

Supporting Information for

3-C-Aminoalkyl Modification in the Ribofuranosyl Ring of Apralogs (5-*O*-Ribofuranosyl Apramycins) for Enhanced Antibacterial Activity

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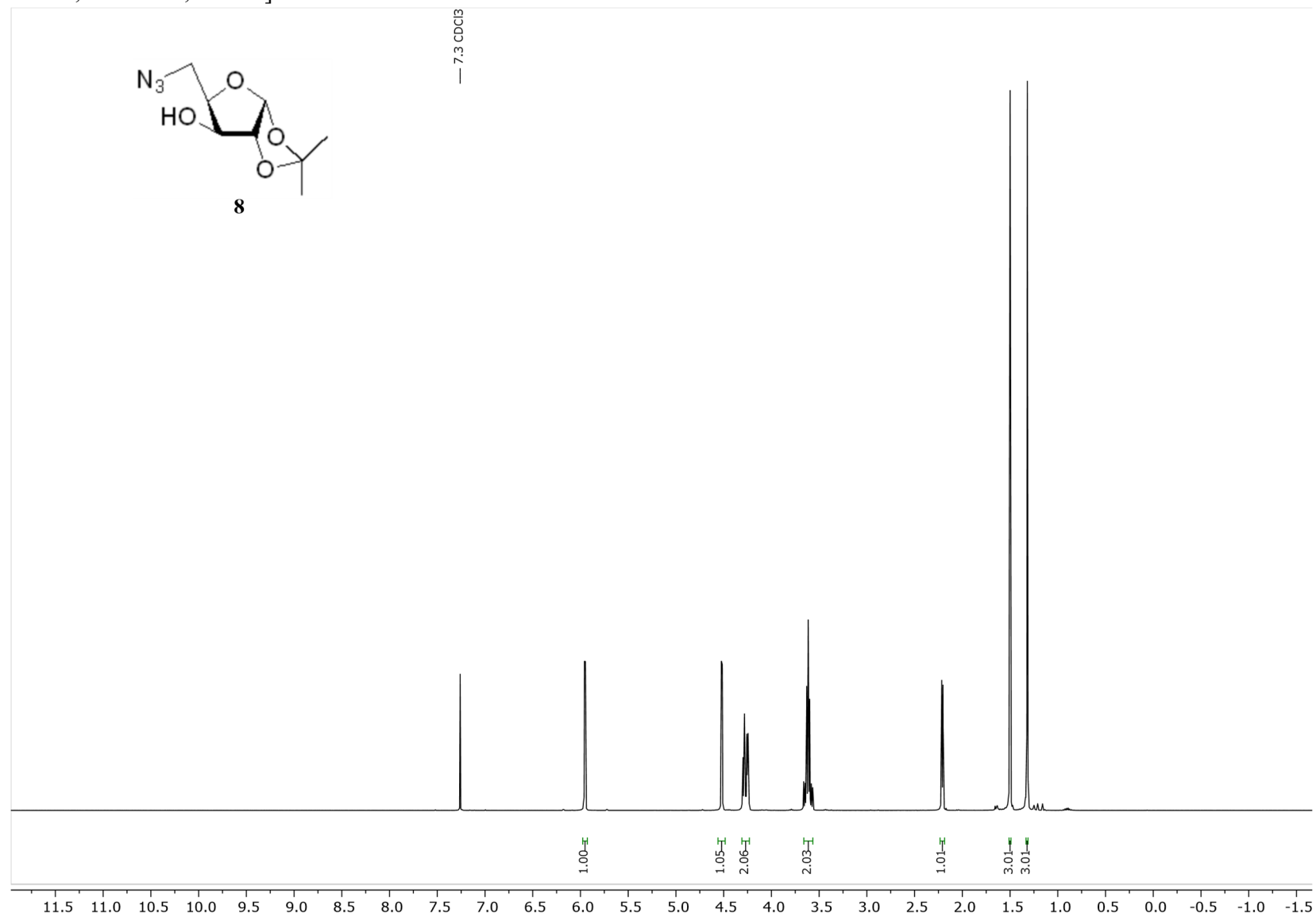
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- b) Institute of Medical Microbiology, University of Zurich, Gloriastrasse 30, 8006 Zürich, Switzerland
- c) Organic Chemistry Laboratory, ETH Zürich, Vladimir-Prelog-Weg 1-5/10, 8093 Zürich, Switzerland
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- f) Department of Chemistry, University of Georgia, 302 East Campus Road, Athens, GA 30602, USA

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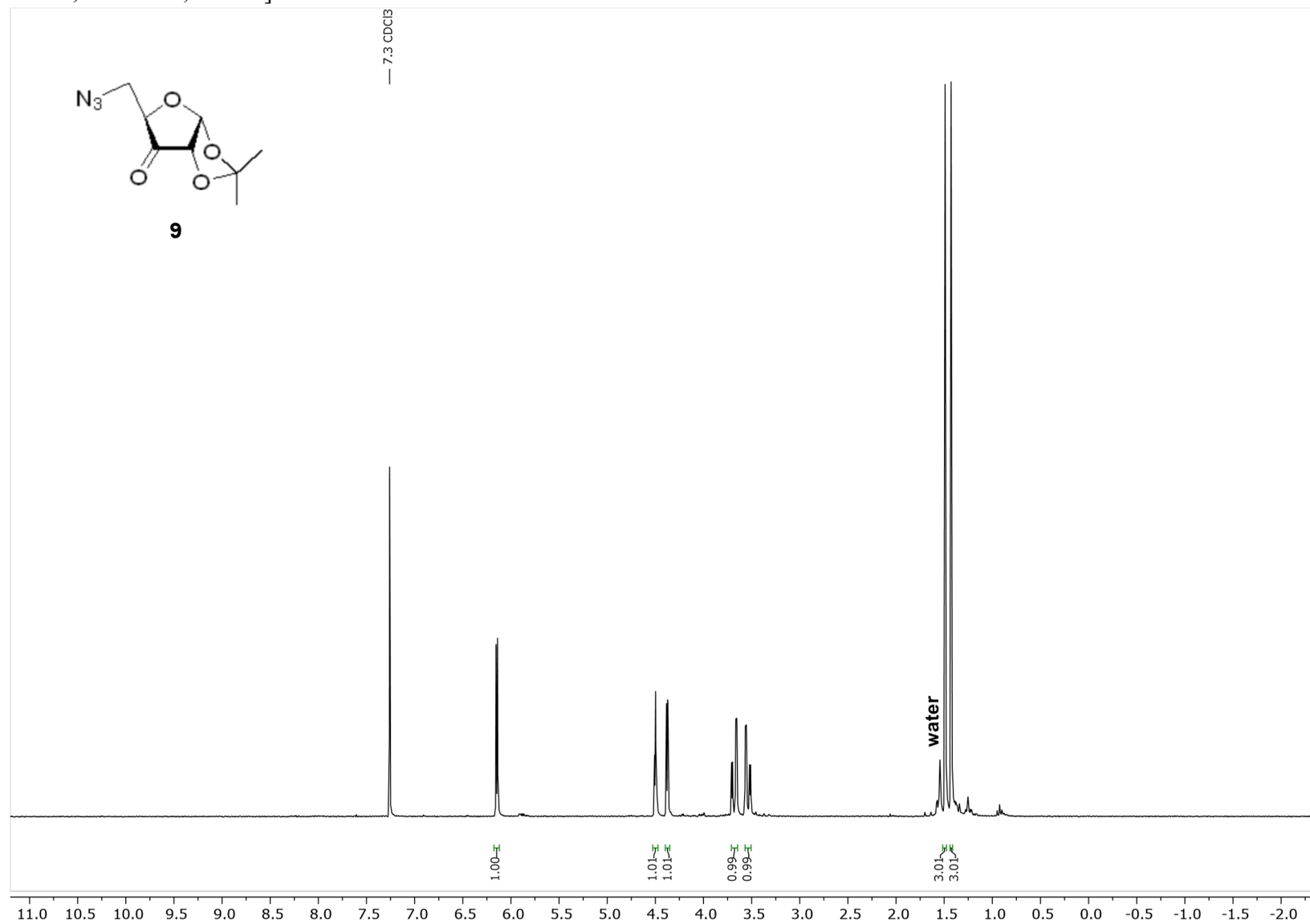
5-Azido-5-deoxy-1,2-*O*-isopropylidene- α -D-xilofuranose (8)

[^1H NMR, 400 MHz, CDCl_3]



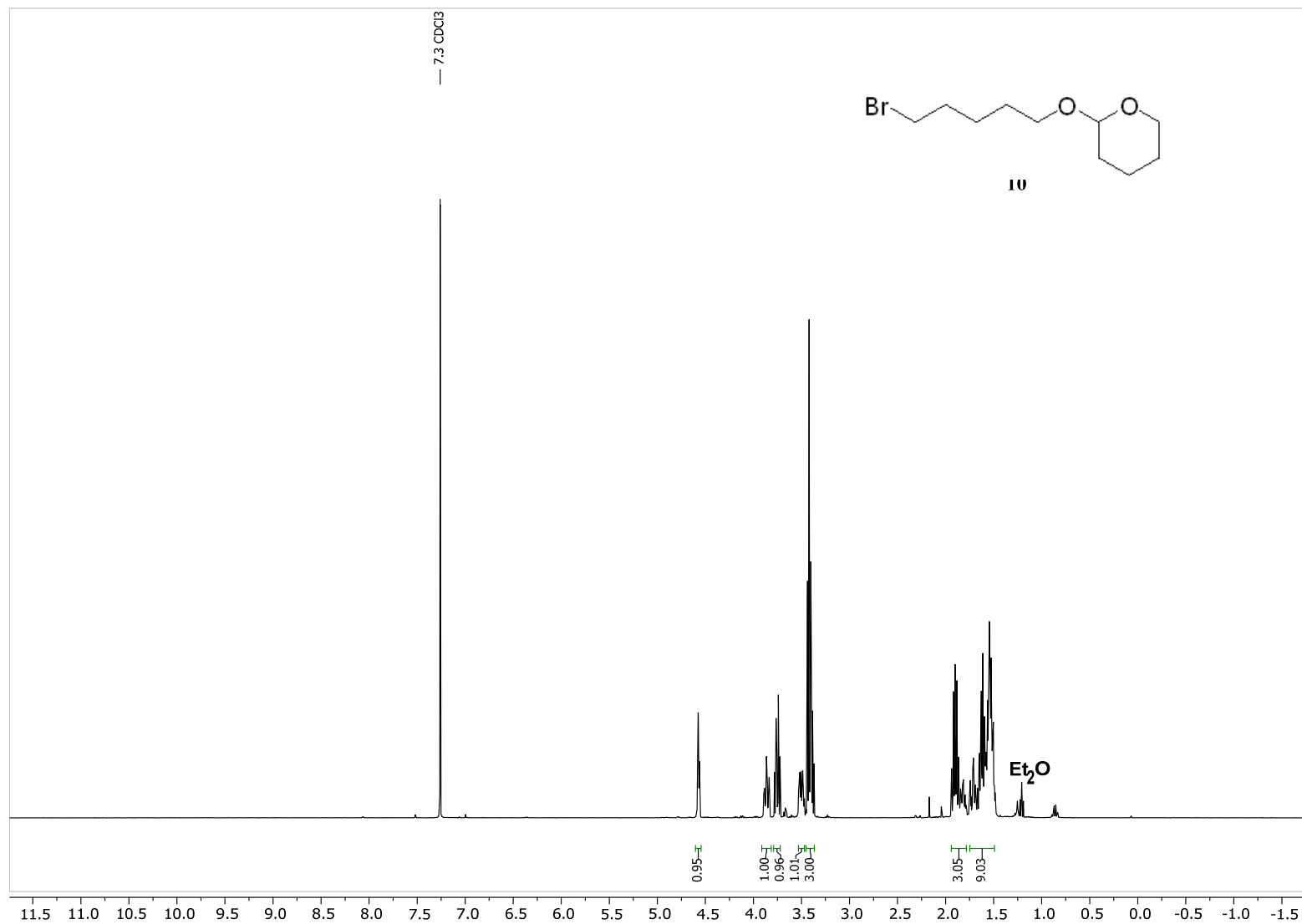
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[^1H NMR, 400 MHz, CDCl_3]



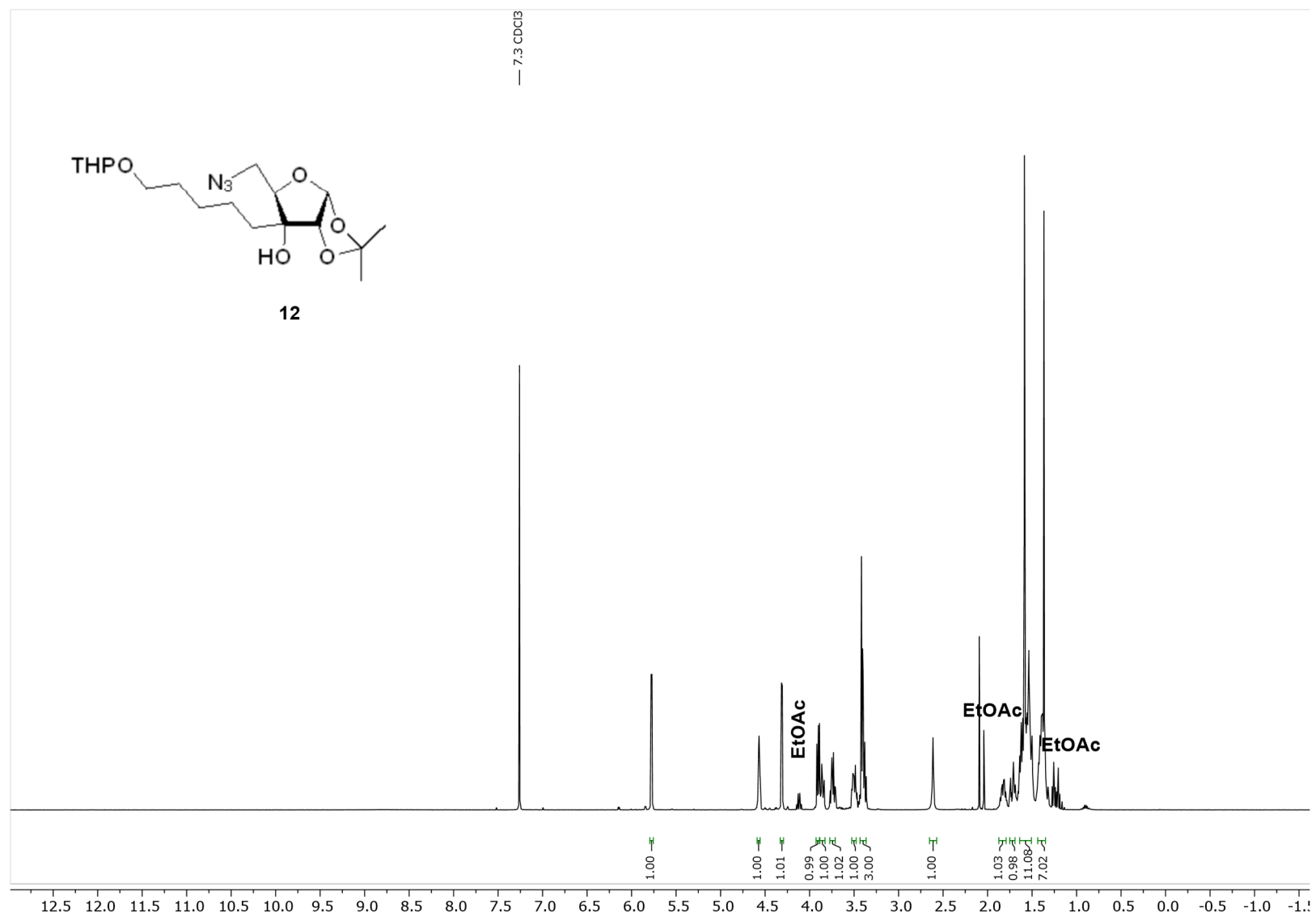
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[¹H NMR, 400 MHz, CDCl₃]



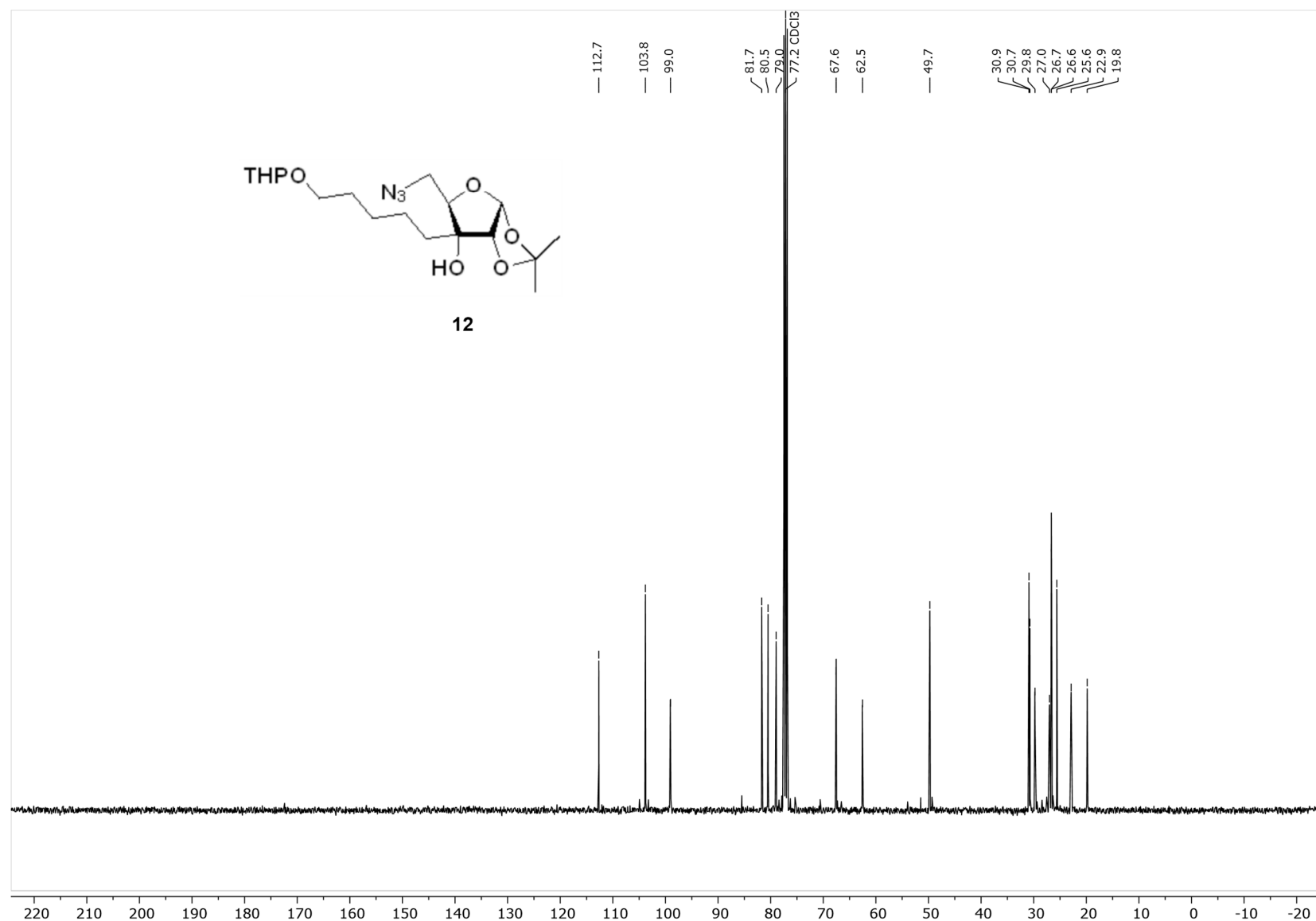
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(6-(5-(((tetrahydro-2H-pyran-2-yl)oxy)pentyl)- α -D-ribofuranose (12)

[^1H NMR, 400 MHz, CDCl_3]



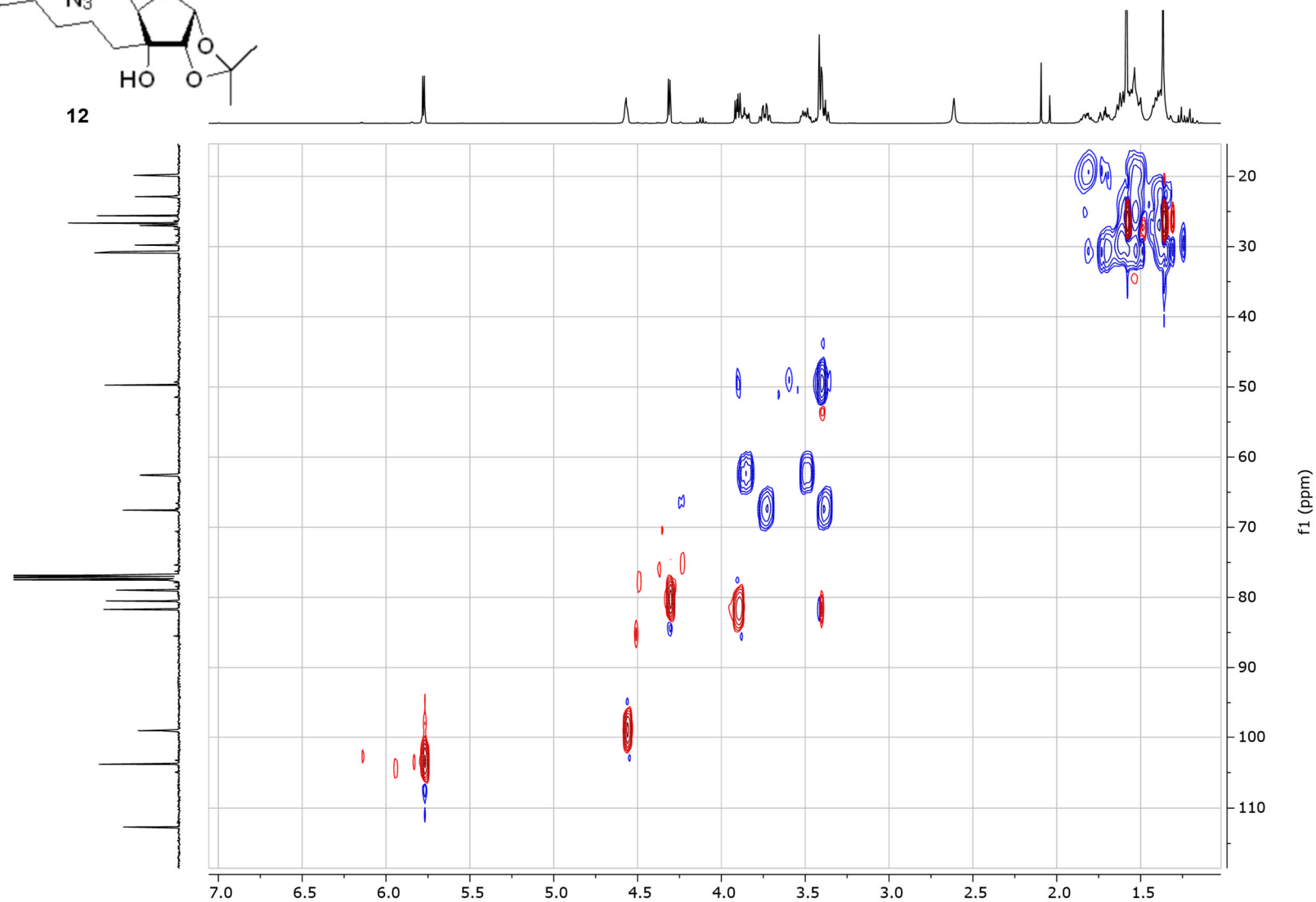
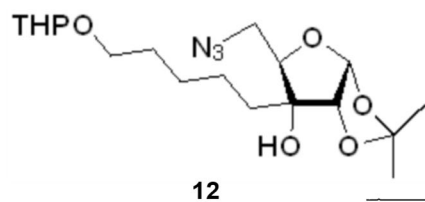
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(6-(5-(((tetrahydro-2H-pyran-2-yl)oxy)pentyl)- α -D-ribofuranose (12)

[^{13}C NMR, 101 MHz, CDCl_3]



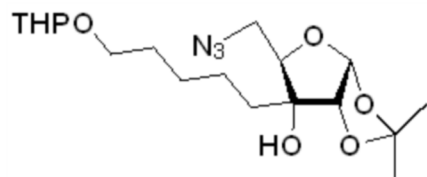
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(6-(5-(((tetrahydro-2H-pyran-2-yl)oxy)pentyl)- α -D-ribofuranose (12)

