Supporting information
II

Copies of NMR spectra

The Effect of Deoxyfluorination and O-Acylation on the Cytotoxicity of *N*-Acetyl-D-Gluco- and D-Galactosamine Hemiacetals

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[a]*Institute of Chemical Process Fundamentals of the CAS, v. v. i., Rozvojová 135, 16502 Praha 6, Czech Republic.* [b]*University of Chemistry and Technology Prague, Technická 5, 16628 Praha 6, Czech Republic*. [c]*Department of Chemical Engineering, University of Chemistry and Technology, Technická 3, 166 28 Prague 6, Prague, Czech Republic*. [d]*Research Centre for Applied and Molecular Oncology, Masaryk Memorial Cancer Institute, Žlutý kopec 7, Brno, Czech Republic*.

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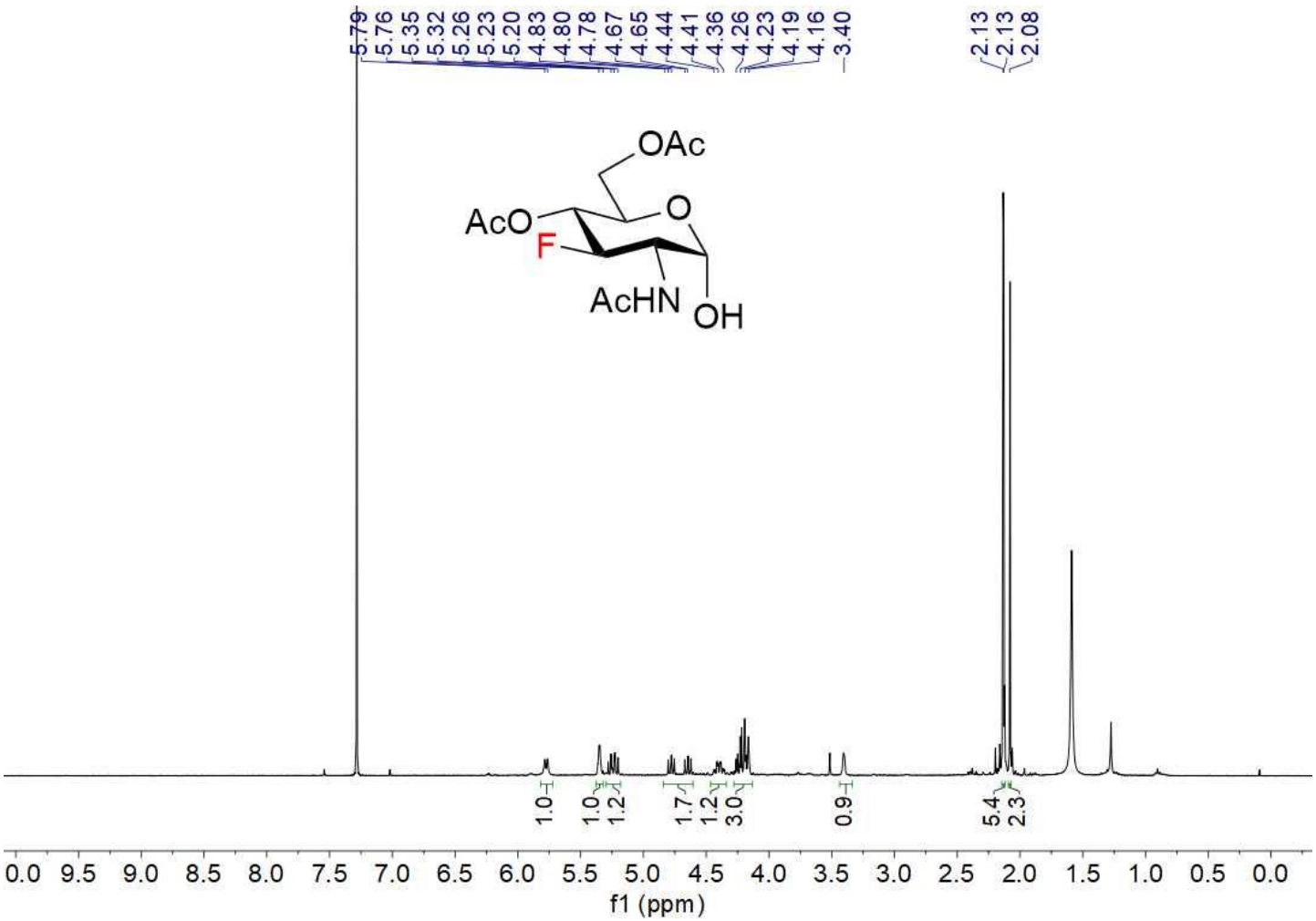
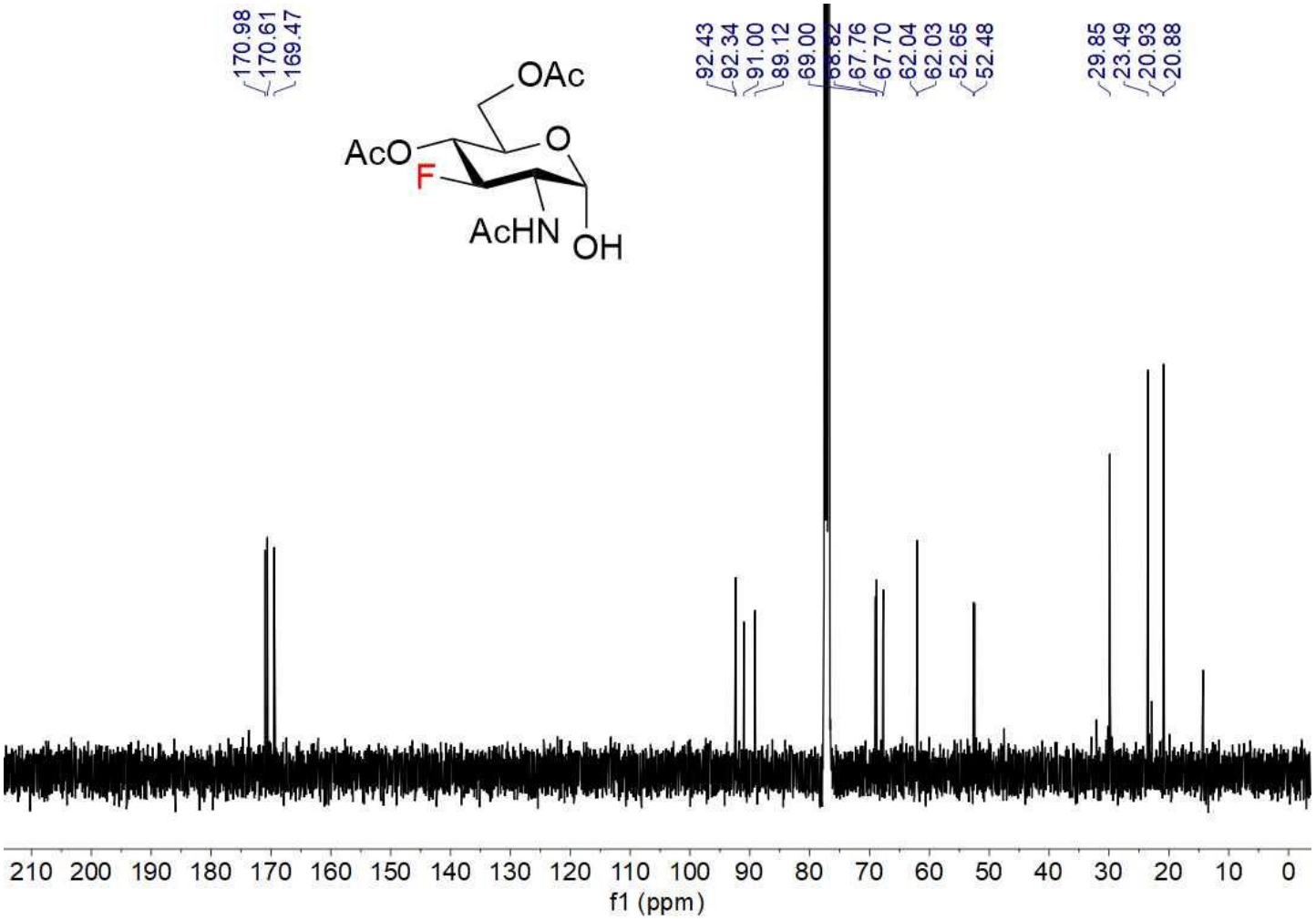
NMR COMPOUND 11

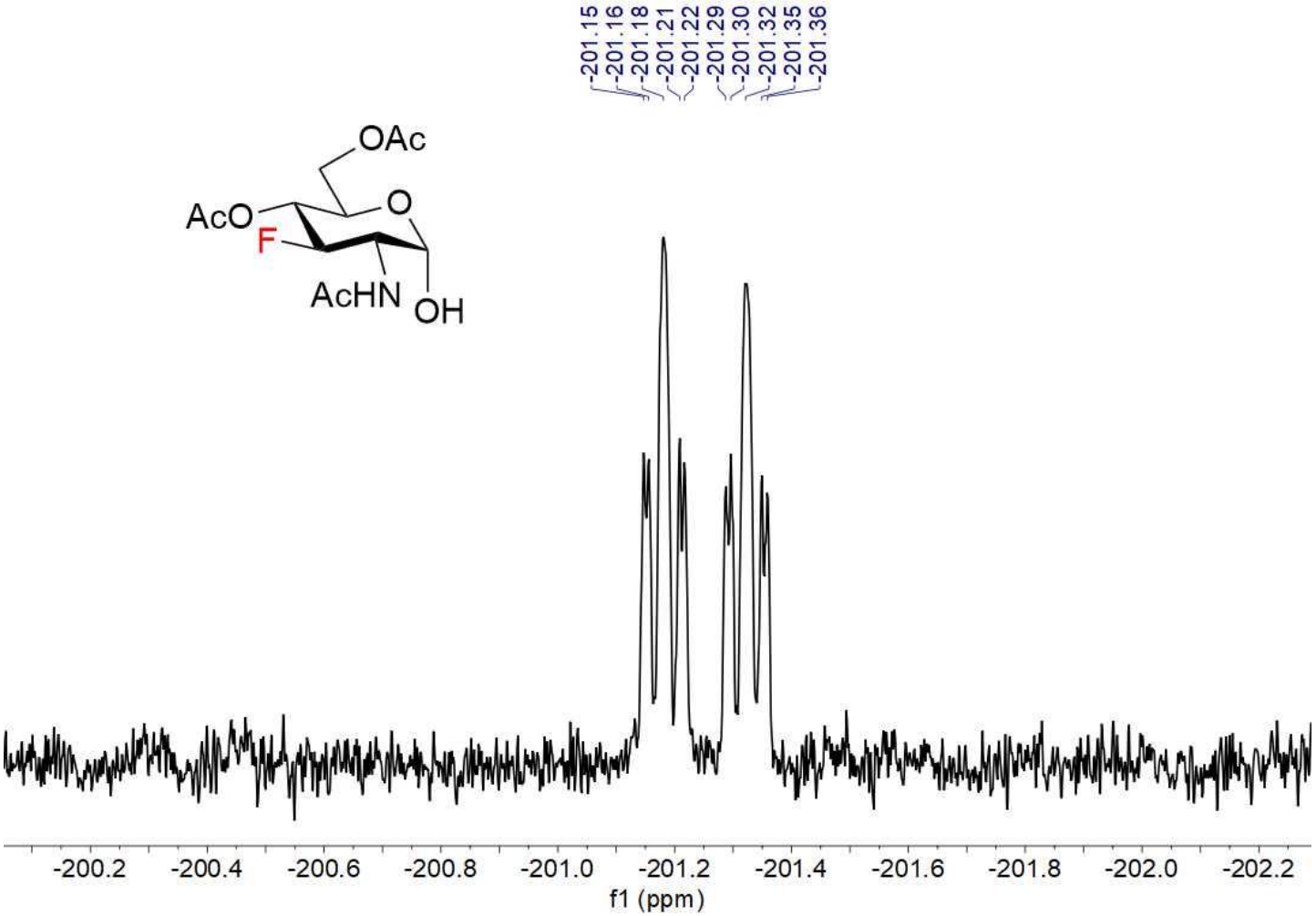
^{1}H NMR (400 MHz, $CDCl_3$) 11



^{13}C NMR (100 MHz, $CDCl_3$) 11



^{19}F NMR (376 MHz, $CDCl_3$) 11



NMR COMPOUND 14

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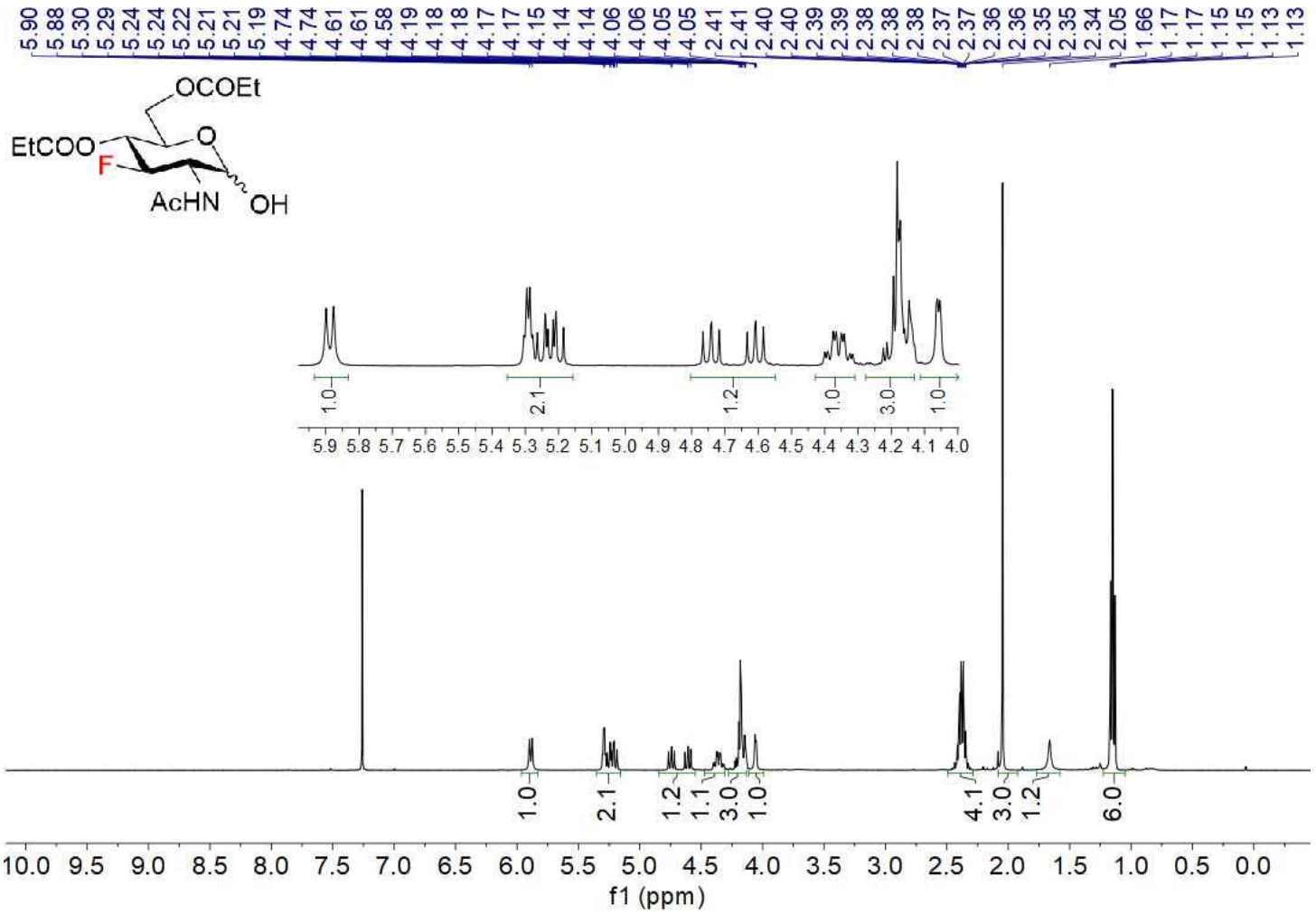
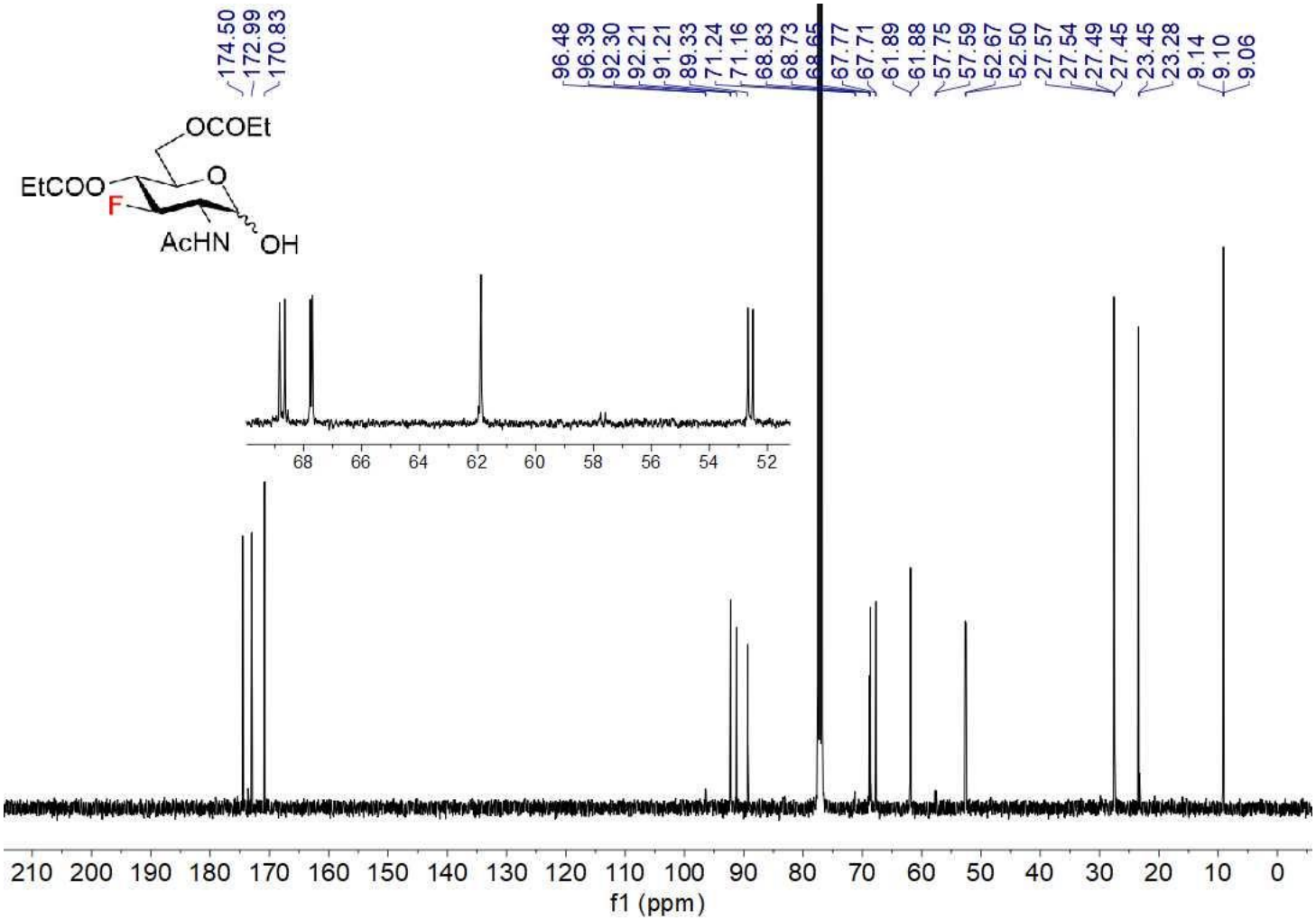


^{13}C NMR (100 MHz, $CDCl_3$) 14



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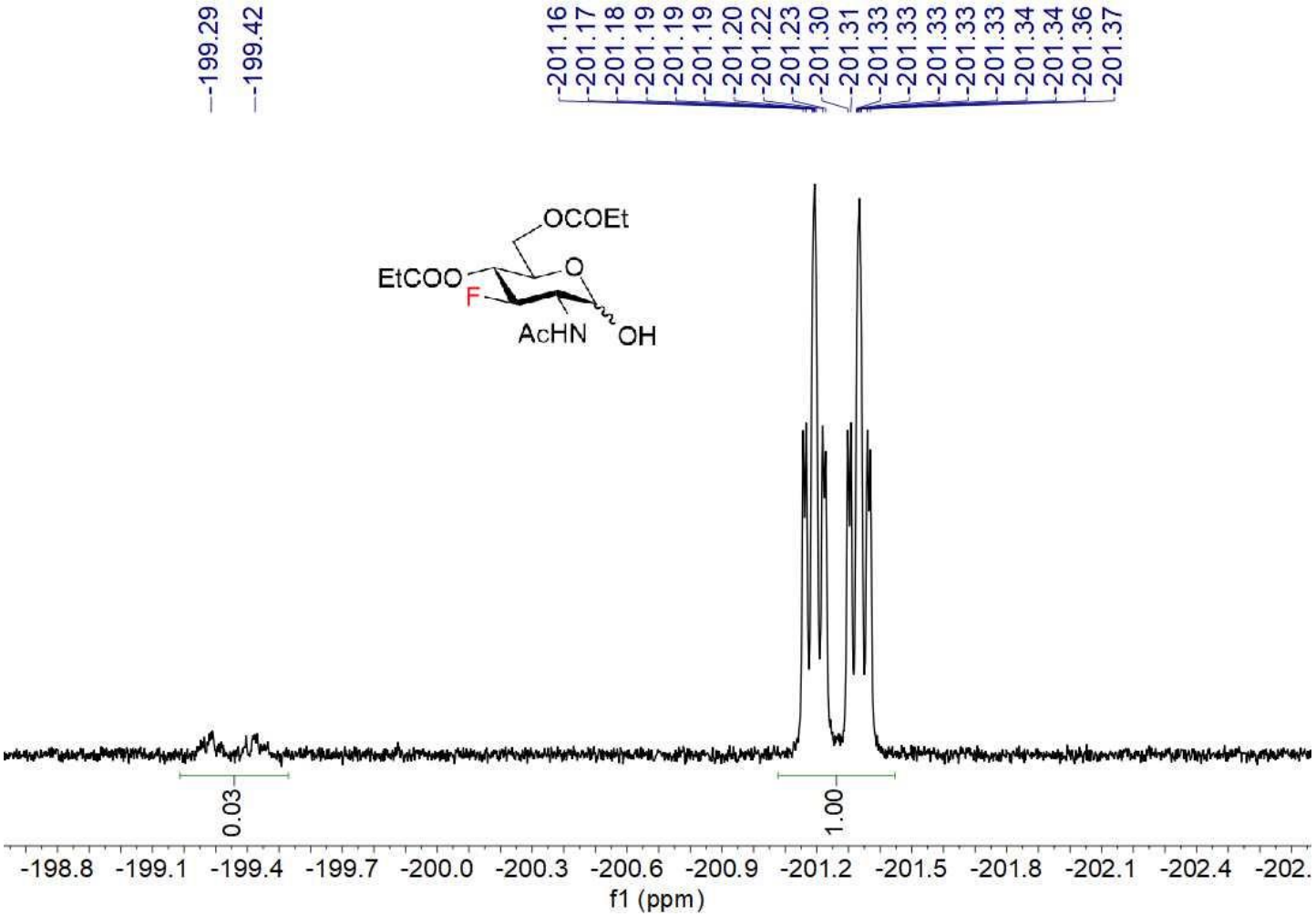

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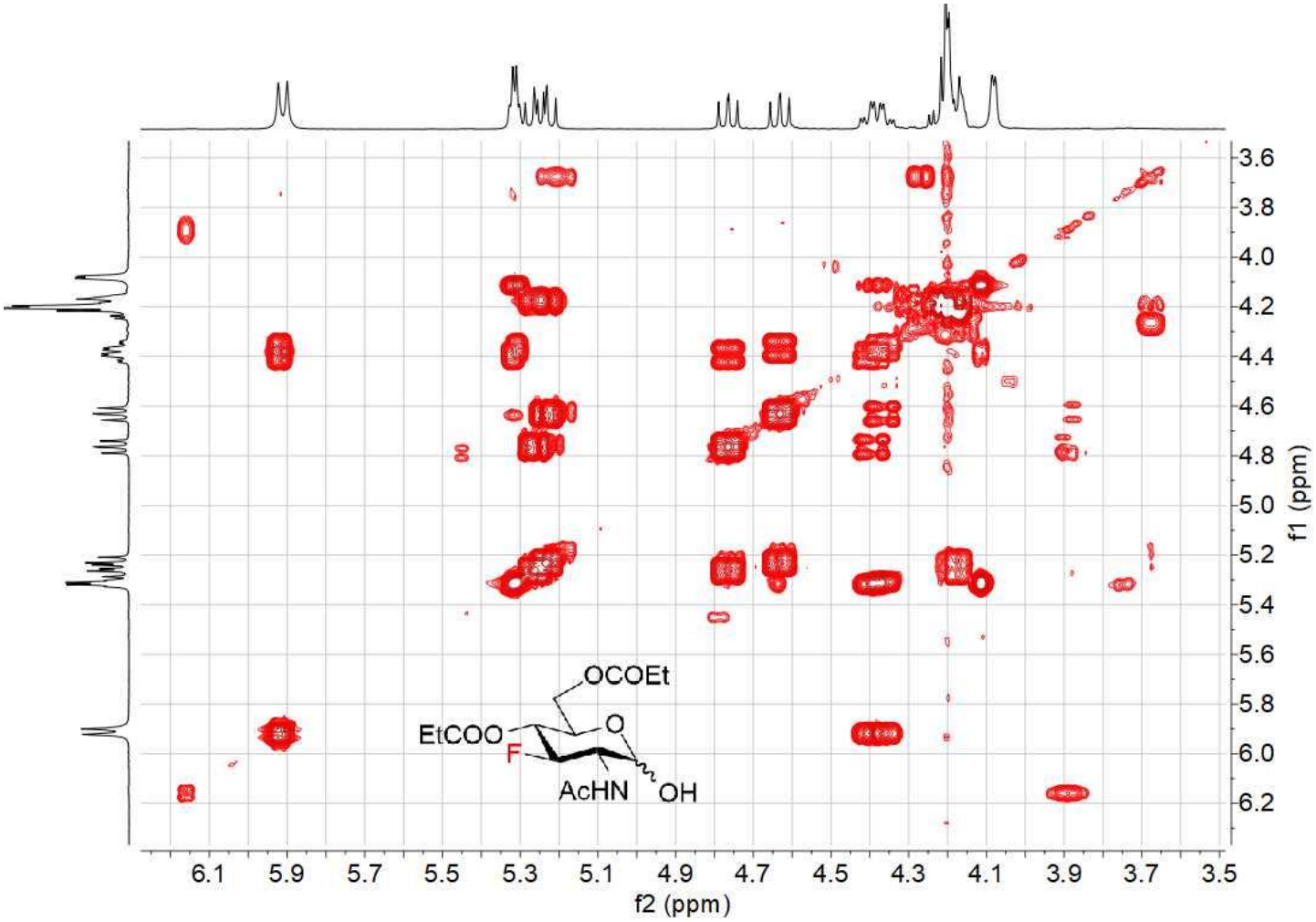
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O
F
AcHN
OH
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f1 (ppm)
6.1
5.9
5.7
5.5
5.3
5.1
4.9
4.7
4.5
4.3
4.1
3.9
3.7
3.5
3.6
3.8
4.0
4.2
4.4
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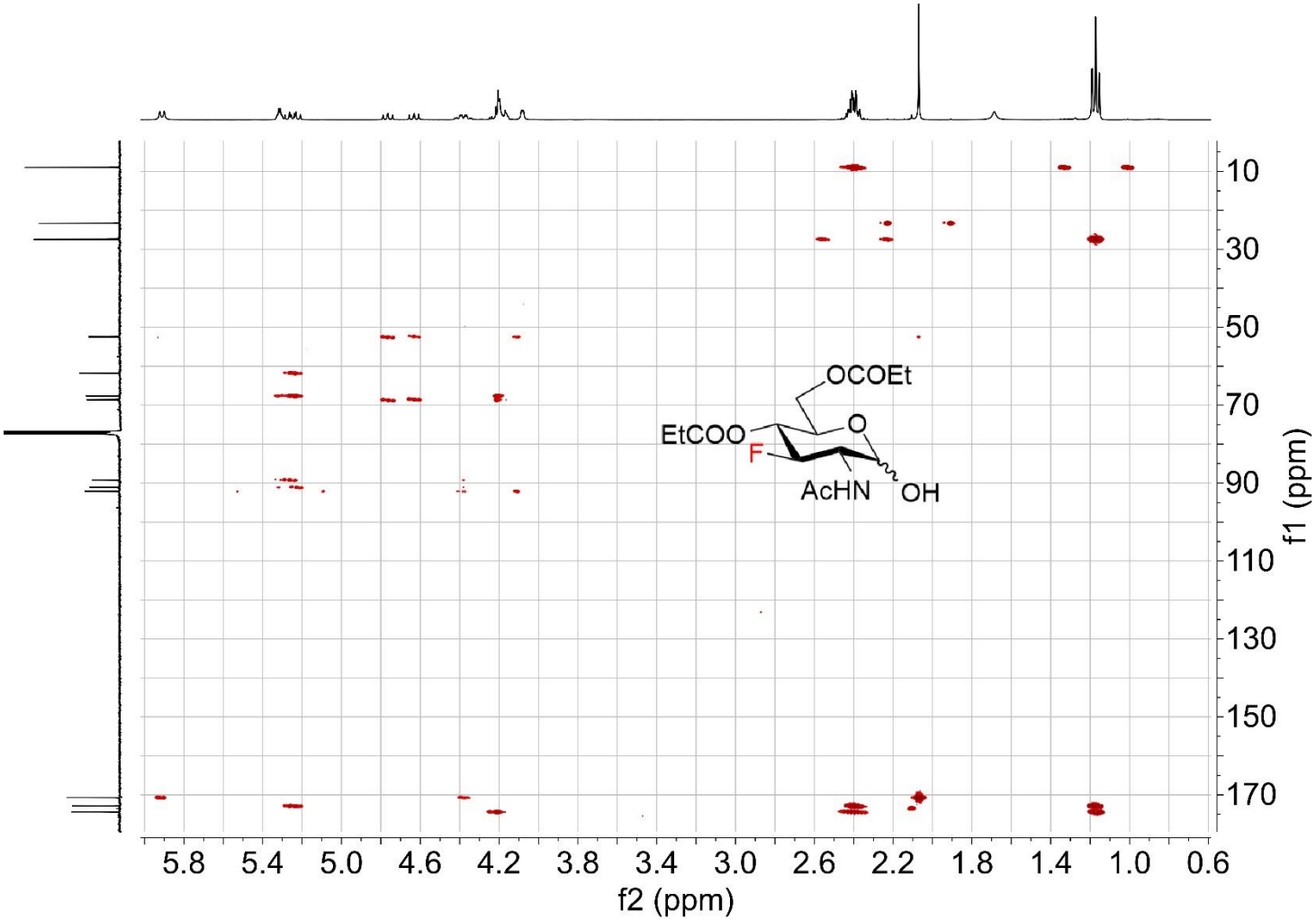
5.2
5.4
5.6
5.8
6.0
6.2

^{1}H-^{13}C HMBC 14



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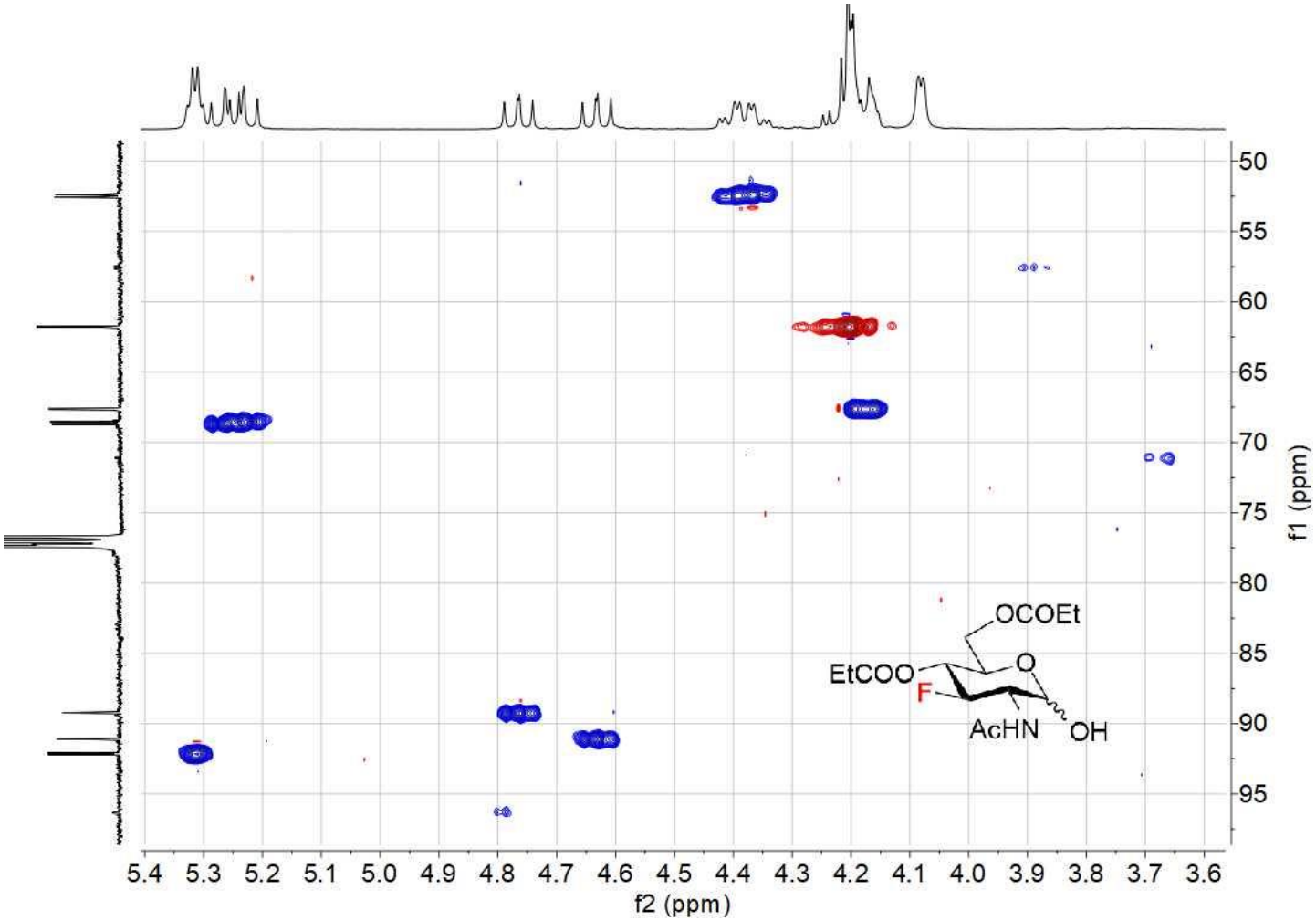
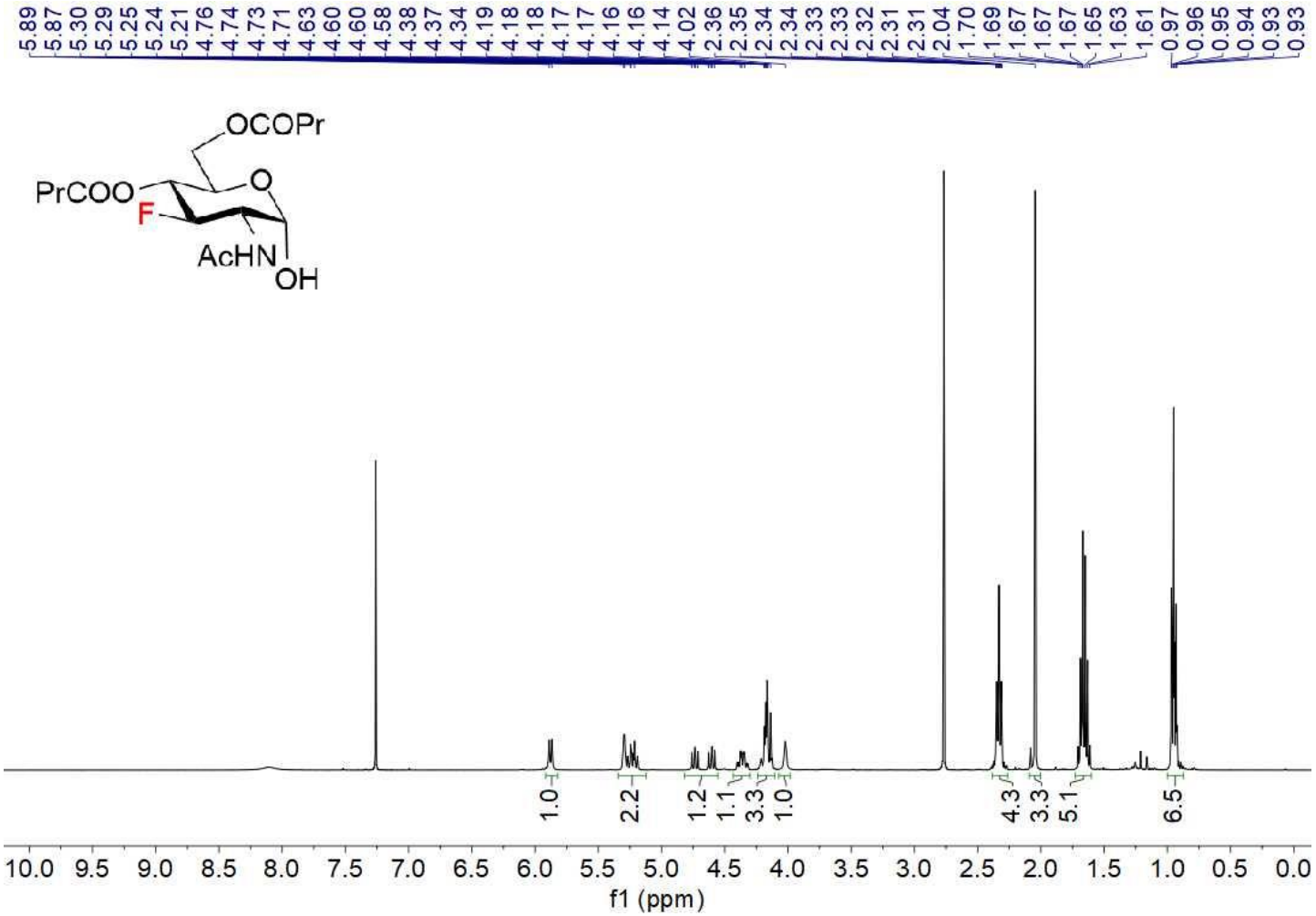
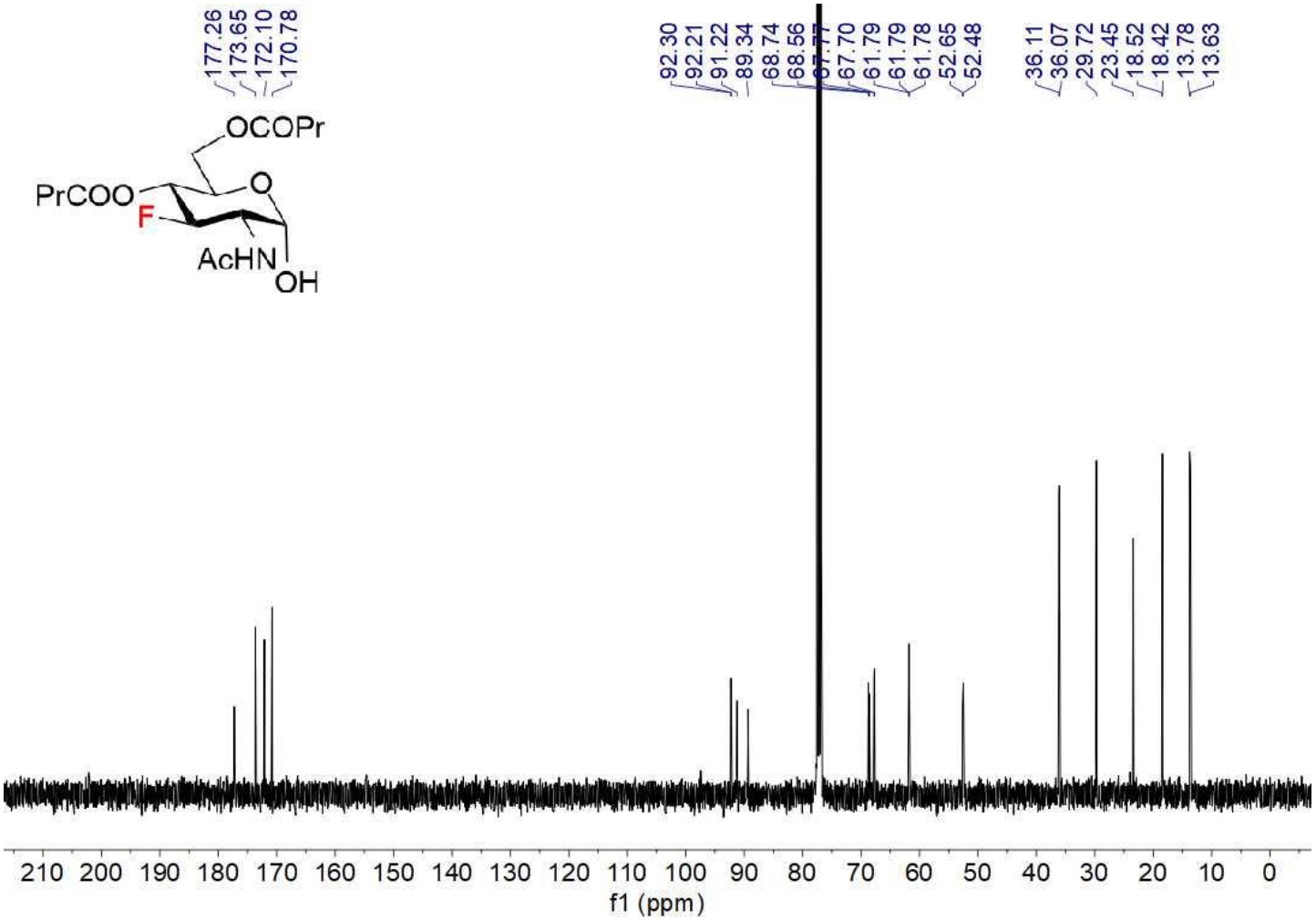


NMR COMPOUND 15

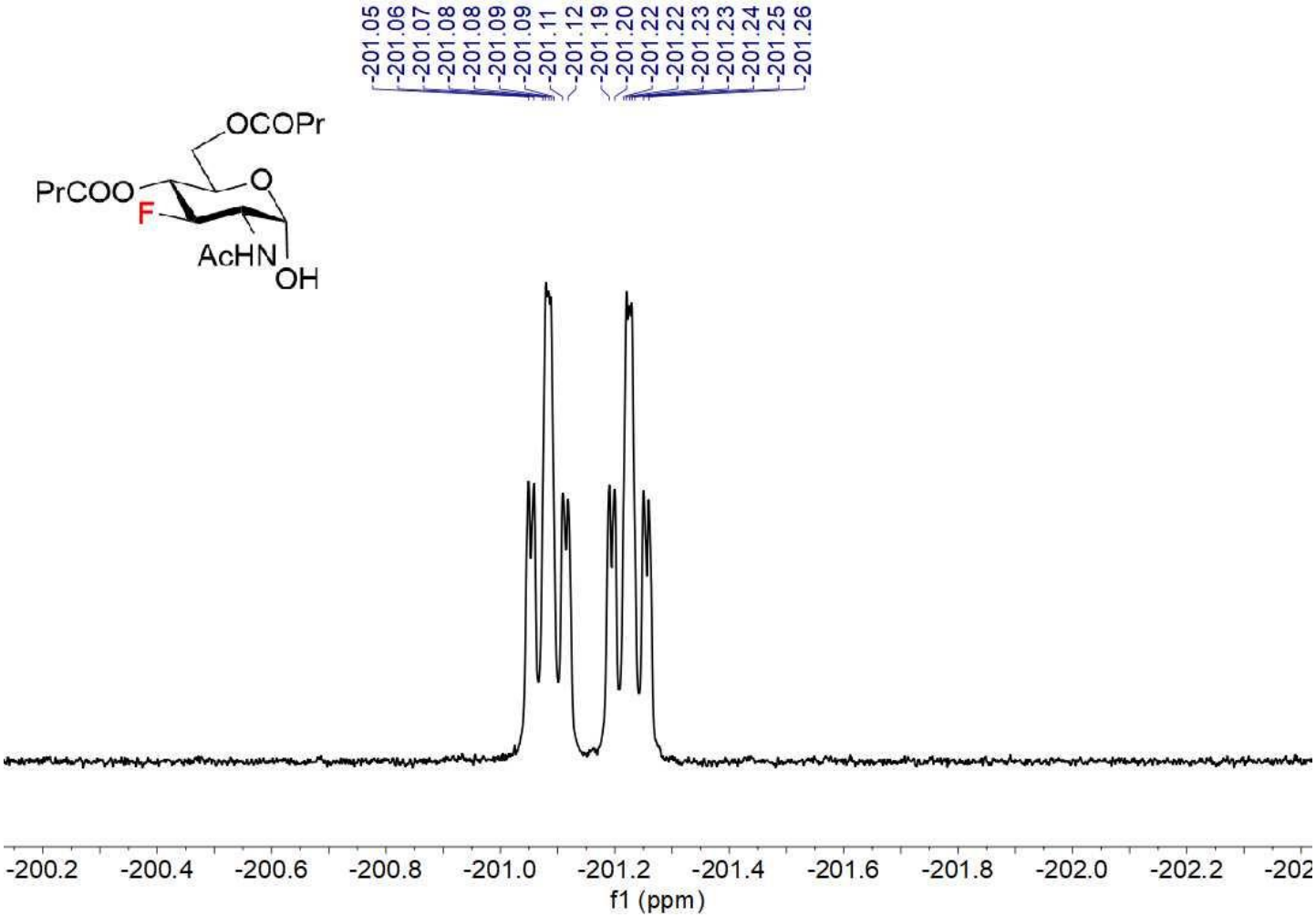
^{1}H NMR (400 MHz, $CDCl_3$) 15



^{13}C NMR (100 MHz, $CDCl_3$) 15



^{19}F NMR (376 MHz, $CDCl_3$) 15



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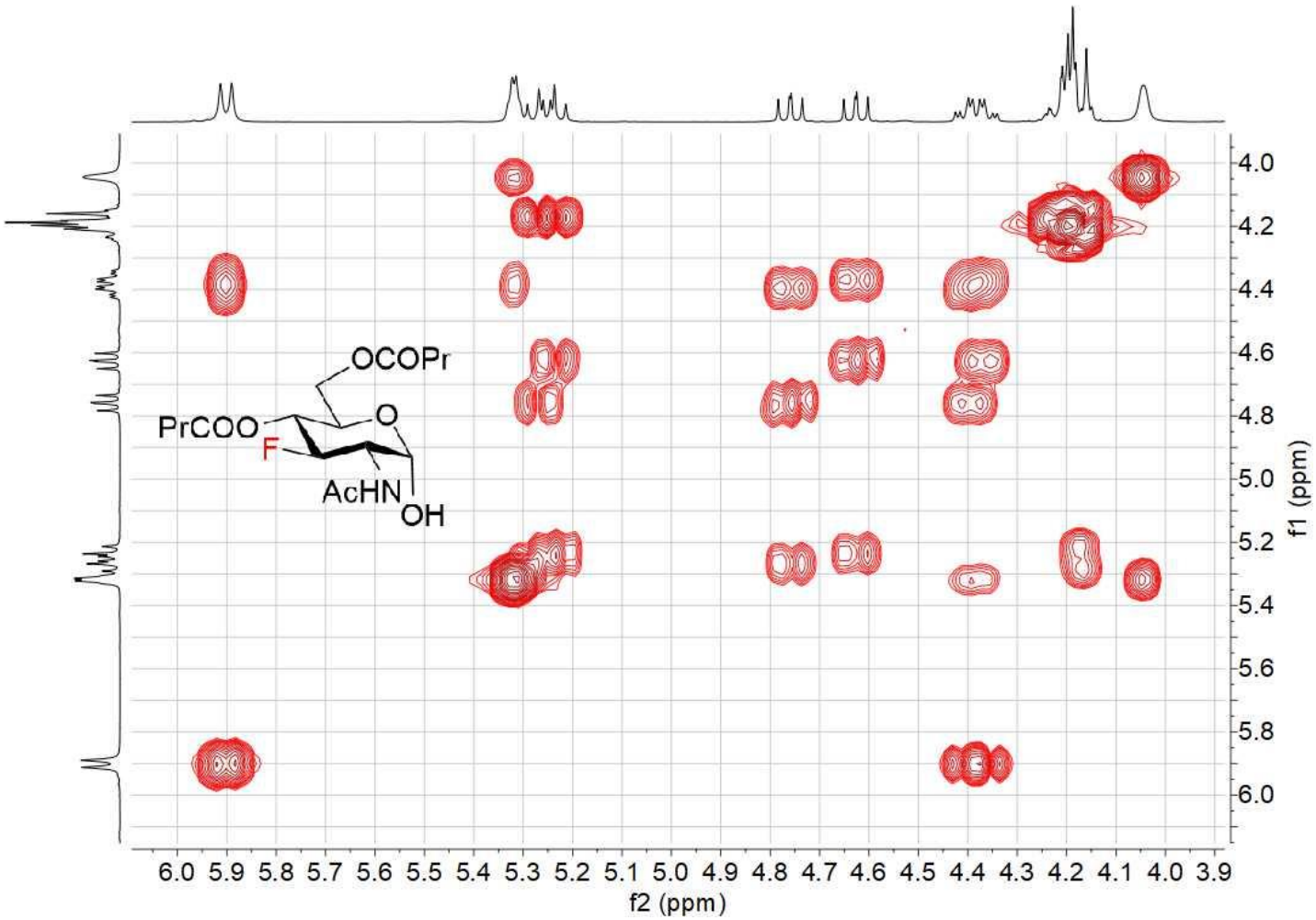

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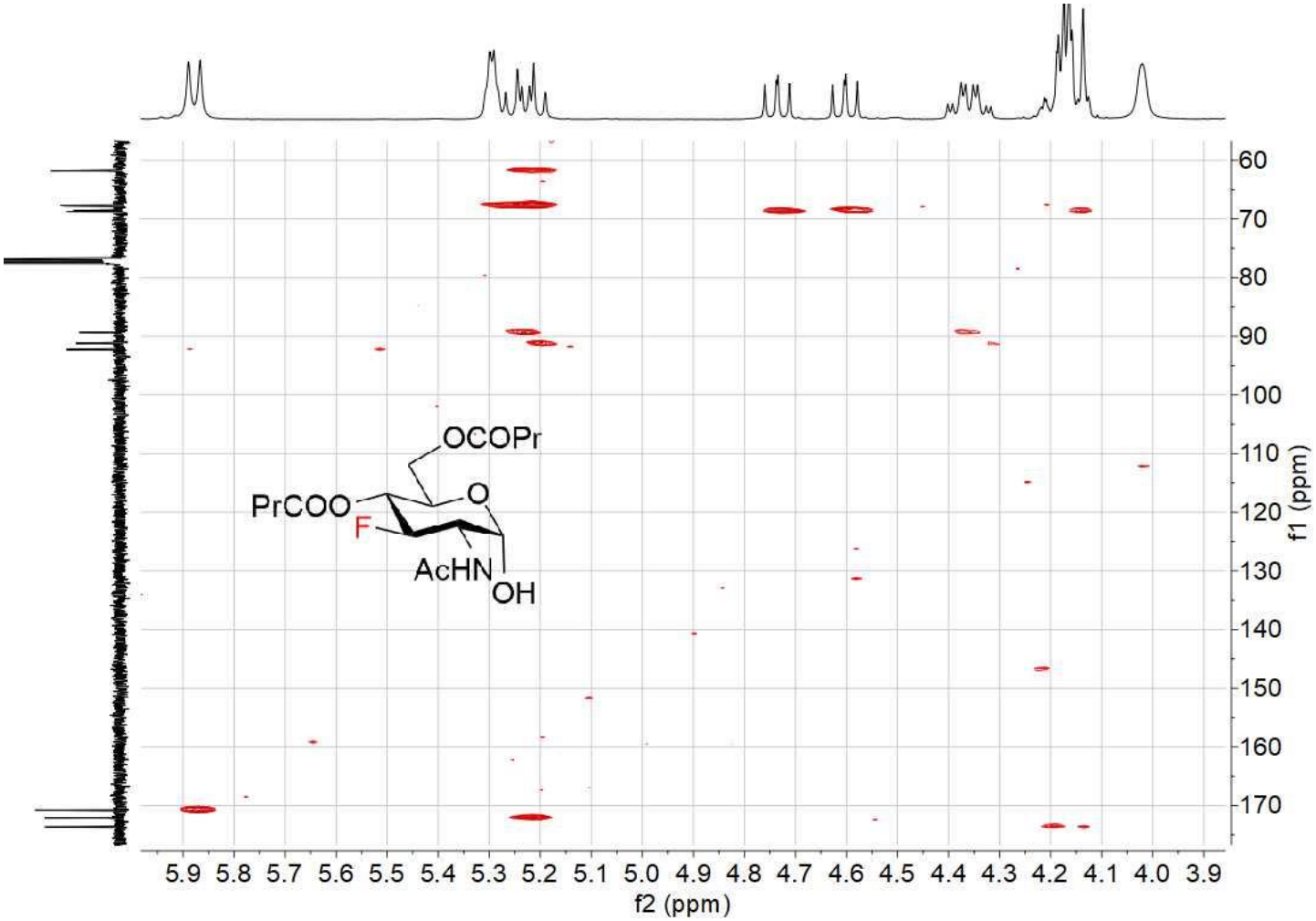

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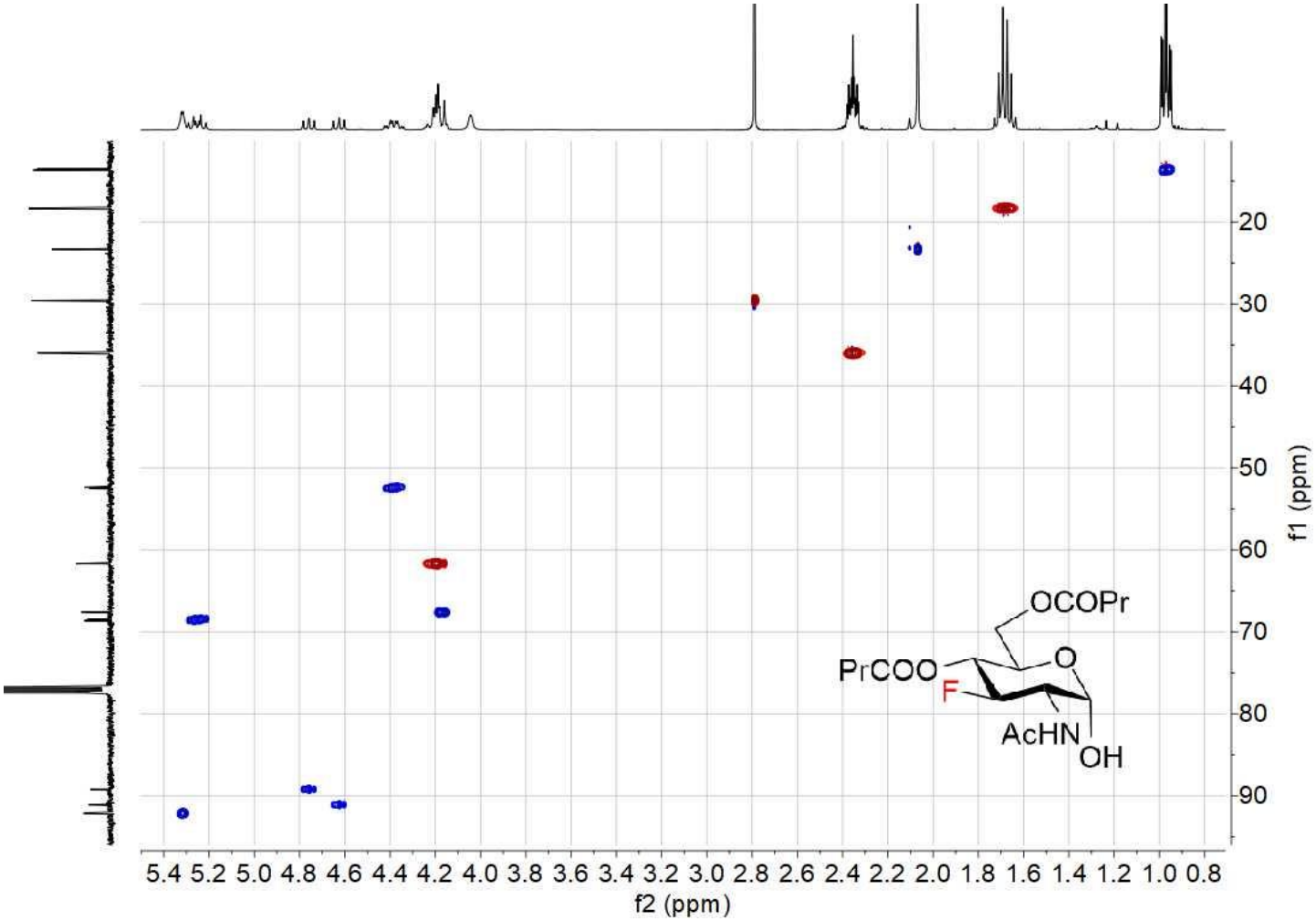

NMR COMPOUND 16

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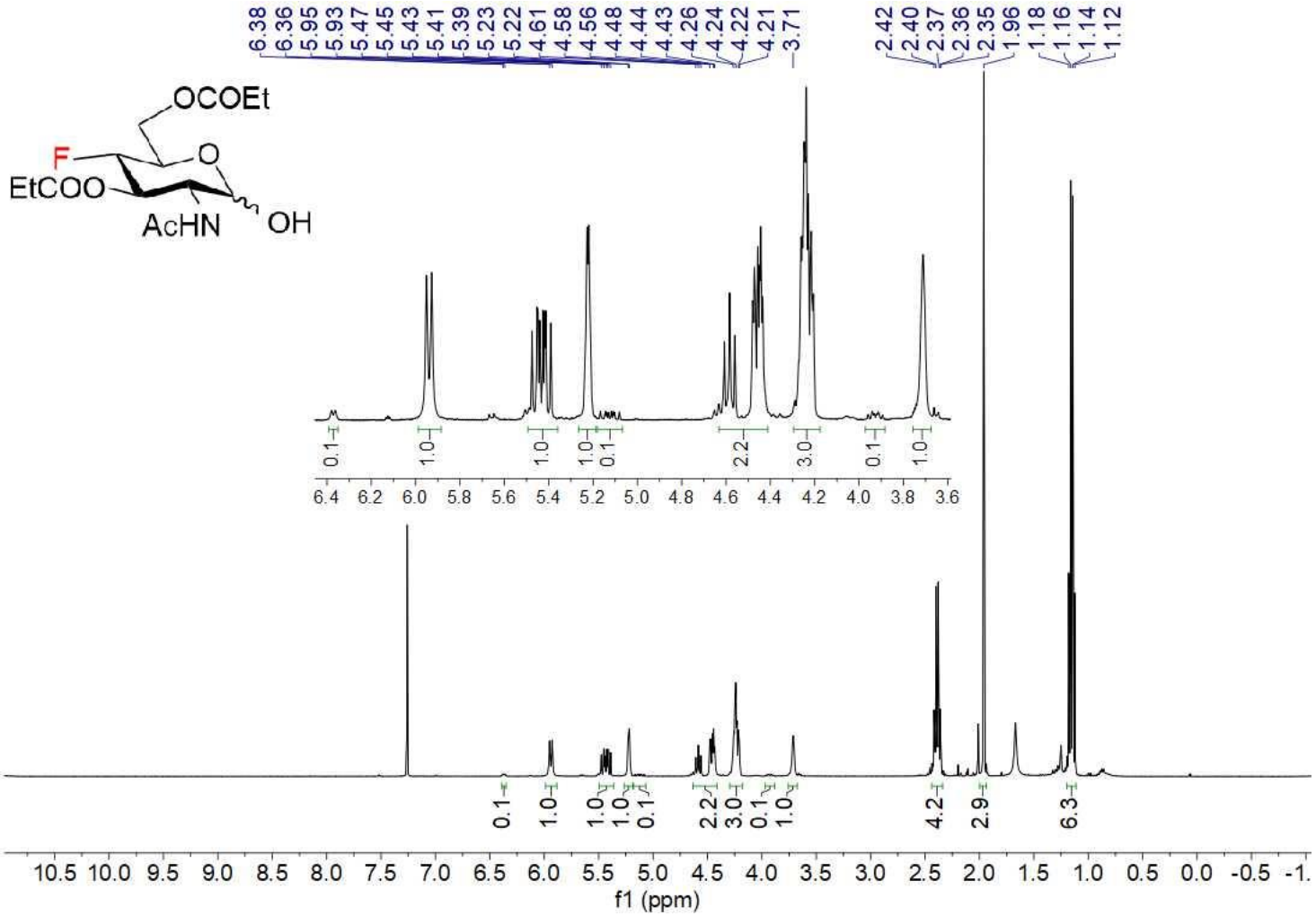
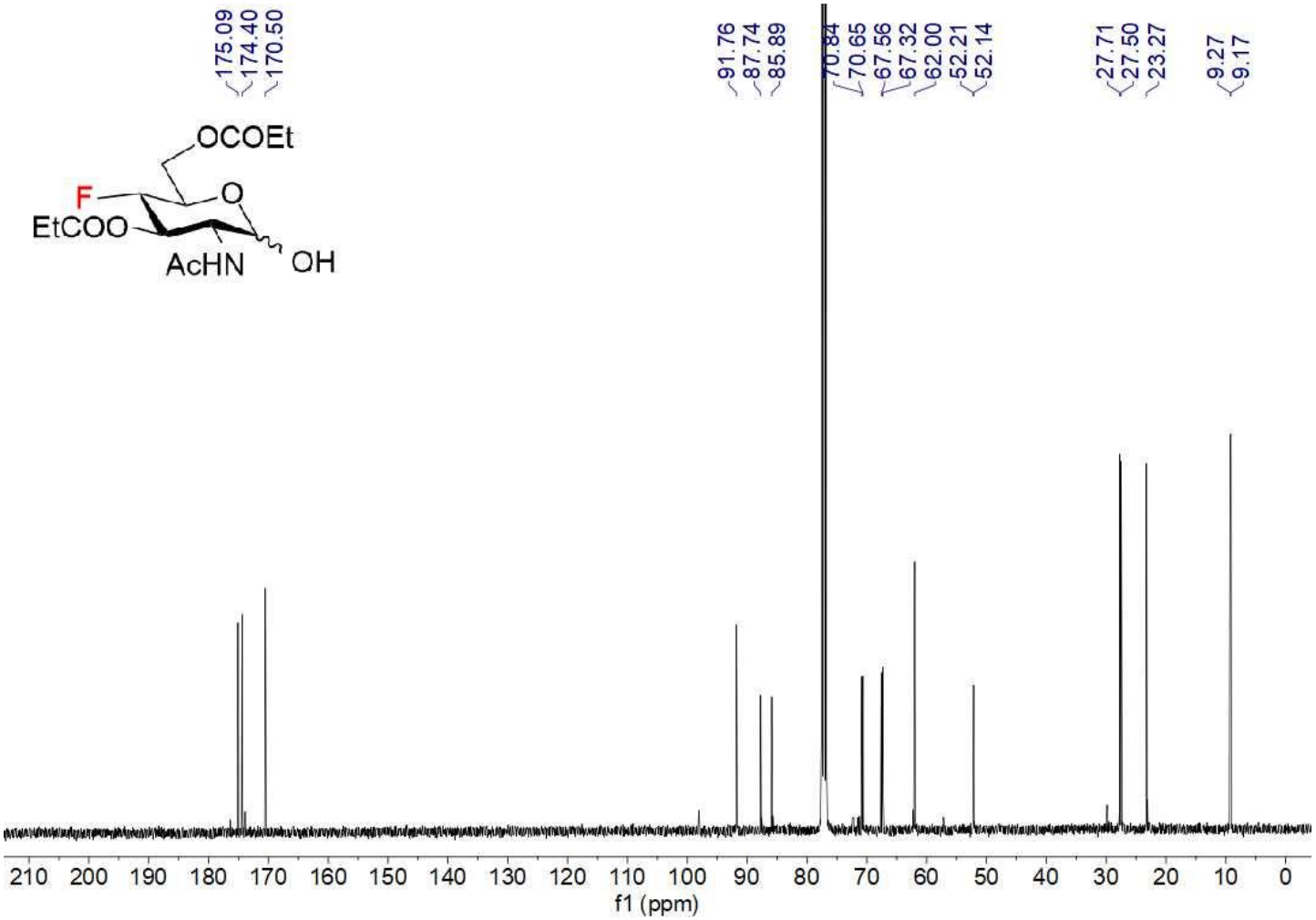


^{13}C NMR (100 MHz, $CDCl_3$) 16



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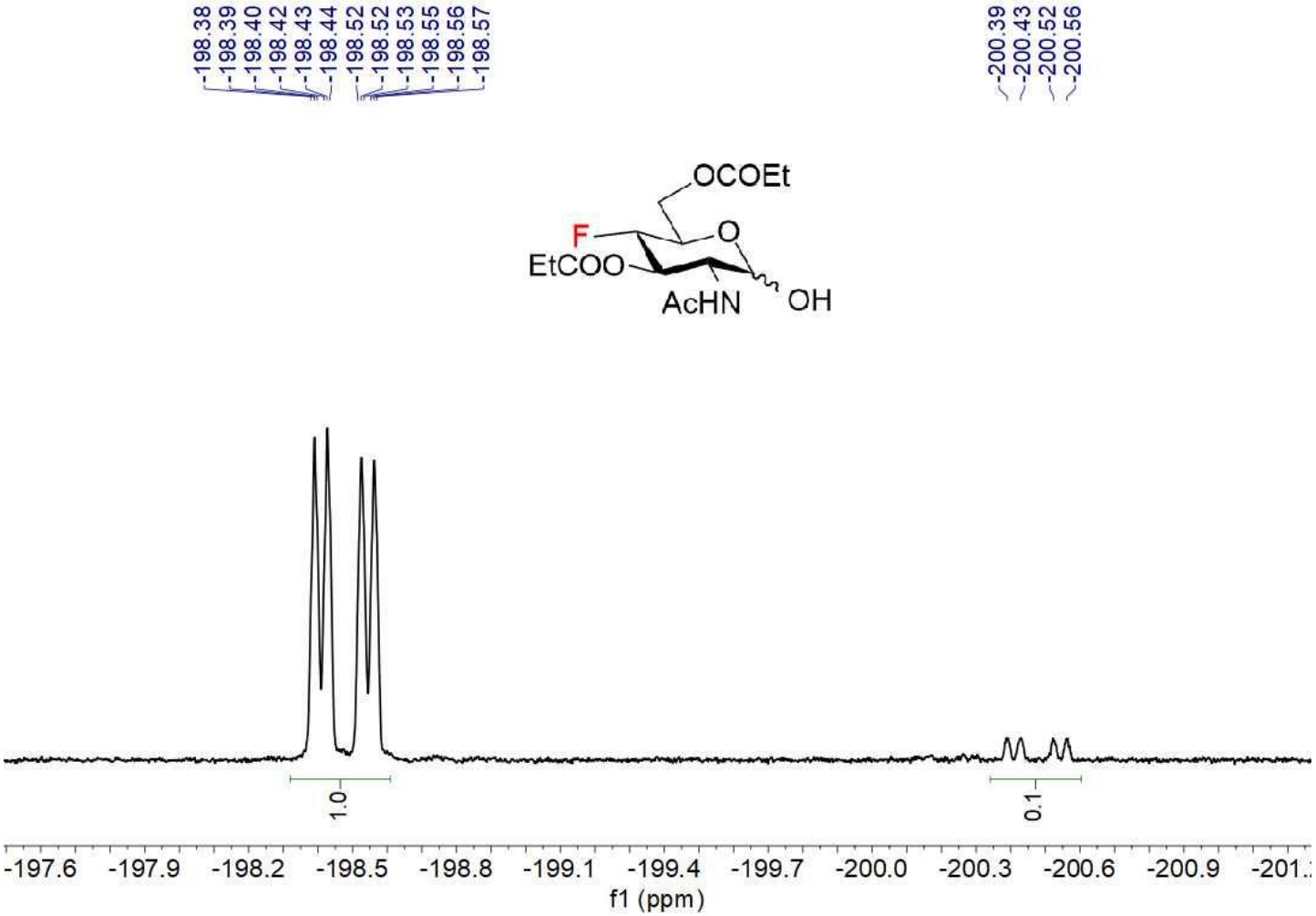

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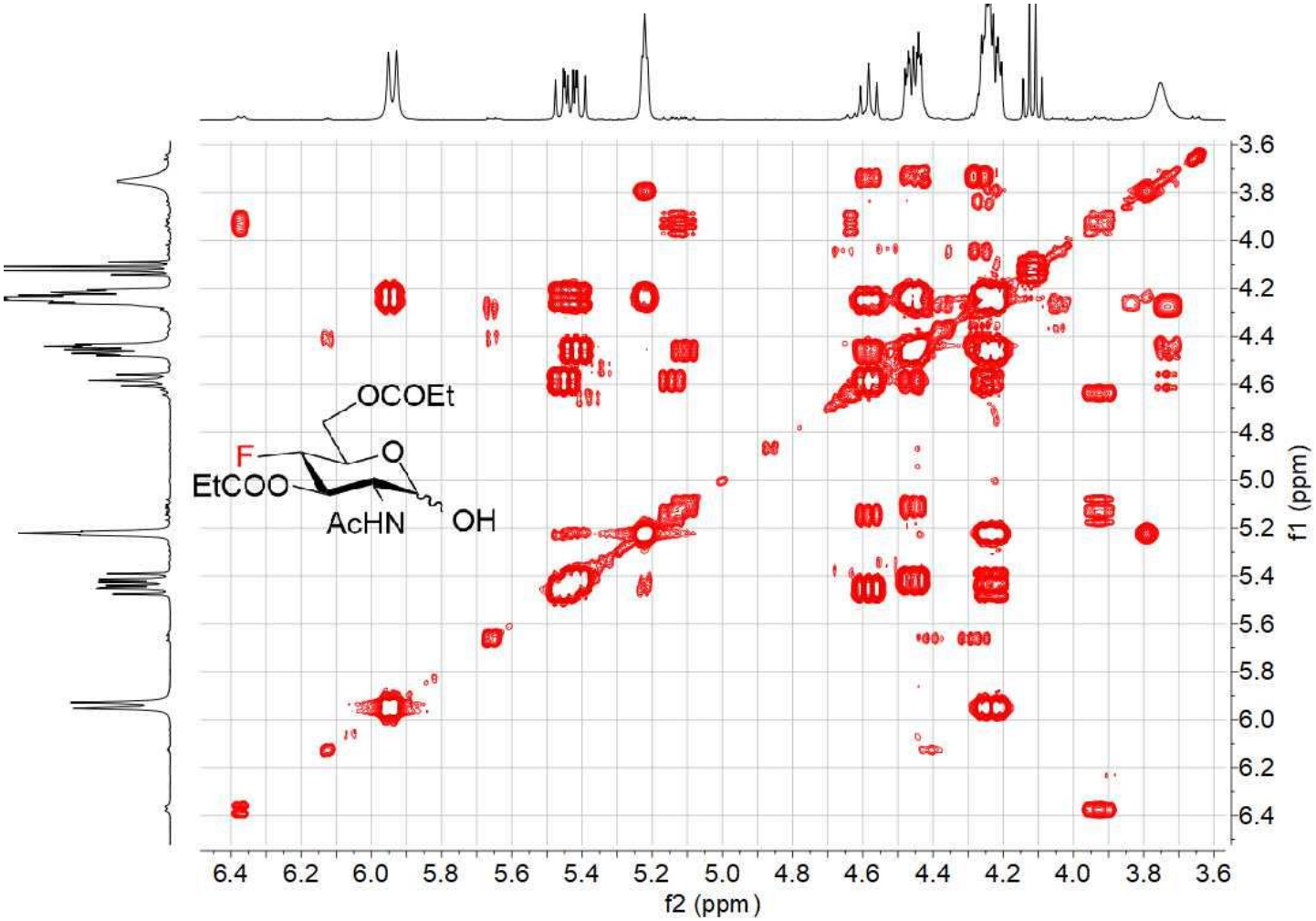

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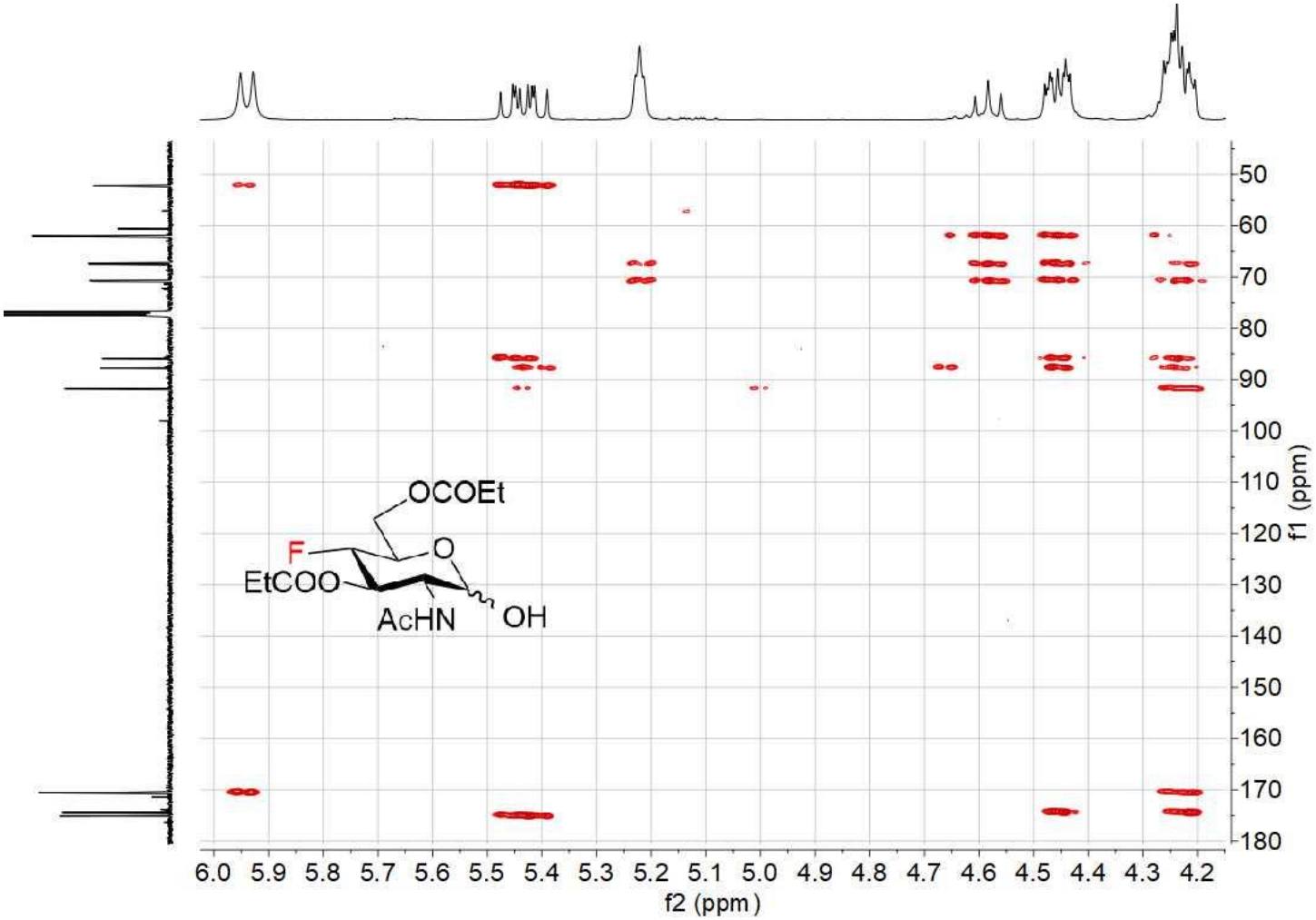

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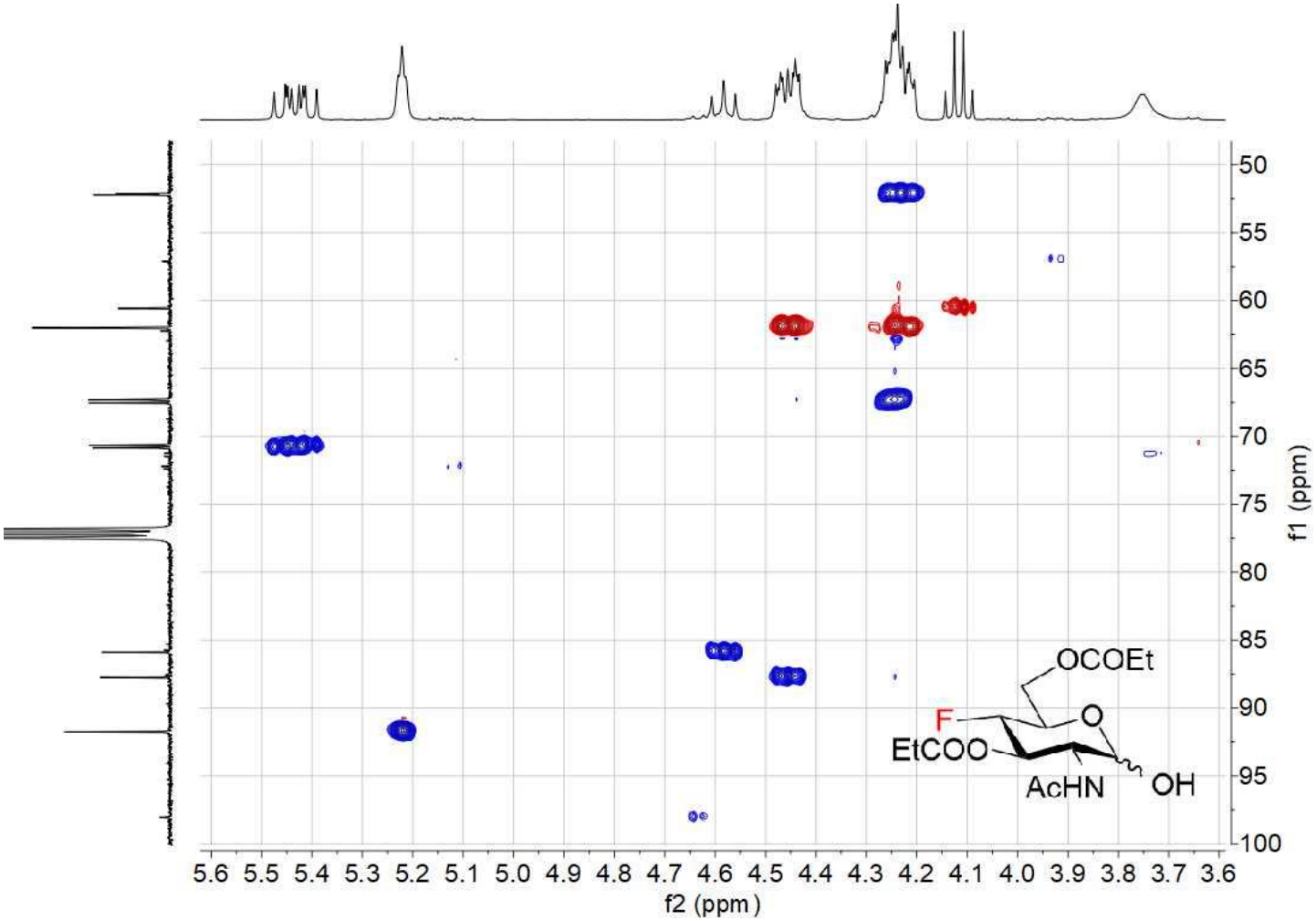
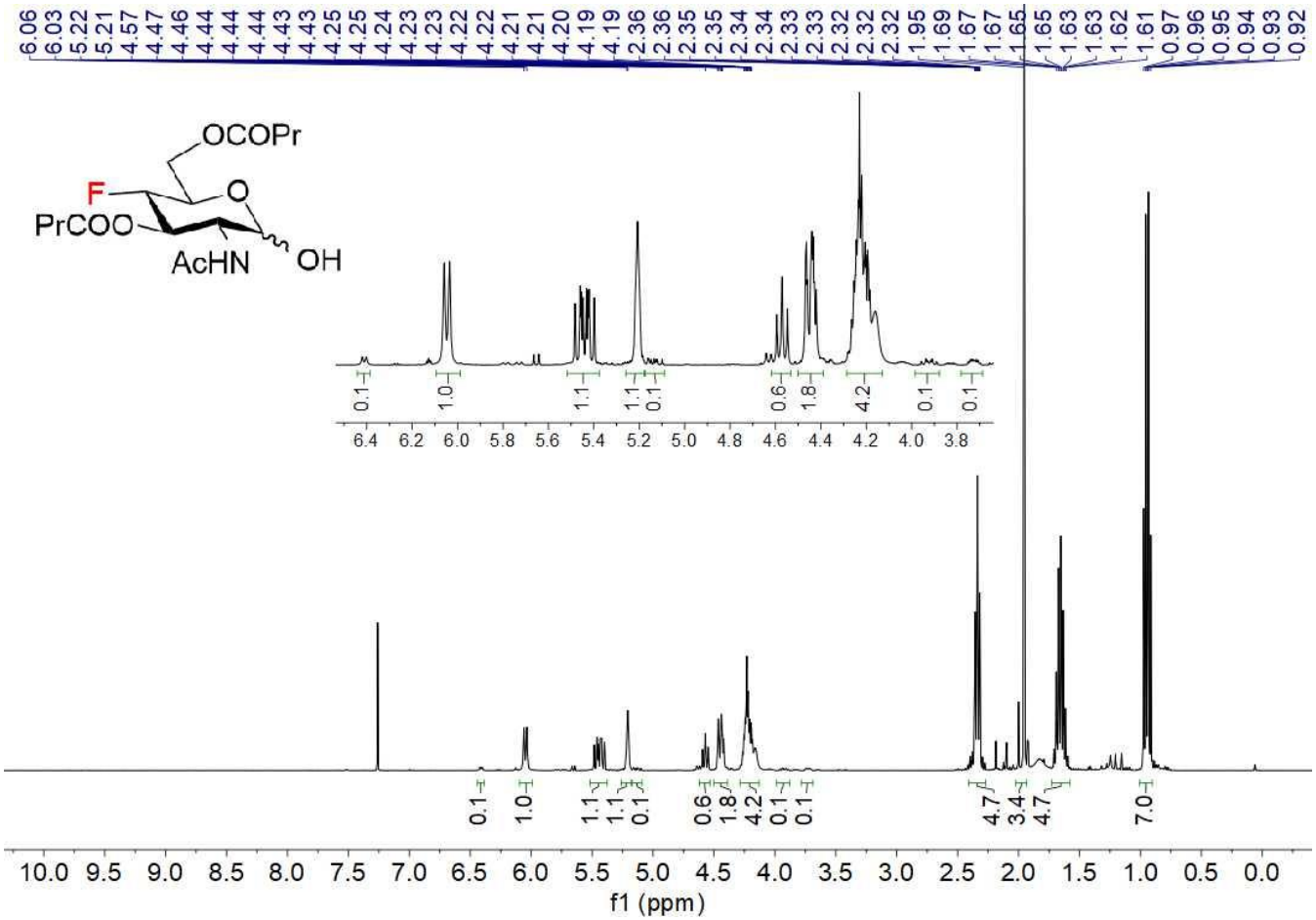
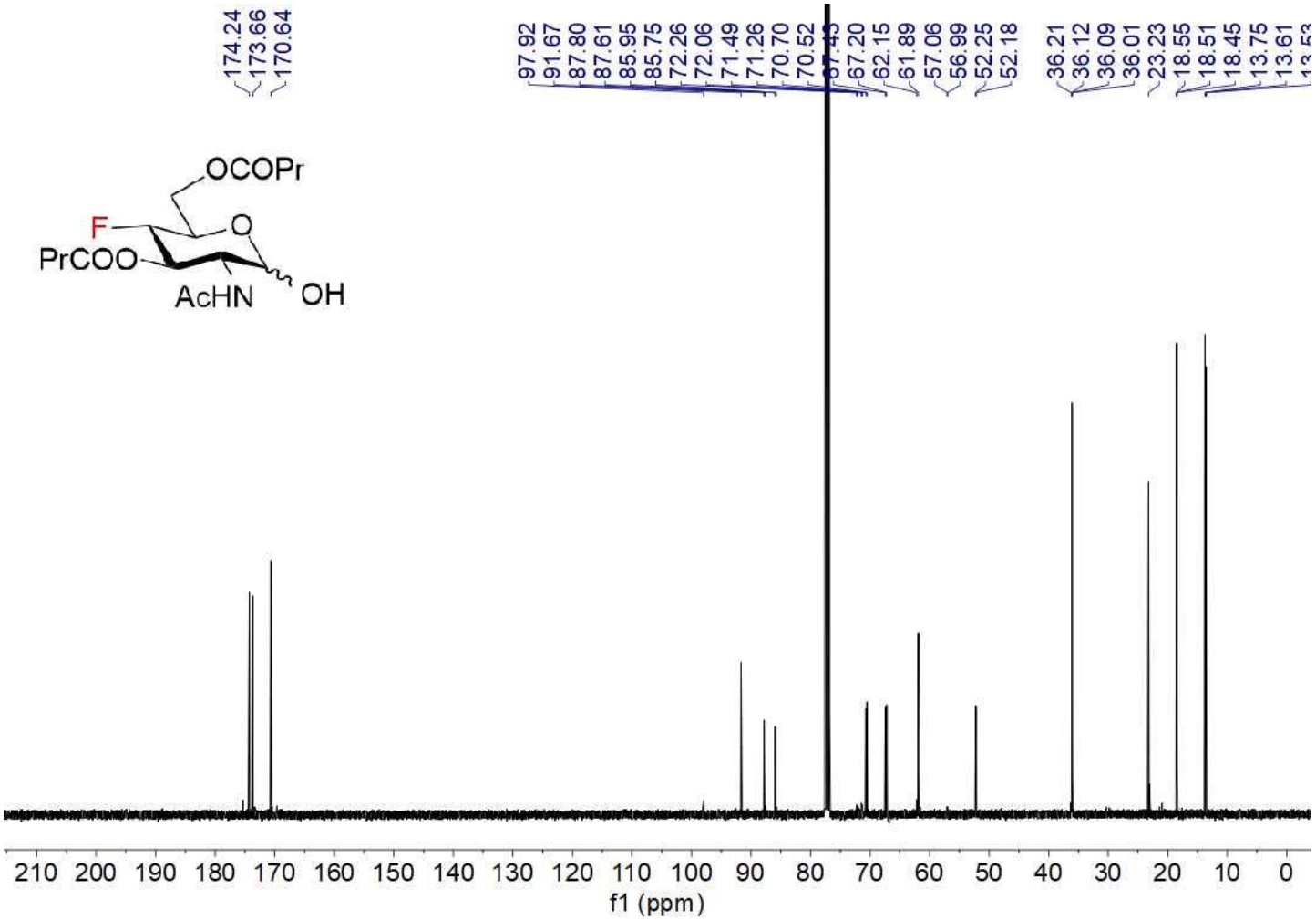


NMR COMPOUND 17

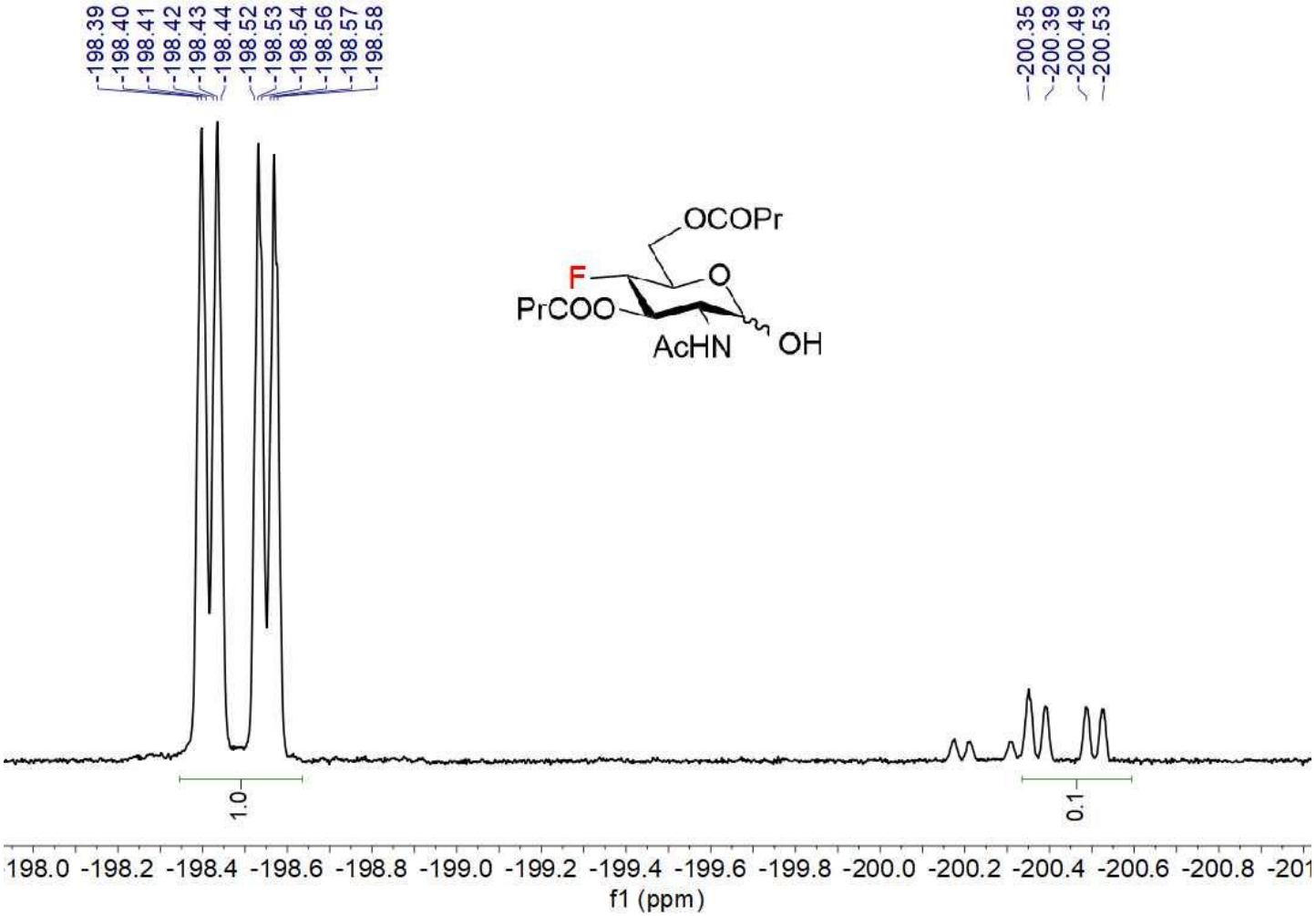
1H NMR (400 MHz, CDCl3) 17 (α/β ≈ 10:1, containing ca 5% of O1-Ac)



^{13}C NMR (100 MHz, $CDCl_3$) 17



^{19}F NMR (376 MHz, $CDCl_3$) 17



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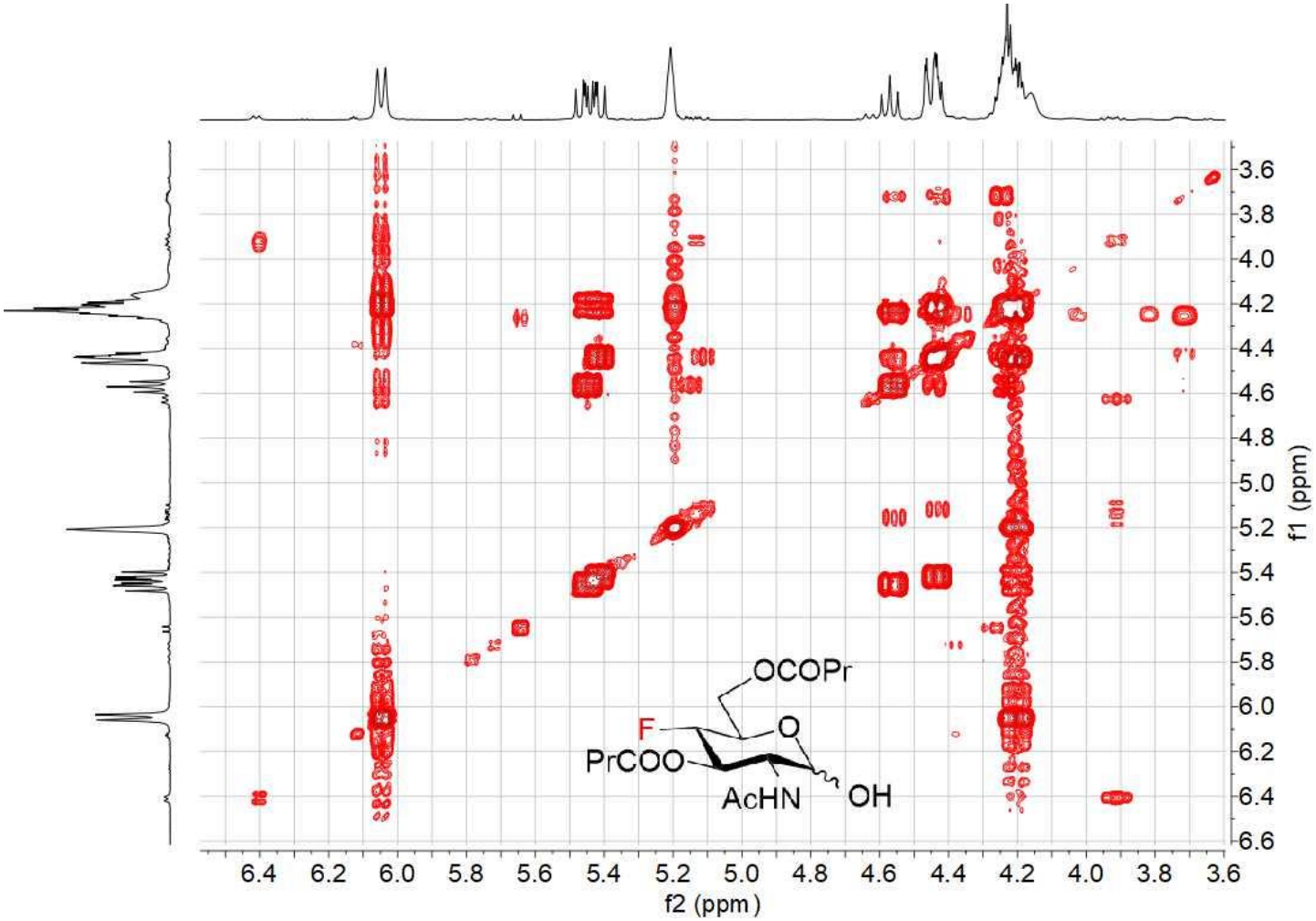

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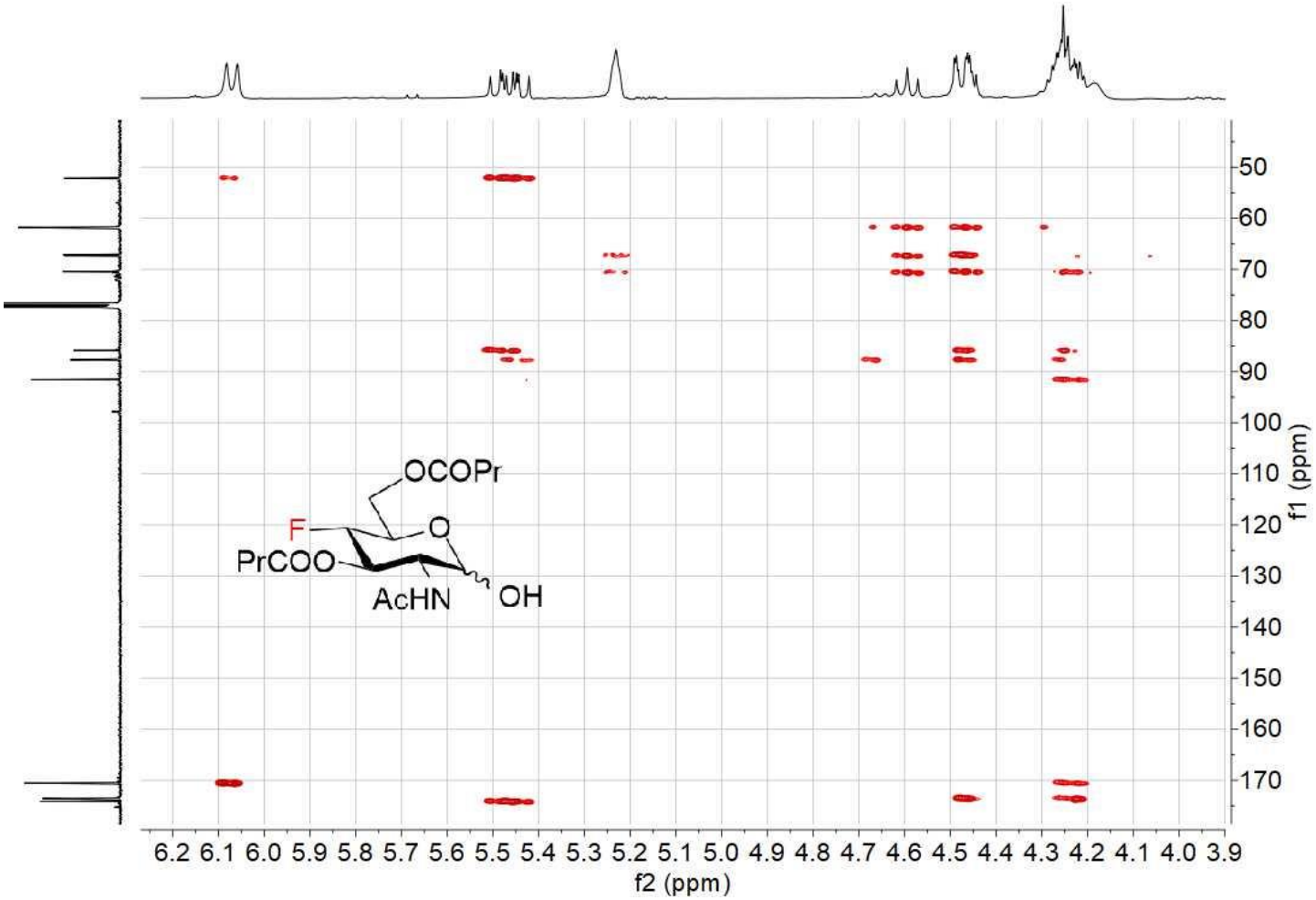

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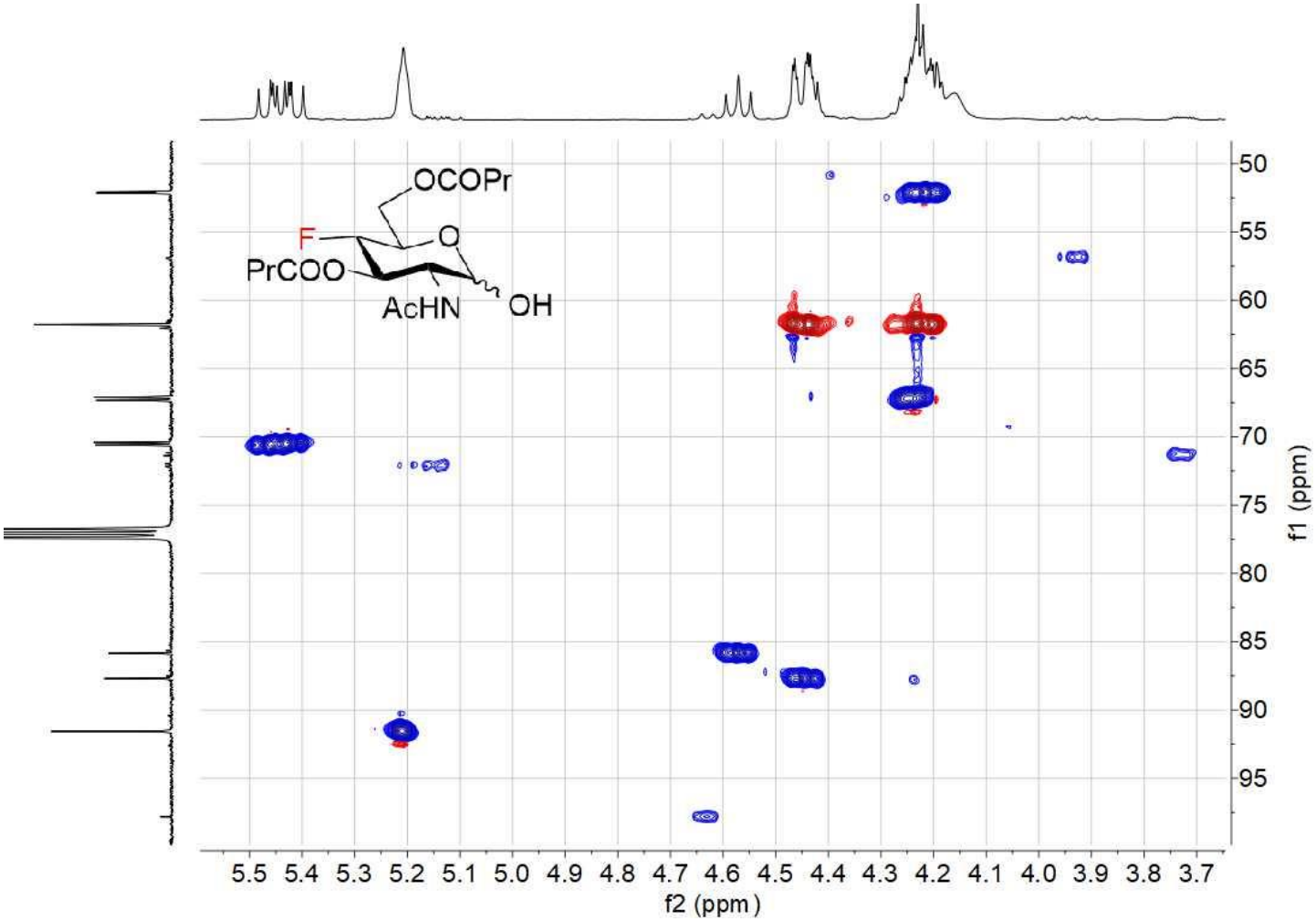
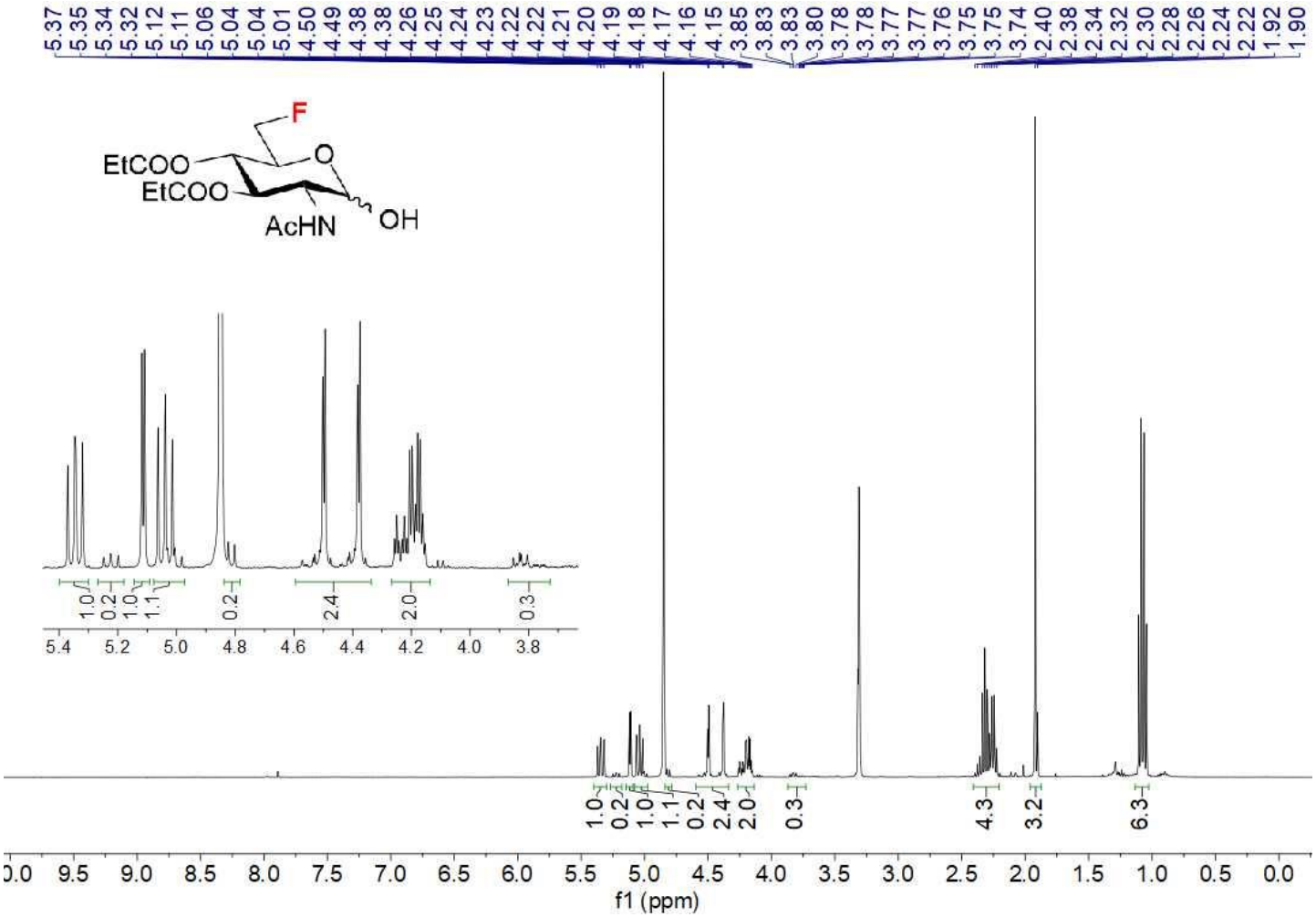
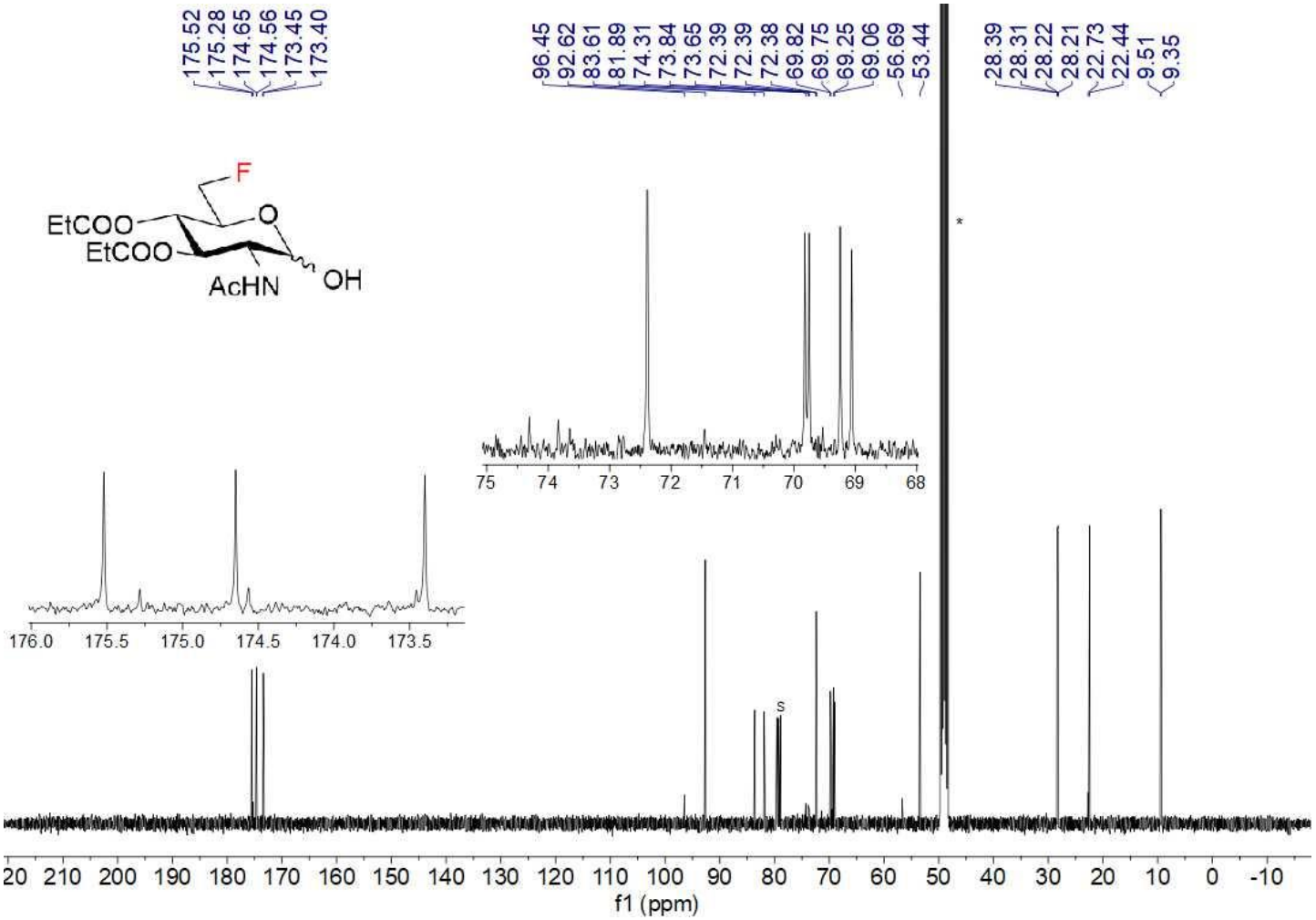


NMR COMPOUND 18 (prepared from compound 93)

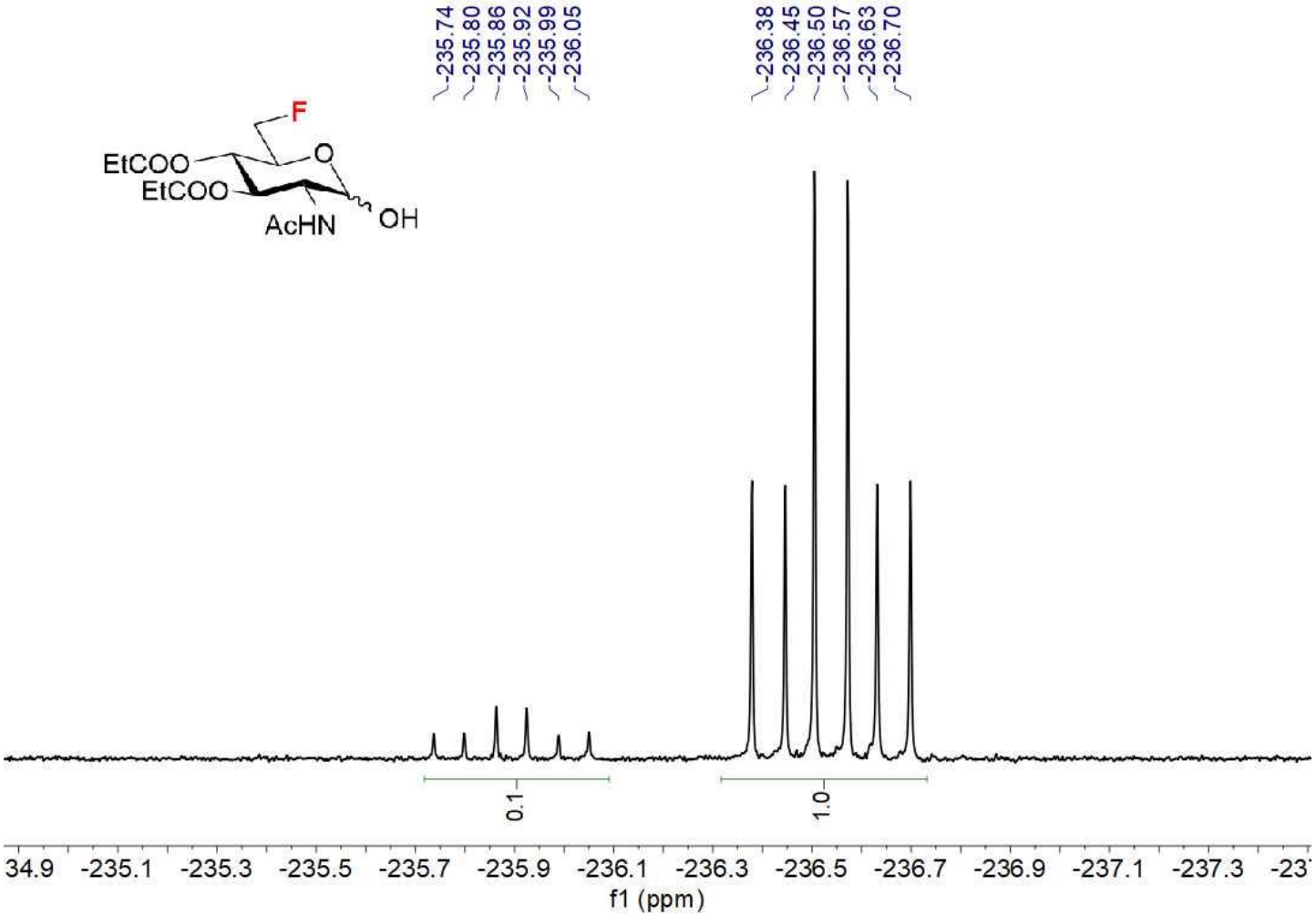
^{1}H NMR (400 MHz, CD_3OD) 18



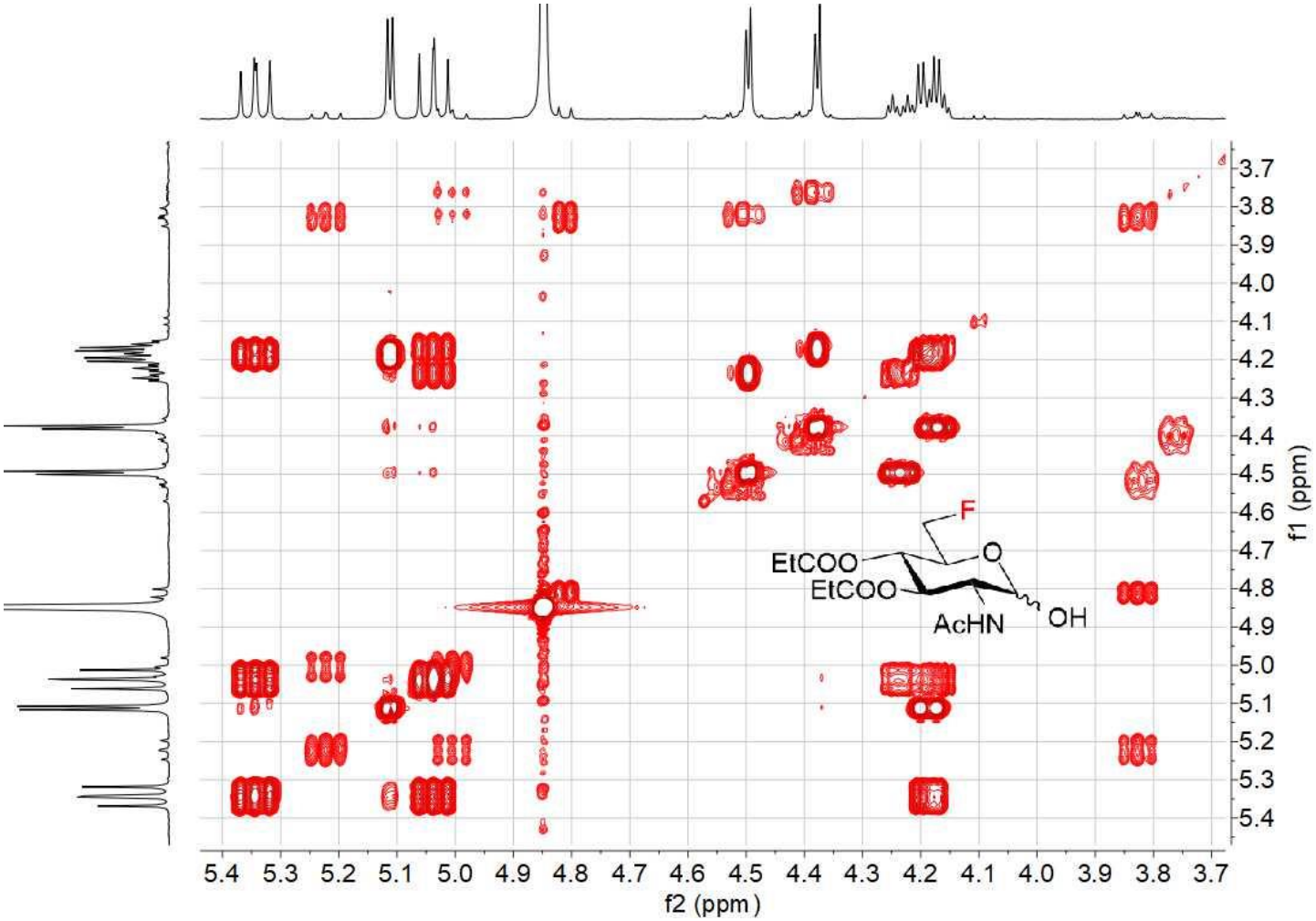
^{13}C NMR (100 MHz, CD_3OD) 18



^{19}F NMR (376 MHz, CD_3OD) 18



^{1}H-^{1}H COSY 18



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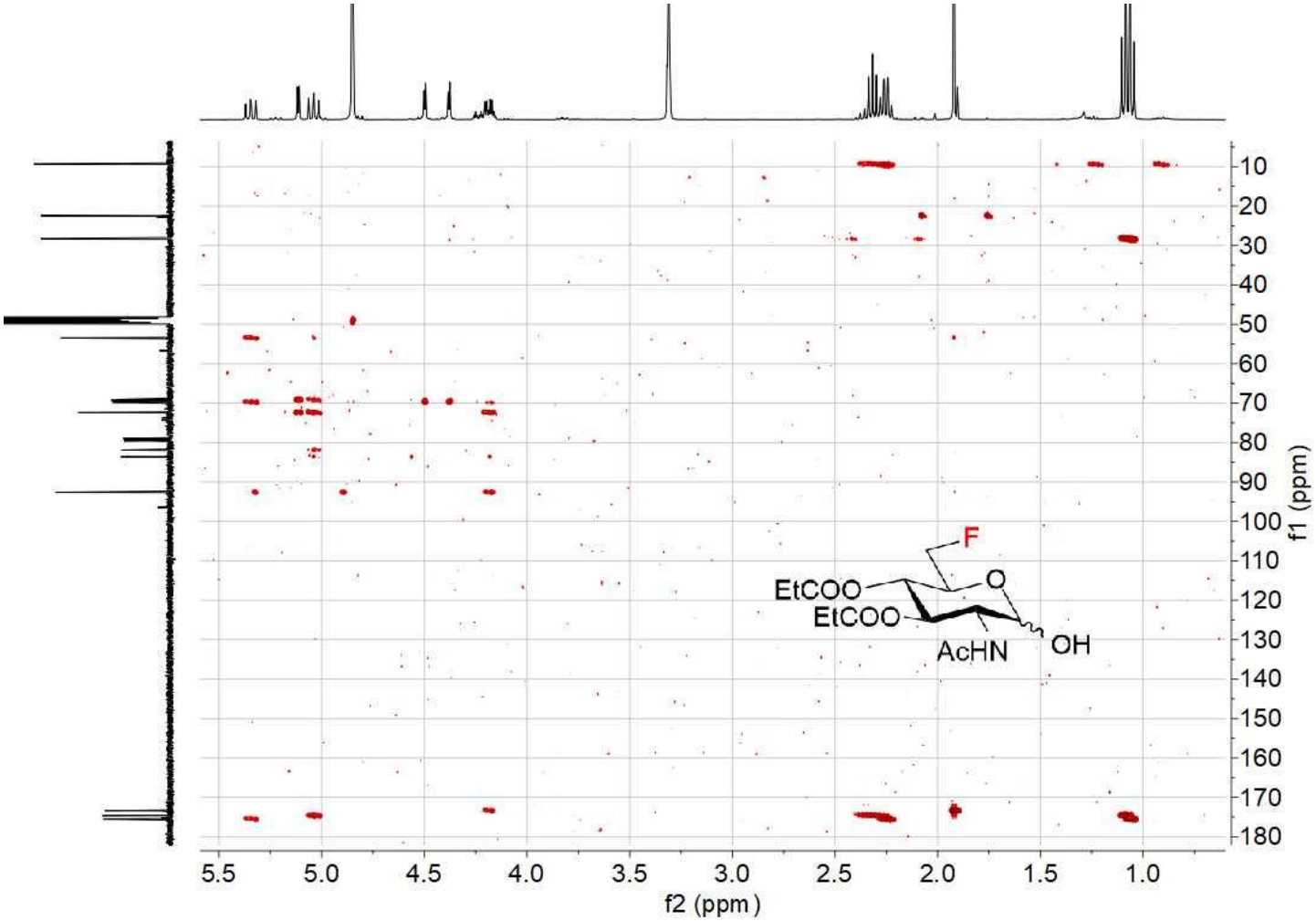

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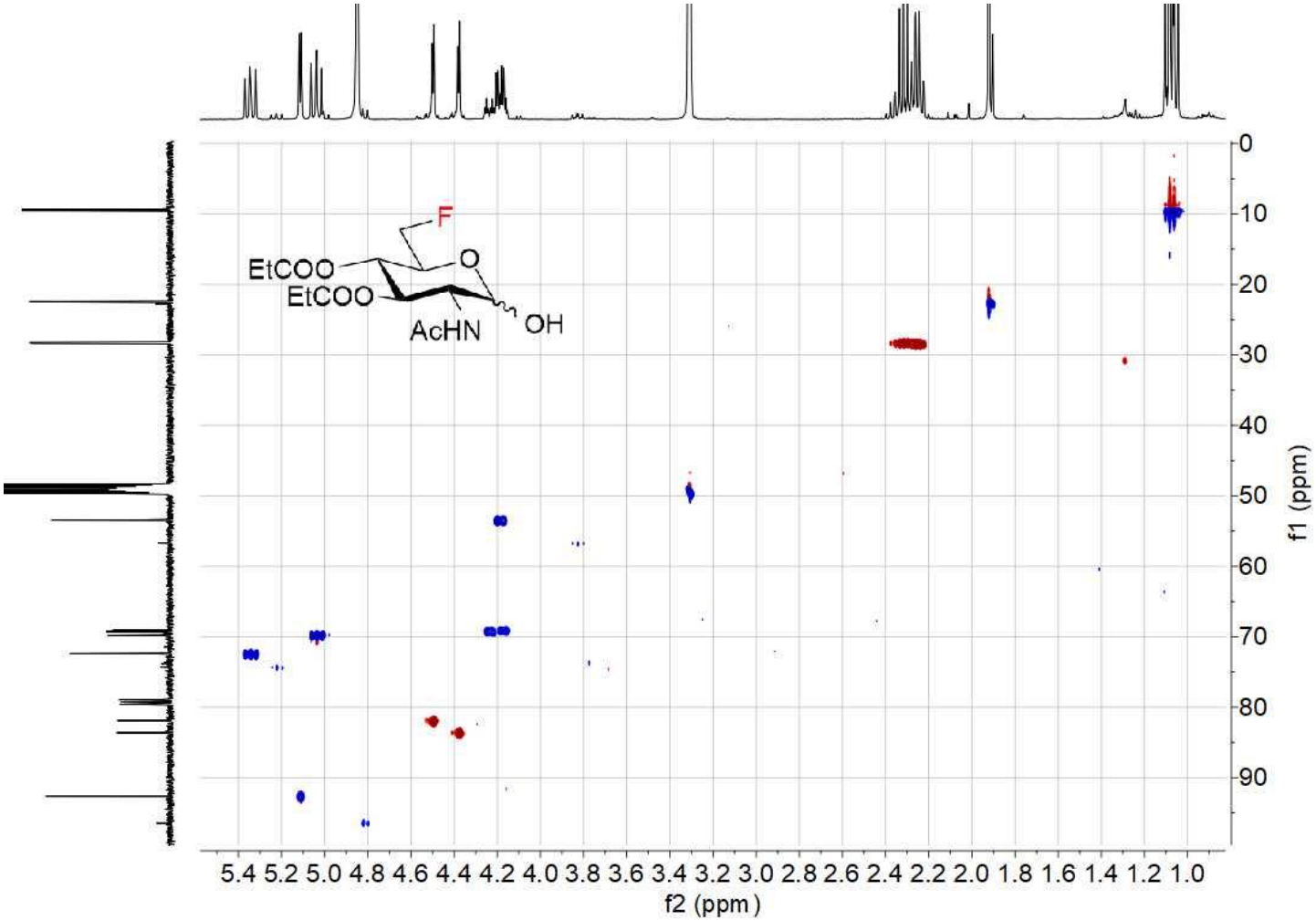
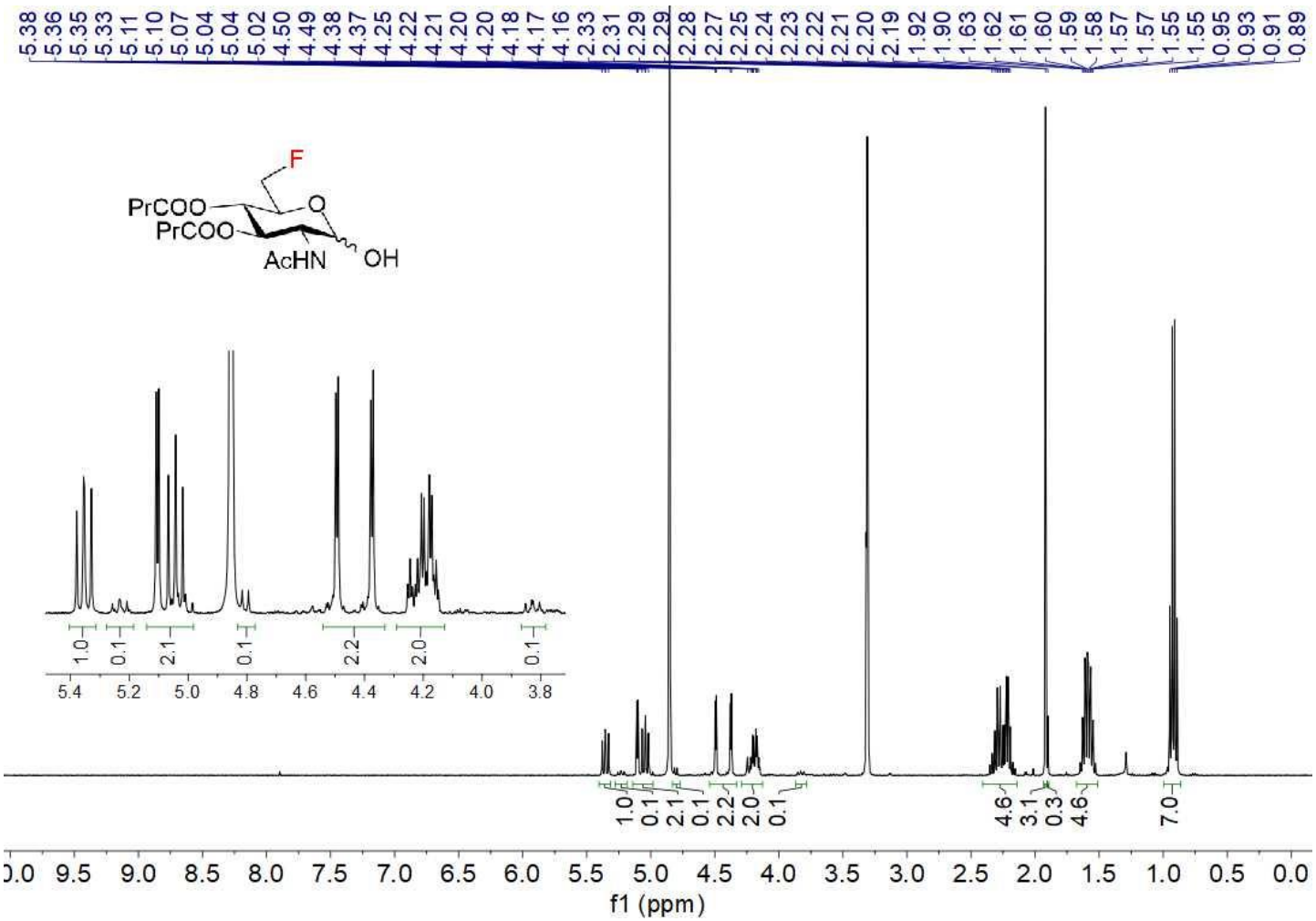
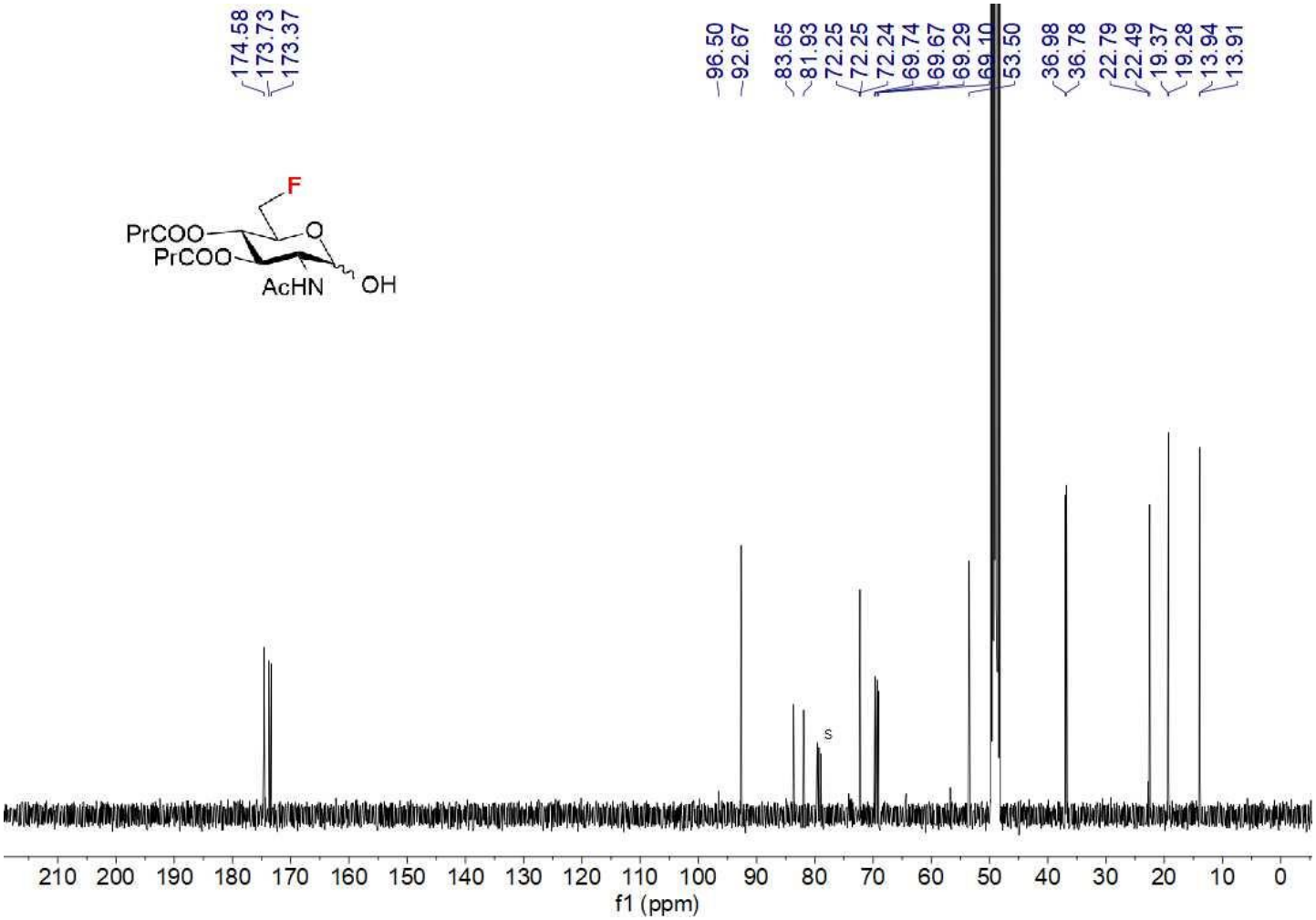


NMR COMPOUND 19 (prepared from compound 93)

^{1}H NMR (400 MHz, CD_3OD) 19



^{13}C NMR (100 MHz, CD_3OD) 19



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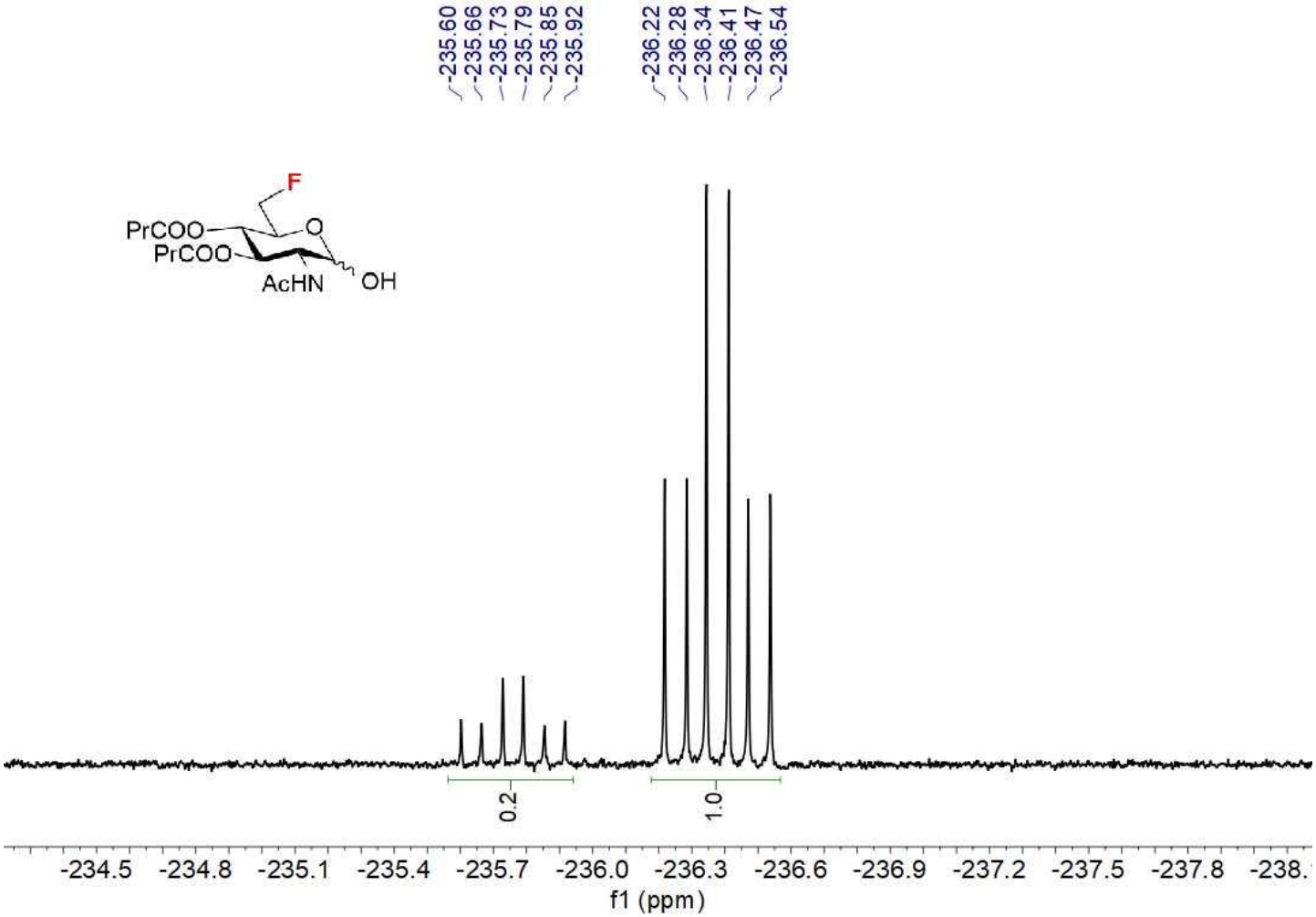

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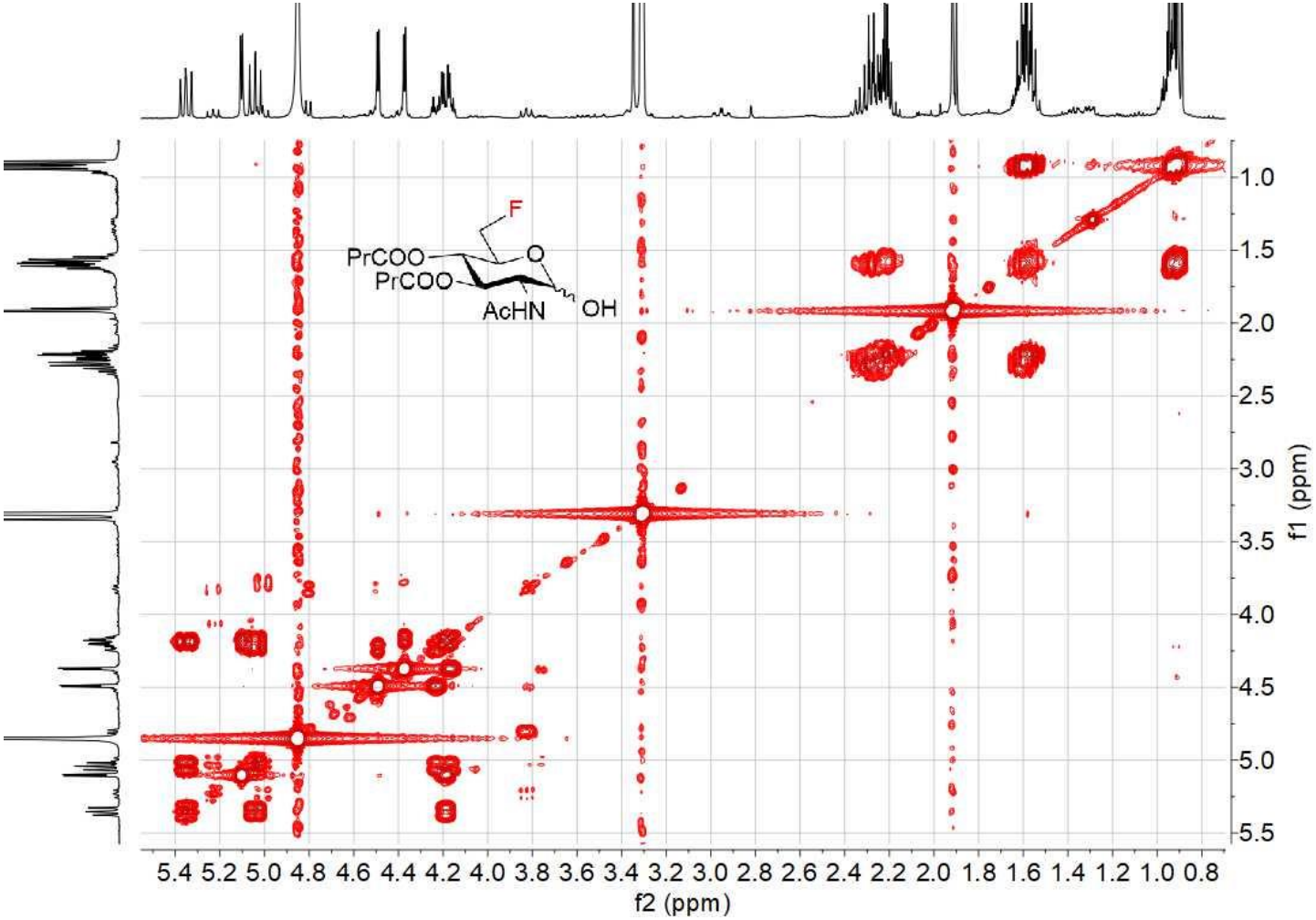

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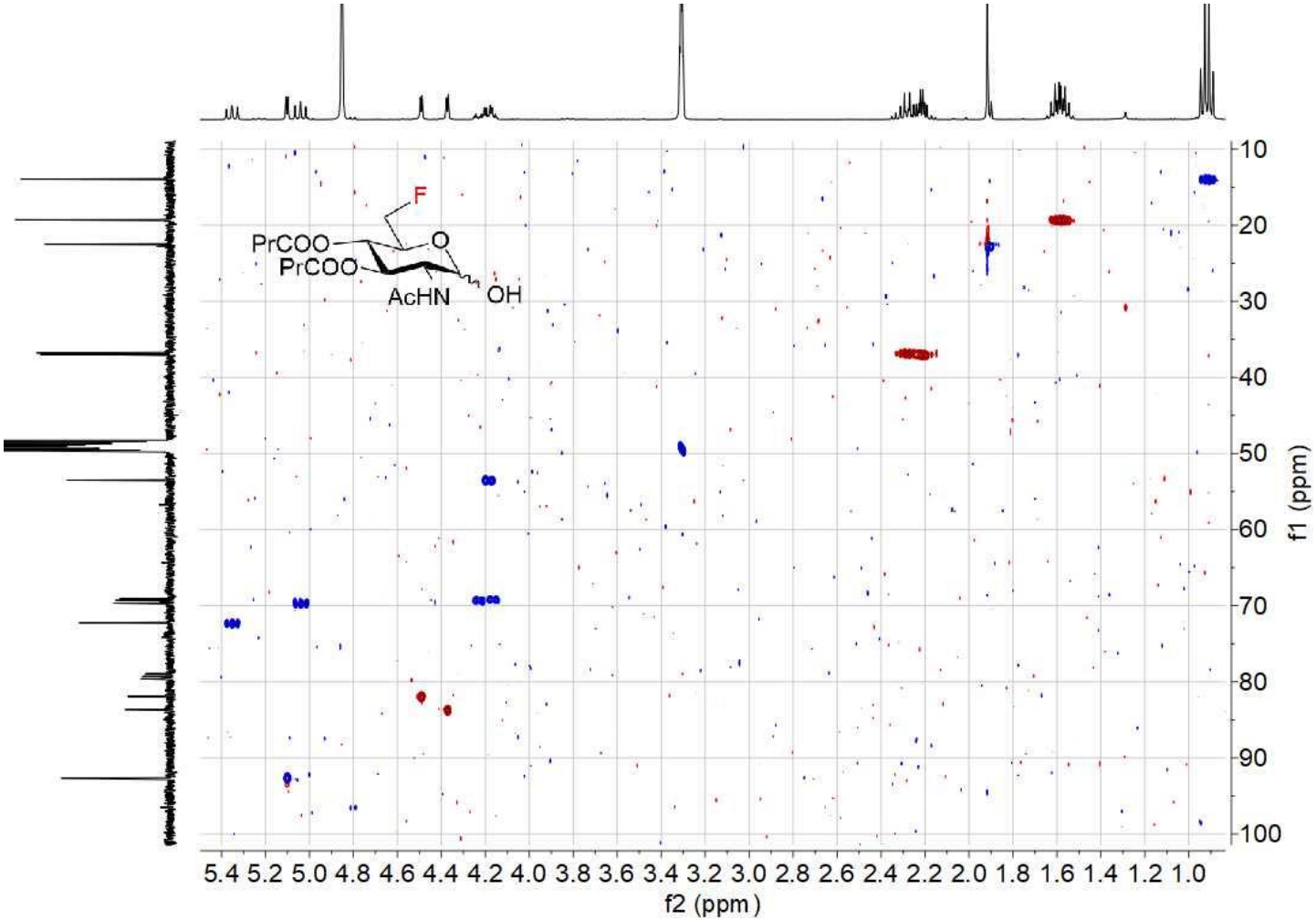

NMR COMPOUND 20

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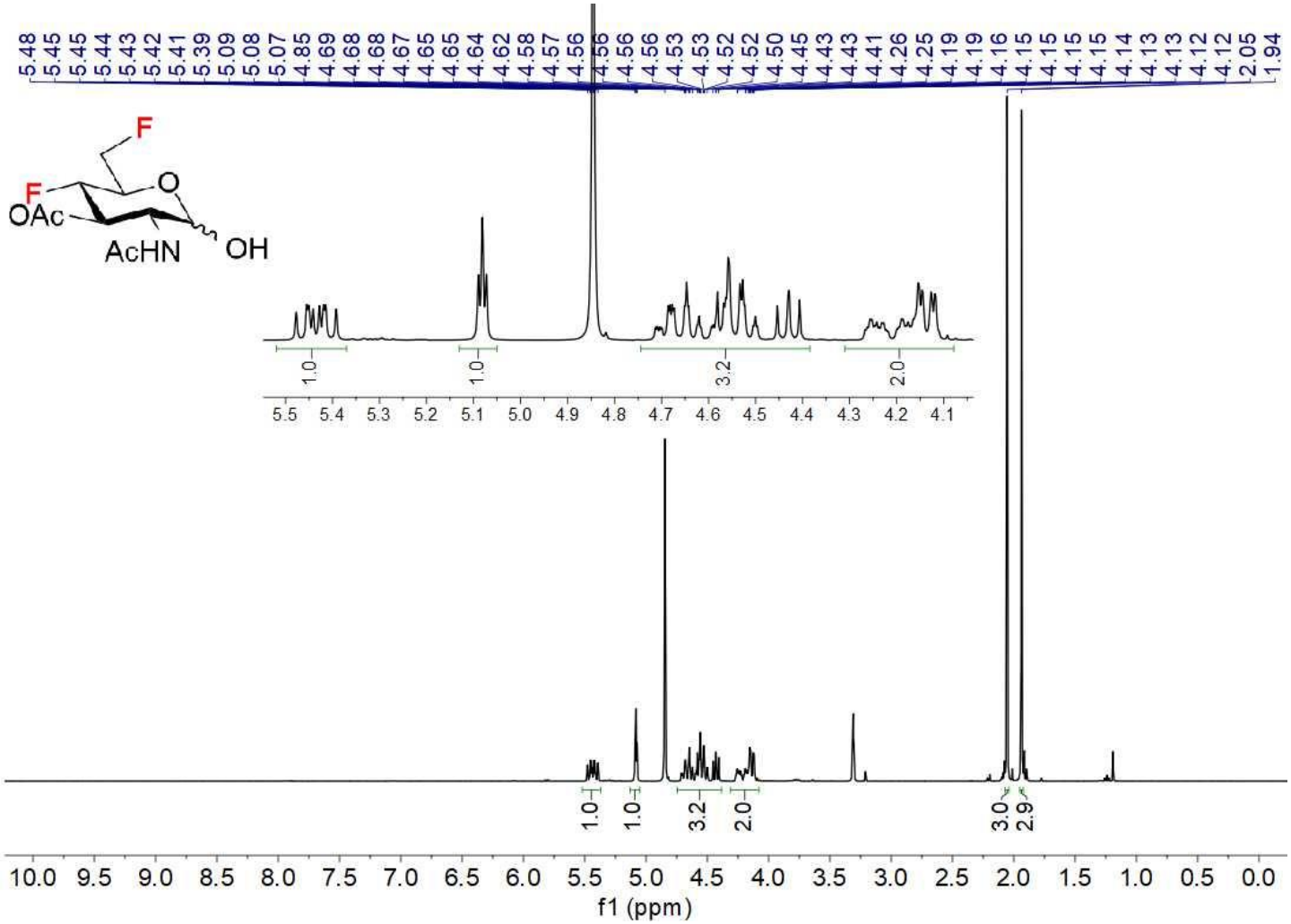
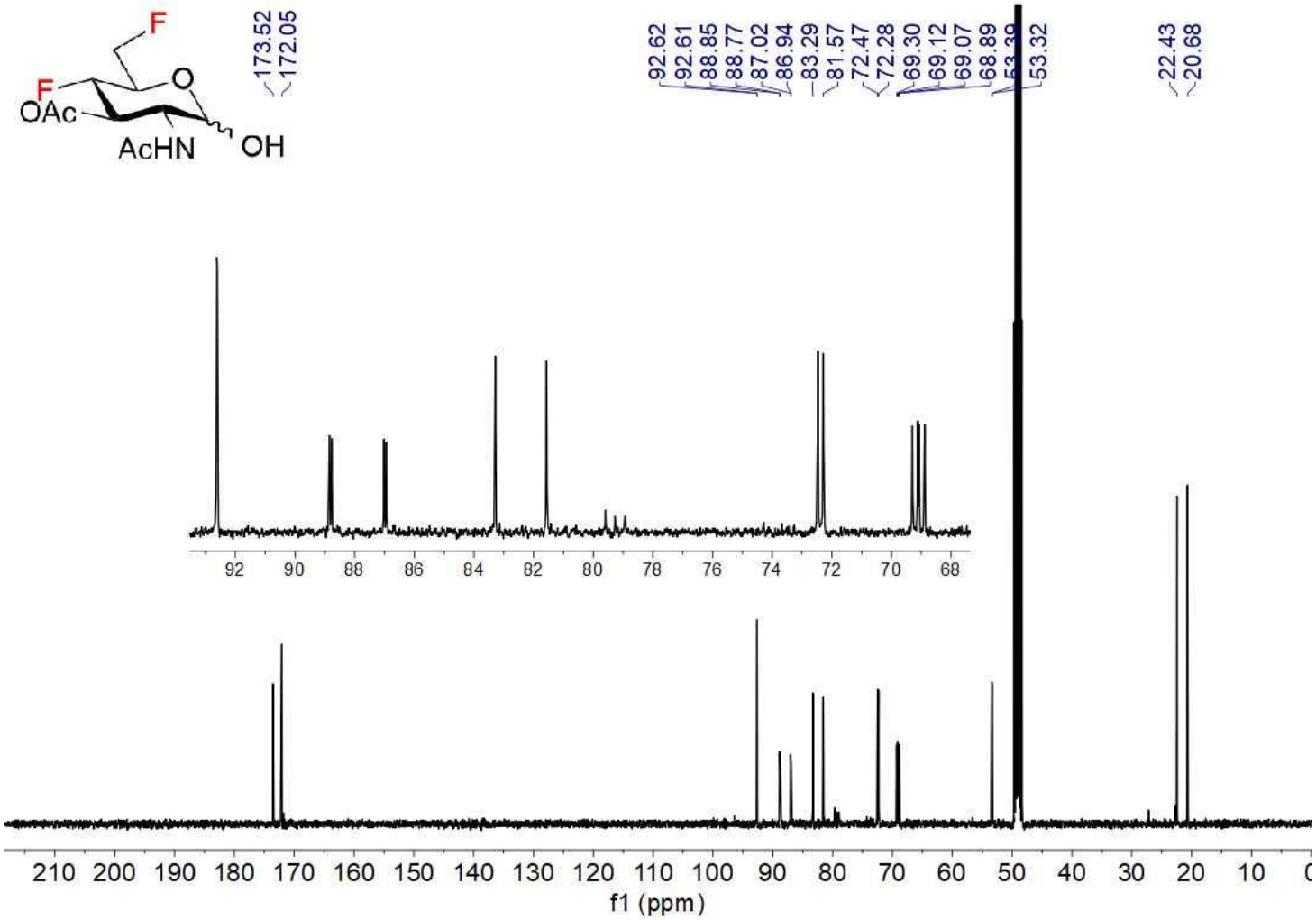
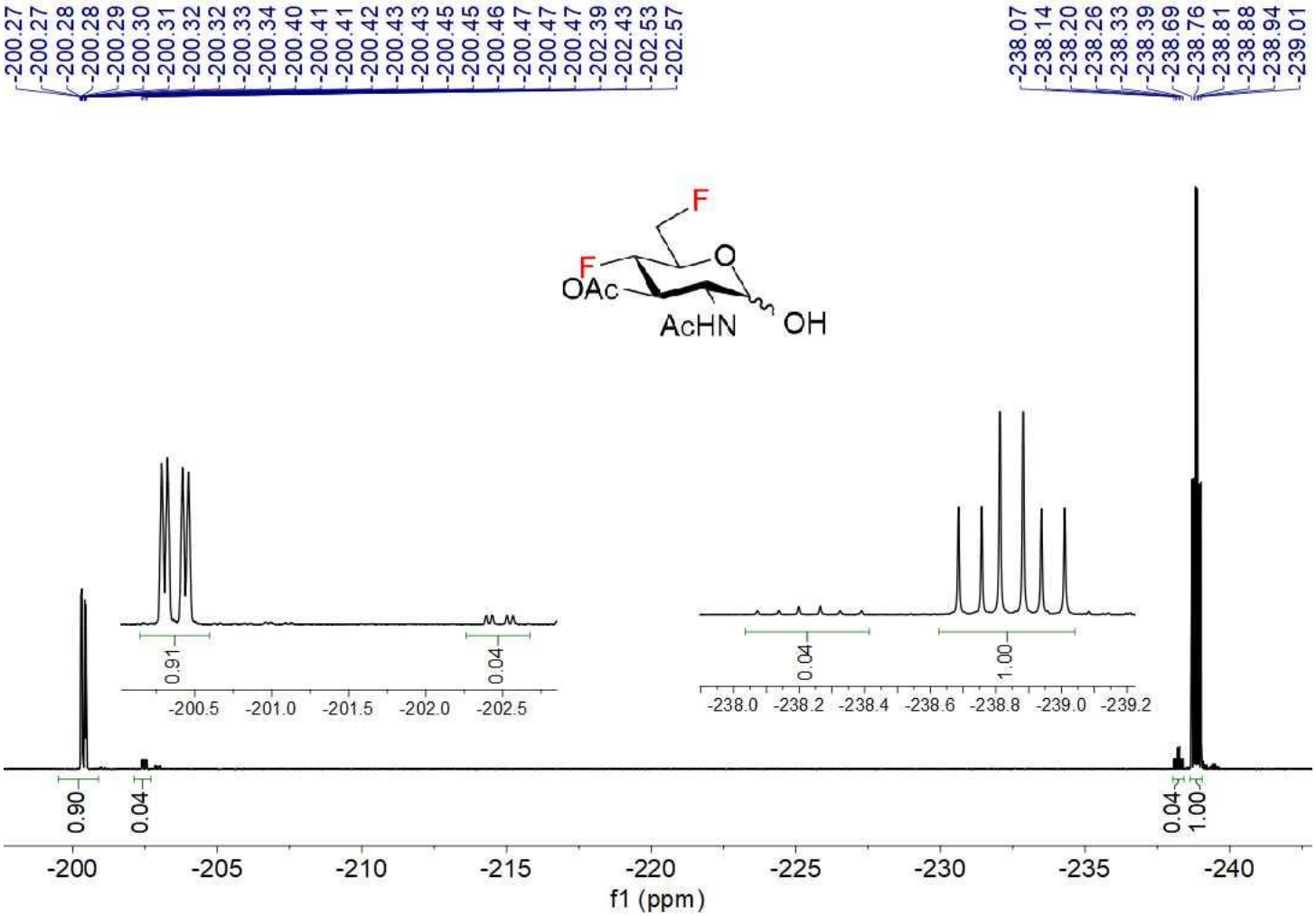


^{13}C NMR (100 MHz, CD_3OD) 20



^{19}F NMR (376 MHz, CD_3OD) 20



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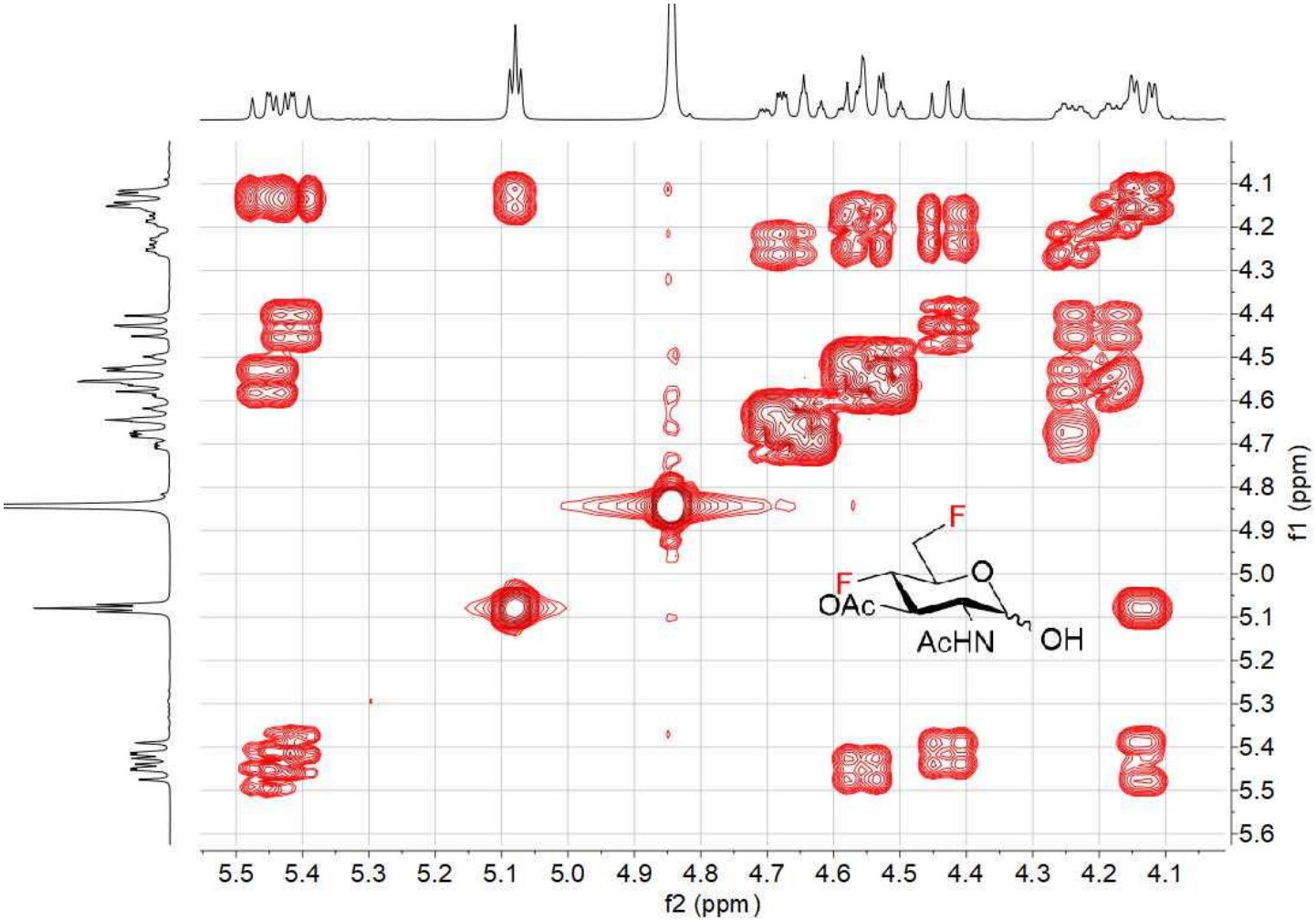

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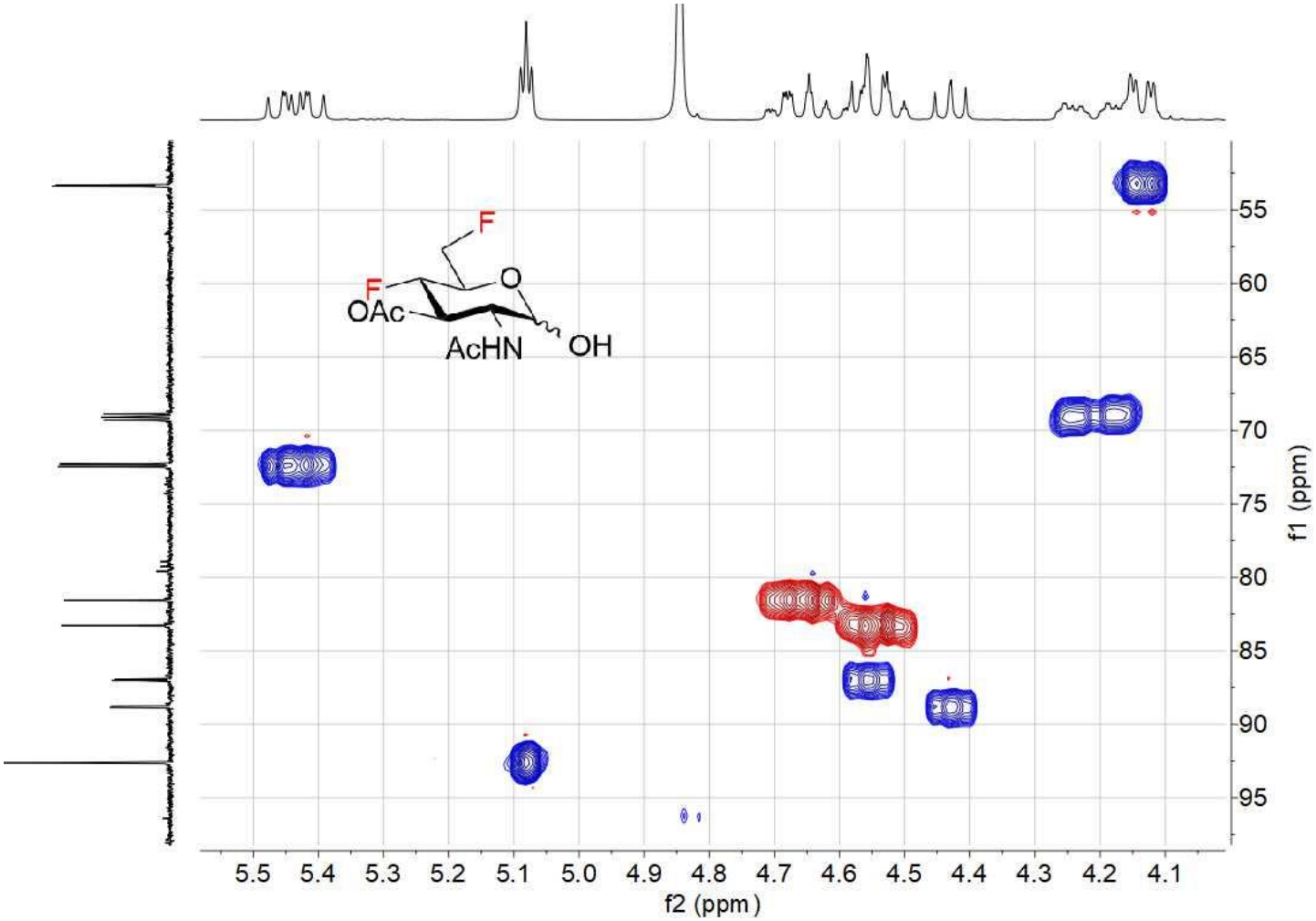
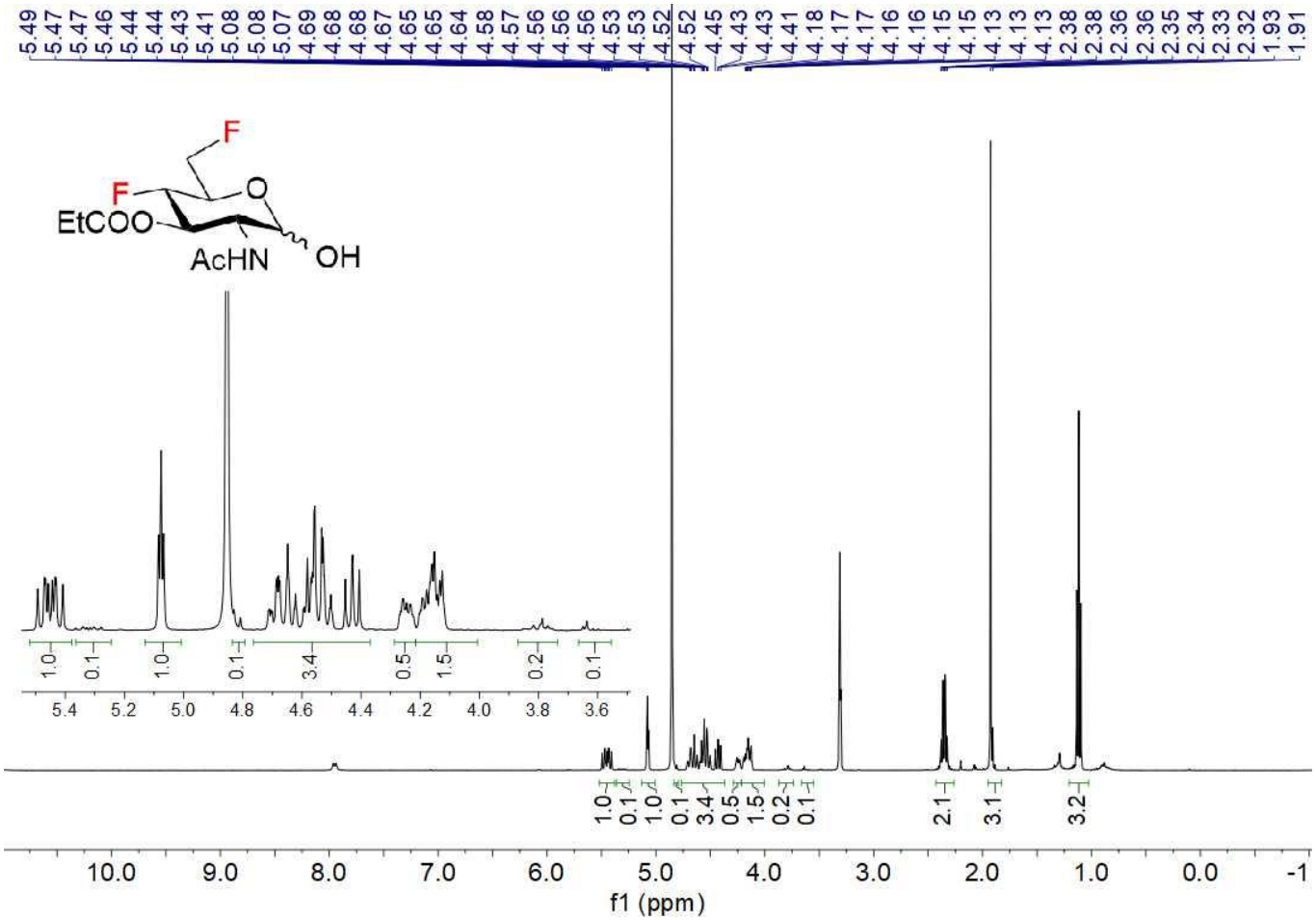
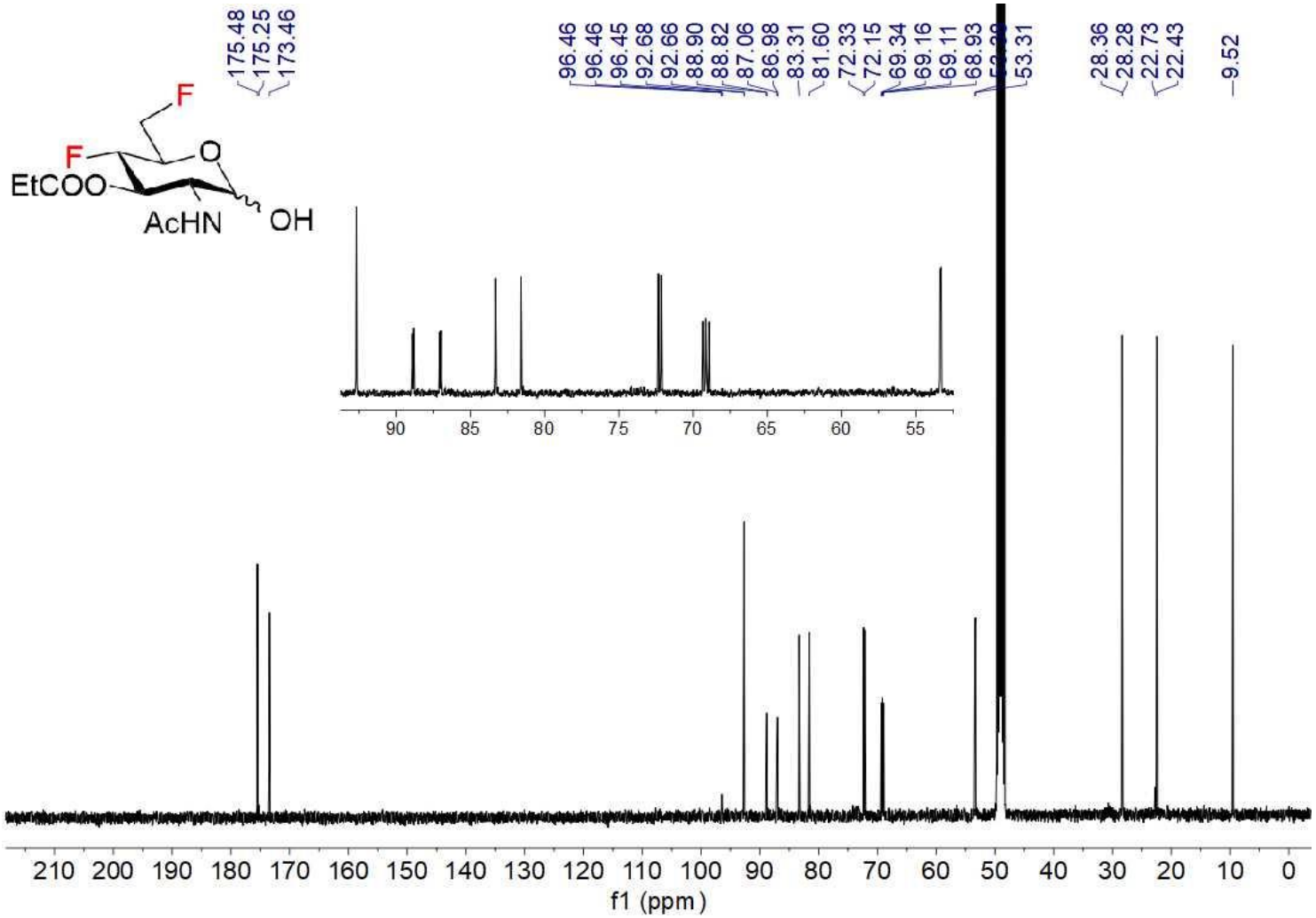


NMR COMPOUND 21

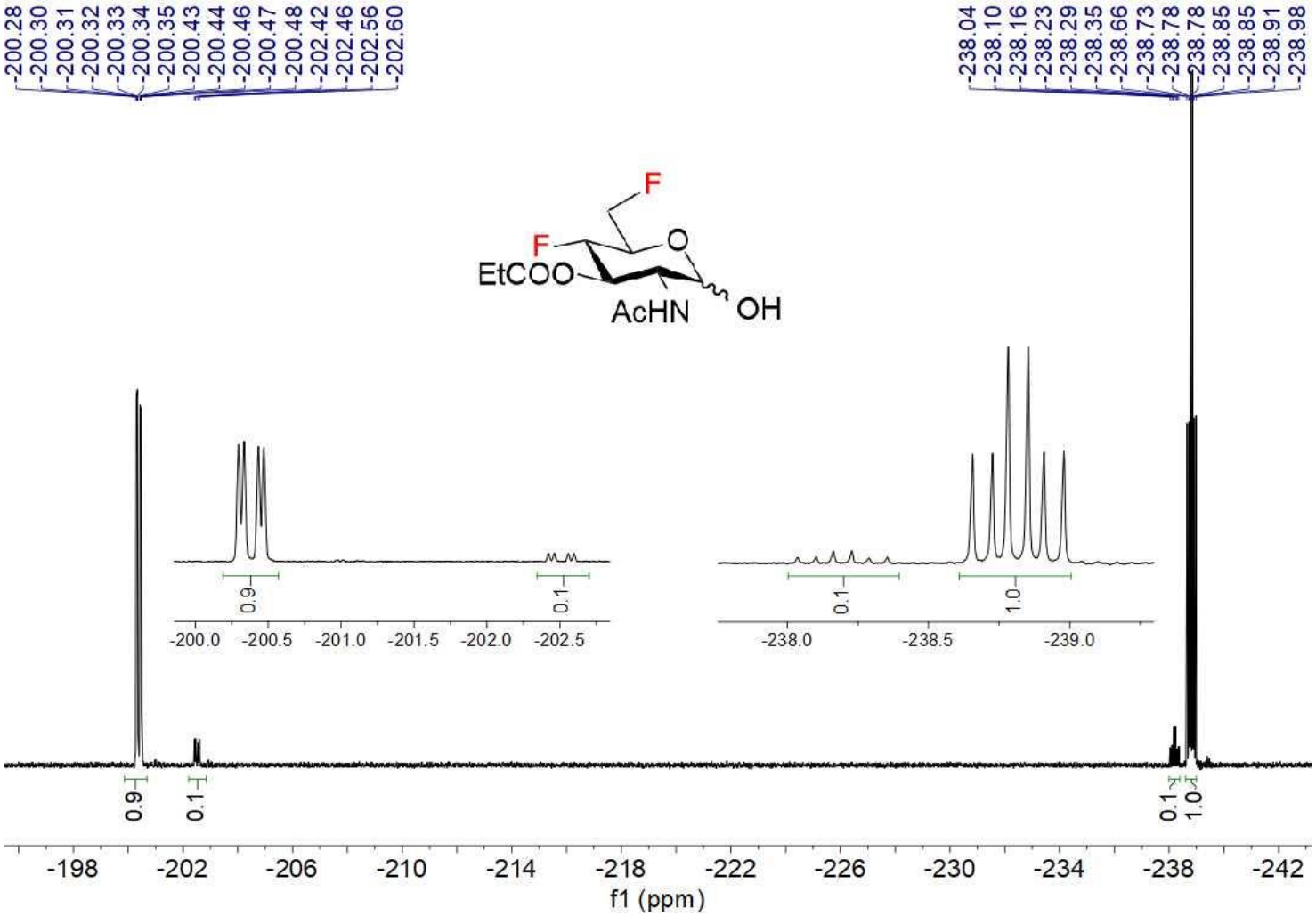
^{1}H NMR (400 MHz, CD_3OD) 21



^{13}C NMR (100 MHz, CD_3OD) 21



^{19}F NMR (376 MHz, CD_3OD) 21



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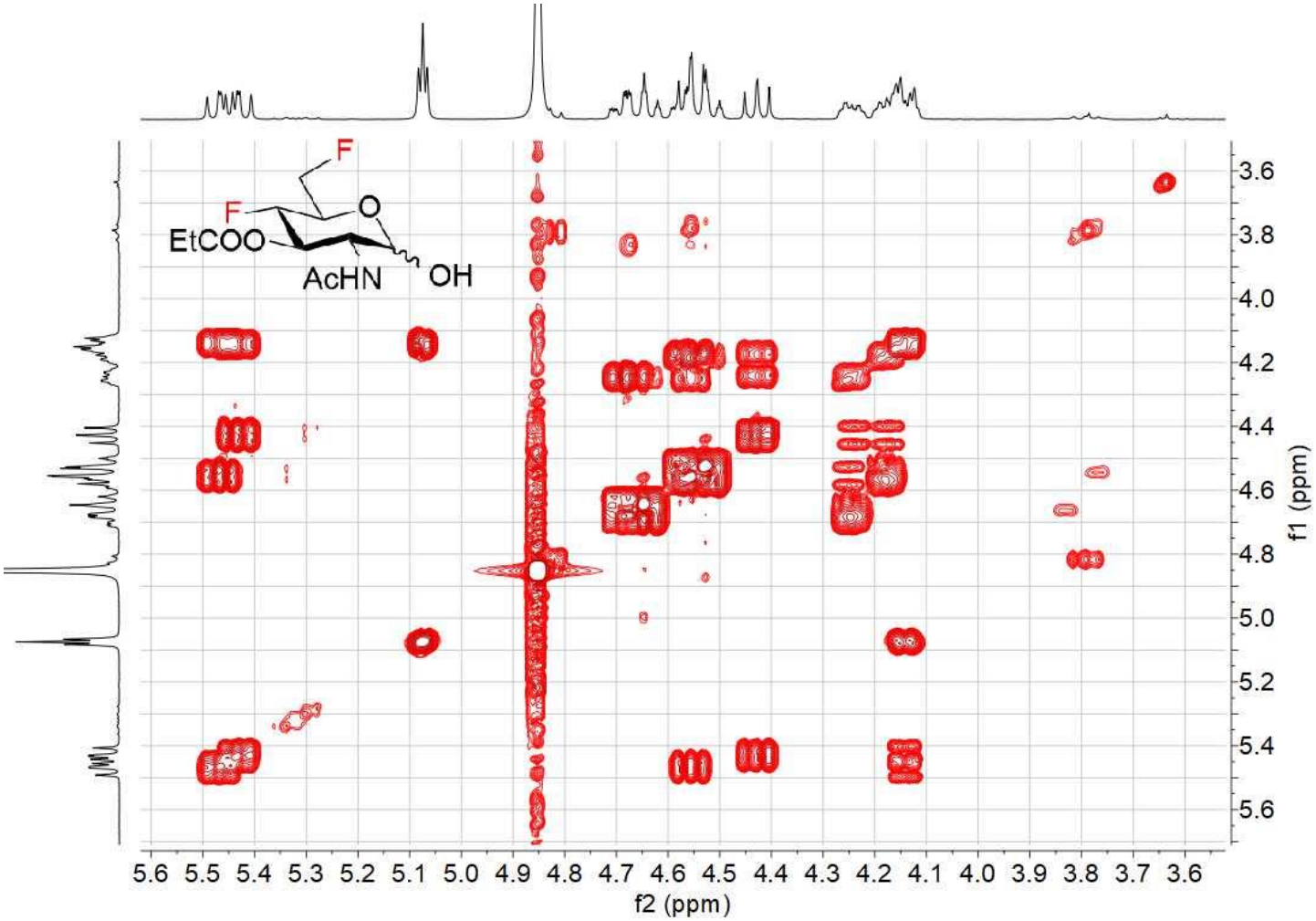
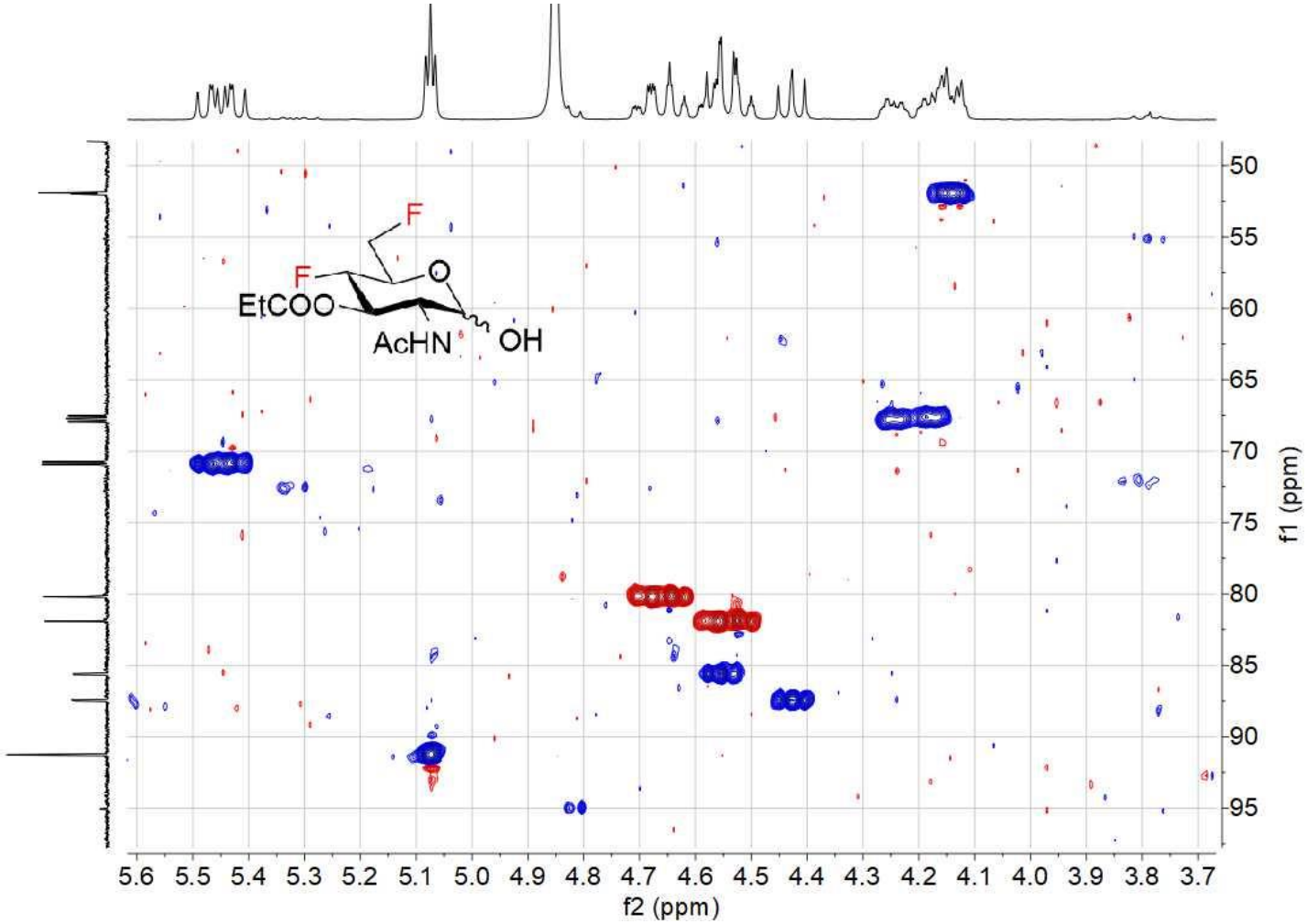
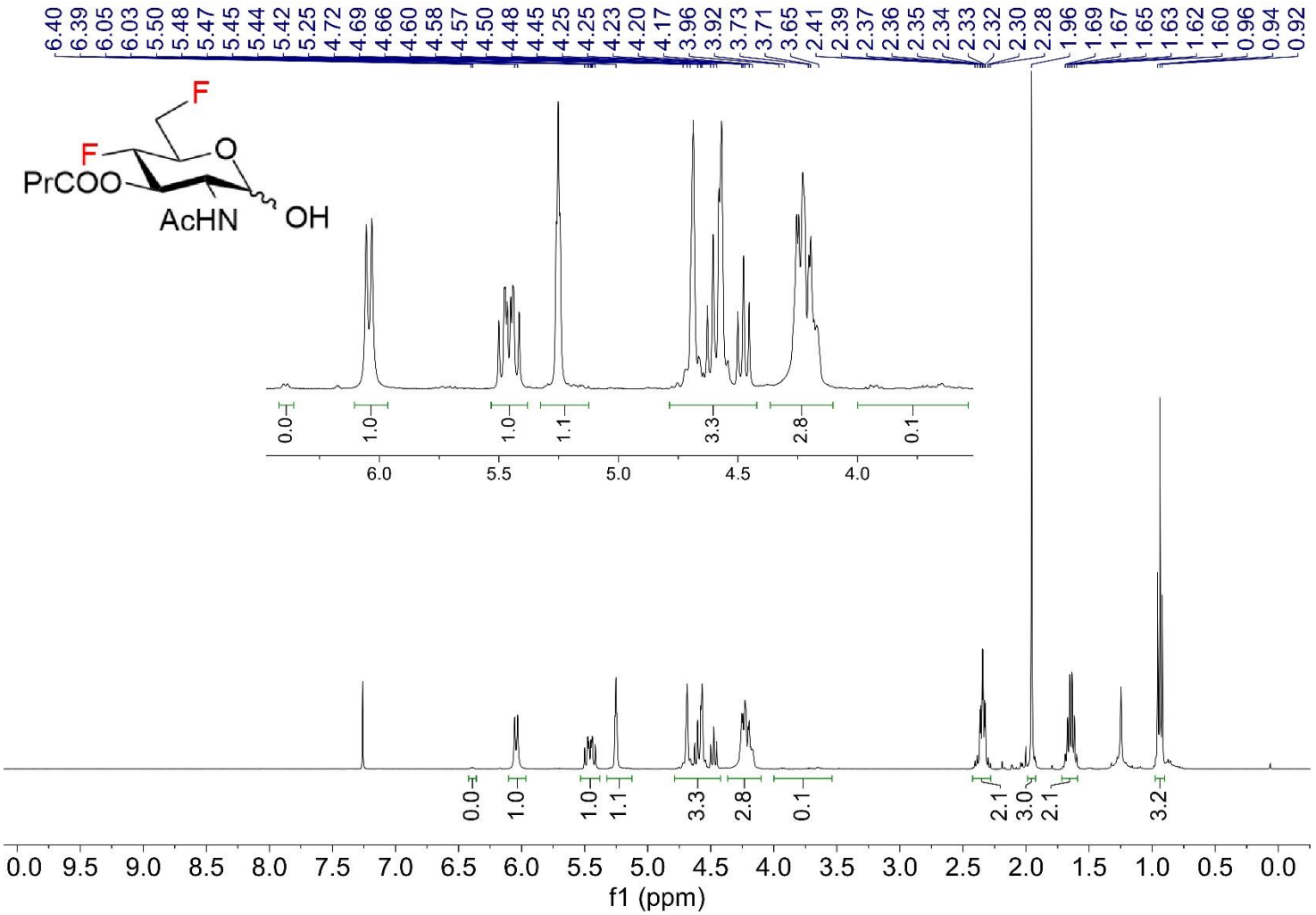

F
F
O
EtCOO
AcHN
OH
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
5.4
5.6
f1 (ppm)
5.6 5.5 5.4 5.3 5.2 5.1 5.0 4.9 4.8 4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6
f2 (ppm)

^{1}H-^{13}C HSQC 21

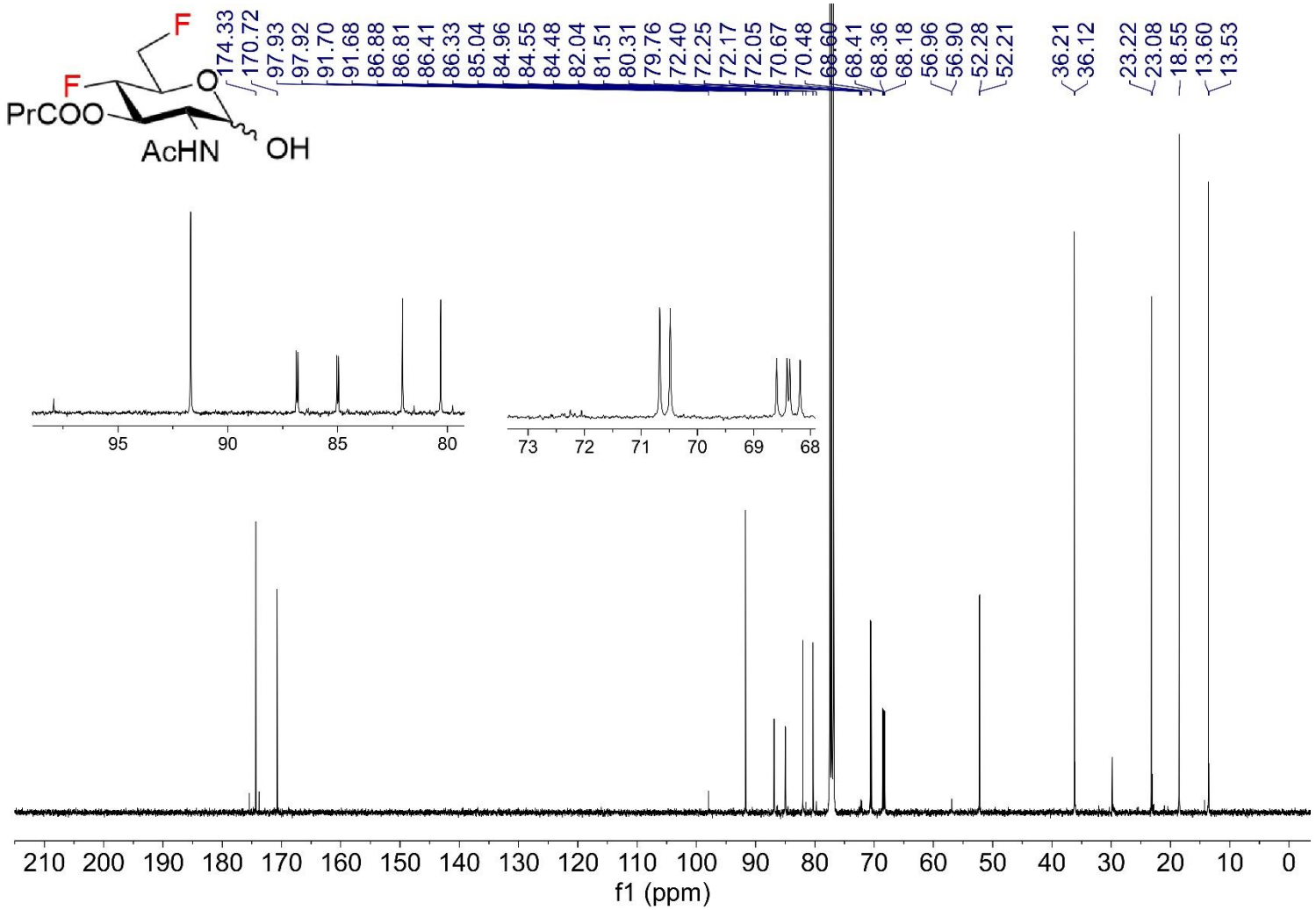


NMR COMPOUND 22

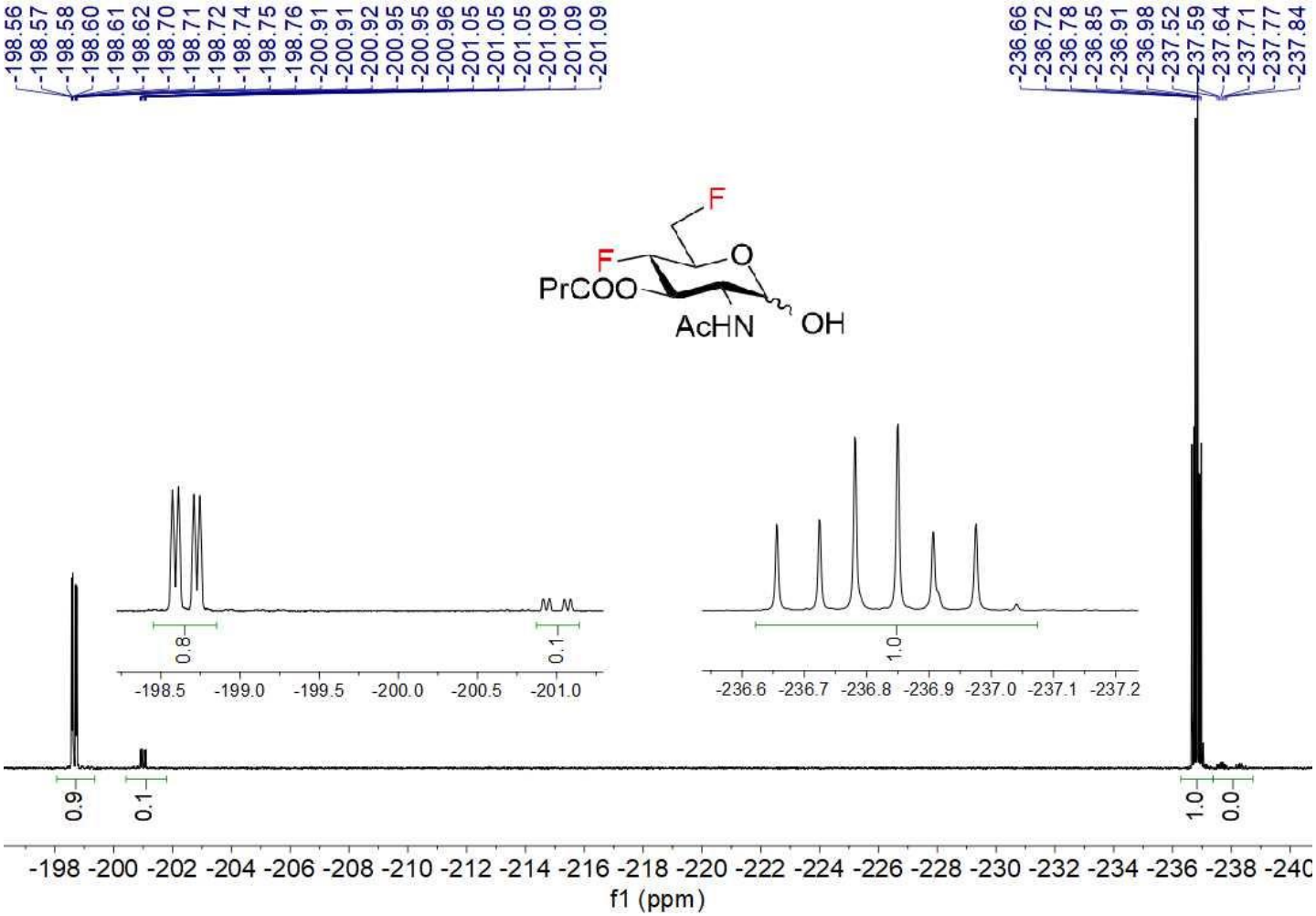
^{1}H NMR (400 MHz, $CDCl_3$) 22



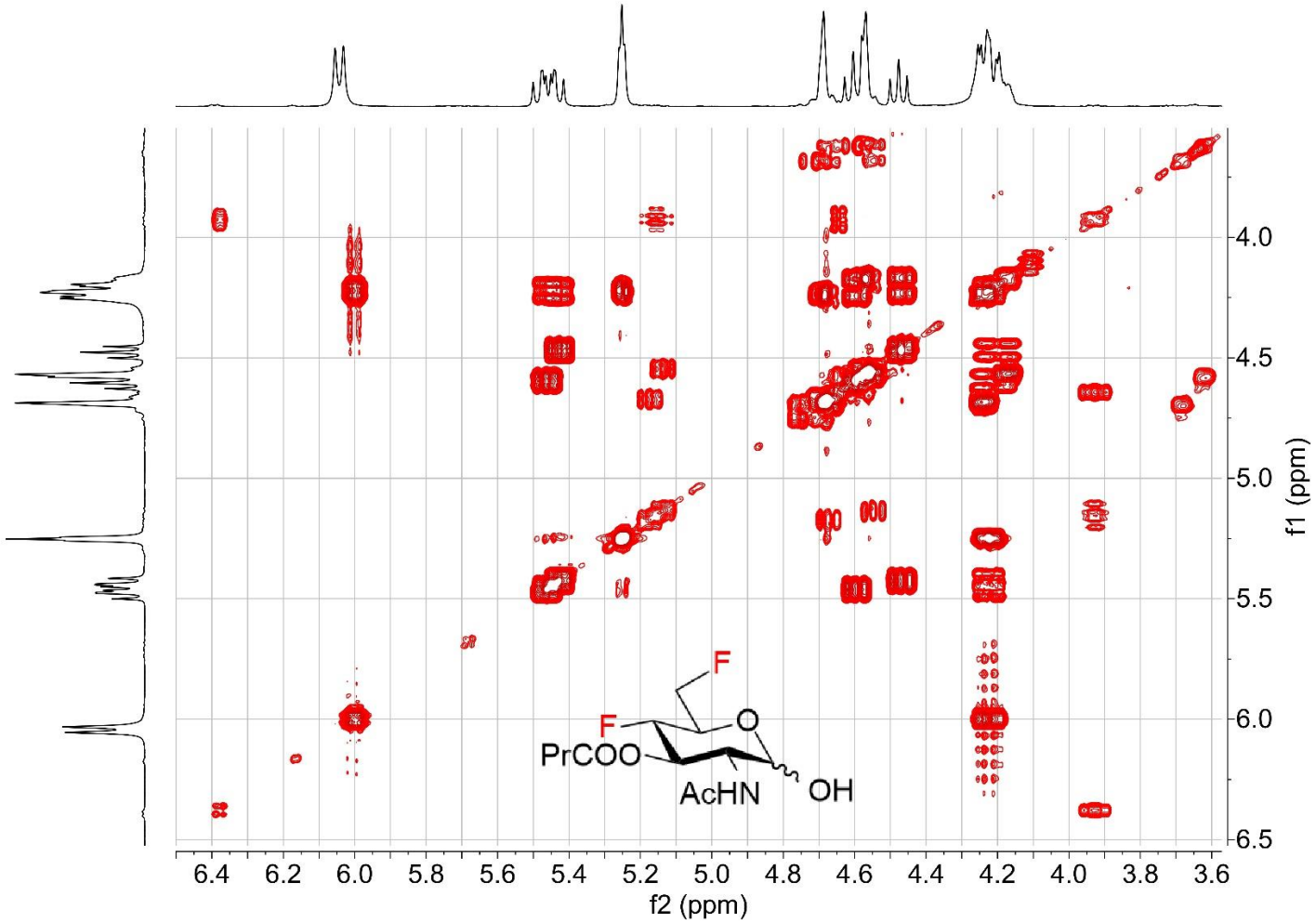
^{13}C NMR (100 MHz, $CDCl_3$) 22



^{19}F NMR (376 MHz, $CDCl_3$) 22



^{1}H-^{1}H COSY 22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F
O
PrCOO
AcHN
OH
f2 (ppm)
f1 (ppm)
6.4
6.2
6.0
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5.6
5.4
5.2
5.0
4.8
4.6
4.4
4.2
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4.0
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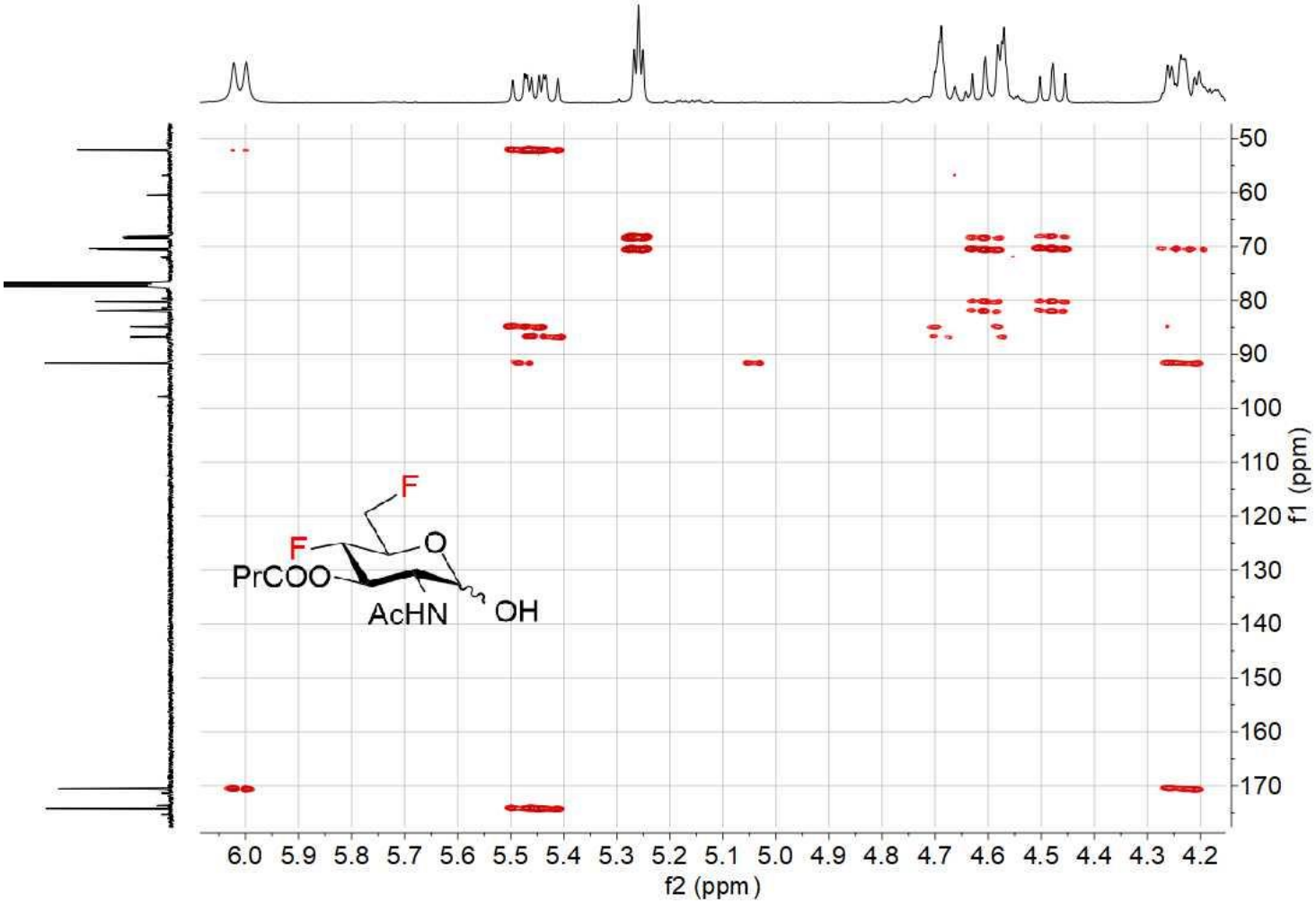
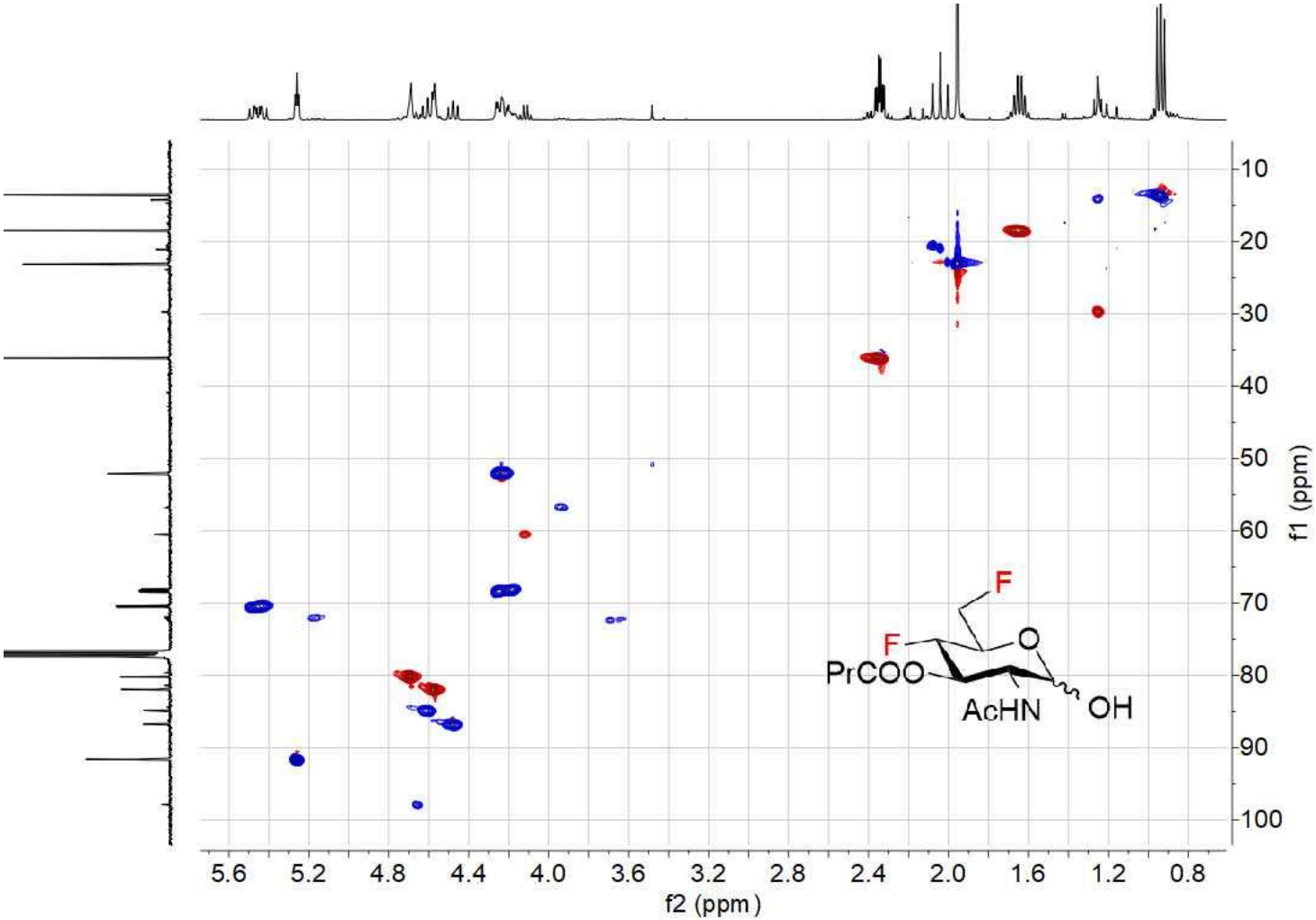
5.5
6.0
6.5

