

Synthesis of 2'-O-Methyl/2'-O-MOE-L-Nucleoside Derivatives and Their Applications: Preparation of G-Quadruplexes, Their Characterization, and Stability Studies

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[§]CIBER-BBN Networking Centre on Bioengineering, Biomaterials and Nanomedicine, 08034-Barcelona, Spain.

[#]Rasayan Inc., 2802 Crystal Ridge Road, Encinitas, CA 92024-6615, USA.

ELECTRONIC SUPPLEMENTARY INFORMATION (page 1 of 129 pages)

Contents:

Copies of ¹H, ¹³C, ¹⁹F, DEPT, and some 2D NMR spectra of compounds **10**, **11**, **12**, **13**, **14**, **15**, **16**, **17**, **18**, **19**, **20**, **21**, **22**, **23**, **24**, **25**, **26**, **27**, **28**, **29**, and **30**:

- | | | |
|--|--|--|
| - ¹ H NMR of 10 (S3) | - ¹ H NMR of 14 (S26) | - HMBC of 17 (S49) |
| - ¹³ C NMR of 10 (S4) | - ¹³ C NMR of 14 (S27) | - ¹ H NMR of 18 (S50) |
| - DEPT NMR of 10 (S5) | - DEPT NMR of 14 (S28) | - ¹³ C NMR of 18 (S51) |
| - COSY of 10 (S6) | - COSY of 14 (S29) | - DEPT NMR of 18 (S52) |
| - HSQC of 10 (S7) | - HSQC of 14 (S30) | - COSY of 18 (S53) |
| - ¹ H NMR of 11 (S8) | - HMBC of 14 (S31) | - HSQC of 18 (S54) |
| - ¹³ C NMR of 11 (S9) | - ¹ H NMR of 15 (S32) | - HMBC of 18 (S55) |
| - DEPT NMR of 11 (S10) | - ¹³ C NMR of 15 (S33) | - ¹ H NMR of 19 (S56) |
| - COSY of 11 (S11) | - DEPT NMR of 15 (S34) | - ¹³ C NMR of 19 (S57) |
| - HSQC of 11 (S12) | - COSY of 15 (S35) | - DEPT NMR of 19 (S58) |
| - HMBC of 11 (S13) | - HSQC of 15 (S36) | - COSY of 19 (S59) |
| - ¹ H NMR of 12 (S14) | - HMBC of 15 (S37) | - HSQC of 19 (S60) |
| - ¹³ C NMR of 12 (S15) | - ¹ H NMR of 16 (S38) | - HMBC of 19 (S61) |
| - DEPT NMR of 12 (S16) | - ¹³ C NMR of 16 (S39) | - ¹ H NMR of 20 (S62) |
| - COSY of 12 (S17) | - DEPT NMR of 16 (S40) | - ¹³ C NMR of 20 (S63) |
| - HSQC of 12 (S18) | - COSY of 16 (S41) | - DEPT NMR of 20 (S64) |
| - HMBC of 12 (S19) | - HSQC of 16 (S42) | - COSY of 20 (S65) |
| - ¹ H NMR of 13 (S20) | - HMBC of 16 (S43) | - HSQC of 20 (S66) |
| - ¹³ C NMR of 13 (S21) | - ¹ H NMR of 17 (S44) | - HMBC of 20 (S67) |
| - DEPT NMR of 13 (S22) | - ¹³ C NMR of 17 (S45) | - ¹ H NMR of 21 (S68) |
| - COSY of 13 (S23) | - DEPT NMR of 17 (S46) | - ¹³ C NMR of 21 (S69) |
| - HSQC of 13 (S24) | - COSY of 17 (S47) | - DEPT NMR of 21 (S70) |
| - HMBC of 13 (S25) | - HSQC of 17 (S48) | - COSY of 21 (S71) |

- HSQC of **21** (S72)
- HMBC of **21** (S73)
- ¹H NMR of **22** (S74)
- ¹³C NMR of **22** (S75)
- DEPT NMR of **22** (S76)
- COSY of **22** (S77)
- HSQC of **22** (S78)
- HMBC of **22** (S79)
- ¹H NMR of **23** (S80)
- ¹³C NMR of **23** (S81)
- DEPT NMR of **23** (S82)
- COSY of **23** (S83)
- HSQC of **23** (S84)
- HMBC of **23** (S85)
- ¹H NMR of **24** (S86)
- ¹³C NMR of **24** (S87)
- DEPT NMR of **24** (S88)
- COSY of **24** (S89)
- HSQC of **24** (S90)
- ¹H NMR of **25** (S91)
- ¹³C NMR of **25** (S92)
- DEPT NMR of **25** (S93)
- COSY of **25** (S94)
- HSQC of **25** (S95)
- HMBC of **25** (S96)
- ¹⁹F NMR **25** (S97)
- ¹H NMR of **26** (S98)
- ¹³C NMR of **26** (S99)
- DEPT NMR of **26** (S100)
- COSY of **26** (S101)
- HSQC of **26** (S102)
- ¹⁹F NMR **26** (S103)
- ¹H NMR of **27** (S104)
- ¹³C NMR of **27** (S105)
- DEPT NMR of **27** (S106)
- COSY of **27** (S107)
- HSQC of **27** (S108)
- HMBC of **27** (S109)
- ¹H NMR of **28** (S110)
- ¹³C NMR of **28** (S111)
- DEPT NMR of **28** (S112)
- COSY of **28** (S113)
- HSQC of **28** (S114)
- HMBC of **28** (S115)
- ¹H NMR of **29** (S116)
- ¹H NMR of **30** (S117)
- ¹³C NMR of **30** (S118)
- DEPT NMR of **30** (S119)
- COSY of **30** (S120)
- HSQC of **30** (S121)

Figure S1. CD Spectra of oligonucleotides:

- TG4T (S122) - TG4U_{OMe} (S122) - TG₄^LU_{OMe} (S123) - TG₄^LU_{OMOE} (S123)

Figure S2. Denaturalization curves of oligonucleotides:

- TG4T (S124) - TG4U_{OMe} (S124) - TG₄^LU_{OMe} (S125) - TG₄^LU_{OMOE} (S125)

Figure S3. G-quadruplex degradation:

- TG4T (S126) - TG4U_{OMe} (S126) - TG₄^LU_{OMe} (S126) - TG₄^LU_{OMOE} (S126)

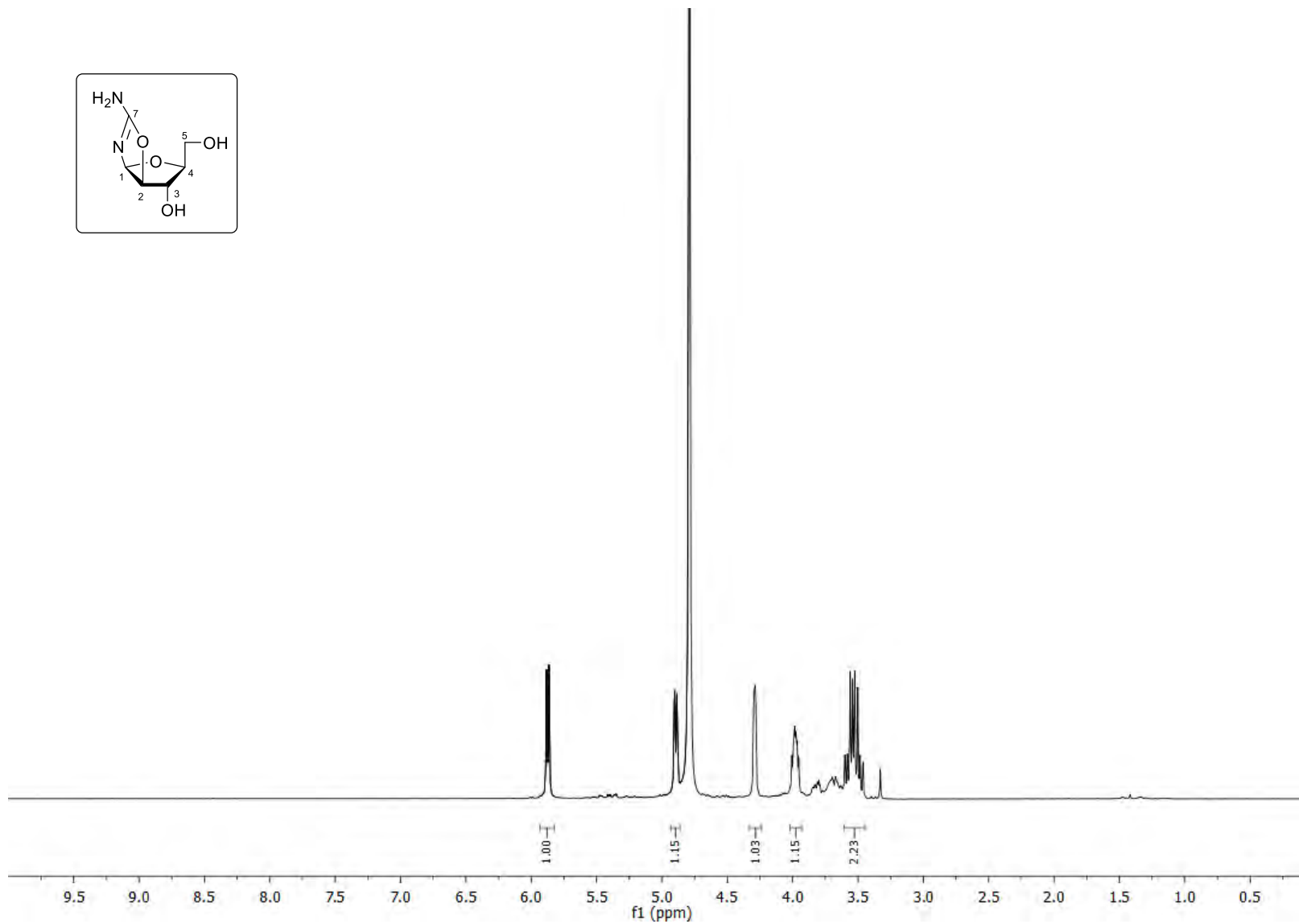
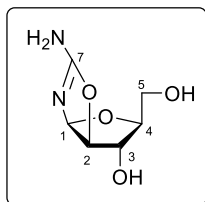
Figure S4. MALDI-TOF of oligonucleotides:

- TG4T (S127) - TG4U_{OMe} (S127) - TG₄^LU_{OMe} (S128) - TG₄^LU_{OMOE} (S128)

Figure S5. Native 20% PAGE of oligonucleotides (S129)

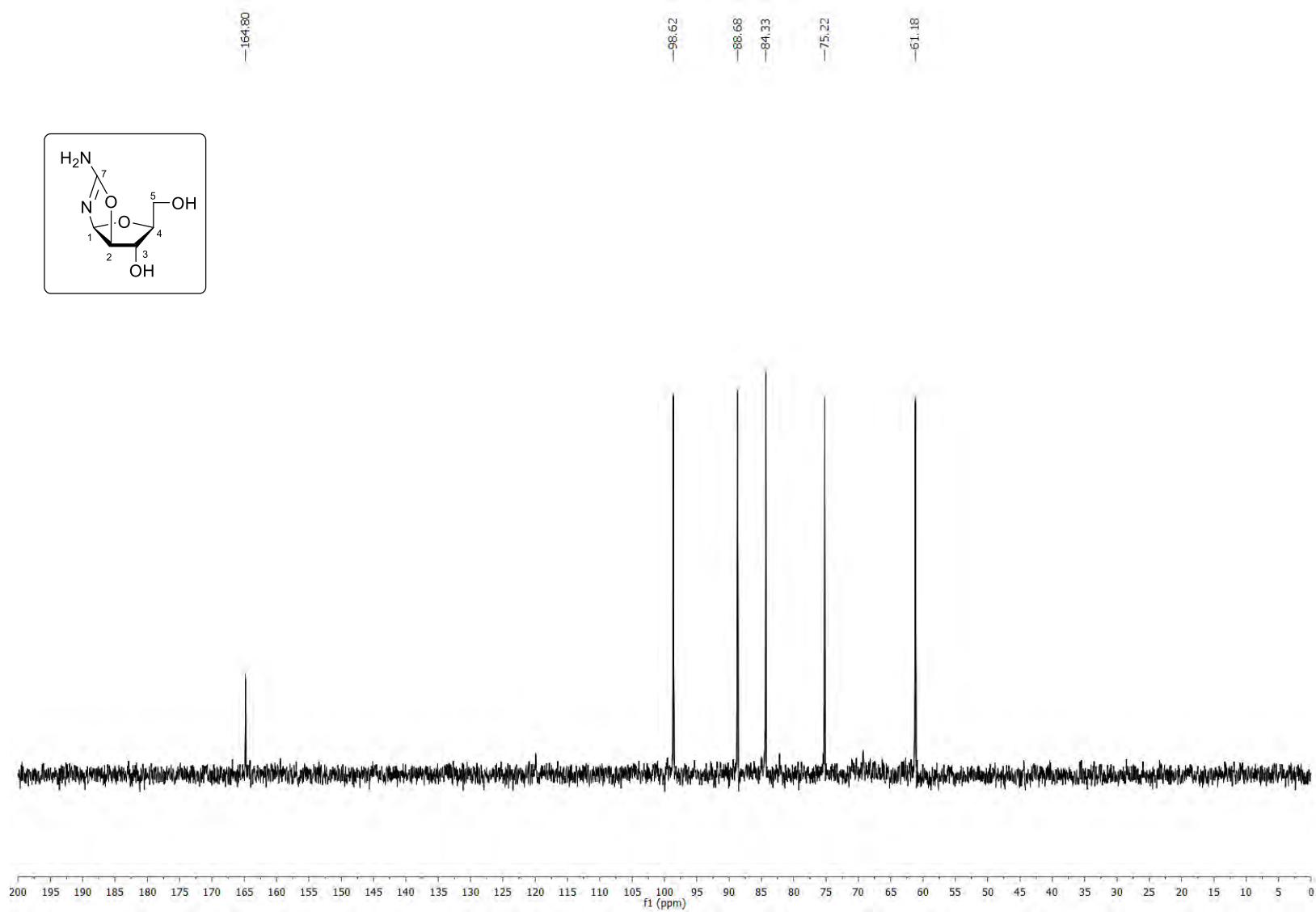
2-Amino-β-L-arabinofurano[1',2':4,5]oxazoline (10)

¹H NMR (300.13 MHz, D₂O)



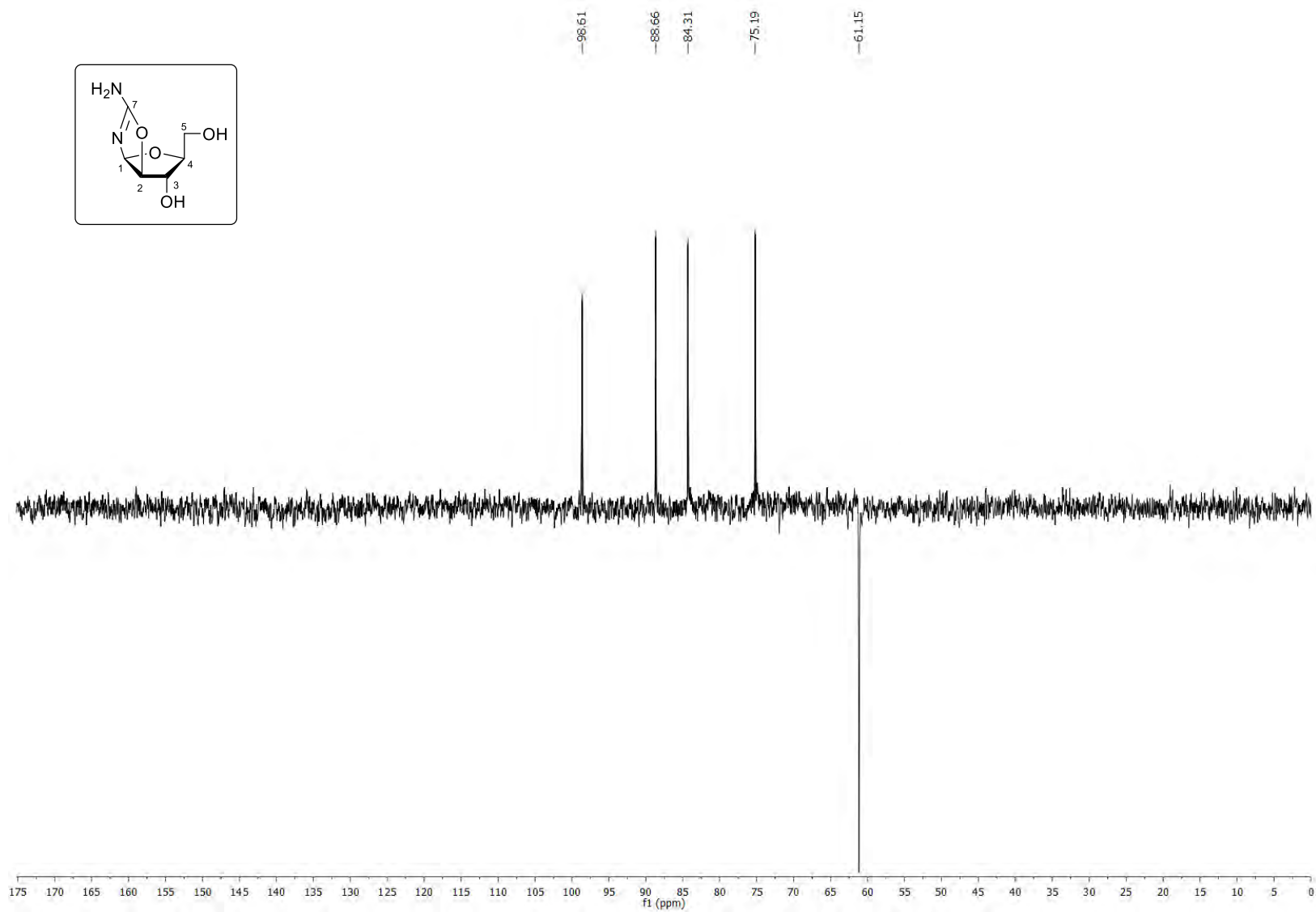
2-Amino-β-L-arabinofurano[1',2':4,5]oxazoline (10)

^{13}C NMR (75.5 MHz, D_2O)



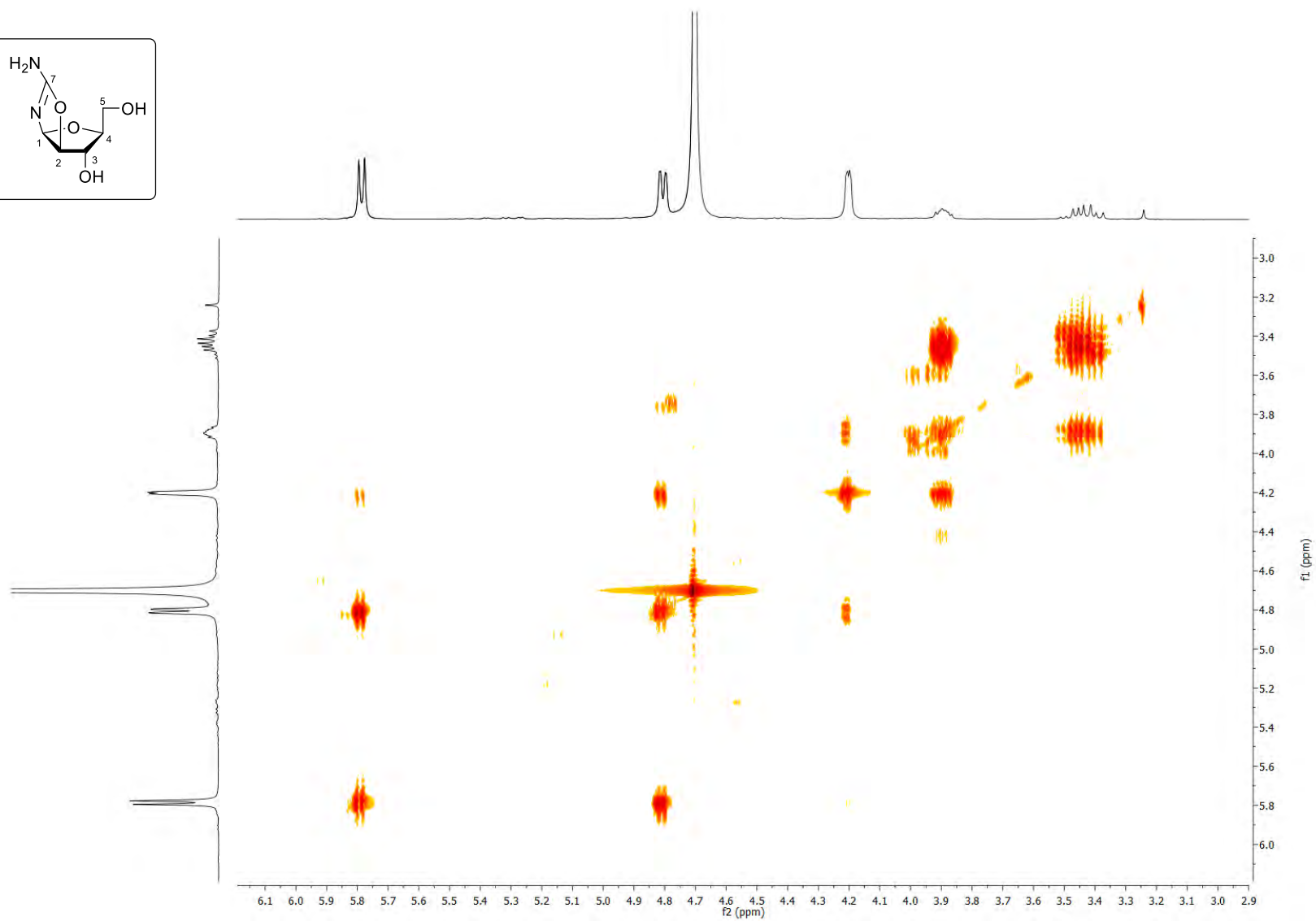
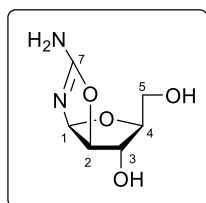
2-Amino- β -L-arabinofurano[1',2':4,5]oxazoline (10)

DEPT NMR (75.5 MHz, D₂O)



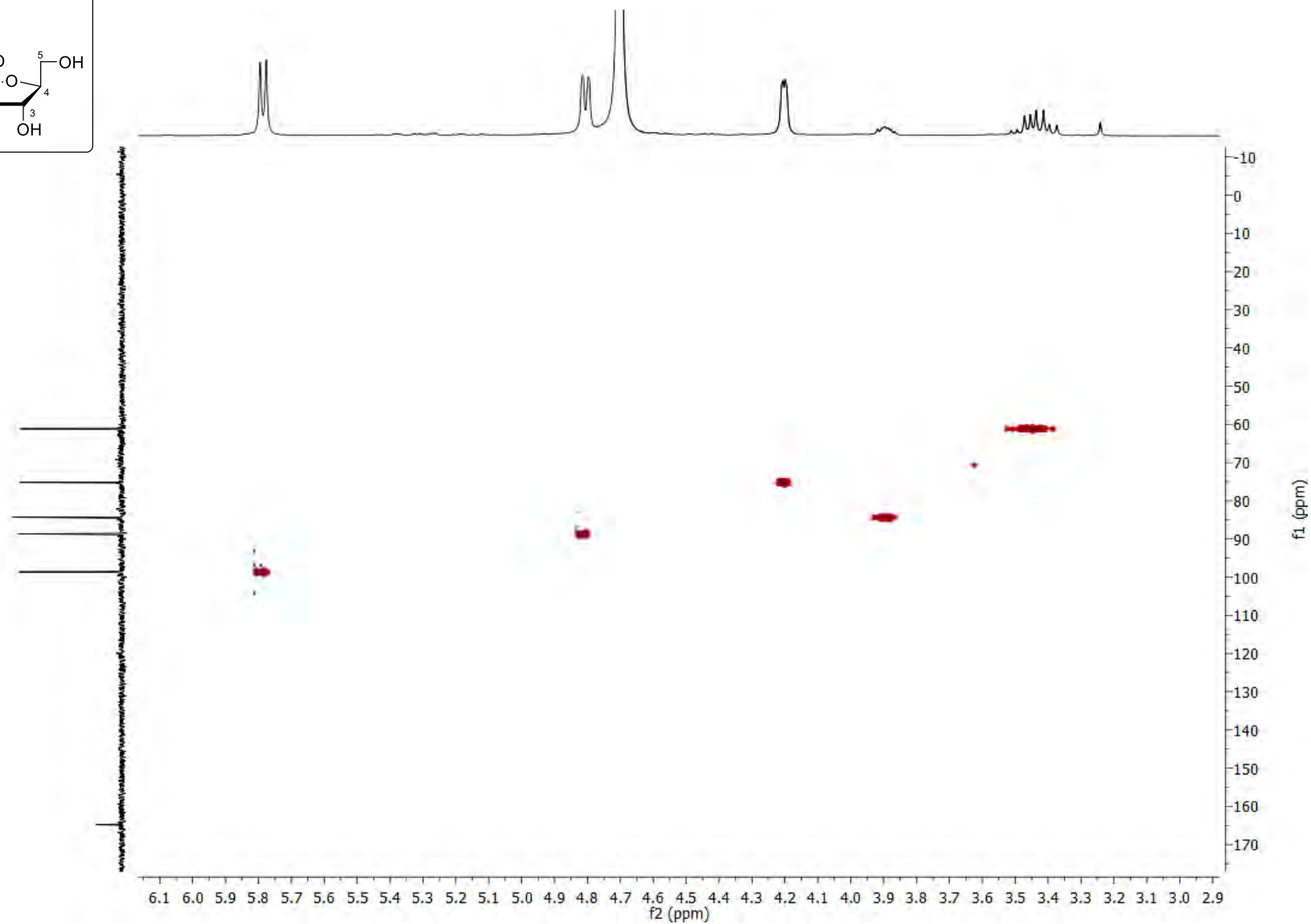
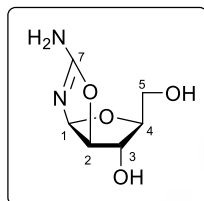
2-Amino- β -L-arabinofurano[1',2':4,5]oxazoline (10)

COSY NMR (D_2O)



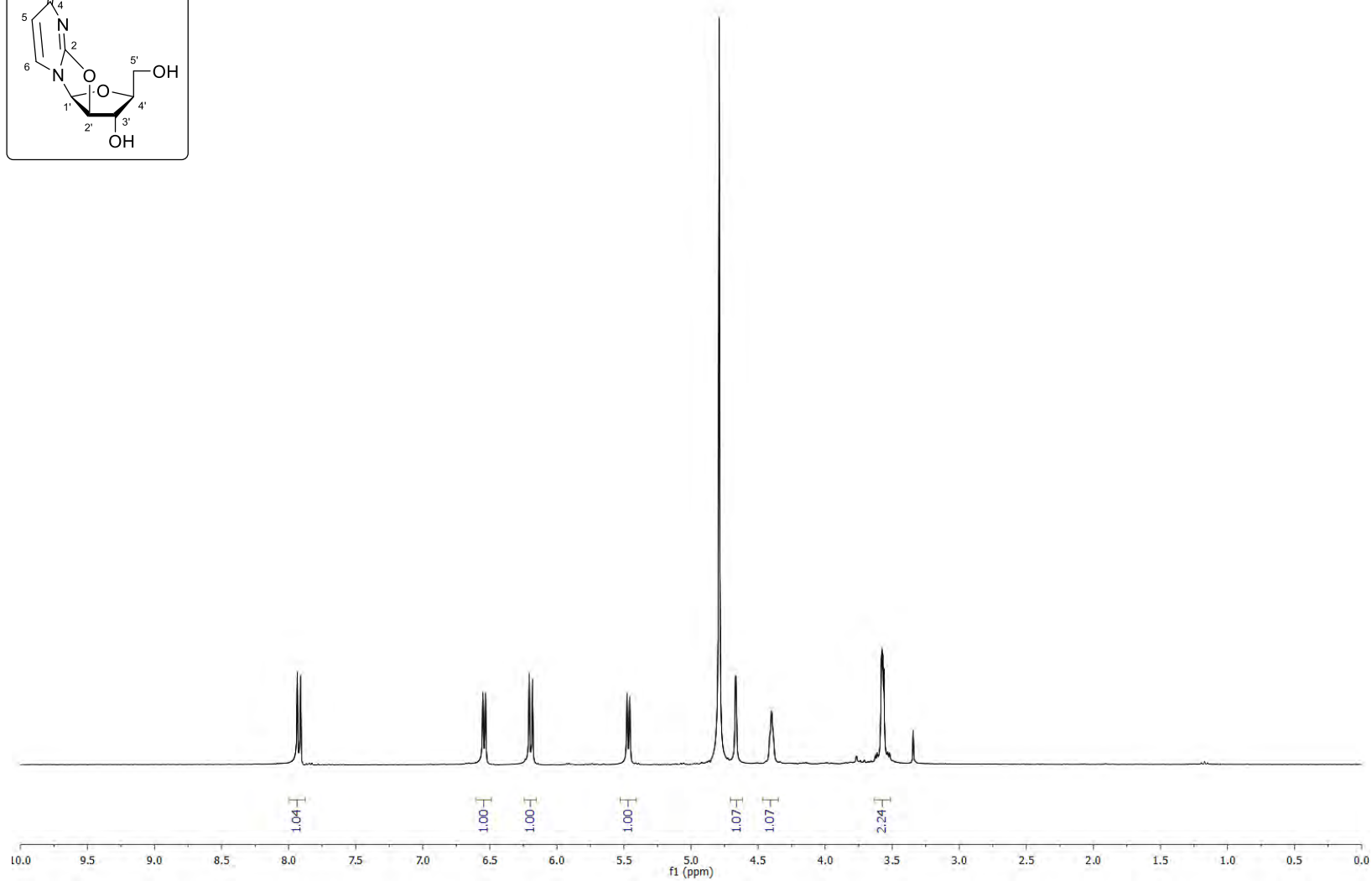
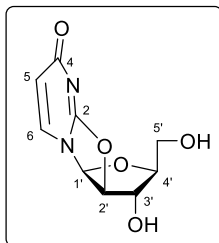
2-Amino-β-L-arabinofurano[1',2':4,5]oxazoline (10)

HSQC NMR (D₂O)



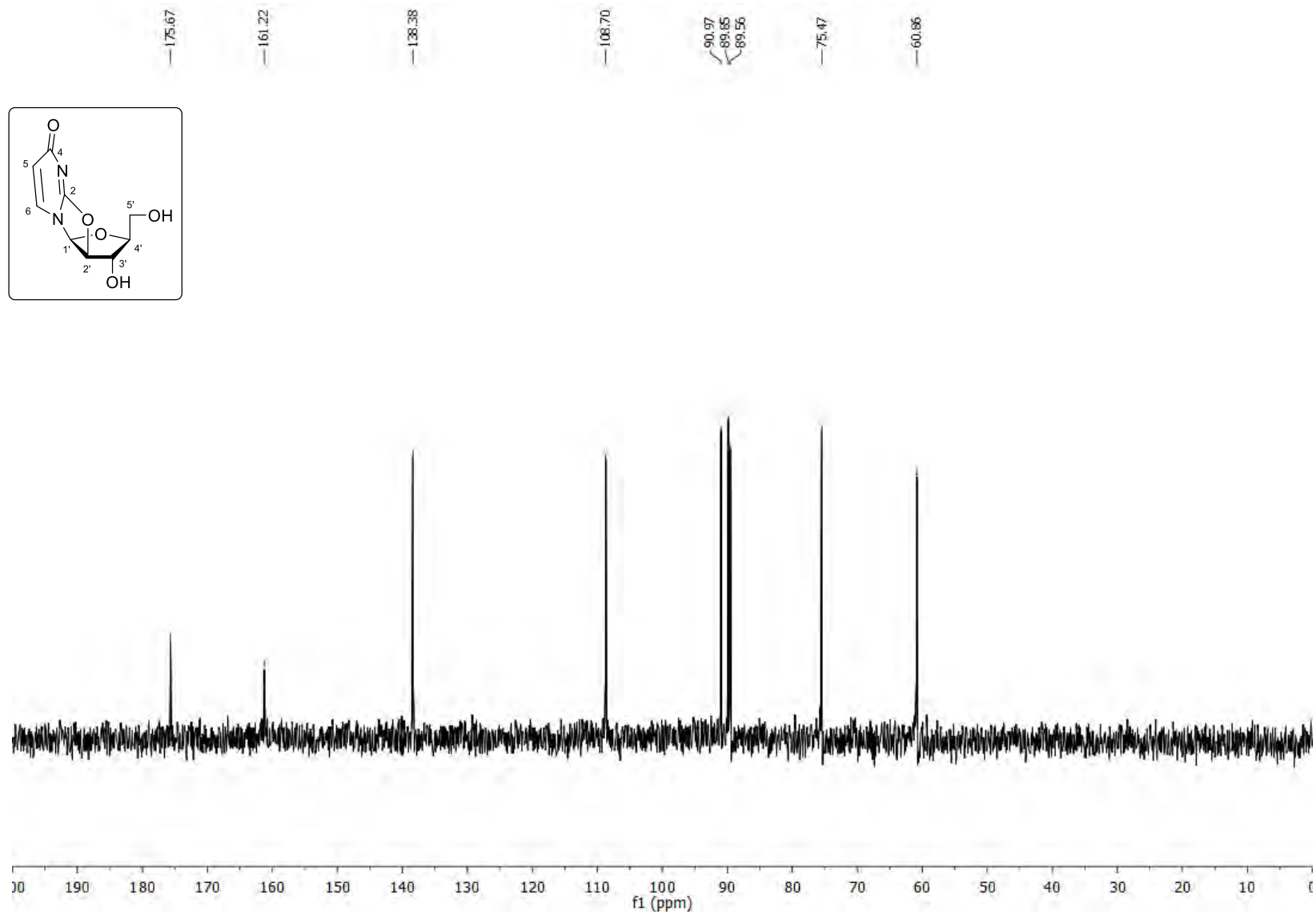
O^{2,2'}-Anhydro-L-uridine (11)

¹H NMR (300.13 MHz, D₂O)



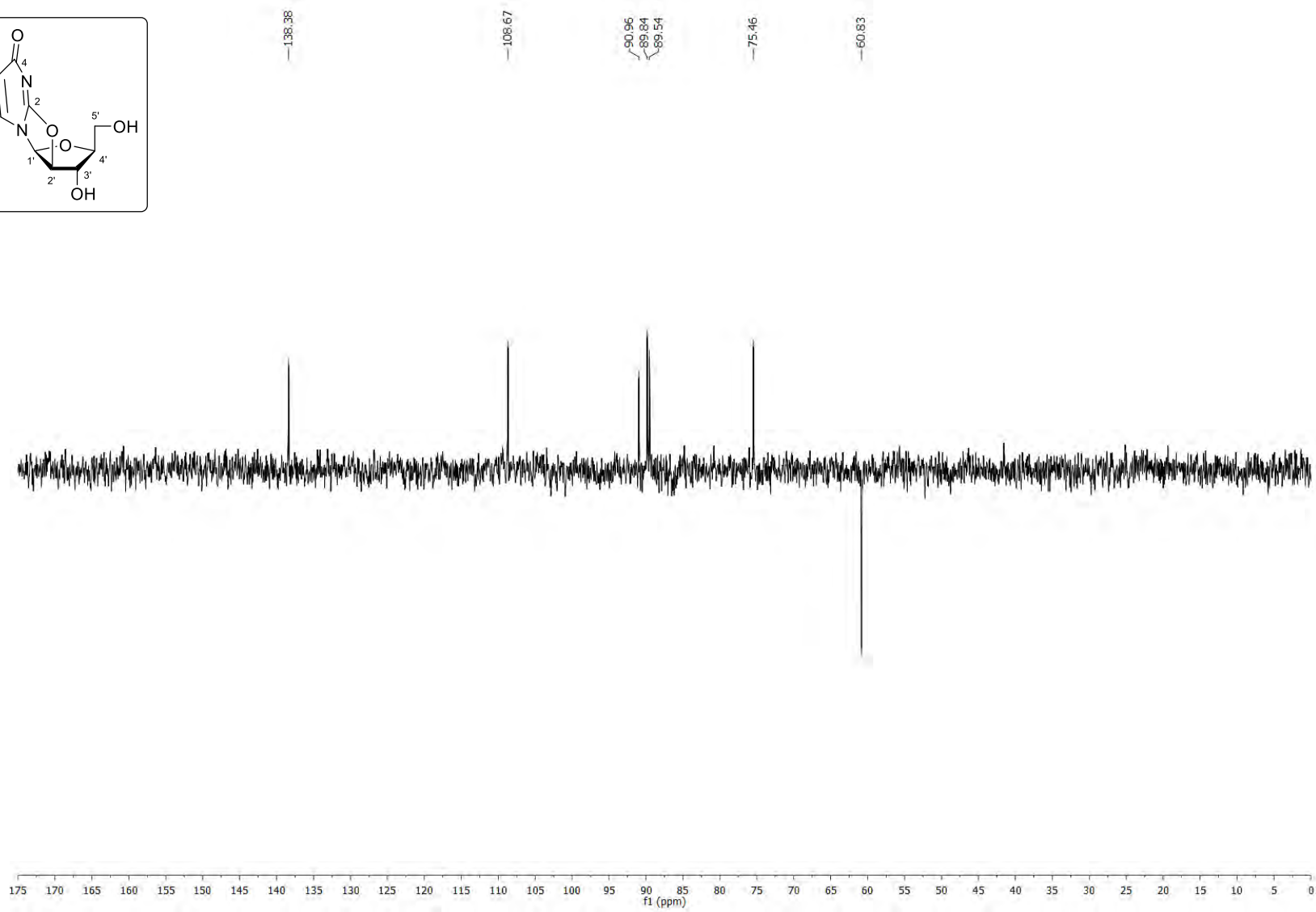
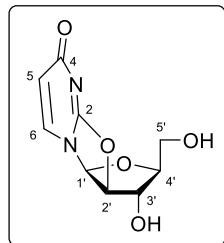
O^{2,2'}-Anhydro-L-uridine (11)

¹³C NMR (75.5 MHz, D₂O)



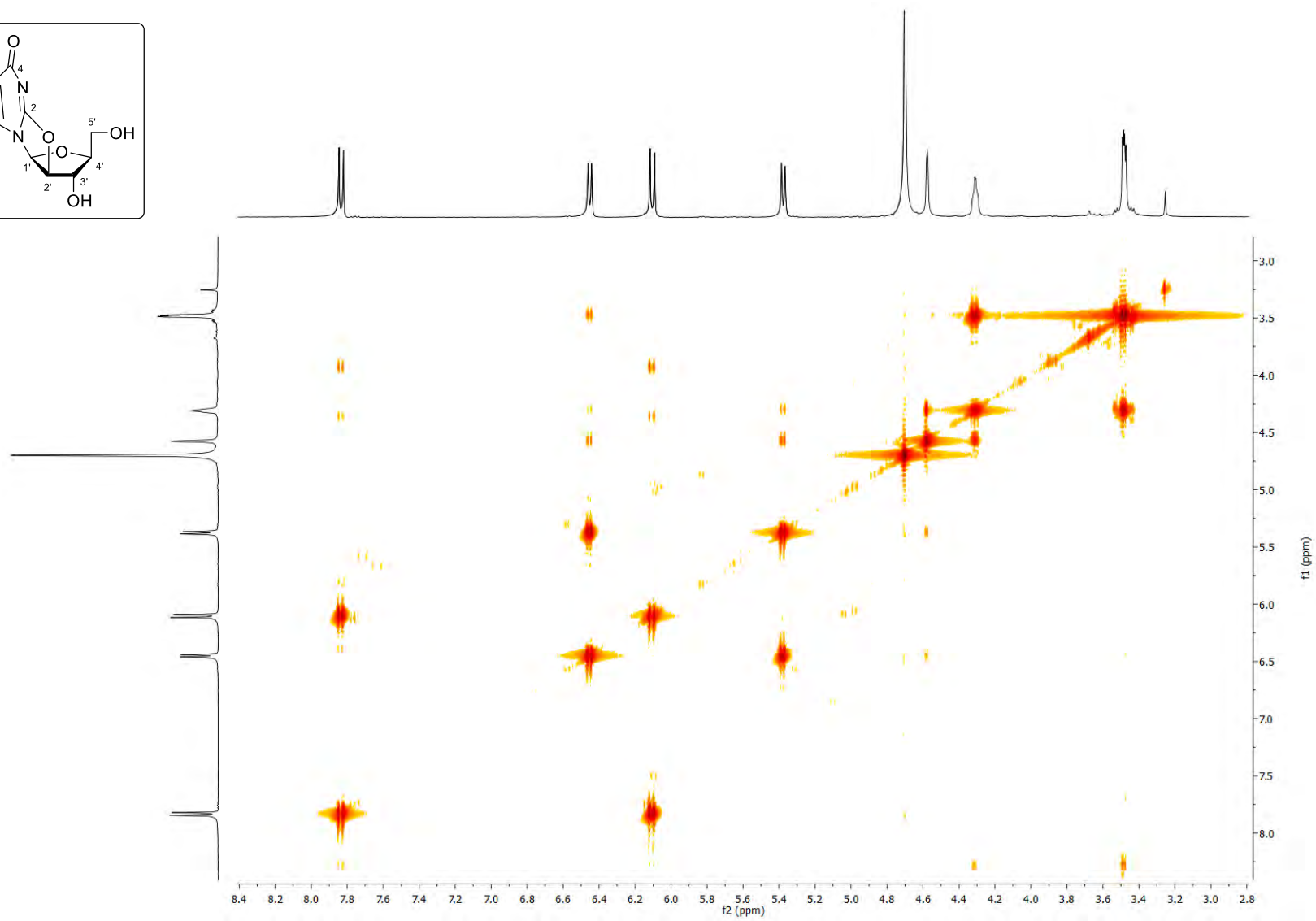
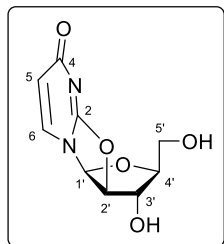
O^{2,2'}-Anhydro-L-uridine (11)

DEPT NMR (75.5 MHz, D₂O)



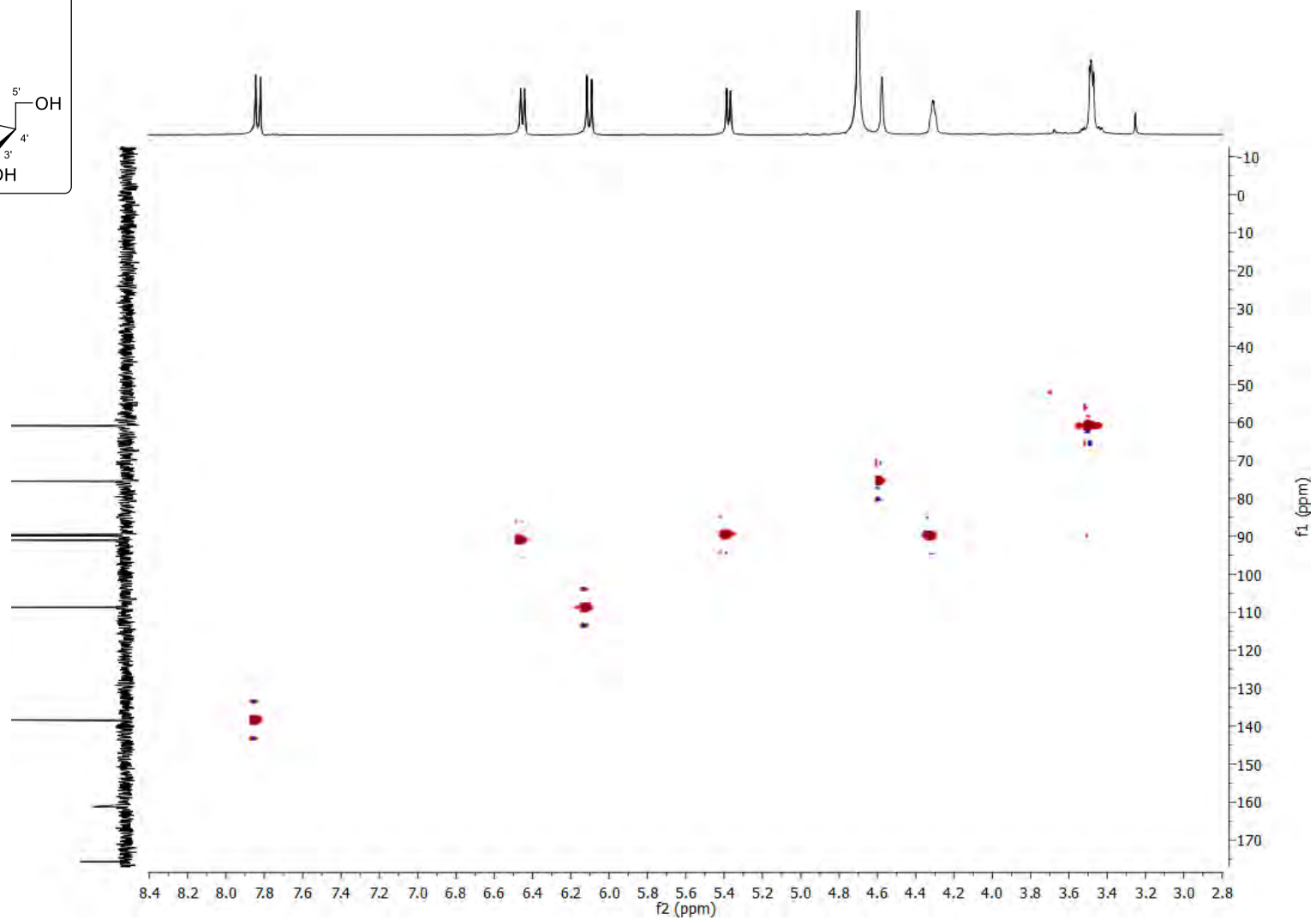
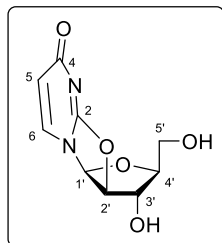
O^{2,2'}-Anhydro-L-uridine (11)

COSY NMR (D₂O)



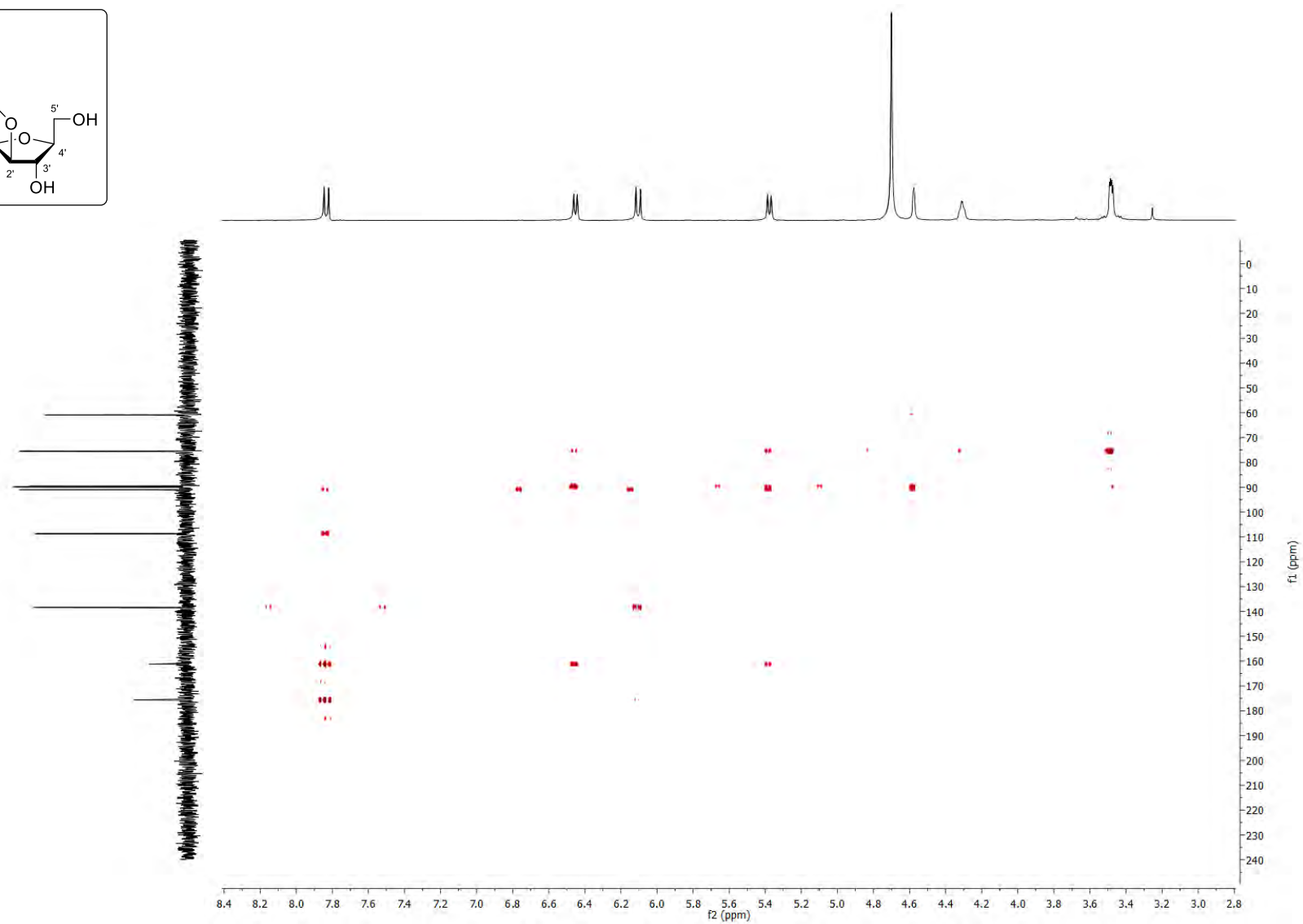
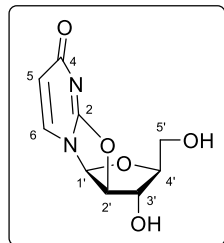
O^{2,2'}-Anhydro-L-uridine (11)

HSQC NMR (D₂O)



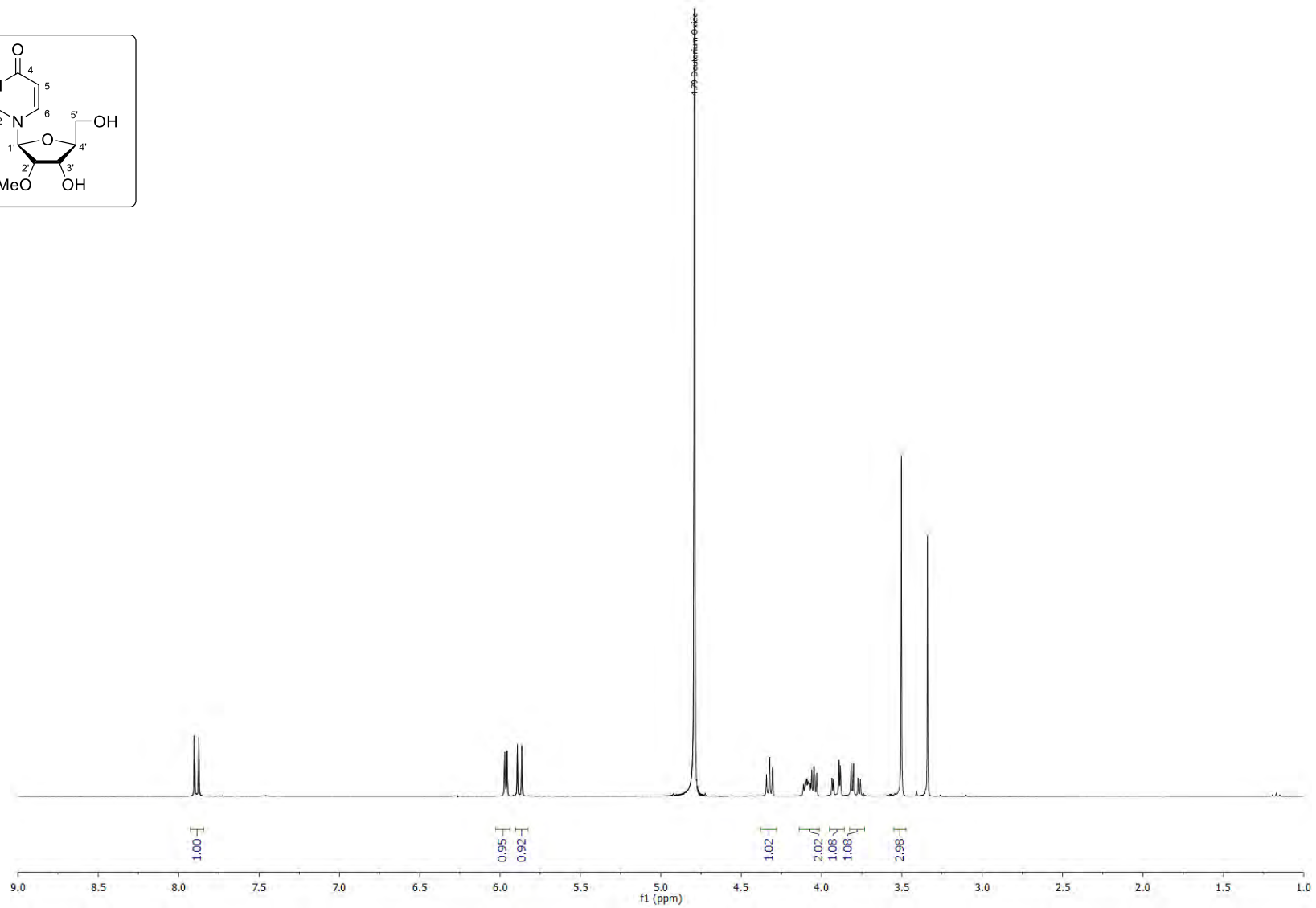
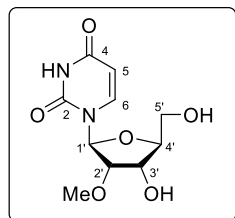
O^{2,2'}-Anhydro-L-uridine (11)

HMBC NMR (D₂O)



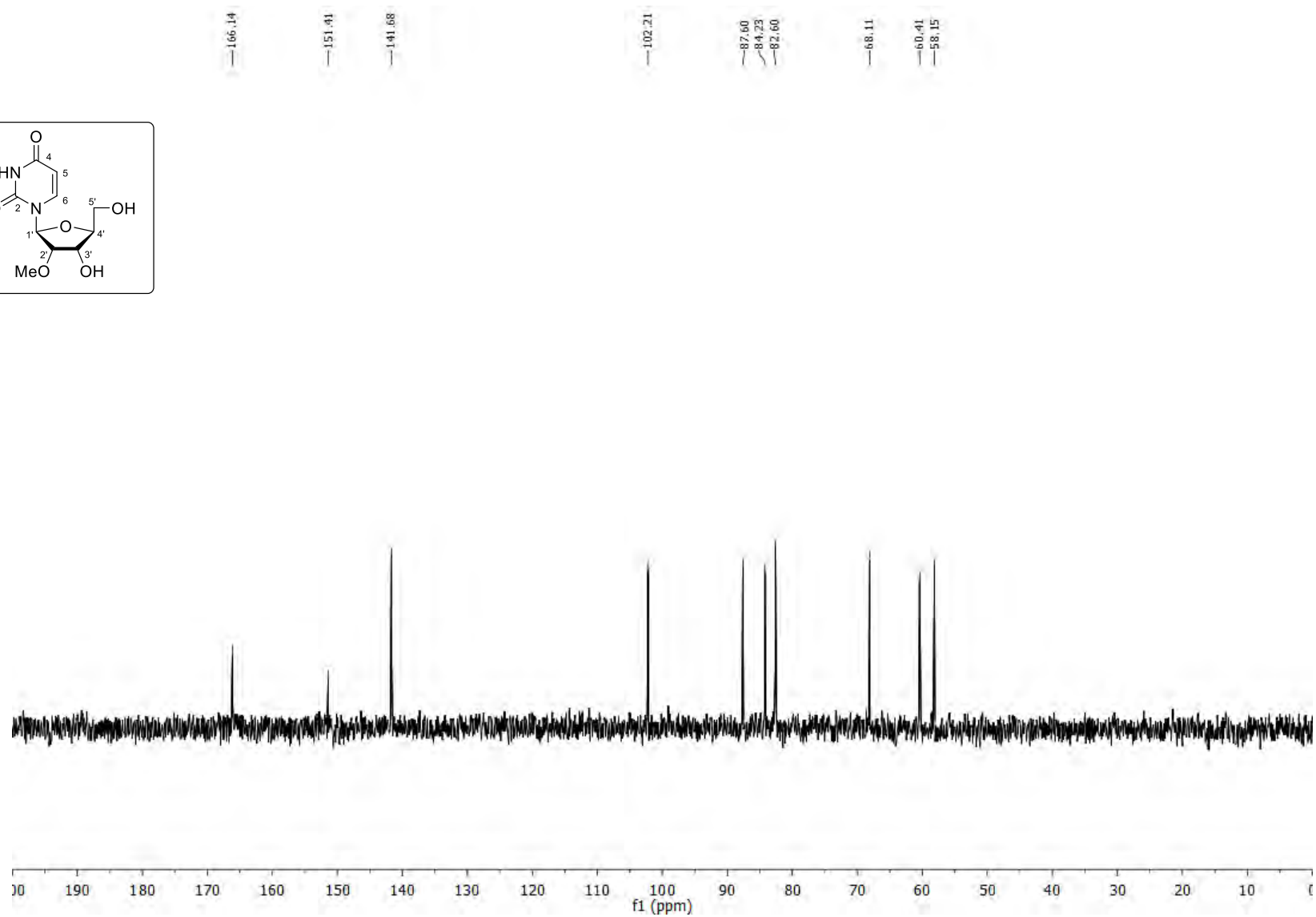
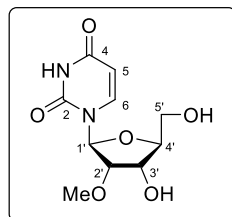
2'-O-Methyl-L-uridine (12)

^1H NMR (300.13 MHz, D_2O)



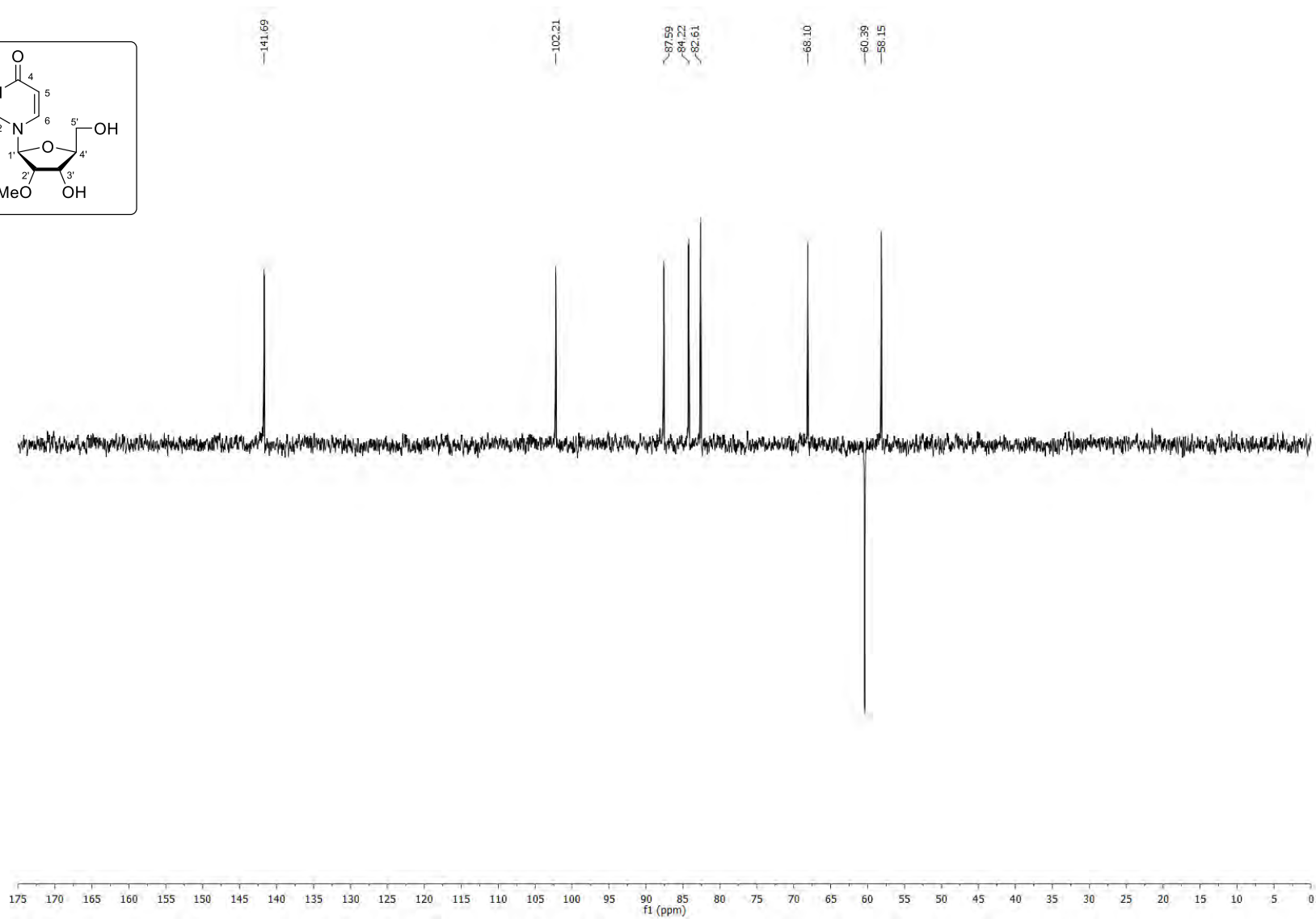
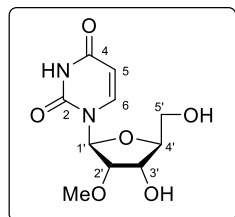
2'-*O*-Methyl-L-uridine (12)

^{13}C NMR (75.5 MHz, D_2O)



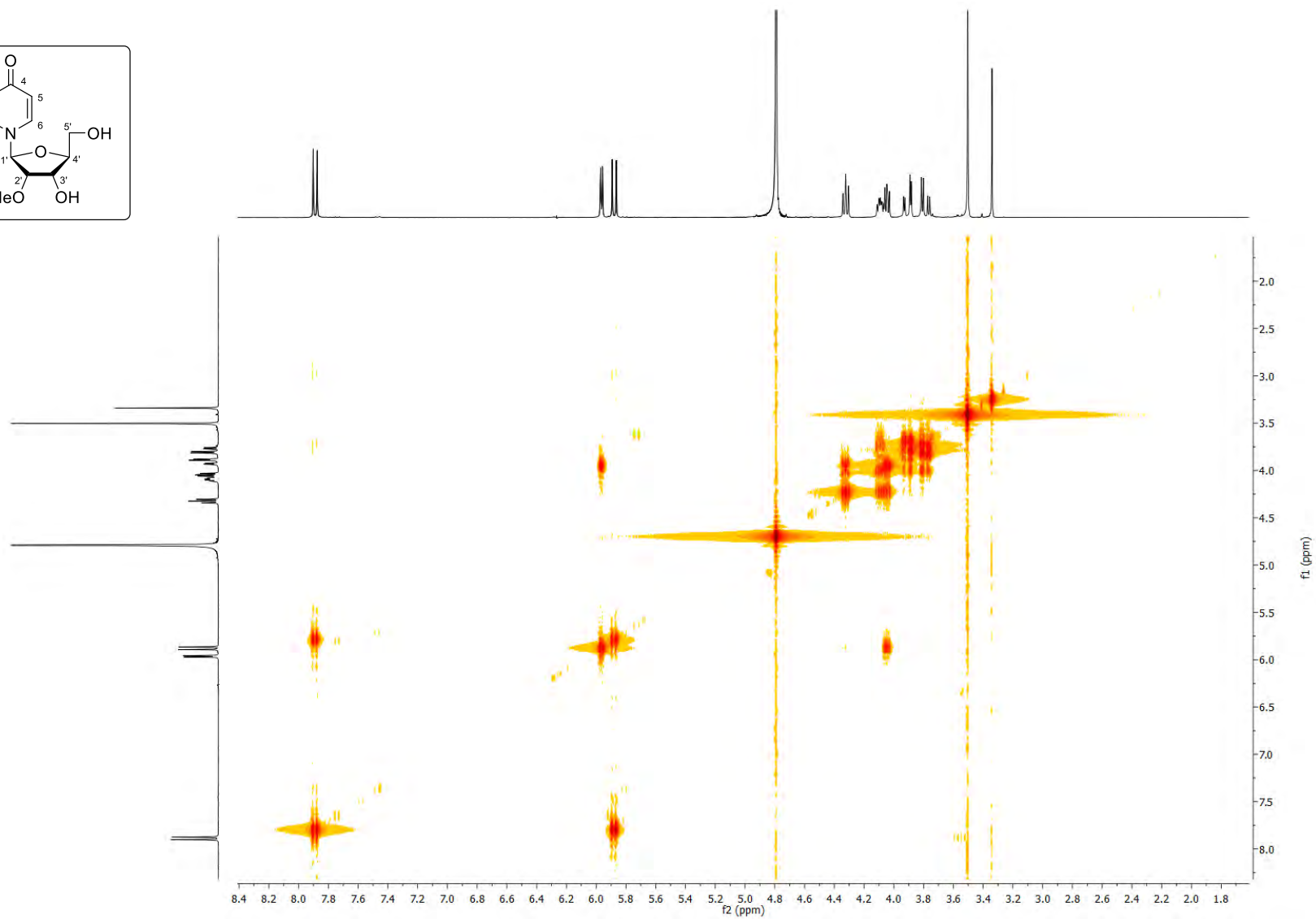
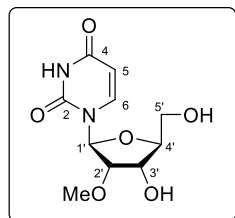
2'-O-Methyl-L-uridine (12)

DEPT NMR (75.5 MHz, D₂O)



