Supporting Information (SI)

Synthesis and evaluation of 1,2-*trans* alkyl galactofuranosides mimetics as mycobacteriostatic agents.

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Part I. General Experimental Informations

All reactions were carried out in oven-dried glassware. Tetrahydrofuran and toluene were distilled from sodium/benzophenone, dimethylformamide from CaH_2, dried MeOH was purchased sealed on molecular sieves. Dichloromethane used was stabilized on amylene. All reagents were purchased from commercial sources and were used without further purification unless noted. Unless otherwise stated, all reactions were carried out at room temperature under a positive pressure of nitrogen and were monitored by TLC on Silica Gel 60 F_{254}. TLC spots were detected under 254 nm light or by staining with cerium ammonium molybdate solution. Column chromatographies were performed on Silica Gel (50 µm). Optical rotations were measured at 20 °C on a Perkin-Elmer 341 polarimeter. NMR spectra were recorded at 300 or 400 MHz for ^1H and 75 or 100 MHz for ^{13}C. Chemical shifts are given in δ units (ppm) and referenced to $CDCl_3$ (7.26 ppm) or CD_3OD (3,31 ppm). Coupling constants J were calculated in Hertz (Hz). Proton and carbon NMR peaks were unambiguously assigned by COSY (double quantum filtered with gradient pulse for selection), HSQC (gradient echo-anti echo selection and shape pulse) and HMBC (echo-anti echo gradient selection, magnitude mode) correlation experiments. High Resolution Masses were measured by electrospray with a MS/MS ZabSpec TOF Micromass using *m*-nitrobenzylic alcohol as a matrix and accelerated caesium ions for ionization (Centre Regional des Mesures Physiques de l'Ouest, Université de Rennes 1). Compounds **8**,[1] **19**,[2] **21**,[2] **26**,[3] **32**,[4] **37**[5] and **39**[6] were prepared according to reported procedures.

Part II. STD-NMR

1. STD-NMR experiments

All STD-NMR experiments were recorded at 298 K with a spectral width of 12 ppm on a Bruker Avance III 400 MHz spectrometer operating at 9.4 T observing ^1H at 400.13 MHz. The spectrometer was equipped with a BBOF probe (direct detection) with gradient in z direction. The ^1H NMR chemical shifts are given in ppm related to the residual HDO signal at 4.68 ppm. In STD experiments, selective saturation of the protein was achieved by a train of Gaussian Shaped pulses of 49 ms each, truncated at 1% and separate by a 1 ms delay. The duration of the presaturation (2 s) was adjusted by n = 41 cycles. An irradiation power of 50 dB used for the selective pulse was 47.0 Hz. A 30 ms spin-lock pulse was used to remove residual protein resonances.

The On-resonance irradiation (I-On) and the Off-resonance (I-Off) of the protein was respectively performed at -3 ppm (or +7 ppm) and +300 ppm. Spectra processing was performed on a PC using Bruker Topspin v2.1 software. Resulting difference STD-NMR spectra between On- an Off-resonance spectra were analysed by employing a 0.5 Hz line broadening.

Acquisition of ^{1}H NMR spectra of the ligand (0.7 mg/0.5 mL D_2O *i.e* 5 mM) were recorded first, followed by a STD-NMR with the absence of cells as reference in order to verify the absence of STD effect in these experimental conditions. Final STD-NMR spectra using the same parameters were performed after addition of cells (20 mg wet mass) as follows: 512 to 2048 scans were recorded, acquisition time of 1.7 s, 2 s of saturation time for 2.1 s of relaxation delay. A 3-9-19 WATERGATE sequence was used to suppress residual HOD signal when needed. Intensities of all STD effects were calculated though integrals over the respective signals in ^{1}H NMR reference spectrum. The largest STD effect in each spectrum was set to 100% and relative intensities were determined, as common for non refined STD effects. Hence, sufficient comparisons of relative STD effects between sugars were possible, but absolute binding's intensities could not be determined. STD-NMR spectra in the presence of *M. smegmatis* living cells are depicted in red (in green without cells), and ^{1}H NMR are depicted in blue.

2. STD-NMR Spectra

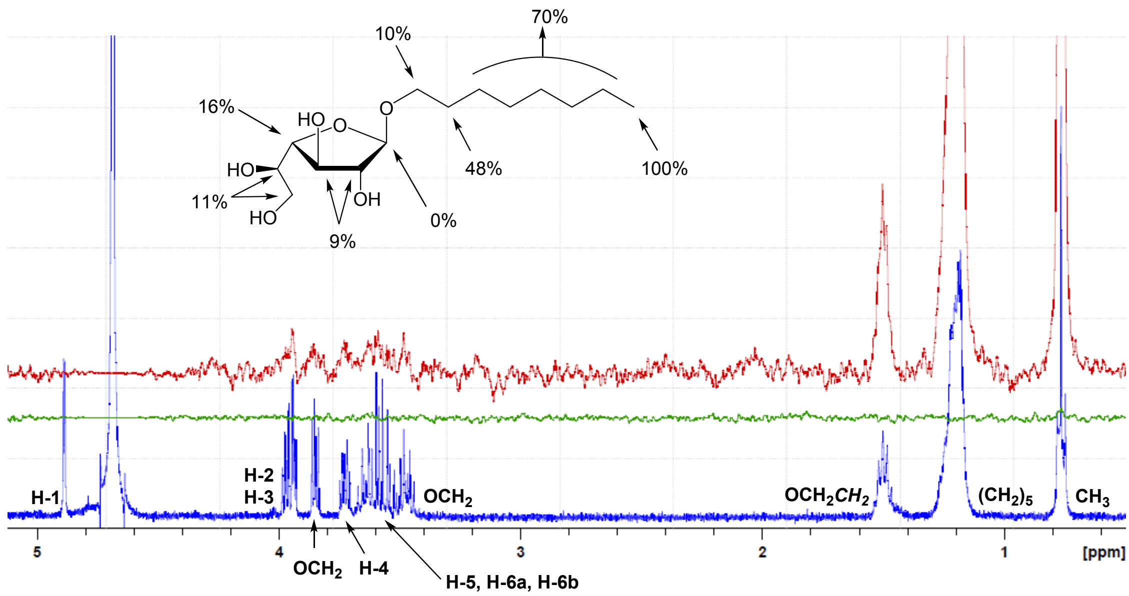


Figure 1: *STD effects measured on octyl β-D-galactofuranoside* ***1*** *in presence of M. smegmatis*

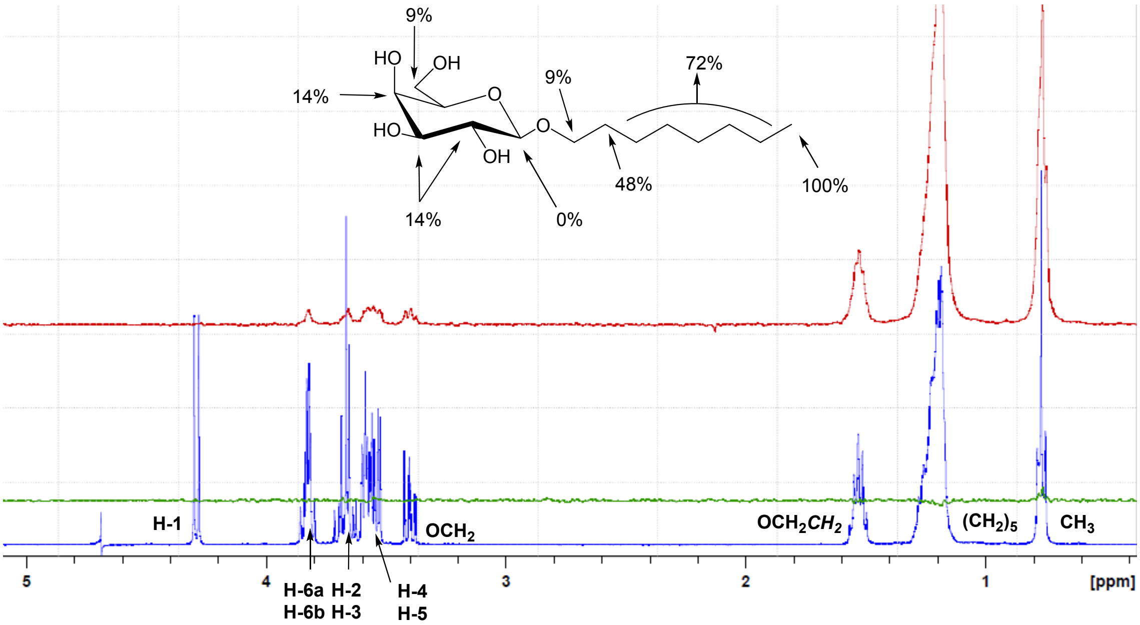


Figure 2: *STD effects measured on octyl β-D-galactopyranoside **44** in presence of M. smegmatis.*

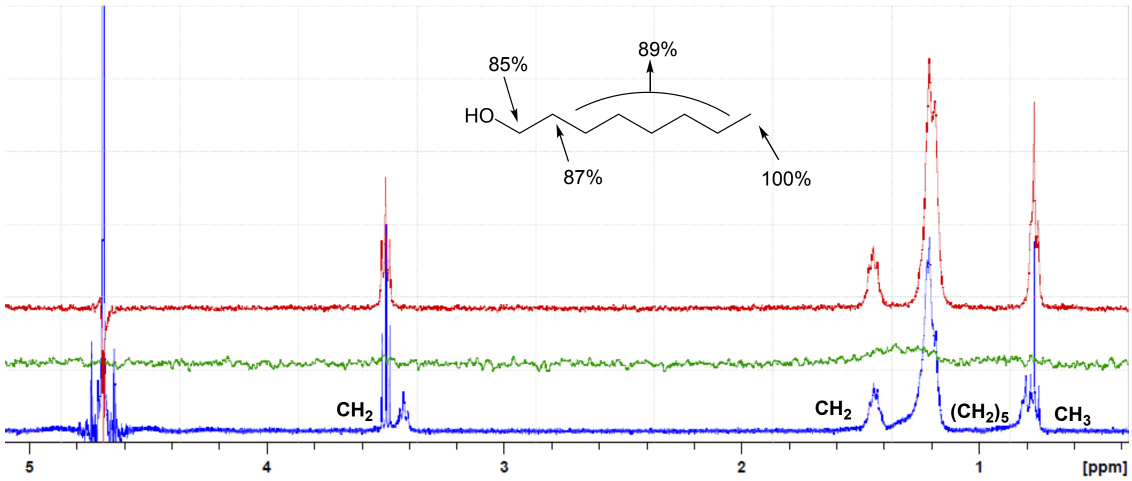
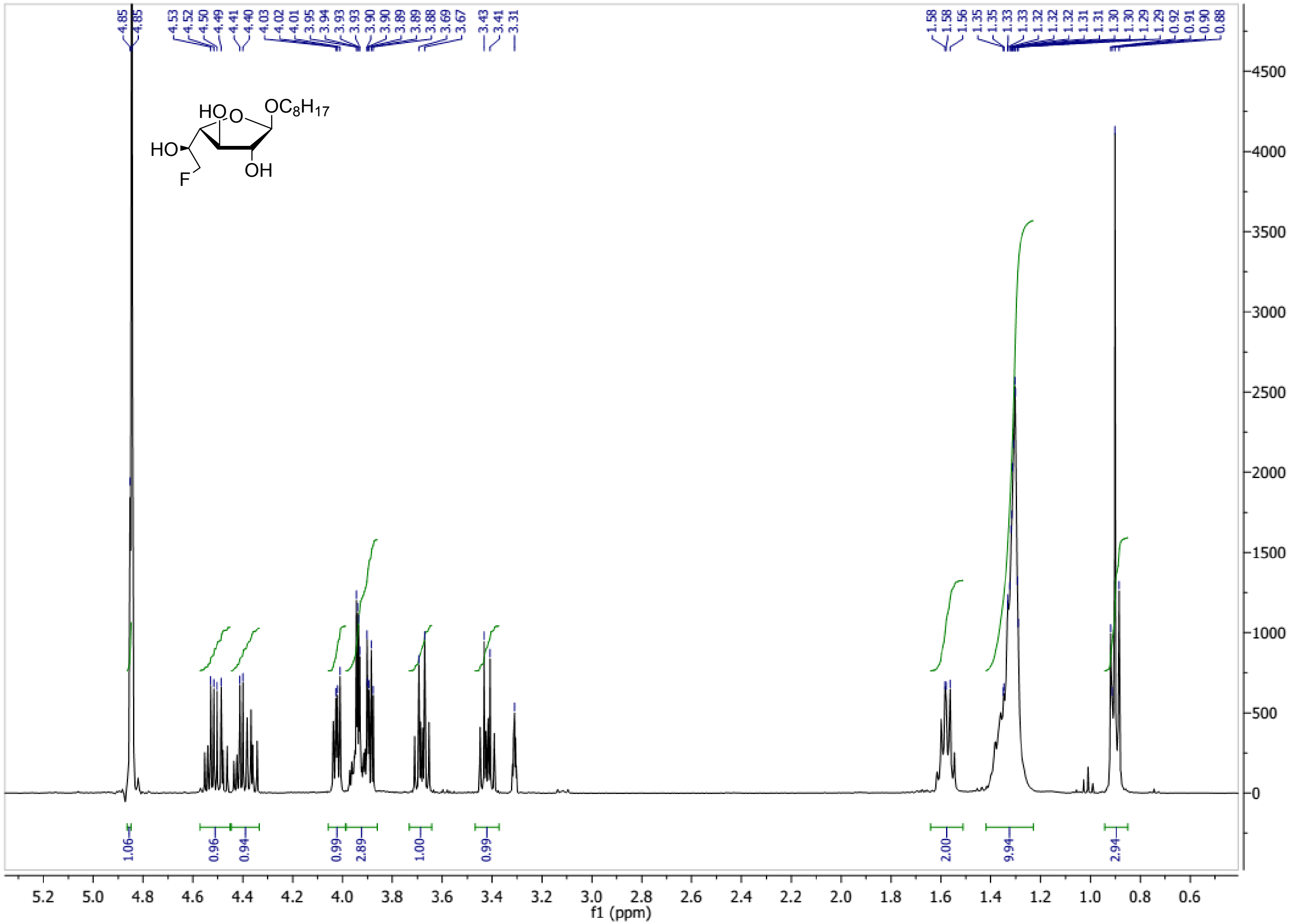


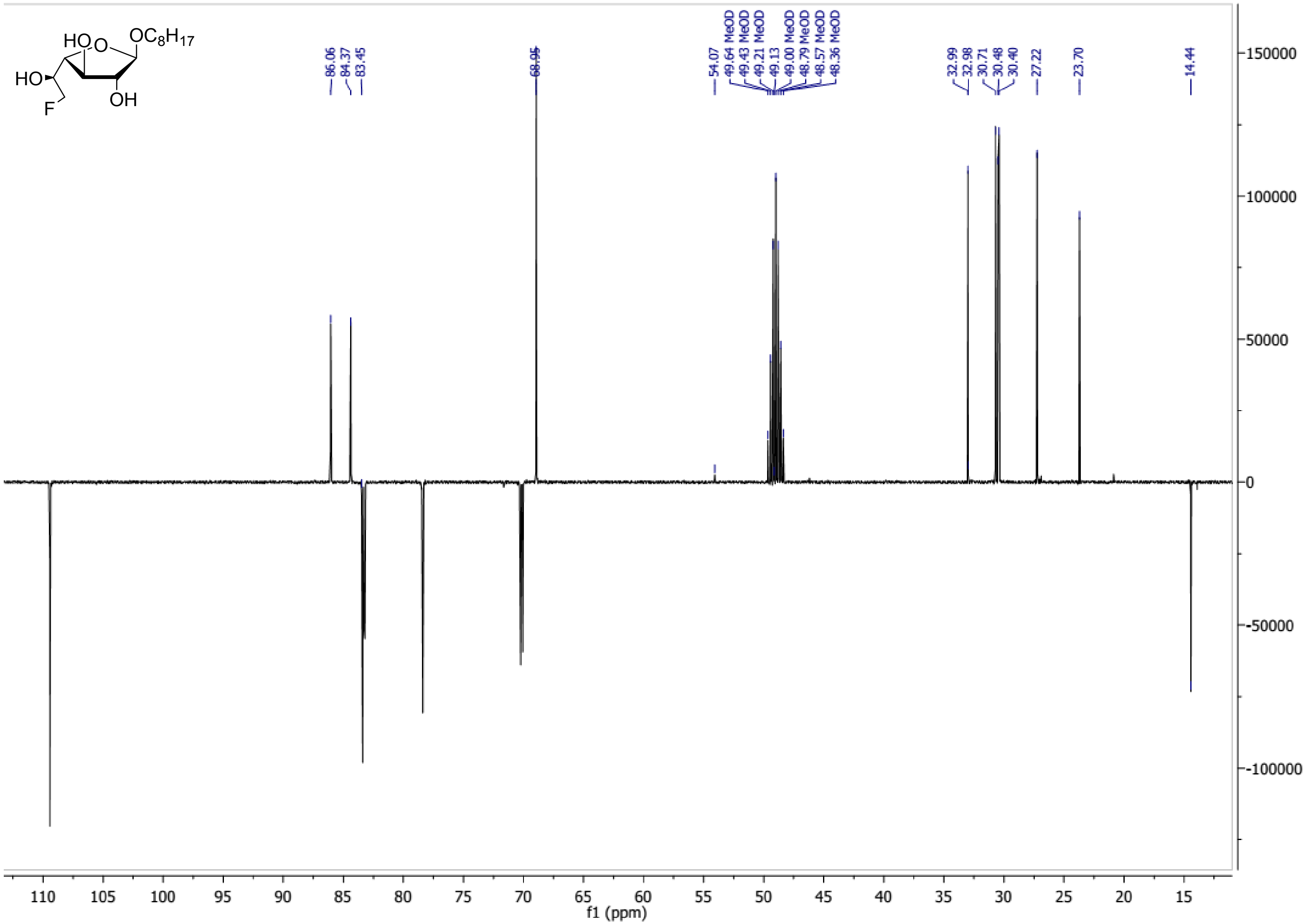
Figure 3: *STD effects measured on octan-1-ol in presence of M. smegmatis.*

Part III. References

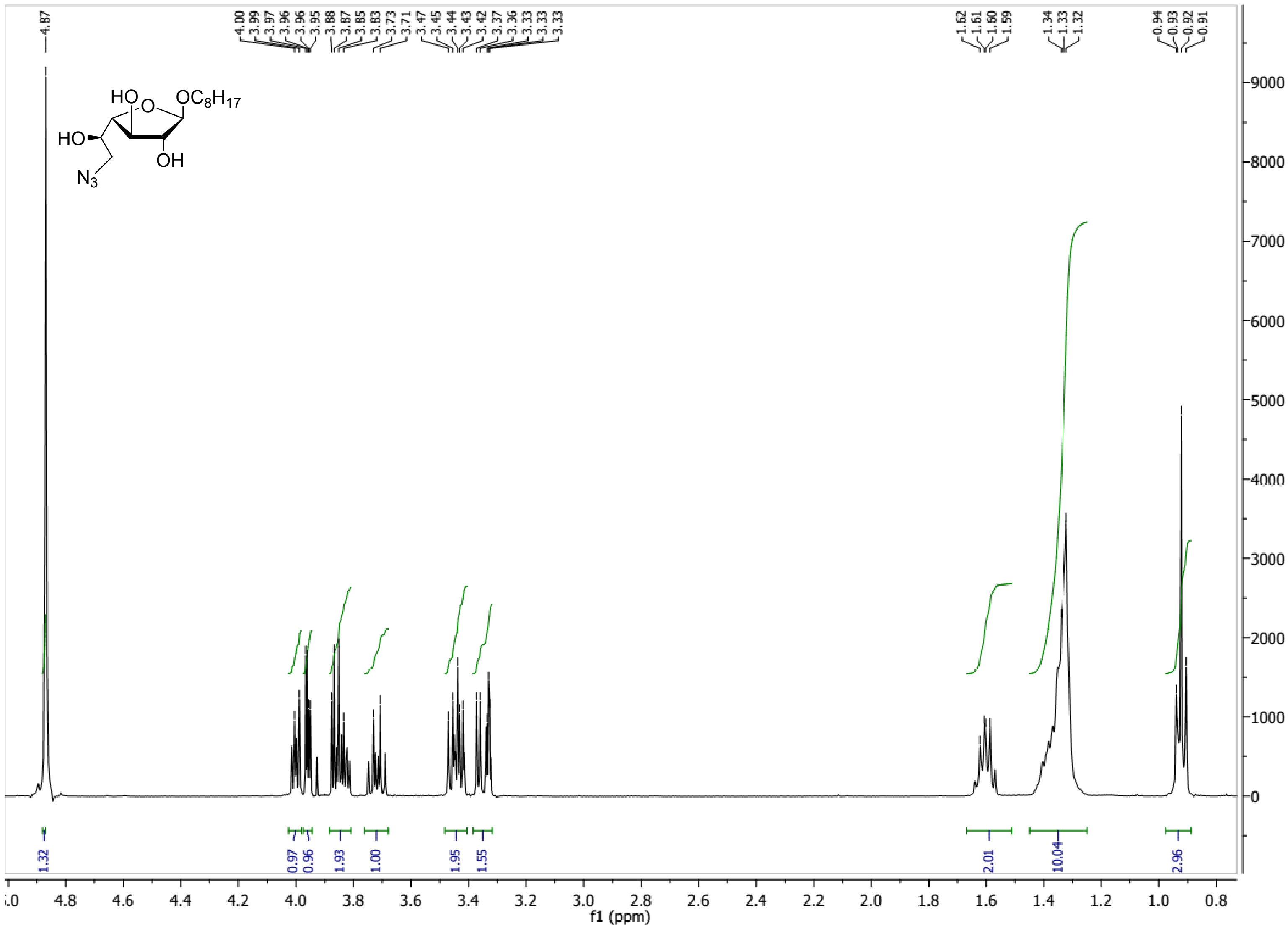
1. V. Ferrières, J.-N. Bertho and D. Plusquellec, *Carbohydr. Res.*, 1998, **311**, 25-35.
2. R. Dureau, F. Robert-Gangneux, J.-P. Gangneux, C. Nugier-Chauvin, L. Legentil, R. Daniellou and V. Ferrières, *Carbohydr. Res.*, 2010, **345**, 1299-1305.
3. R. Dureau, L. Legentil, R. Daniellou and V. Ferrières, *J. Org. Chem.*, 2012, **77**, 1301-1307.
4. G. R. Bebernitz, J. G. Dain, R. O. Deems, D. A. Otero, W. R. Simpson and R. J. Strohschein, *J. Med. Chem.*, 2000, **44**, 512-523.
5. M. Ouchi, Y. Inoue, K. Wada, S. Iketani, T. Hakushi and E. Weber, *J. Org. Chem.*, 1987, **52**, 2420-2427.
6. M. Gelin, V. Ferrières and D. Plusquellec, *Eur. J. Org. Chem.*, 2000, 1423-1431.



[1]H NMR Spectrum of **2** (400 MHz, CD_3OD).



^{13}C NMR Spectrum of **2** (100 MHz, CD_3OD).