[HSQC, 400 MHz, CDCl₃]



5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(6-(5-(((tetrahydro-2H-pyran-2-yl)oxy)pentyl)- α -D-ribofuranose (12)

[HMBC, 400 MHz, CDCl₃]

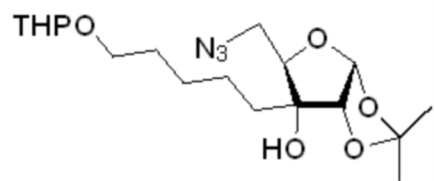


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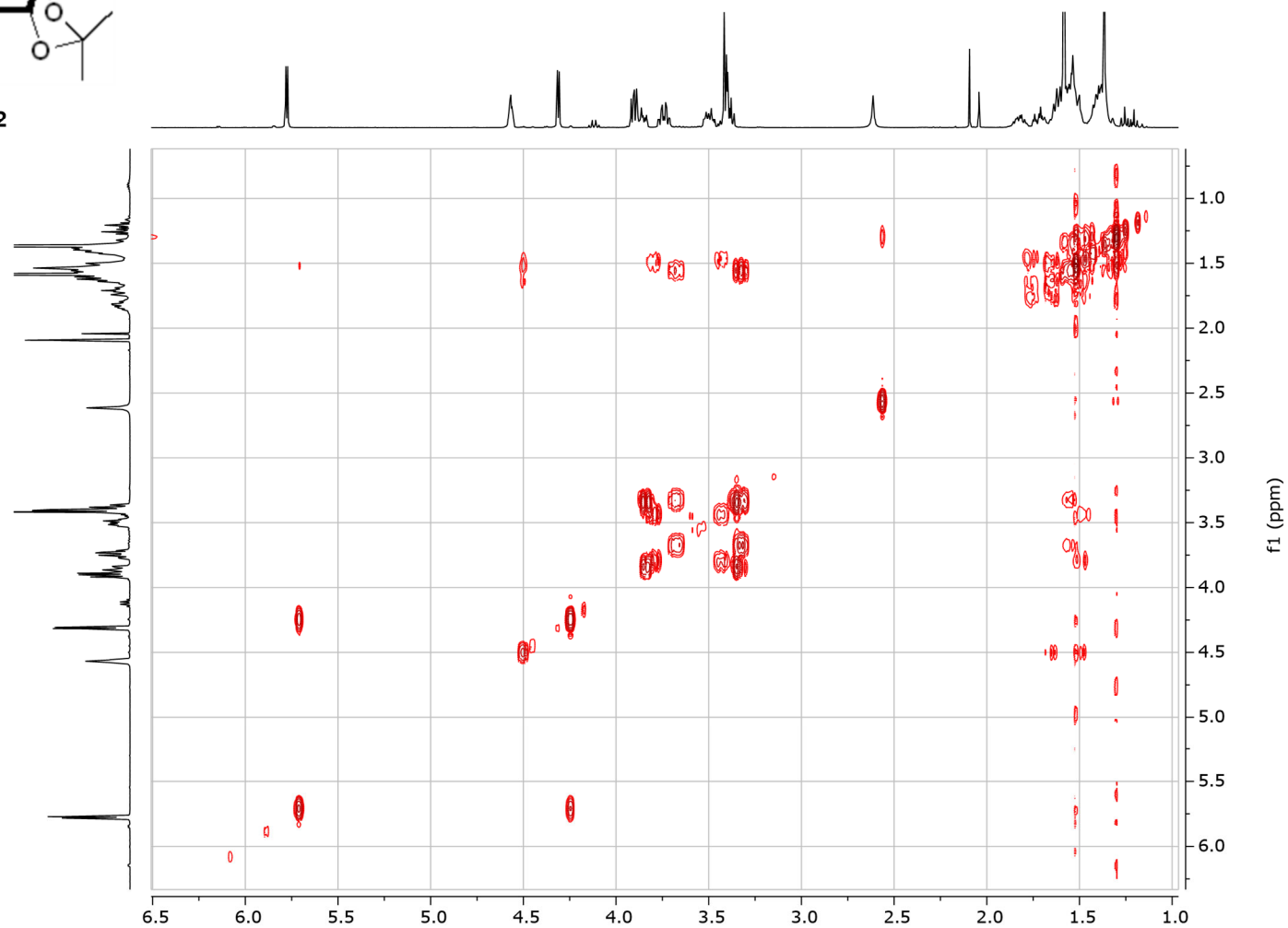


5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(6-(5-(((tetrahydro-2H-pyran-2-yl)oxy)pentyl)- α -D-ribofuranose (12)

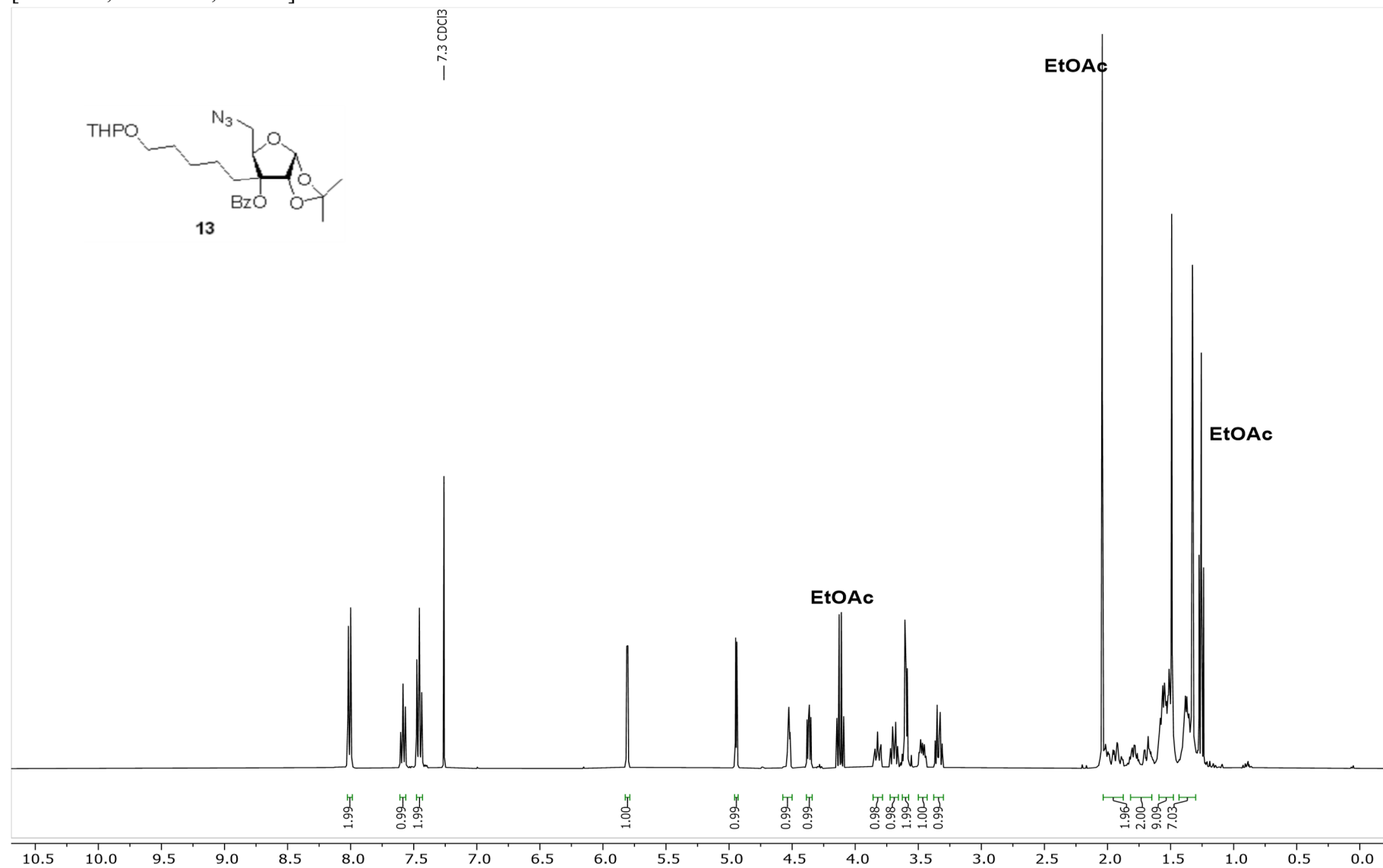
[COSY, 400 MHz, CDCl₃]



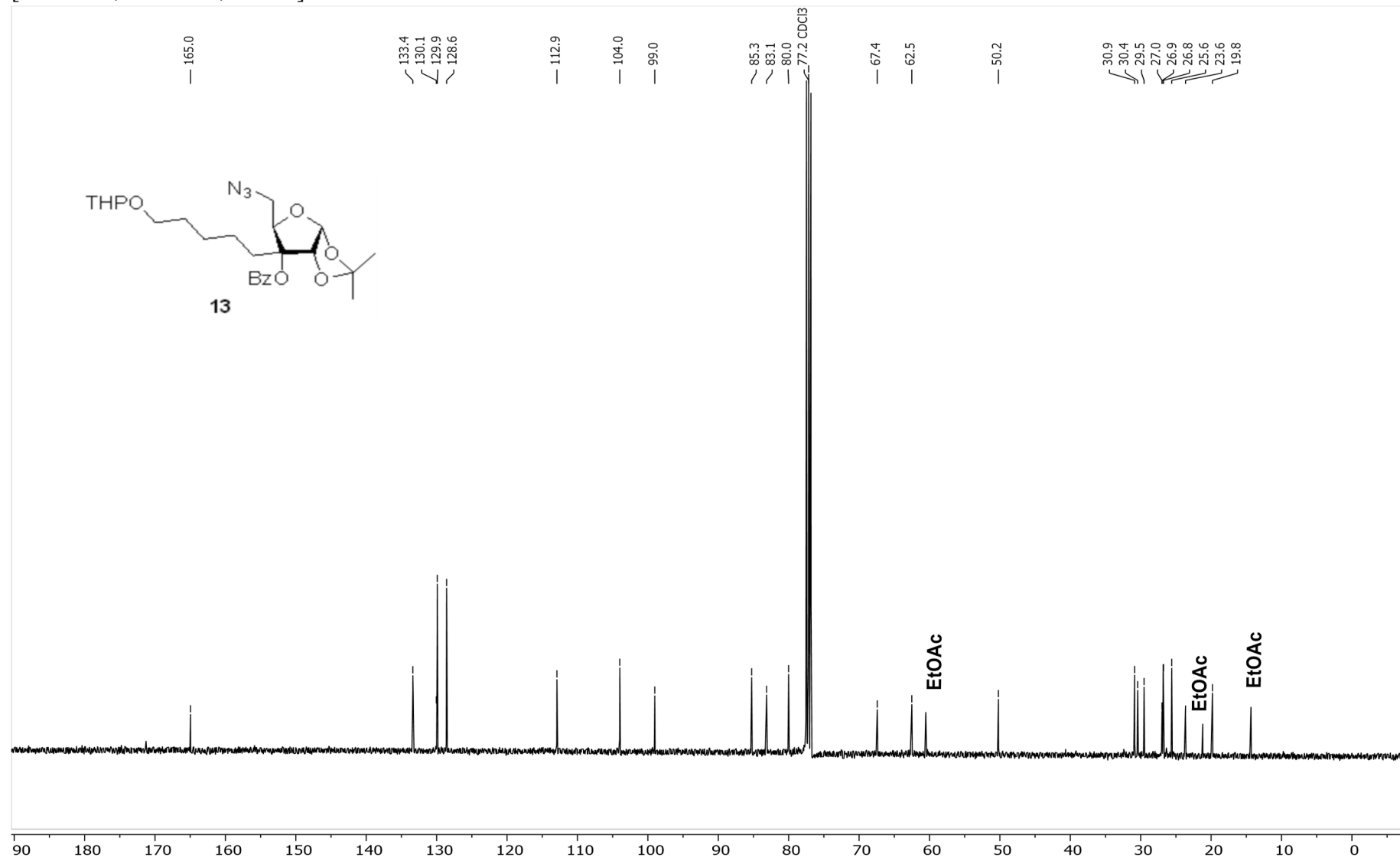
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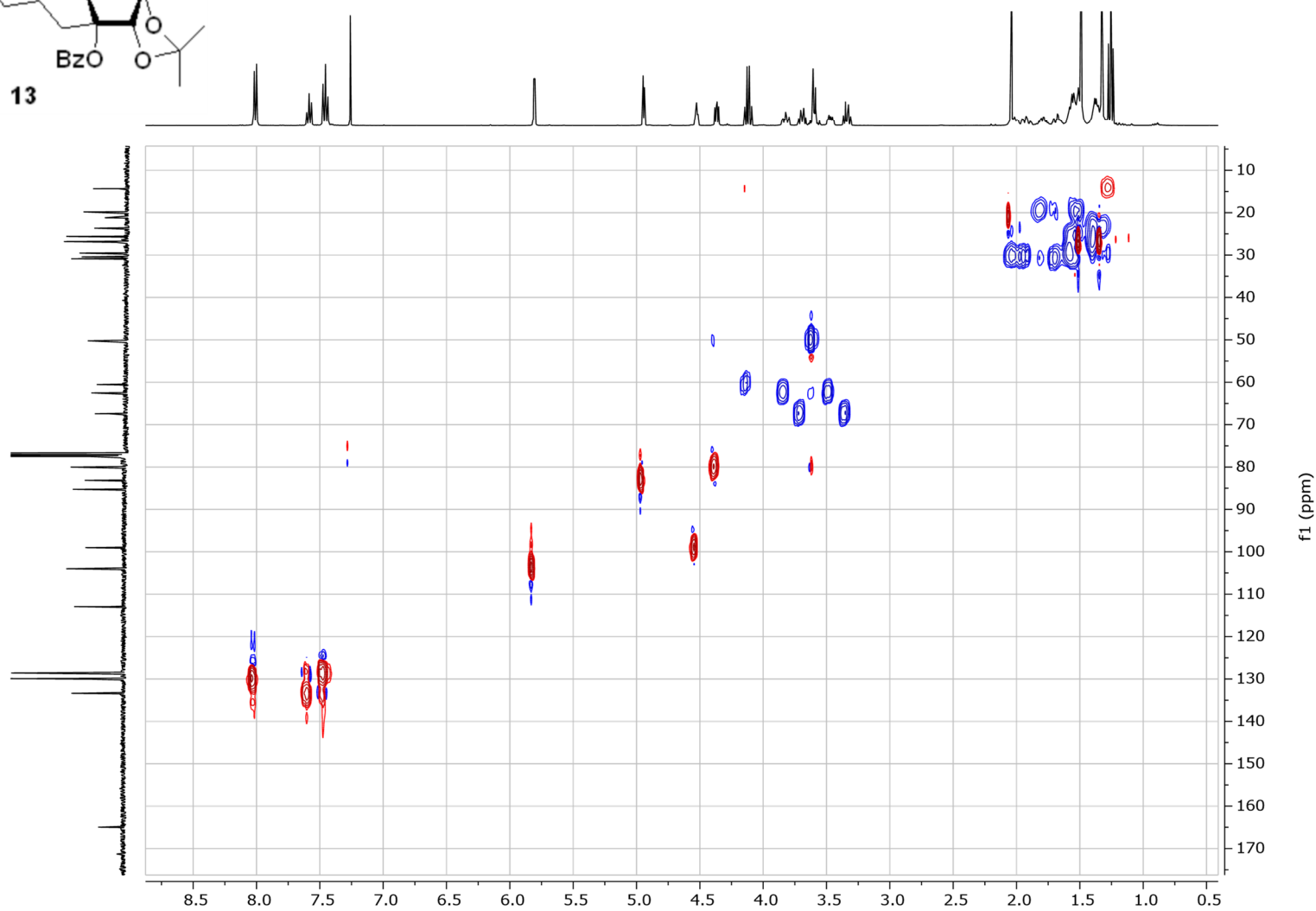
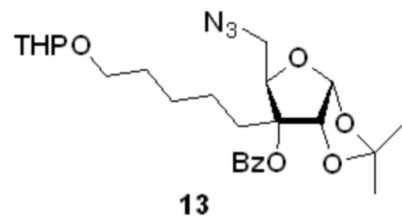
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 ^1H NMR, 400 MHz, CDCl_3



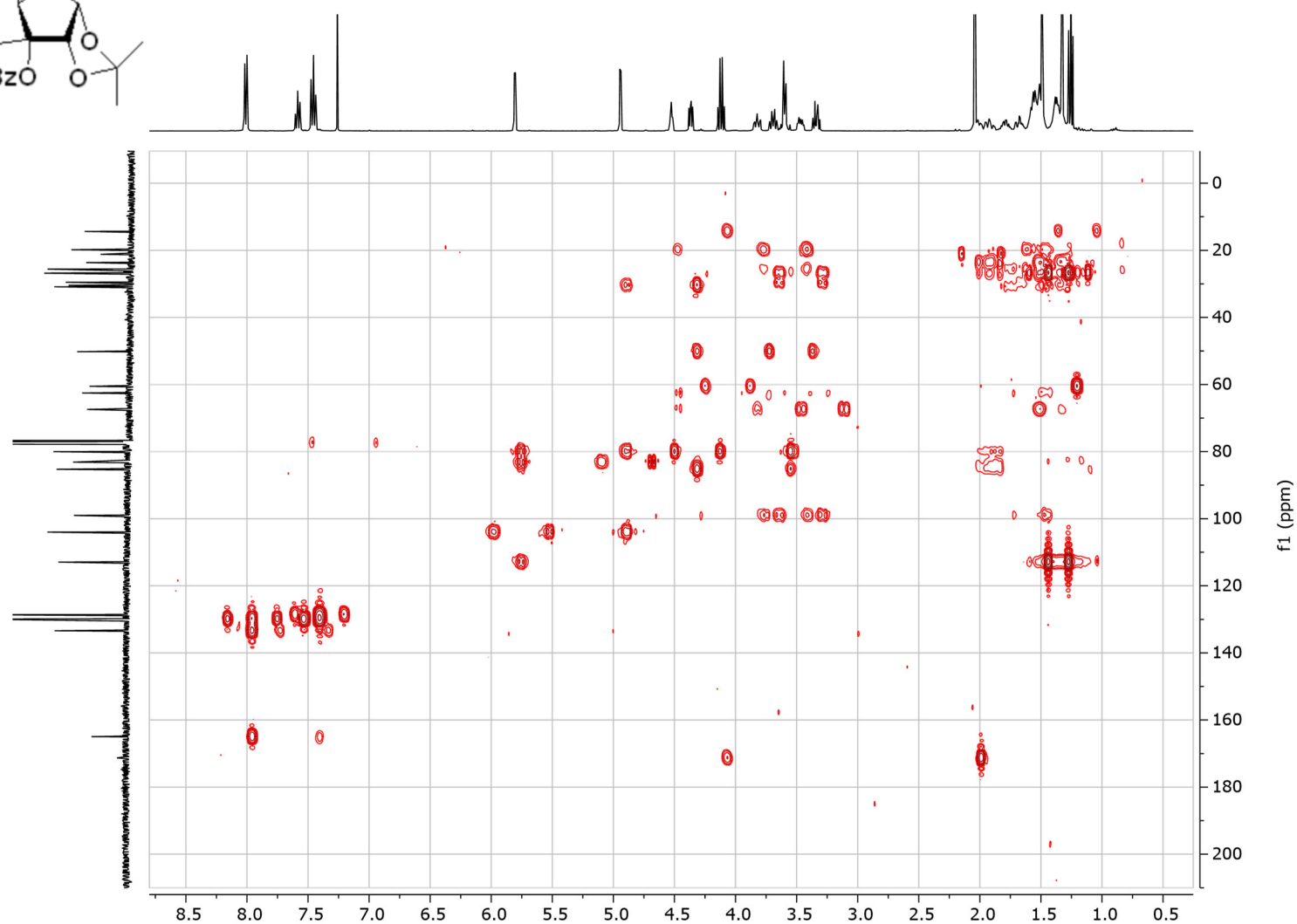
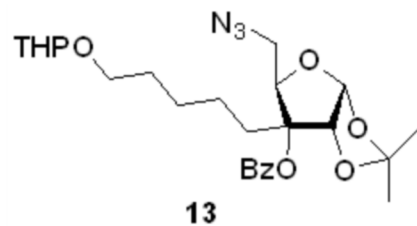
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¹³C NMR, 101 MHz, CDCl₃]



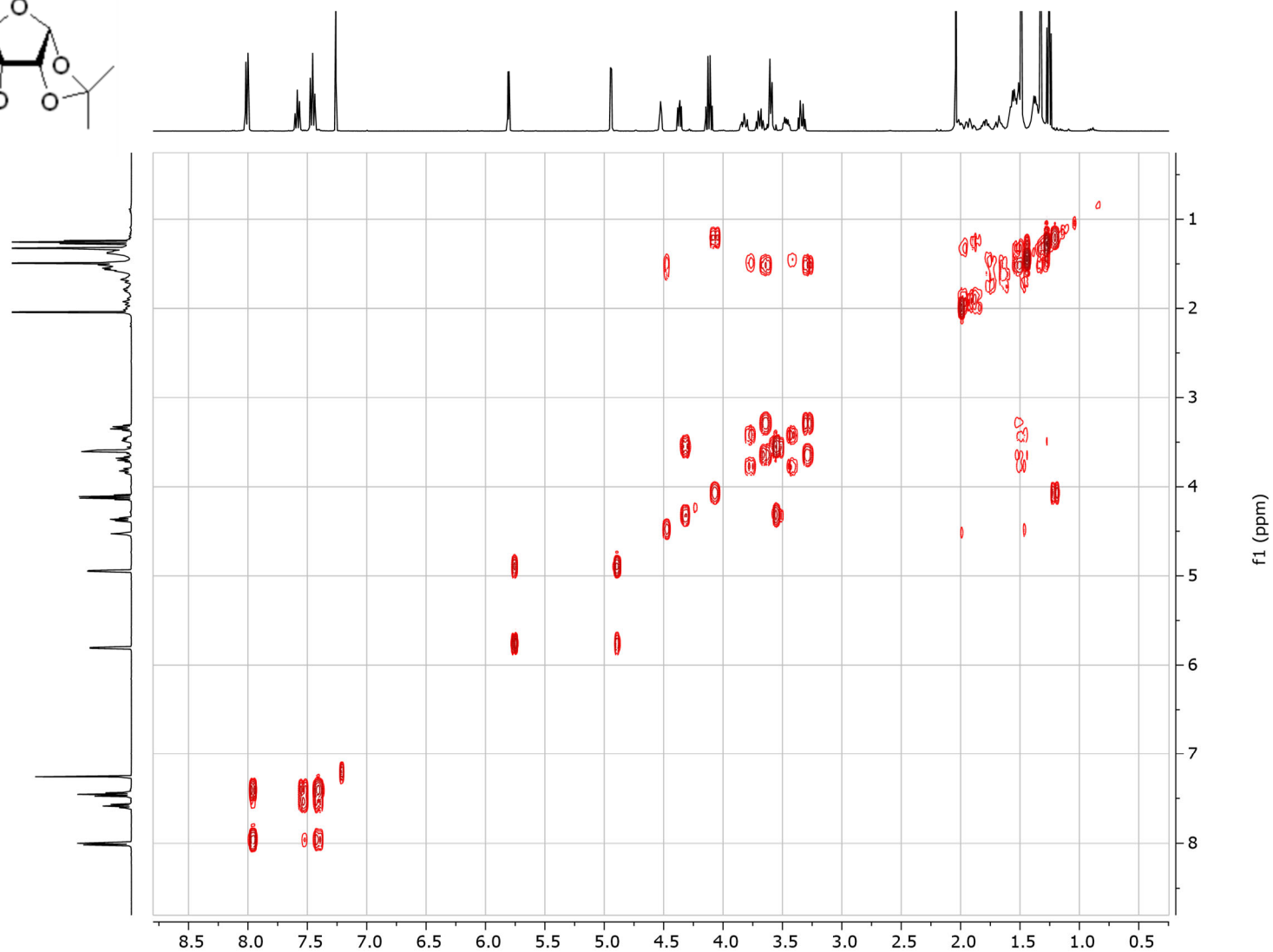
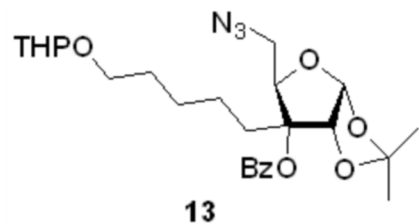
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(6-(5-(((tetrahydro-2H-pyran-2-yl)oxy)pentyl)-3-*O*-benzoyl- α -D-ribofuranose (13)
 [HSQC, 400 MHz, CDCl₃]



