

Chemoenzymatic Syntheses and Anti-HIV-1 Activity of Glucose-Nucleoside Conjugates as Prodrugs

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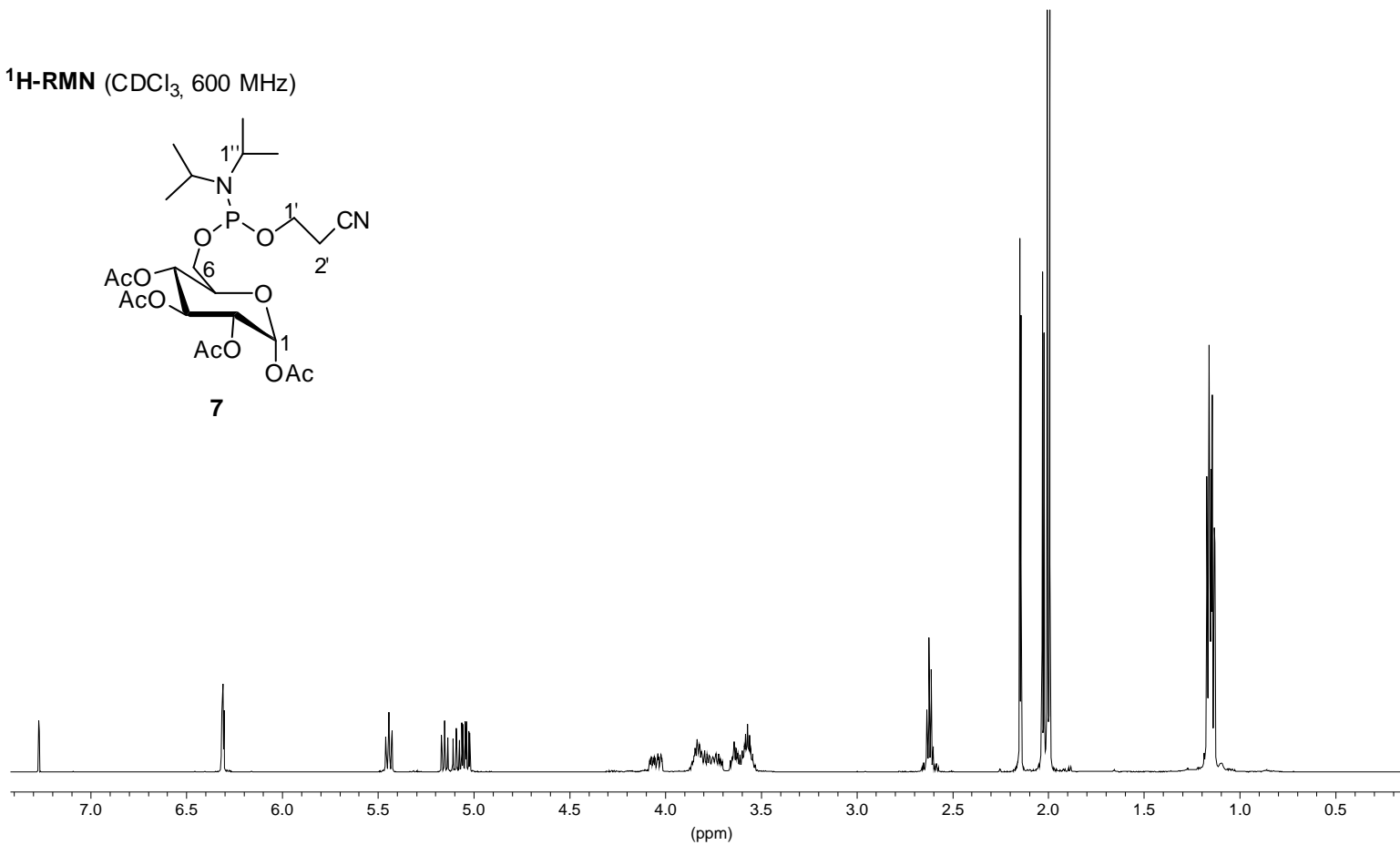
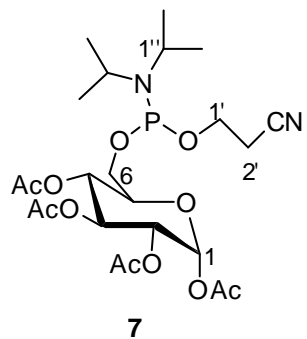
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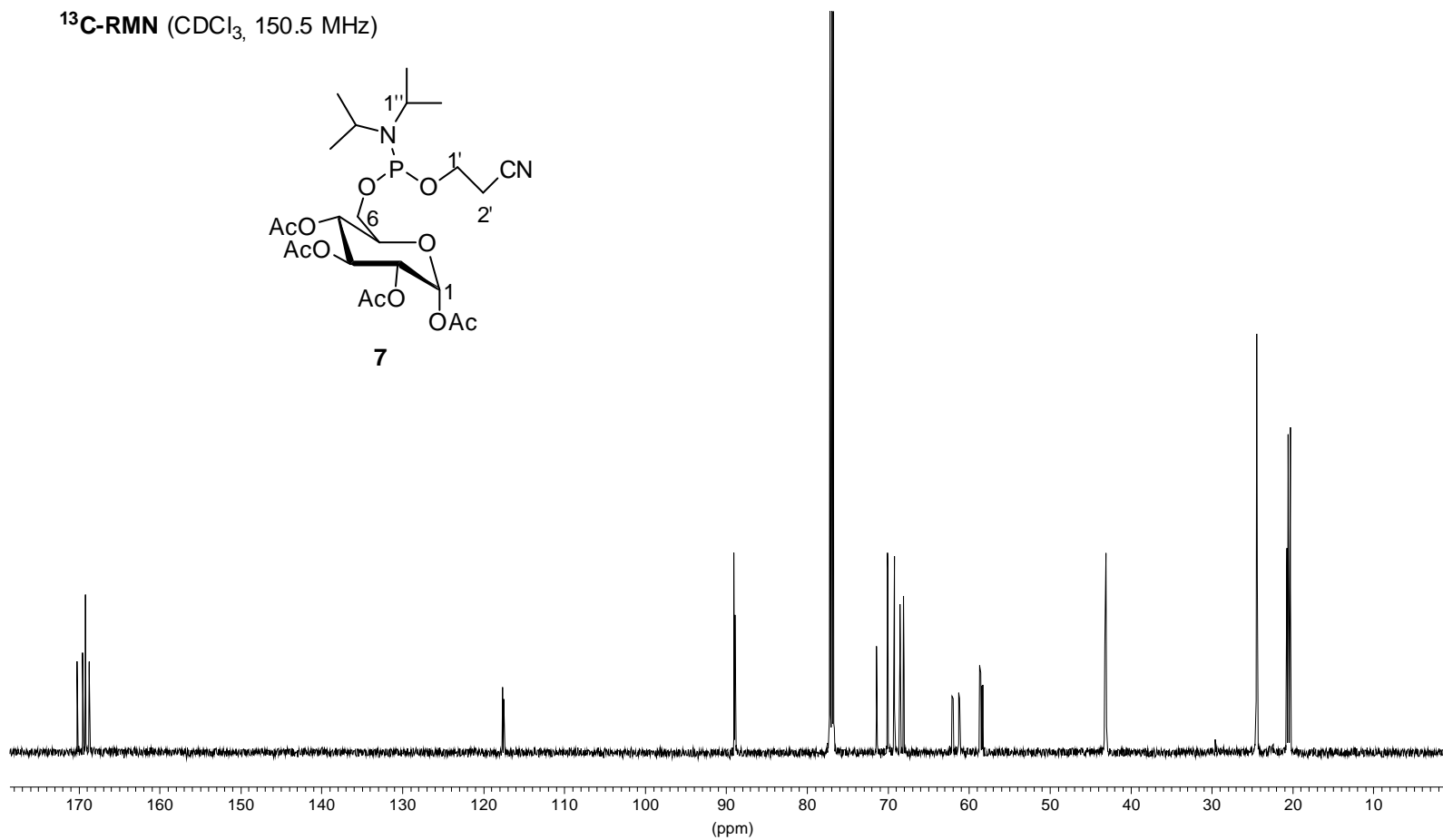
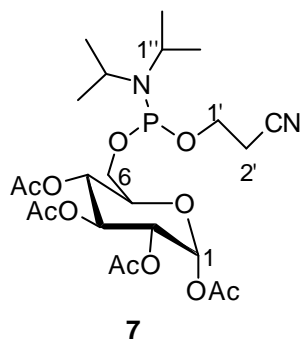
2-Cyanoethyl-*N,N*-diisopropyl-(1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranoside-6-yl)phosphoramidite (7)

$^1\text{H-RMN}$ (CDCl_3 , 600 MHz)



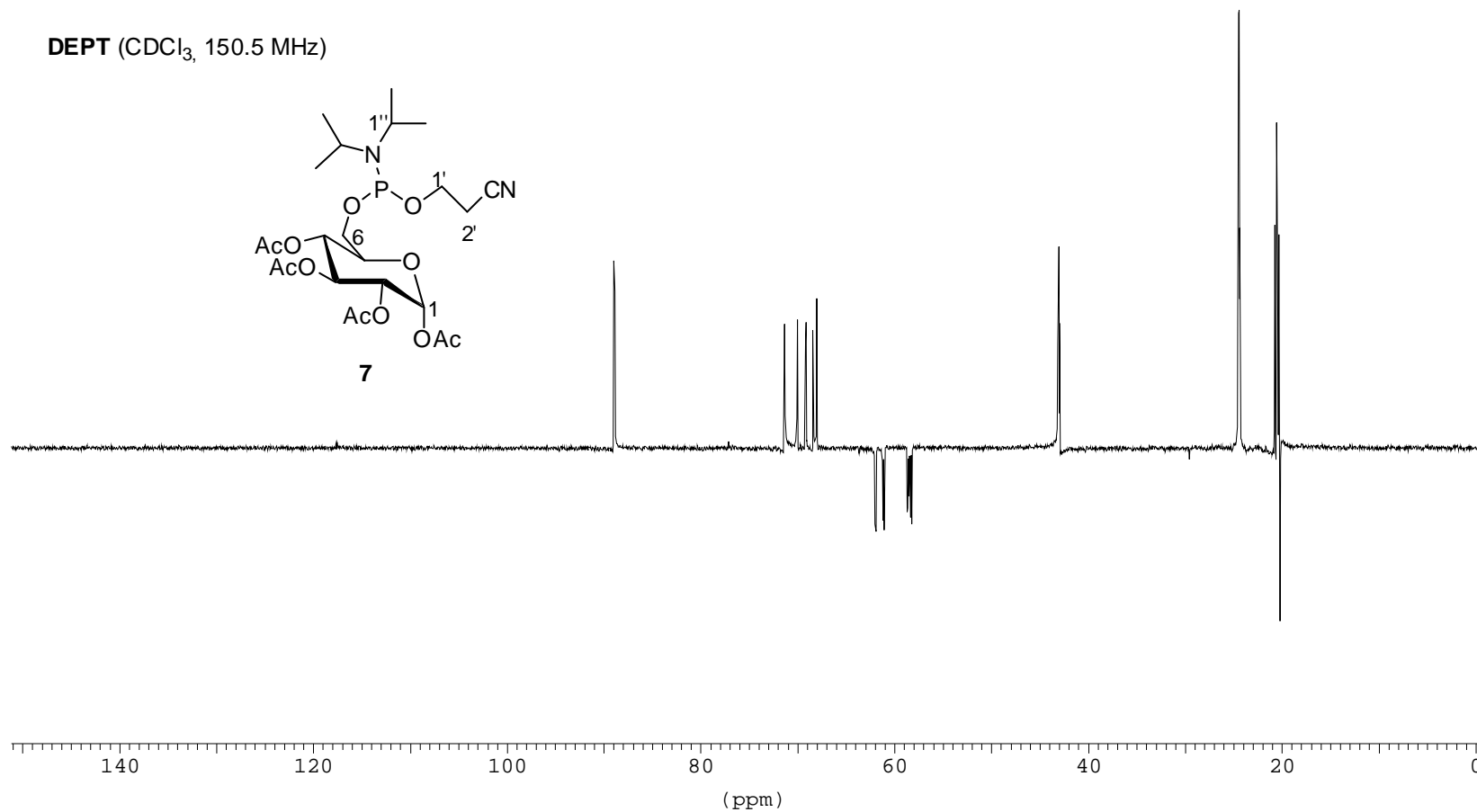
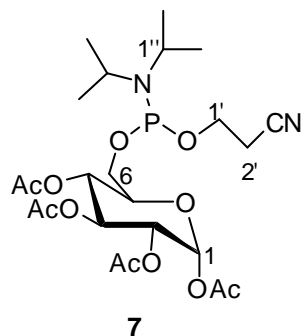
2-Cyanoethyl-*N,N*-diisopropyl-(1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranoside-6-yl)phosphoramidite (7)

^{13}C -RMN (CDCl_3 , 150.5 MHz)



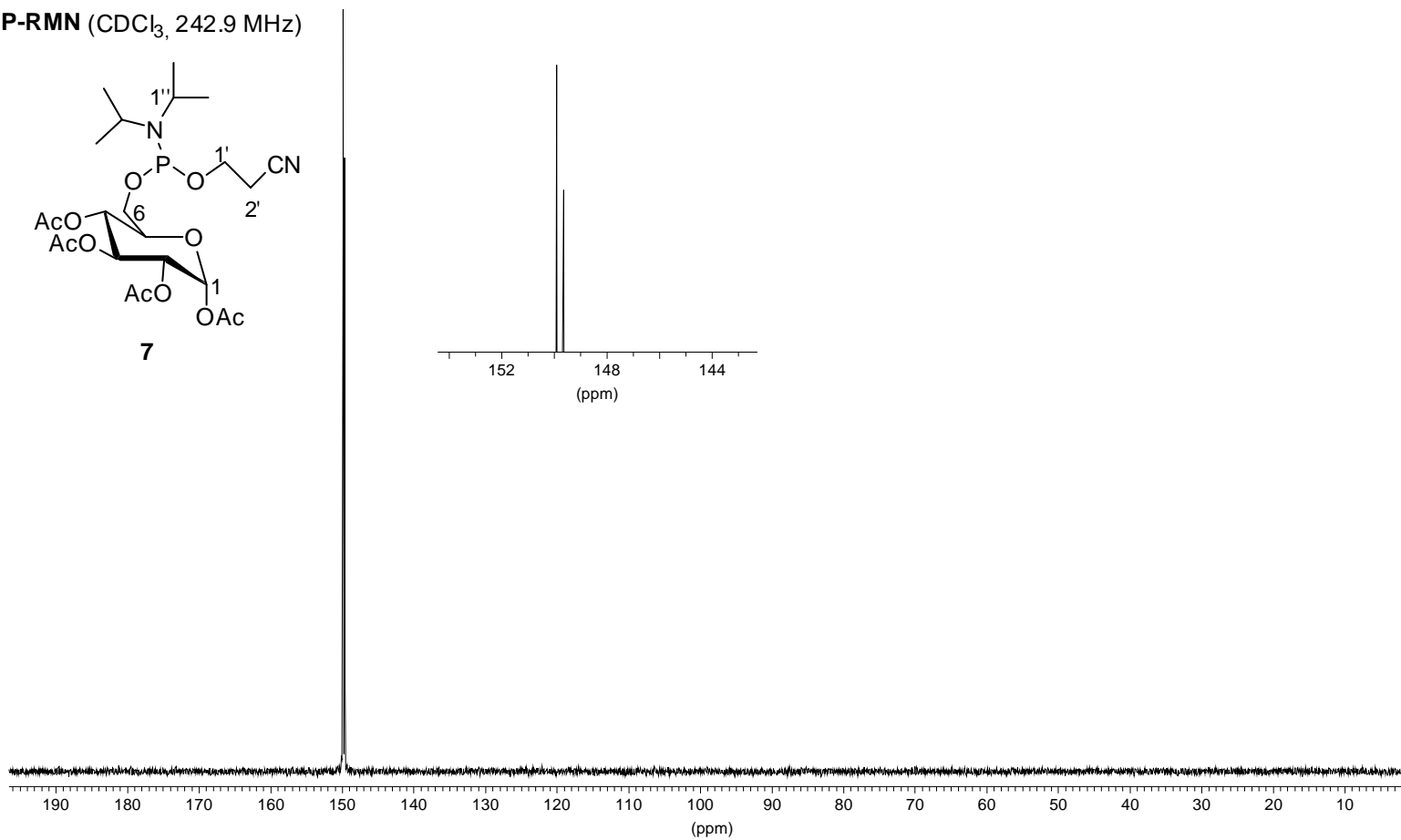
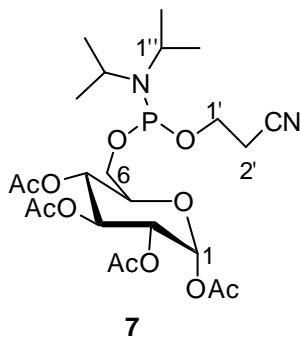
2-Cyanoethyl-*N,N*-diisopropyl-(1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranoside-6-yl)phosphoramidite (7)

DEPT (CDCl₃, 150.5 MHz)



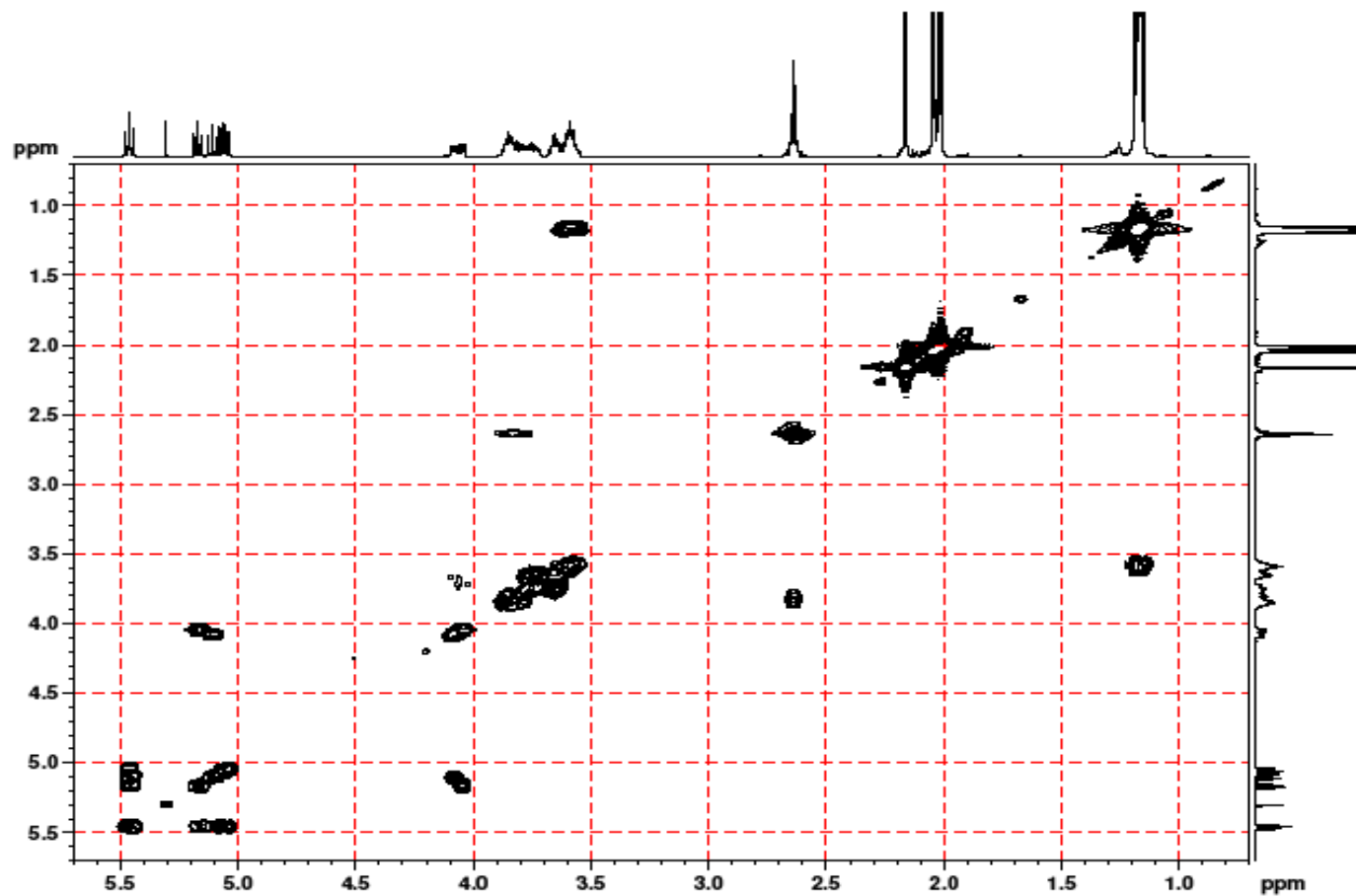
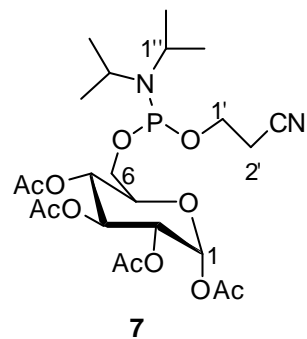
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^{31}P -RMN (CDCl_3 , 242.9 MHz)



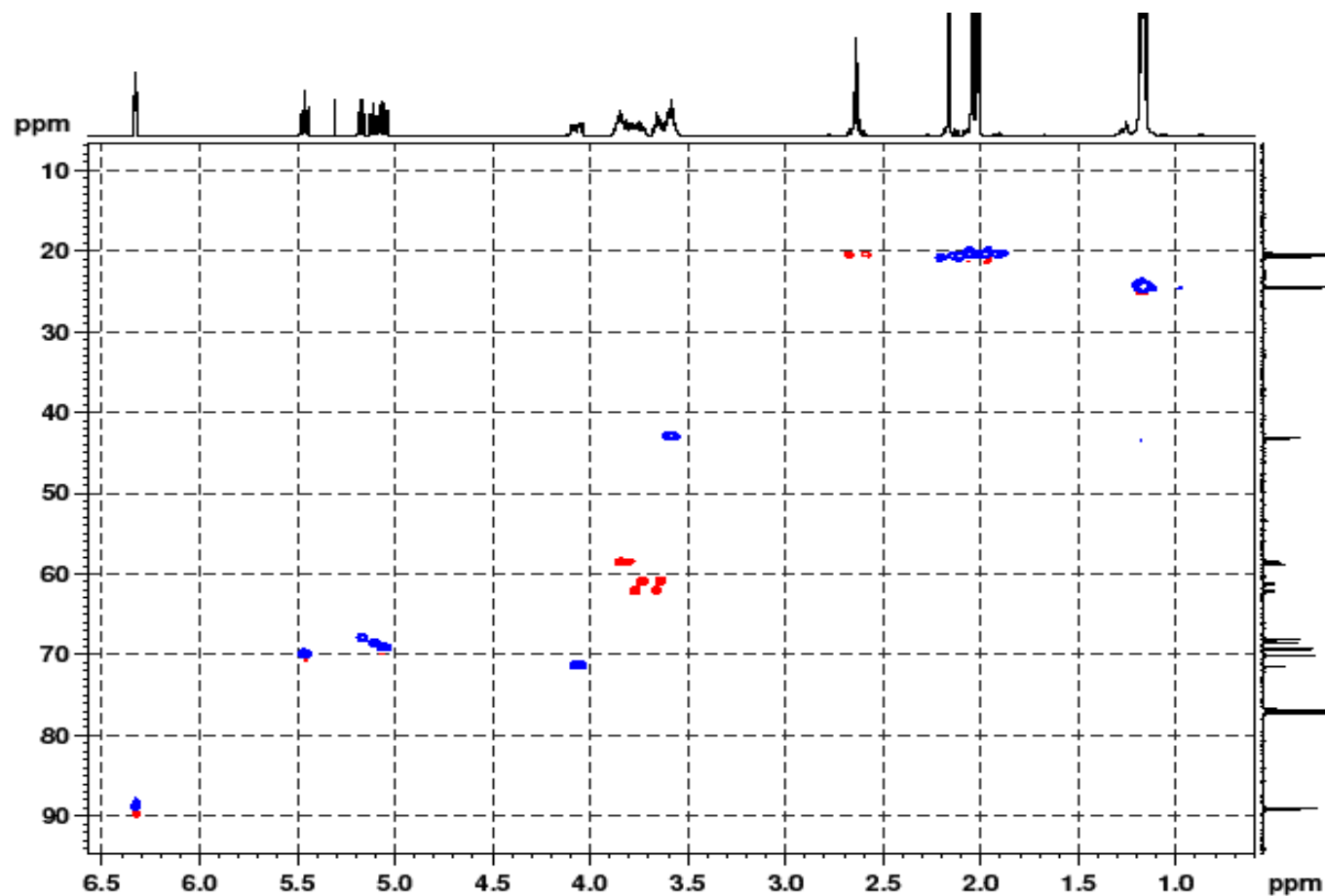
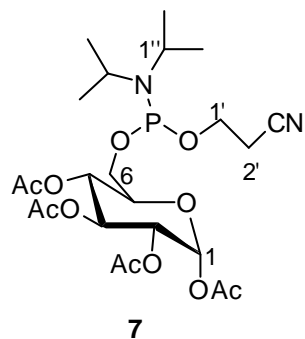
2-Cyanoethyl-*N,N*-diisopropyl-(1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranoside-6-yl)phosphoramidite (7)

COSY (CDCl₃, 600 MHz)



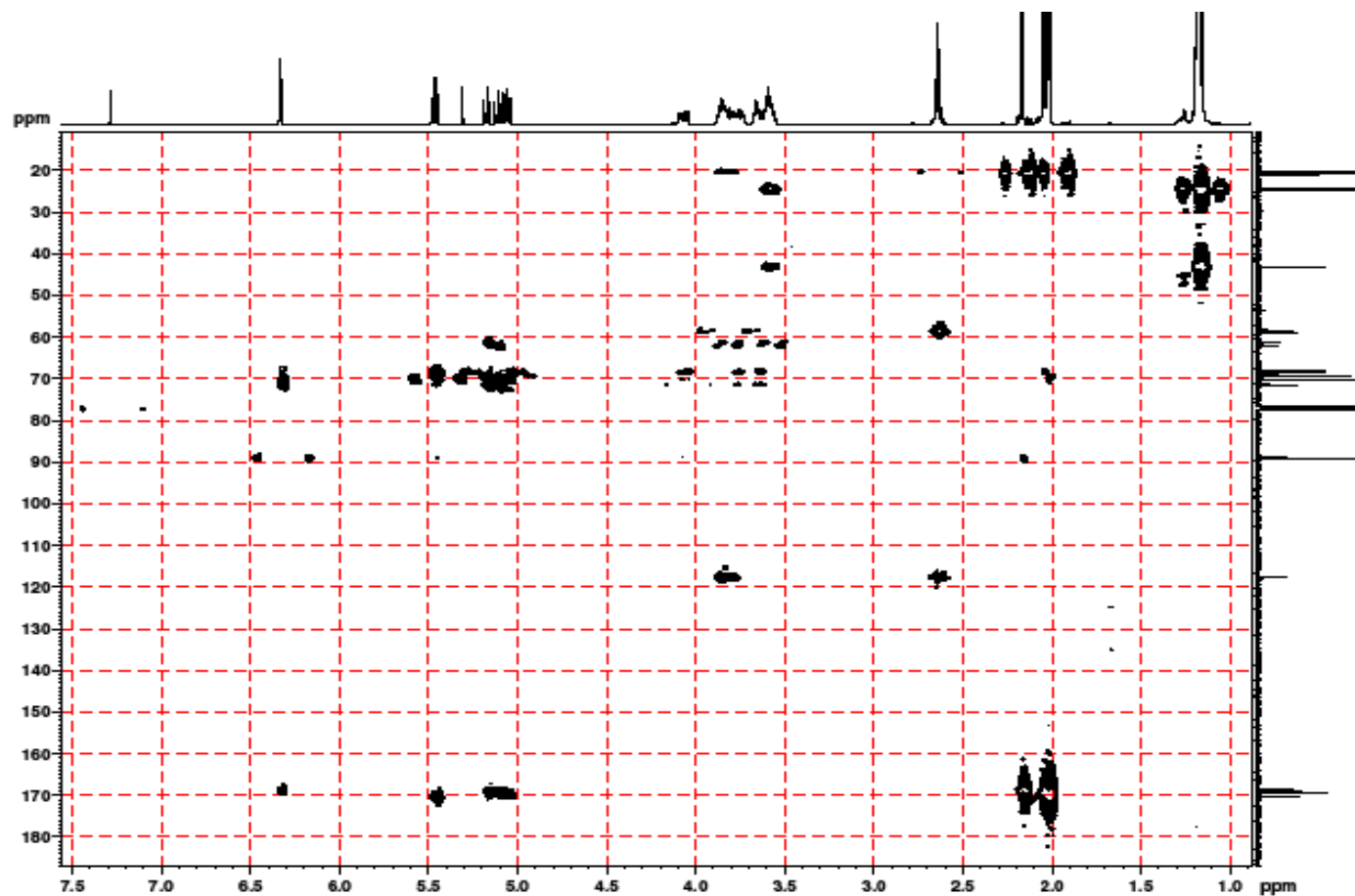
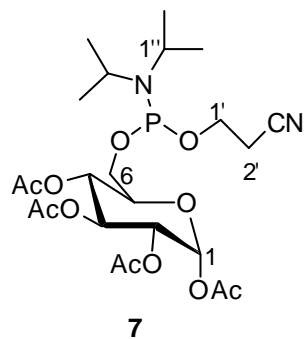
2-Cyanoethyl-*N,N*-diisopropyl-(1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranoside-6-yl)phosphoramidite (7)

HSQC (CDCl₃, 600 MHz)



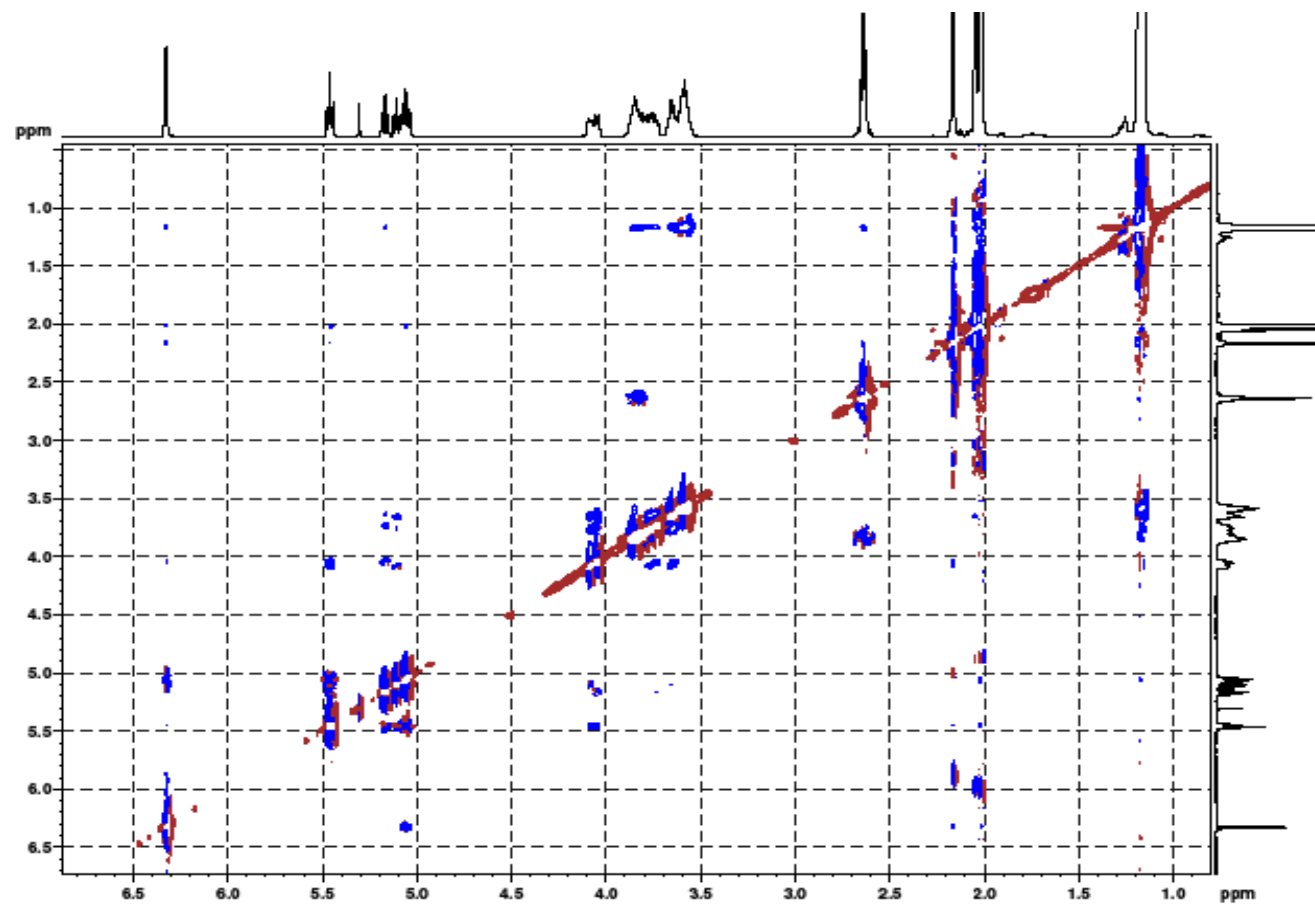
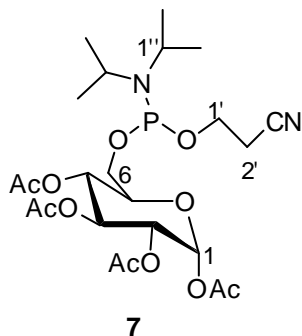
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HMBC (CDCl₃, 600 MHz)



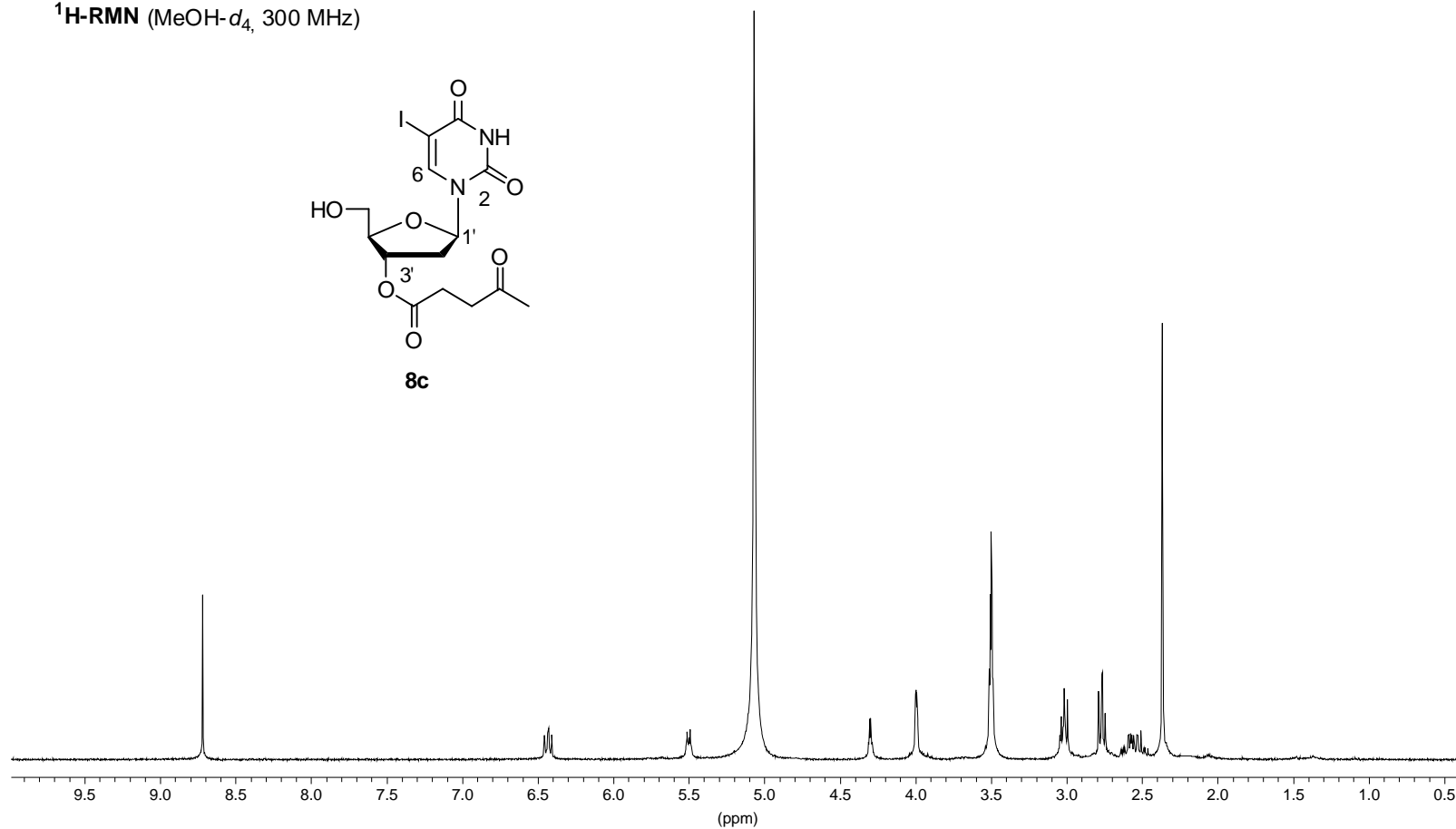
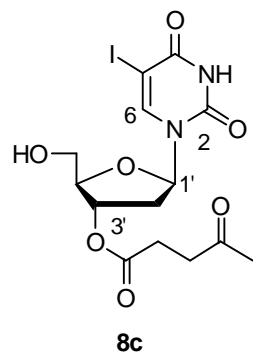
2-Cyanoethyl-*N,N*-diisopropyl-(1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranoside-6-yl)phosphoramidite (7)

NOESY (CDCl₃, 600 MHz)



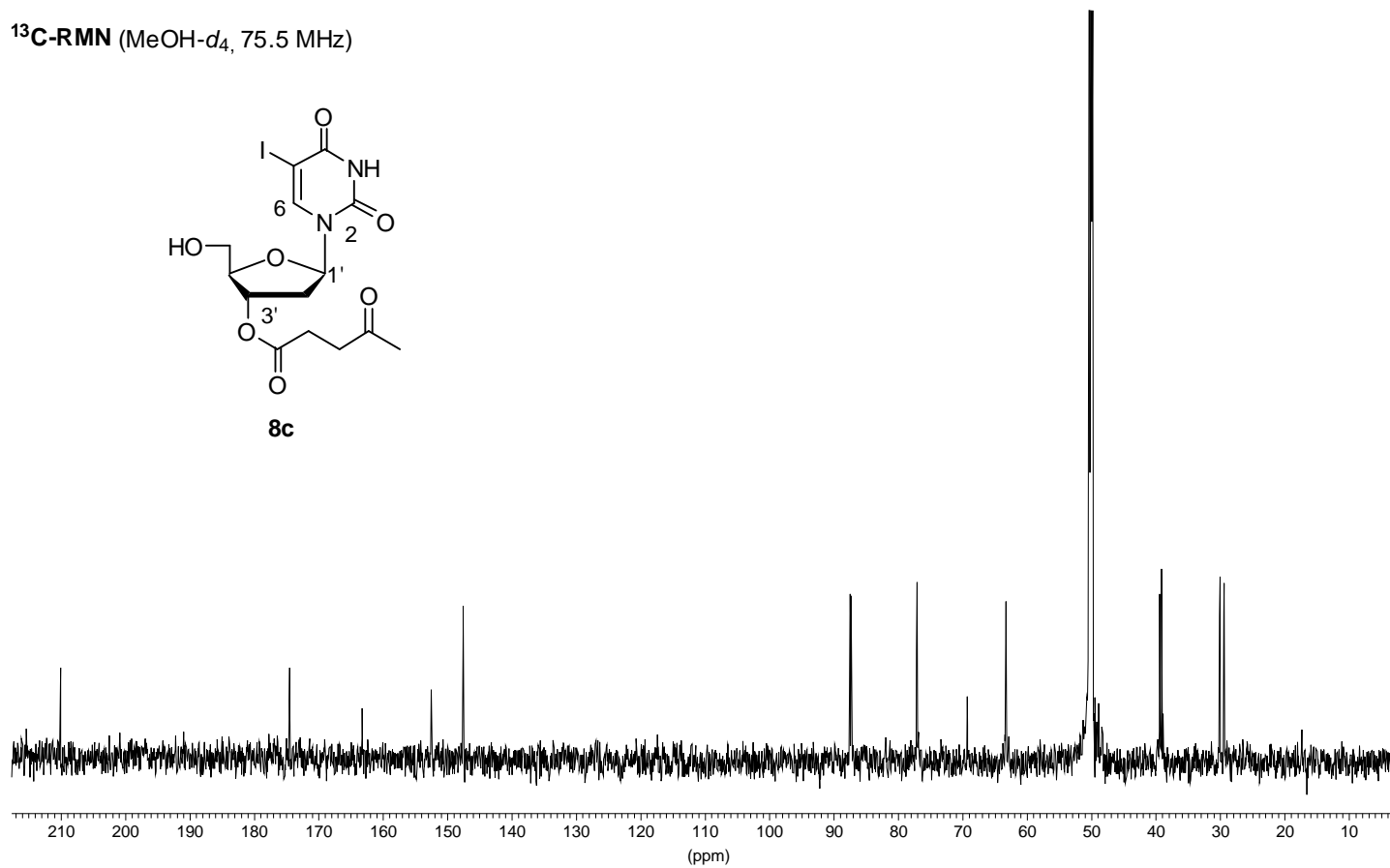
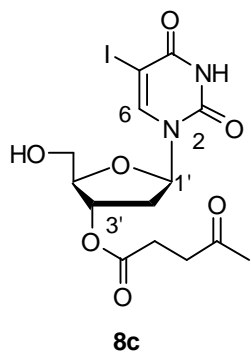
5-Iodo-3'-O-levulinyl-2'-deoxyuridine (8c)

¹H-RMN (MeOH-*d*₄, 300 MHz)



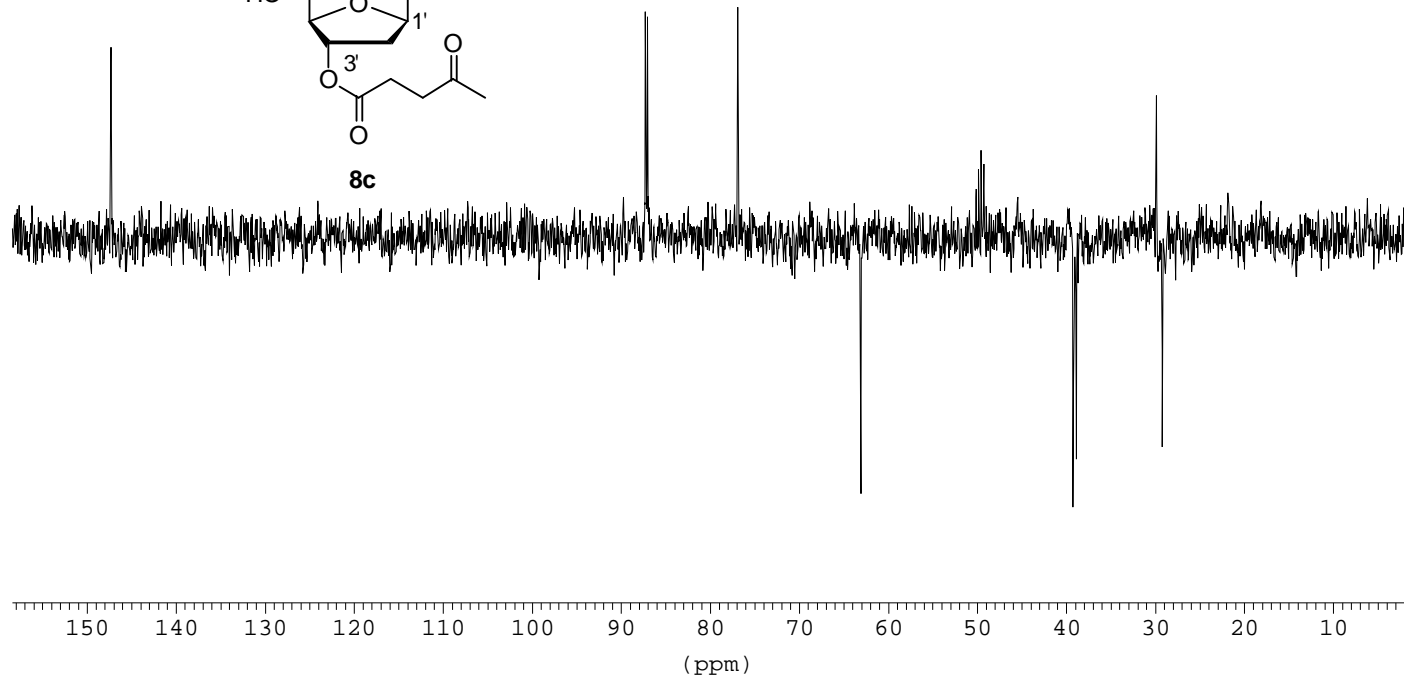
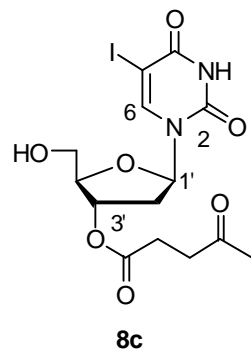
5-Iodo-3'-O-levulinyl-2'-deoxyuridine (8c)

¹³C-RMN (MeOH-d₄, 75.5 MHz)



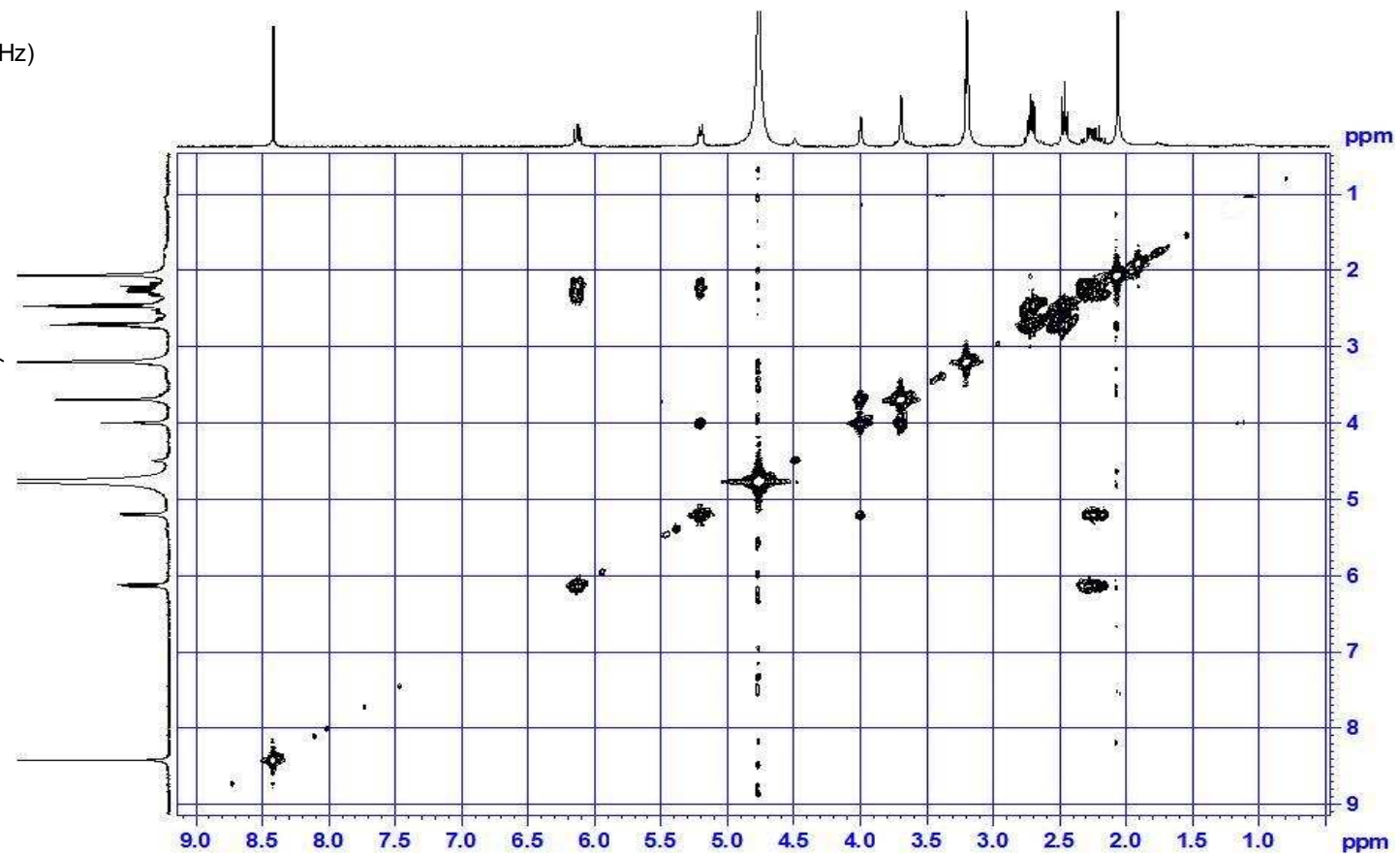
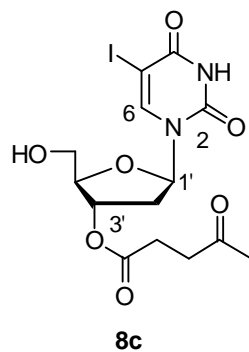
5-Iodo-3'-*O*-levulinyl-2'-deoxyuridine (8c)

DEPT (MeOH-*d*₄, 75.5 MHz)



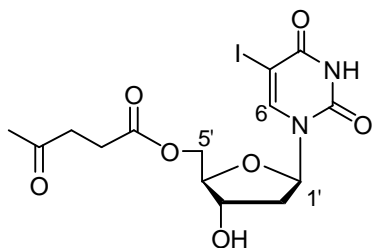
5-Iodo-3'-O-levulinyl-2'-deoxyuridine (8c)

COSY (MeOH- d_4 , 300 MHz)

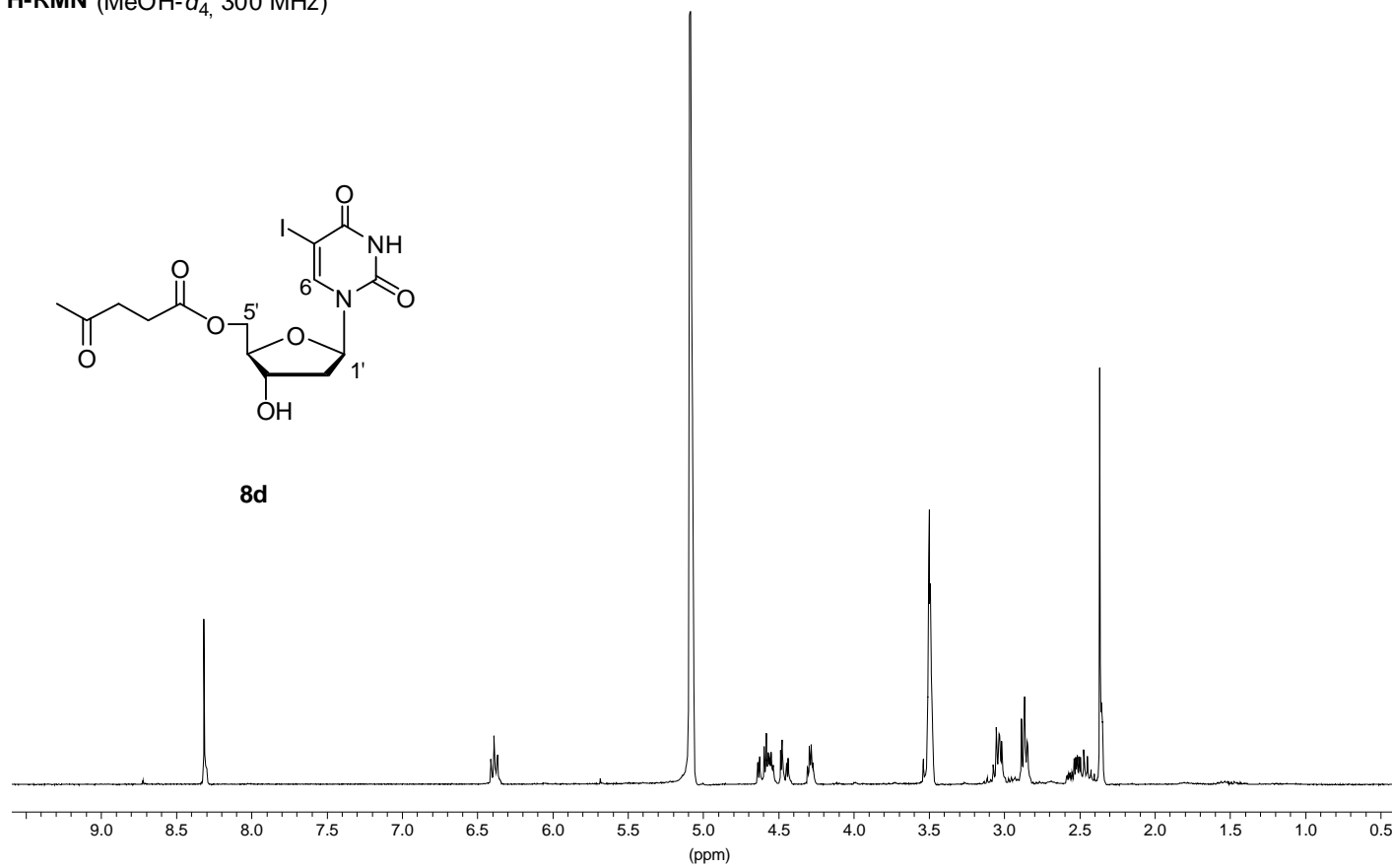


5-Iodo-5'-O-levulinyl-2'-deoxyuridine (8d)

¹H-RMN (MeOH-*d*₄, 300 MHz)

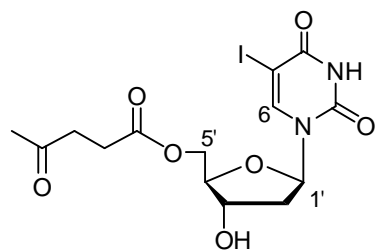


8d

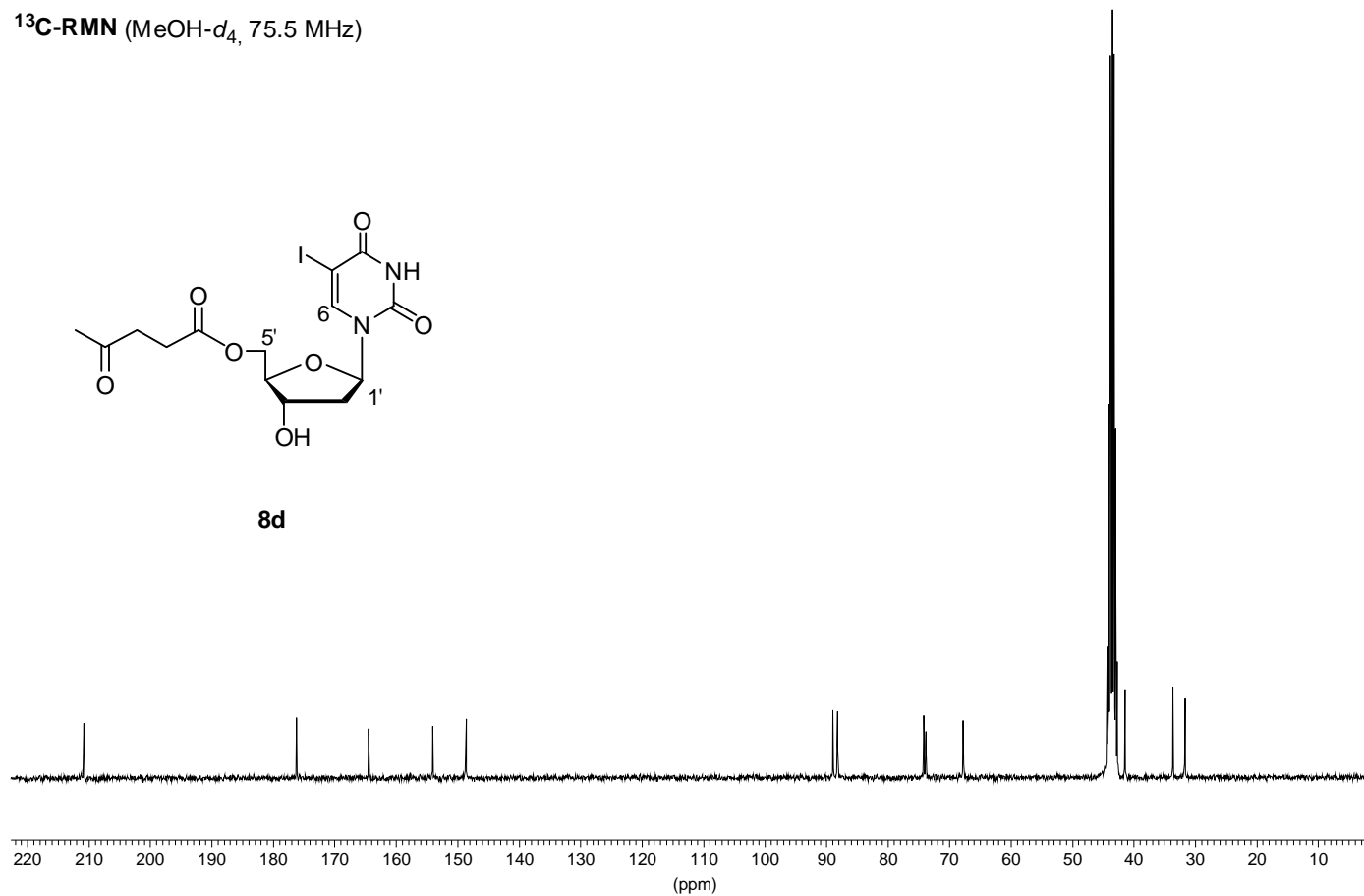


5-Iodo-5'-*O*-levulinyl-2'-deoxyuridine (8d)

^{13}C -RMN (MeOH- d_4 , 75.5 MHz)

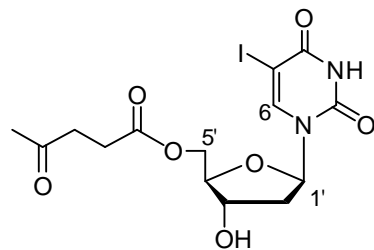


8d

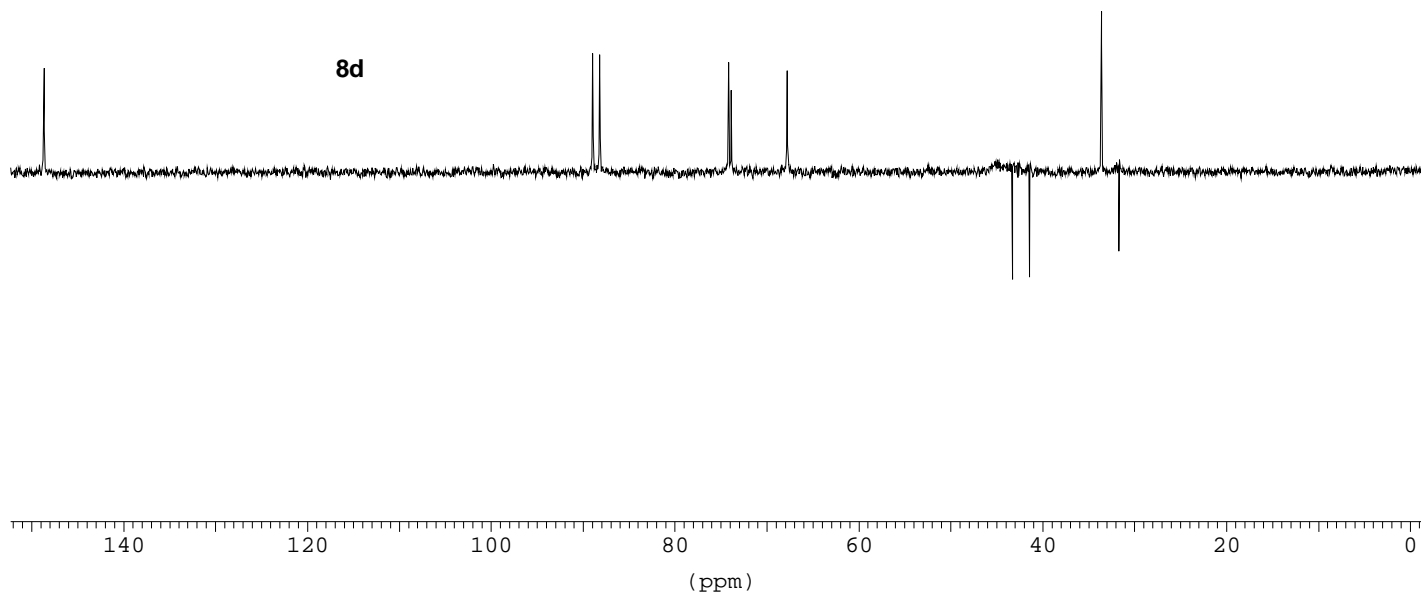


5-Iodo-5'-*O*-levulinyl-2'-deoxyuridine (8d)

DEPT (MeOH-*d*₄, 75.5 MHz)

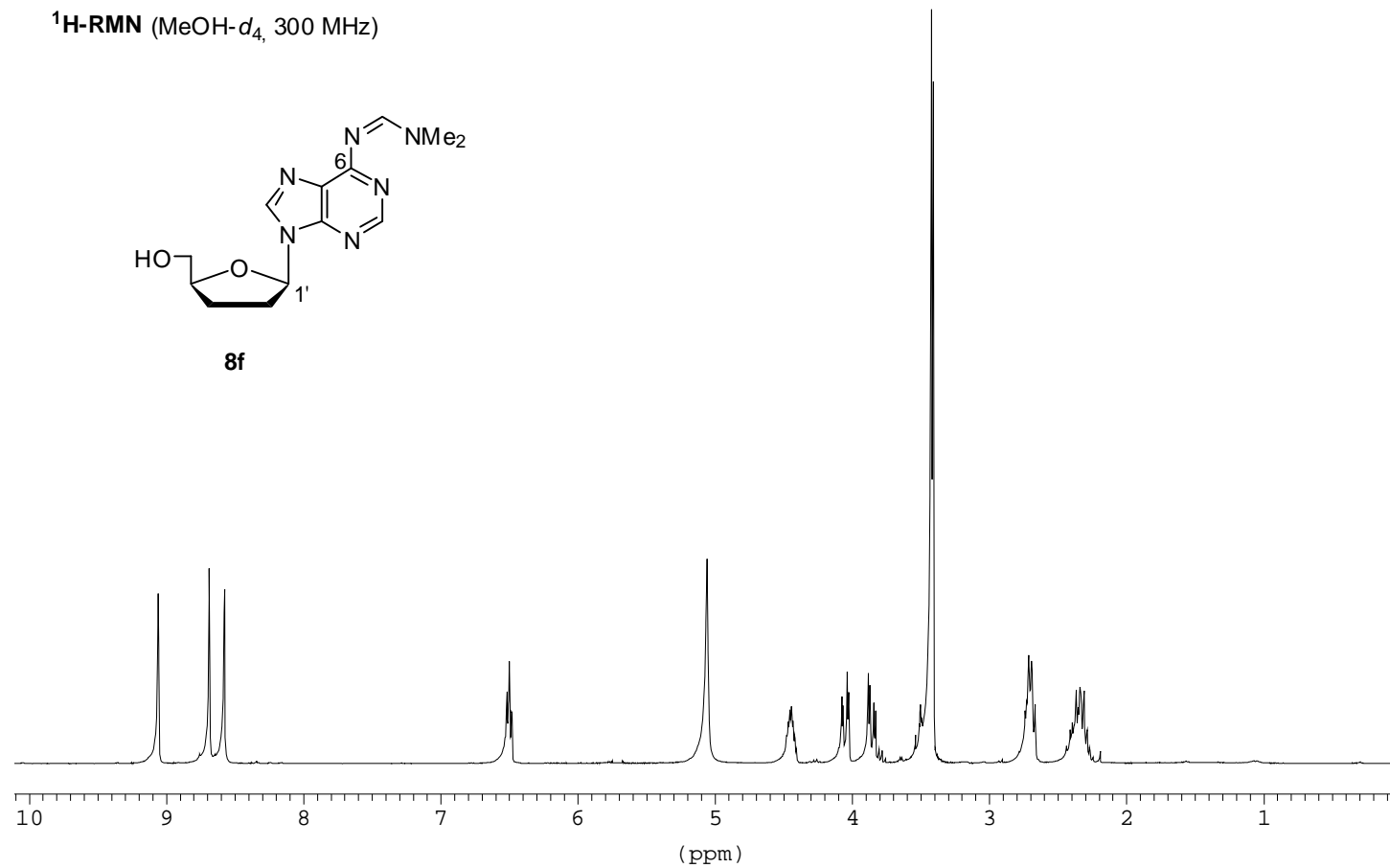
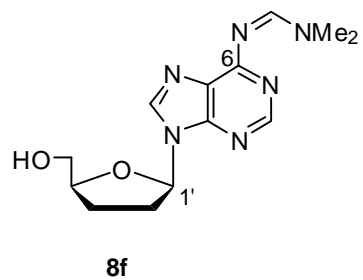


8d



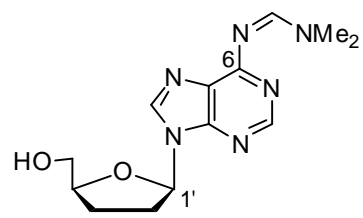
***N*⁶-(Dimethylamino)methylene-2',3'-dideoxyadenosine (8f)**

¹H-RMN (MeOH-*d*₄, 300 MHz)

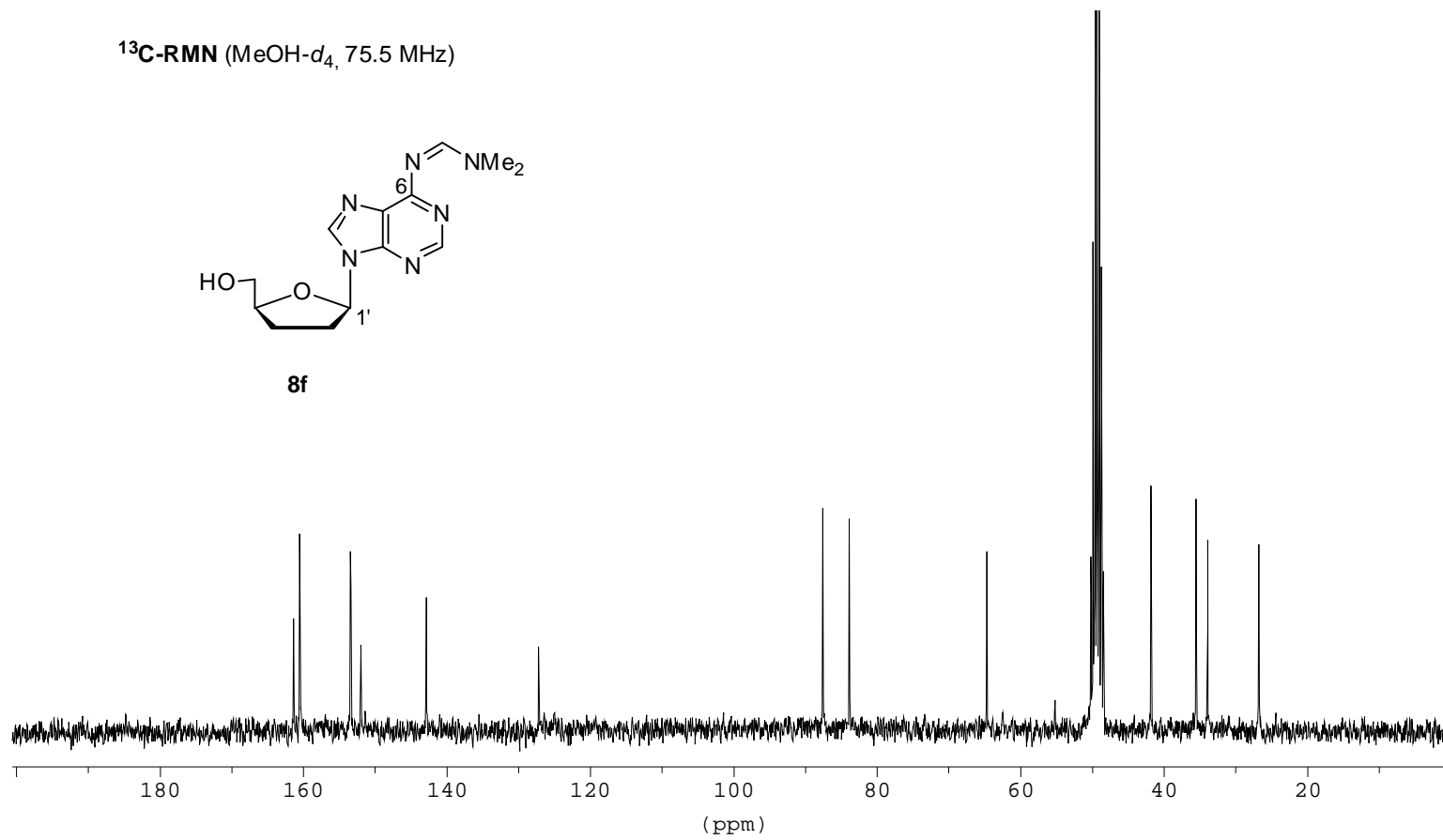


***N*⁶-(Dimethylamino)methylene-2',3'-dideoxyadenosine (8f)**

¹³C-RMN (MeOH-*d*₄, 75.5 MHz)

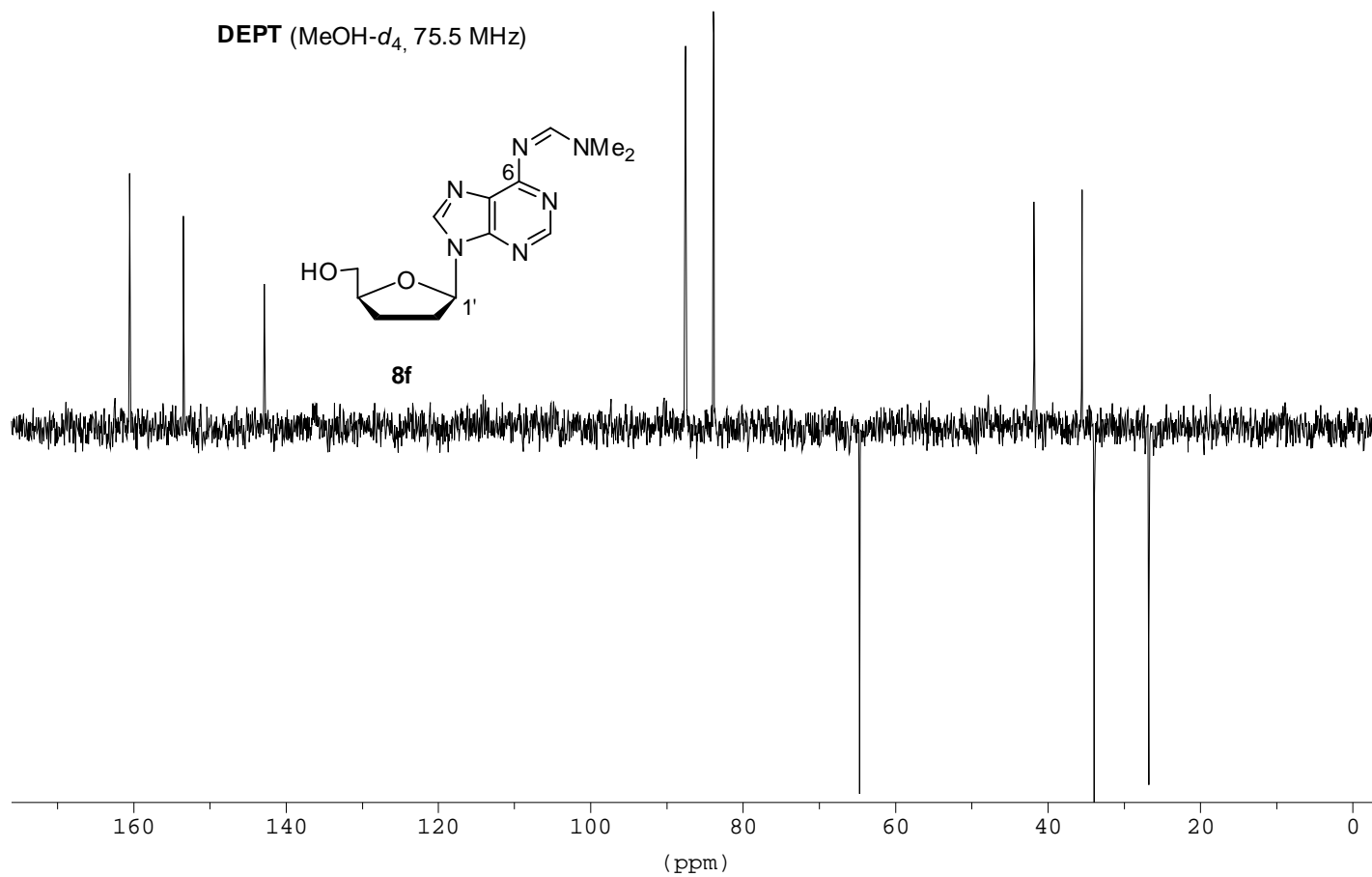


8f



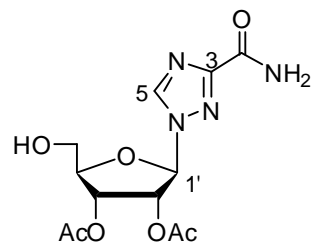
***N*⁶-(Dimethylamino)methylene-2',3'-dideoxyadenosine (8f)**

