

Supporting Information

A protecting group-free divergent synthesis of natural benzofurans via one-pot synthesis of 2-bromo-6-hydroxybenzofurans

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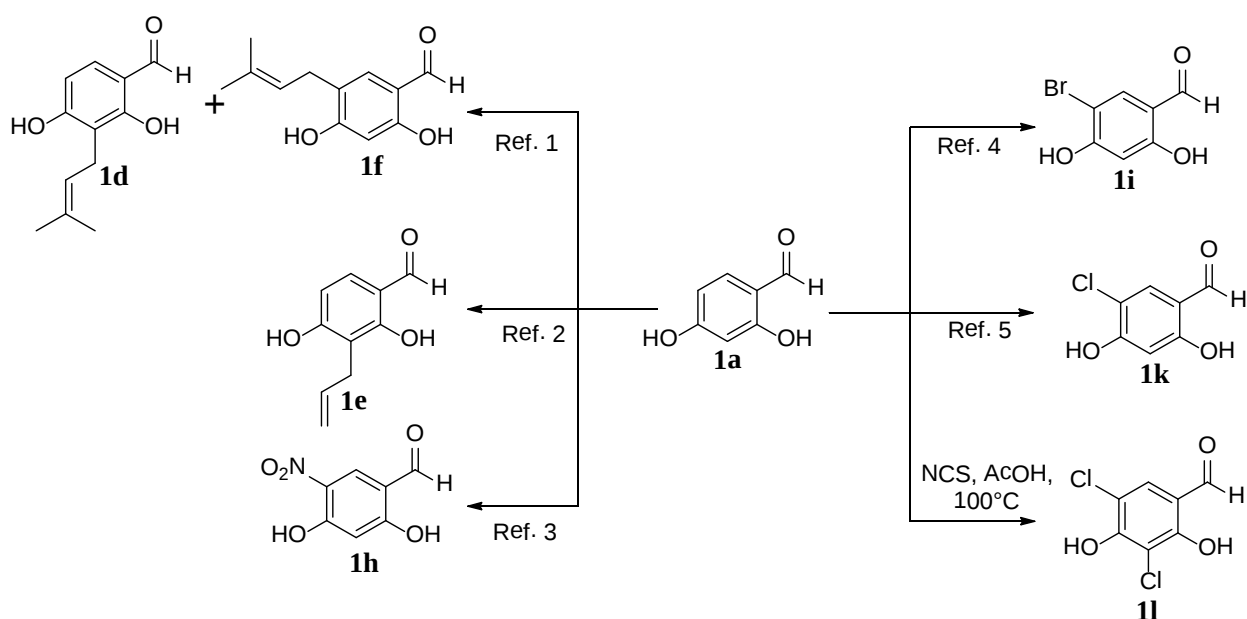
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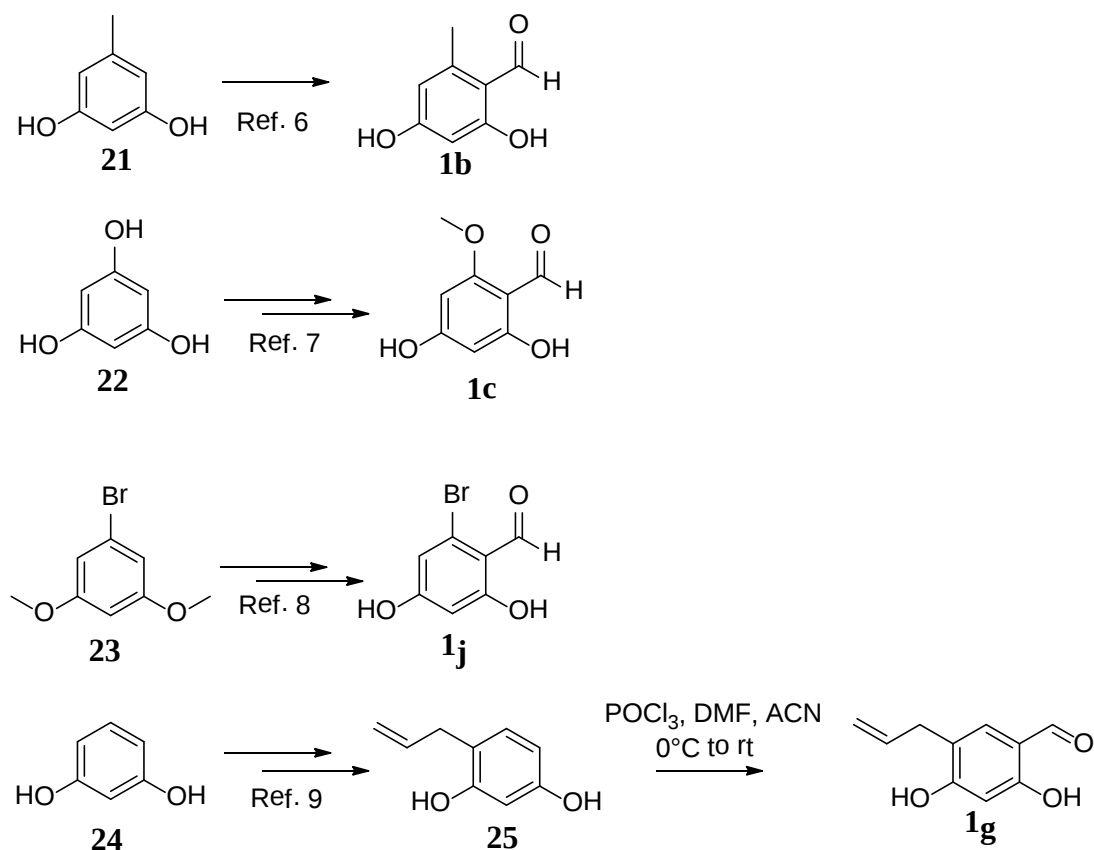
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Scheme 1. The synthesis of aldehydes **1d-f**, **1h**, **1i**, **1k**, and **1l** from **1a**

Synthesis of 3,5-dichloro-2,4-dihydroxybenzaldehyde (1l). To a solution of **1a** (1.00 g, 7.24 mmol) in AcOH was added NCS (2.40 g, 18.1 mmol) and reaction mixture was heated to 100 °C for 16 h. Reaction mass was cooled to rt and poured into crushed ice. The precipitated solid was filtered and dried under vacuum to give **1l** as light brown solid. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) δ 11.48 (brs, 1H), 9.88 (s, 1H), 7.78 (s, 1H); ^{13}C NMR (100 MHz, $\text{DMSO}-d_6$) δ 193.03, 157.34, 156.51, 131.24, 115.97, 113.70, 110.00; HRMS (ESI) m/z calcd for $\text{C}_7\text{H}_5\text{Cl}_2\text{O}_3$ $[\text{M} + \text{H}]^+$ 206.9616; found 206.9606.



Scheme 2. The synthesis of aldehydes **1b**, **1c**, **1g**, and **1j**.

Synthesis of 5-allyl-2,4-dihydroxybenzaldehyde (1g). To a solution of **25** (3.00 g, 19.9 mmol) in ACN at 0 °C was added DMF (3.1 mL, 39.9 mmol) and POCl₃ (2.29 mL, 23.9 mmol). The reaction mass was stirred for 1 h slowly raising to rt. Reaction mass was basified with saturated NaHCO₃ solution, extracted with EtOAc. Organic layers washed with brine, dried over sodium sulfate and concentrated in *vacuo*. Purification by silica gel column chromatography (0 to 13% EtOAc in hexane) afforded **1g** (2.00 g, 56%) as off white solid. ¹H NMR (400 MHz, CDCl₃) δ 11.27 (s, 1H), 9.67 (s, 1H), 7.27 (s, 1H), 6.46 (s, 1H), 6.38 (s, 1H), 6.03–5.96 (m, 1H), 5.19 (dd, *J* = 16.0, 2.8 Hz, 1H), 5.18 (dd, *J* = 10.0, 2.8 Hz, 1H), 3.37 (d, *J* = 6.4 Hz, 2H); ¹³C NMR (100 MHz, CDCl₃) δ 194.59, 163.00, 162.27, 135.76, 119.01, 117.02, 115.29, 103.32, 103.28, 33.70. HRMS (ESI) *m/z* calcd for C₁₀H₁₁O₃ [M + H]⁺ 179.0708; found 179.0700

Table 1. The screened reaction conditions for the Suzuki coupling

Entry	Base (2.5 equiv)	Catalyst (5 mol%)	Solvent	Temp (°C)	Time (h)	Yield (%)
1	K ₃ PO ₄	Pd(dppf)Cl ₂ .DCM	dioxane:H ₂ O (4:1)	80	1	30
2	K ₂ CO ₃	Pd(PPh ₃) ₄	THF:EtOH:H ₂ O (2:2:1),	80	1	70
3	K ₃ PO ₄	Pd(dppf)Cl ₂ .DCM	DMSO:H ₂ O (4:1)	80	1	80
4	K ₃ PO ₄	Pd(dppf)Cl ₂ .DCM	DMF:H ₂ O (4:1)	80	1	83

¹H NMR (400 MHz, CDCl₃) spectrum of compound **3a**

new experiment

Sample Name:
AS-IV-21-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

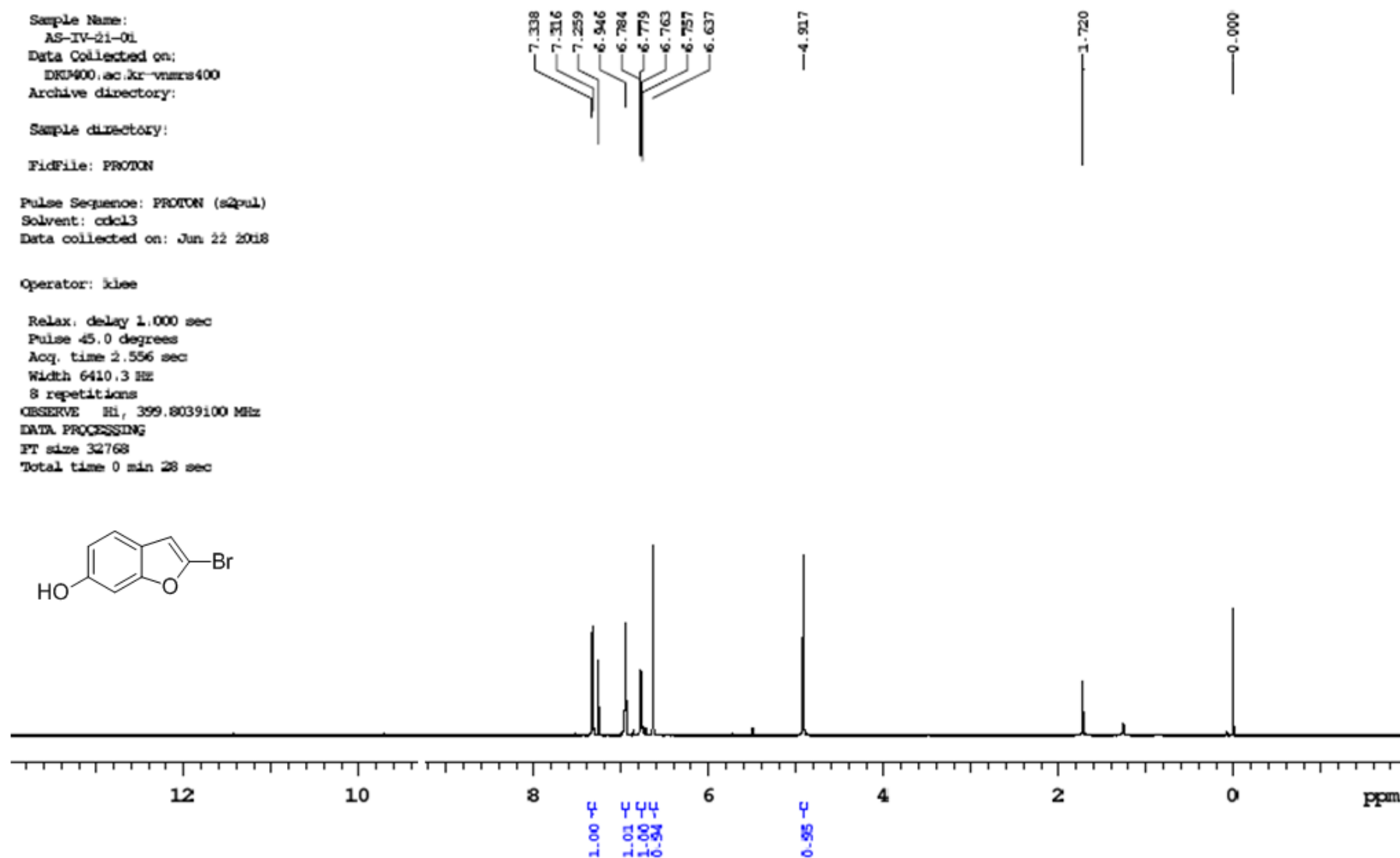
Sample directory:

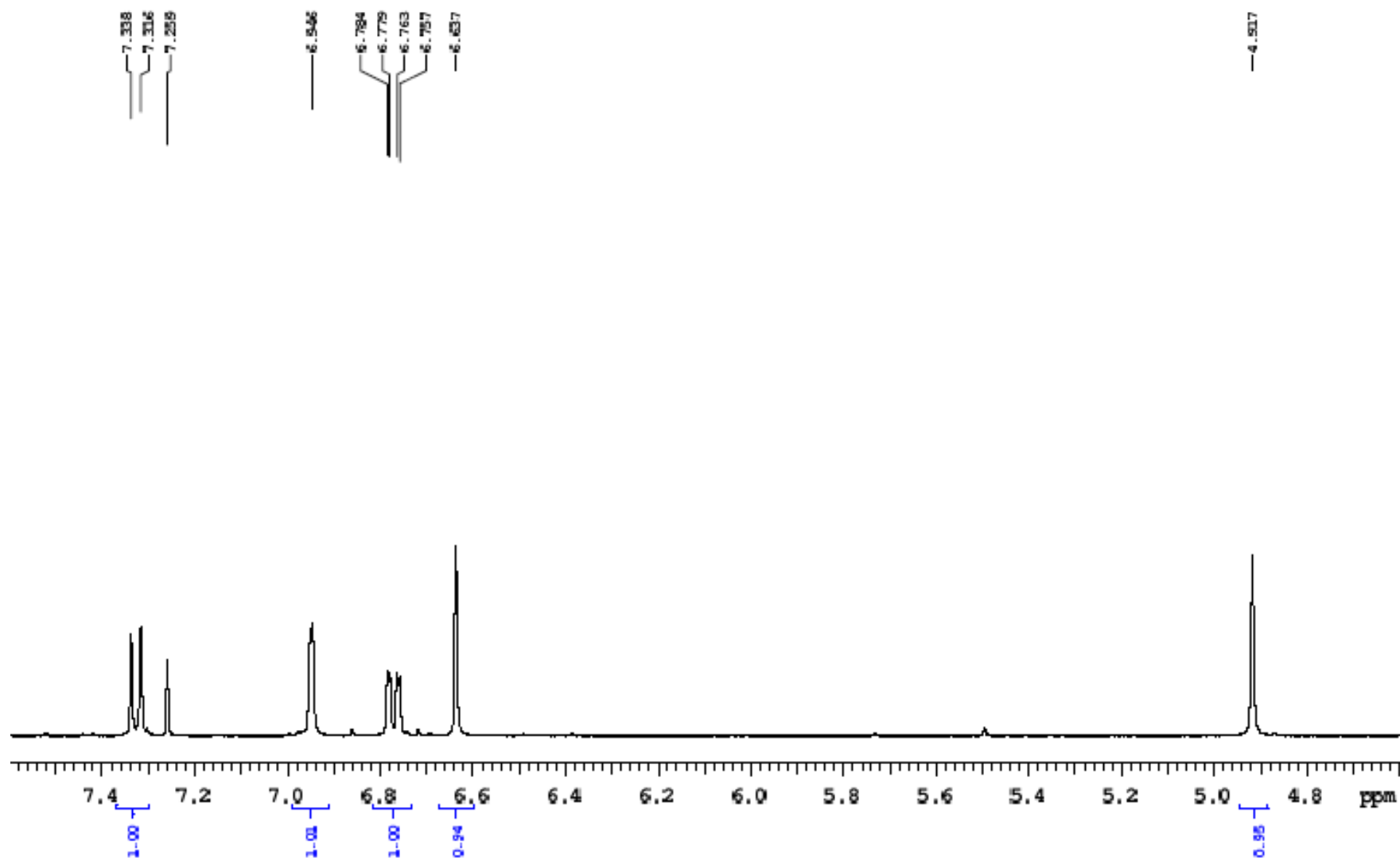
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Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Jun 22 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
8 repetitions
OBSERVE H1, 399.8039100 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 28 sec





^{13}C NMR (100 MHz, CDCl_3) spectrum of compound **3a**

new experiment

Sample Name:
AS-IV-21-02
Data Collected on:
DKU400.ac.kr-vmrs400
Archive directory:

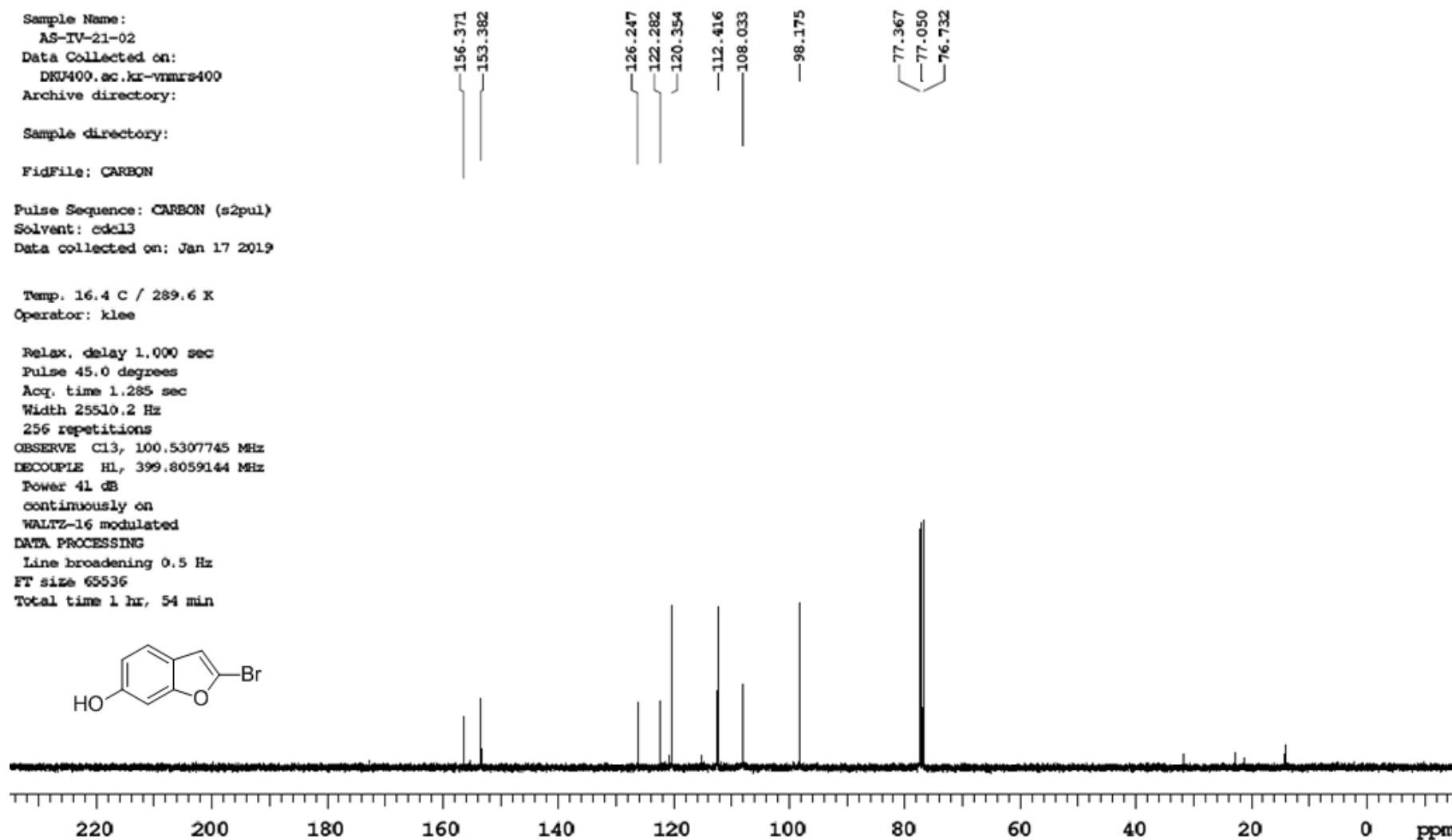
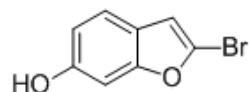
Sample directory:

FidFile: CARBON

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Jan 17 2019

Temp. 16.4 C / 289.6 K
Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
256 repetitions
OBSERVE C13, 100.5307745 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹H NMR (400 MHz, DMSO-*d*₆) spectrum of compound **3b**

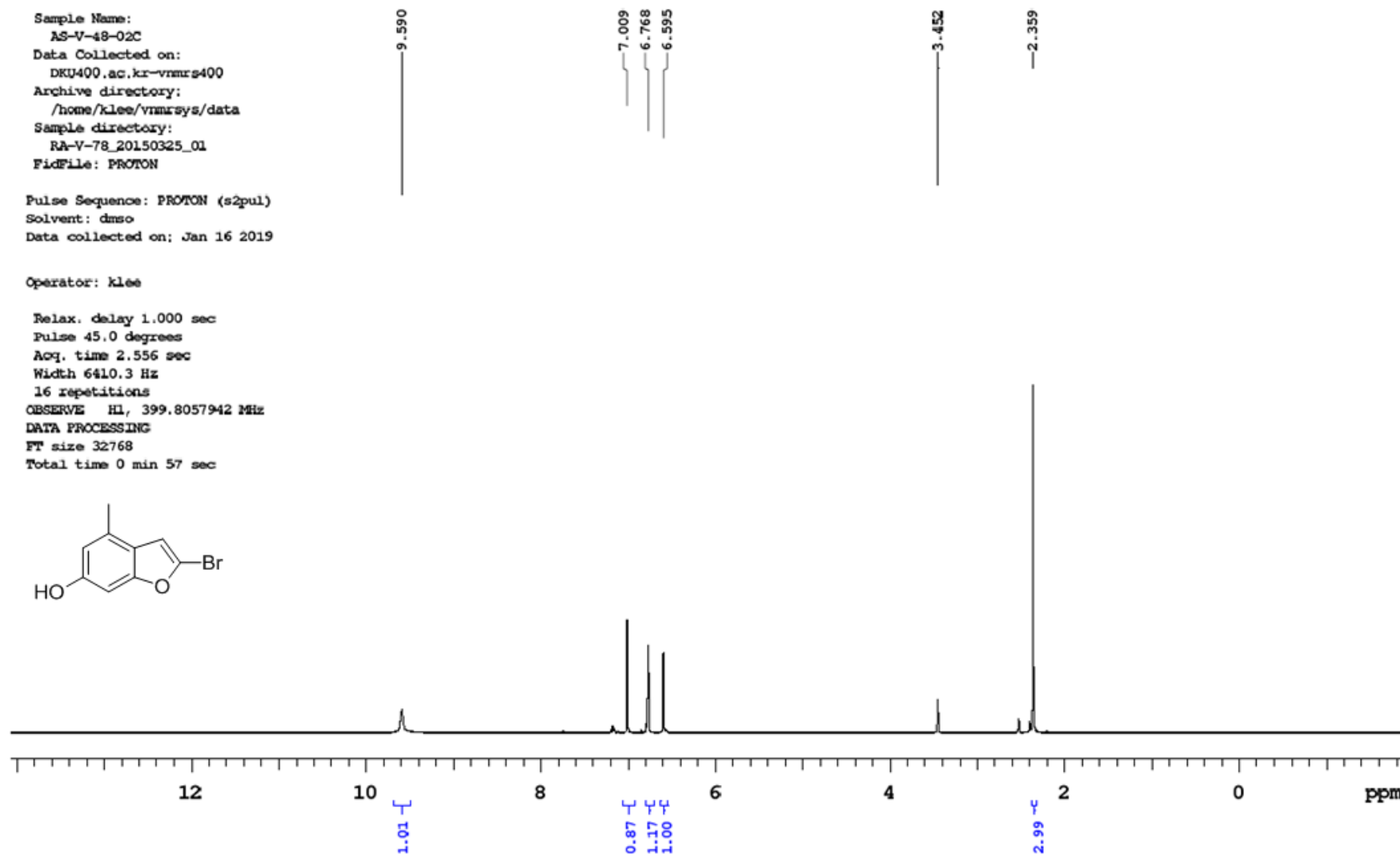
STANDARD 1H OBSERVE - profile

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Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: dms
Data collected on: Jan 16 2019

Operator: klee

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Pulse 45.0 degrees
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Width 6410.3 Hz
16 repetitions
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DATA PROCESSING
FT size 32768
Total time 0 min 57 sec



¹³C NMR (100 MHz, DMSO-*d*₆) spectrum of compound **3b**

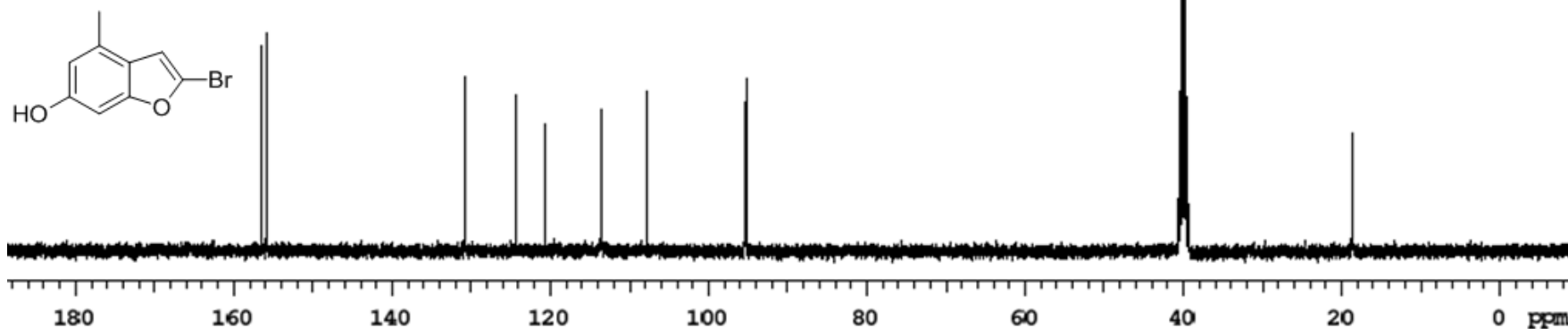
STANDARD 1H OBSERVE - profile

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 FidFile: AS-V-48-01C

Pulse Sequence: CARBON (s2pul)
 Solvent: dms
 Data collected on: Nov 8 2018

Operator: klee

Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 1.285 sec
 Width 25510.2 Hz
 320 repetitions
 OBSERVE C13, 100.5312520 MHz
 DECOUPLE H1, 399.8078135 MHz
 Power 41 dB
 continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 65536
 Total time 3 hr, 10 min



¹H NMR (400 MHz, DMSO-*d*₆) spectrum of compound 3c

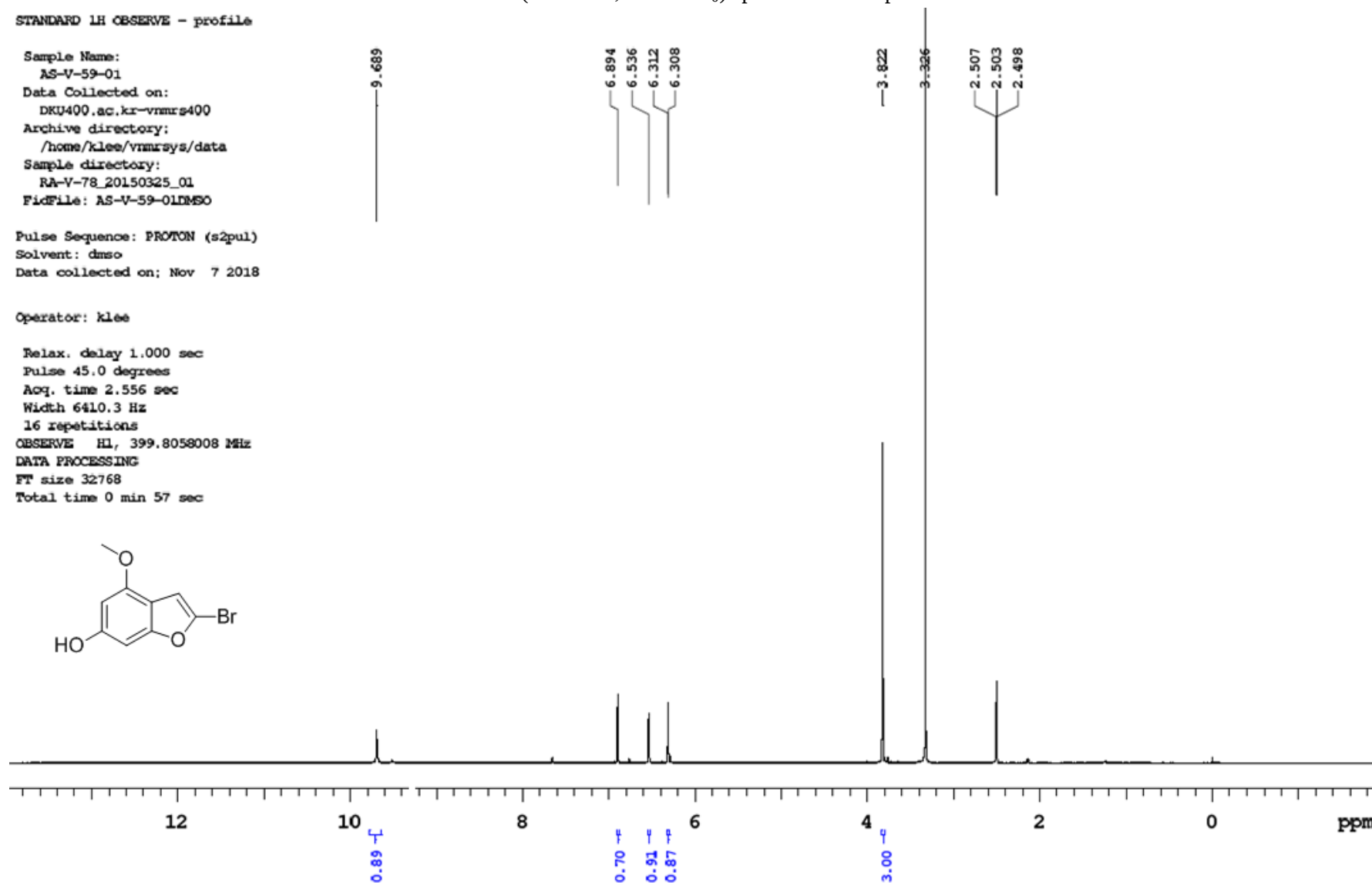
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-59-01
Data Collected on:
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Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-59-01DMSO

Pulse Sequence: PROTON (s2pul)
Solvent: dms
Data collected on: Nov 7 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE HL, 399.8058008 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec



¹³C NMR (100 MHz, DMSO-d₆) spectrum of compound **3c**

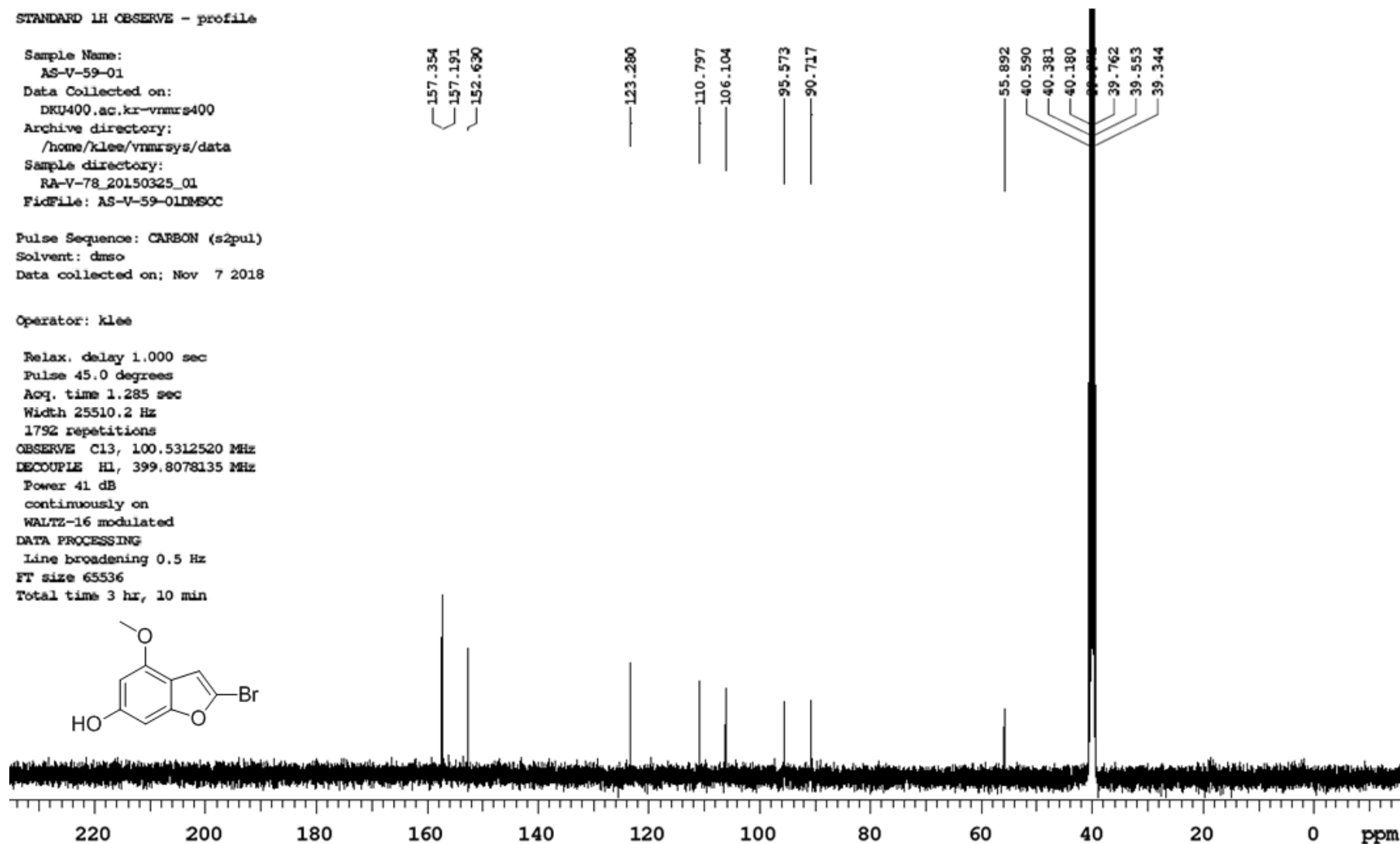
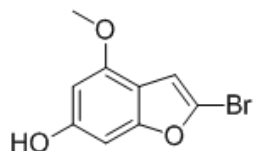
STANDARD LH OBSERVE - profile

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Archive directory:
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Sample directory:
RA-V-78_20150325_01
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Pulse Sequence: CARBON (s2pul)
Solvent: dmsc
Data collected on; Nov 7 2018

Operator: klee

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Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
1792 repetitions
OBSERVE C13, 100.5312520 MHz
DECOUPLE H1, 399.8078135 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 3 hr, 10 min