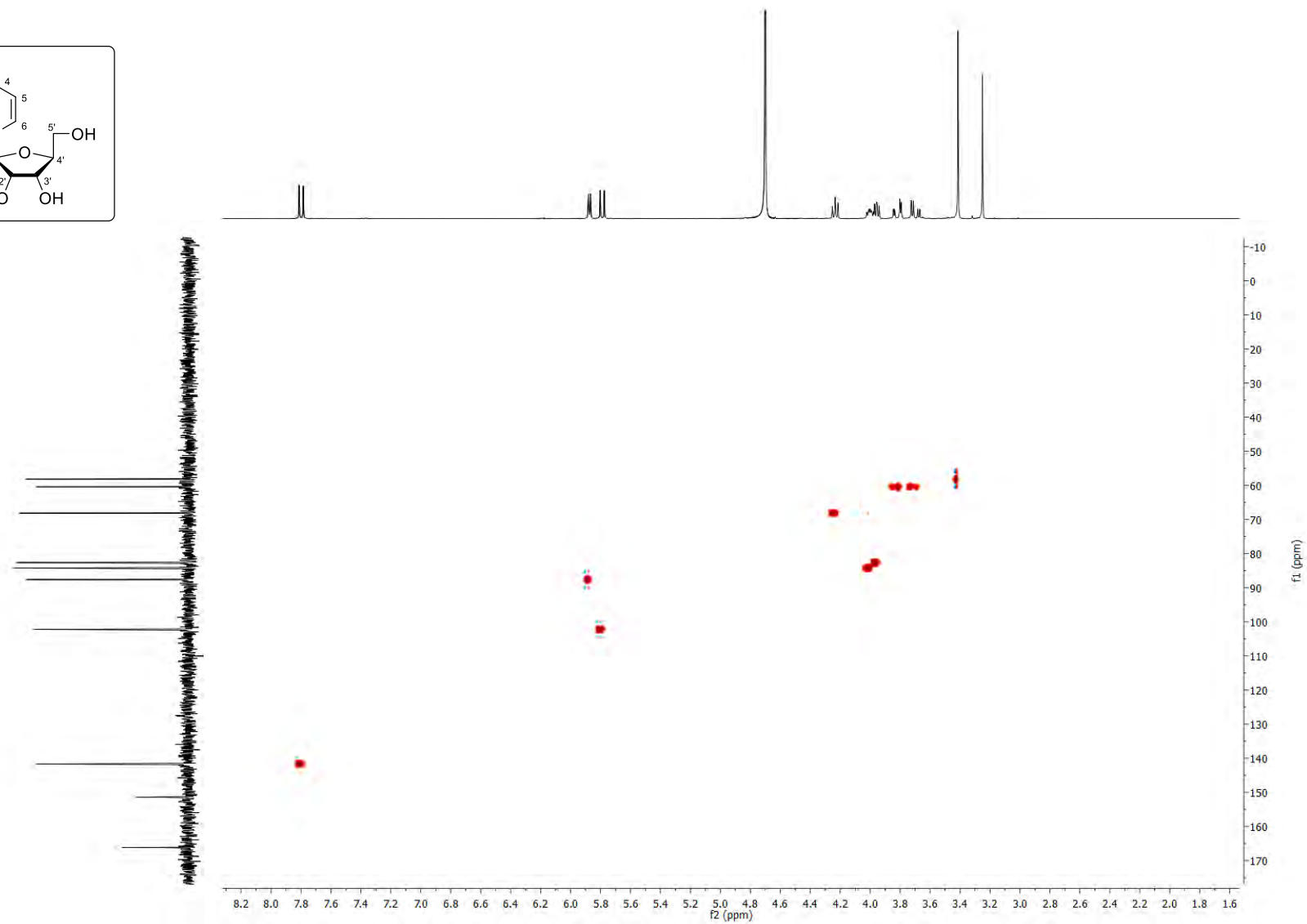
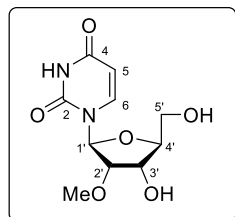
2'-O-Methyl-L-uridine (12)

COSY NMR (D₂O)



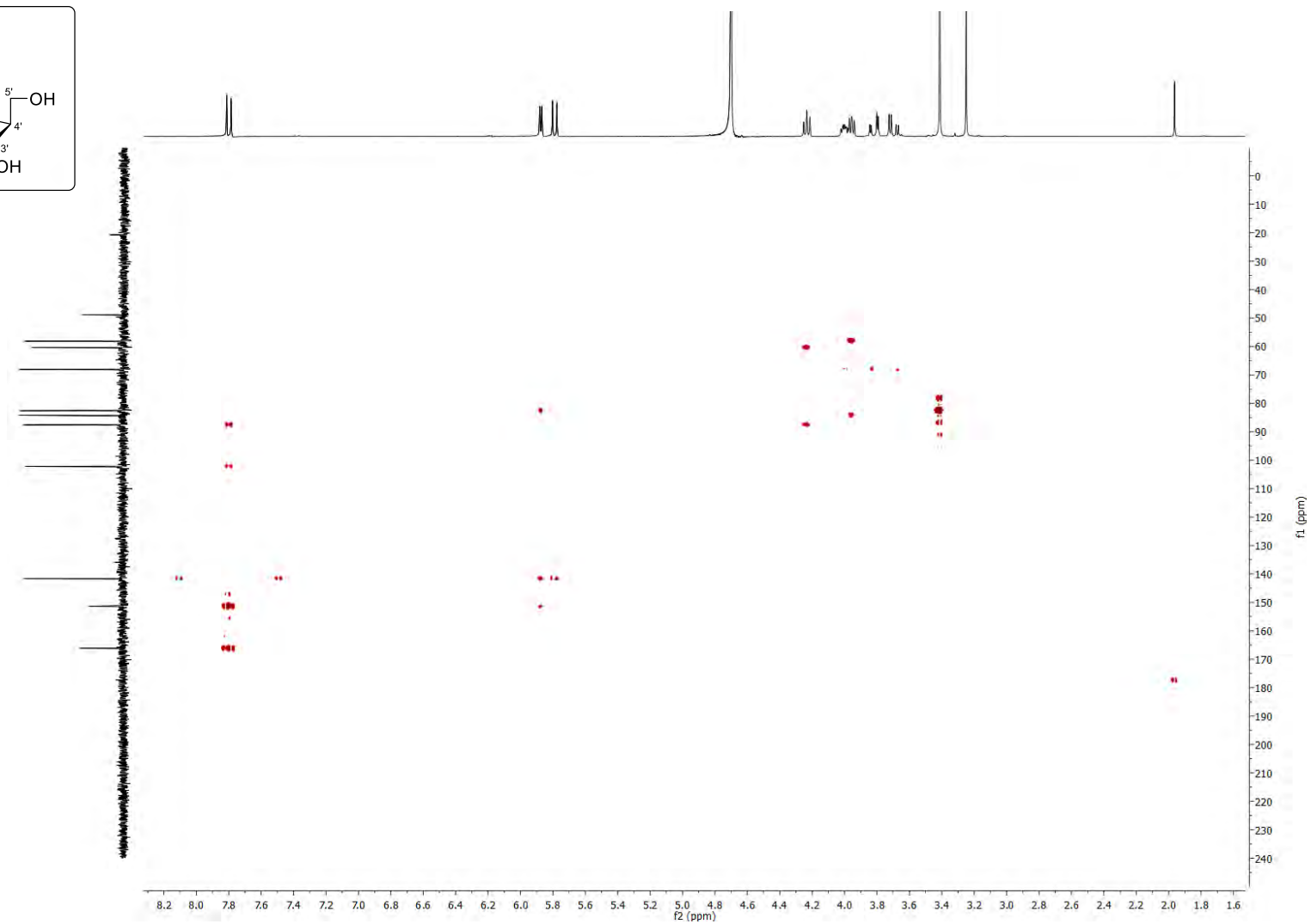
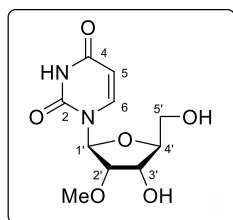
2'-O-Methyl-L-uridine (12)

HSQC NMR (D₂O)



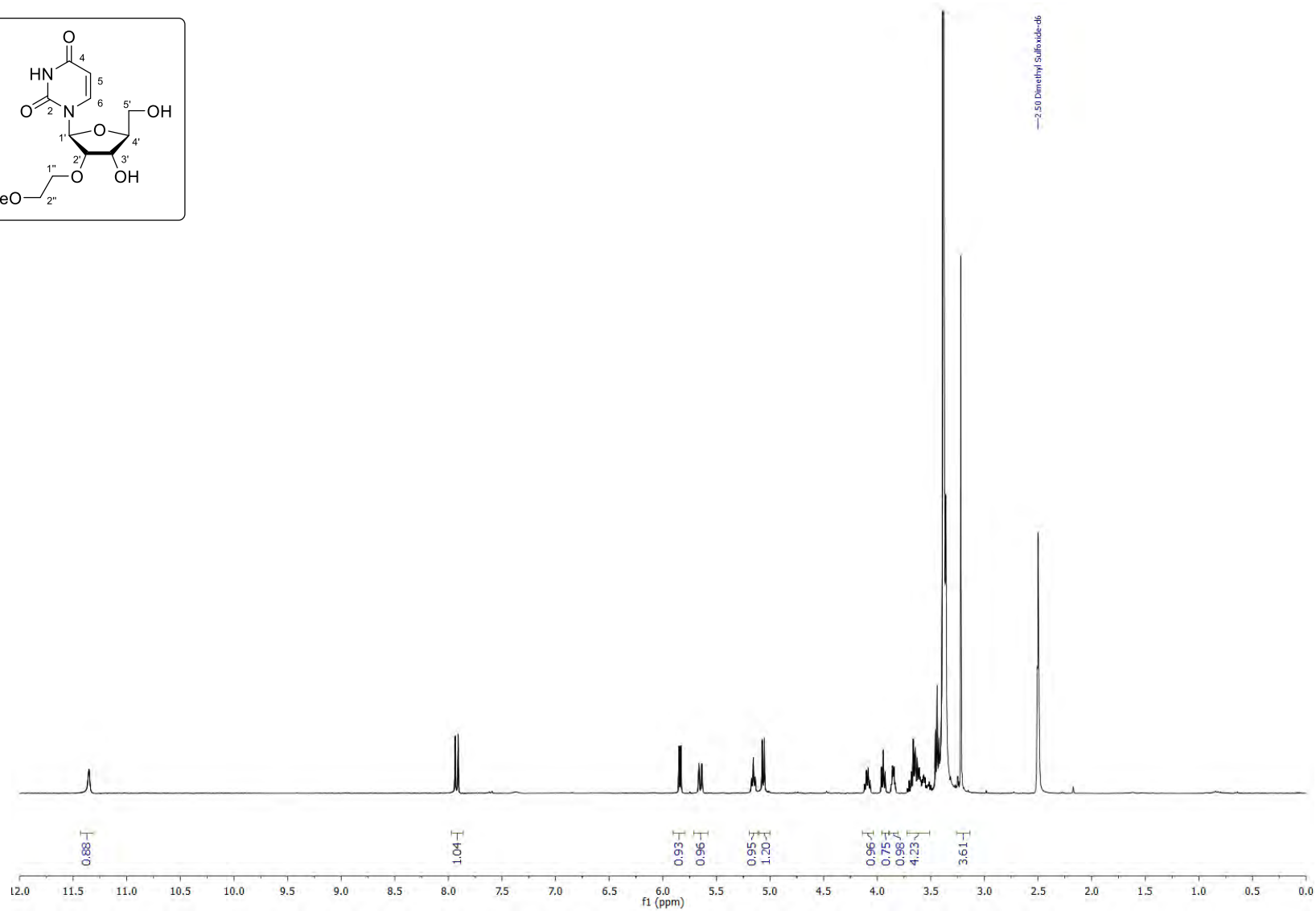
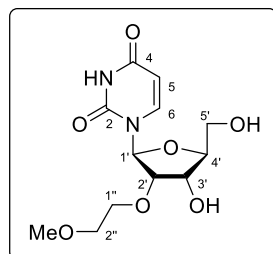
2'-O-Methyl-L-uridine (12)

HMBC NMR (D₂O)



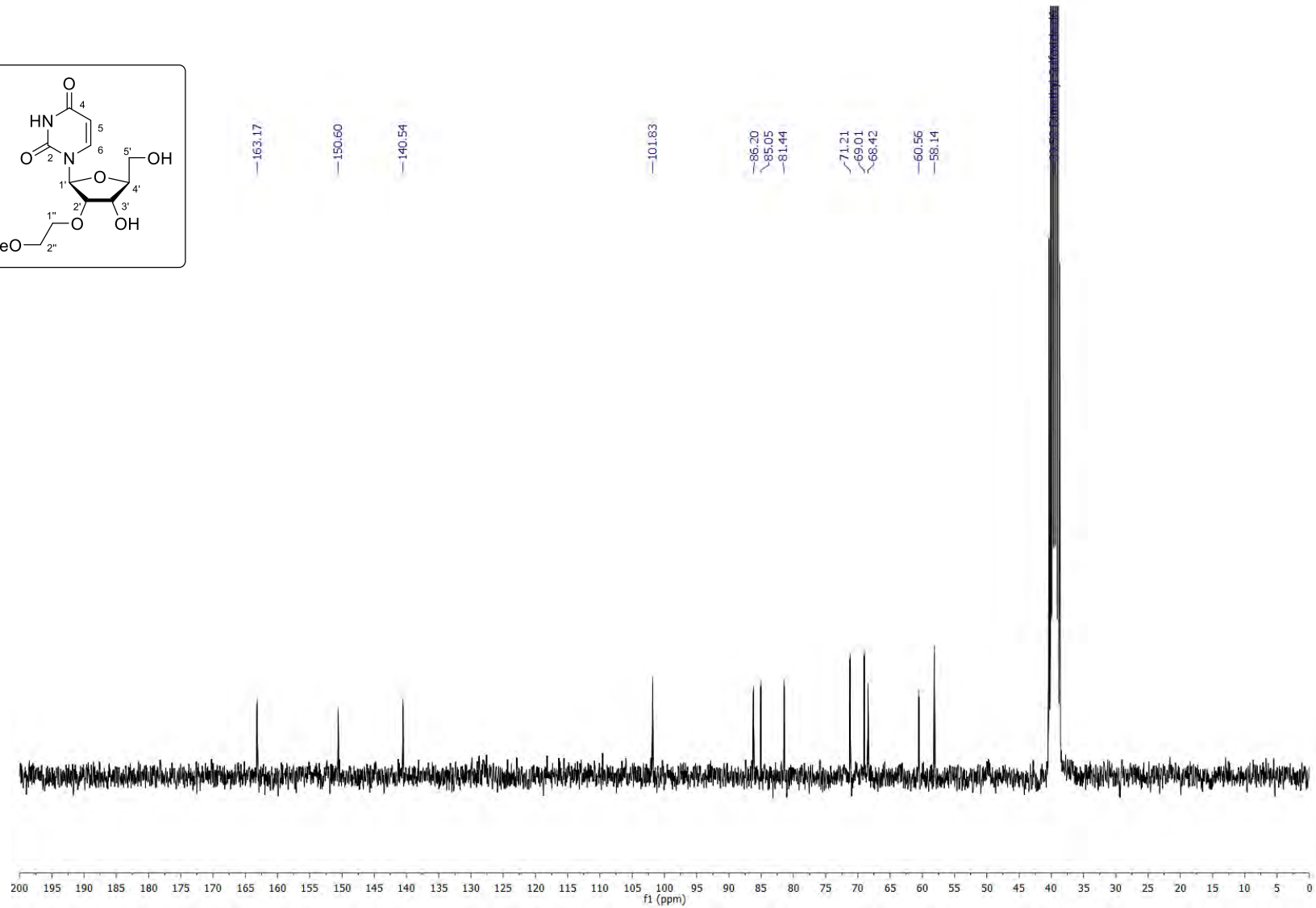
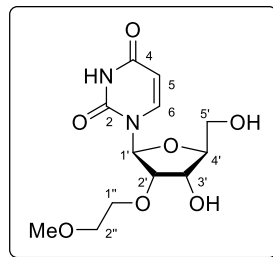
2'-O-(2-Methoxyethyl)-L-uridine (13)

^1H NMR (300.13 MHz, $\text{DMSO-}d_6$)



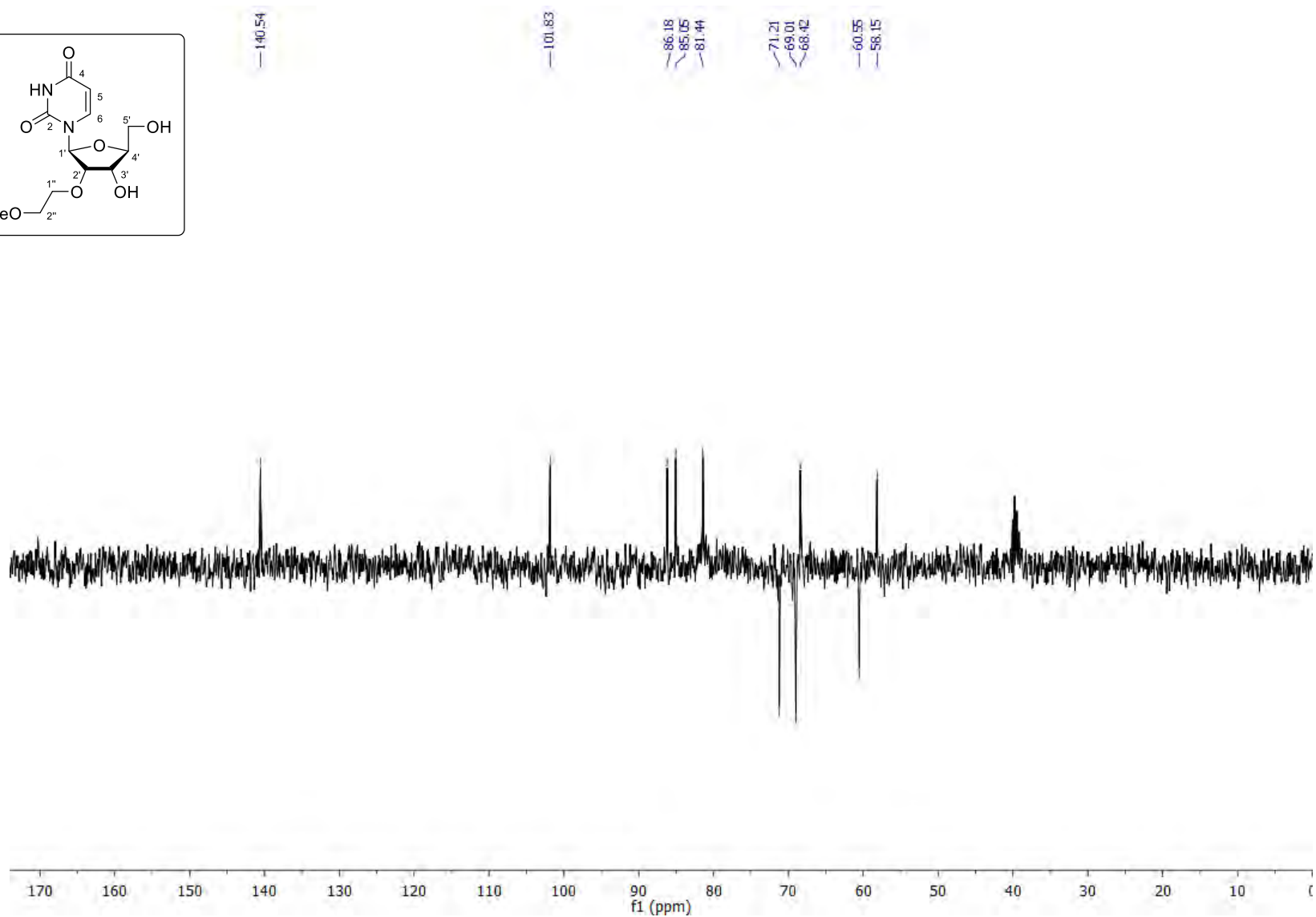
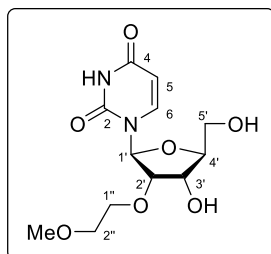
2'-O-(2-Methoxyethyl)-L-uridine (13)

^{13}C NMR (75.5 MHz, $\text{DMSO-}d_6$)



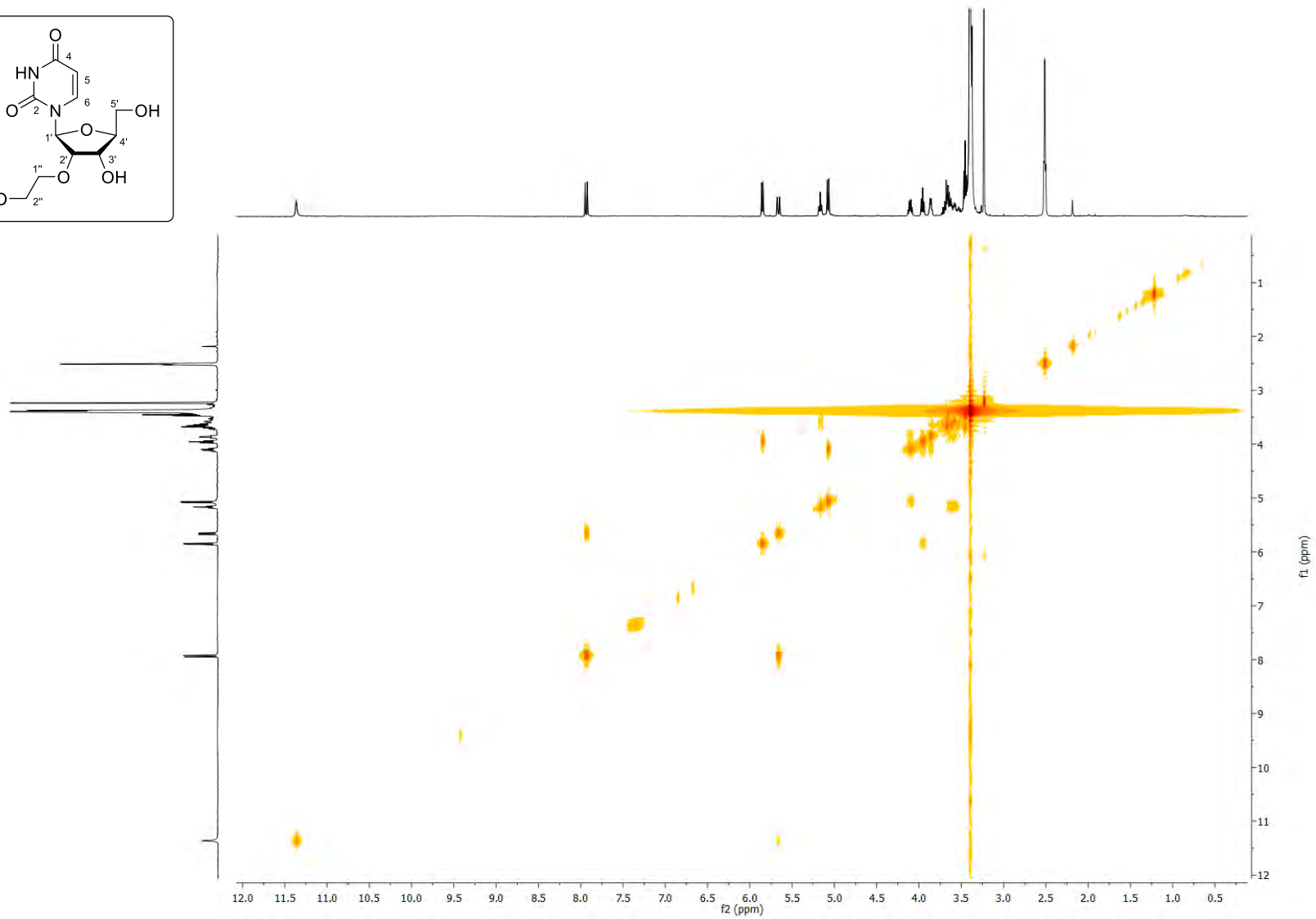
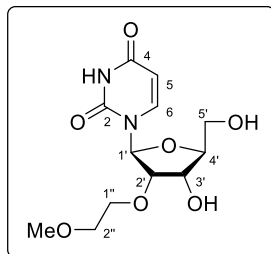
2'-O-(2-Methoxyethyl)-L-uridine (13)

DEPT NMR (75.5 MHz, DMSO-*d*₆)



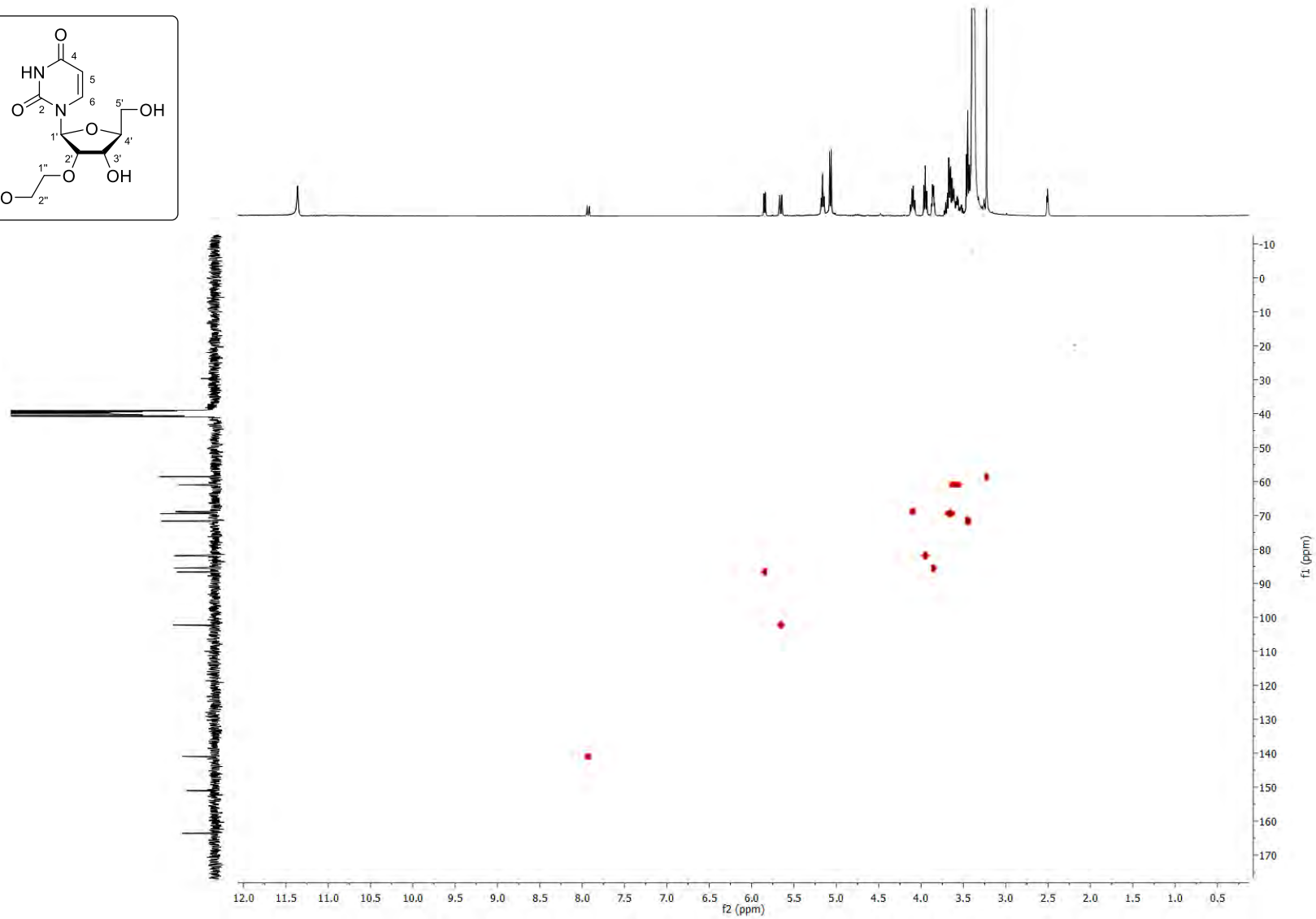
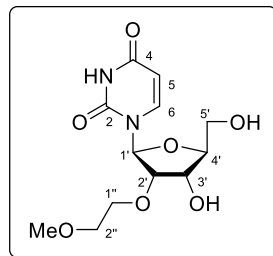
2'-O-(2-Methoxyethyl)-L-uridine (13)

COSY NMR (DMSO-*d*₆)



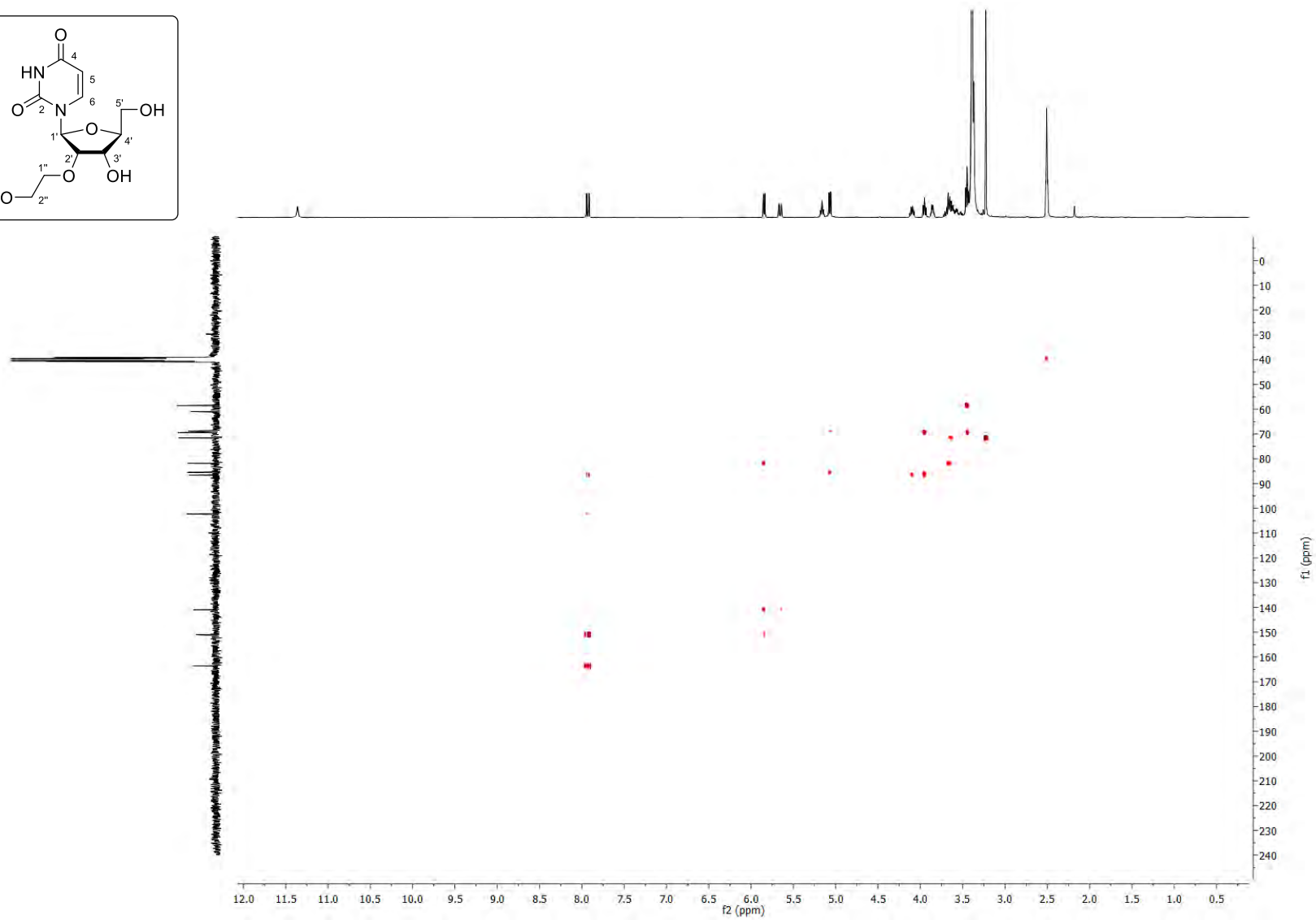
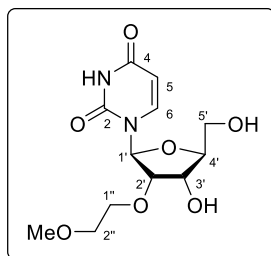
2'-O-(2-Methoxyethyl)-L-uridine (13)

HSQC NMR (DMSO- d_6)



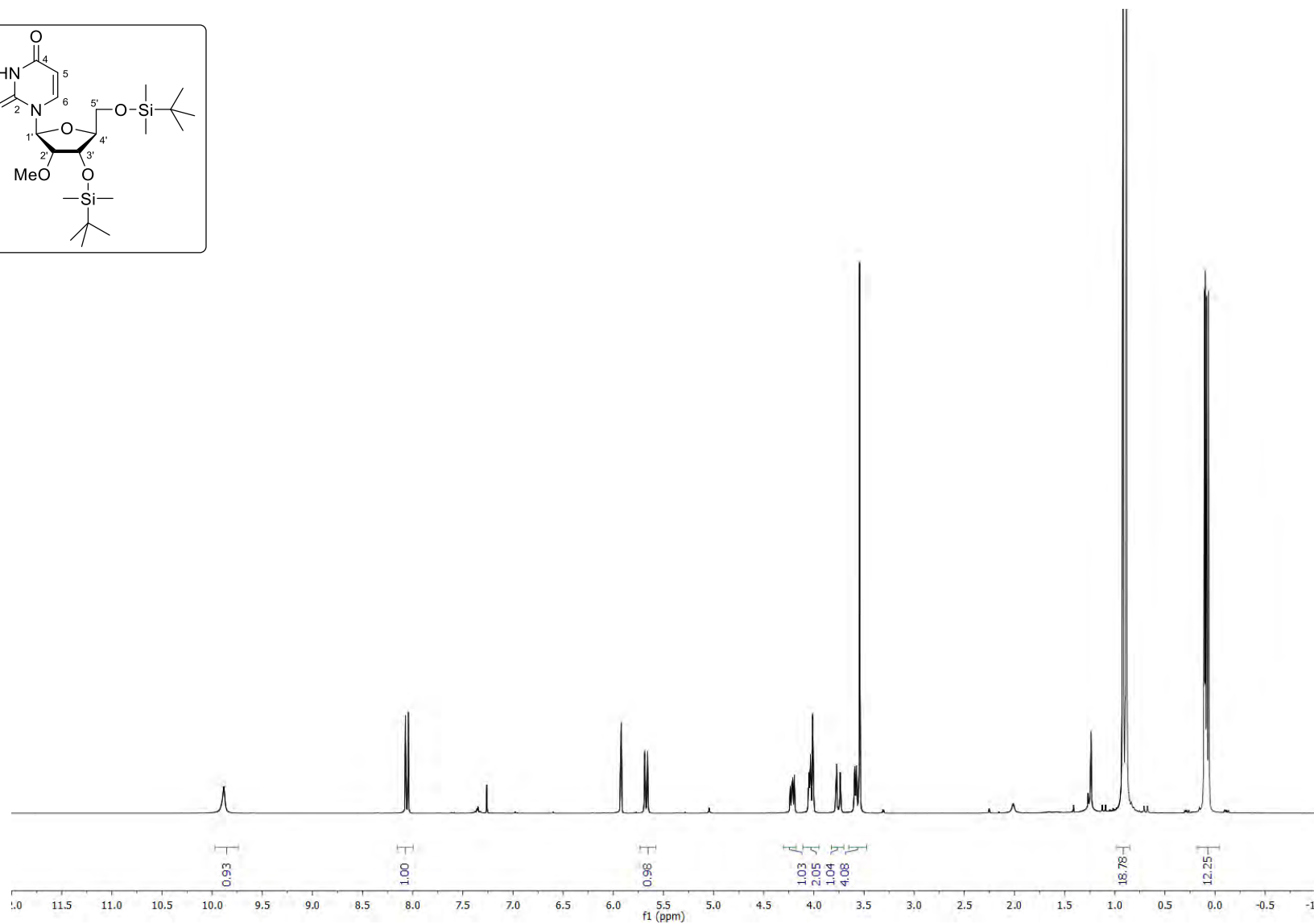
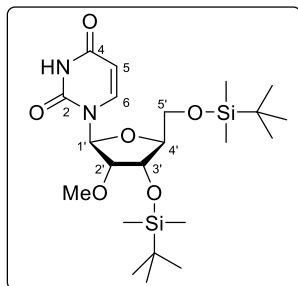
2'-O-(2-Methoxyethyl)-L-uridine (13)

HMBC NMR (DMSO- d_6)



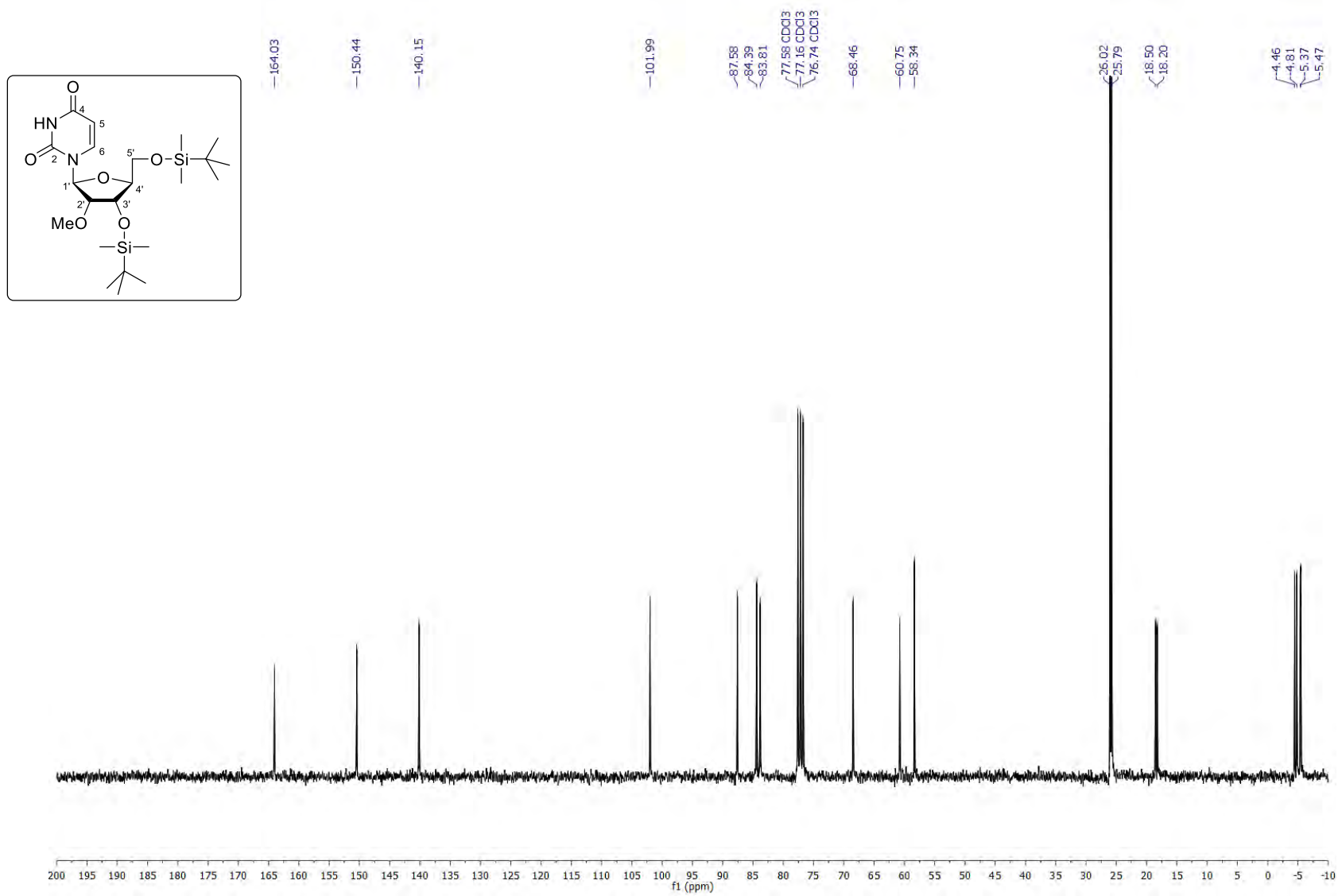
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-uridine (14)

^1H NMR (300.13 MHz, CDCl_3)



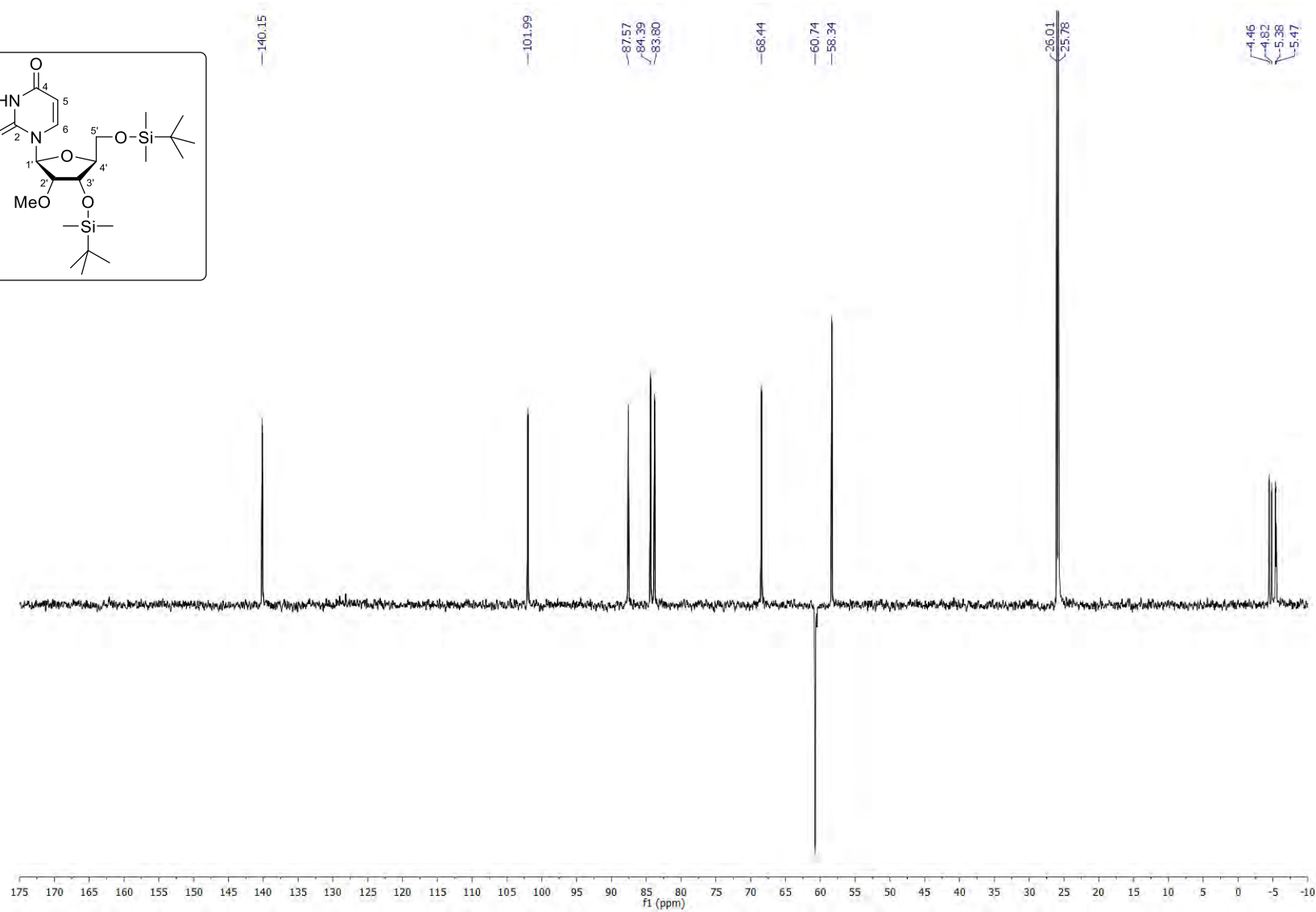
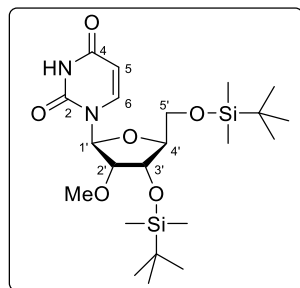
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-uridine (14)

^{13}C NMR (75.5 MHz, CDCl_3)



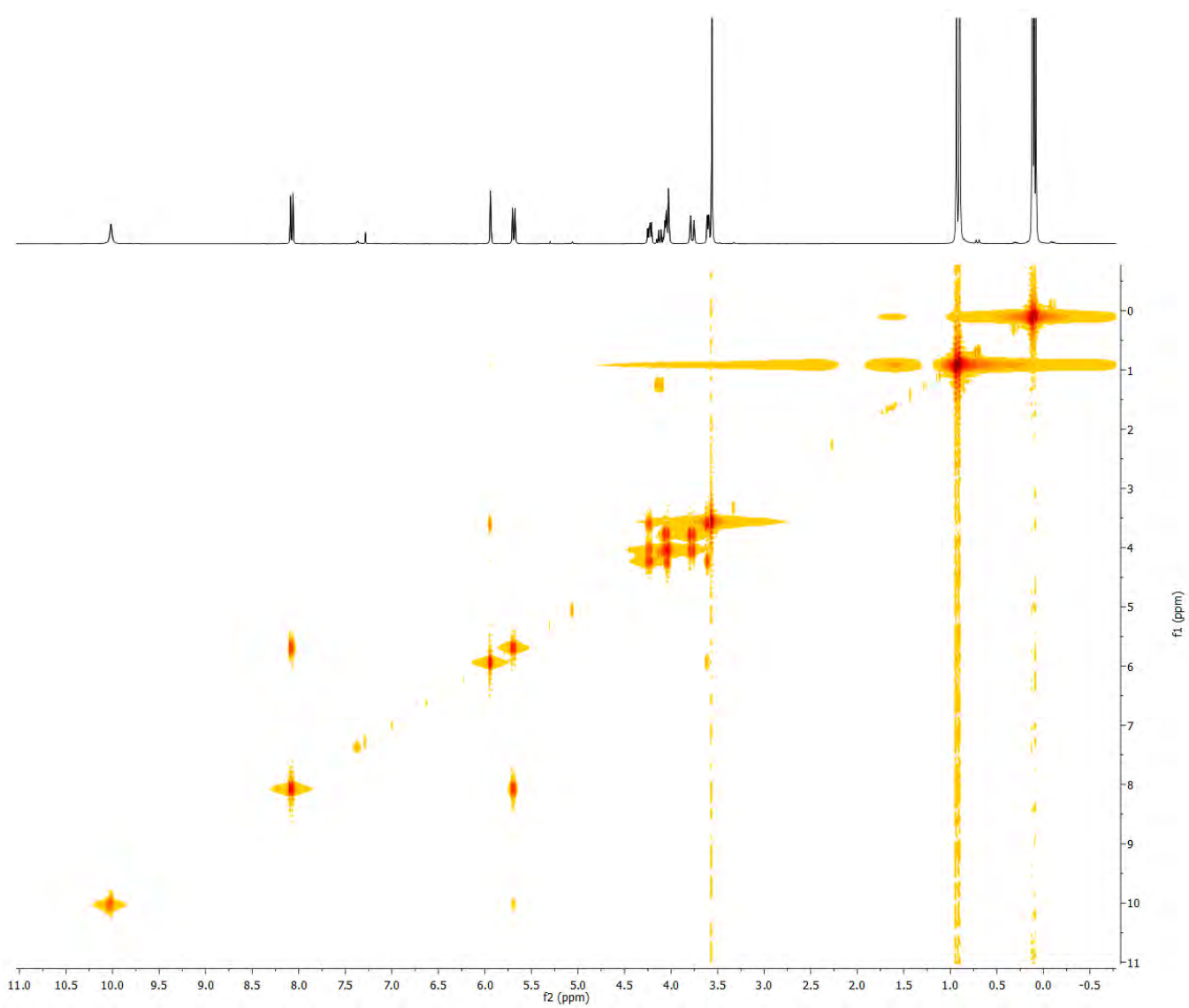
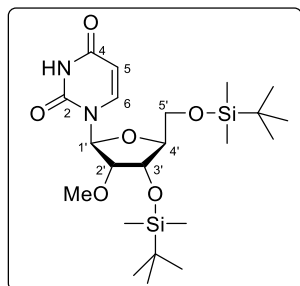
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-uridine (14)

DEPT NMR (75.5 MHz, CDCl₃)



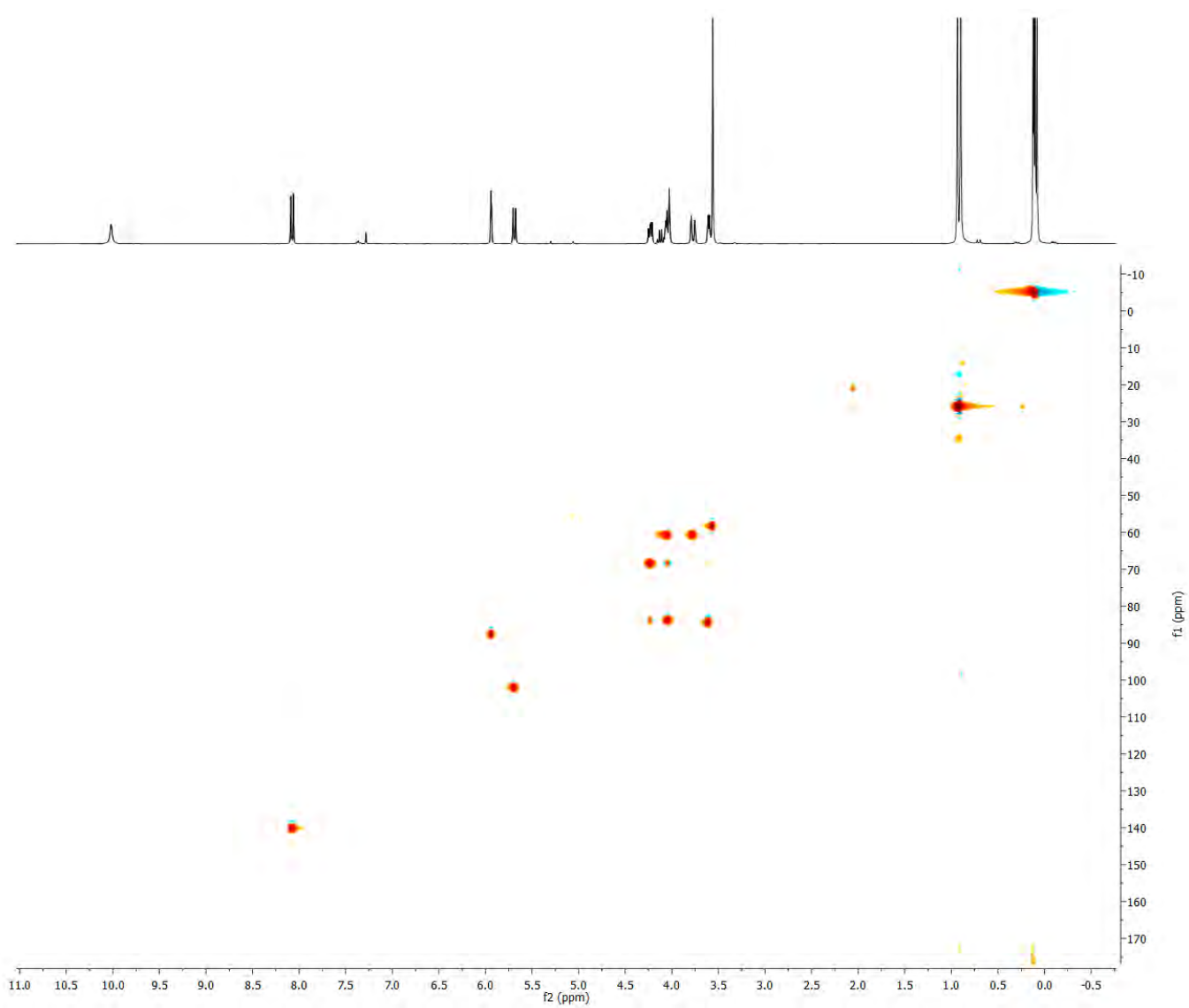
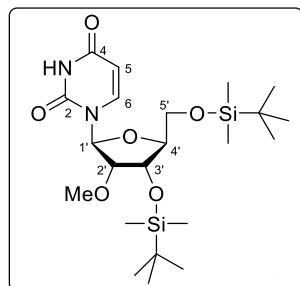
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-uridine (14)

COSY NMR (CDCl₃)



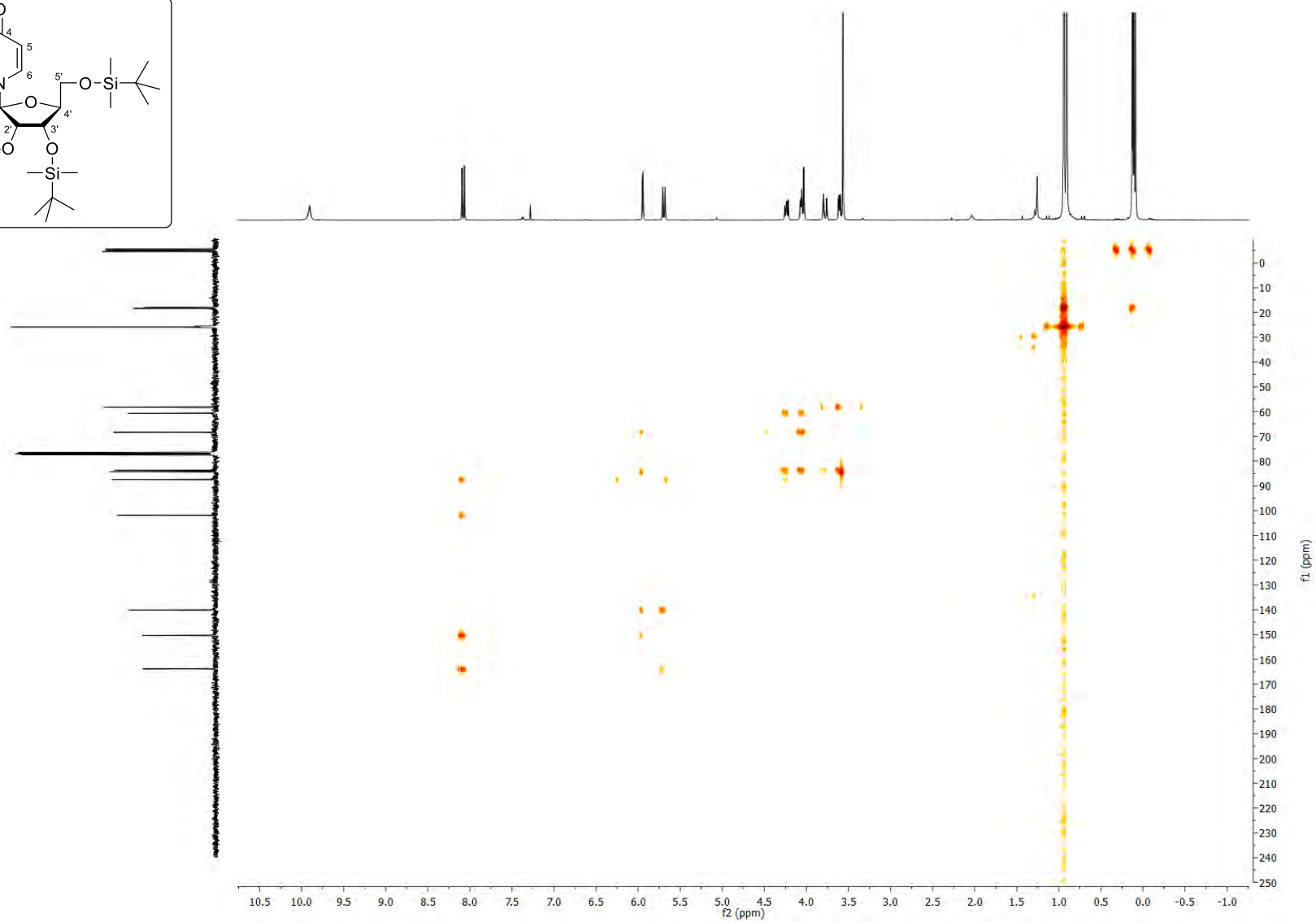
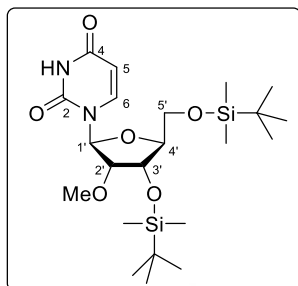
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-uridine (14)

HSQC NMR (CDCl₃)



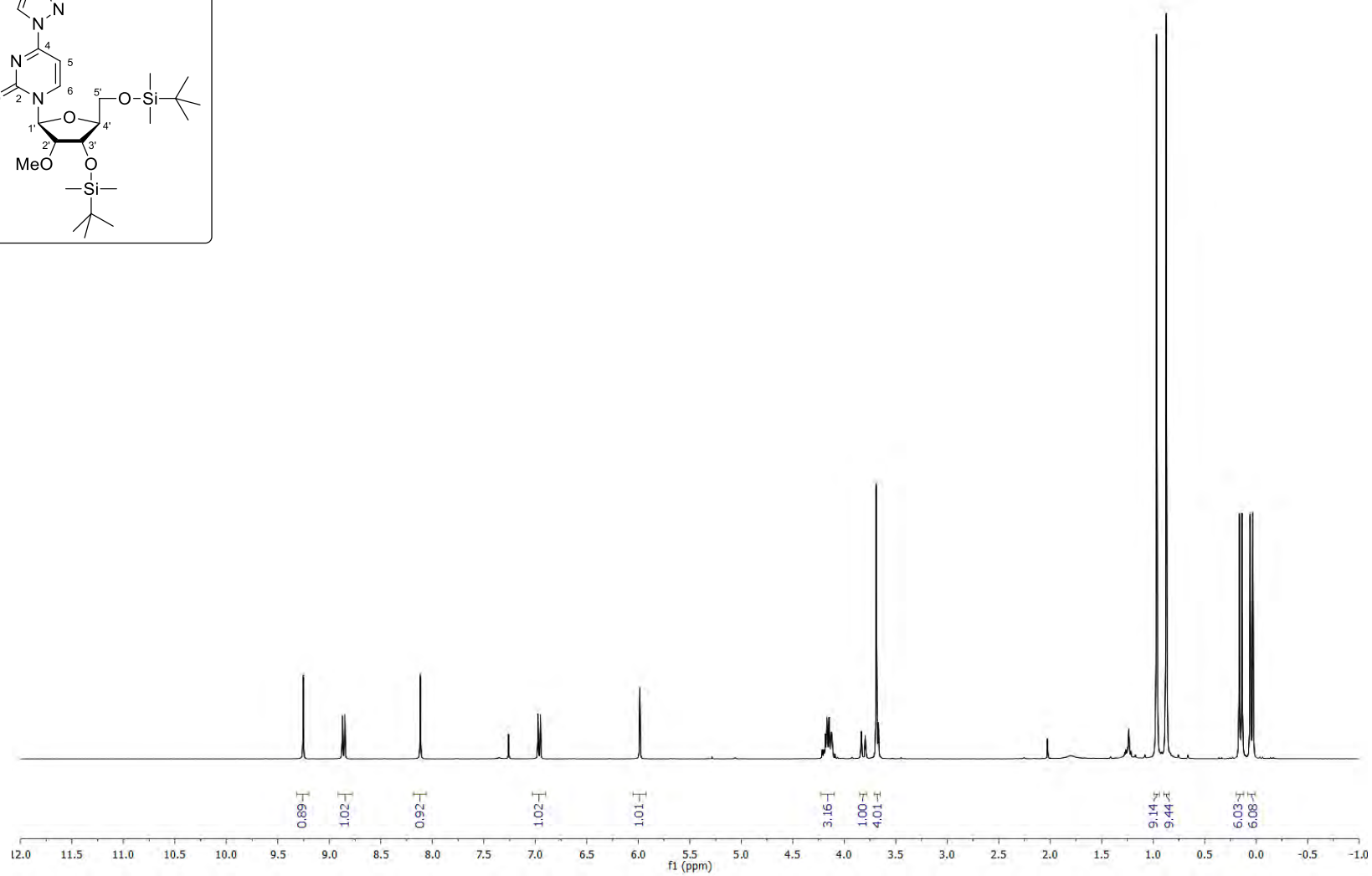
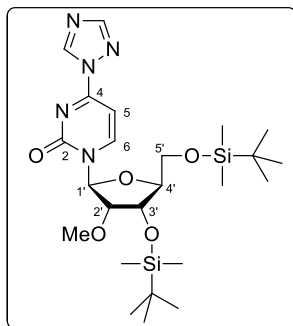
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-uridine (14)

HMBC NMR (CDCl₃)



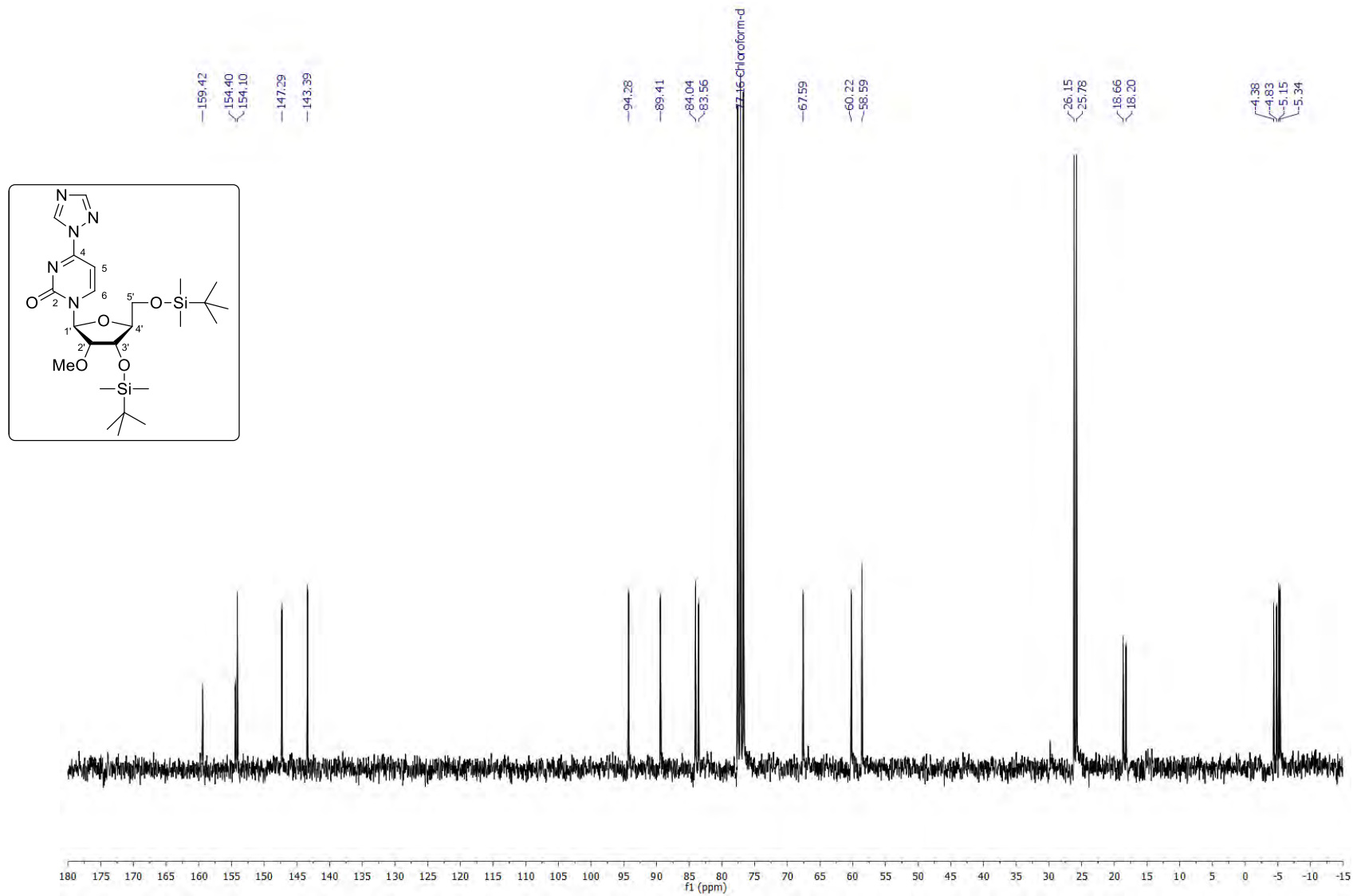
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (15)

^1H NMR (300.13 MHz, CDCl_3)



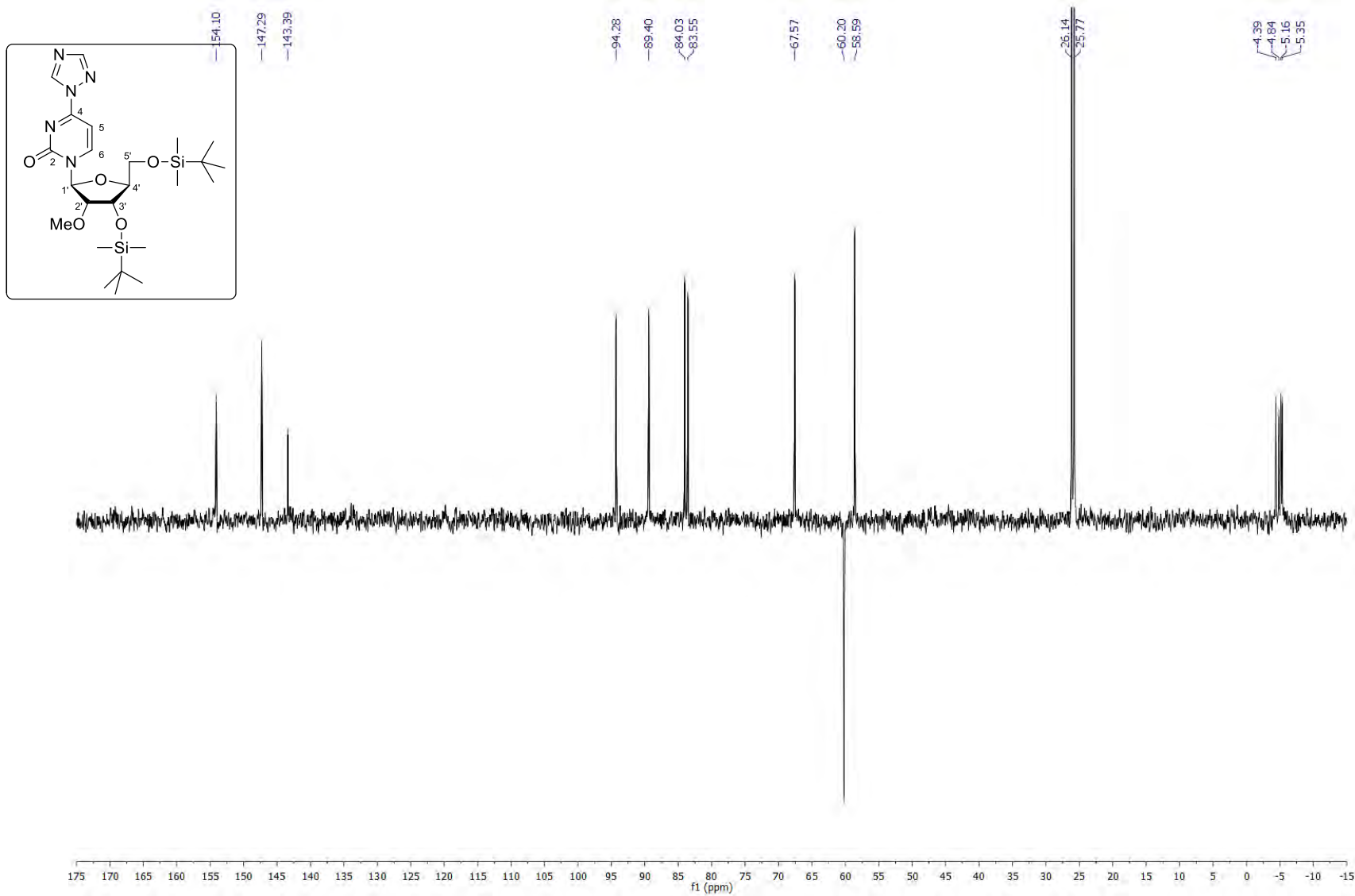
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (15)

