Electronic Supplementary Material (ESI) for ChemComm.

Supporting Information

1. General

1.1 Solvents & Chemicals

All solvents and reagents employed were obtained from Acros (Geel, Belgium), Merck (Darmstadt, Germany), Carl Roth (Karlsruhe, Germany), Sigma-Aldrich (St. Gallen, Switzerland), TCI (Zwijndrecht, Belgium), ABCR (Karlsruhe, Germany) or Alfa Aesar (Ward Hill USA). Technical gases (Argon 5.0, H2 and food grade CO2) were obtained from Air Liquide (Paris, France). Deuterated solvents were obtained from Armar (Doettingen, Switzerland). Solvents were dried using appropriate drying agents. Unless otherwise stated, reactions were performed under air. NMR spectra (^{1}H, ^{13}C, and ^{31}P) were recorded in CDCl3, CD_3OD and CD_2Cl_2 or mixtures of those on Bruker (Rheinstetten, Germany) AvanceDPX-300, AvanceII-300, Avance400 or AvanceIII-500 at 25°C. Chemical shifts are given in ppm with respect to TMS (^{1}H, ^{13}C, δ = 0.00) or H_3PO_4 (^{31}P, δ = 0.00) or with calibration against the residual solvent signal. UPLC was performed on a 1290 Infinity series system (Agilent Technologies, Santa Clara, US) using Zorbax RRHD C18 Eclipse Plus 2.1x50 mm, 1.8 Micron column, UV/Vis detector and either FLD or Agilent 6120 quadrupole LC/MS (ESI+/-). UPLC-MS was carried out using mixtures of solvent A (99.9% H2O + 0.1% FA) and B (99.9% MeOH + 0.1% FA) with gradient (5% B in A to 95% B in A in 1 min) and a flow of 0.6 mL/min at 20°C. Fluorescence Spectra were recorded on Cary Eclipse, absorption spectra were recorded on Cary 100Bio UV/Vis (both Varian, Palo Alto, US), both at 37°C.

1.2 Abbreviations

ASM = acid sphingomyelinase, aq. = aqueous, CH = cyclohexane, DIPEA = diisopropylethylamine, DMF = *N*,*N*-dimethylformamide, EA = ethyl acetate, eq. = equivalents, FA = formic acid, rt = room temperature, sat. = saturated, THF = tetrahydrofuran

1.3 Chromatography

Thin-layer chromatography (TLC) was performed using silica gel 60 F254 (Merck (Darmstadt, Germany)) and the compounds were detected with UV light (254 nm/366 nm) or by spraying the plates with ninhydrin solution (3 w% in EtOH), followed by heating. Flash chromatography was performed on silica gel 60 (0.040–0.063 mm) obtained from Macherey-Nagel (Dueren, Germany). Solvents were evaporated under reduced pressure while maintaining the water bath temperature at 40°C.

1.4 Characterization of caged compounds in vitro

Compounds were illuminated using an Alpha Innotec AI-TLM-40 Dual-wavelength Transilluminator (180 W) at 305 nm. UPLC was performed on a 1290 Infinity series system using Zorbax RRHD C18 Eclipse Plus 2.1x50 mm, 1.8 Micron column. Identity of the compounds was checked by specific retention times. The peak areas obtained from the inbuilt UV/Vis detector were calculated by Agilent's ChemStation software.