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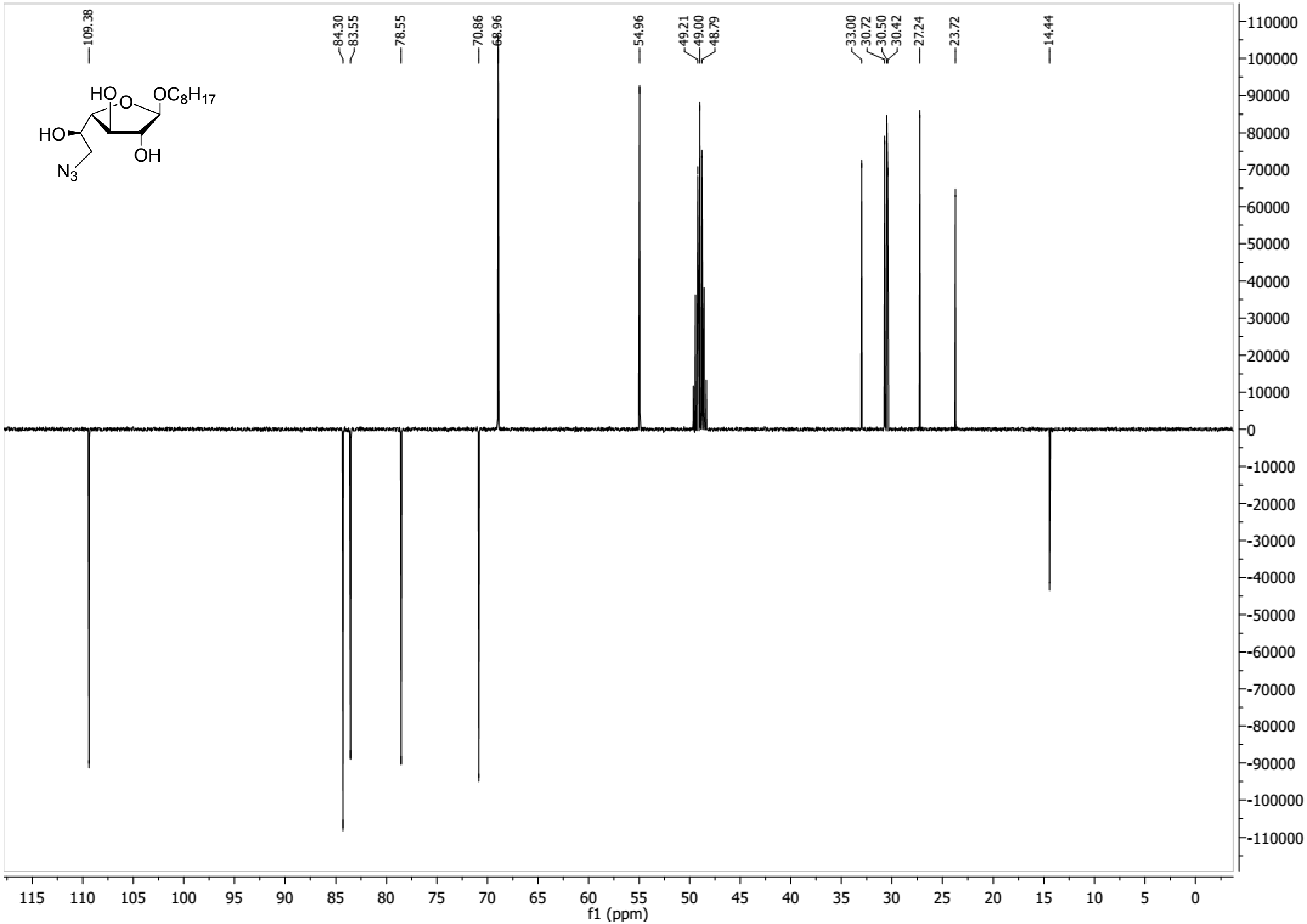
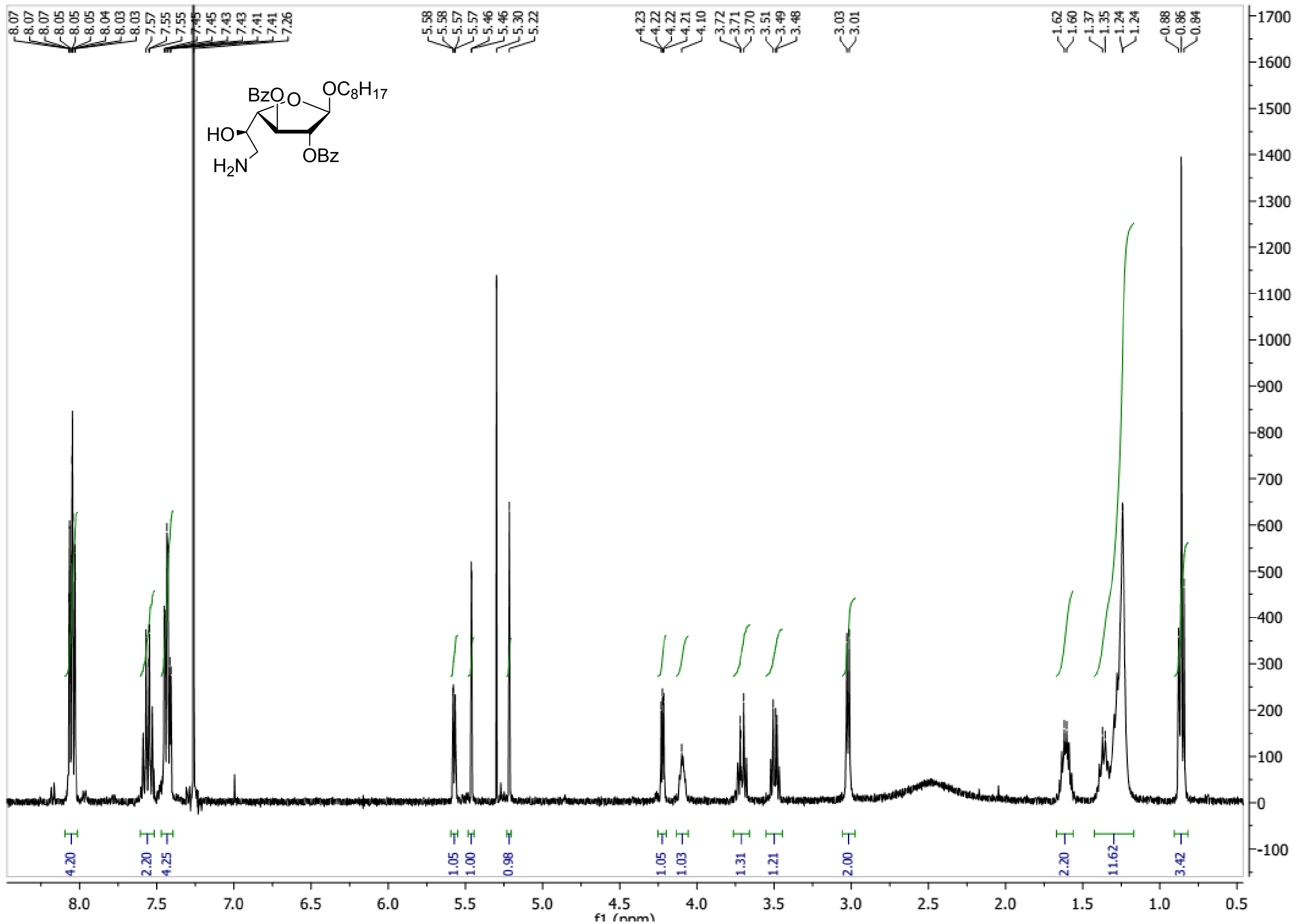
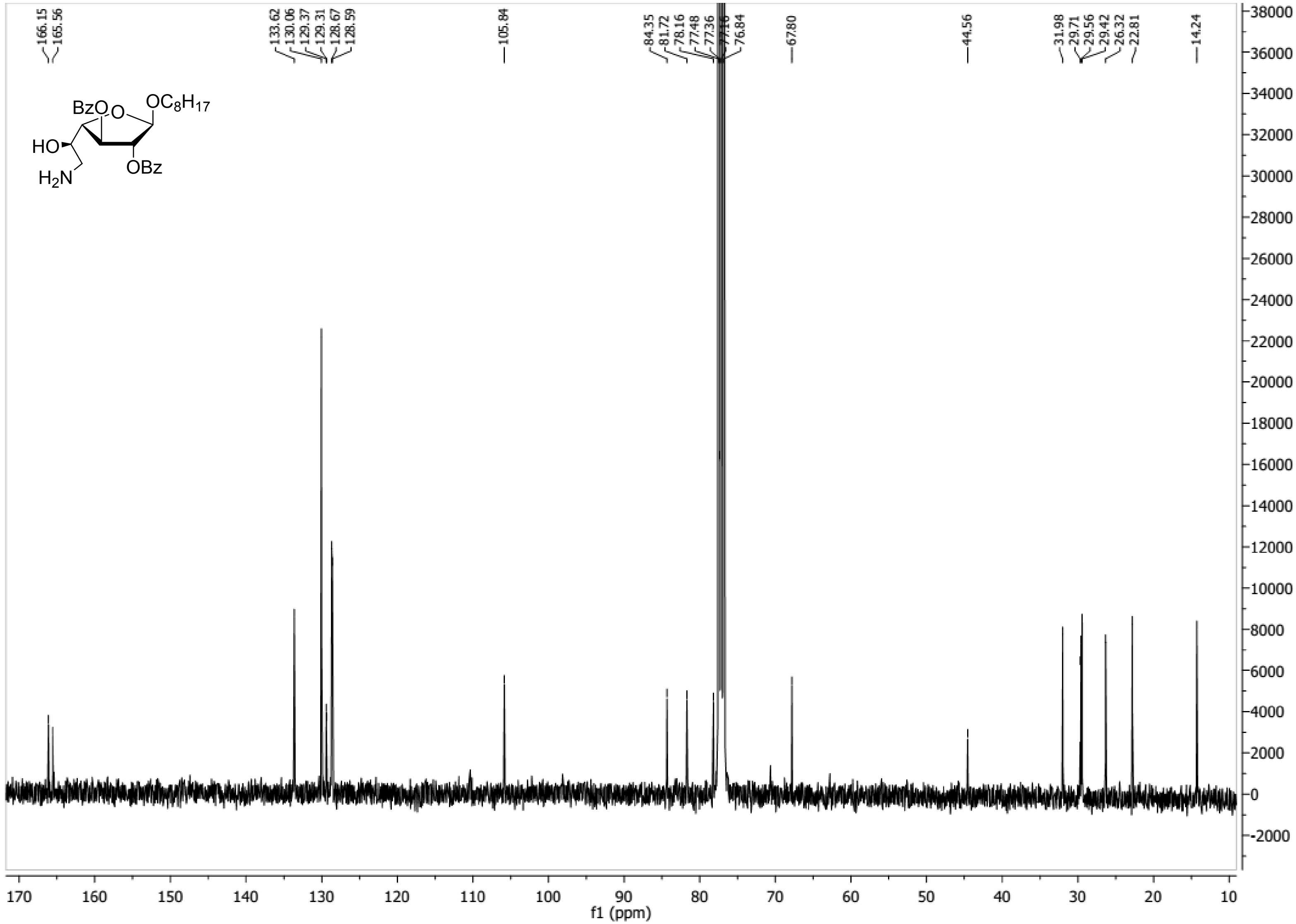


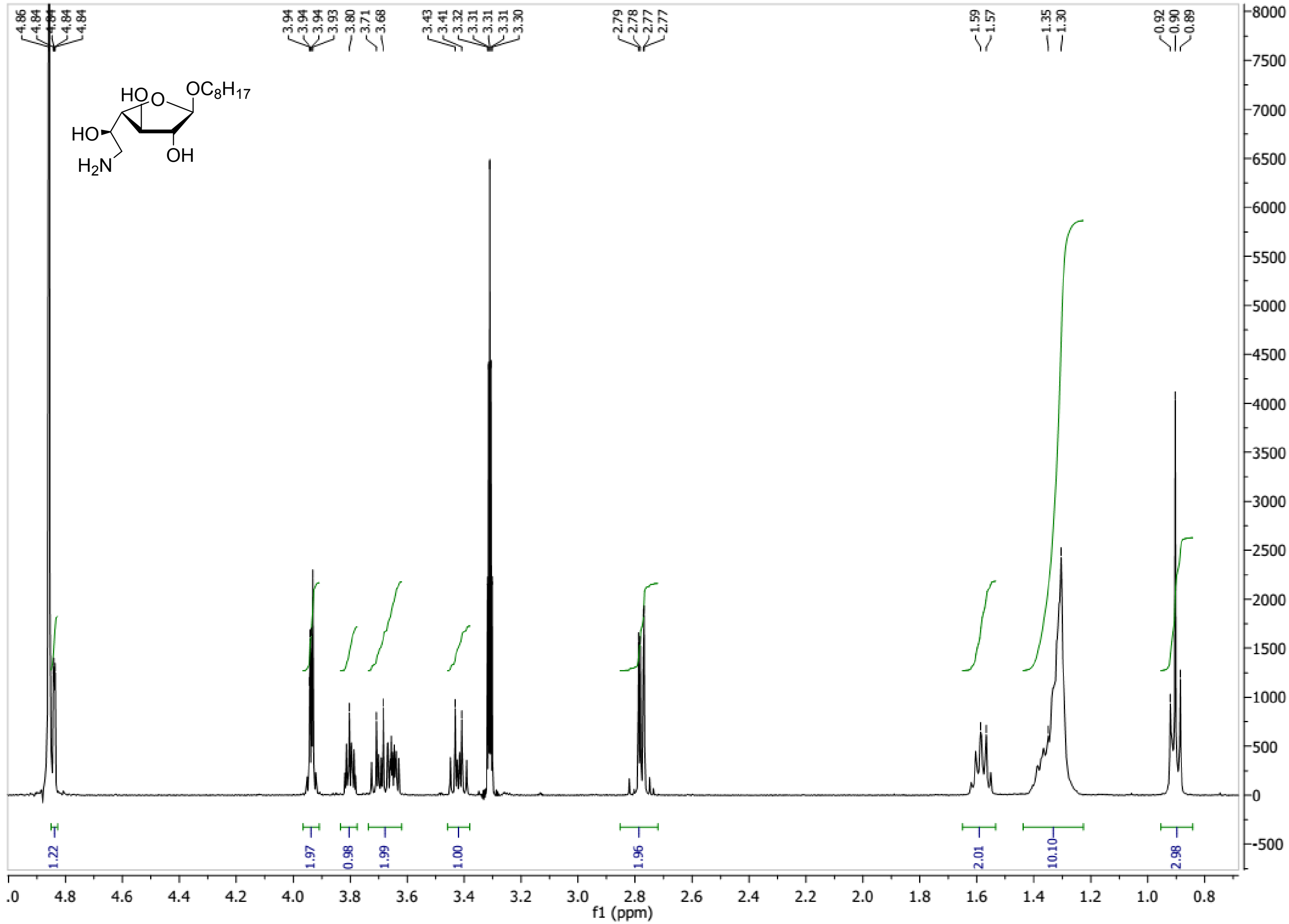
^{13}C NMR Spectrum of **3** (100 MHz, CD_3OD).



^{1}H NMR Spectrum of **22** (400 MHz, $CDCl_3$).



^{13}C NMR Spectrum of **22** (100 MHz, $CDCl_3$).



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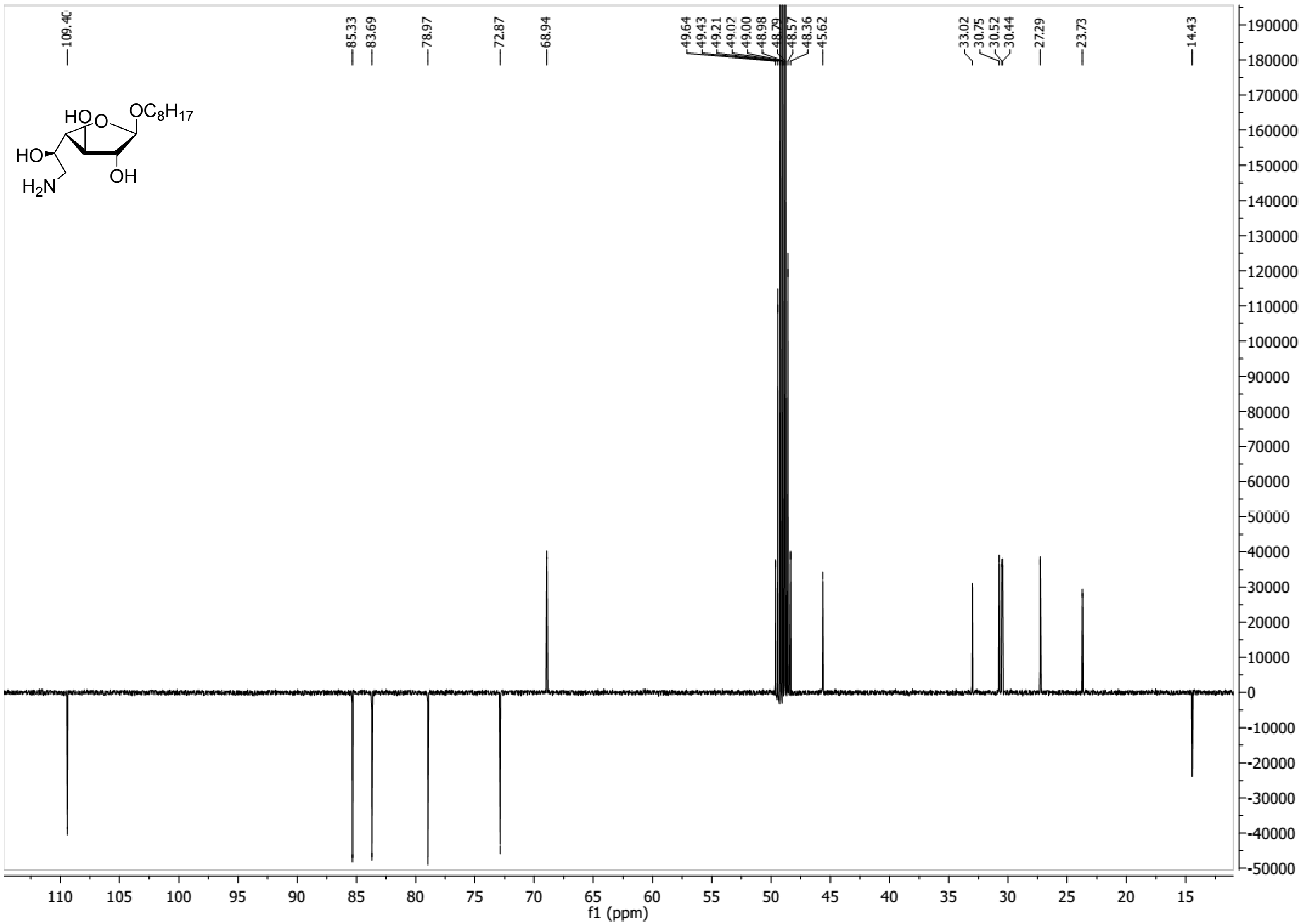
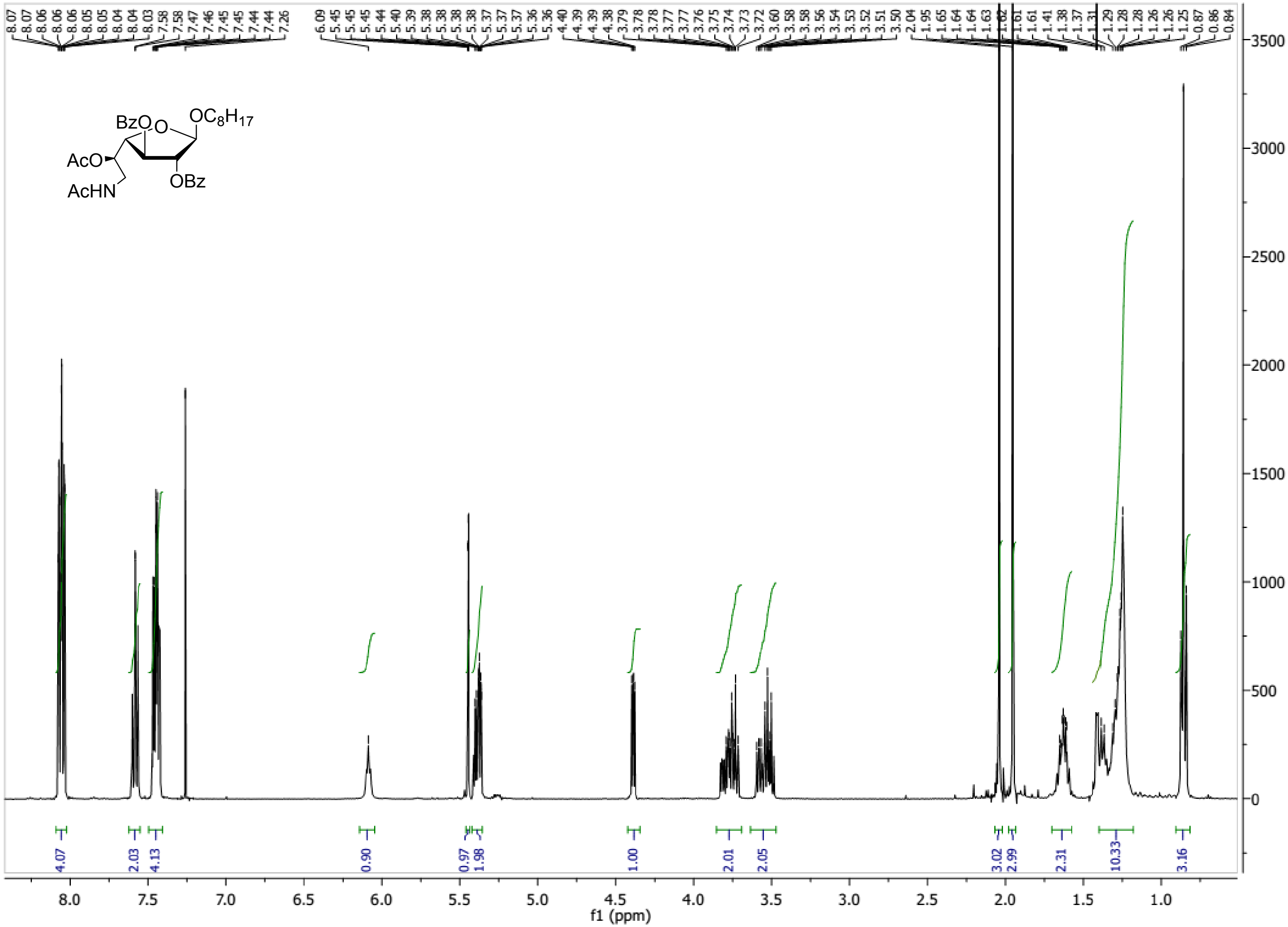
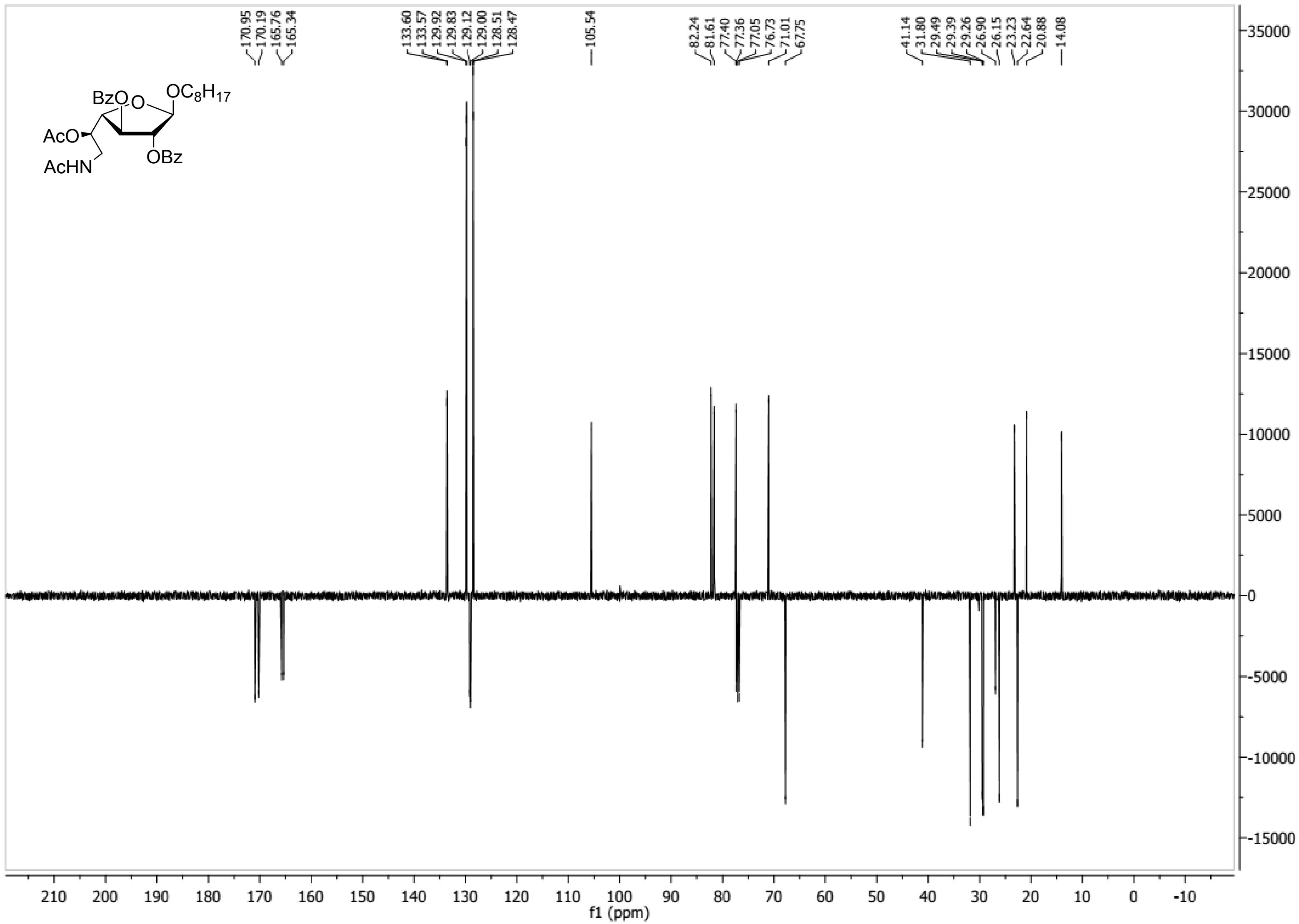