^{13}C NMR (75.5 MHz, CDCl_3)



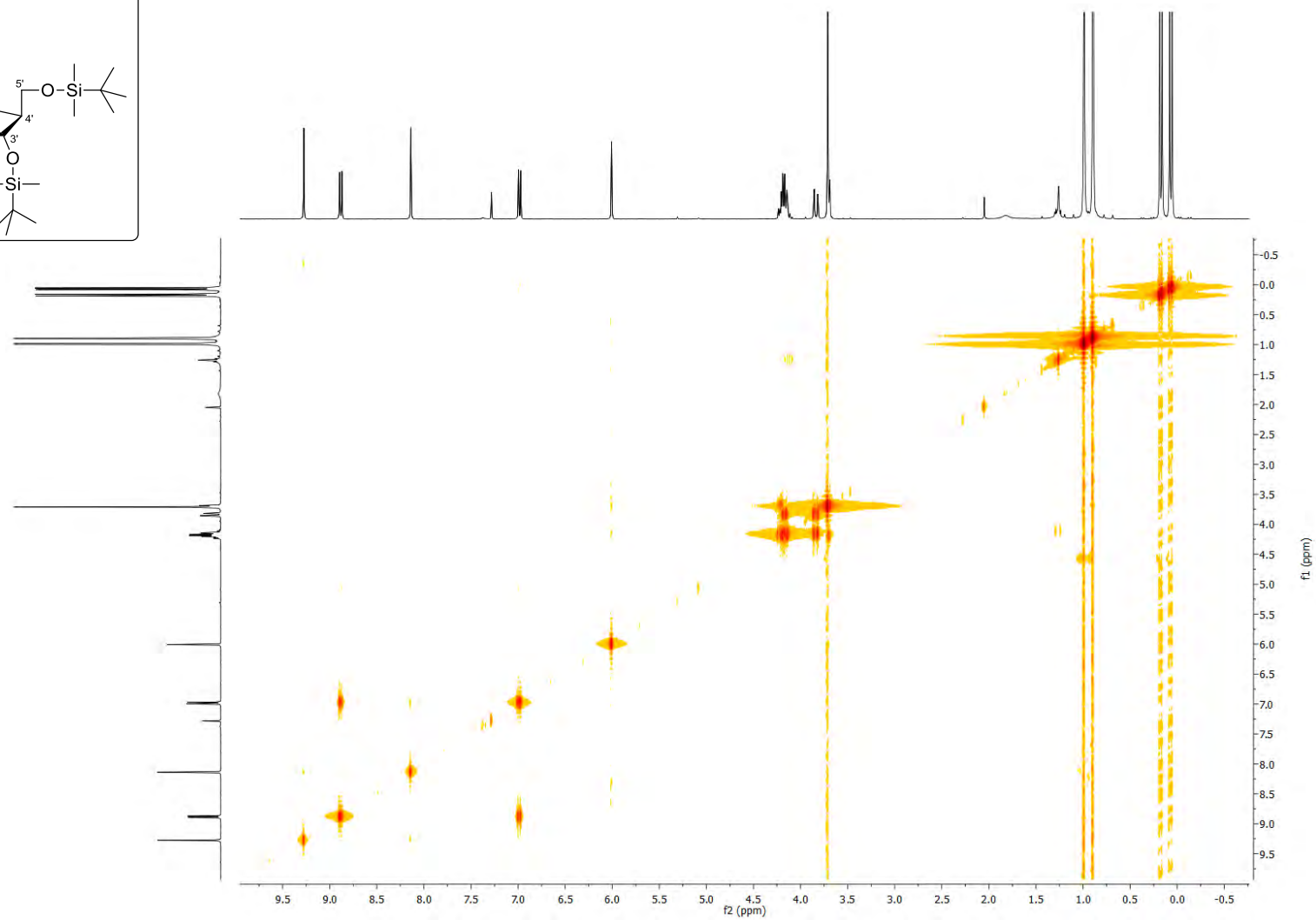
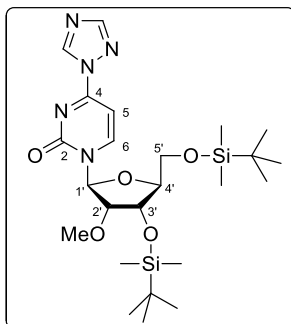
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (15)

DEPT NMR (75.5 MHz, CDCl₃)



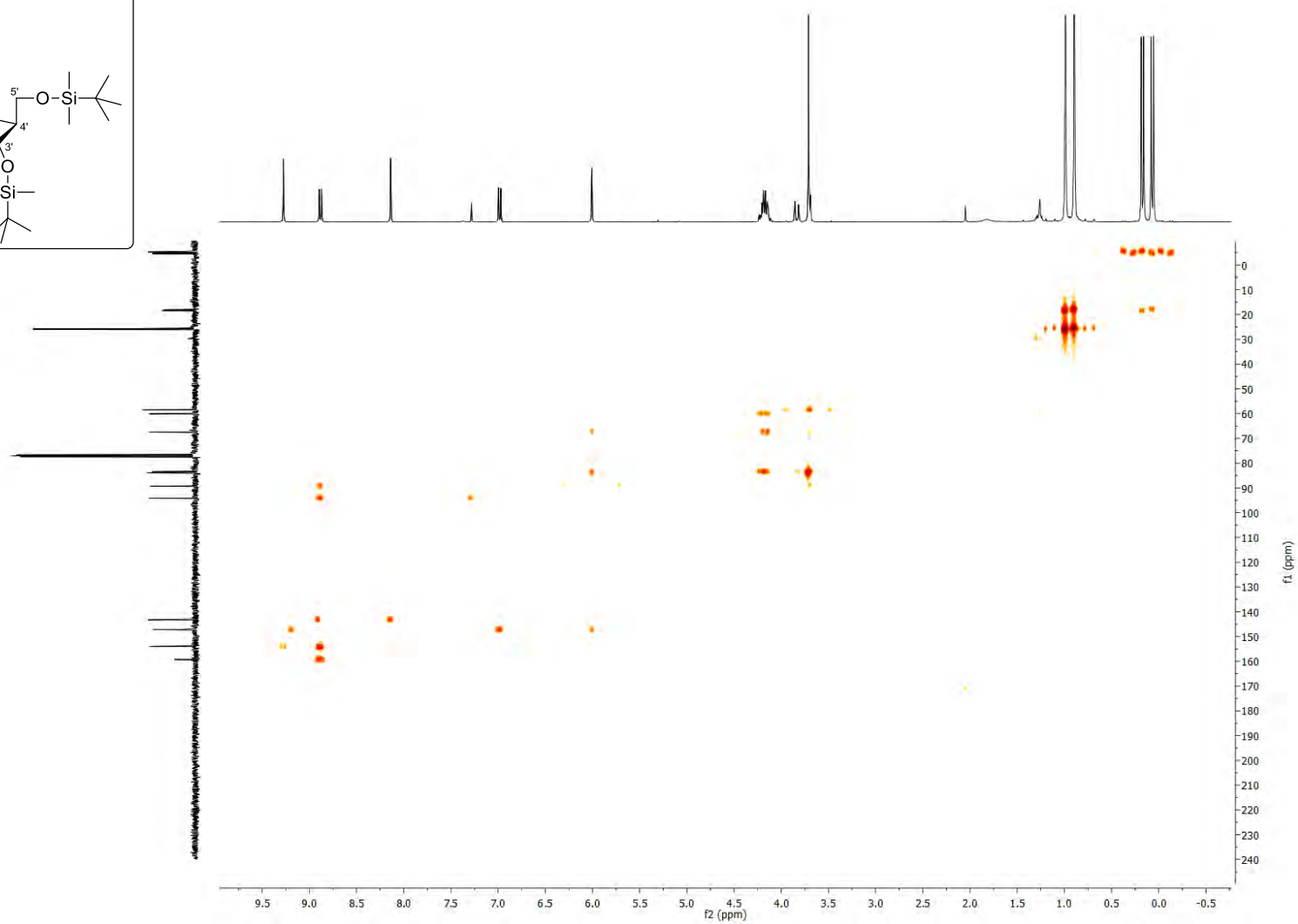
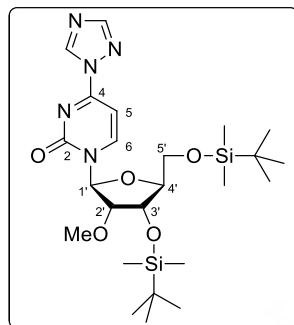
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (15)

COSY NMR (CDCl₃)



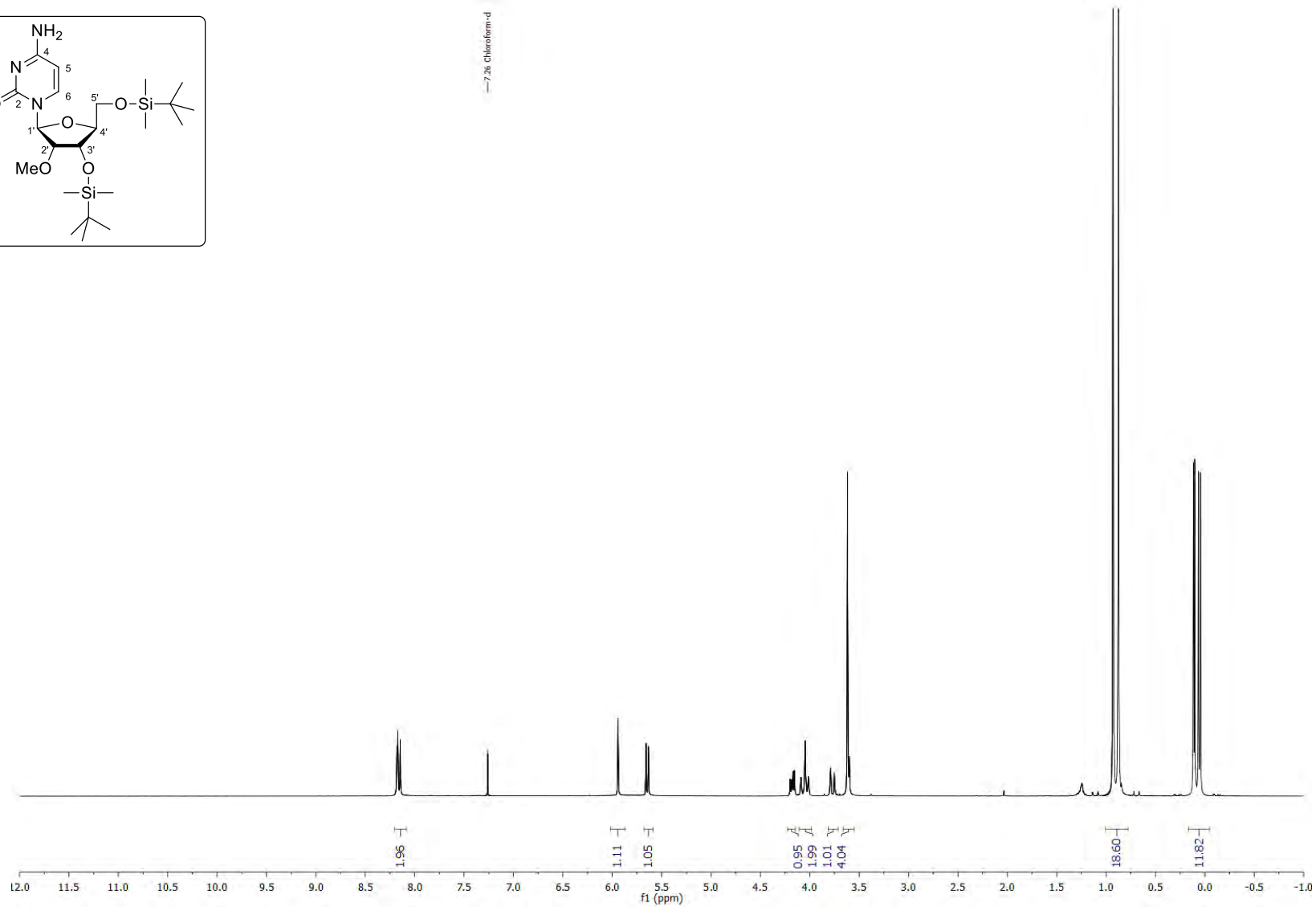
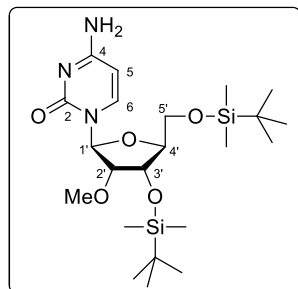
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (15)

HMBC NMR (CDCl₃)



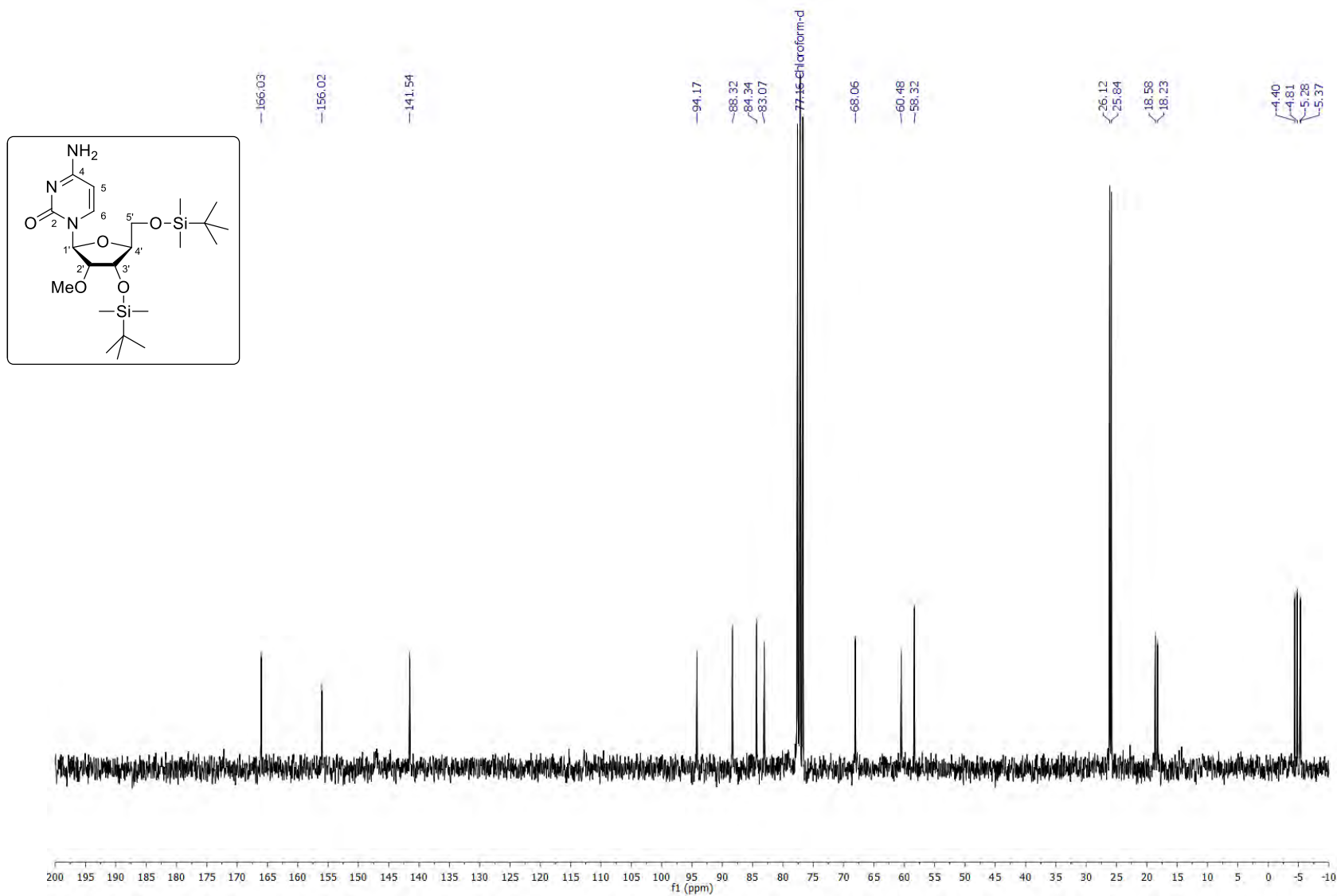
3',5'-Bis-O-(*tert*-butyldimethylsilyl)-2'-O-methyl-L-cytidine (16)

¹H NMR (300.13 MHz, CDCl₃)



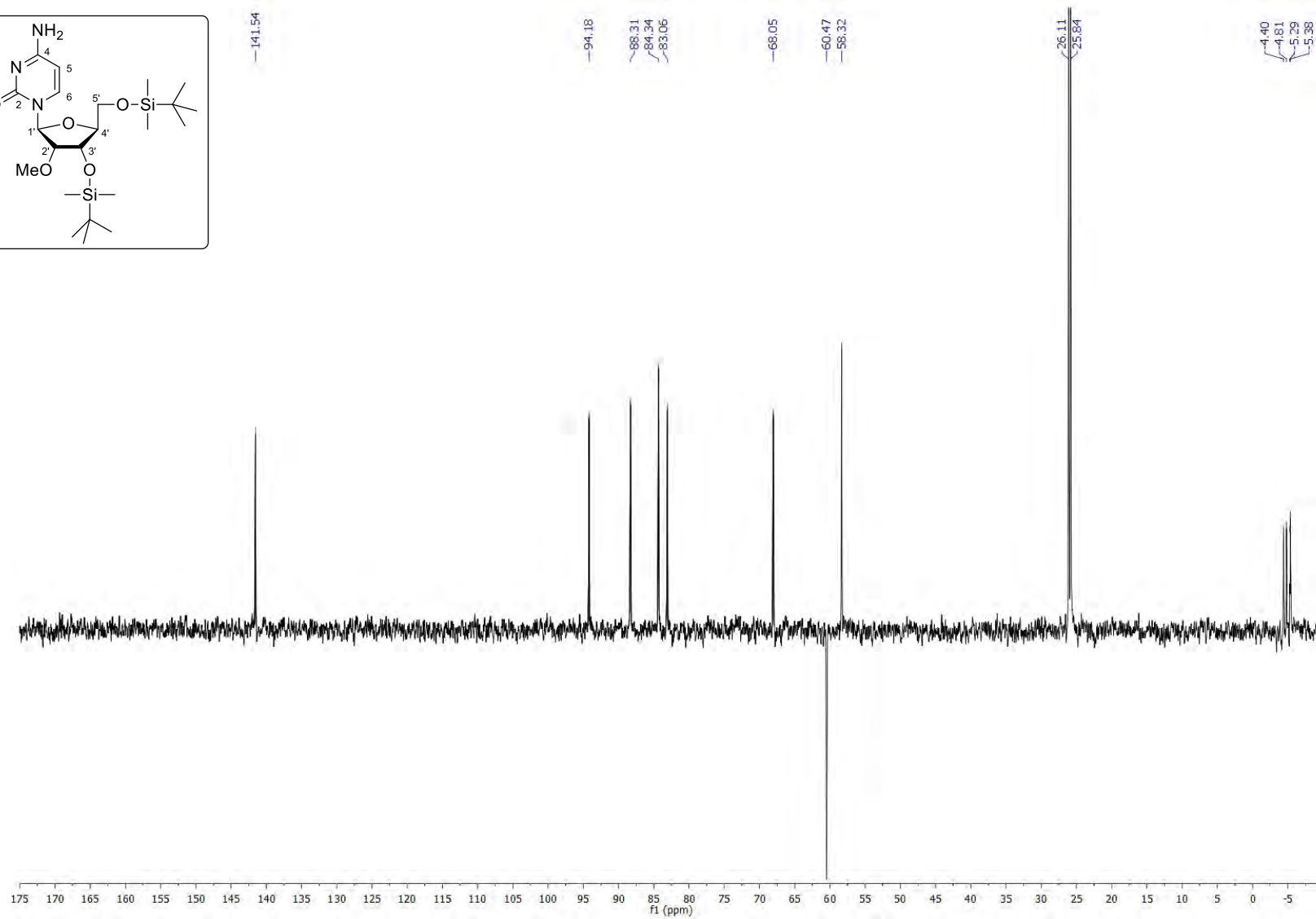
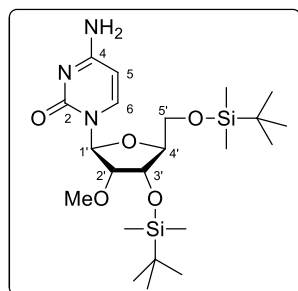
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-cytidine (16)

^{13}C NMR (75.5 MHz, CDCl_3)



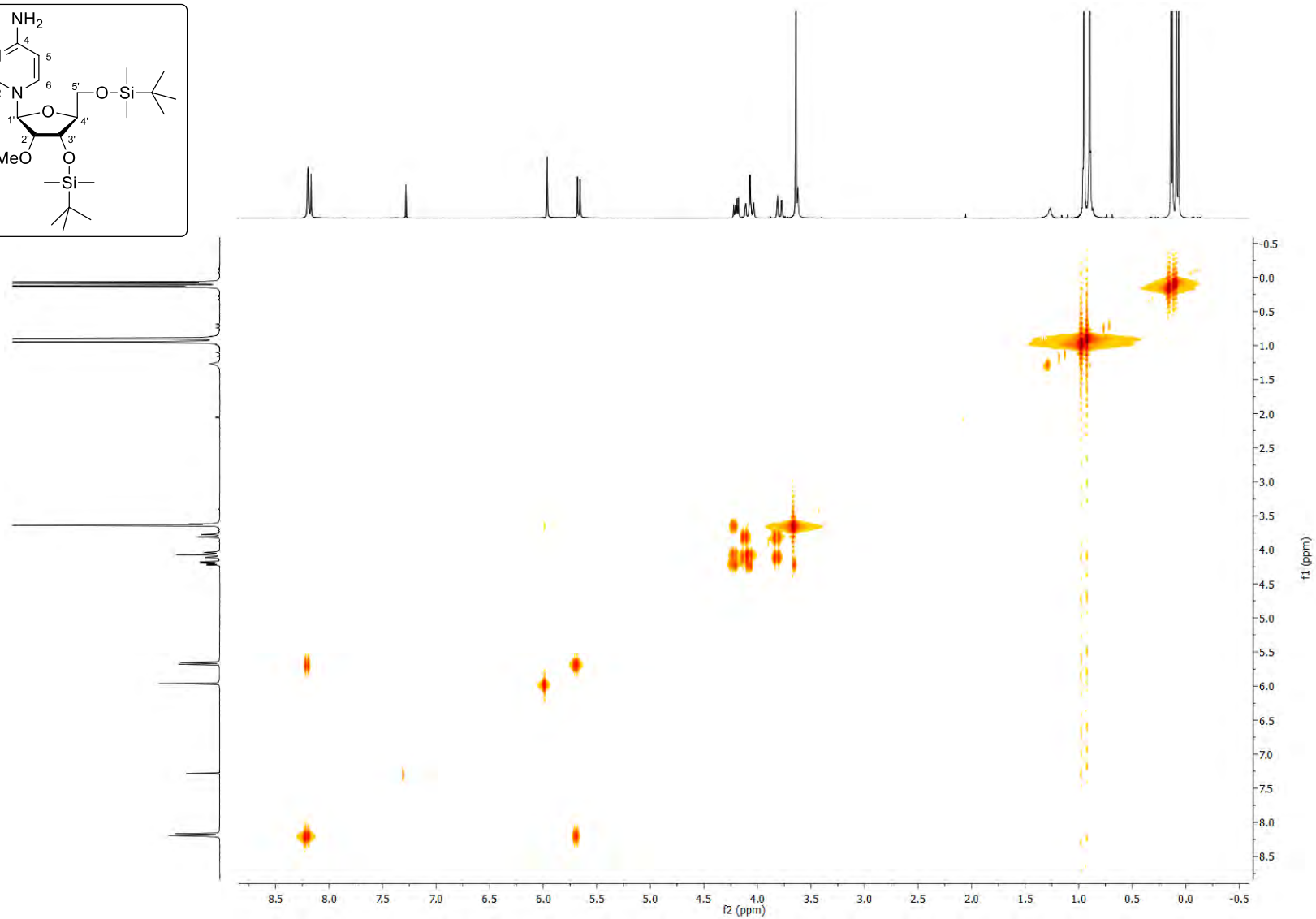
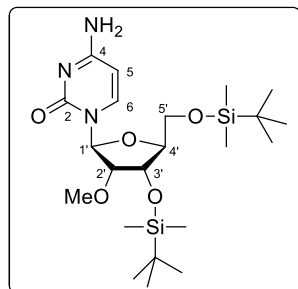
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-cytidine (16)

DEPT NMR (75.5 MHz, CDCl₃)



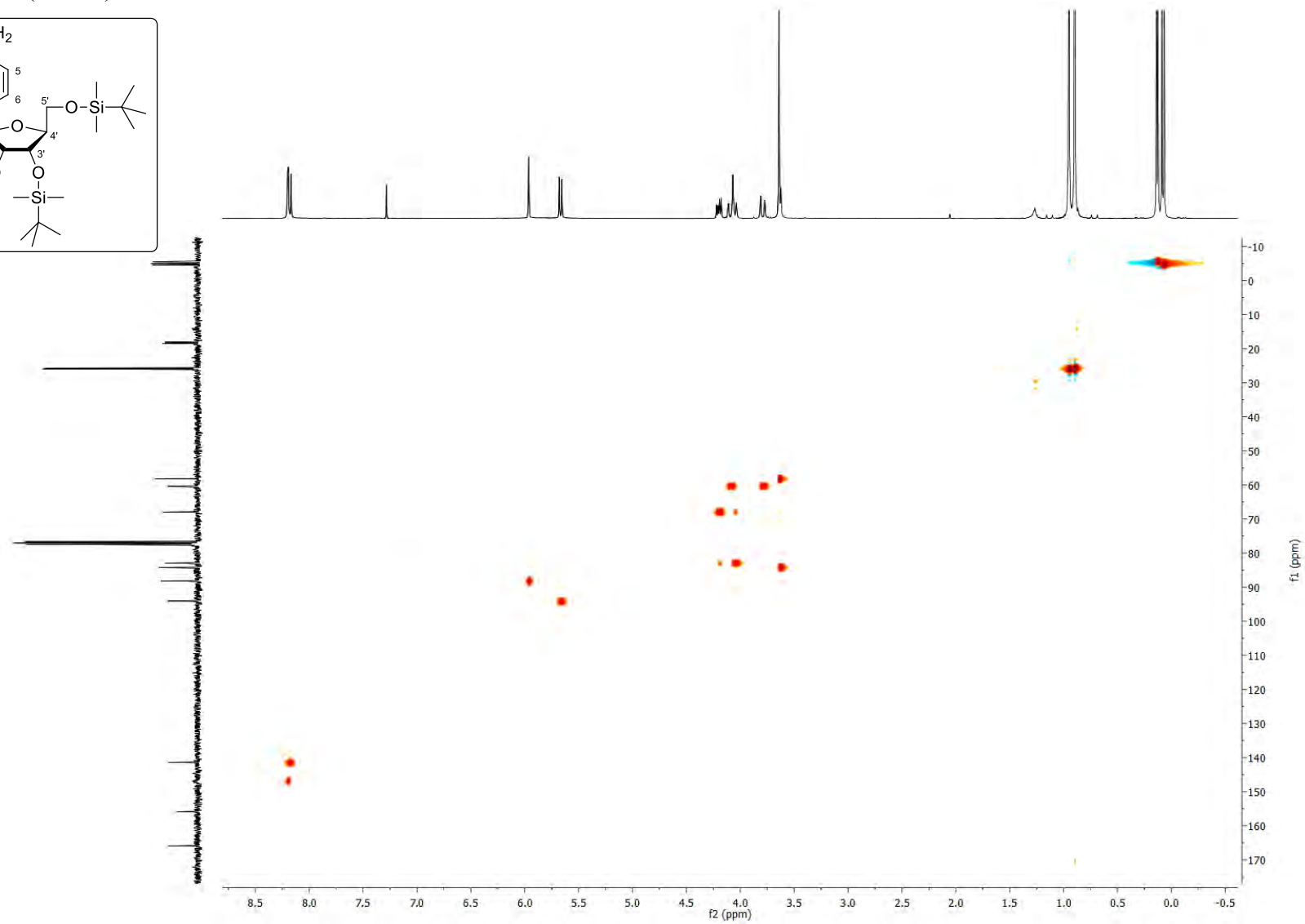
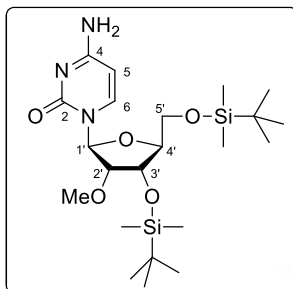
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-cytidine (16)

COSY NMR (CDCl₃)



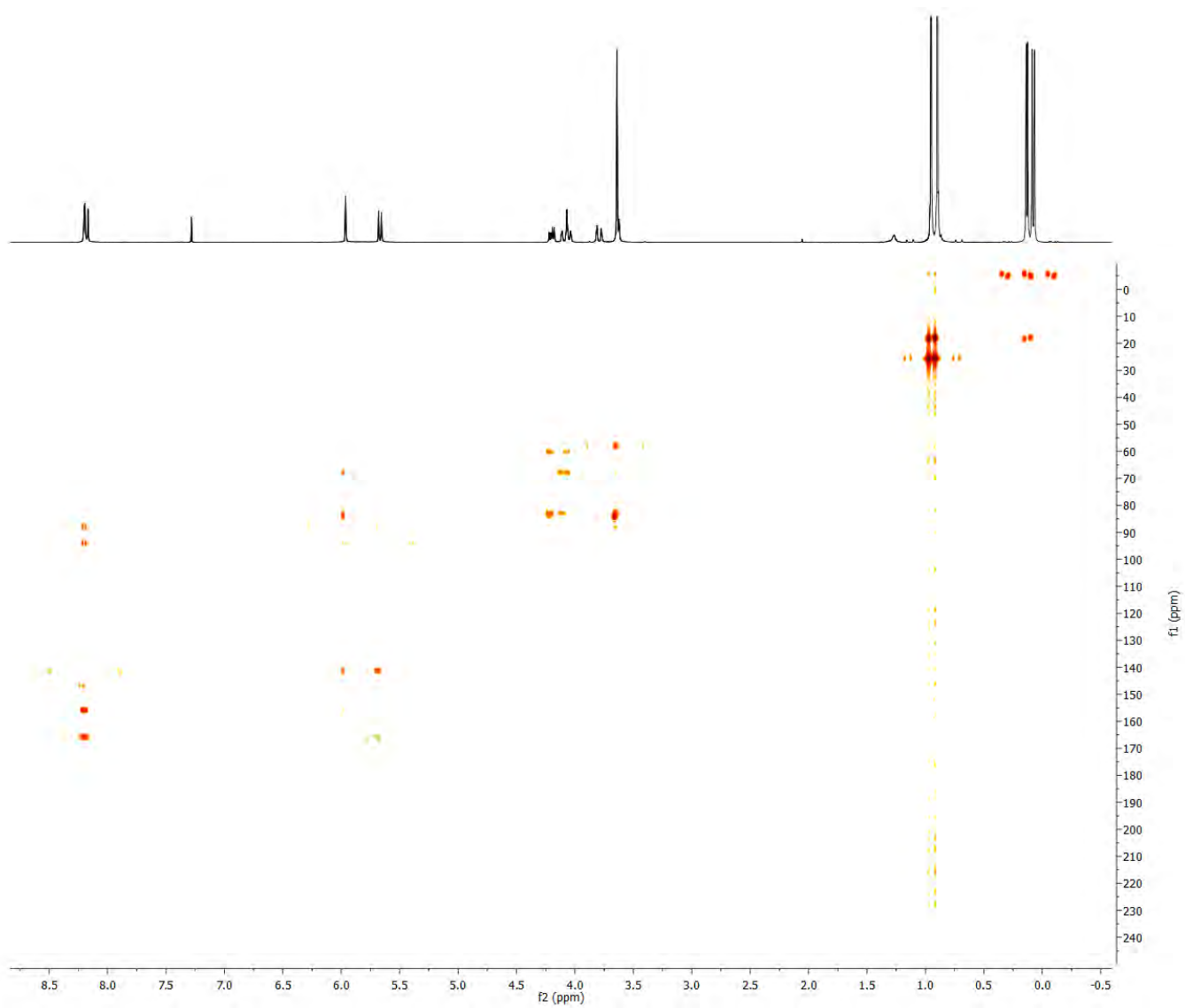
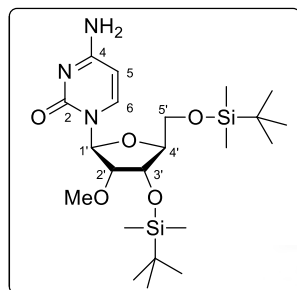
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-cytidine (16)

HSQC NMR (CDCl₃)



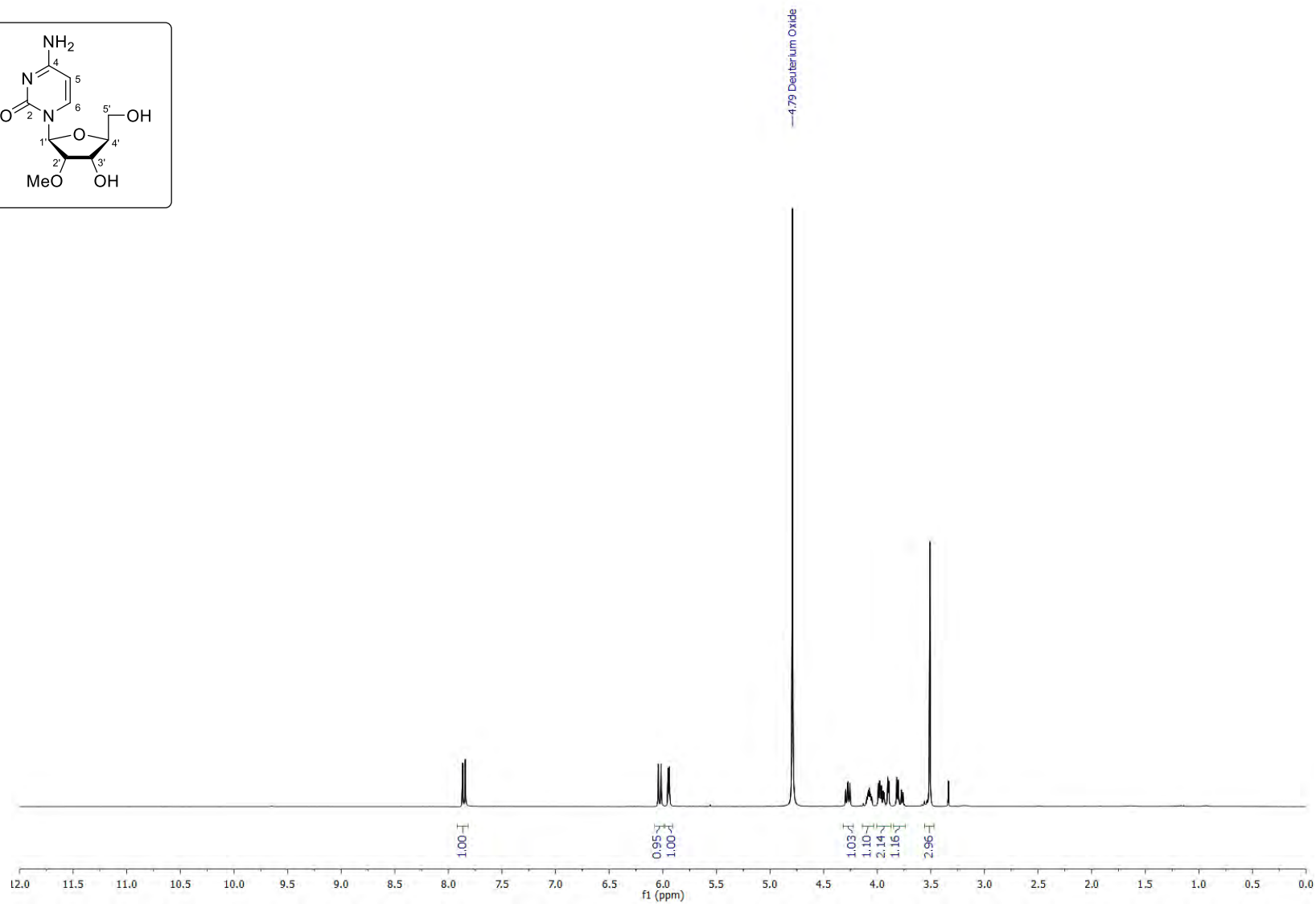
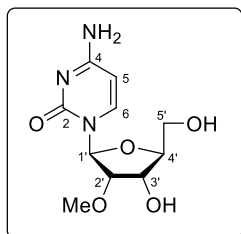
3',5'-Bis-*O*-(*tert*-butyldimethylsilyl)-2'-*O*-methyl-L-cytidine (16)

HMBC NMR (CDCl₃)



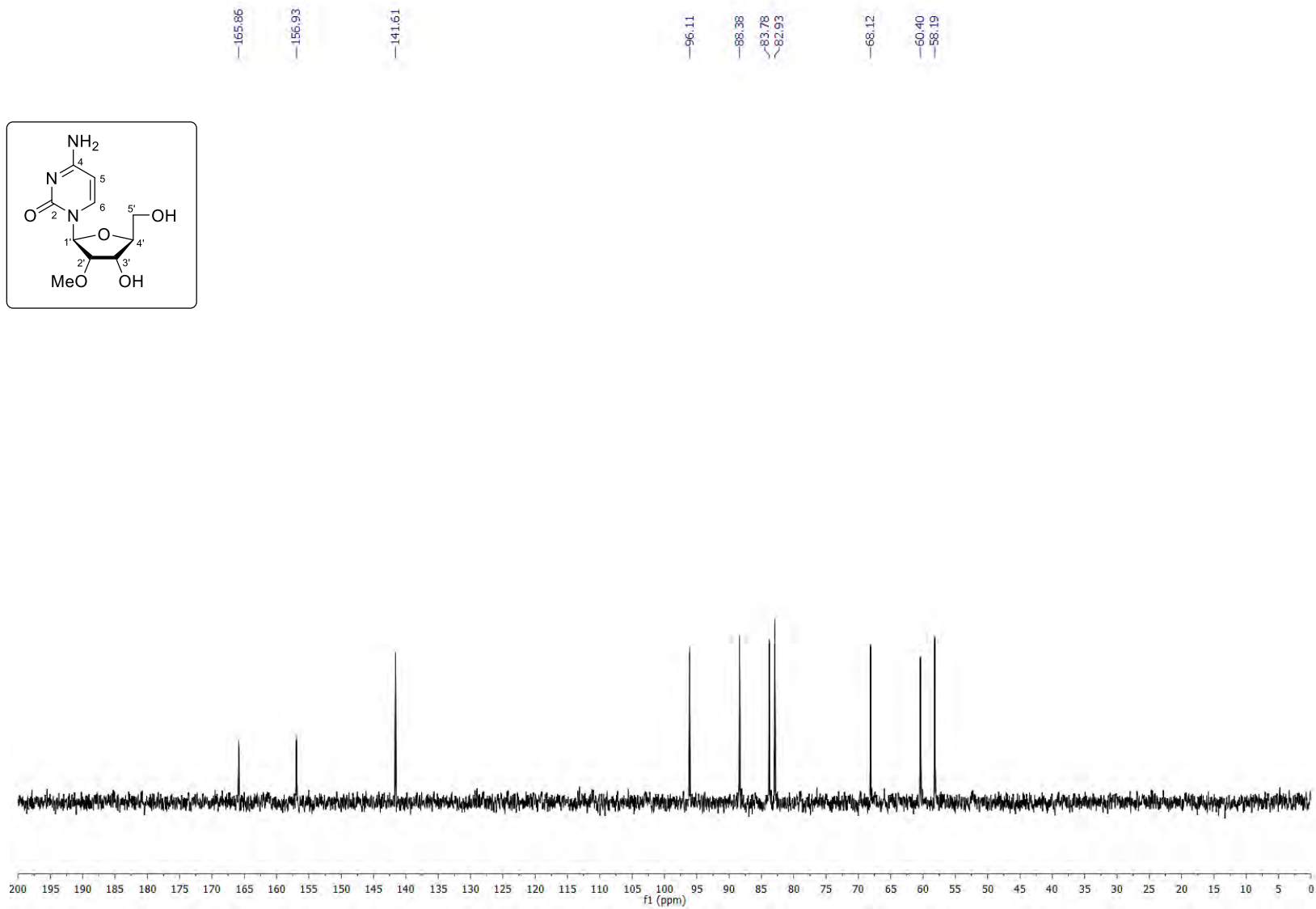
2'-O-Methyl-L-cytidine (17)

^1H NMR (300.13 MHz, D_2O)



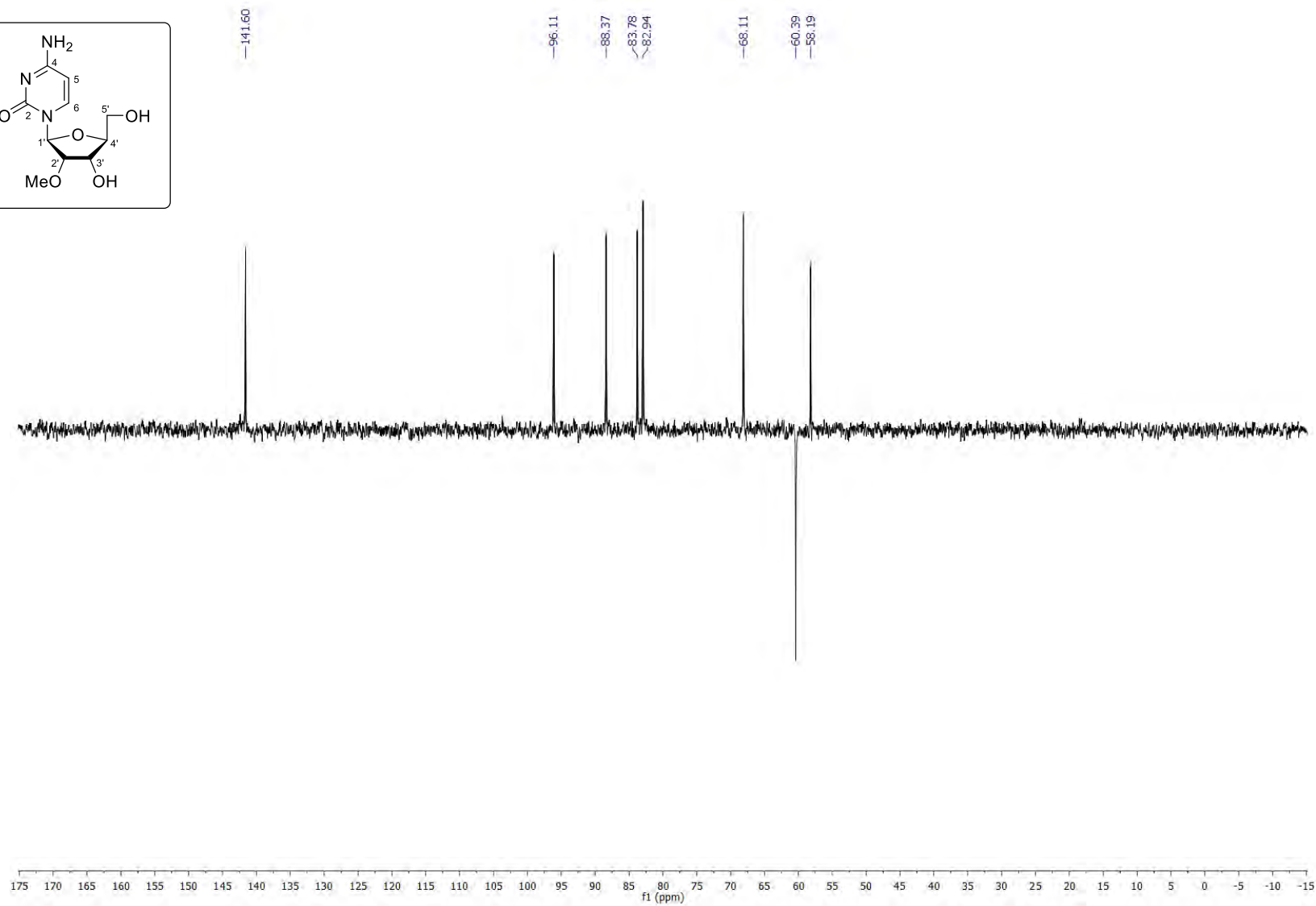
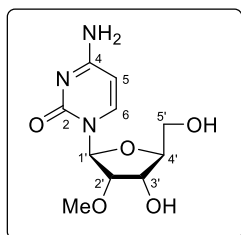
2'-*O*-Methyl-L-cytidine (17)

^{13}C NMR (75.5 MHz, D_2O)



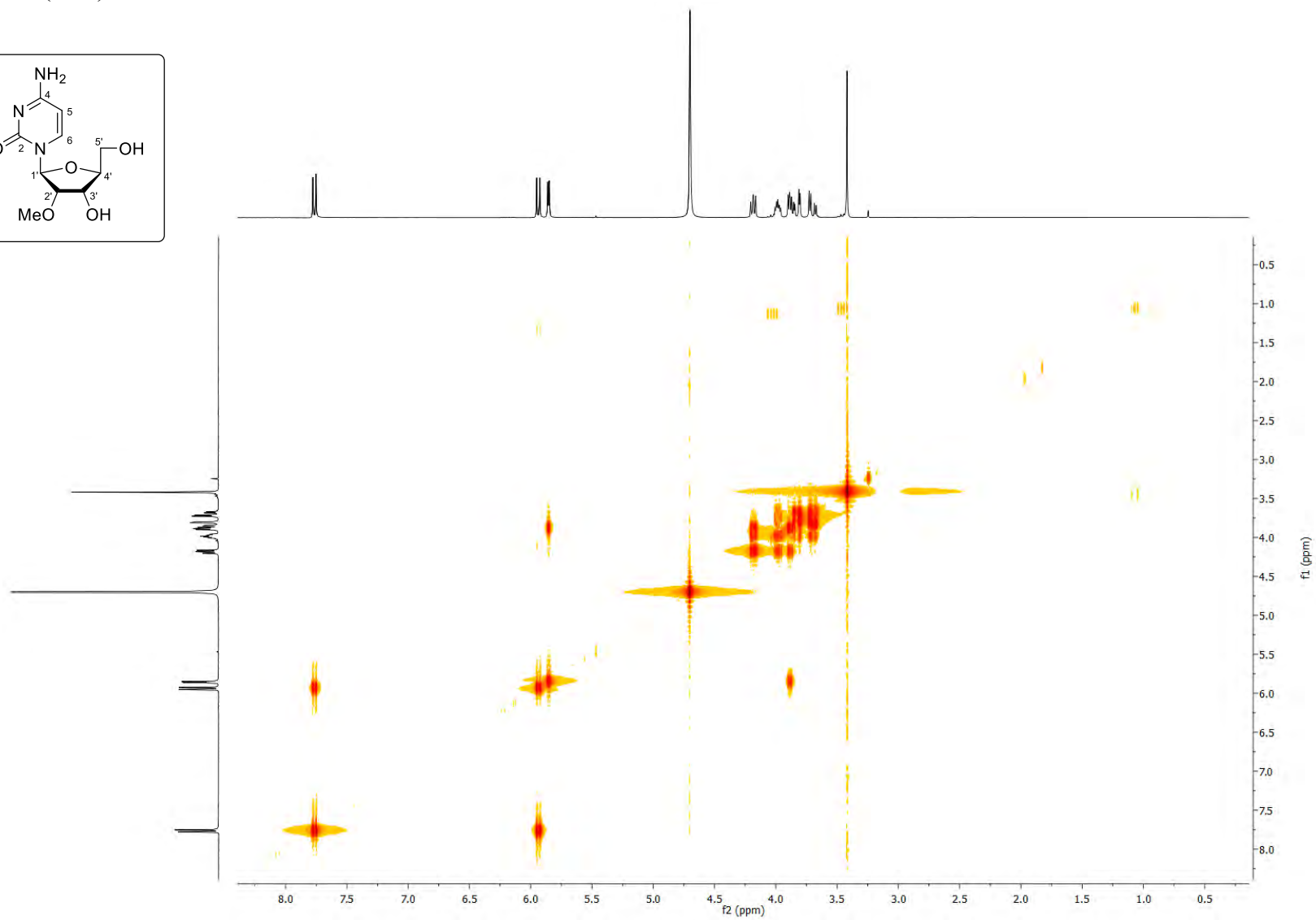
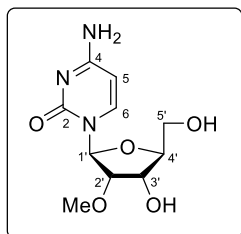
2'-*O*-Methyl-L-cytidine (17)

DEPT NMR (75.5 MHz, D₂O)



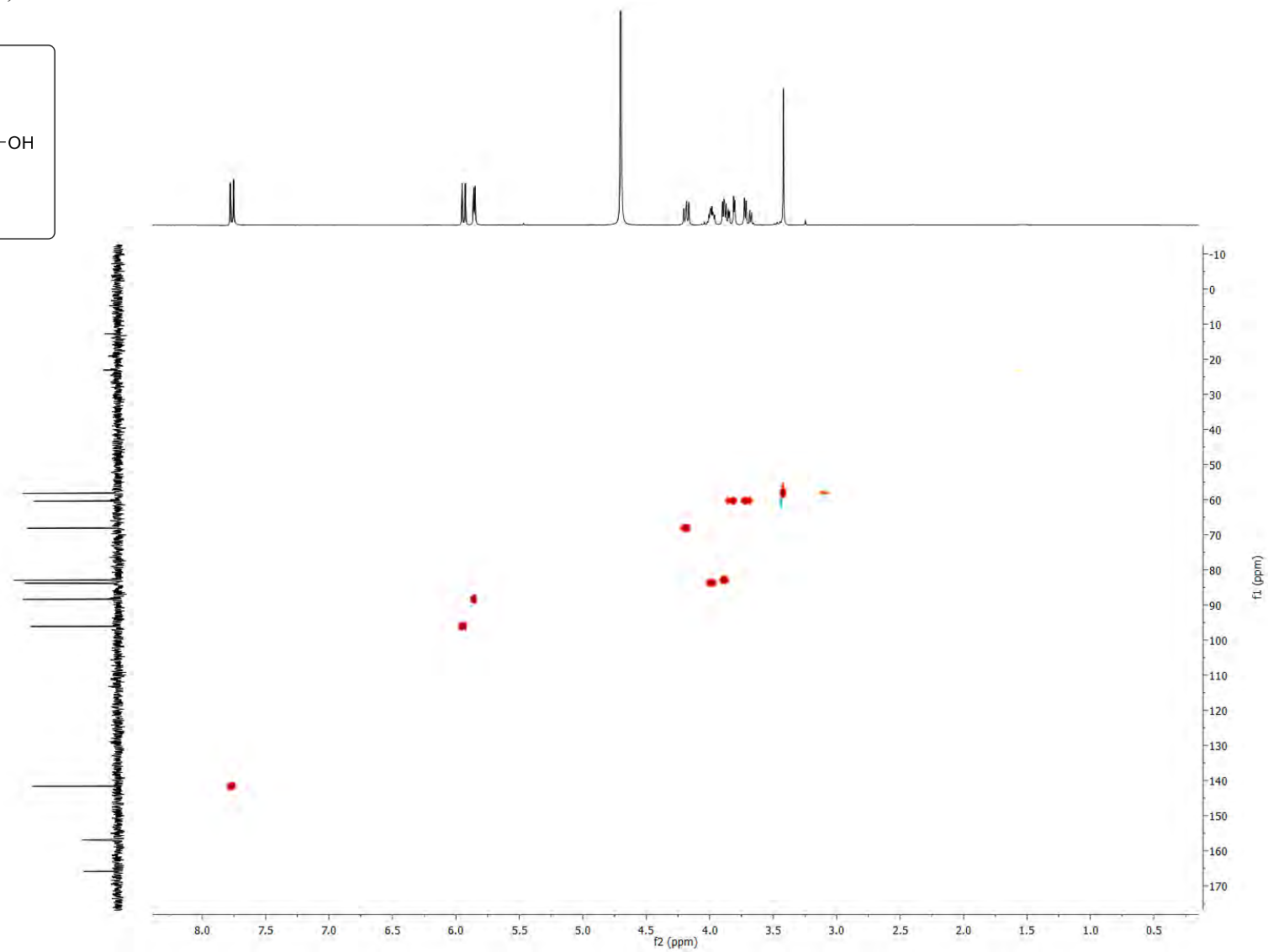
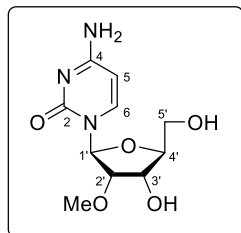
2'-O-Methyl-L-cytidine (17)

COSY NMR (D₂O)



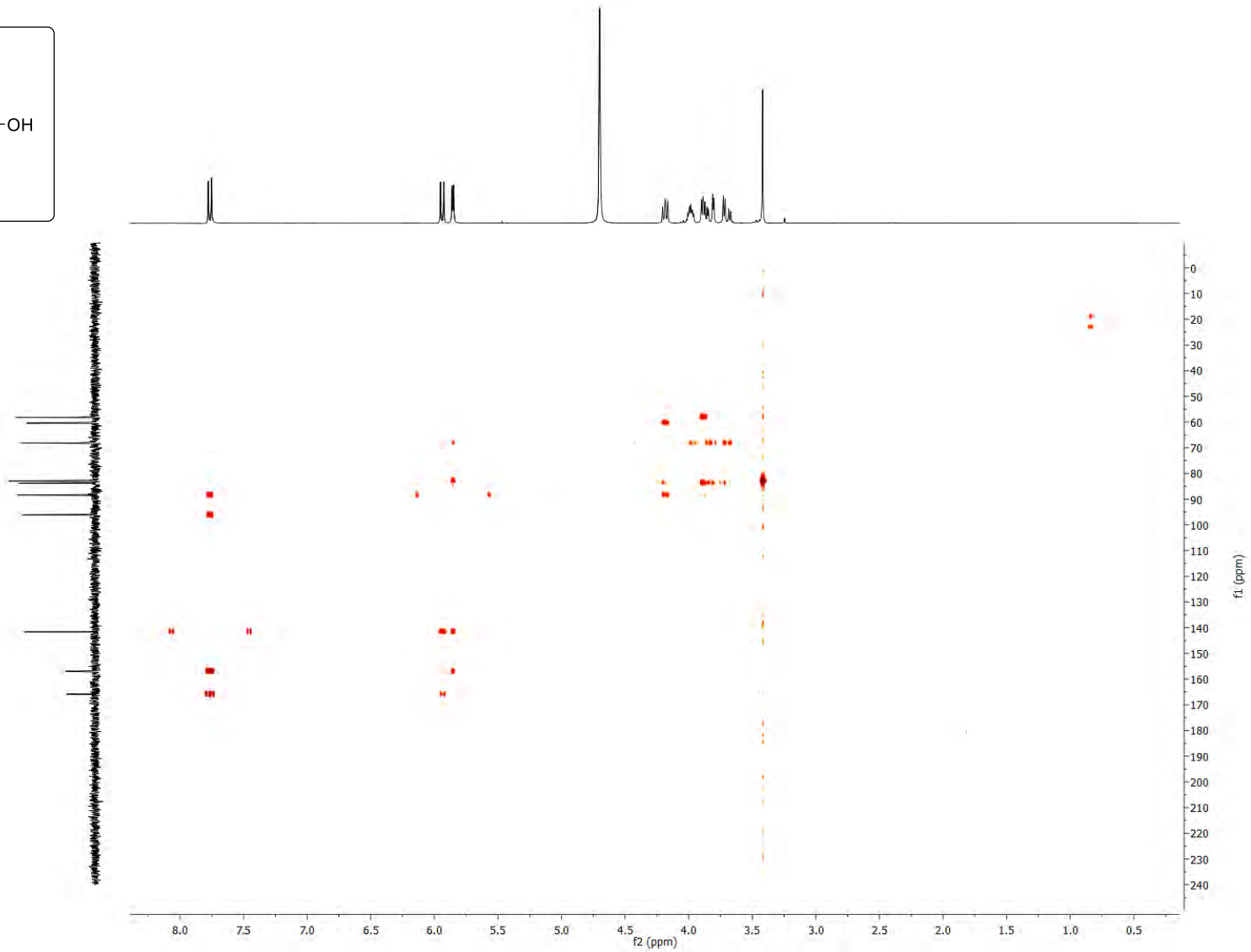
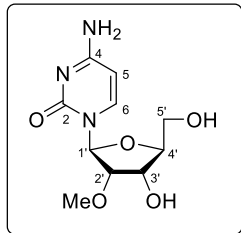
2'-O-Methyl-L-cytidine (17)

HSQC NMR (D₂O)



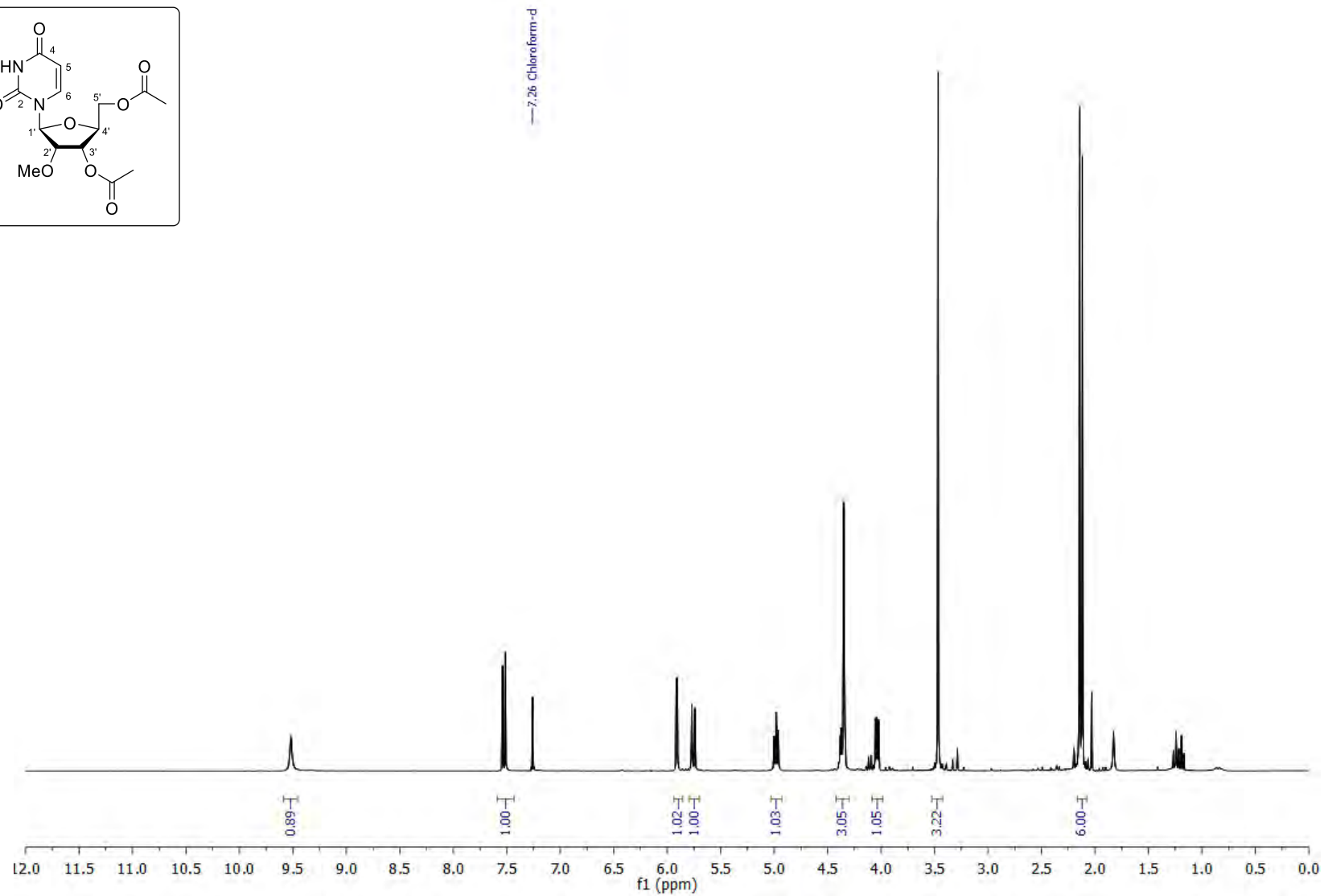
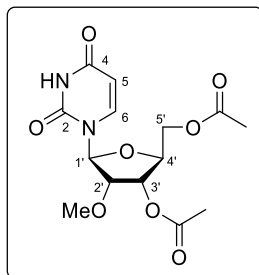
2'-O-Methyl-L-cytidine (17)

HMBC NMR (D₂O)



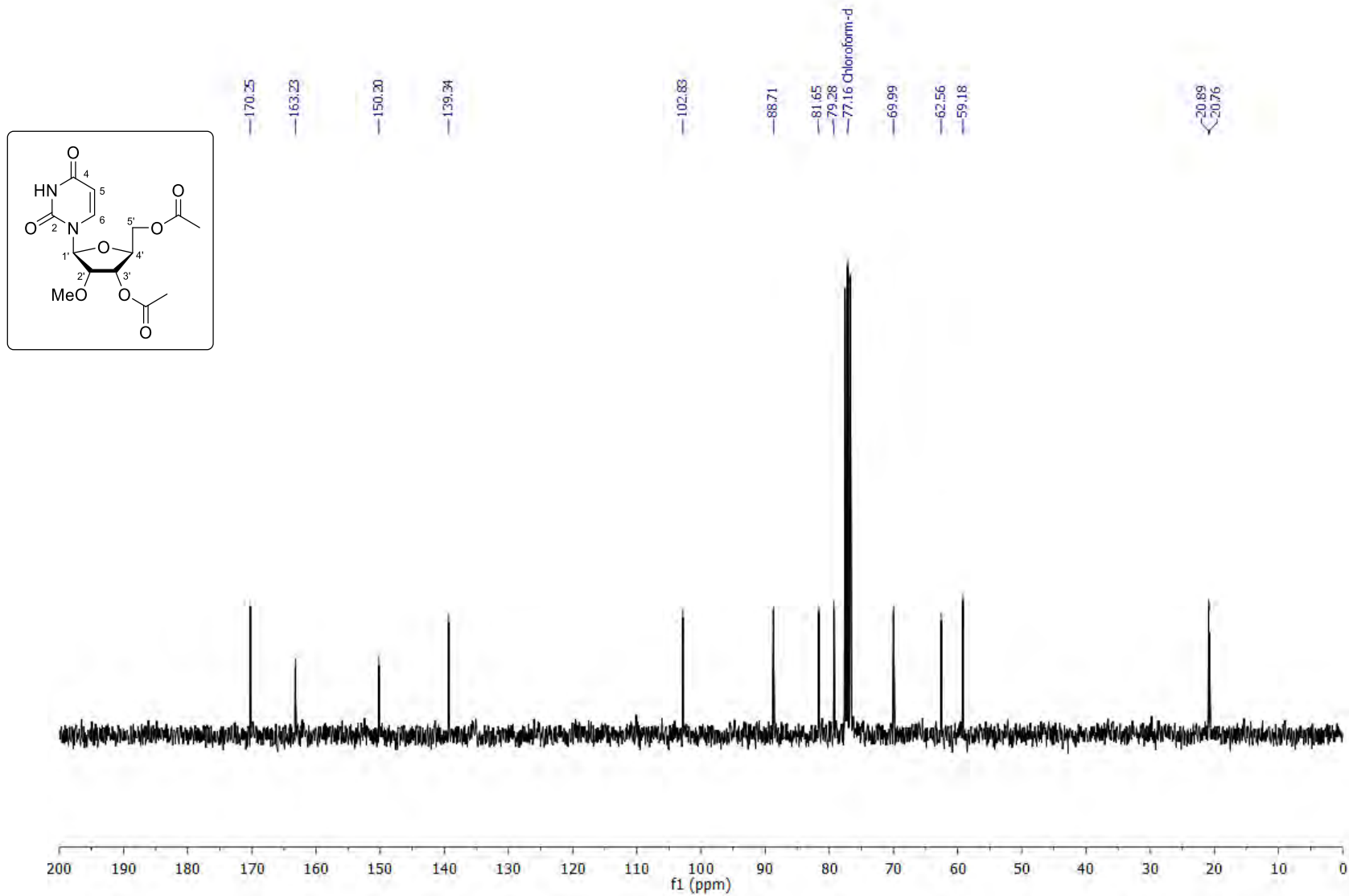
3',5'-di-*O*-Acetyl-2'-*O*-methyl-L-uridine (18)

¹H NMR (300.13 MHz, CDCl₃)



