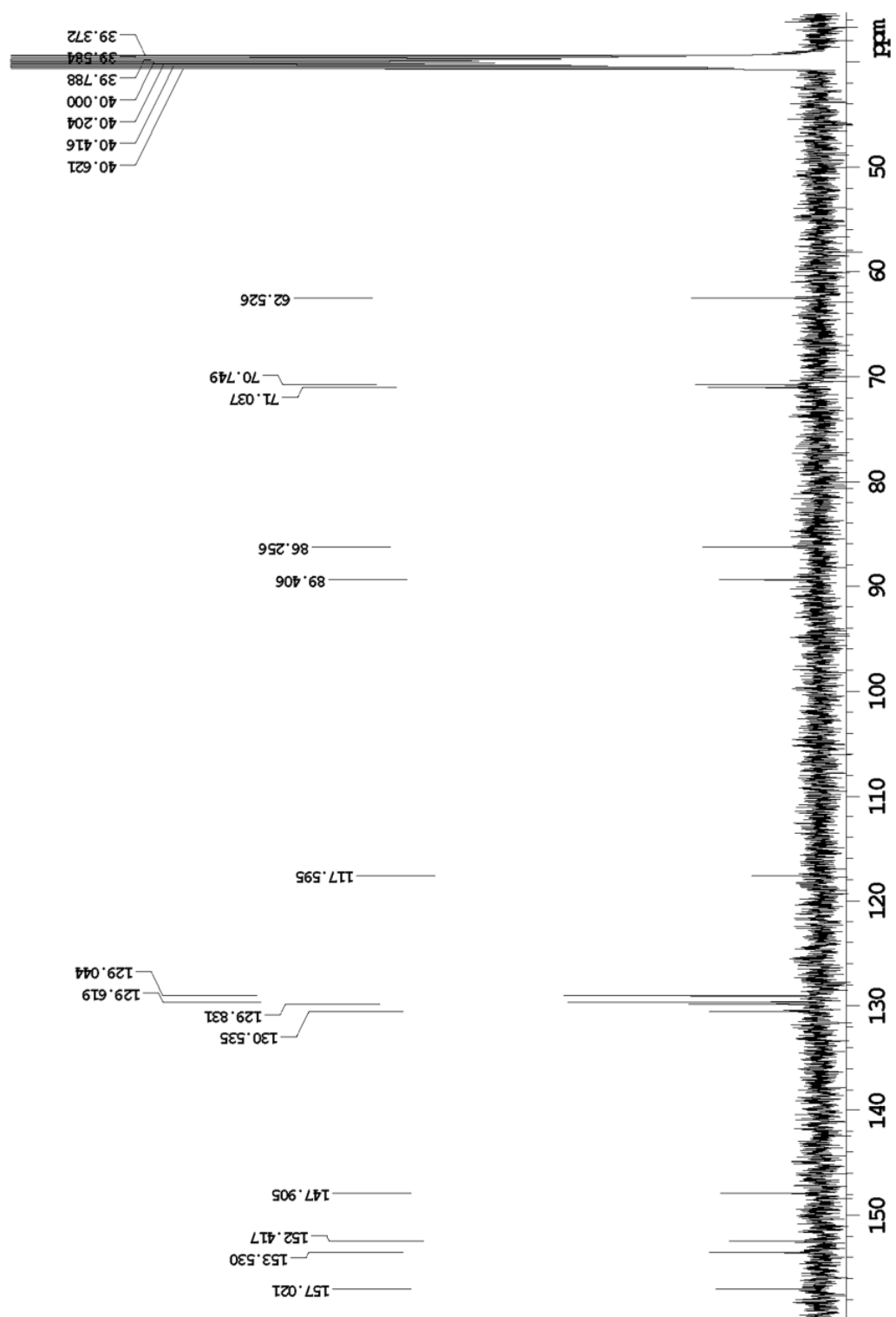




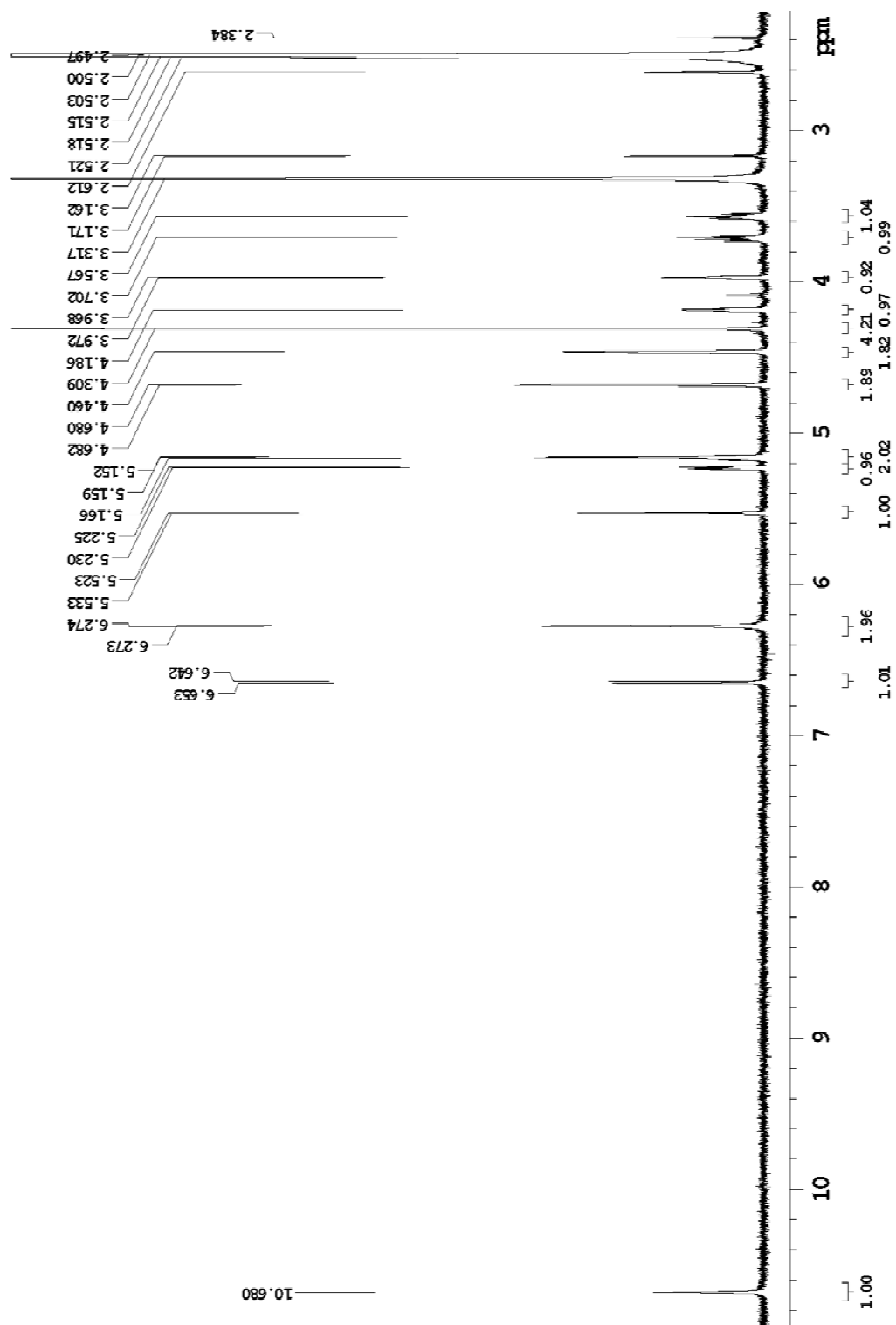
$^{13}\text{C}\{^1\text{H}\}$ NMR (dms0-d₆, 75 MHz) of **11**



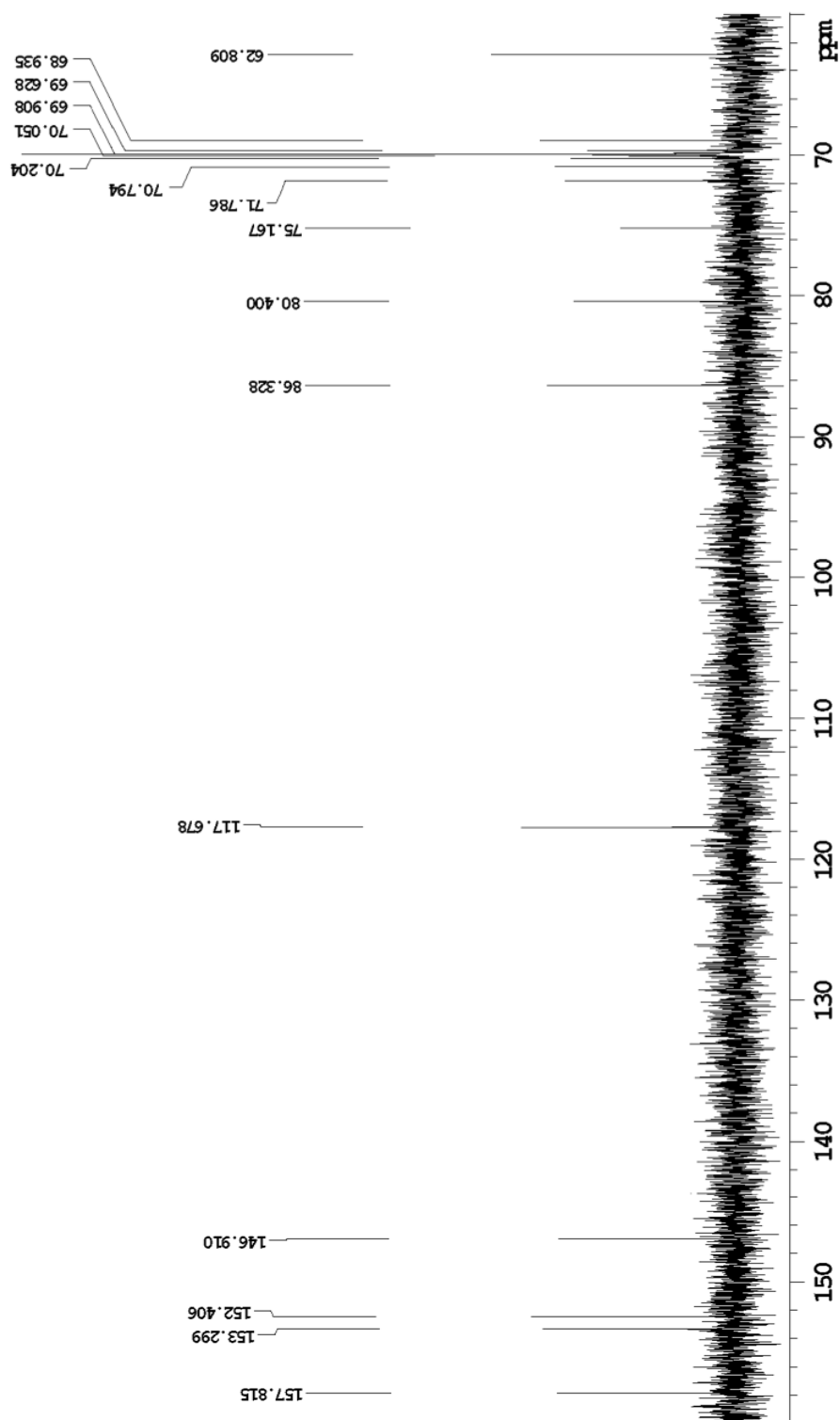
¹H-NMR (dms0-d₆, 400 MHz) of **12**