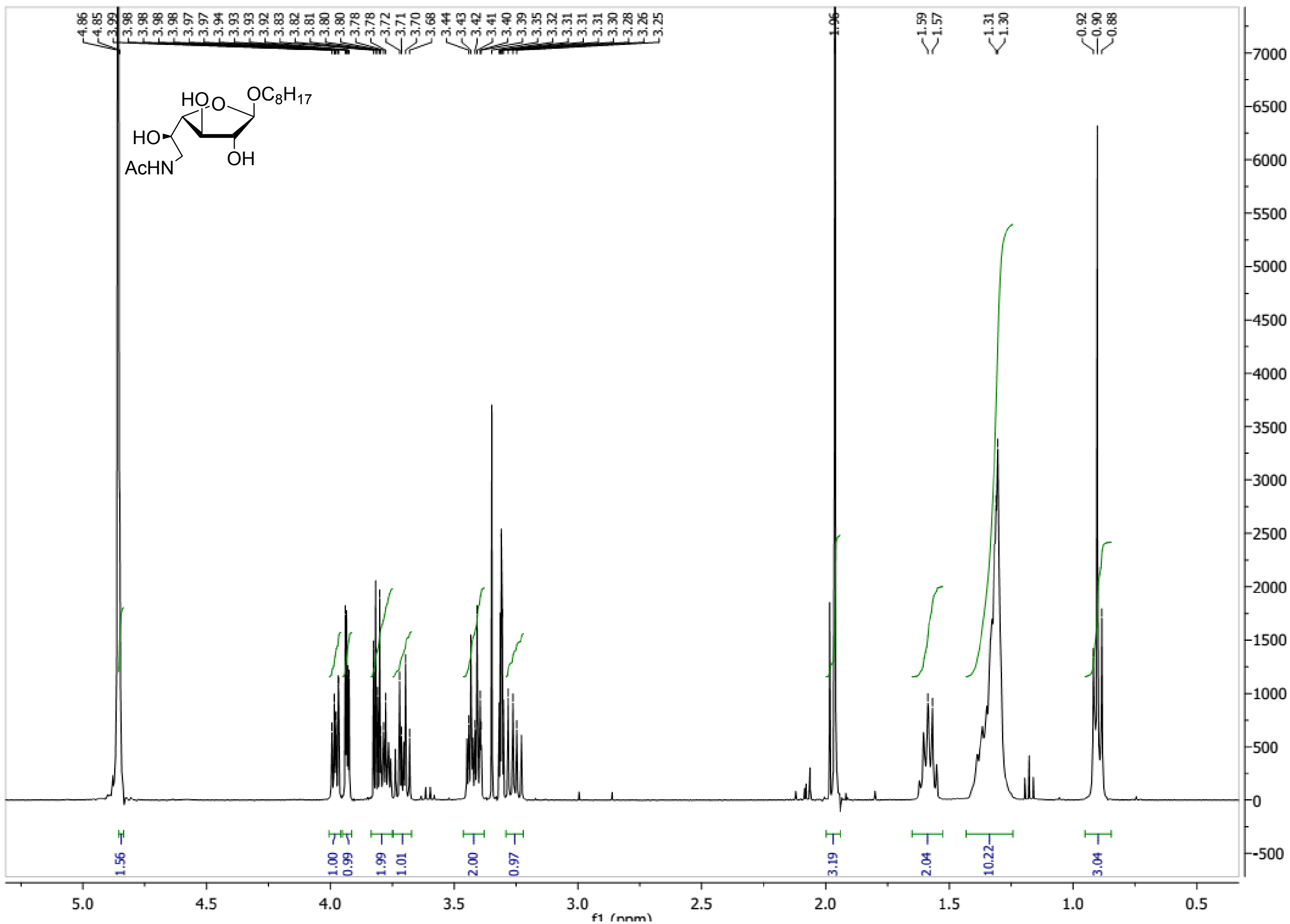
^{13}C NMR Spectrum of **4** (100 MHz, CD_3OD).



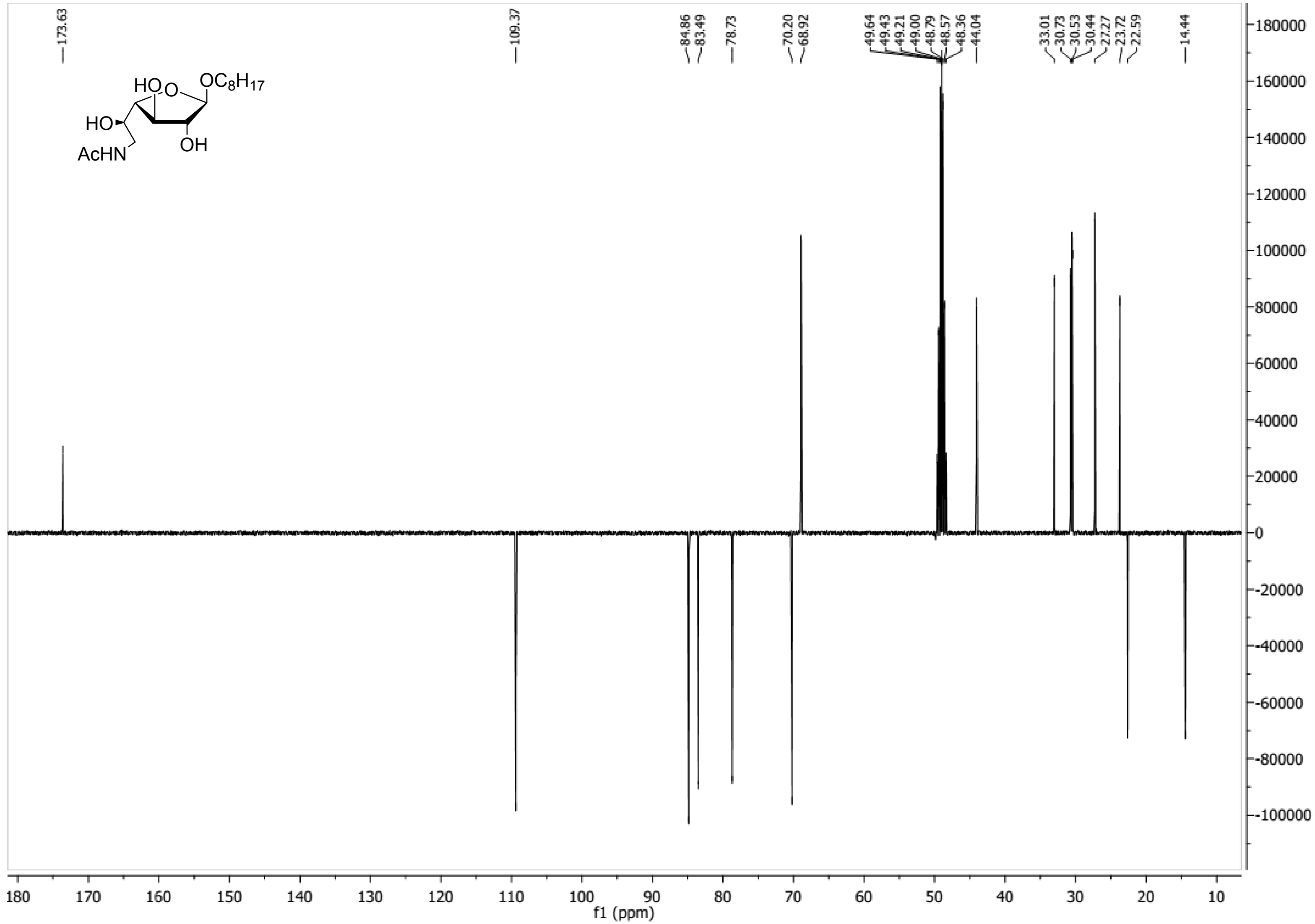
[1]H NMR Spectrum of **23** (400 MHz, $CDCl_3$).



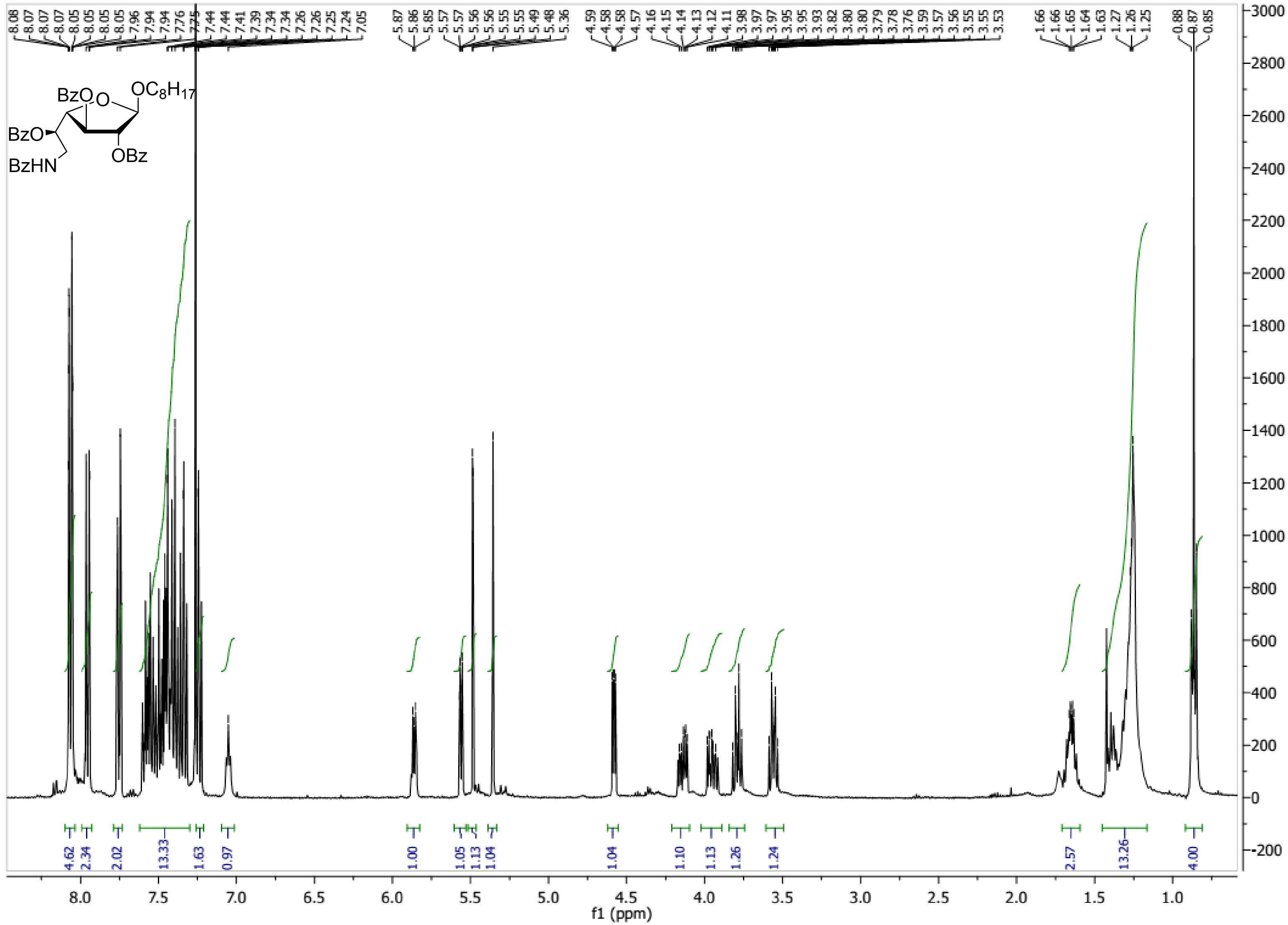
^{13}C NMR Spectrum of **23** (100 MHz, $CDCl_3$).



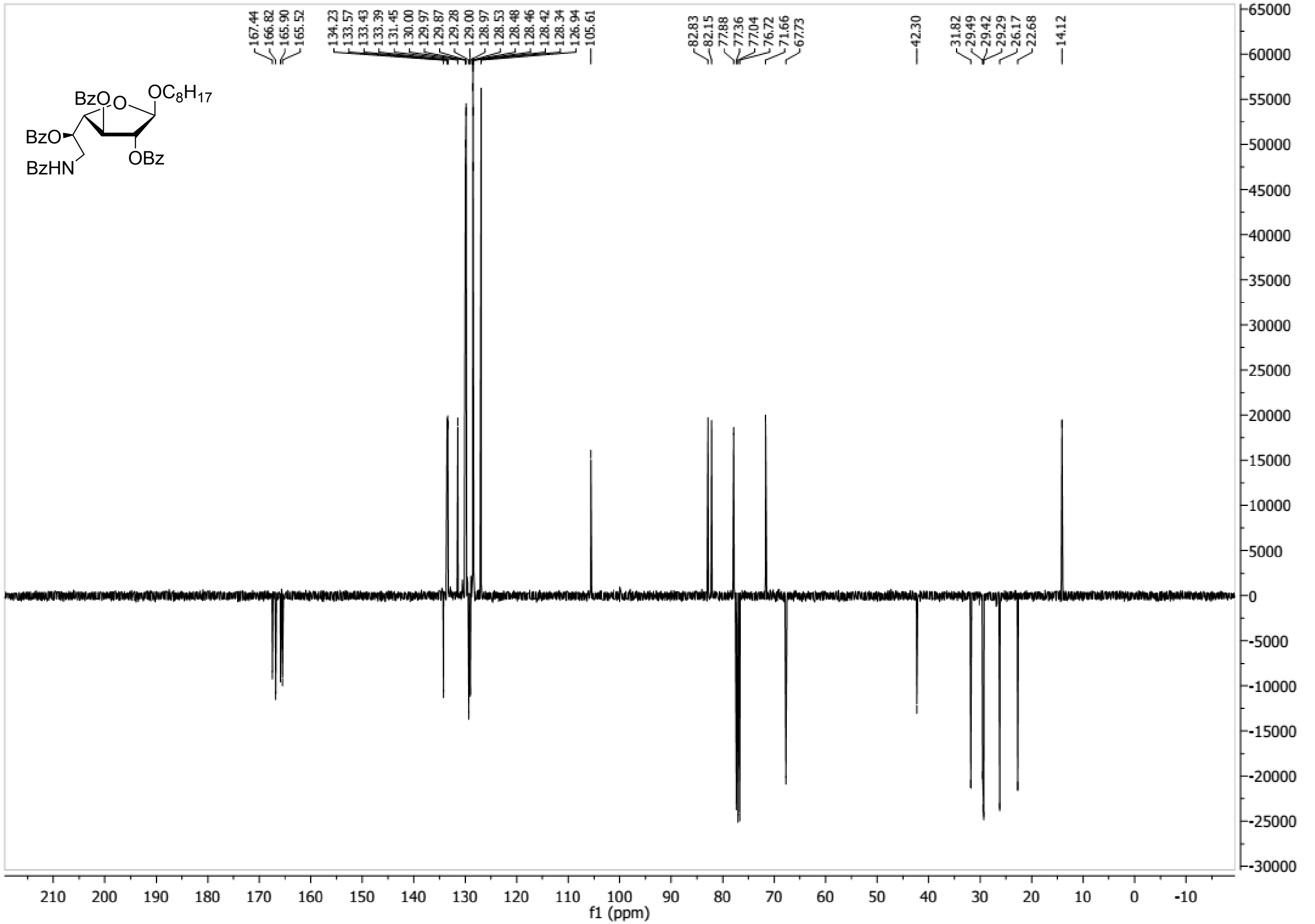
[1]H NMR Spectrum of **5** (400 MHz, CD_3OD).



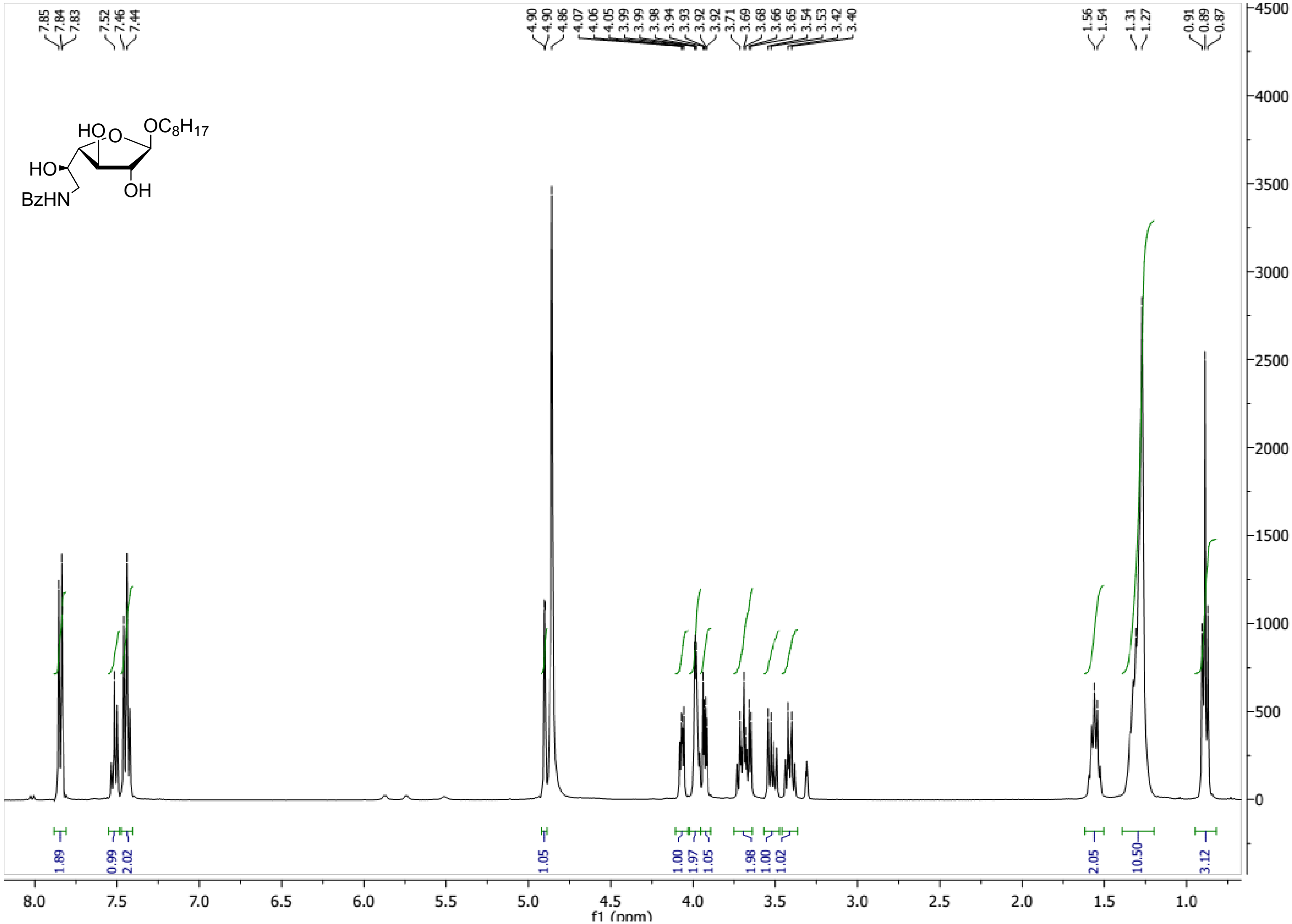
^{13}C NMR Spectrum of **5** (100 MHz, CD_3OD).



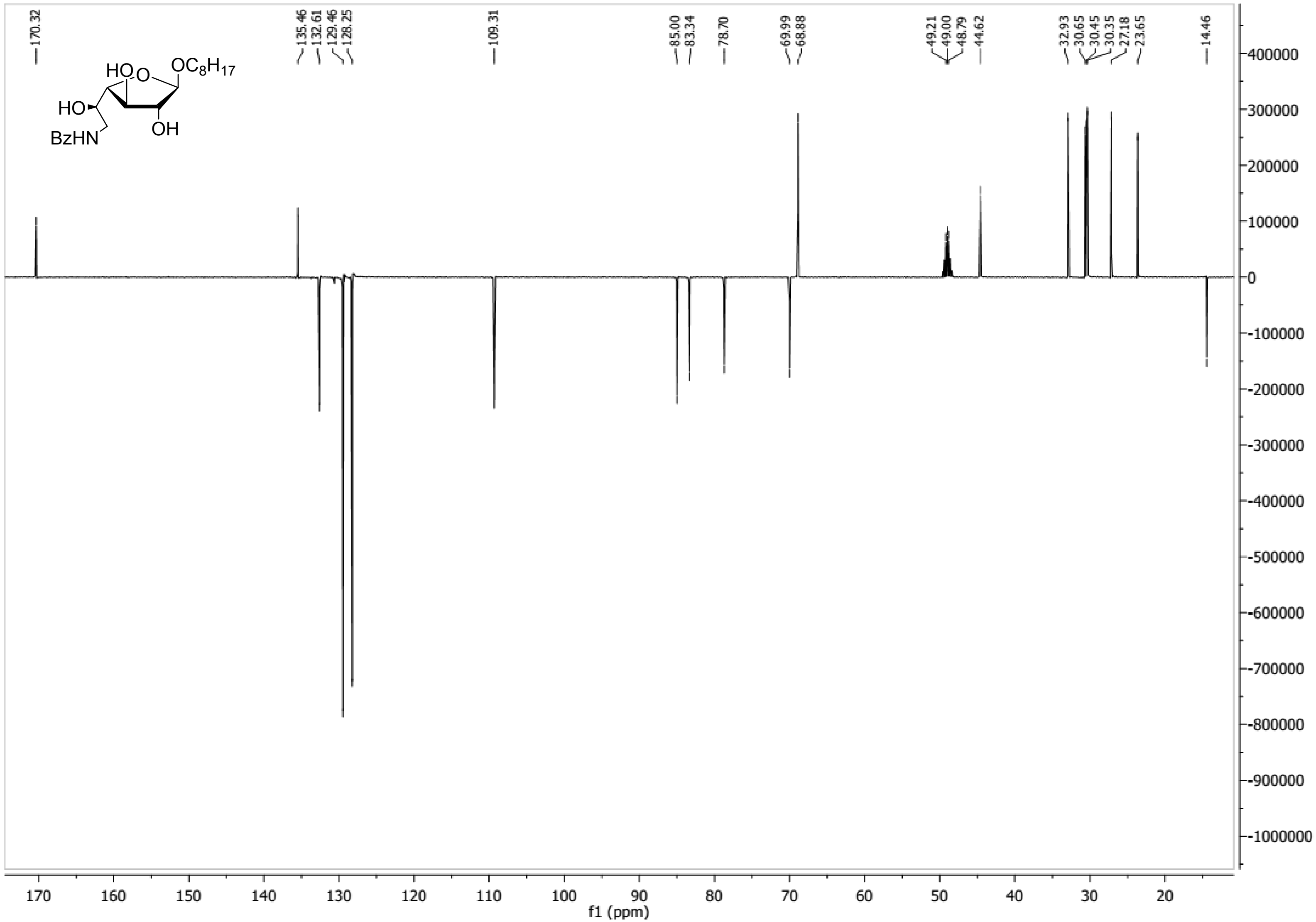
[1]H NMR Spectrum of **24** (400 MHz, $CDCl_3$).