DEPT (MeOH-*d*₄, 75.5 MHz)

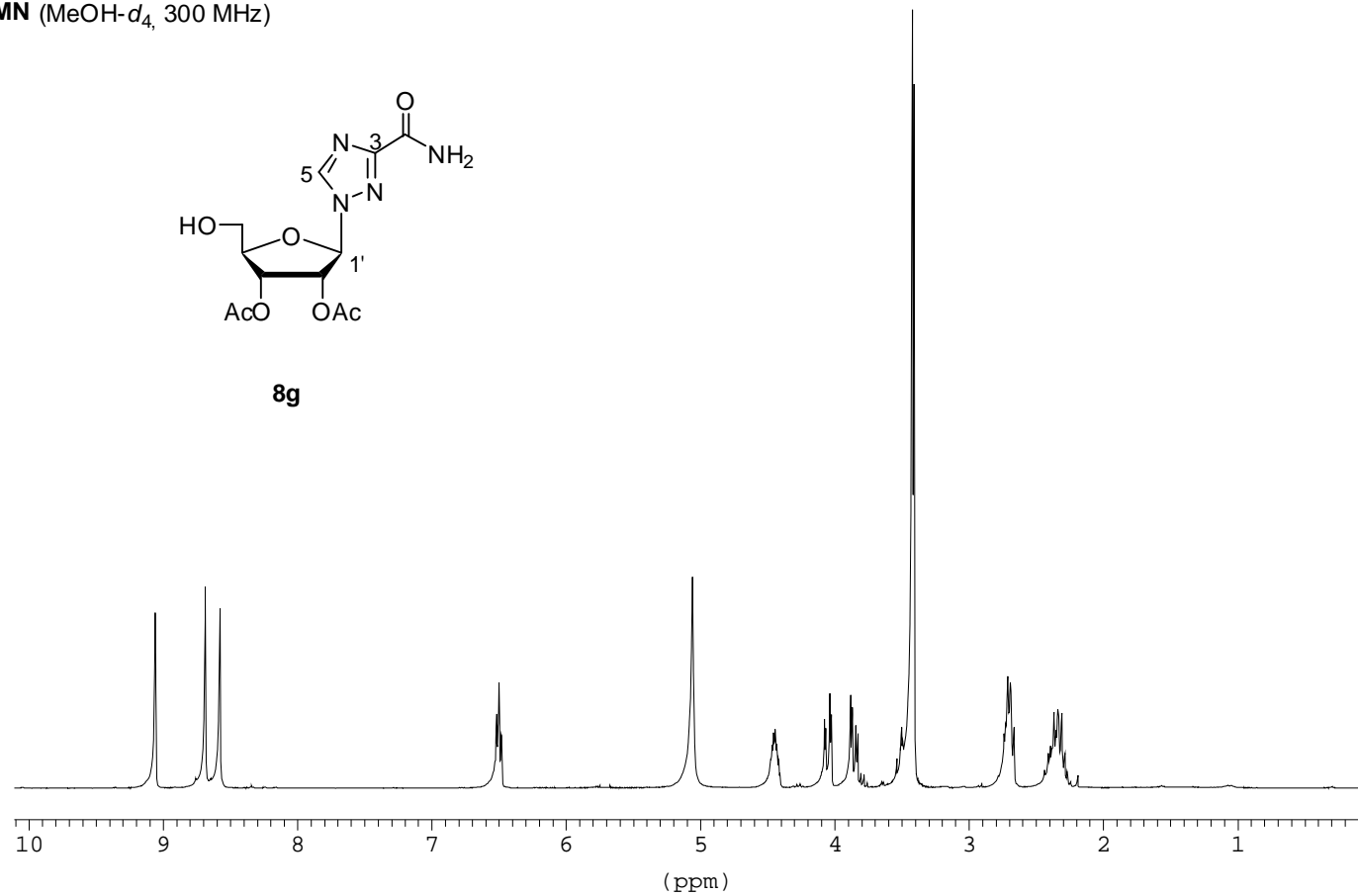


1-(2',3'-Di-O-acetyl-β-D-ribofuranosyl)-1H-1,2,4-triazole-3-carboxamide (8g)

¹H-RMN (MeOH-d₄, 300 MHz)

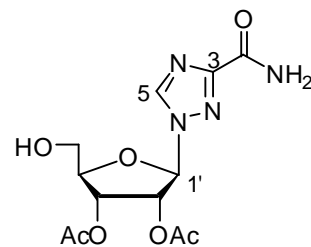


8g

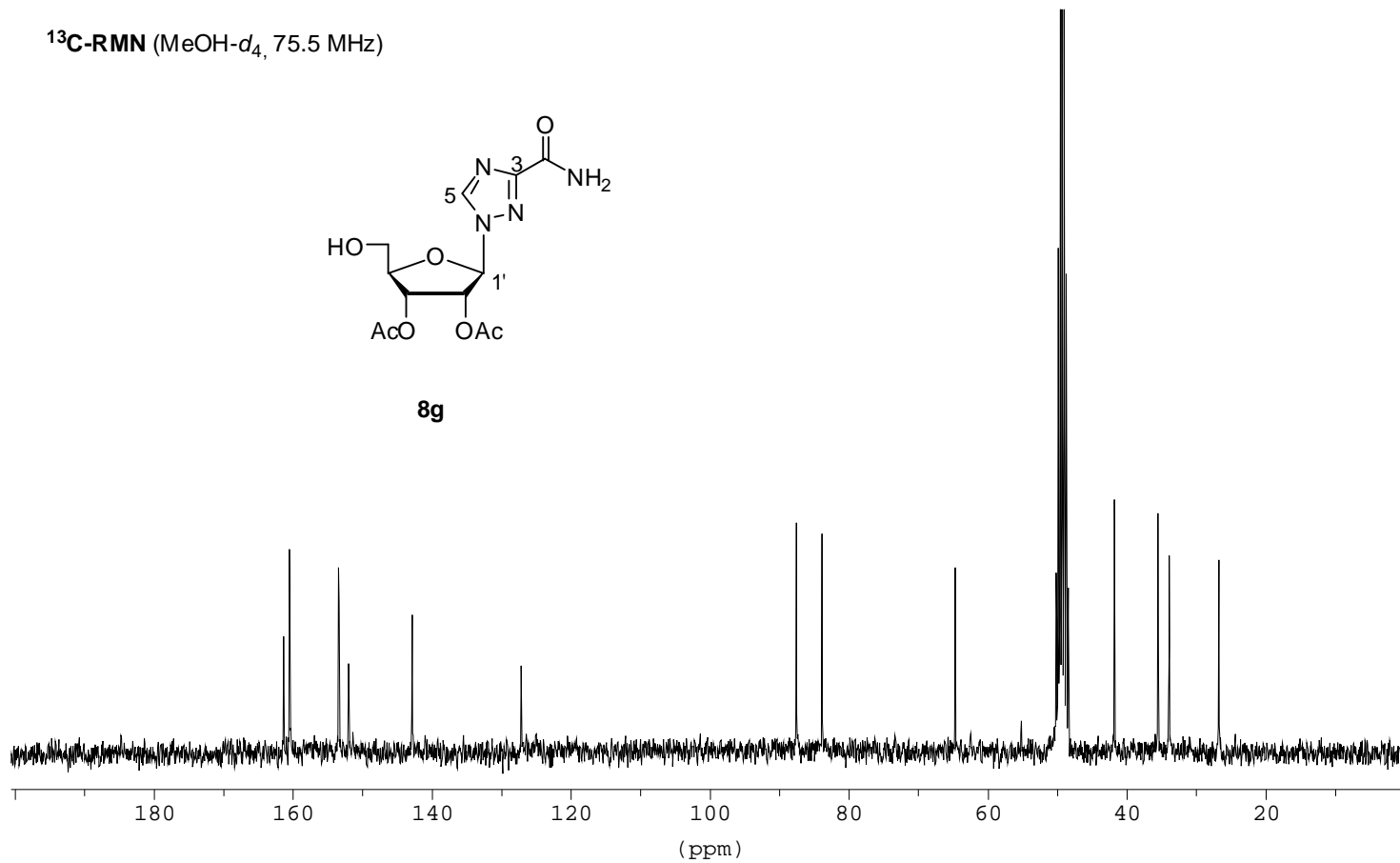


1-(2',3'-Di-O-acetyl-β-D-ribofuranosyl)-1H-1,2,4-triazole-3-carboxamide (8g)

¹³C-RMN (MeOH-d₄, 75.5 MHz)

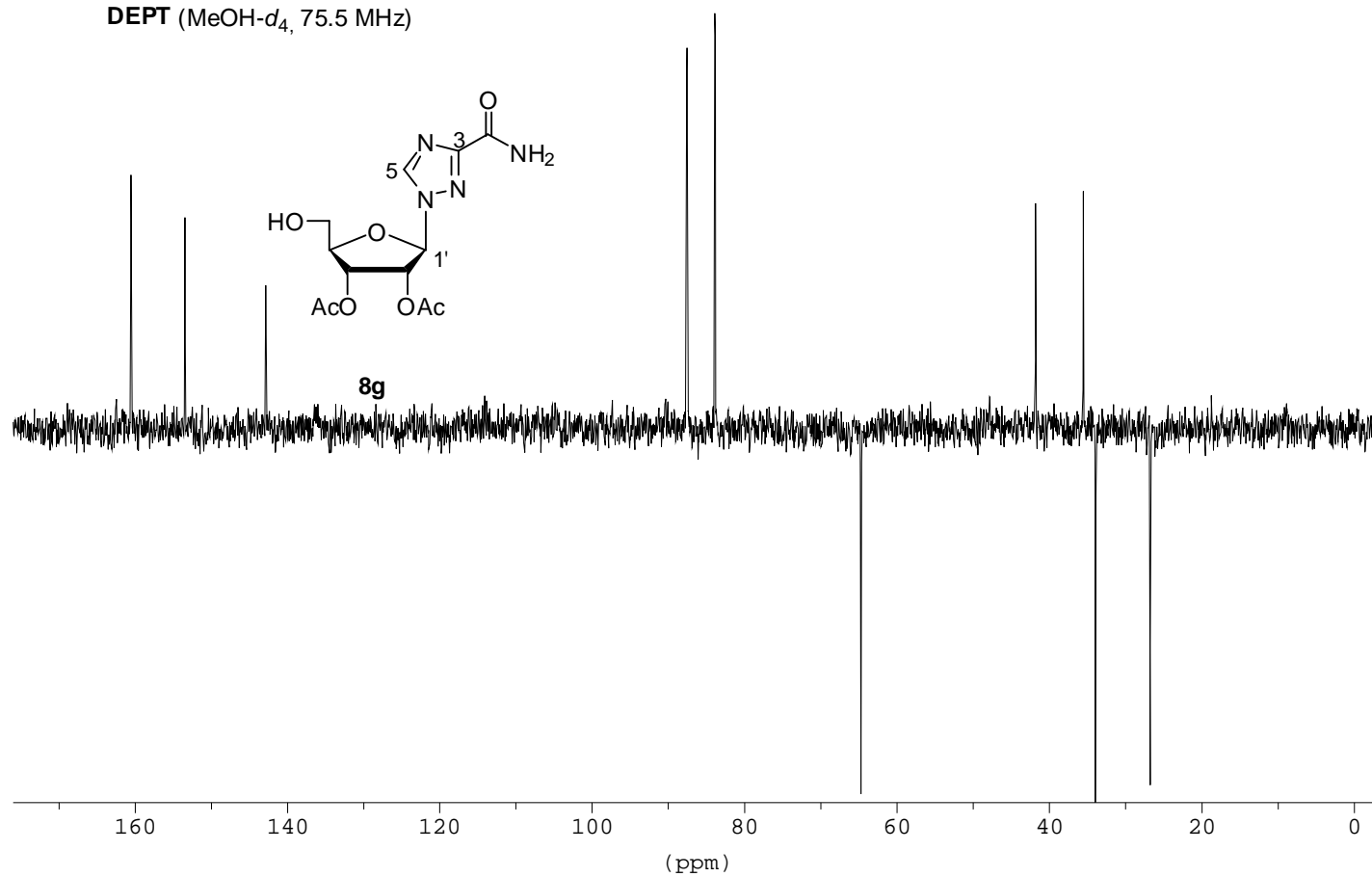


8g



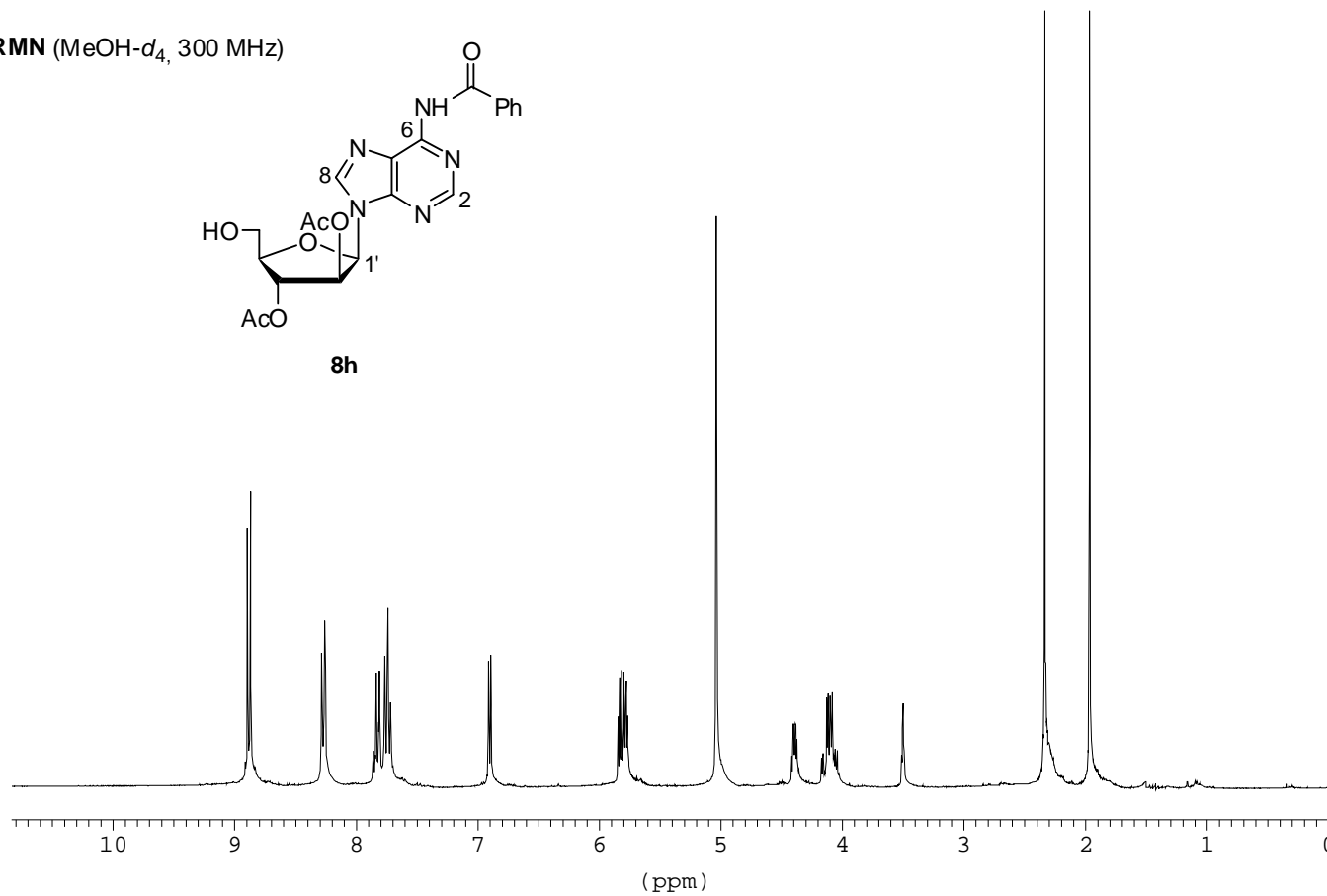
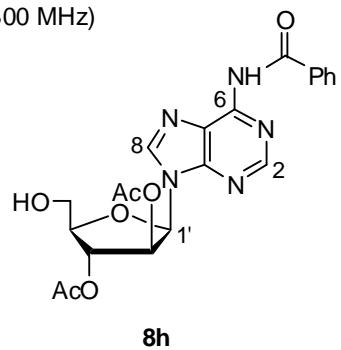
1-(2',3'-Di-O-acetyl-β-D-ribofuranosyl)-1H-1,2,4-triazole-3-carboxamide (8g)

DEPT (MeOH-*d*₄, 75.5 MHz)



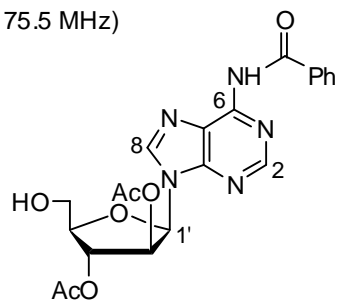
***N*⁶-Benzoyl-9-(2',3'-di-*O*-acetyl-β-*D*-arabinofuranosyl)adenine (8h)**

¹H-RMN (MeOH-*d*₄, 300 MHz)

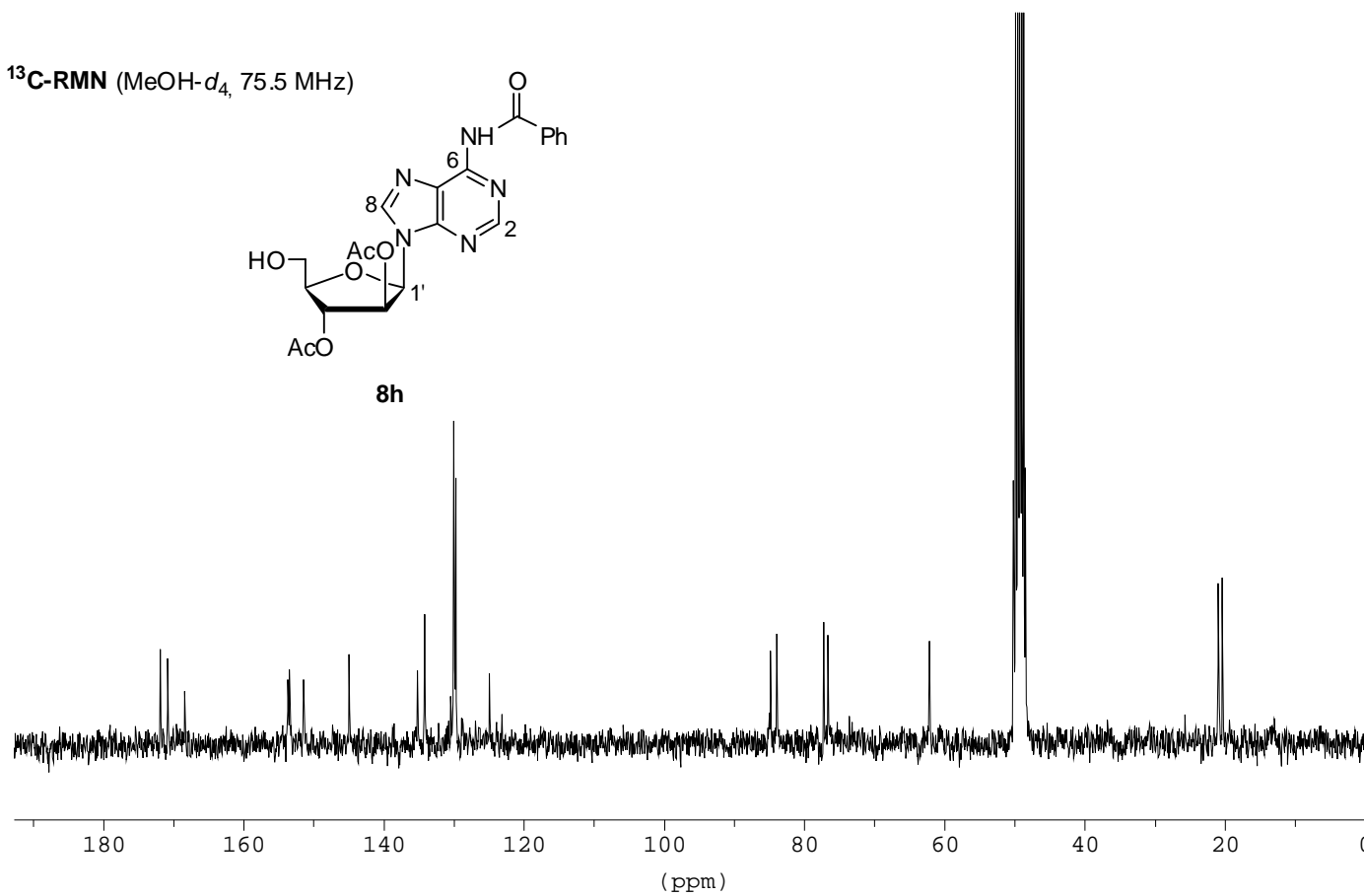


***N*⁶-Benzoyl-9-(2',3'-di-*O*-acetyl-β-*D*-arabinofuranosyl)adenine (8h)**

¹³C-RMN (MeOH-*d*₄, 75.5 MHz)

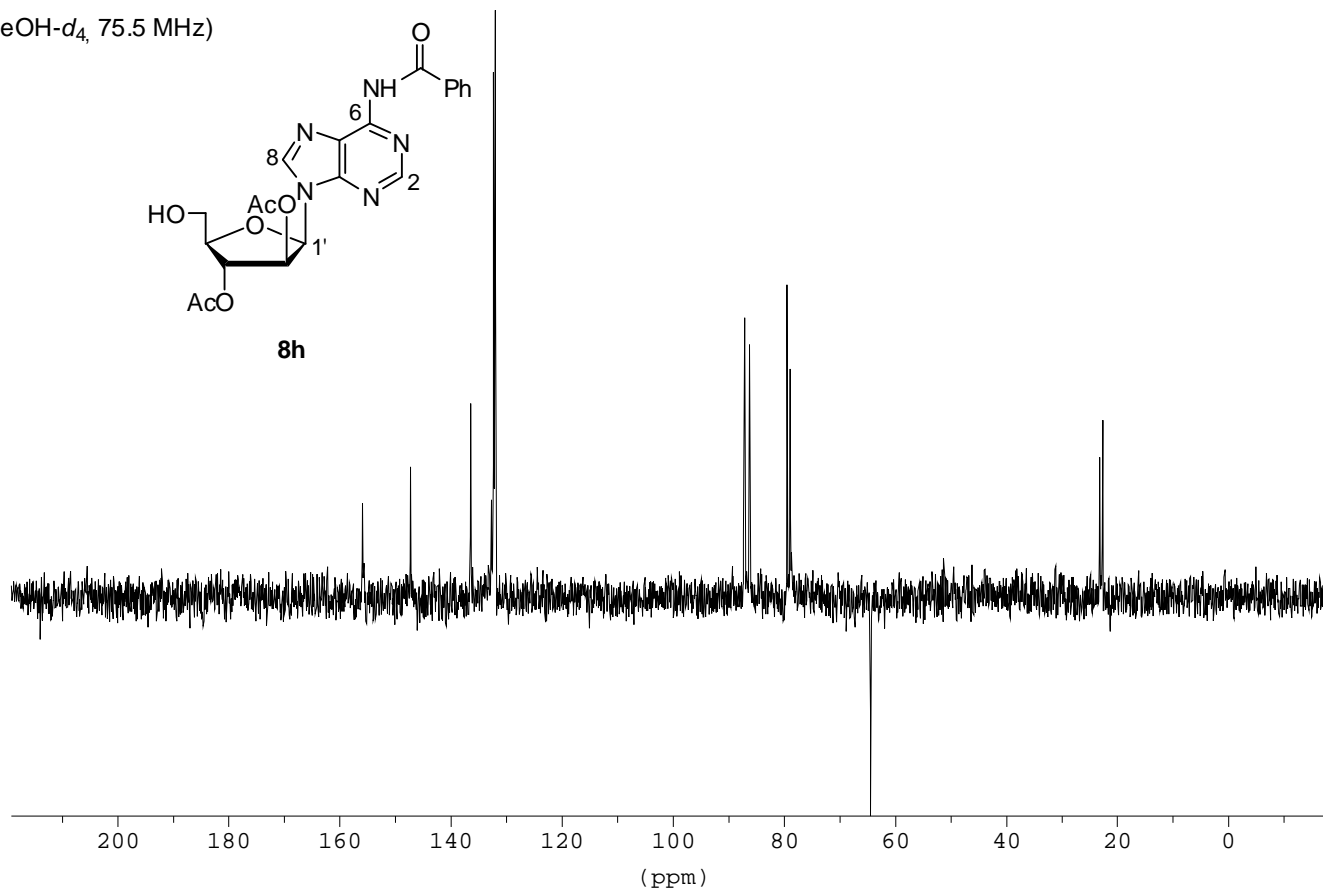
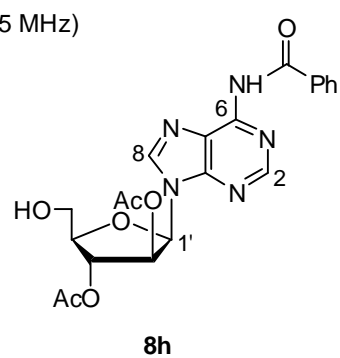


8h



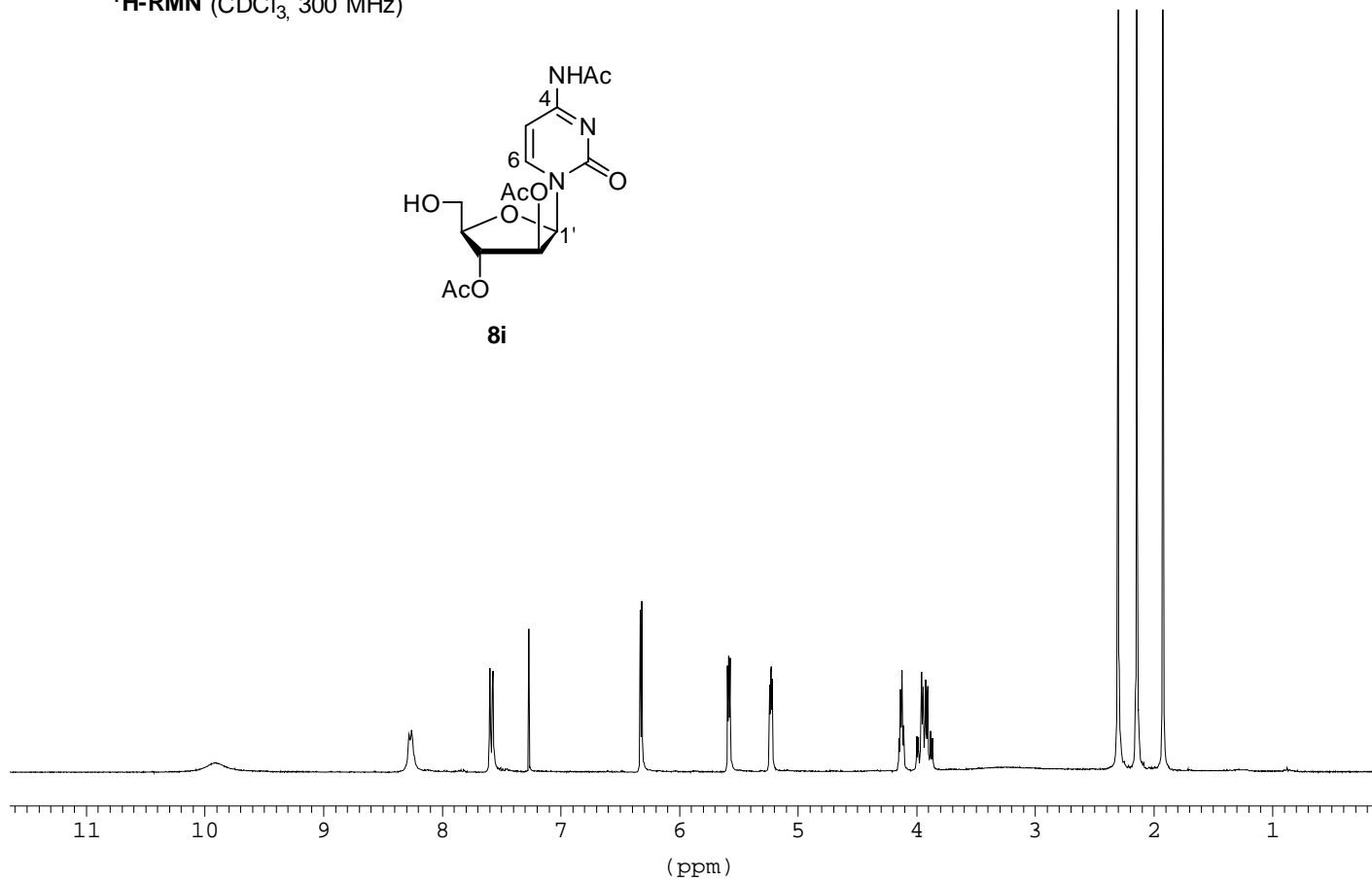
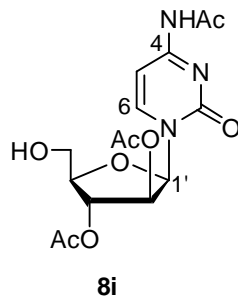
***N*⁶-Benzoyl-9-(2',3'-di-*O*-acetyl-β-*D*-arabinofuranosyl)adenine (**8h**)**

DEPT (MeOH-*d*₄, 75.5 MHz)



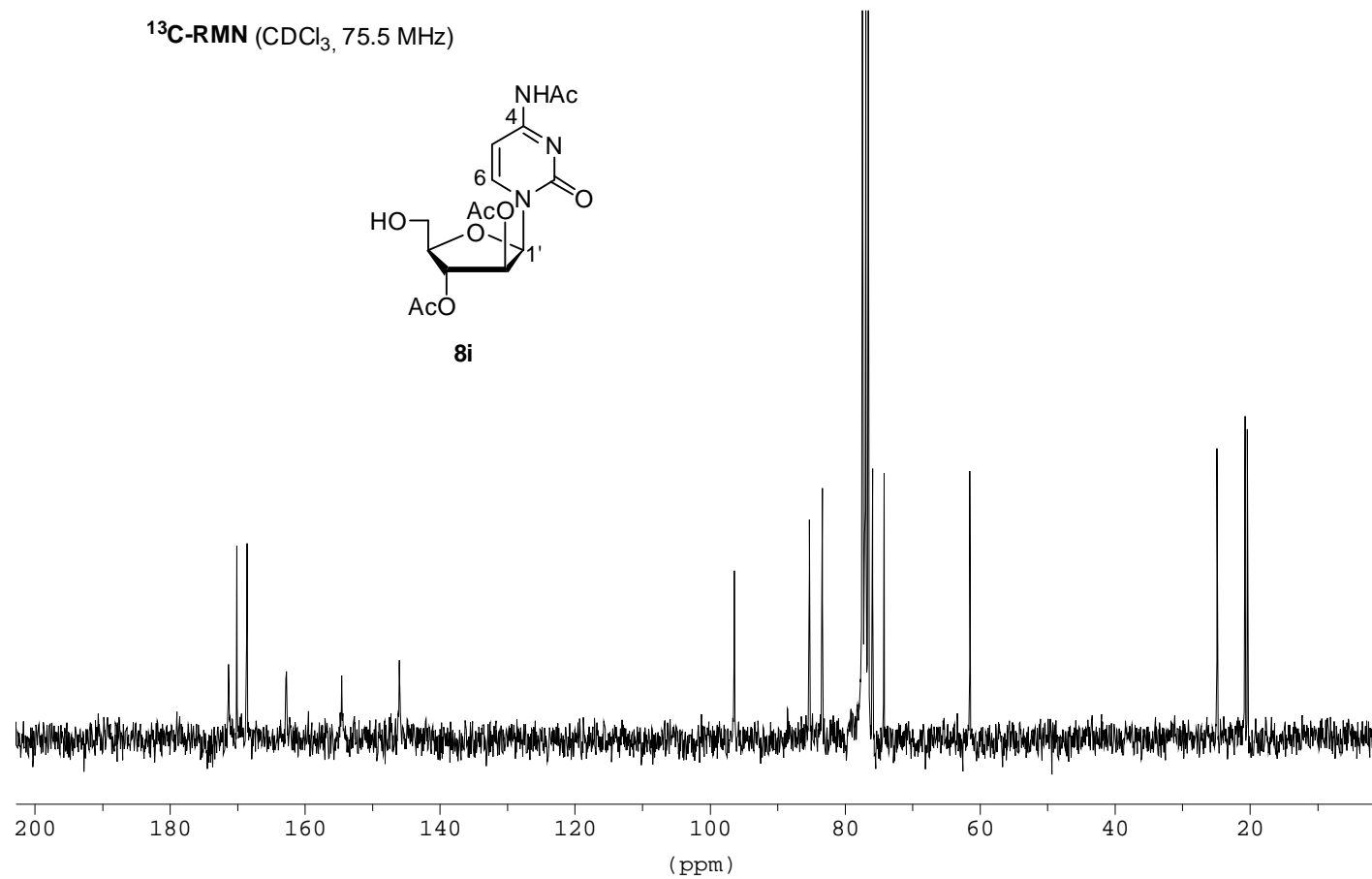
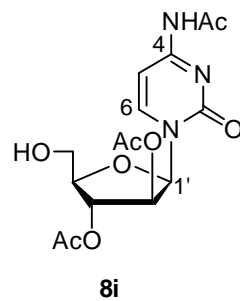
***N*⁴-Acetyl-1-(2',3'-di-*O*-acetyl-β-D-arabinofuranosyl)cytosine (8i)**

¹H-RMN (CDCl₃, 300 MHz)



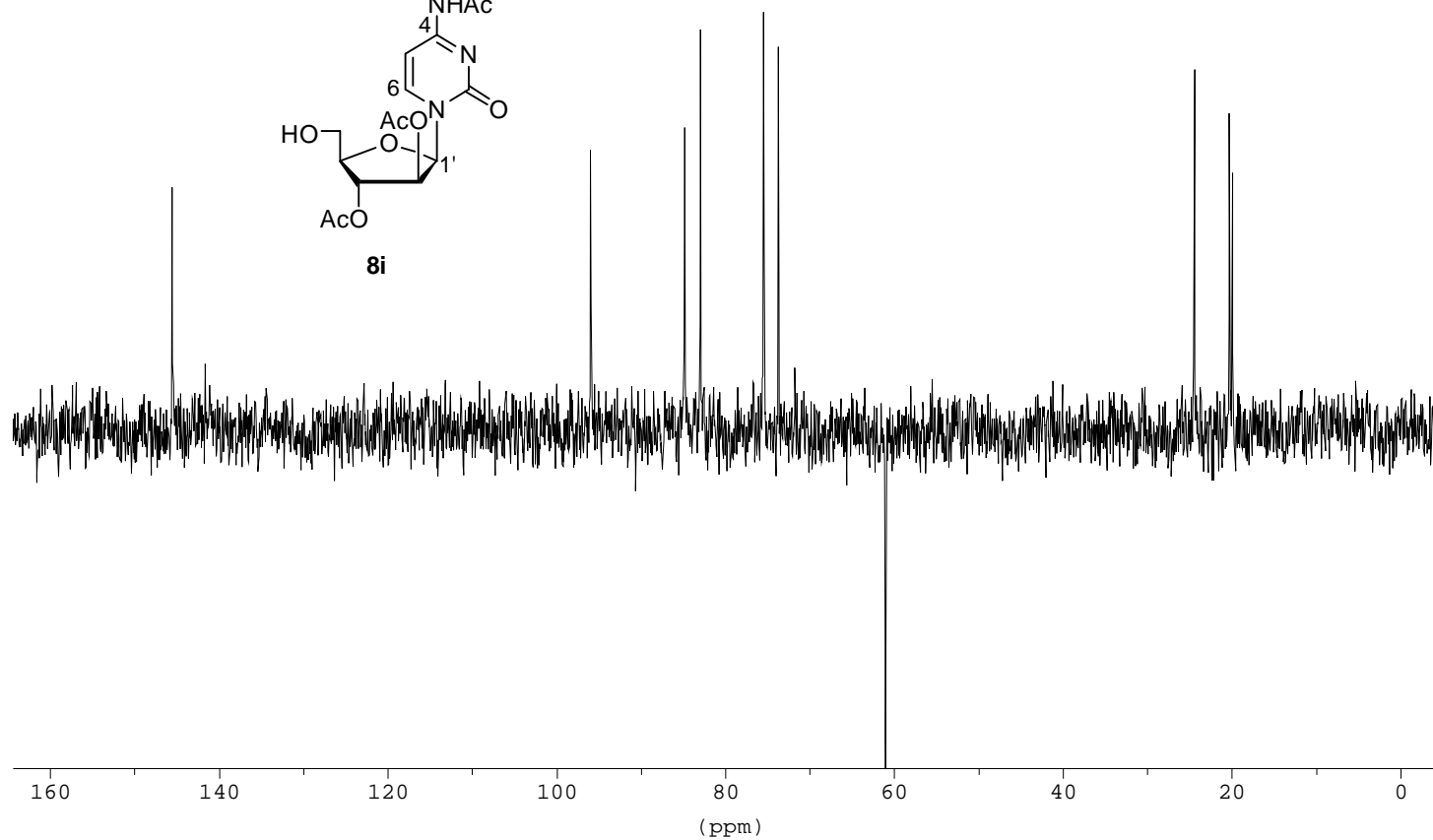
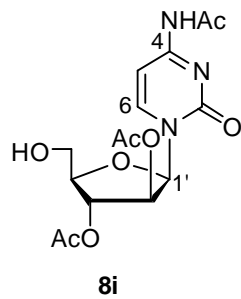
*N*⁴-Acetyl-1-(2',3'-di-*O*-acetyl-β-*D*-arabinofuranosyl)cytosine (**8i**)

¹³C-RMN (CDCl₃, 75.5 MHz)



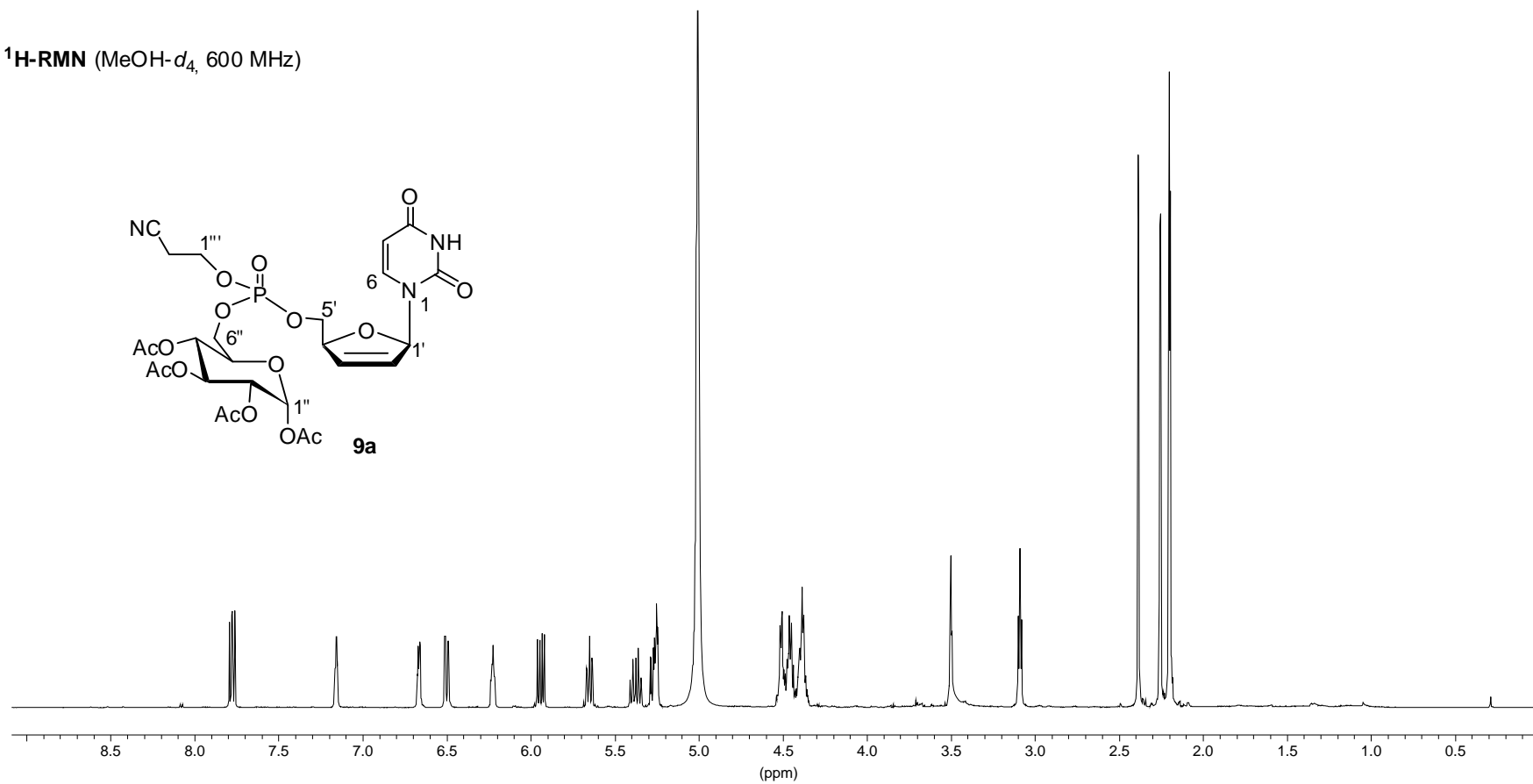
***N*⁴-Acetyl-1-(2',3'-di-*O*-acetyl-β-D-arabinofuranosyl)cytosine (8i)**

DEPT (CDCl₃, 75.5 MHz)



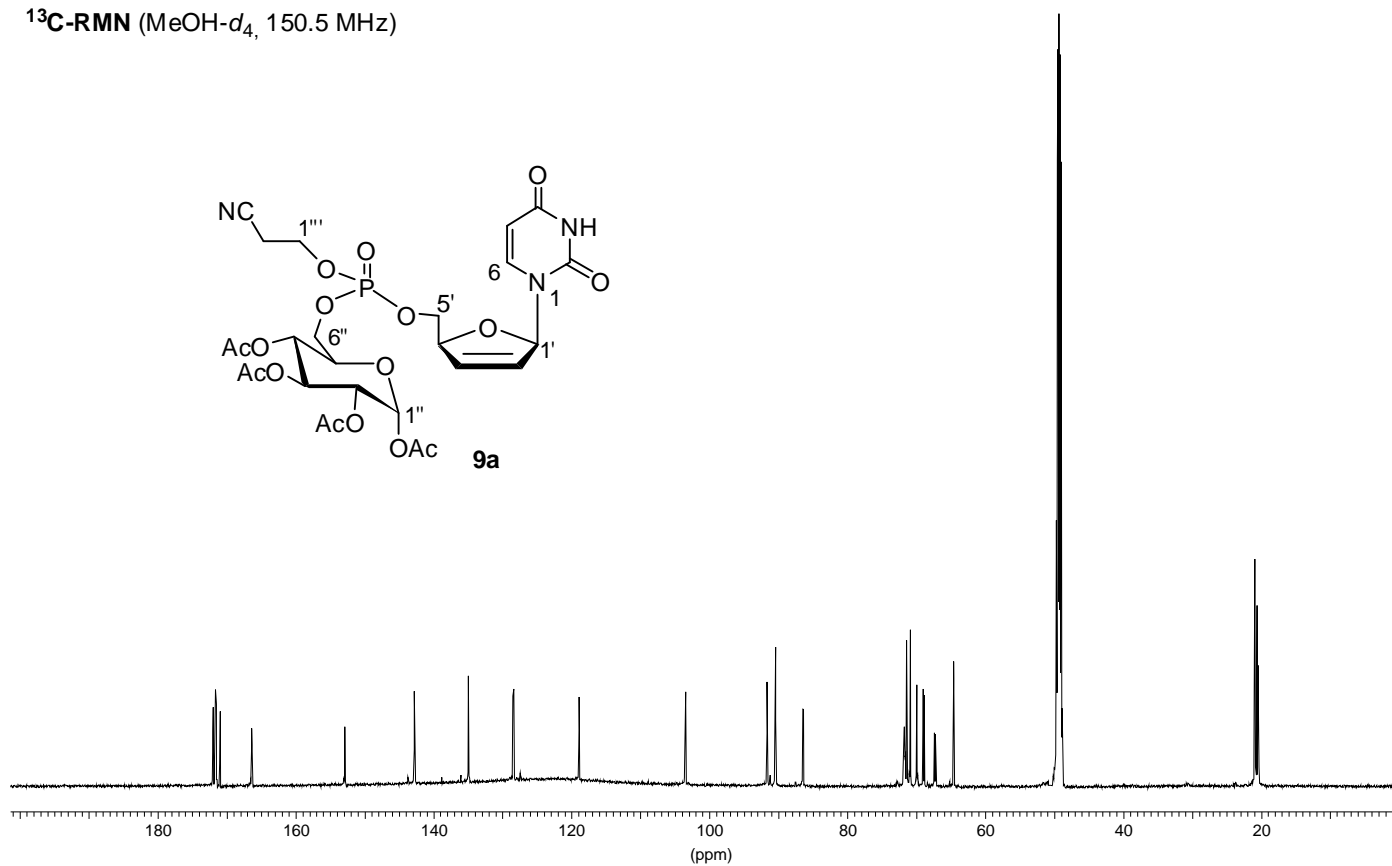
2-Cyanoethyl-(2',3'-dideoxy-2',3'-dideoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9a)

$^1\text{H-RMN}$ (MeOH- d_4 , 600 MHz)



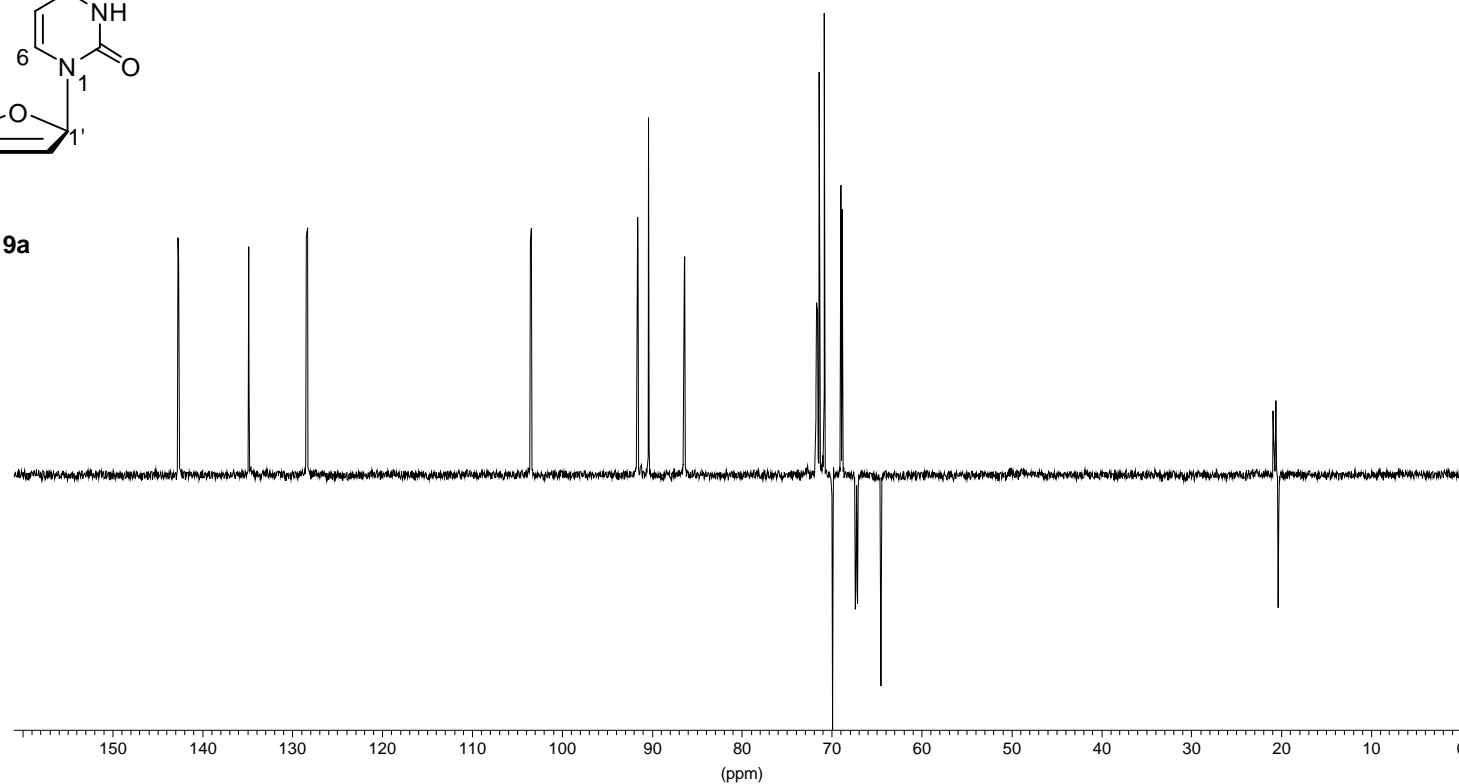
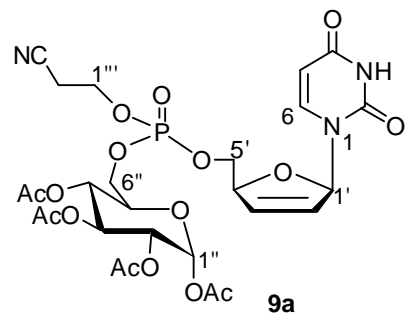
2-Cyanoethyl-(2',3'-didehydro-2',3'-dideoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9a)

^{13}C -RMN (MeOH- d_4 , 150.5 MHz)



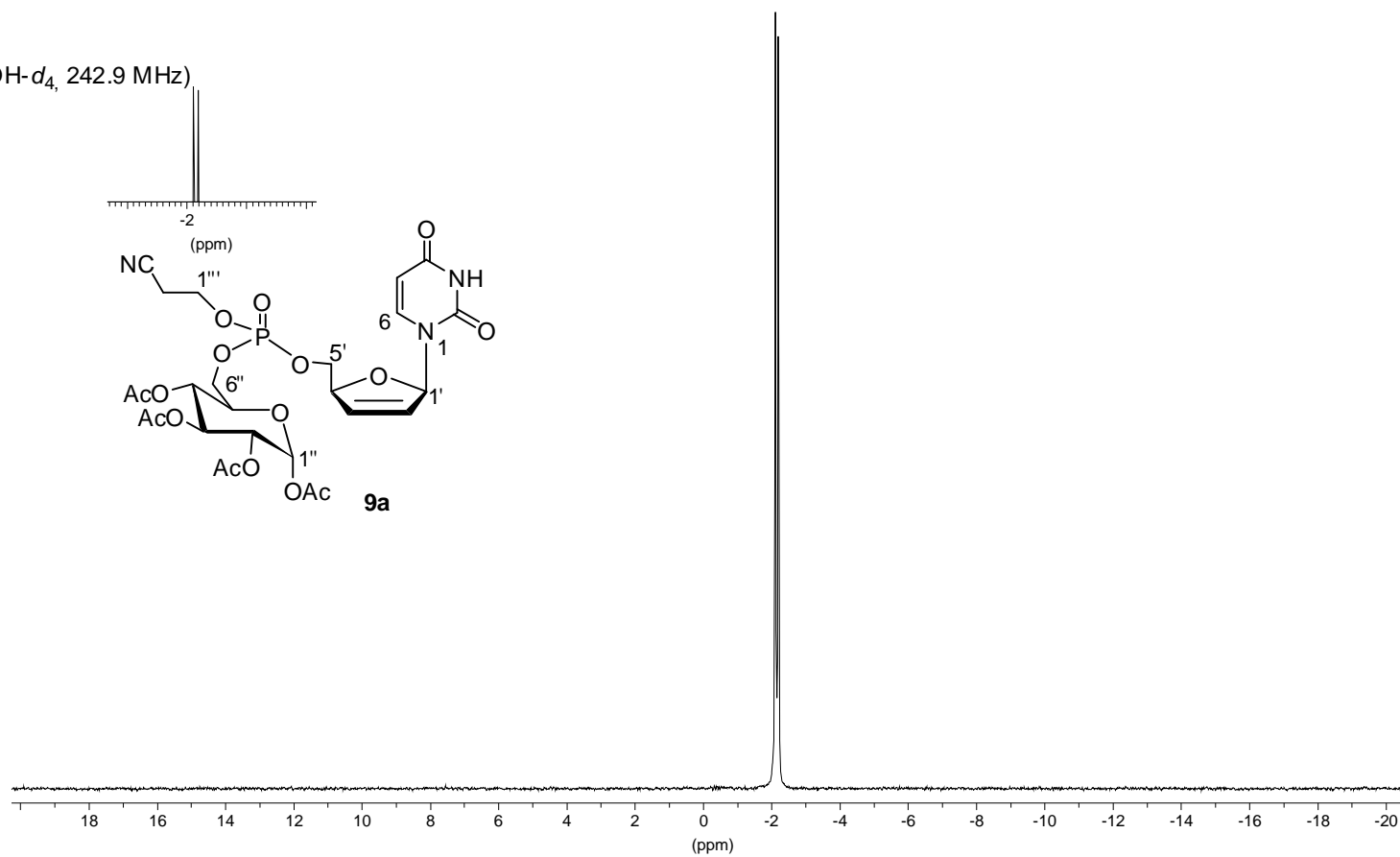
2-Cyanoethyl-(2',3'-didehydro-2',3'-dideoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9a)

DEPT (MeOH- d_4 , 150.5 MHz)



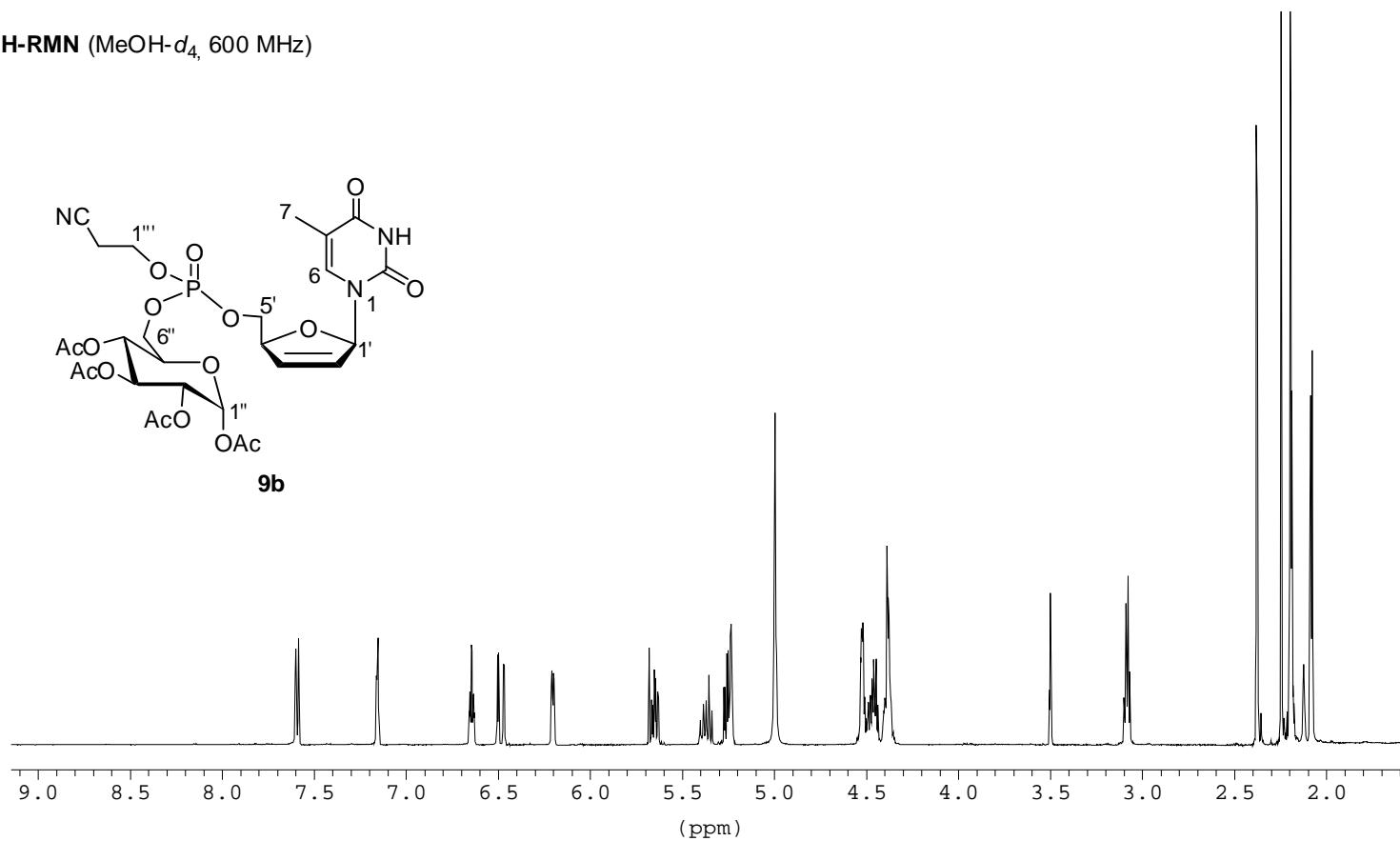
2-Cyanoethyl-(2',3'-dideoxy-2',3'-dideoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9a)

^{31}P -RMN (MeOH- d_4 , 242.9 MHz)



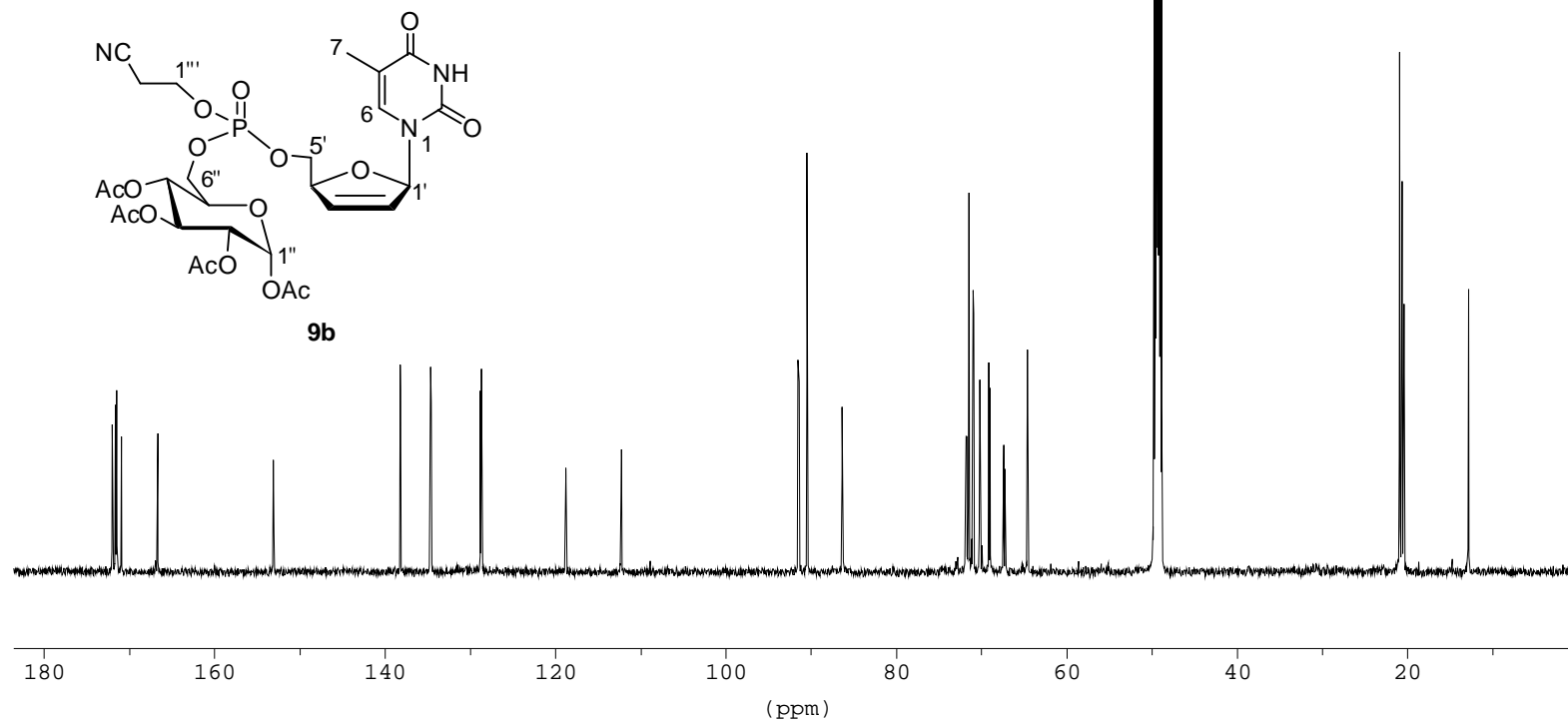
2-Cyanoethyl-(2',3'-didehydro-2',3'-dideoxythymidin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9b)

¹H-RMN (MeOH-*d*₄, 600 MHz)



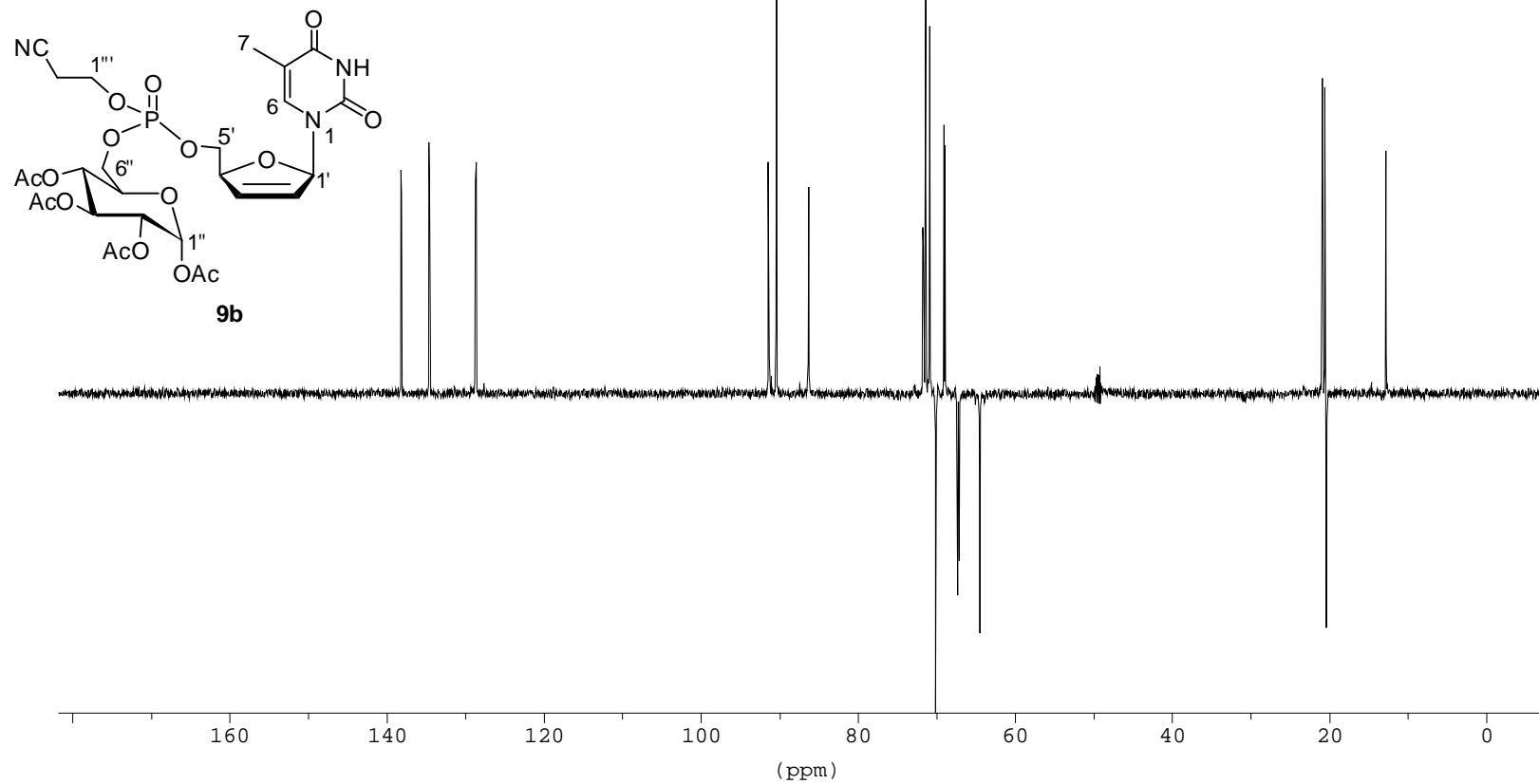
2-Cyanoethyl-(2',3'-dideoxythymidin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9b)

^{13}C -RMN (MeOH- d_4 , 150.5 MHz)



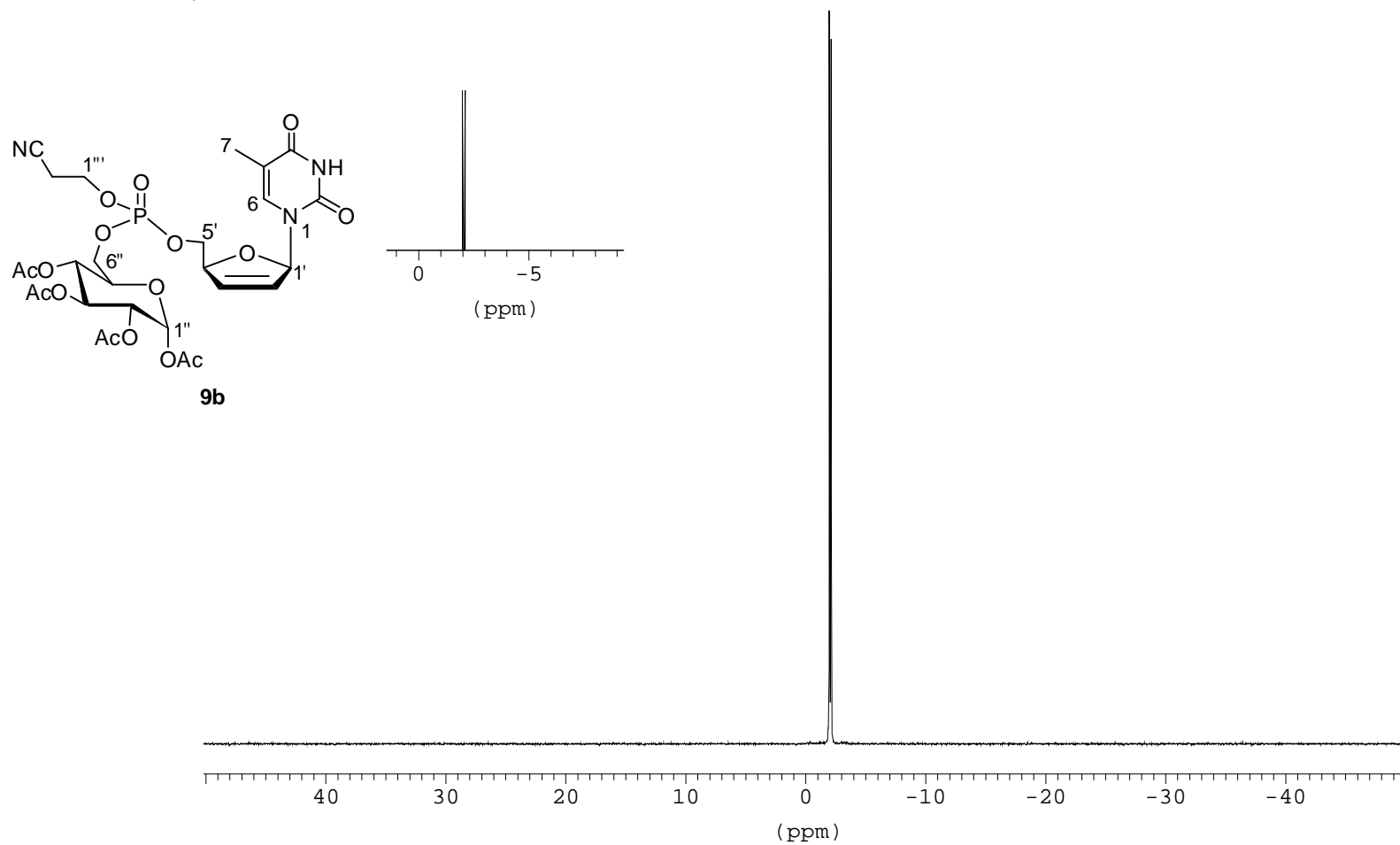
2-Cyanoethyl-(2',3'-didehydro-2',3'-dideoxythymidin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9b)

DEPT (MeOH- d_4 , 150.5 MHz)



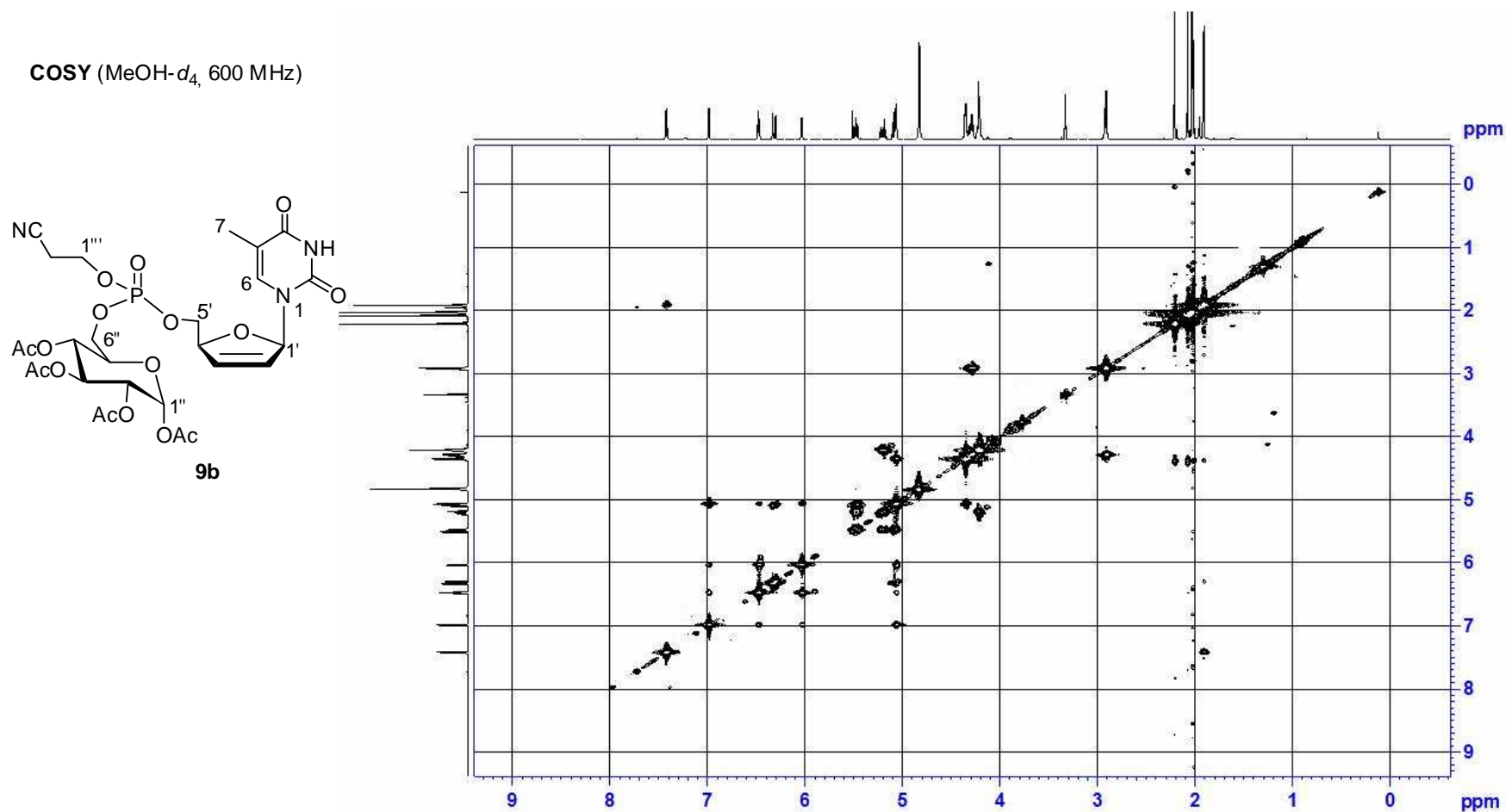
2-Cyanoethyl-(2',3'-dideoxythymidin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9b)

