

Supporting Information File 2
for
Synthetic avenues towards a tetrasaccharide related to
***Streptococcus pneumonia* of serotype 6A**

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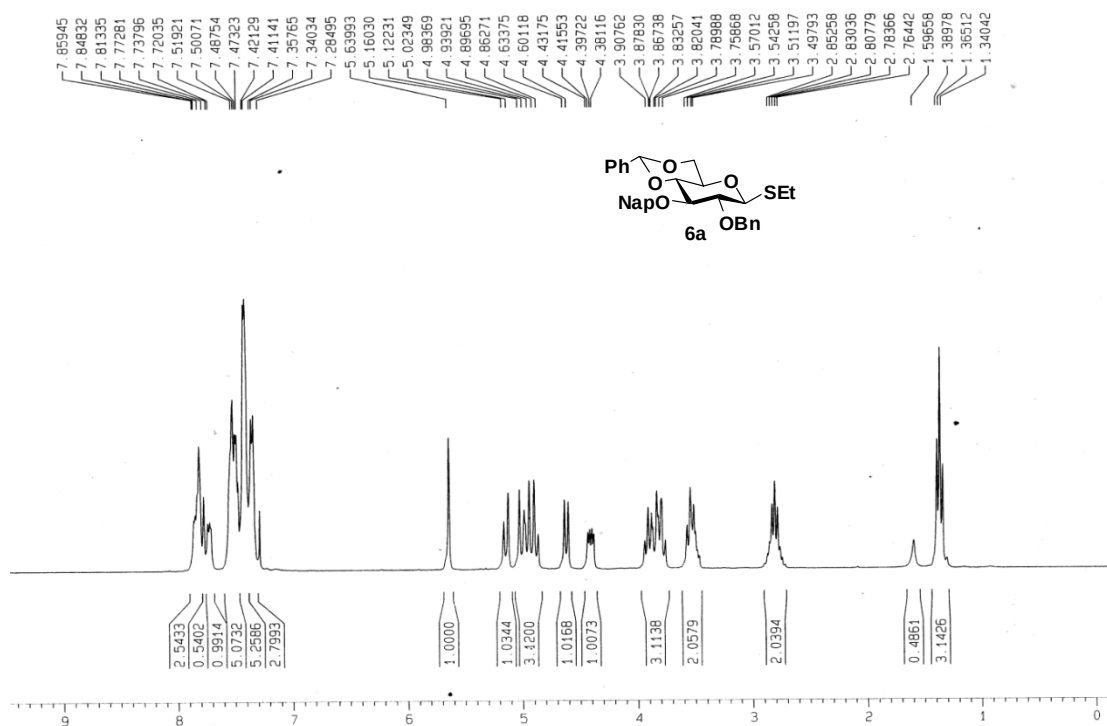
* Corresponding author

¹H and ¹³C NMR of compounds 1, 3a, 4, 5, 6a, 6b, 7, 12a, 19, 20, 21, and 23 and 2D

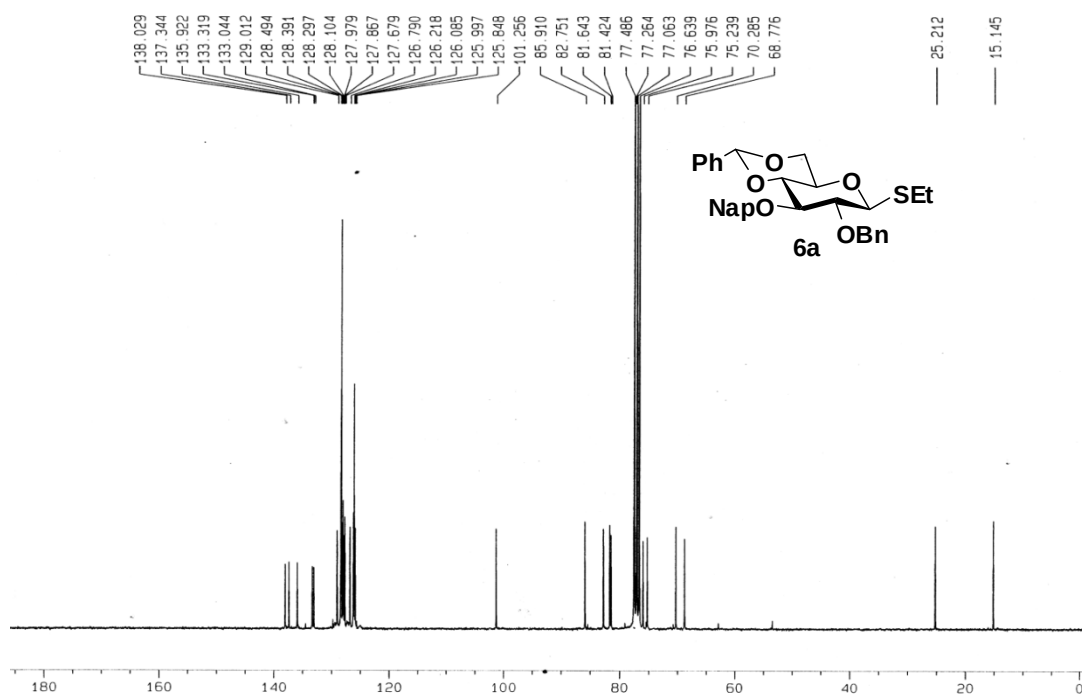
NMR (COSY, HSQC and HMBC) of compound 23

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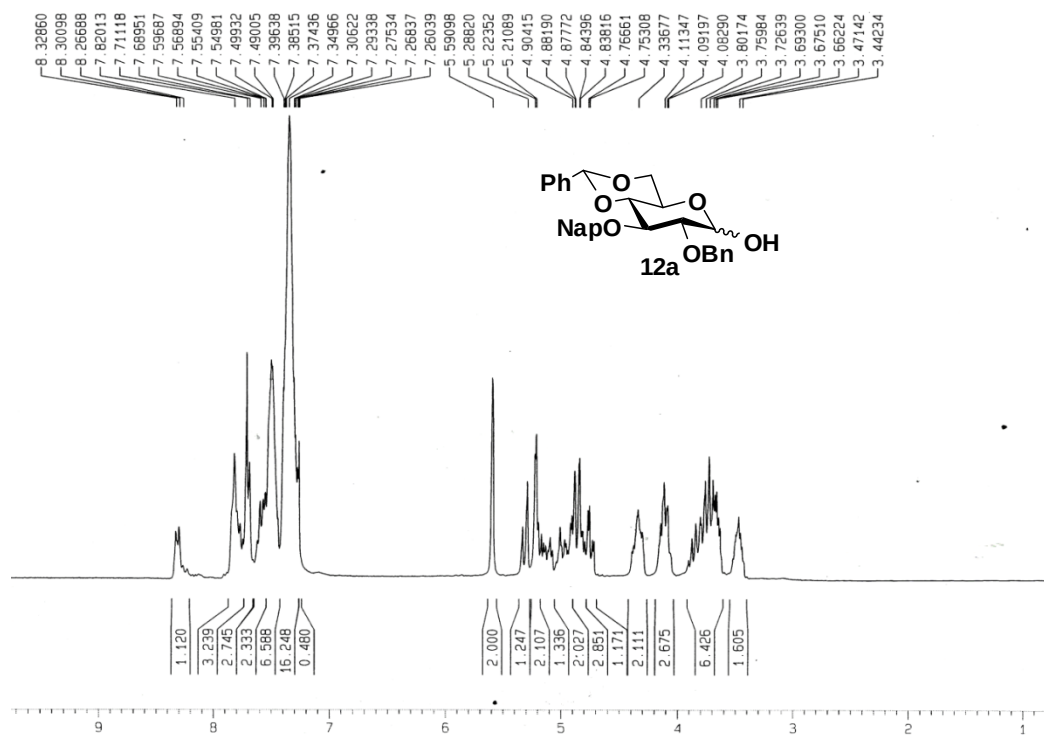
^1H -NMR (300 MHz) spectra of compound **6a** (CDCl_3)