¹H NMR (600 MHz, CDCl₃) spectrum of compound **3d**

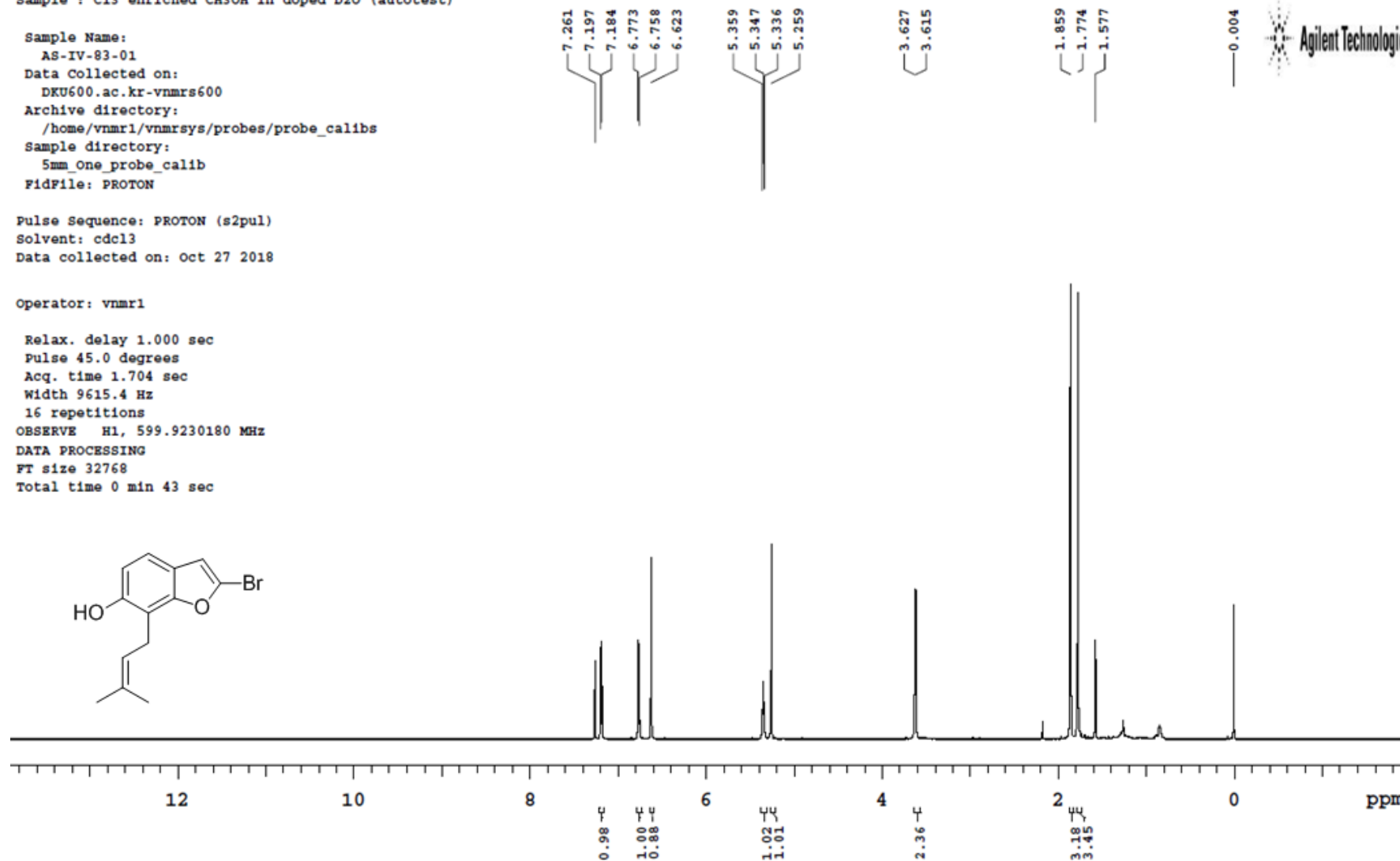
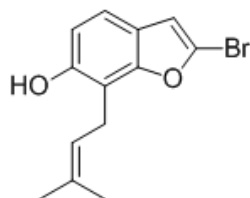
Calibration for 5mm_One_probe on 14Jul2017
Sample : C13 enriched CH₃OH in doped D₂O (autotest)

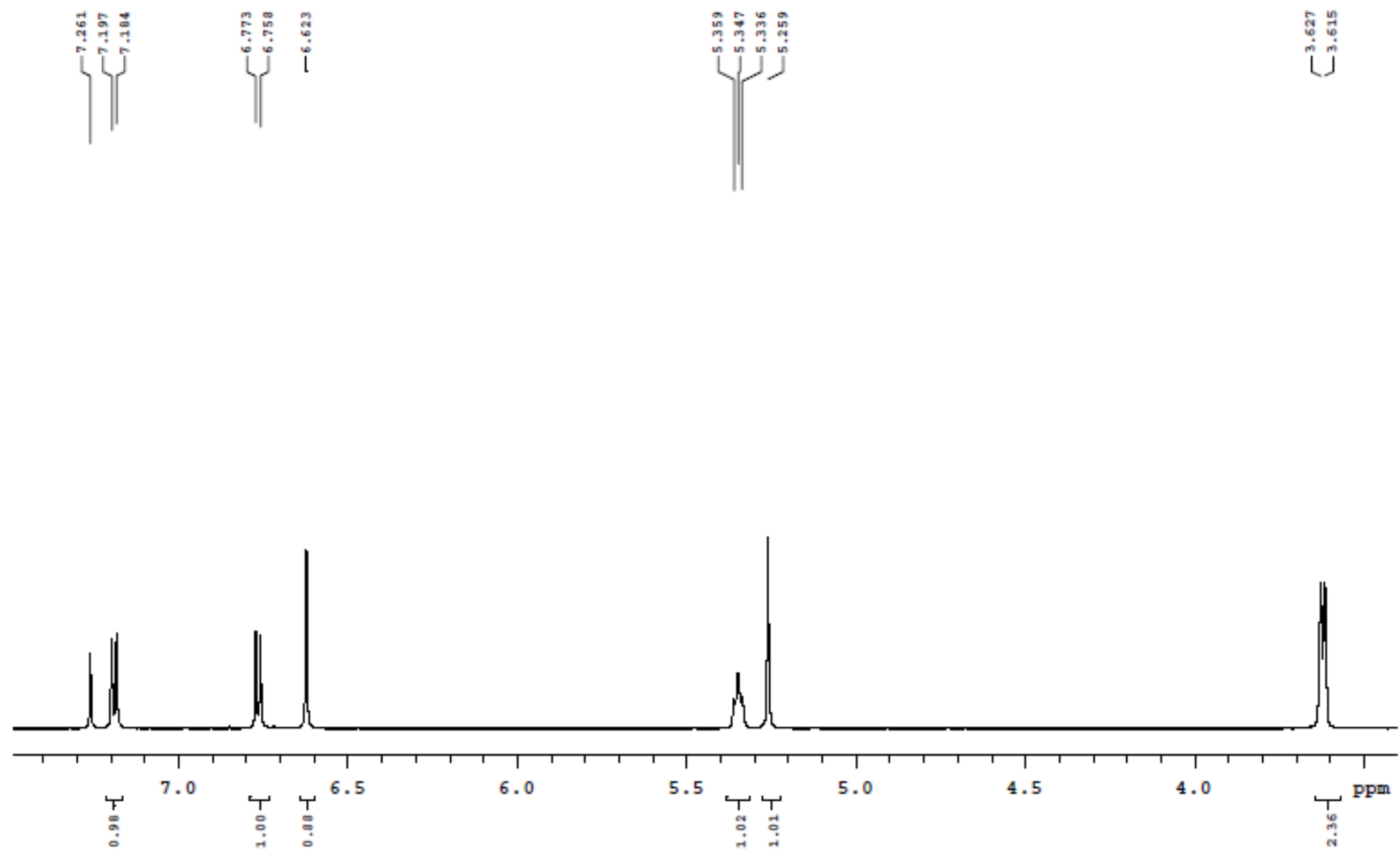
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FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Oct 27 2018

Operator: vnmr1

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.704 sec
Width 9615.4 Hz
16 repetitions
OBSERVE H1, 599.9230180 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 43 sec





¹³C NMR (150 MHz, CDCl₃) spectrum of compound **3d**

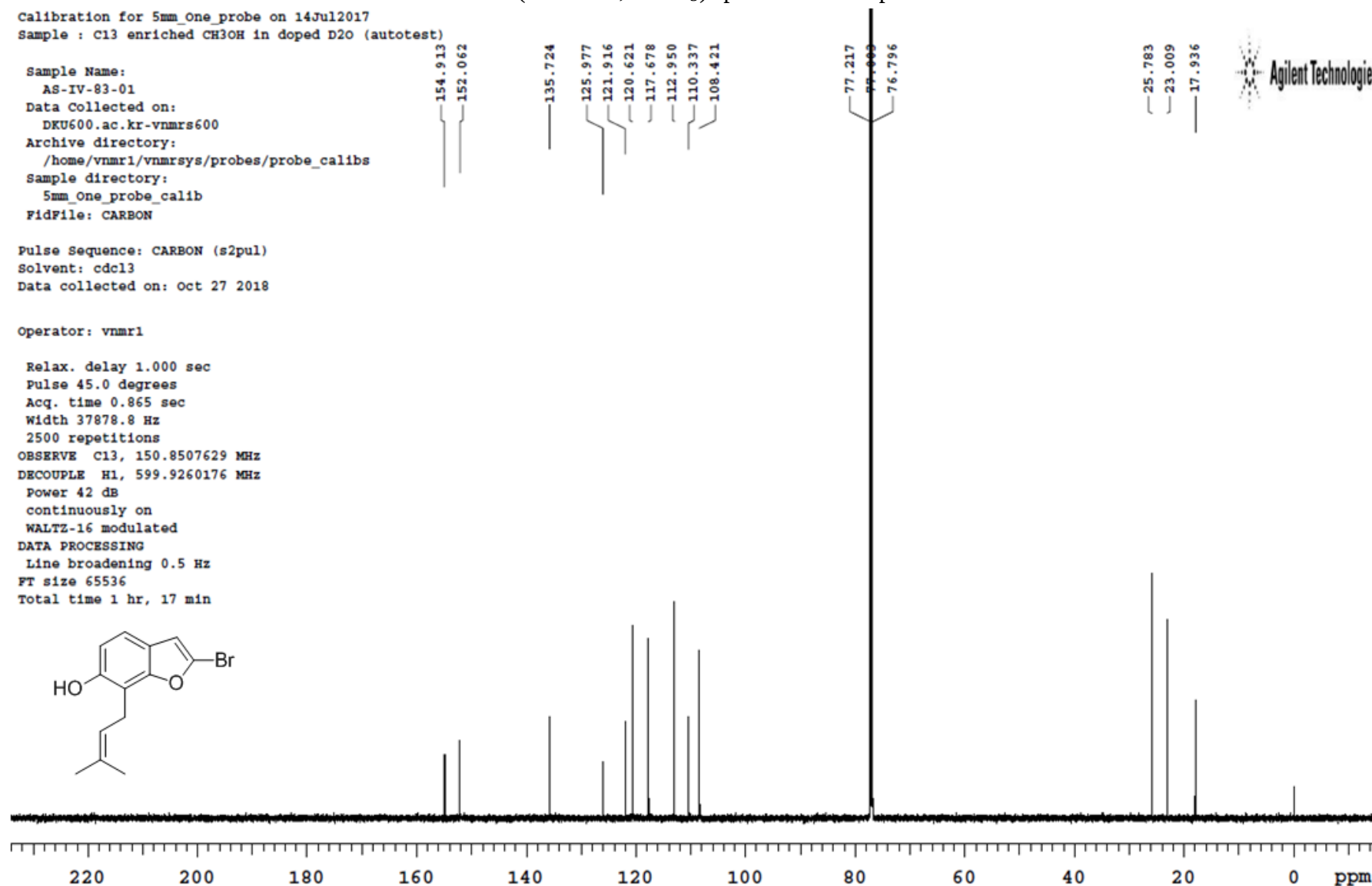
Calibration for 5mm_One_probe on 14Jul2017
Sample : C13 enriched CH₃OH in doped D₂O (autotest)

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Data Collected on:
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Sample directory:
5mm_One_probe_calib
FidFile: CARBON

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Oct 27 2018

Operator: vnmr1

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 0.865 sec
Width 37878.8 Hz
2500 repetitions
OBSERVE C13, 150.8507629 MHz
DECOUPLE H1, 599.9260176 MHz
Power 42 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 17 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound 3e

STANDARD 1H OBSERVE - profile

Sample Name:
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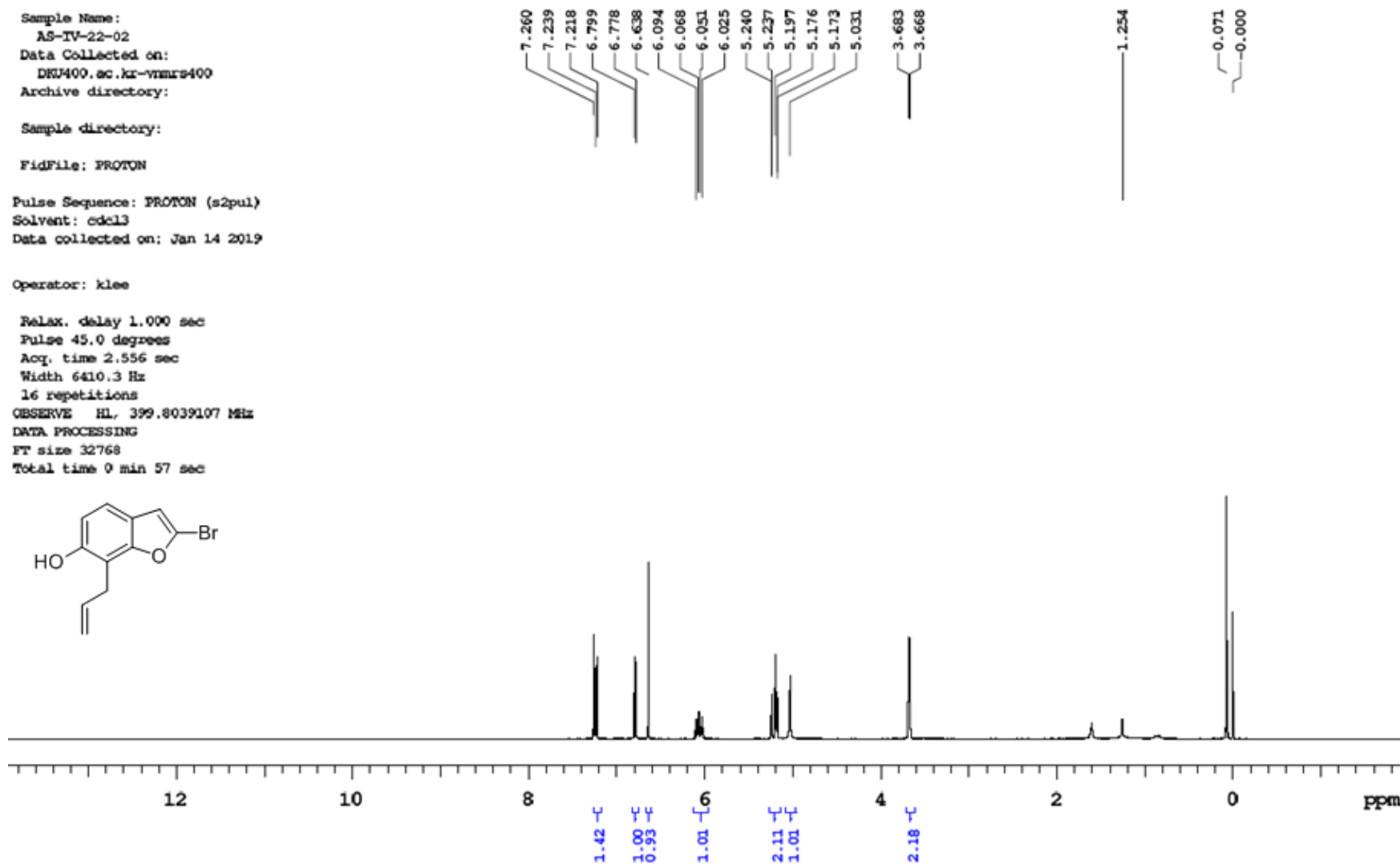
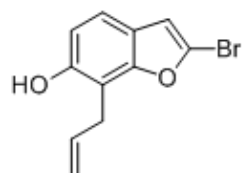
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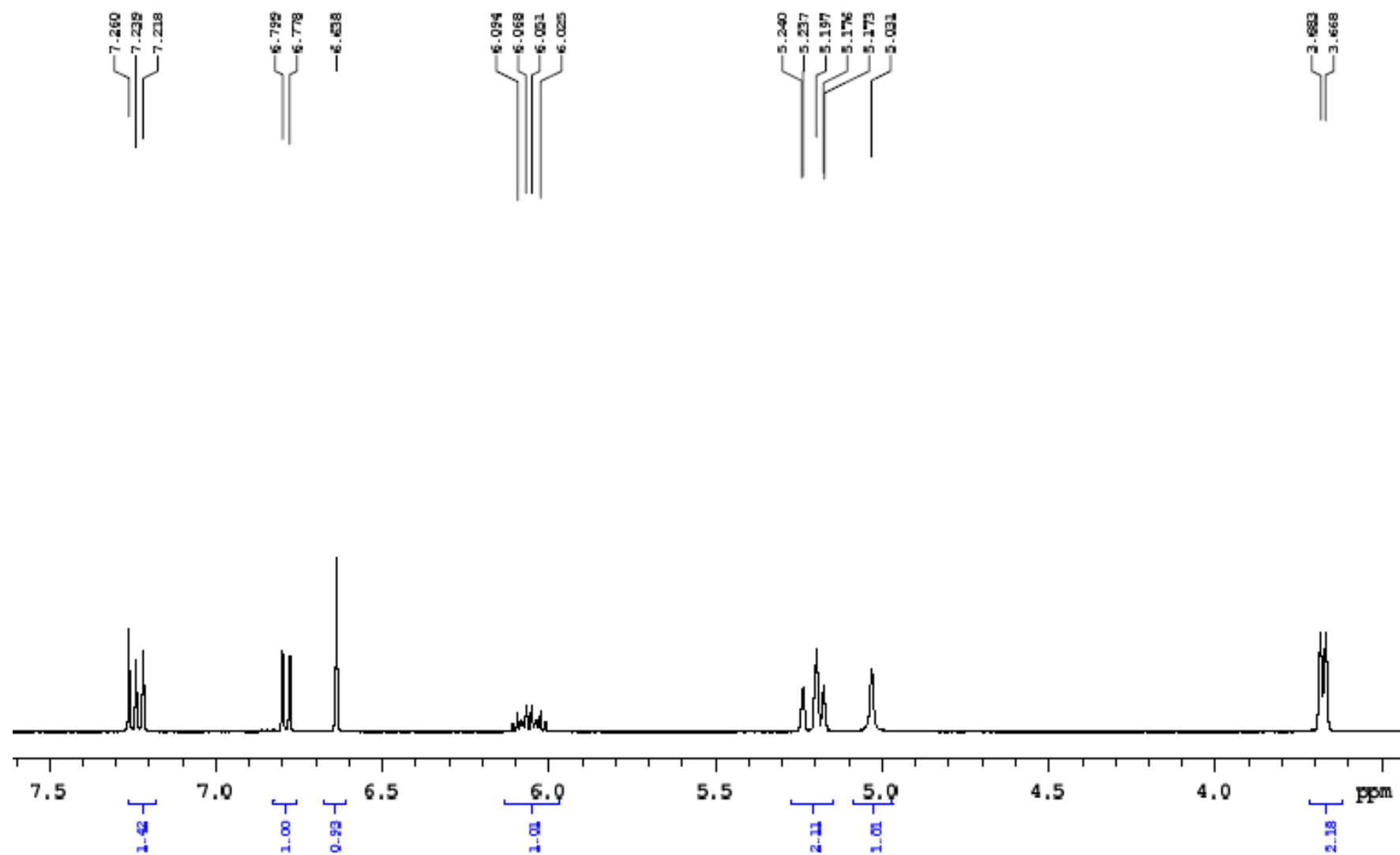
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Solvent: cdcl3
Data collected on: Jan 14 2019

Operator: klee

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Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE HL, 399.8039107 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec





^{13}C NMR (100 MHz, CDCl_3) spectrum of compound **3e**

STANDARD 1H OBSERVE - profile

Sample Name:
AS-IV-22-02
Data Collected on:
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Archive directory:

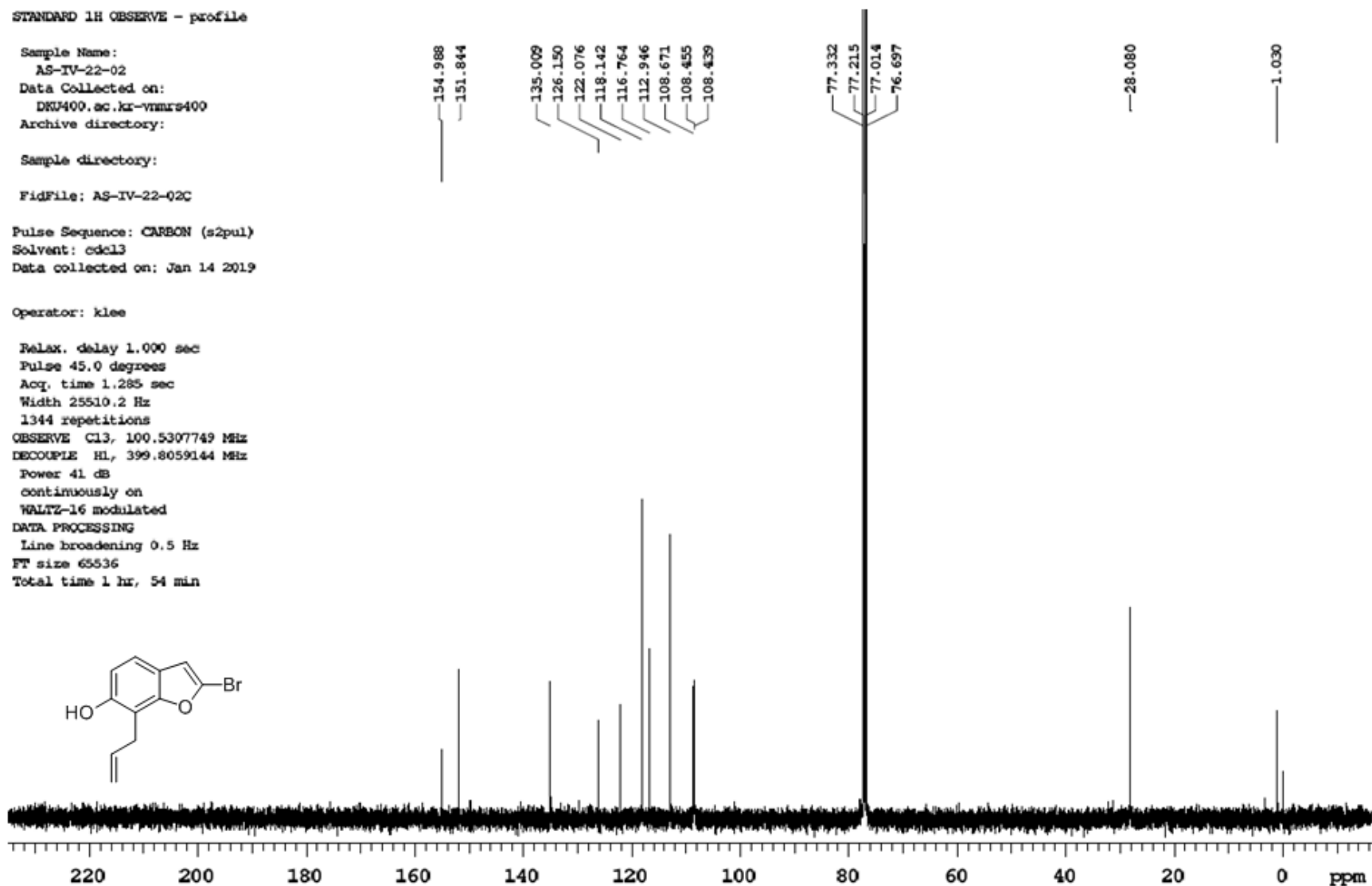
Sample directory:

FidFile: AS-IV-22-02C

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl_3
Data collected on: Jan 14 2019

Operator: klee

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Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
1344 repetitions
OBSERVE C13, 100.5307749 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound 3f

STANDARD 1H OBSERVE - profile

Sample Name:
AS-IV-41-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

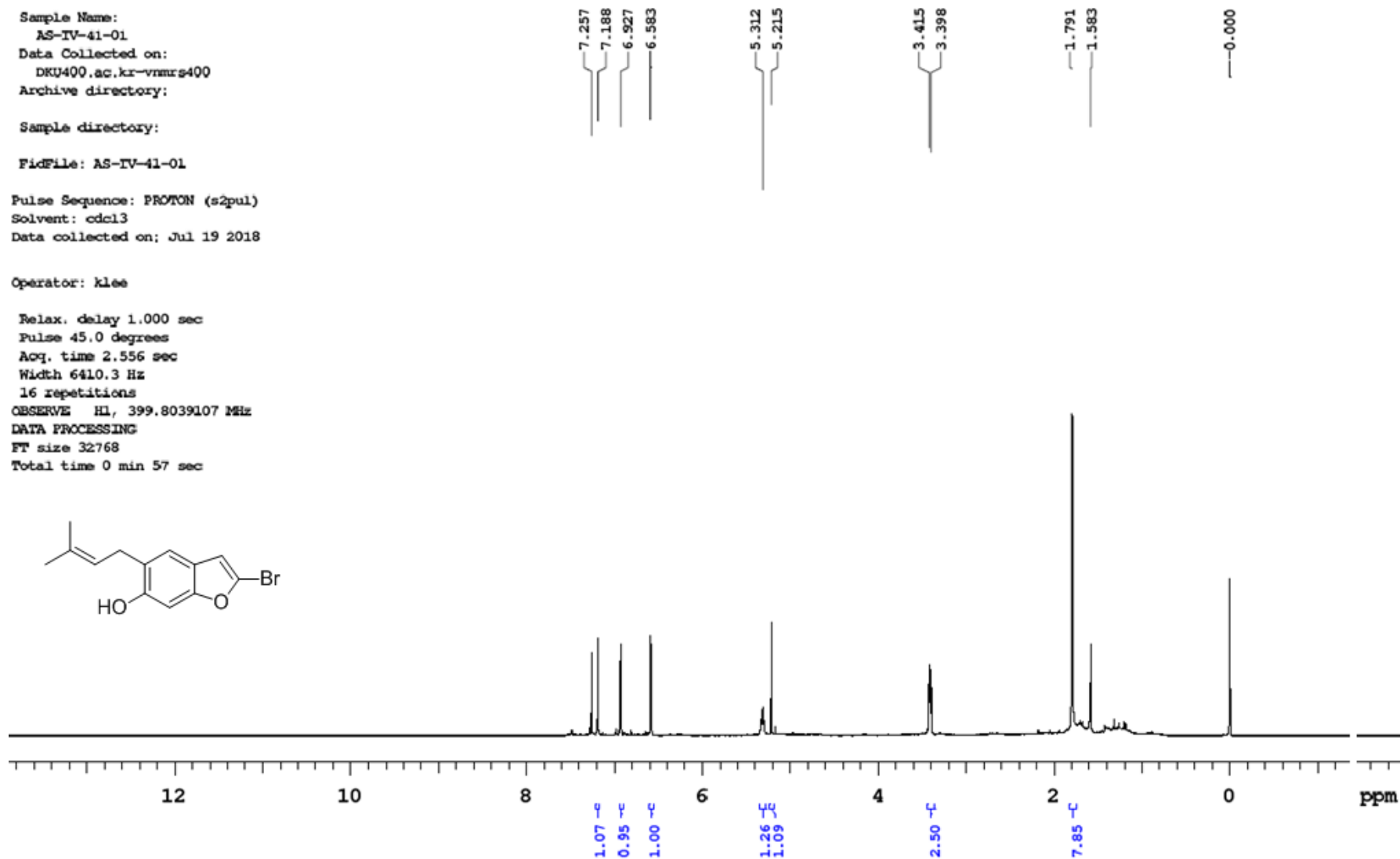
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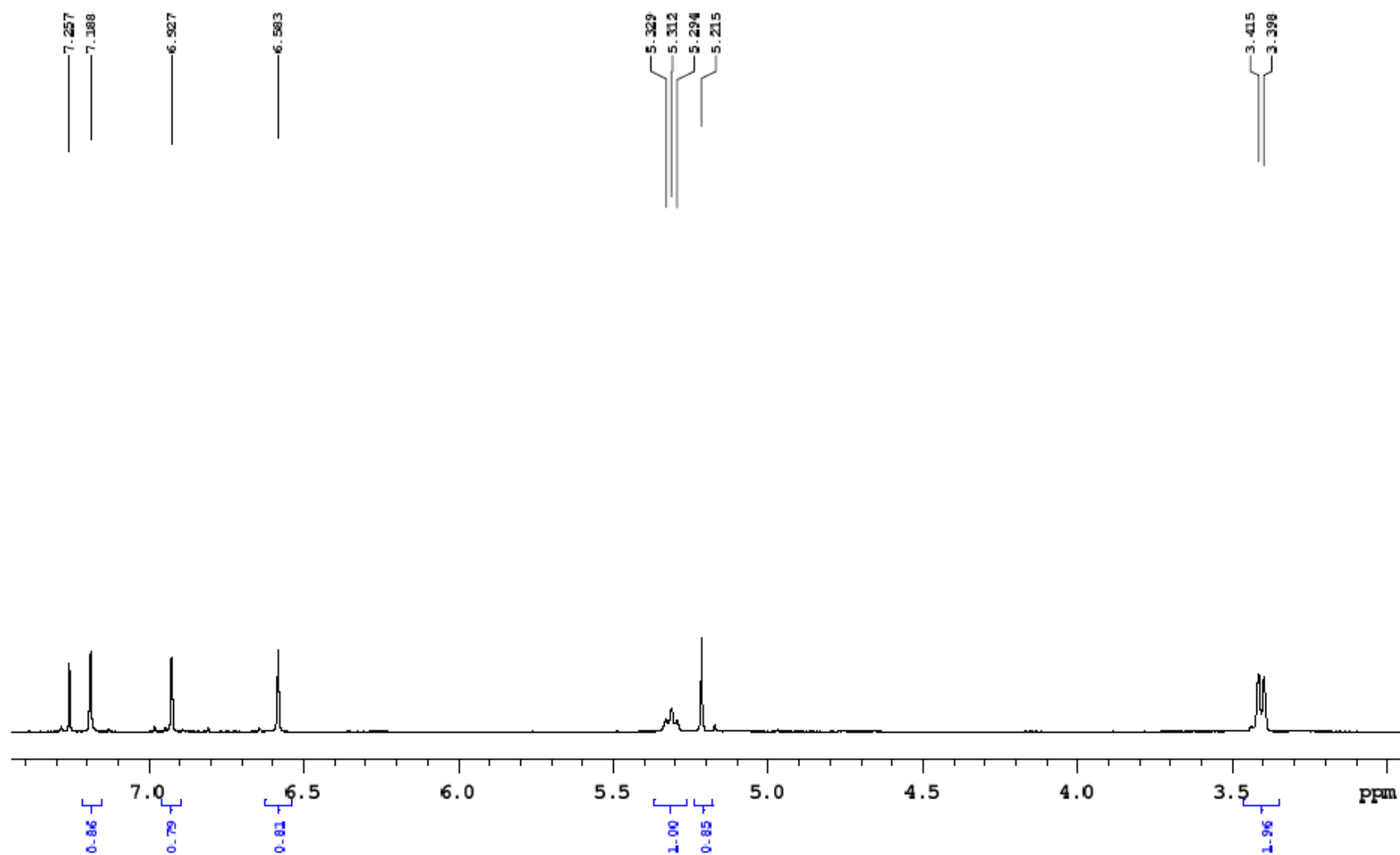
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Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Jul 19 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE H1, 399.8039107 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec





^{13}C NMR (100 MHz, CDCl_3) spectrum of compound **3f**

STANDARD 1H OBSERVE - profile

Sample Name:
AS-IV-41-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

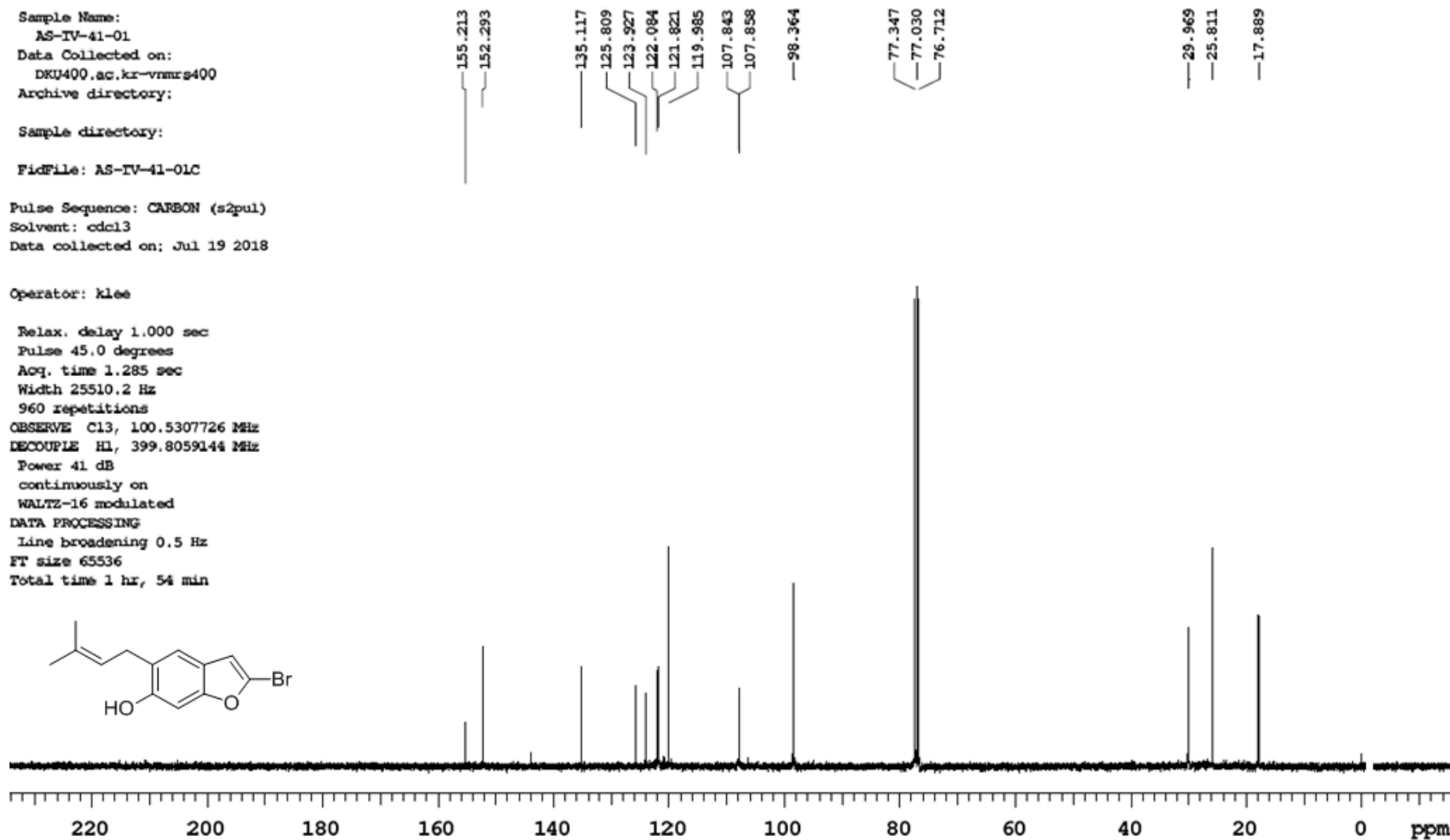
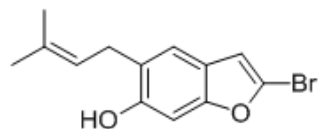
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Solvent: cdcl_3
Data collected on: Jul 19 2018