^{31}P -RMN (MeOH- d_4 , 242.9 MHz)



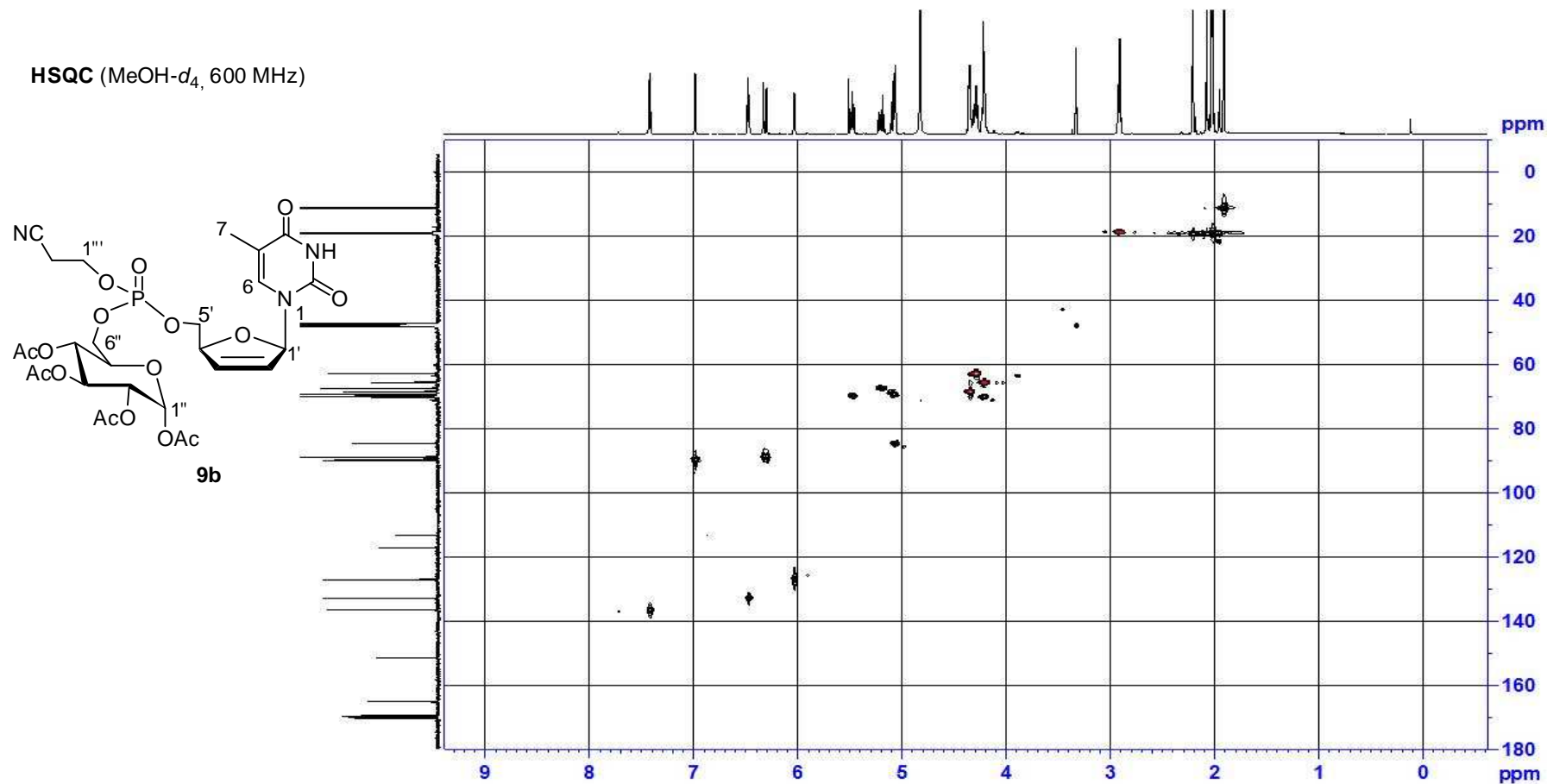
2-Cyanoethyl-(2',3'-didehydro-2',3'-dideoxythymidin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9b)

COSY (MeOH- d_4 , 600 MHz)

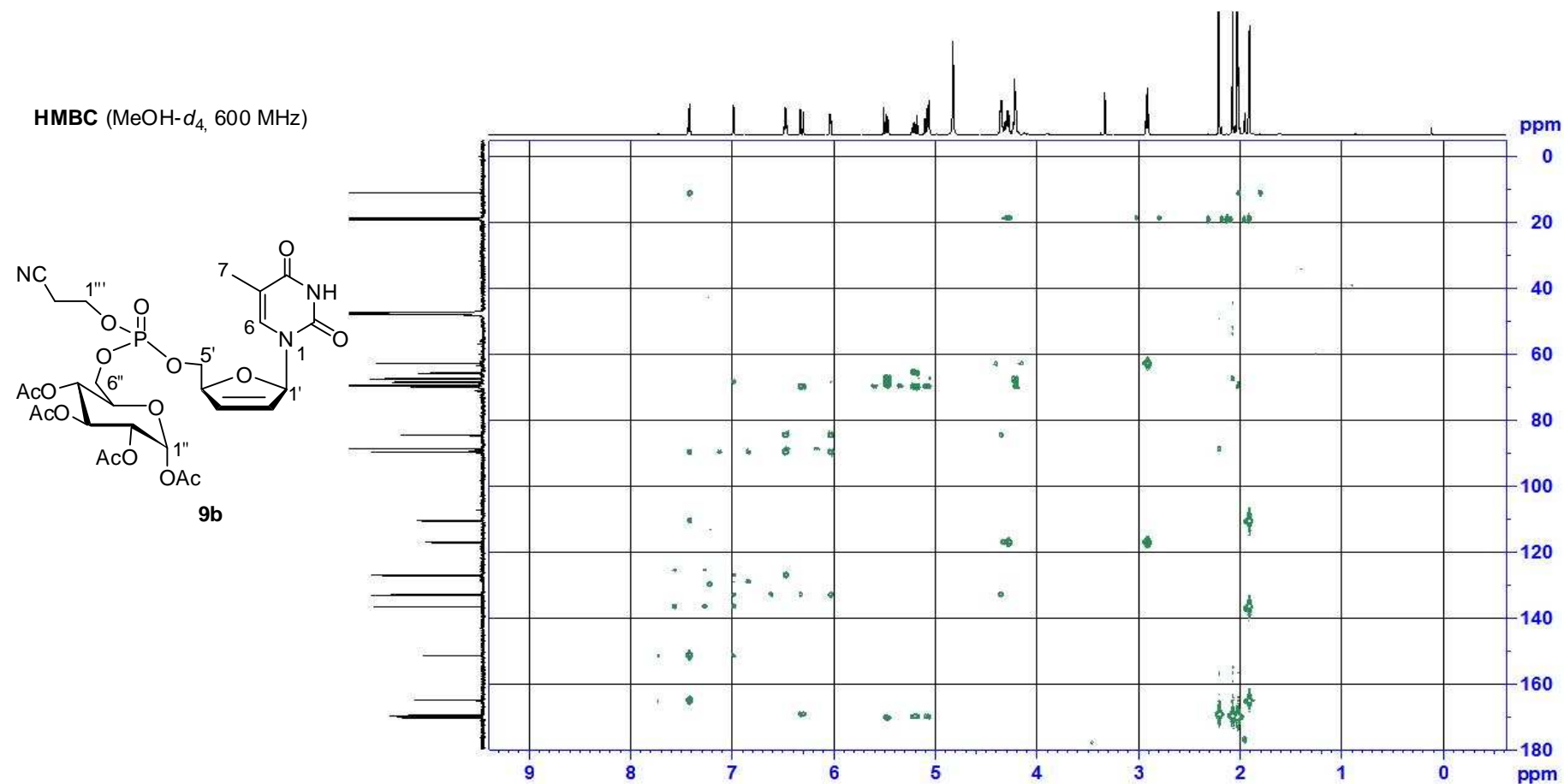


2-Cyanoethyl-(2',3'-didehydro-2',3'-dideoxythymidin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9b)

HSQC (MeOH- d_4 , 600 MHz)

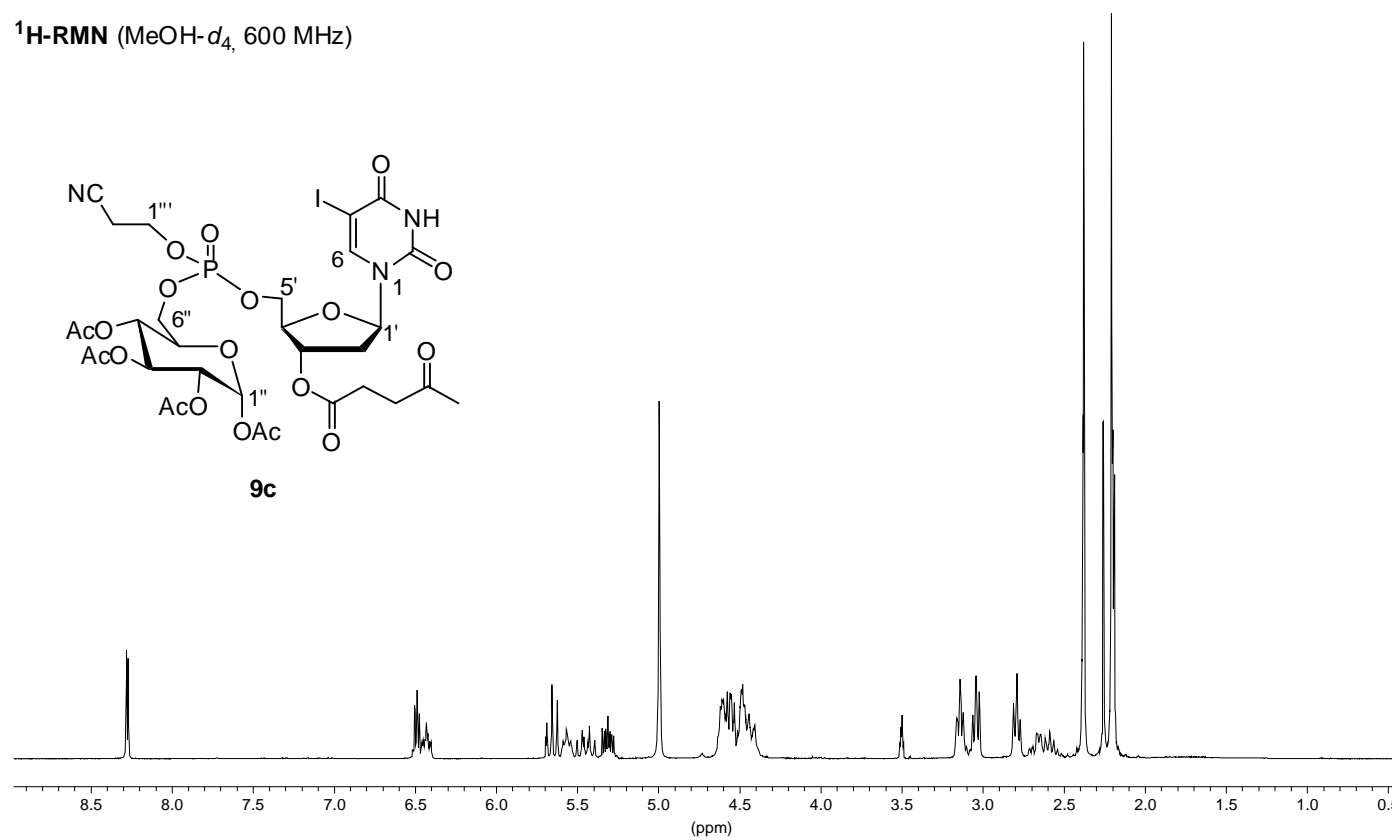


2-Cyanoethyl-(2',3'-didehydro-2',3'-dideoxythymidin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9b)



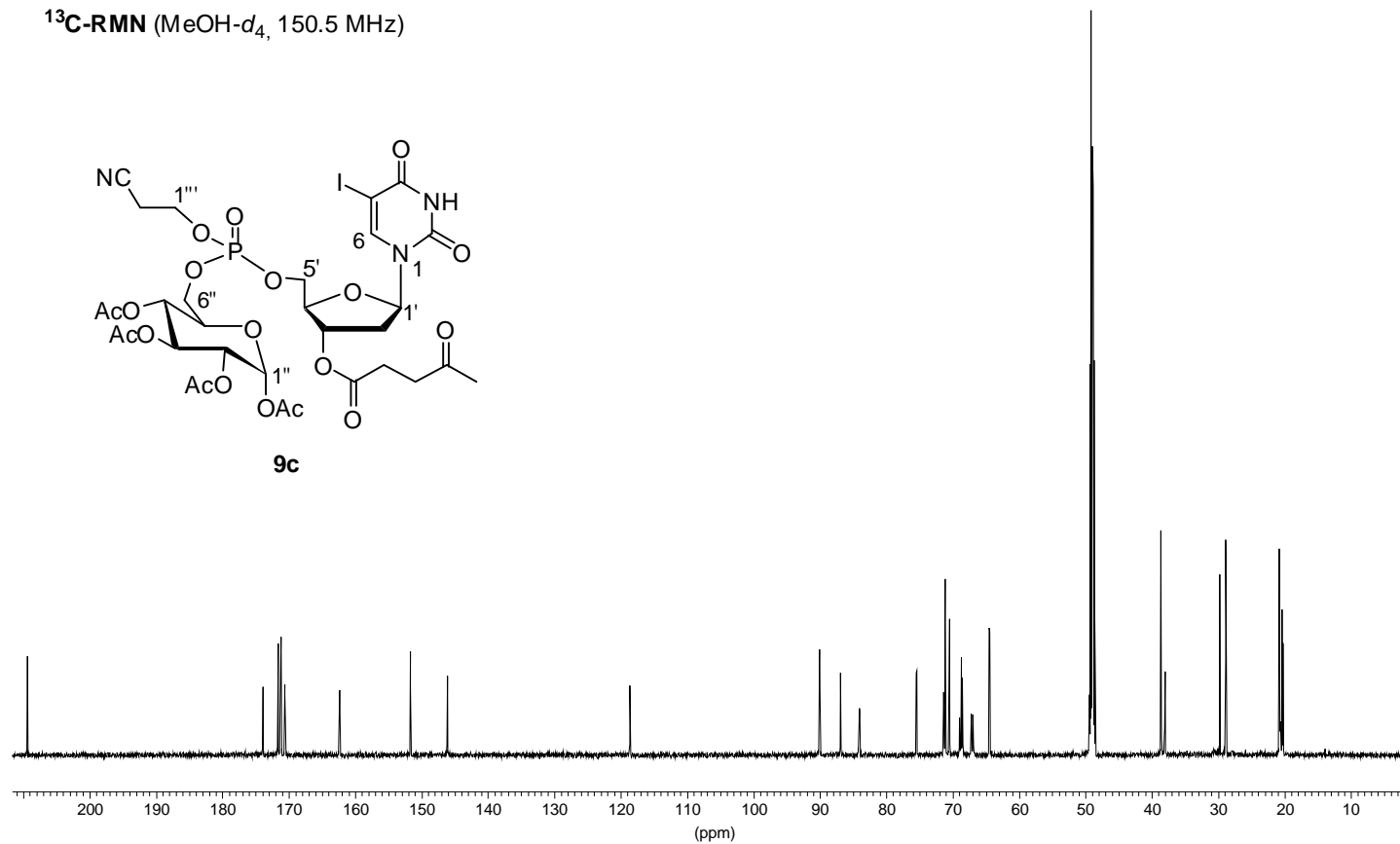
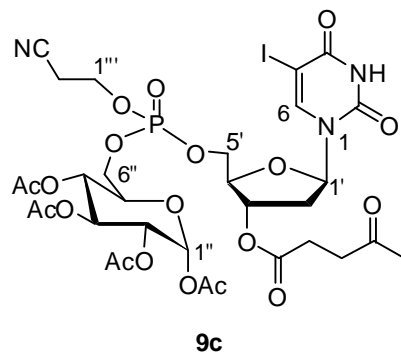
2-Cyanoethyl-(3'-*O*-levulinyl-5-iodo-2'-deoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (**9c**)

$^1\text{H-RMN}$ (MeOH- d_4 , 600 MHz)



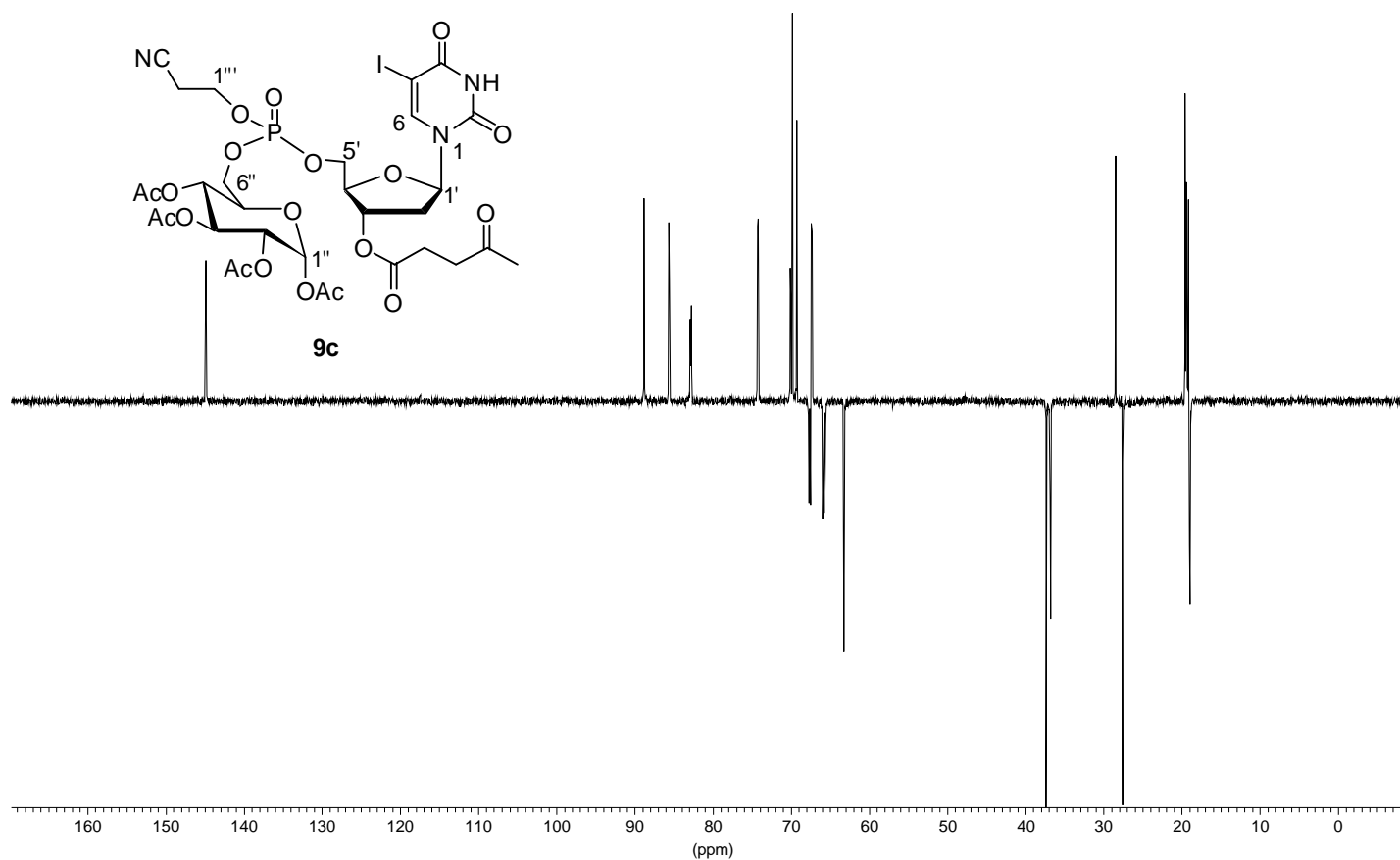
2-Cyanoethyl-(3'-*O*-levulinyl-5-iodo-2'-deoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (**9c**)

^{13}C -RMN (MeOH- d_4 , 150.5 MHz)



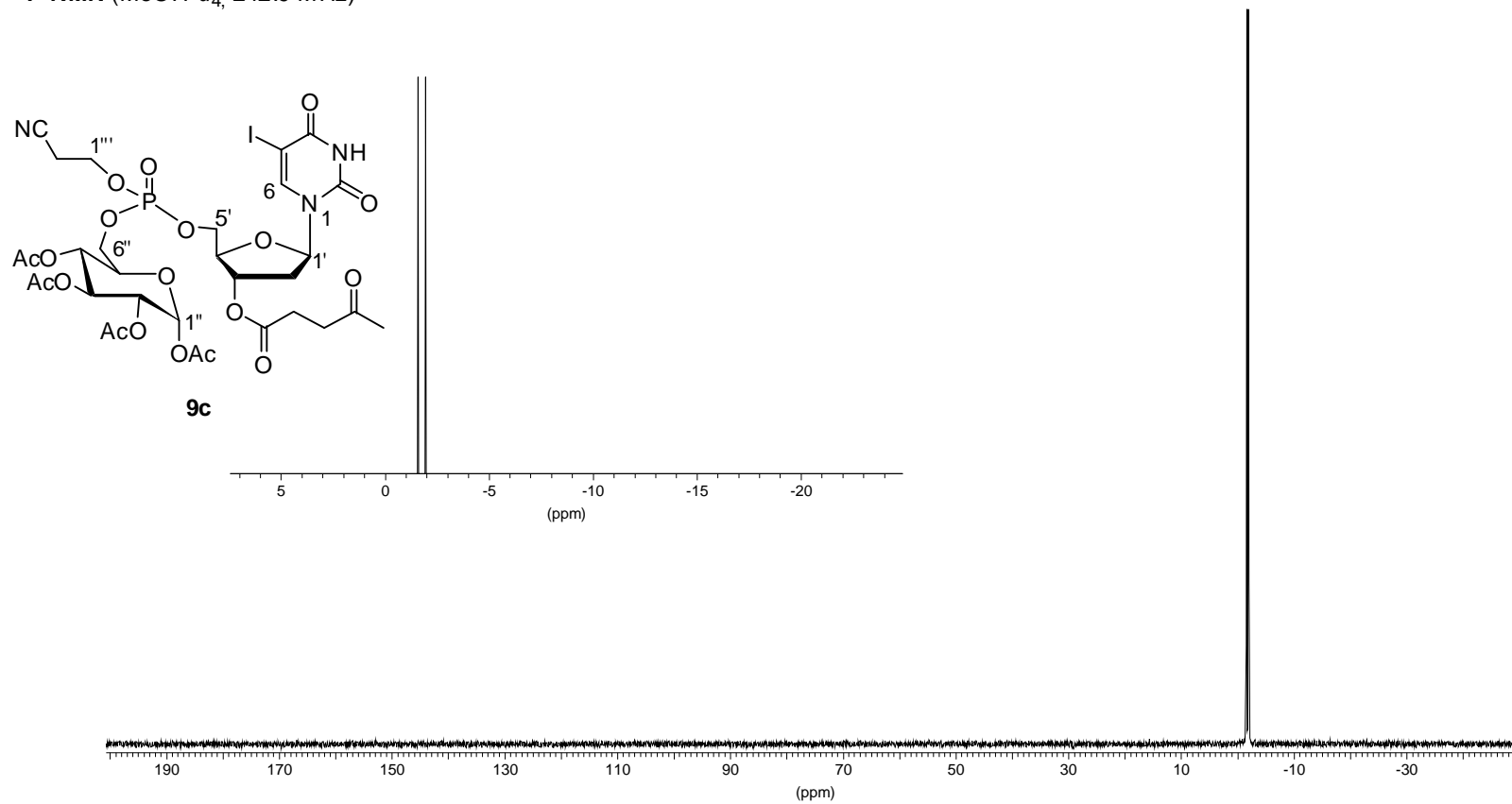
2-Cyanoethyl-(3'-*O*-levulinyl-5-iodo-2'-deoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9c**)**

DEPT (MeOH- d_4 , 150.5 MHz)

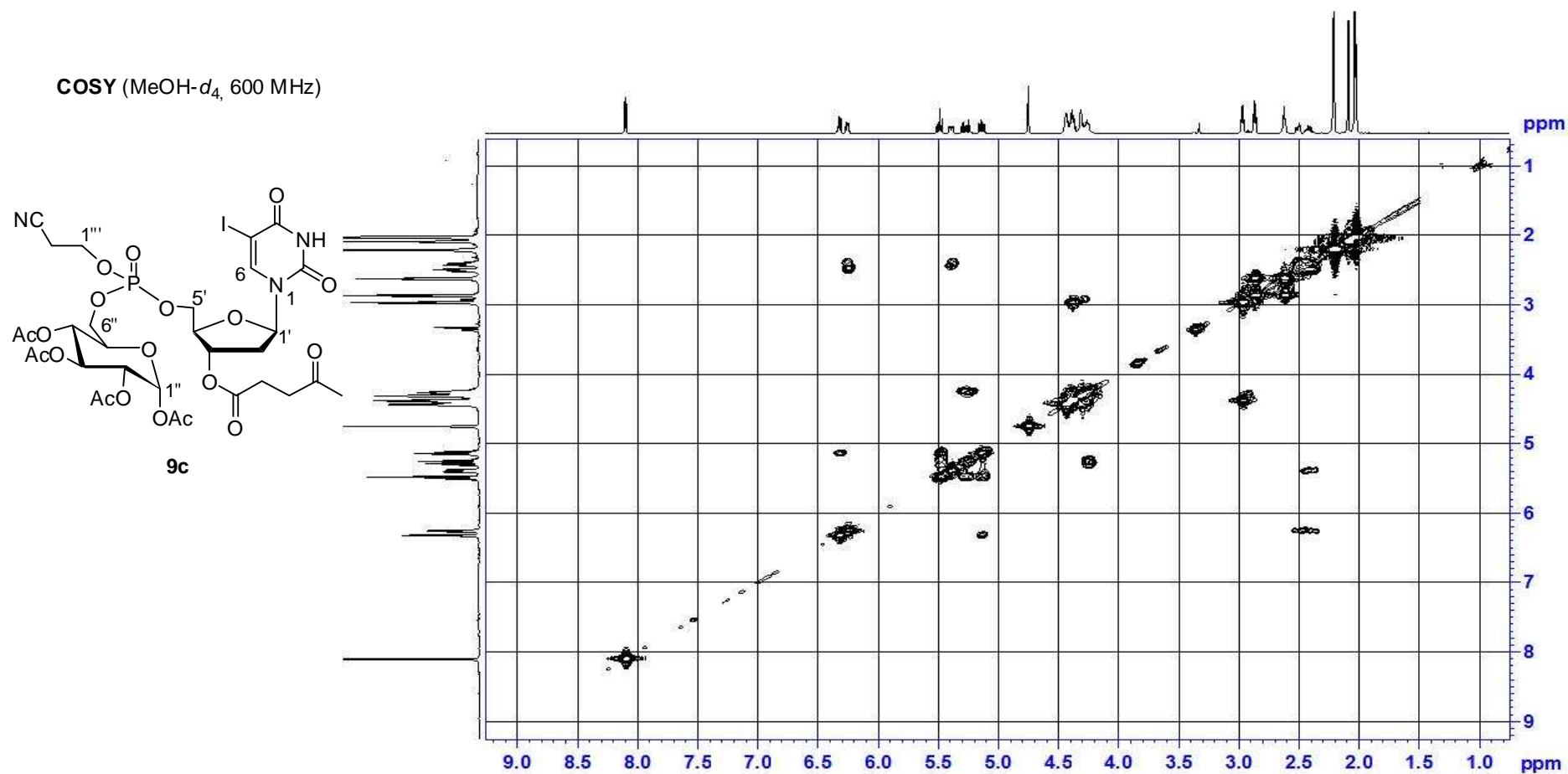


2-Cyanoethyl-(3'-*O*-levulinyl-5-iodo-2'-deoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (**9c**)

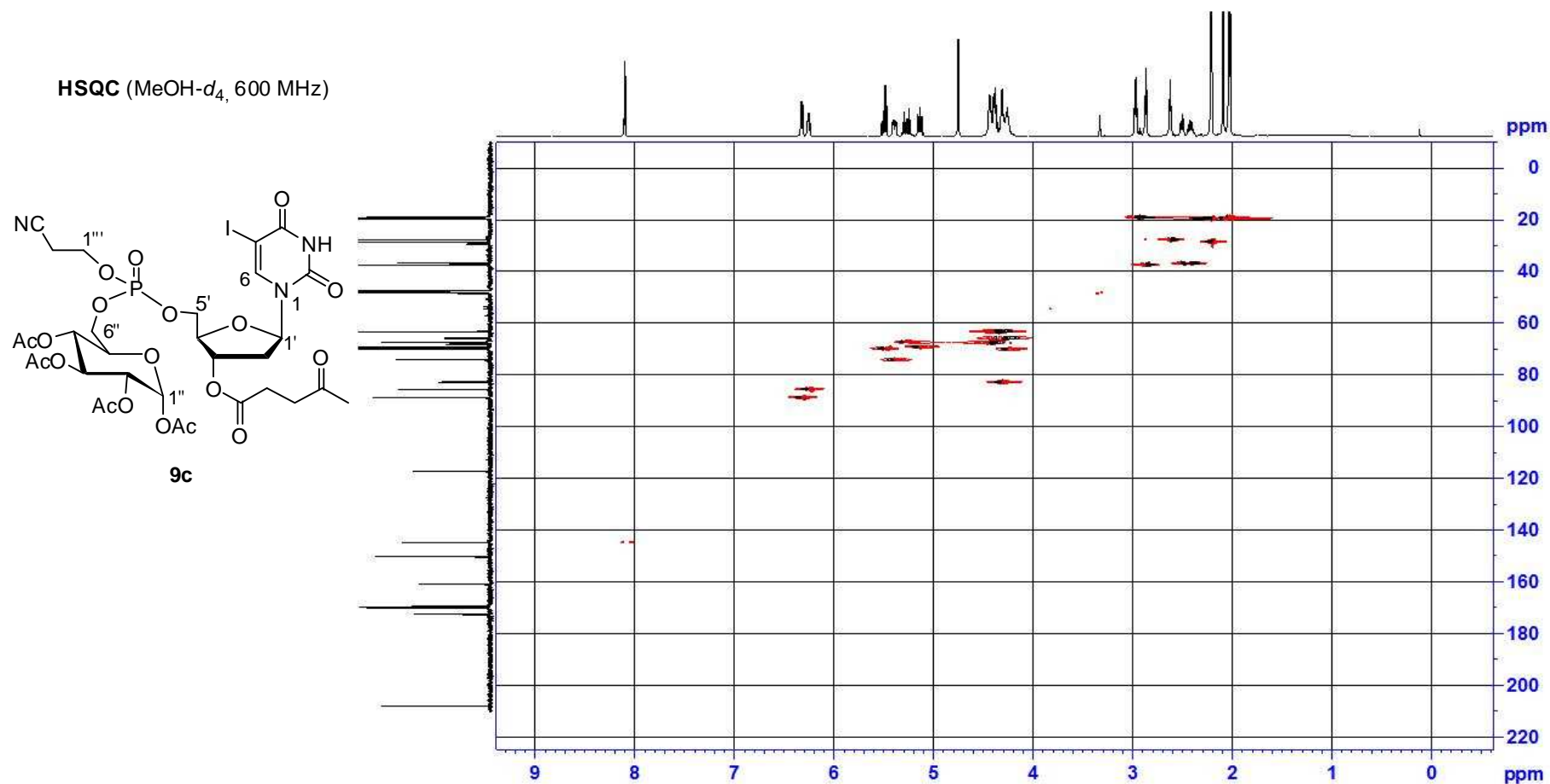
^{31}P -RMN (MeOH- d_4 , 242.9 MHz)



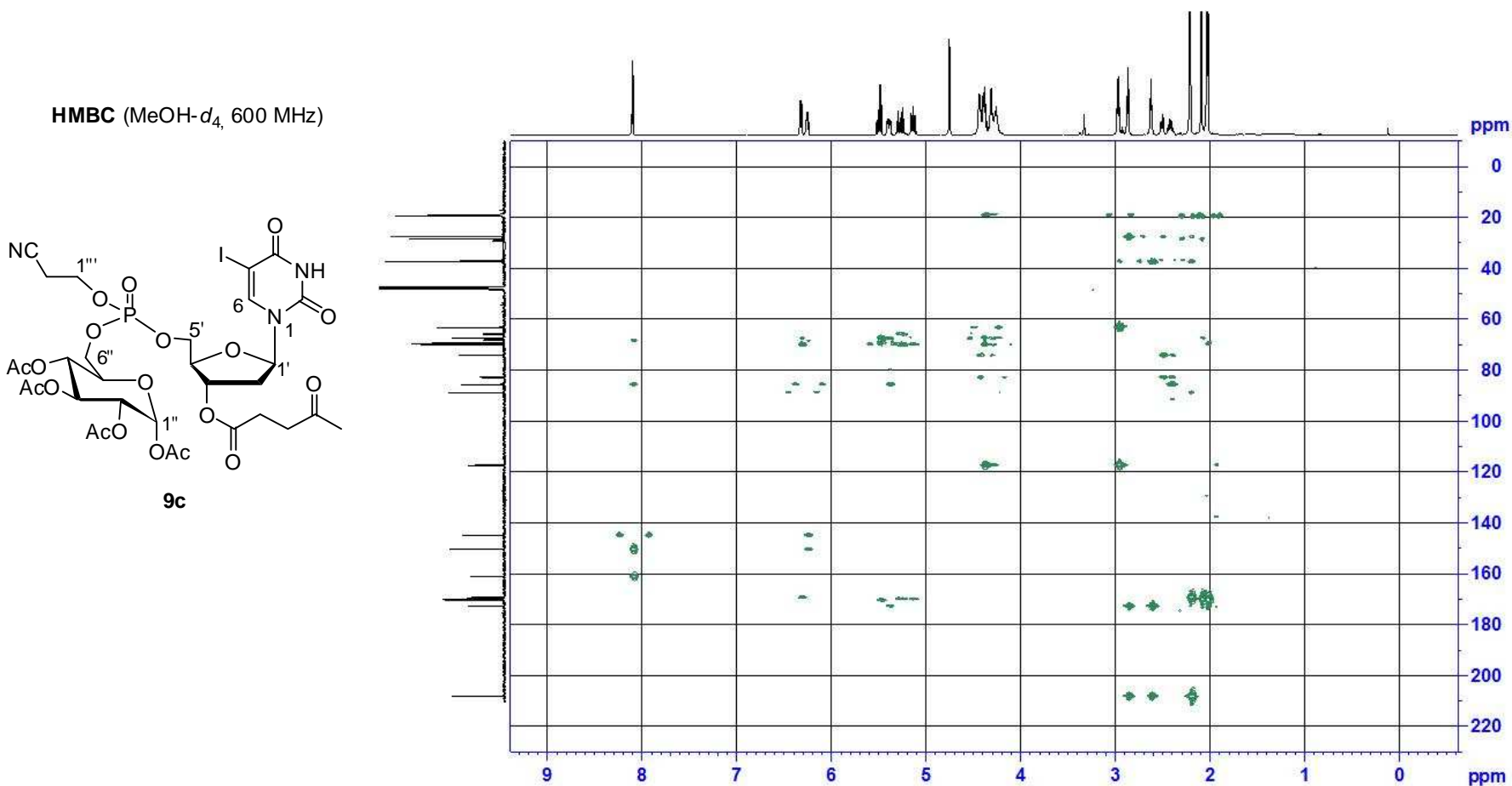
-Cynoethyl-(3'-*O*-levulinyl-5-iodo-2'-deoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9c)



-Cyanoethyl-(3'-*O*-levulinyl-5-iodo-2'-deoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9c)

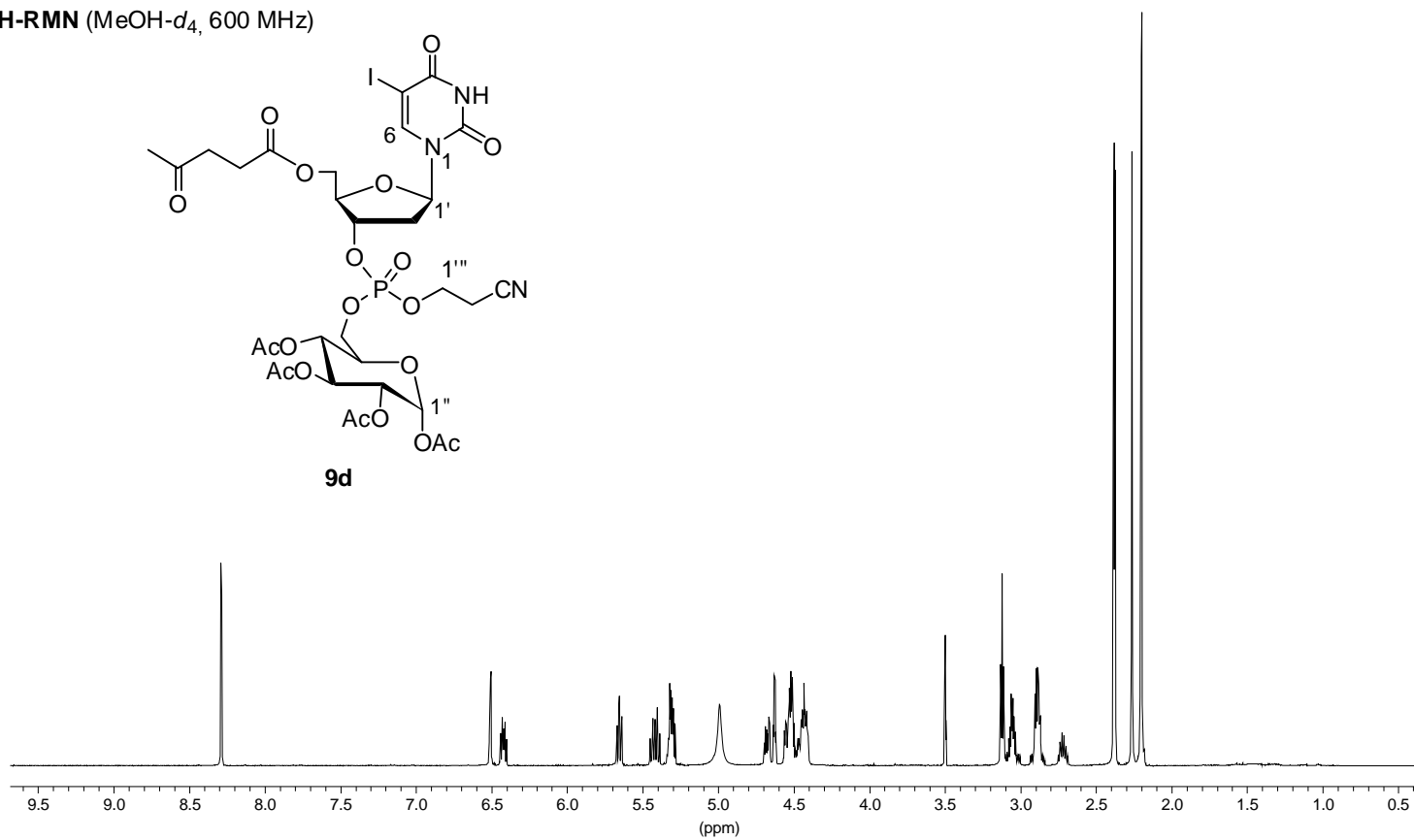
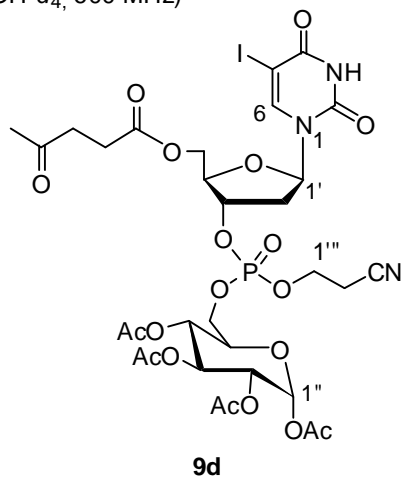


-Cyanoethyl-(3'-*O*-levulinyl-5-iodo-2'-deoxyuridin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9c)



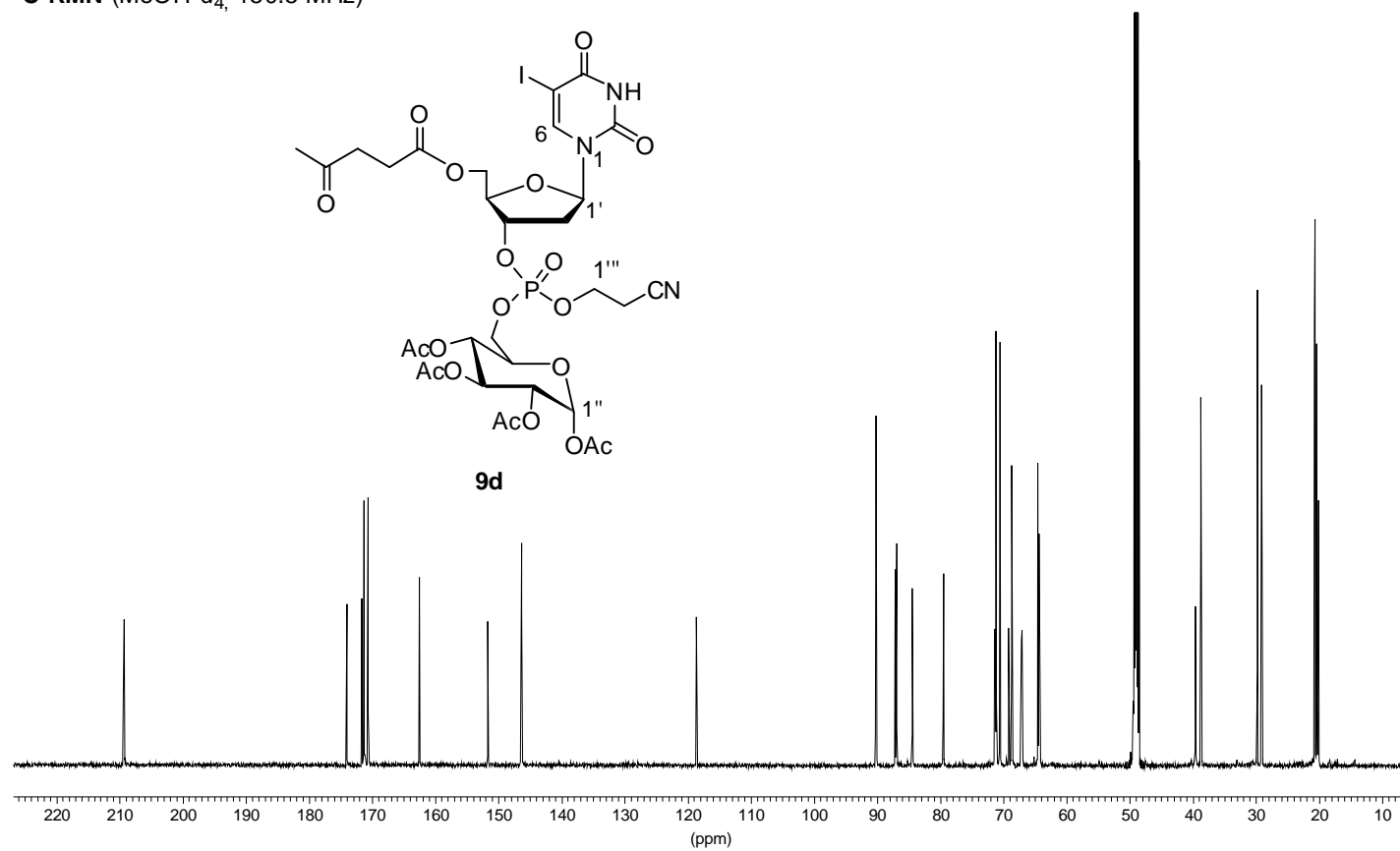
2-Cyanoethyl-(5'-*O*-levulinyl-5-iodo-2'-deoxyuridin-3'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9d**)**

¹H-RMN (MeOH-*d*₄, 600 MHz)



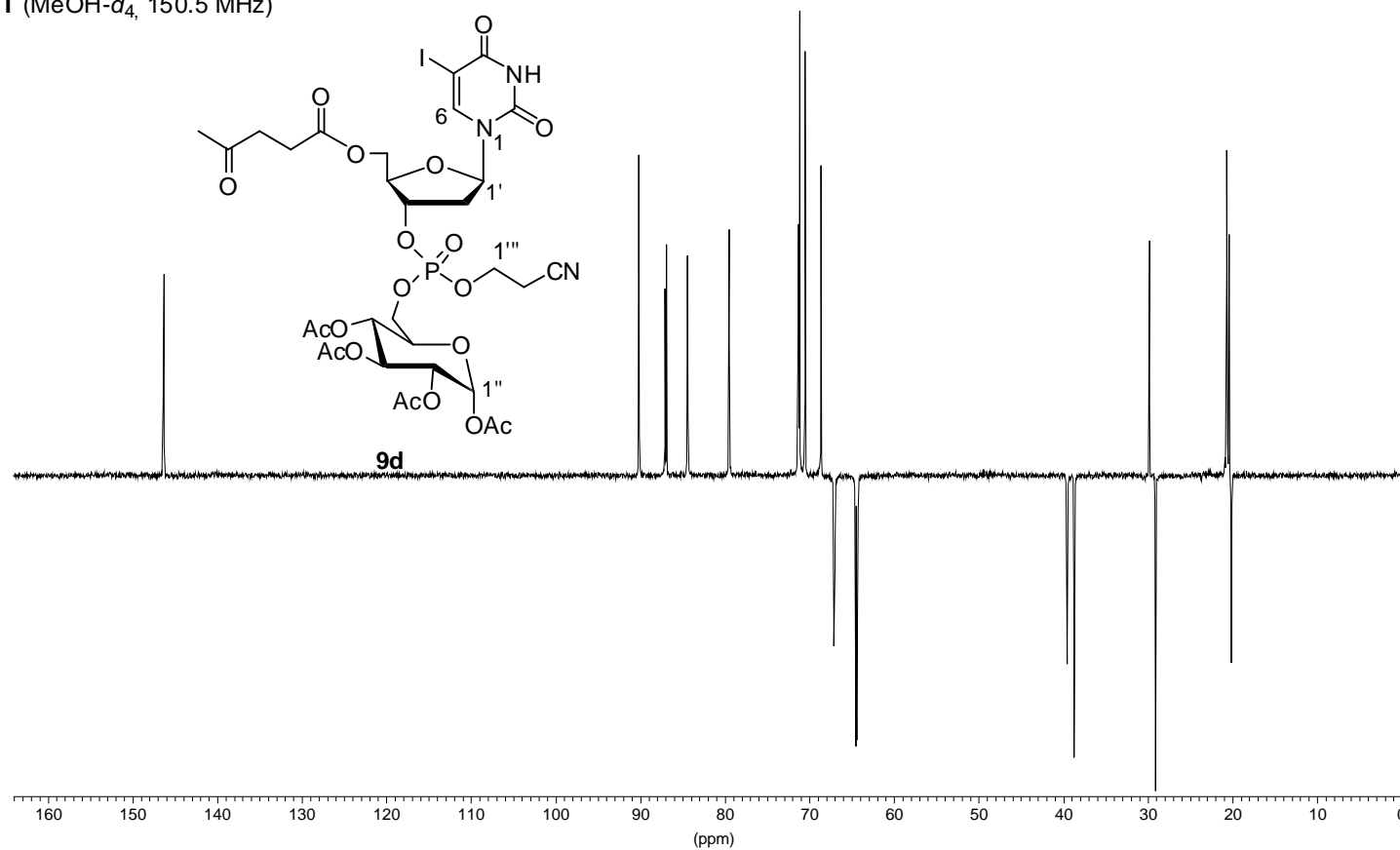
2-Cyanoethyl-(5'-*O*-levulinyl-5-iodo-2'-deoxyuridin-3'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (**9d**)

^{13}C -RMN (MeOH- d_4 , 150.5 MHz)



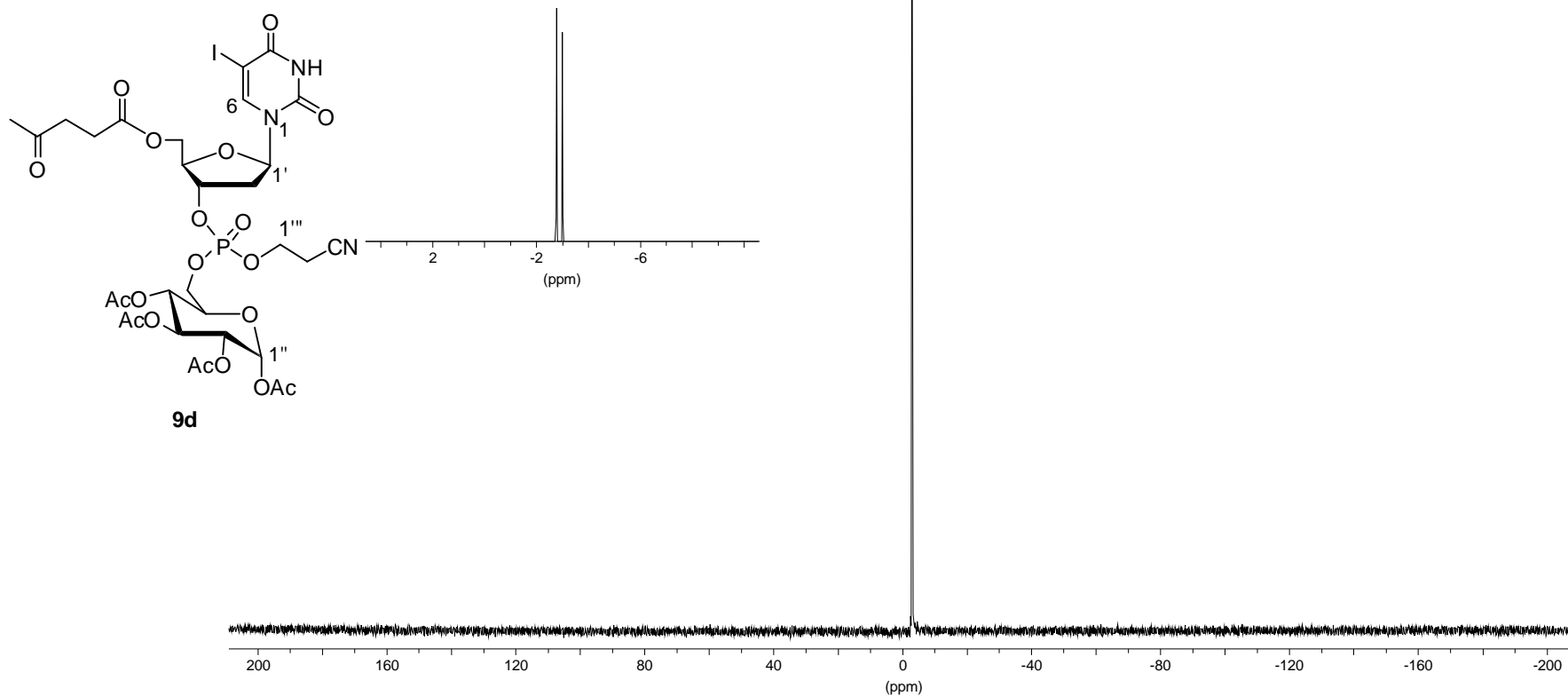
2-Cyanoethyl-(5'-*O*-levulinyl-5-iodo-2'-deoxyuridin-3'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9d**)**

DEPT (MeOH-*d*₄, 150.5 MHz)

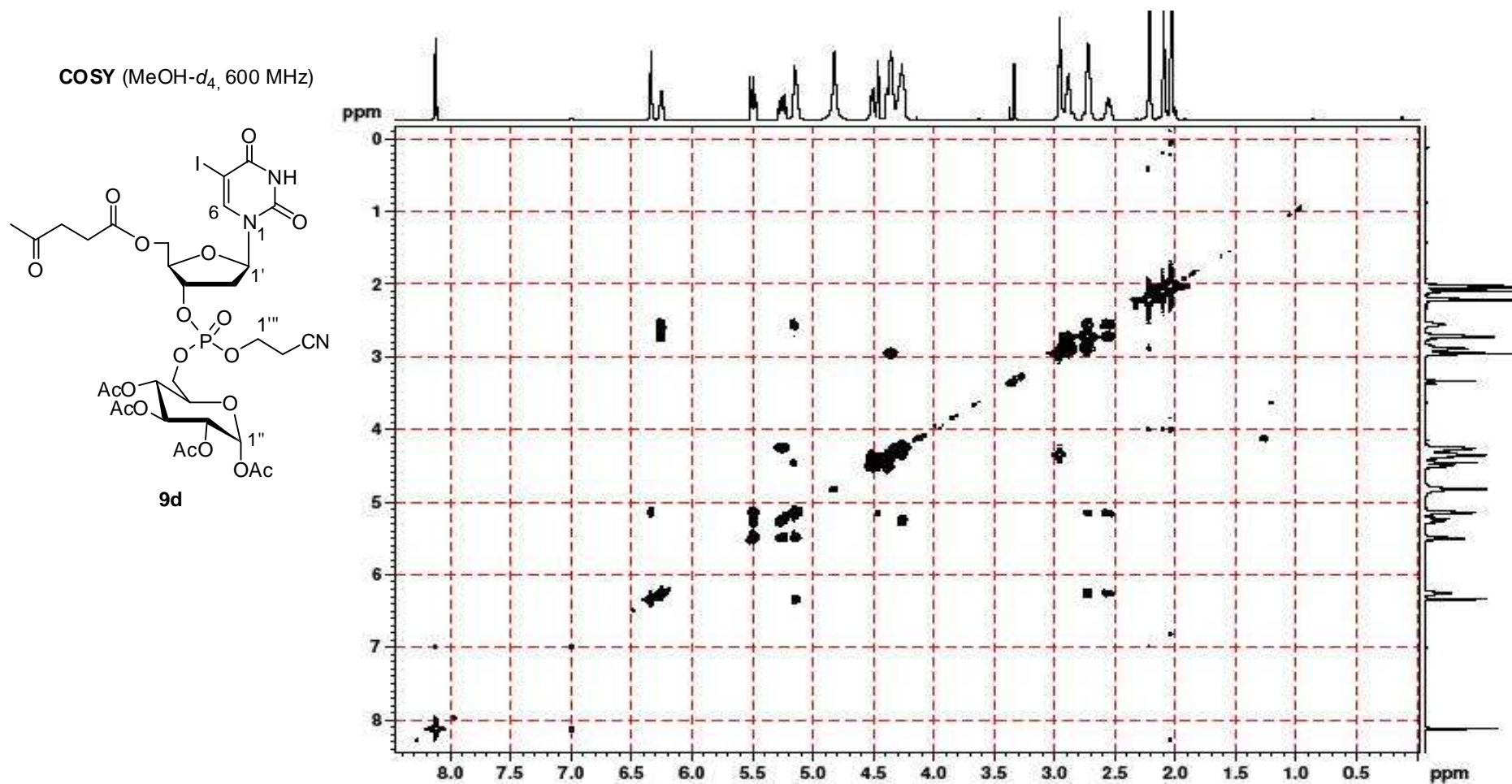


2-Cyanoethyl-(5'-*O*-levulinyl-5-iodo-2'-deoxyuridin-3'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9d)

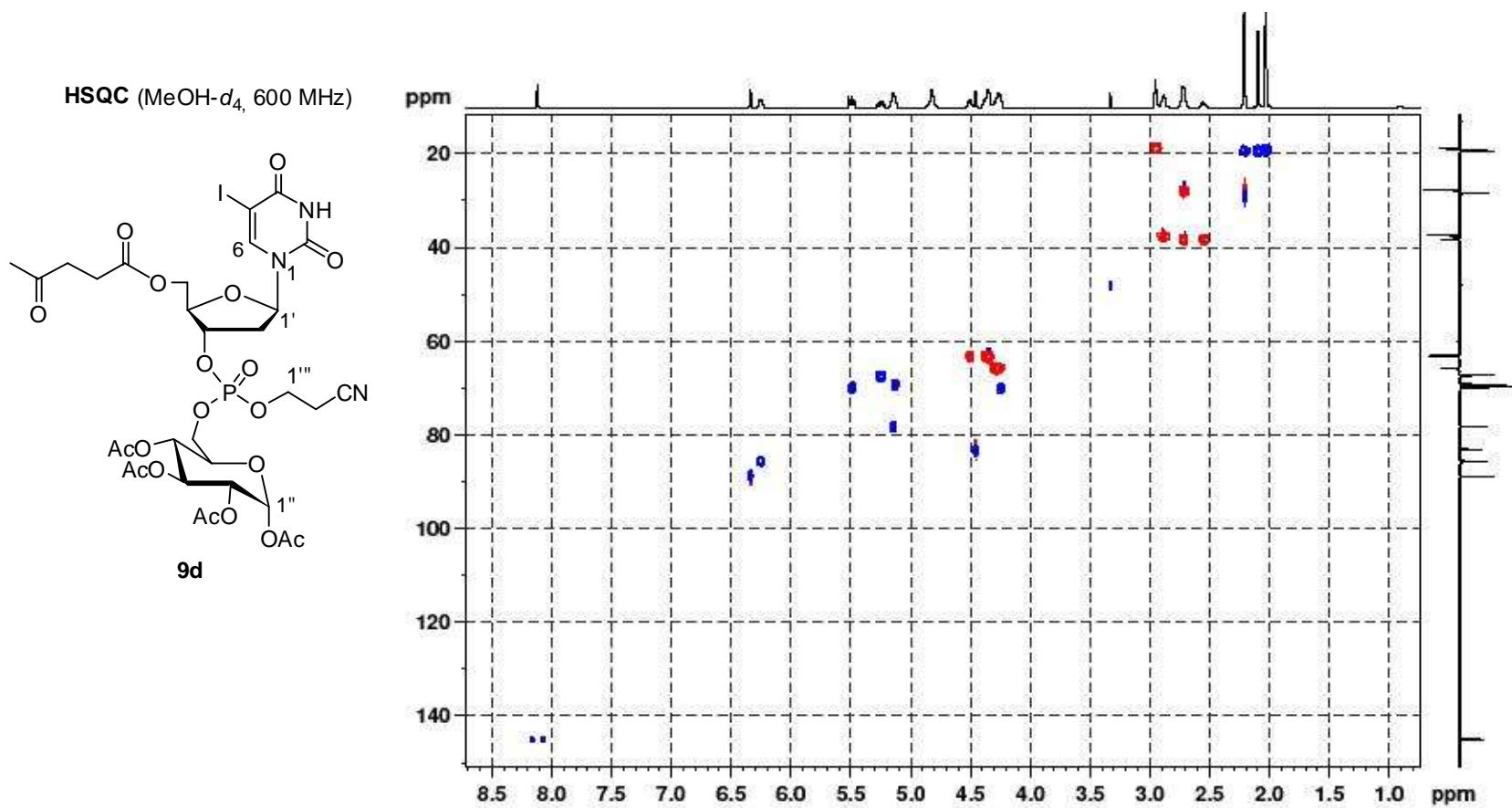
^{31}P -RMN (MeOH- d_4 , 242.9 MHz)



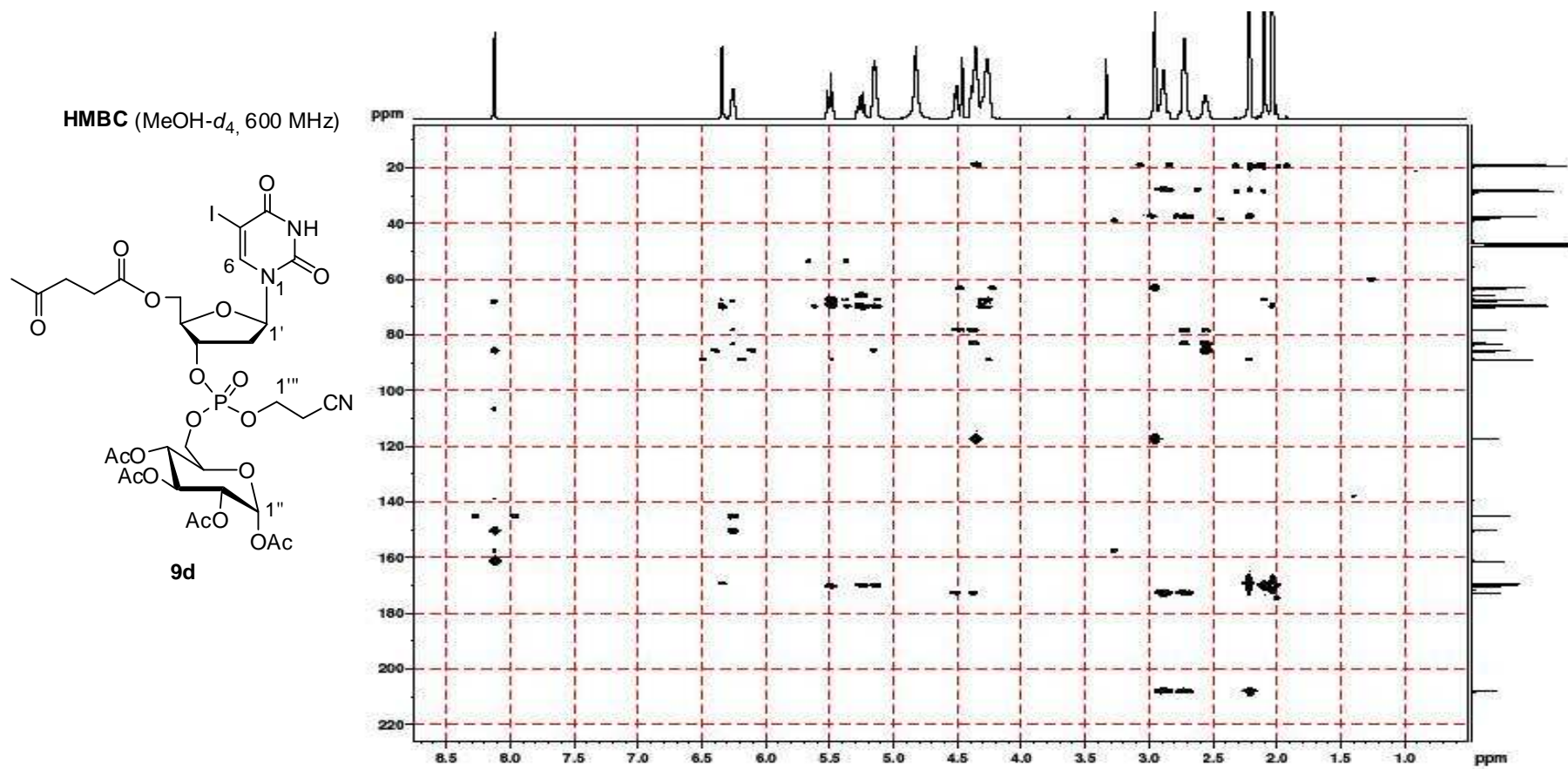
2-Cyanoethyl-(5'-*O*-levulinyl-5-iodo-2'-deoxyuridin-3'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9d)



2-Cyanoethyl-(5'-*O*-levulinyl-5-iodo-2'-deoxyuridin-3'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9d)

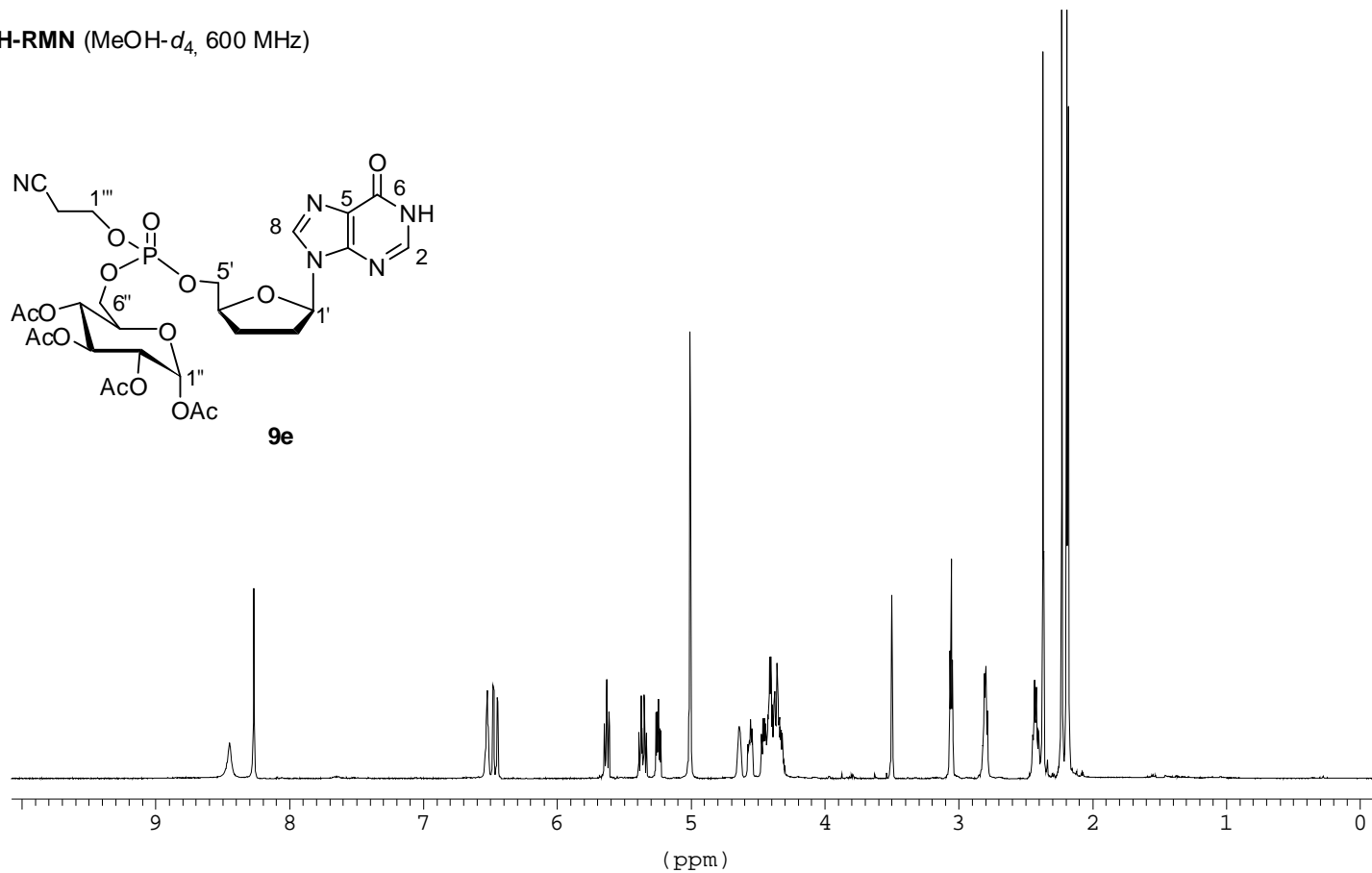
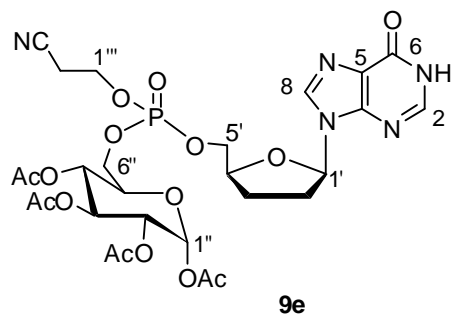


2-Cyanoethyl-(5'-*O*-levulinyl-5-iodo-2'-deoxyuridin-3'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9d)



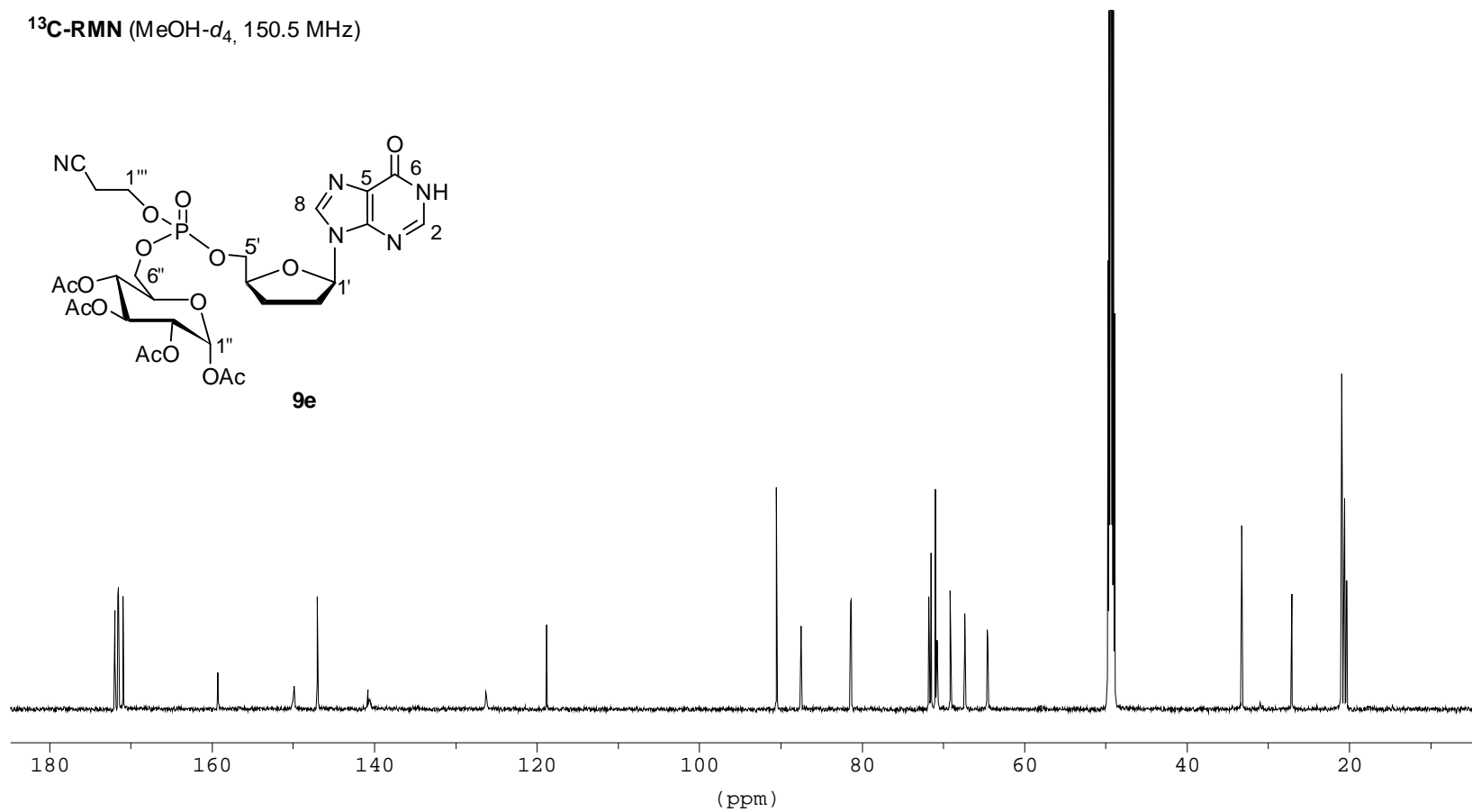
2-Cyanoethyl-(2',3'-dideoxyinosin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9e)

¹H-RMN (MeOH-*d*₄, 600 MHz)