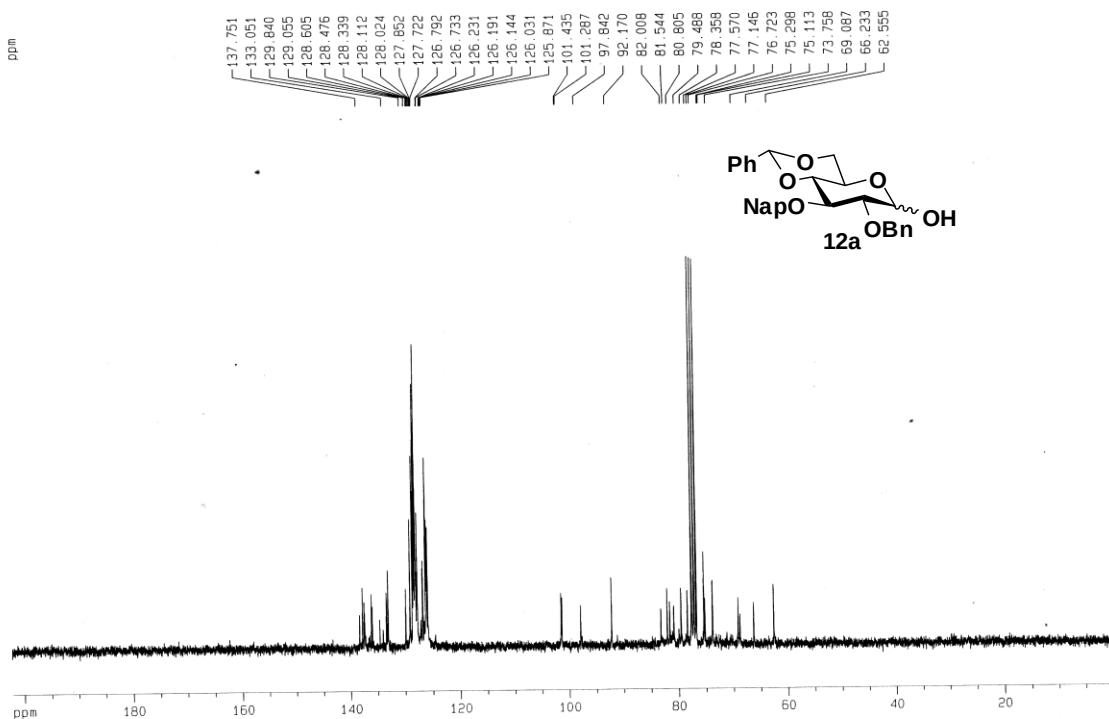
^{13}C -NMR (75 MHz) spectra of compound **6a** (CDCl_3)



^1H -NMR (300 MHz) spectra of compound **12a** (CDCl_3)



^{13}C -NMR (75 MHz) spectra of compound **13a** (CDCl_3)



Chemical structure of compound 16 is shown in the top left. The structure is a bicyclic system with a benzoyl (BzO) group, a phenyl (SPH) group, and a naphthyl (NapO) group. The label 16 is below the structure.

The ^1H NMR spectrum (400 MHz, CDCl_3) shows the following chemical shifts (ppm) listed on the right side of the spectrum:

- 8.166, 8.151, 8.151, 8.011, 7.996, 7.996, 7.955, 7.740, 7.655, 7.630, 7.616, 7.603, 7.589, 7.566, 7.551, 7.535, 7.509, 7.494, 7.476, 7.460, 7.452, 7.450, 7.437, 7.428, 7.424, 7.411, 7.397, 7.345, 7.342, 7.329, 7.313, 7.304, 7.295, 7.290, 7.284, 7.265, 7.253, 7.244, 7.242, 5.972, 5.970, 5.960, 5.960, 5.674, 5.672, 5.593, 5.574, 5.555, 4.868, 4.843, 4.694, 4.669, 4.468, 4.455, 4.448, 4.436, 4.129, 4.122, 4.109, 4.103, 1.348, 1.335, 1.282.

Integration values are provided below the baseline:

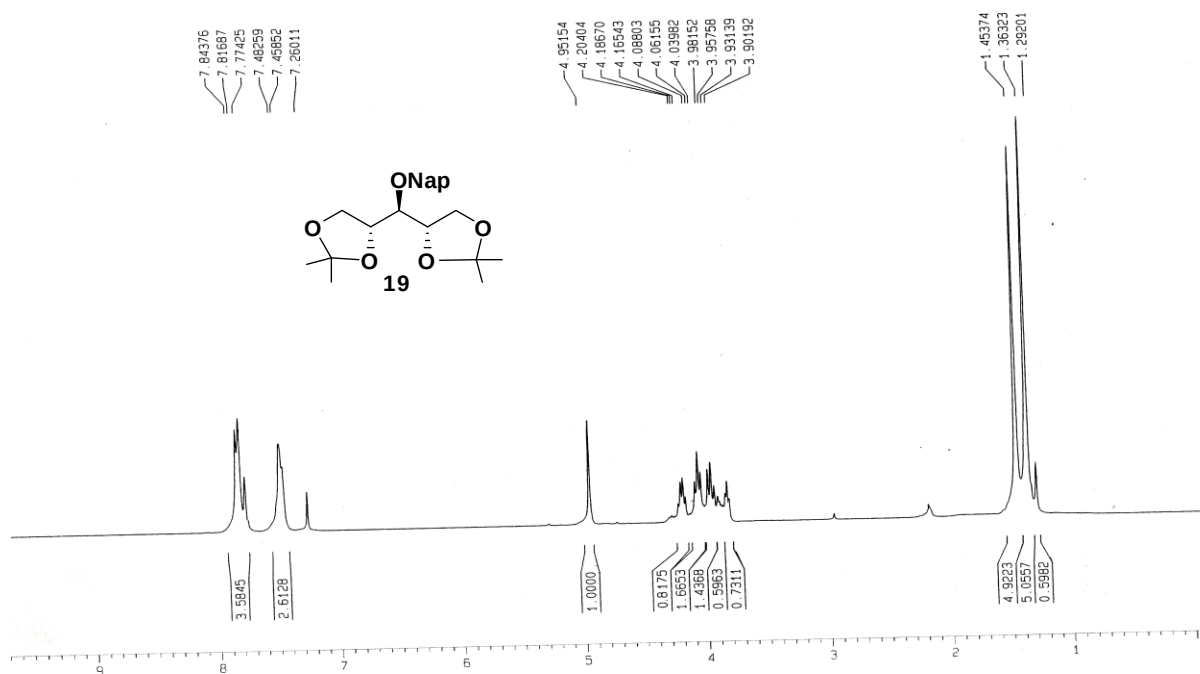
- 1.00, 1.05, 1.05, 0.54, 0.54, 1.16, 1.13, 2.20, 2.24, 1.57, 0.66, 0.52, 0.46, 0.53, 0.55, 0.53, 0.54, 0.52.