5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(6-(5-(((tetrahydro-2H-pyran-2-yl)oxy)pentyl)-3-*O*-benzoyl- α -D-ribofuranose (13)
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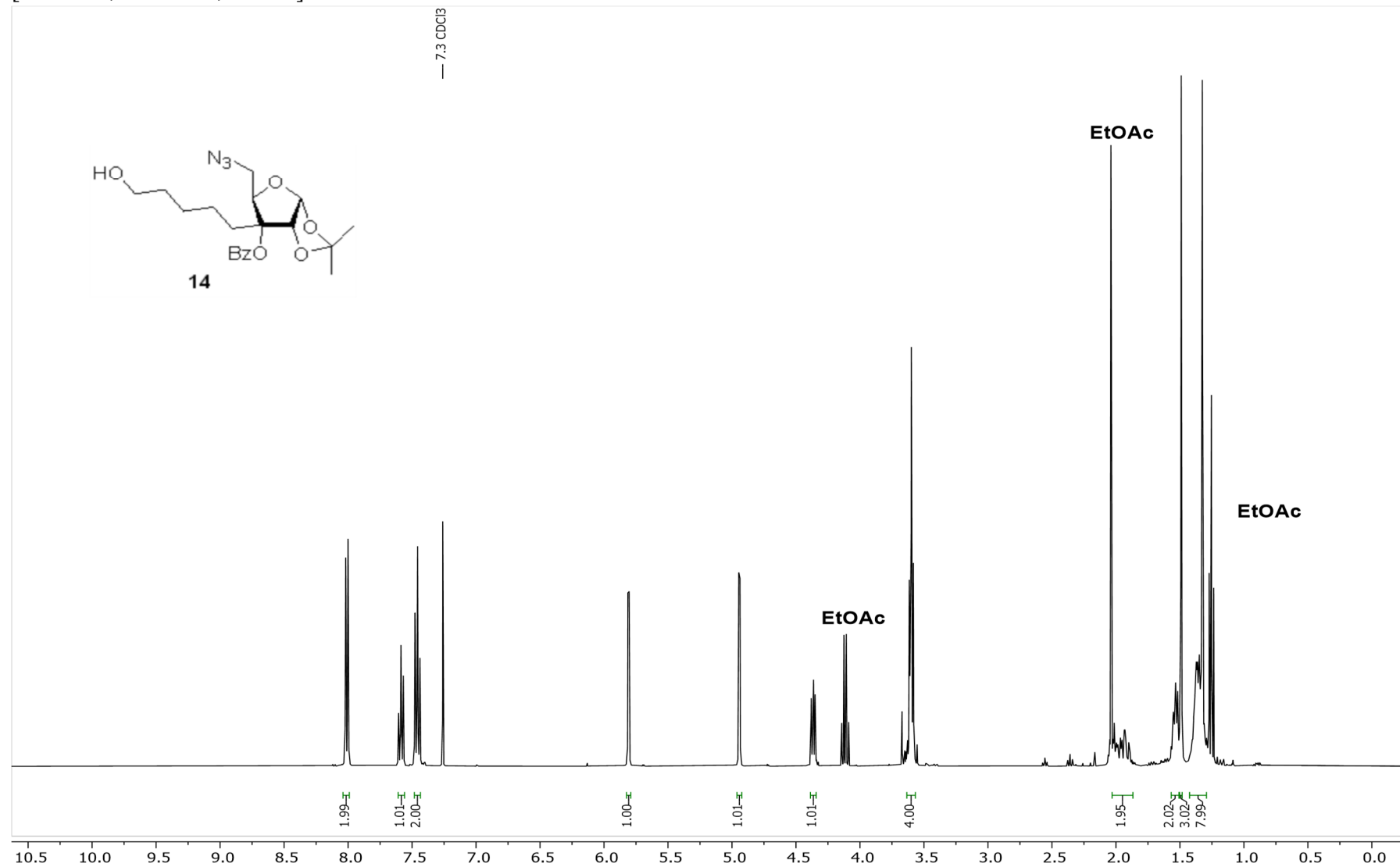


5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(6-(5-(((tetrahydro-2H-pyran-2-yl)oxy)pentyl)-3-*O*-benzoyl- α -D-ribofuranose (13)
 [COSY, 400 MHz, CDCl₃]



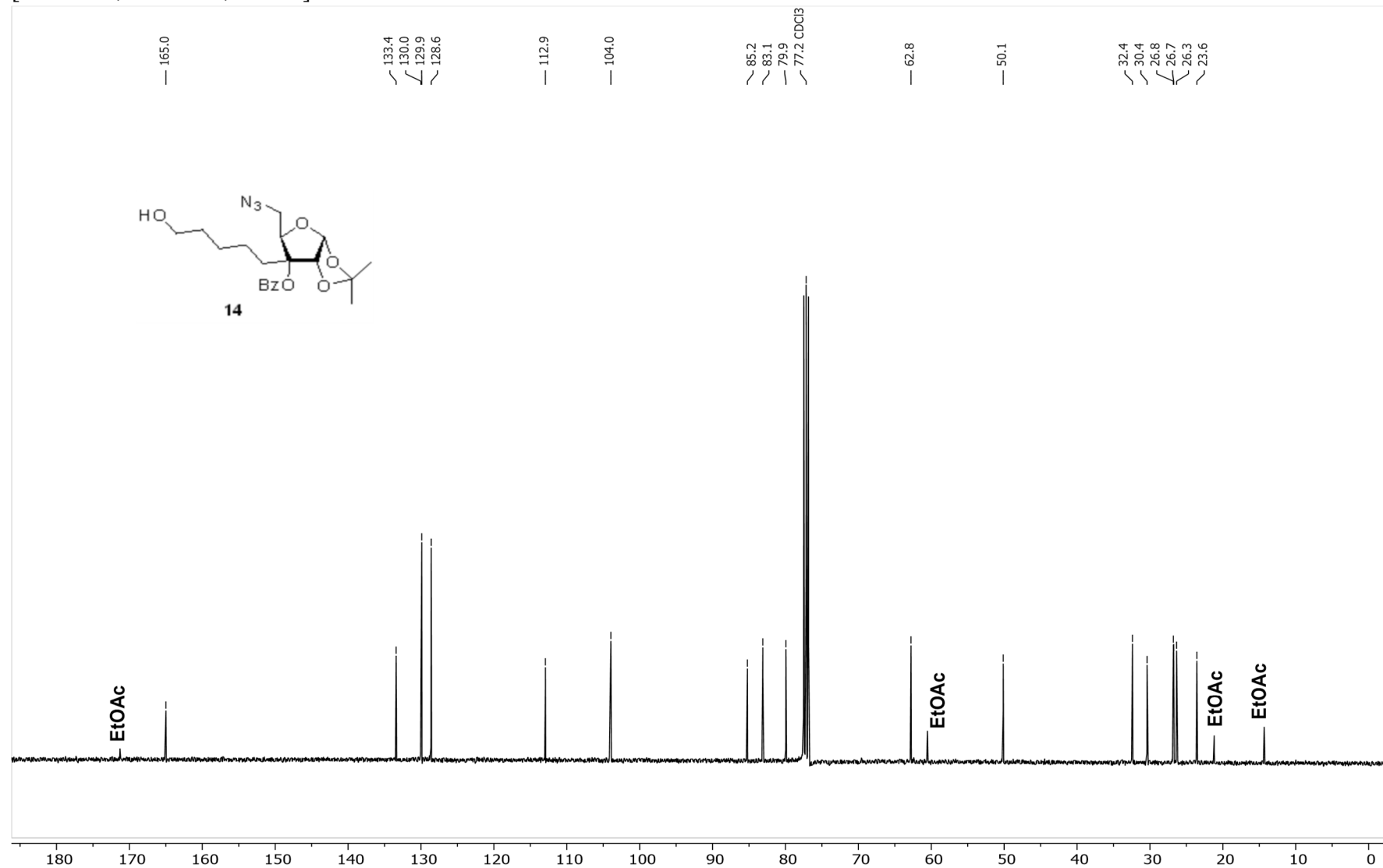
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-hydroxypentyl)-3-*O*-benzoyl- α -D-ribofuranose (14)

[^1H NMR, 400 MHz, CDCl_3]



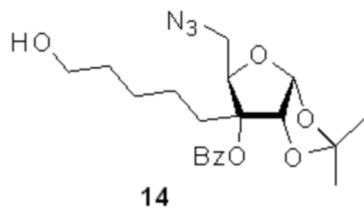
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-hydroxypentyl)-3-*O*-benzoyl- α -D-ribofuranose (14)

[^{13}C NMR, 101 MHz, CDCl_3]

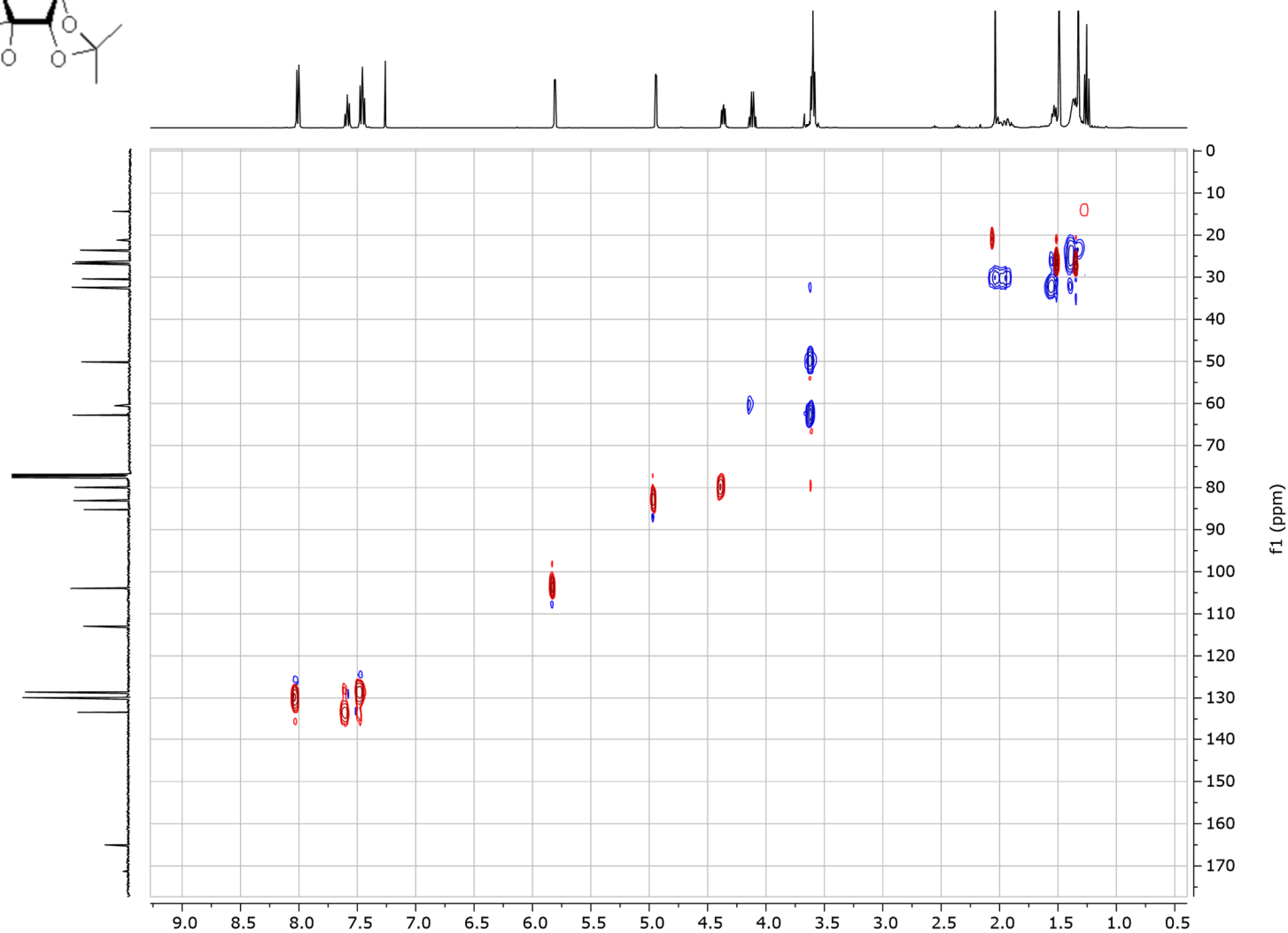


Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-hydroxypentyl)-3-*O*-benzoyl- α -D-ribofuranose (14)

[HSQC, 400 MHz, CDCl₃]

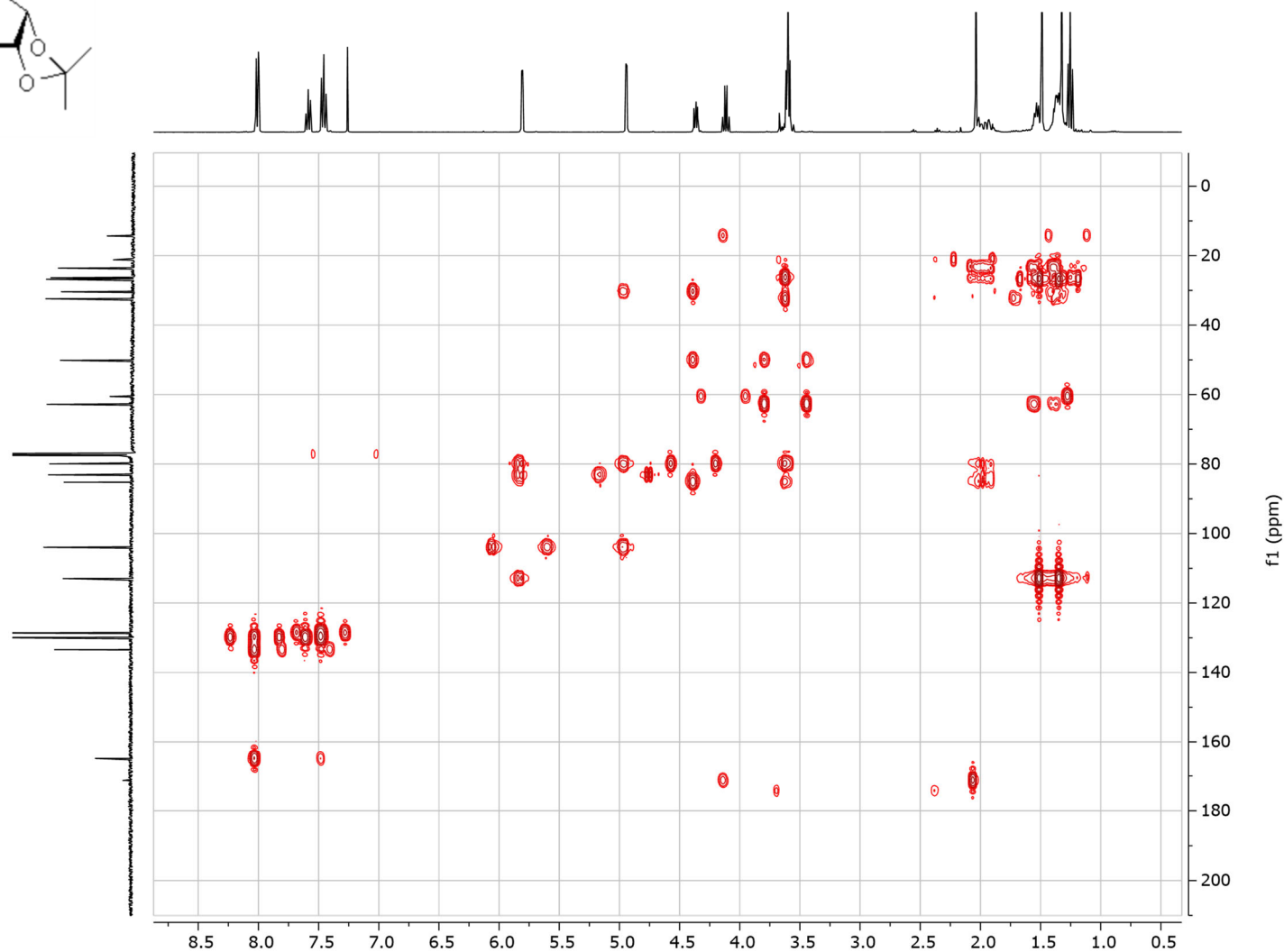
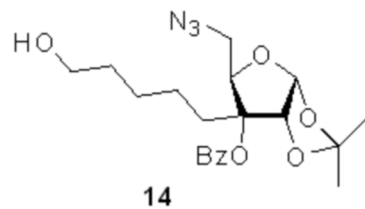


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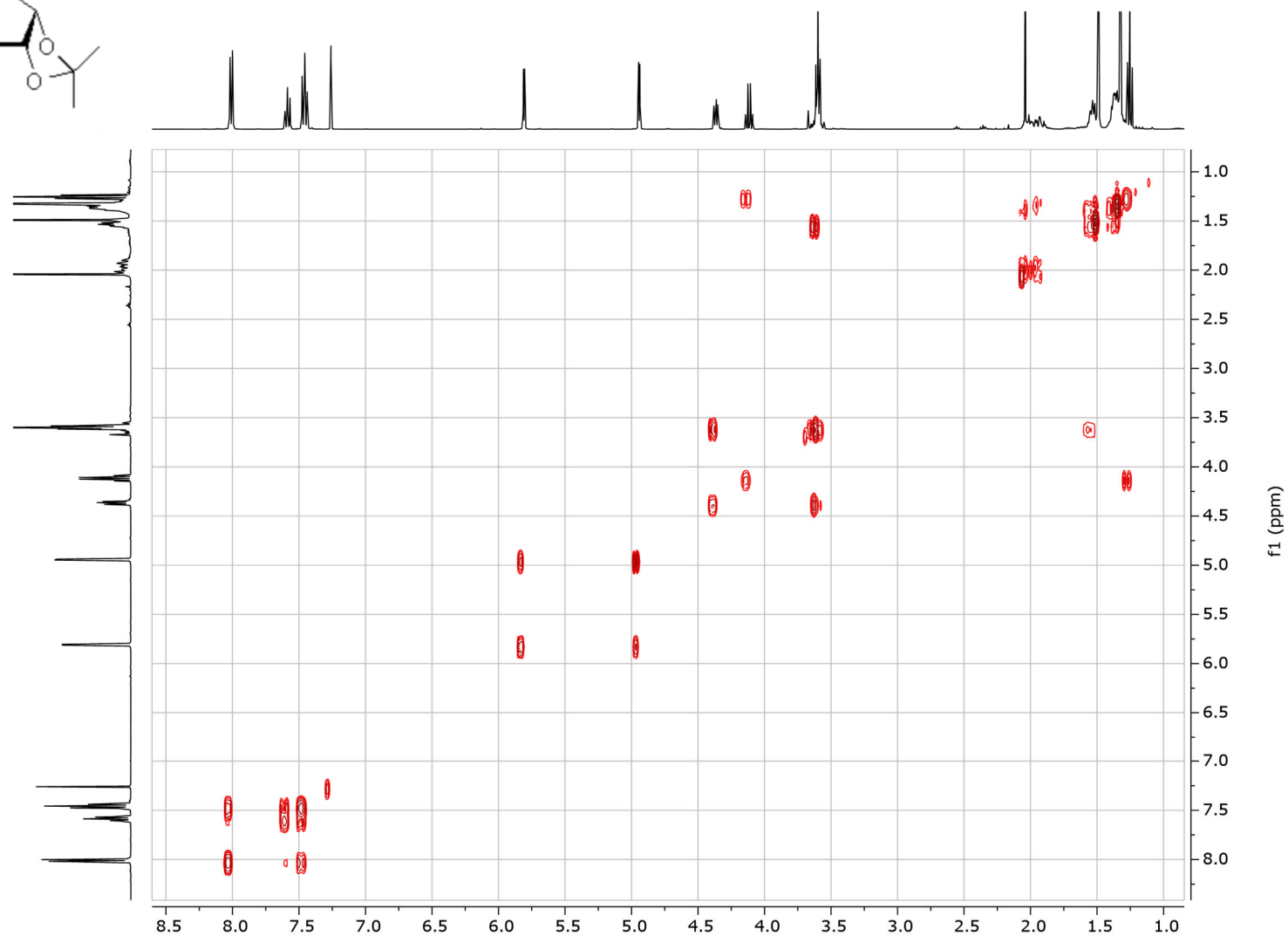
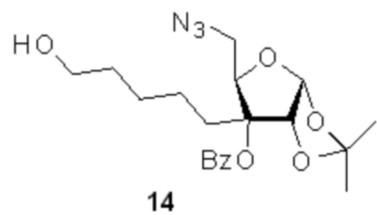
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-hydroxypentyl)-3-*O*-benzoyl- α -D-ribofuranose (14)

[HMBC, 400 MHz, CDCl₃]



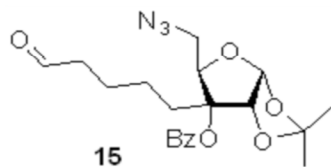
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-hydroxypentyl)-3-*O*-benzoyl- α -D-ribofuranose (14)

[COSY, 400 MHz, CDCl₃]



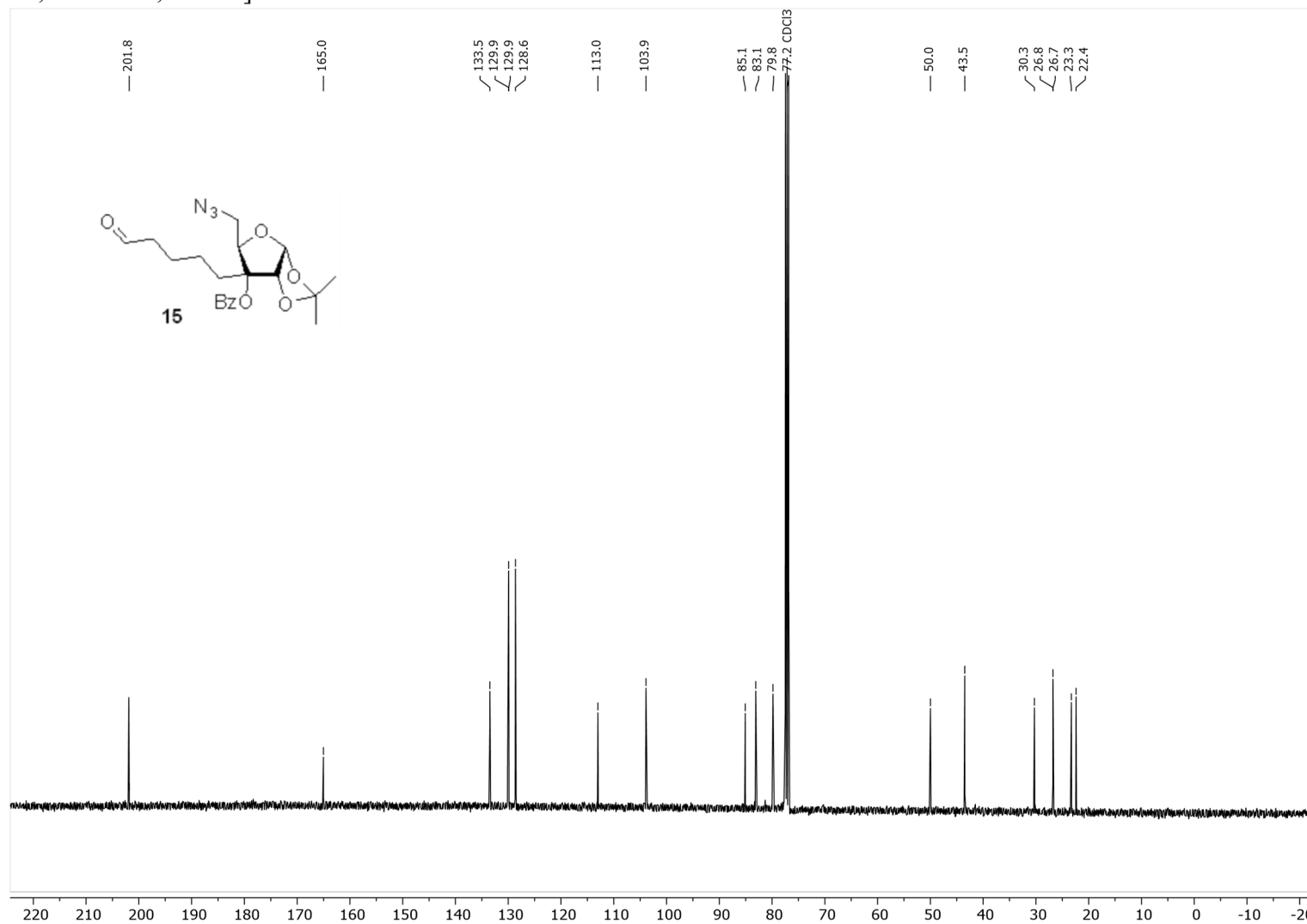
[¹H NMR, 400 MHz, CDCl₃]