Operator: klee

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Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
960 repetitions
OBSERVE C13, 100.5307726 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound **3g**

new experiment

Sample Name:
AS-IV-26-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

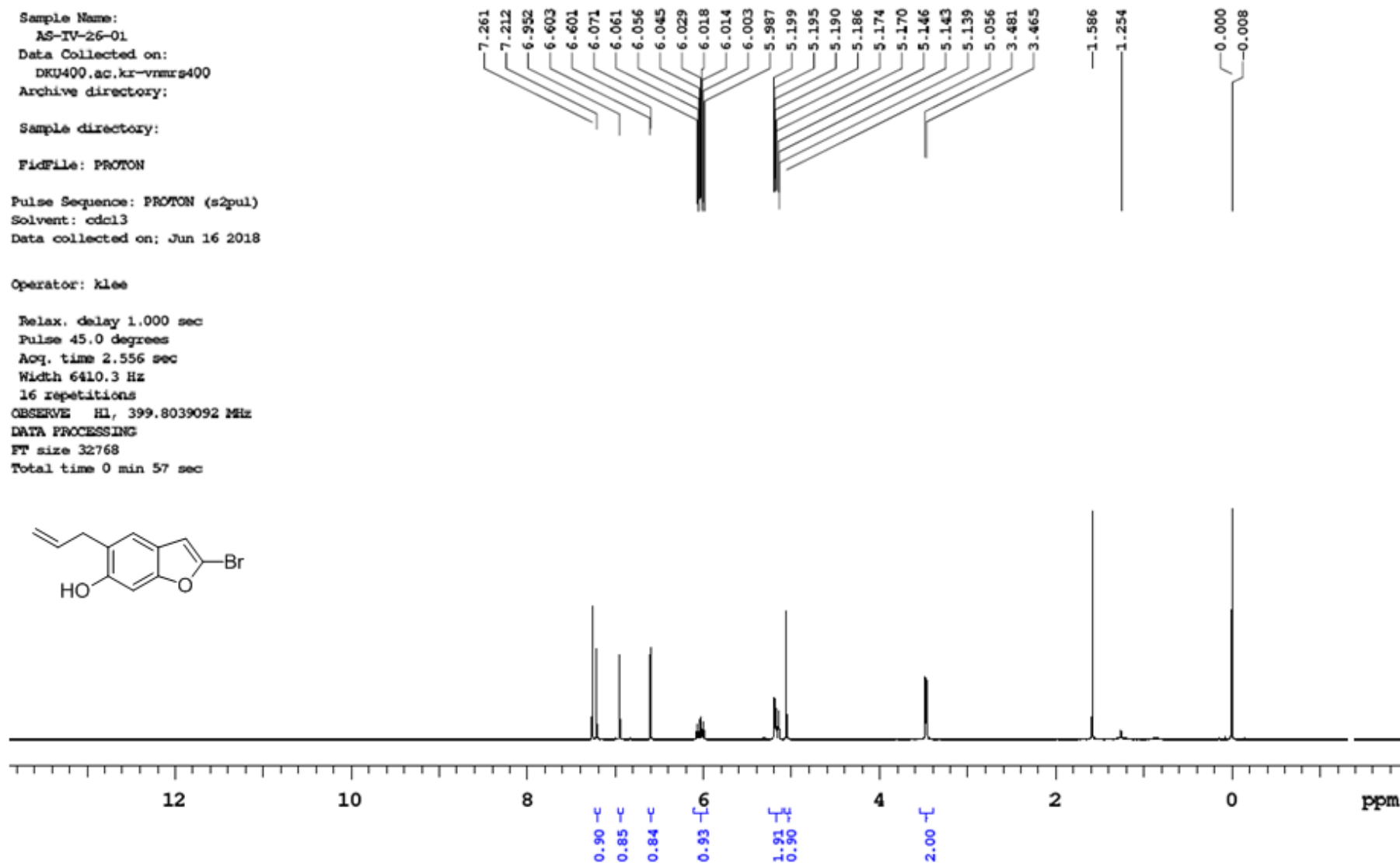
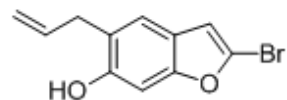
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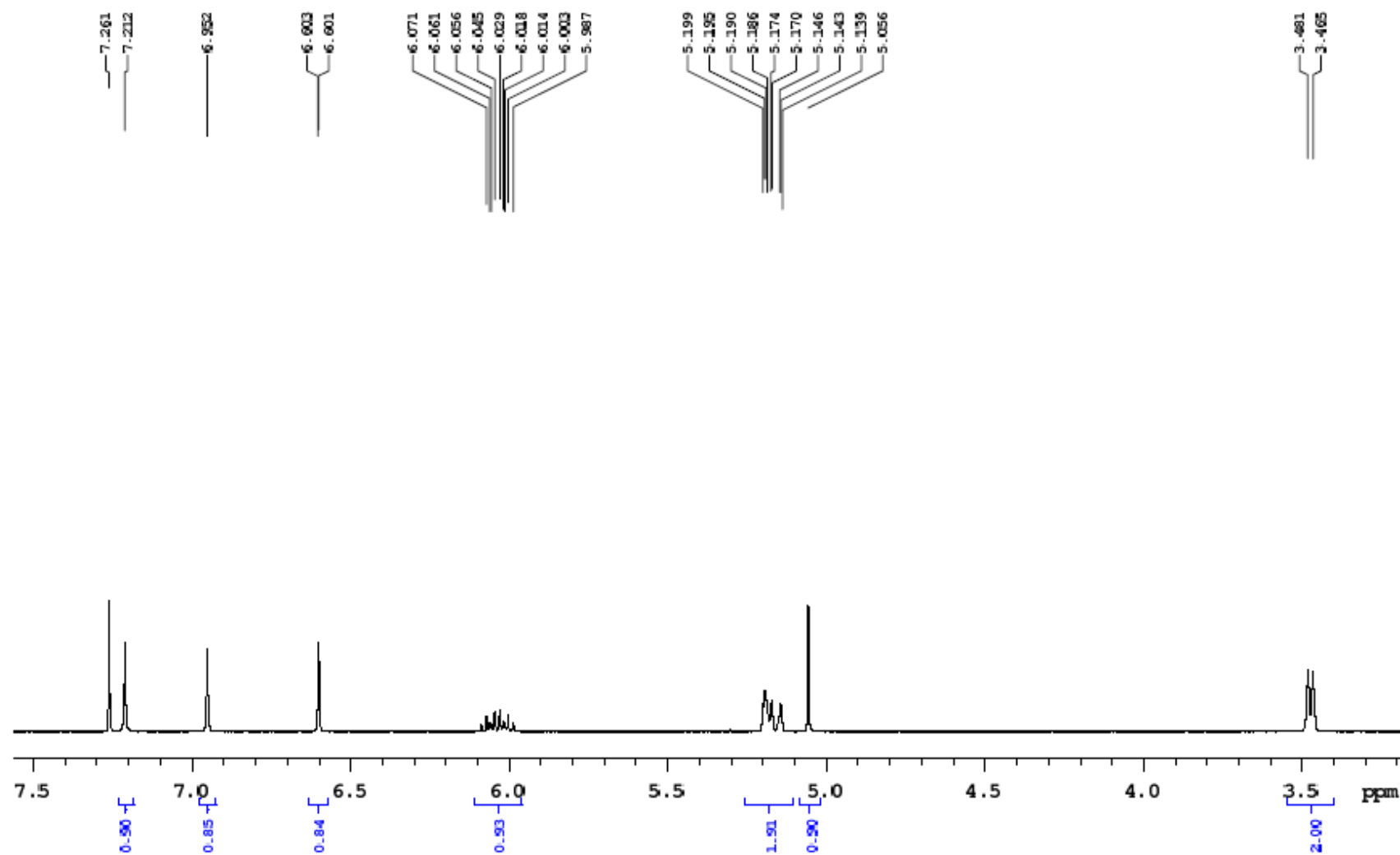
FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Jun 16 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE H1, 399.8039092 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec





¹³C NMR (100 MHz, CDCl₃) spectrum of compound **3g**

new experiment

Sample Name:
AS-IV-26-01
Data Collected on:
DEK400.ac.kr-vnmr400
Archive directory:

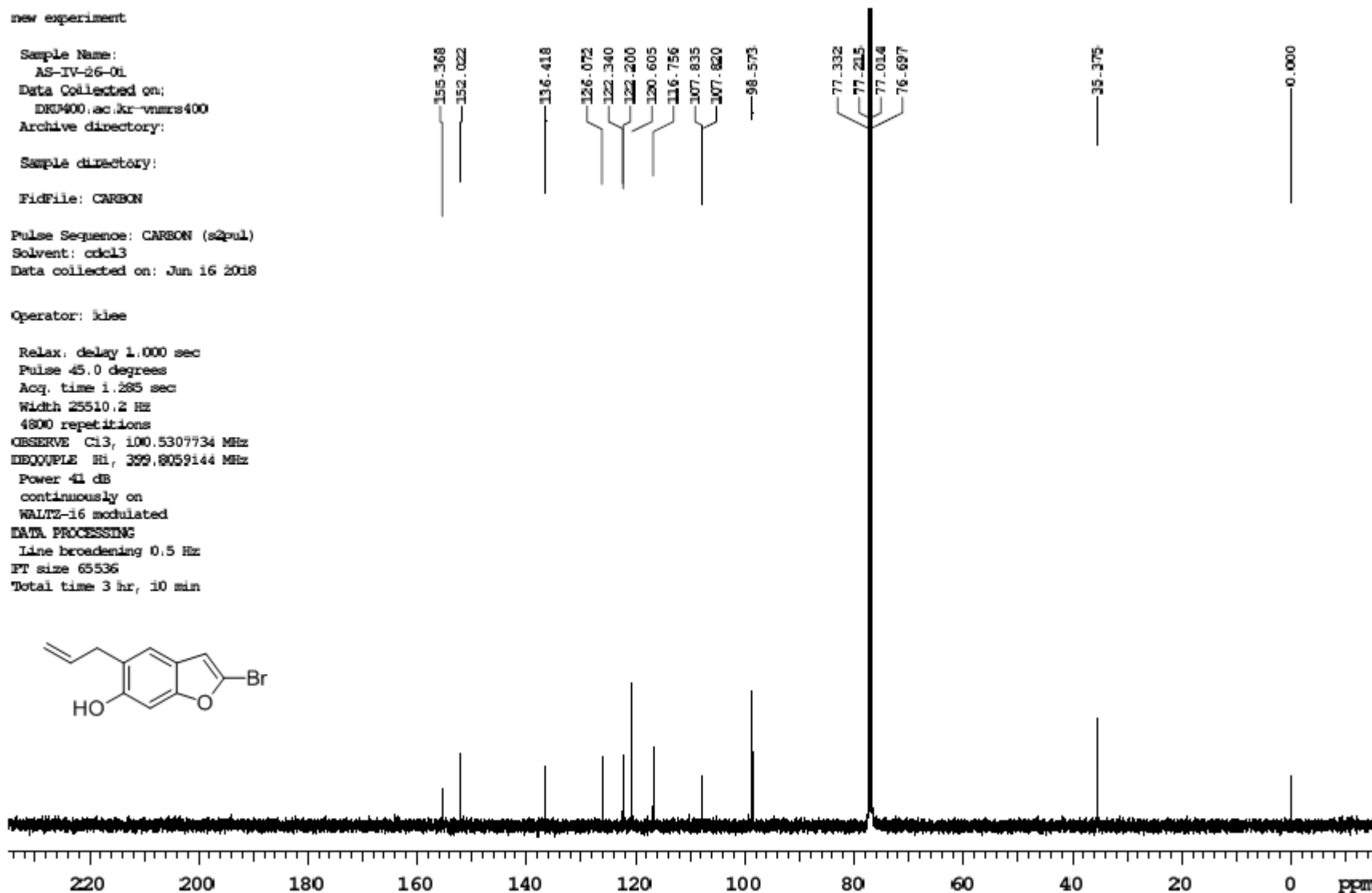
Sample directory:

FidFile: CARBON

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Jun 16 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
4800 repetitions
OBSERVE C13, 100.5307734 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 3 hr, 10 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound **3h**

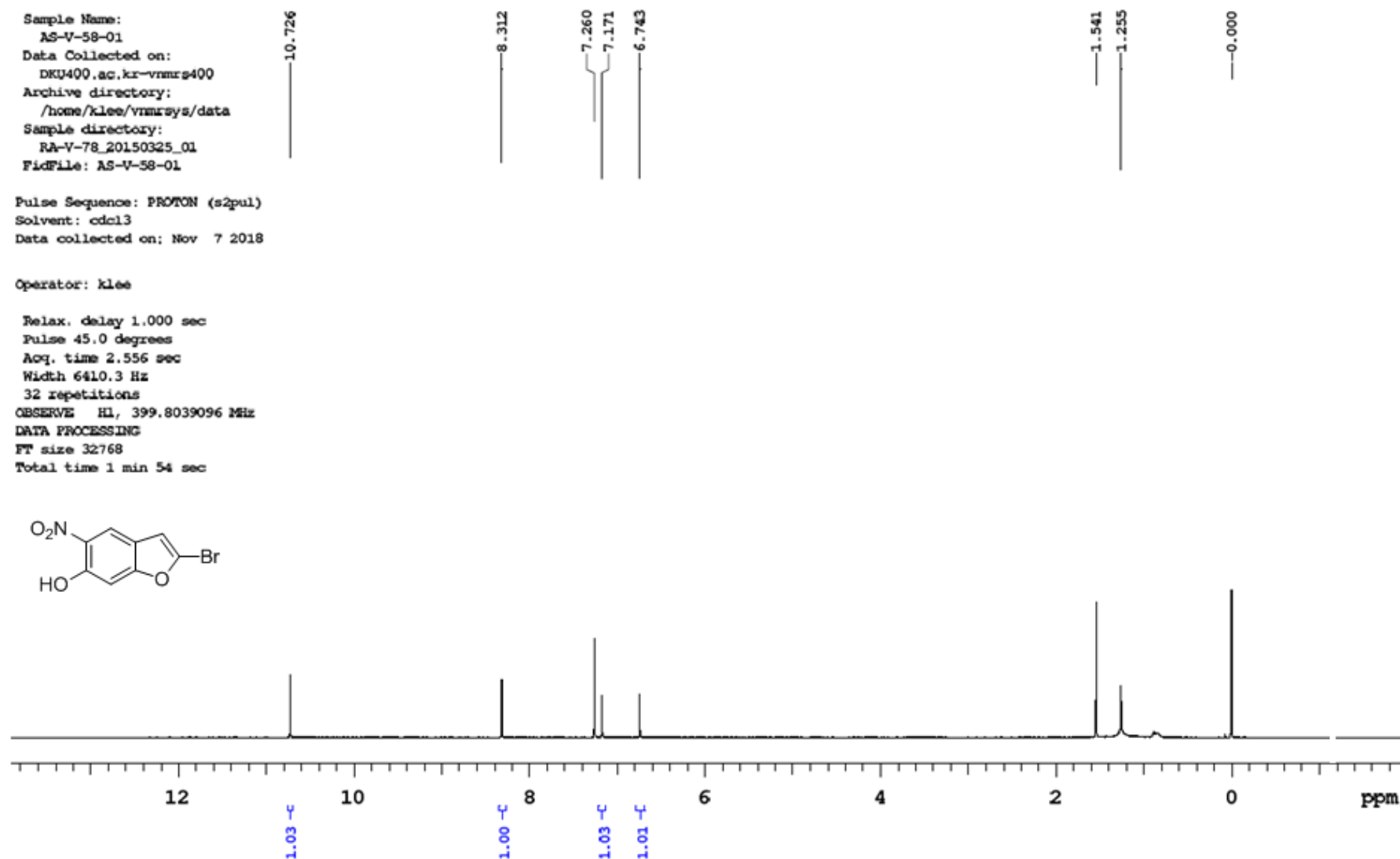
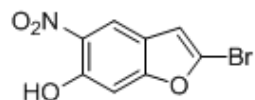
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-58-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-58-01

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Nov 7 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
32 repetitions
OBSERVE H1, 399.8039096 MHz
DATA PROCESSING
FT size 32768
Total time 1 min 54 sec



¹³C NMR (100 MHz, CDCl₃) spectrum of compound **3h**

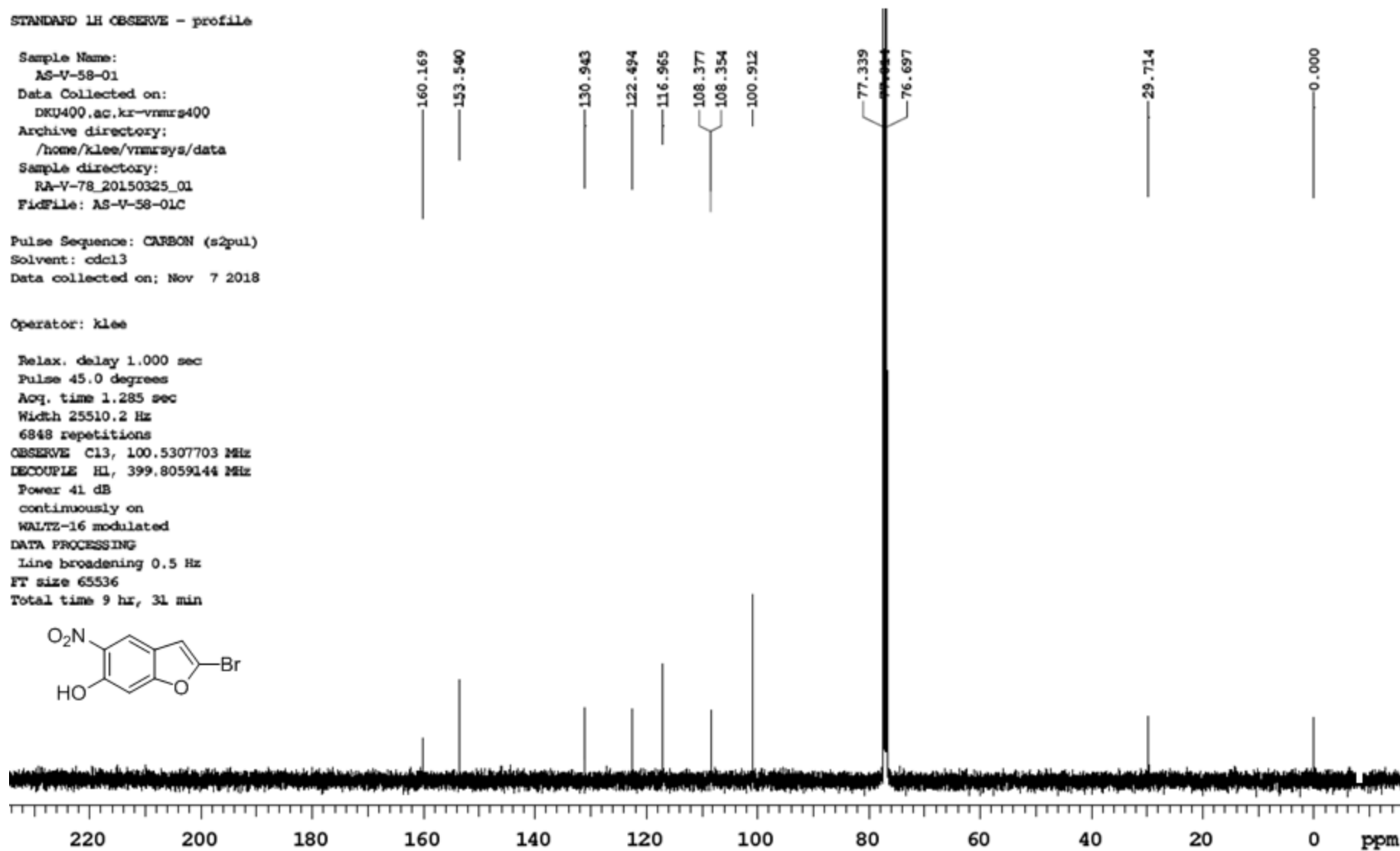
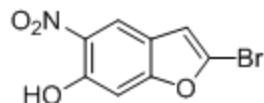
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-58-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/Klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-58-01C

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Nov 7 2018

Operator: Klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
6848 repetitions
OBSERVE C13, 100.5307703 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 9 hr, 31 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound 3i

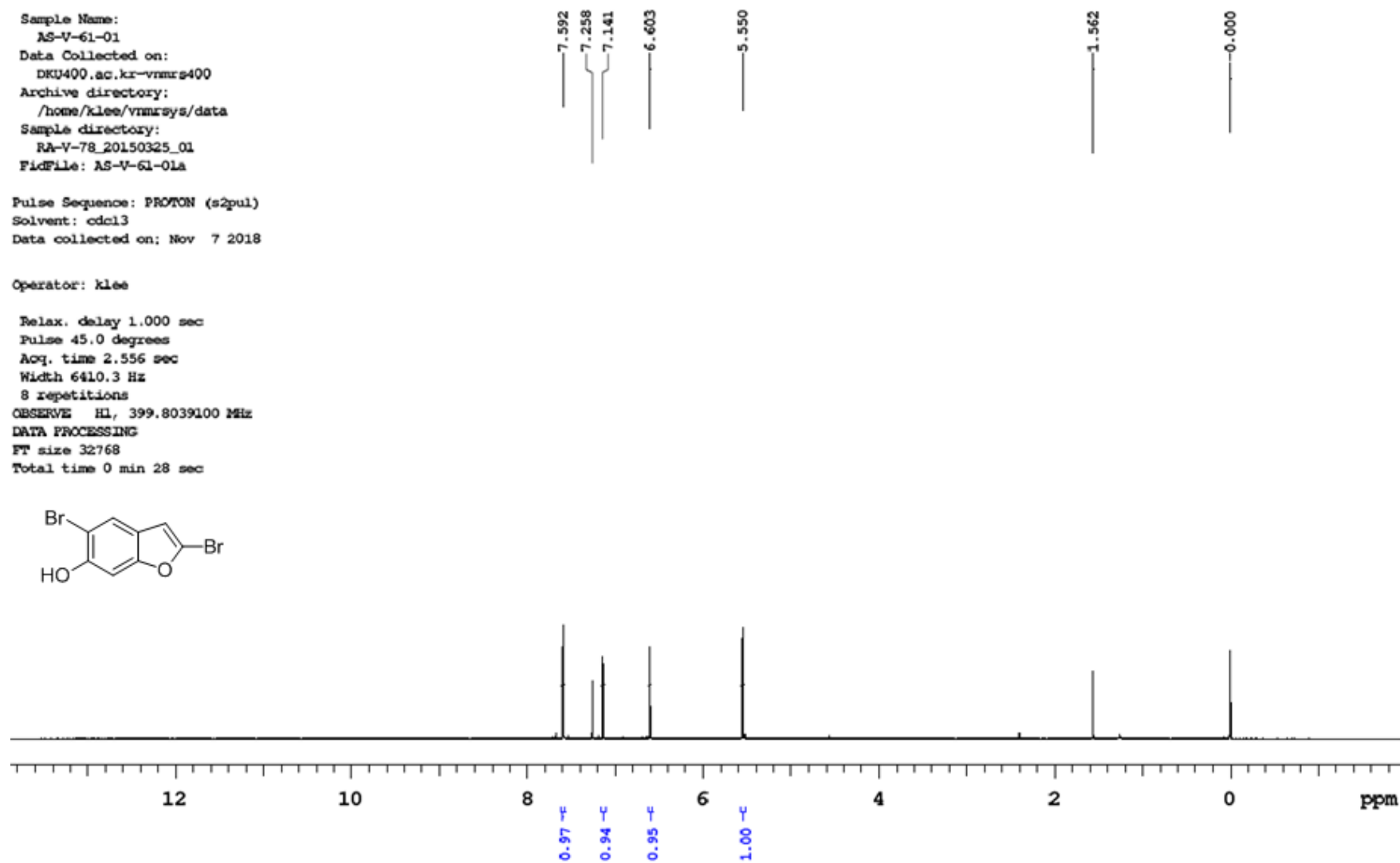
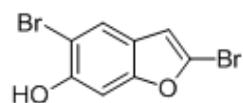
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-61-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-61-01a

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Nov 7 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
8 repetitions
OBSERVE H1, 399.8039100 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 28 sec



¹³C NMR (100 MHz, CDCl₃) spectrum of compound **3i**

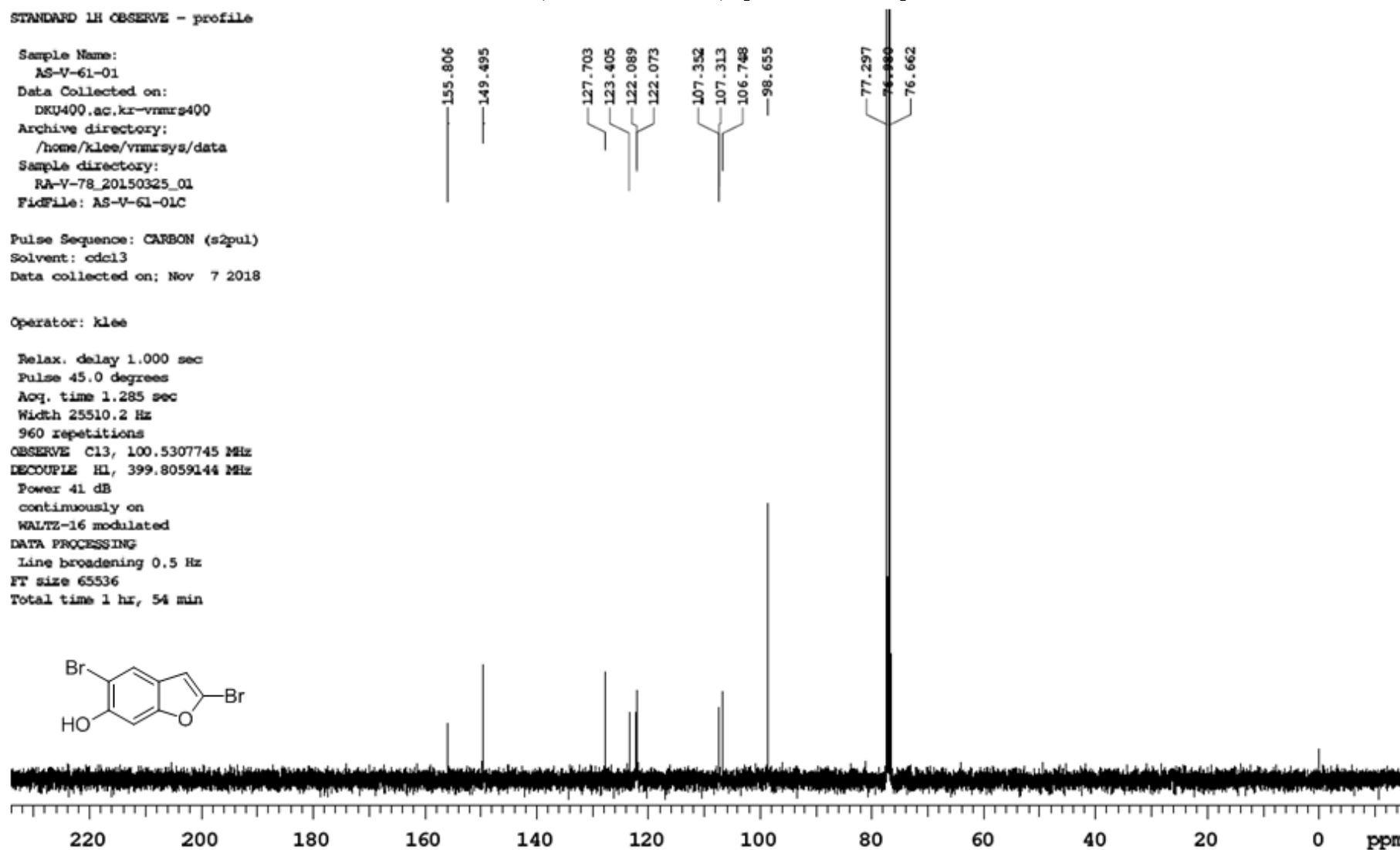
STANDARD LH OBSERVE - profile

Sample Name:
AS-V-61-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-61-01C

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Nov 7 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
960 repetitions
OBSERVE C13, 100.5307745 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹H NMR (400 MHz, DMSO-*d*₆) spectrum of compound 3j

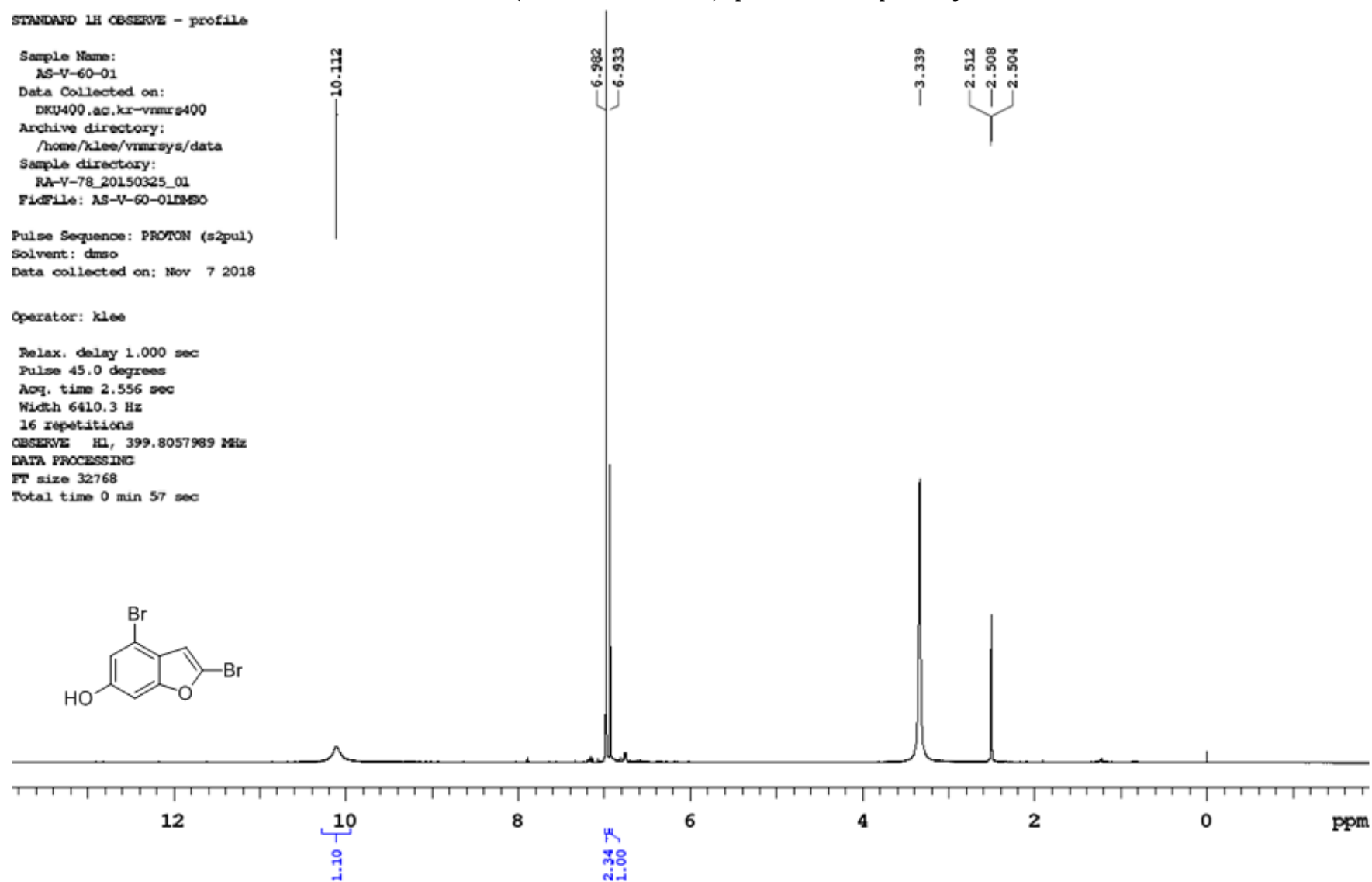
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-60-01
Data Collected on:
DKU400.ac.kr-vmrsg400
Archive directory:
/home/klee/vmrsg400/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-60-01DMSO

Pulse Sequence: PROTON (s2pul)
Solvent: dmsd
Data collected on: Nov 7 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE H1, 399.8057969 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec



¹³C NMR (100 MHz, DMSO-*d*₆) spectrum of compound 3j

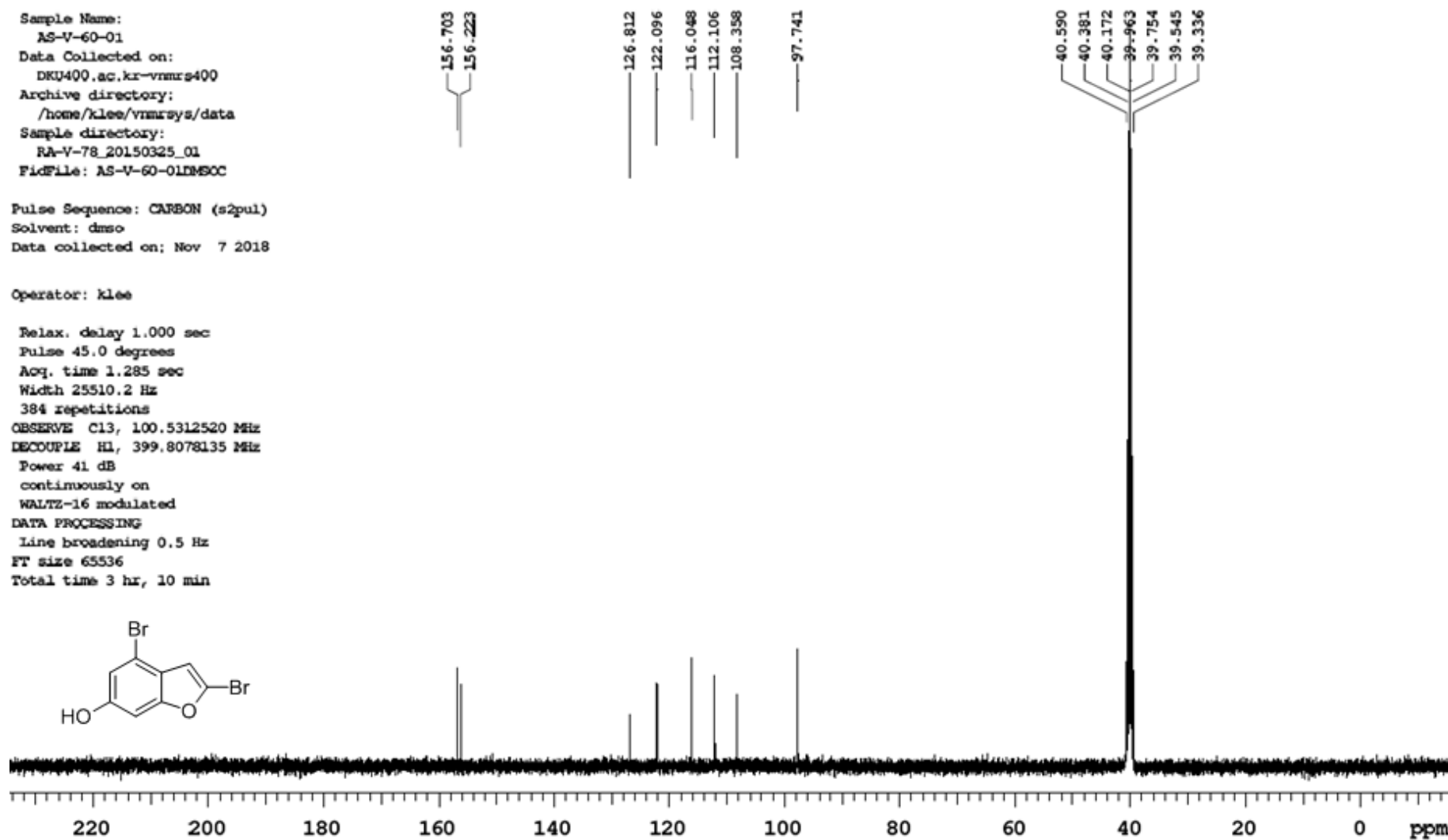
STANDARD LH OBSERVE - profile

Sample Name:
AS-V-60-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-60-01DMSOC

Pulse Sequence: CARBON (s2pul)
Solvent: dmsc
Data collected on; Nov 7 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
384 repetitions
OBSERVE C13, 100.5312520 MHz
DECOUPLE H1, 399.8078135 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 3 hr, 10 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound **3k**

STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-57-02
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

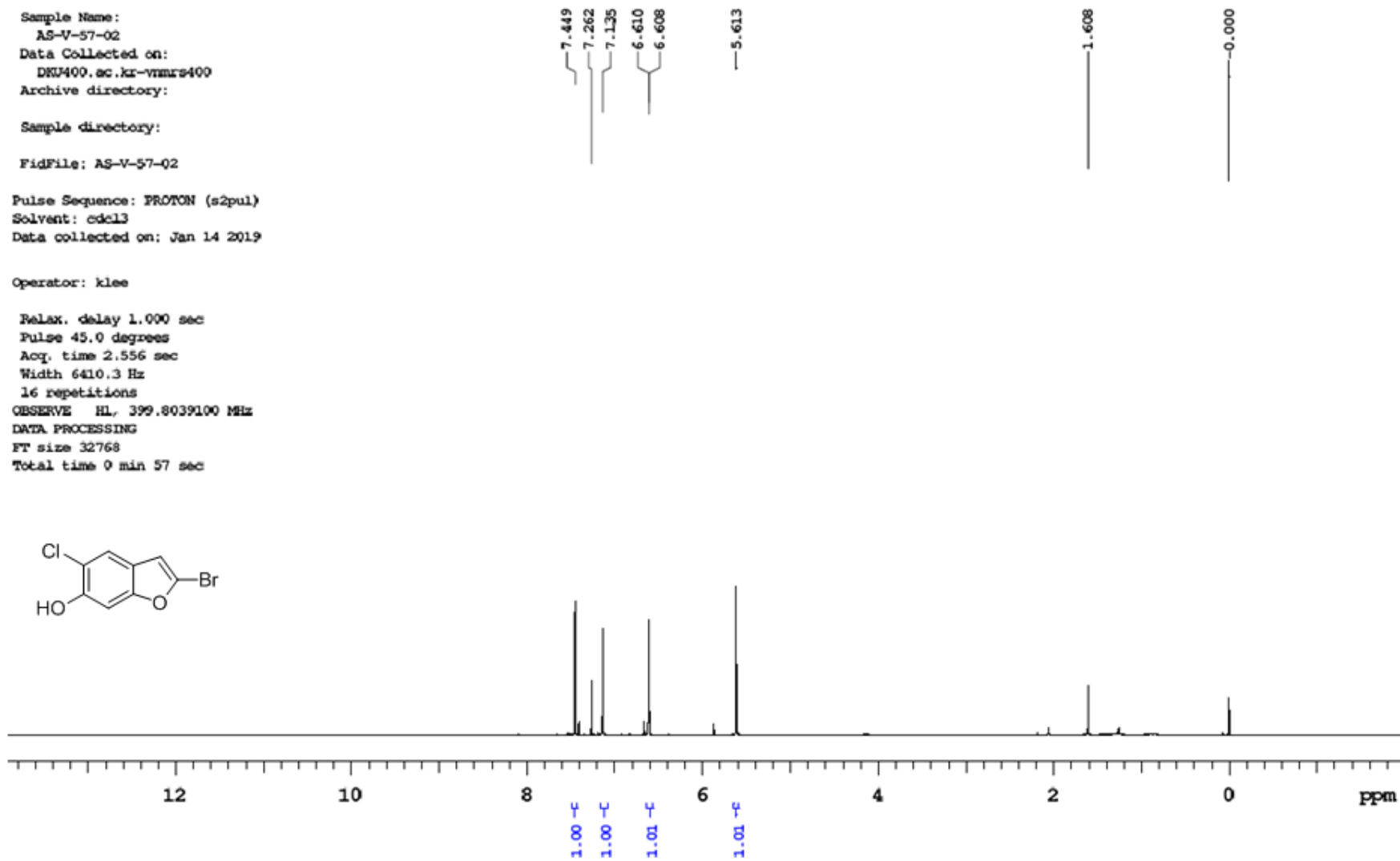
Sample directory:

FidFile: AS-V-57-02

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Jan 14 2019

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE HL, 399.8039100 MHz
DATA PROCESSING
FT size 32768
Total time 9 min 57 sec



¹³C NMR (100 MHz, CDCl₃) spectrum of compound **3k**

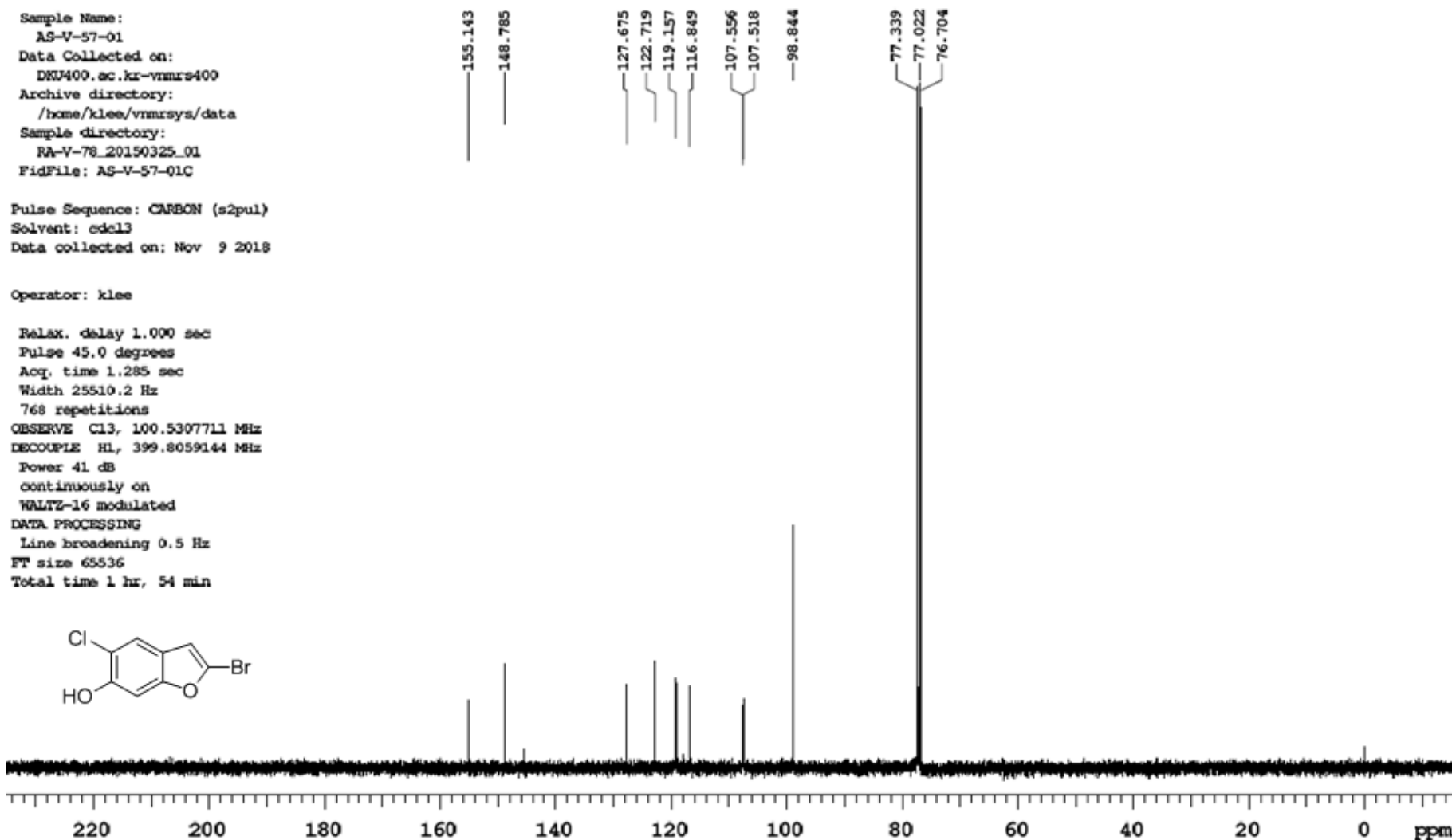
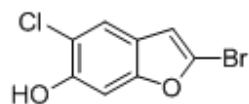
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-57-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/kee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-57-01C

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Nov 9 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
768 repetitions
OBSERVE C13, 100.5307711 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound 3l

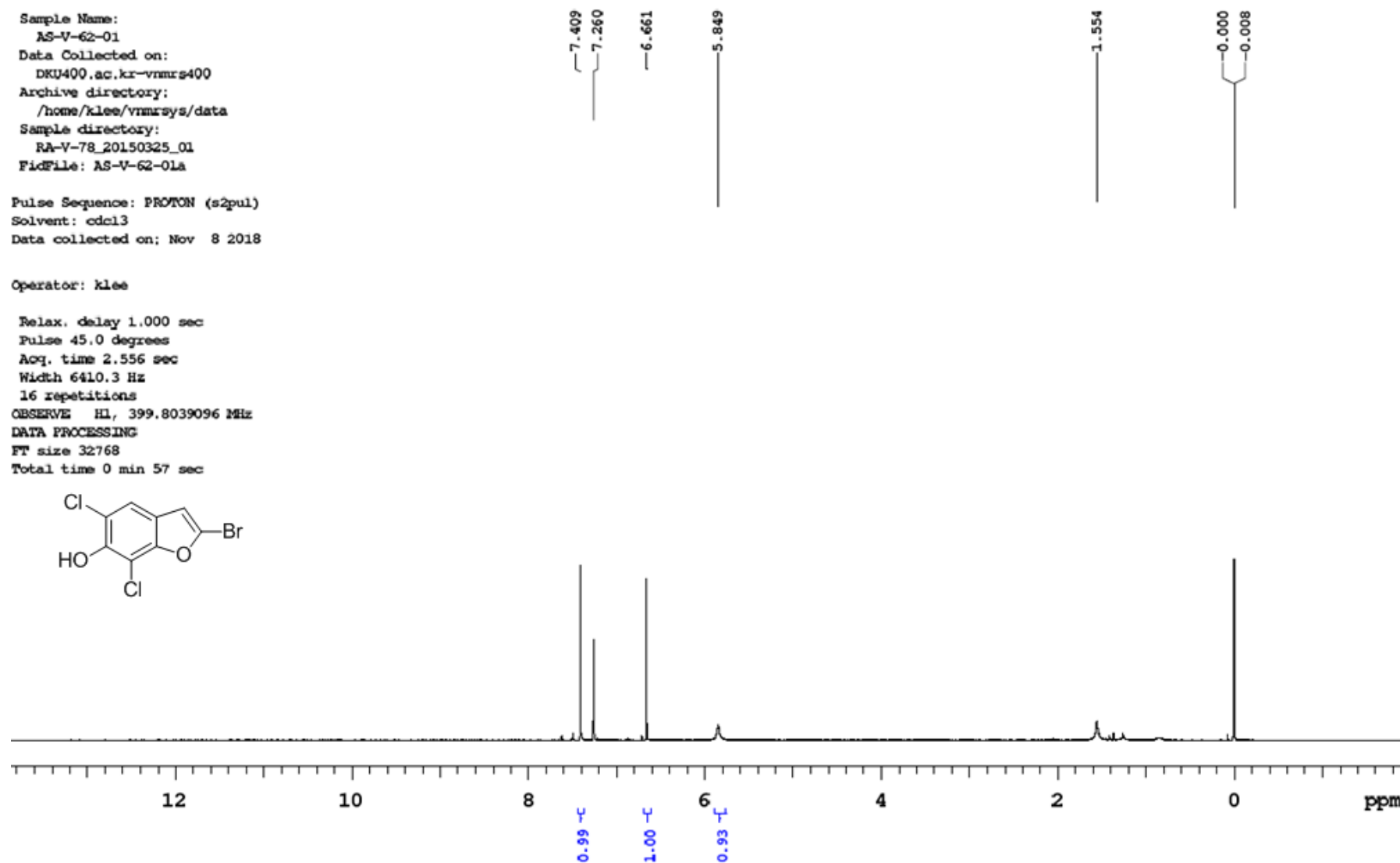
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-62-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-62-01a

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Nov 8 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE H1, 399.8039096 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec



^{13}C NMR (100 MHz, CDCl_3) spectrum of compound **31**

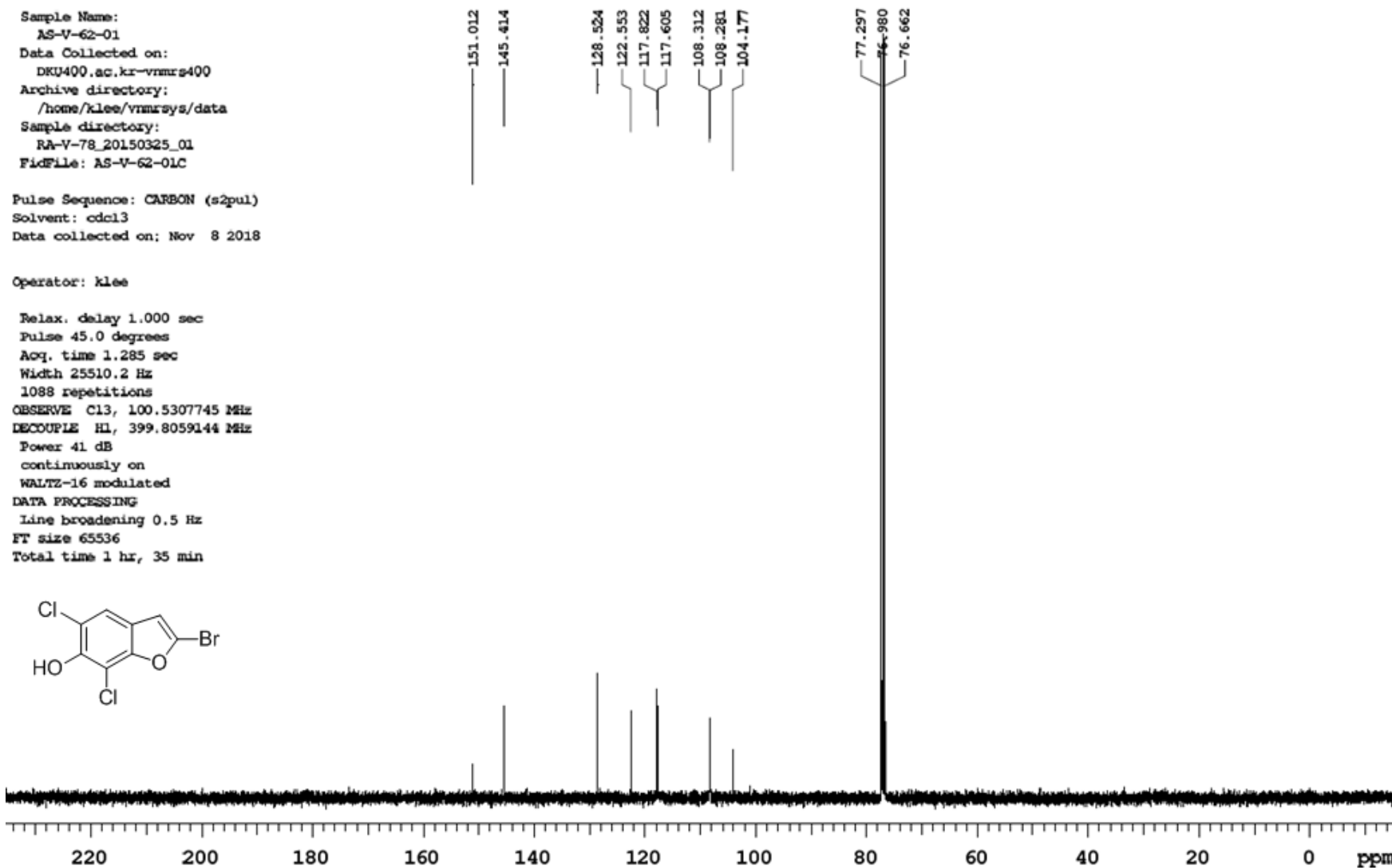
STANDARD LH OBSERVE - profile

Sample Name:
AS-V-62-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-62-01C

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl_3
Data collected on: Nov 8 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
1088 repetitions
OBSERVE C13, 100.5307745 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 35 min



¹H NMR (400 MHz, DMSO-d₆) spectrum of compound **3m**

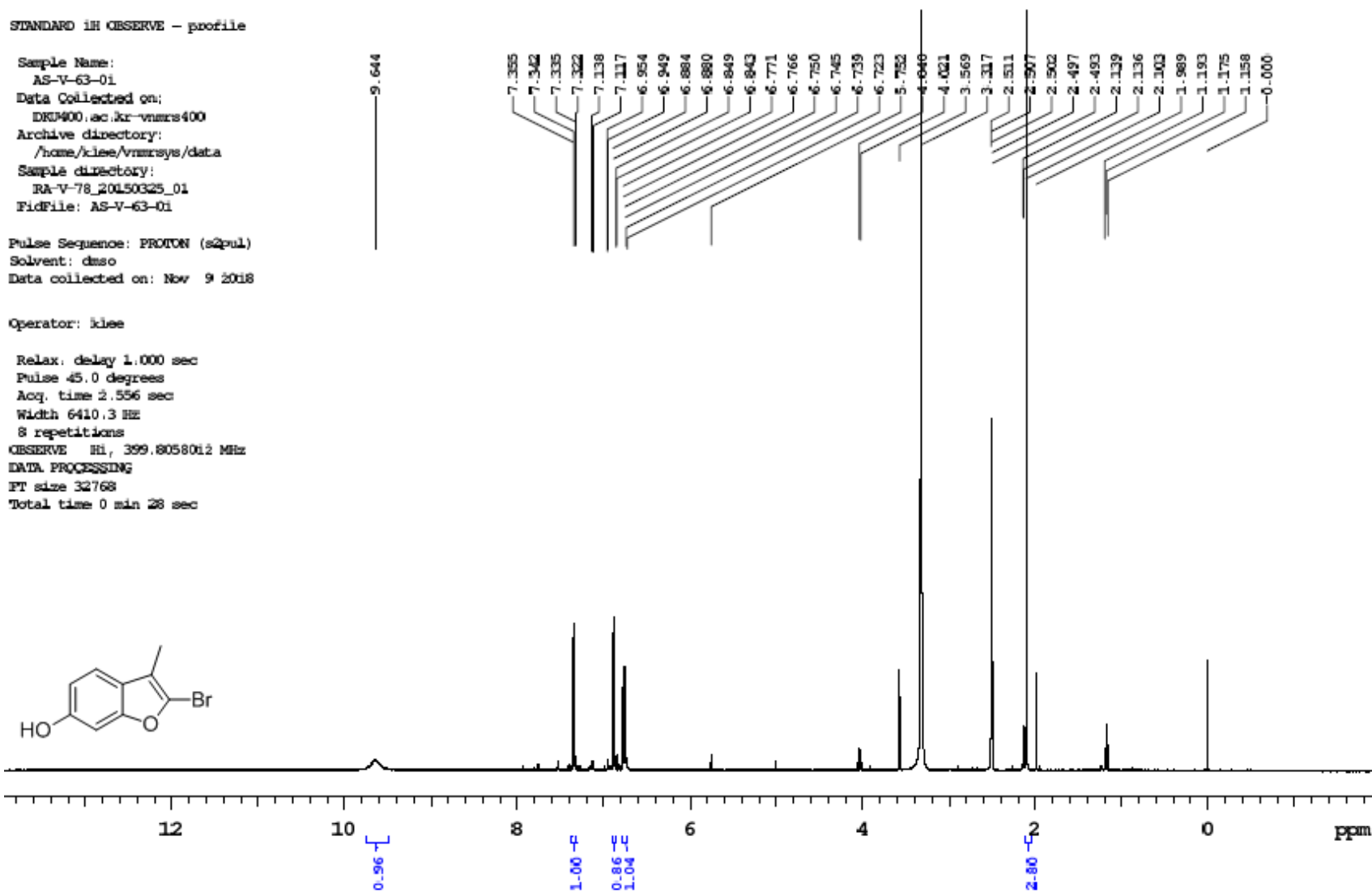
STANDARD 1H OBSERVE - profile

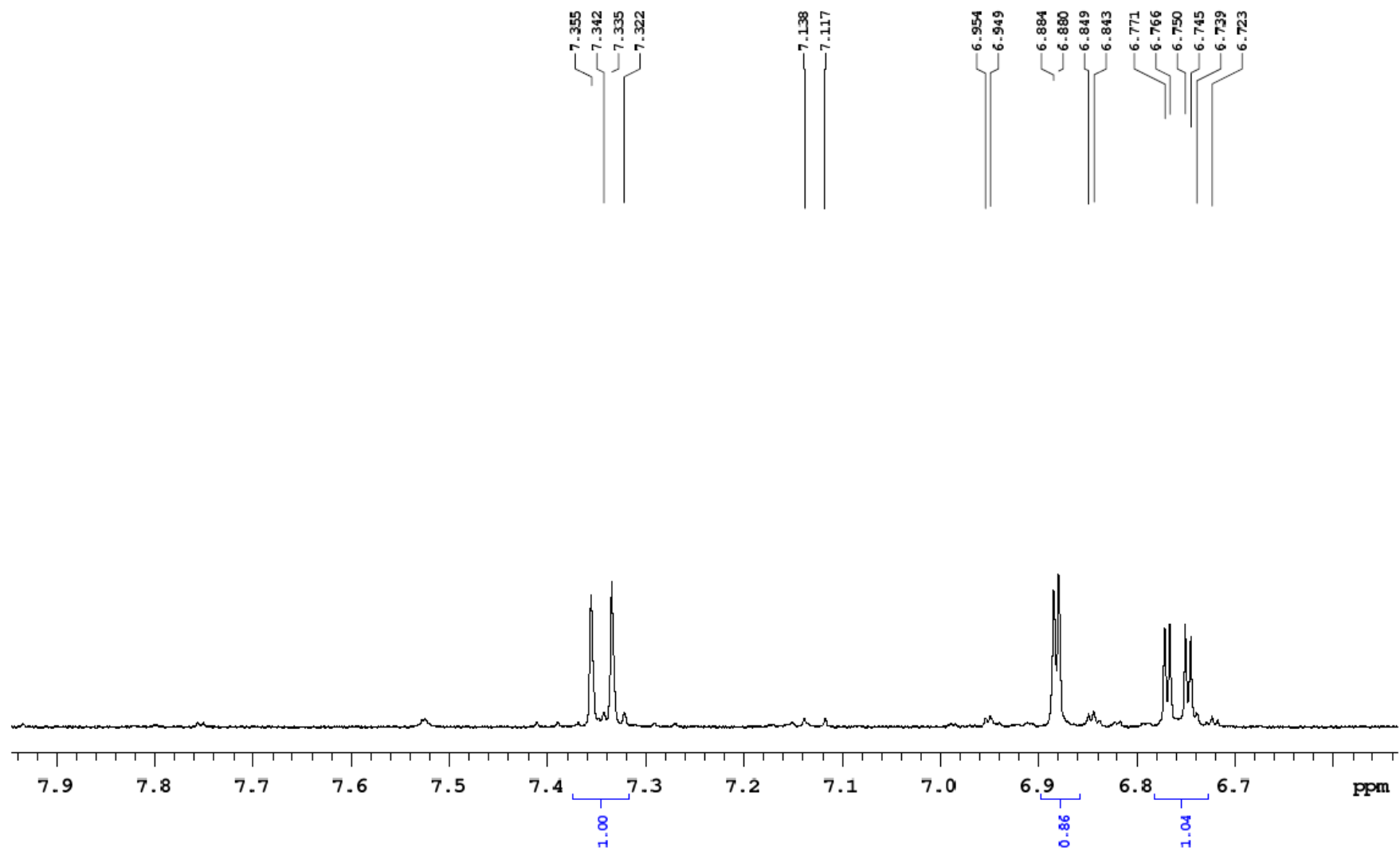
Sample Name:
AS-V-63-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-63-01

Pulse Sequence: PROTON (s2pul)
Solvent: dms
Data collected on: Nov 9 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
8 repetitions
OBSERVE H1, 399.8058012 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 28 sec





^{13}C NMR (100 MHz, DMSO- d_6) spectrum of compound **3m**

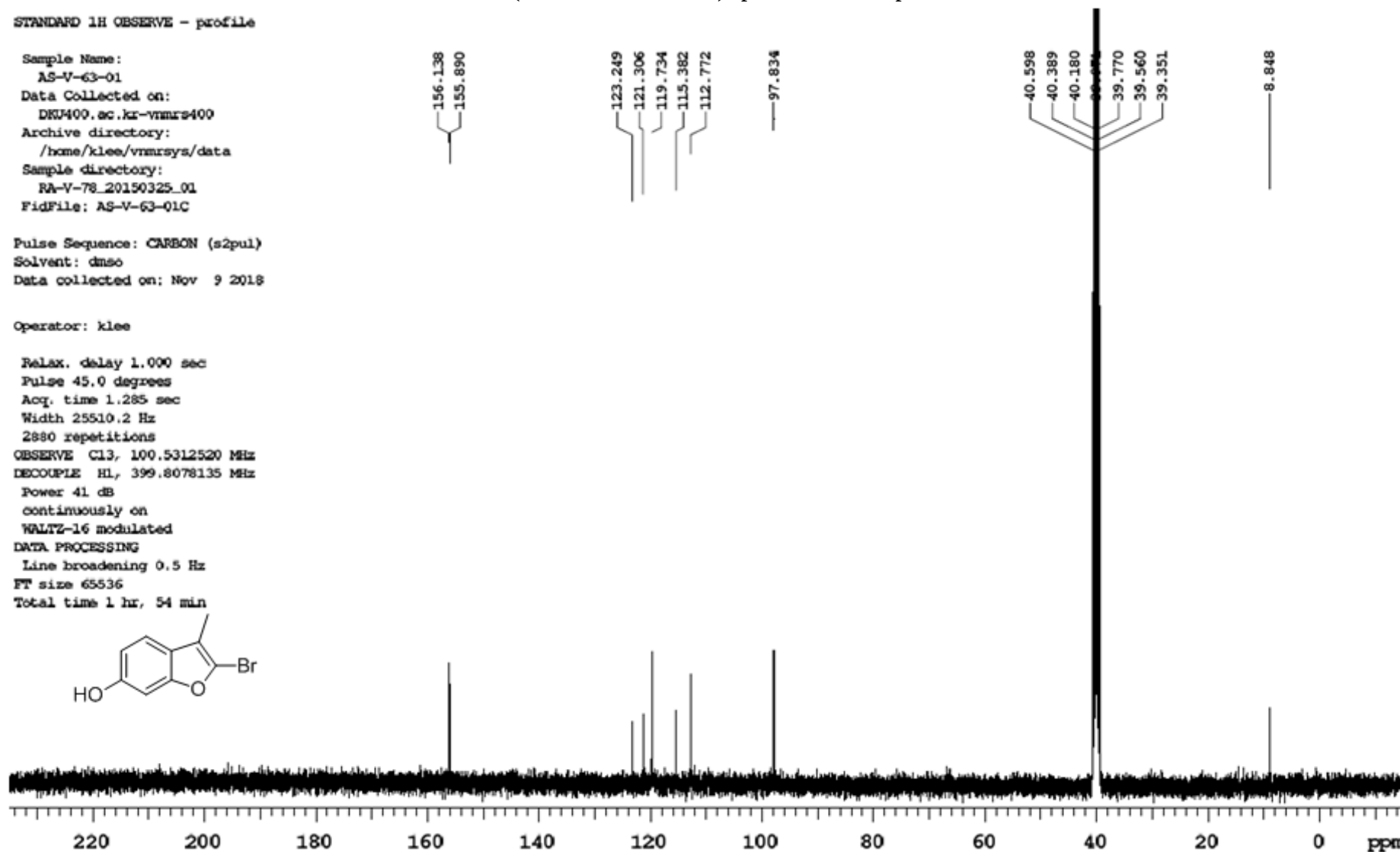
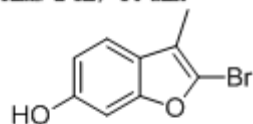
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-63-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-63-Q1C

Pulse Sequence: CARBON (s2pul)
Solvent: dmsd
Data collected on: Nov 9 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
2880 repetitions
OBSERVE C13, 100.5312520 MHz
DECOUPLE H1, 399.8078135 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹H NMR (400 MHz, DMSO-*d*₆) spectrum of compound **13**

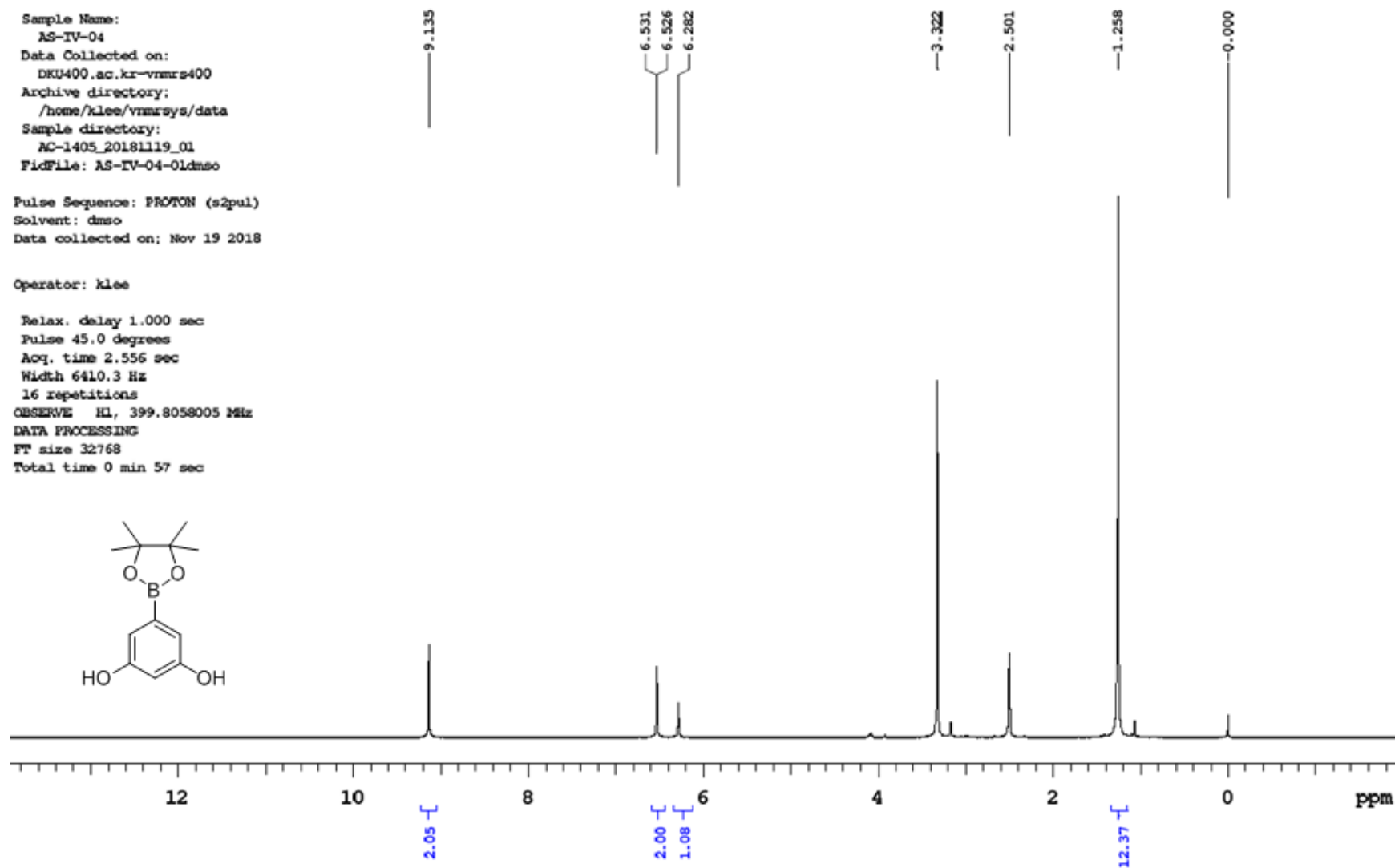
STANDARD 1H OBSERVE - profile

Sample Name:
AS-IV-04
Data Collected on:
DKU400.ac.kr~vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
AC-1405_20181119_01
FidFile: AS-IV-04-01dms0

Pulse Sequence: PROTON (s2pul)
Solvent: dms0
Data collected on: Nov 19 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE H1, 399.8058005 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec



¹³C NMR (100 MHz, DMSO-d₆) spectrum of compound **13**

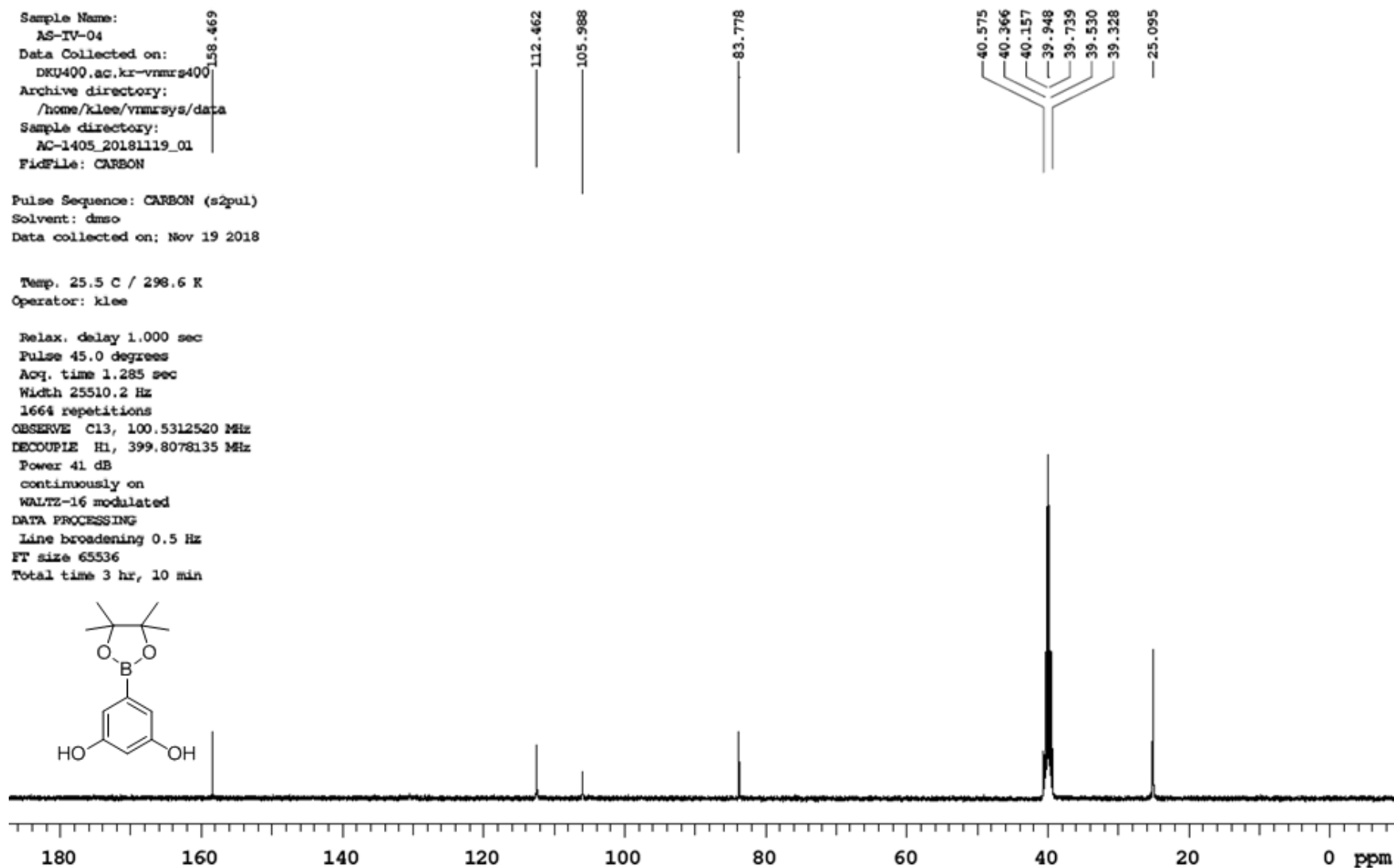
STANDARD 1H OBSERVE - profile

Sample Name: AS-IV-04
Data Collected on: DKU400.ac.kr-vnmrs400
Archive directory: /home/klee/vnmrsys/data
Sample directory: AC-1405_20181119_01
FidFile: CARBON

Pulse Sequence: CARBON (s2pul)
Solvent: dmsd
Data collected on: Nov 19 2018

Temp. 25.5 C / 298.6 K
Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
1664 repetitions
OBSERVE C13, 100.5312520 MHz
DECOUPLE H1, 399.8078135 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 3 hr, 10 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound **14**

STANDARD 1H OBSERVE - profile

Sample Name:

AS-IV-43-01

Data Collected on:

DKU400.ac.kr-vnmrs400

Archive directory:

Sample directory:

FidFile: PROTON

Pulse Sequence: PROTON (s2pul)

Solvent: cdcl3

Data collected on: Jul 20 2018

Operator: klee

Relax. delay 1.000 sec

Pulse 45.0 degrees

Acq. time 2.556 sec

Width 6410.3 Hz

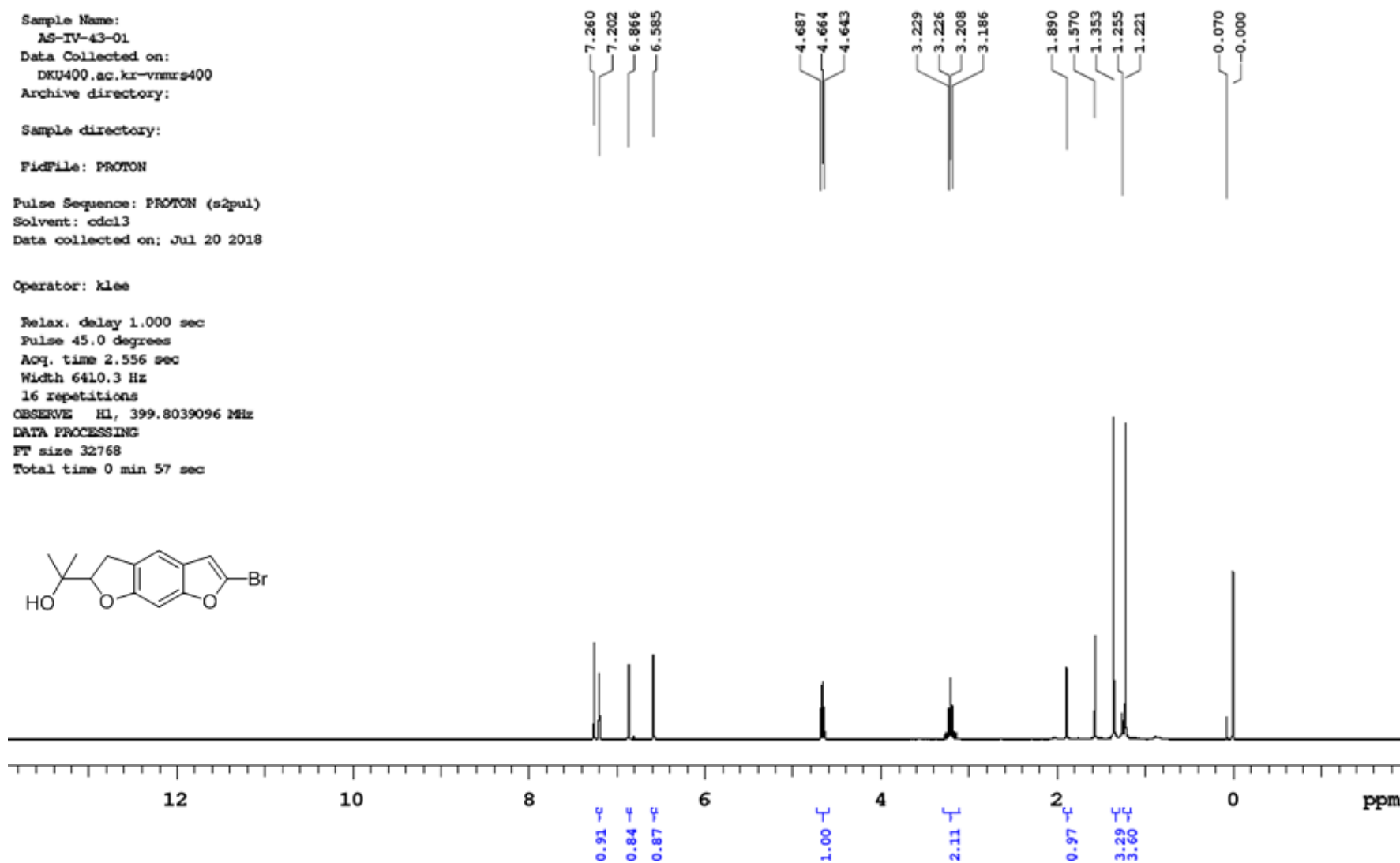
16 repetitions

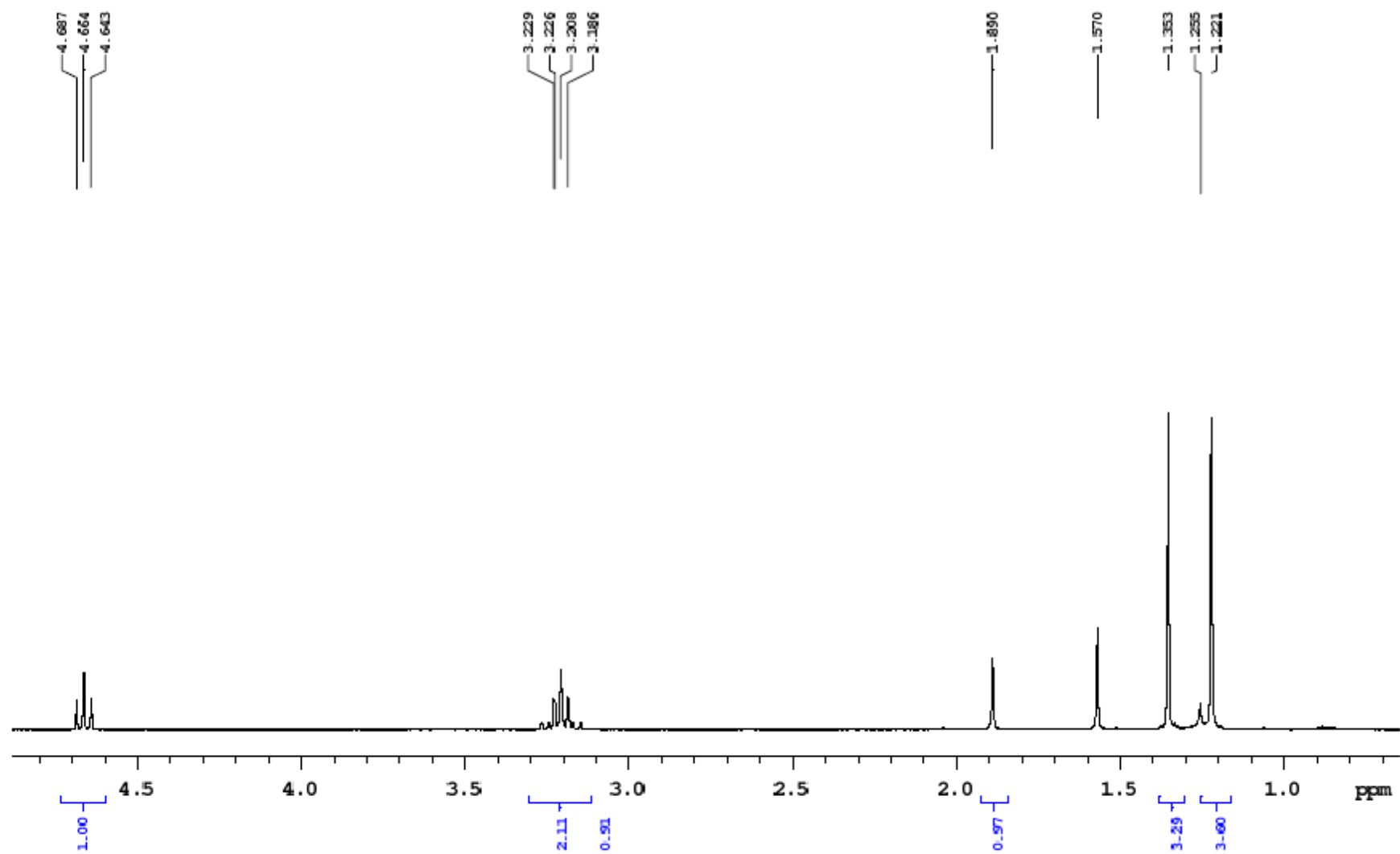
OBSERVE H1, 399.8039096 MHz

DATA PROCESSING

FT size 32768

Total time 0 min 57 sec





¹³C NMR (100 MHz, CDCl₃) spectrum of compound **14**

STANDARD LH OBSERVE - profile

Sample Name:
AS-IV-43-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

Sample directory:

FidFile: AS-IV-43-OLC

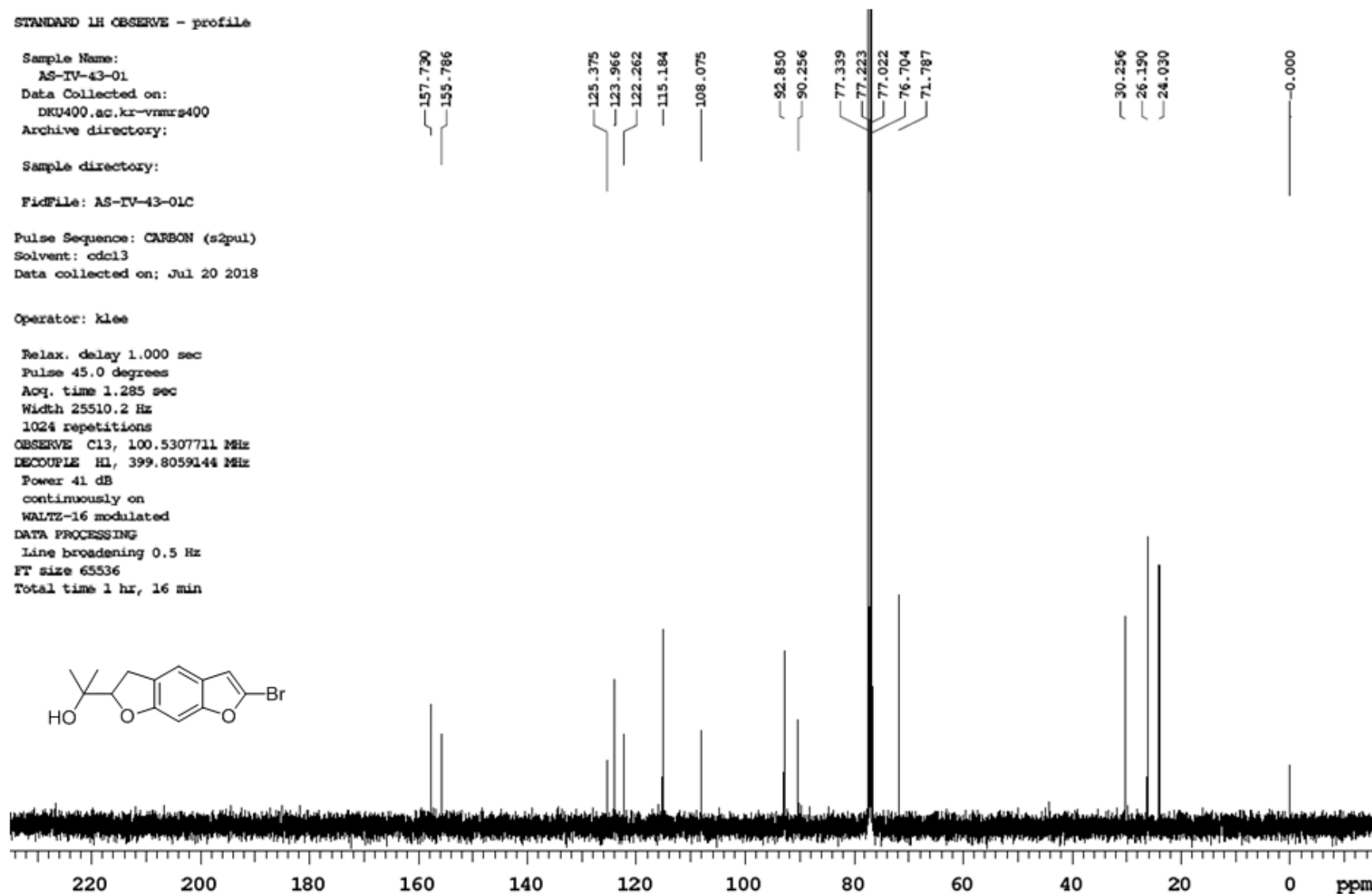
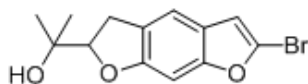
Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Jul 20 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
1024 repetitions

OBSERVE C13, 100.5307711 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated

DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 16 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound 15

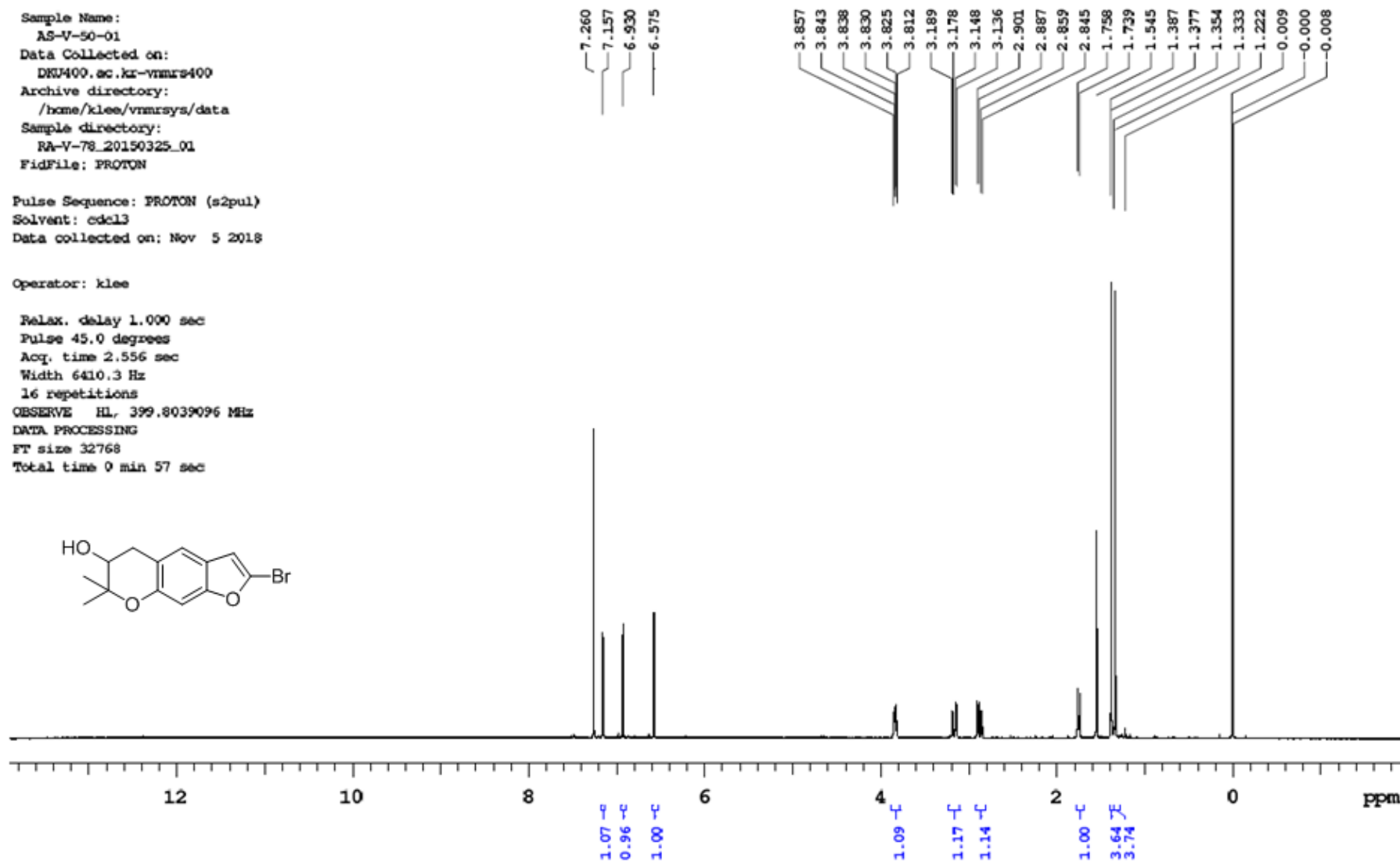
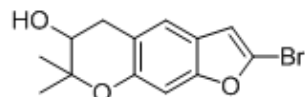
STANDARD 1H OBSERVE - profile

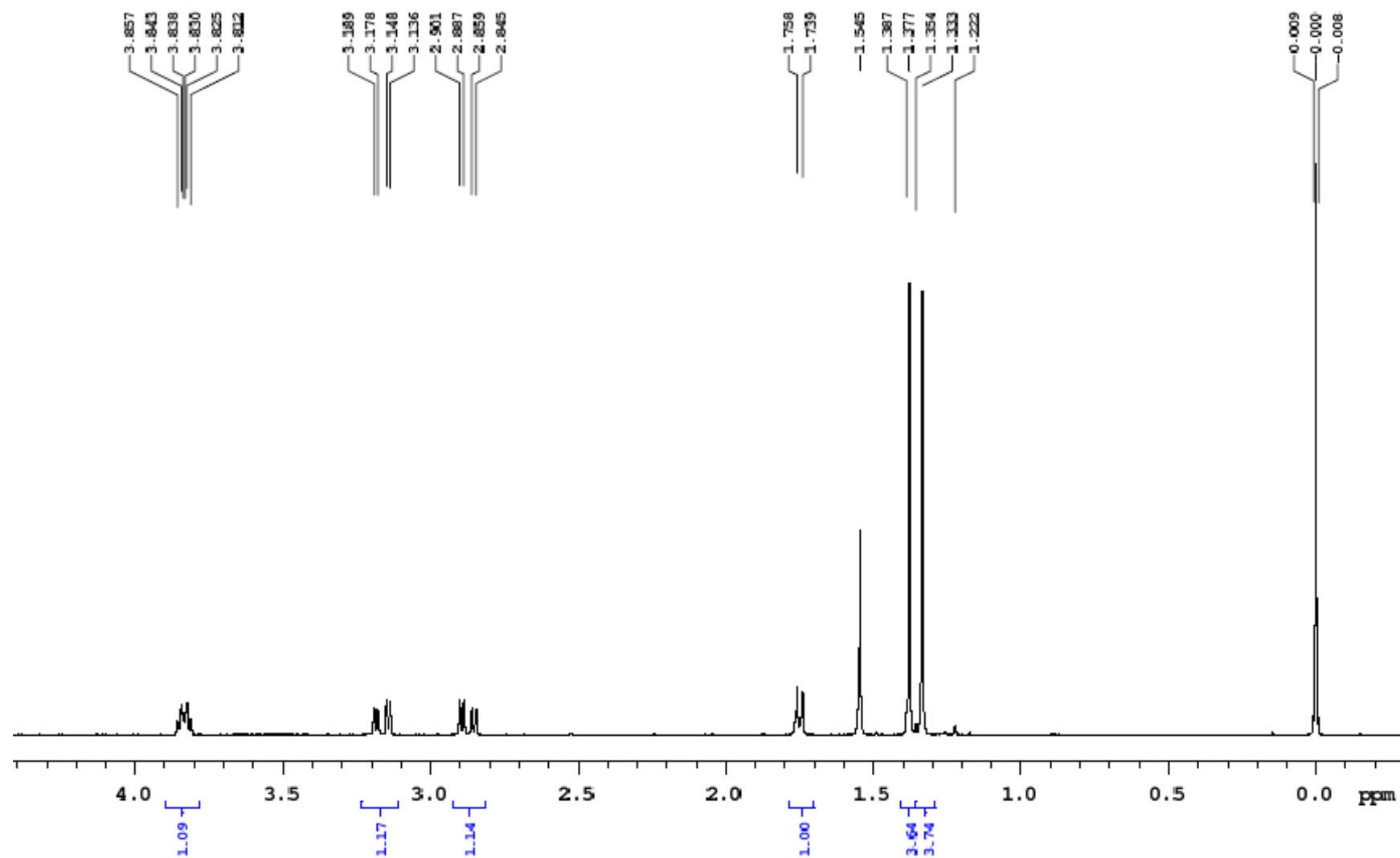
Sample Name:
AS-V-50-01
Data Collected on:
DNV400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Nov 5 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE HL, 399.8039096 MHz
DATA PROCESSING
FT size 32768
Total time 9 min 57 sec





¹³C NMR (100 MHz, CDCl₃) spectrum of compound 15

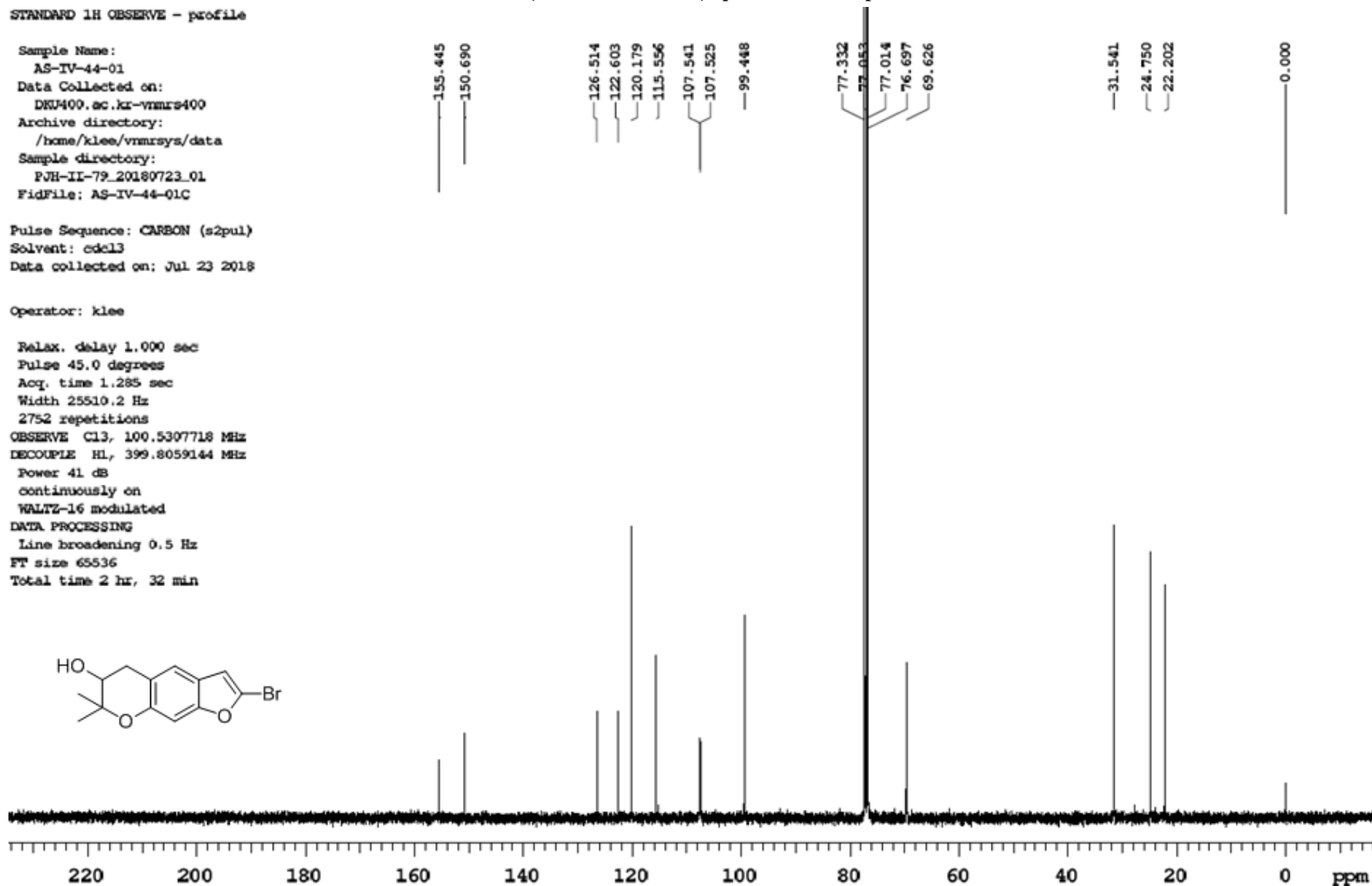
STANDARD 1H OBSERVE - profile

Sample Name:
AS-IV-44-01
Data Collected on:
DNV409.ac.kr-vnmrs409
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
FVH-II-79_20180723_01
FidFile: AS-IV-44-01C

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Jul 23 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
2752 repetitions
OBSERVE C13, 100.5307718 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 2 hr, 32 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound **16**

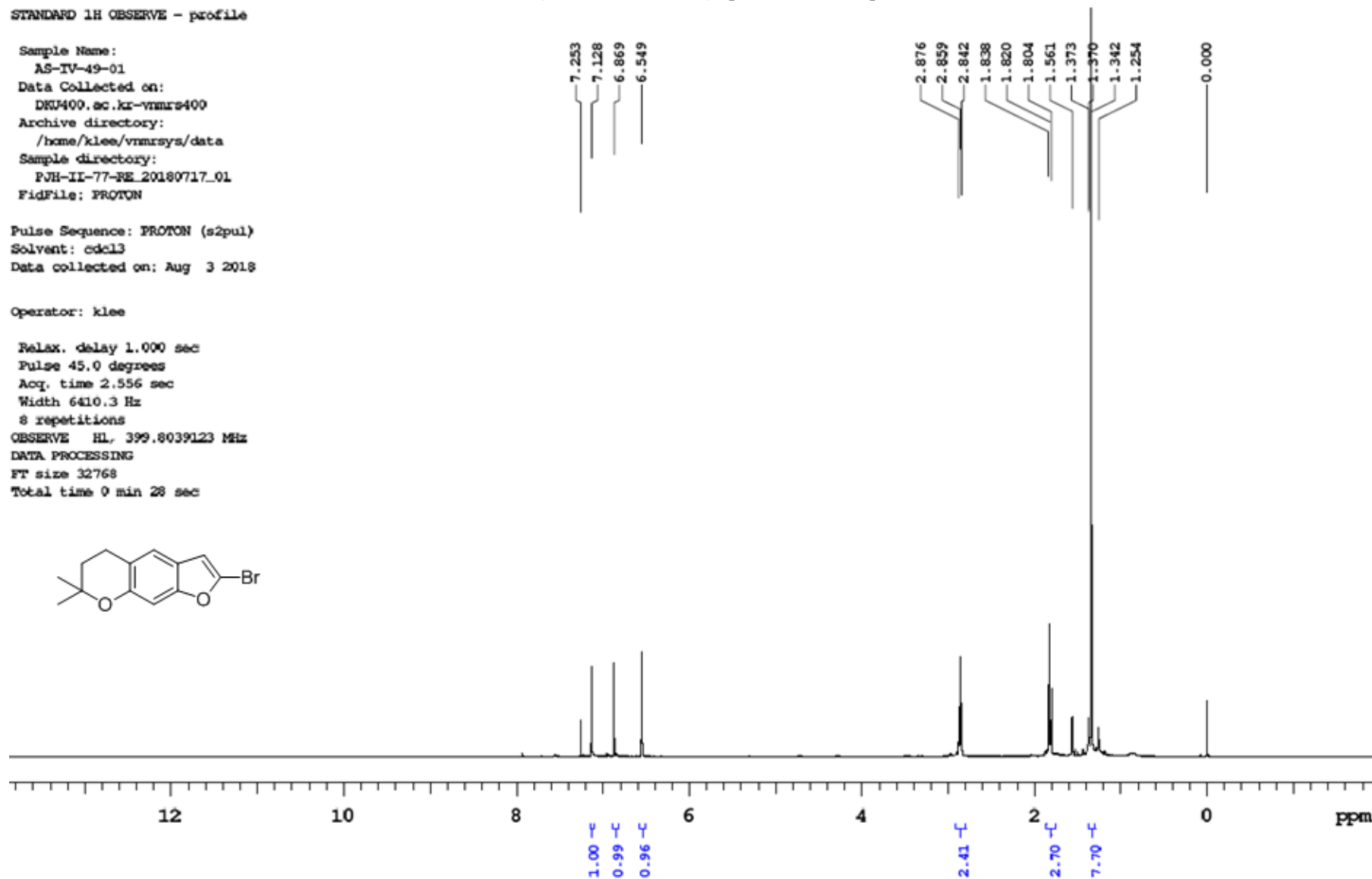
STANDARD 1H OBSERVE - profile

Sample Name:
AS-IV-49-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
PJH-II-77-RE_20180717_01
FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Aug 3 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
8 repetitions
OBSERVE HL, 399.8039123 MHz
DATA PROCESSING
FT size 32768
Total time 9 min 28 sec



^{13}C NMR (100 MHz, CDCl_3) spectrum of compound **16**

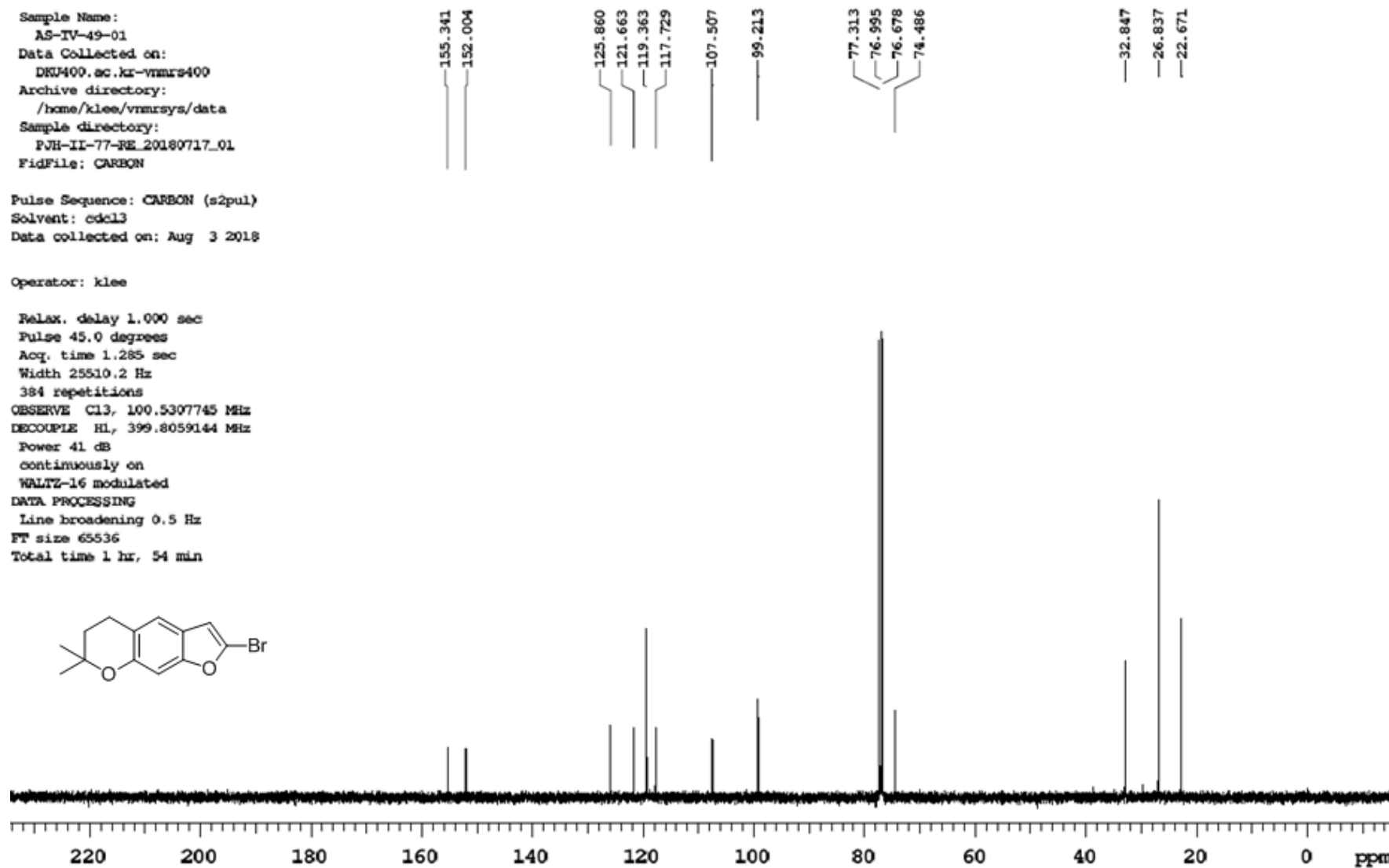
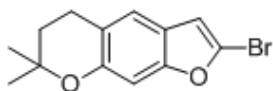
STANDARD 1H OBSERVE - profile

Sample Name:
AS-IV-49-01
Data Collected on:
DNV400.ac.kr-vmrs400
Archive directory:
/home/klee/vmrsys/data
Sample directory:
PVH-II-77-RE_20180717_01
FidFile: CARBON

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl_3
Data collected on: Aug 3 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
384 repetitions
OBSERVE Cl_3 , 100.5307745 MHz
DECOUPLE H_1 , 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹H NMR (400 MHz, CDCl₃) spectrum of compound 17

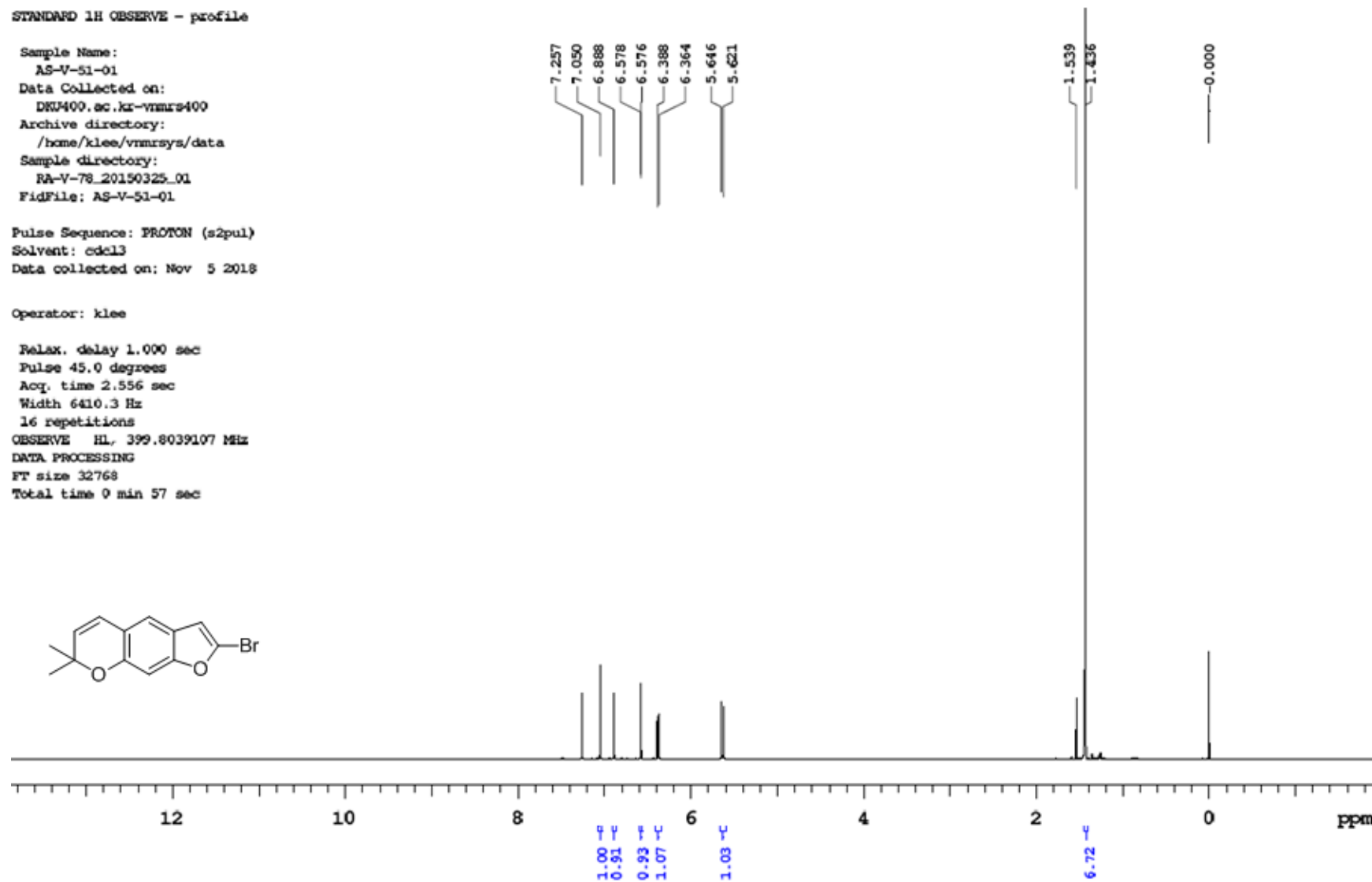
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-51-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-51-01

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Nov 5 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE HL, 399.8039107 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec



^{13}C NMR (100 MHz, CDCl_3) spectrum of compound 17

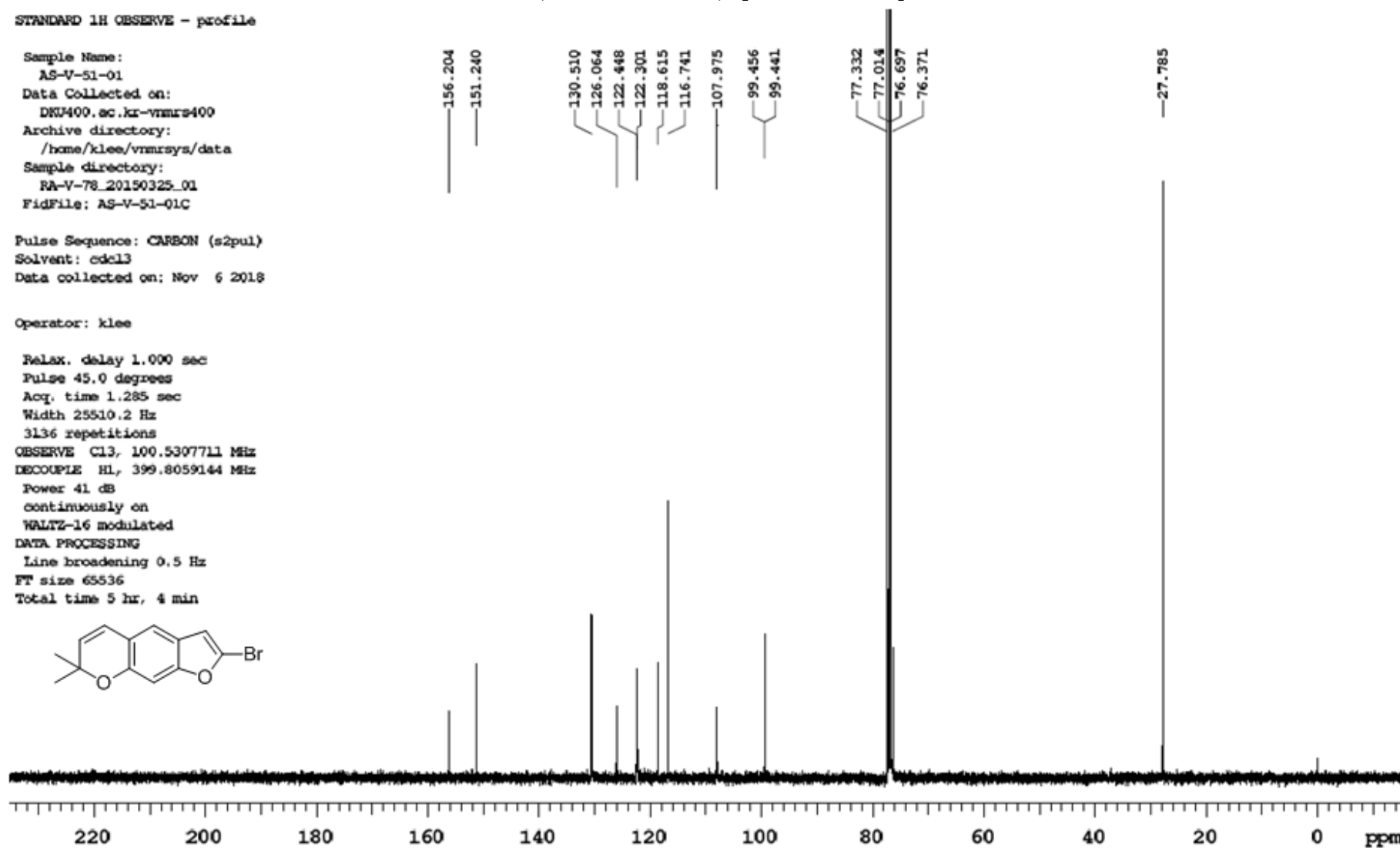
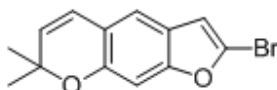
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-51-01
Data Collected on:
DNV400.ac.kr-vmrns400
Archive directory:
/home/klee/vmrnsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-51-01C

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Nov 6 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
3136 repetitions
OBSERVE C13, 100.5307711 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 5 hr, 4 min