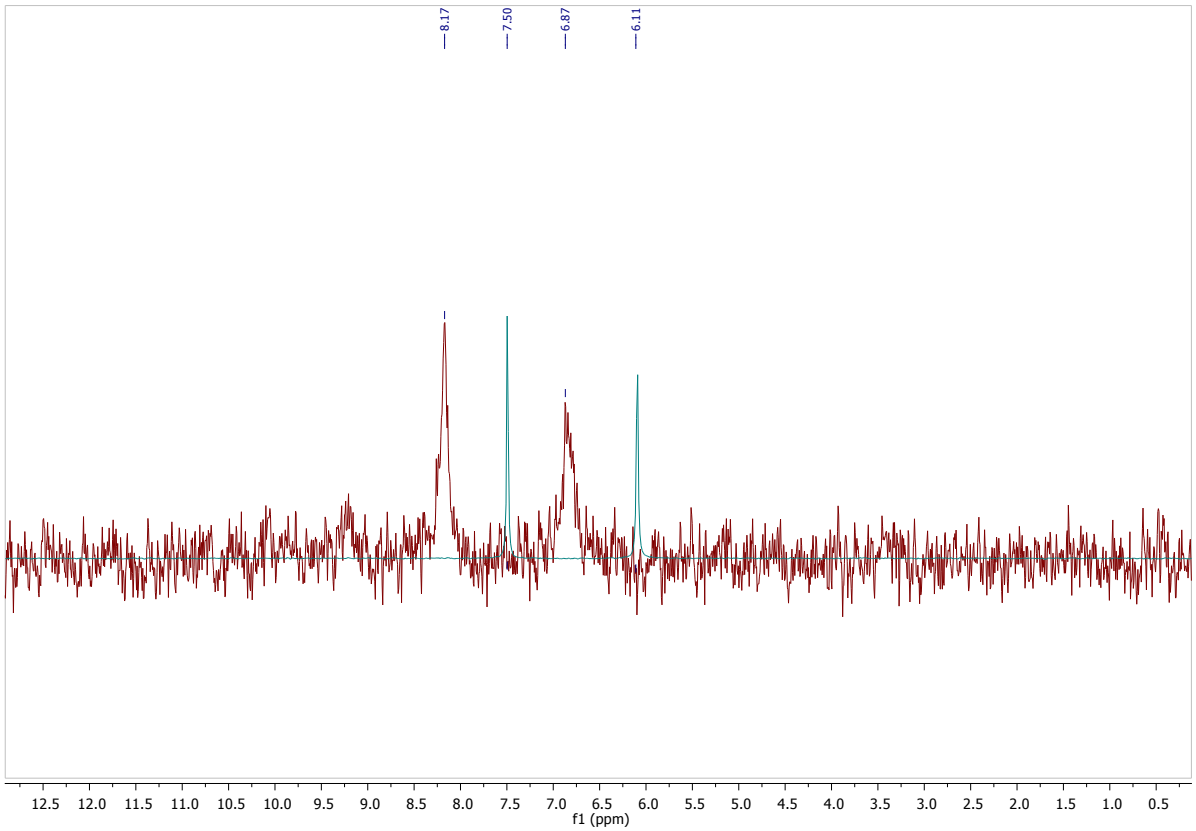


Figure S1: ^{31}P NMR spectra of compound 2 (PCAI) before (blue) and after (red) uncaging for 10 min. in chloroform. It should be noted that uncaging leads to significantly reduced solubility and partial precipitation.

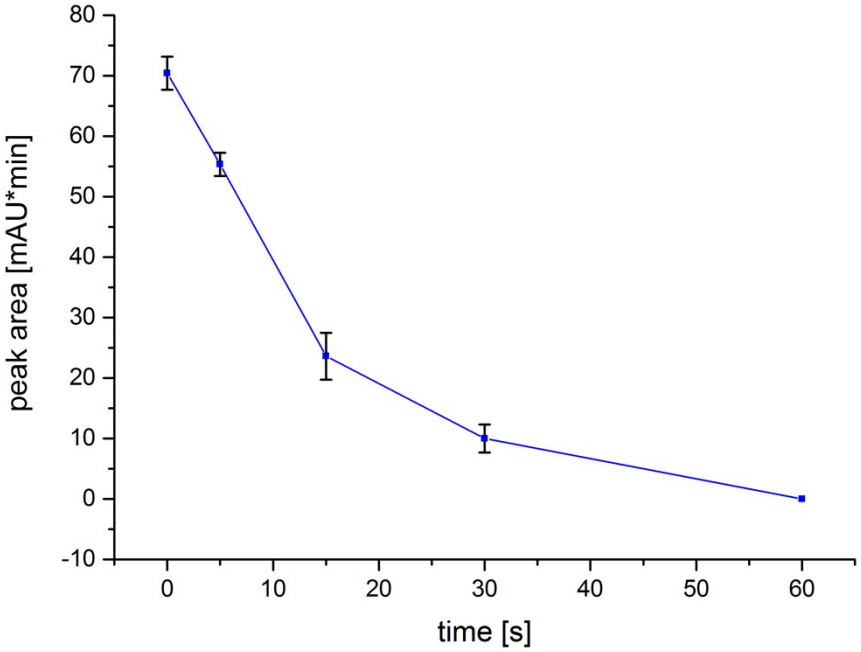


Figure S2: Uncaging kinetics for compound **2** (**PCAI**). Compound **2** (5 µM) in DMSO was incubated at room temperature. After the indicated illumination times, a sample was applied to HPLC and the peak area was determined.