[¹H NMR, 400 MHz, CDCl₃]



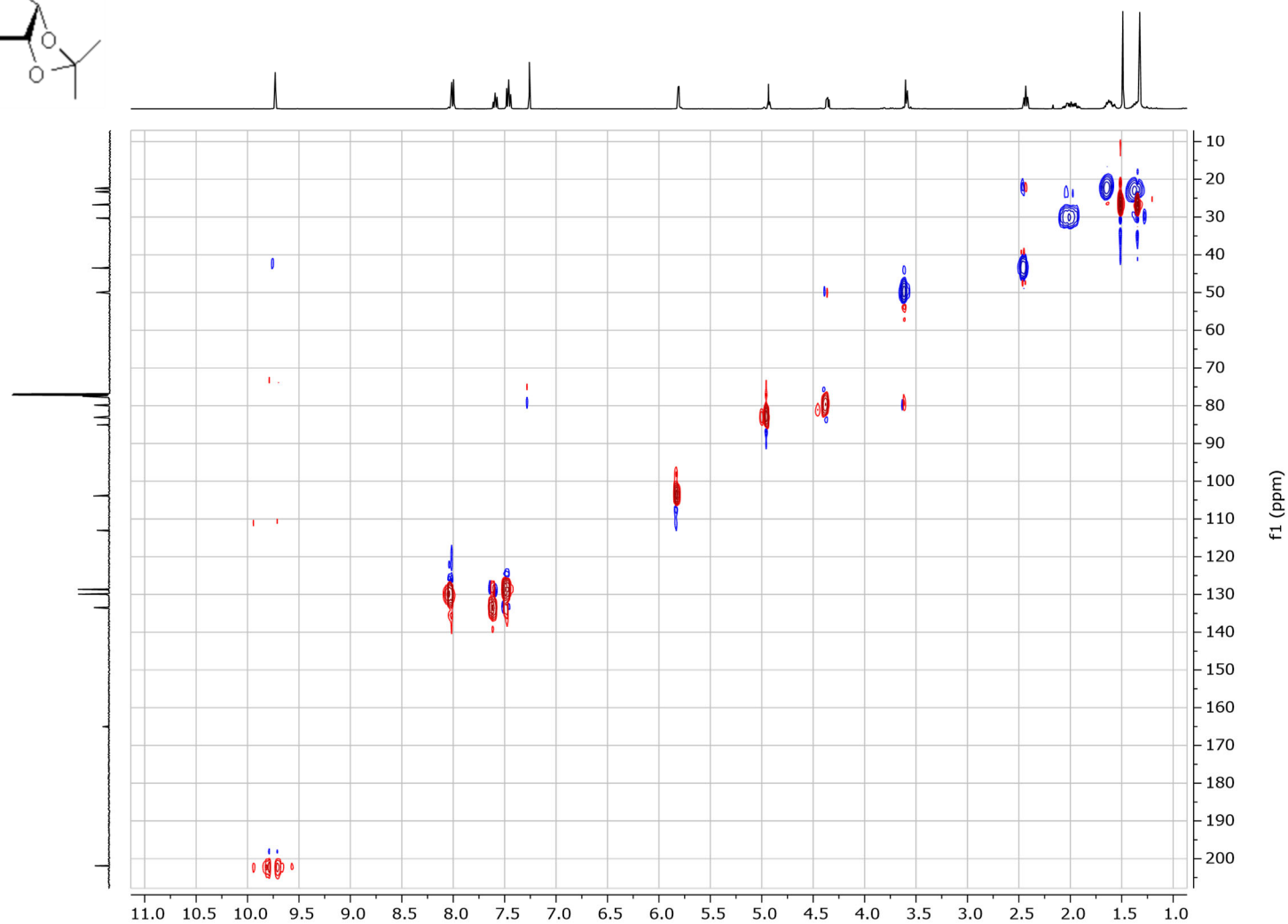
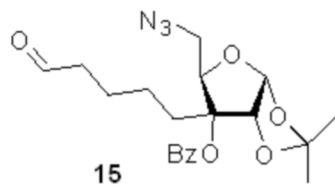
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-oxopentyl)-3-*O*-benzoyl- α -D-ribofuranose (15)

[^{13}C NMR, 101 MHz, CDCl_3]



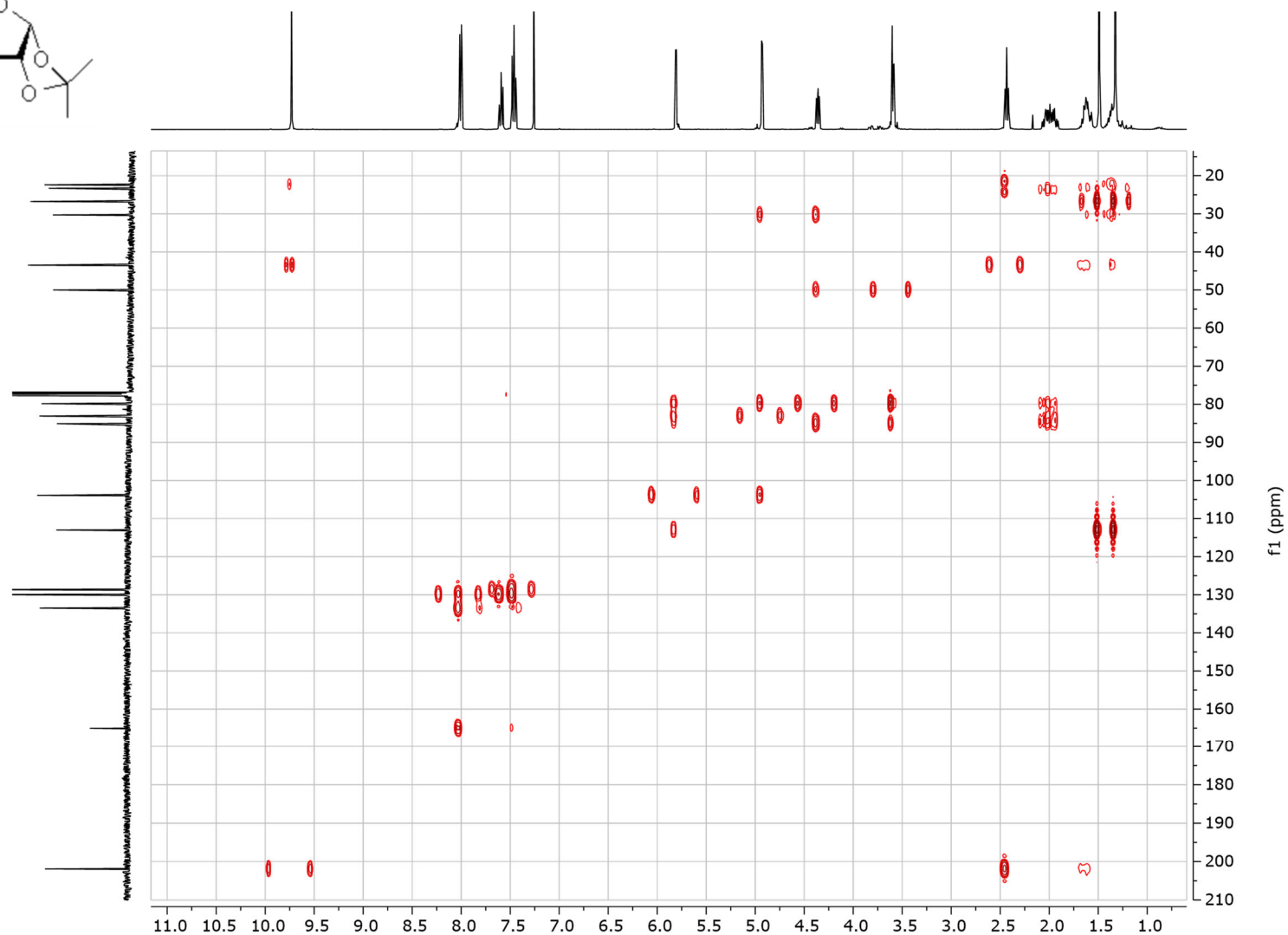
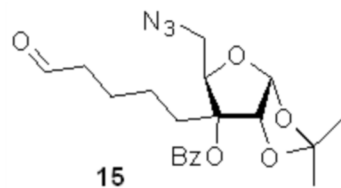
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-oxopentyl)-3-*O*-benzoyl- α -D-ribofuranose (15)

[HSQC, 400 MHz, CDCl₃]



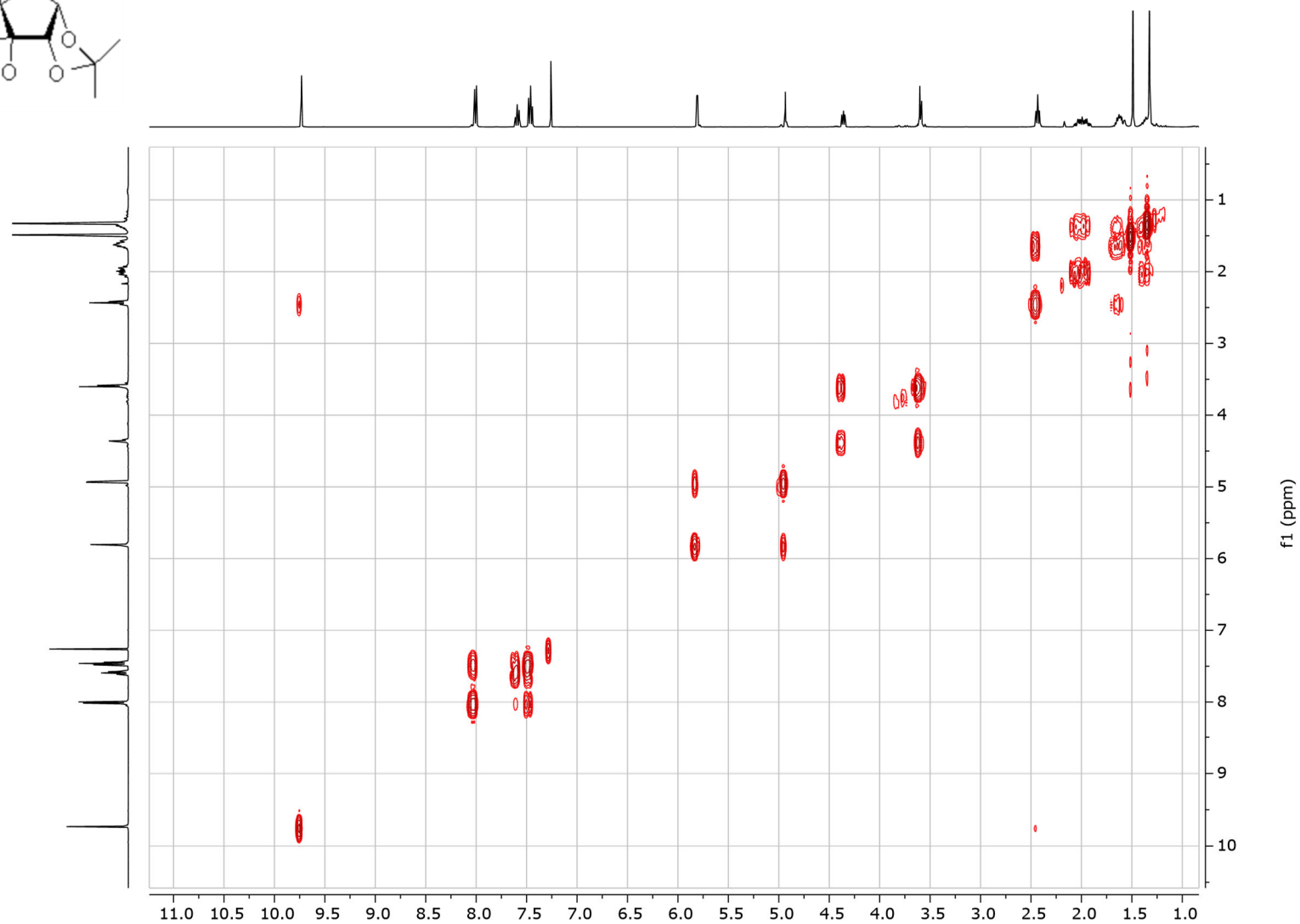
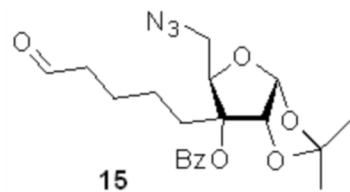
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-oxopentyl)-3-*O*-benzoyl- α -D-ribofuranose (15)

[HMBC, 400 MHz, CDCl₃]



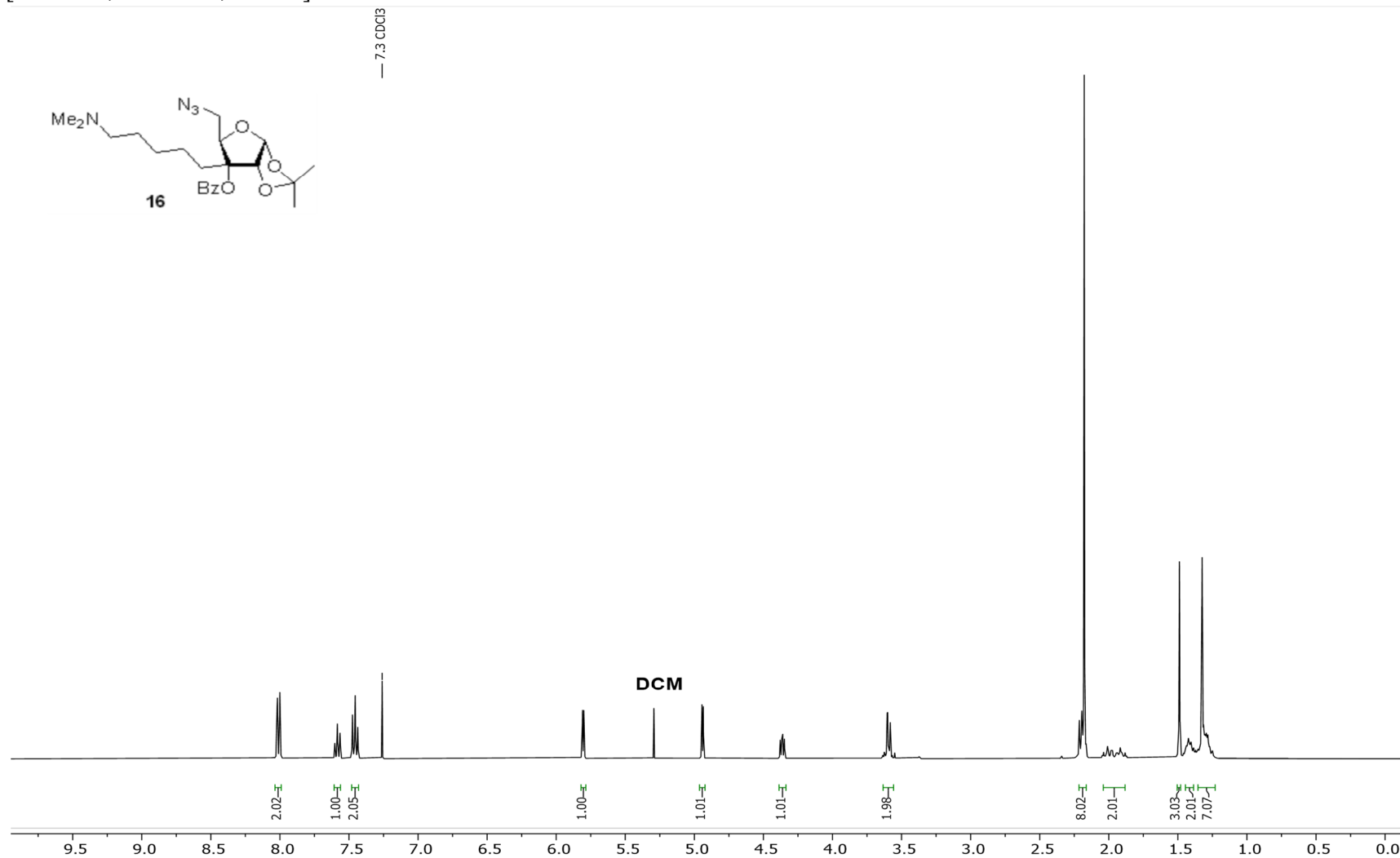
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-oxopentyl)-3-*O*-benzoyl- α -D-ribofuranose (15)

[COSY, 400 MHz, CDCl₃]



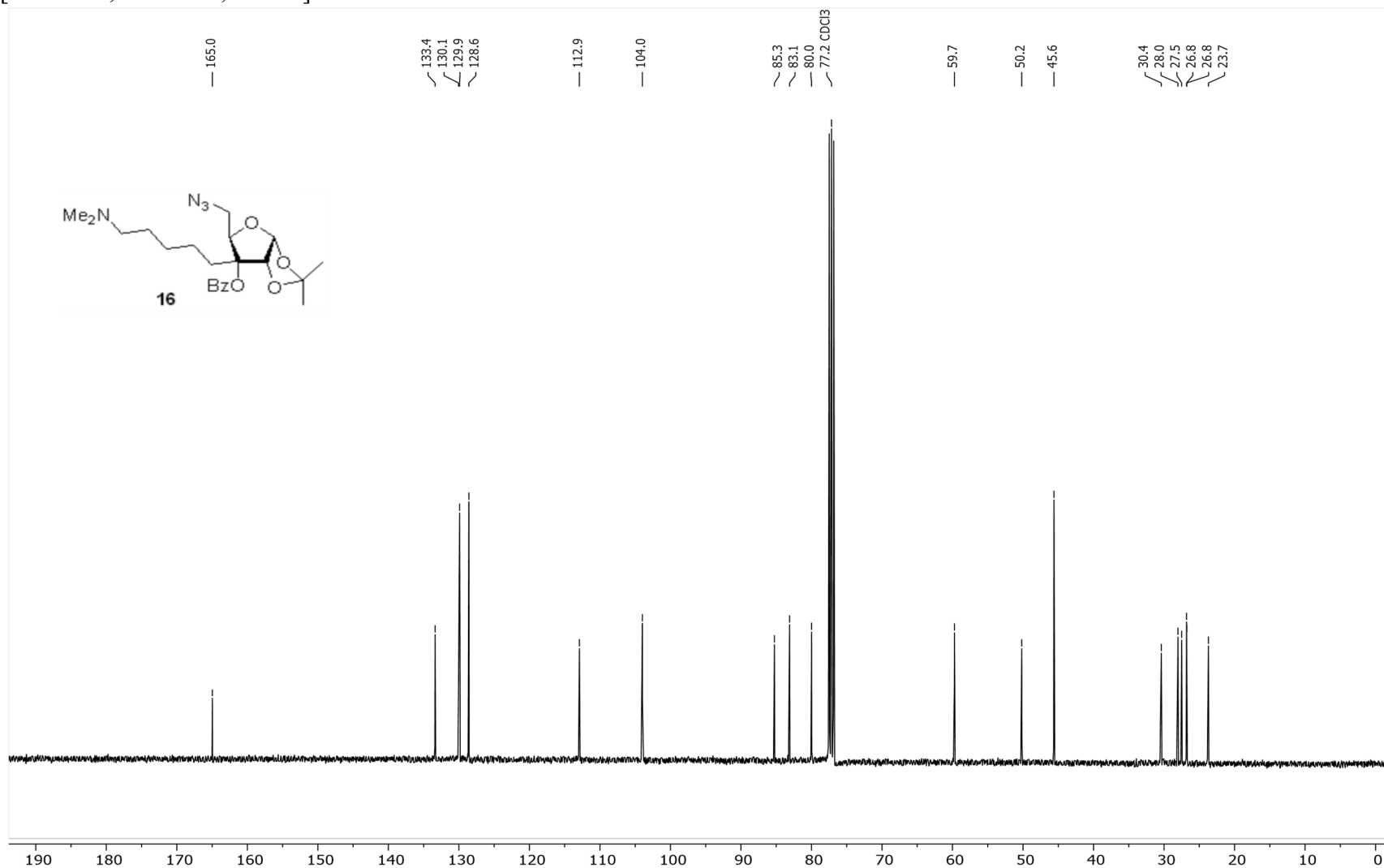
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- α -D-ribofuranose (16)

[^1H NMR, 400 MHz, CDCl_3]



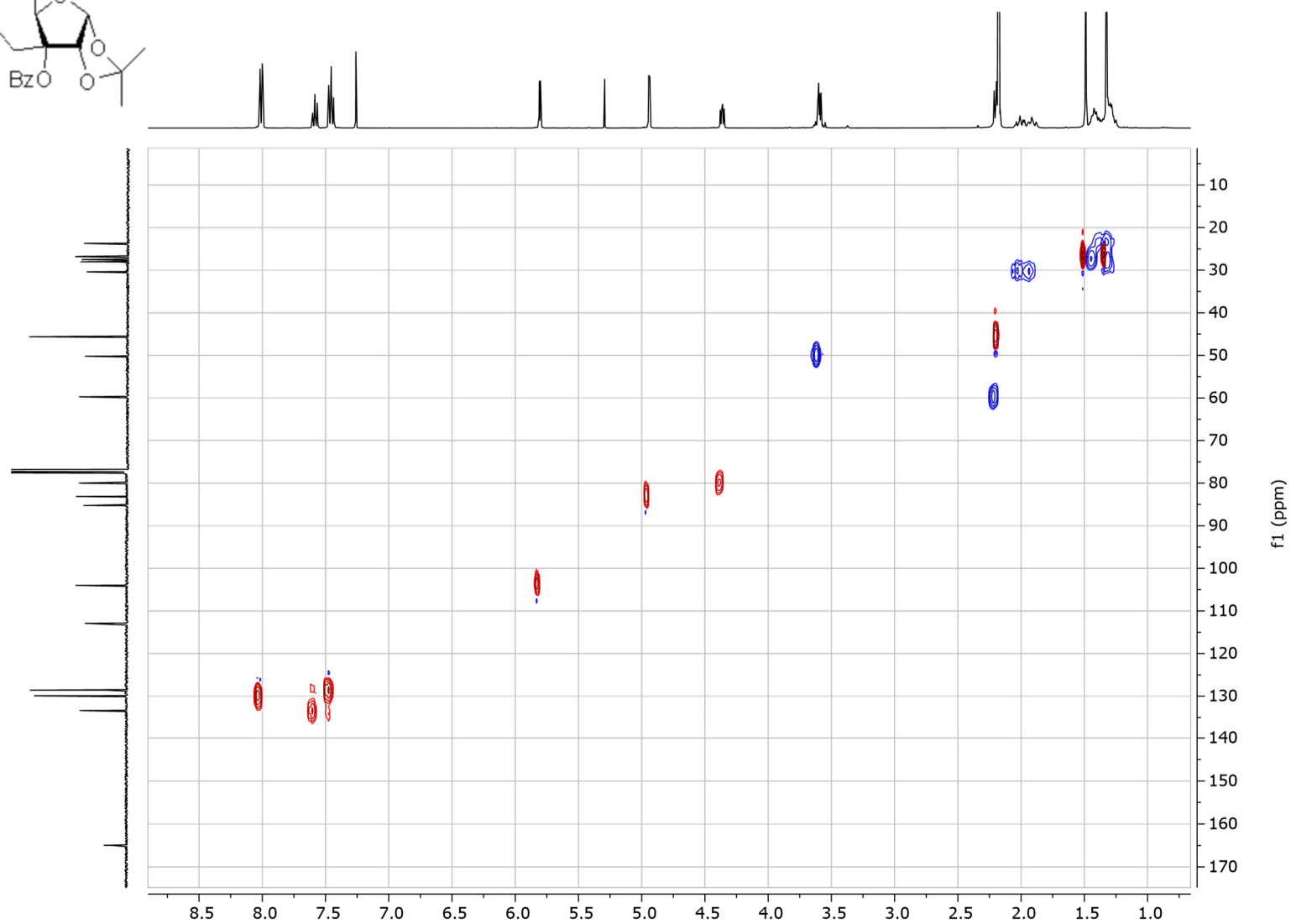
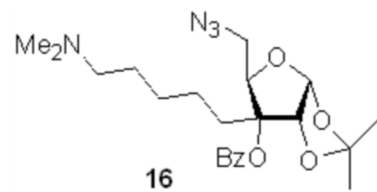
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[^{13}C NMR, 101 MHz, CDCl_3]