¹H NMR (400 MHz, DMSO-d₆) spectrum of moracin M (4)

new experiment

Sample Name:
AS-IV-34-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

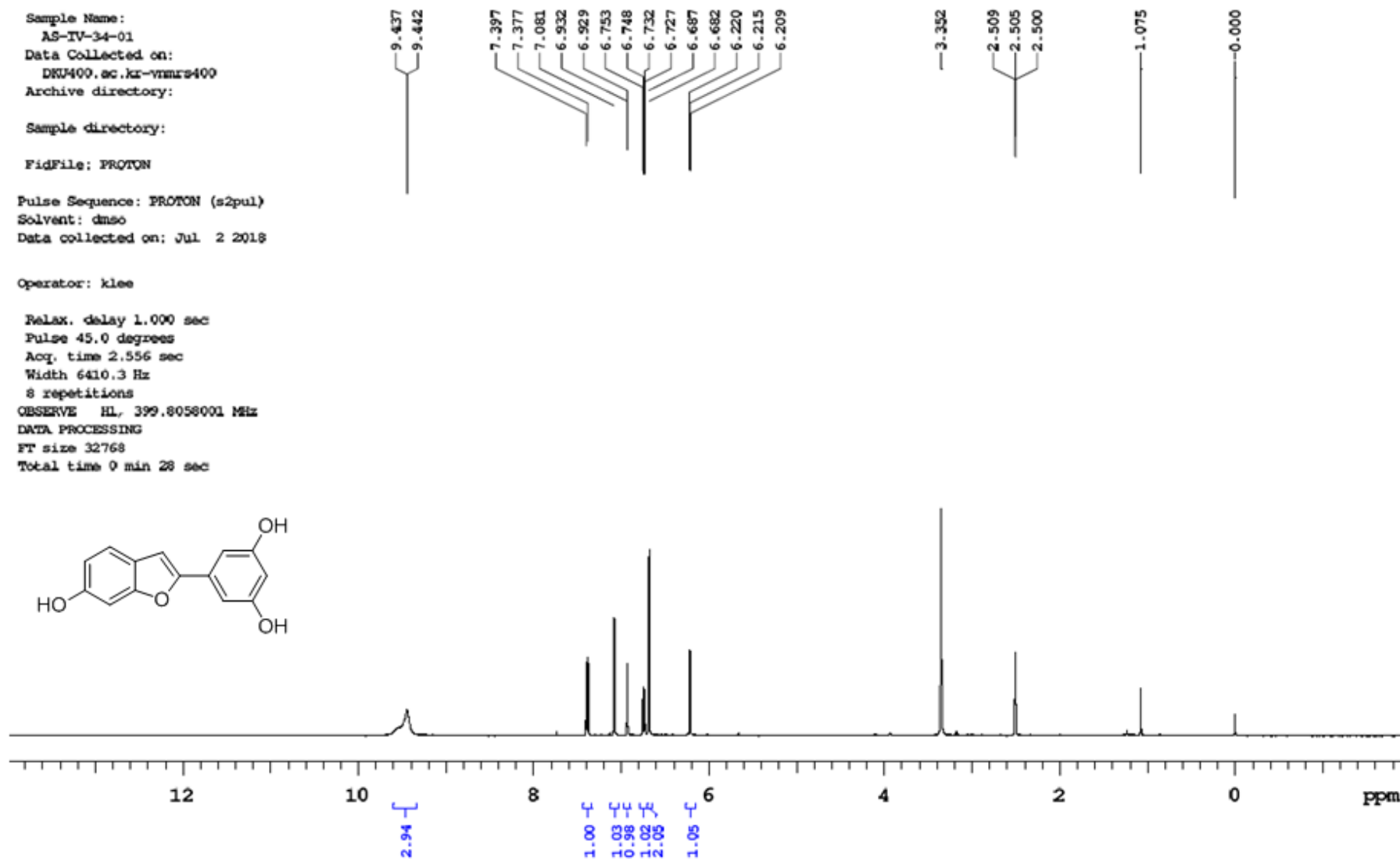
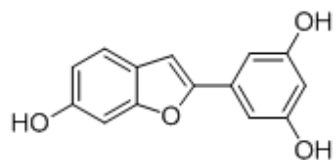
Sample directory:

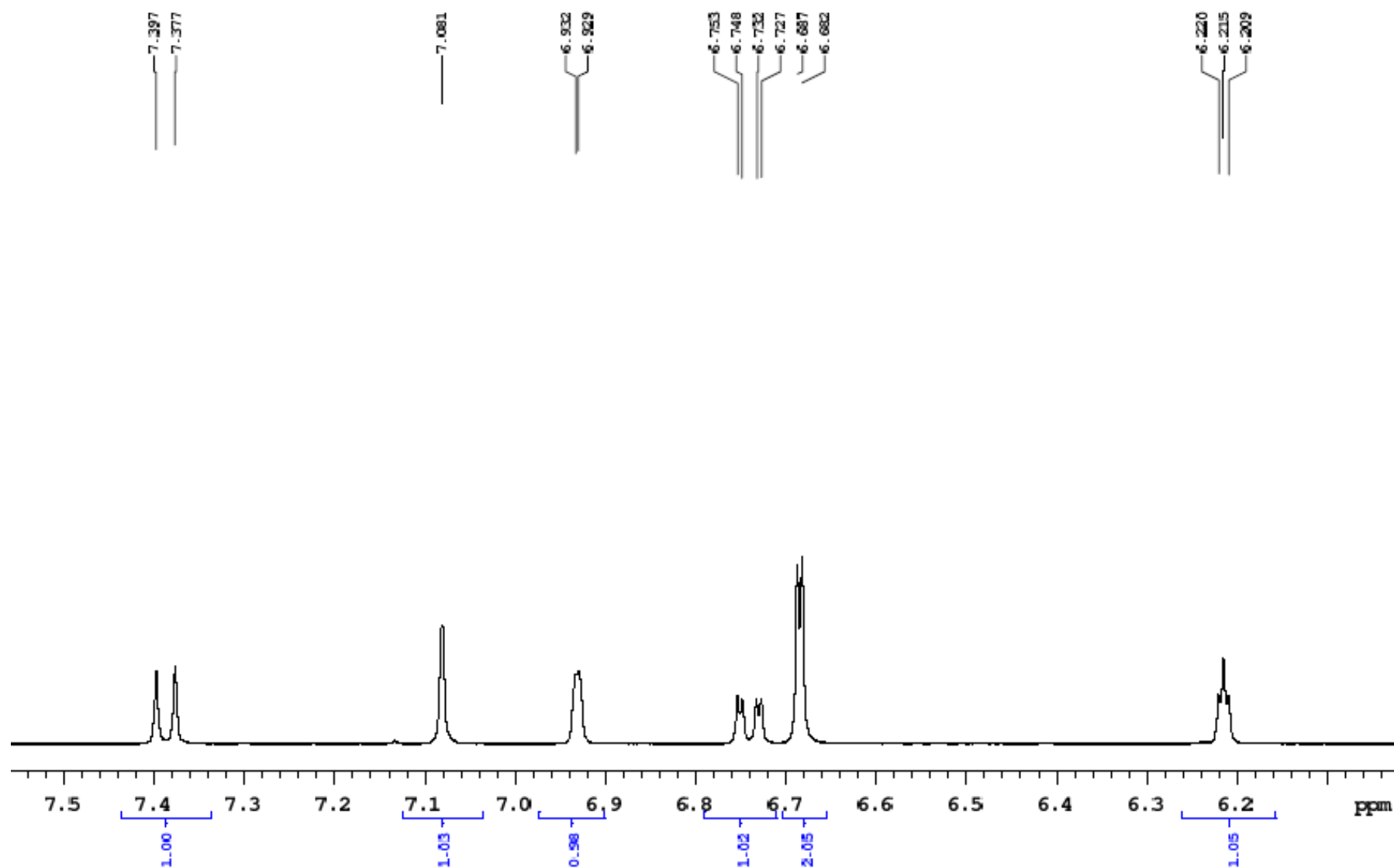
FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: dmsd
Data collected on: Jul 2 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
8 repetitions
OBSERVE HL 399.8058001 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 28 sec





¹³C NMR (100 MHz, DMSO-*d*₆) spectrum of moracin M (4)

new experiment

Sample Name:
AS-IV-34-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

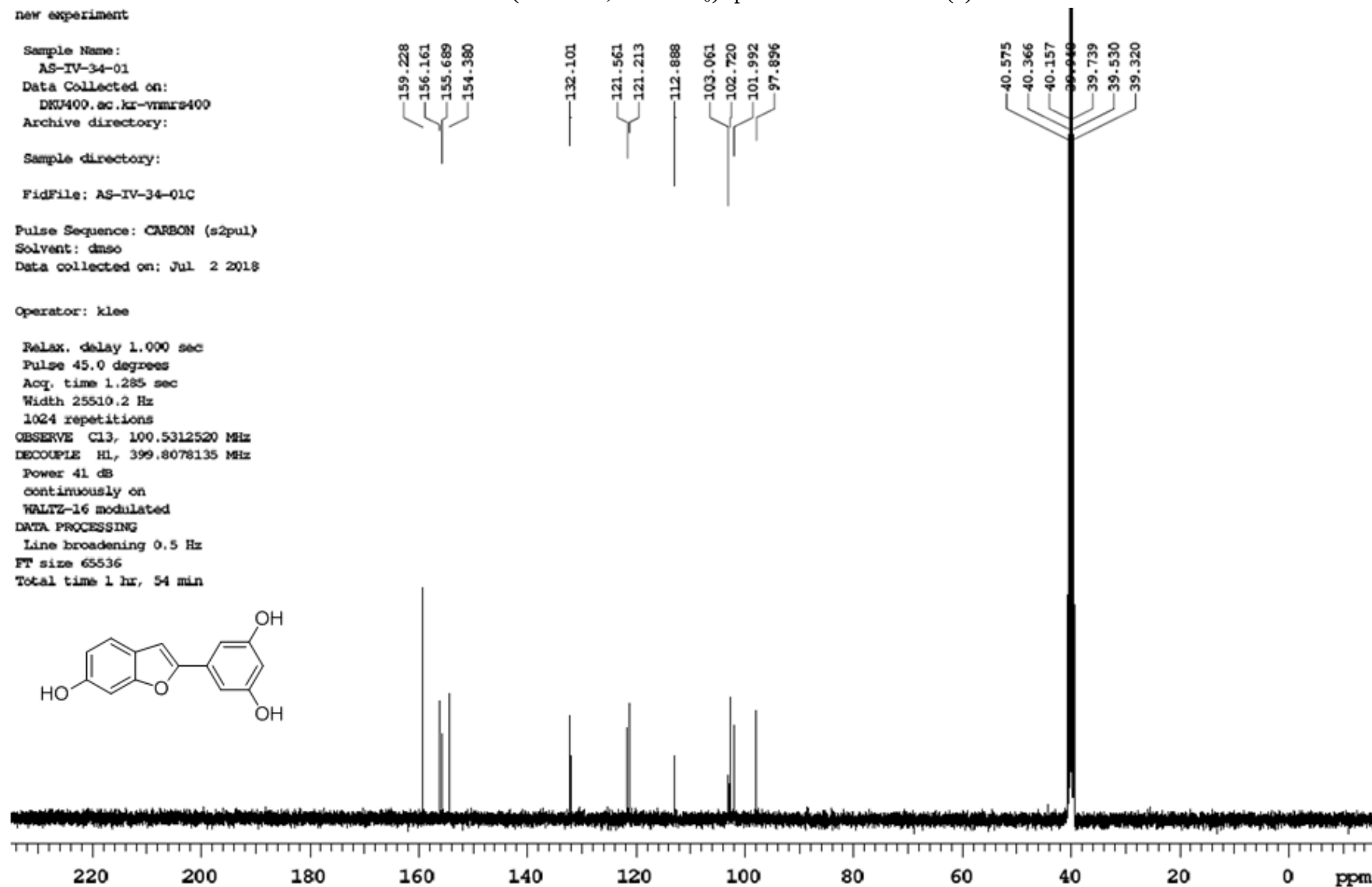
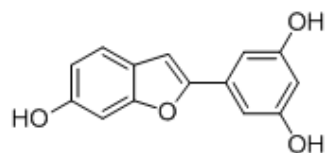
Sample directory:

FidFile: AS-IV-34-Q1C

Pulse Sequence: CARBON (s2pul)
Solvent: dmsc
Data collected on: Jul 2 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
1024 repetitions
OBSERVE C13, 100.5312520 MHz
DECOUPLE H1, 399.8078135 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹H NMR (600 MHz, methanol-*d*₄) spectrum of moracin N (5)

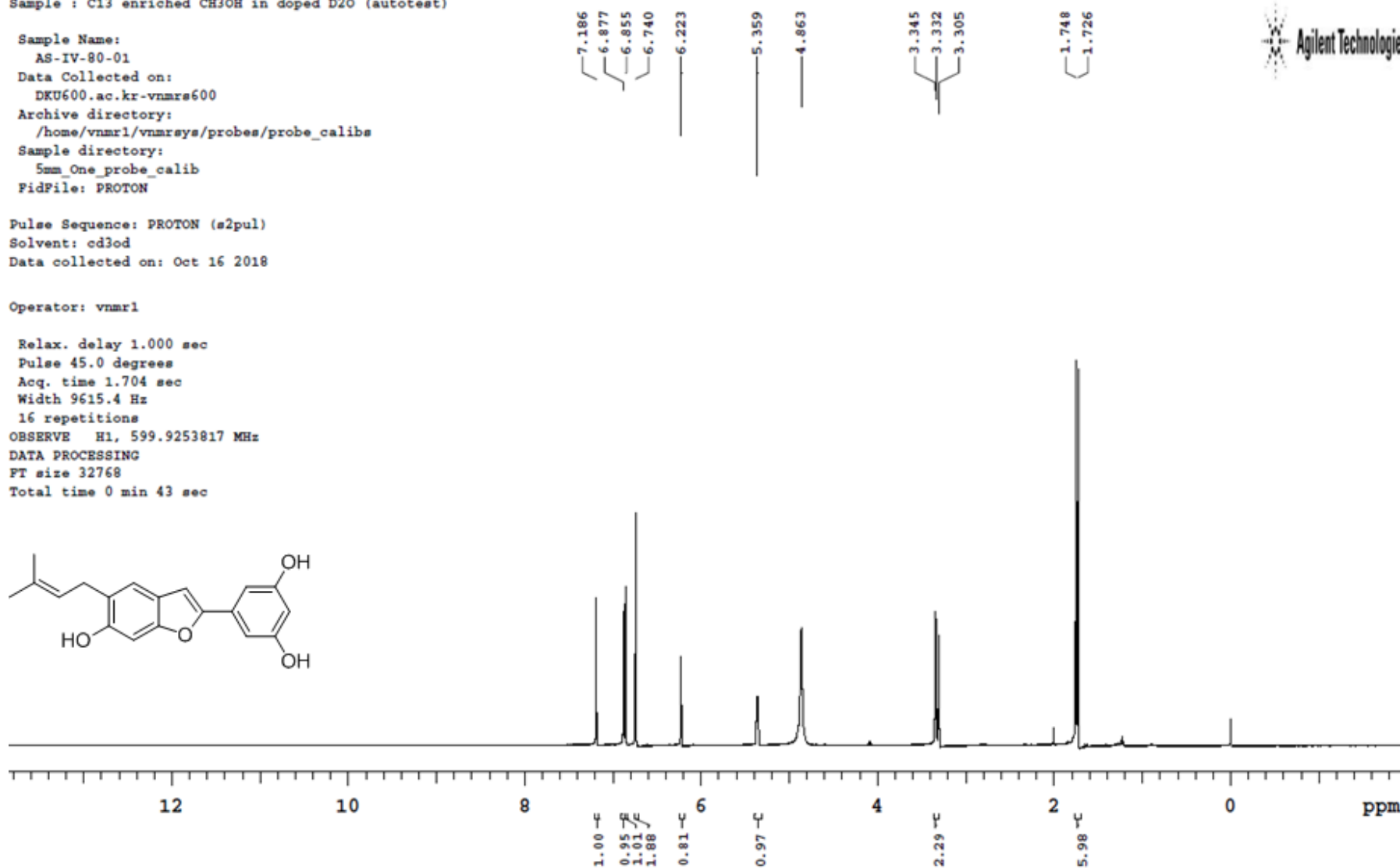
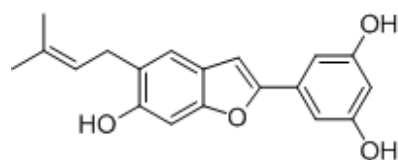
Calibration for 5mm_One_probe on 14Jul2017
Sample : C13 enriched CH3OH in doped D2O (autotest)

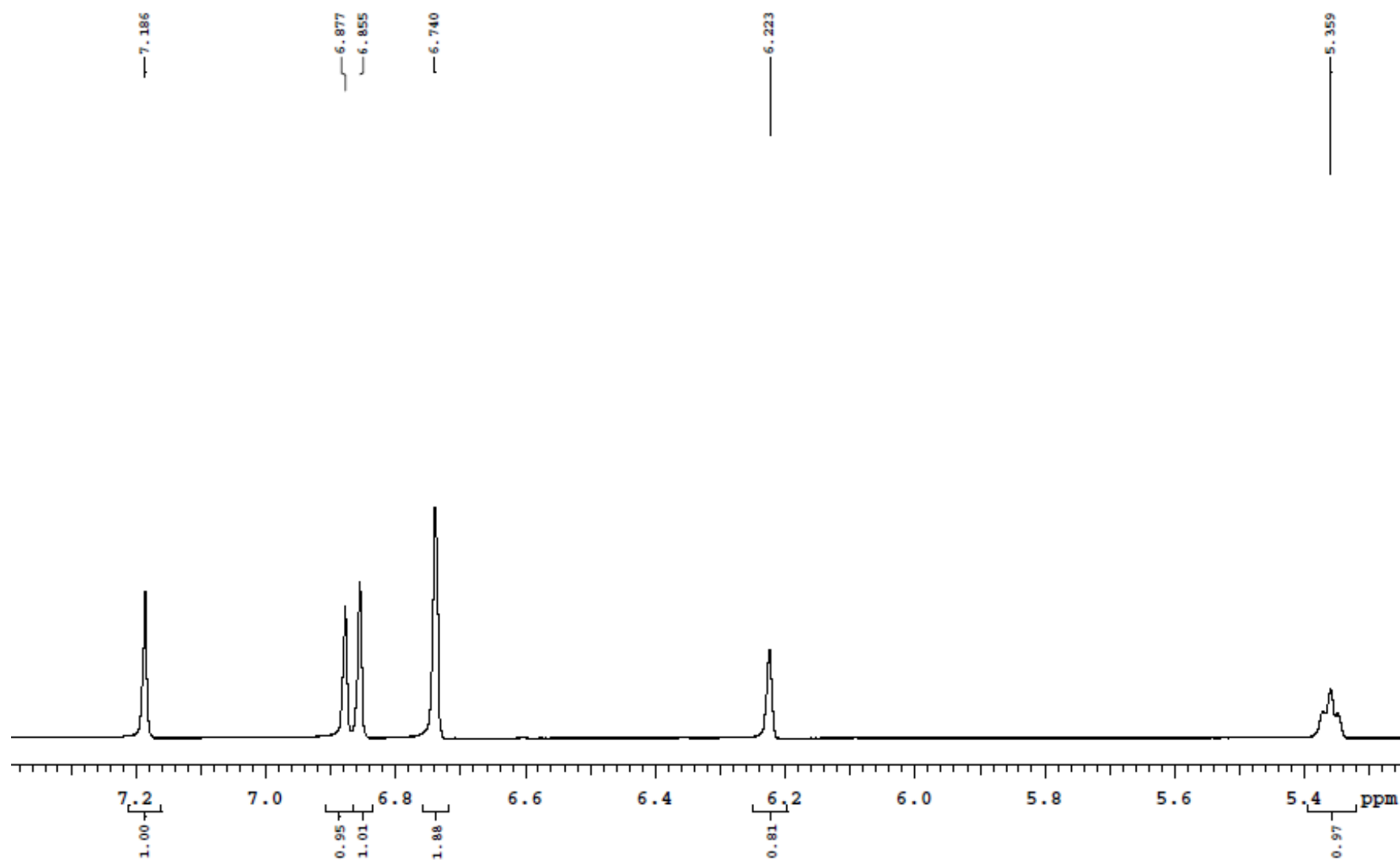
Sample Name:
AS-IV-80-01
Data Collected on:
DKU600.ac.kr-vnmrs600
Archive directory:
/home/vnmr1/vnmrsys/probes/probe_calibs
Sample directory:
5mm_One_probe_calib
FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: cd3od
Data collected on: Oct 16 2018

Operator: vnmr1

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.704 sec
Width 9615.4 Hz
16 repetitions
OBSERVE H1, 599.9253817 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 43 sec





¹³C NMR (150 MHz, methanol-d₄) spectrum of moracin N (5)

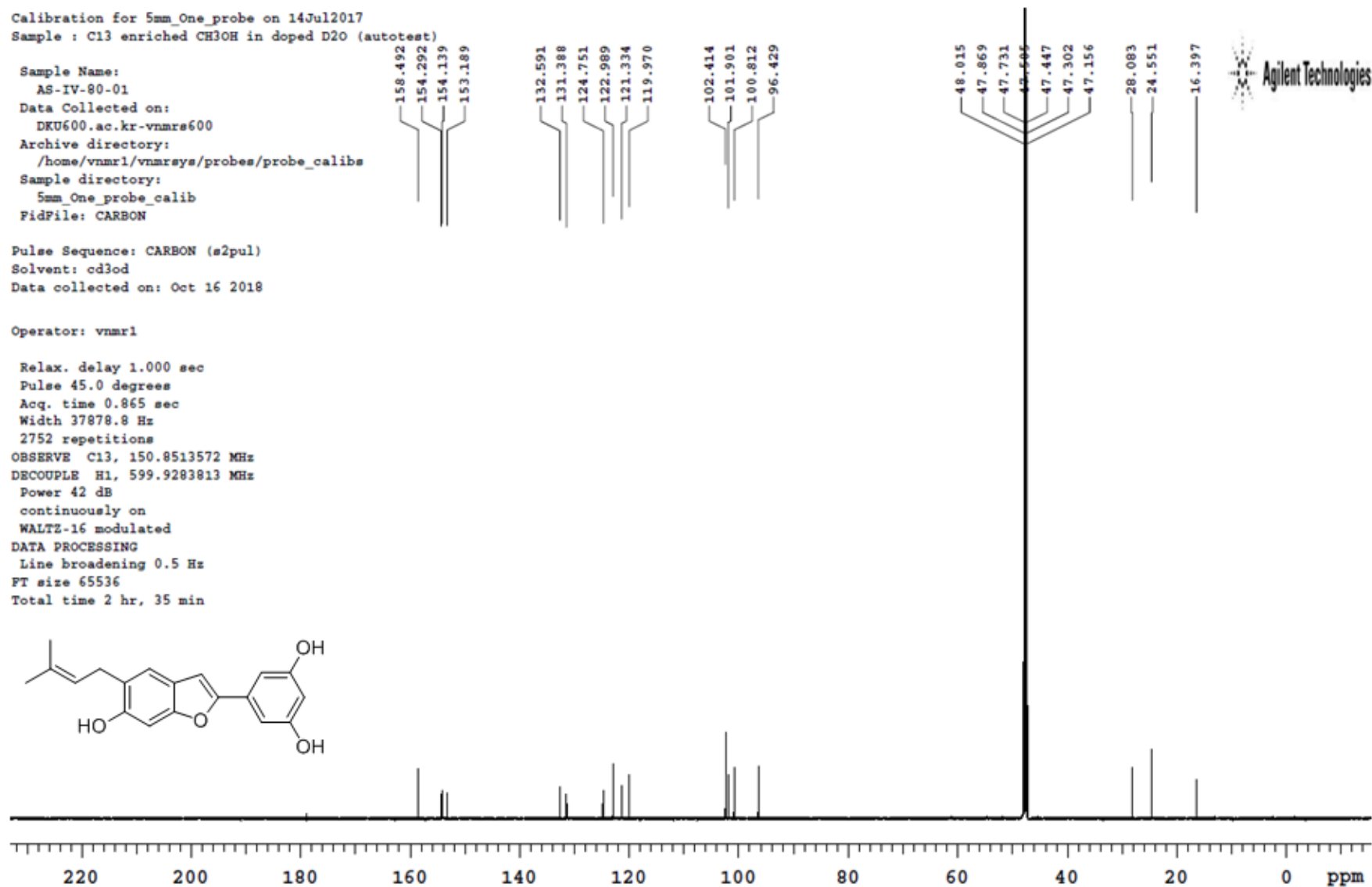
Calibration for 5mm_One_probe on 14Jul2017
Sample : C13 enriched CH₃OH in doped D₂O (autotest)

Sample Name:
AS-IV-80-01
Data Collected on:
DKU600.ac.kr-vnmrs600
Archive directory:
/home/vnmr1/vnmrsys/probes/probe_calibs
Sample directory:
5mm_One_probe_calib
FidFile: CARBON

Pulse Sequence: CARBON (s2pul)
Solvent: cd3od
Data collected on: Oct 16 2018

Operator: vnmr1

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 0.865 sec
Width 37878.8 Hz
2752 repetitions
OBSERVE C13, 150.8513572 MHz
DECOUPLE H1, 599.9283813 MHz
Power 42 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 2 hr, 35 min



^1H NMR (400 MHz, methanol- d_4) spectrum of moracin O (6).

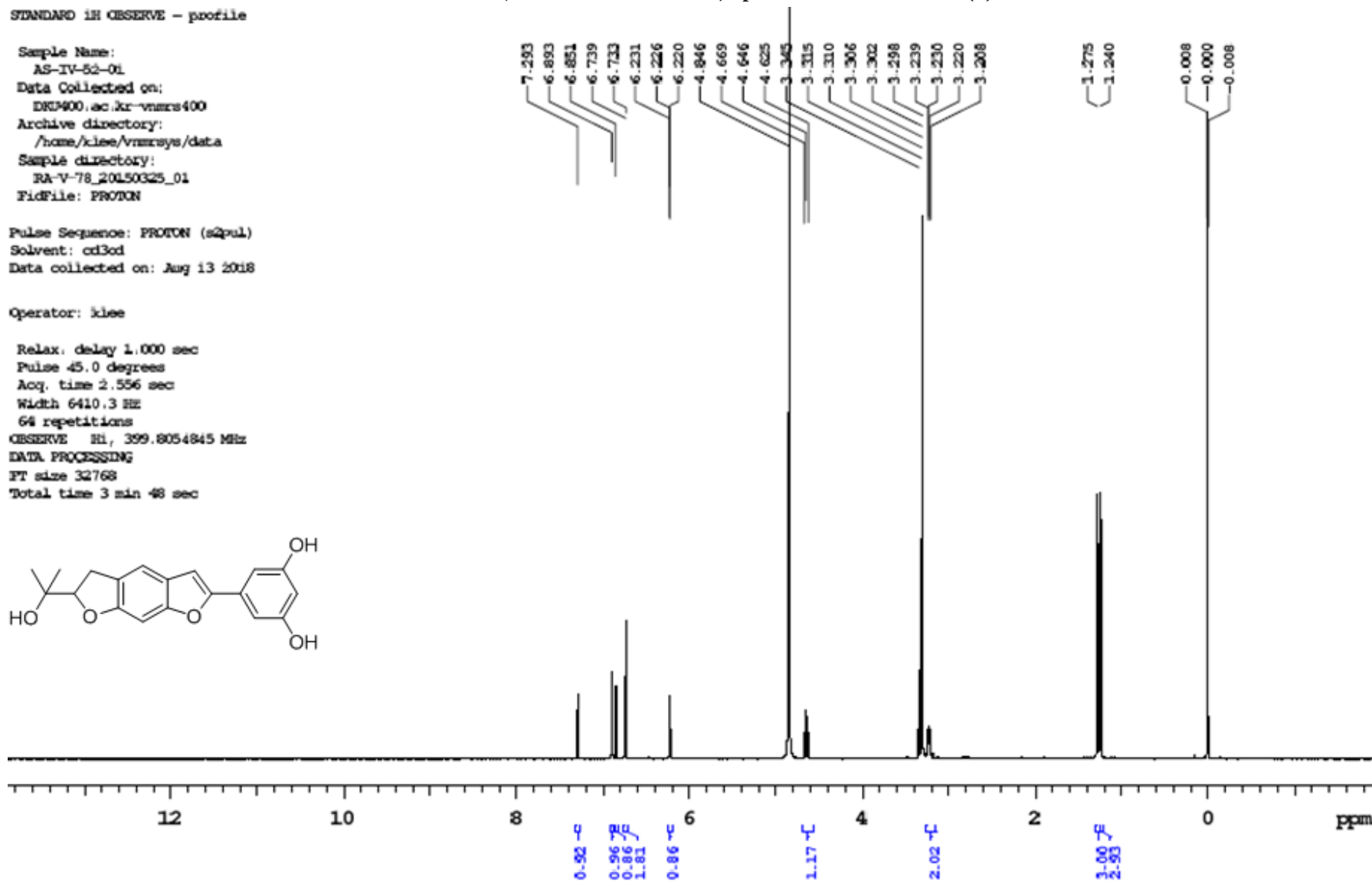
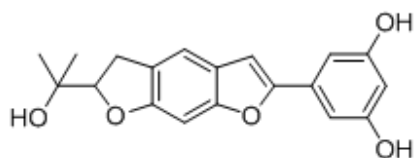
STANDARD 1H OBSERVE - profile

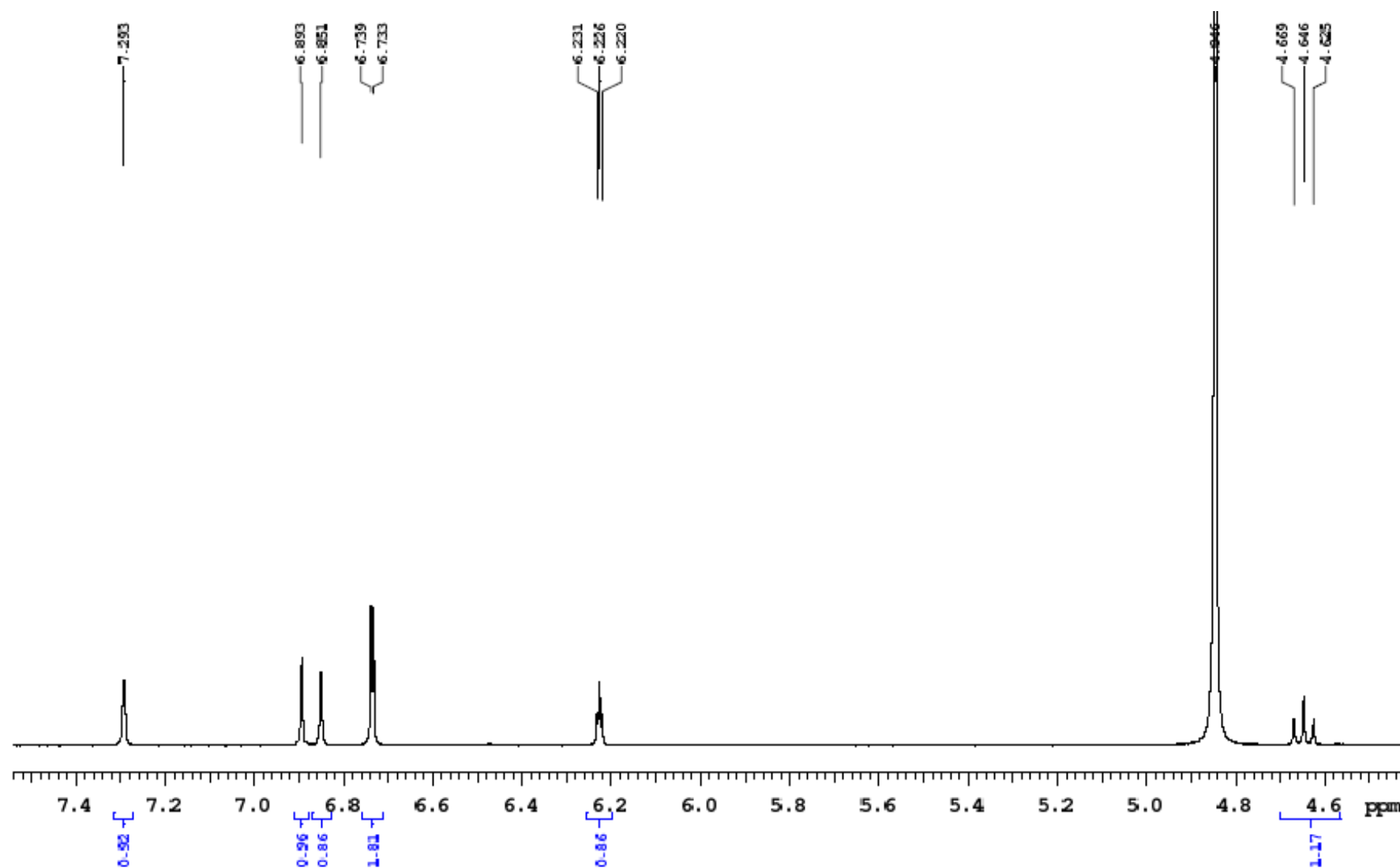
Sample Name:
AS-IV-52-01
Data Collected on:
DNP400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: PROTON

Pulse Sequence: PROTON (sqpul)
Solvent: cd3od
Data collected on: Aug 13 2018

Operator: klee

Relax: delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
64 repetitions
OBSERVE H1, 399.8054845 MHz
DATA PROCESSING
FT size 32768
Total time 3 min 48 sec





^{13}C NMR (100 MHz, methanol- d_4) spectrum of moracin O (6).

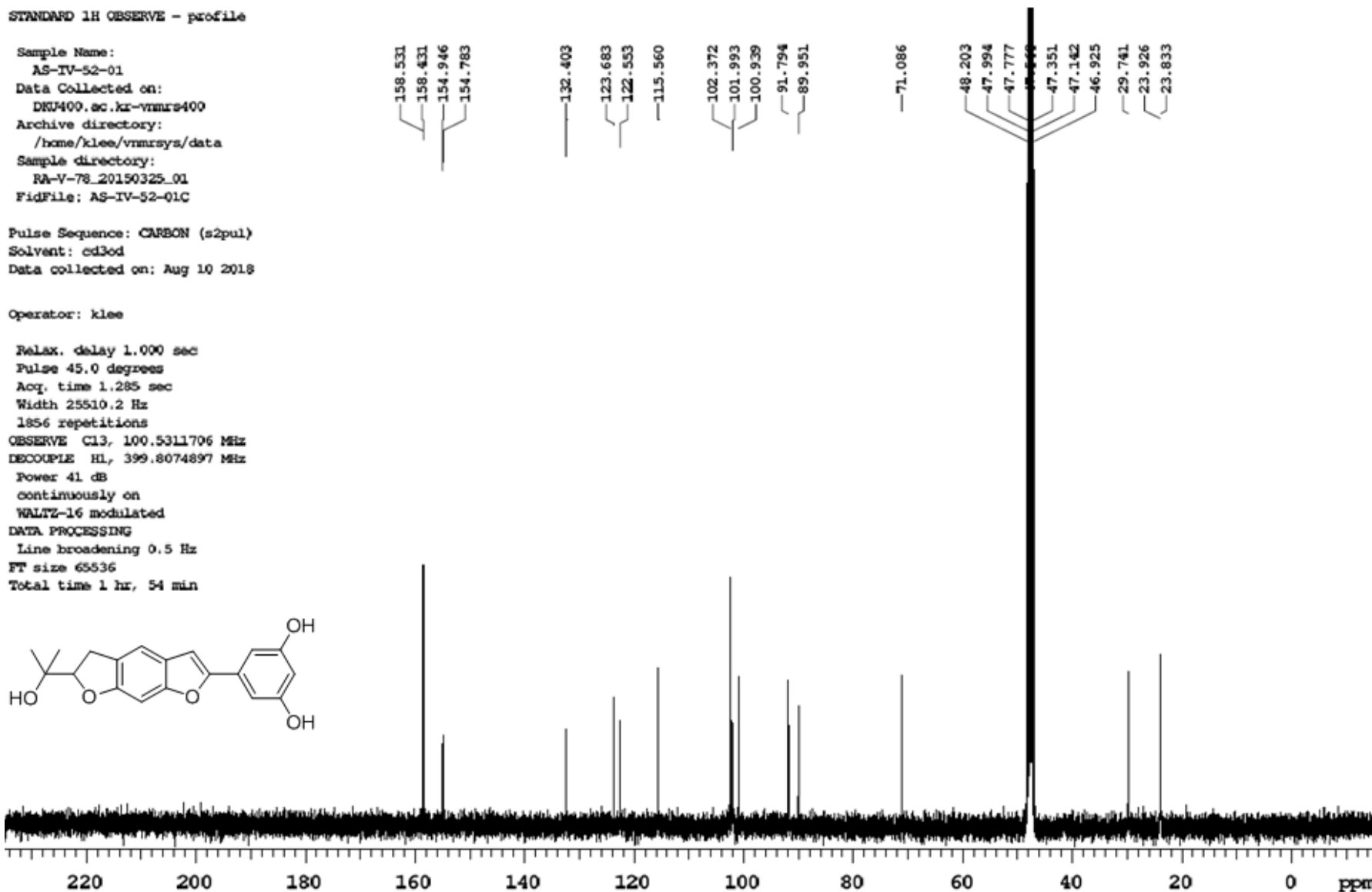
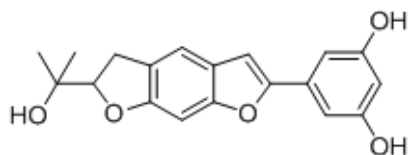
STANDARD 1H OBSERVE - profile

Sample Name:
AS-IV-52-01
Data Collected on:
DNV400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-IV-52-01C

Pulse Sequence: CARBON (s2pul)
Solvent: cd3od
Data collected on: Aug 10 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
1856 repetitions
OBSERVE C13, 100.5311706 MHz
DECOUPLE H1, 399.8074897 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹H NMR (400 MHz, methanol-*d*₄) spectrum of moracin P (7).