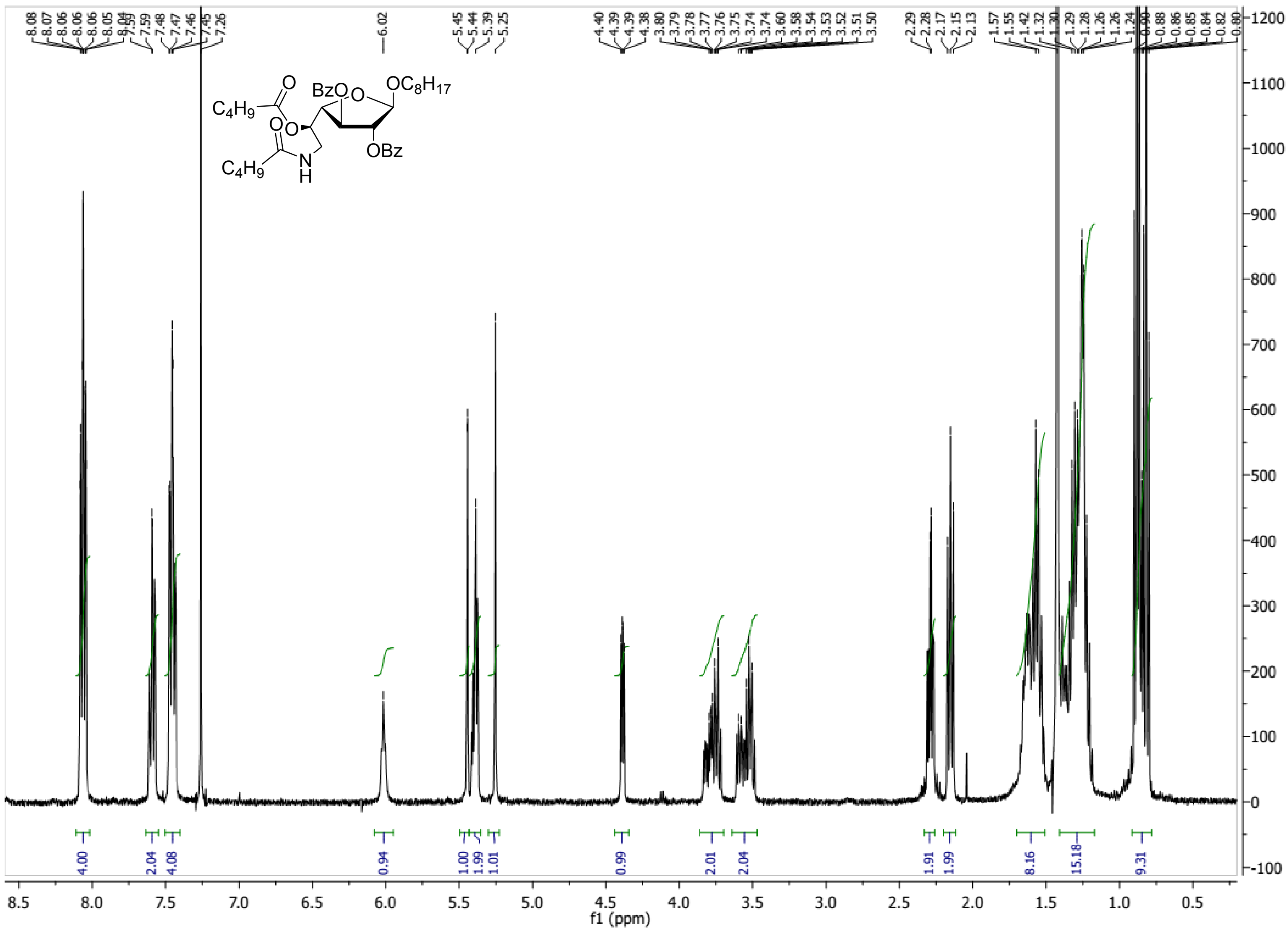
^{13}C NMR Spectrum of **24** (100 MHz, $CDCl_3$).



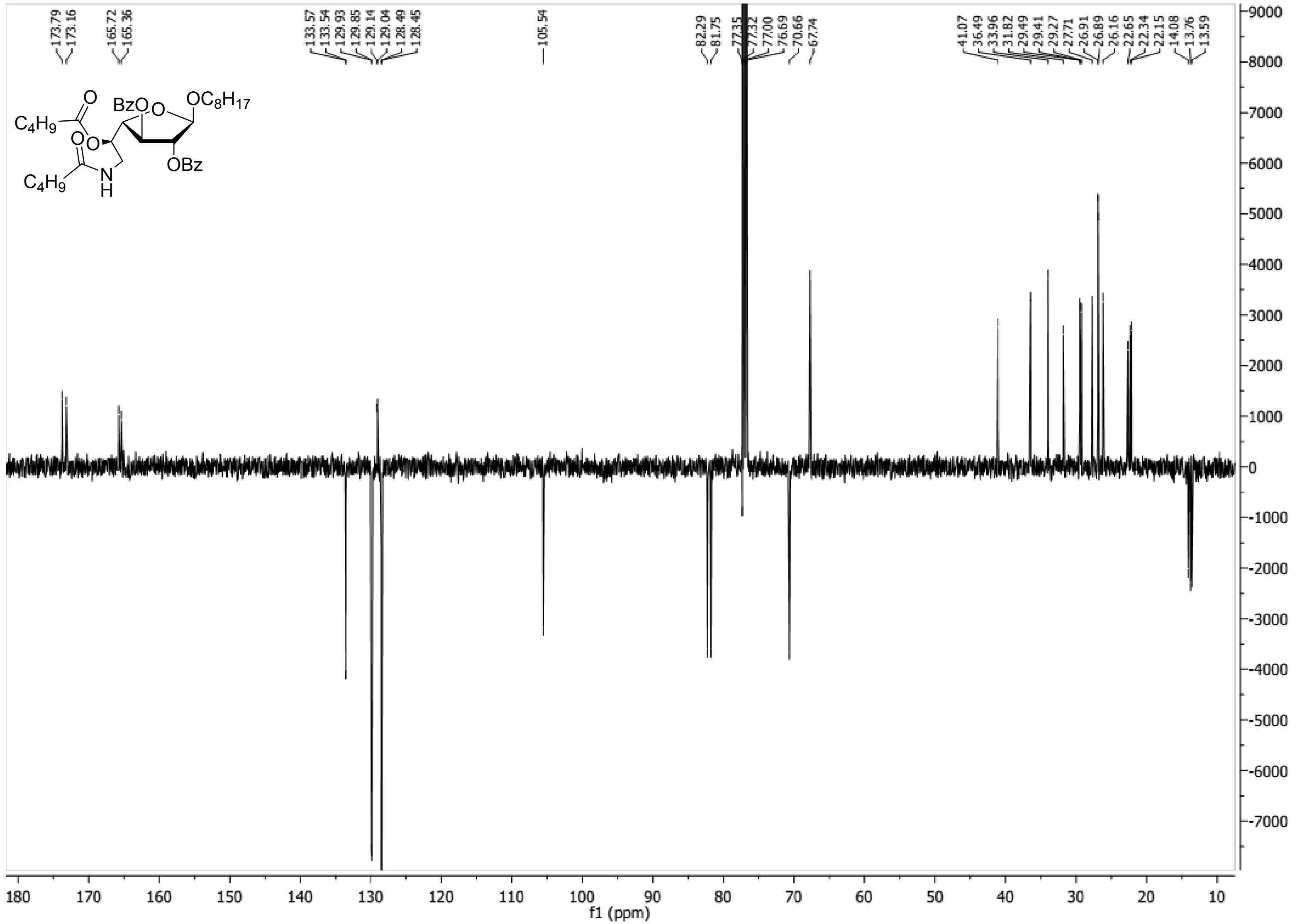
[1]H NMR Spectrum of **6** (400 MHz, CD_3OD).



^{13}C NMR Spectrum of **6** (100 MHz, CD_3OD).



[1]H NMR Spectrum of **25** (400 MHz, $CDCl_3$).



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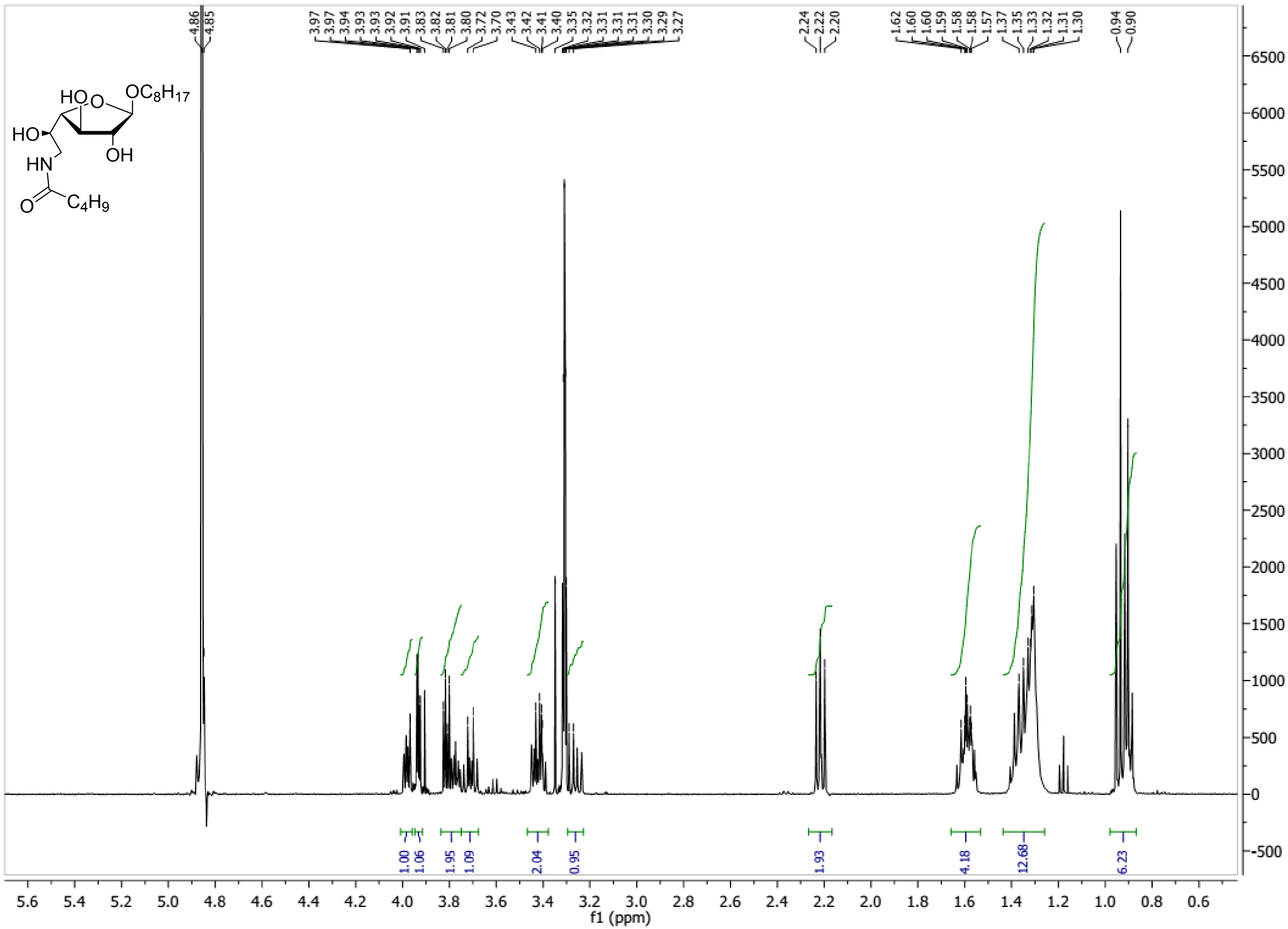

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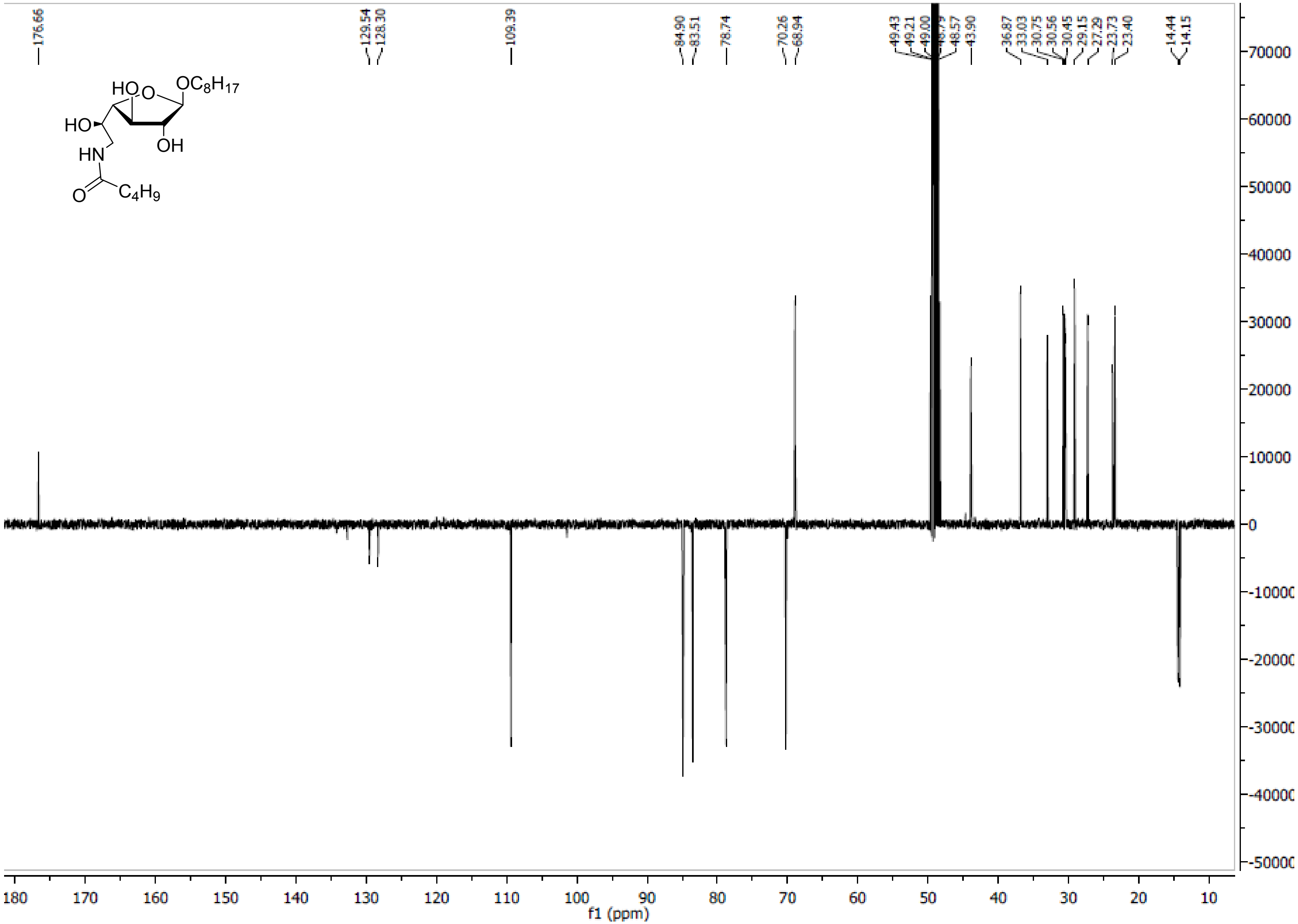
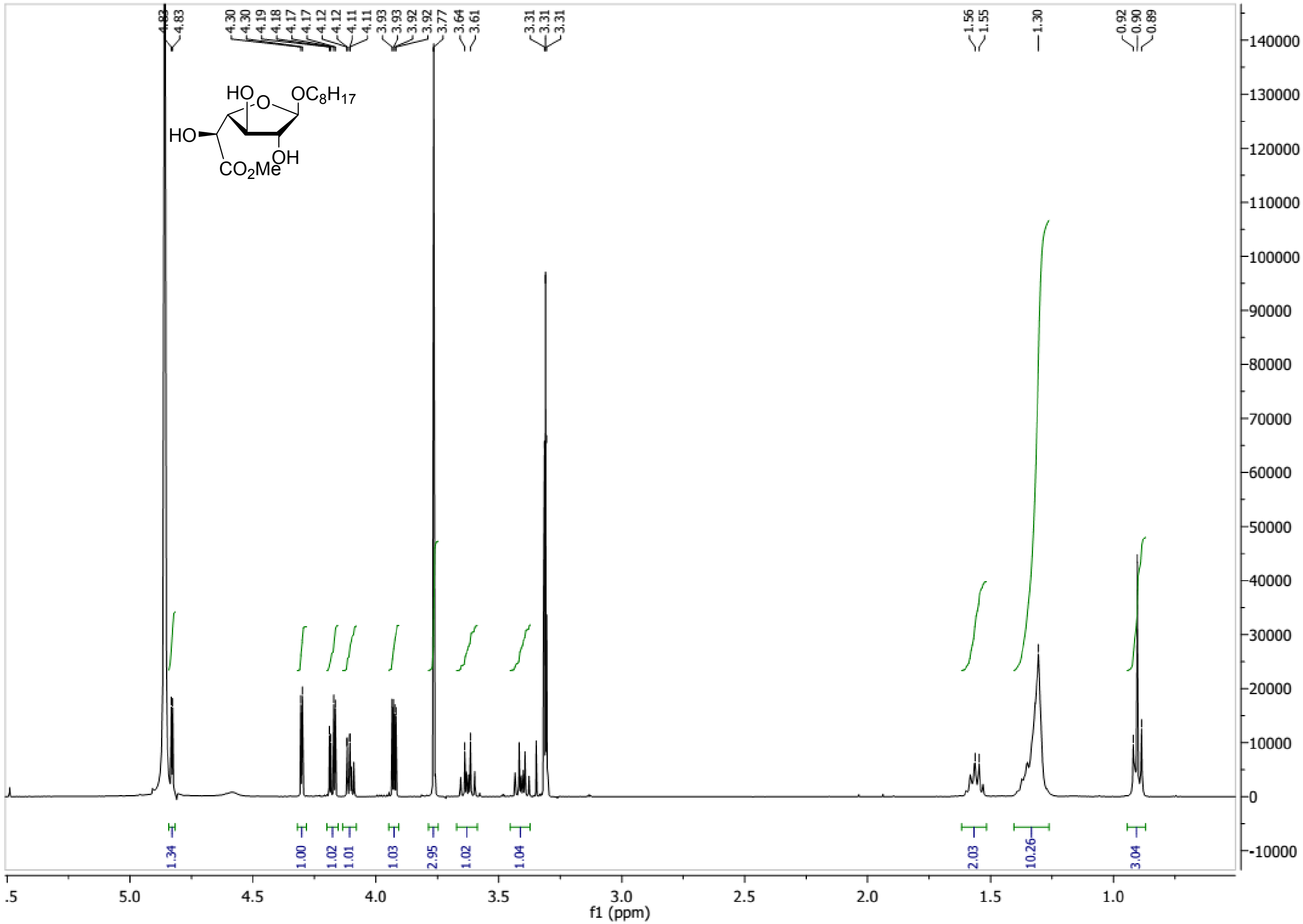
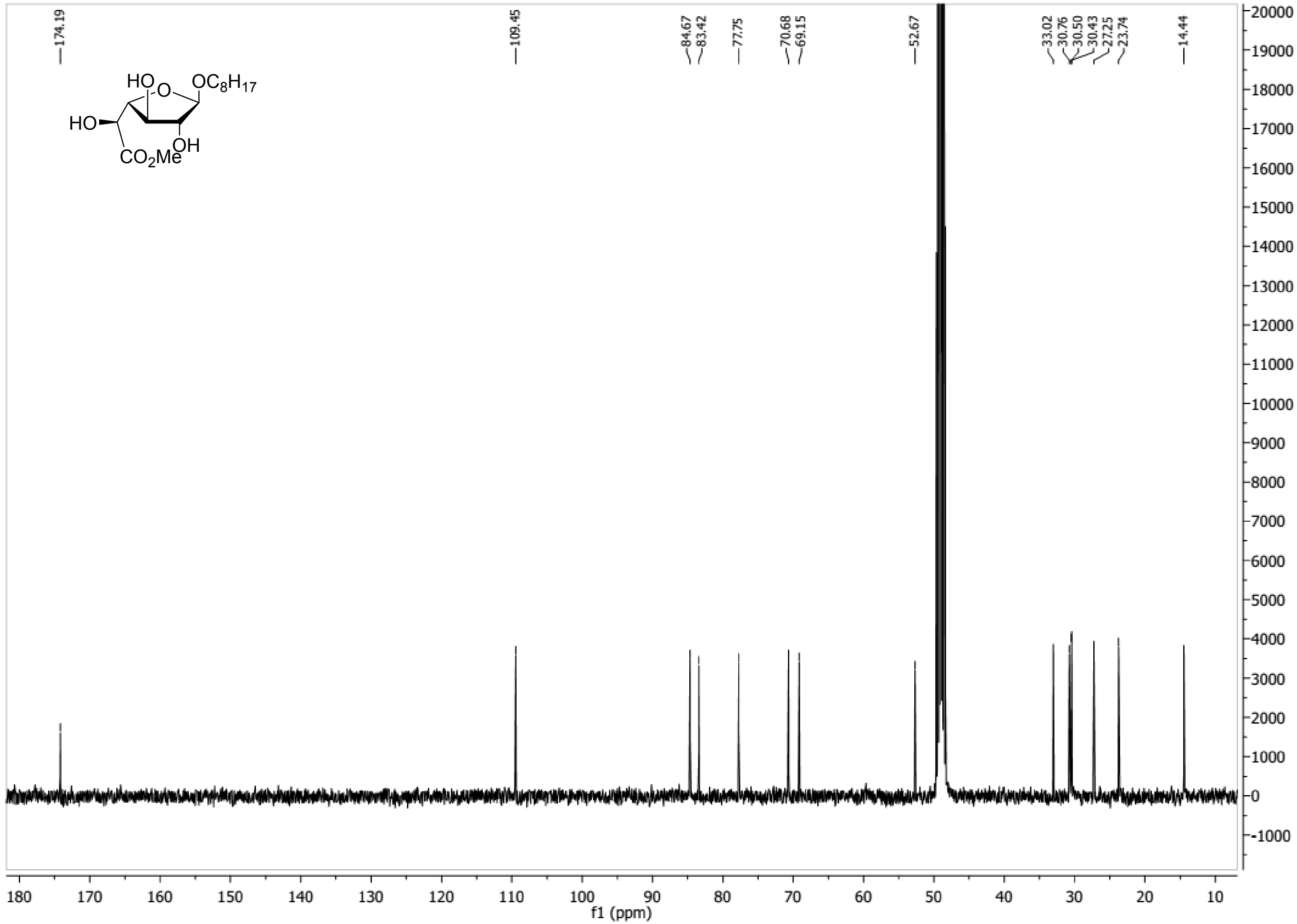


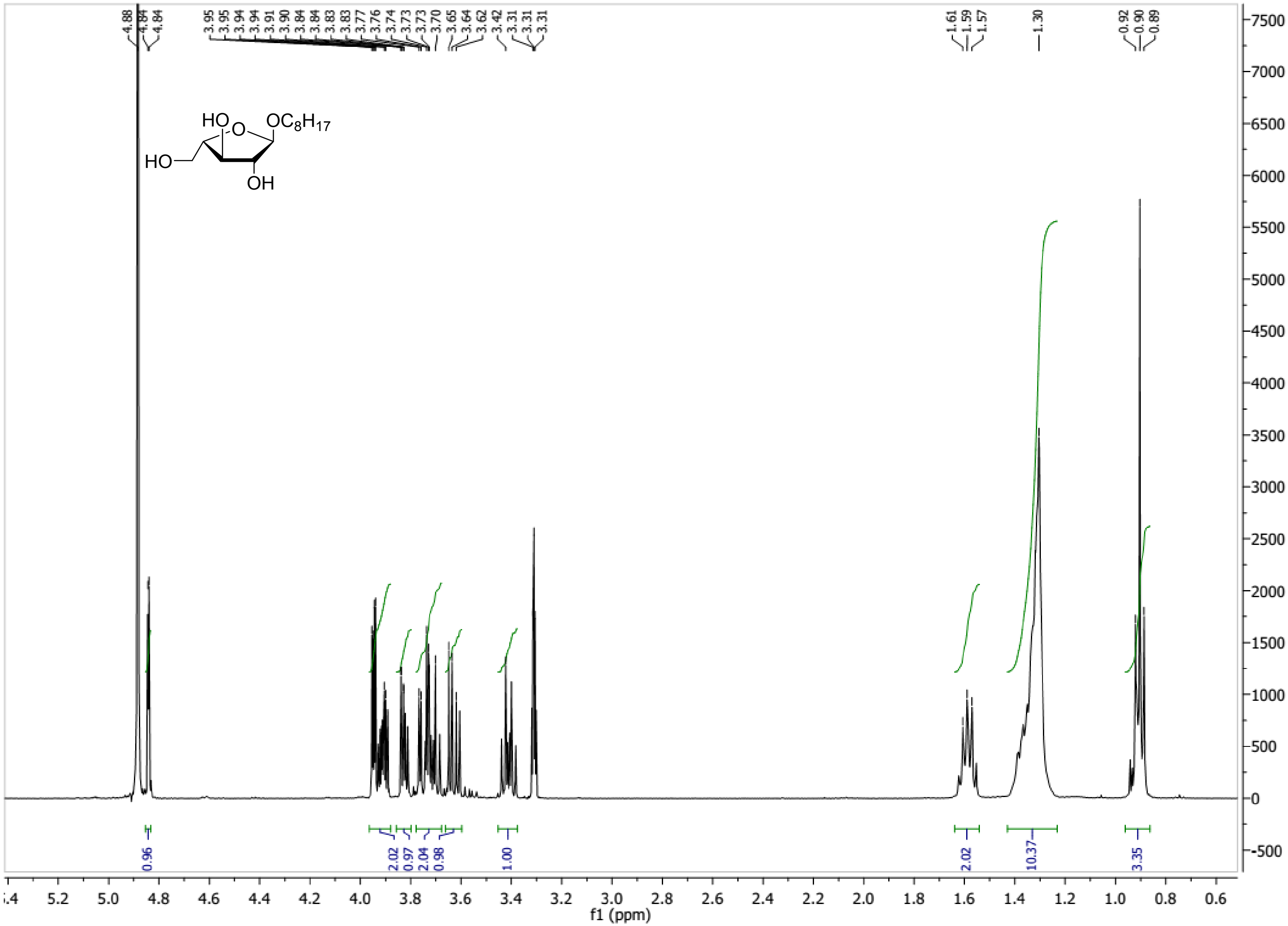
^{13}C NMR Spectrum of **7** (100 MHz, CD_3OD).