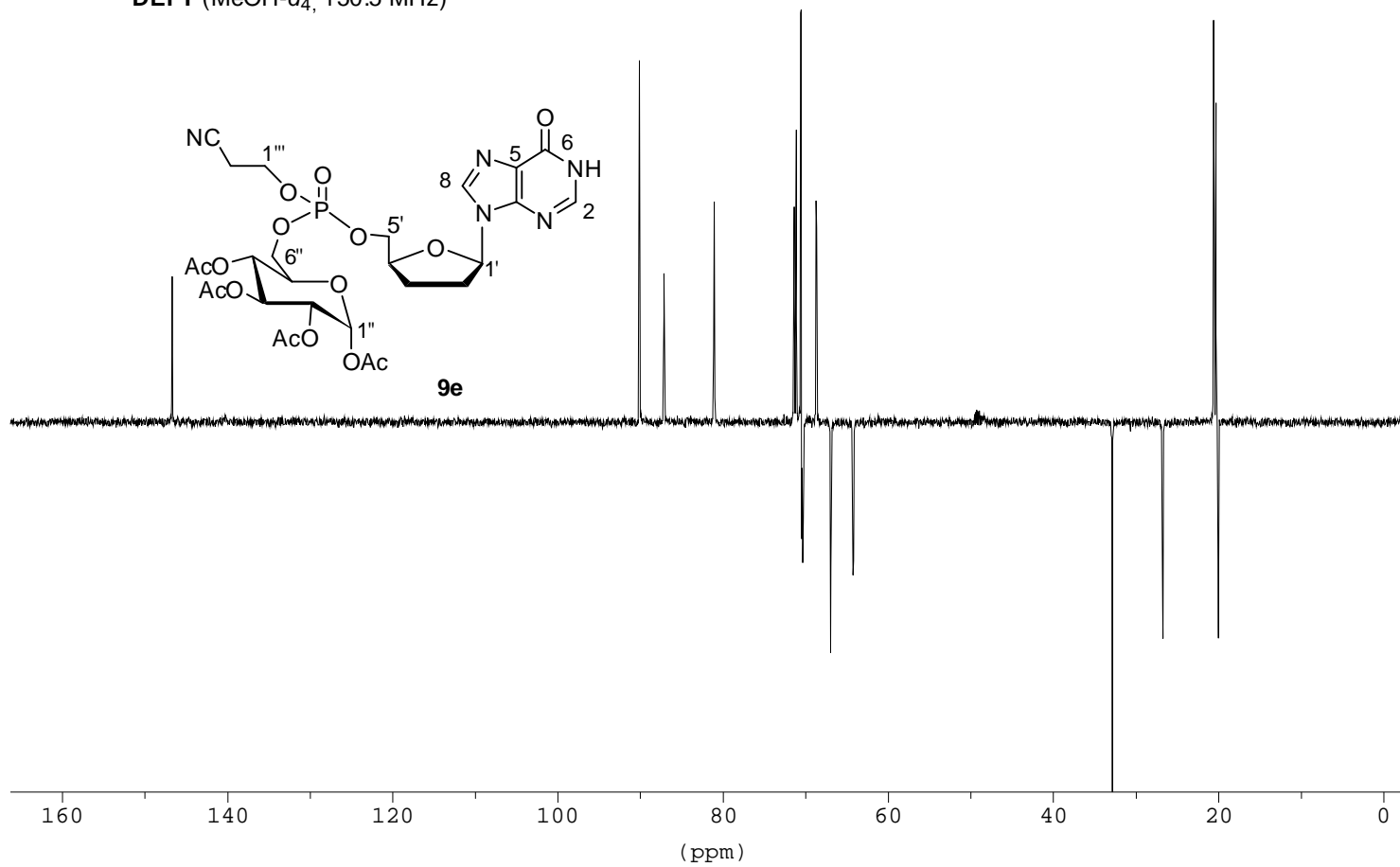
2-Cyanoethyl-(2',3'-dideoxyinosin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9e)

^{13}C -RMN (MeOH- d_4 , 150.5 MHz)



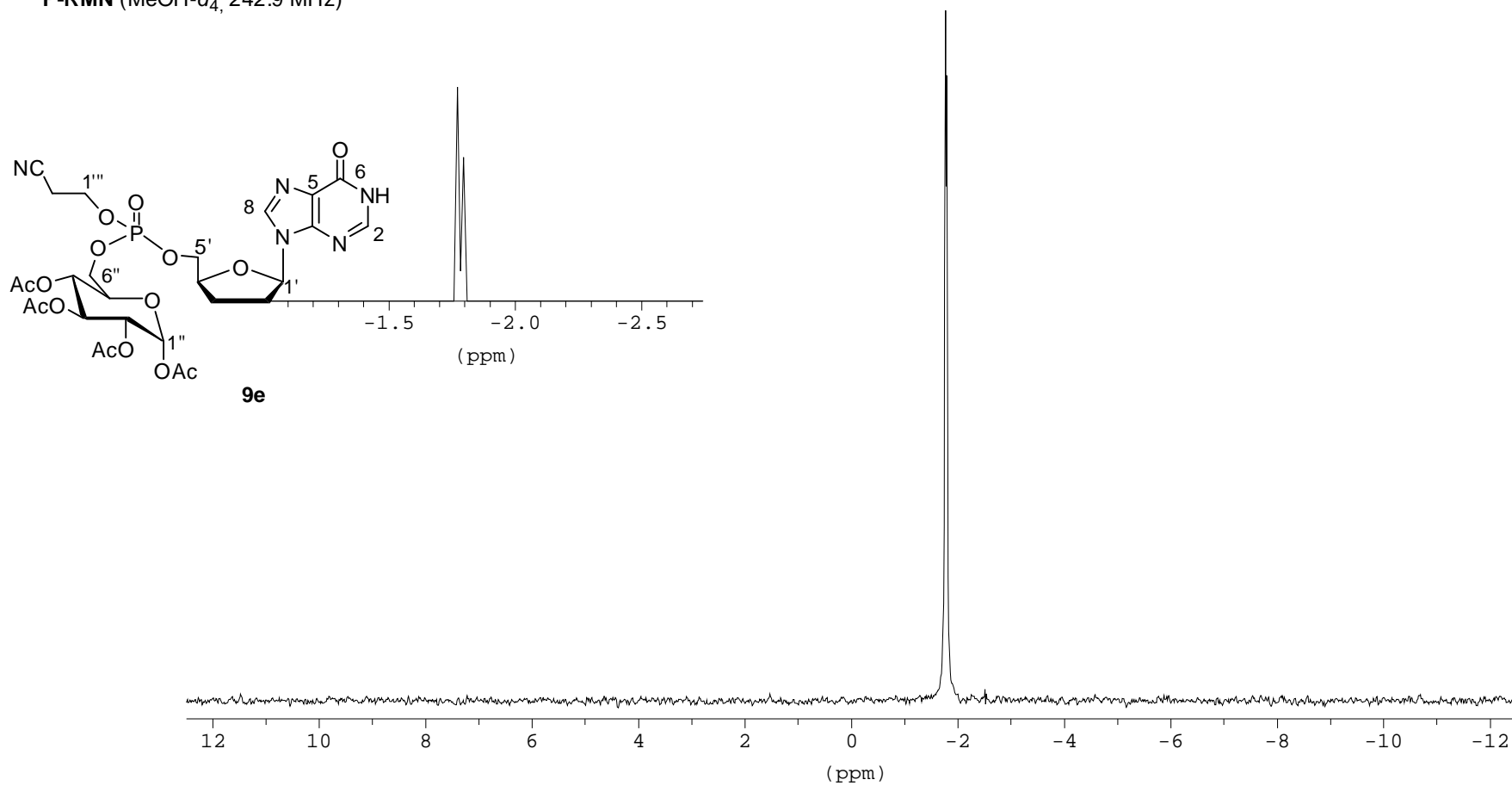
2-Cyanoethyl-(2',3'-dideoxyinosin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9e)

DEPT (MeOH- d_4 , 150.5 MHz)



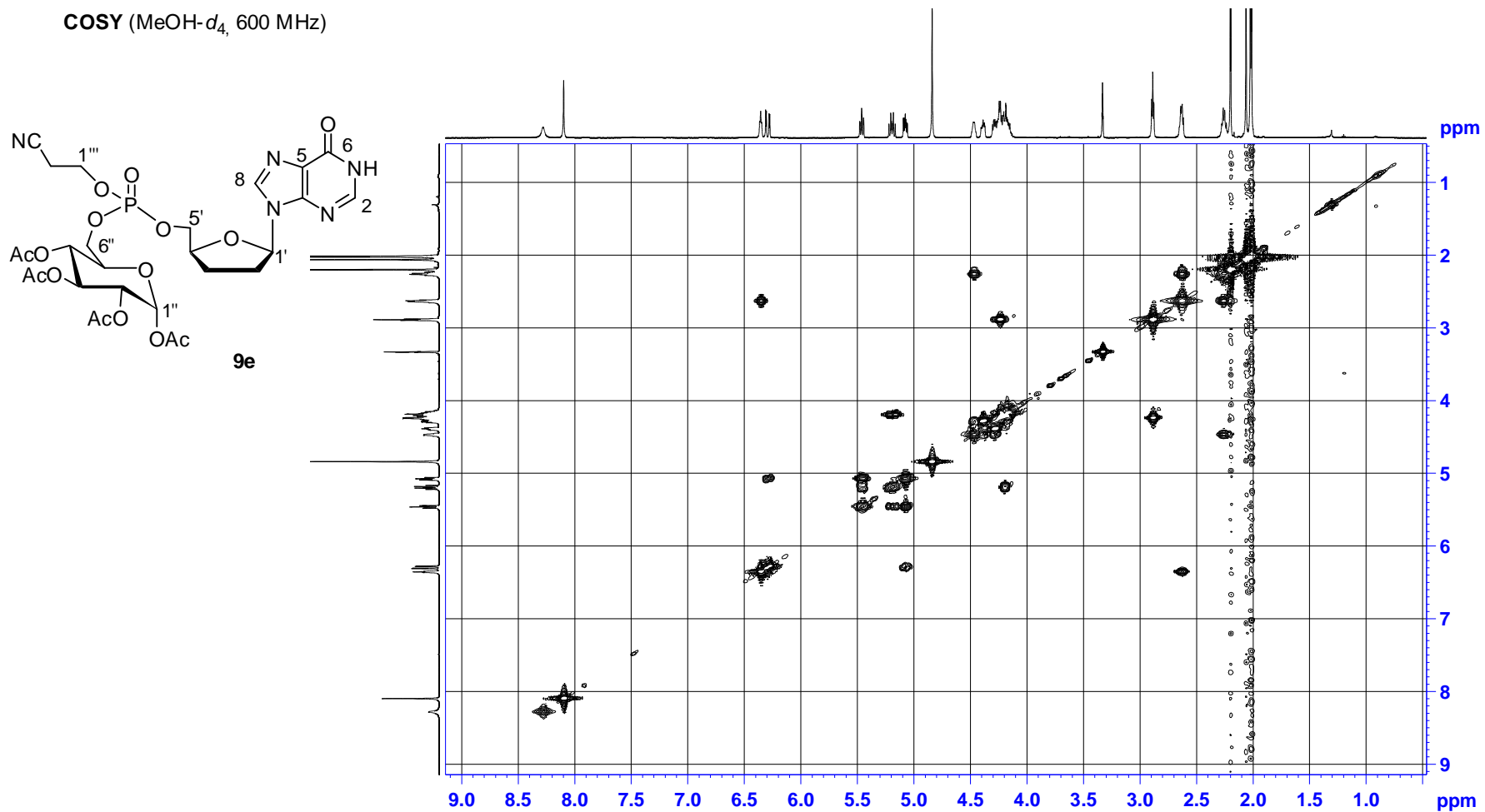
2-Cyanoethyl-(2',3'-dideoxyinosin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9e)

^{31}P -RMN (MeOH- d_4 , 242.9 MHz)

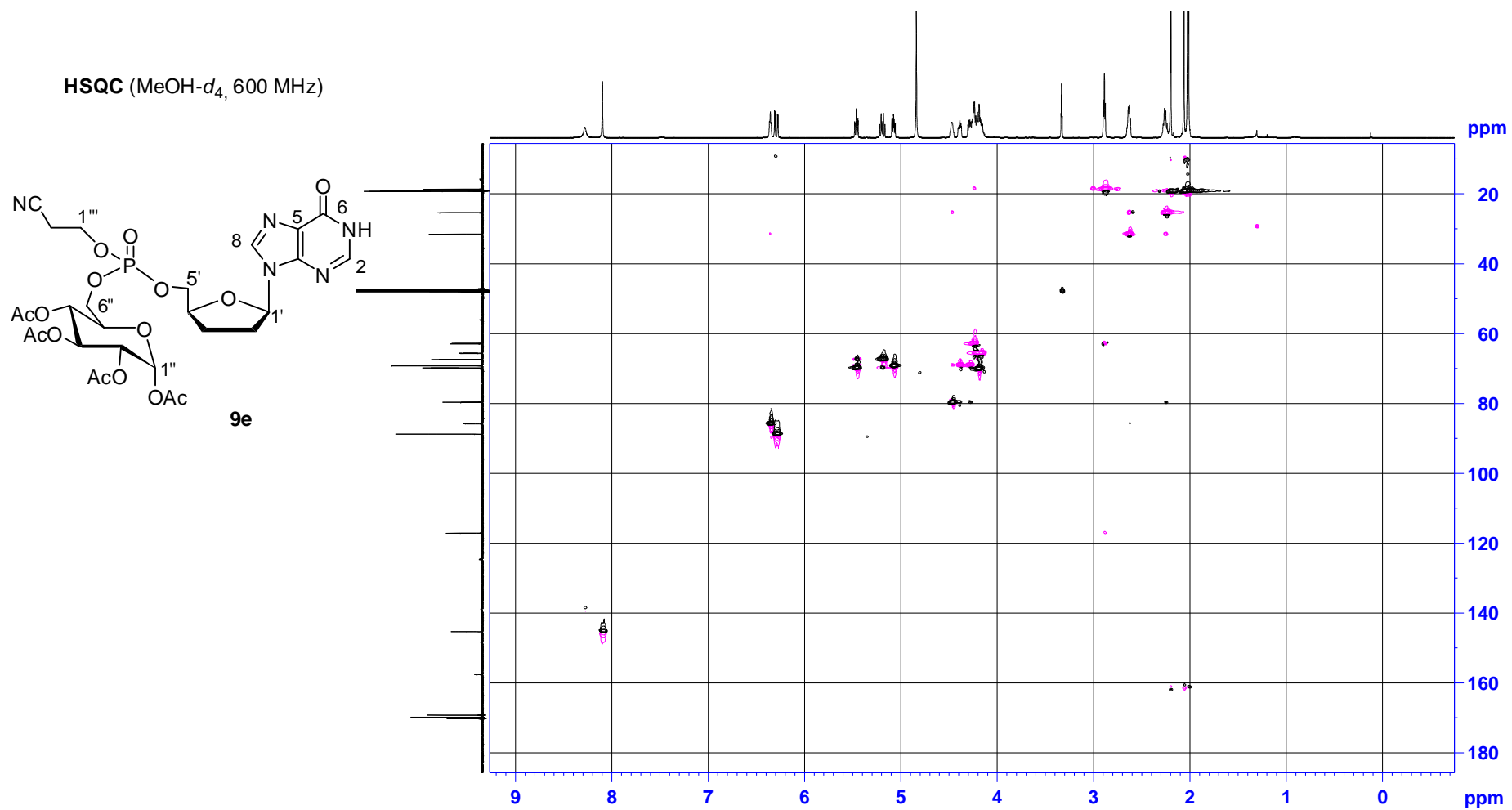


2-Cyanoethyl-(2',3'-dideoxyinosin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9e)

COSY (MeOH-*d*₄, 600 MHz)

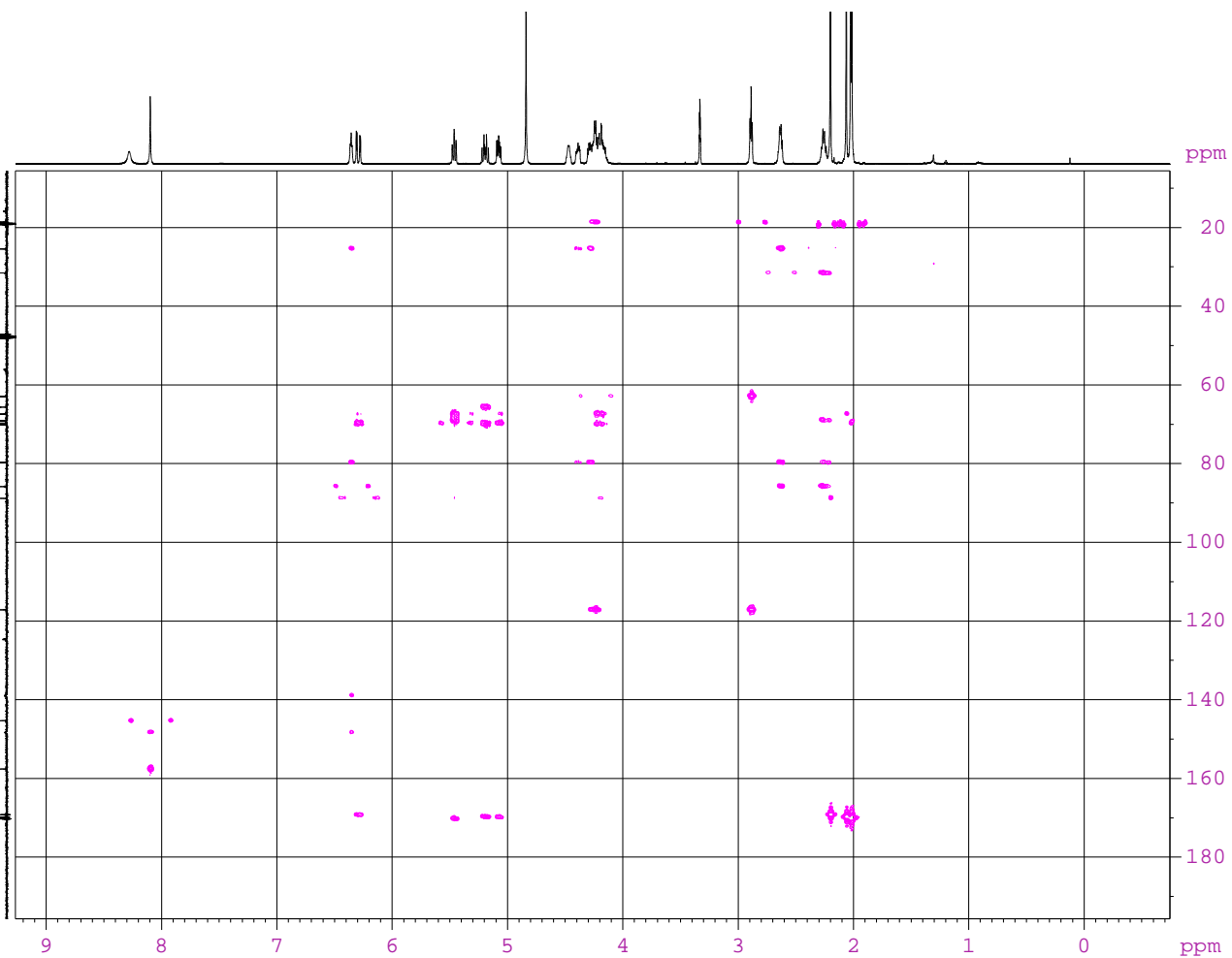
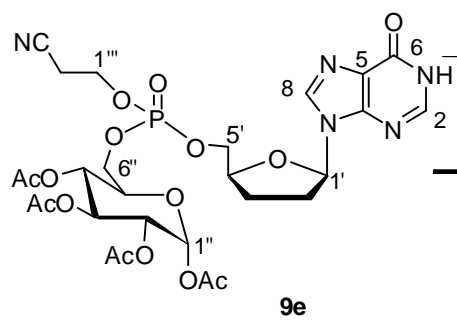


2-Cyanoethyl-(2',3'-dideoxyinosin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9e)



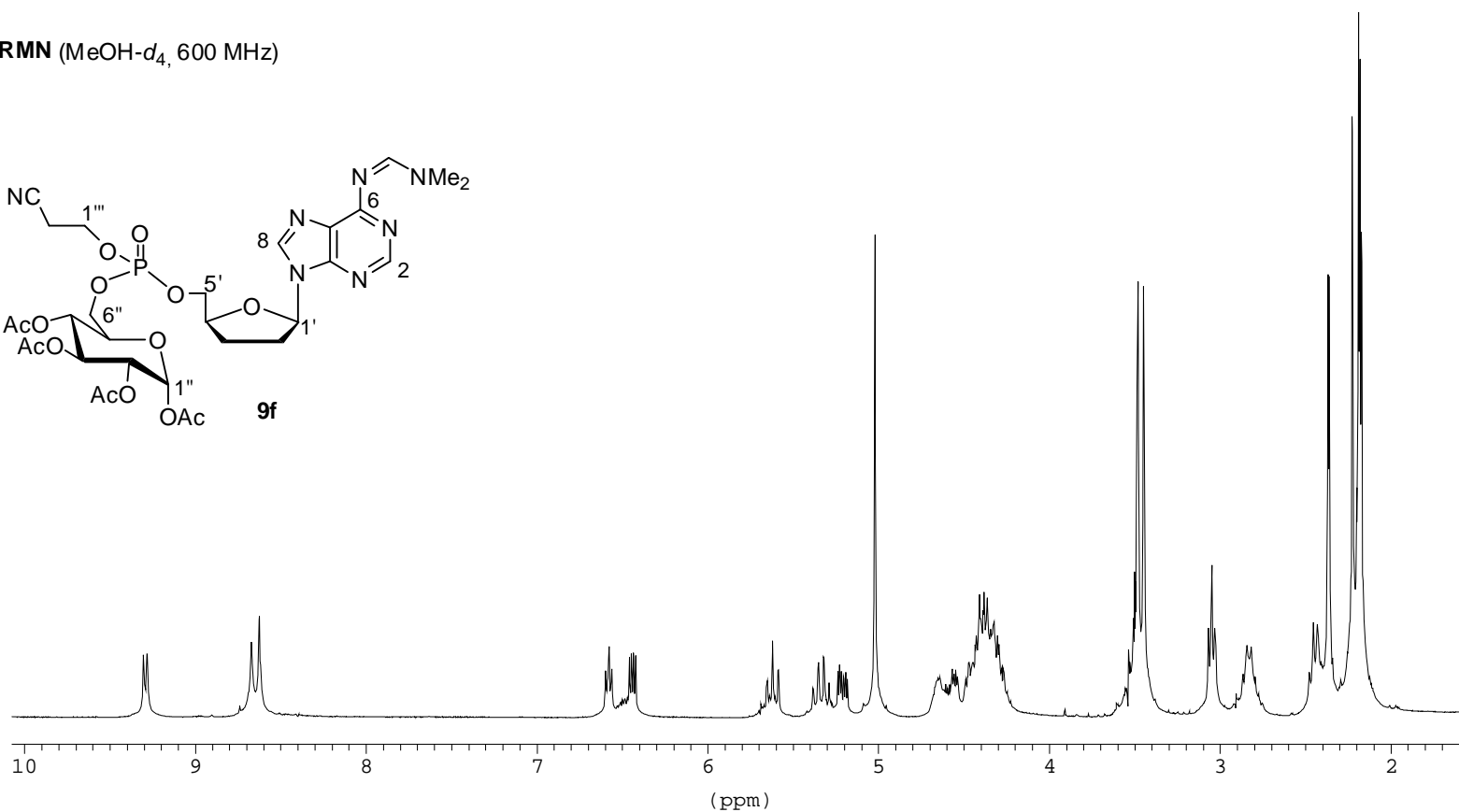
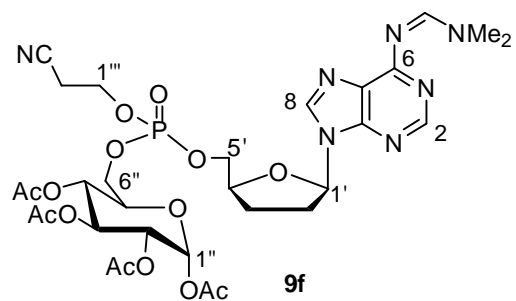
2-Cyanoethyl-(2',3'-dideoxyinosin-5'-yl)-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9e)

HMBC (MeOH- d_4 , 600 MHz)



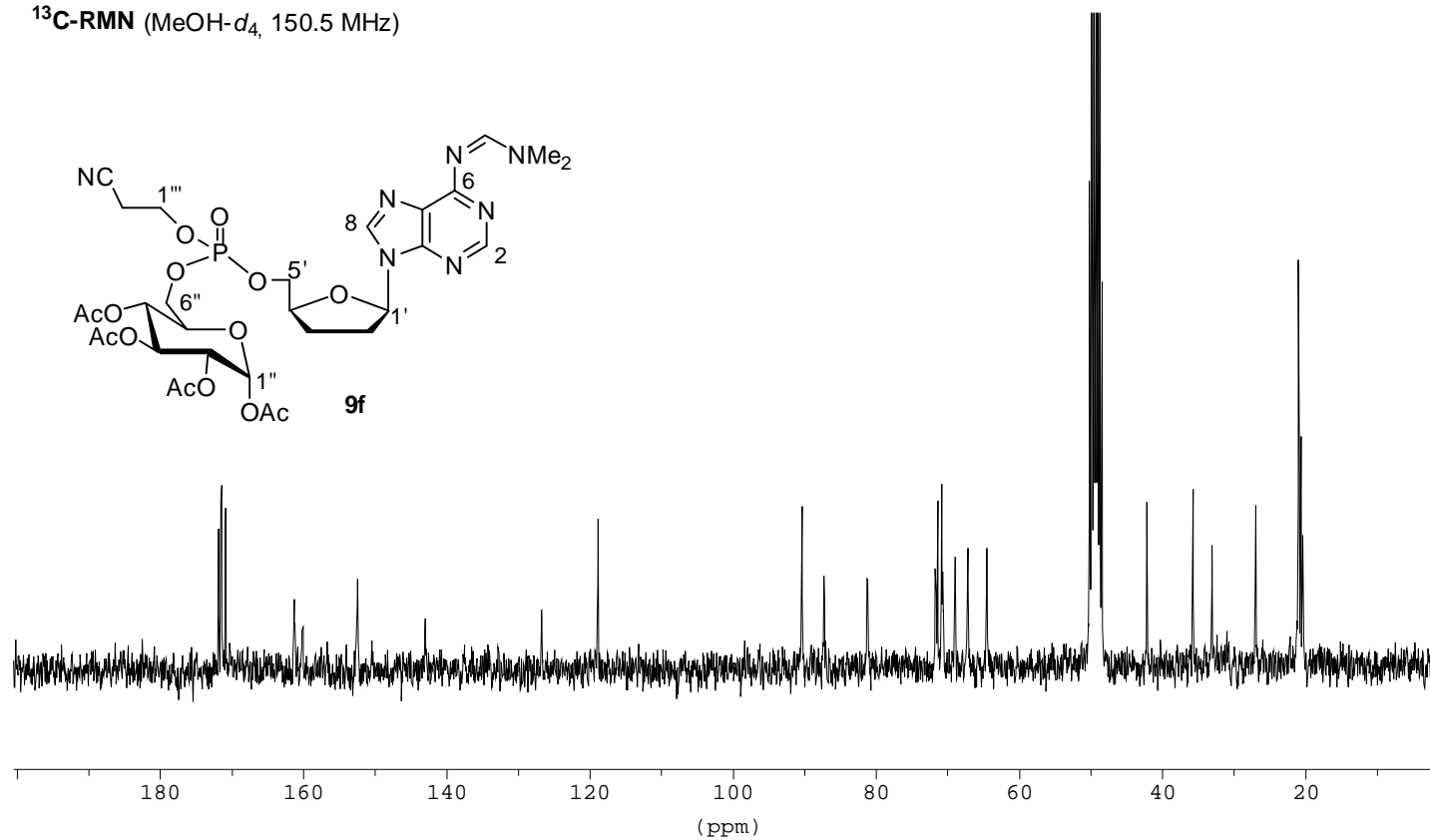
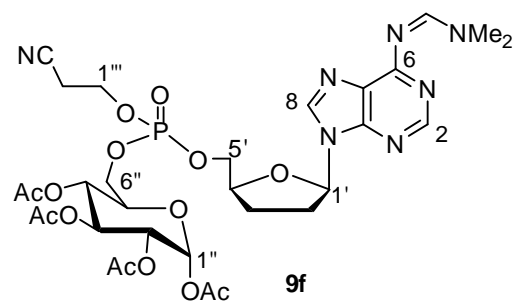
2-Cyanoethyl-[N⁶-(dimethylamino)methylen-2',3'-dideoxyadenosin-5'-yl]-1,2,3,4-tetra-O-acetyl- α -D-glucopyranos-6-yl phosphate (9f)

¹H-RMN (MeOH-d₄, 600 MHz)



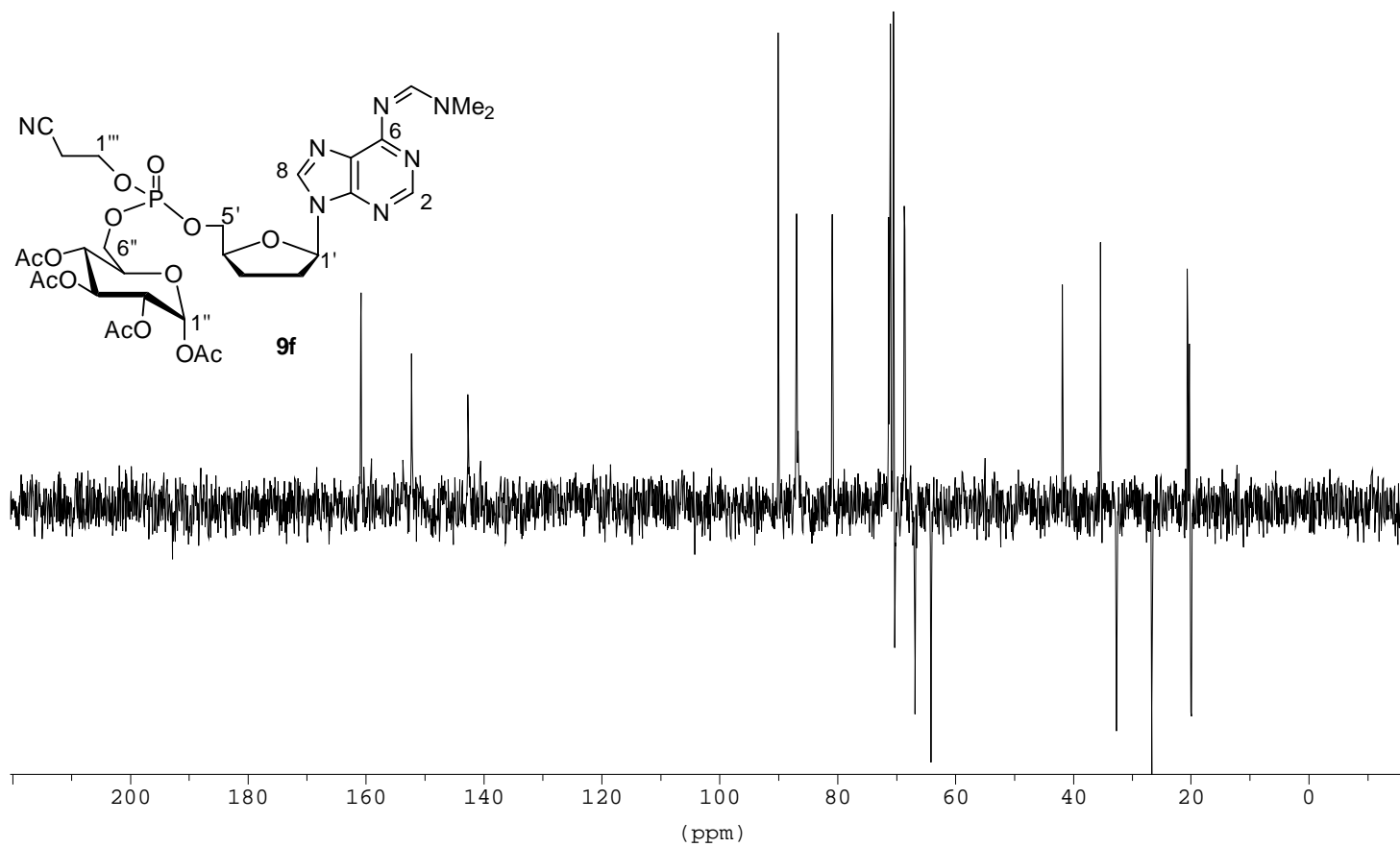
2-Cyanoethyl-[*N*⁶-(dimethylamino)methylen-2',3'-dideoxyadenosin-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9f)

¹³C-RMN (MeOH-*d*₄, 150.5 MHz)



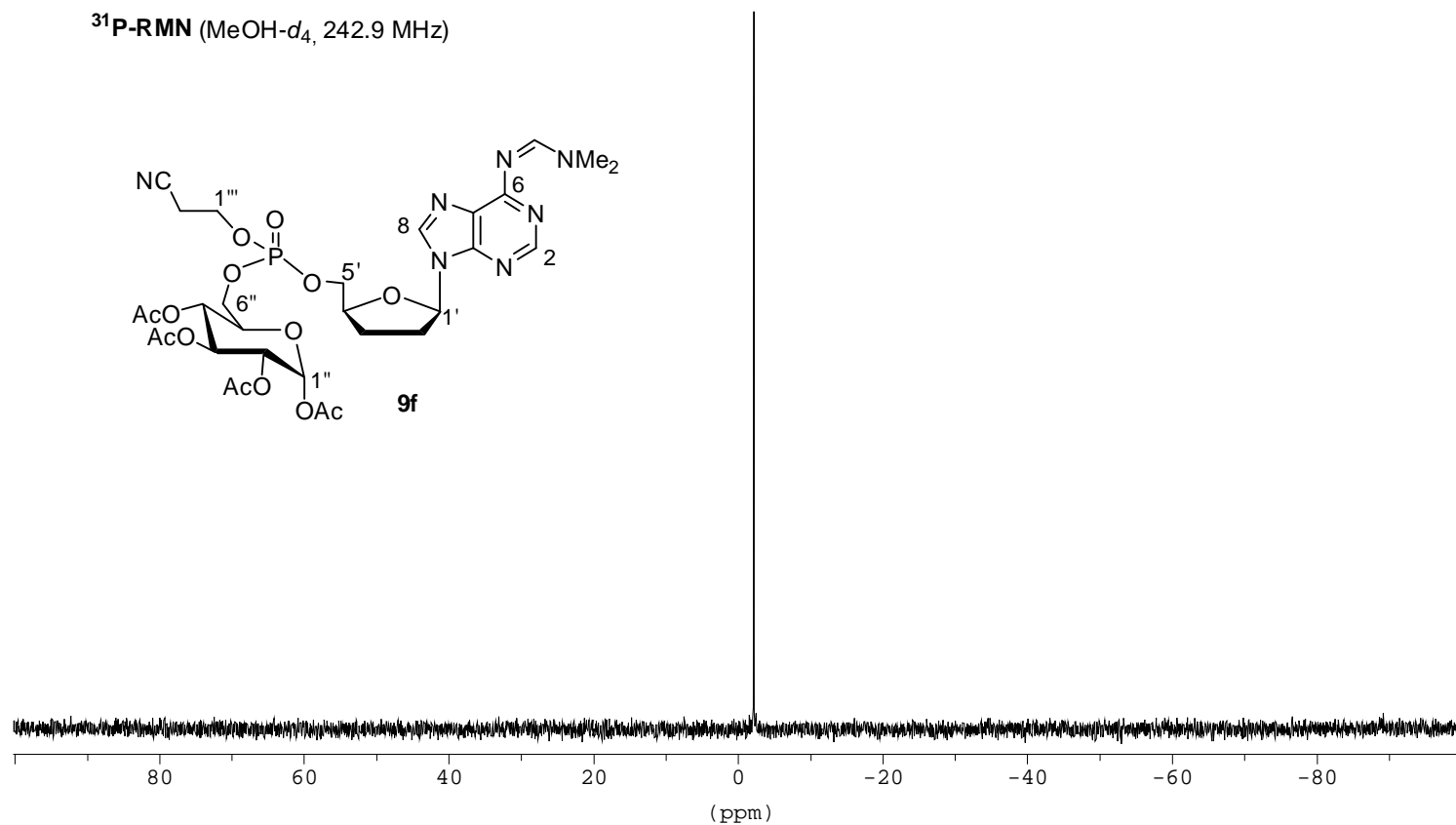
2-Cyanoethyl-[*N*⁶-(dimethylamino)methylen-2',3'-dideoxyadenosin-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9f**)**

DEPT (MeOH-*d*₄, 150.5 MHz)



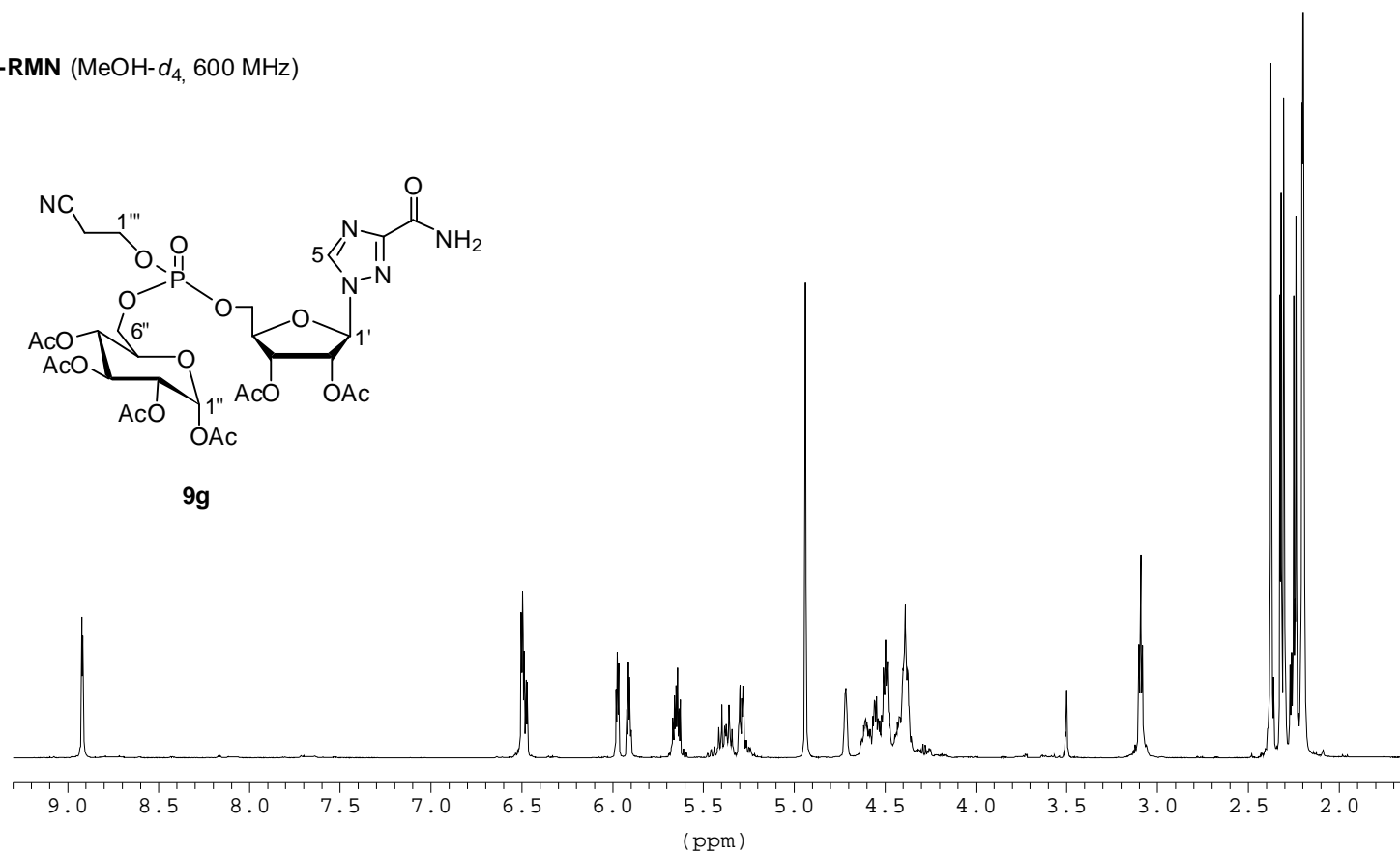
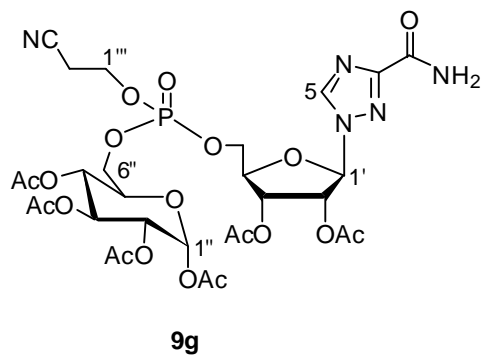
2-Cyanoethyl-[N⁶-(dimethylamino)methylen-2',3'-dideoxyadenosin-5'-yl]-1,2,3,4-tetra-O-acetyl- α -D-glucopyranos-6-yl phosphate (9f)

³¹P-RMN (MeOH-d₄, 242.9 MHz)



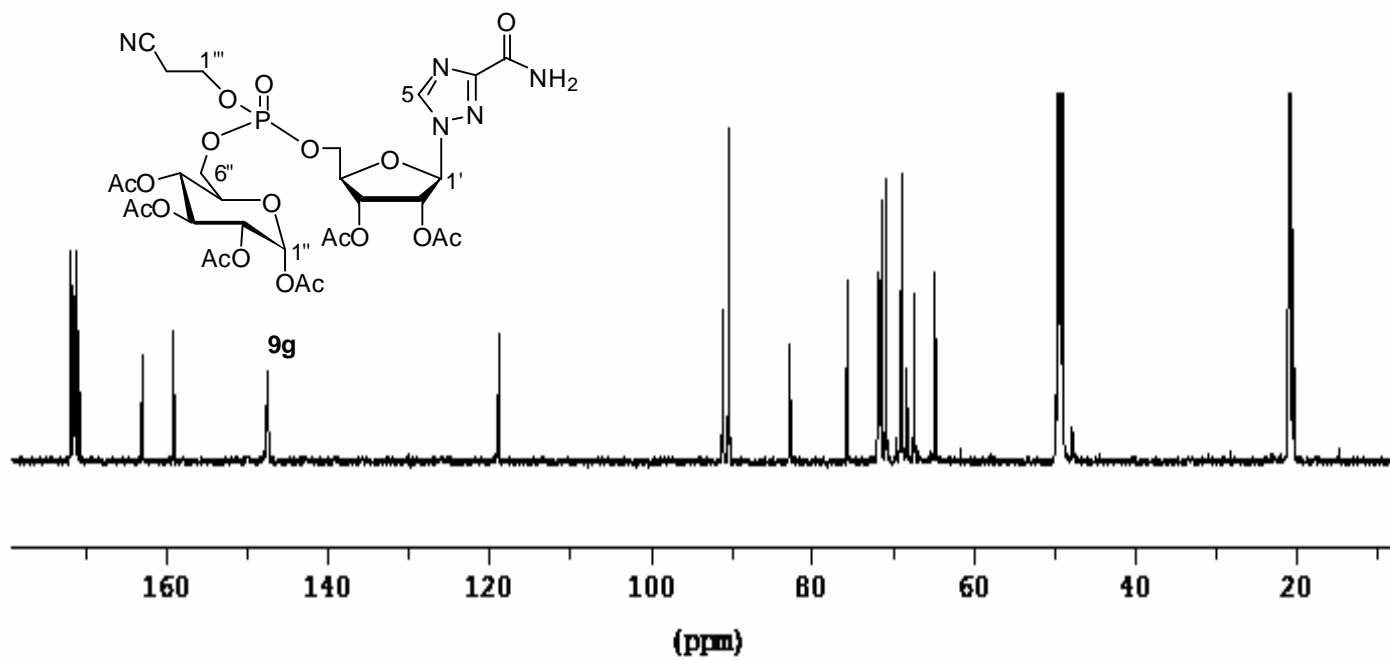
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(3-carbamoyl-1,2,4-triazoyl)- β -D-ribofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9g)

¹H-RMN (MeOH-*d*₄, 600 MHz)



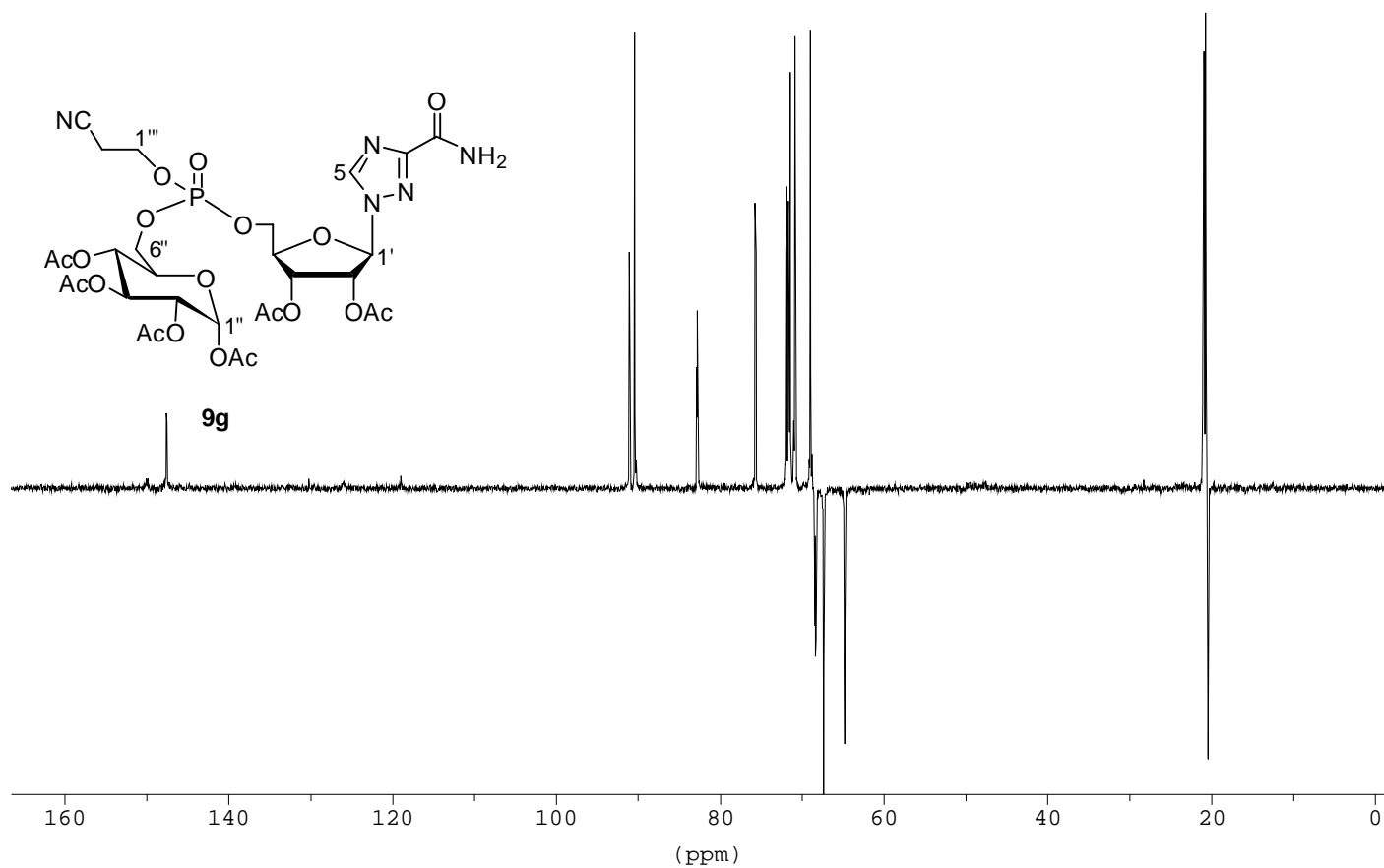
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(3-carbamoyl-1,2,4-triazoyl)- β -D-ribofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9g)

^{13}C -RMN (MeOH- d_4 , 150.5 MHz)



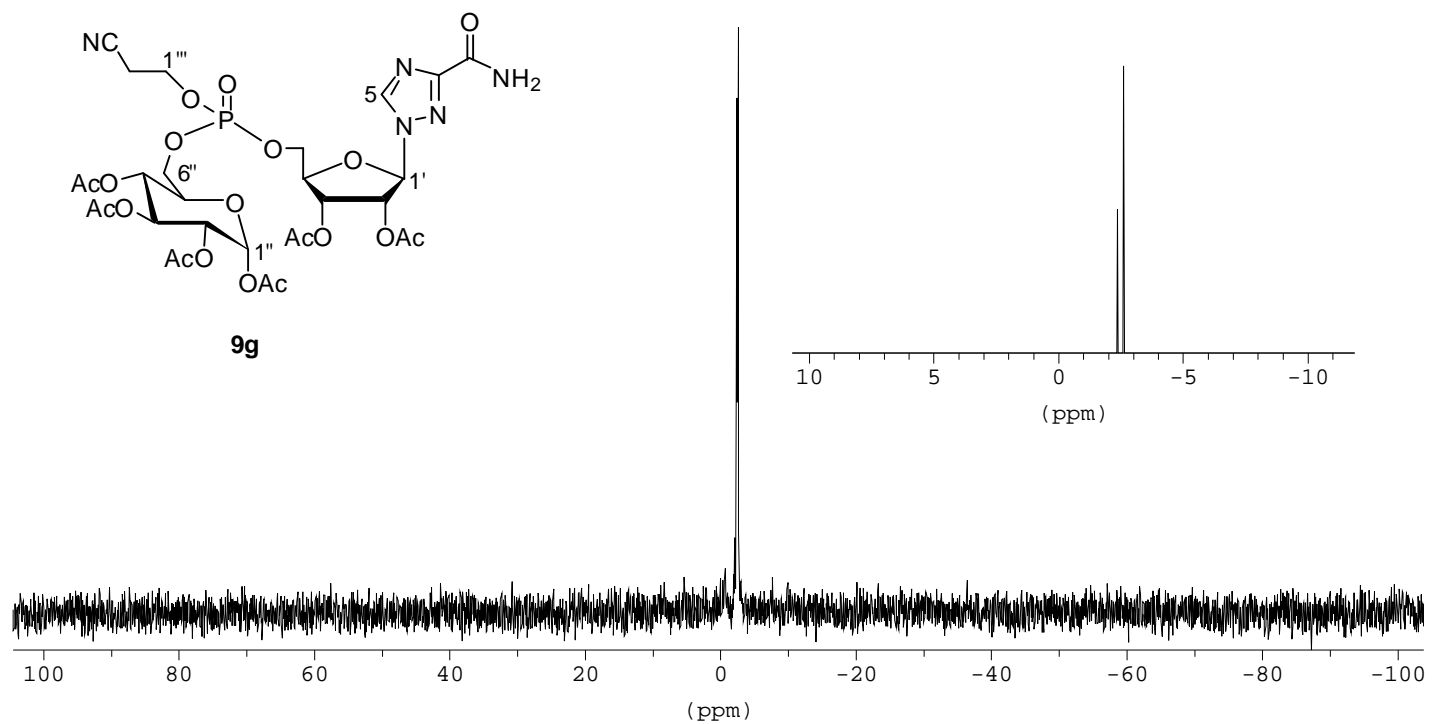
2-Cyanoethyl-[2',3'-di-O-acetyl-1'-(3-carbamoyl-1,2,4-triazoyl)-β-D-ribofuranos-5'-yl]-1,2,3,4-tetra-O-acetyl-α-D-glucopyranos-6-yl phosphate (9g)

DEPT (MeOH-*d*₄, 150.5 MHz)



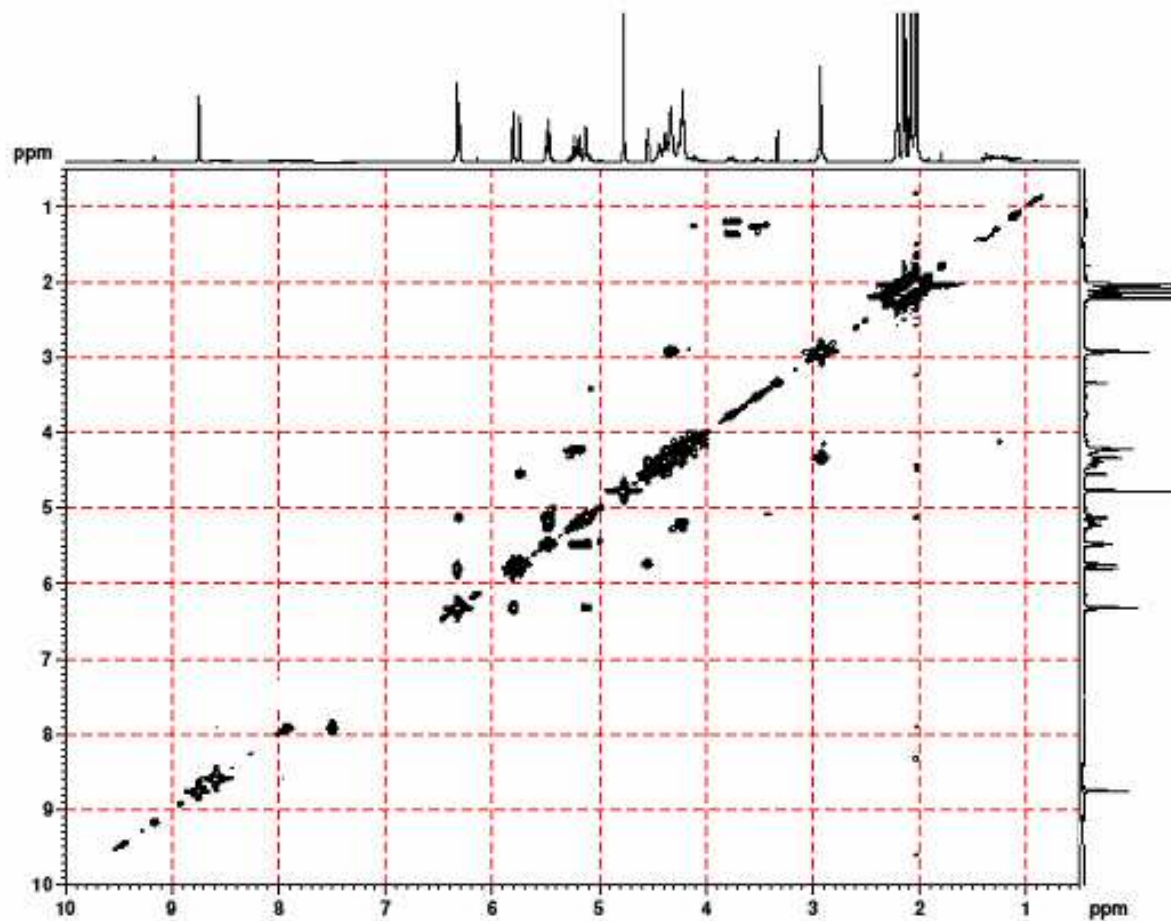
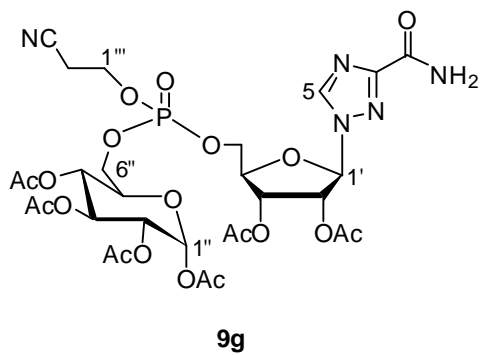
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(3-carbamoyl-1,2,4-triazoyl)- β -D-ribofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9g)

^{31}P -RMN (MeOH- d_4 , 242.9 MHz)



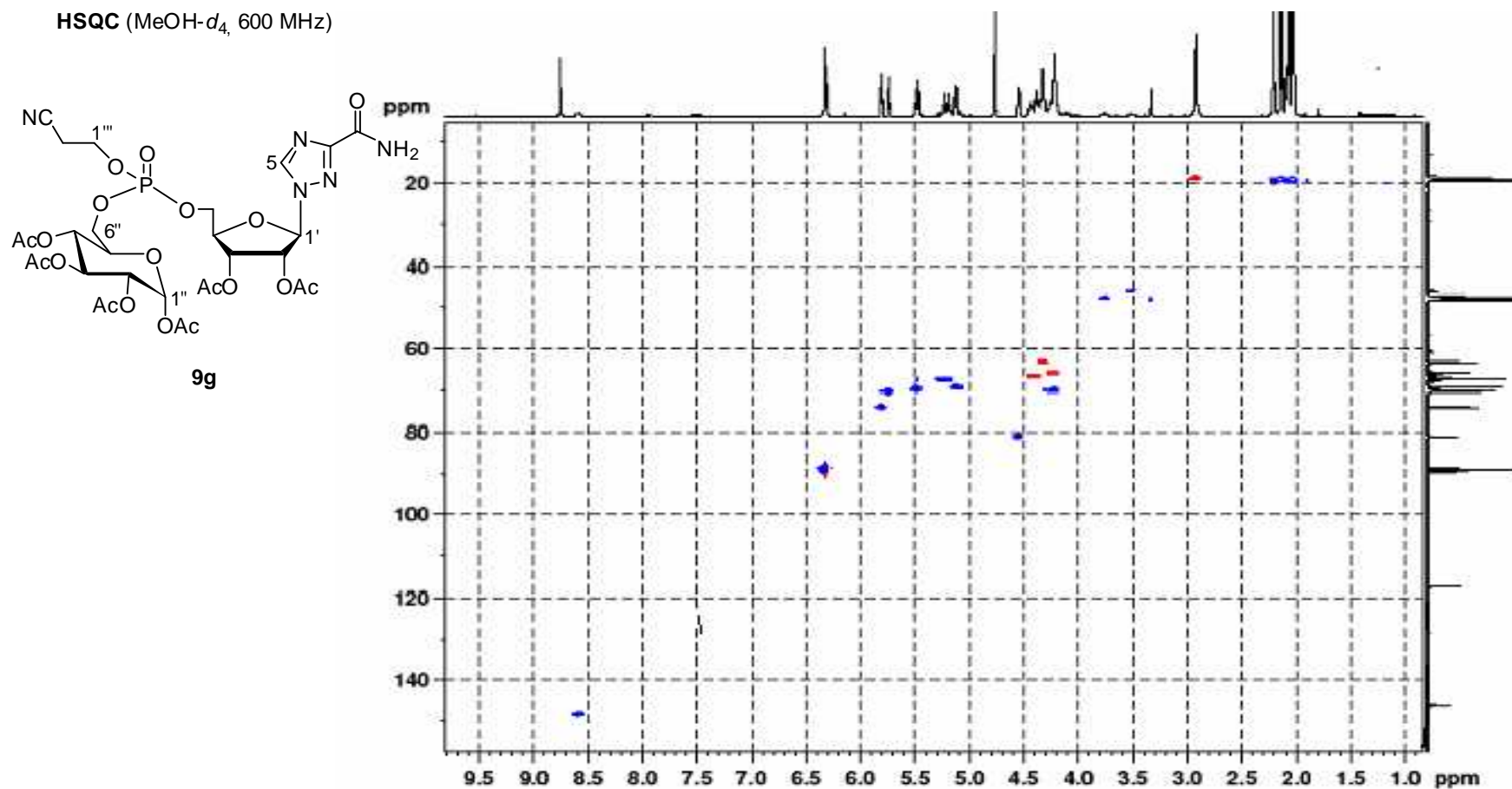
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(3-carbamoyl-1,2,4-triazoyl)- β -D-ribofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9g)

COSY (MeOH-*d*₄, 600 MHz)

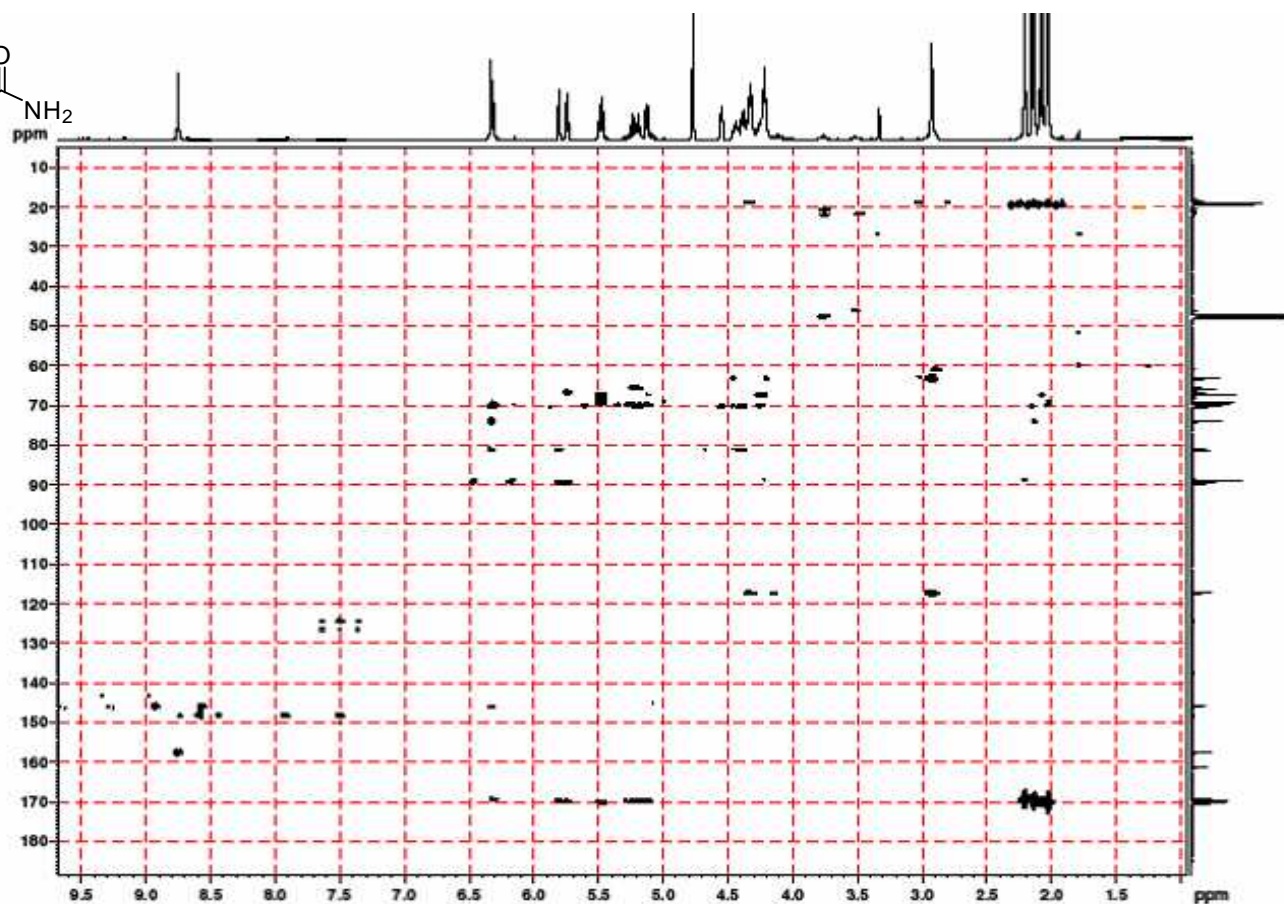
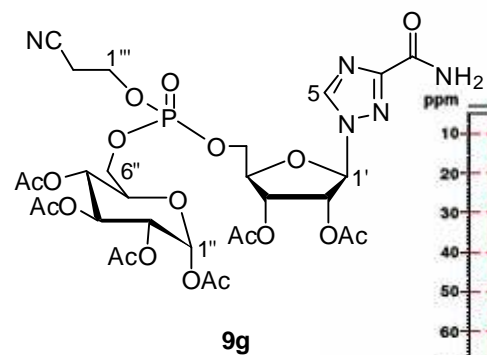


2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(3-carbamoyl-1,2,4-triazoyl)- β -D-ribofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9g)

HSQC (MeOH-*d*₄, 600 MHz)

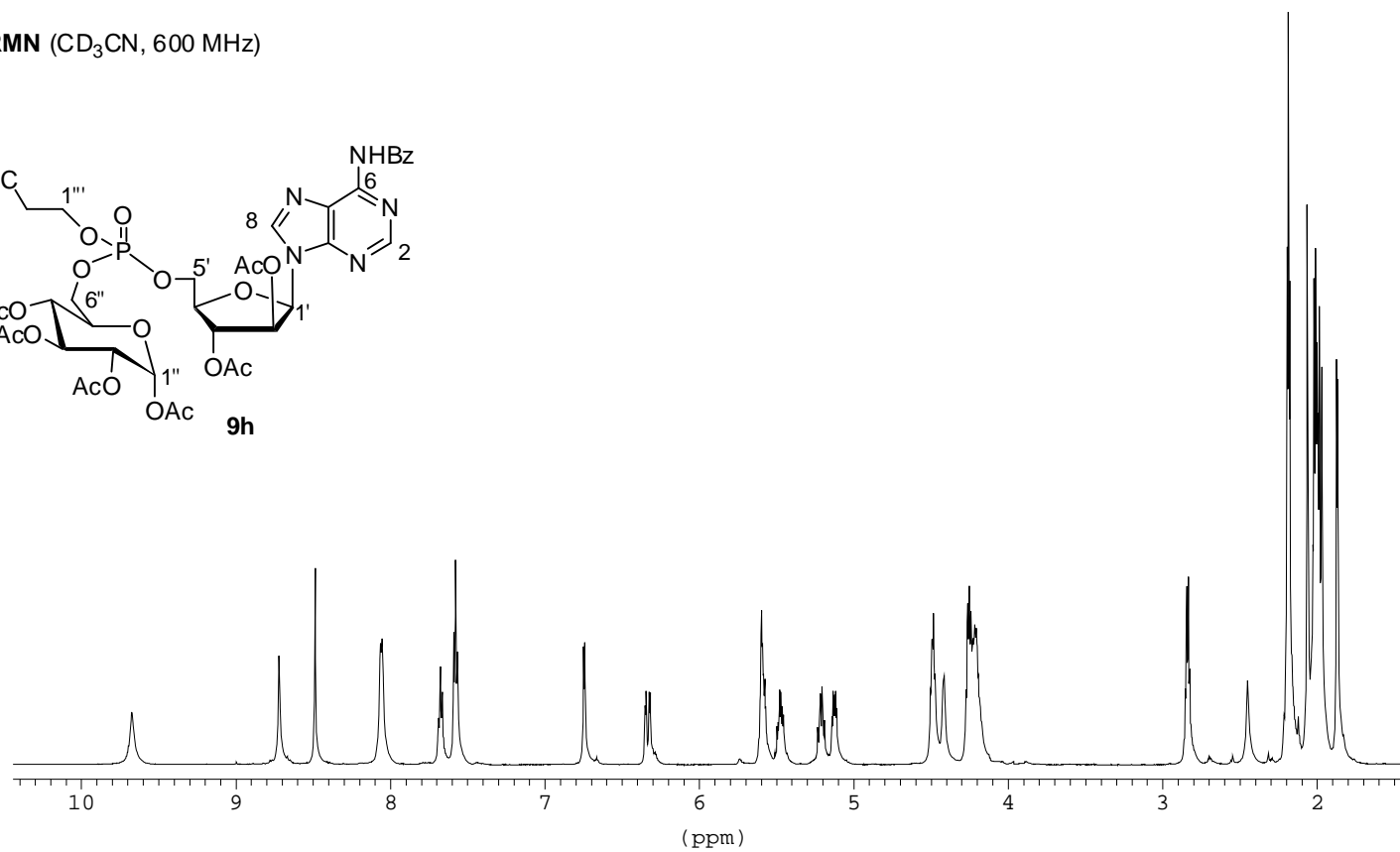
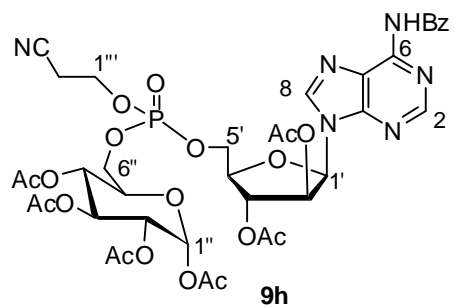


2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(3-carbamoyl-1,2,4-triazoyl)- β -D-ribofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9g)
HMBC (MeOH- d_4 , 600 MHz)



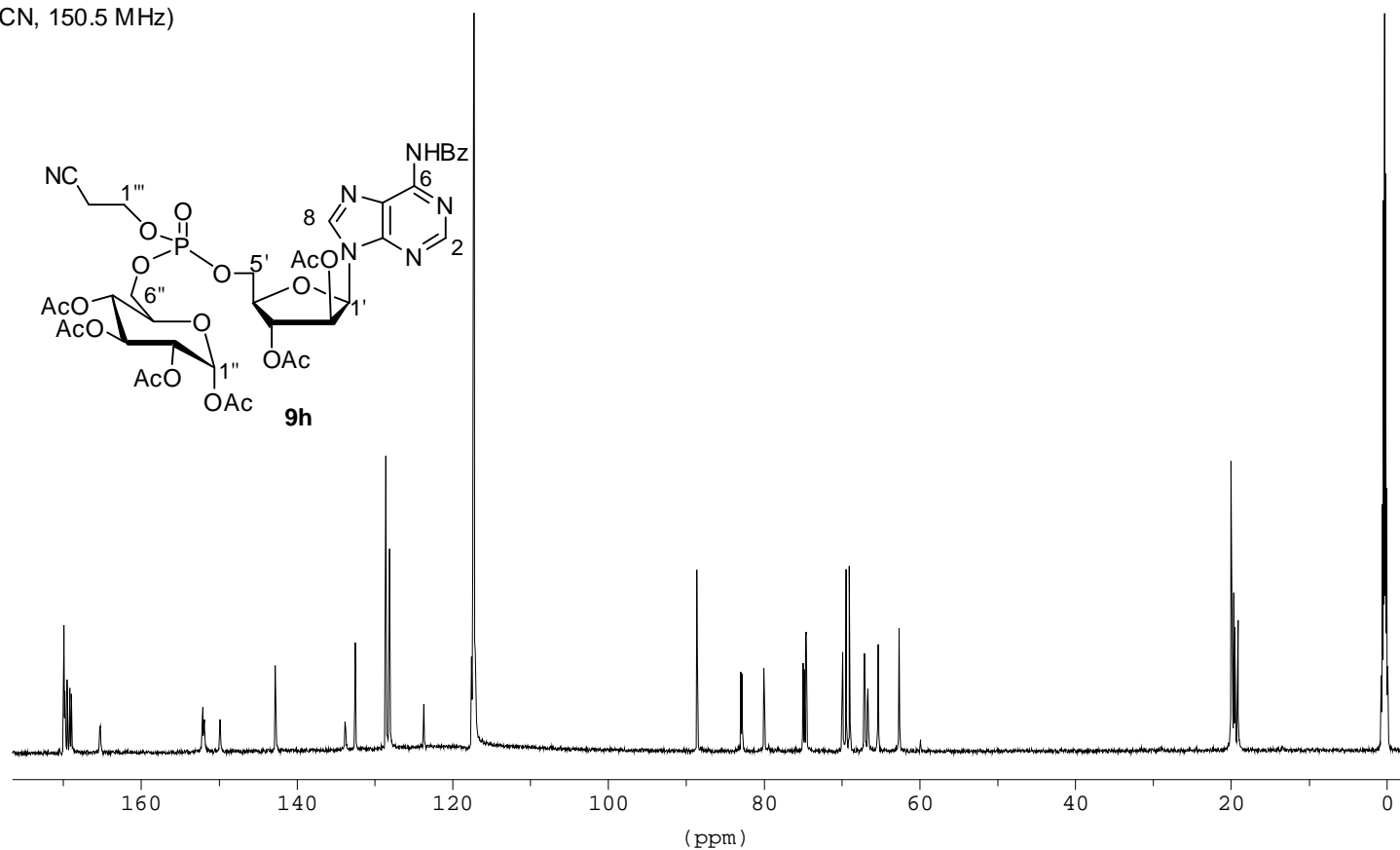
2-Cyanoethyl-[2',3'-di-O-acetyl-1'-(N⁶-benzoyladeninyl)-β-D-arabinofuranos-5'-yl]-1,2,3,4-tetra-O-acetyl-α-D-glucopyranos-6-yl phosphate (9h)

¹H-RMN (CD₃CN, 600 MHz)

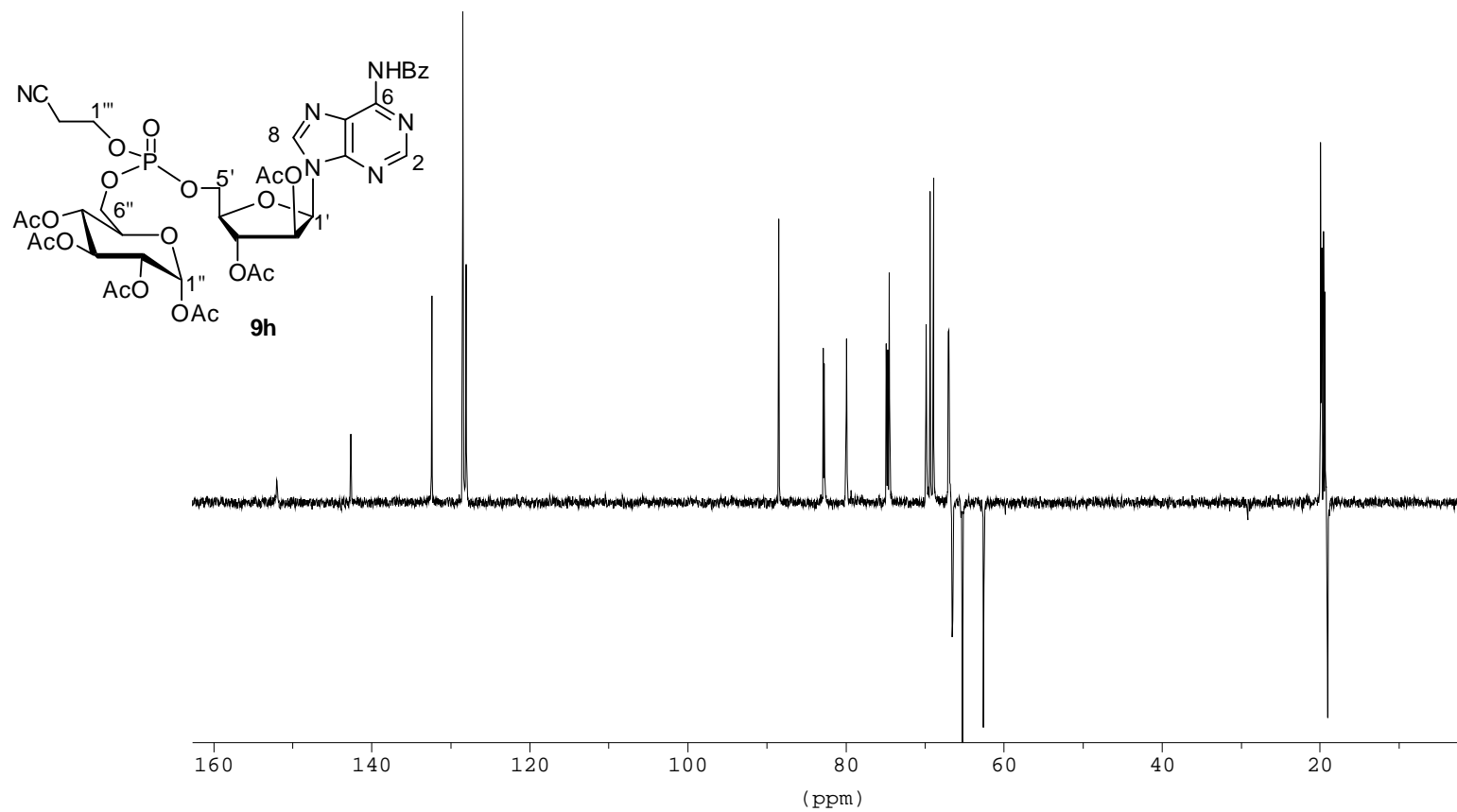


2-Cyanoethyl-[2',3'-di-O-acetyl-1'-(N⁶-benzoyladeninyl)-β-D-arabinofuranos-5'-yl]-1,2,3,4-tetra-O-acetyl-α-D-glucopyranos-6-yl phosphate (9h)