O=C1OC(c2ccccc2)C(=O)OC1c3ccccc3

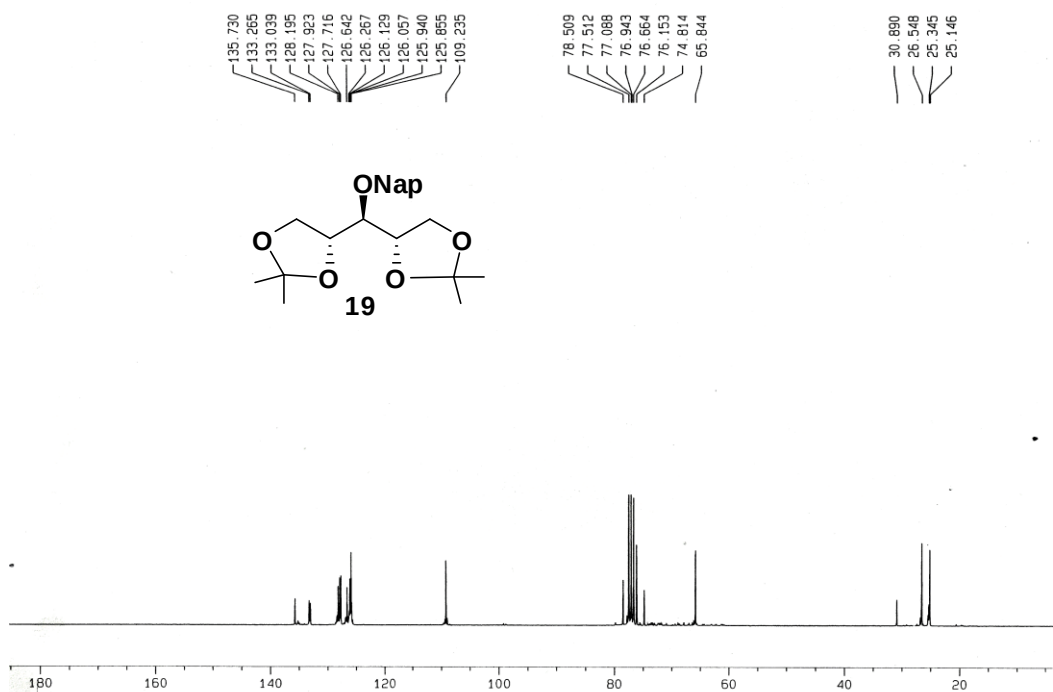
165.93, 165.84, 134.89, 133.64, 133.52, 133.33, 133.25, 133.12, 131.89, 130.11, 130.00, 129.88, 129.71, 129.30, 128.64, 128.53, 128.30, 128.04, 127.96, 127.72, 127.04, 126.08, 125.98, 86.34, 77.41, 77.16, 76.90, 74.67, 73.27, 71.25, 70.75, 68.28, 17.73

BzO, NapO, OBz, SPh, 16

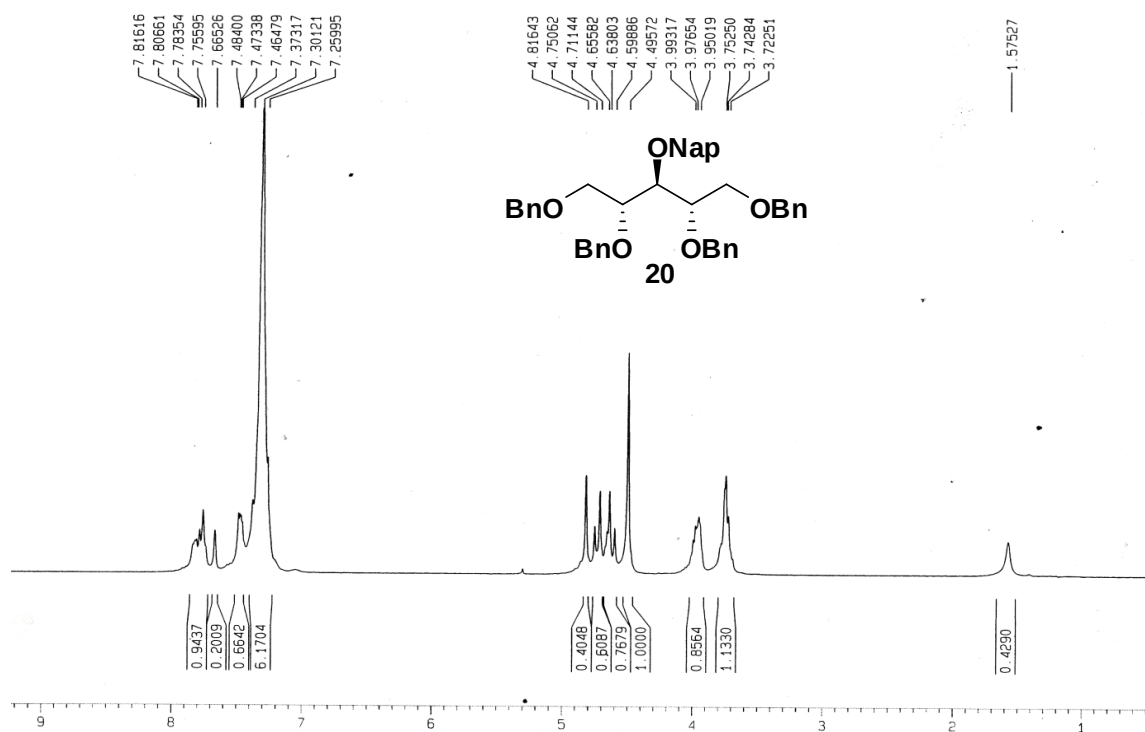
¹H-NMR (300 MHz) spectra of compound **19** (CDCl₃)



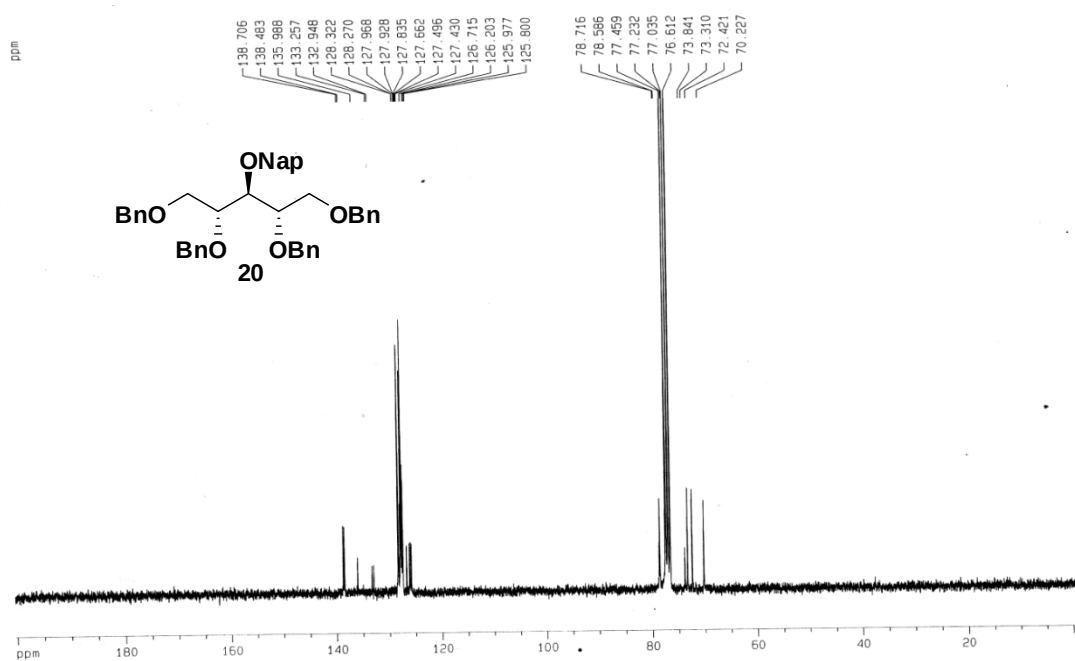
¹³C-NMR (75 MHz) spectra of compound **19** (CDCl₃)



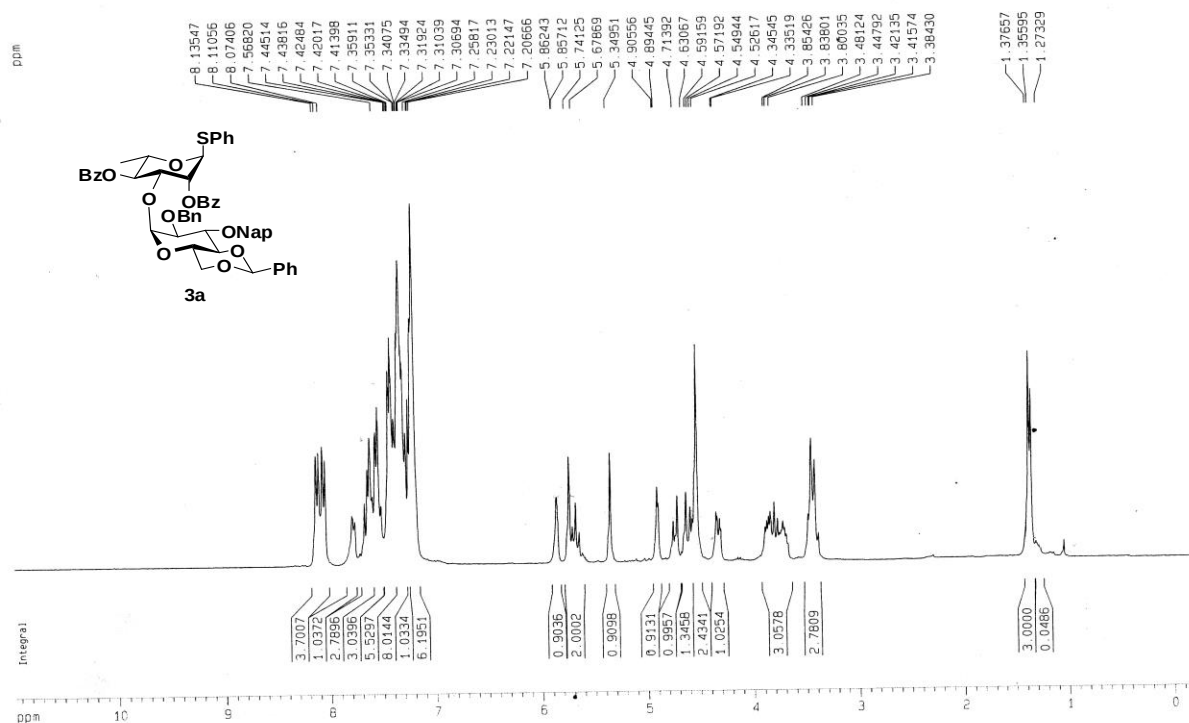
^1H -NMR (300 MHz) spectra of compound **20** (CDCl_3)