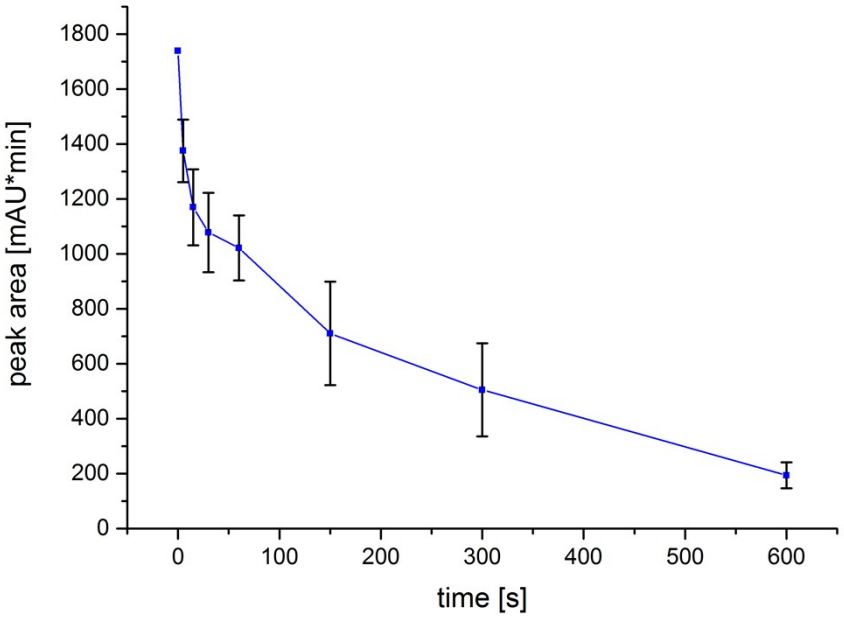


Figure S3: Uncaging kinetics for compound **2** (**PCAI**). Compound **2** (5 mM) in DMSO was incubated at room temperature. After the indicated illumination times, a sample was applied to HPLC and the peak area was determined.

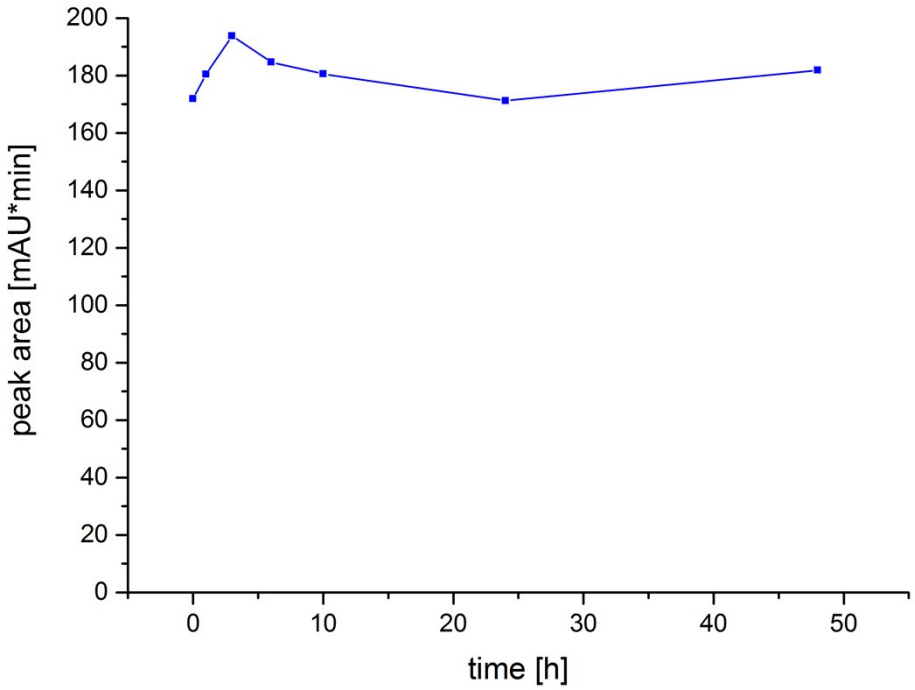


Figure S4: Stability test for compound **2** (**PCAI**) under acidic conditions. Compound **2** (5 mM) in DMSO was diluted 1:10 with ASM buffer (pH 4.5) and incubated at 37 °C. After the indicated incubation times, a sample was applied to HPLC and the peak area was determined.