¹³C{¹H}NMR (dms0-d₆, 101 MHz) of **12**

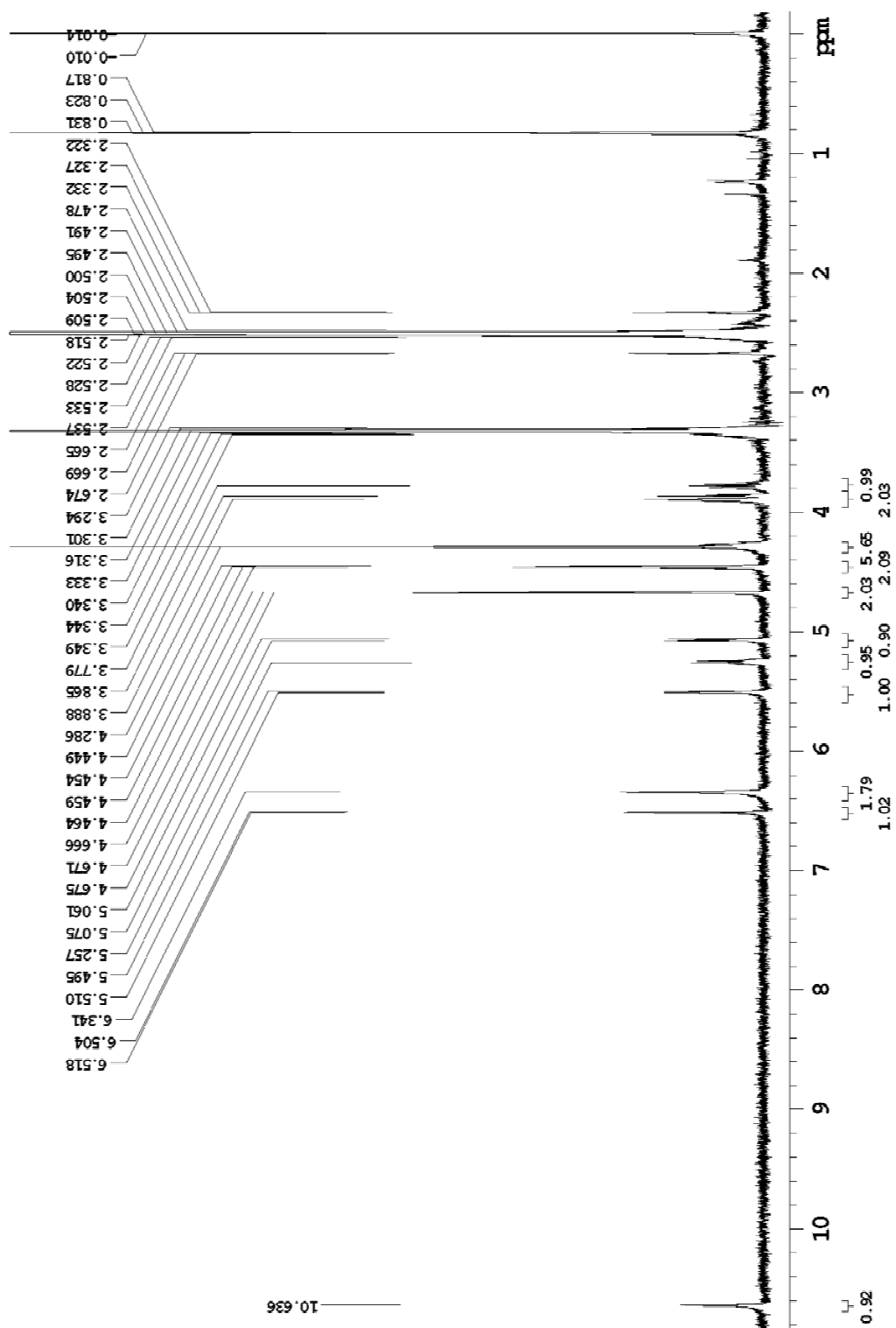


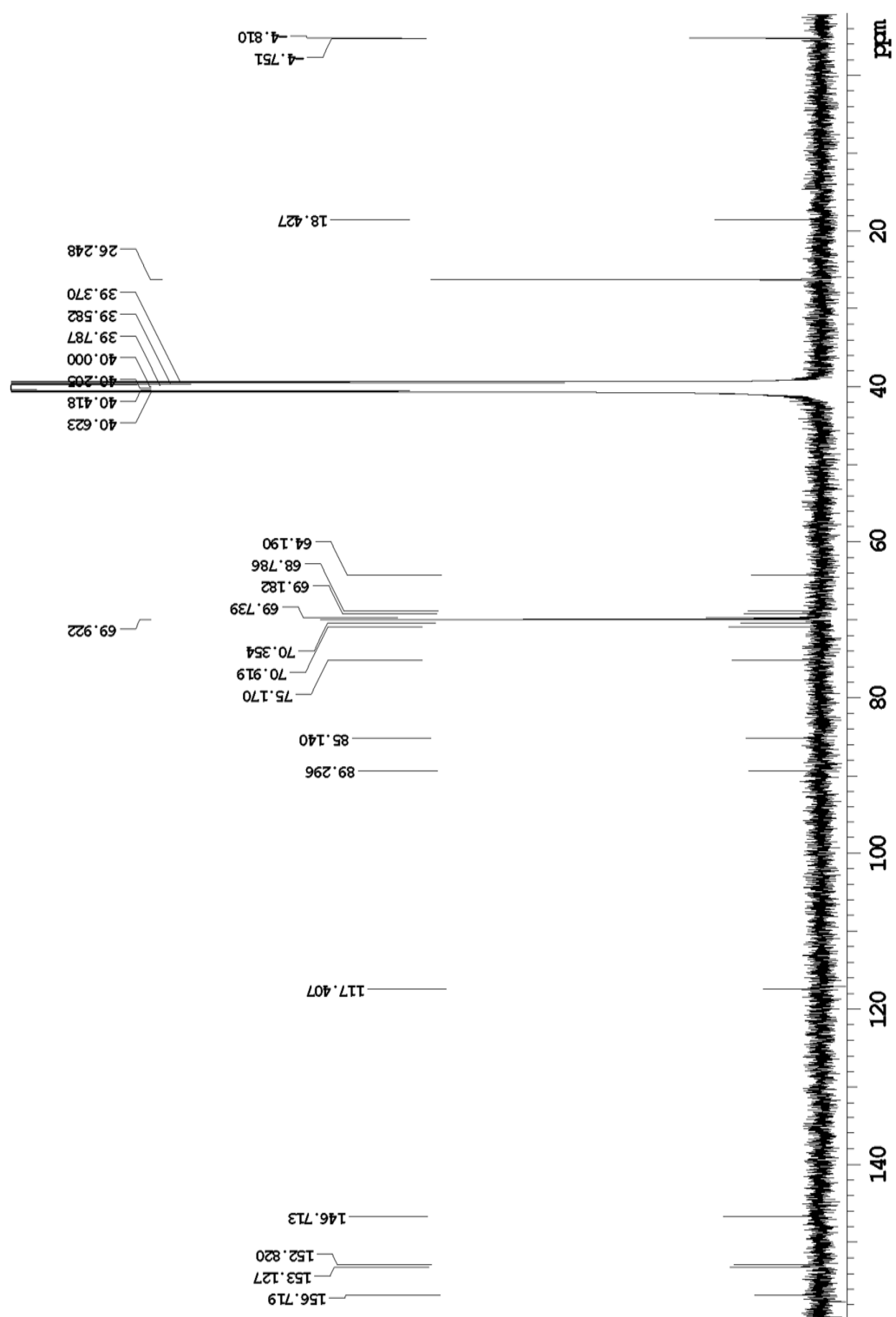
¹H-NMR (dms0-d₆, 600 MHz) of **13**



$^{13}\text{C}\{^1\text{H}\}$ NMR (dms0-d₆, 151 MHz) of **13**

^1H -NMR (dmso- d_6 , 400 MHz) of **14**





$^{13}\text{C}\{^1\text{H}\}$ NMR (dms0-d₆, 101 MHz) of **14**