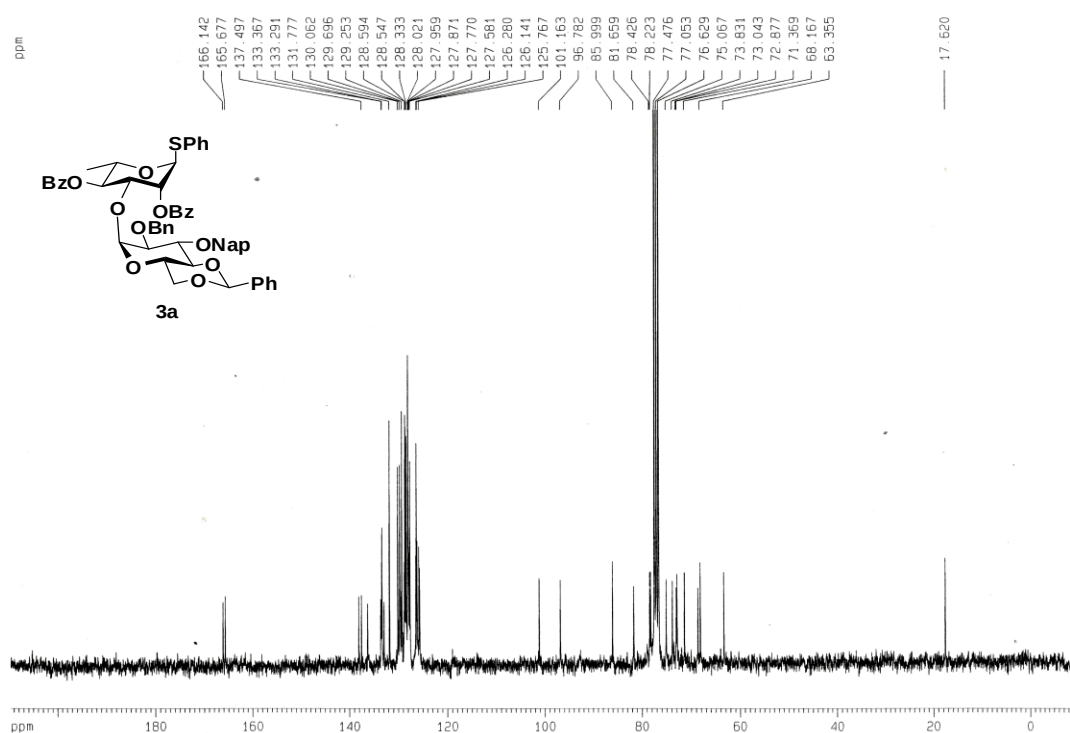
^{13}C -NMR (75 MHz) spectra of compound **20** (CDCl_3)



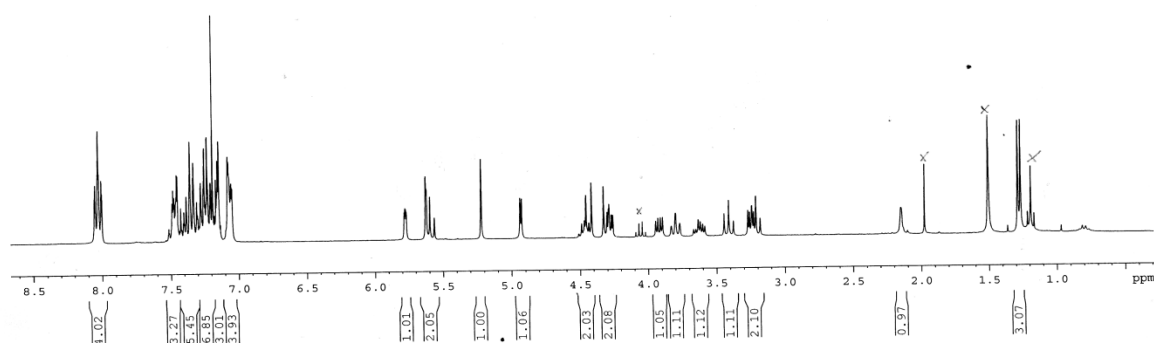
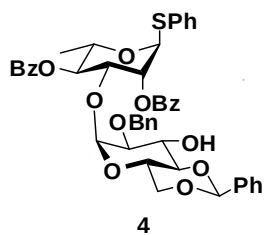
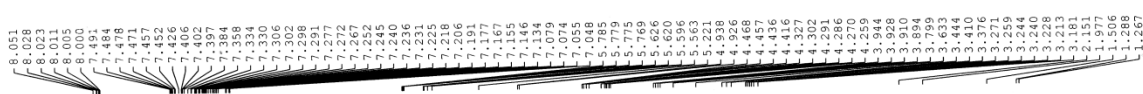
¹H-NMR (300 MHz) spectra of compound **3a** (CDCl₃)



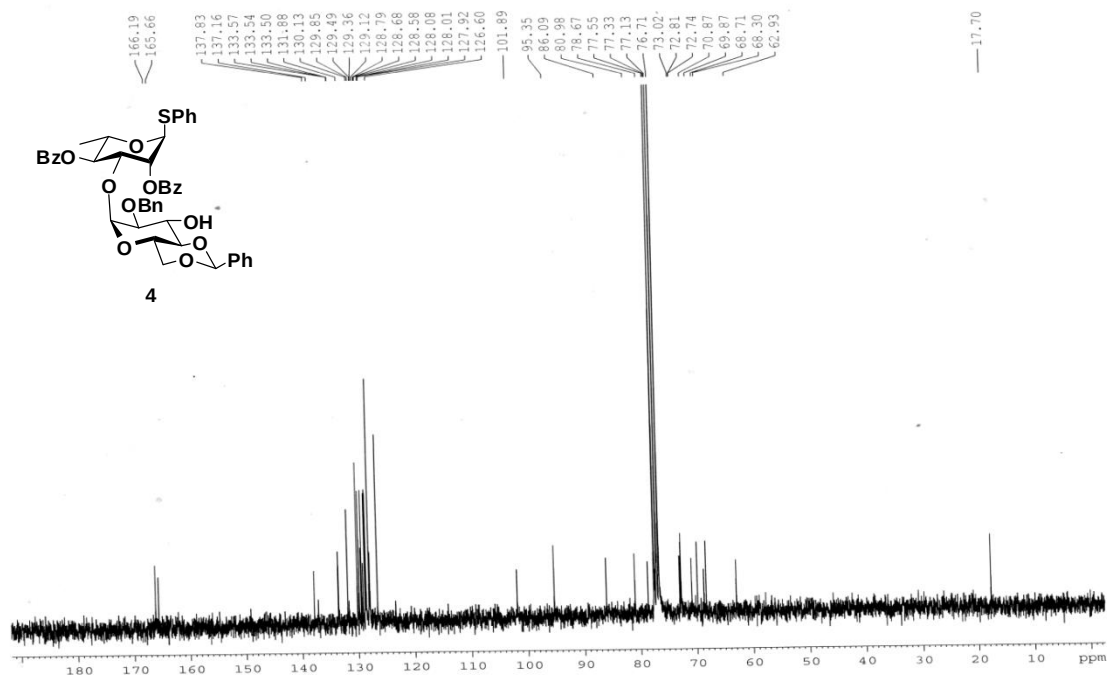
¹³C-NMR (75 MHz) spectra of compound **3a** (CDCl₃)