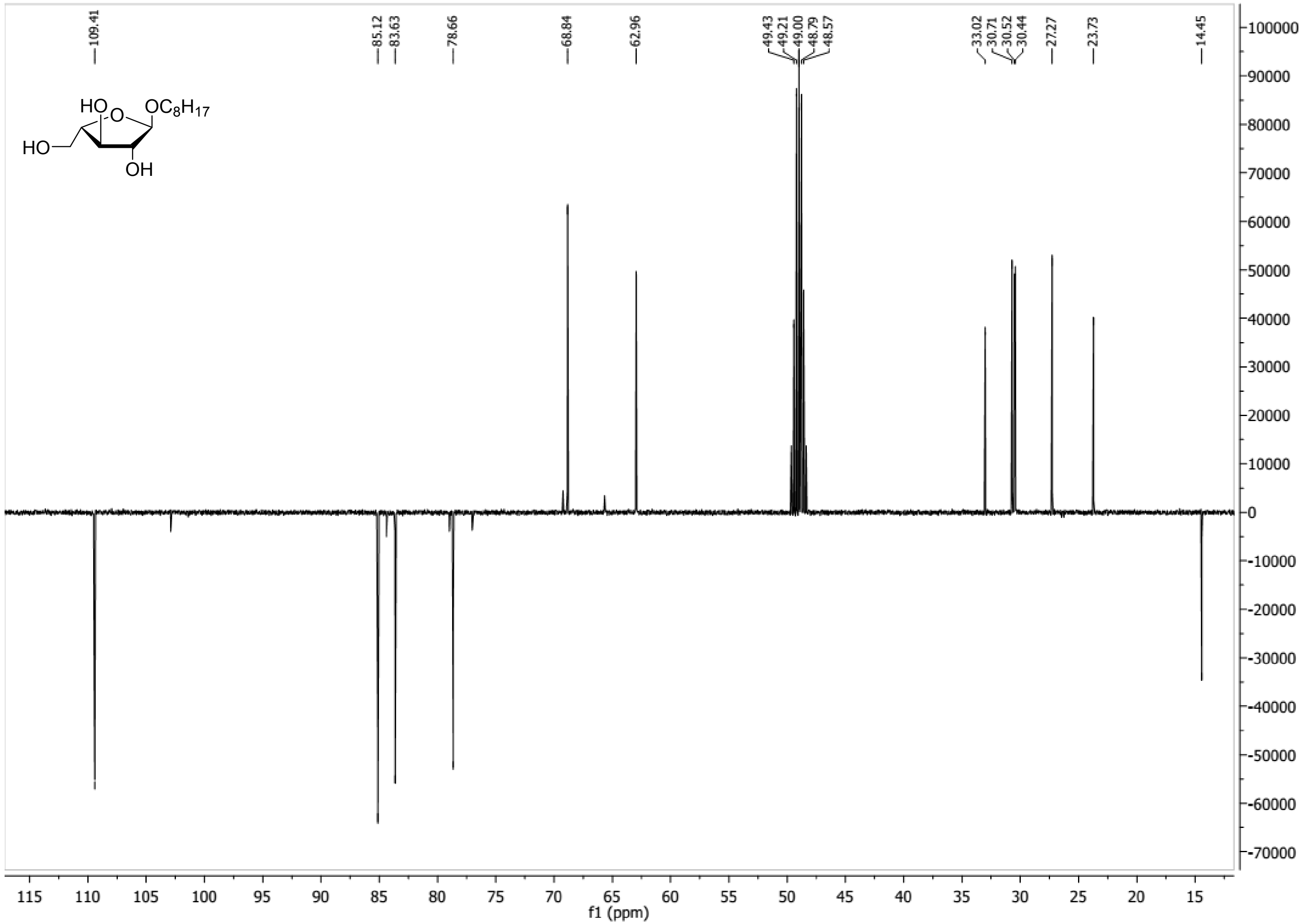
[1]H NMR Spectrum of **9** (400 MHz, CD_3OD).



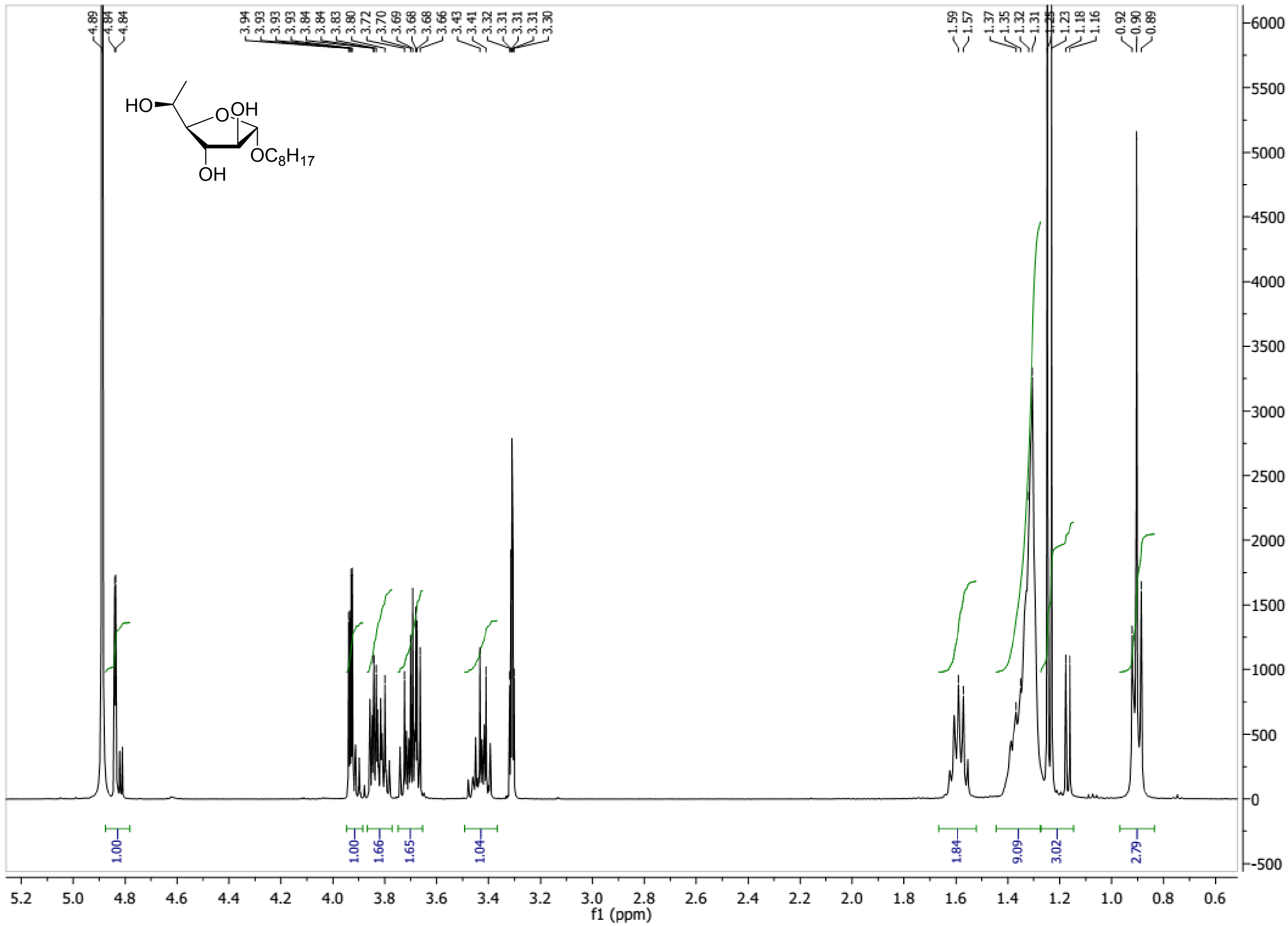
^{13}C NMR Spectrum of **9** (100 MHz, CD_3OD).



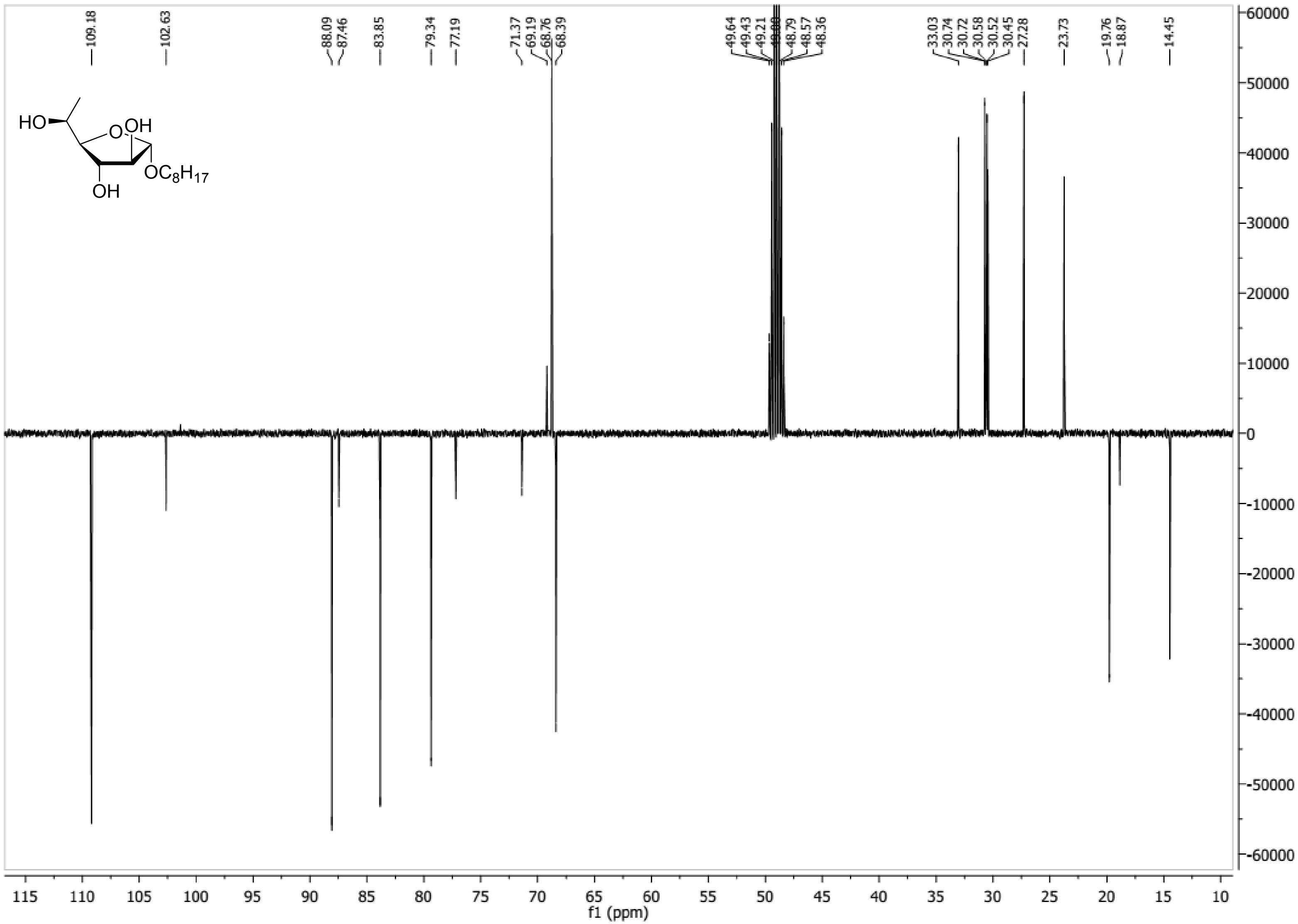
^{1}H NMR Spectrum of **10** (400 MHz, CD_3OD).



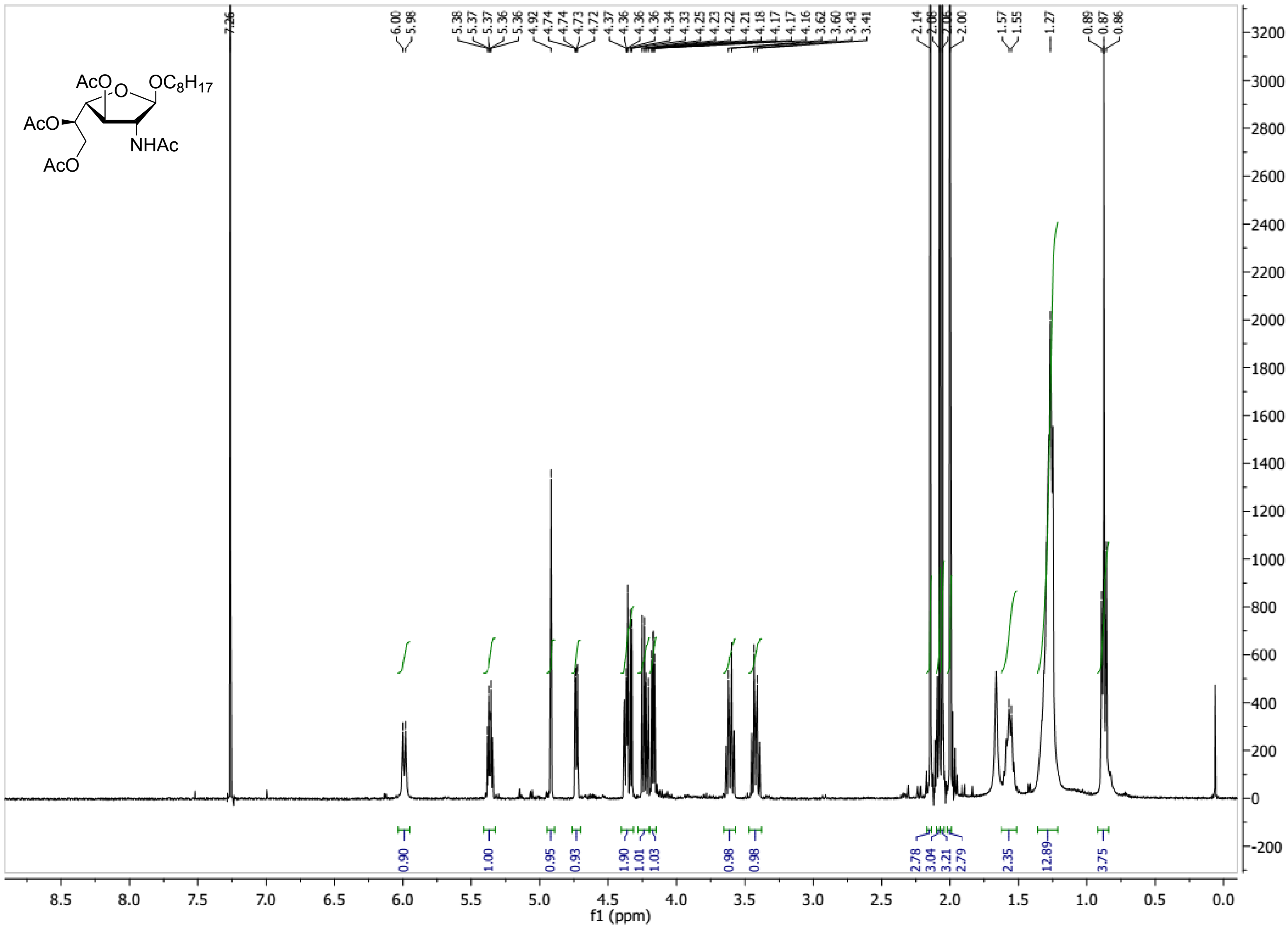
^{13}C NMR Spectrum of **10** (100 MHz, CD_3OD).



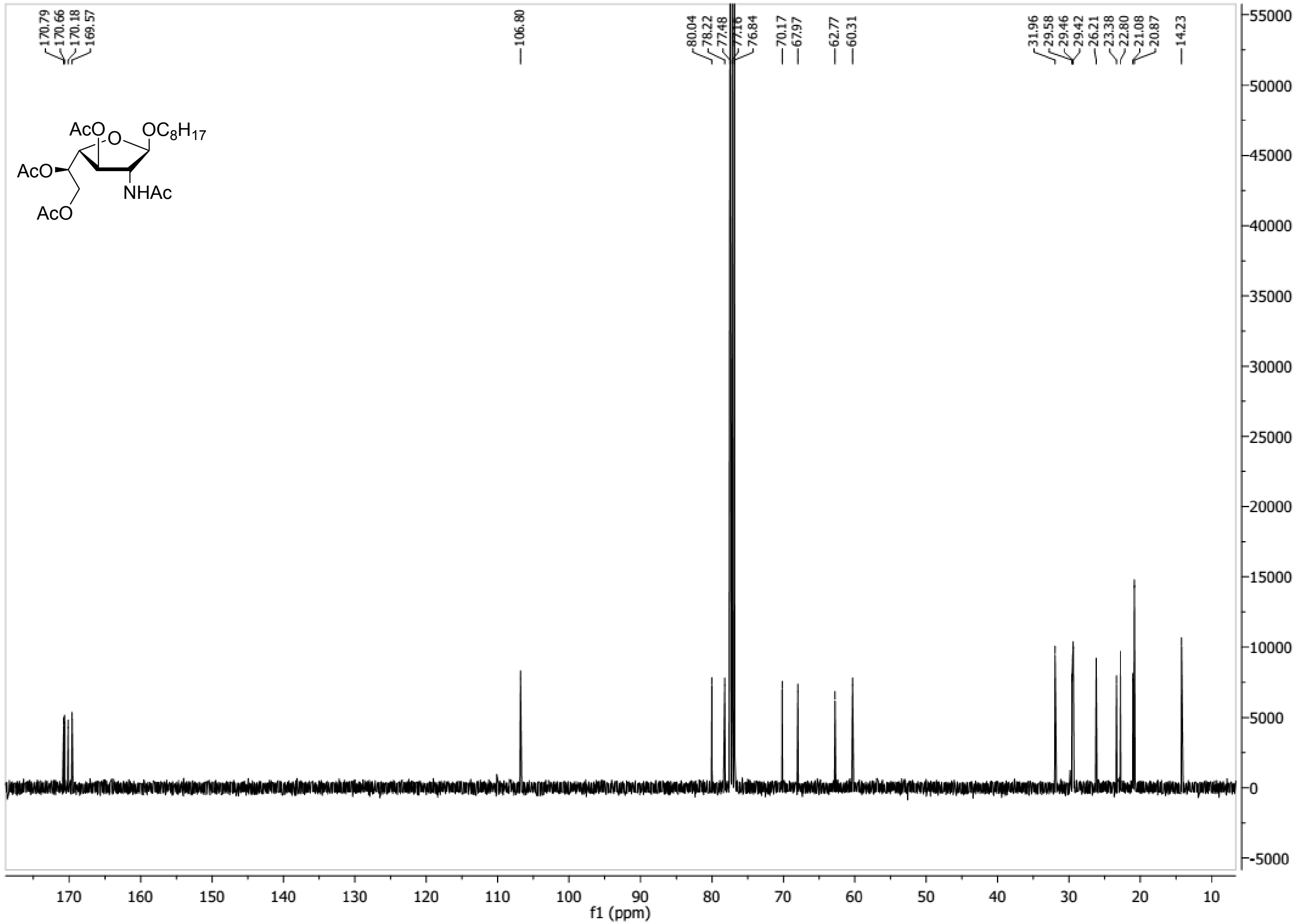
[1]H NMR Spectrum of **12** (400 MHz, CD_3OD).



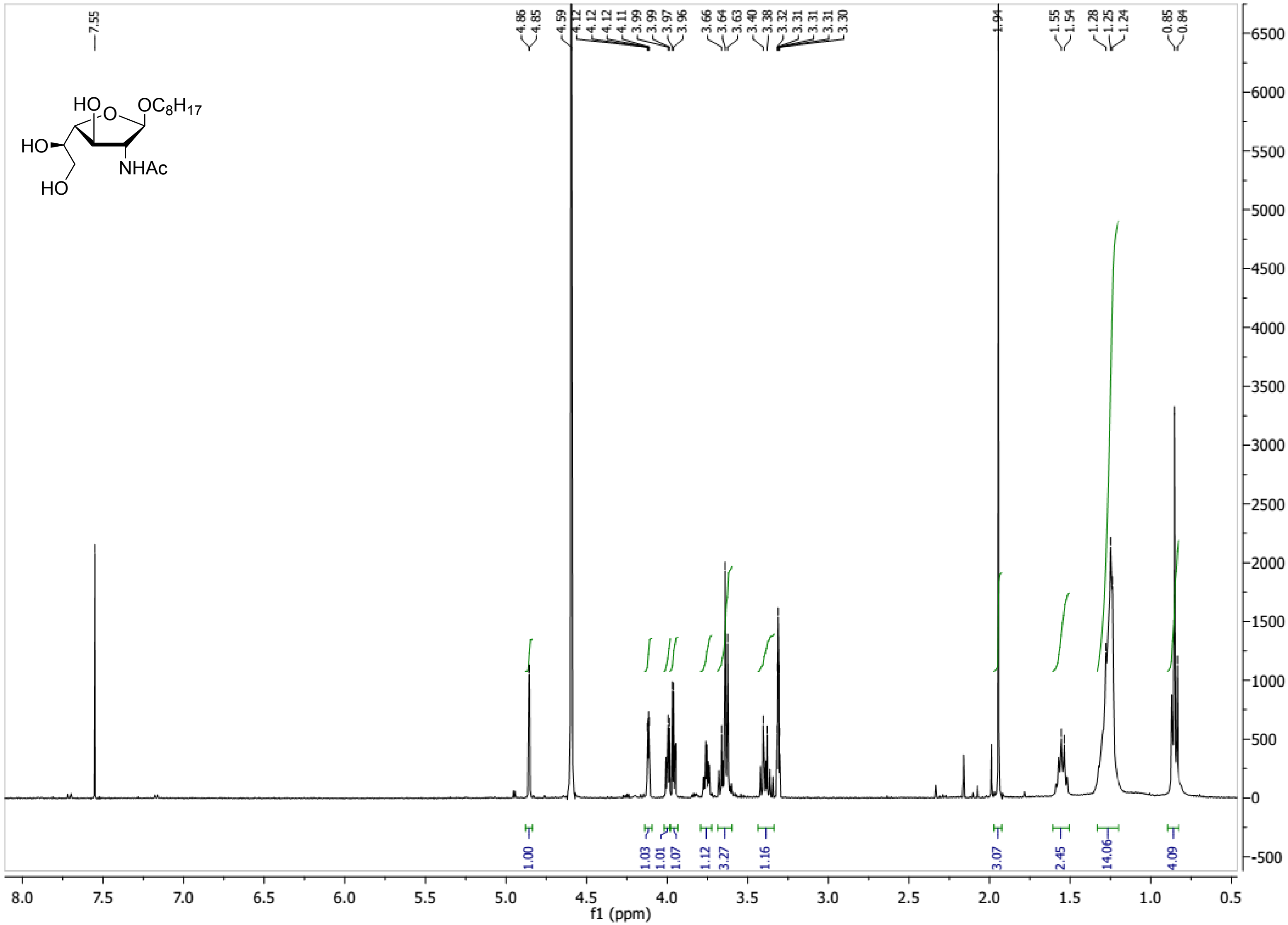
^{13}C NMR Spectrum of **12** (100 MHz, CD_3OD).