¹³C-RMN (CD₃CN, 150.5 MHz)

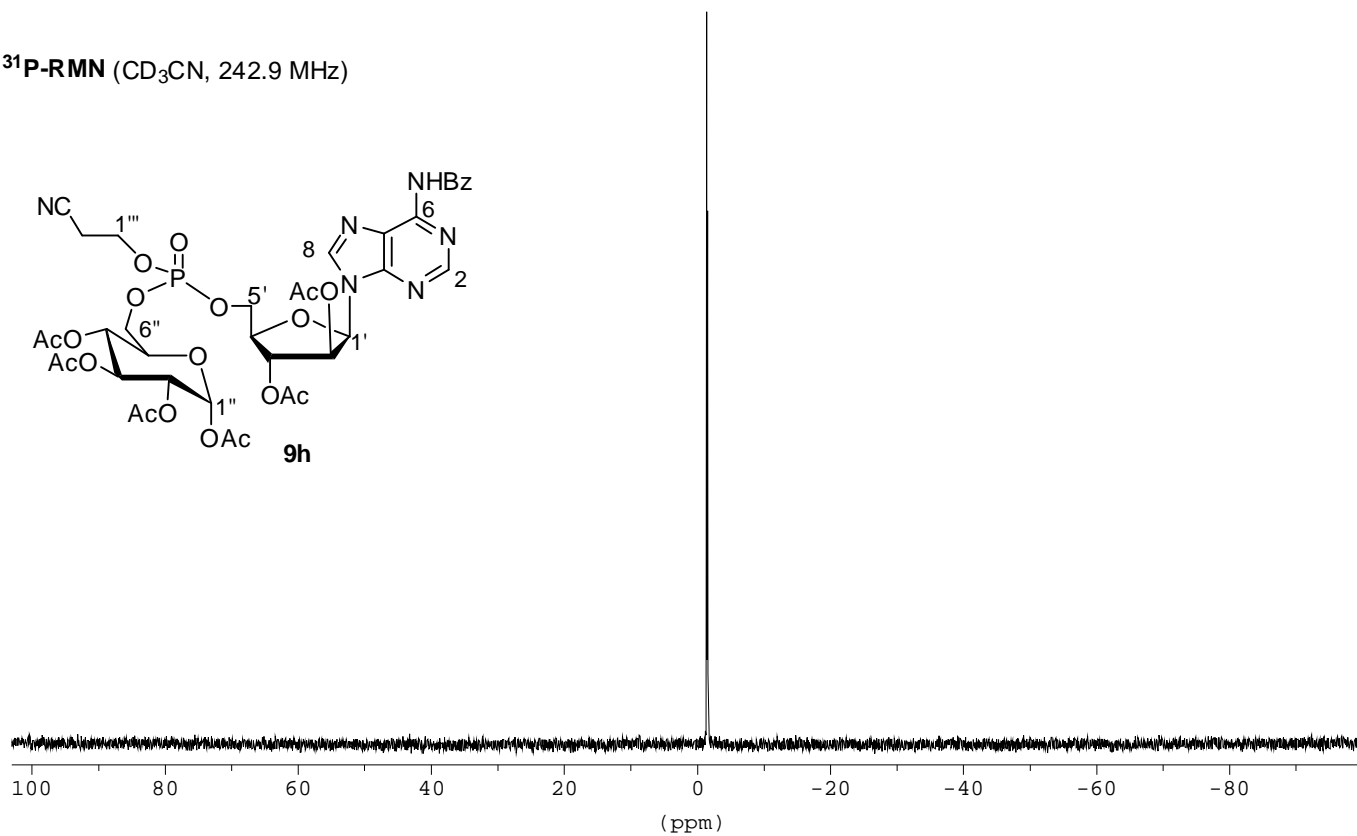


2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(*N*⁶-benzoyladeninyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9h)
DEPT (CD₃CN, 150.5 MHz)

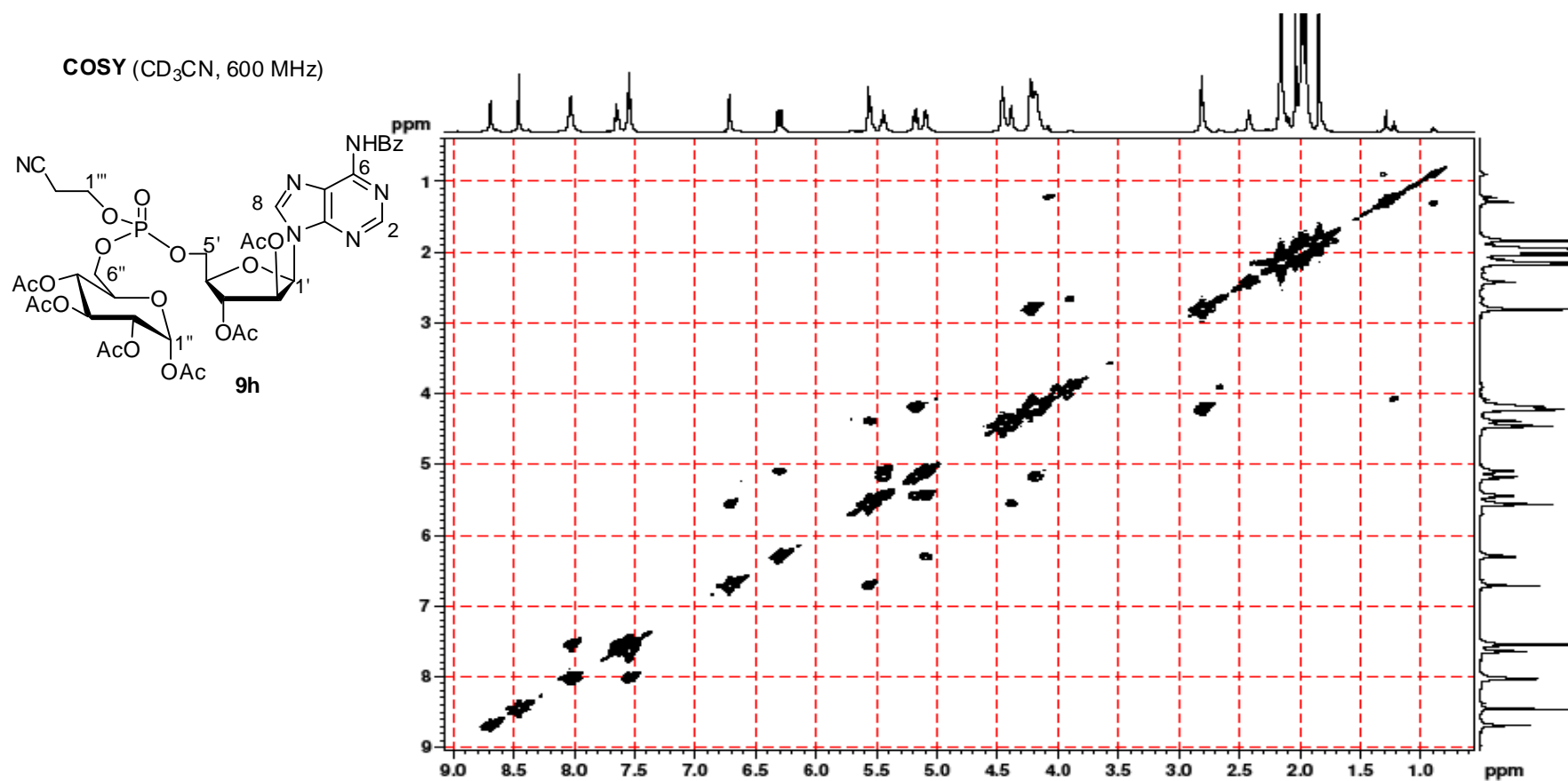


2-Cyanoethyl-[2',3'-di-O-acetyl-1'-(N⁶-benzoyladeninyl)-β-D-arabinofuranos-5'-yl]-1,2,3,4-tetra-O-acetyl-α-D-glucopyranos-6-yl phosphate (9h)

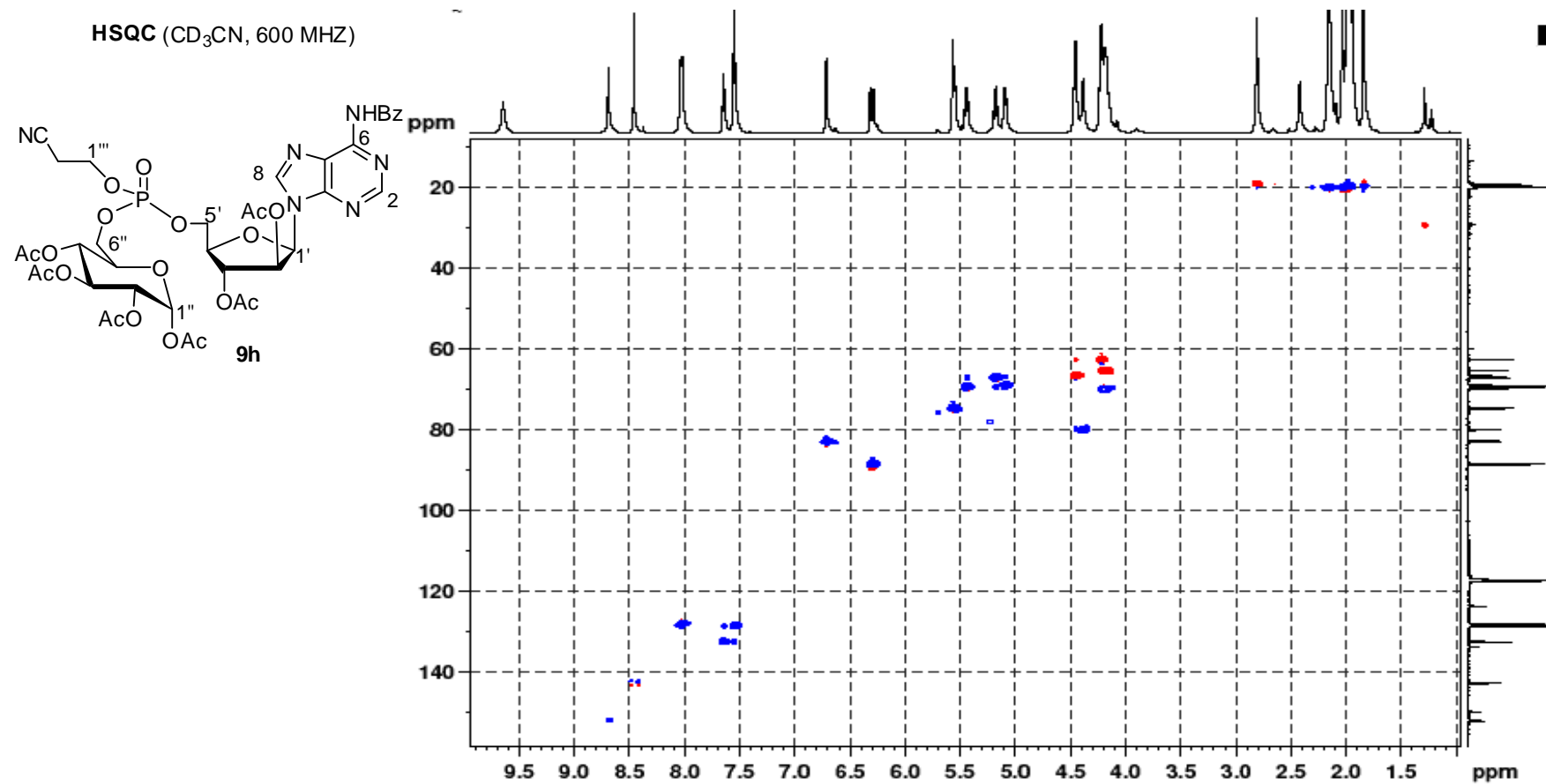
³¹P-RMN (CD₃CN, 242.9 MHz)



2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(*N*⁶-benzoyladeninyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9h)

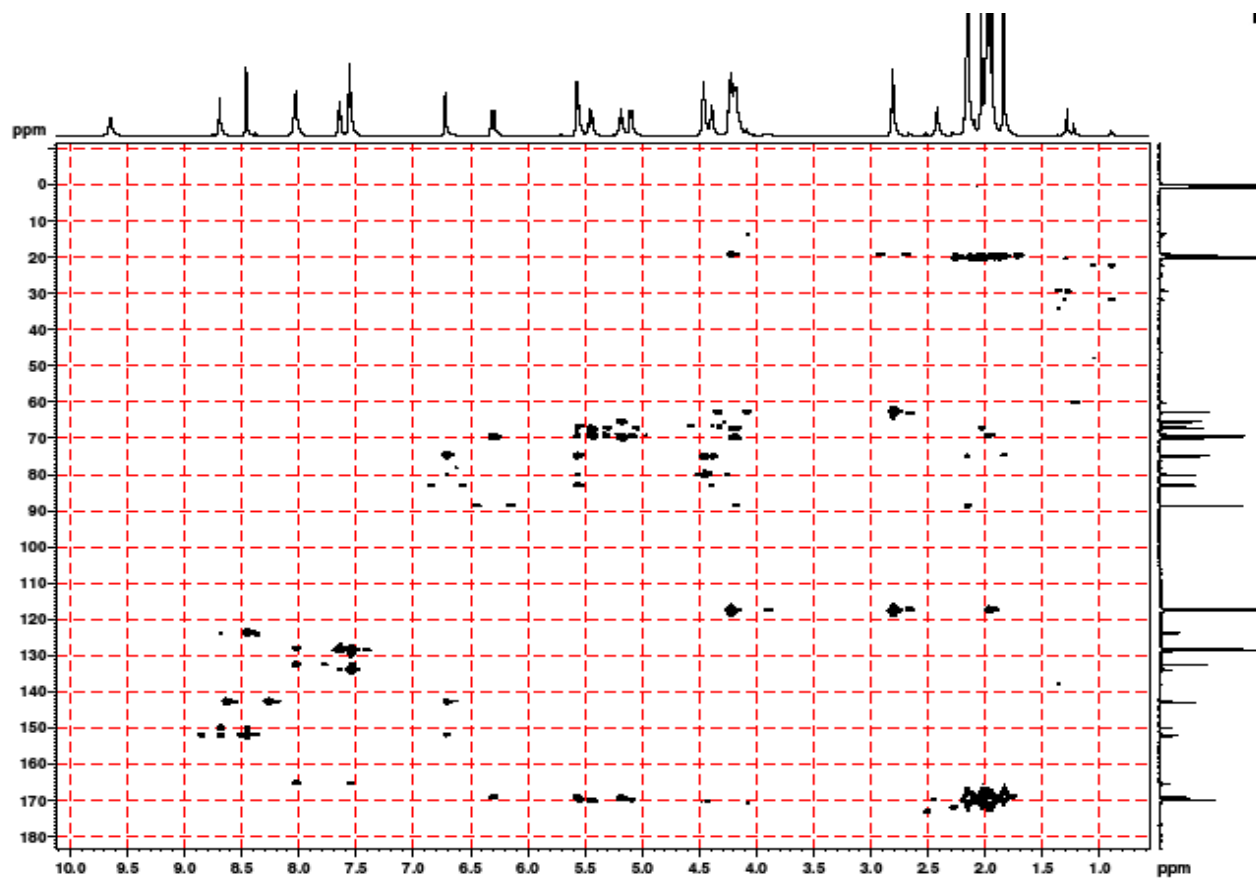
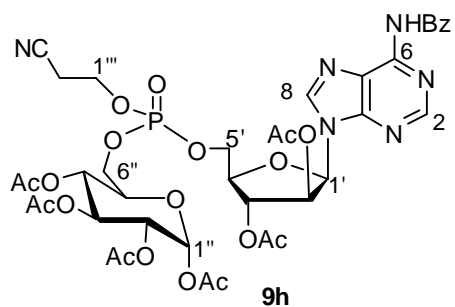


2-Cyanoethyl-[2',3'-di-O-acetyl-1'-(N⁶-benzoyladeninyl)-β-D-arabinofuranos-5'-yl]-1,2,3,4-tetra-O-acetyl-α-D-glucopyranos-6-yl phosphate (9h)



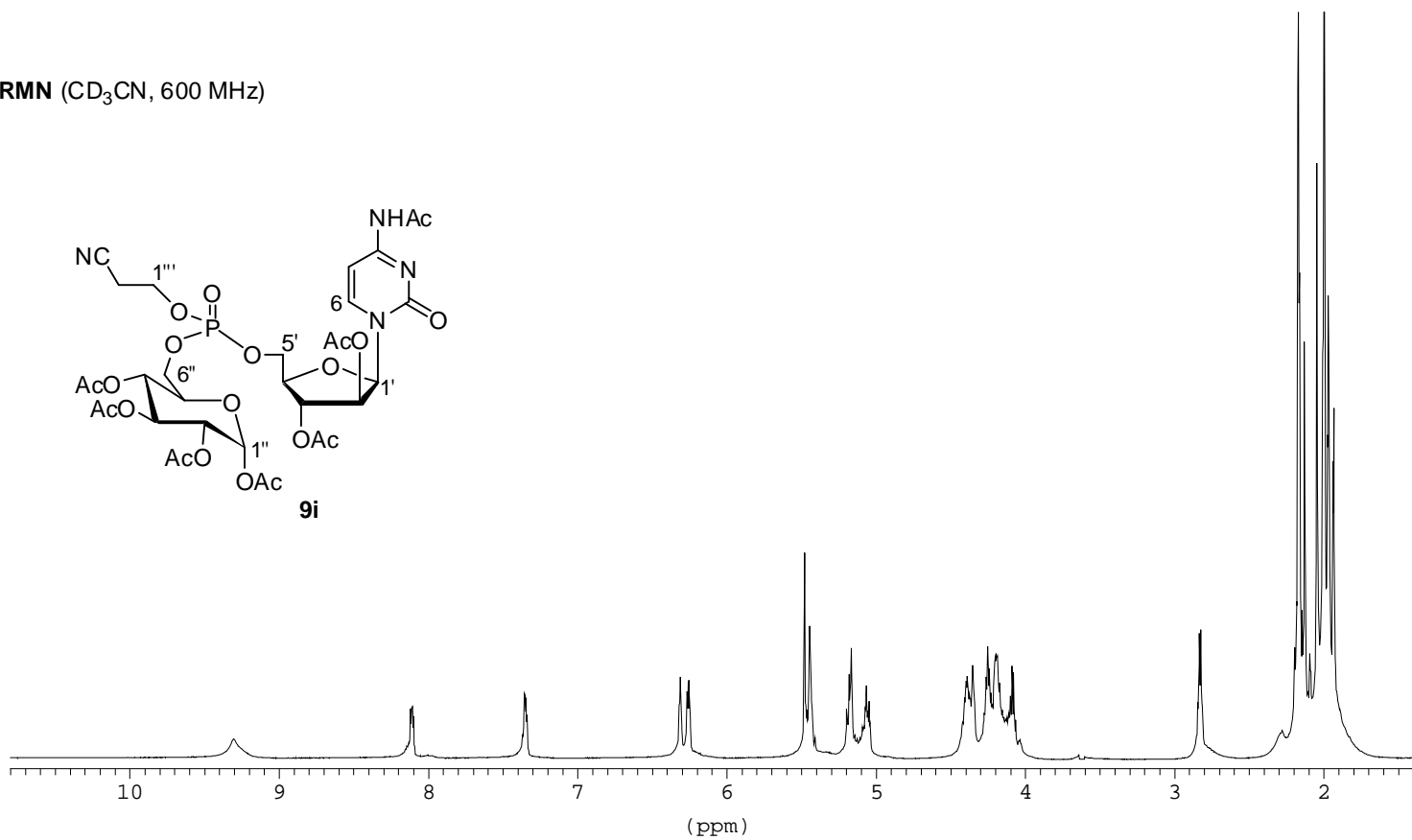
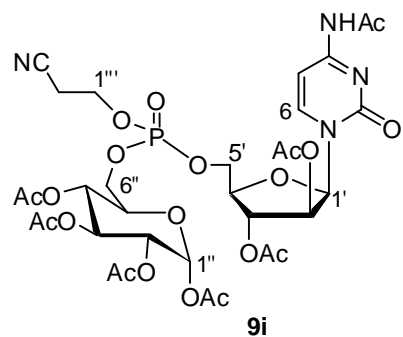
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(*N*⁶-benzoyladeninyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9h)

HMBC (CD₃CN, 600 MHz)



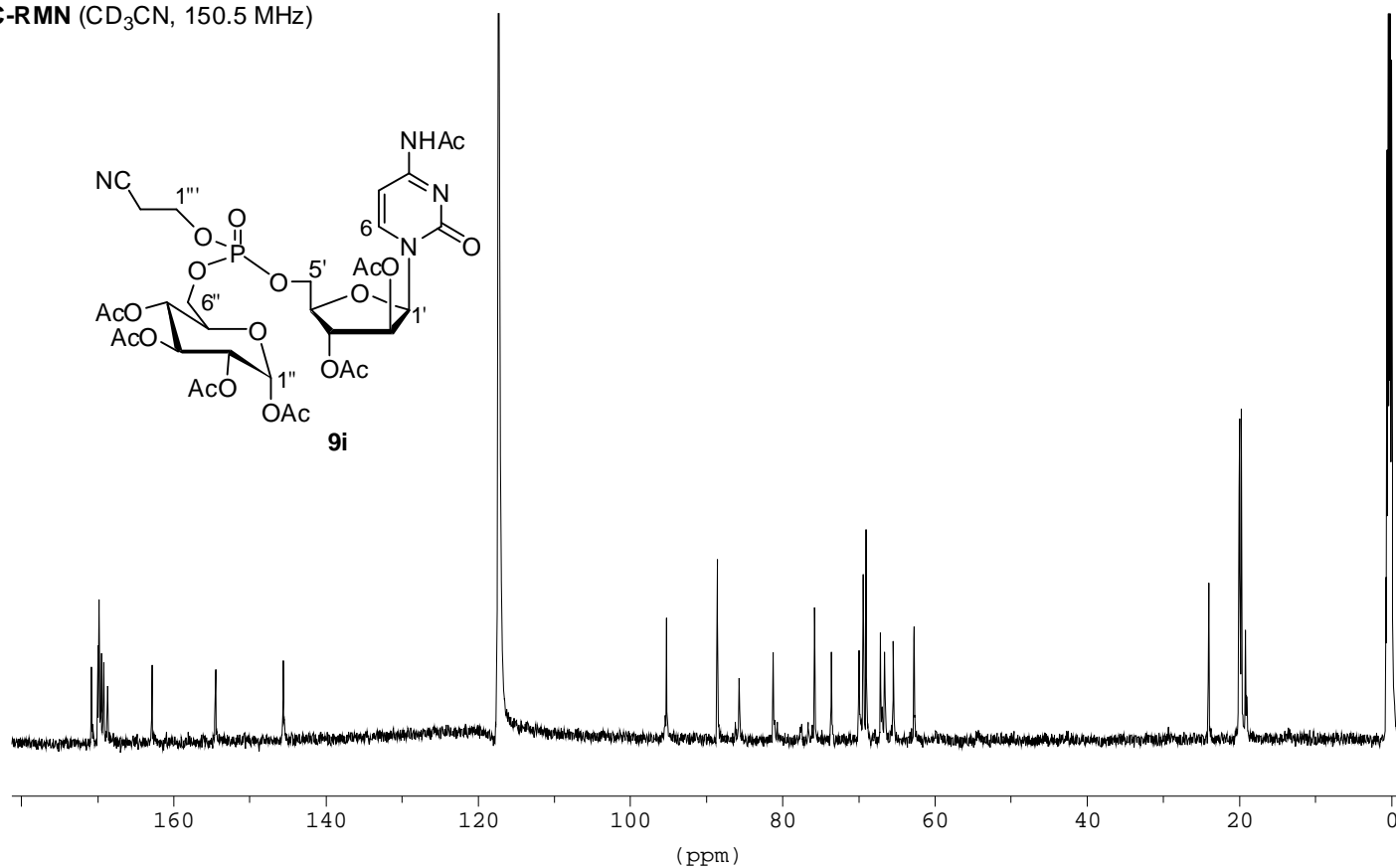
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(*N*⁴-benzoylcytosinyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9i**)**

¹H-RMN (CD₃CN, 600 MHz)



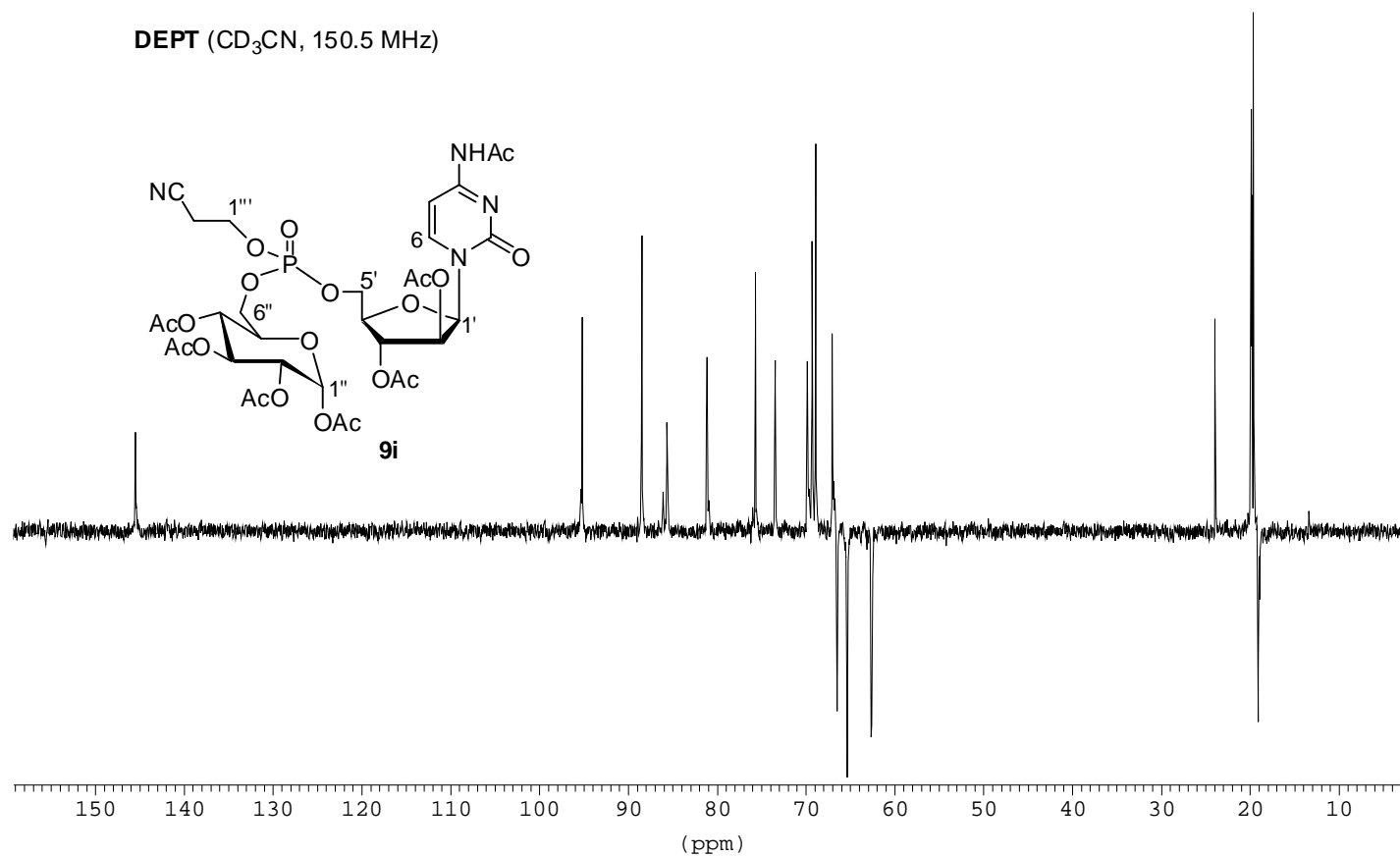
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(*N*⁴-benzoylcytosinyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9i**)**

¹³C-RMN (CD₃CN, 150.5 MHz)



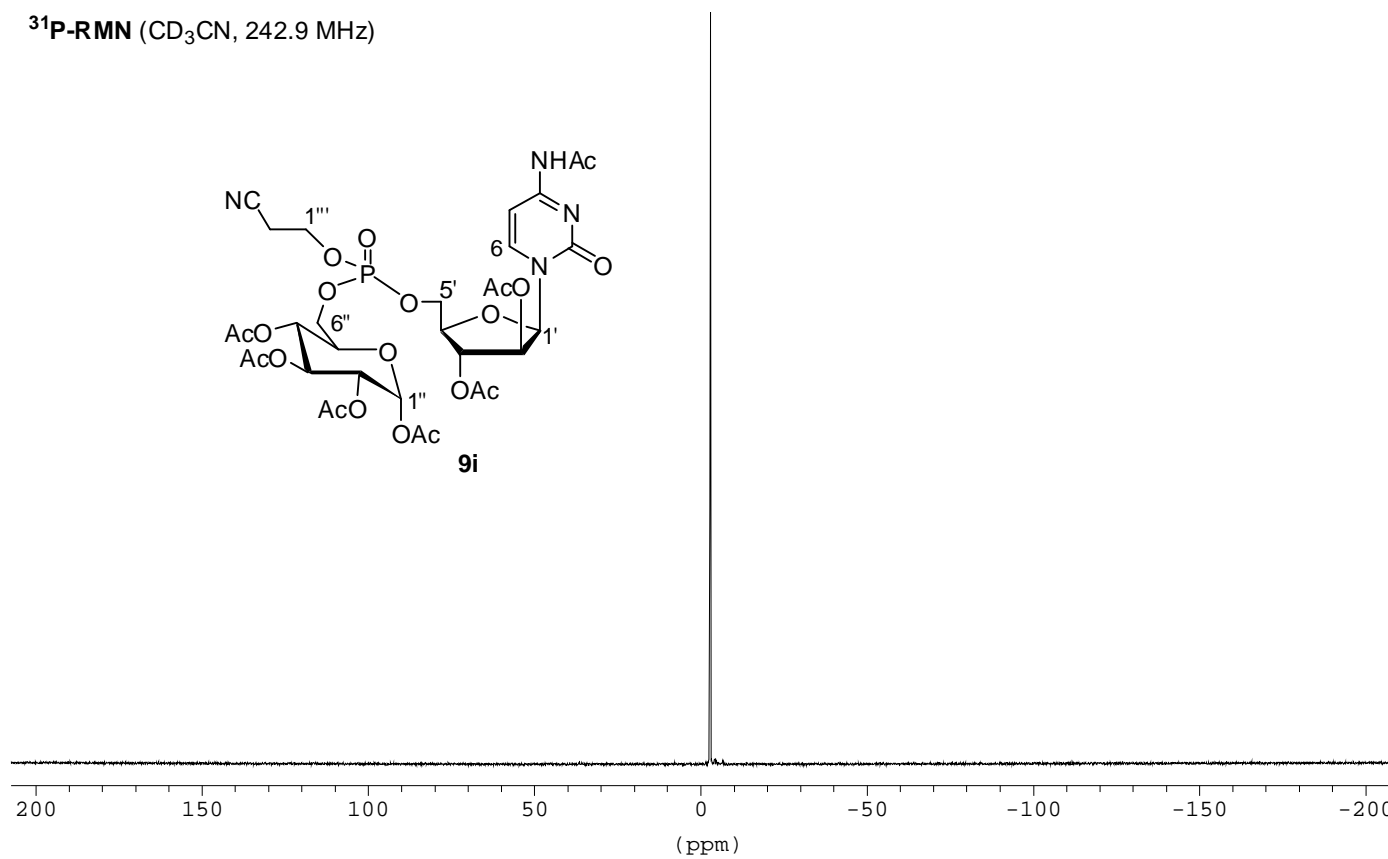
2-Cyanoethyl-[2',3'-di-O-acetyl-1'-(*N*⁴-benzoylcytosinyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-O-acetyl- α -D-glucopyranos-6-yl phosphate (9i**)**

DEPT (CD₃CN, 150.5 MHz)



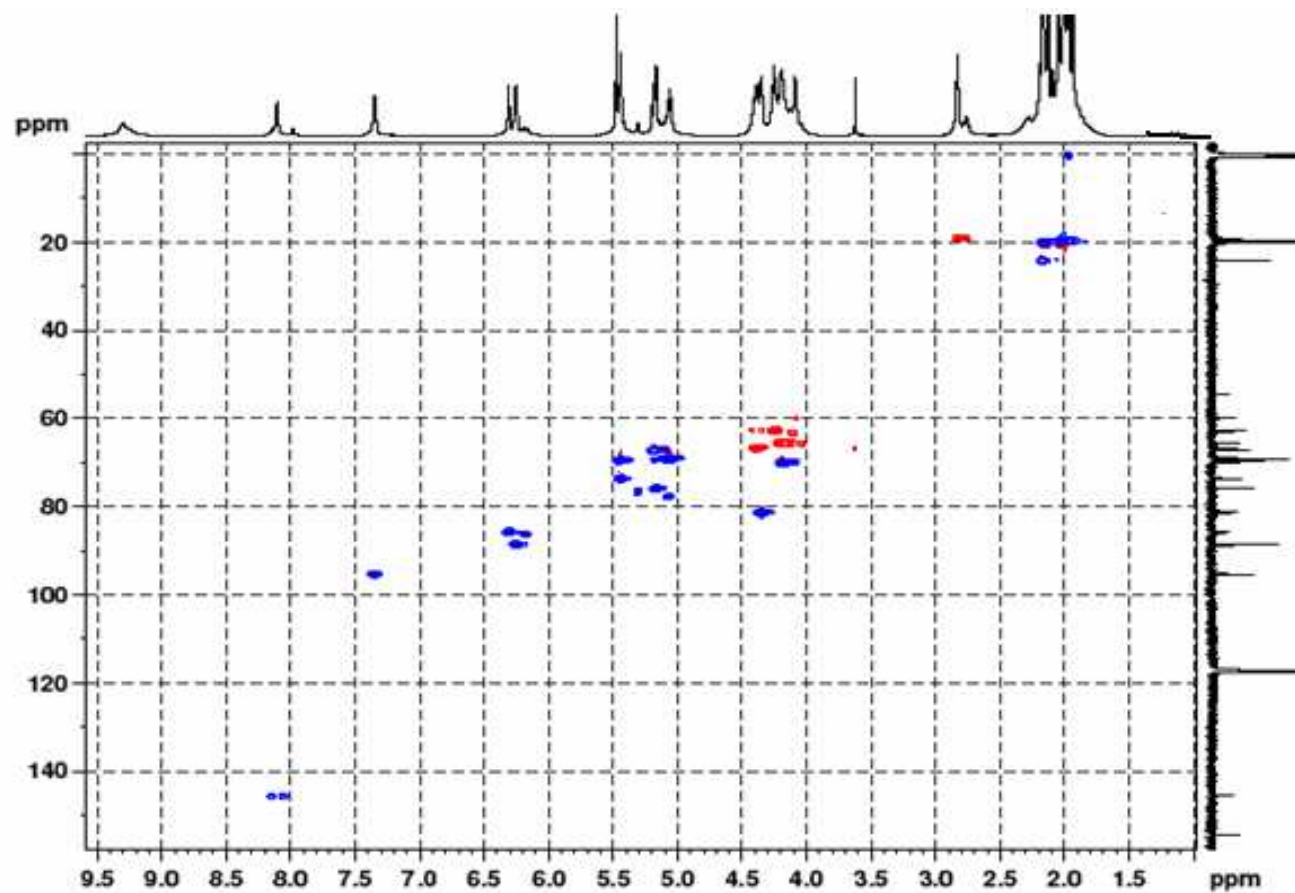
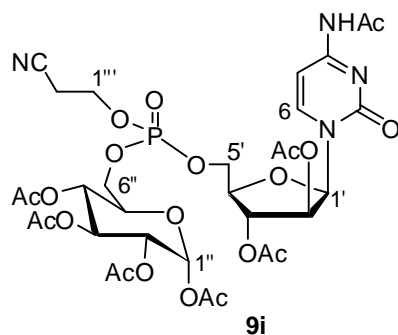
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(*N*⁴-benzoylcytosinyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9i**)**

³¹P-RMN (CD₃CN, 242.9 MHz)



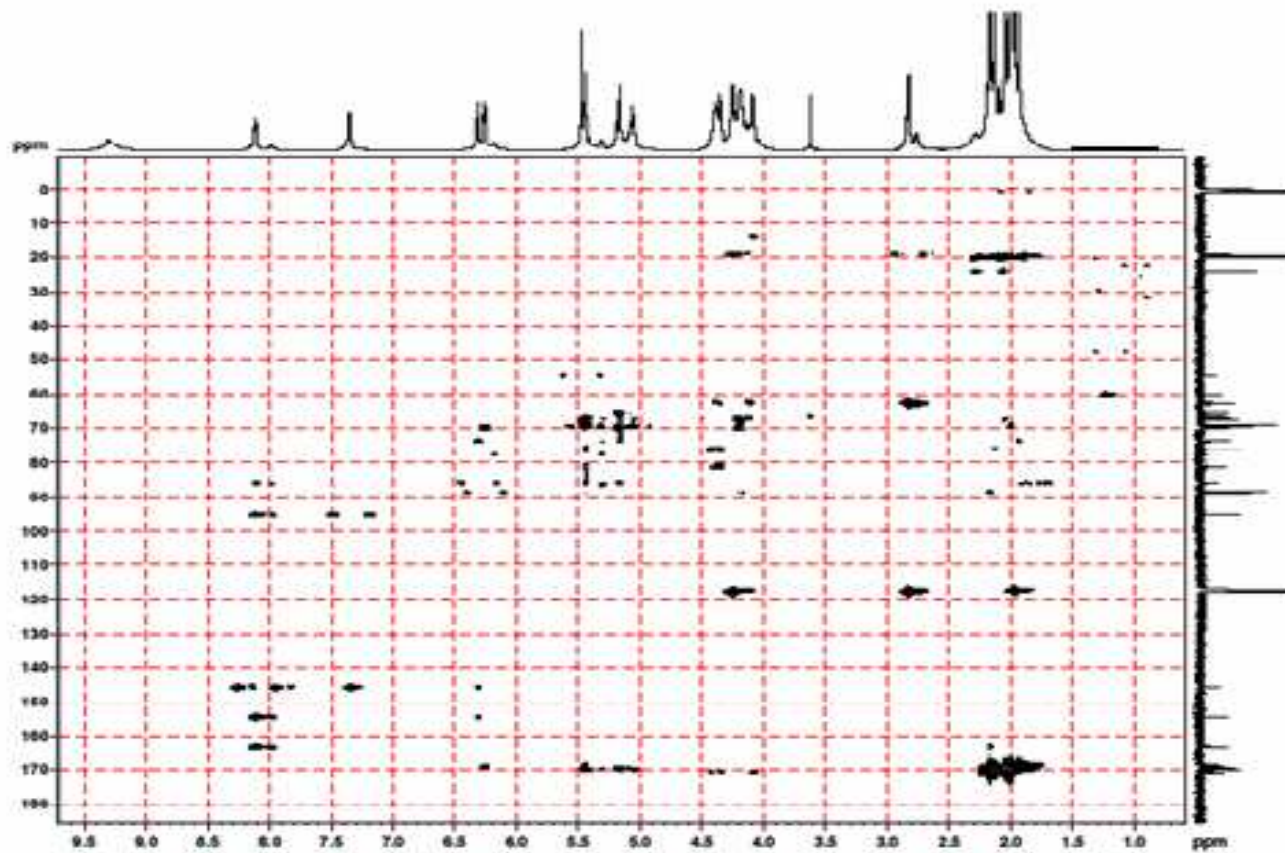
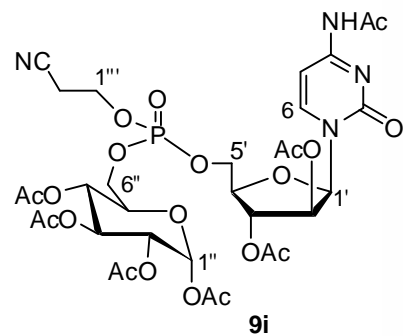
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(*N*⁴-benzoylcytosinyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9i)

HSQC (CD₃CN, 600 MHz)



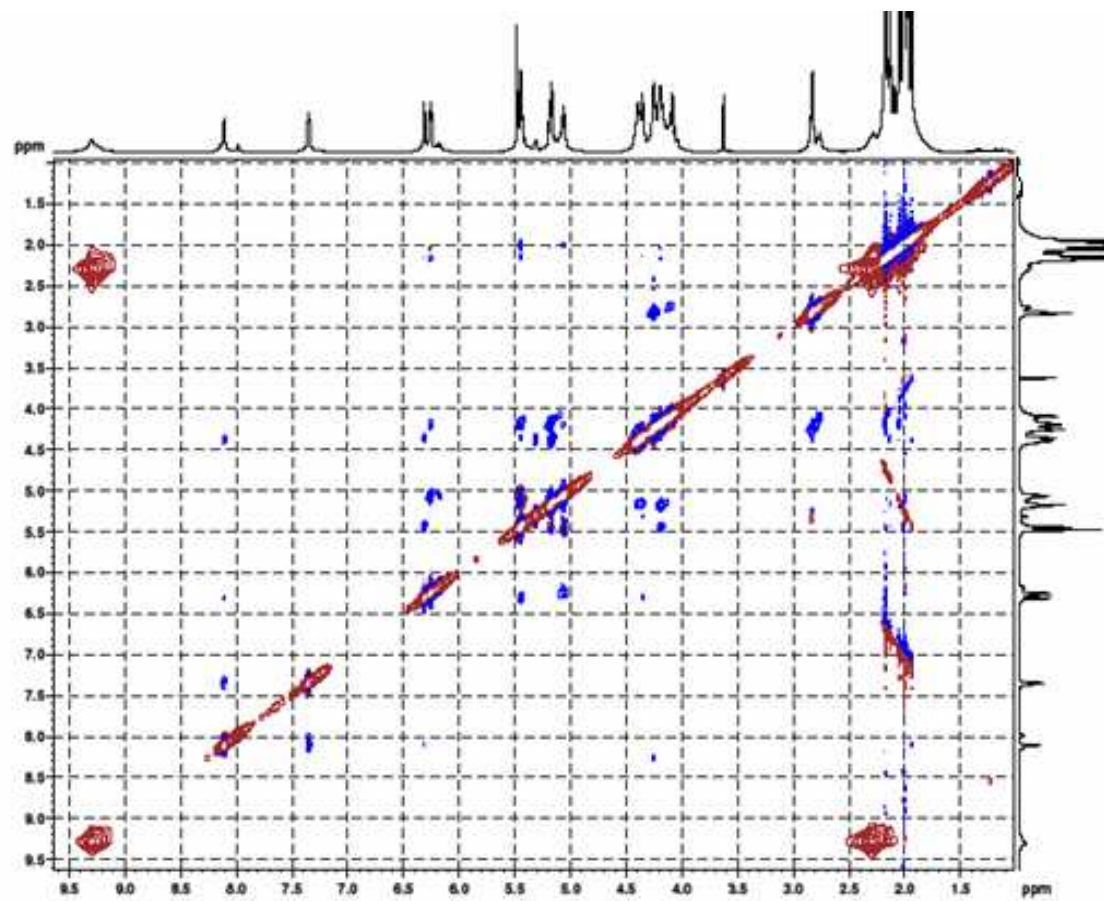
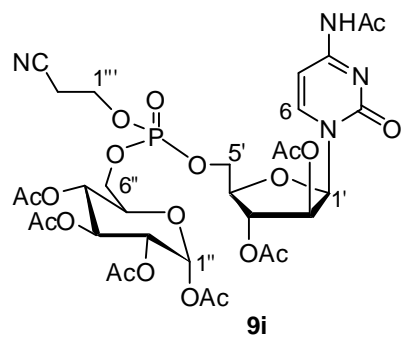
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(*N*⁴-benzoylcytosinyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9i)

HMBC (CD₃CN, 600 MHz)



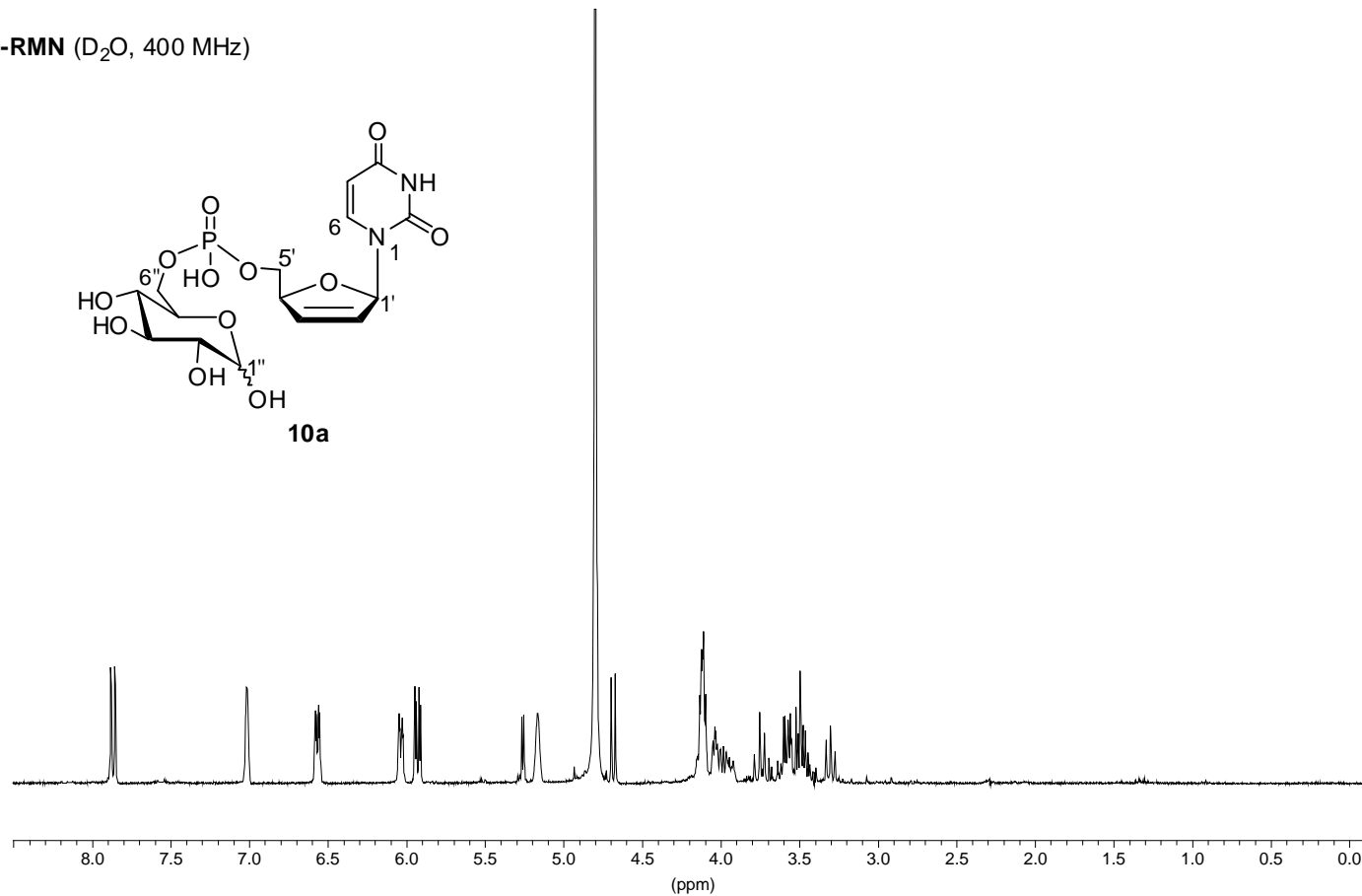
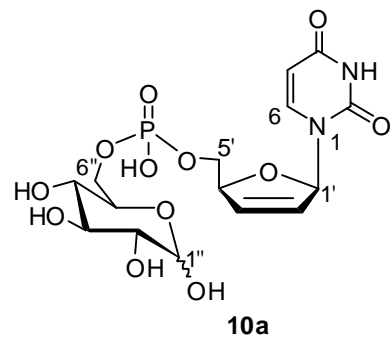
2-Cyanoethyl-[2',3'-di-*O*-acetyl-1'-(*N*⁴-benzoylcytosinyl)- β -D-arabinofuranos-5'-yl]-1,2,3,4-tetra-*O*-acetyl- α -D-glucopyranos-6-yl phosphate (9i)

NOESY (CD₃CN, 600 MHz)



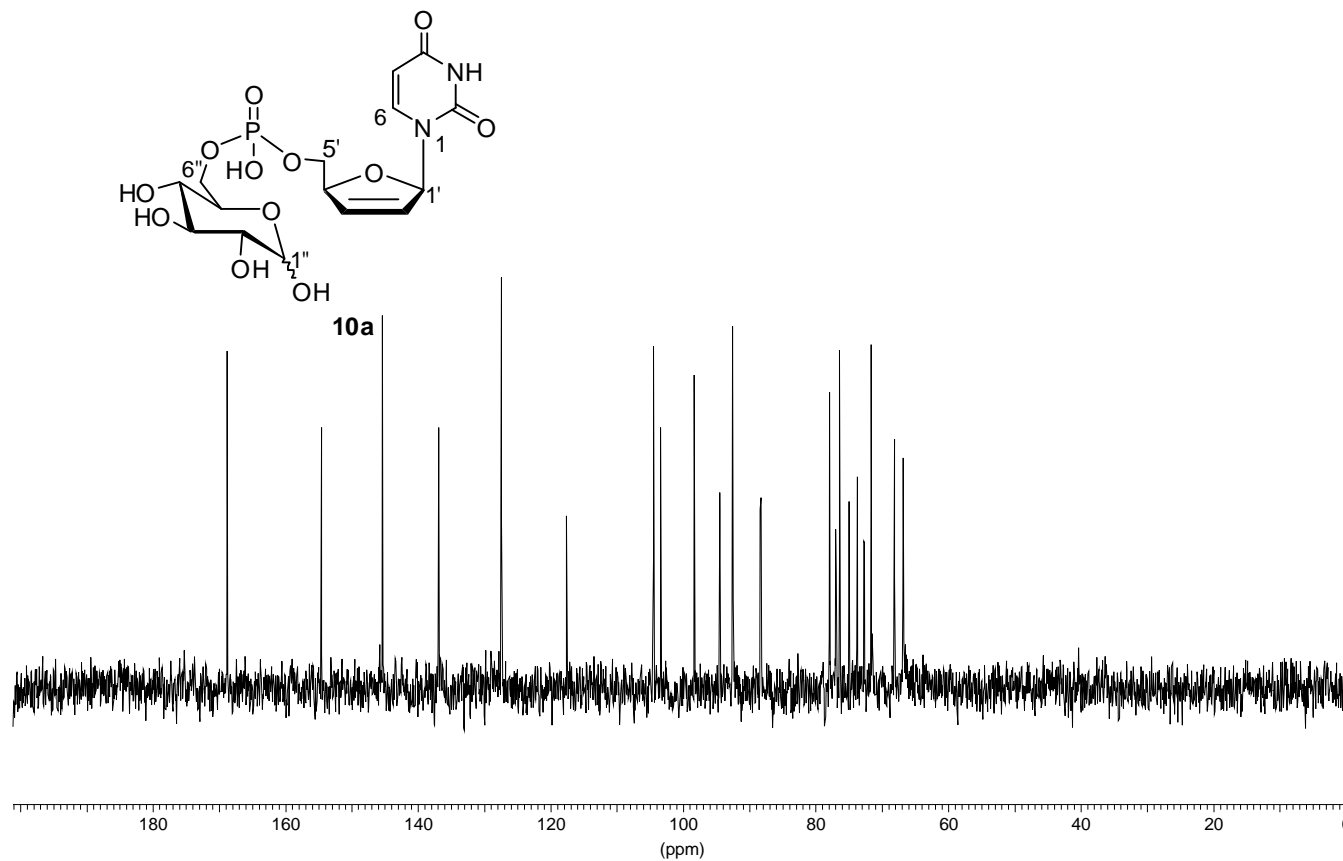
2',3'-Didehydro-2',3'-dideoxyuridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10a)

$^1\text{H-RMN}$ (D_2O , 400 MHz)



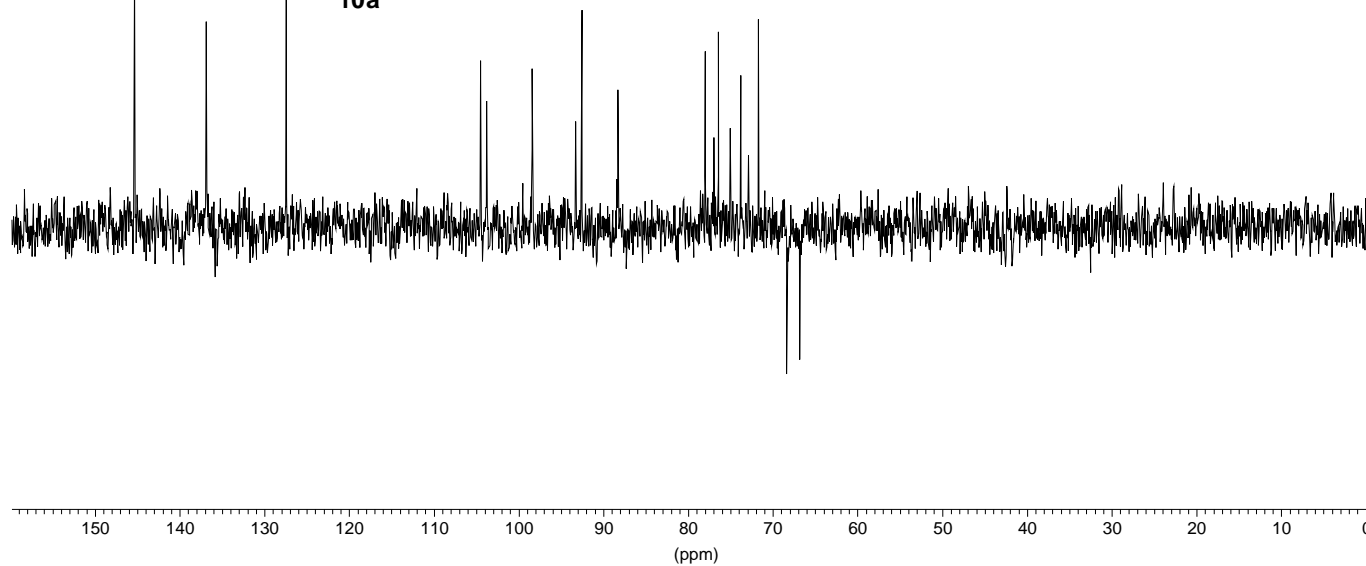
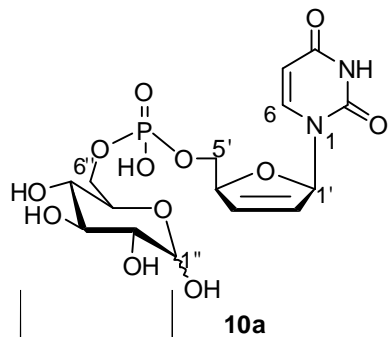
2',3'-Didehydro-2',3'-dideoxyuridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10a)

^{13}C -RMN (D_2O , 100.6 MHz)



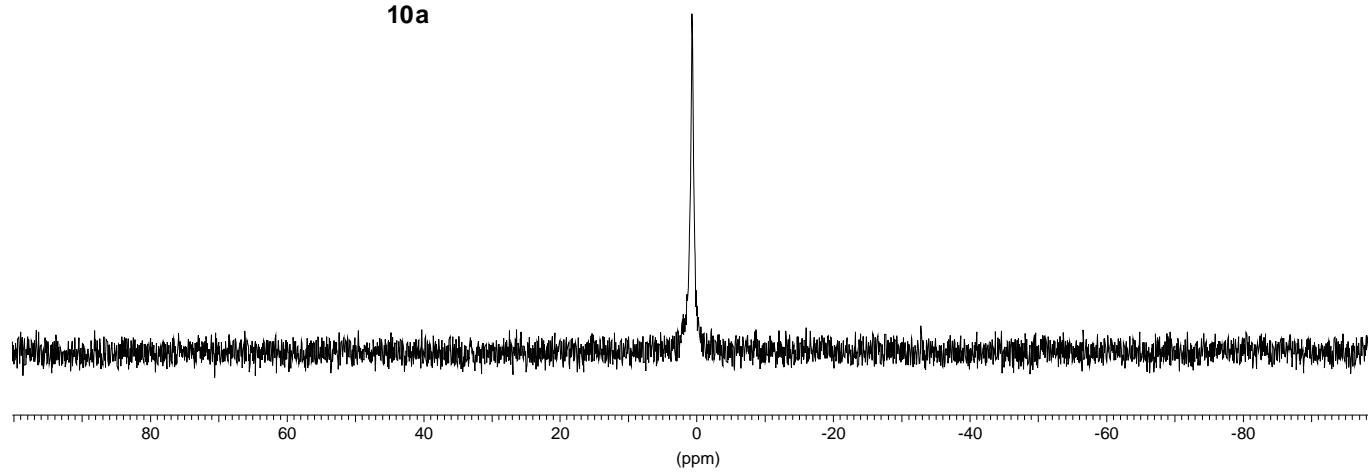
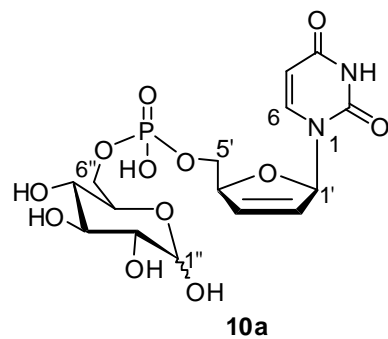
2',3'-Didehydro-2',3'-dideoxyuridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10a)

DEPT (D_2O , 100.6 MHz)



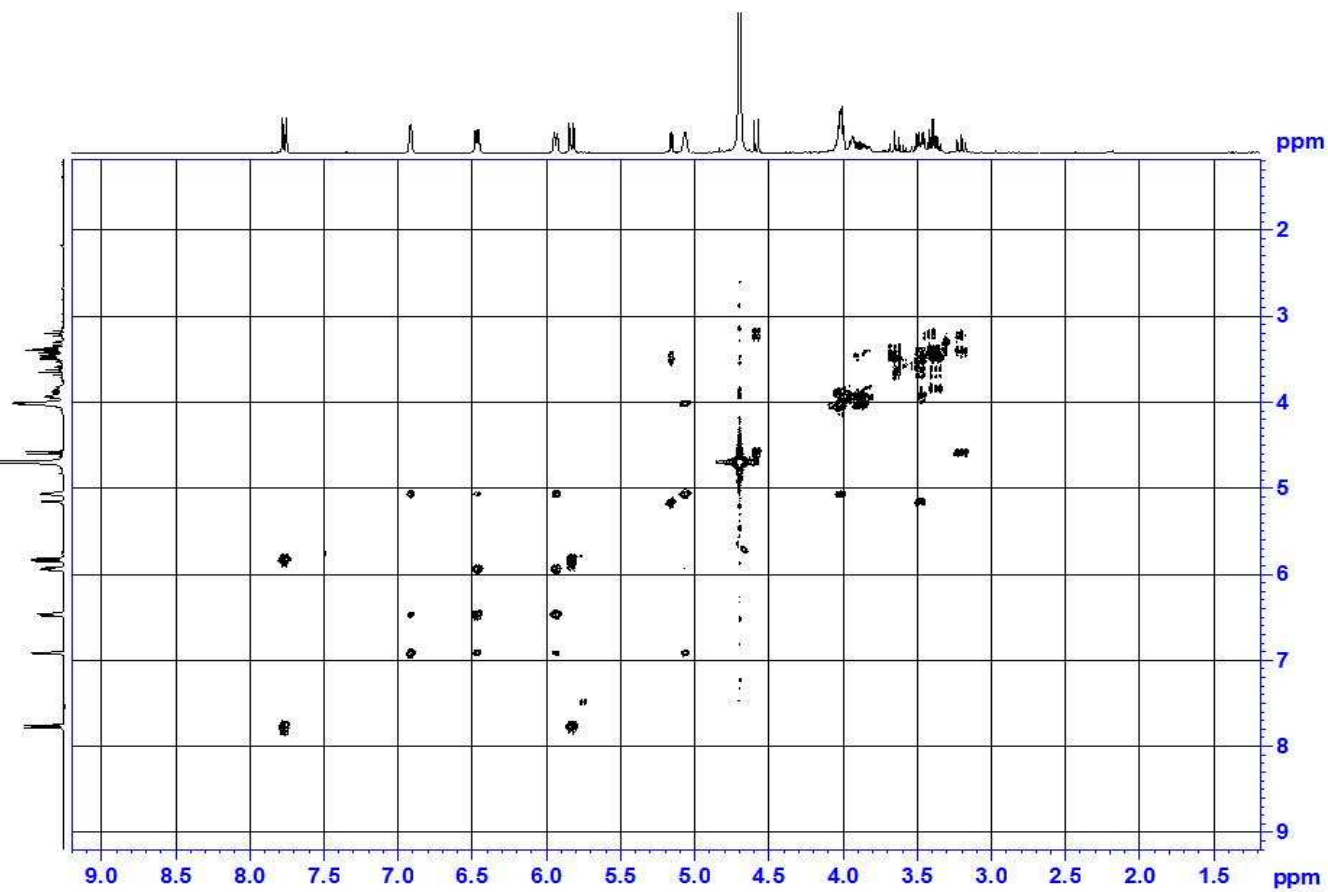
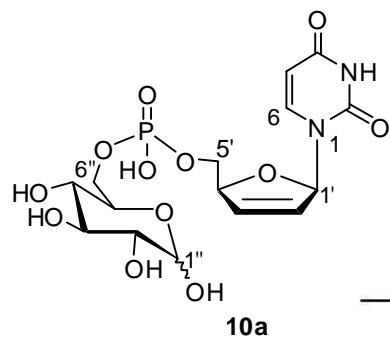
2',3'-Didehydro-2',3'-dideoxyuridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10a)

^{31}P -RMN (D_2O , 161.9 MHz)

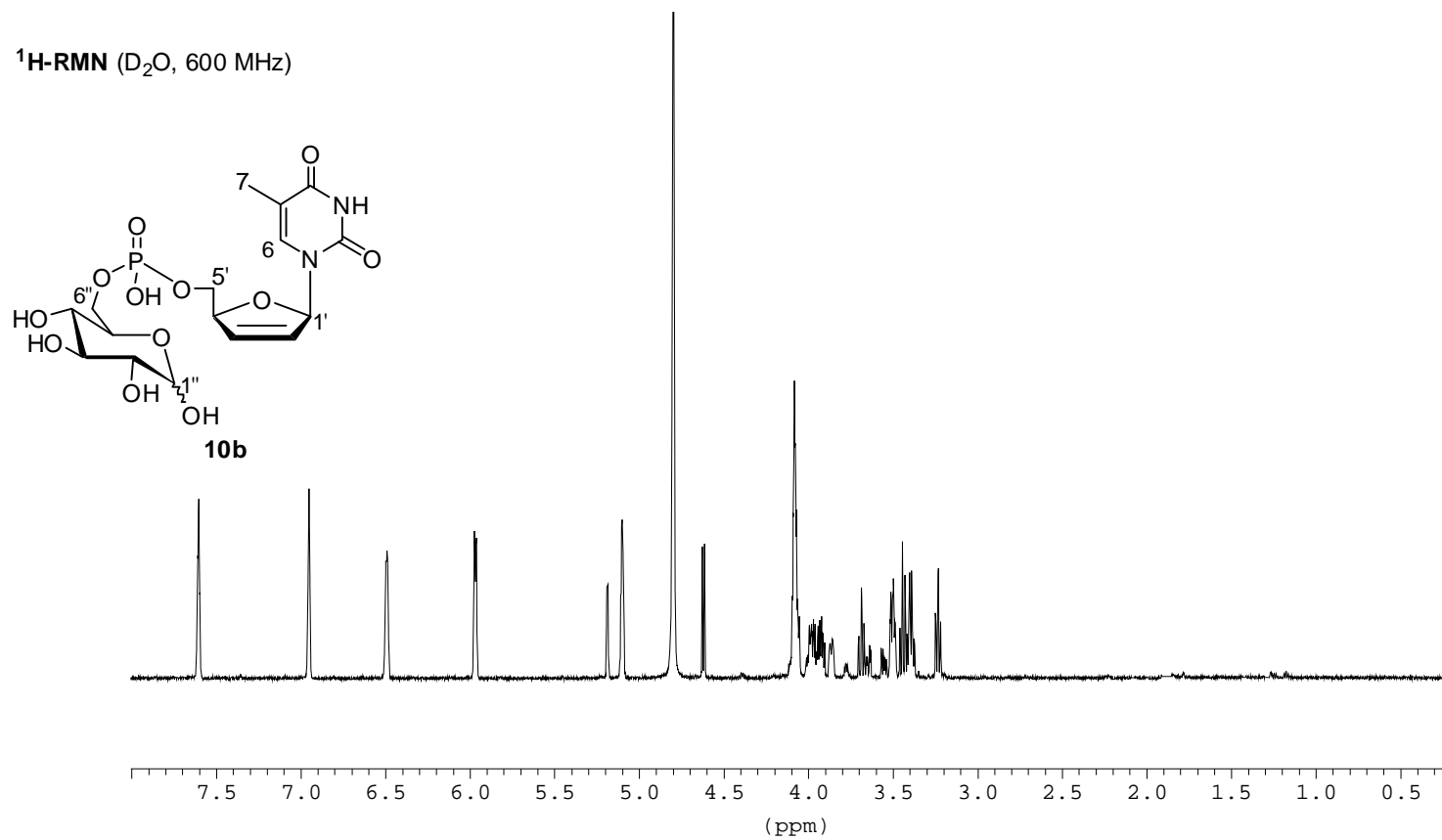


2',3'-Didehydro-2',3'-dideoxyuridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10a)

COSY (D₂O, 400 MHz)

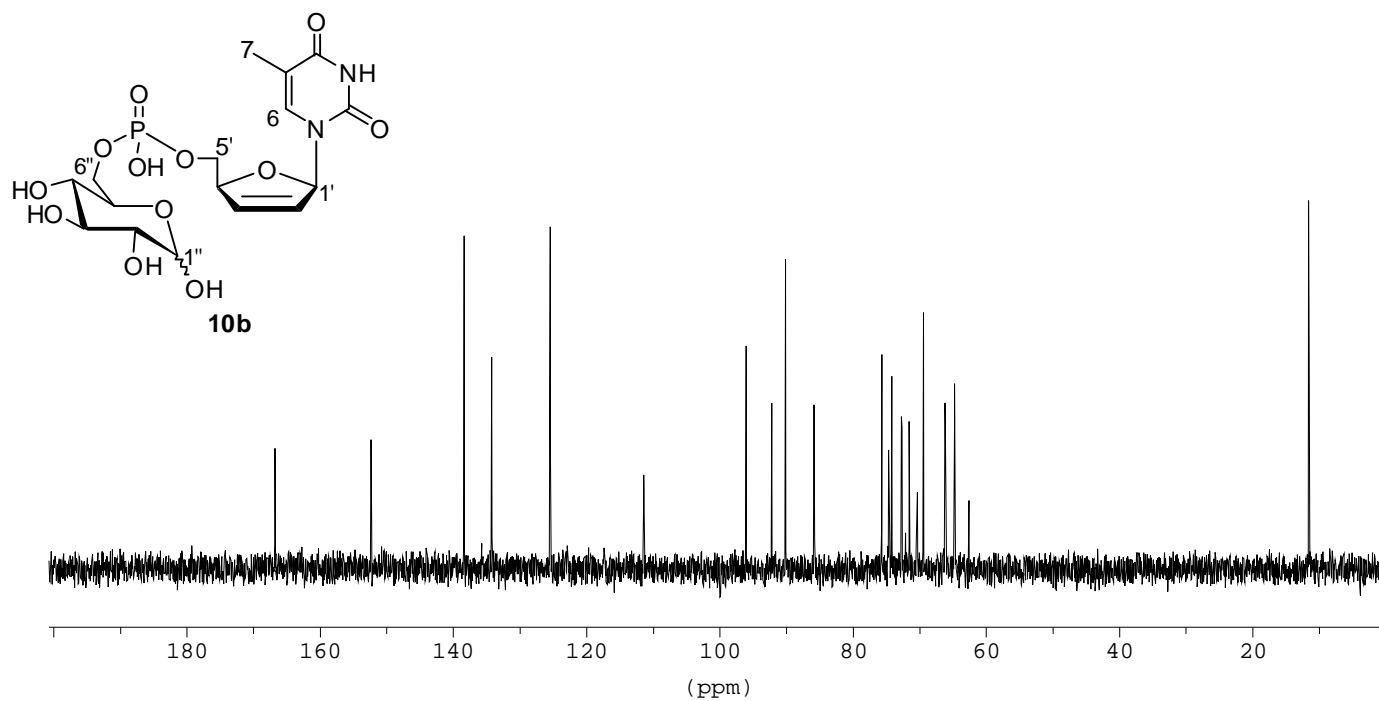


2',3'-Didehydro-2',3'-dideoxythymidine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10b)



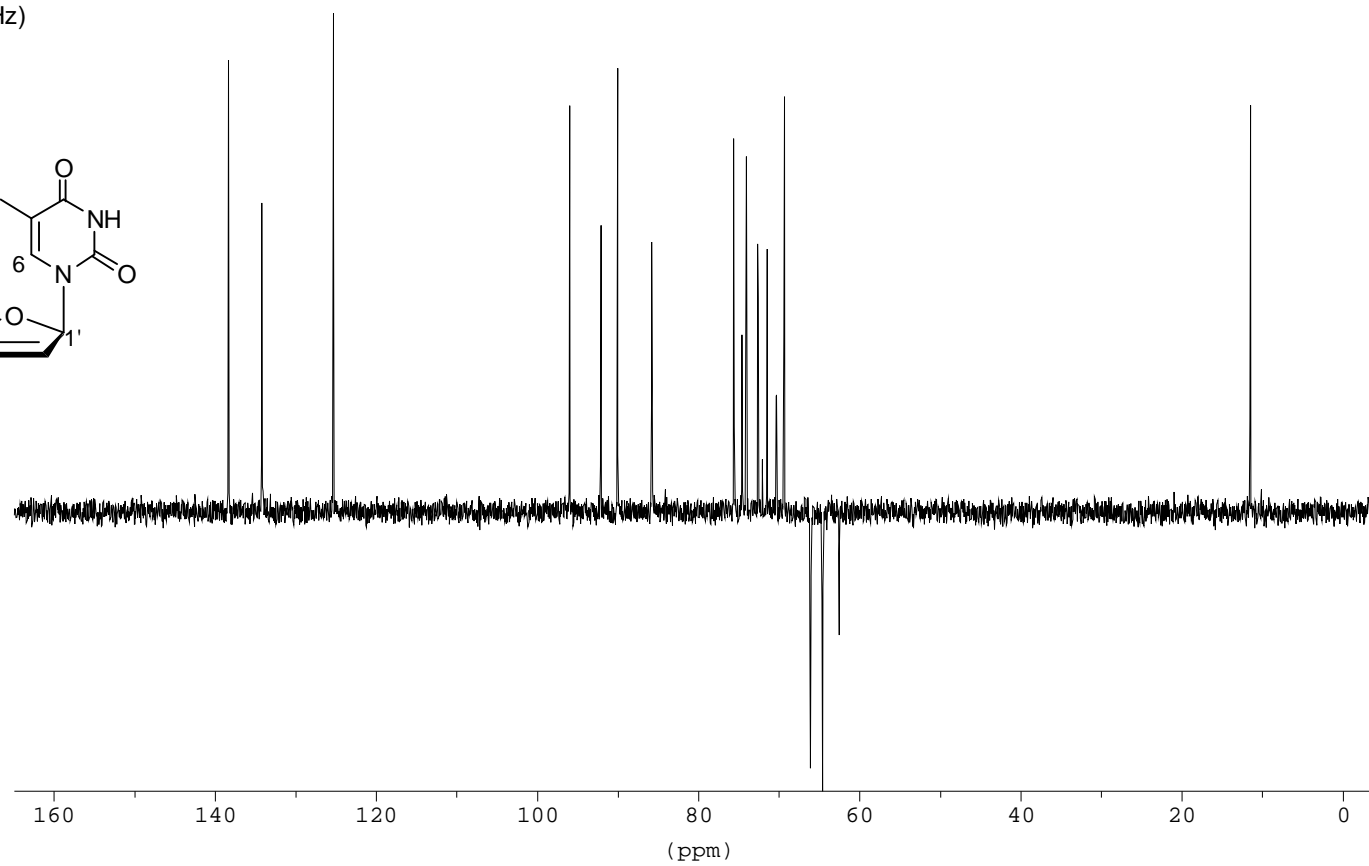
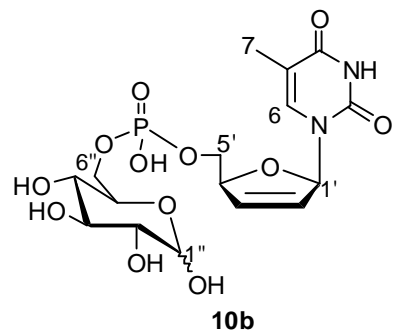
2',3'-Didehydro-2',3'-dideoxythymidine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10b)