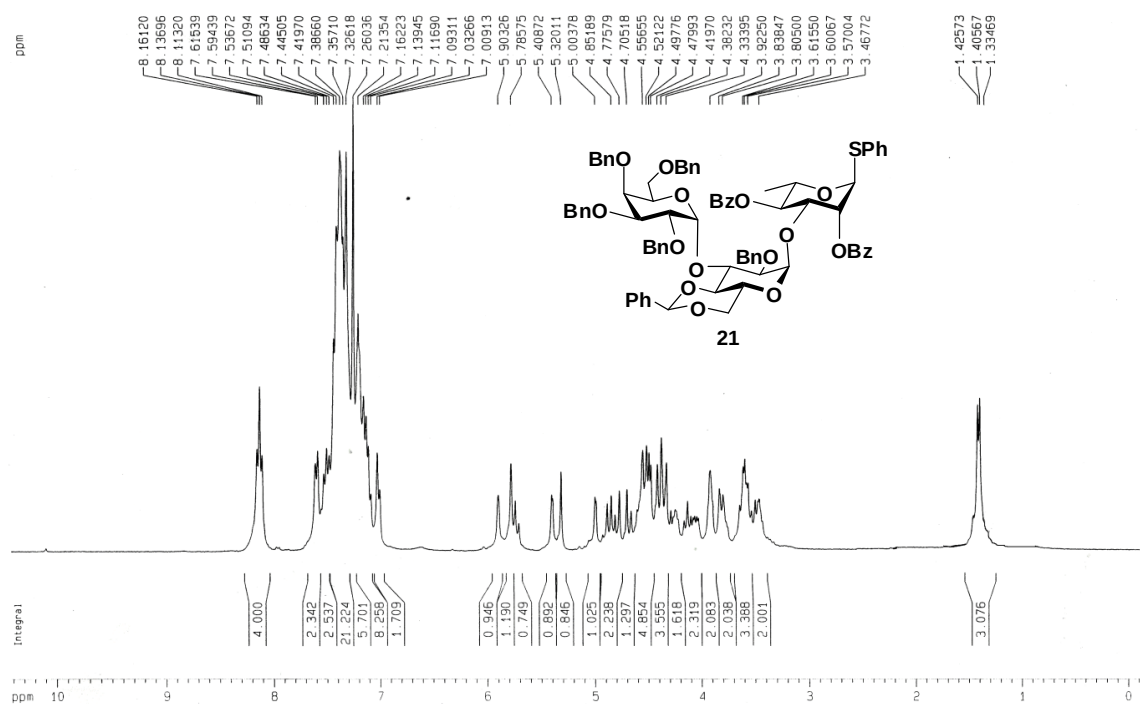
¹H-NMR (300 MHz) spectra of compound 4(CDCl₃)



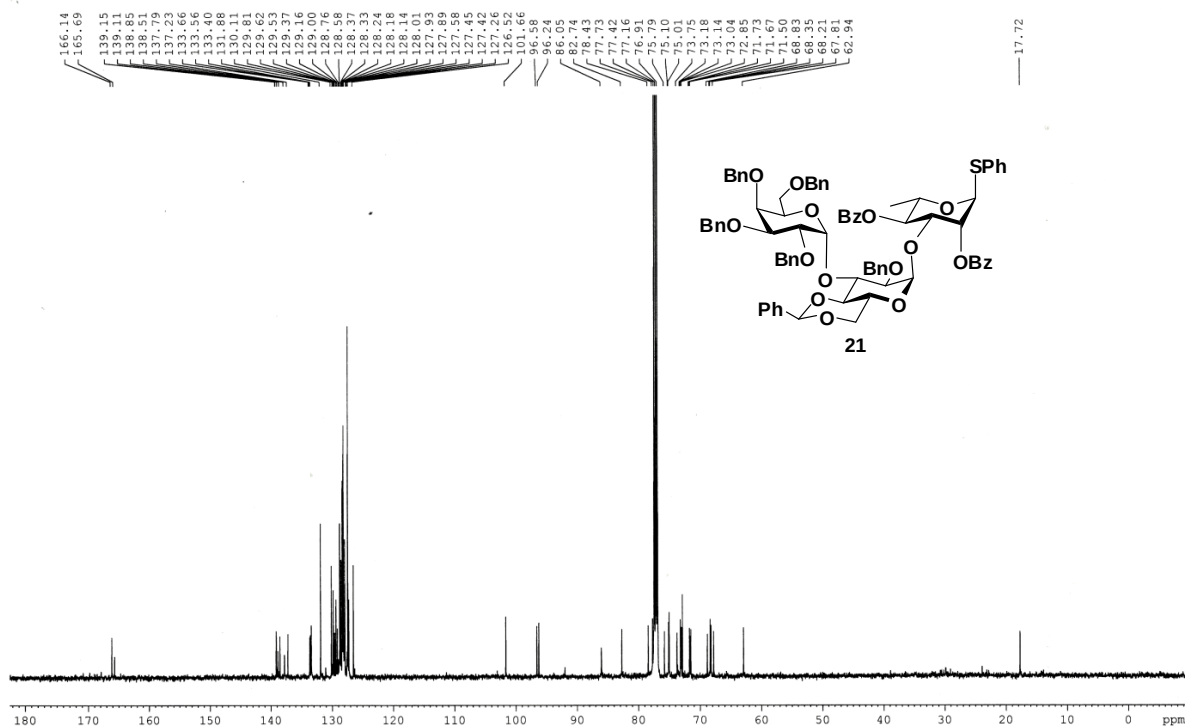
¹³C-NMR (75 MHz) spectra of compound 4 (CDCl₃)



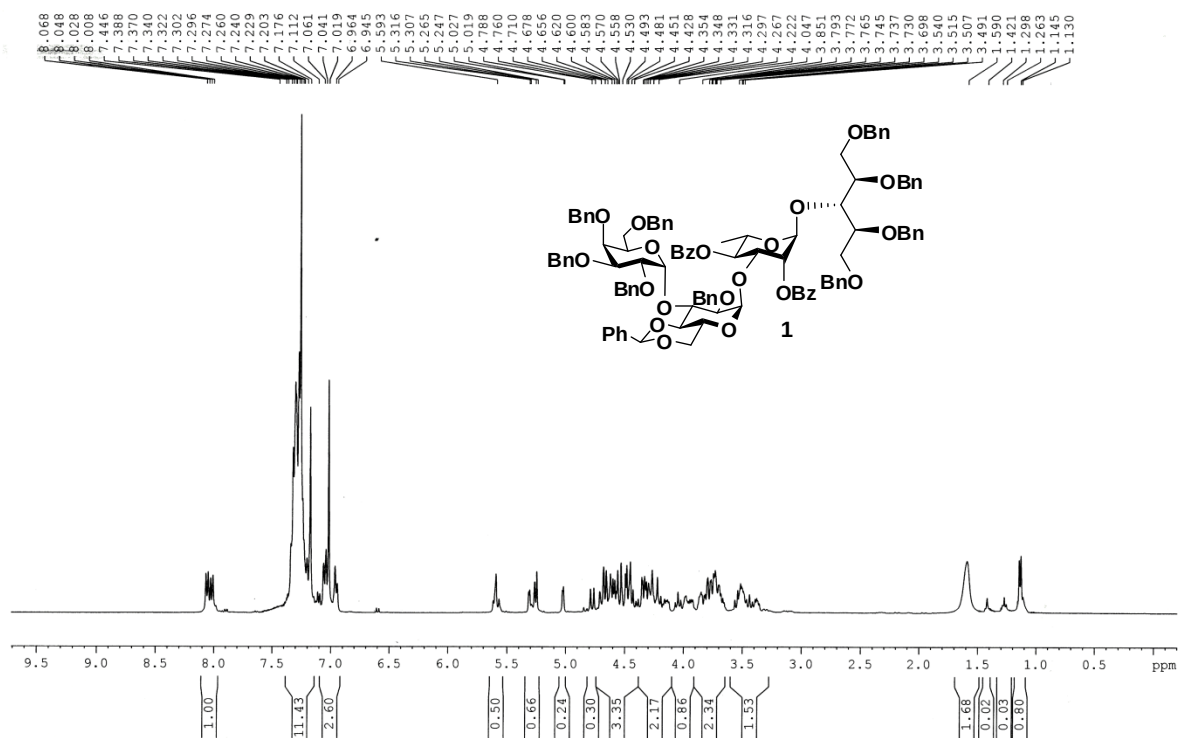
¹H-NMR (300 MHz) spectra of compound 21 (CDCl₃)