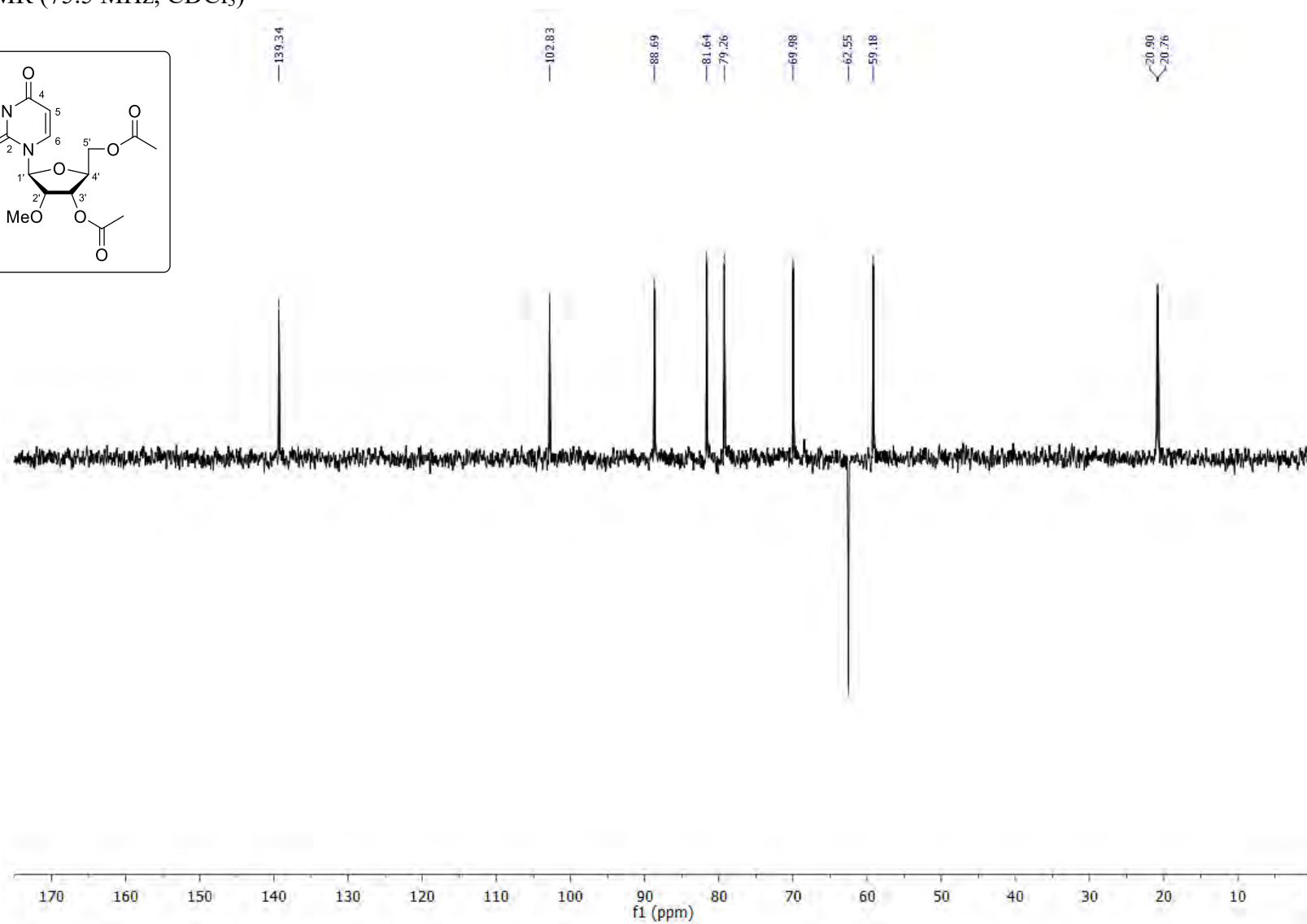
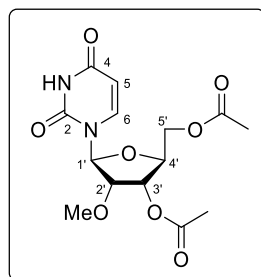
3',5'-di-*O*-Acetyl-2'-*O*-methyl-L-uridine (18)

^{13}C NMR (75.5 MHz, CDCl_3)



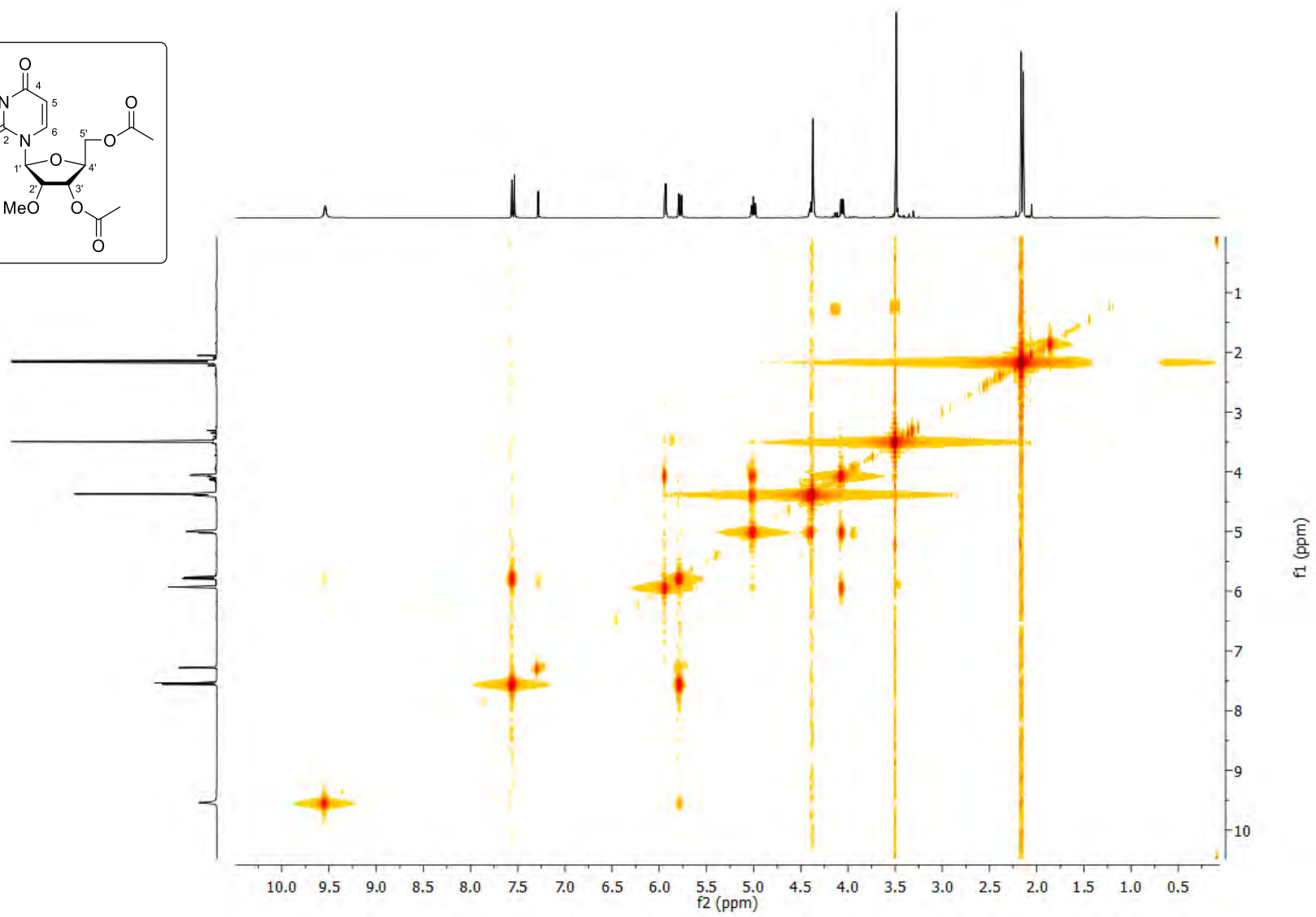
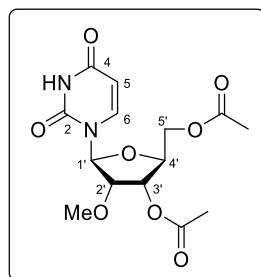
3',5'-di-*O*-Acetyl-2'-*O*-methyl-L-uridine (18)

DEPT NMR (75.5 MHz, CDCl₃)



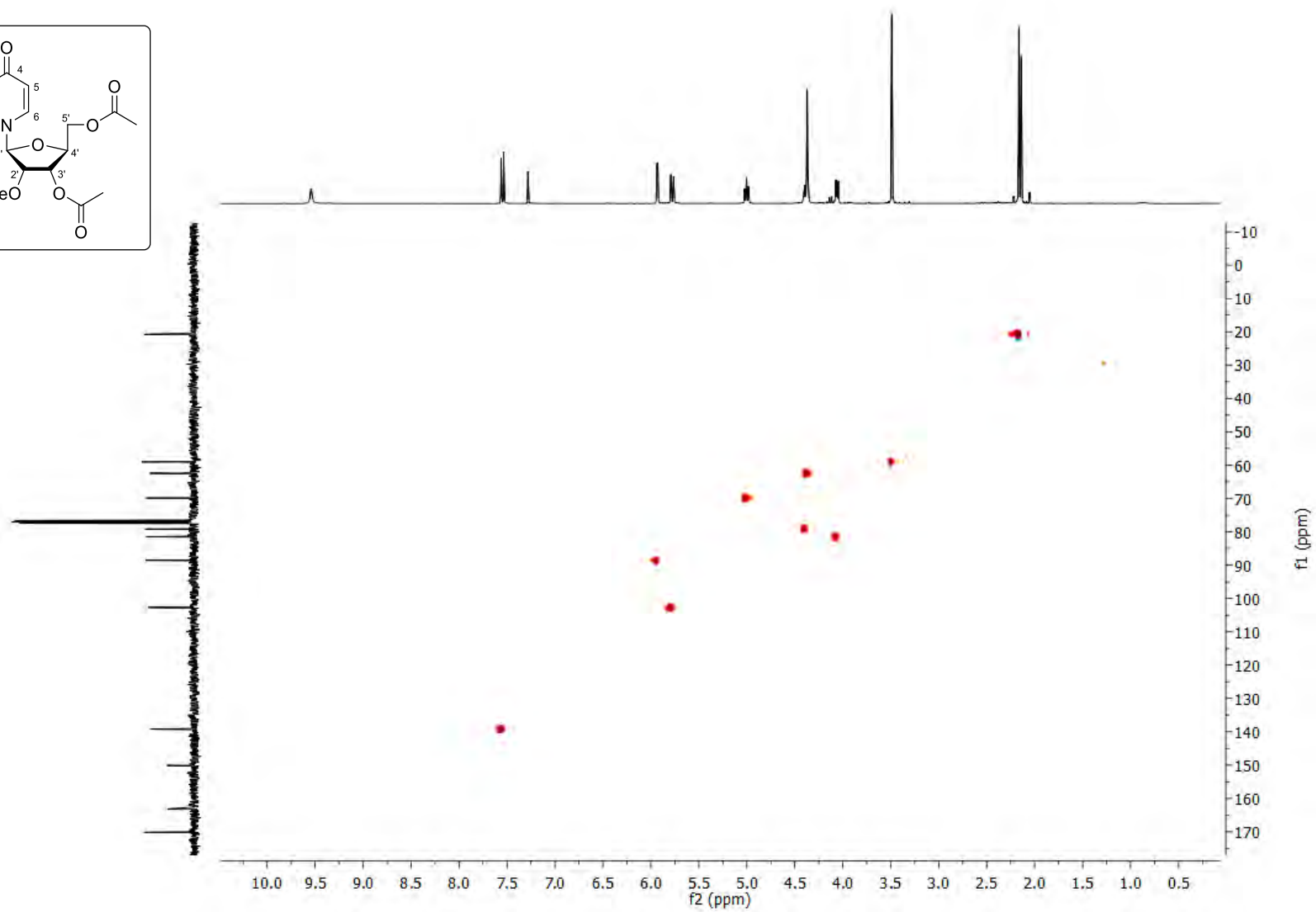
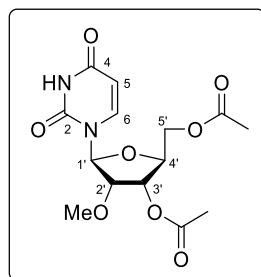
3',5'-di-*O*-Acetyl-2'-*O*-methyl-L-uridine (18)

COSY NMR (75.5 MHz, CDCl₃)



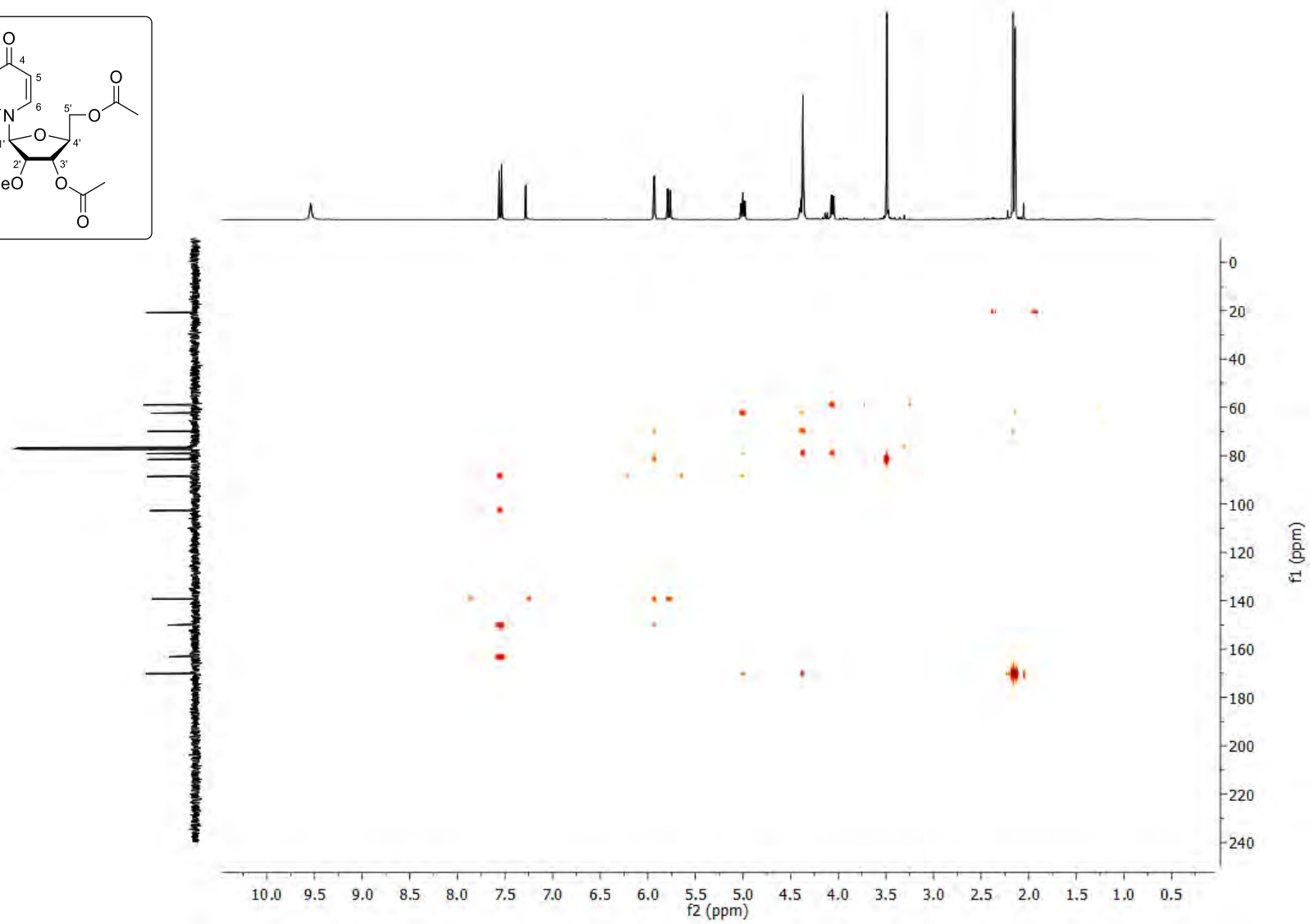
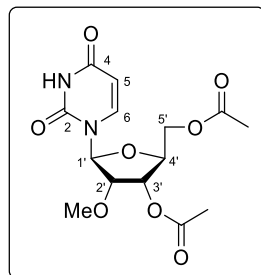
3',5'-di-*O*-Acetyl-2'-*O*-methyl-L-uridine (18)

HSQC NMR (75.5 MHz, CDCl₃)



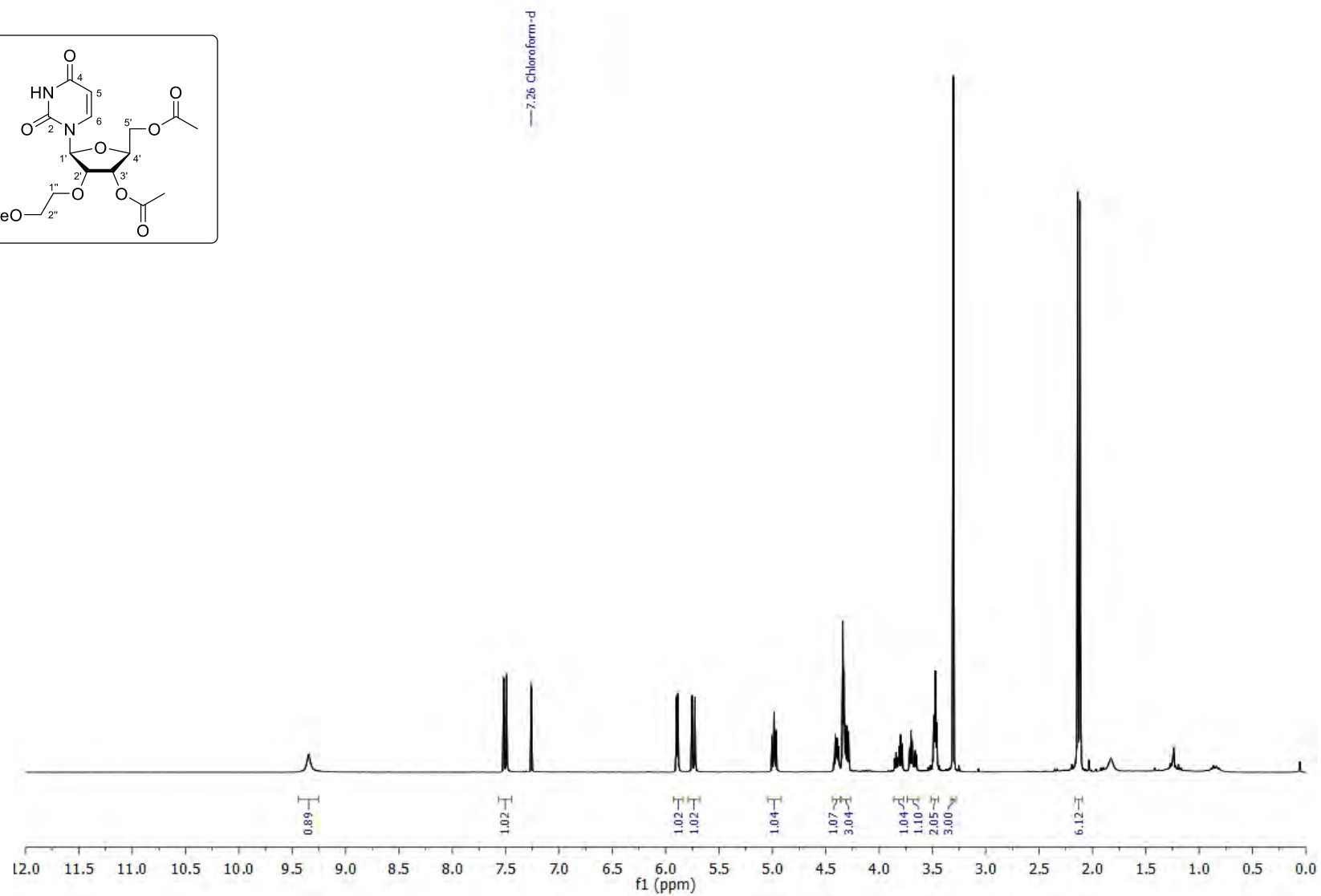
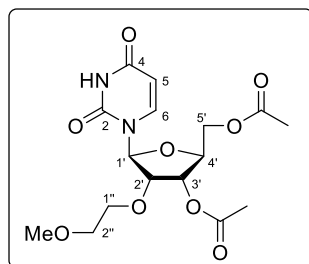
3',5'-di-*O*-Acetyl-2'-*O*-methyl-L-uridine (18)

HMBC NMR (75.5 MHz, CDCl₃)



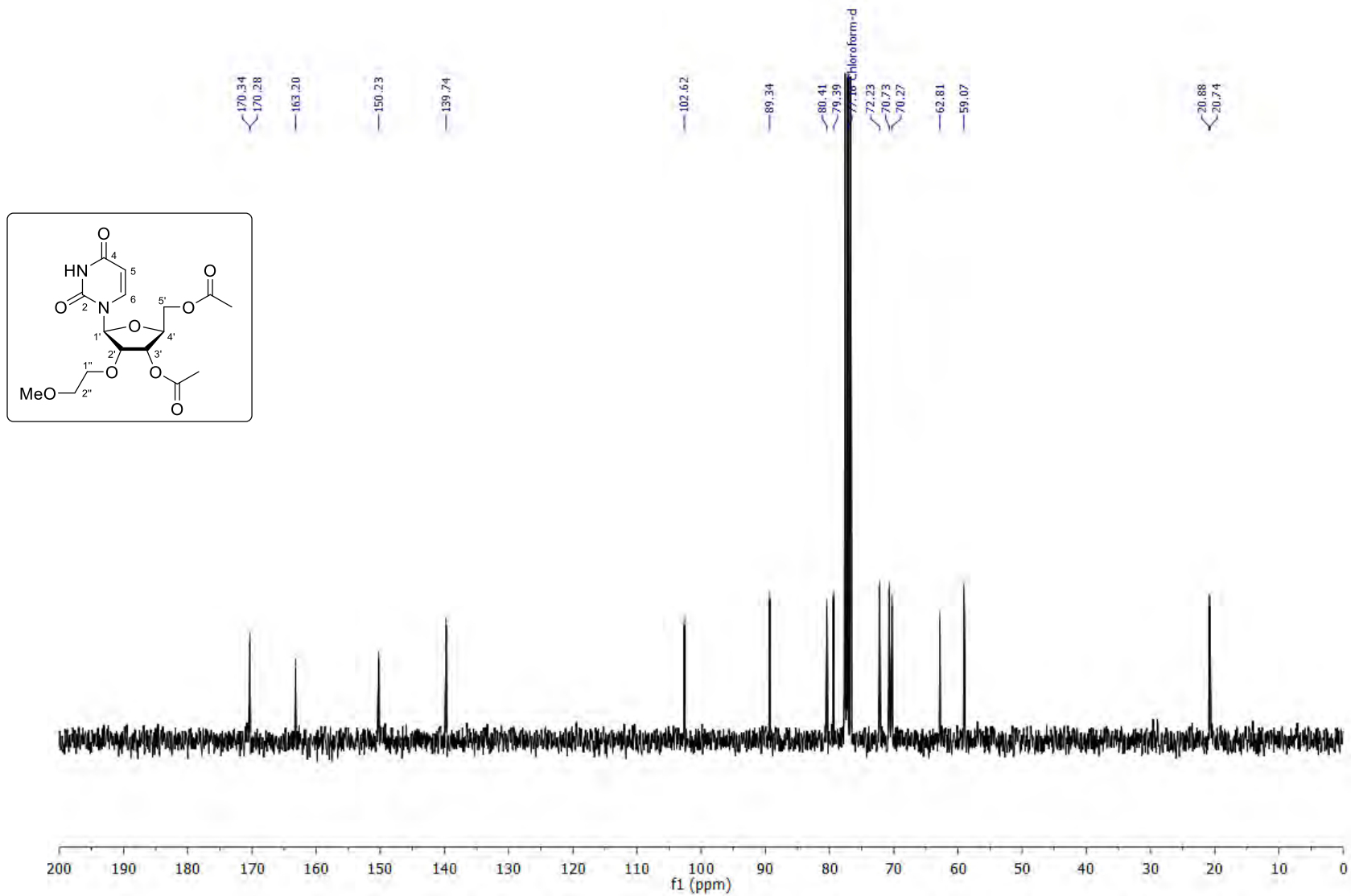
3',5'-di-O-Acetyl-2'-O-(2-methoxyethyl)-L-uridine (19)

^1H NMR (300.13 MHz, CDCl_3)



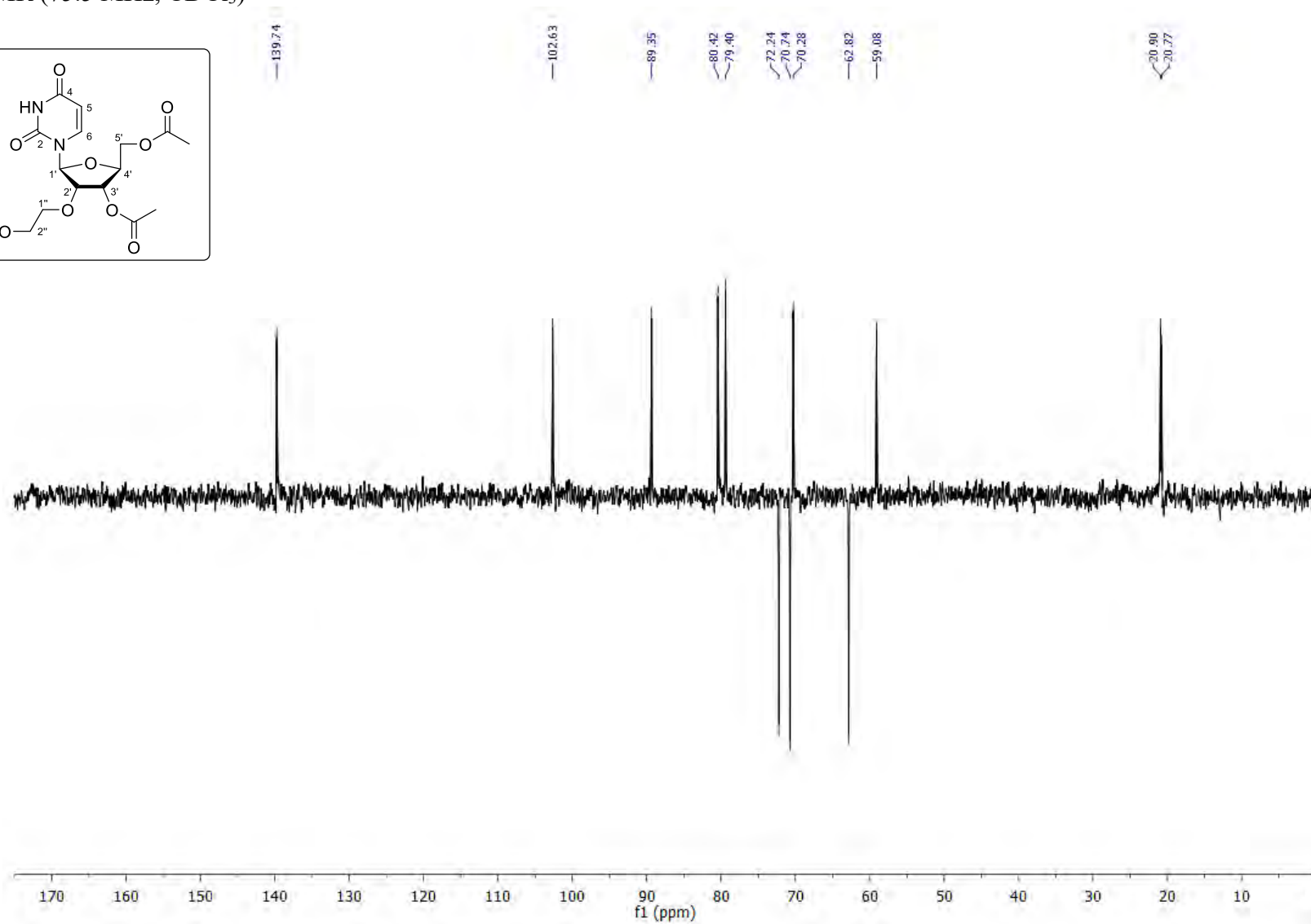
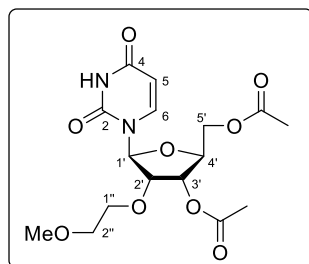
3',5'-di-*O*-Acetyl-2'-*O*-(2-methoxyethyl)-L-uridine (19)

^{13}C NMR (75.5 MHz, CDCl_3)



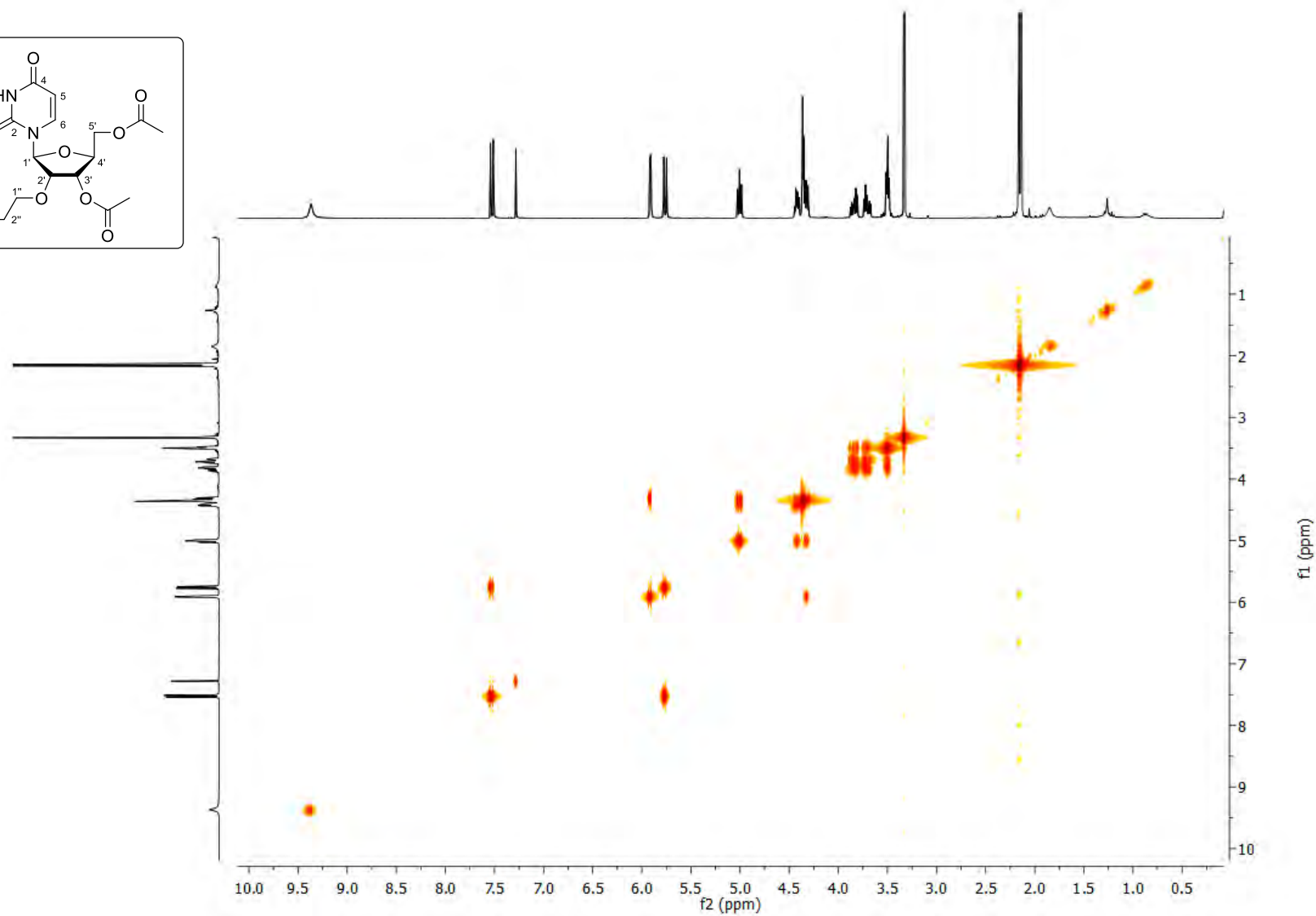
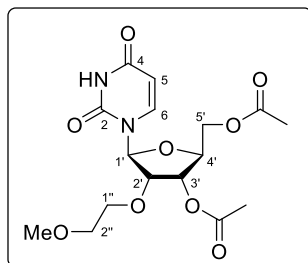
3',5'-di-O-Acetyl-2'-O-(2-methoxyethyl)-L-uridine (19)

DEPT NMR (75.5 MHz, CDCl₃)



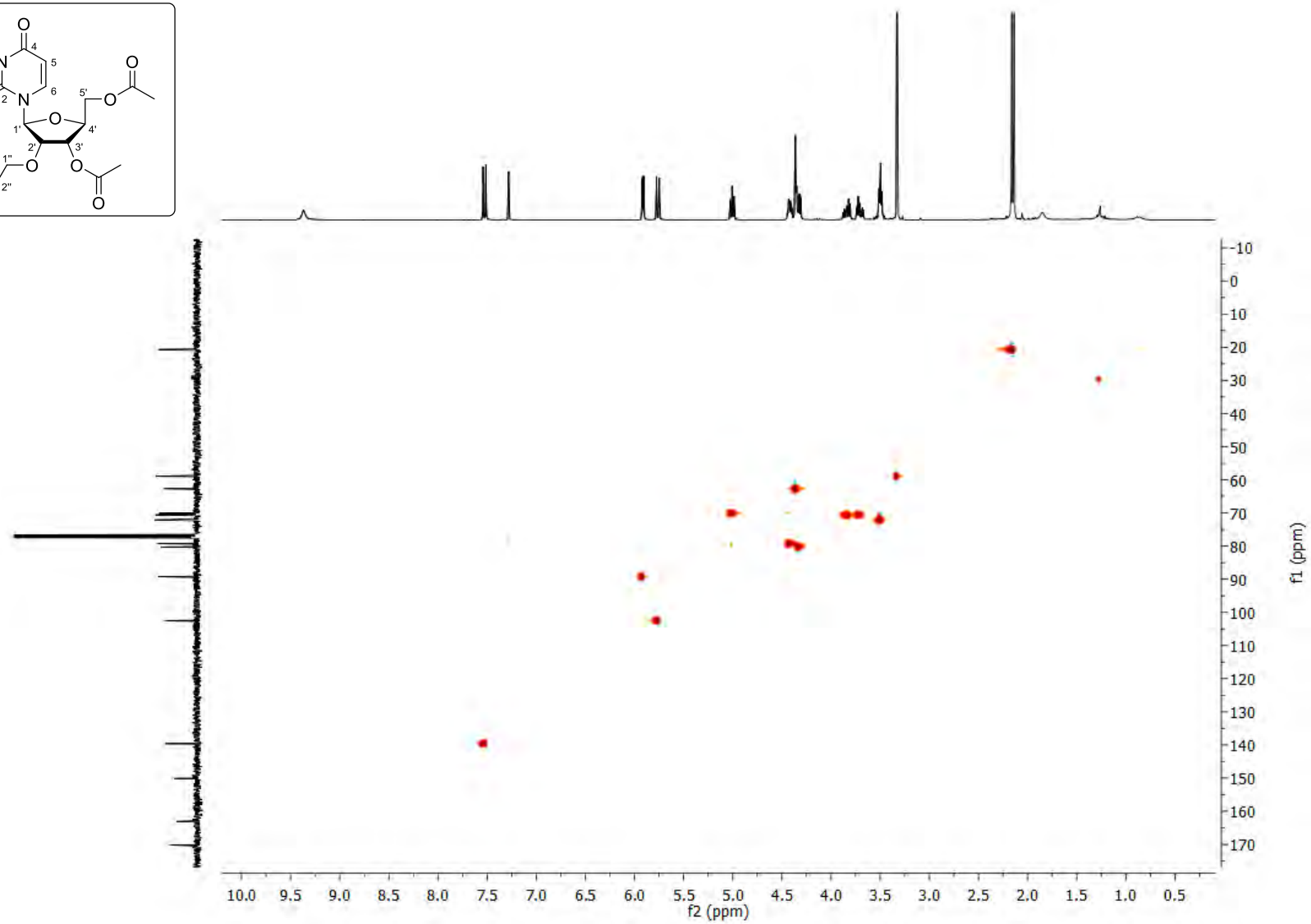
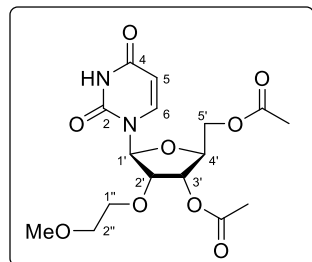
3',5'-di-*O*-Acetyl-2'-*O*-(2-methoxyethyl)-L-uridine (19)

COSY NMR (CDCl₃)



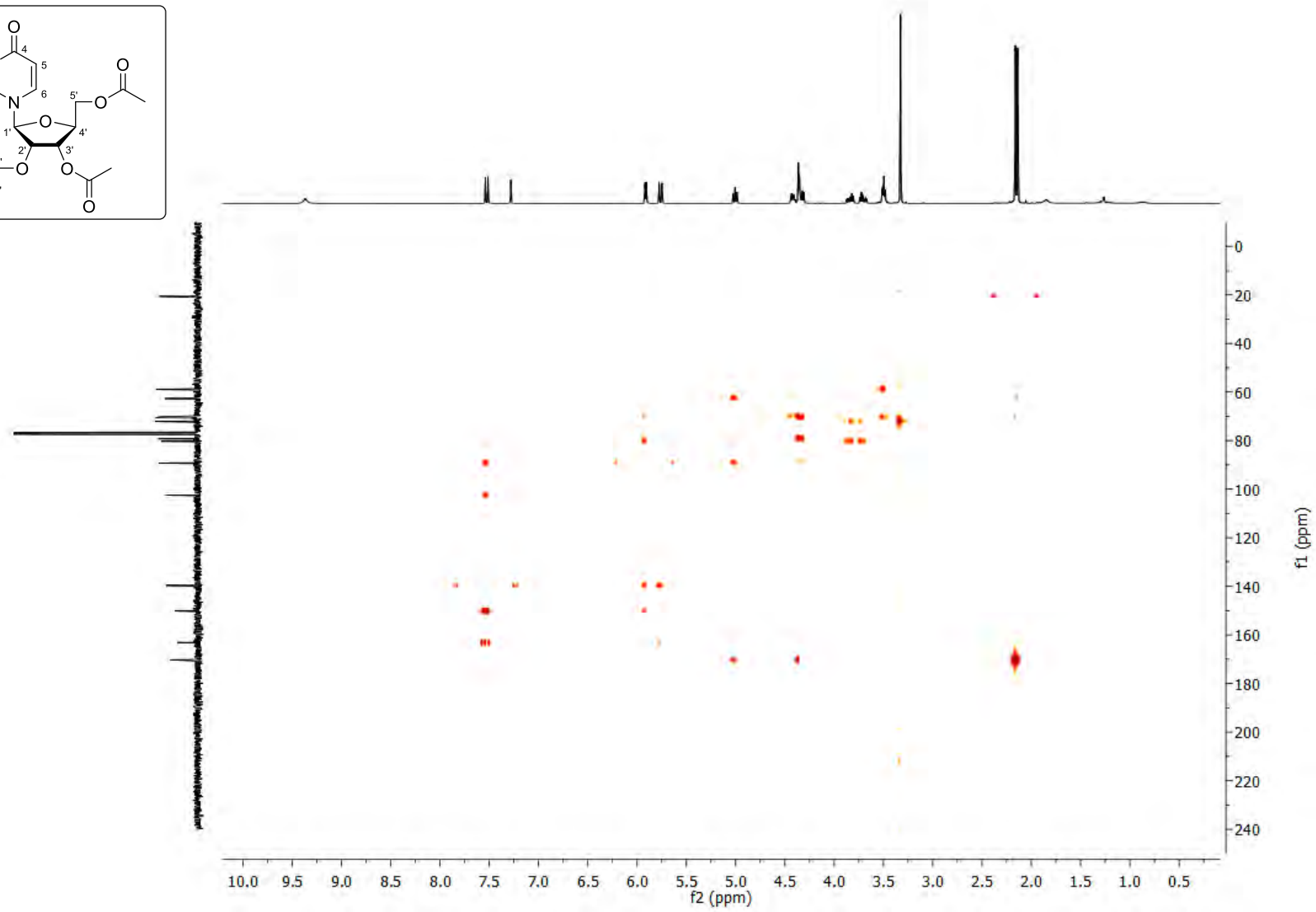
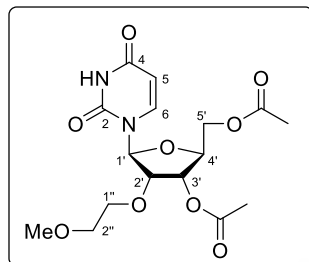
3',5'-di-O-Acetyl-2'-O-(2-methoxyethyl)-L-uridine (19)

HSQC NMR (CDCl₃)



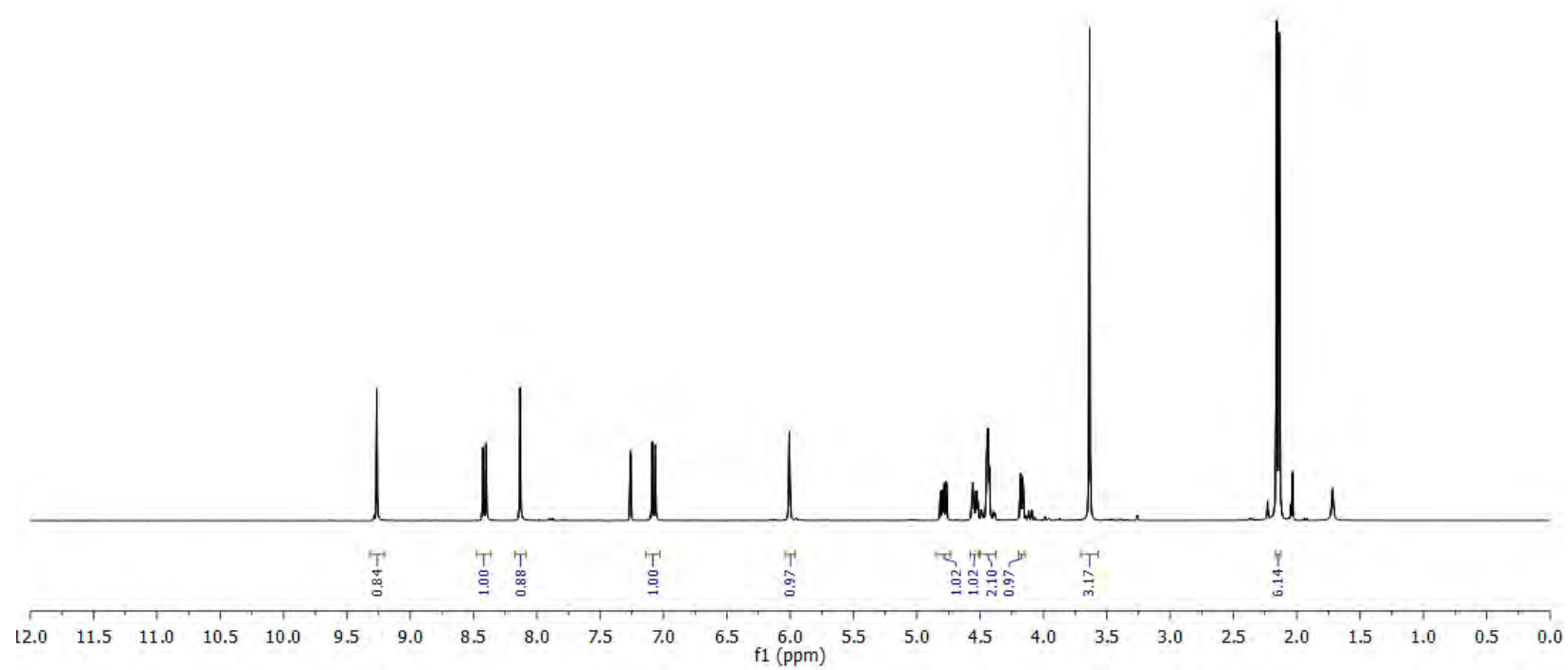
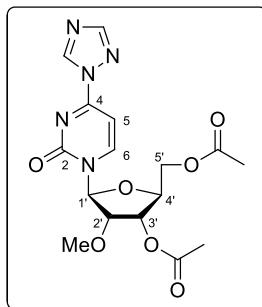
3',5'-di-*O*-Acetyl-2'-*O*-(2-methoxyethyl)-L-uridine (19)

HMBC NMR (CDCl₃)



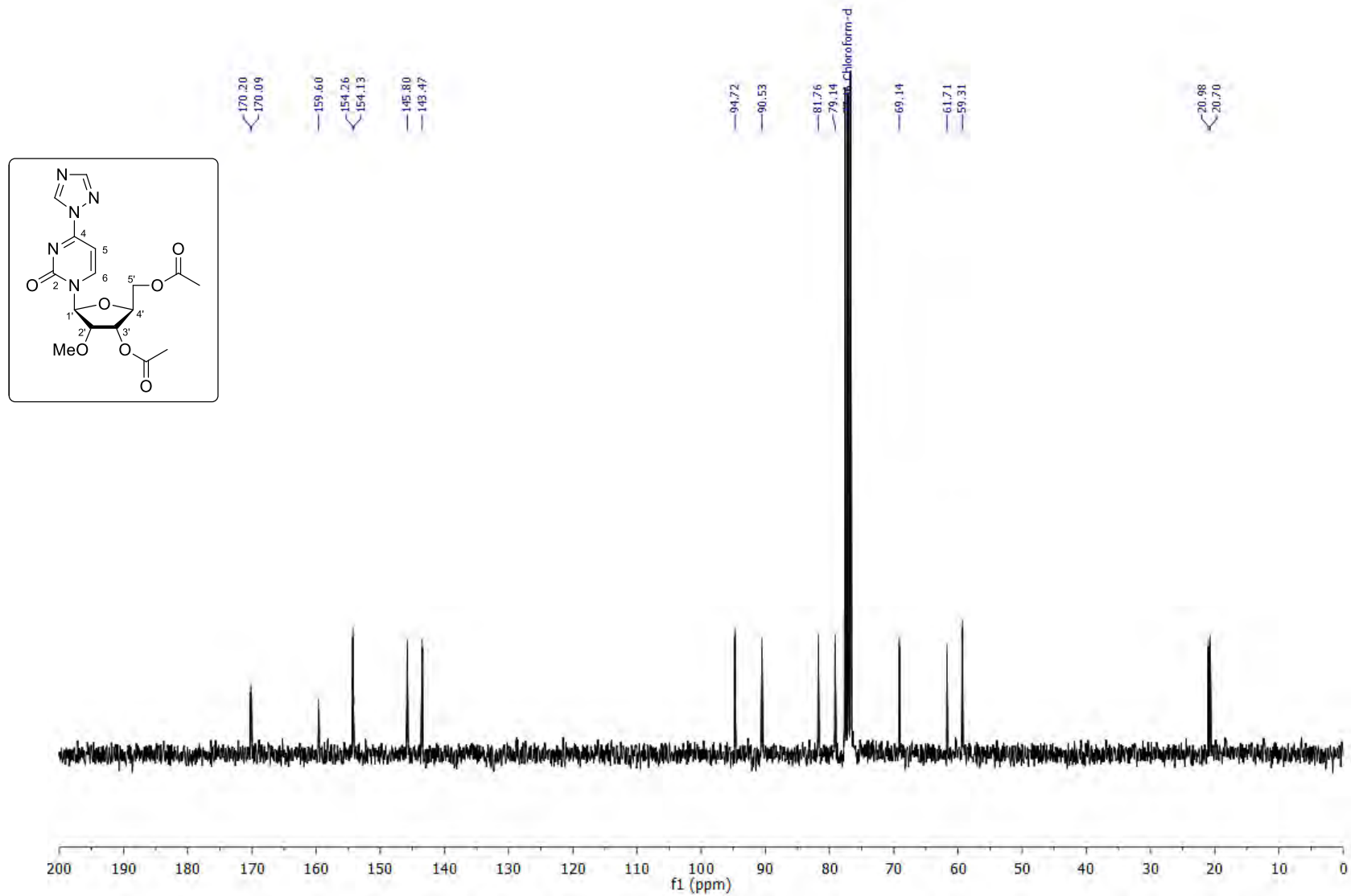
3',5'-di-*O*-Acetyl-2'-*O*-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (20)

^1H NMR (300.13 MHz, CDCl_3)



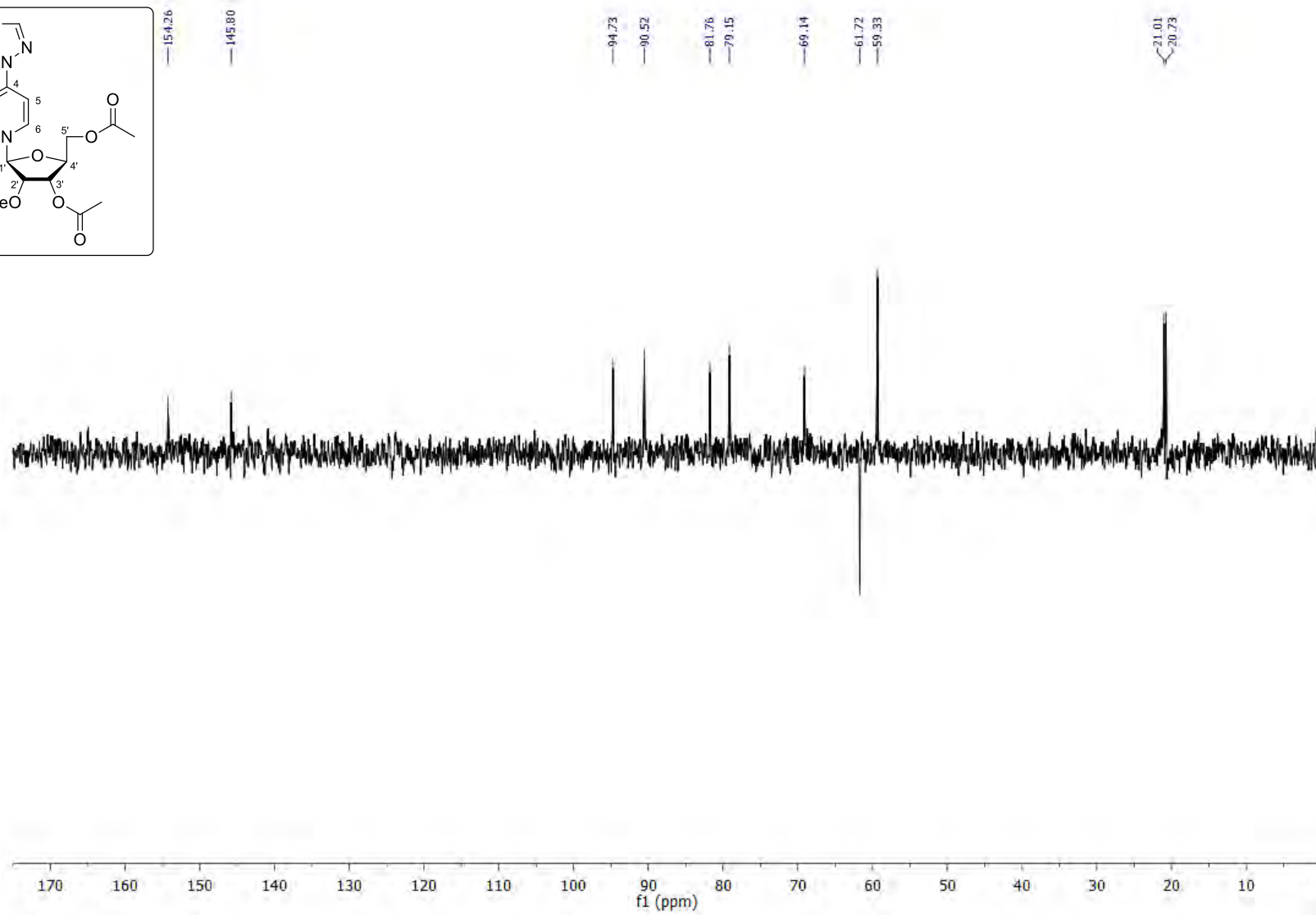
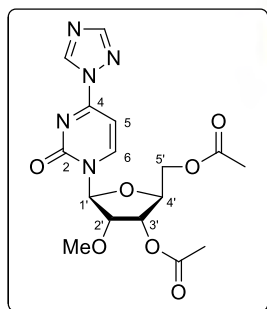
3',5'-di-*O*-Acetyl-2'-*O*-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (20)

^{13}C -NMR (75.5 MHz, CDCl_3)



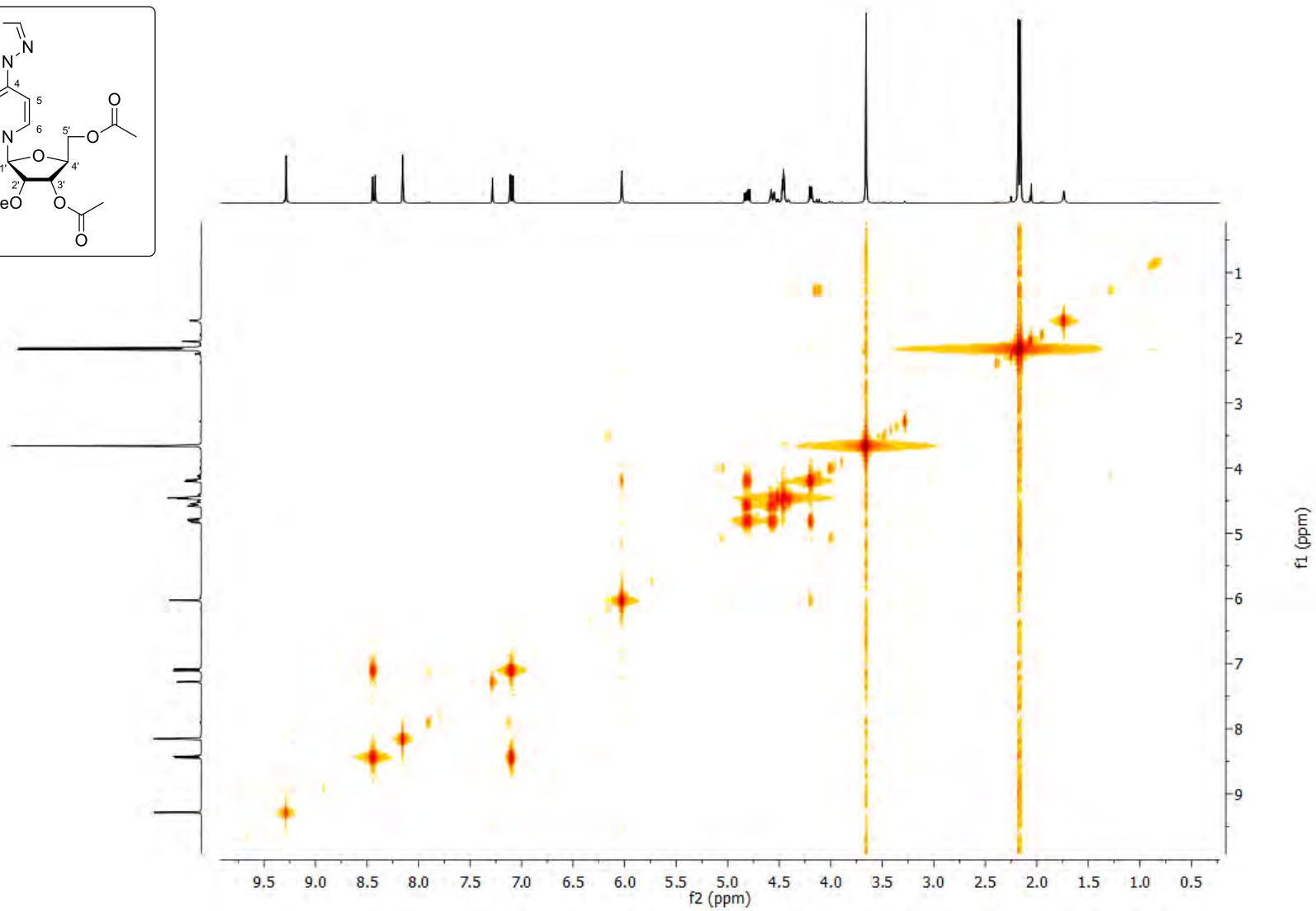
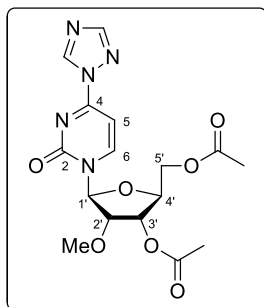
3',5'-di-O-Acetyl-2'-O-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (20)

DEPT NMR (75.5 MHz, CDCl₃)



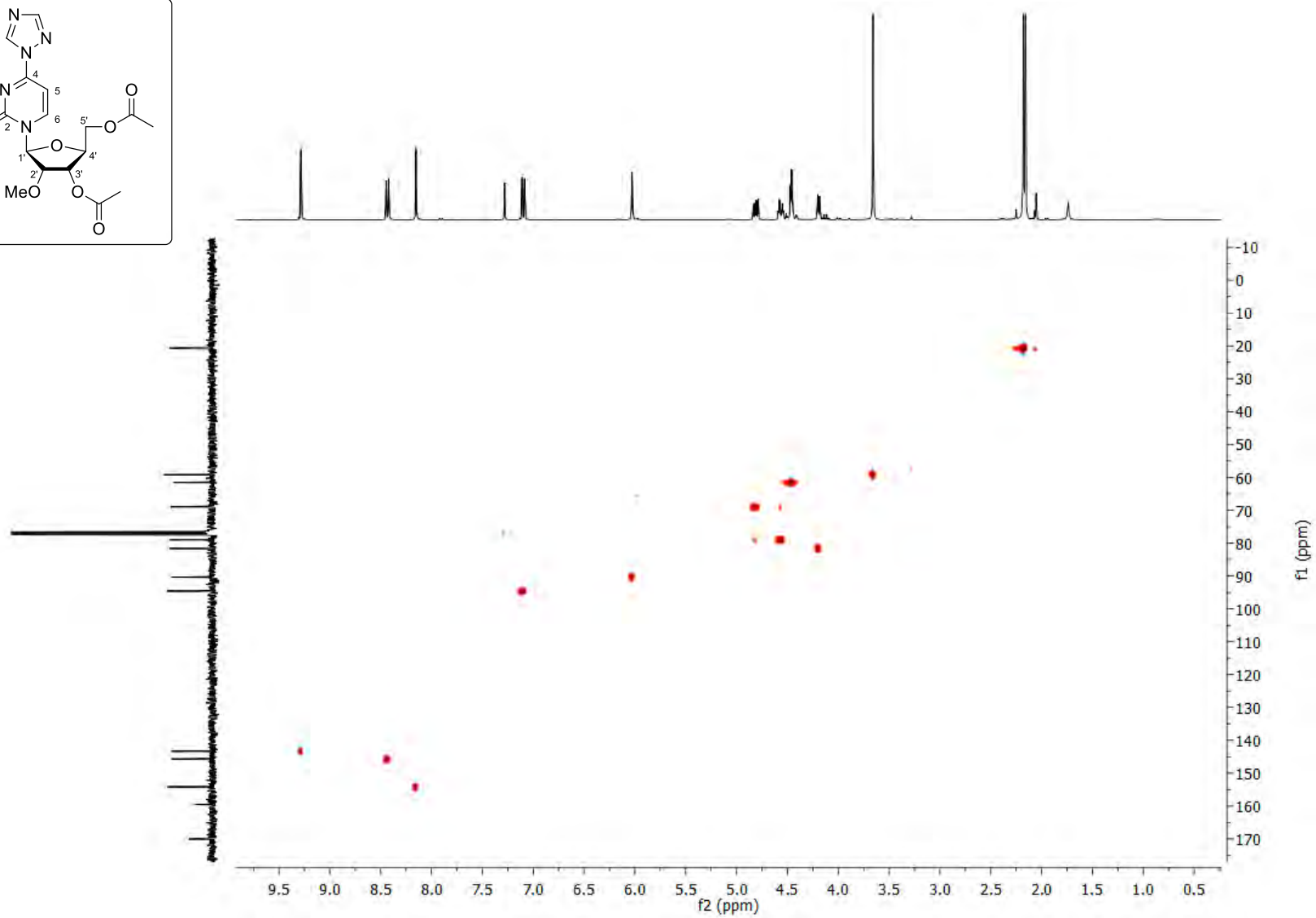
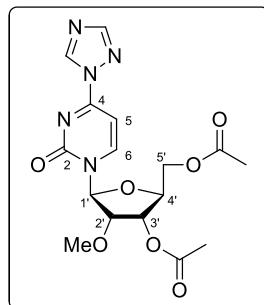
3',5'-di-*O*-Acetyl-2'-*O*-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (20)

COSY NMR (CDCl₃)



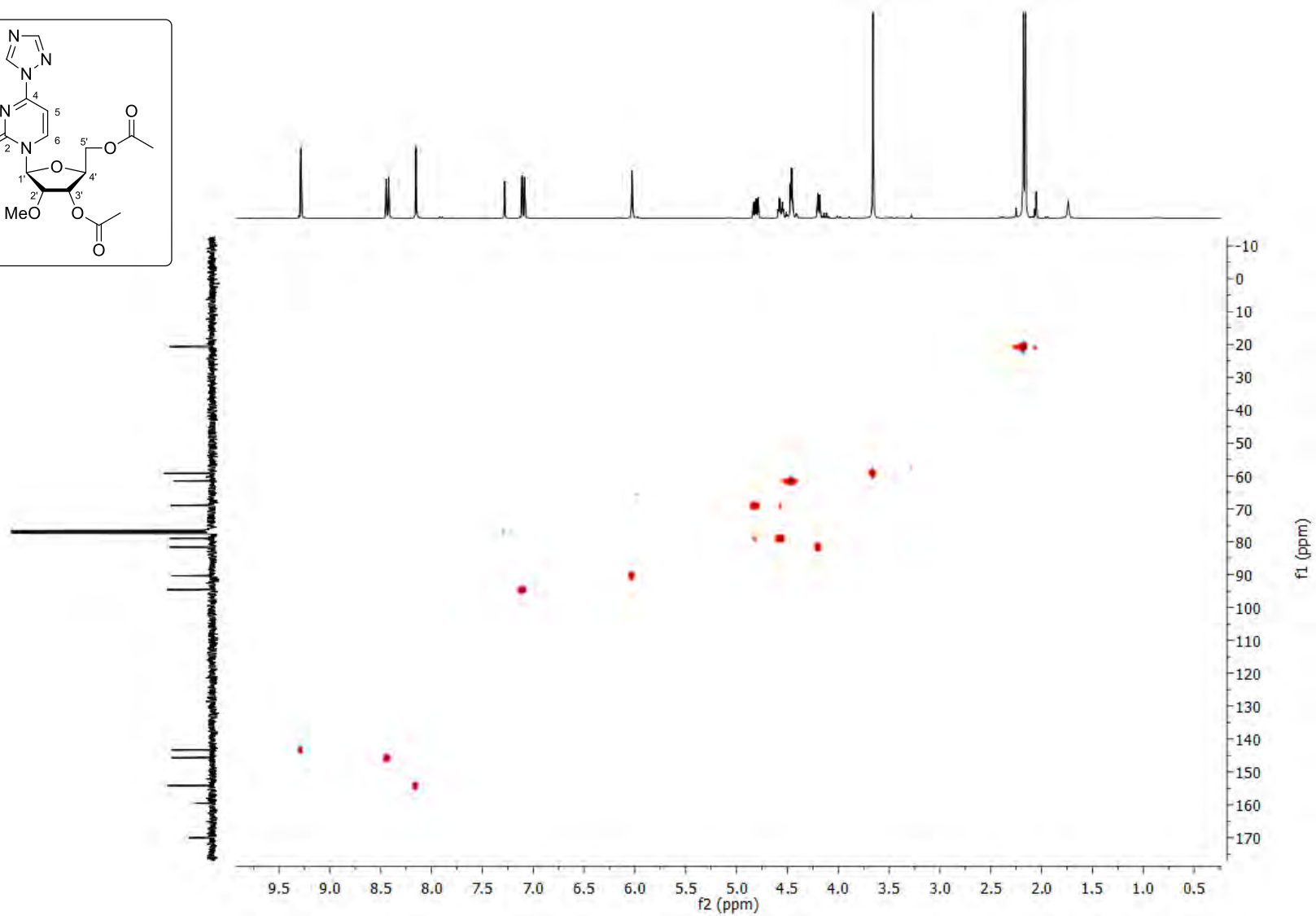
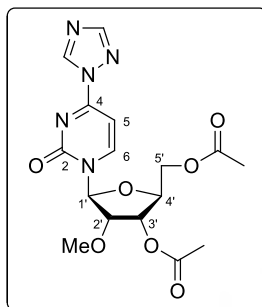
3',5'-di-*O*-Acetyl-2'-*O*-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (20)

HSQC NMR (CDCl₃)



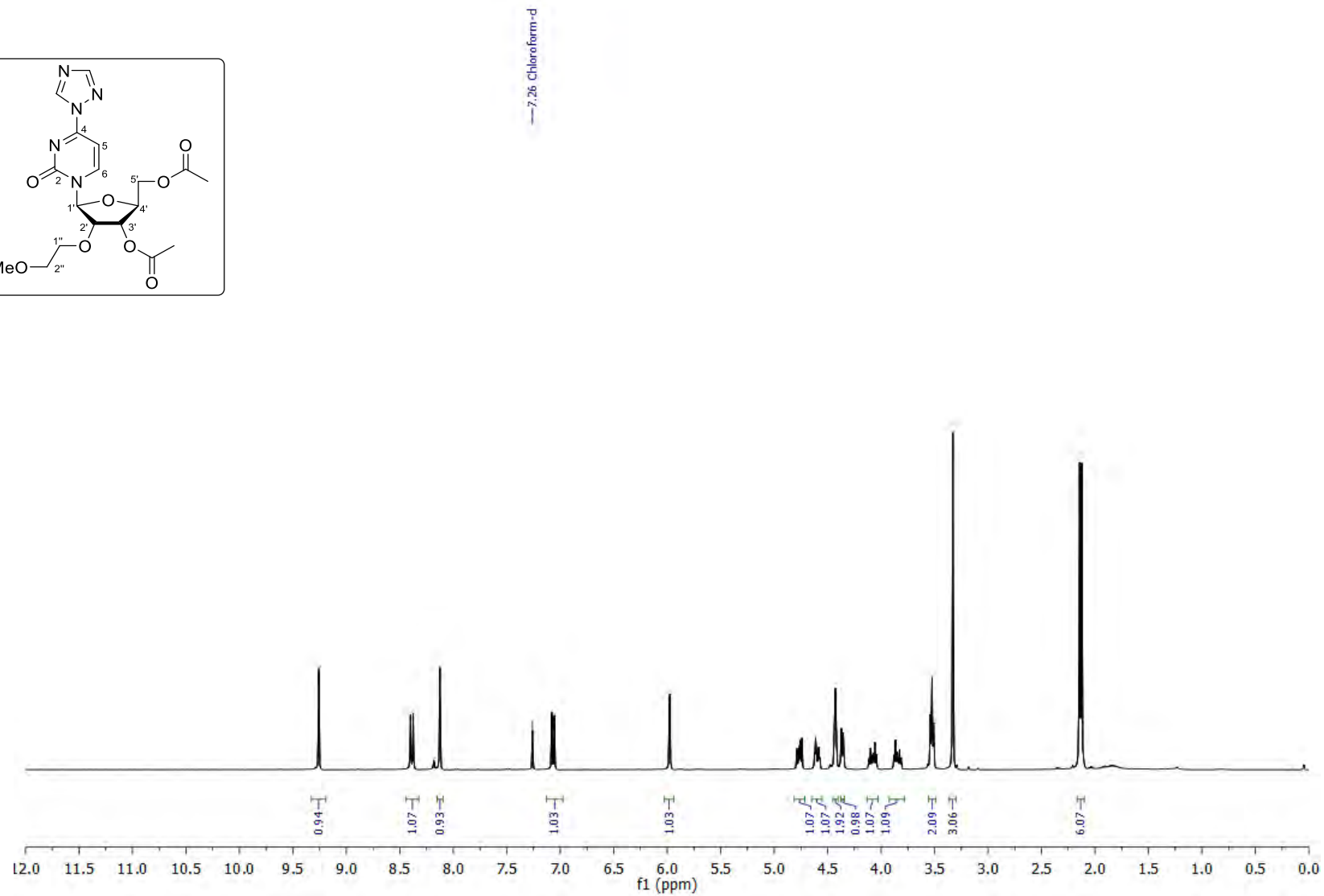
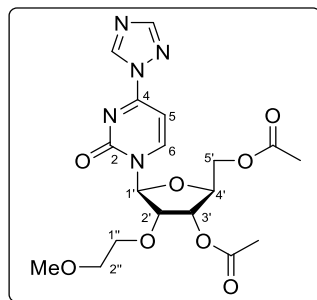
3',5'-di-O-Acetyl-2'-O-methyl-4-(1,2,4-triazol-1-yl)-L-cytidine (20)