^{13}C -RMN (D_2O , 150.5 MHz)



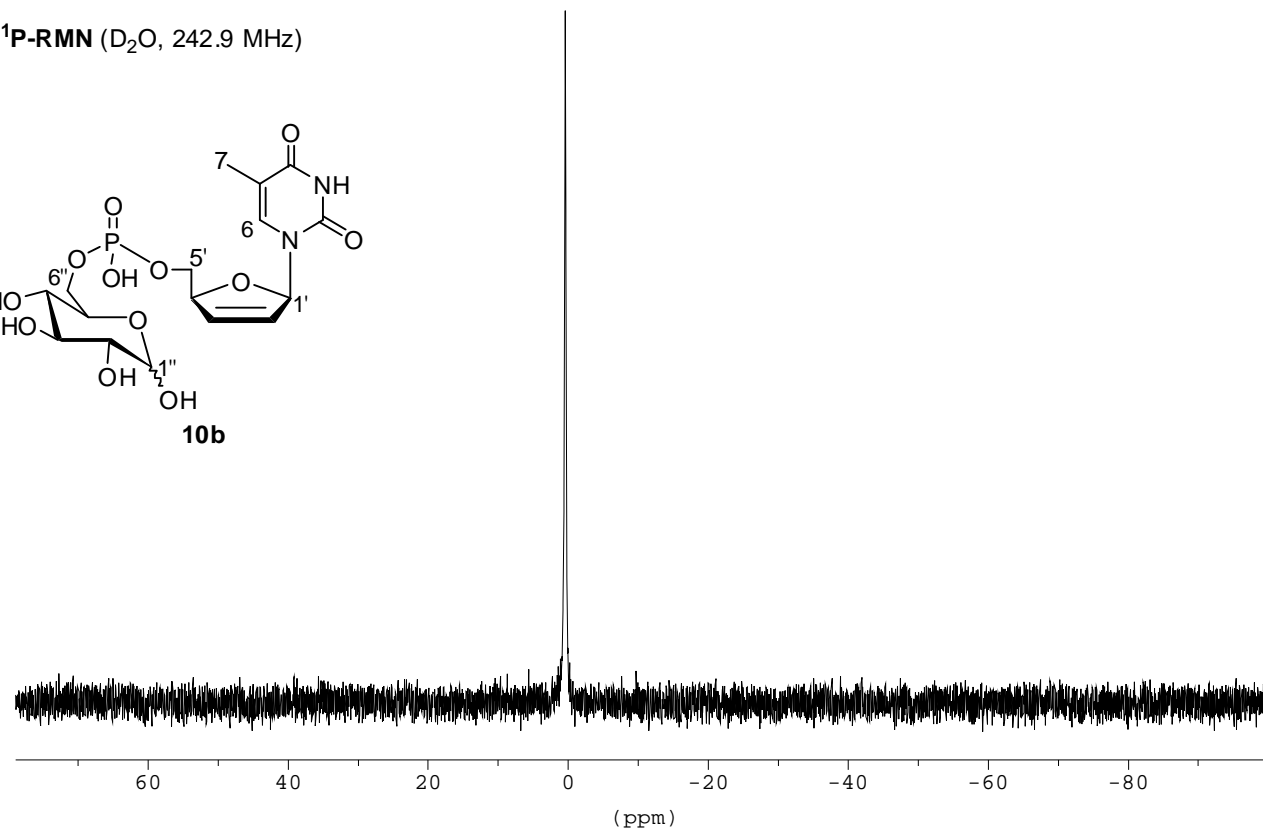
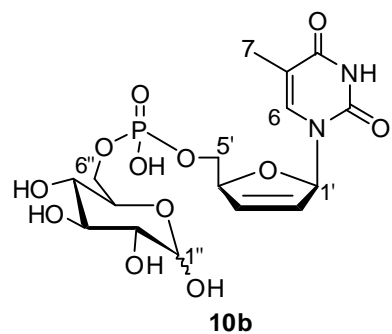
2',3'-Didehydro-2',3'-dideoxythymidine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10b)

DEPT(D₂O, 150.5 MHz)



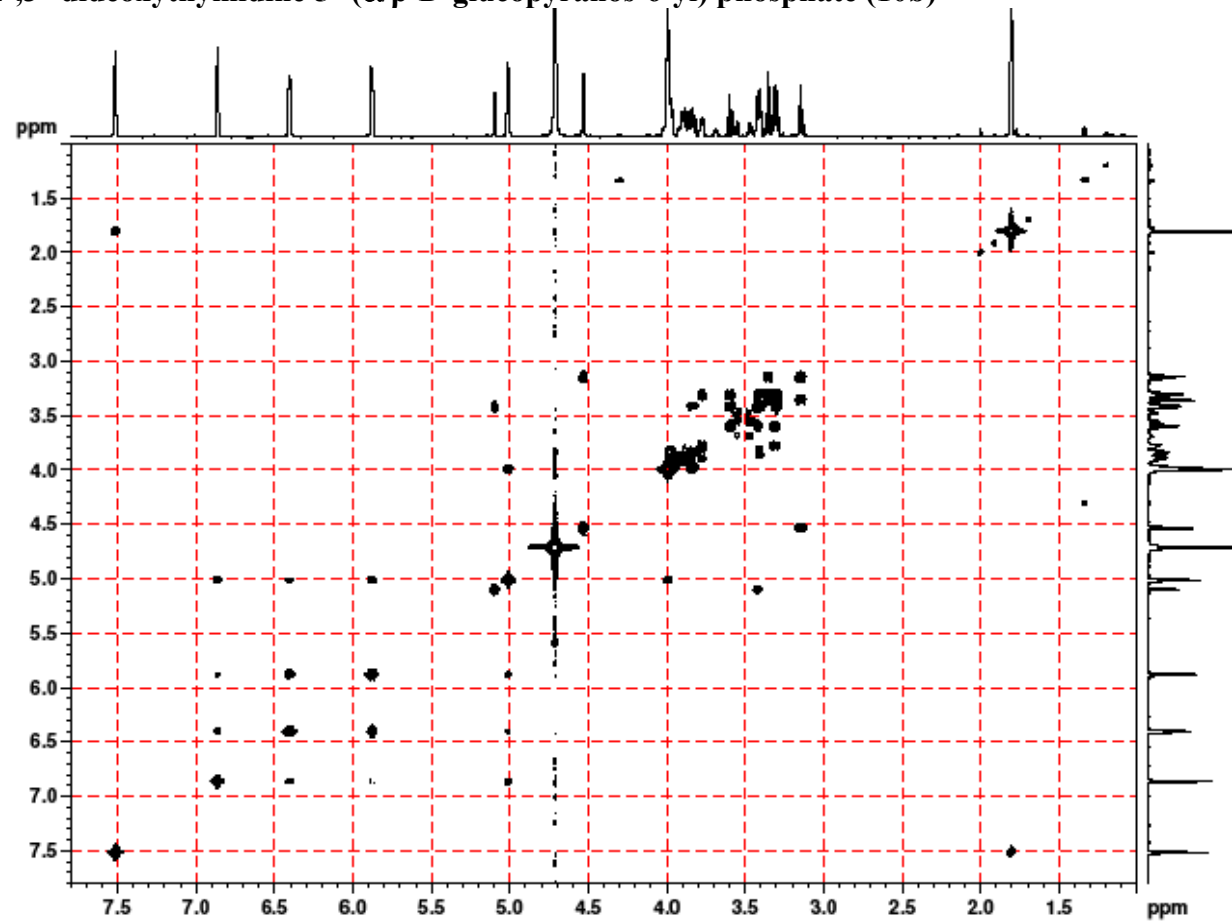
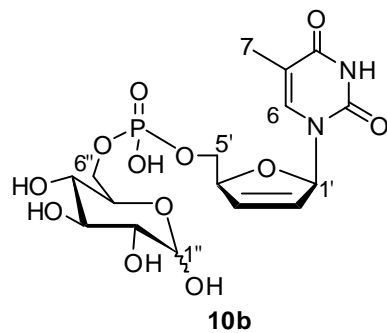
2',3'-Didehydro-2',3'-dideoxythymidine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10b)

^{31}P -RMN (D₂O, 242.9 MHz)



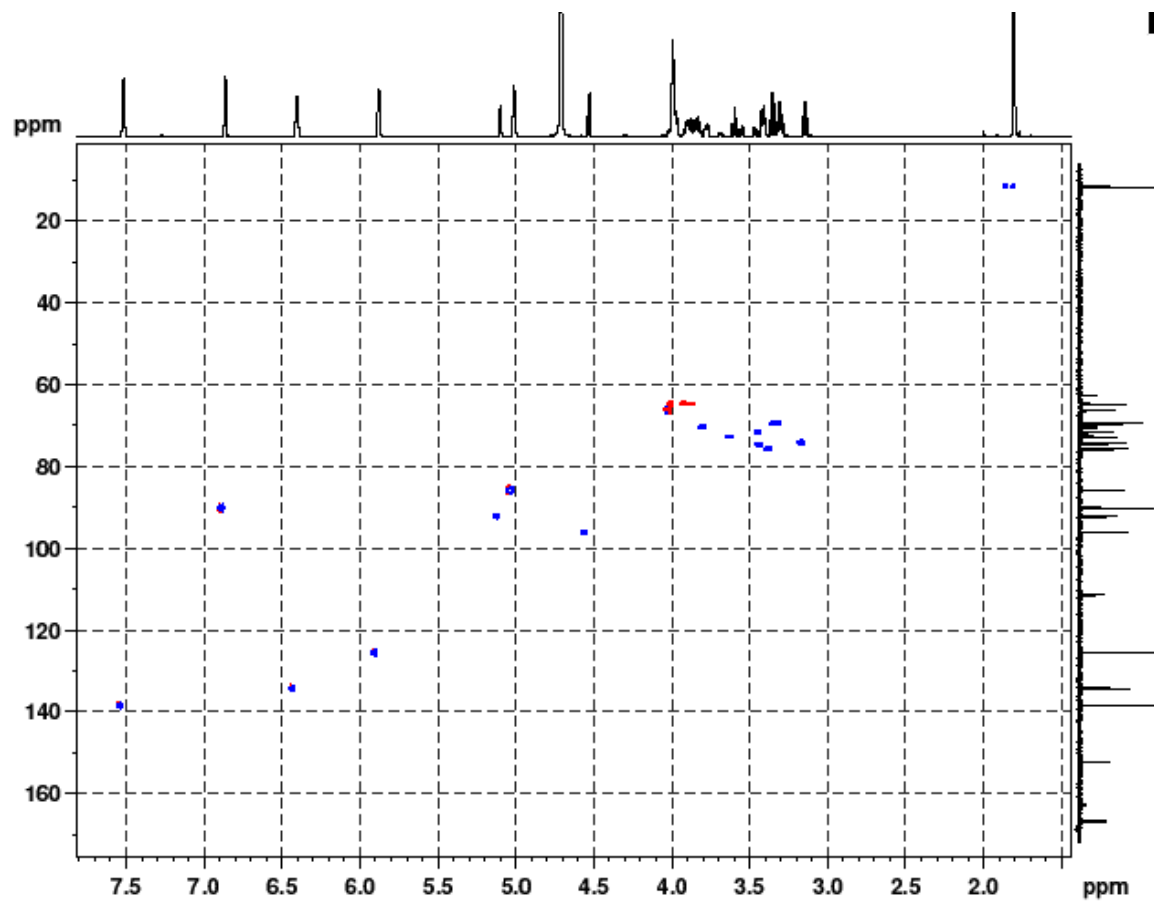
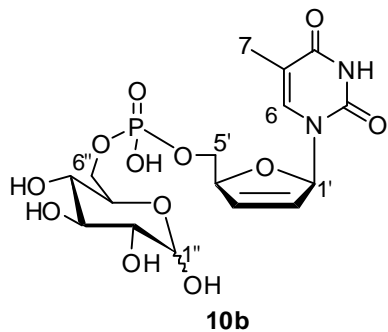
2',3'-Didehydro-2',3'-dideoxythymidine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10b)

COSY (D₂O, 600 MHz)



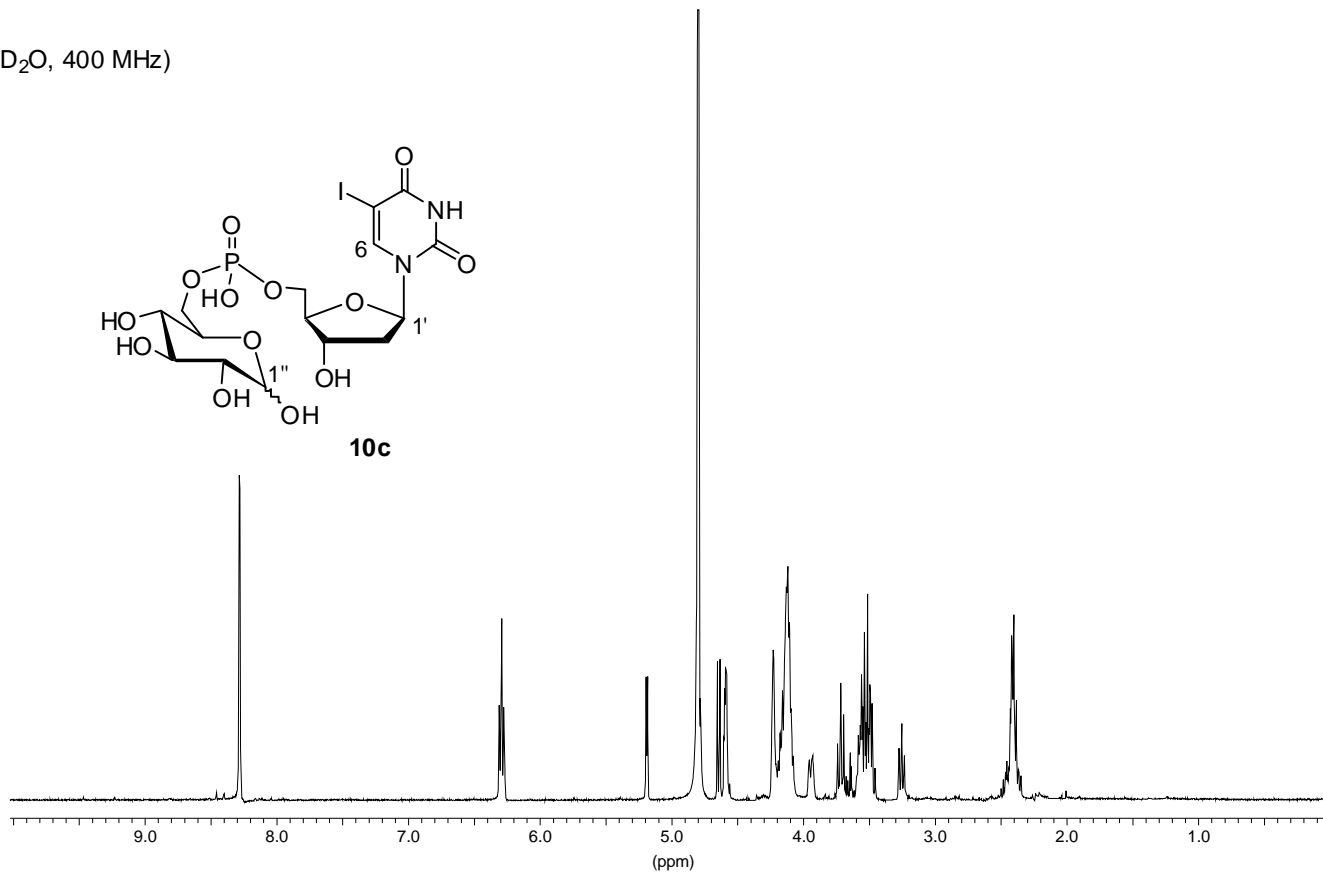
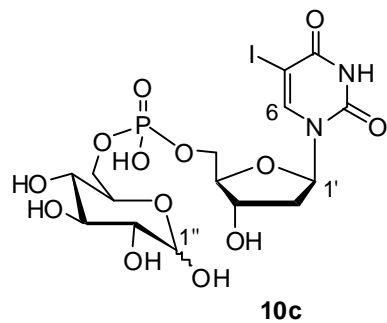
2',3'-Dideohydro-2',3'-dideoxythymidine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10b)

HSQC (D_2O , 600 MHz)



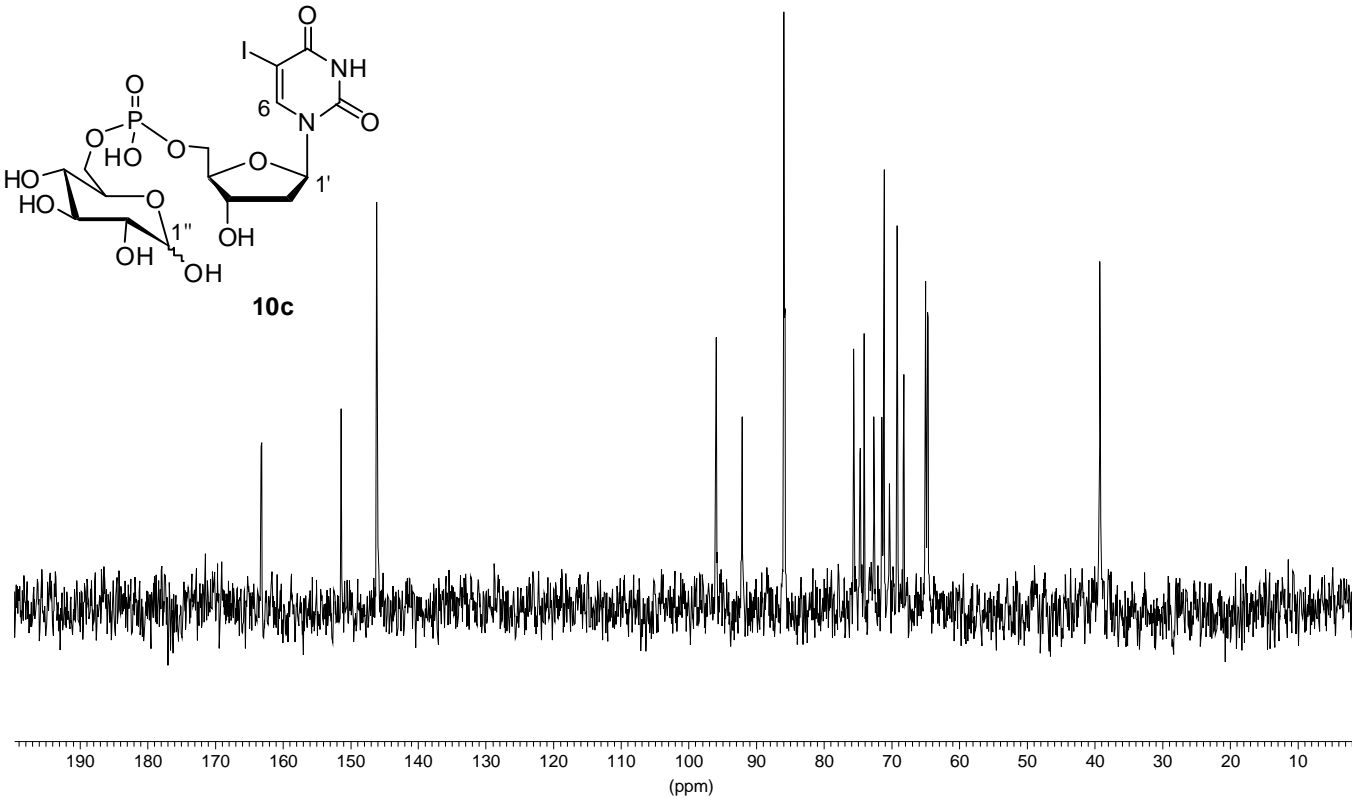
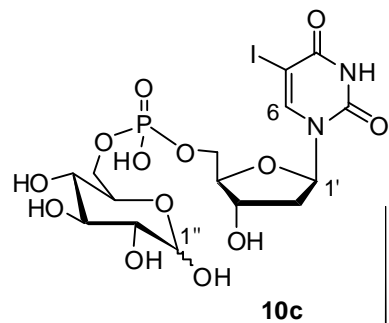
2'-Deoxy-5-iodouridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10c)

$^1\text{H-RMN}$ (D_2O , 400 MHz)



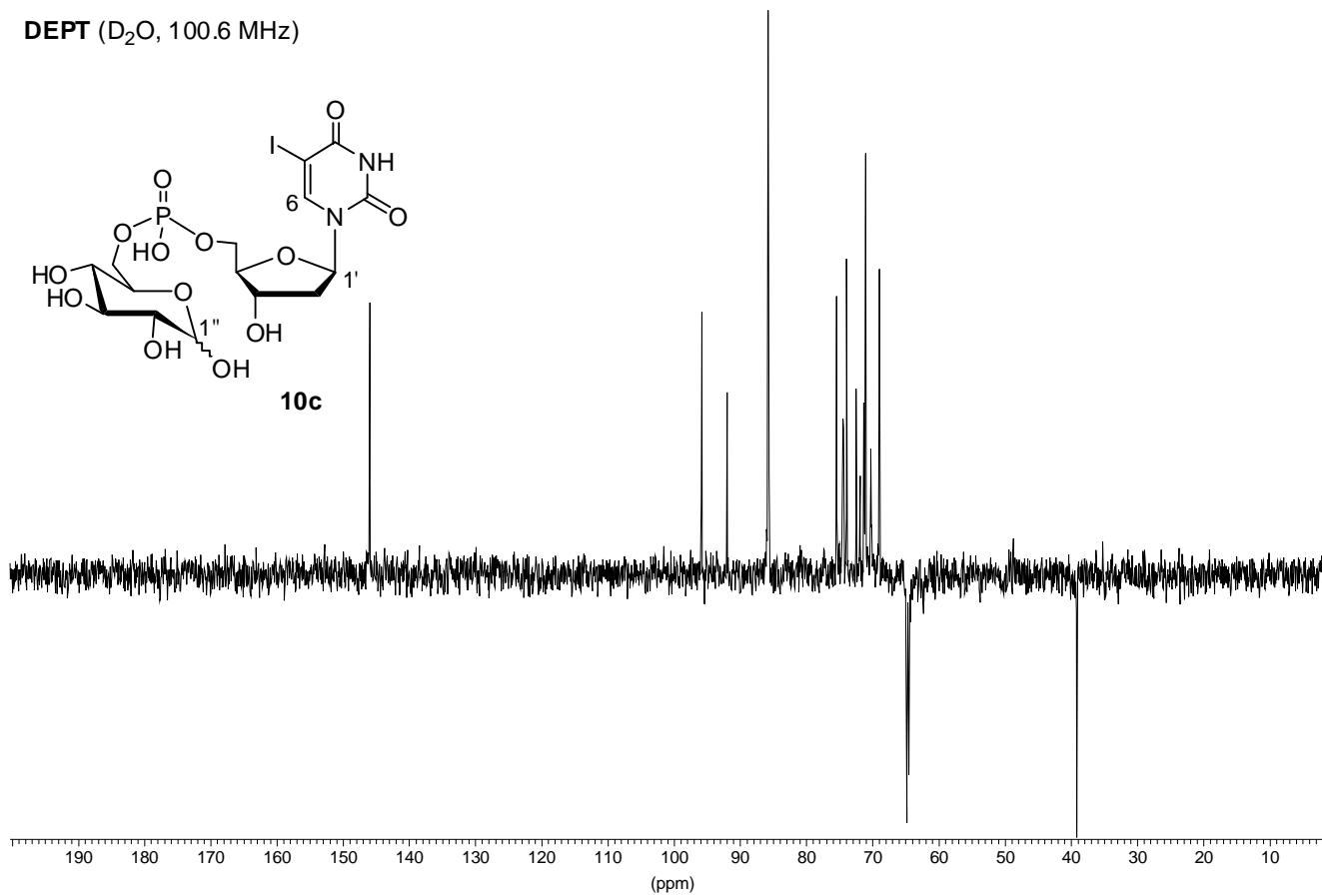
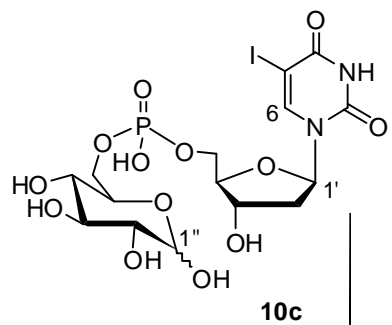
2'-Deoxy-5-iodouridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10c)

^{13}C -RMN (D_2O , 100.6 MHz)



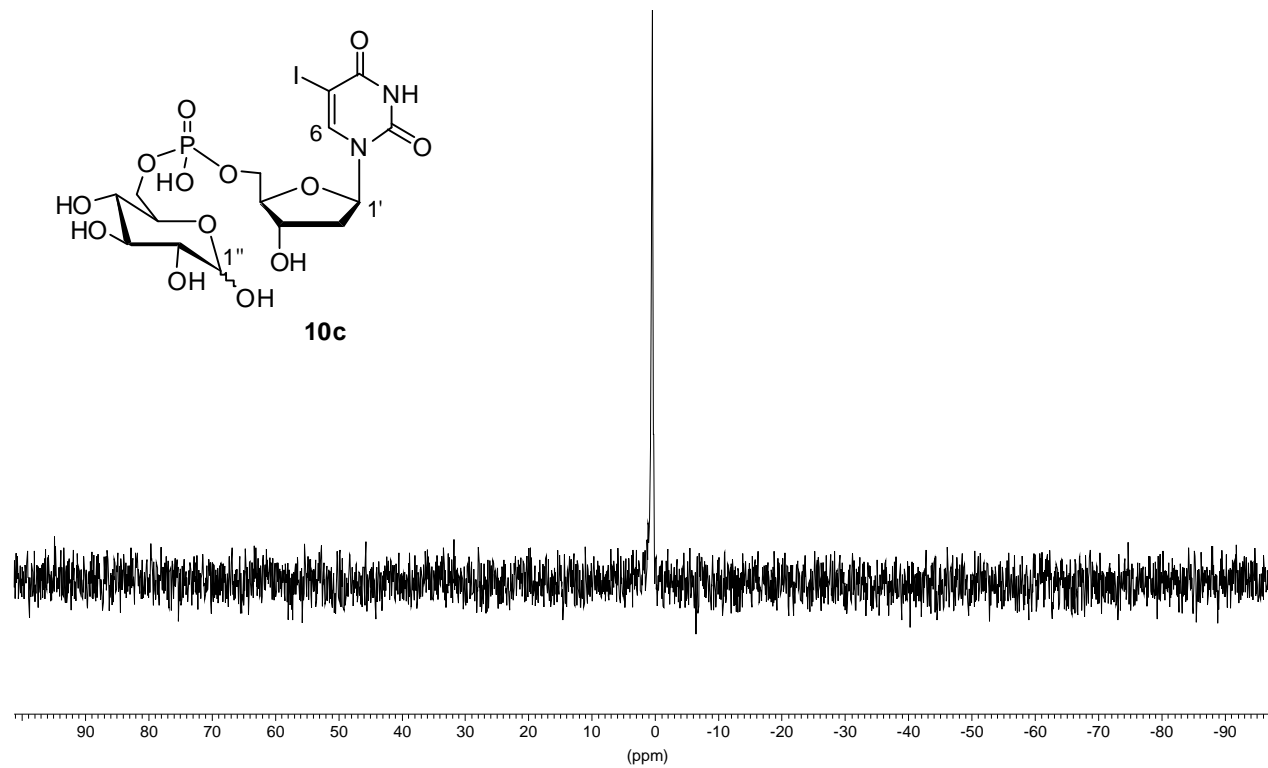
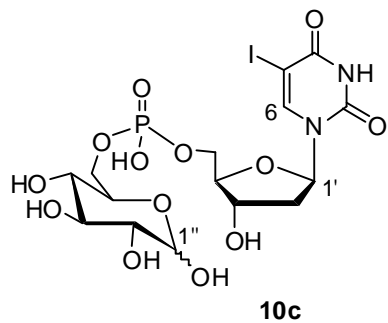
2'-Deoxy-5-iodouridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10c)

DEPT (D₂O, 100.6 MHz)

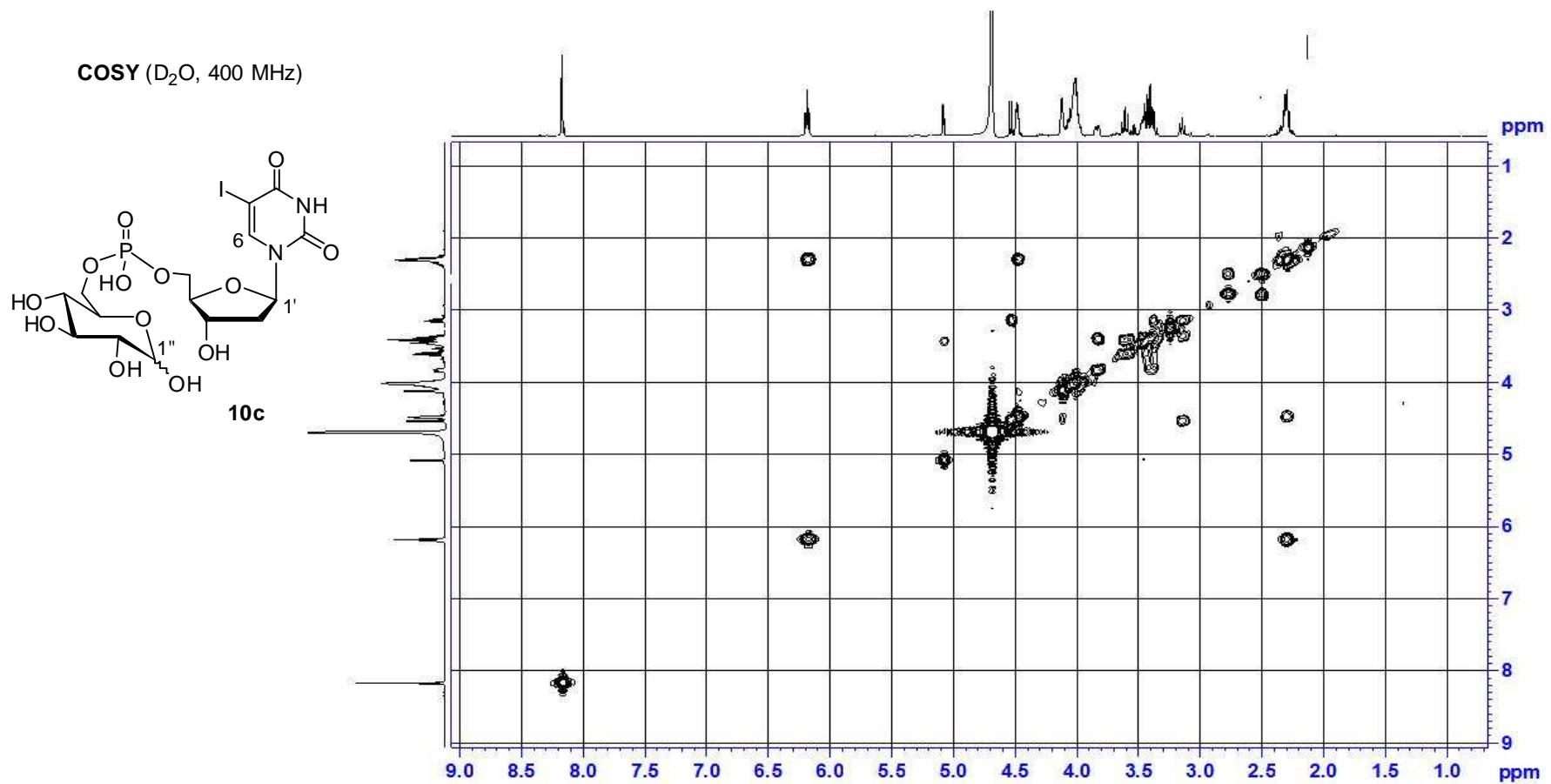


2'-Deoxy-5-iodouridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10c)

^{31}P -RMN (D_2O , 161.9 MHz)

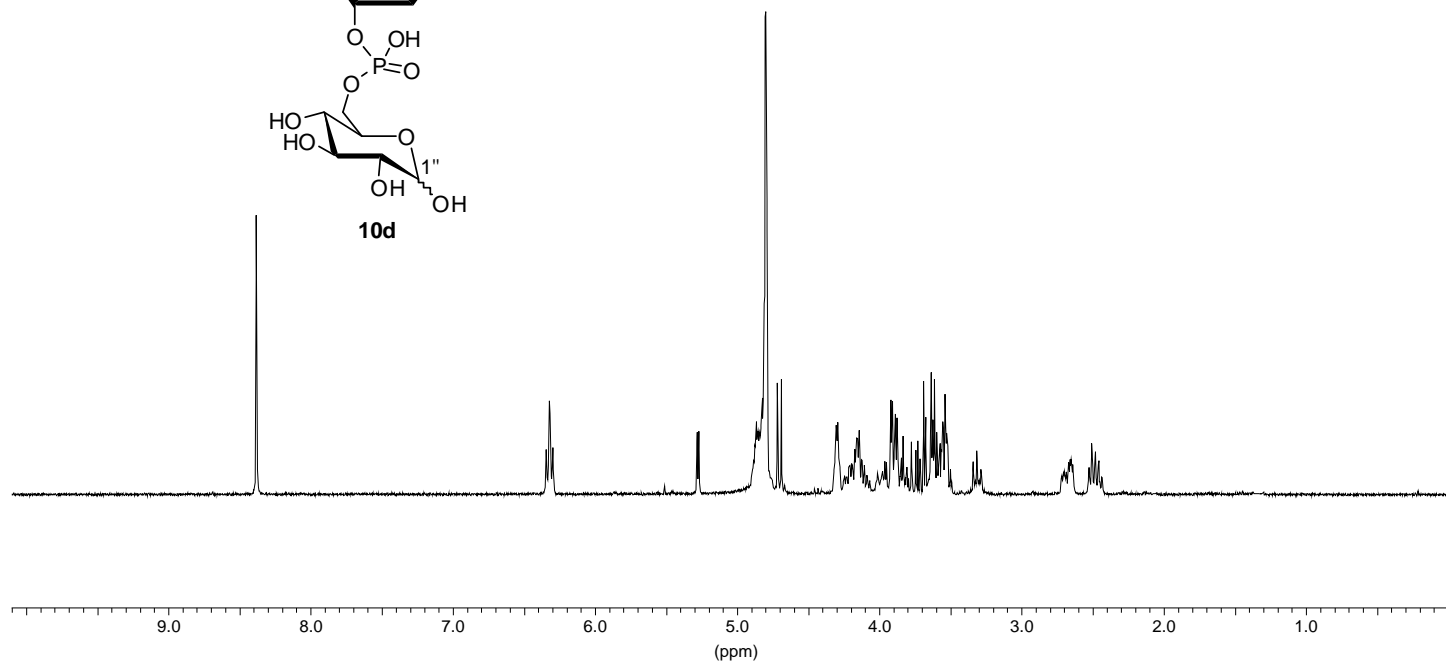
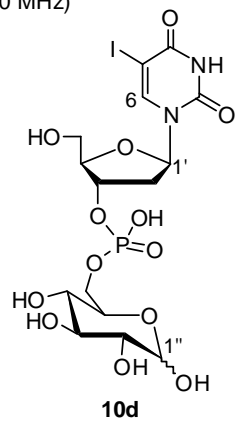


2'-Deoxy-5-iodouridine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10c)



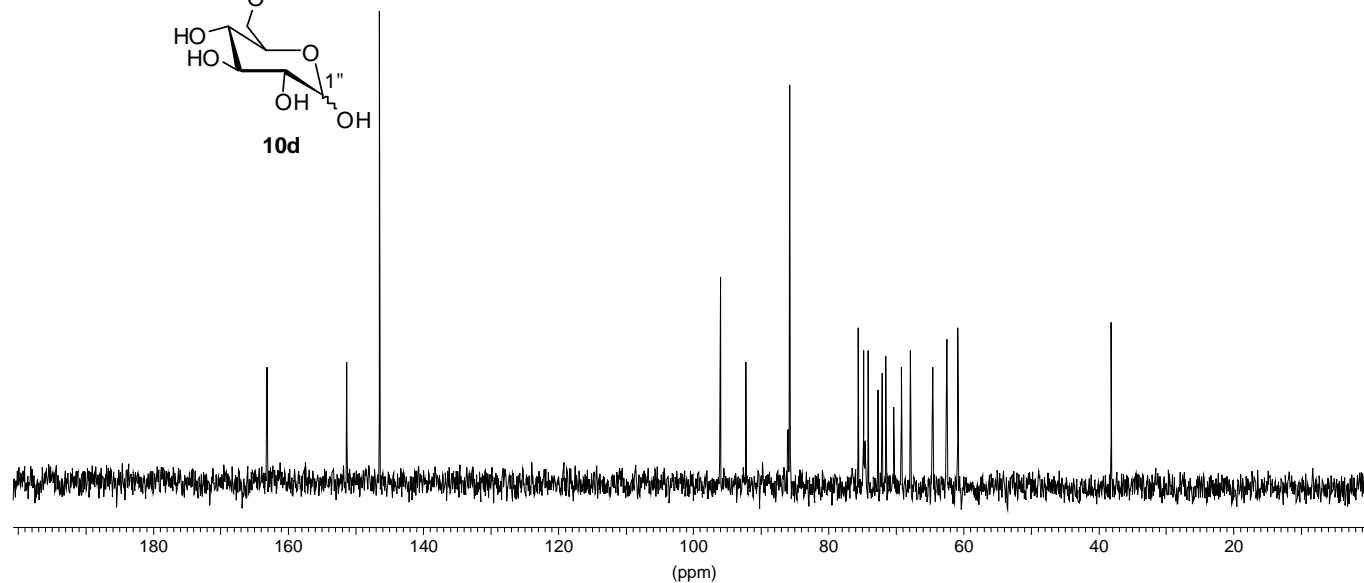
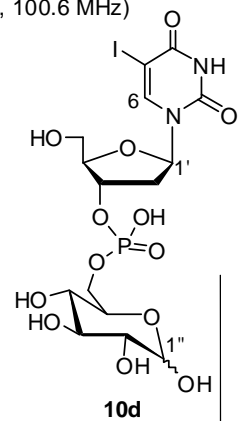
2'-Deoxy-5-iodouridine 3'-(α/β -D-glucopyranos-6-yl) phosphate (10d)

$^1\text{H-RMN}$ (D_2O , 400 MHz)



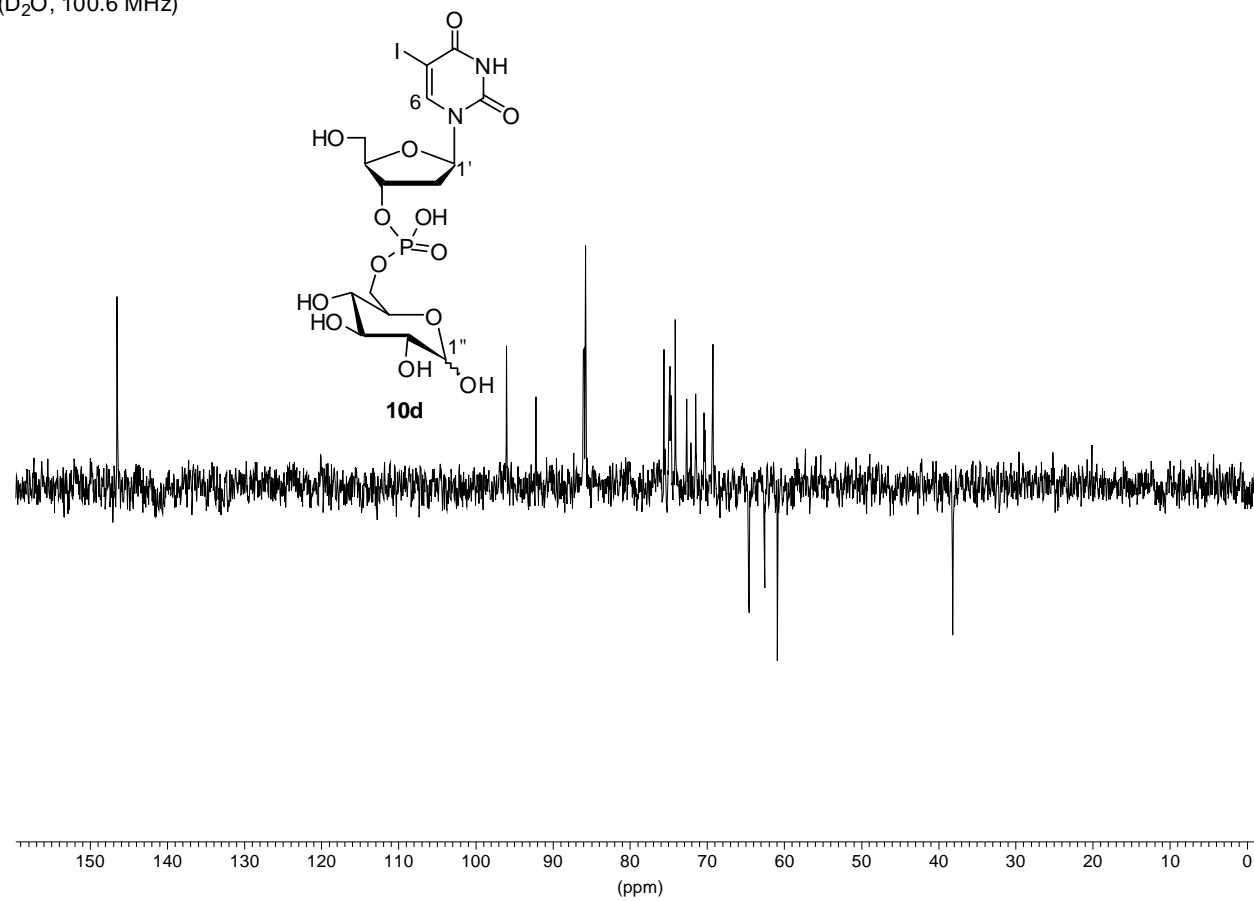
2'-Deoxy-5-iodouridine 3'-(α/β -D-glucopyranos-6-yl) phosphate (10d)

¹³C-RMN (D₂O, 100.6 MHz)



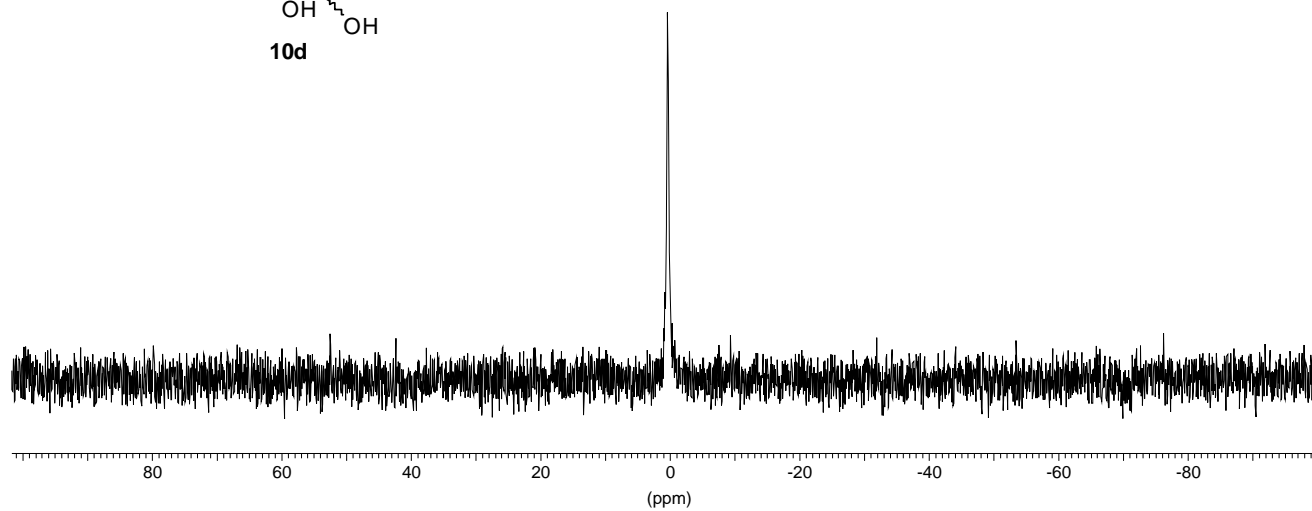
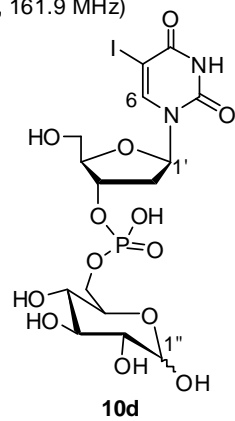
2'-Deoxy-5-iodouridine 3'-(α/β -D-glucopyranos-6-yl) phosphate (10d)

DEPT (D_2O , 100.6 MHz)



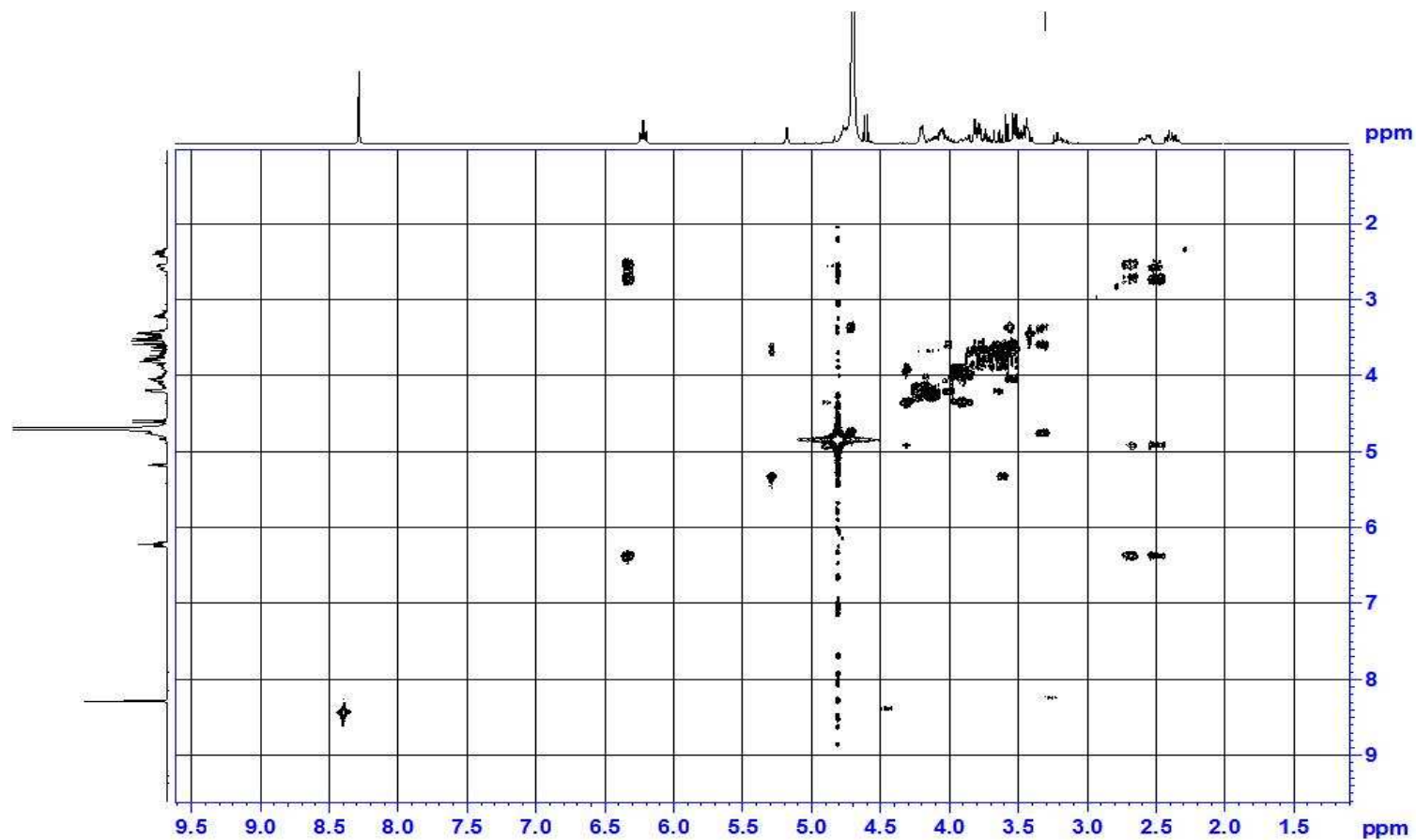
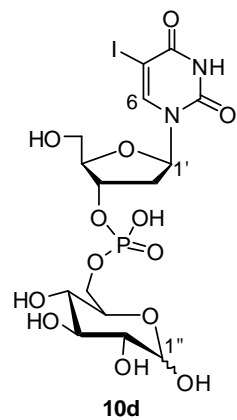
2'-Deoxy-5-iodouridine 3'-(α/β -D-glucopyranos-6-yl) phosphate (10d)

^{31}P -RMN (D_2O , 161.9 MHz)



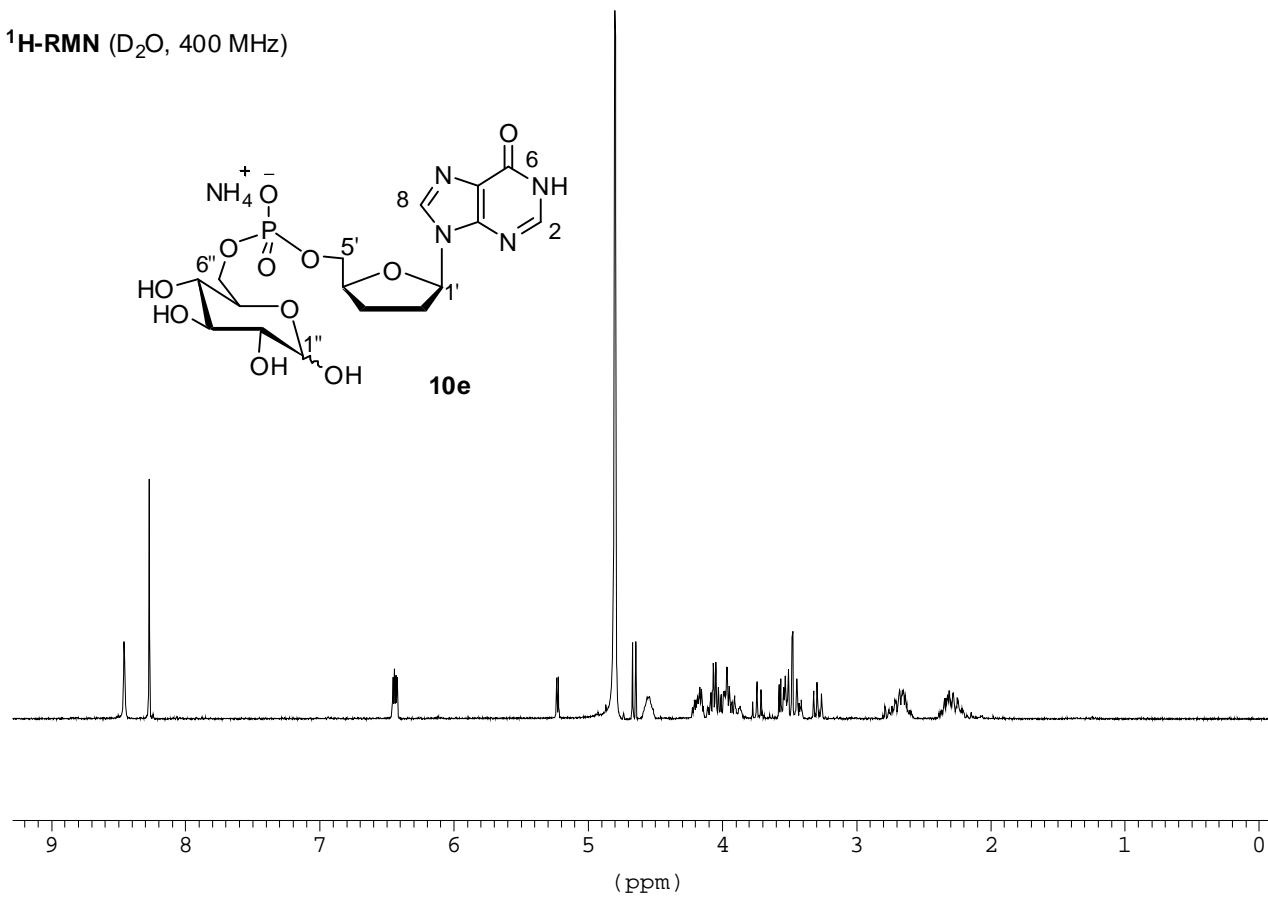
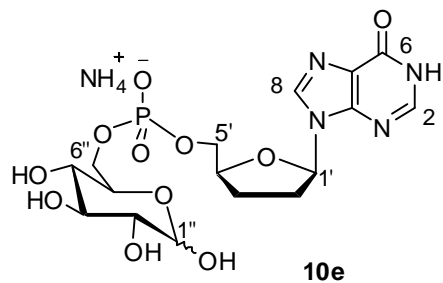
2'-Deoxy-5-iodouridine 3'-(α/β -D-glucopyranos-6-yl) phosphate (10d)

COSY (D₂O, 400 MHz)



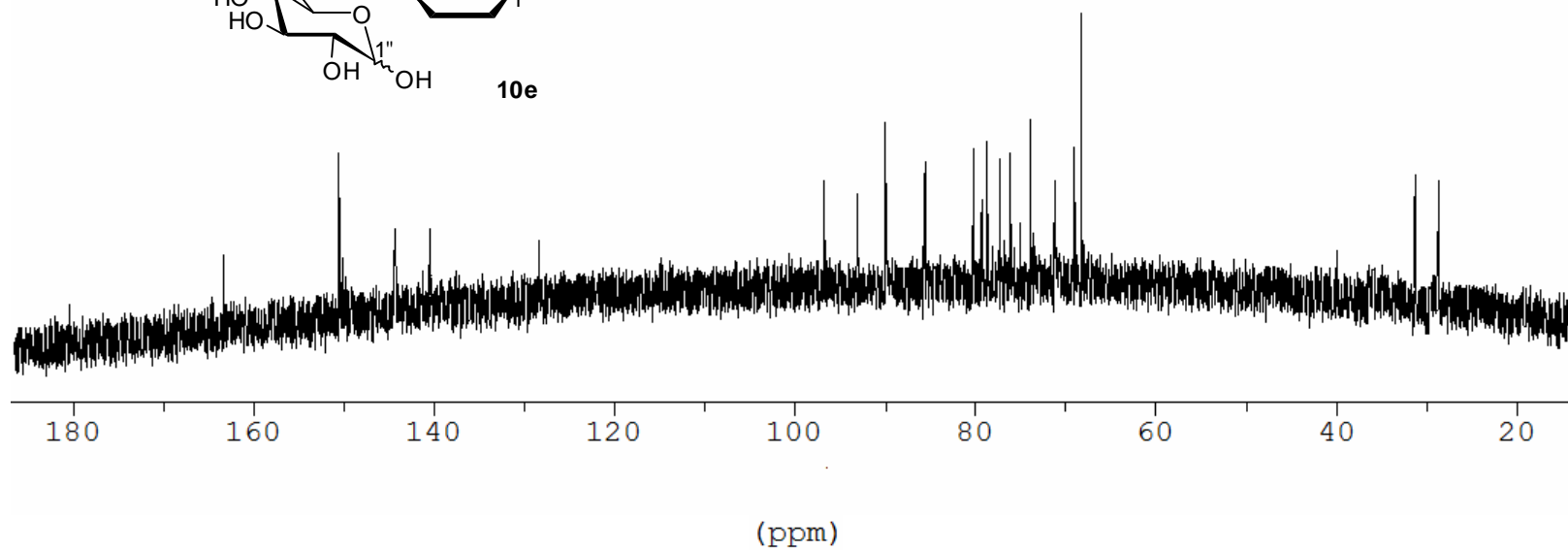
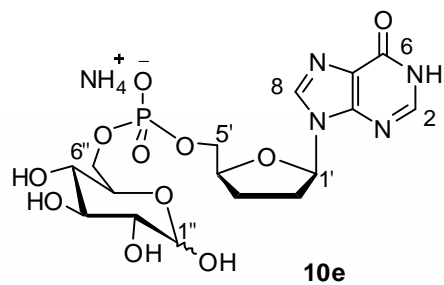
2',3'-Dideoxyinosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10e)

¹H-RMN (D₂O, 400 MHz)



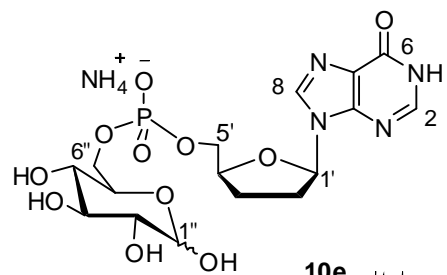
2',3'-Dideoxyinosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10e)

^{13}C -RMN (D_2O , 100.6 MHz)

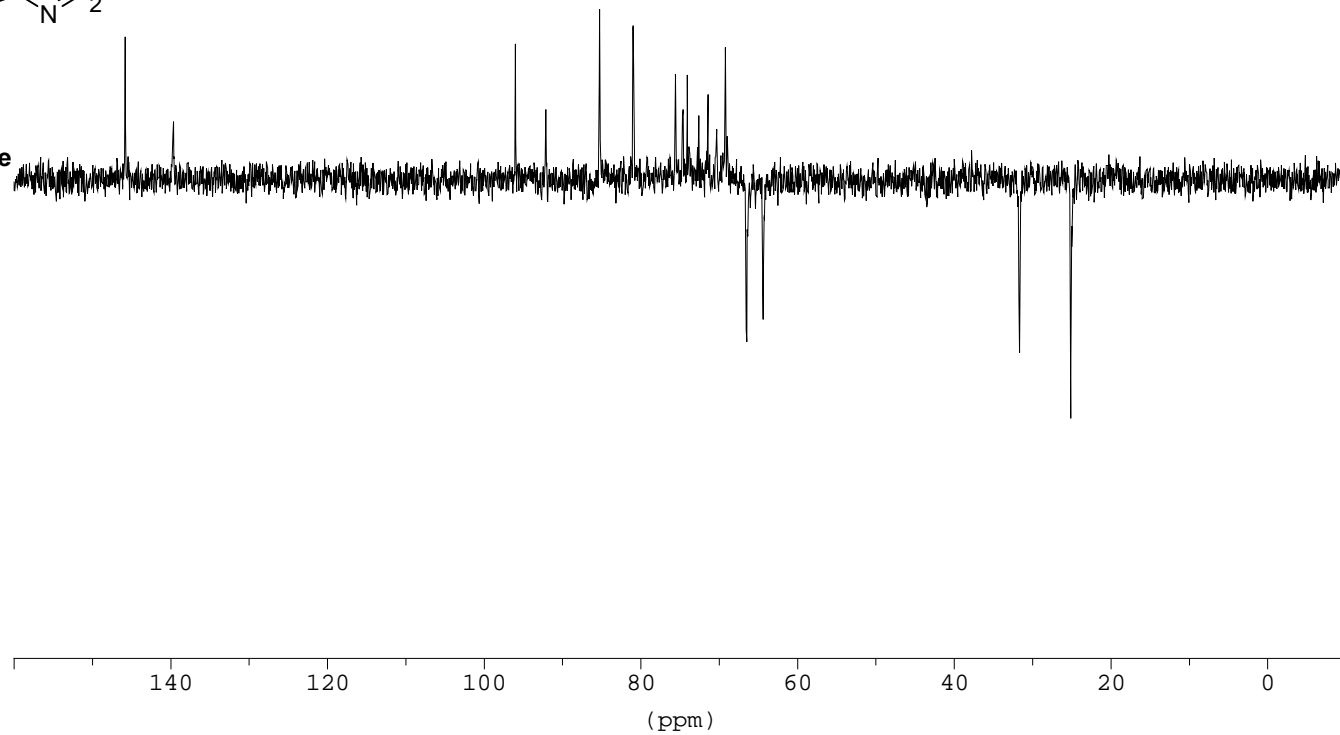


2',3'-Dideoxyinosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10e)

DEPT (D₂O, 100.6 MHz)

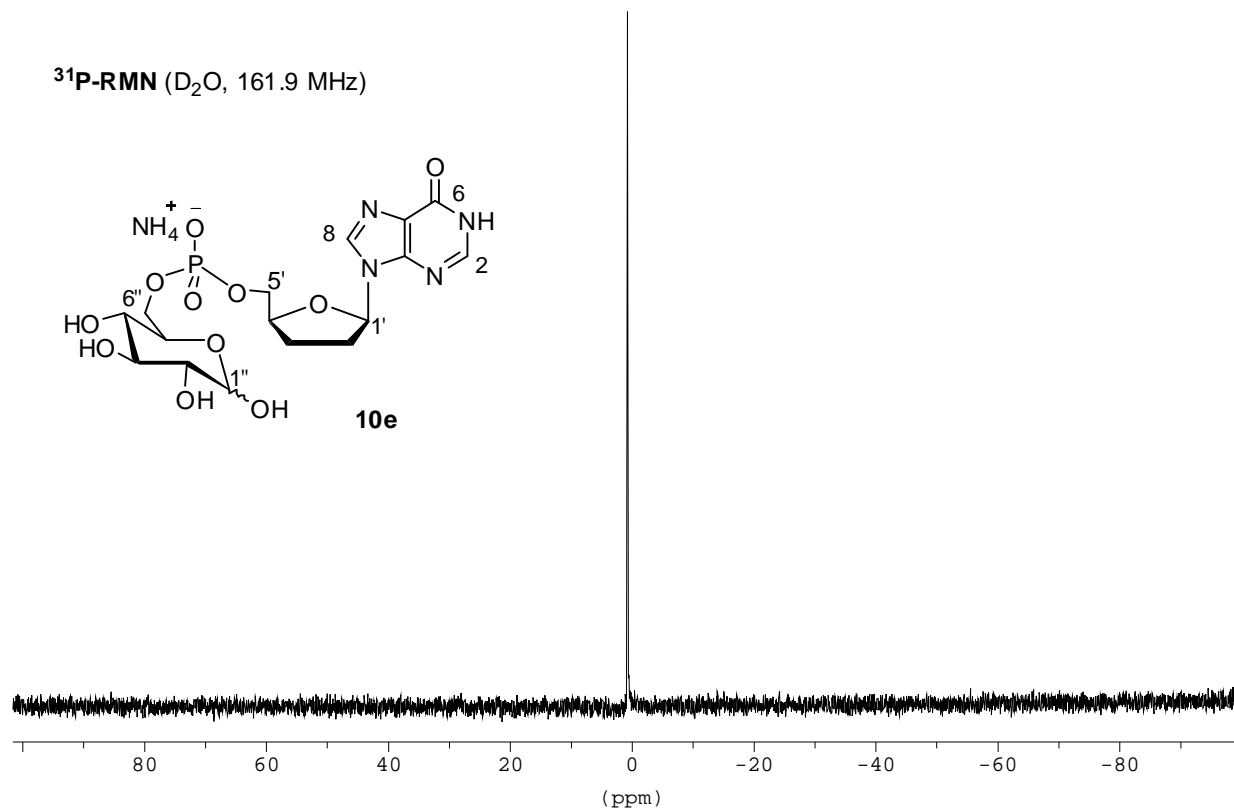


10e



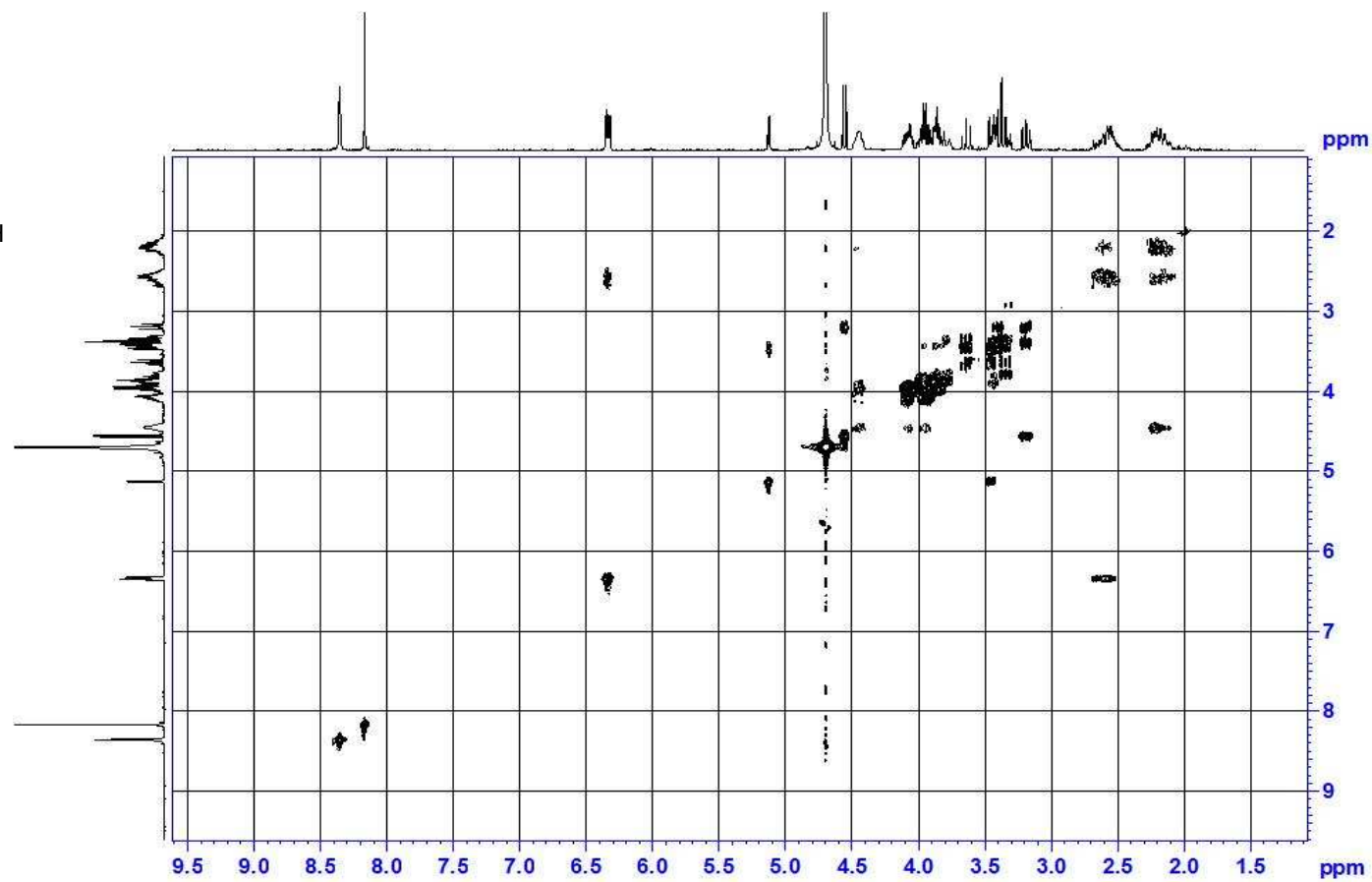
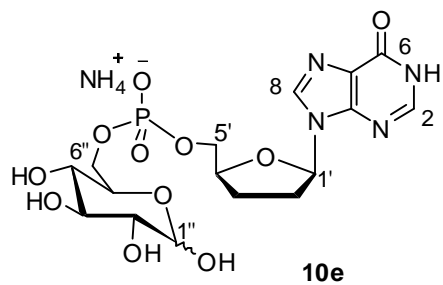
2',3'-Dideoxyinosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10e)

^{31}P -RMN (D_2O , 161.9 MHz)



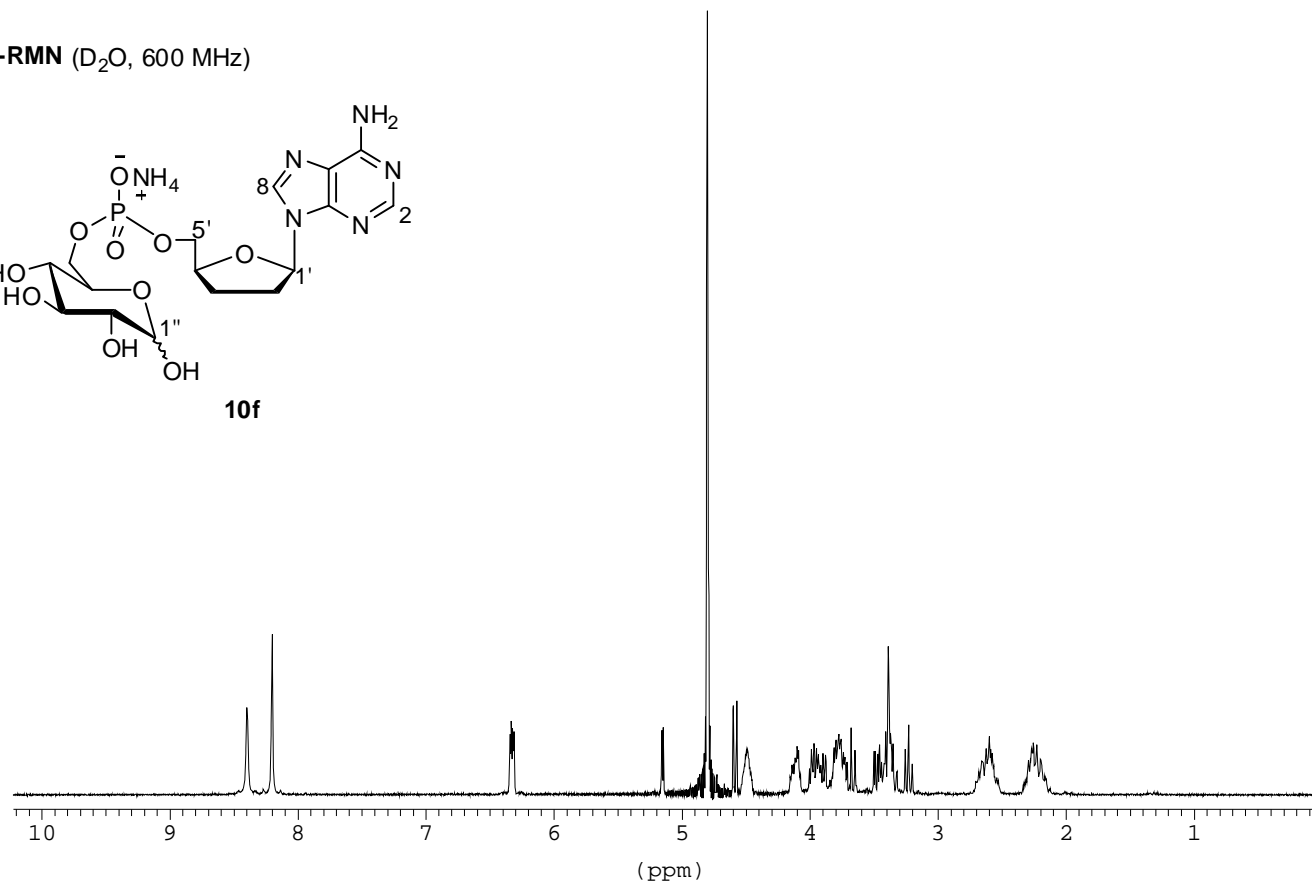
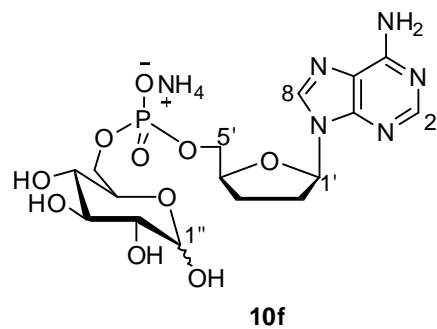
2',3'-Dideoxyinosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10e)

COSY (D₂O, 400 MHz)