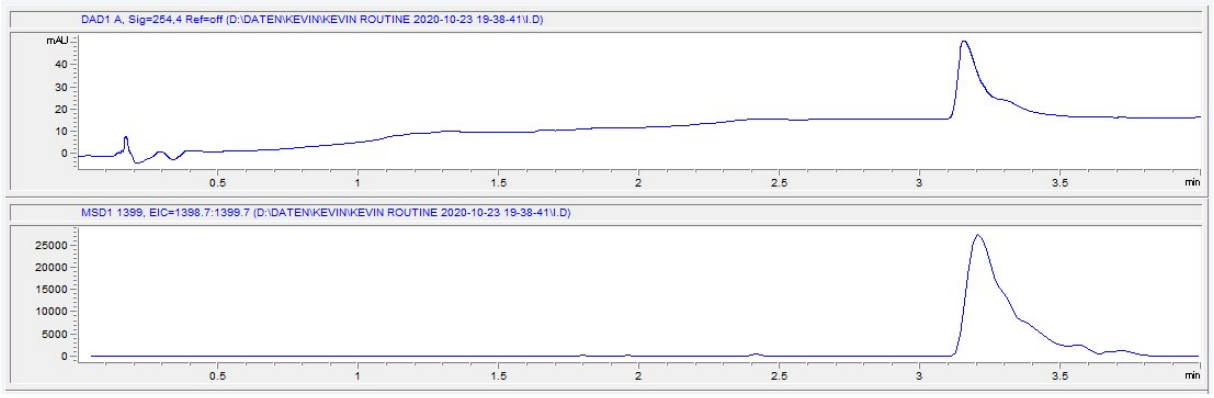


Figure S5: HPLC chromatograph after 30 min incubation of **PCAI** in TRIS/HCl buffer pH 7.4. Upper lane: absorption shows **PCAI** (t = 3.2 min). Bottom lane: m/z = 1399 for $[M(\mathbf{2})+Na]^+$ at retention time for **PCAI** (3.2 min).

A

B

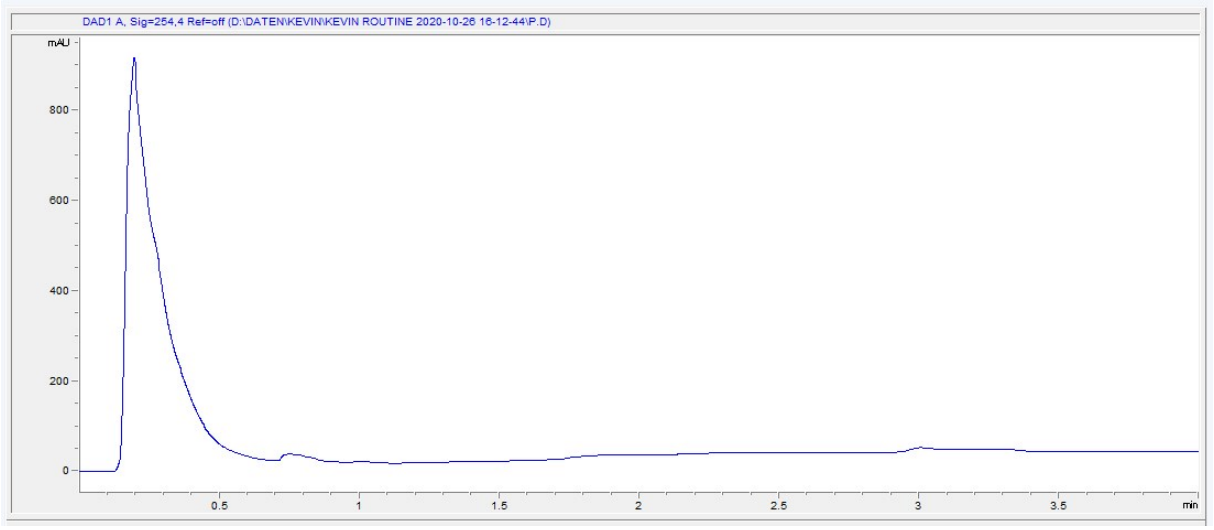


Figure S6: Stability test for compound **2** (**PCAI**) in HEK293 lysate. **A** HPLC chromatogram after 30 min incubation of PCAI (20µM) in HEK lysate. The upper chromatograph shows absorption at ~3.3 min plus absorption specific for cell lysate (**B**). The middle chromatograph (m/z selective for 1399 expected for [M(**2**)+Na]$^+$ shows intact PCAI (t = 3.2 min). The third chromatograph (m/z selective for 1189 expected for [M(**1**)+Na]$^+$ shows formation of compound **1** devoid of butyryl esters at t = 2.1 min. **B** Chromatograph (absorption) for pure HEK293 lysate.