[1]H NMR Spectrum of *n*-Octyl 2-acetamido-2-deoxy-3,5,6-tri-*O*-acetyl-β-D-galactofuranoside (400 MHz, $CDCl_3$).



^{13}C NMR Spectrum of *n*-Octyl 2-acetamido-2-deoxy-3,5,6-tri-*O*-acetyl-β-D-galactofuranoside (100 MHz, $CDCl_3$).



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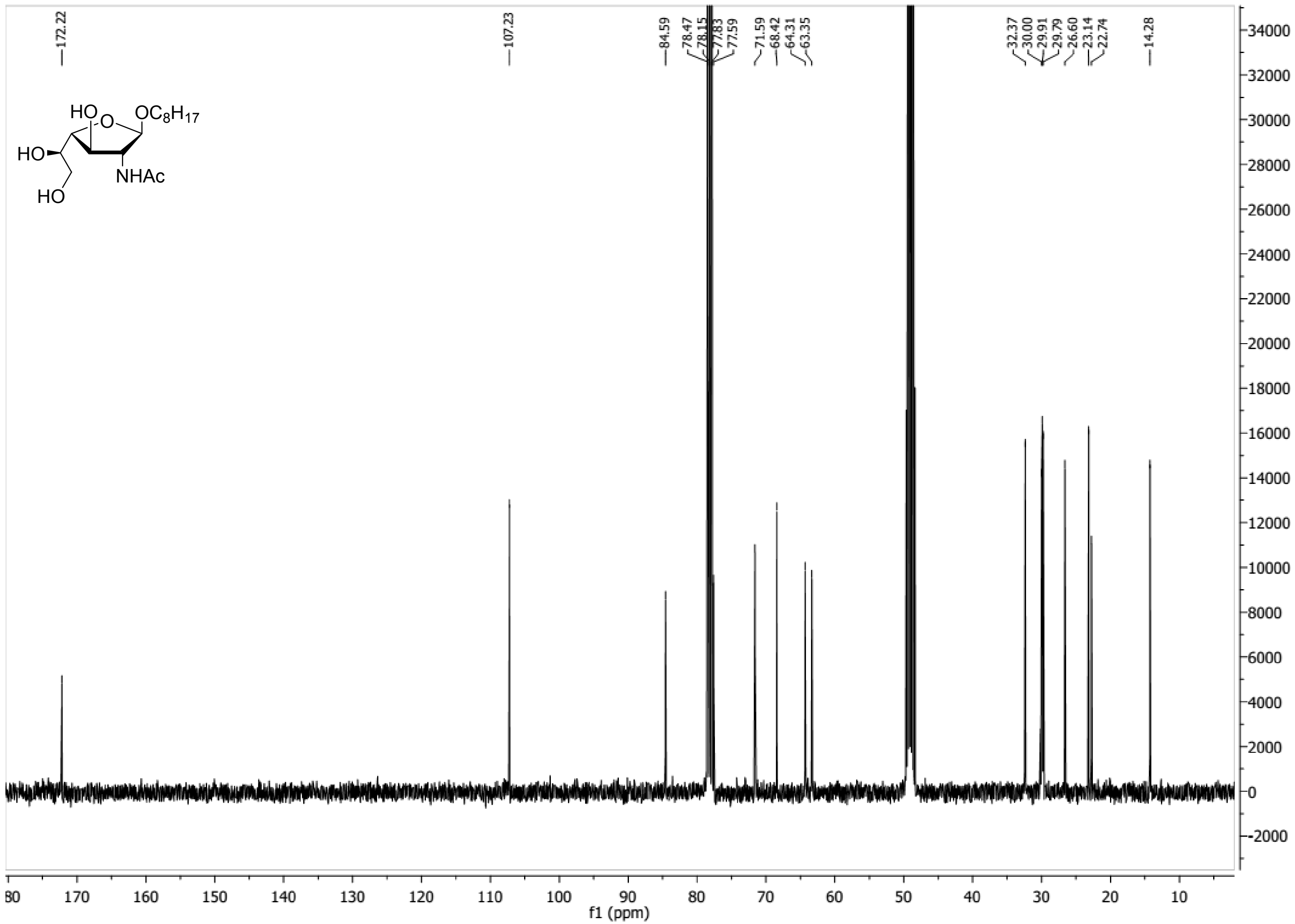
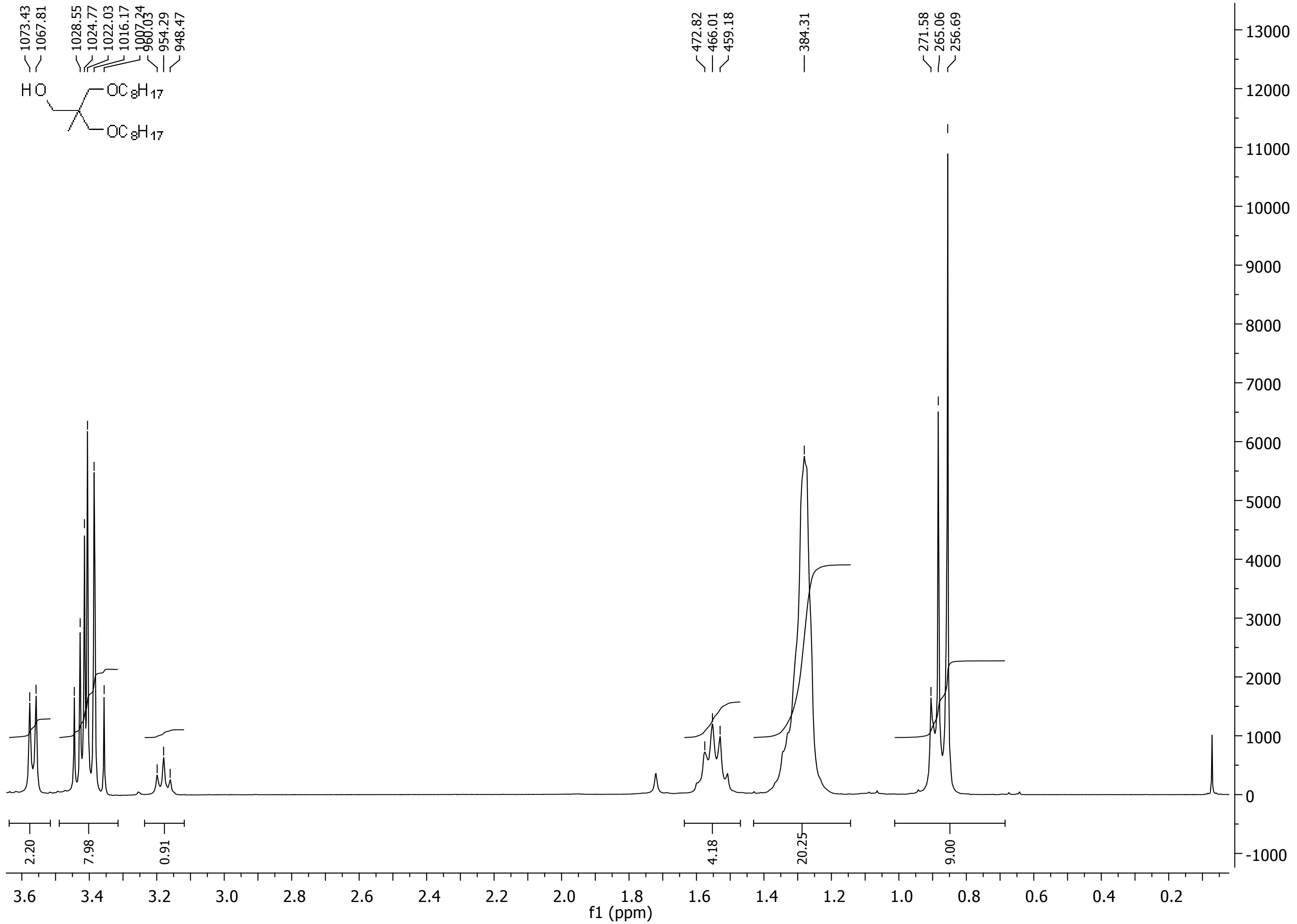


^{13}C NMR Spectrum of **13** (100 MHz, CD_3OD -$CDCl_3$).



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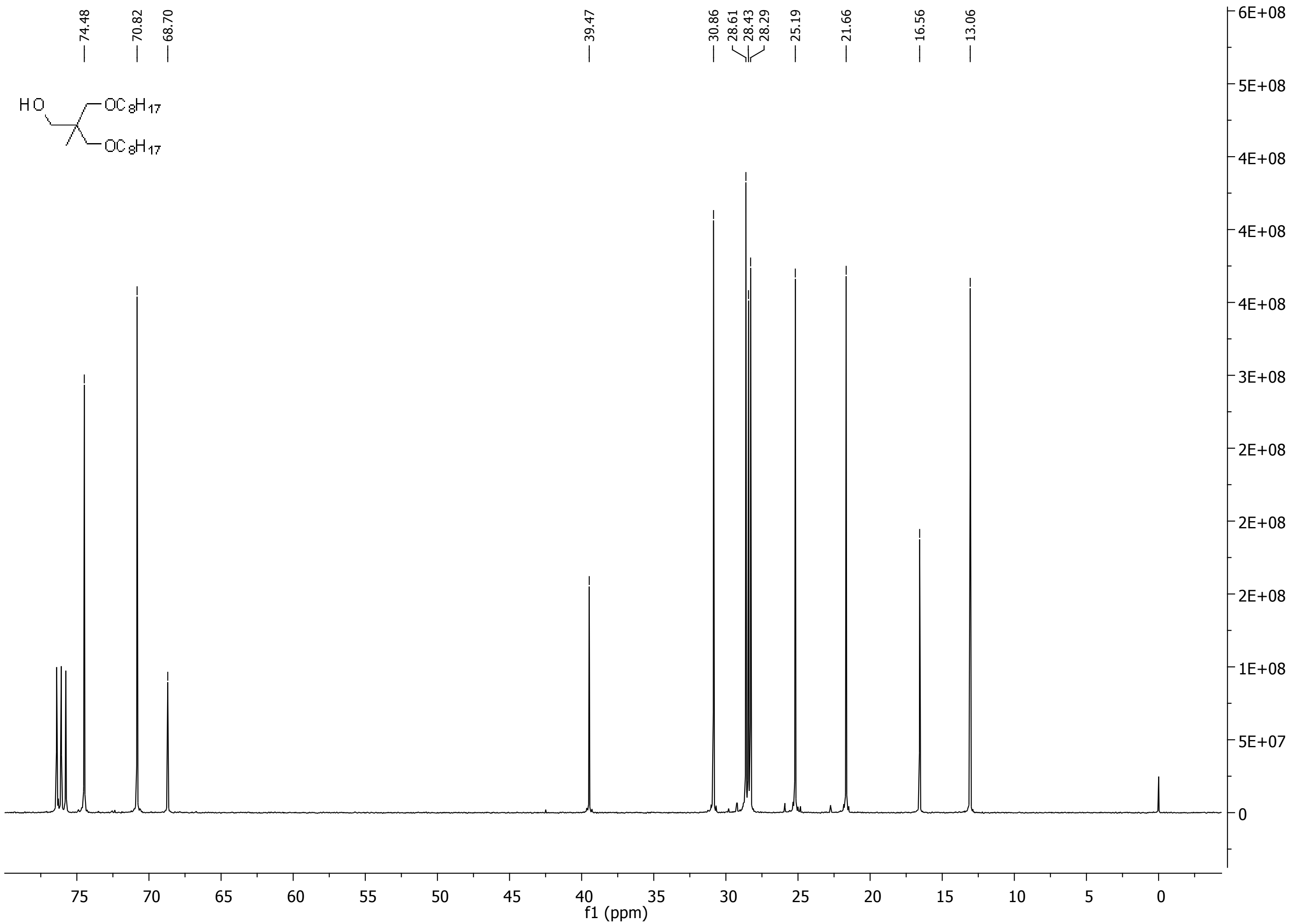
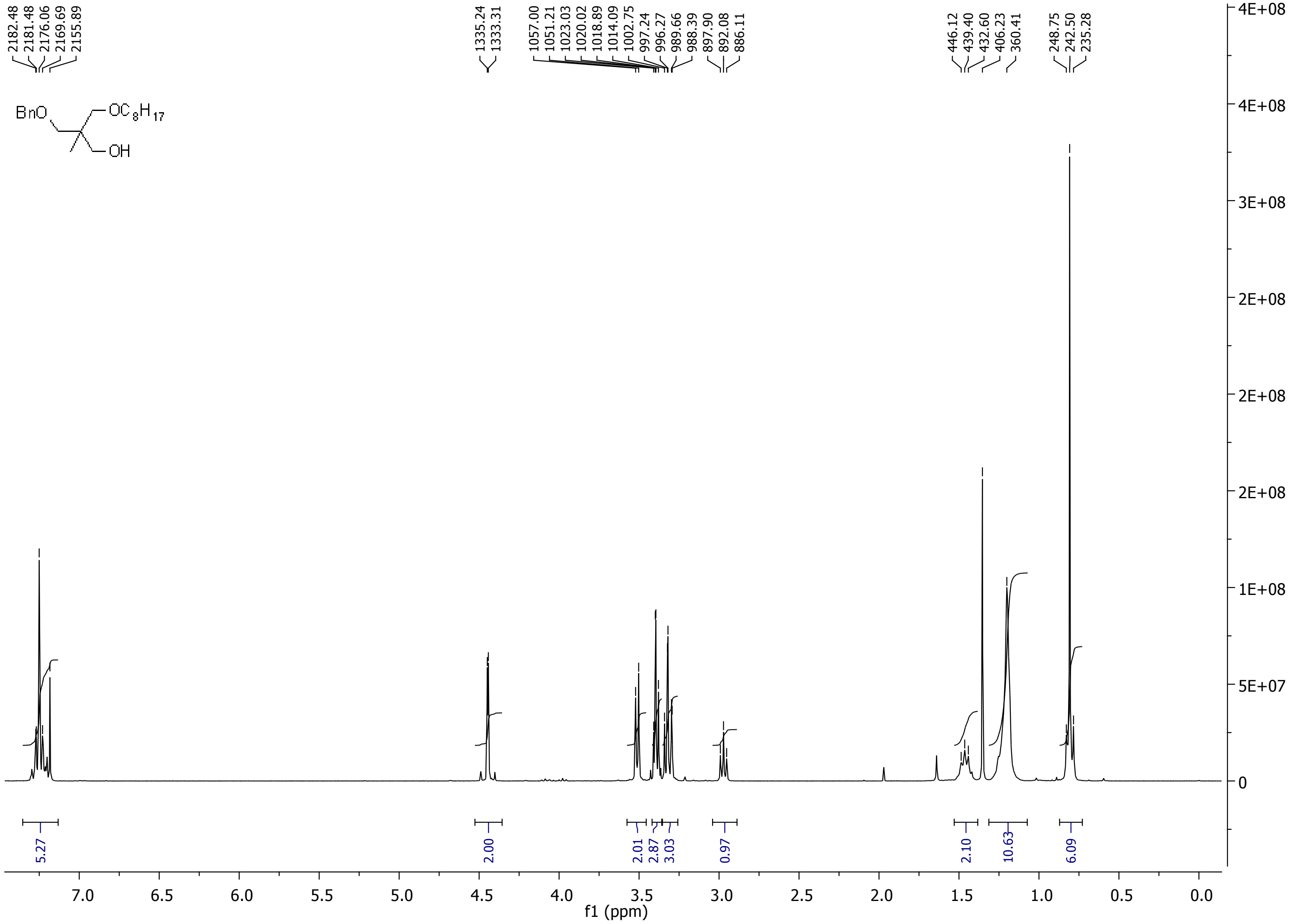
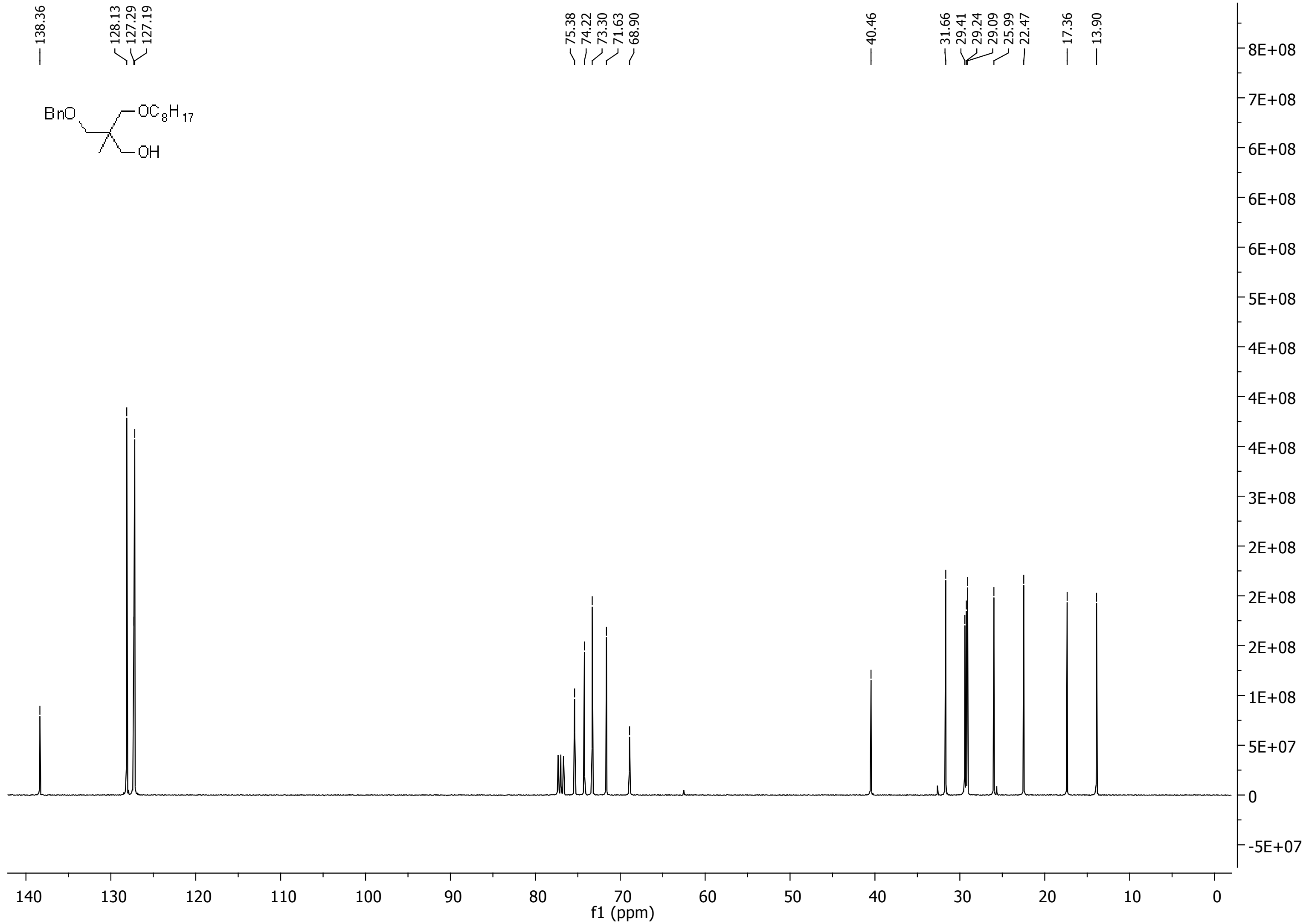


^{13}C NMR Spectrum of **34** (75 MHz, $CDCl_3$).



^1H NMR Spectrum of **38** (300 MHz, $CDCl_3$).



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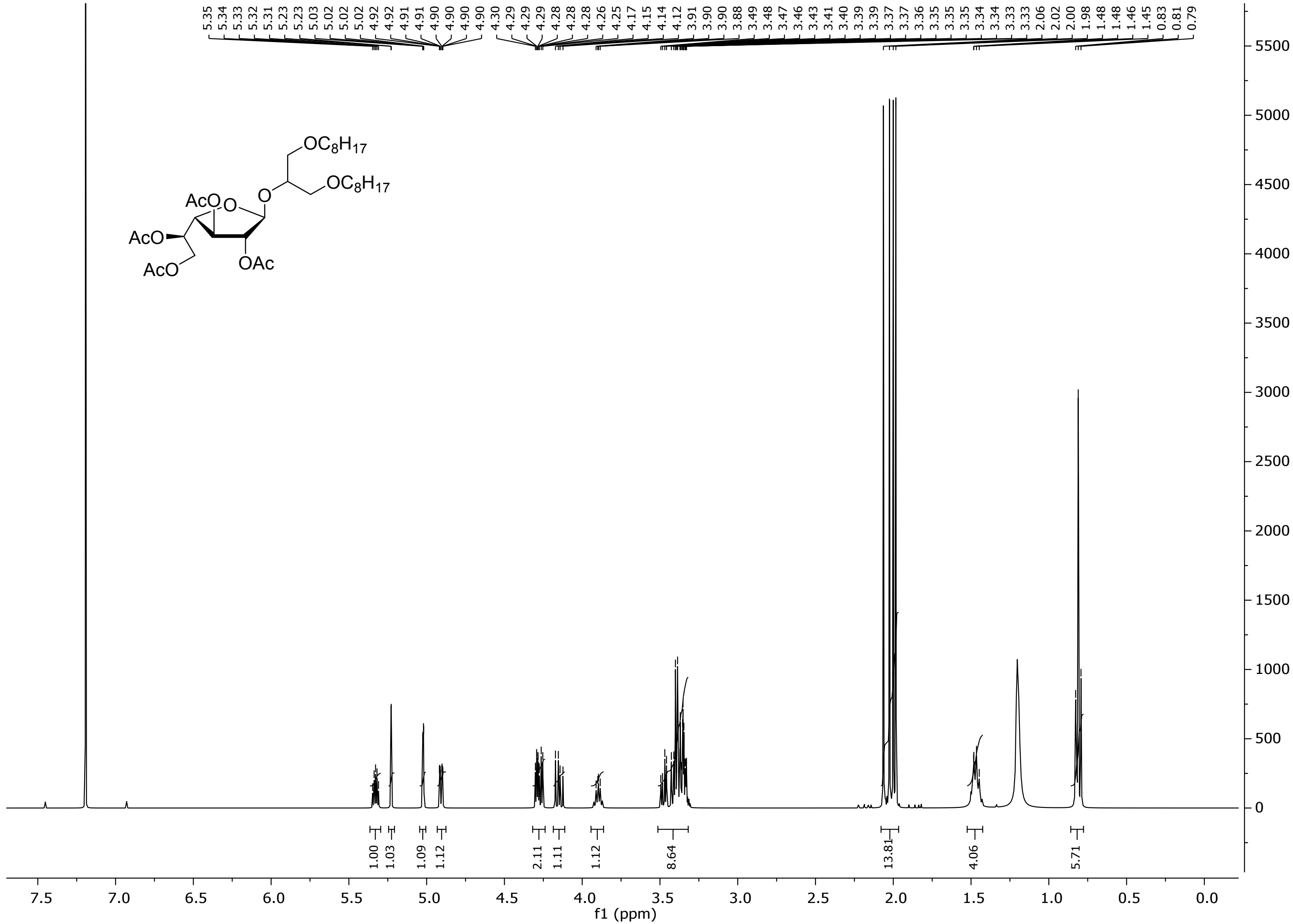