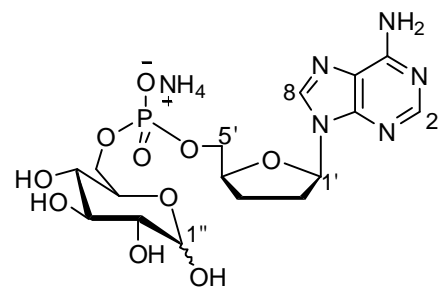
2',3'-Dideoxyadenosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10f)

$^1\text{H-RMN}$ (D_2O , 600 MHz)

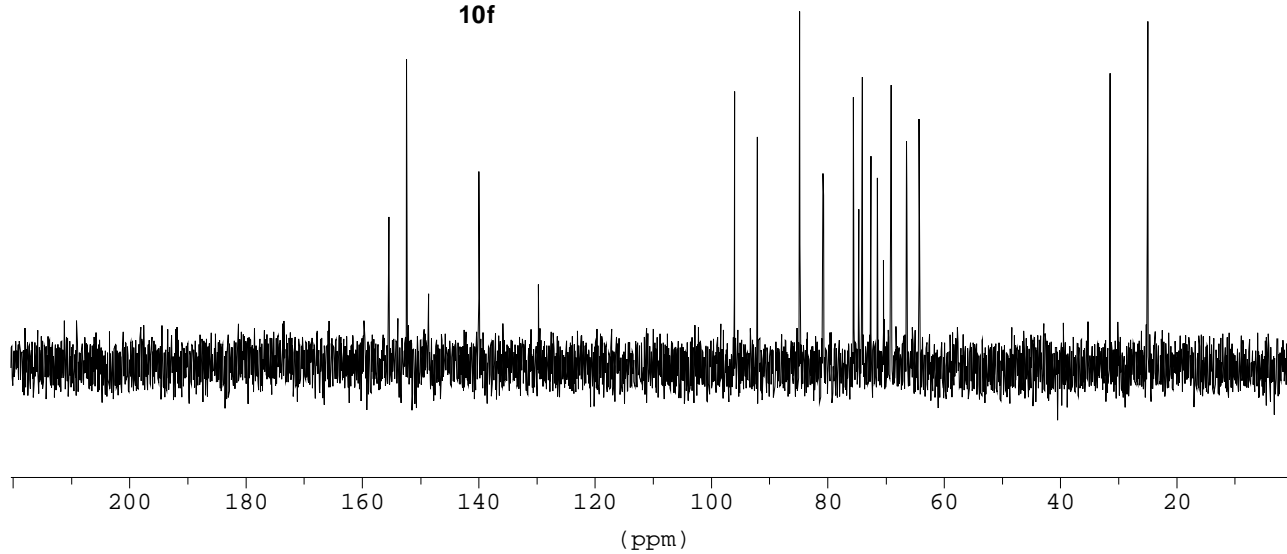


2',3'-Dideoxyadenosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10f)

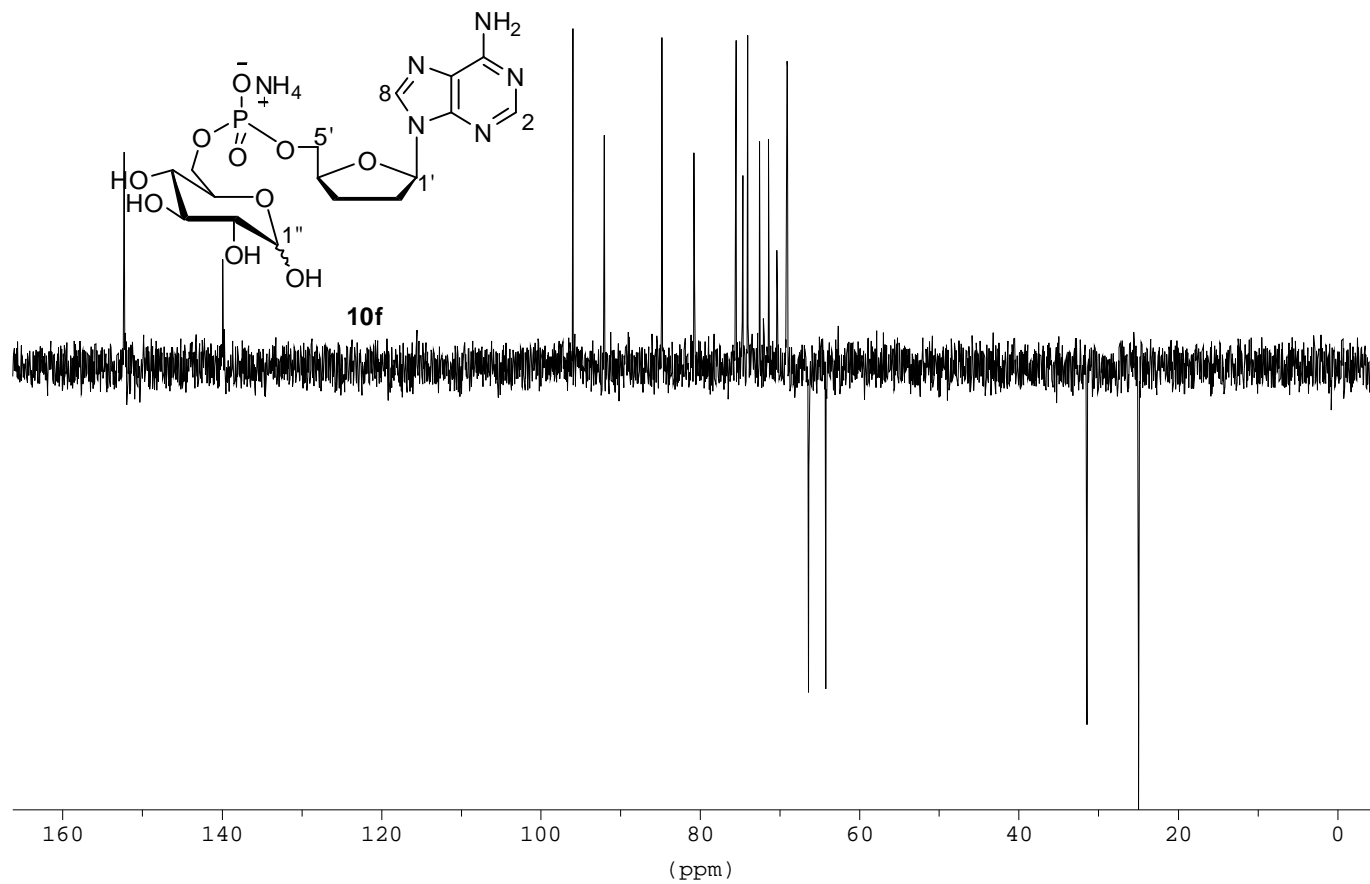
^{13}C -RMN (D_2O , 150.5 MHz)



10f

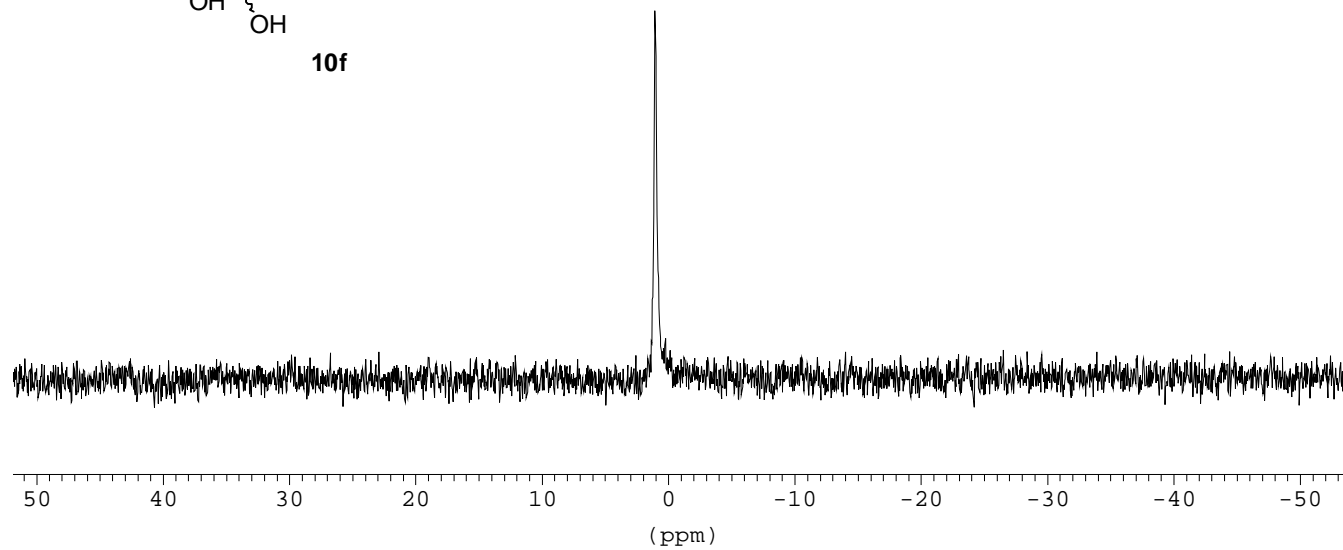
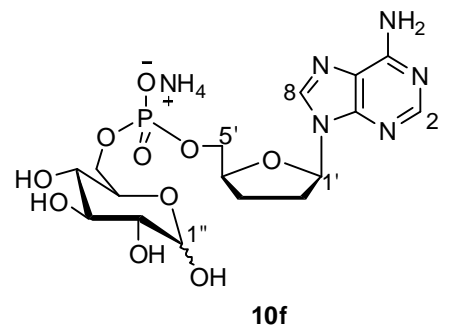


2',3'-Dideoxyadenosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10f)
DEPT (D_2O , 150.5 MHz)



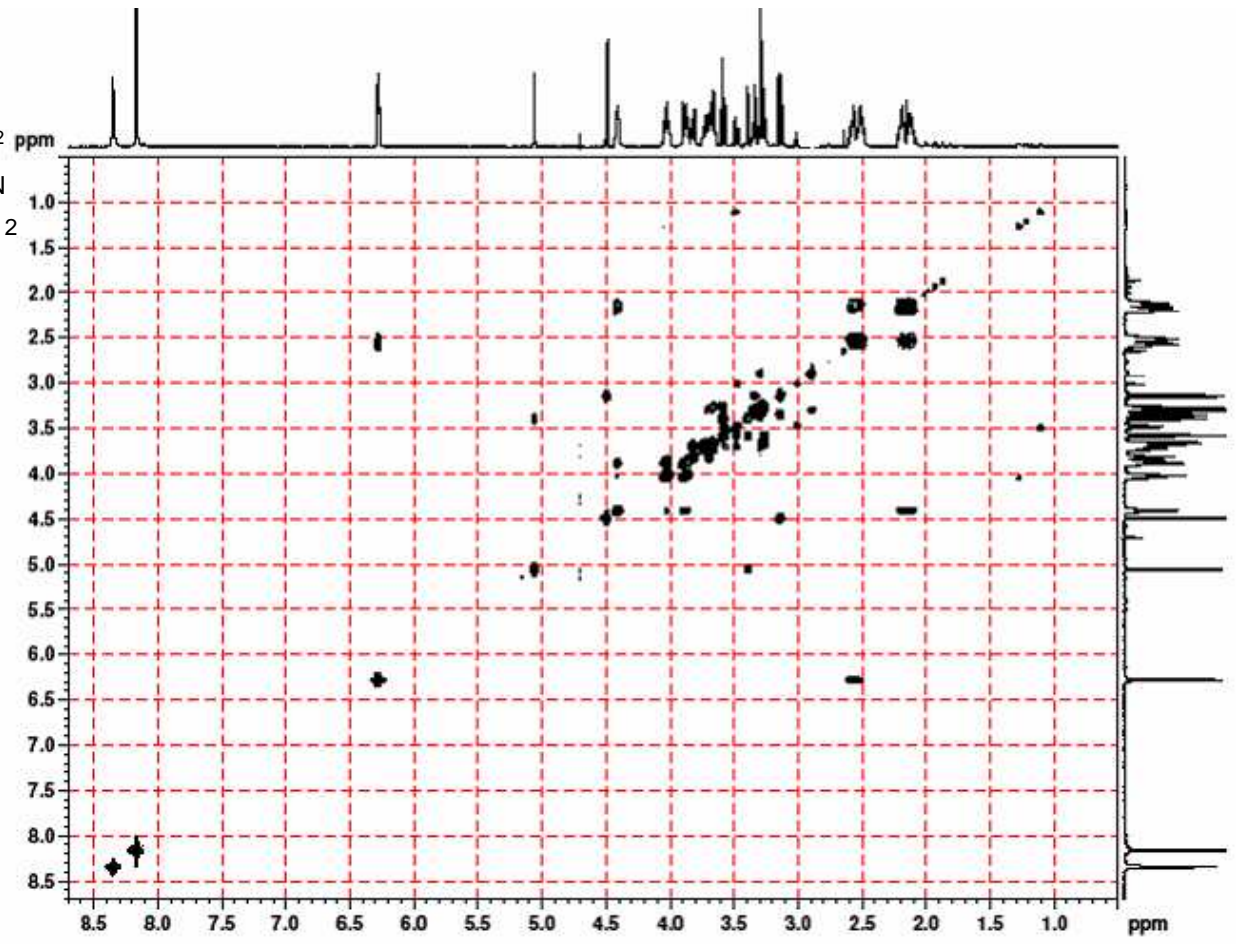
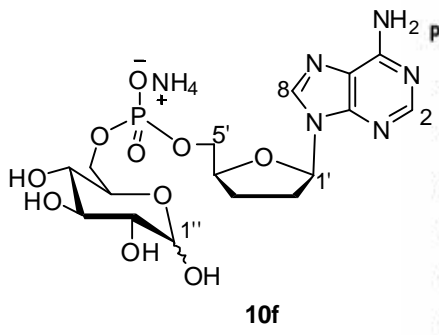
2',3'-Dideoxyadenosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10f)

³¹P-RMN (D₂O, 242.9 MHz)

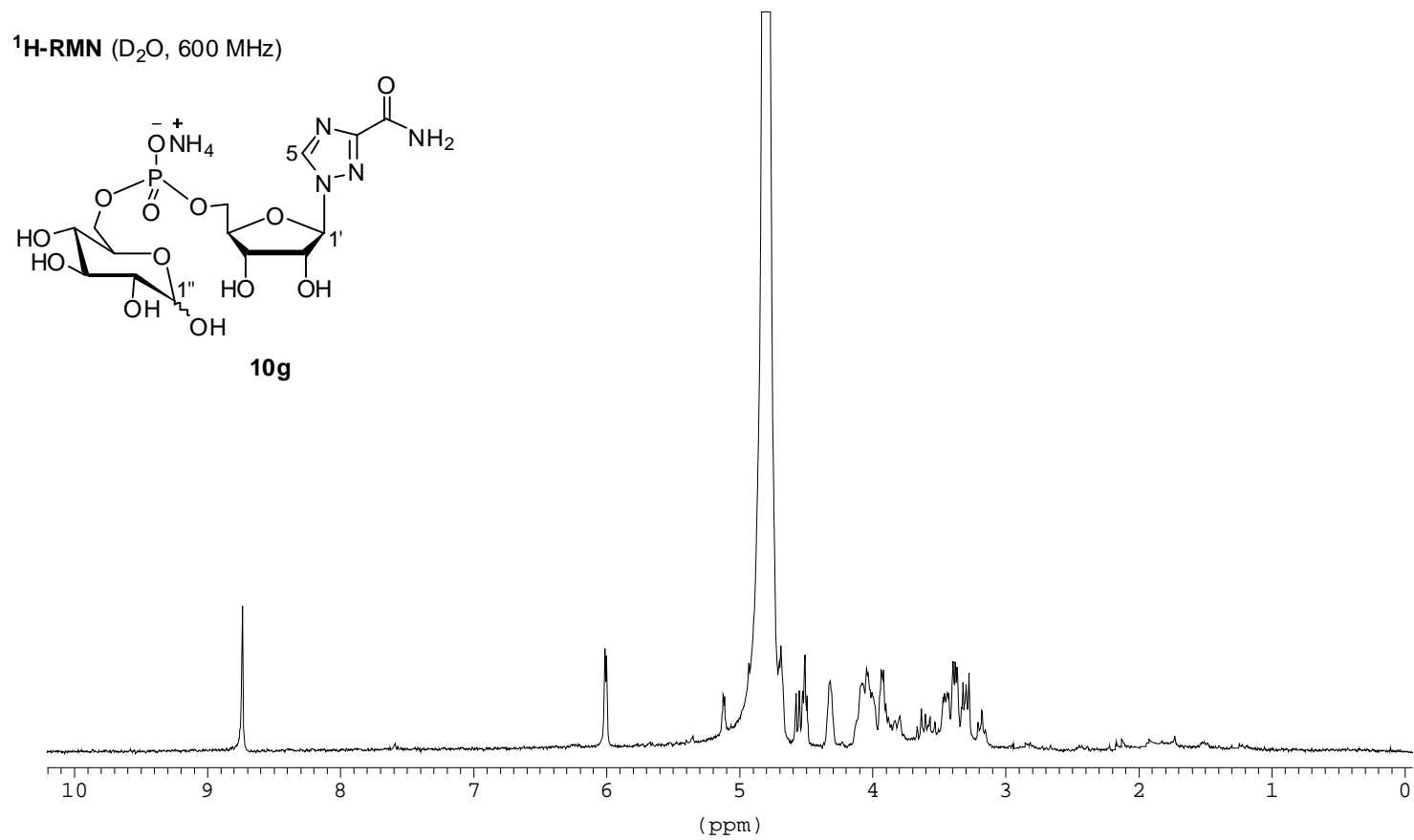


2',3'-Dideoxyadenosine 5'-(α/β -D-glucopyranos-6-yl) phosphate (10f)

COSY (D₂O, 600 MHz)

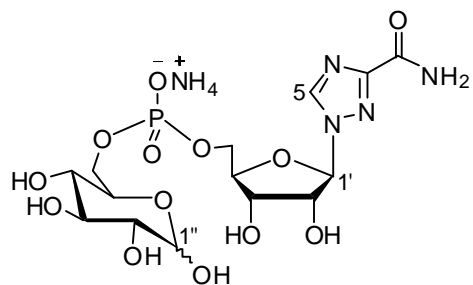


1'-(3-Carbamoyl-1,2,4-triazoyl)- β -D-ribofuranose 5'-(α/β -D-glucopyranos-6-yl) phosphate (10g)

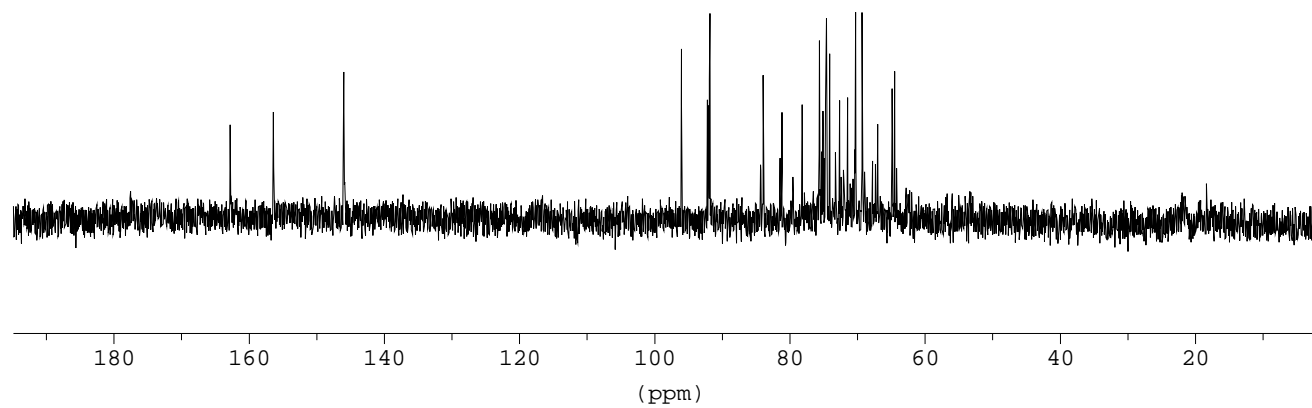


1'-(3-Carbamoyl-1,2,4-triazoyl)- β -D-ribofuranose 5'-(α/β -D-glucopyranos-6-yl) phosphate (10g)

^{13}C -RMN (D_2O , 150.5 MHz)

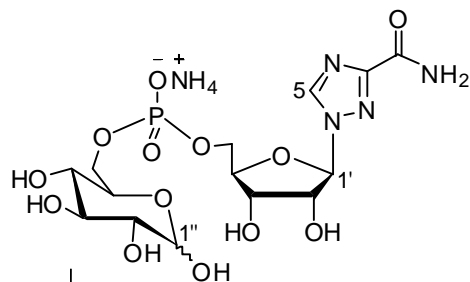


10g

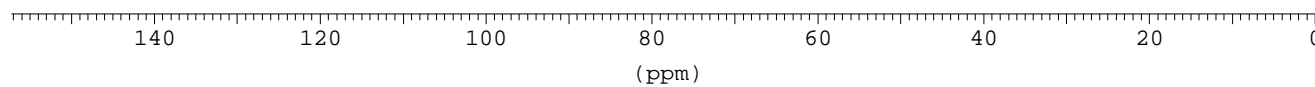
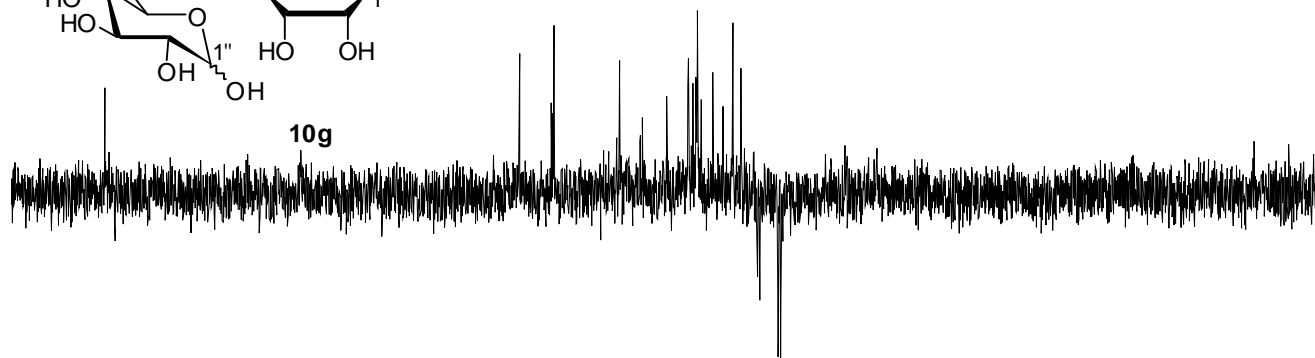


1'-(3-Carbamoyl-1,2,4-triazoyl)-β-D-ribofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10g)

DEPT (D₂O, 150.5 MHz)

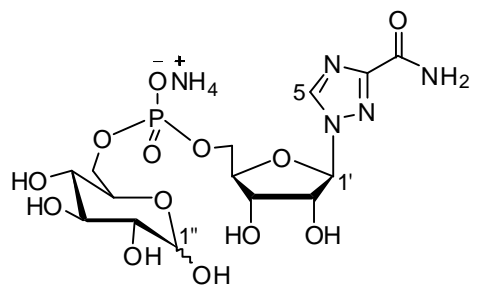


10g

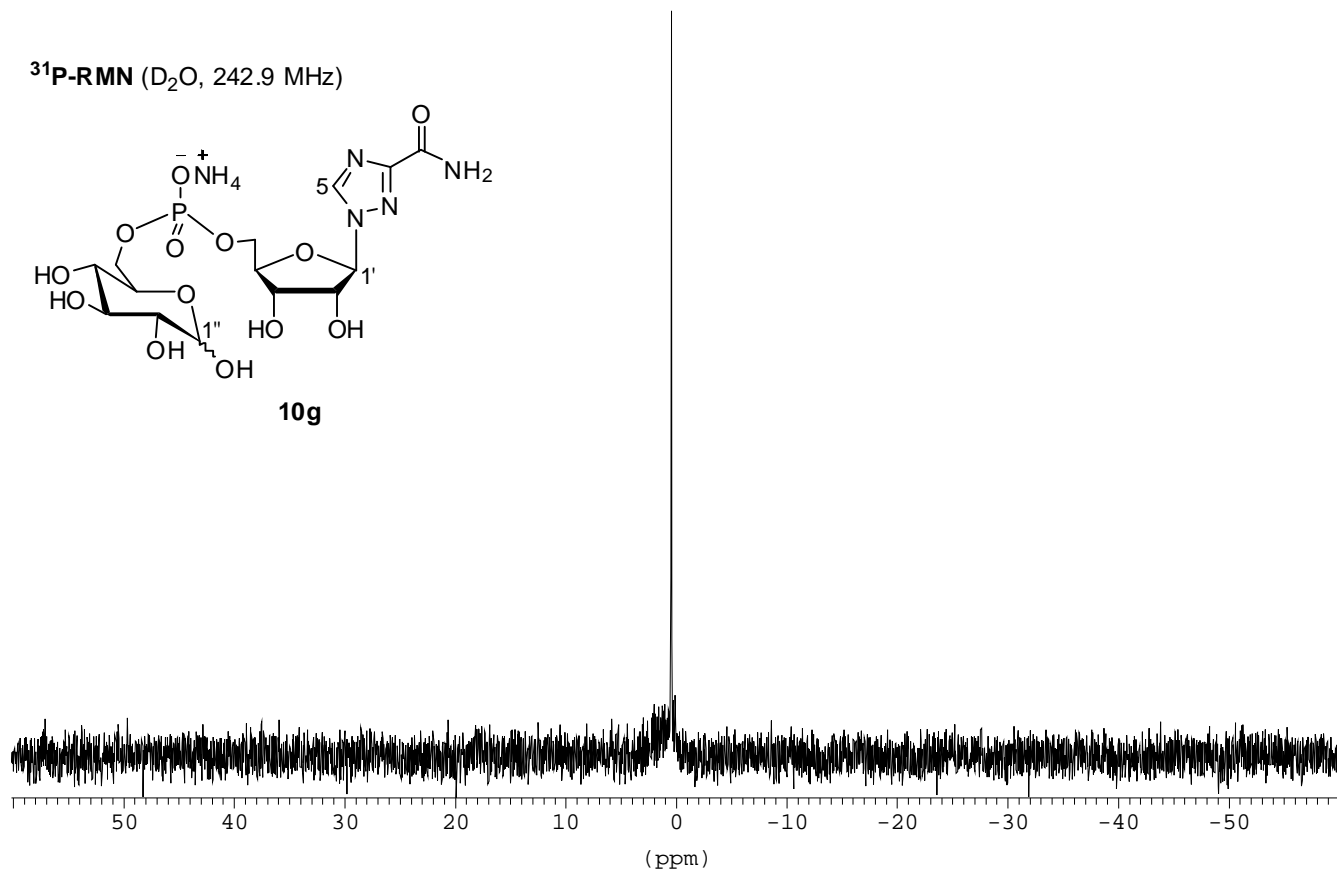


1'-(3-Carbamoyl-1,2,4-triazoyl)- β -D-ribofuranose 5'-(α/β -D-glucopyranos-6-yl) phosphate (10g)

^{31}P -RMN (D_2O , 242.9 MHz)

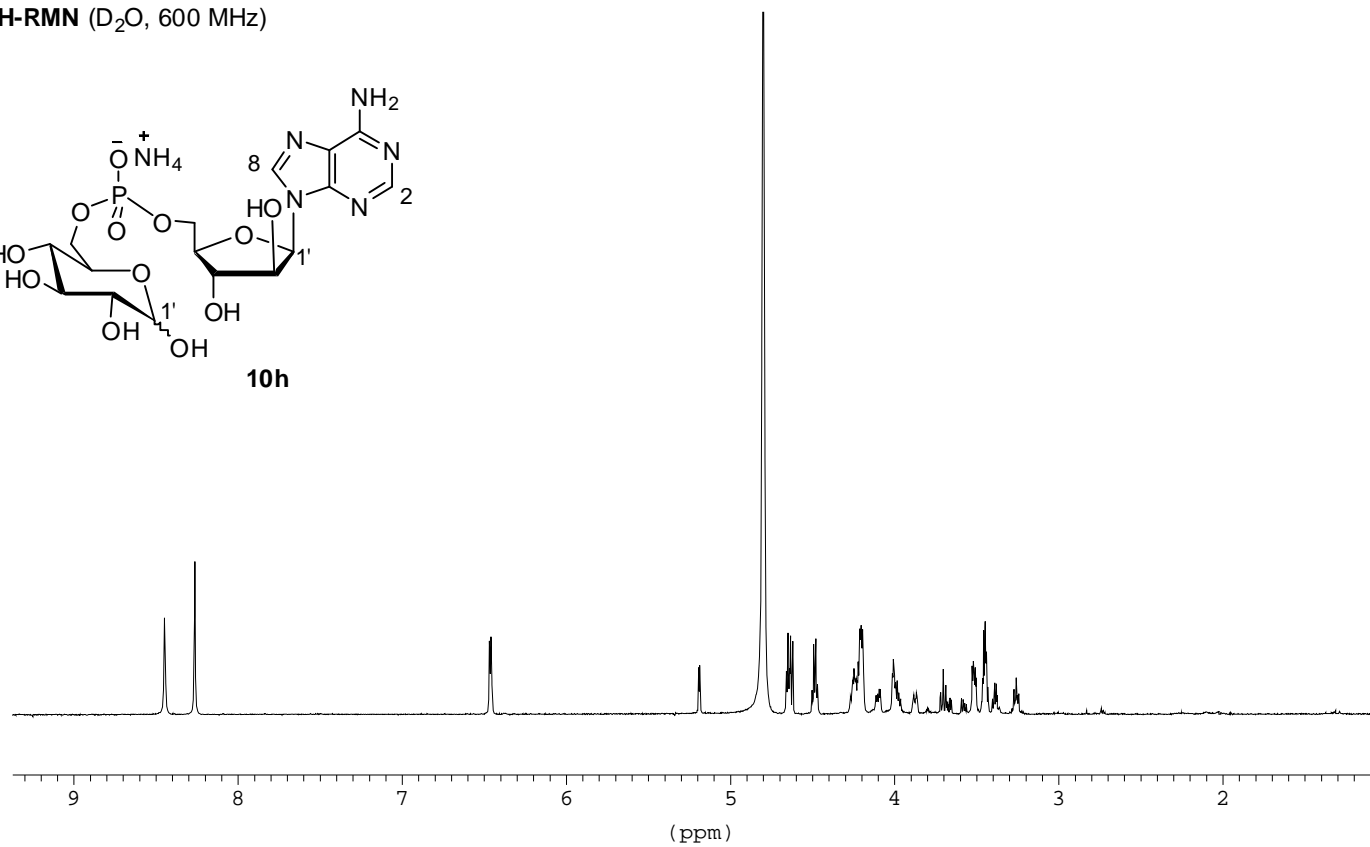
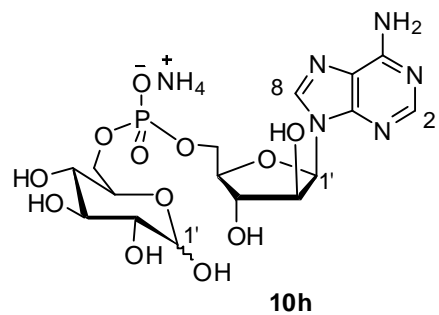


10g



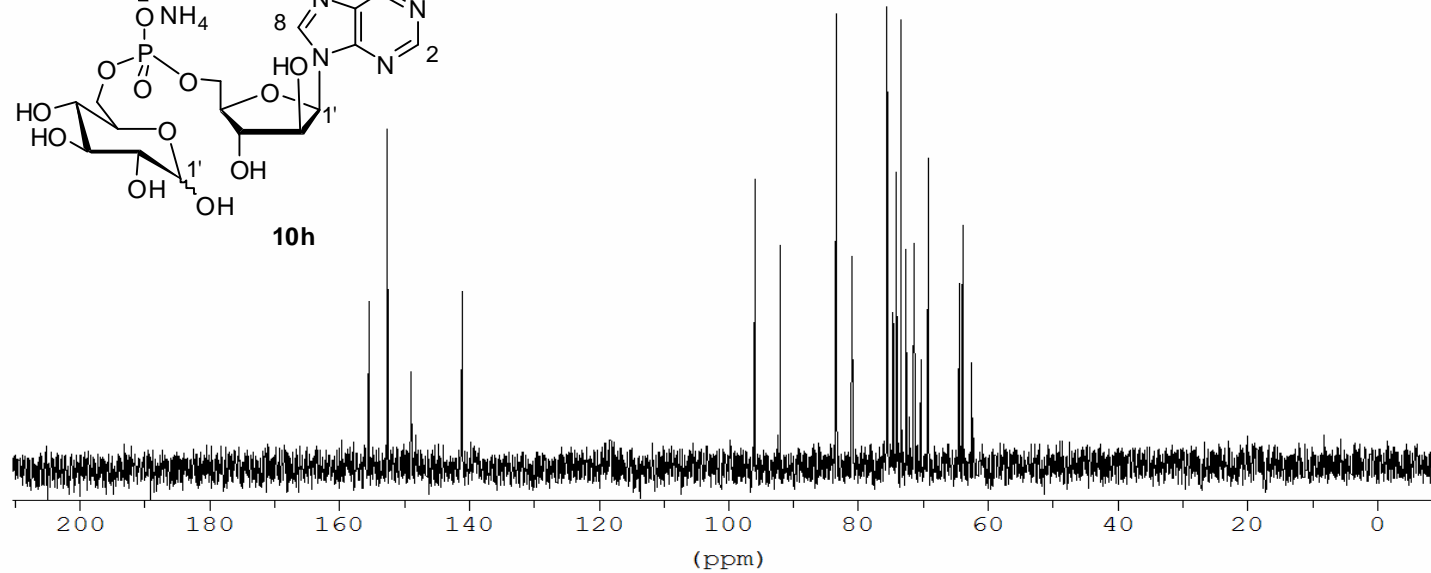
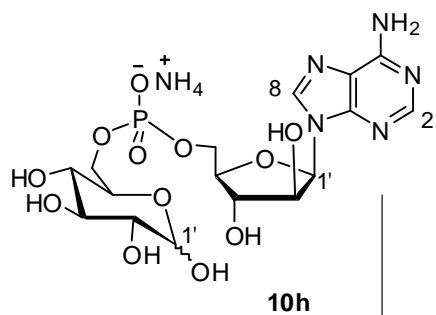
1'-Adeniny-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10h)

¹H-RMN (D₂O, 600 MHz)



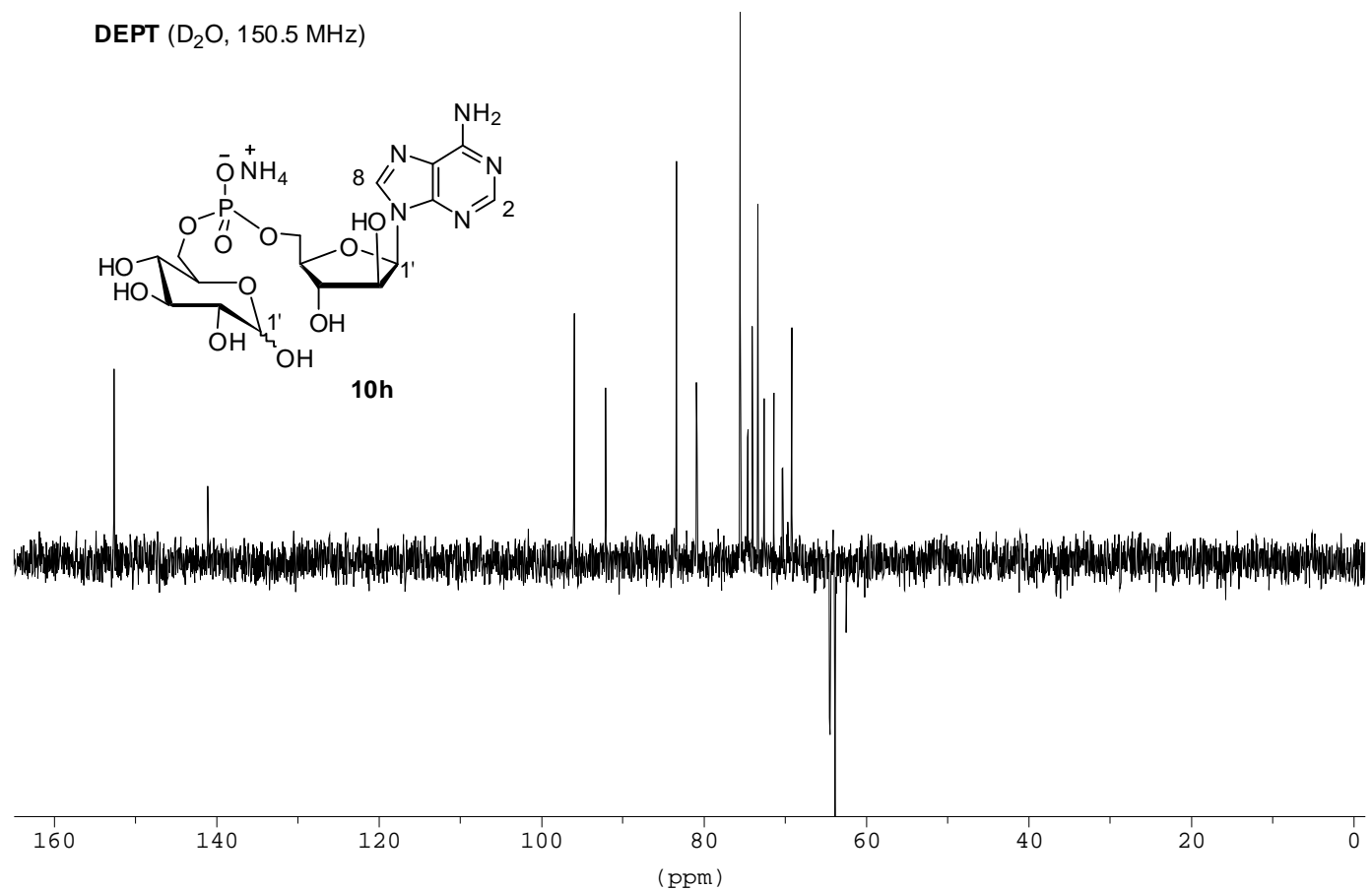
1'-AdeninyI-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10h)

¹³C-RMN (D₂O, 150.5 MHz)



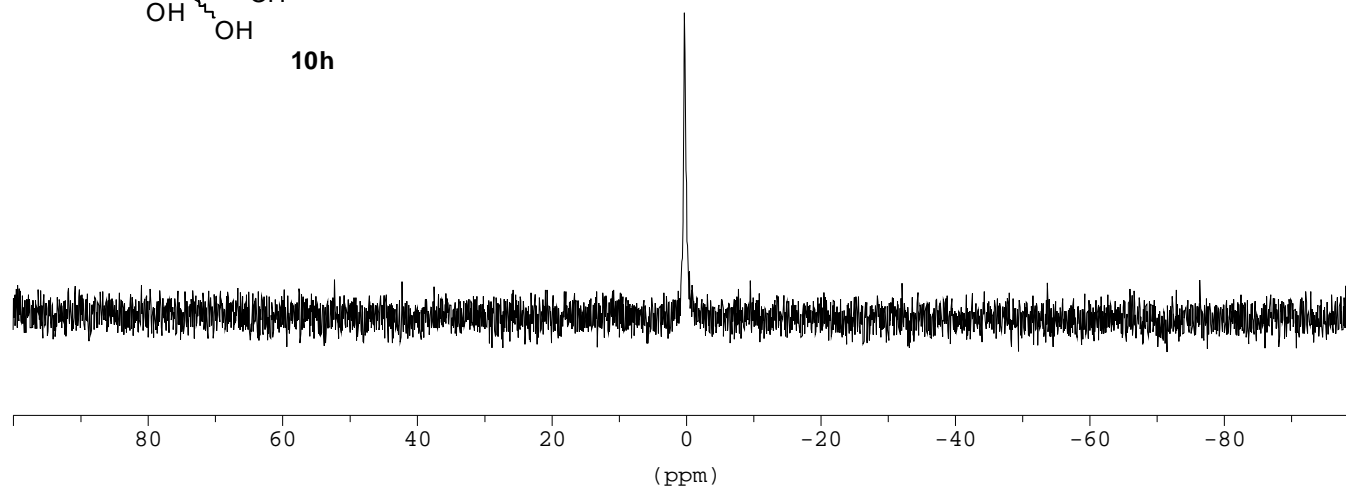
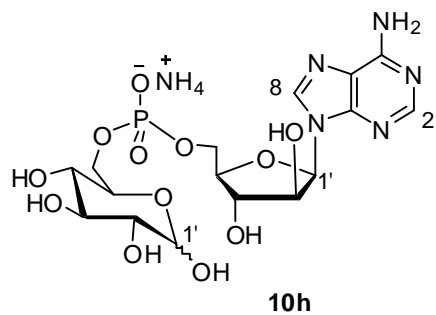
1'-Adeniny-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10h)

DEPT (D₂O, 150.5 MHz)

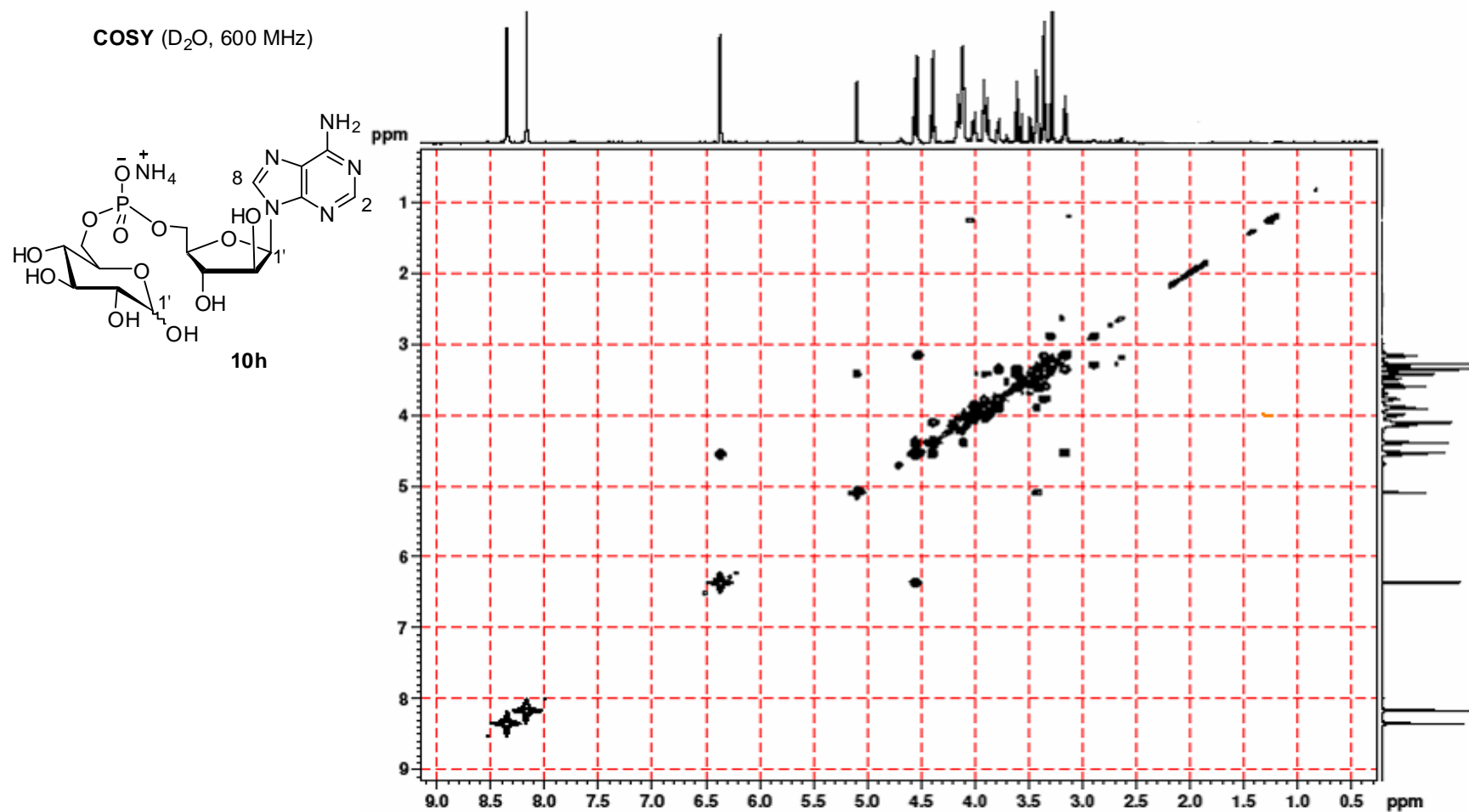


1'-Adeniny-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10h)

³¹P-RMN (D₂O, 242.9 MHz)

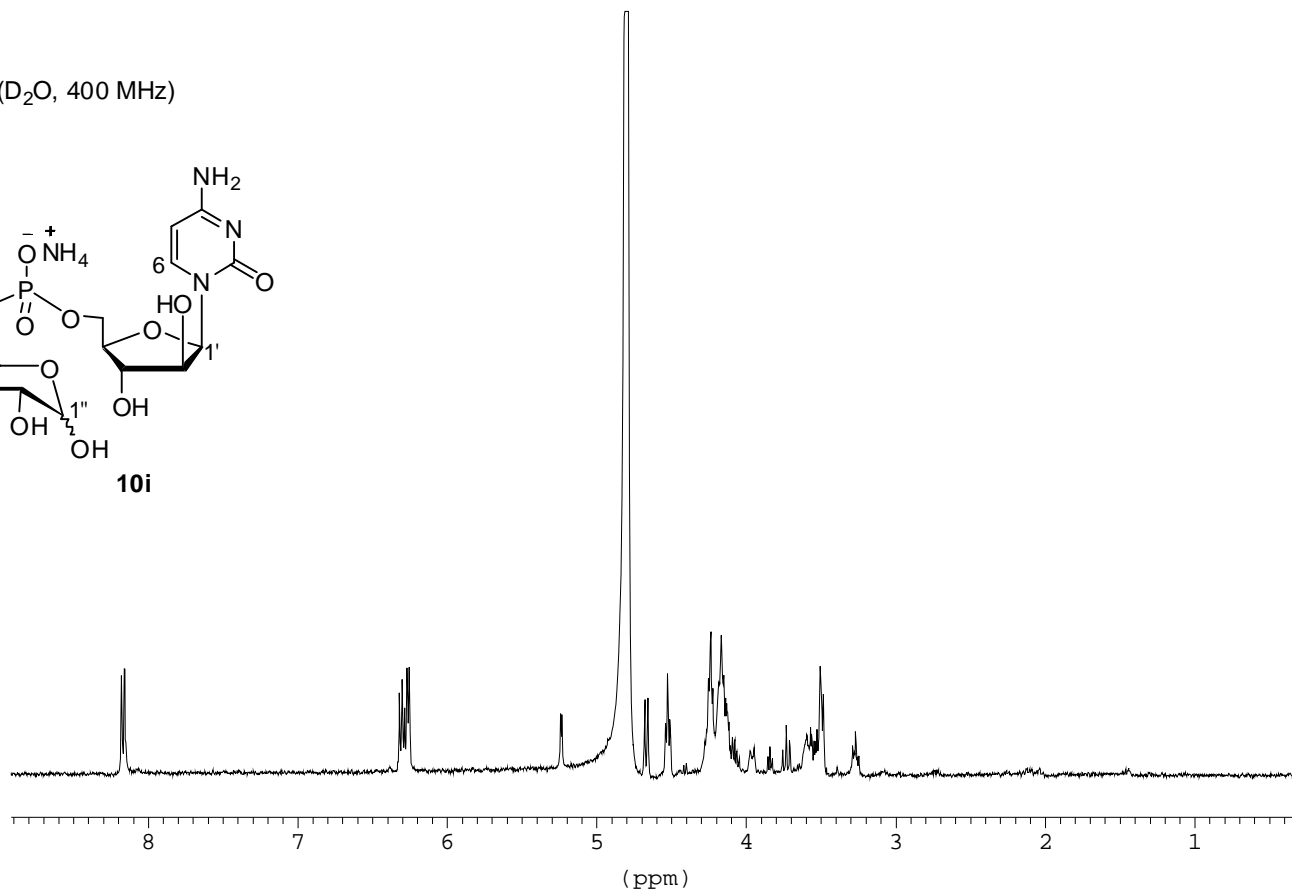
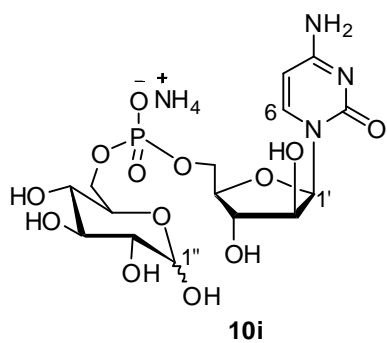


1'-Adeniny-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10h)



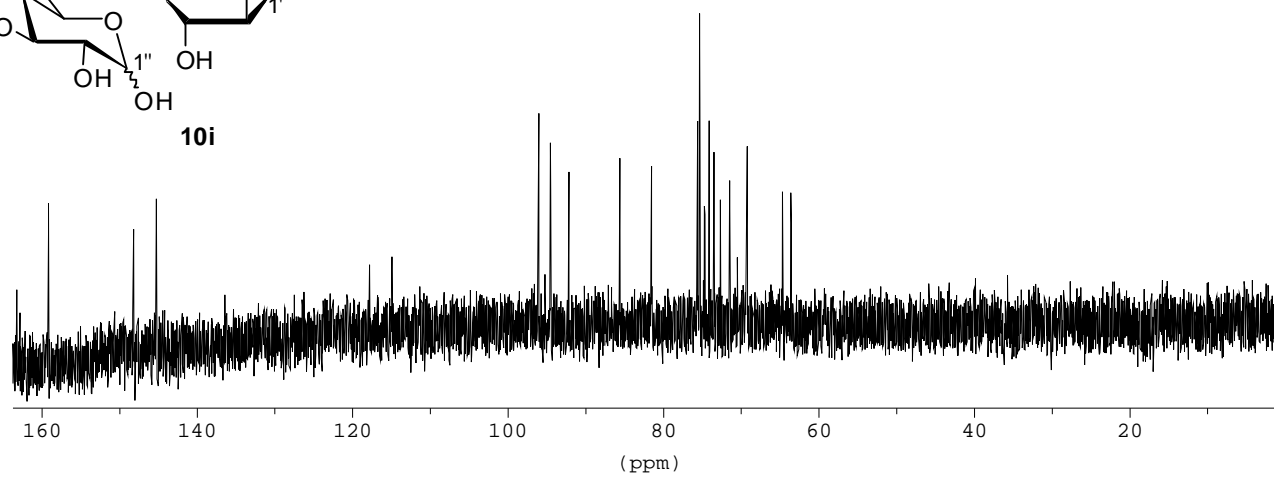
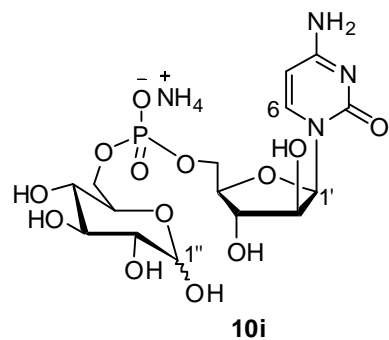
1'-Cytosinyl-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10i)

¹H-RMN (D₂O, 400 MHz)



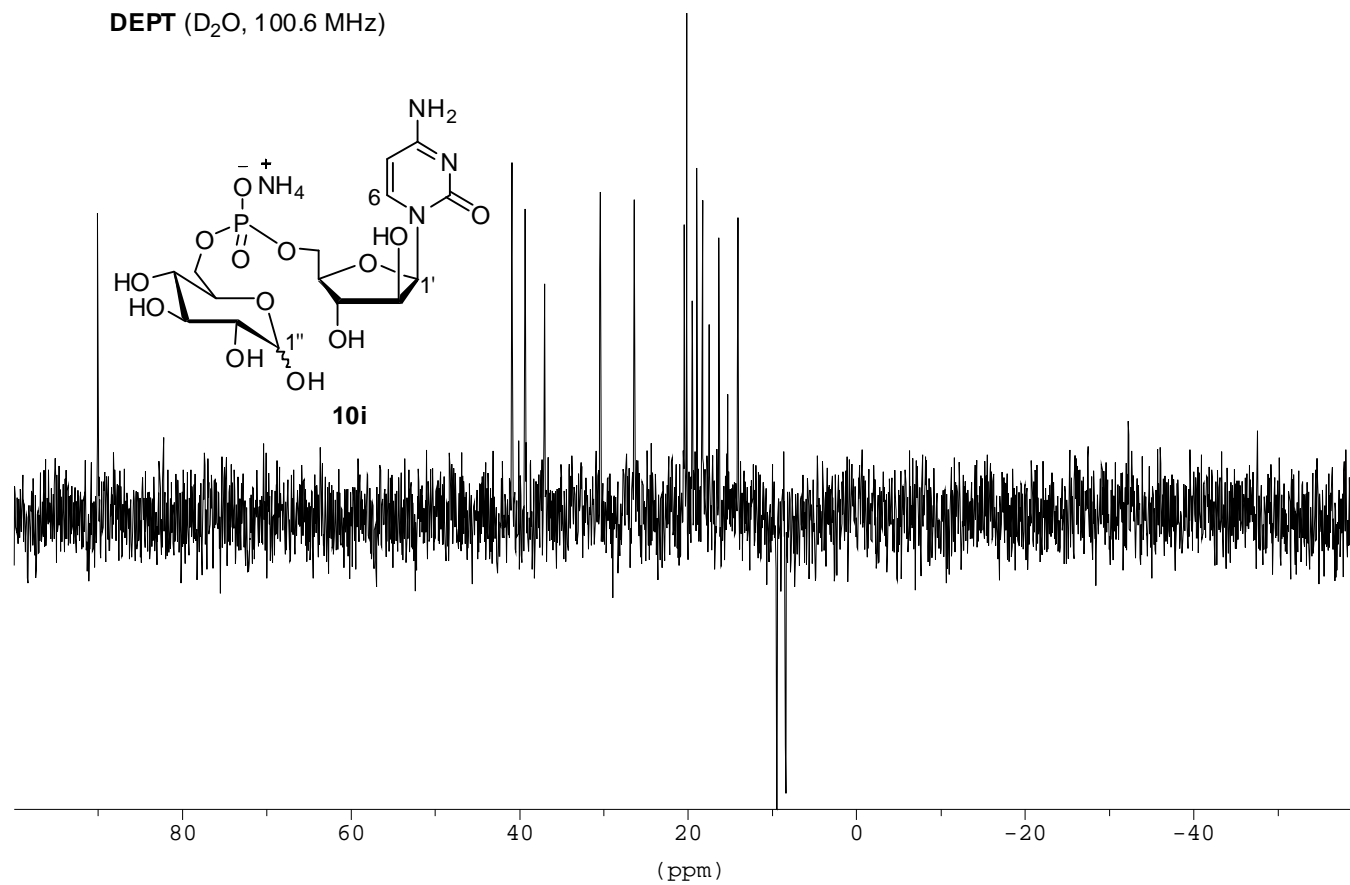
1'-Cytosinyl-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10i)

¹³C-RMN (D₂O, 100.6 MHz)



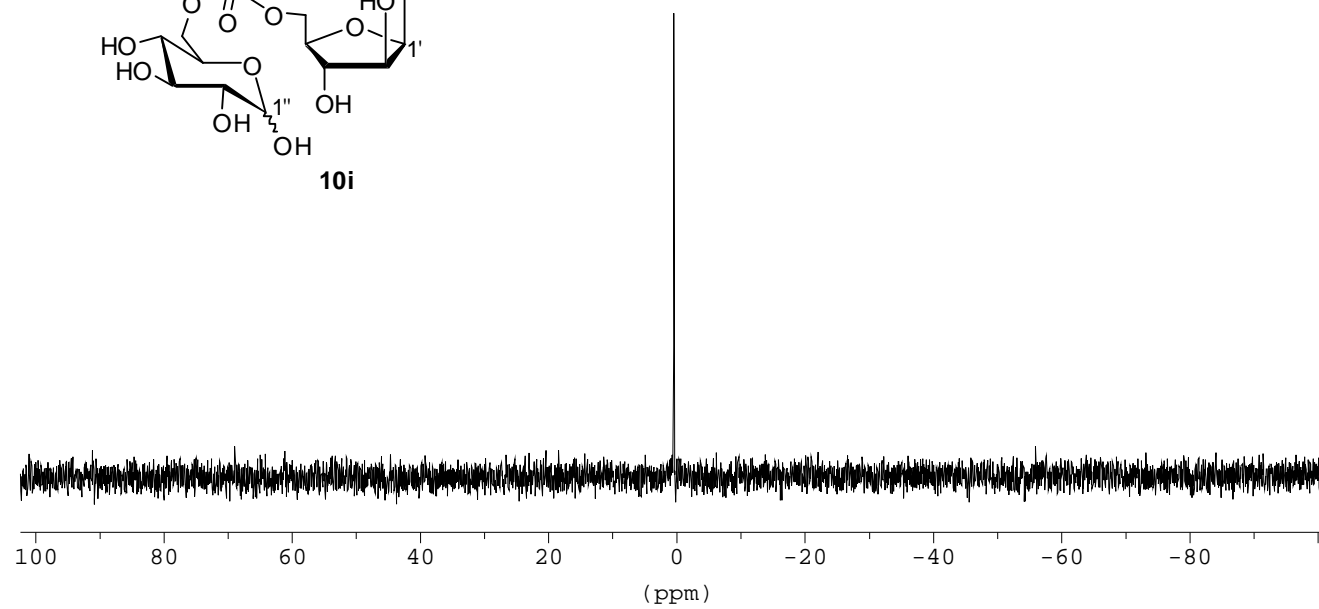
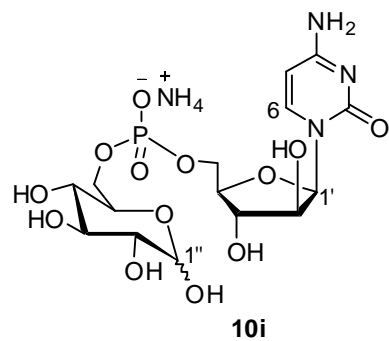
1'-Cytosinyl-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10i)

DEPT (D₂O, 100.6 MHz)

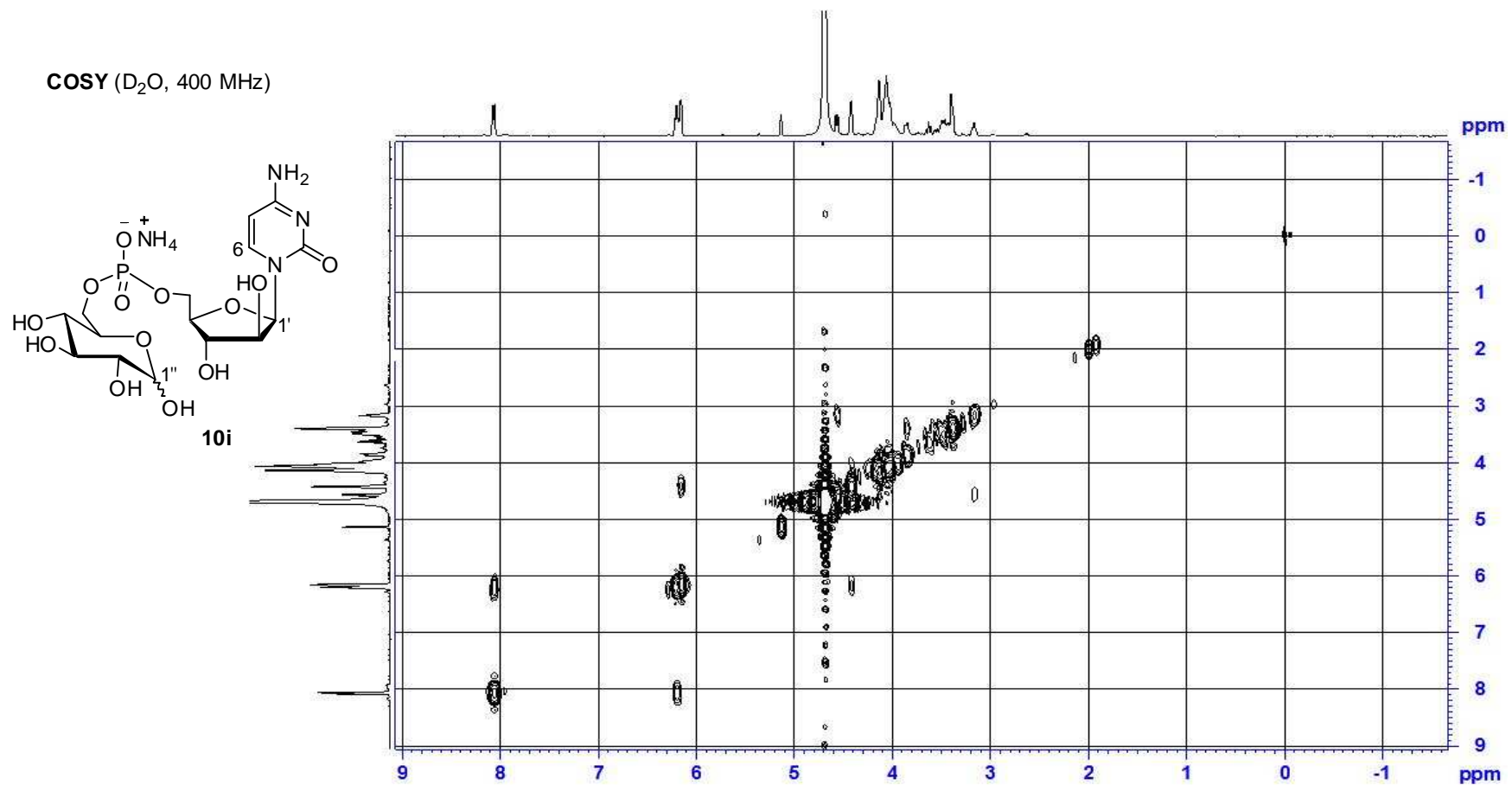


1'-Cytosinyl-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10i)

³¹P-RMN (D₂O, 161.9 MHz)

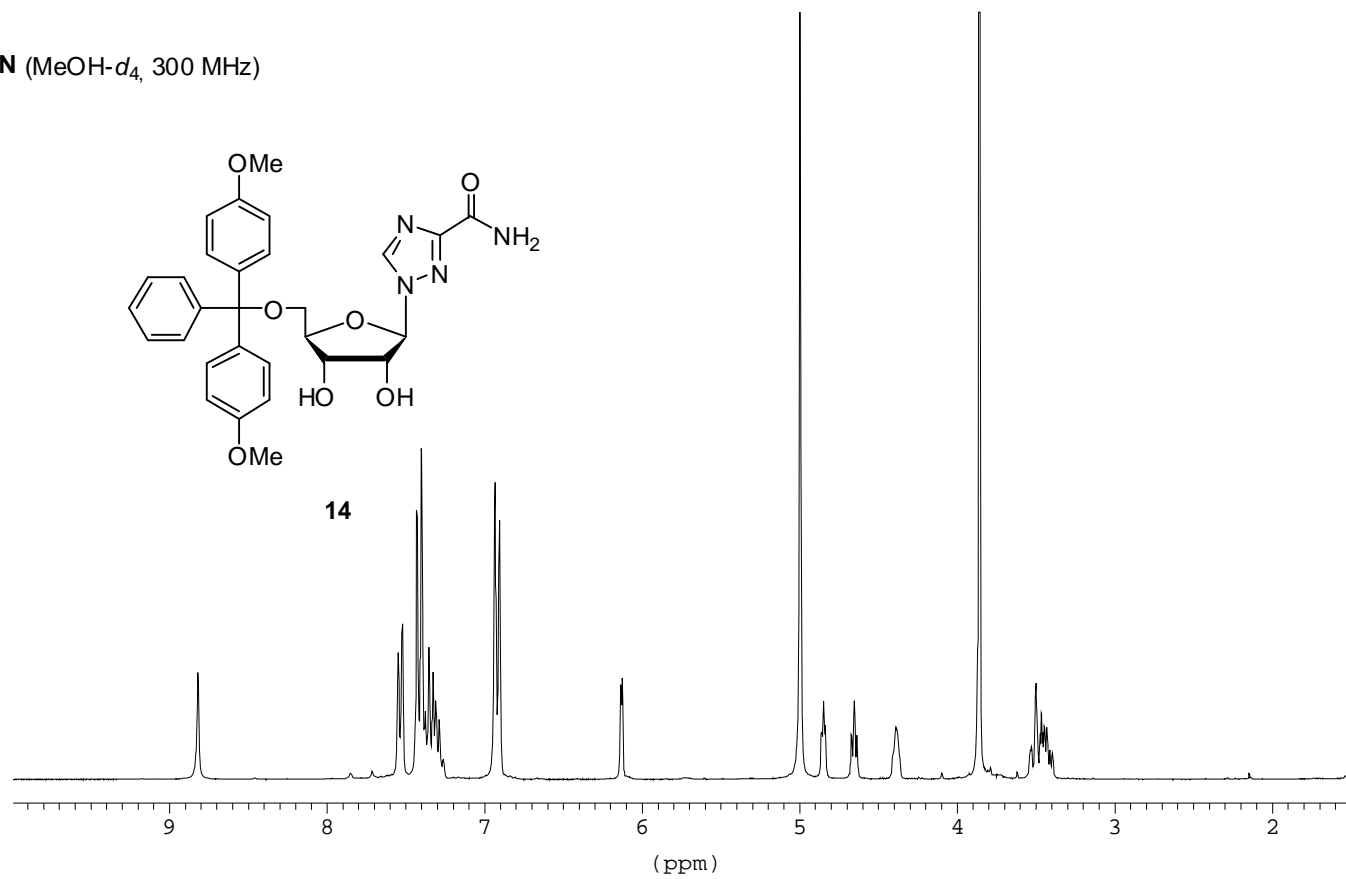


1'-Cytosinyl-β-D-arabinofuranose 5'-(α/β-D-glucopyranos-6-yl) phosphate (10i)



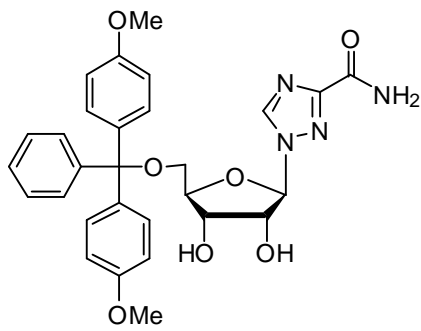
1-(5'-*O*-dimethoxytrityl- β -D-ribofuranosyl)-1,2,4-triazole-3-carboxamide (14)

$^1\text{H-RMN}$ (MeOH- d_4 , 300 MHz)

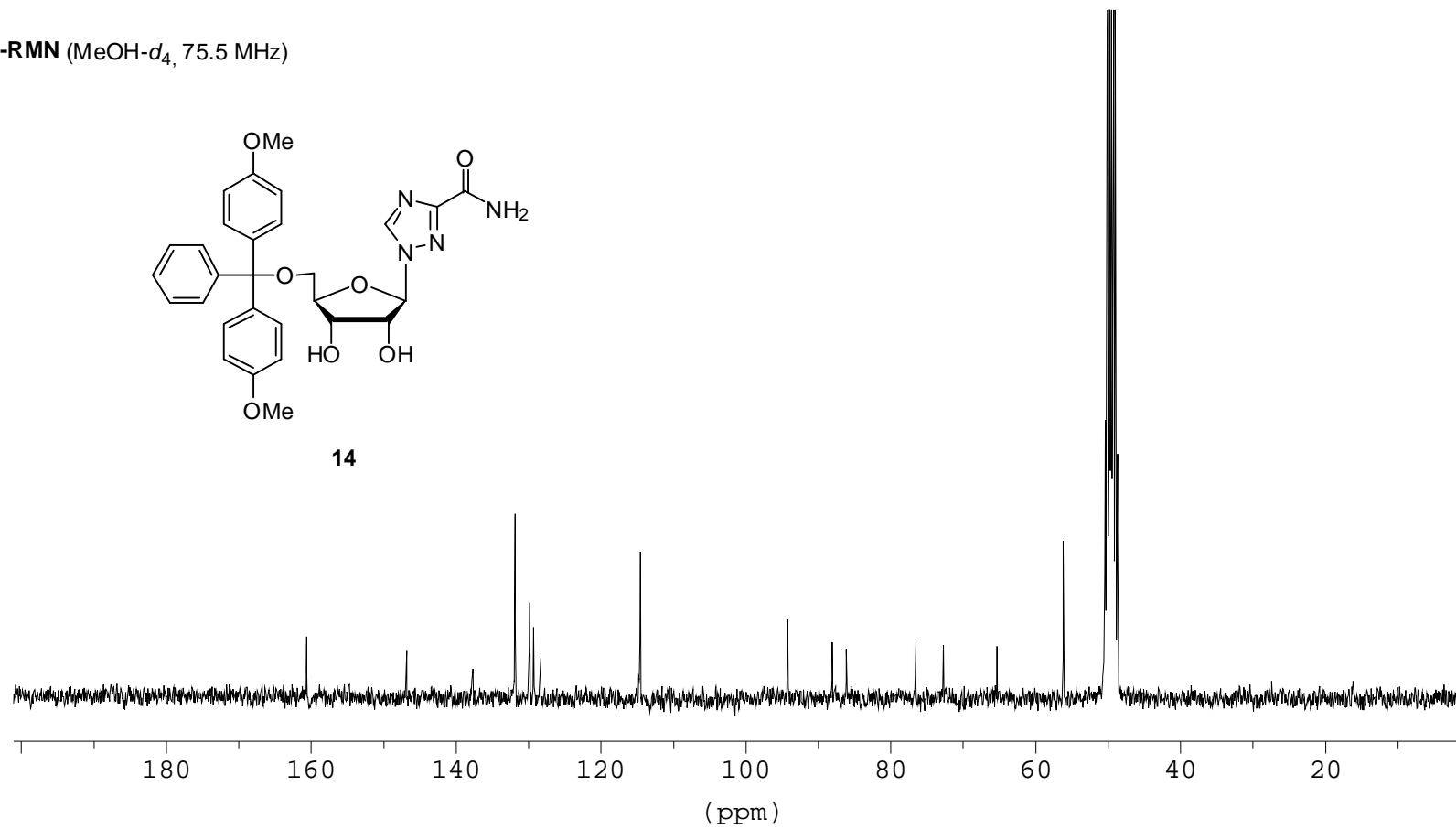


1-(5'-*O*-dimethoxytrityl- β -D-ribofuranosyl)-1,2,4-triazole-3-carboxamide (14)

^{13}C -RMN (MeOH- d_4 , 75.5 MHz)

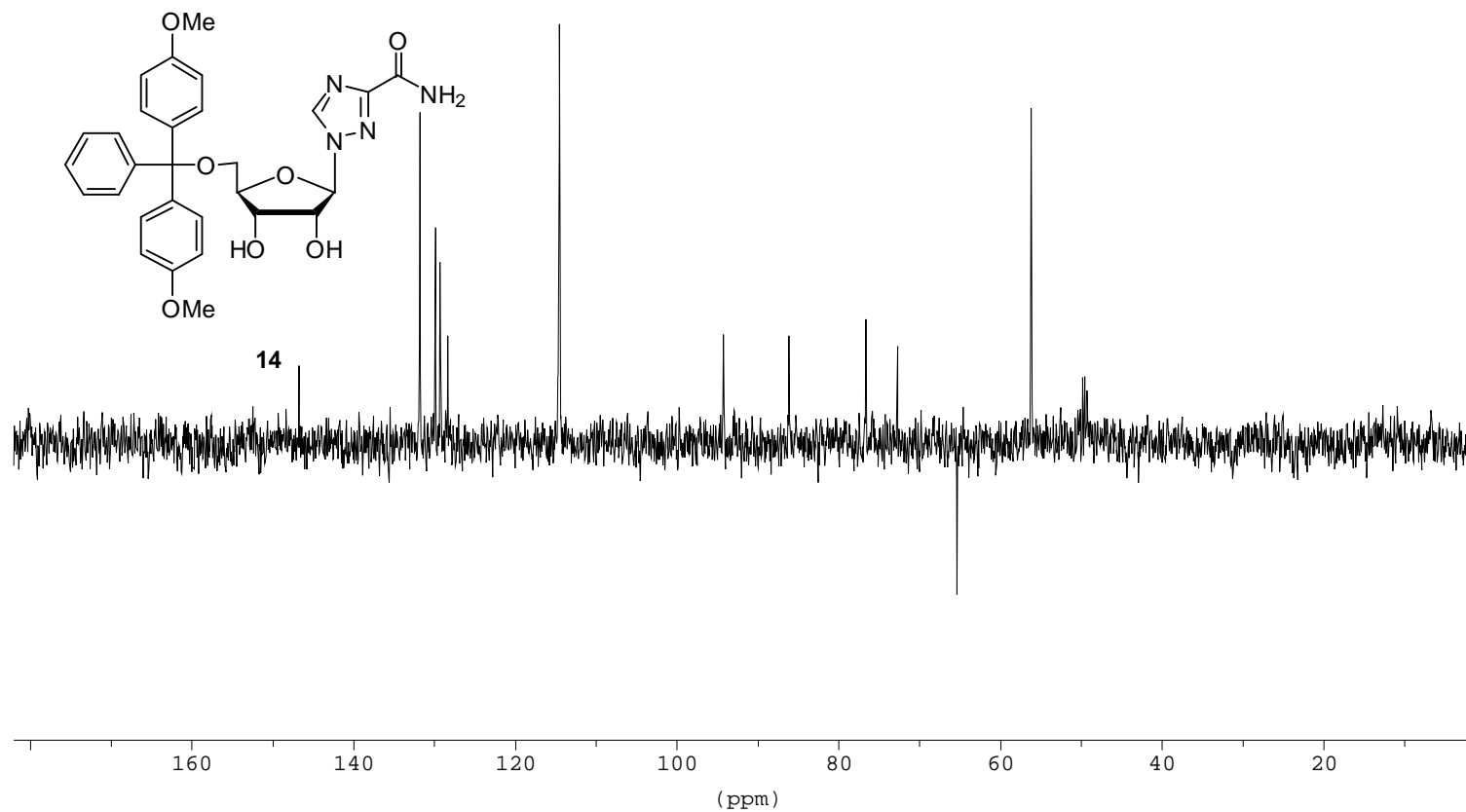


14



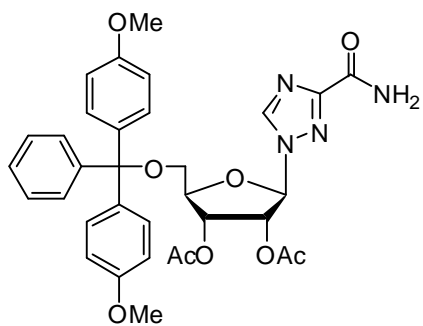
1-(5'-*O*-dimethoxytrityl- β -D-ribofuranosyl)-1,2,4-triazole-3-carboxamide (14)

DEPT (MeOH- d_4 , 75.5 MHz)

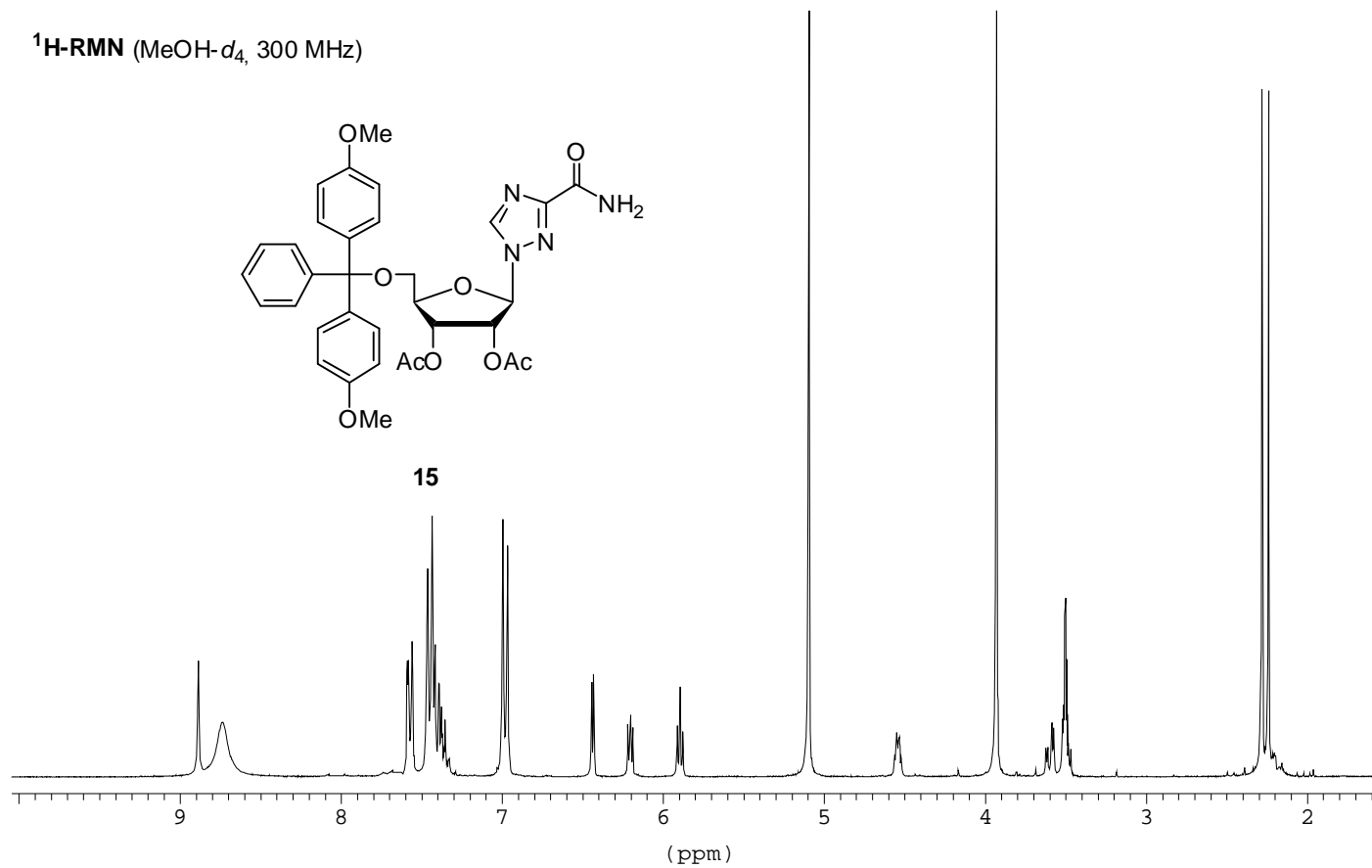


1-(2',3'-di-*O*-acetyl-5'-*O*-dimethoxytrityl- β -D-ribofuranosyl)-1,2,4-triazole-3-carboxamide (15).