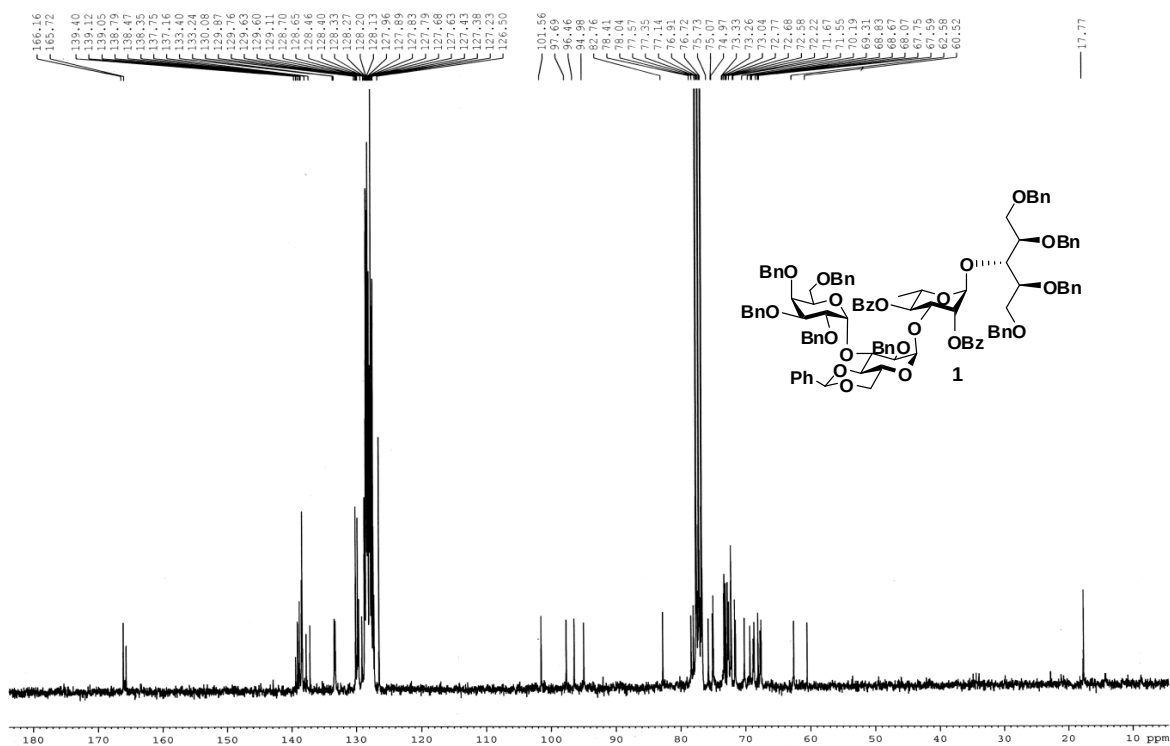
¹³C-NMR (75 MHz) spectra of compound 21 (CDCl₃)



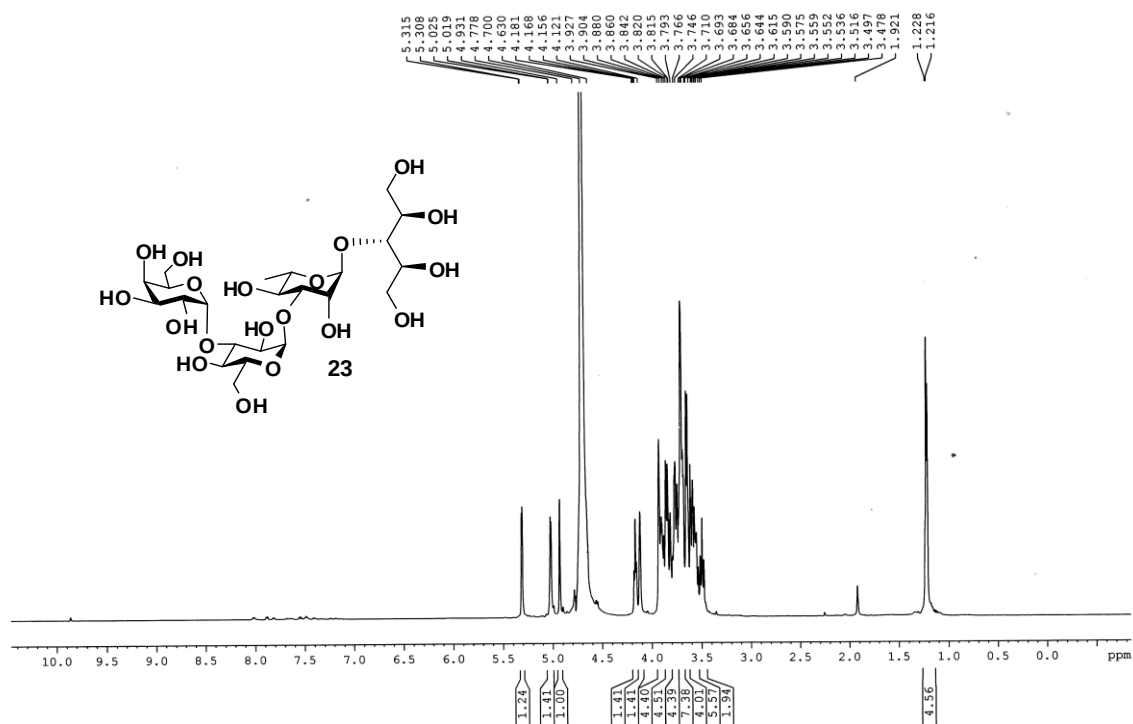
¹H-NMR (300 MHz) spectra of compound **1** (CDCl₃)



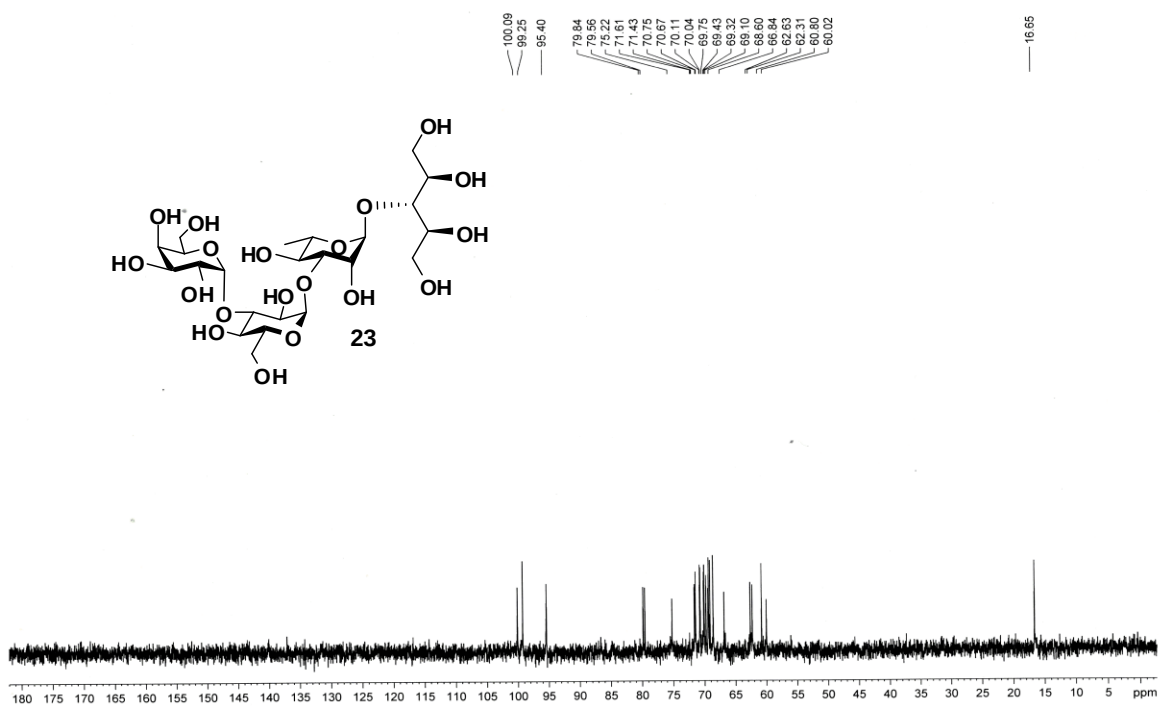
¹³C-NMR (75 MHz) spectra of compound **1** (CDCl₃)