^{1}H-^{13}C HMBC 22

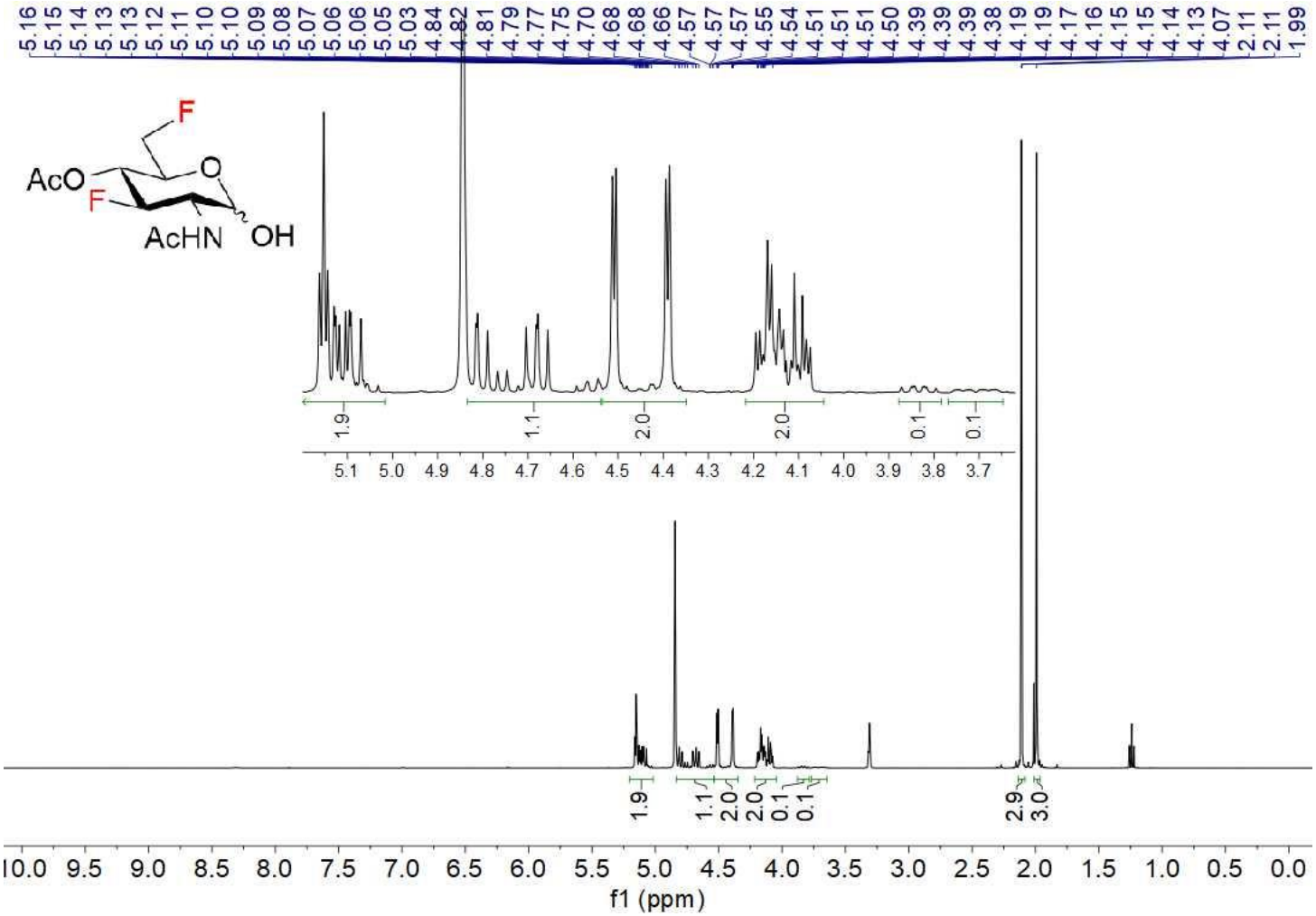


^{1}H-^{13}C HSQC 22

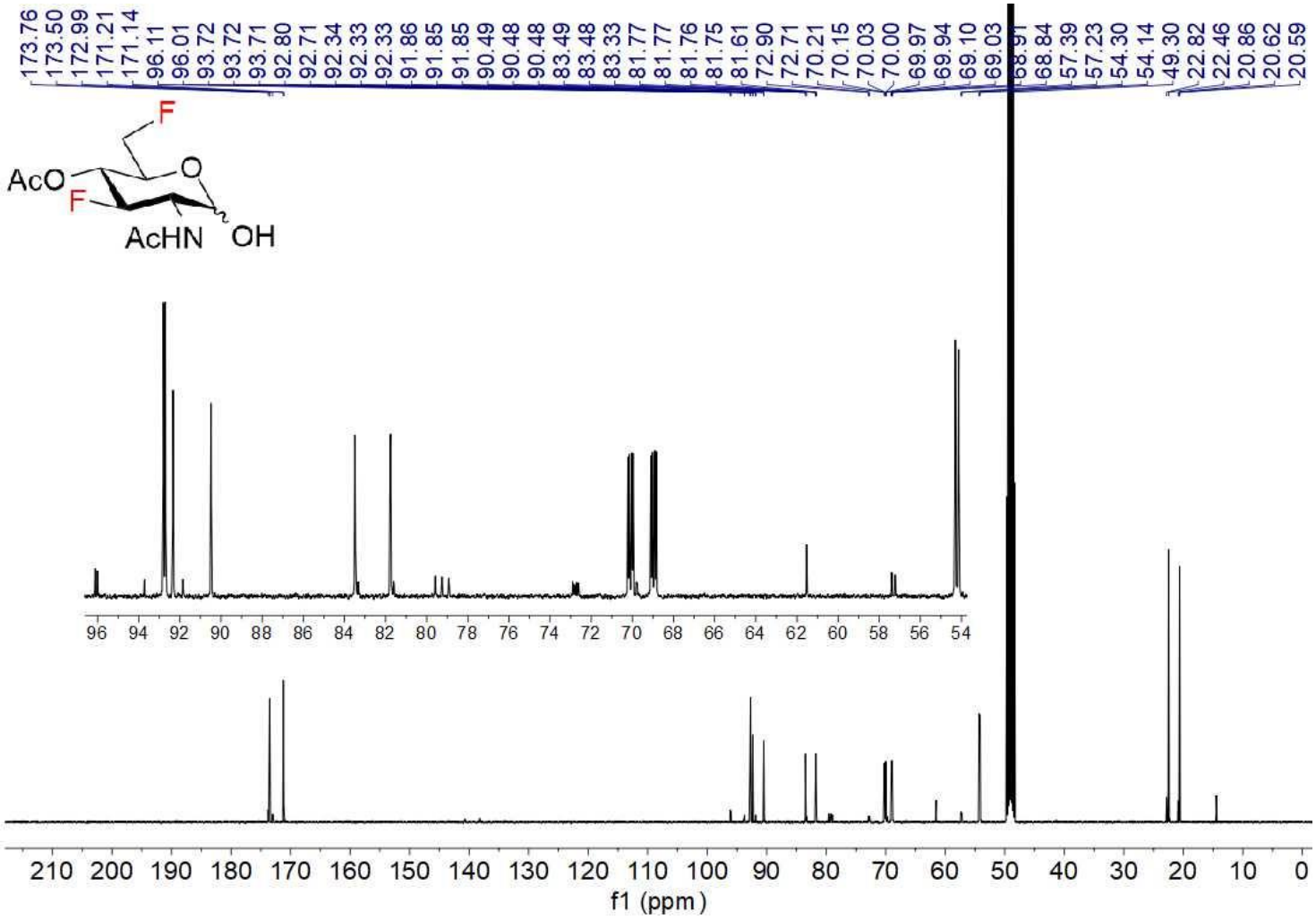


NMR COMPOUND 23

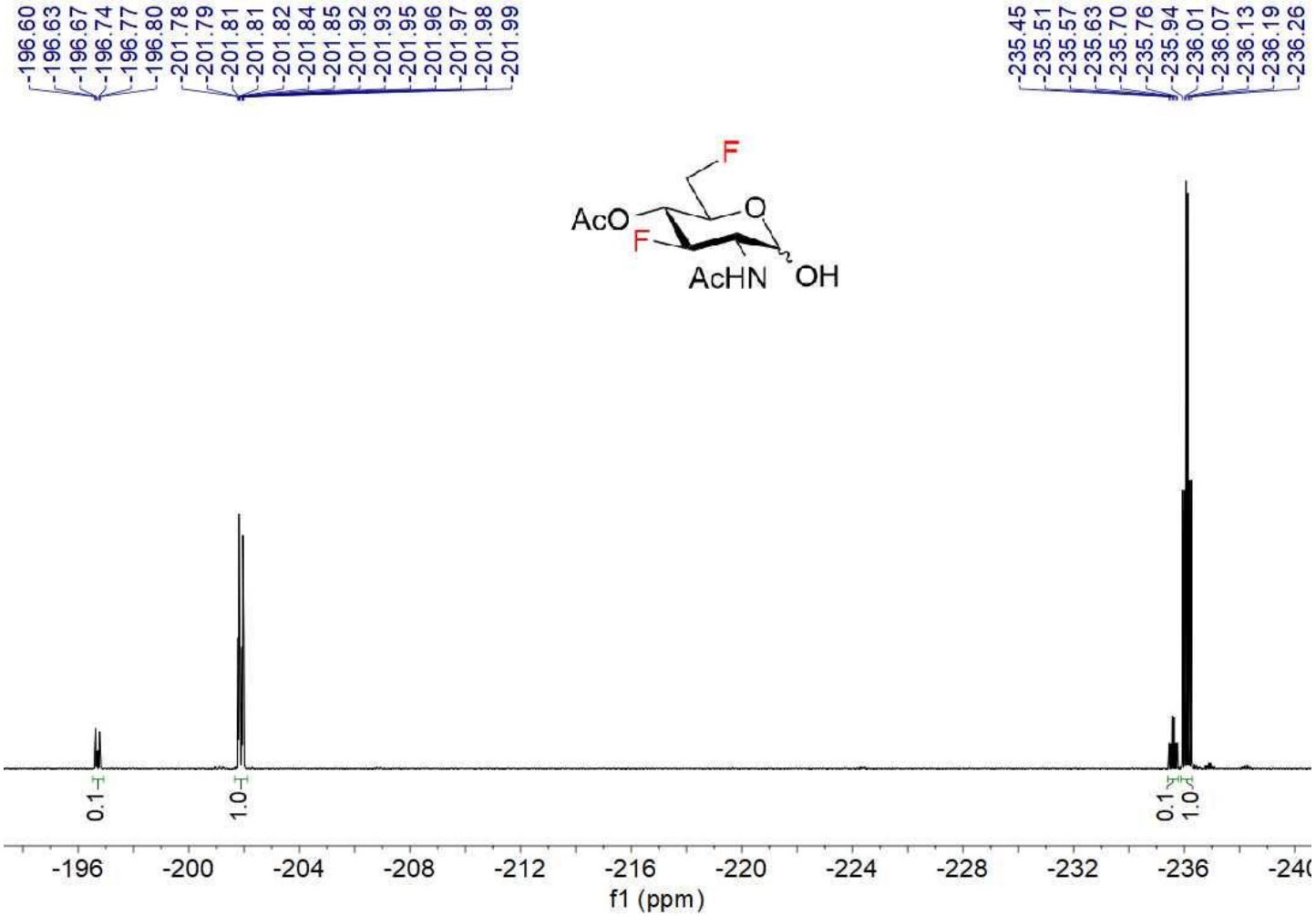
^{1}H NMR (400 MHz, CD_3OD) 23



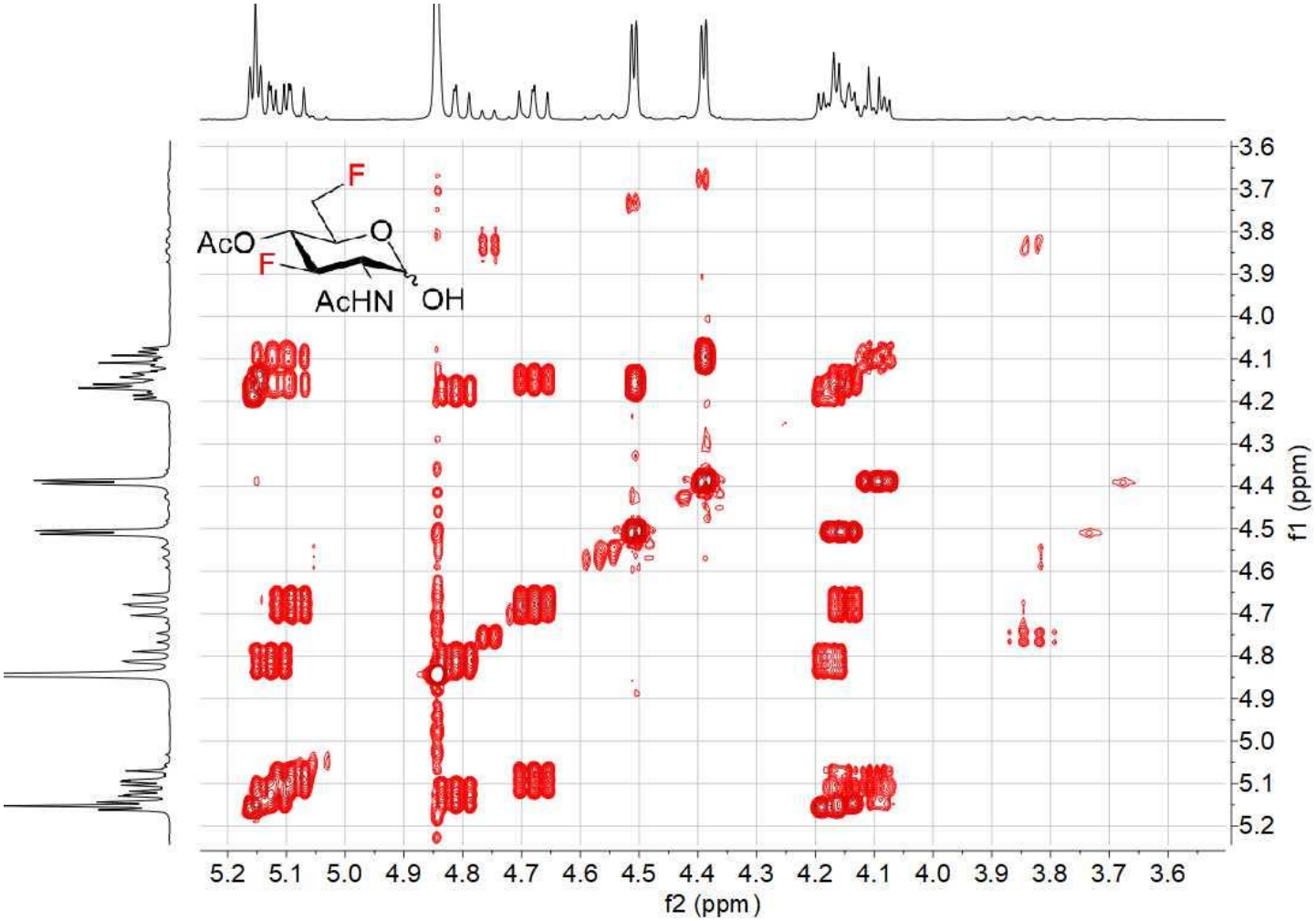
^{13}C NMR (100 MHz, CD_3OD) 23



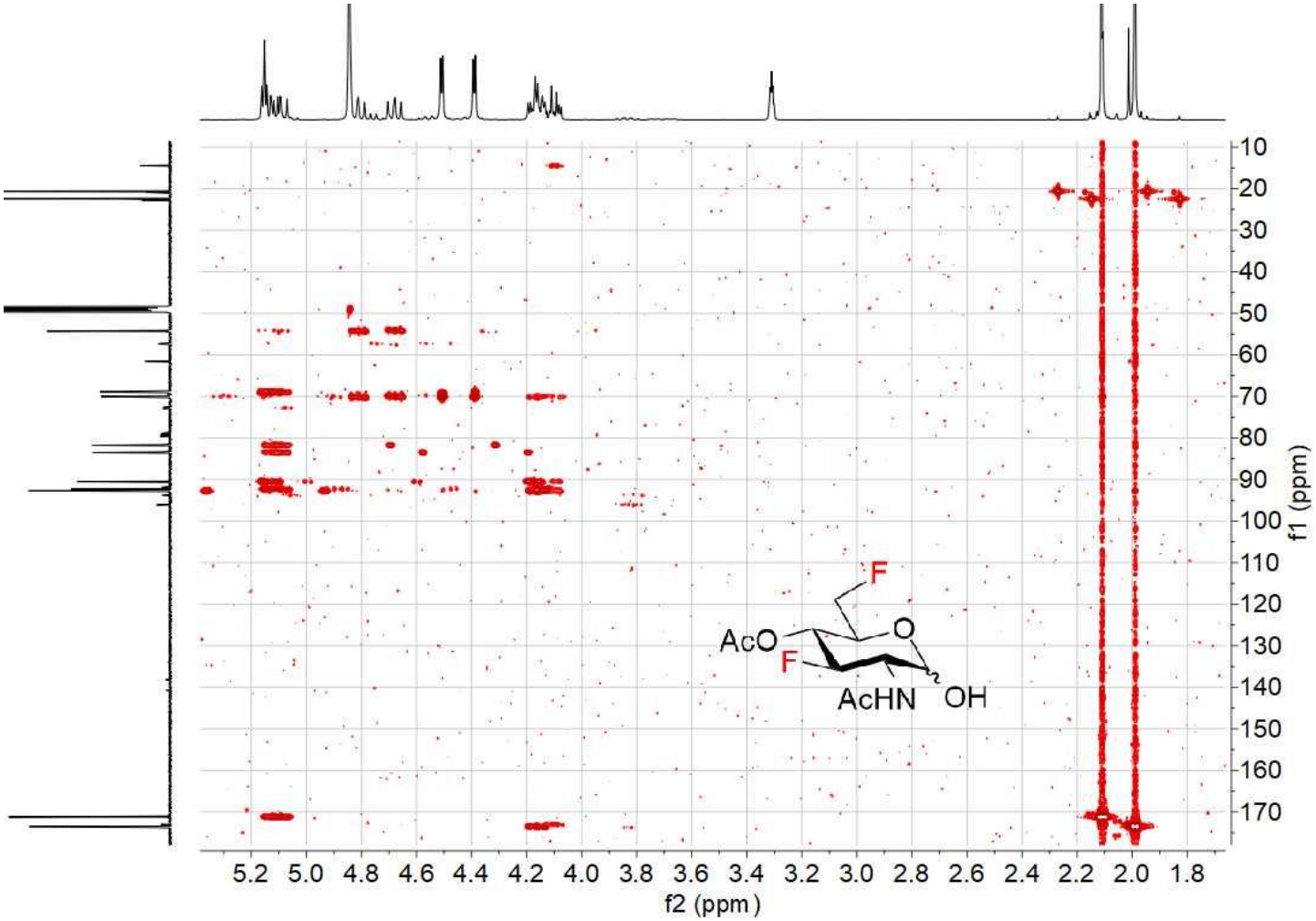
^{19}F NMR (376 MHz, CD_3OD) 23



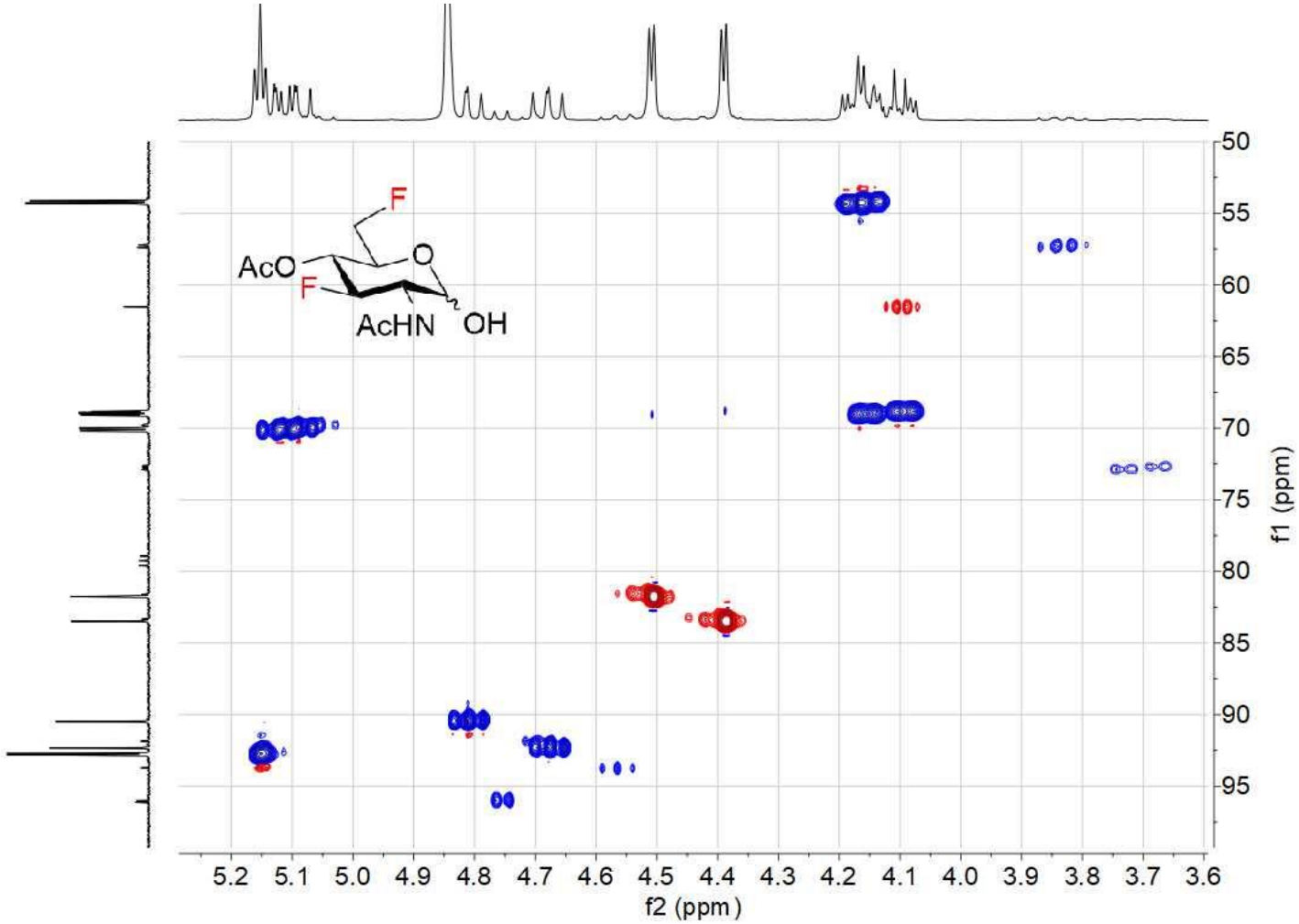
^{1}H-^{1}H COSY 23



^{1}H-^{13}C HMBC 23

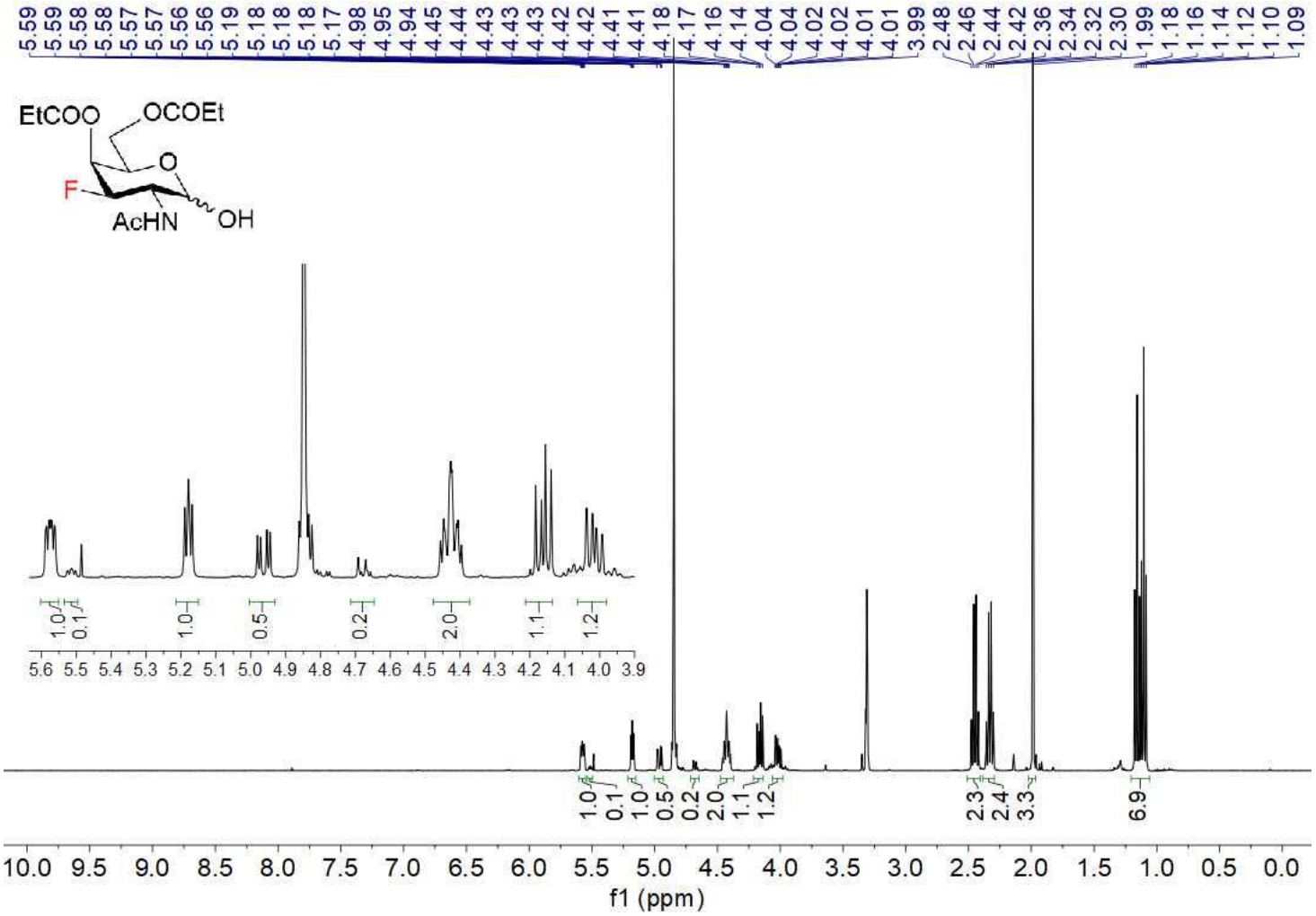


^{1}H-^{13}C HSQC 23

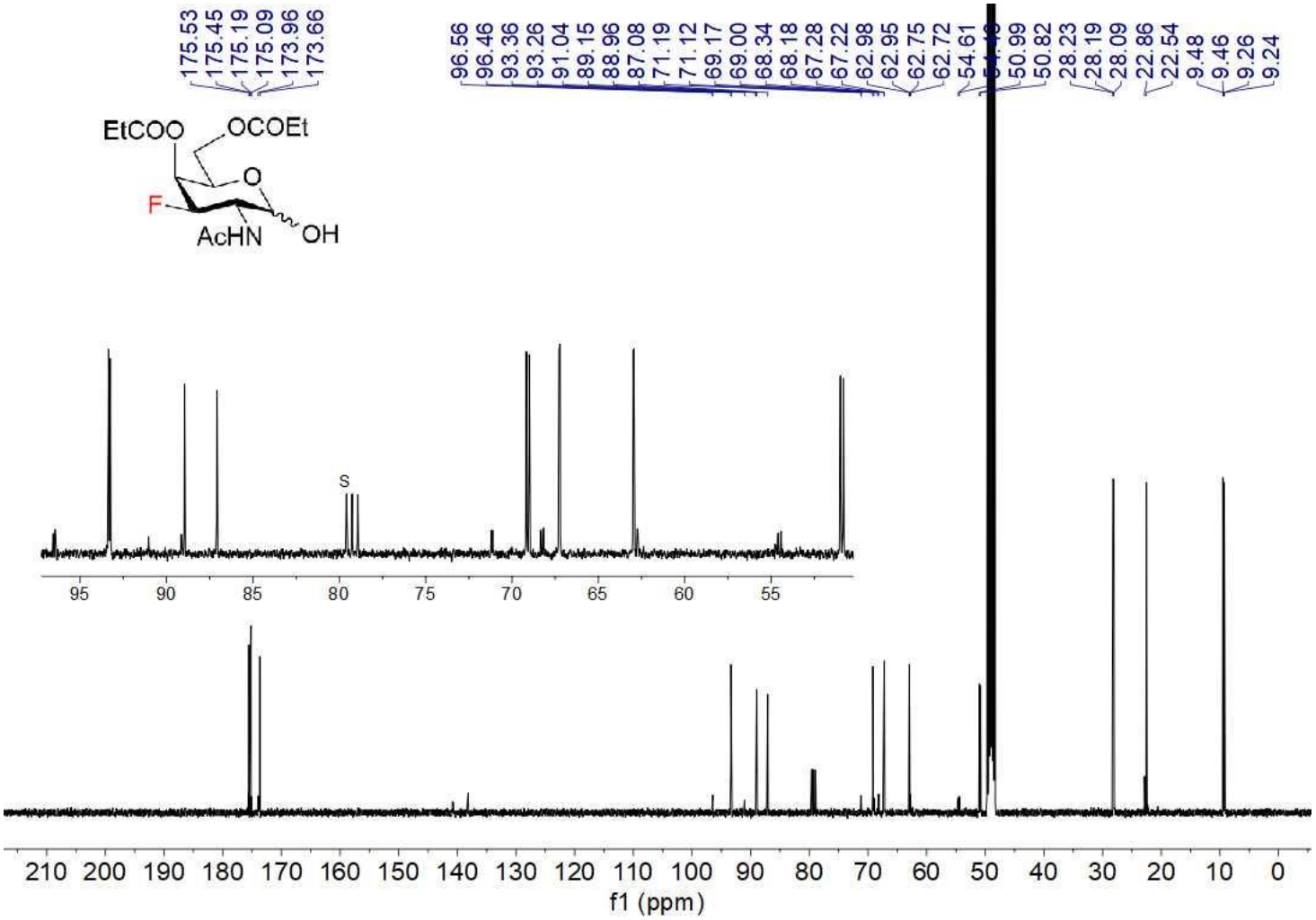


NMR COMPOUND 25

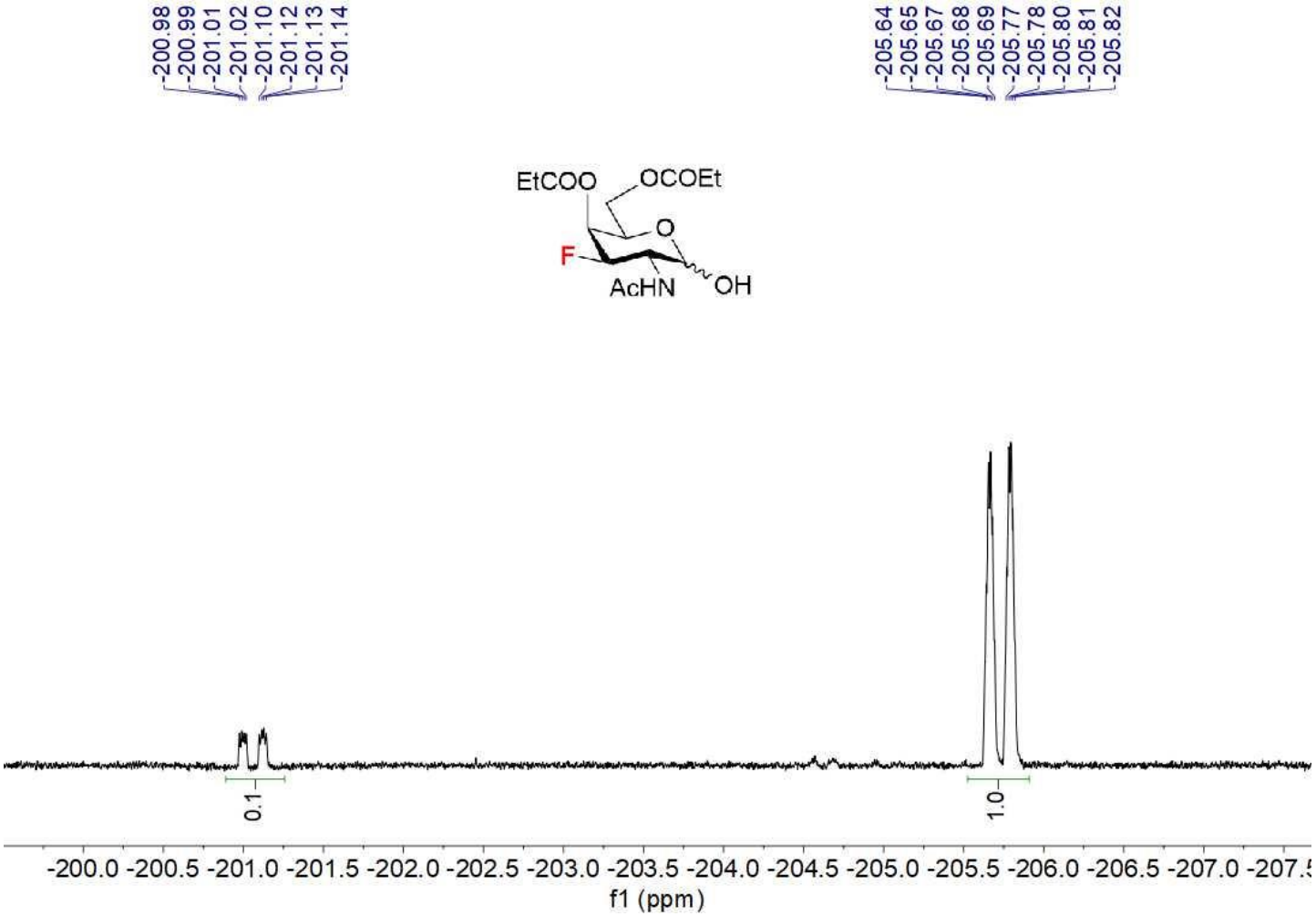
^{1}H NMR (400 MHz, CD_3OD) 25



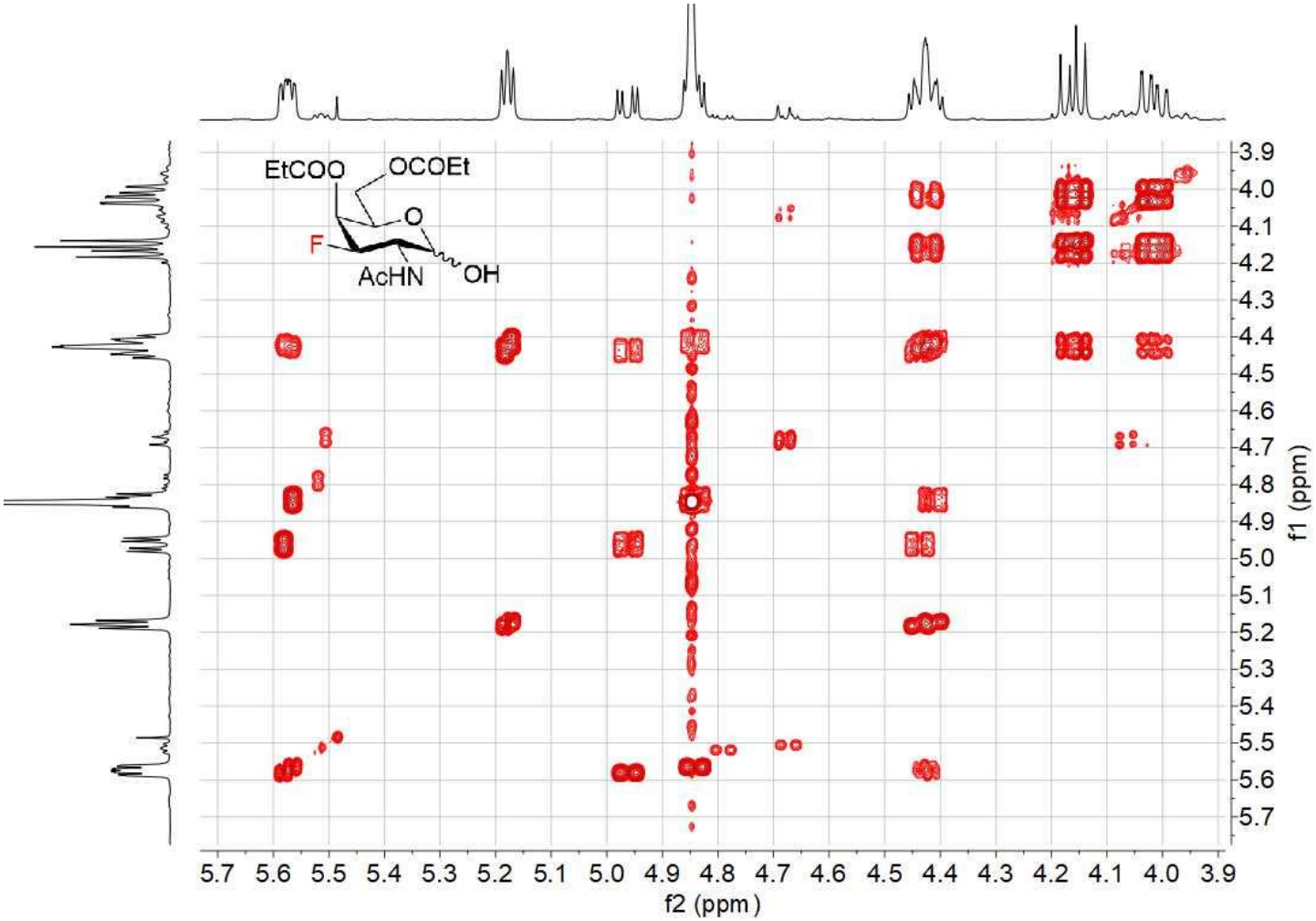
^{13}C NMR (100 MHz, CD_3OD) 25



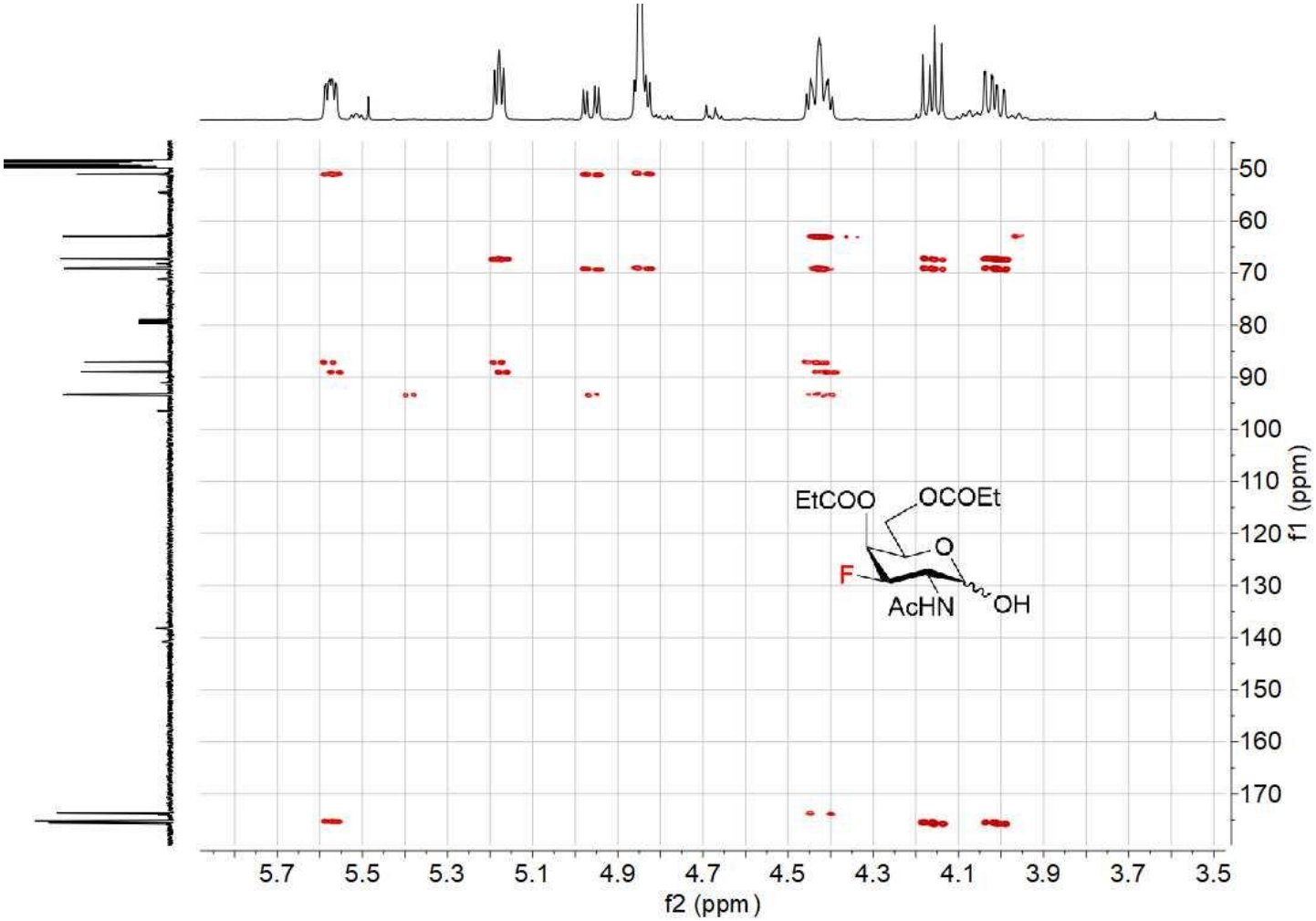
^{19}F NMR (376 MHz, CD_3OD) 25



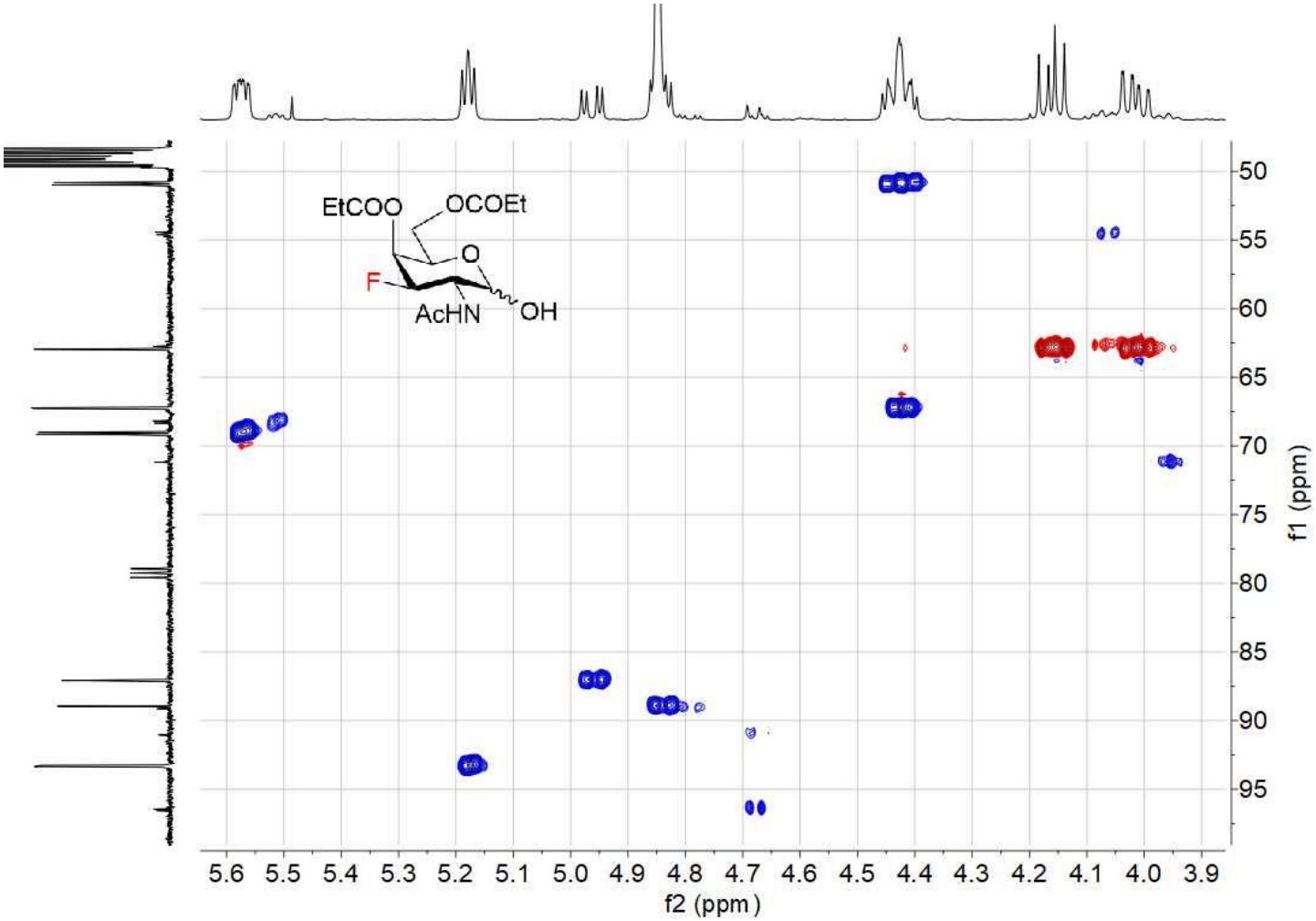
^{1}H-^{1}H COSY 25



^{1}H-^{13}C HMBC 25

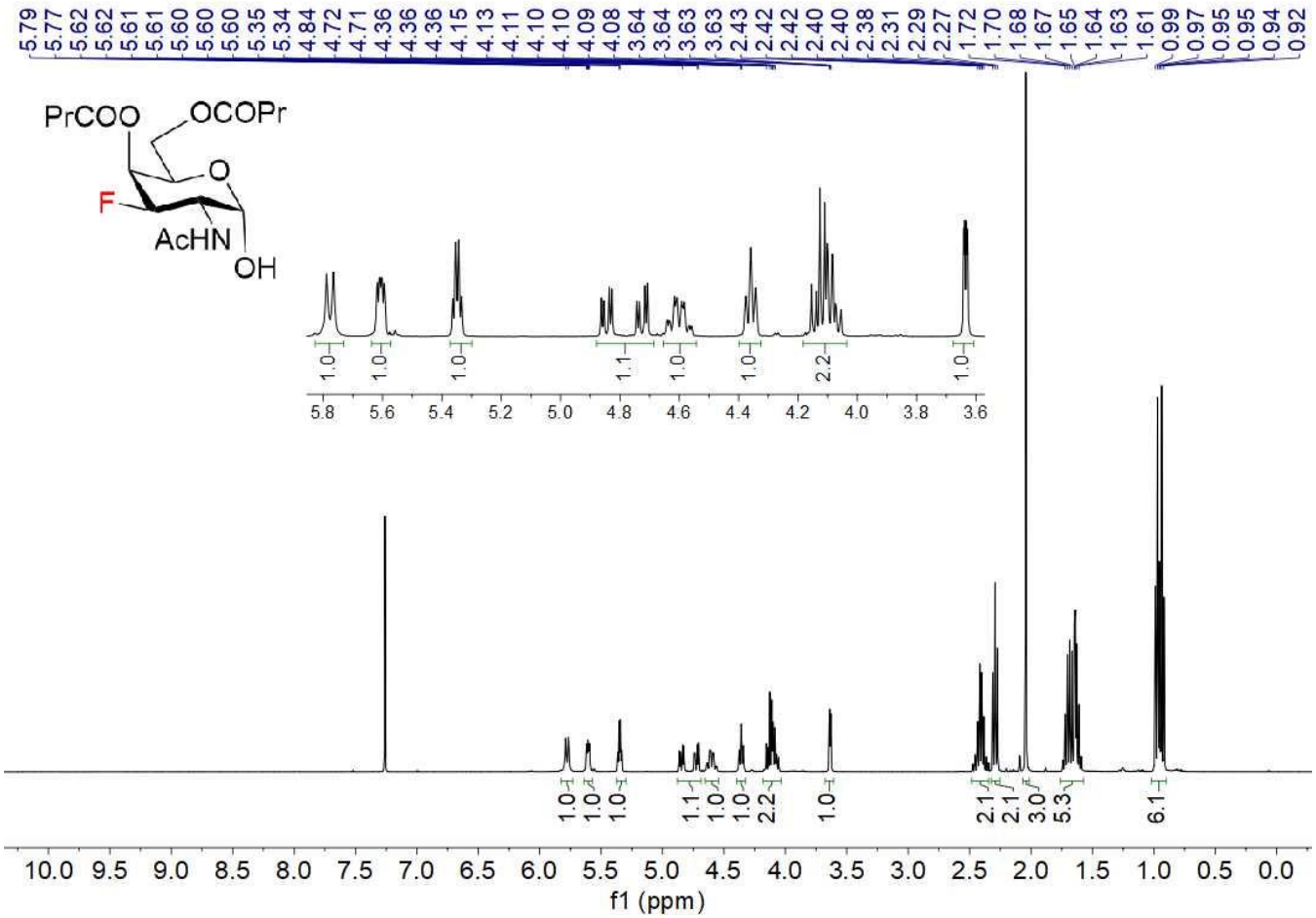


^{1}H-^{13}C HSQC 25

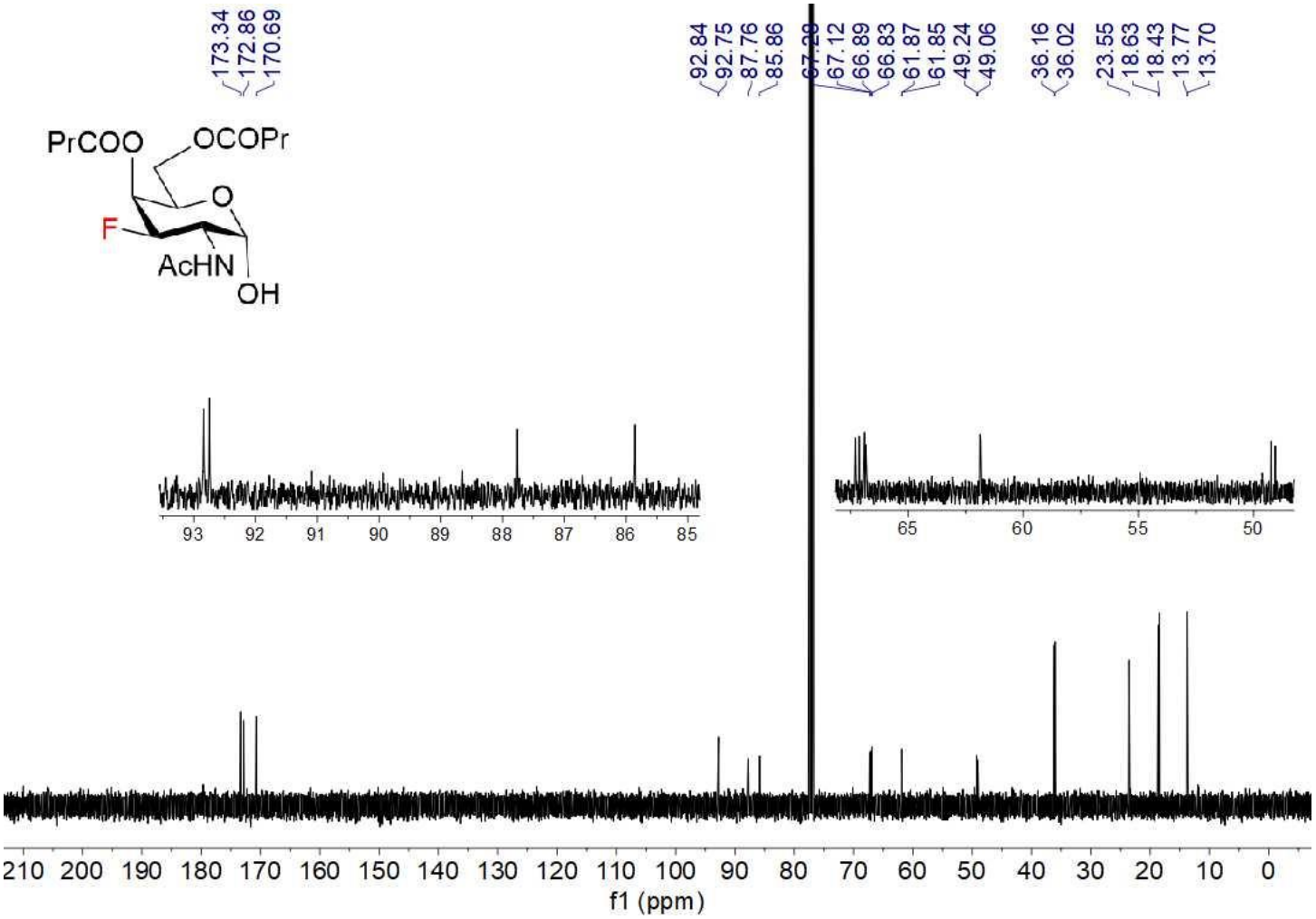


NMR COMPOUND 26

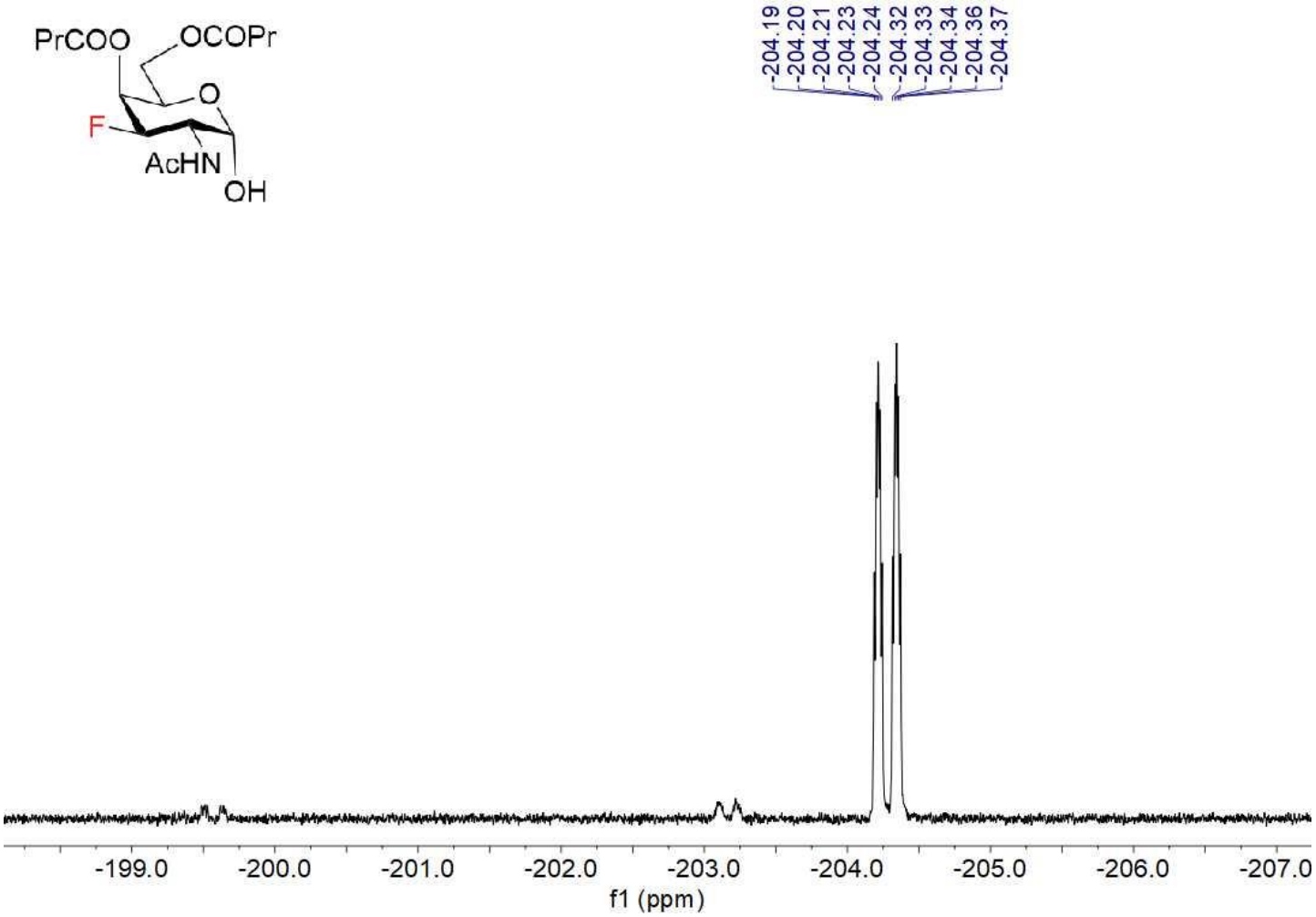
^{1}H NMR (400 MHz, $CDCl_3$) 26



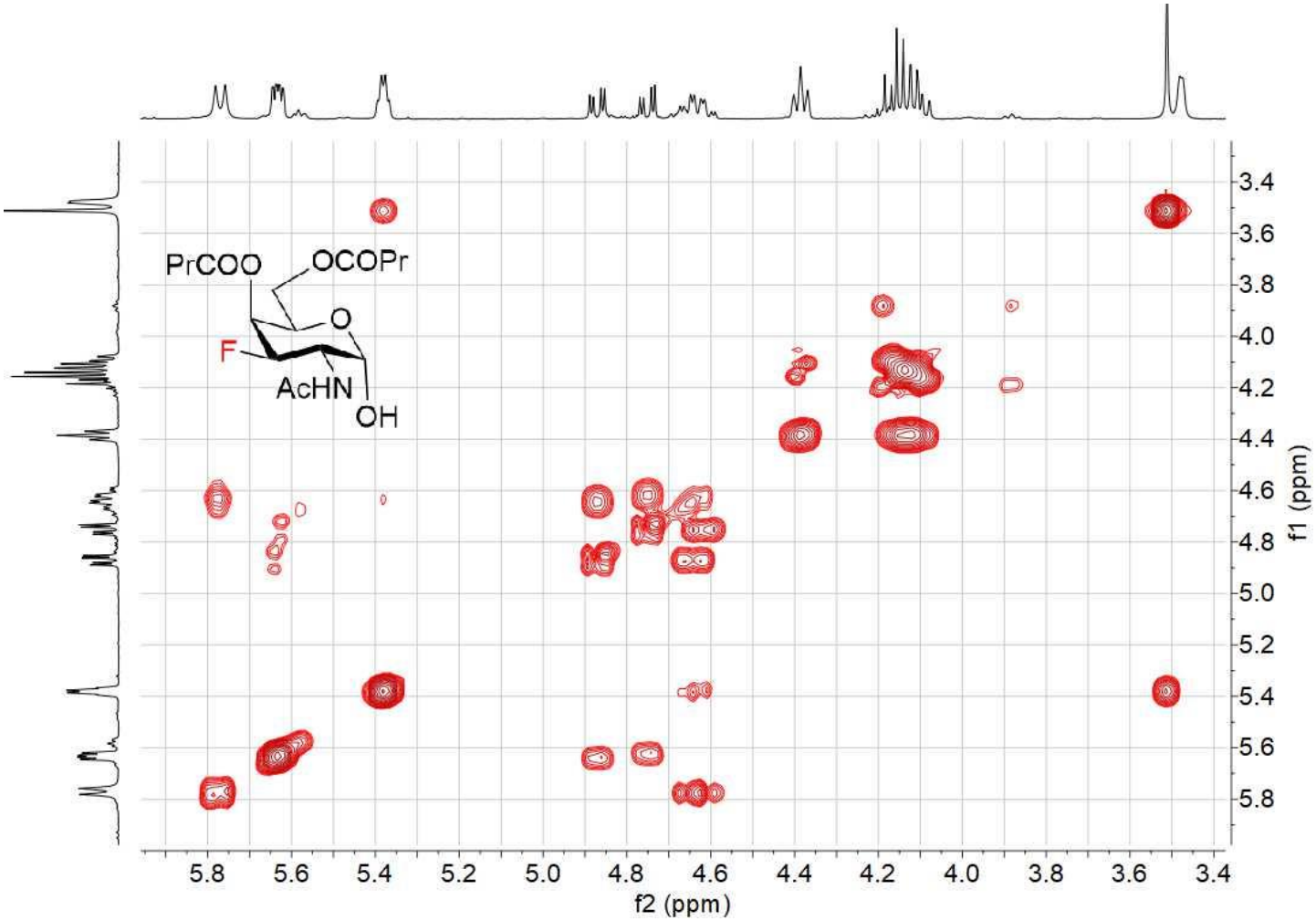
^{13}C NMR (100 MHz, $CDCl_3$) 26



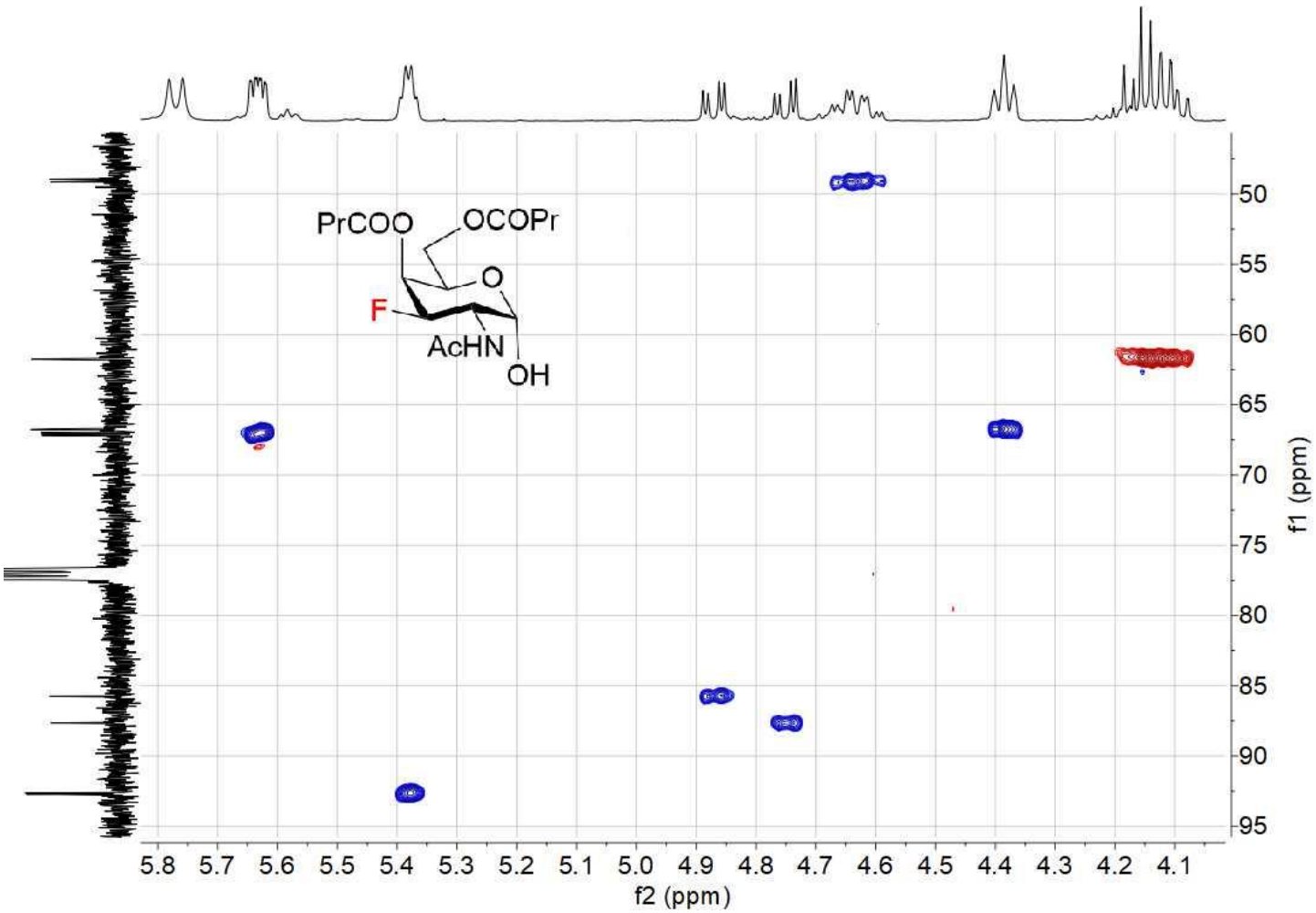
^{19}F NMR (376 MHz, $CDCl_3$) 26



^{1}H-^{1}H COSY 26

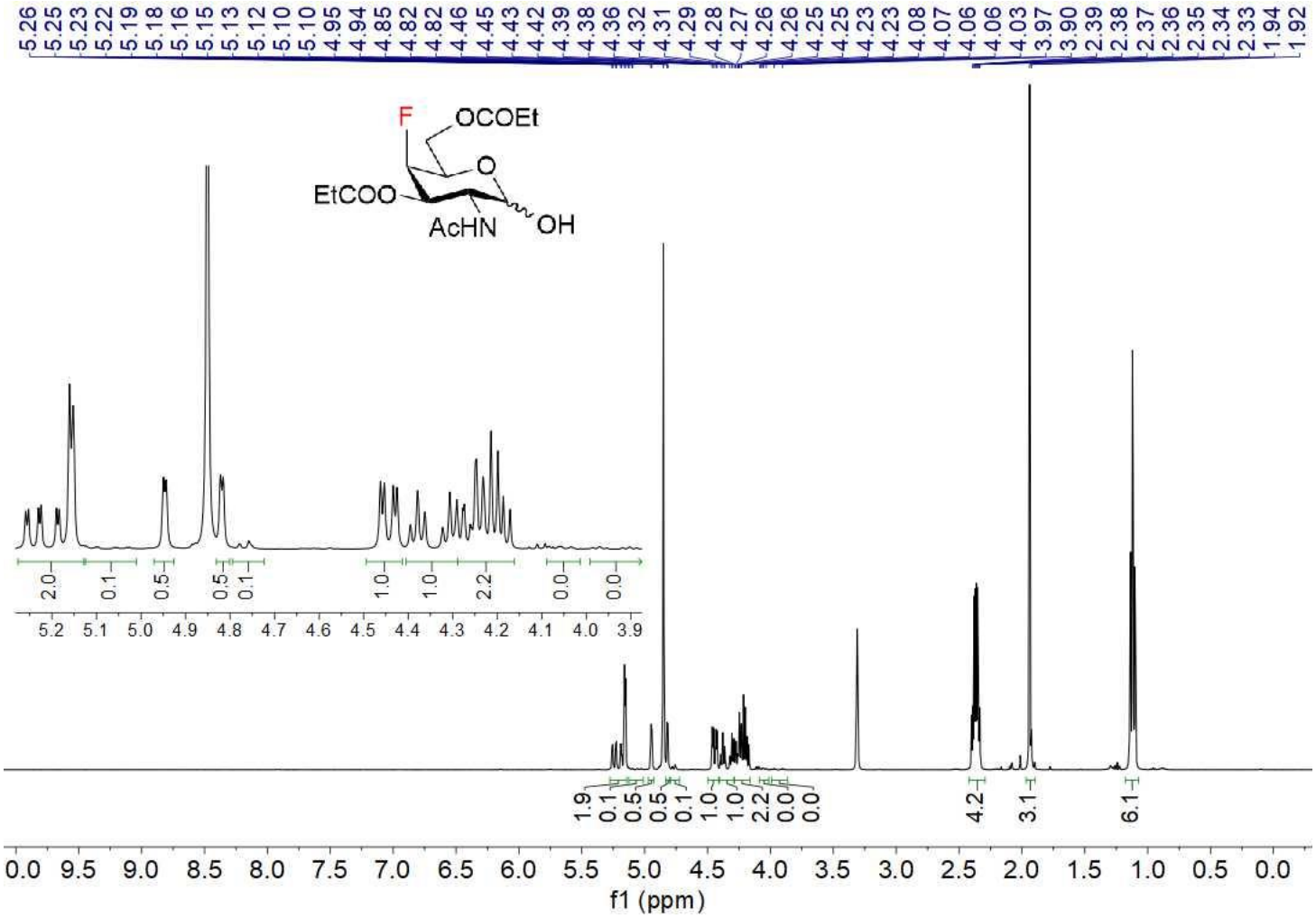


^{1}H-^{13}C HSQC 26

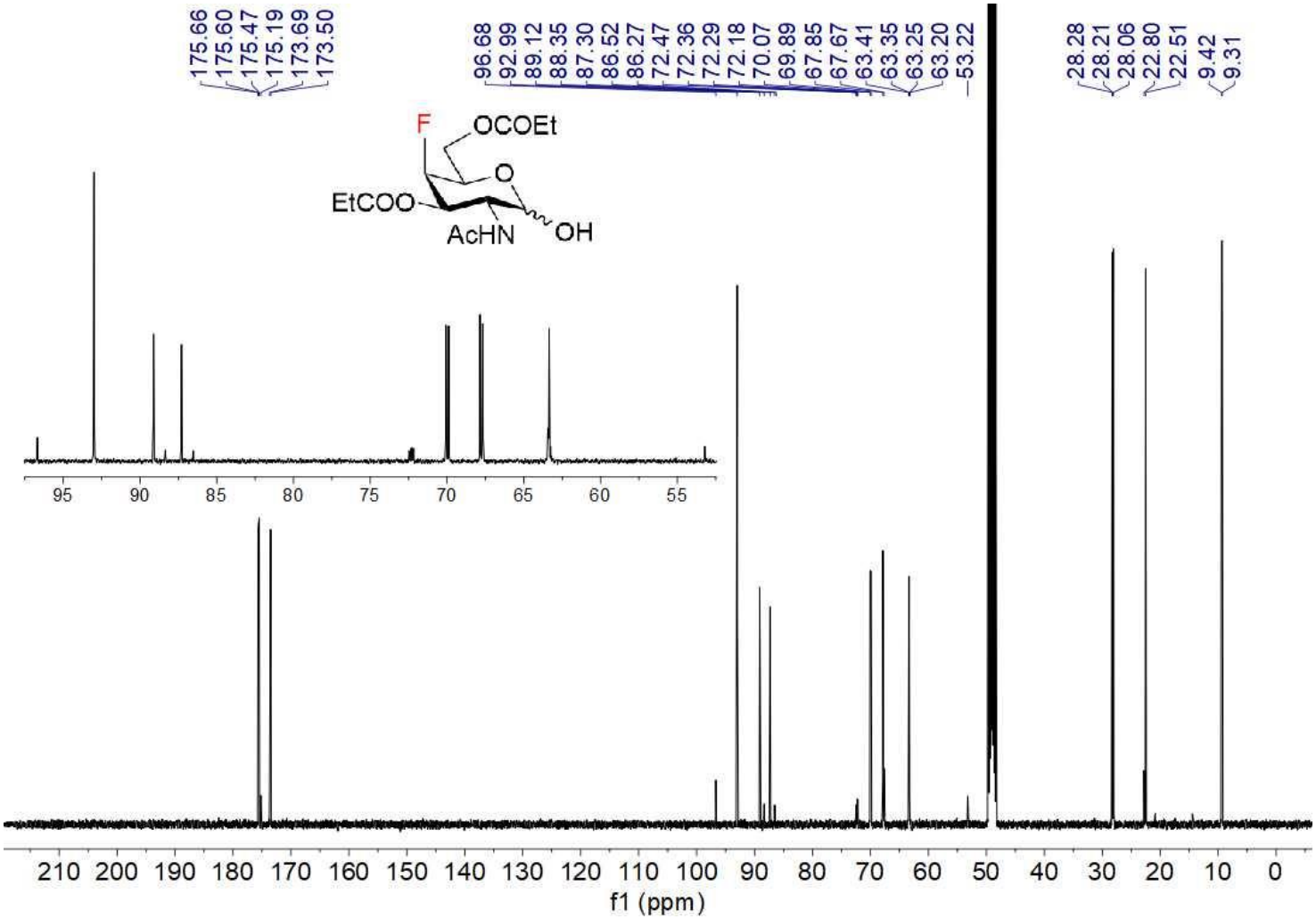


NMR COMPOUND 27

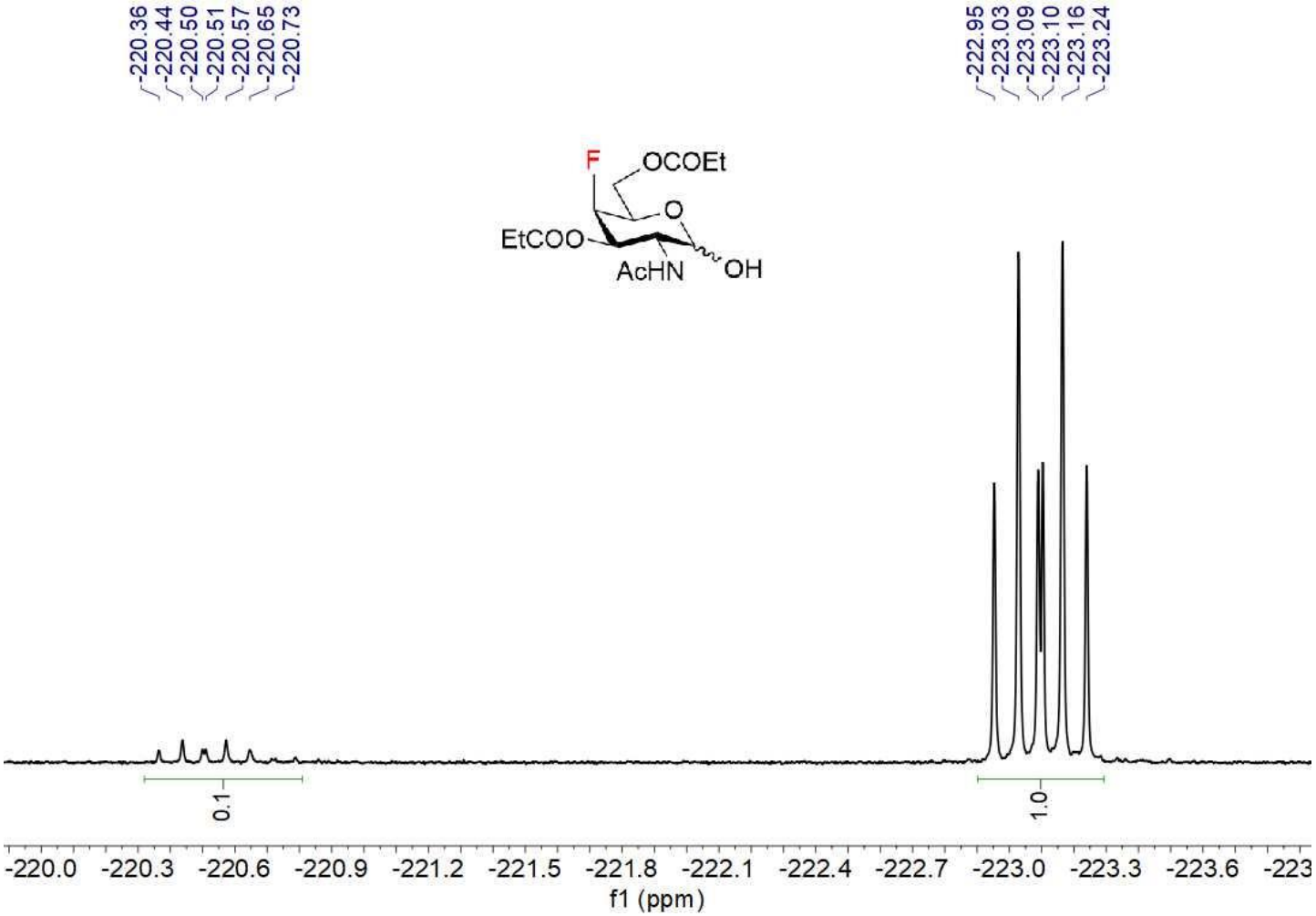
^{1}H NMR (400 MHz, CD_3OD) 27



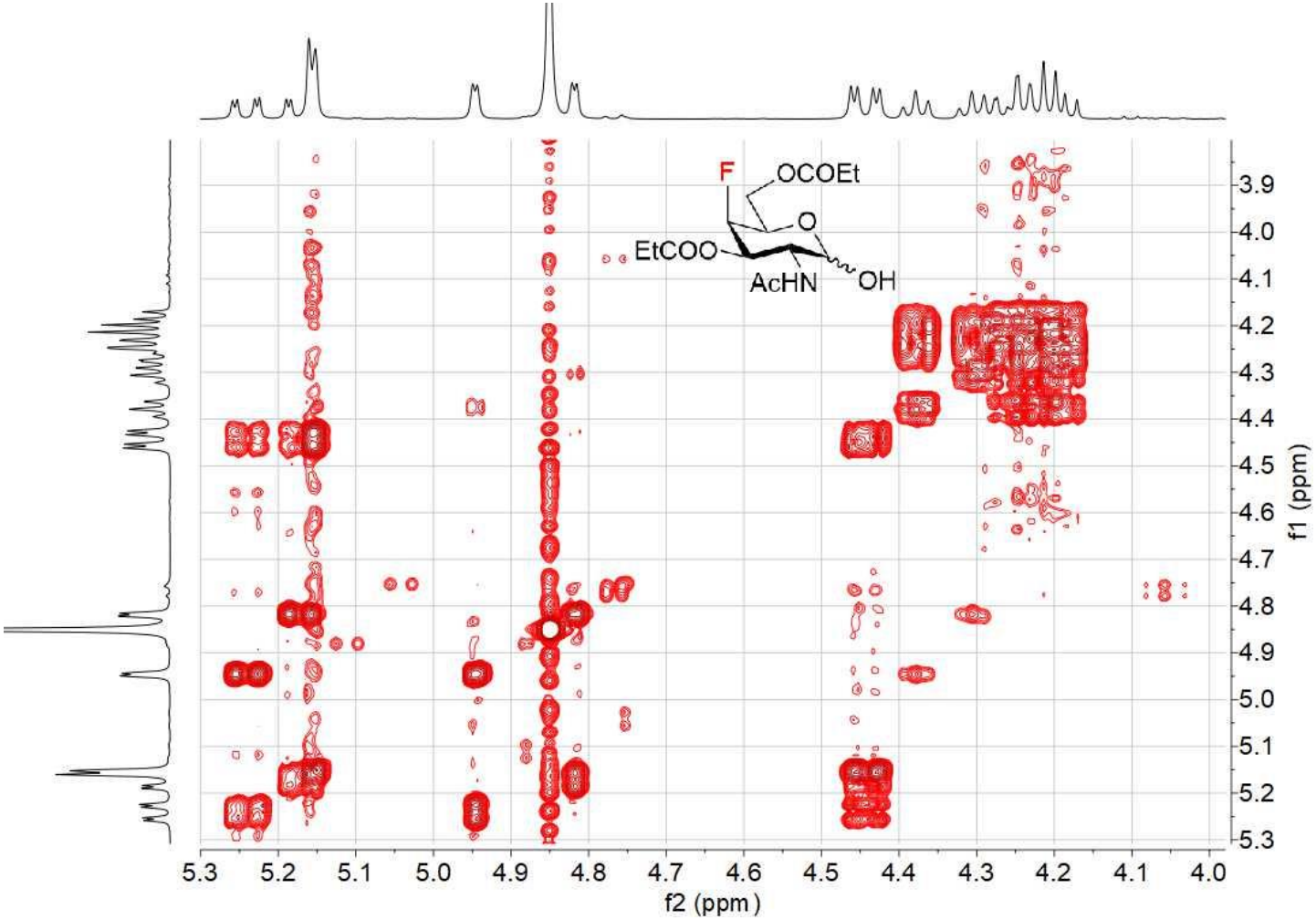
^{13}C NMR (100 MHz, CD_3OD) 27



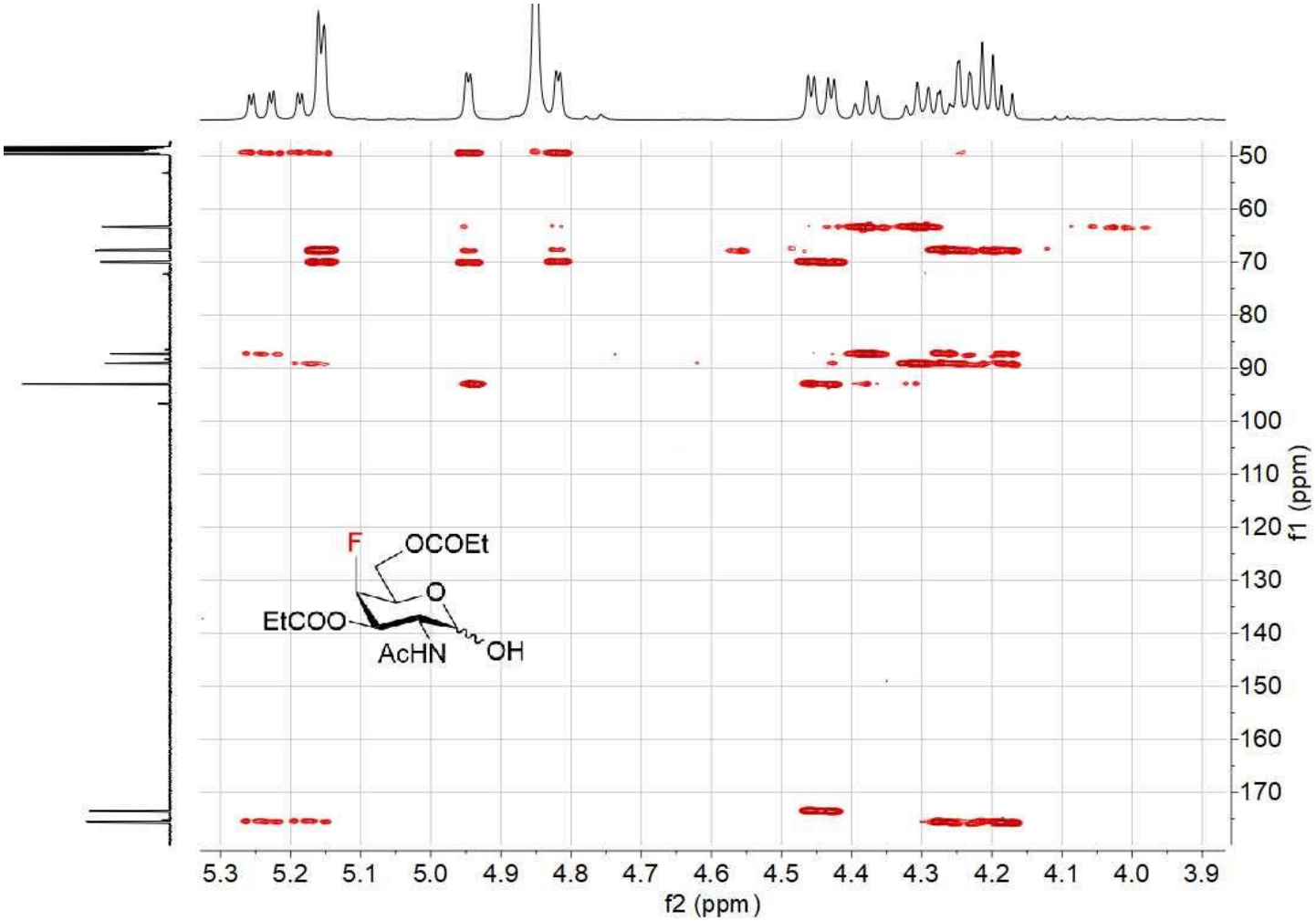
^{19}F NMR (376 MHz, CD_3OD) 27



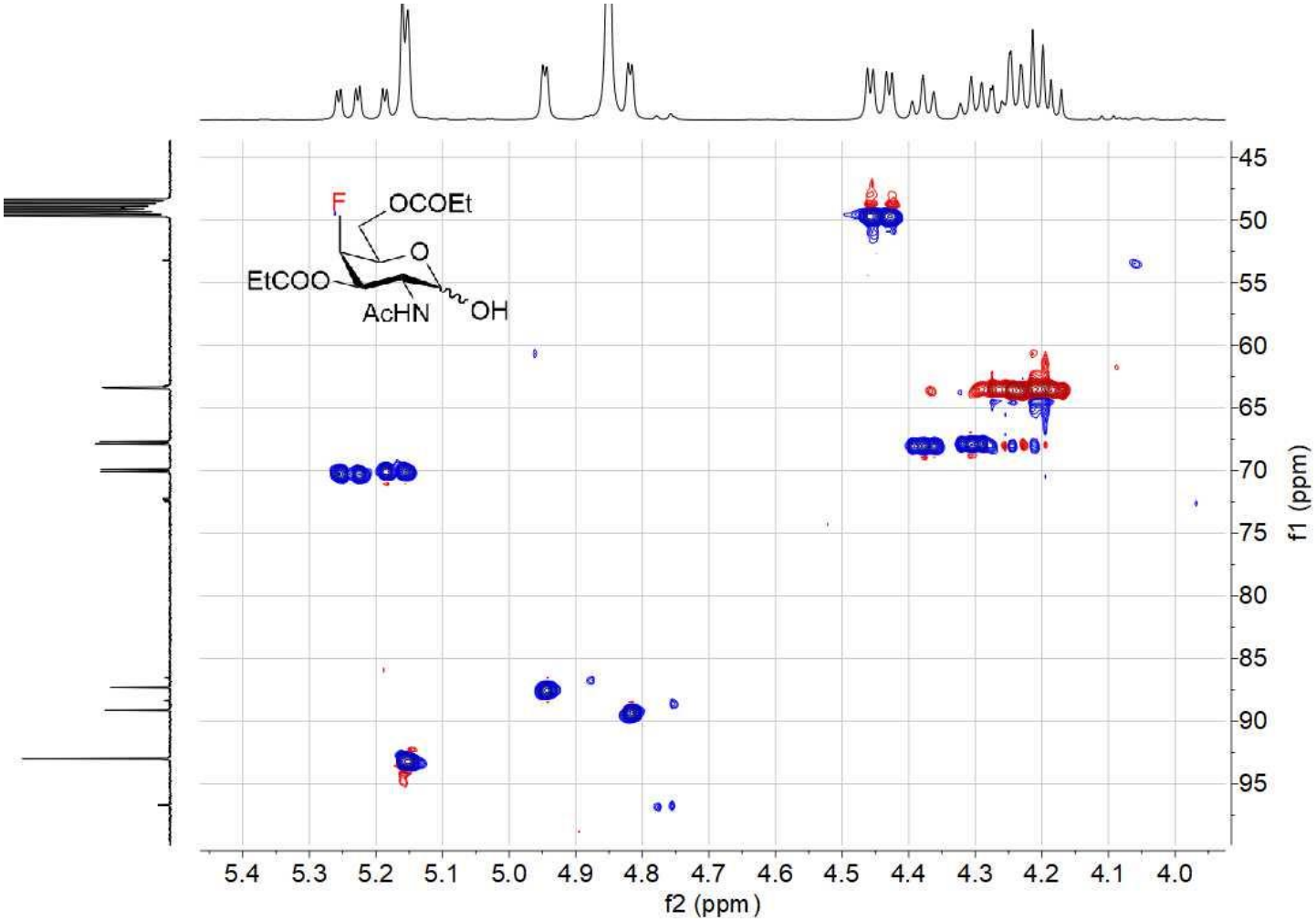
^{1}H-^{1}H COSY 27



^{1}H-^{13}C HMBC 27

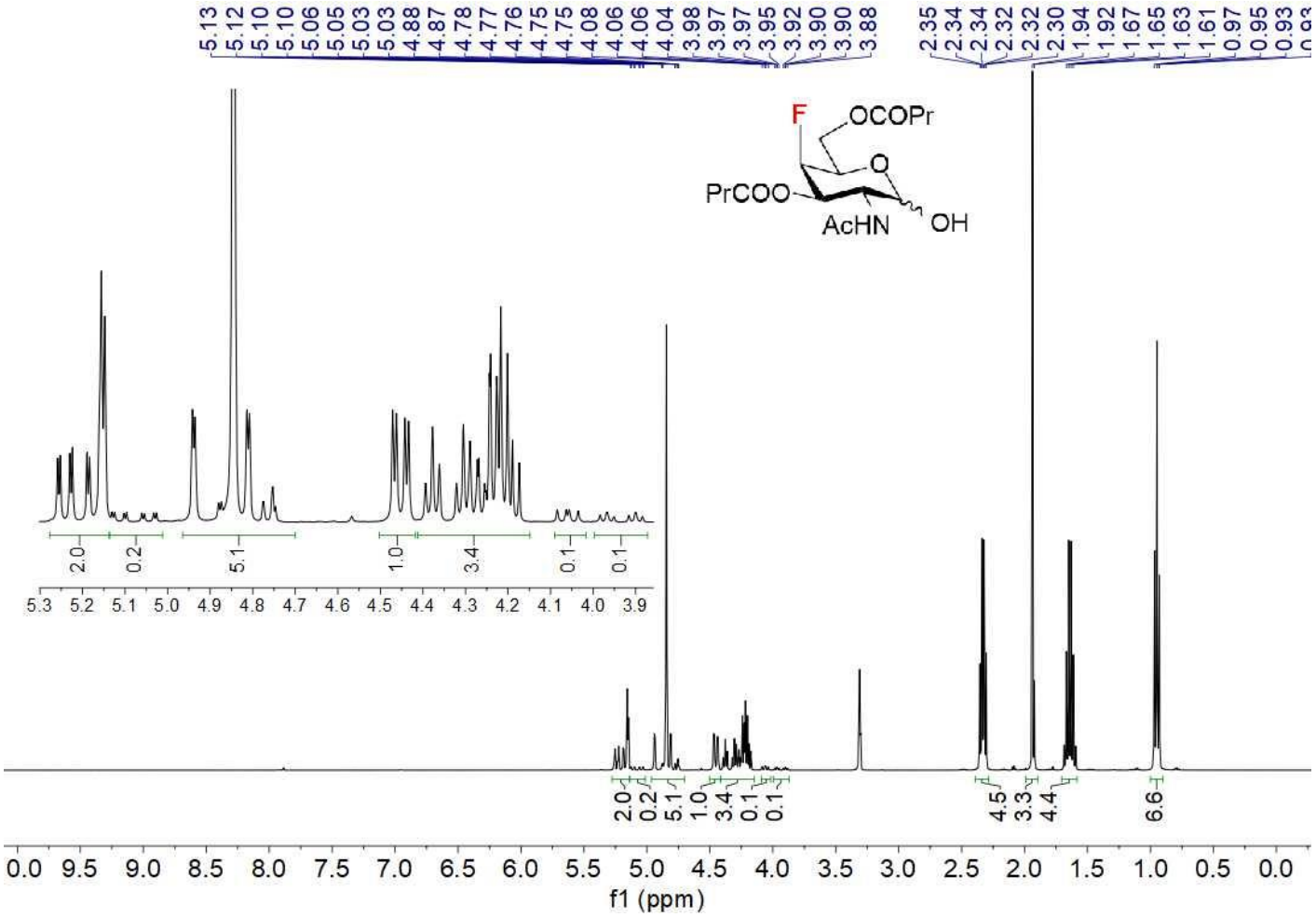


^{1}H-^{13}C HSQC 27

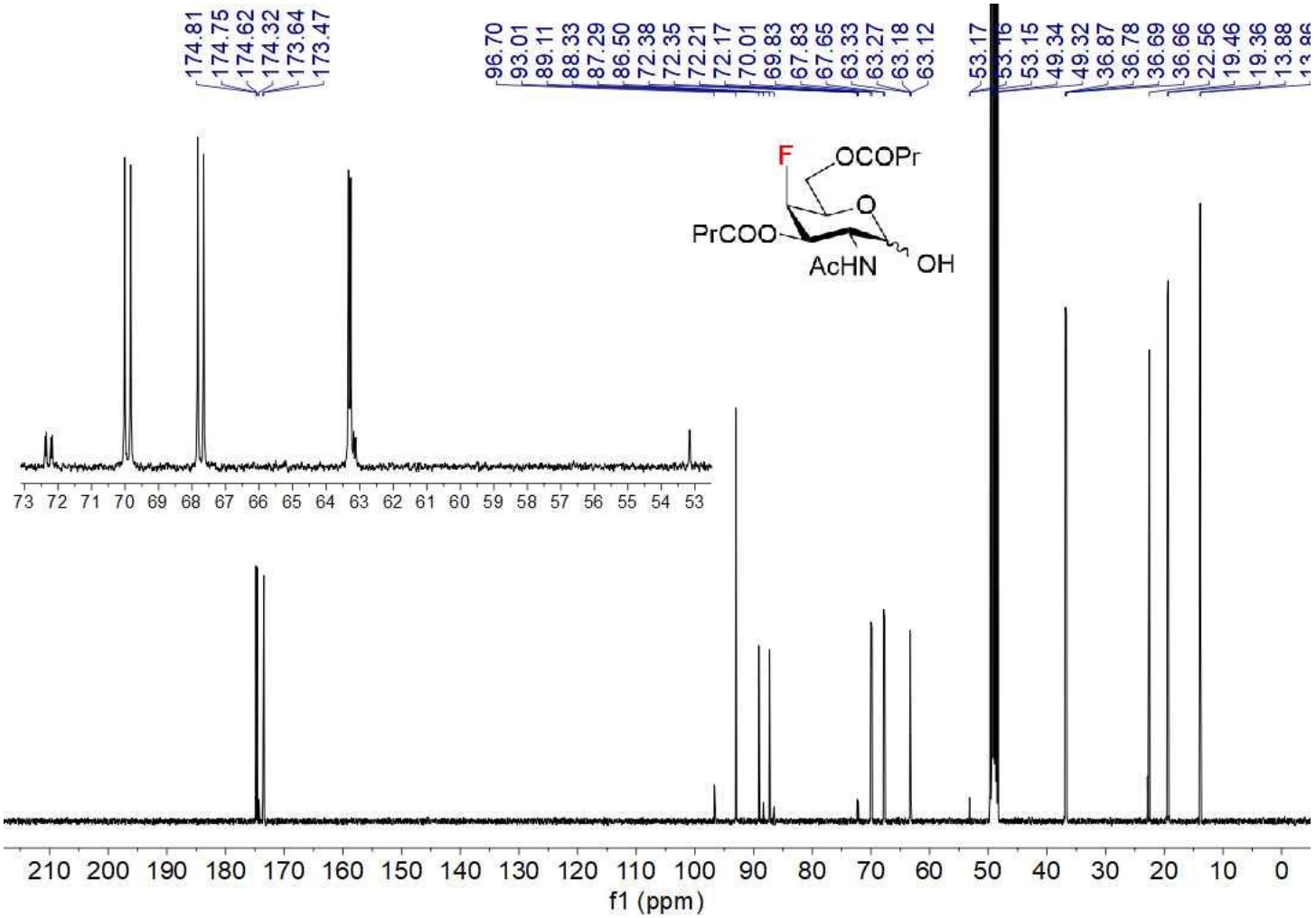


NMR COMPOUND 28

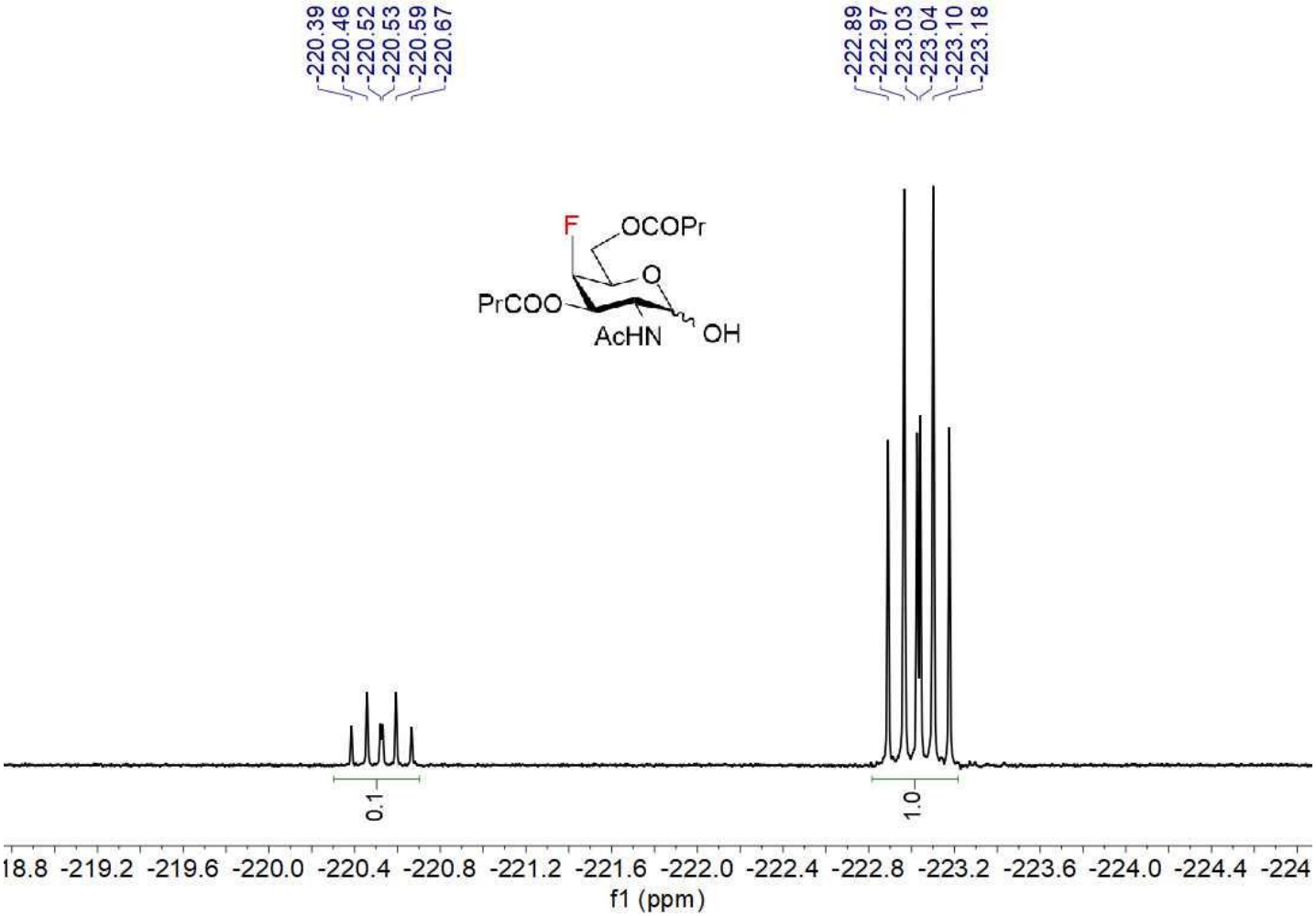
^{1}H NMR (400 MHz, CD_3OD) 28



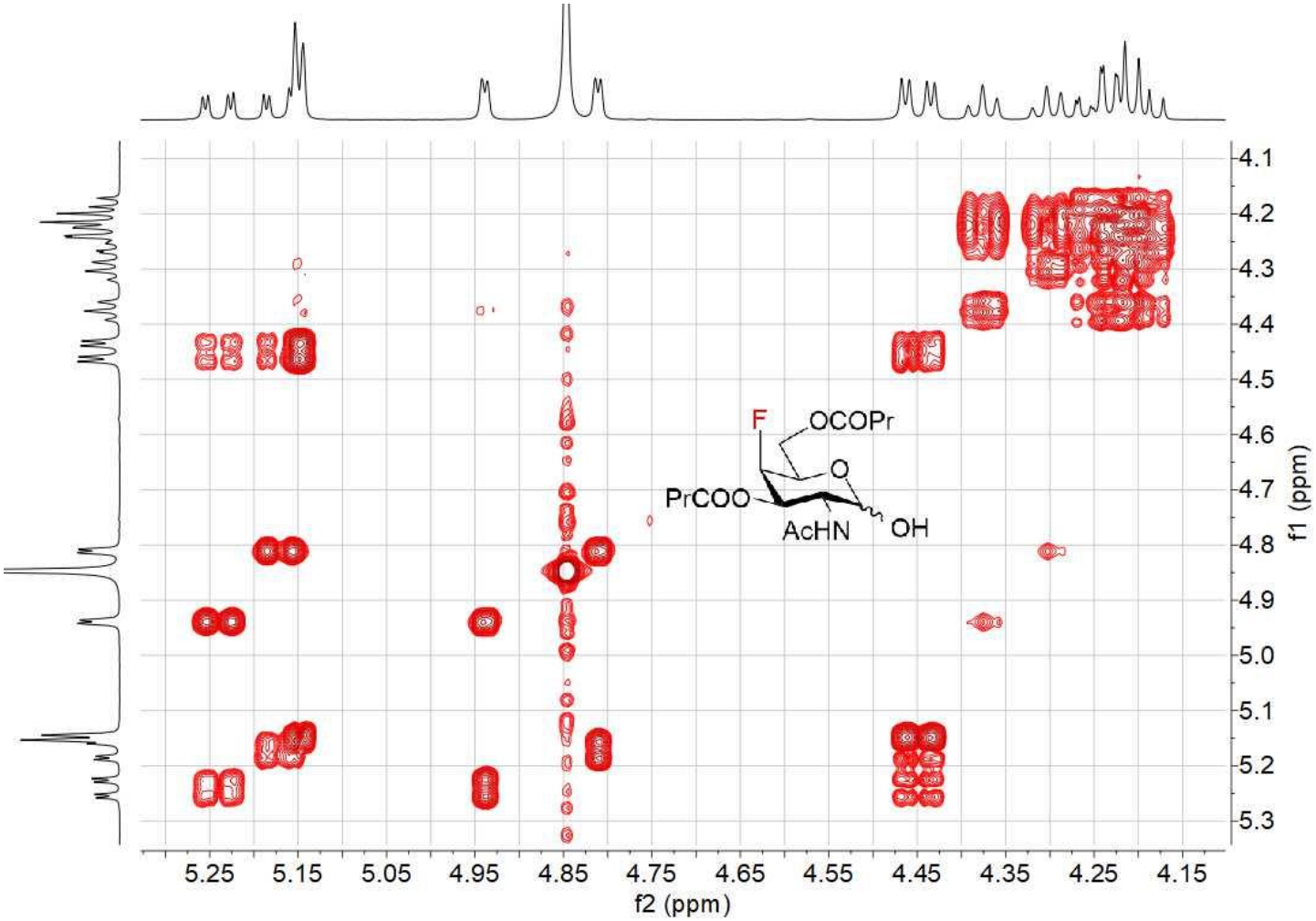
^{13}C NMR (100 MHz, CD_3OD) 28



^{19}F NMR (376 MHz, CD_3OD) 28



^{1}H-^{1}H COSY 28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PrCOO
AcHN
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f1 (ppm)
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5.05
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4.35
4.25
4.15
4.1
4.2
4.3
4.4
4.5
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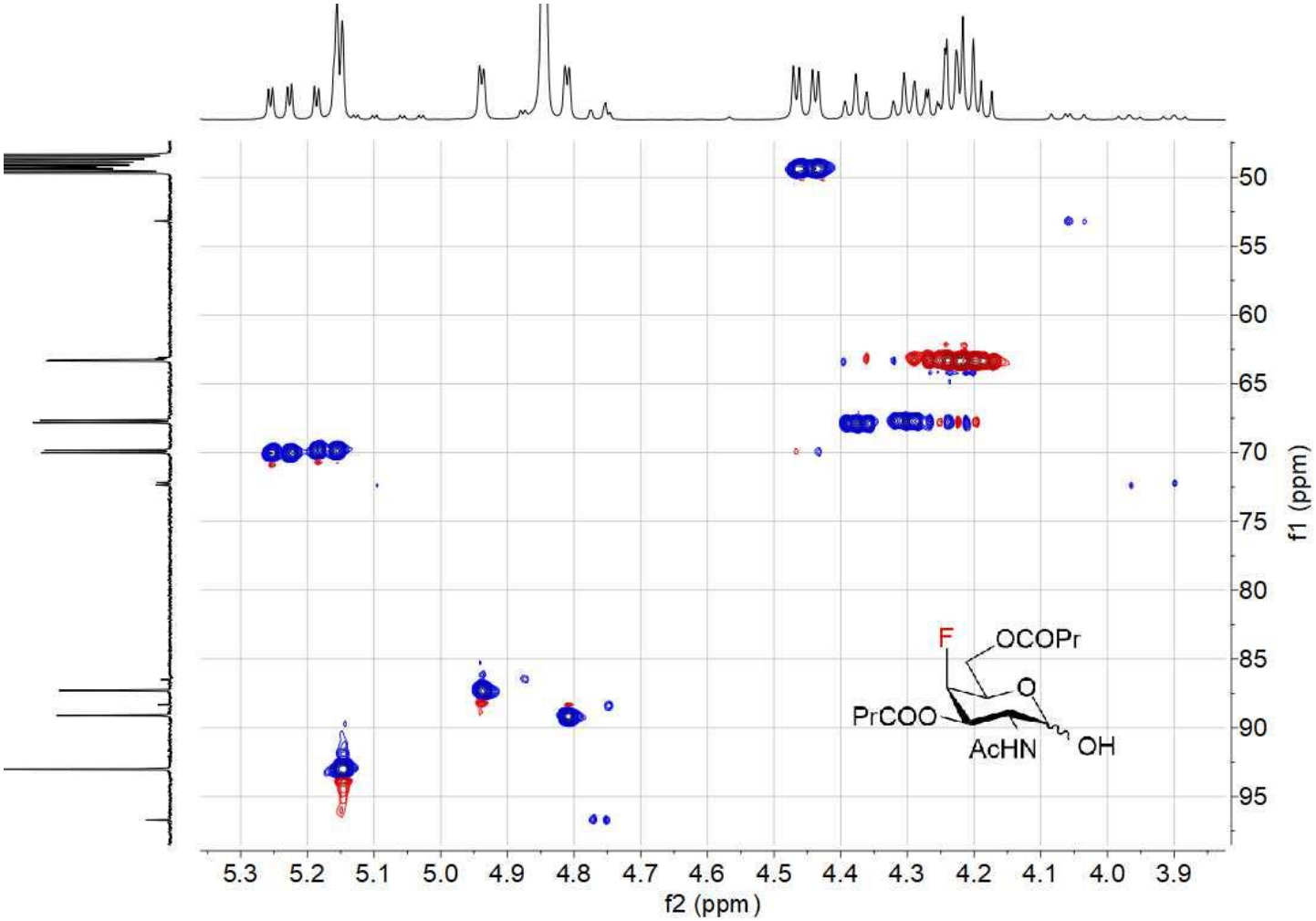
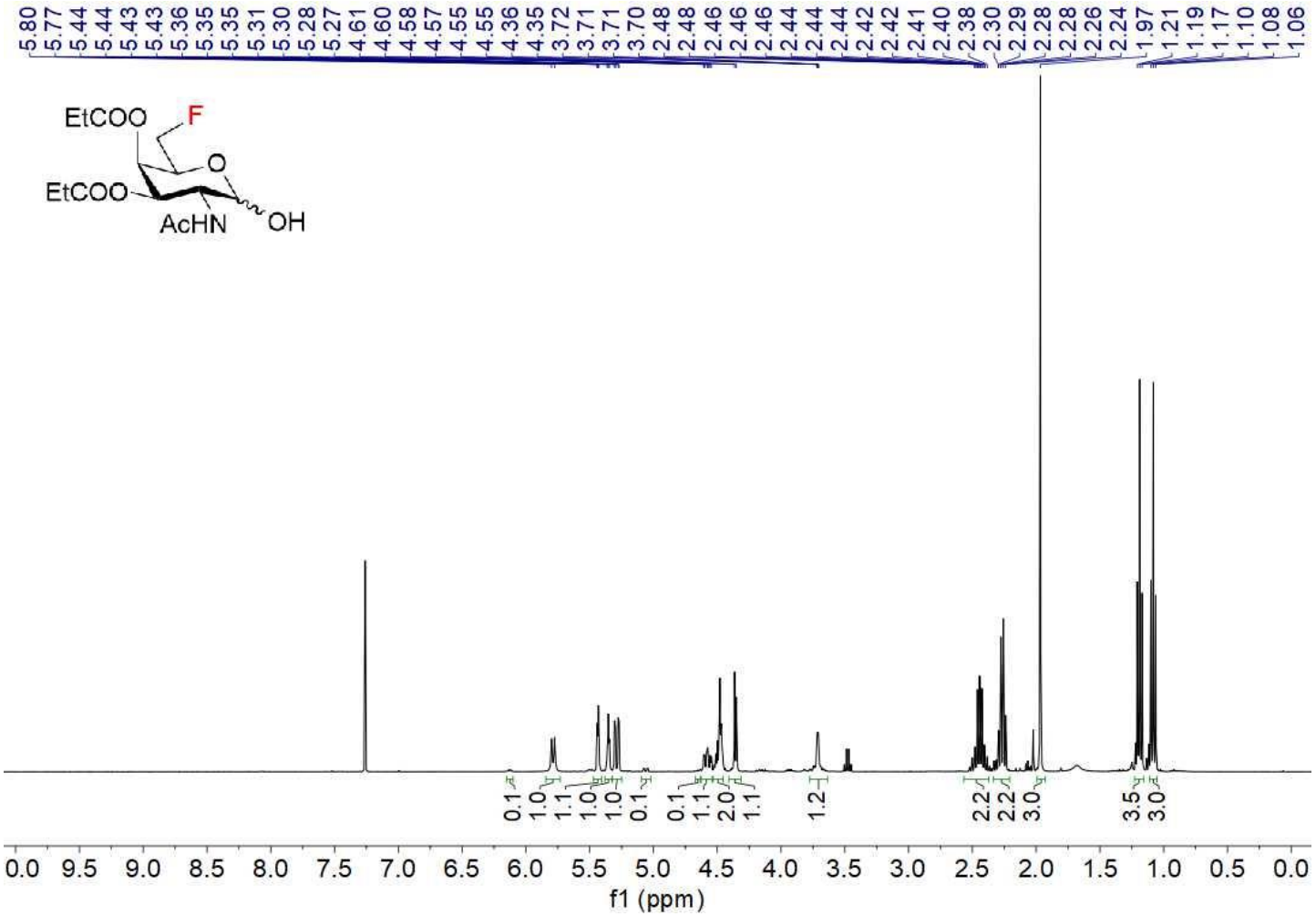
4.8
4.9
5.0
5.1
5.2
5.3

^{1}H-^{13}C HSQC 28

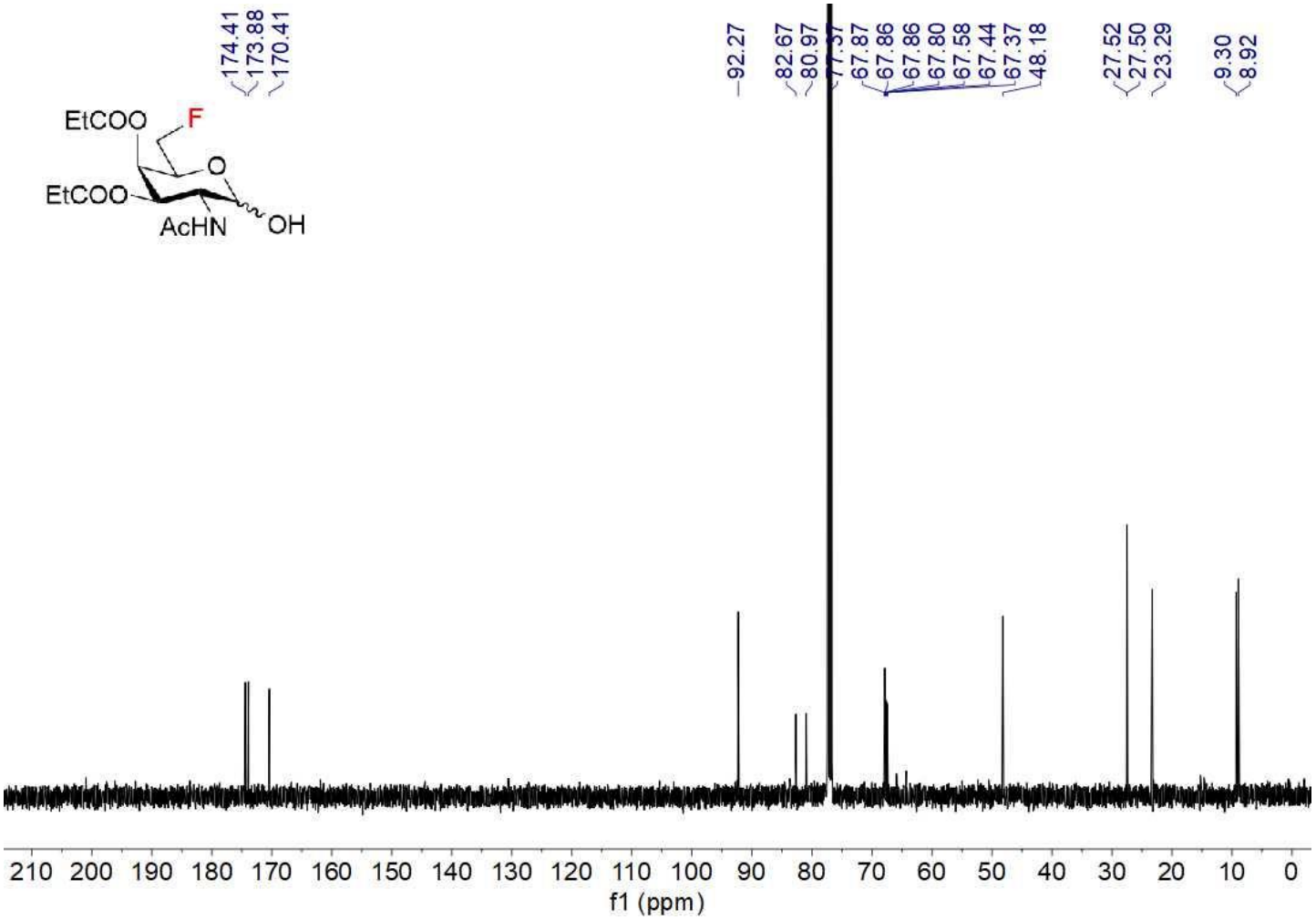


NMR COMPOUND 29

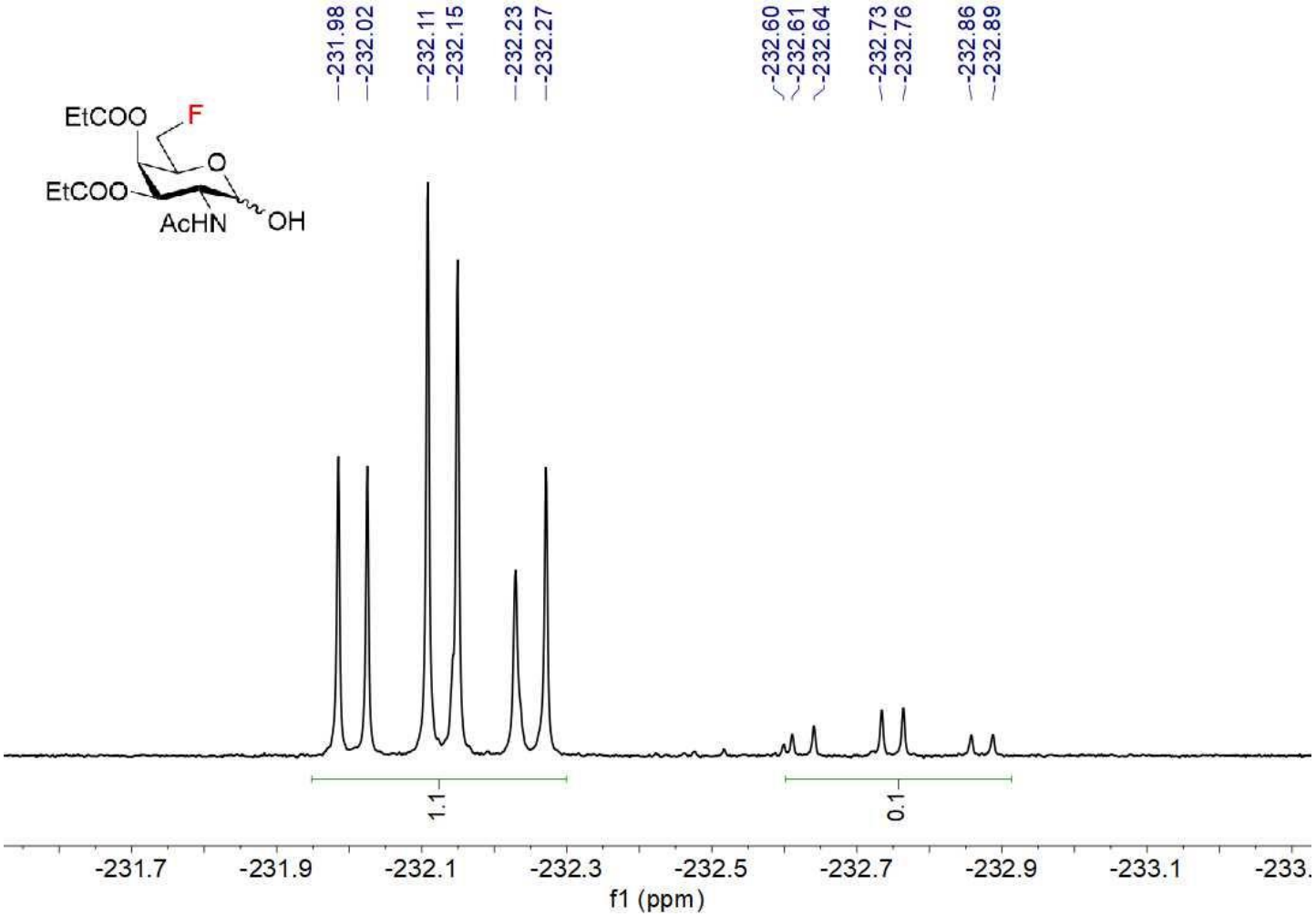
^{1}H NMR (400 MHz, $CDCl_3$) 29



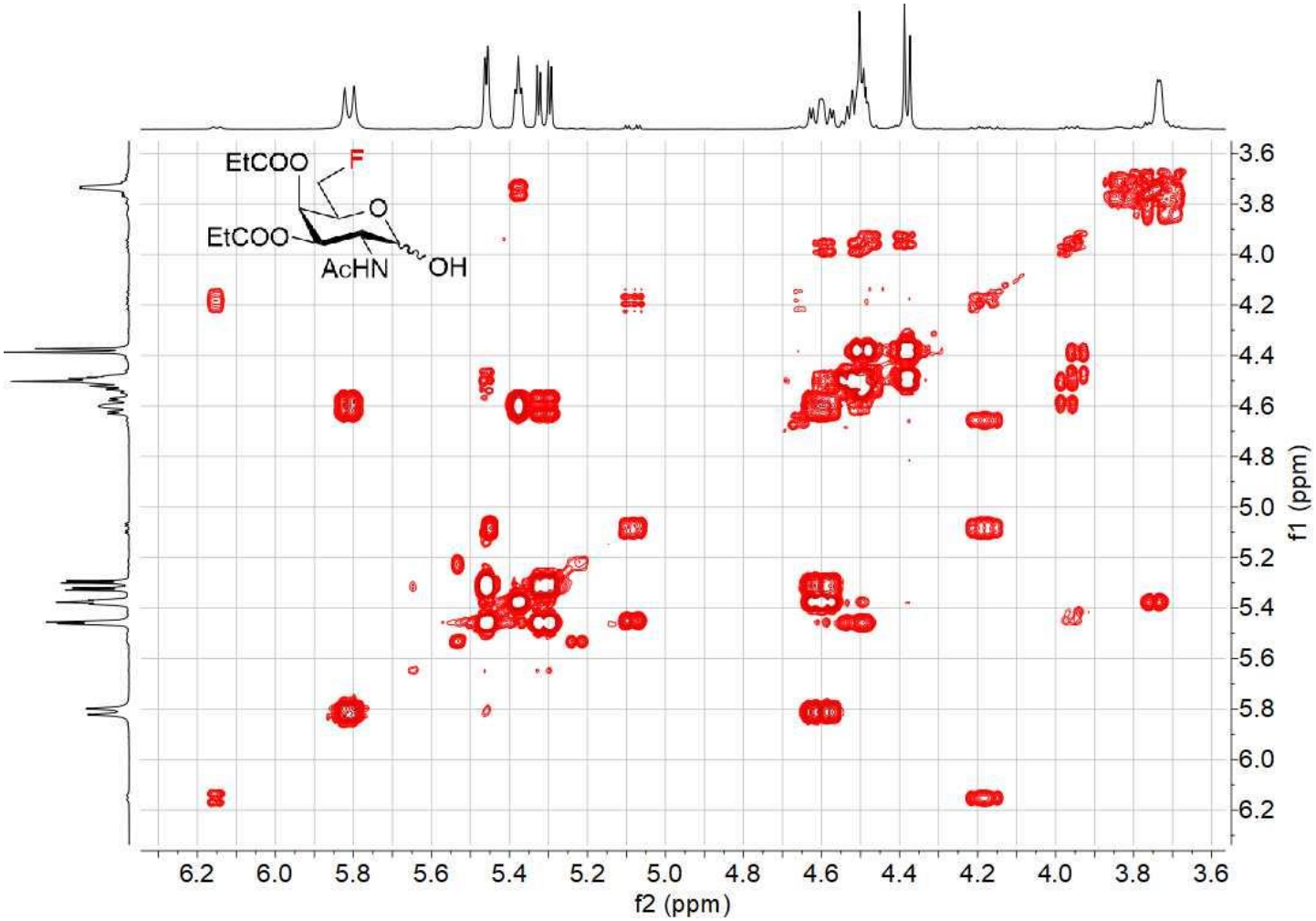
^{13}C NMR (100 MHz, $CDCl_3$) 29



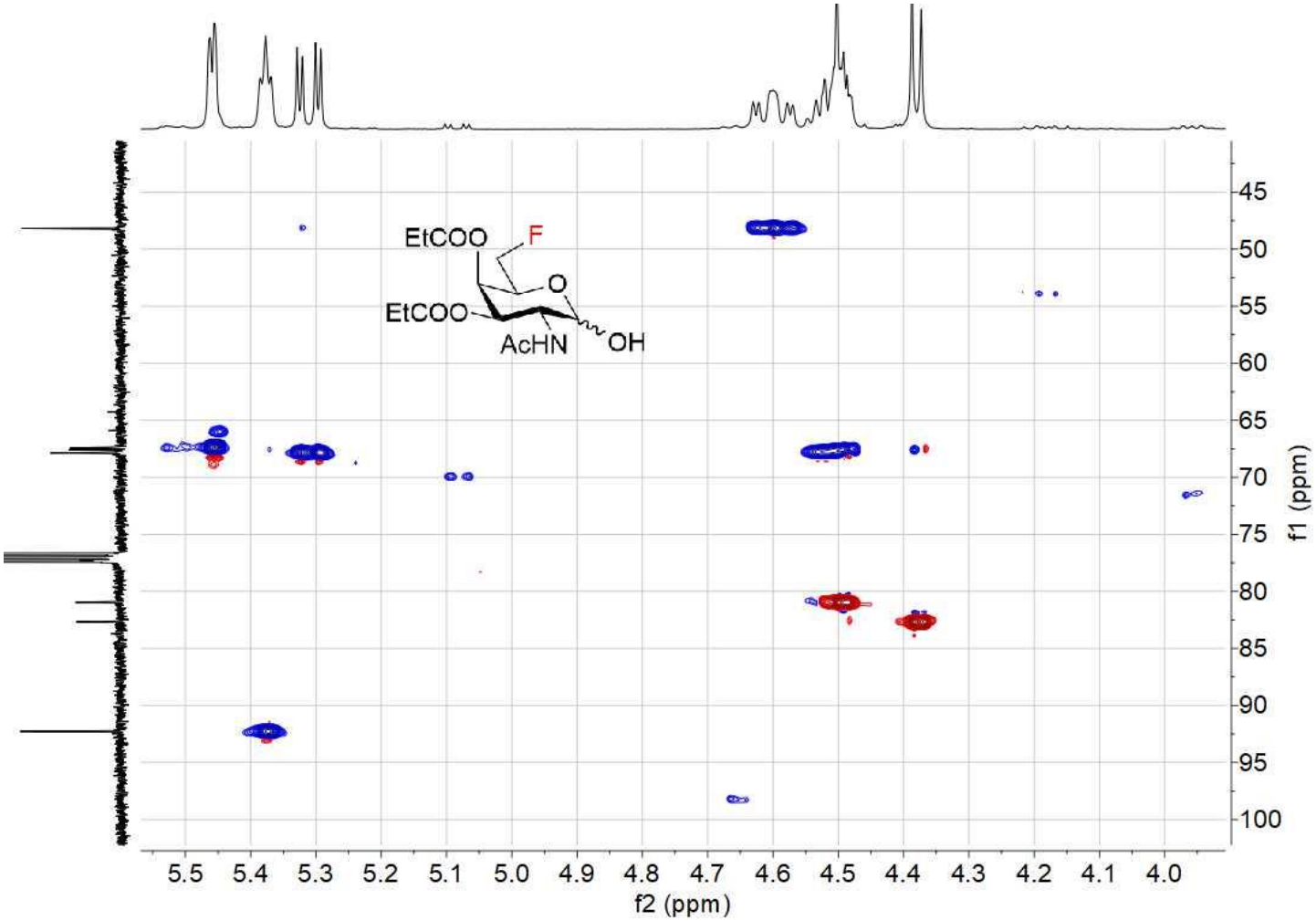
^{19}F NMR (376 MHz, $CDCl_3$) 29



^{1}H-^{1}H COSY 29

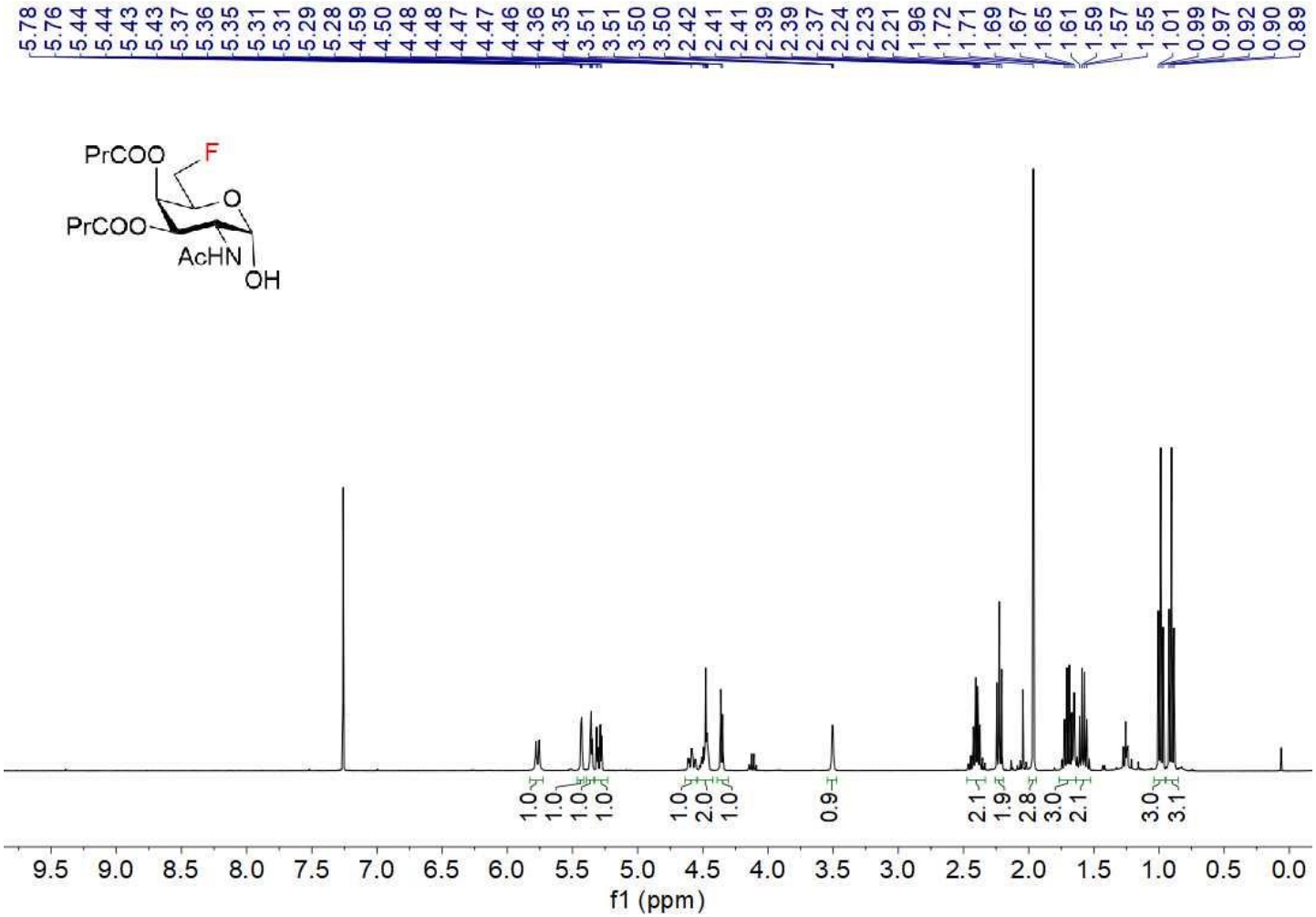


^{1}H-^{13}C HSQC 29

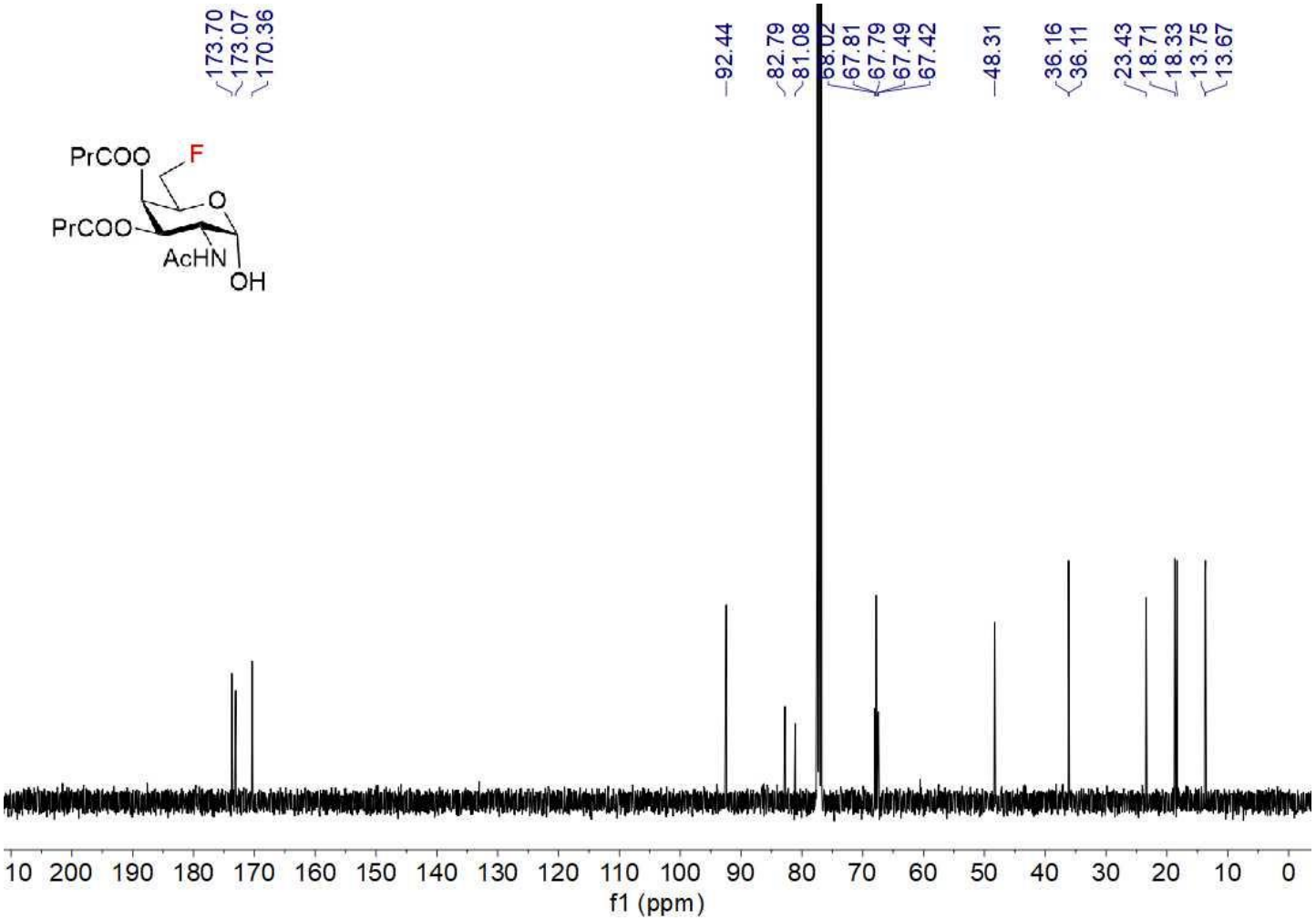


NMR COMPOUND 30

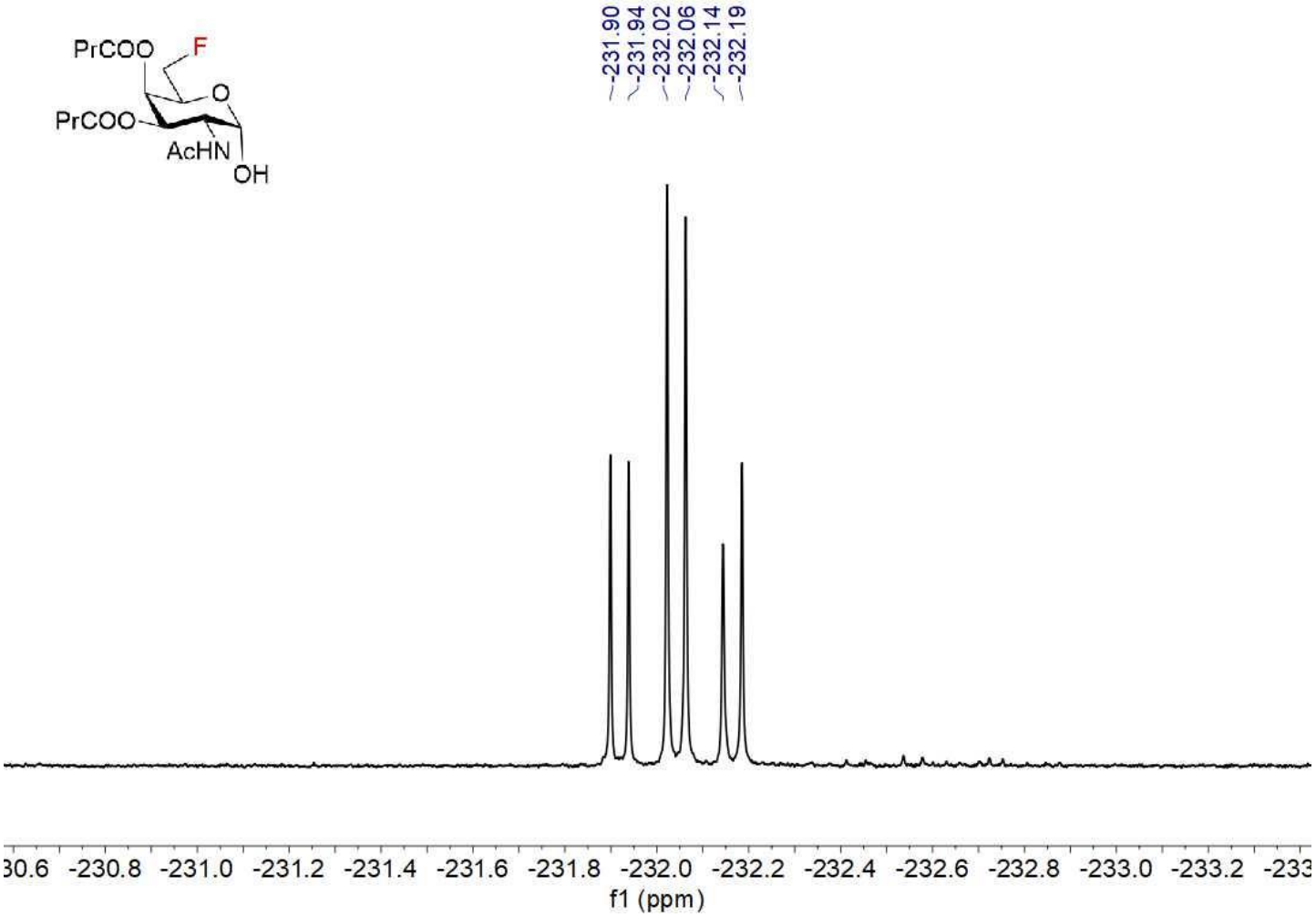
^{1}H NMR (400 MHz, $CDCl_3$) 30



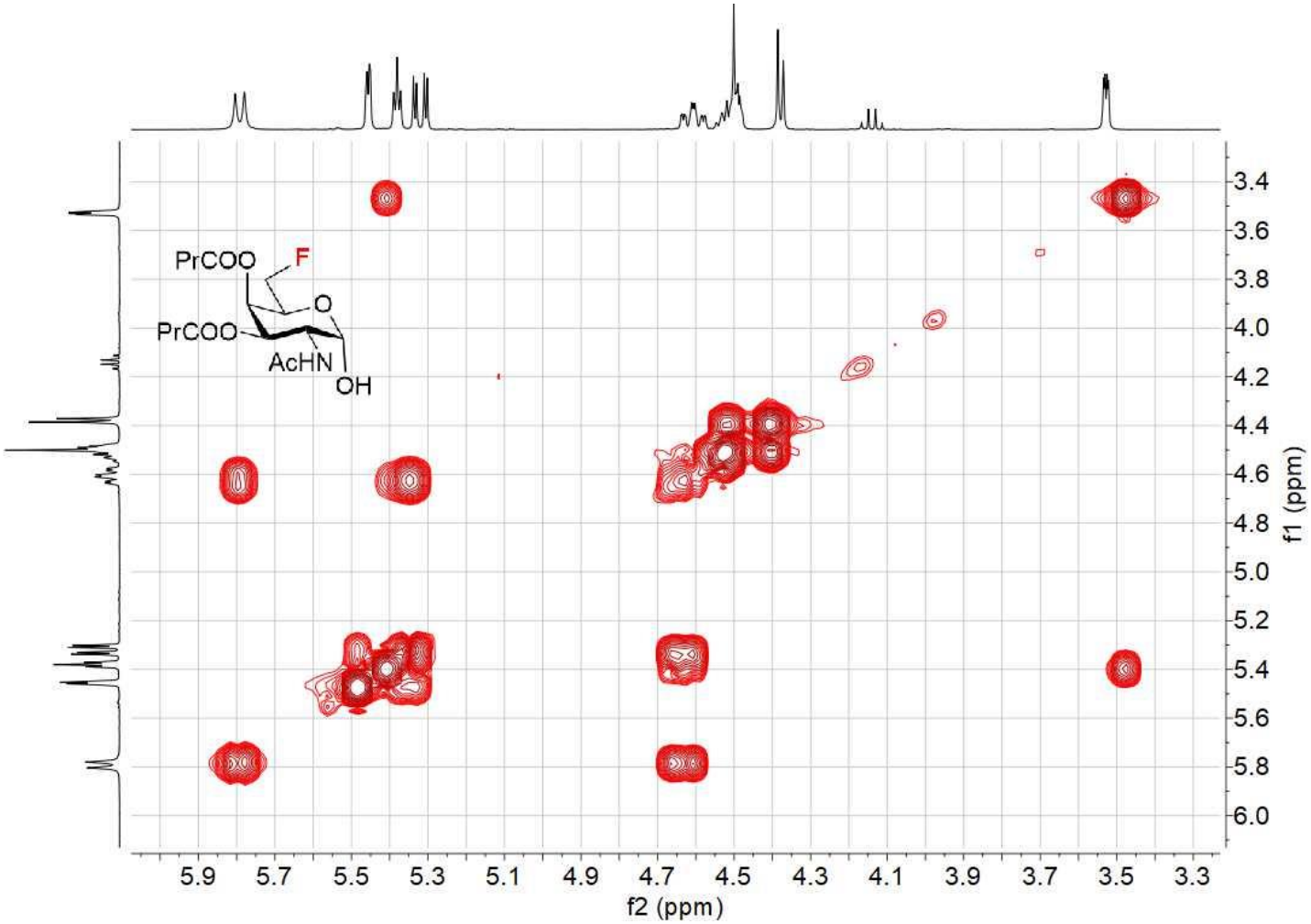
^{13}C NMR (100 MHz, $CDCl_3$) 30



^{19}F NMR (376 MHz, $CDCl_3$) 30

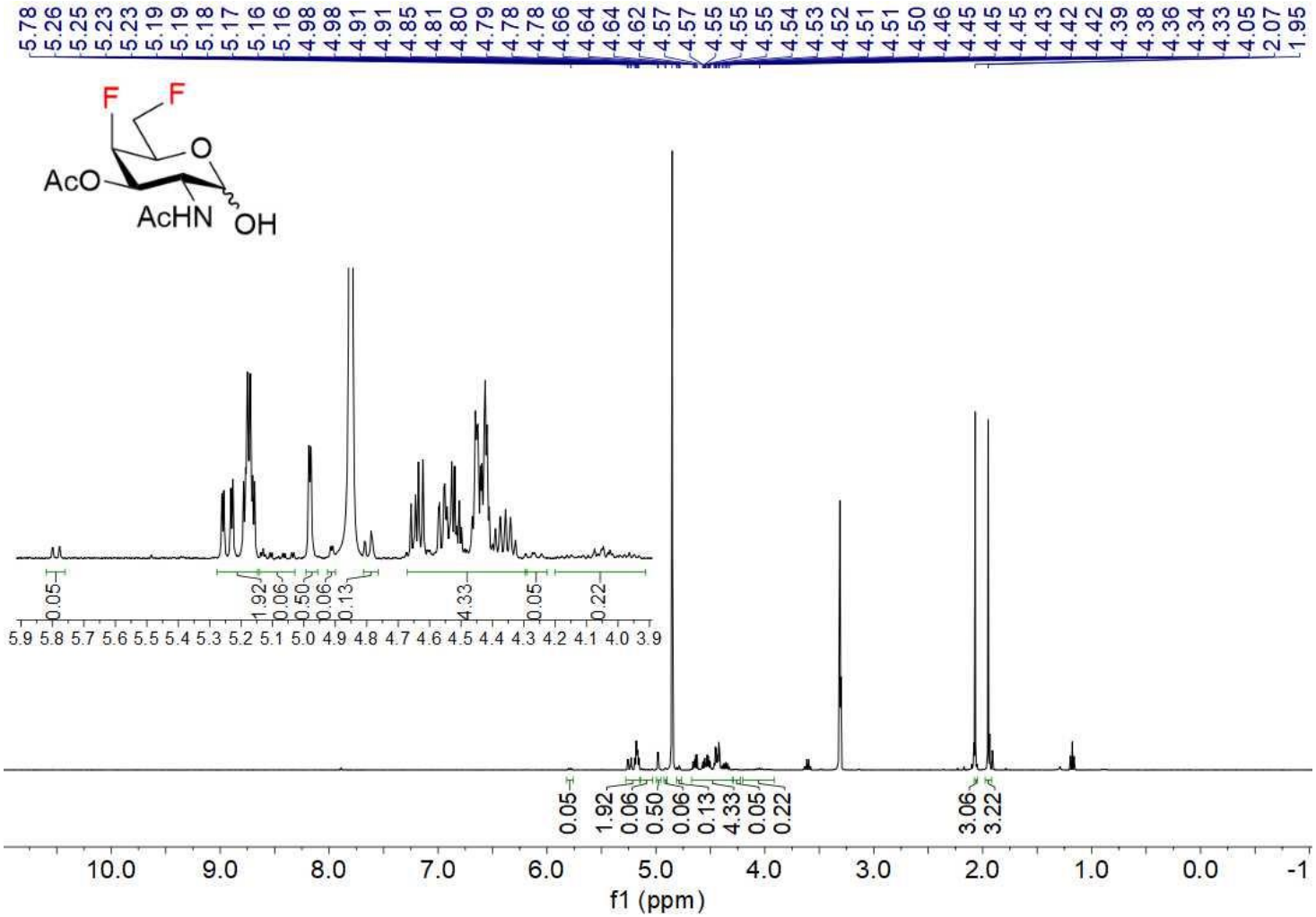


^{1}H-^{1}H COSY 30

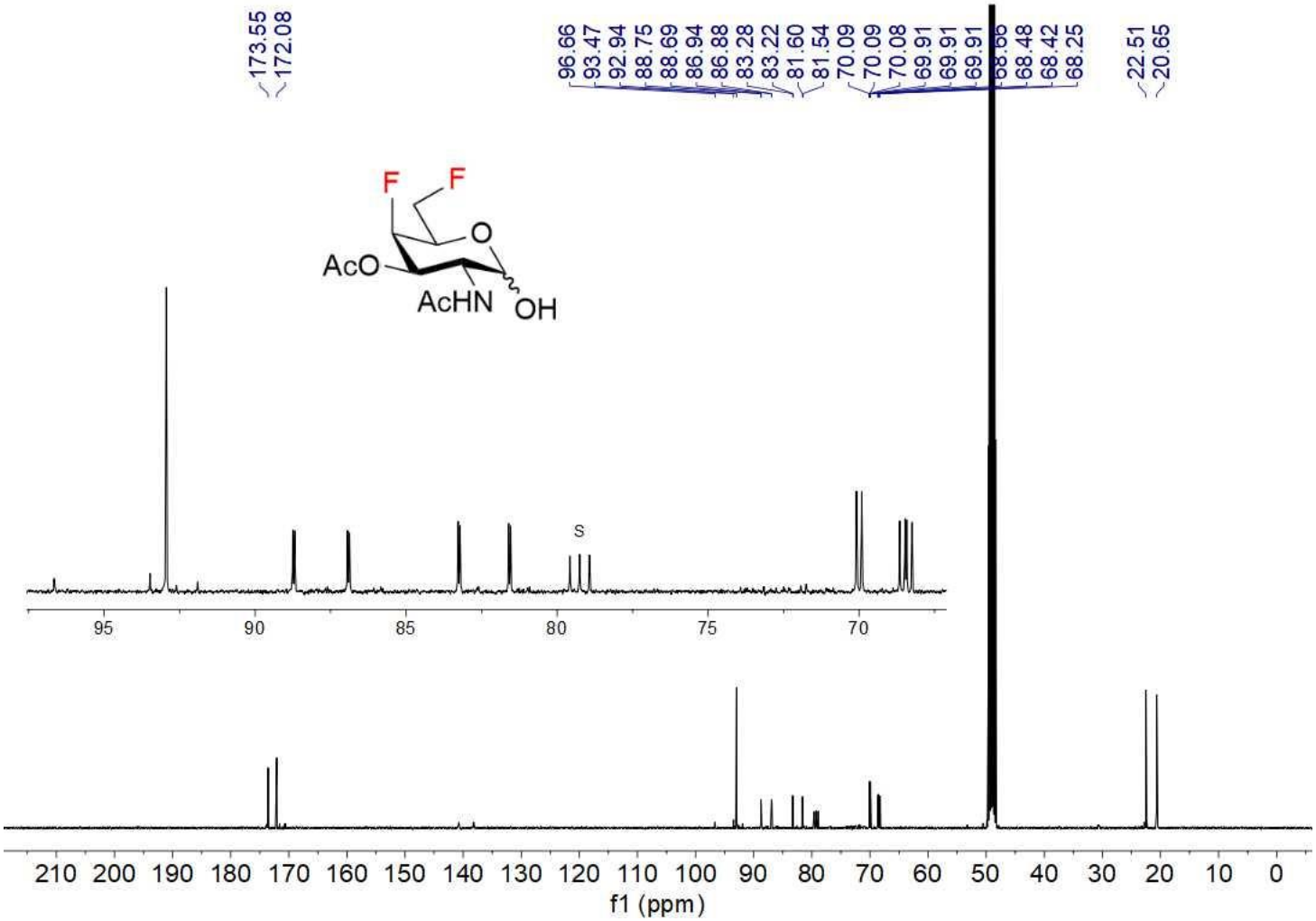


NMR COMPOUND 31

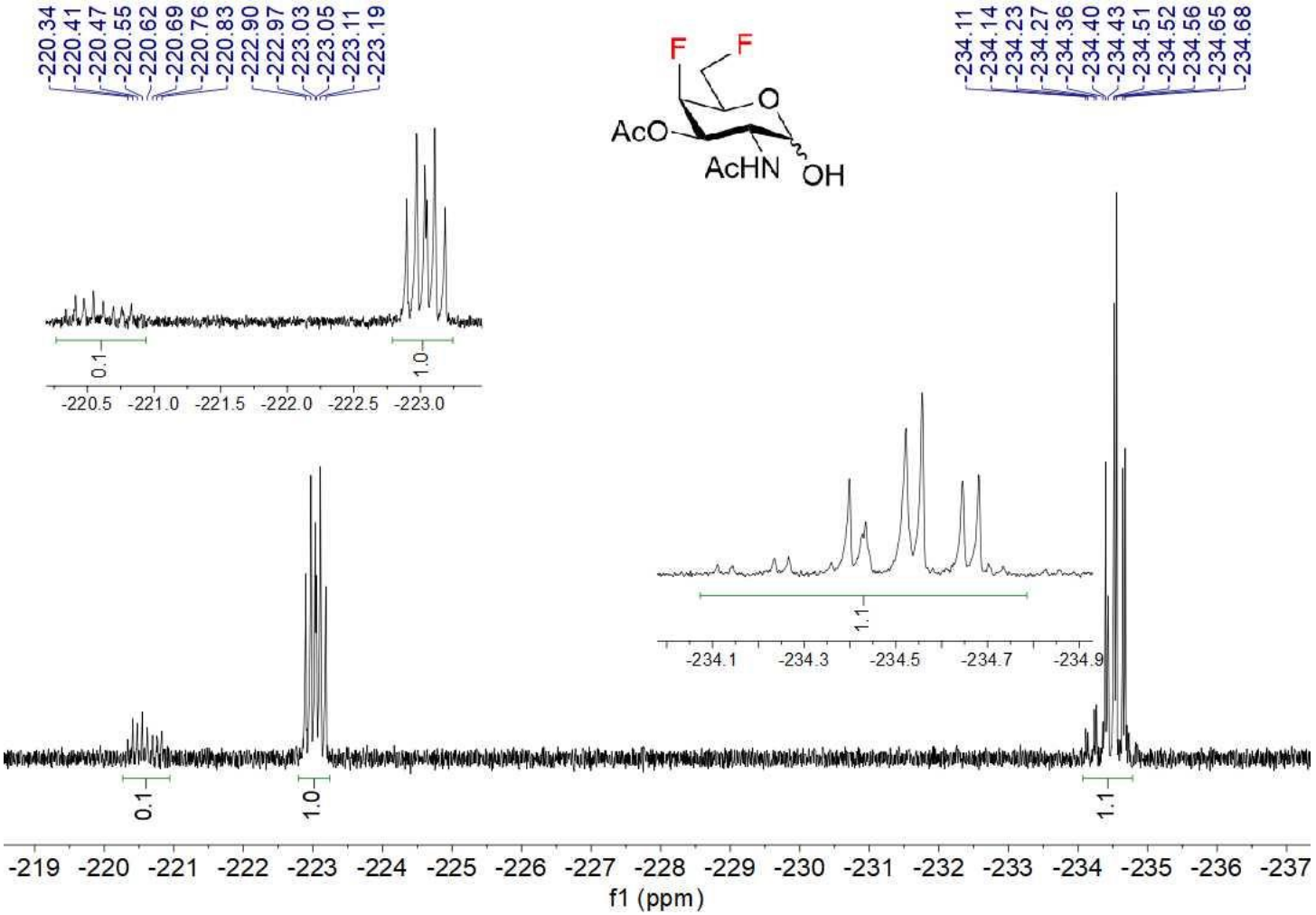
^{1}H NMR (400 MHz, CD_3OD) 31



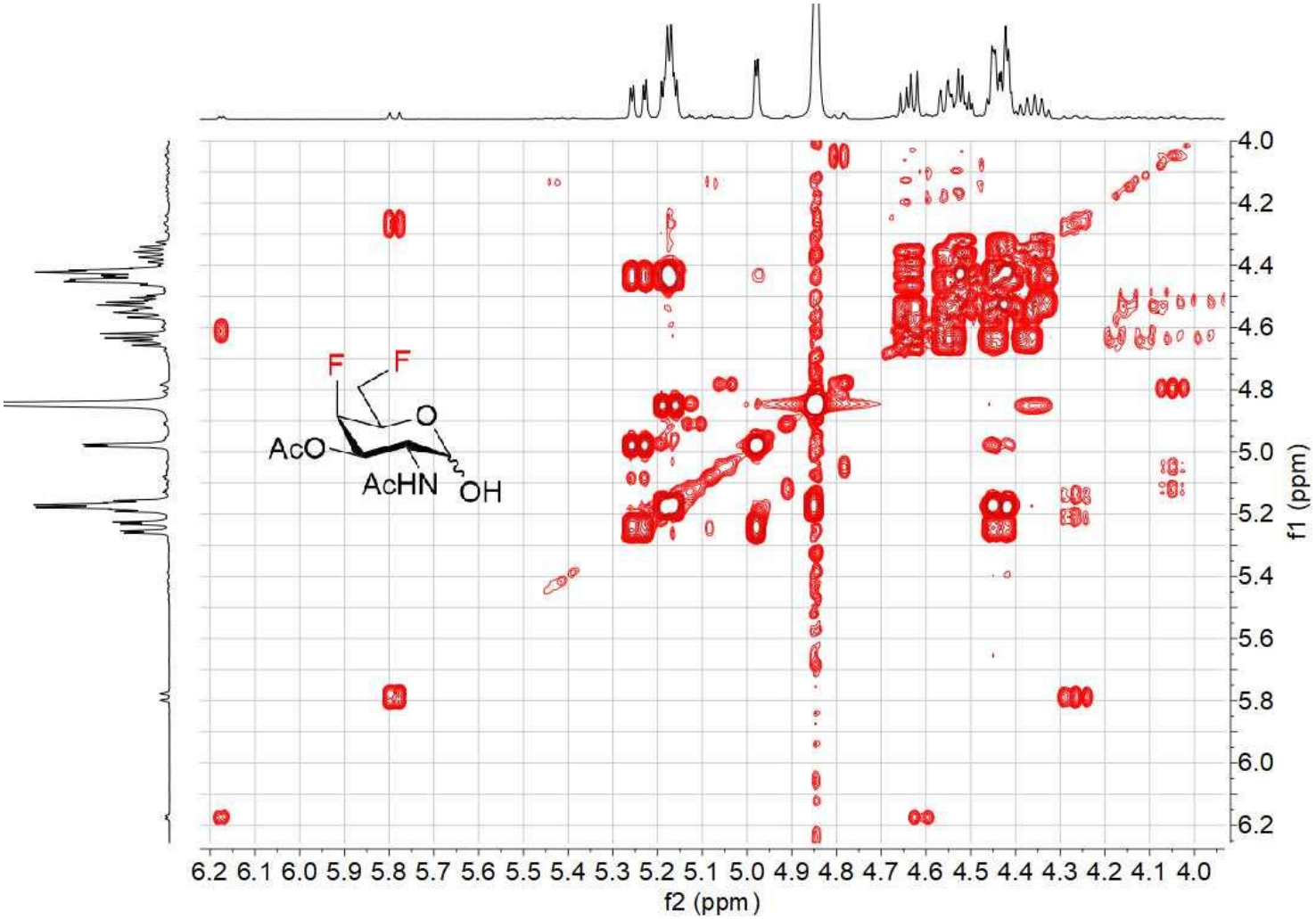
^{13}C NMR (100 MHz, CD_3OD) 31



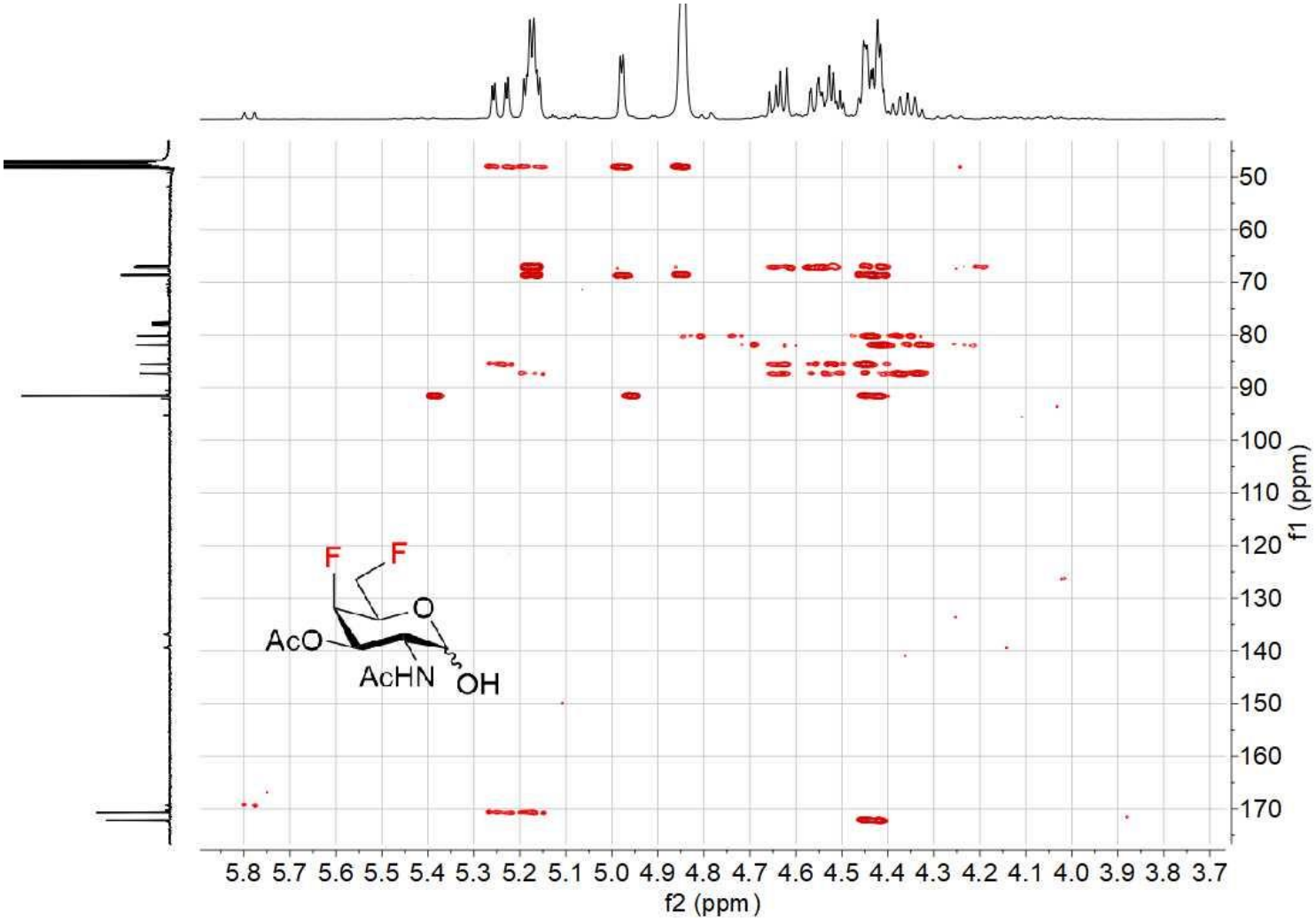
^{19}F NMR (376 MHz, CD_3OD) 31



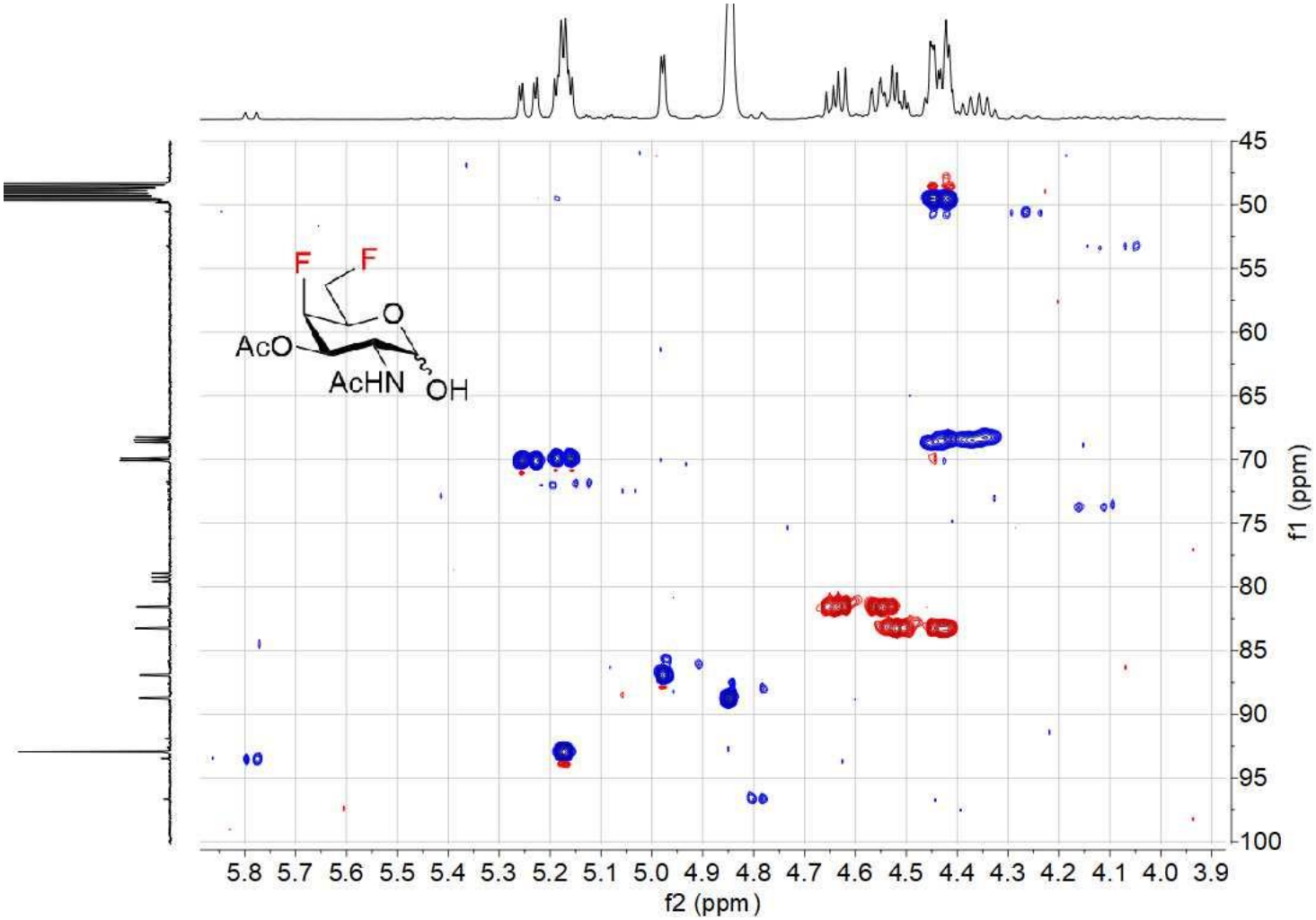
^{1}H-^{1}H COSY 31


F
F
O
AcO
AcHN
OH
f2 (ppm)
f1 (ppm)
6.2 6.1 6.0 5.9 5.8 5.7 5.6 5.5 5.4 5.3 5.2 5.1 5.0 4.9 4.8 4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0
4.0 4.2 4.4 4.6 4.8 5.0 5.2 5.4 5.6 5.8 6.0 6.2

^{1}H-^{13}C HMBC 31

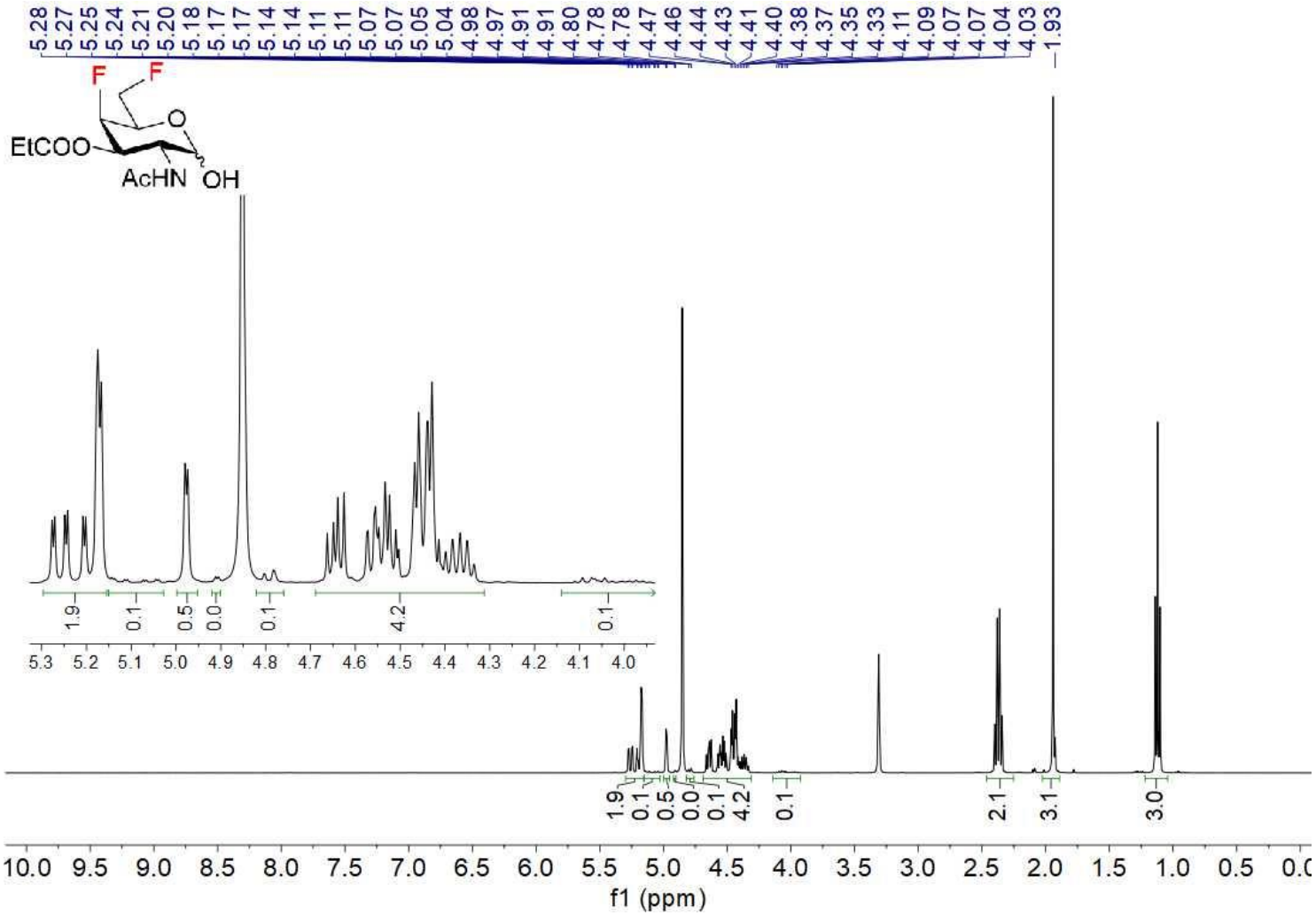


^{1}H-^{13}C HSQC 31

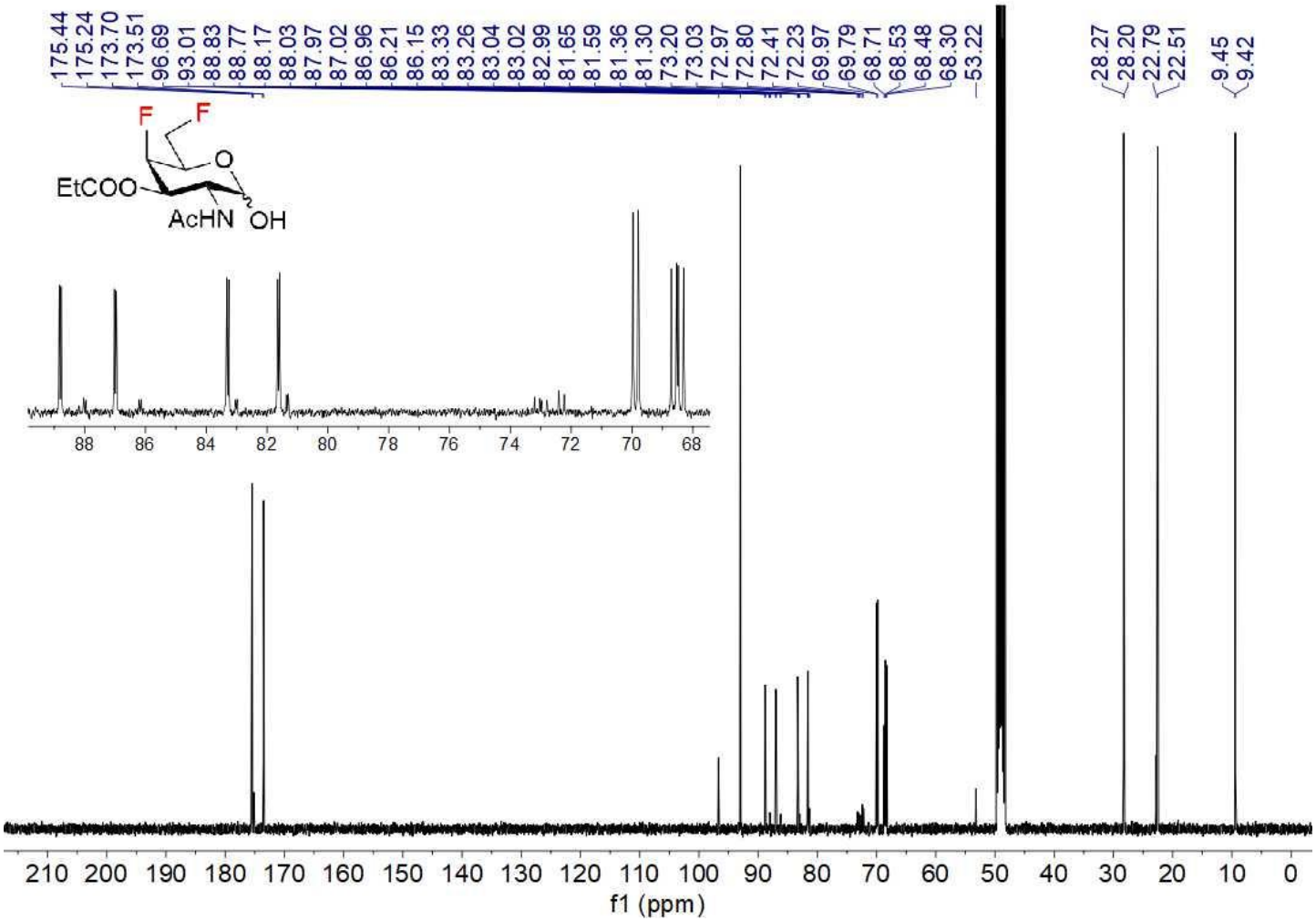


NMR COMPOUND 32

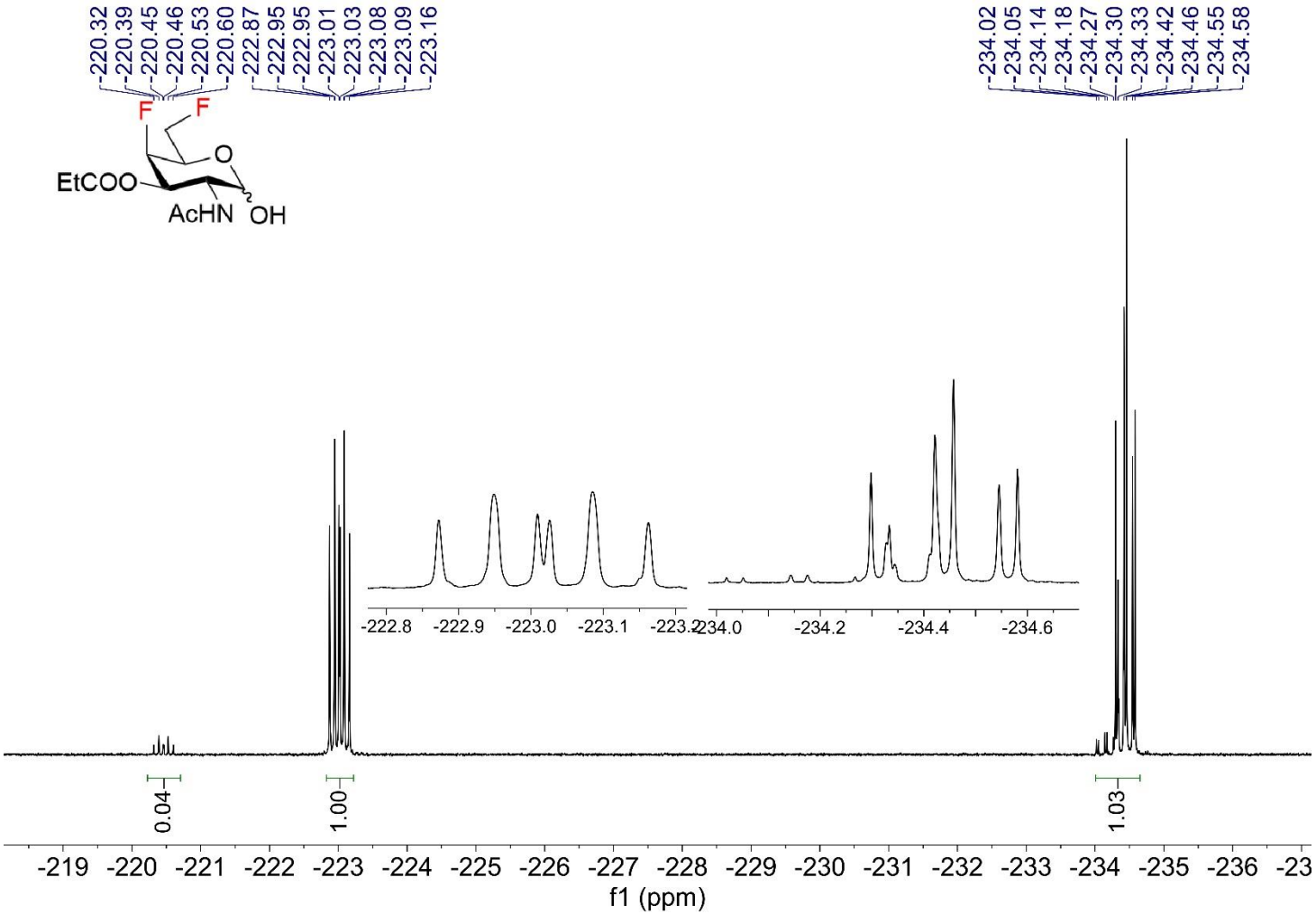
^{1}H NMR (400 MHz, CD_3OD) 32



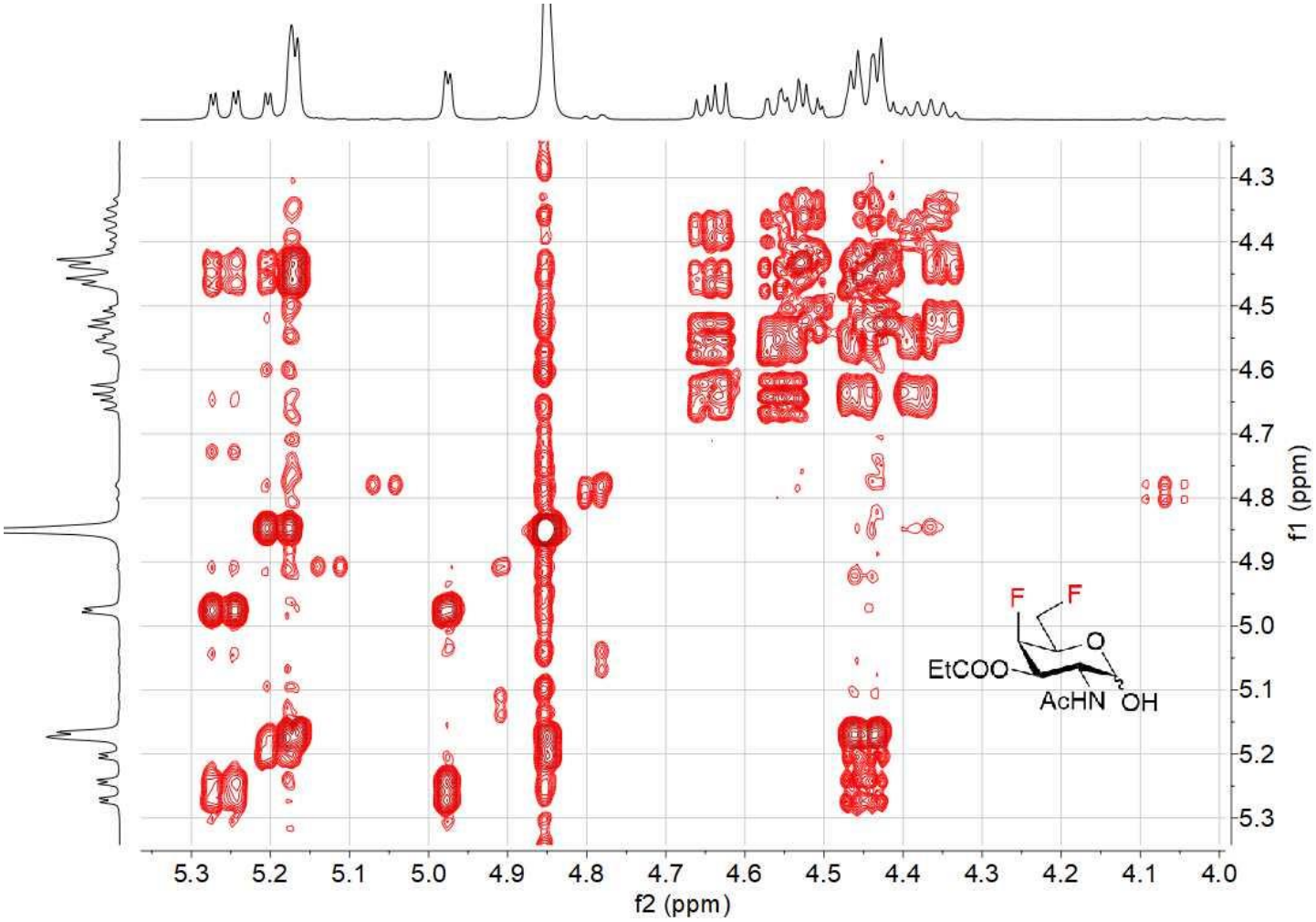
^{13}C NMR (100 MHz, CD_3OD) 32



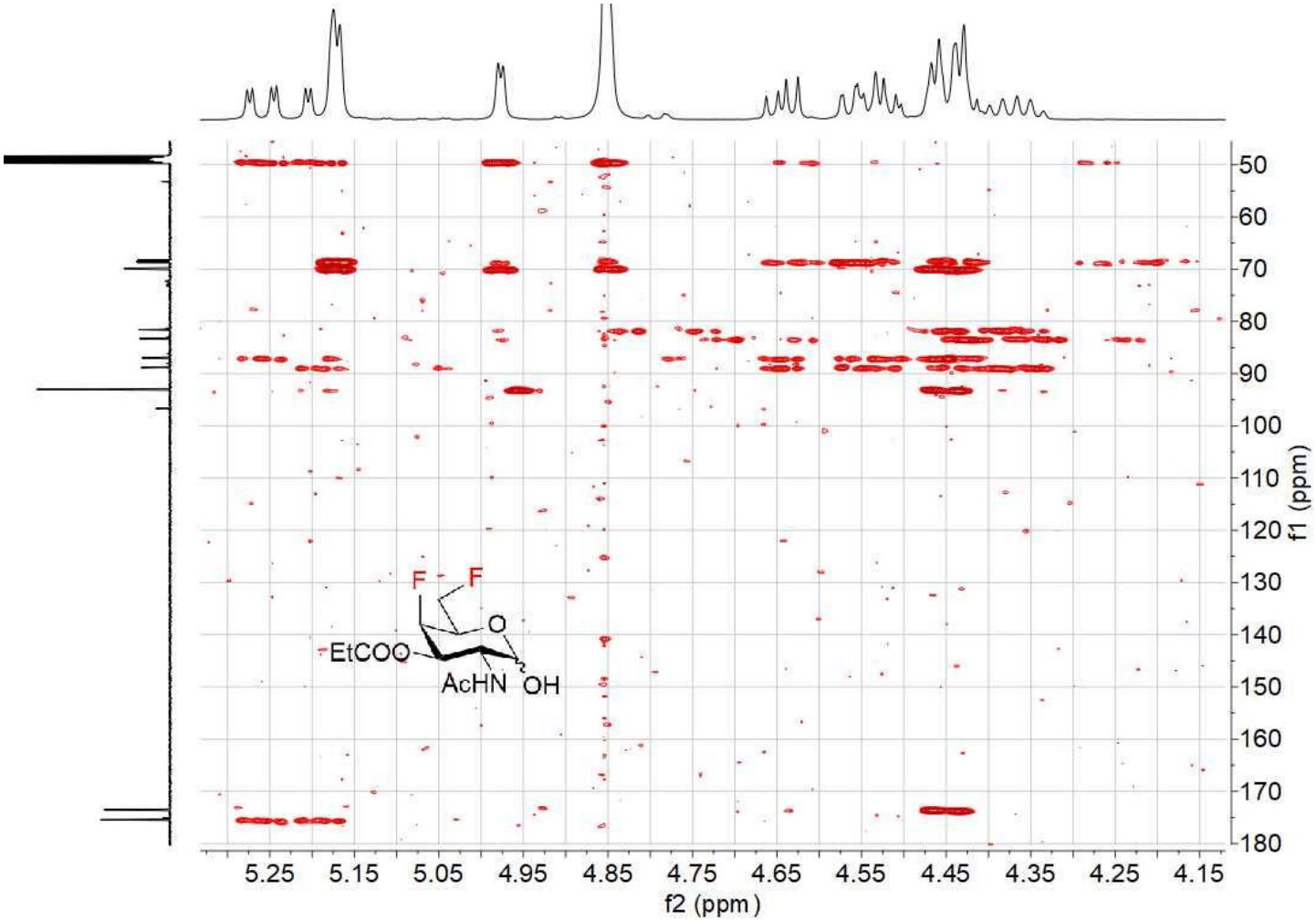
^{19}F NMR (376 MHz, CD_3OD) 32



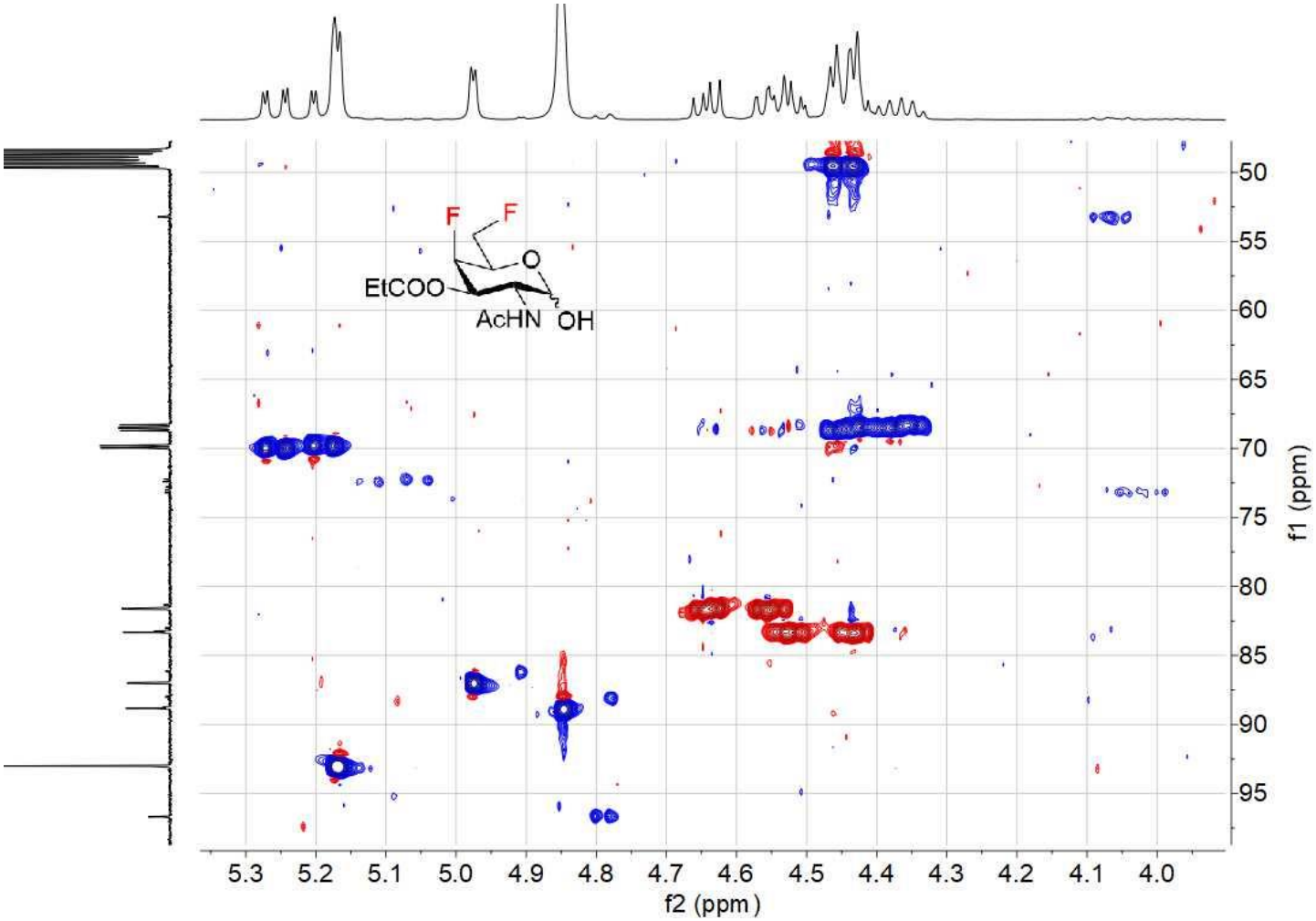
^{1}H-^{1}H COSY 32


f2 (ppm)
f1 (ppm)
5.3
5.2
5.1
5.0
4.9
4.8
4.7
4.6
4.5
4.4
4.3
4.2
4.1
4.0
F
F
O
EtCOO
AcHN
OH