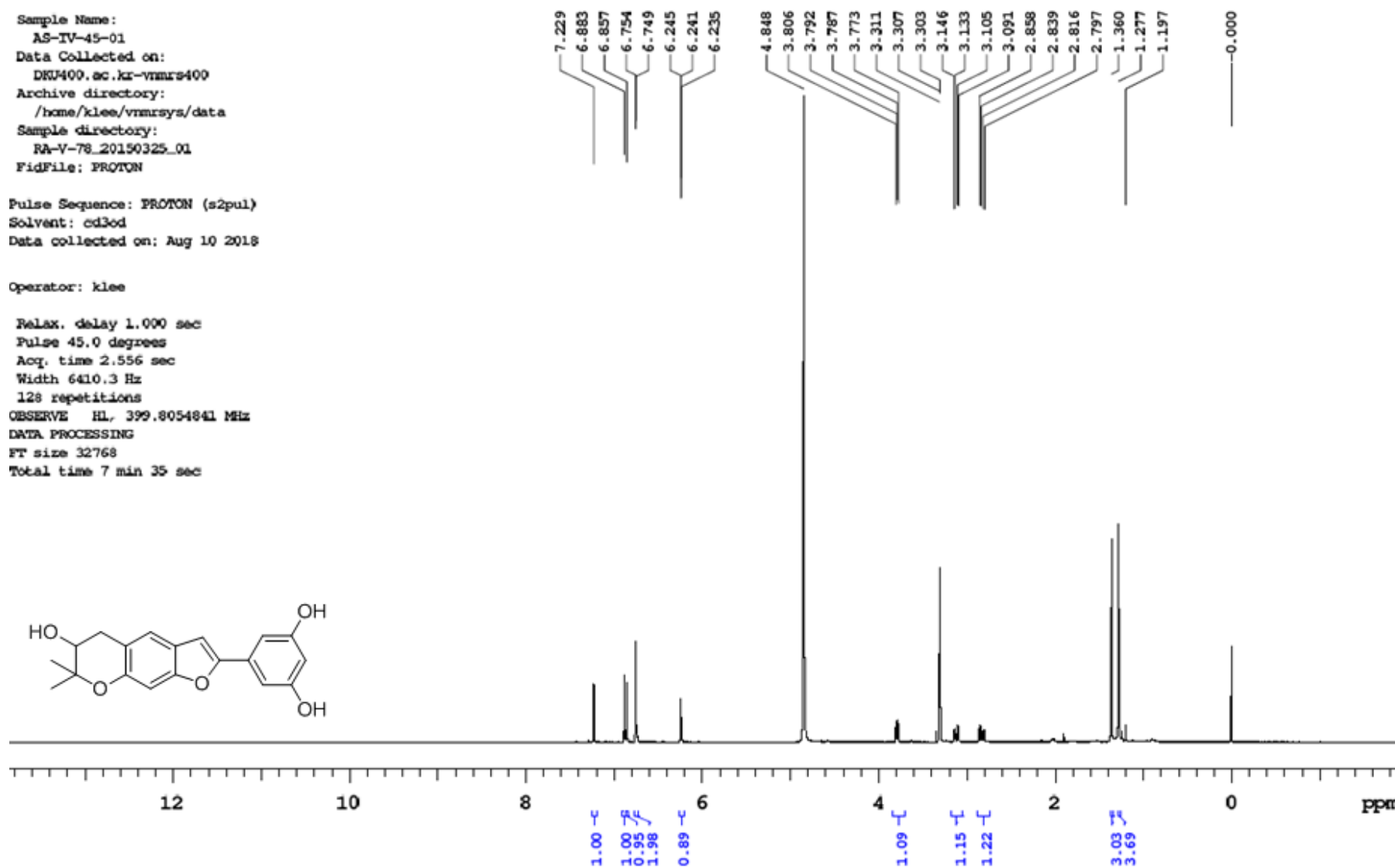
STANDARD 1H OBSERVE - profile

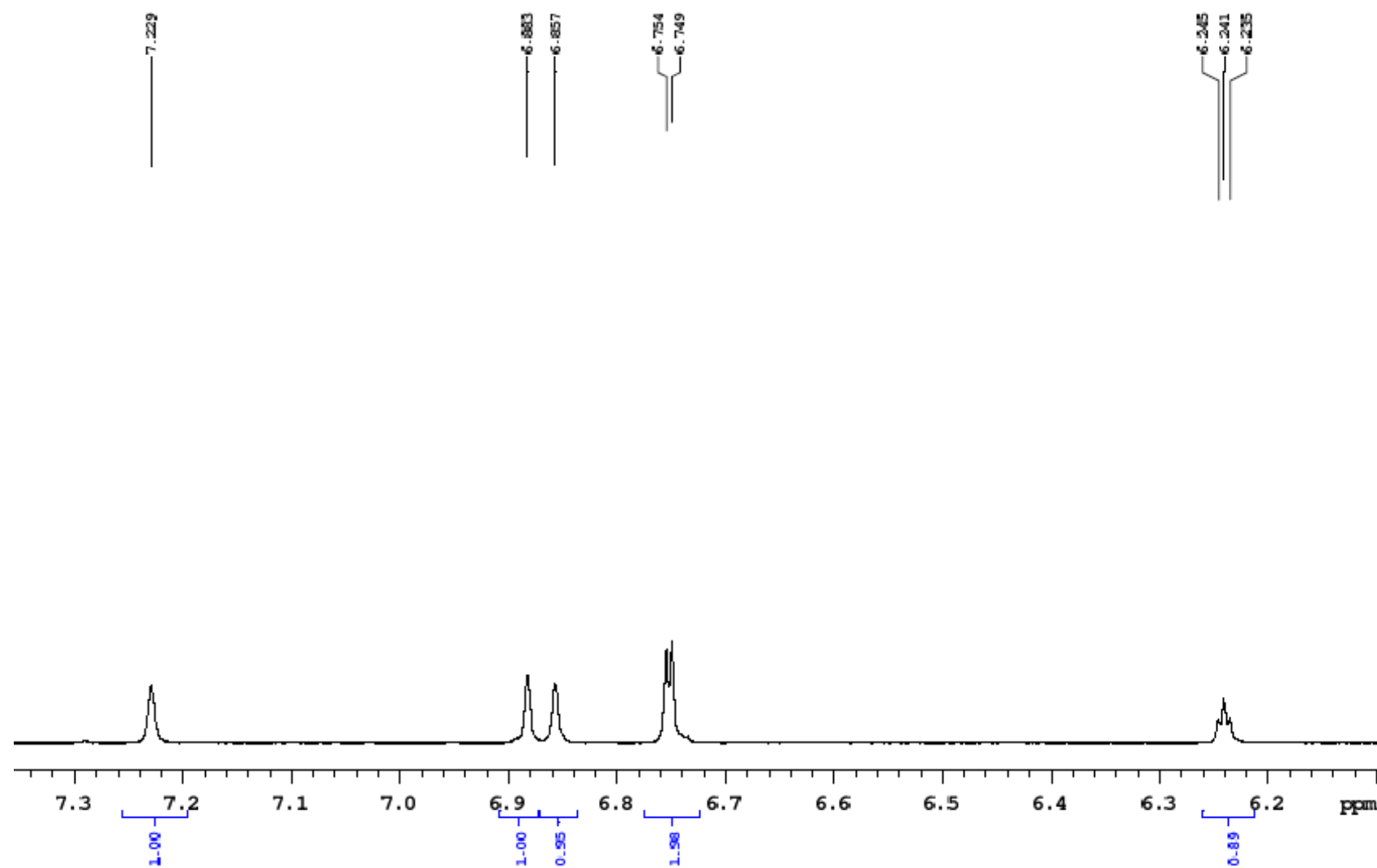
Sample Name:
AS-IV-45-01
Data Collected on:
DKU400.ac.kr-vmrs400
Archive directory:
/home/klee/vmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: cd3od
Data collected on: Aug 10 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
128 repetitions
OBSERVE HL, 399.8054841 MHz
DATA PROCESSING
FT size 32768
Total time 7 min 35 sec





¹³C NMR (100 MHz, methanol-d₄) spectrum of moracin P (7).

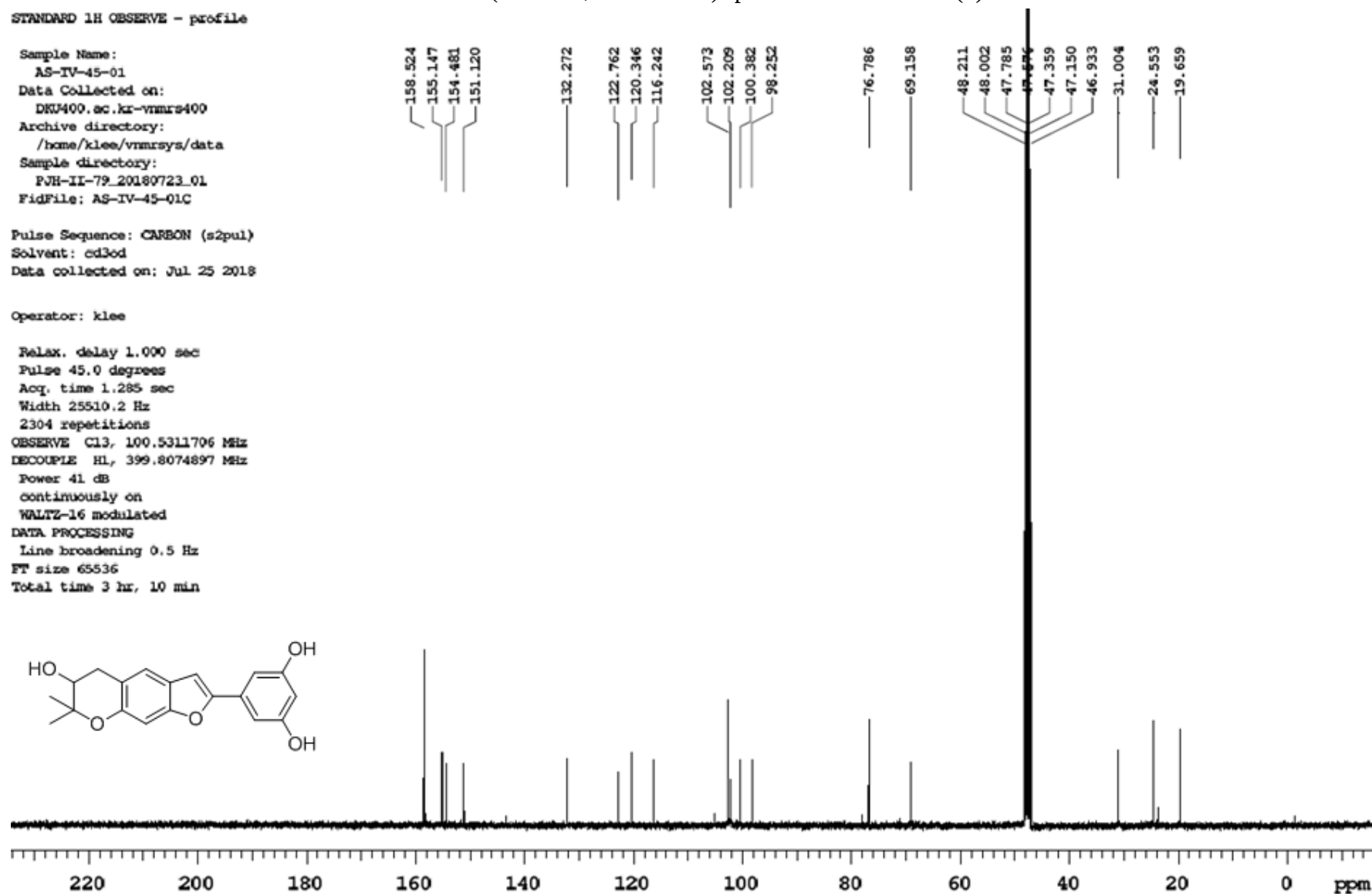
STANDARD 1H OBSERVE - profile

Sample Name:
AS-IV-45-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
PJH-II-79_20180723_01
FidFile: AS-IV-45-01C

Pulse Sequence: CARBON (s2pul)
Solvent: cd3od
Data collected on: Jul 25 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
2304 repetitions
OBSERVE C13, 100.5311706 MHz
DECOUPLE H1, 399.8074897 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 3 hr, 10 min



^1H NMR (400 MHz, methanol- d_4) spectrum of gramniphinol F (**8**).

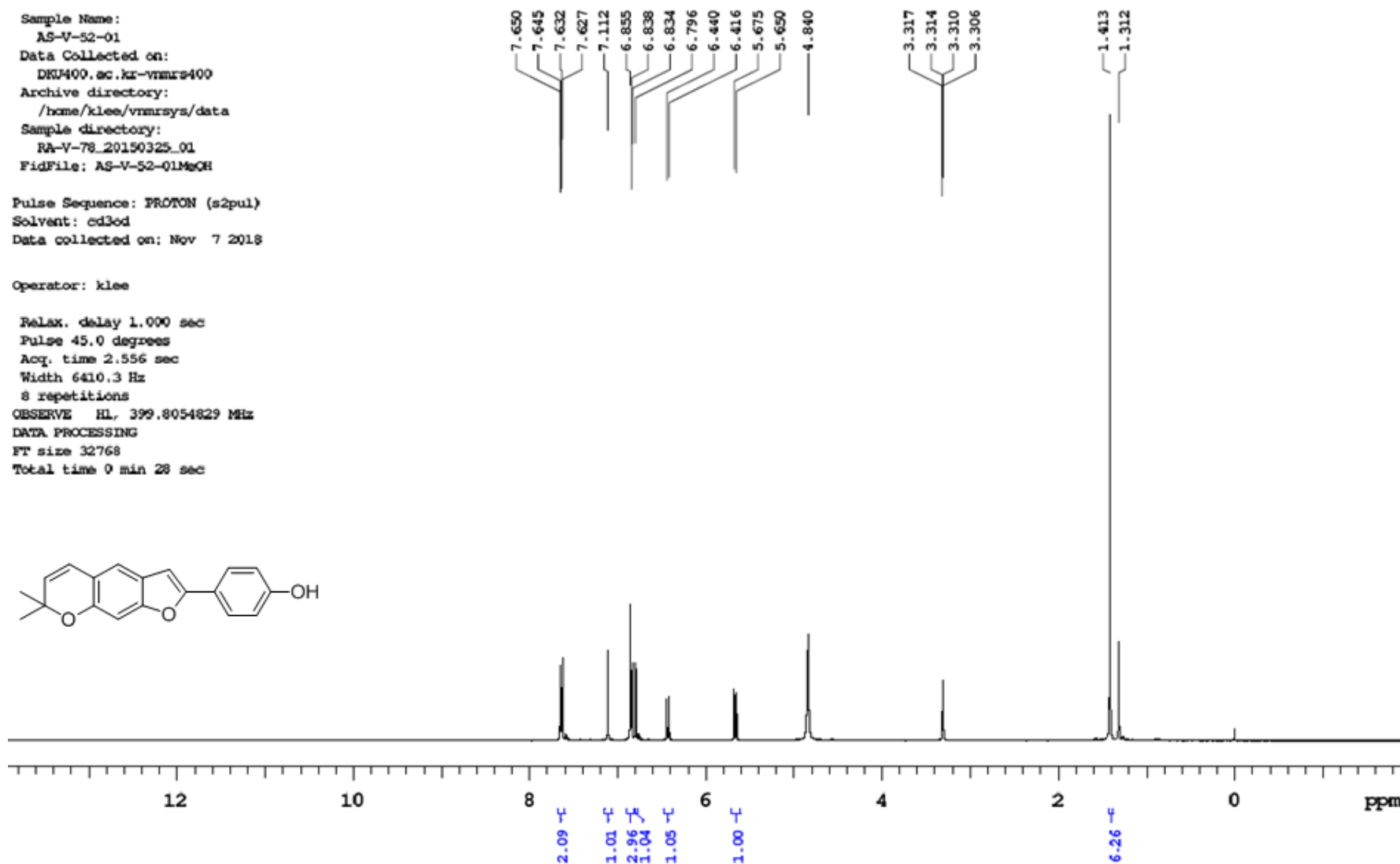
STANDARD ^1H OBSERVE - profile

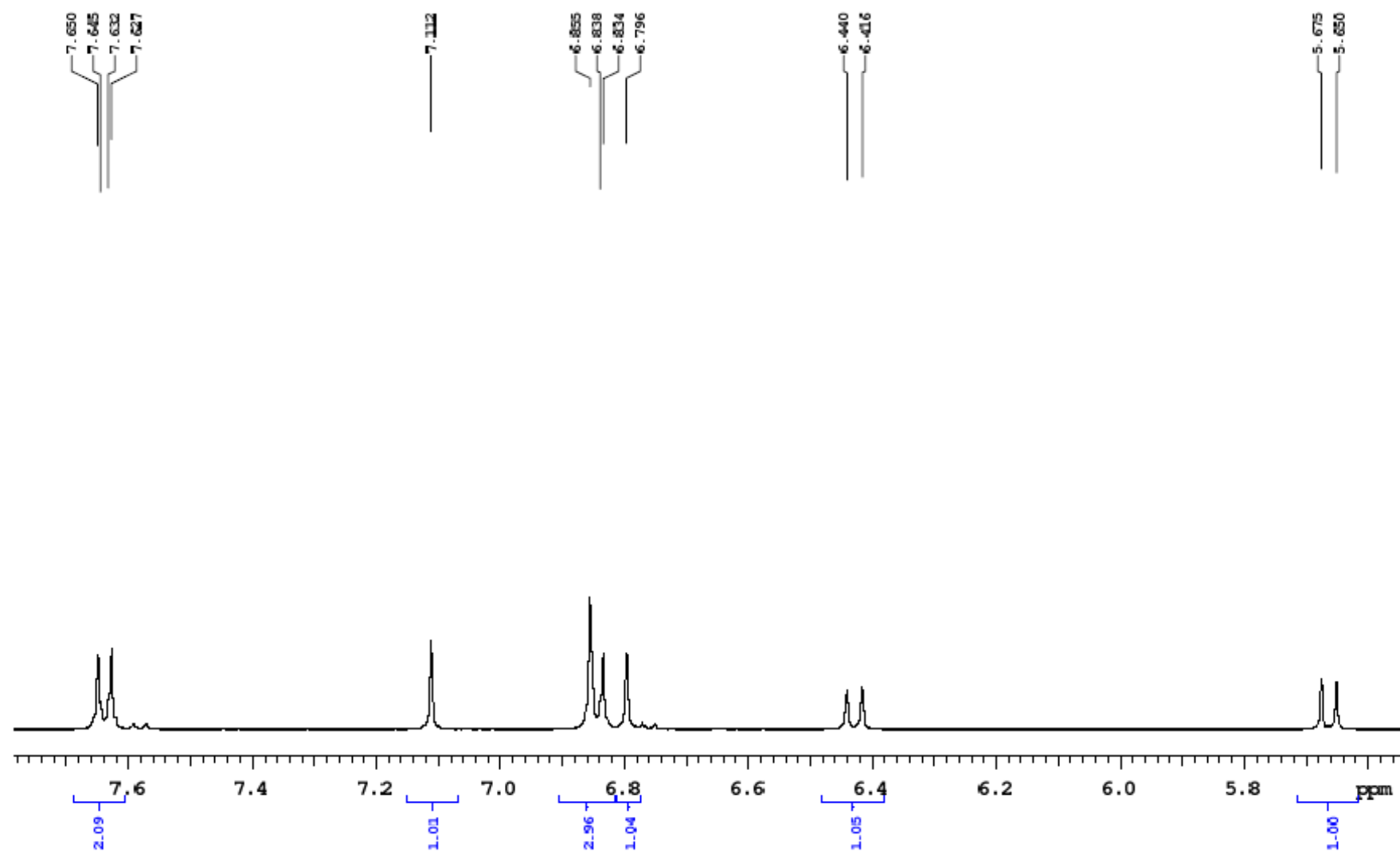
Sample Name:
AS-V-52-01
Data Collected on:
DKU400.sc.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-52-01MeOH

Pulse Sequence: PROTON (s2pul)
Solvent: cd3od
Data collected on: Nov 7 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
8 repetitions
OBSERVE HL, 399.8054829 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 28 sec





STANDARD IN OBSERVE - profile

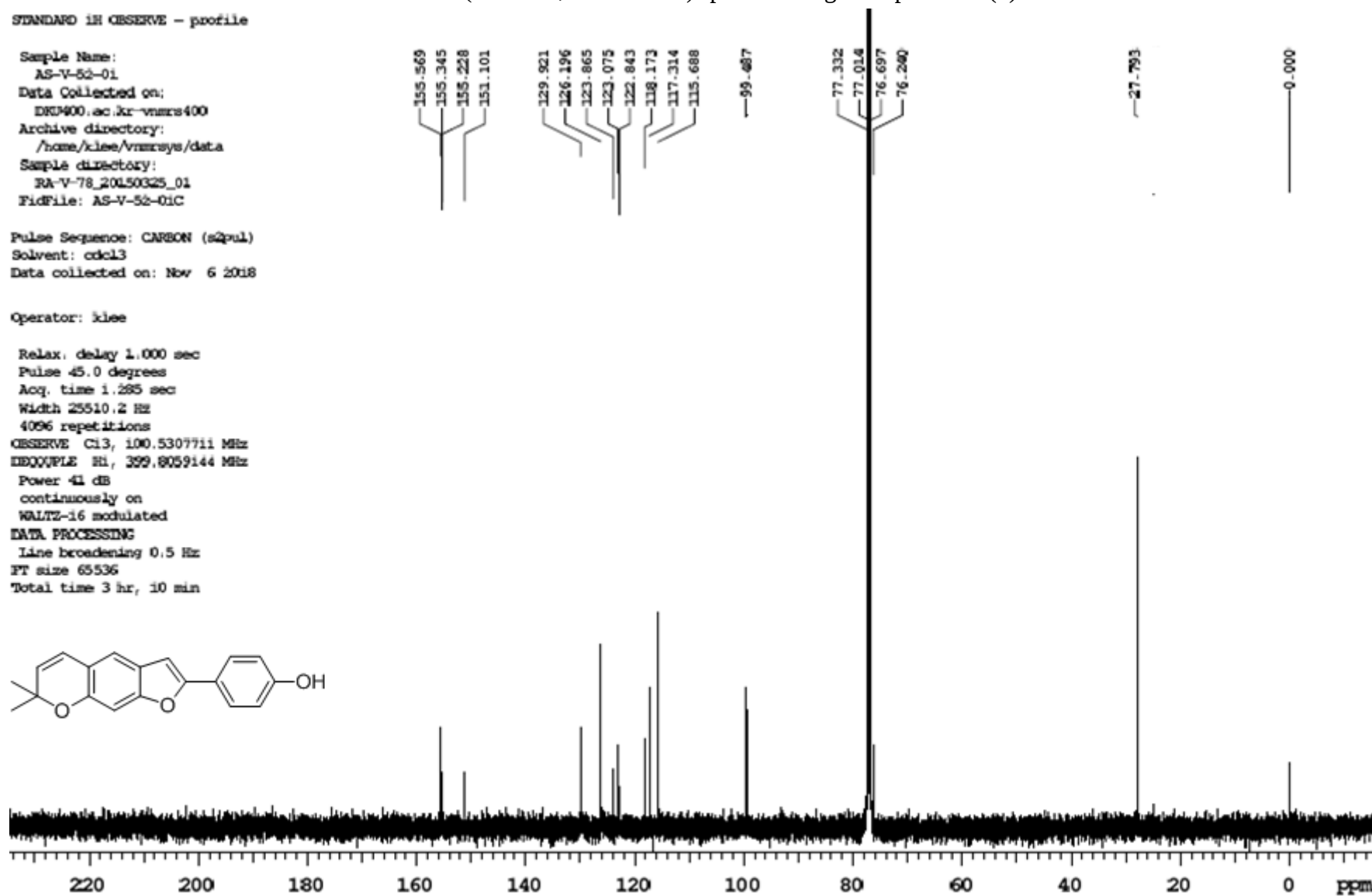
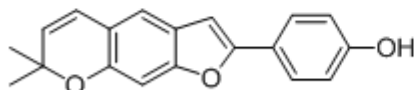
$\frac{155.569}{155.345}$
 $\frac{155.228}{151.101}$
 $\frac{129.921}{126.196}$
 $\frac{123.865}{123.075}$
 $\frac{122.843}{118.173}$
 $\frac{117.314}{115.688}$
 $\frac{99.487}{77.332}$
 $\frac{77.014}{76.697}$
 $\frac{76.240}{27.793}$
 $\frac{0.000}{0.000}$