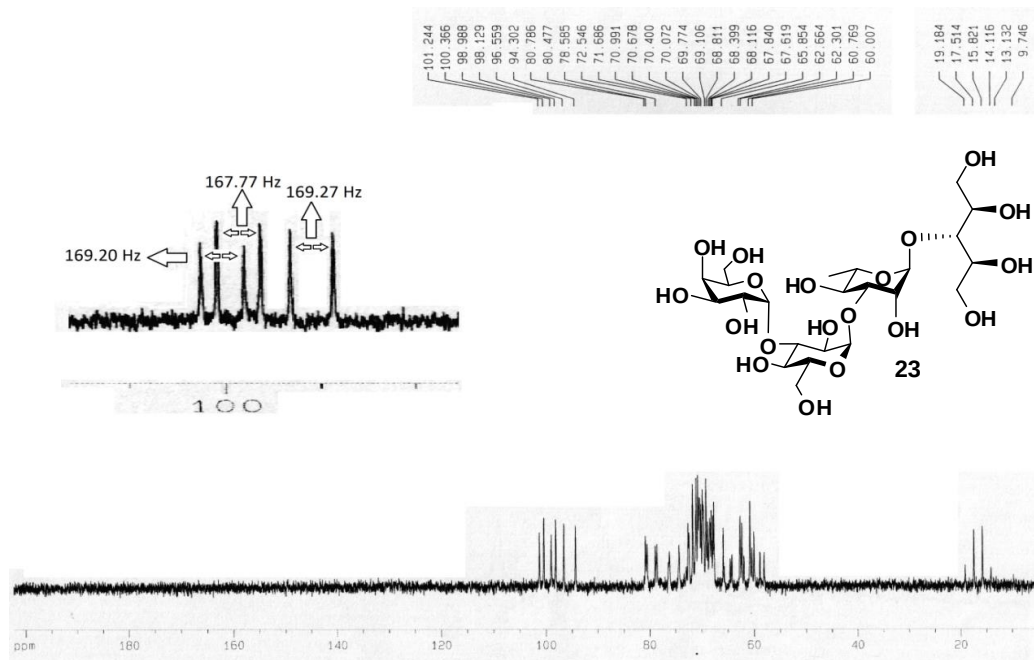
^1H -NMR (500 MHz) spectra of compound **23** (D_2O)



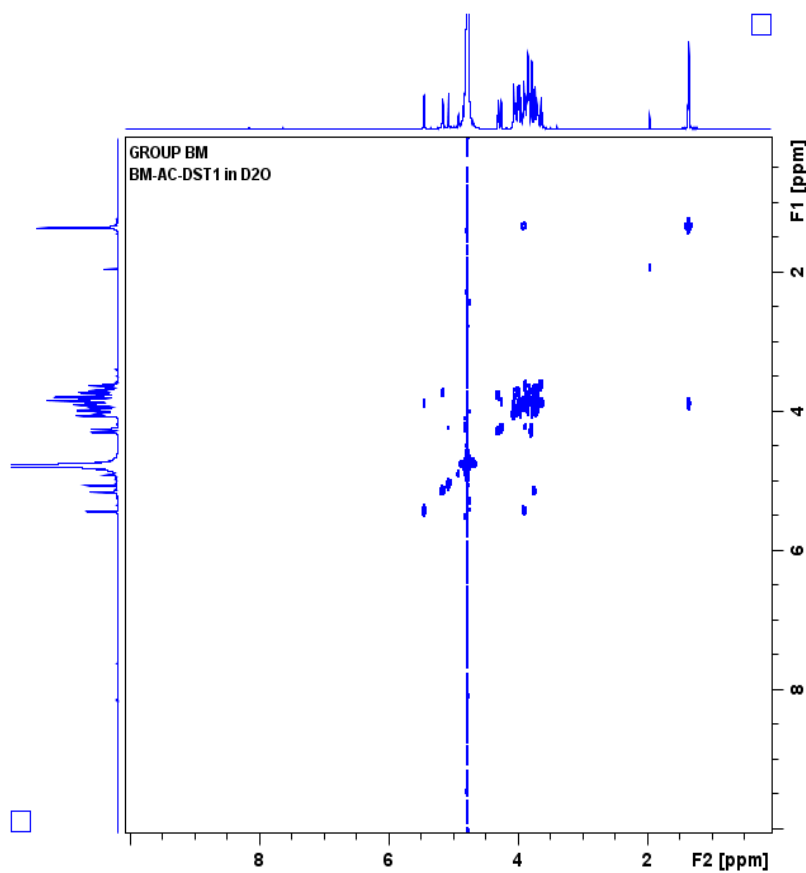
^{13}C -NMR (125 MHz) spectra of compound **23** (D_2O)



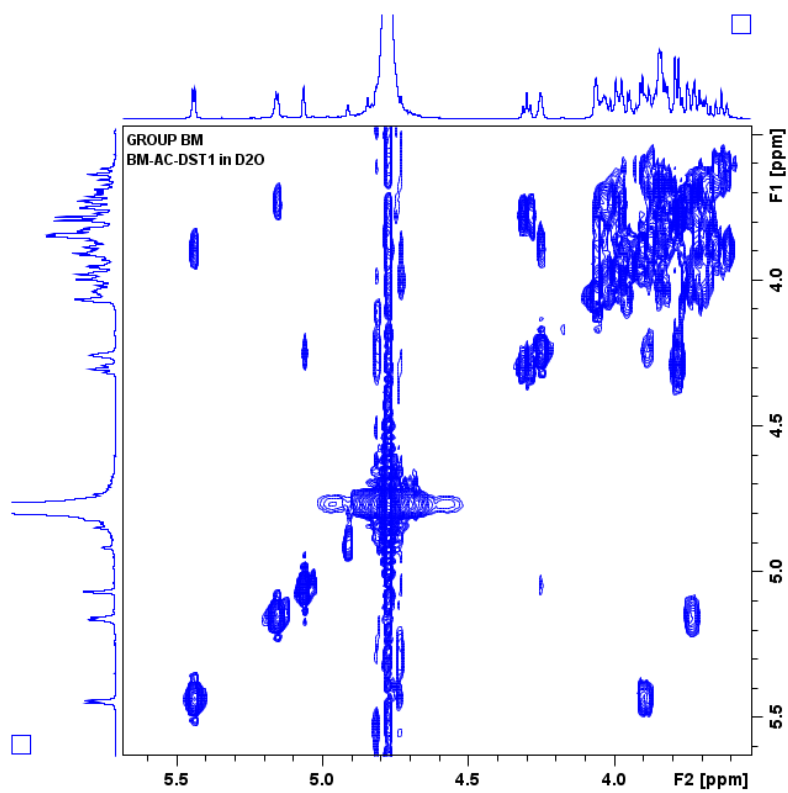
^1H - ^{13}C Coupled NMR of compound **23**