¹H-RMN (MeOH-*d*₄, 300 MHz)

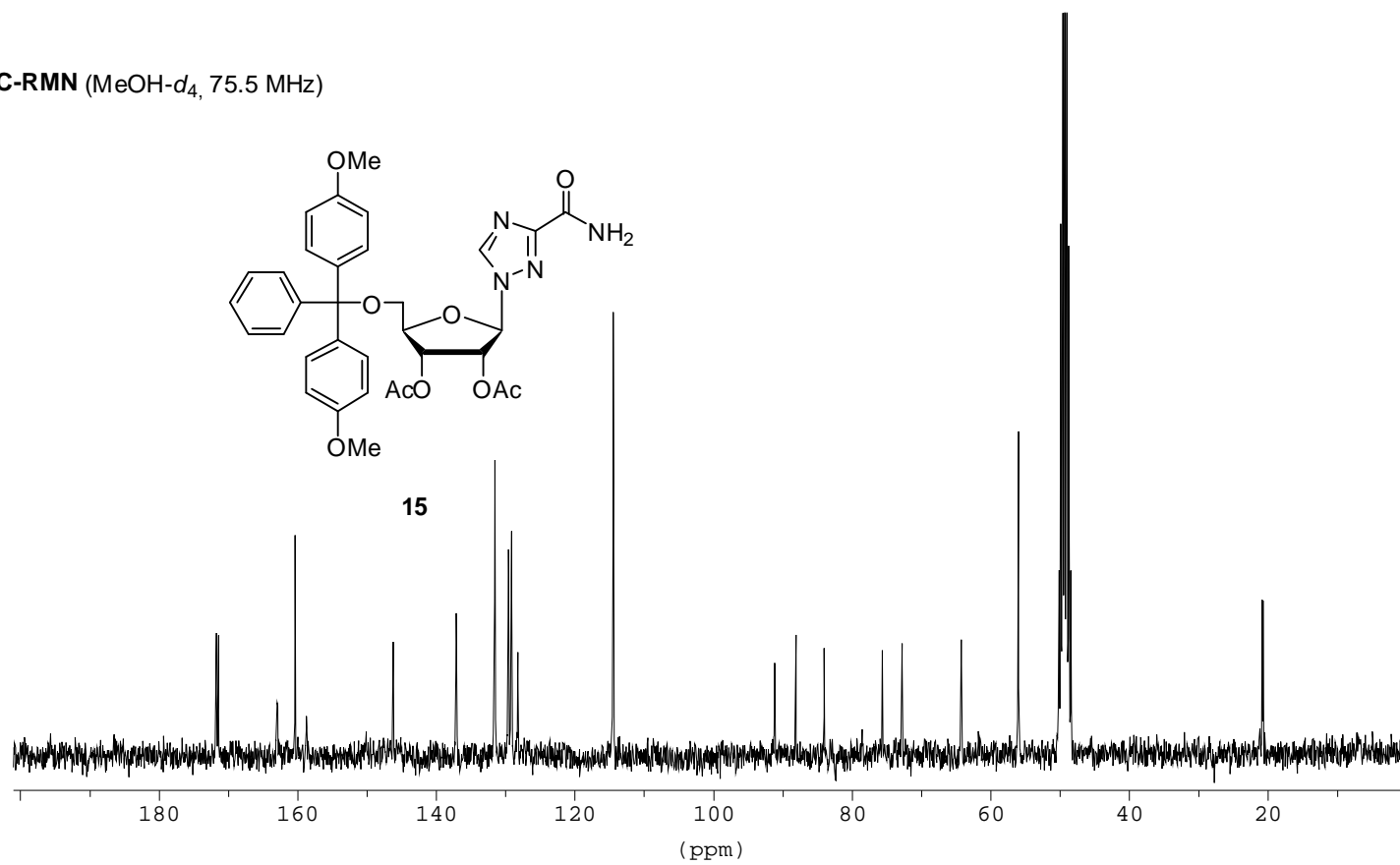


15



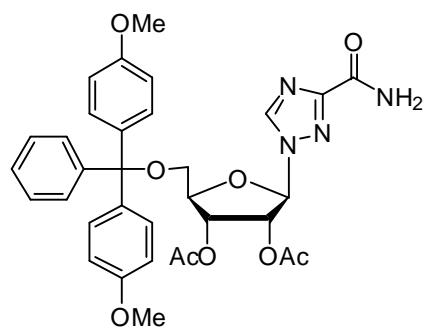
1-(2',3'-di-*O*-acetyl-5'-*O*-dimethoxytrityl- β -D-ribofuranosyl)-1,2,4-triazole-3-carboxamide (15).

^{13}C -RMN (MeOH- d_4 , 75.5 MHz)

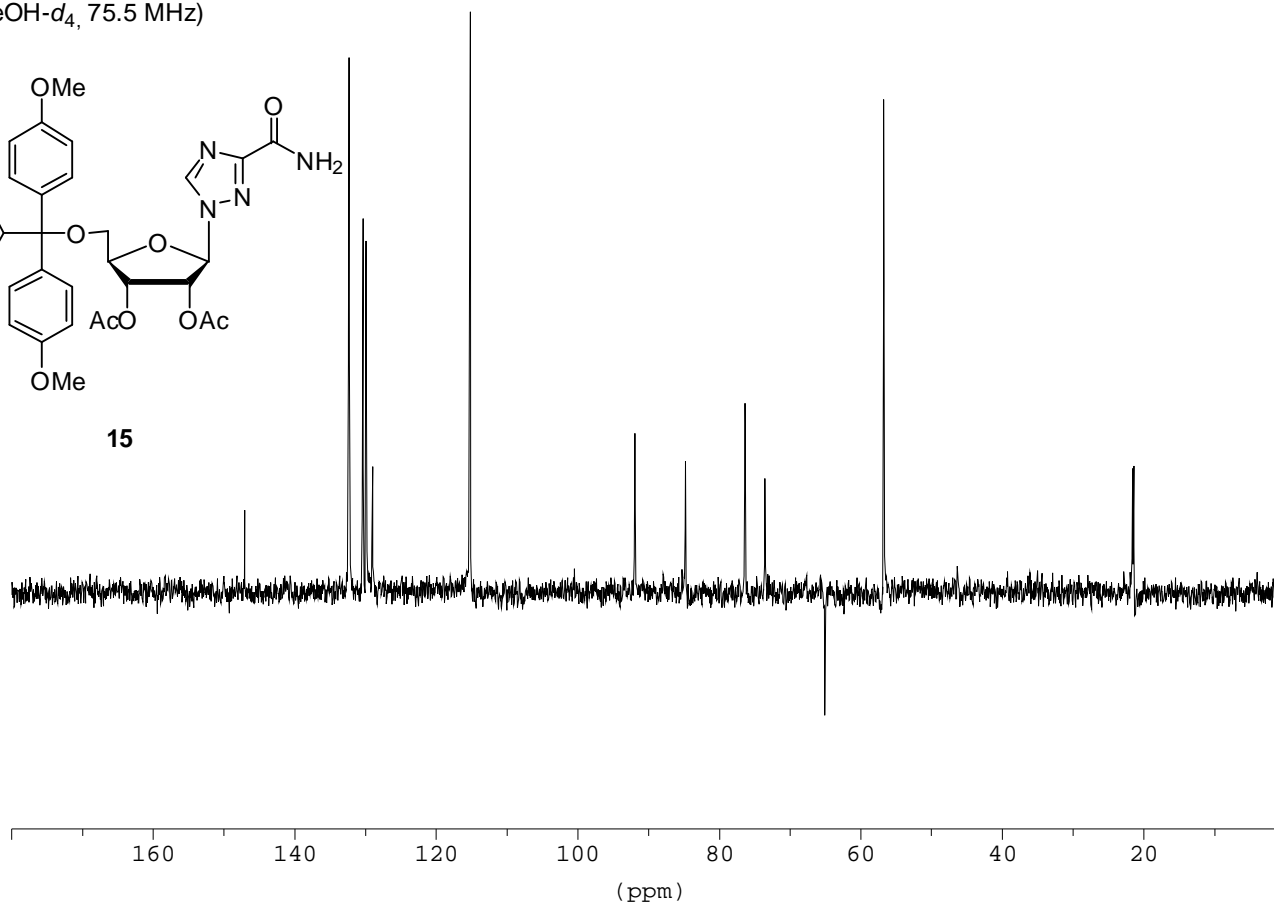


1-(2',3'-di-*O*-acetyl-5'-*O*-dimethoxytrityl-β-D-ribofuranosyl)-1,2,4-triazole-3-carboxamide (15).

DEPT (MeOH-*d*₄, 75.5 MHz)

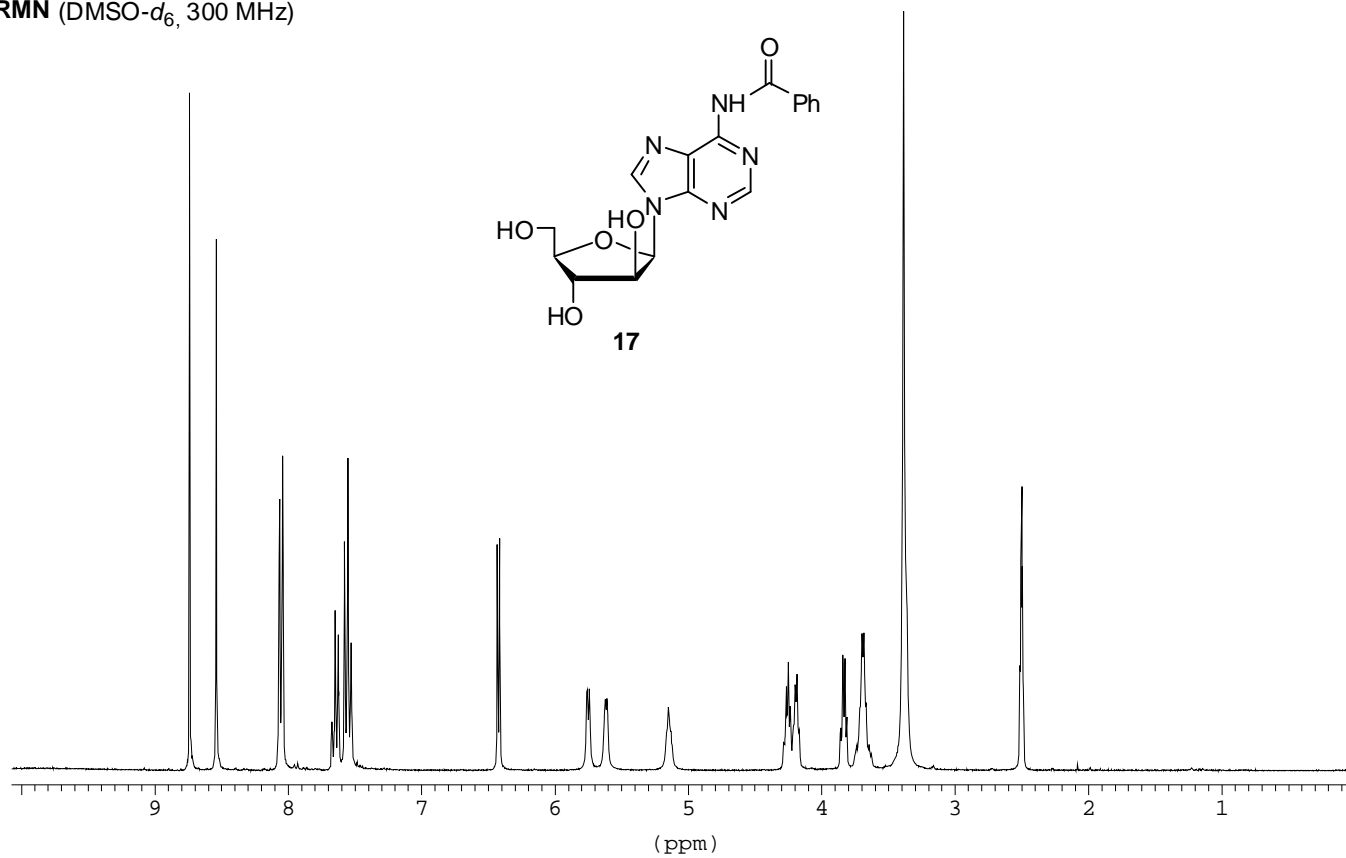
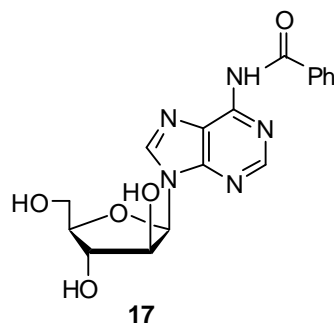


15



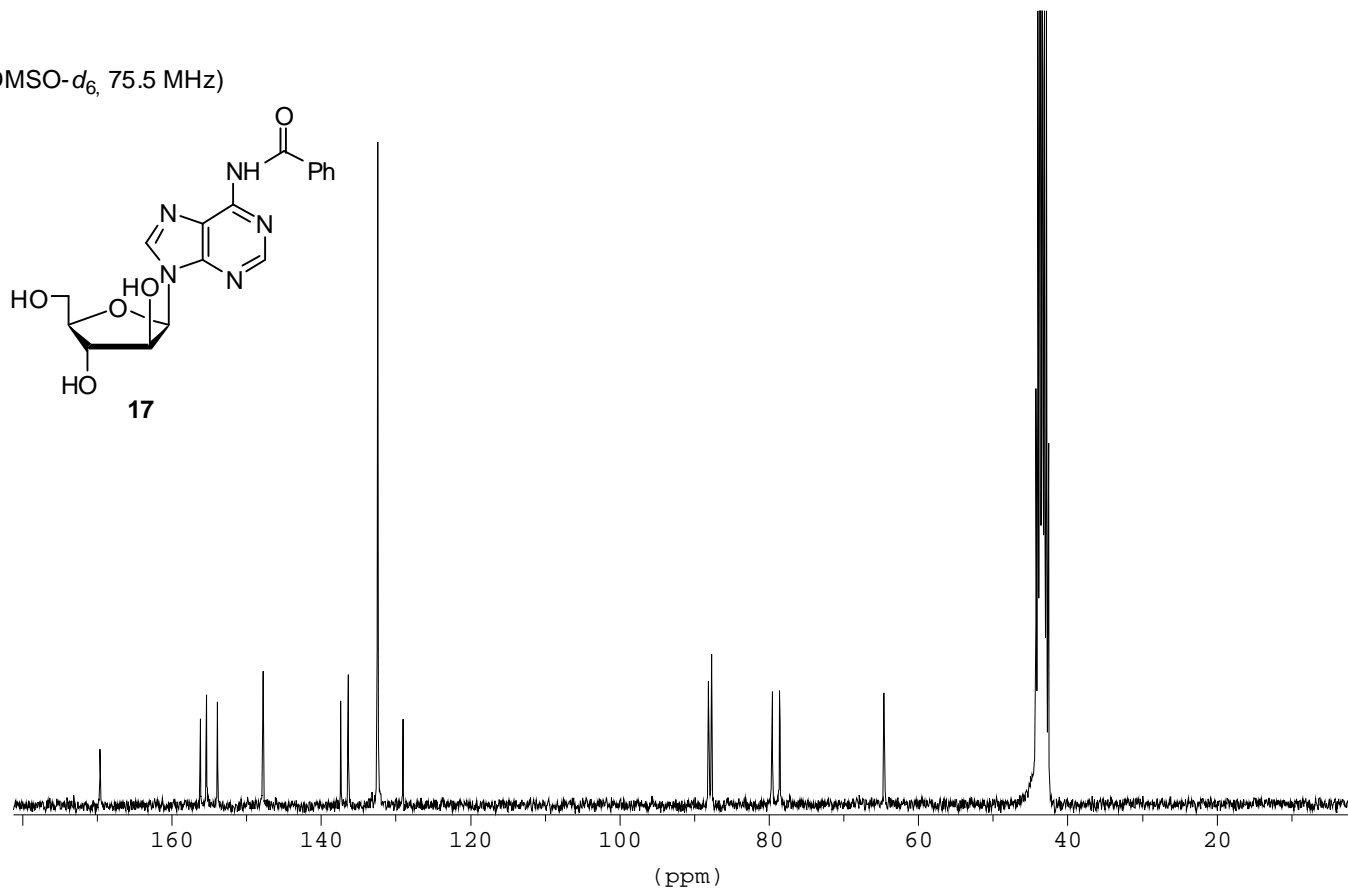
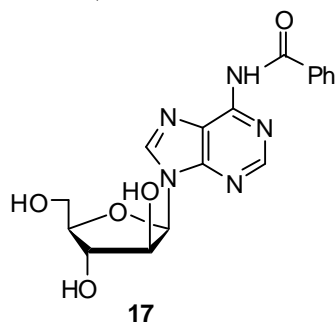
9-(β -D-arabinofuranosyl)- N^6 -benzoyladenine (17)

$^1\text{H-RMN}$ (DMSO- d_6 , 300 MHz)



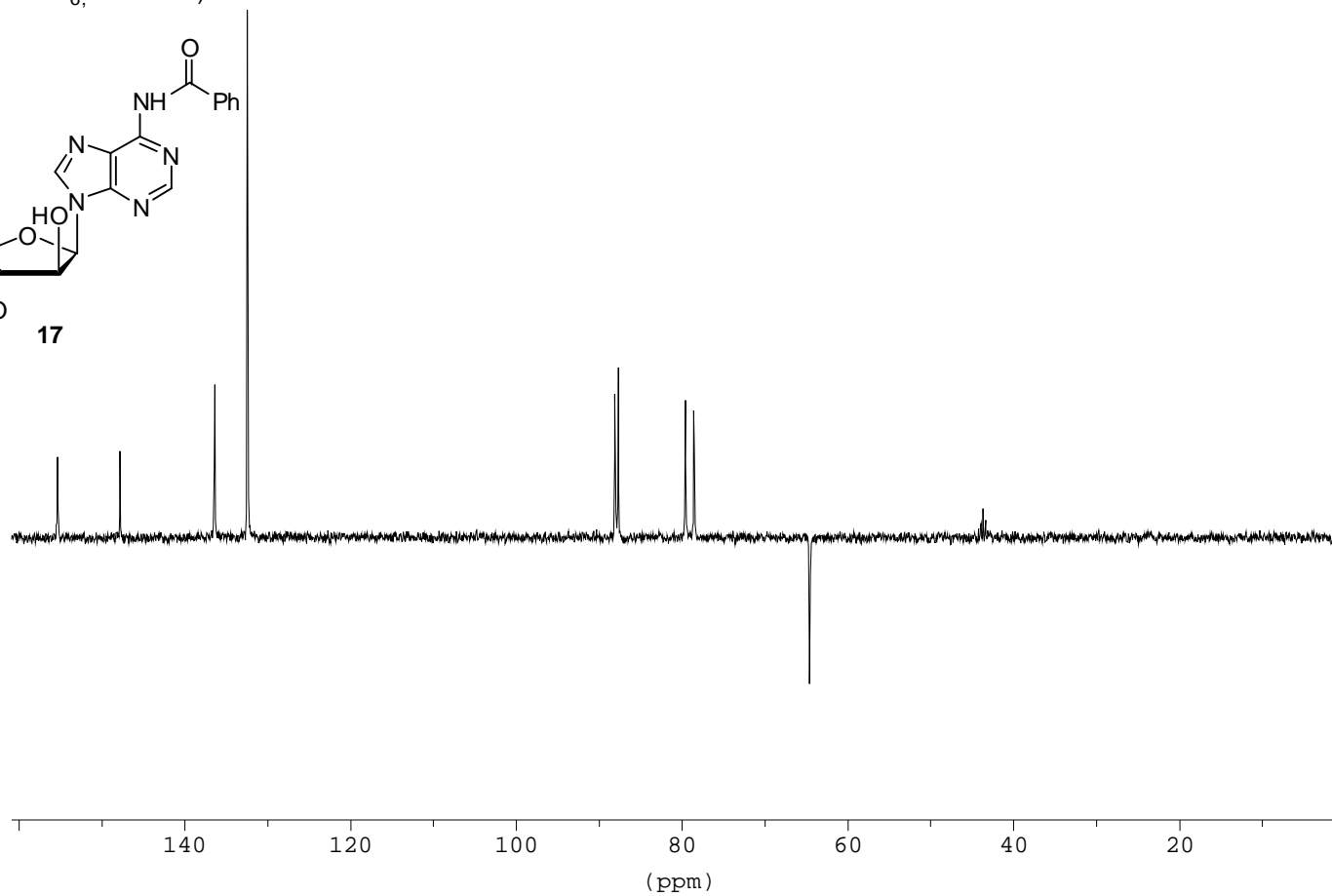
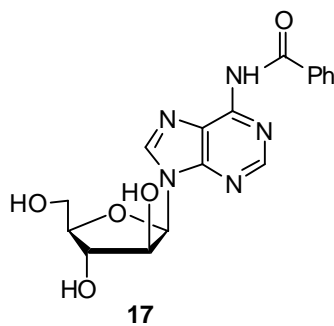
9-(β -D-arabinofuranosyl)- N^6 -benzoyladenine (17)

^{13}C -RMN (DMSO- d_6 , 75.5 MHz)



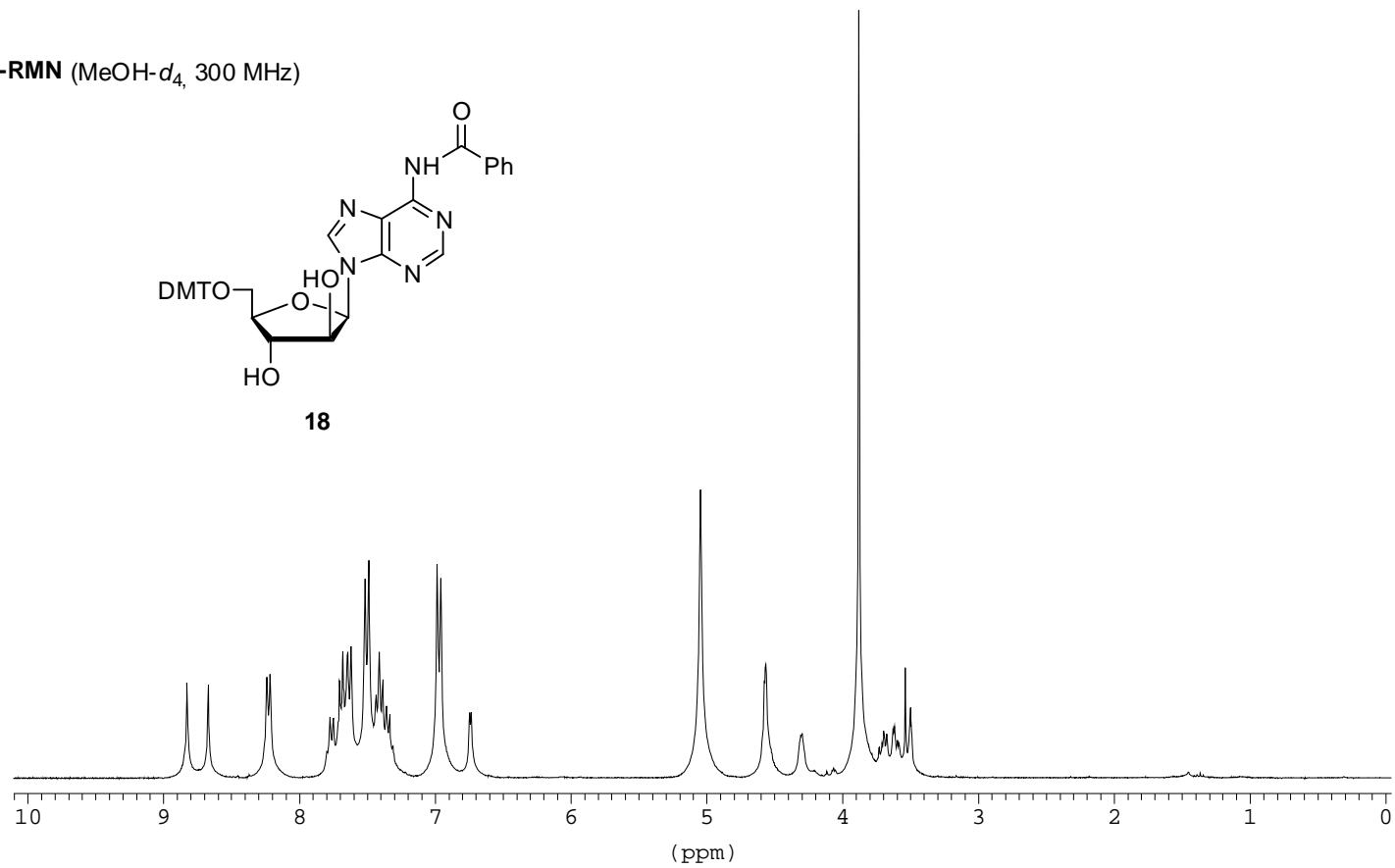
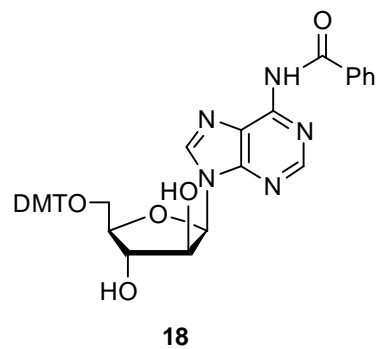
9-(β -D-arabinofuranosyl)- N^6 -benzoyladenine (17)

DEPT(DMSO- d_6 , 75.5 MHz)



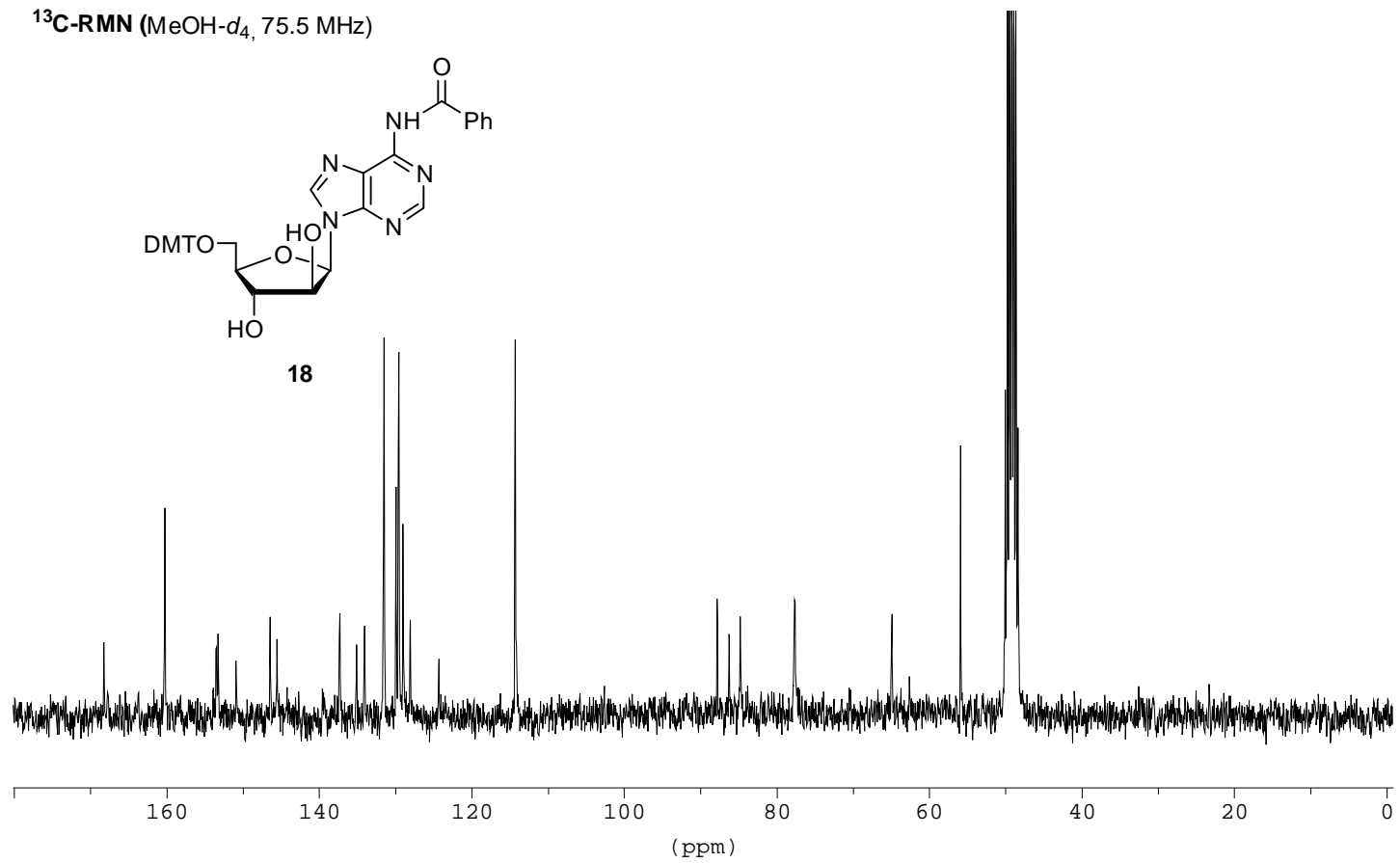
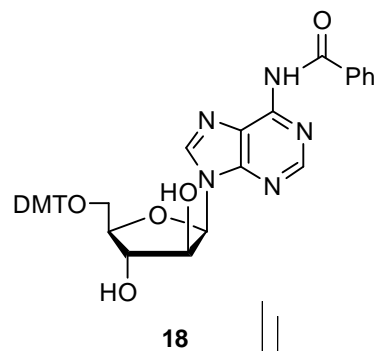
Synthesis of *N*⁶-benzoyl-9-(5'-*O*-dimethoxytrityl-β-D-arabinofuranosyl)adenine (18)

¹H-RMN (MeOH-*d*₄, 300 MHz)



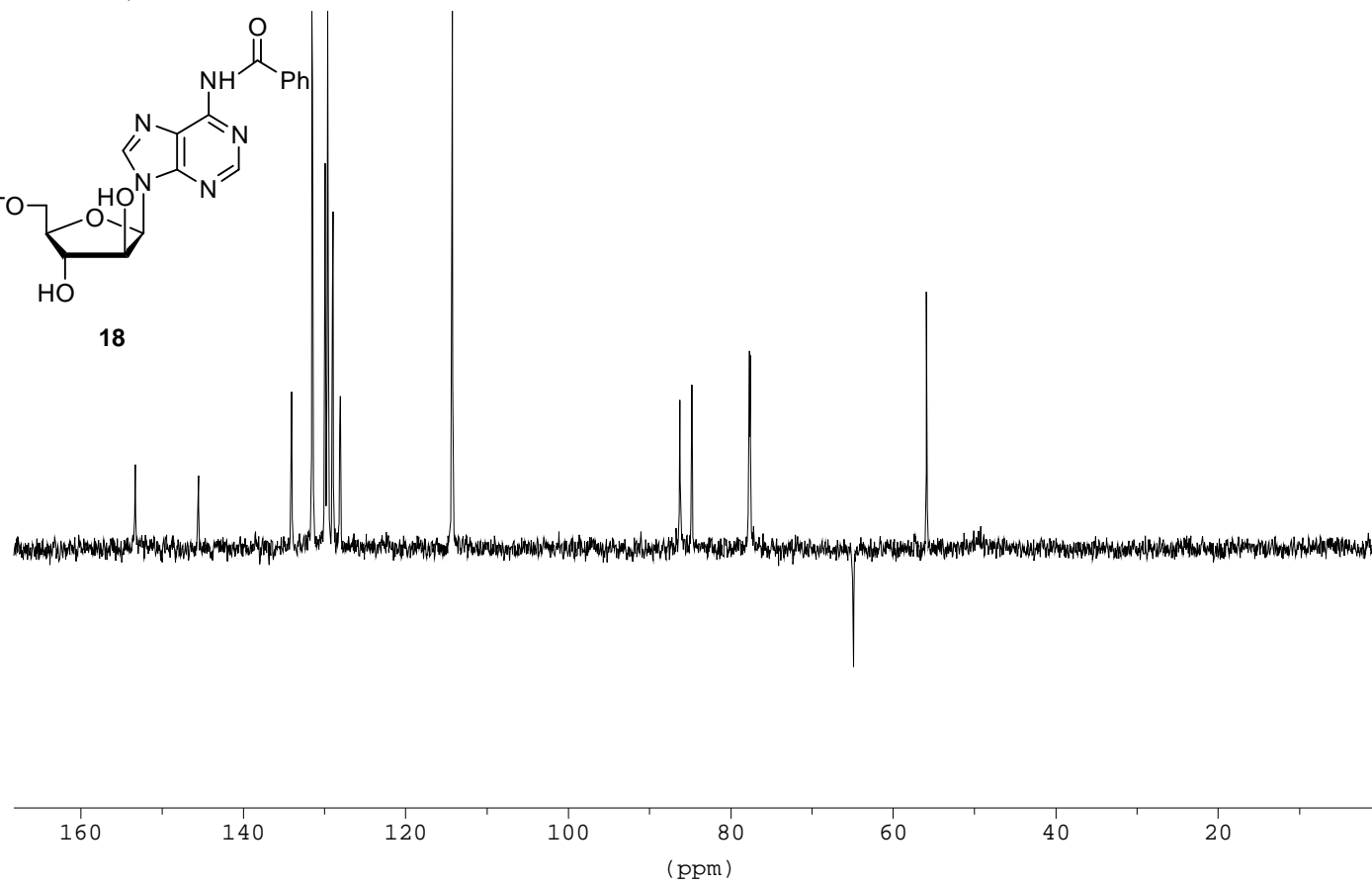
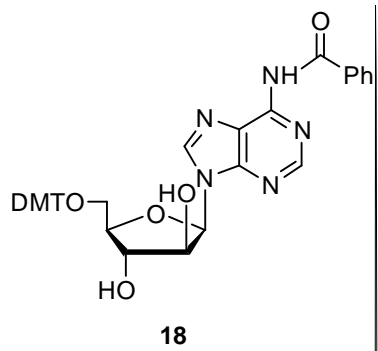
Synthesis of *N*⁶-benzoyl-9-(5'-*O*-dimethoxytrityl-β-*D*-arabinofuranosyl)adenine (18)

¹³C-RMN (MeOH-*d*₄, 75.5 MHz)



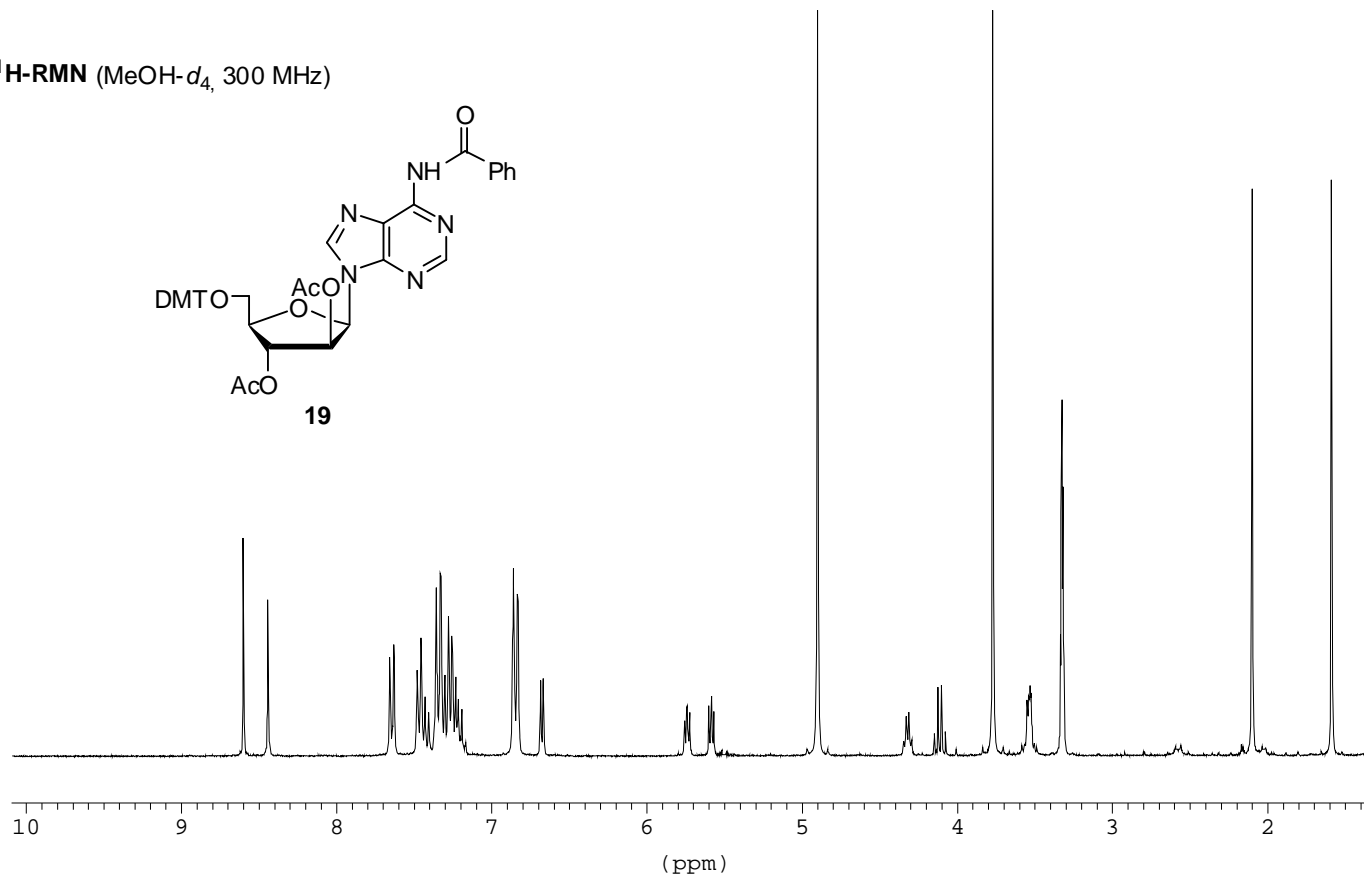
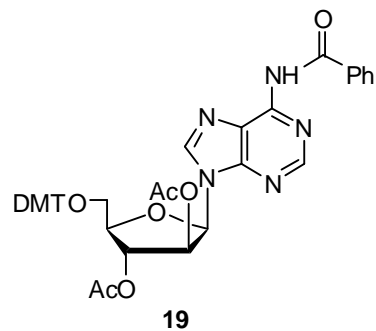
Synthesis of *N*⁶-benzoyl-9-(5'-*O*-dimethoxytrityl-β-D-arabinofuranosyl)adenine (18)

DEPT (MeOH-*d*₄, 75.5 MHz)



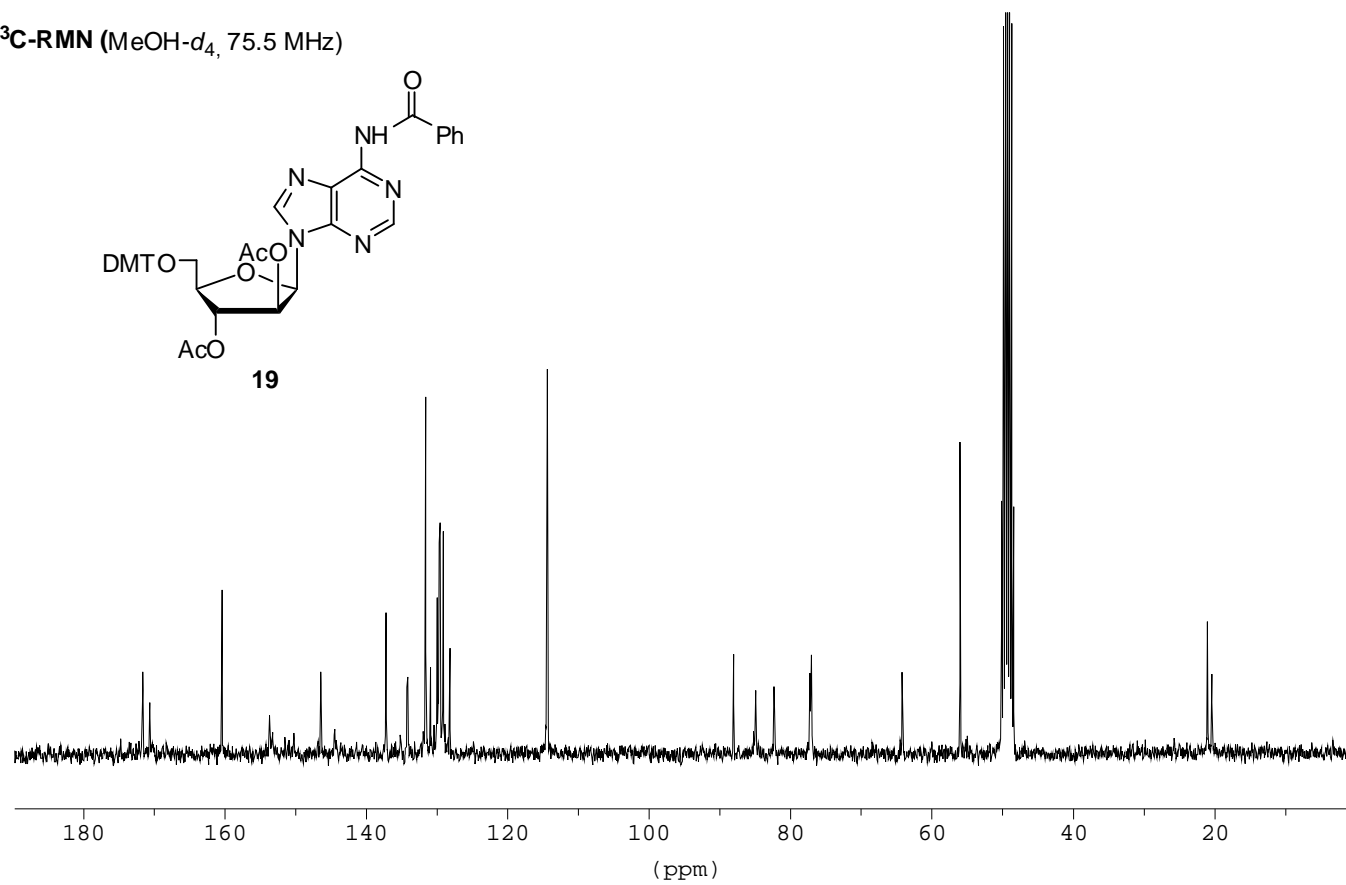
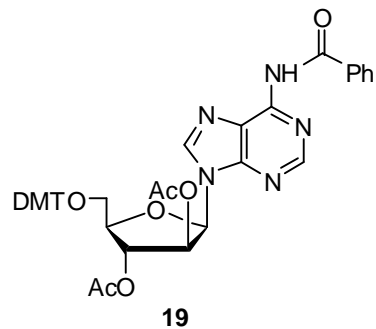
***N*⁶-benzoyl-9-(2',3'-di-*O*-acetyl-5'-*O*-dimethoxytrityl-β-*D*-arabinofuranosyl)adenine (19)**

¹H-RMN (MeOH-*d*₄, 300 MHz)



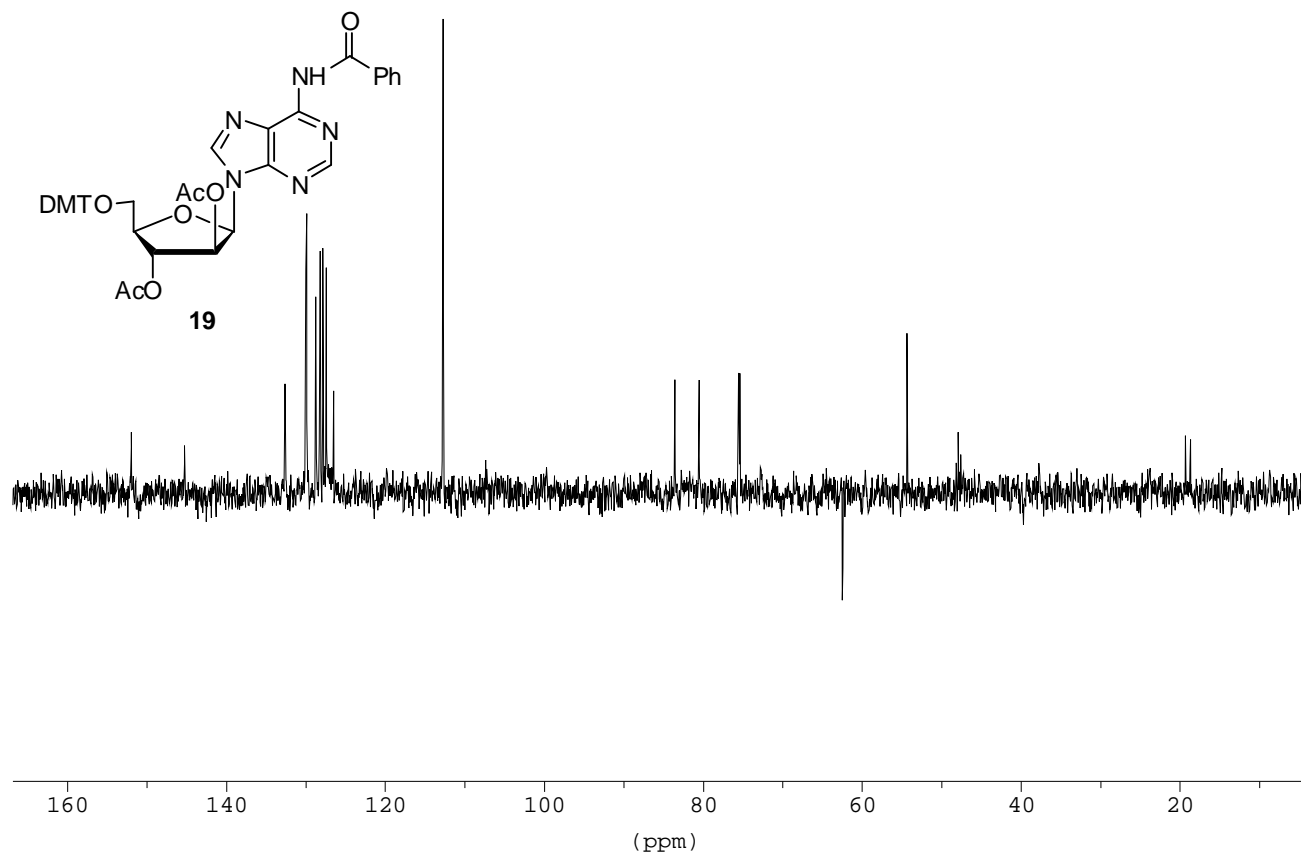
***N*⁶-benzoyl-9-(2',3'-di-*O*-acetyl-5'-*O*-dimethoxytrityl-β-D-arabinofuranosyl)adenine (19)**

¹³C-RMN (MeOH-*d*₄, 75.5 MHz)



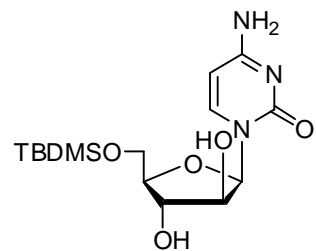
***N*⁶-benzoyl-9-(2',3'-di-*O*-acetyl-5'-*O*-dimethoxytrityl-β-D-arabinofuranosyl)adenine (19)**

DEPT (MeOH-*d*₄, 75.5 MHz)

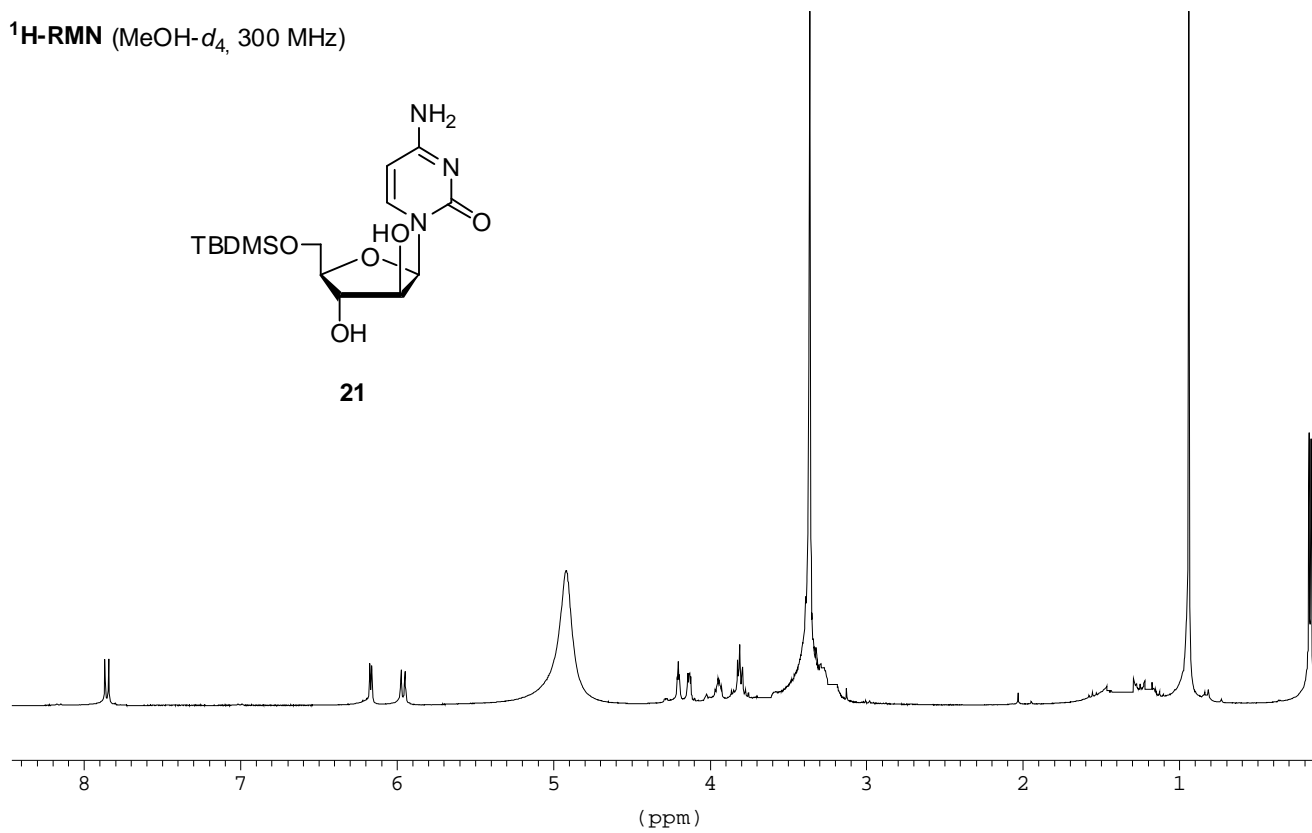


1-(5'-*O*-*tert*-butyldimethylsilyl)- β -D-arabinofuranosyl)cytosine (21)

¹H-RMN (MeOH-*d*₄, 300 MHz)

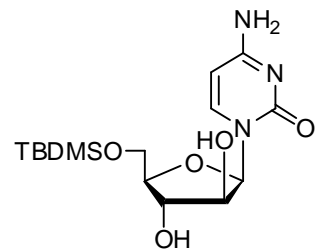


21

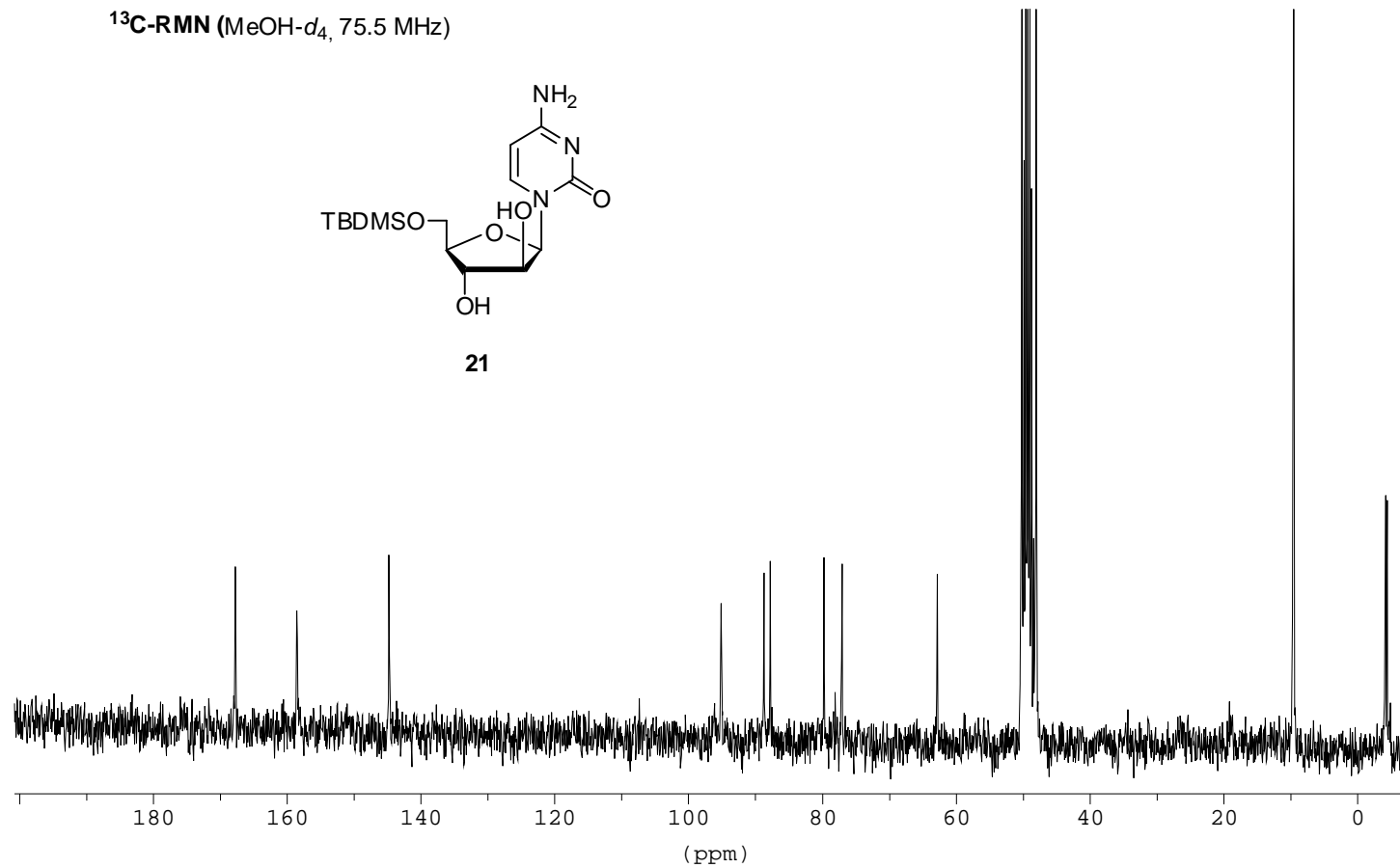


1-(5'-*O*-*tert*-butyldimethylsilyl)- β -D-arabinofuranosyl)cytosine (21)

^{13}C -RMN (MeOH- d_4 , 75.5 MHz)

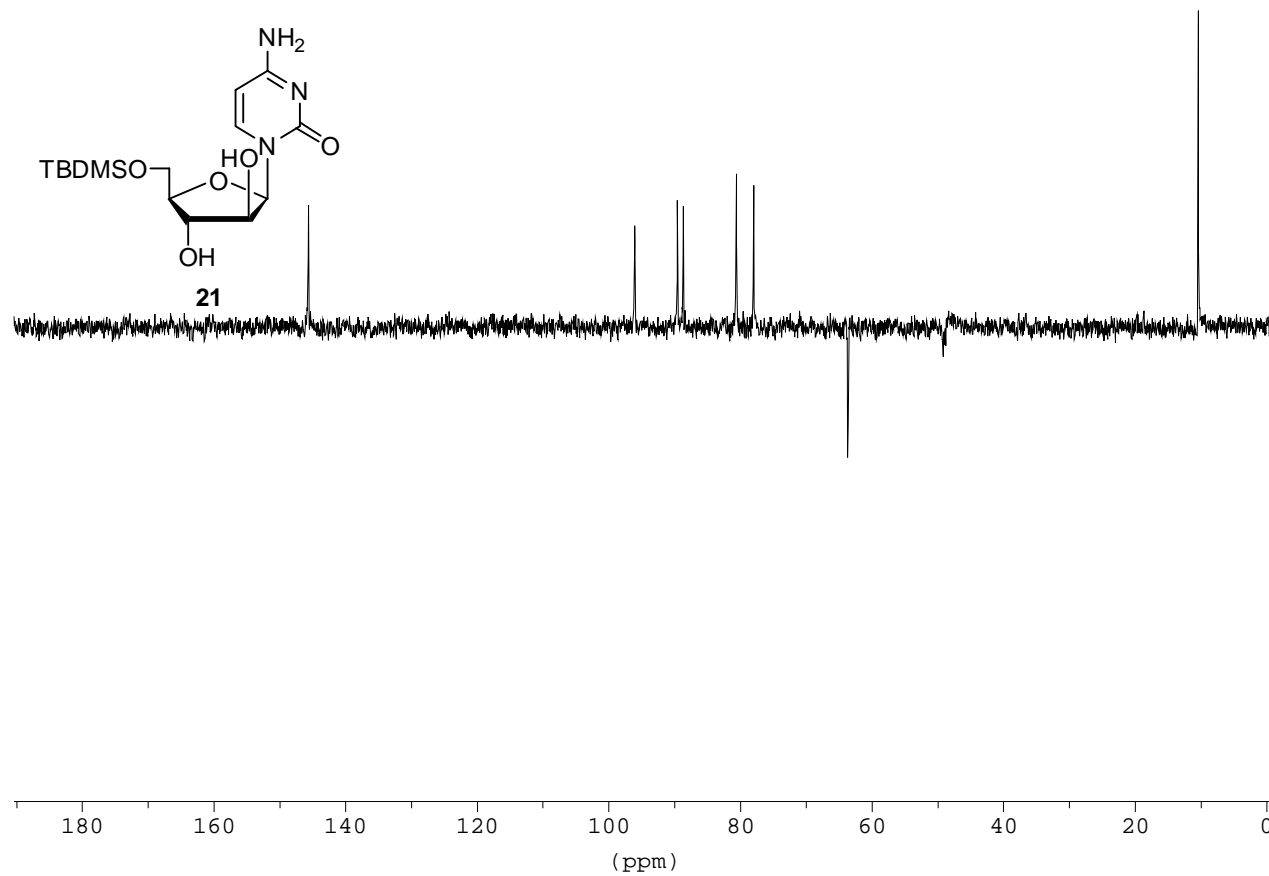


21



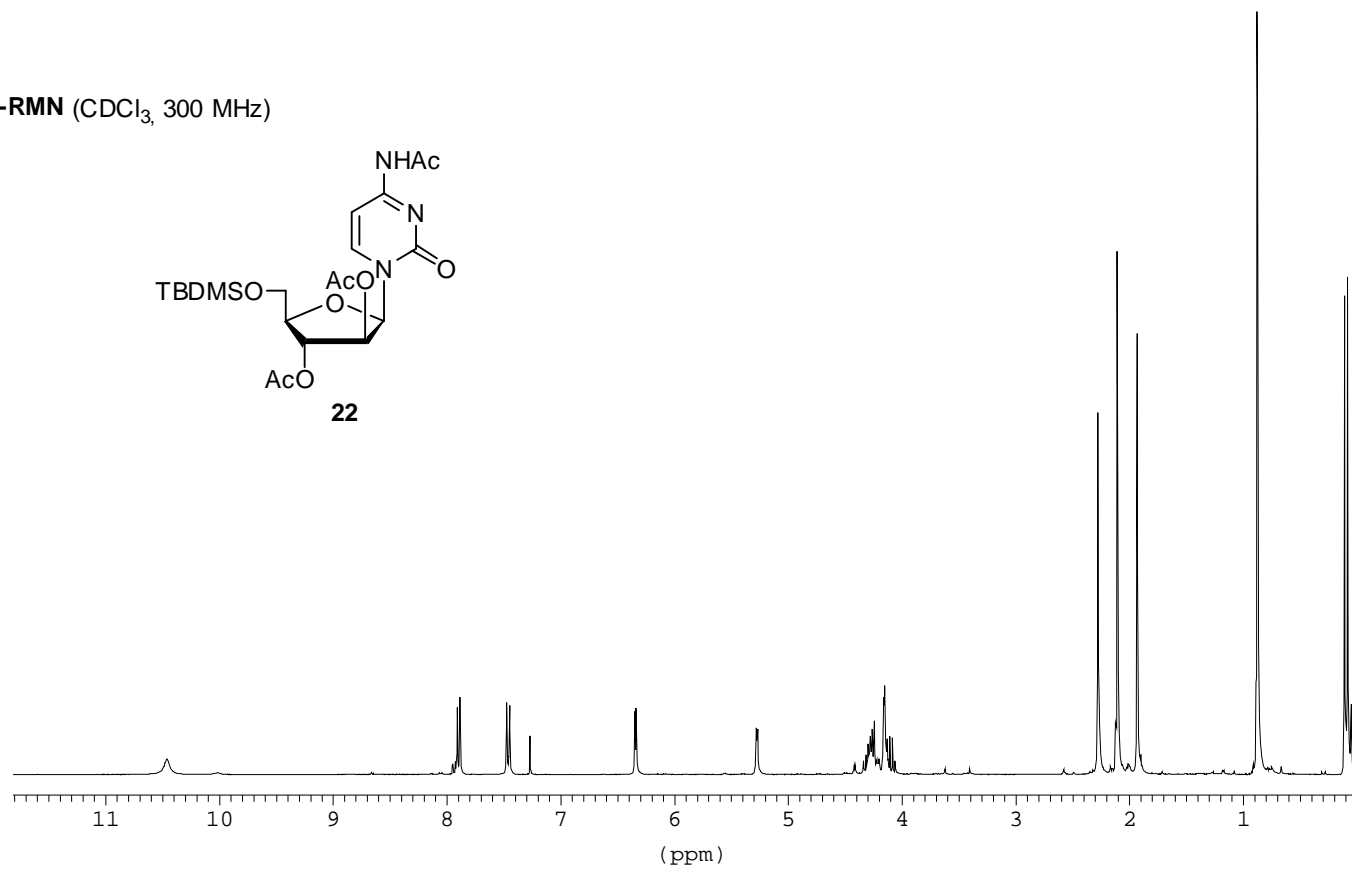
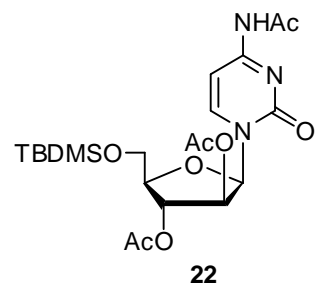
1-(5'-*O*-*tert*-butyldimethylsilyl)- β -D-arabinofuranosyl)cytosine (21)

DEPT (MeOH-*d*₄, 75.5 MHz)



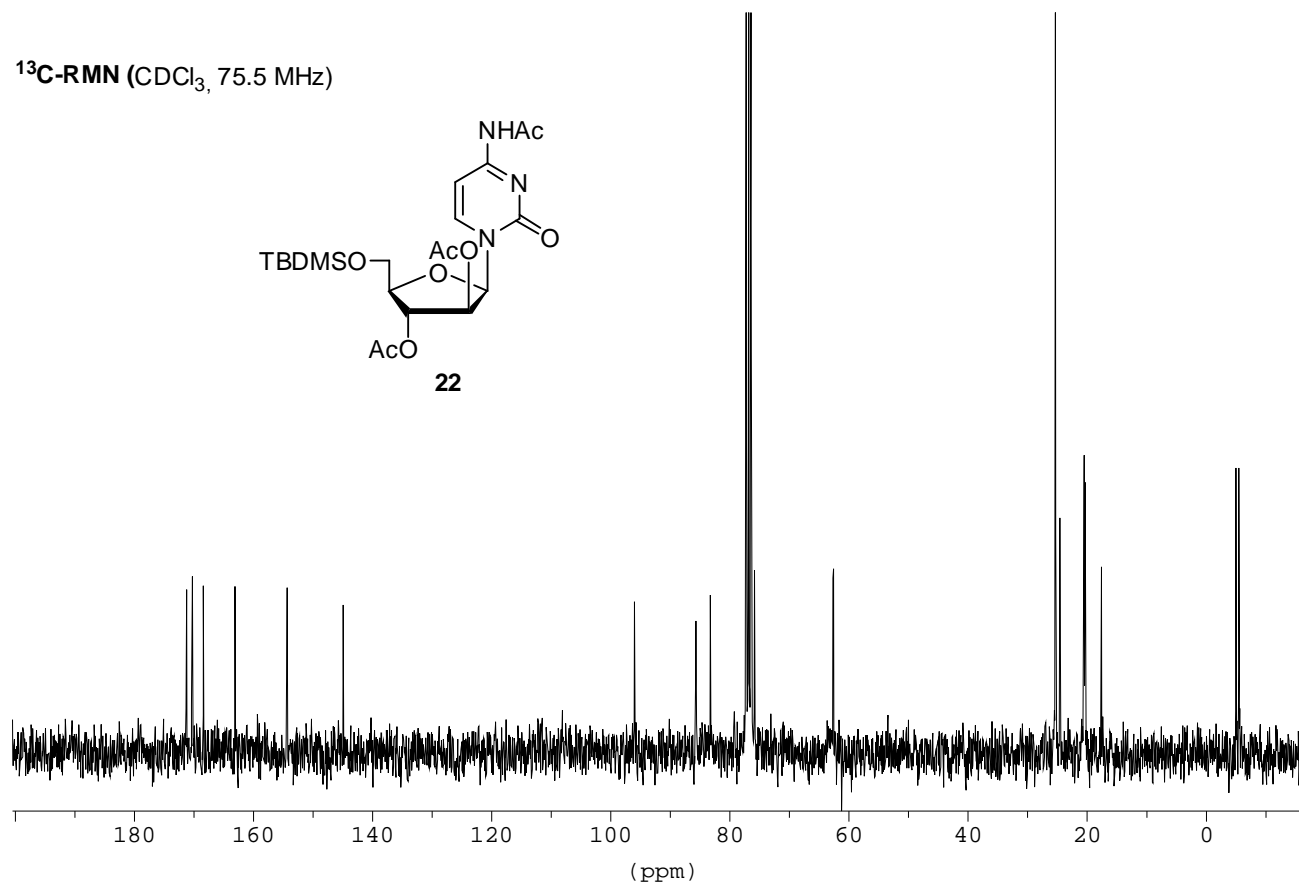
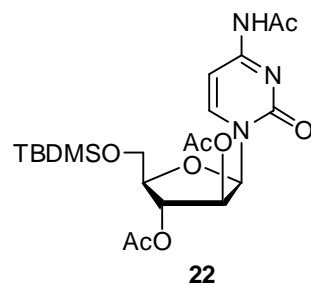
*N*⁴-acetyl-1-(2',3'-di-*O*-acetyl-5'-*O*-*tert*-butyldimethylsilyl)- β -D-arabinofuranosyl)cytosine (22)

¹H-RMN (CDCl₃, 300 MHz)



*N*⁴-acetyl-1-(2',3'-di-*O*-acetyl-5'-*O*-*tert*-butyldimethylsilyl)-β-D-arabinofuranosylcytosine (**22**)

¹³C-RMN (CDCl₃, 75.5 MHz)



*N*⁴-acetyl-1-(2',3'-di-*O*-acetyl-5'-*O*-*tert*-butyldimethylsilyl)- β -D-arabinofuranosyl)cytosine (**22**)

DEPT (CDCl₃, 75.5 MHz)