2. Acid Sphingomyelinase Assays in vitro

2.1 Preparation of recombinant ASM

Human acid sphingomyelinase (ASM) was expressed in insect Sf9 cells and purified to homogeneity similar to method described by LANSMANN et al.[1] The recombinant enzyme purified in the presence of Zn^{2+} (0.1 mM) had an activity of 23 nmol h^{-1} ml^{-1} as determined in a micellar assay system.

2.2 Fluorescent ASM assay (cuvette)

Fluorescence spectra were recorded with a Cary Eclipse spectrometer (Varian, Palo Alto, US) at a constant 37°C in 3 mL 1x1 cm quartz cuvettes. Unless otherwise specified the scan rate 600 nm min -1. The optical density at the wavelength used was less than 0.05 in each experiment. All spectra were recorded with magnetic stirring, all slit widths were 5 nm, PMT voltage was 700 V, if not stated otherwise. ASM buffer, (usually 2993 µL) was filled into quartz cuvettes (1x1 cm, 3 mL) and blank spectra were recorded. FRET-Probe (CKM42-1, 1 mM in DMSO, usually 3 µL giving final 1 µM) and Inhibitor (**1**, 10 mM or 25 mM in DMSO usually 3 µL giving 10 µM or 25 µM) were added and initial static spectra were recorded (Ex/Em in nm: 485/(500-800), all slits 5 nm). Then, recombinant human ASM from insect cells (usually 0.42 µL 0.0625 µg/µL ASM in elution buffer) was added simultaneously to the cuvette(s), which were stoppered tightly and placed in a multicell holder. After 30 sec of preincubation, data points (485/512 + 485/624) were recorded in time intervals. For uncaging, cuvettes were removed from the reader and treated for 30s or 60s using a transilluminator (Biorad). Fluorescence data was plotted using OriginLab OriginPro 9.1G software.

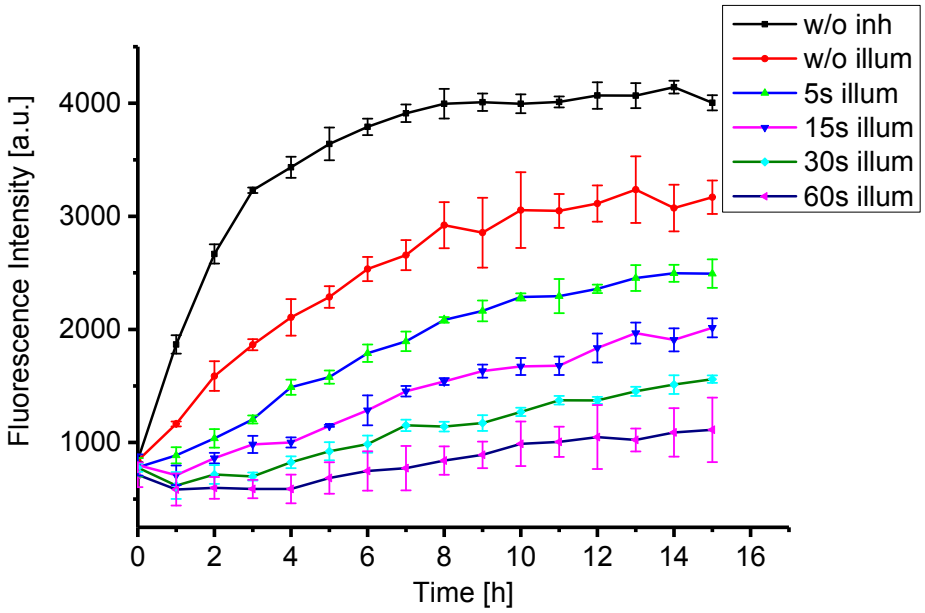


Figure S7: Inhibition of ASM in presence of compound 10 µM **1**. Compound **1** was either not illuminated (red curve) or - prior to mixing with FRET probe end enzyme - illuminated for the times indicated in the box.