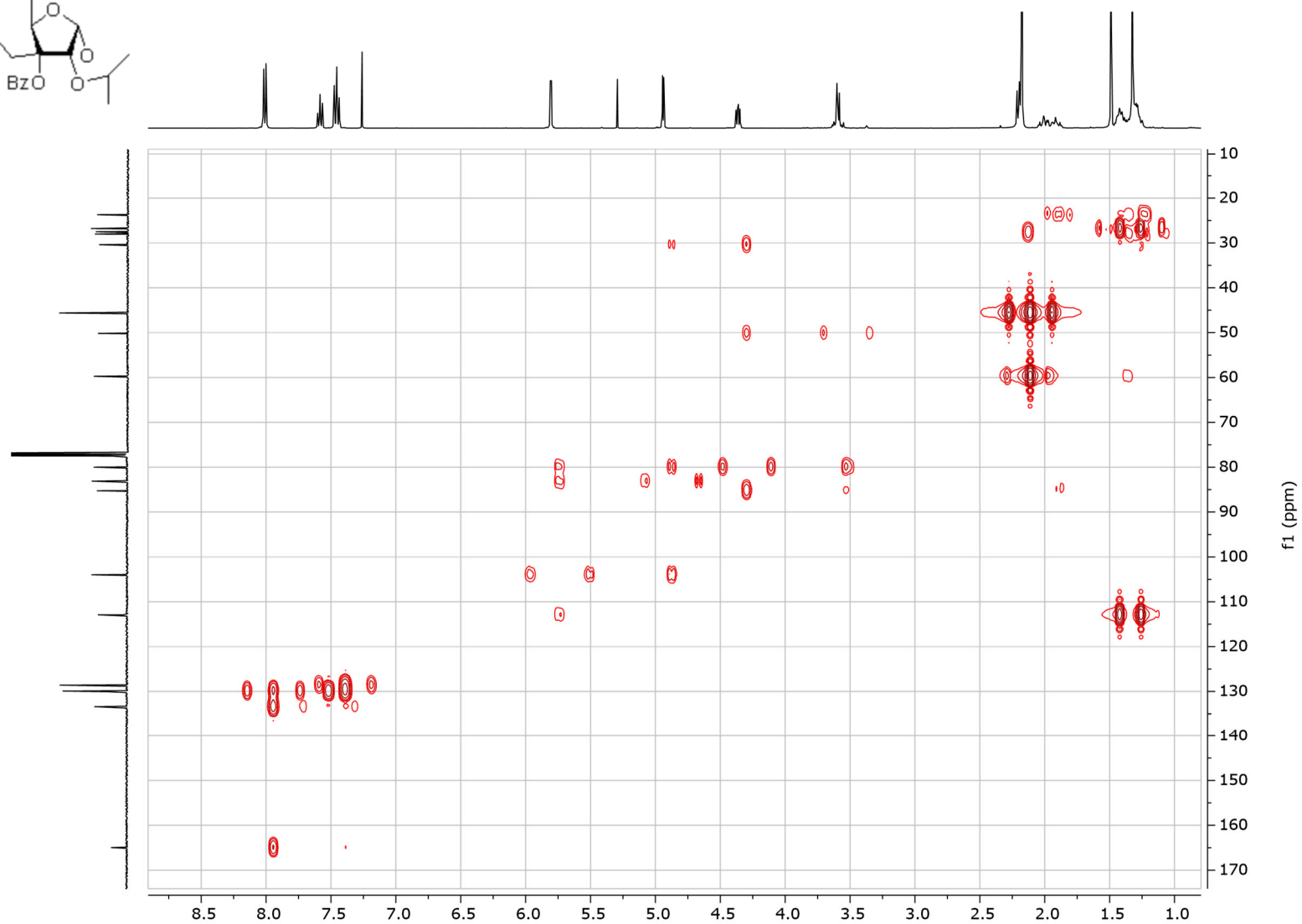
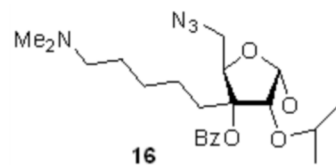
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[HSQC, 400 MHz, CDCl₃]



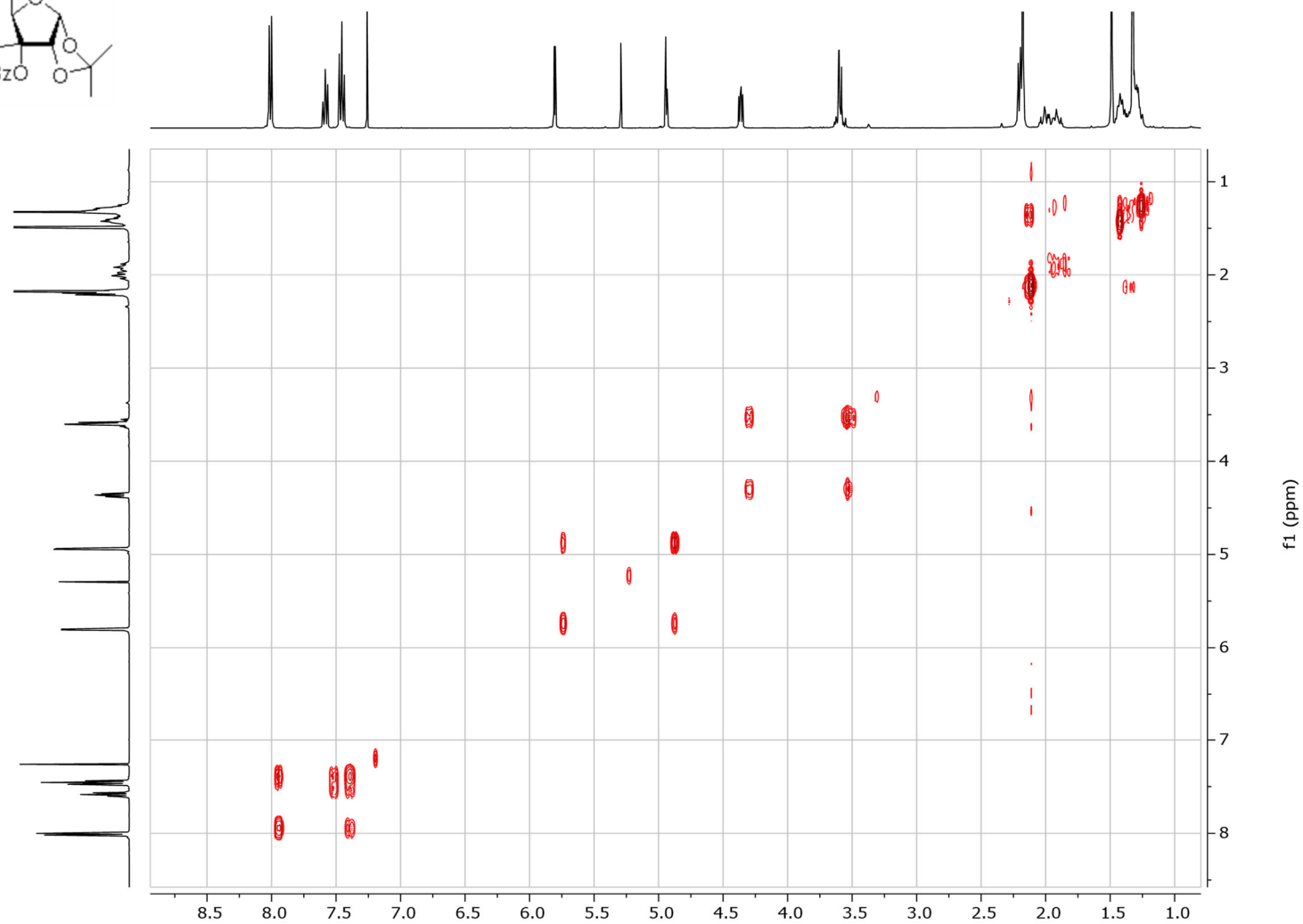
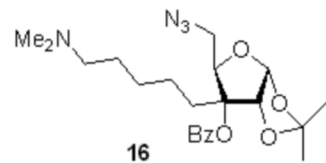
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[HMBC, 400 MHz, CDCl₃]



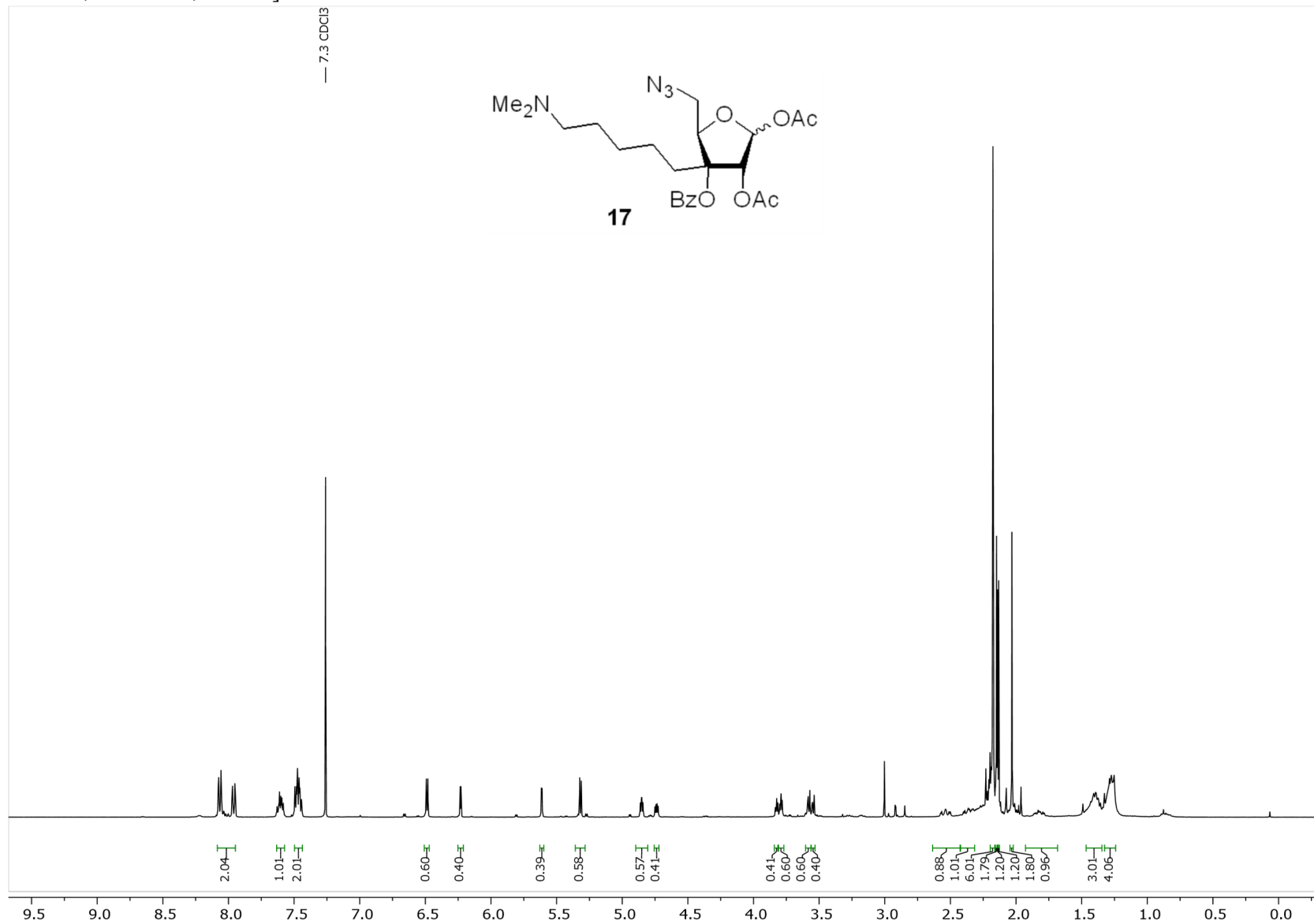
5-Azido-5-deoxy-1,2-*O*-isopropylidene-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- α -D-ribofuranose (16)

[COSY, 400 MHz, CDCl₃]



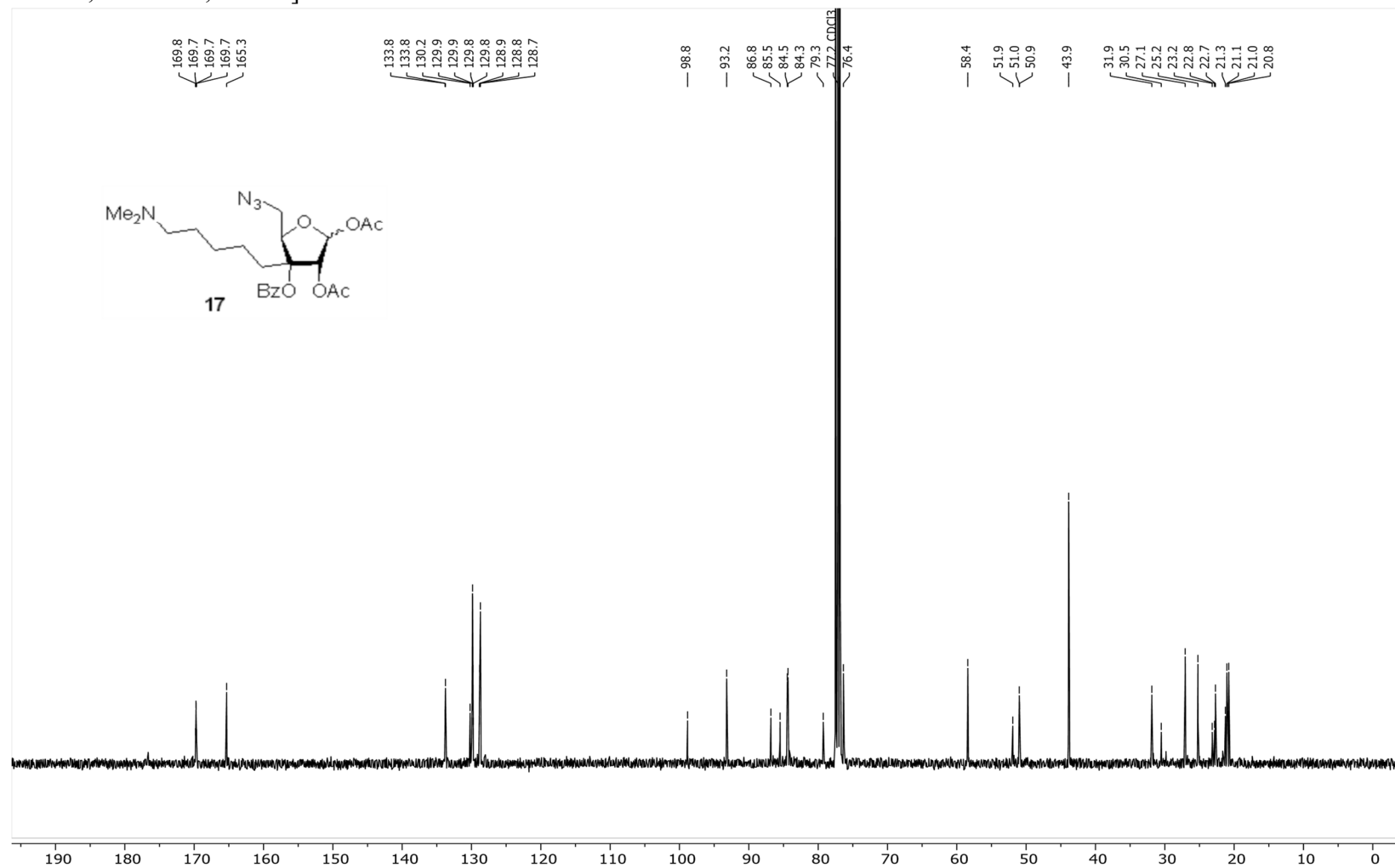
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[¹H NMR, 400 MHz, CDCl₃]



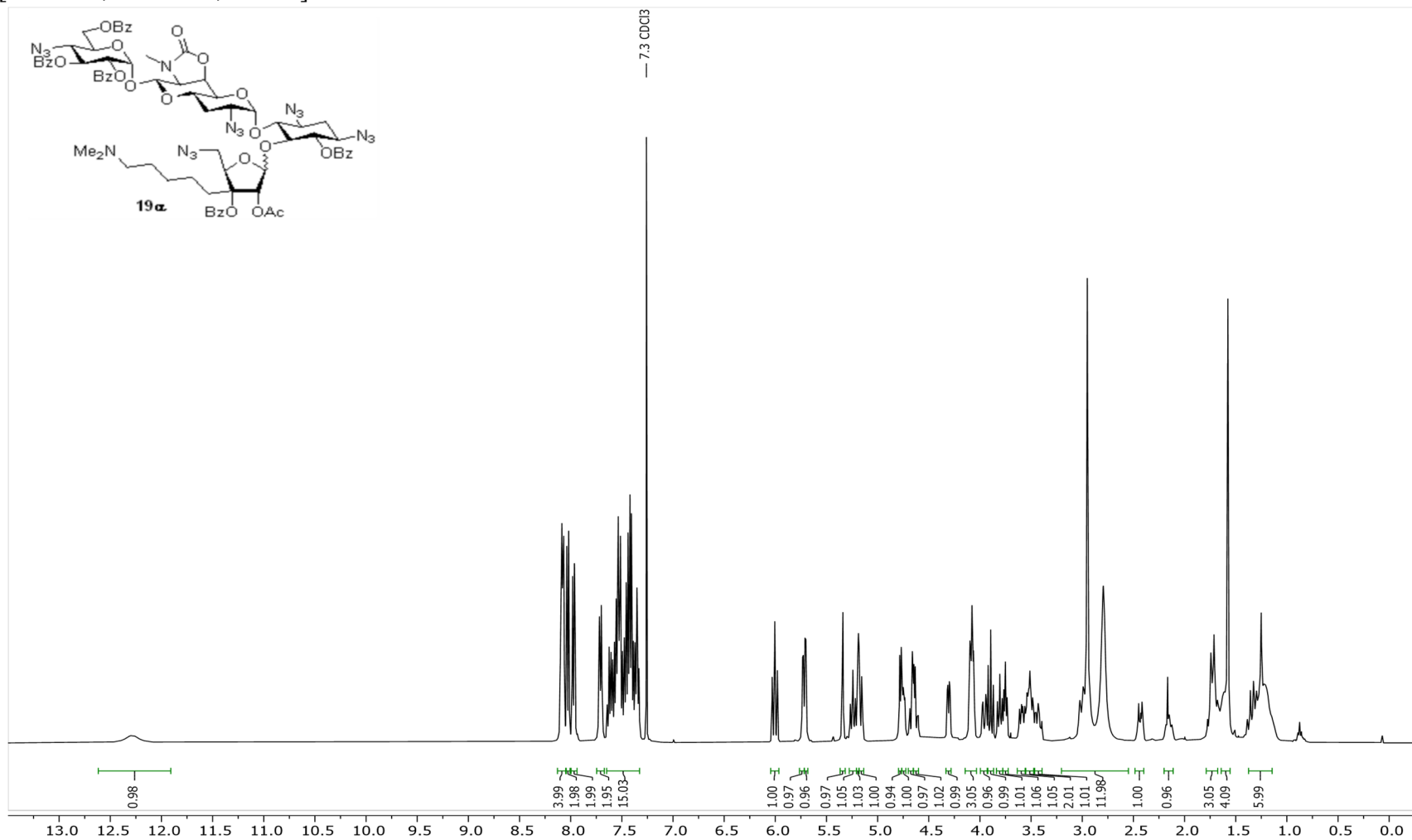
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[^{13}C NMR, 101 MHz, CDCl_3]



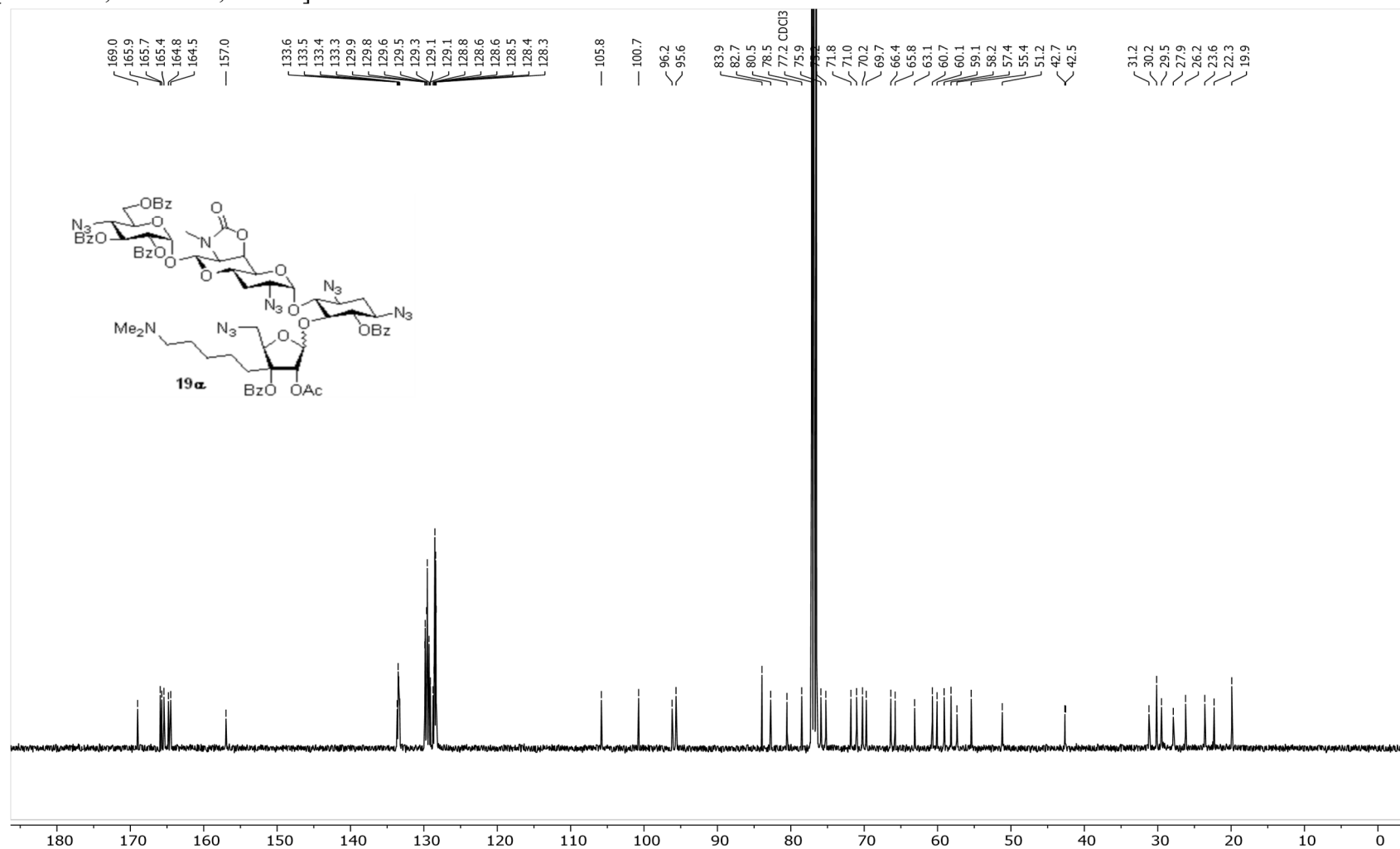
5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- α -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19a**)**

[¹H NMR, 400 MHz, CDCl₃]