HMBC NMR (CDCl₃)



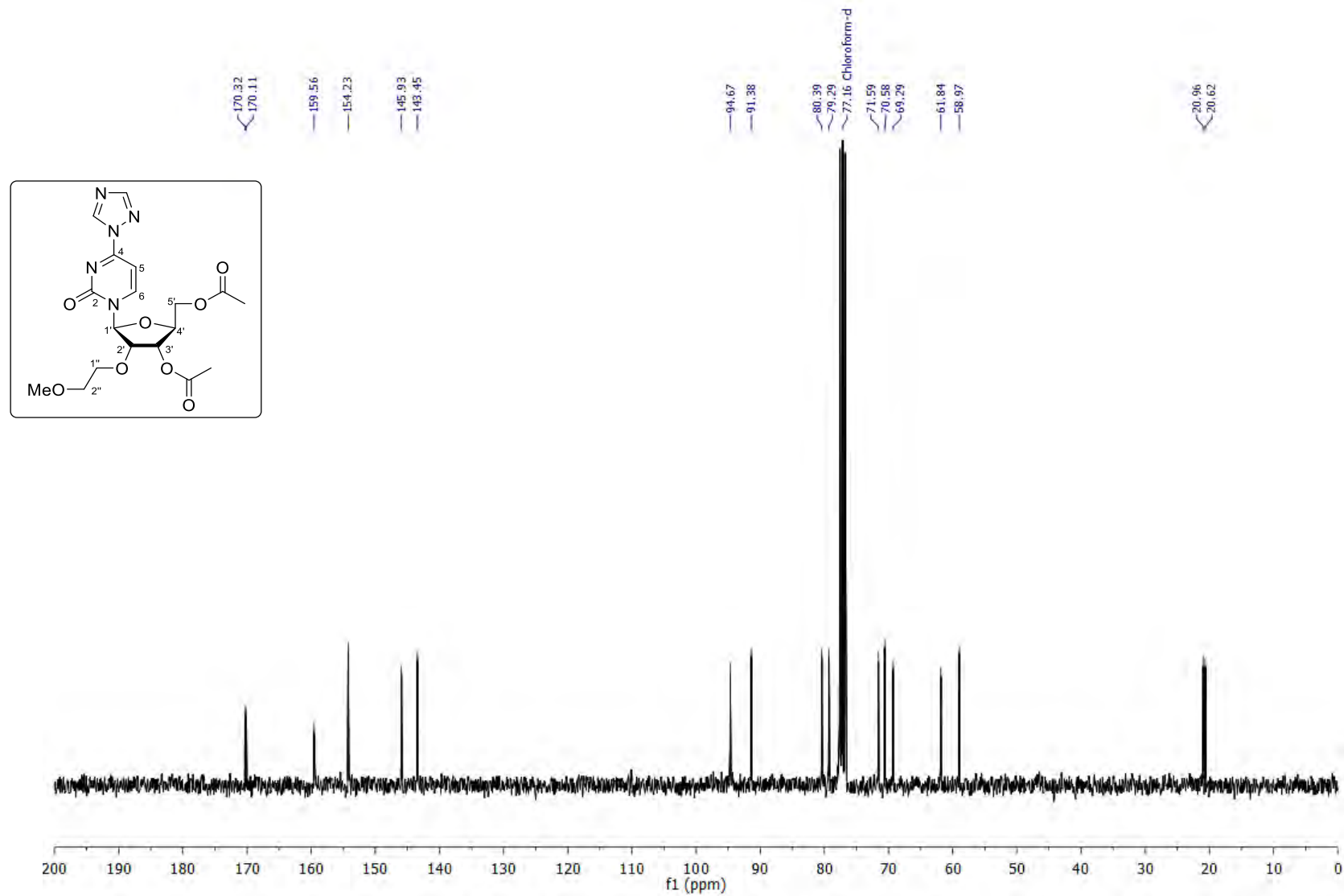
3',5'-di-*O*-Acetyl-2'-*O*-(2-methoxyethyl)-4-(1,2,4-triazol-1-yl)-L-cytidine (21)

¹H NMR (300.13 MHz, CDCl₃)



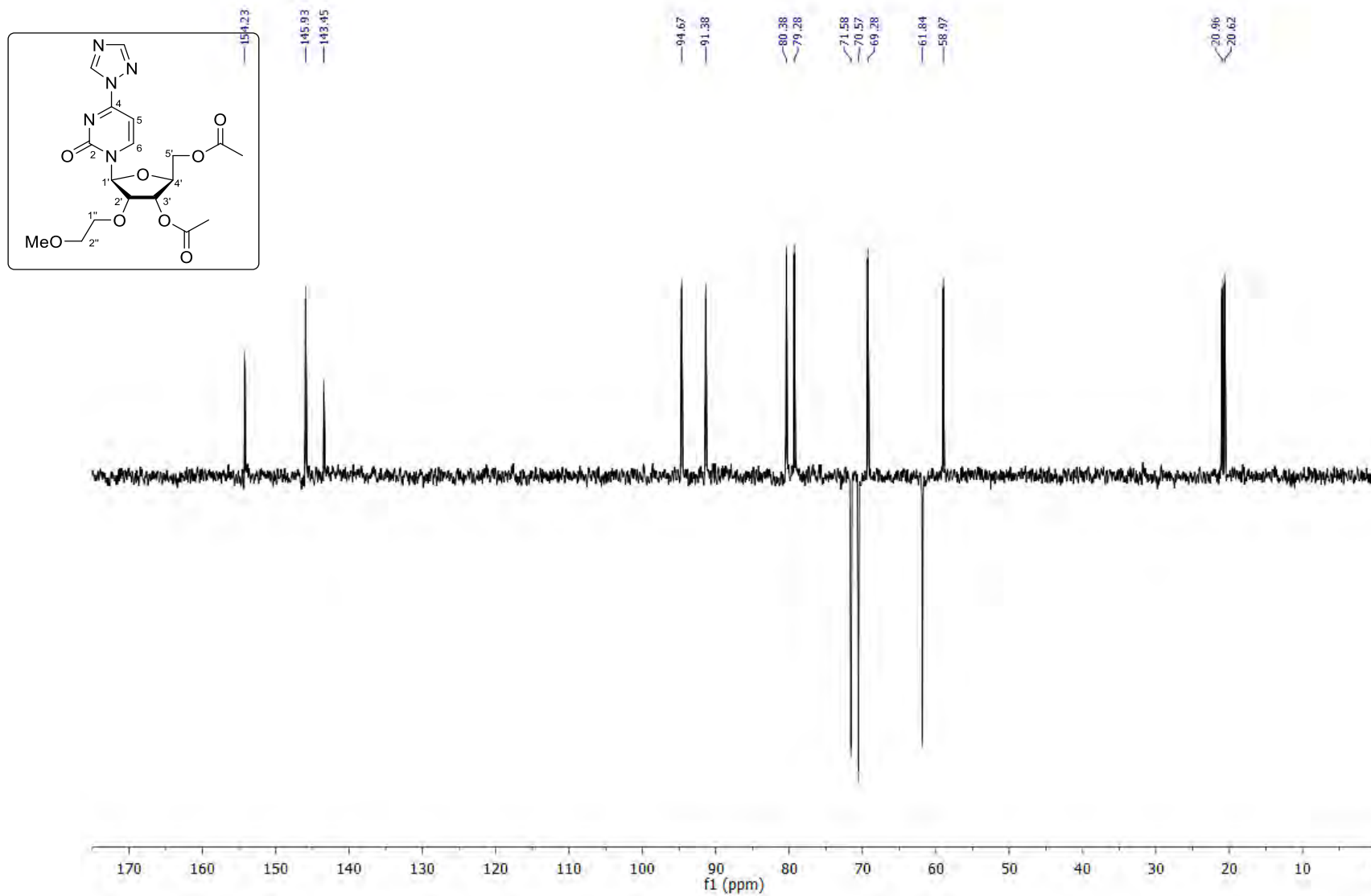
3',5'-di-O-Acetyl-2'-O-(2-methoxyethyl)-4-(1,2,4-triazol-1-yl)-L-cytidine (21)

^{13}C NMR (75.5 MHz, CDCl_3)



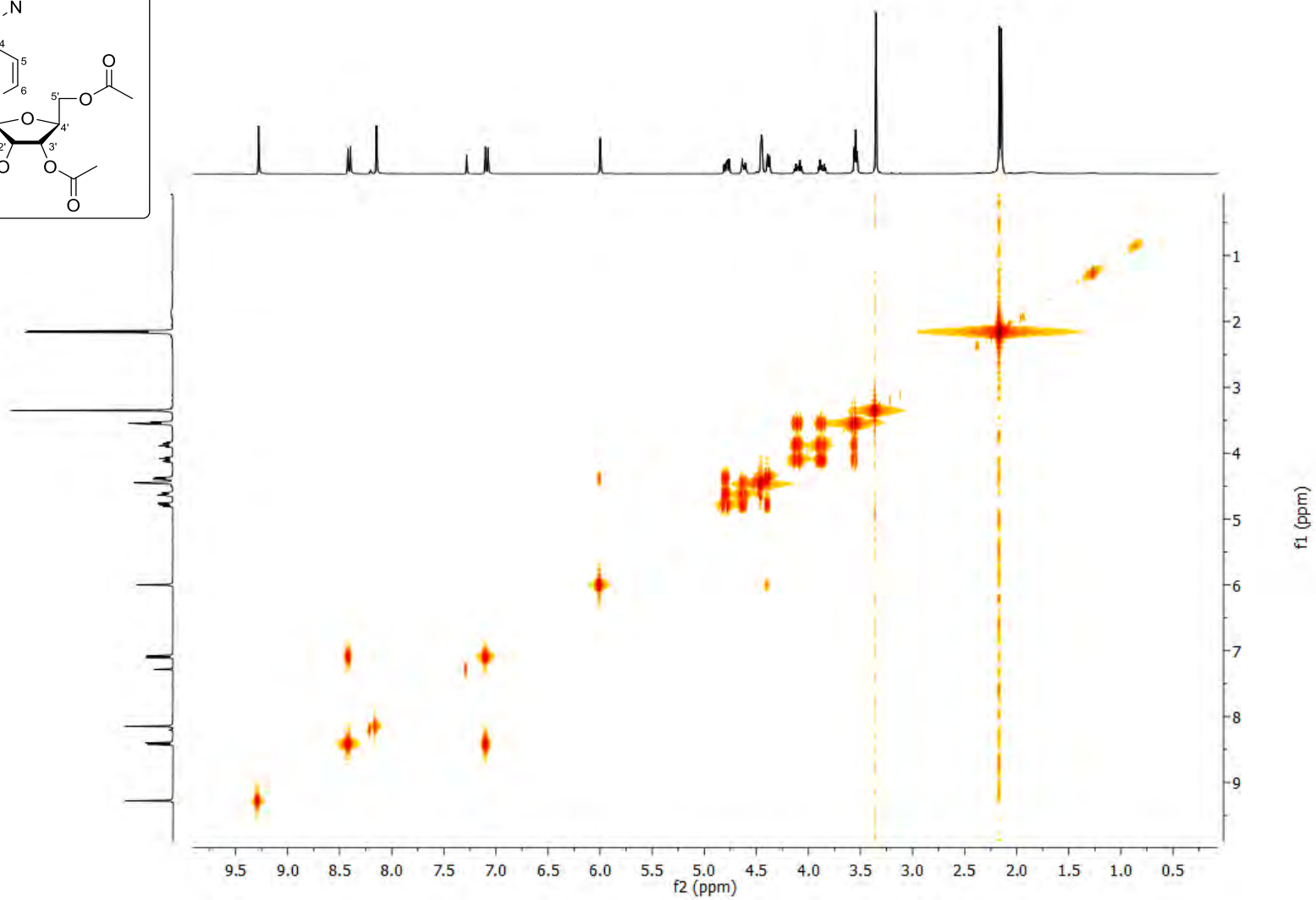
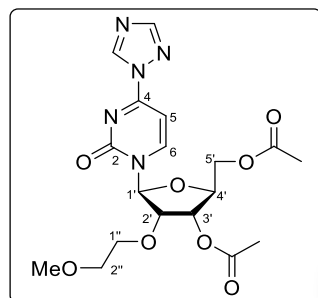
3',5'-di-*O*-Acetyl-2'-*O*-(2-methoxyethyl)-4-(1,2,4-triazol-1-yl)-L-cytidine (21)

DEPT NMR (75.5 MHz, CDCl₃)



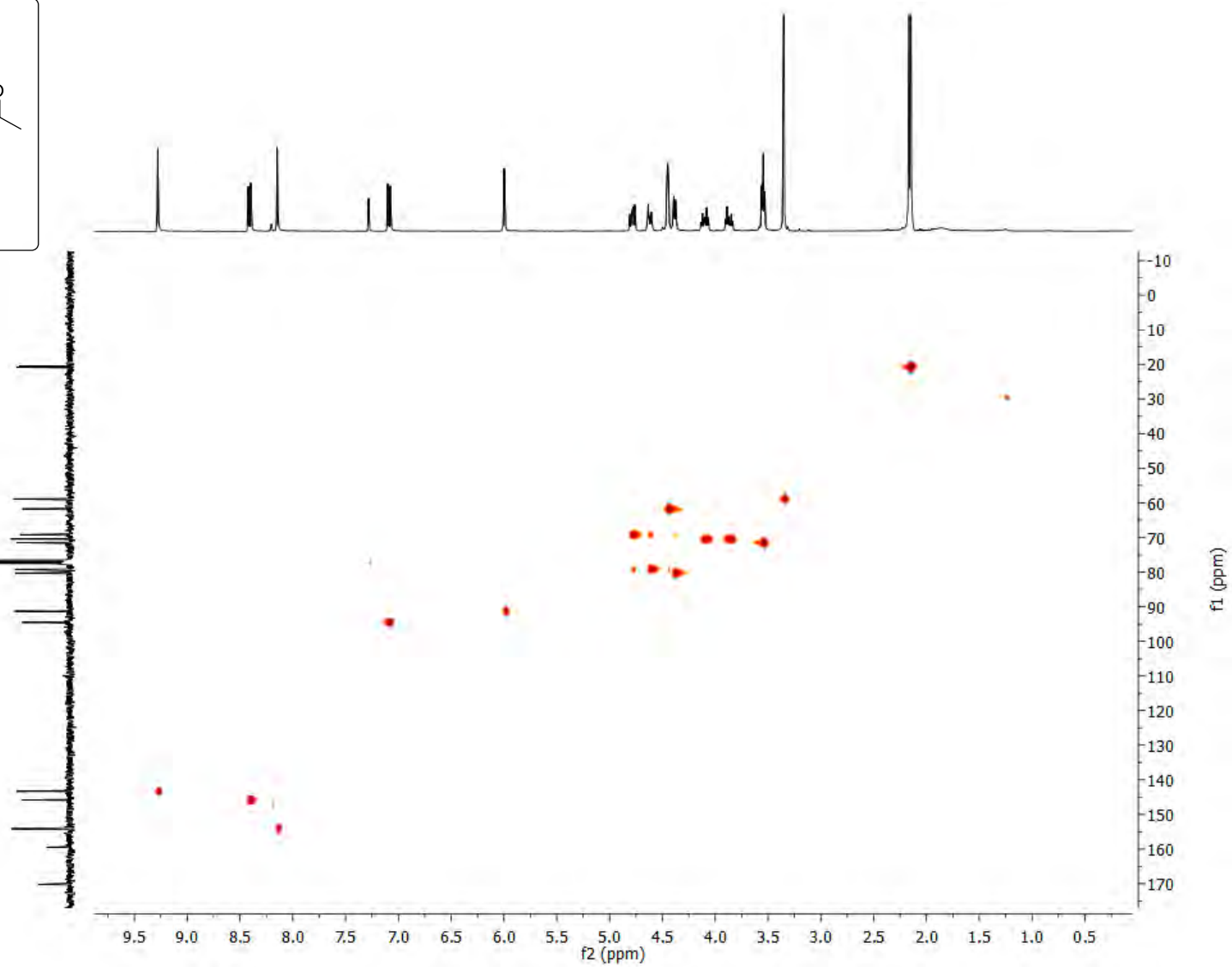
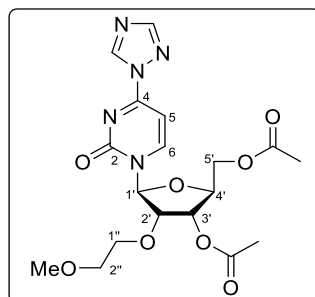
3',5'-di-*O*-Acetyl-2'-*O*-(2-methoxyethyl)-4-(1,2,4-triazol-1-yl)-L-cytidine (21)

COSY NMR (CDCl₃)



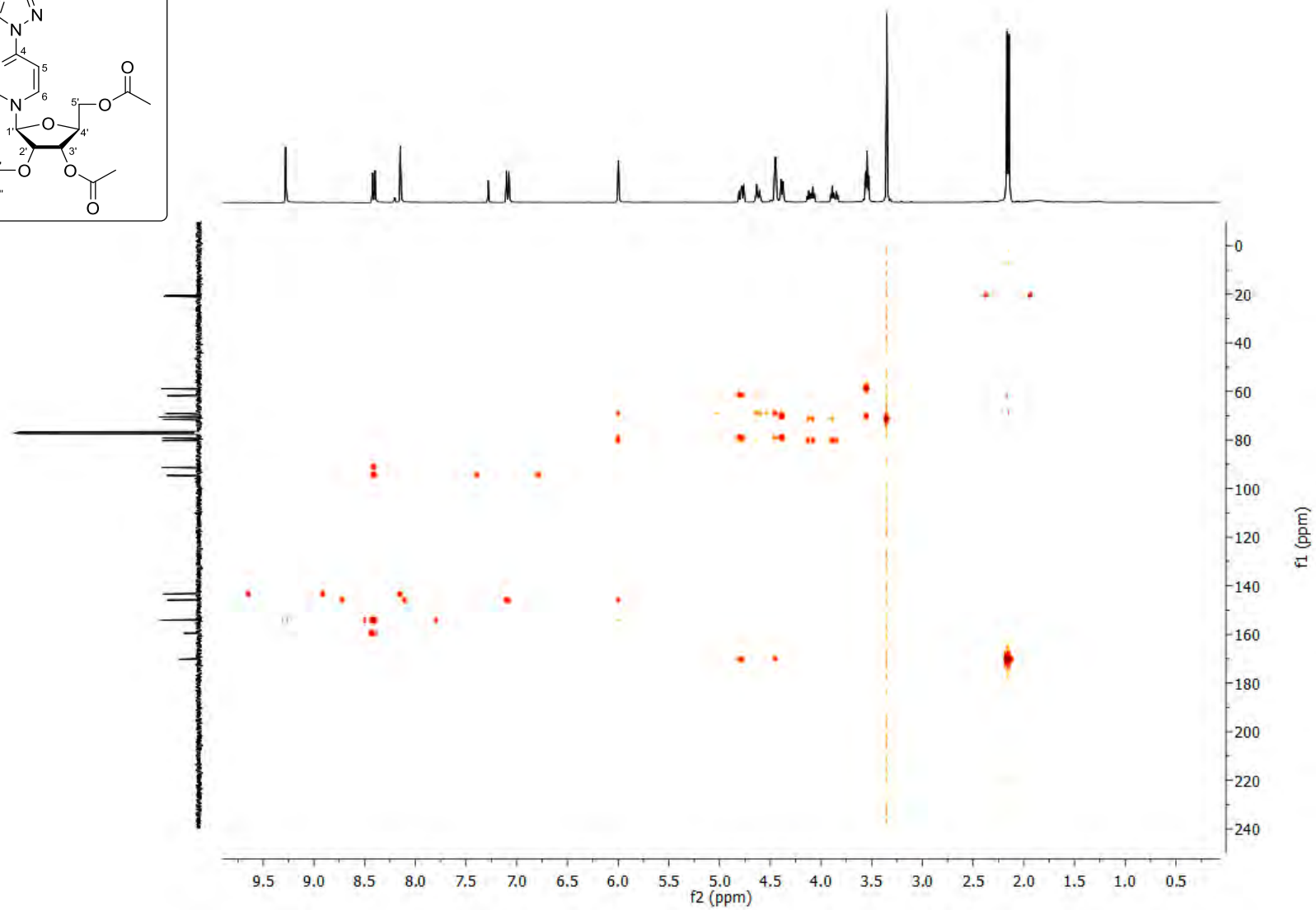
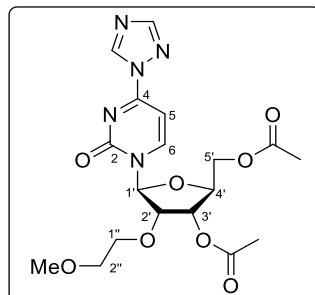
3',5'-di-*O*-Acetyl-2'-*O*-(2-methoxyethyl)-4-(1,2,4-triazol-1-yl)-L-cytidine (21)

HSQC NMR (CDCl₃)



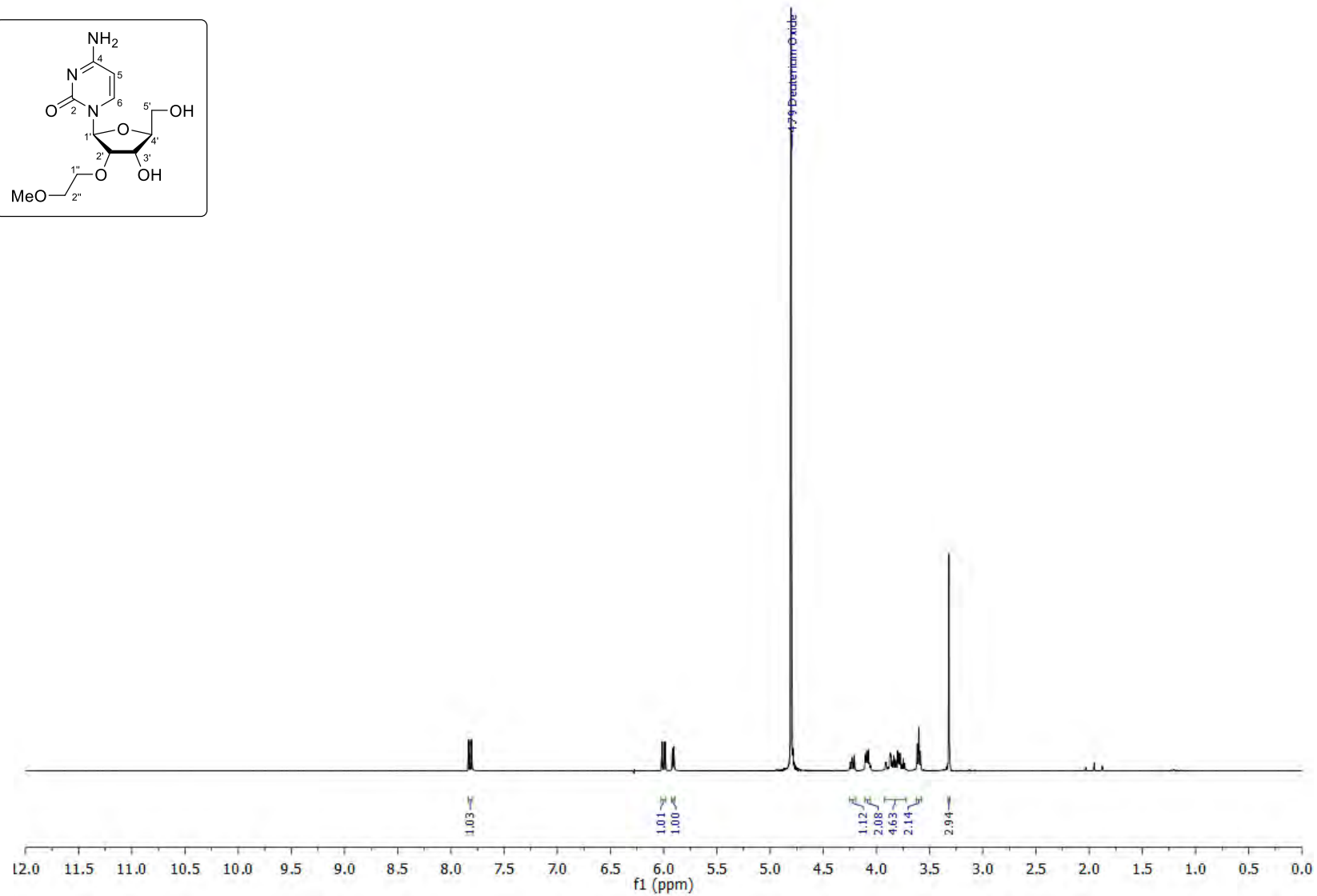
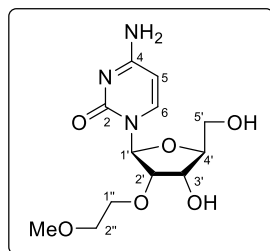
3',5'-di-*O*-Acetyl-2'-*O*-(2-methoxyethyl)-4-(1,2,4-triazol-1-yl)-L-cytidine (21)

HMBC NMR (CDCl₃)



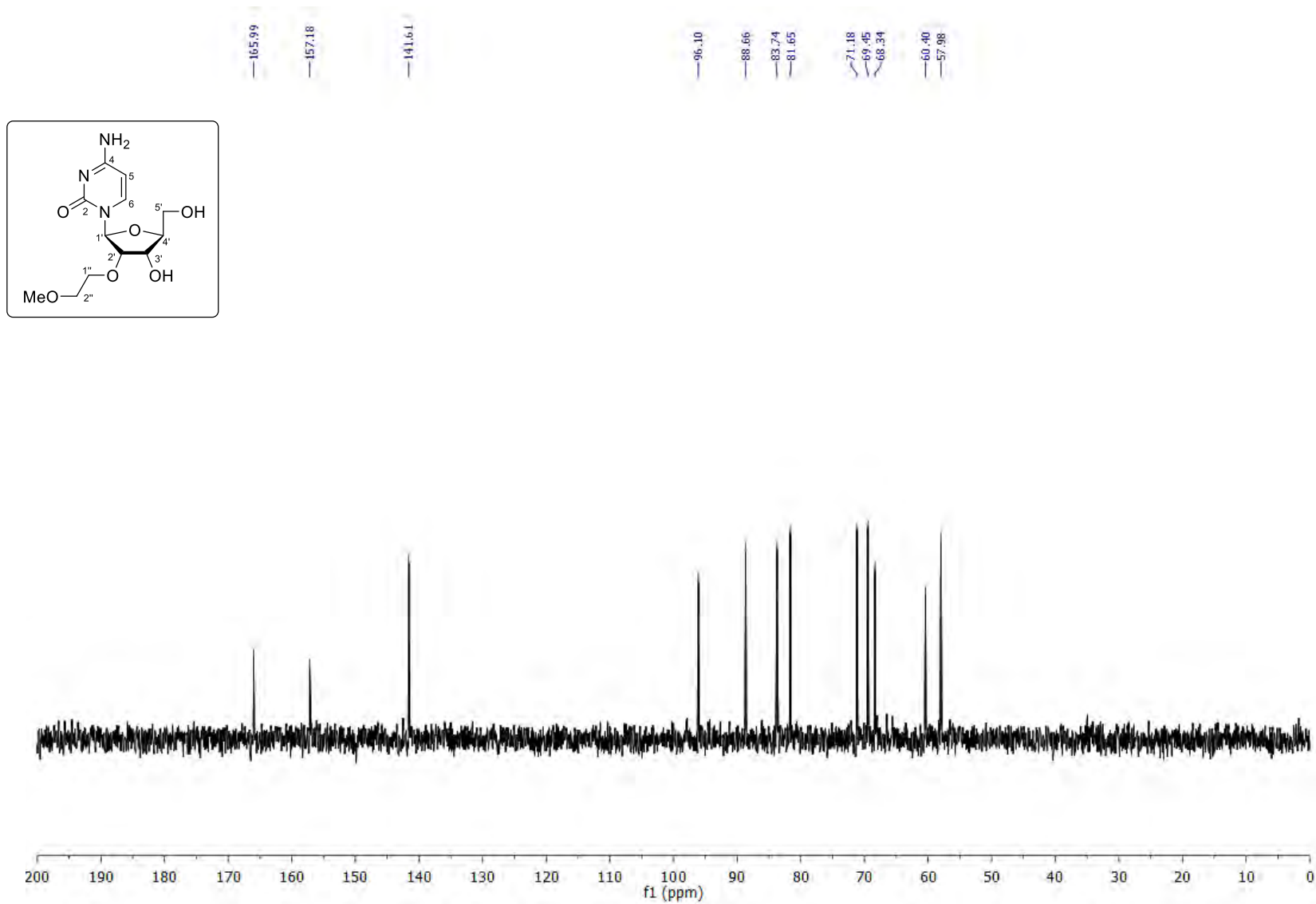
2'-O-(2-Methoxyethyl)-L-cytidine (22)

^1H NMR (300.13 MHz, D_2O)



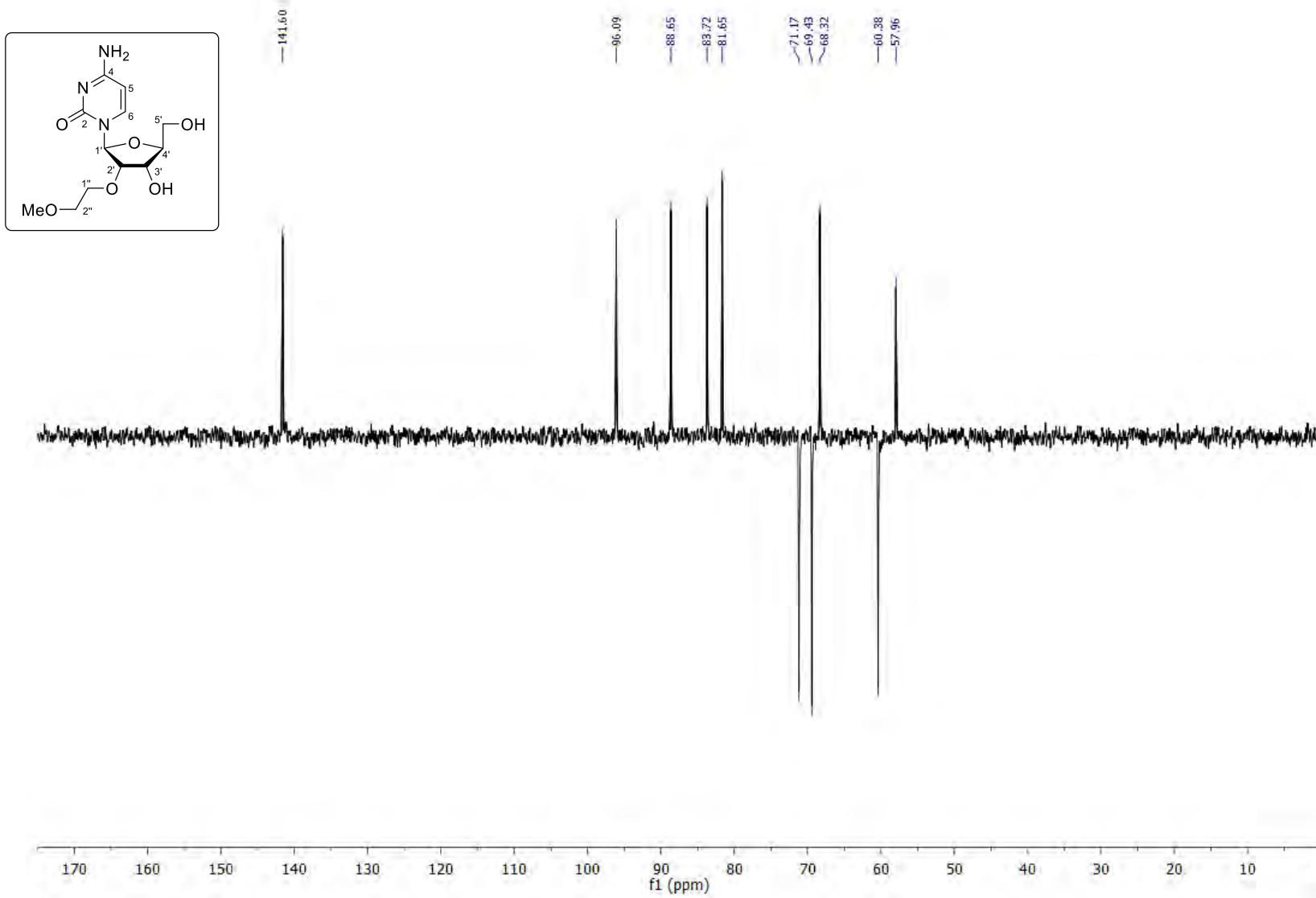
2'-O-(2-Methoxyethyl)-L-cytidine (22)

^{13}C NMR (75.5 MHz, D_2O)



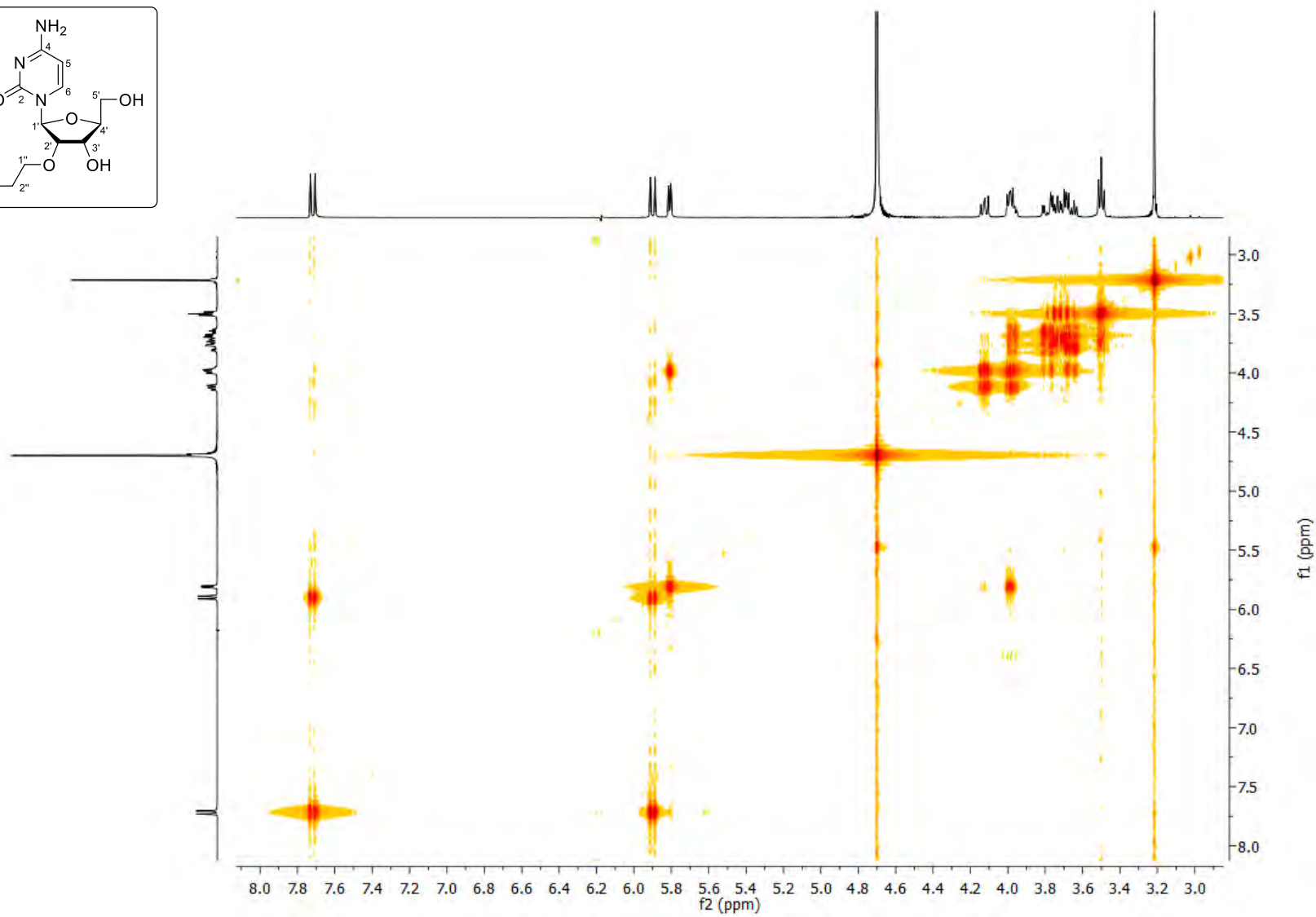
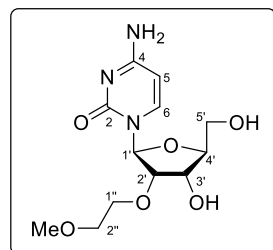
2'-O-(2-Methoxyethyl)-L-cytidine (22)

DEPT NMR (75.5 MHz, D₂O)



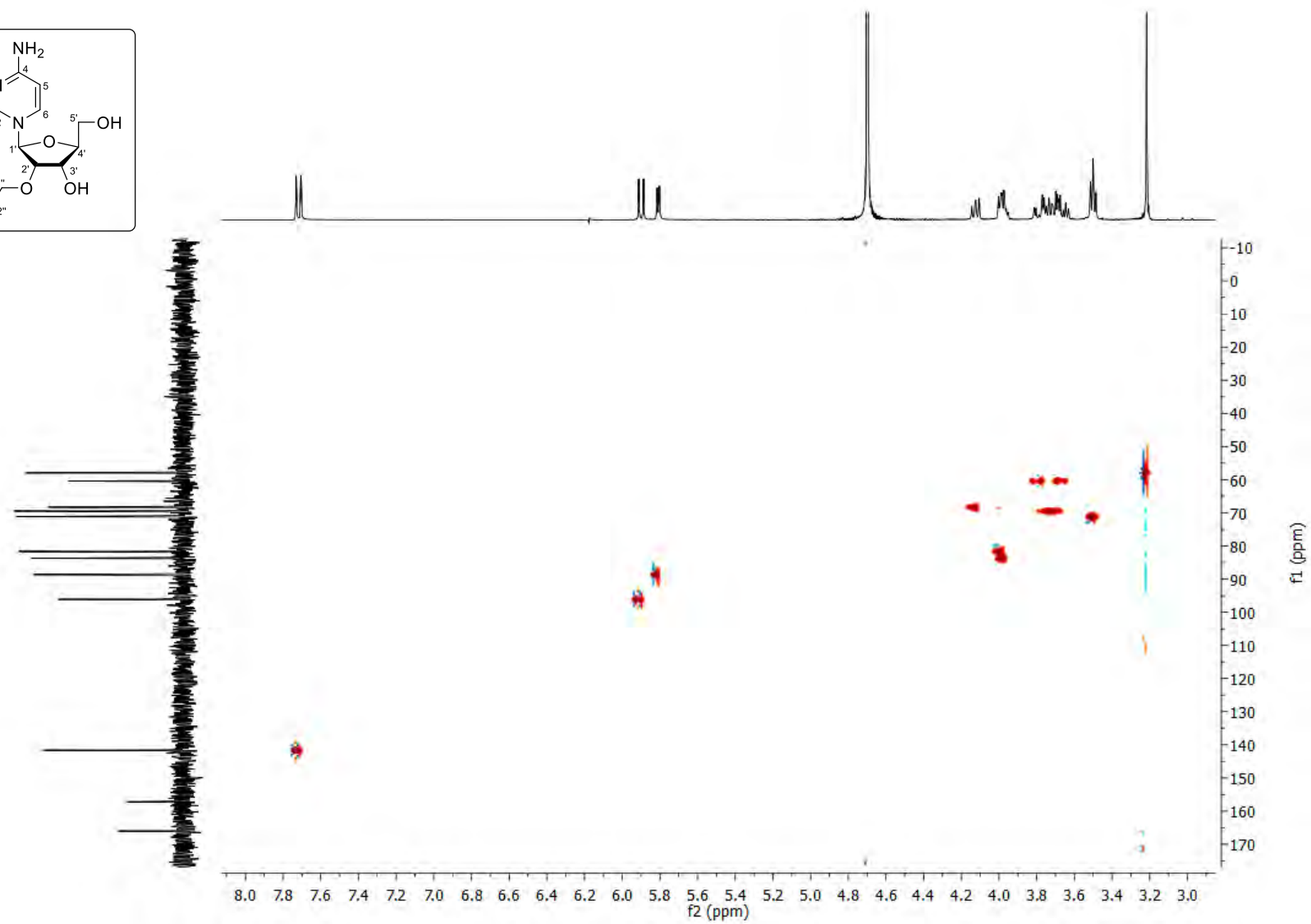
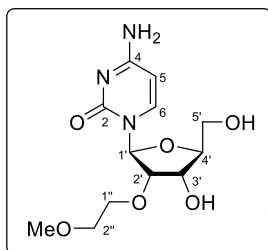
2'-O-(2-Methoxyethyl)-L-cytidine (22)

COSY NMR (D₂O)



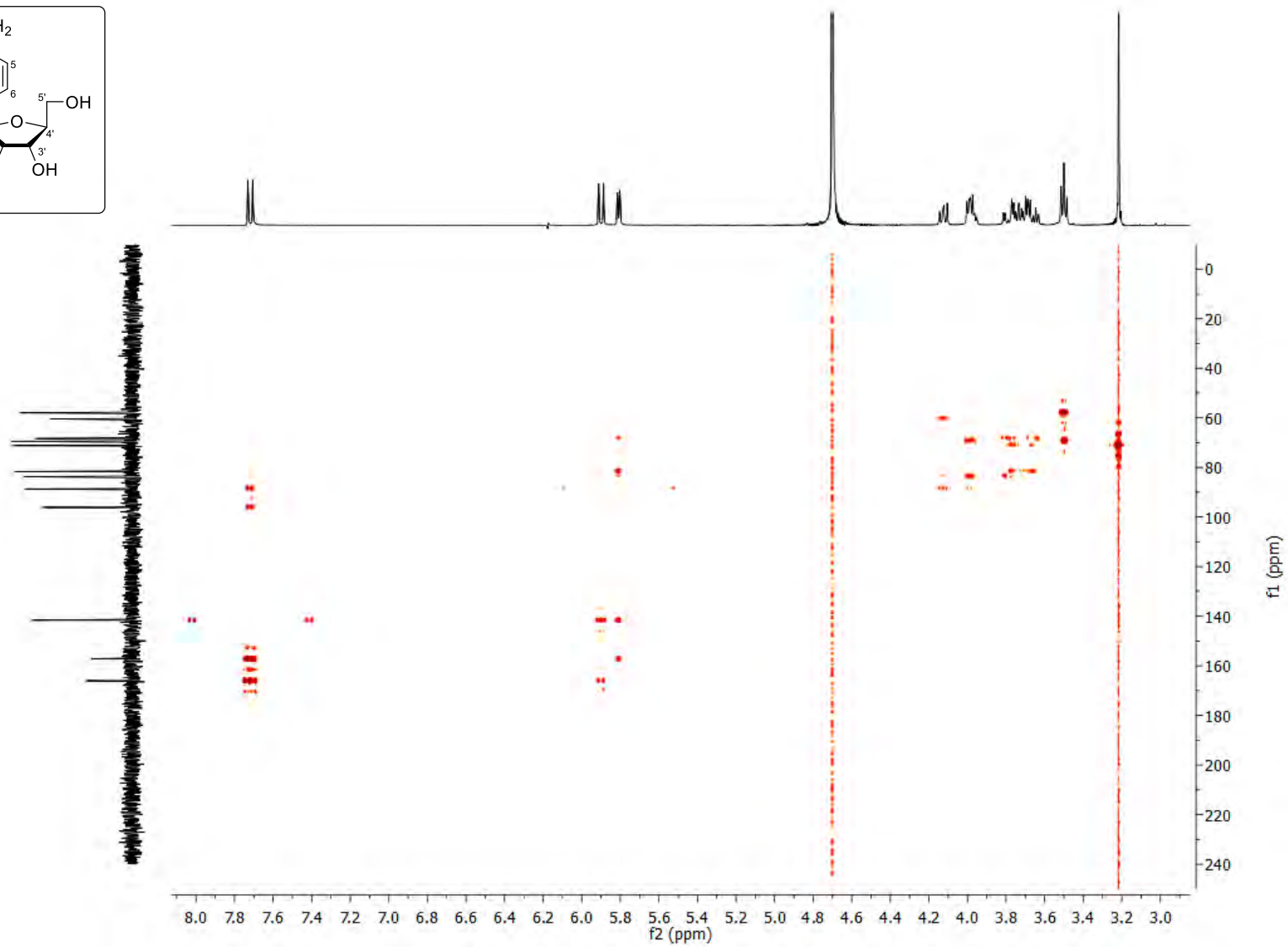
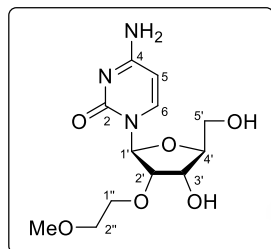
2'-O-(2-Methoxyethyl)-L-cytidine (22)

HSQC NMR (D₂O)



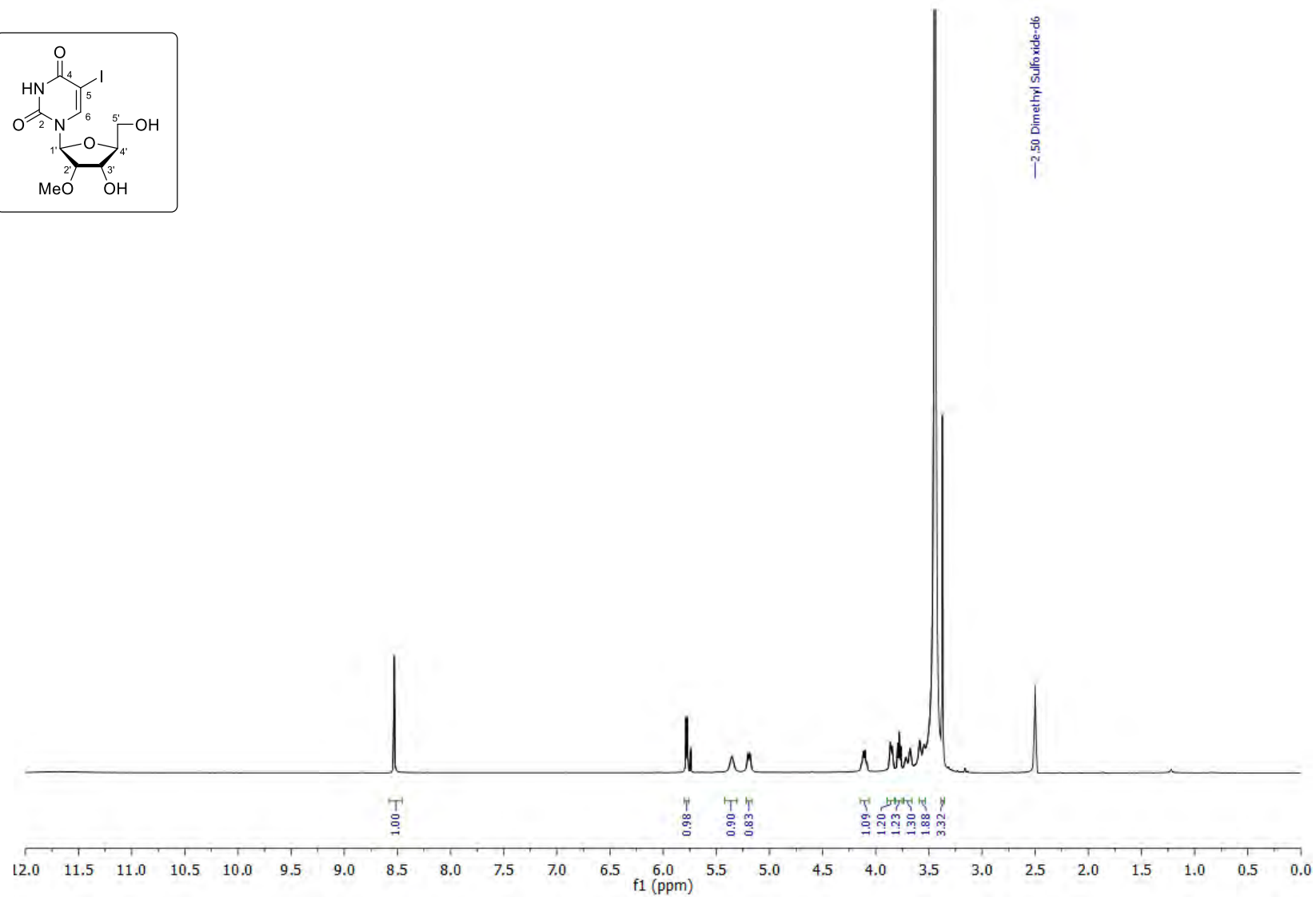
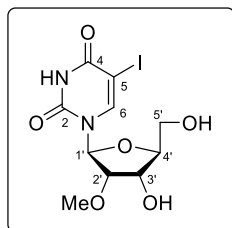
2'-O-(2-Methoxyethyl)-L-cytidine (22)

HMBC NMR (D₂O)



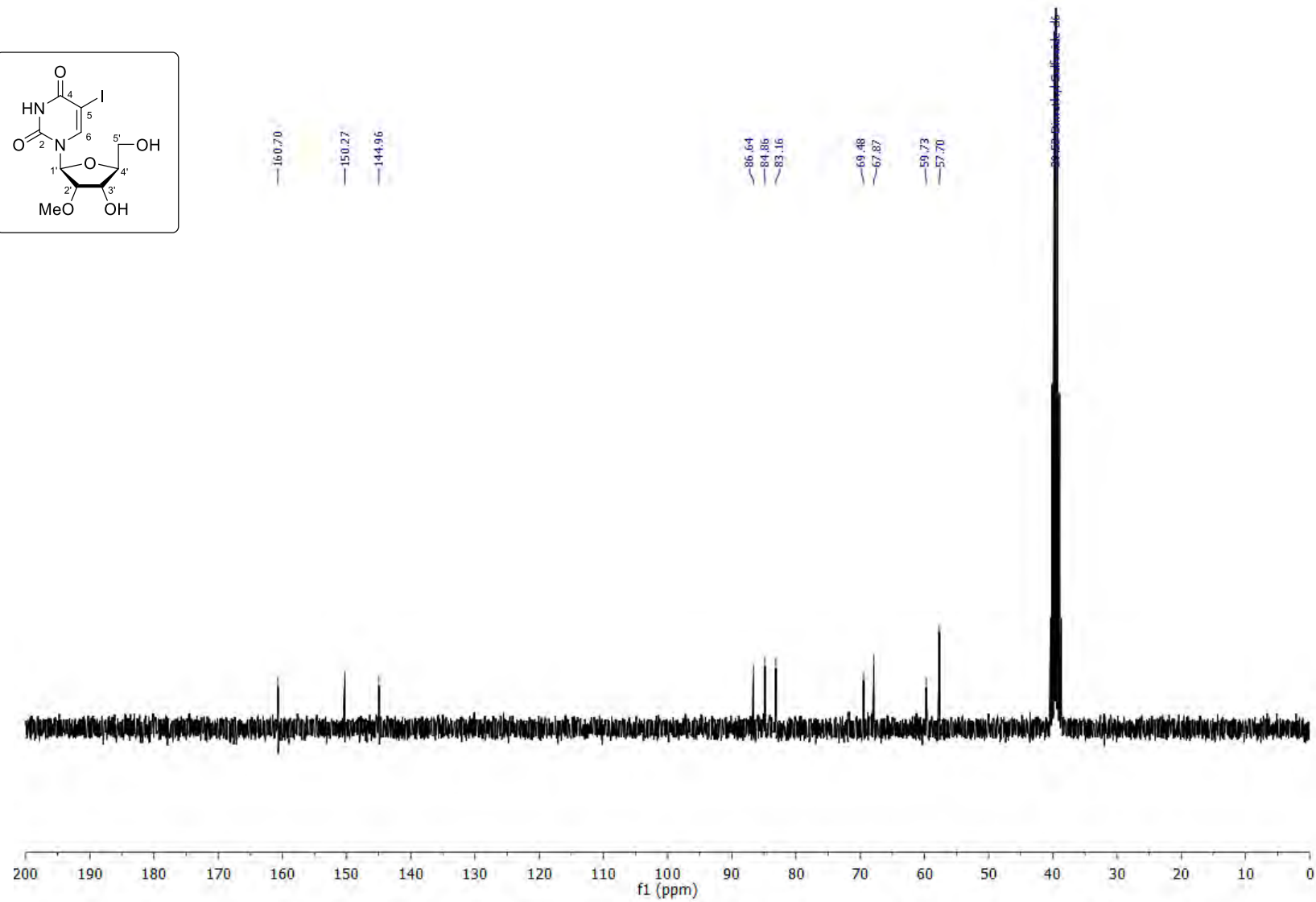
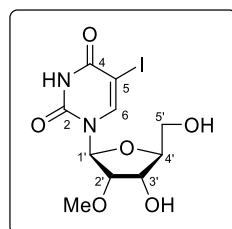
2'-O-Methyl-L-5-iodouridine (23)

^1H NMR (300.13 MHz, $\text{DMSO-}d_6$)



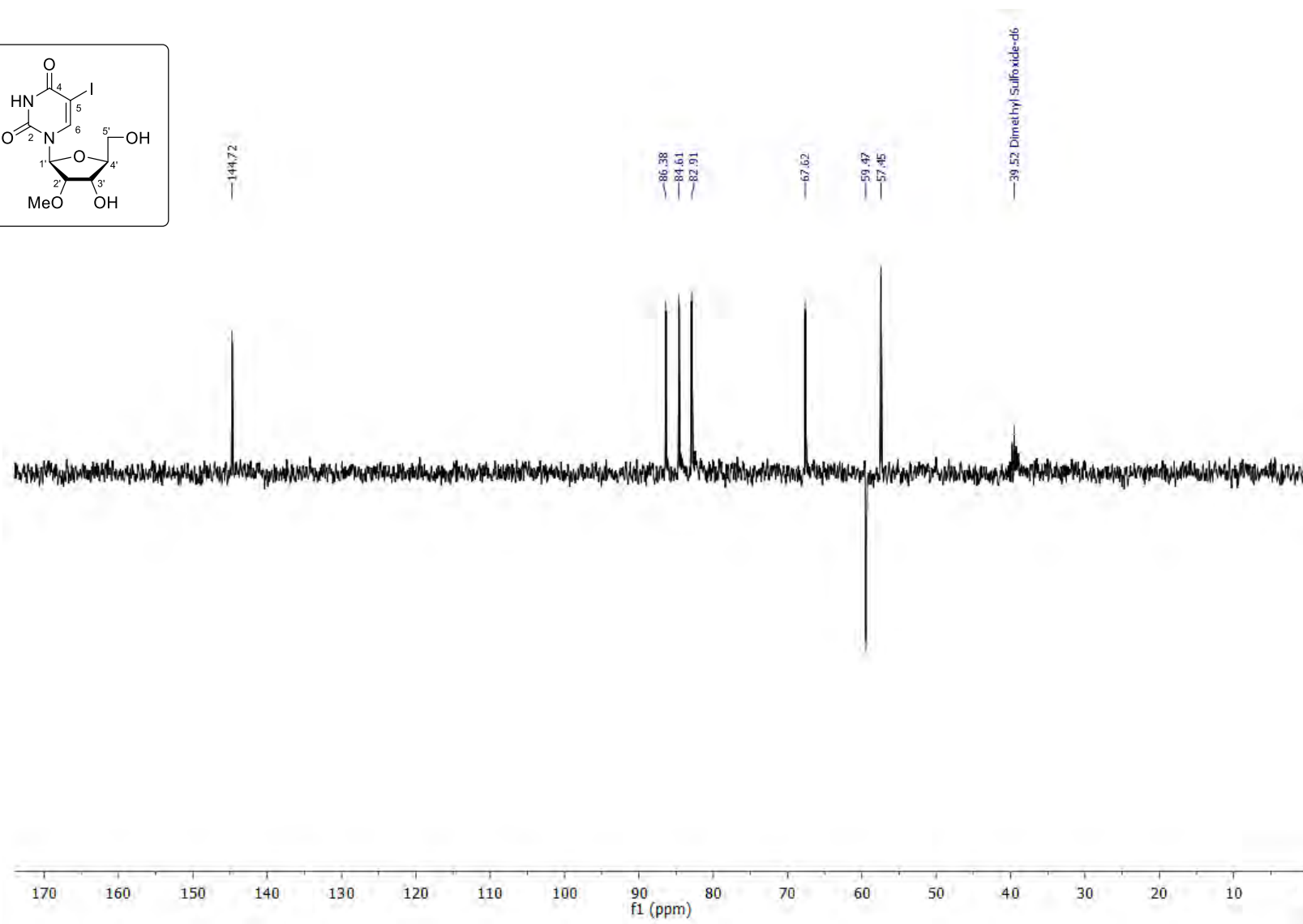
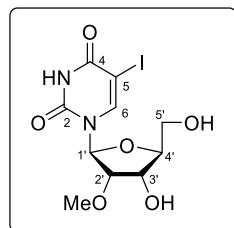
2'-*O*-Methyl-L-5-iodouridine (23)

^{13}C NMR (75.5 MHz, $\text{DMSO-}d_6$)



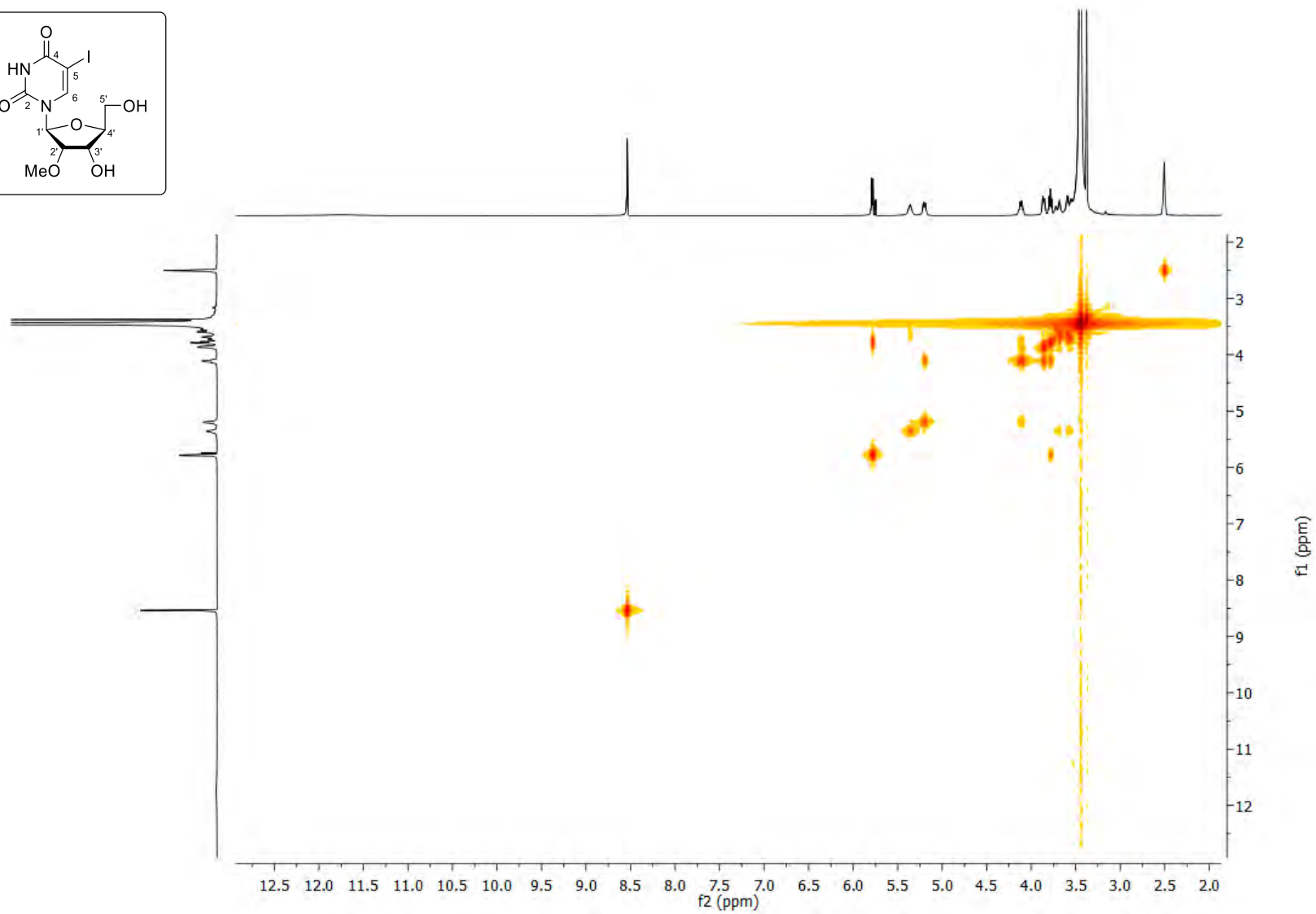
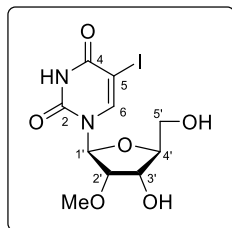
2'-*O*-Methyl-L-5-iodouridine (23)

DEPT NMR (75.5 MHz, DMSO-*d*₆)



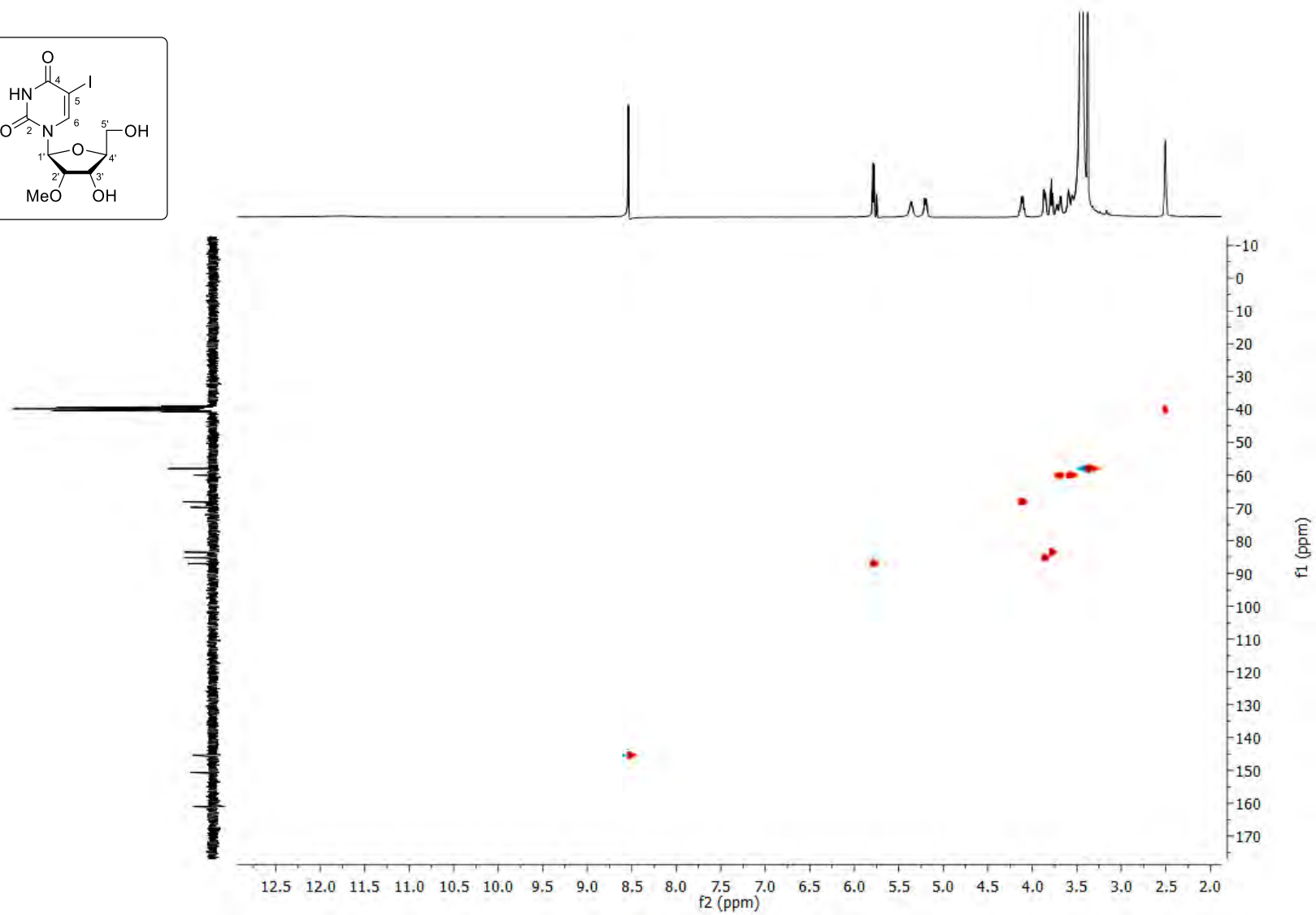
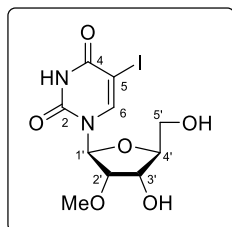
2'-O-Methyl-L-5-iodouridine (23)

COSY NMR (DMSO- d_6)