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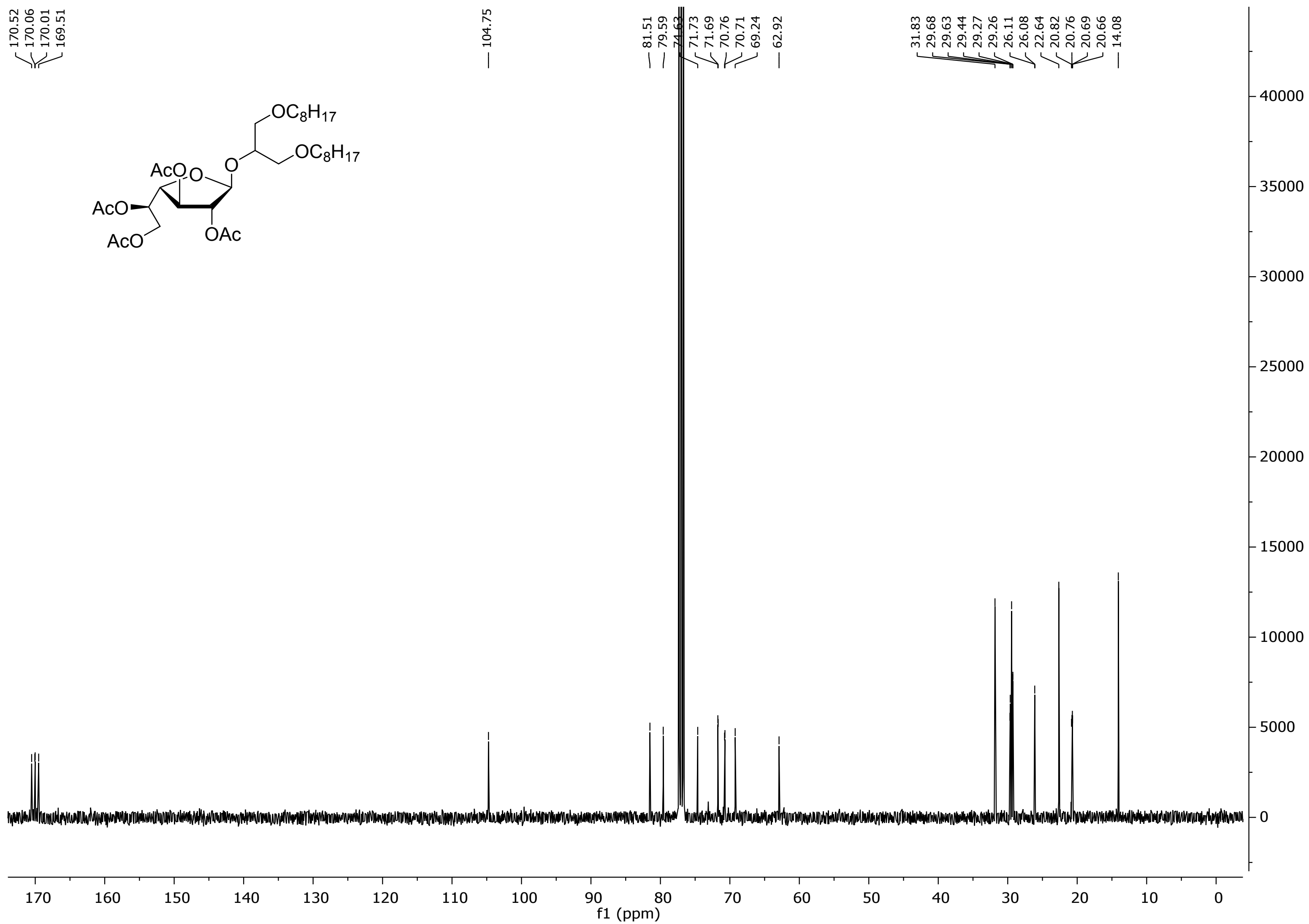

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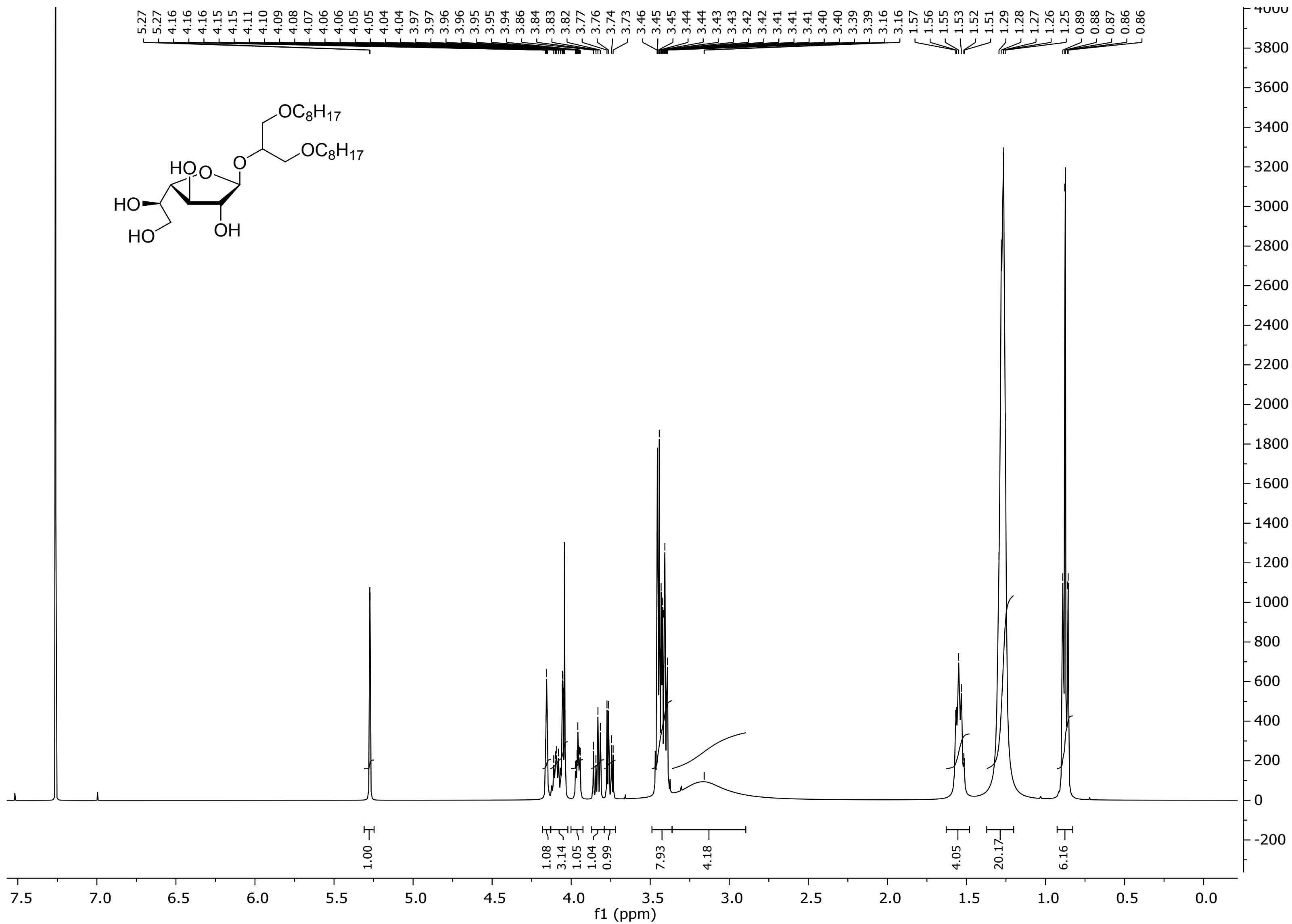

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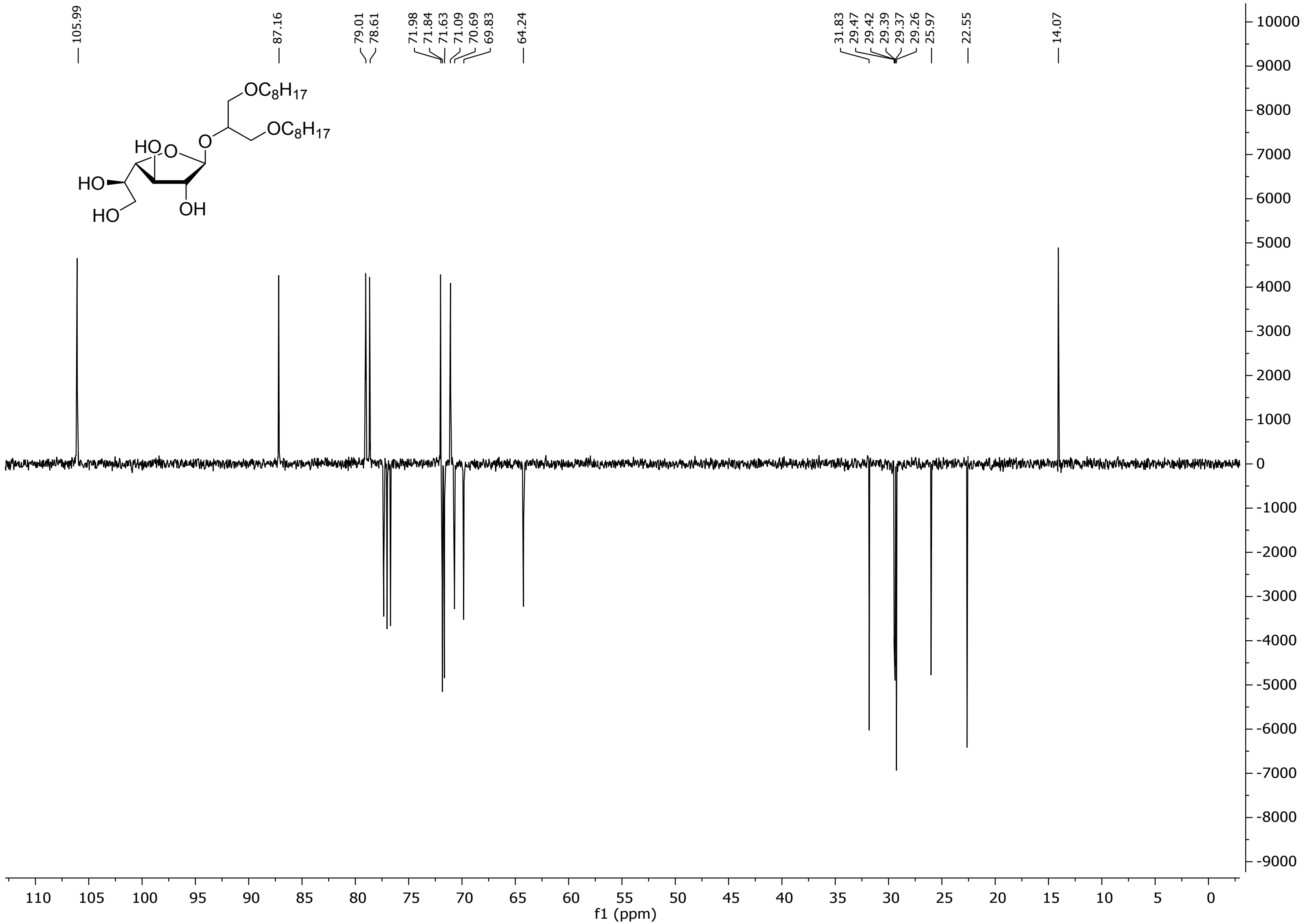

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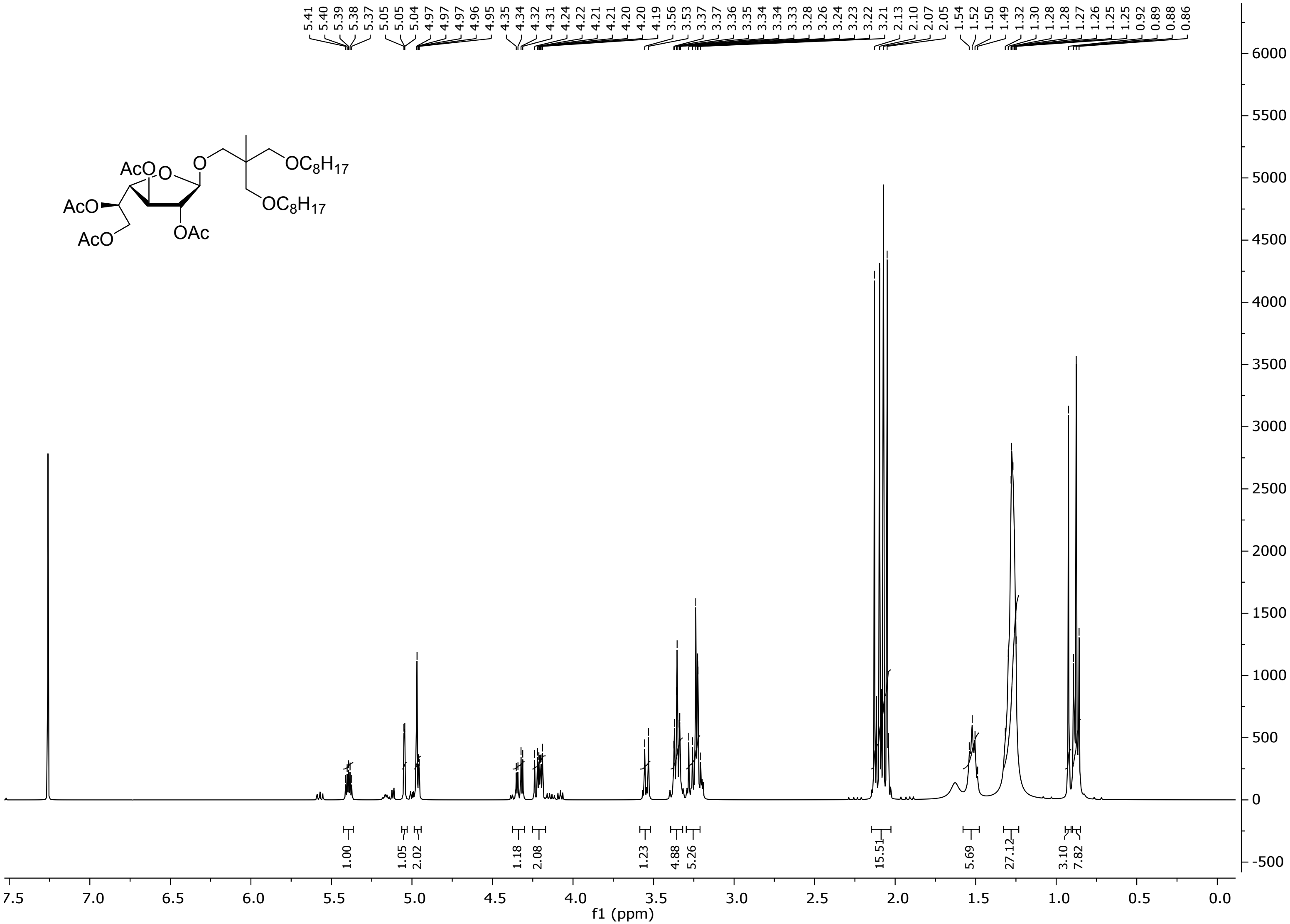

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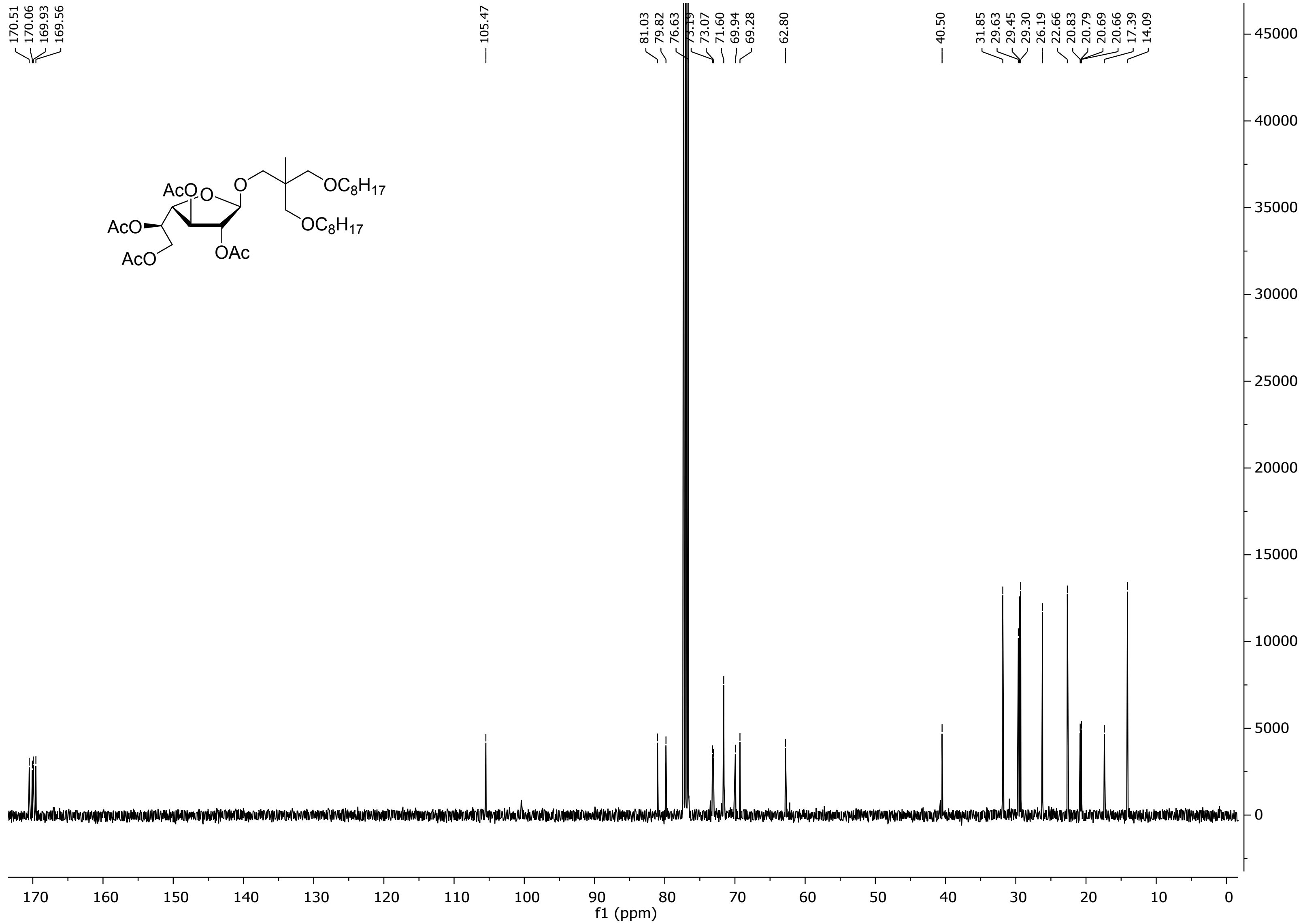
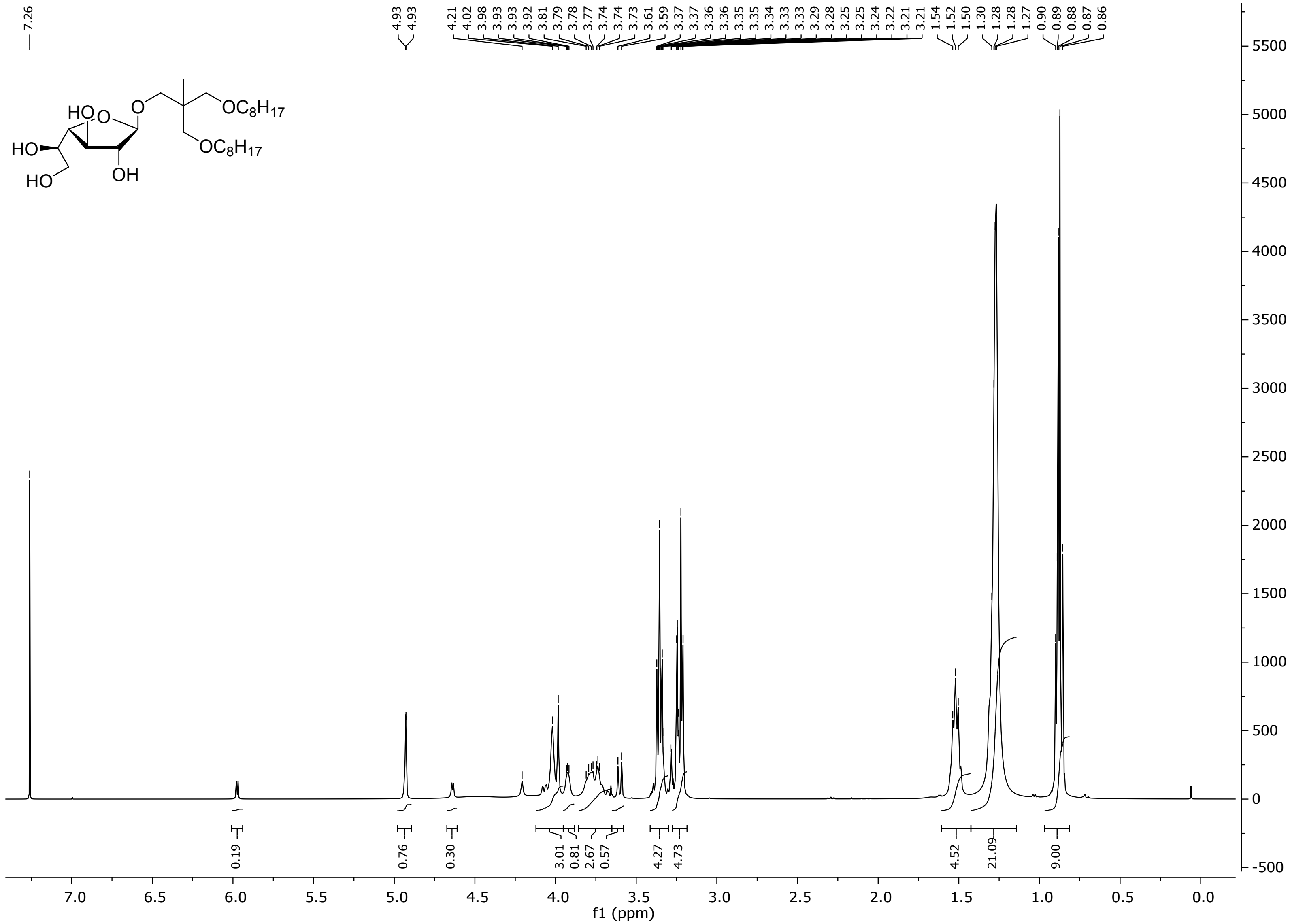


^{13}C NMR Spectrum of **41** (100 MHz, $CDCl_3$).