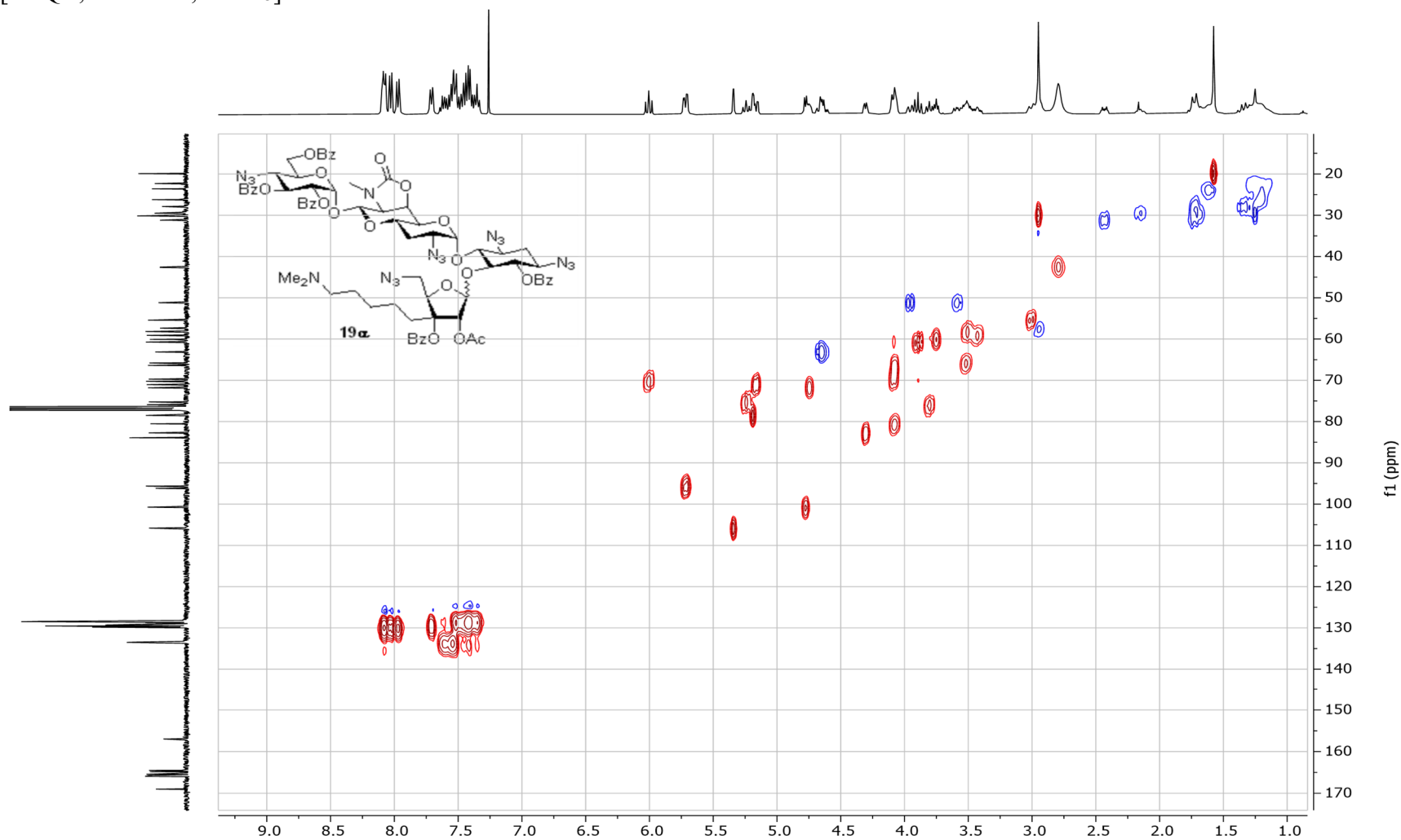


5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- α -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19a**)**

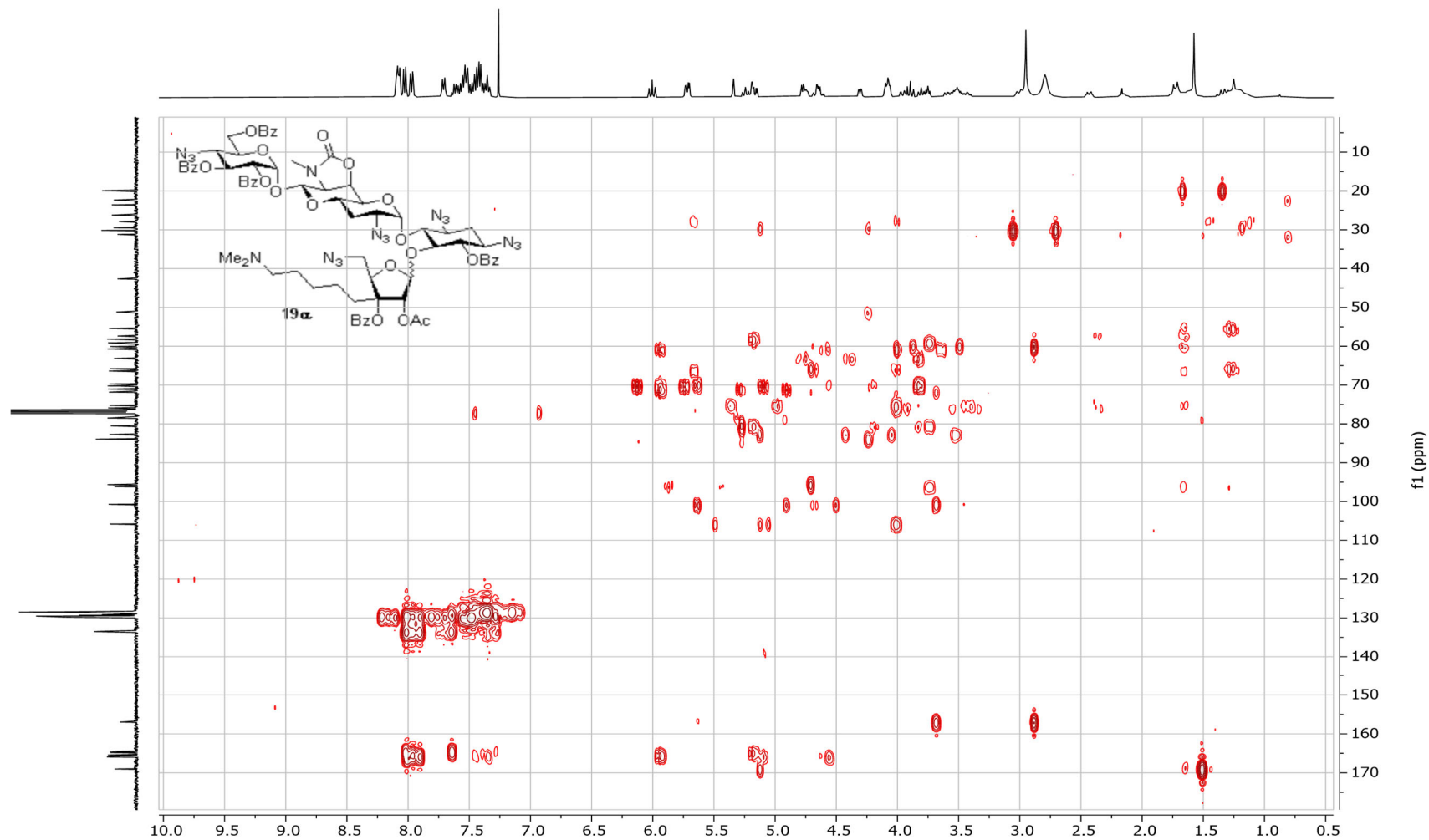
[^{13}C NMR, 101 MHz, CDCl_3]



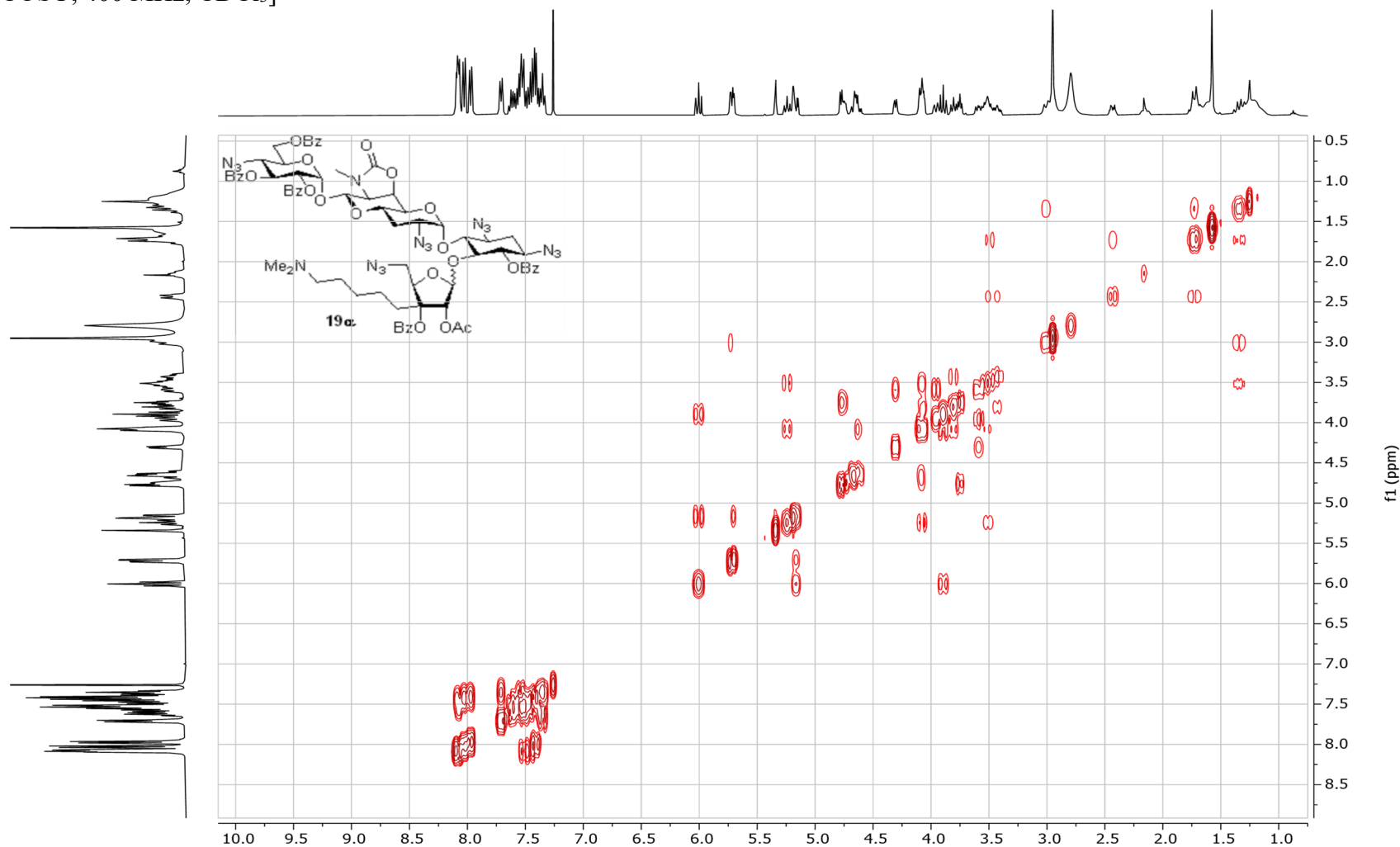
5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- α -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19 α)
 [HSQC, 400 MHz, CDCl₃]



5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- α -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19a)
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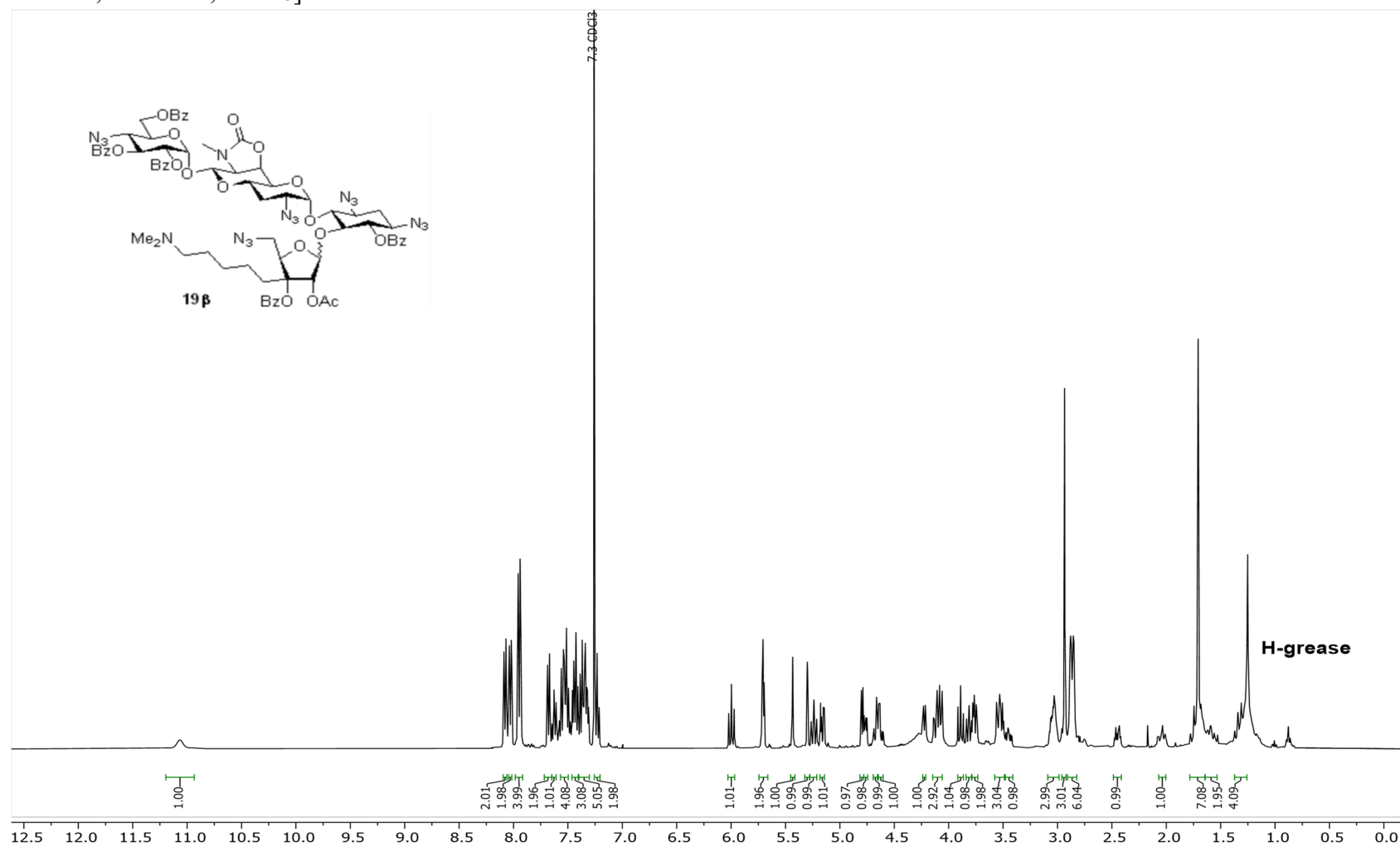


5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- α -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19a)
 [COSY, 400 MHz, CDCl₃]



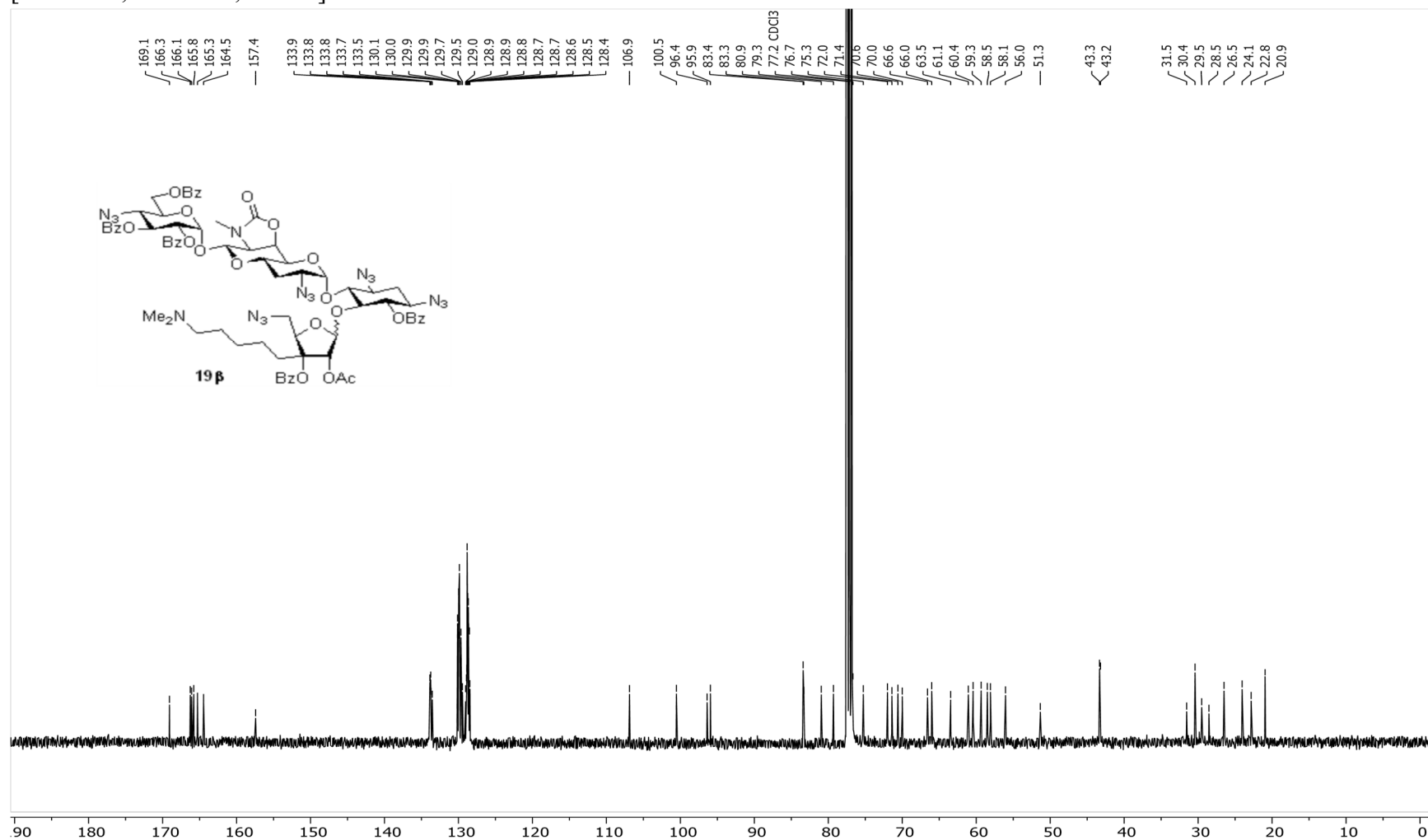
5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- β -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19 β**)**

[¹H NMR, 400 MHz, CDCl₃]

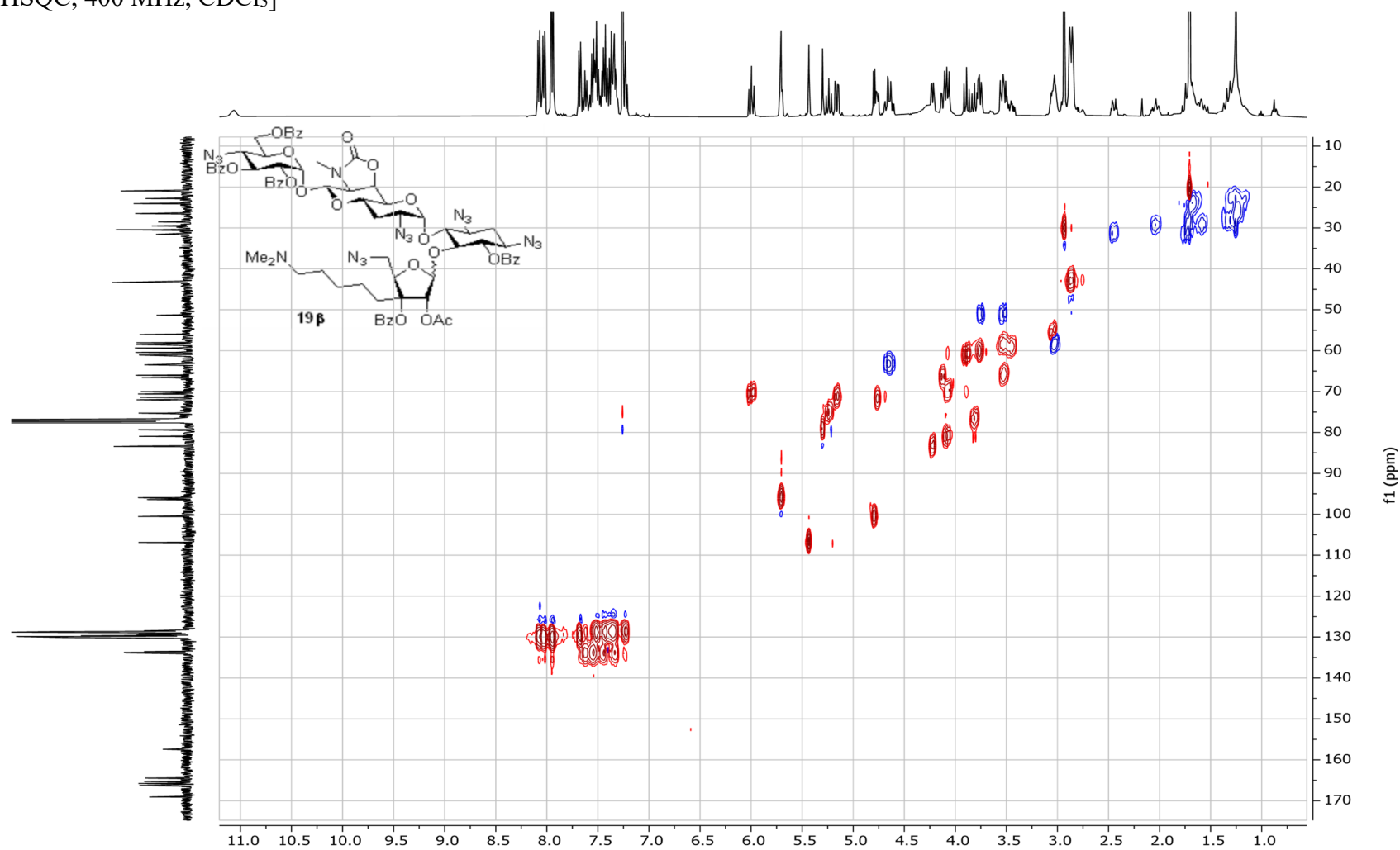


5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- β -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19 β)

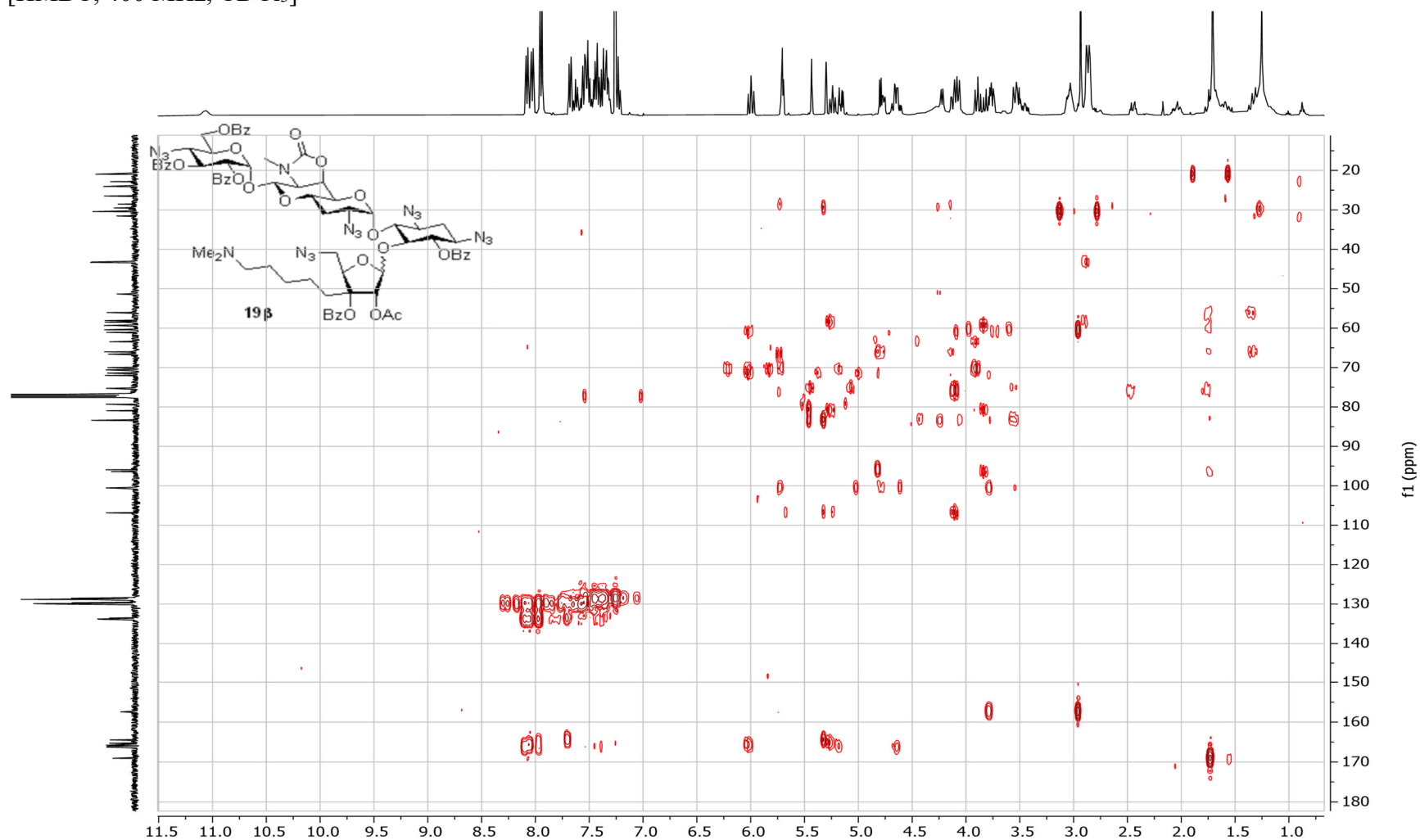
[¹³C NMR, 101 MHz, CDCl₃]