^{1}H-^{13}C HMBC 32

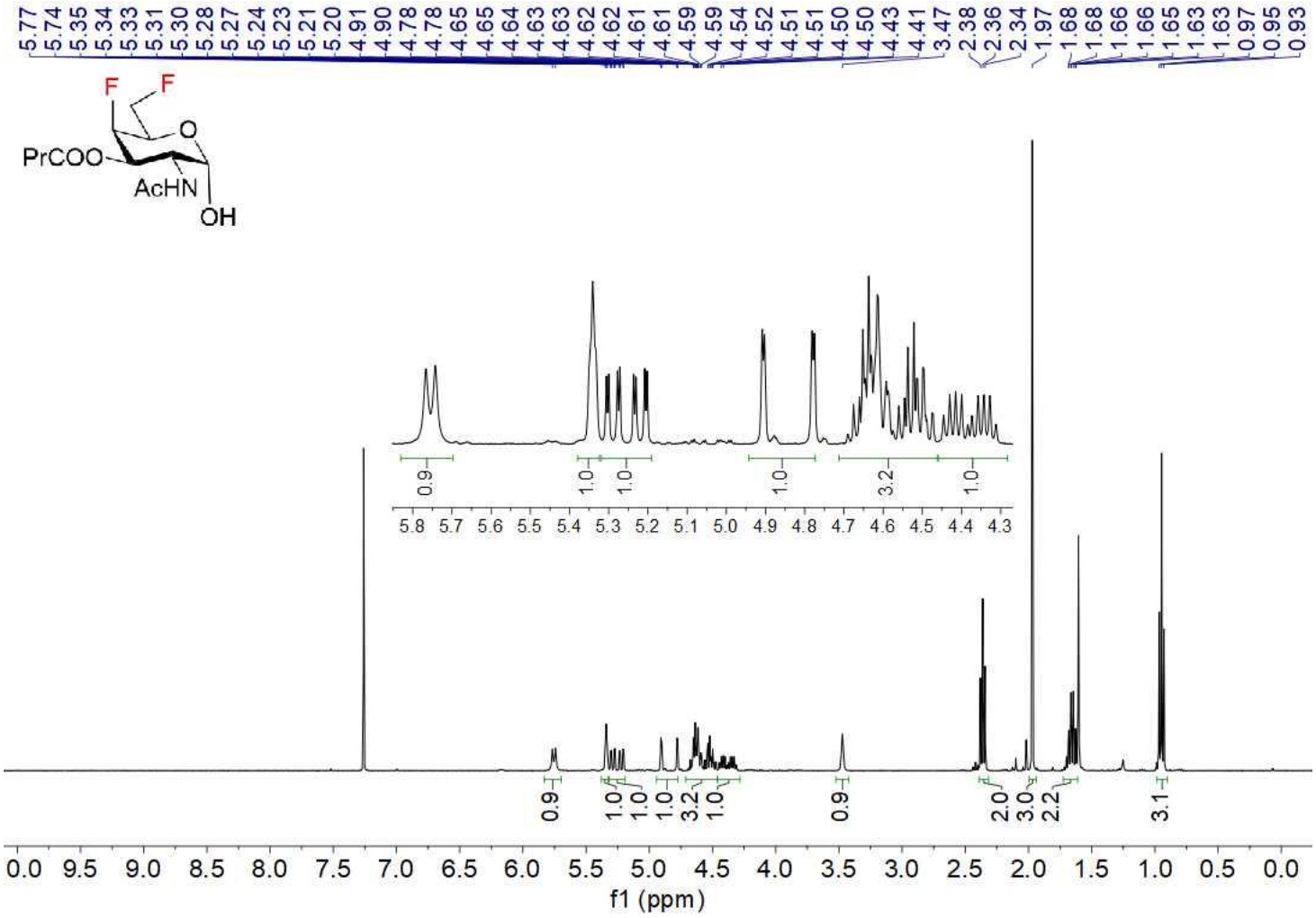


^{1}H-^{13}C HSQC 32

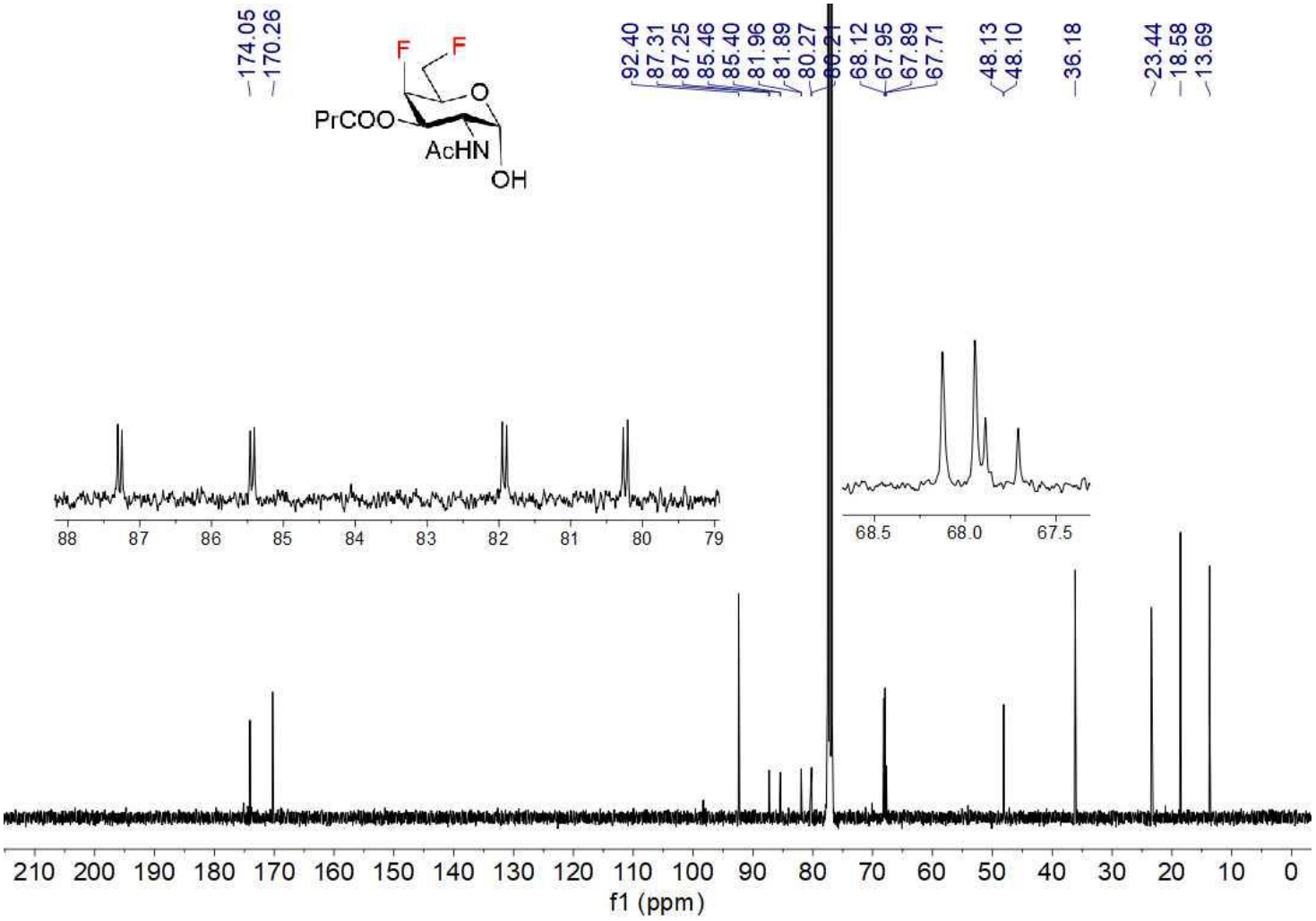


NMR COMPOUND 33

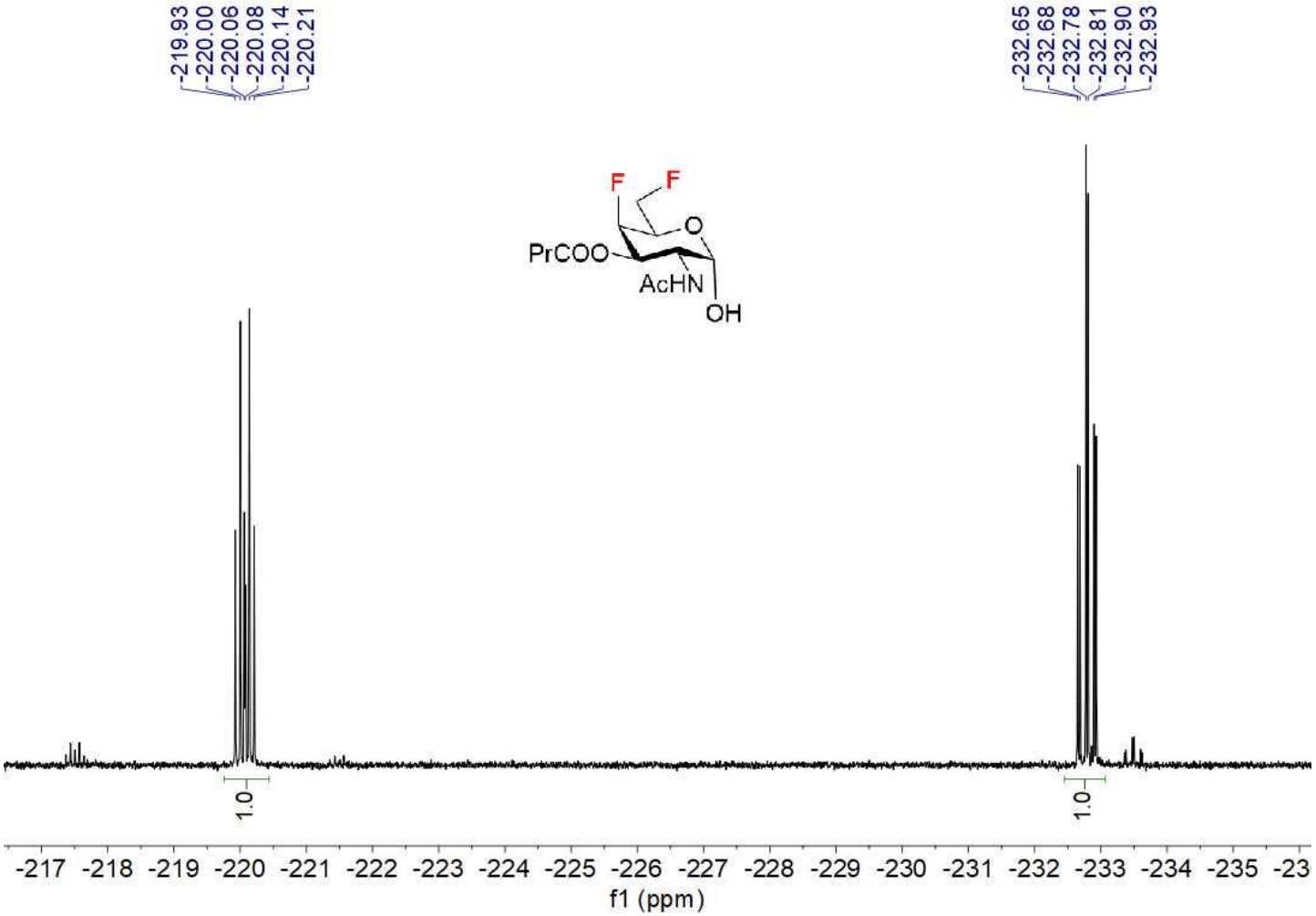
^{1}H NMR (400 MHz, $CDCl_3$) 33



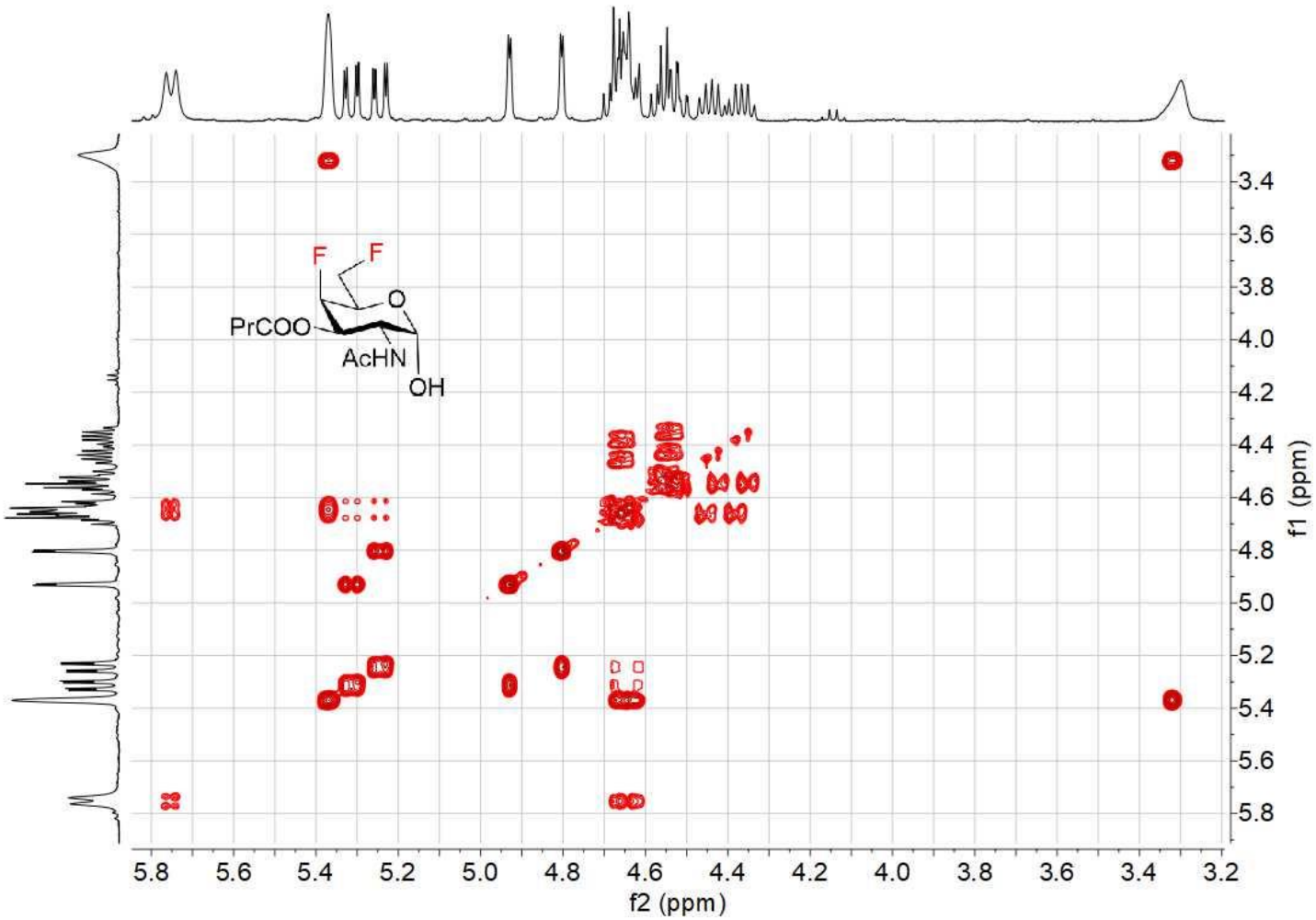
^{13}C NMR (100 MHz, $CDCl_3$) 33



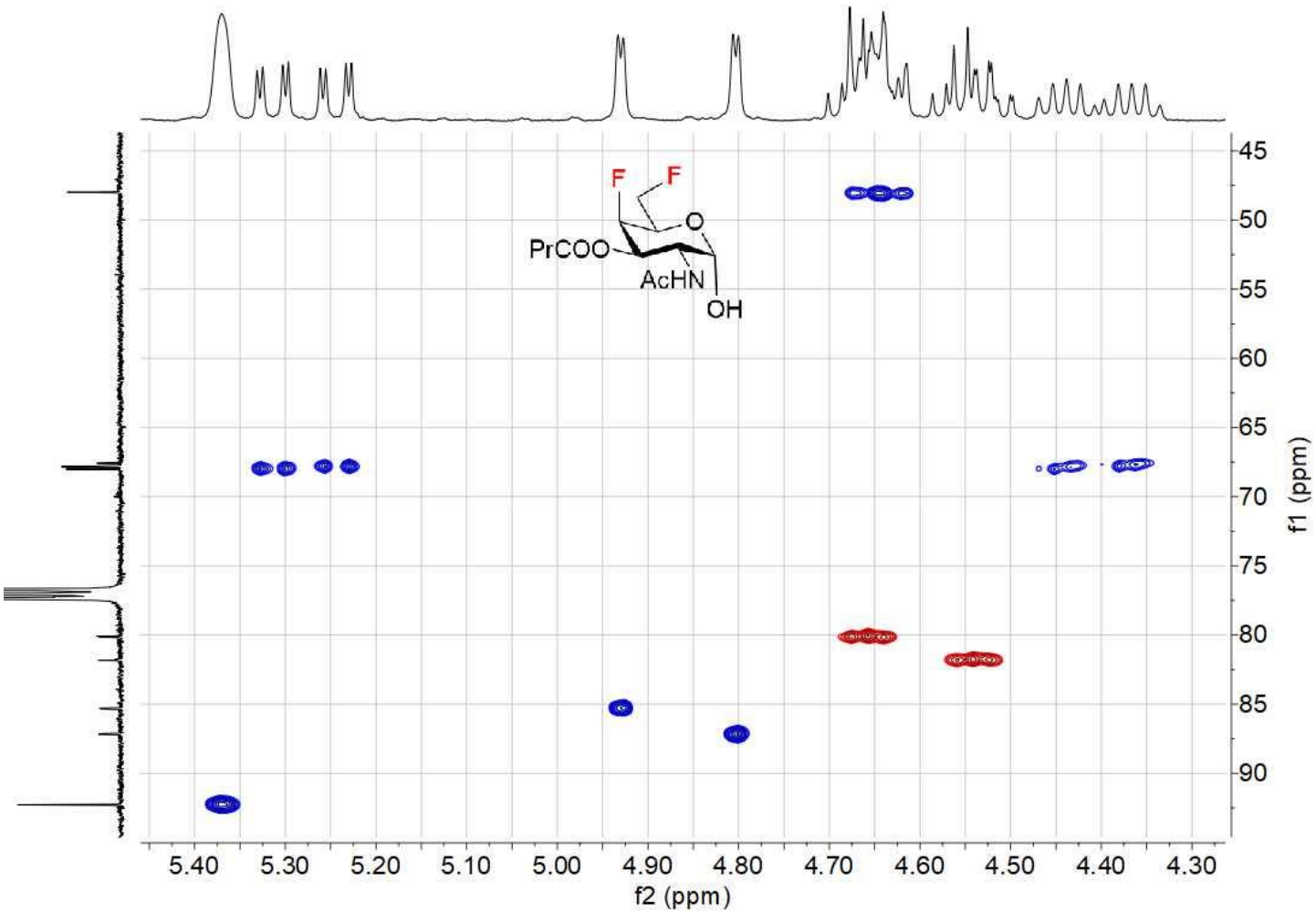
^{19}F NMR (376 MHz, $CDCl_3$) 33



^{1}H-^{1}H COSY 33

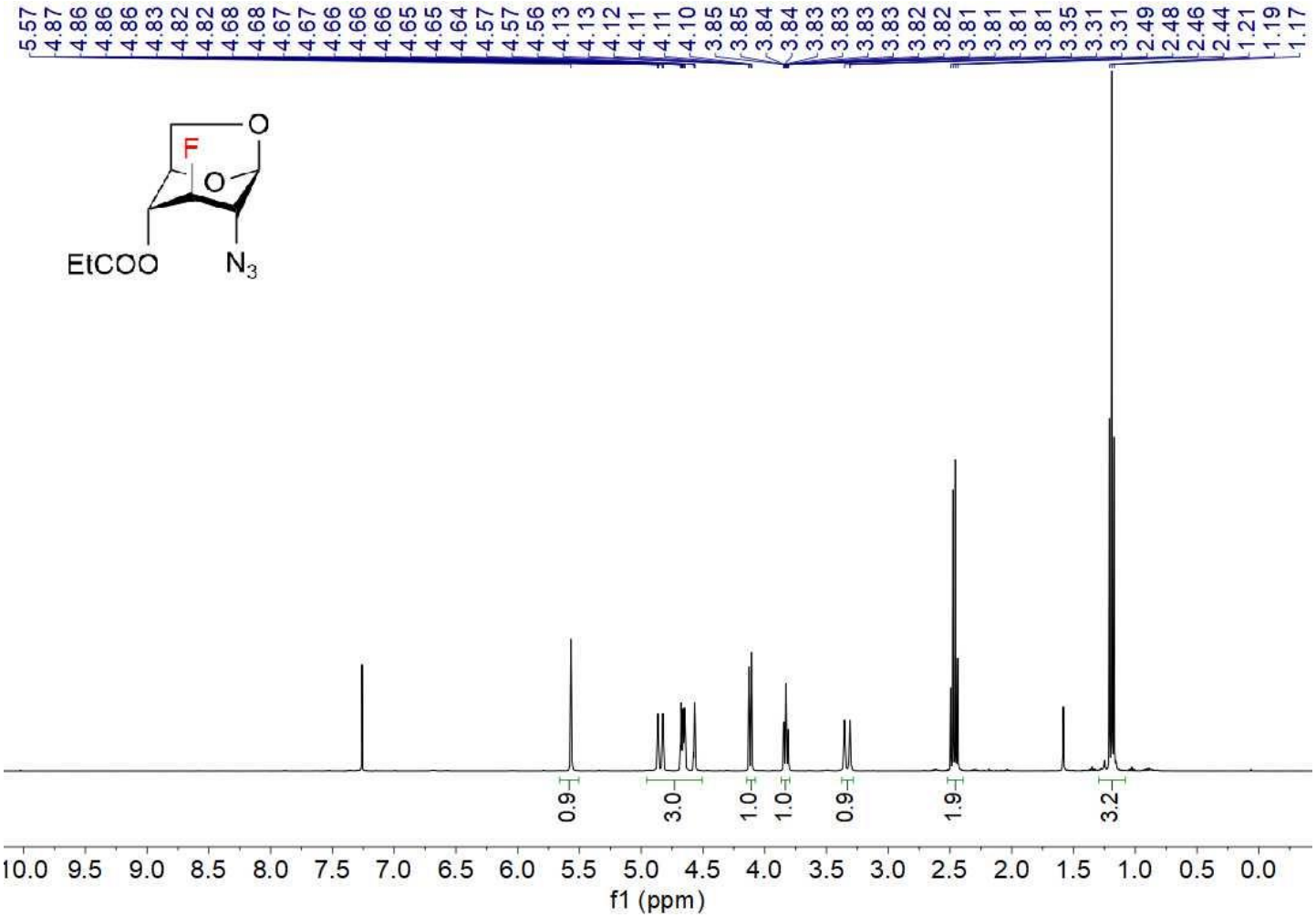


^{1}H-^{13}C HSQC 33

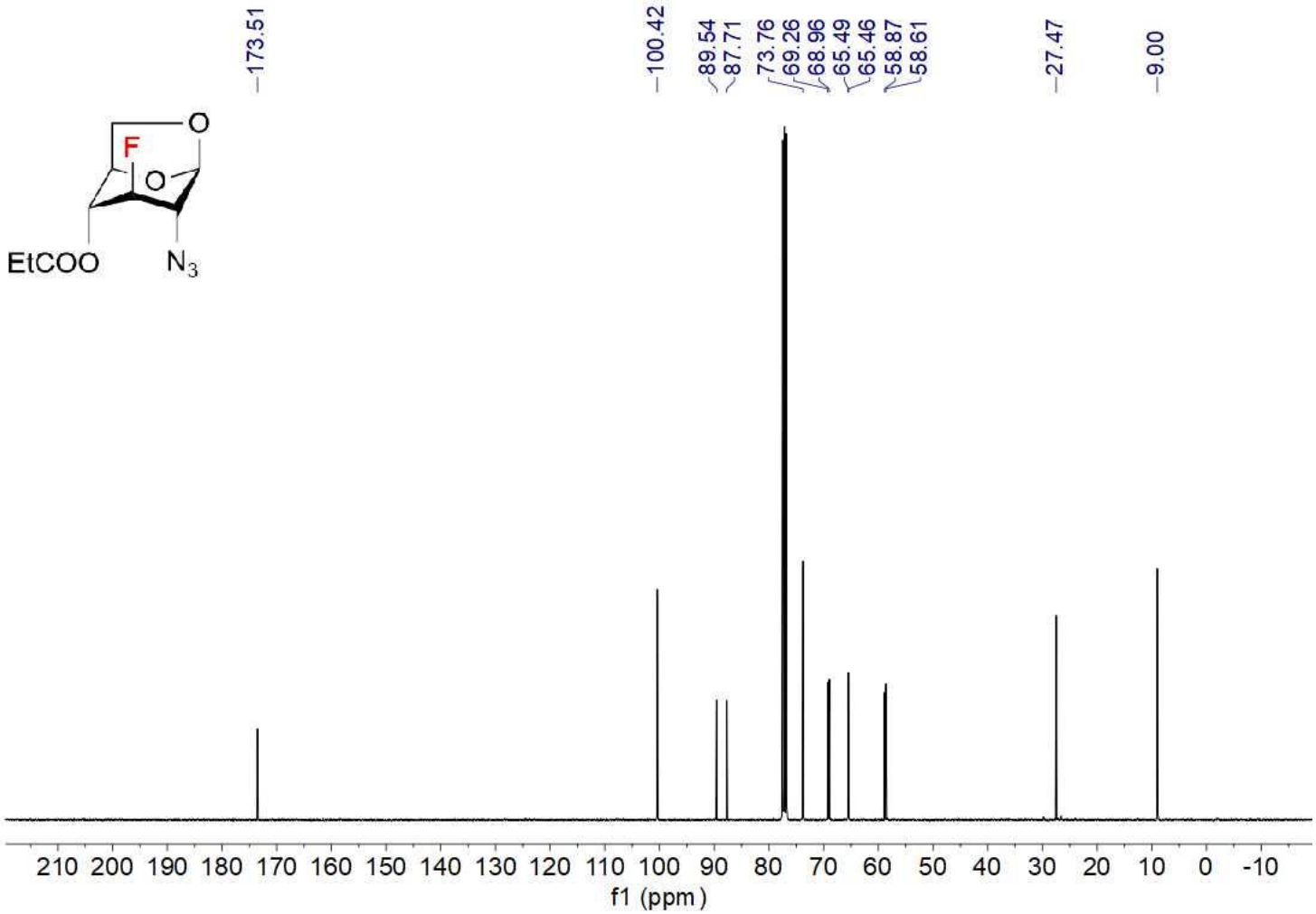


NMR COMPOUND 40

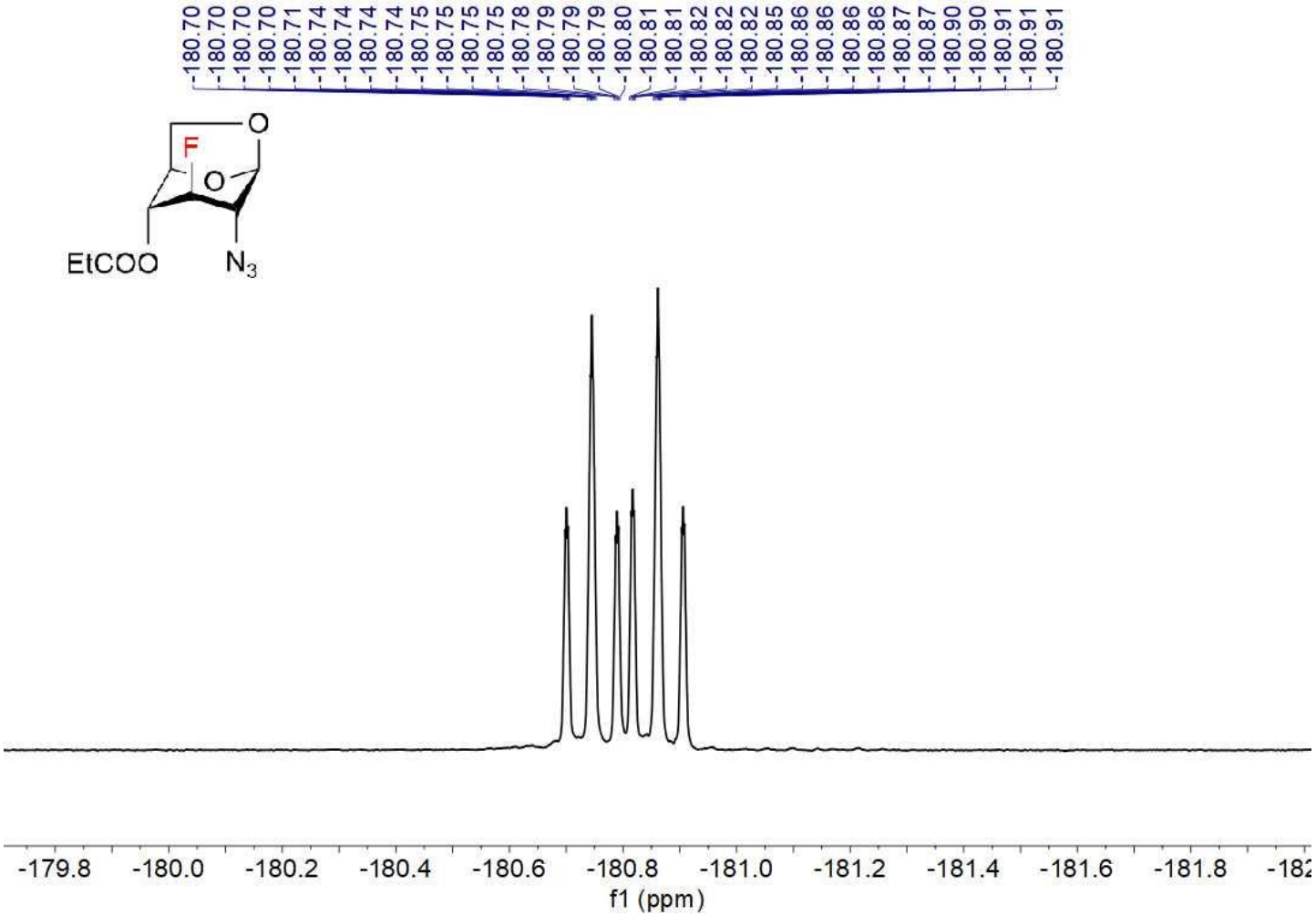
^{1}H NMR (400 MHz, $CDCl_3$) 40



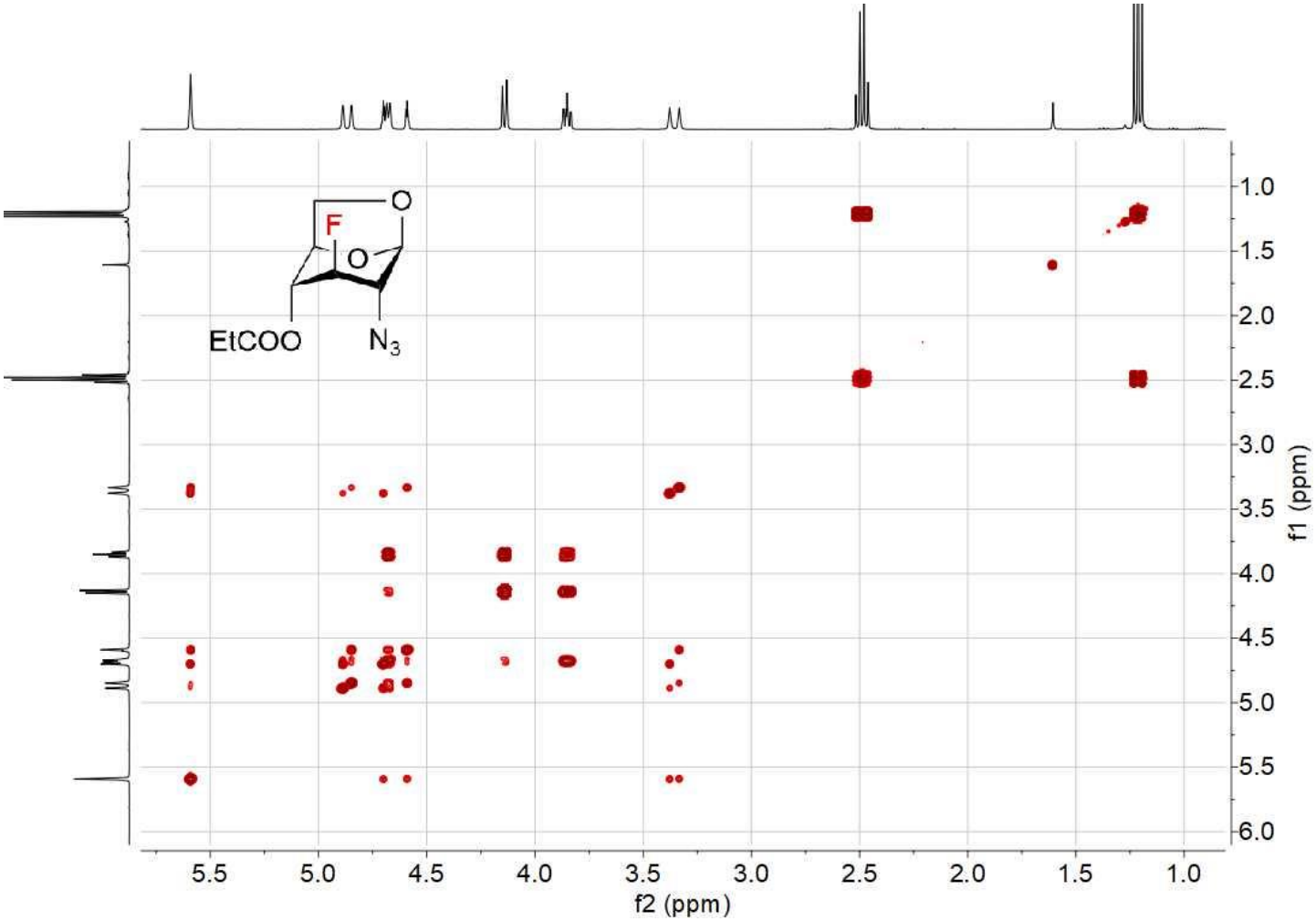
^{13}C NMR (100 MHz, $CDCl_3$) 40



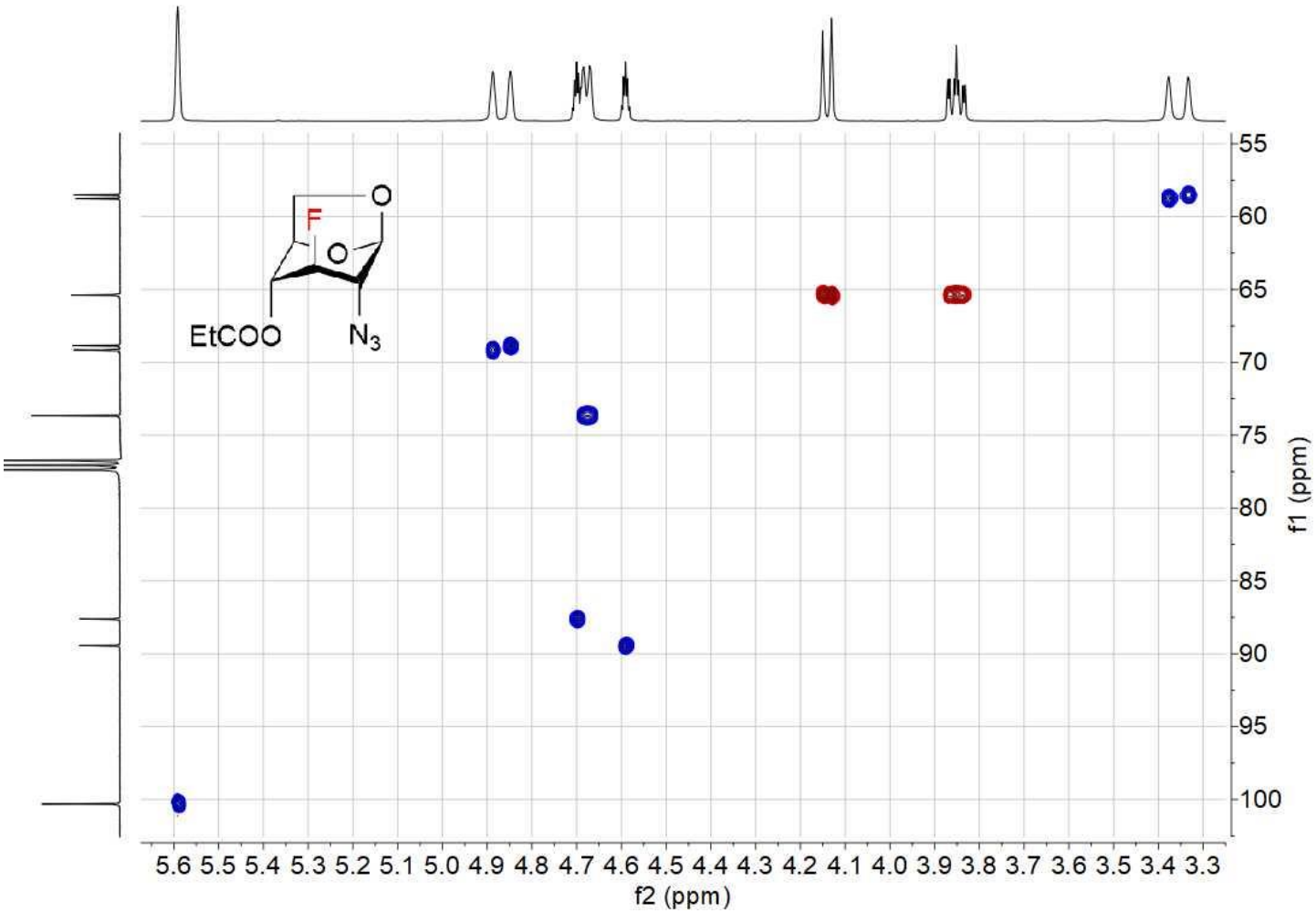
^{19}F NMR (376 MHz, $CDCl_3$) 40



^{1}H-^{1}H COSY 40

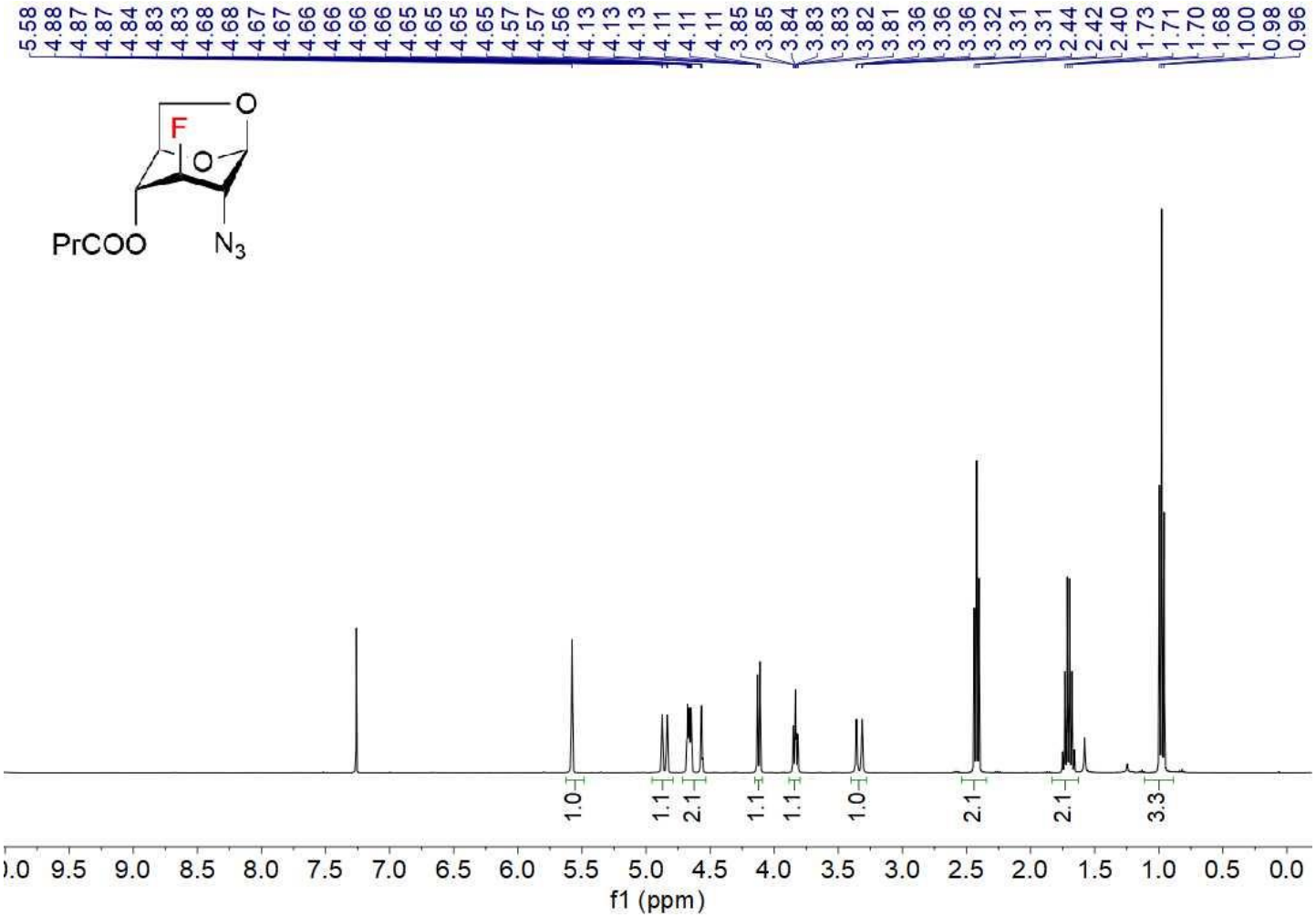


^{1}H-^{13}C HSQC 40

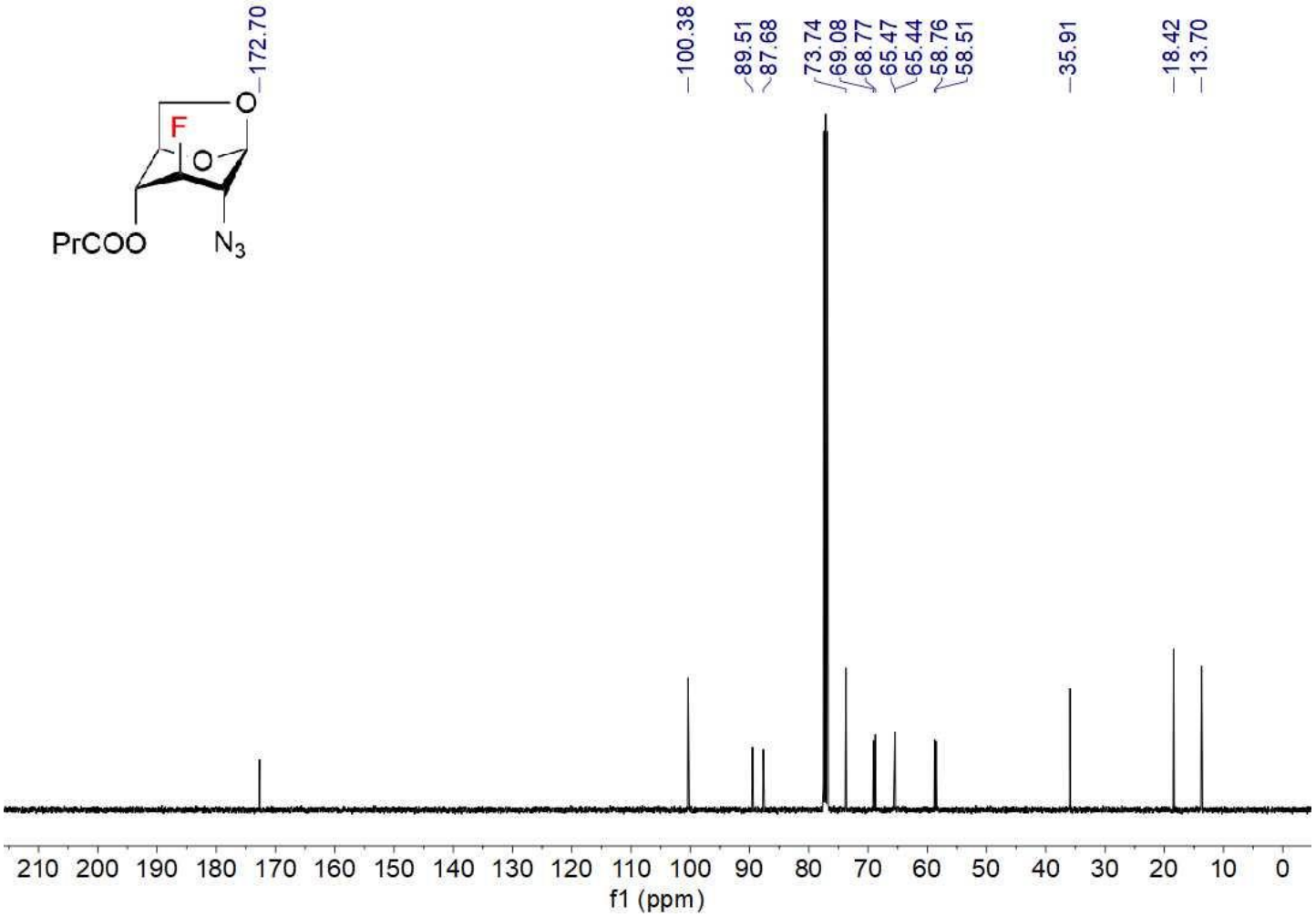


NMR COMPOUND 41

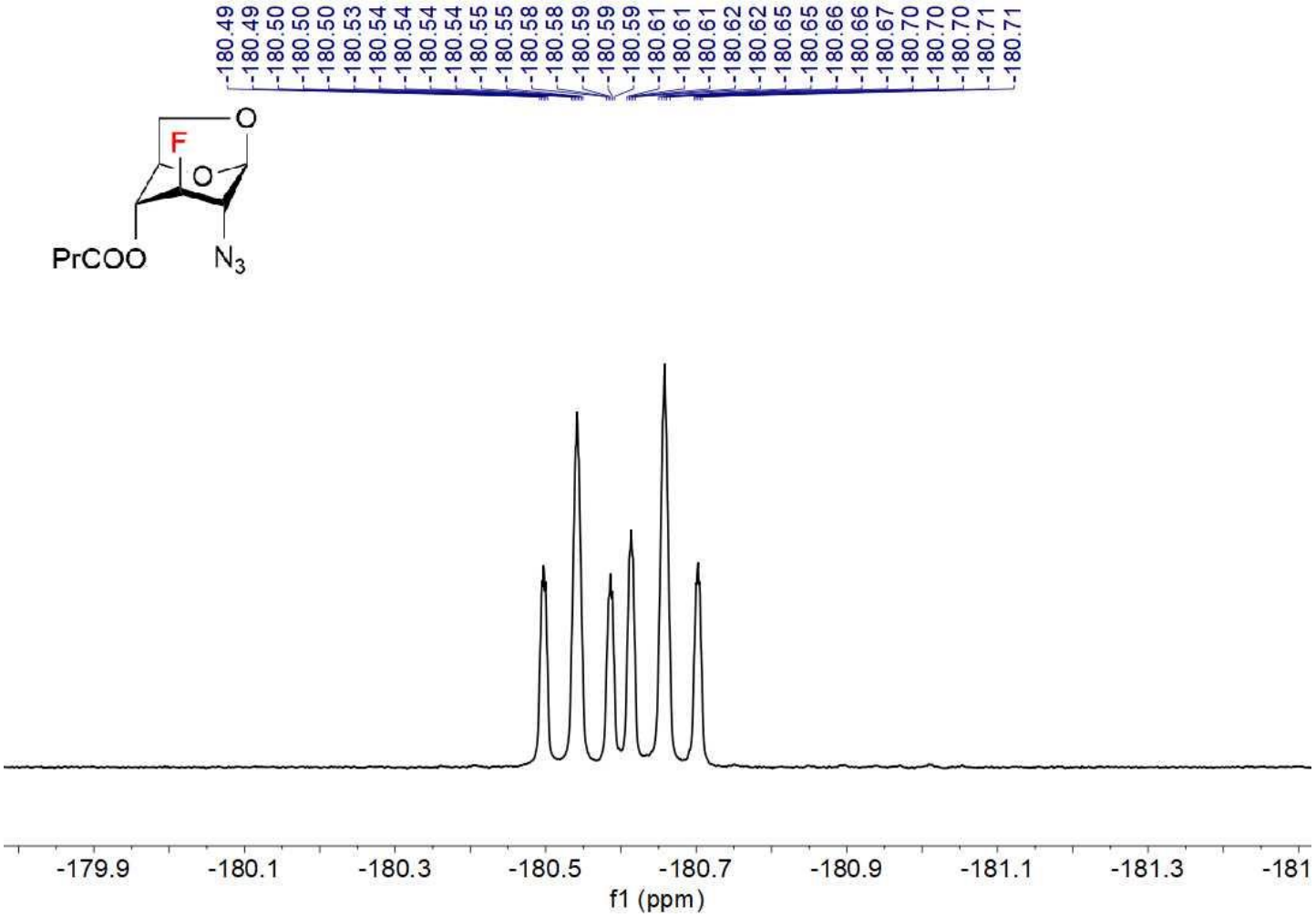
^{1}H NMR (400 MHz, $CDCl_3$) 41



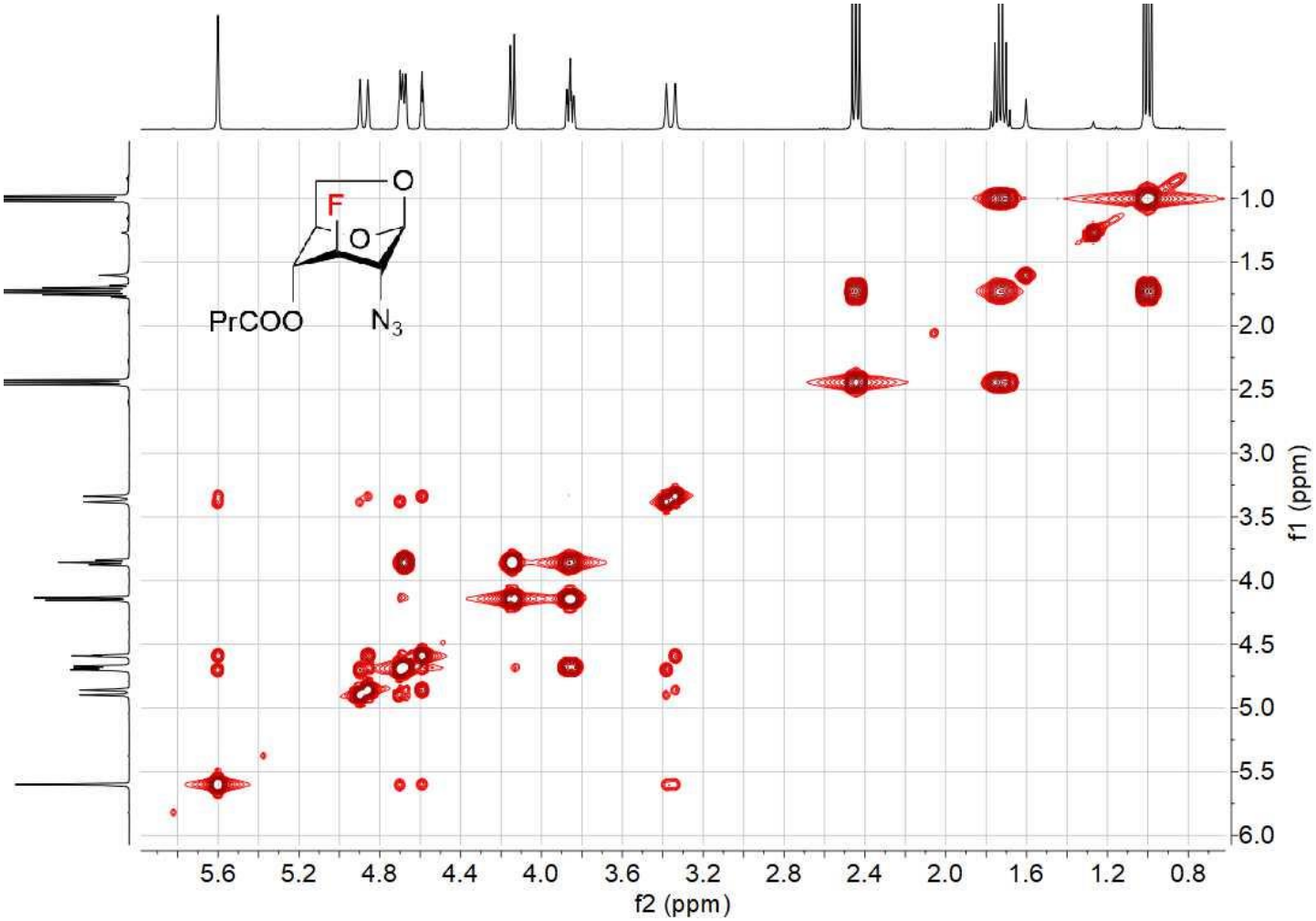
^{13}C NMR (100 MHz, $CDCl_3$) 41



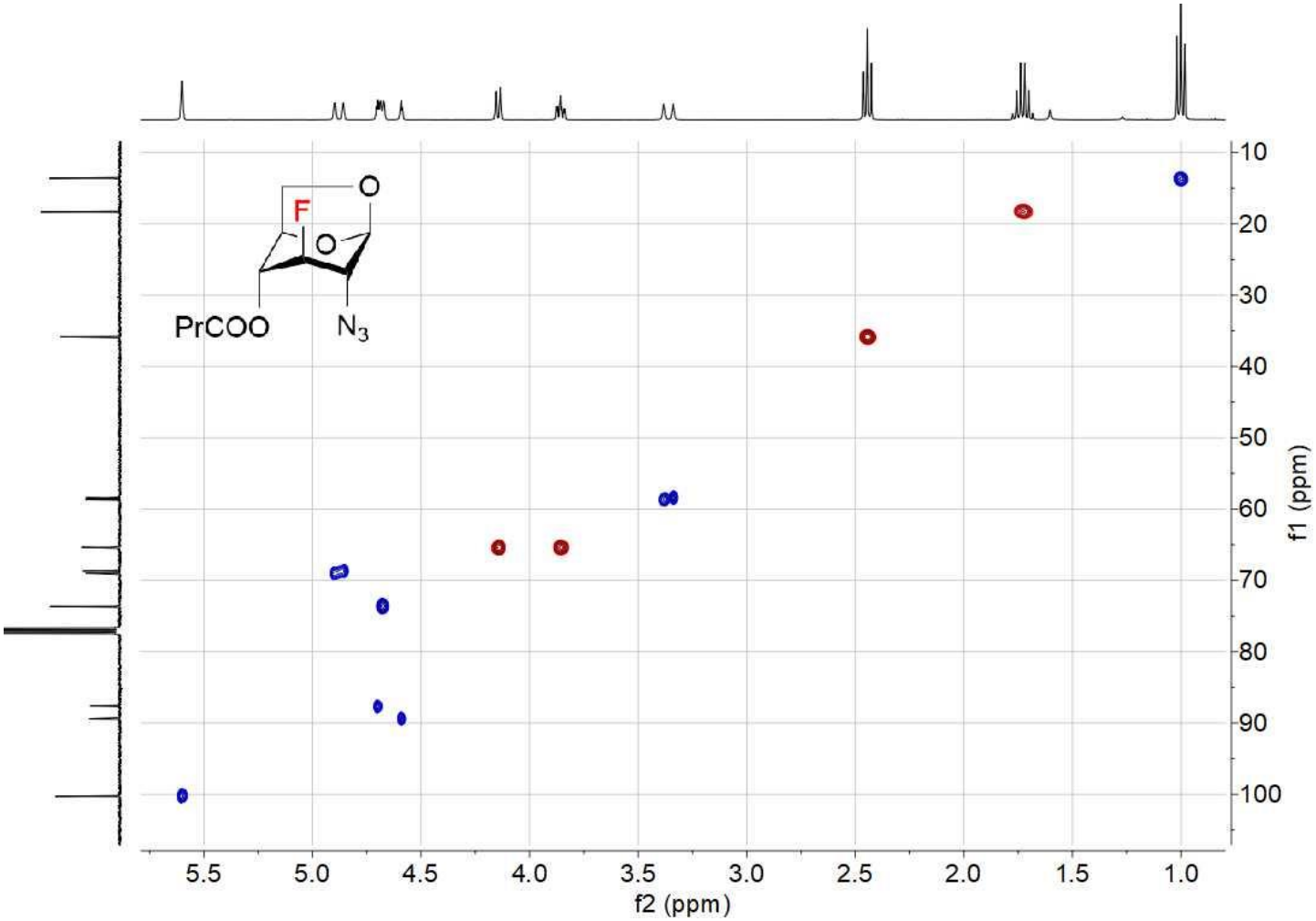
^{19}F NMR (376 MHz, $CDCl_3$) 41



^{1}H-^{1}H COSY 41

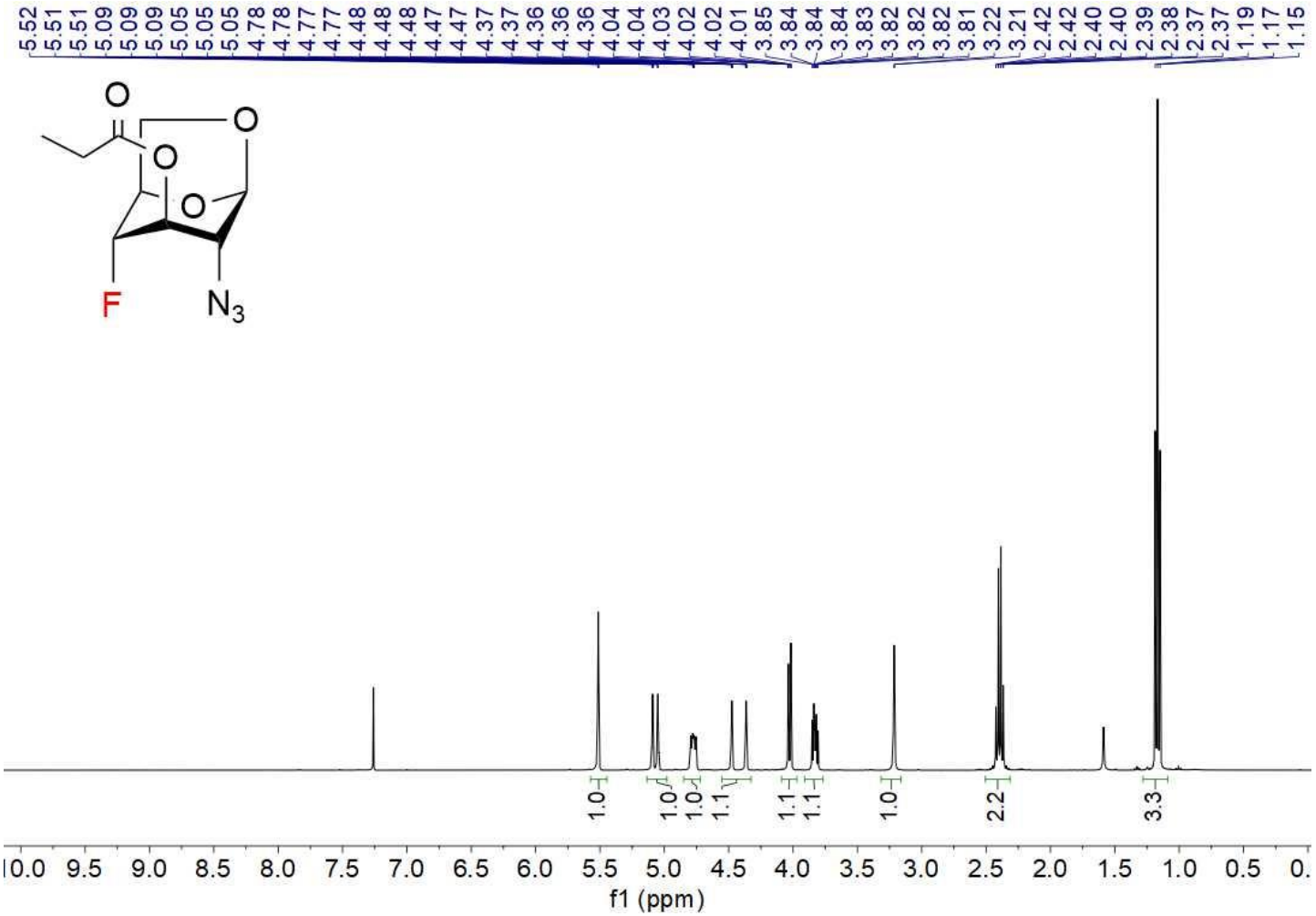


^{1}H-^{13}C HSQC 41

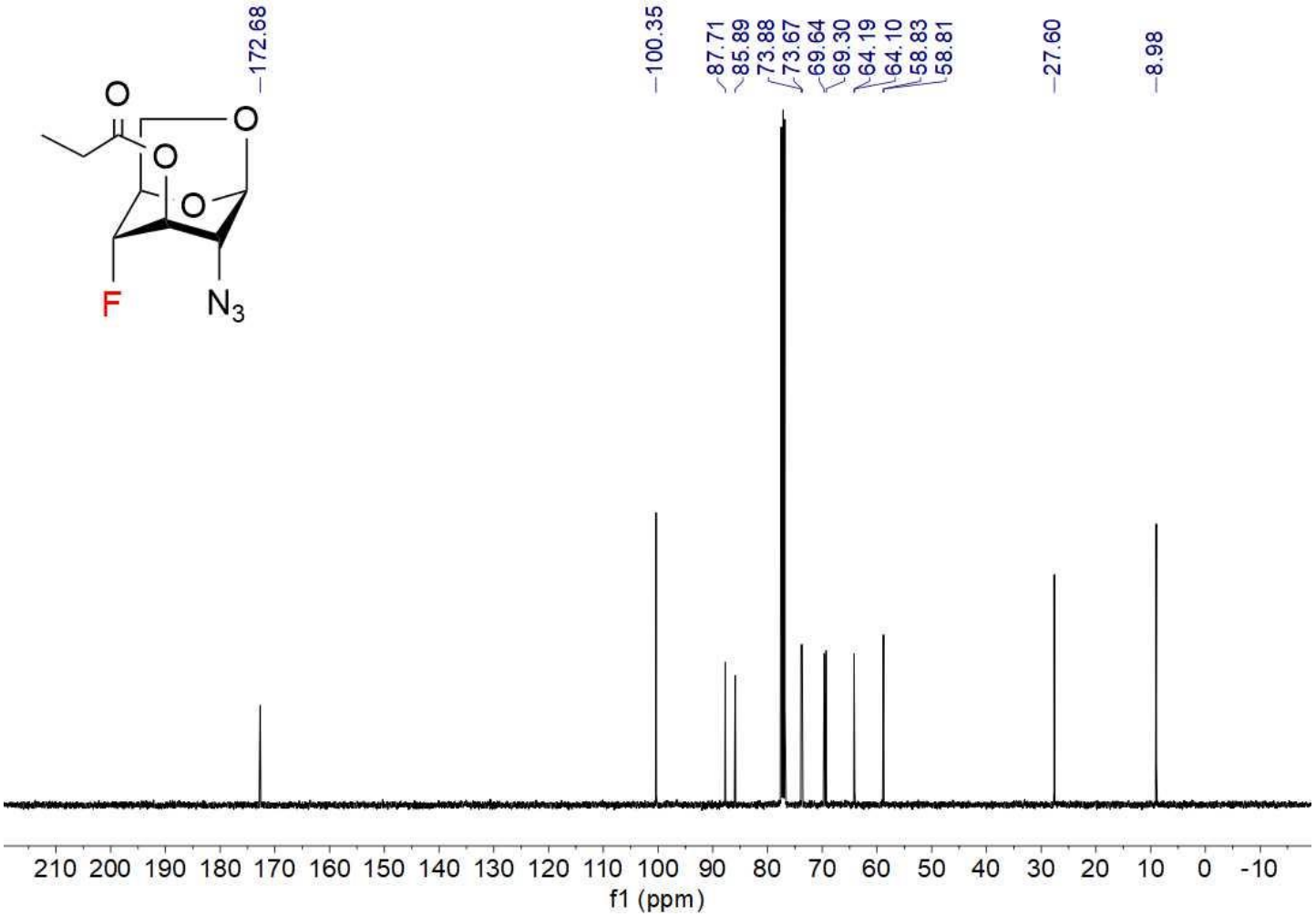


NMR COMPOUND 43

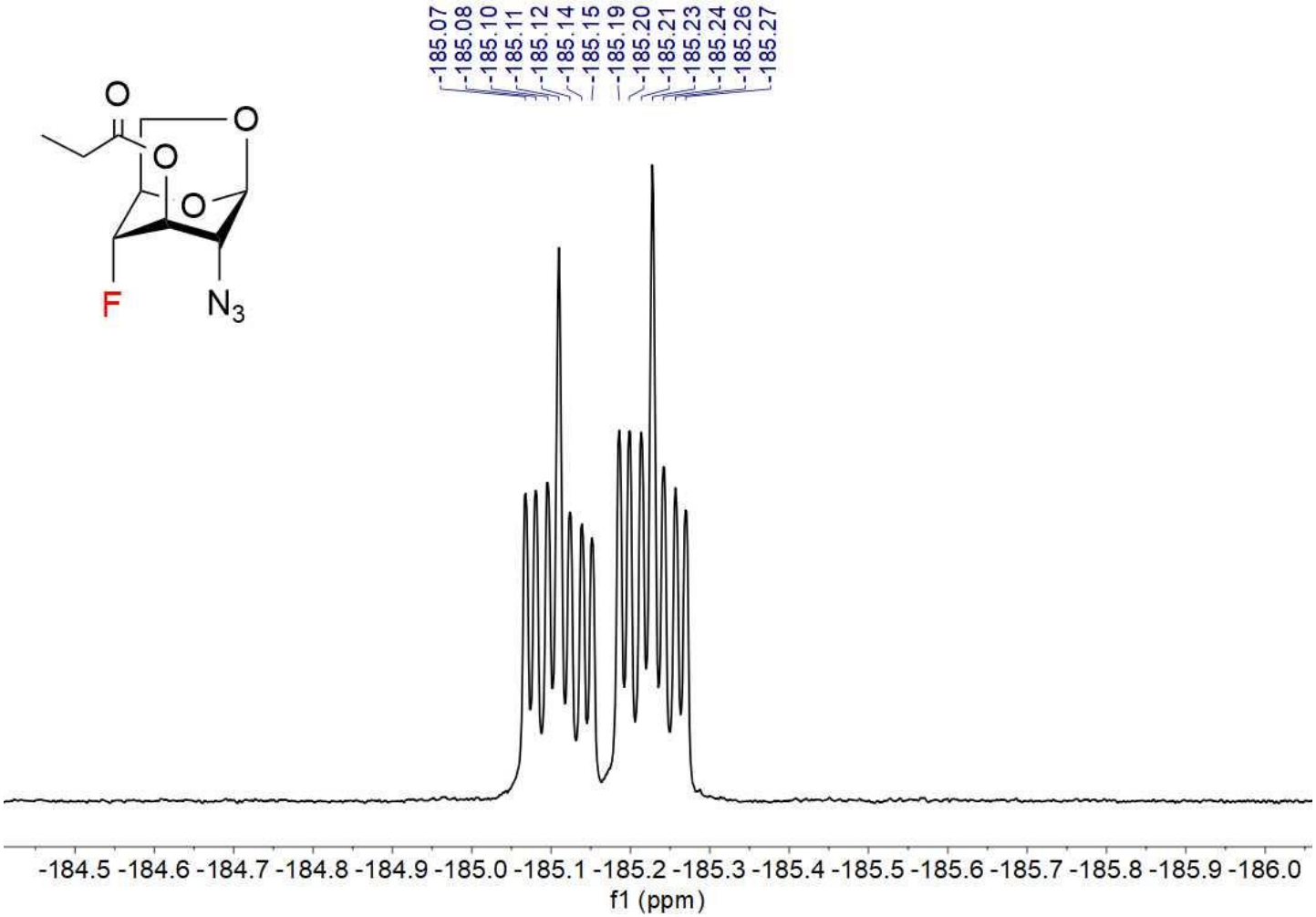
^{1}H NMR (400 MHz, $CDCl_3$) 43



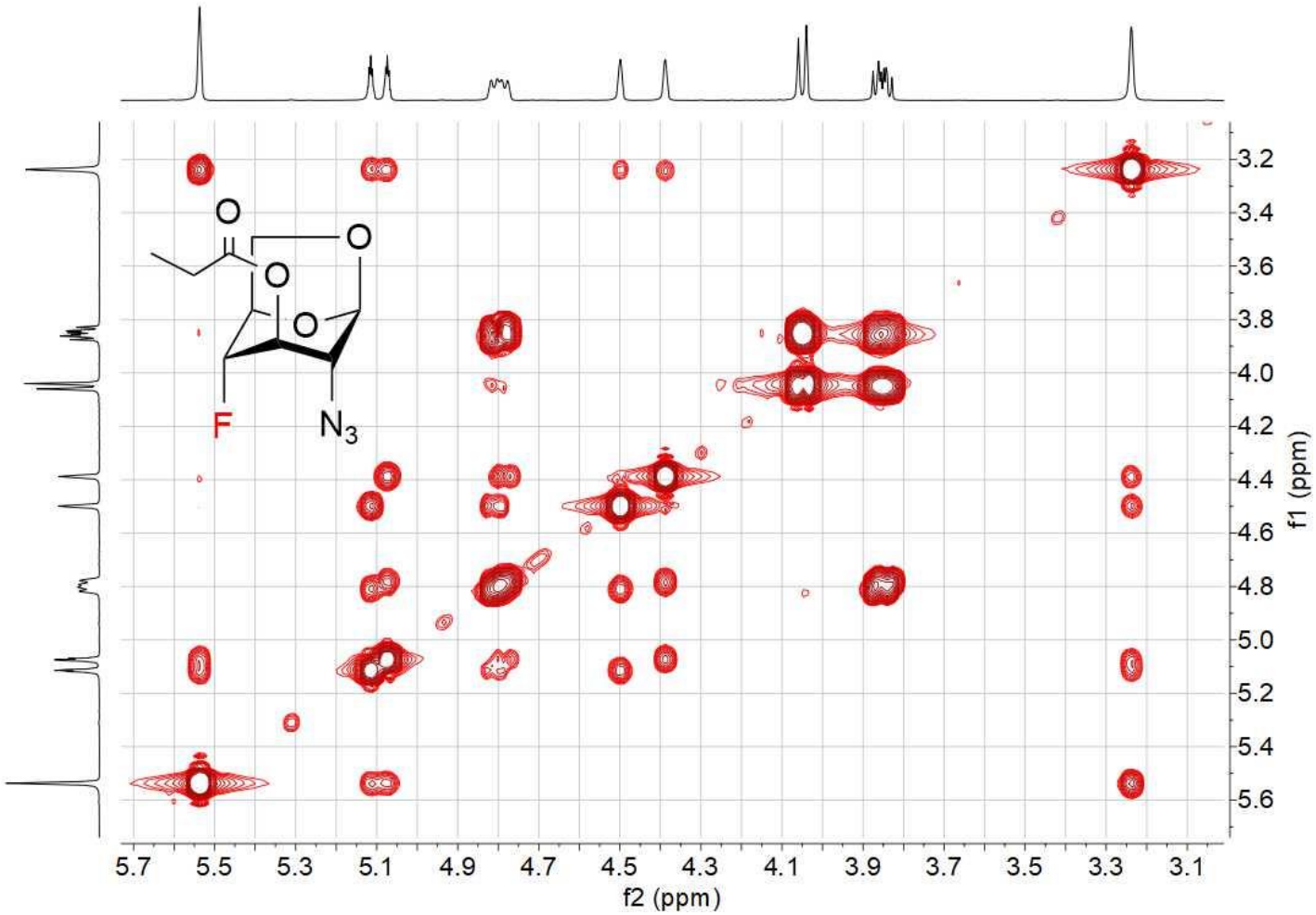
^{13}C NMR (100 MHz, $CDCl_3$) 43



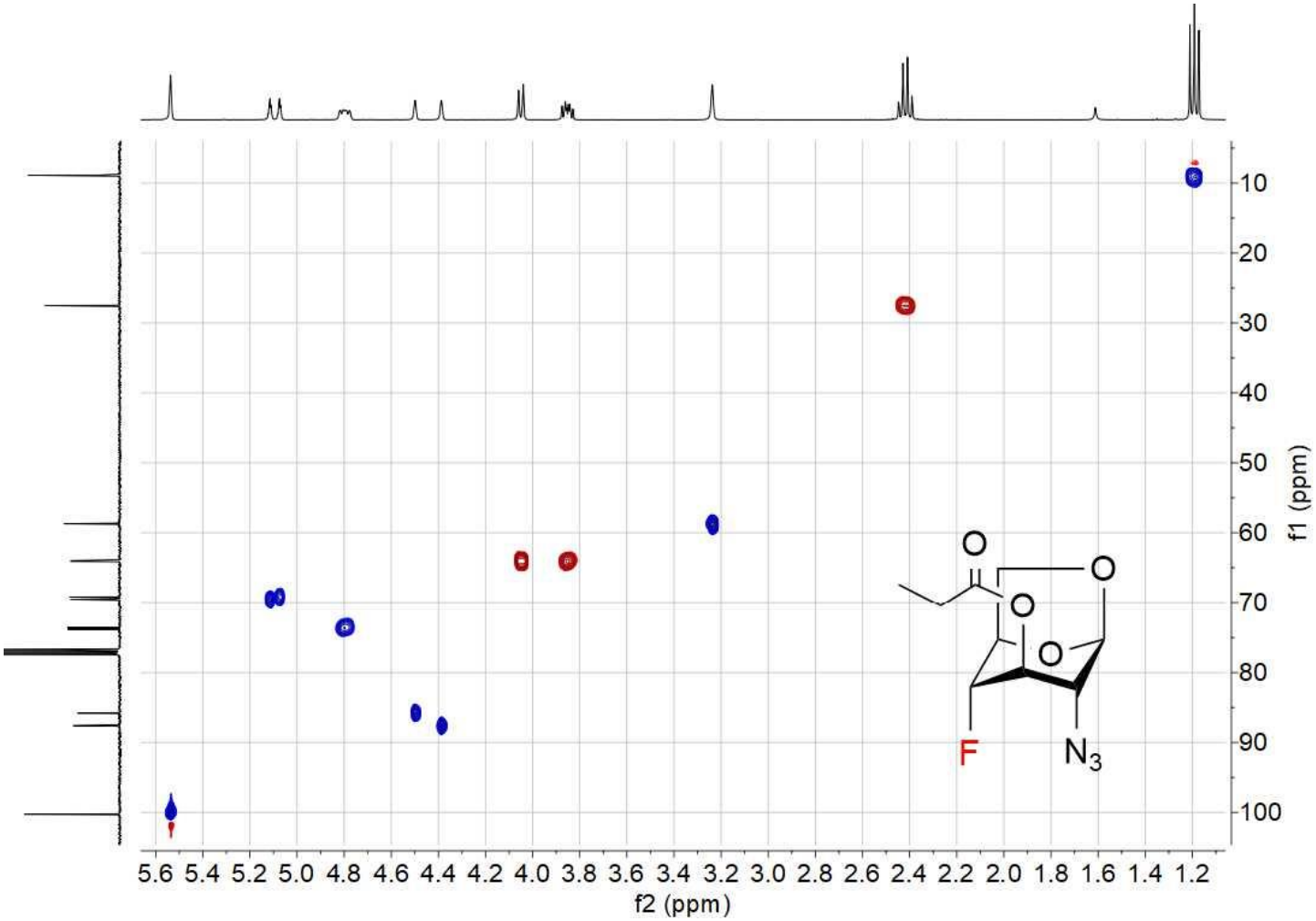
^{19}F NMR (376 MHz, $CDCl_3$) 43



^{1}H-^{1}H COSY 43

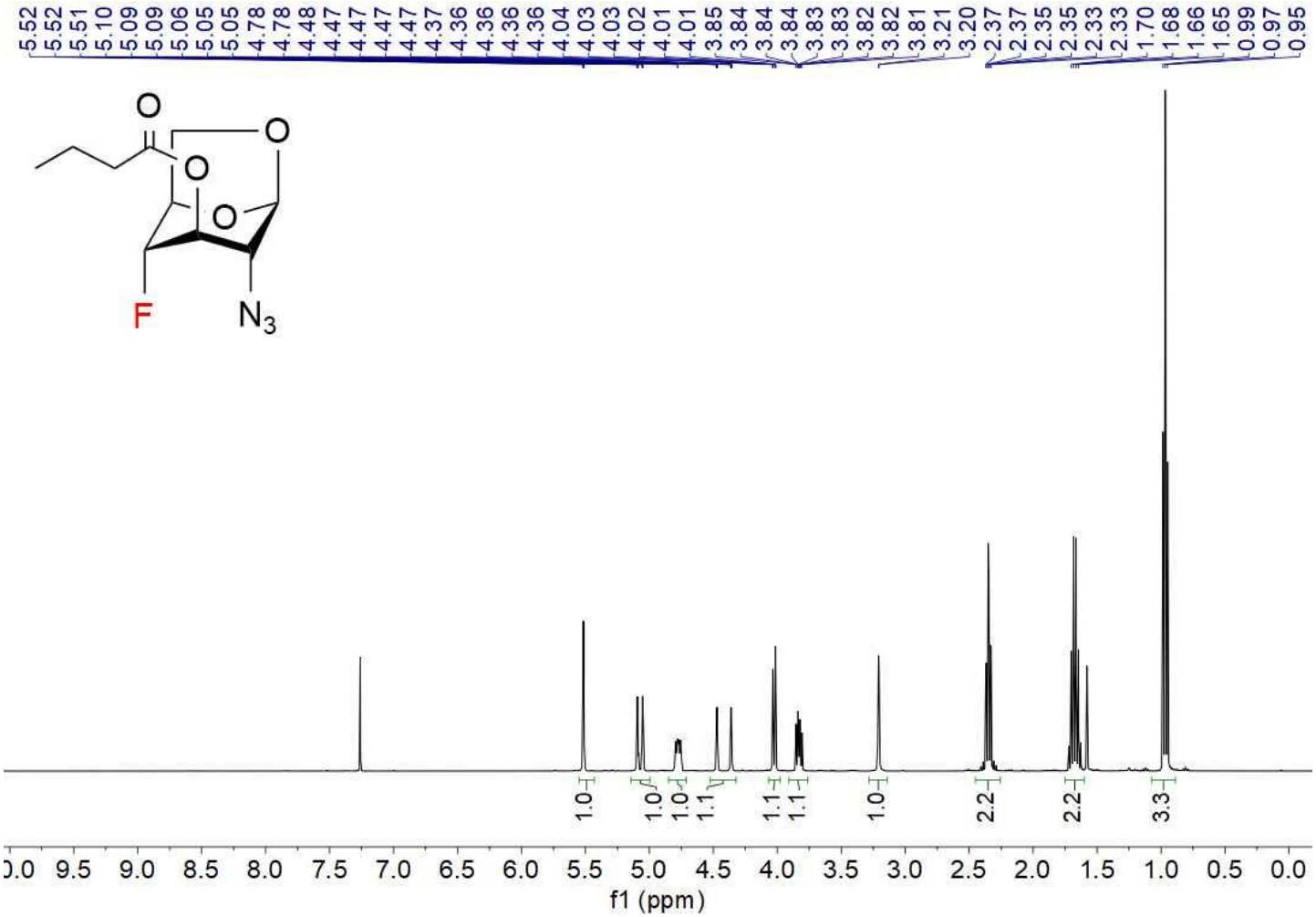

O
O
O
O
F
N3
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
5.4
5.6
f1 (ppm)
5.7
5.5
5.3
5.1
4.9
4.7
4.5
4.3
4.1
3.9
3.7
3.5
3.3
3.1
f2 (ppm)

^{1}H-^{13}C HSQC 43

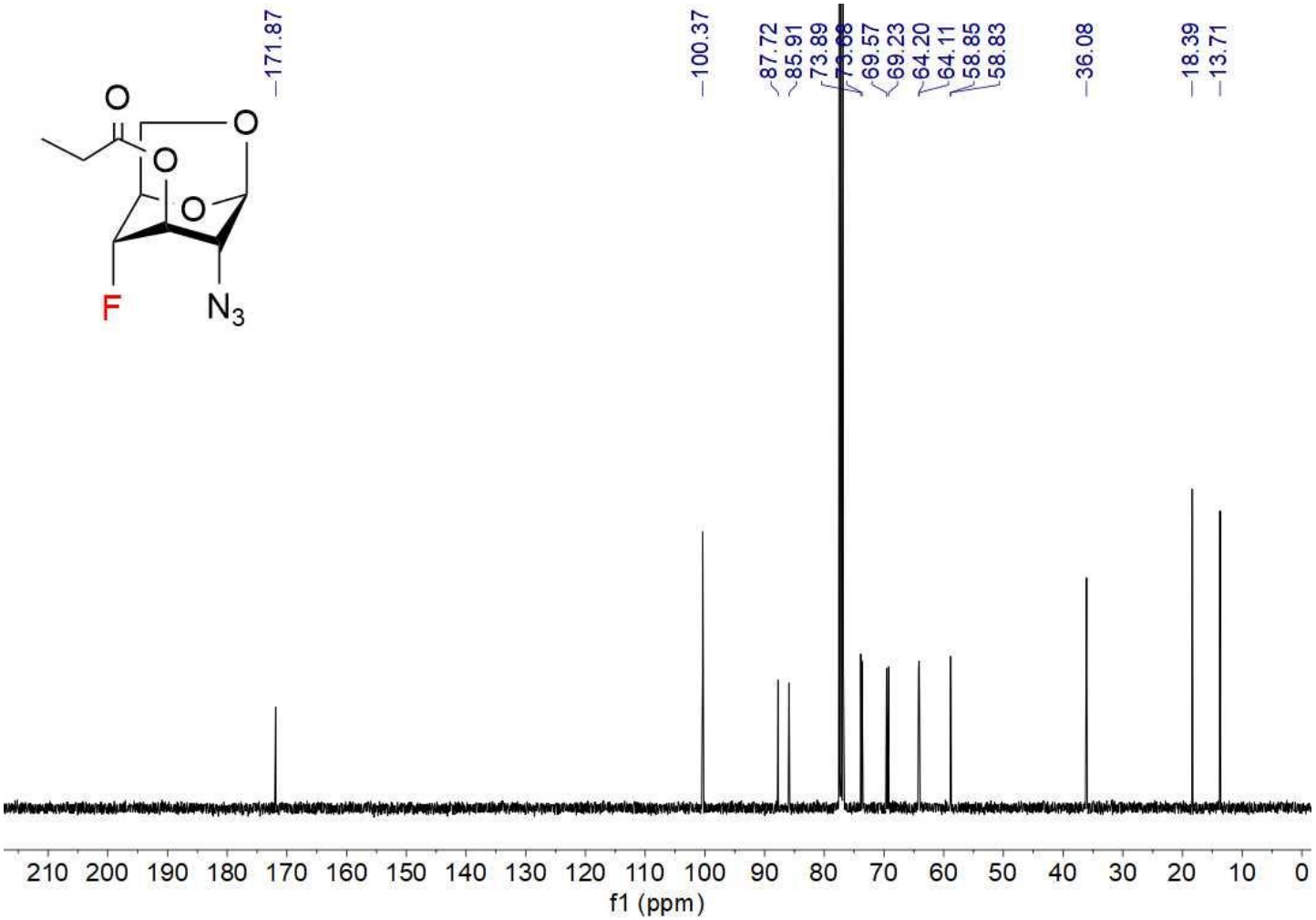


NMR COMPOUND 44

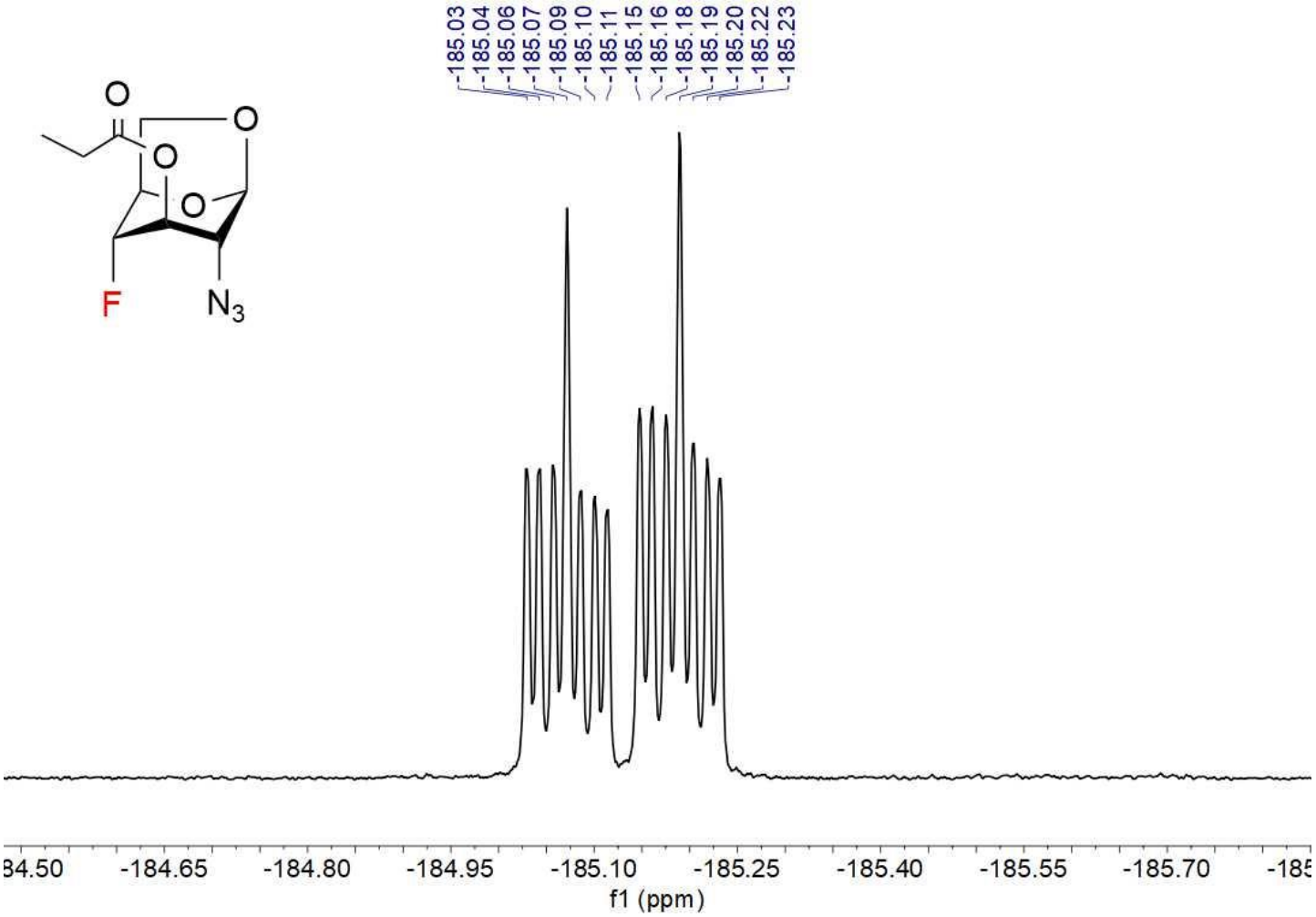
^{1}H NMR (400 MHz, $CDCl_3$) 44



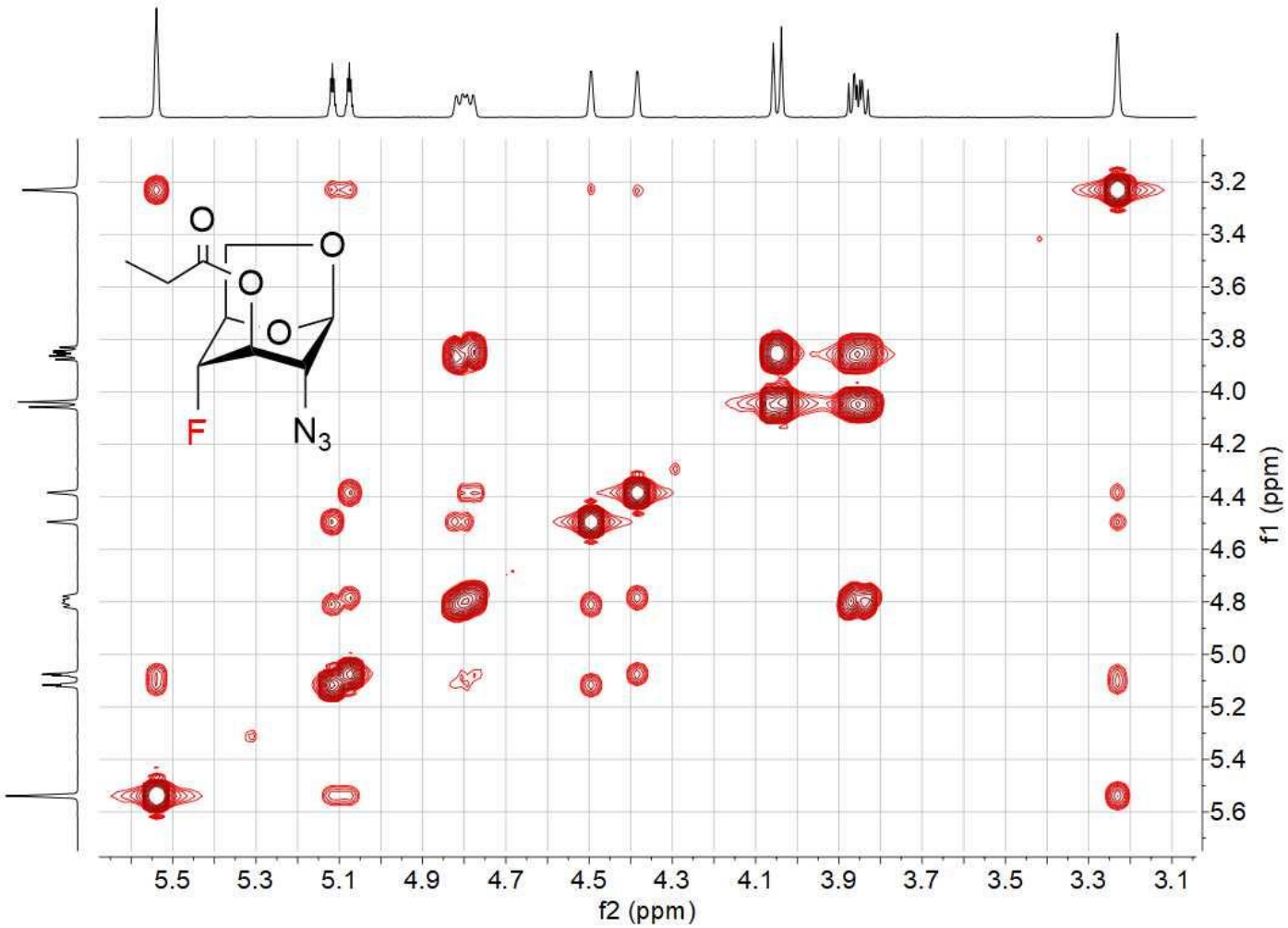
^{13}C NMR (100 MHz, $CDCl_3$) 44



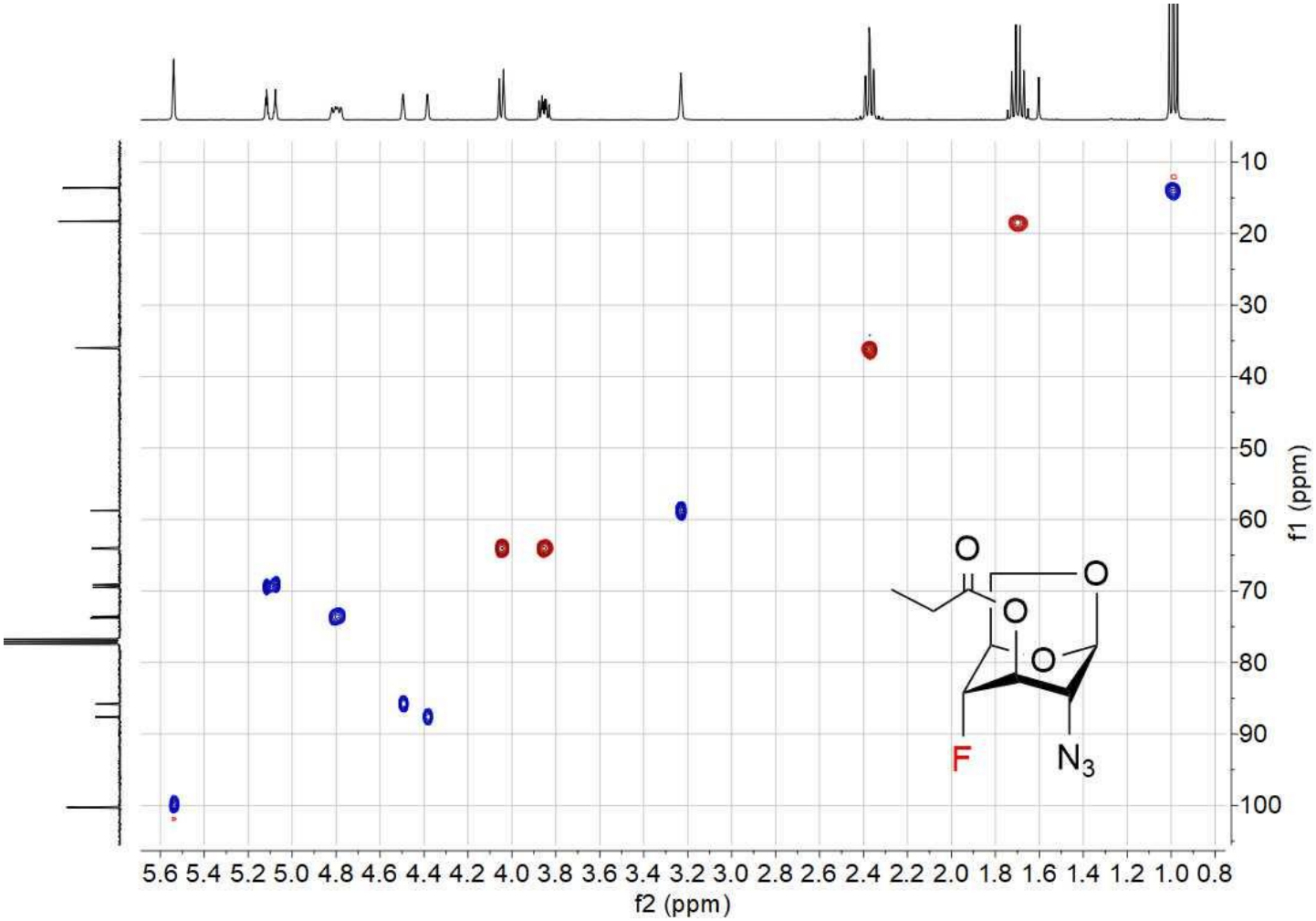
^{19}F NMR (376 MHz, $CDCl_3$) 44



^{1}H-^{1}H COSY 44

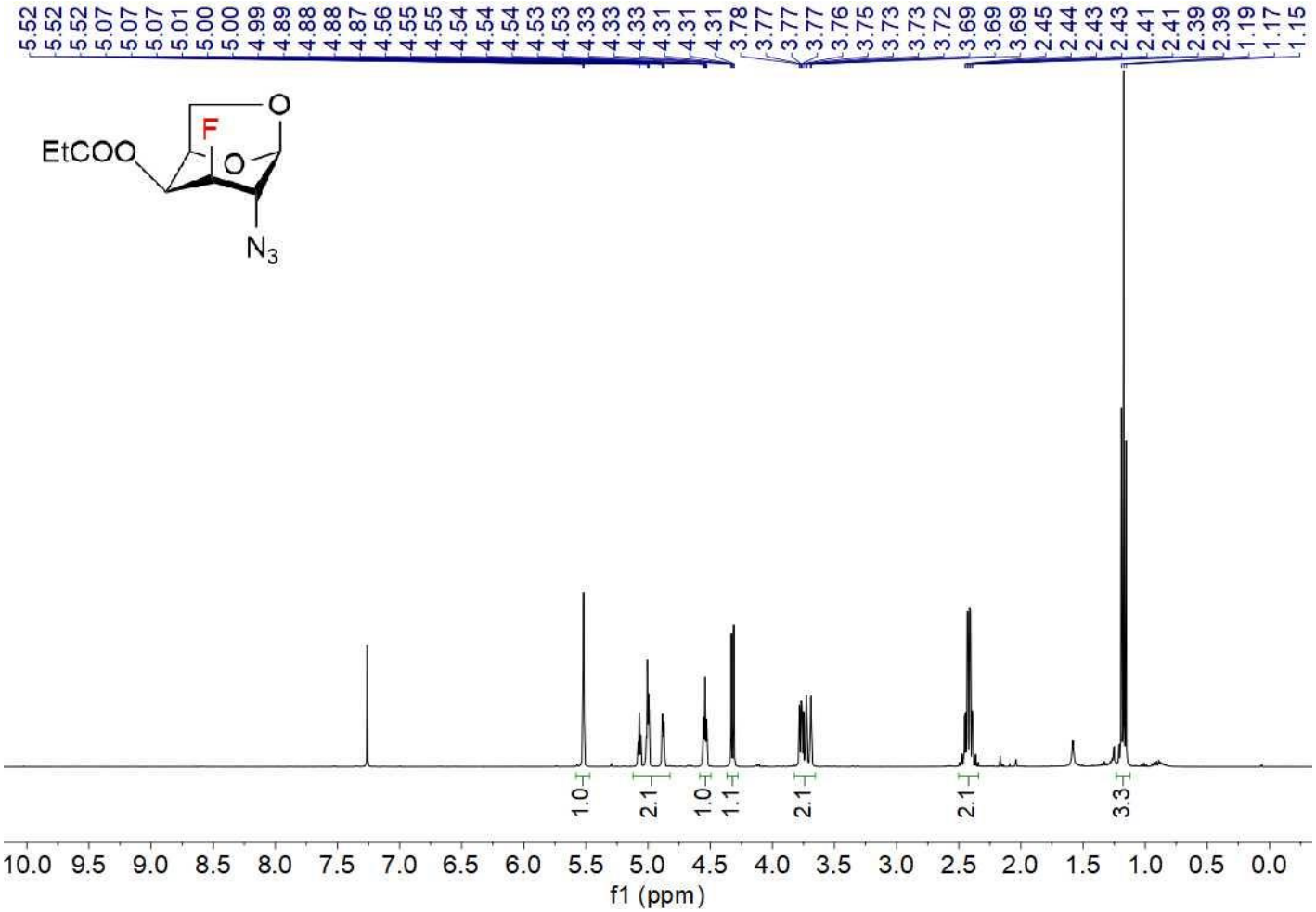

O
O
O
O
F
N3
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
5.4
5.6
f1 (ppm)
5.5
5.3
5.1
4.9
4.7
4.5
4.3
4.1
3.9
3.7
3.5
3.3
3.1
f2 (ppm)

^{1}H-^{13}C HSQC 44

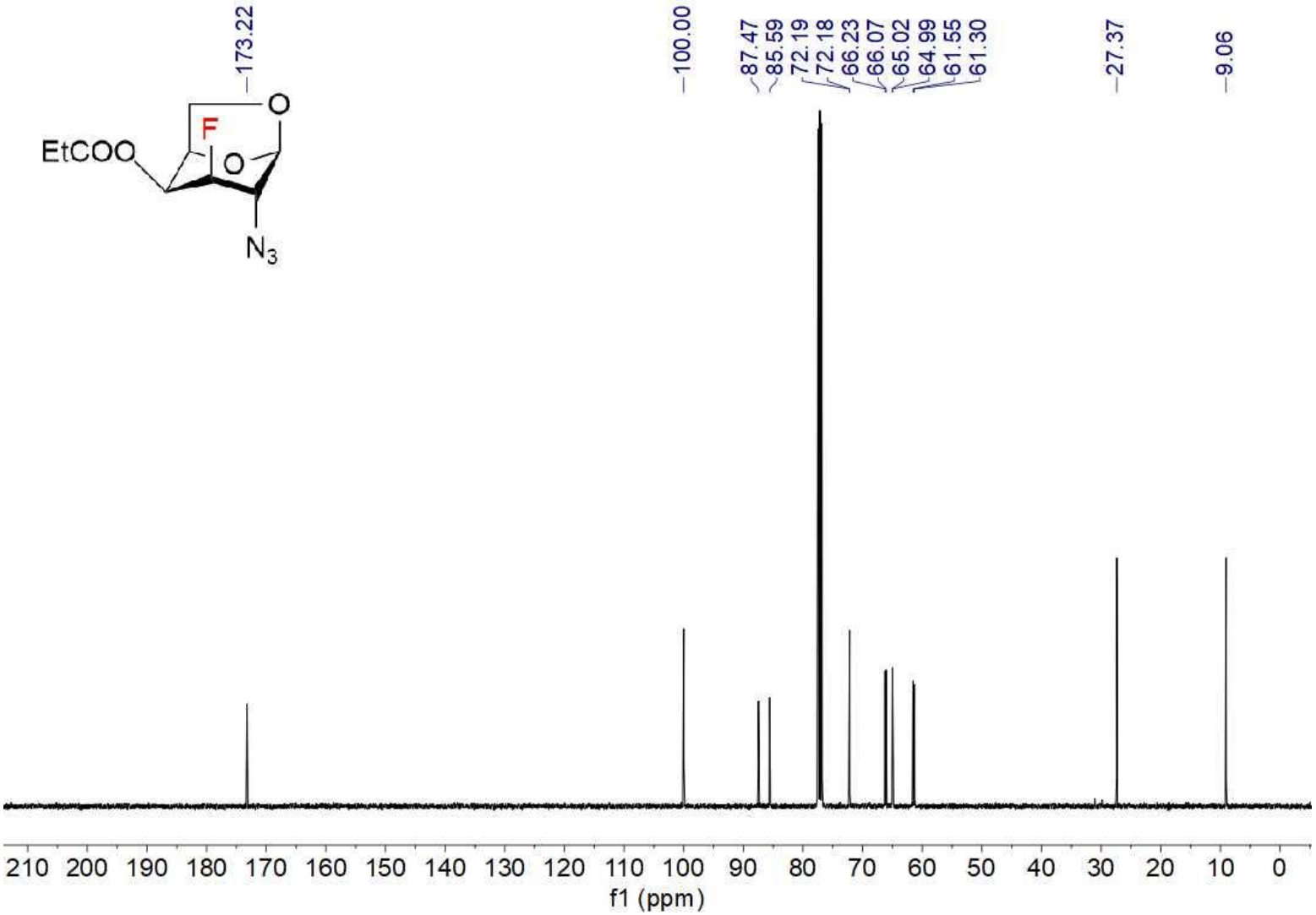


NMR COMPOUND 45

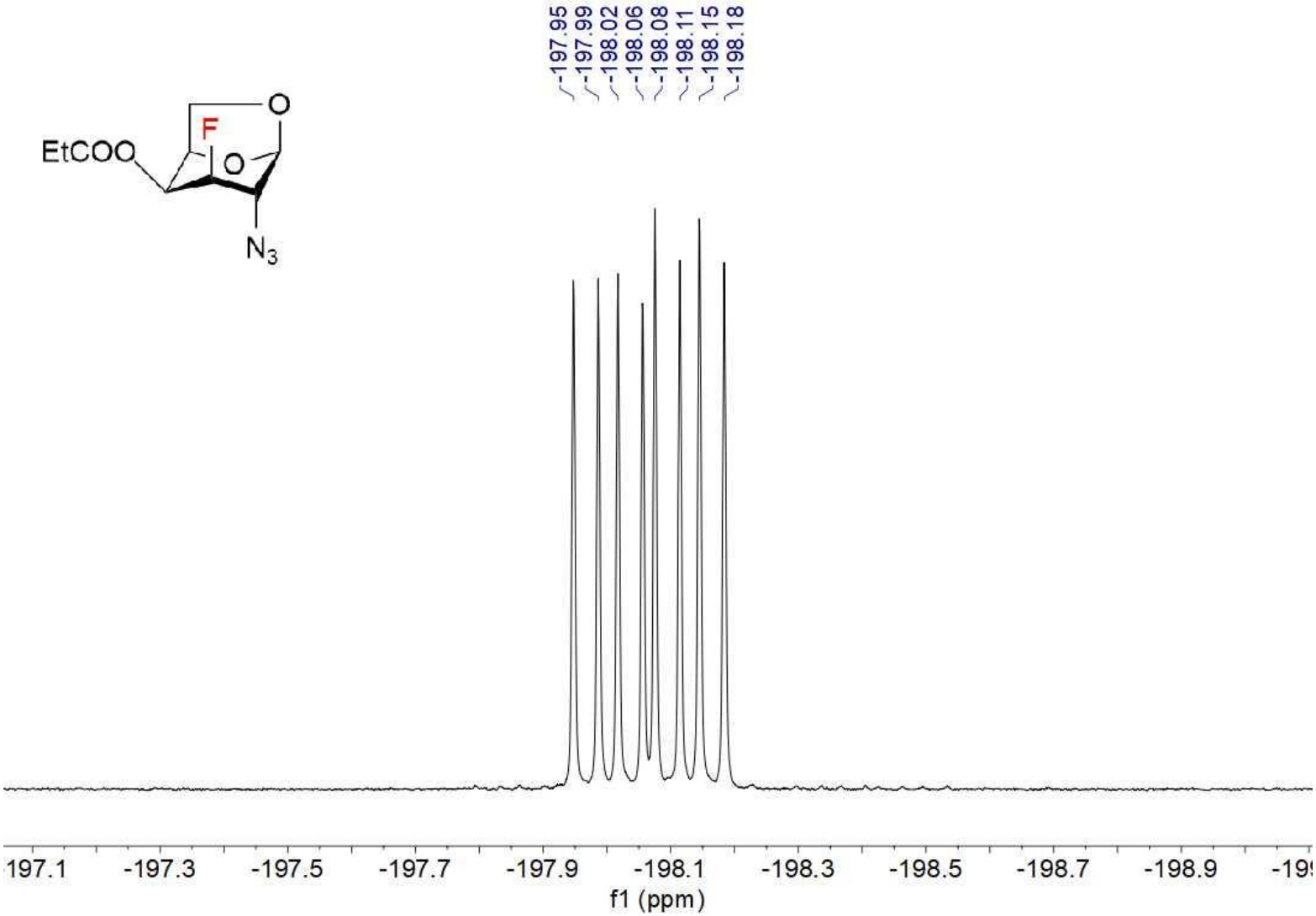
^{1}H NMR (400 MHz, $CDCl_3$) 45



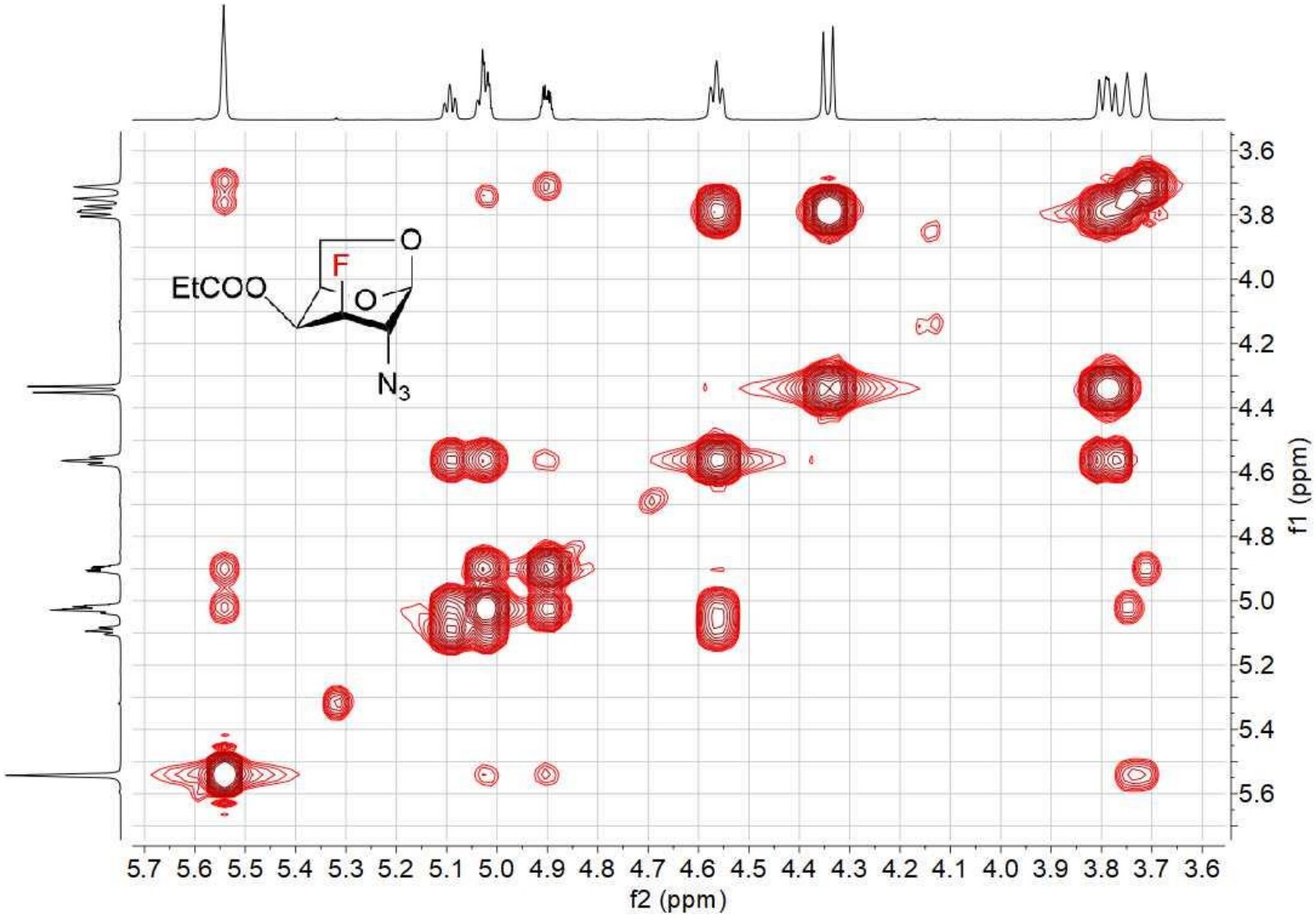
^{13}C NMR (100 MHz, $CDCl_3$) 45



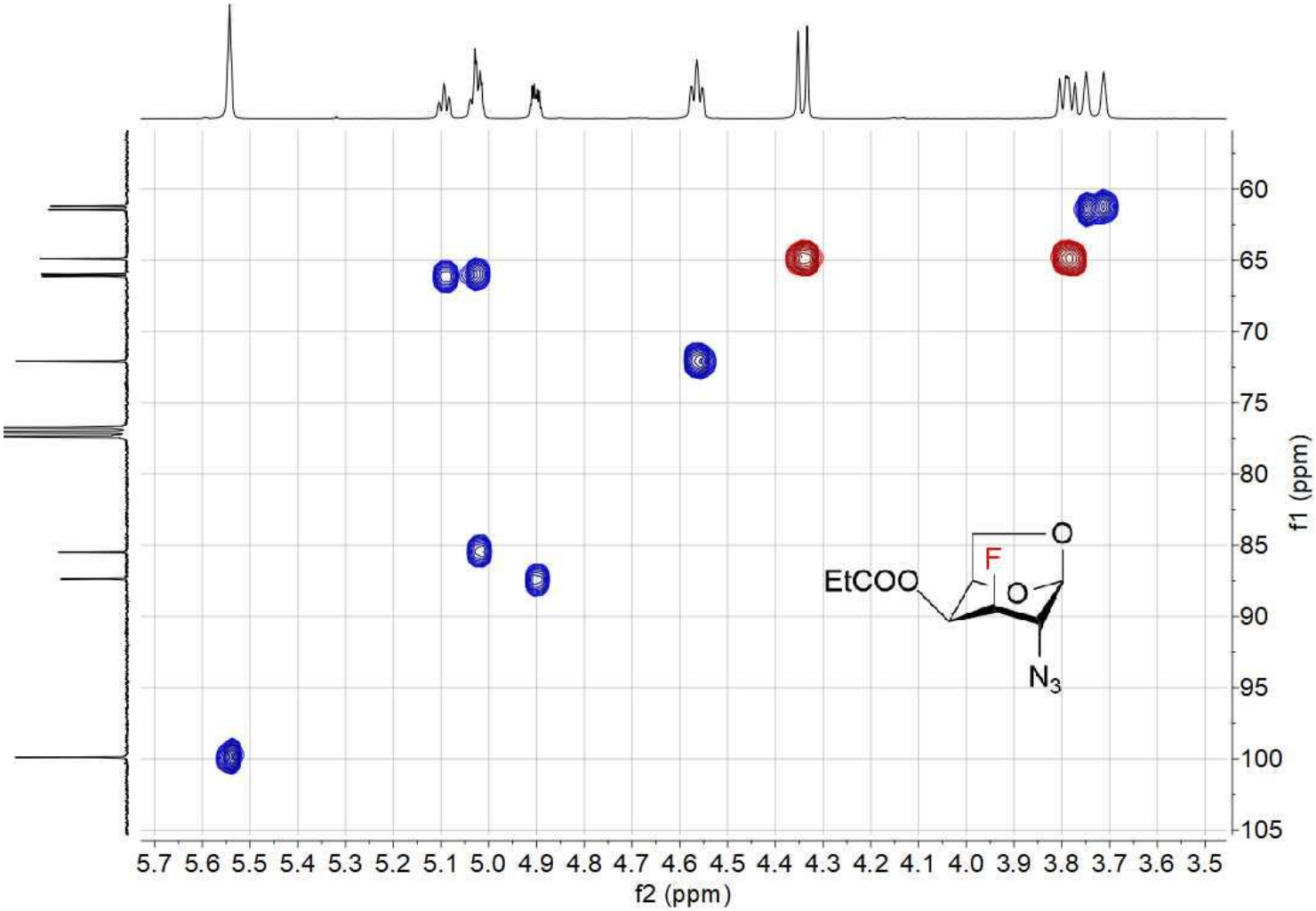
^{19}F NMR (376 MHz, $CDCl_3$) 45



^{1}H-^{1}H COSY 45

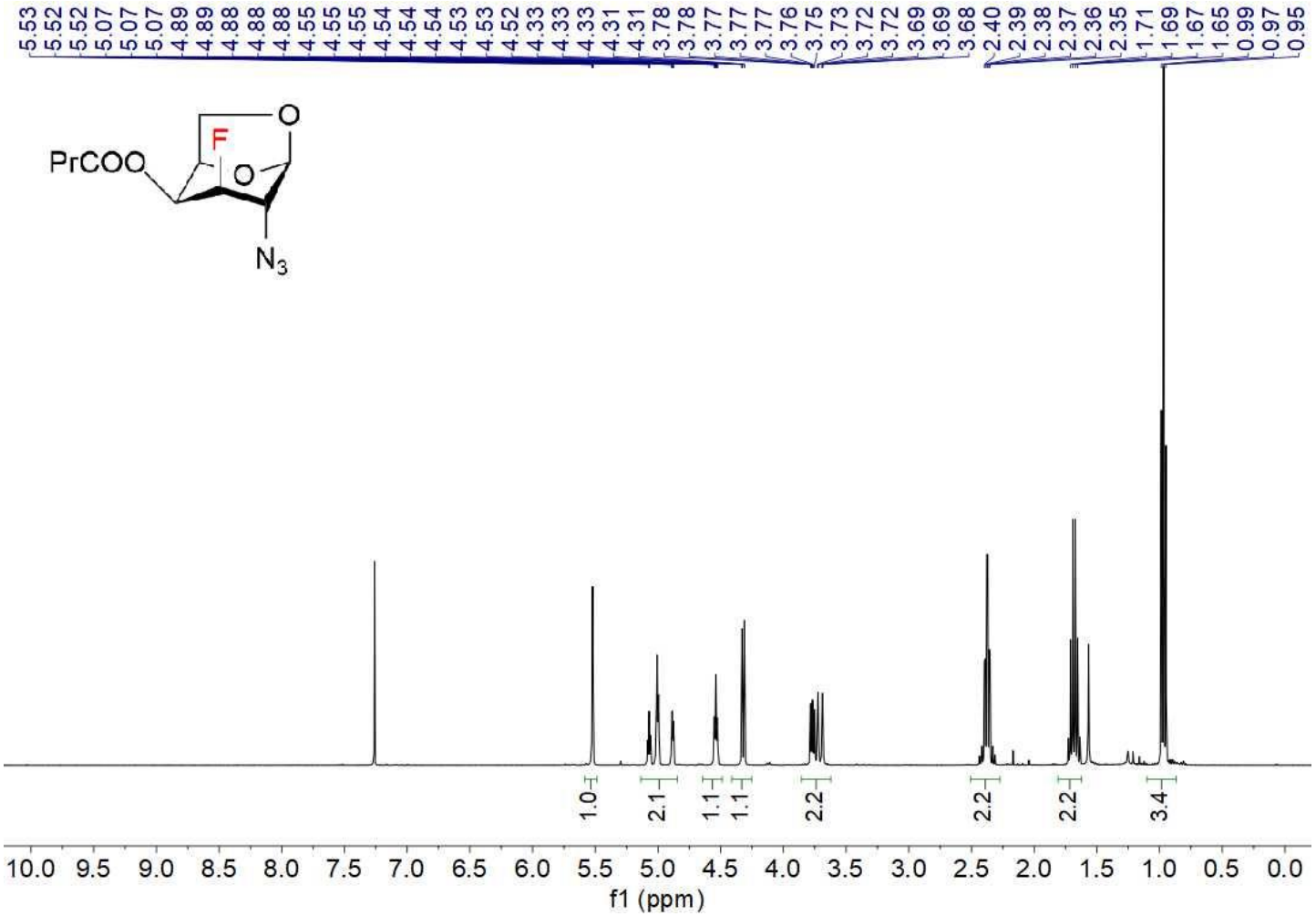

EtCOO
F
O
O
N3
f1 (ppm)
f2 (ppm)
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
5.4
5.6
5.7 5.6 5.5 5.4 5.3 5.2 5.1 5.0 4.9 4.8 4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6

^{1}H-^{13}C HSQC 45

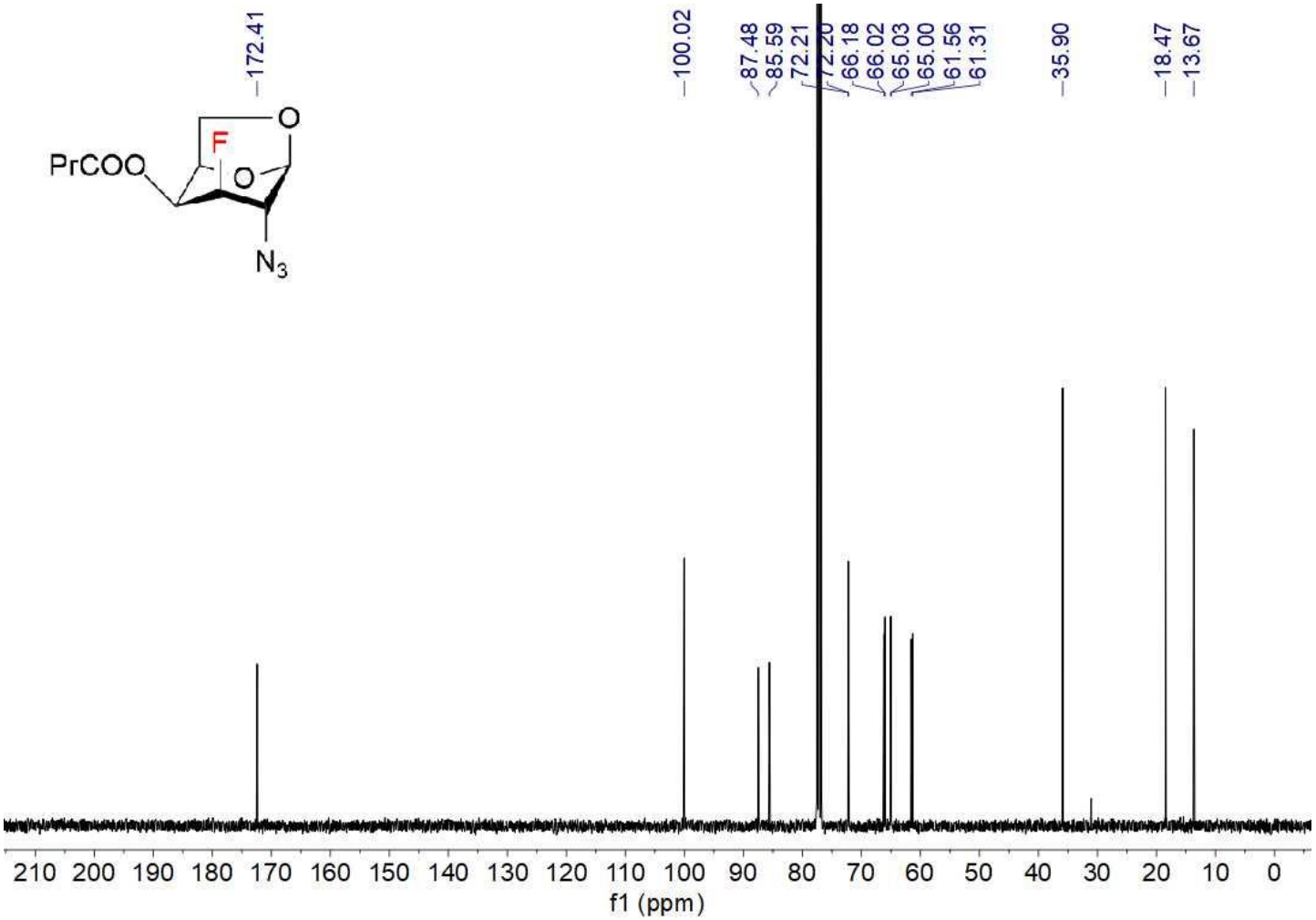


NMR COMPOUND 46

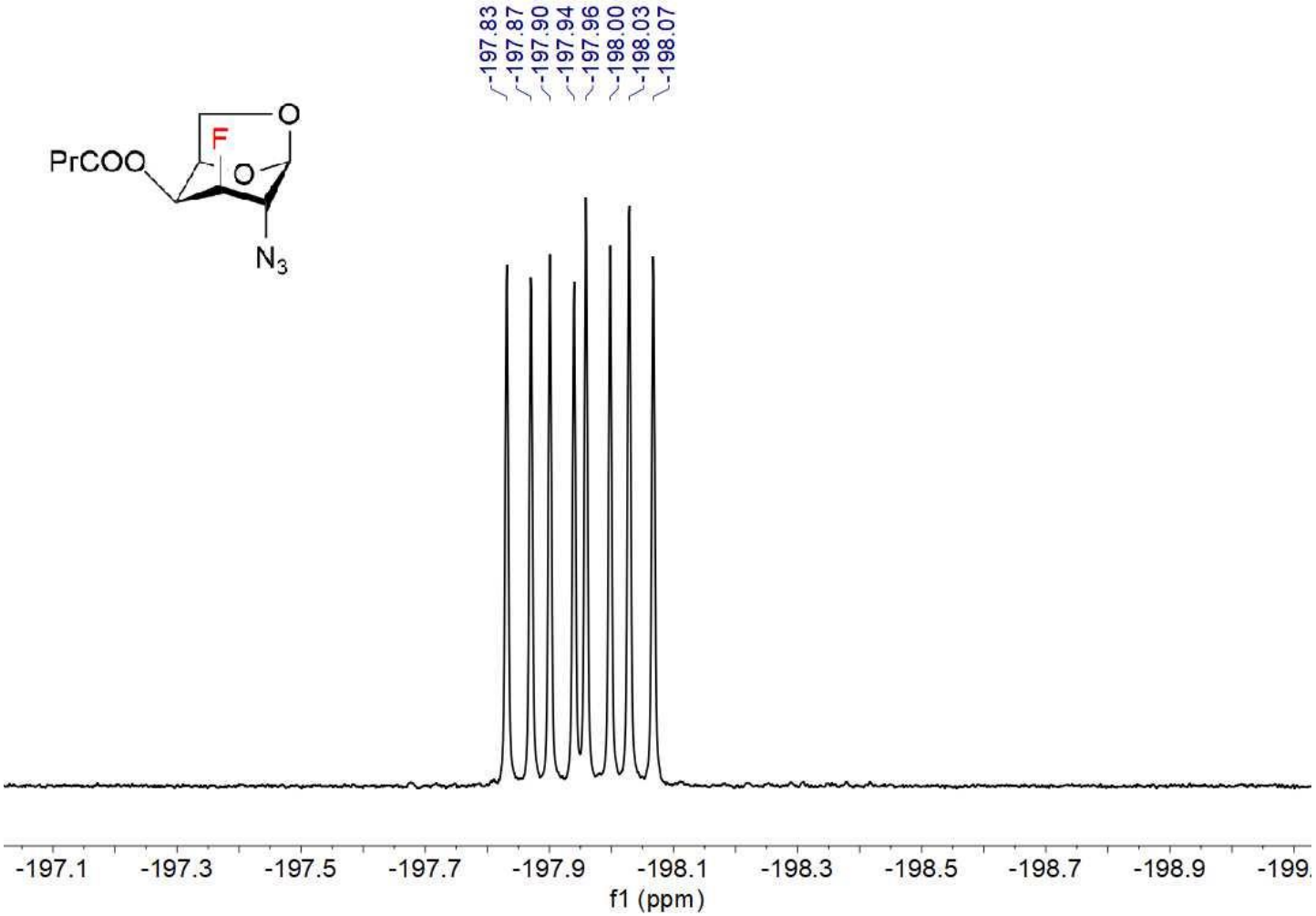
^{1}H NMR (400 MHz, $CDCl_3$) 46



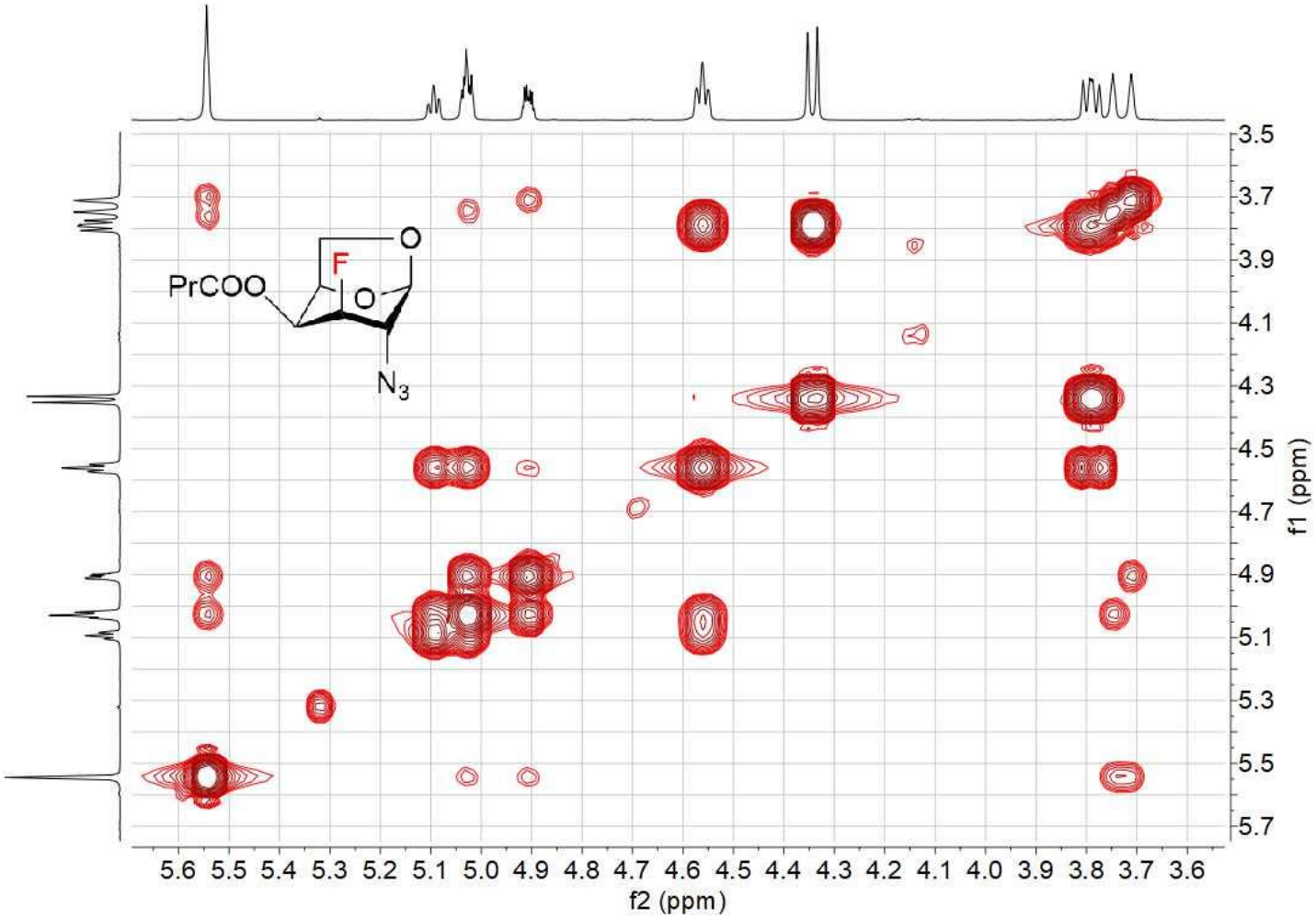
^{13}C NMR (100 MHz, $CDCl_3$) 46



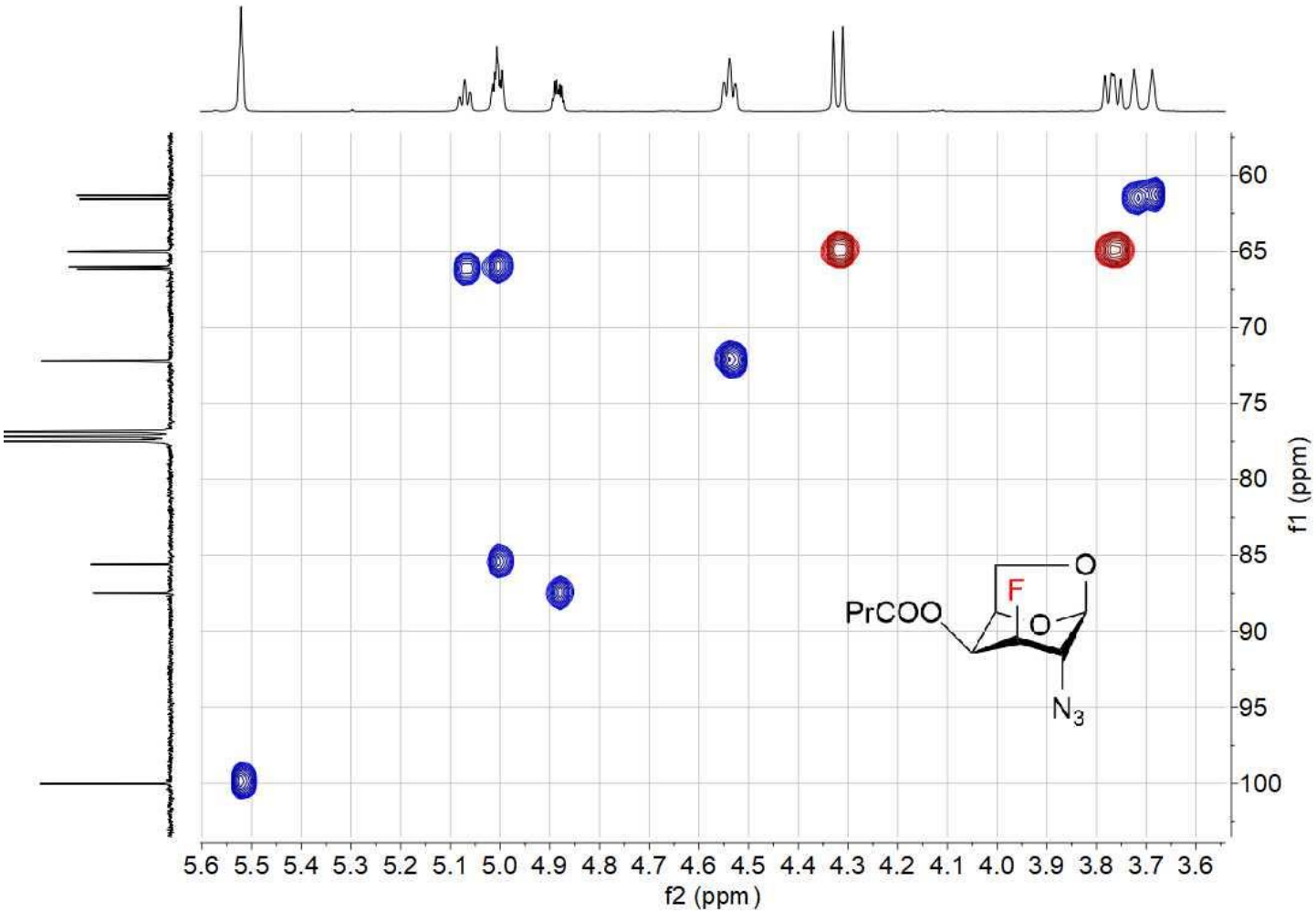
^{19}F NMR (376 MHz, $CDCl_3$) 46



^{1}H-^{1}H COSY 46

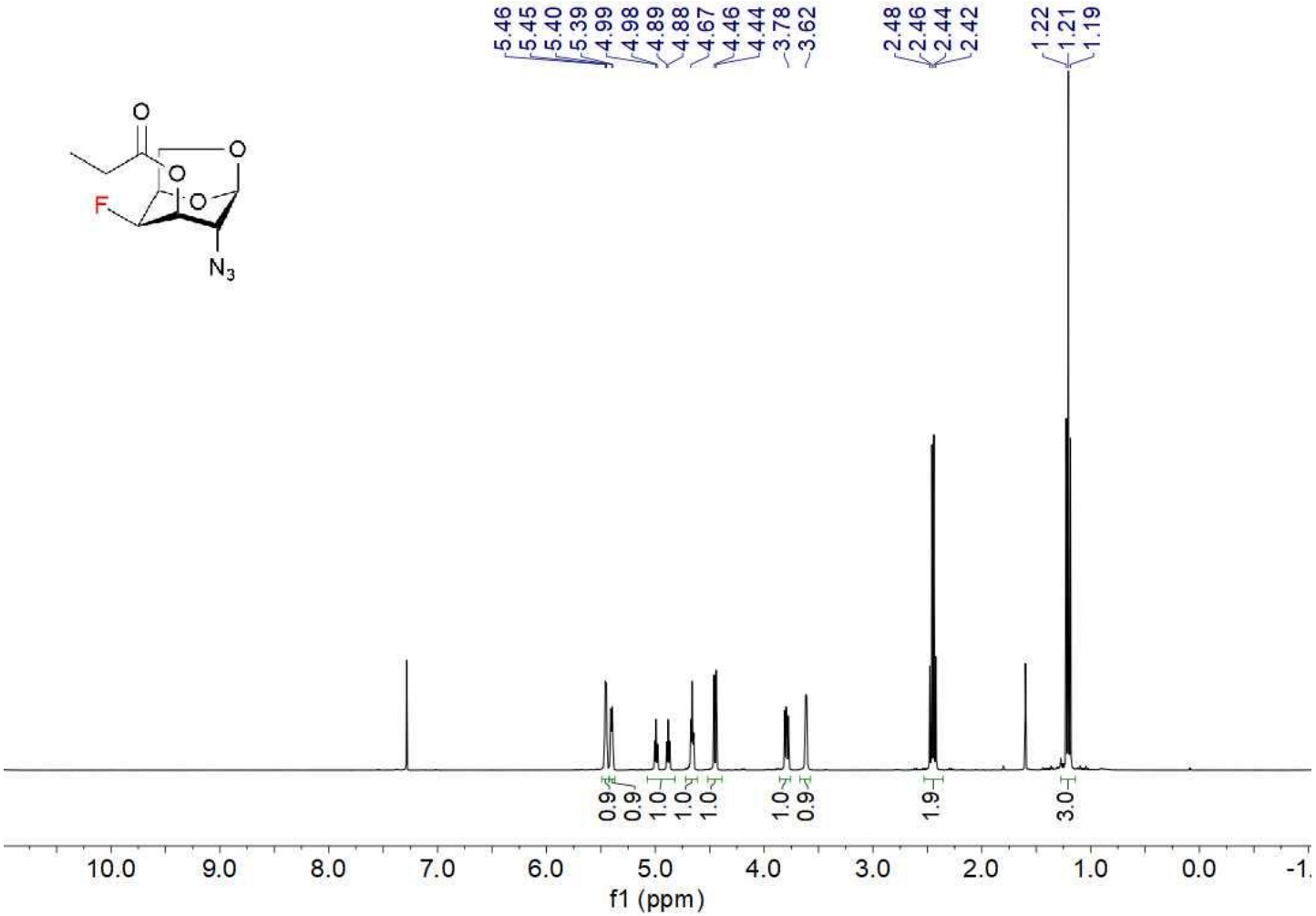


^{1}H-^{13}C HSQC 46

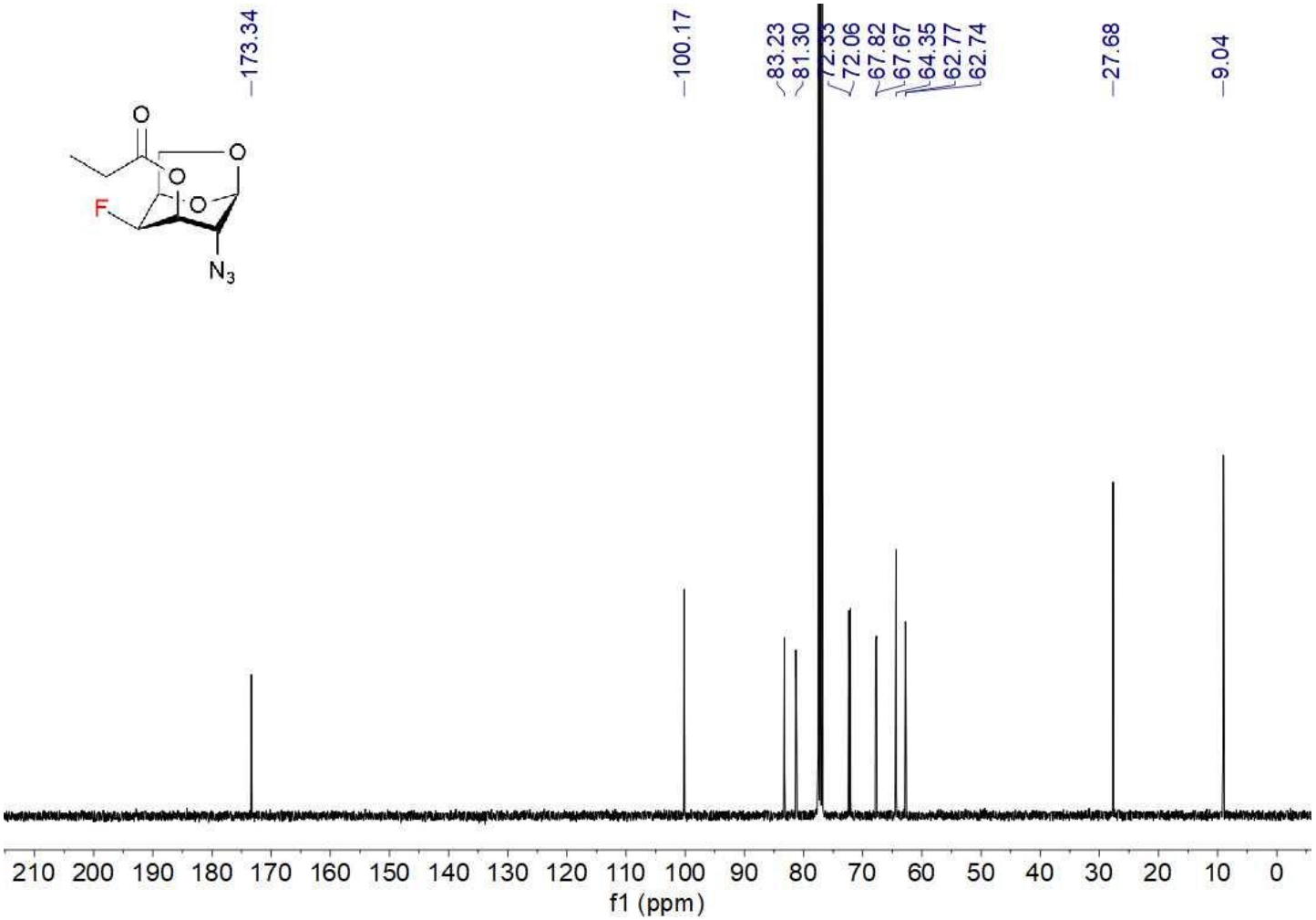


NMR COMPOUND 48

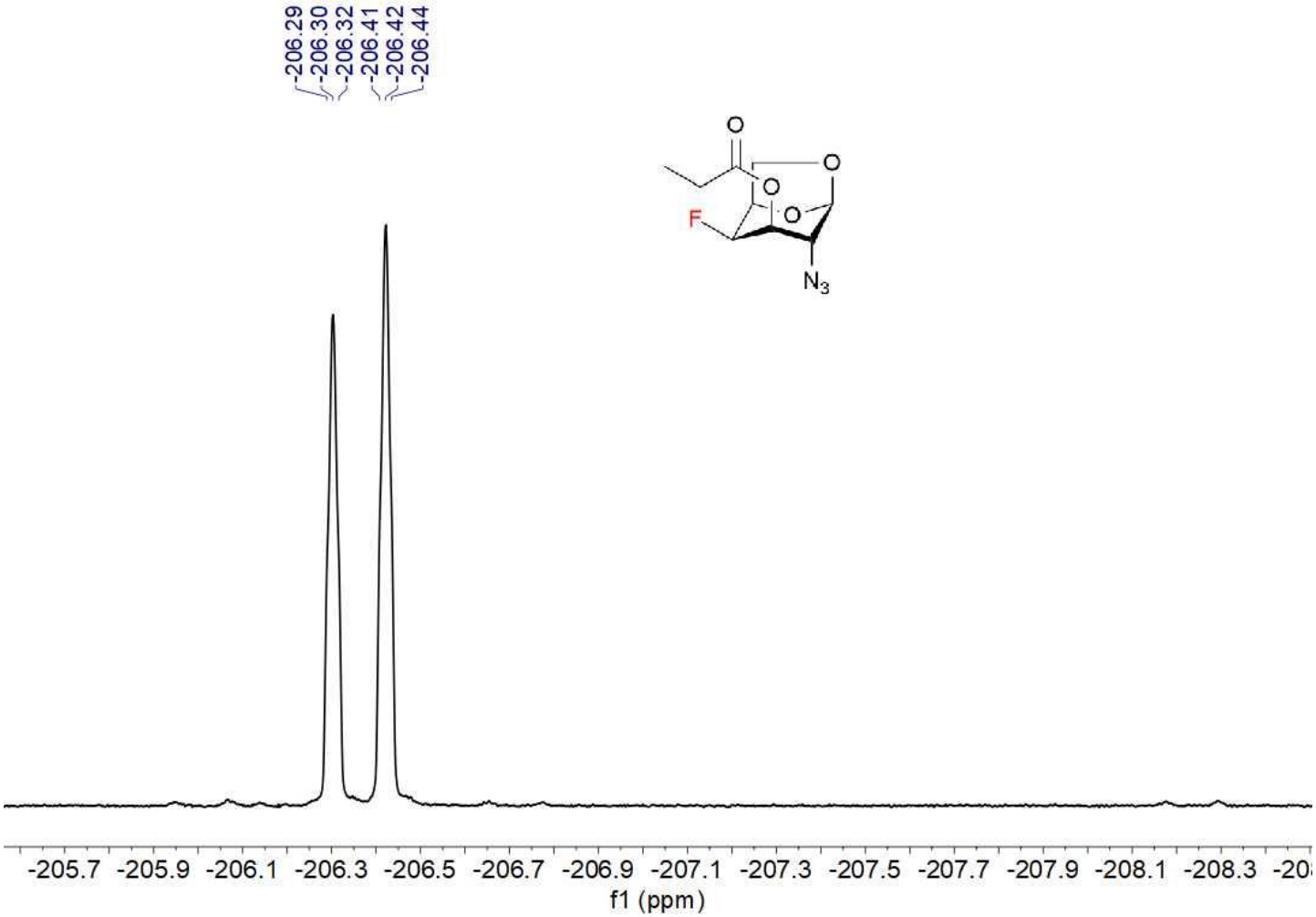
^{1}H NMR (400 MHz, $CDCl_3$) 48



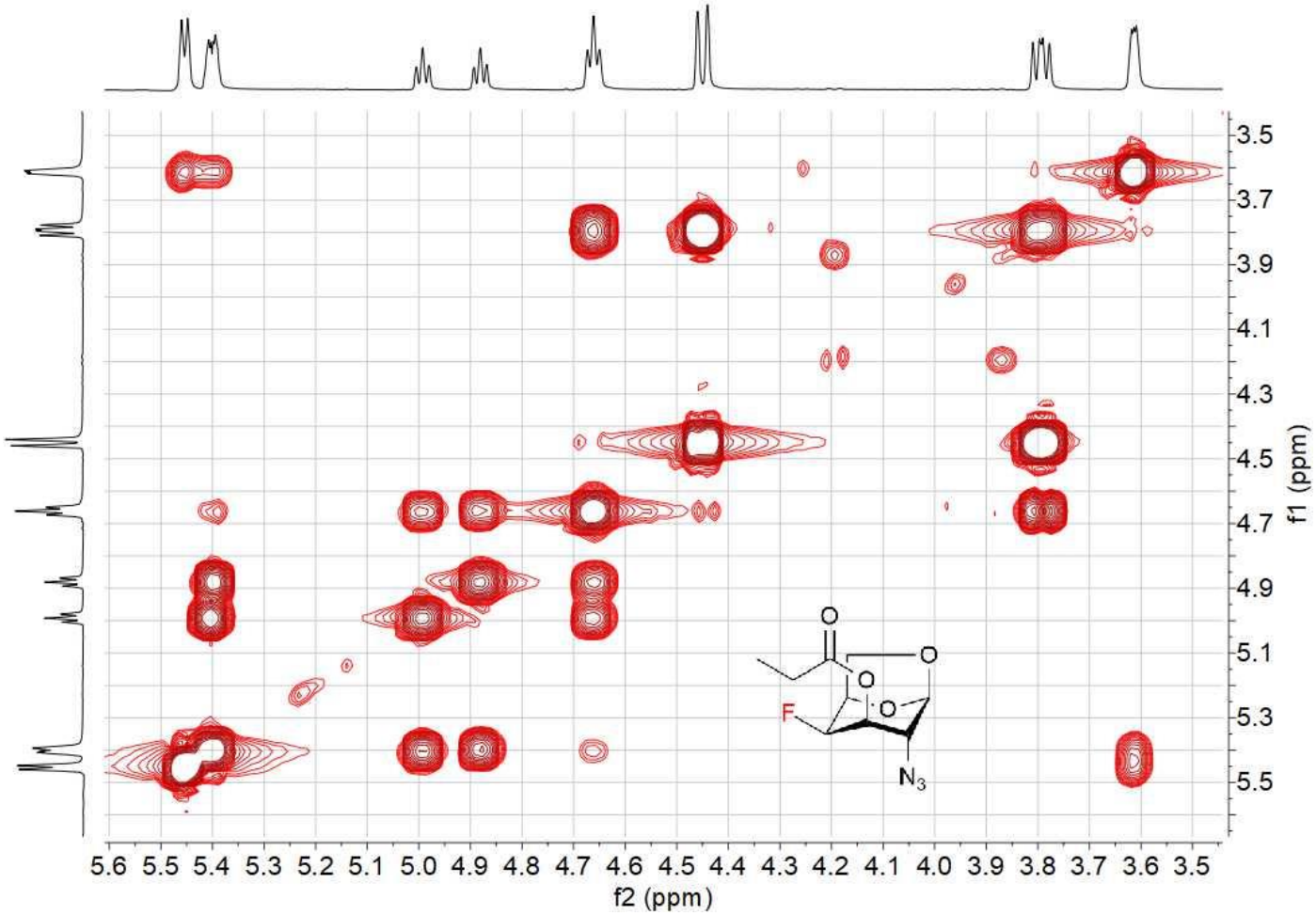
^{13}C NMR (100 MHz, $CDCl_3$) 48



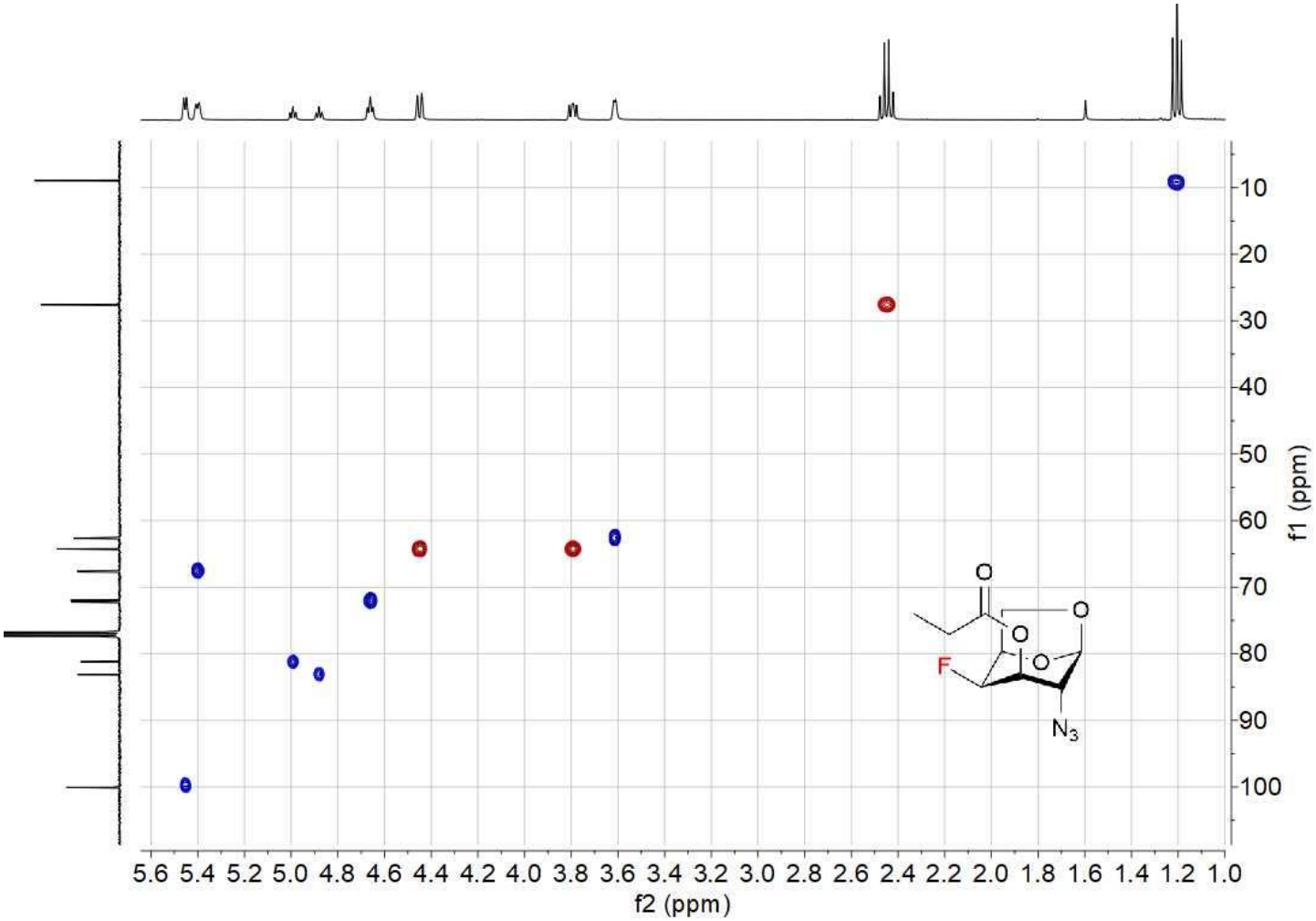
^{19}F NMR (376 MHz, $CDCl_3$) 48



^{1}H-^{1}H COSY 48

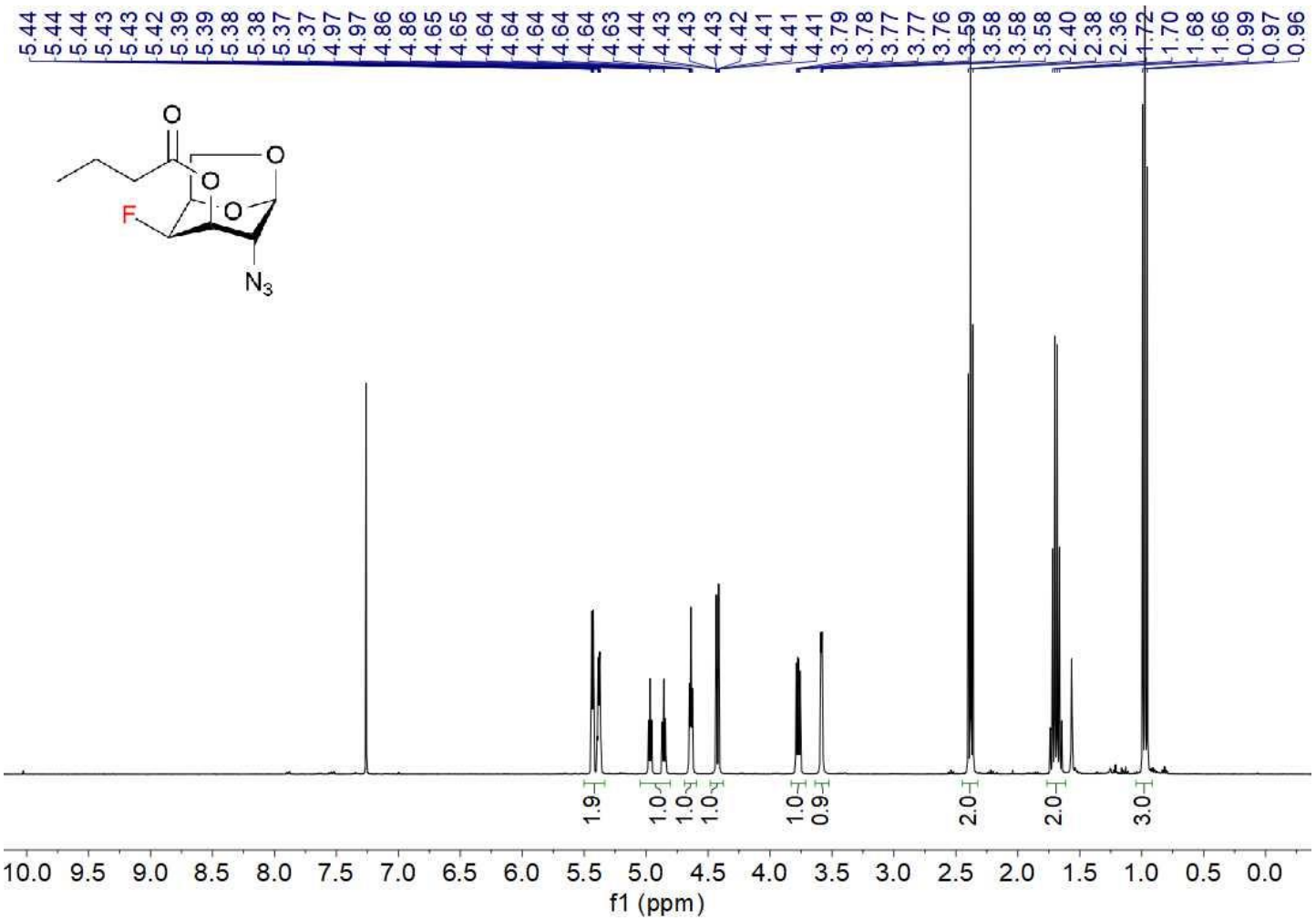

f2 (ppm)
f1 (ppm)
5.6 5.5 5.4 5.3 5.2 5.1 5.0 4.9 4.8 4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6 3.5
3.5 3.7 3.9 4.1 4.3 4.5 4.7 4.9 5.1 5.3 5.5
O
O
O
O
F
N3

^{1}H-^{13}C HSQC 48

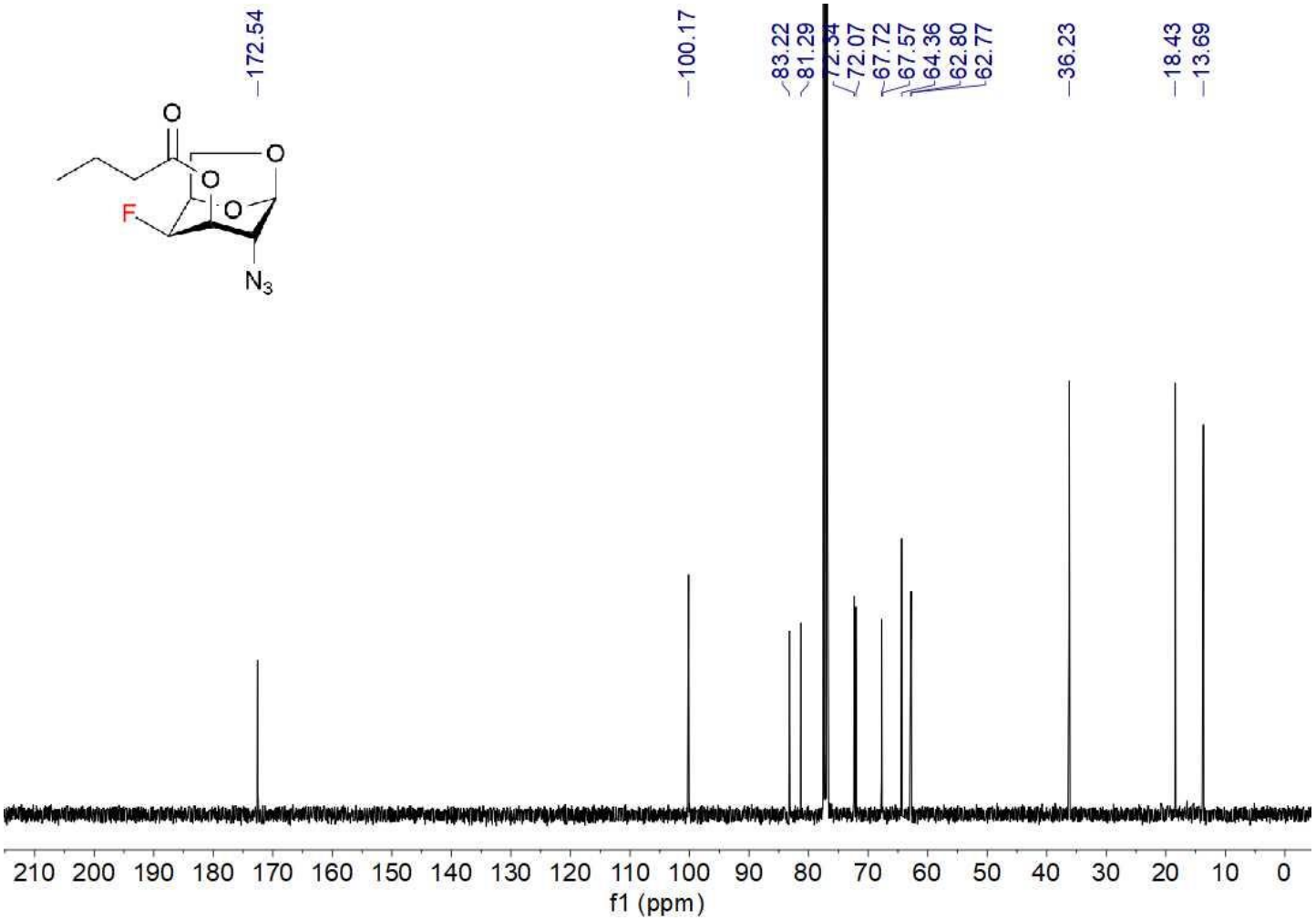


NMR COMPOUND 49

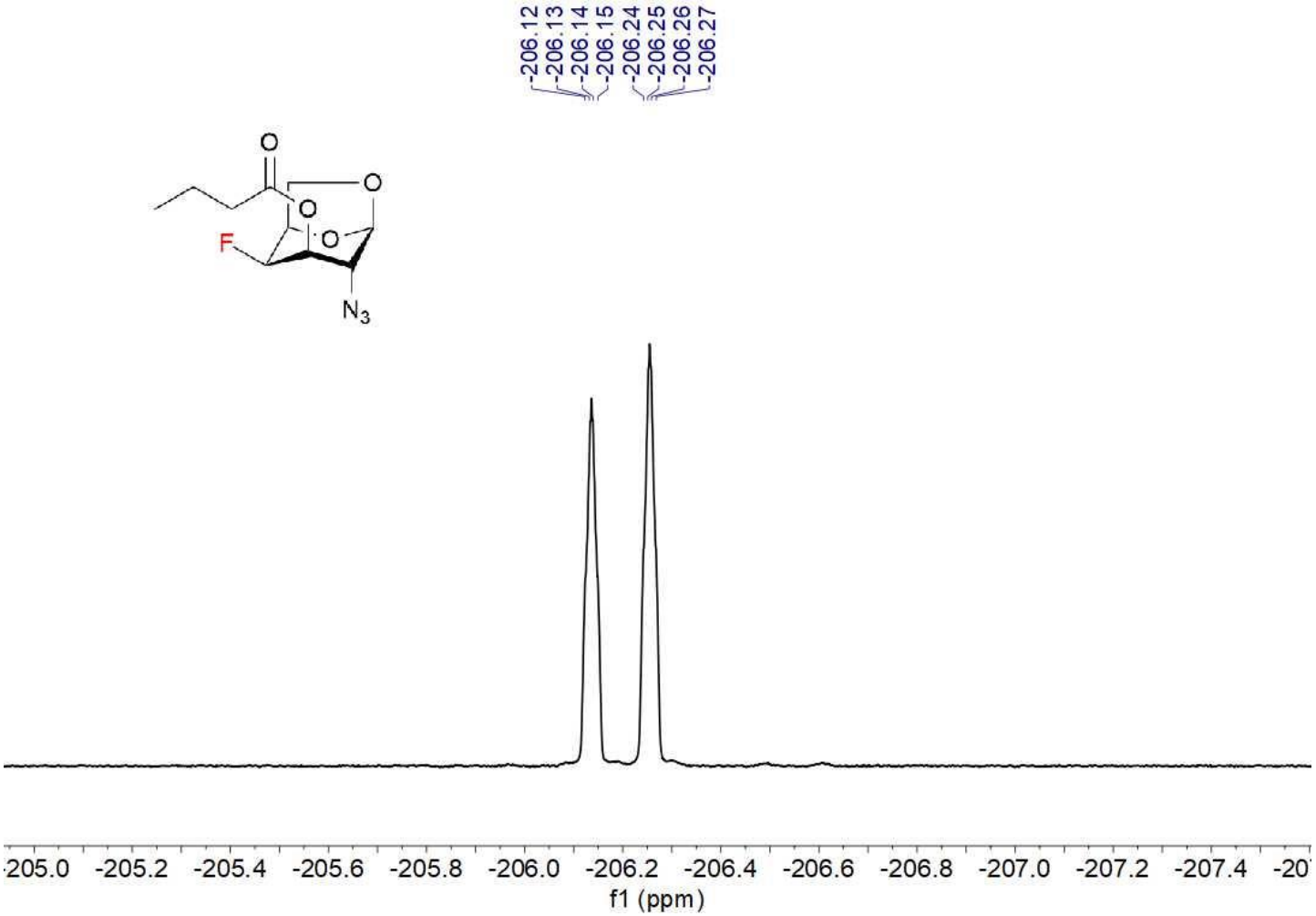
^{1}H NMR (400 MHz, $CDCl_3$) 49



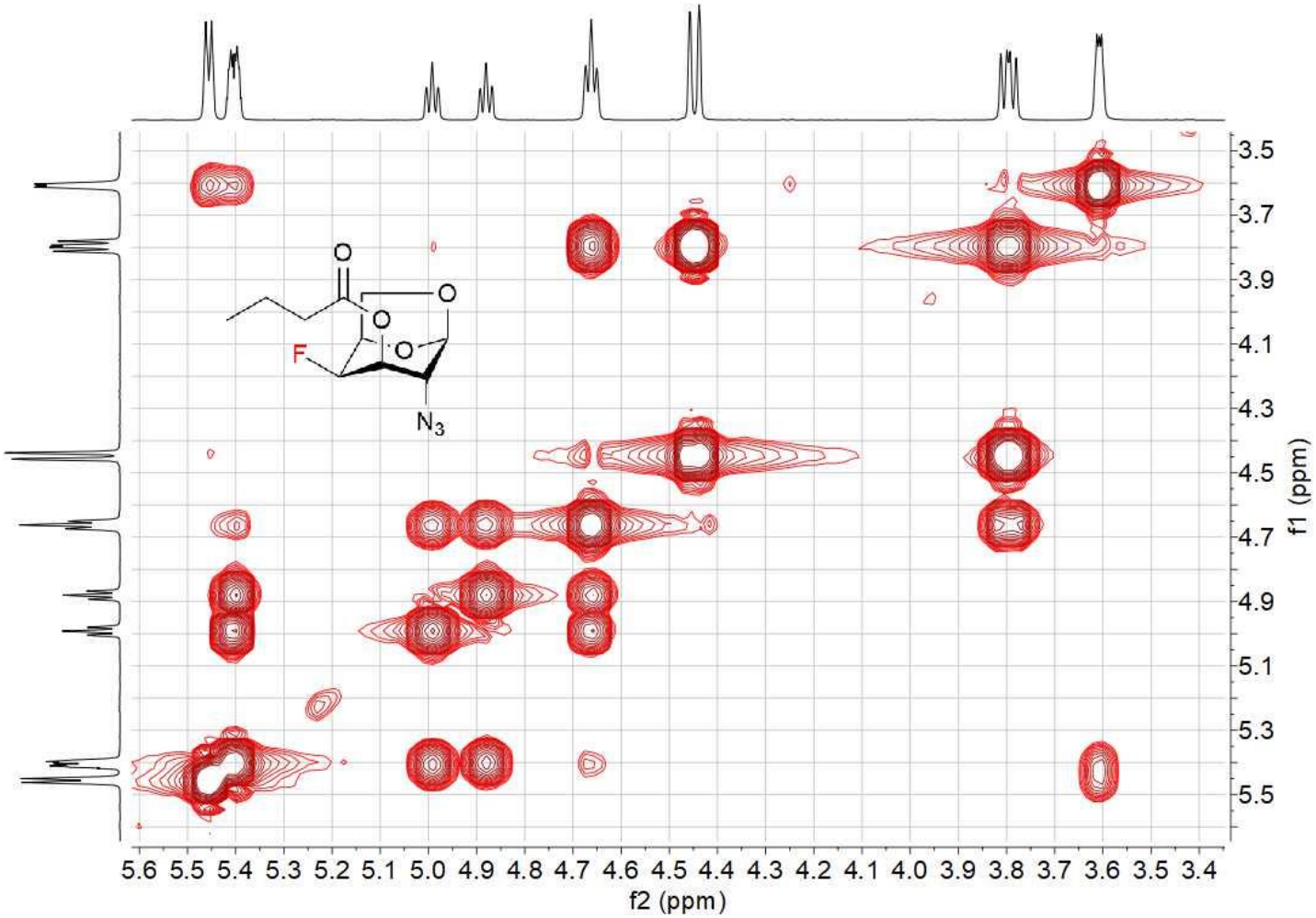
^{13}C NMR (100 MHz, $CDCl_3$) 49



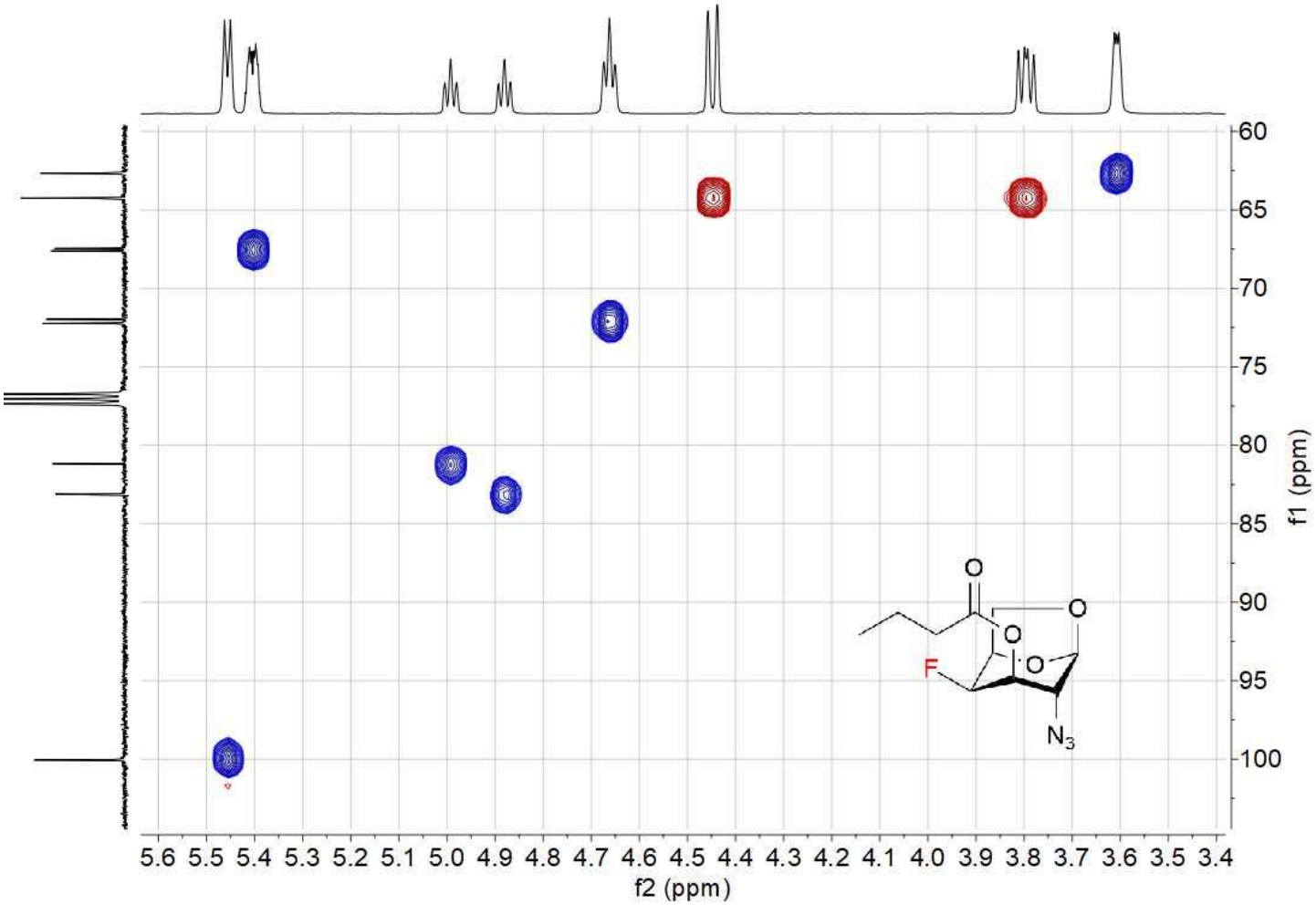
^{19}F NMR (376 MHz, $CDCl_3$) 49



^{1}H-^{1}H COSY 49

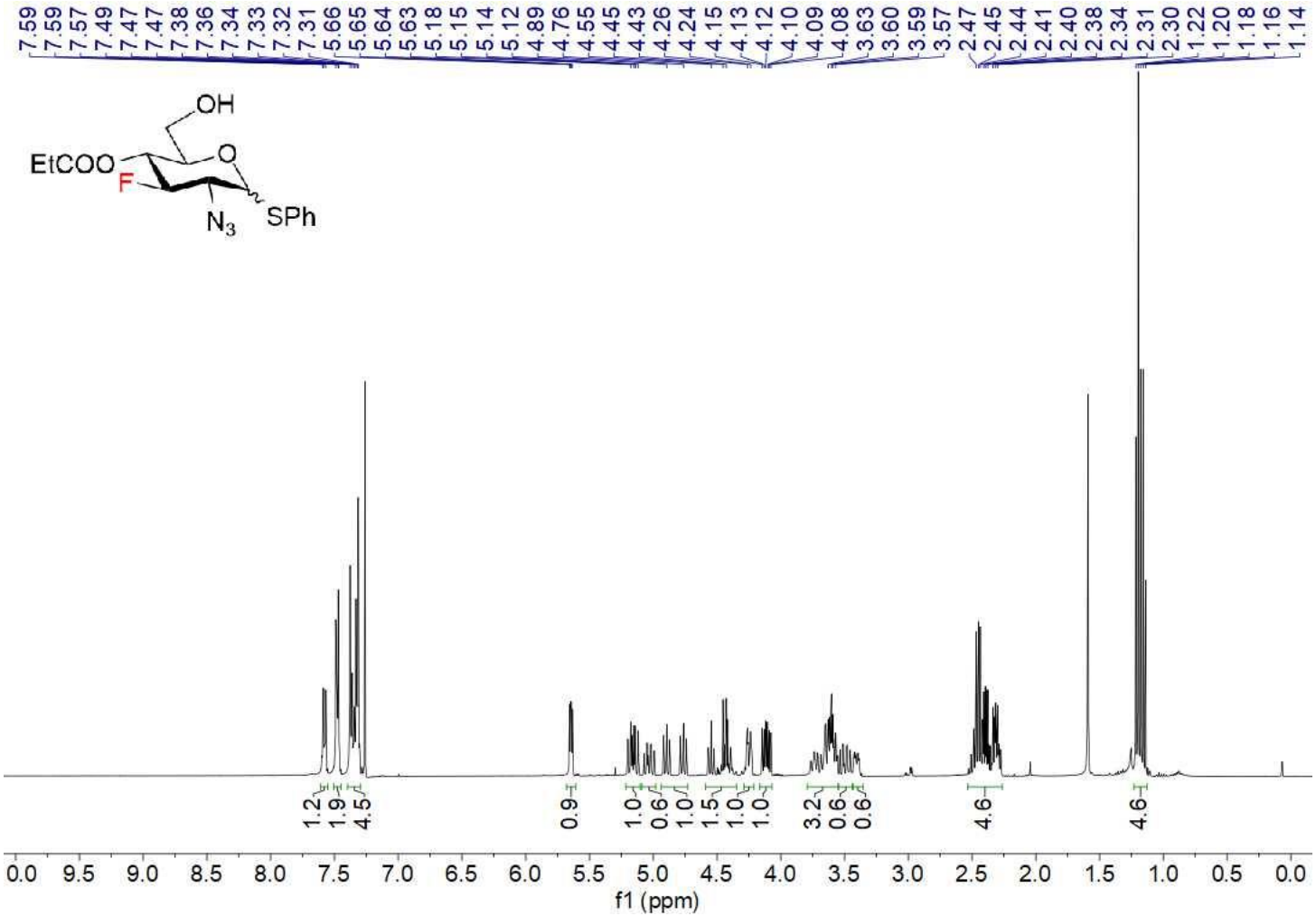

O
O
O
O
F
N3
3.5
3.7
3.9
4.1
4.3
4.5
4.7
4.9
5.1
5.3
5.5
f1 (ppm)
5.6 5.5 5.4 5.3 5.2 5.1 5.0 4.9 4.8 4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6 3.5 3.4
f2 (ppm)

^{1}H-^{13}C HSQC 49

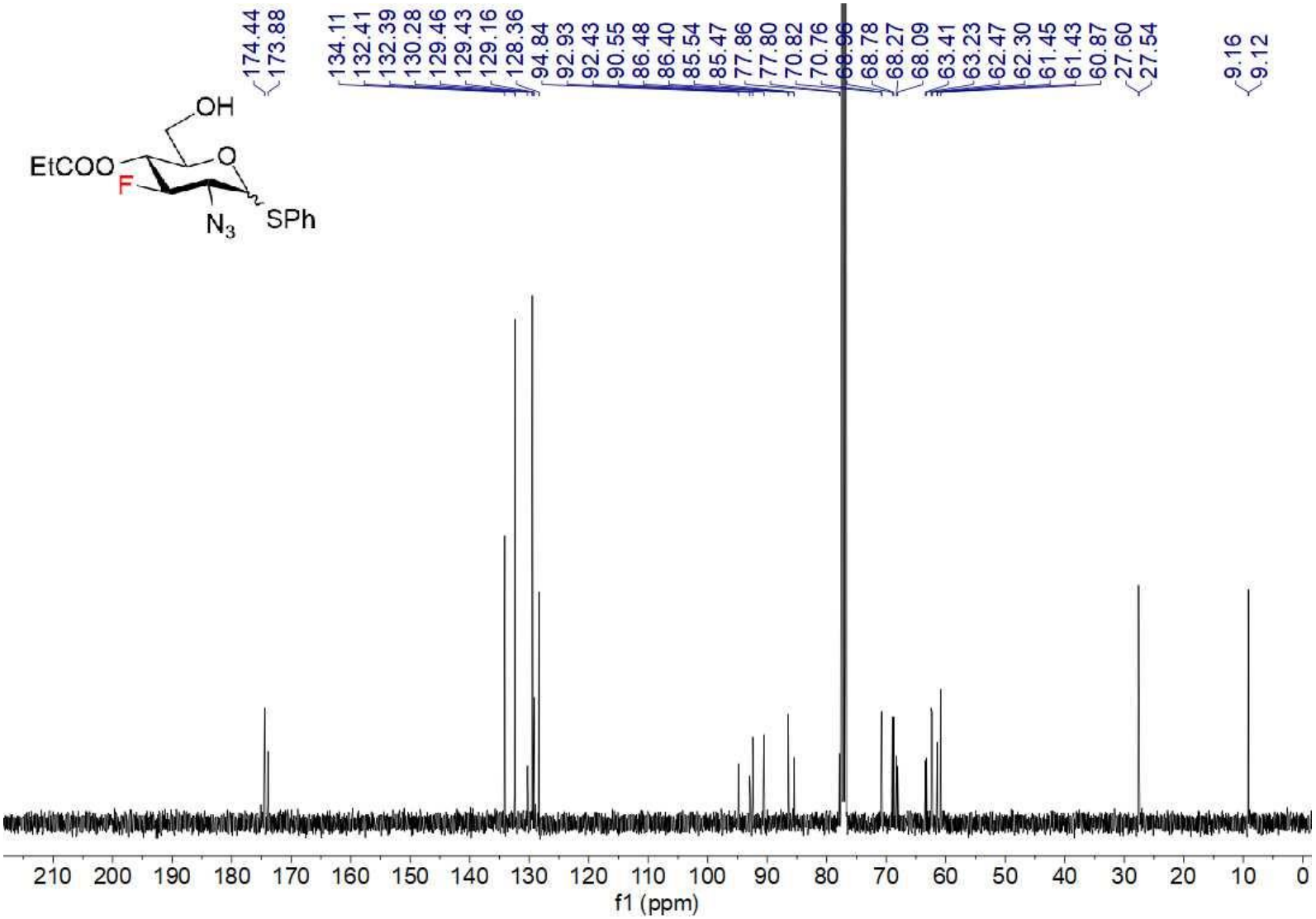


NMR COMPOUND 51

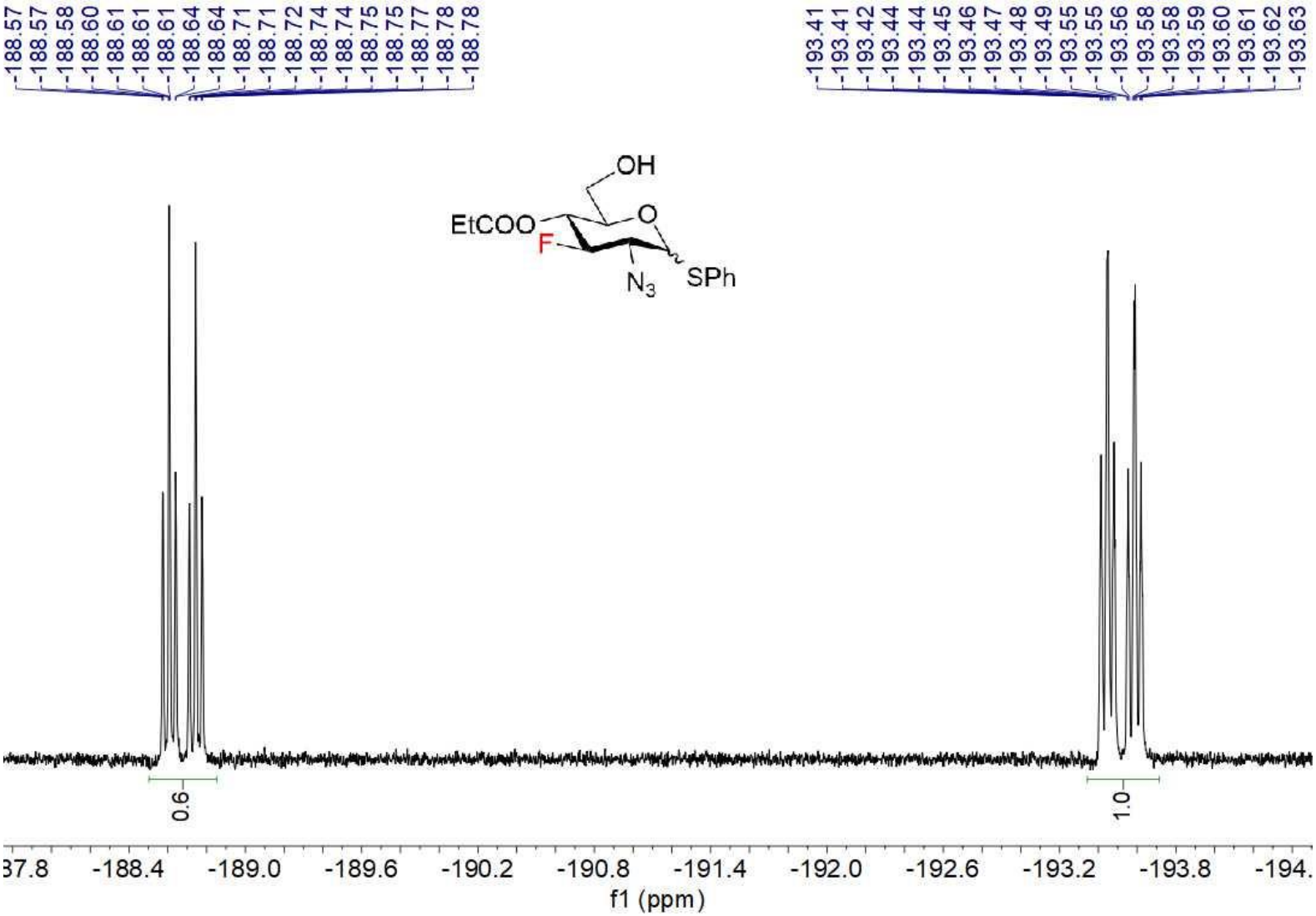
^{1}H NMR (400 MHz, $CDCl_3$) 51



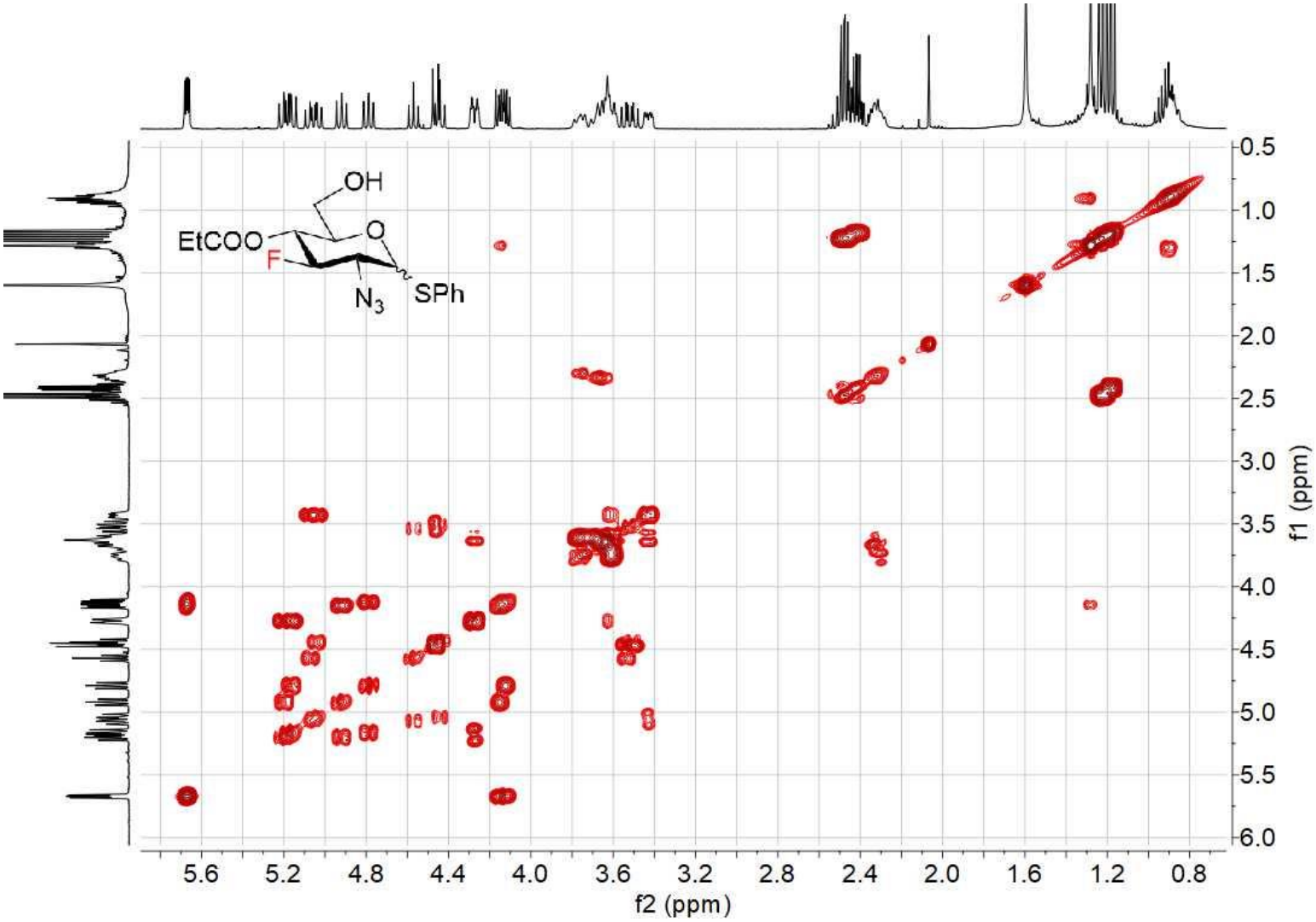
^{13}C NMR (100 MHz, $CDCl_3$) 51



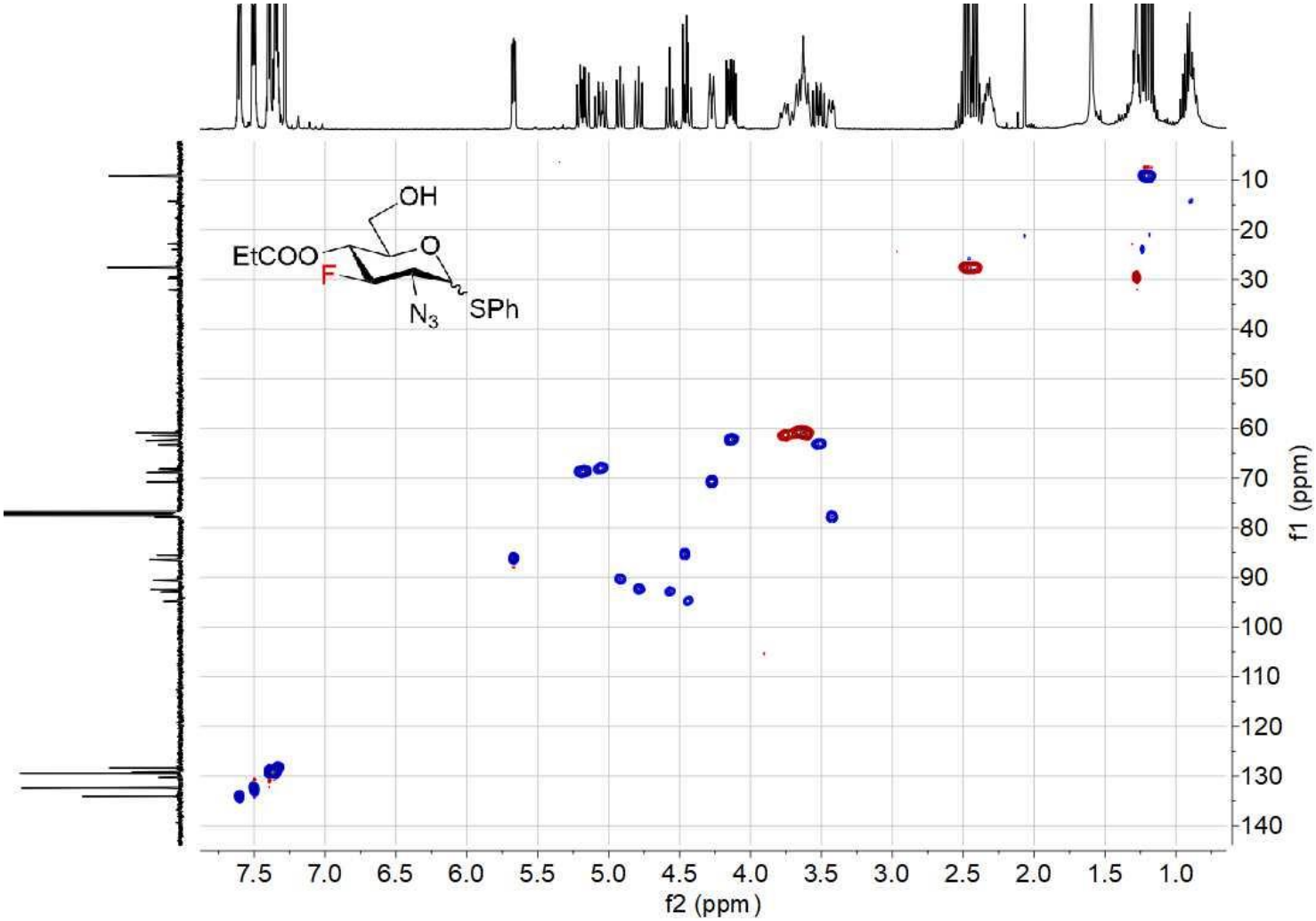
^{19}F NMR (376 MHz, $CDCl_3$) 51



^{1}H-^{1}H COSY 51

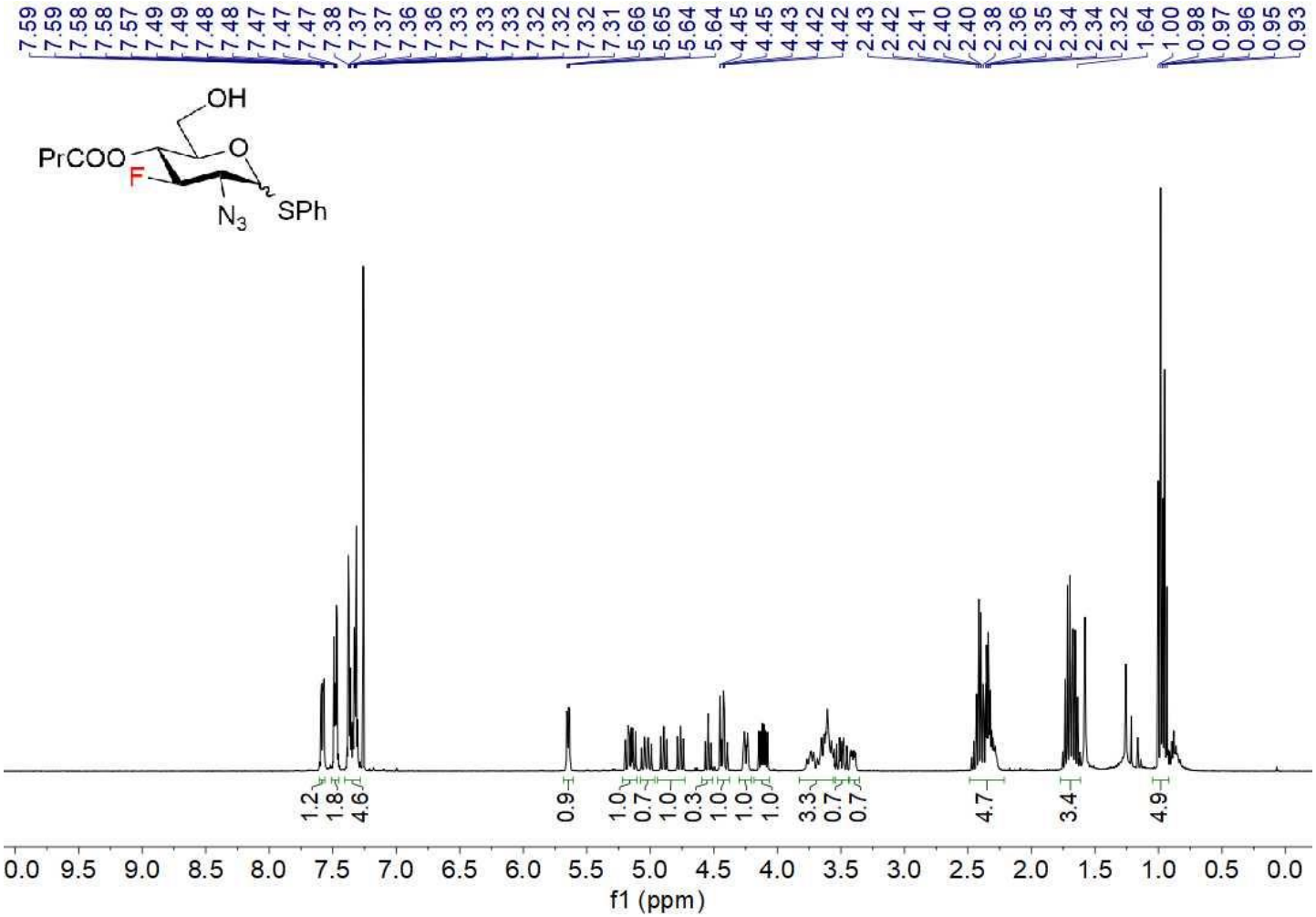


^{1}H-^{13}C HSQC 51

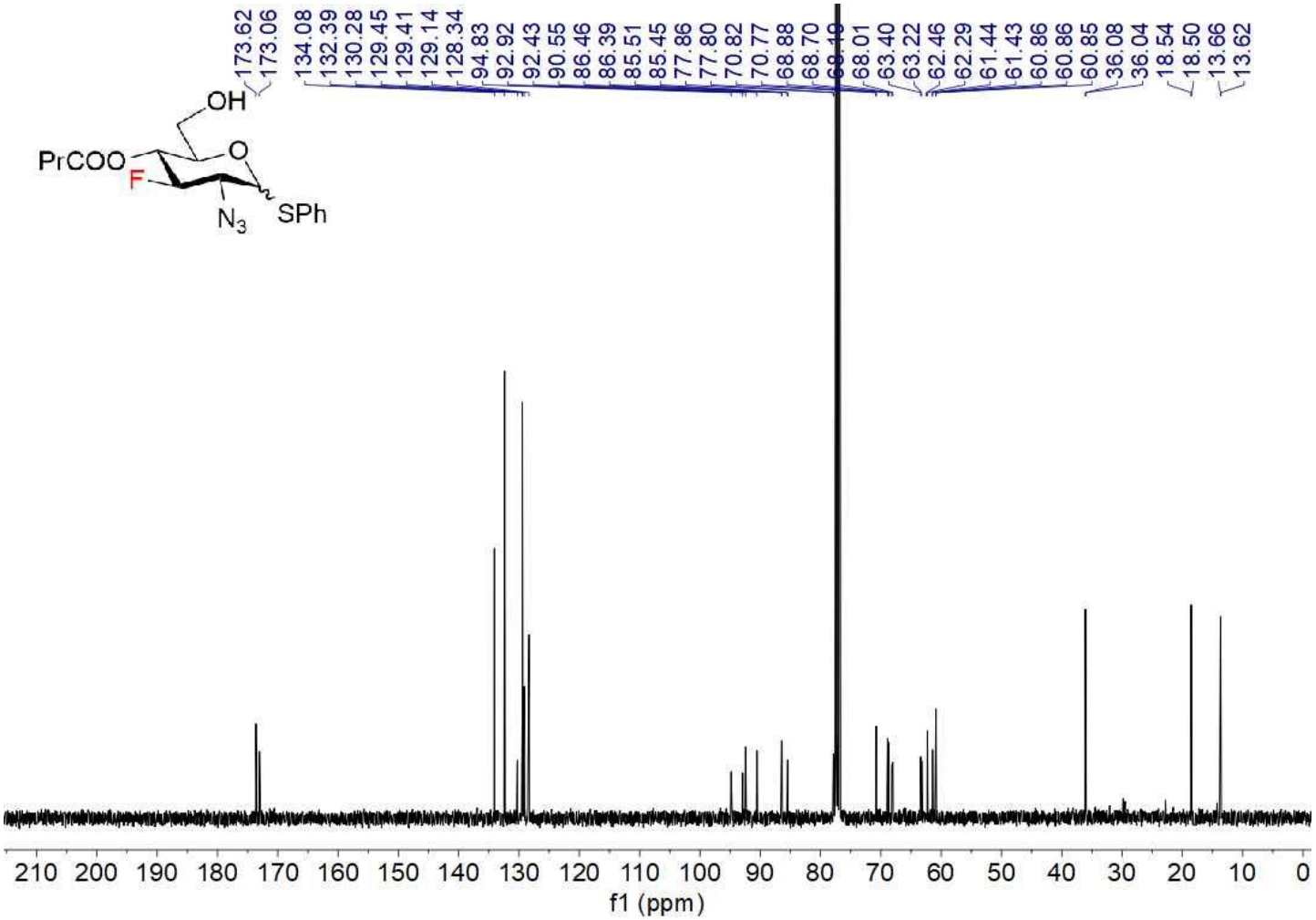


NMR COMPOUND 52

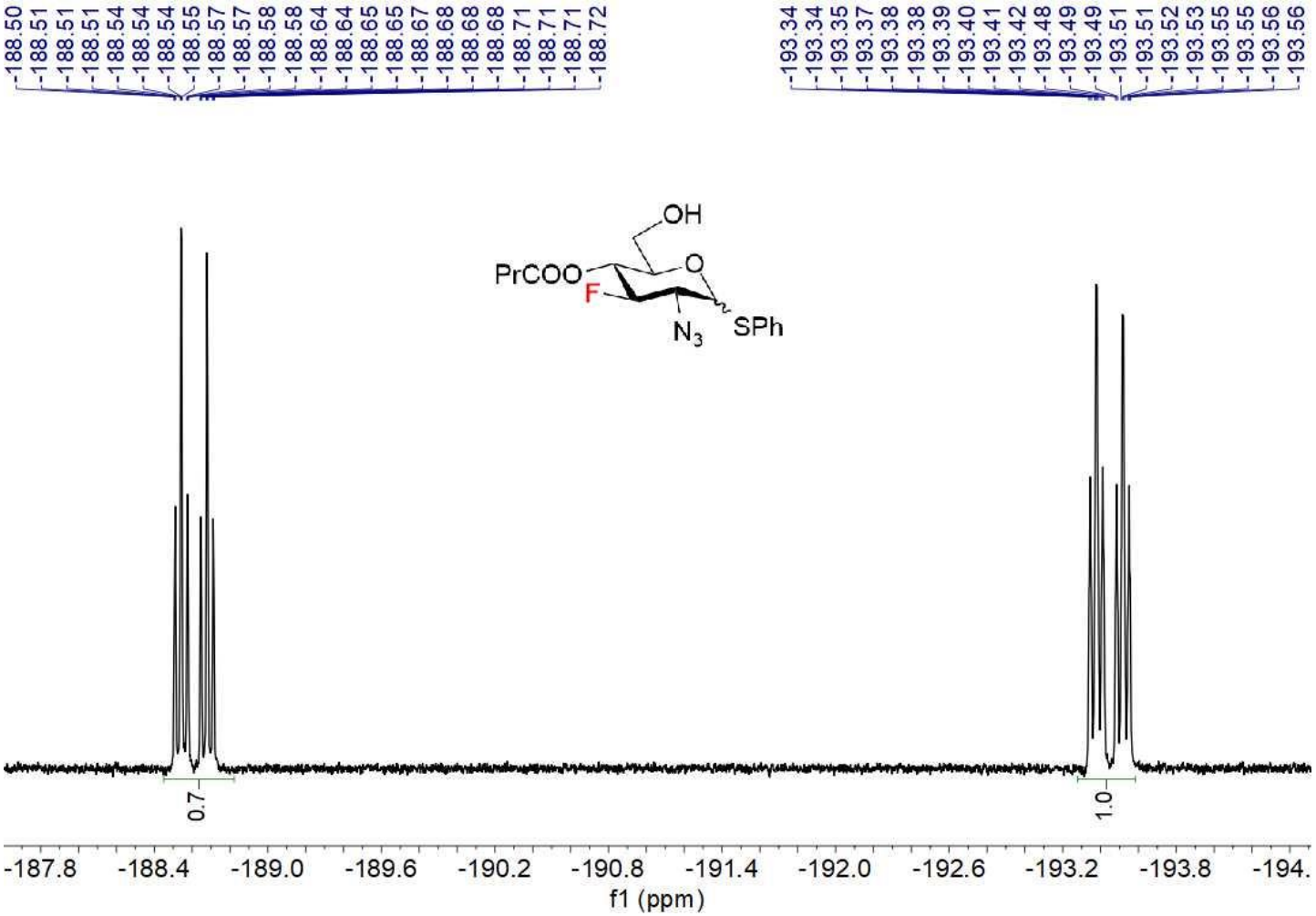
^{1}H NMR (400 MHz, $CDCl_3$) 52



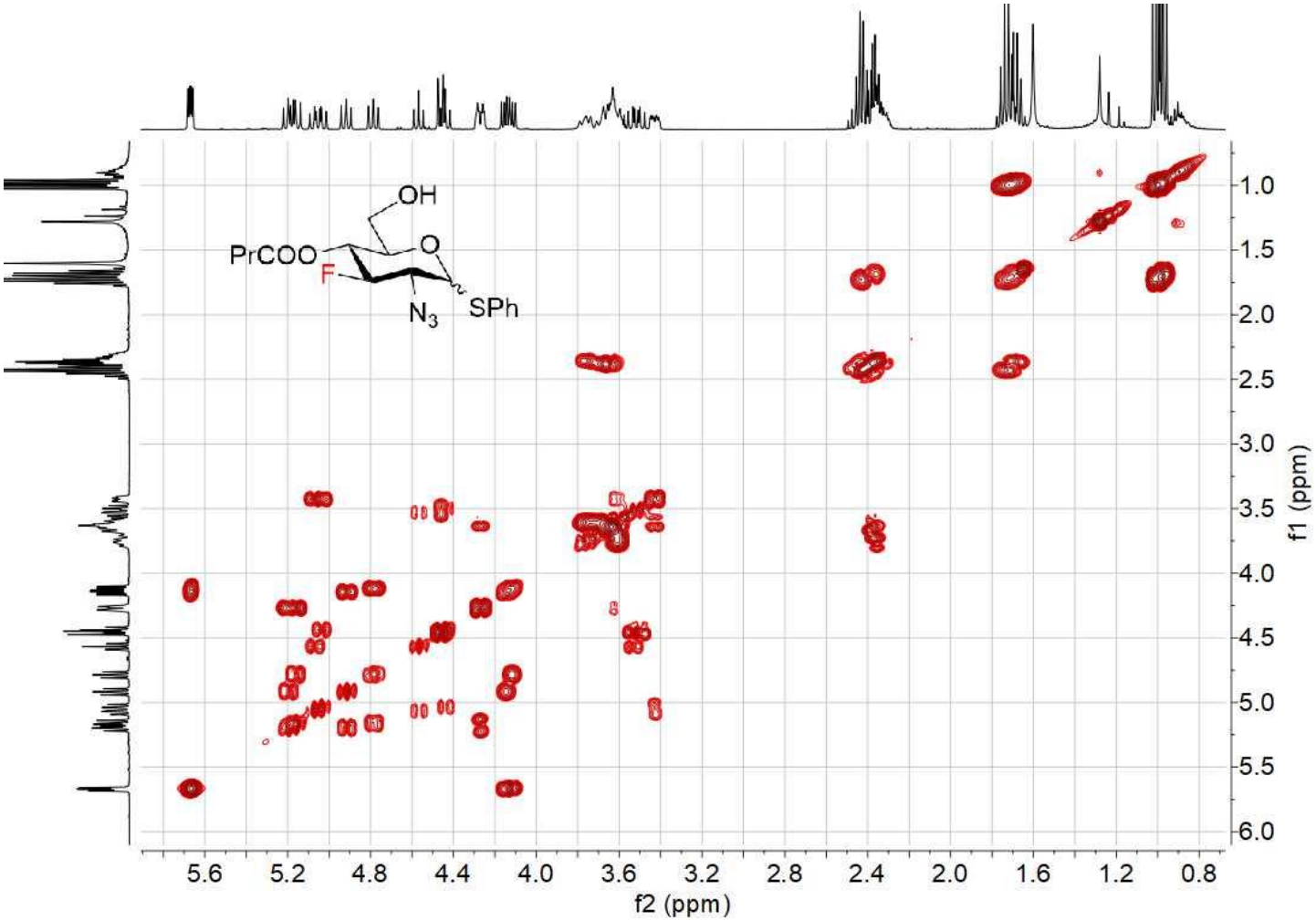
^{13}C NMR (100 MHz, $CDCl_3$) 52



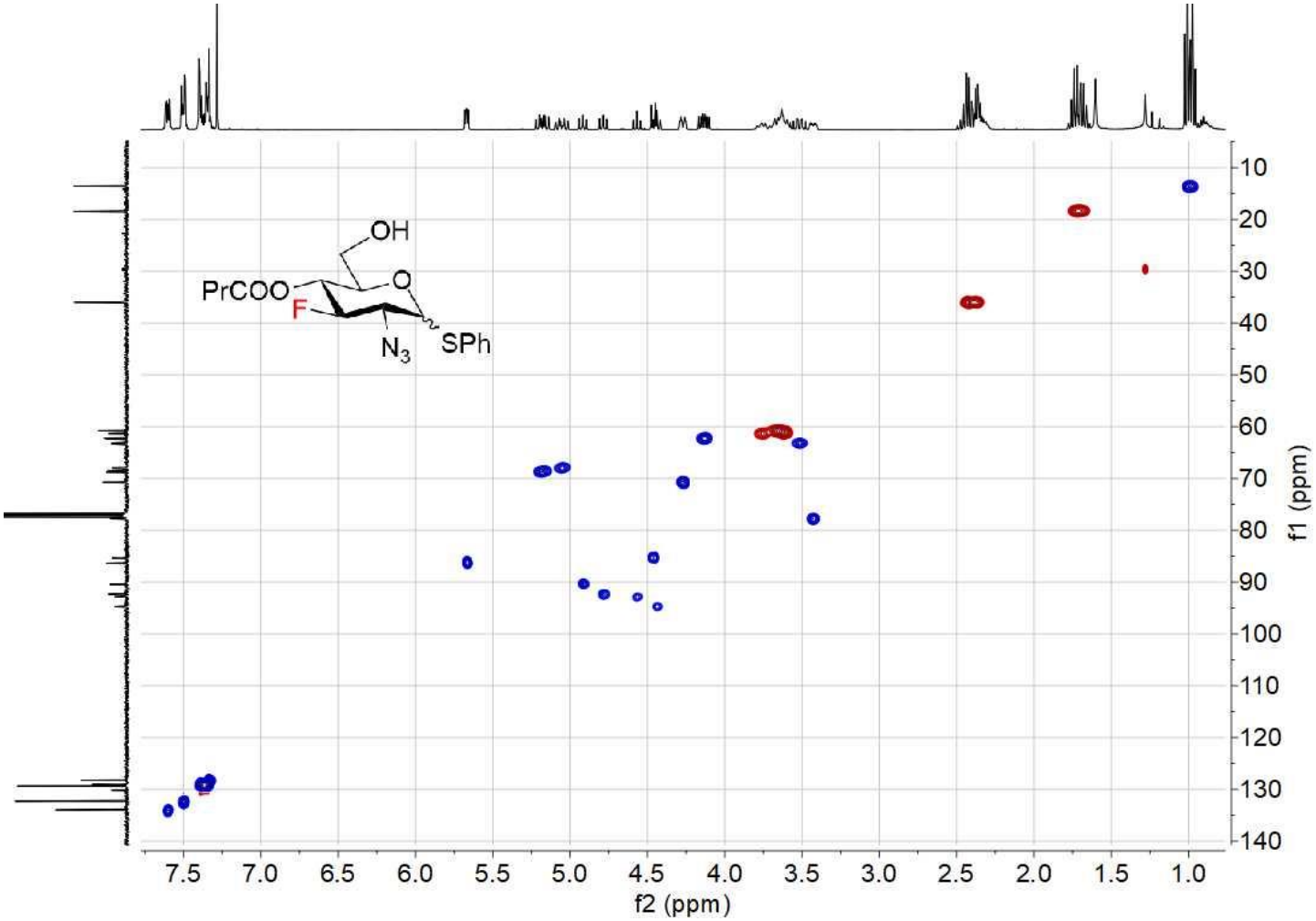
^{19}F NMR (376 MHz, $CDCl_3$) 52



^{1}H-^{1}H COSY 52

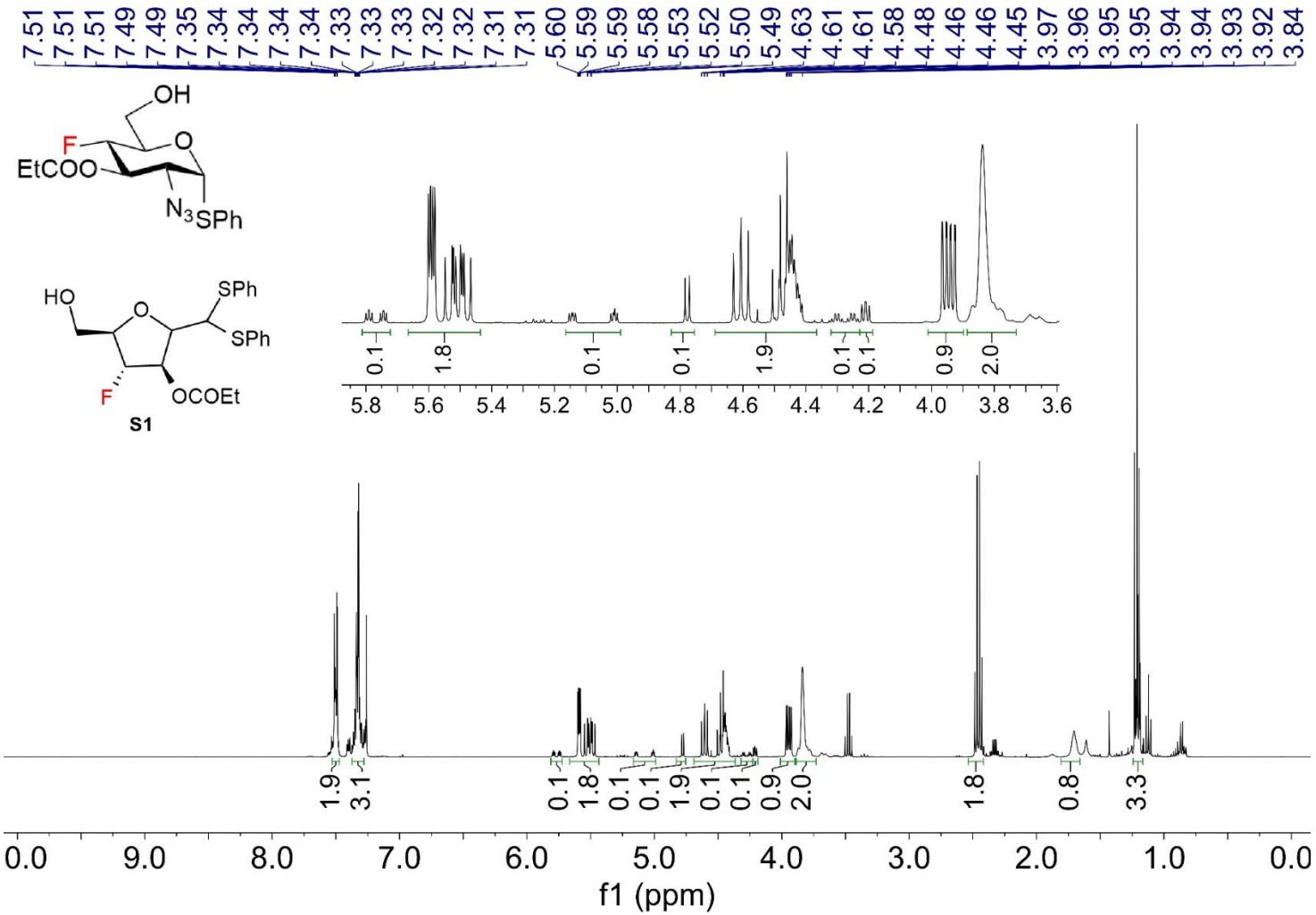


^{1}H-^{13}C HSQC 52

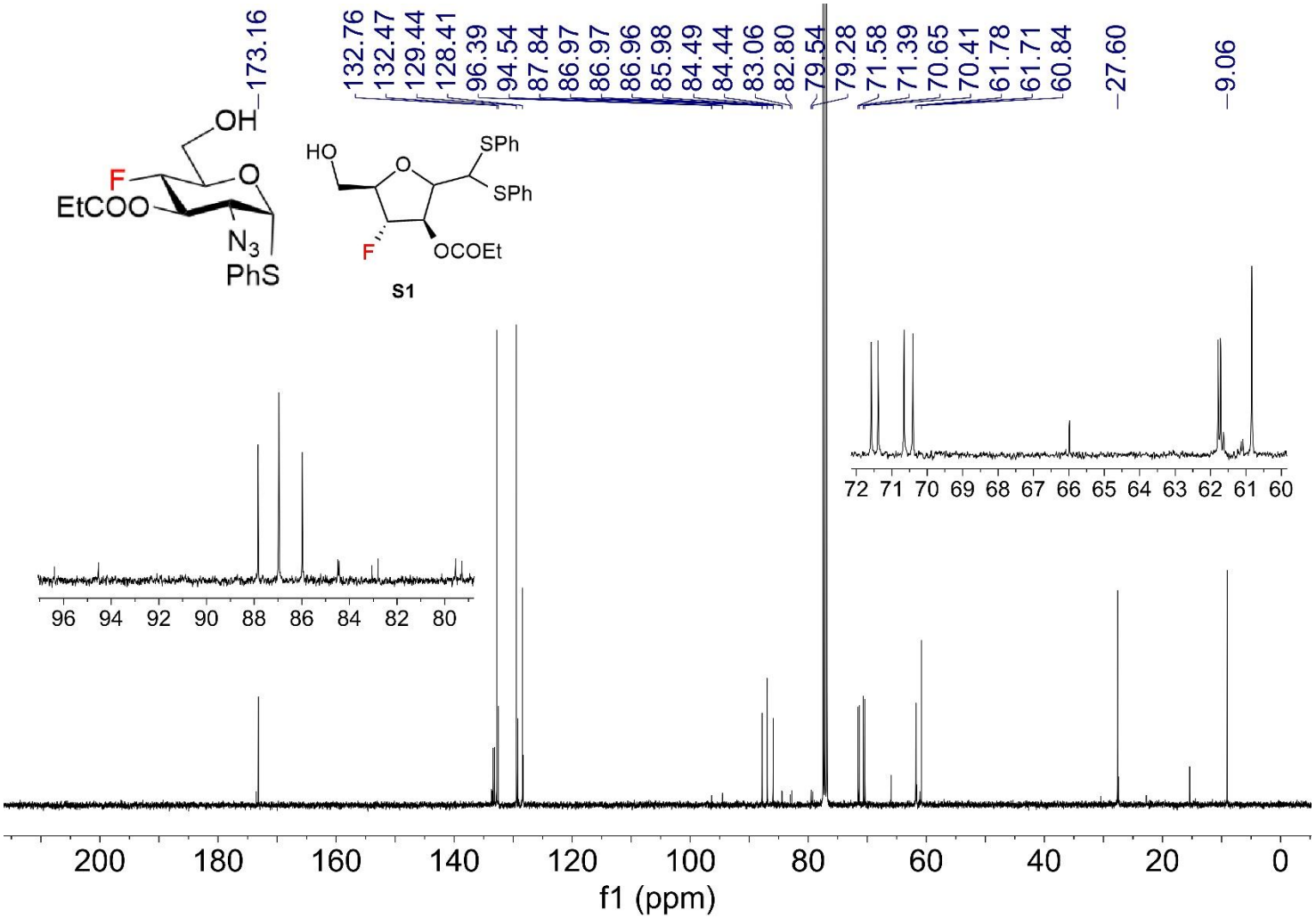


NMR COMPOUND α-54

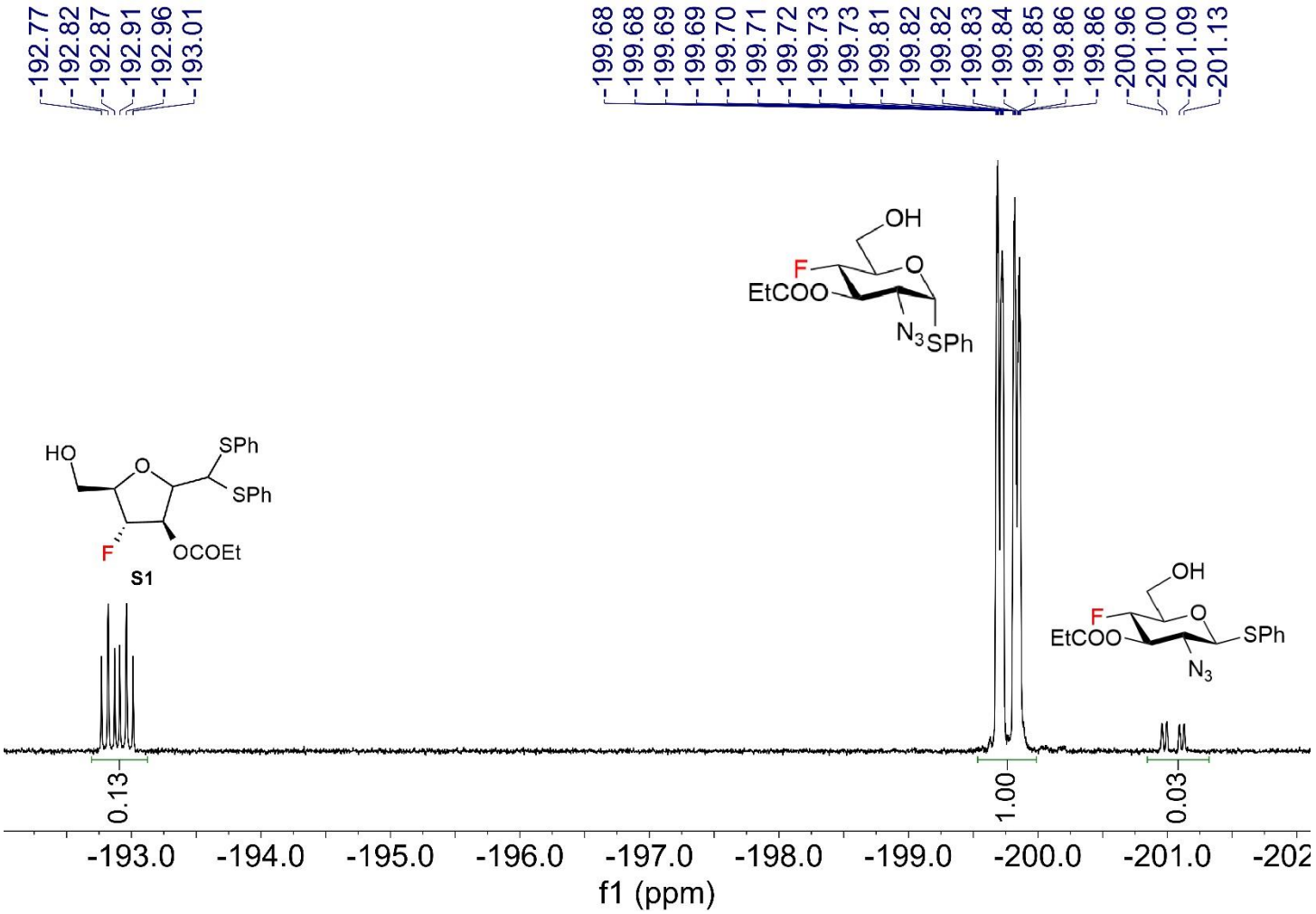
^{1}H NMR (400 MHz, $CDCl_3$) α-54 and 9% of S1