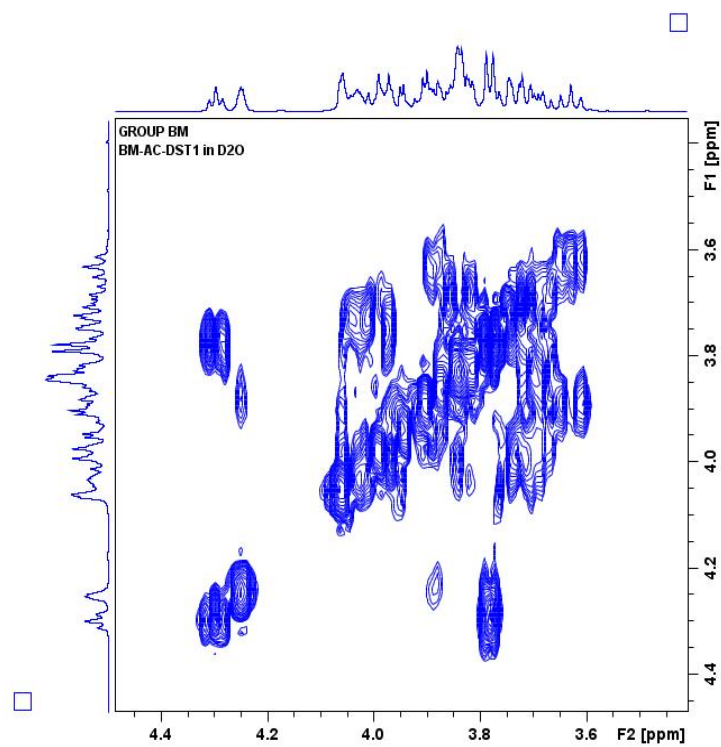
^1H - ^1H COSY NMR spectra of compound **23**



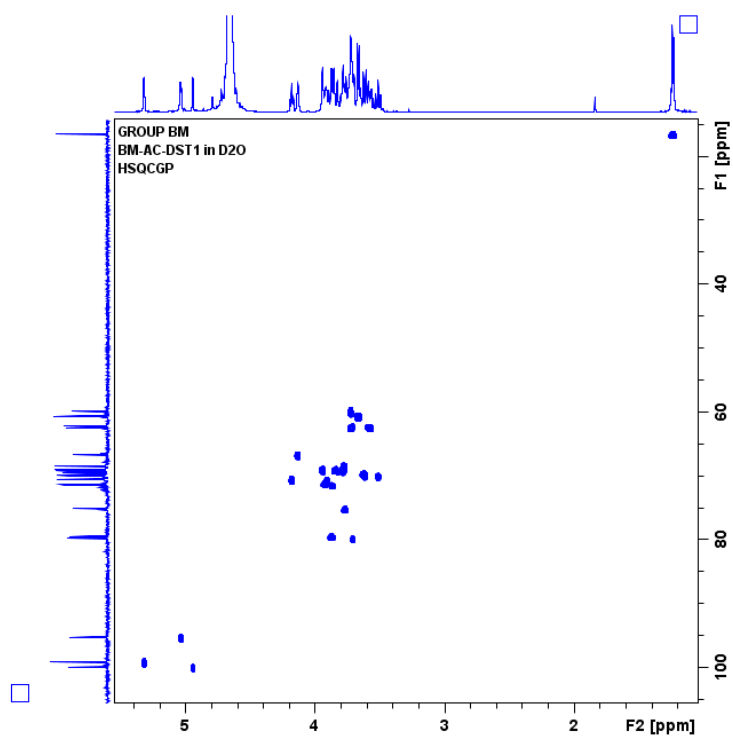
^1H - ^1H COSY NMR expansion δ 3.3-5.5.



^1H - ^1H COSY NMR expansion δ 3.4-4.4.

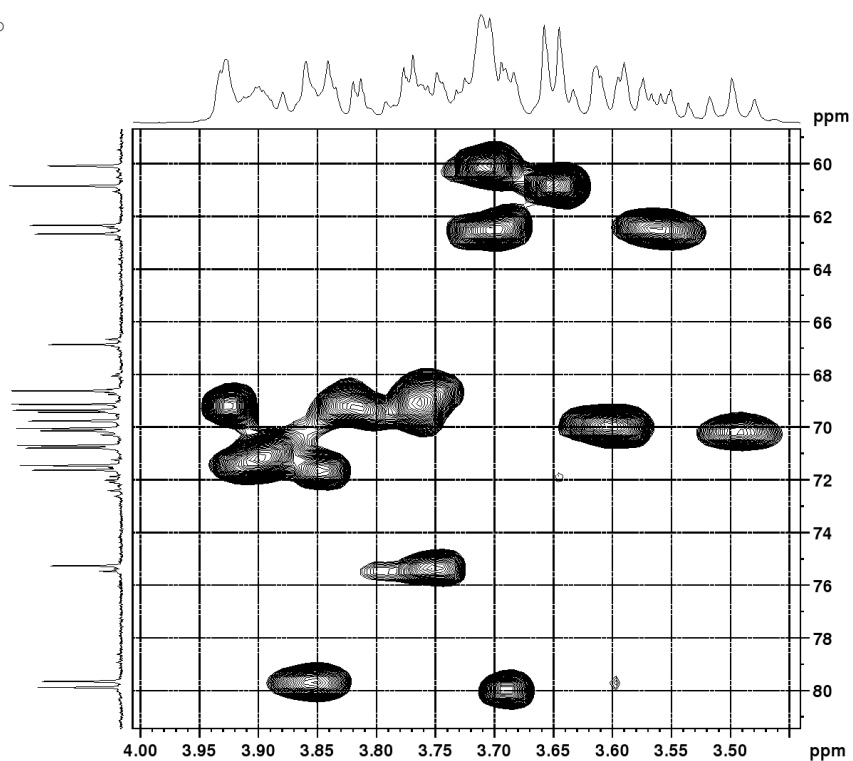


HSQC spectra of compound 23

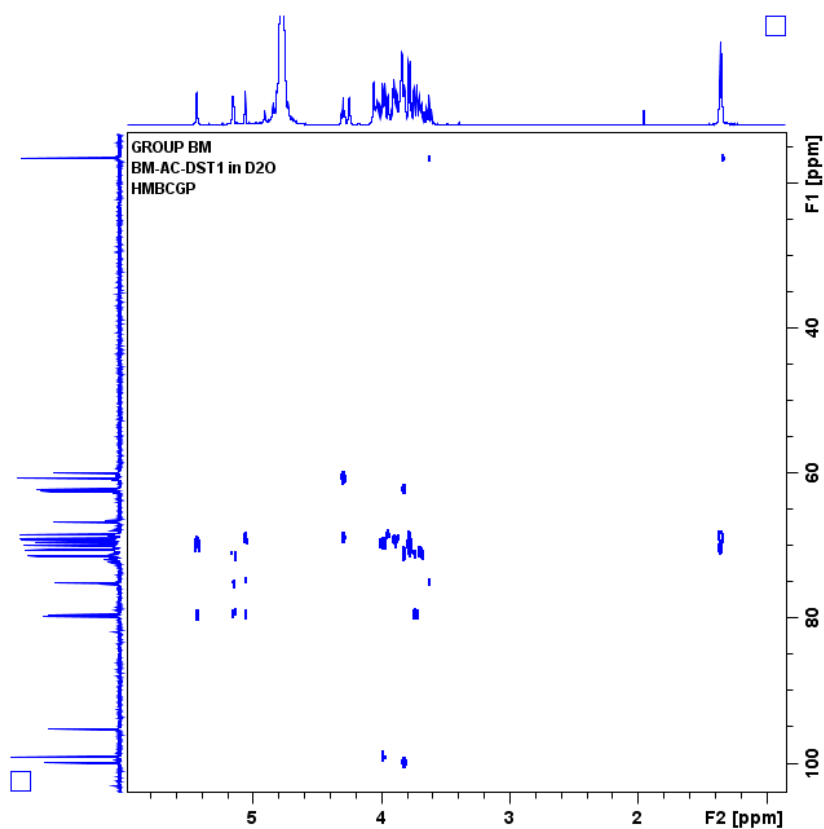


HSQC spectra of compound 23 expansion δ 3.5-4.0 and 58-82

GROUP BM
BM-AC-DST1 in D2O
HSQCGP



HMBC spectra of compound 23



HMBC spectra of compound 23 δ 3.5-5.5 and 60-100