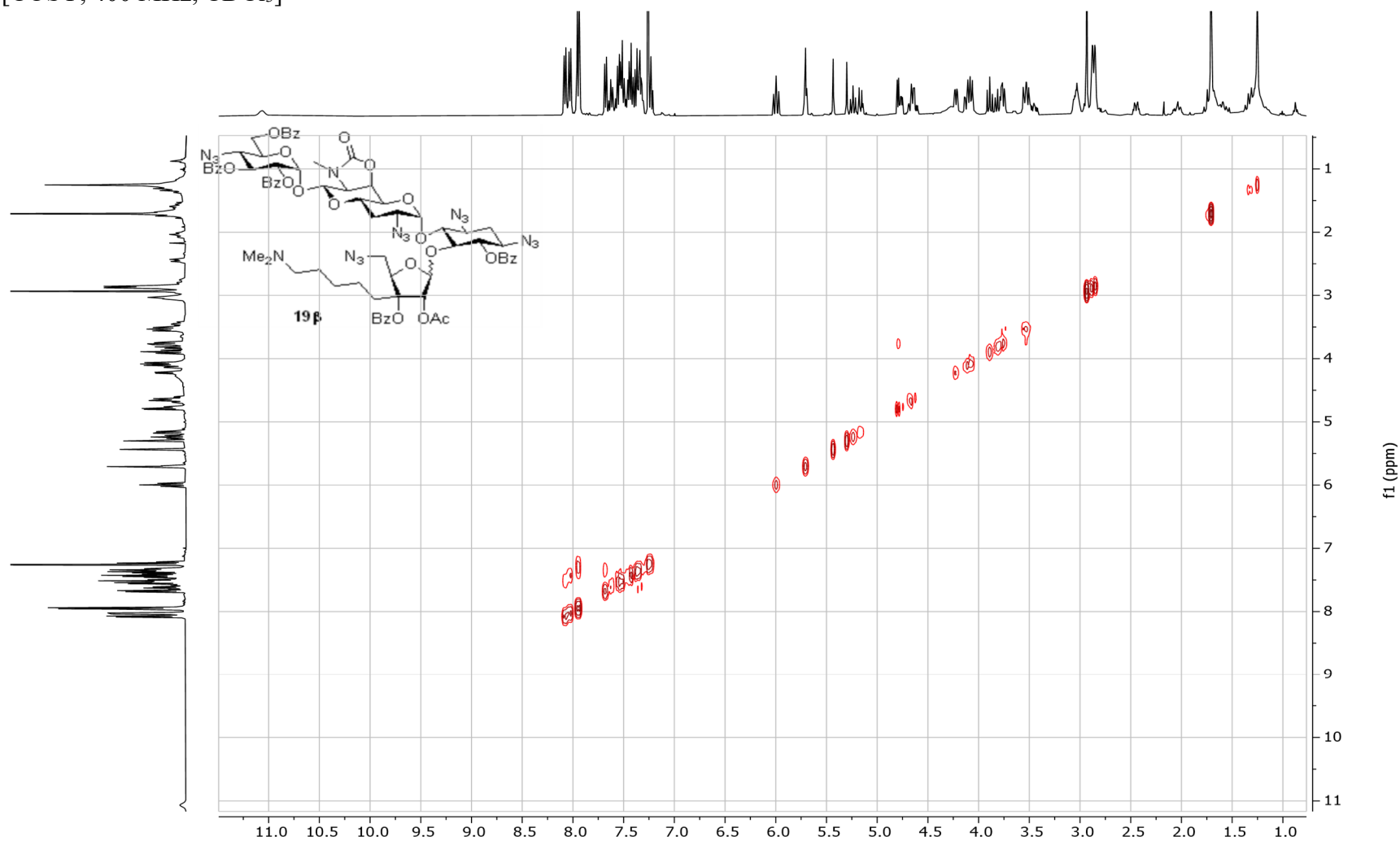
5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- β -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19 β)
 [HSQC, 400 MHz, CDCl₃]



5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- β -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19 β)
 [HMBC, 400 MHz, CDCl₃]

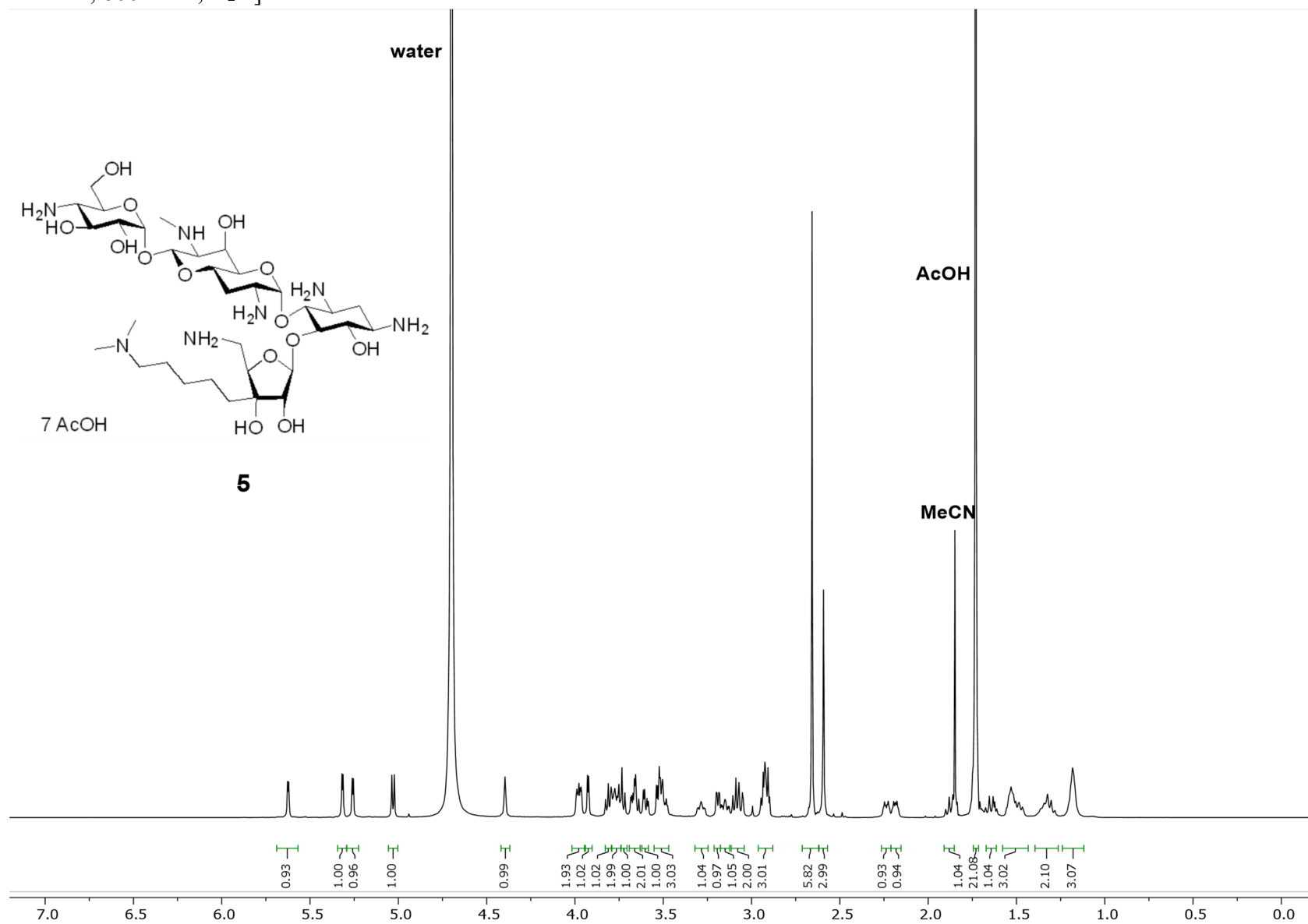


5-*O*-[5'''-Azido-5'''-deoxy-2'''-*O*-acetyl-3-*C*-(5-(dimethylamino)pentyl)-3-*O*-benzoyl- β -D-ribofuranosyl]-6,2'',3'',6''-tetra-*O*-benzoyl-1,3,2',4''-tetraazido-1,3,2',4''-tetra(desamino)-6',7'-oxazolidino-apramycin trifluoroacetate (19 β)
 [COSY, 400 MHz, CDCl₃]



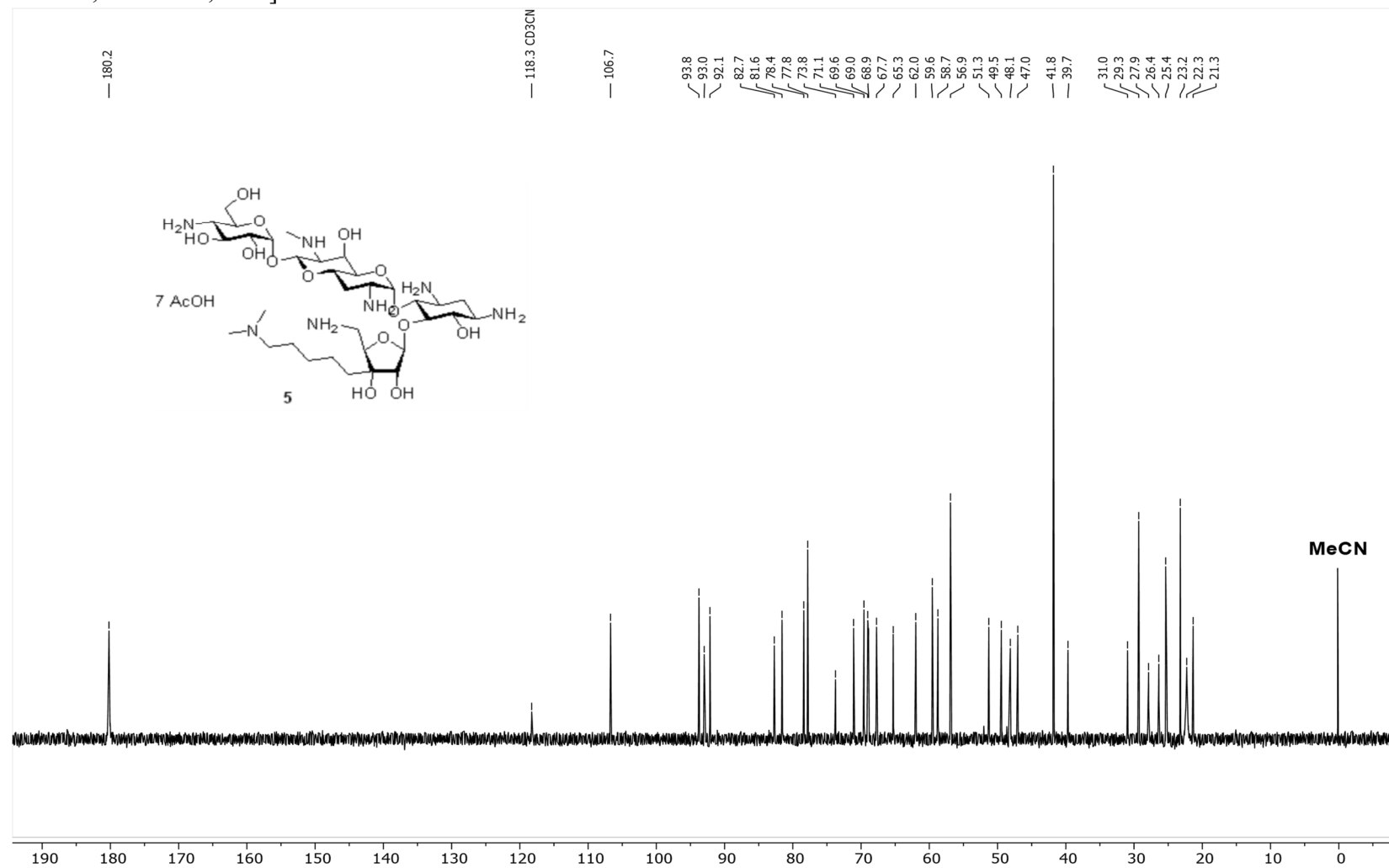
5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- β -D-ribofuranosyl]-apramycin heptaacetate (5)

[¹H NMR, 600 MHz, D₂O]



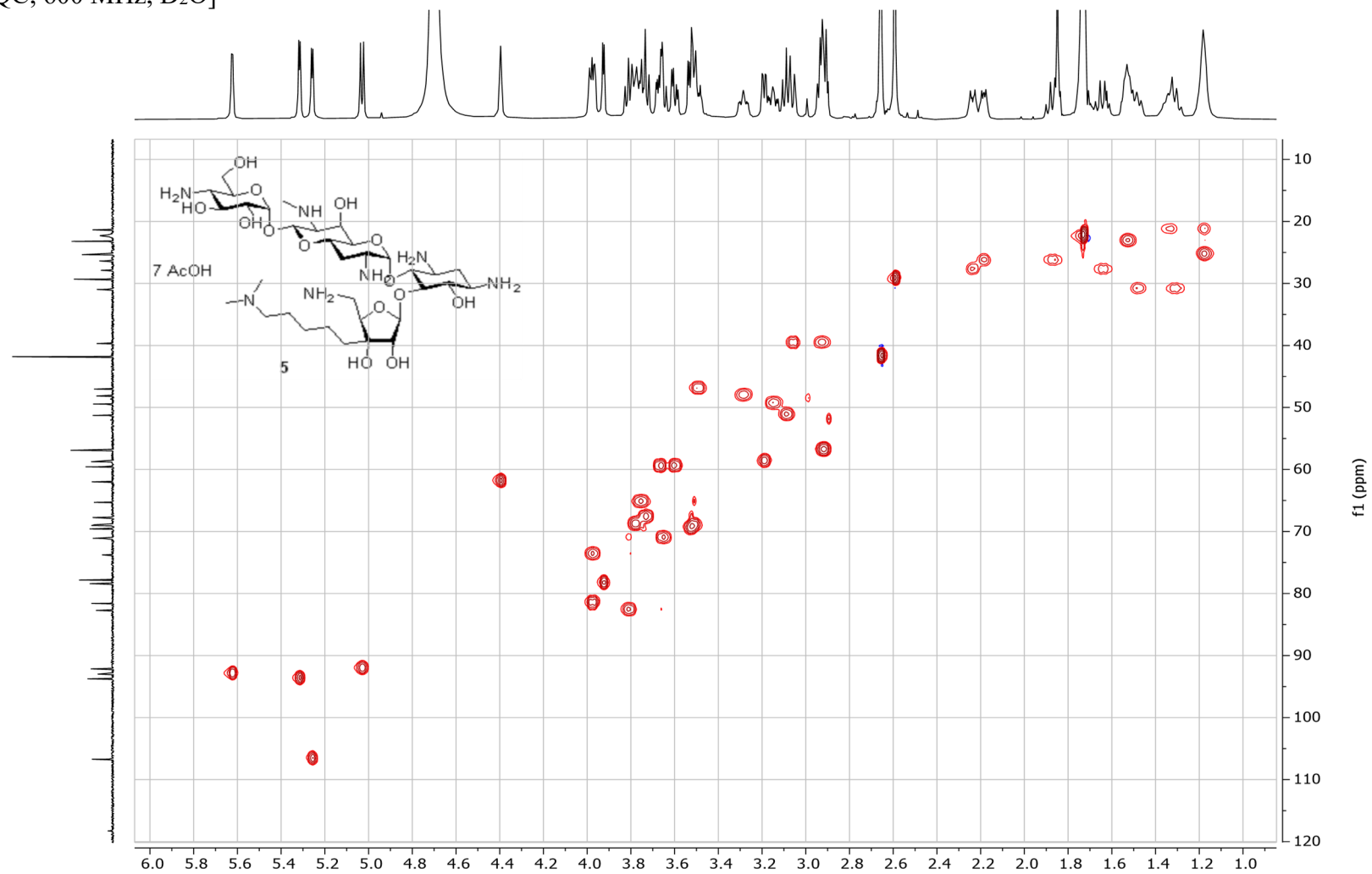
5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- β -D-ribofuranosyl]-apramycin heptaacetate (5)

[¹³C NMR, 125 MHz, D₂O]

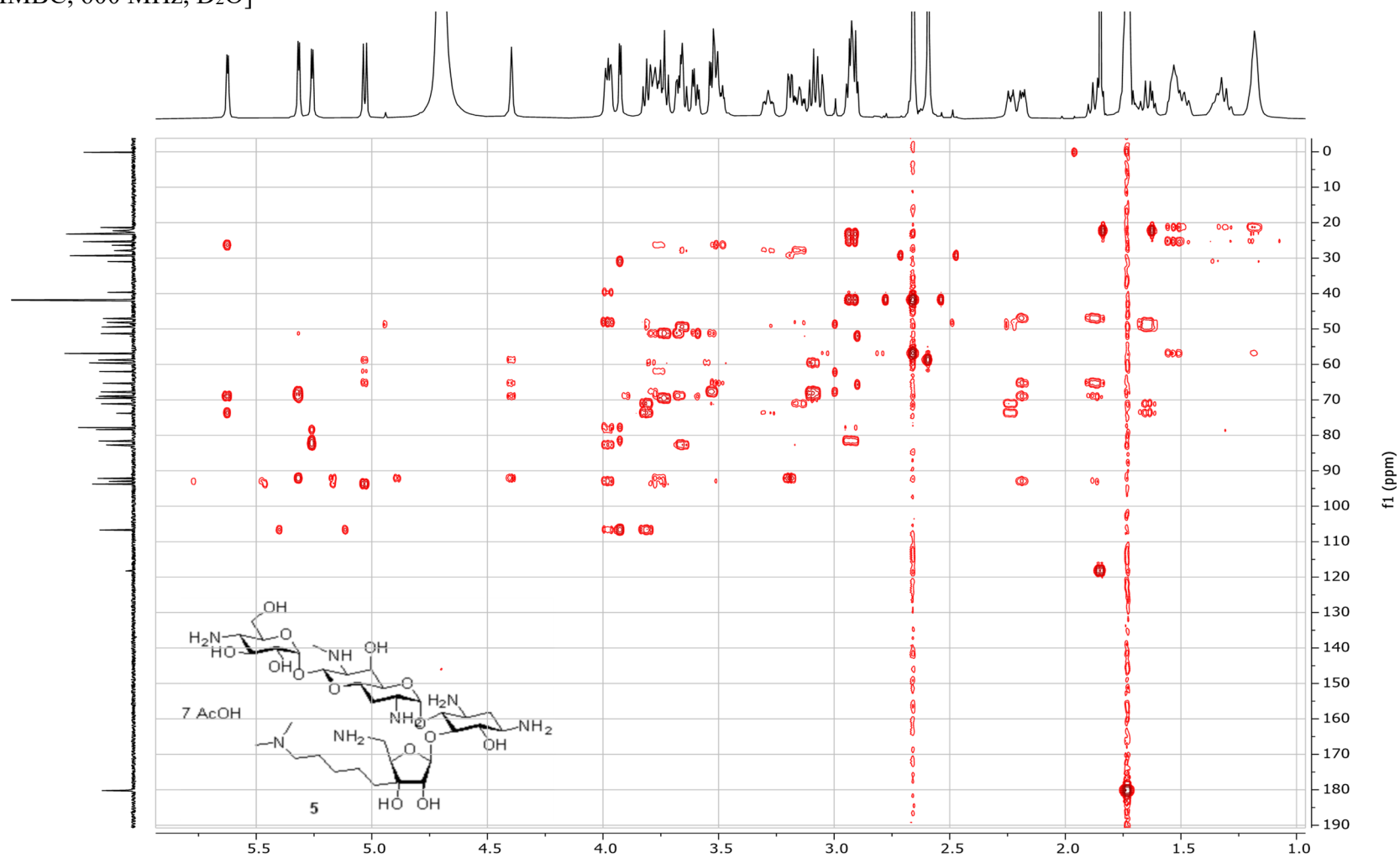


5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- β -D-ribofuranosyl]-apramycin heptaacetate (5)

[HSQC, 600 MHz, D₂O]

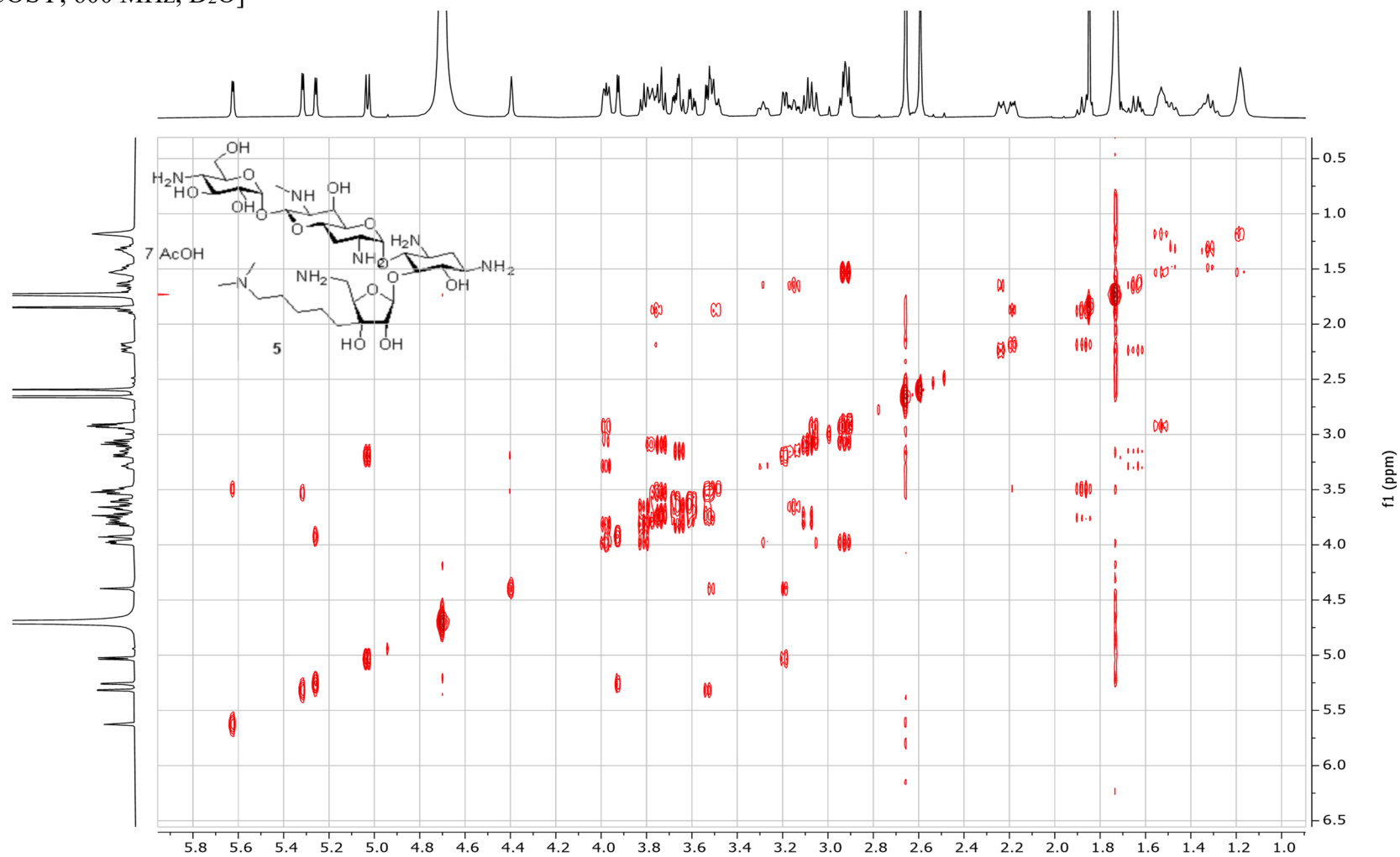


5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- β -D-ribofuranosyl]-apramycin heptaacetate (5)
 [HMBC, 600 MHz, D₂O]