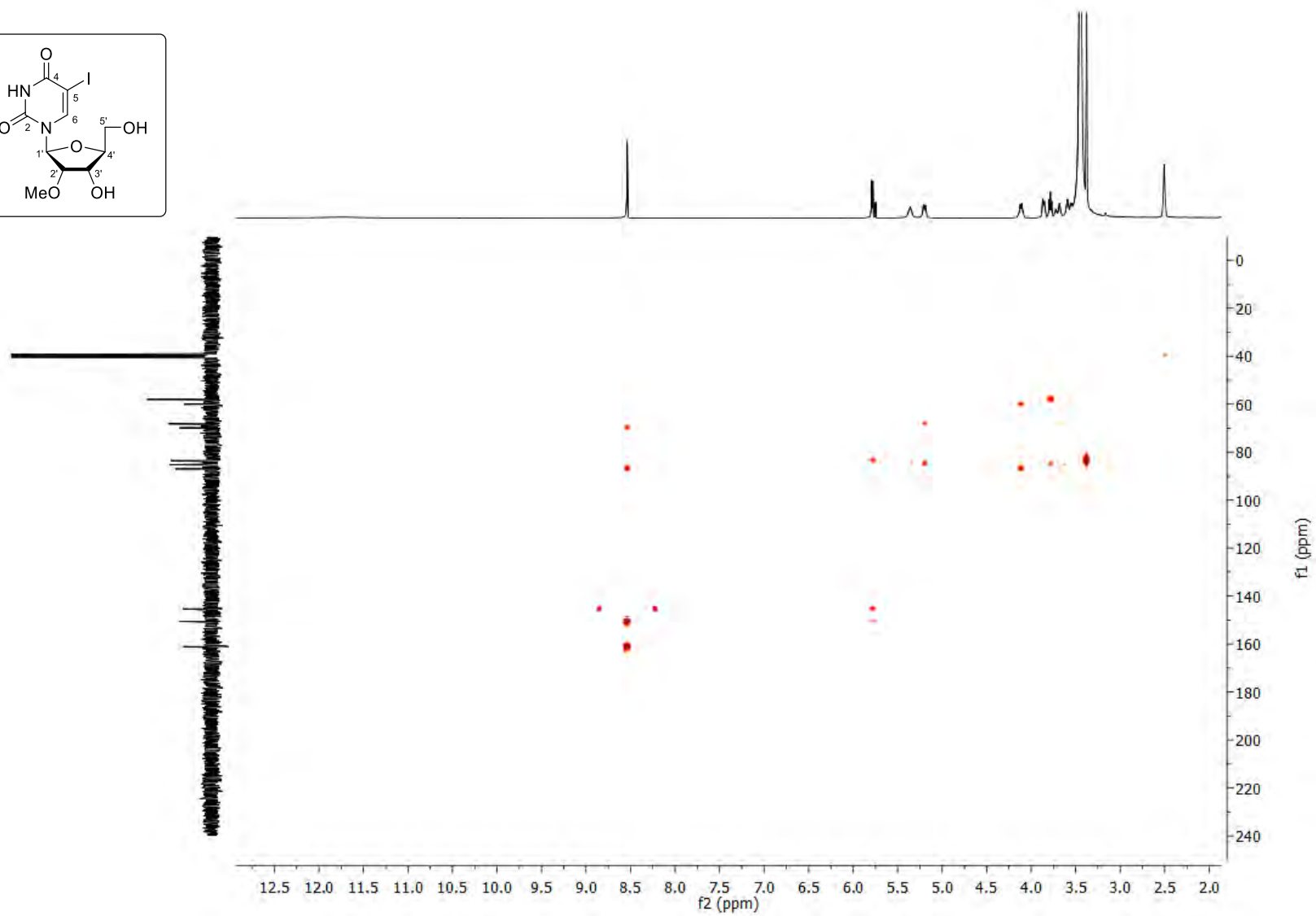
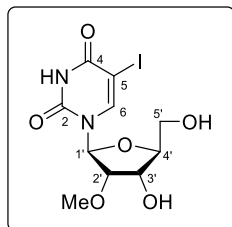
2'-O-Methyl-L-5-iodouridine (23)

HSQC NMR (DMSO- d_6)



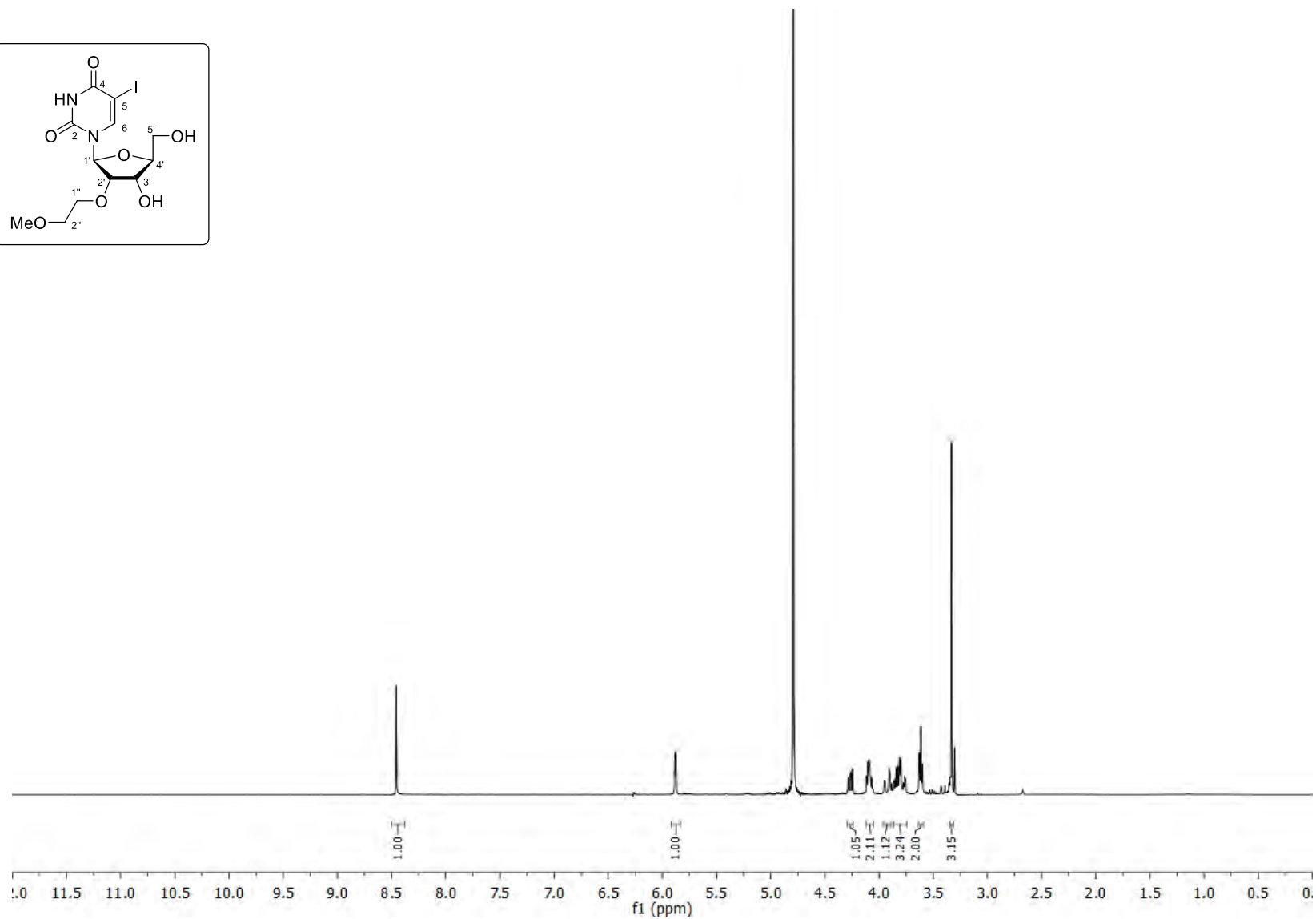
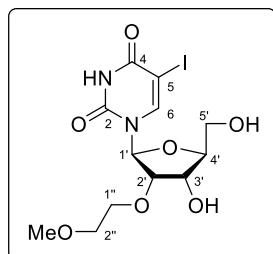
2'-O-Methyl-L-5-iodouridine (23)

HMBC NMR (DMSO-*d*₆)



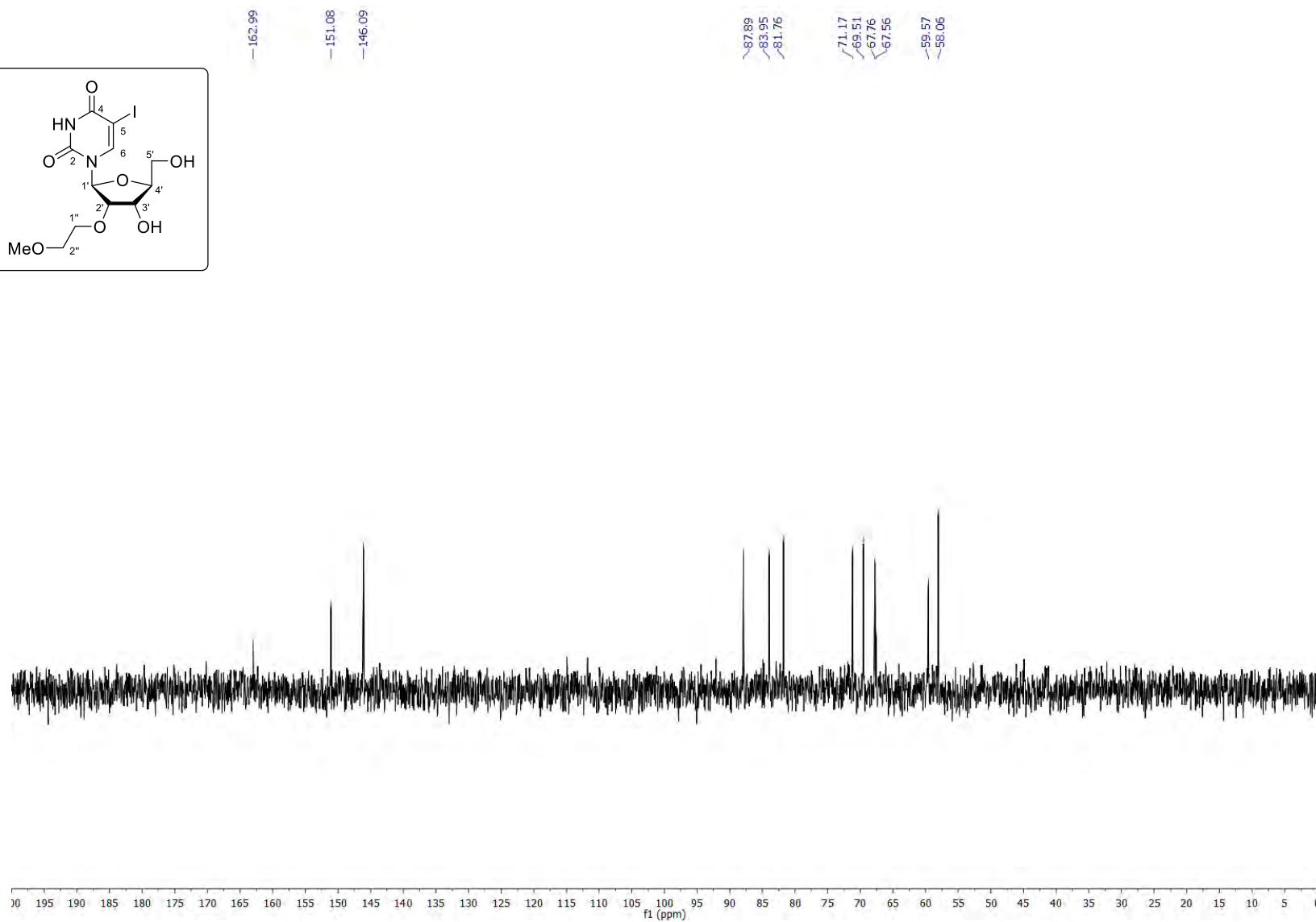
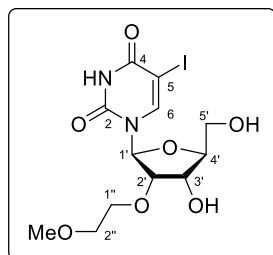
2'-O-(2-Methoxyethyl)-L-5-iodouridine (24)

^1H NMR (300.13 MHz, D_2O)



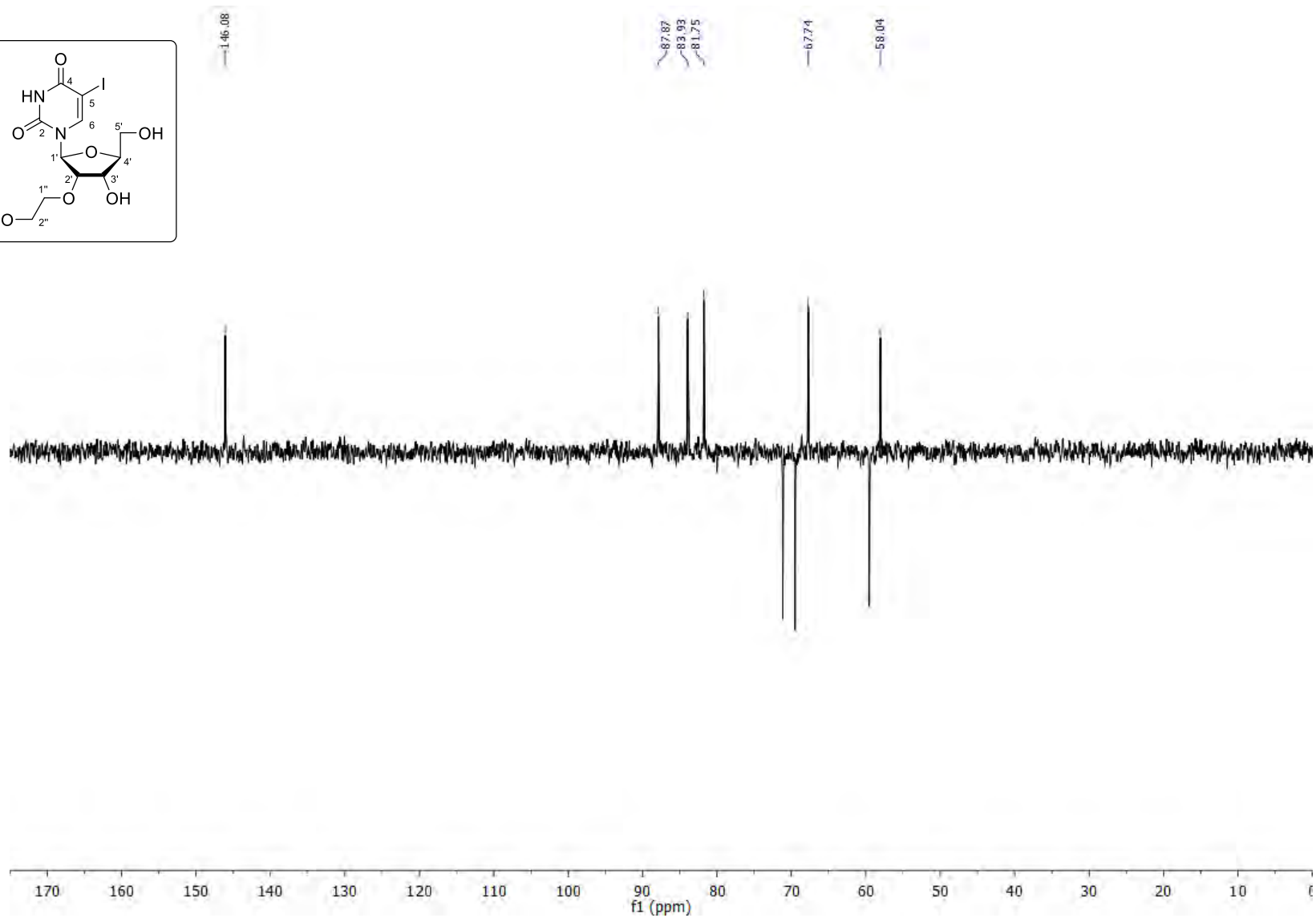
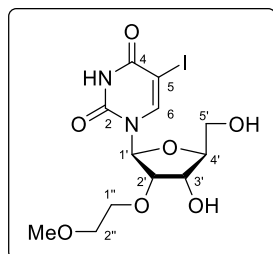
2'-O-(2-Methoxyethyl)-L-5-iodouridine (24)

^{13}C NMR (75.5 MHz, D_2O)



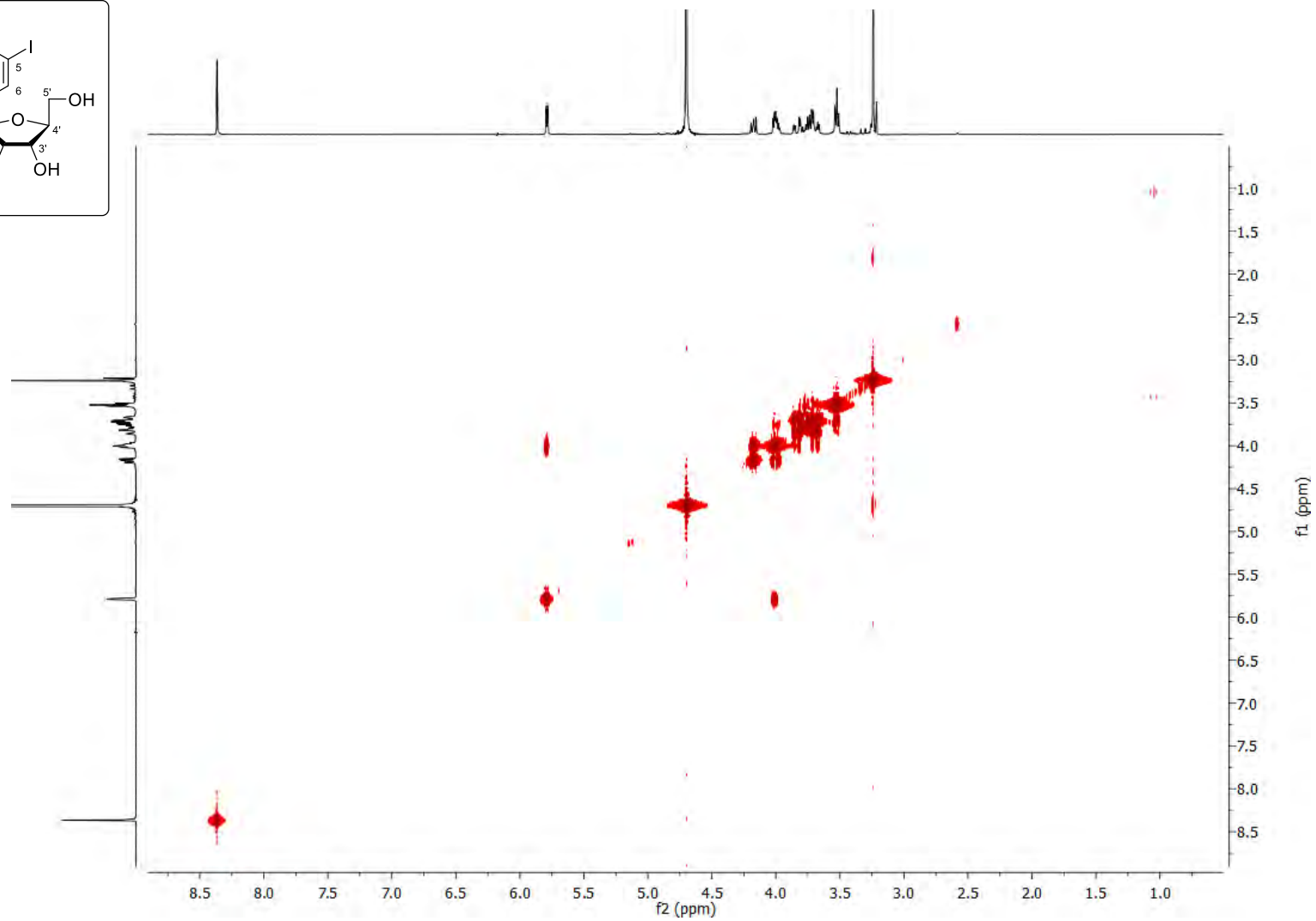
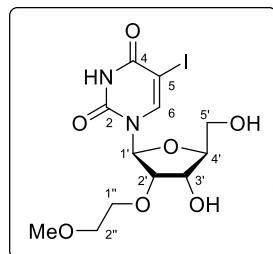
2'-O-(2-Methoxyethyl)-L-5-iodouridine (24)

DEPT NMR (75.5 MHz, D₂O)



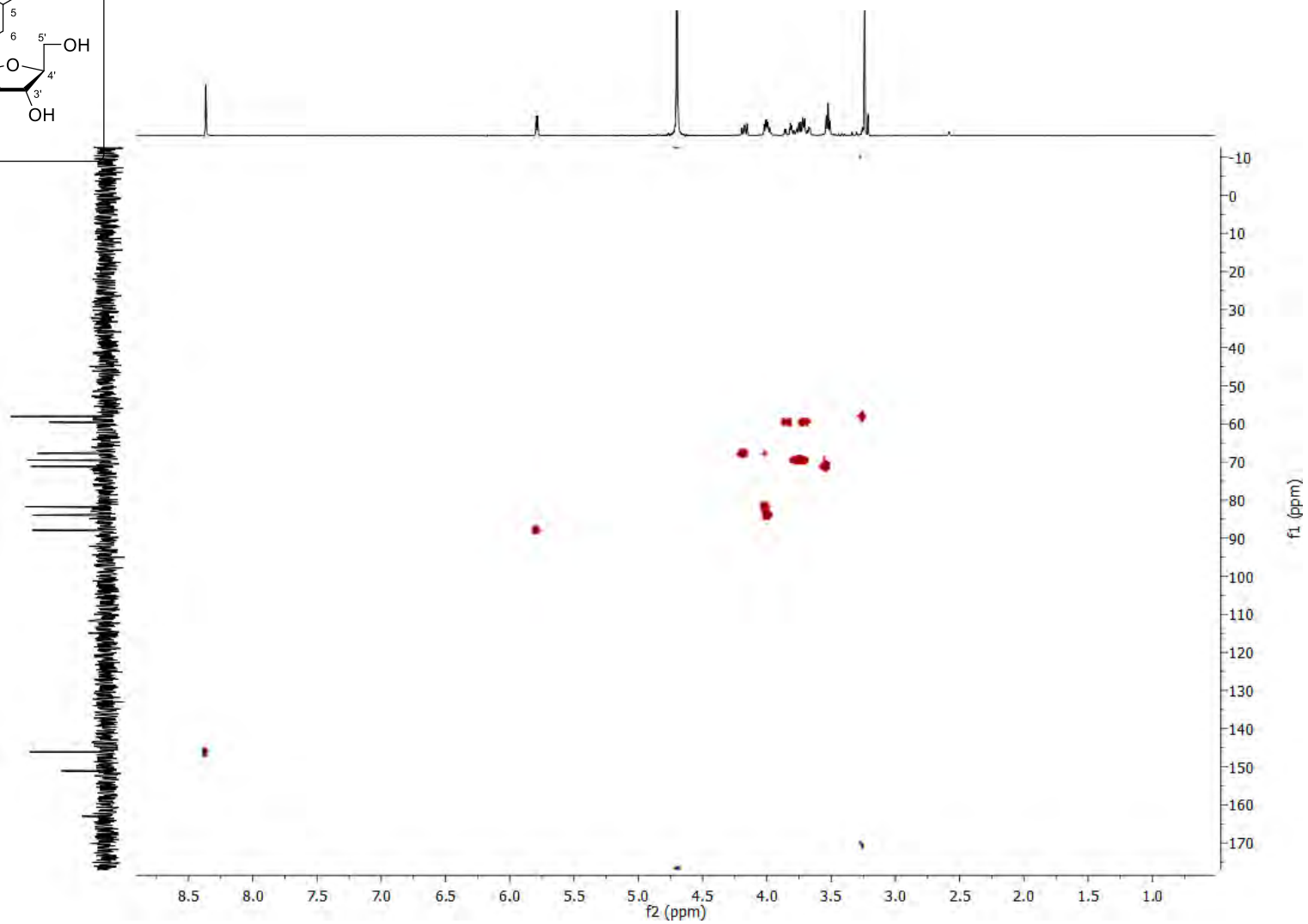
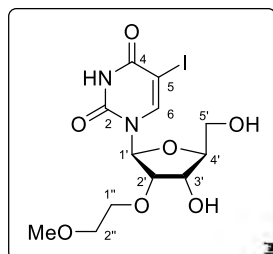
2'-O-(2-Methoxyethyl)-L-5-iodouridine (24)

COSY NMR (D₂O)



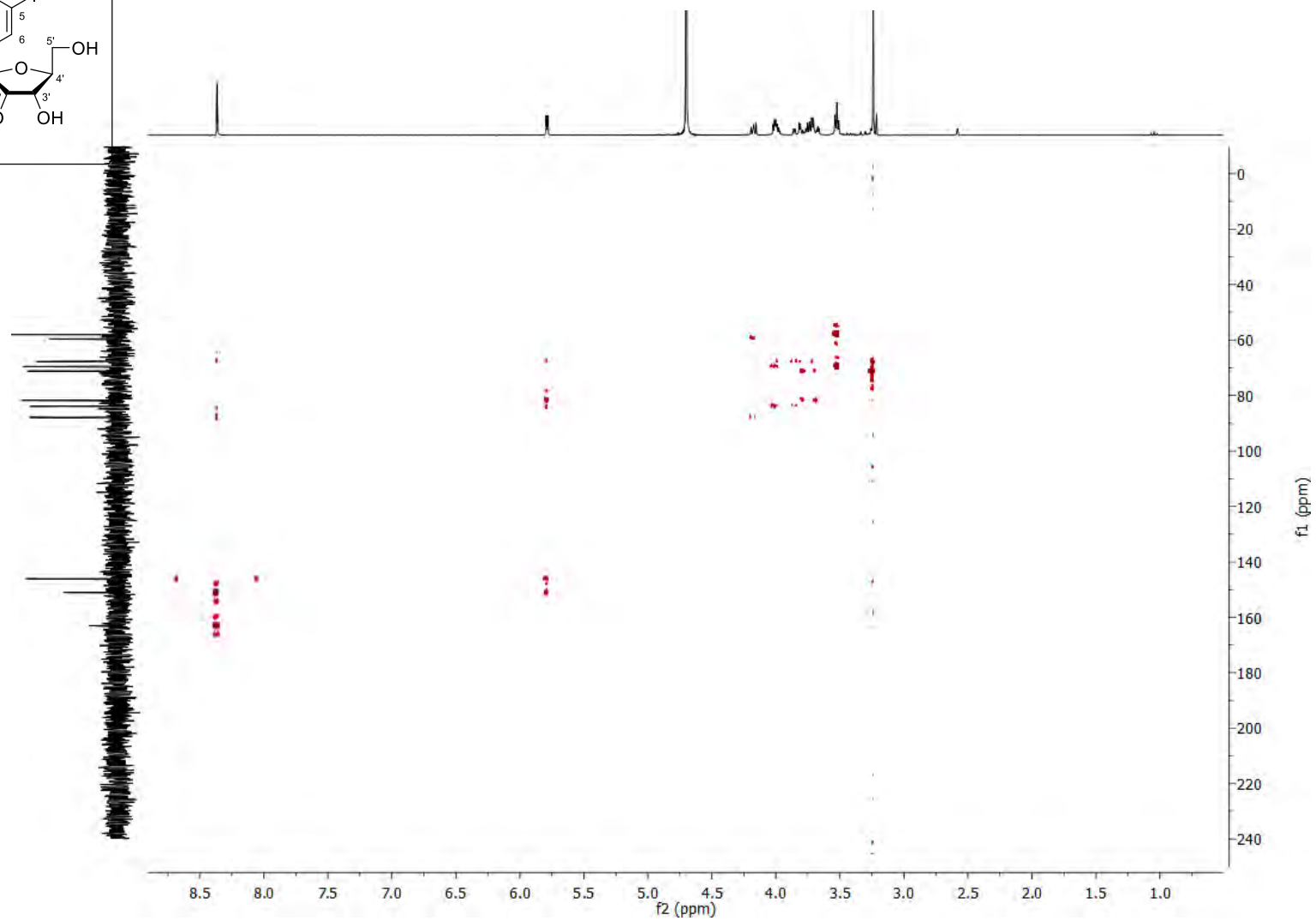
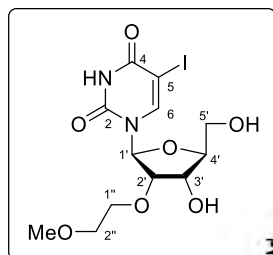
2'-O-(2-Methoxyethyl)-L-5-iodouridine (24)

HSQC NMR (D₂O)



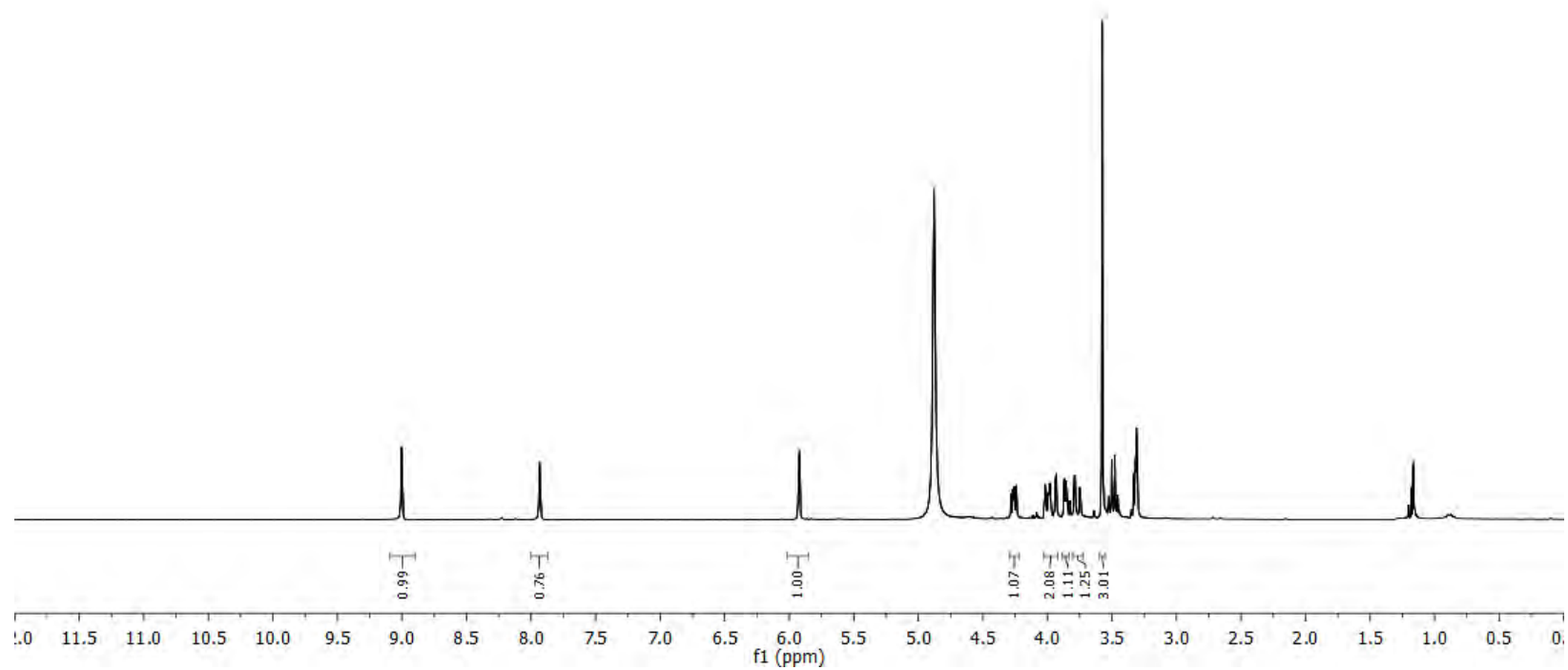
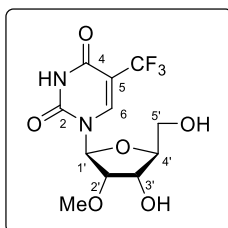
2'-O-(2-Methoxyethyl)-L-5-iodouridine (24)

HMBC NMR (D₂O)



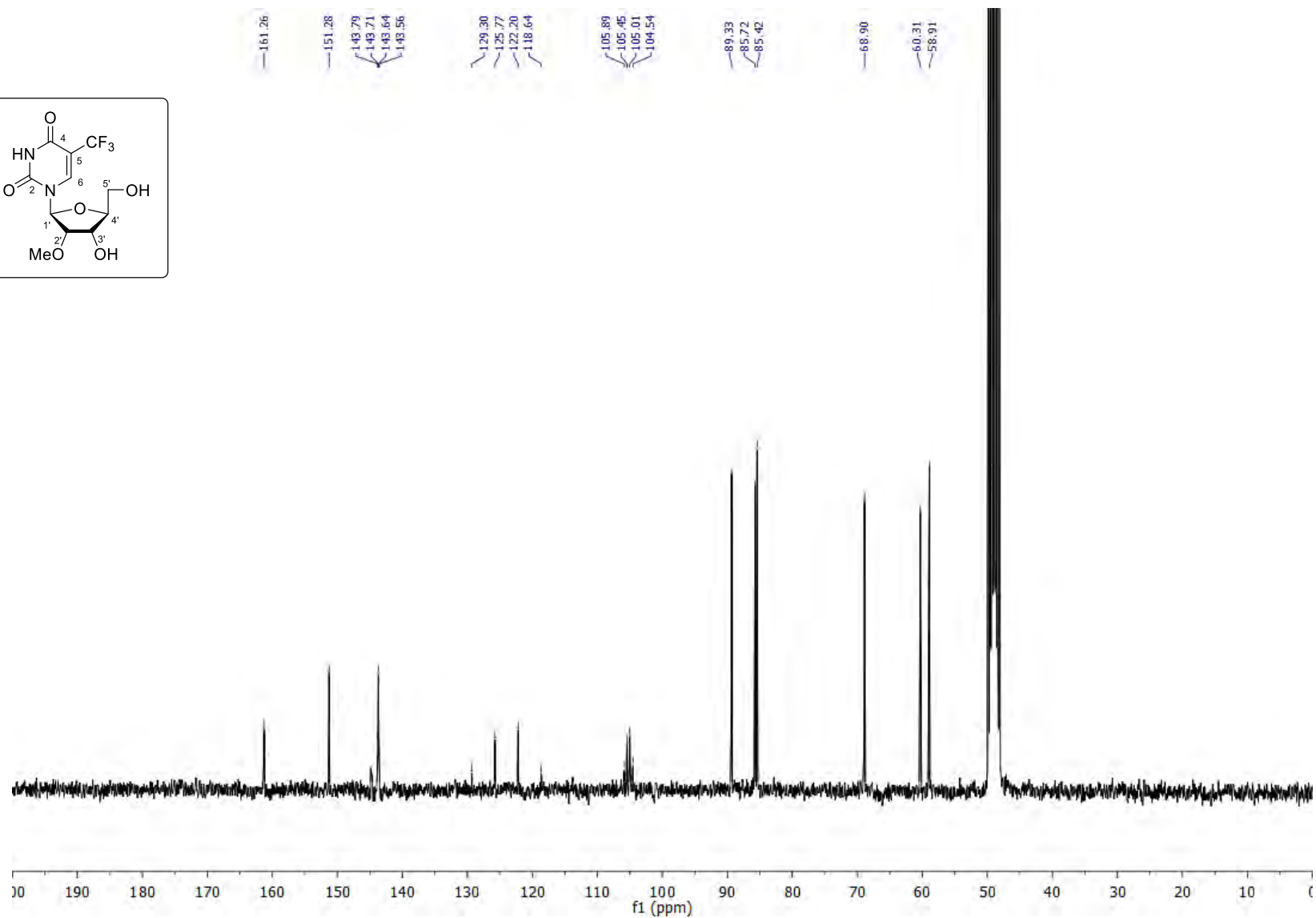
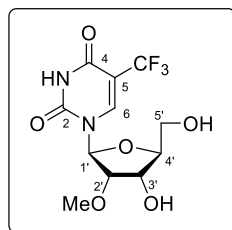
2'-O-Methyl-L-5-trifluoromethyluridine (25)

^1H NMR (300.13 MHz, $\text{MeOD-}d_4$)



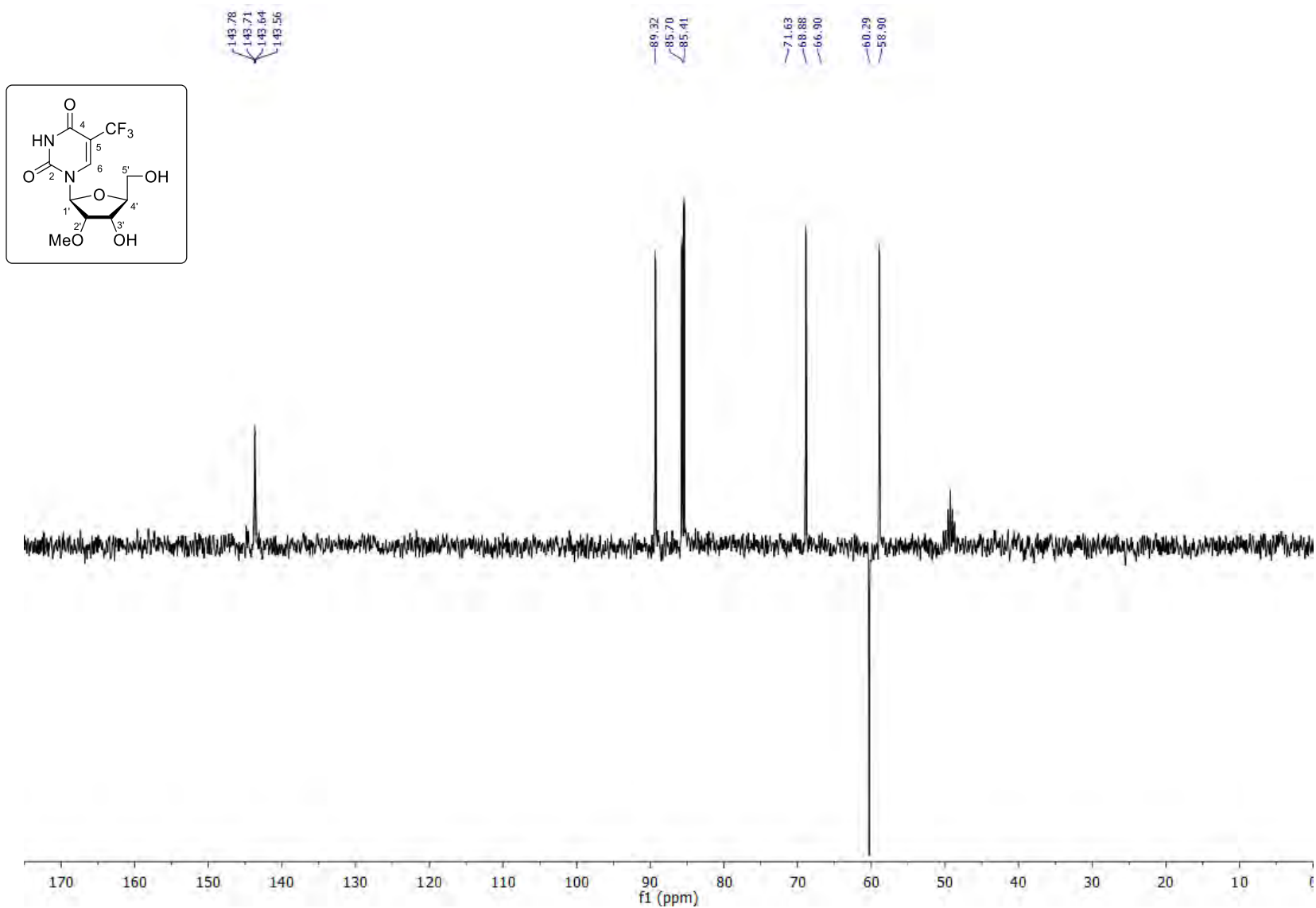
2'-O-Methyl-L-5-trifluoromethyluridine (25)

^{13}C NMR (75.5 MHz, $\text{MeOD-}d_4$)



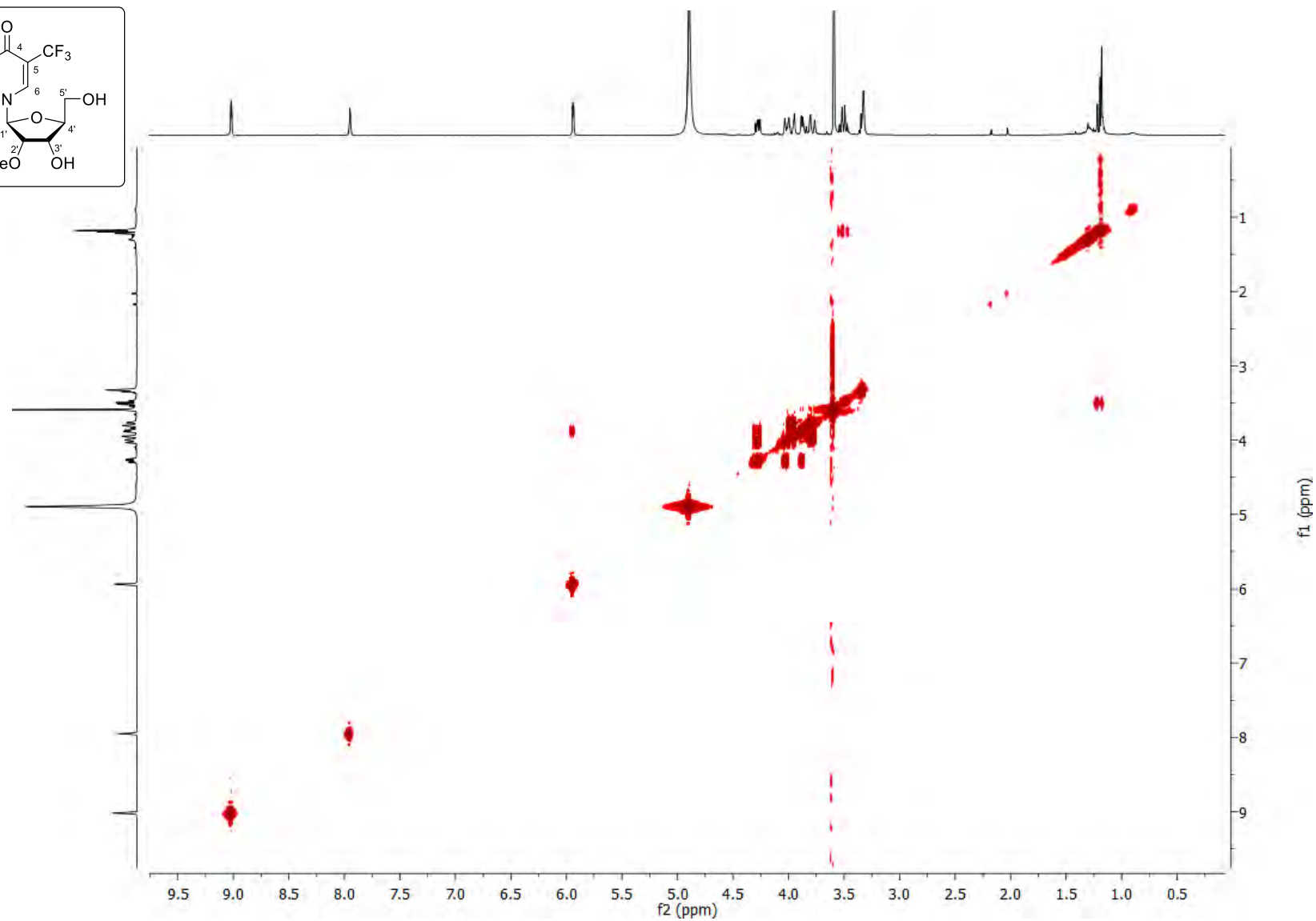
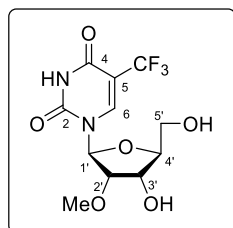
2'-O-Methyl-L-5-trifluoromethyluridine (25)

DEPT NMR (75.5 MHz, MeOD- d_4)



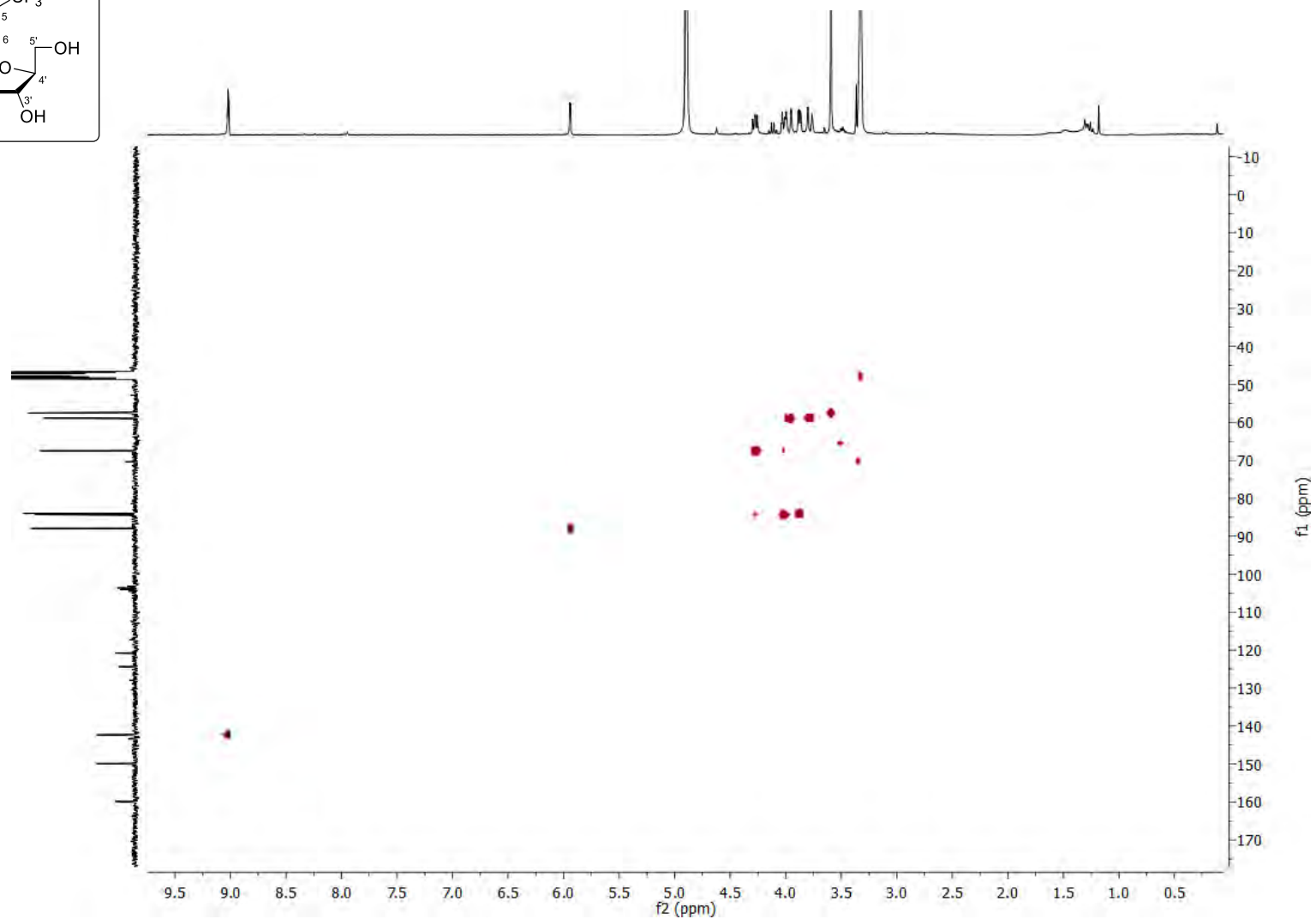
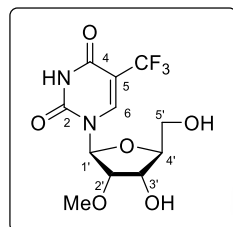
2'-O-Methyl-L-5-trifluoromethyluridine (25)

COSY NMR (MeOD-*d*₄)



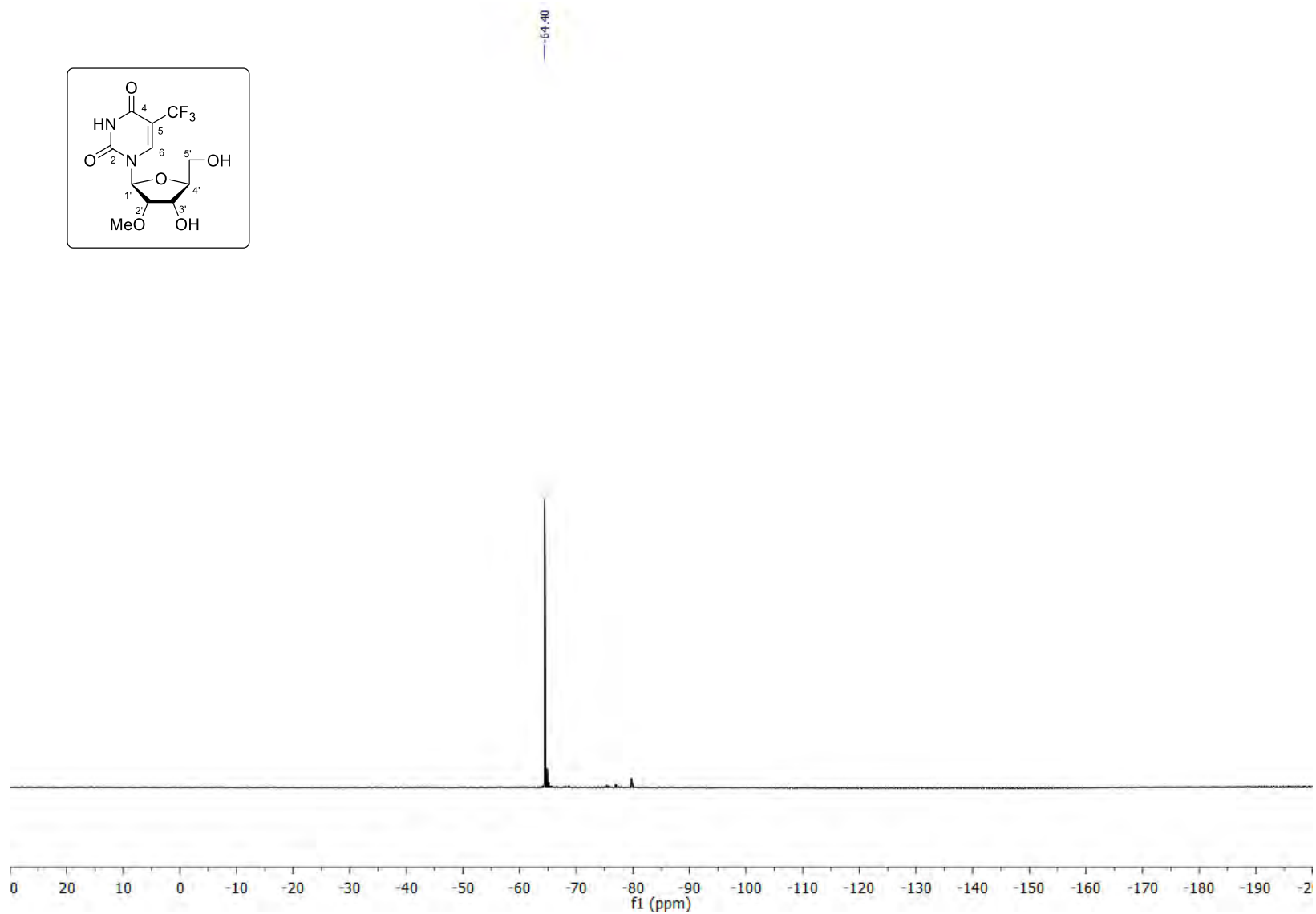
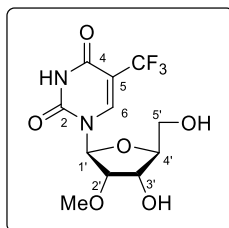
2'-*O*-Methyl-L-5-trifluoromethyluridine (25)

HSQC NMR (MeOD-*d*₄)



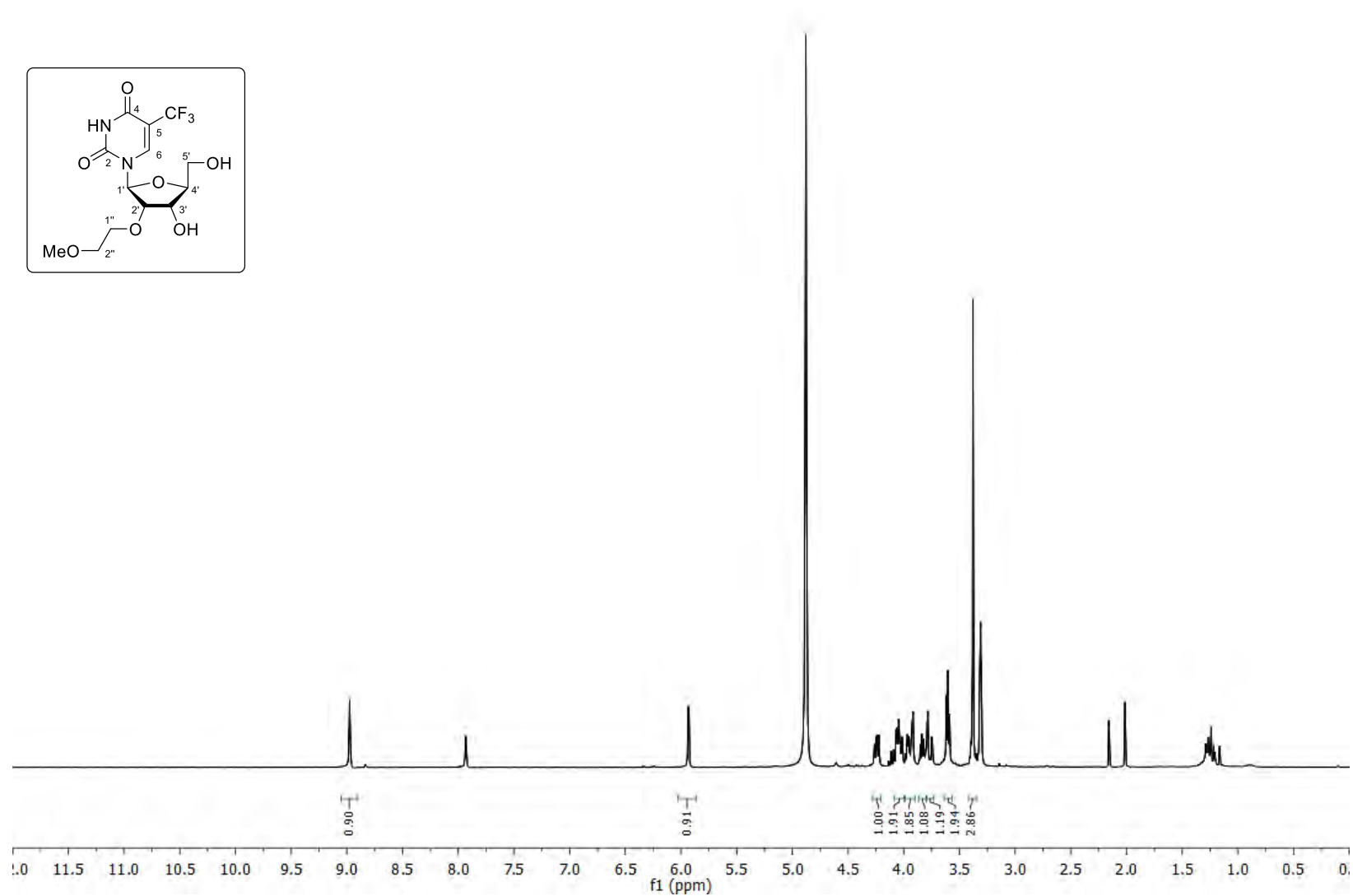
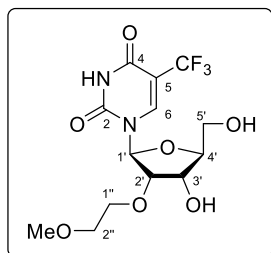
2'-O-Methyl-L-5-trifluoromethyluridine (25)

^{19}F NMR (282 MHz, $\text{MeOD-}d_4$)



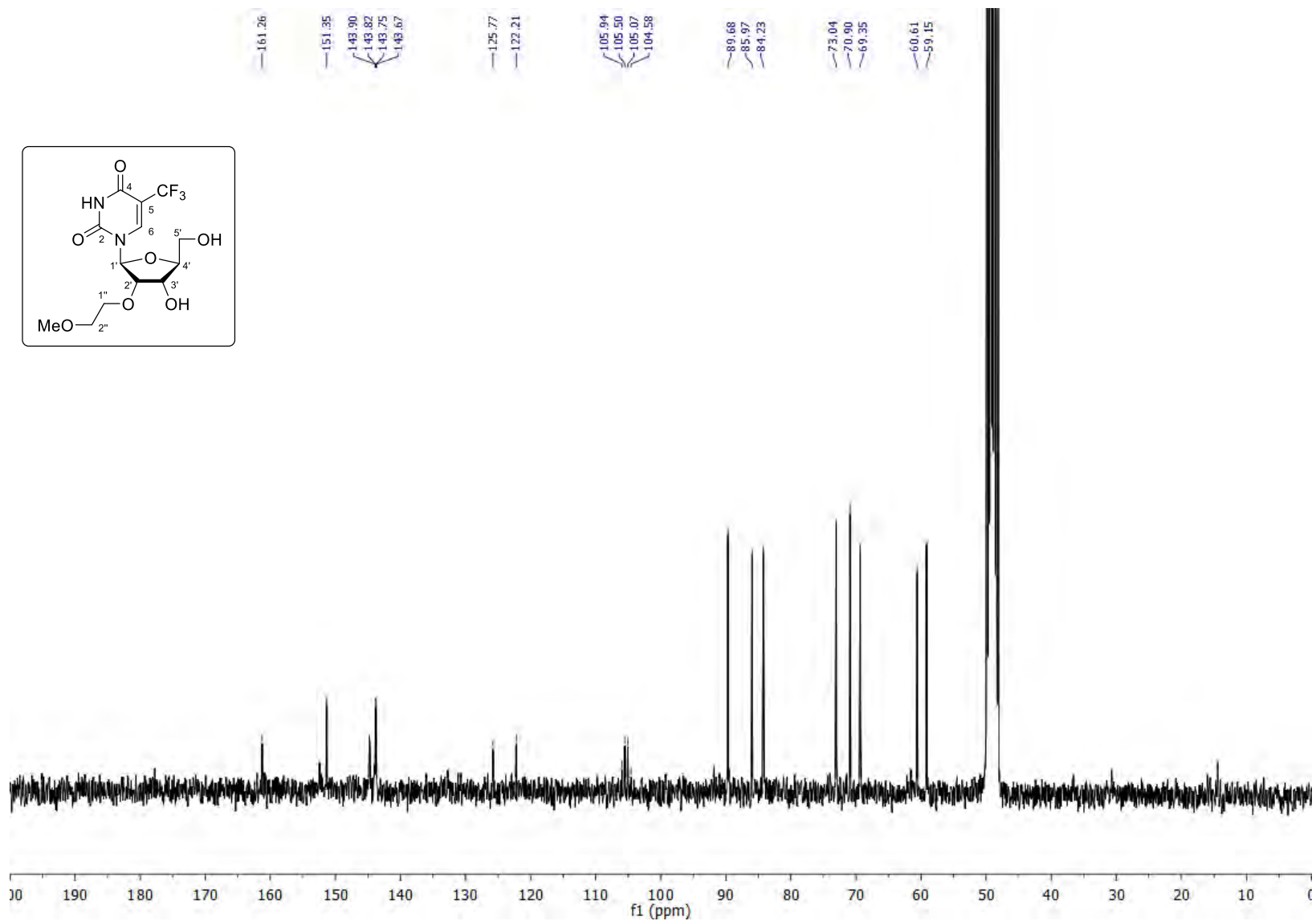
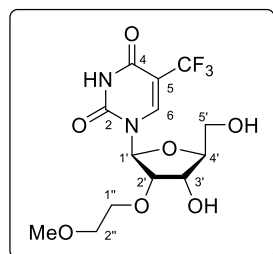
2'-O-(2-Methoxyethyl)-L-5-trifluoromethyluridine (26)

^1H NMR (300.13 MHz, $\text{MeOD-}d_4$)



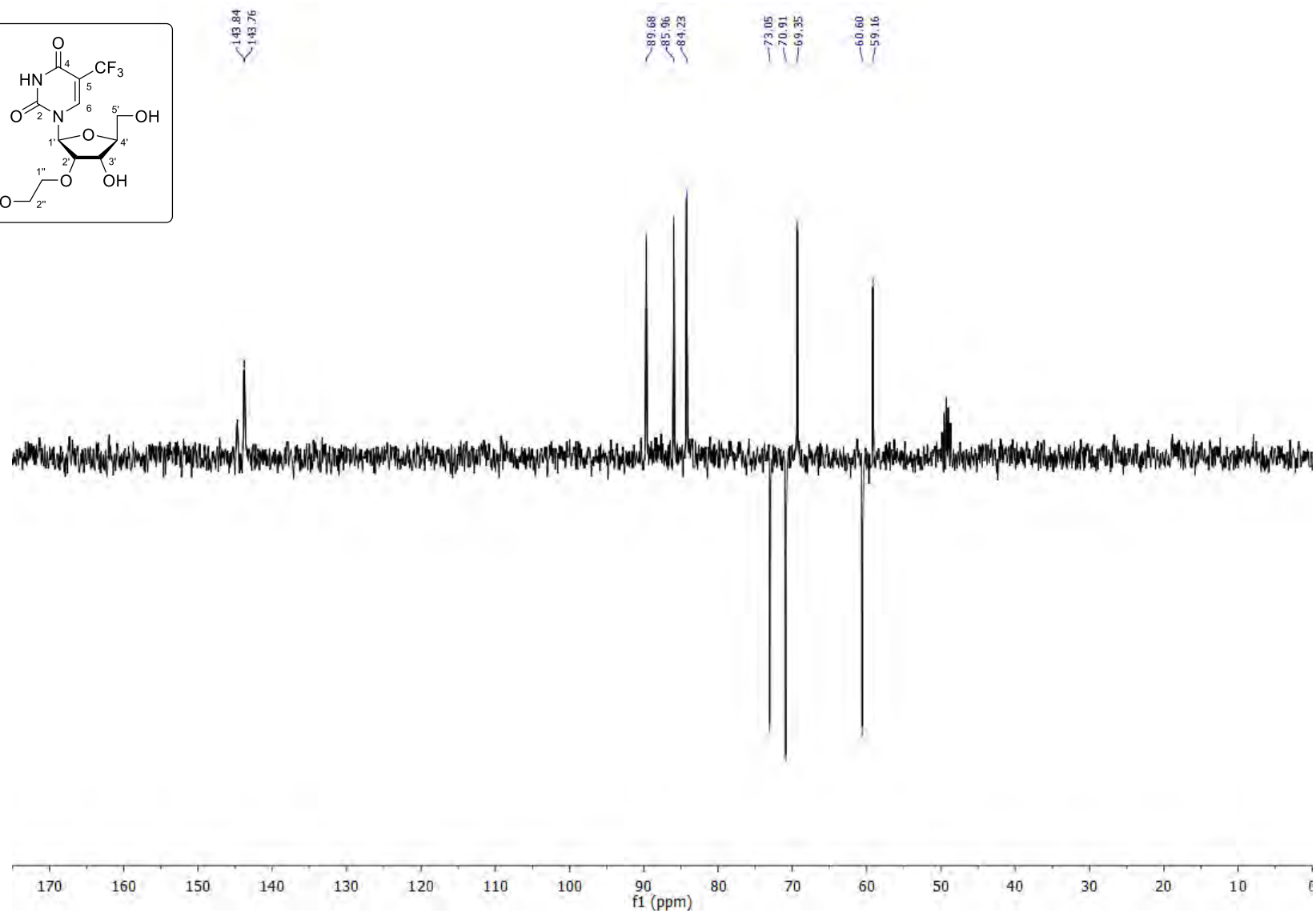
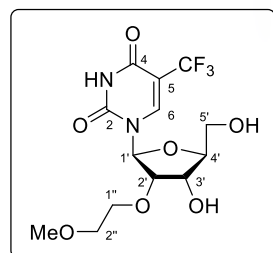
2'-O-(2-Methoxyethyl)-L-5-trifluoromethyluridine (26)

^{13}C NMR (75.5 MHz, $\text{MeOD-}d_4$)



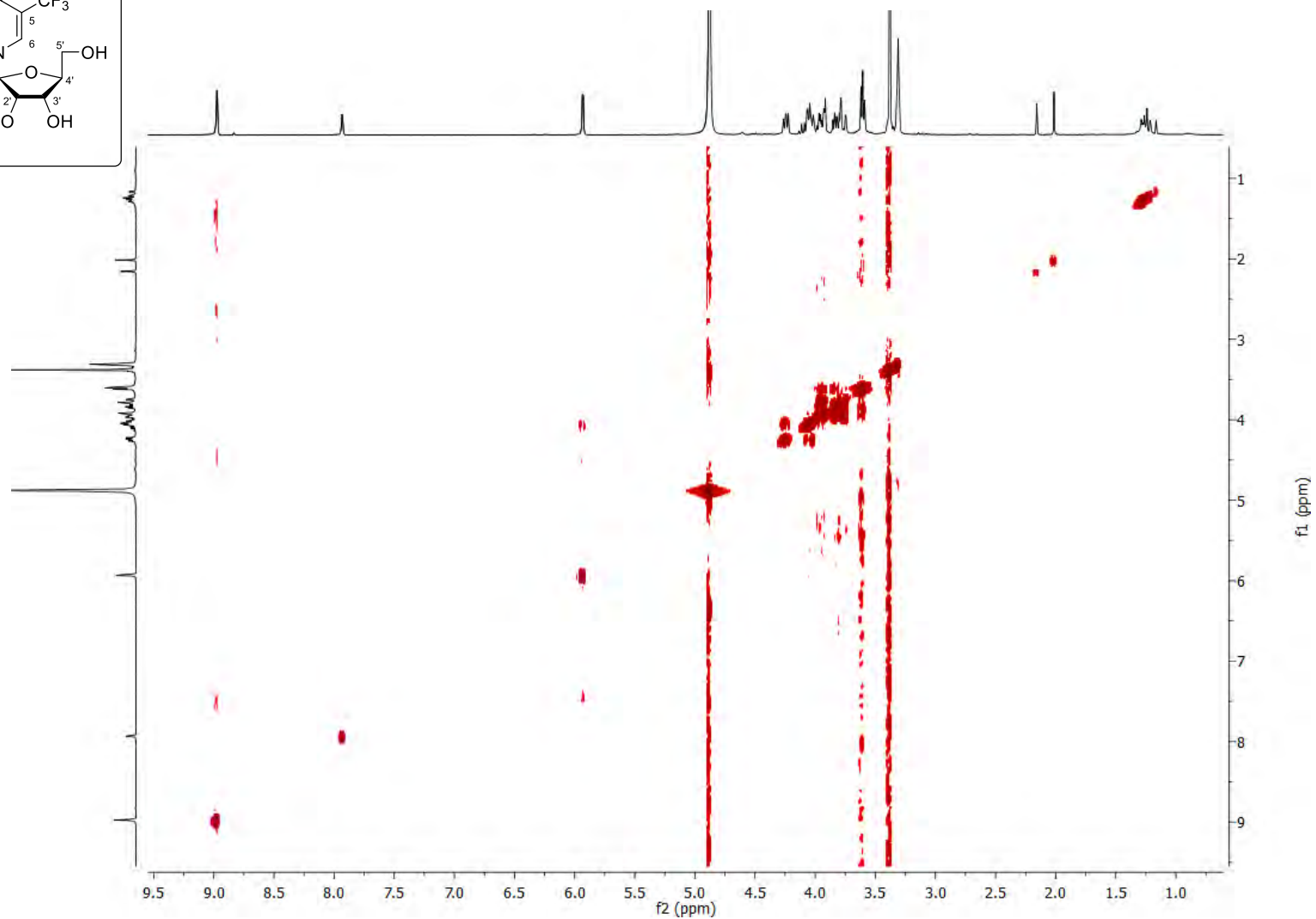
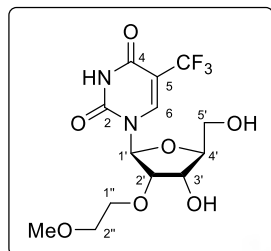
2'-O-(2-Methoxyethyl)-L-5-trifluoromethyluridine (26)