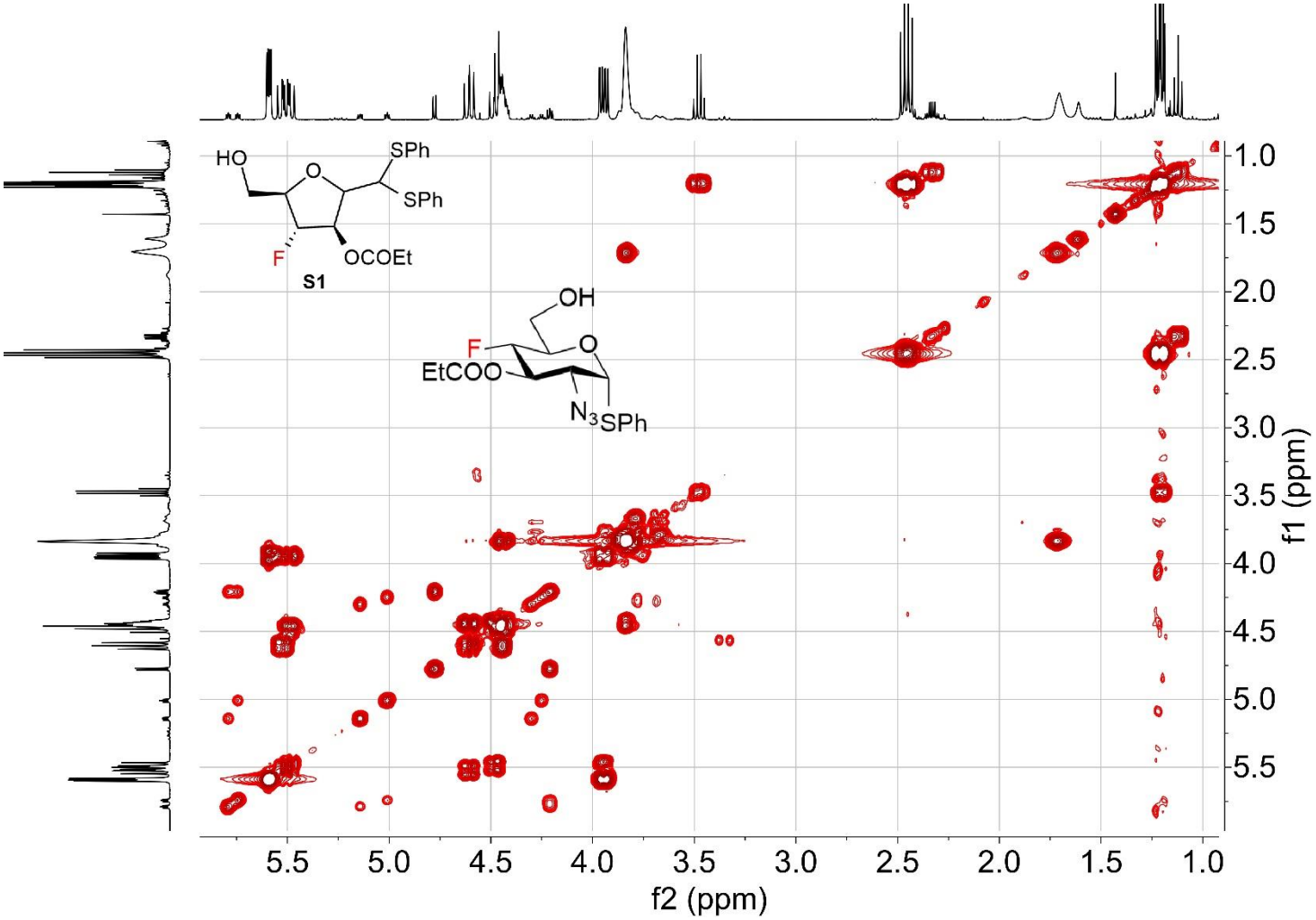
^{13}C NMR (100 MHz, $CDCl_3$) α-54 and S1



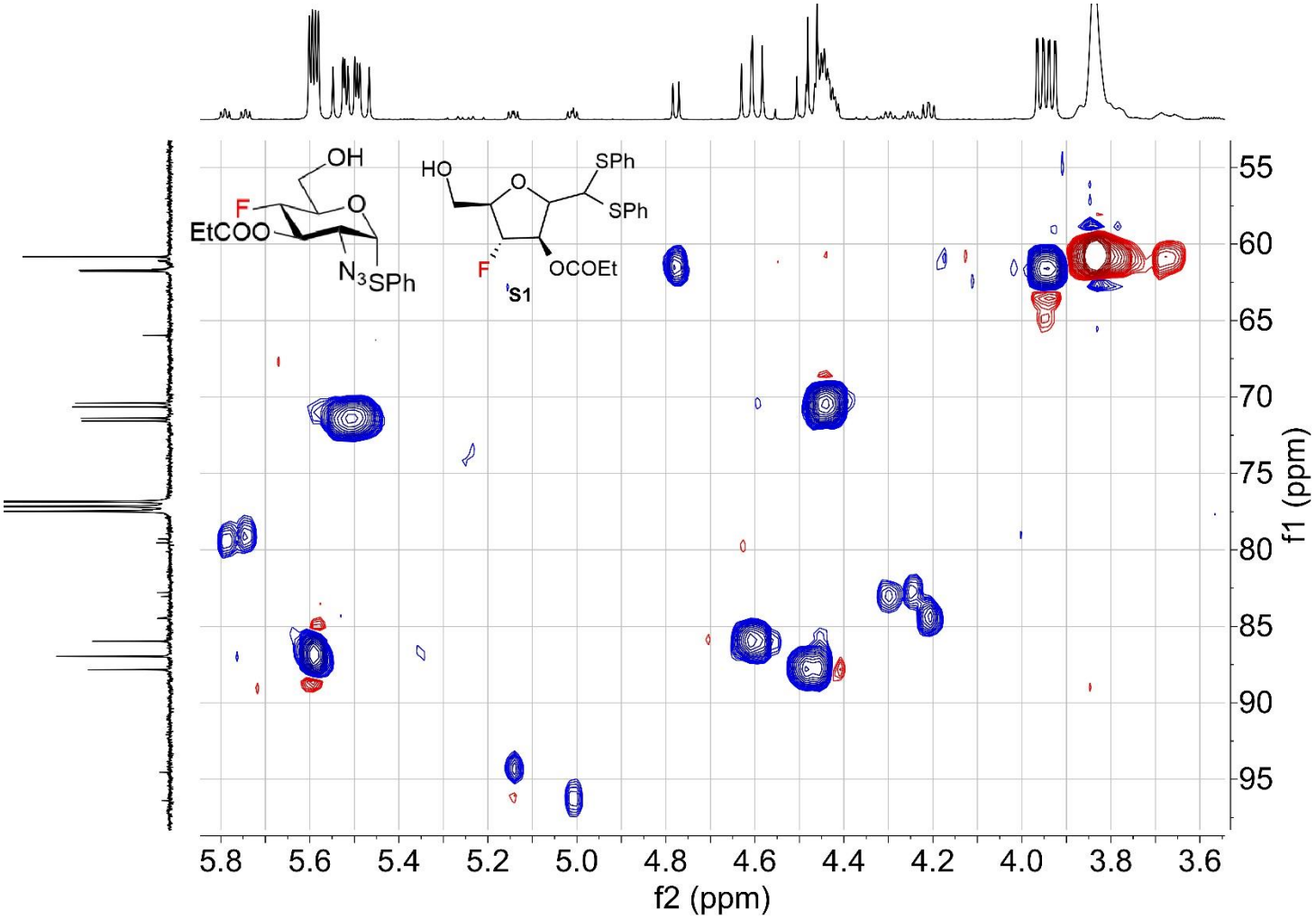
^{19}F NMR (376 MHz, $CDCl_3$) α-54, 9% S1 and 3% β-23



^{1}H-^{1}H COSY α-54

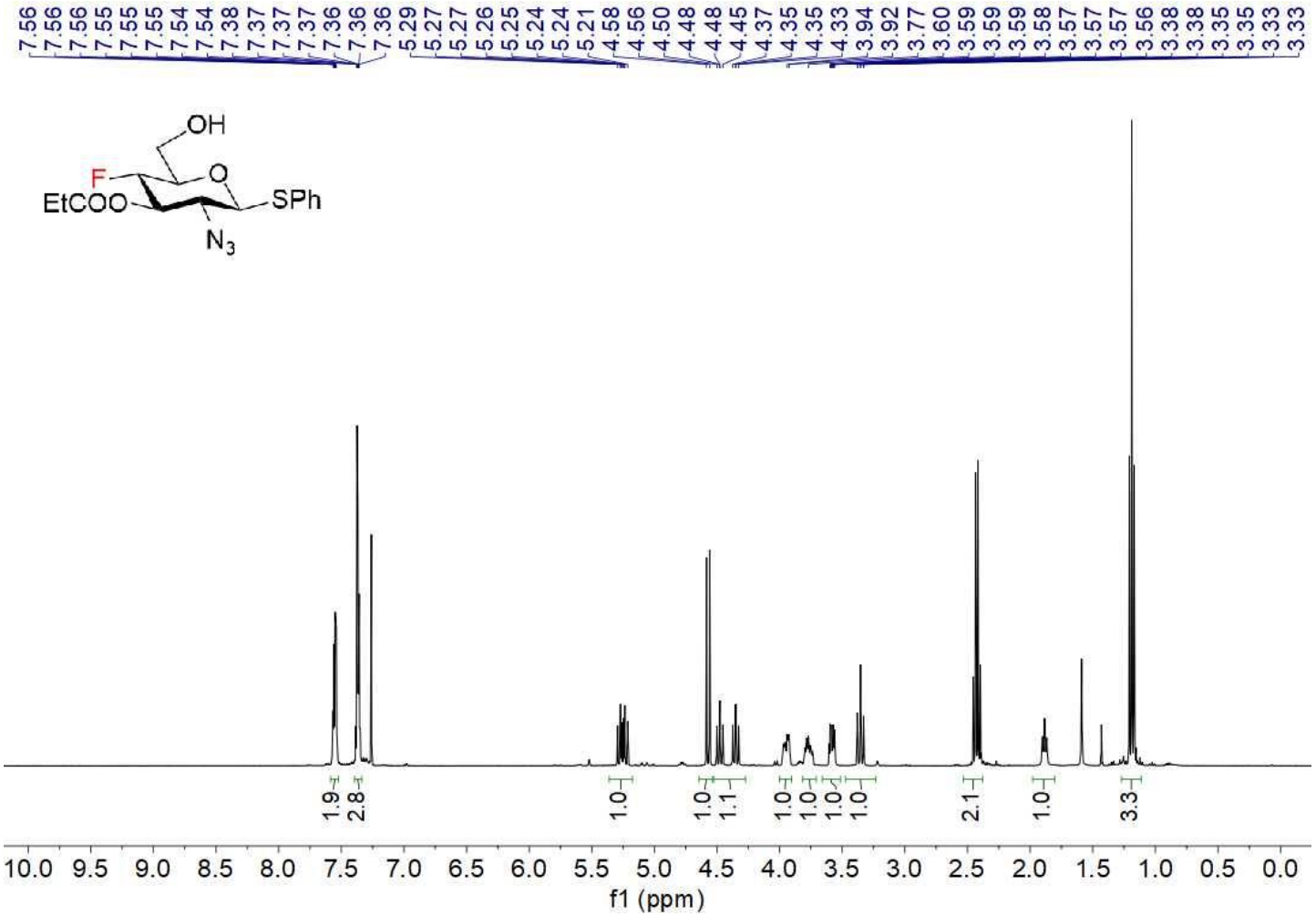


^{1}H-^{13}C HSQC α-54

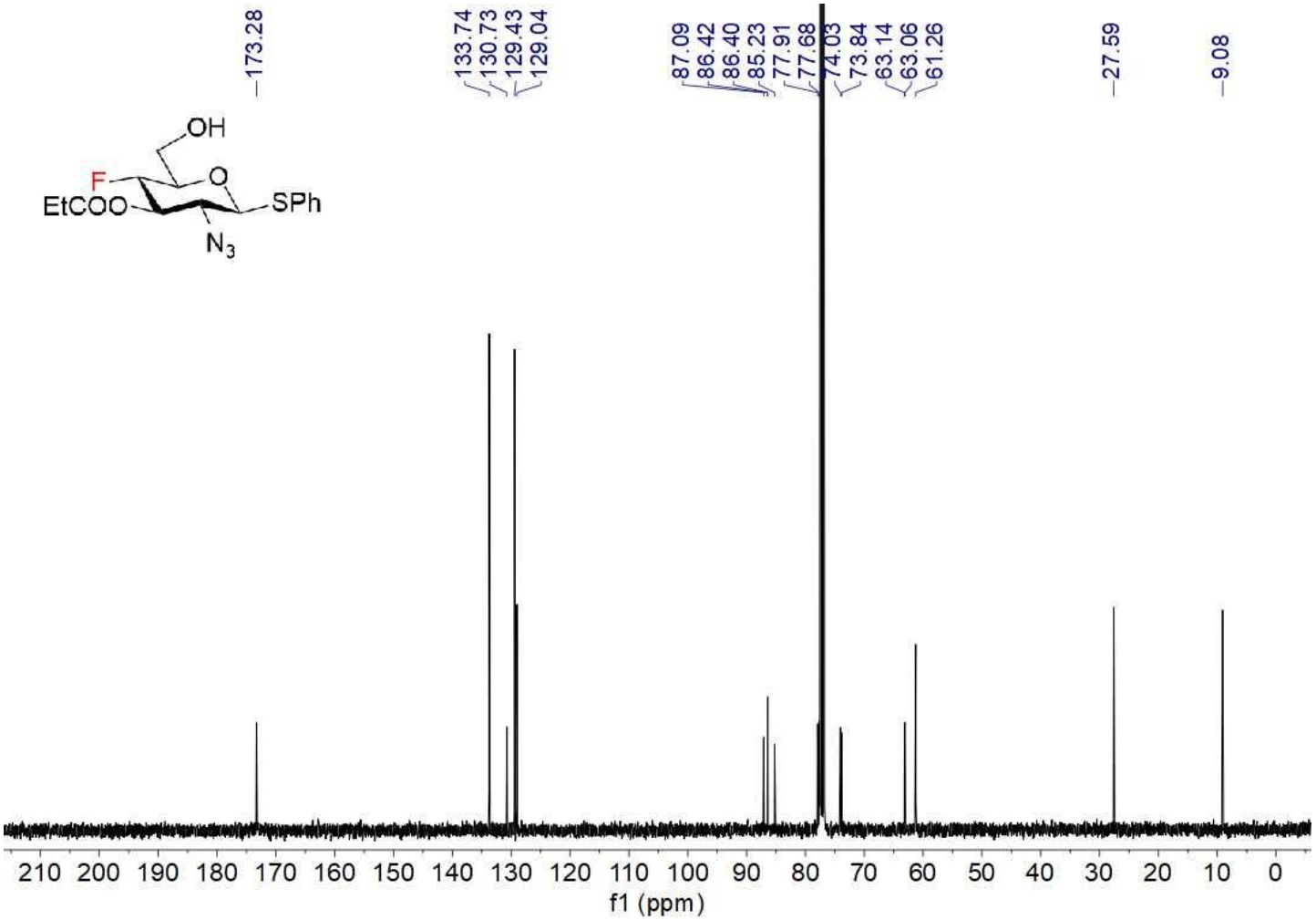


NMR COMPOUND β-54

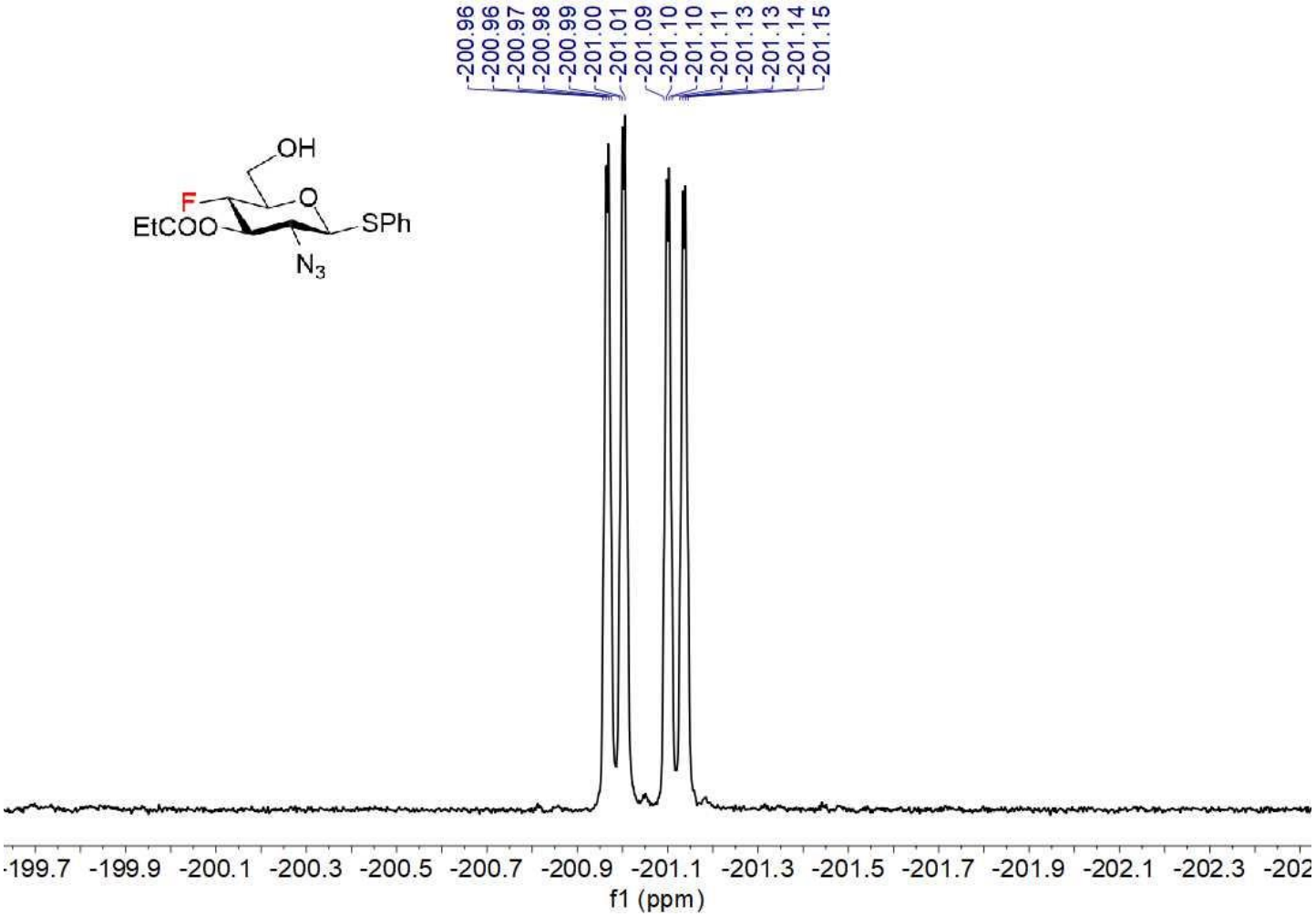
^{1}H NMR (400 MHz, $CDCl_3$) β-54



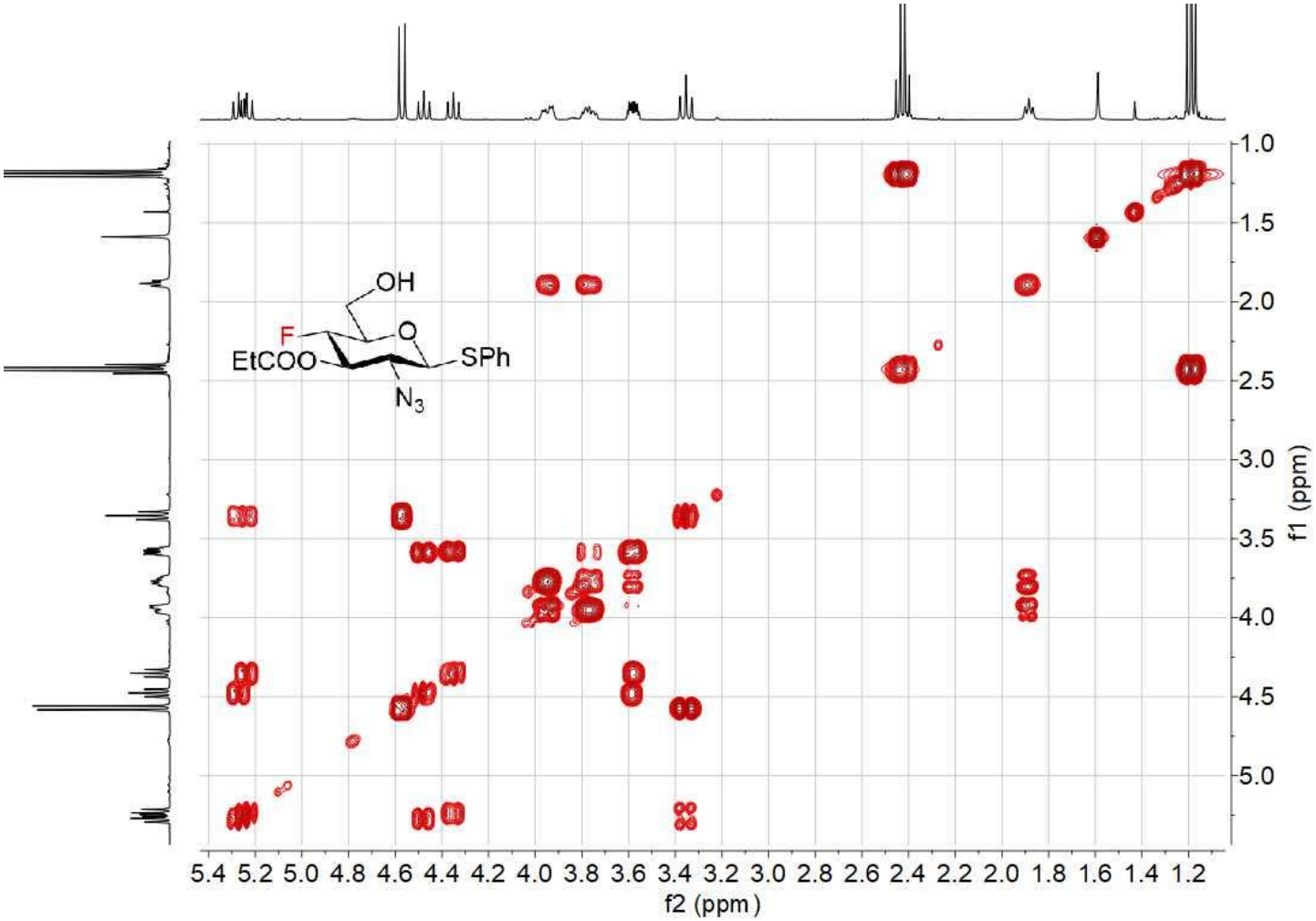
^{13}C NMR (100 MHz, $CDCl_3$) β-54



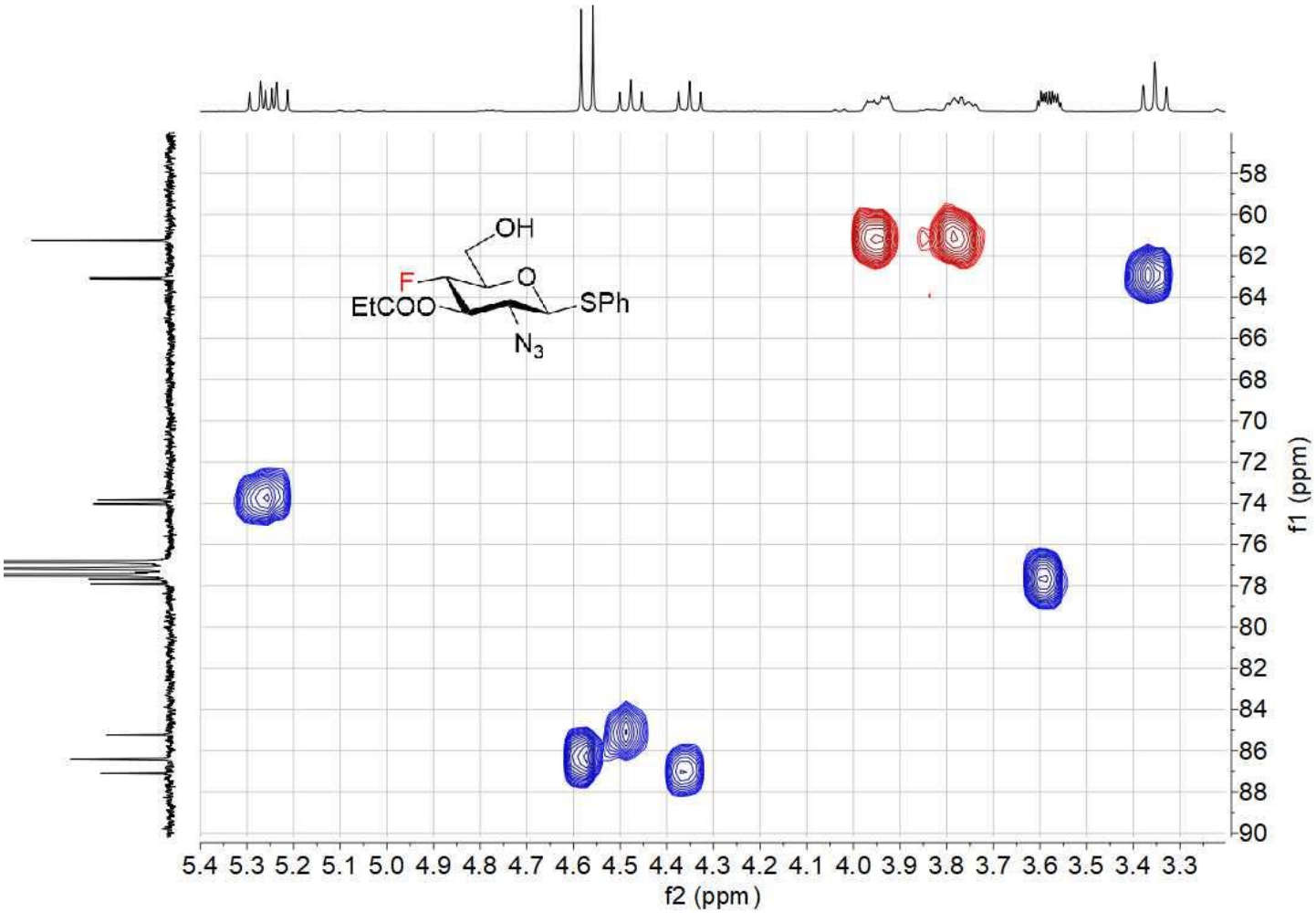
^{19}F NMR (376 MHz, $CDCl_3$) β-54



^{1}H-^{1}H COSY β-54

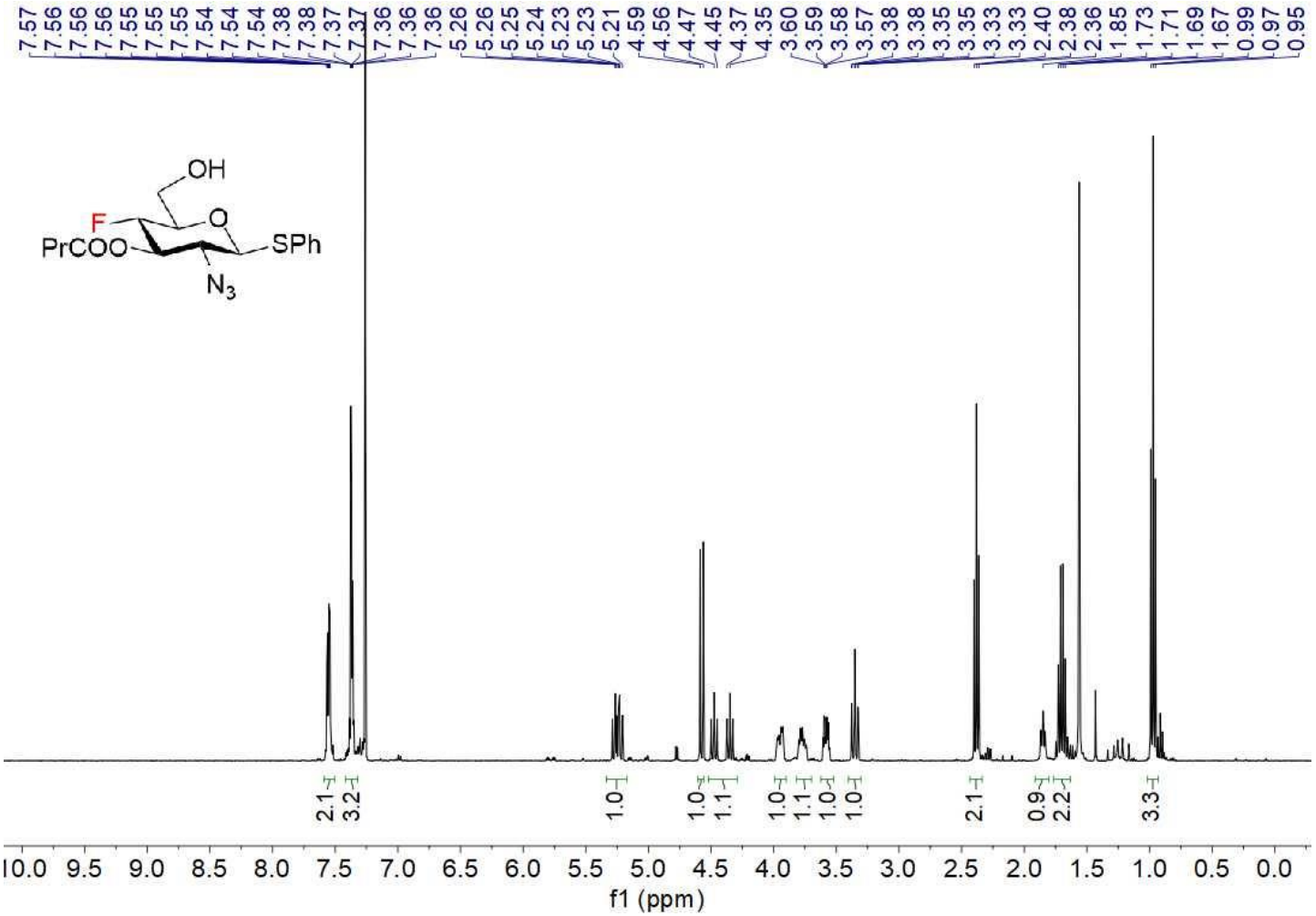


^{1}H-^{13}C HSQC β-54

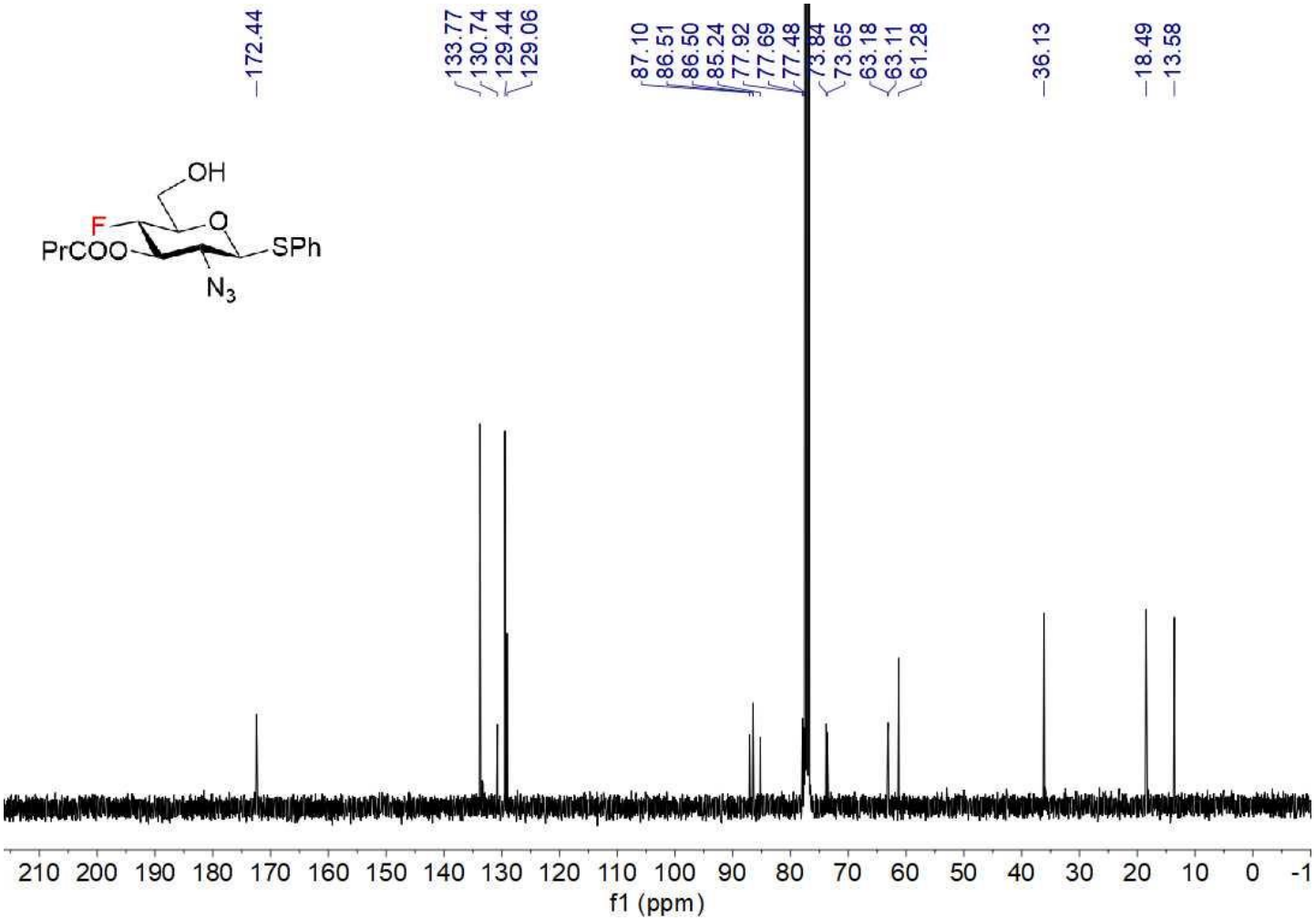


NMR COMPOUND β-55

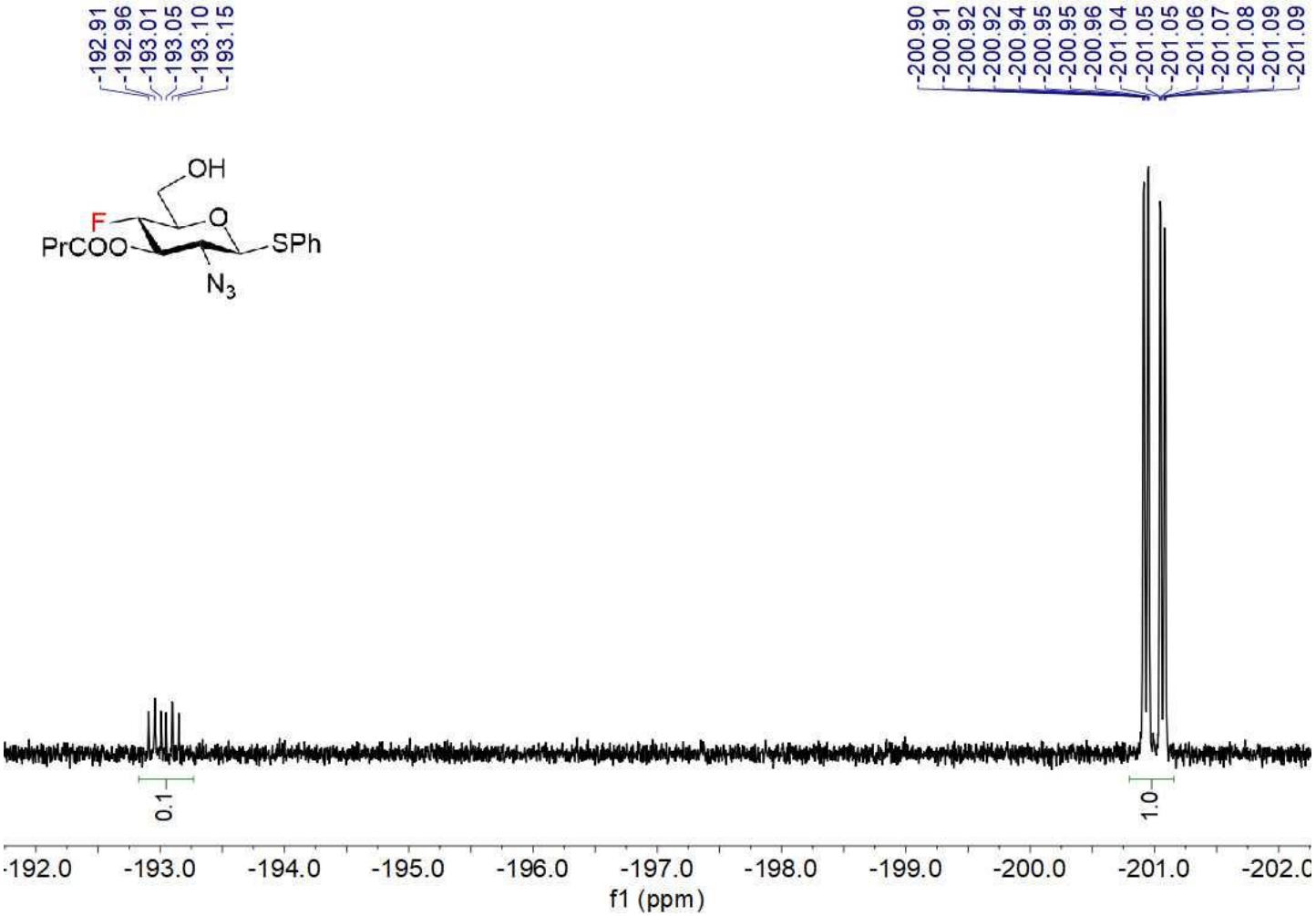
^{1}H NMR (400 MHz, $CDCl_3$) β-55



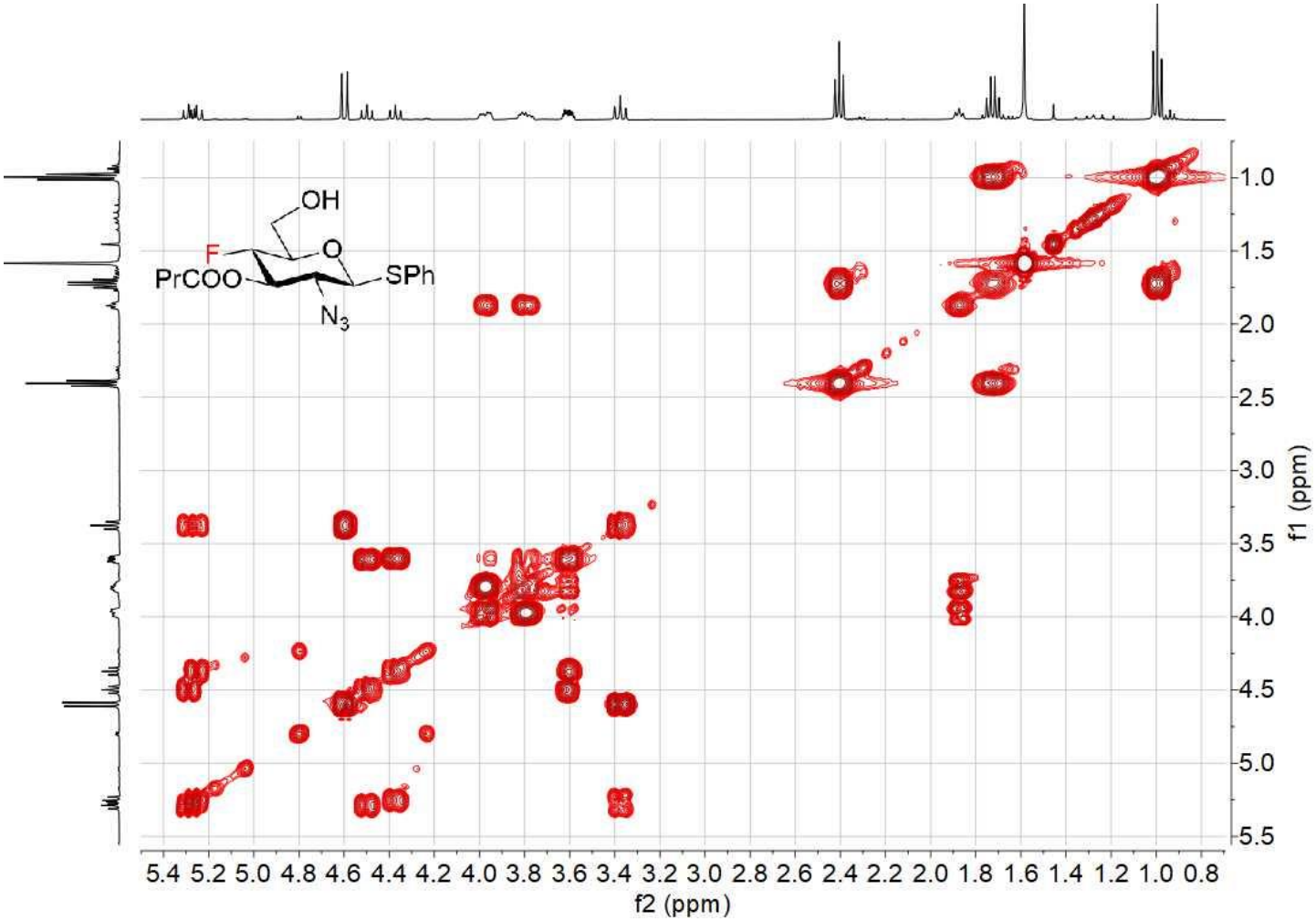
^{13}C NMR (100 MHz, $CDCl_3$) β-55



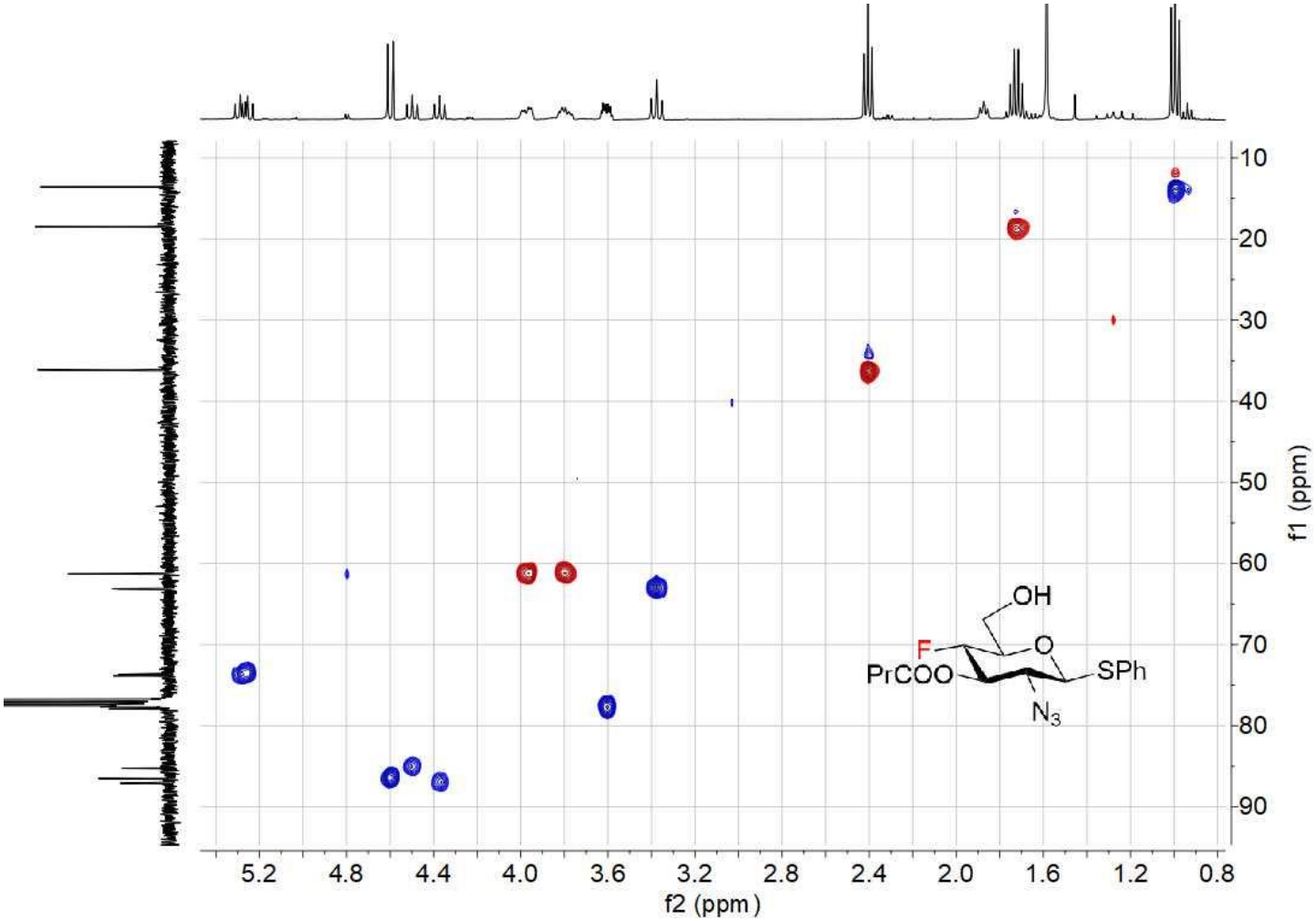
^{19}F NMR (376 MHz, $CDCl_3$) β-55



^{1}H-^{1}H COSY β-55

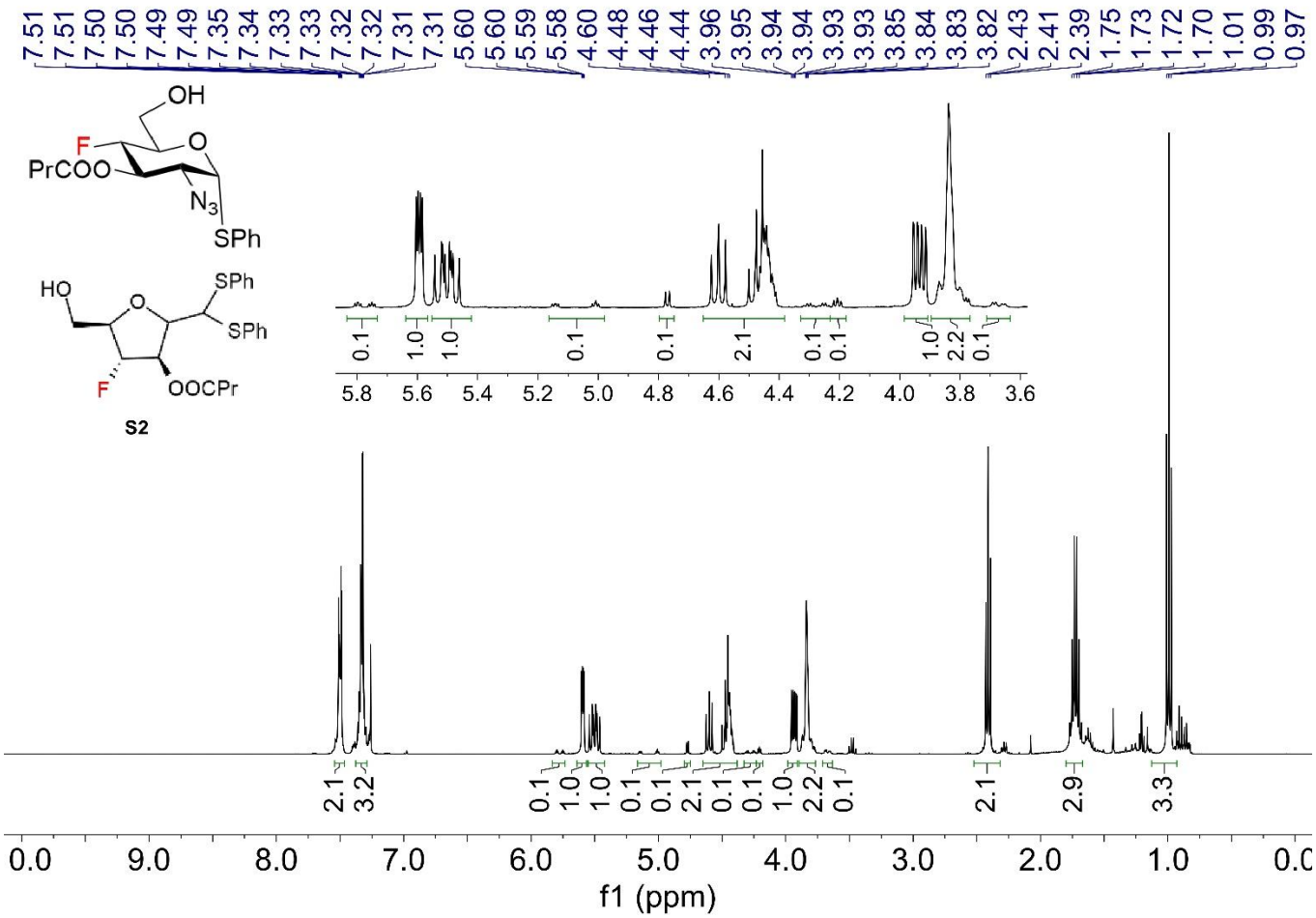


^{1}H-^{13}C HSQC β-55

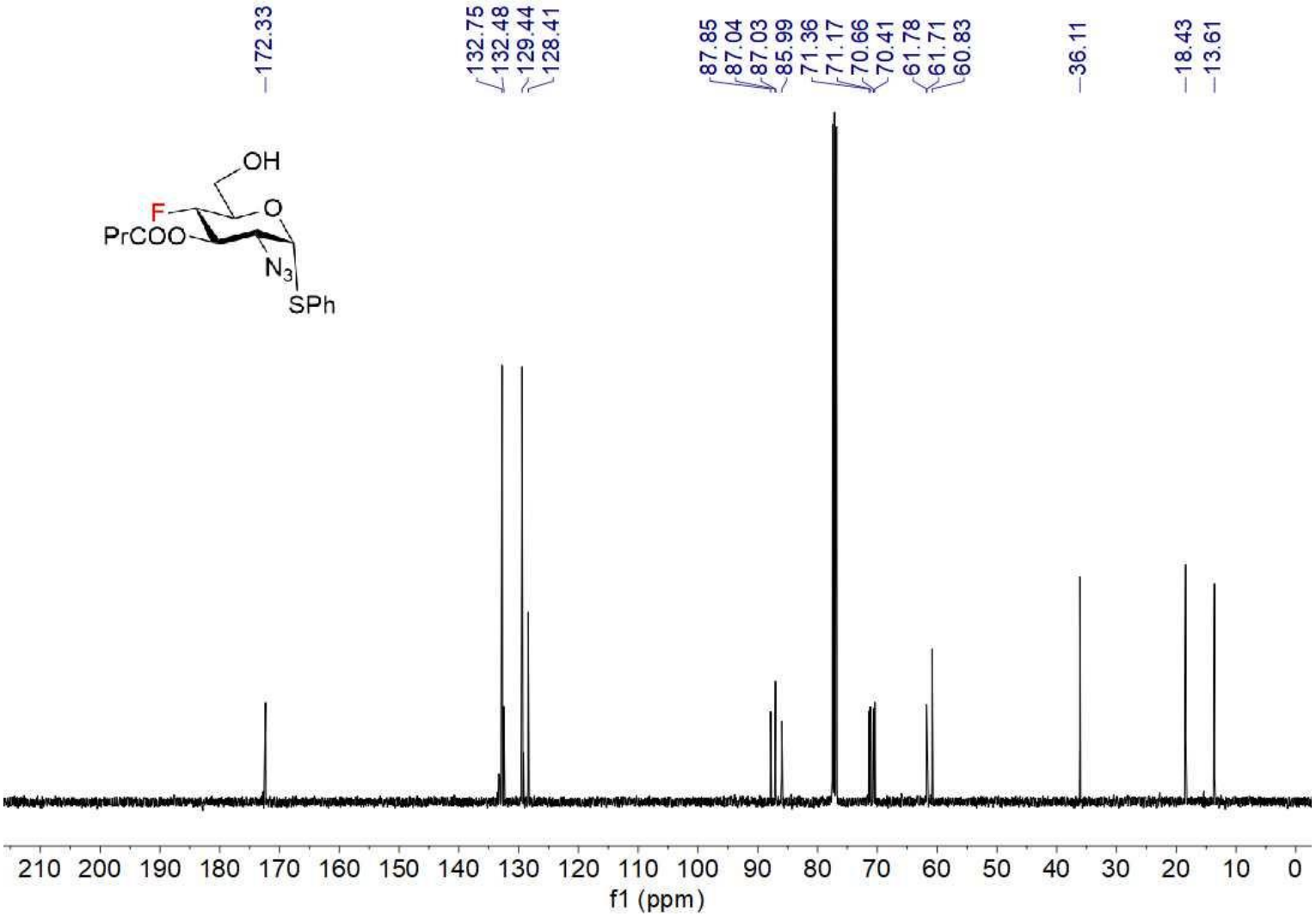


NMR COMPOUND α-55

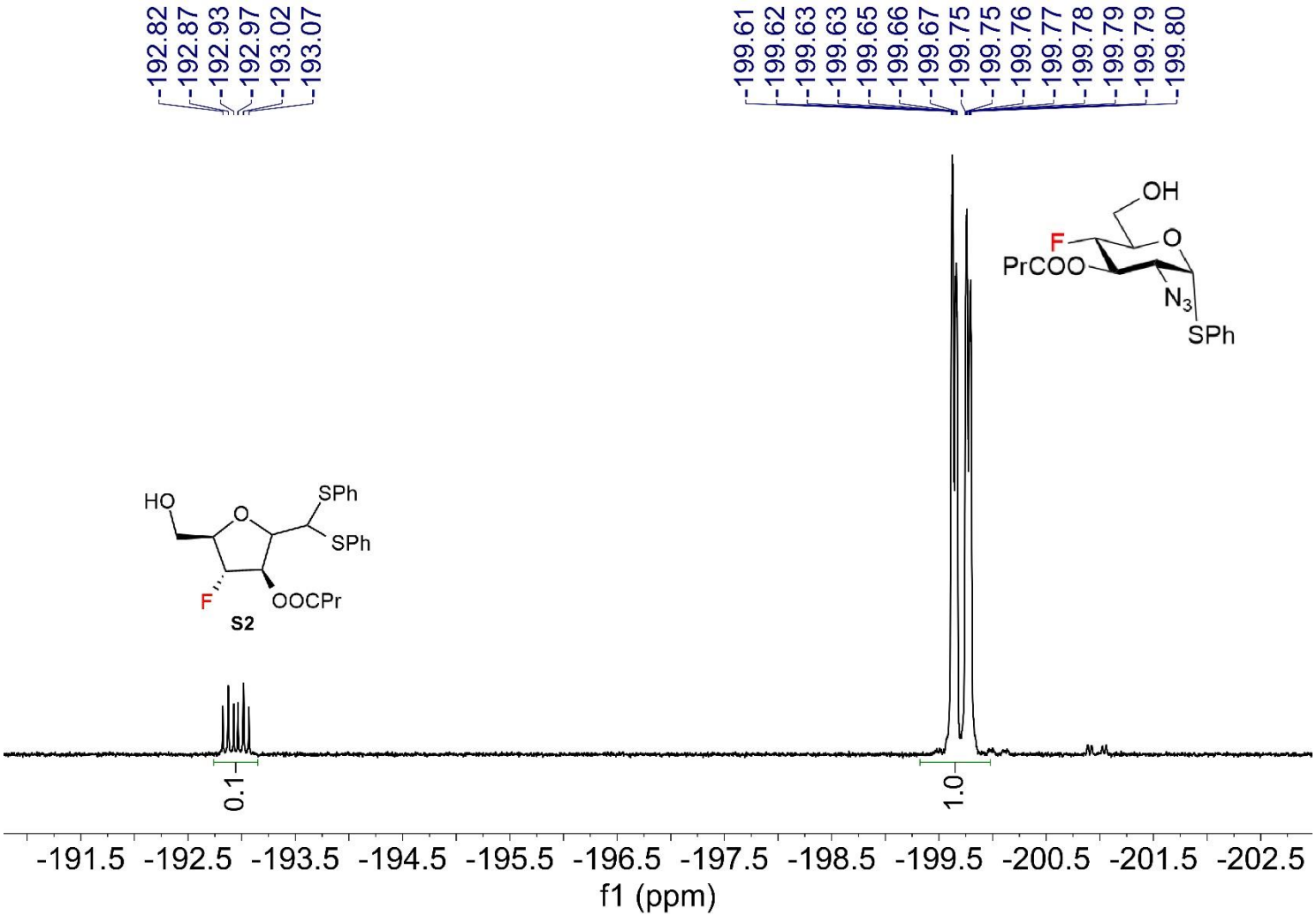
^{1}H NMR (400 MHz, $CDCl_3$) α-55 and 9% of S2



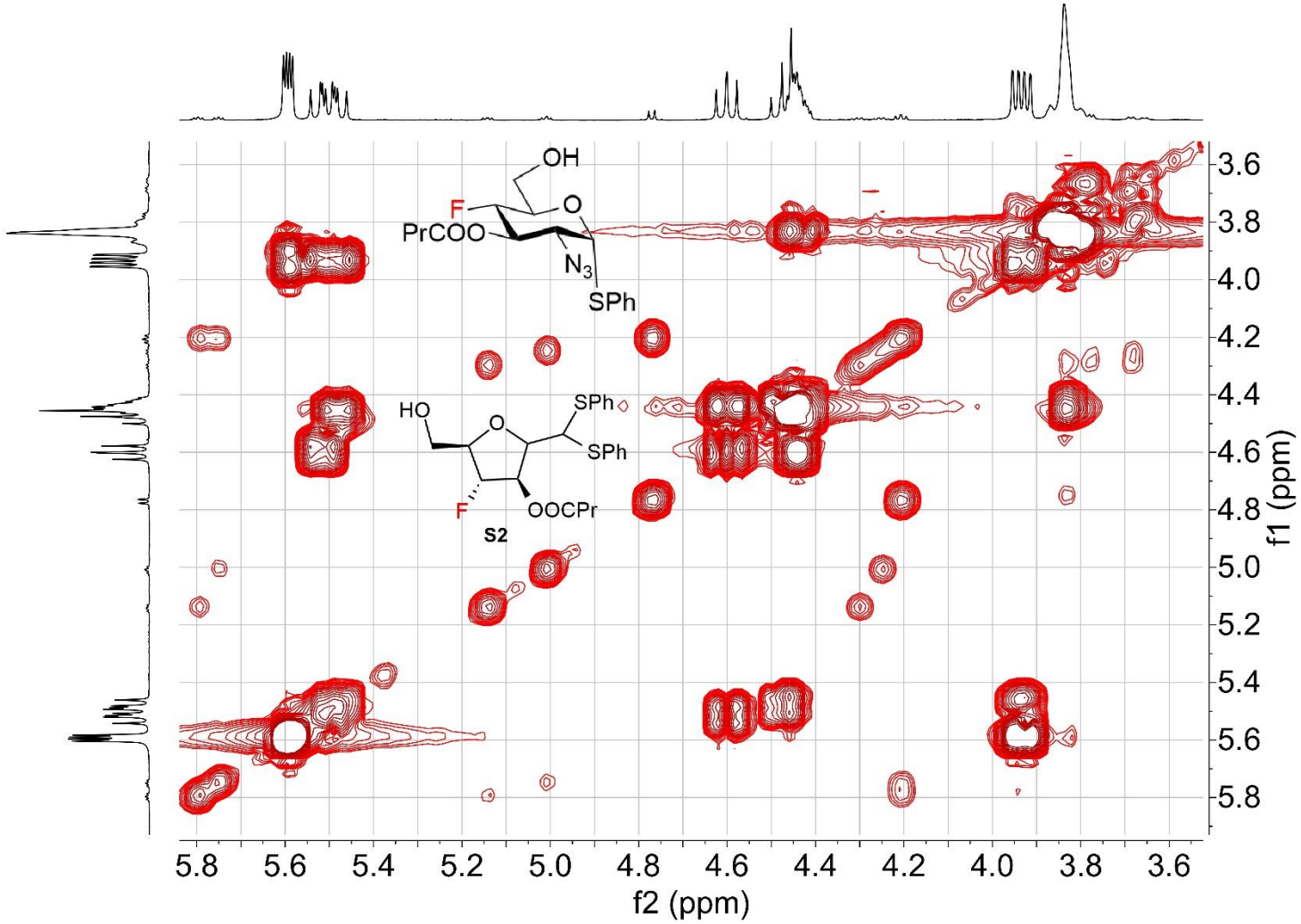
^{13}C NMR (100 MHz, $CDCl_3$) α-55



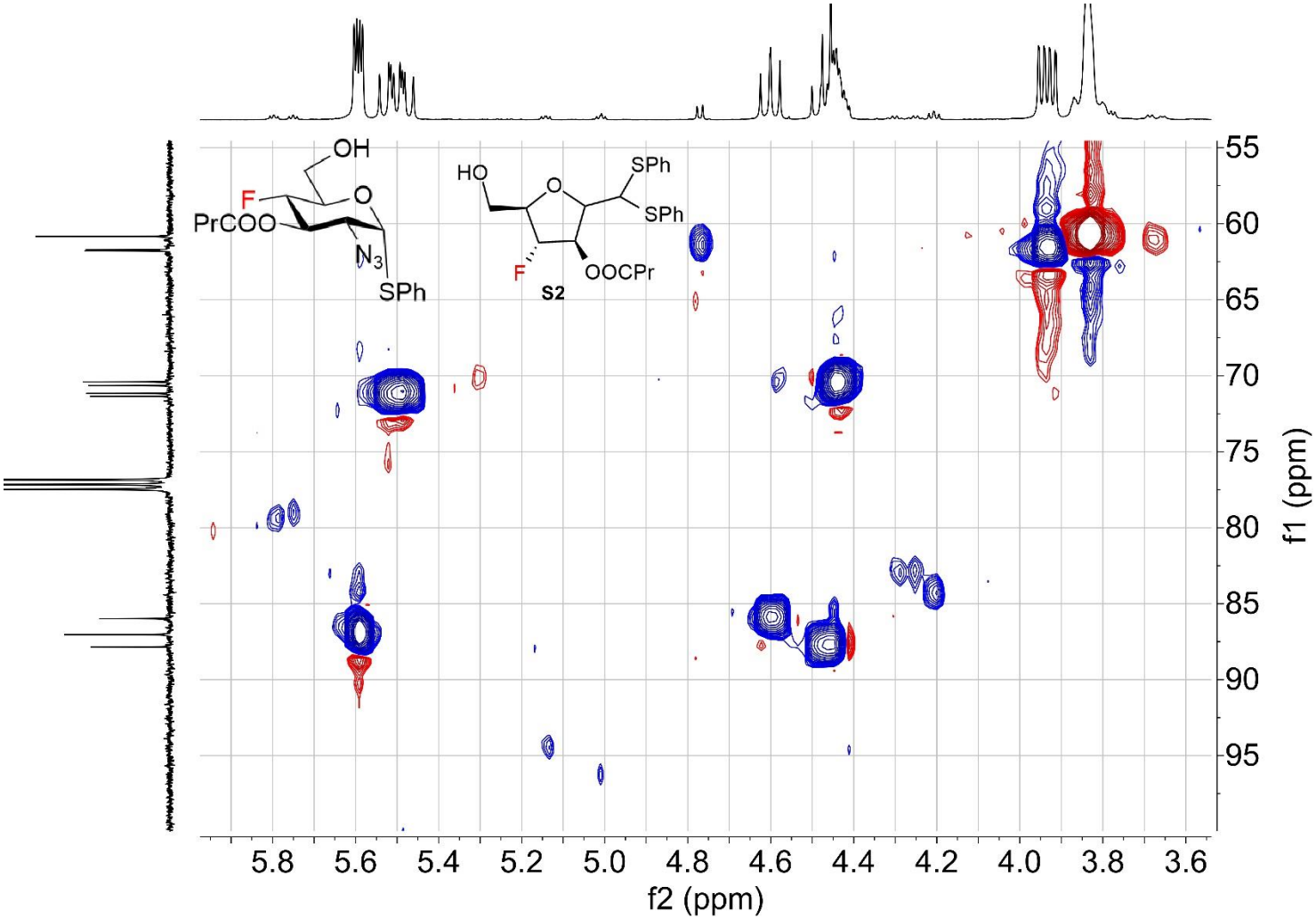
^{19}F NMR (376 MHz, $CDCl_3$) α-55 and 9% of S2



^{1}H-^{1}H COSY α-55

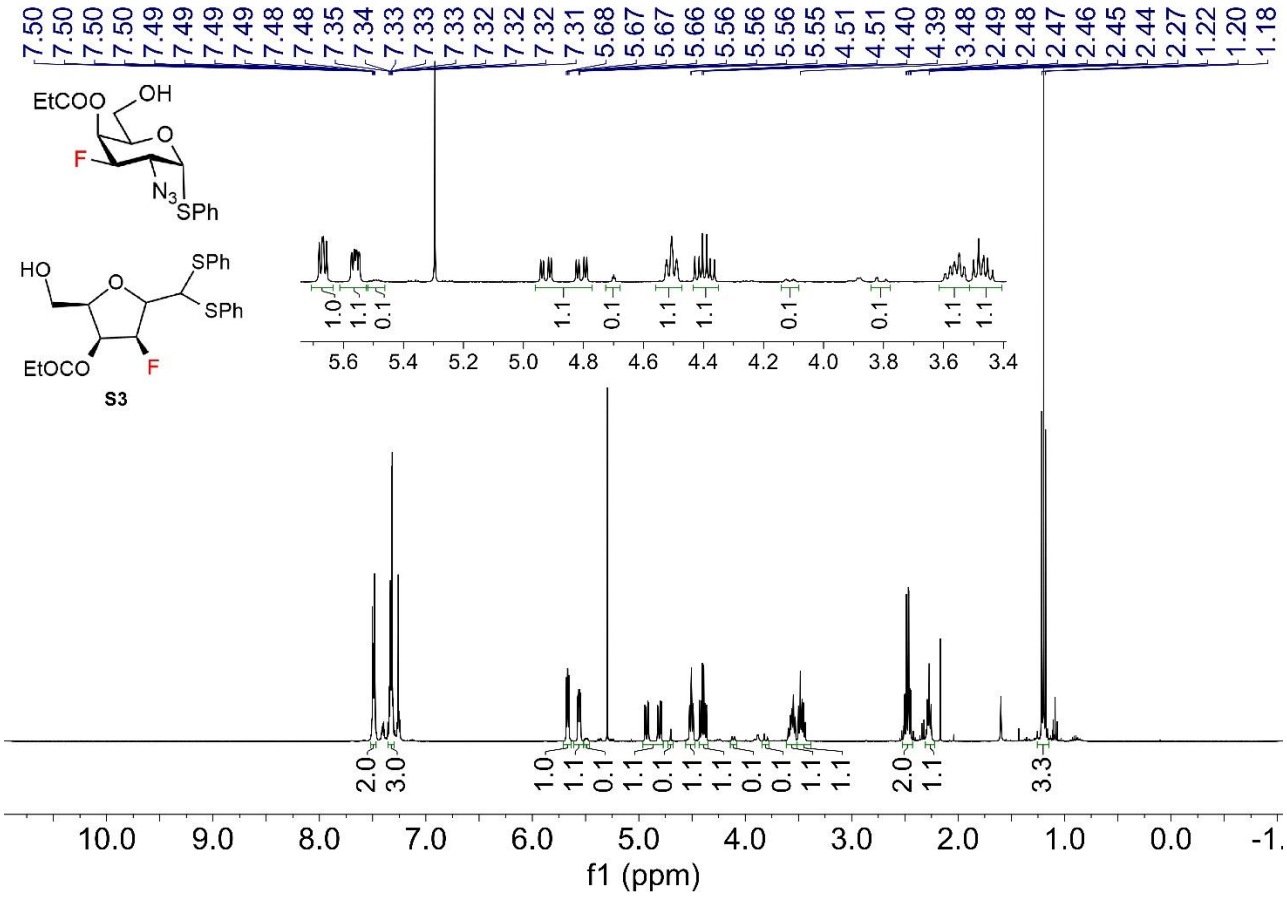


^{1}H-^{13}C HSQC α-55

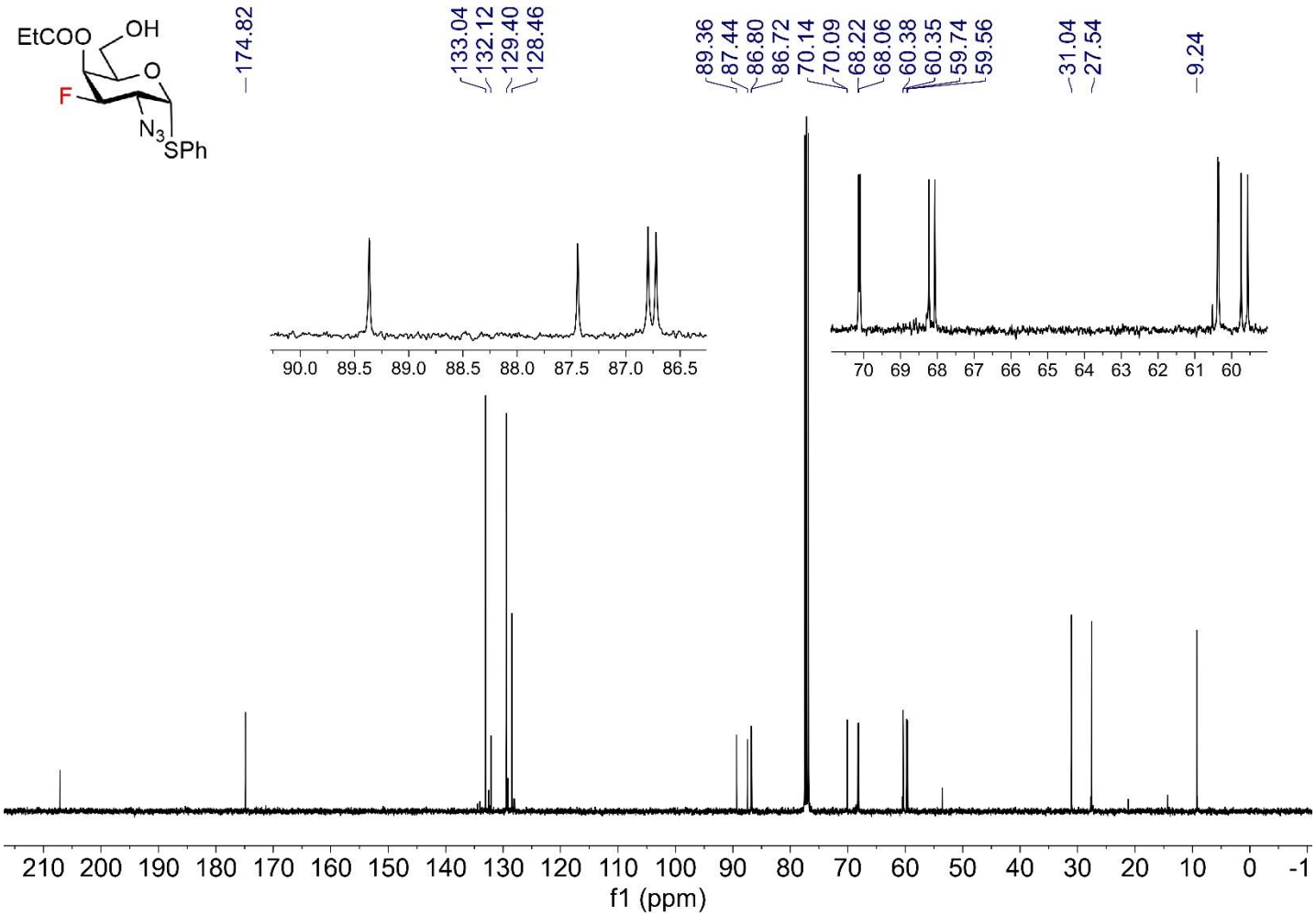


NMR COMPOUND α-56

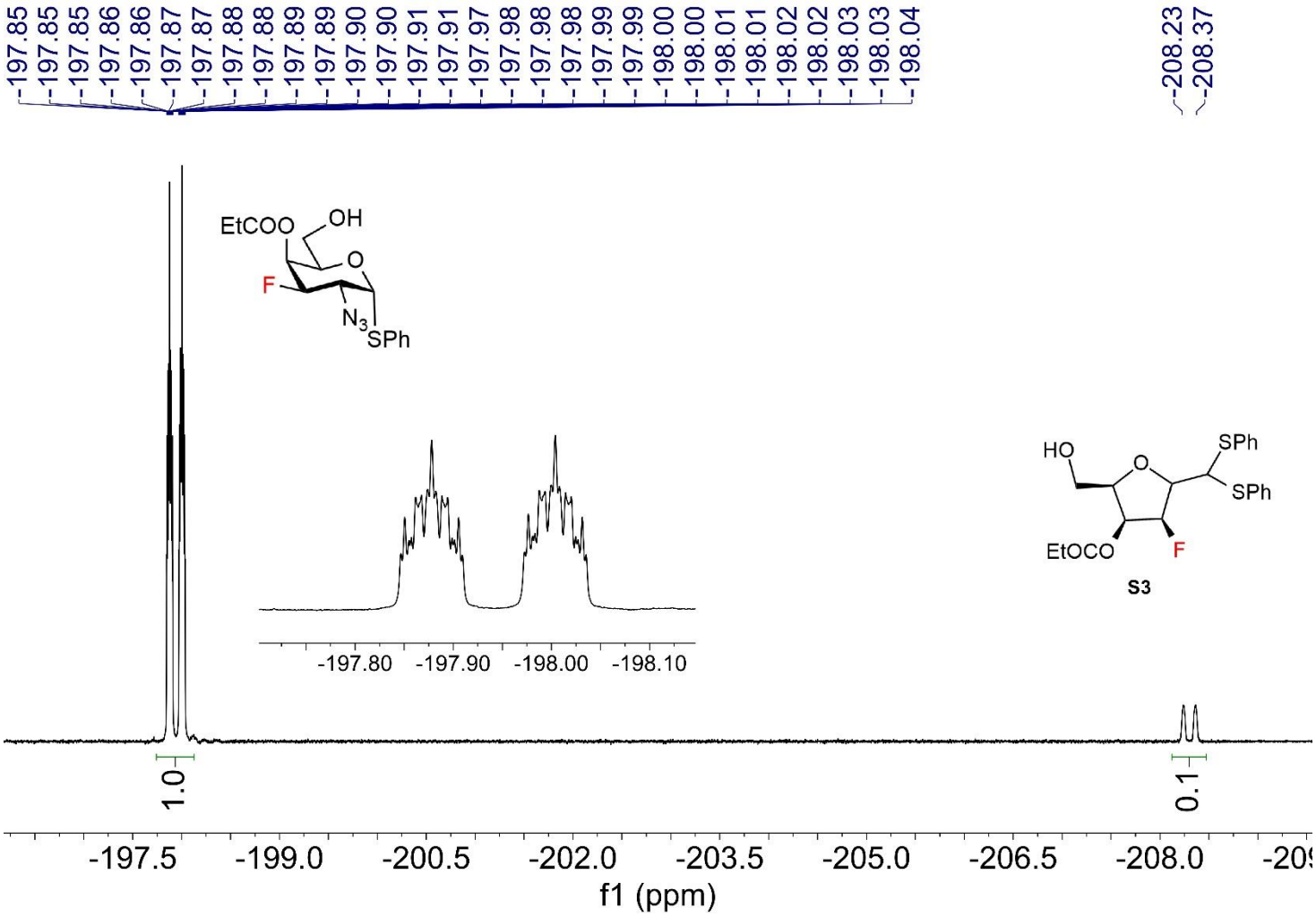
^{1}H NMR (400 MHz, $CDCl_3$) α-56 and ca 9% S3



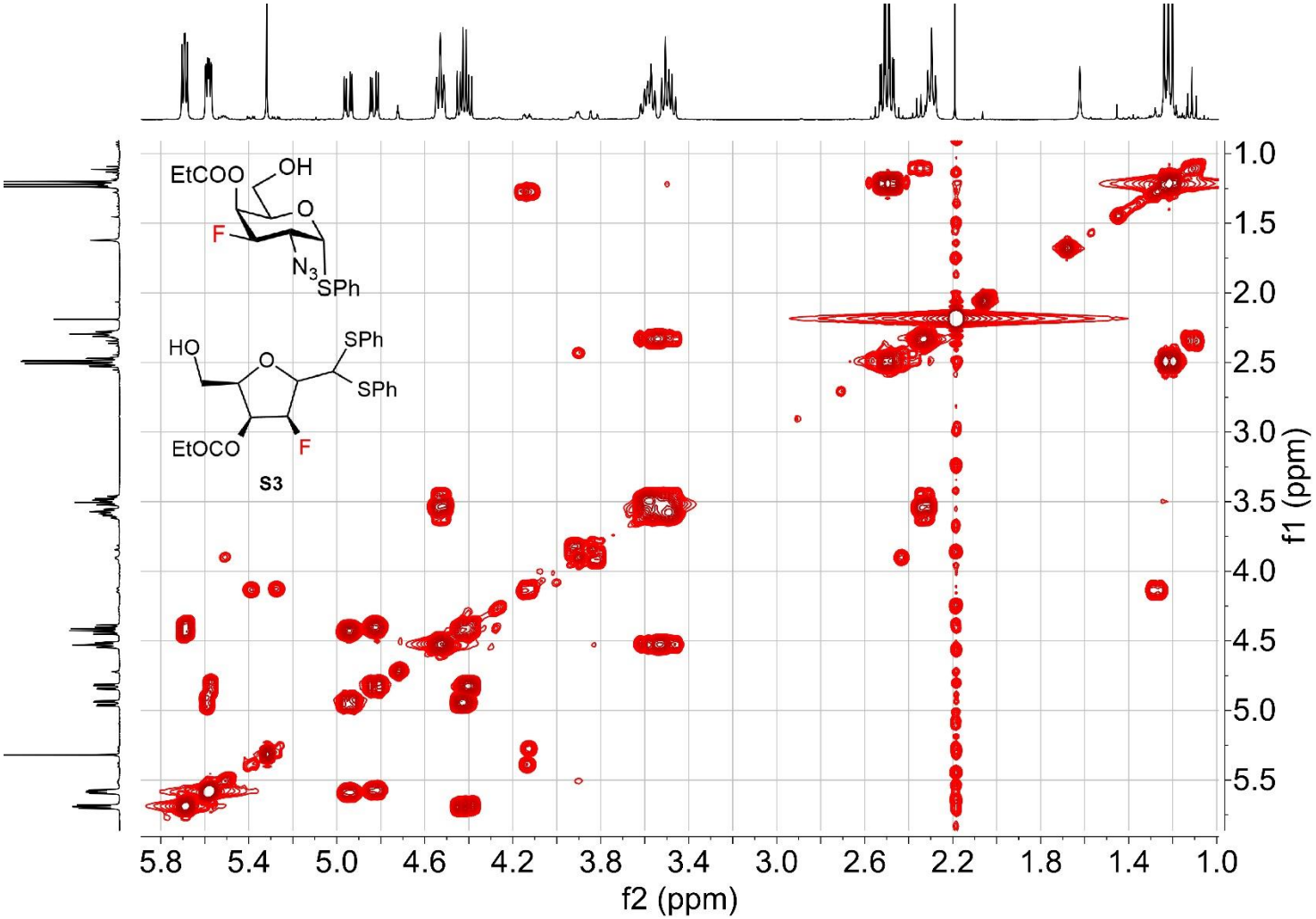
^{13}C NMR (100 MHz, $CDCl_3$) α-56



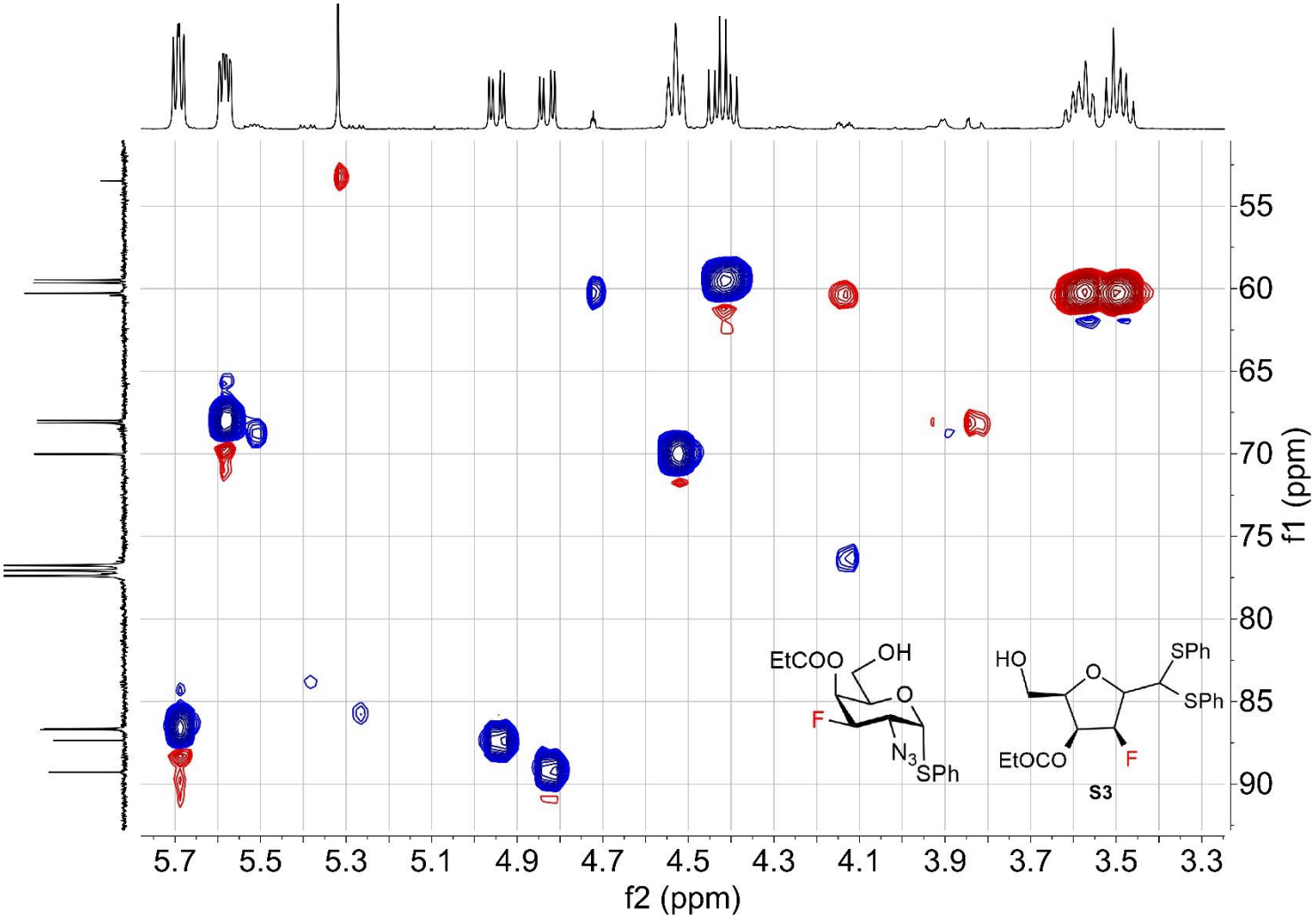
^{19}F NMR (376 MHz, $CDCl_3$) α-56 and 9% of S3