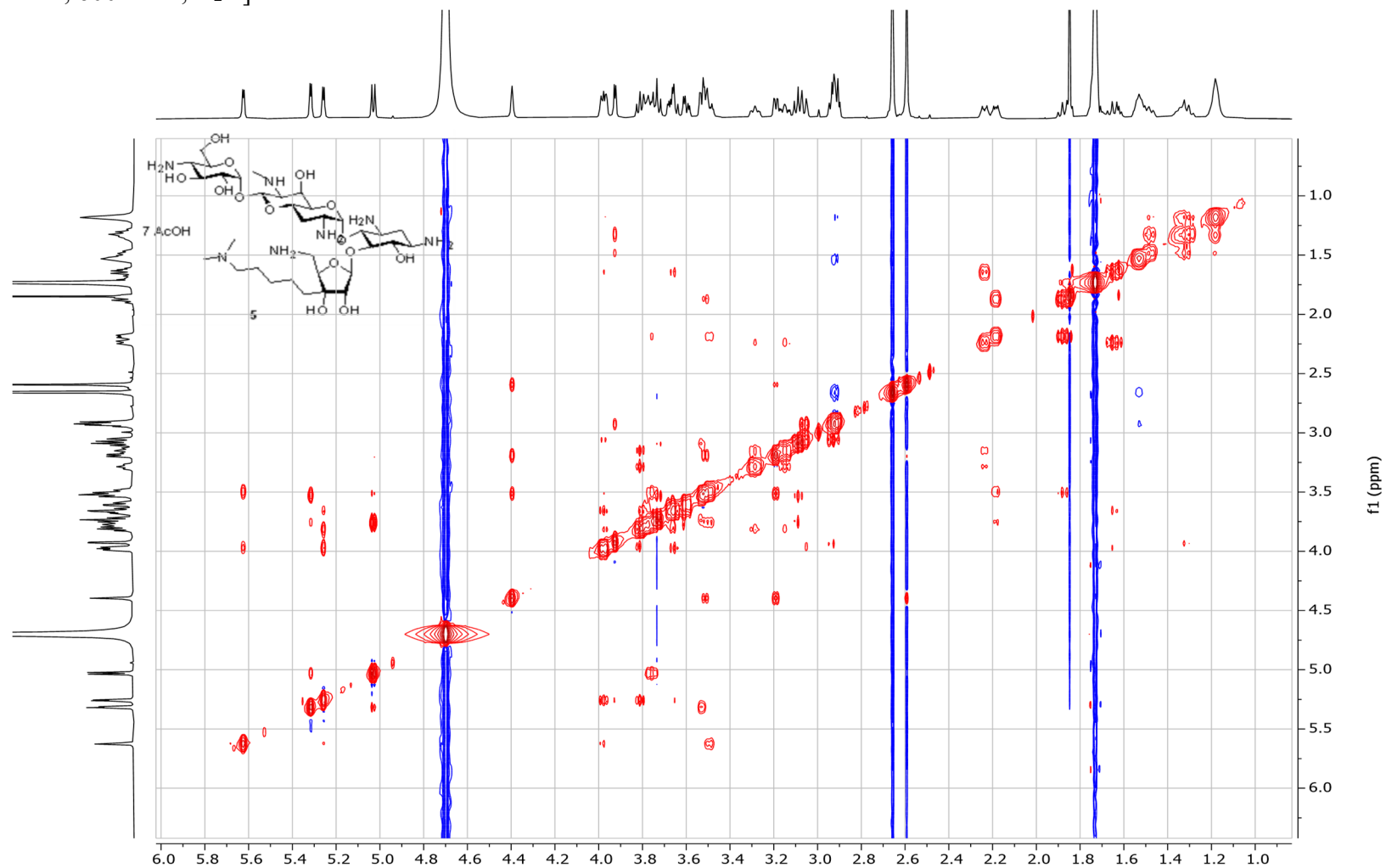
5-O-[5'''-Amino-5'''-deoxy-3-C-(5-(dimethylamino)pentyl)- β -D-ribofuranosyl]-apramycin heptaacetate (5)

[COSY, 600 MHz, D₂O]



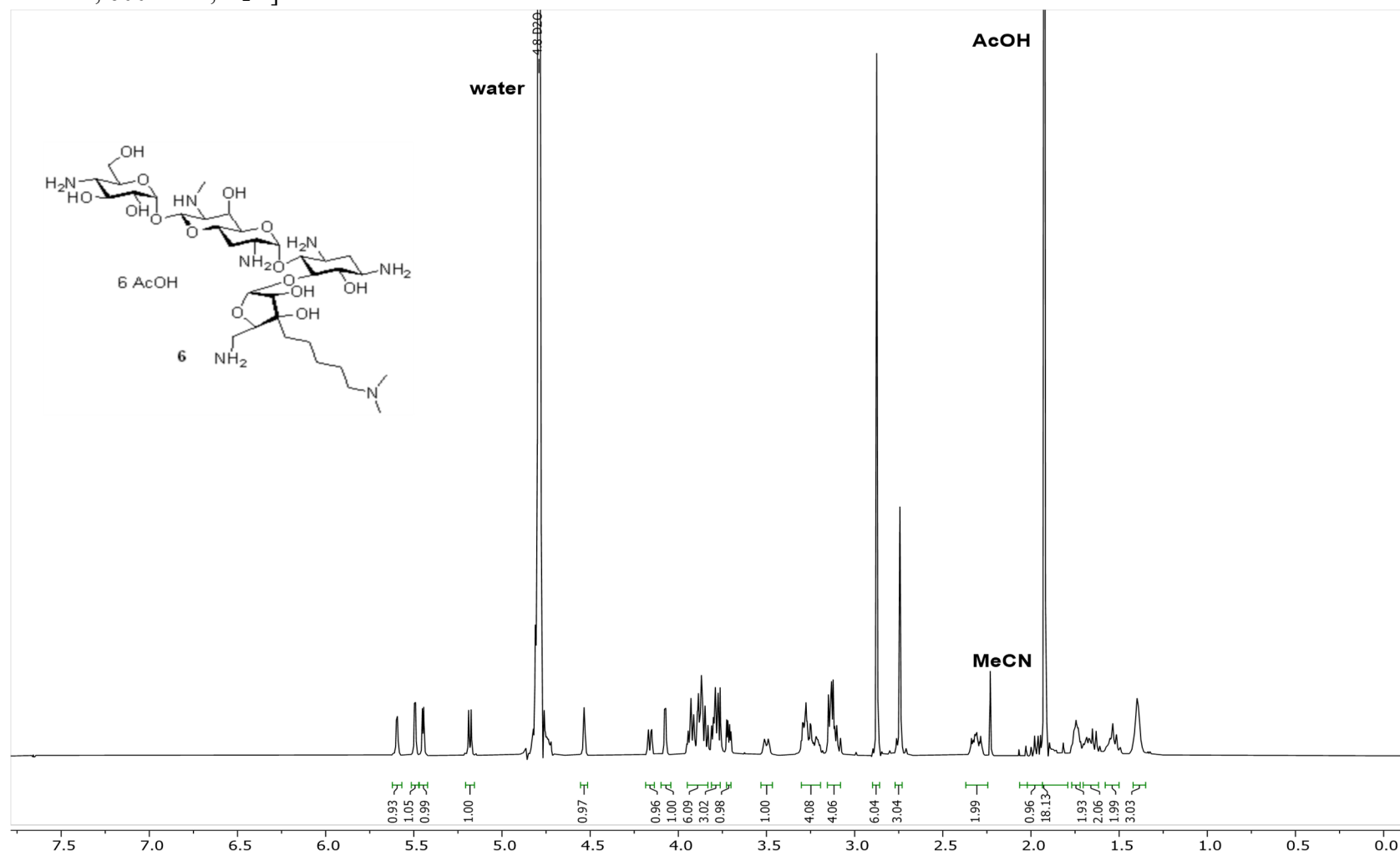
5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- β -D-ribofuranosyl]-apramycin heptaacetate (5)

[NOESY, 600 MHz, D₂O]



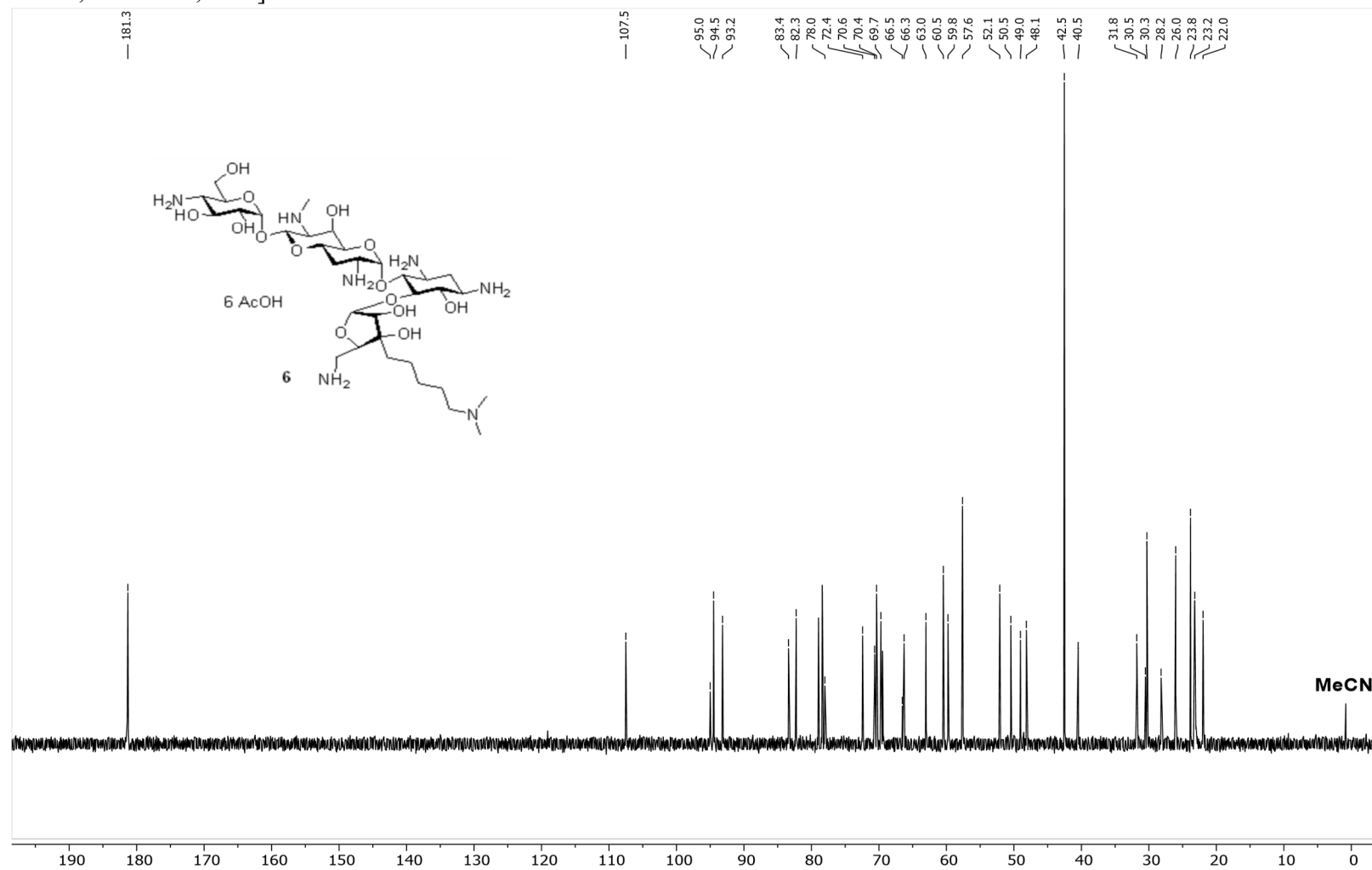
5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- α -D-ribofuranosyl]-apramycin hexaacetate (6)

[¹H NMR, 600 MHz, D₂O]



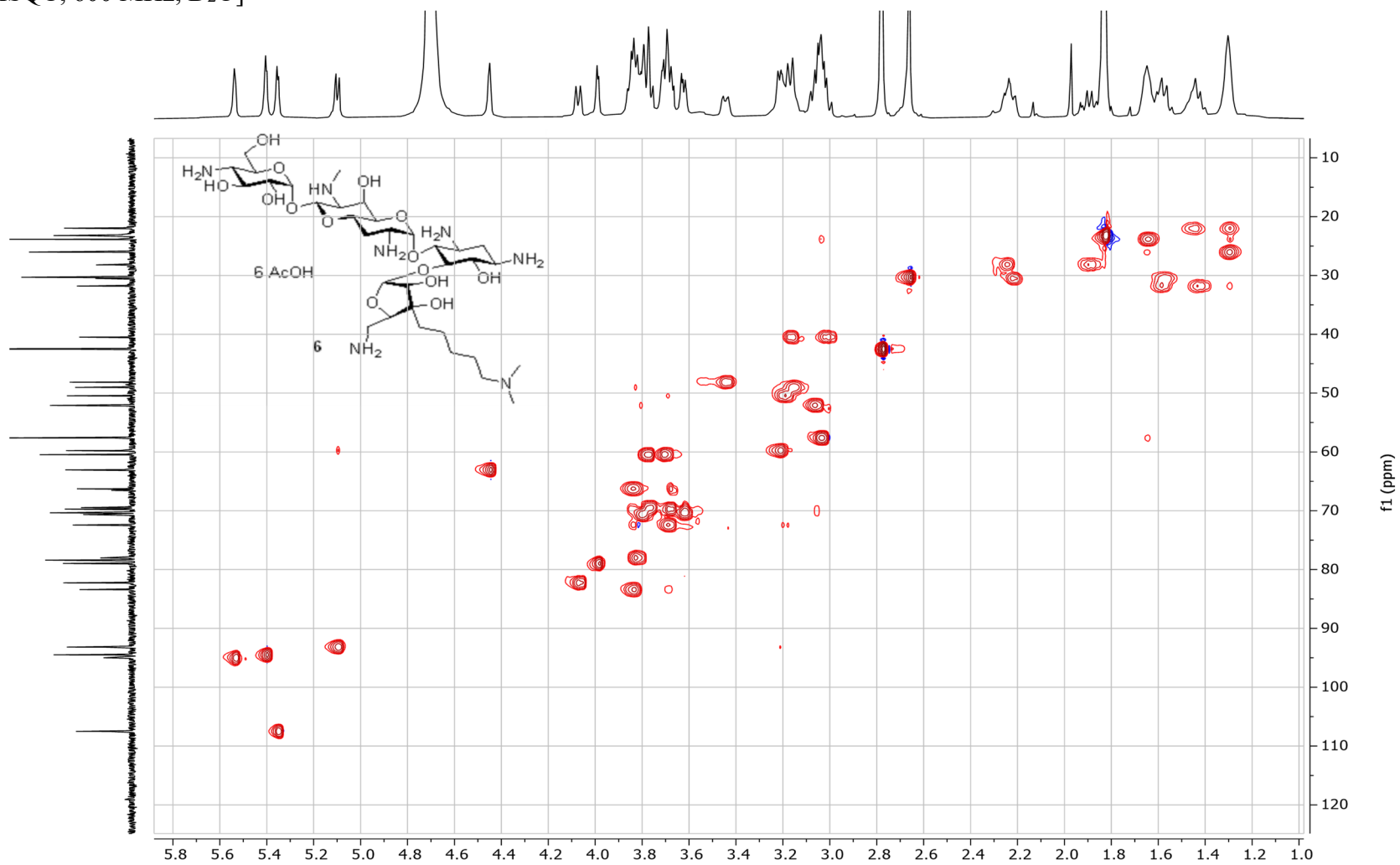
5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- α -D-ribofuranosyl]-apramycin hexaacetate (6)

[¹³C NMR, 125 MHz, D₂O]



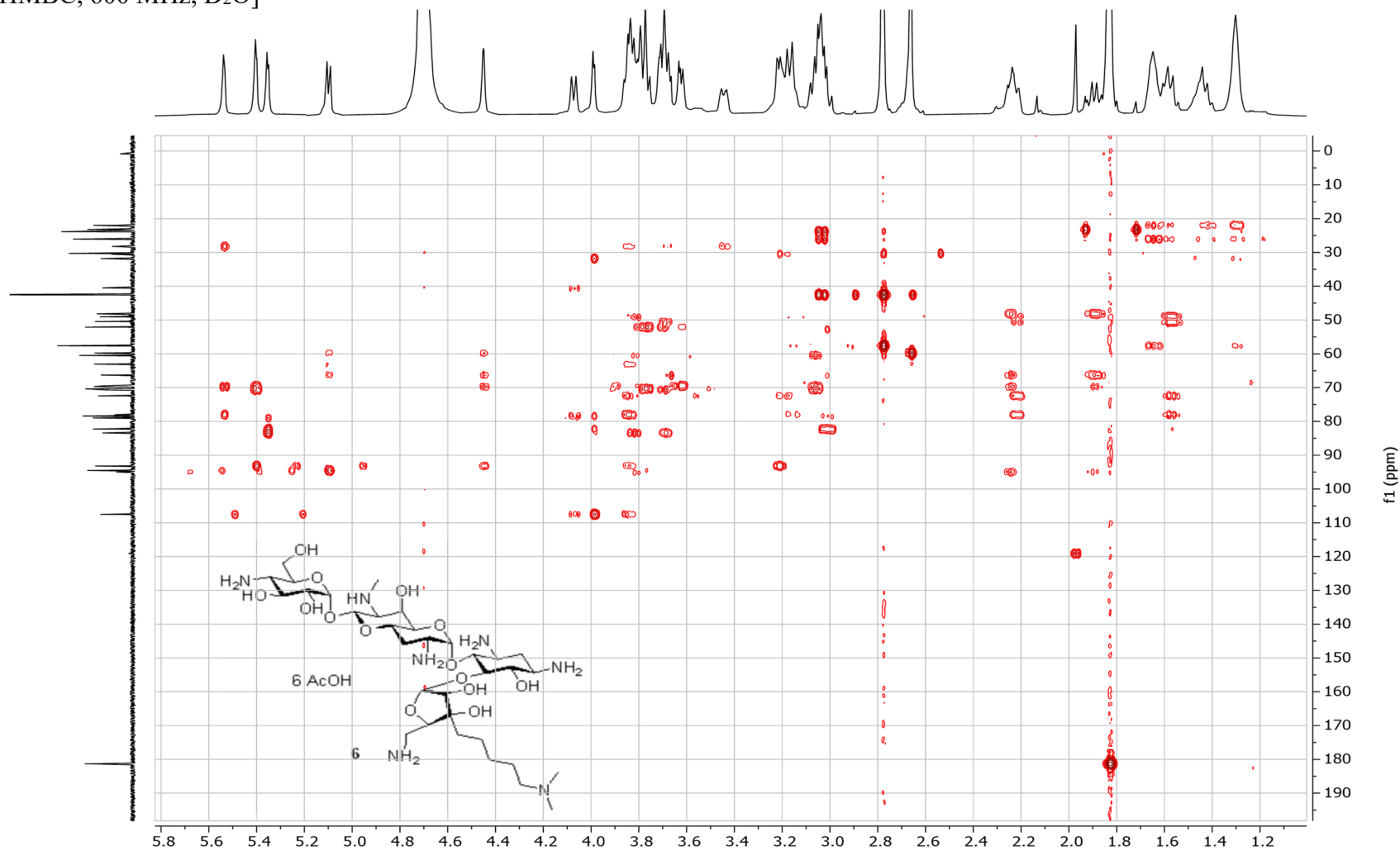
5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- α -D-ribofuranosyl]-apramycin hexaacetate (6)

[HSQC, 600 MHz, D₂O]



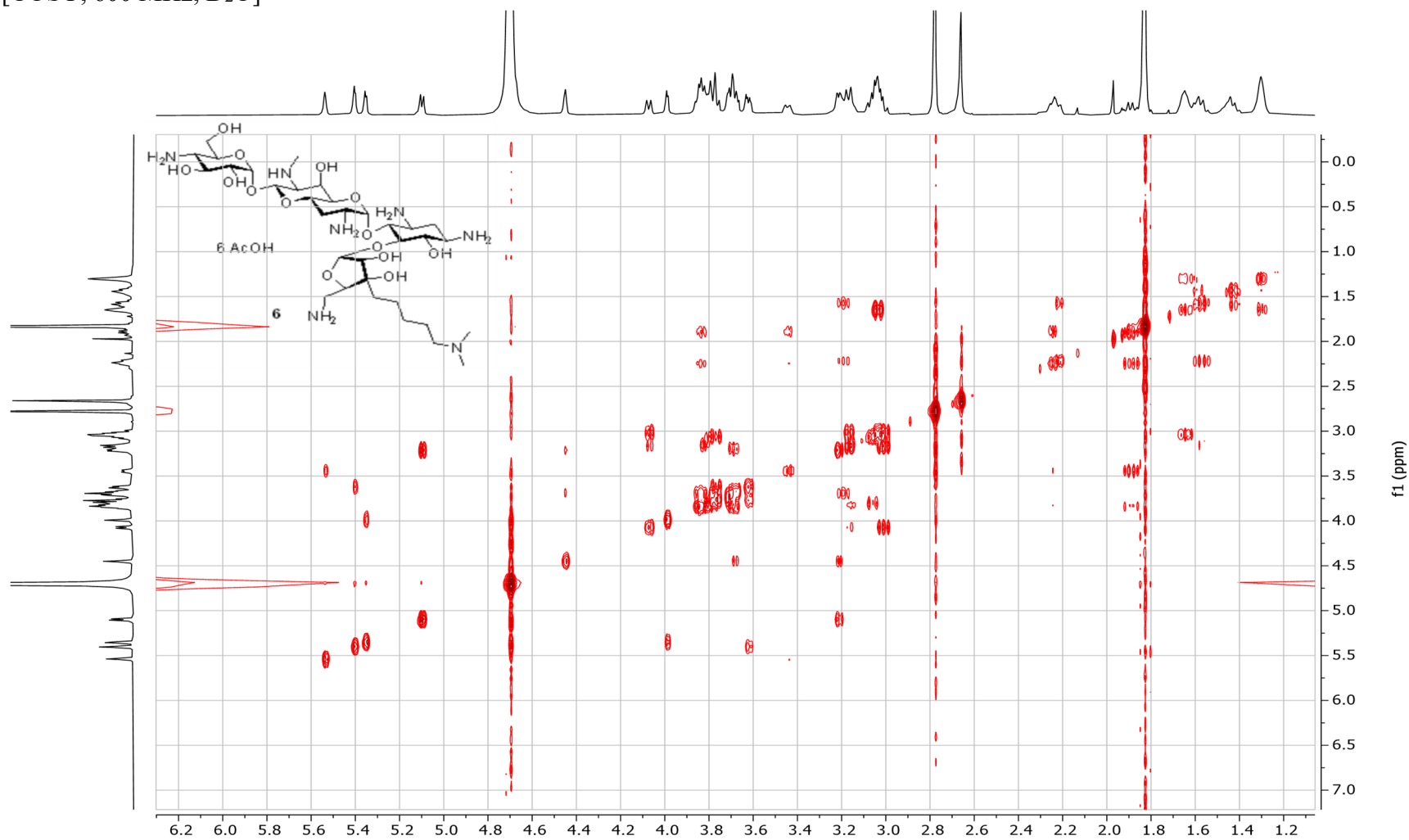
5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- α -D-ribofuranosyl]-apramycin hexaacetate (6)

[HMBC, 600 MHz, D₂O]



5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- α -D-ribofuranosyl]-apramycin hexaacetate (6)

[COSY, 600 MHz, D₂O]



5-*O*-[5'''-Amino-5'''-deoxy-3-*C*-(5-(dimethylamino)pentyl)- α -D-ribofuranosyl]-apramycin hexaacetate (6)
 [NOESY, 600 MHz, D₂O]