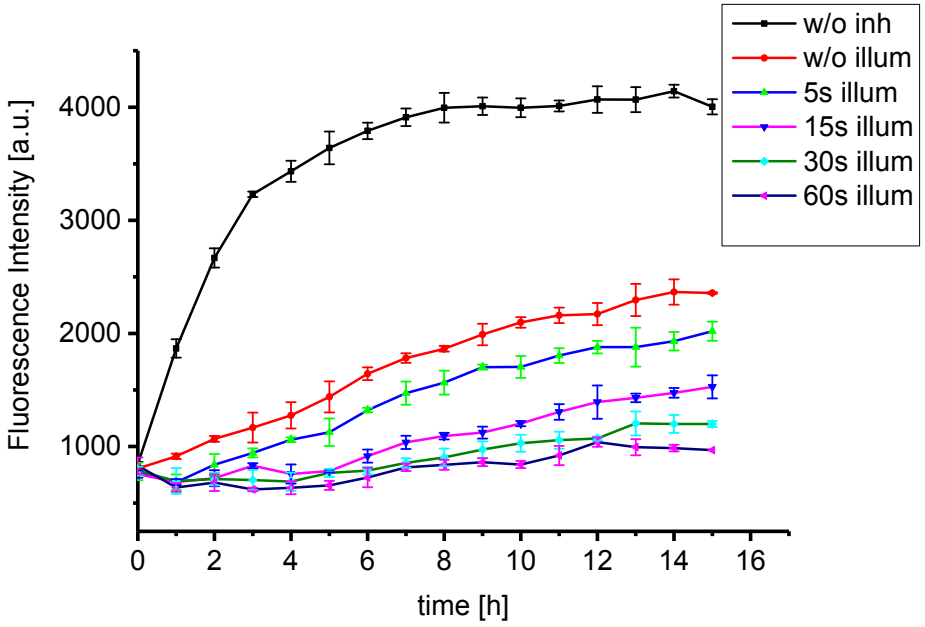


Figure S8: Inhibition of ASM in presence of compound 25 µM **1**. Compound **1** was either not illuminated (red curve) or - prior to mixing with FRET probe end enzyme - illuminated for the times indicated in the box.

3. Flow cytometric assessment of sphingomyelinase activity in living cells

The FC assay was performed similar to the procedures described elsewhere.[2, 3]
Human embryonic kidney cells (HEK-293) cells were cultured in Dulbecco's modifed Eagle's medium (DMEM, ThermoFisher) supplemented with 10% FCS (FCS, ThermoFisher), 100 U mL^{-1} penicillin and 0.1mgmL^{-1} streptomycin (ThermoFisher) at 37 °C with 5% CO_2. 75,000 cells per well of a 6-well plate were treated with the probes in different concentrations (see Result) for over a period of 16 h at 37°C with 5% CO_2 in darkness. The cells were exposed to UV light pulse for 60 seconds. 10 µM of the FRET probe[2] was added to the cells. The cells were incubated for 16 h at 37°C with 5% CO_2 in darkness. . The geometric mean fluorescence intensity (MFI) on the green channel (520 nm), which correlated to the cleavage of the substrate and on the red channel (700 nm), which correlated to the uptake of the substrate was detected using a BD FACSMelody flow cytometer (BD Biosciences). The fluorescence values were obtained from a minimum of 10,000 cells in each sample, as describe by Kappe *et al*. (2020).[2] The geometric mean of the fluorescence per cell was calculated using FlowJo software. Data presented are representative of geometric means ± SD of the fluorescence intensity obtained from three independent cultures and determined in three technical independent experiments.