^{1}H-^{1}H COSY α-56

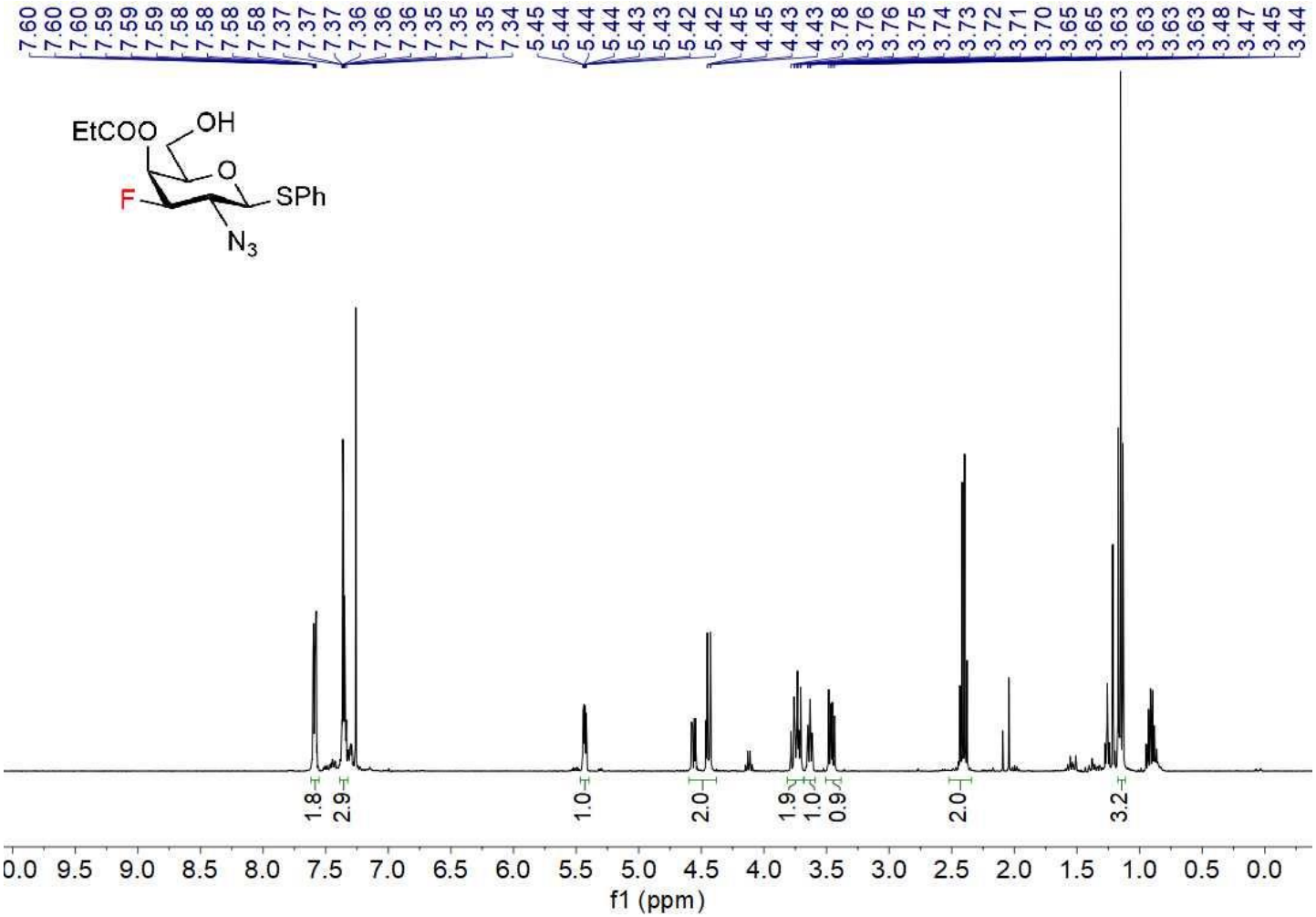


^{1}H-^{13}C HSQC α-56

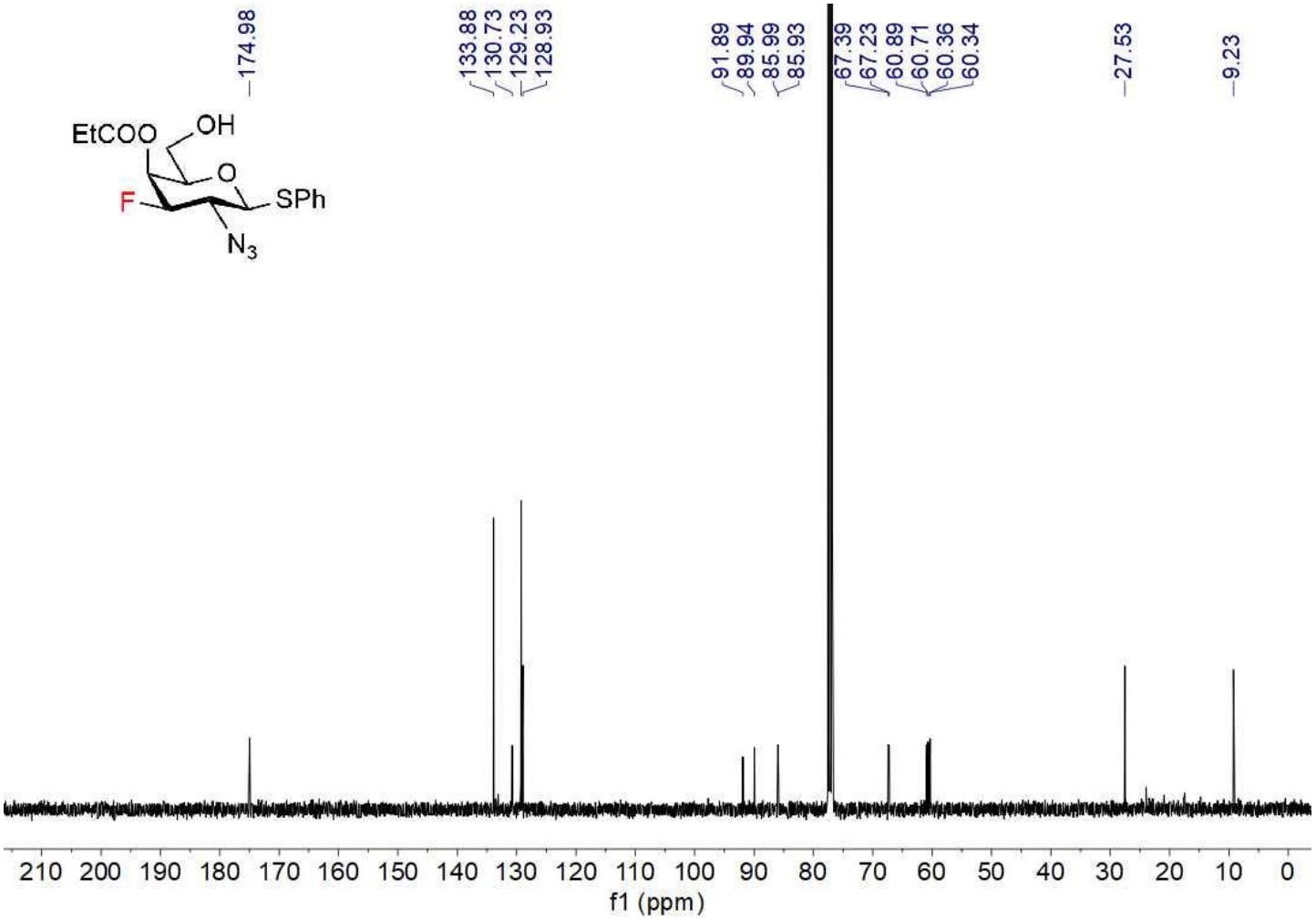


NMR COMPOUND β-56

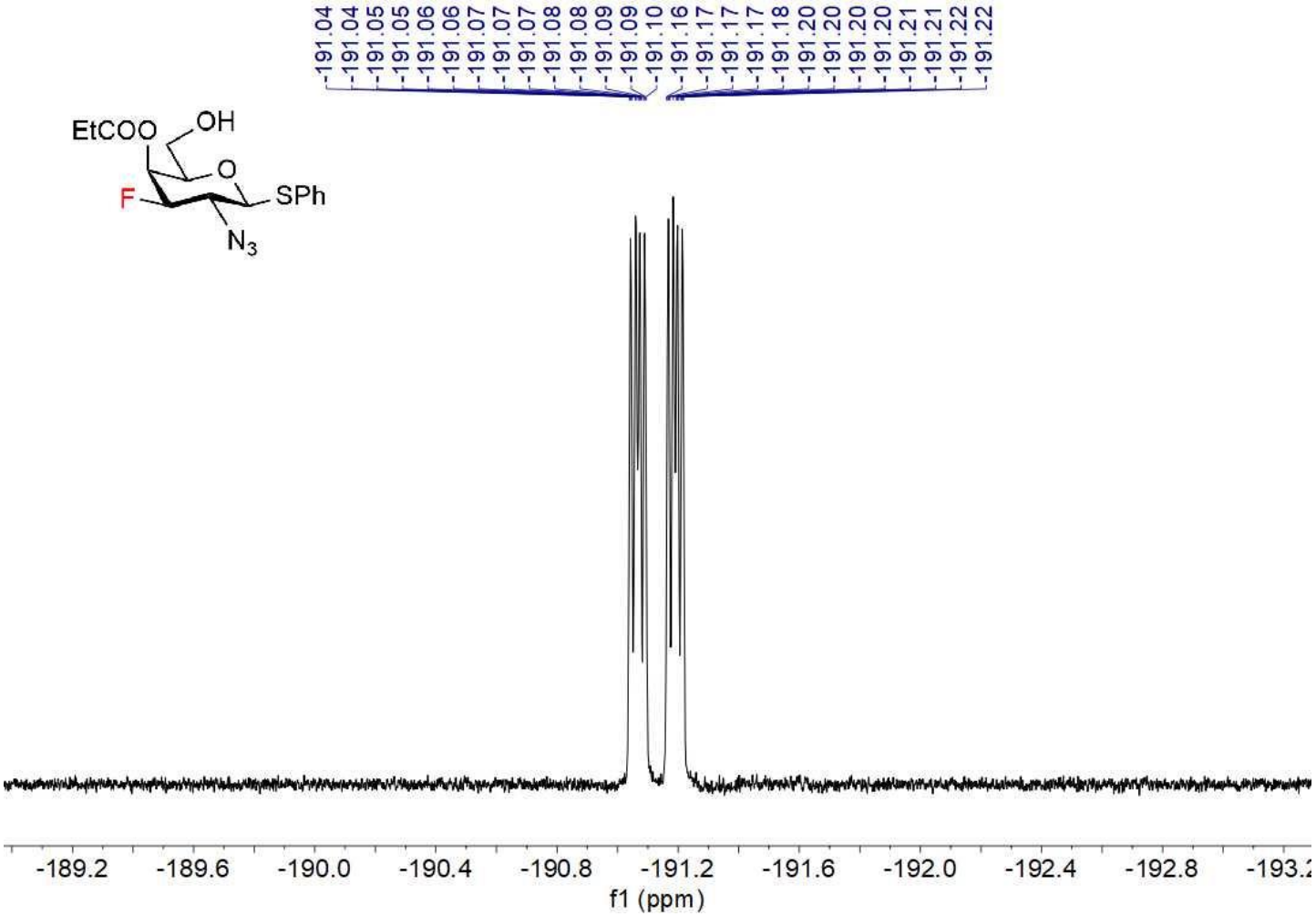
^{1}H NMR (400 MHz, $CDCl_3$) β-56



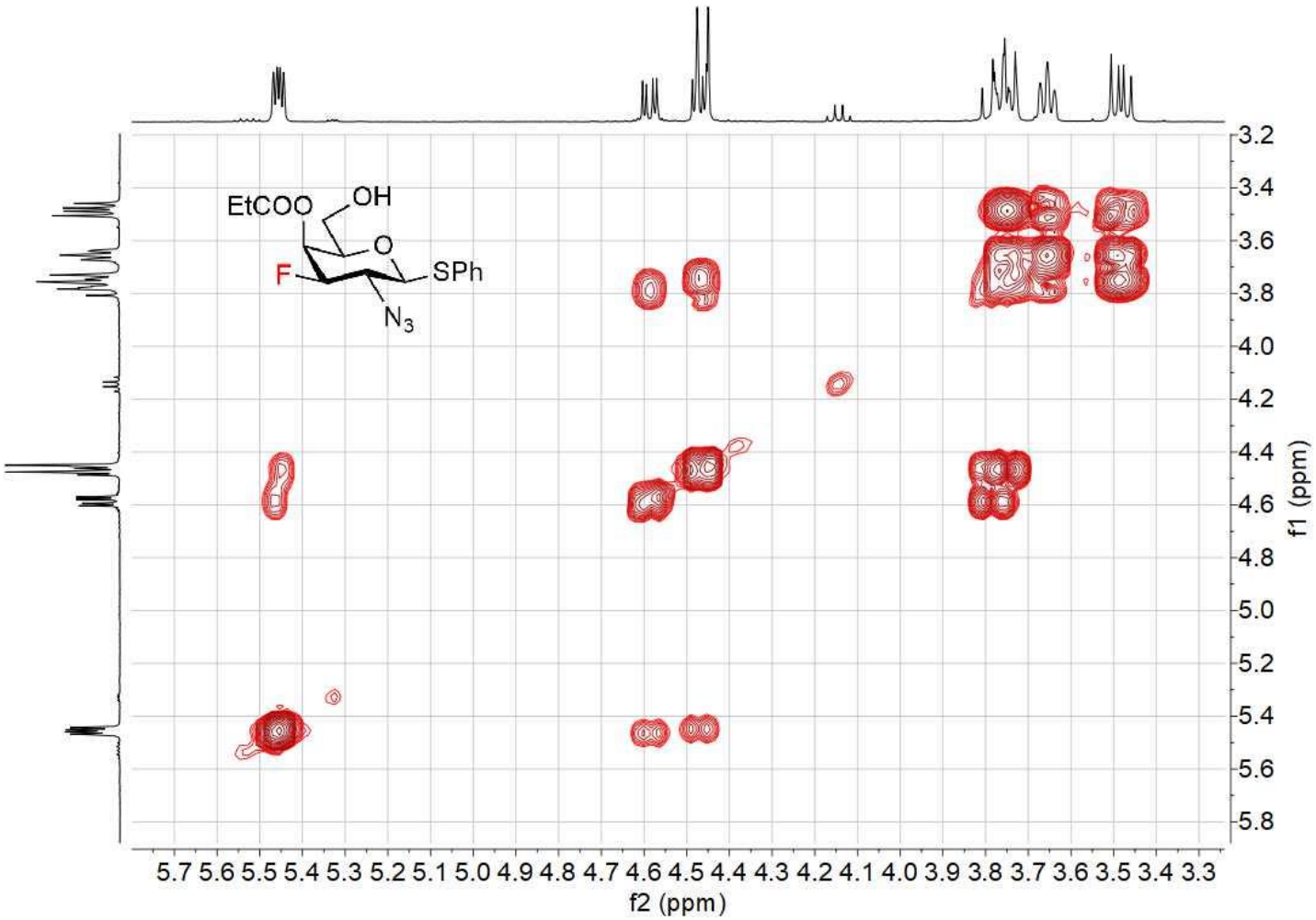
^{13}C NMR (100 MHz, $CDCl_3$) β-56



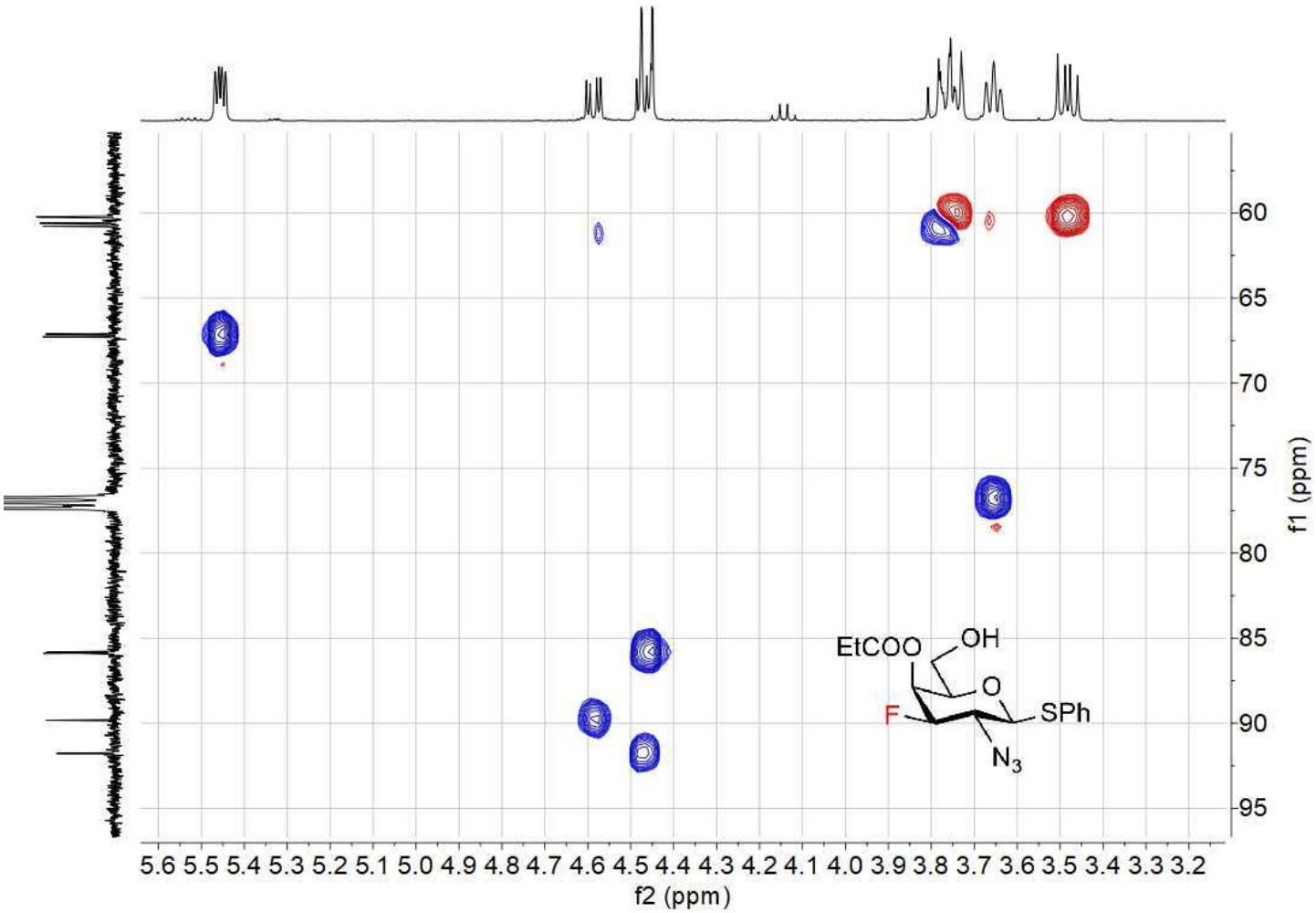
^{19}F NMR (376 MHz, $CDCl_3$) β-56



^{1}H-^{1}H COSY β-56

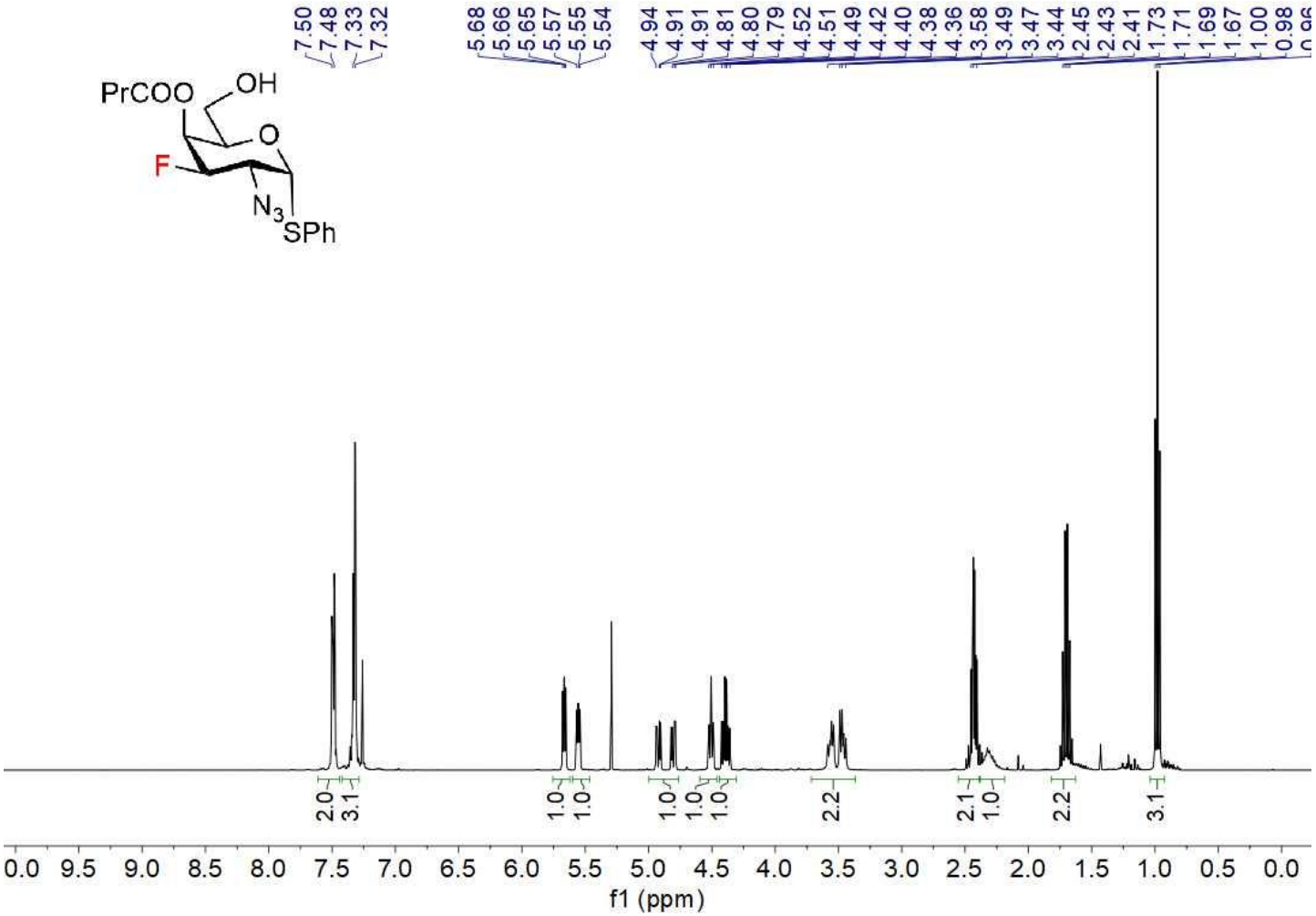


^{1}H-^{13}C HSQC β-56

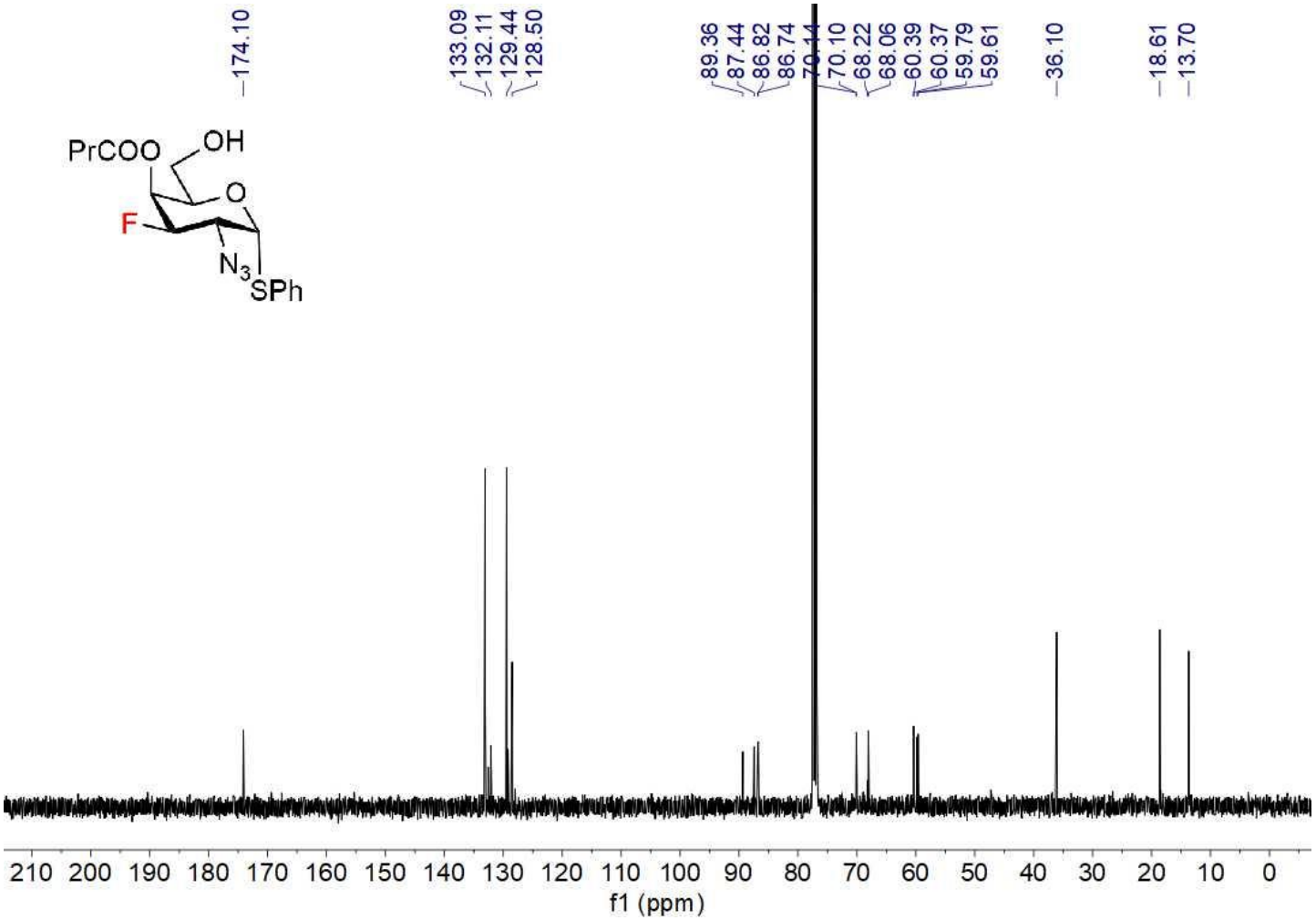


NMR COMPOUND α-57

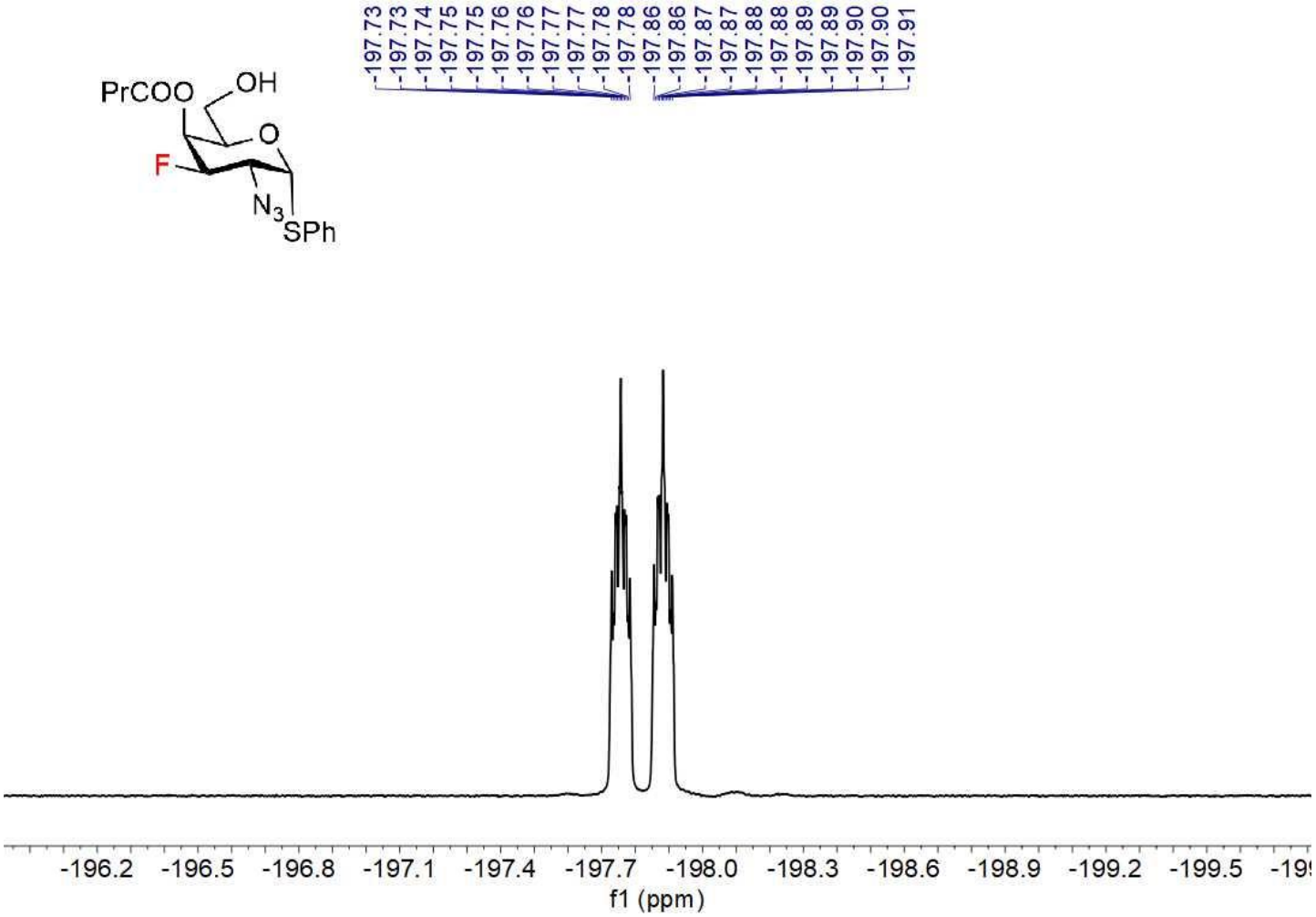
^{1}H NMR (400 MHz, $CDCl_3$) α-57



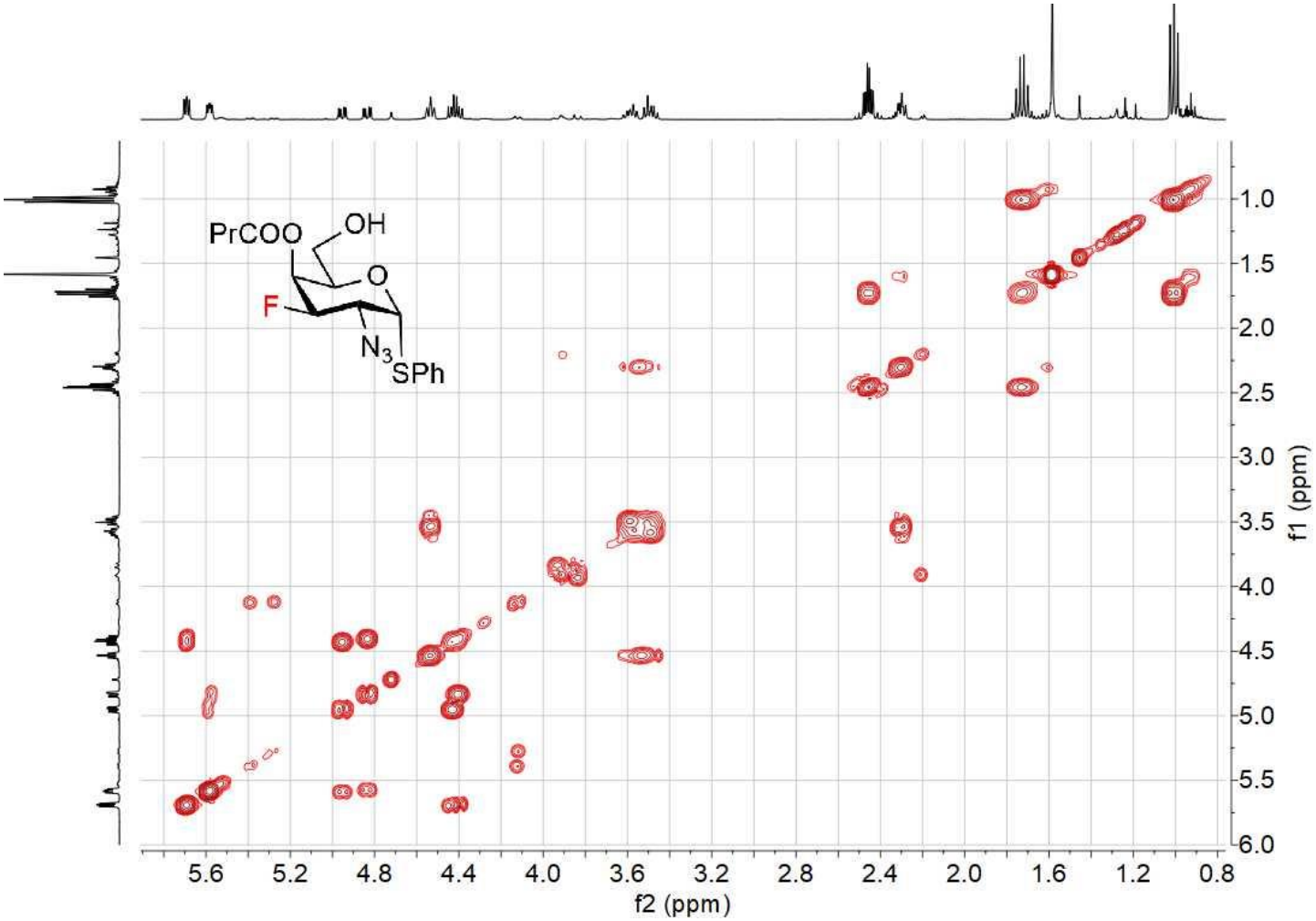
^{13}C NMR (100 MHz, $CDCl_3$) α-57



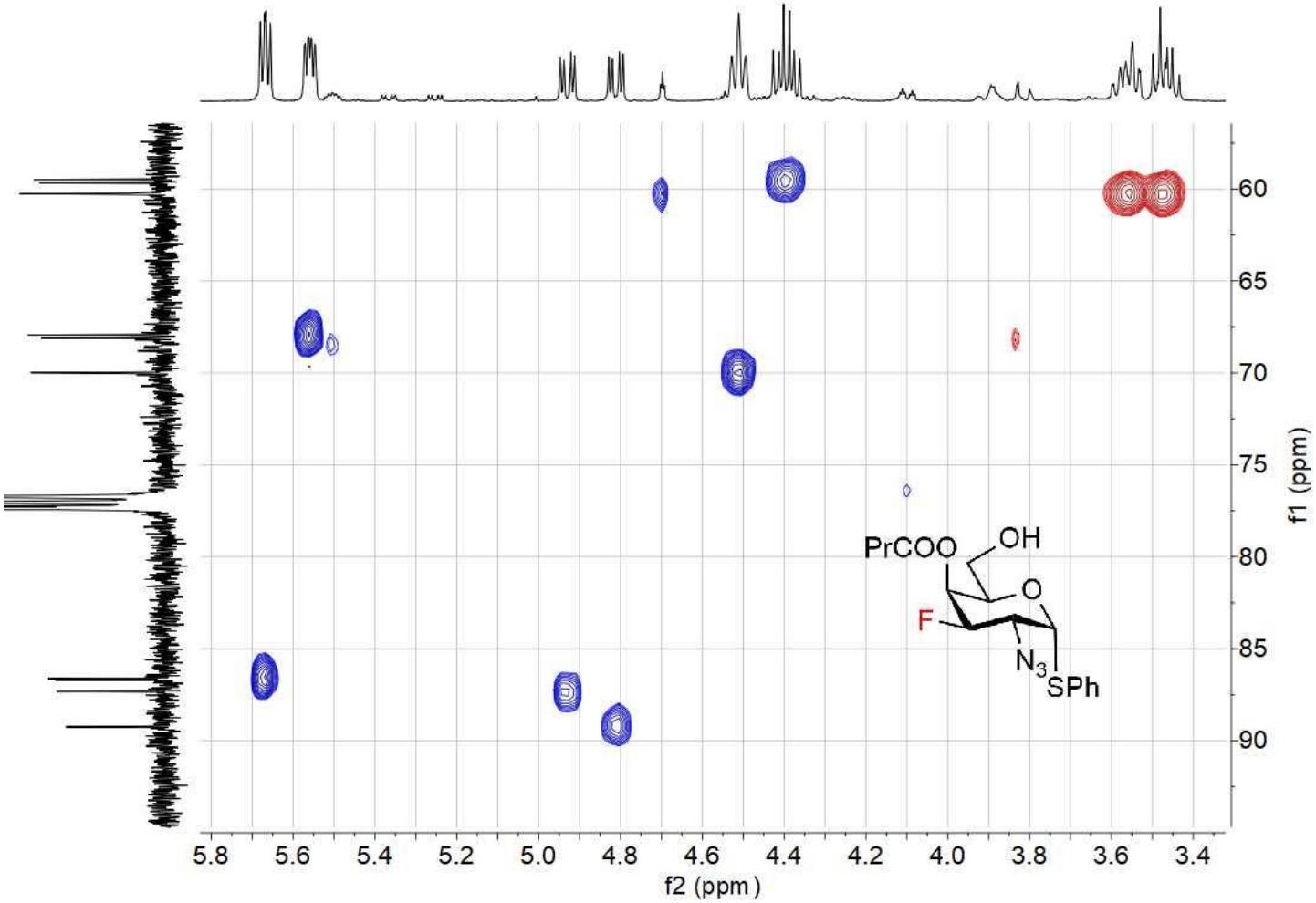
^{19}F NMR (376 MHz, $CDCl_3$) α-57



^{1}H-^{1}H COSY α-57

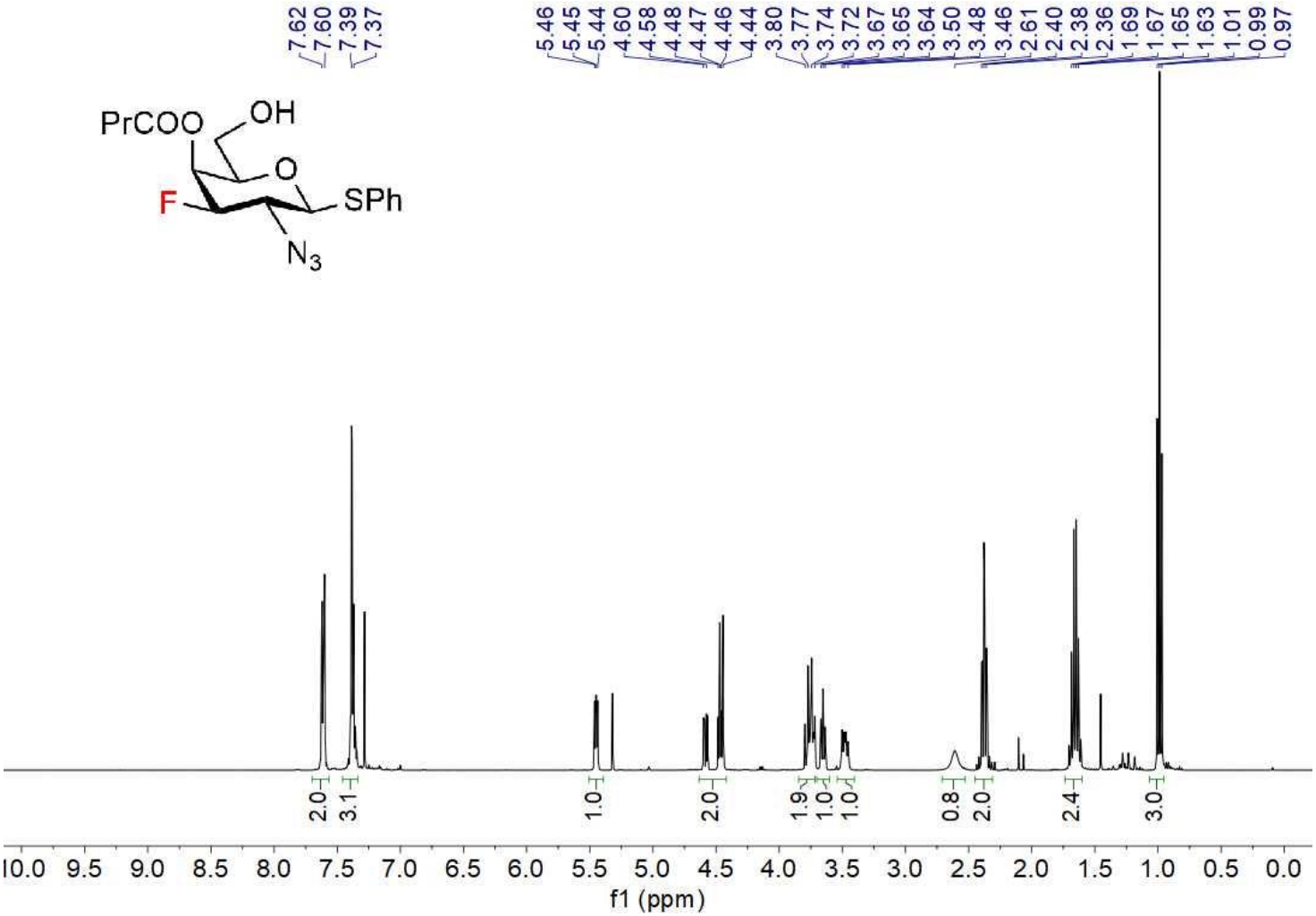


^{1}H-^{13}C HSQC α-57

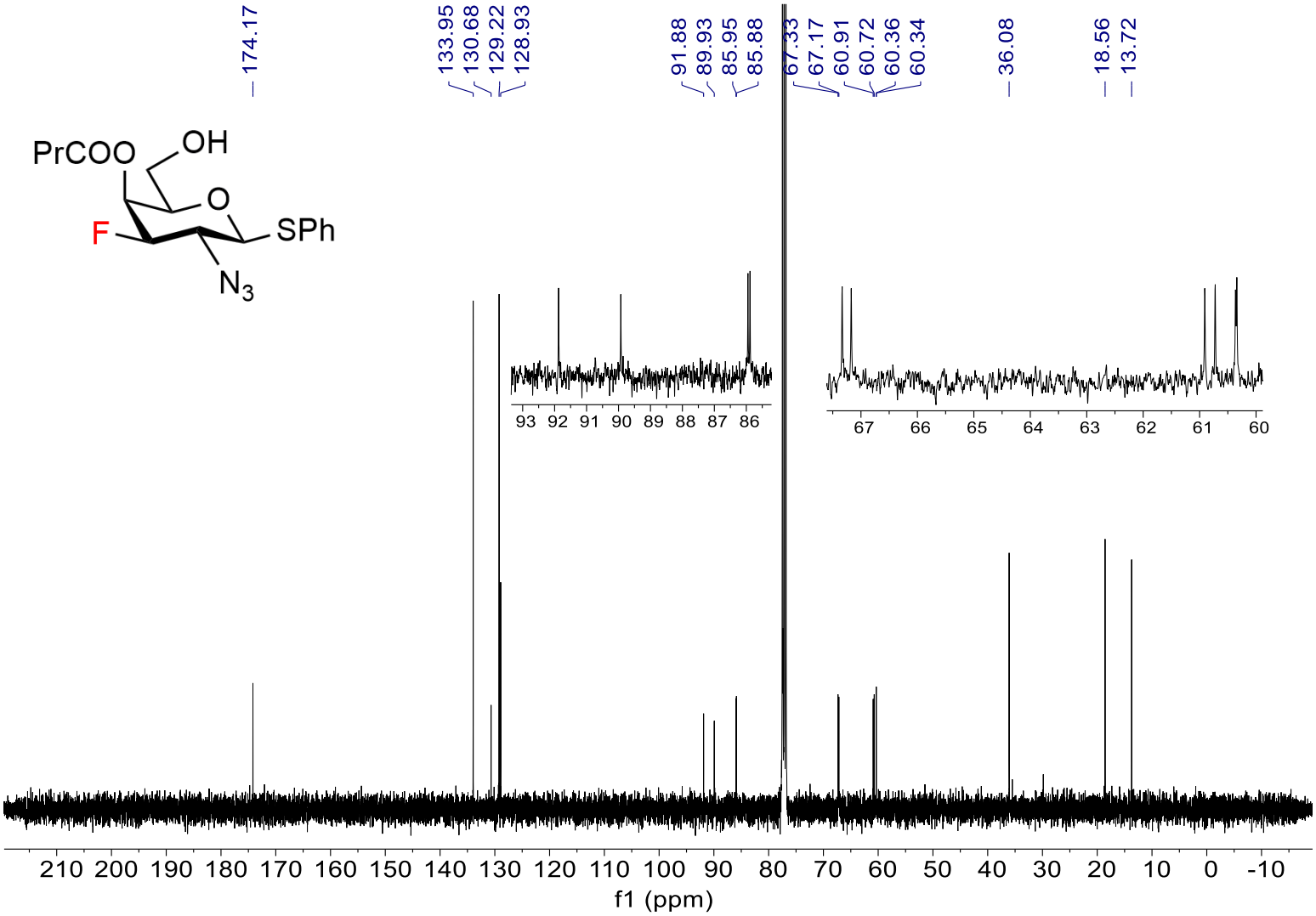


NMR COMPOUND β-57

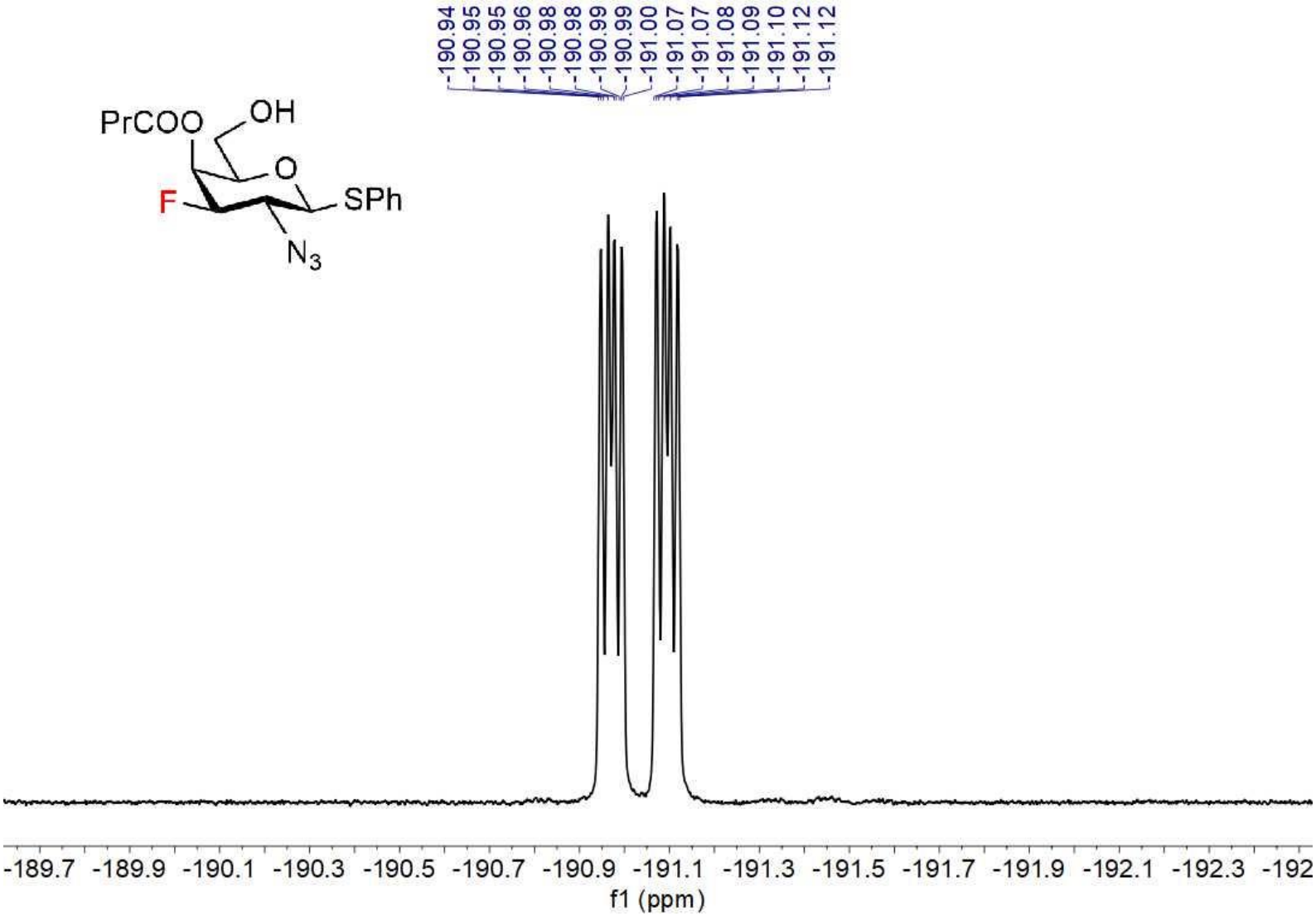
^{1}H NMR (400 MHz, $CDCl_3$) β-57



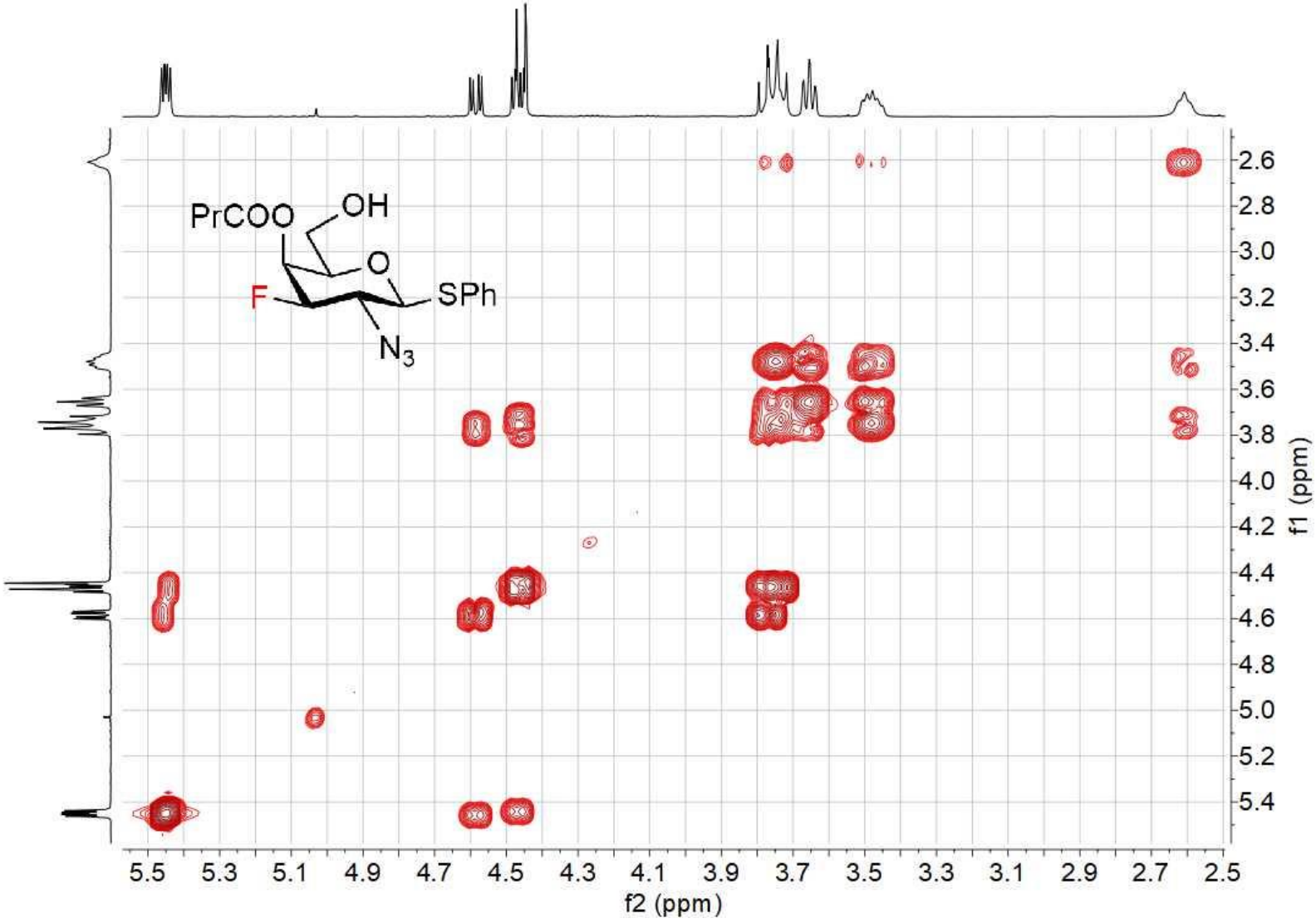
^{13}C NMR (100 MHz, $CDCl_3$) β-57



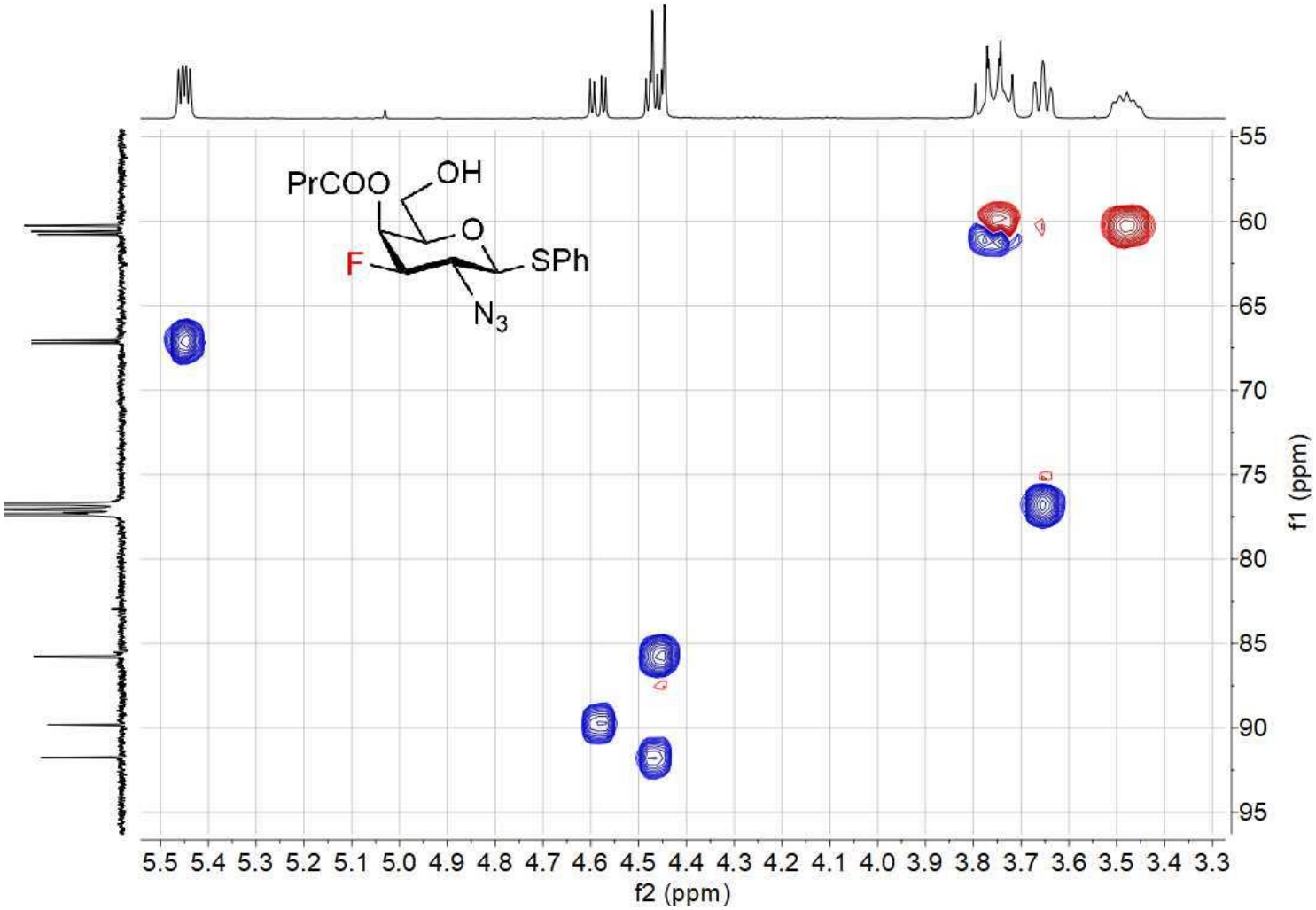
^{19}F NMR (376 MHz, $CDCl_3$) β-57



^{1}H-^{1}H COSY β-57

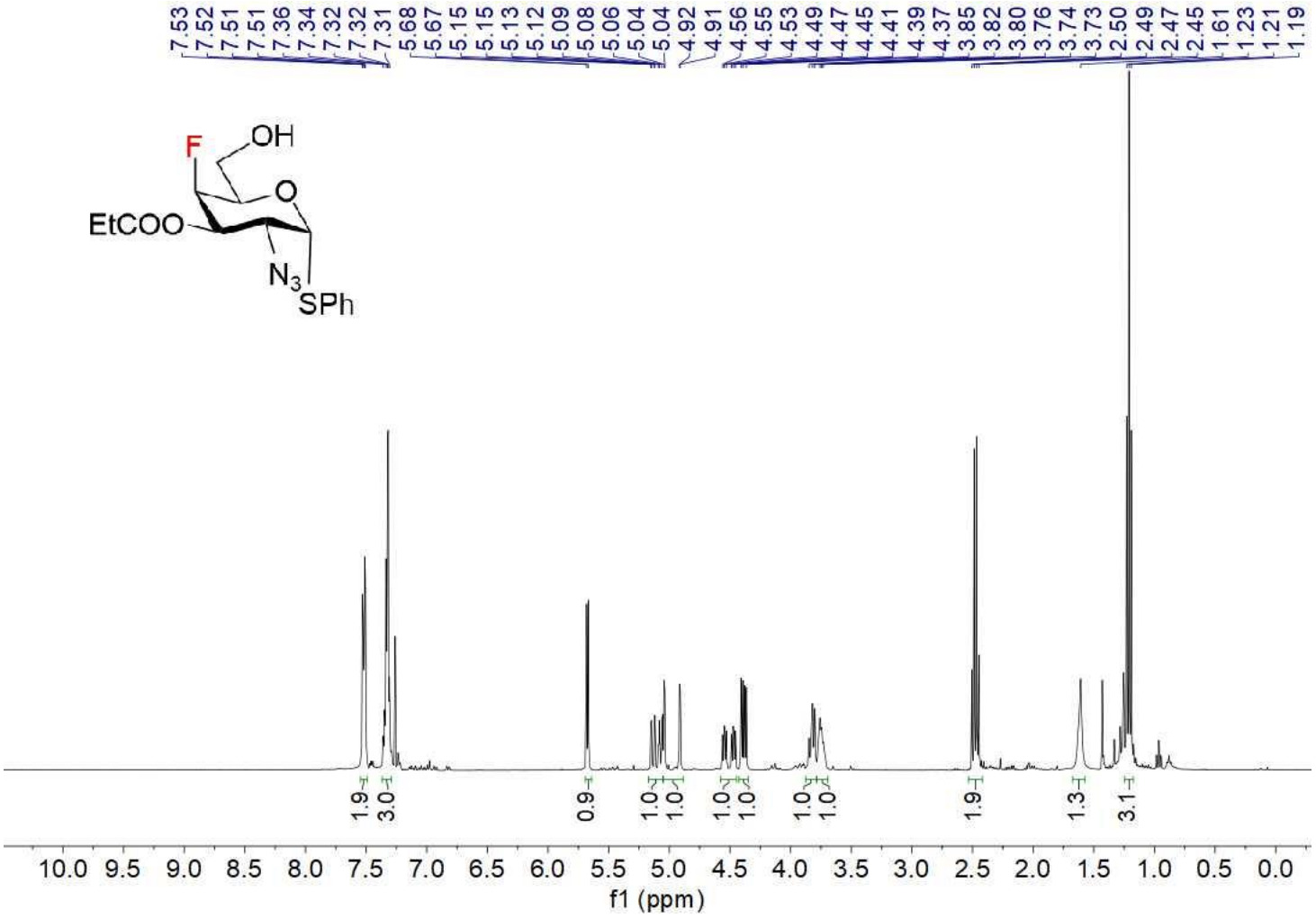


^{1}H-^{13}C HSQC β-57

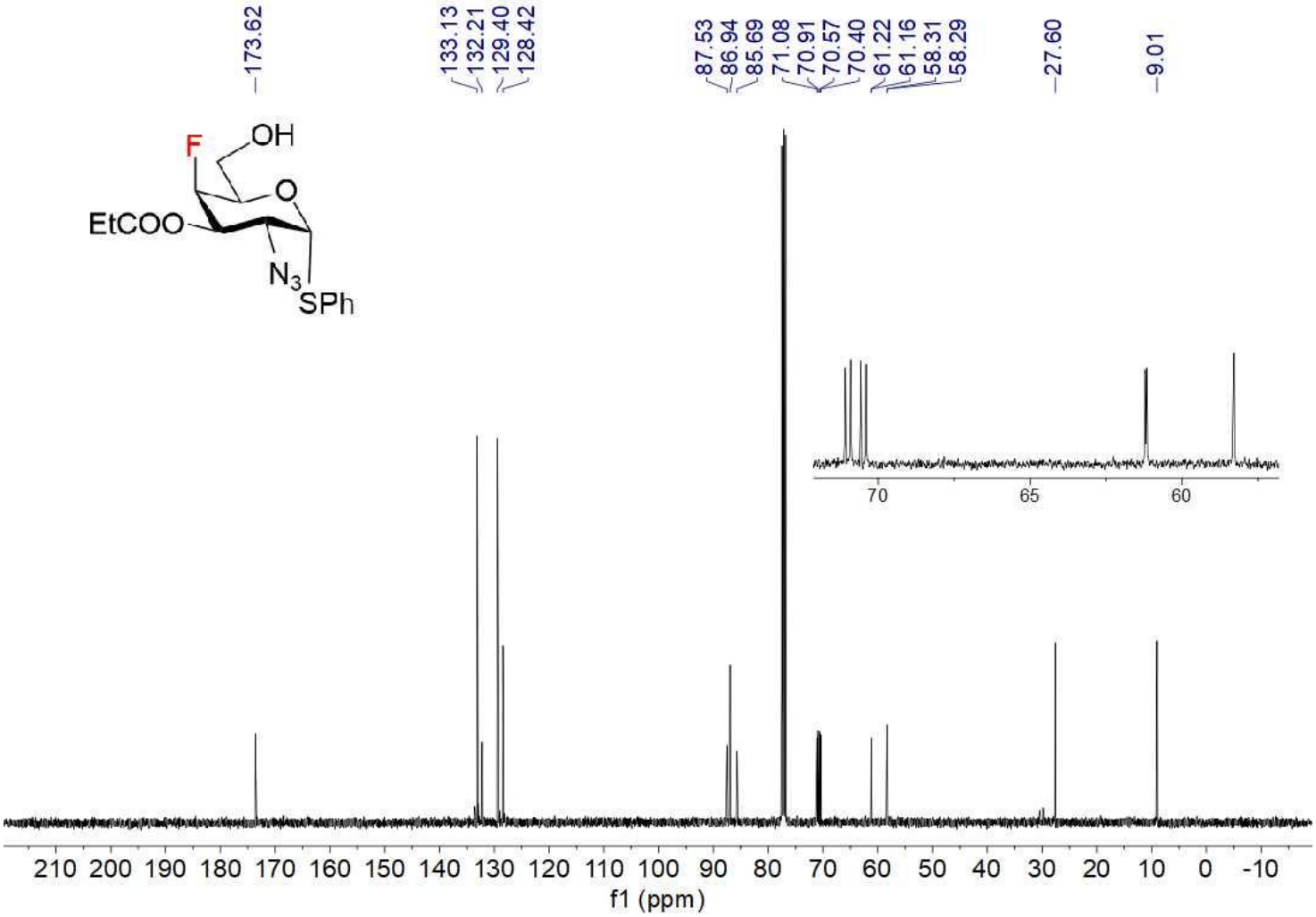


NMR COMPOUND α-59

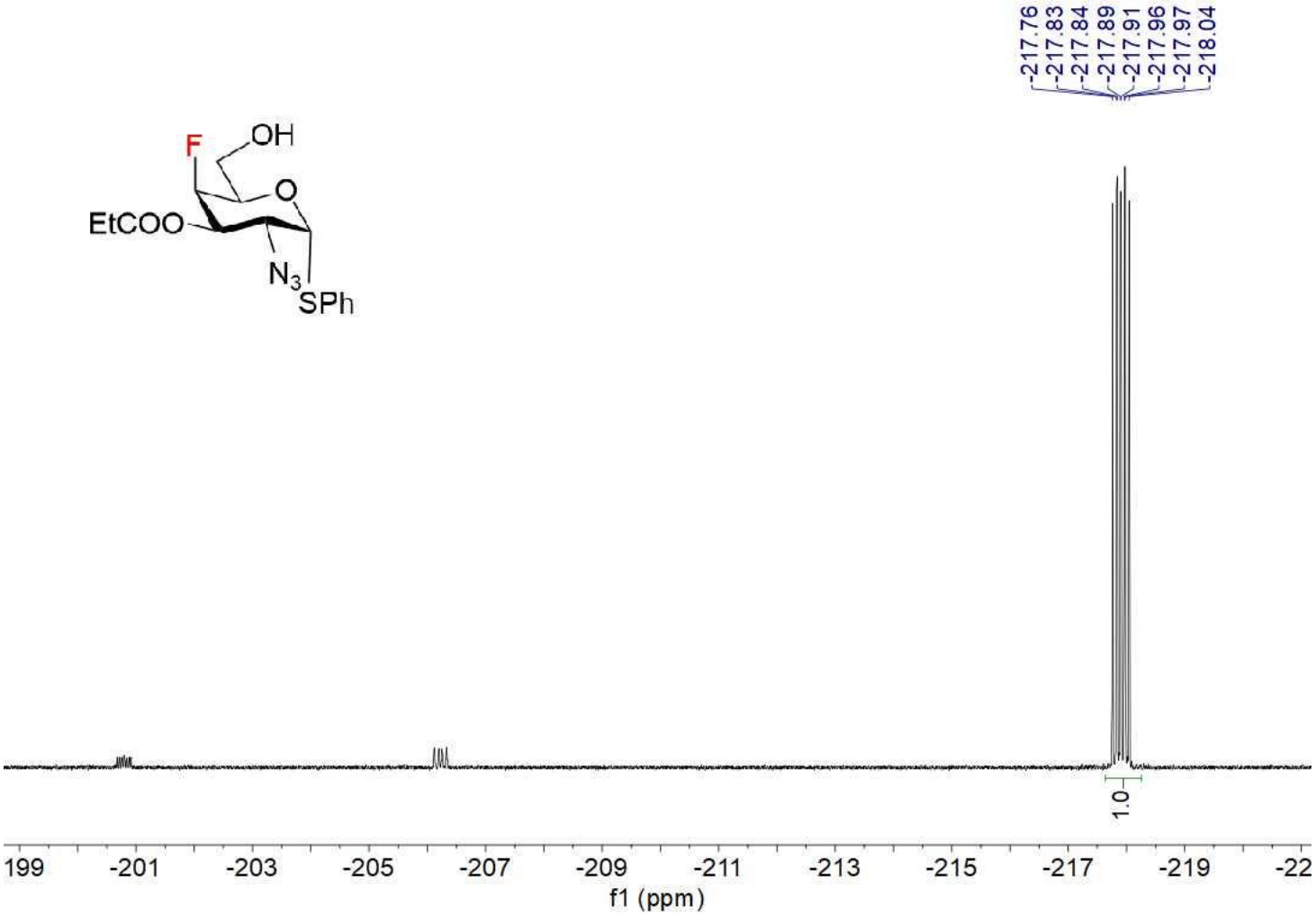
^{1}H NMR (400 MHz, $CDCl_3$) α-59



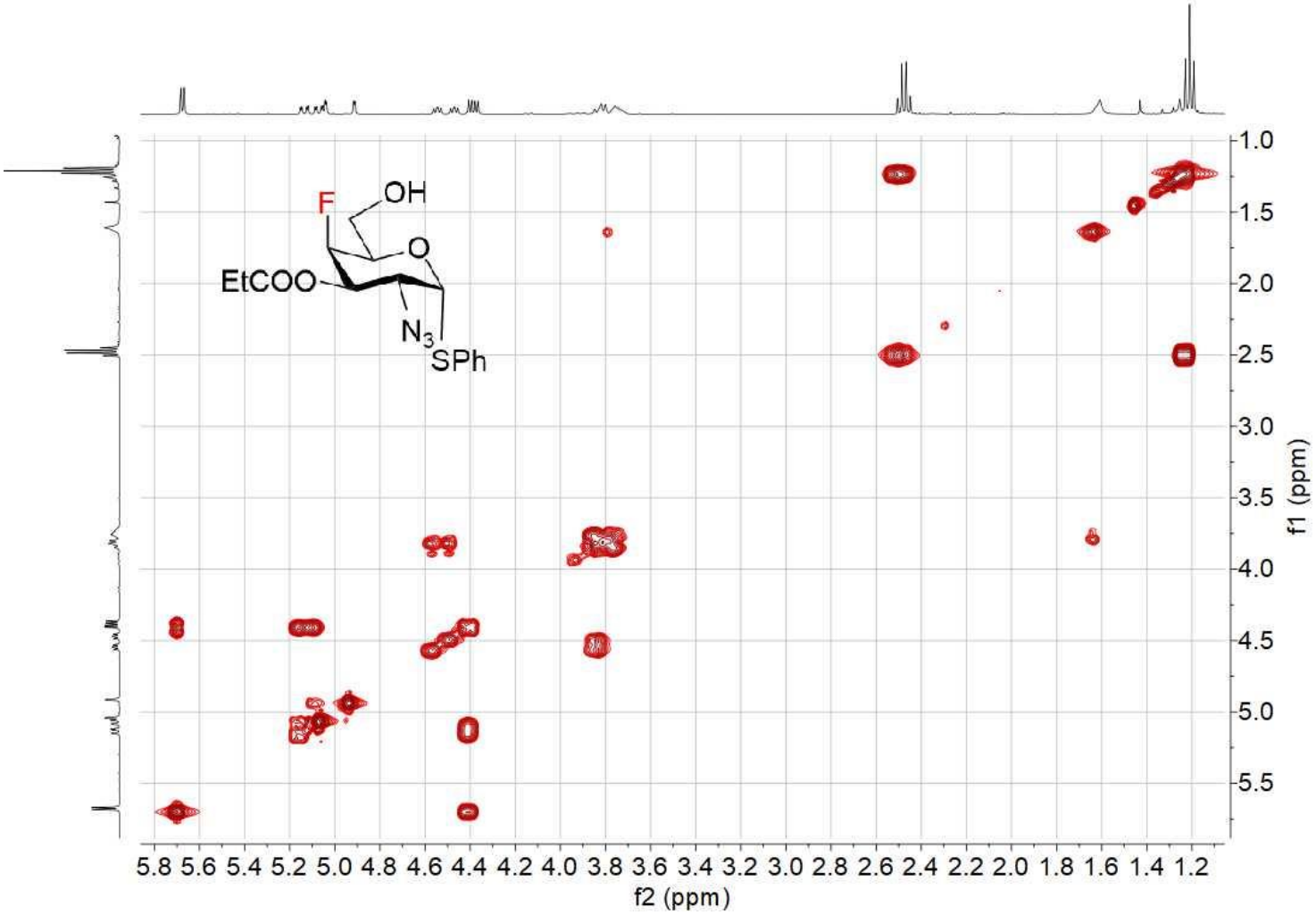
^{13}C NMR (100 MHz, $CDCl_3$) α-59



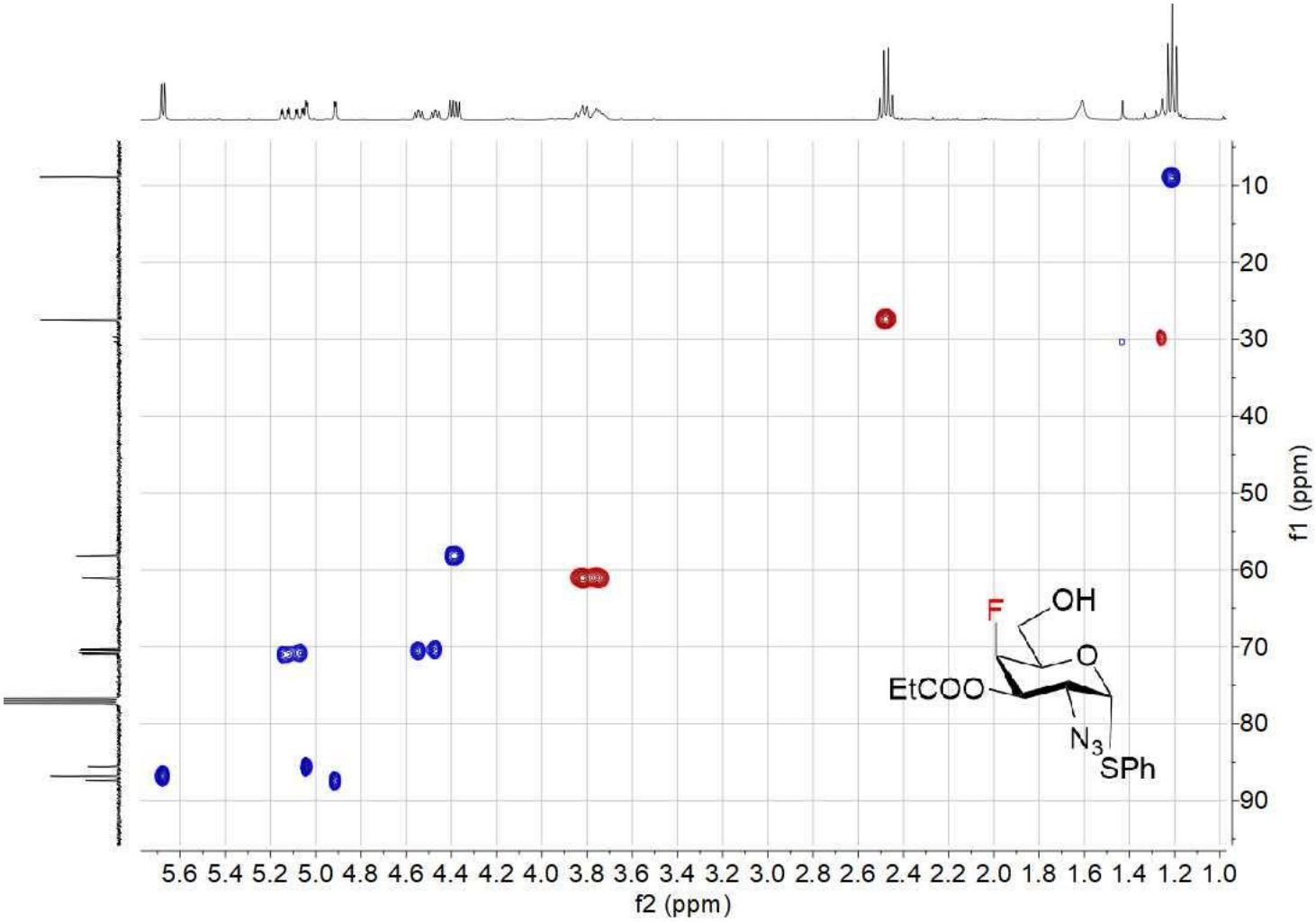
^{19}F NMR (376 MHz, $CDCl_3$) α-59



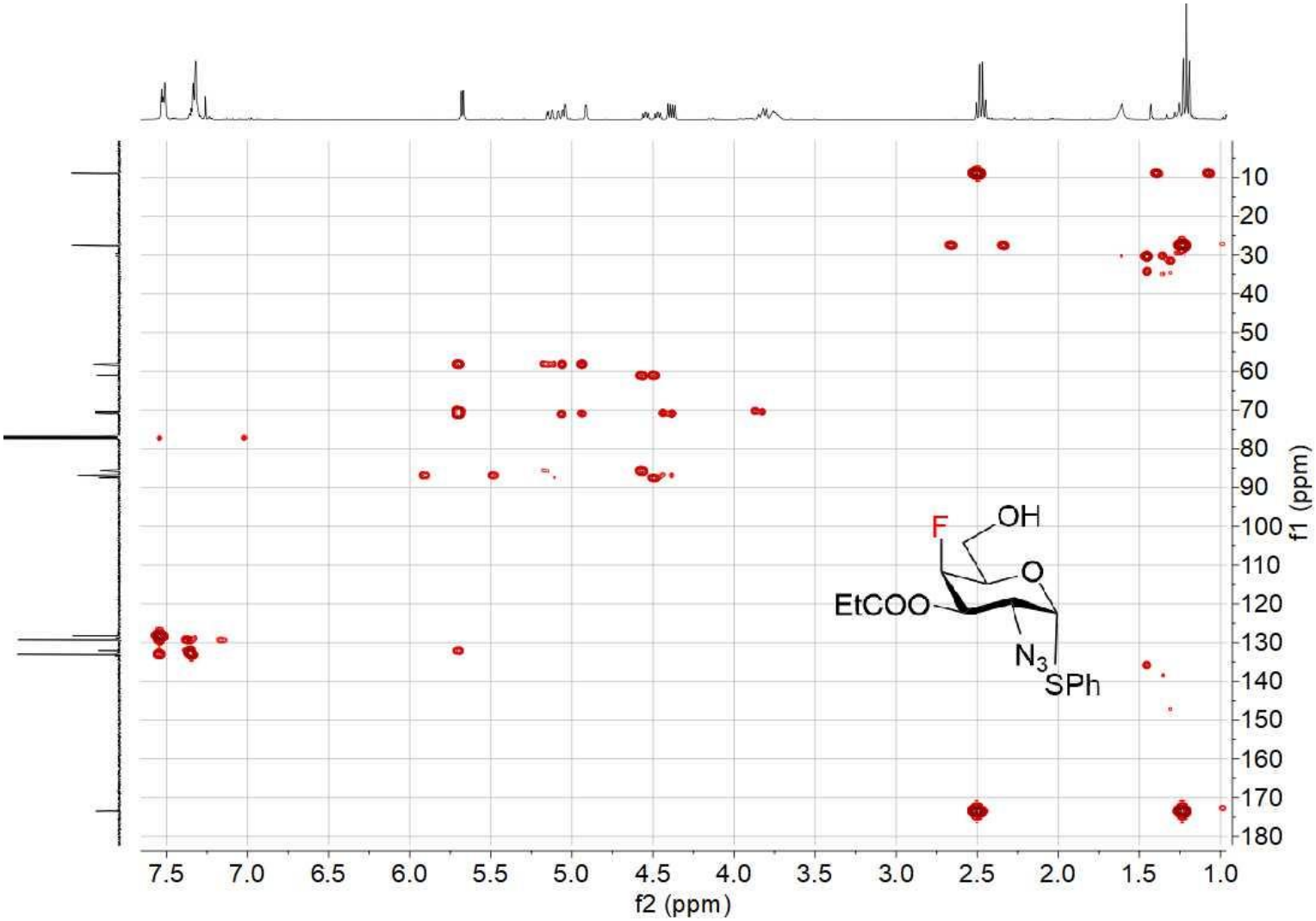
^{1}H-^{1}H COSY α-59



^{1}H-^{13}C HSQC α-59

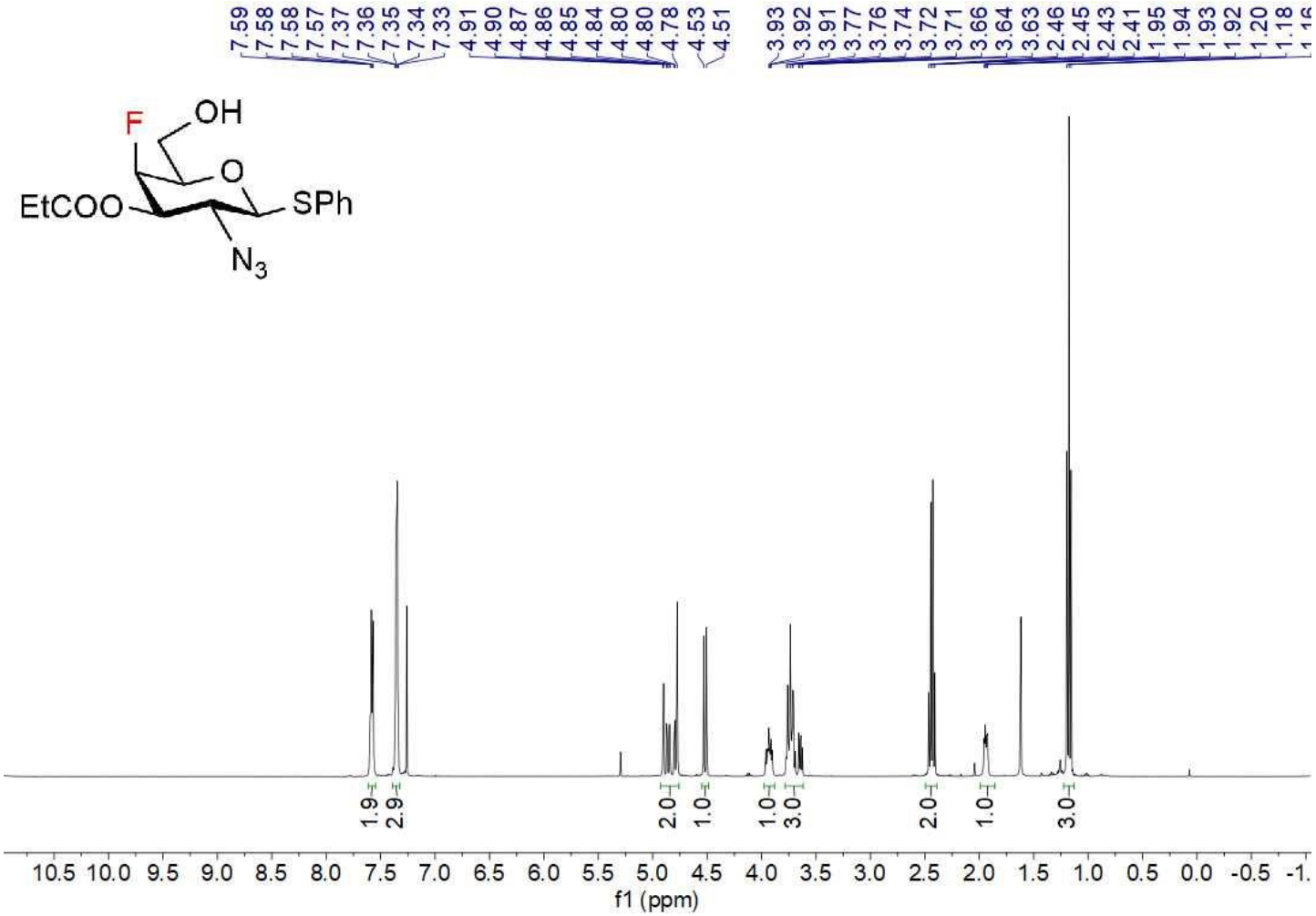


^{1}H-^{13}C HMBC α-59

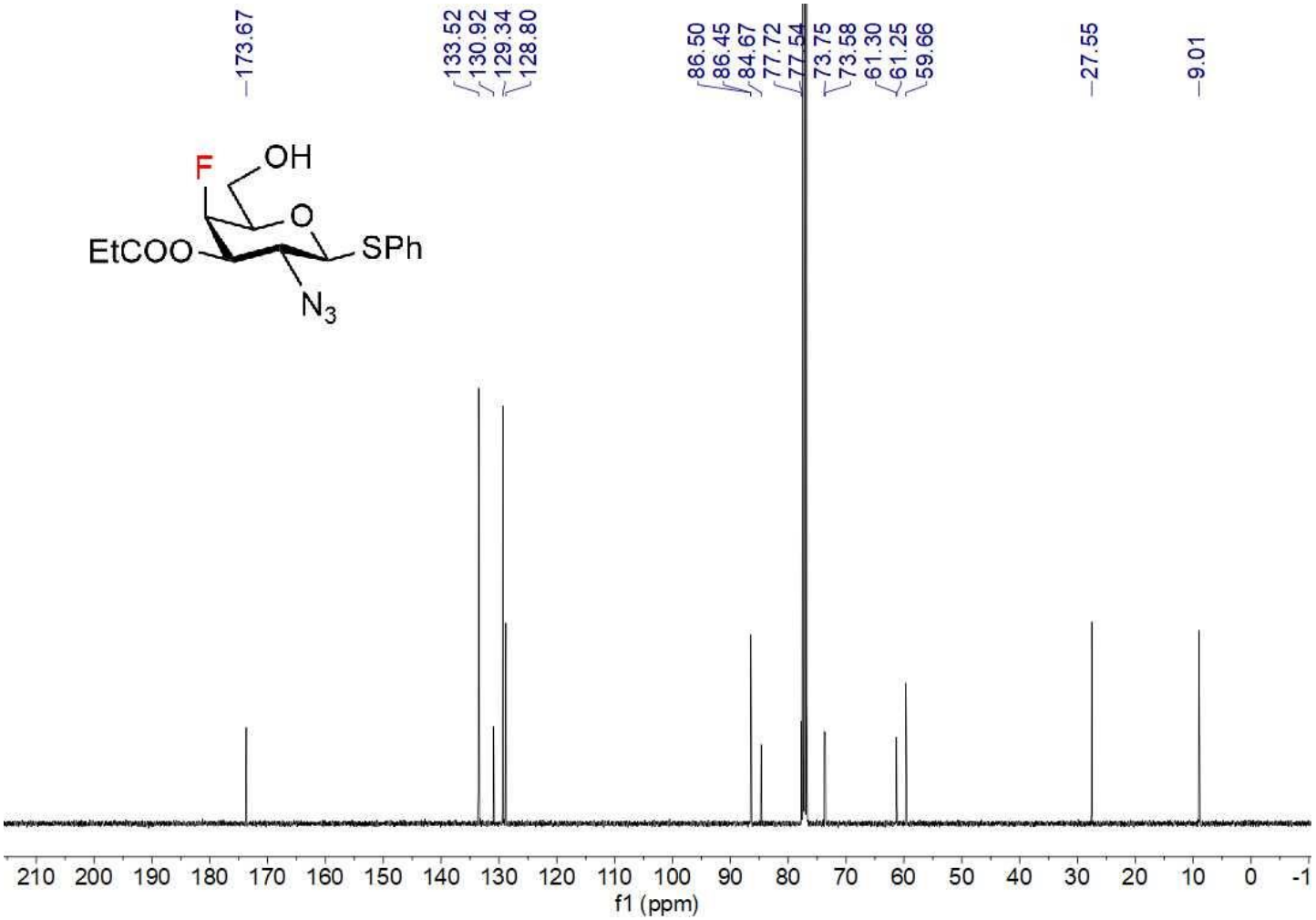


NMR COMPOUND β-59

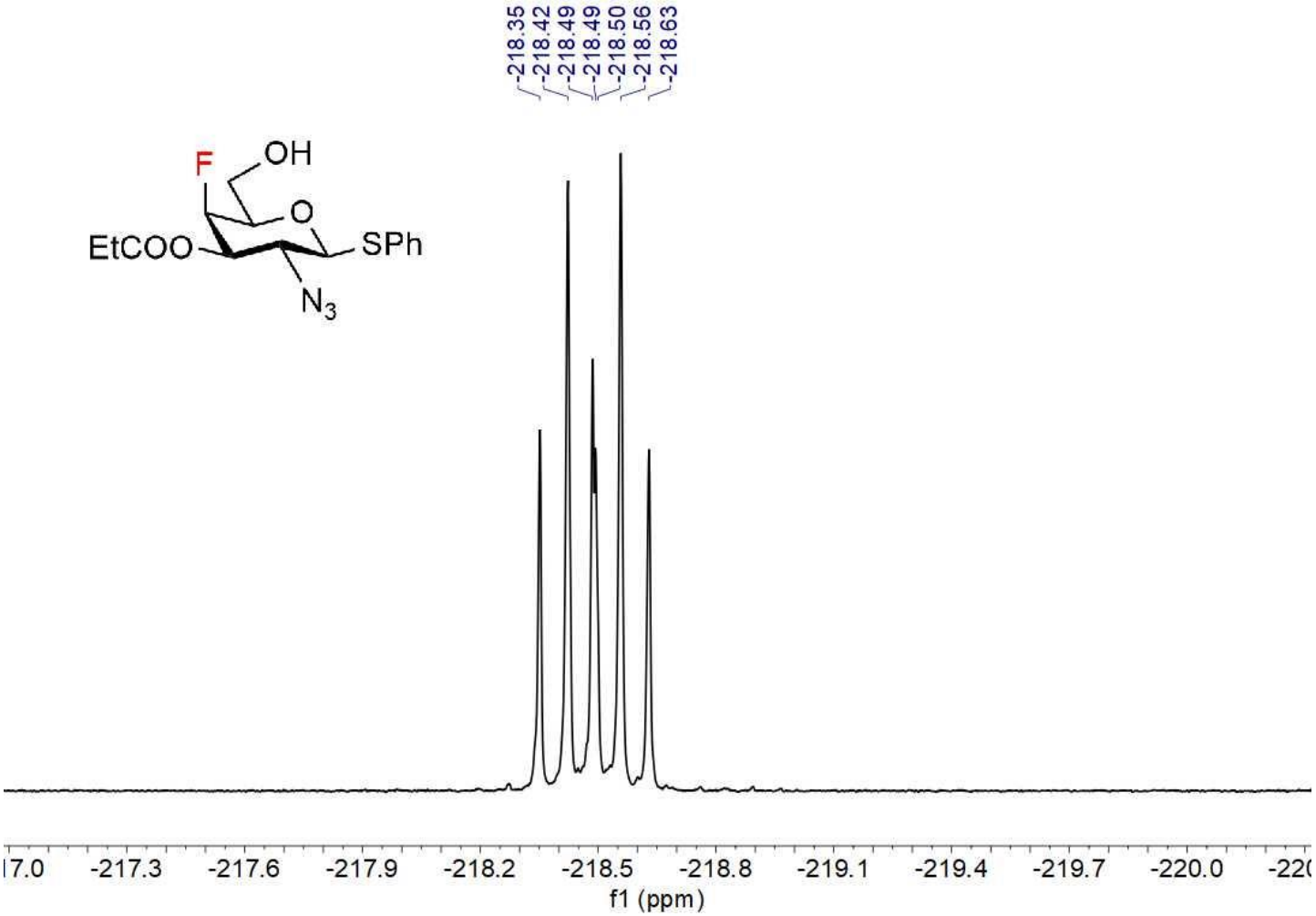
^{1}H NMR (400 MHz, $CDCl_3$) β-59



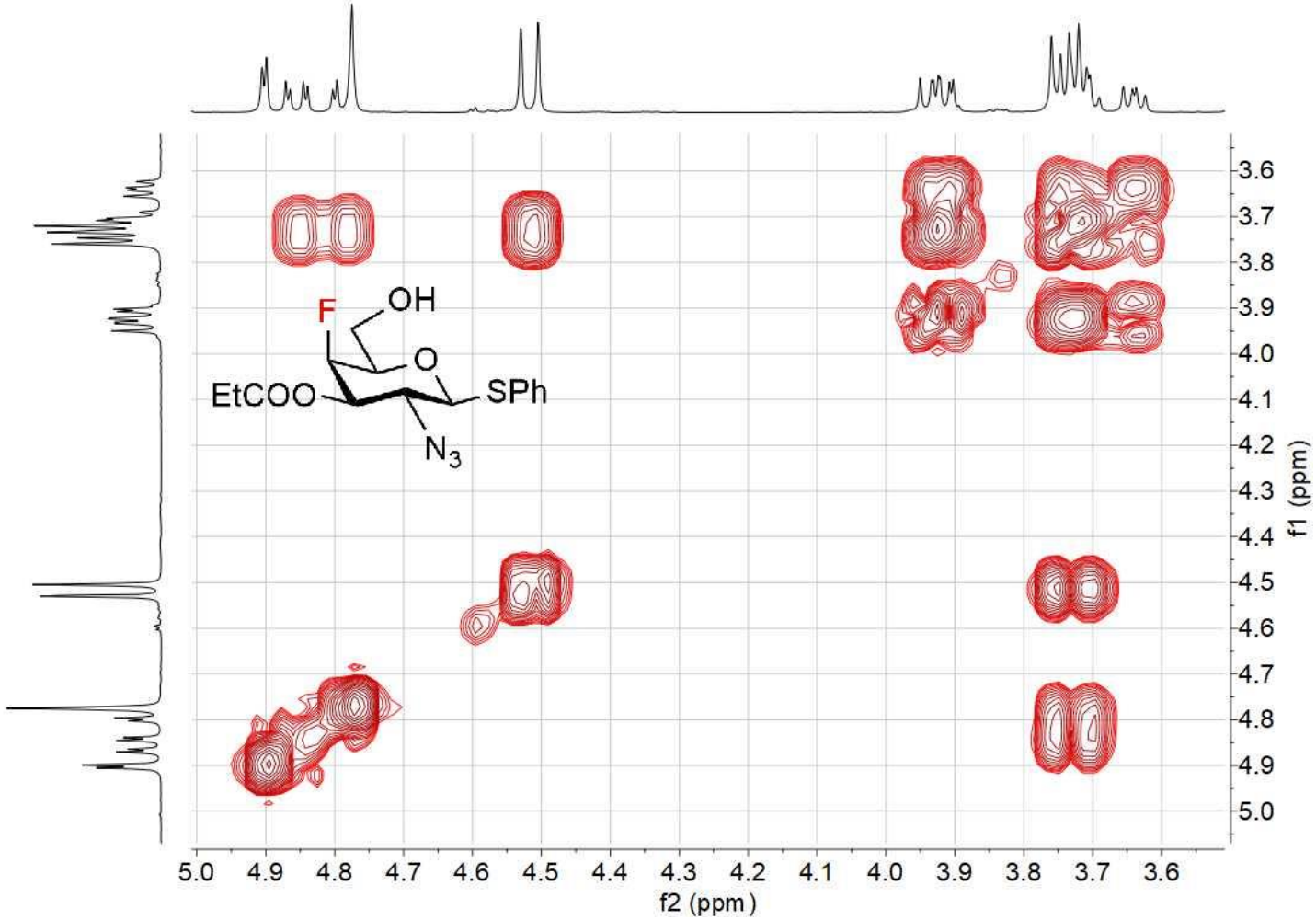
^{13}C NMR (100 MHz, $CDCl_3$) β-59



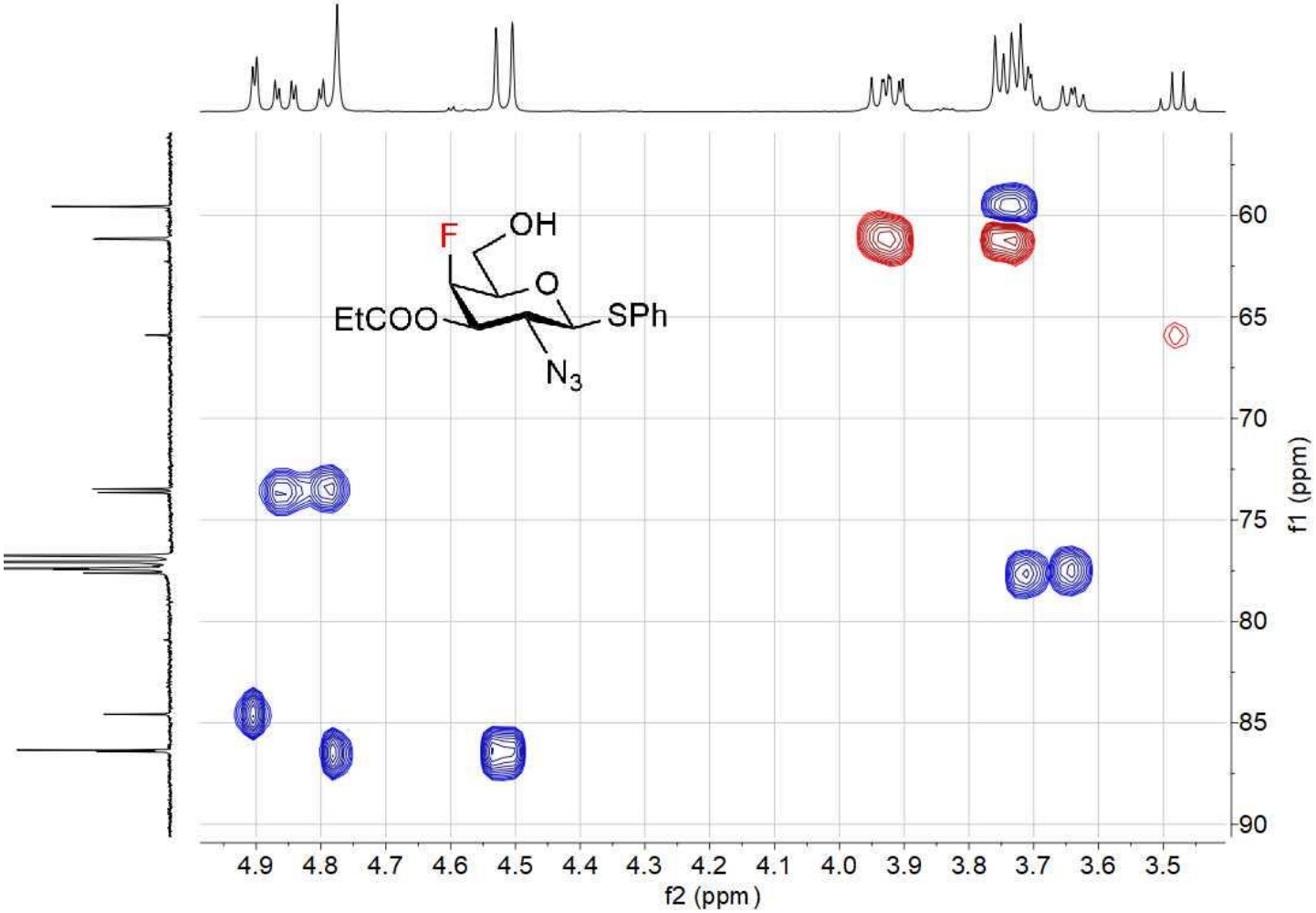
^{19}F NMR (376 MHz, $CDCl_3$) β-59



^{1}H-^{1}H COSY β-59

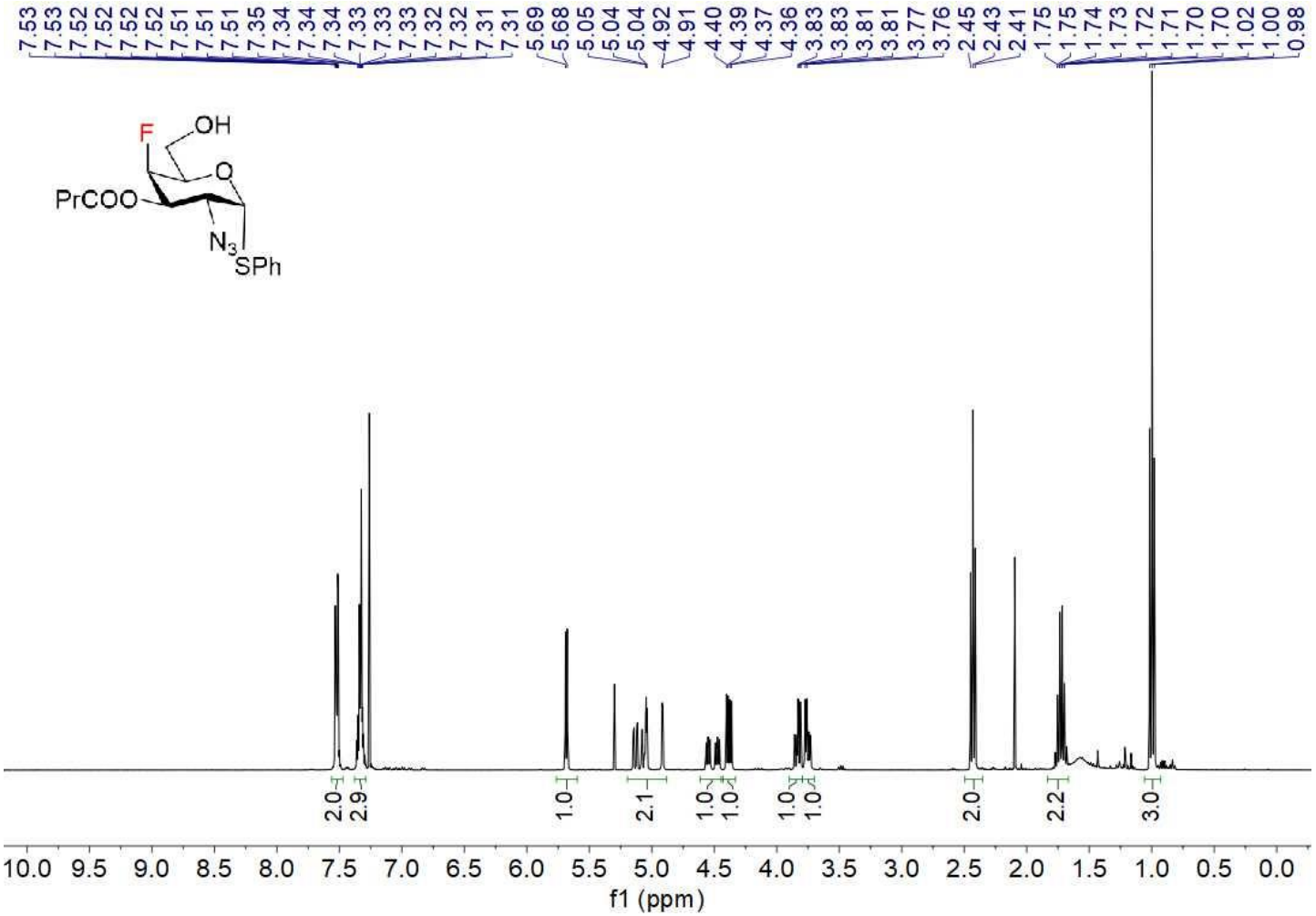


^{1}H-^{13}C HSQC β-59

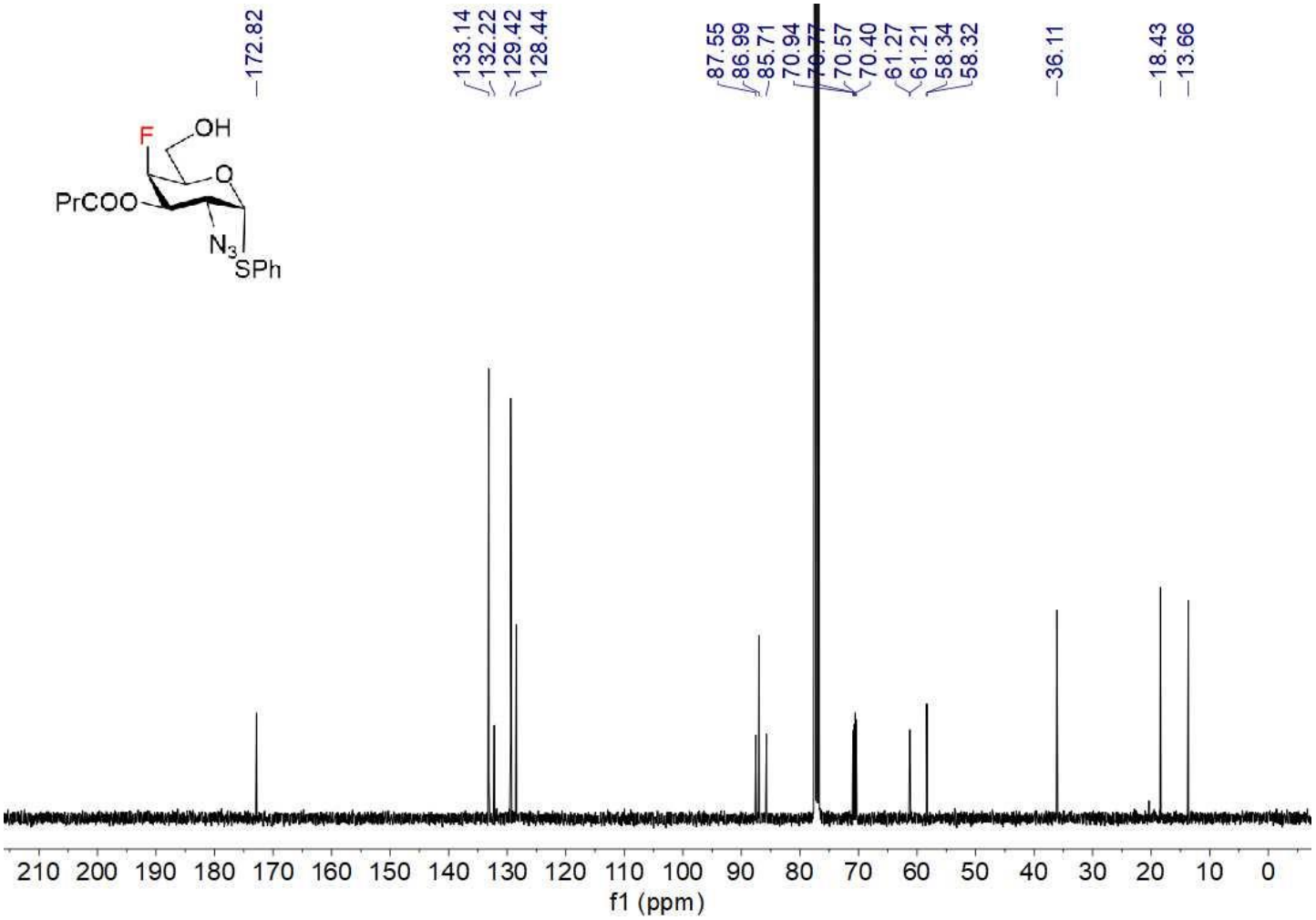


NMR COMPOUND α-60

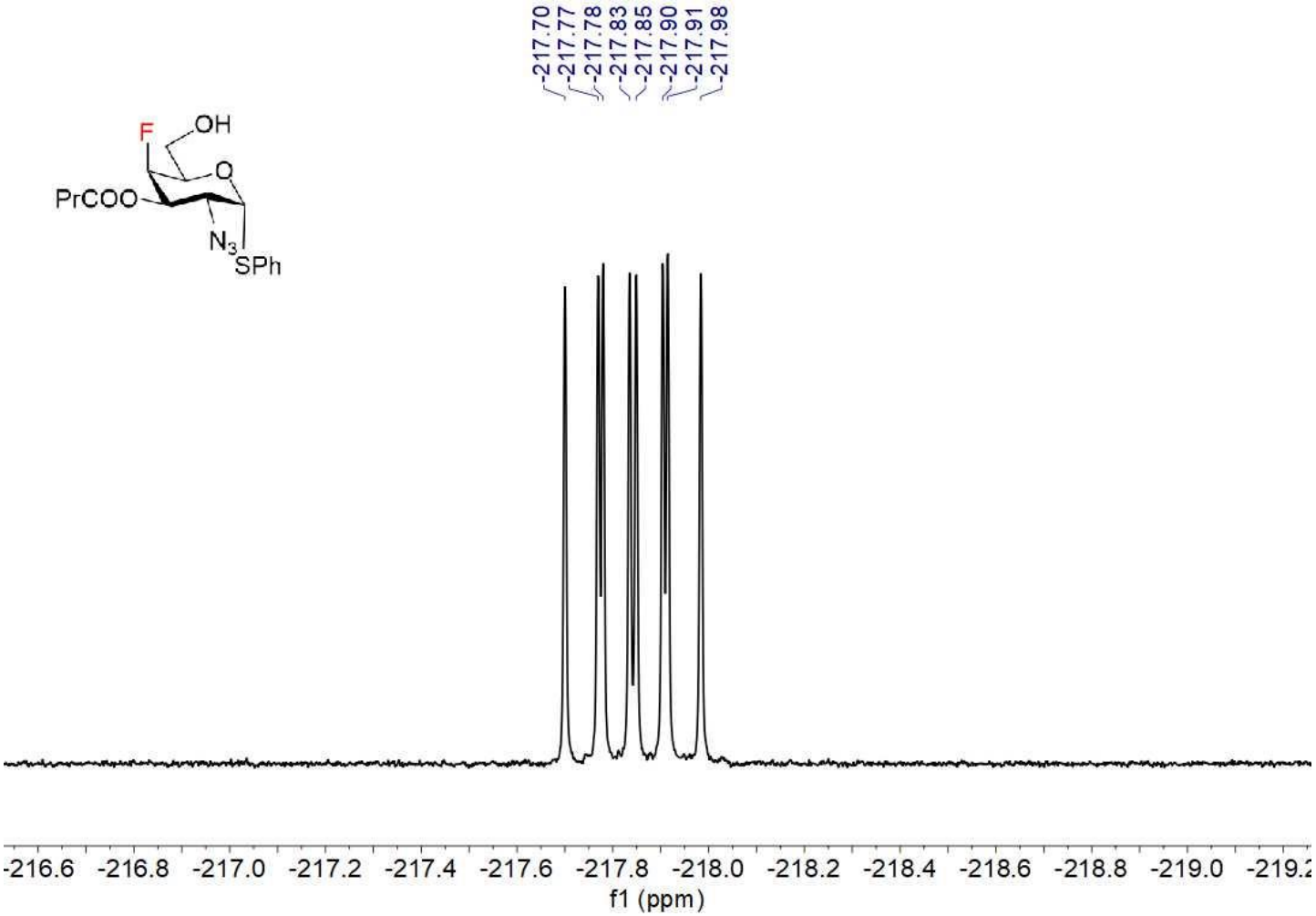
^{1}H NMR (400 MHz, $CDCl_3$) α-60



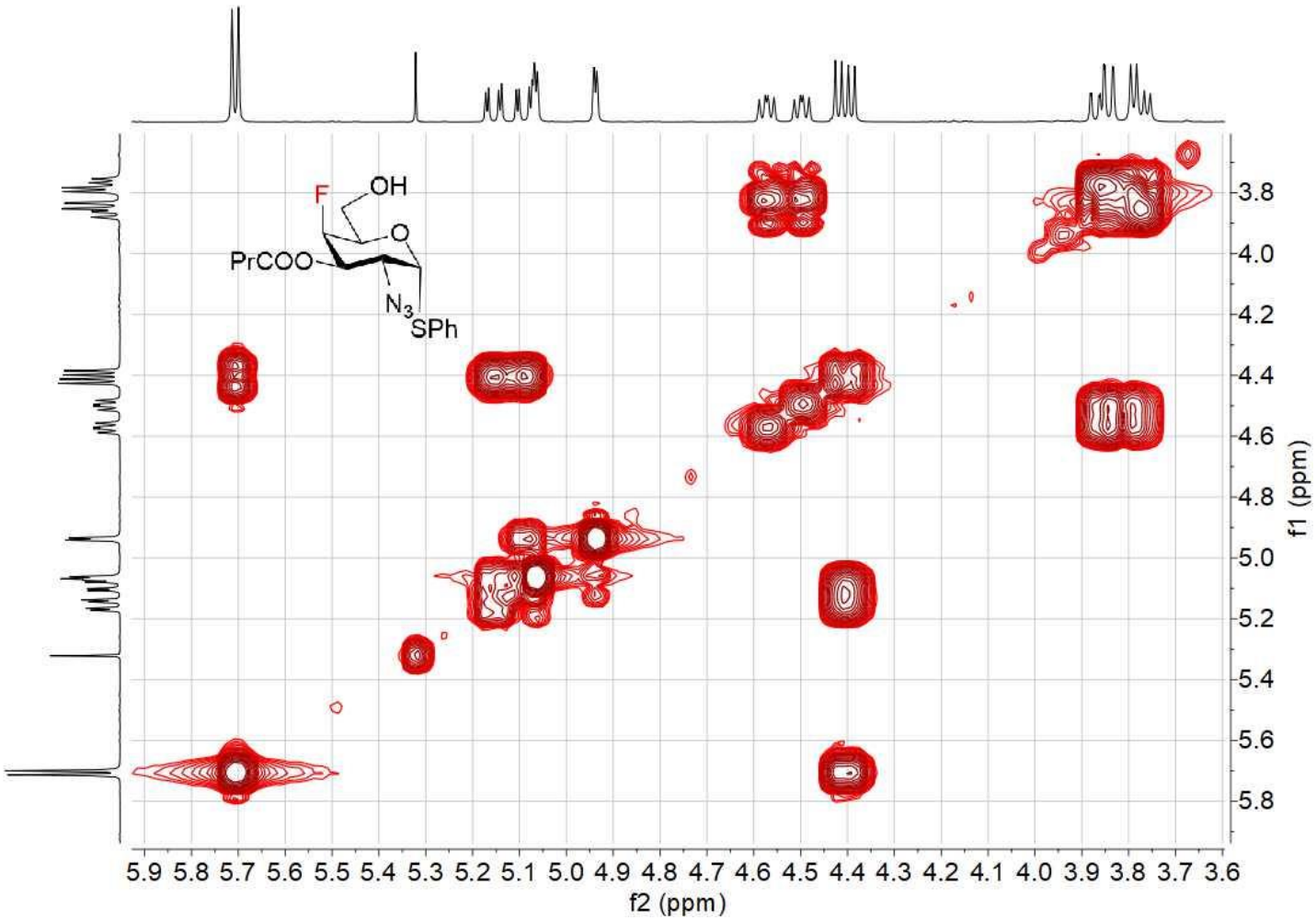
^{13}C NMR (100 MHz, $CDCl_3$) α-60



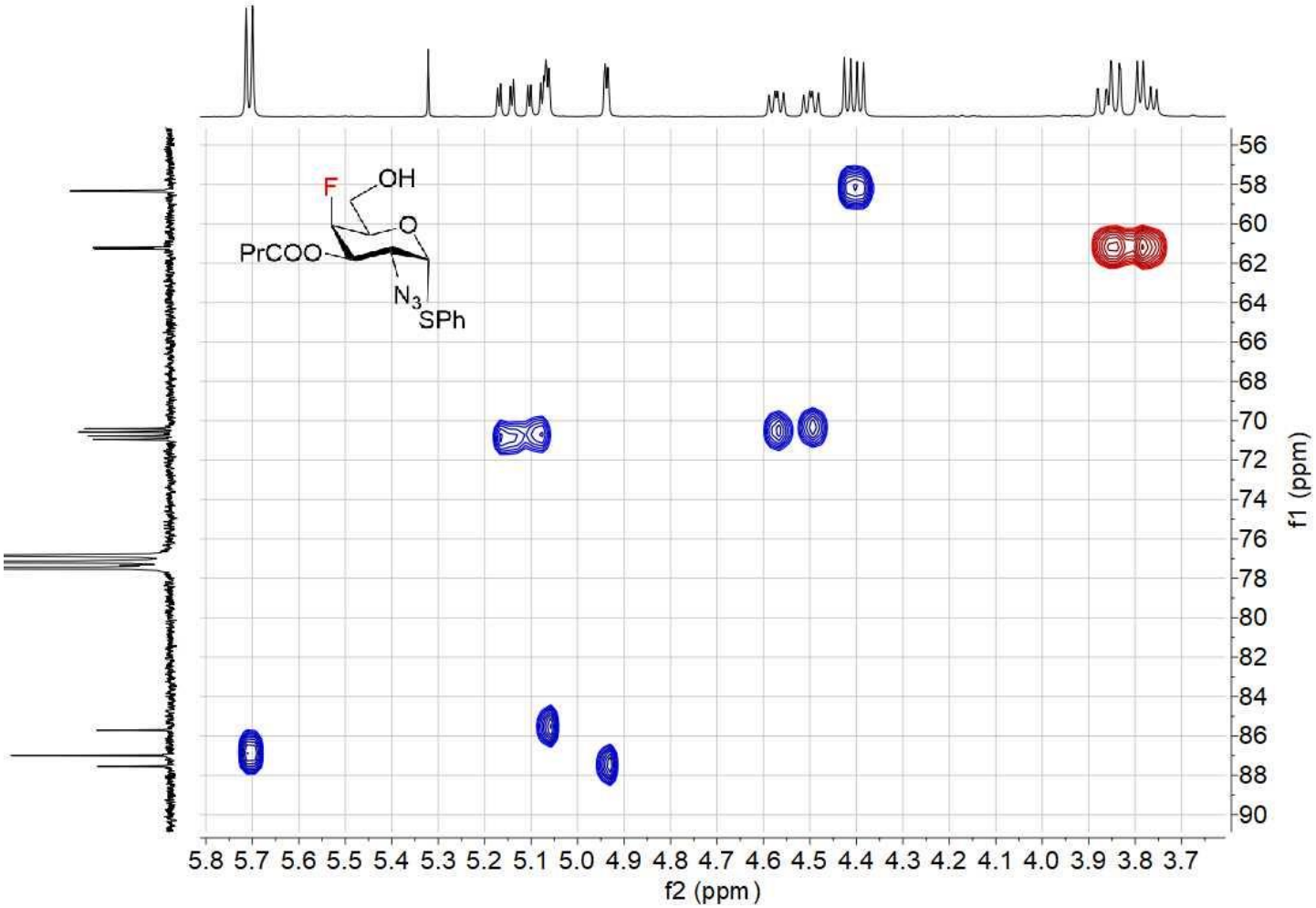
^{19}F NMR (376 MHz, $CDCl_3$) α-60



^{1}H-^{1}H COSY α-60

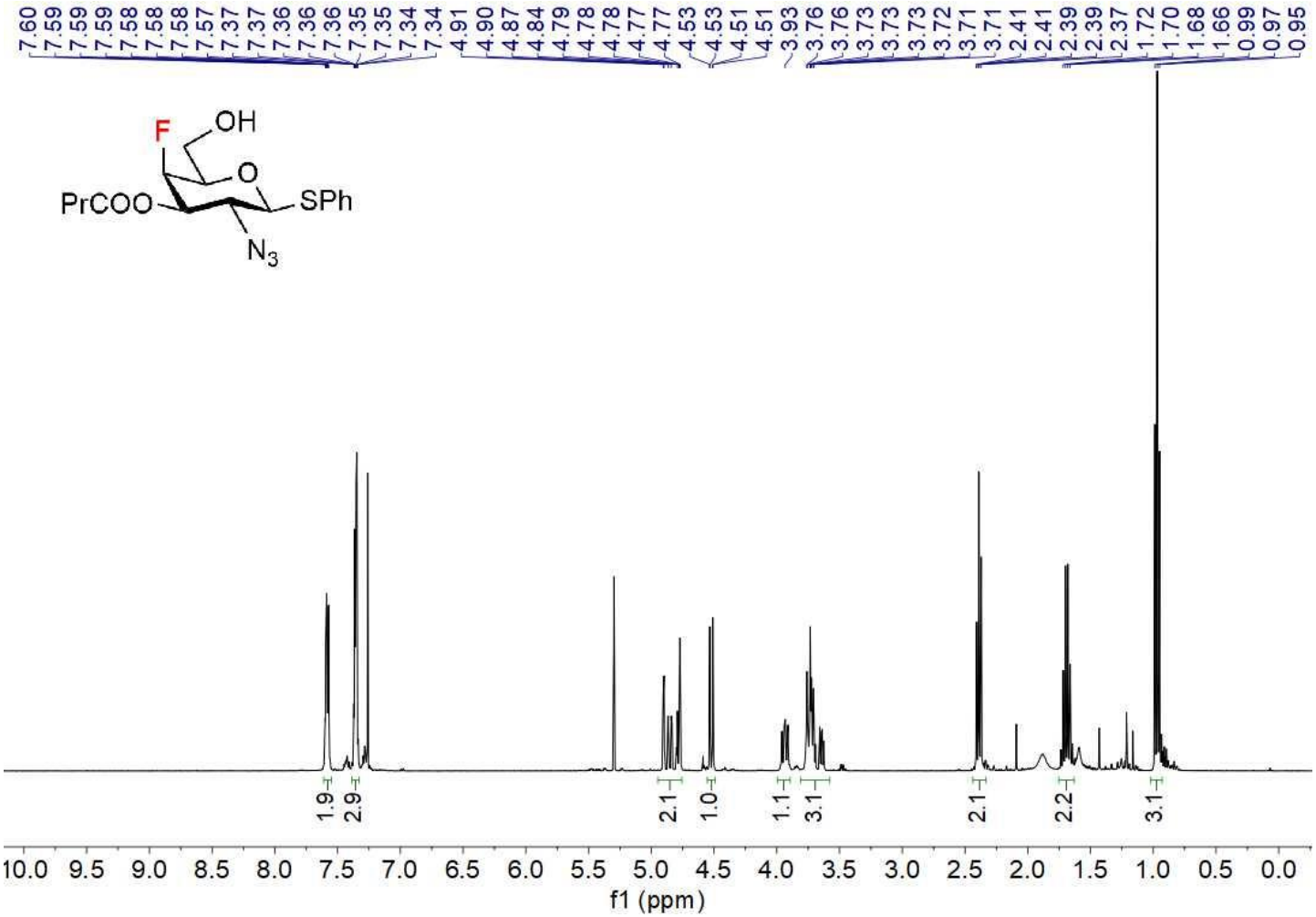


^{1}H-^{13}C HSQC α-60

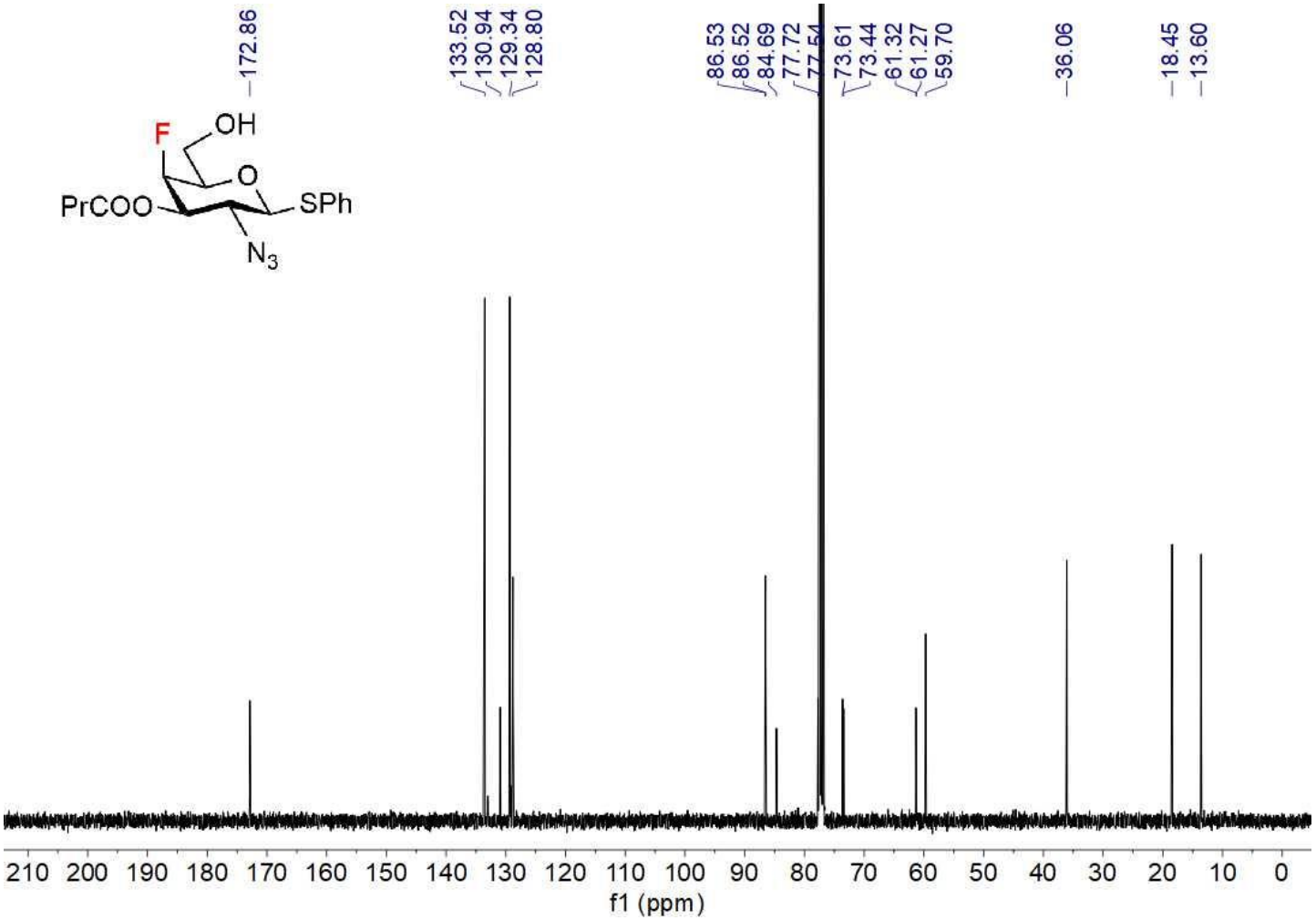


NMR COMPOUND β-60

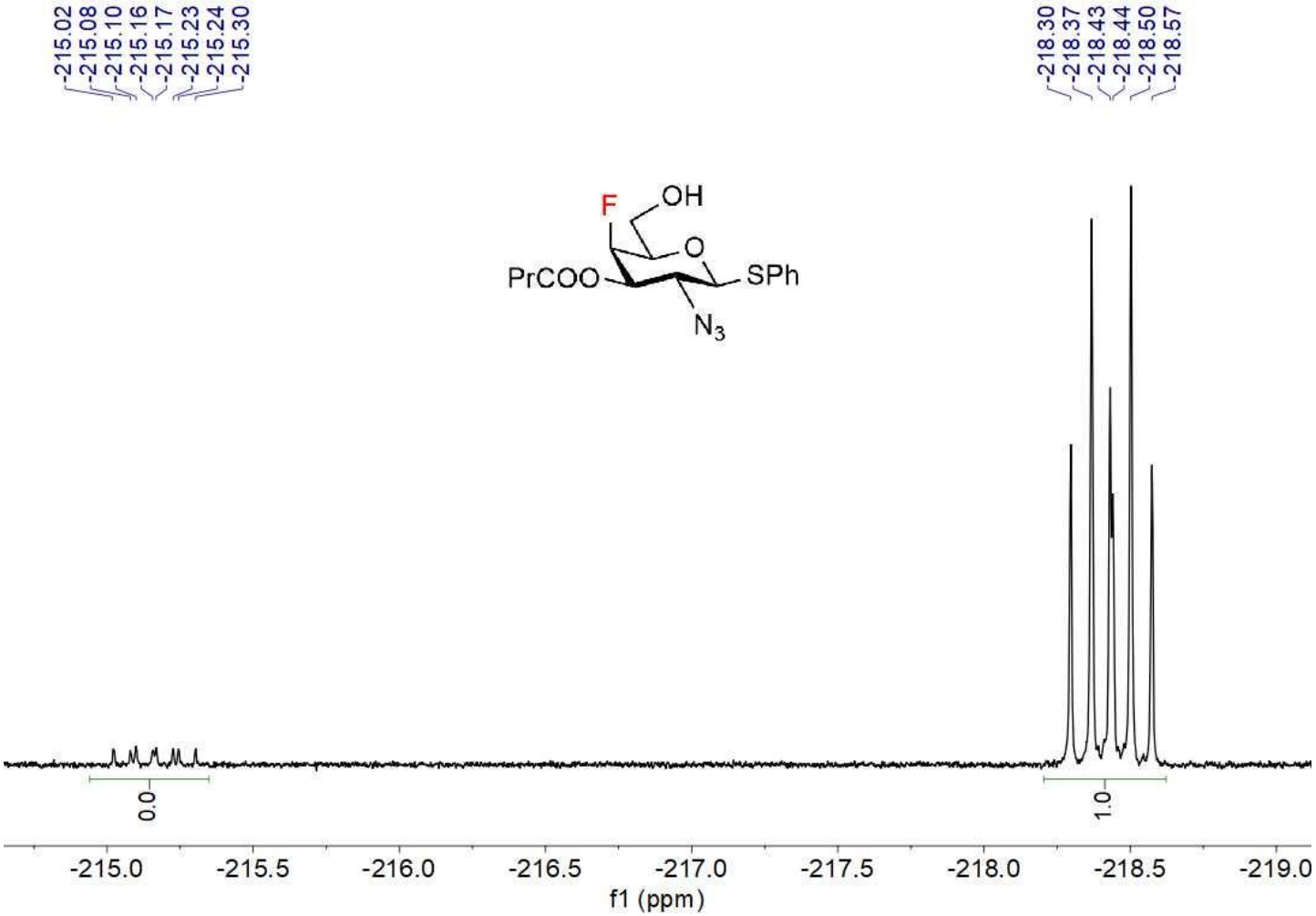
^{1}H NMR (400 MHz, $CDCl_3$) β-60



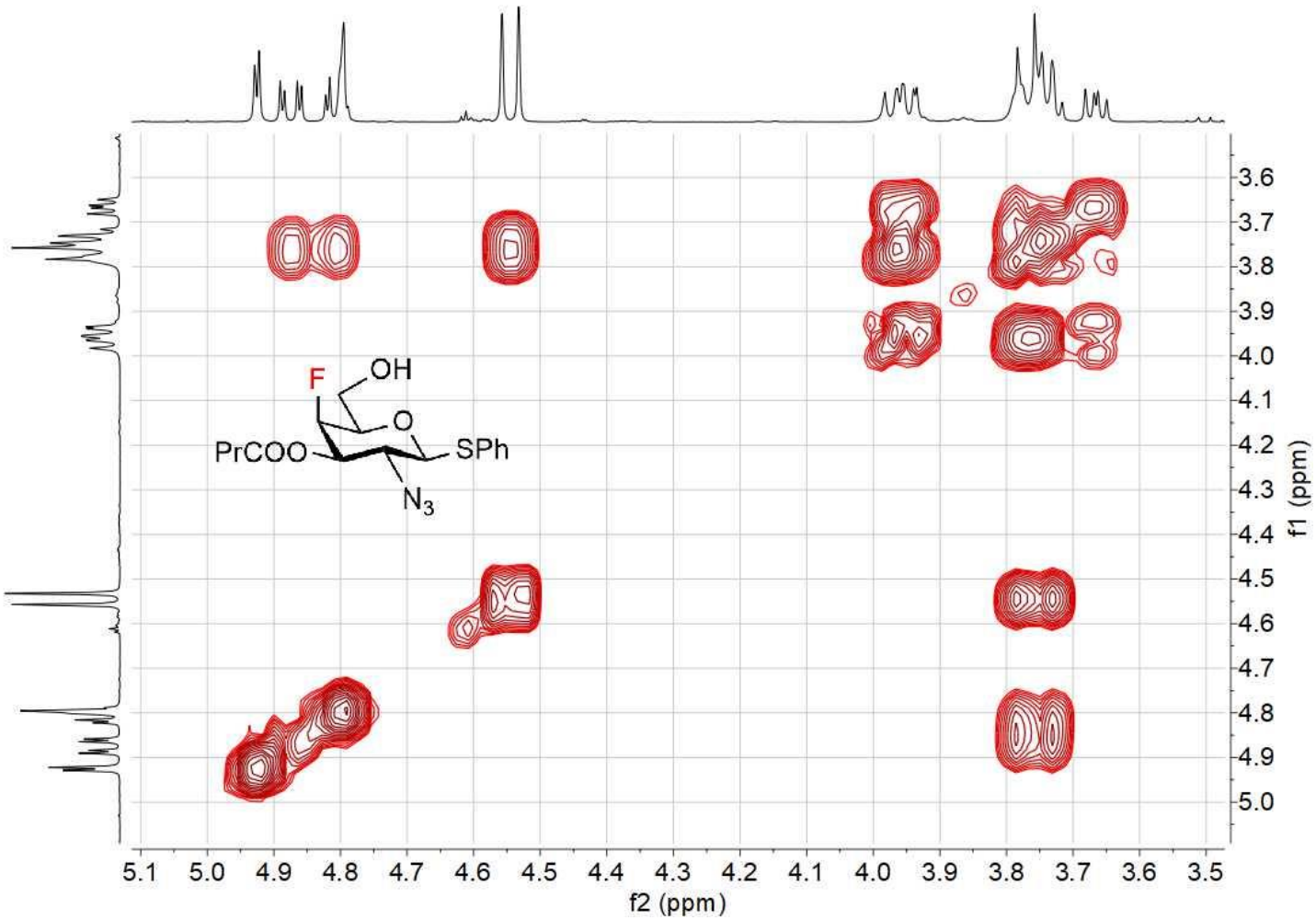
^{13}C NMR (100 MHz, $CDCl_3$) β-60



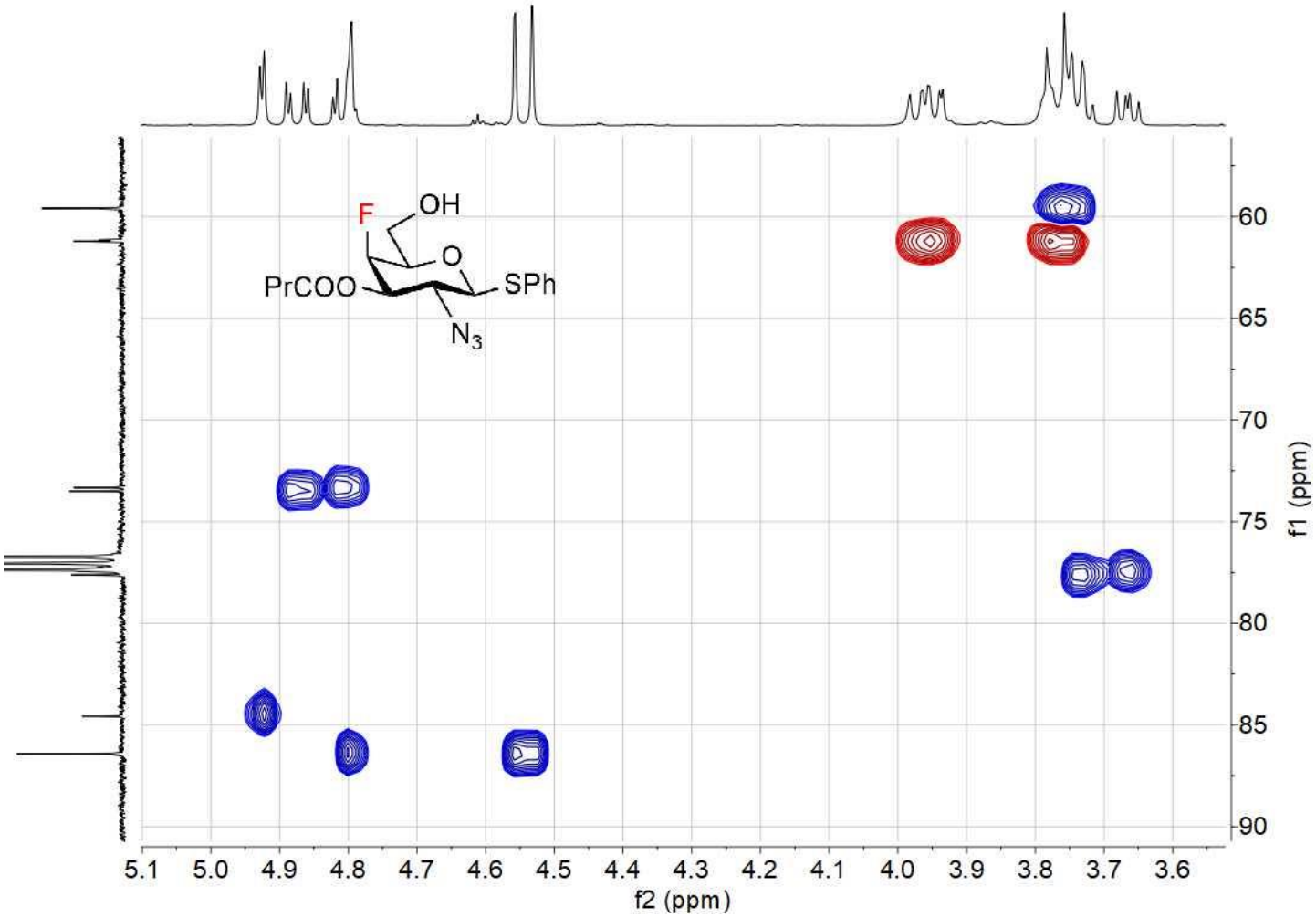
^{19}F NMR (376 MHz, $CDCl_3$) β-60



^{1}H-^{1}H COSY β-60

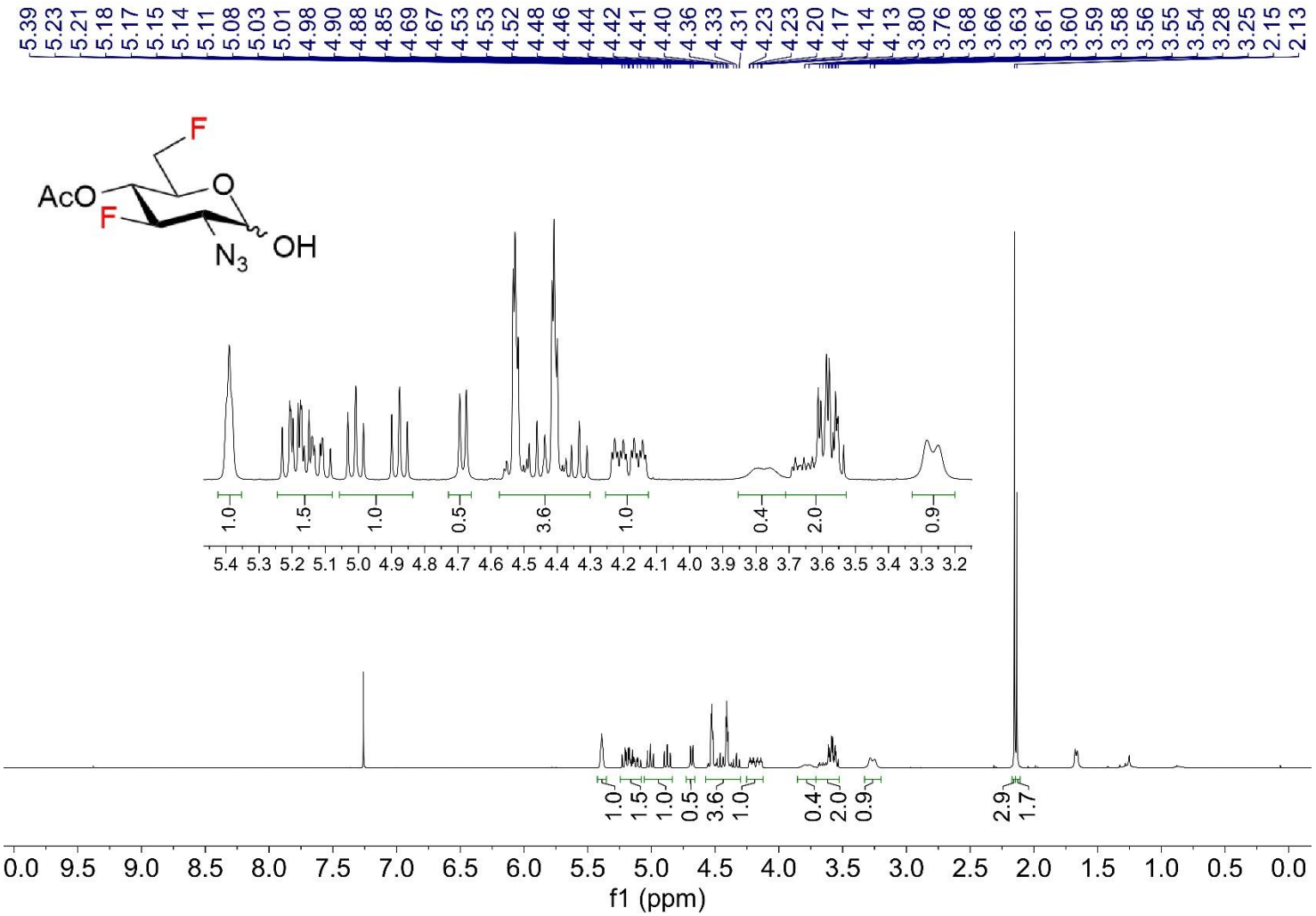


^{1}H-^{13}C HSQC 60

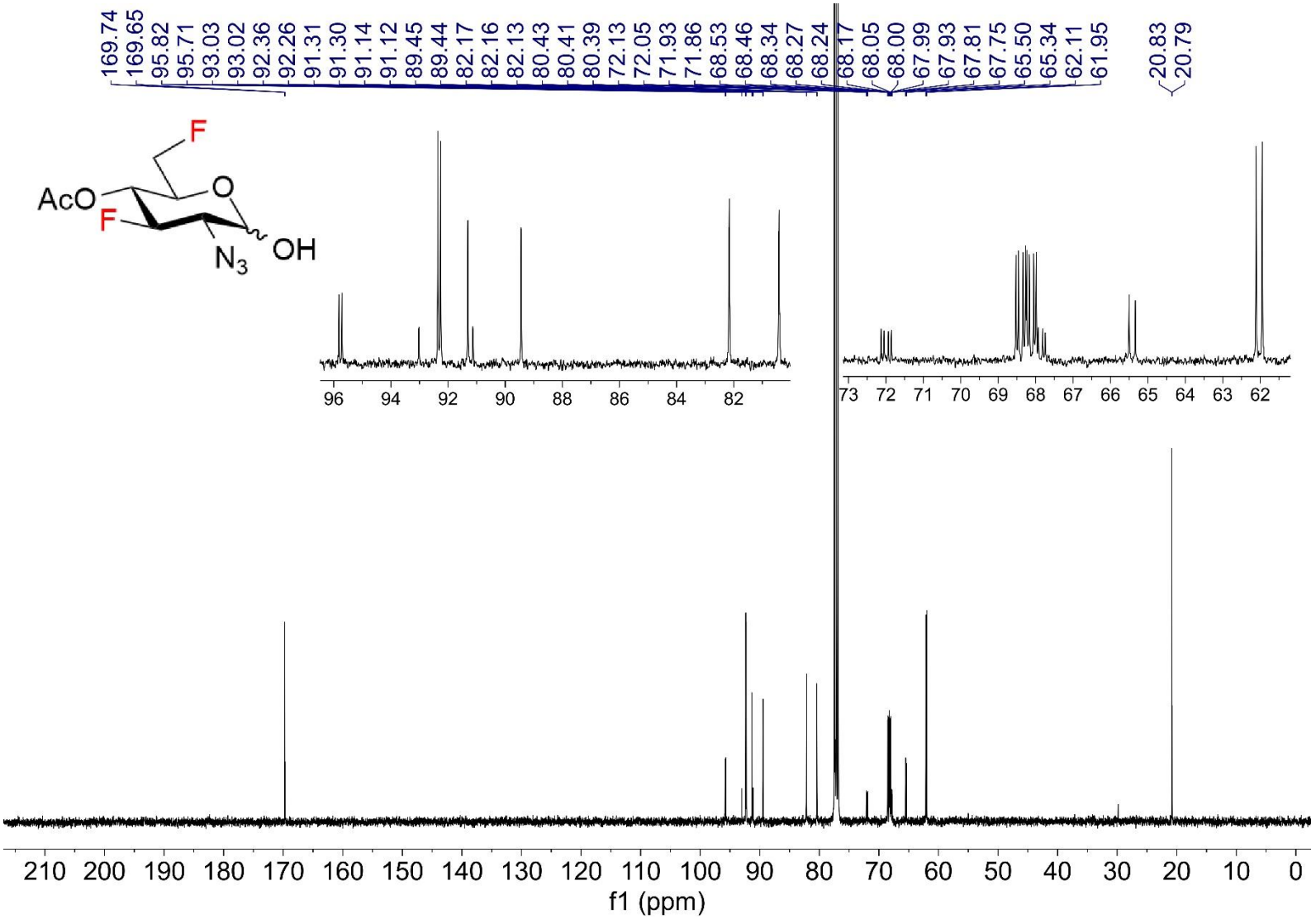


NMR COMPOUND 61

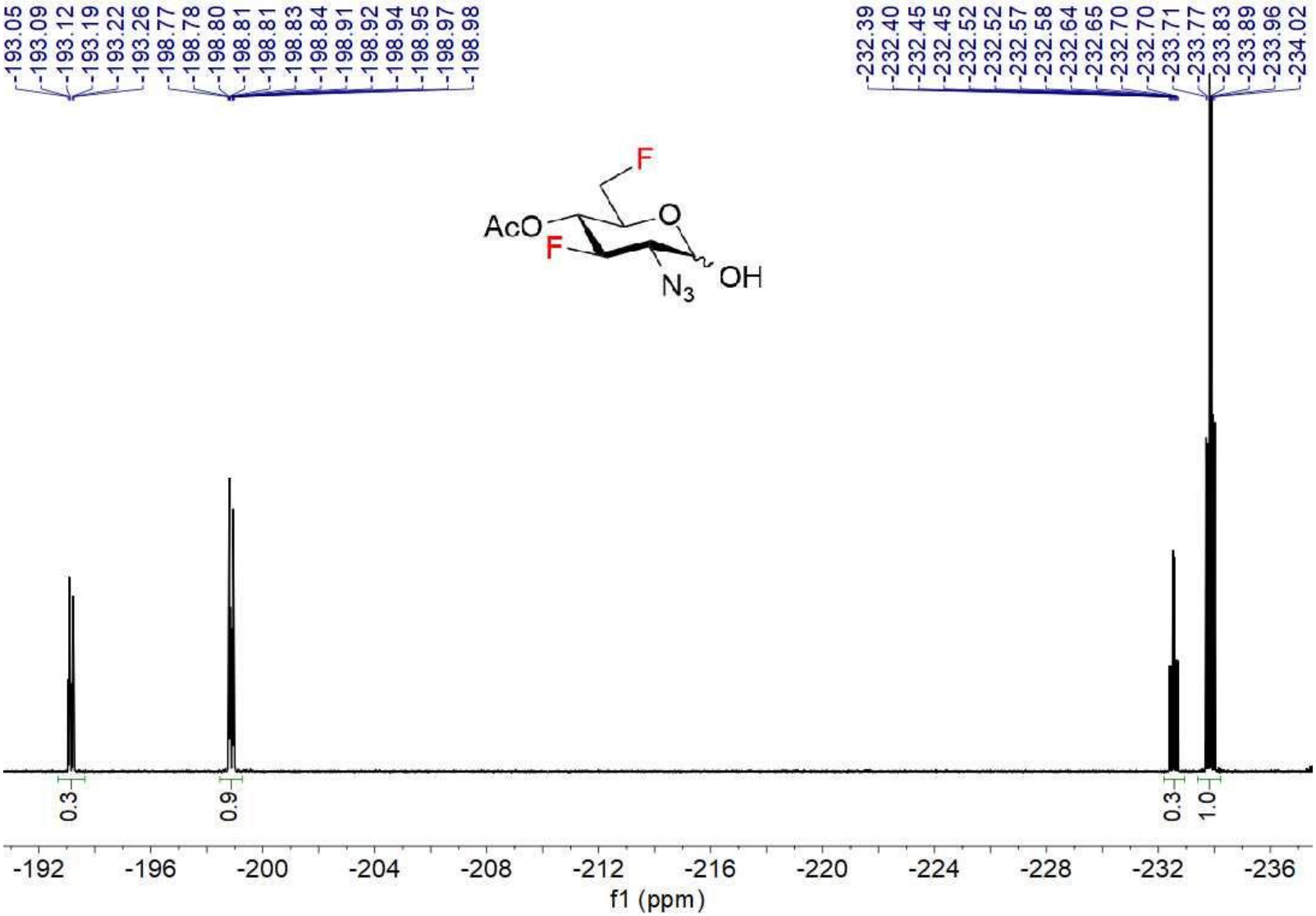
^{1}H NMR (400 MHz, $CDCl_3$) 61



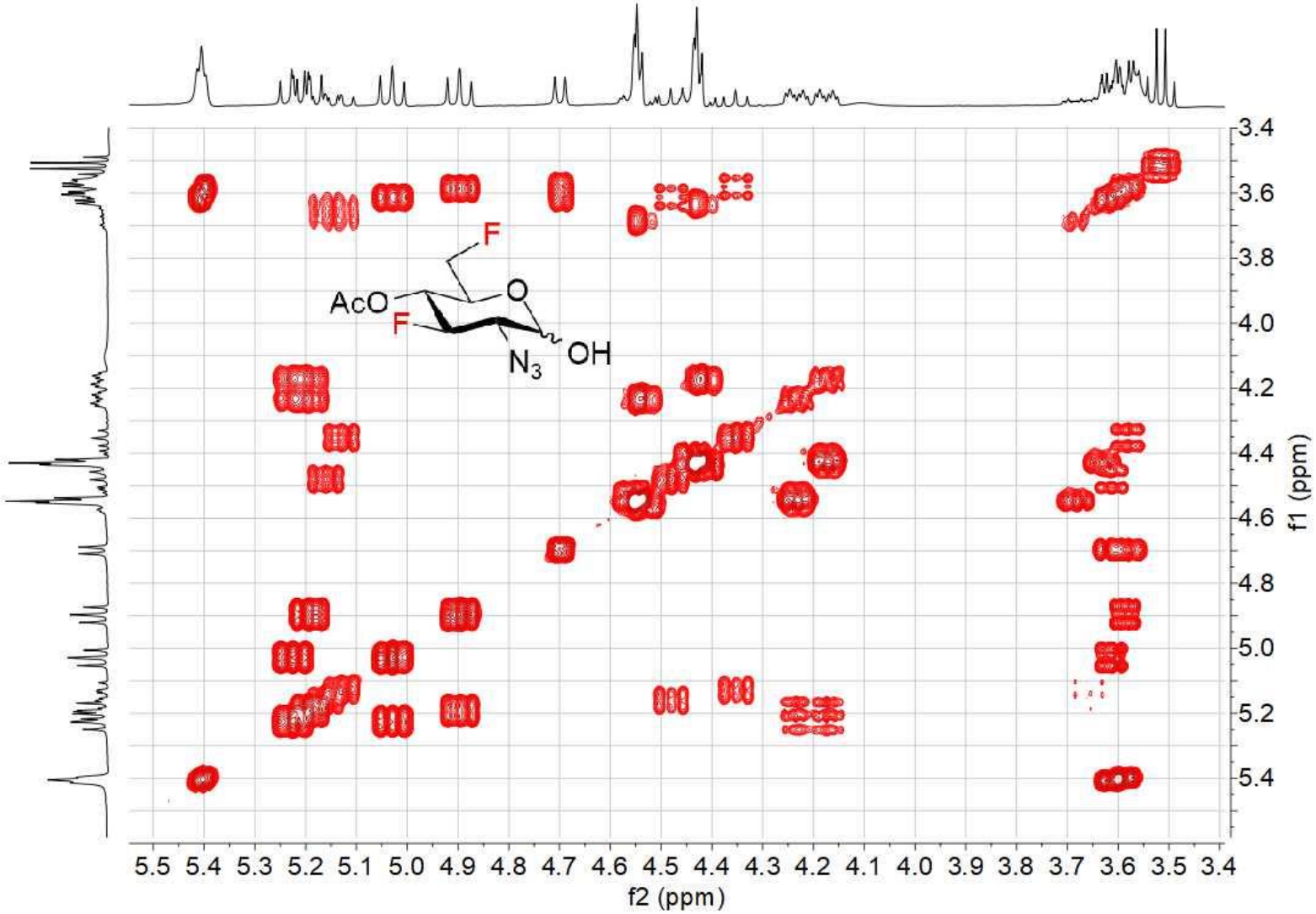
^{13}C NMR (100 MHz, $CDCl_3$)61



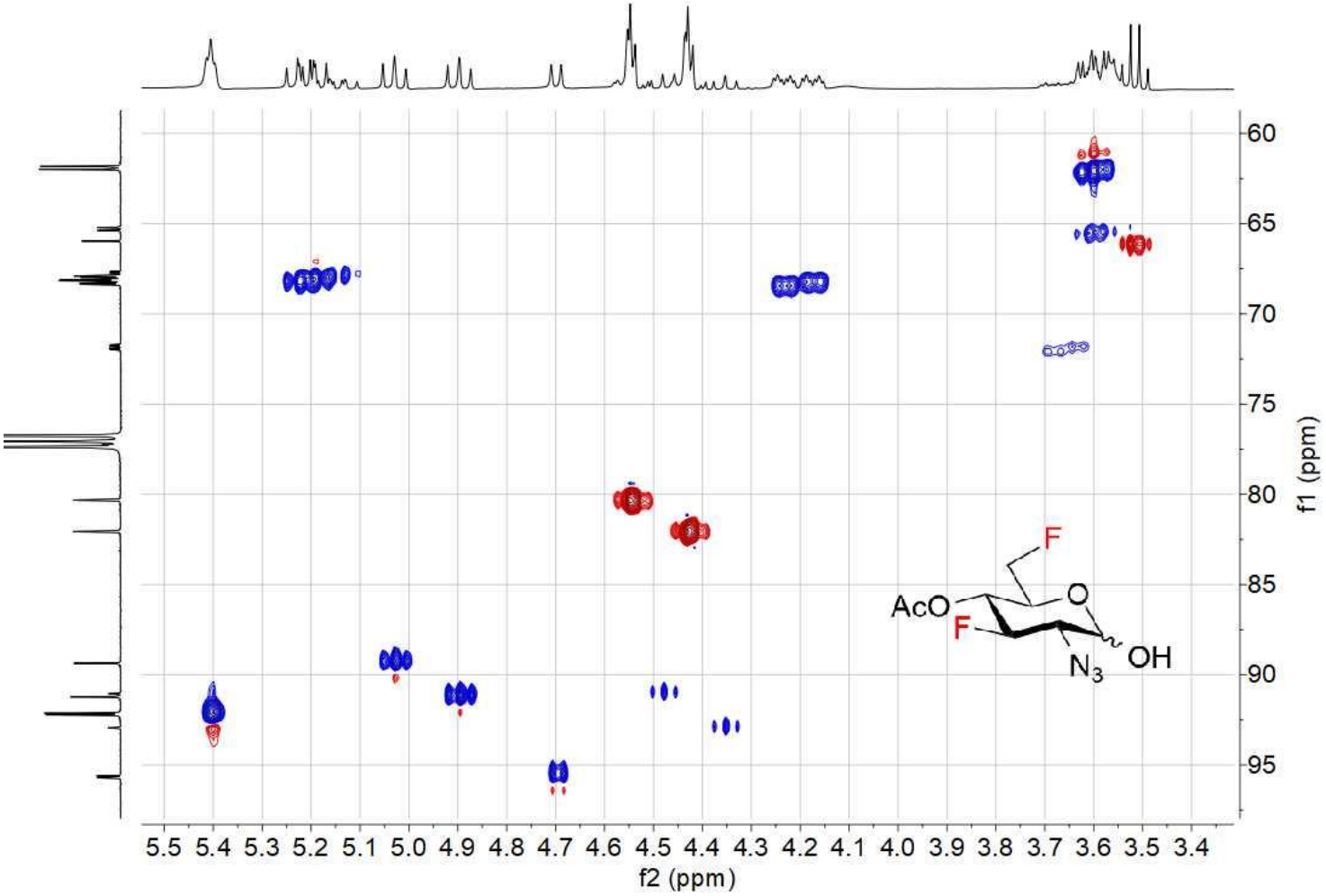
^{19}F NMR (376 MHz, $CDCl_3$) 61



^{1}H-^{1}H COSY 61

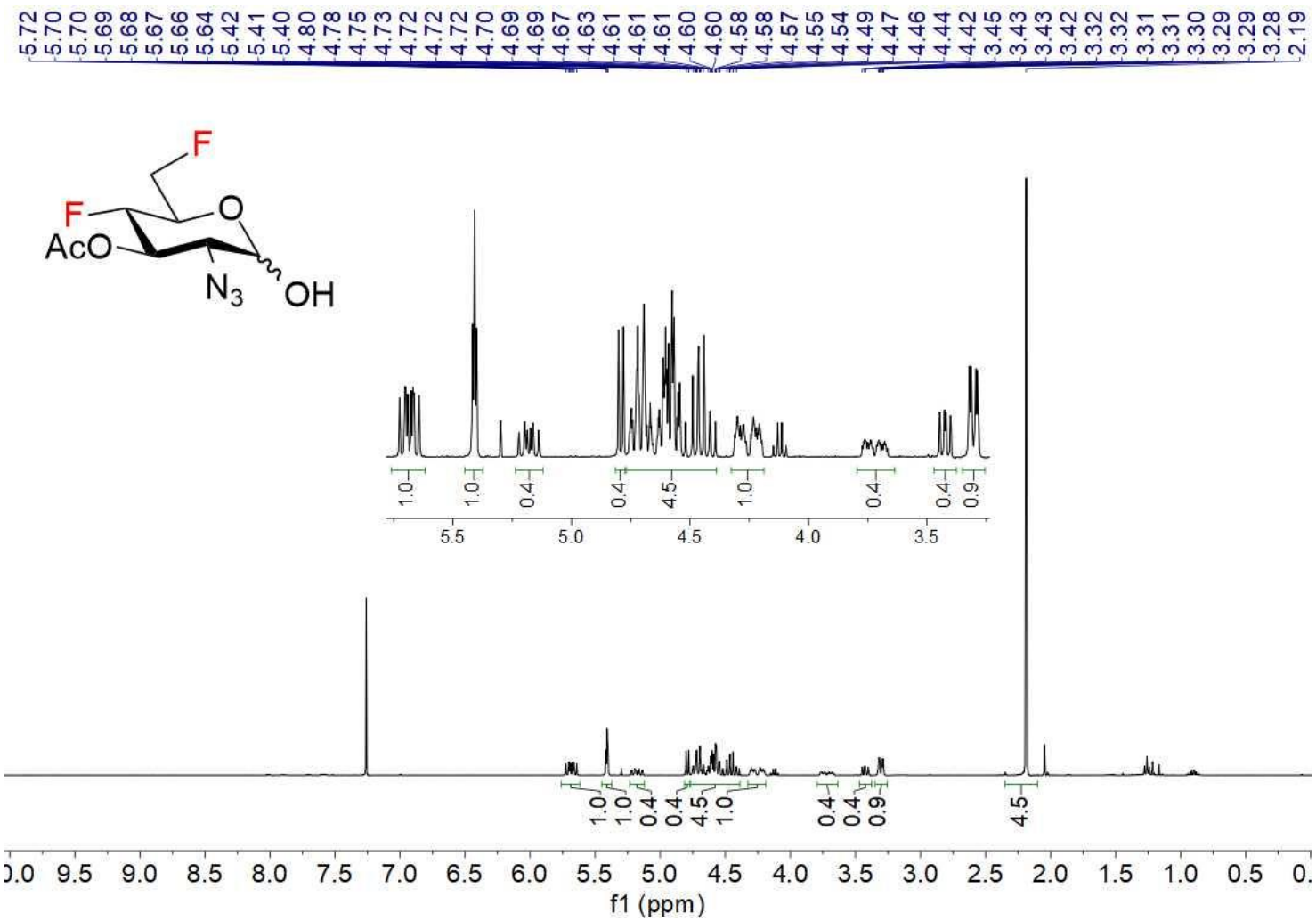


^{1}H-^{13}C HSQC 61

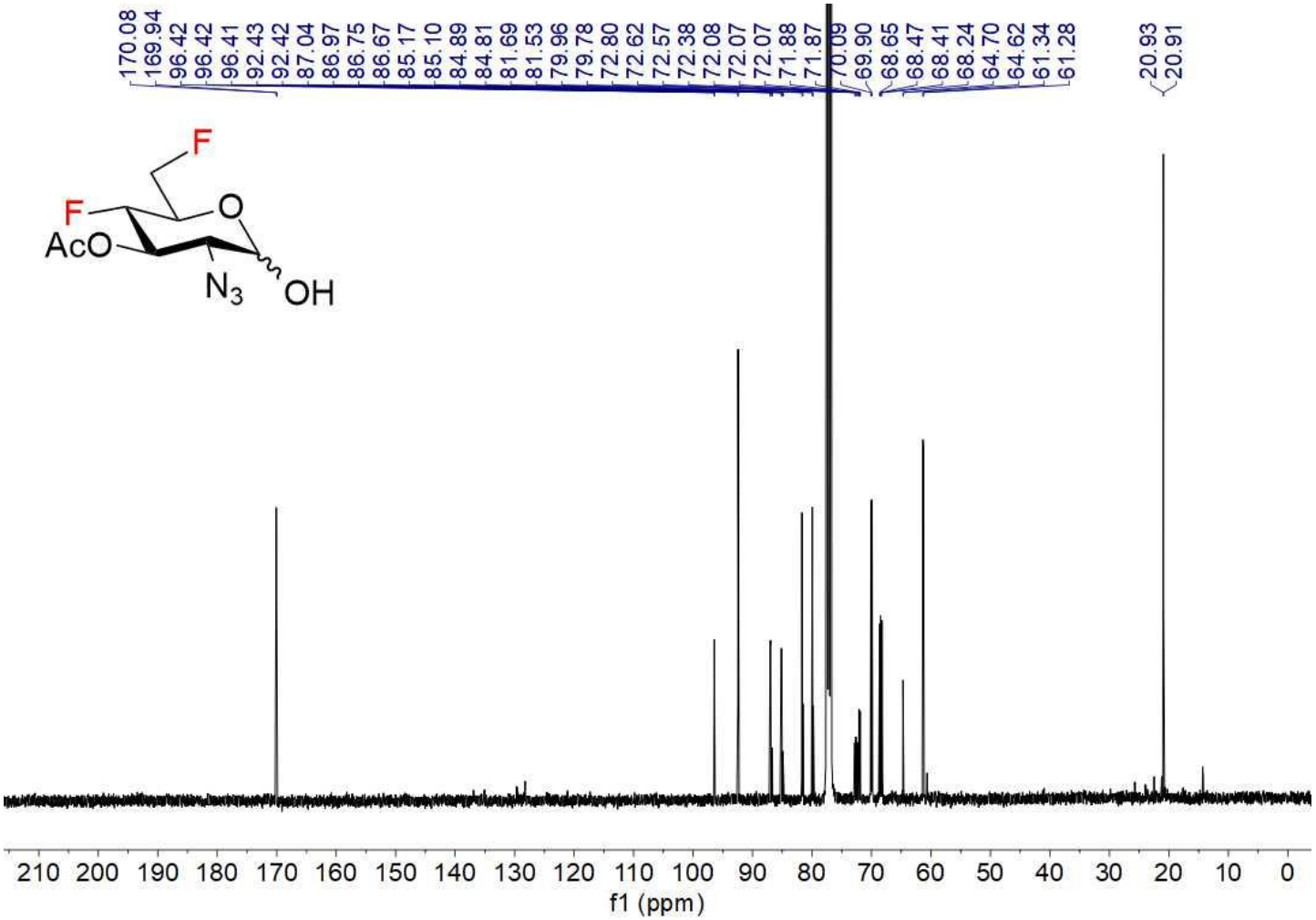


NMR COMPOUND 62

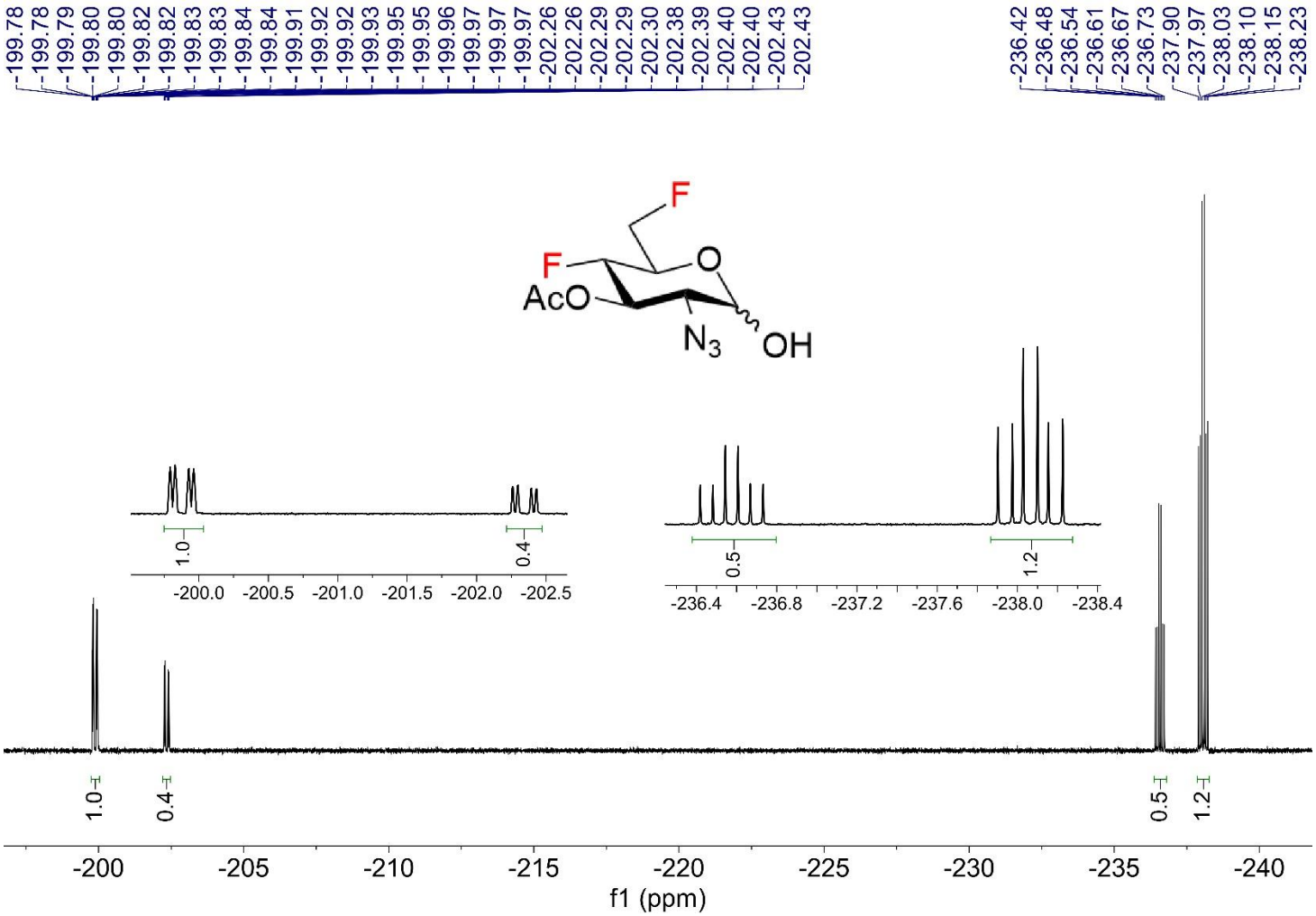
^{1}H NMR (400 MHz, $CDCl_3$) 62



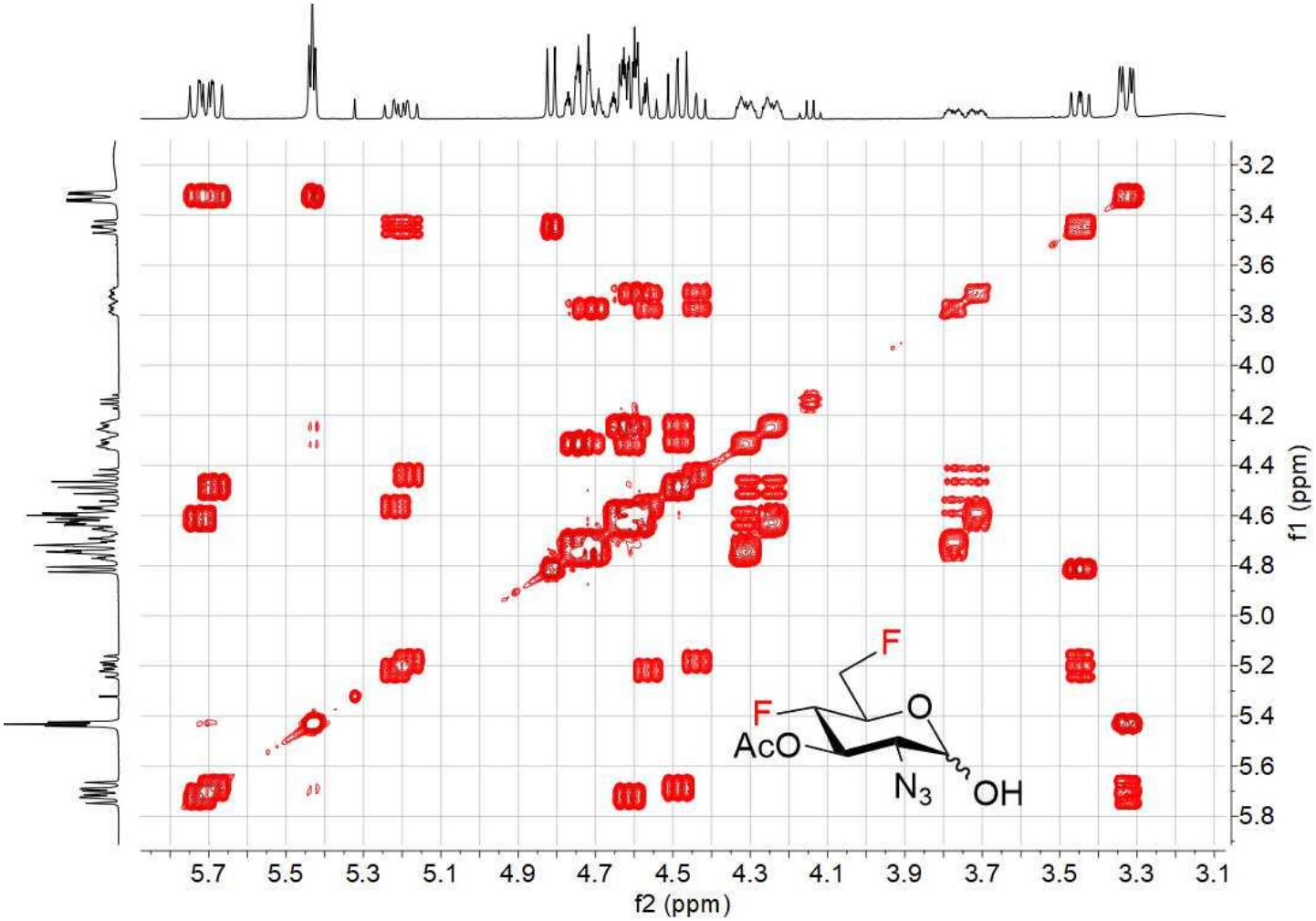
^{13}C NMR (100 MHz, $CDCl_3$) 62



^{19}F NMR (376 MHz, $CDCl_3$) 62



^{1}H-^{1}H COSY 62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f1 (ppm)
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5.5
5.3
5.1
4.9
4.7
4.5
4.3
4.1
3.9
3.7
3.5
3.3
3.1
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
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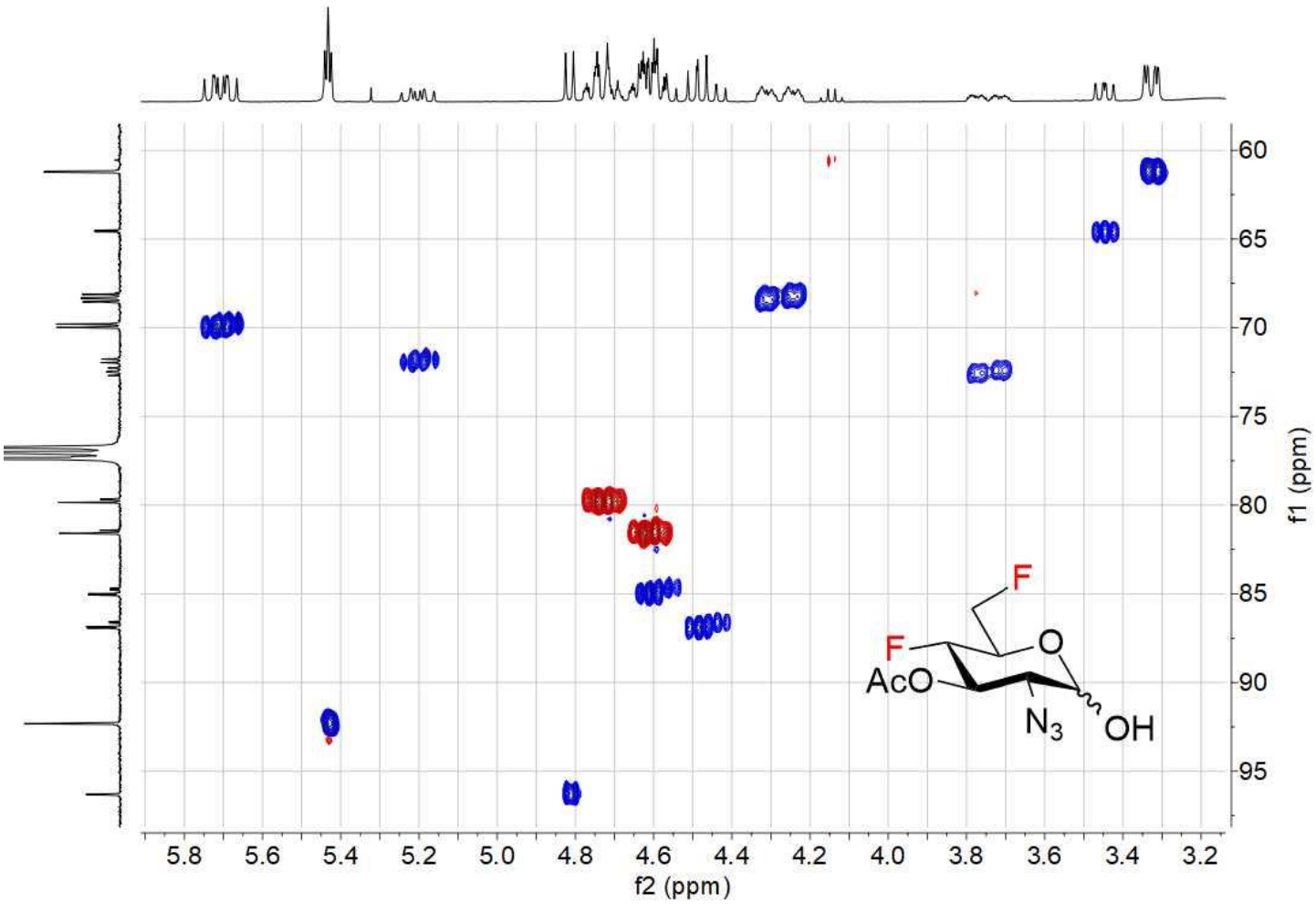
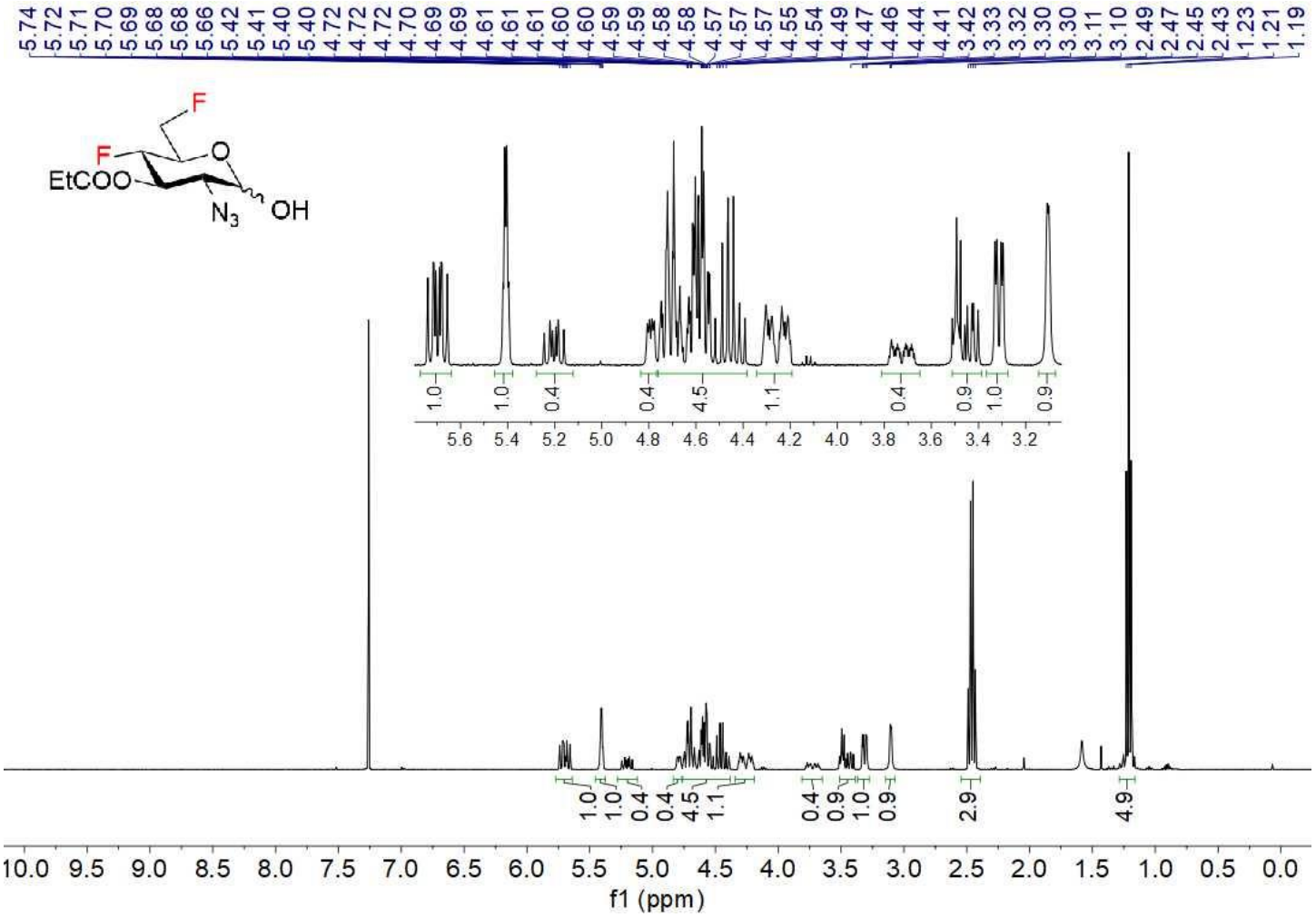
5.4
5.6
5.8
F
F
O
AcO
N3
OH

^{1}H-^{13}C HSQC 62

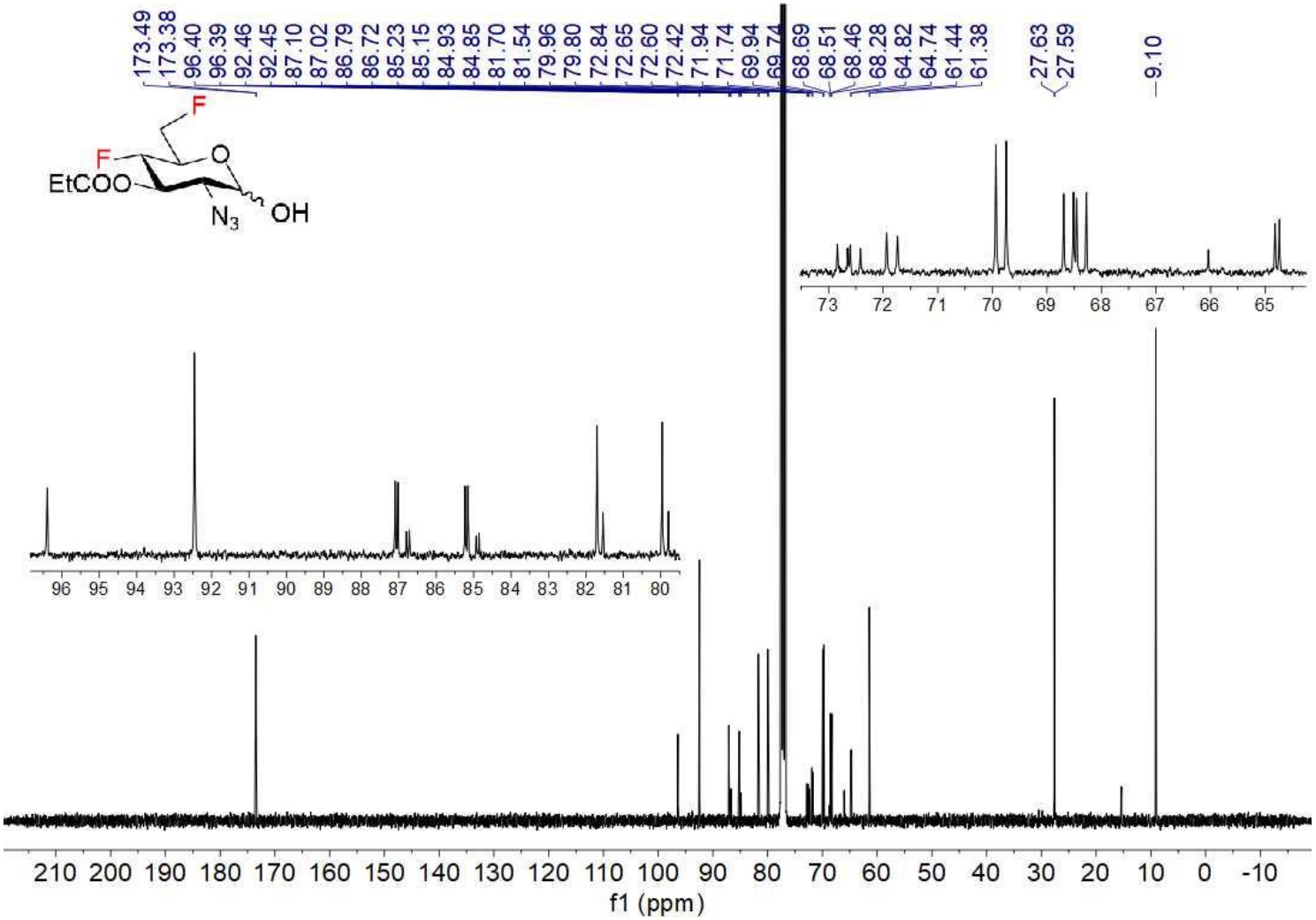


NMR COMPOUND 63

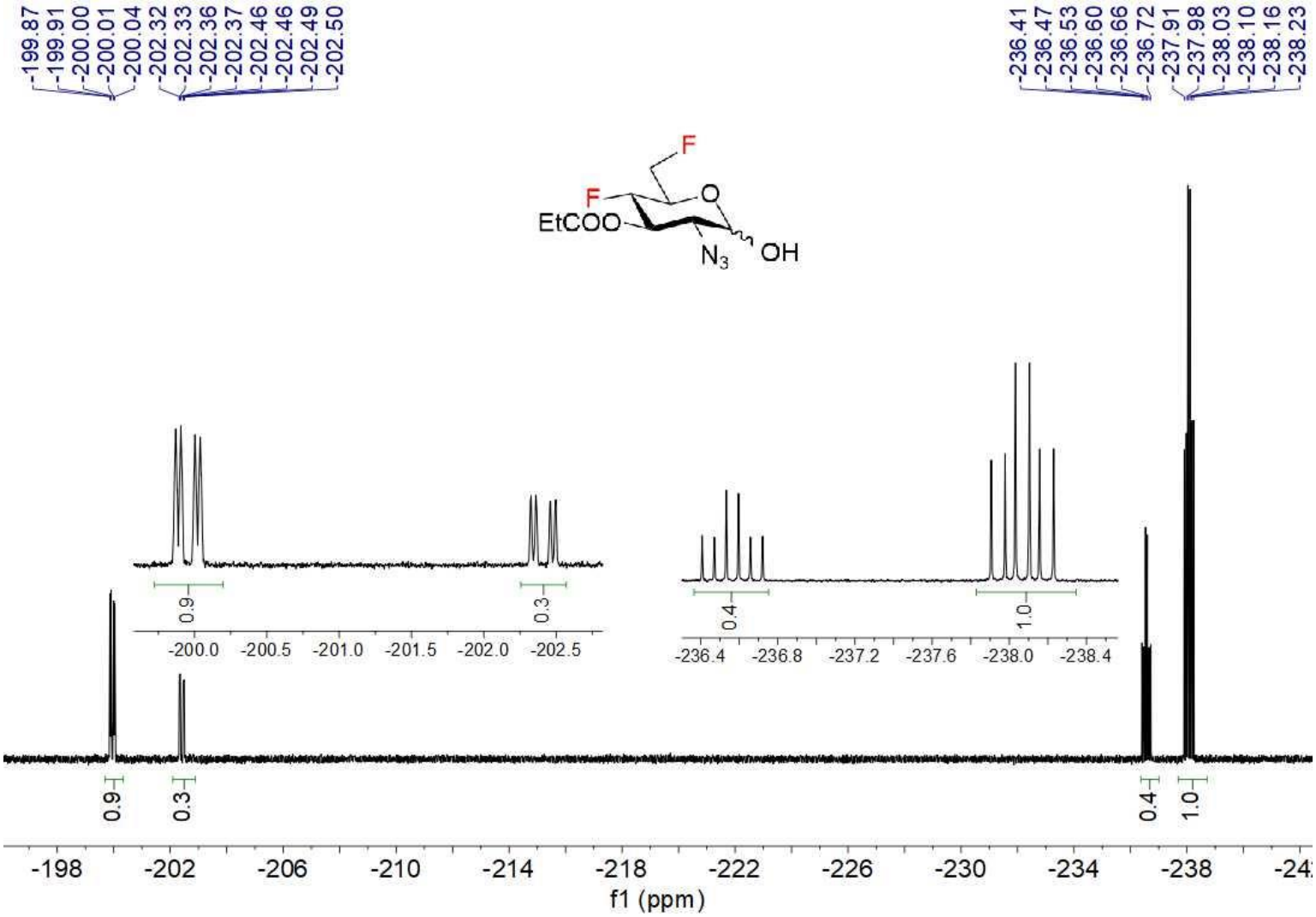
^{1}H NMR (400 MHz, $CDCl_3$) 63



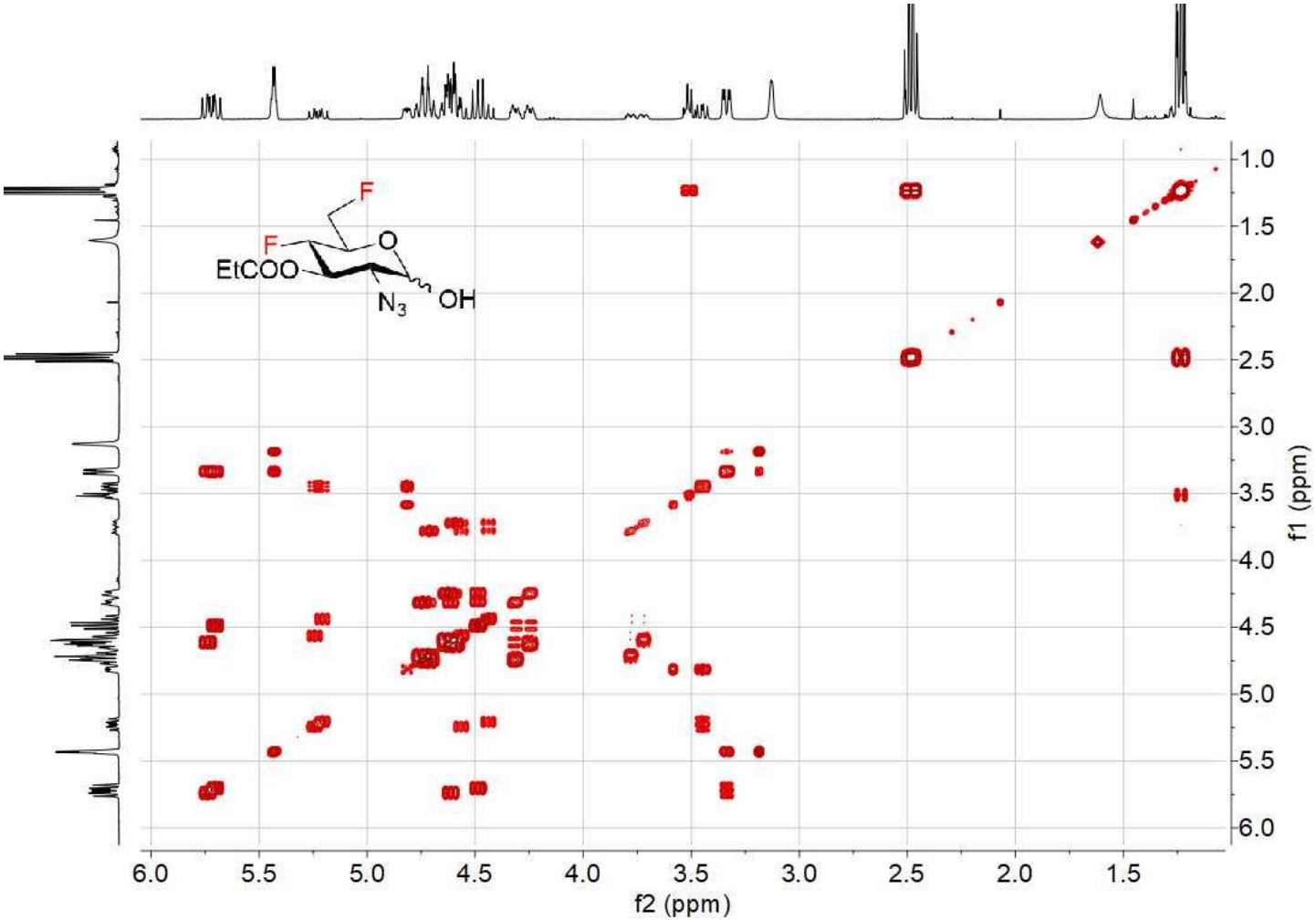
^{13}C NMR (100 MHz, $CDCl_3$) 63



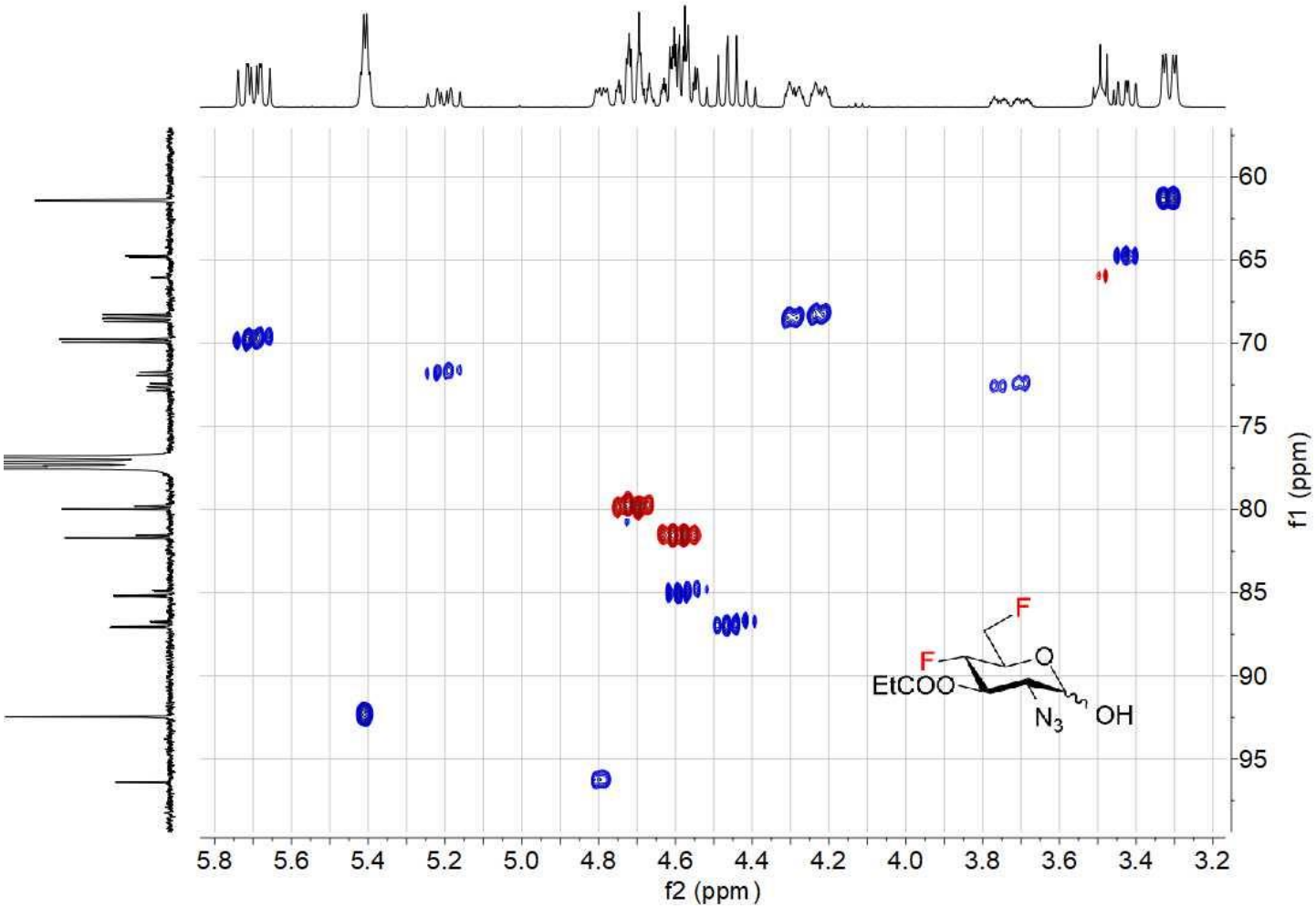
^{19}F NMR (376 MHz, $CDCl_3$) 63



^{1}H-^{1}H COSY 63

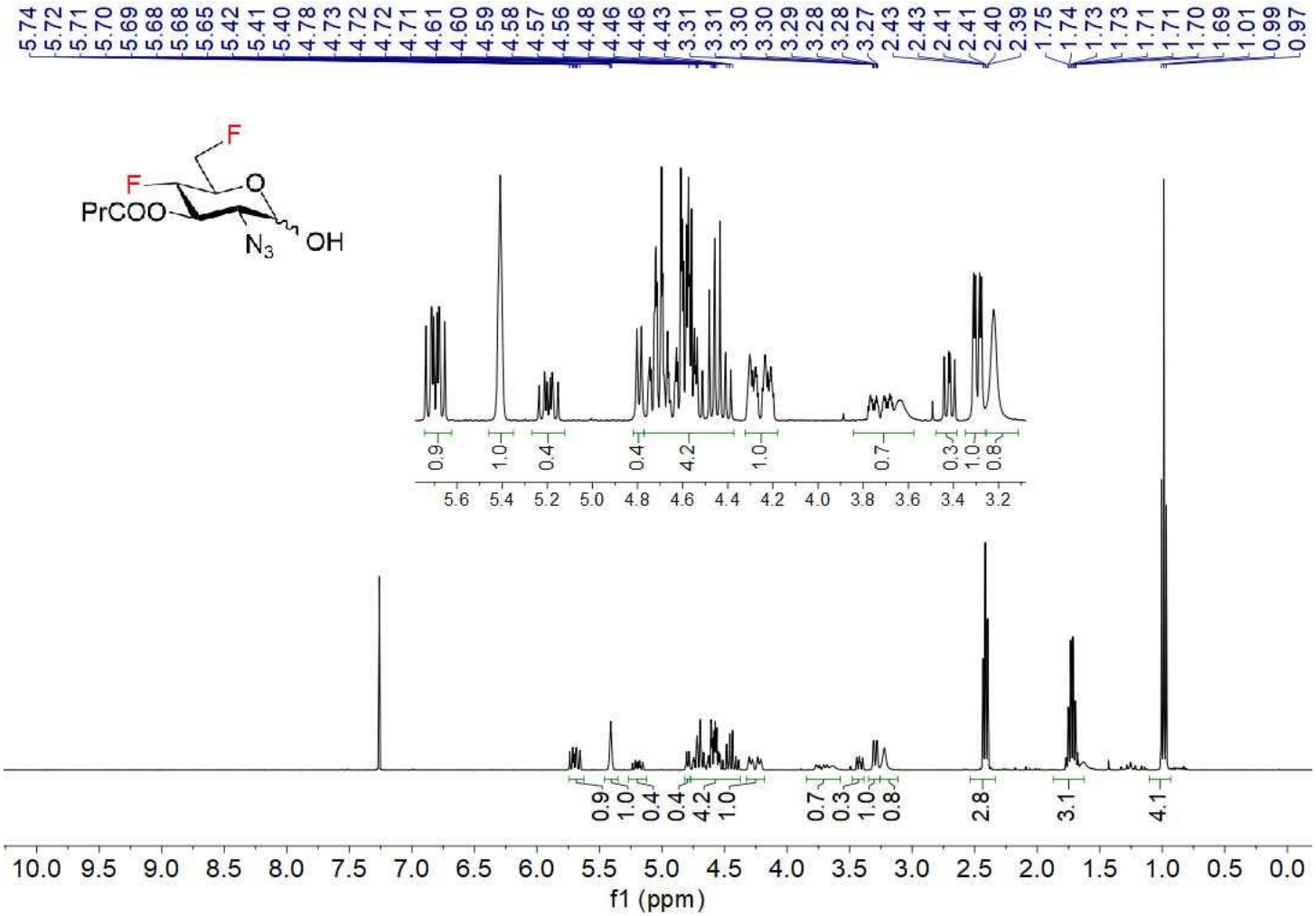


^{1}H-^{13}C HSQC 63

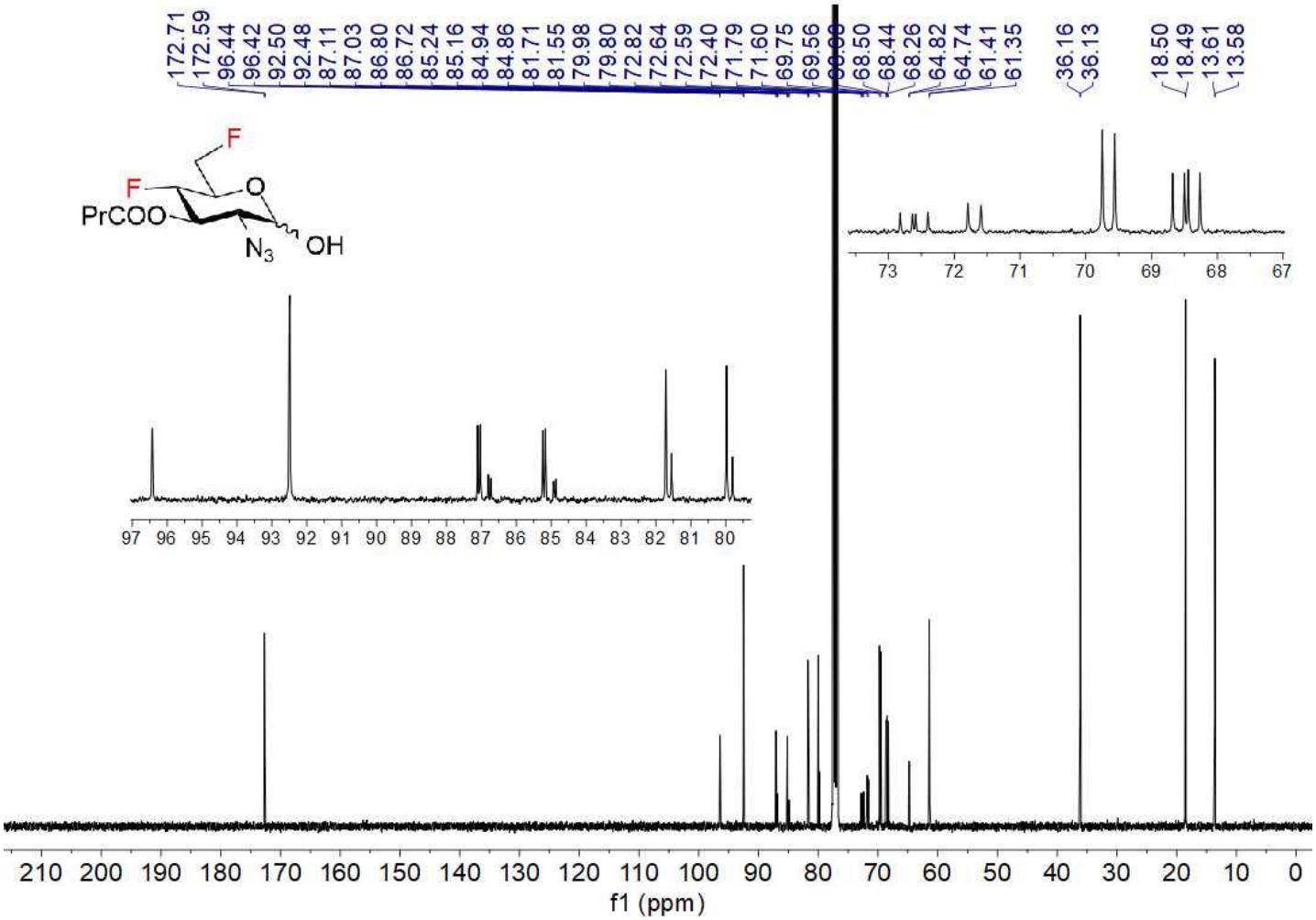


NMR COMPOUND 64

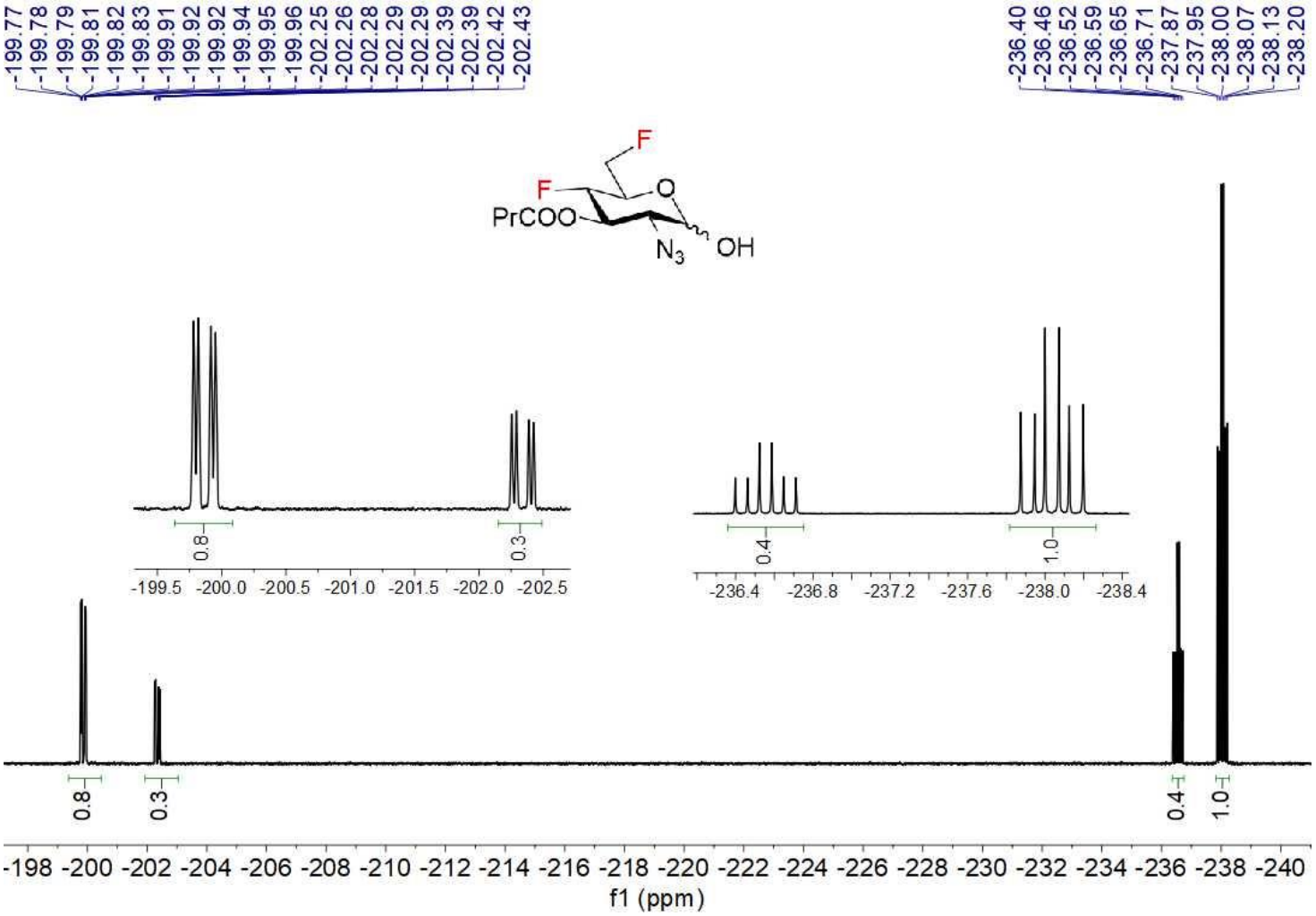
^{1}H NMR (400 MHz, $CDCl_3$) 64



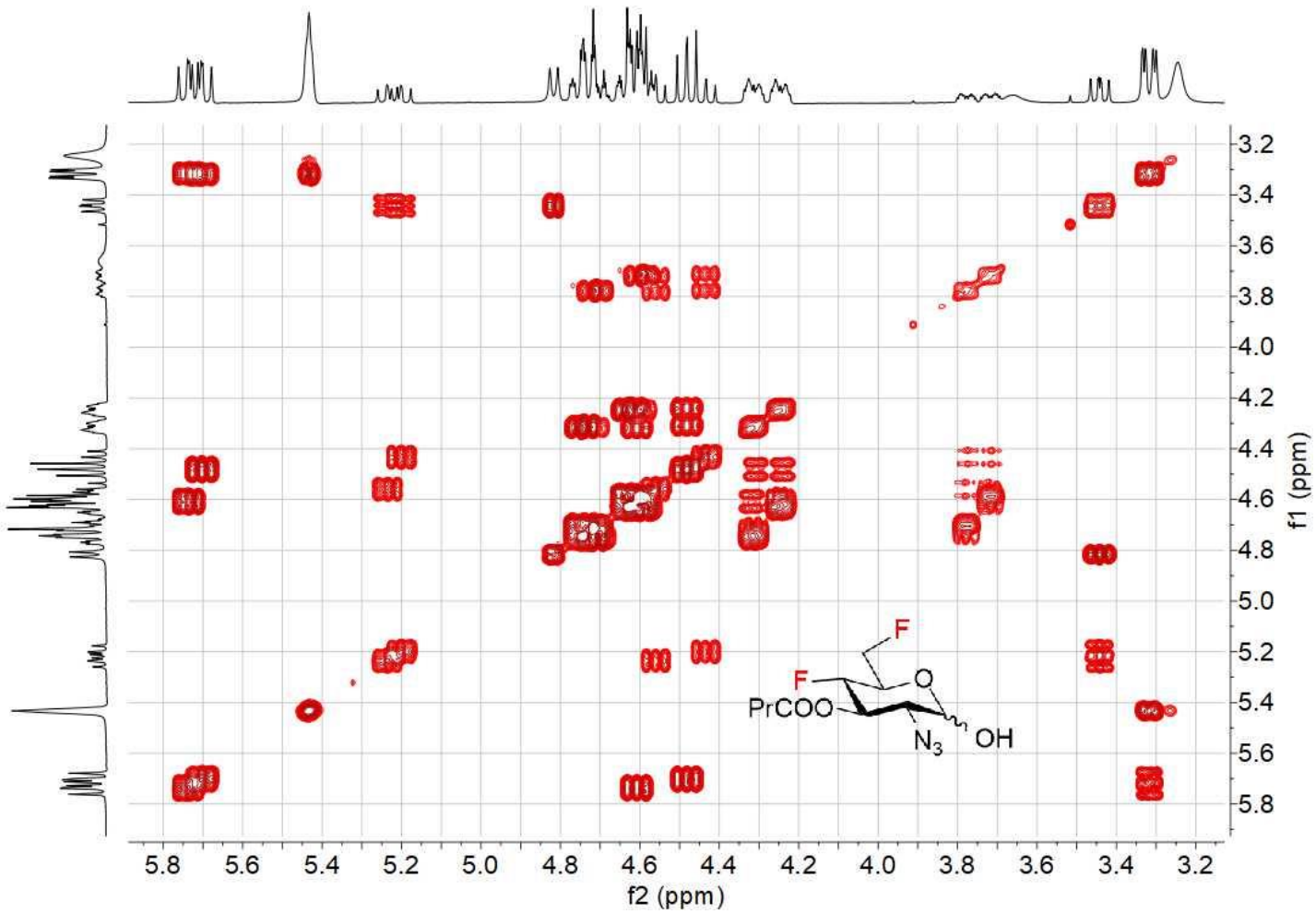
^{13}C NMR (100 MHz, $CDCl_3$) 64



^{19}F NMR (376 MHz, $CDCl_3$) 64



^{1}H-^{1}H COSY 64



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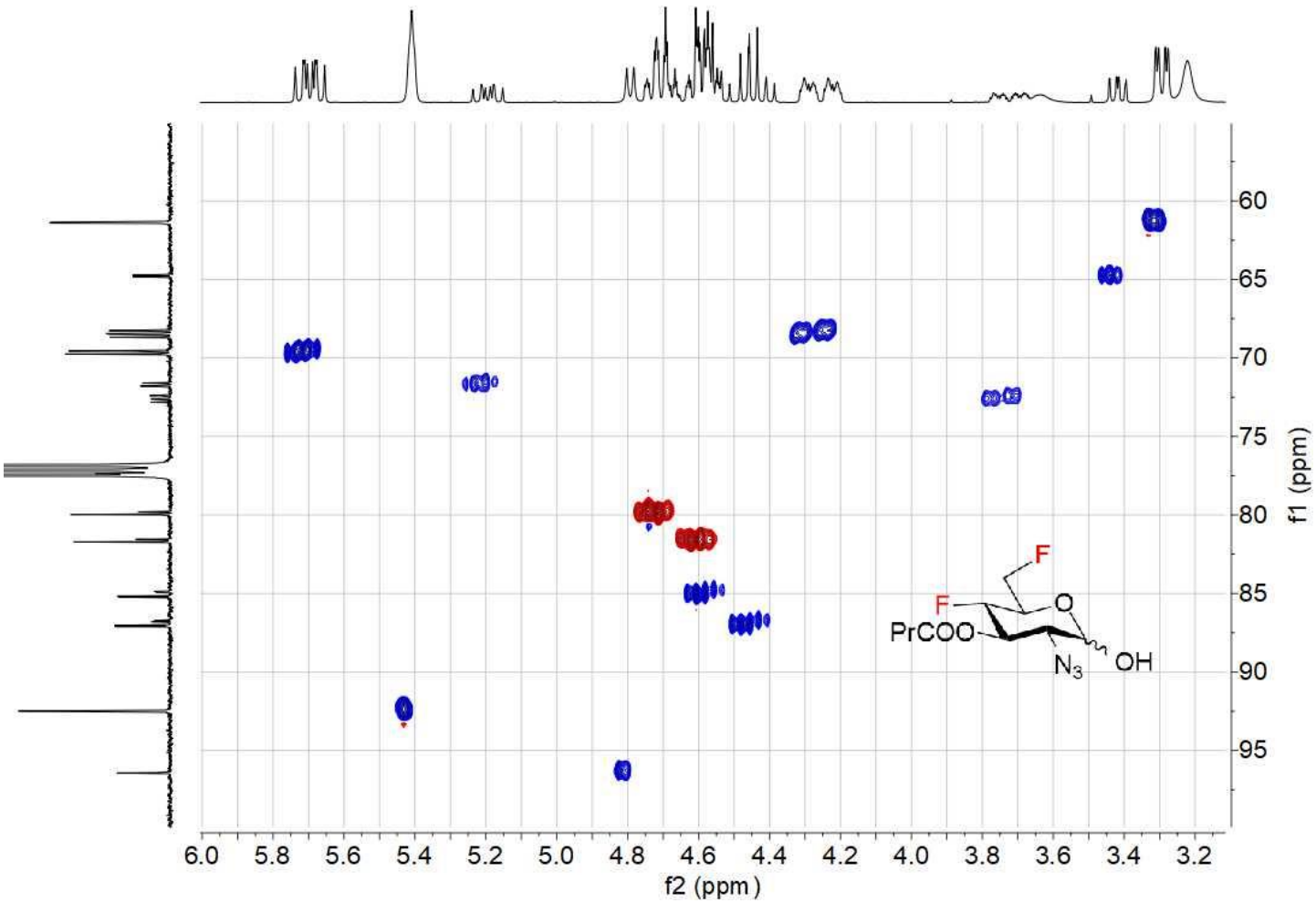
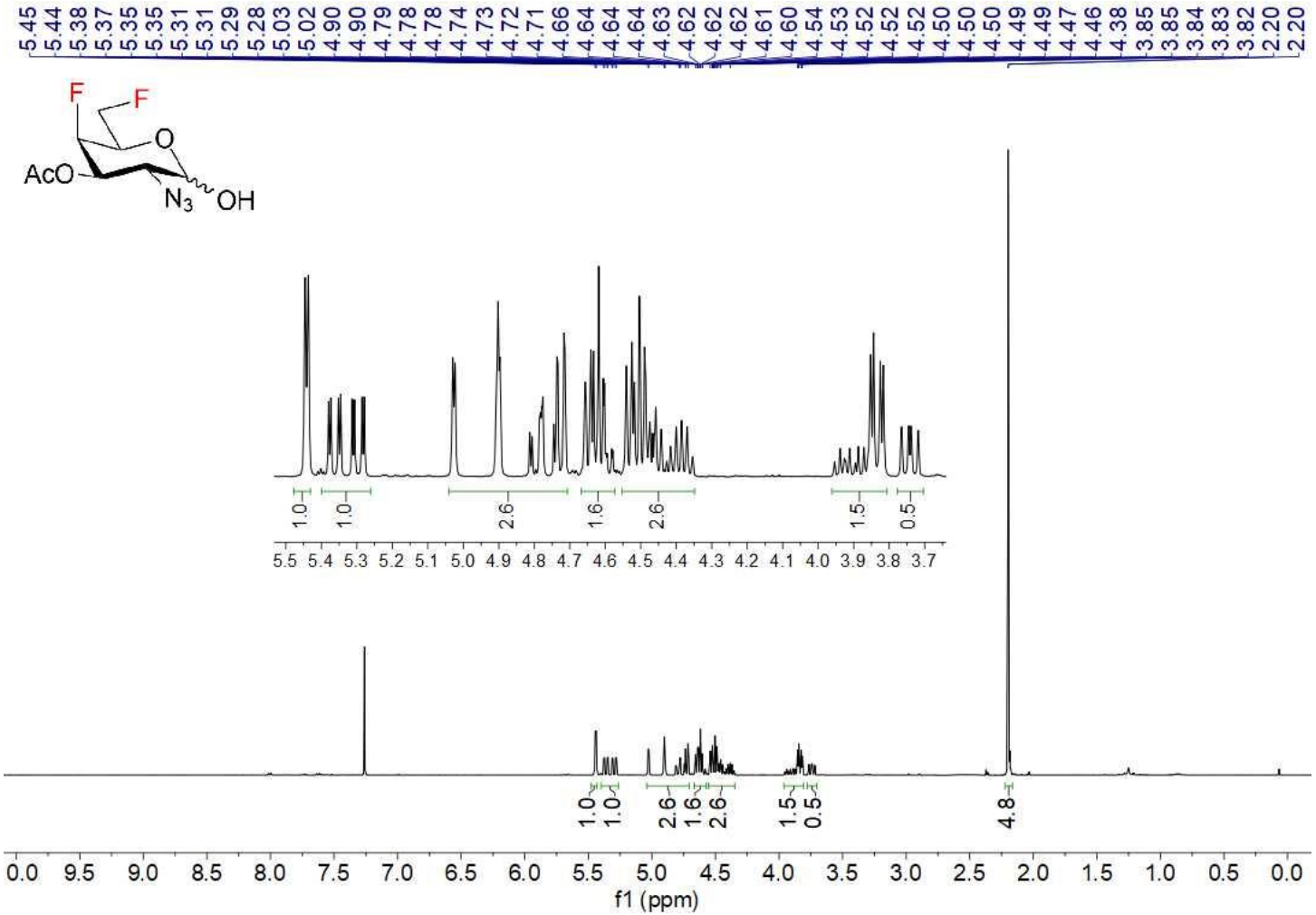
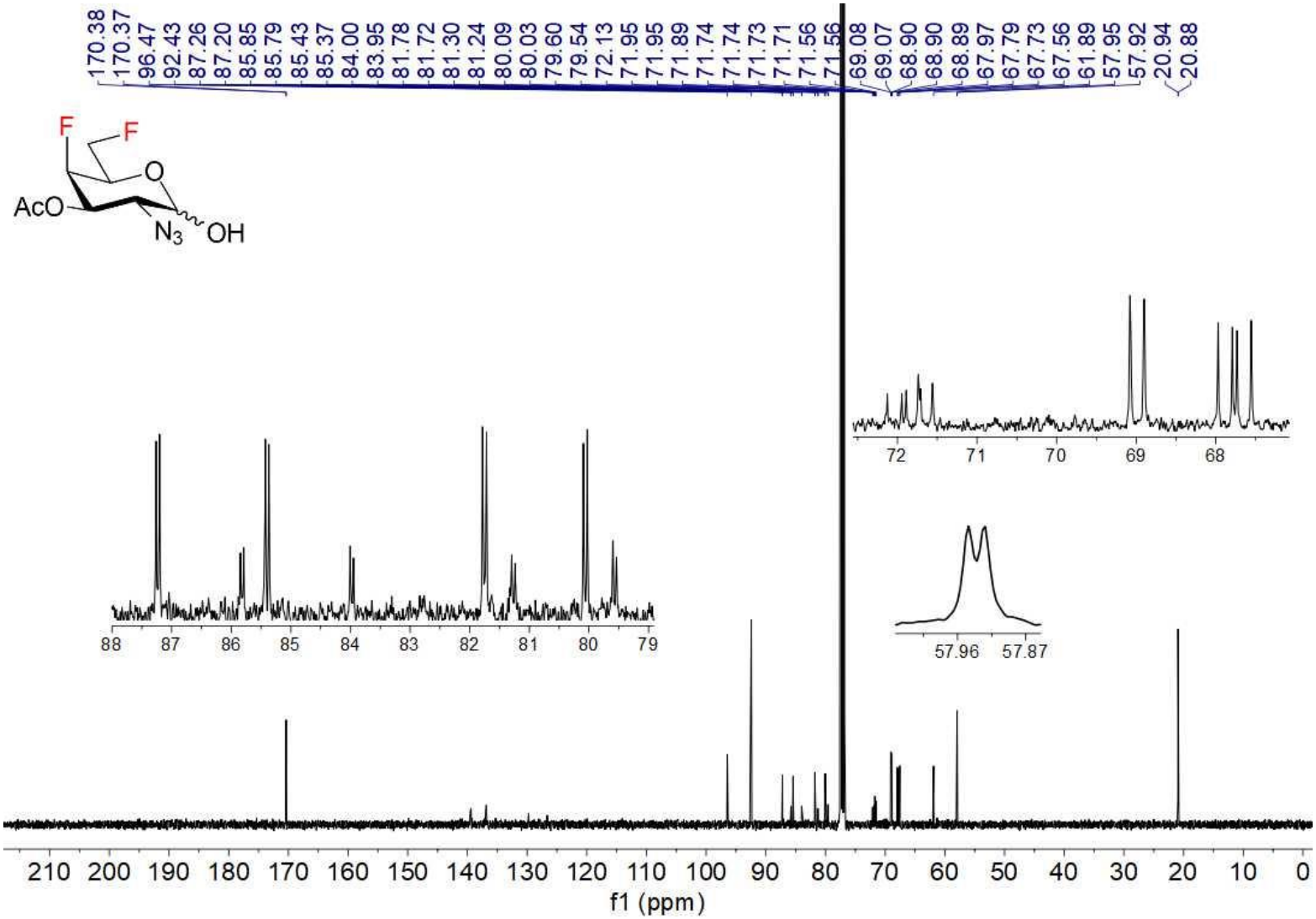


NMR COMPOUND 65

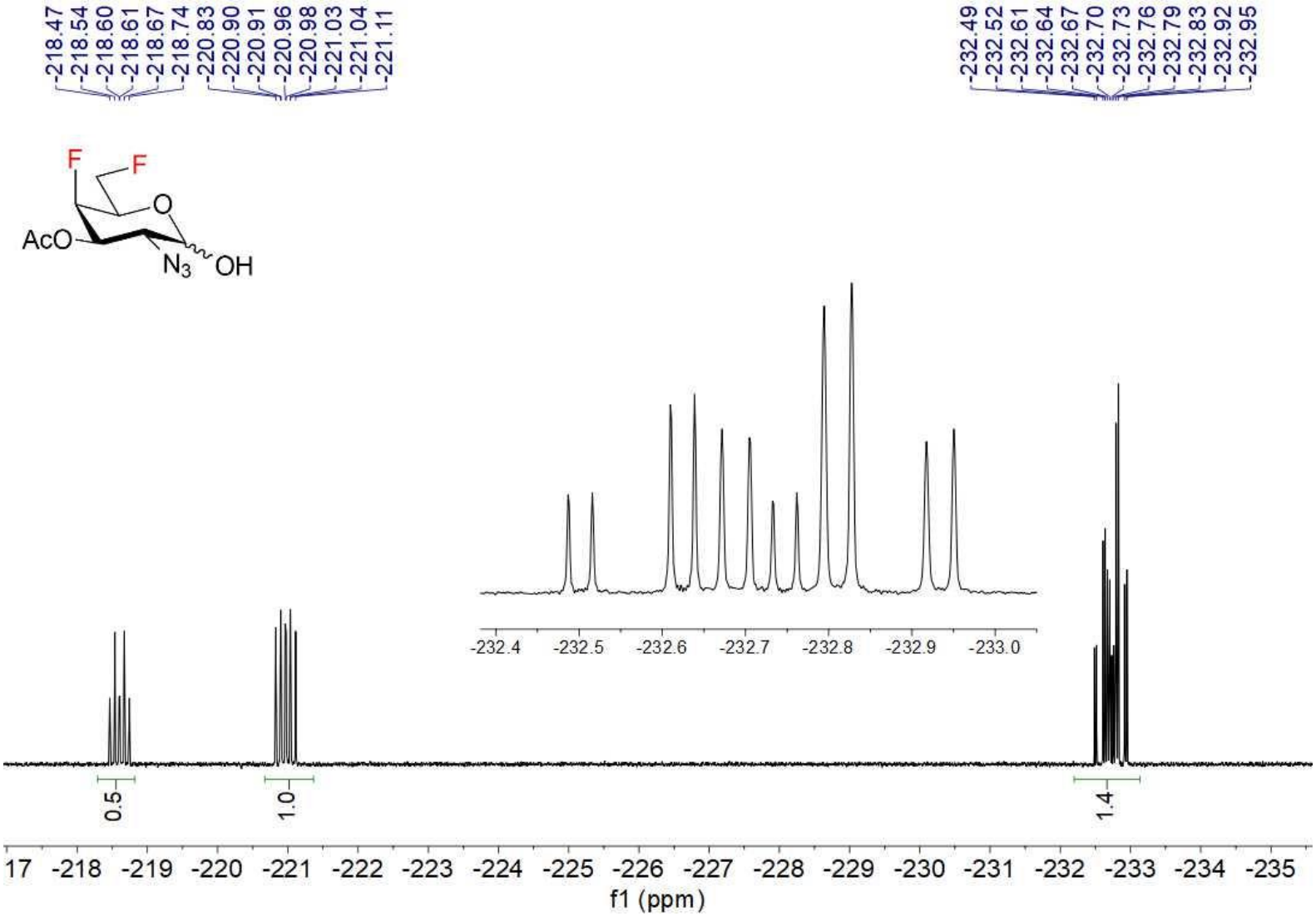
^{1}H NMR (400 MHz, $CDCl_3$) 65



^{13}C NMR (100 MHz, $CDCl_3$) 65



^{19}F NMR (376 MHz, $CDCl_3$) 65



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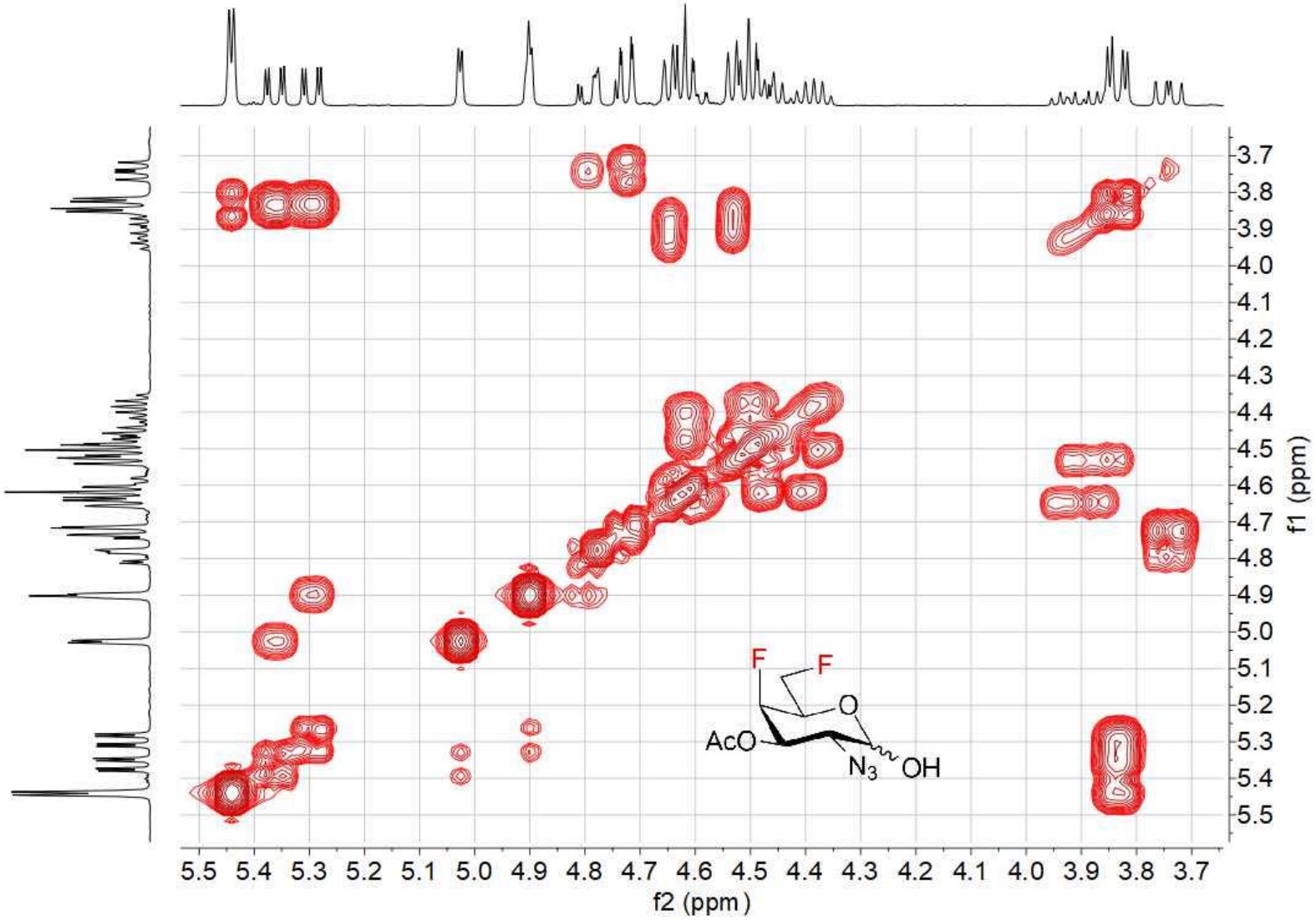

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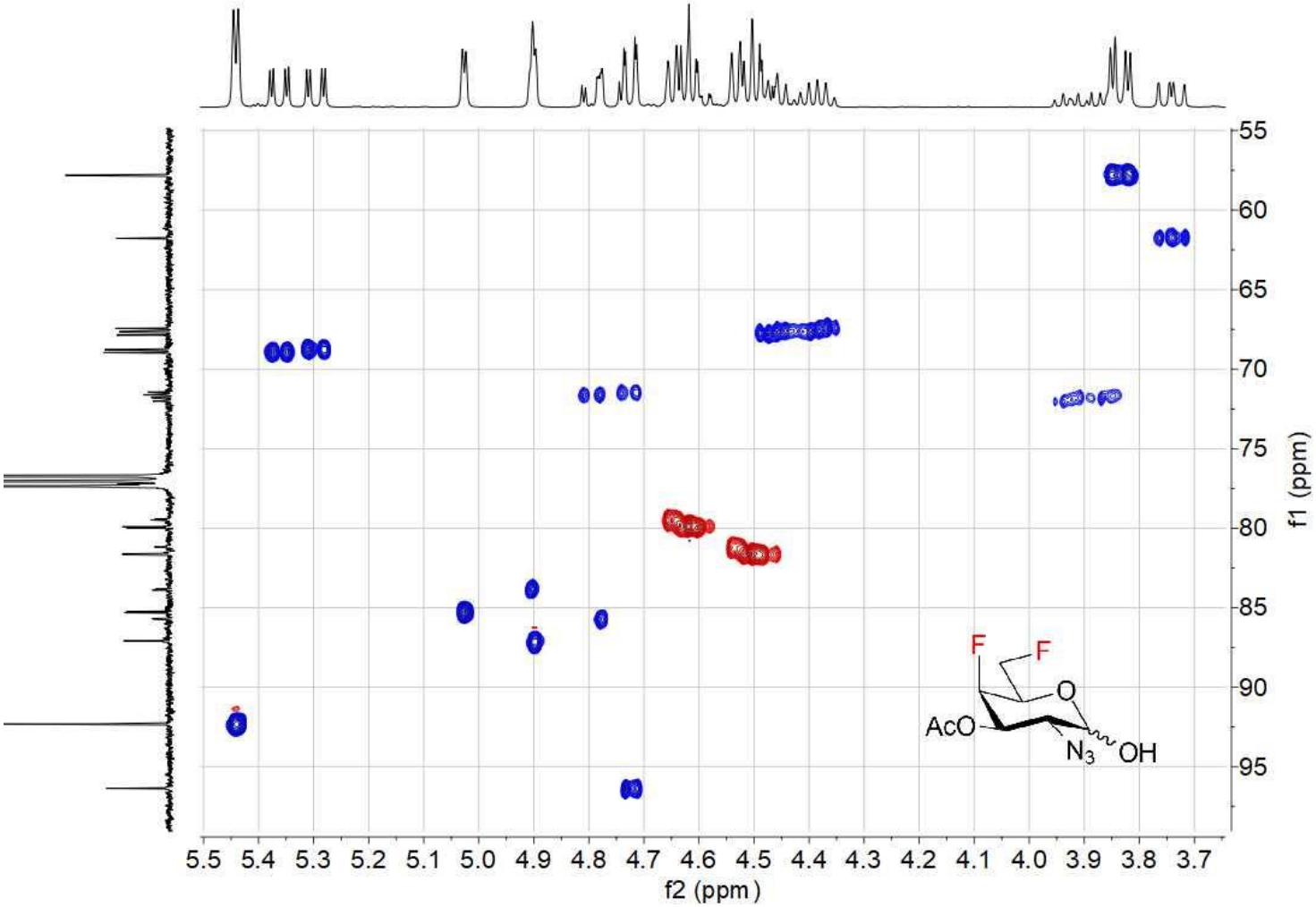
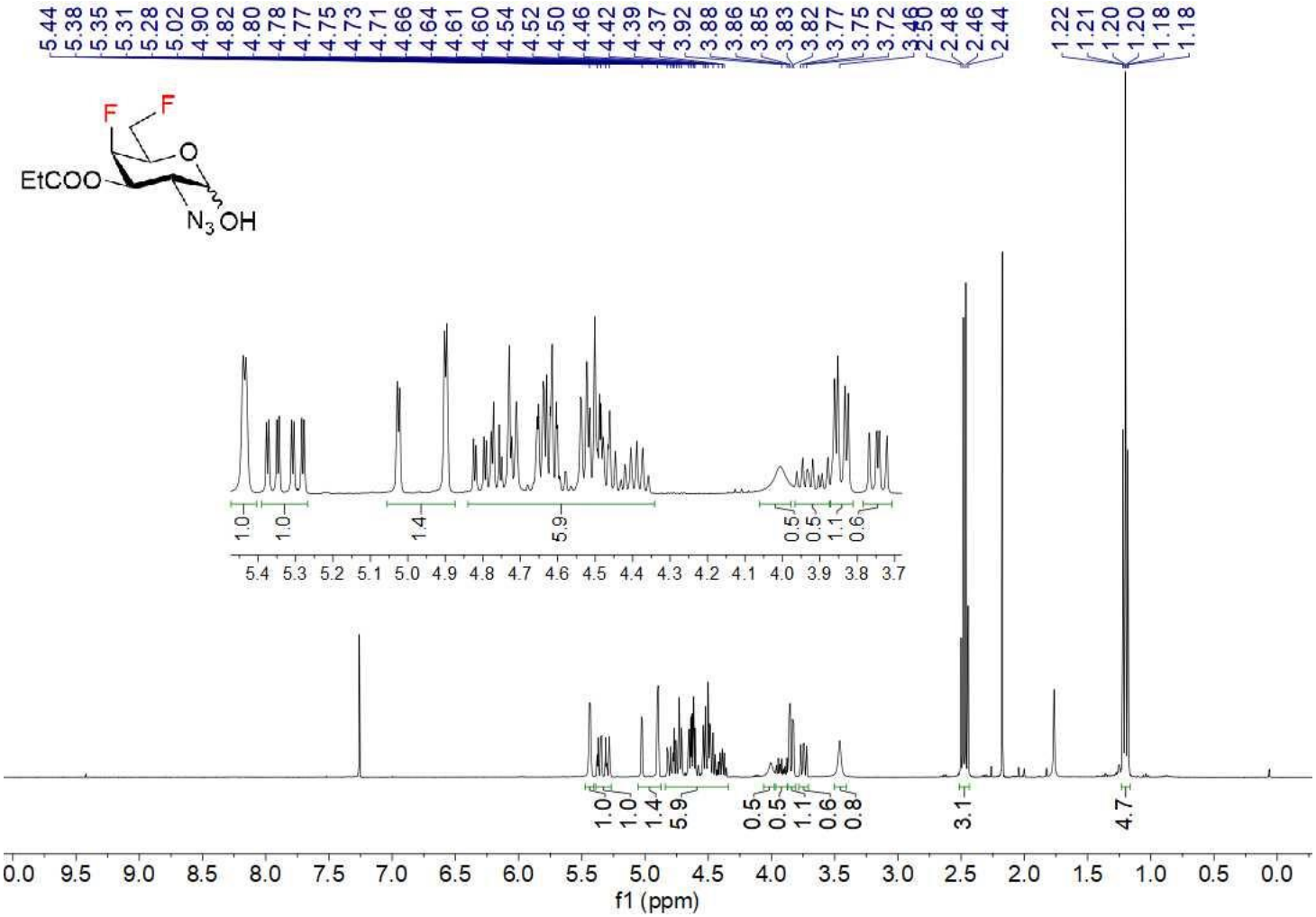
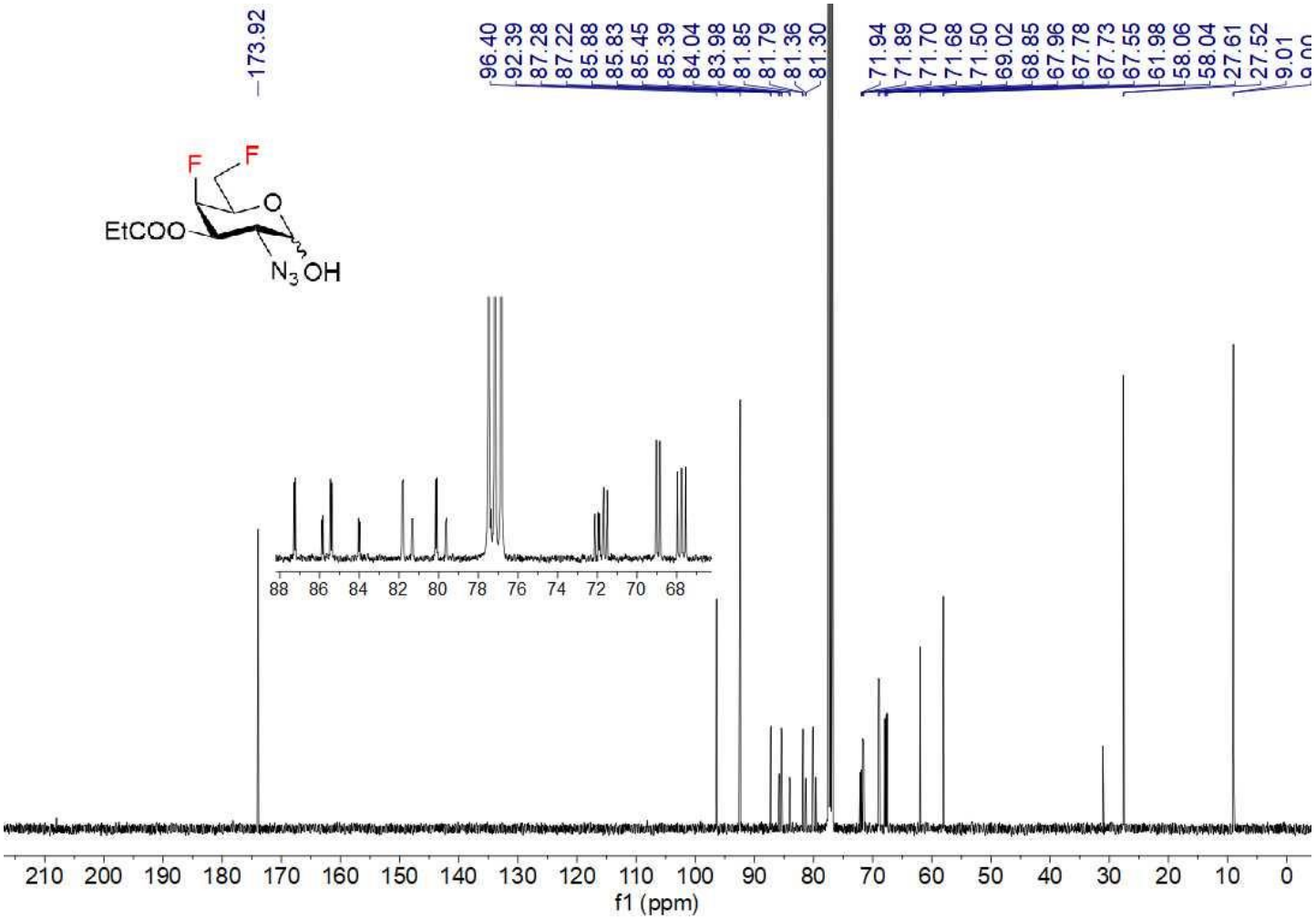


NMR COMPOUND 66

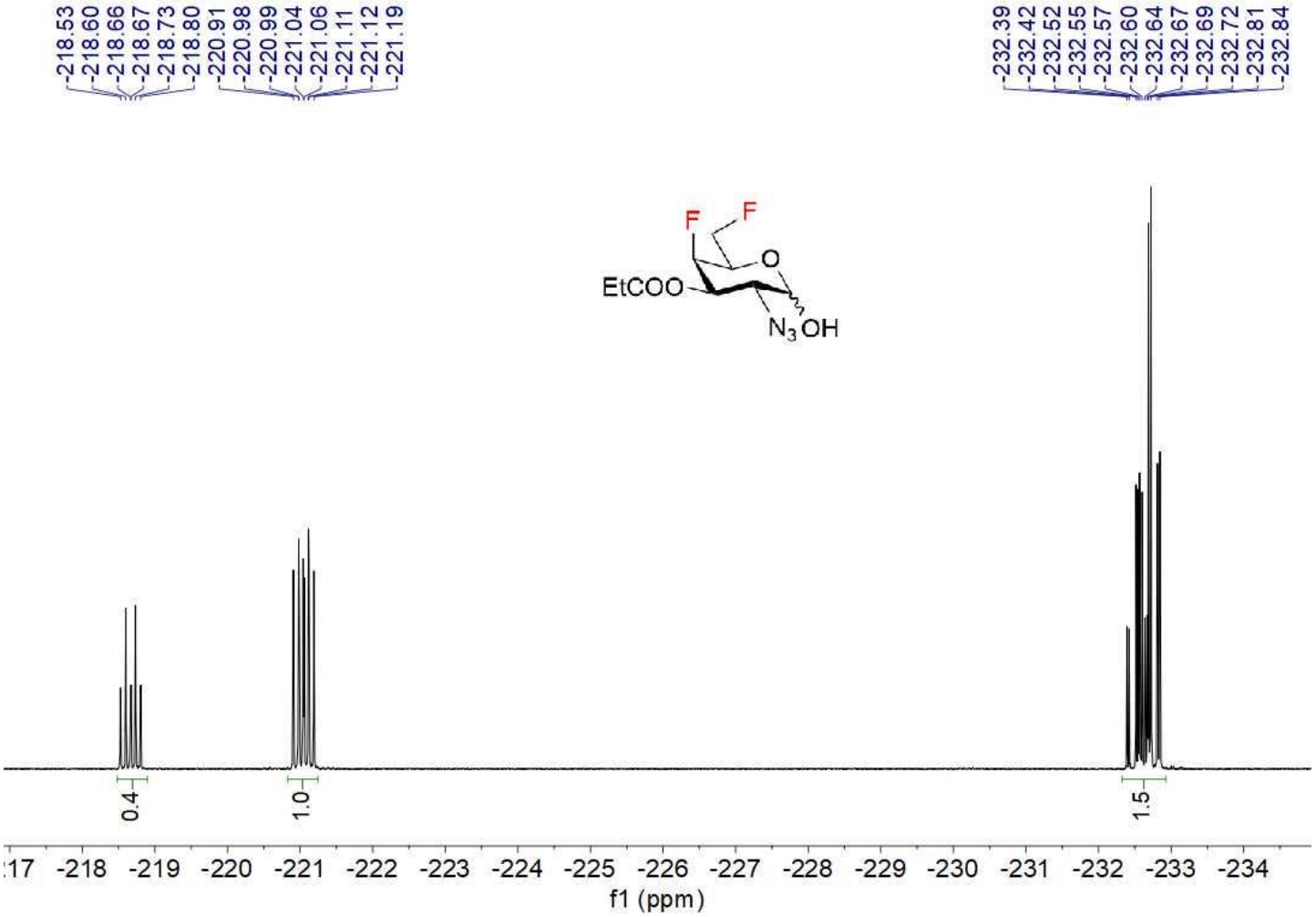
^{1}H NMR (400 MHz, $CDCl_3$) 66



^{13}C NMR (100 MHz, $CDCl_3$) 66



^{19}F NMR (376 MHz, $CDCl_3$) 66



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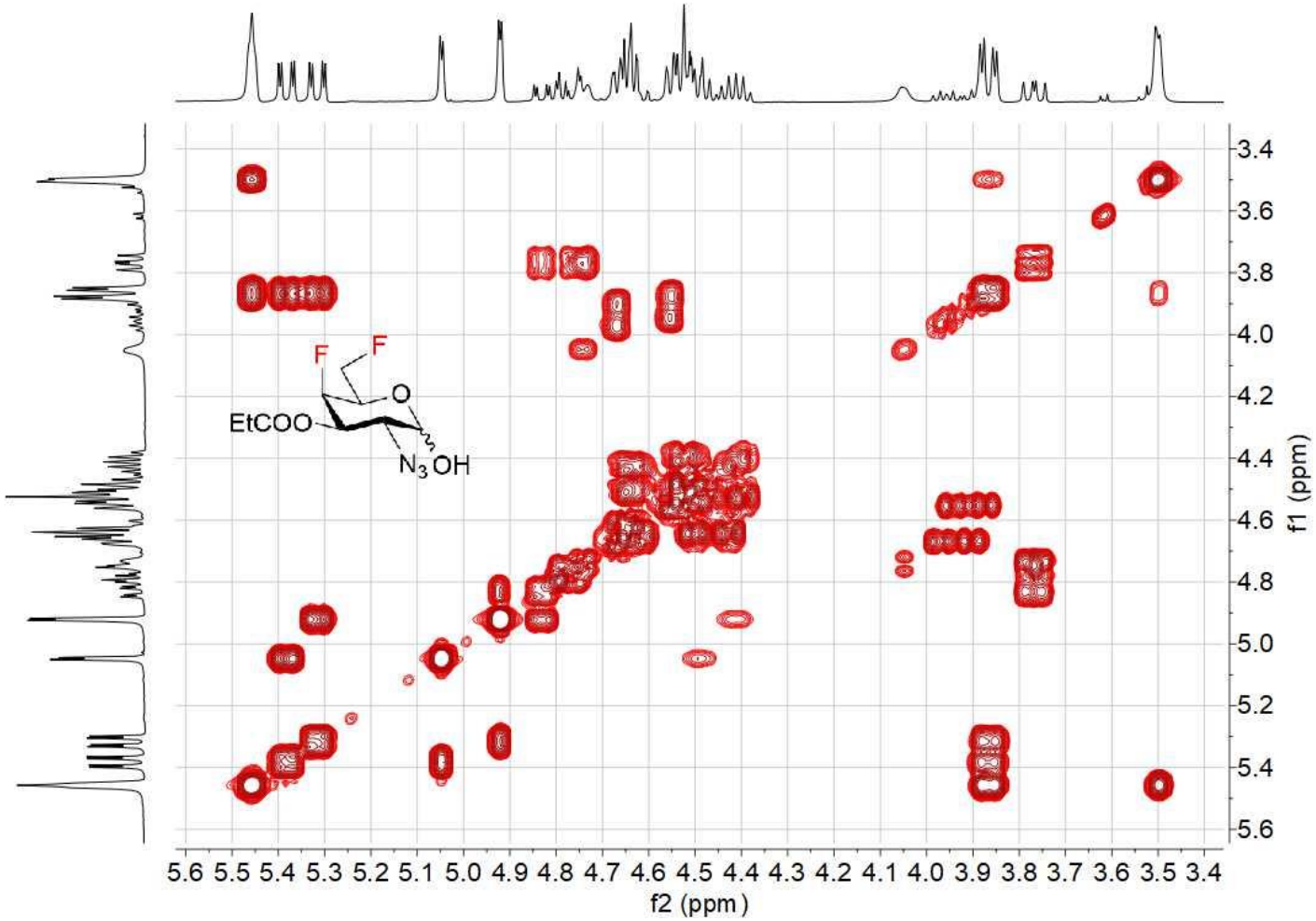
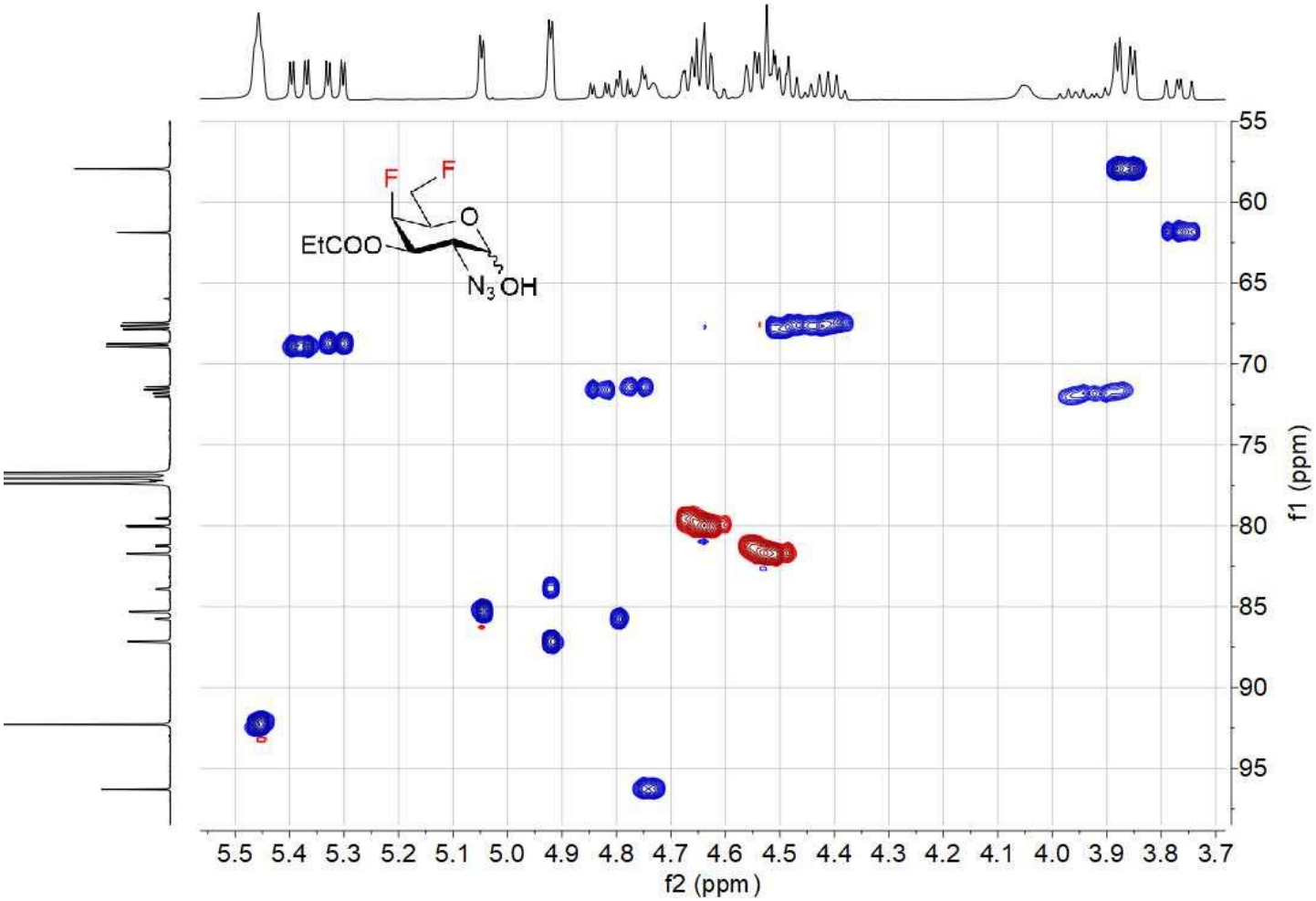
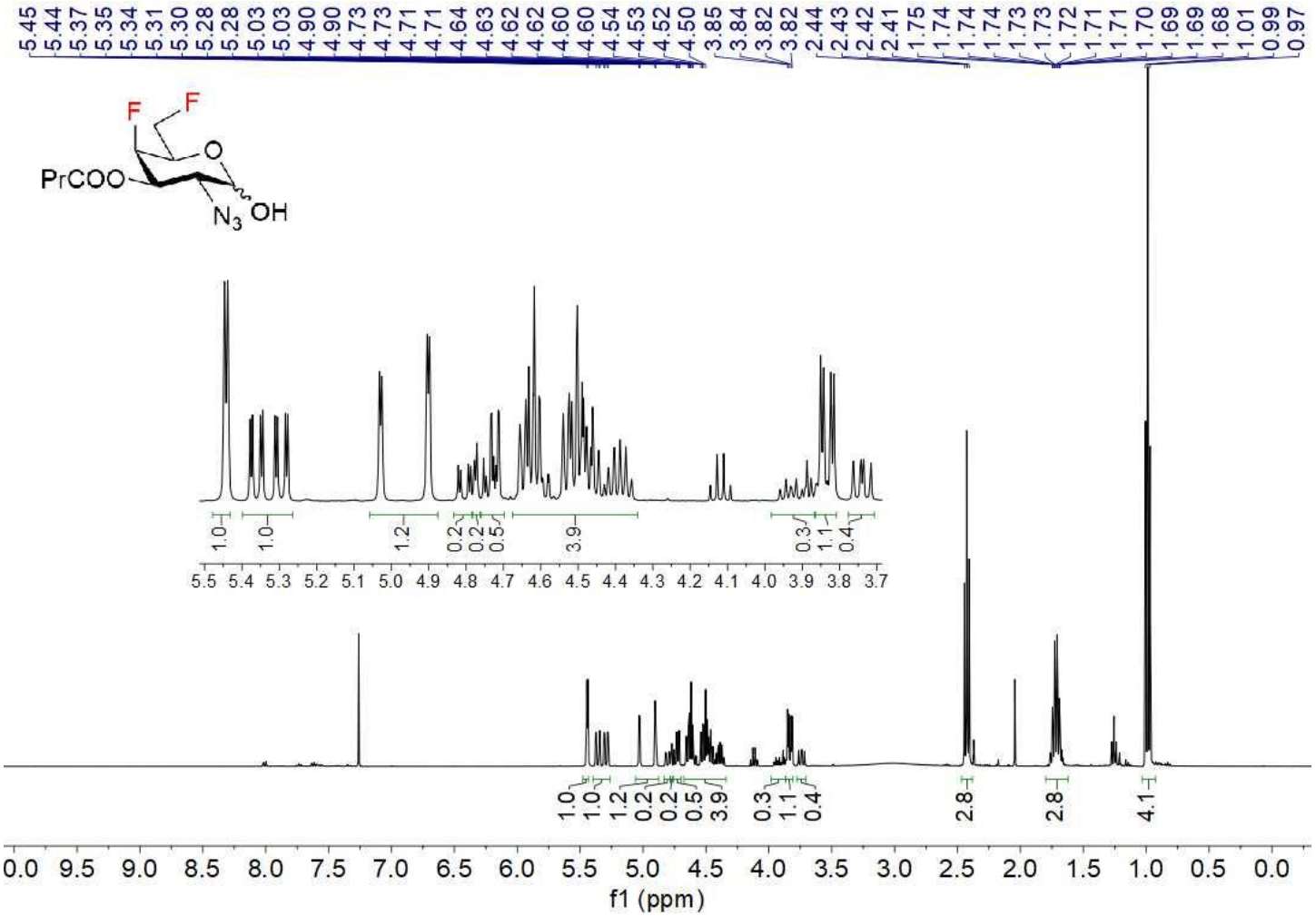


^{1}H-^{13}C HSQC 66

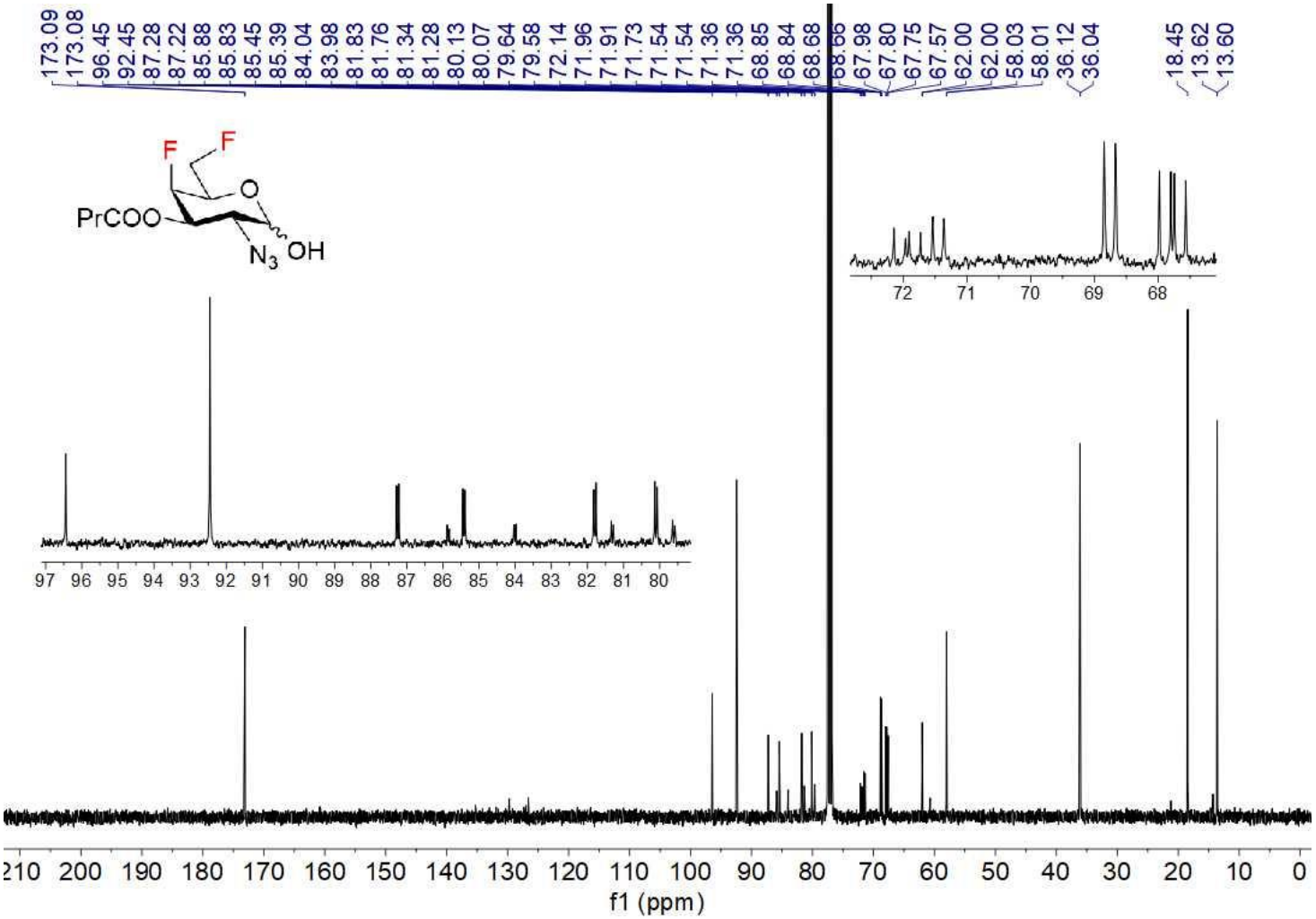


NMR COMPOUND 67

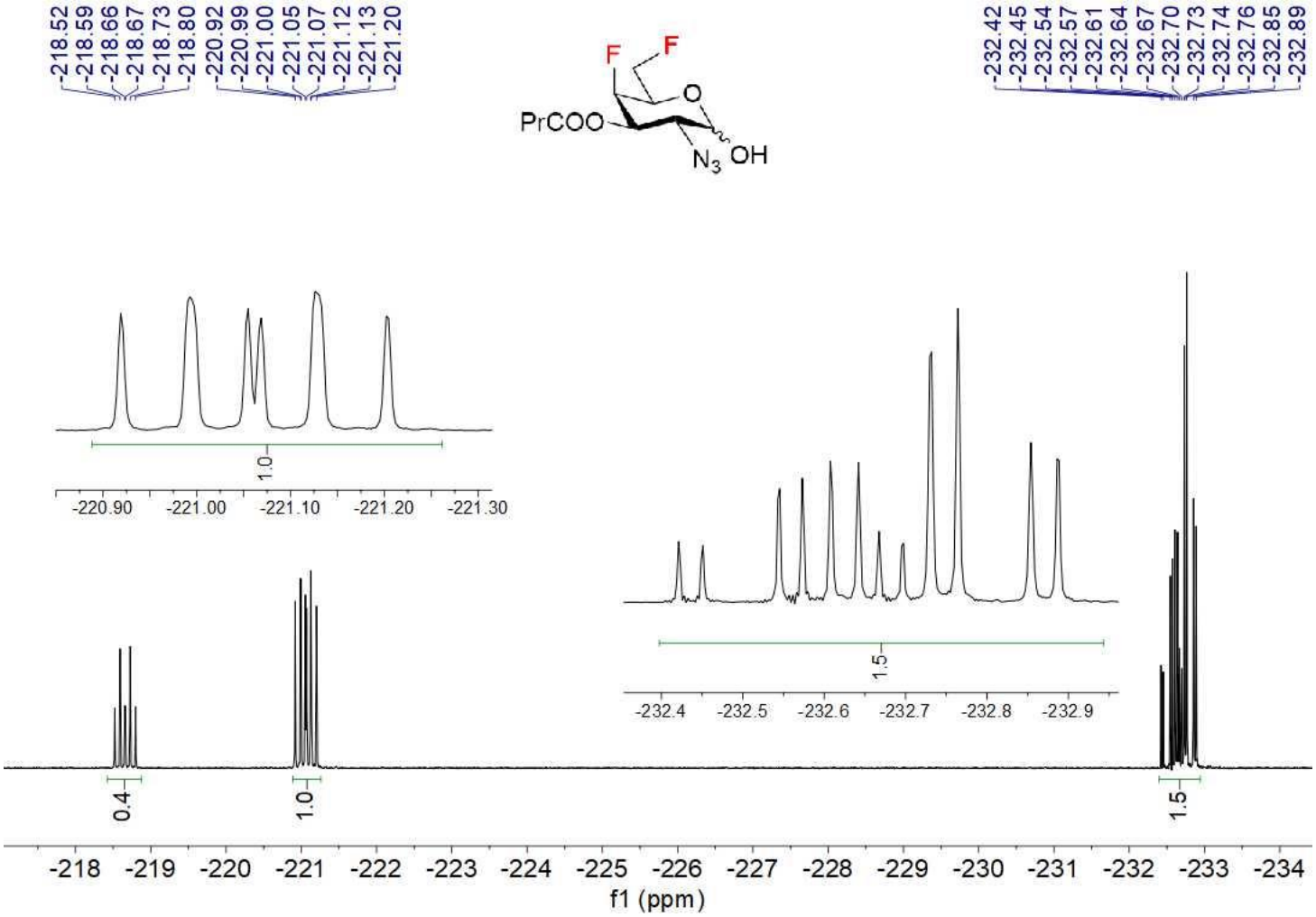
^{1}H NMR (400 MHz, $CDCl_3$) 67



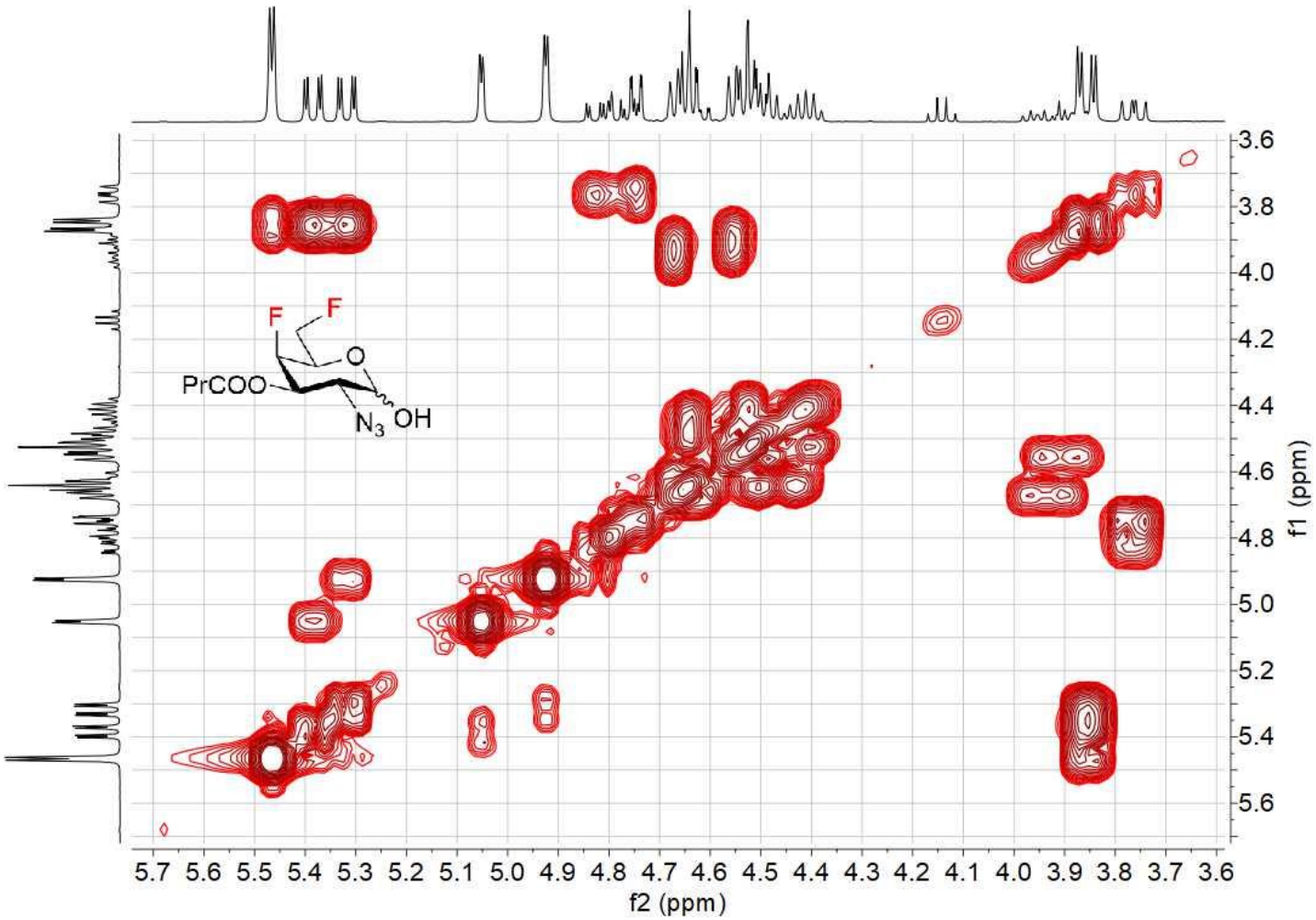
^{13}C NMR (100 MHz, $CDCl_3$) 67



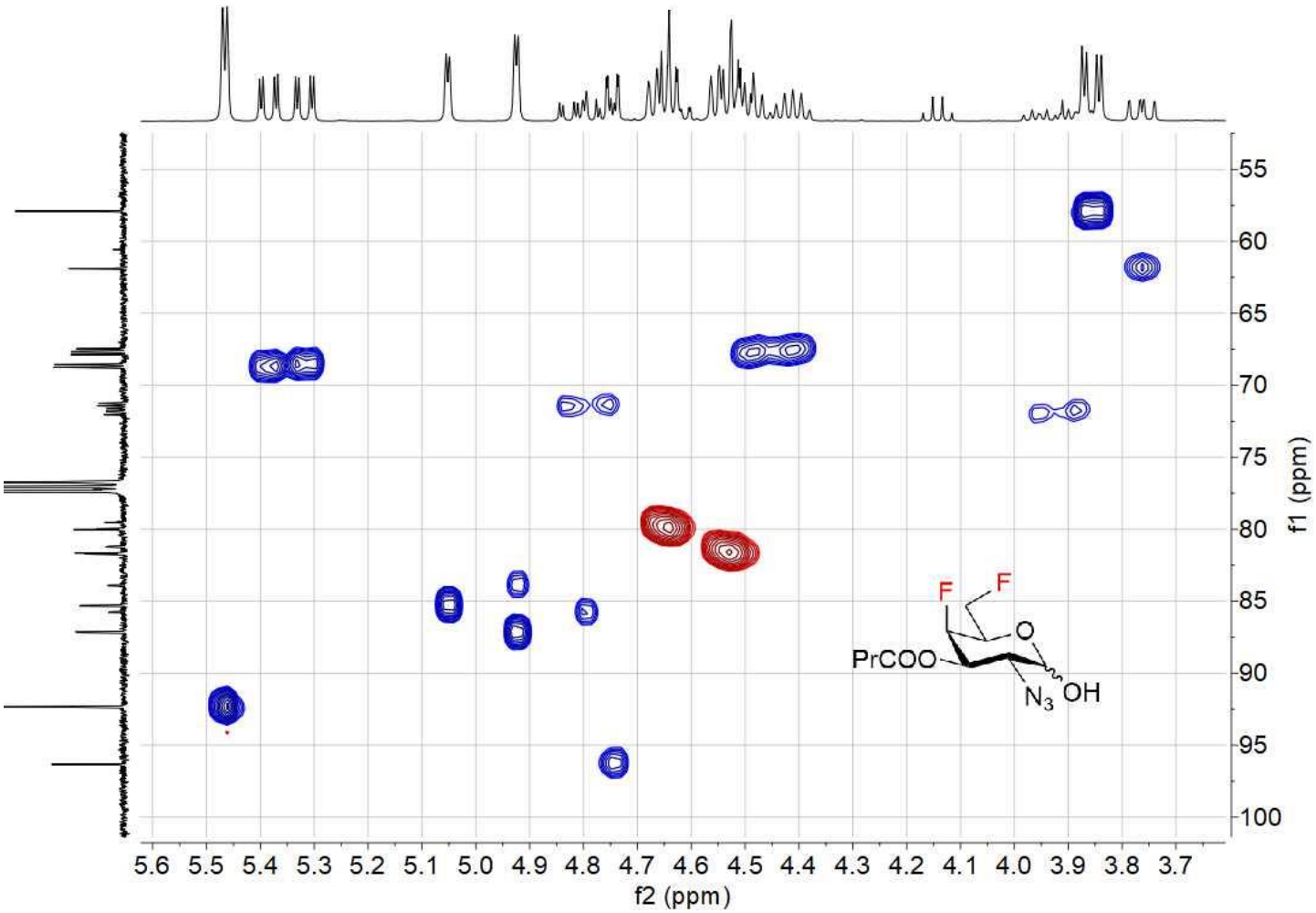
^{19}F NMR (376 MHz, $CDCl_3$) 67



^{1}H-^{1}H COSY 67

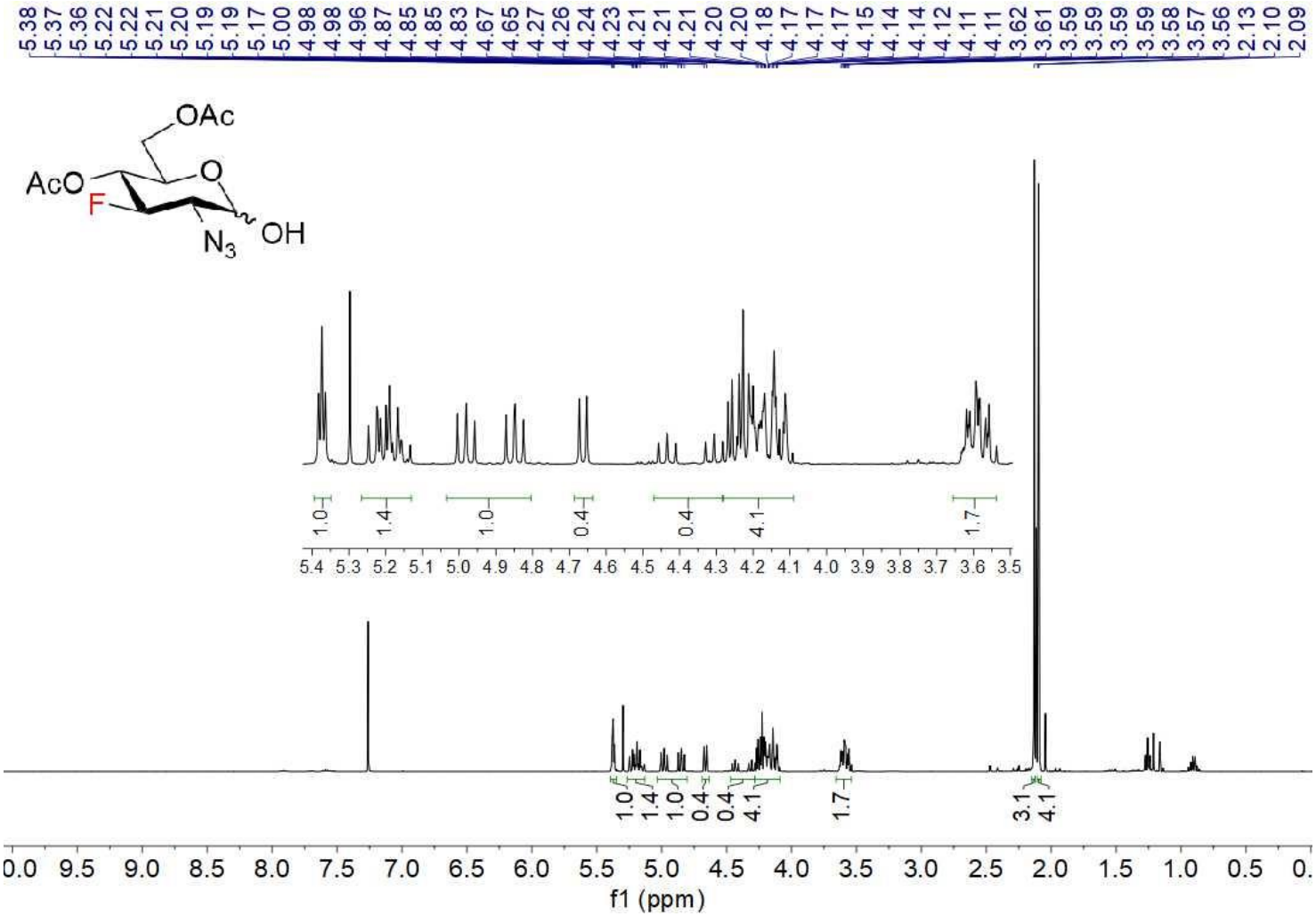


^{1}H-^{13}C HSQC 67

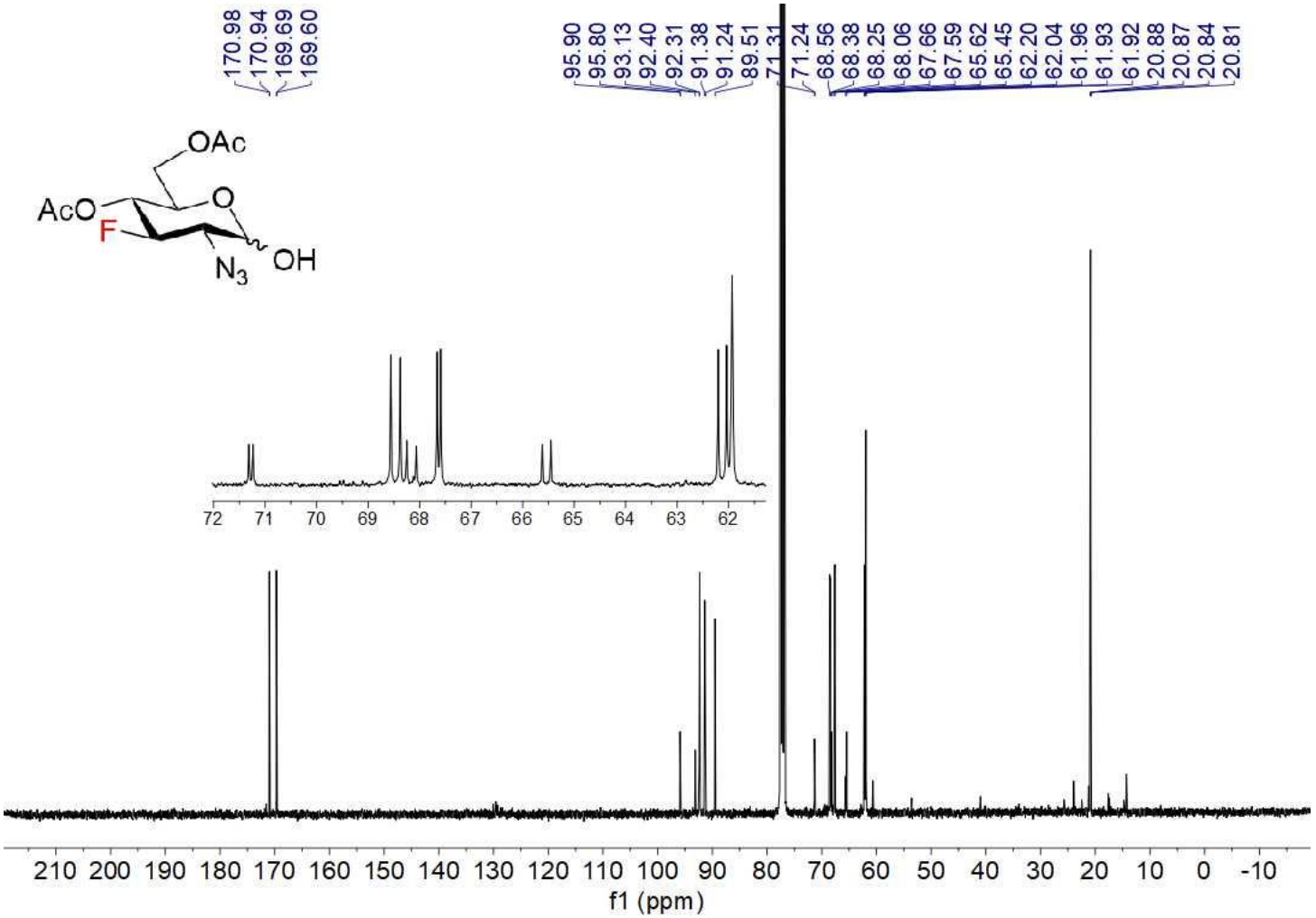


NMR COMPOUND 68

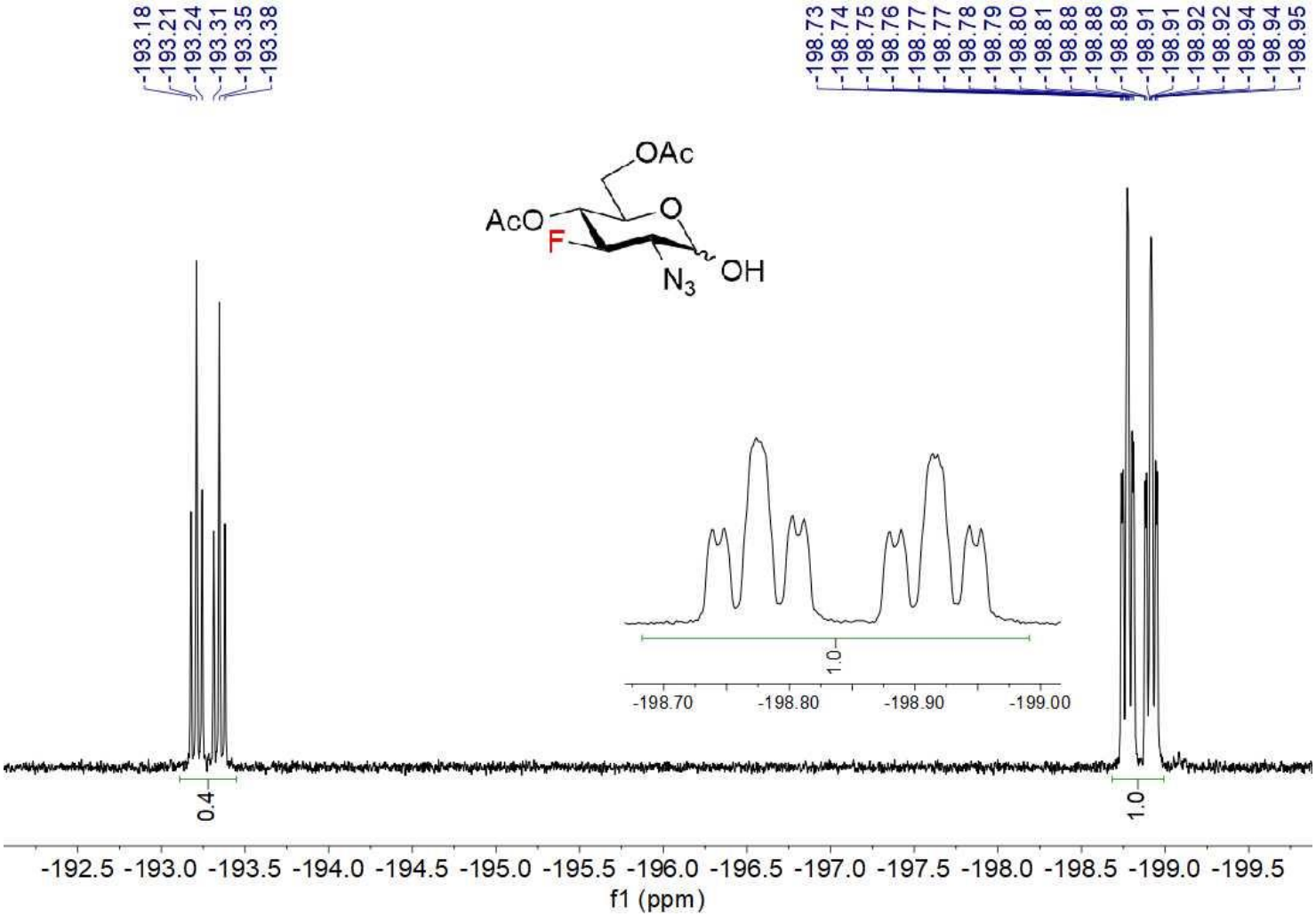
^{1}H NMR (400 MHz, $CDCl_3$) 68



^{13}C NMR (100 MHz, $CDCl_3$) 68



^{19}F NMR (376 MHz, $CDCl_3$) 68



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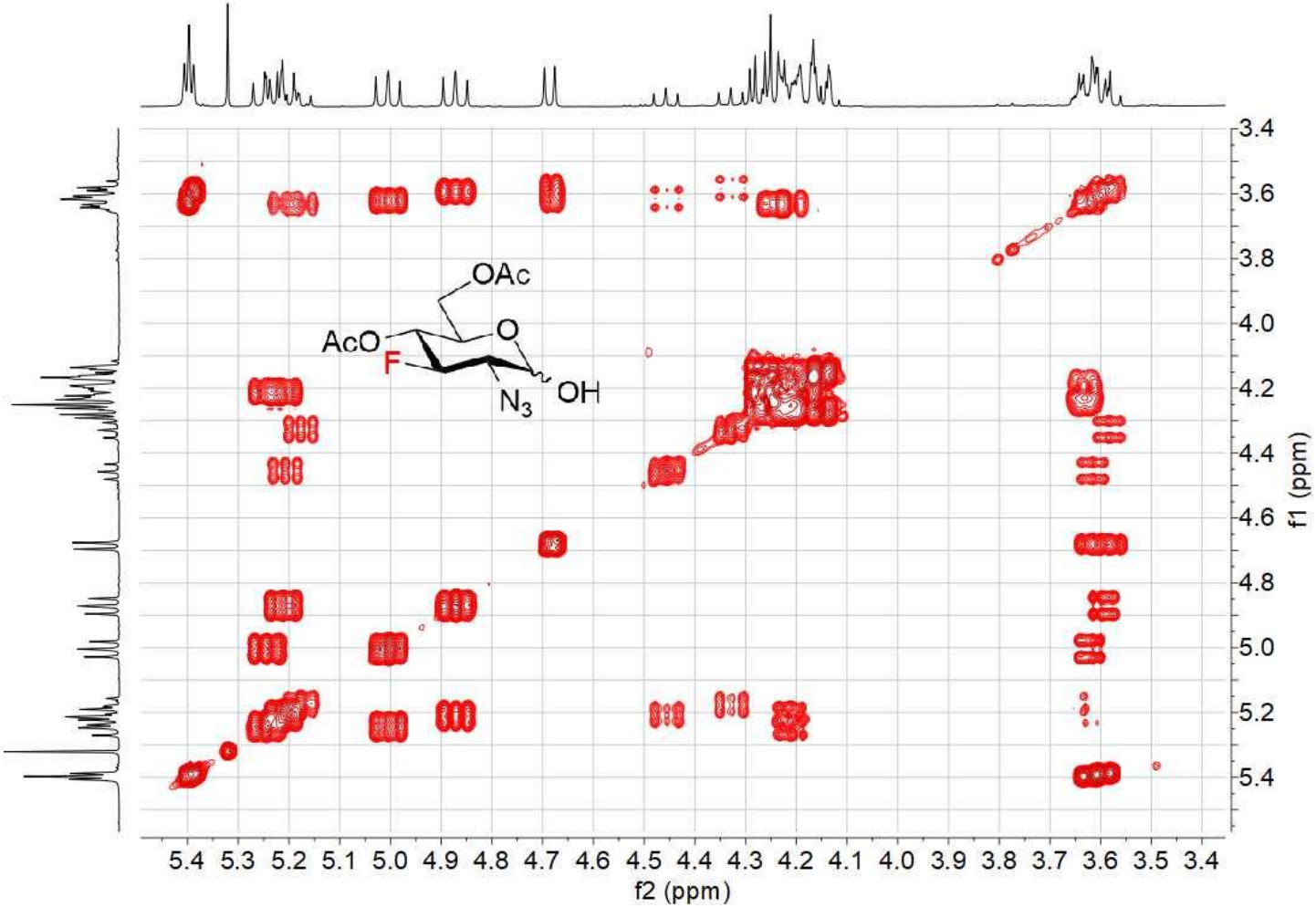
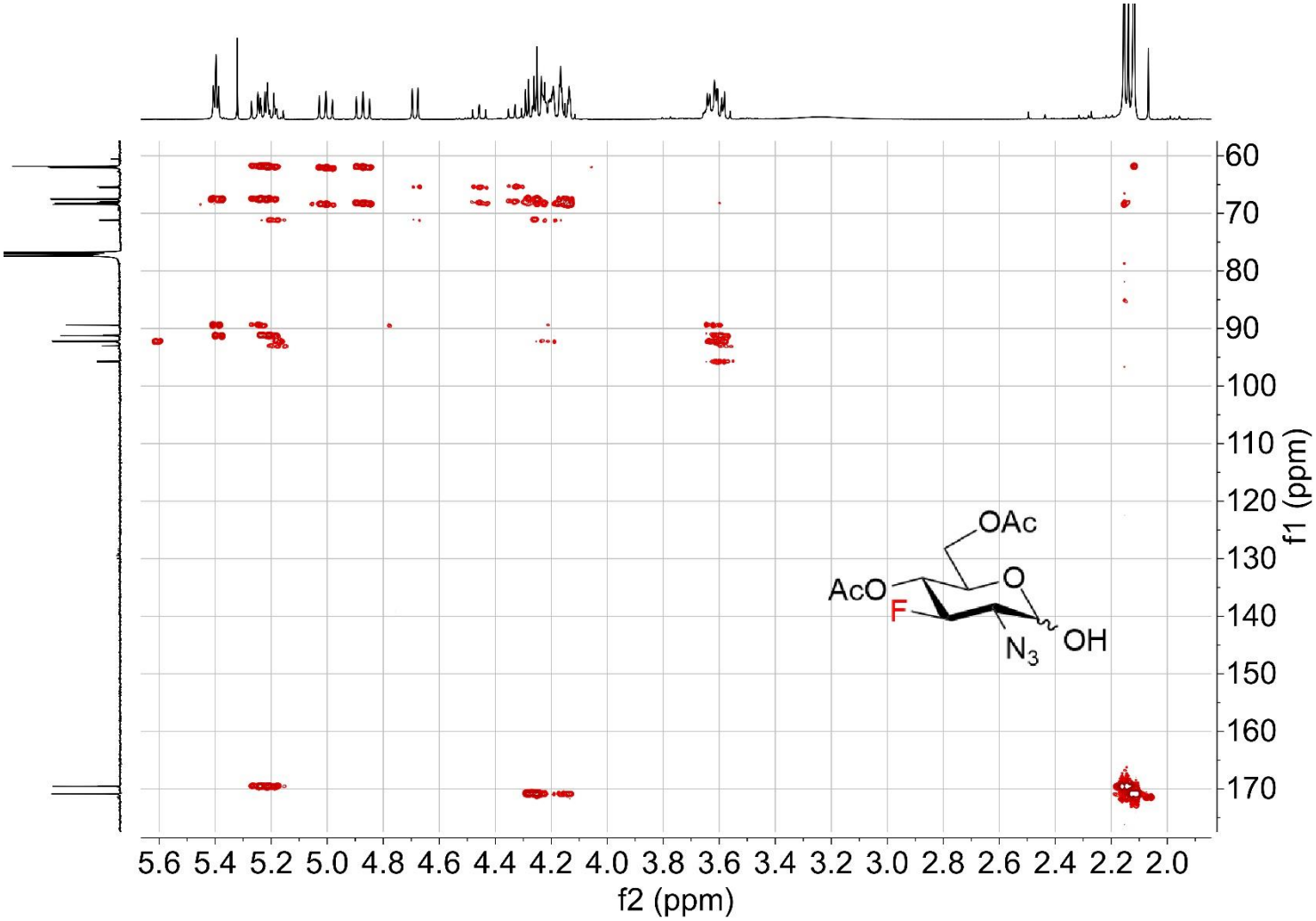
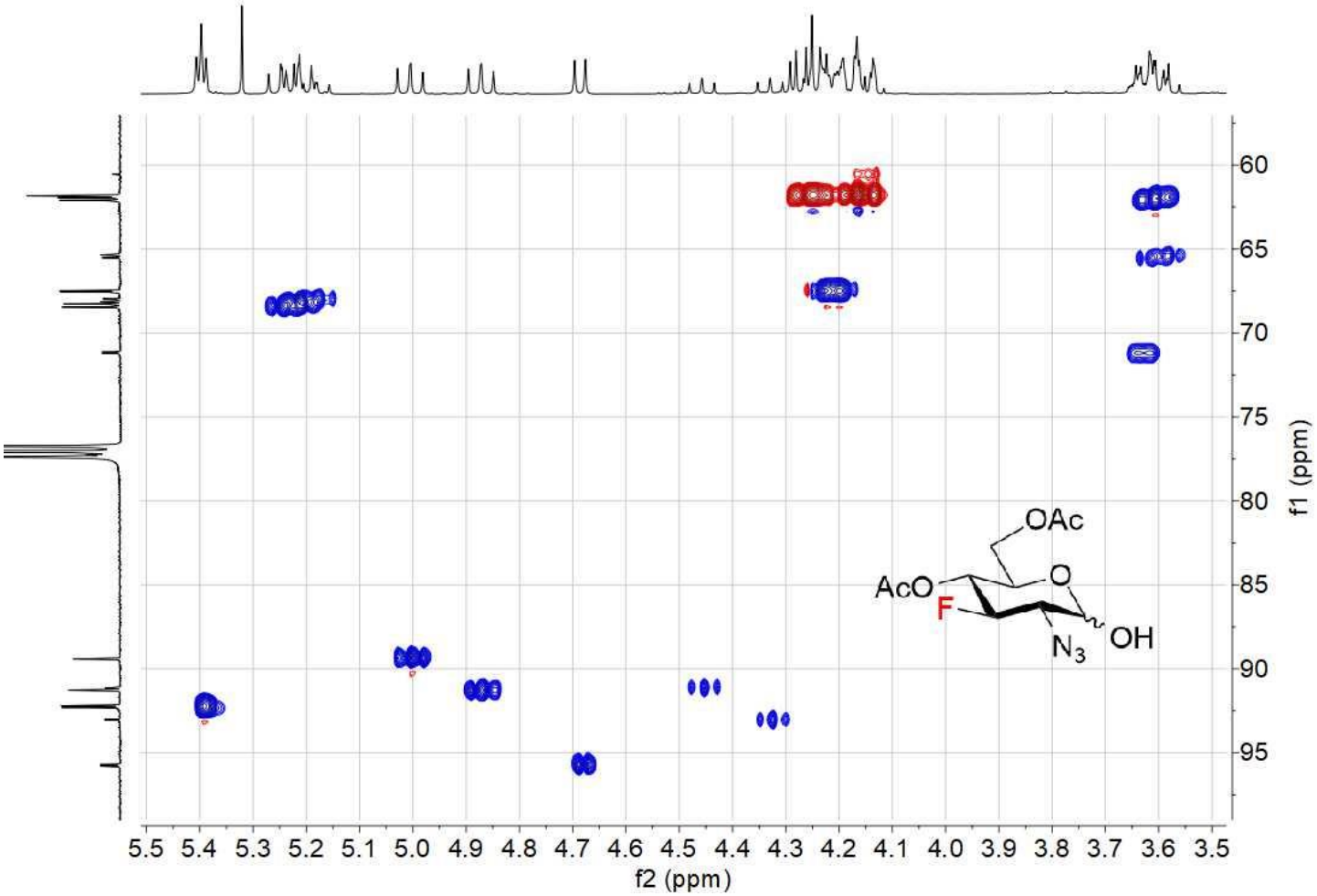


^{1}H-^{13}C HMBC 68

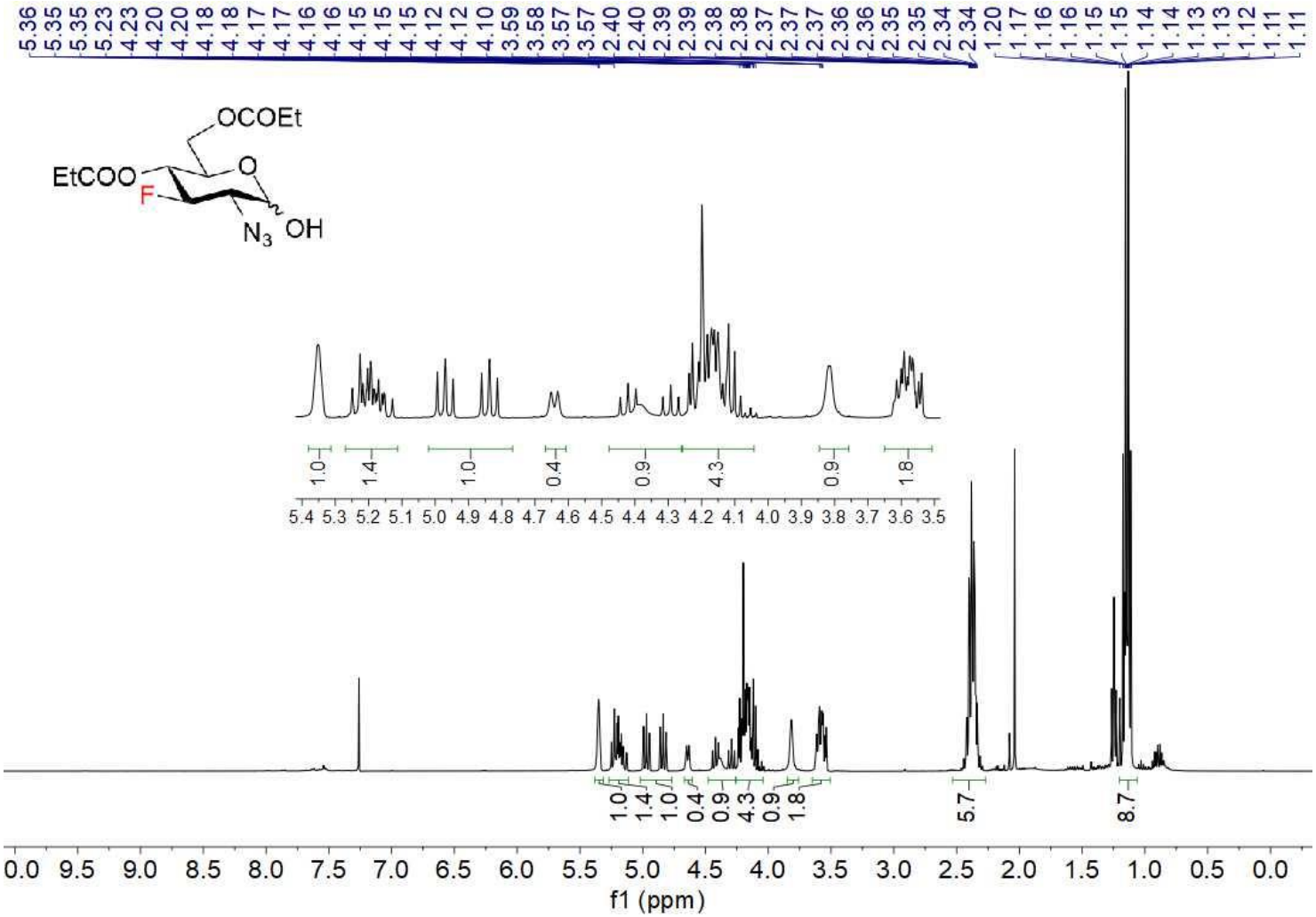


^{1}H-^{13}C HSQC 68

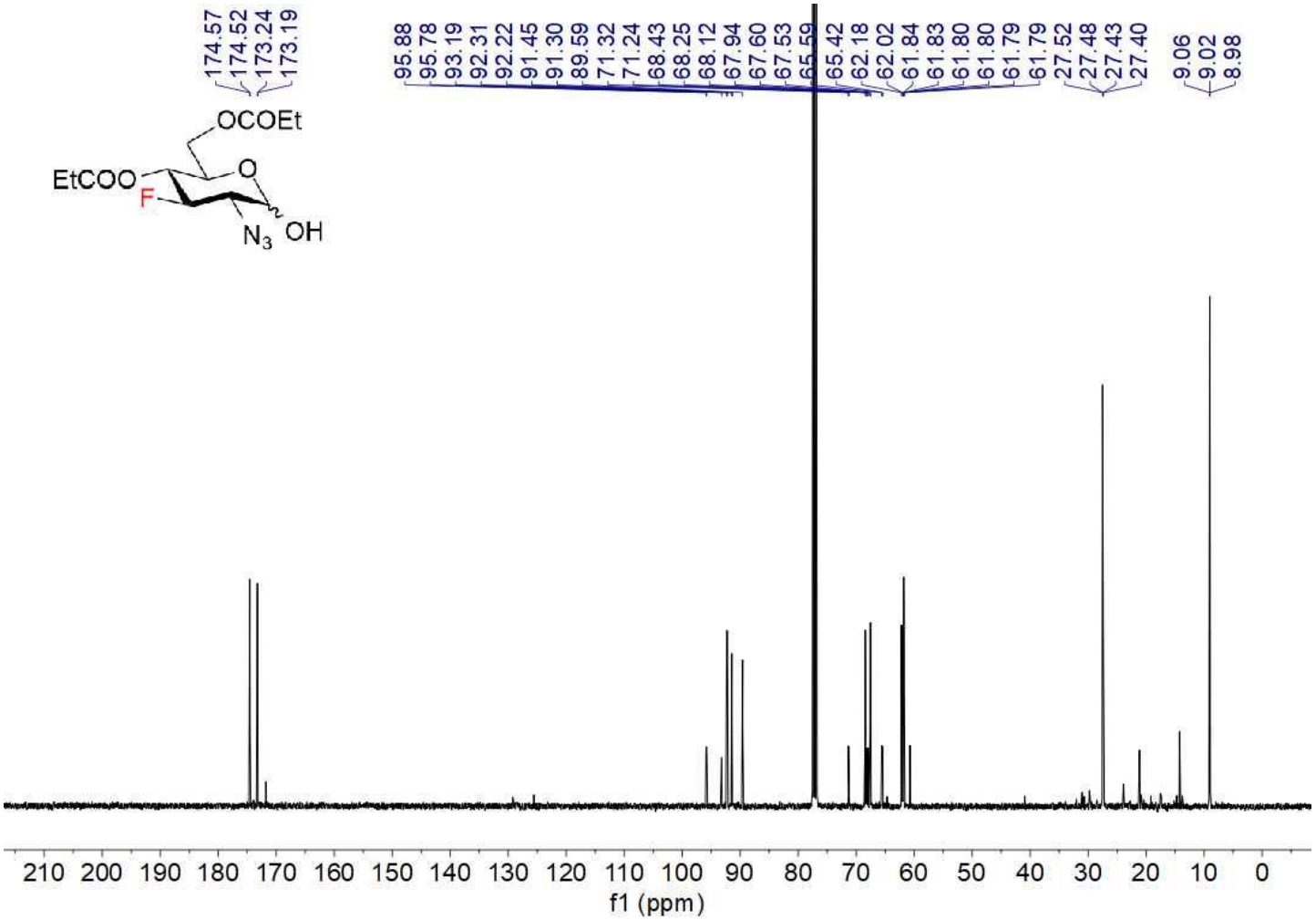


NMR COMPOUND 69

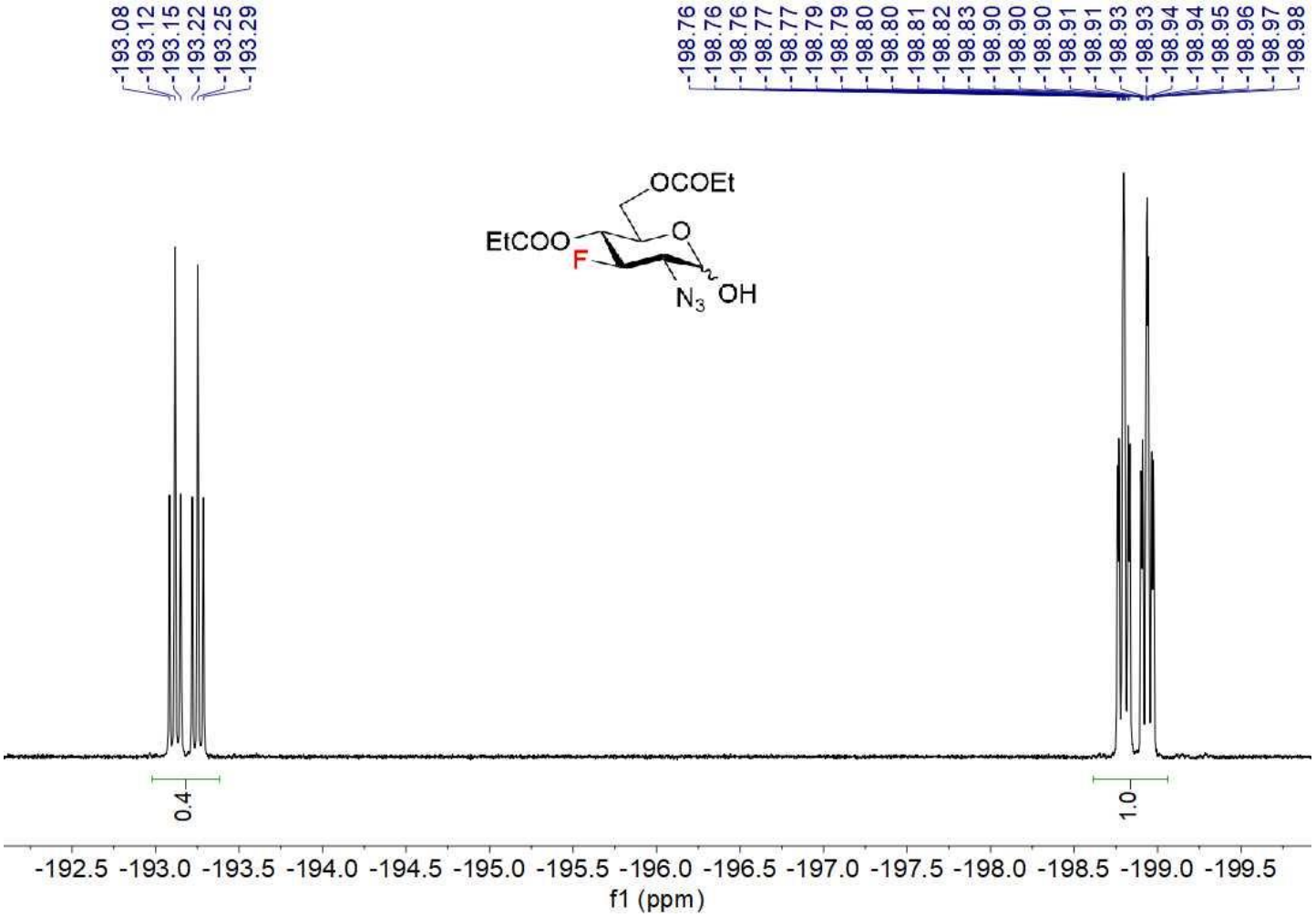
^{1}H NMR (400 MHz, $CDCl_3$) 69



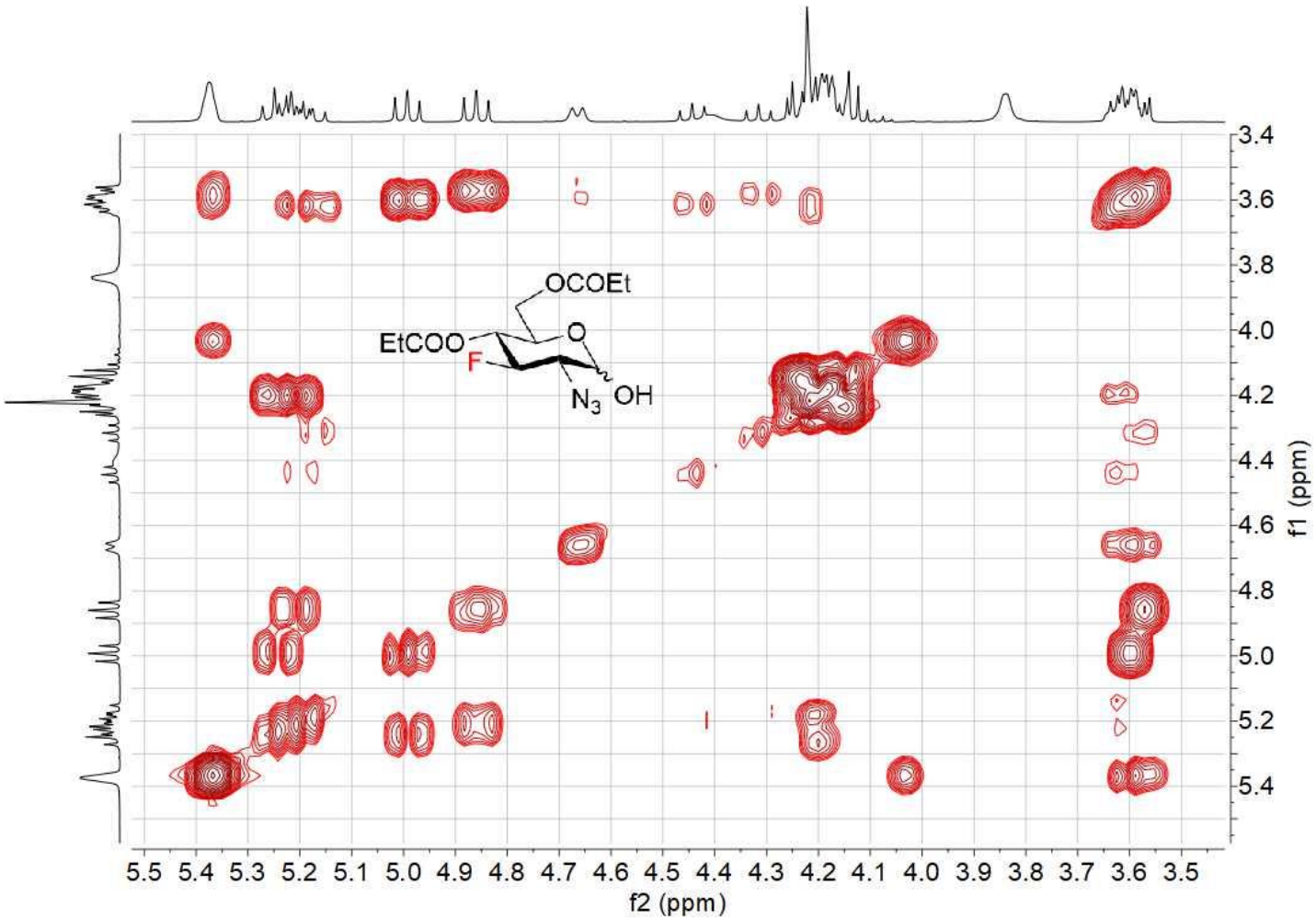
^{13}C NMR (100 MHz, $CDCl_3$) 69



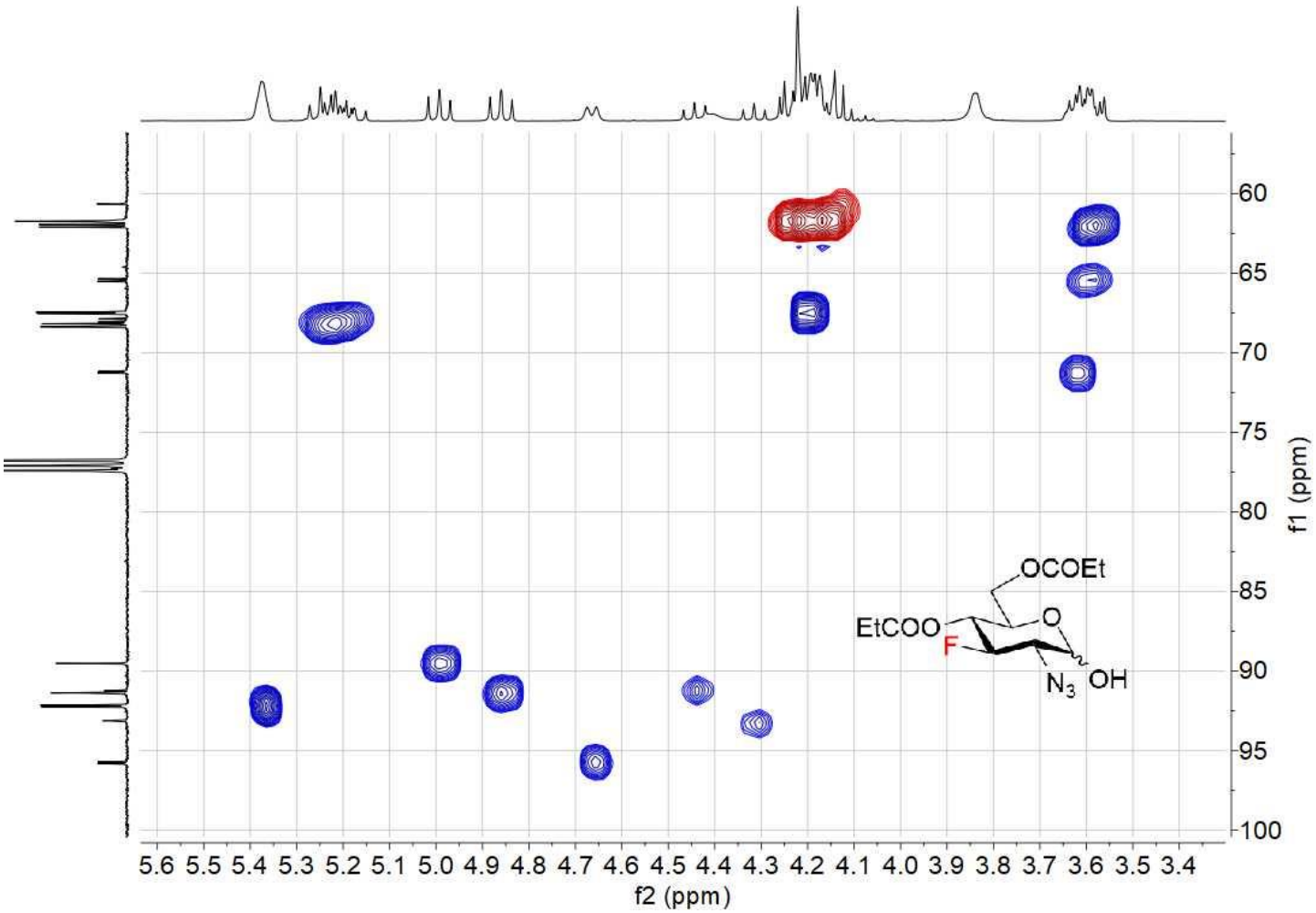
^{19}F NMR (376 MHz, $CDCl_3$) 69



^{1}H-^{1}H COSY 69

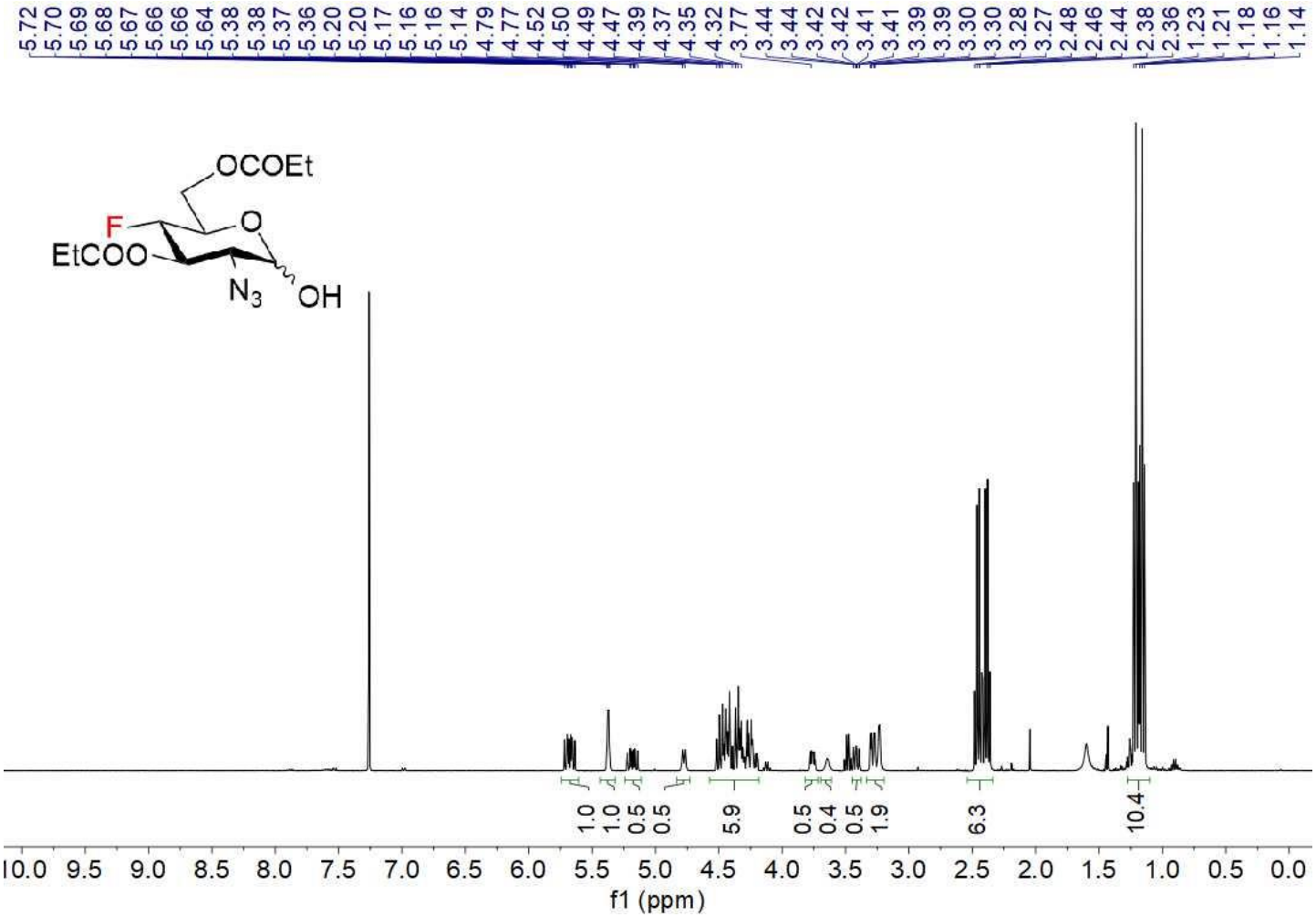

OCOEt
EtCOO
F
O
N3
OH
f1 (ppm)
f2 (ppm)
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
5.4
5.5 5.4 5.3 5.2 5.1 5.0 4.9 4.8 4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6 3.5