Operator: klee

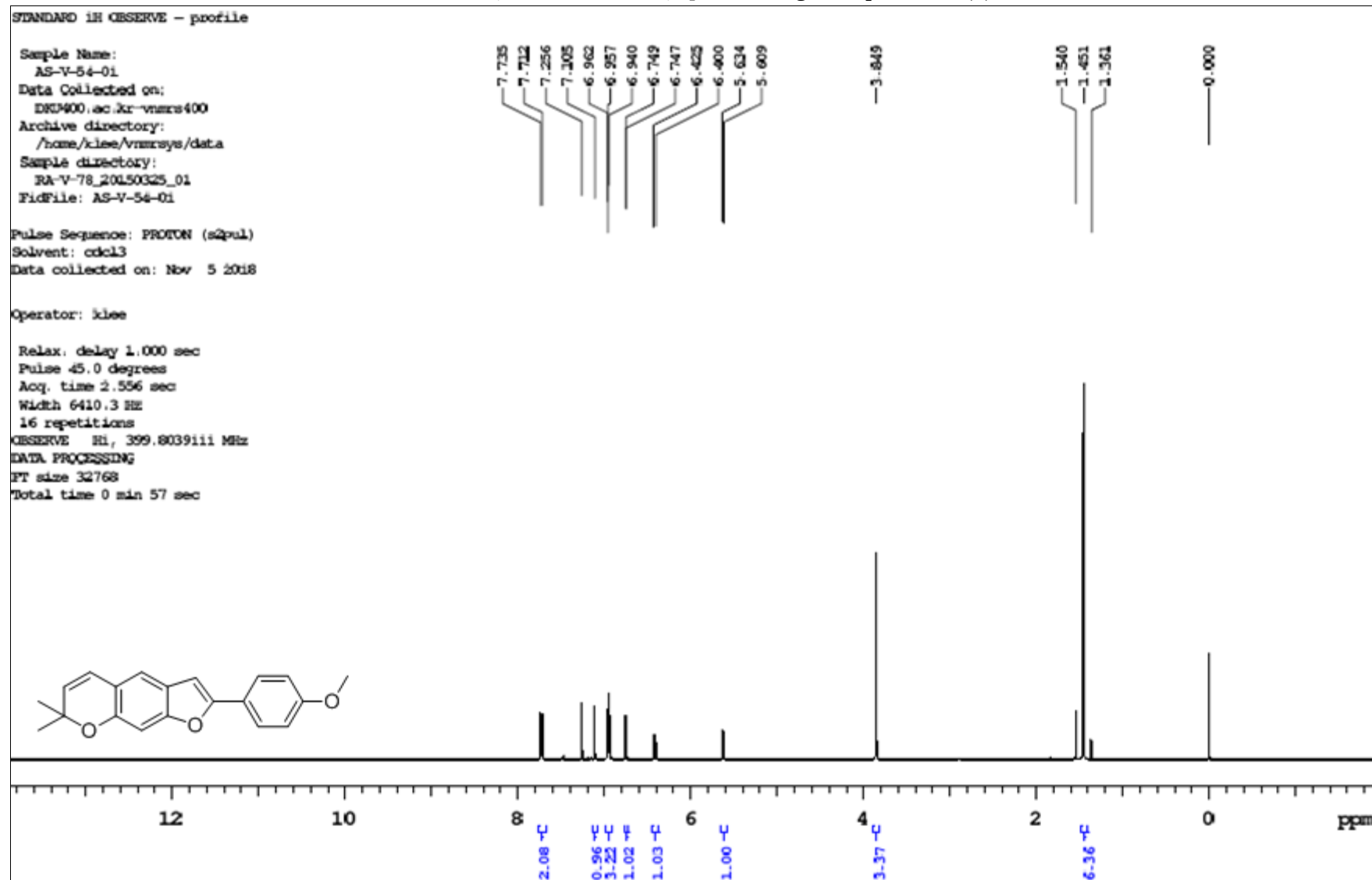
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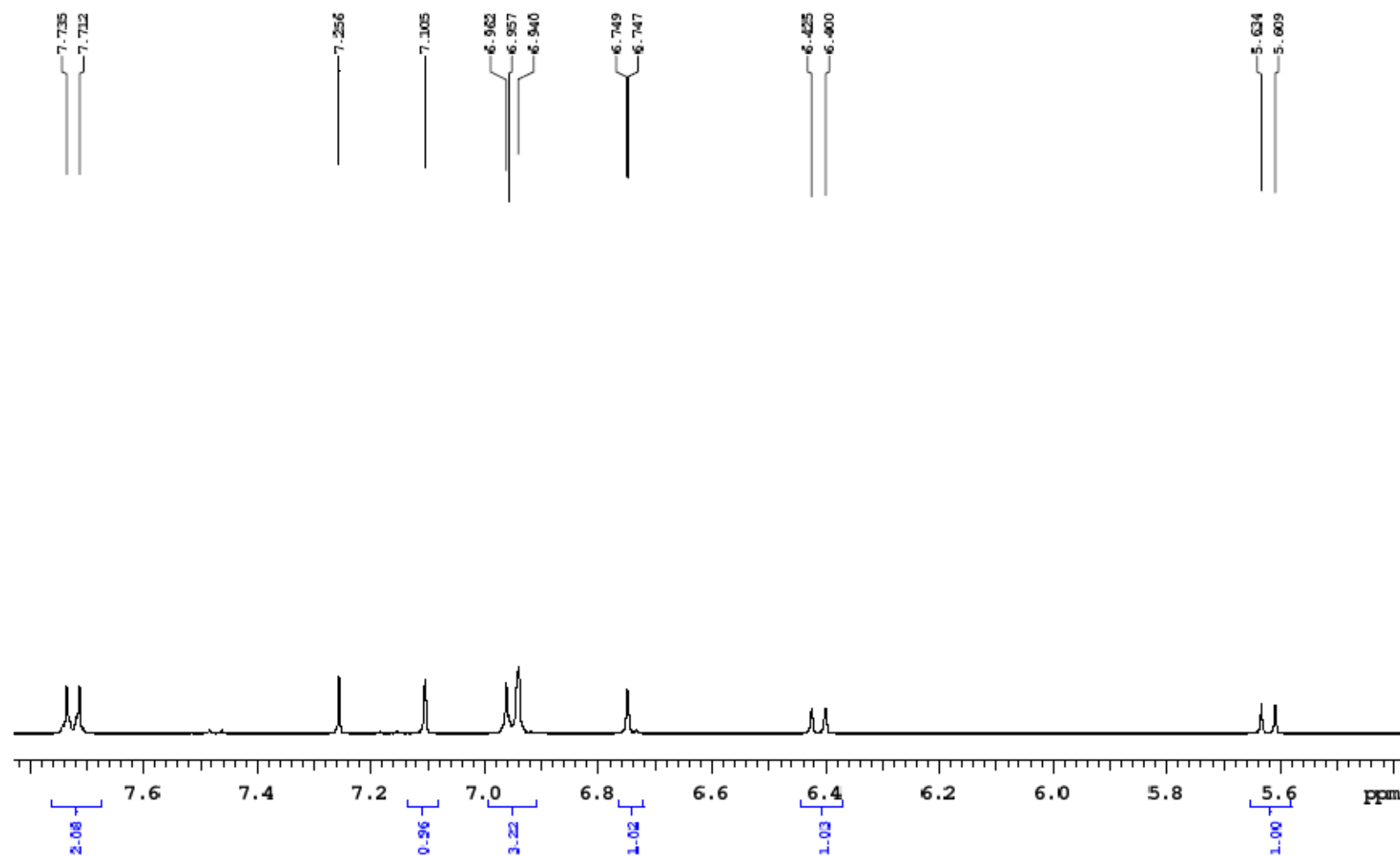
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
4096 repetitions
OBSERVE C13, 100.5307711 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 3 hr, 10 min

```



^1H NMR (400 MHz, CDCl_3) spectrum of gramniphinol G (9).





^{13}C NMR (100 MHz, CDCl_3) spectrum of gramniphinol G (9).

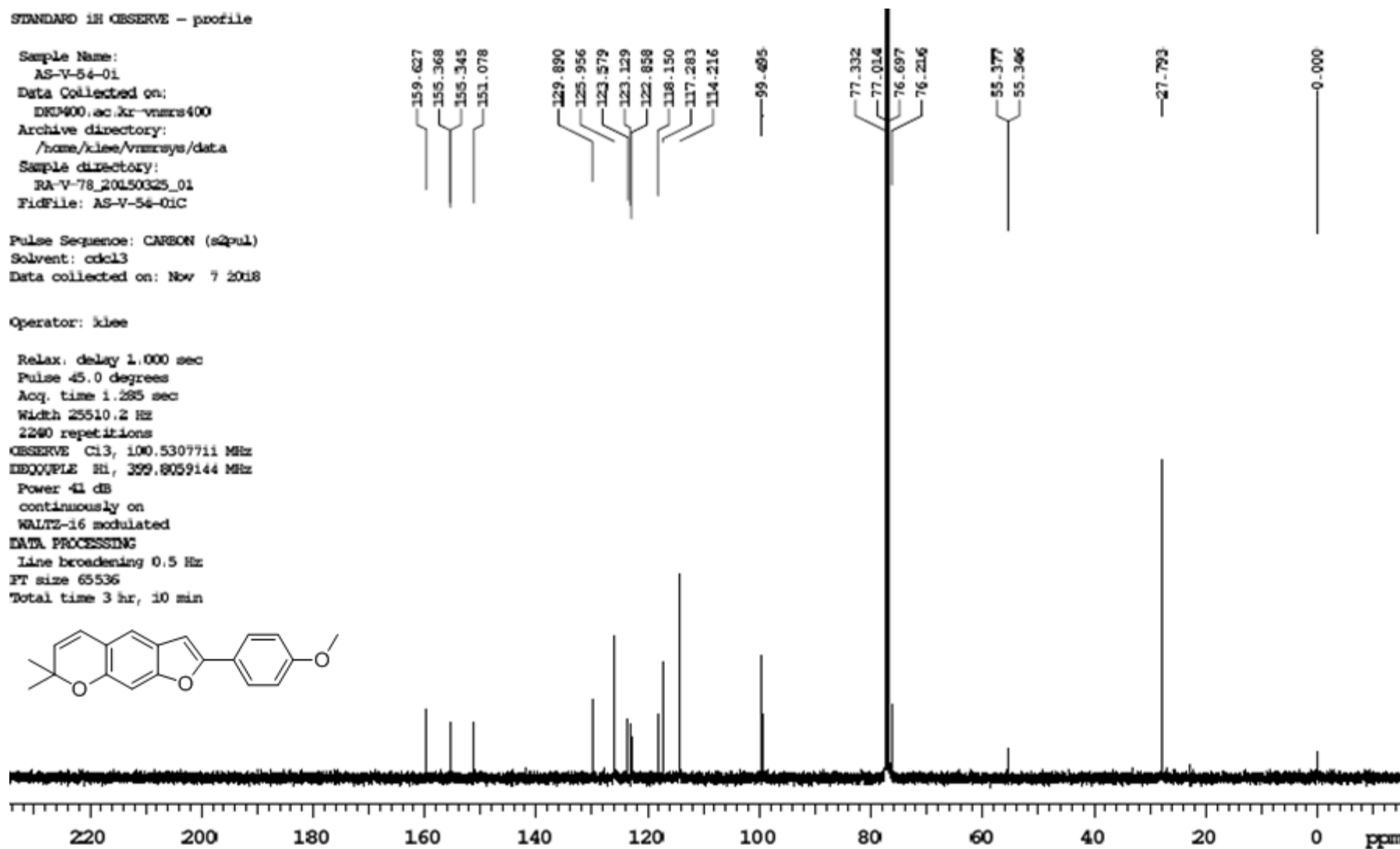
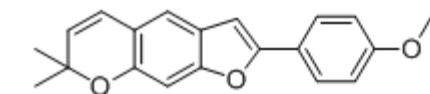
STANDARD IN OBSERVE - profile

Sample Name:
AS-V-54-01
Data Collected on:
DPX400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-54-01C

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl_3
Data collected on: Nov 7 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
2240 repetitions
OBSERVE Cl_3 , 100.5307711 MHz
DECOUPLE H_1 , 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 3 hr, 10 min



^1H NMR (600 MHz, methanol- d_4) spectrum of morunigrol C (**10**).

STANDARD PROTON PARAMETERS

Sample Name:
AS-IV-81-01
Data Collected on:
DKU600.ac.kr-vnmrs600
Archive directory:

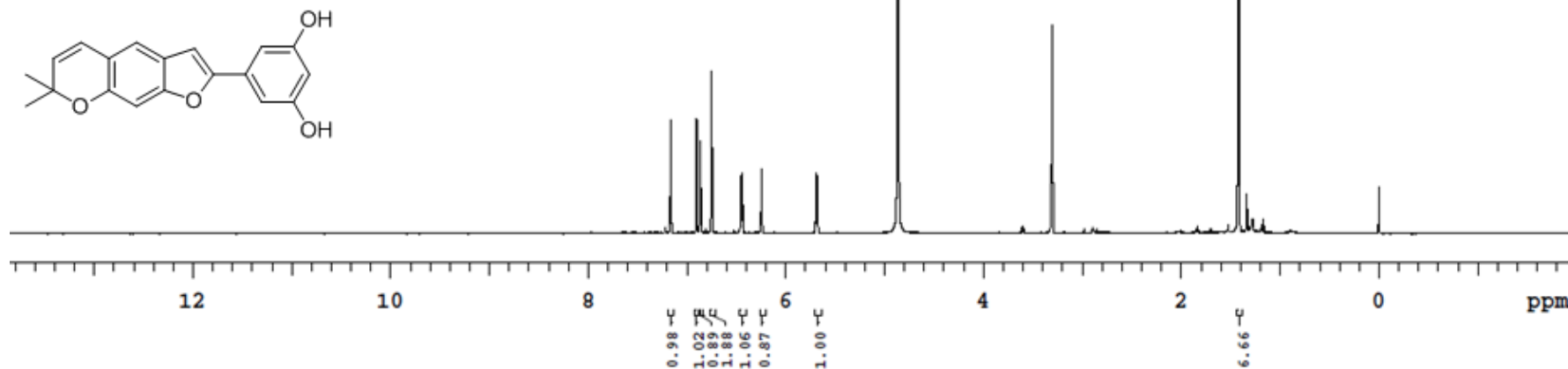
Sample directory:

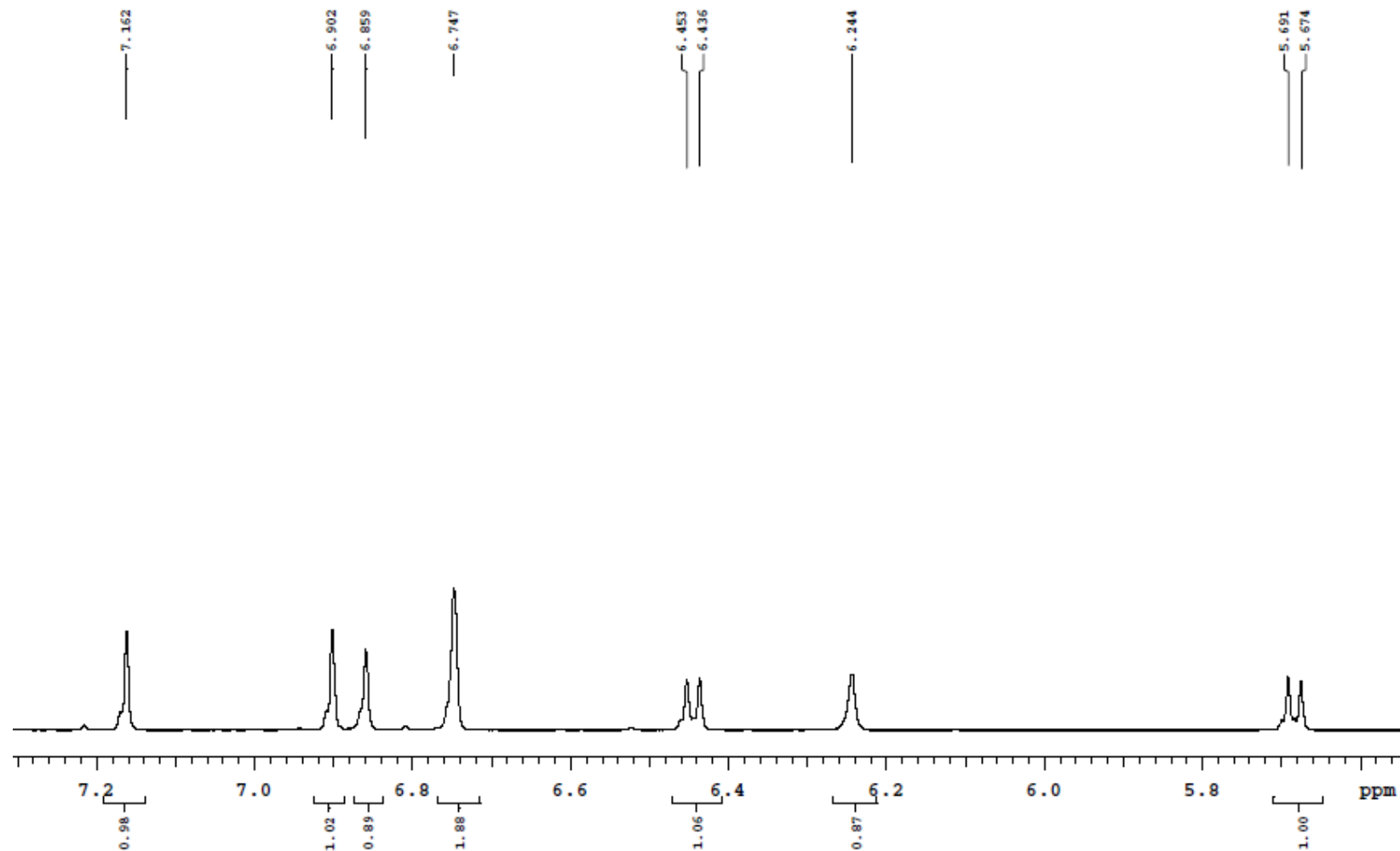
FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: cd3od
Data collected on: Oct 22 2018

Operator: vnmr1

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.704 sec
Width 9615.4 Hz
16 repetitions
OBSERVE H1, 599.9253817 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 43 sec





¹³C NMR (150 MHz, methanol-d₄) spectrum of morunigrol C (**10**).

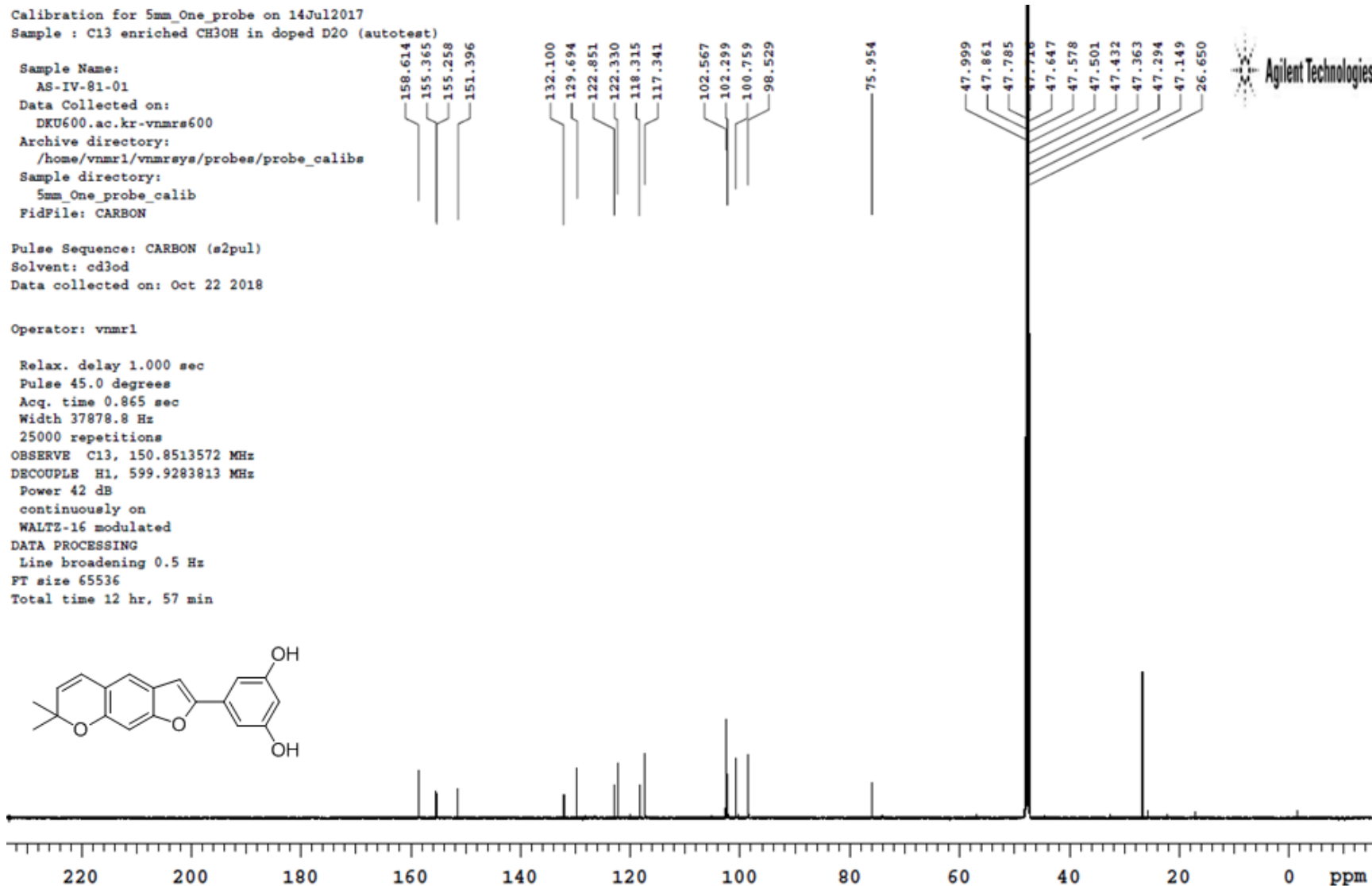
Calibration for 5mm_One_probe on 14Jul2017
Sample : C13 enriched CH₃OH in doped D₂O (autotest)

Sample Name:
AS-IV-81-01
Data Collected on:
DKU600.ac.kr-vnmrs600
Archive directory:
/home/vnmr1/vnmrsys/probes/probe_calibs
Sample directory:
5mm_One_probe_calib
FidFile: CARBON

Pulse Sequence: CARBON (s2pul)
Solvent: cd3od
Data collected on: Oct 22 2018

Operator: vnmr1

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 0.865 sec
Width 37878.8 Hz
25000 repetitions
OBSERVE C13, 150.8513572 MHz
DECOUPLE H1, 599.9283813 MHz
Power 42 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 12 hr, 57 min



^1H NMR (400 MHz, CDCl_3) spectrum of 3',5'-di-O-methyl morunigrol C (**11**)

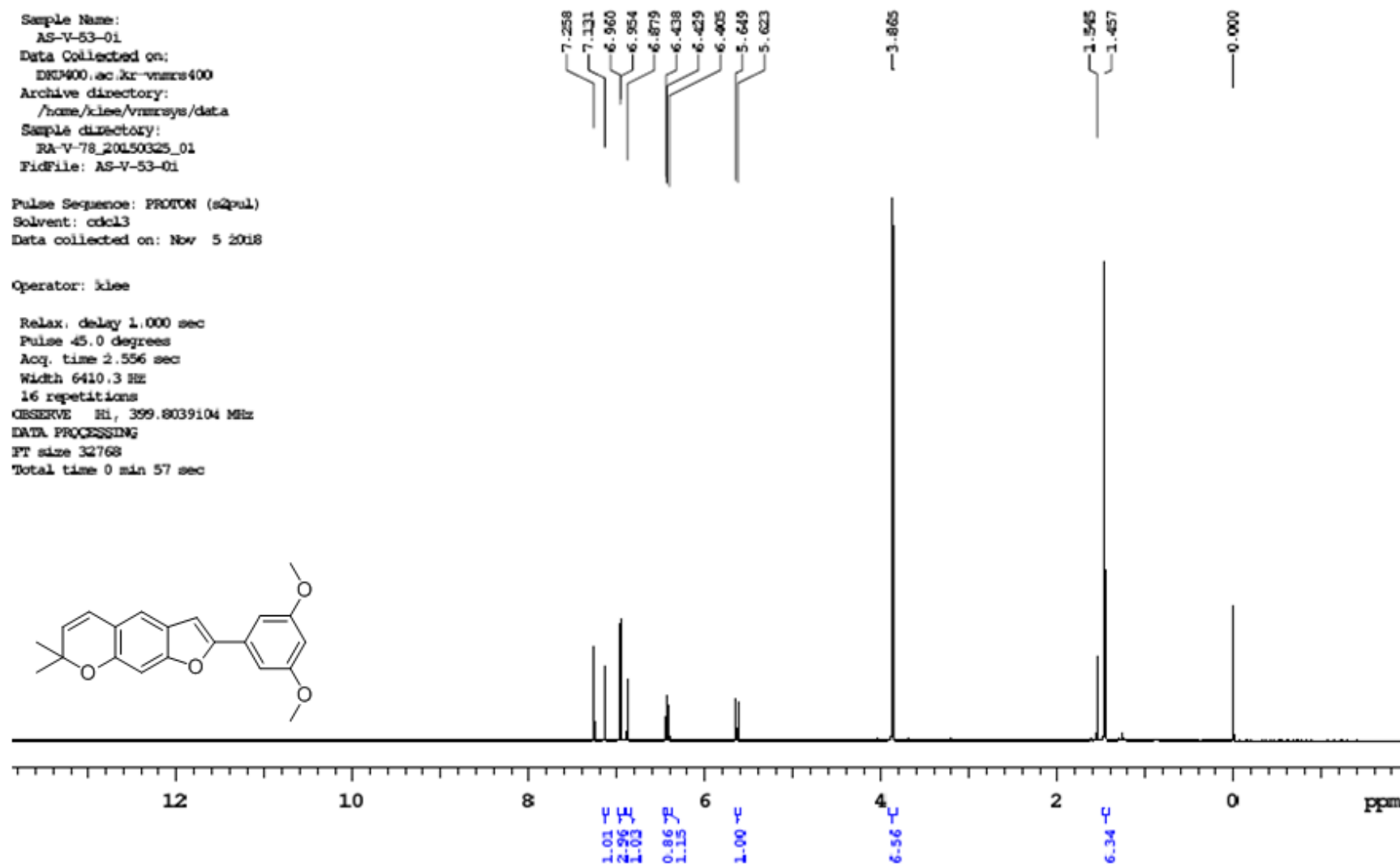
STANDARD 1H OBSERVE - profile

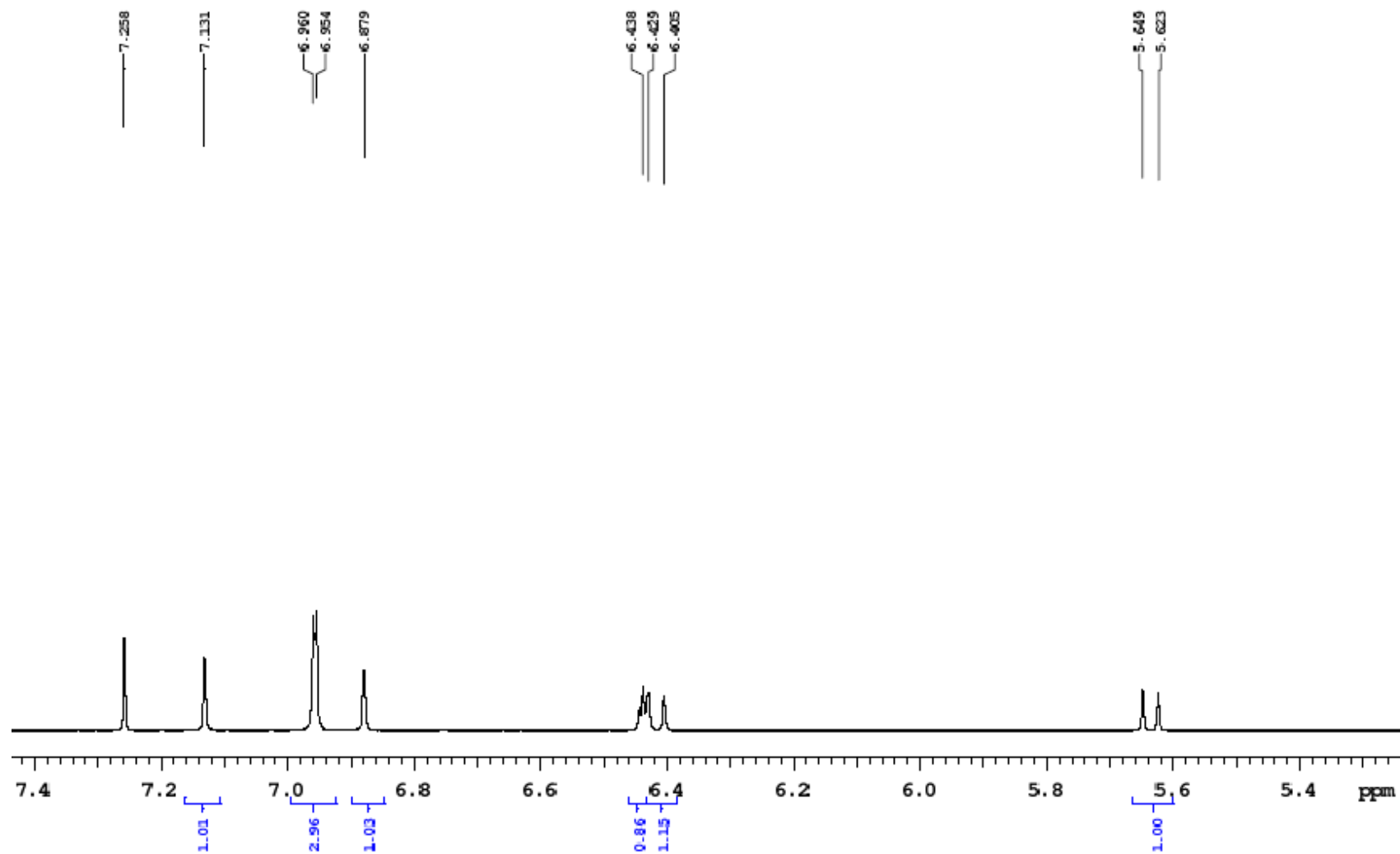
Sample Name:
AS-V-53-01
Data Collected on:
DNV400.ac.kr-vnmr400
Archive directory:
/home/klee/vnmr400/data
Sample directory:
RA-V-78_20150325_01
FidFile: AS-V-53-01

Pulse Sequence: PROTON (sqpul)
Solvent: cdcl3
Data collected on: Nov 5 2018

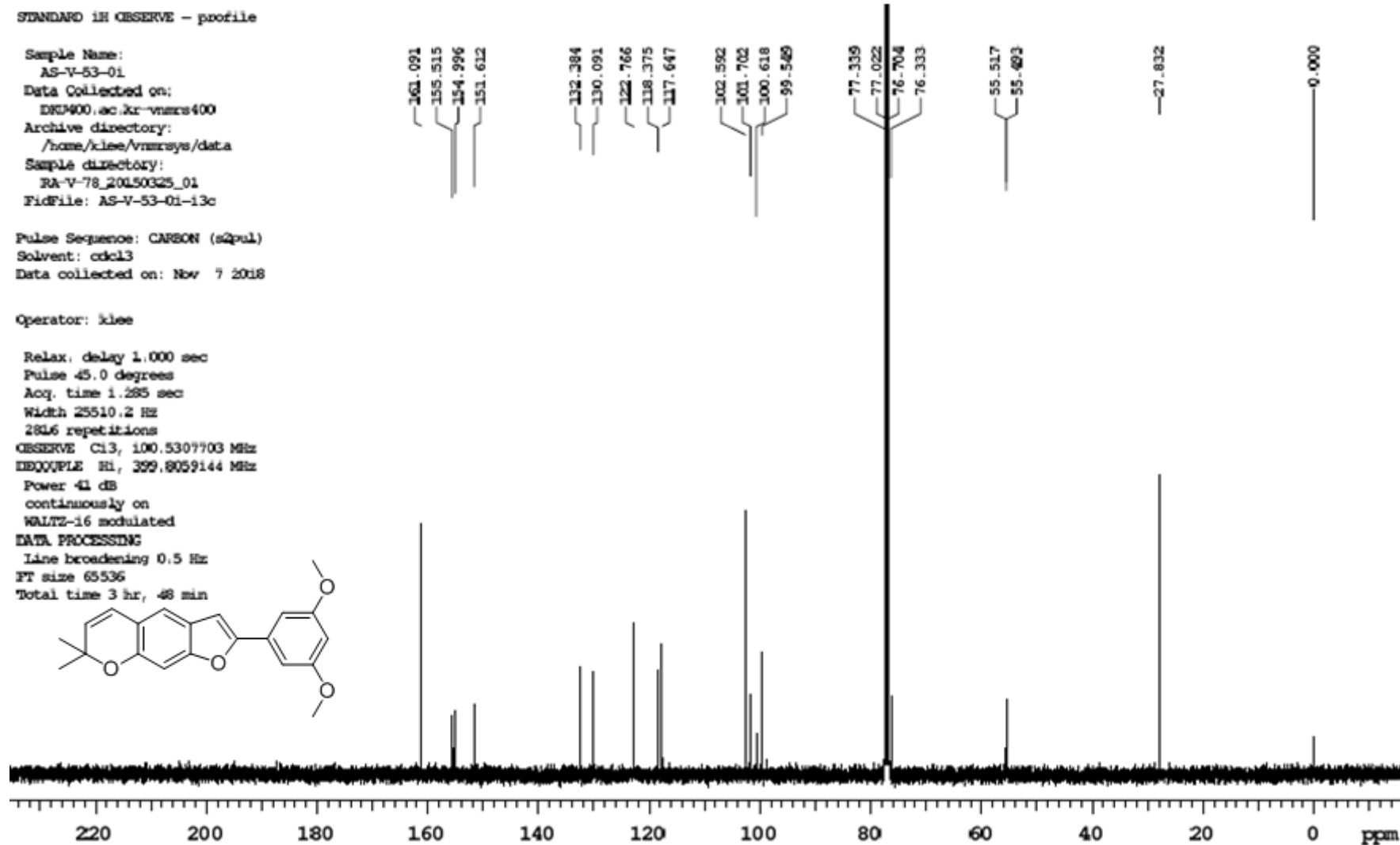
Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE H1, 399.8039104 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec





^{13}C NMR (100 MHz, CDCl_3) spectrum of 3',5'-di-O-methyl morunigrol C (**11**)



¹H NMR (400 MHz, CDCl₃) spectrum of Compound **1g**

new experiment

Sample Name:
AS-TV-02-02C
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

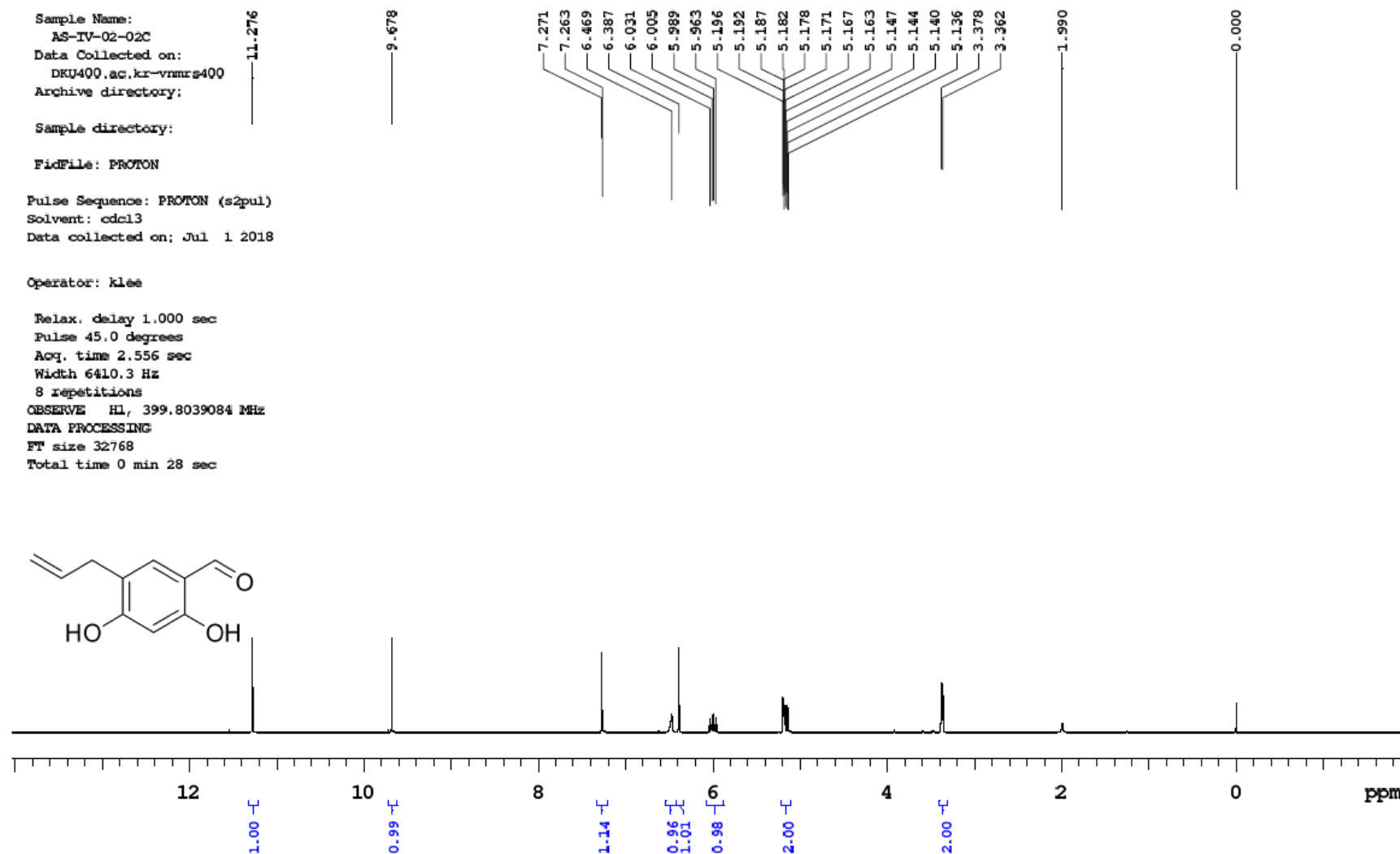
Sample directory:

FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Jul 1 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
8 repetitions
OBSERVE H1, 399.8039084 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 28 sec



¹³C NMR (100 MHz, CDCl₃) spectrum of Compound **1g**

new experiment

Sample Name:
AS-IV-02-02C
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:

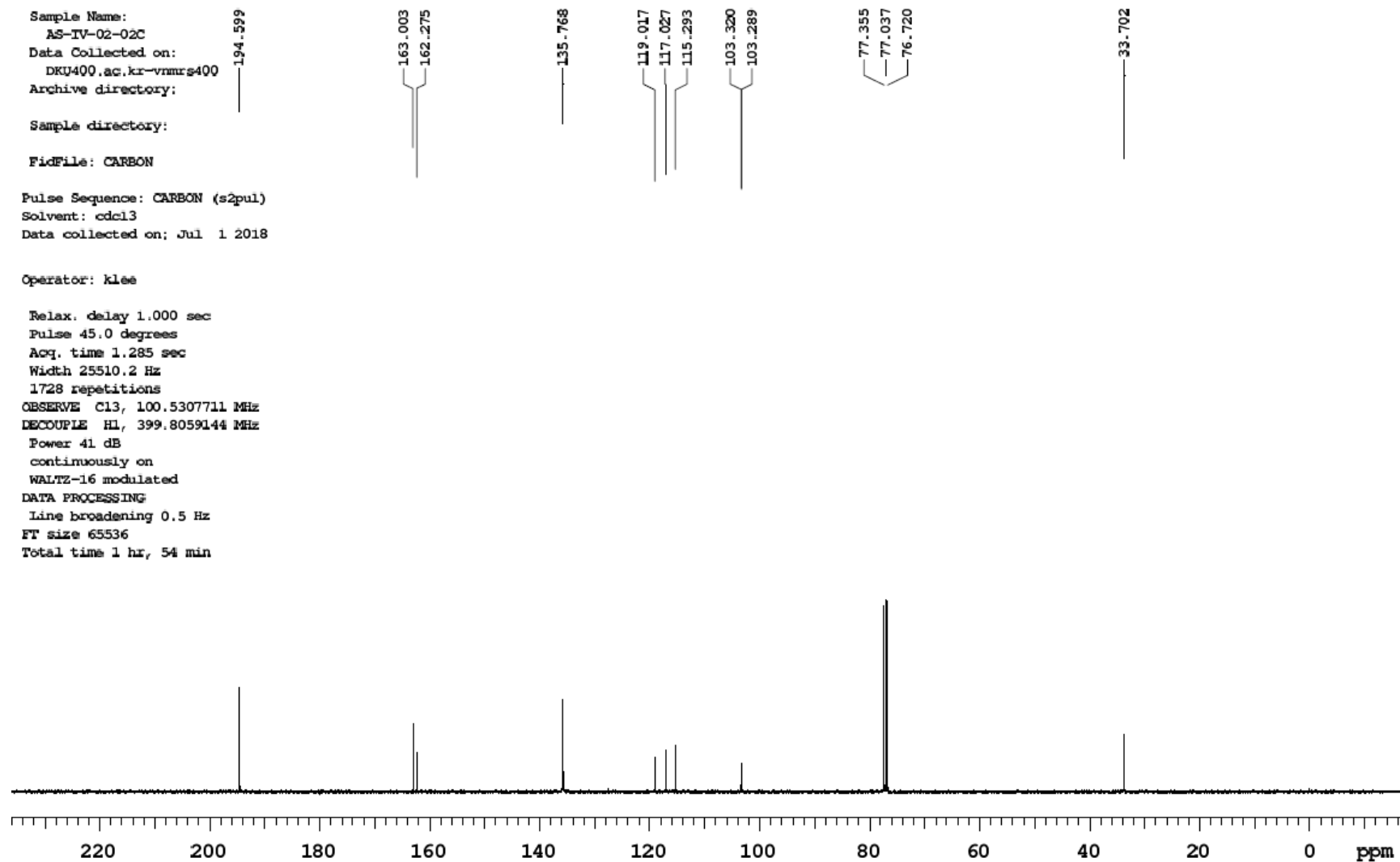
Sample directory:

FidFile: CARBON

Pulse Sequence: CARBON (s2pul)
Solvent: cdcl3
Data collected on: Jul 1 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
1728 repetitions
OBSERVE C13, 100.5307711 MHz
DECOUPLE H1, 399.8059144 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



¹HNMR (400 MHz, DMSO-*d*₆) spectrum of Compound **11**

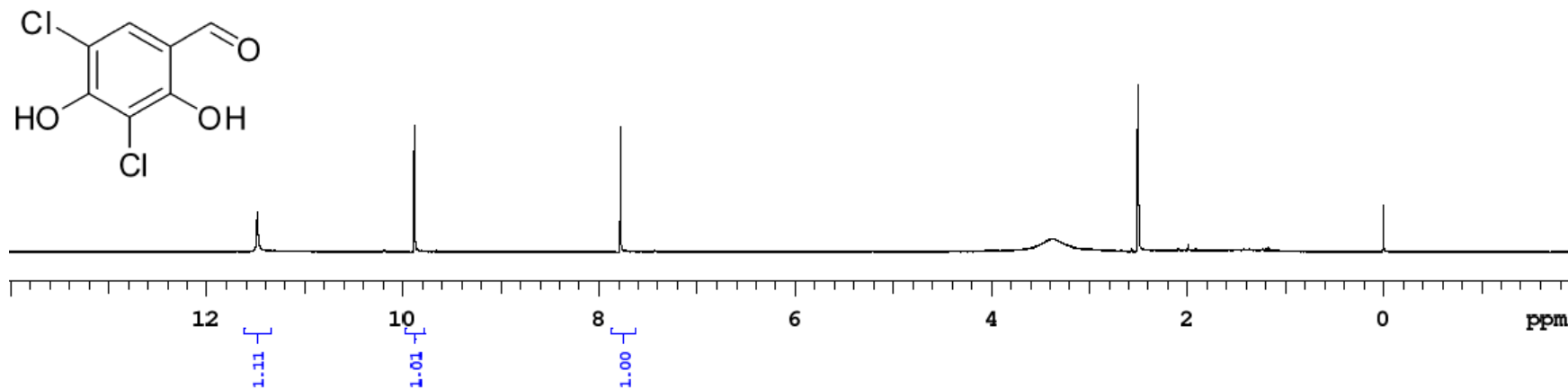
STANDARD 1H OBSERVE - profile

Sample Name:
AS-V-44-01
Data Collected on:
DKU400.ac.kr-vnmrs400
Archive directory:
/home/klee/vnmrsys/data
Sample directory:
AC-1405_20181119_01
FidFile: PROTON

Pulse Sequence: PROTON (s2pul)
Solvent: dmsc
Data collected on: Nov 22 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
16 repetitions
OBSERVE H1, 399.8057997 MHz
DATA PROCESSING
FT size 32768
Total time 0 min 57 sec



¹³C NMR (100 MHz, DMSO-*d*₆) spectrum of Compound **11**

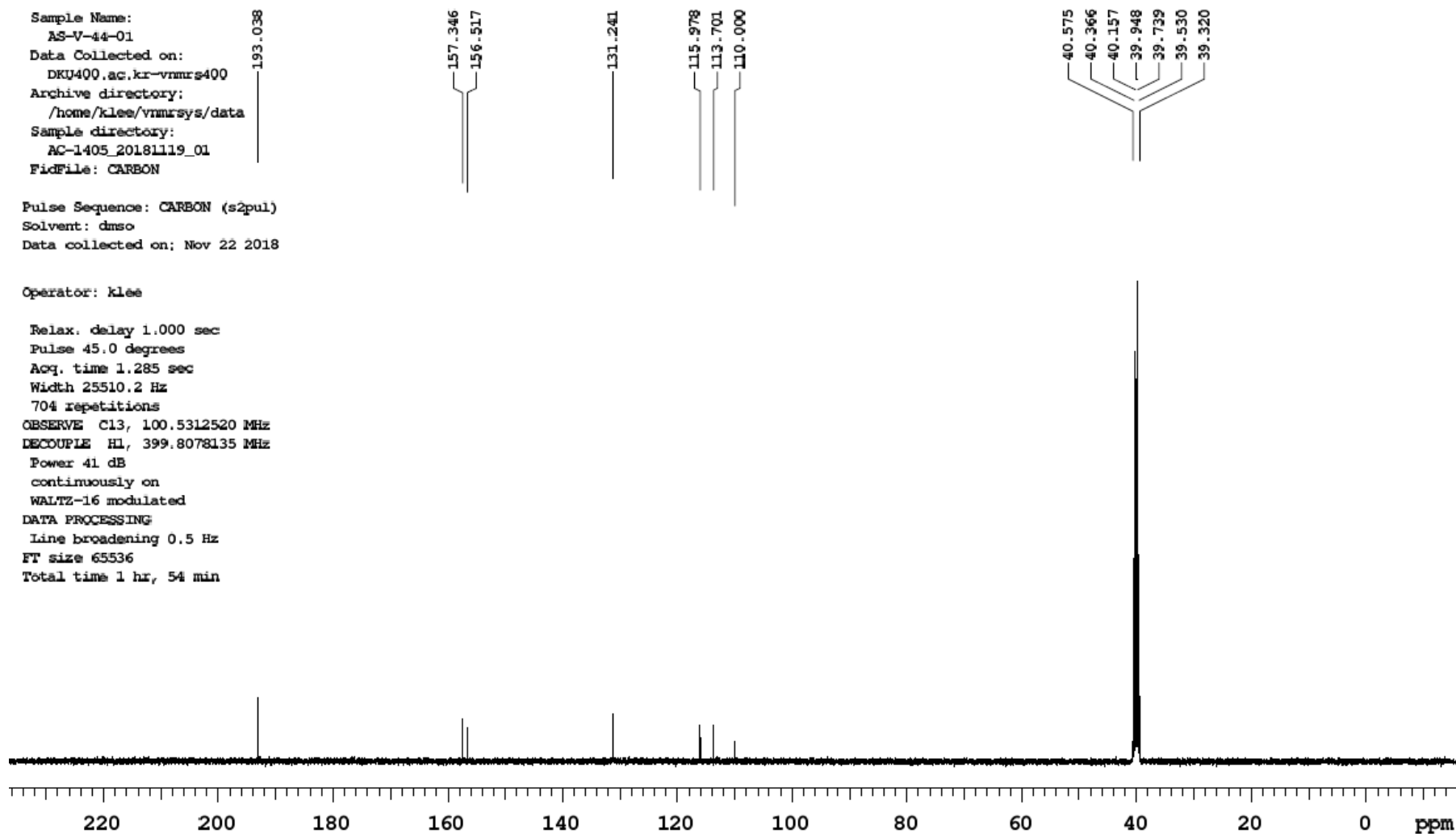
STANDARD 1H OBSERVE - profile

Sample Name: AS-V-44-01
Data Collected on: DKU400.ac.kr-vnmrsg400
Archive directory: /home/klee/vnmrsg/data
Sample directory: AC-1405_20181119_01
FidFile: CARBON

Pulse Sequence: CARBON (s2pul)
Solvent: dmsd
Data collected on: Nov 22 2018

Operator: klee

Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.285 sec
Width 25510.2 Hz
704 repetitions
OBSERVE C13, 100.5312520 MHz
DECOUPLE H1, 399.8078135 MHz
Power 41 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 hr, 54 min



References

1. Z. Wang; Y. Cao; S. Paudel; G. Yoon and S. H. Cheon, *Arch. Pharm. Res.* 2013, **36**, 1432–1436.
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