DEPT NMR (75.5 MHz, MeOD-*d*₄)



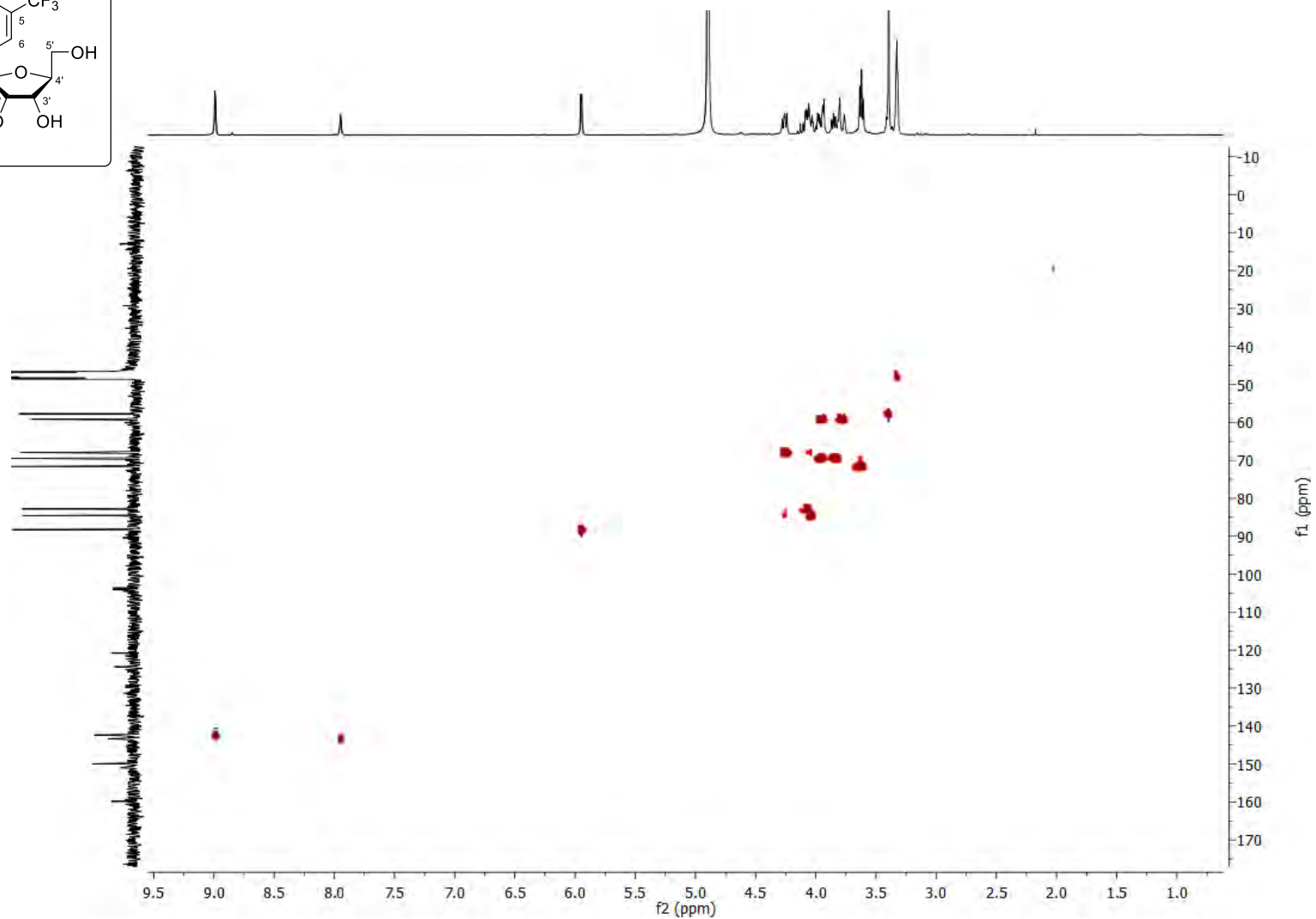
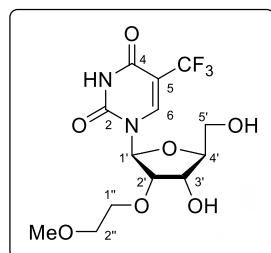
2'-O-(2-Methoxyethyl)-L-5-trifluoromethyluridine (26)

COSY NMR (MeOD- d_4)



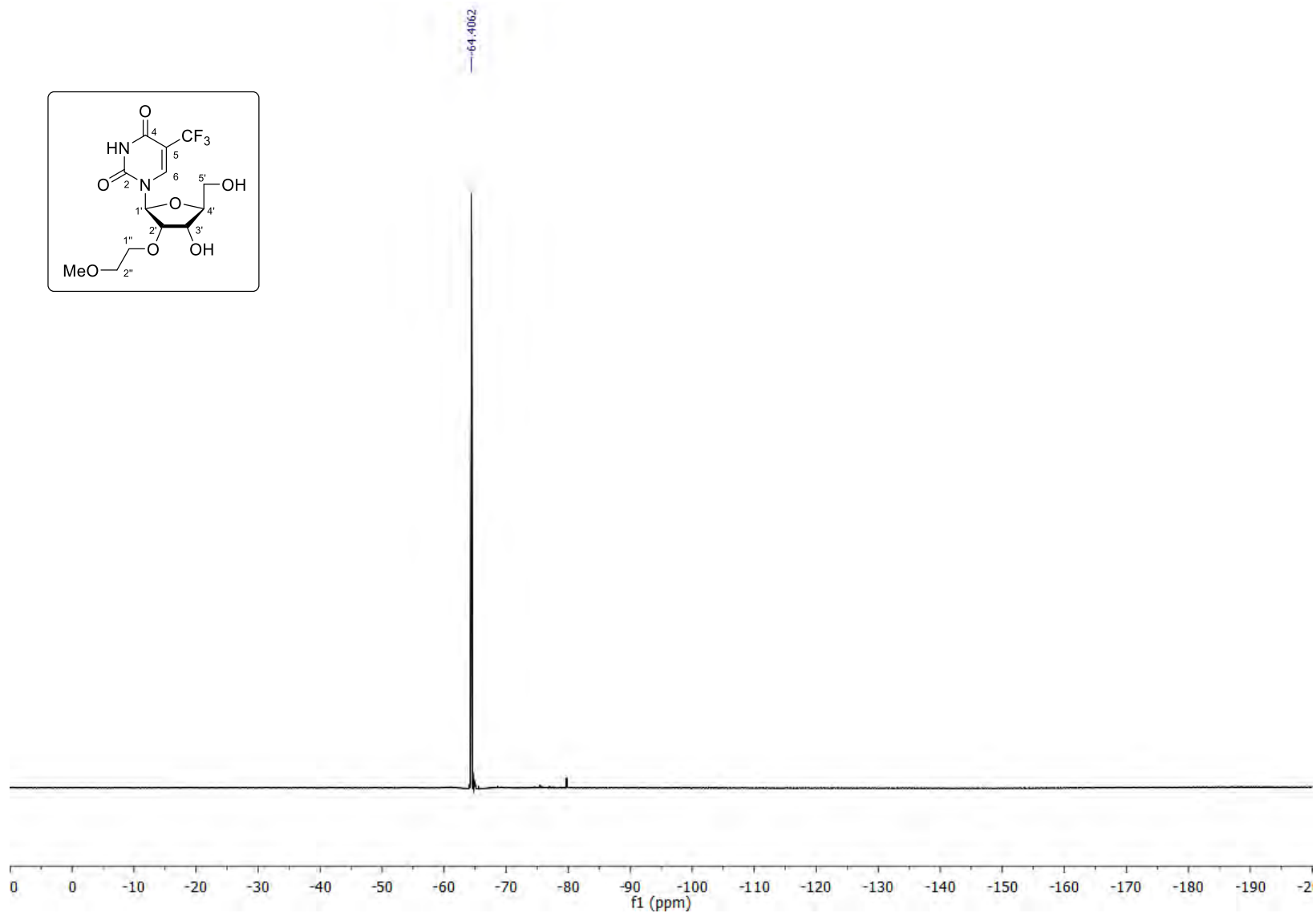
2'-O-(2-Methoxyethyl)-L-5-trifluoromethyluridine (26)

HSQC NMR (MeOD-*d*₄)



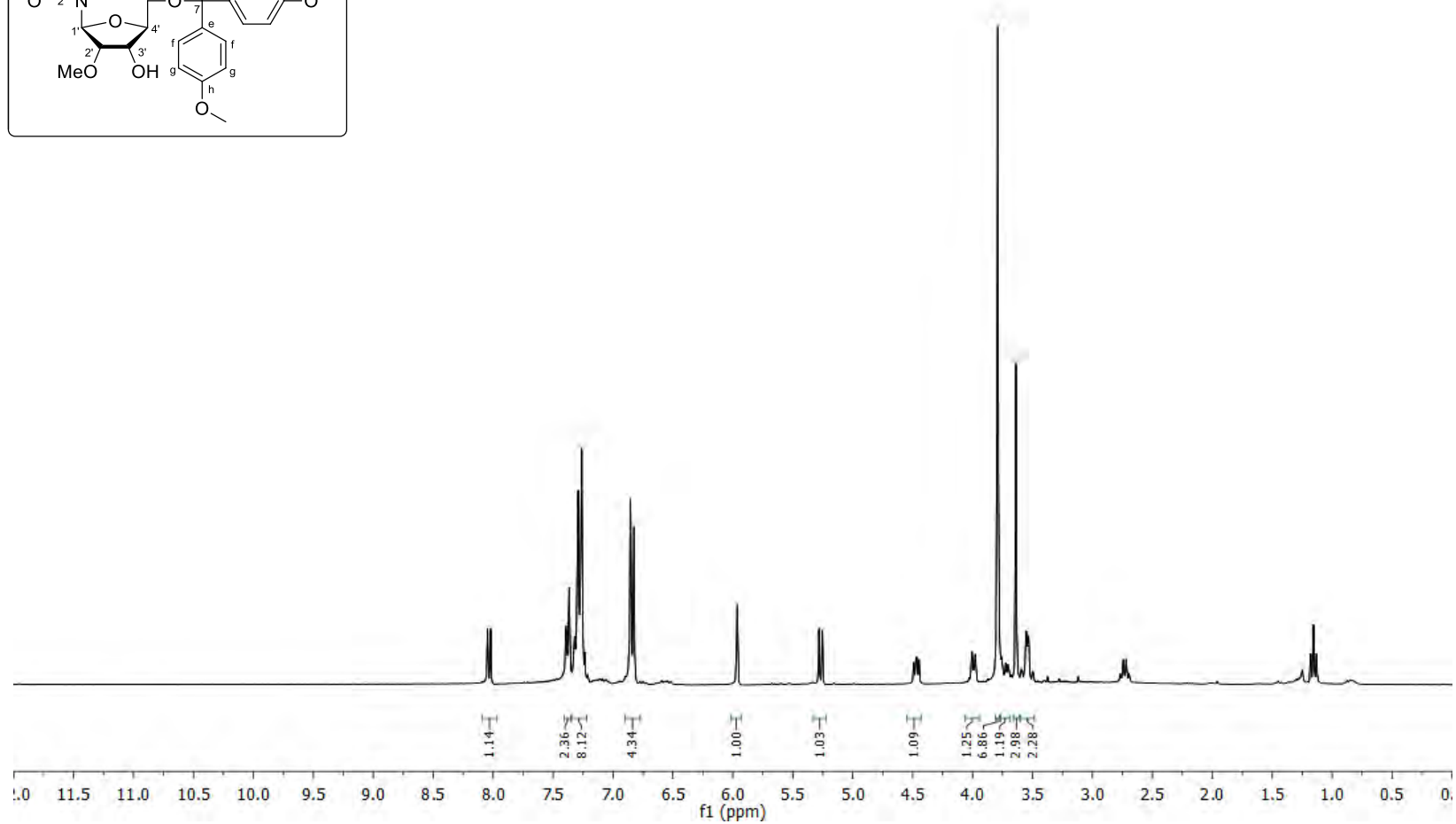
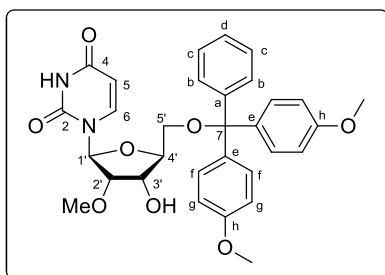
2'-O-(2-Methoxyethyl)-L-5-trifluoromethyluridine (26)

^{19}F NMR (282 MHz, $\text{MeOD-}d_4$)



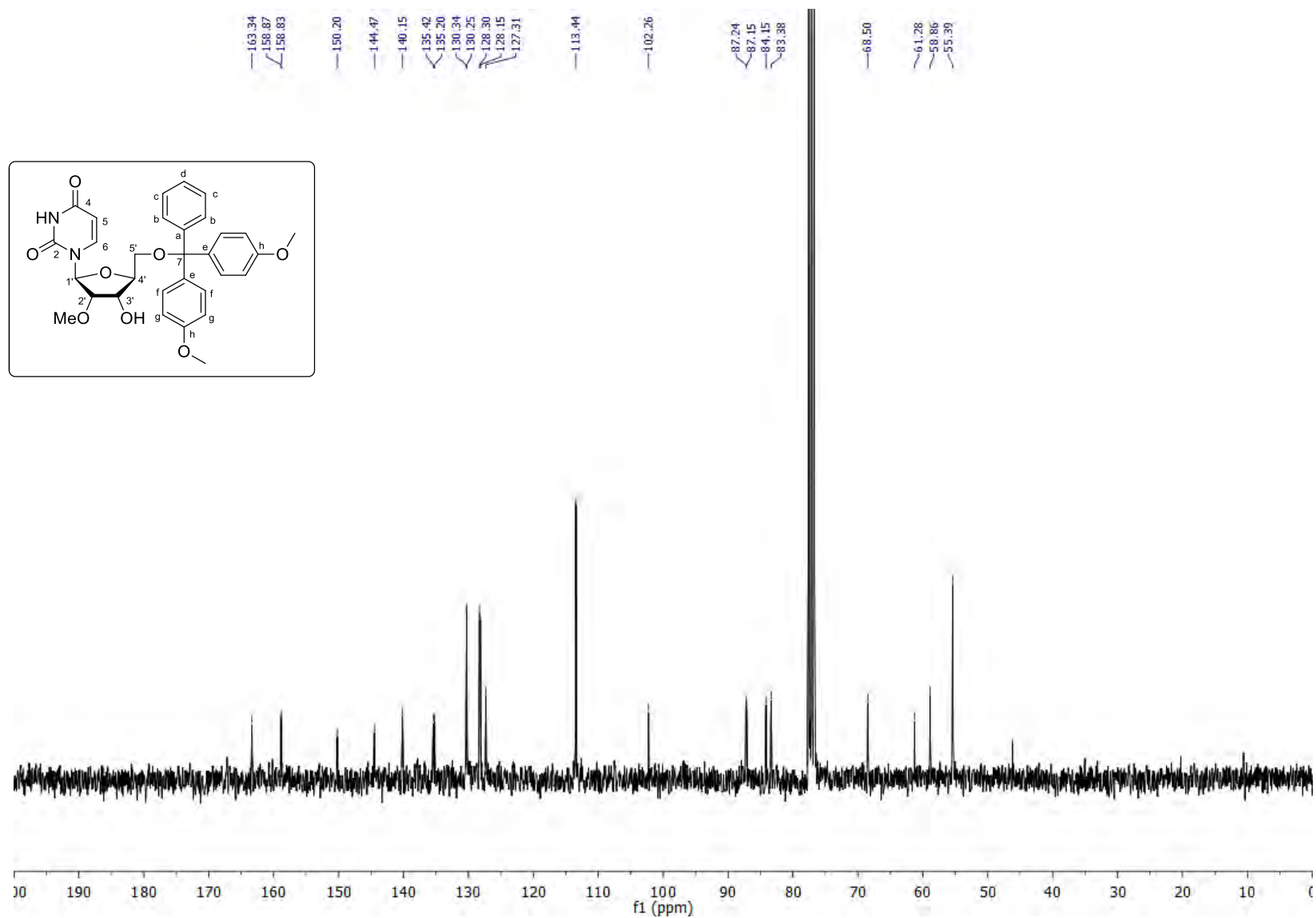
5'-O-(4,4'-Dimethoxytrityl)-2'-O-methyl-L-uridine (27)

¹H NMR (300.13 MHz, CDCl₃)



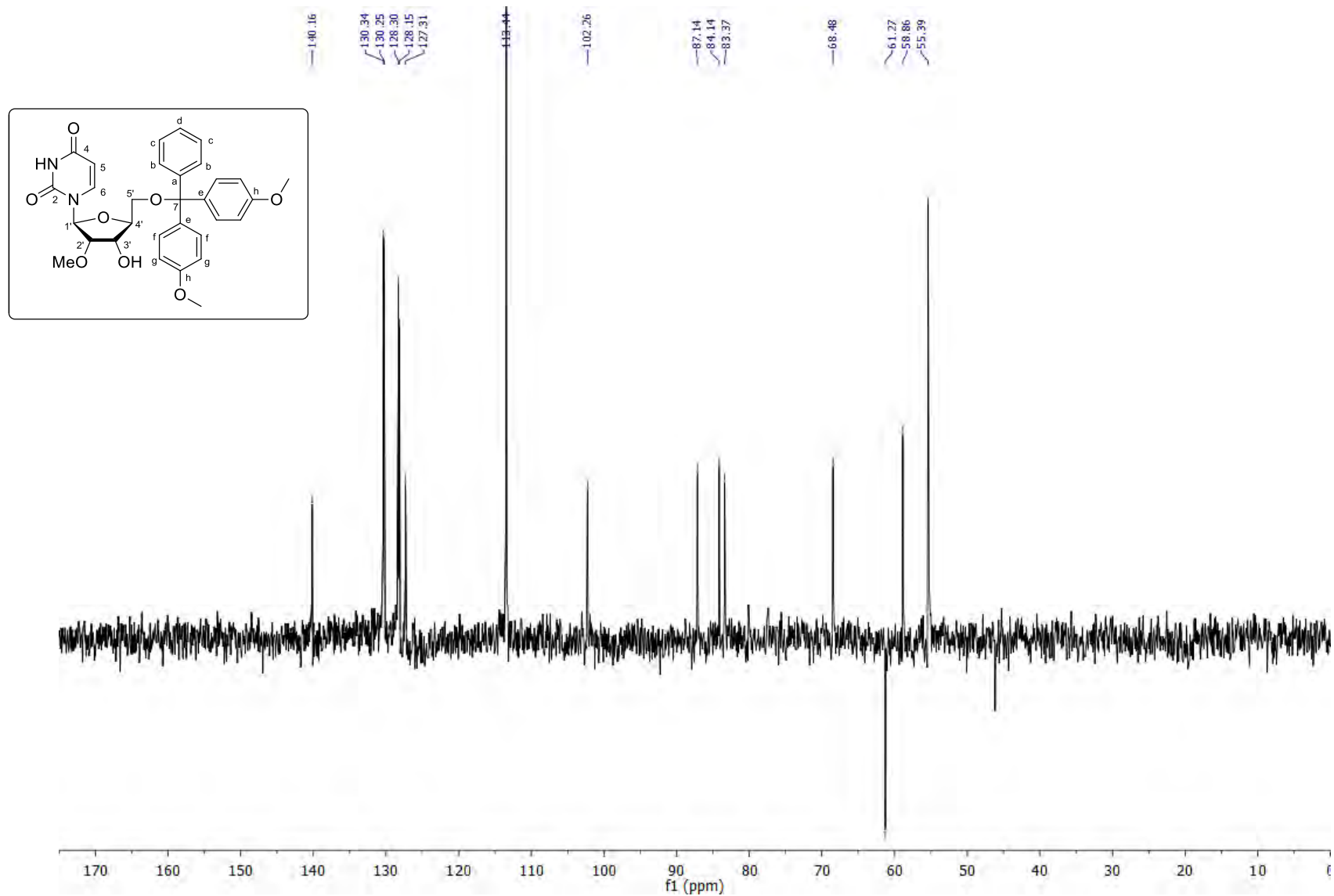
5'-O-(4,4'-Dimethoxytrityl)-2'-O-methyl-L-uridine (27)

^{13}C NMR (75.5 MHz, CDCl_3)



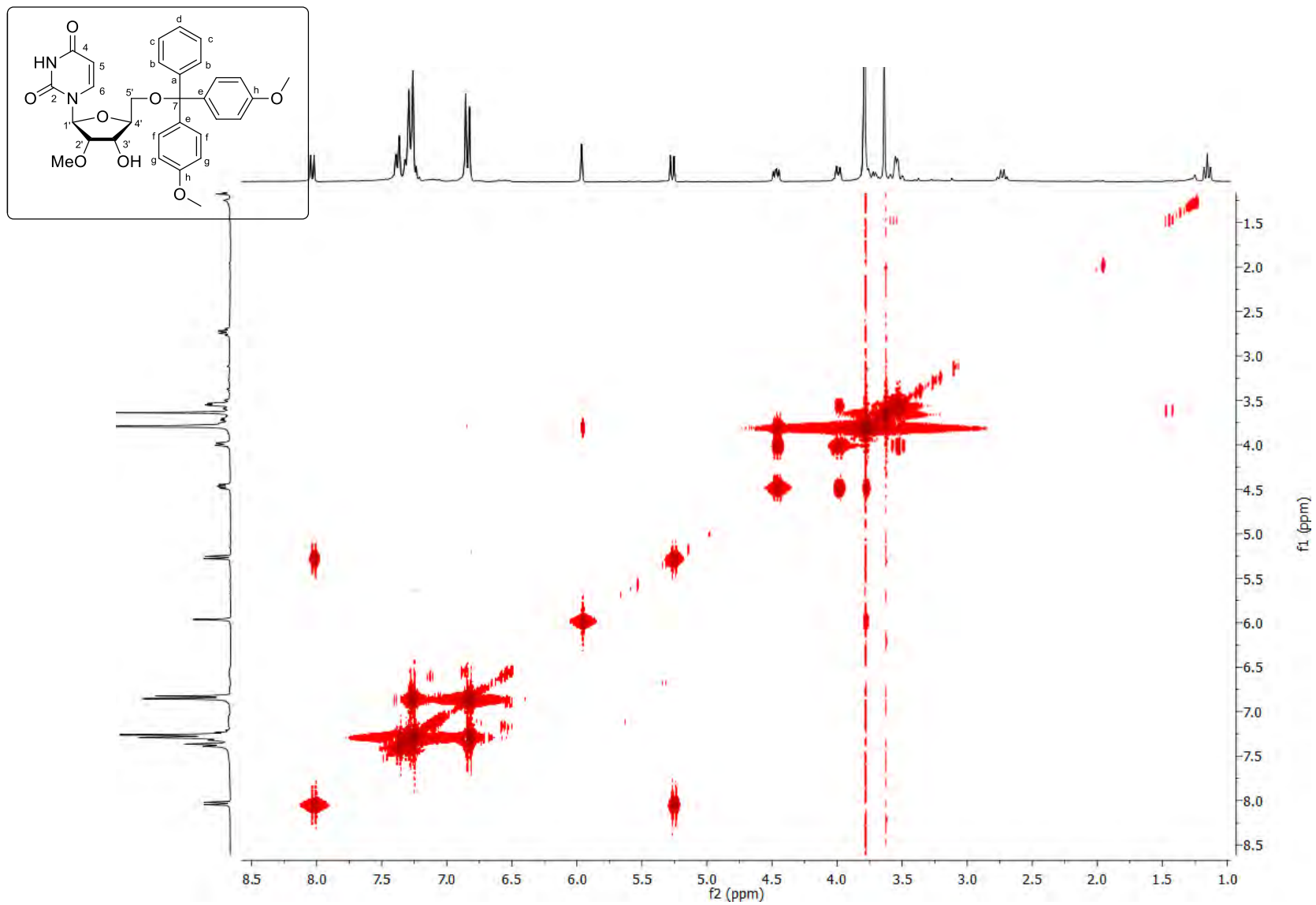
5'-O-(4,4'-Dimethoxytrityl)-2'-O-methyl-L-uridine (27)

DEPT NMR (75.5 MHz, CDCl₃)



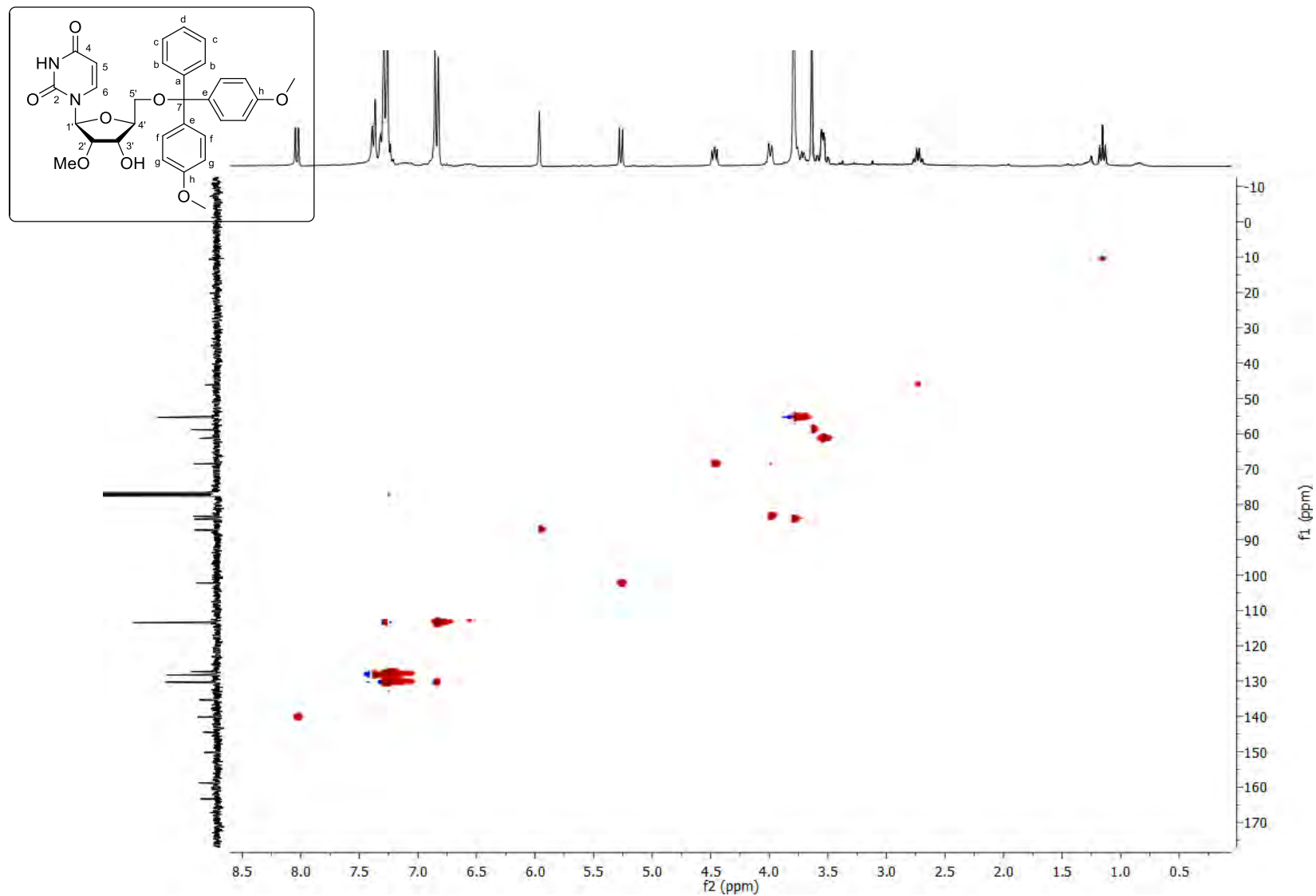
5'-O-(4,4'-Dimethoxytrityl)-2'-O-methyl-L-uridine (27)

COSY NMR (CDCl₃)



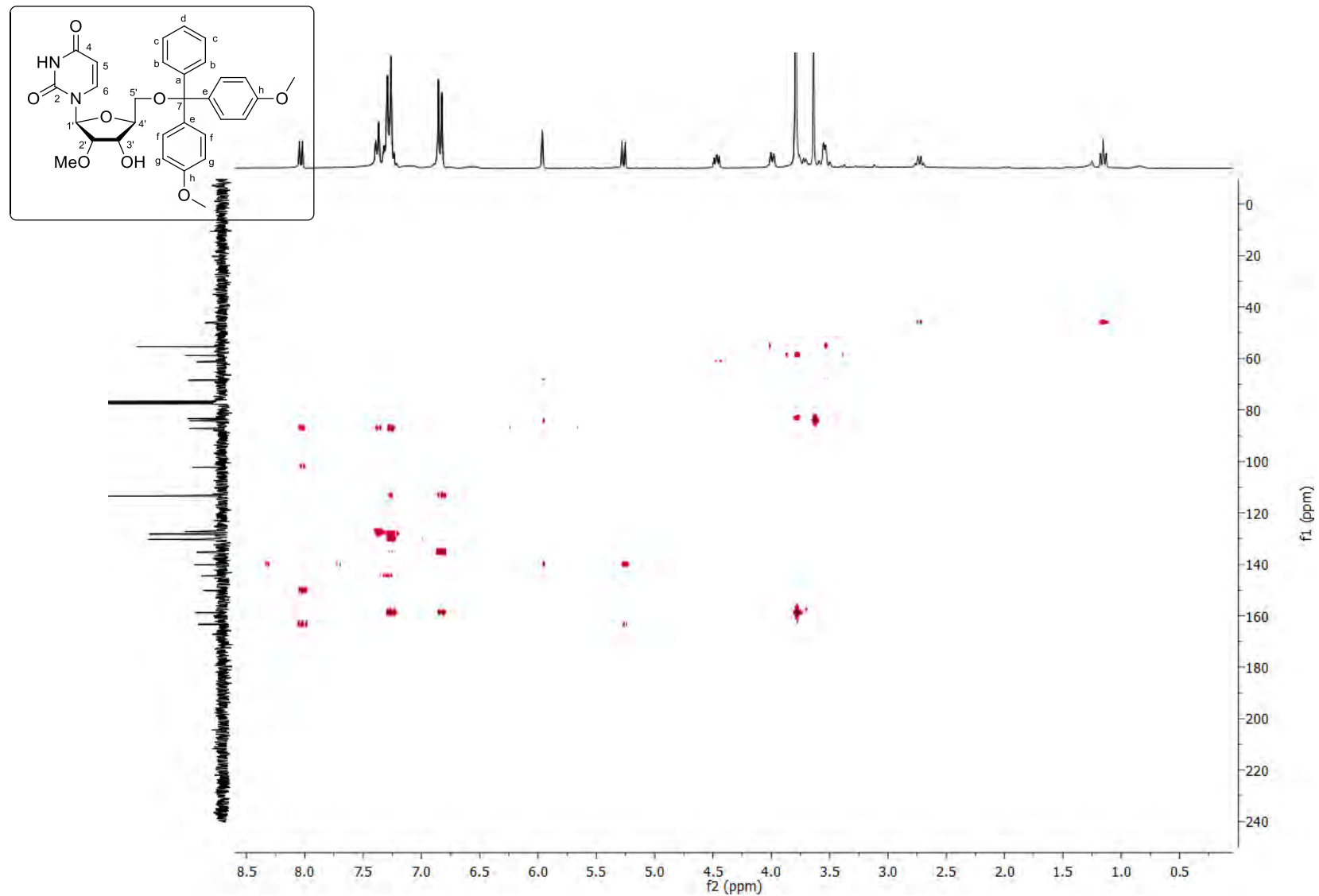
5'-O-(4,4'-Dimethoxytrityl)-2'-O-methyl-L-uridine (27)

HSQC NMR (CDCl₃)



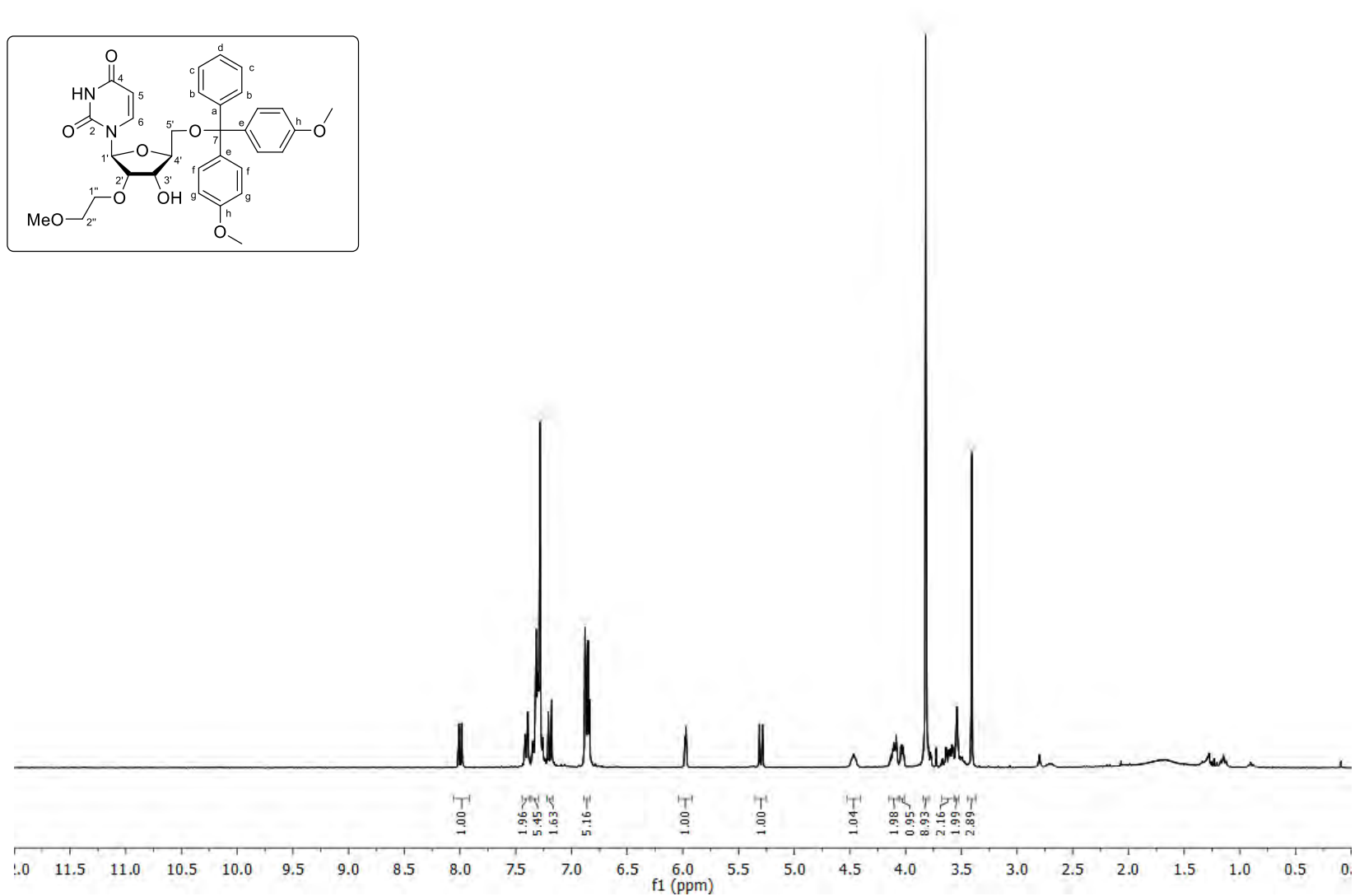
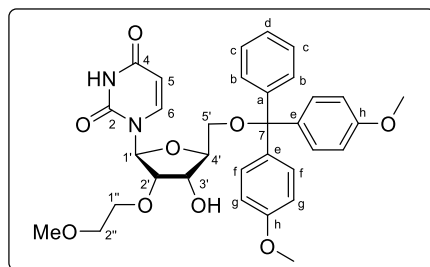
5'-O-(4,4'-Dimethoxytrityl)-2'-O-methyl-L-uridine (27)

HMBC NMR (CDCl₃)



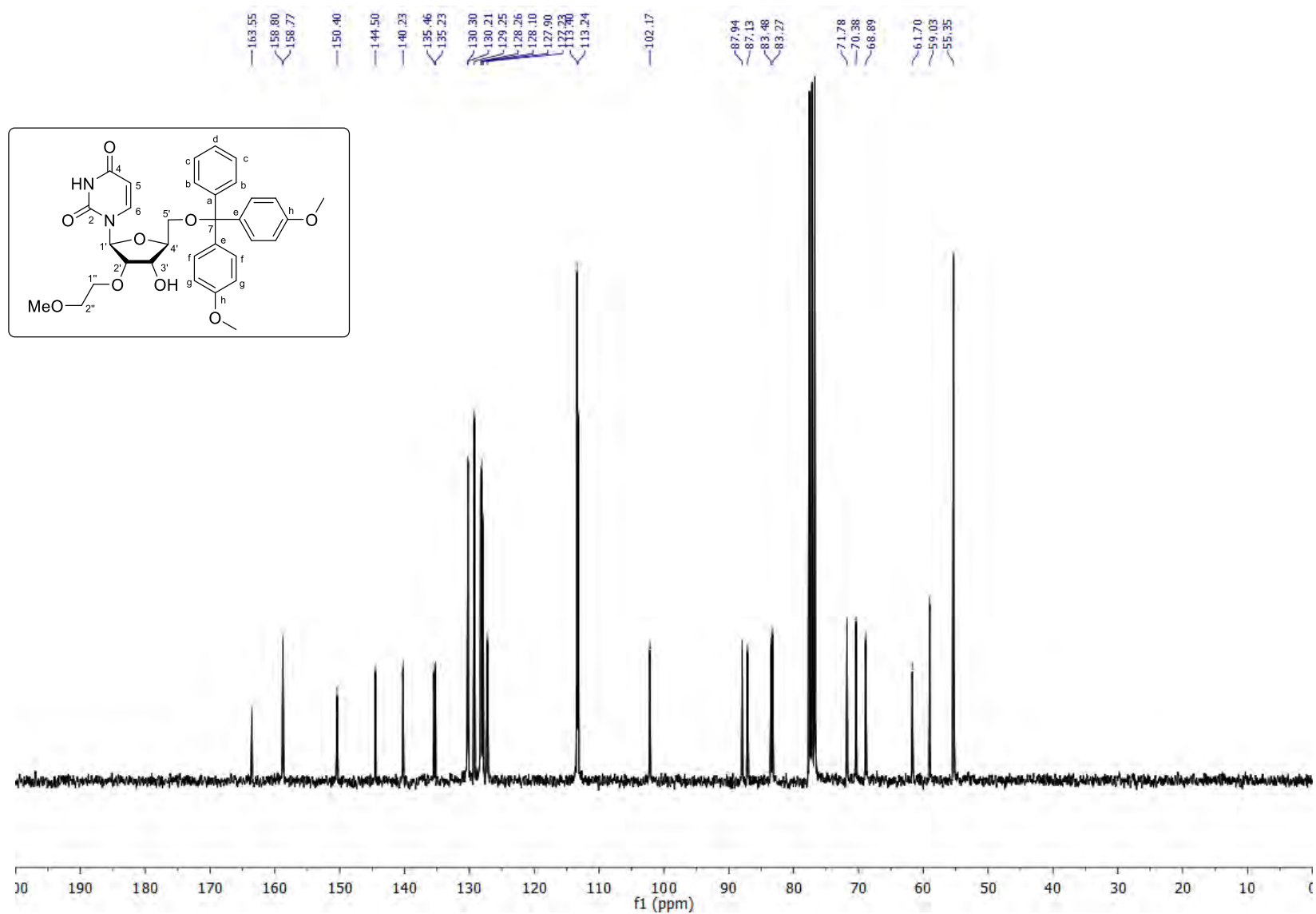
5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-L-uridine (28)

¹H NMR (300.13 MHz, CDCl₃)



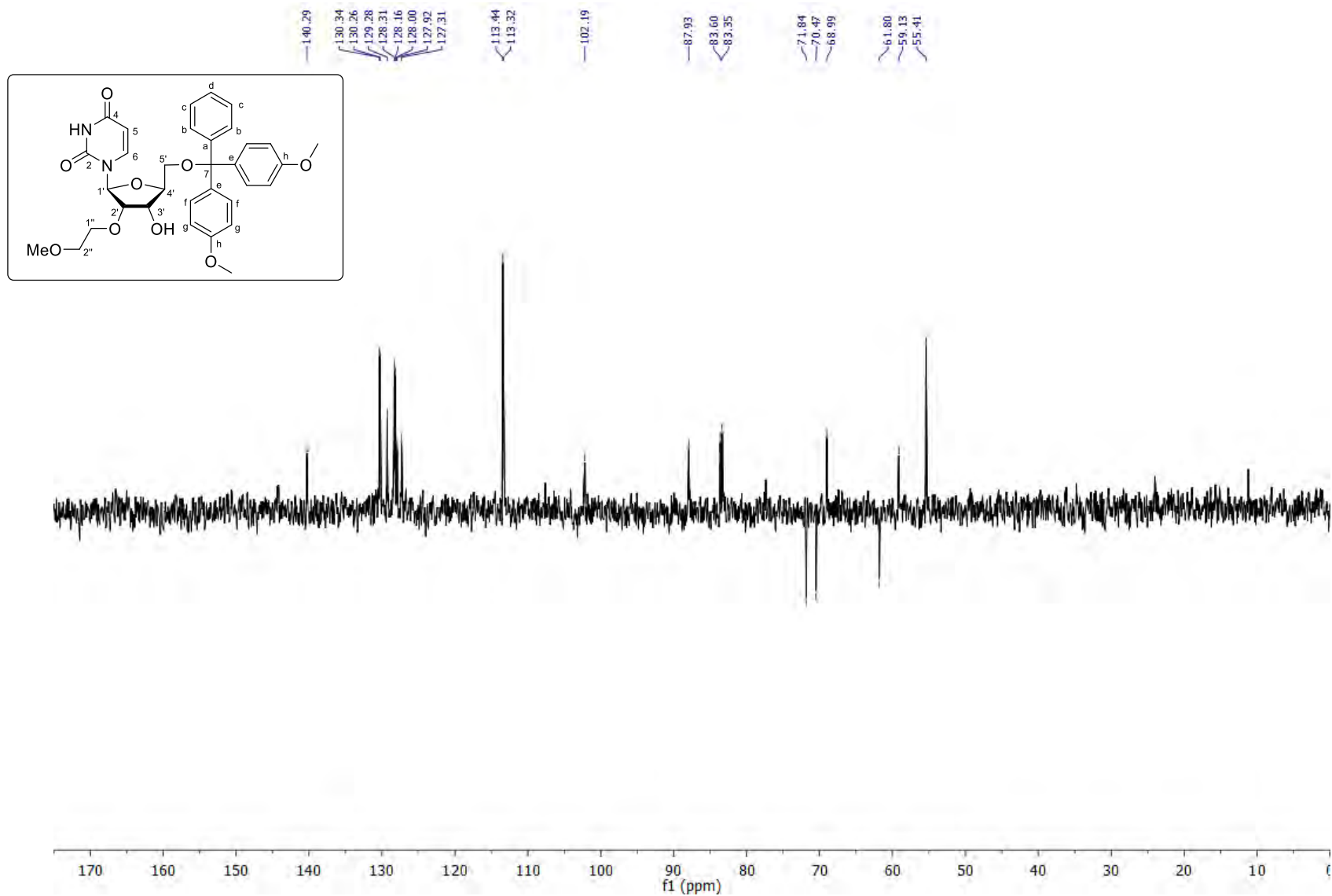
5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-L-uridine (28)

^{13}C NMR (75.5 MHz, CDCl_3)



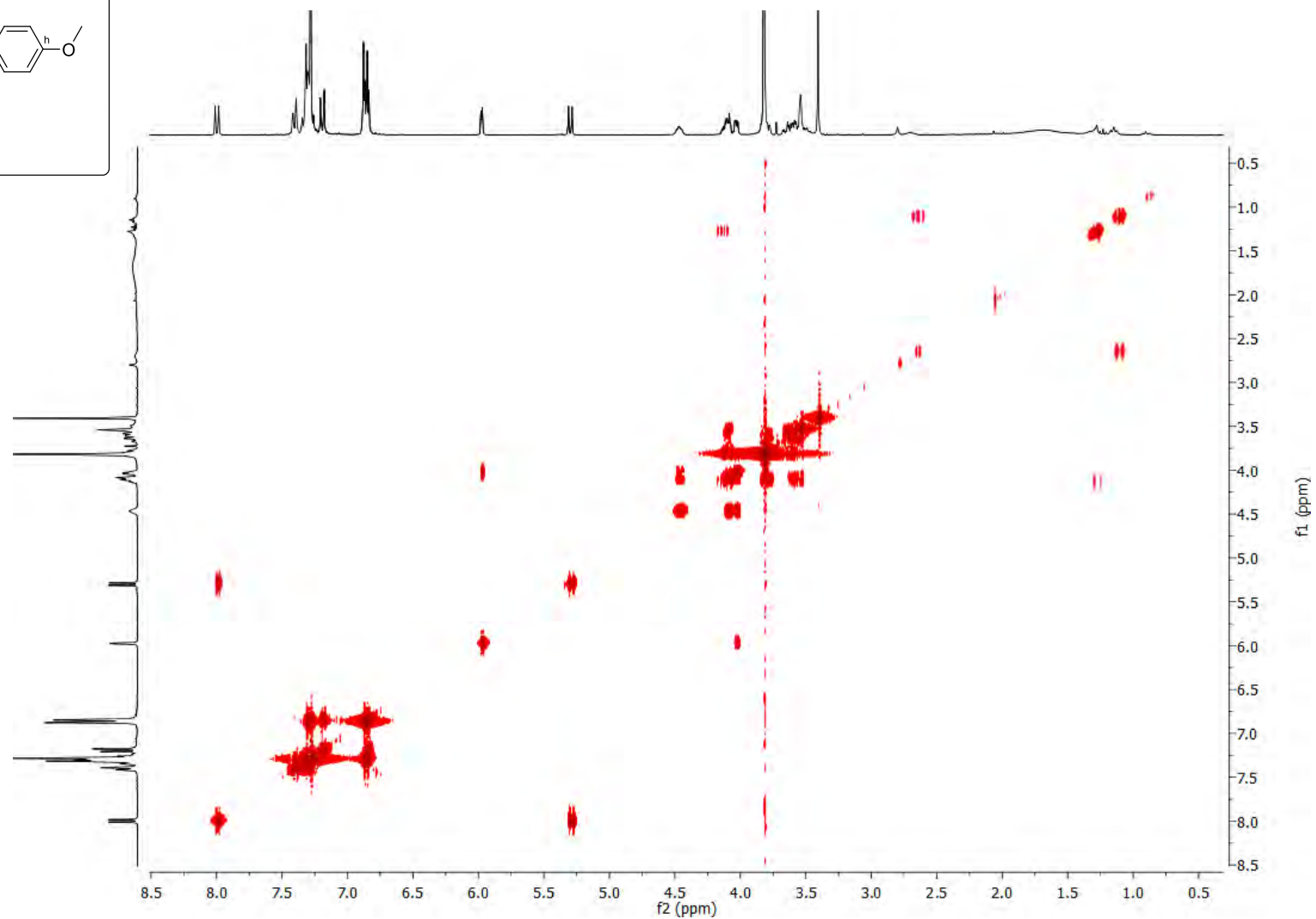
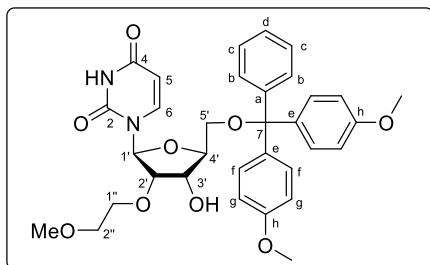
5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-L-uridine (28)

DEPT NMR (75.5 MHz, CDCl₃)



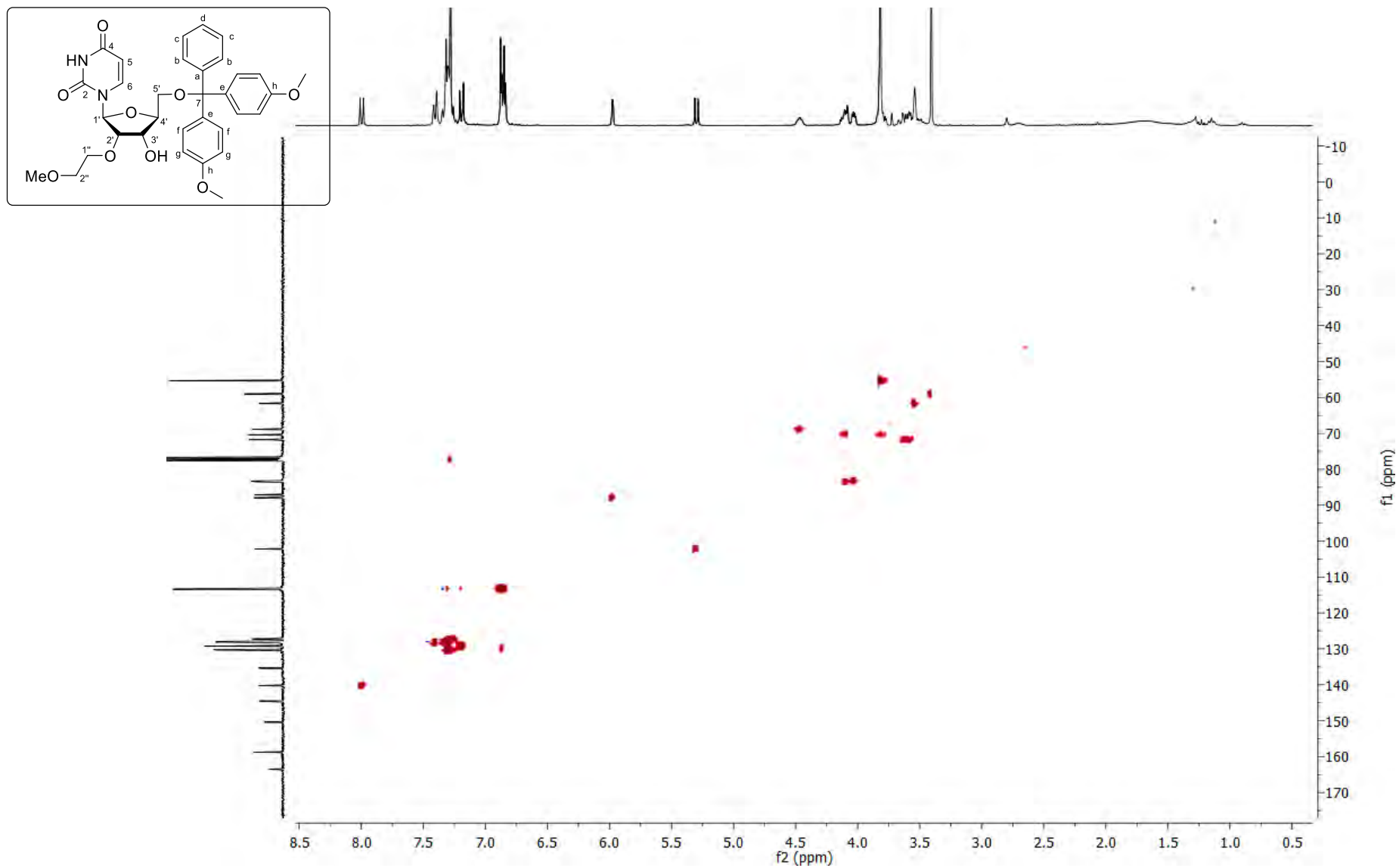
5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-L-uridine (28)

COSY NMR (CDCl₃)



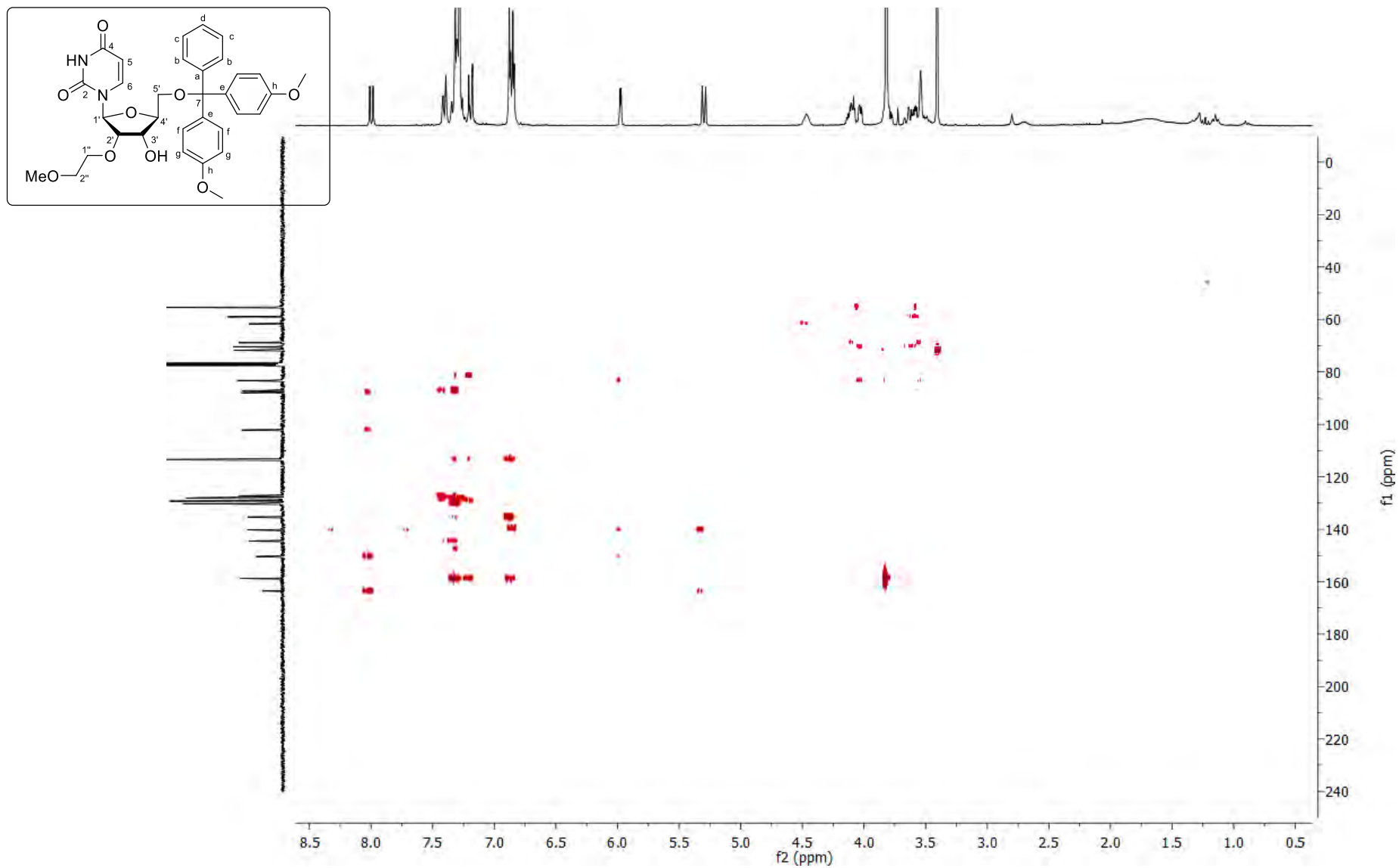
5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-L-uridine (28)

HSQC NMR (CDCl₃)



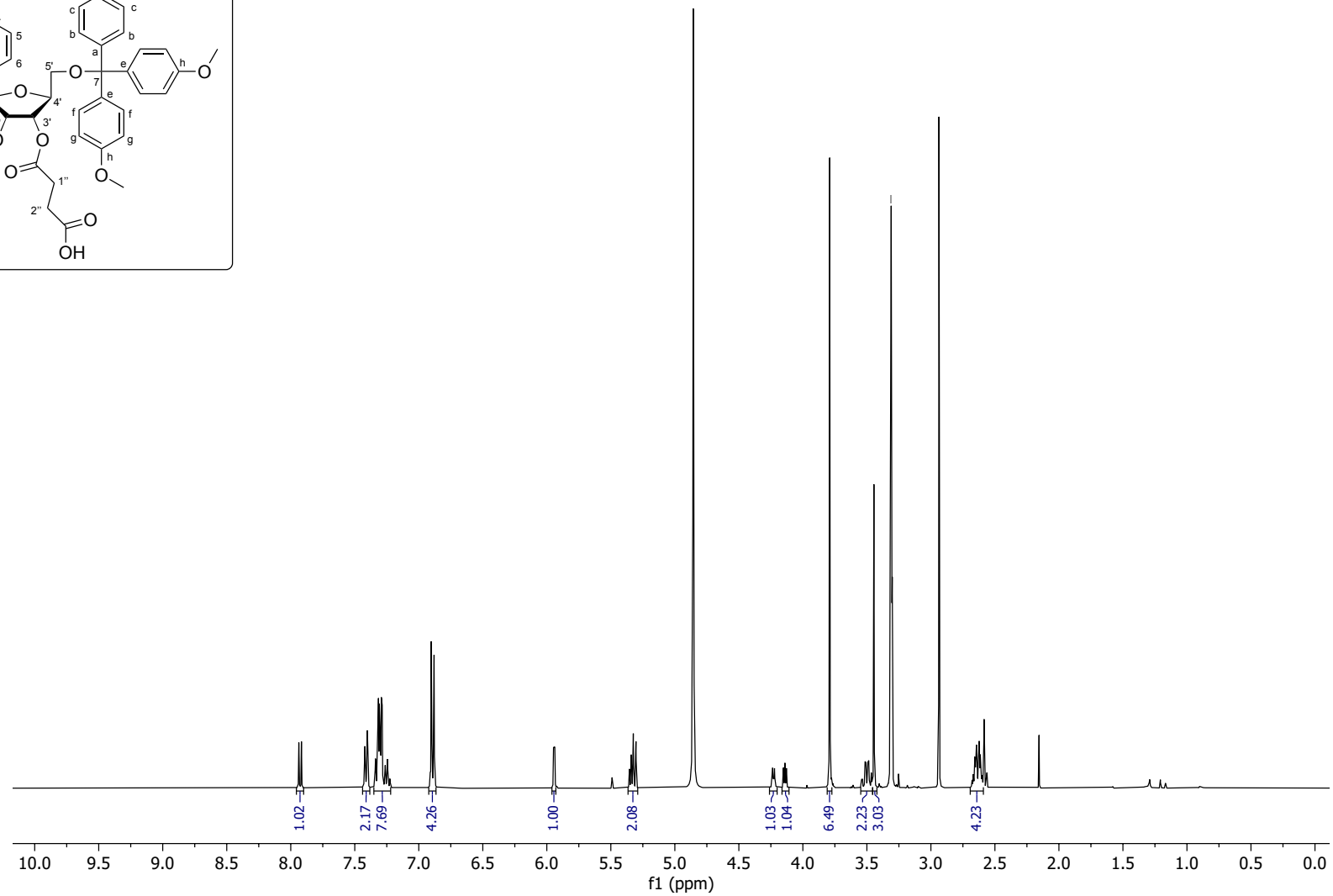
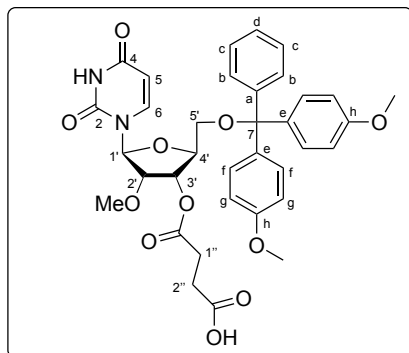
5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-L-uridine (28)

HMBC NMR (CDCl₃)



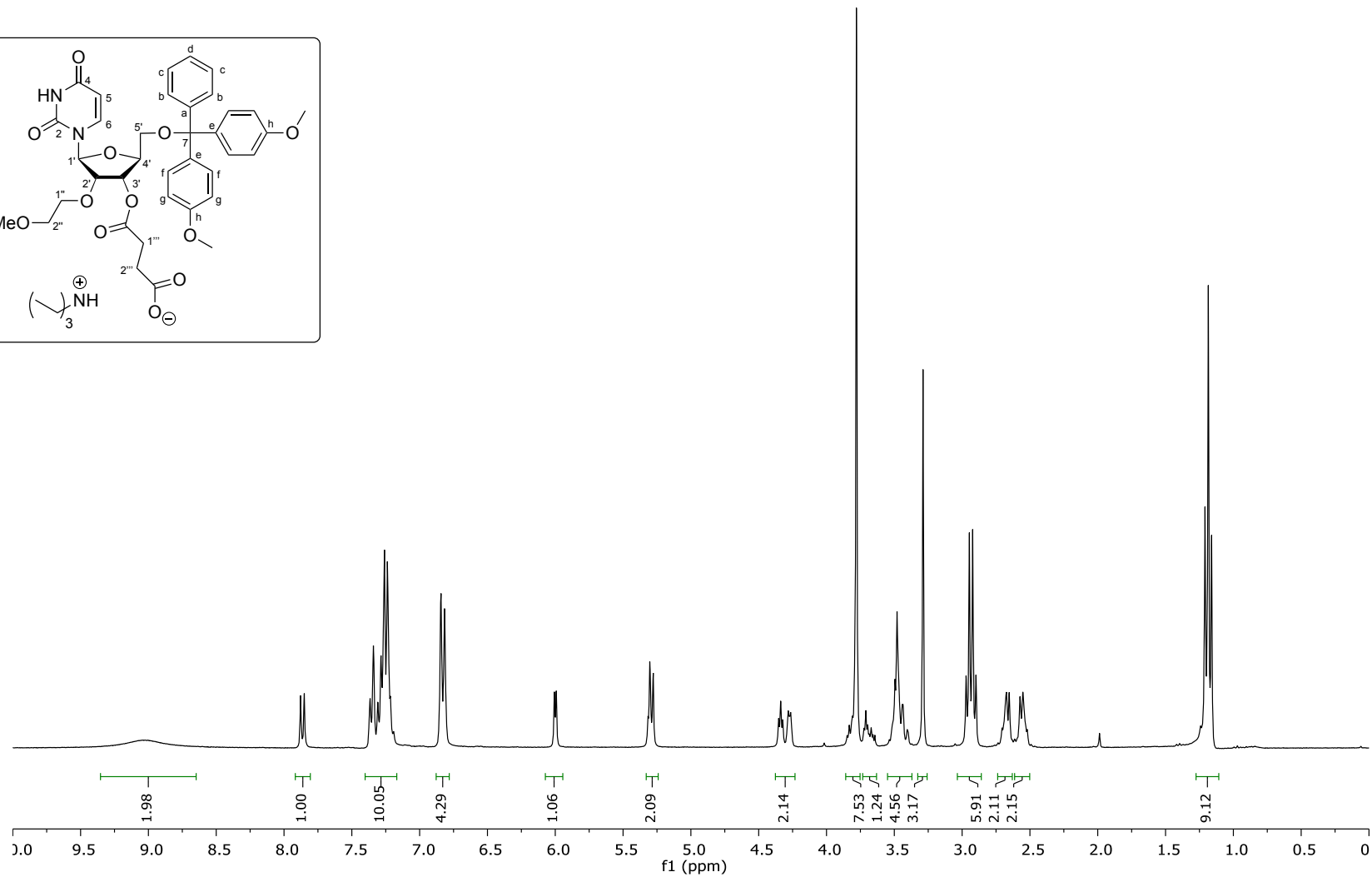
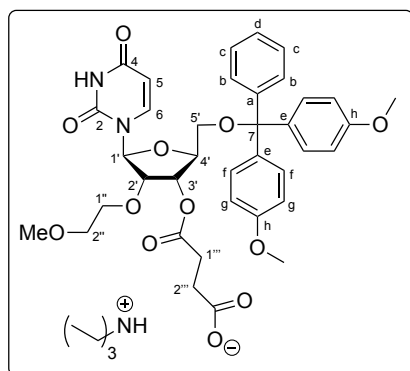
5'-O-(4,4'-Dimethoxytrityl)-2'-O-methyl-3'-O-succinyl-L-uridine (29)

¹H NMR (300.13 MHz, MeOD-*d*₄):