^{1}H-^{13}C HSQC 69

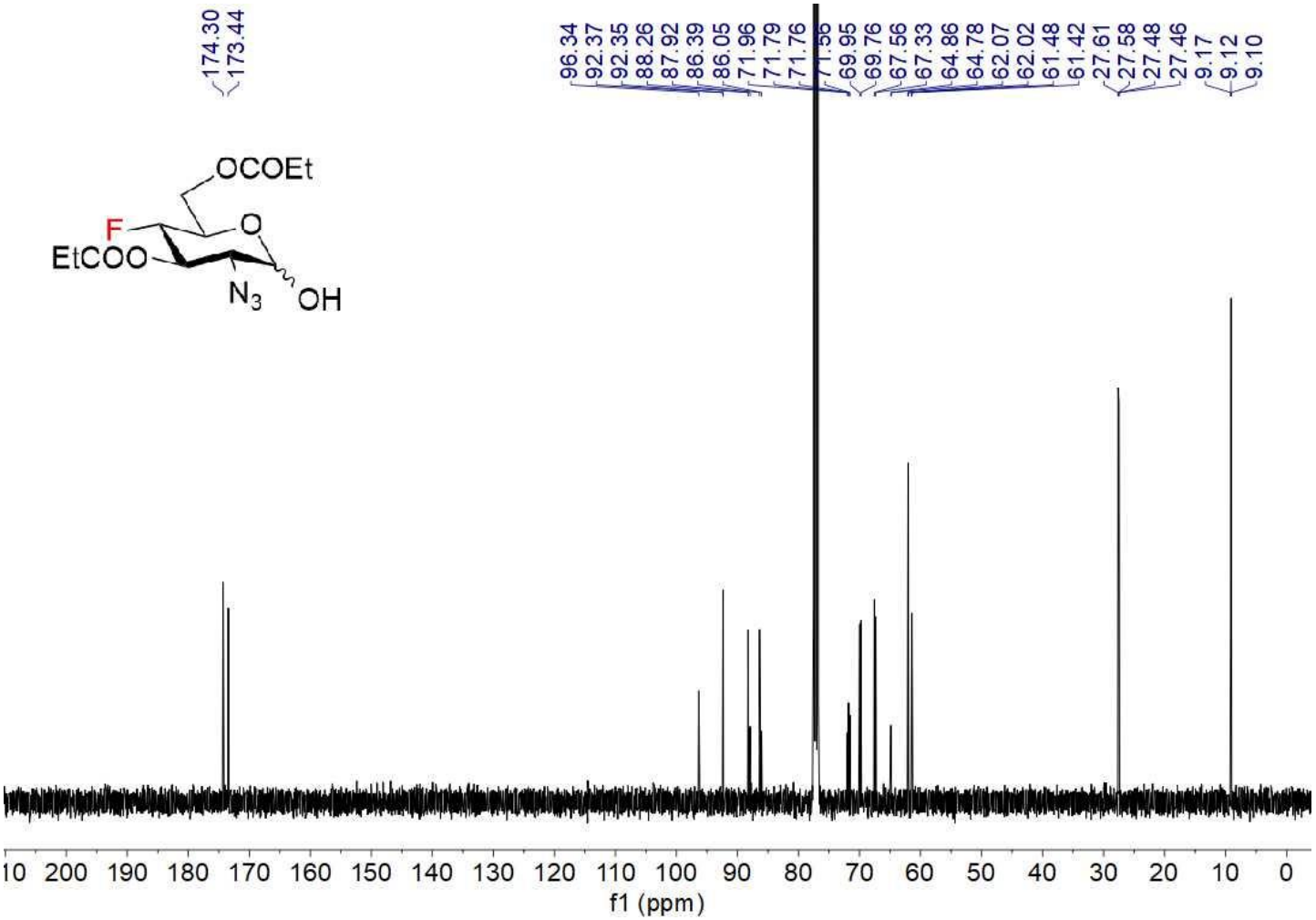


NMR COMPOUND 70

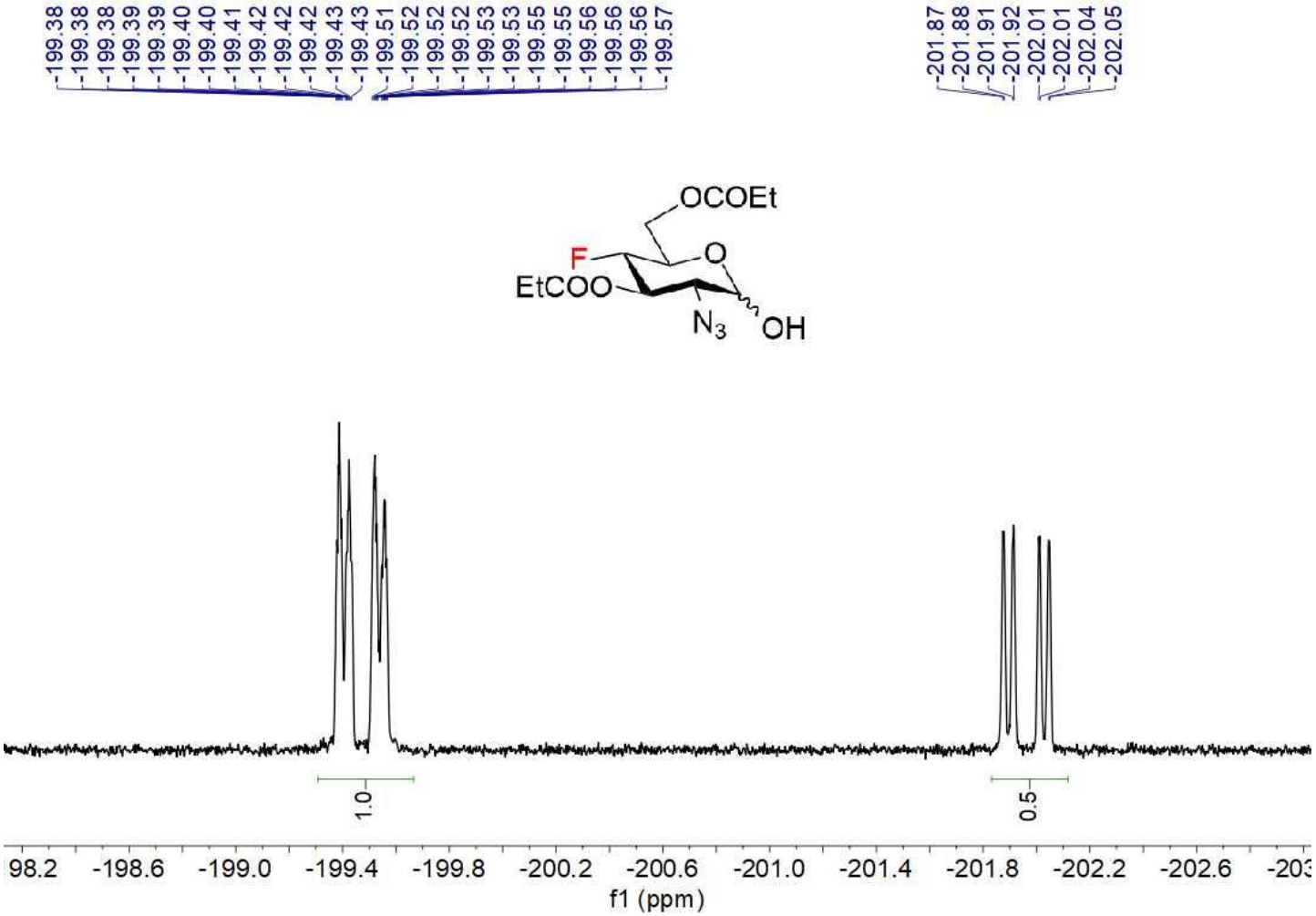
^{1}H NMR (400 MHz, $CDCl_3$) 70



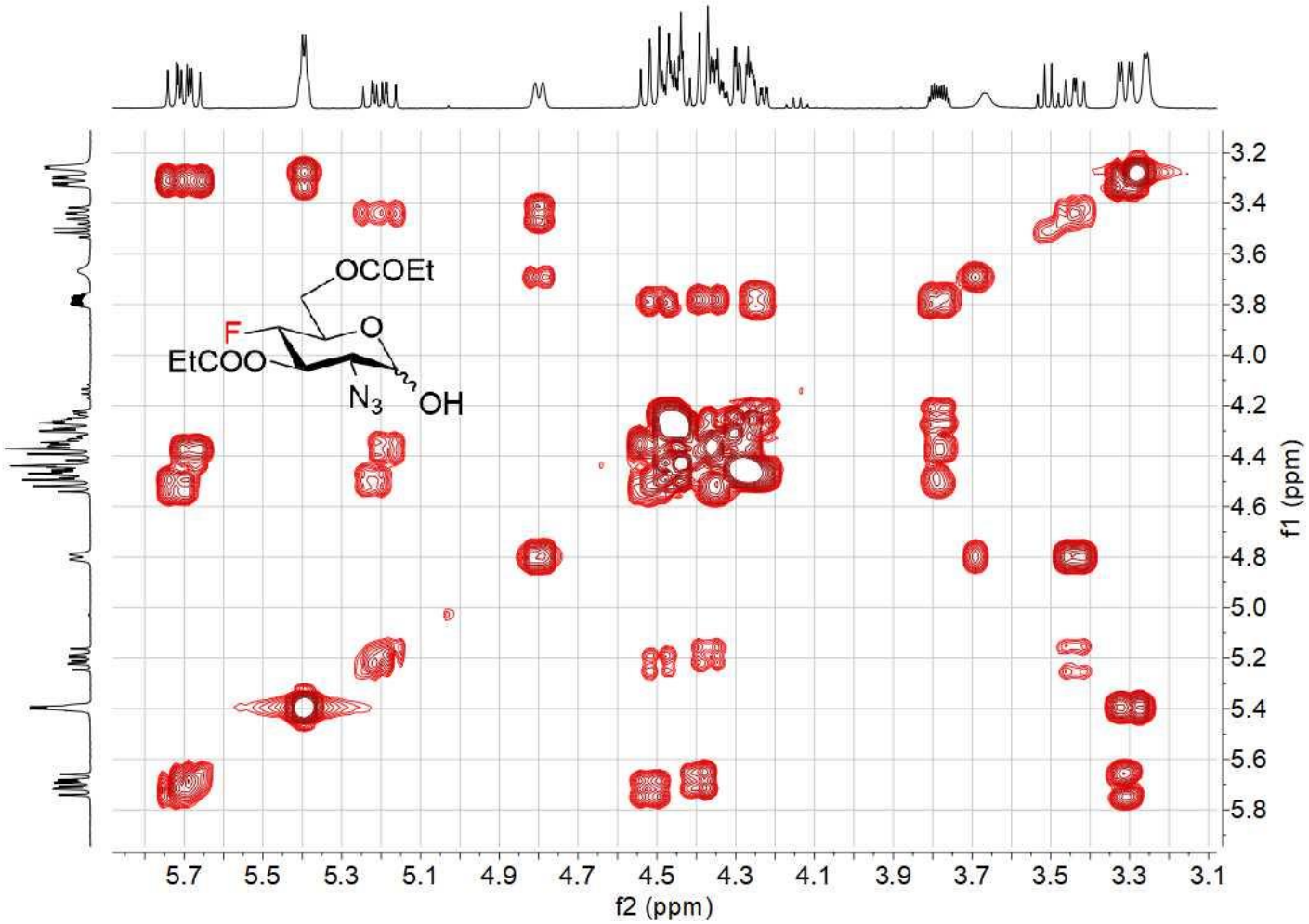
^{13}C NMR (100 MHz, $CDCl_3$) 70



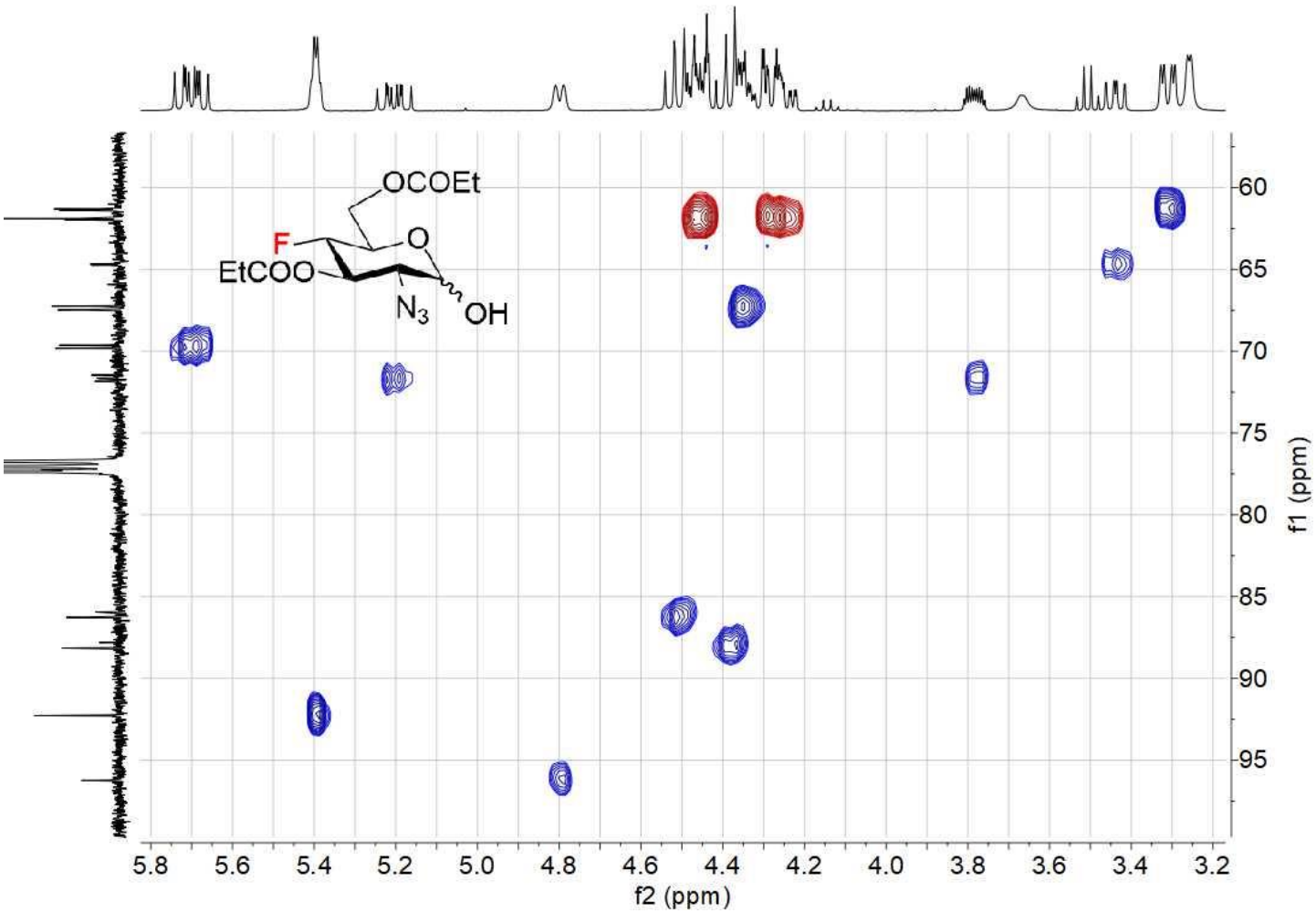
^{19}F NMR (376 MHz, $CDCl_3$) 70



^{1}H-^{1}H COSY 70

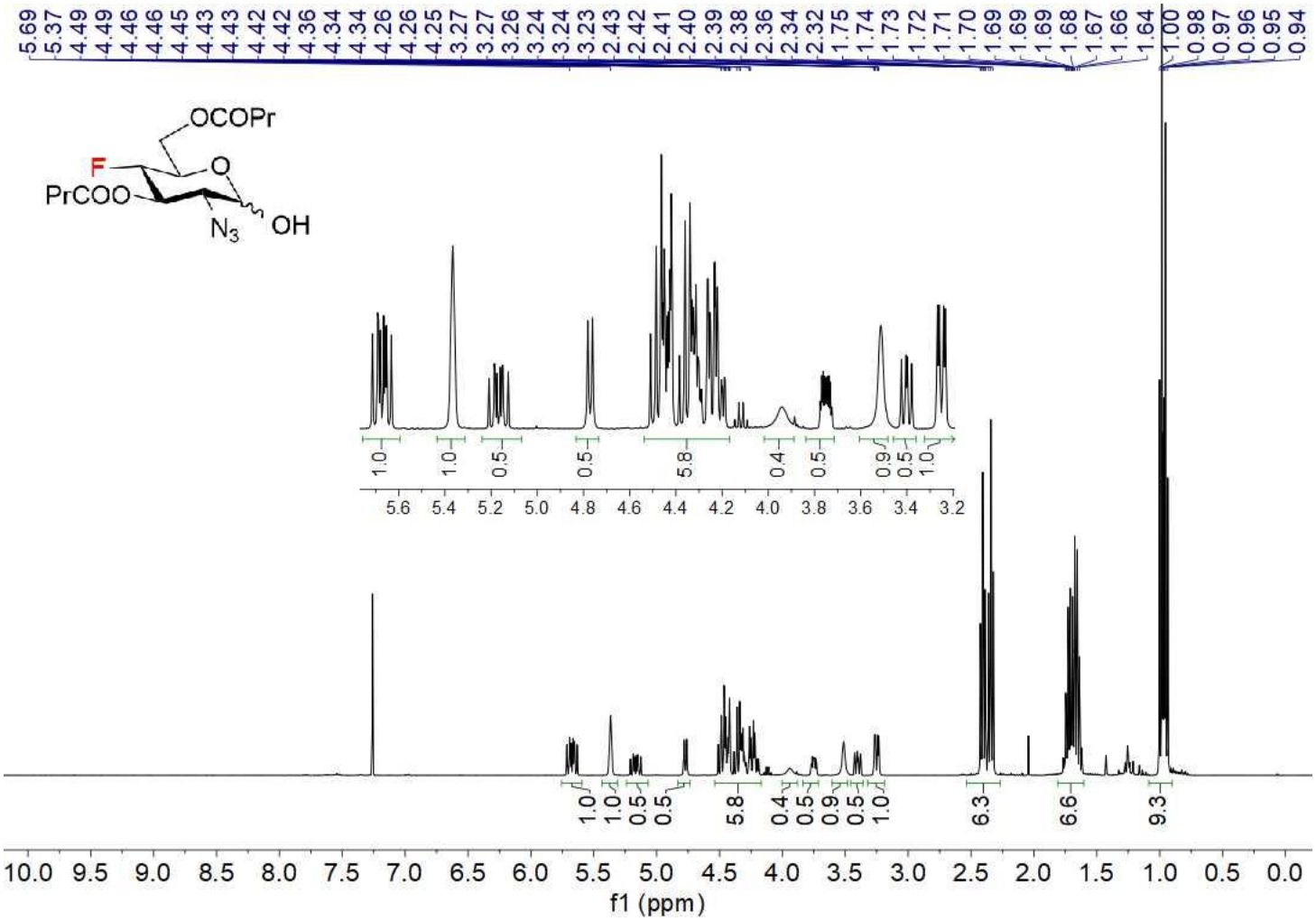


^{1}H-^{13}C HSQC 70

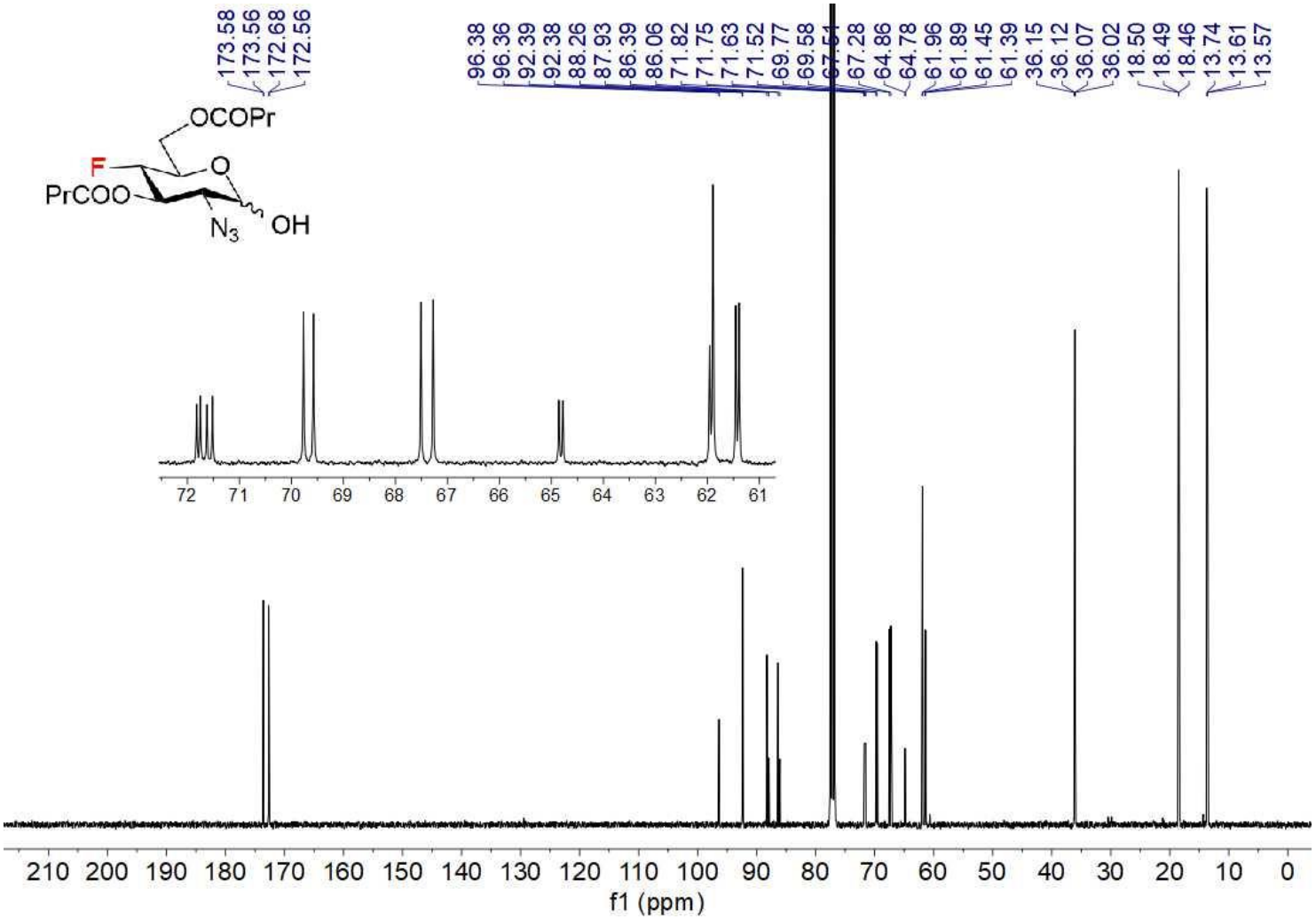


NMR COMPOUND 71

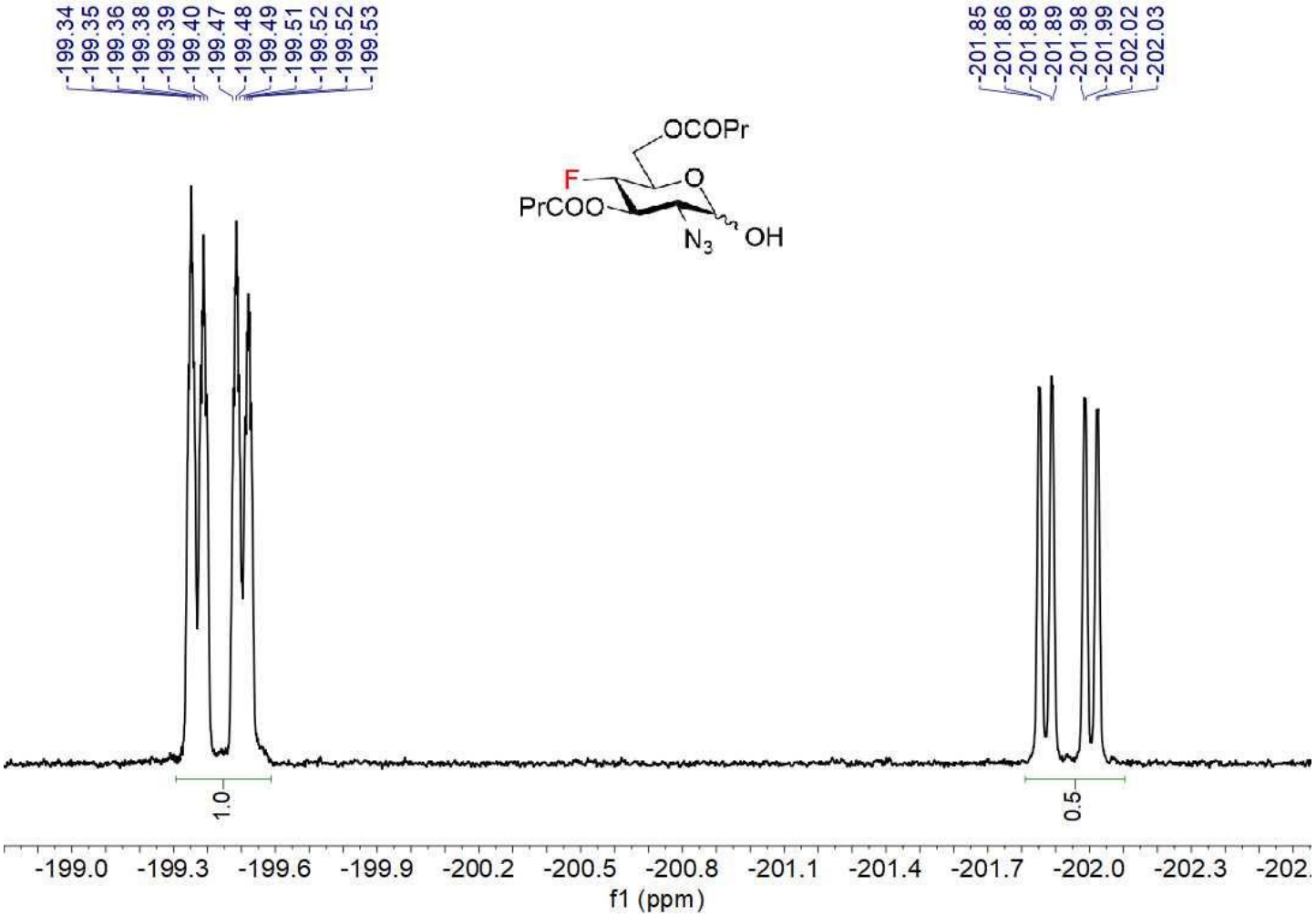
^{1}H NMR (400 MHz, $CDCl_3$) 71



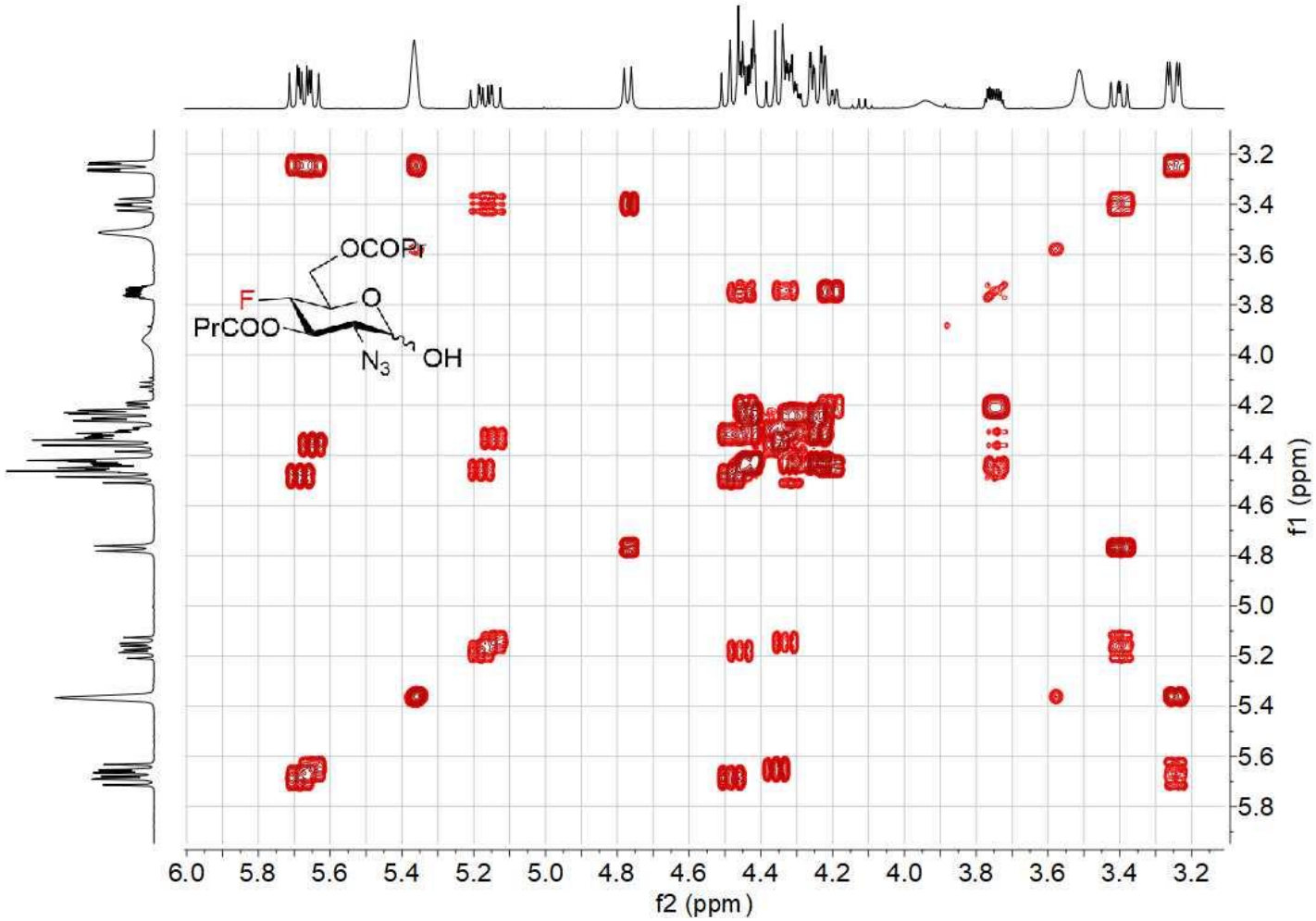
^{13}C NMR (100 MHz, $CDCl_3$) 71



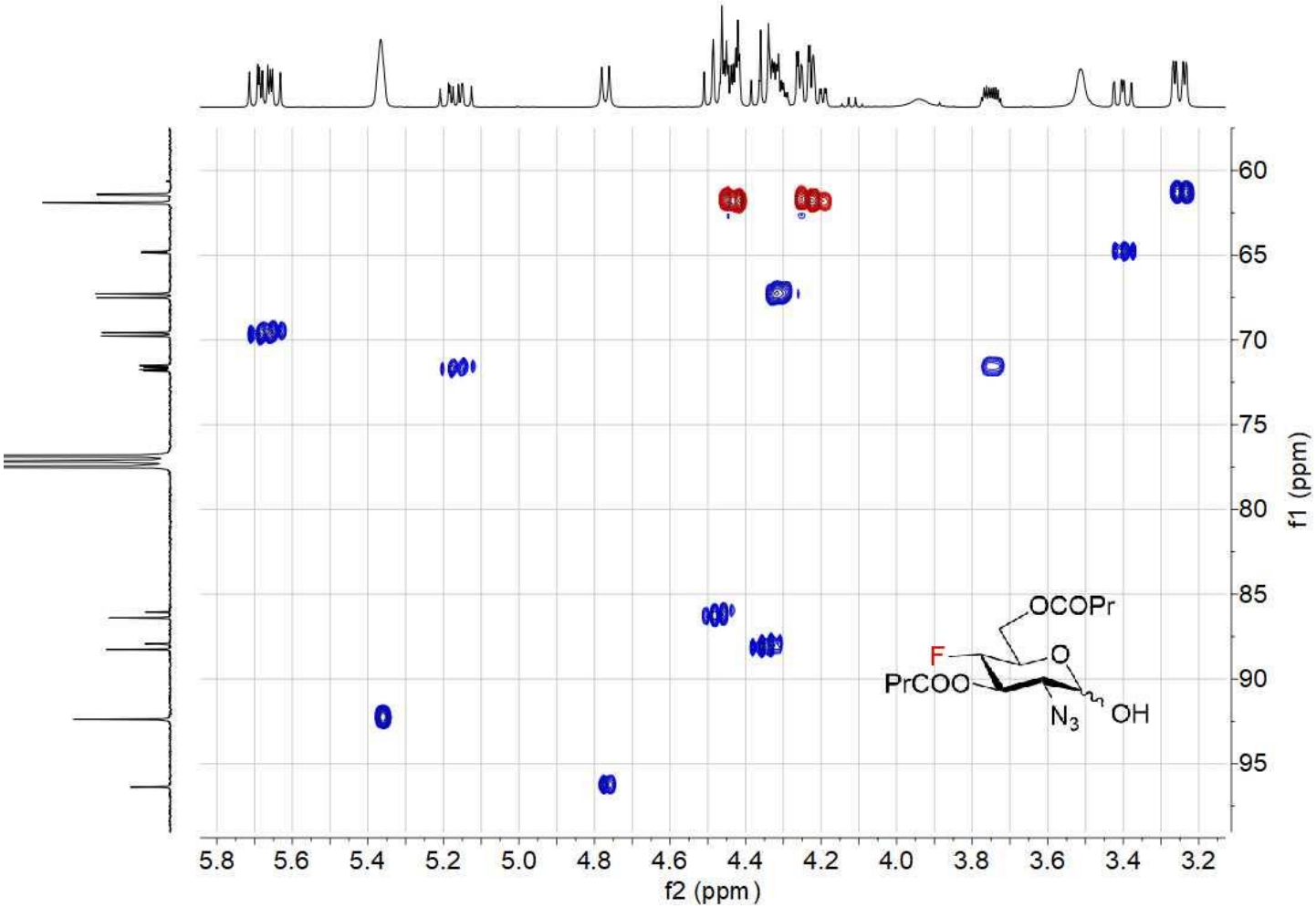
^{19}F NMR (376 MHz, $CDCl_3$) 71



^{1}H-^{1}H COSY 71

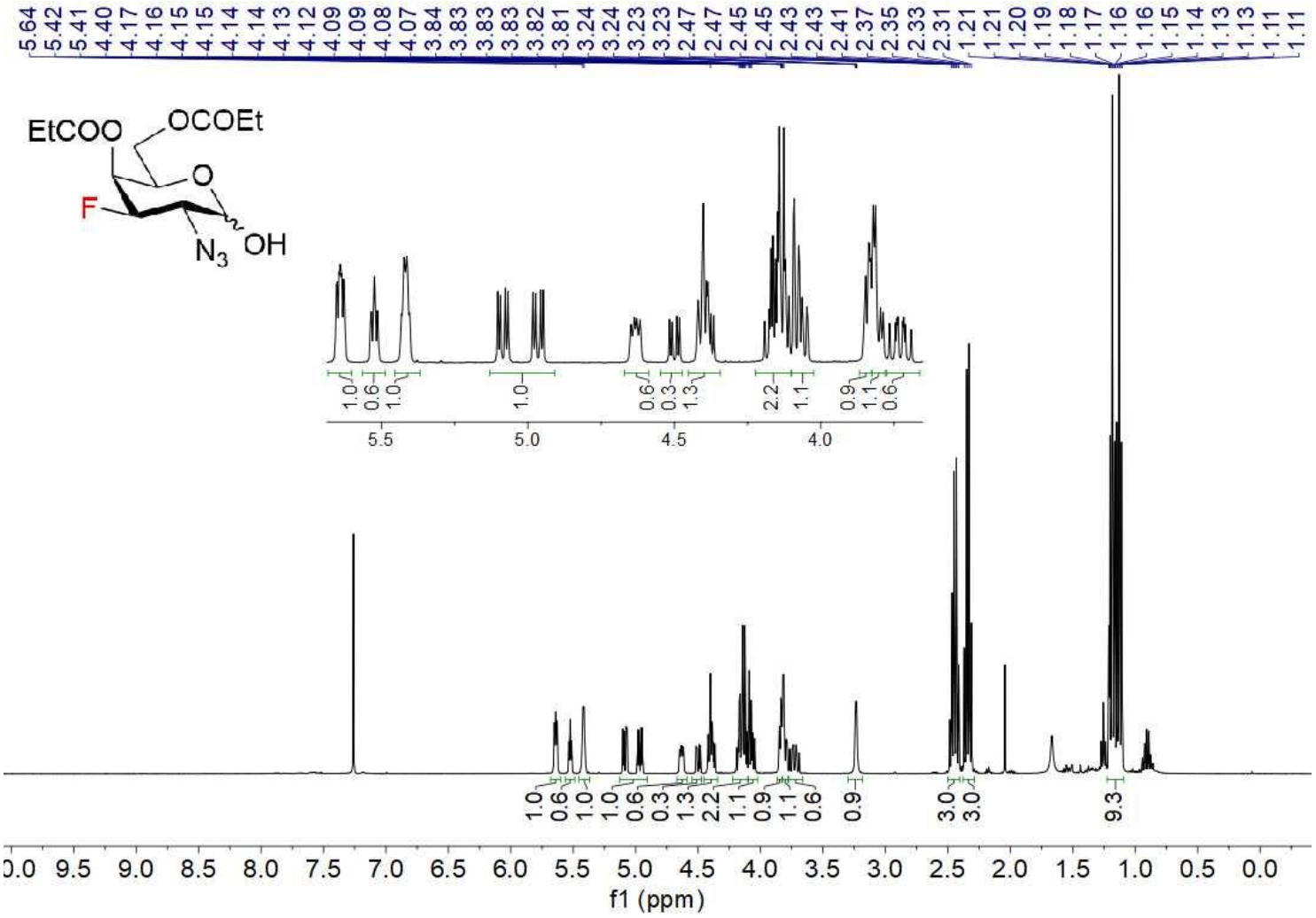


^{1}H-^{13}C HSQC 71

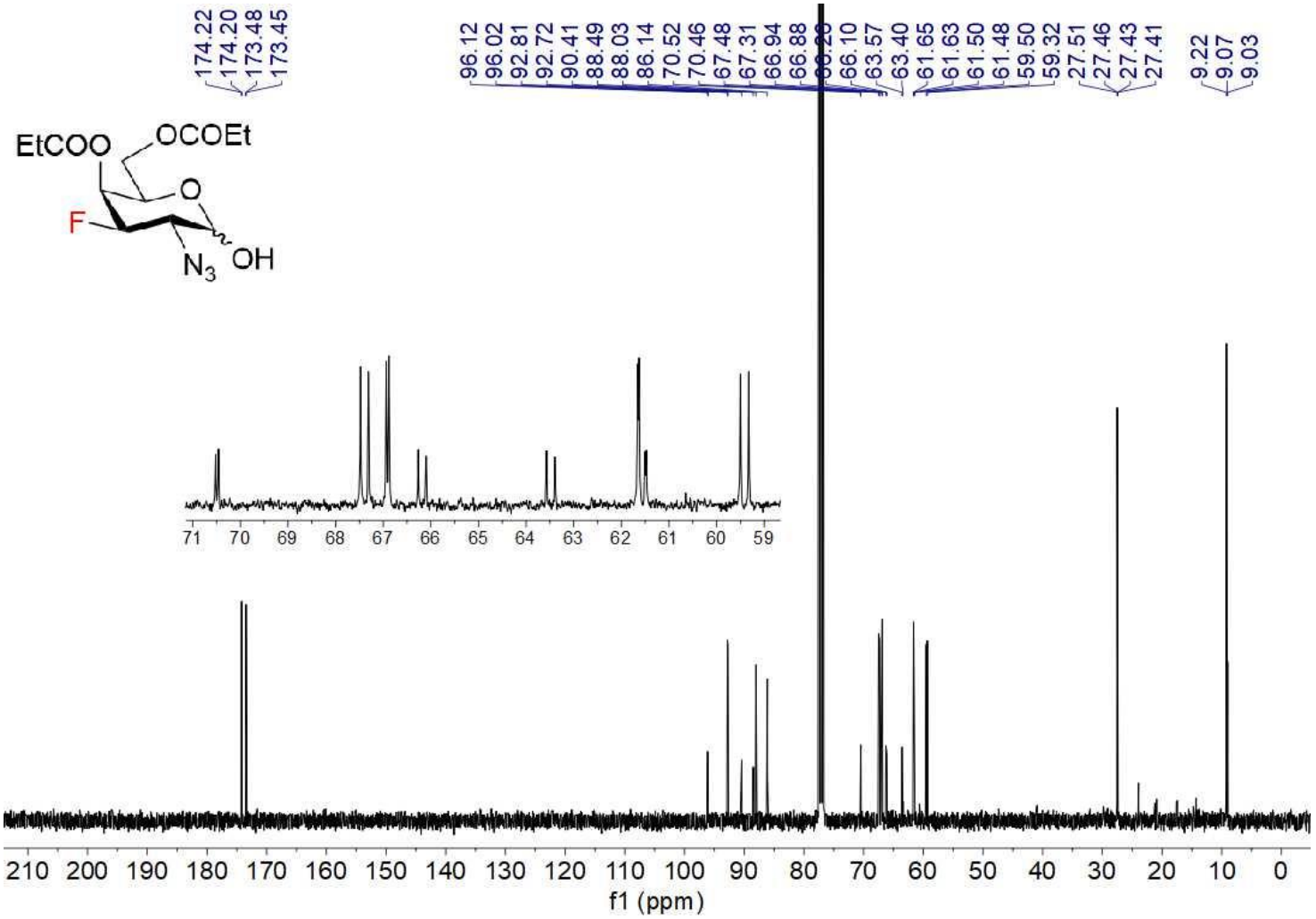


NMR COMPOUND 72

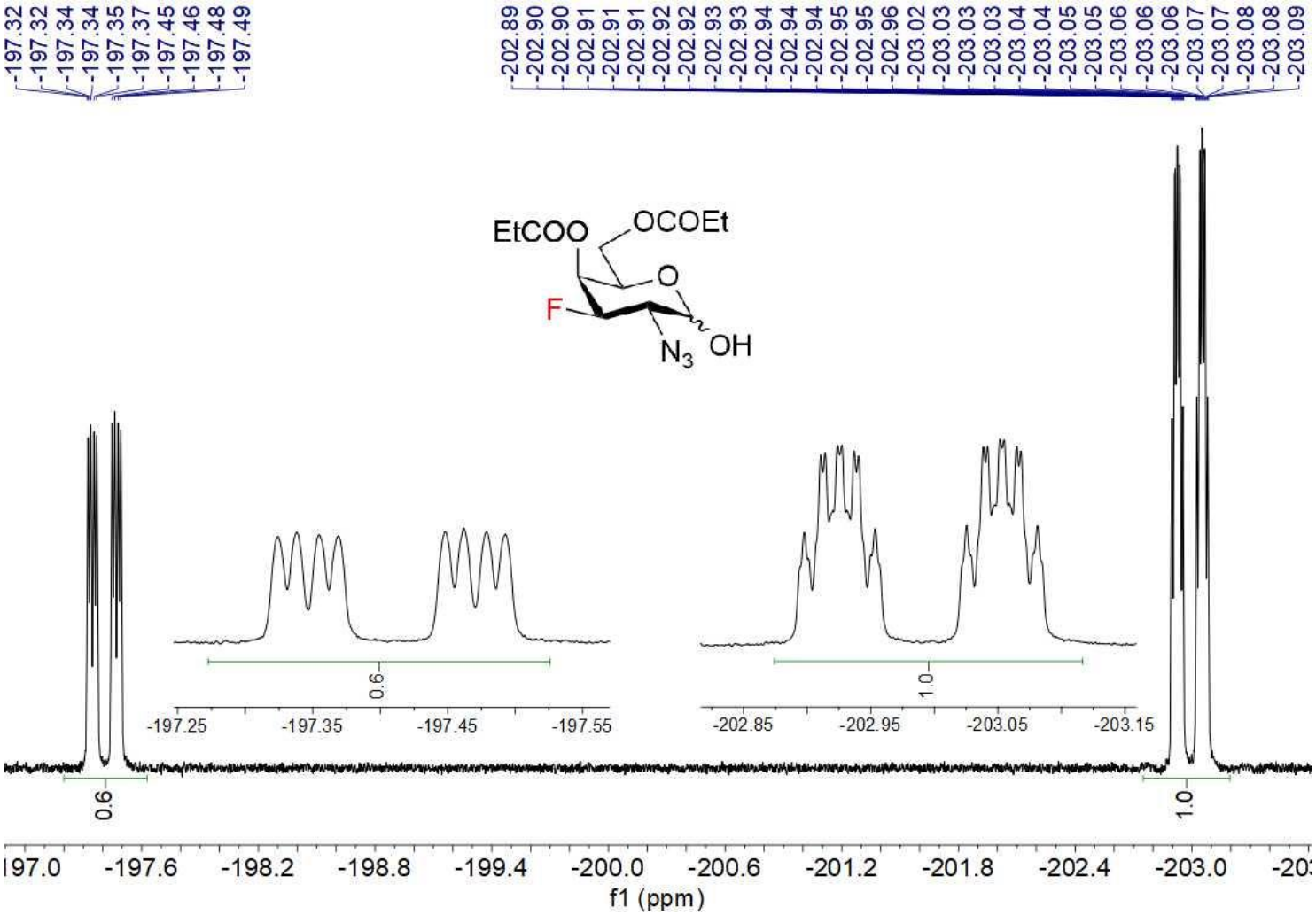
^{1}H NMR (400 MHz, $CDCl_3$) 72



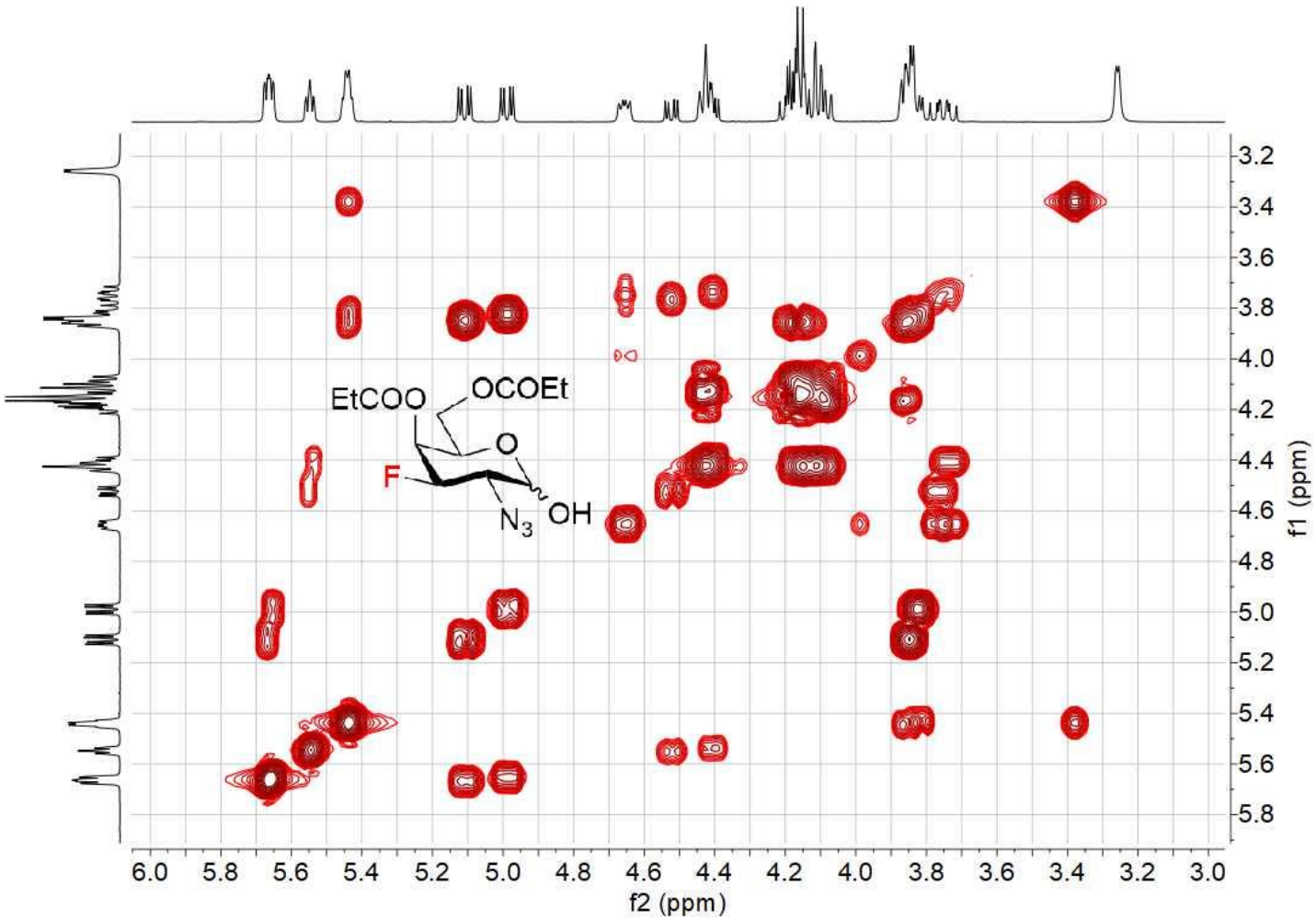
^{13}C NMR (100 MHz, $CDCl_3$) 72



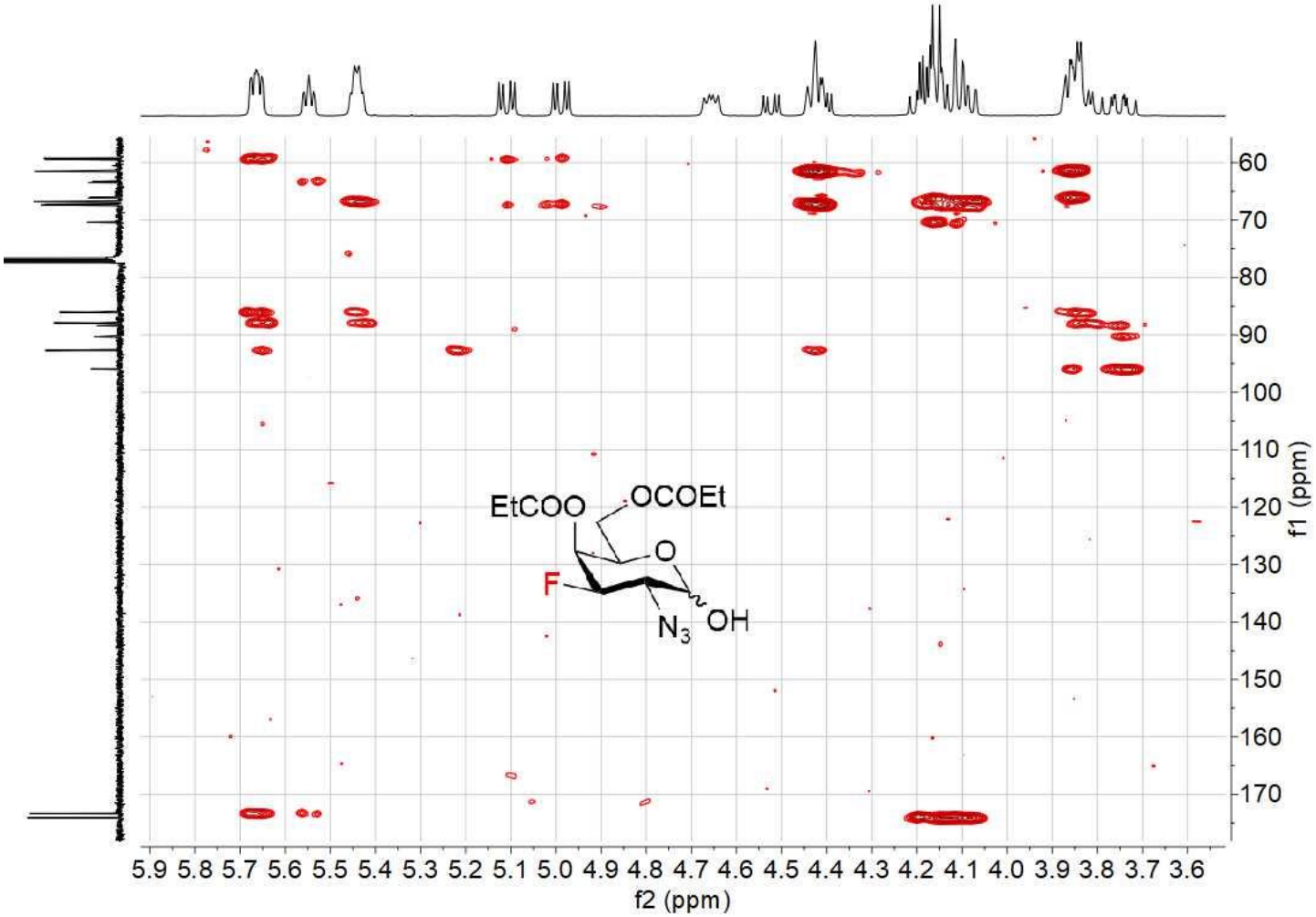
^{19}F NMR (376 MHz, $CDCl_3$) 72



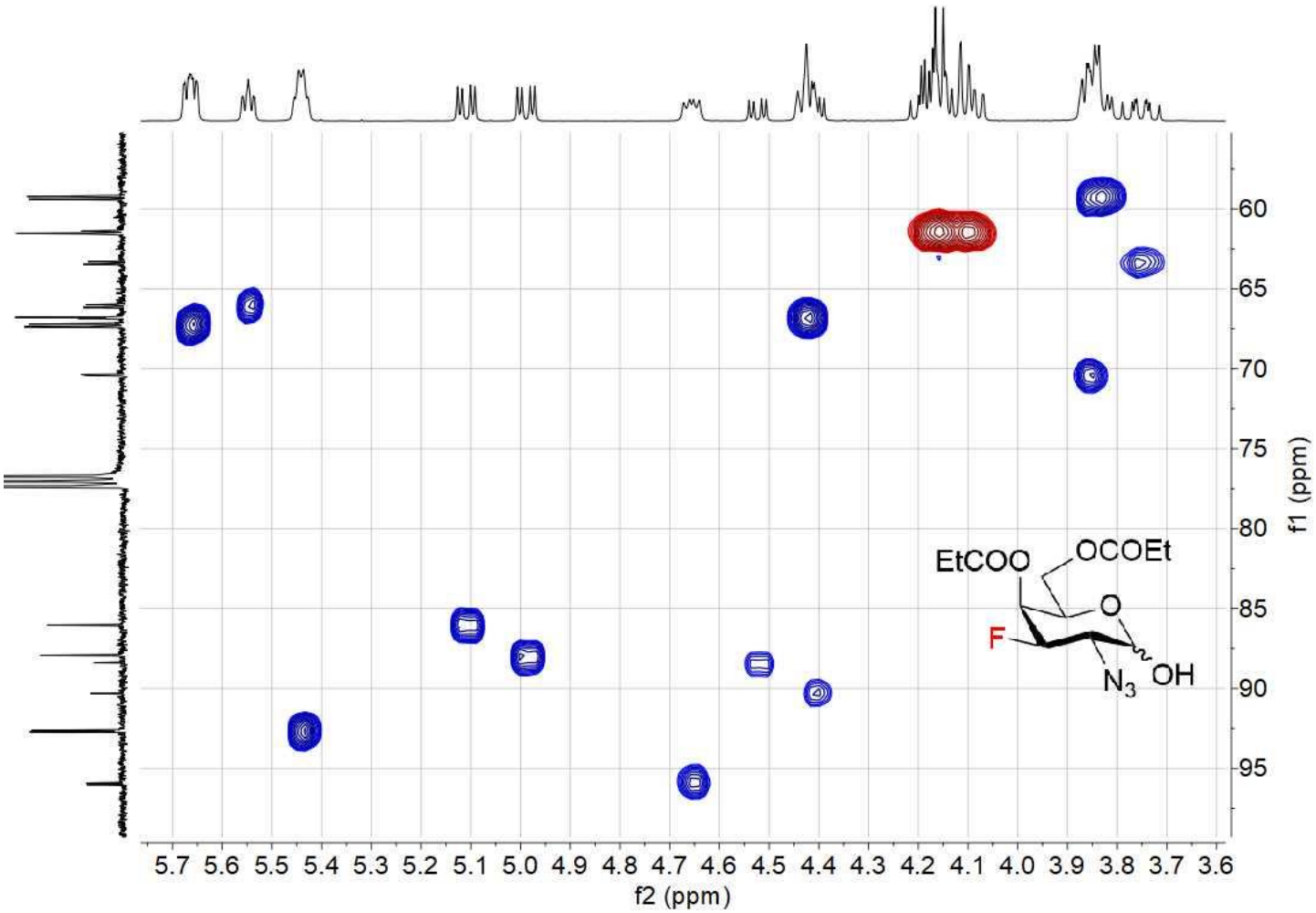
^{1}H-^{1}H COSY 72



^{1}H-^{13}C HMBC 72

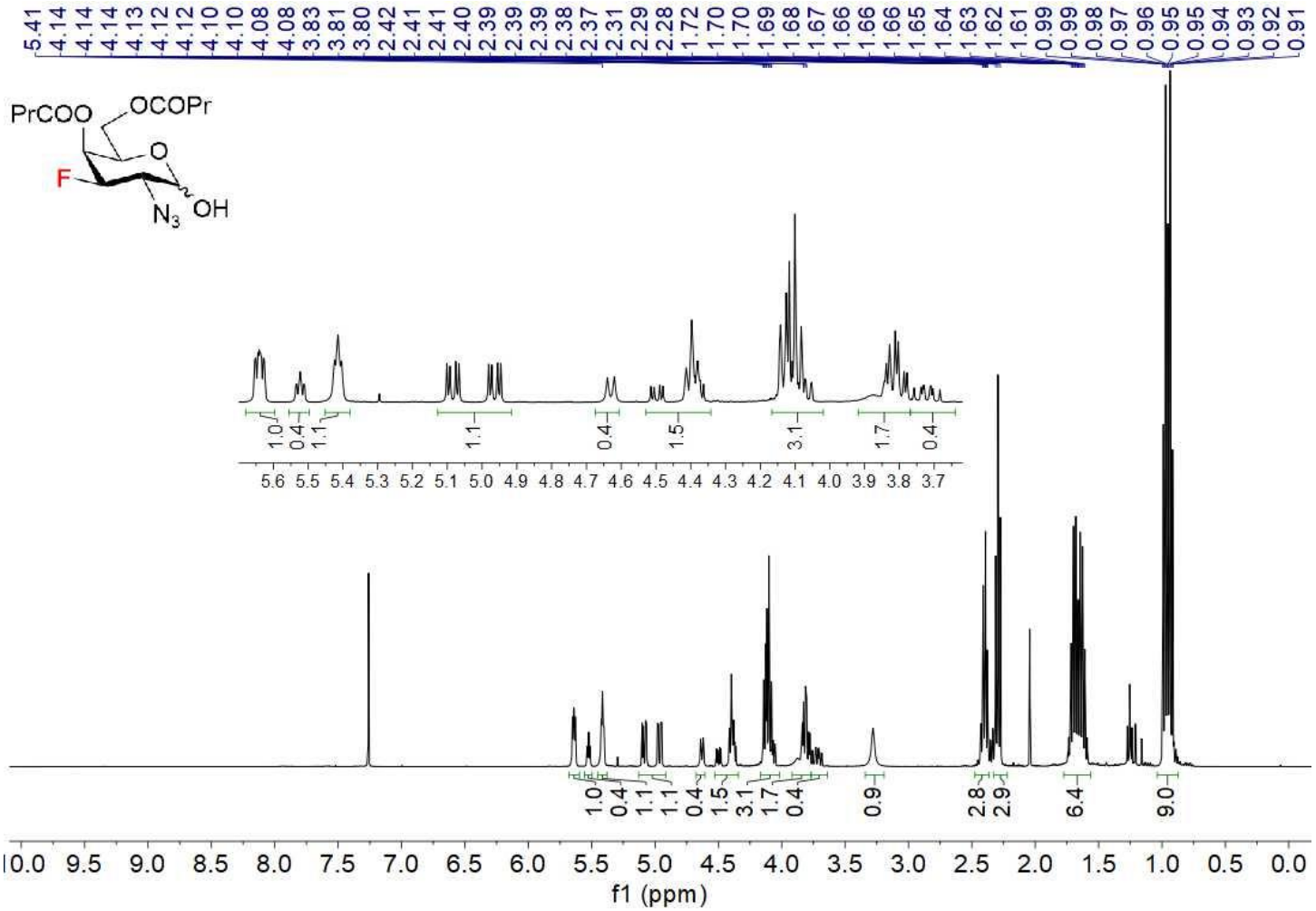


^{1}H-^{13}C HSQC 72

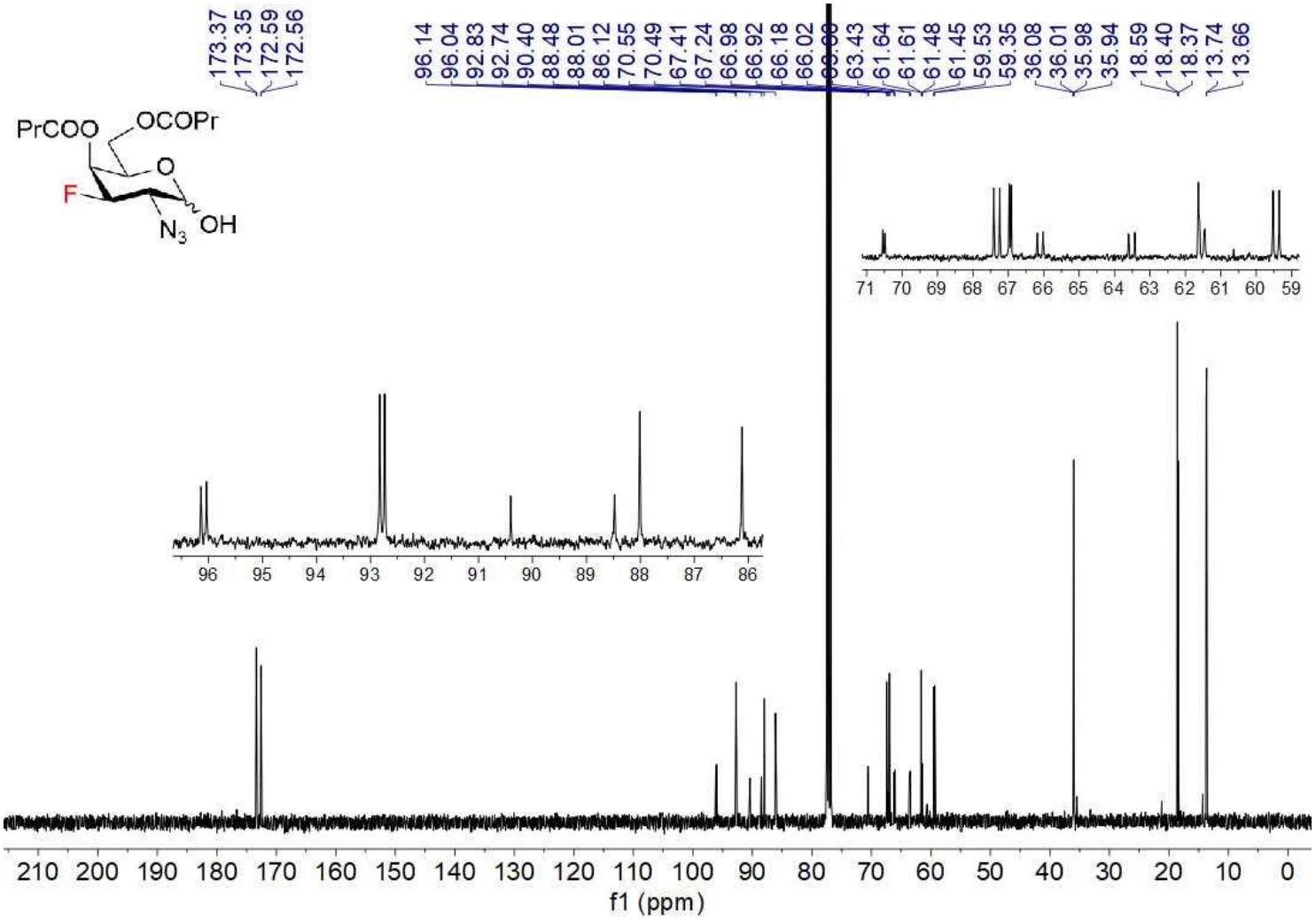


NMR COMPOUND 73

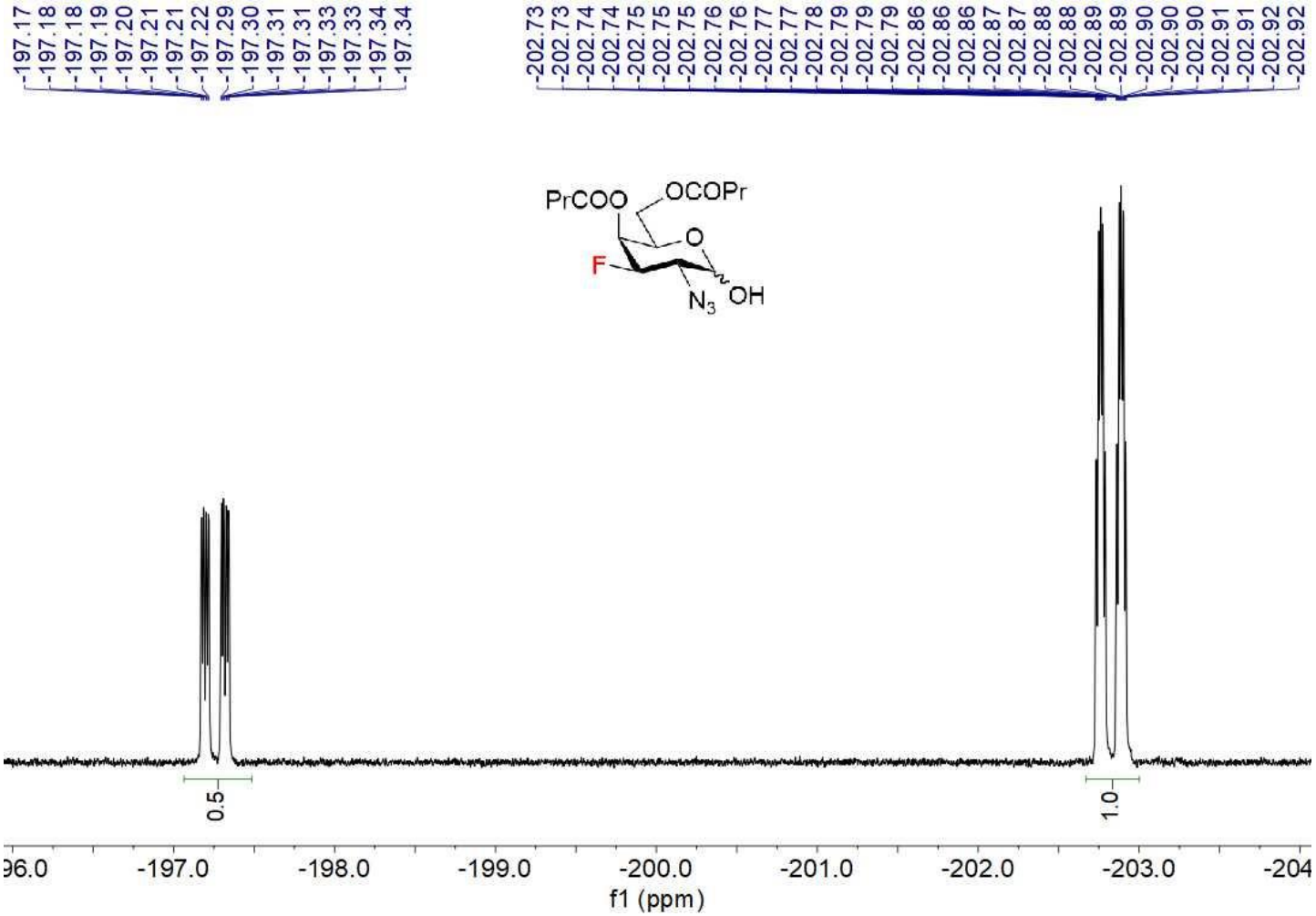
^{1}H NMR (400 MHz, $CDCl_3$) 73



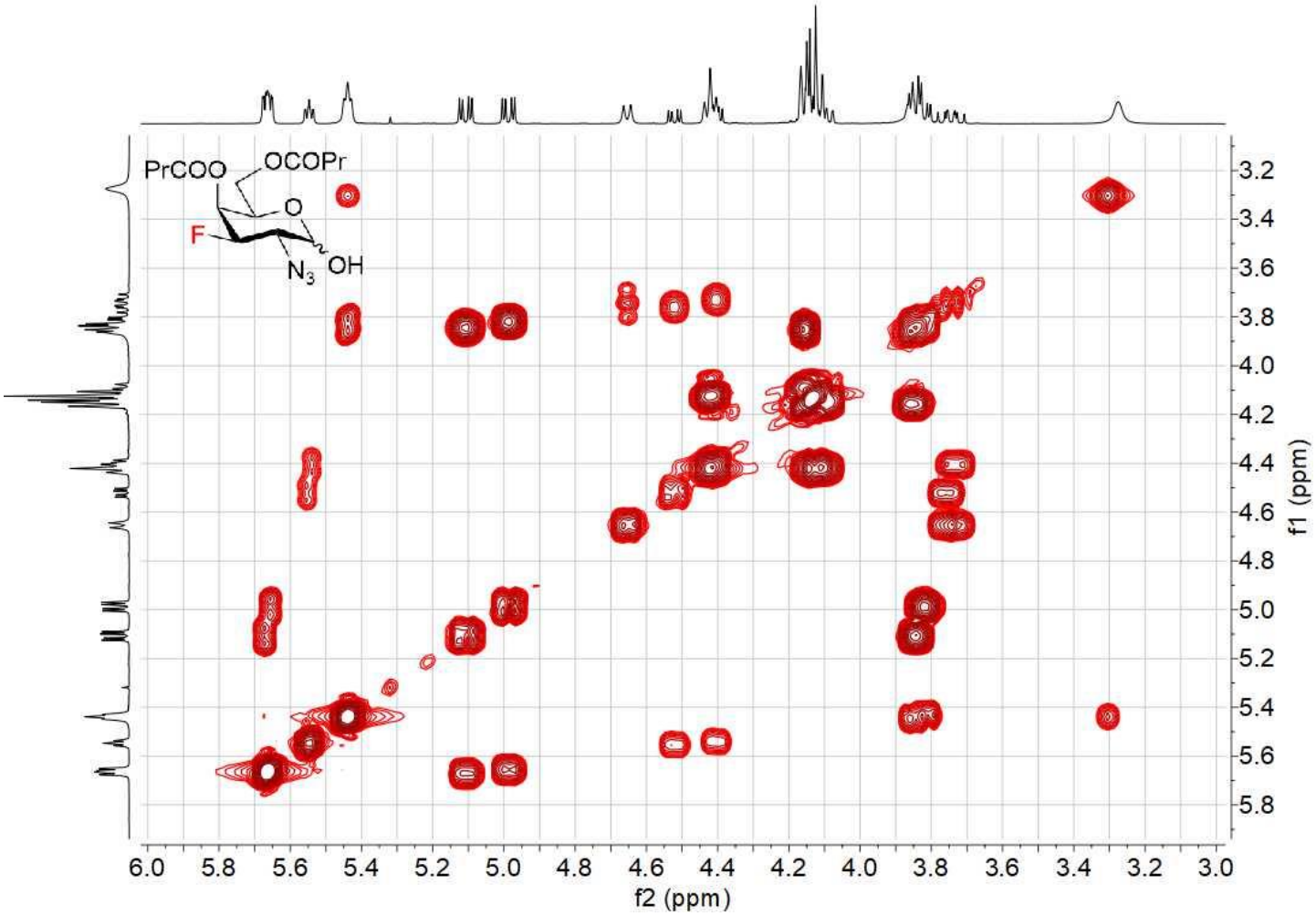
^{13}C NMR (100 MHz, $CDCl_3$) 73



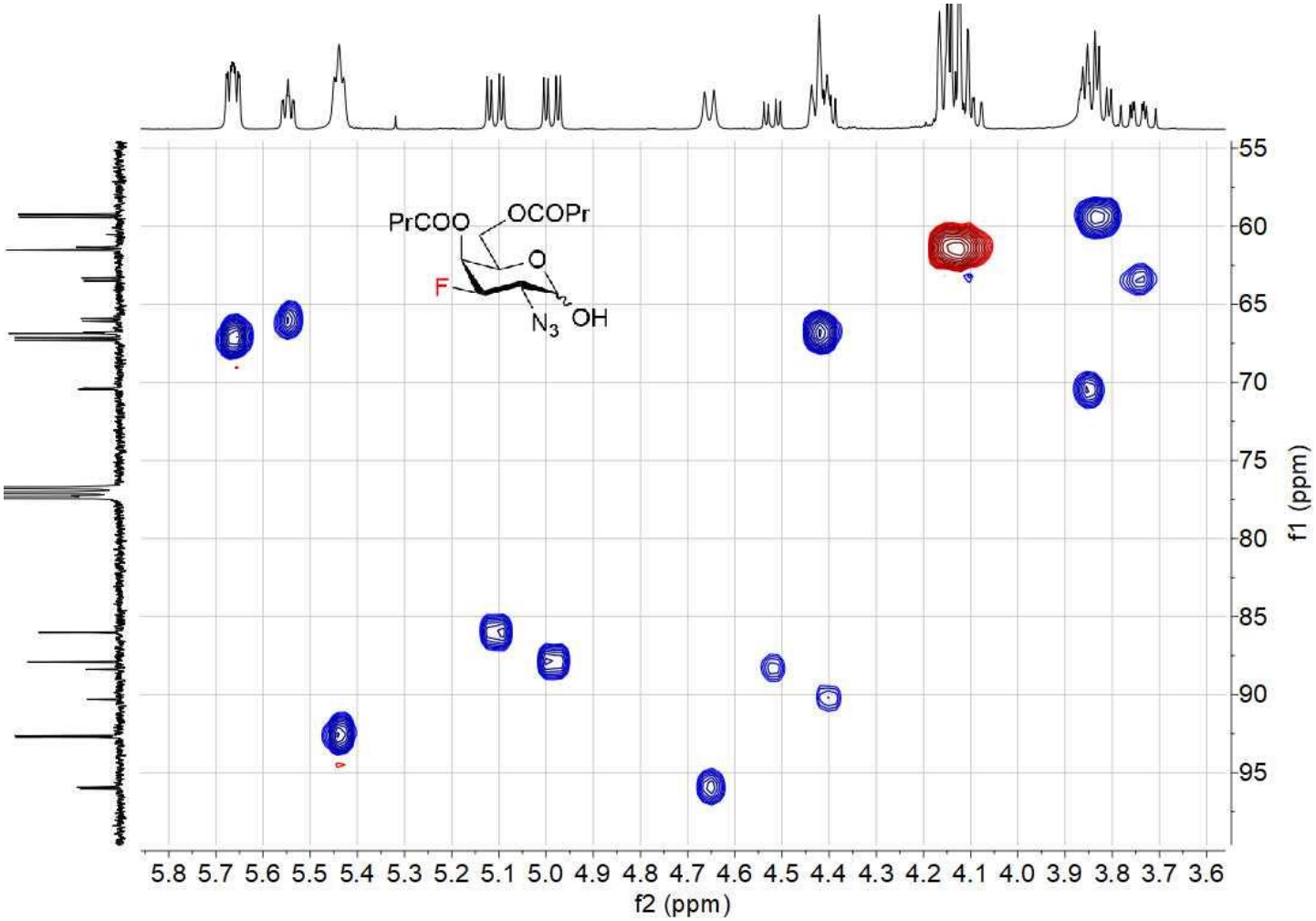
^{19}F NMR (376 MHz, $CDCl_3$) 73



^{1}H-^{1}H COSY 73

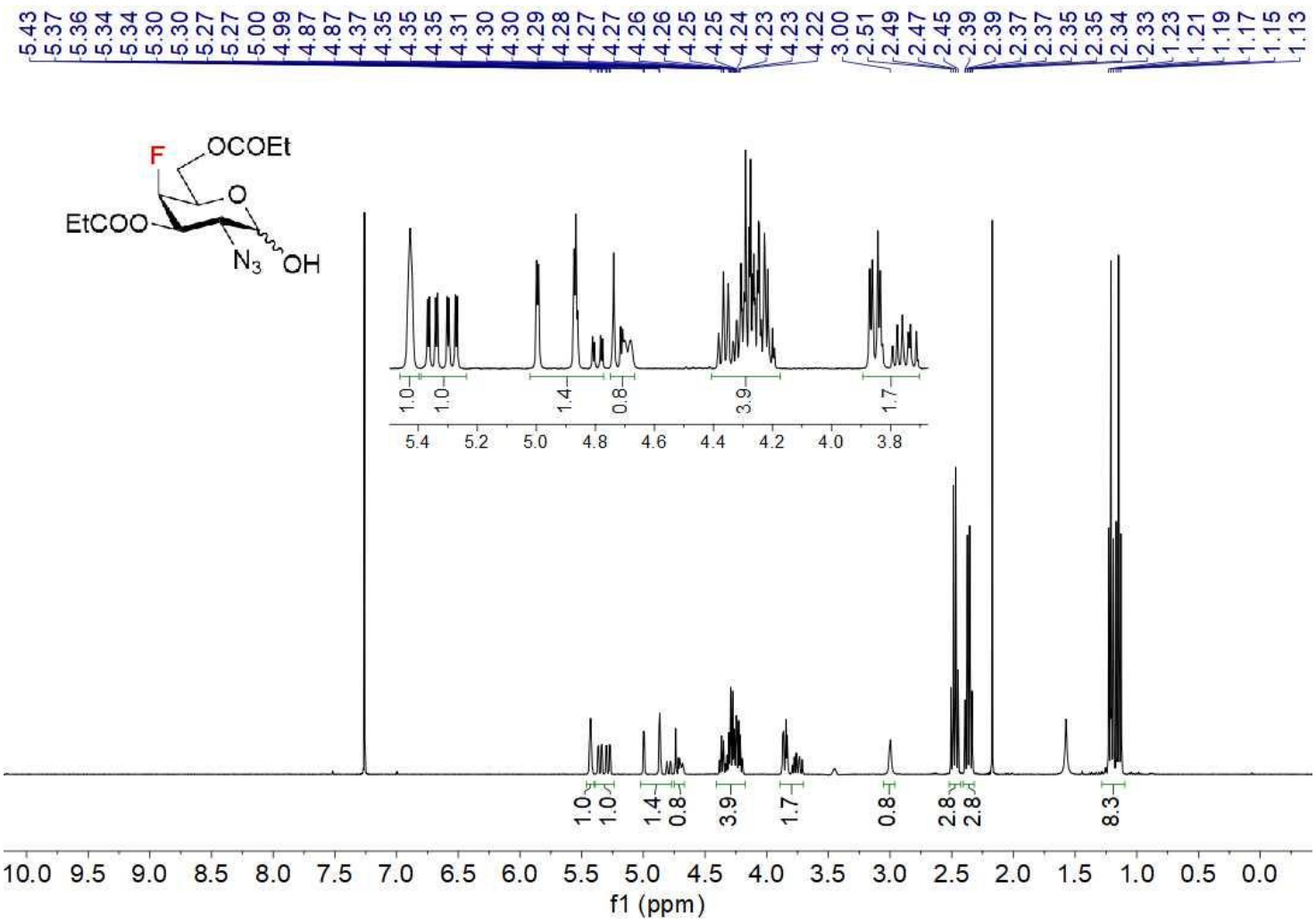


^{1}H-^{13}C HSQC 73

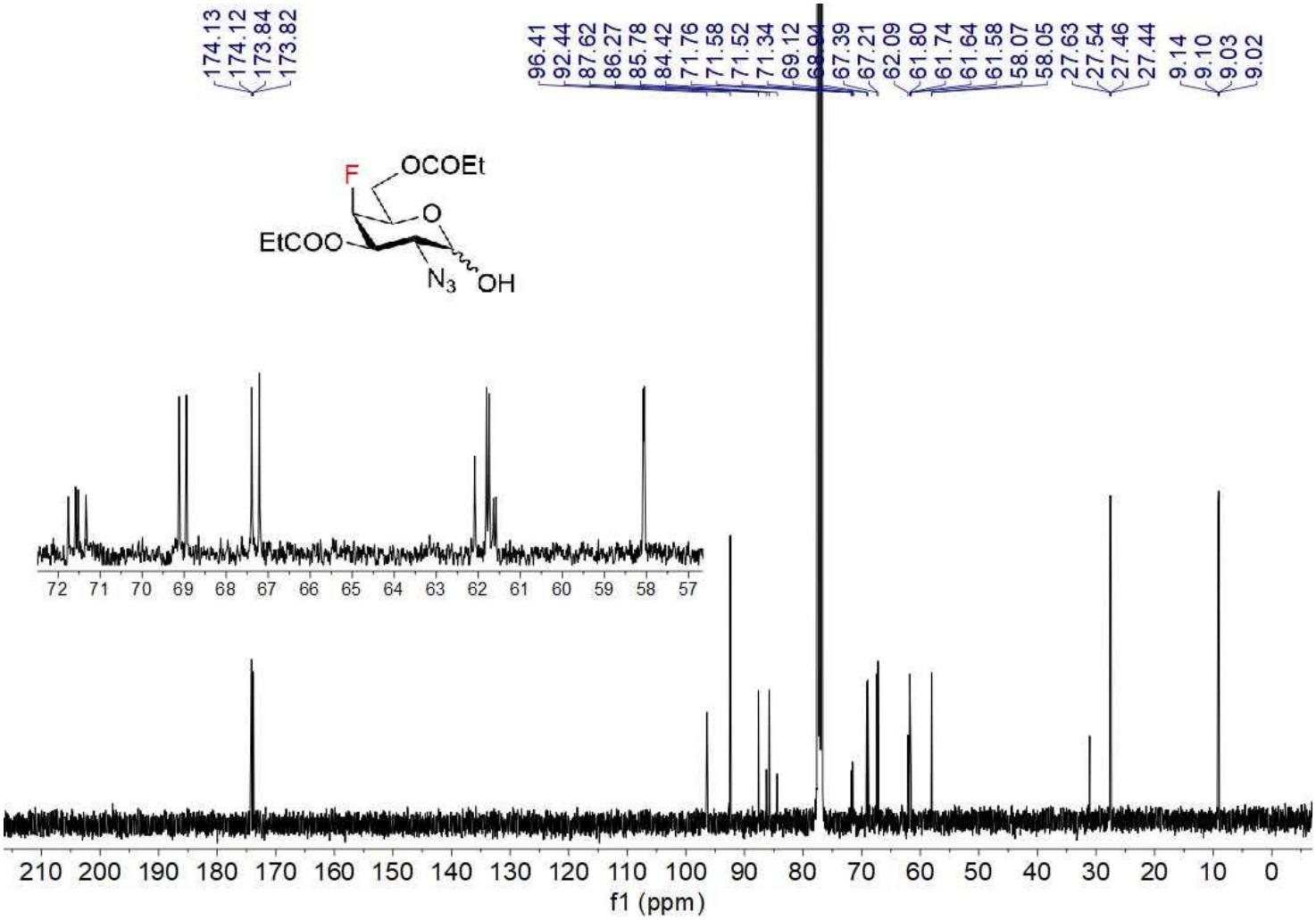


NMR COMPOUND 74

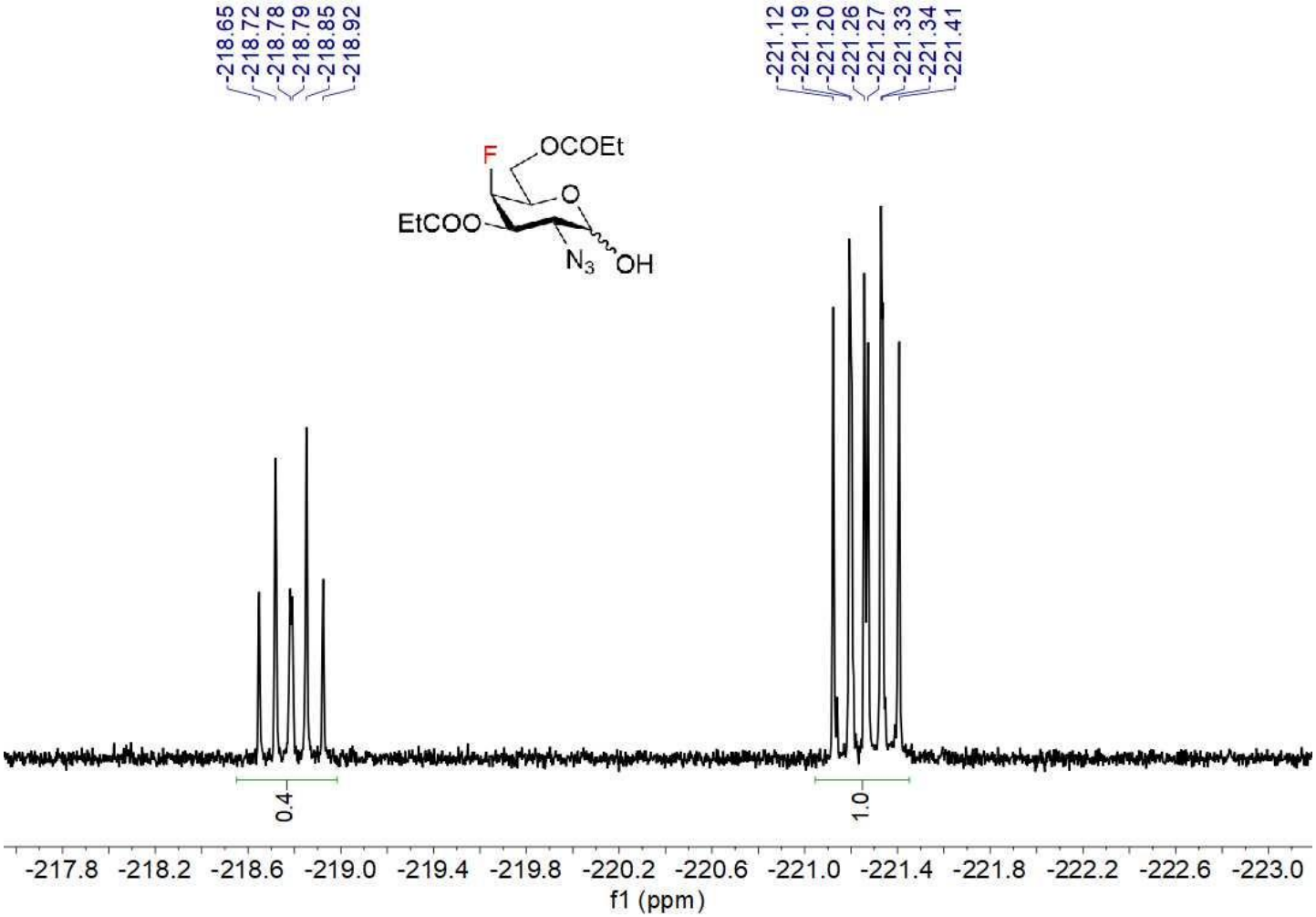
^{1}H NMR (400 MHz, $CDCl_3$) 74



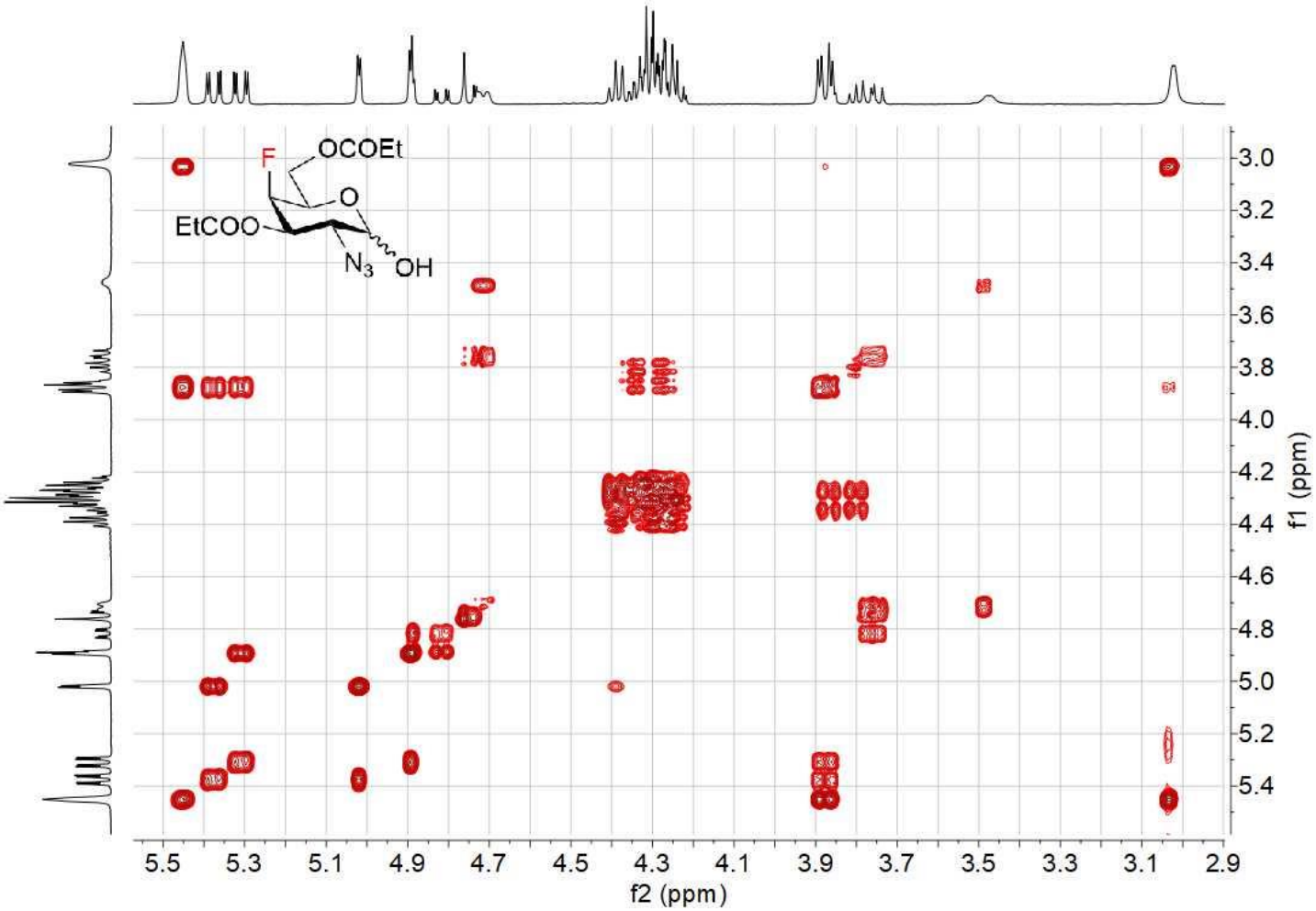
^{13}C NMR (100 MHz, $CDCl_3$) 74



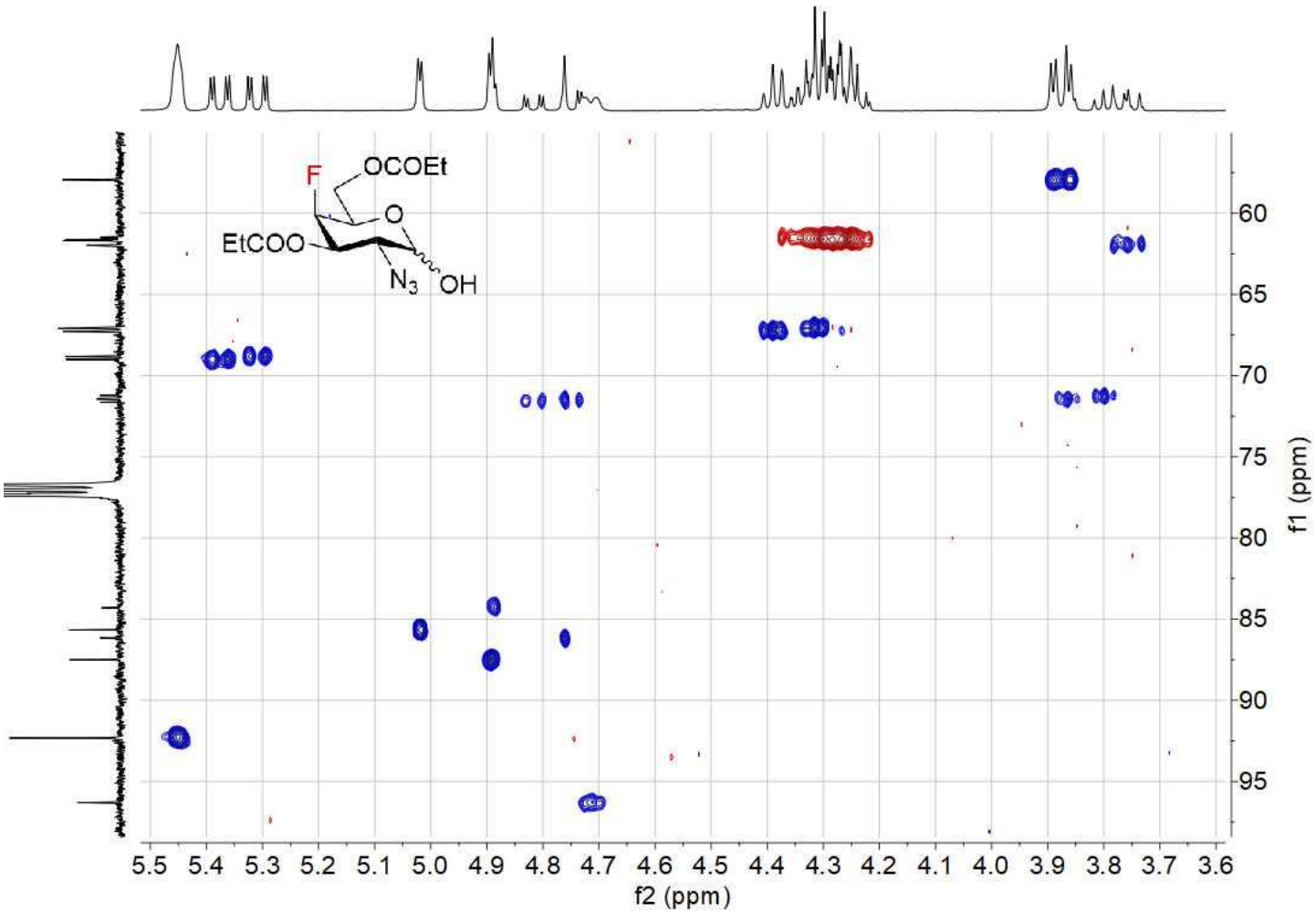
^{19}F NMR (376 MHz, $CDCl_3$) NMR 74



^{1}H-^{1}H COSY 74

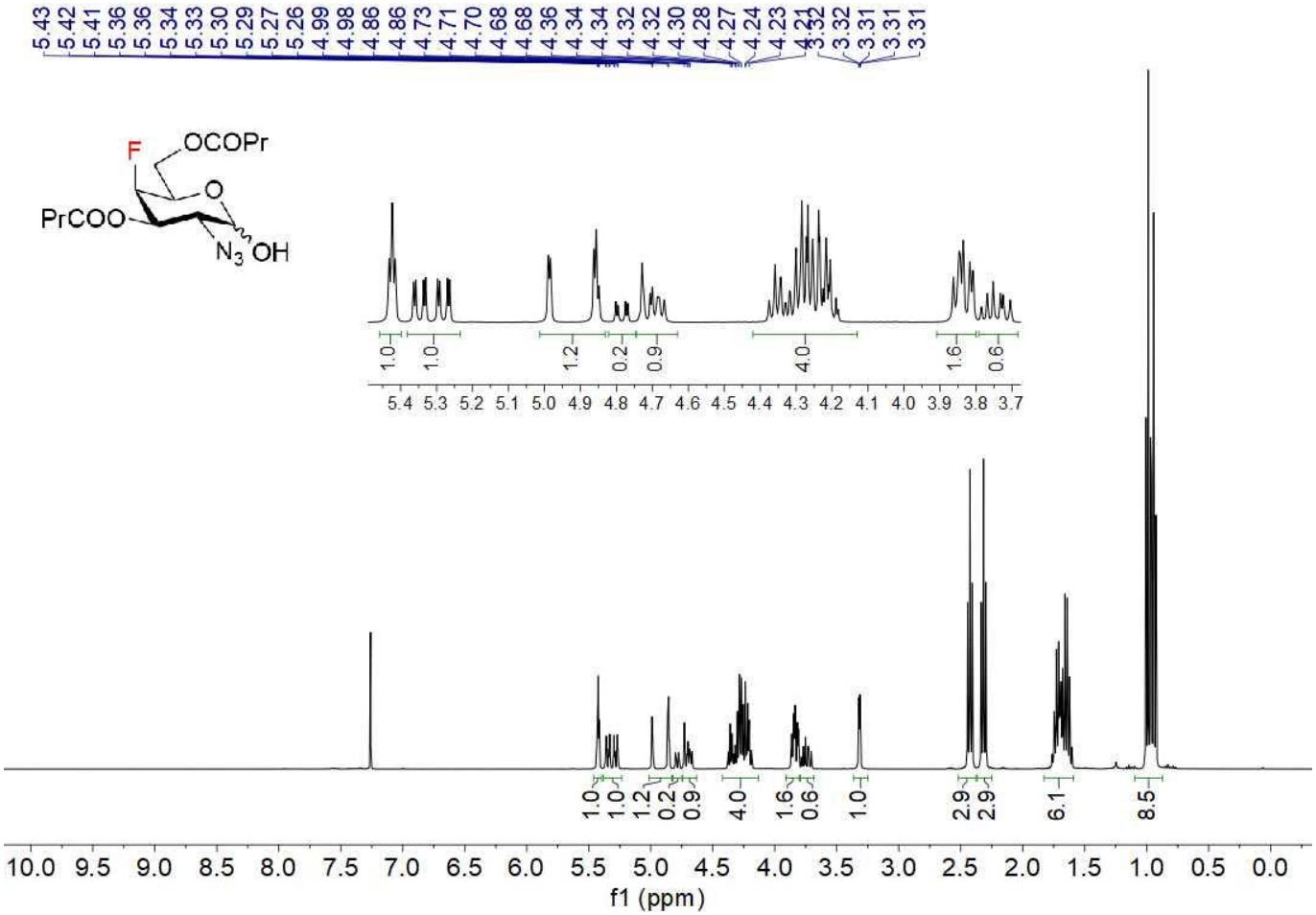


^{1}H-^{13}C HSQC 74

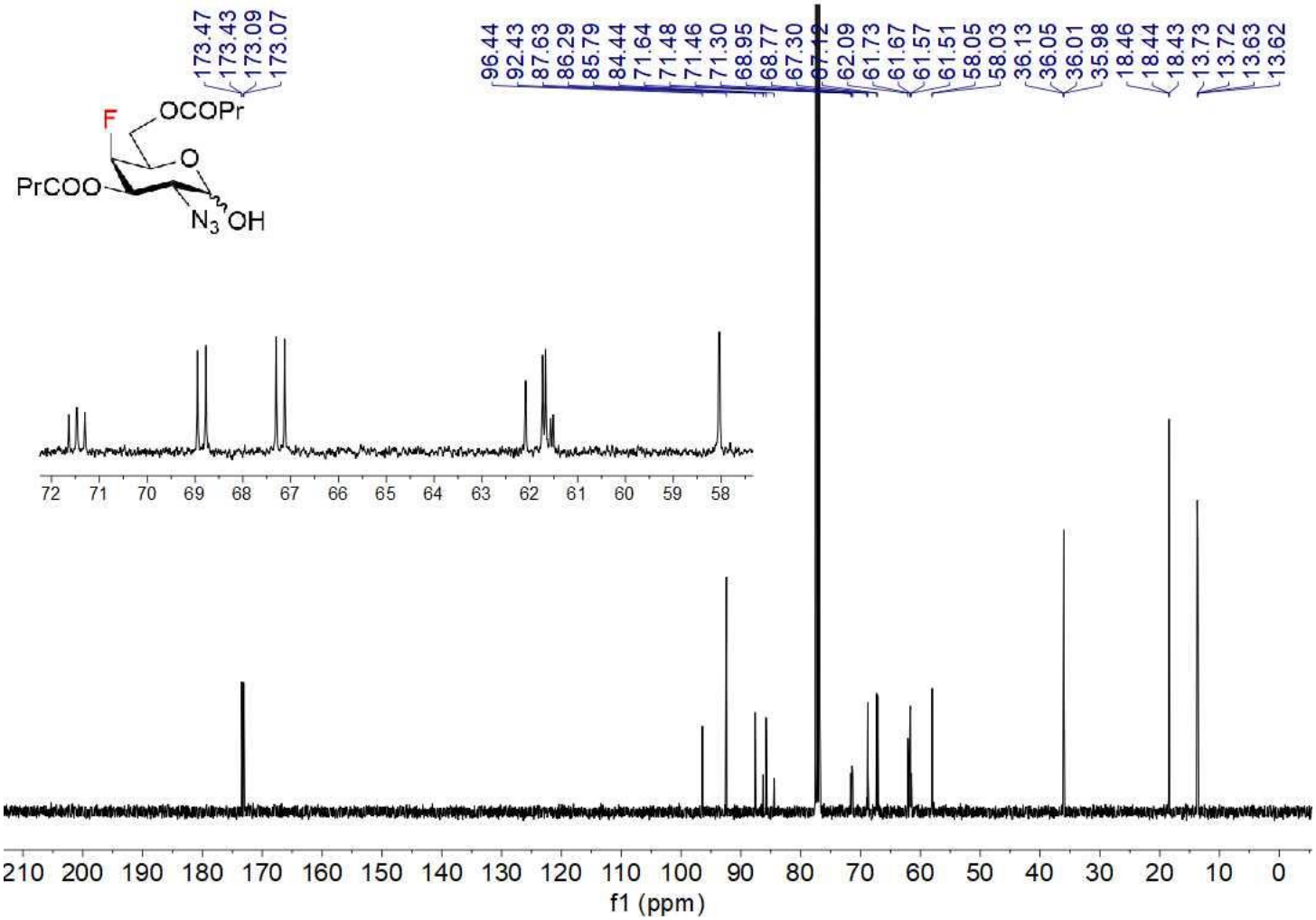


NMR COMPOUND 75

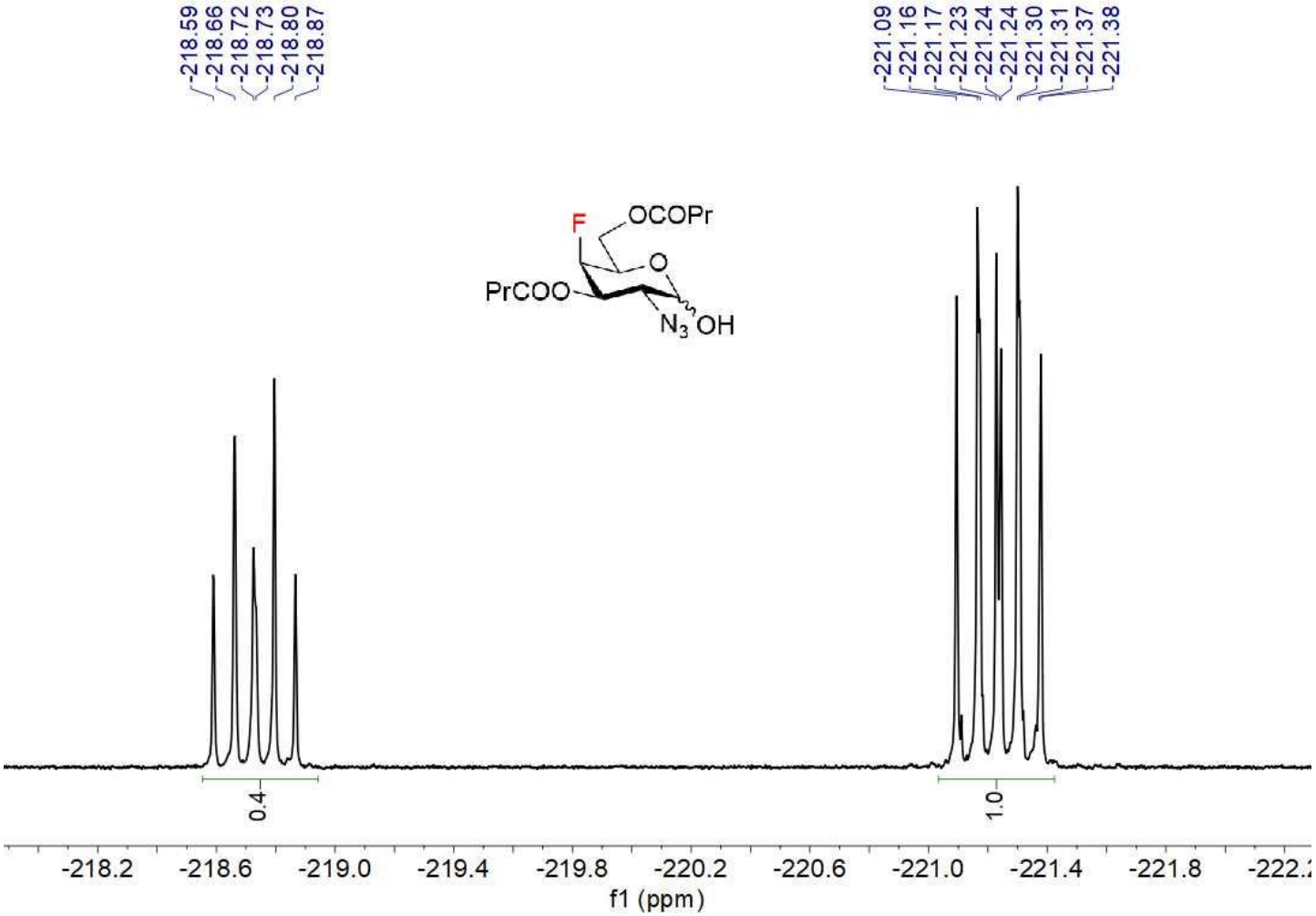
^{1}H NMR (400 MHz, $CDCl_3$) 75



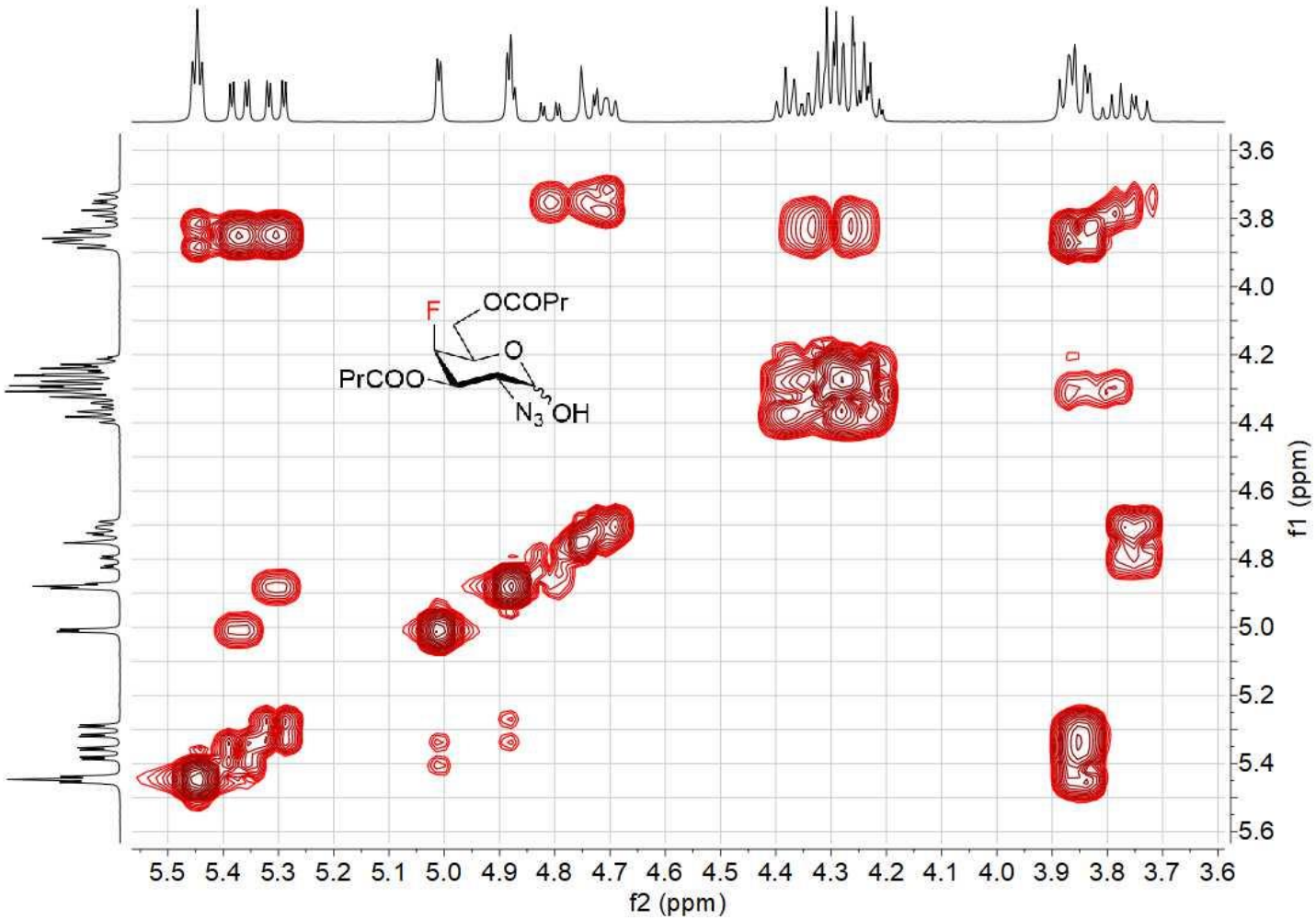
^{13}C NMR (100 MHz, $CDCl_3$) 75



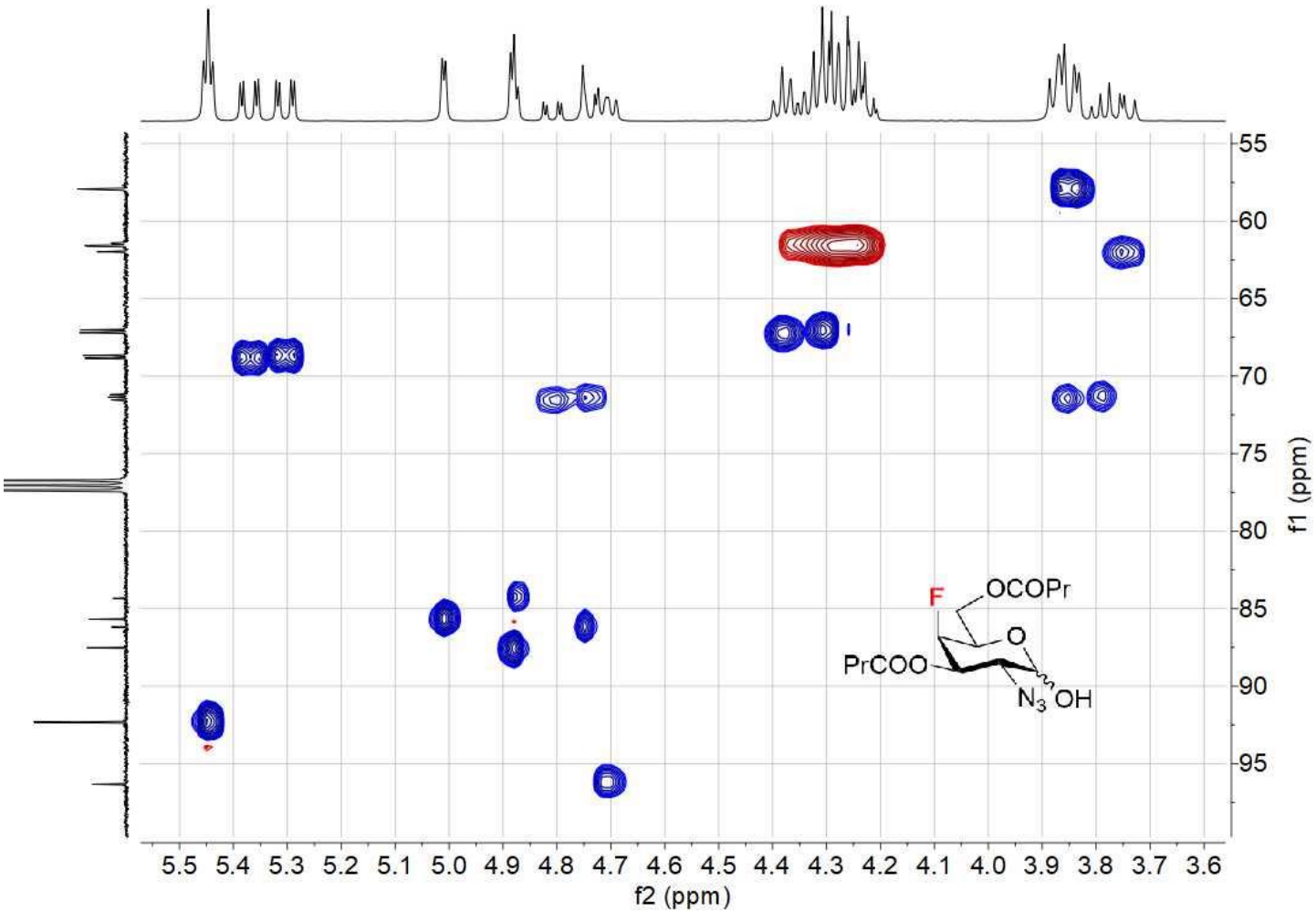
^{19}F NMR (376 MHz, $CDCl_3$) NMR 75



^{1}H-^{1}H COSY 75

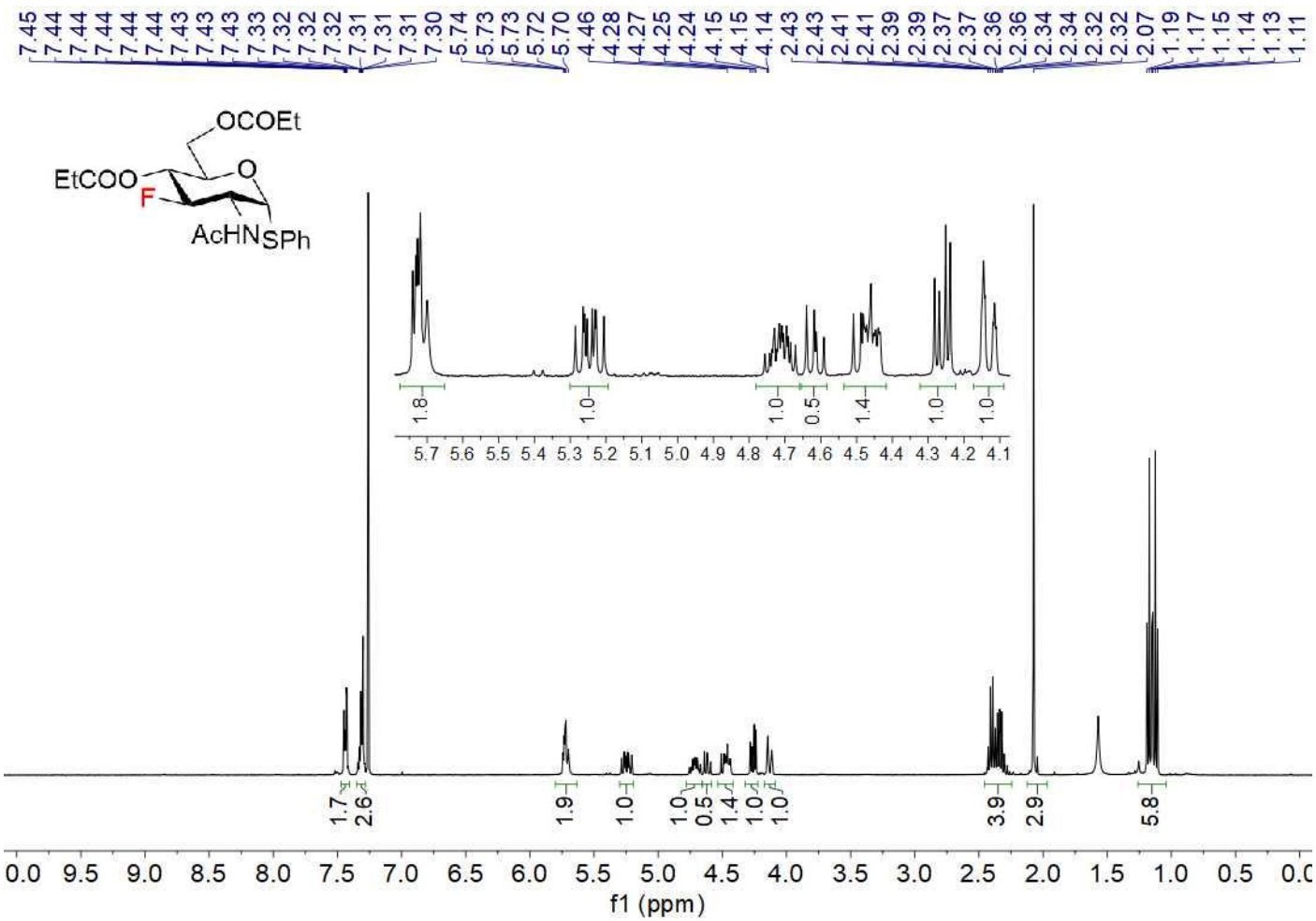


^{1}H-^{13}C HSQC 75

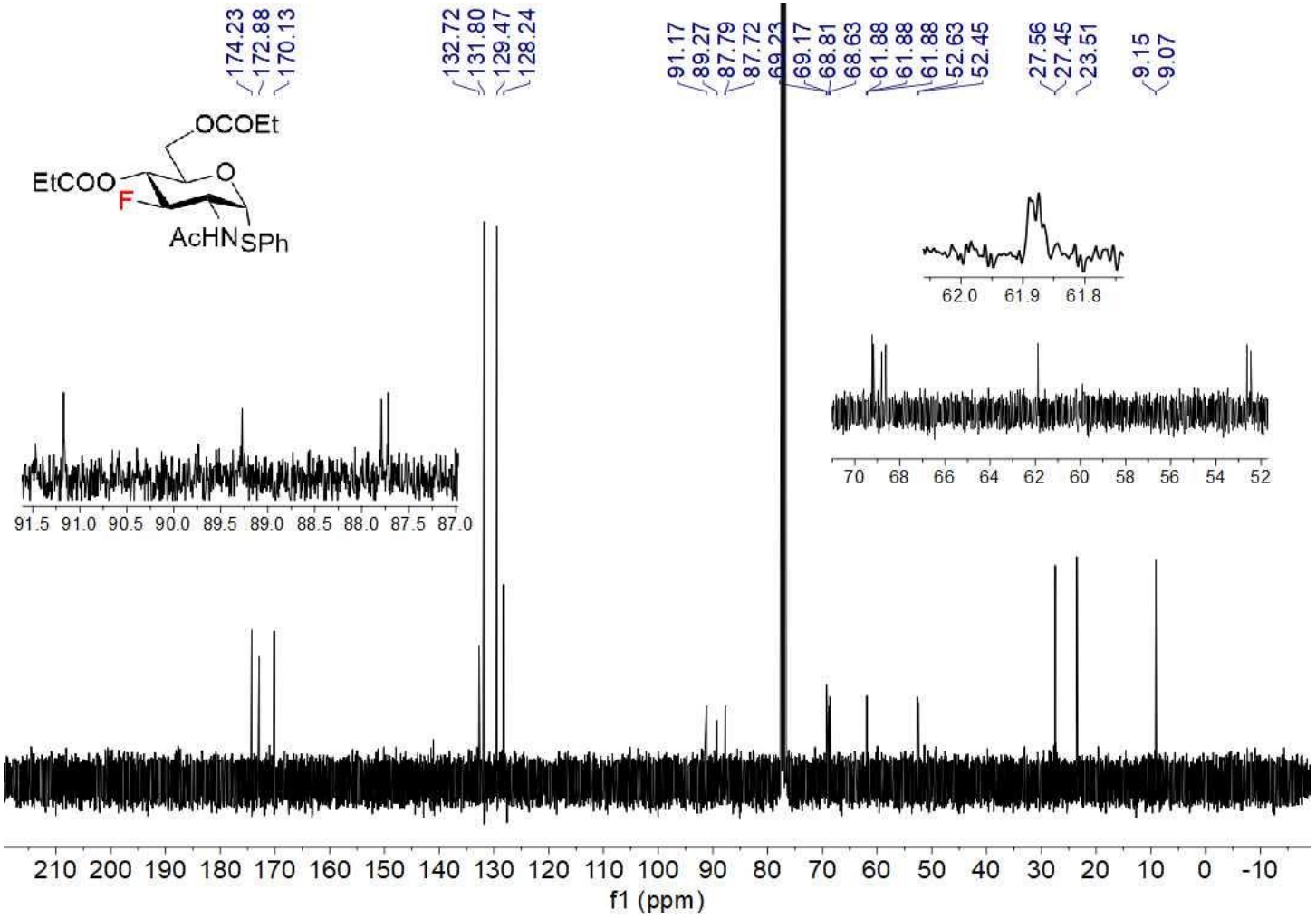


NMR COMPOUND 76

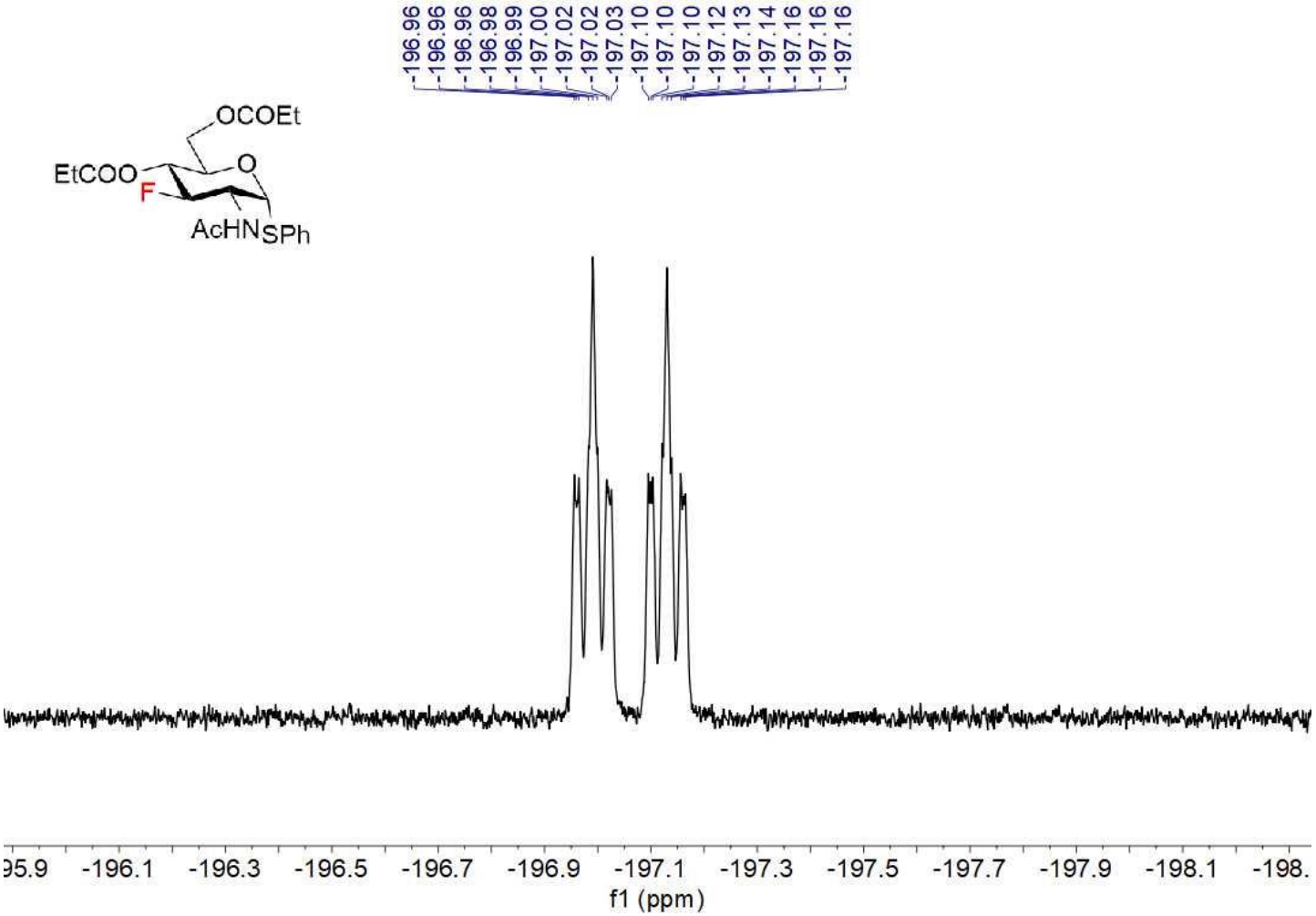
^{1}H NMR (400 MHz, $CDCl_3$) 76



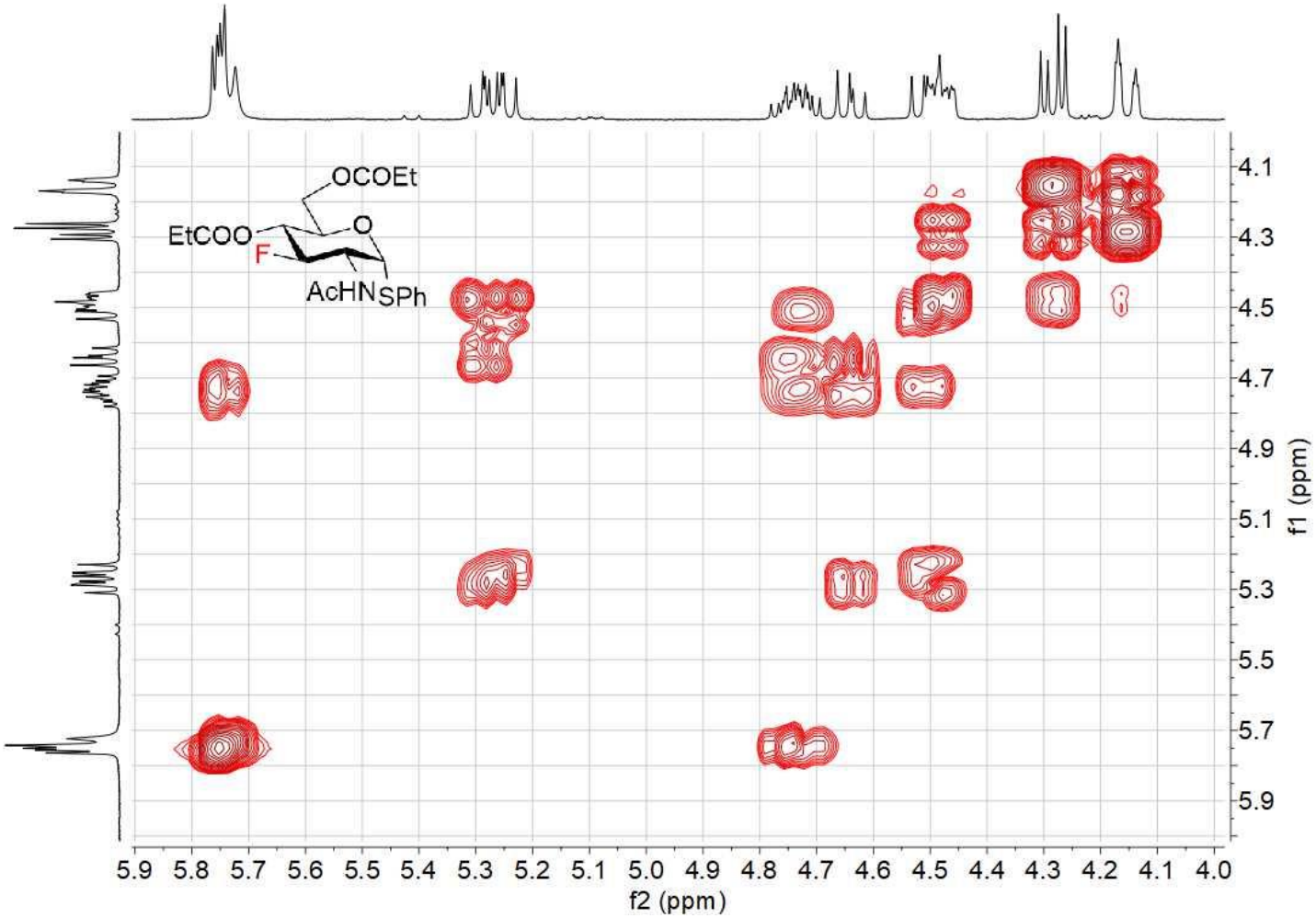
^{13}C NMR (100 MHz, $CDCl_3$) 76



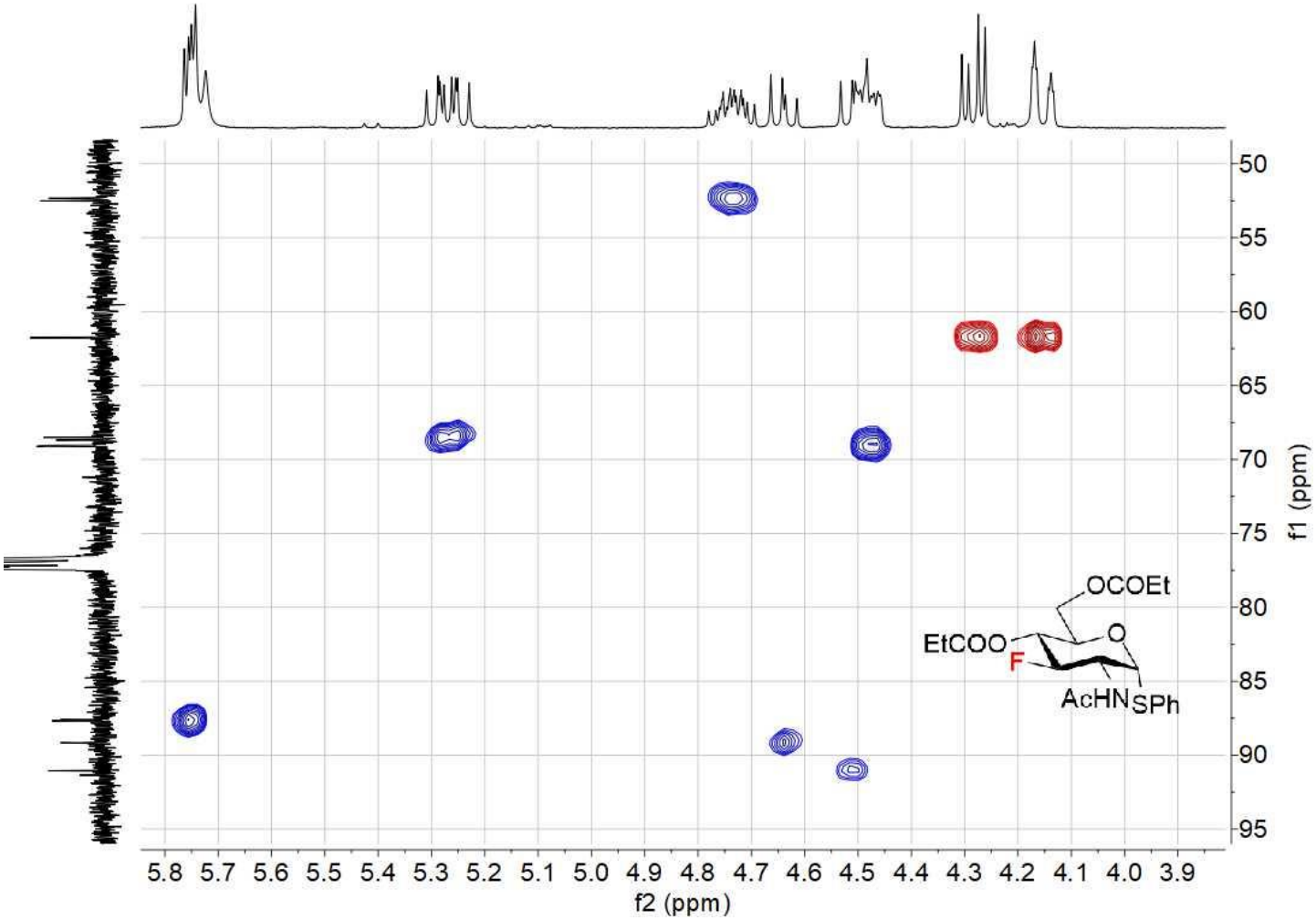
^{19}F NMR (376 MHz, $CDCl_3$) 76



^{1}H-^{1}H COSY 76

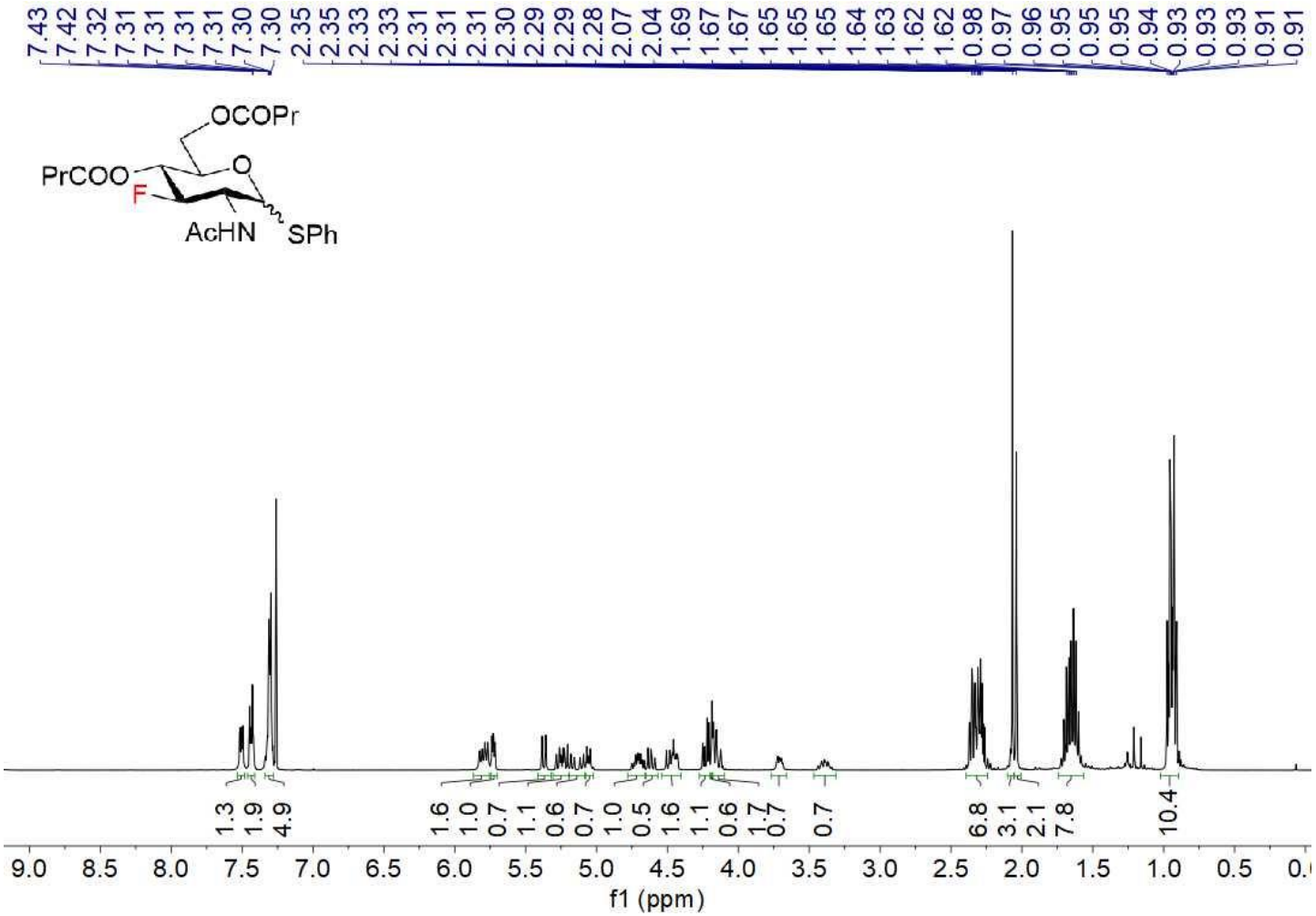


^{1}H-^{13}C HSQC 76

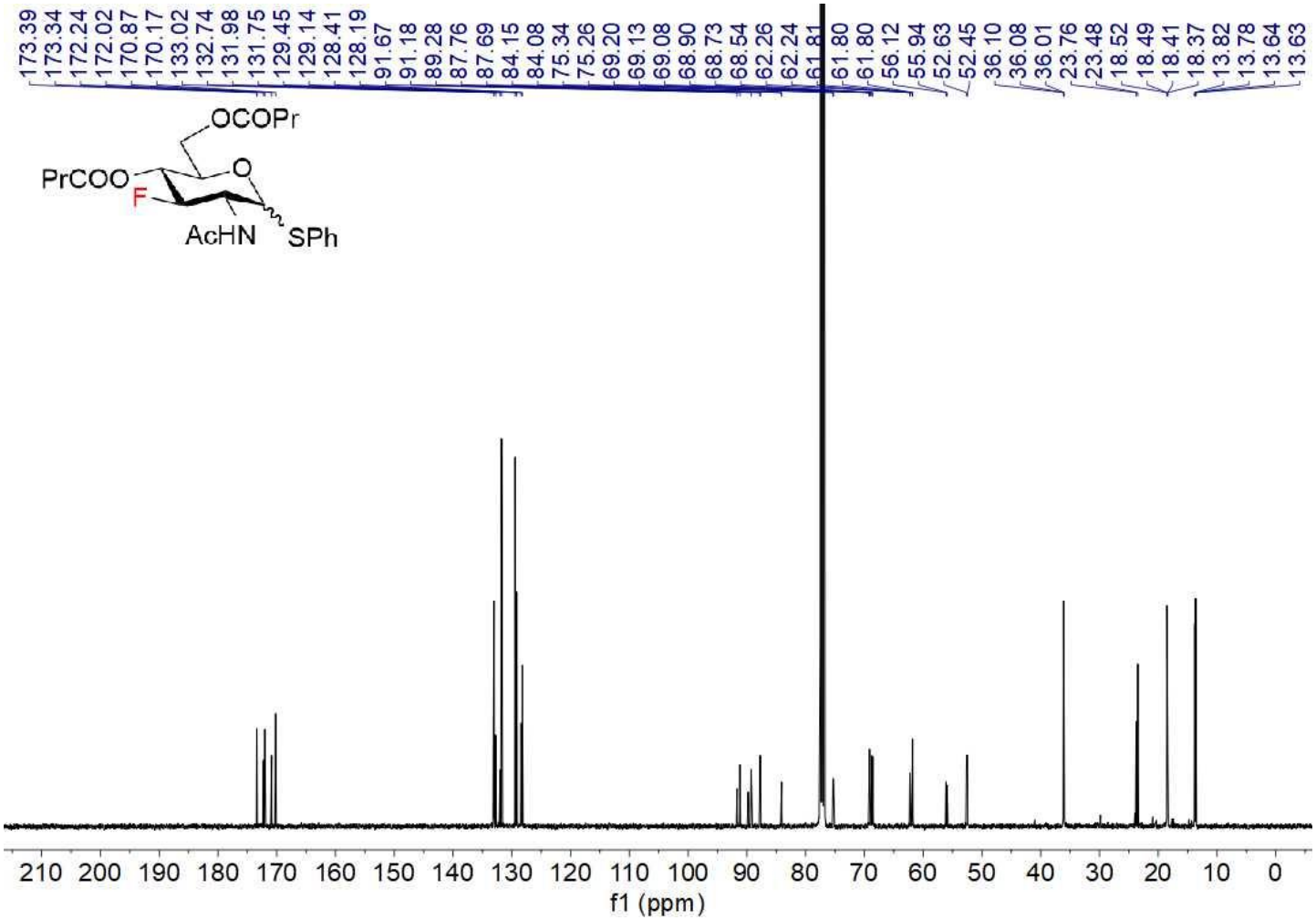


NMR COMPOUND 77

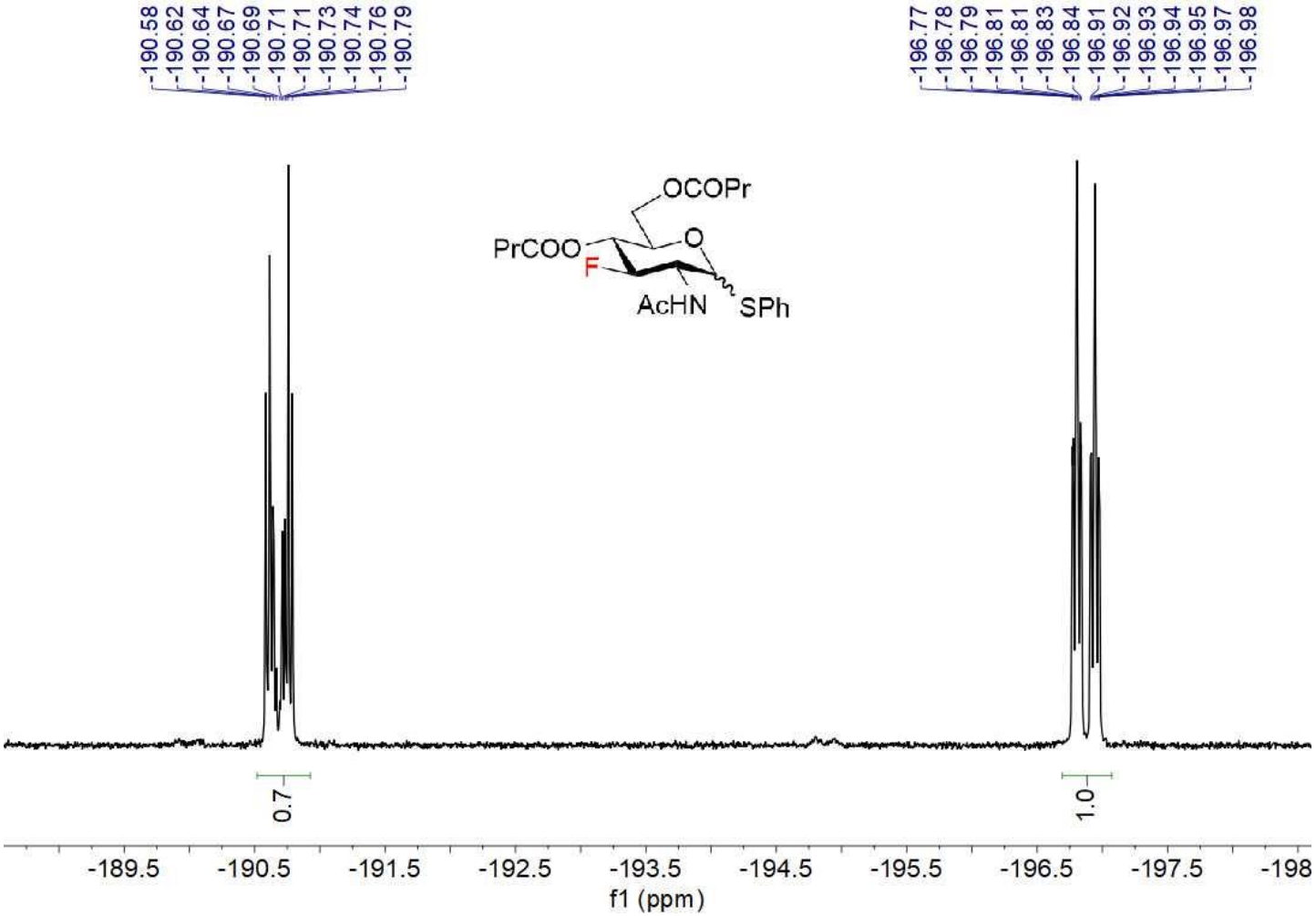
^{1}H NMR (400 MHz, $CDCl_3$) 77



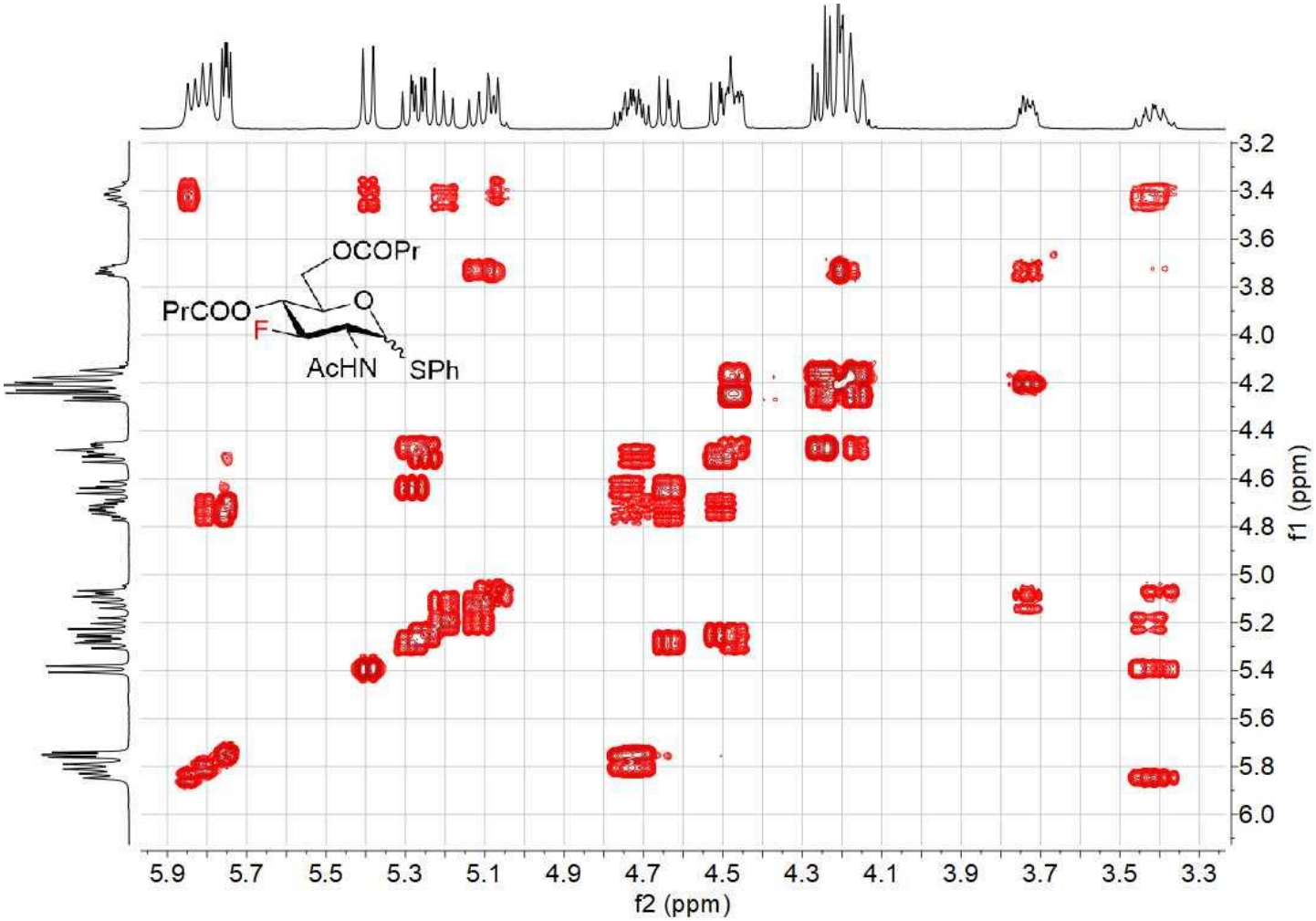
^{13}C NMR (100 MHz, $CDCl_3$) 77



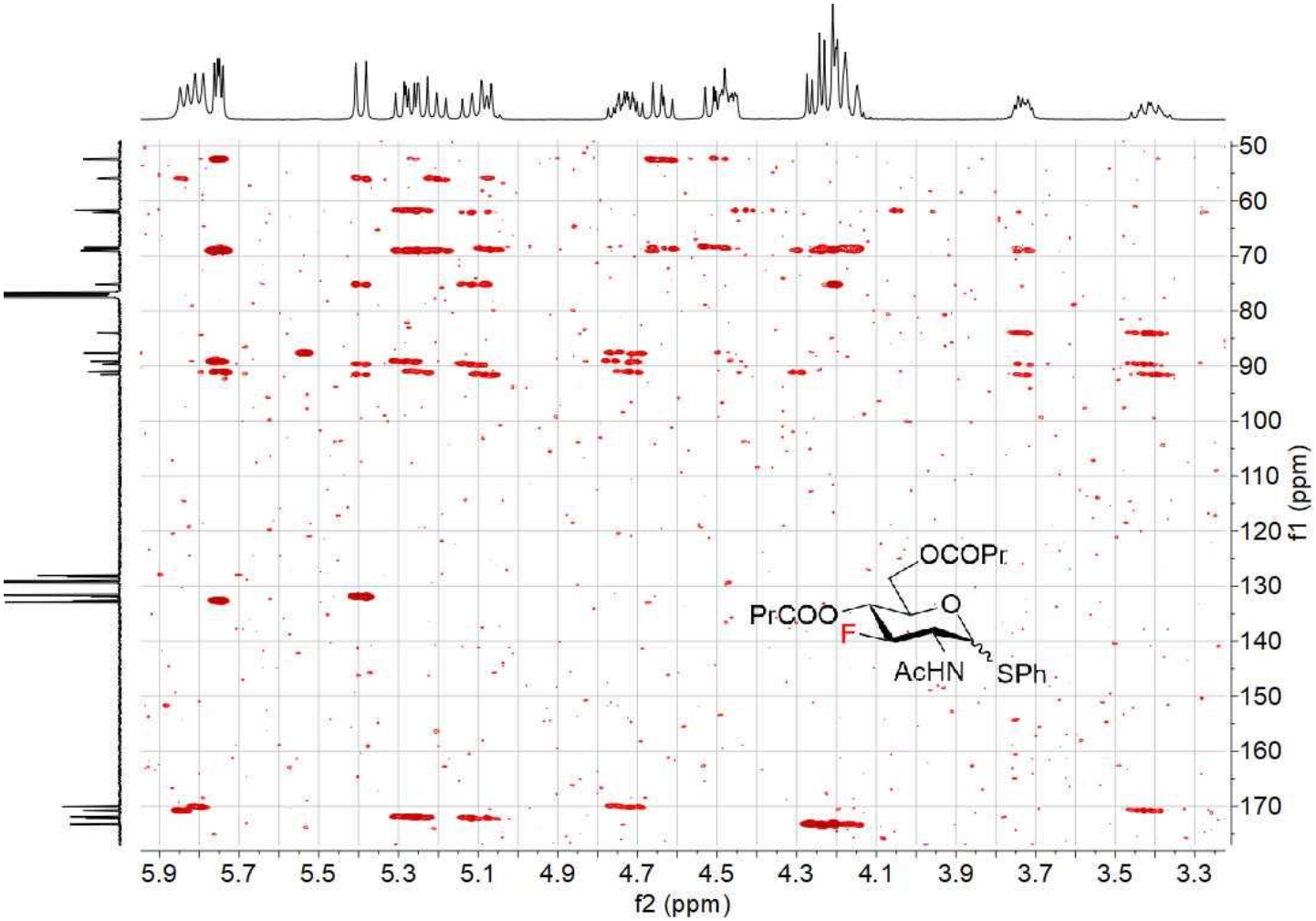
^{19}F NMR (376 MHz, $CDCl_3$) 77



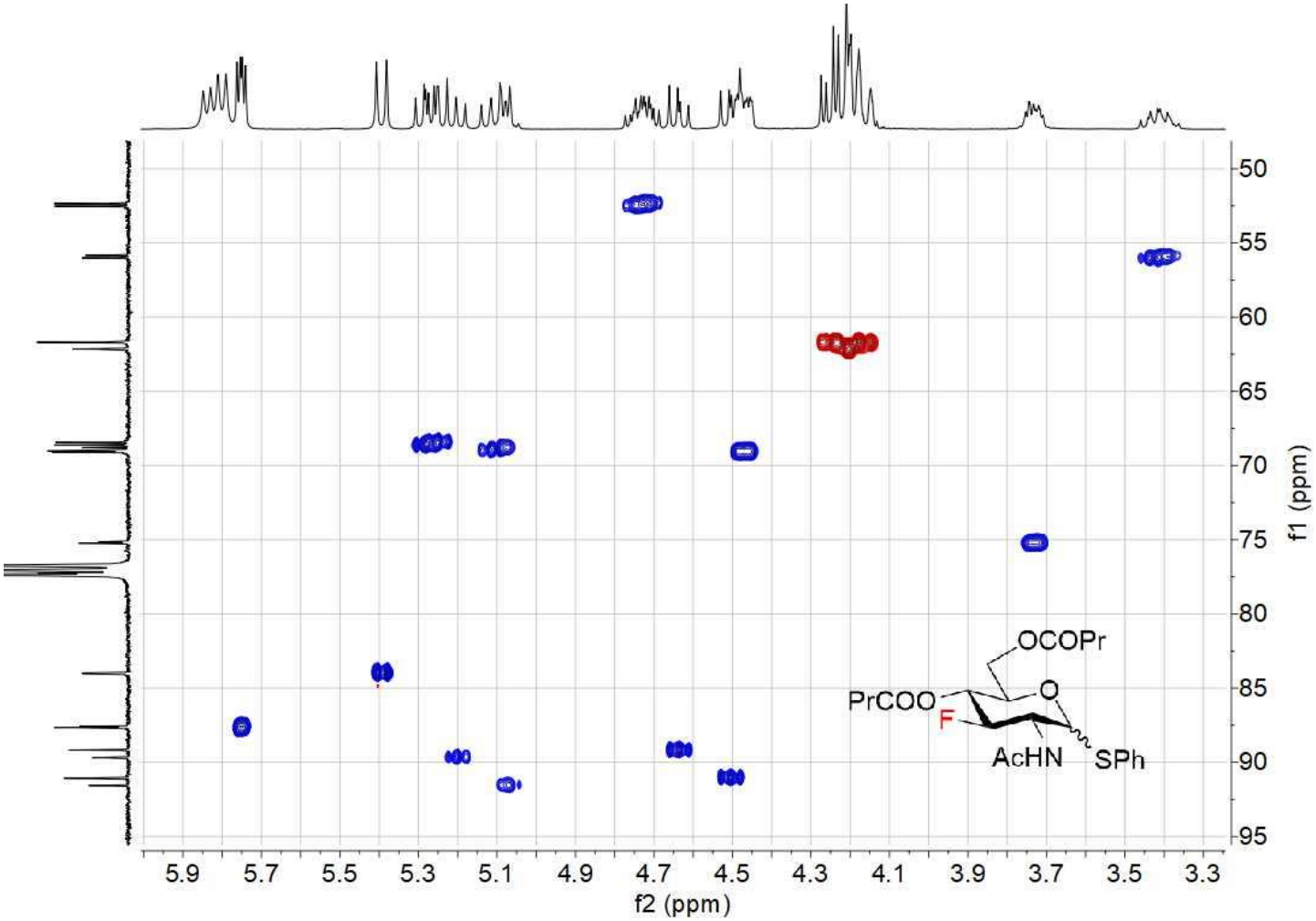
^{1}H-^{1}H COSY 77



^{1}H-^{13}C HMBC 77

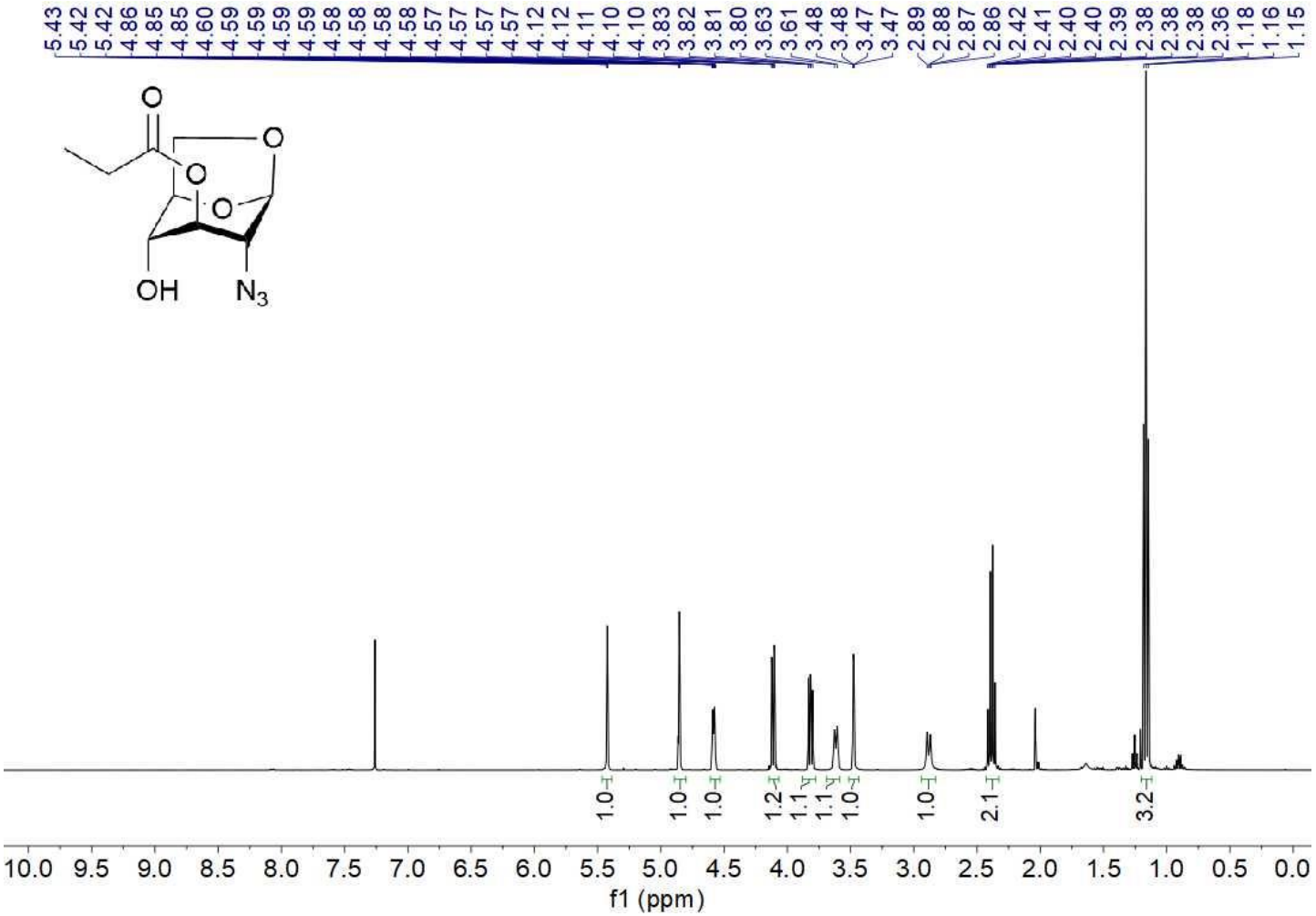


^{1}H-^{13}C HSQC 77

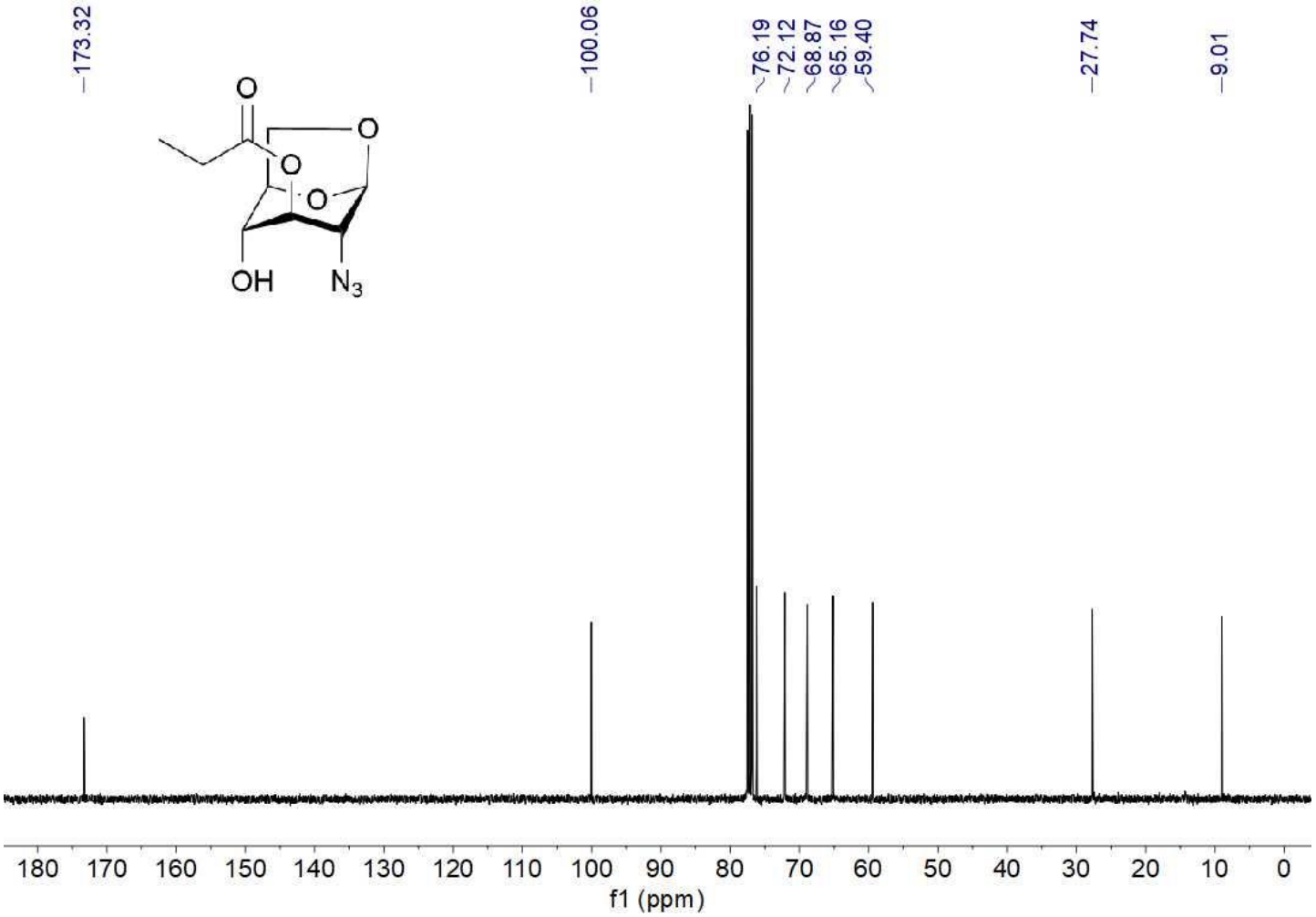


NMR COMPOUND 79

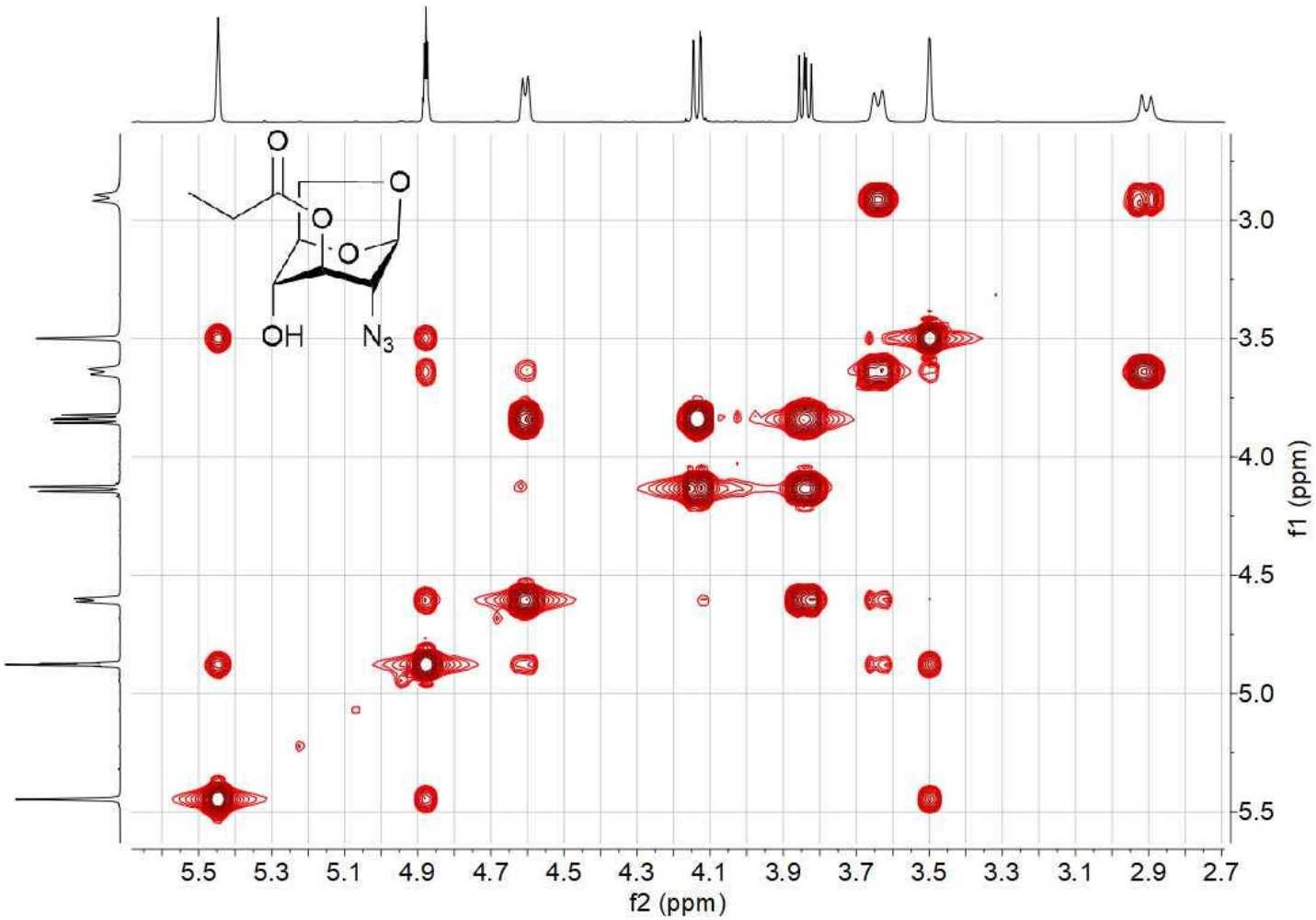
^{1}H NMR (400 MHz, $CDCl_3$) 79



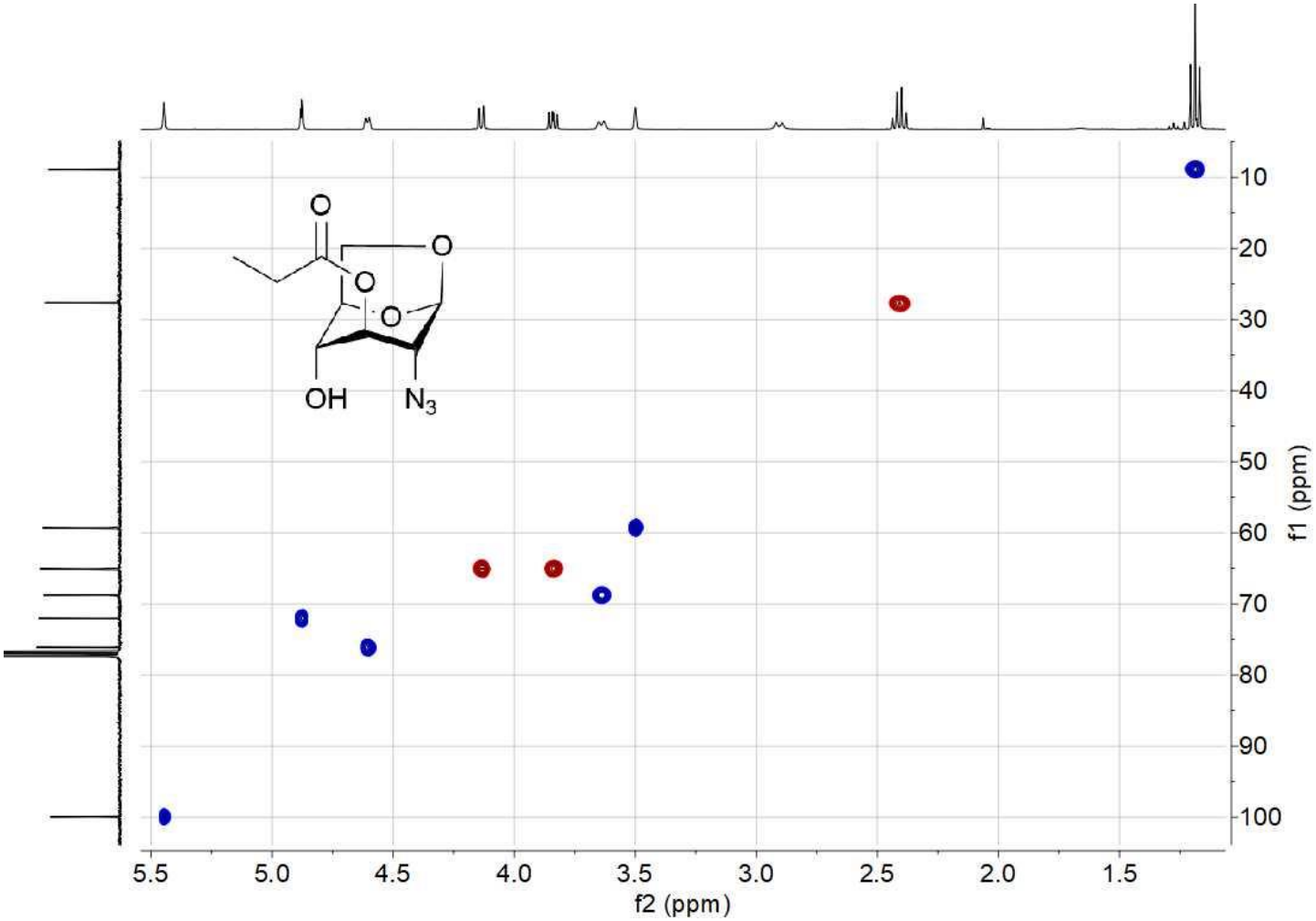
^{13}C NMR (100 MHz, $CDCl_3$) 79



^{1}H-^{1}H COSY 79

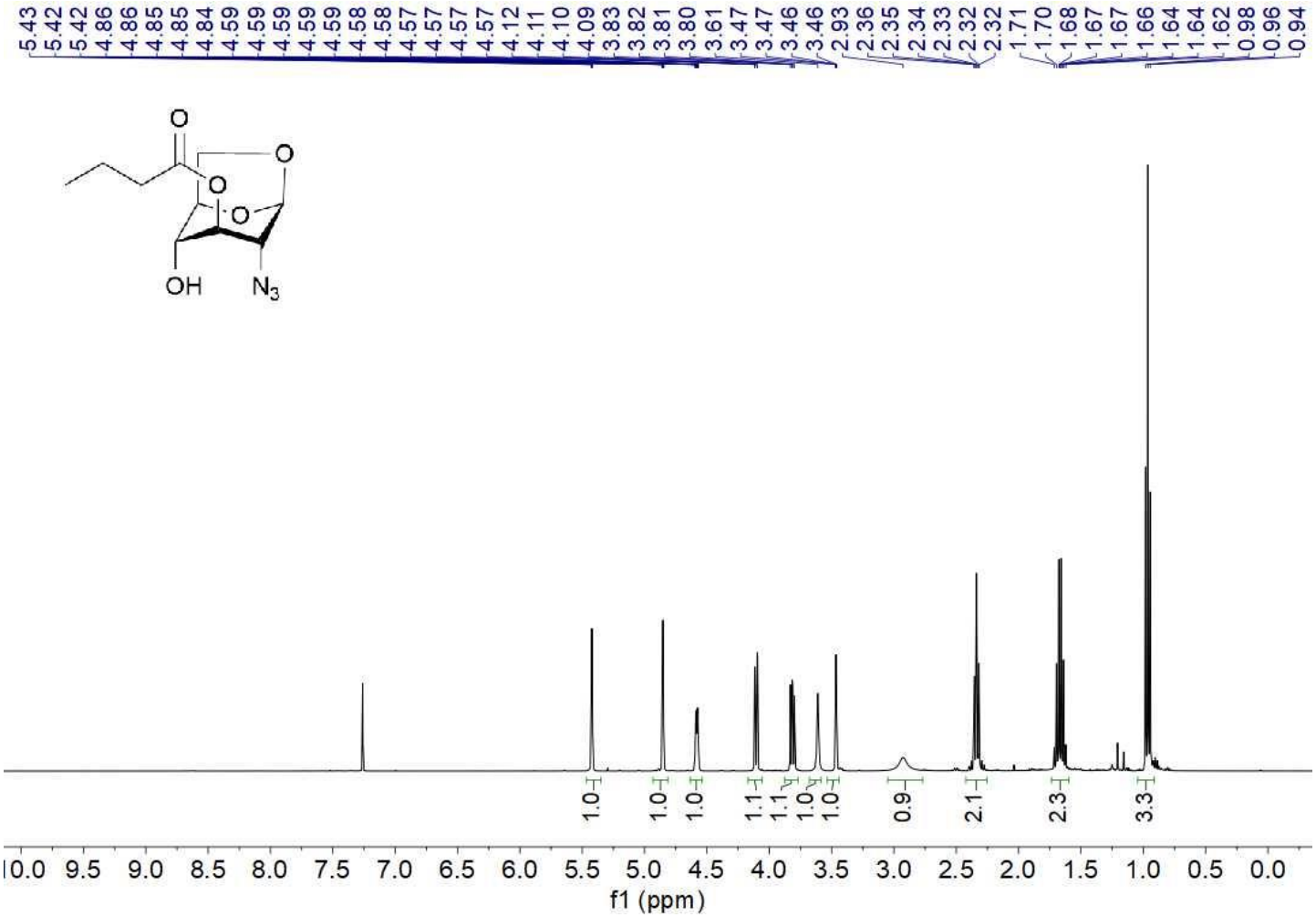

O
O
O
O
OH
N3
3.0
3.5
4.0
4.5
5.0
5.5
f1 (ppm)
5.5
5.3
5.1
4.9
4.7
4.5
4.3
4.1
3.9
3.7
3.5
3.3
3.1
2.9
2.7
f2 (ppm)

^{1}H-^{13}C HSQC 79

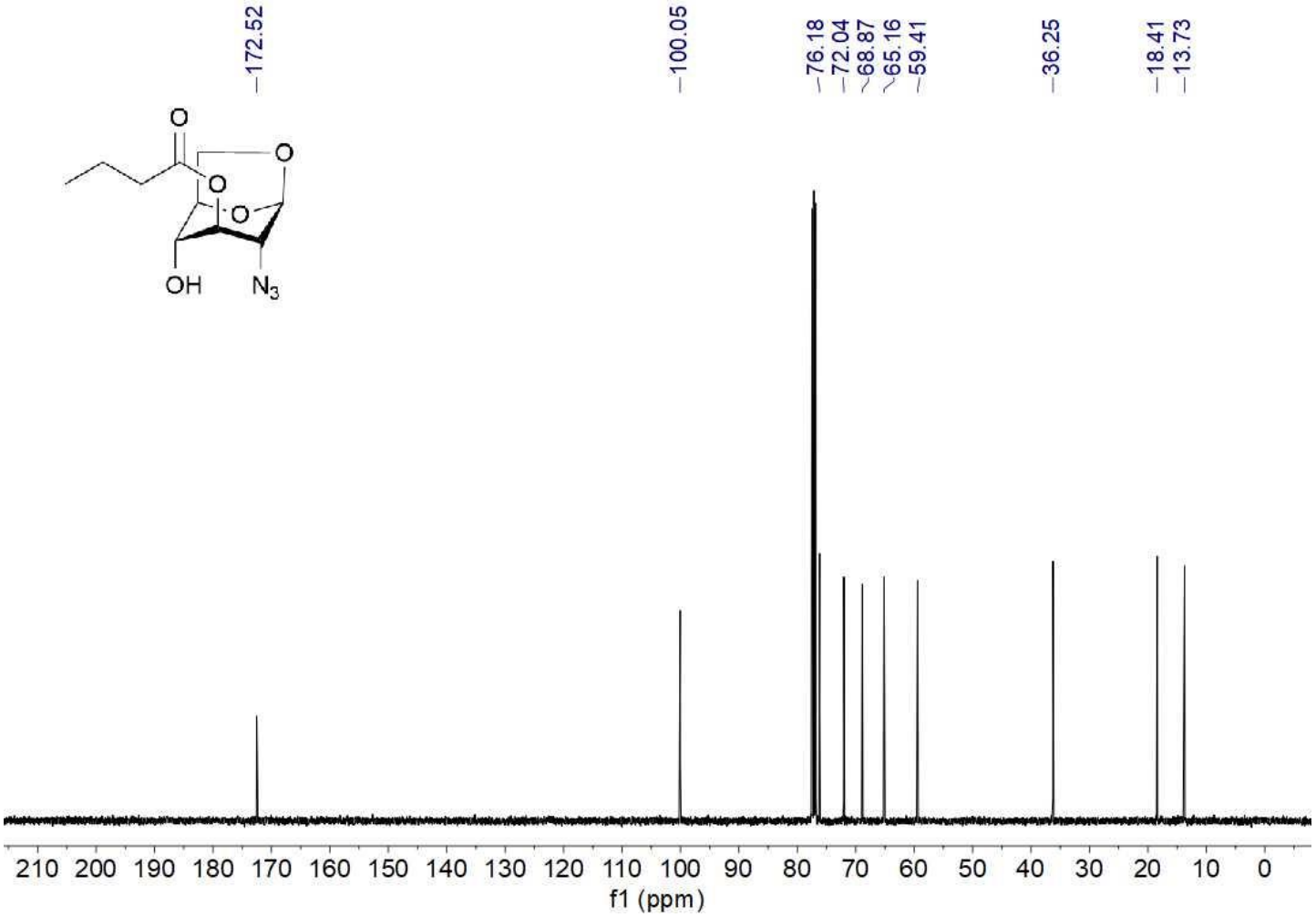


NMR COMPOUND 80

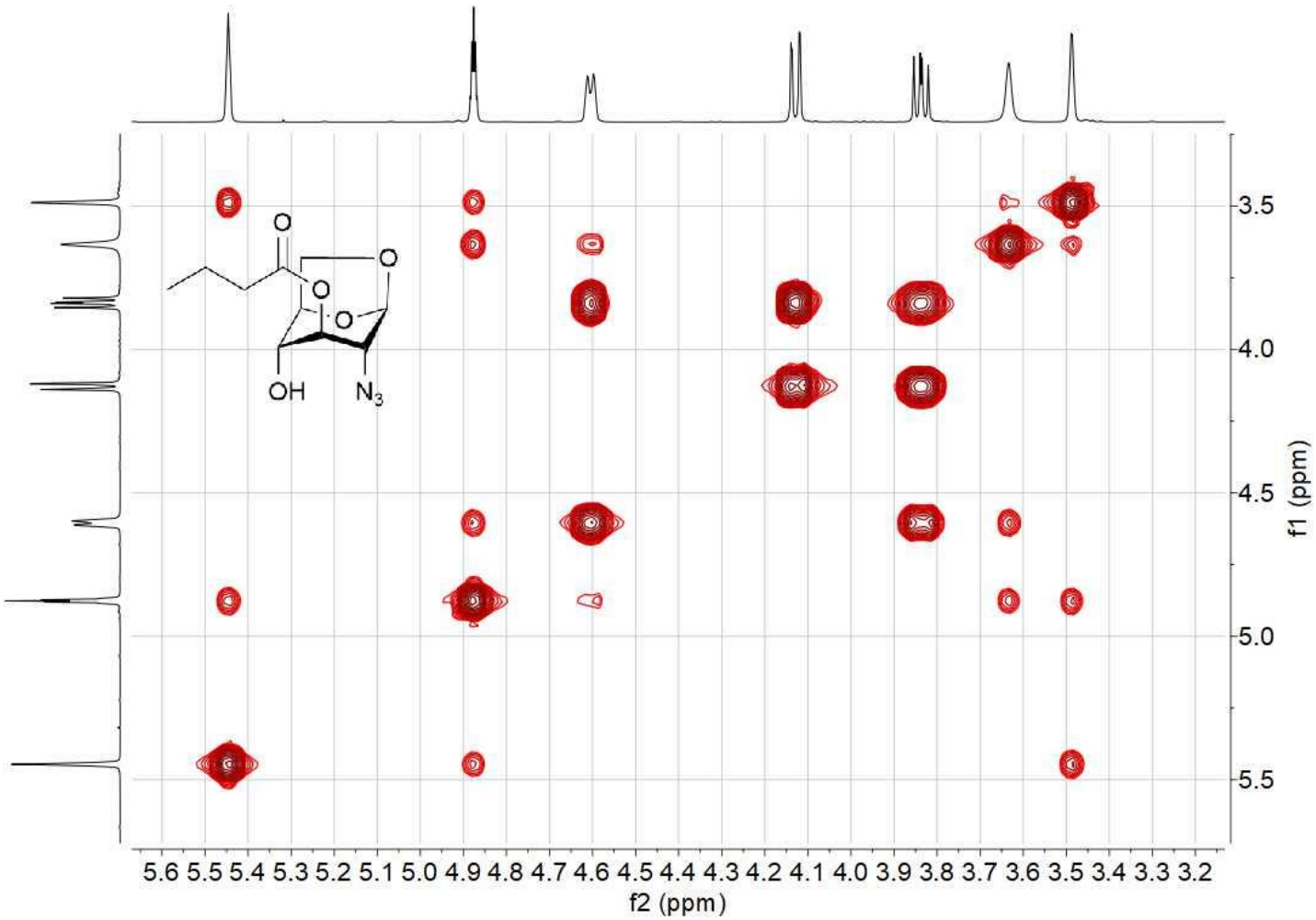
^{1}H NMR (400 MHz, $CDCl_3$) 80



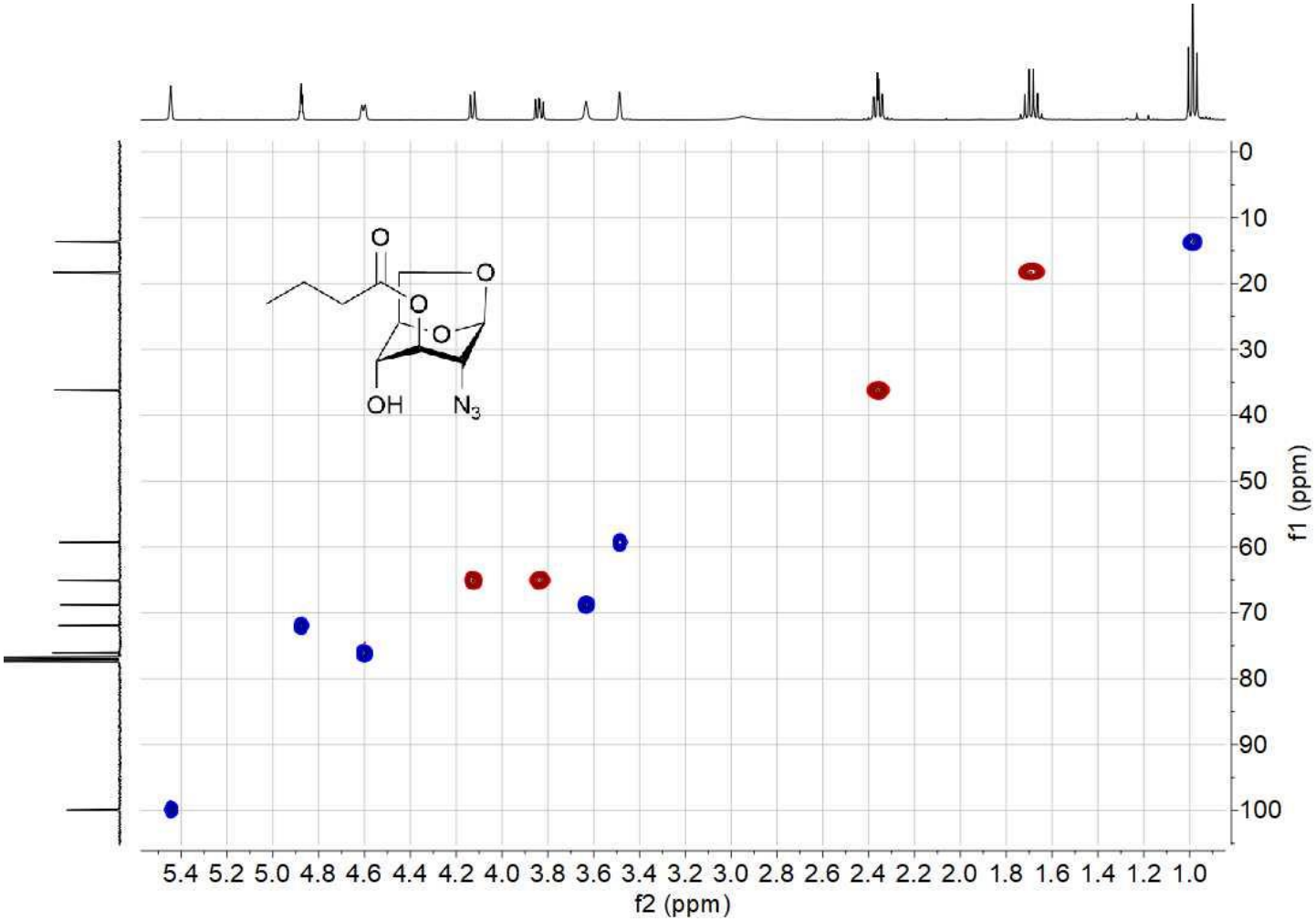
^{13}C NMR (100 MHz, $CDCl_3$) 80



^{1}H-^{1}H COSY 80

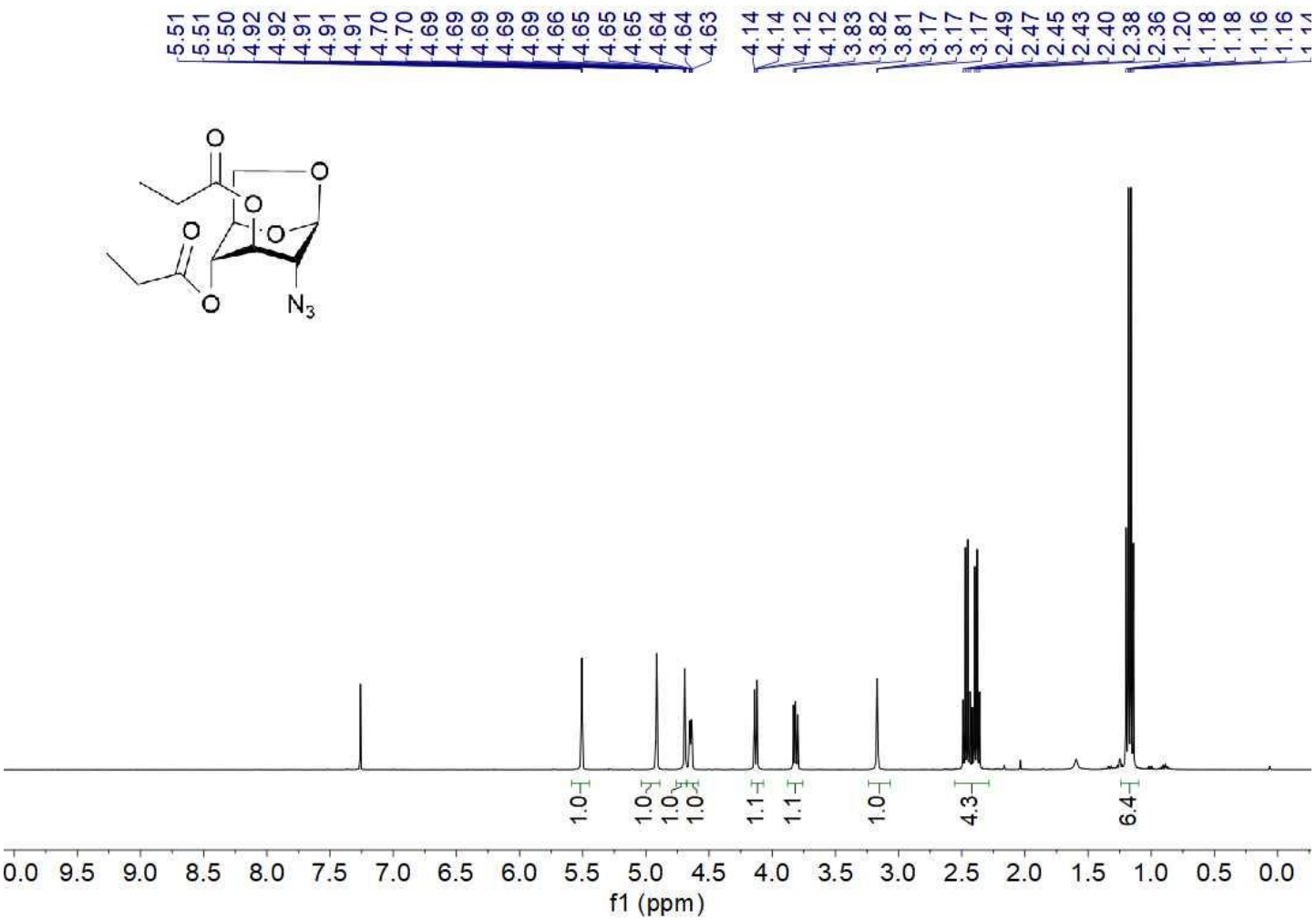

O
O
O
O
OH
N3
3.5
4.0
4.5
5.0
5.5
f1 (ppm)
5.6 5.5 5.4 5.3 5.2 5.1 5.0 4.9 4.8 4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6 3.5 3.4 3.3 3.2
f2 (ppm)