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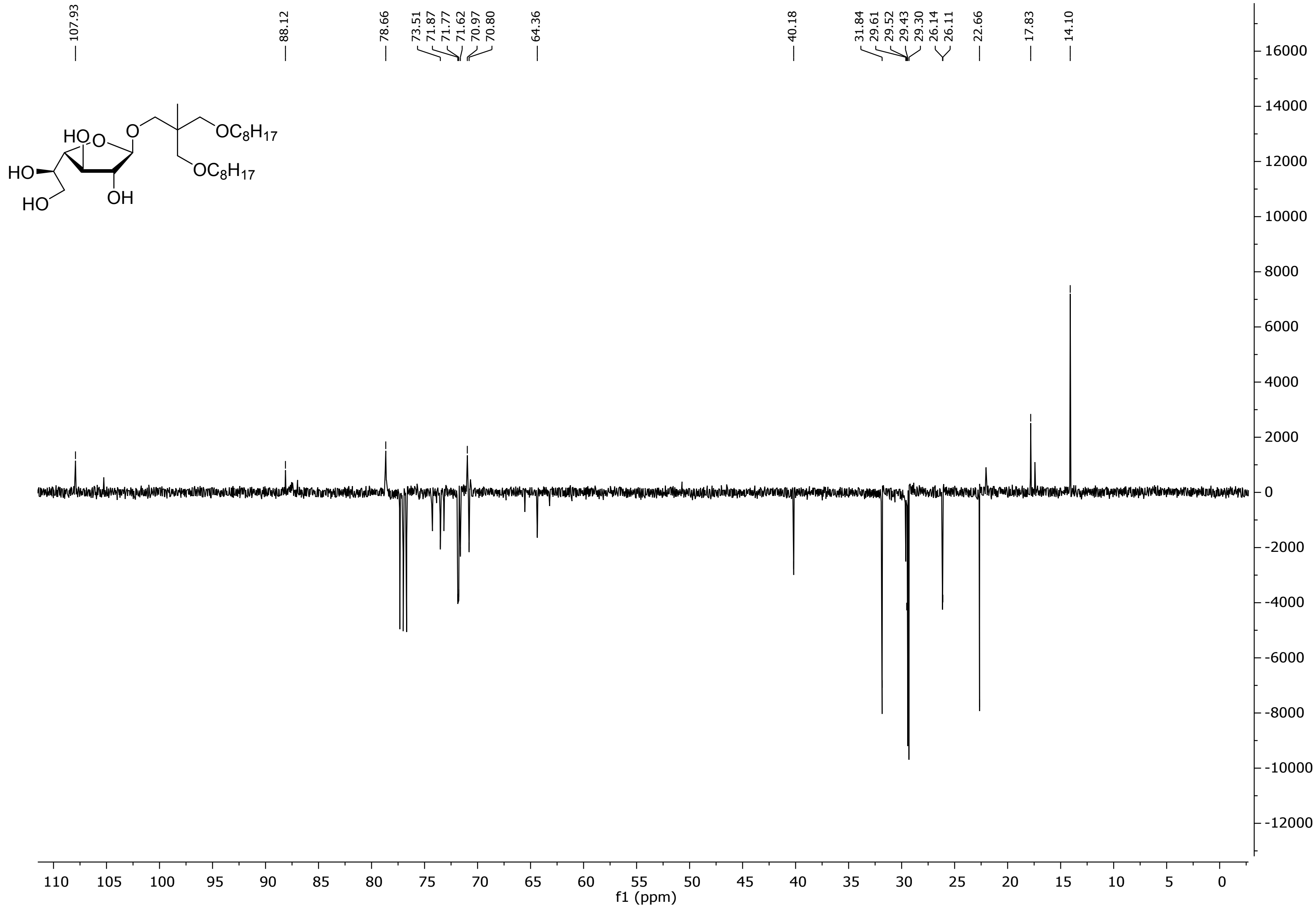

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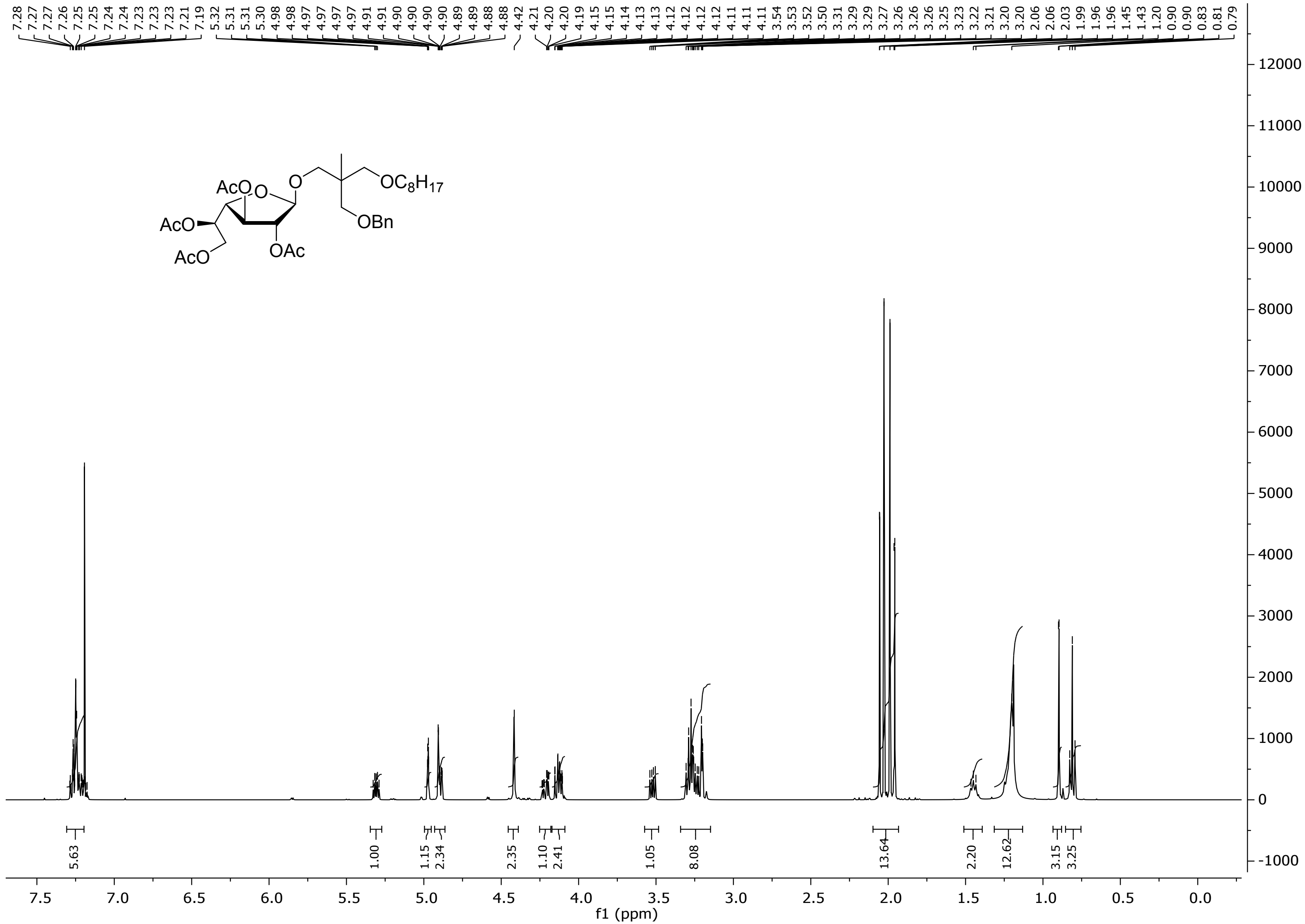

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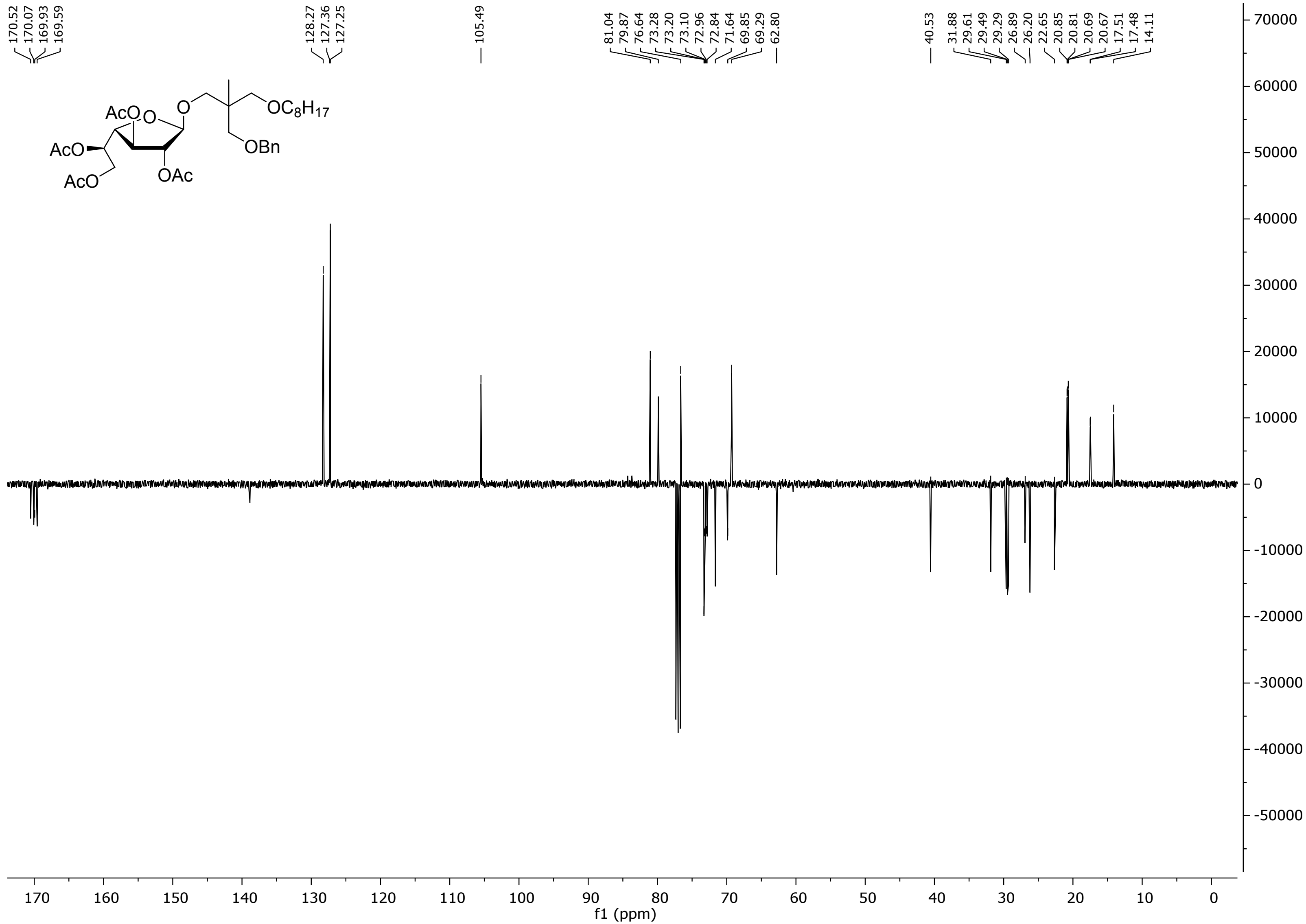

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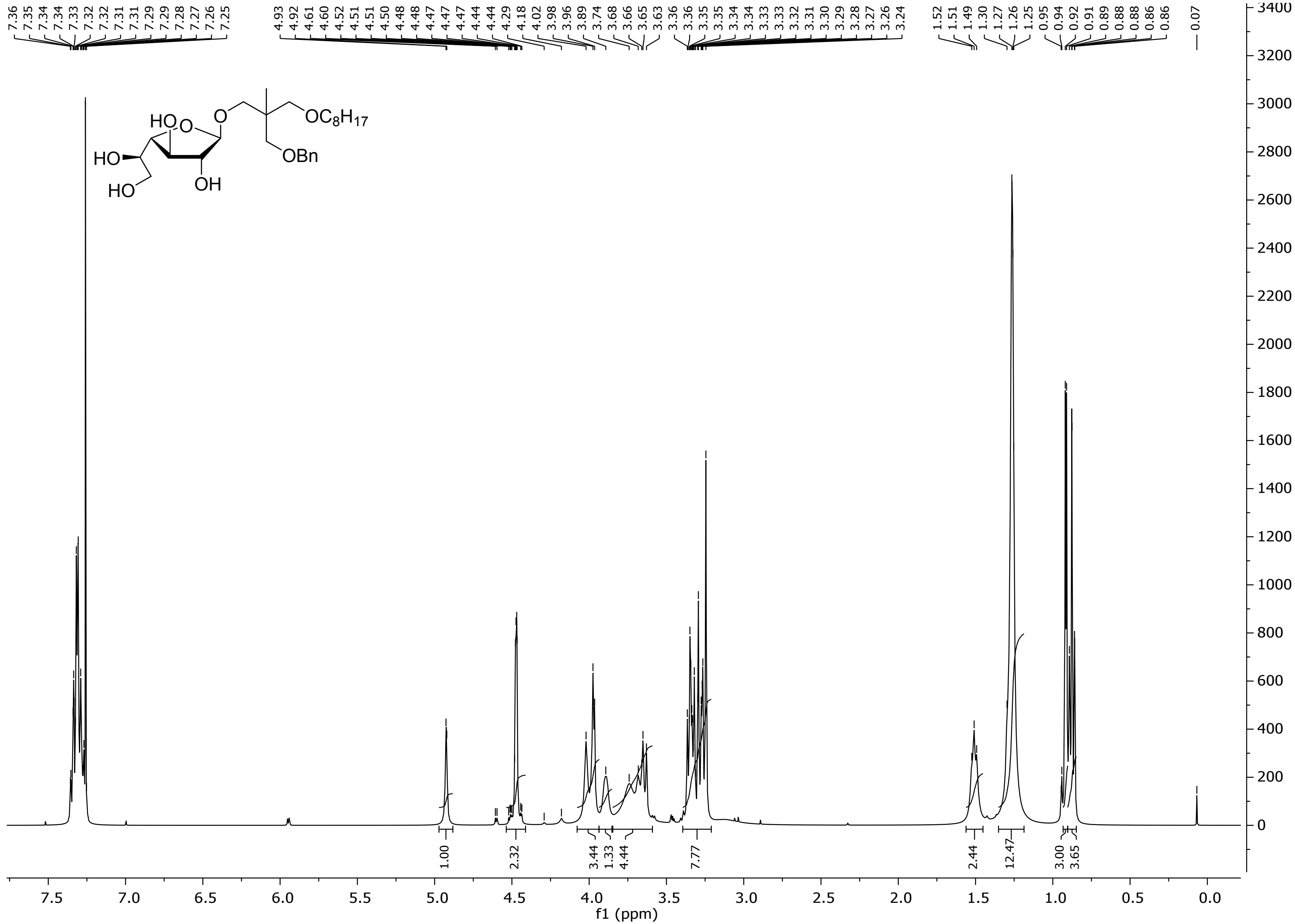

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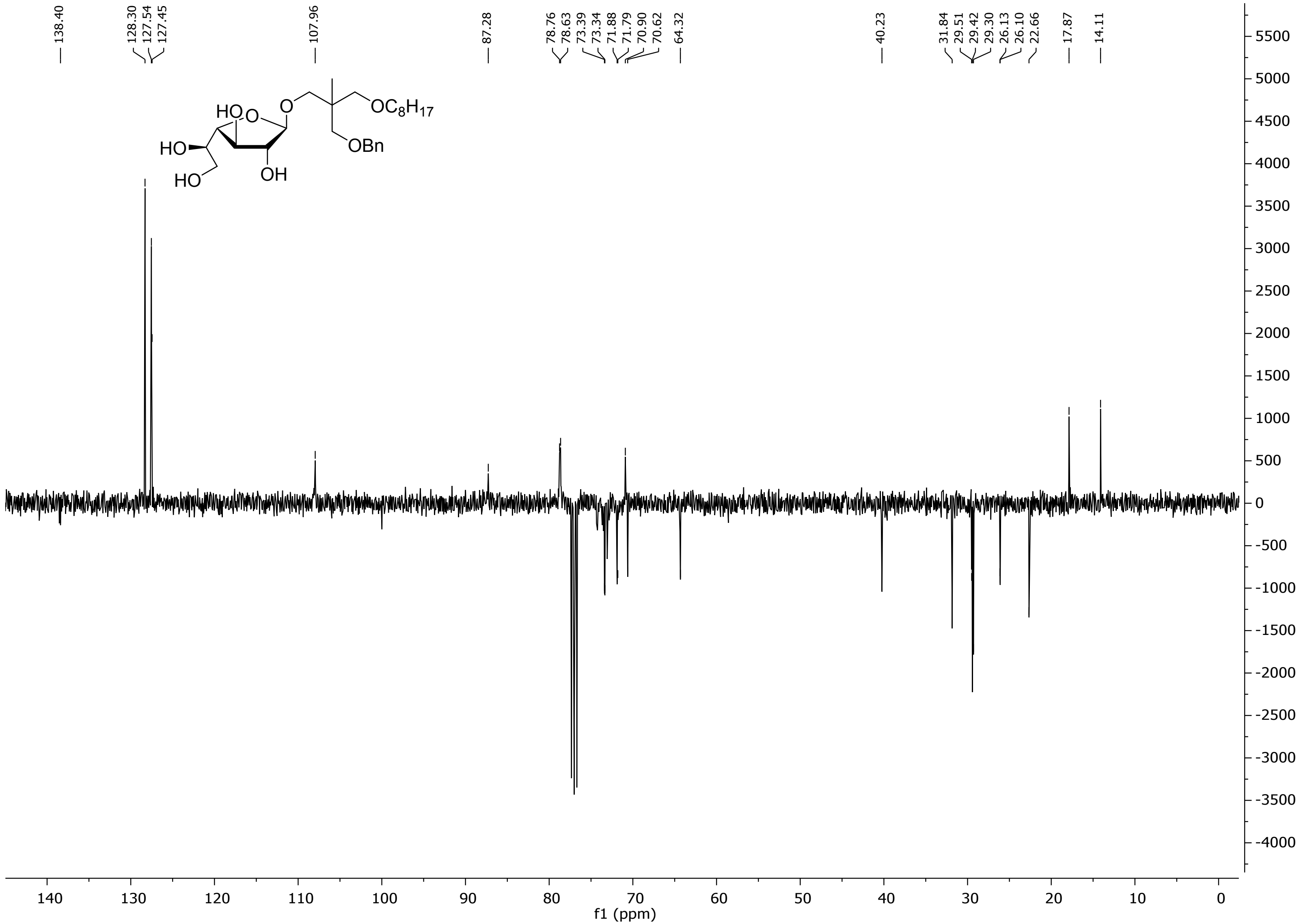

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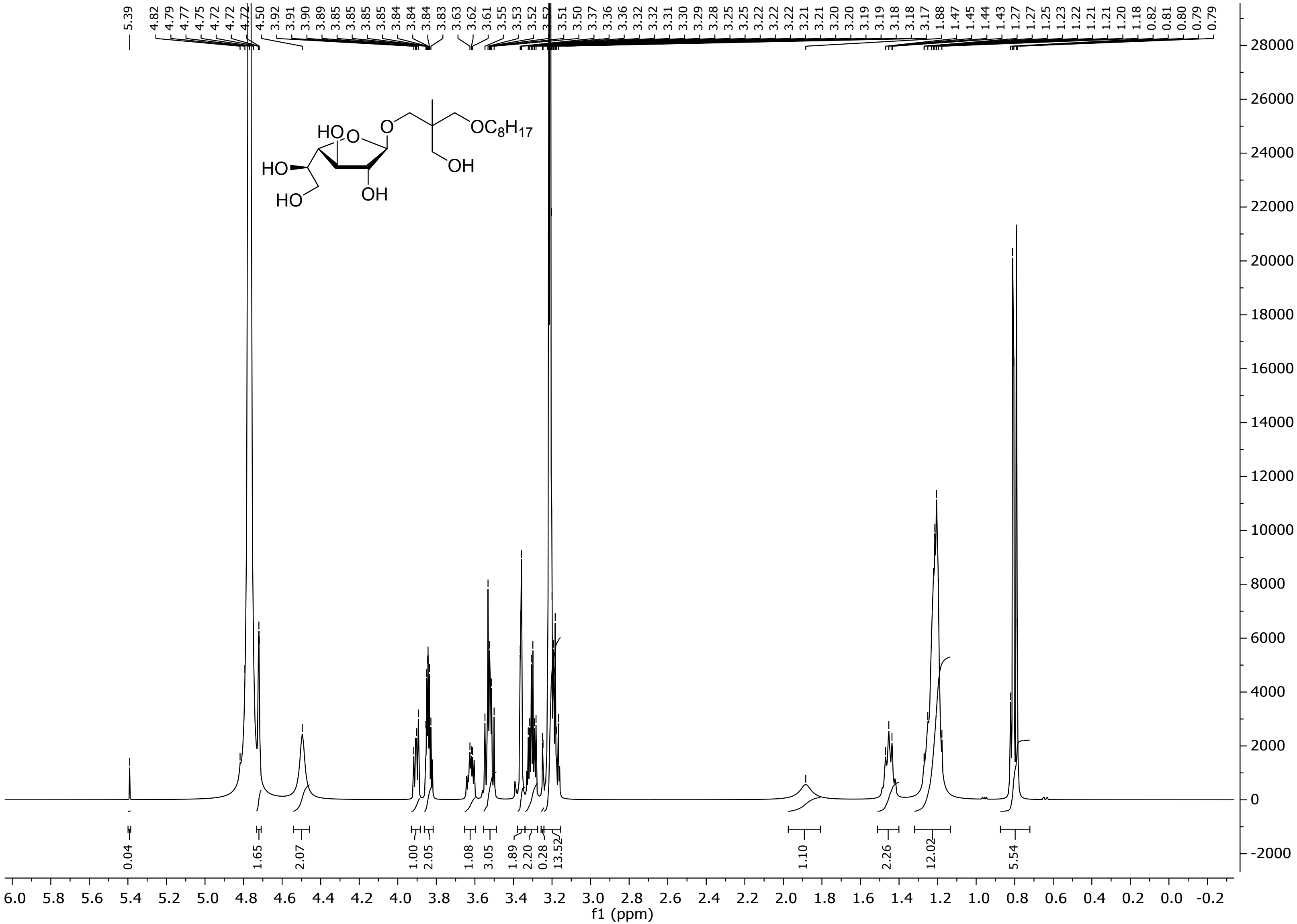

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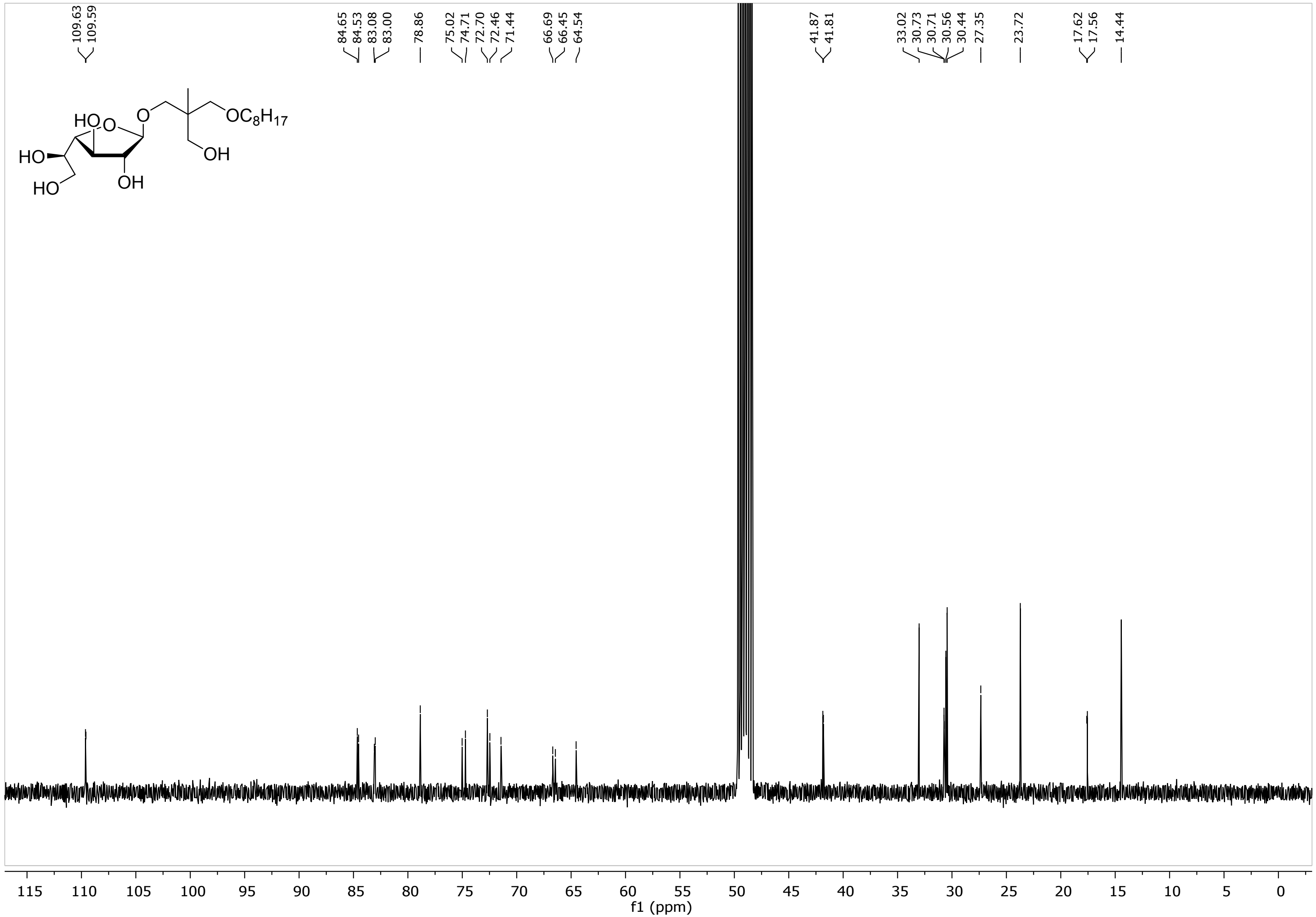

^{13}C NMR Spectrum of **17** (100 MHz, MeOD).