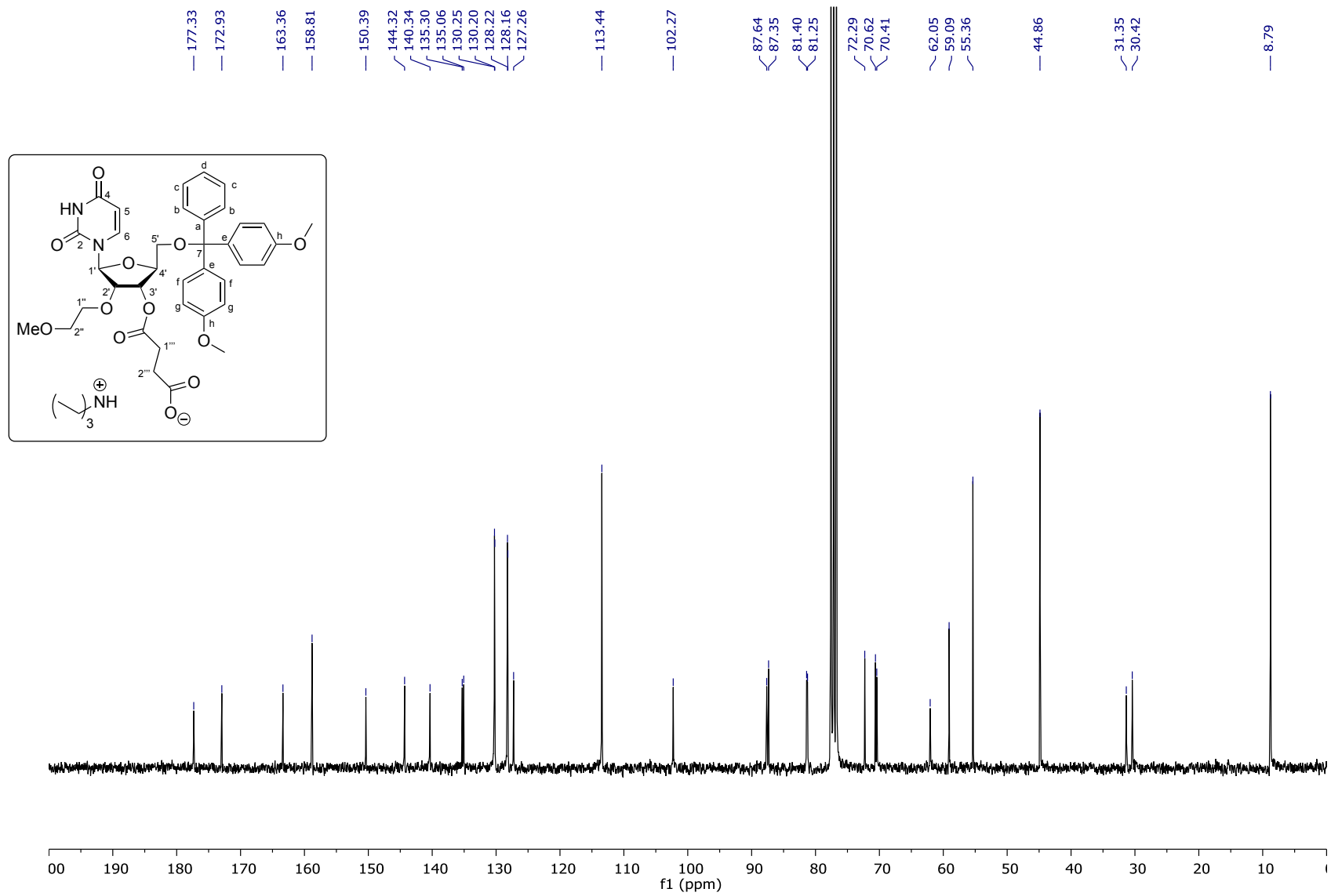
5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-3'-O-succinyl-L-uridine, triethylammonium salt (30)

¹H NMR (300.13 MHz, CDCl₃)



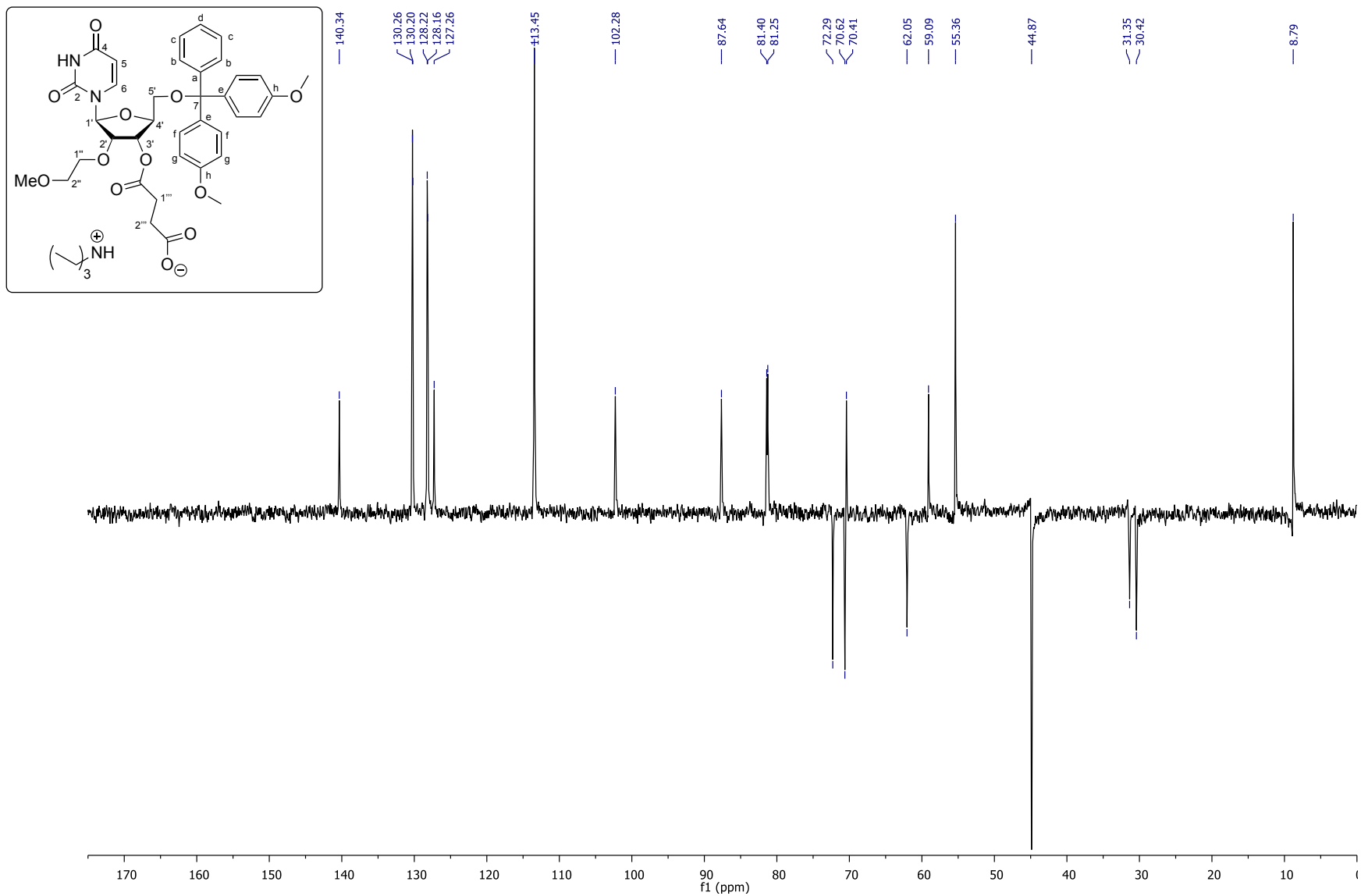
5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-3'-O-succinyl-L-uridine, triethylammonium salt (30)

^{13}C NMR (75.5 MHz, CDCl_3)



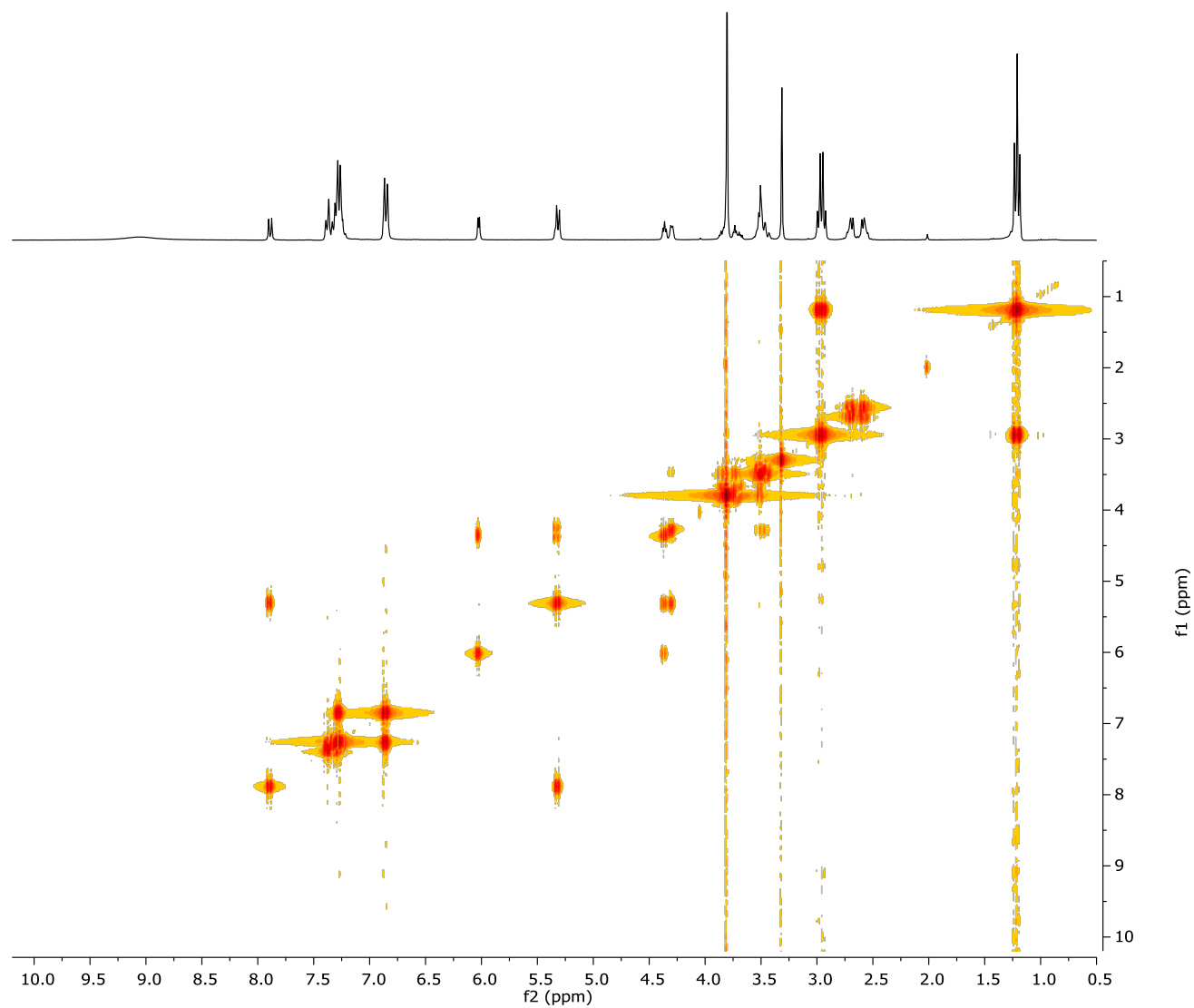
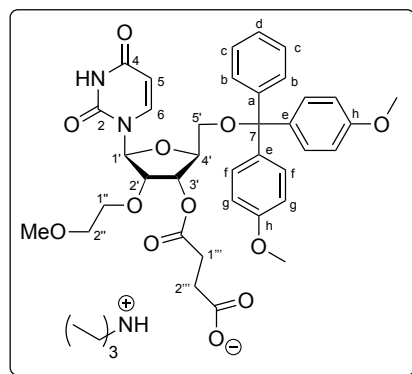
5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-3'-O-succinyl-L-uridine, triethylammonium salt (30)

DEPT NMR (75.5 MHz, CDCl₃)



5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-3'-O-succinyl-L-uridine, triethylammonium salt (30)

COSY NMR (CDCl₃)



5'-O-(4,4'-Dimethoxytrityl)-2'-O-(2-methoxyethyl)-3'-O-succinyl-L-uridine, triethylammonium salt (30)

HSQC NMR (CDCl₃)

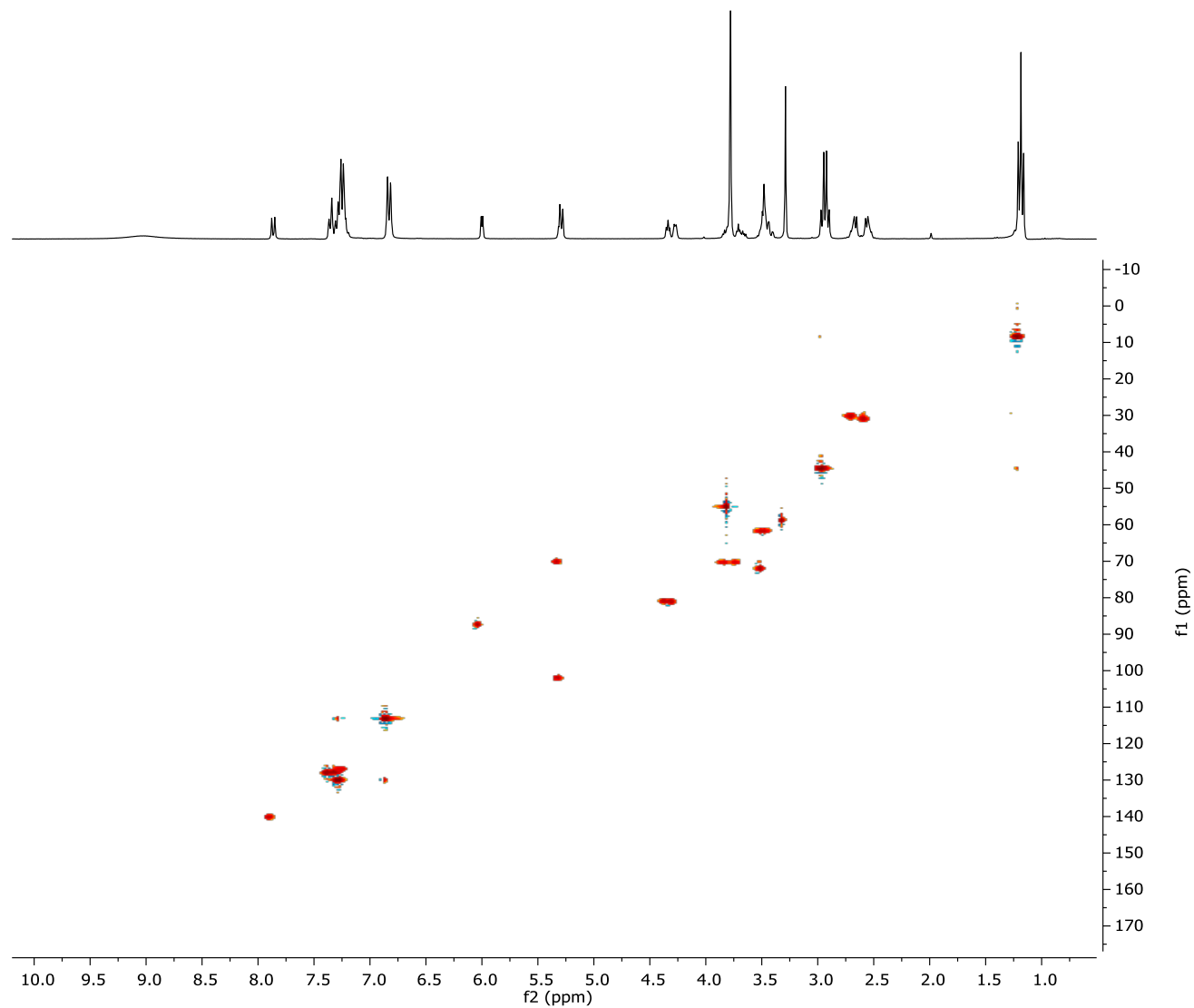
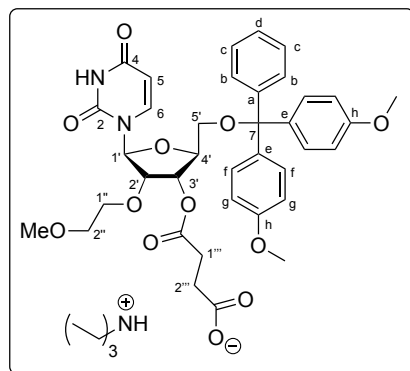


Figure S1. CD spectra in 10 mM NaCl at different temperatures. Samples were heated up to 90 °C.
 Note: (A) TG₄T; (B) TG₄U_{OMe}; (C) TG₄^LU_{OMe}; (D) TG₄^LU_{OMOE}.

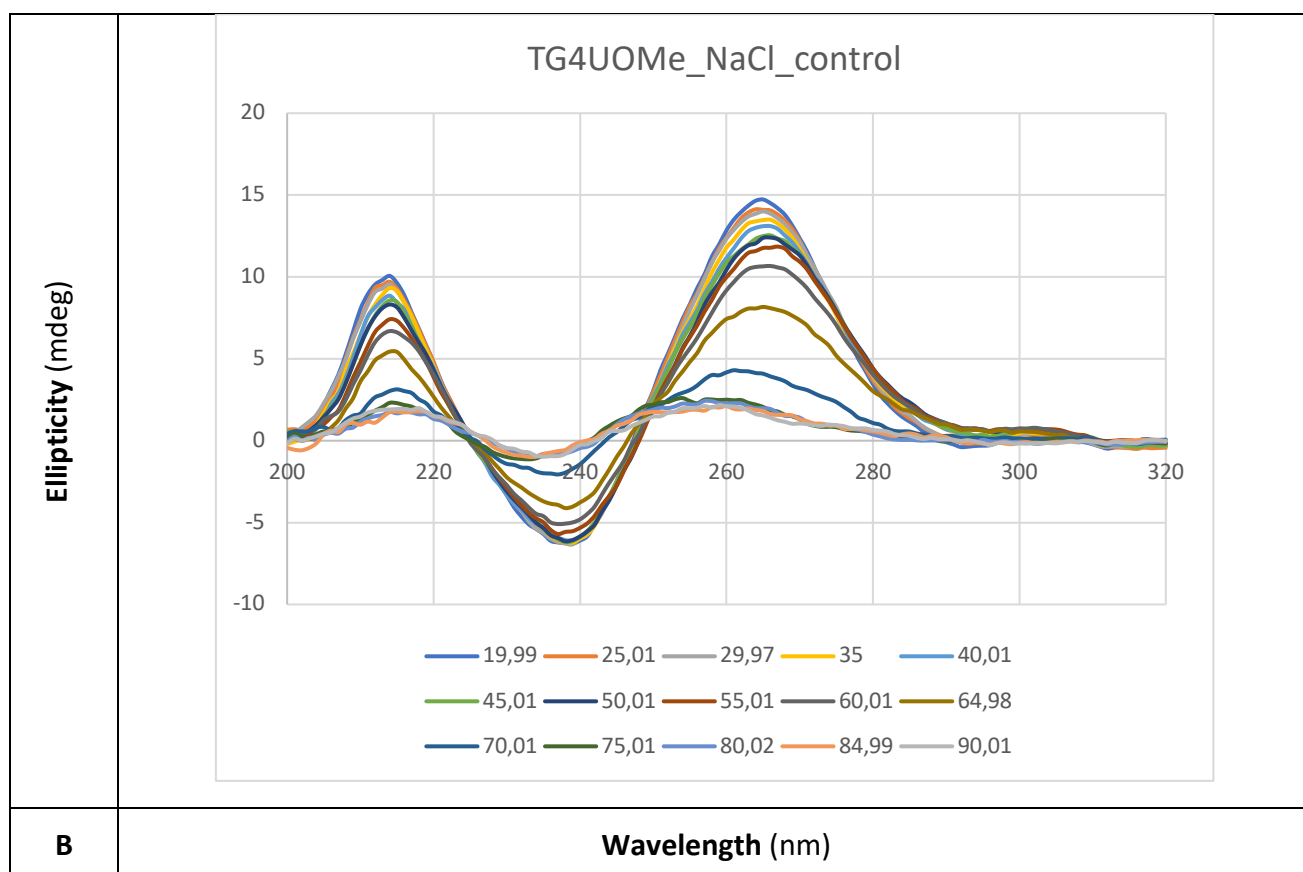
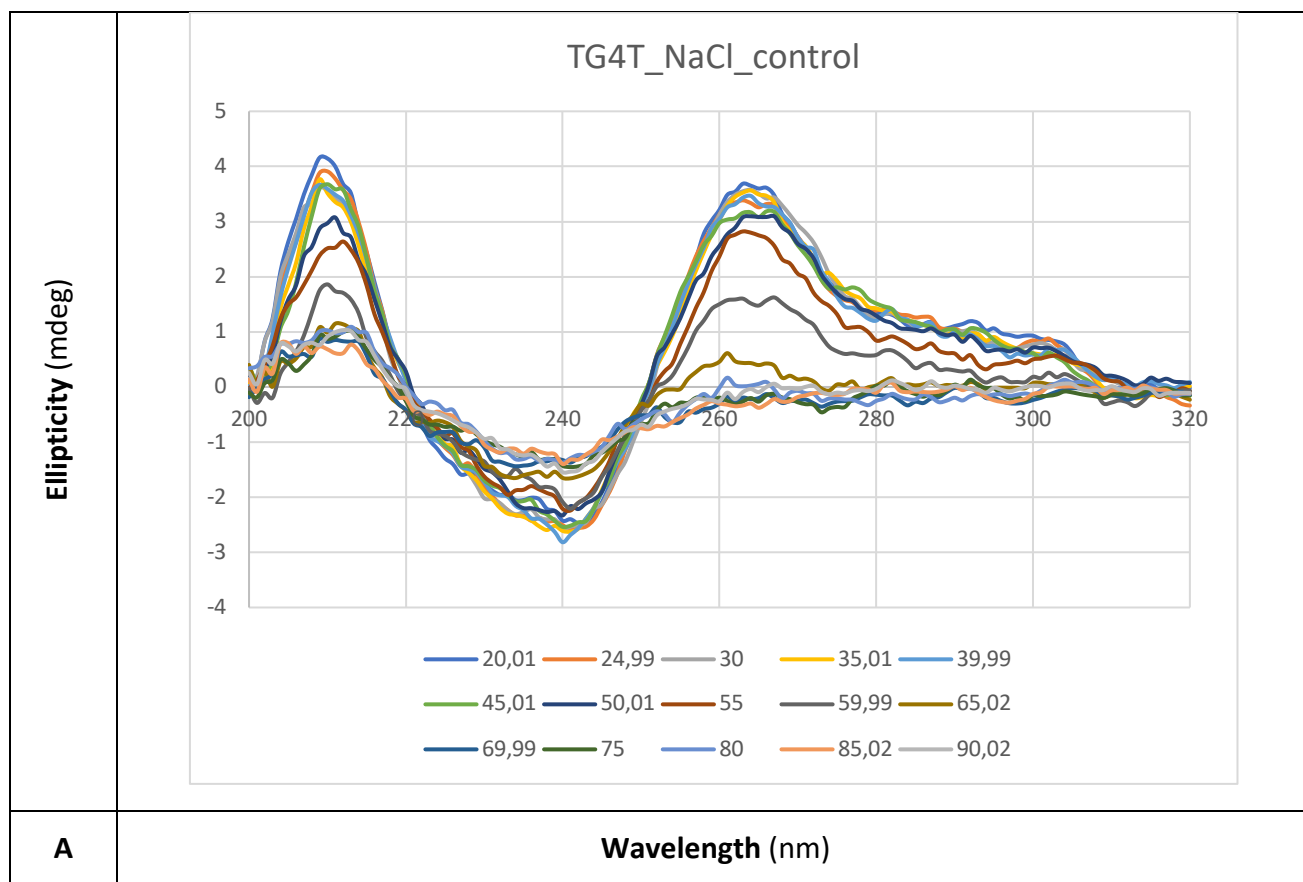


Figure S1 (cont.). CD spectra in 10 mM NaCl at different temperatures. Samples were heated up to 90 °C. Note: (A) TG₄T; (B) TG₄U_{OMe}; (C) TG₄^LU_{OMe}; (D) TG₄^LU_{OMOE}.

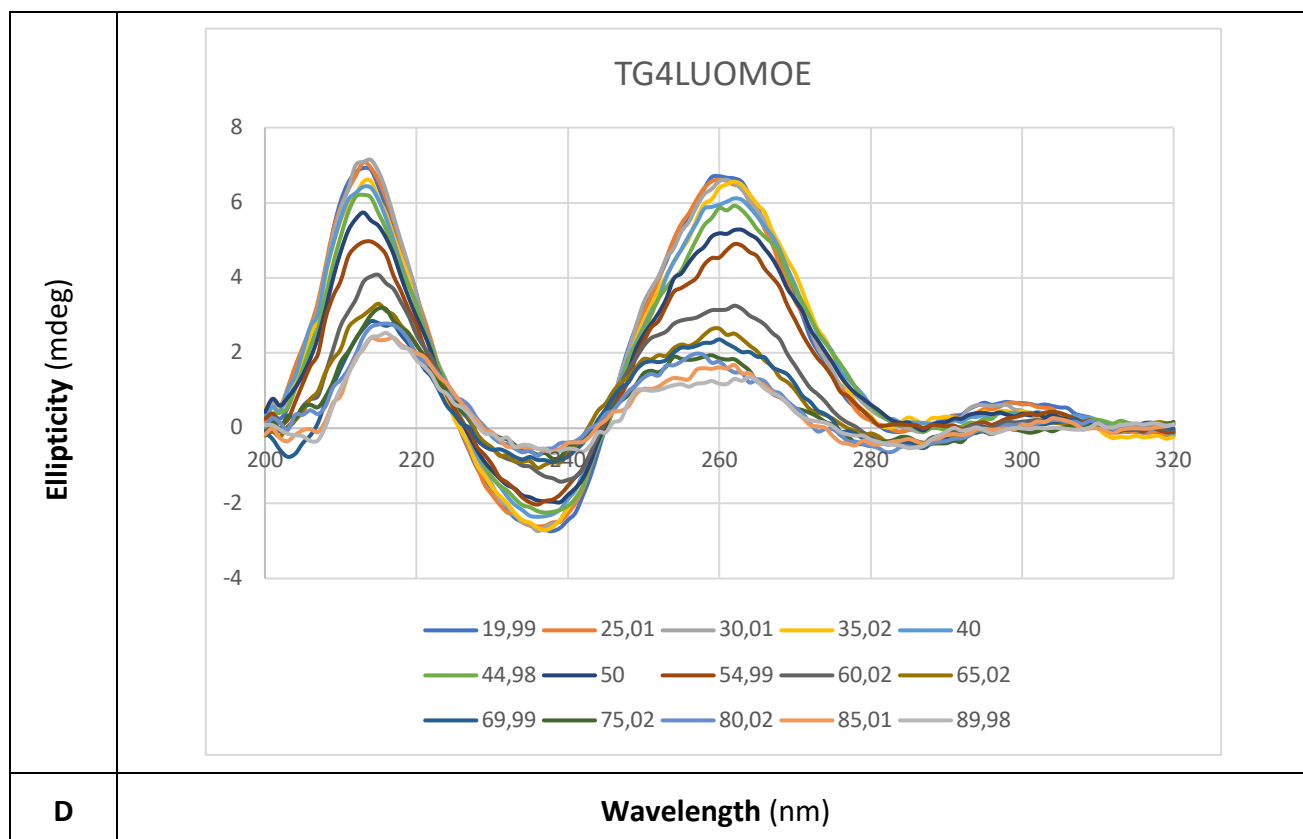
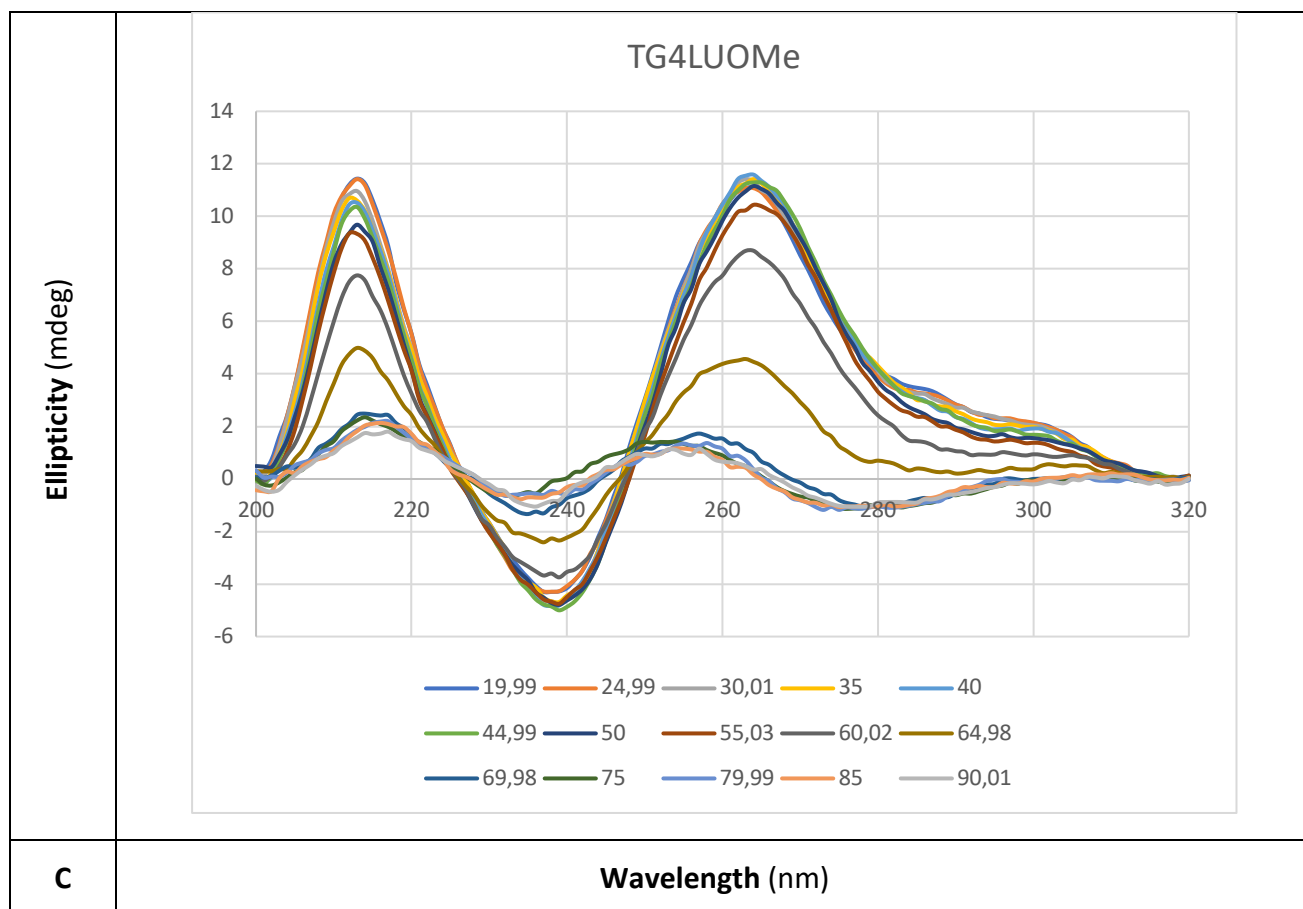


Figure S2. Denaturation curves followed by CD. Note: (A) TG₄T; (B) TG₄U_{OMe}; (C) TG₄^LU_{OMe}; (D) TG₄^LU_{OMOE}.

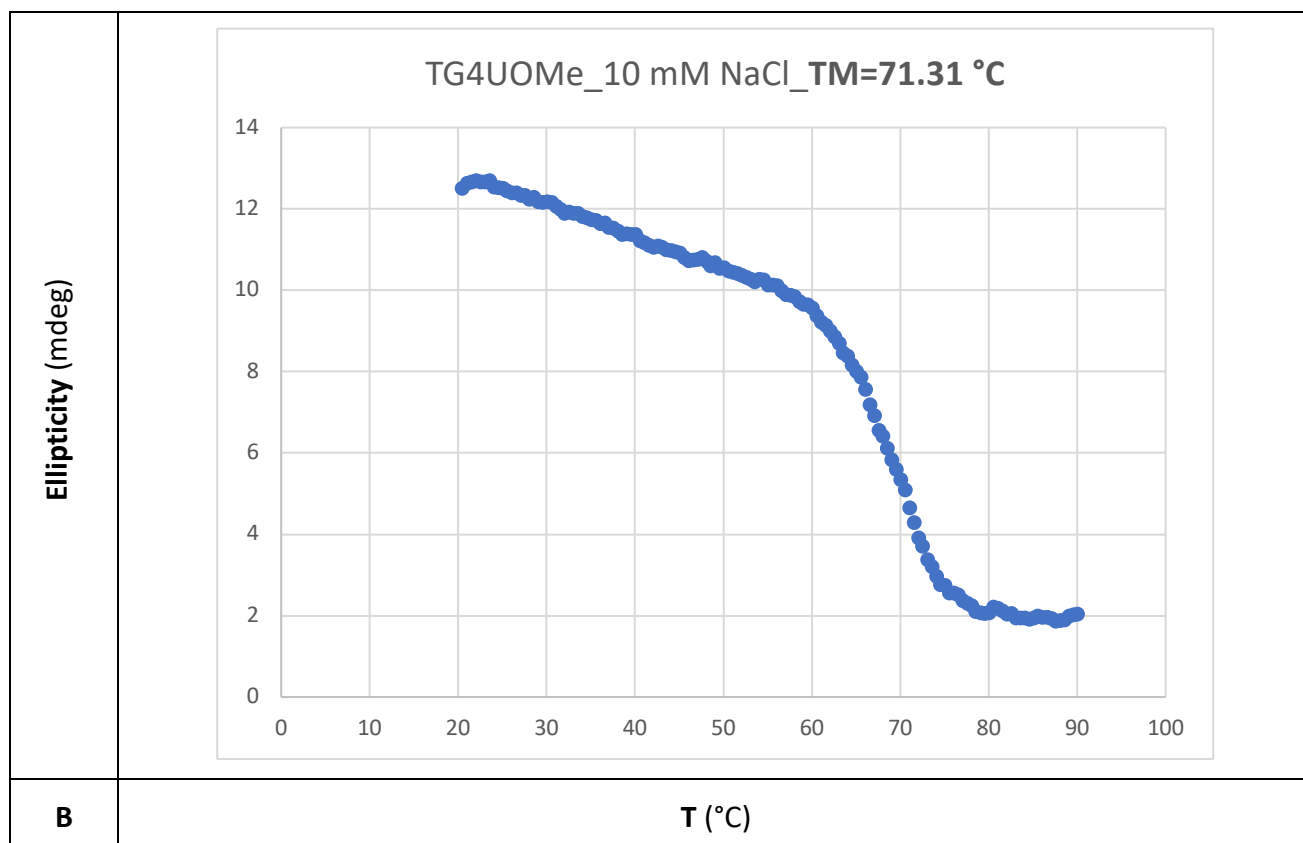
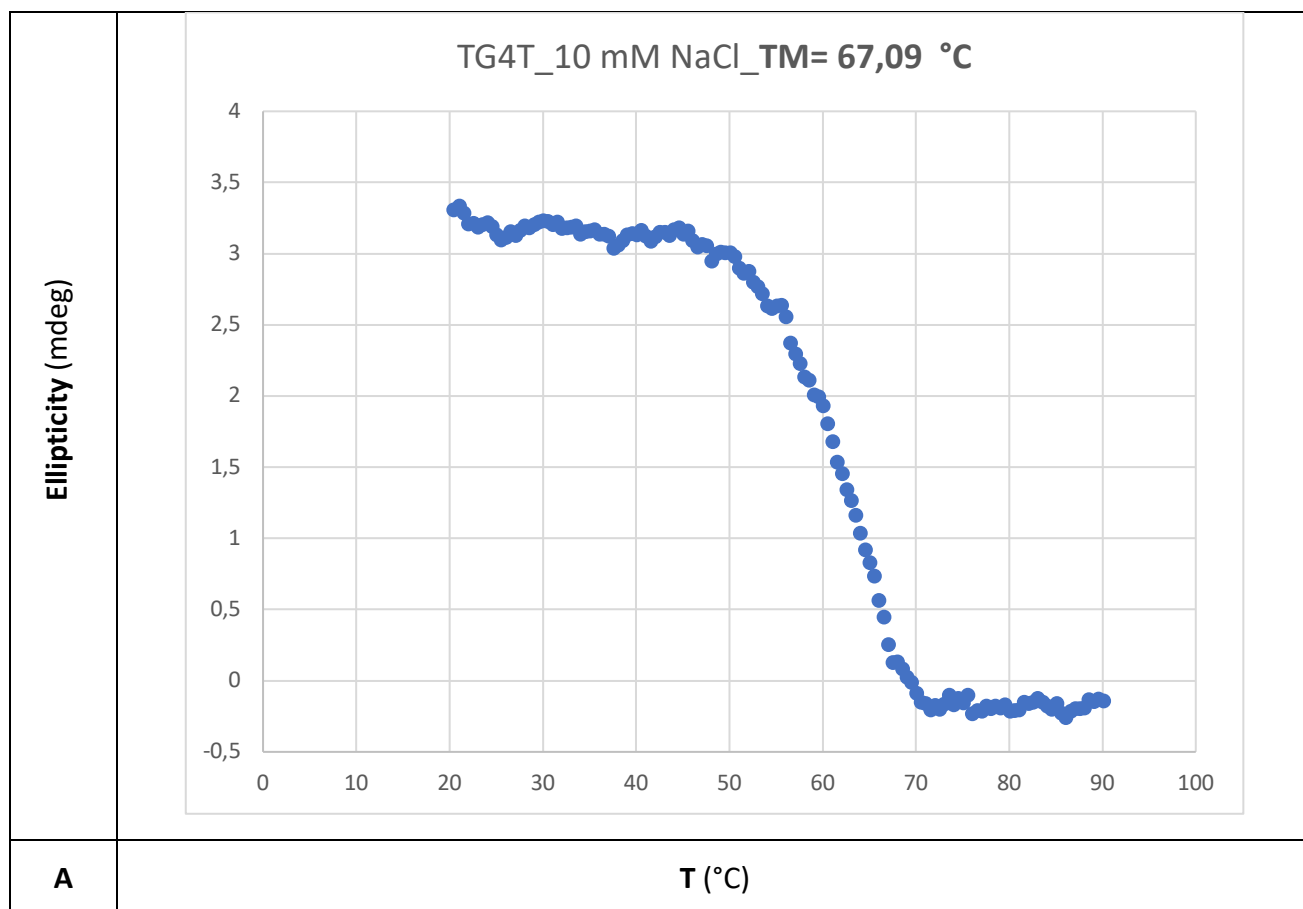


Figure S2 (cont.). Denaturation curves followed by CD. Note: (A) TG₄T; (B) TG₄U_{OMe}; (C) TG₄^LU_{OMe}; (D) TG₄^LU_{OMOE}.

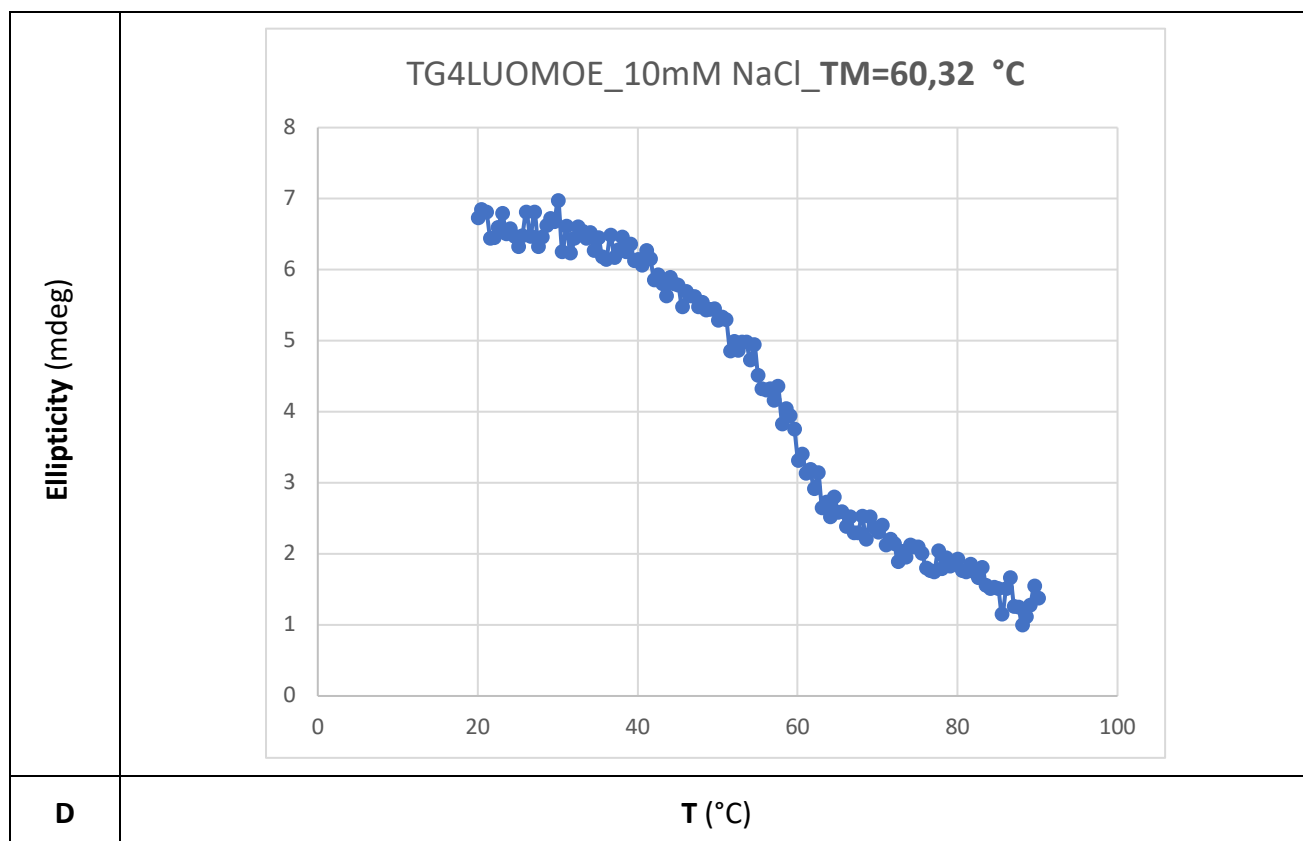
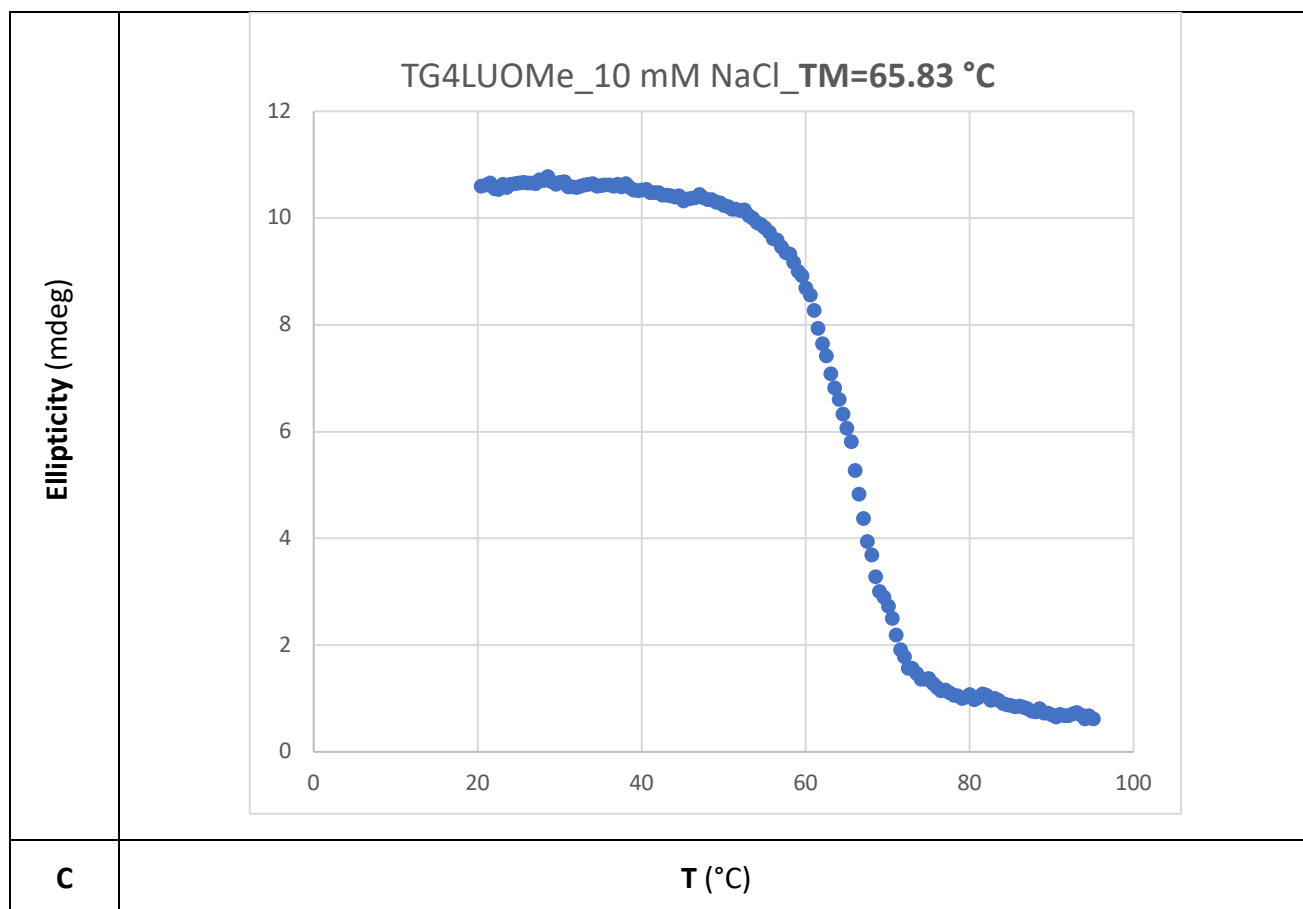


Figure S3. G-quadruplex degradation after incubation with phosphodiesterase I: (A) controls; (B) TG₄^LU_{OMOE}.

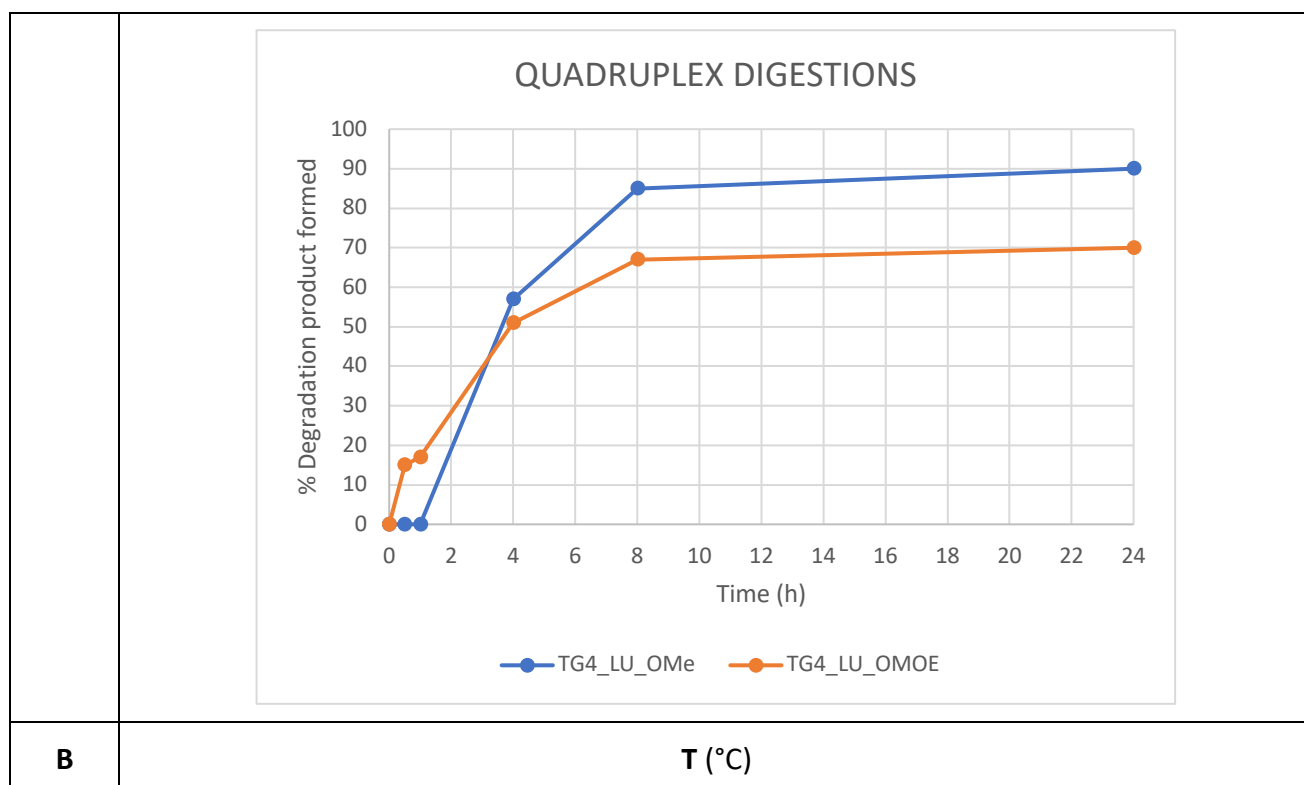
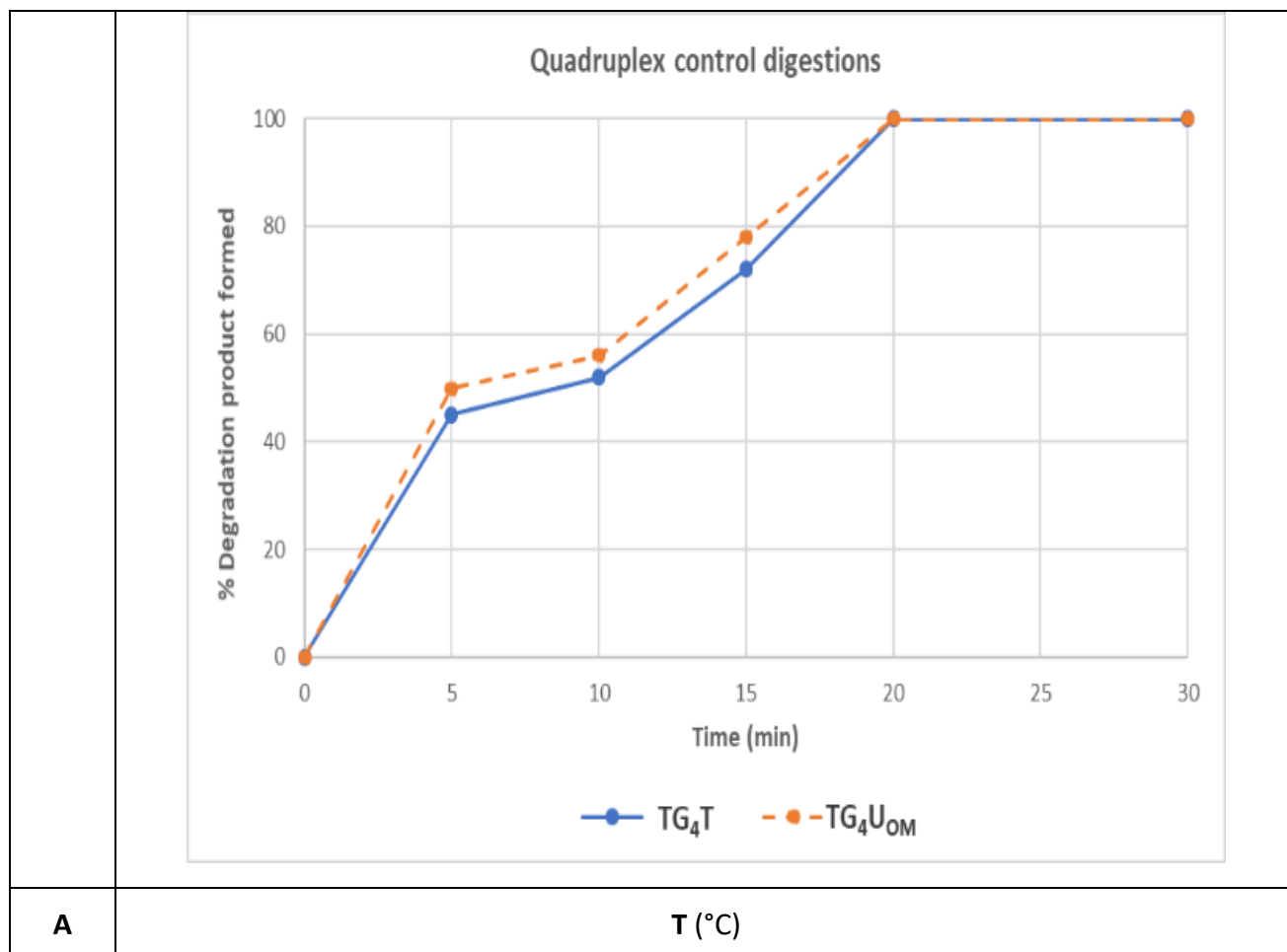


Figure S4. Oligonucleotide characterization by MALDI-TOF: (A) TG₄T; (B) TG₄U_{OMe}; (C) TG₄^LU_{OMe}; (D) TG₄^LU_{OMOE}.

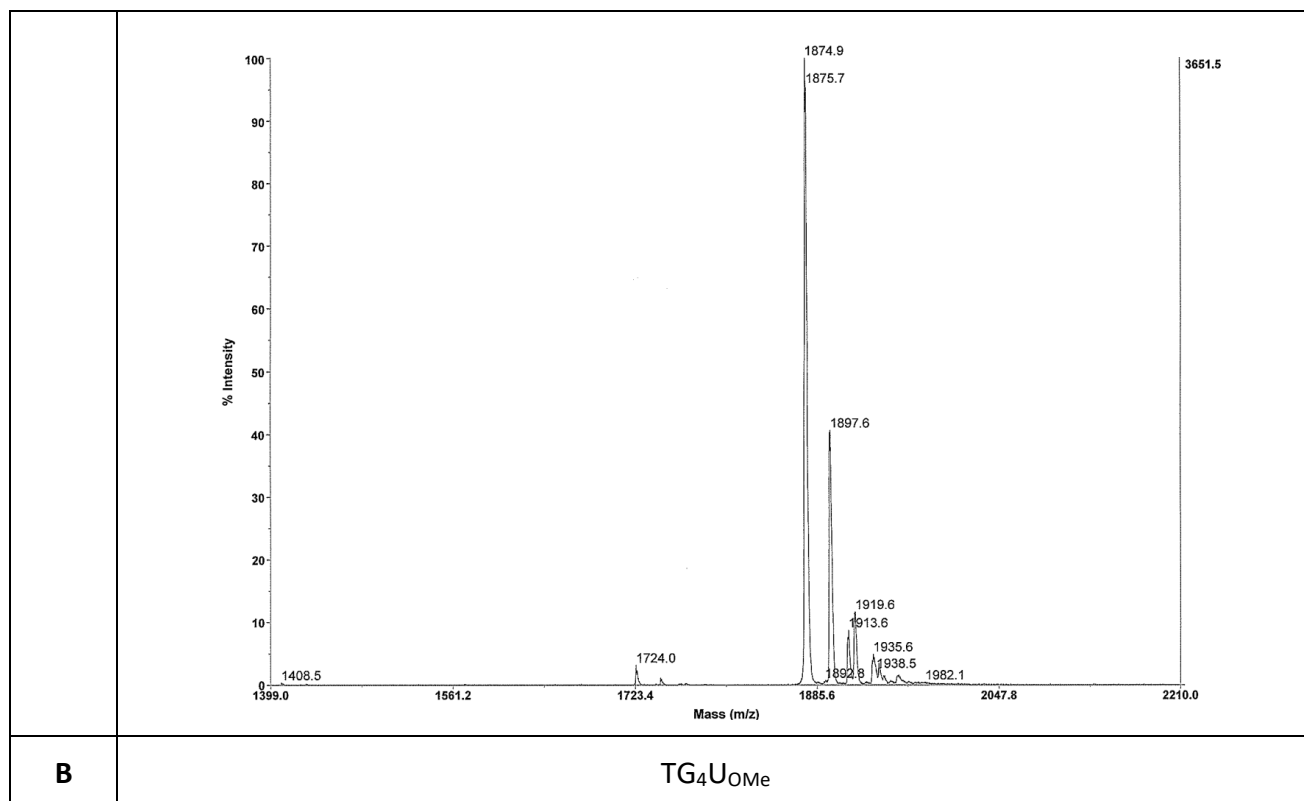
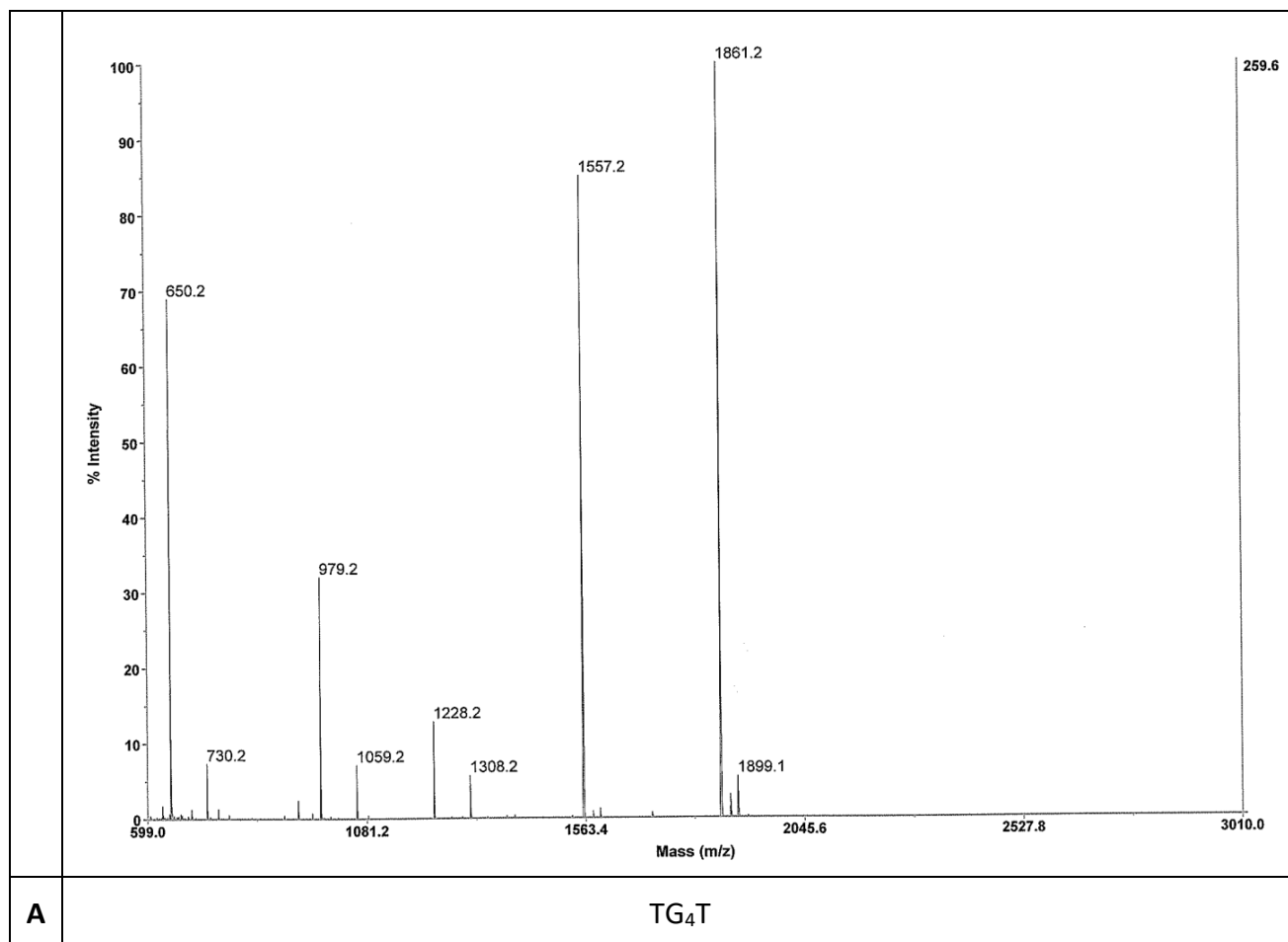


Figure S4 (cont.). Oligonucleotide characterization by MALDI-TOF: (A) TG₄T; (B) TG₄U_{OMe}; (C) TG₄^LU_{OMe}; (D) TG₄^LU_{OMOE}.

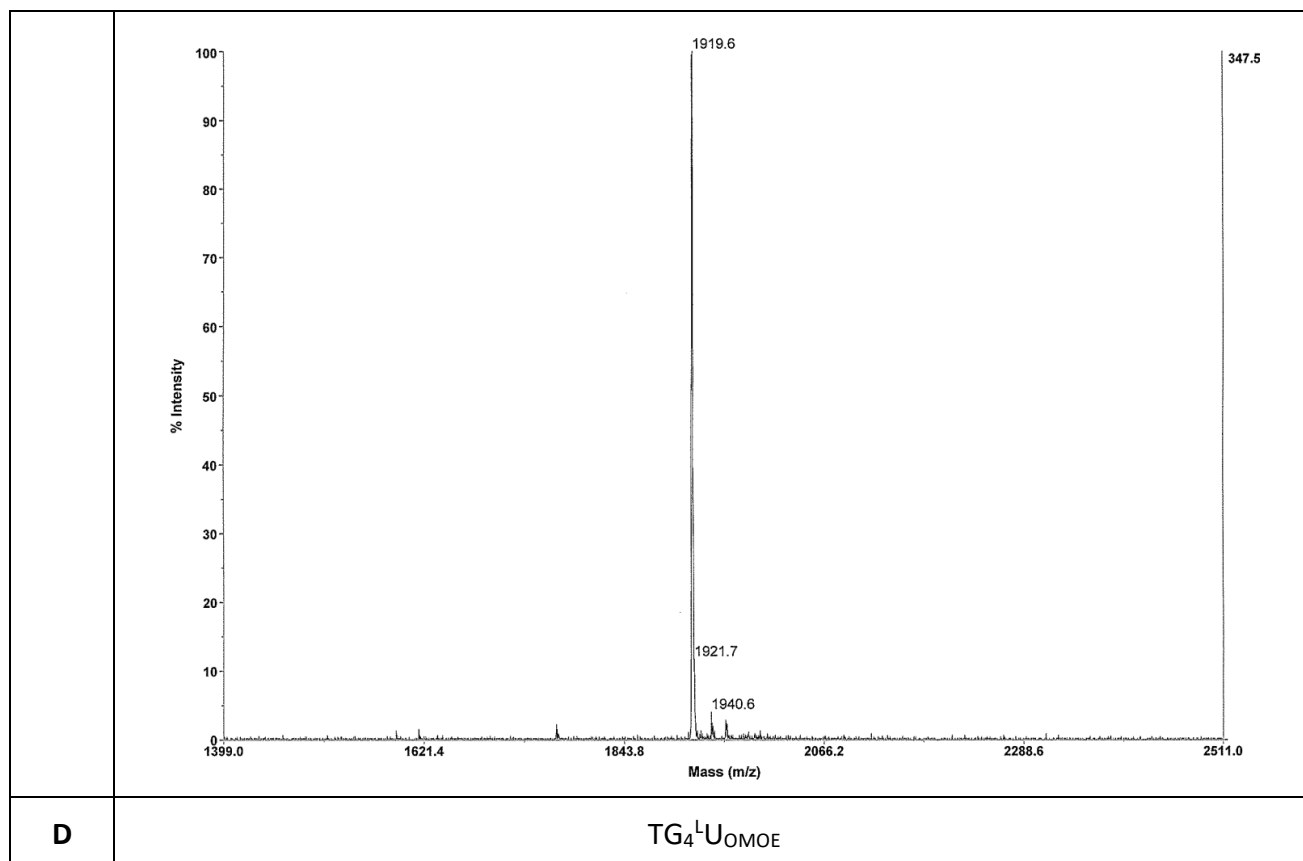
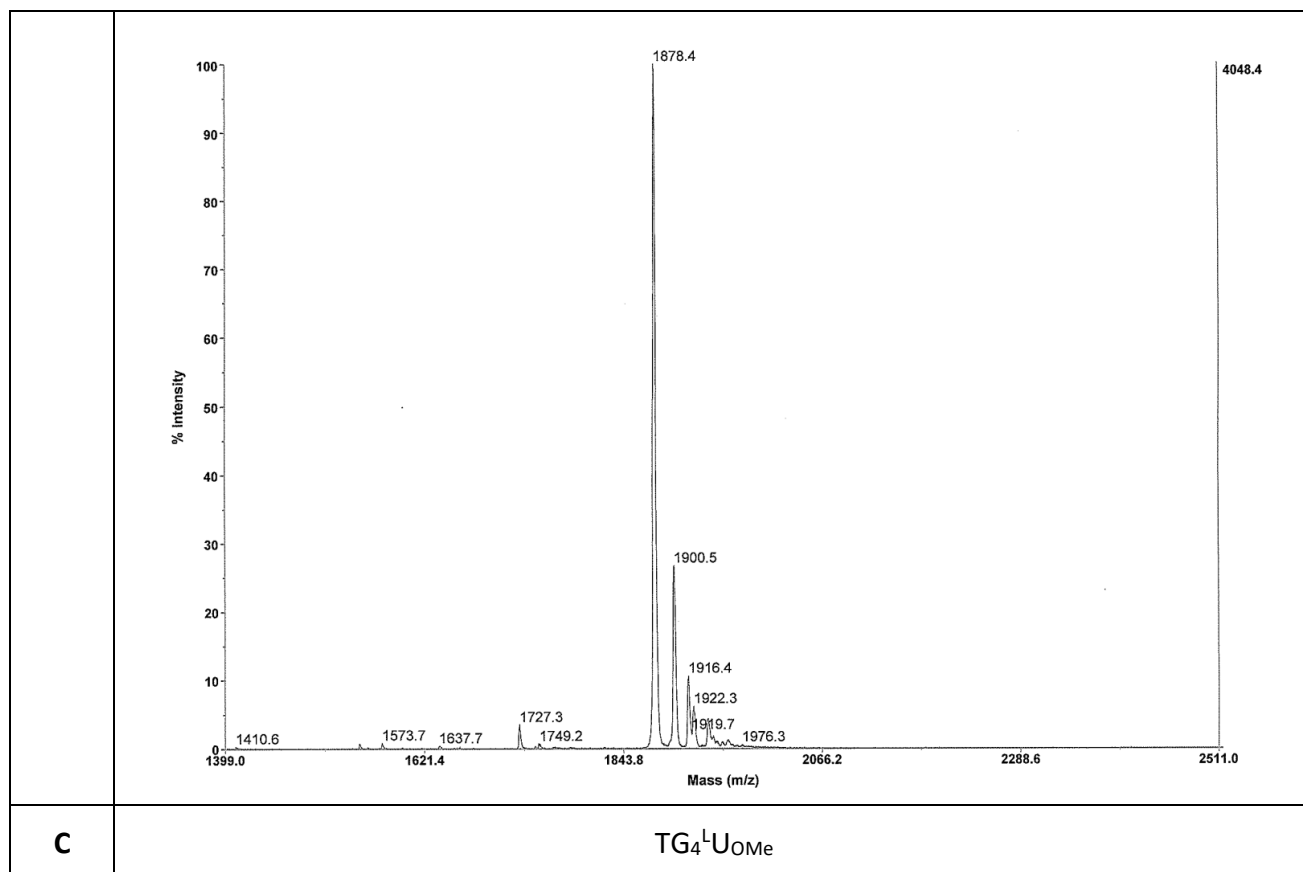


Figure S5. Native 20% PAGE of TBE 1x supplemented with 100 mM KCl using the same running buffer at 100 W maintaining at 4 °C for 2-3 h; stained with Stain-all. Sequences: **(1)** 5'-TG₄^LU_{OMOE}-3'; **(2)** 5'-TG₄^LU_{OMe}-3'; **(3)** 5'-TG₄T-3'; **(4)** 5'-TG₄U_{OMe}-3'; **(5)** and **(6)** T₆; **(7)** Dye (bromophenol blue + xylene cyanol).