^{1}H-^{13}C HSQC 80

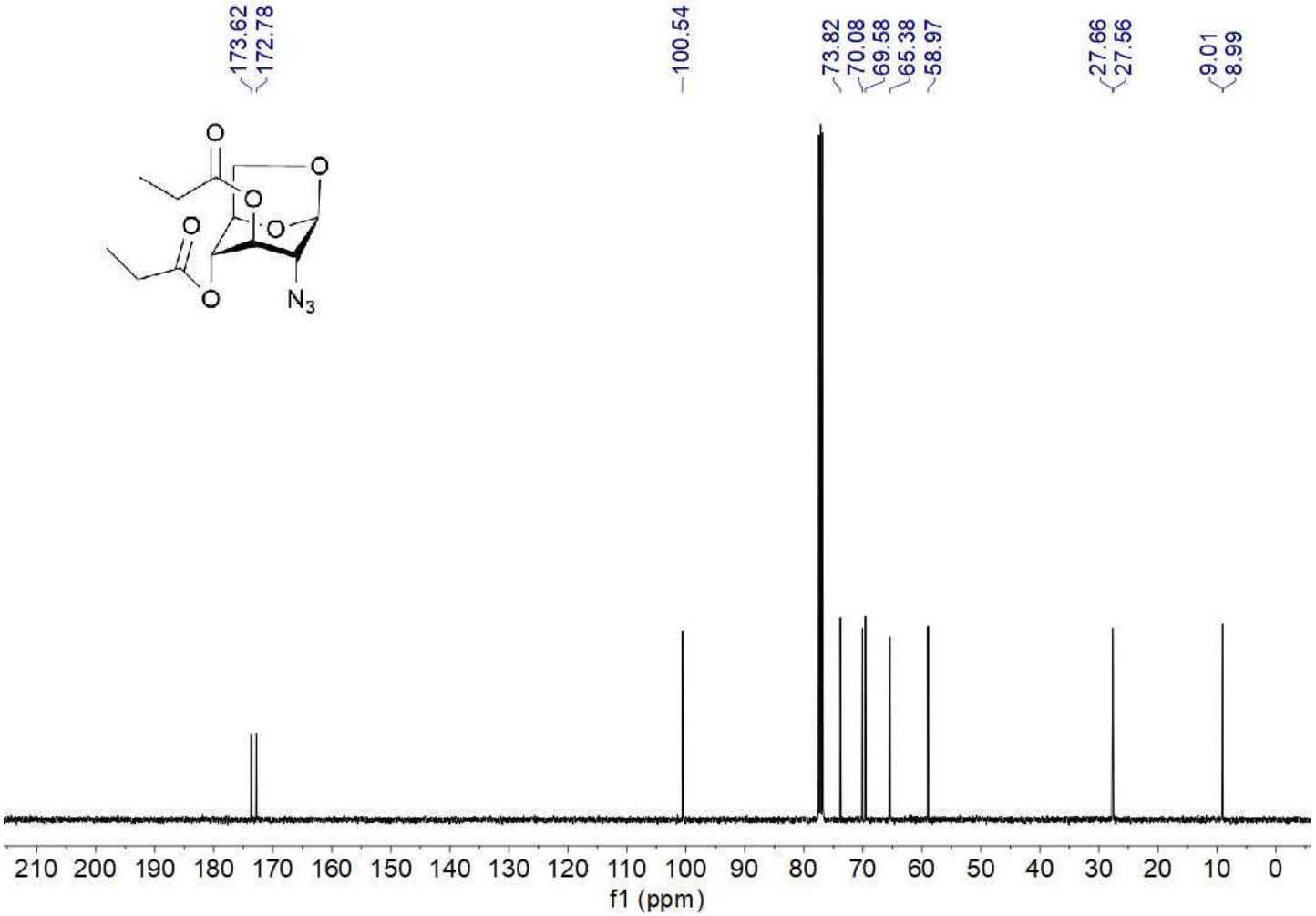


NMR COMPOUND 81

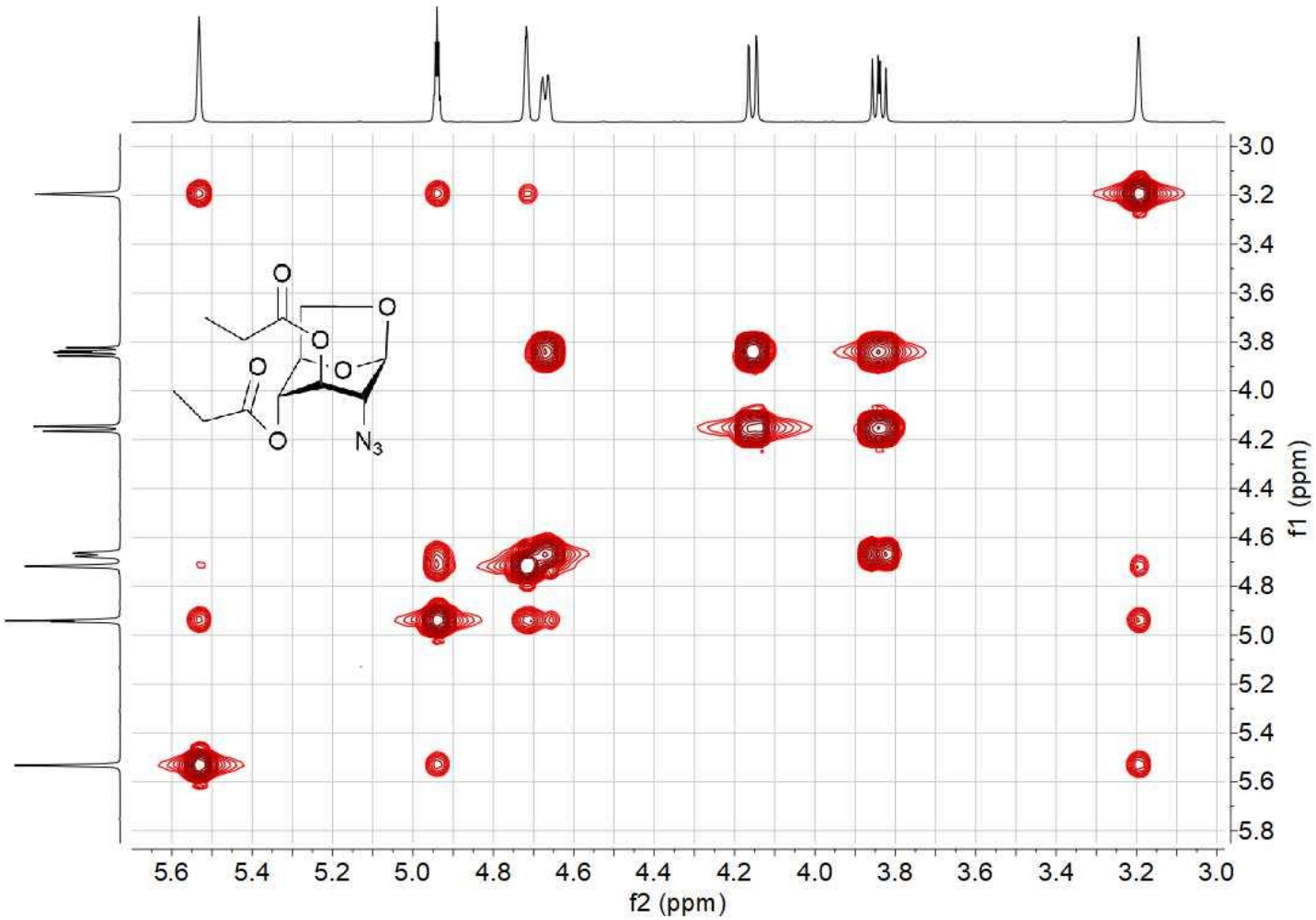
^{1}H NMR (400 MHz, $CDCl_3$) 81



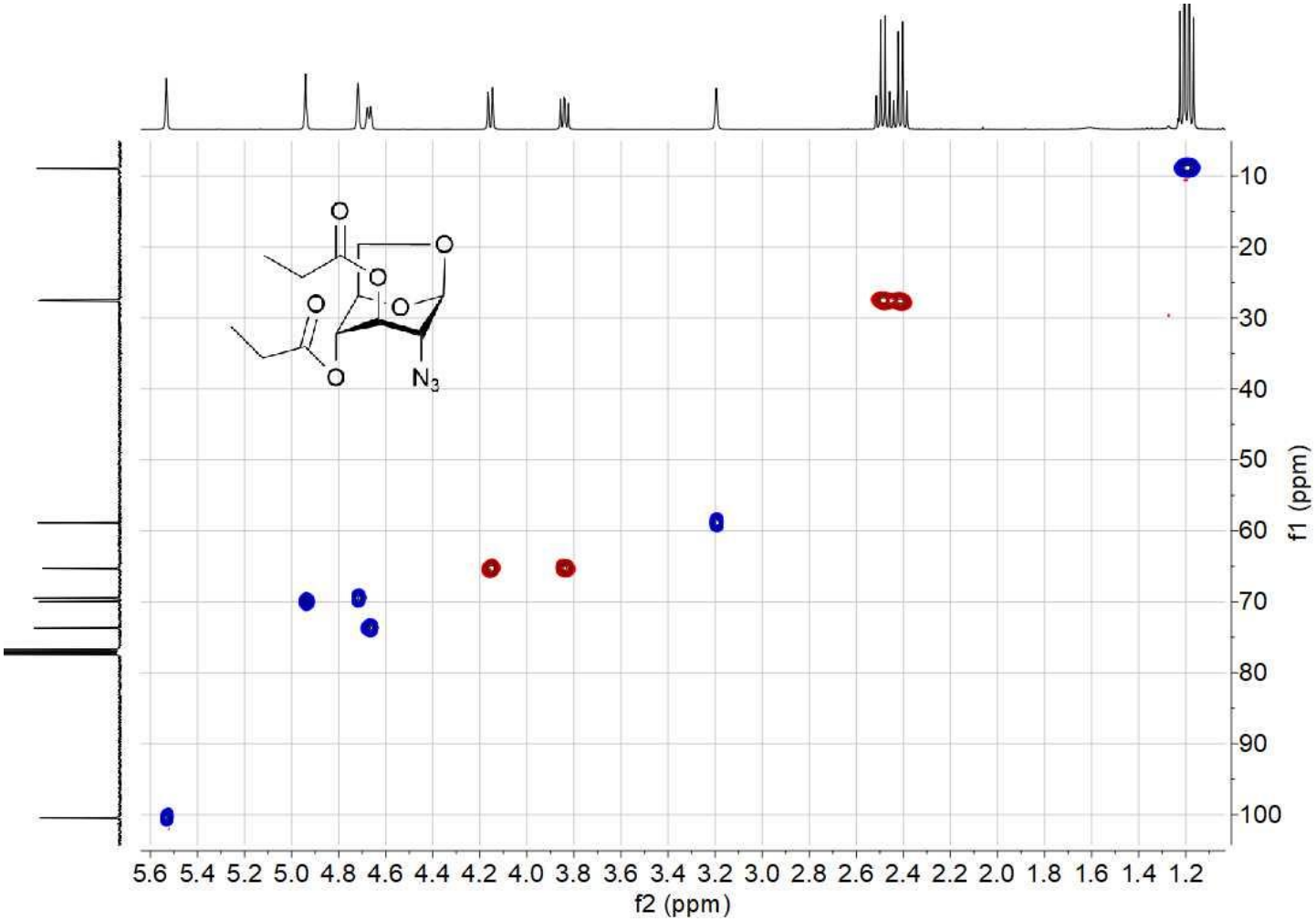
^{13}C NMR (100 MHz, $CDCl_3$) 81



^{1}H-^{1}H COSY 81

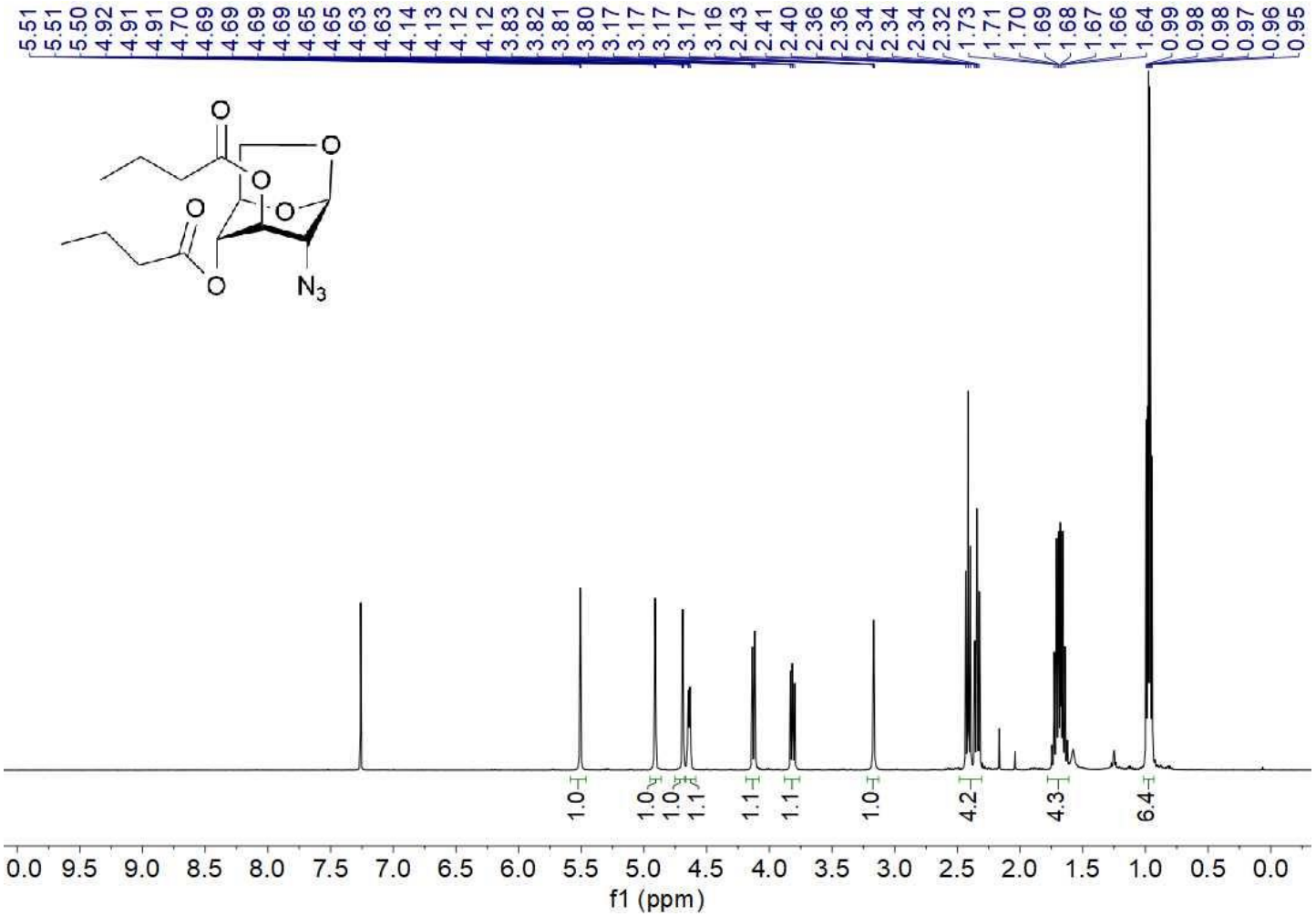


^{1}H-^{13}C HSQC 81

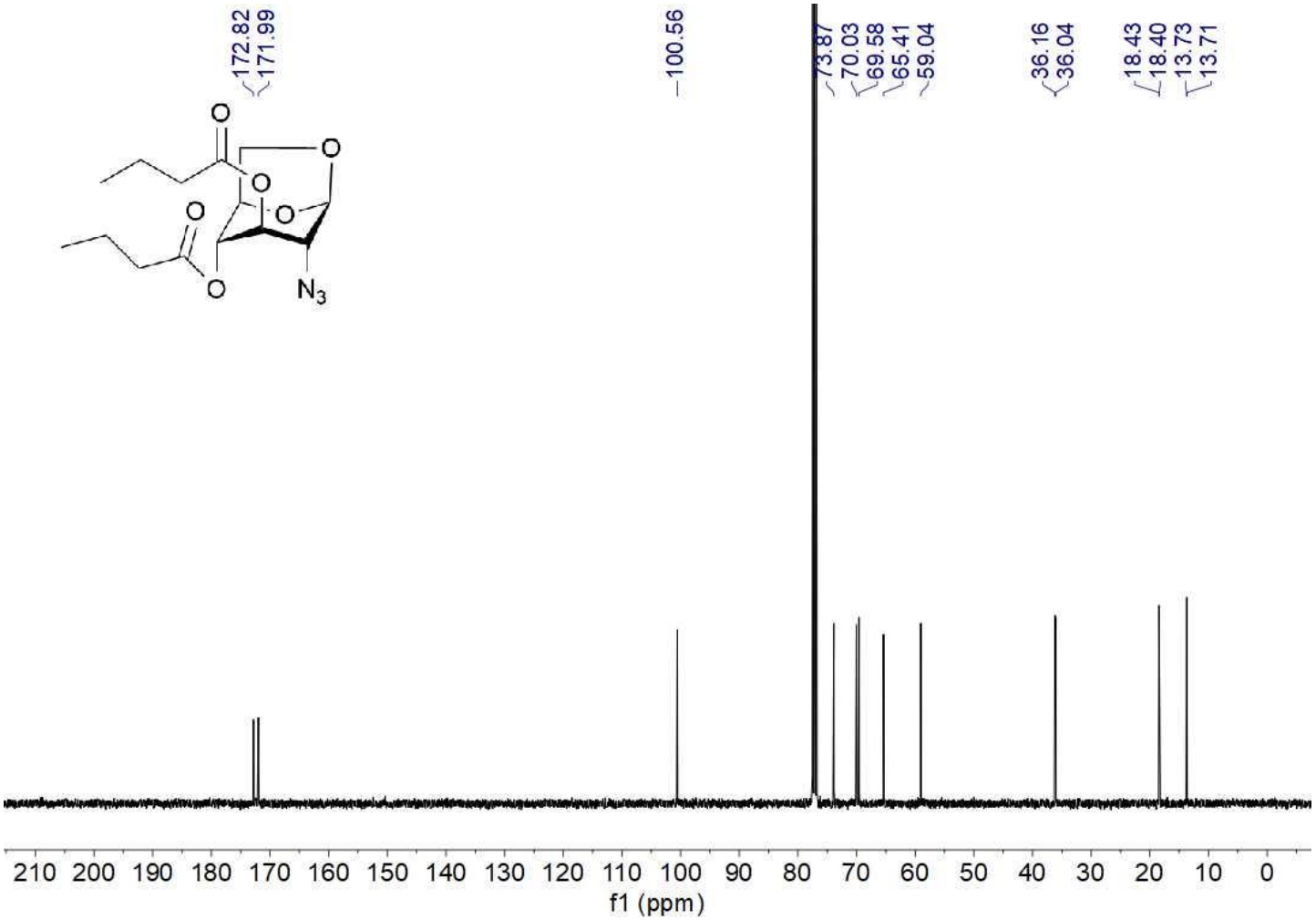


NMR COMPOUND 82

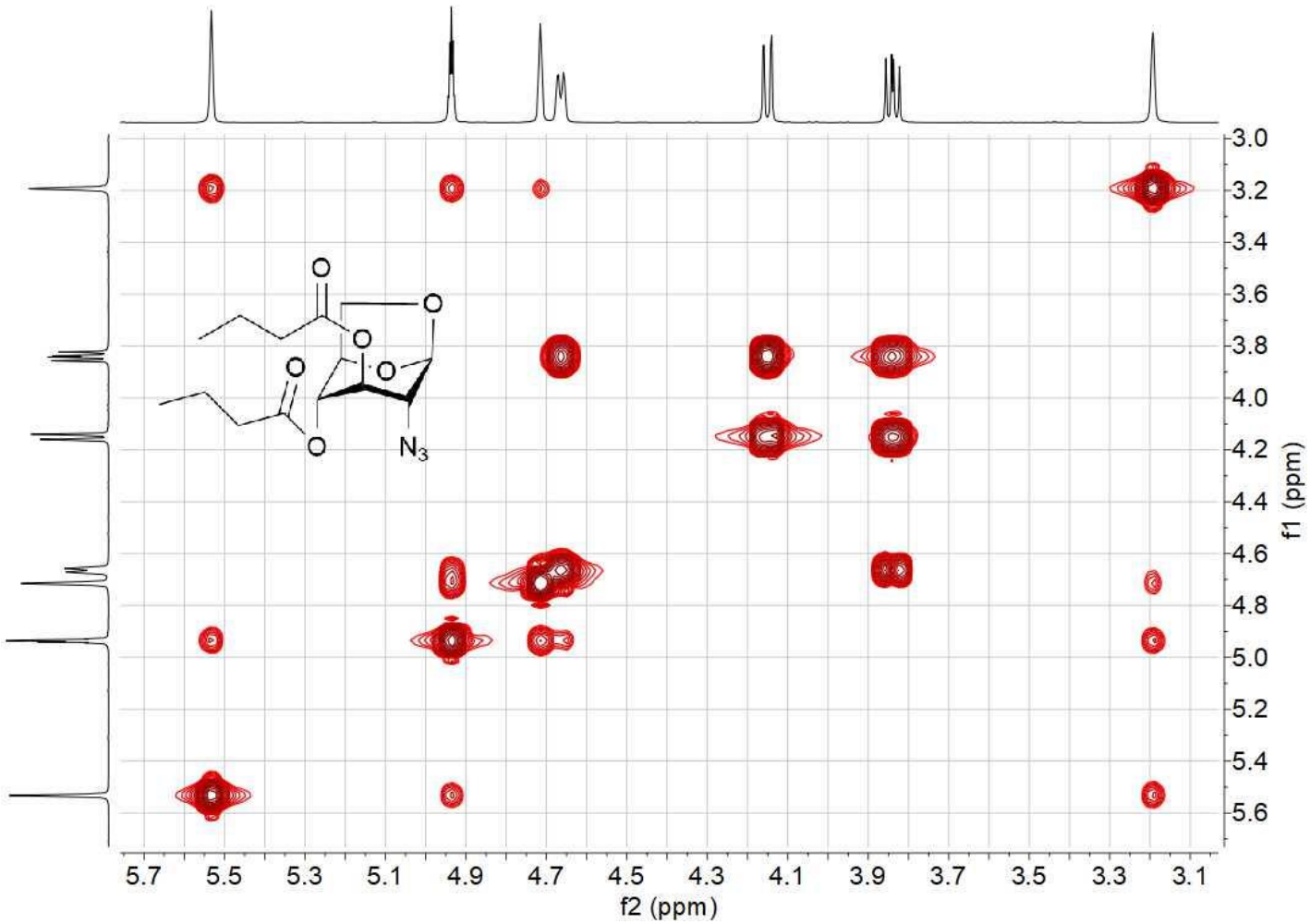
^{1}H NMR (400 MHz, $CDCl_3$) 82



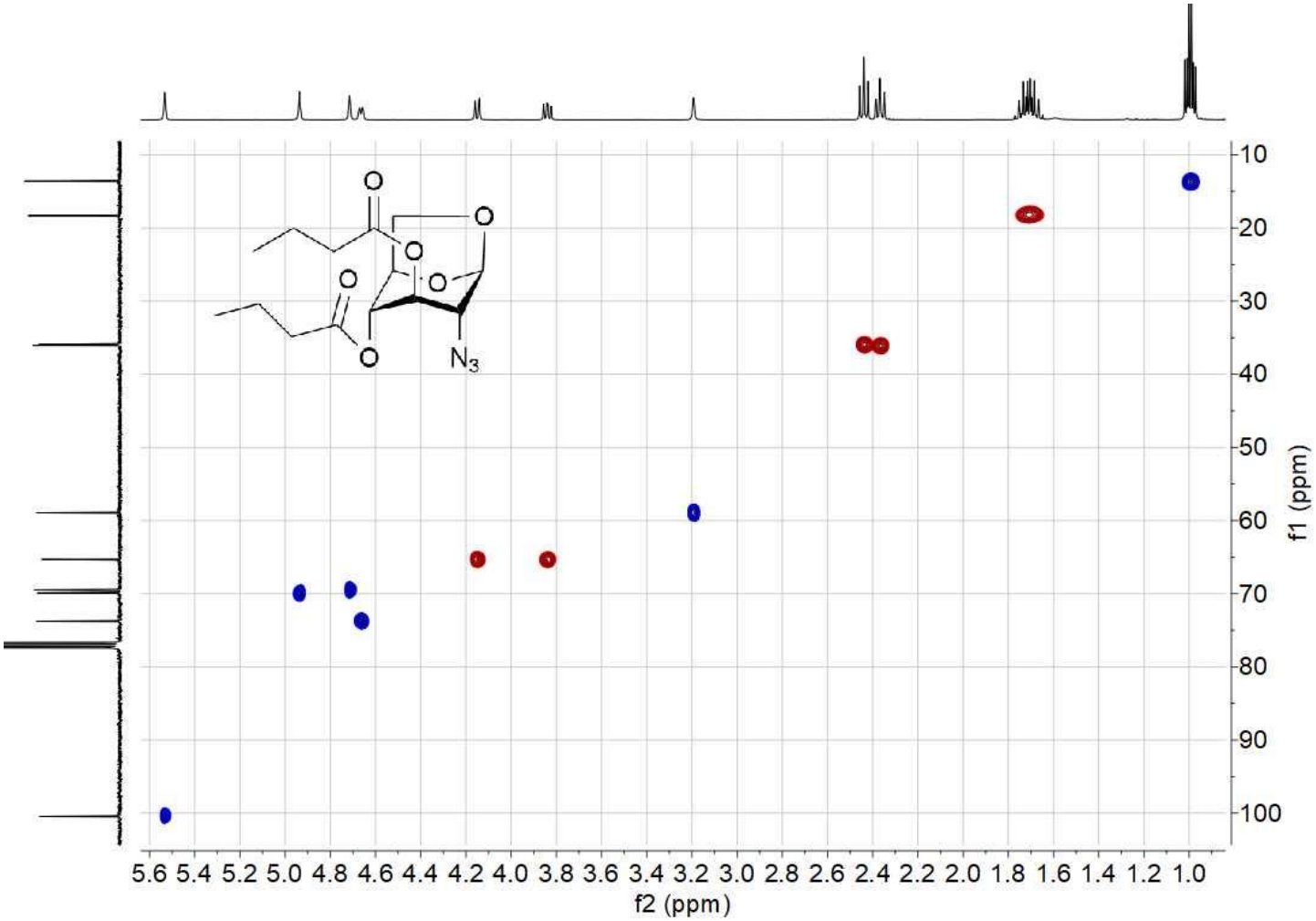
^{13}C NMR (100 MHz, $CDCl_3$) 82



^{1}H-^{1}H COSY 82

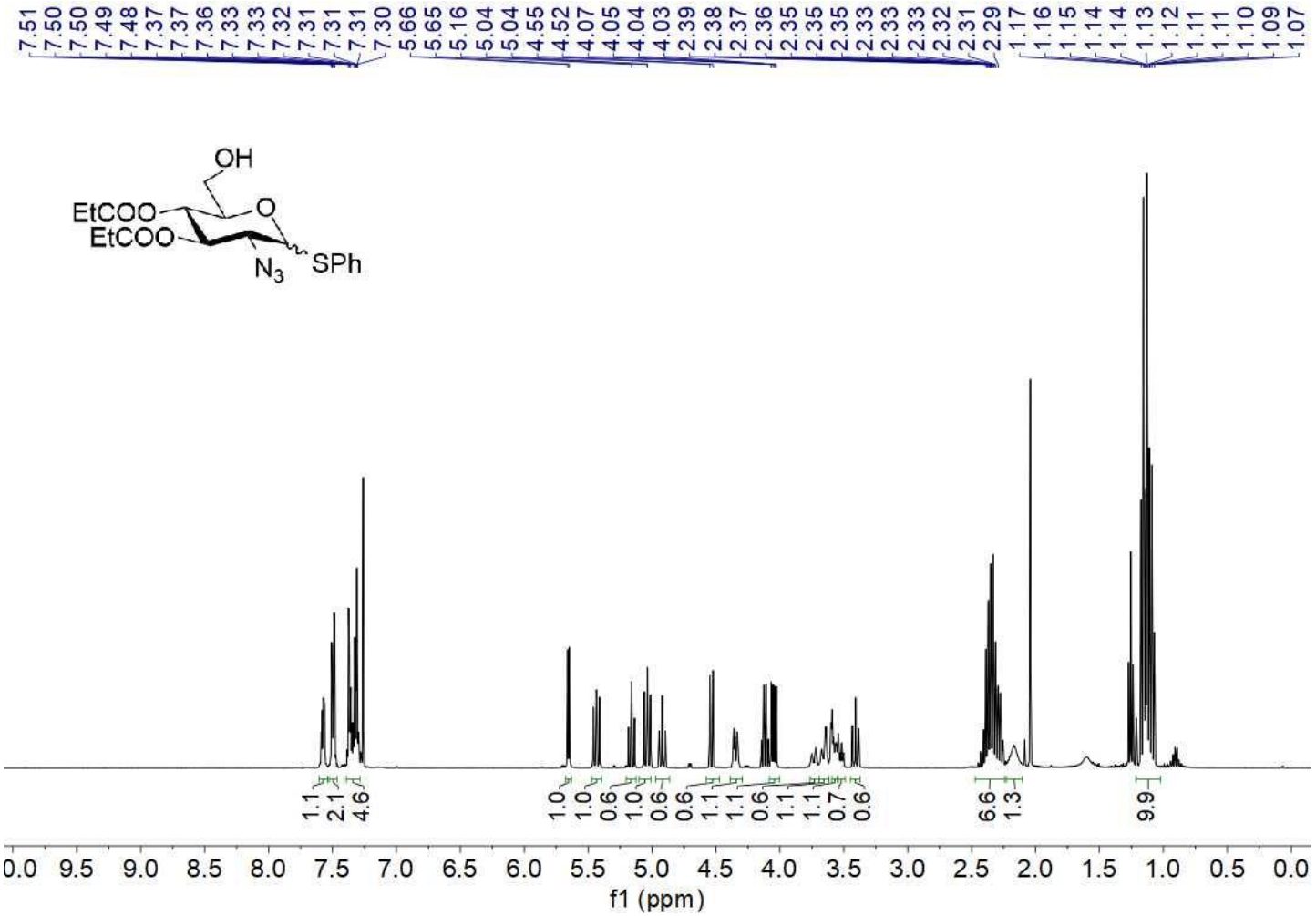

O
O
O
O
O
O
N3
3.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
5.4
5.6
f1 (ppm)
5.7
5.5
5.3
5.1
4.9
4.7
4.5
4.3
4.1
3.9
3.7
3.5
3.3
3.1
f2 (ppm)

^{1}H-^{13}C HSQC 82

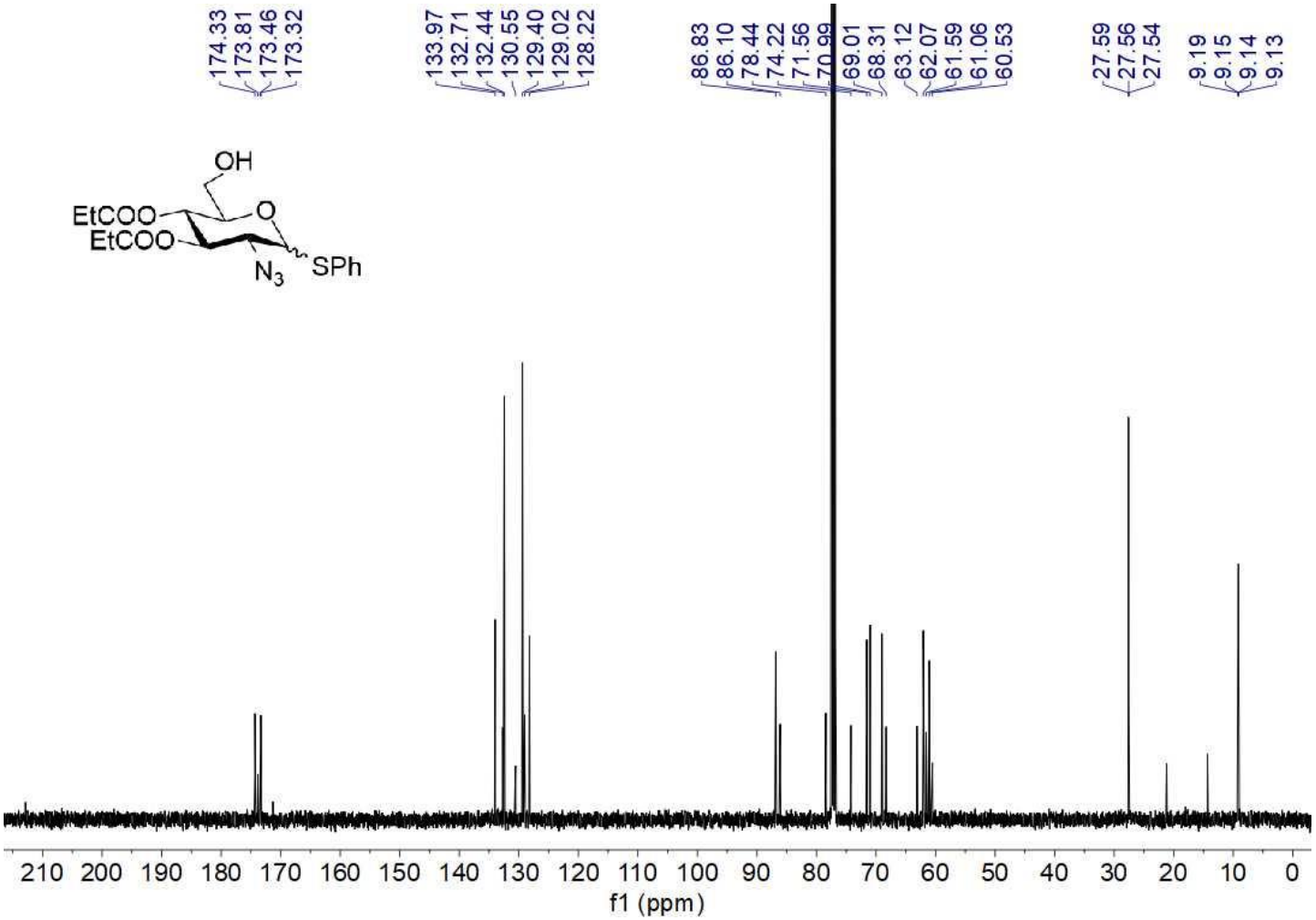


NMR COMPOUND 83

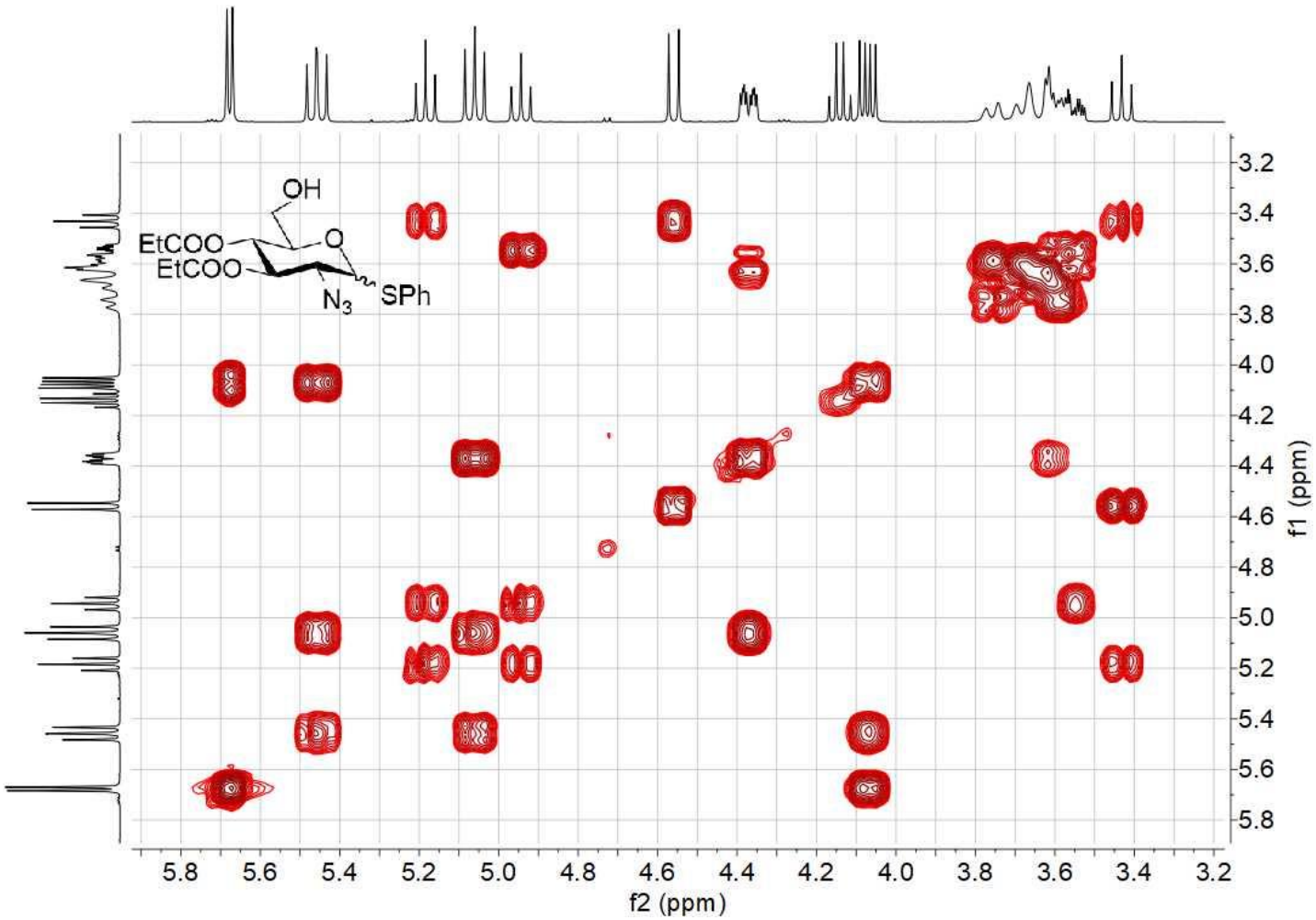
^{1}H NMR (400 MHz, $CDCl_3$) 83



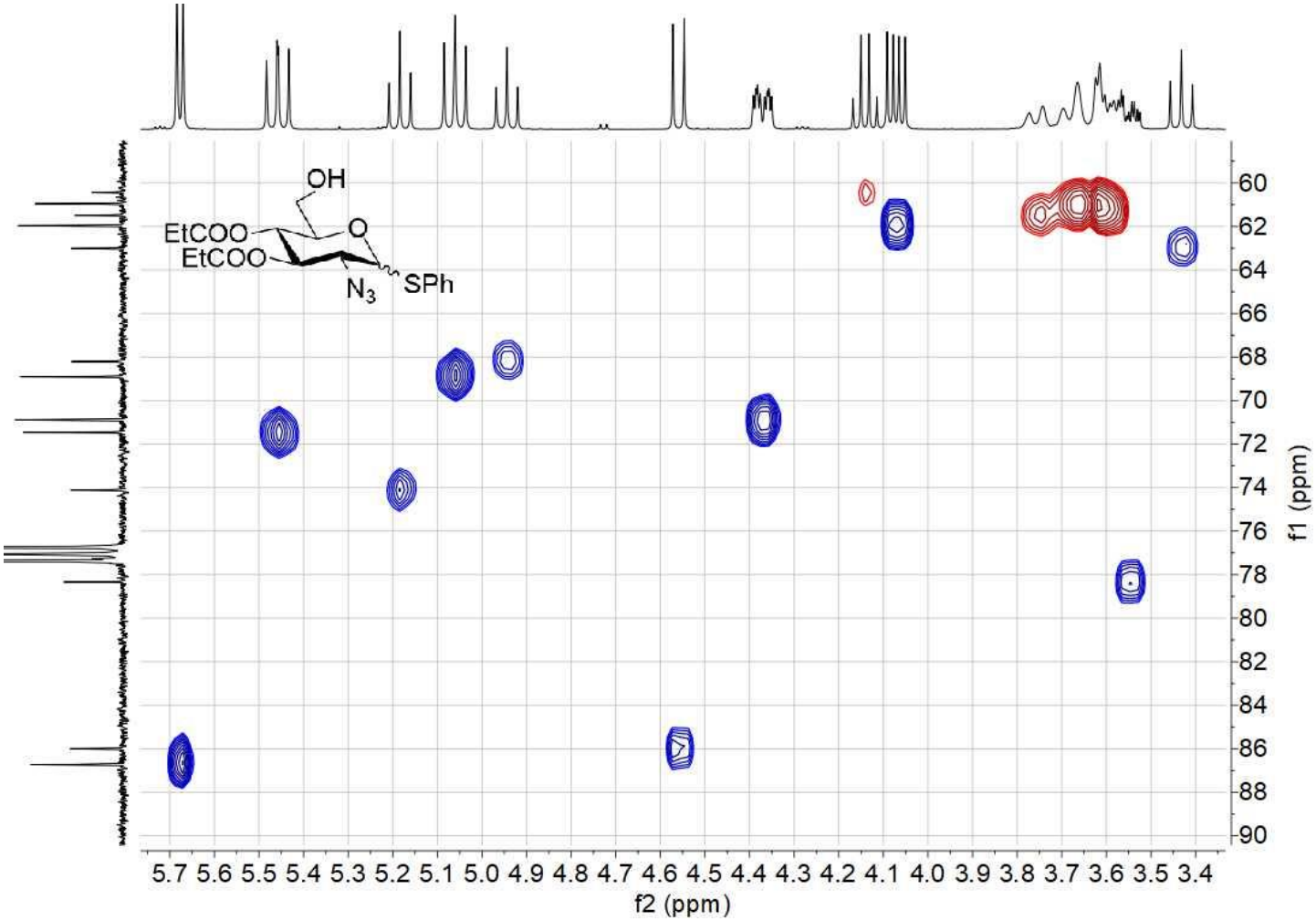
^{13}C NMR (100 MHz, $CDCl_3$) 83



^{1}H-^{1}H COSY 83

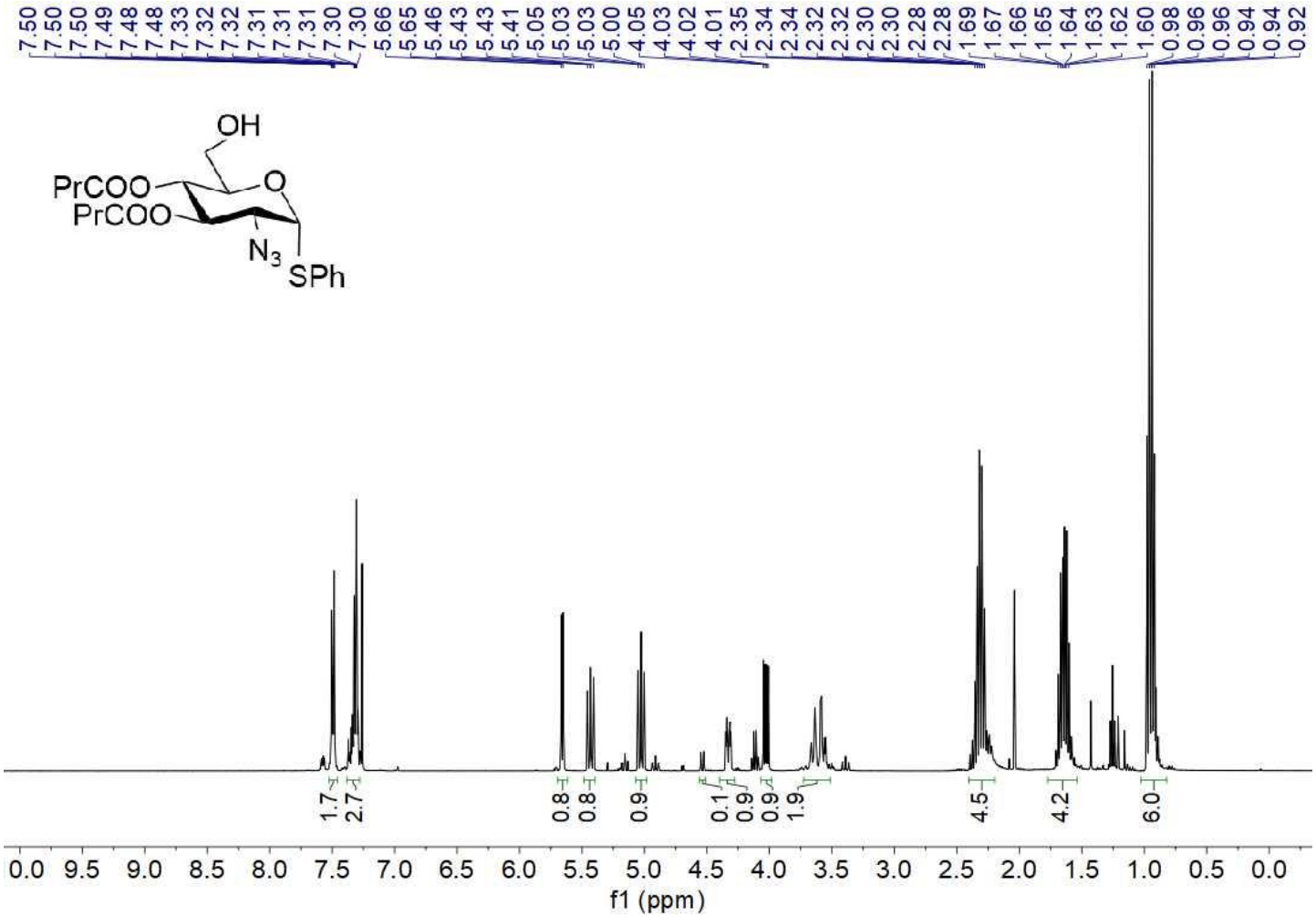


^{1}H-^{13}C HSQC 83

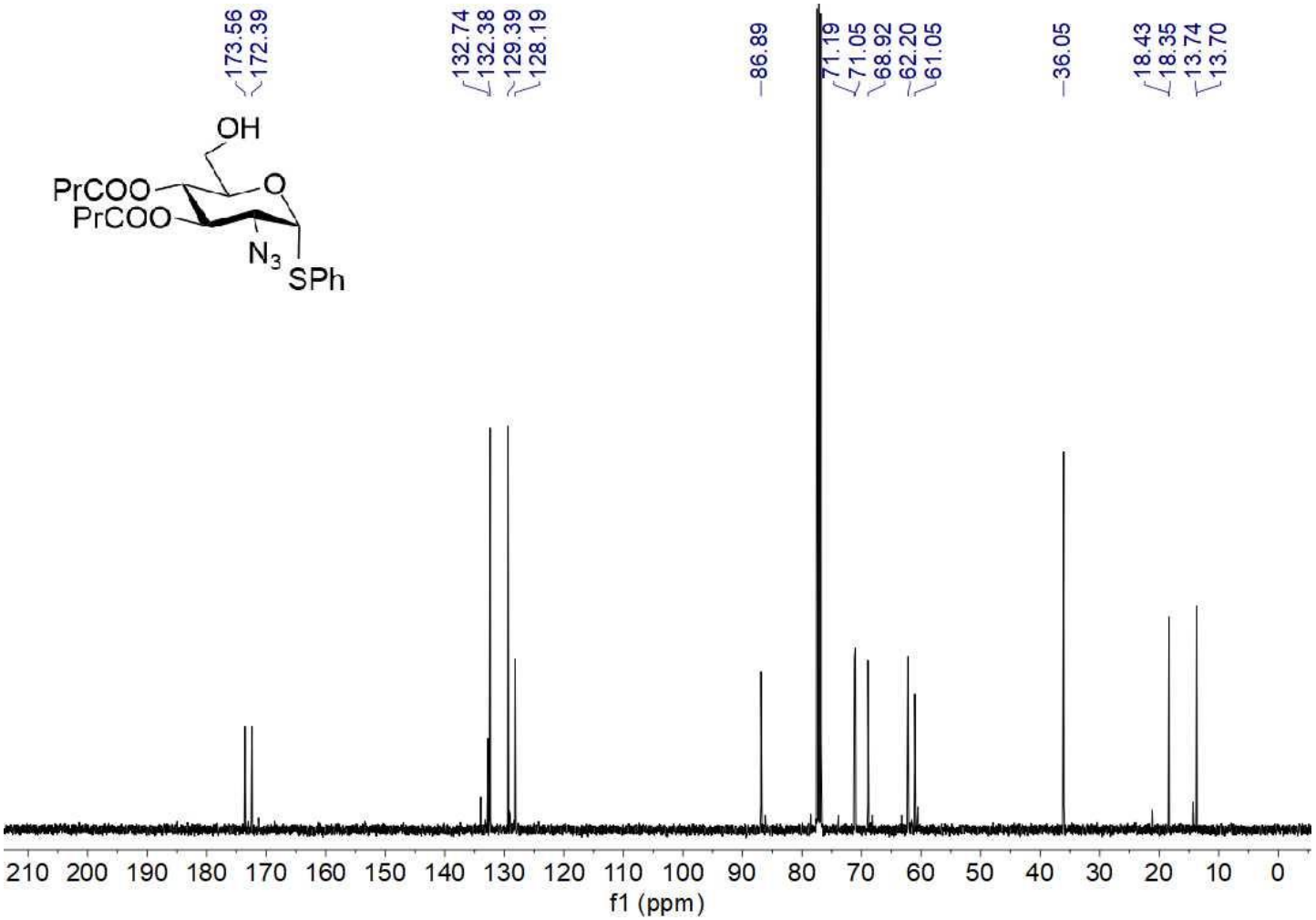


NMR COMPOUND 84 (enriched α-anomer)

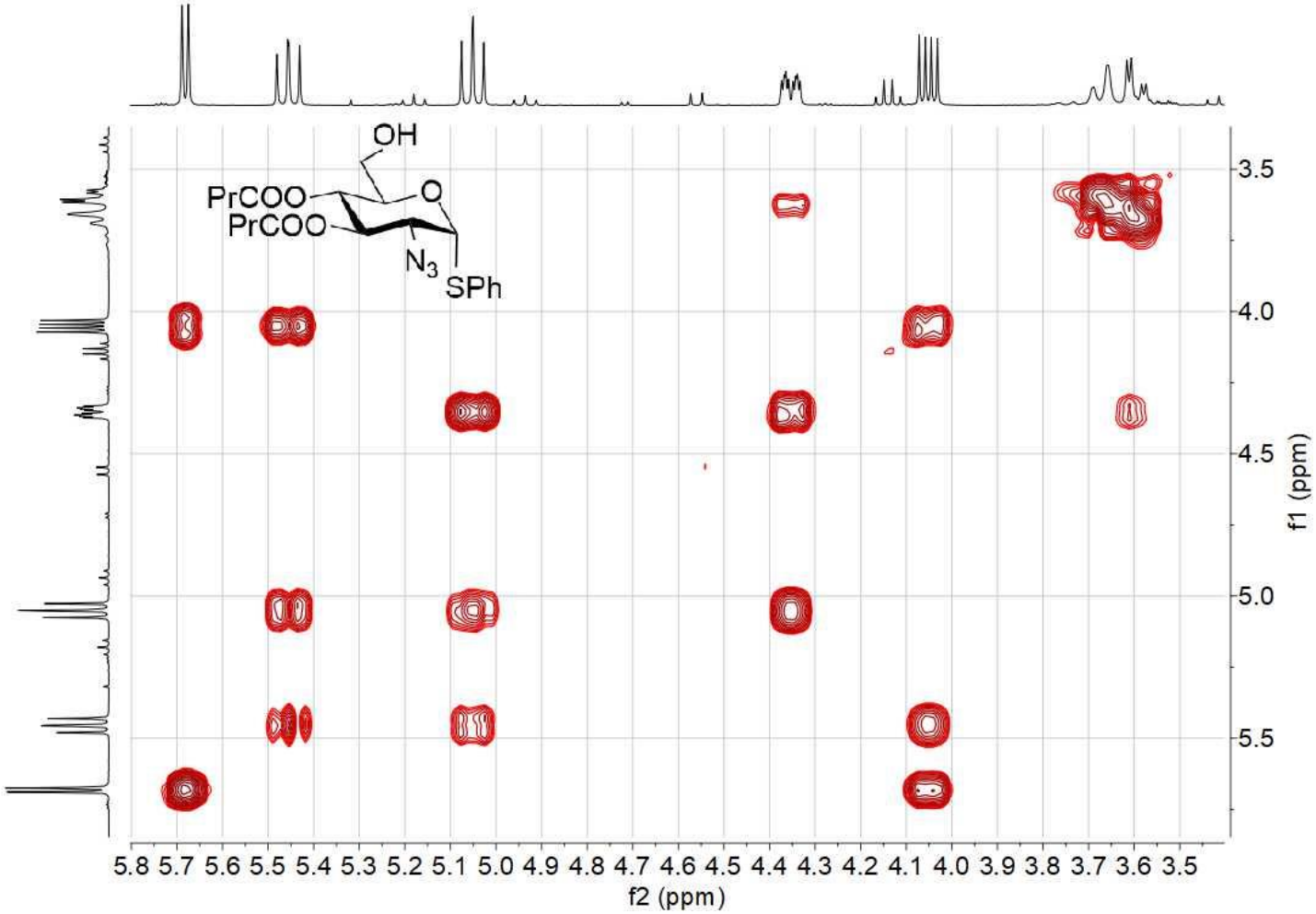
^{1}H NMR (400 MHz, $CDCl_3$) 84 (enriched α-anomer)



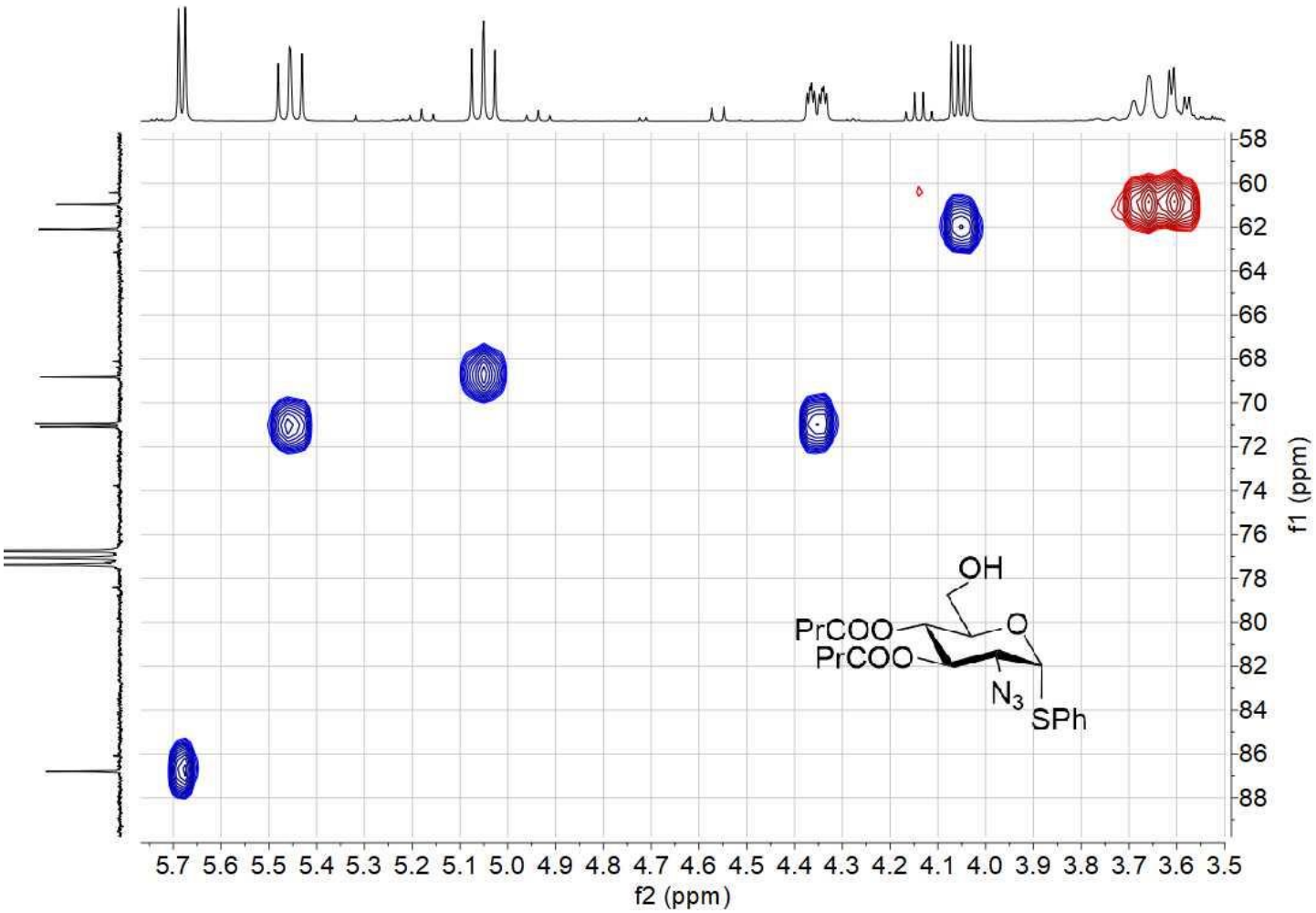
^{13}C NMR (100 MHz, $CDCl_3$) 84 (enriched α-anomer)



^{1}H-^{1}H COSY 84 (enriched α-anomer)

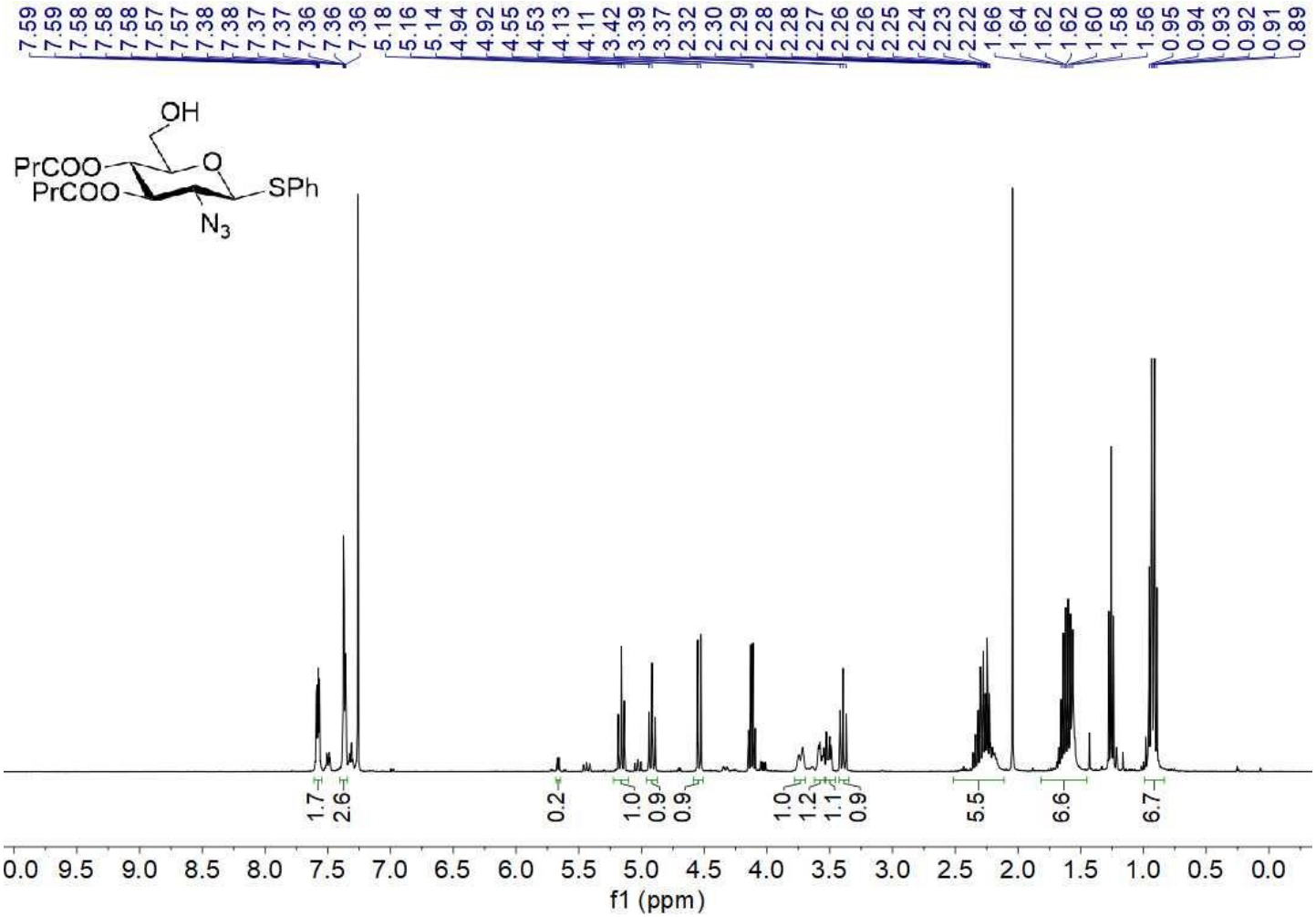


^{1}H-^{13}C HSQC 84 (enriched α-anomer)

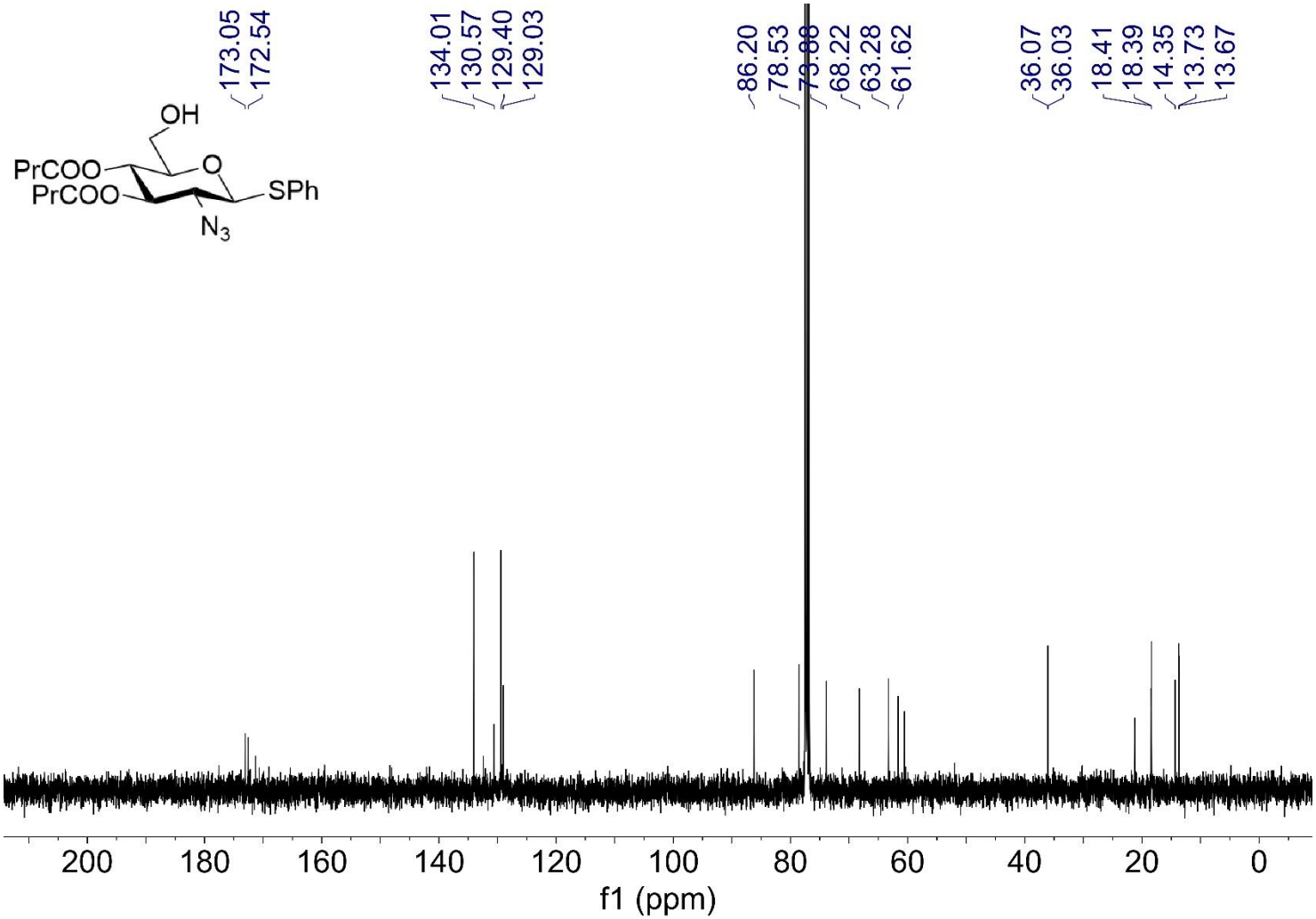


NMR COMPOUND 84 (enriched β-anomer)

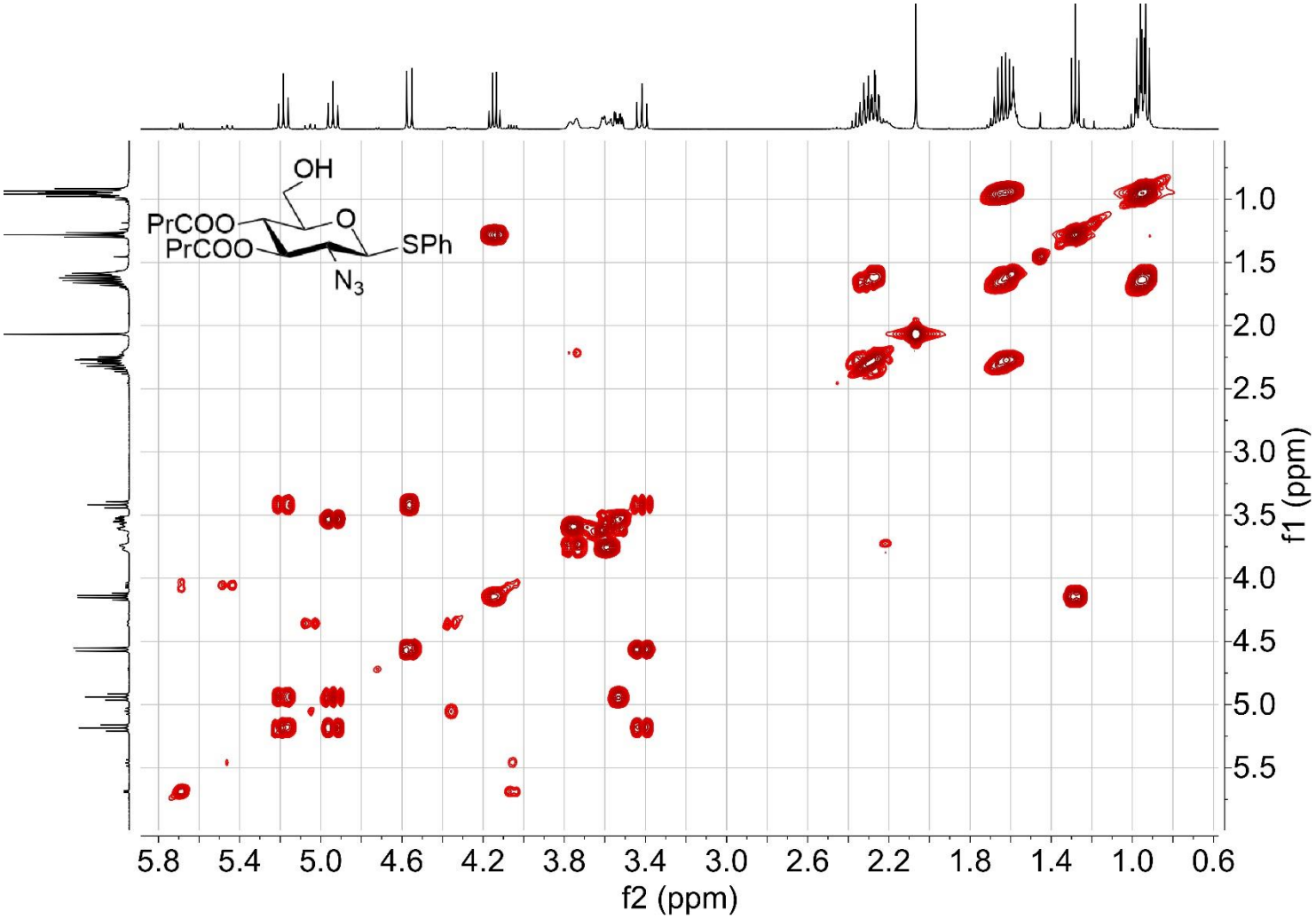
^{1}H NMR (400 MHz, $CDCl_3$) 84 (enriched β-anomer)



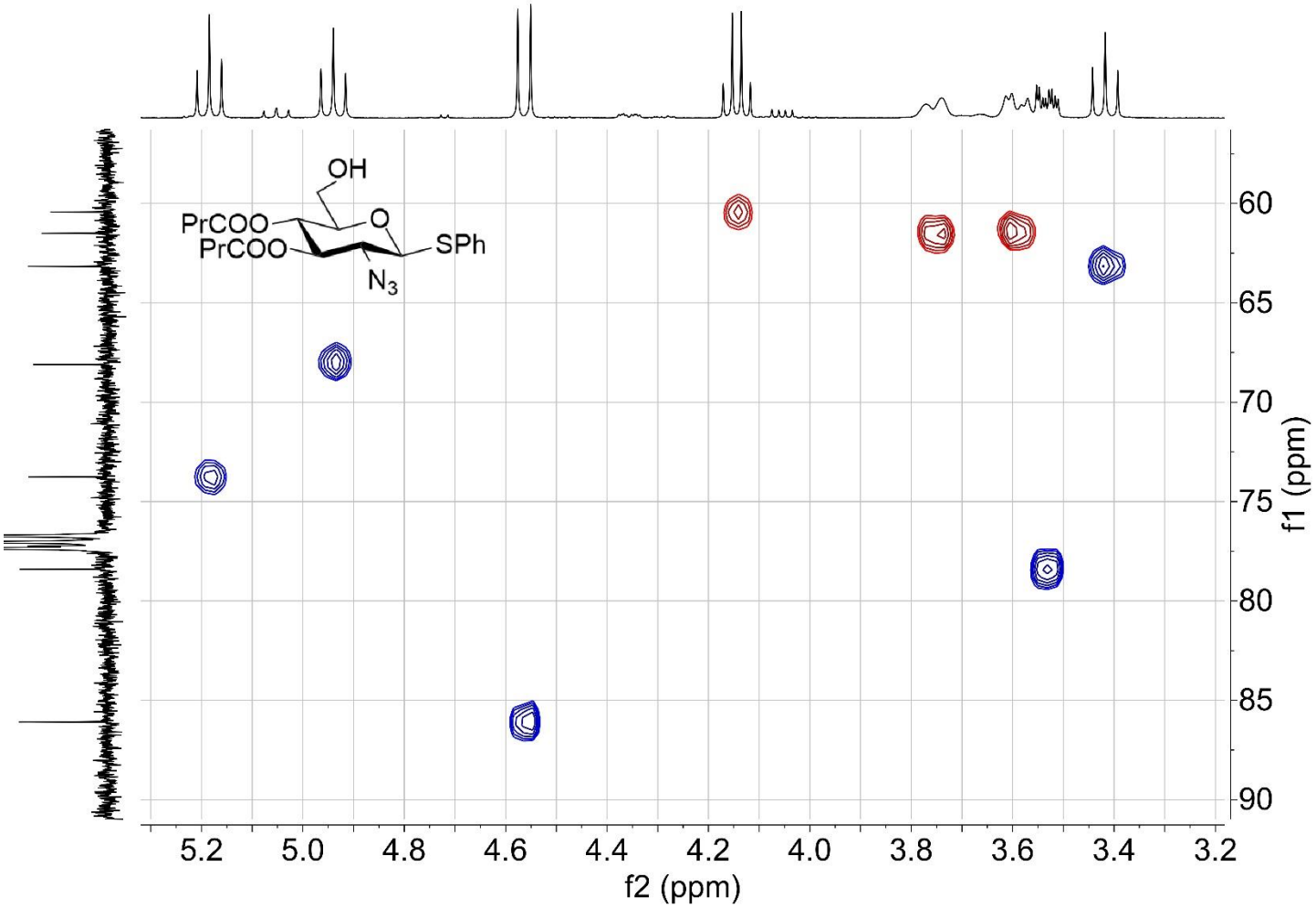
^{13}C NMR (100 MHz, $CDCl_3$) 84 (enriched β-anomer)



^{1}H-^{1}H COSY 84 (enriched β-anomer)

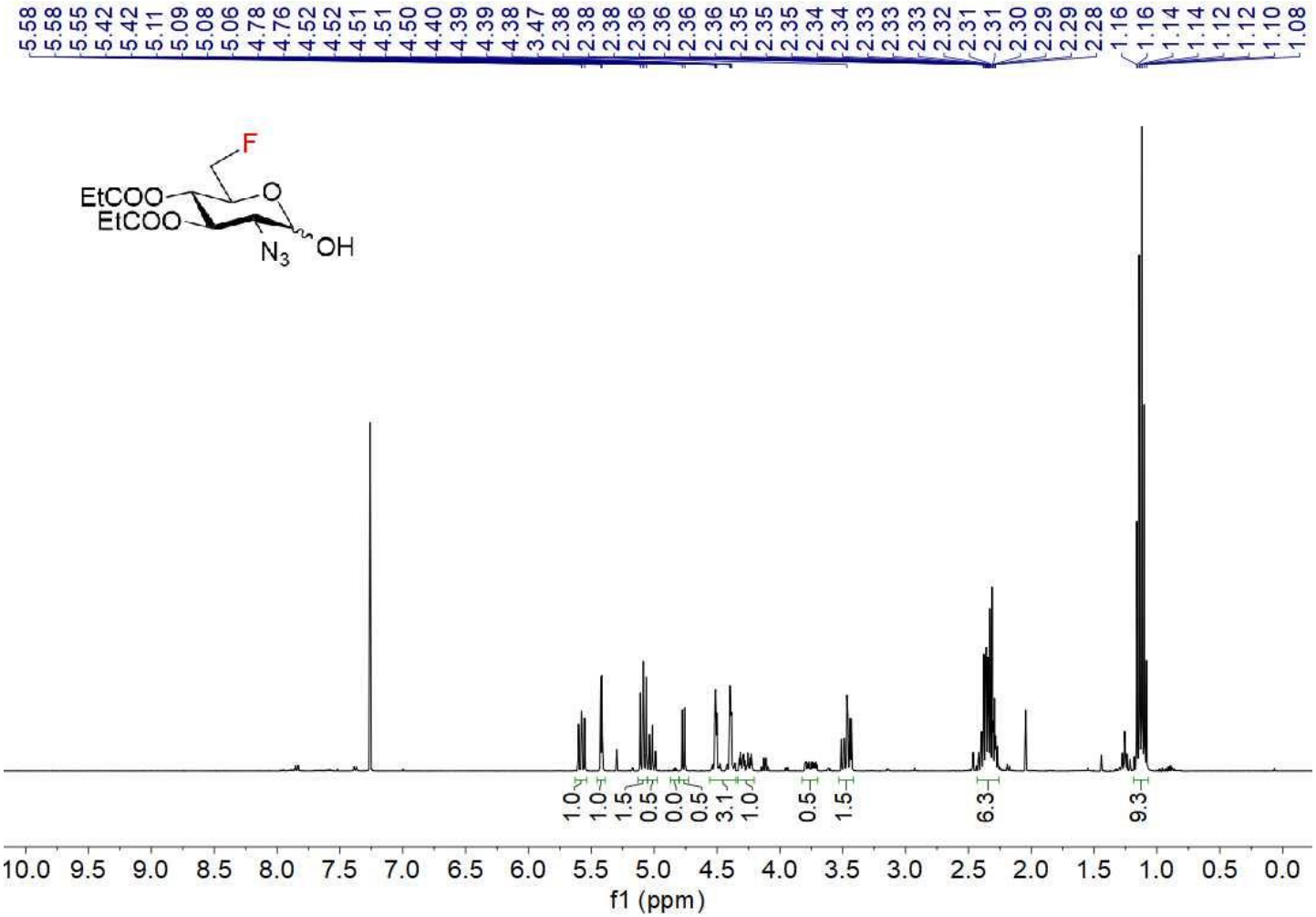


^{1}H-^{13}C HSQC 84 (enriched β-anomer)

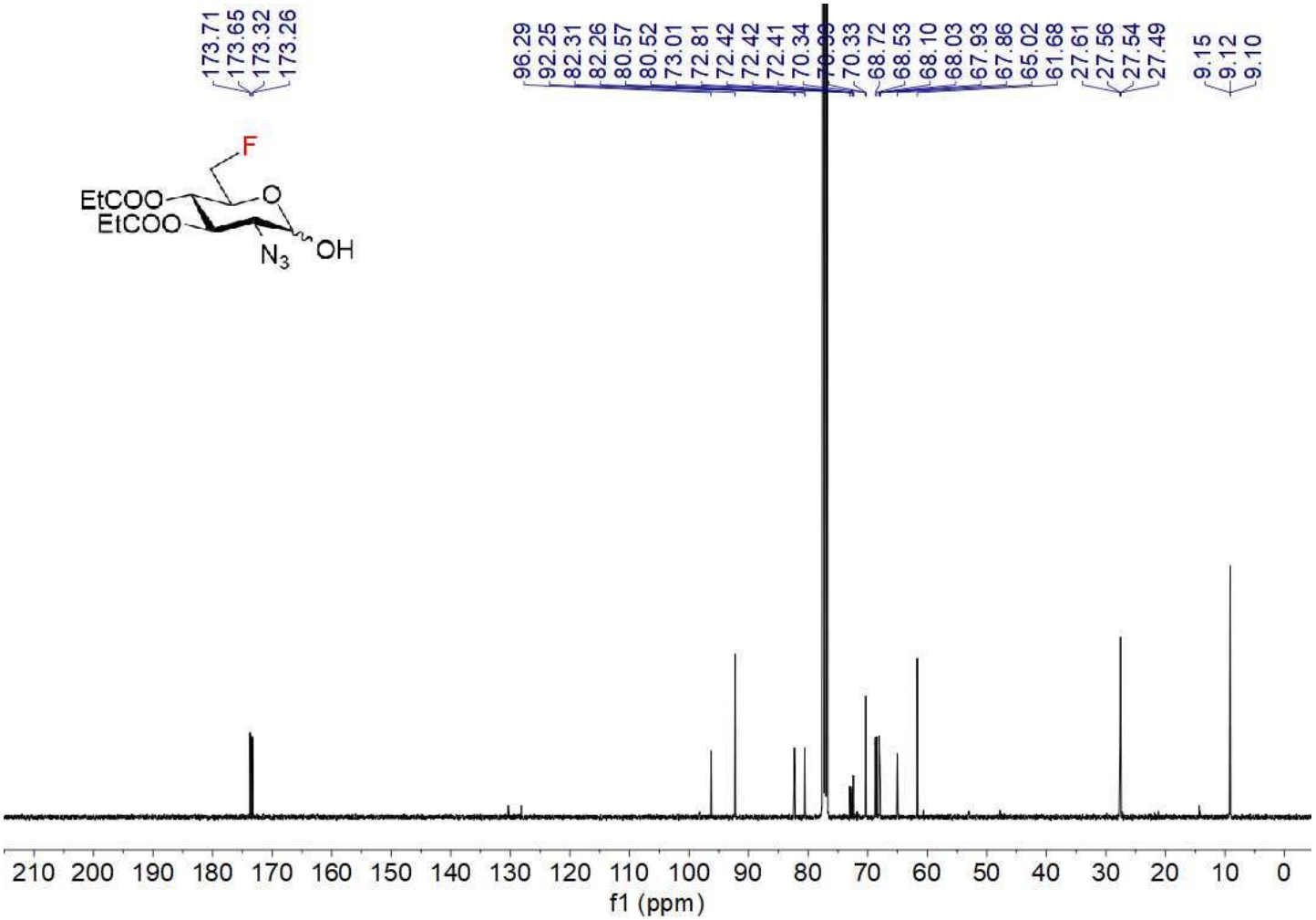


NMR COMPOUND 85

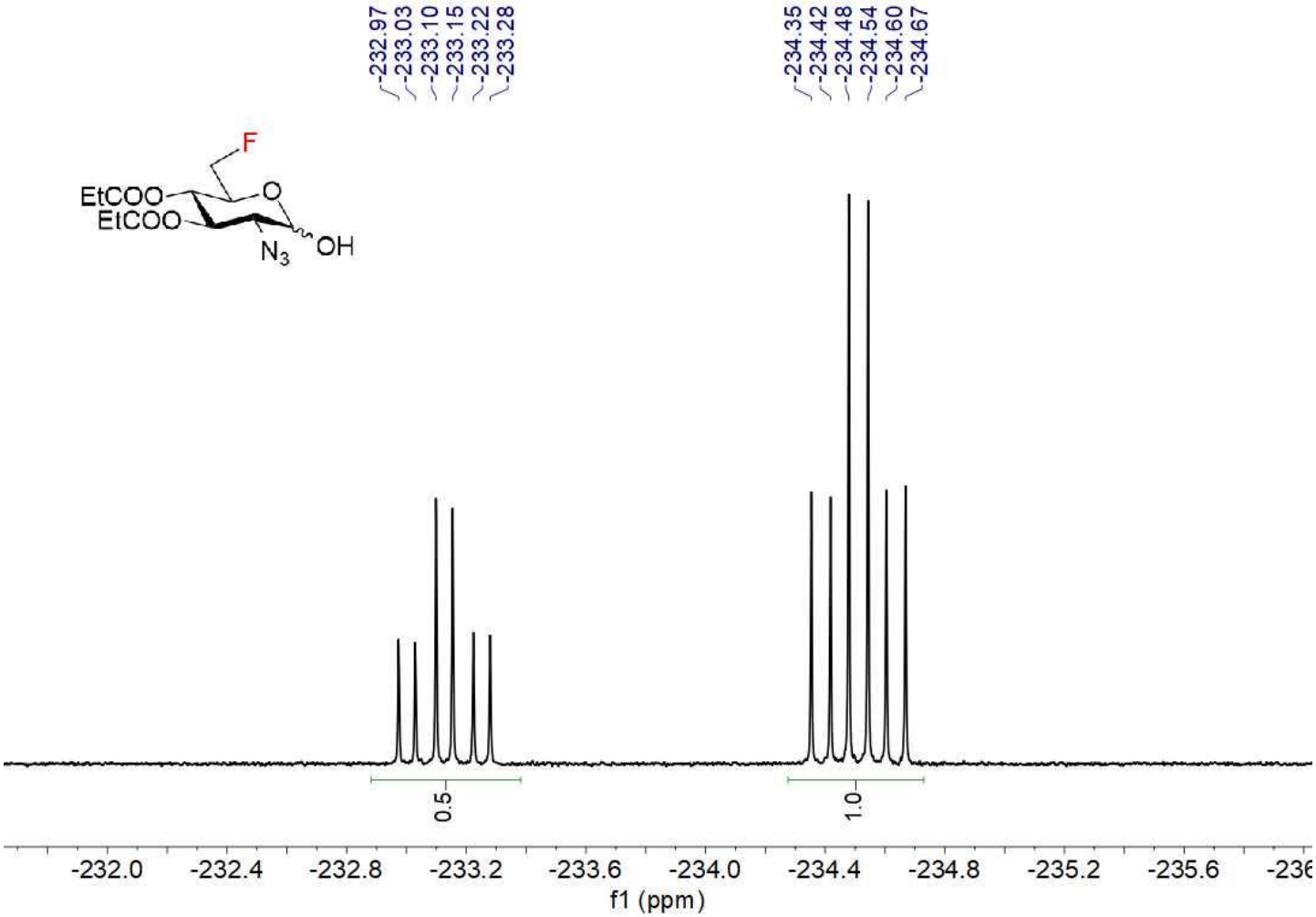
^{1}H NMR (400 MHz, $CDCl_3$) 85



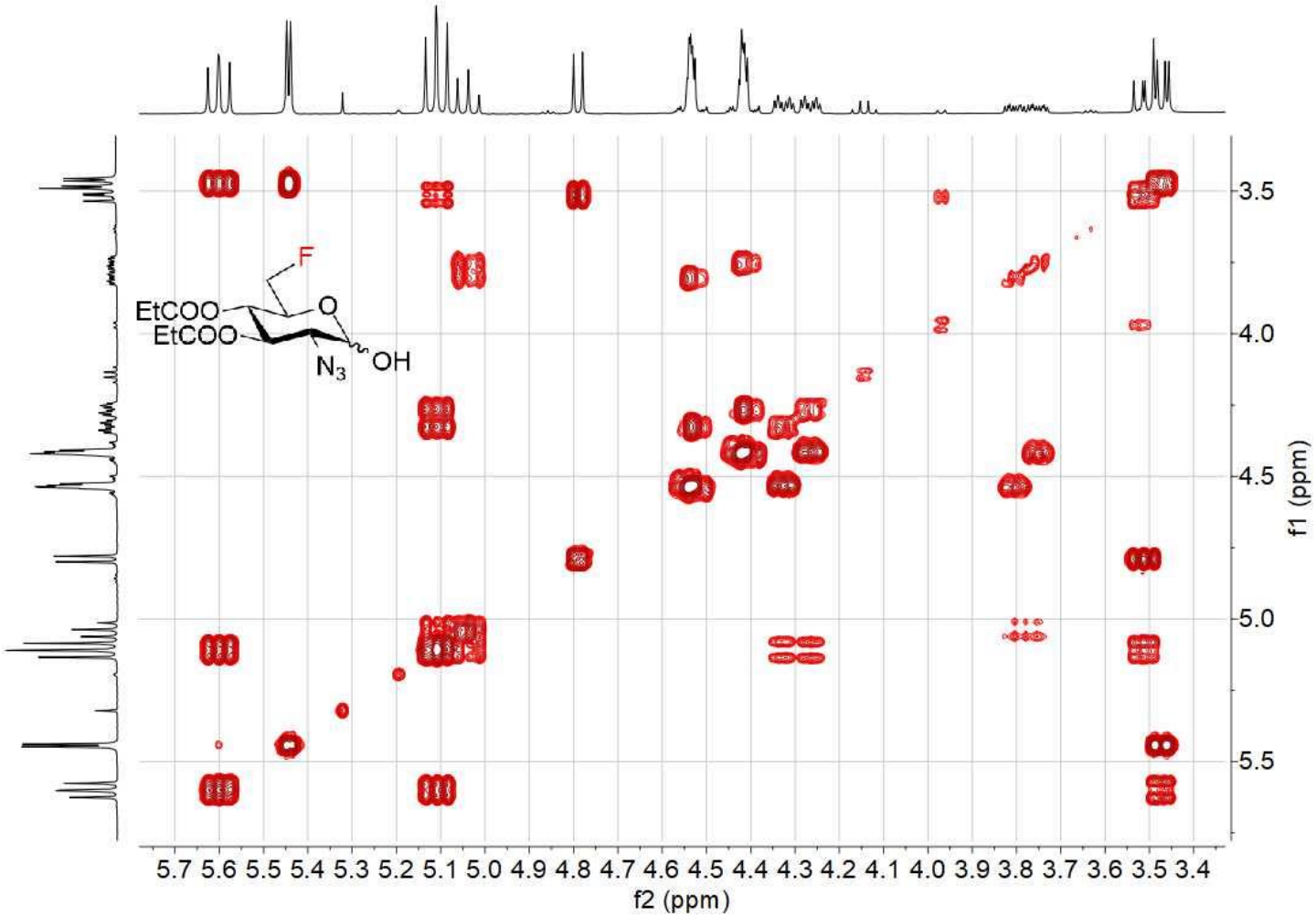
^{13}C NMR (100 MHz, $CDCl_3$) 85



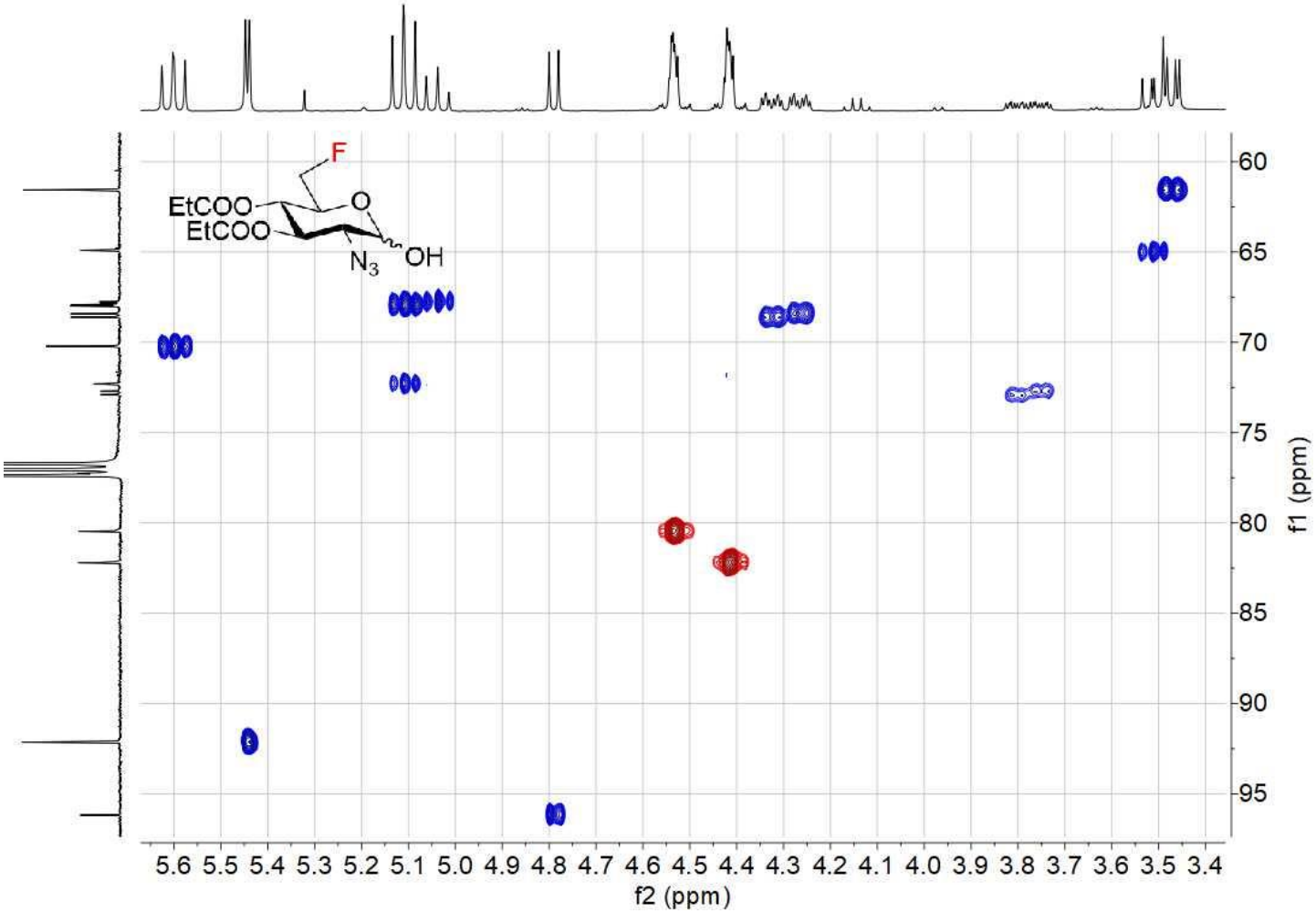
^{19}F NMR (376 MHz, $CDCl_3$) 85



^{1}H-^{1}H COSY 85

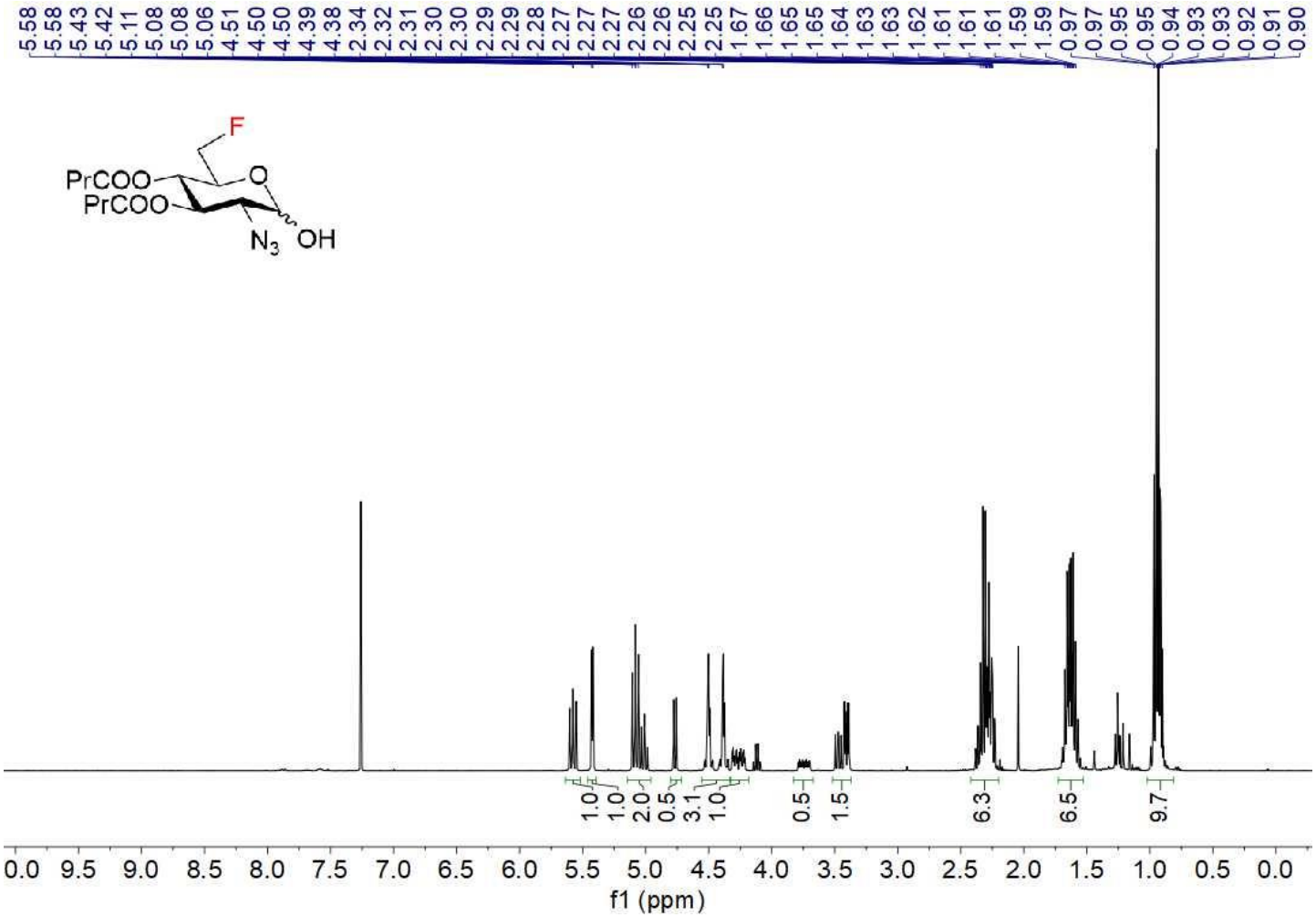

F
EtCOO
EtCOO
O
N3
OH
3.5
4.0
4.5
5.0
5.5
f1 (ppm)
5.7 5.6 5.5 5.4 5.3 5.2 5.1 5.0 4.9 4.8 4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6 3.5 3.4
f2 (ppm)

^{1}H-^{13}C HSQC 85

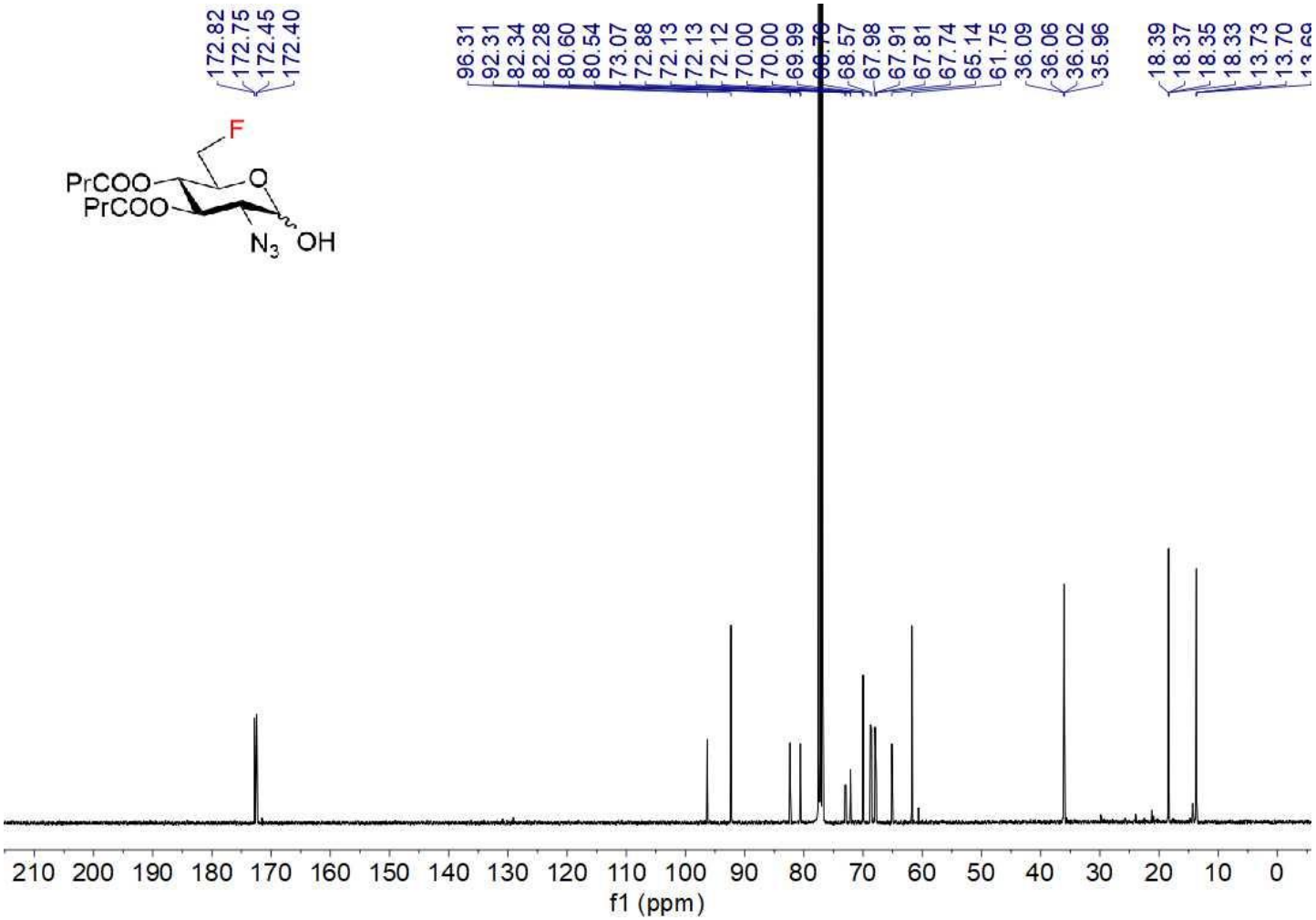


NMR COMPOUND 86

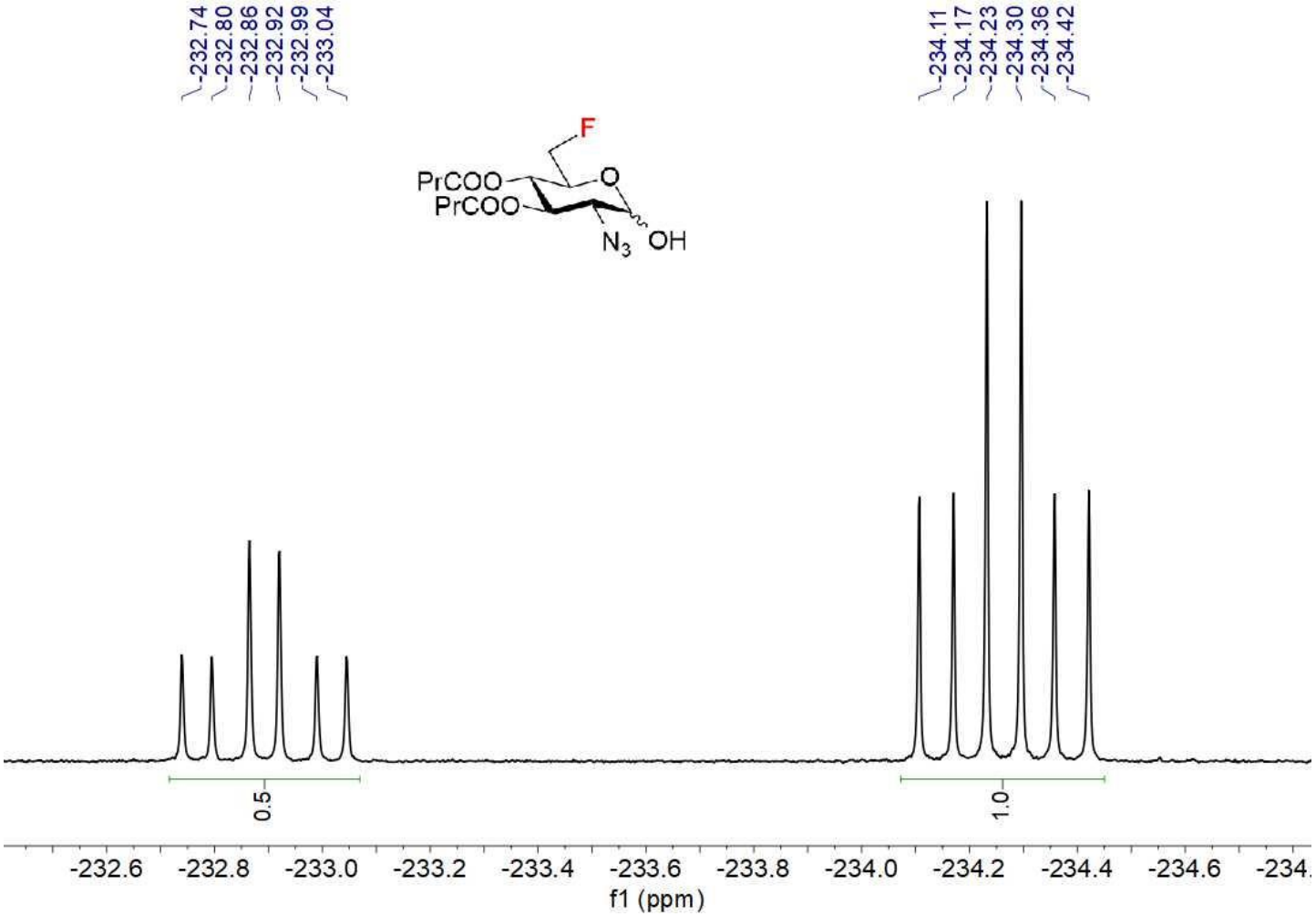
^{1}H NMR (400 MHz, $CDCl_3$) 86



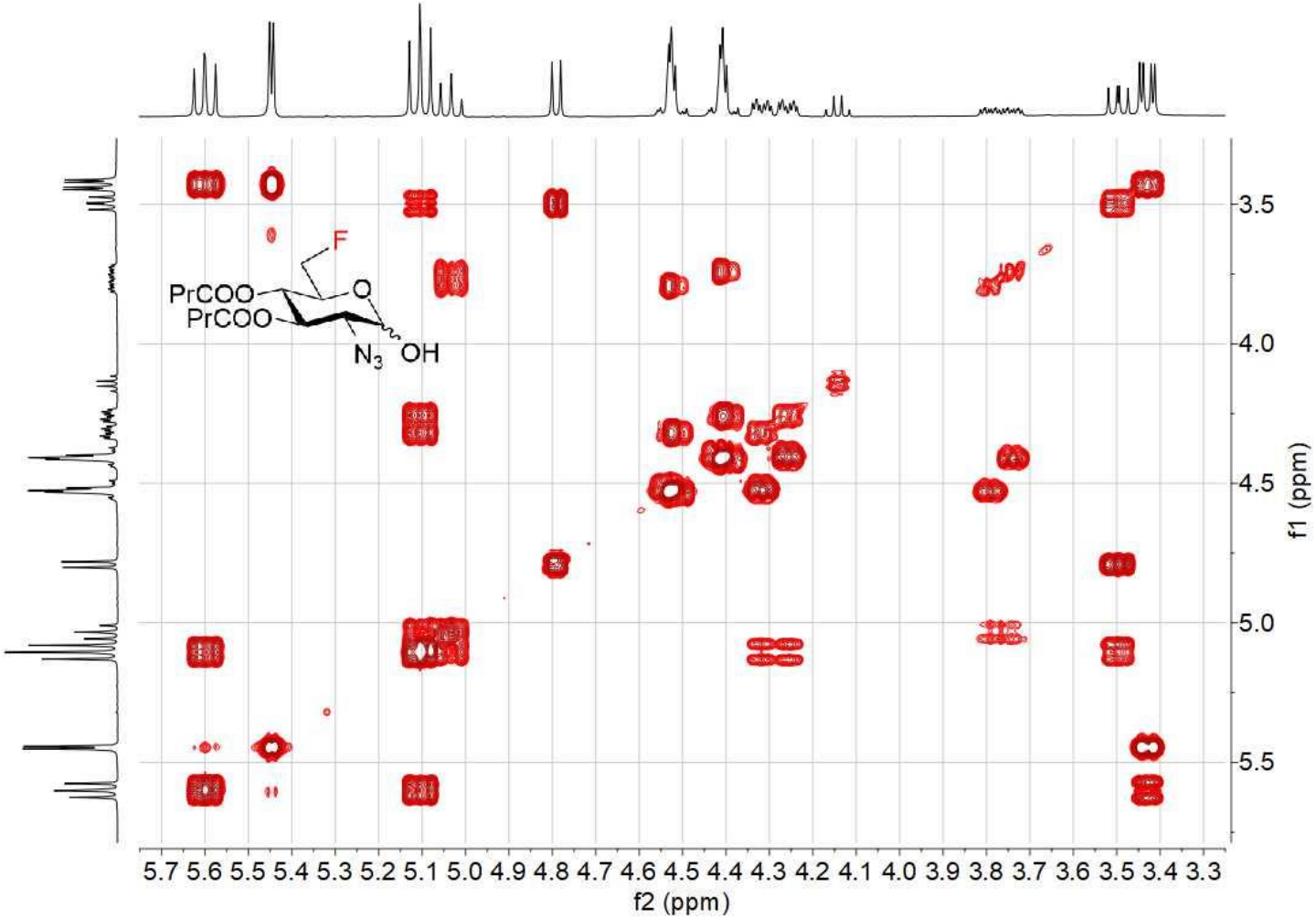
^{13}C NMR (100 MHz, $CDCl_3$) 86



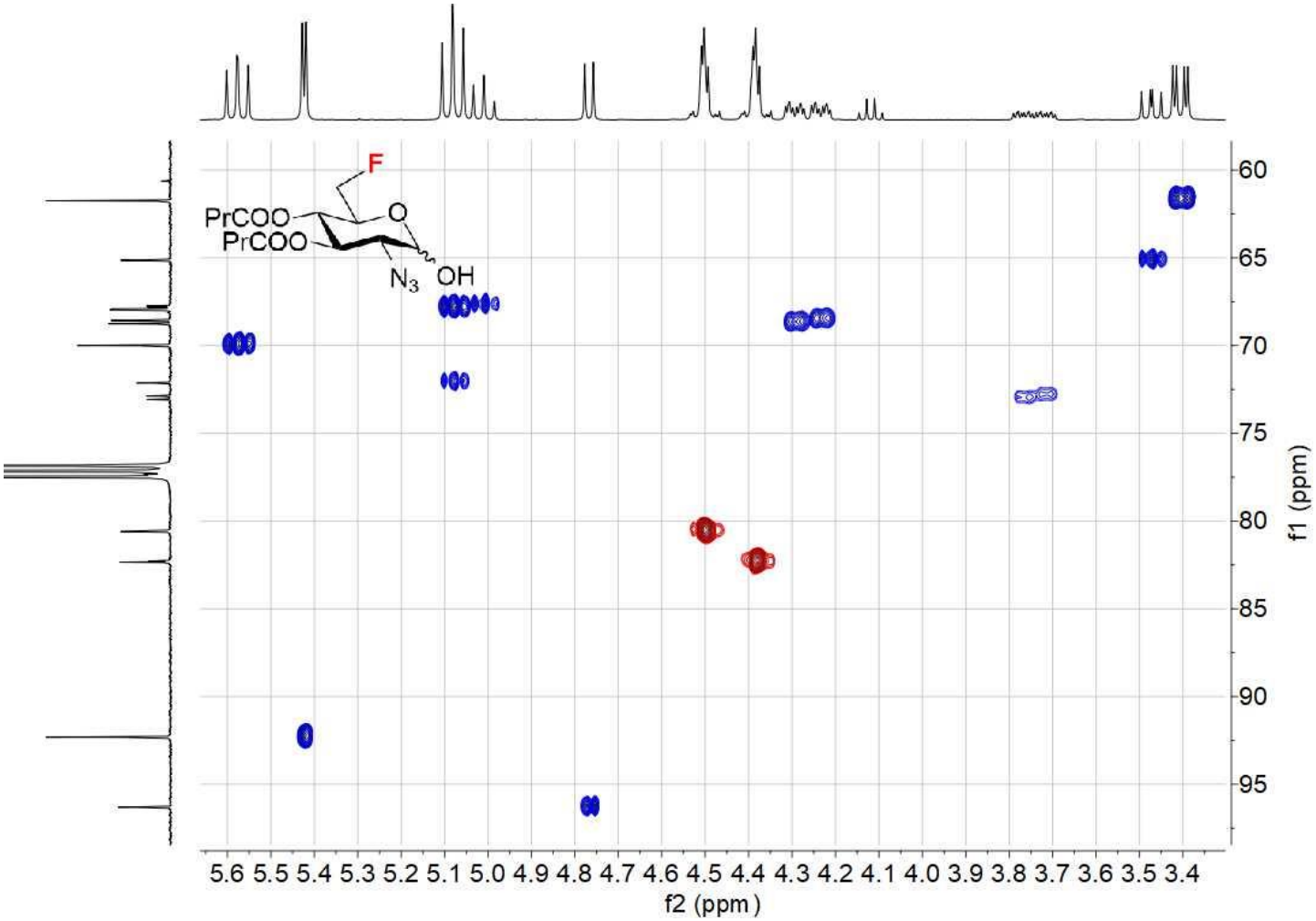
^{19}F NMR (376 MHz, $CDCl_3$) 86



^{1}H-^{1}H COSY 86

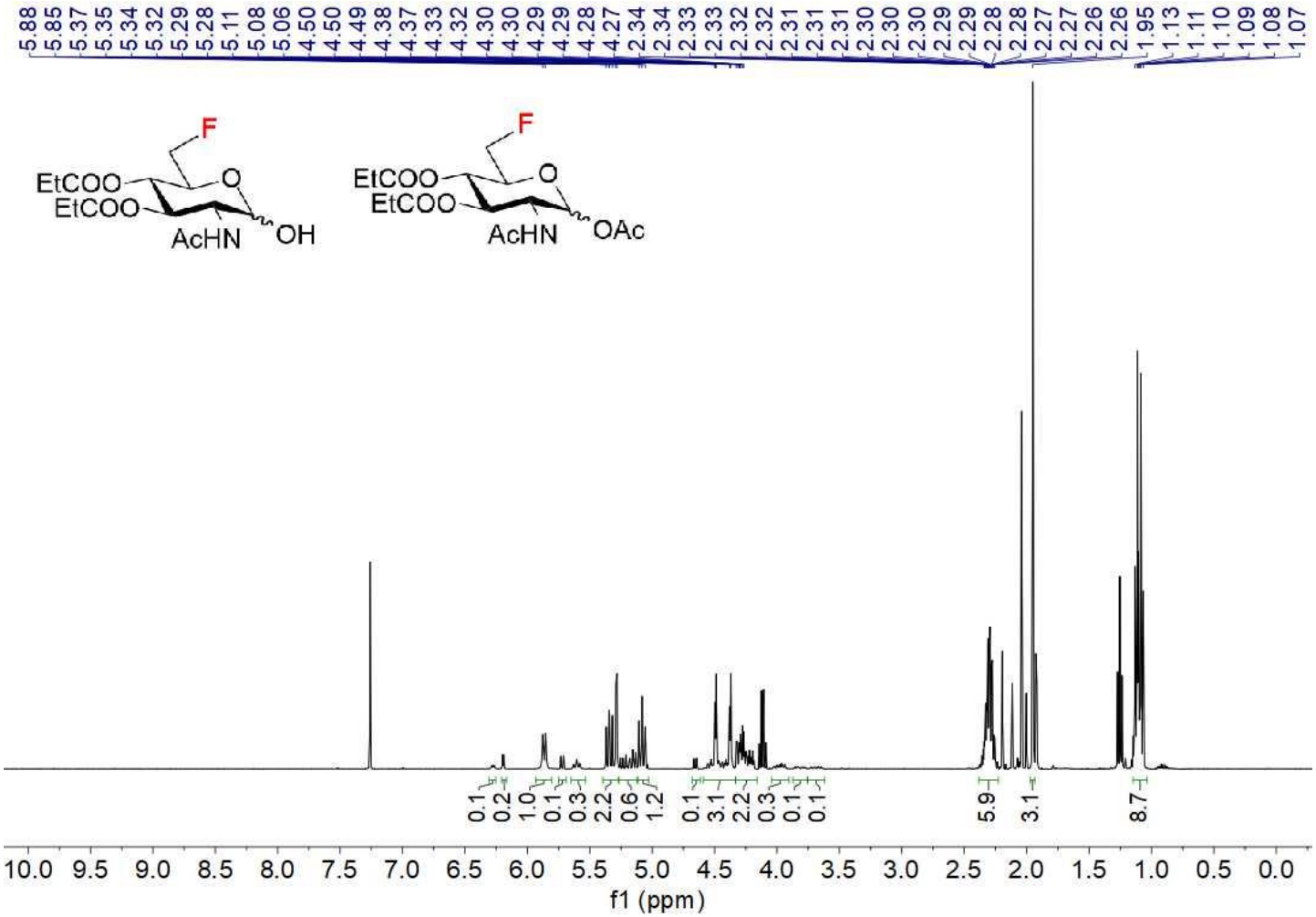

F
PrCOO
PrCOO
O
N3
OH
3.5
4.0
4.5
5.0
5.5
f1 (ppm)
5.7 5.6 5.5 5.4 5.3 5.2 5.1 5.0 4.9 4.8 4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6 3.5 3.4 3.3
f2 (ppm)

^{1}H-^{13}C HSQC 86

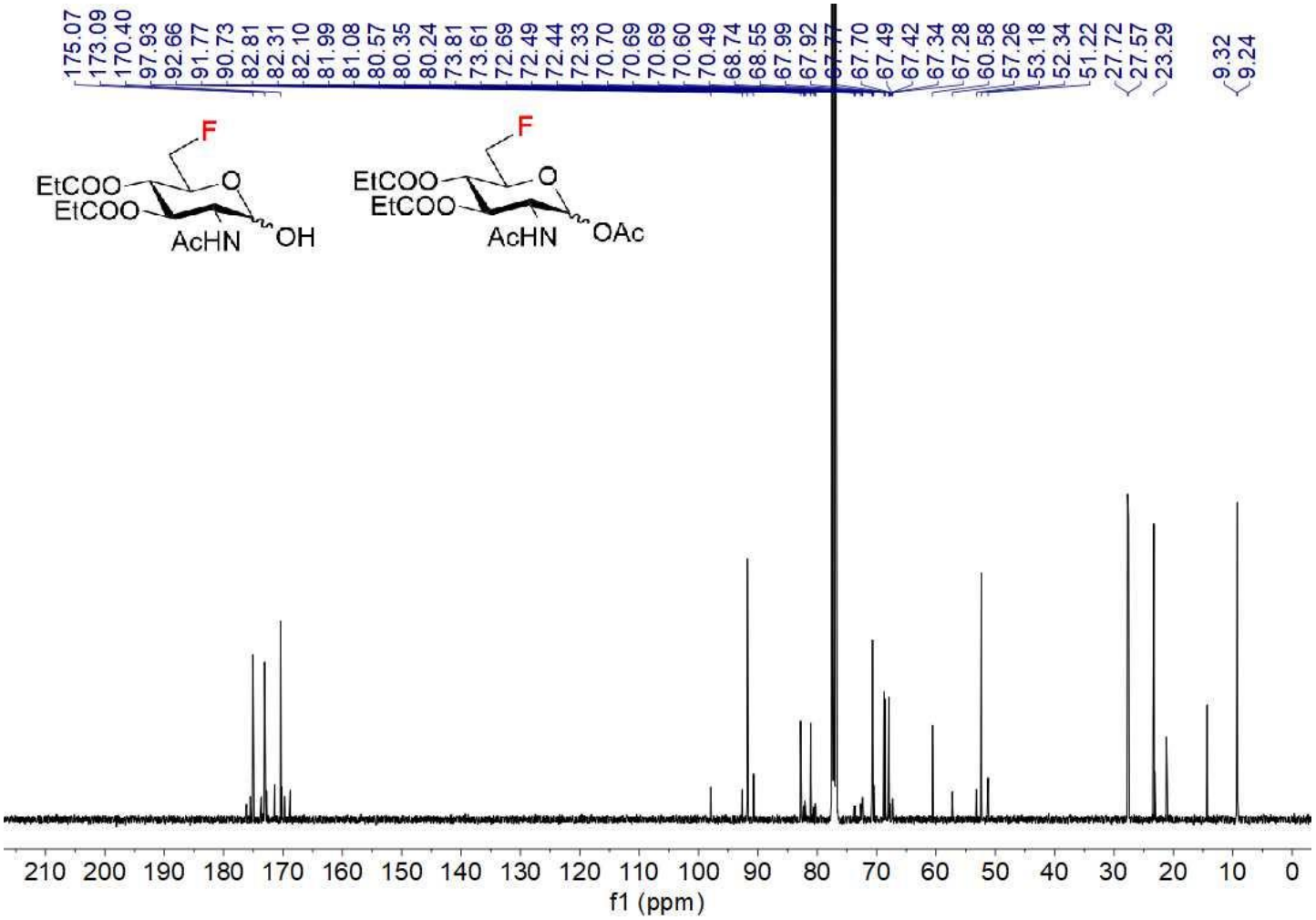


NMR MIXTURE OF COMPOUNDS 18 AND 87

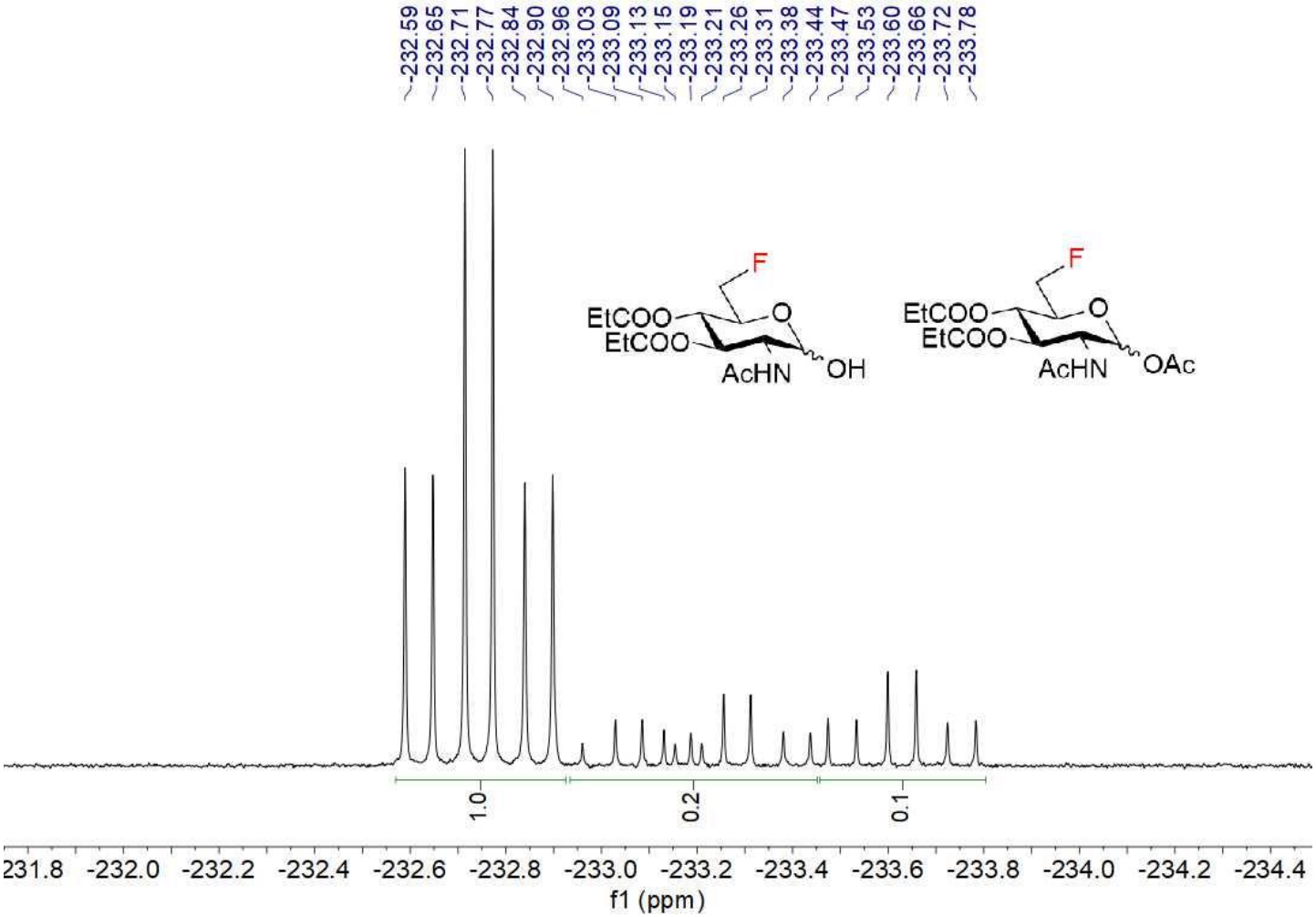
^{1}H NMR (400 MHz, $CDCl_3$) 18 AND 87



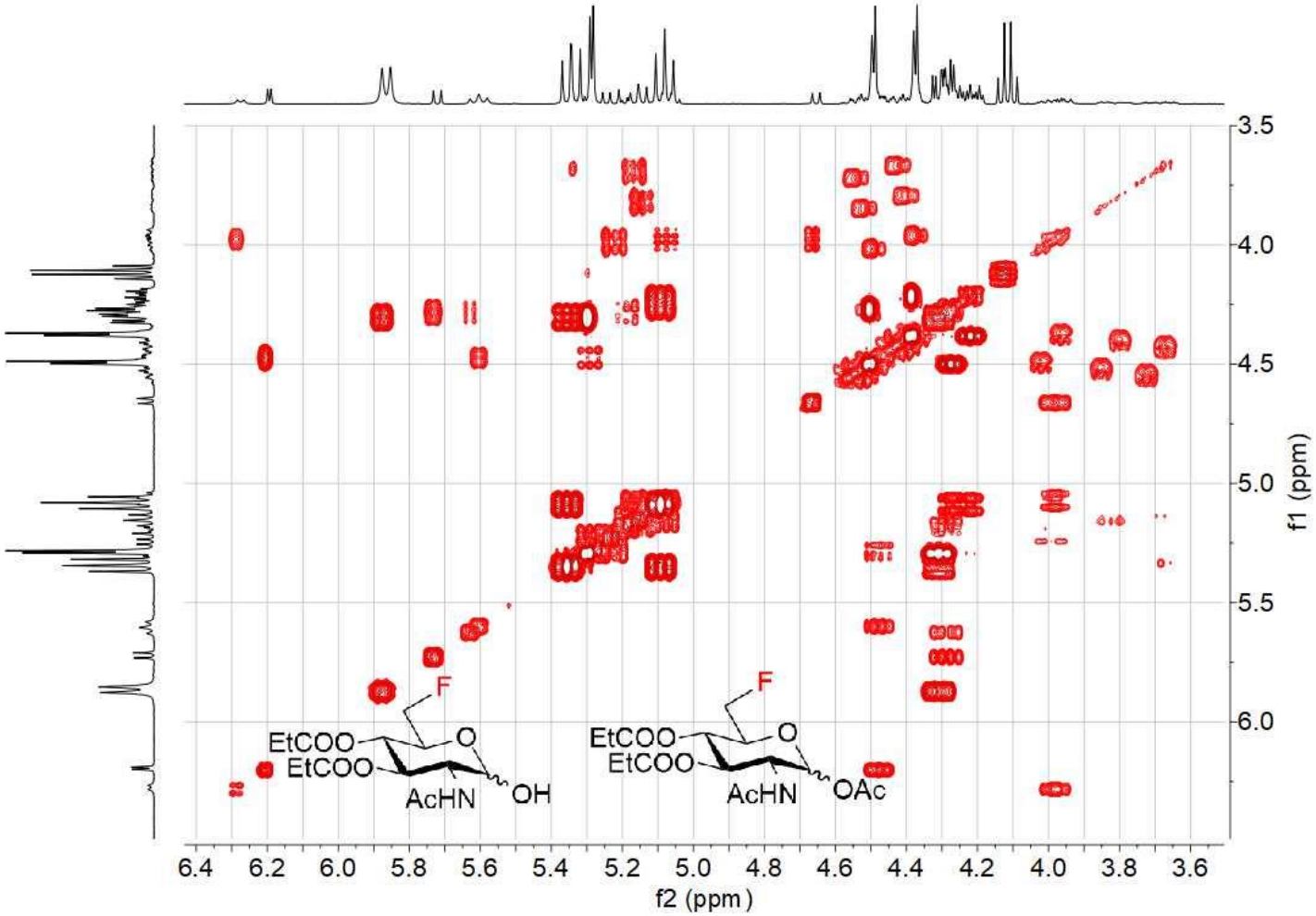
^{13}C NMR (100 MHz, $CDCl_3$) 18 AND 87



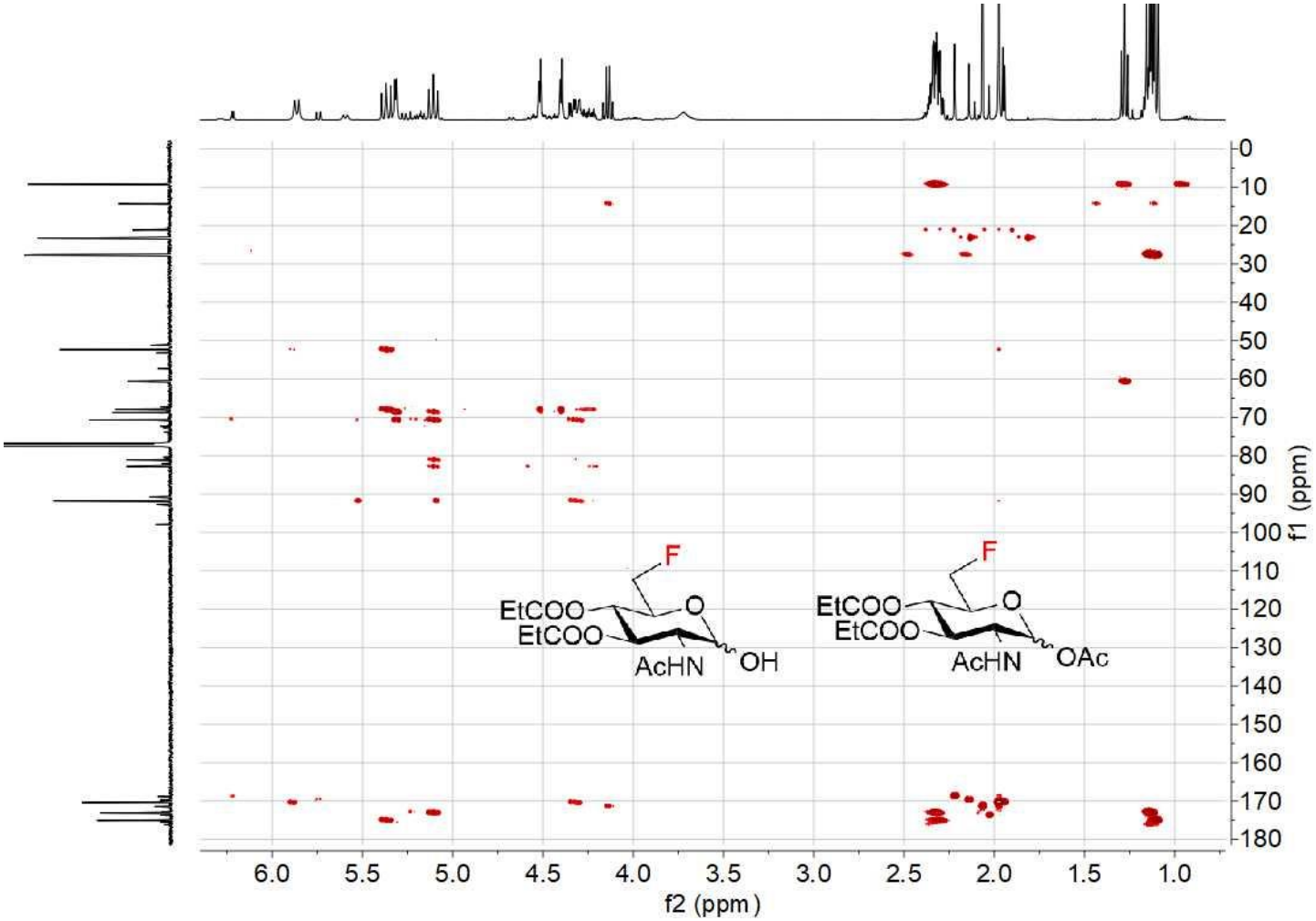
^{19}F NMR (376 MHz, $CDCl_3$) 18 AND 87



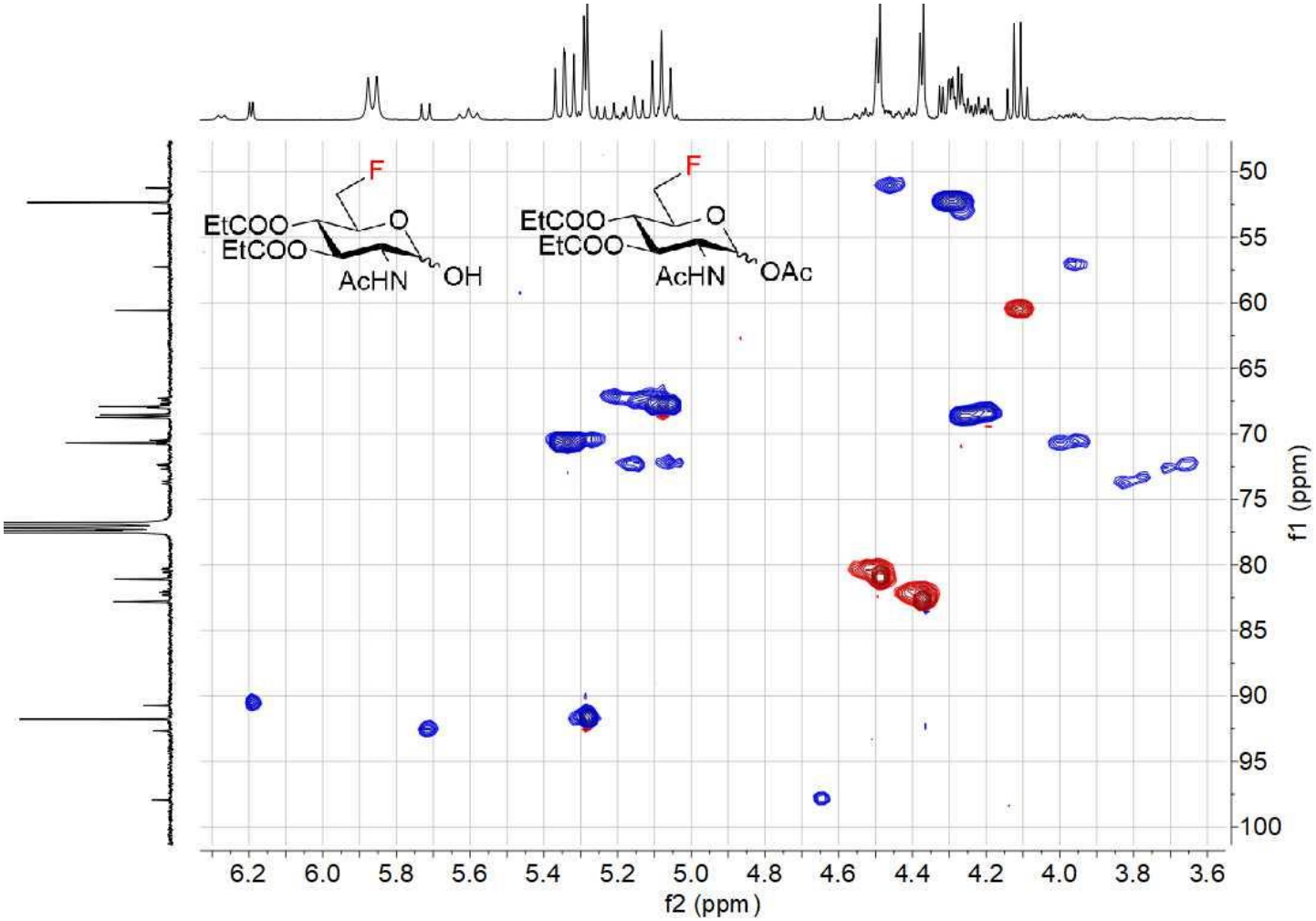
^{1}H-^{1}H COSY 18 AND 87



^{1}H-^{13}C HMBC 18 AND 87

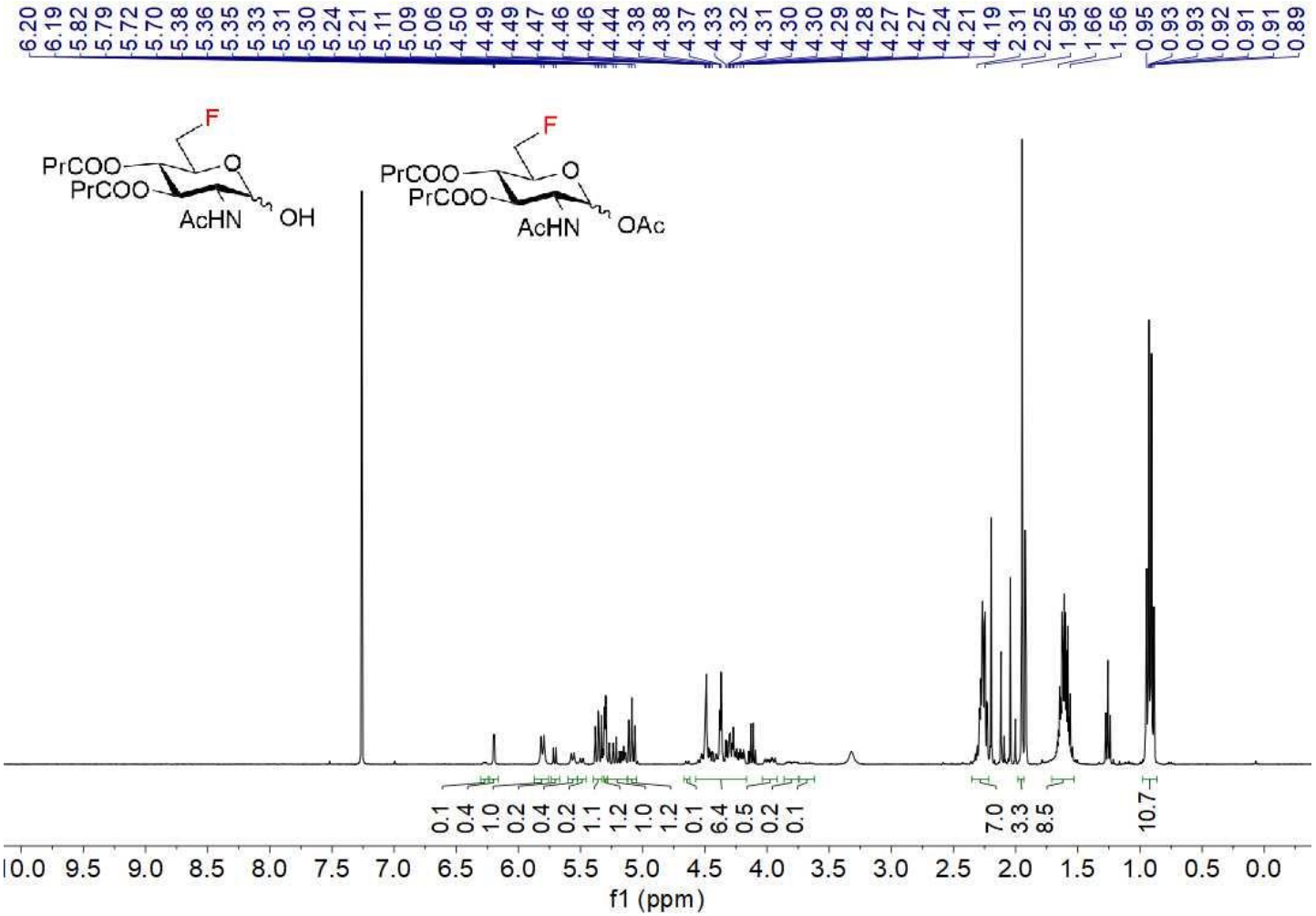


^{1}H-^{13}C HSQC 18 AND 87

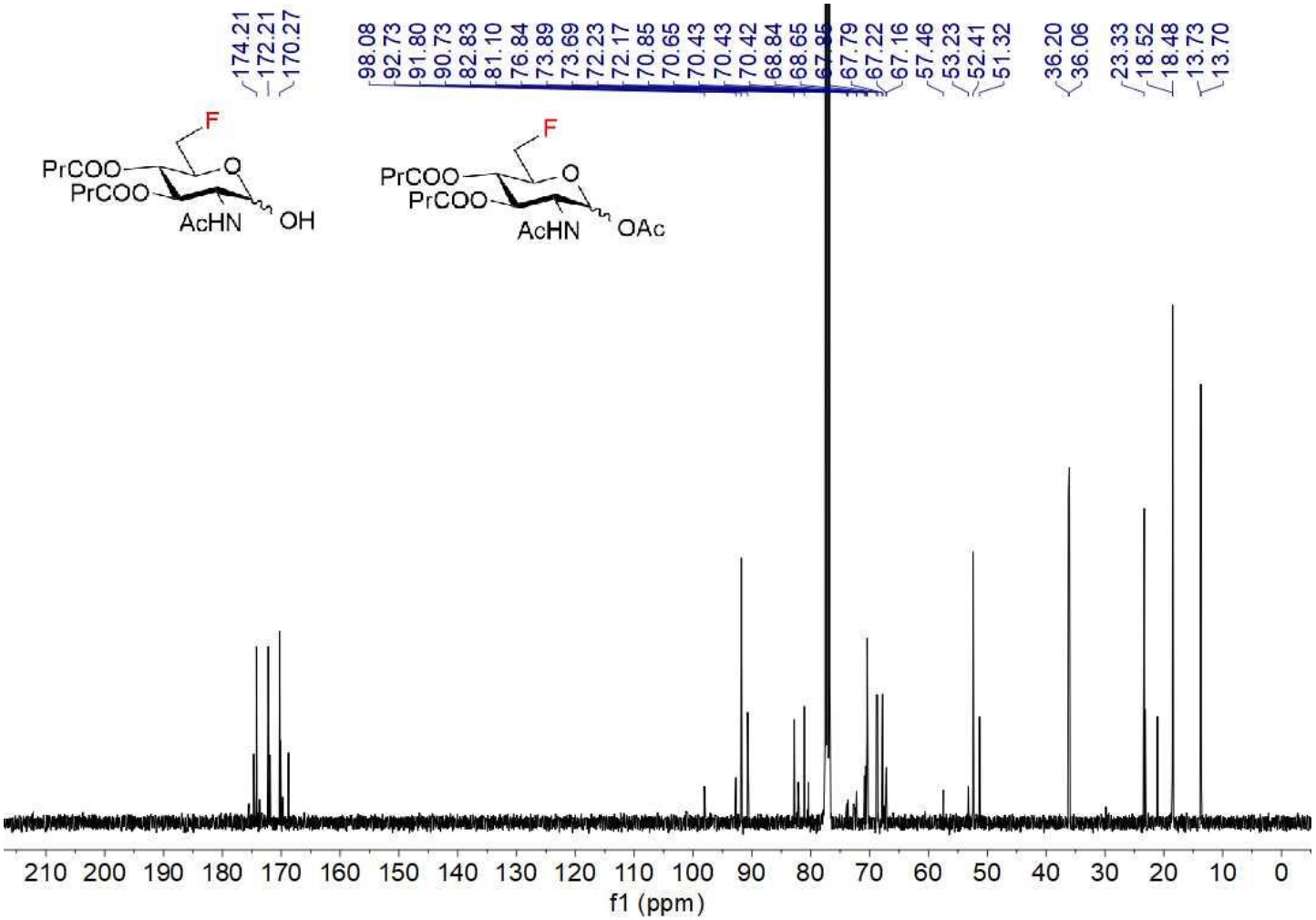


NMR MIXTURE OF COMPOUNDS 19 AND 88

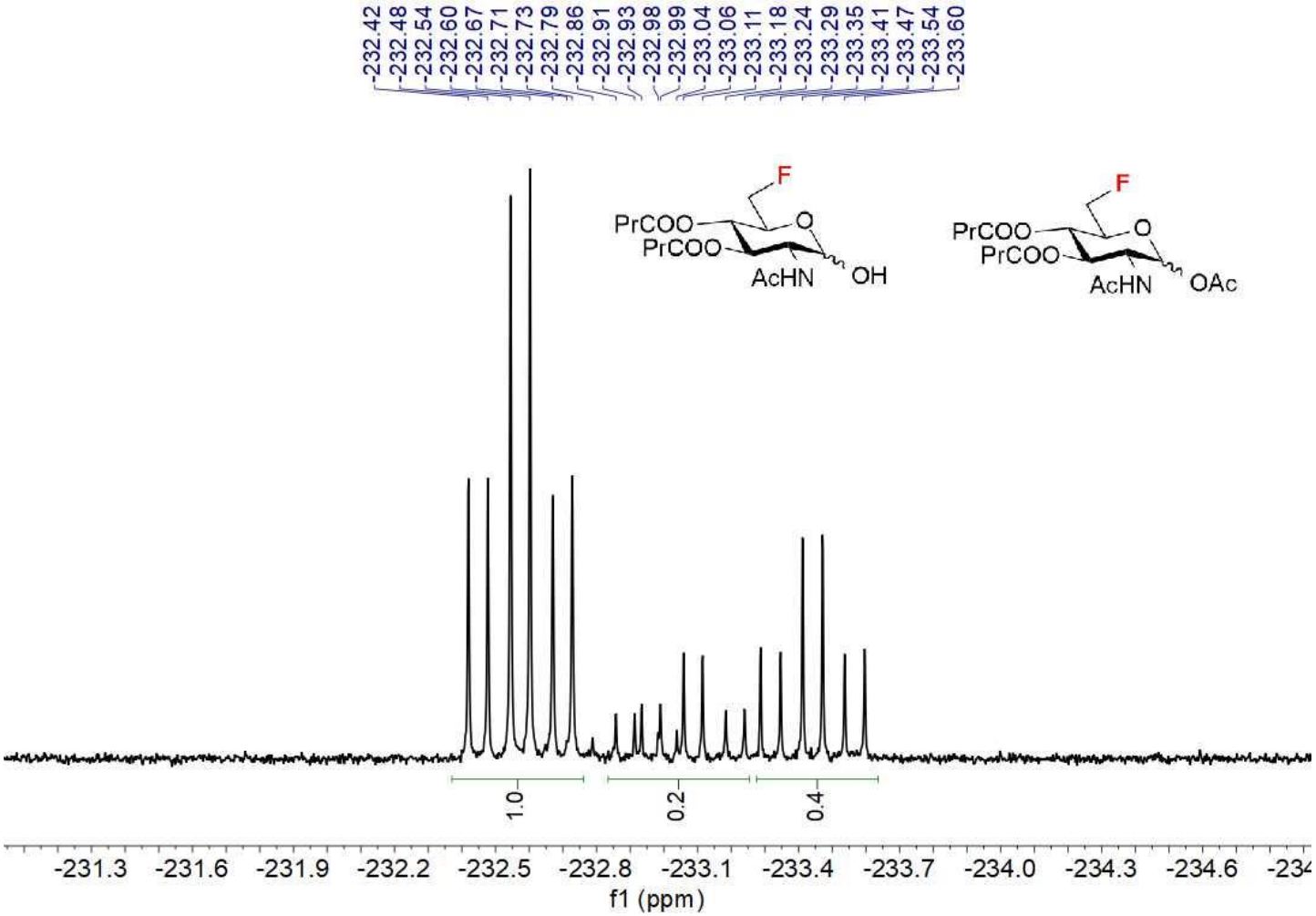
^{1}H NMR (400 MHz, $CDCl_3$) 19 AND 88



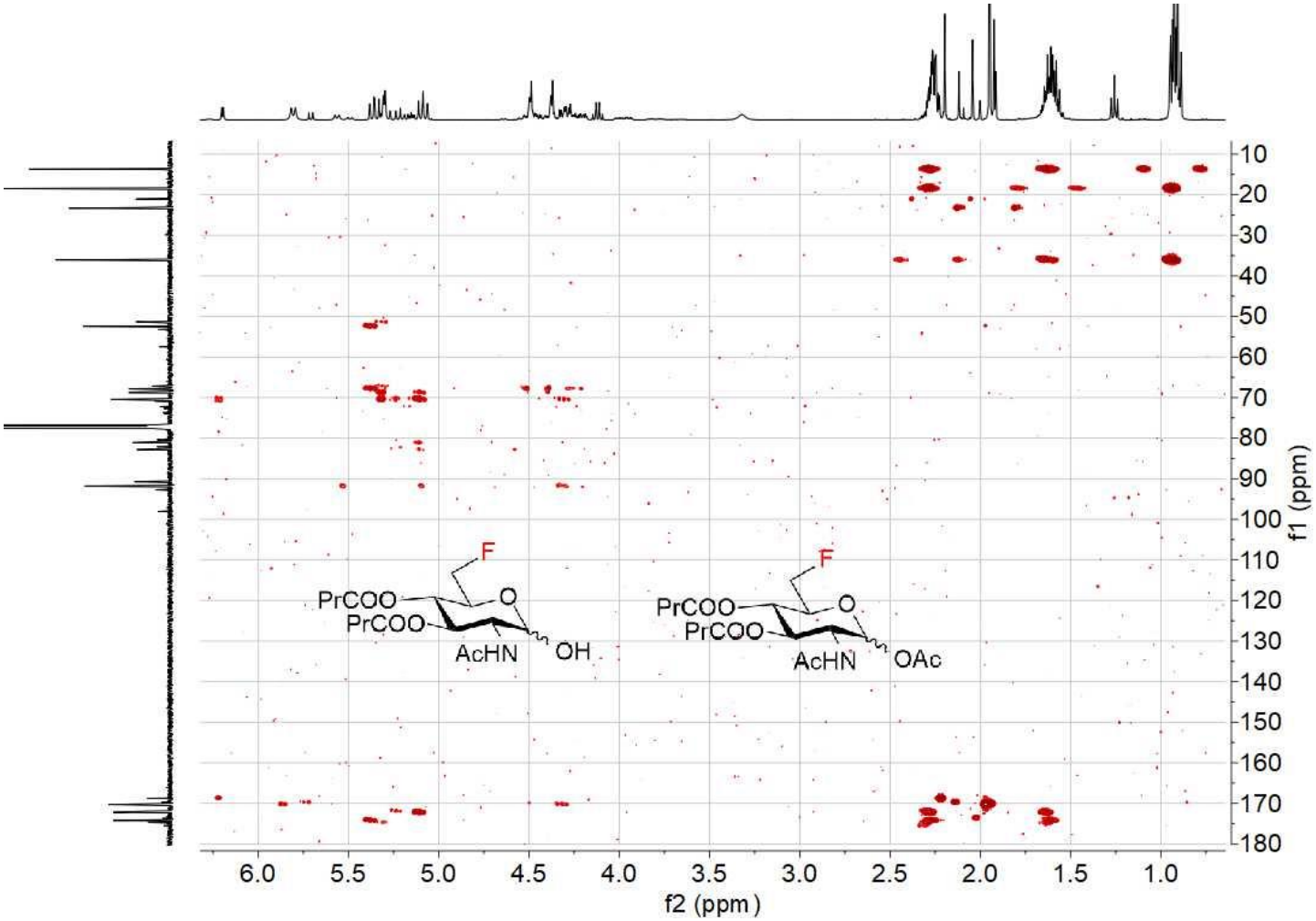
^{13}C NMR (100 MHz, $CDCl_3$) 19 AND 88



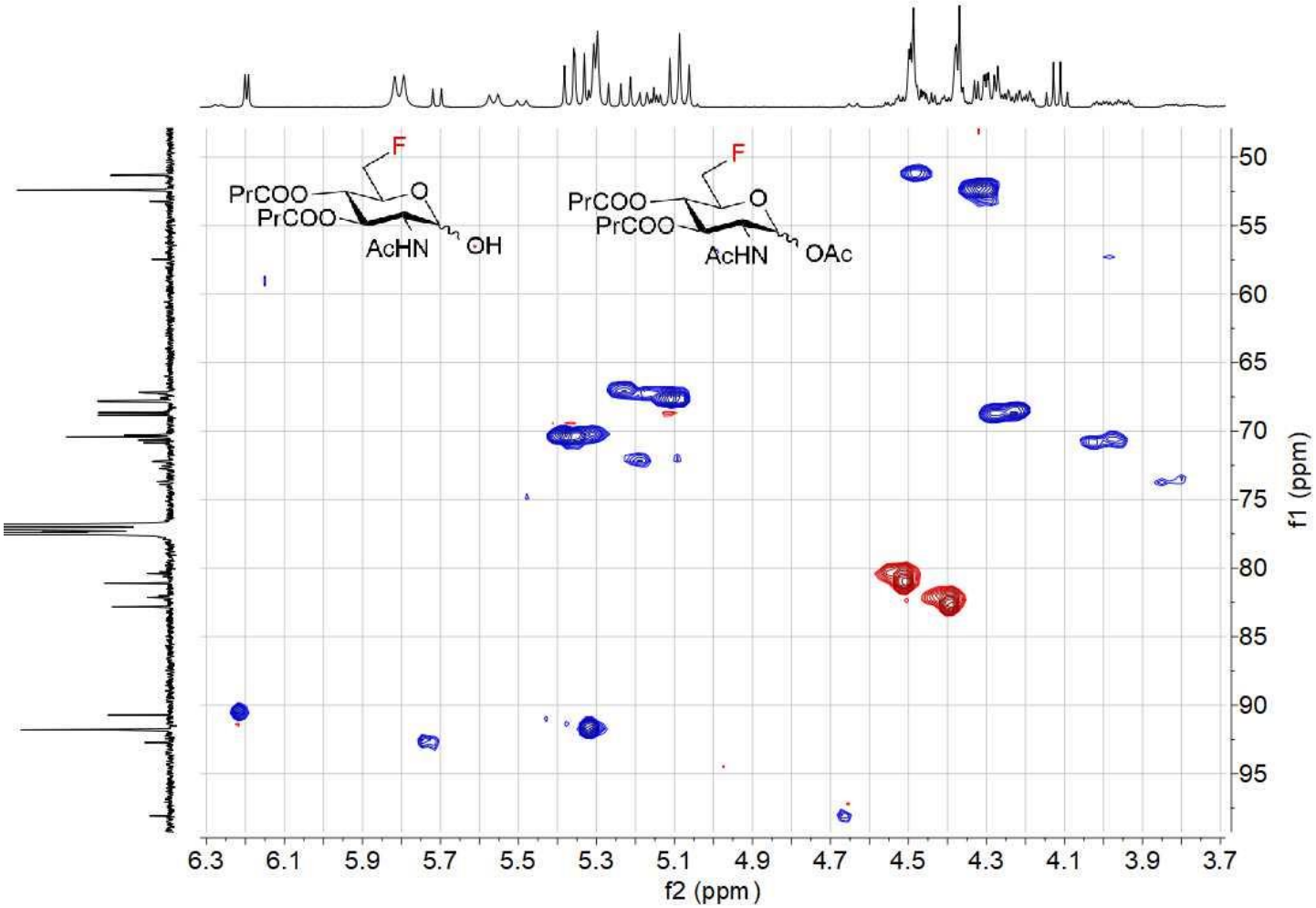
^{19}F NMR (376 MHz, $CDCl_3$) 19 AND 88



^{1}H-^{13}C HMBC 19 AND 88

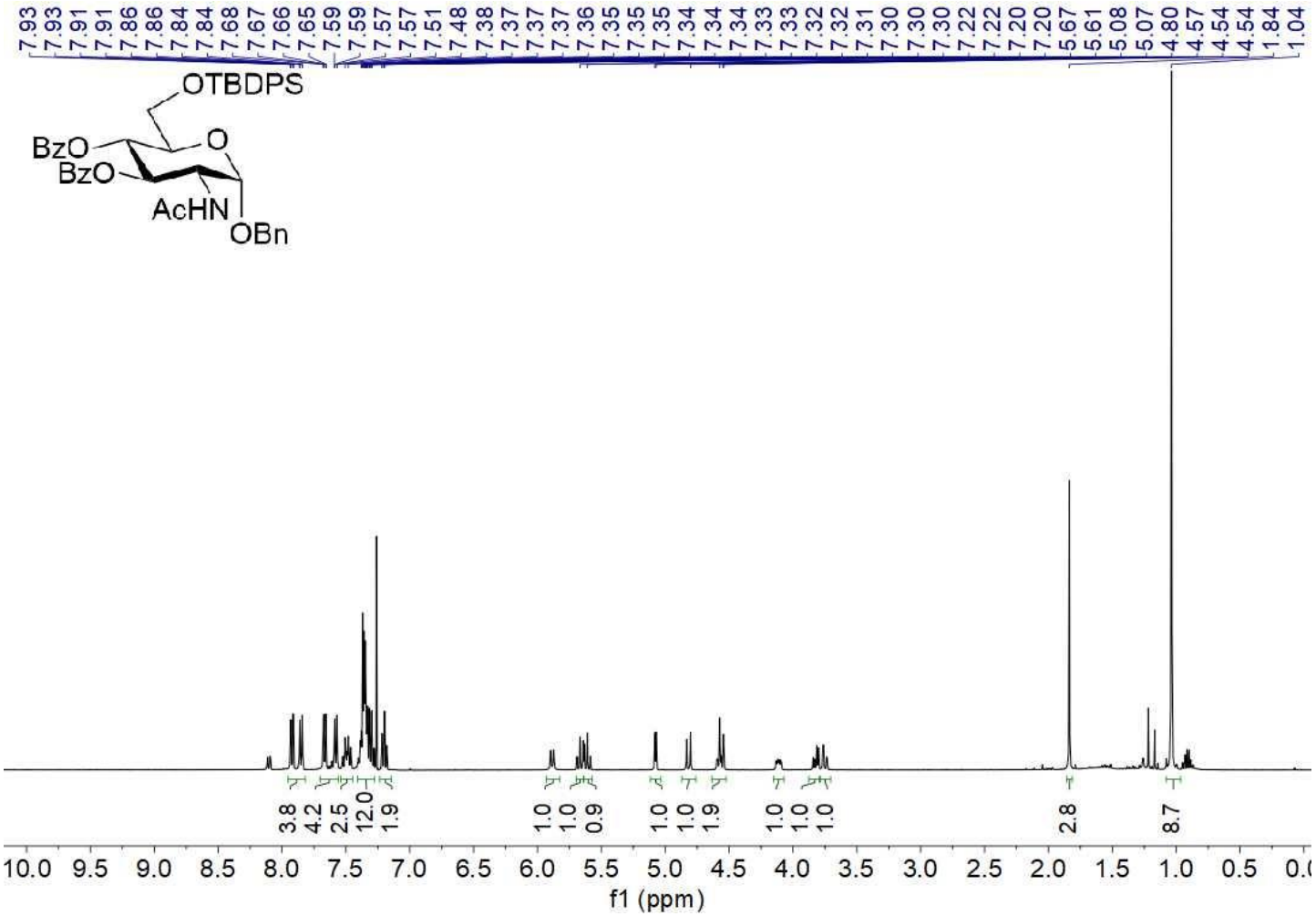


^{1}H-^{13}C HSQC 19 AND 88

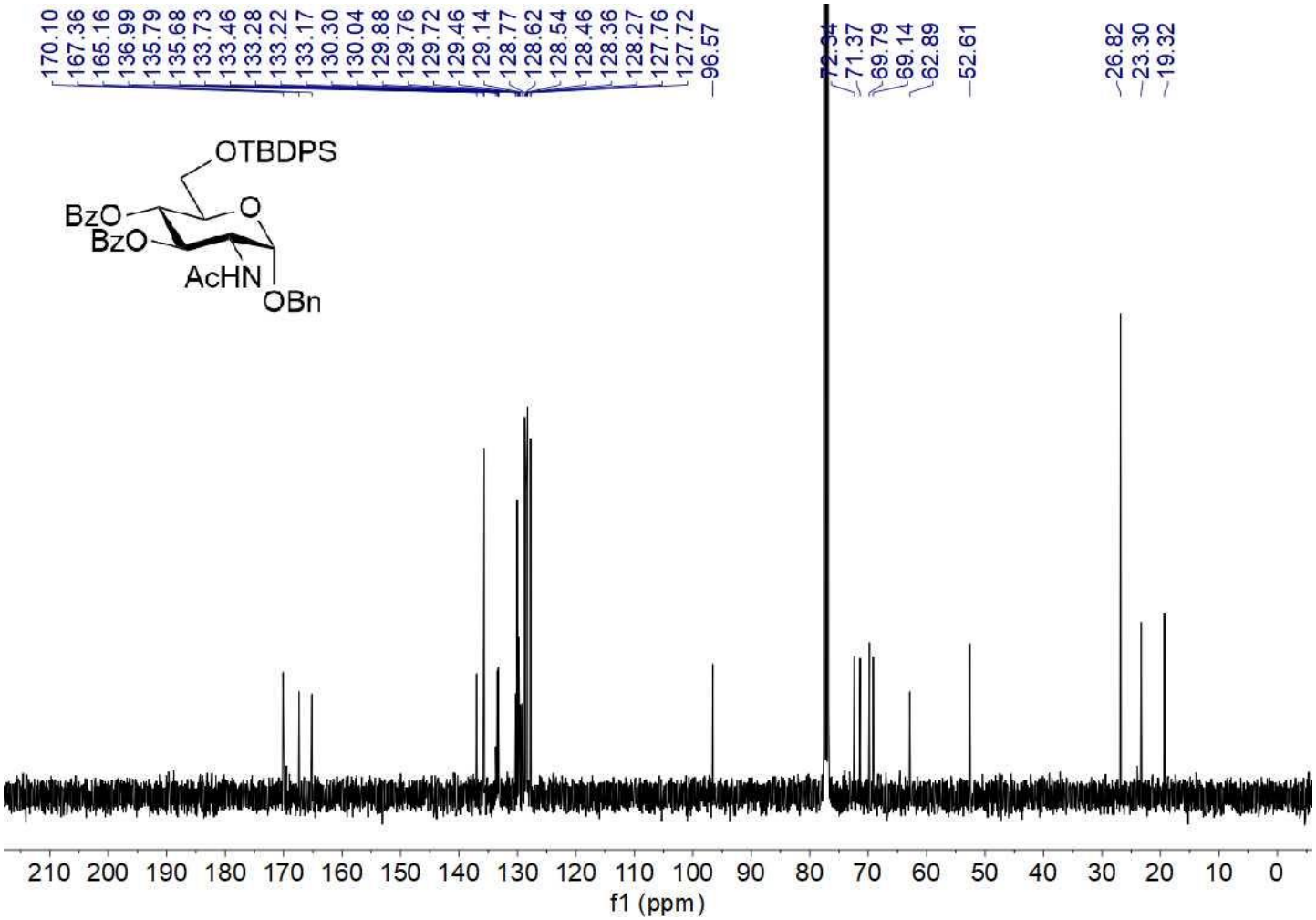


NMR COMPOUND 90

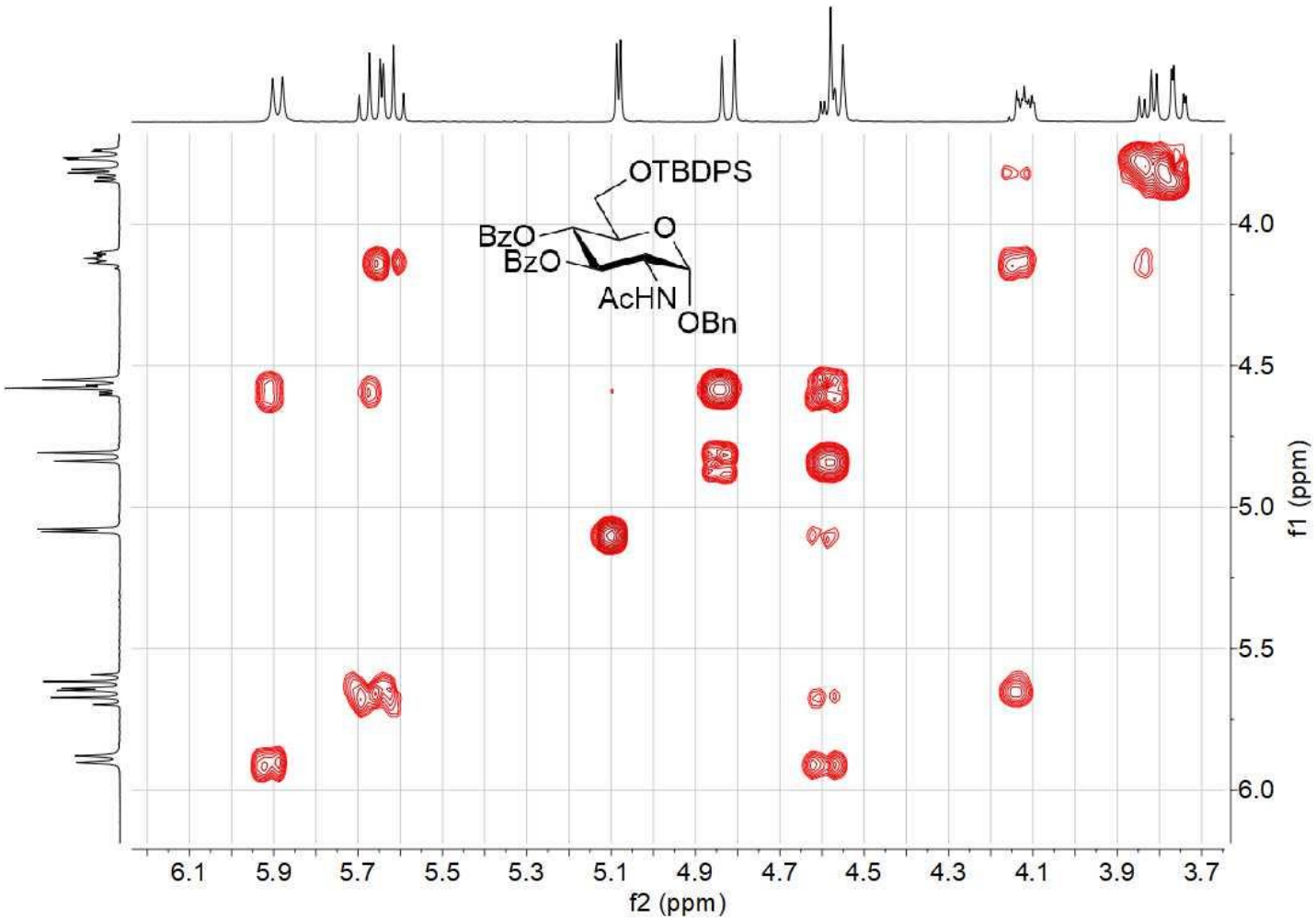
^{1}H NMR (400 MHz, $CDCl_3$) 90



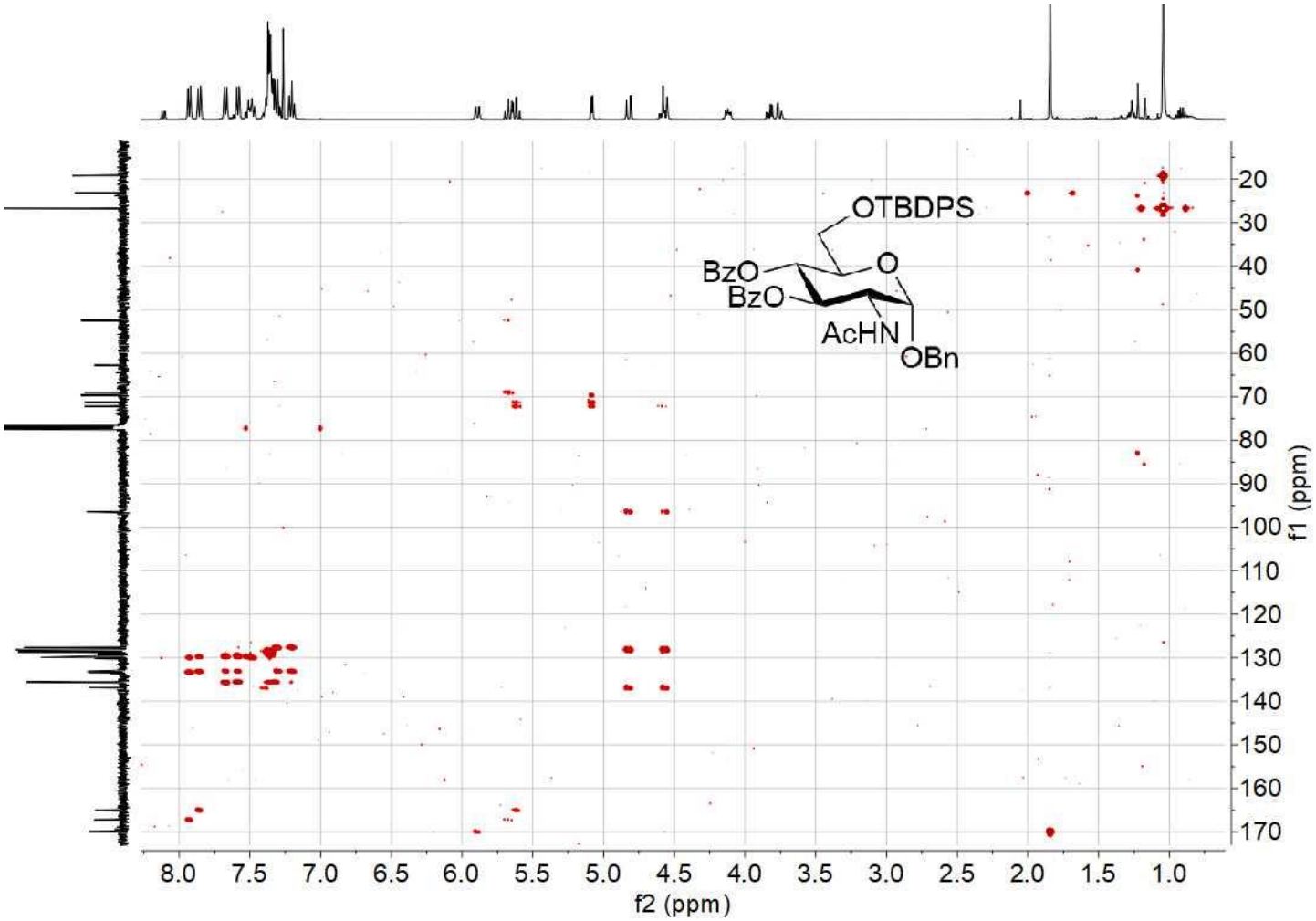
^{13}C NMR (100 MHz, $CDCl_3$) 90



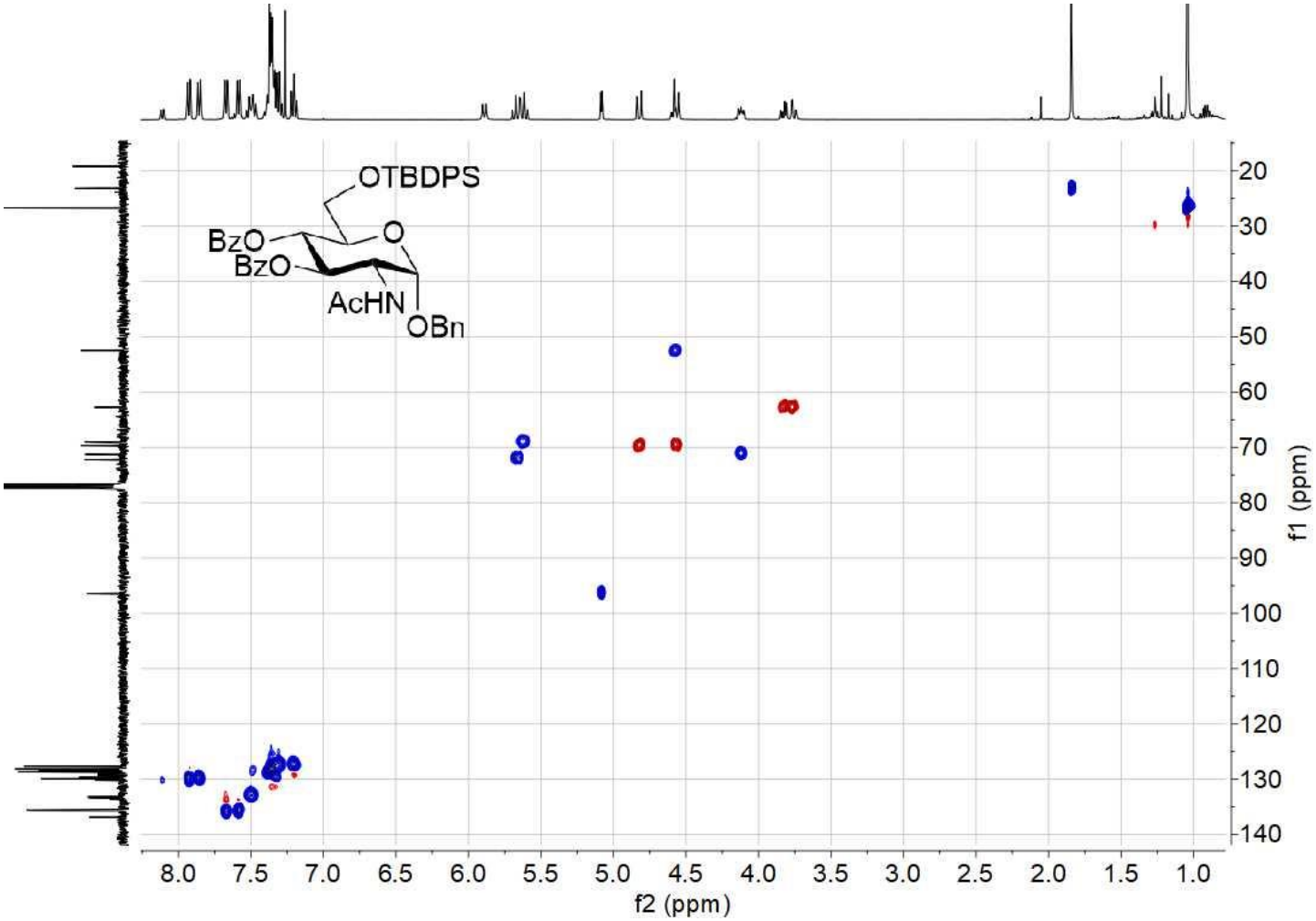
^{1}H-^{1}H COSY 90


OTBDPS
BzO
BzO
O
AcHN
OBn
4.0
4.5
5.0
5.5
6.0
f1 (ppm)
6.1
5.9
5.7
5.5
5.3
5.1
4.9
4.7
4.5
4.3
4.1
3.9
3.7
f2 (ppm)

^{1}H-^{13}C HMBC 90

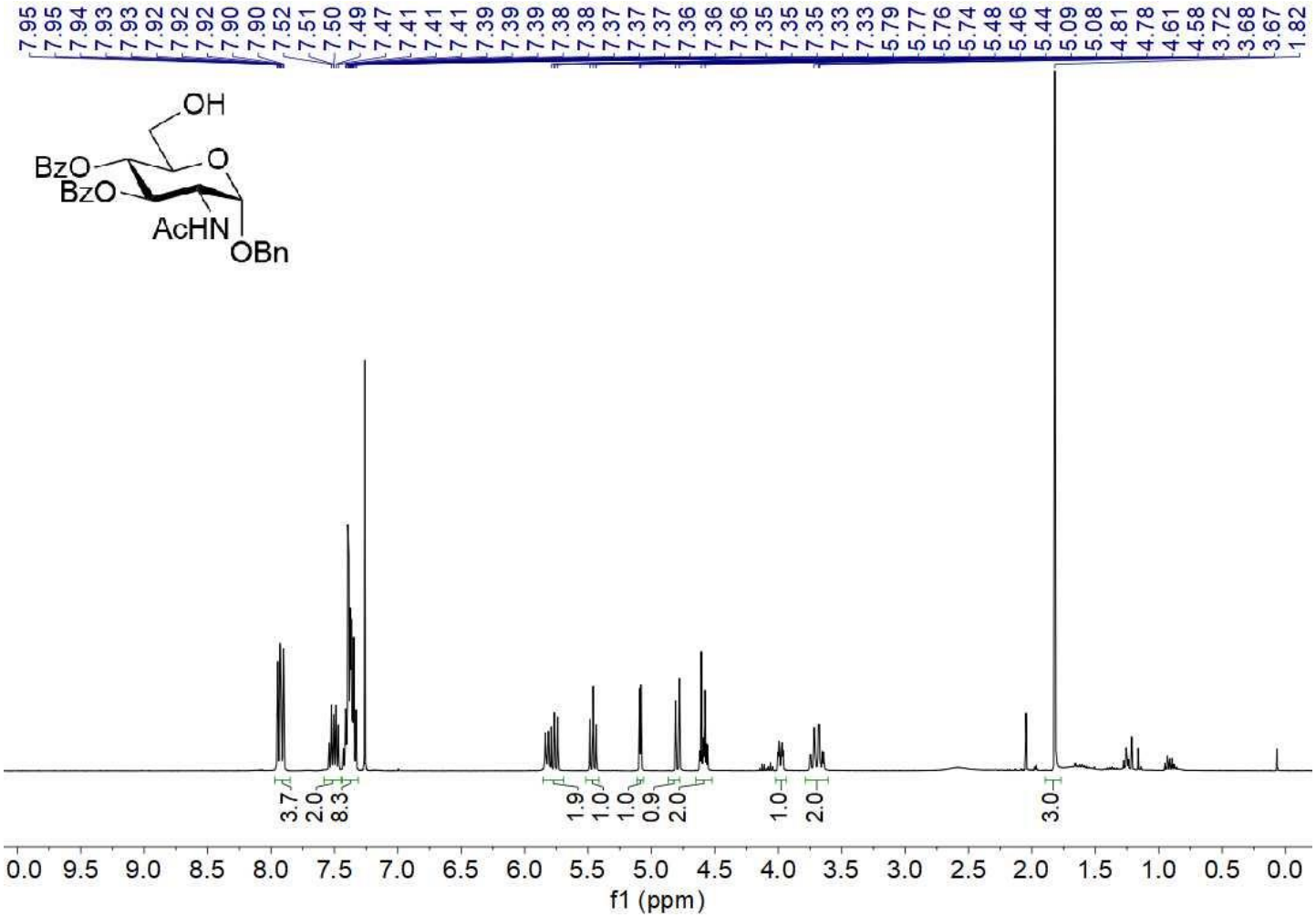


^{1}H-^{13}C HSQC 90

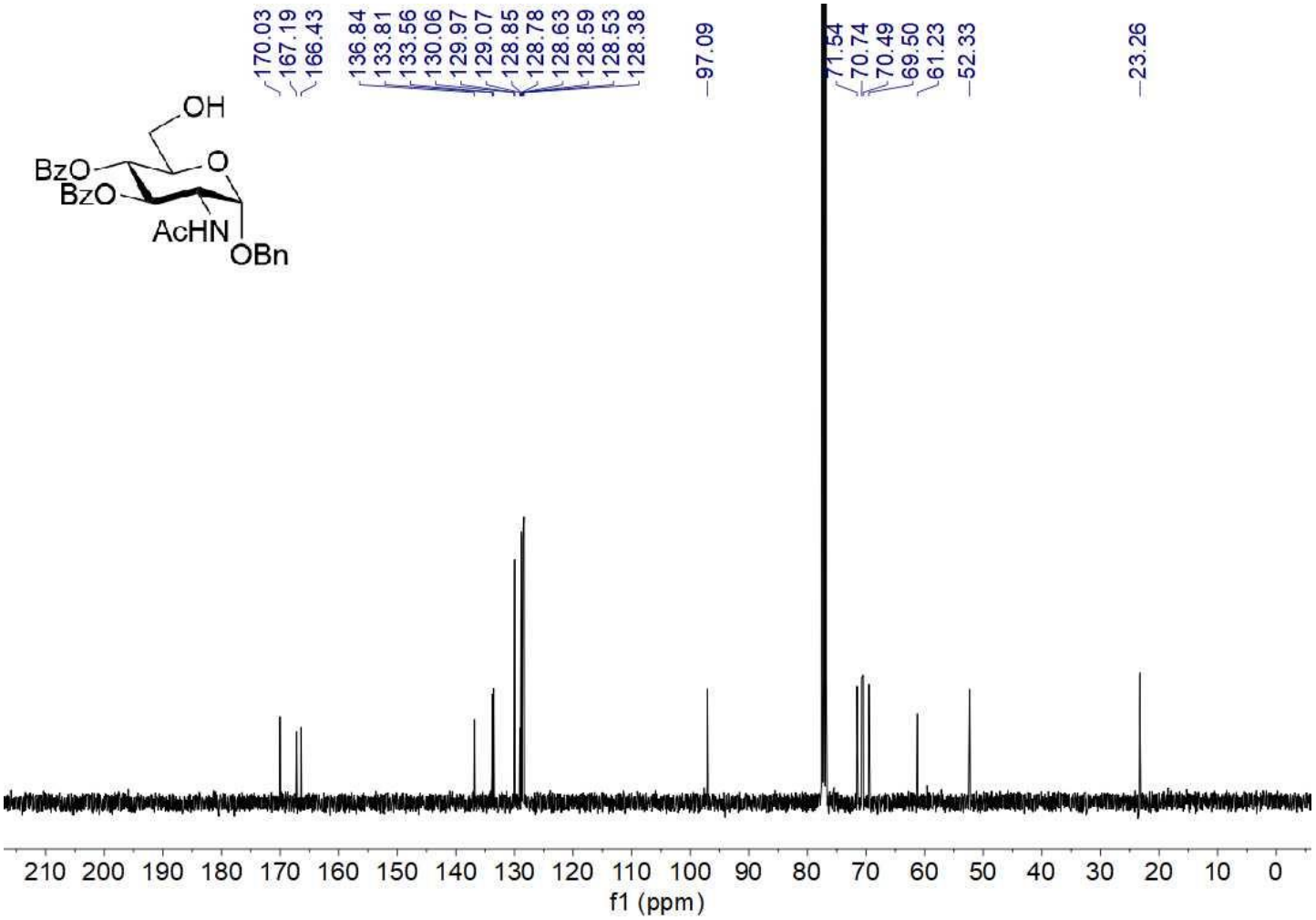


NMR COMPOUND 91

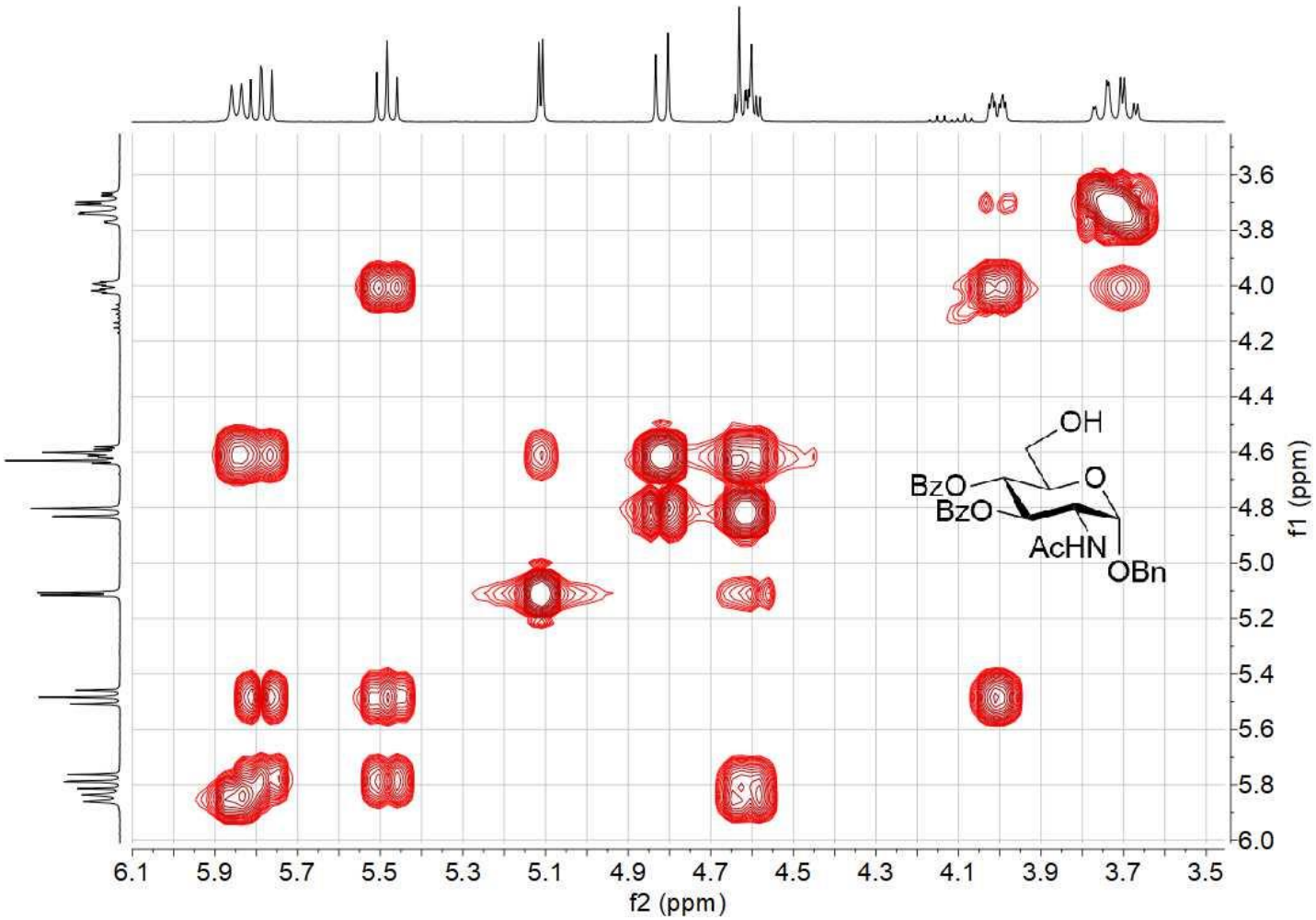
^{1}H NMR (400 MHz, $CDCl_3$) 91



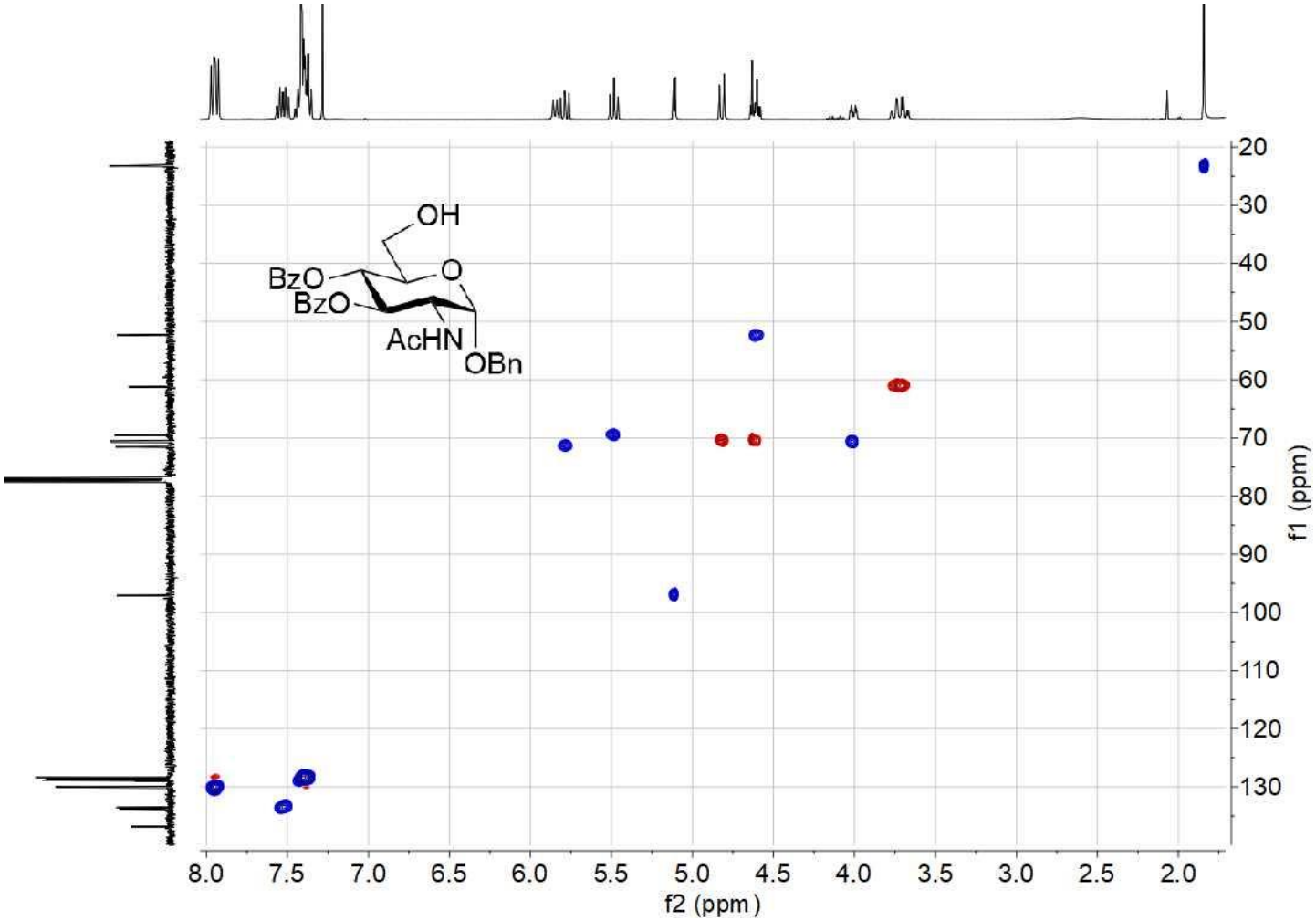
^{13}C NMR (100 MHz, $CDCl_3$) 91



^{1}H-^{1}H COSY 91

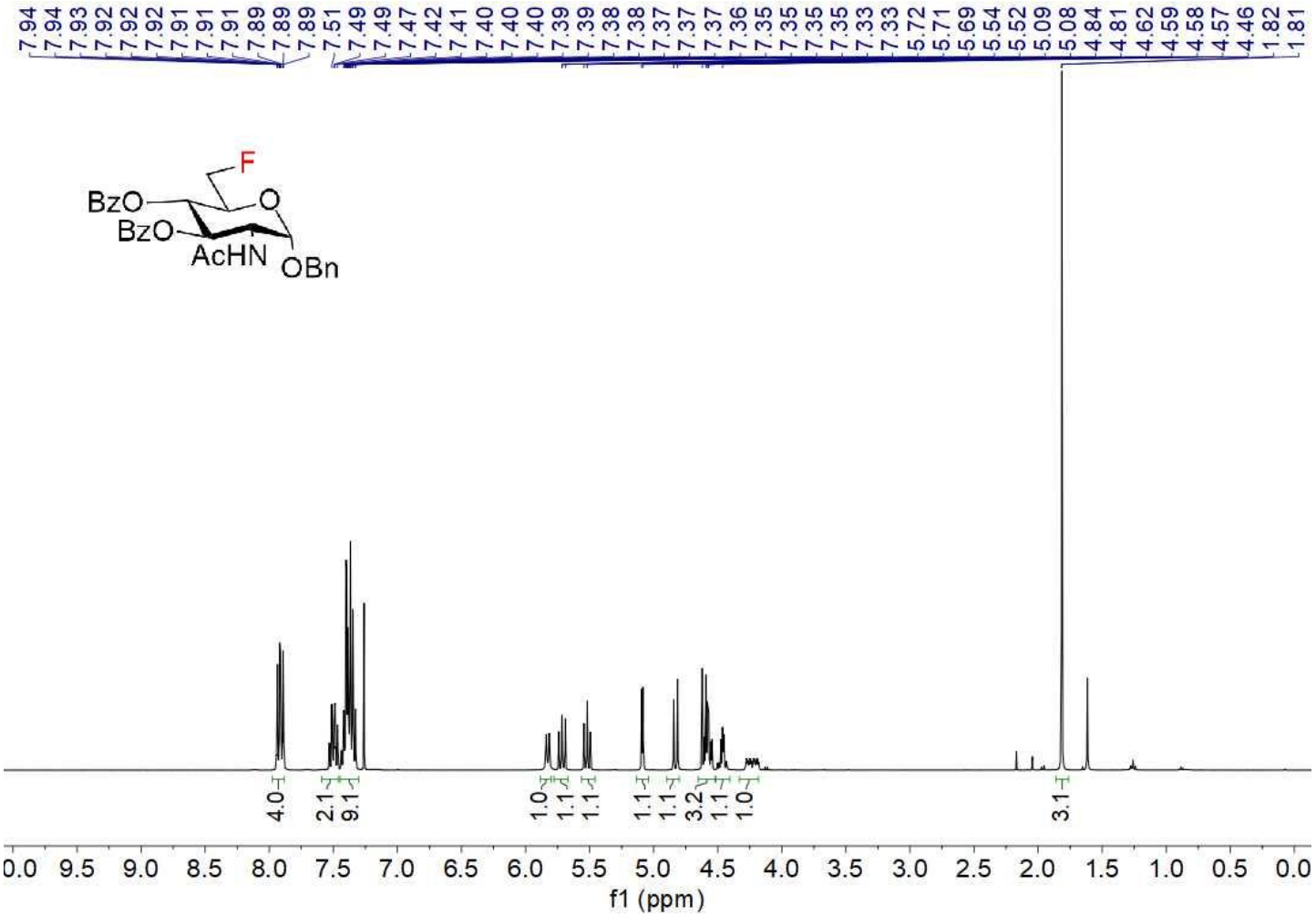


^{1}H-^{13}C HSQC 91

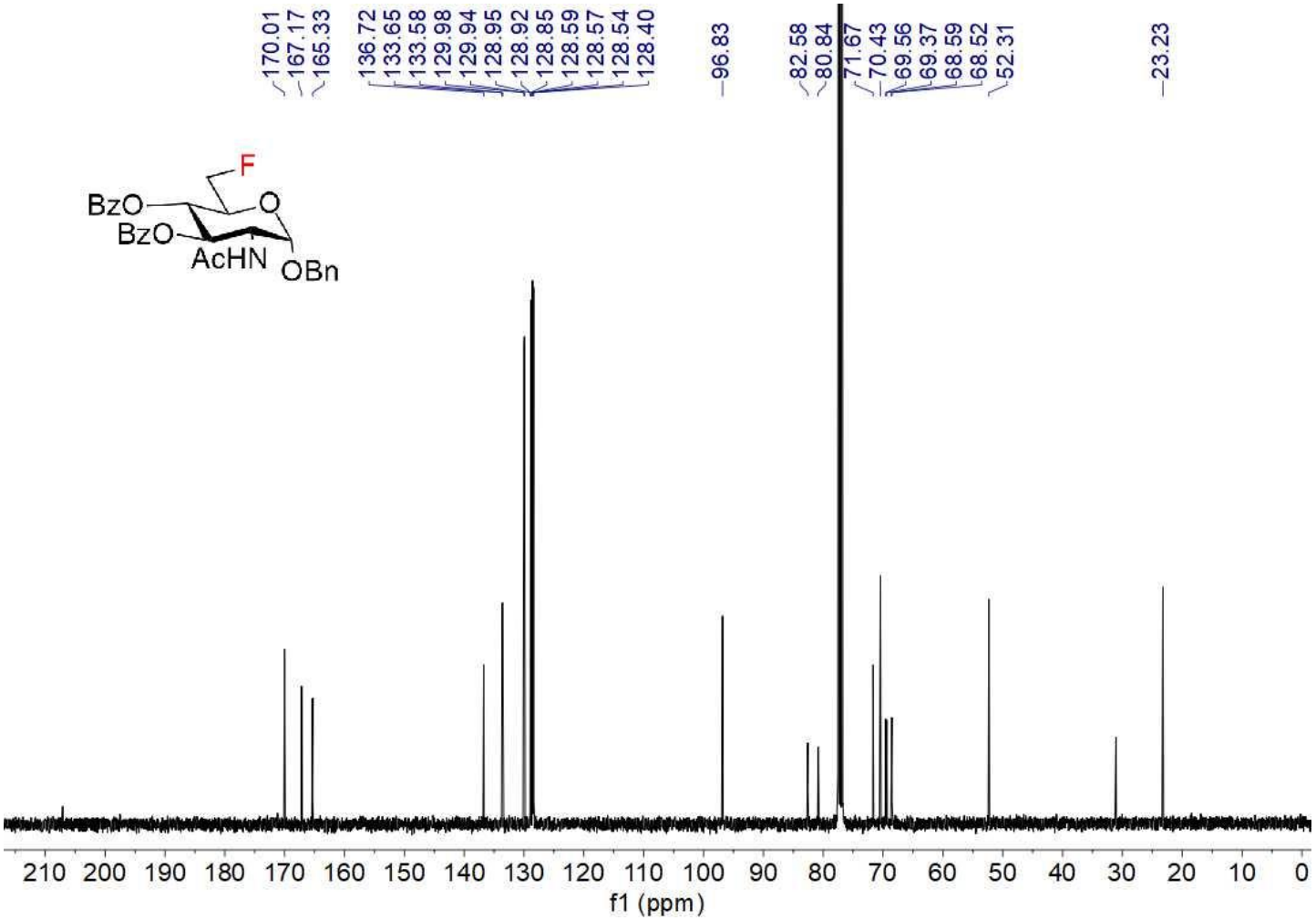


NMR COMPOUND 92

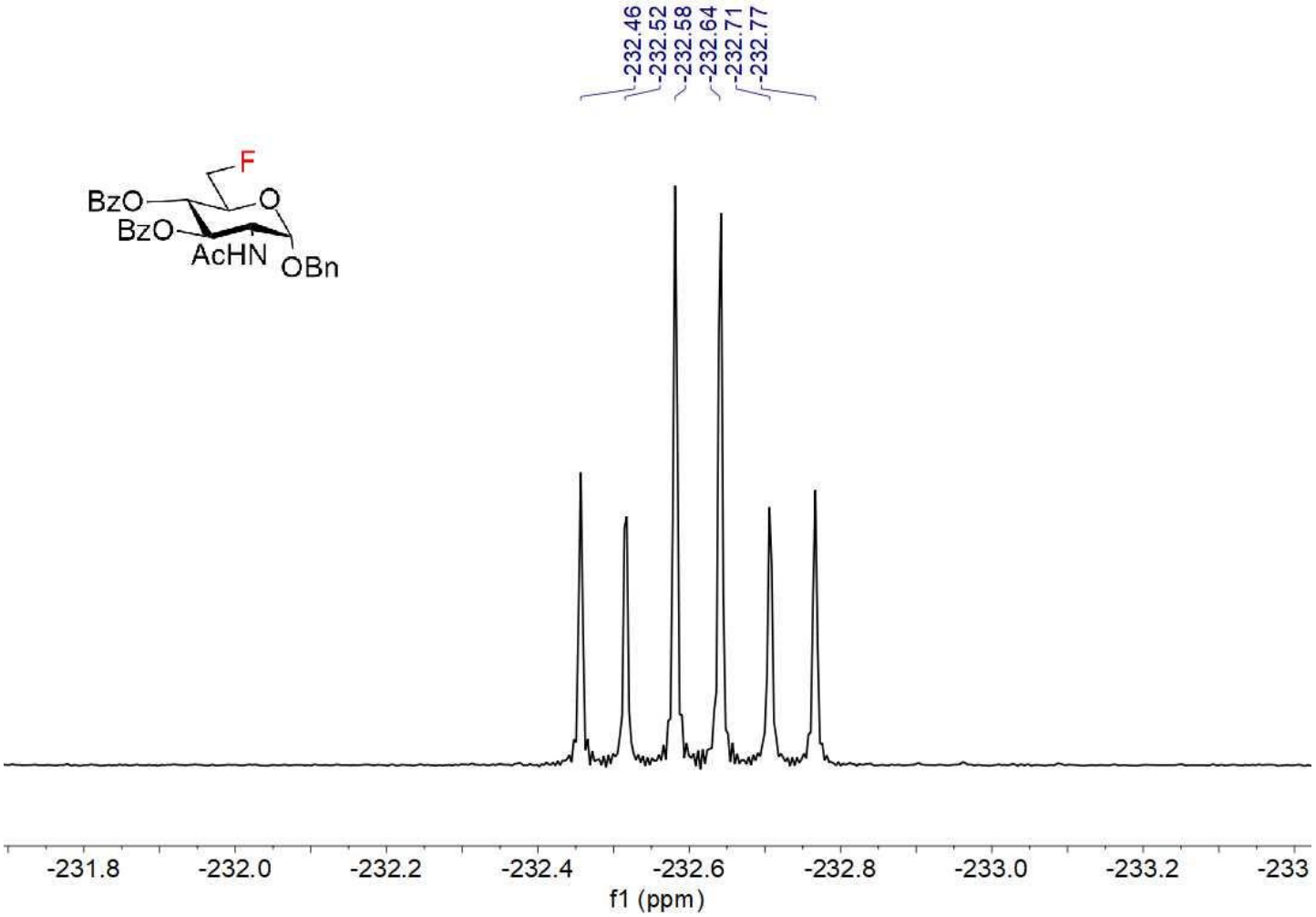
^{1}H NMR (400 MHz, $CDCl_3$) 92



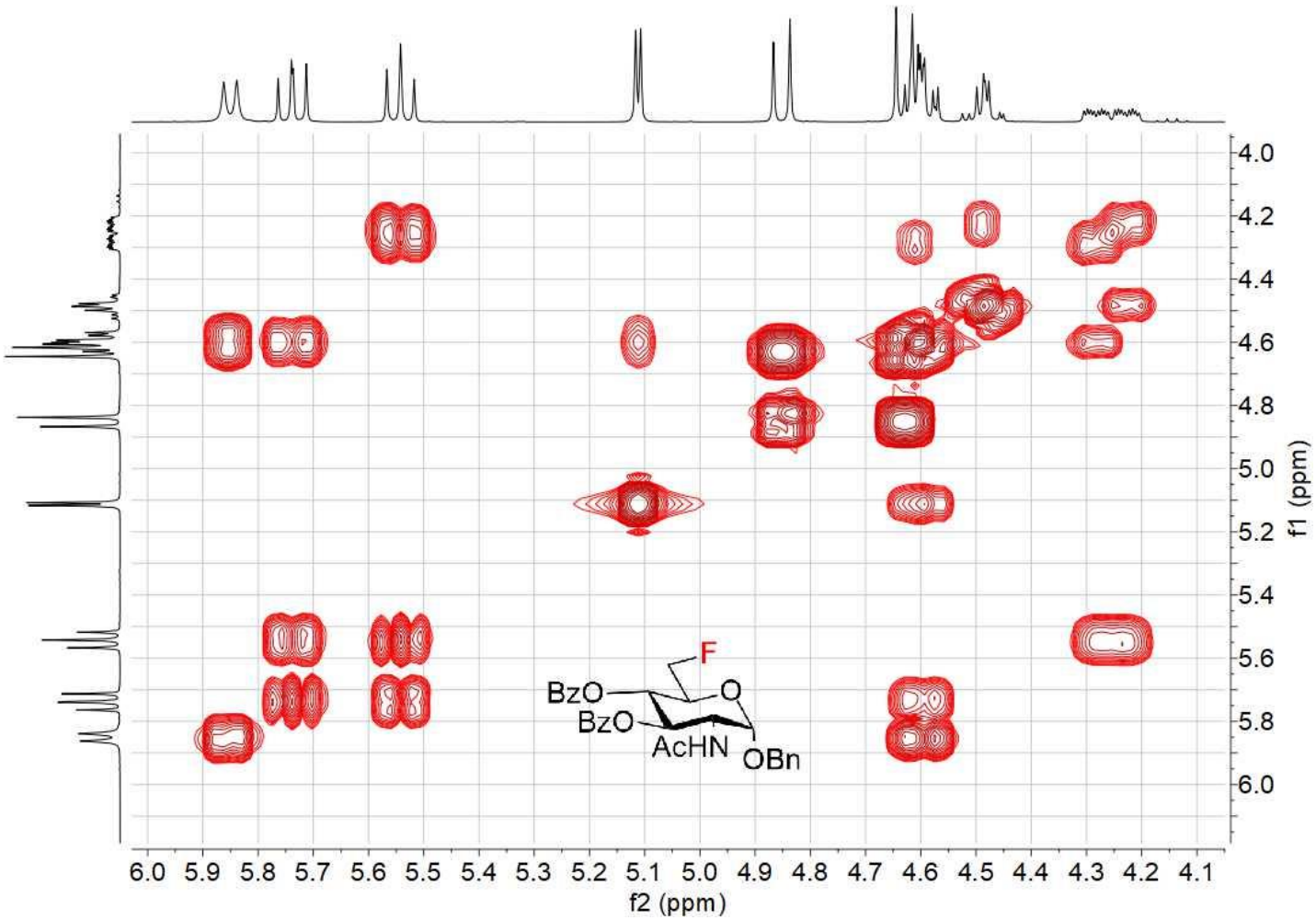
^{13}C NMR (100 MHz, $CDCl_3$) 92



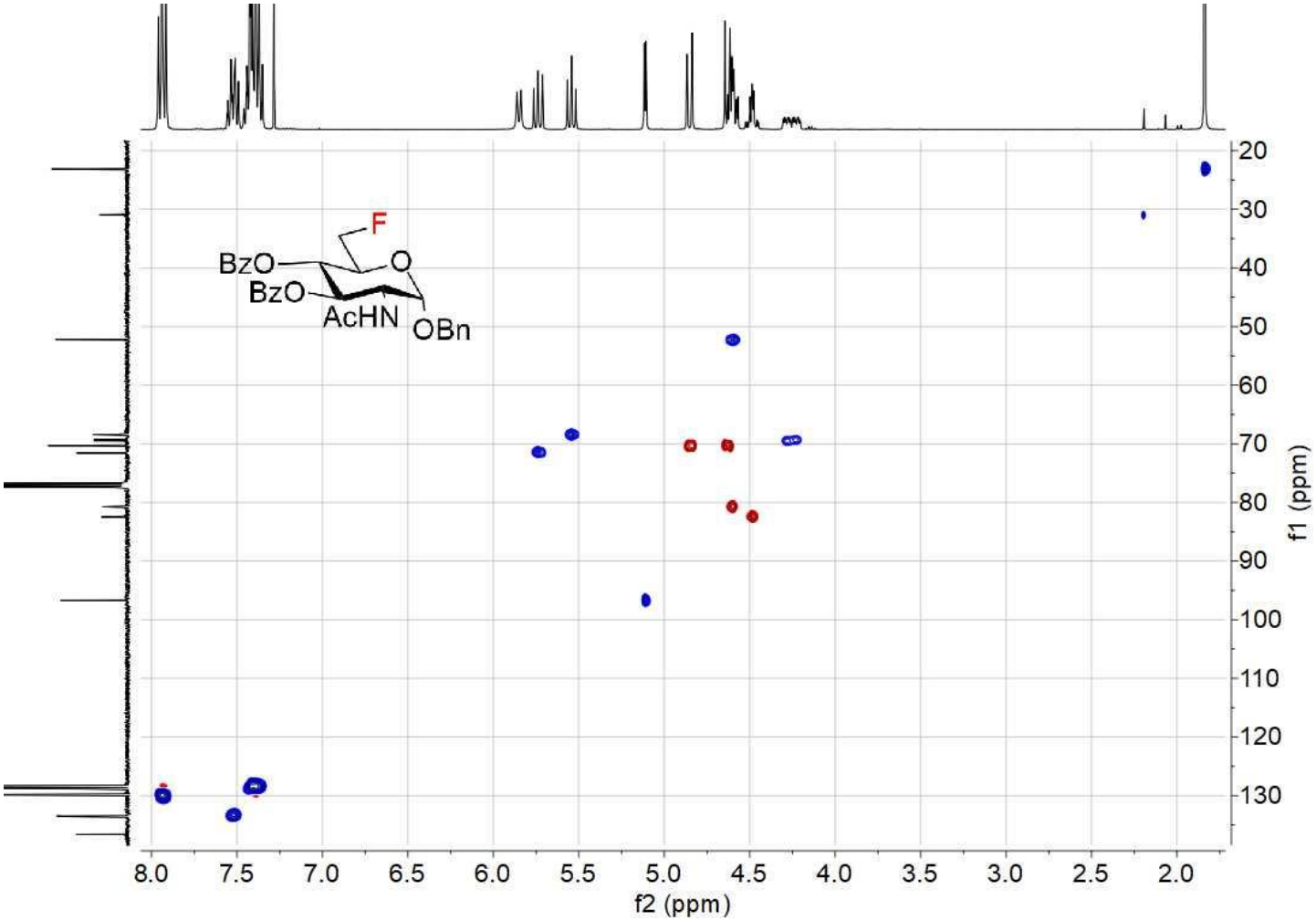
^{19}F NMR (376 MHz, $CDCl_3$) 92



^{1}H-^{1}H COSY 92

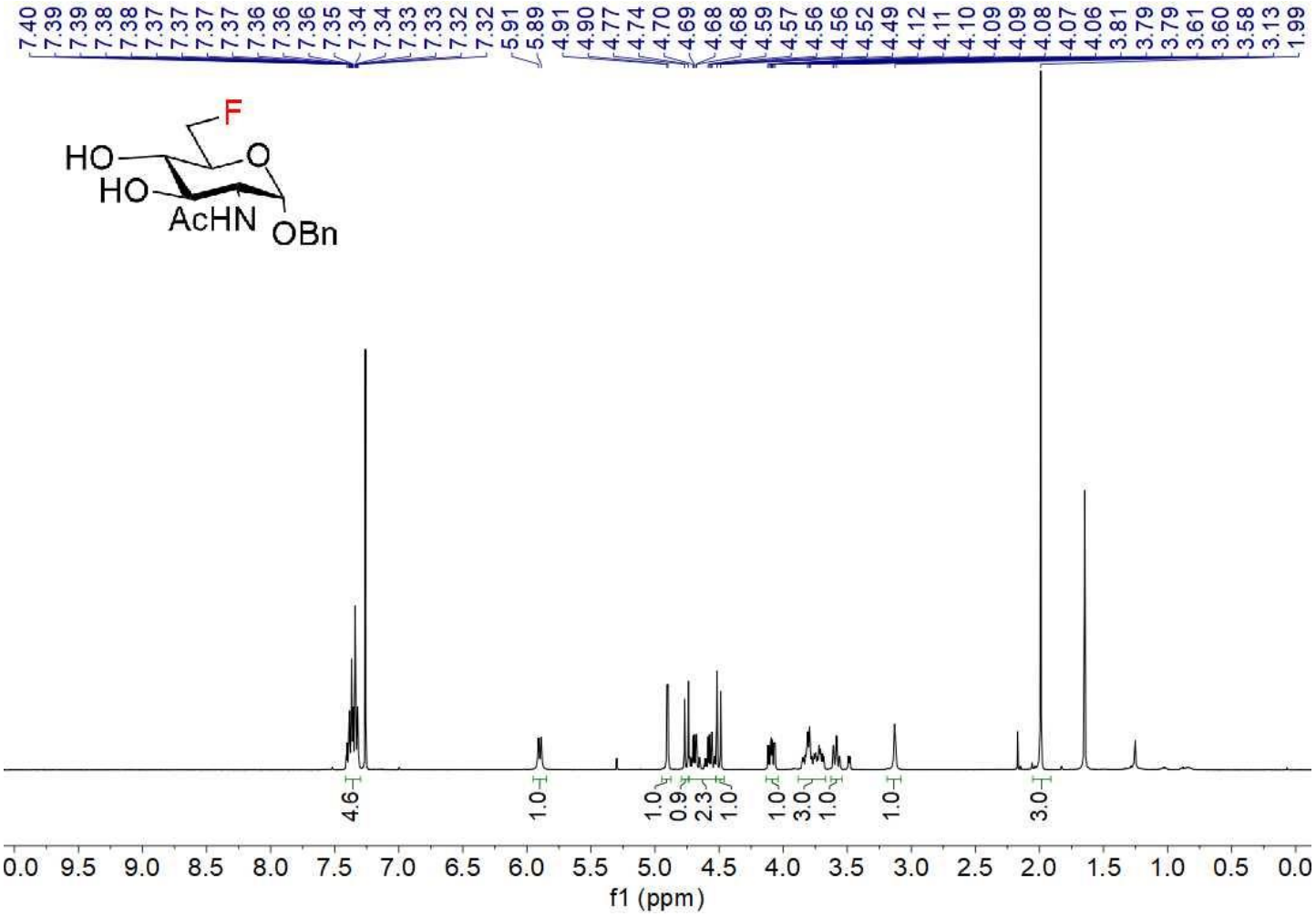


^{1}H-^{13}C HSQC 92

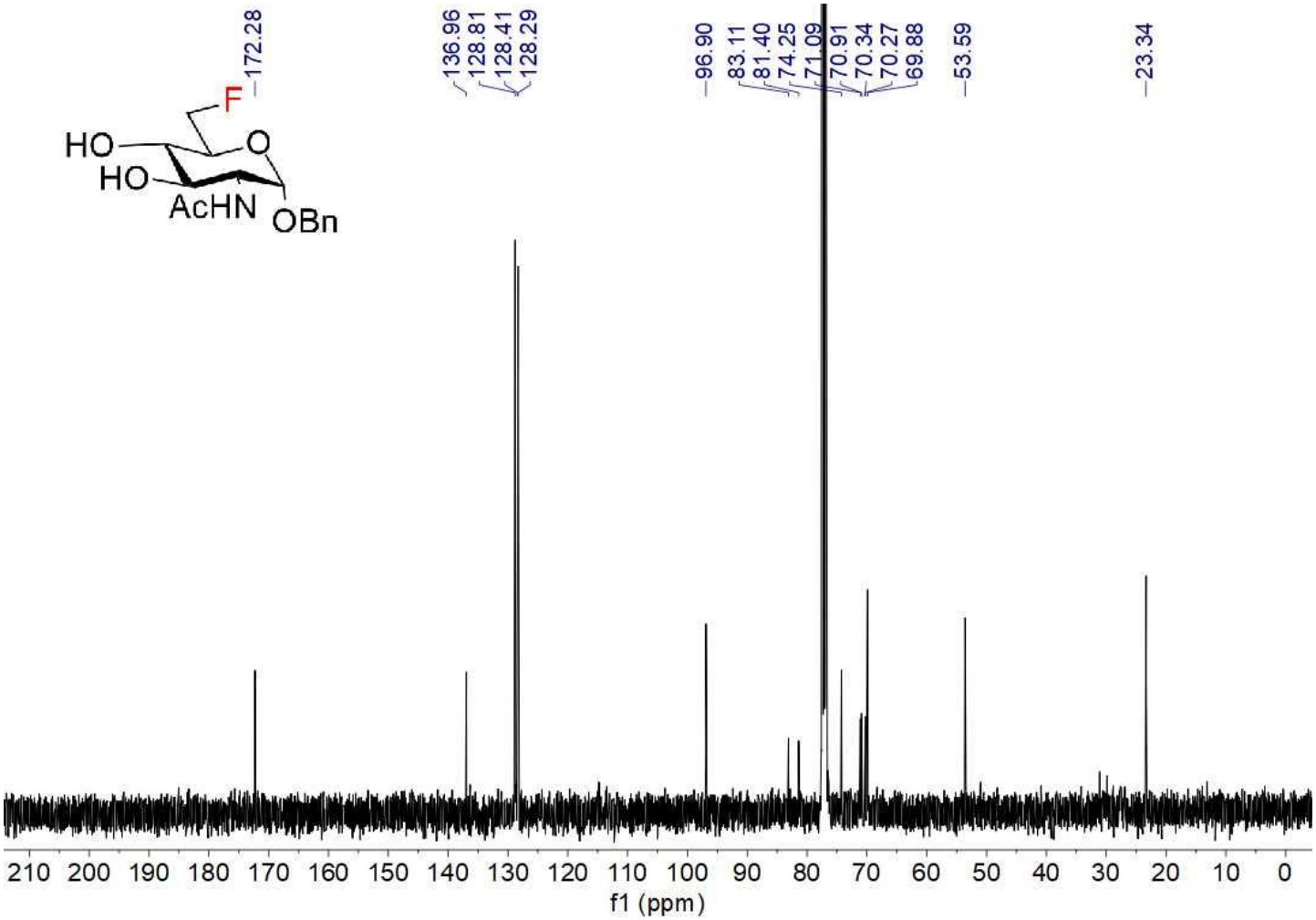


NMR COMPOUND 93

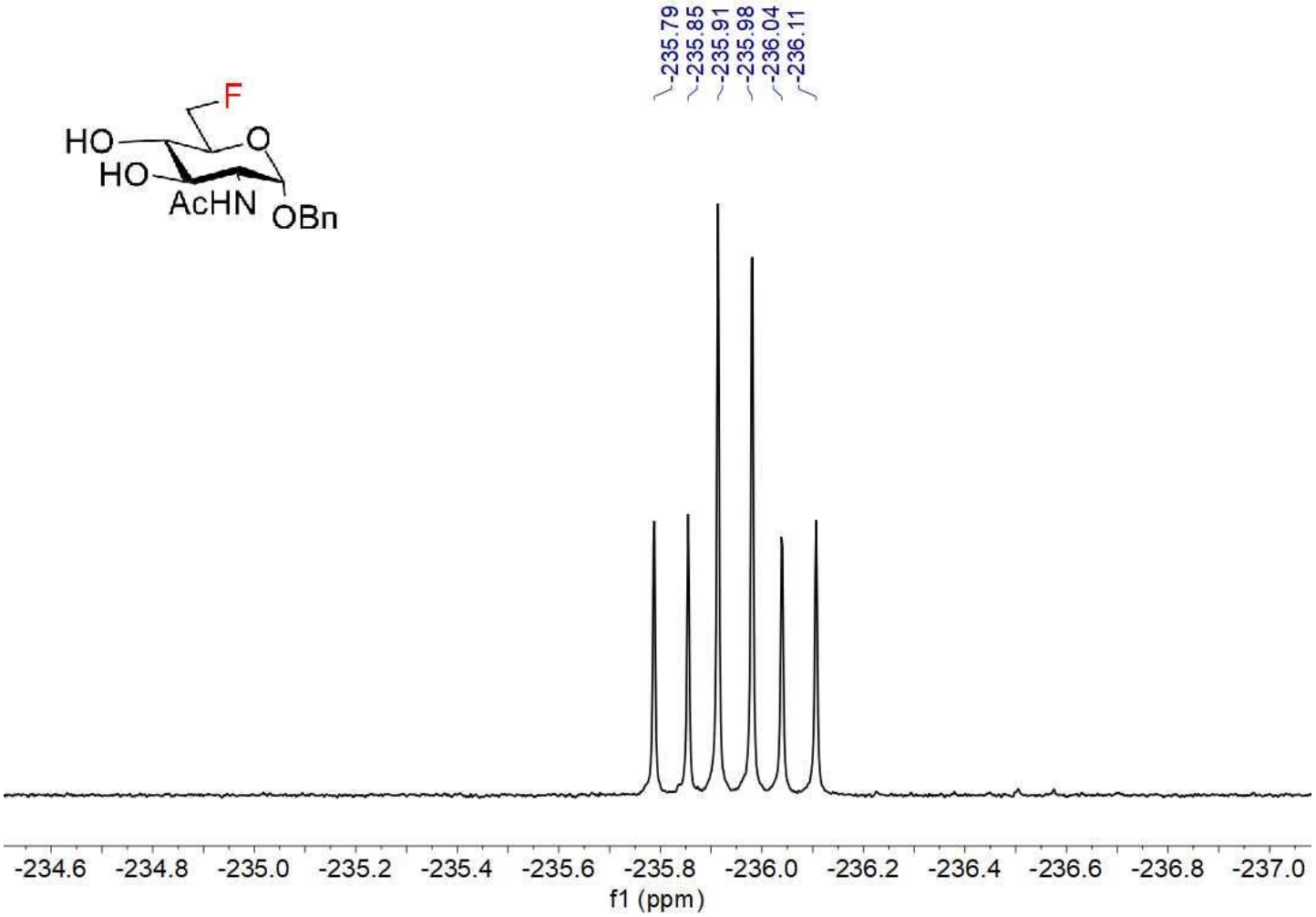
^{1}H NMR (400 MHz, $CDCl_3$) 93



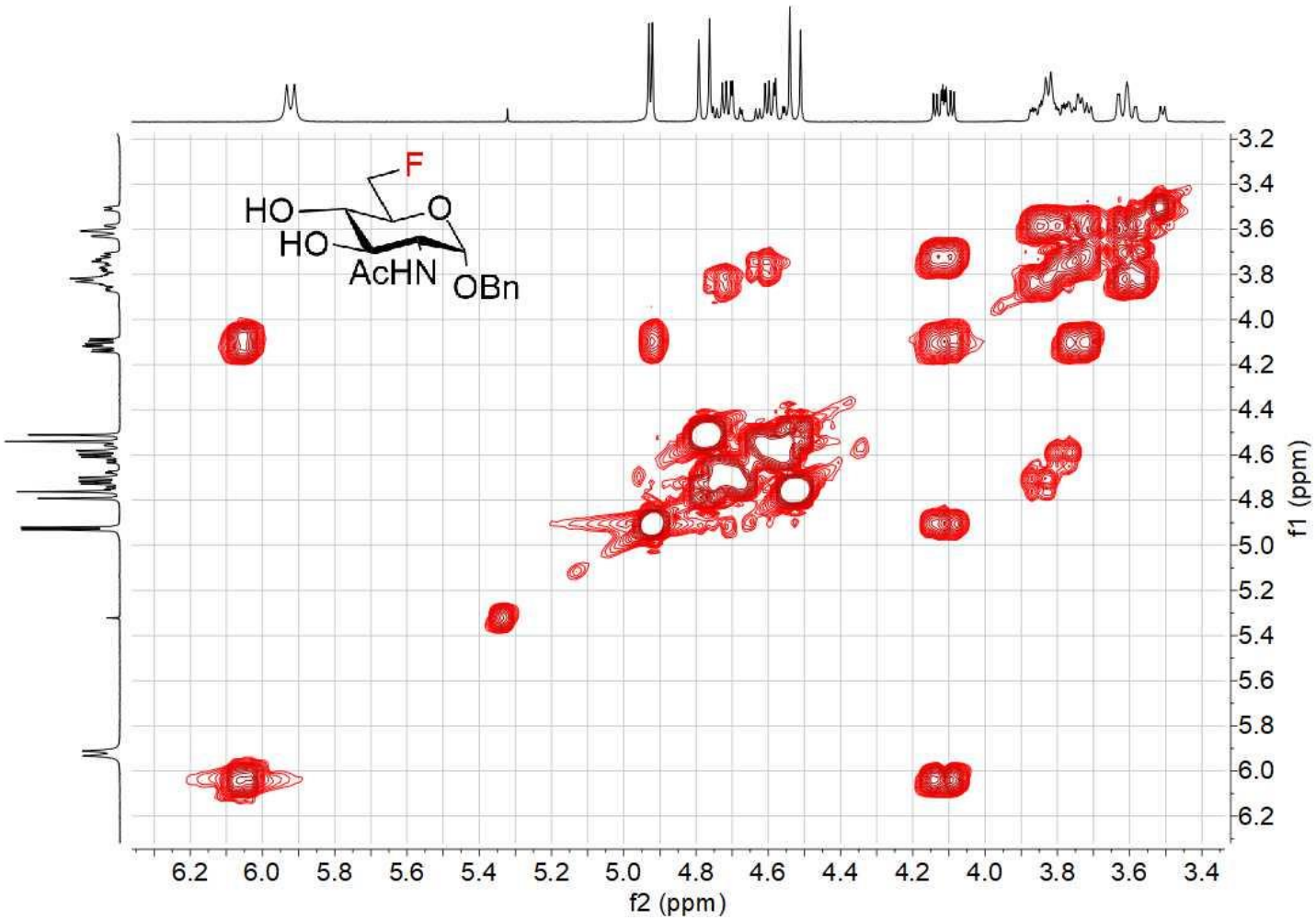
^{13}C NMR (100 MHz, $CDCl_3$) 93



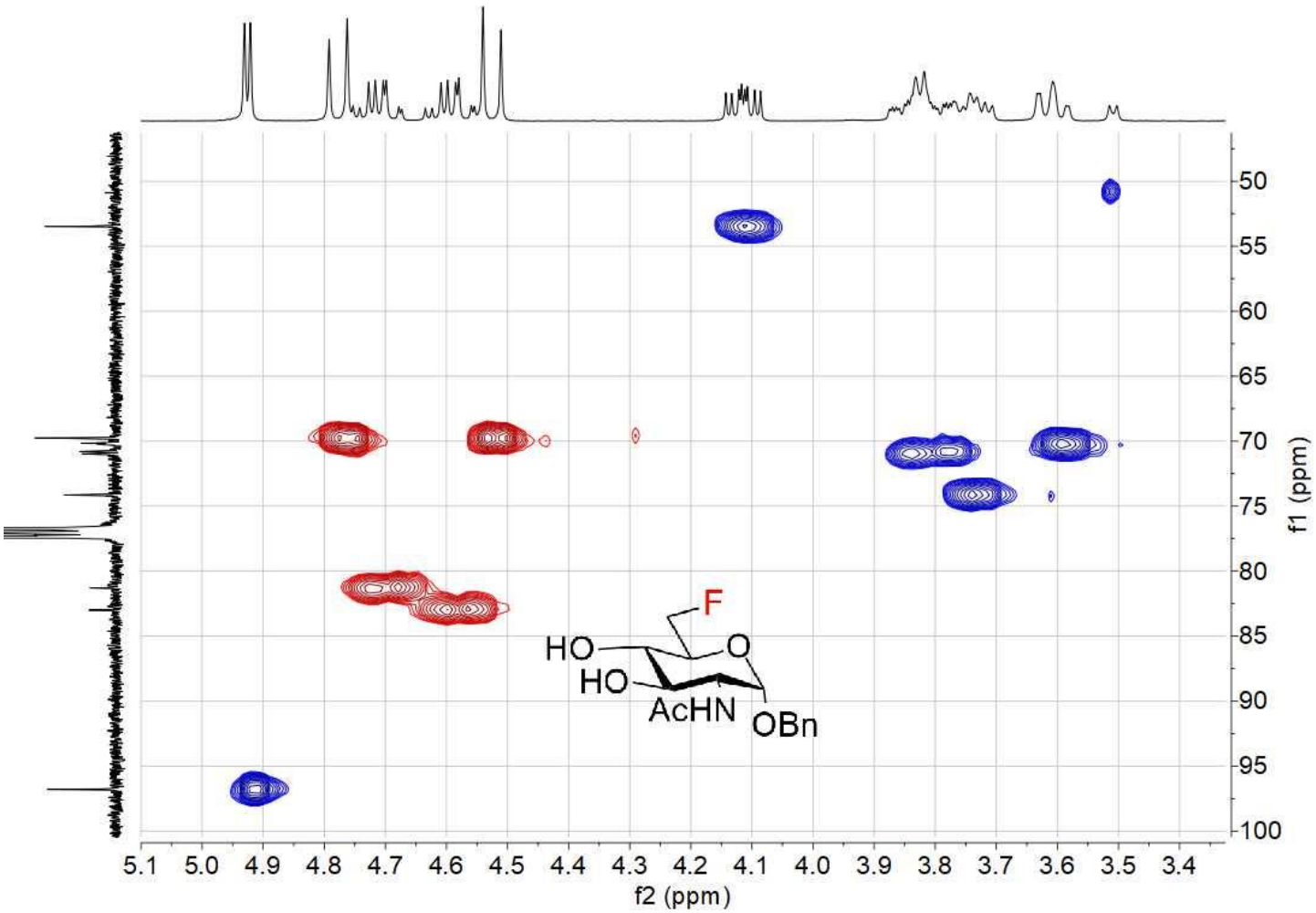
^{19}F NMR (376 MHz, $CDCl_3$) 93



^{1}H-^{1}H COSY 93

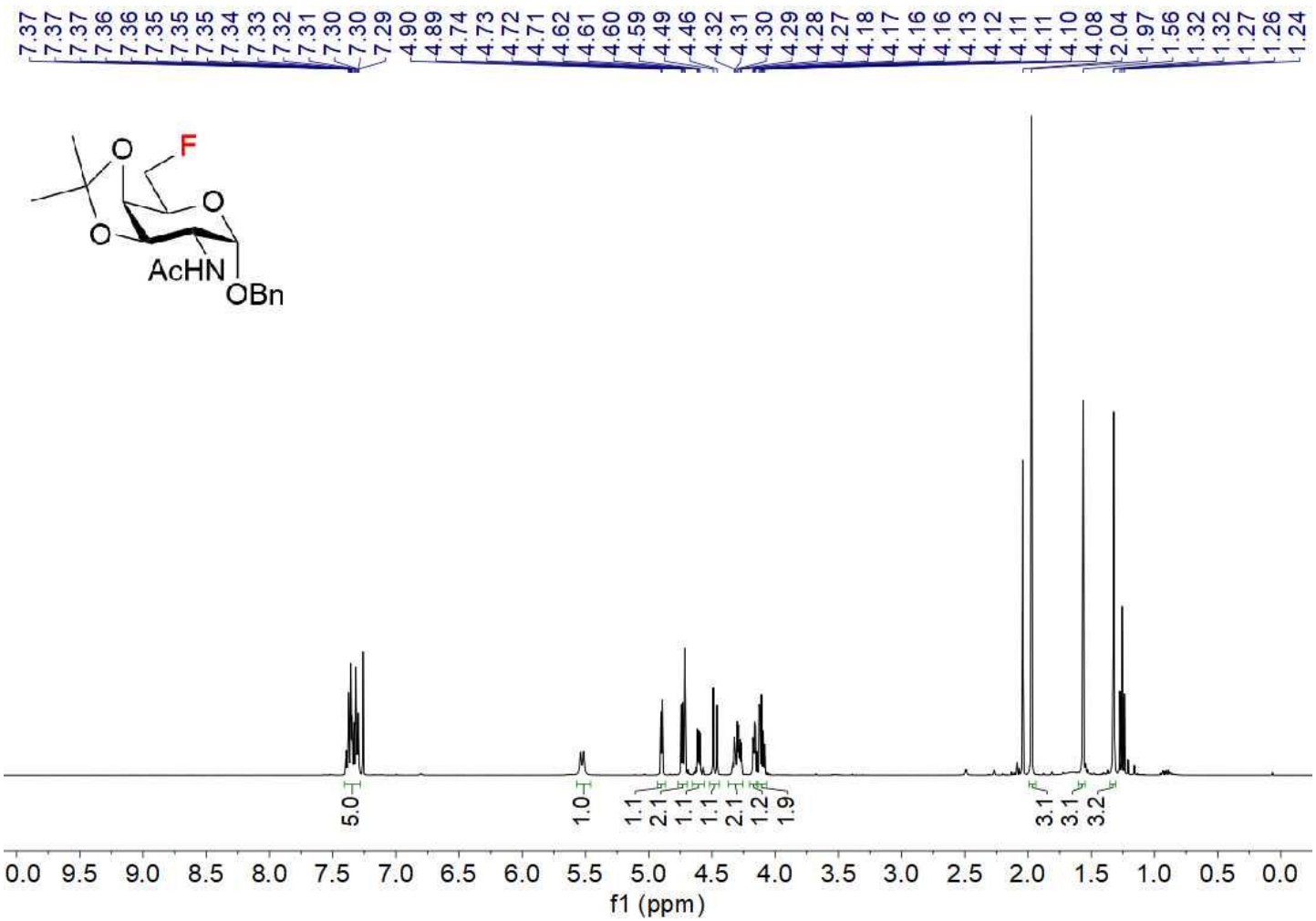


^{1}H-^{13}C HSQC 93

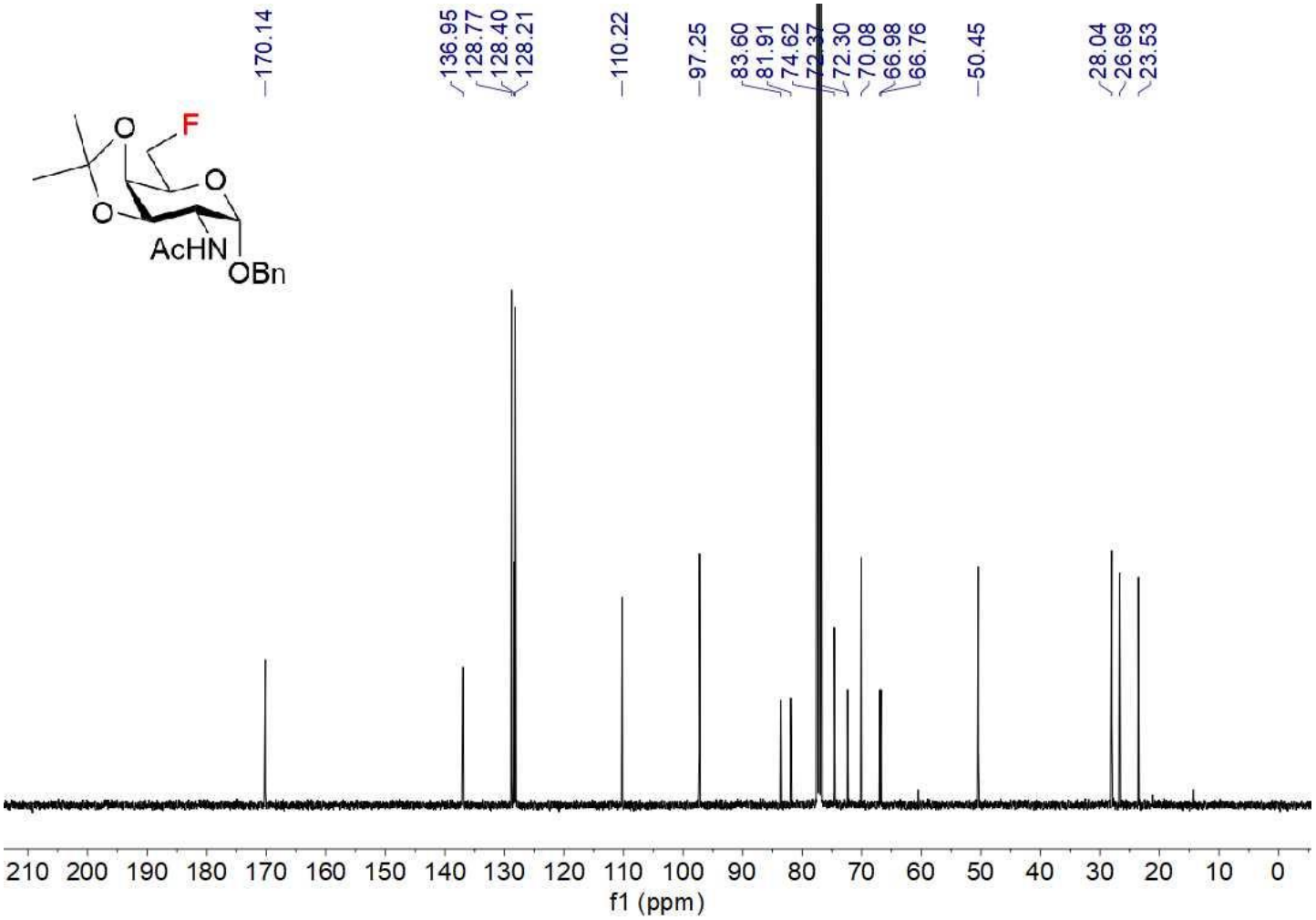


NMR COMPOUND 95

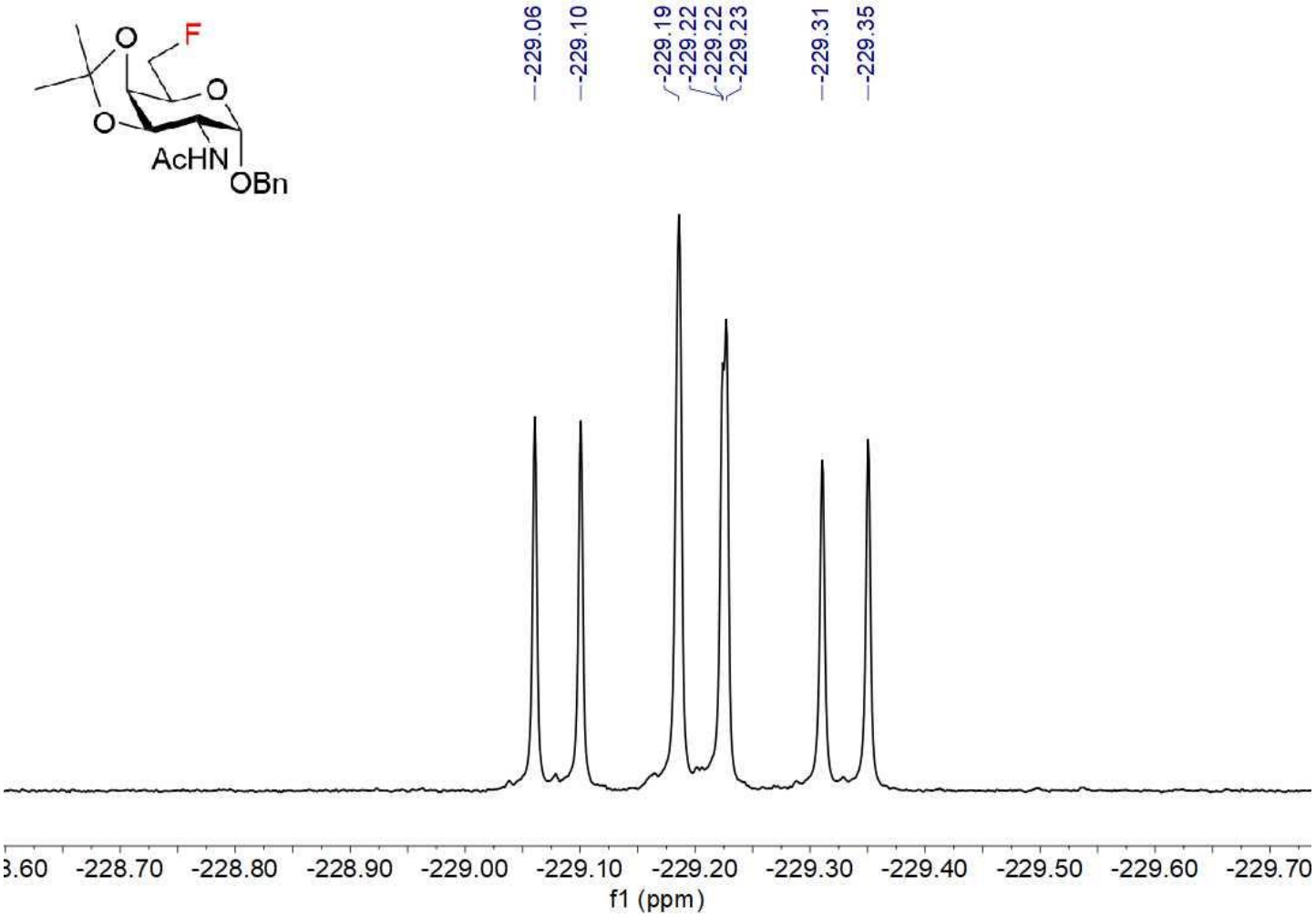
^{1}H NMR (400 MHz, $CDCl_3$) 95



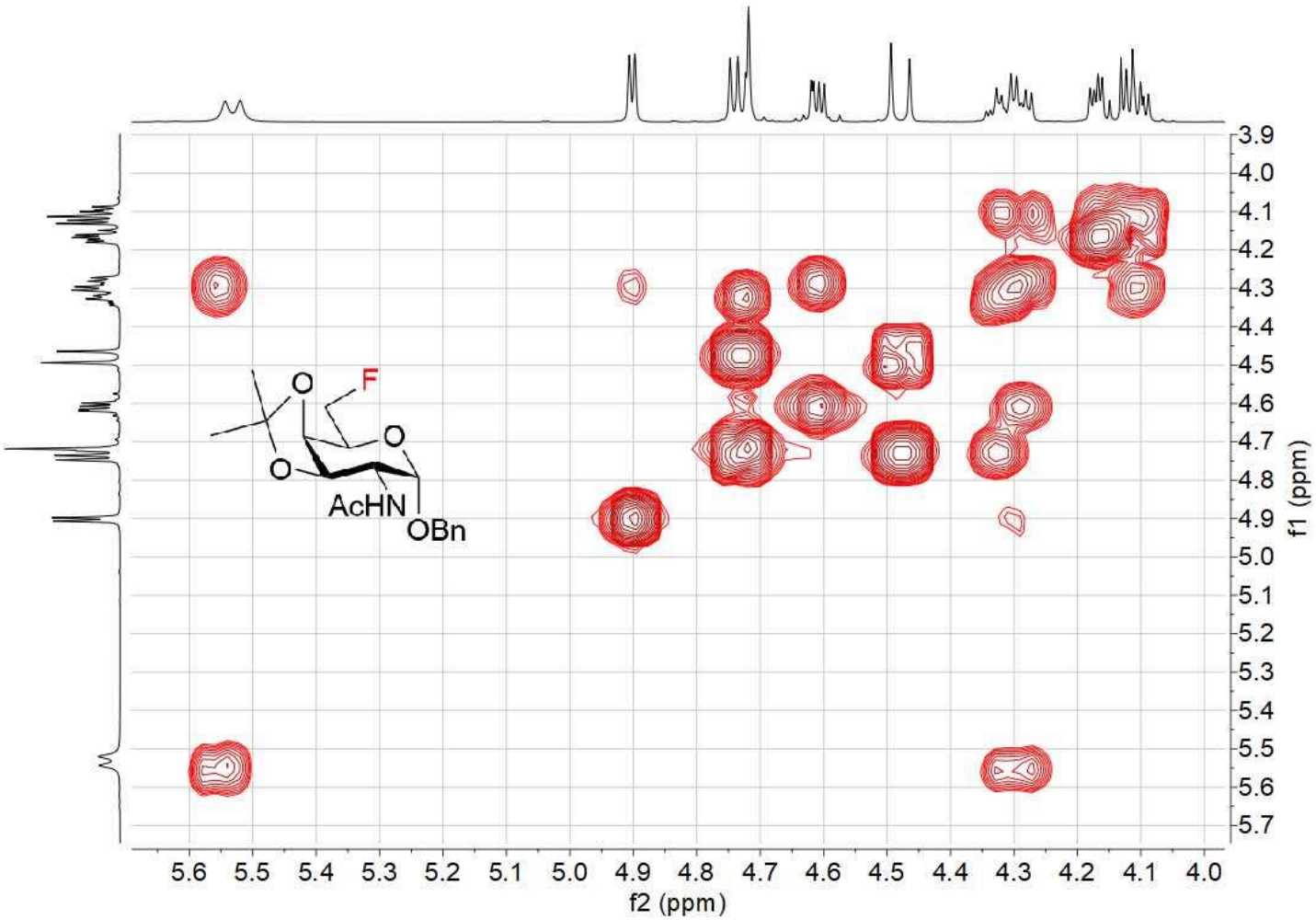
^{13}C NMR (100 MHz, $CDCl_3$) 95



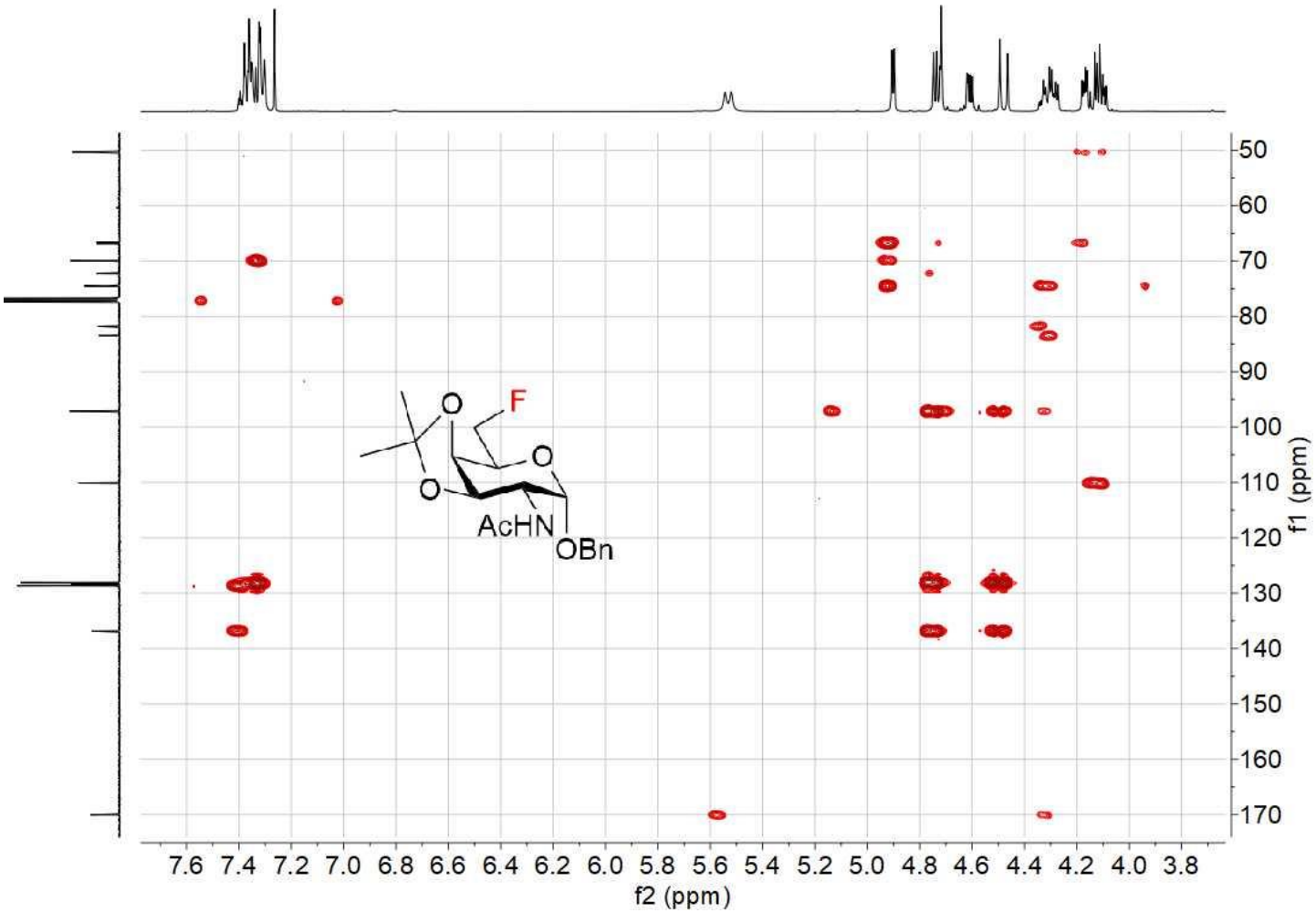
^{19}F NMR (376 MHz, $CDCl_3$) 95



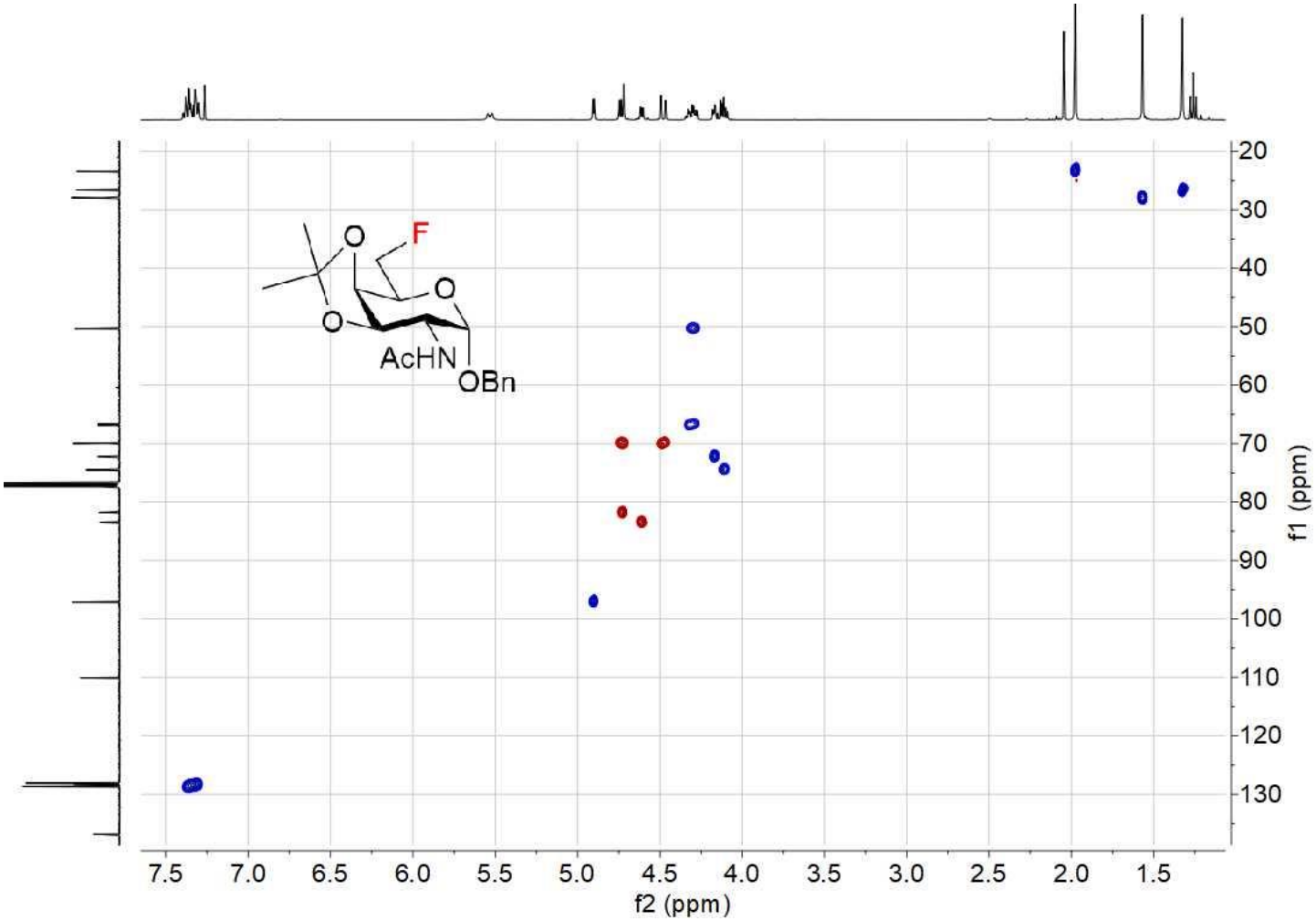
^{1}H-^{1}H COSY 95



^{1}H-^{13}C HMBC 95

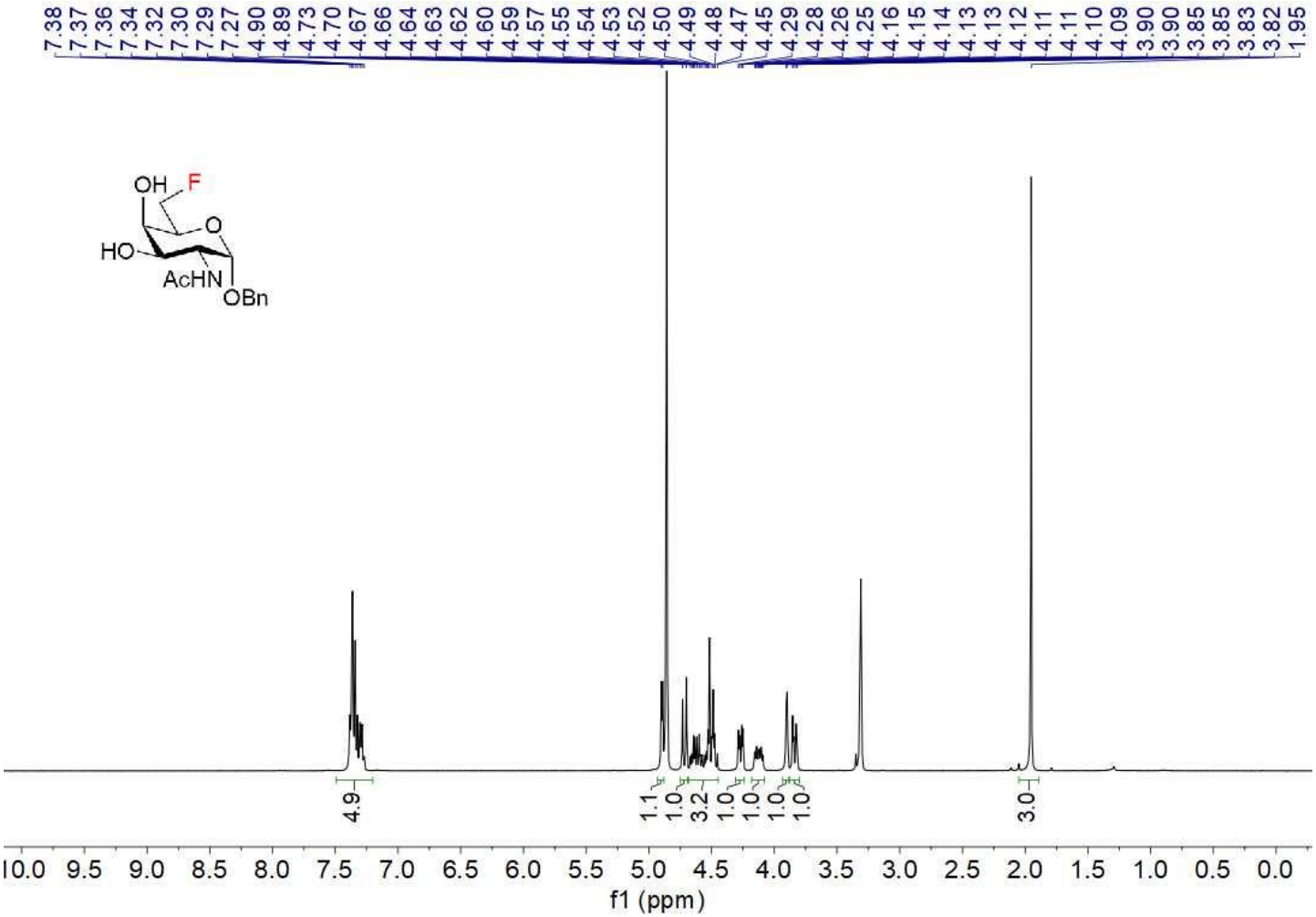


^{1}H-^{13}C HSQC 95

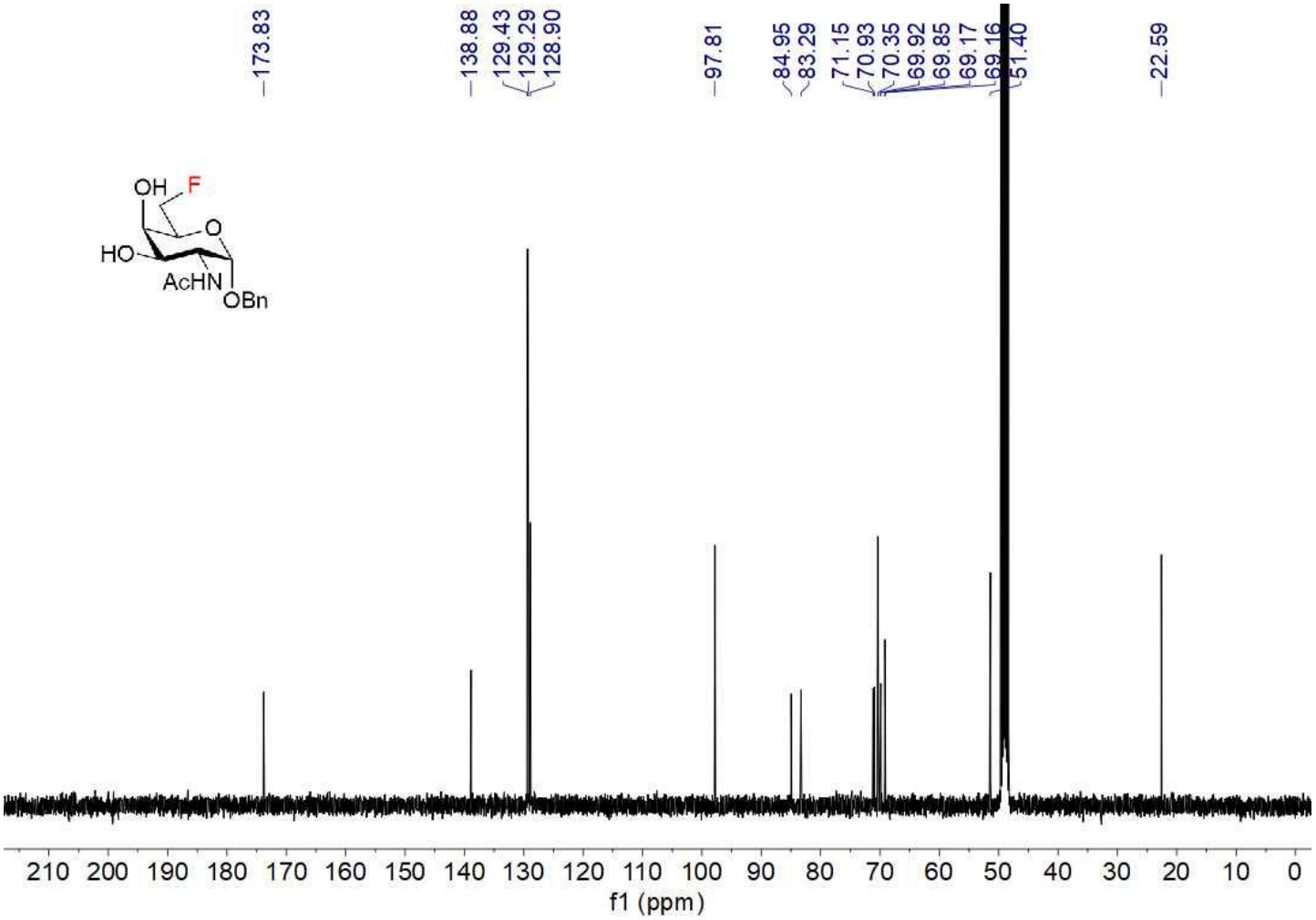


NMR COMPOUND 96

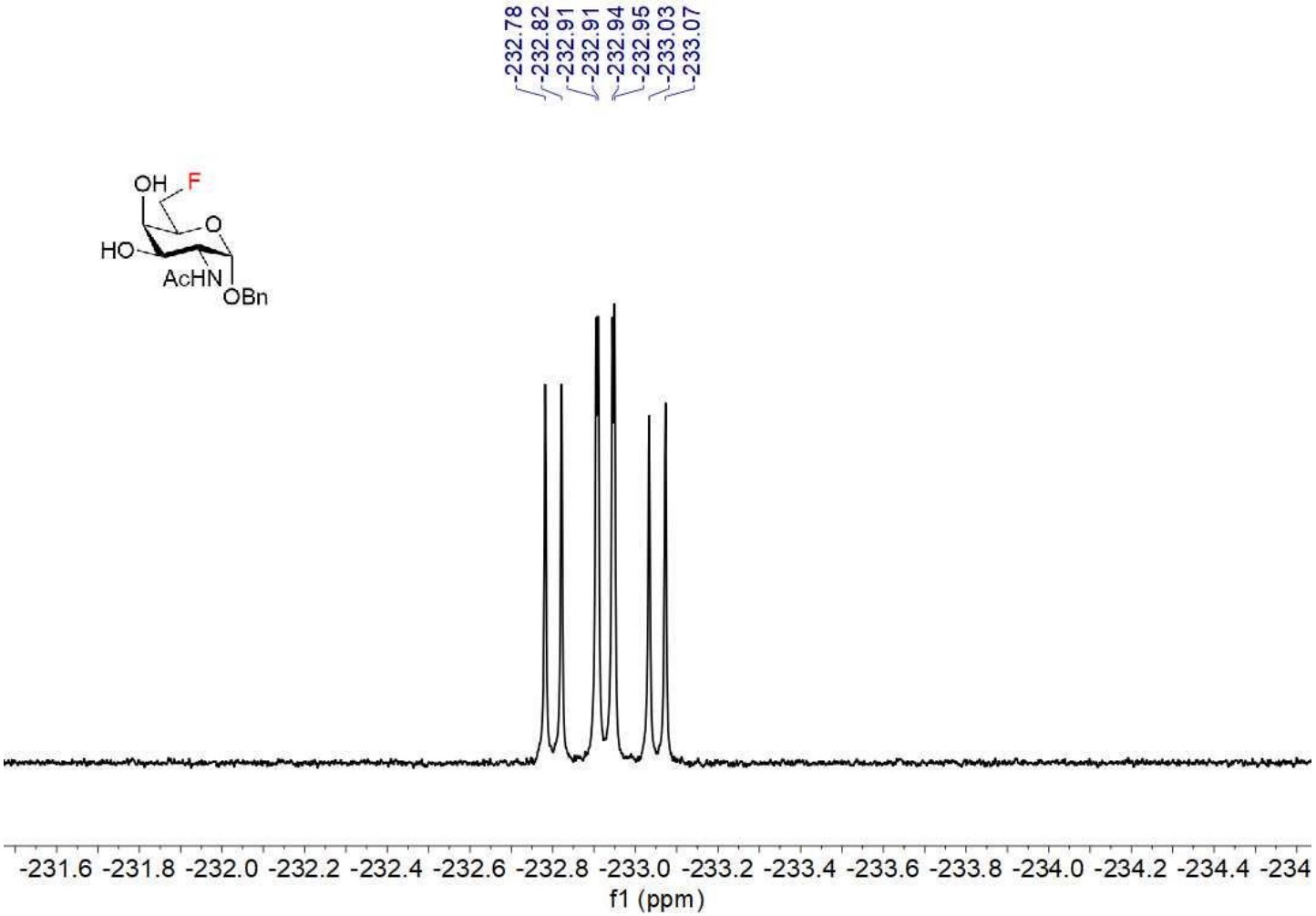
^{1}H NMR (400 MHz, CD_3OD) 96



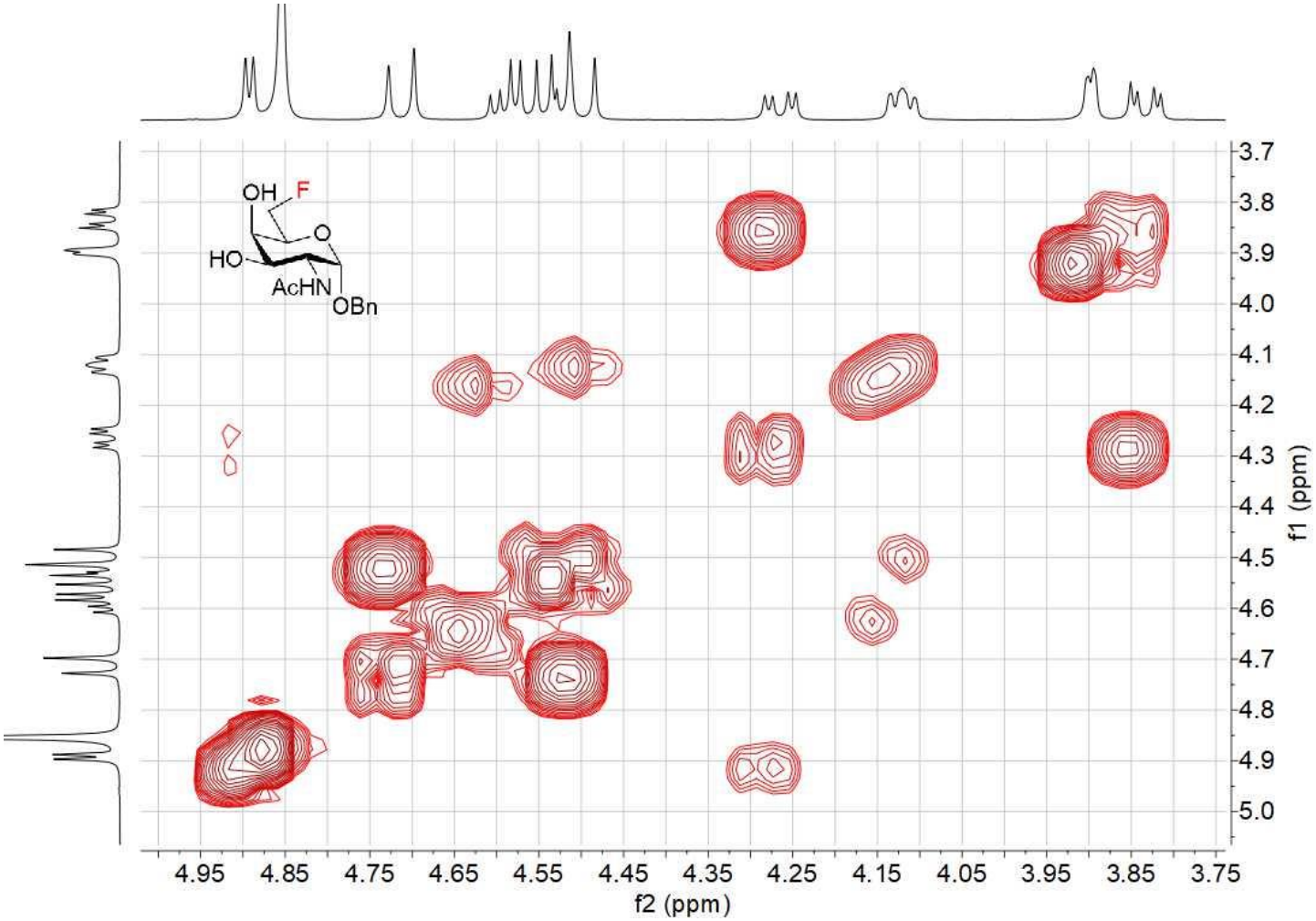
^{13}C NMR (100 MHz, CD_3OD) 96



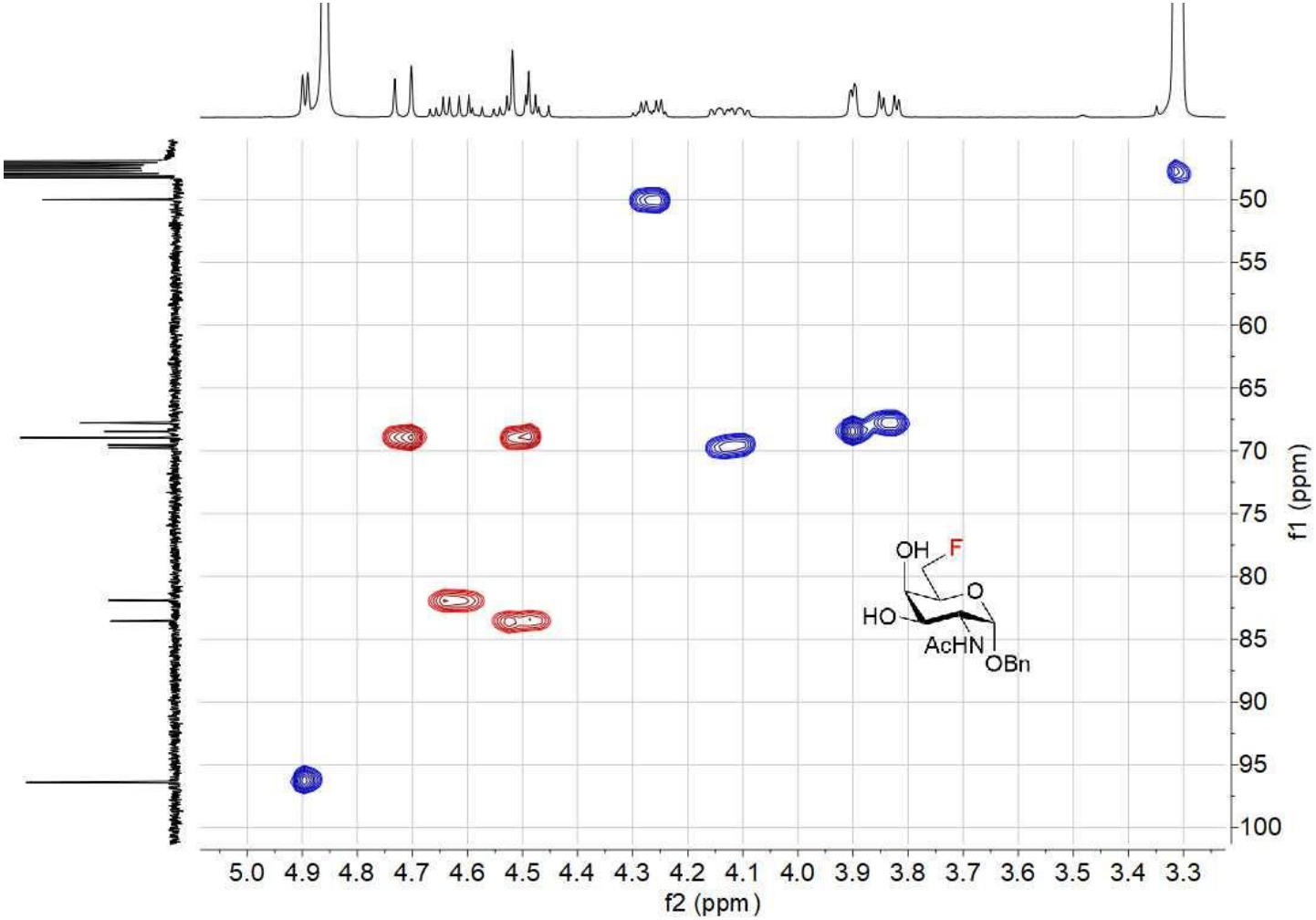
^{19}F NMR (376 MHz, CD_3OD) 96



^{1}H-^{1}H COSY 96

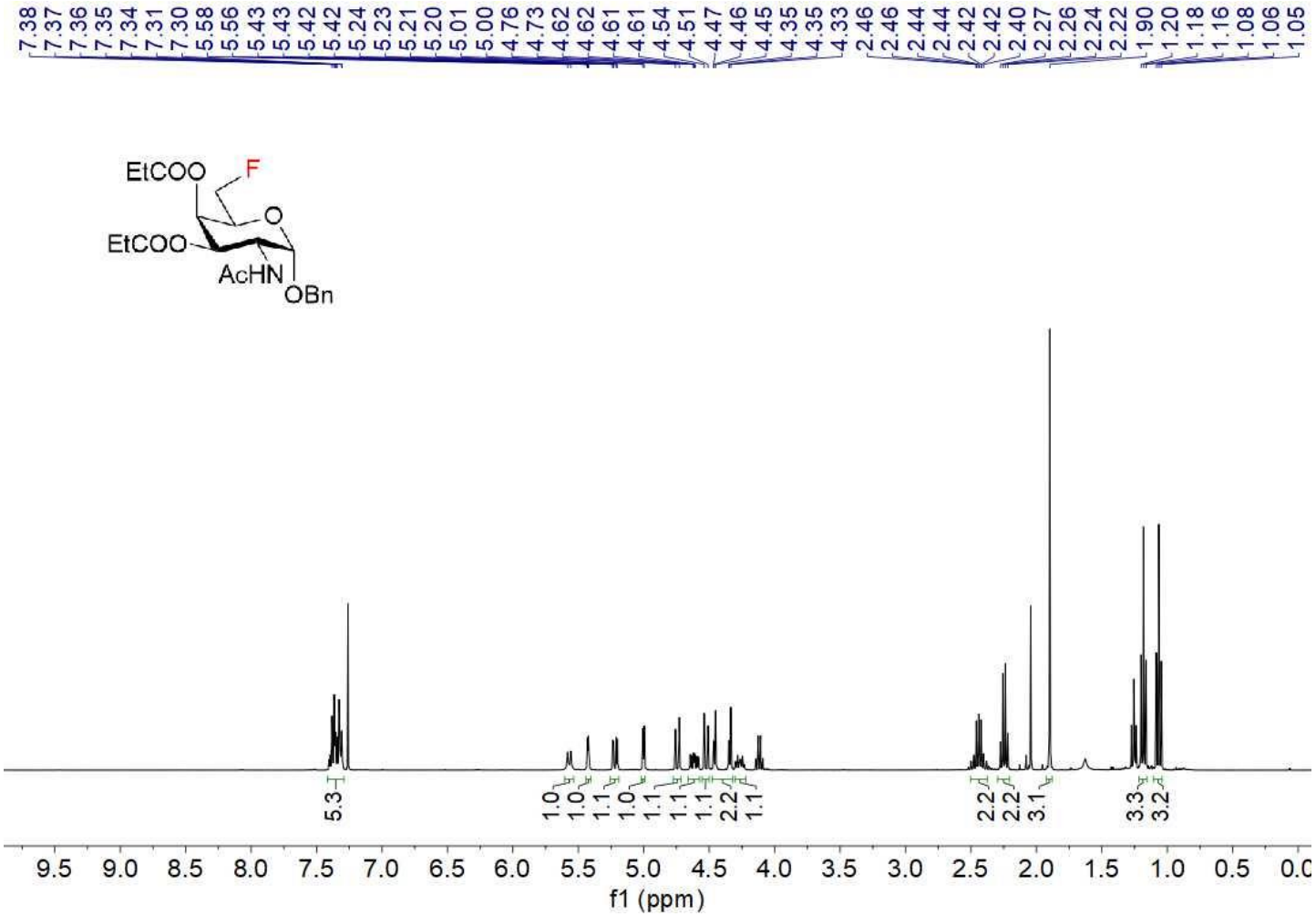

OH
F
O
HO
AcHN
OBn
3.7
3.8
3.9
4.0
4.1
4.2
4.3
4.4
4.5
4.6
4.7
4.8
4.9
5.0
f1 (ppm)
4.95
4.85
4.75
4.65
4.55
4.45
4.35
4.25
4.15
4.05
3.95
3.85
3.75
f2 (ppm)

^{1}H-^{13}C HSQC 96

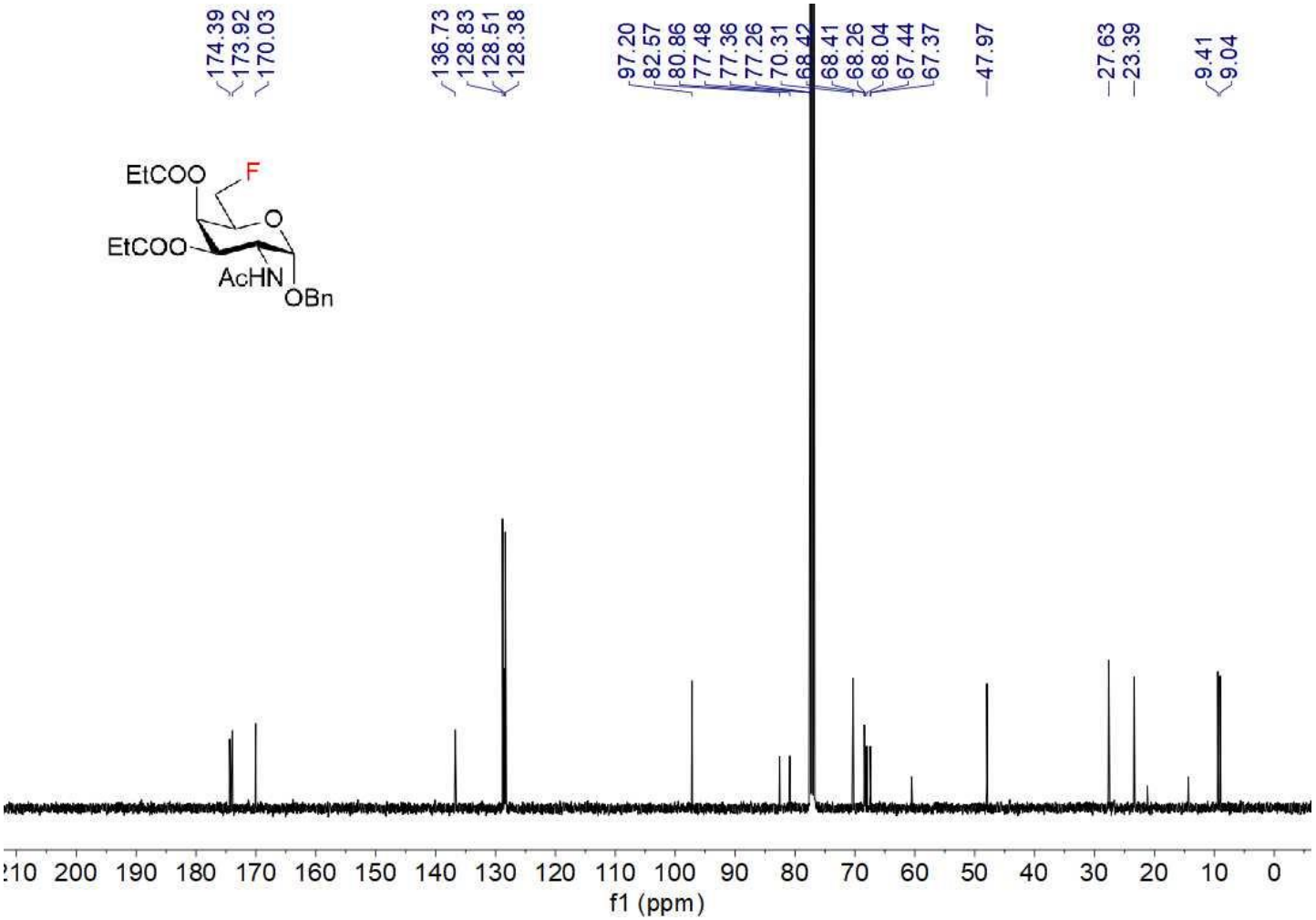


NMR COMPOUND 97

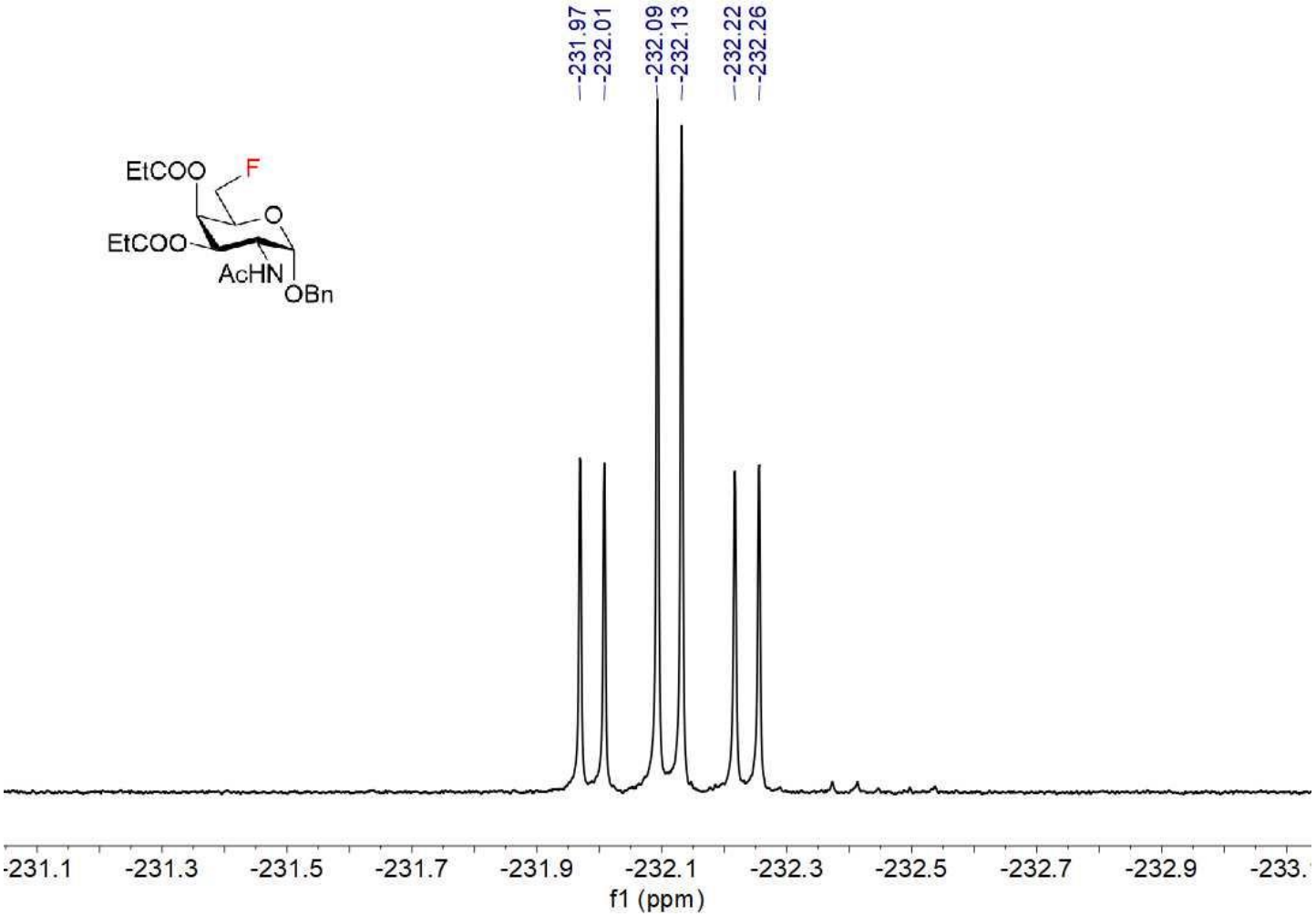
^{1}H NMR (400 MHz, $CDCl_3$) 97



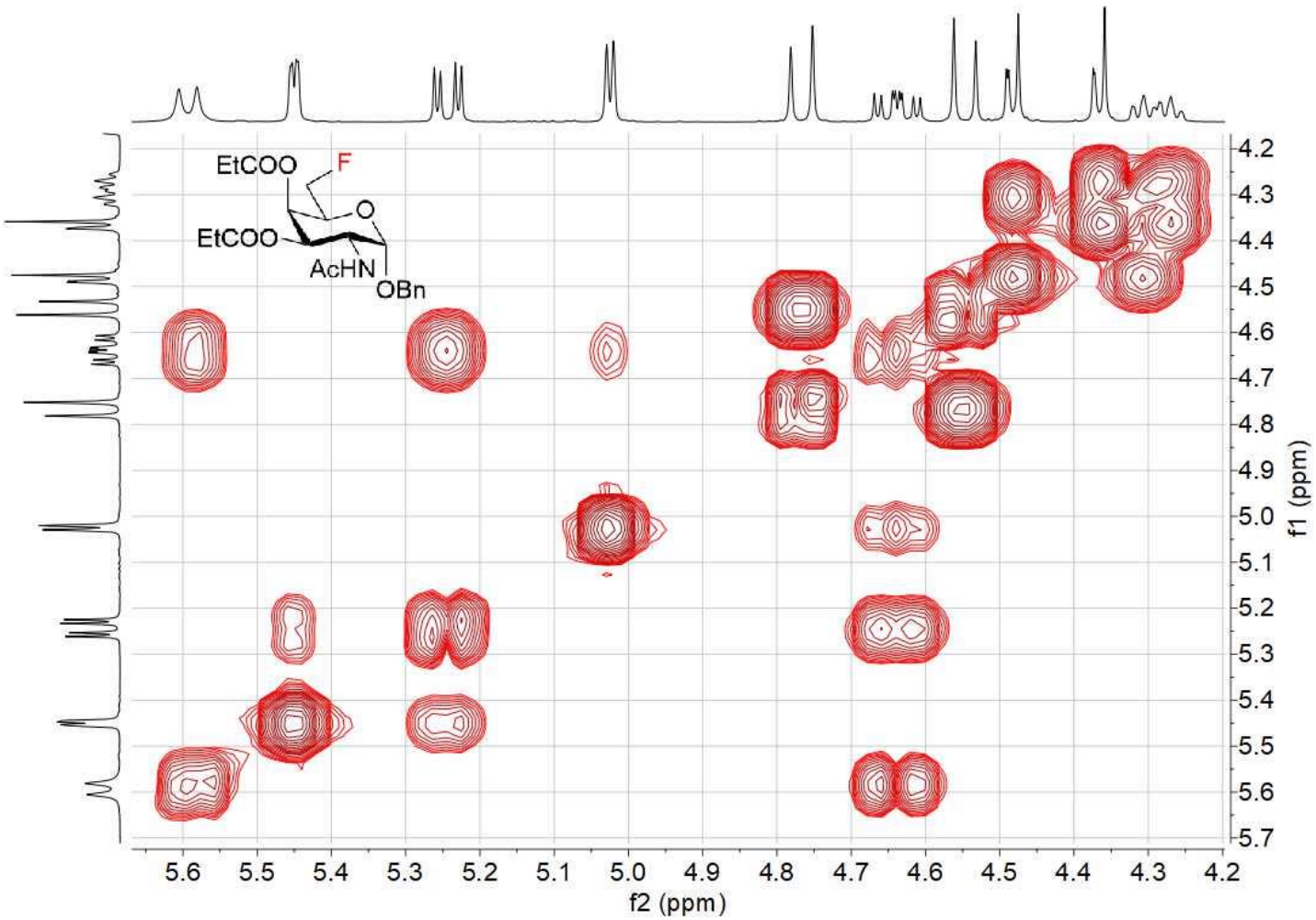
^{13}C NMR (100 MHz, $CDCl_3$) 97



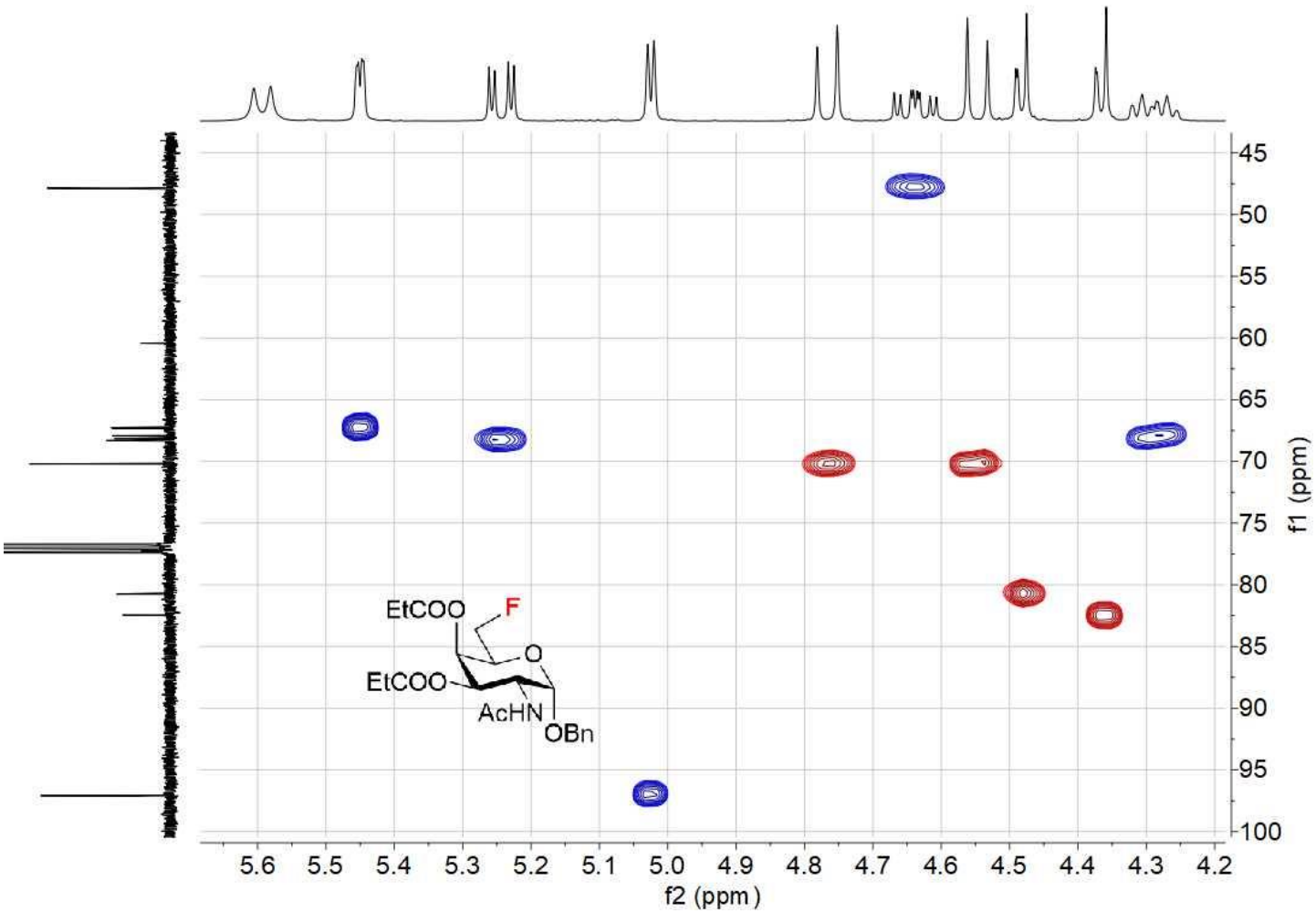
^{19}F NMR (376 MHz, $CDCl_3$) 97



^{1}H-^{1}H COSY 97

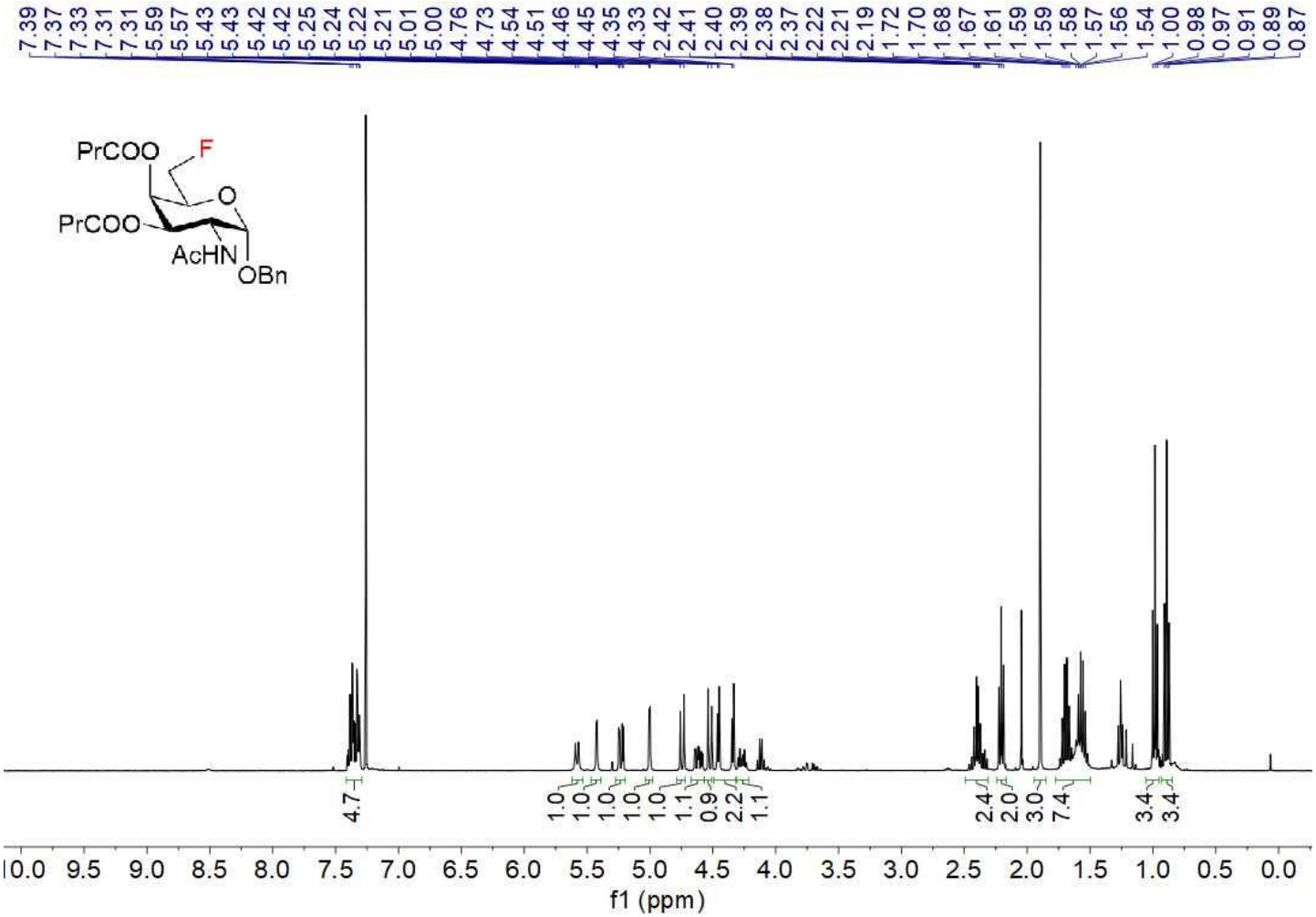


^{1}H-^{13}C HSQC 97

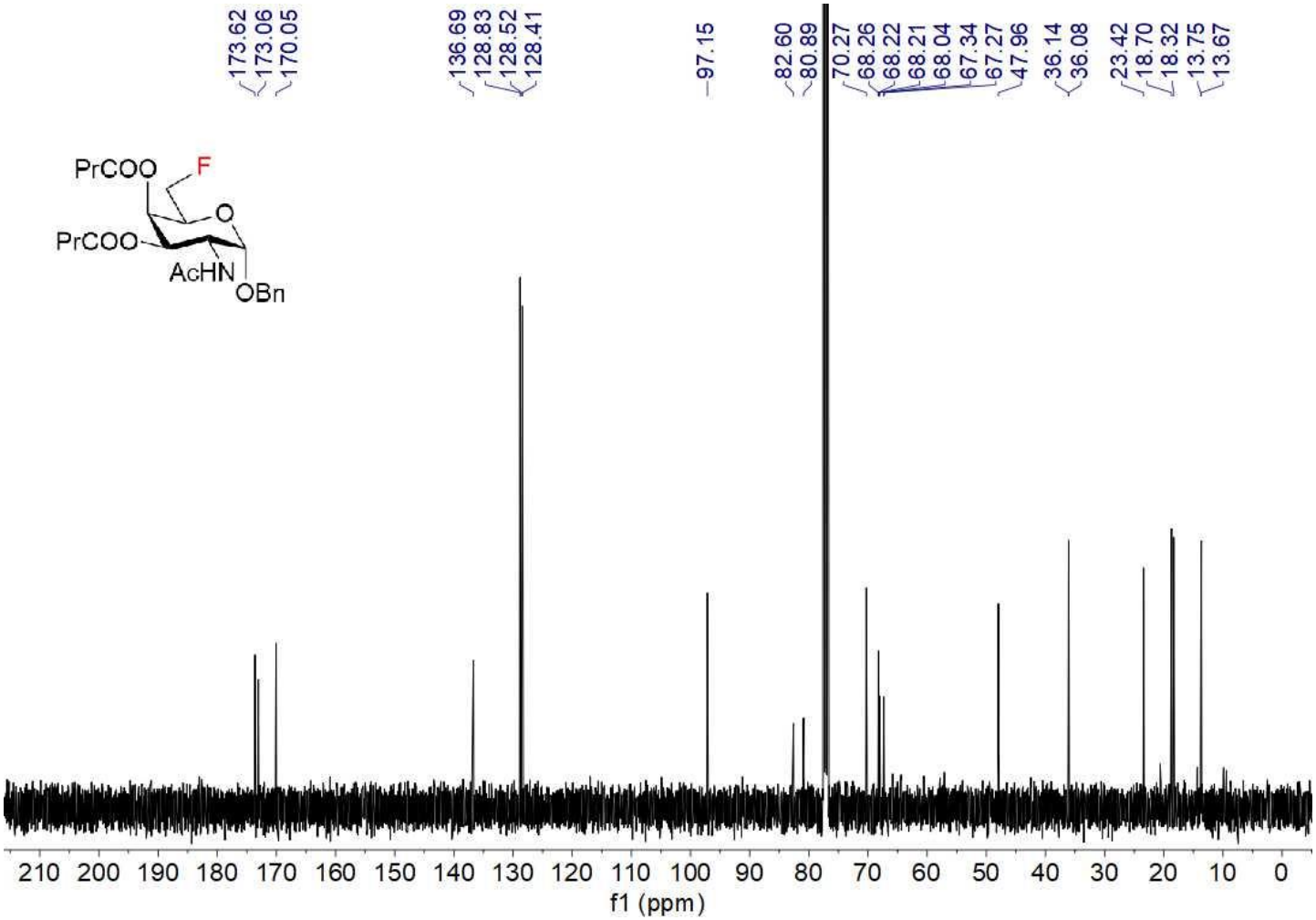


NMR COMPOUND 98

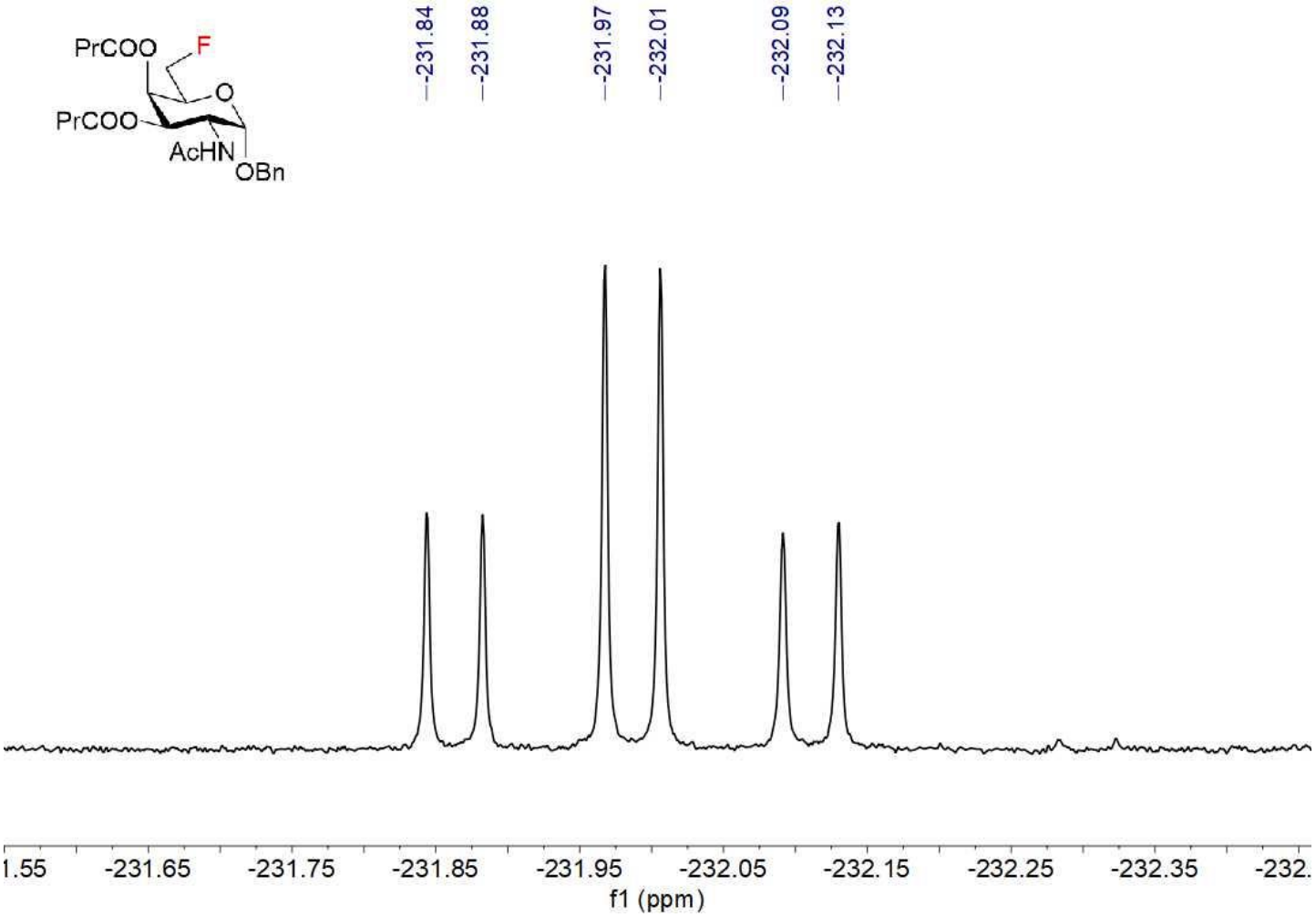
^{1}H NMR (400 MHz, $CDCl_3$) 98



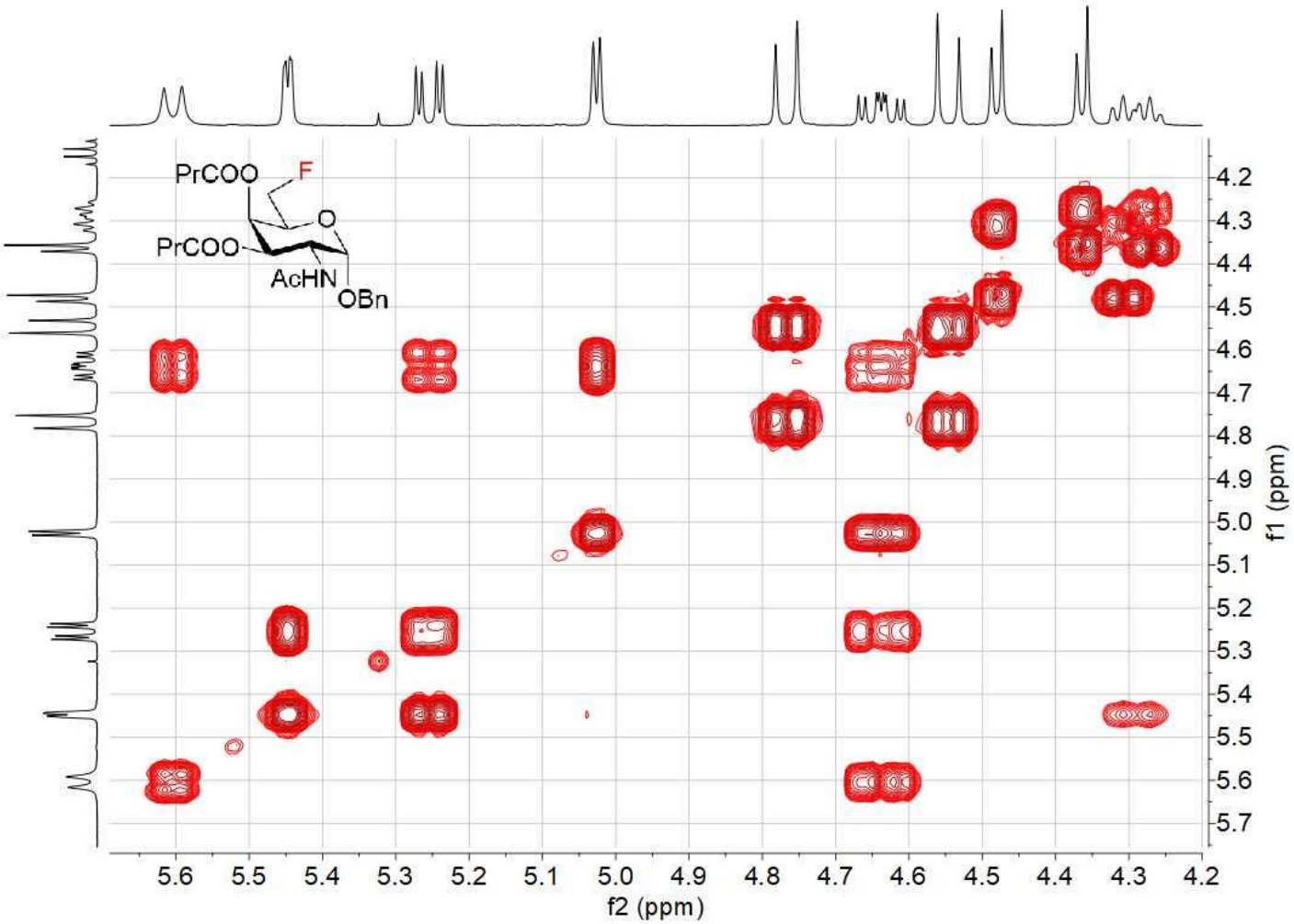
^{13}C NMR (100 MHz, $CDCl_3$) 98



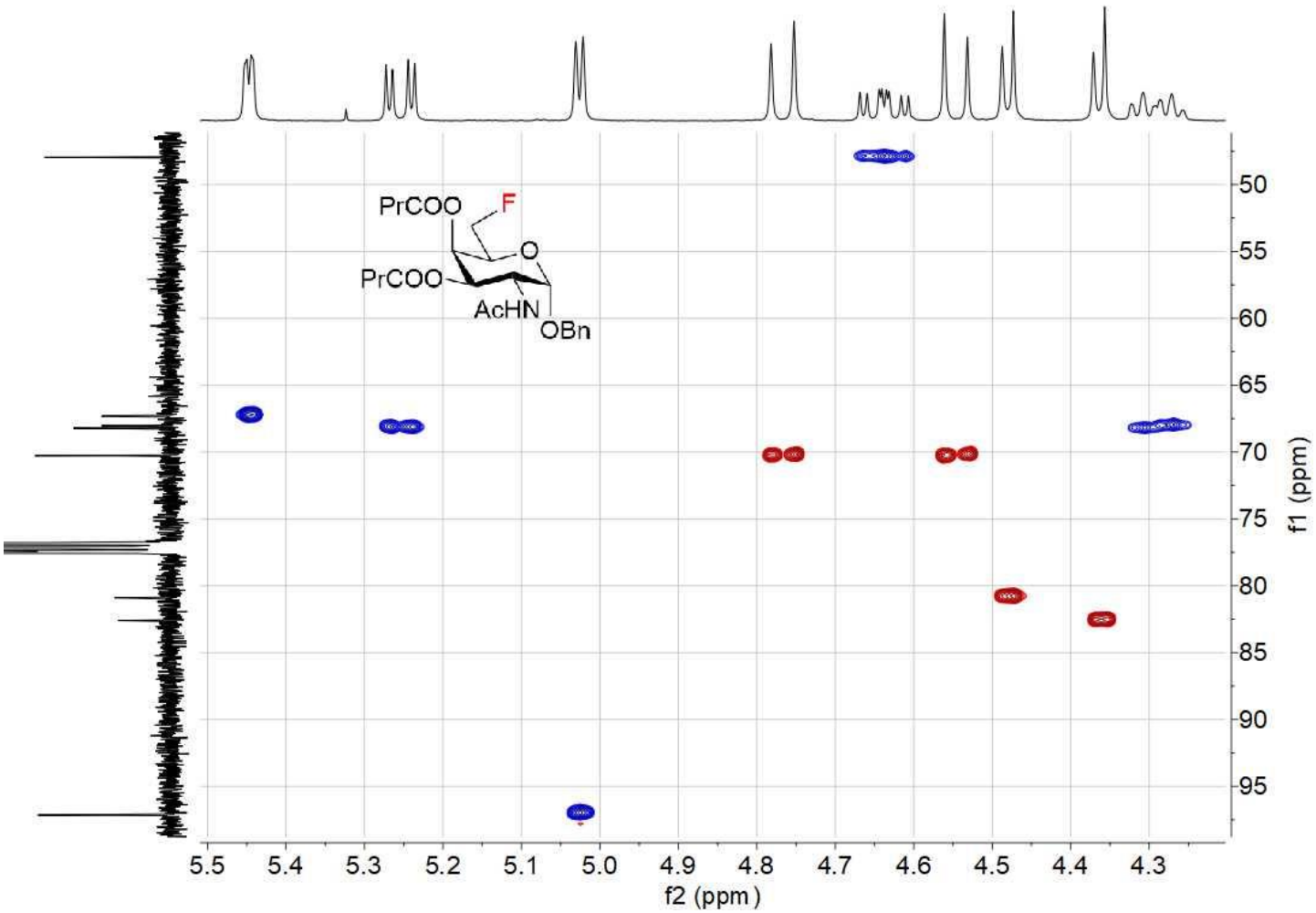
^{19}F NMR (376 MHz, $CDCl_3$) 98



^{1}H-^{1}H COSY 98

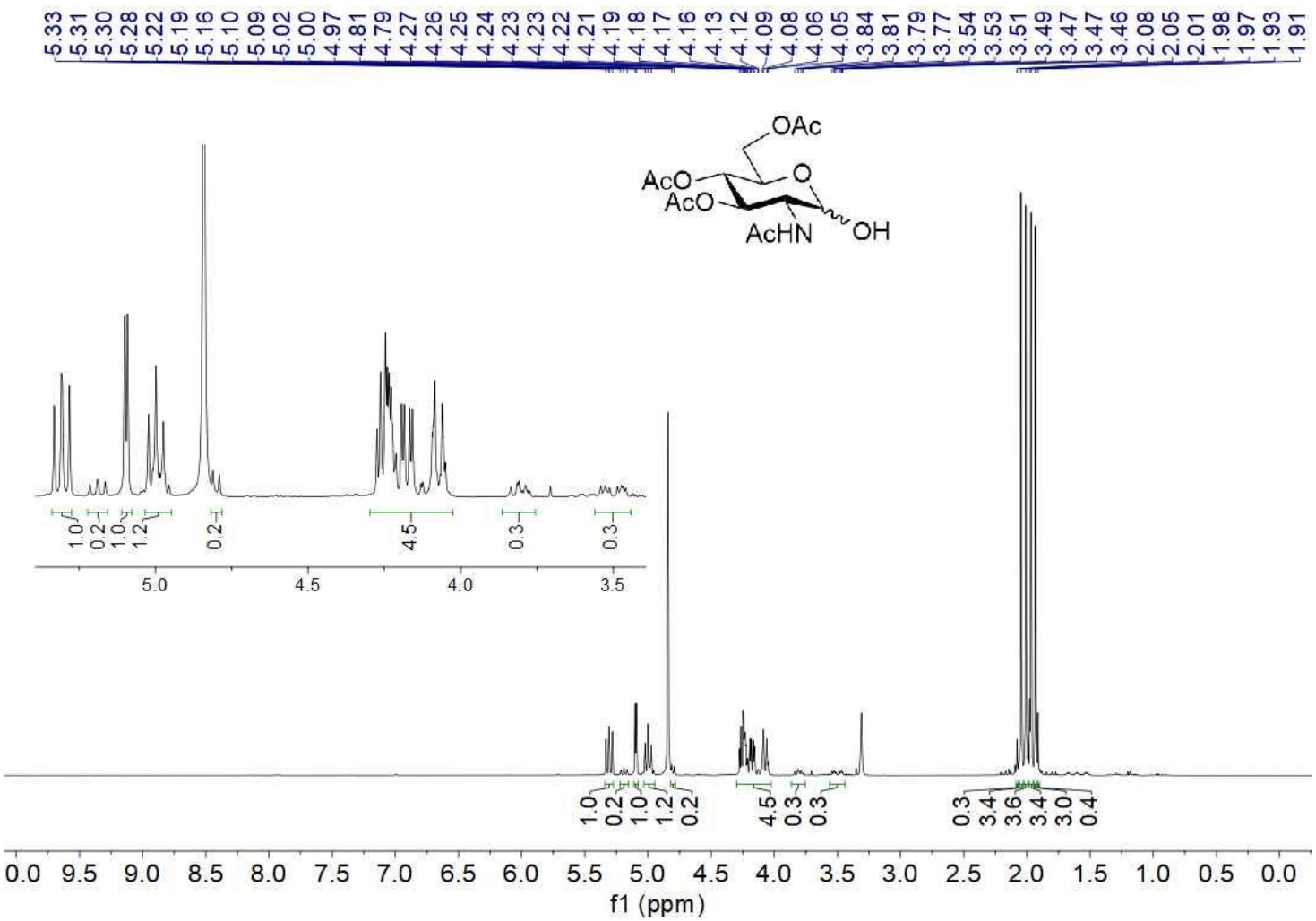


^{1}H-^{13}C HSQC 98

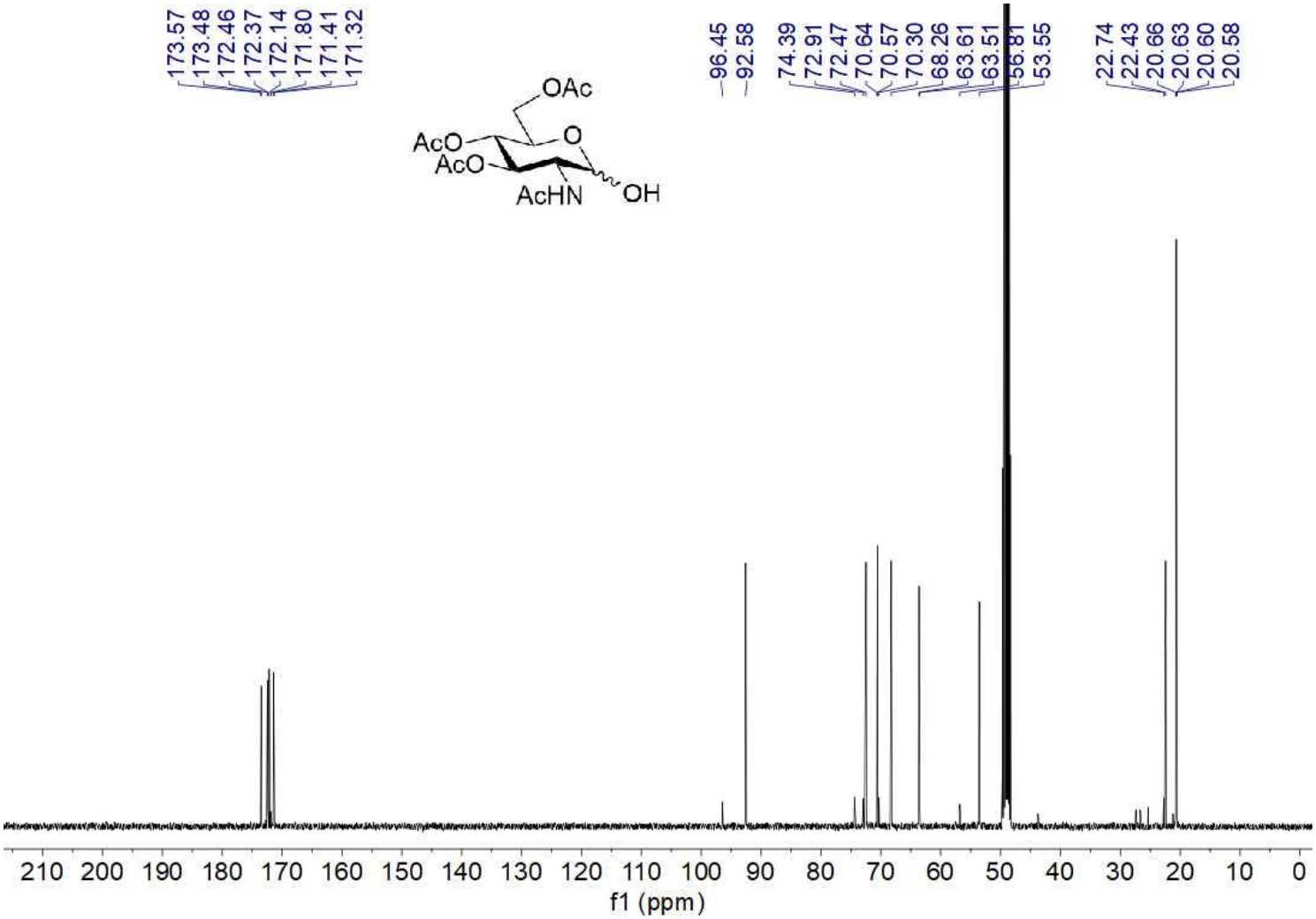


NMR COMPOUND 99

^{1}H NMR (400 MHz, $CDCl_3$) 99

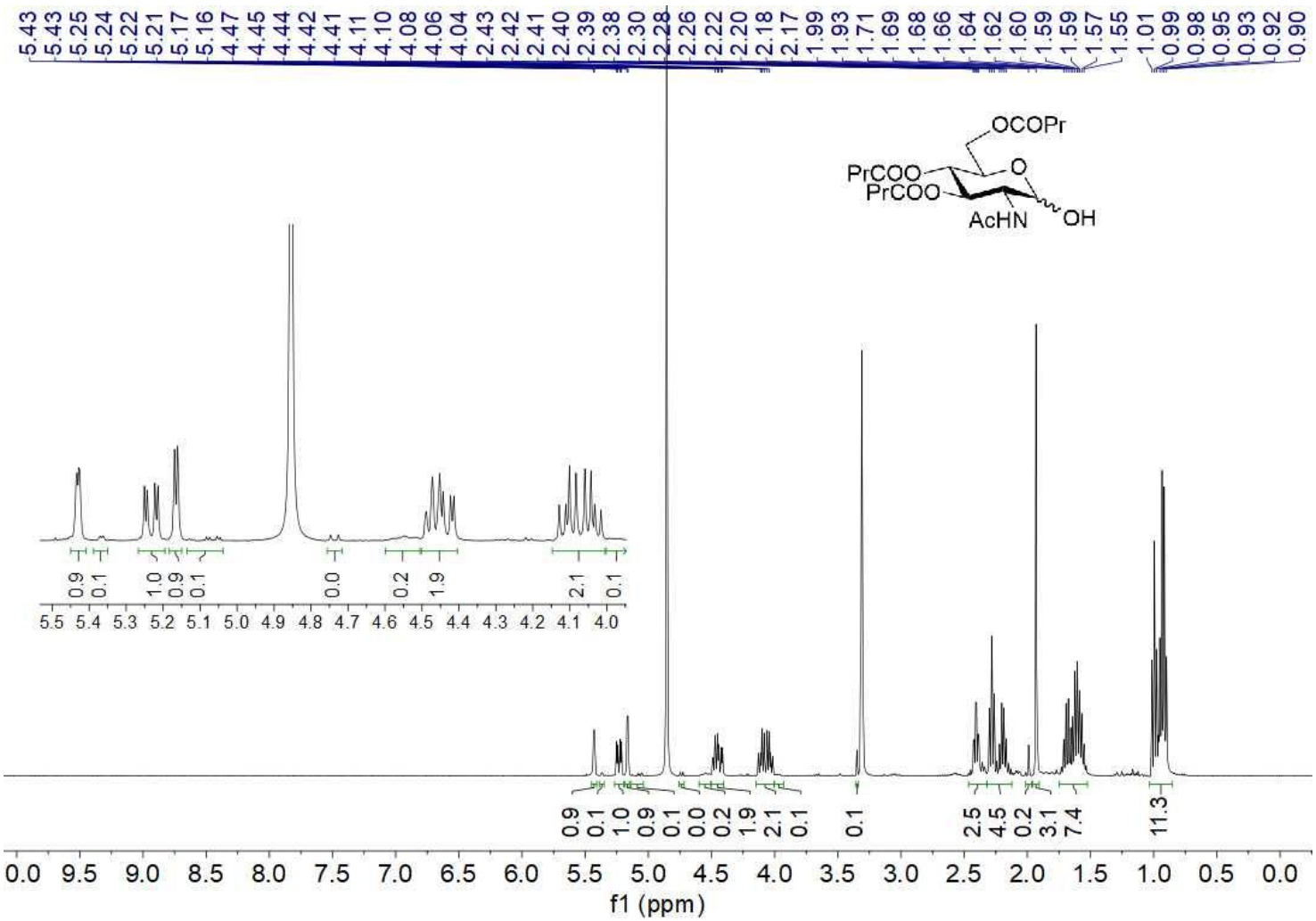


^{13}C NMR (100 MHz, $CDCl_3$) 99

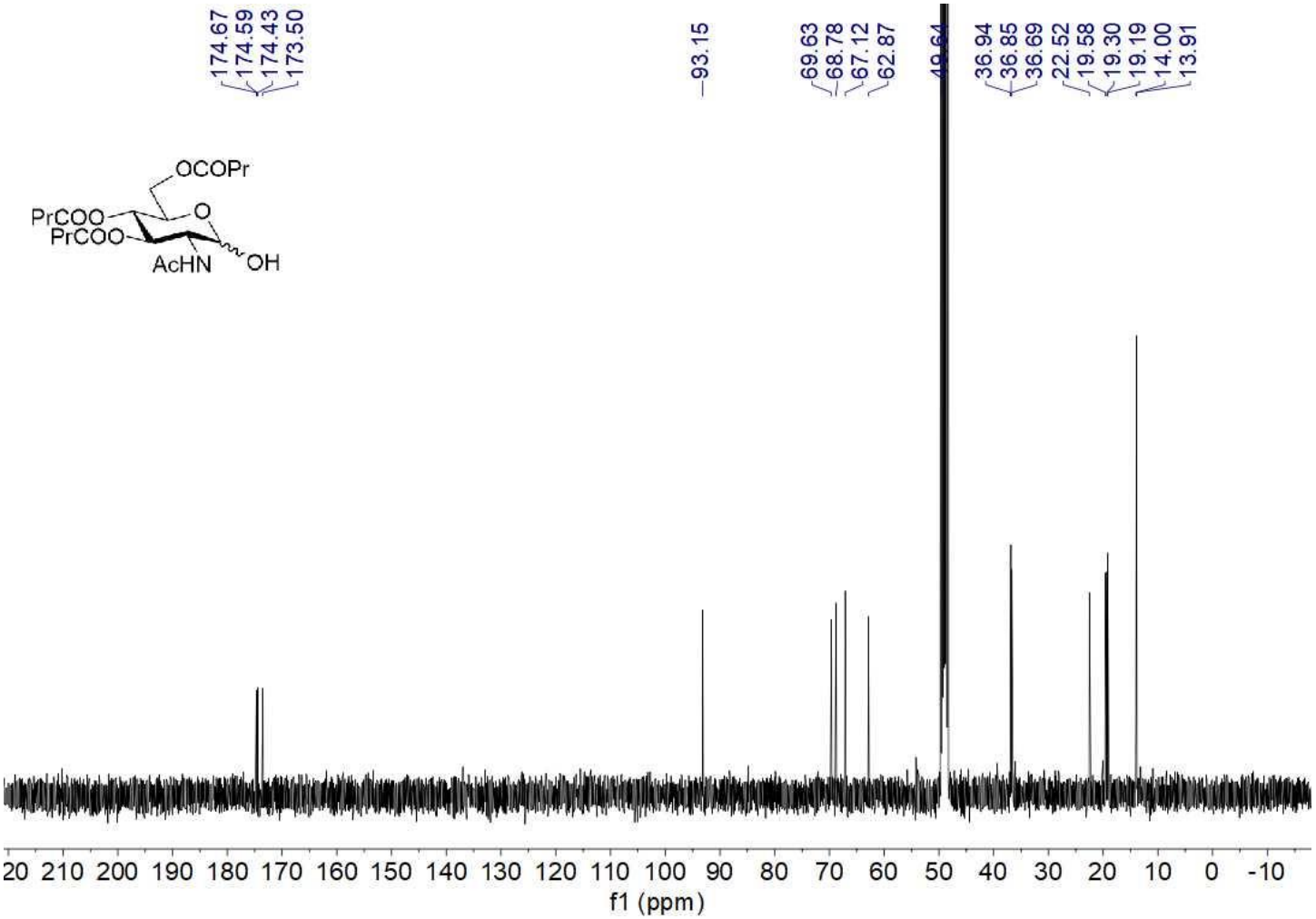


NMR COMPOUND 100

^{1}H NMR (400 MHz, $CDCl_3$) 100

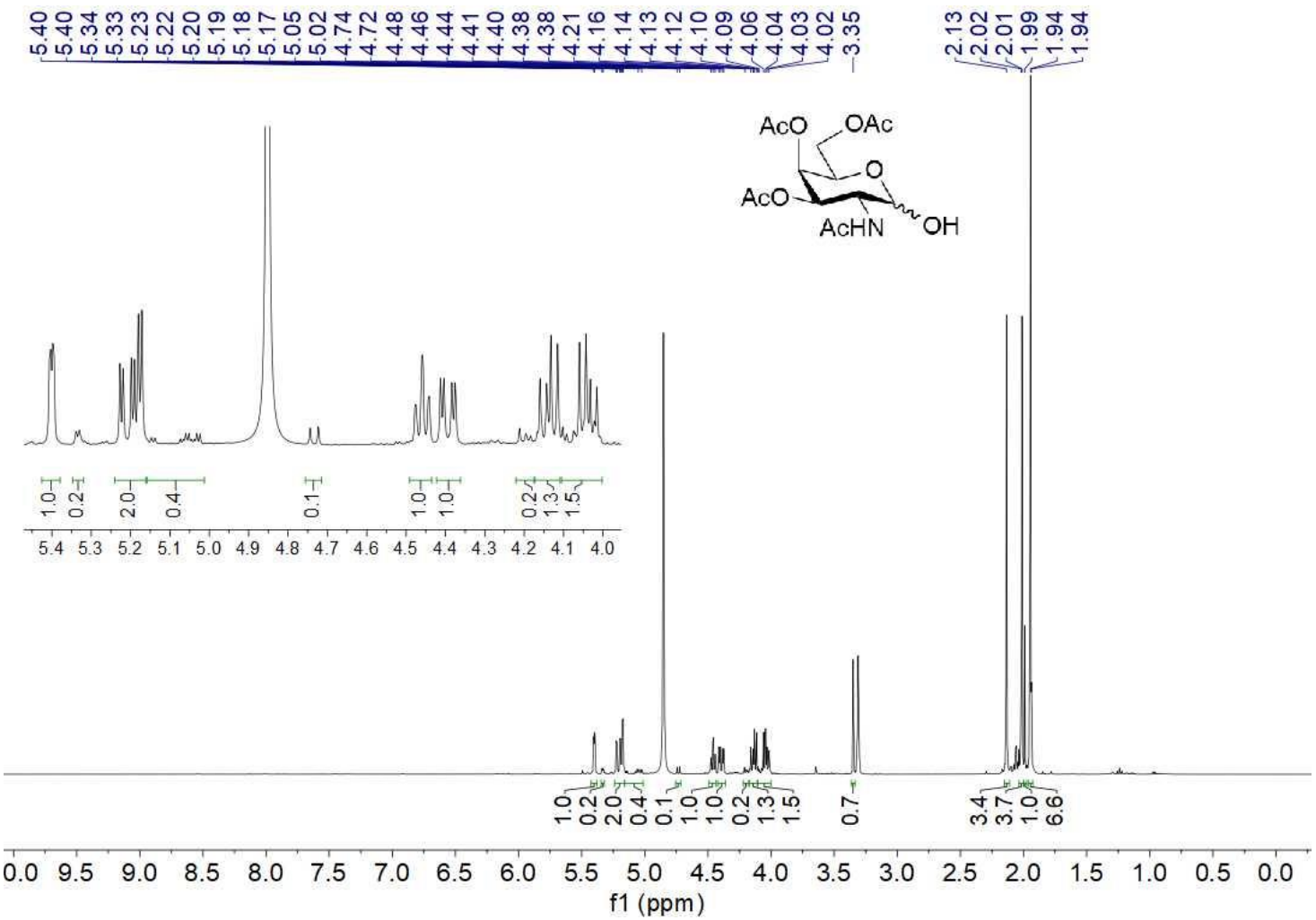


^{13}C NMR (100 MHz, $CDCl_3$) 100

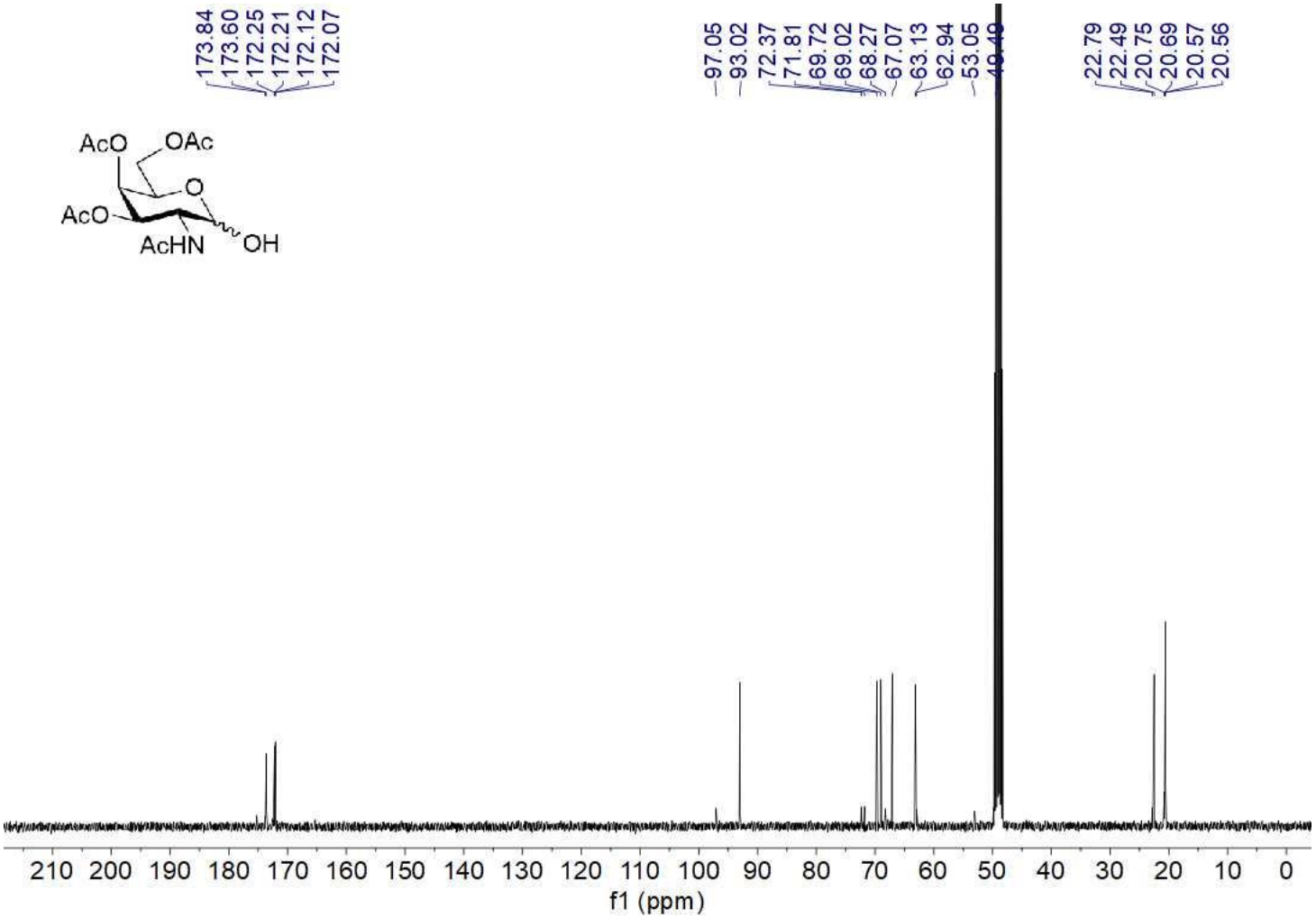


NMR COMPOUND 102

^{1}H NMR (400 MHz, $CDCl_3$) 102

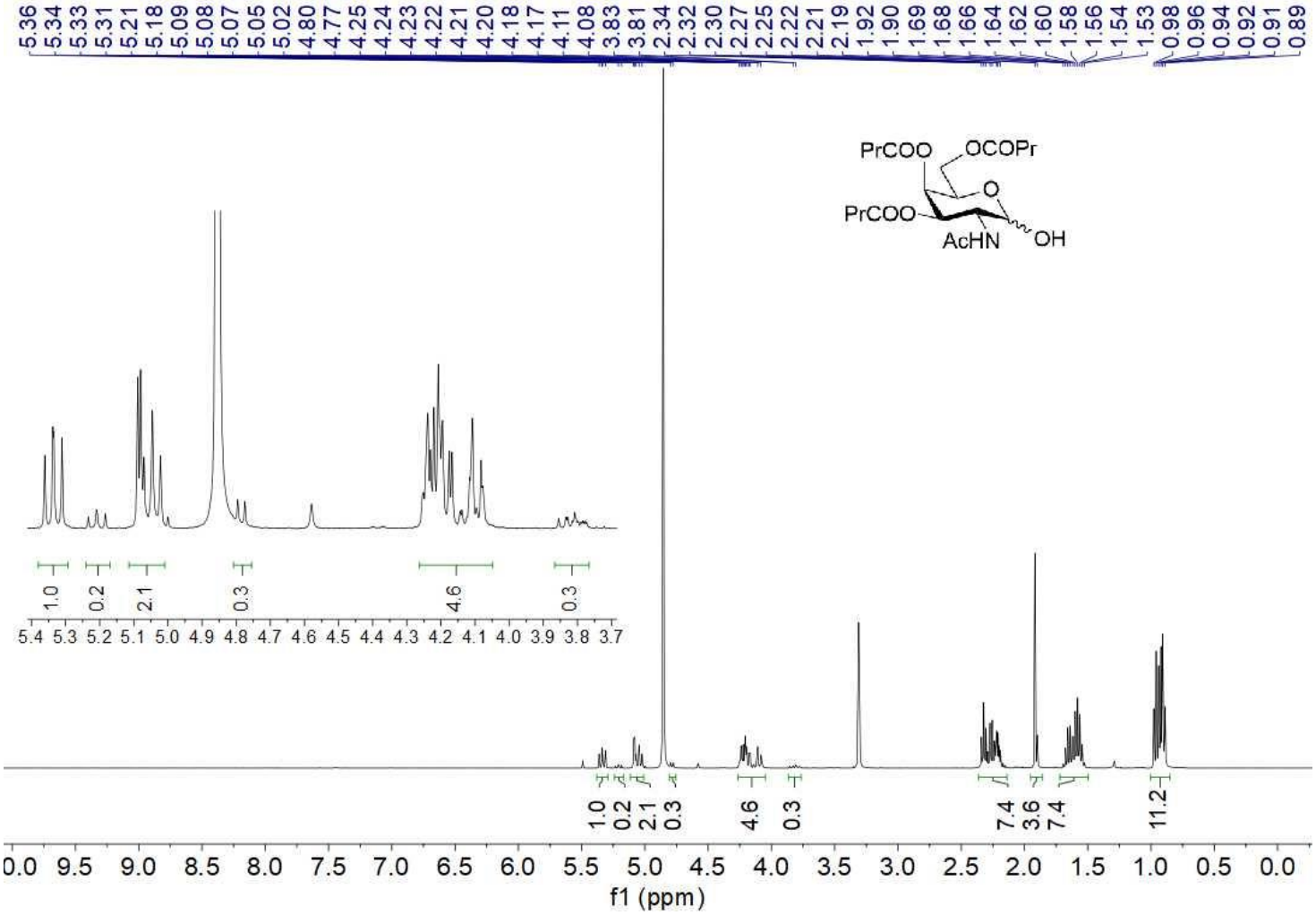


^{13}C NMR (100 MHz, $CDCl_3$) 102

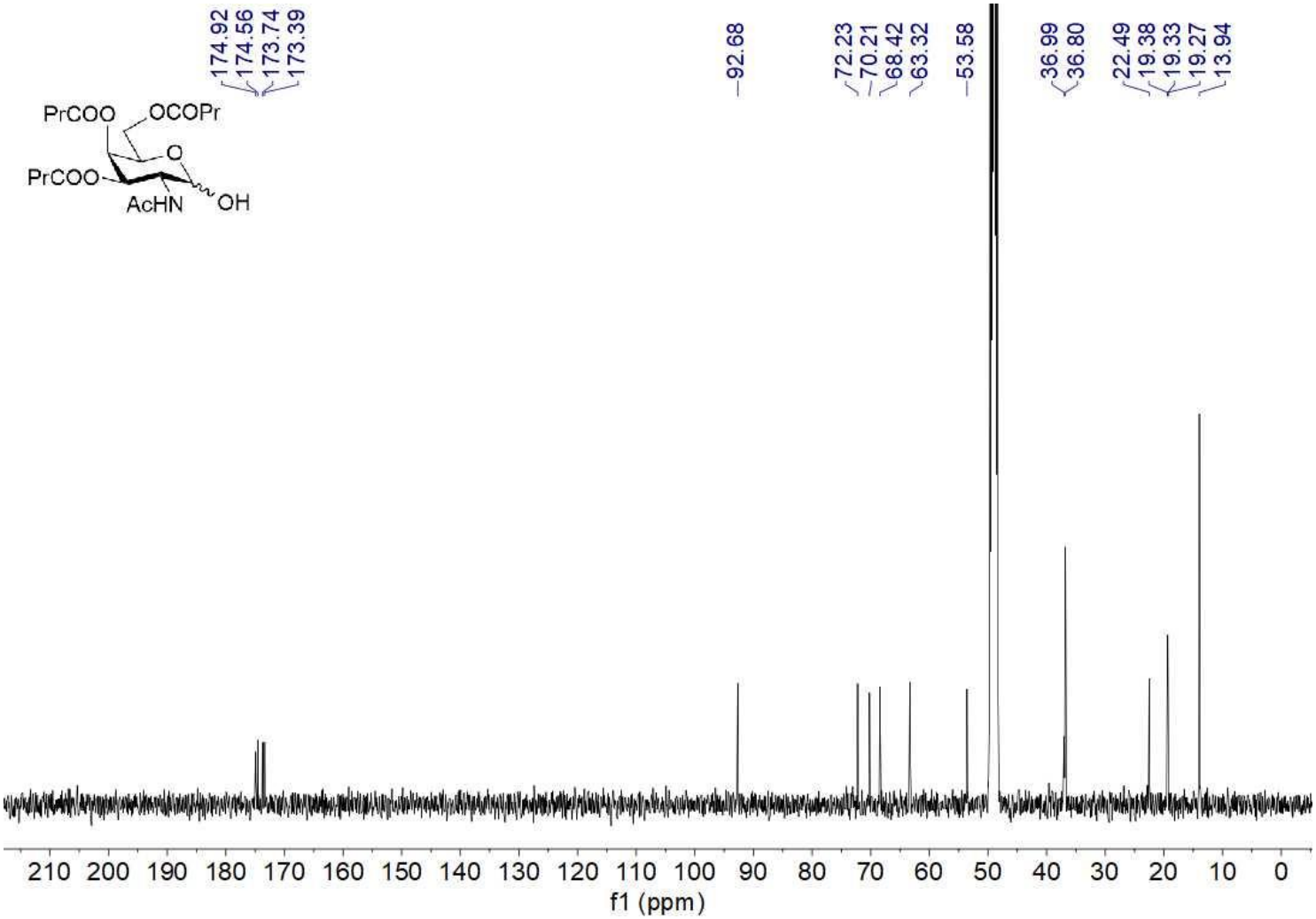


NMR COMPOUND 103

^{1}H NMR (400 MHz, $CDCl_3$) 103

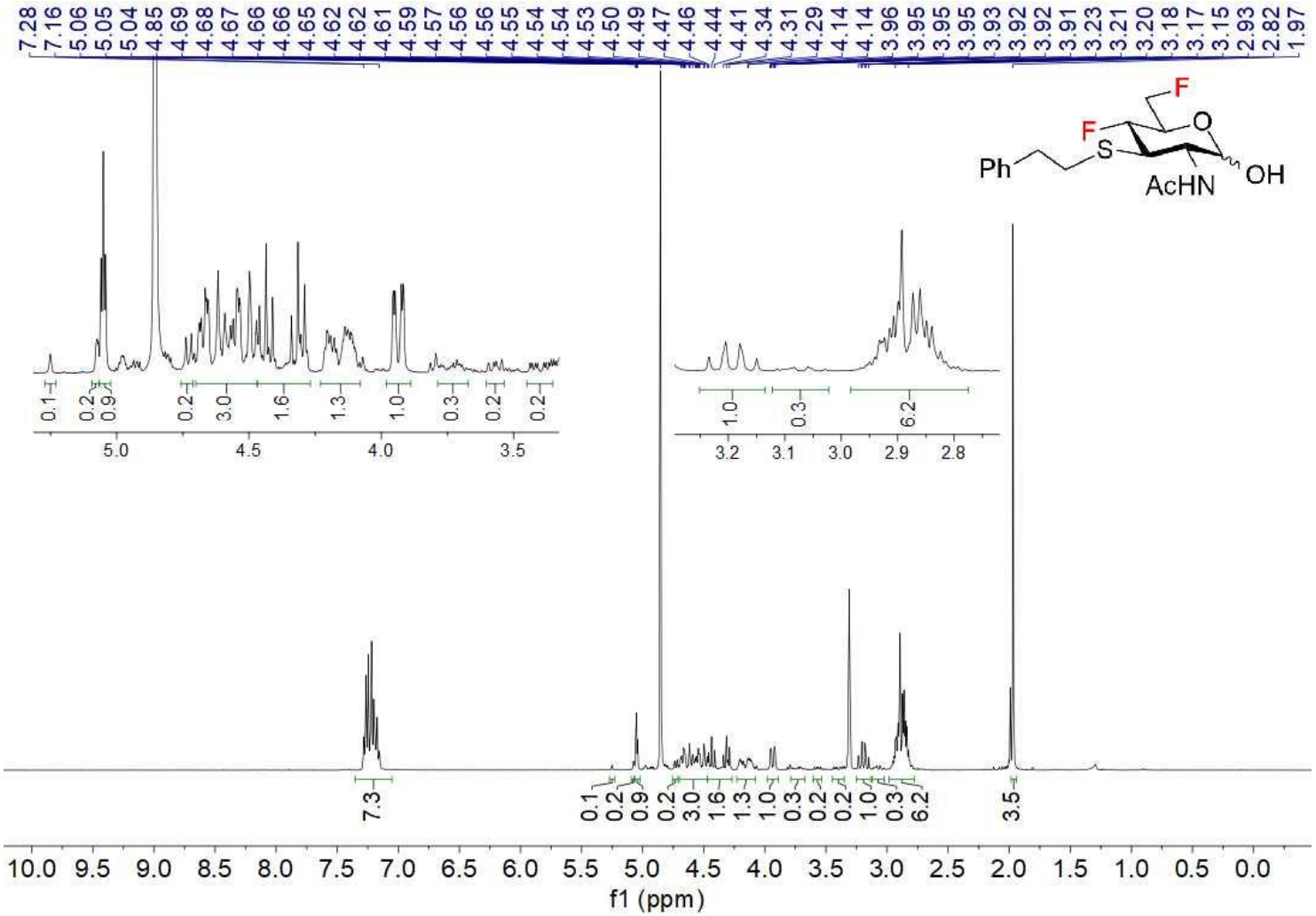


^{13}C NMR (100 MHz, $CDCl_3$) 103

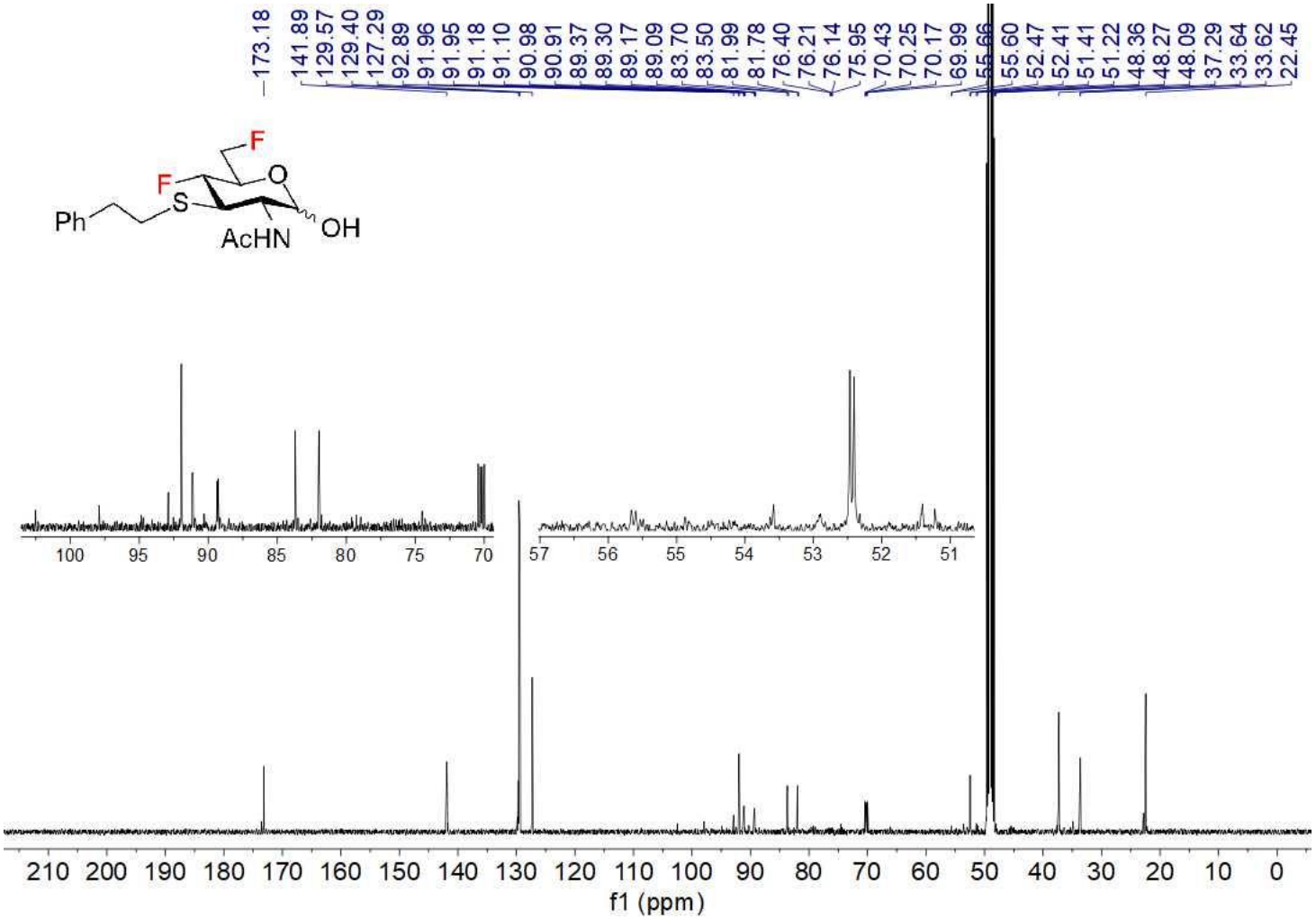


NMR COMPOUND 110

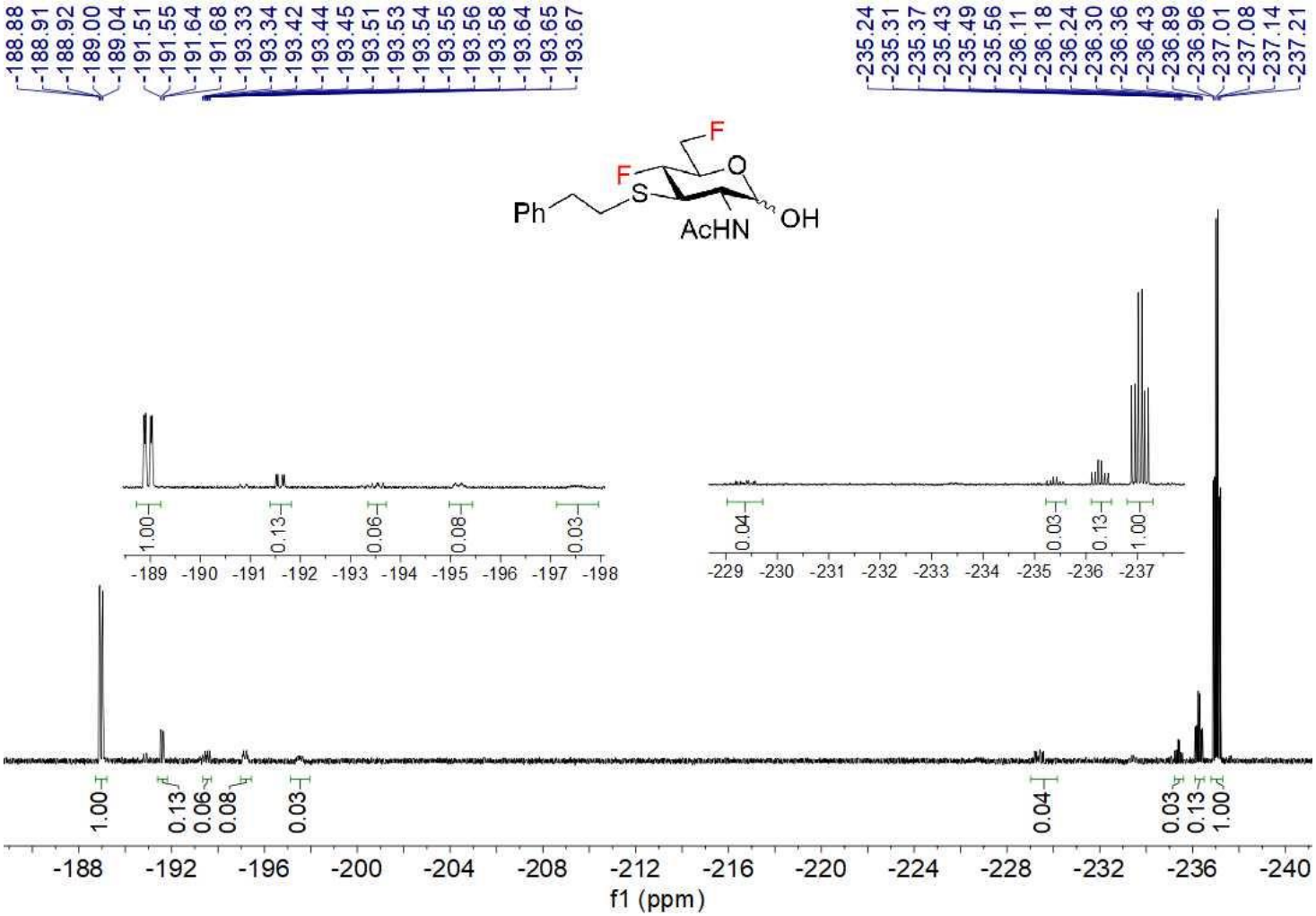
^{1}H NMR (400 MHz, CD_3OD) 110



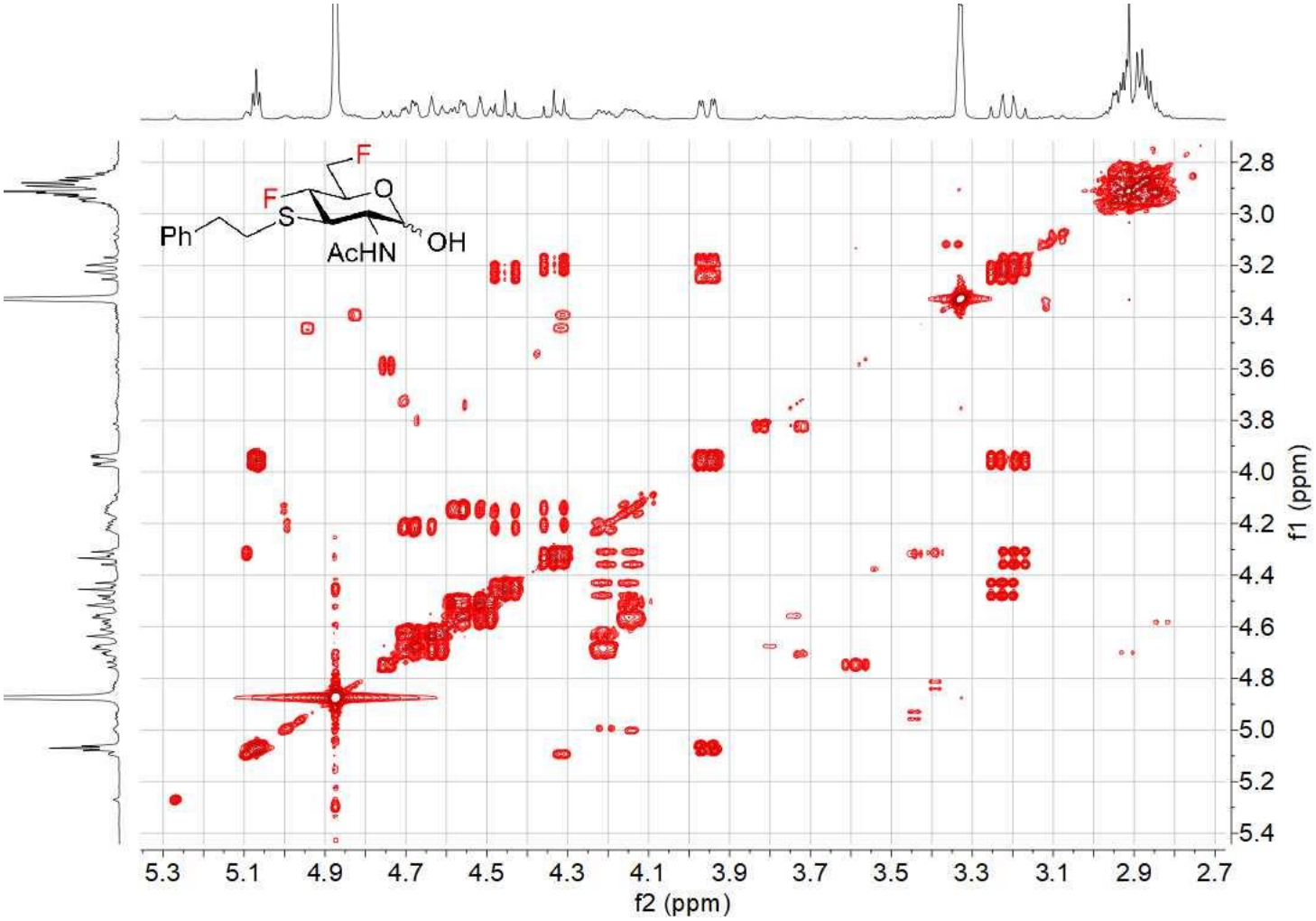
^{13}C NMR (100 MHz, CD_3OD) 110



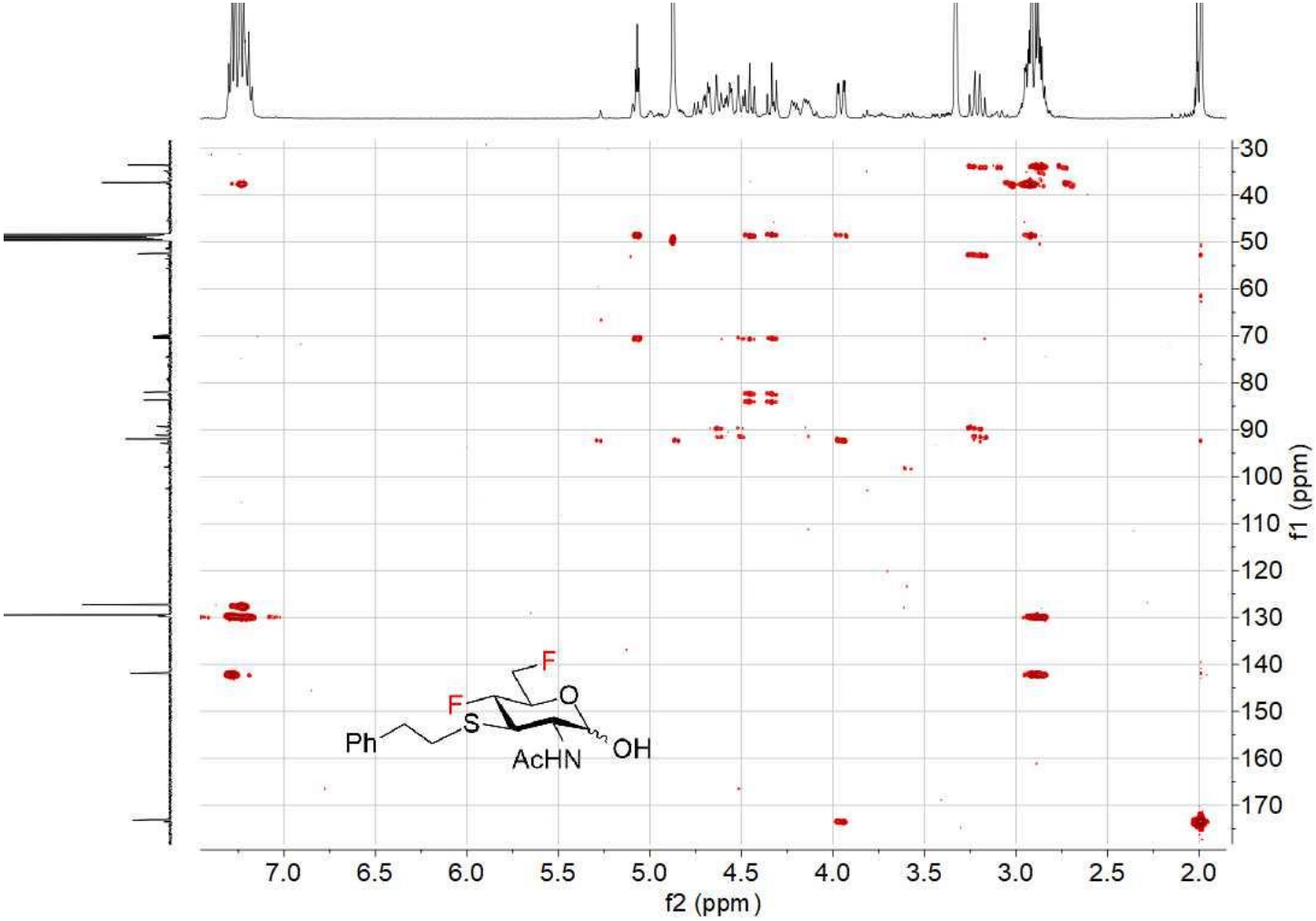
^{19}F NMR (376 MHz, CD_3OD) 110



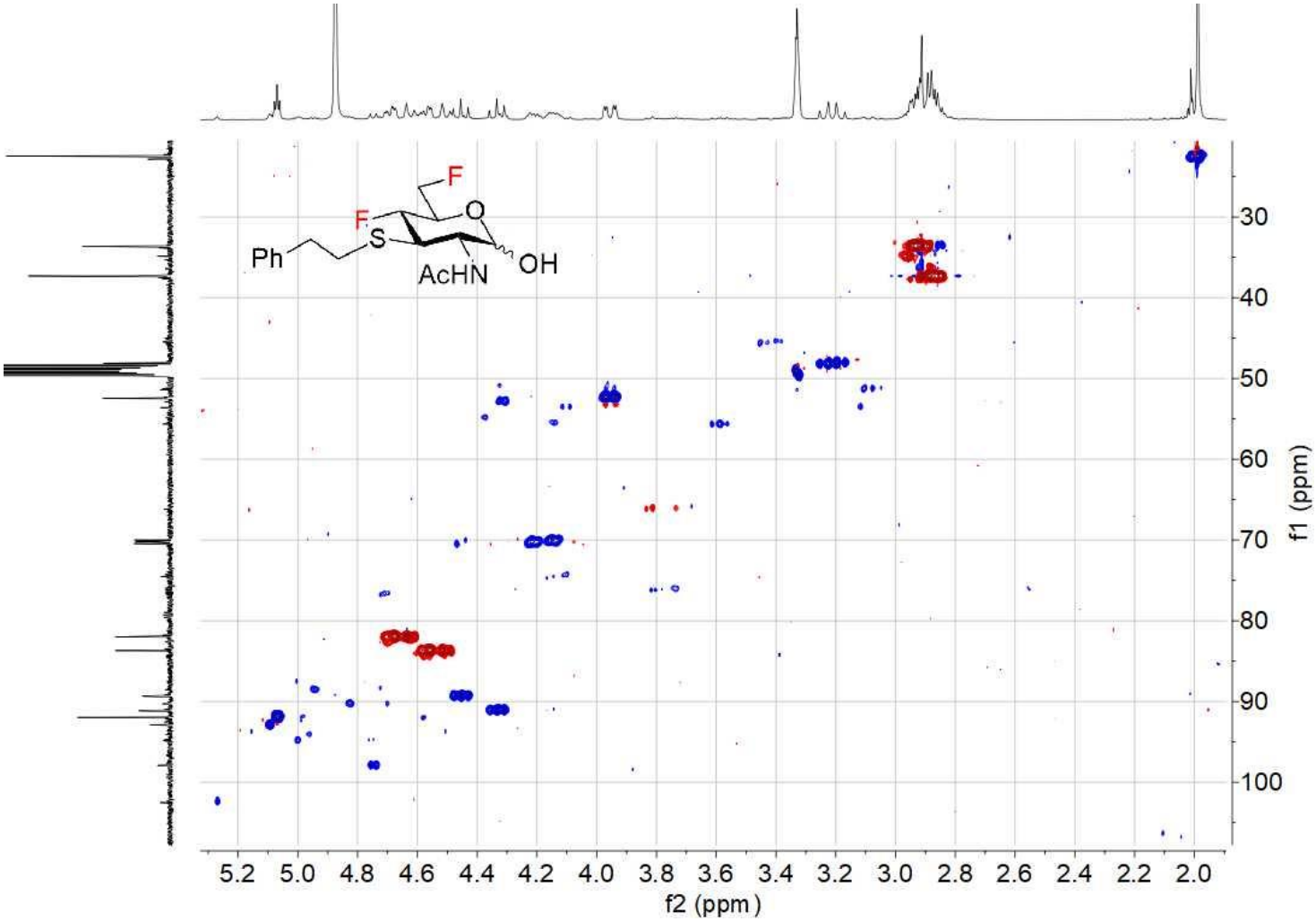
^{1}H-^{1}H COSY 110



^{1}H-^{13}C HMBC 110

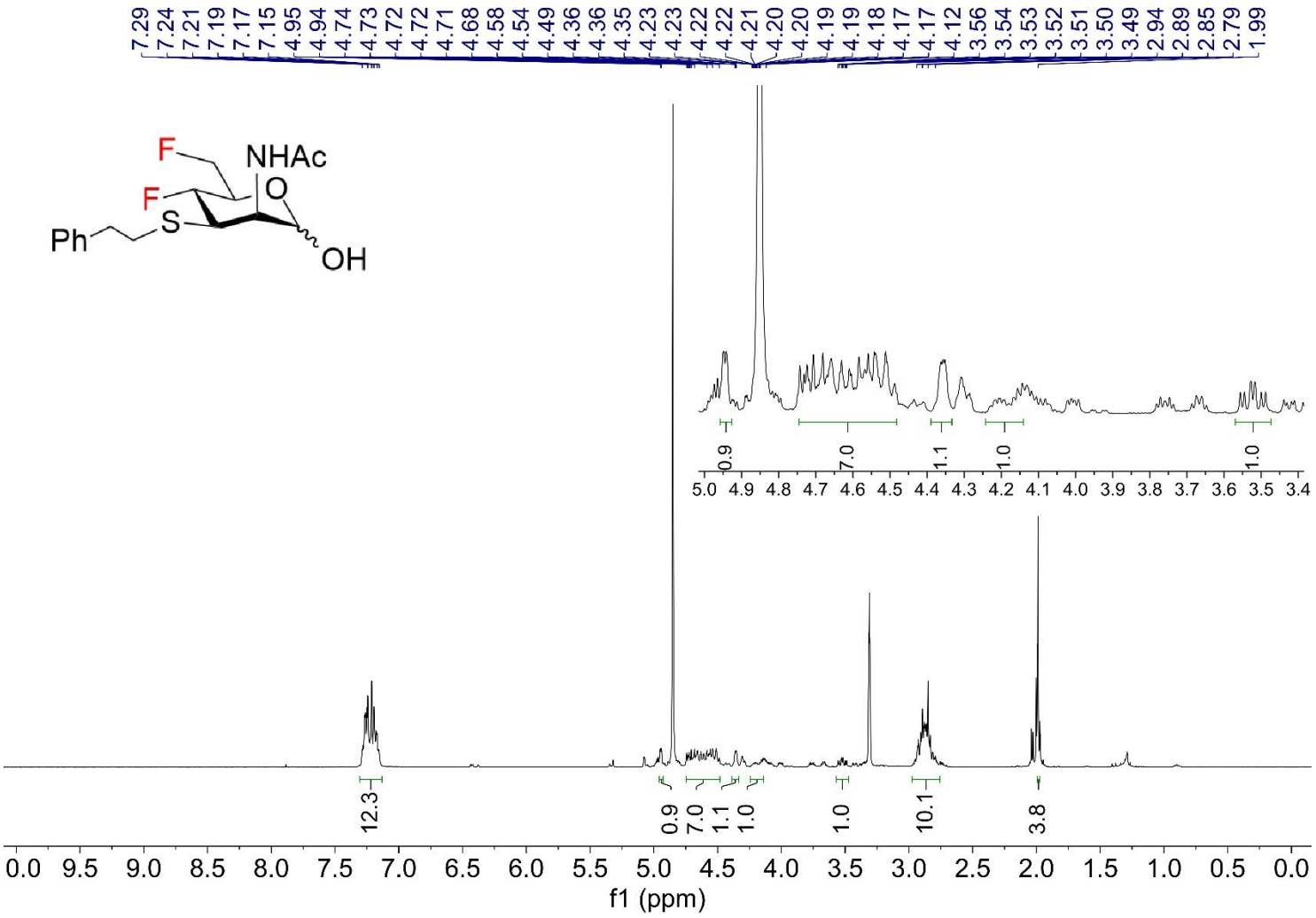


^{1}H-^{13}C HSQC 110

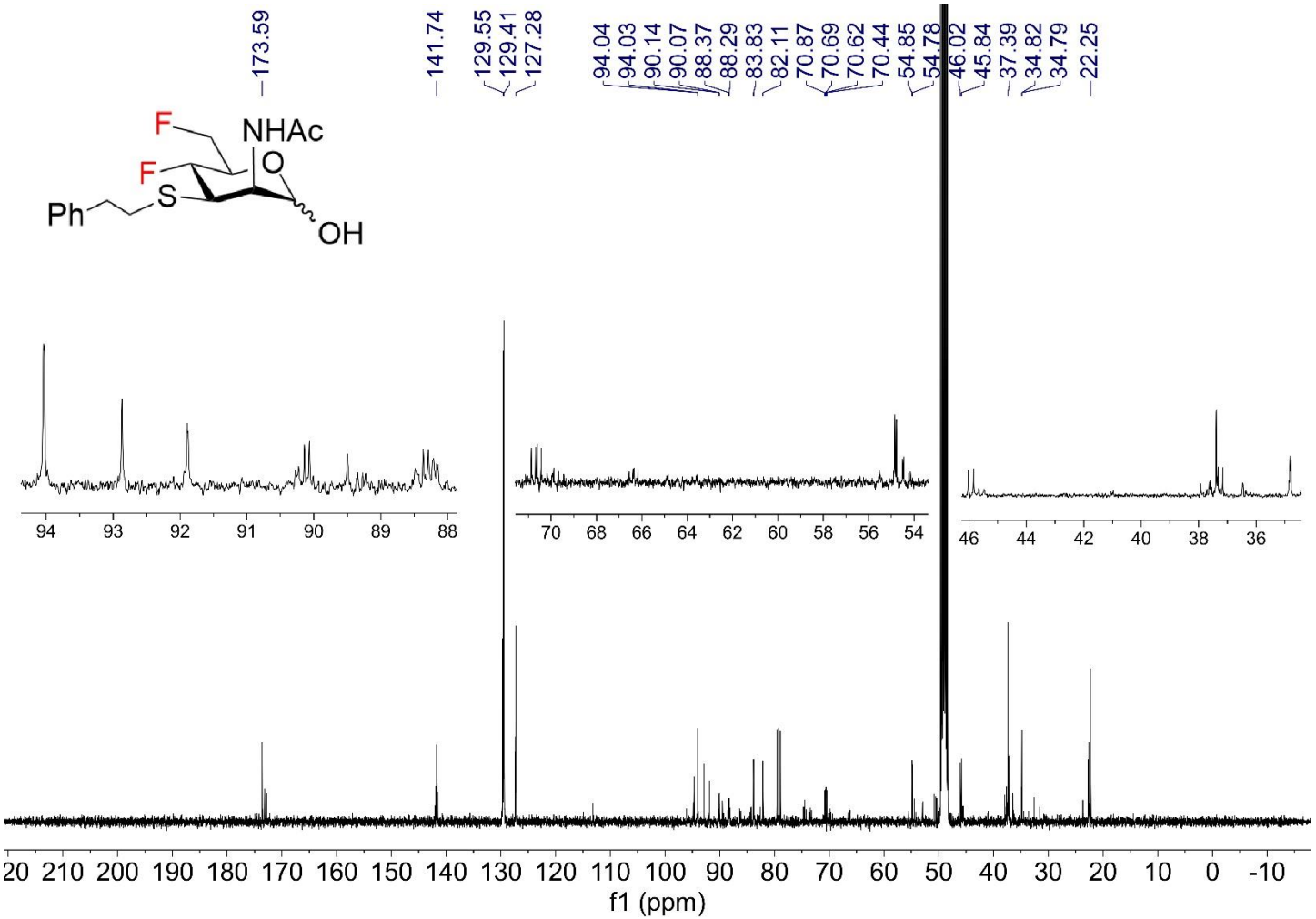


NMR COMPOUND 111 (in a mixture with ca 40% of unidentified compounds)

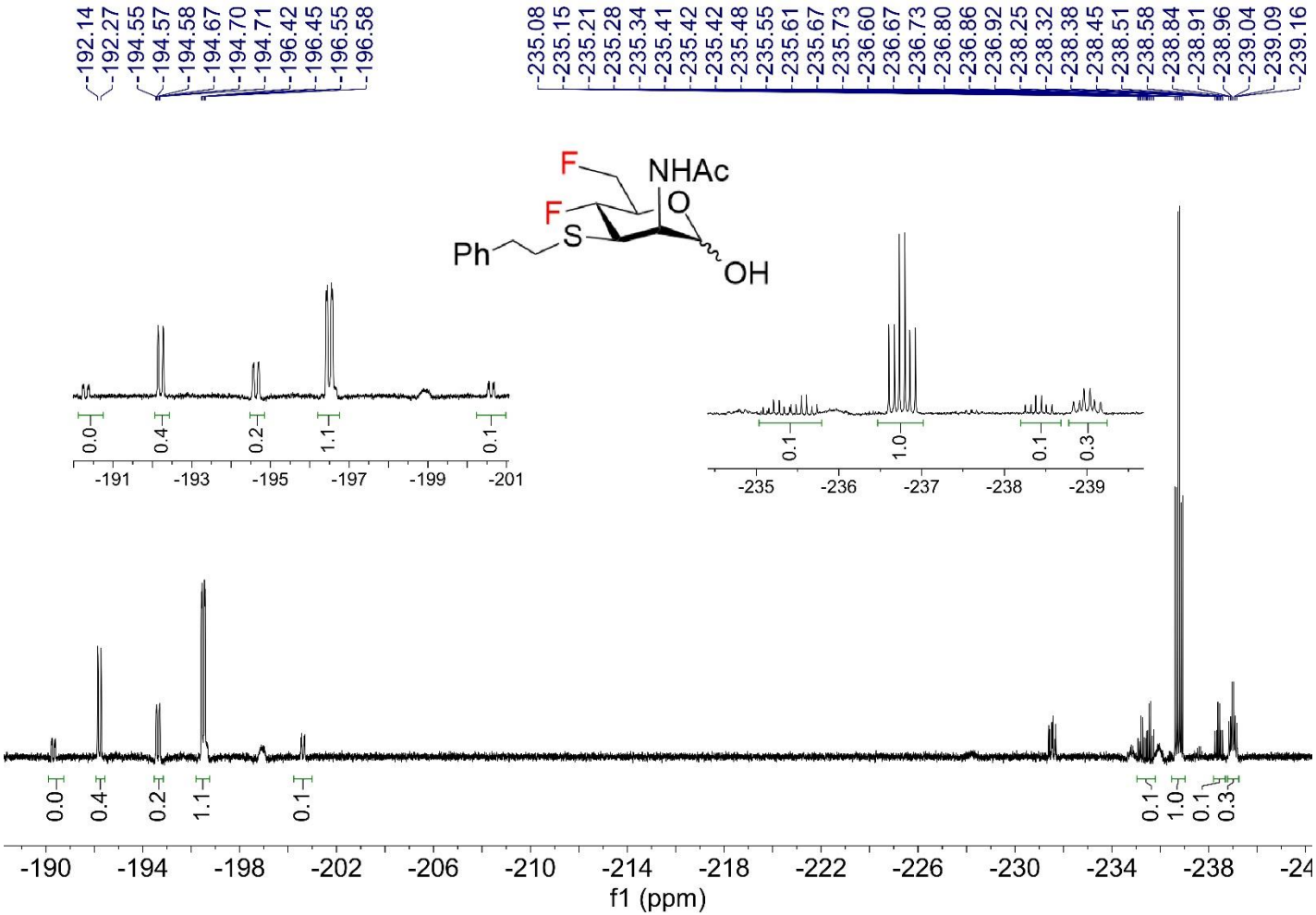
^{1}H NMR (400 MHz, CD_3OD) 111



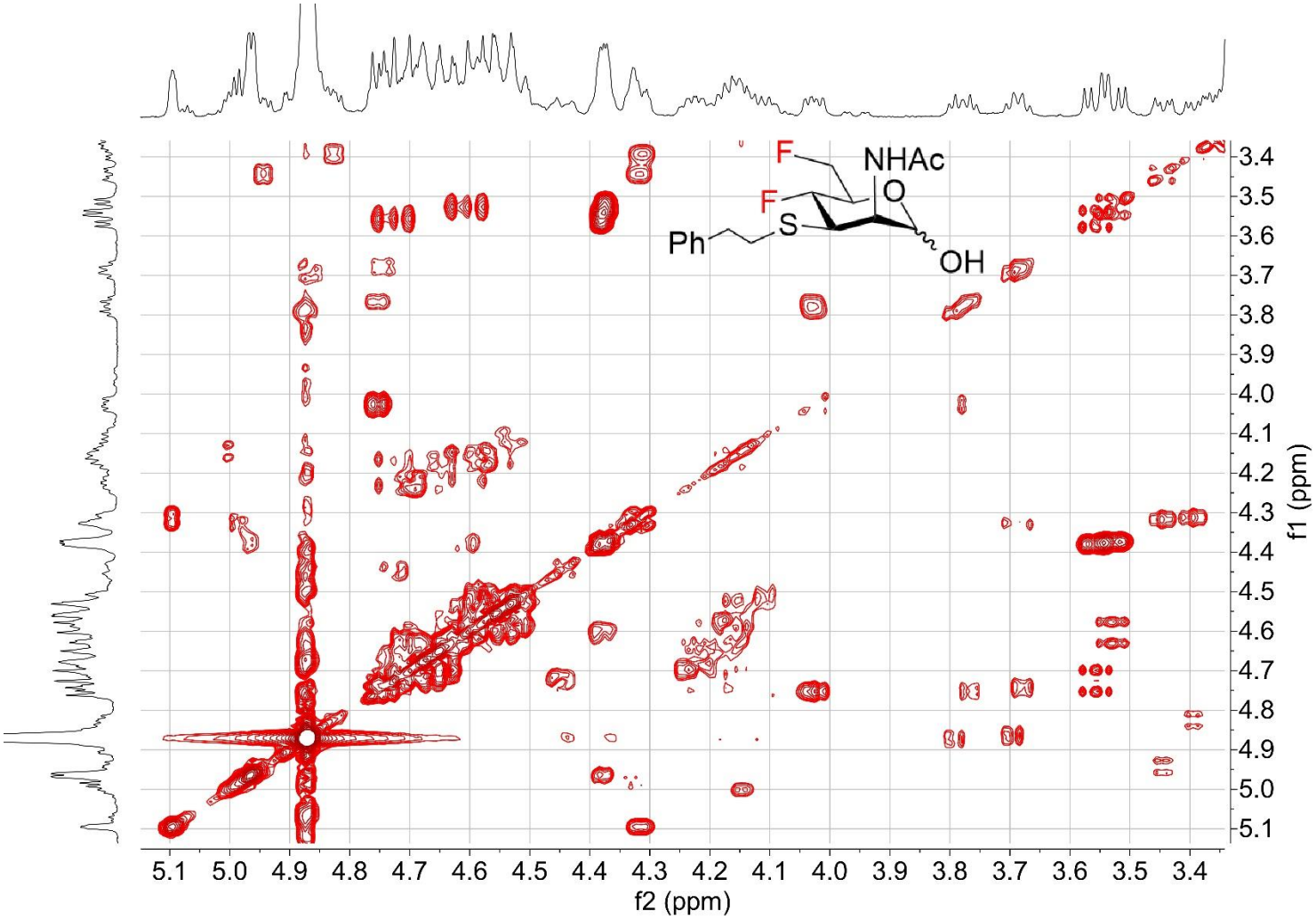
^{13}C NMR (100 MHz, CD_3OD) 111



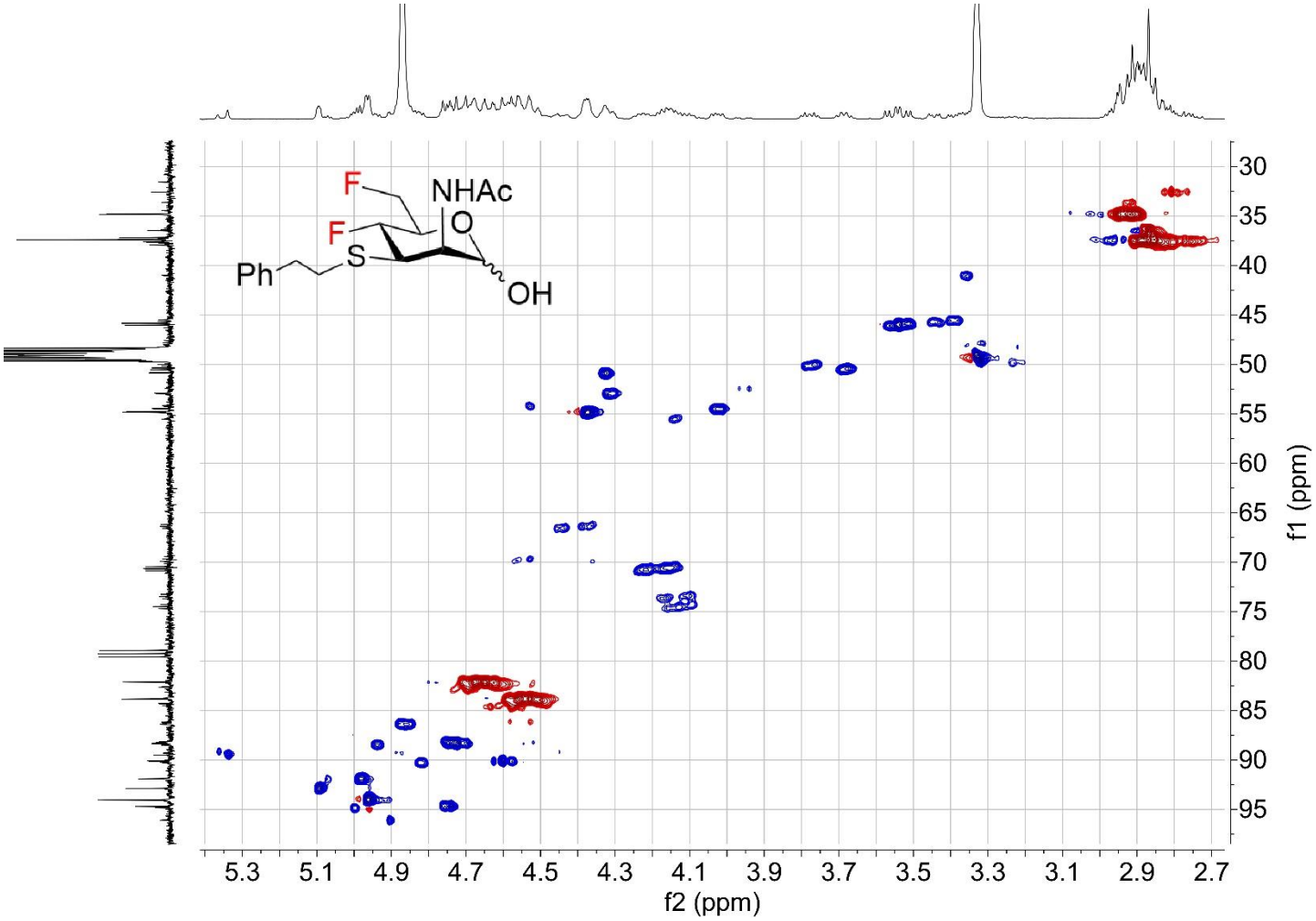
^{19}F NMR (376 MHz, CD_3OD) 111



^{1}H-^{1}H COSY 111

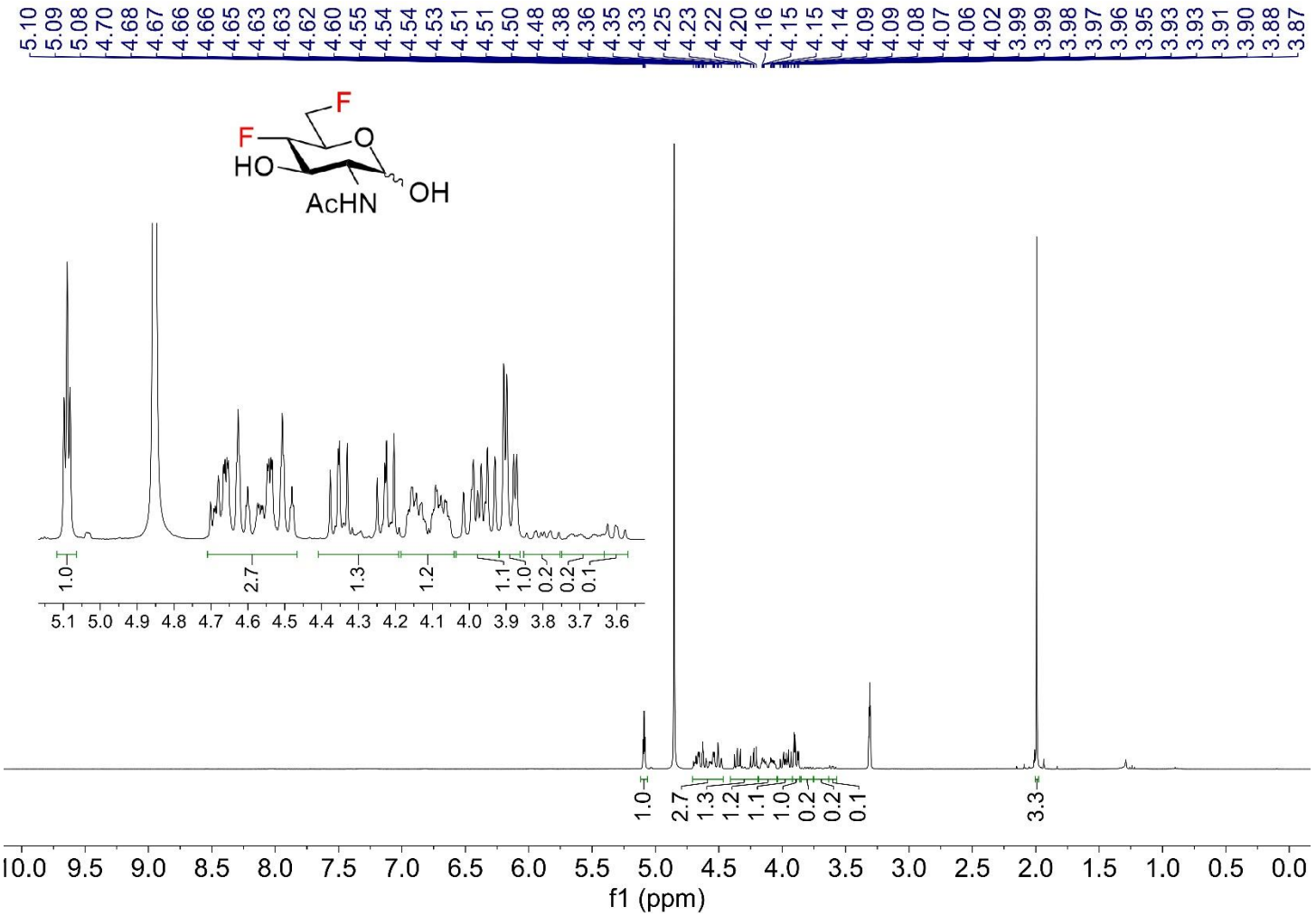


^{1}H-^{13}C HSQC 111

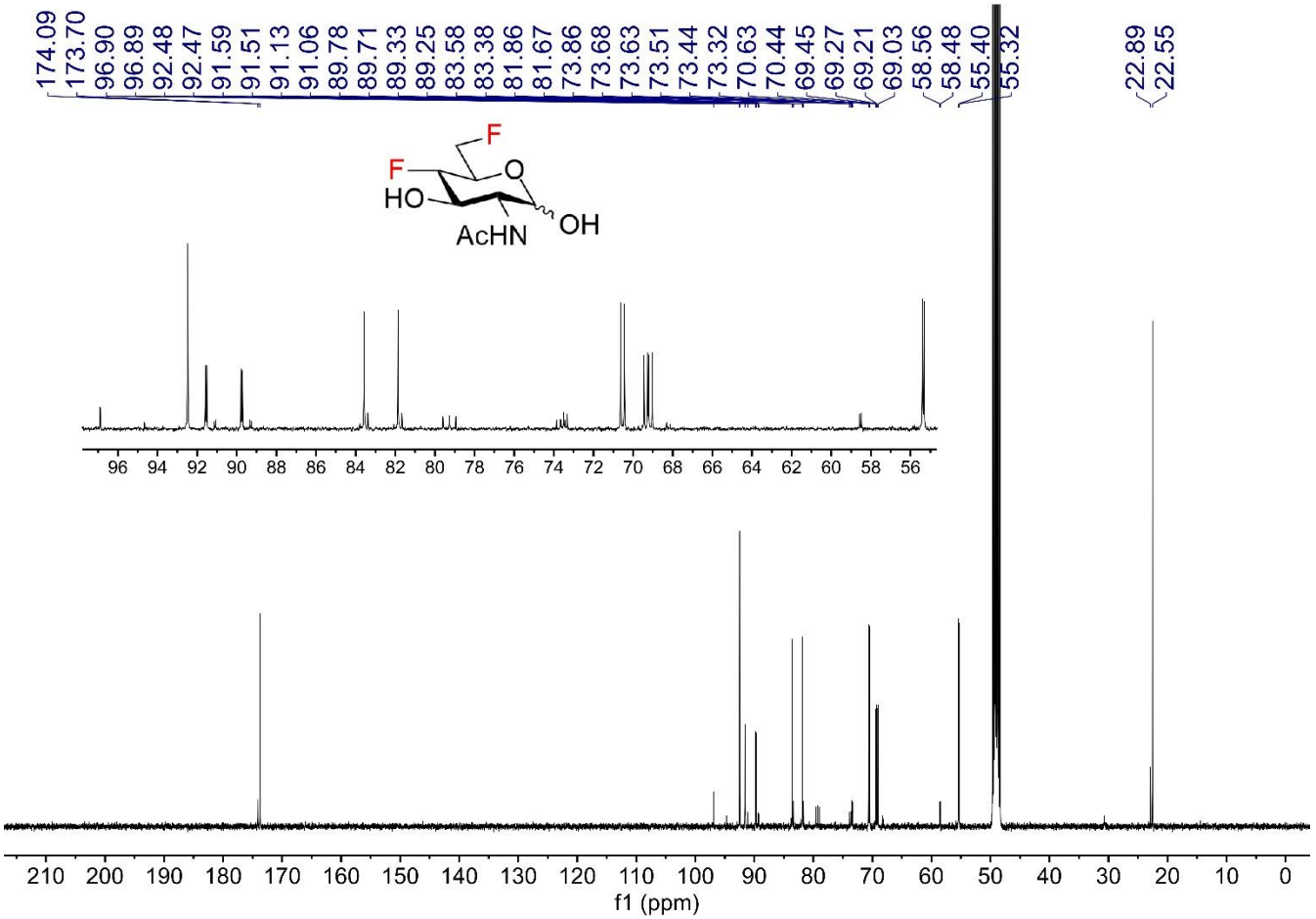


NMR COMPOUND 112

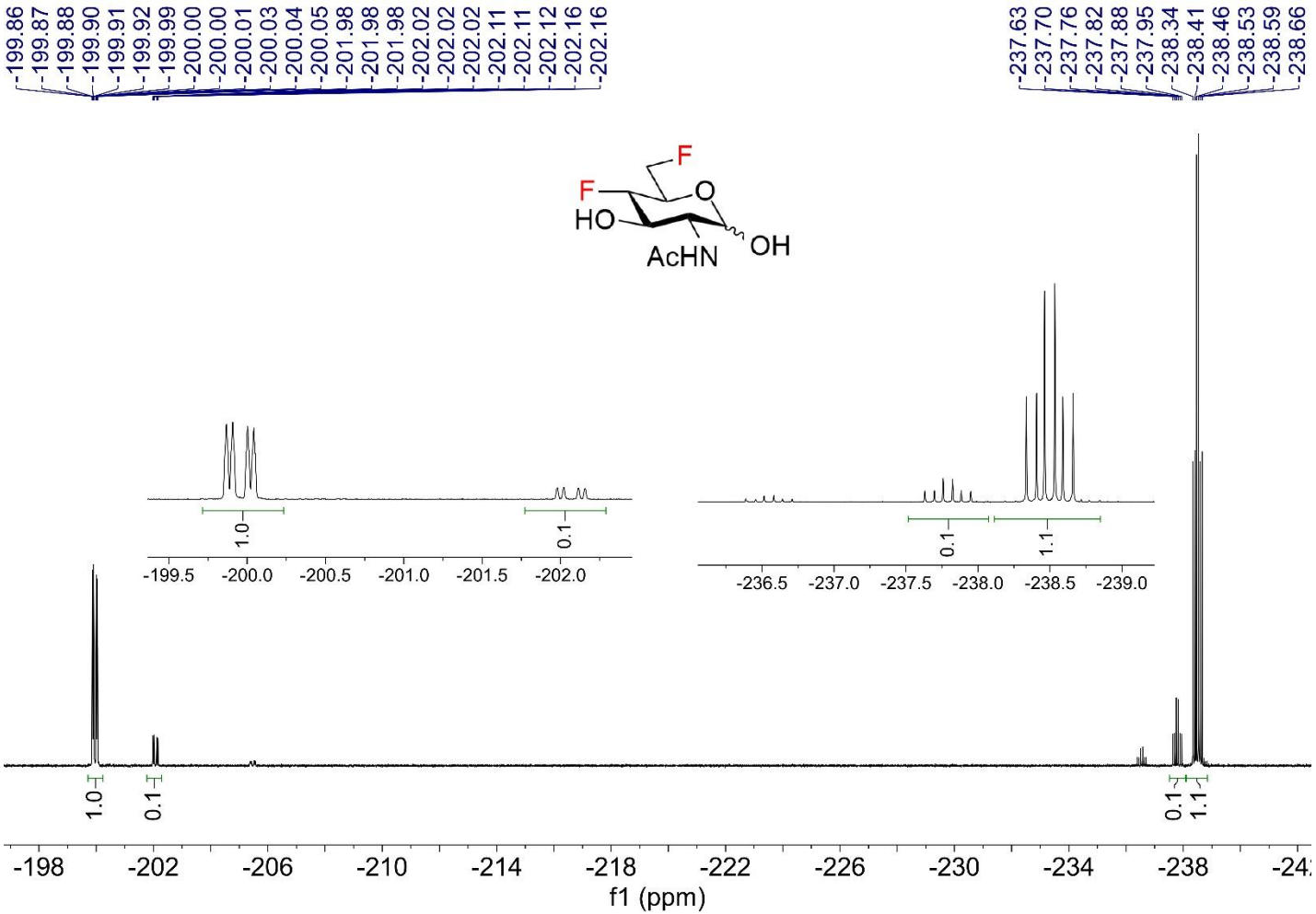
^{1}H NMR (400 MHz, CD_3OD) 112



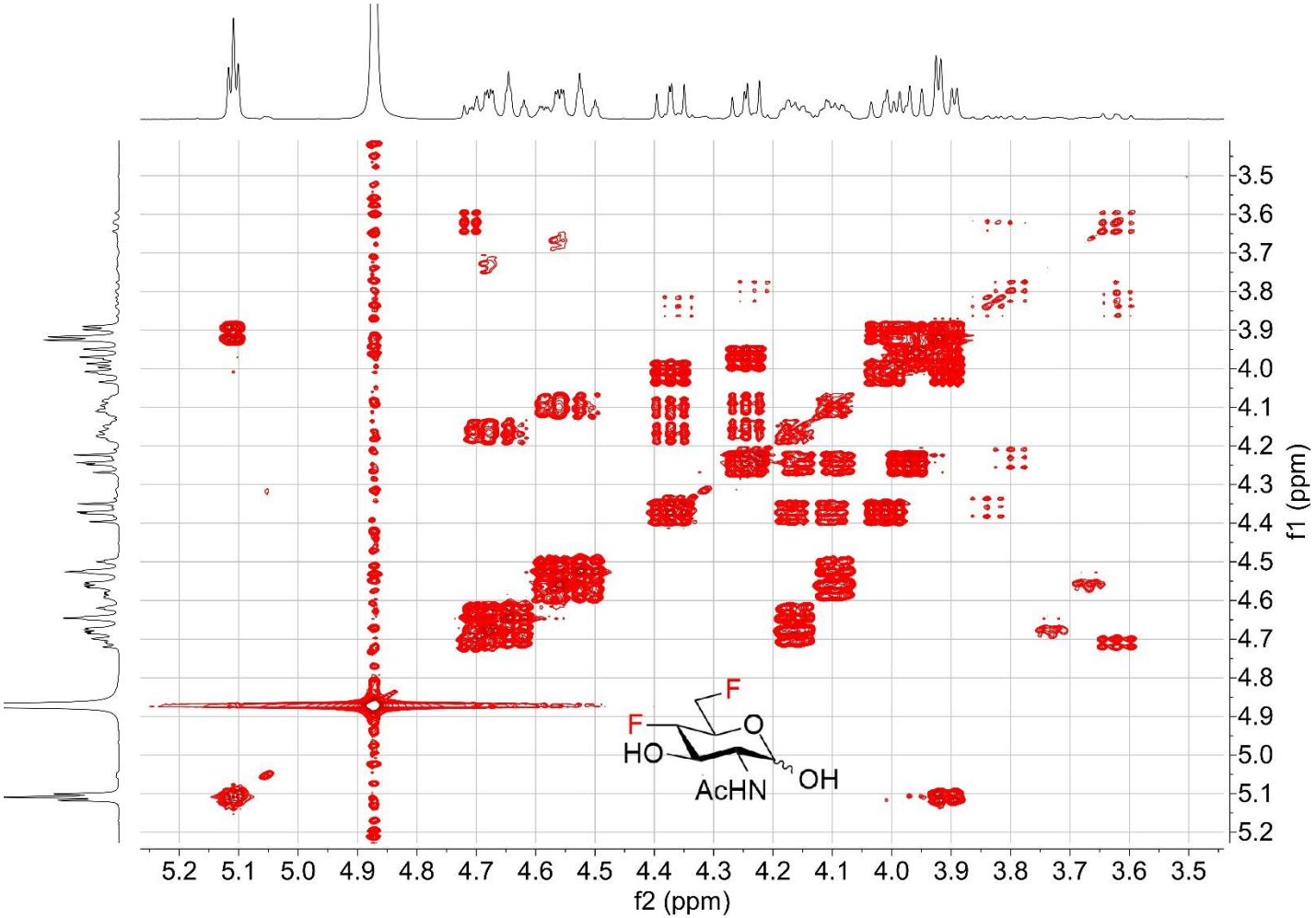
^{13}C NMR (100 MHz, CD_3OD) 112



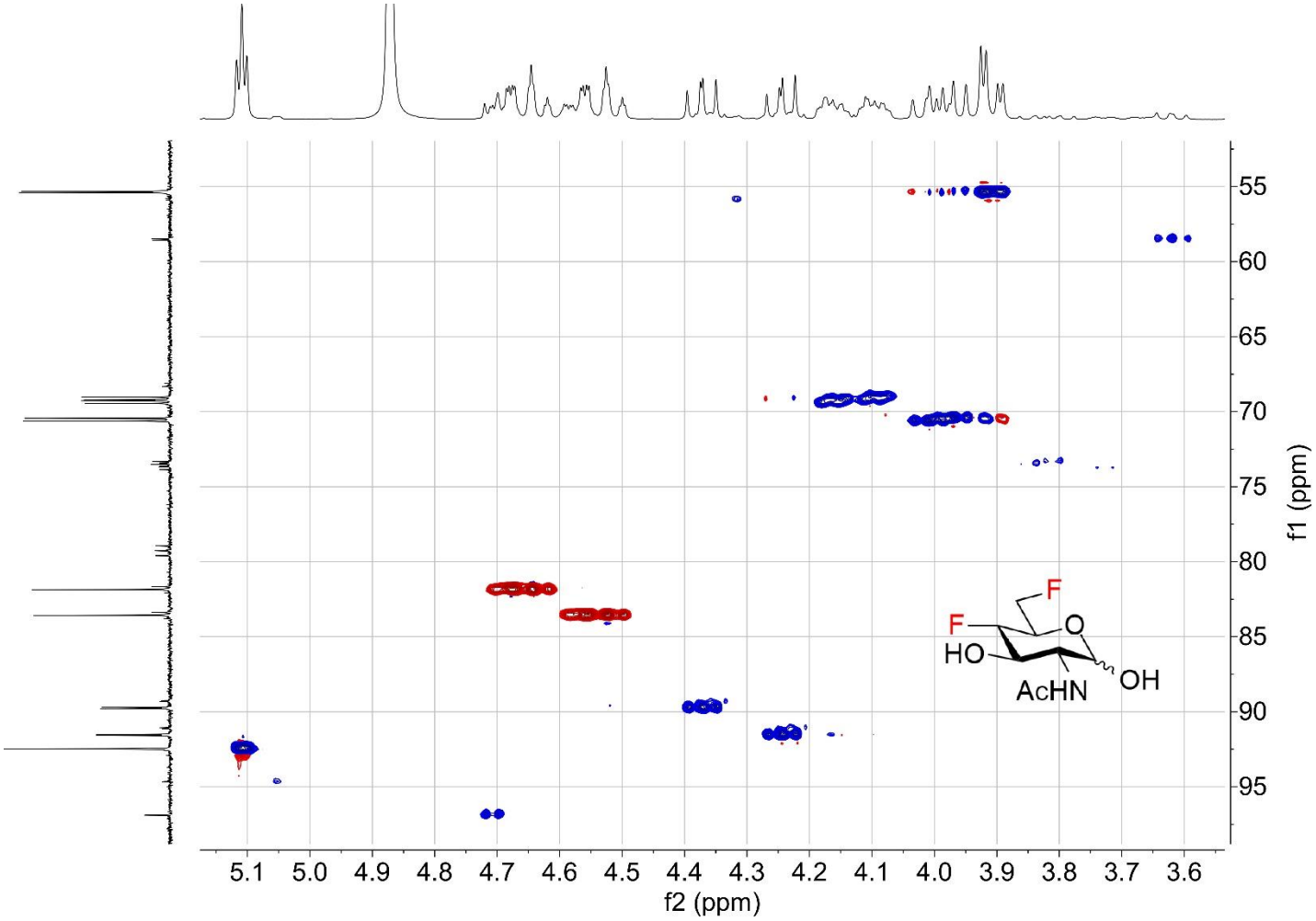
^{19}F NMR (376 MHz, CD_3OD) 112



^{1}H-^{1}H COSY 112

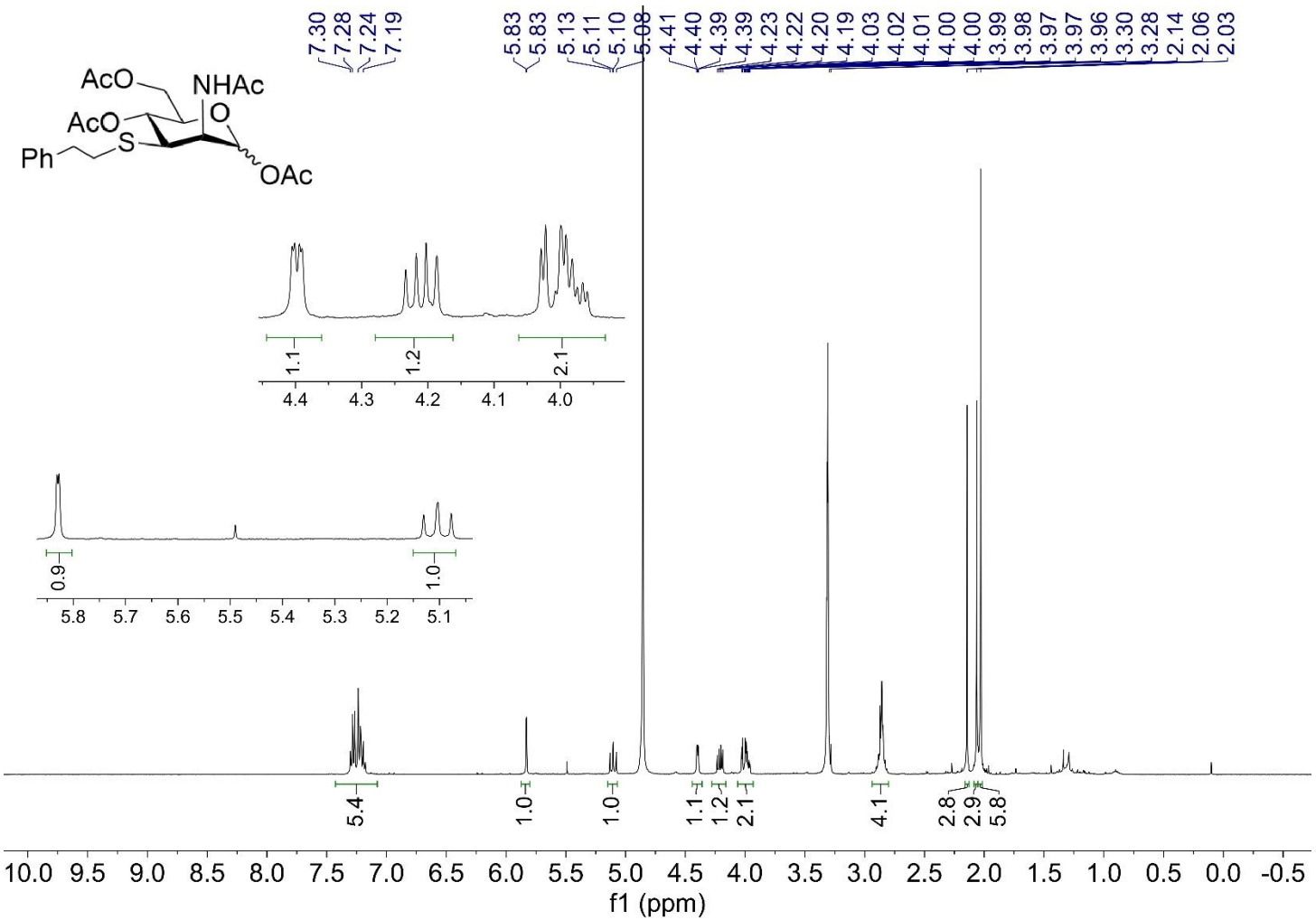


^{1}H-^{13}C HSQC 112

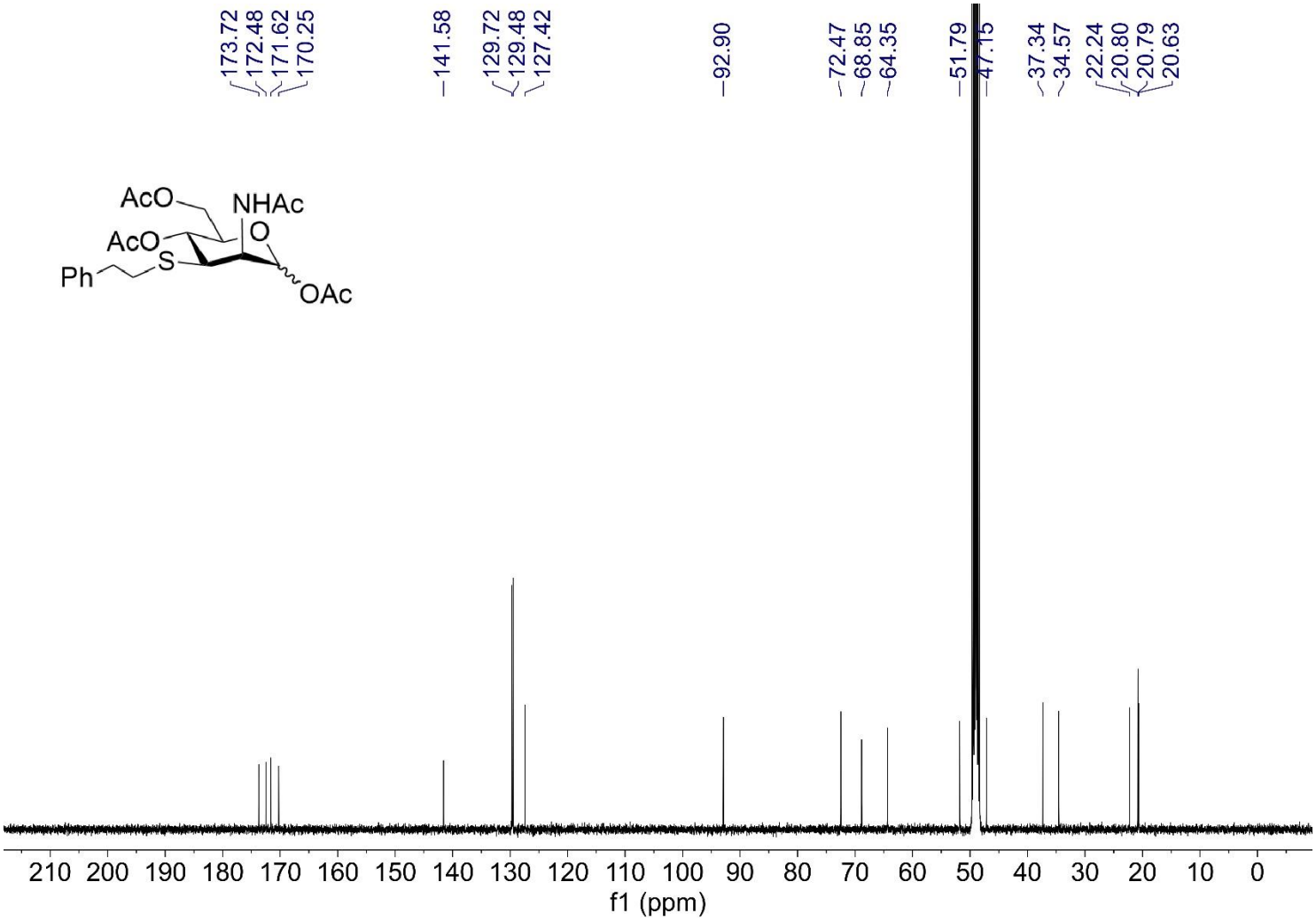


NMR COMPOUND 113

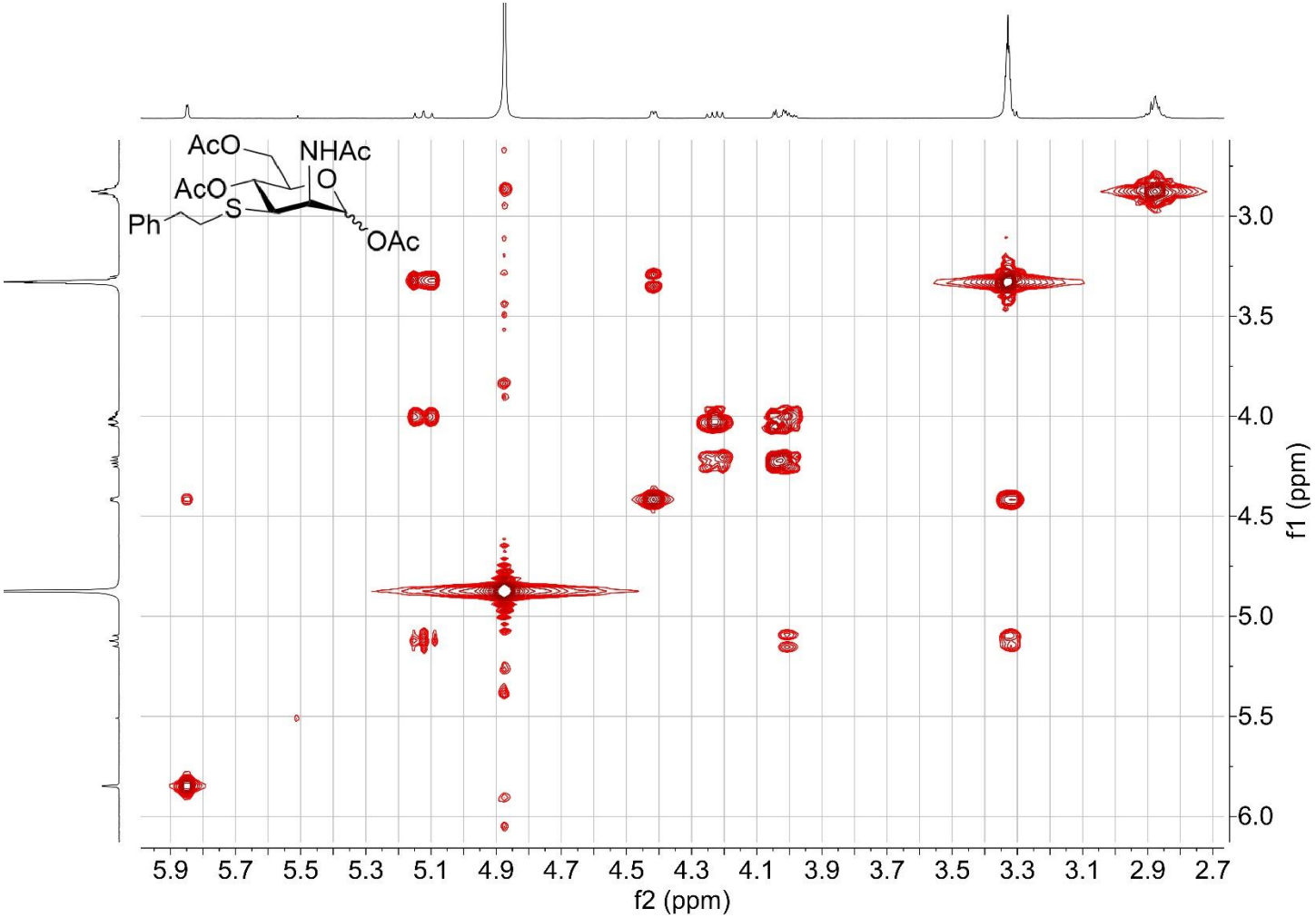
^{1}H NMR (400 MHz, CD_3OD) 113



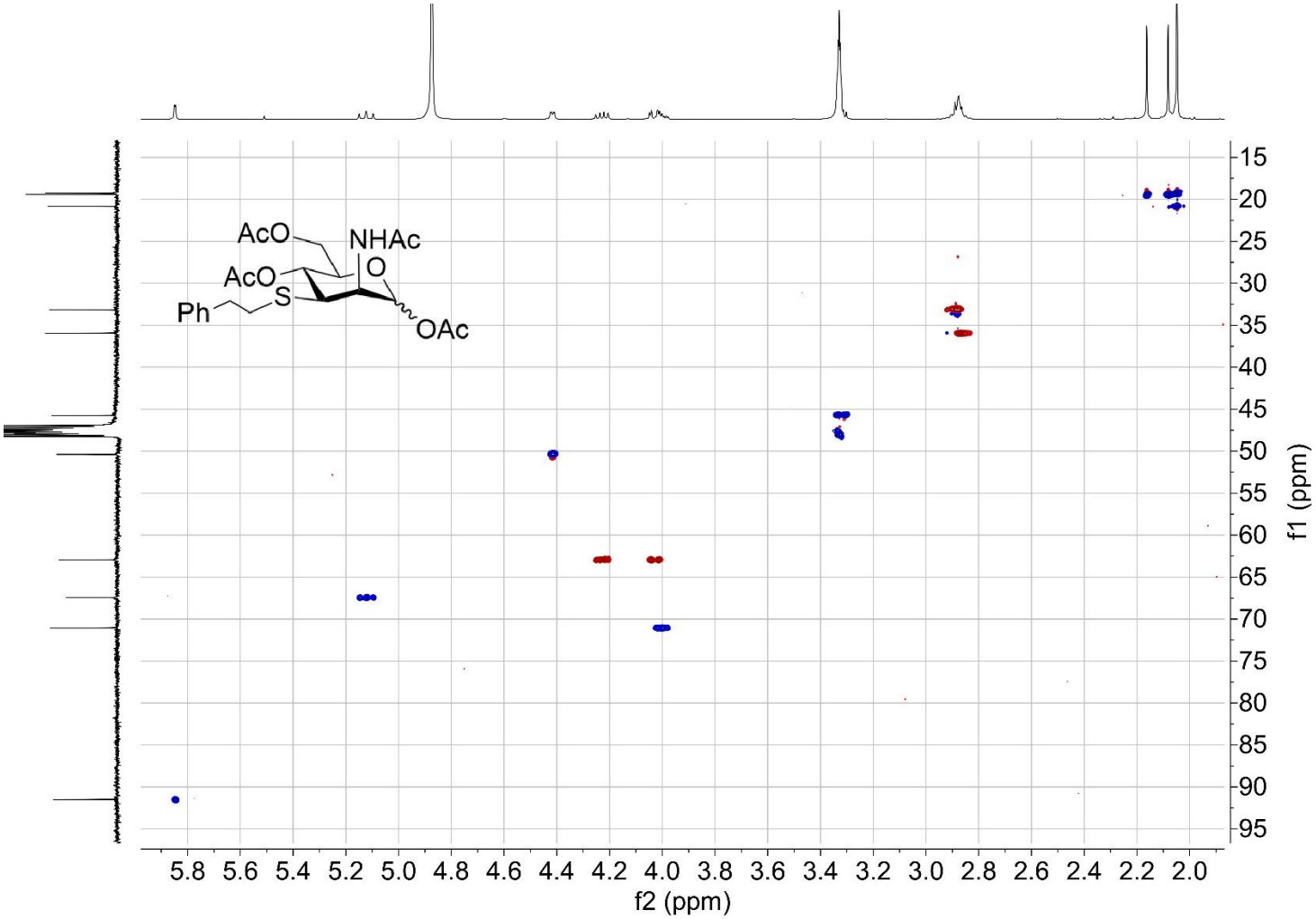
^{13}C NMR (100 MHz, CD_3OD) 113



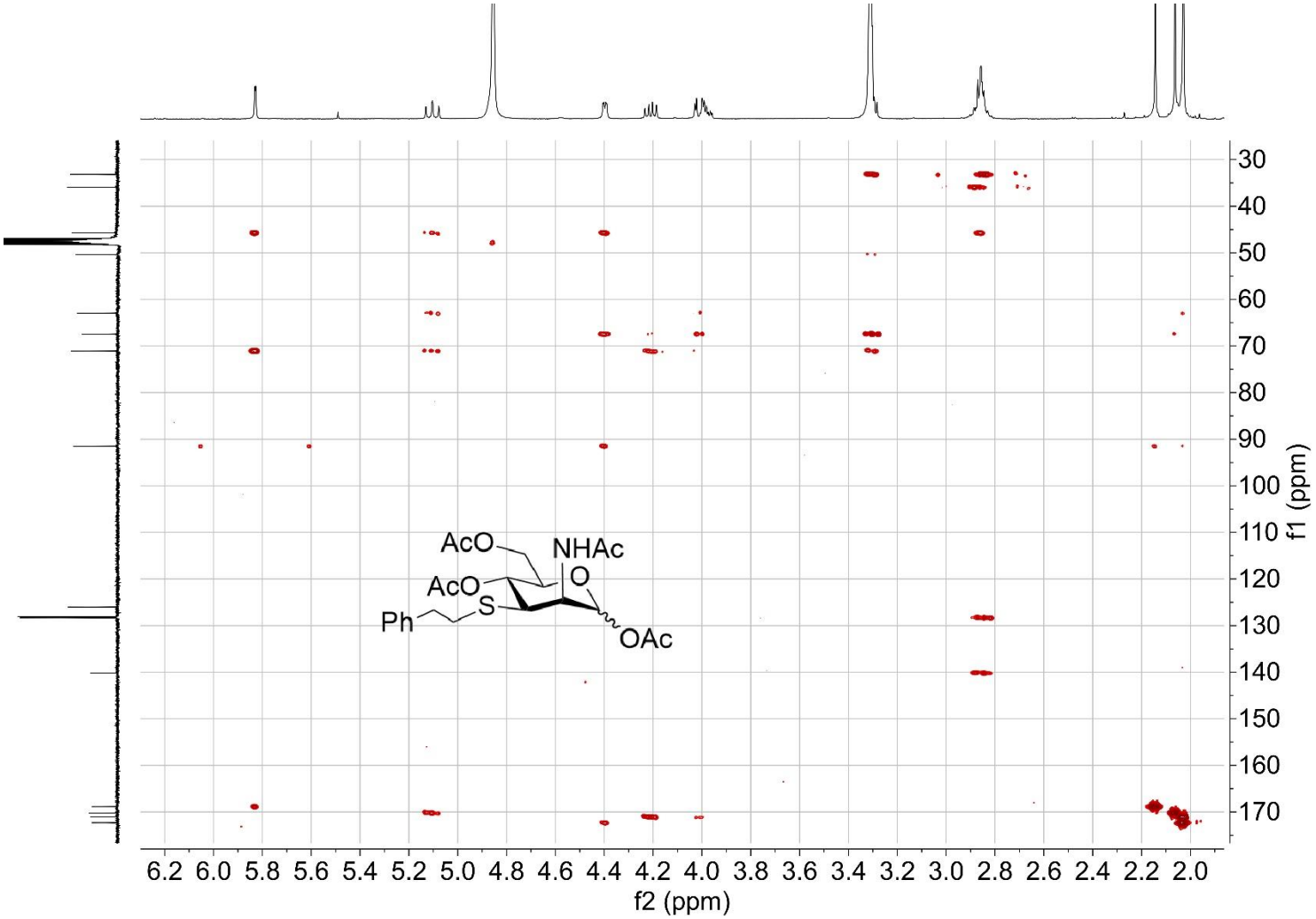
^{1}H-^{1}H COSY 113



^{1}H-^{13}C HSQC 113



^{1}H-^{13}C HMBC 113



^{19}F NMR OF PRODUCTS FORMED ON REACTION OF 20 WITH 2-PHENYLETHANTHIOL UNDER DIFFERENT CONDITIONS

^{19}F NMR {^{1}H} (376 MHz, CD_3OD), reaction conditions: MeONa/MeOH (1) and Na_2CO_3/H_2O (2)