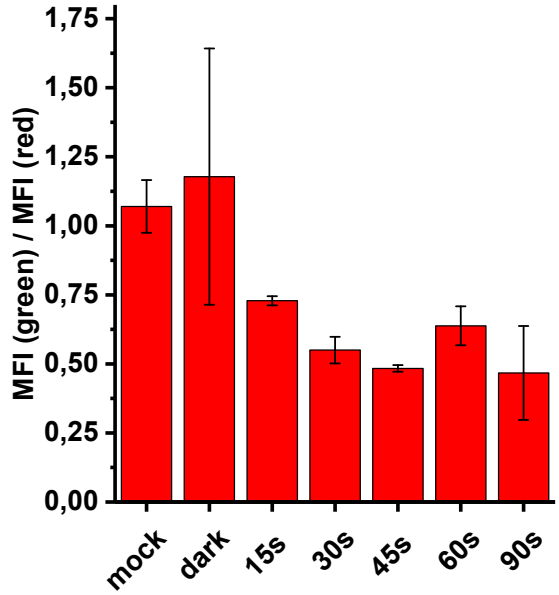


Figure S9: Flow cytometry evaluation of ASM activity in presence of 5 µM **PCAI** after different illumination times (0, 15, 30, 45, 60 and 90 seconds). Hek293 cells were incubated with PCAI for 16 h, followed by illumination for times indicated. Then, cells were treated with ASM FRET probe and incubated for another 16h. Finally, cells were analyzed by flow cytometry. Data are representatives of geometric means ± SD of the fluorescence intensity obtained from three independent cultures and determined in three technical independent experiments.

4. Details for experimental lipidomics

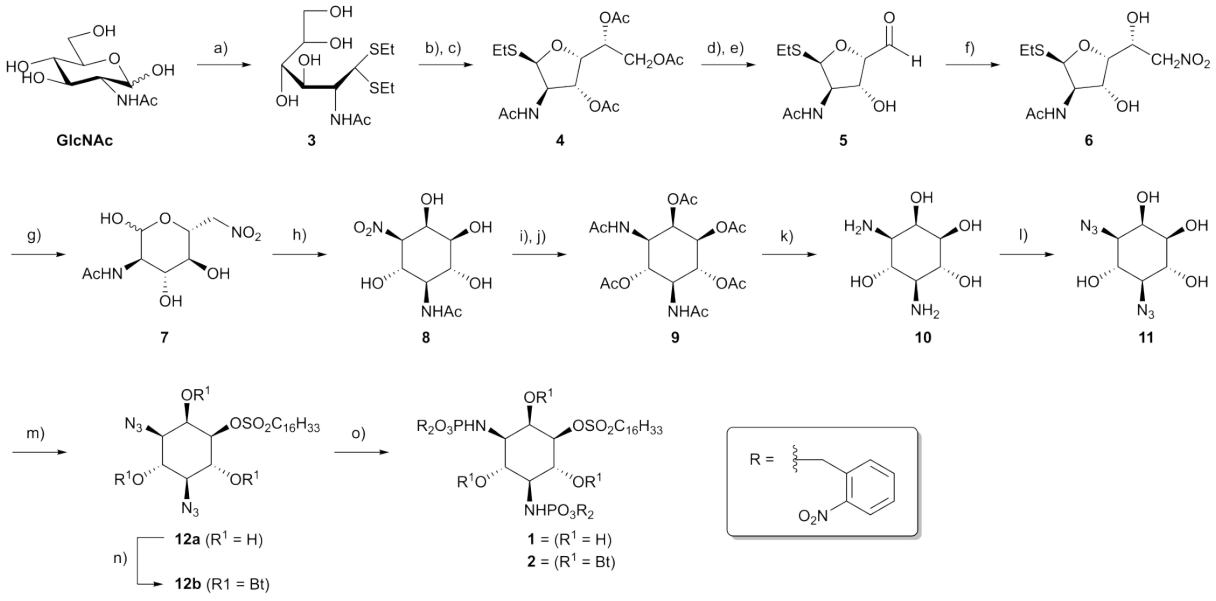
HEK293 cells were cultured in six well plates (150.000 cells per well) under standard growth conditions (DMEM with 4mM L-glutamine, 10% FBS, 1% Penicillin-Streptomycin; CO_2 incubator with 37°C, 5% CO_2). After incubation for 28h, the cells were treated with **PCAI** or 0.5% DMSO (control) for 16h. Then, the cells were illuminated for 30s using a Biorad transilluminator and incubated for another 24h. Cells were then subjected to lipid extraction using 1.5 mL methanol/chloroform (2:1, v:v) as described.[3] The extraction solvent contained C17-ceramide (Cer17) and C16-d_{31}-sphingomyelin (d_{31}-SM16) (both Avanti Polar Lipids, Alabaster, USA) as internal standards. Chromatographic separations were achieved on a 1260 Infinity HPLC (Agilent Technologies, Waldbronn, Germany) equipped with a Poroshell 120 EC-C8 column (3.0 × 150 mm, 2.7 µm; Agilent Technologies). A mobile phase system consisting of water (solvent A) and acetonitrile/methanol (1:1, v:v; solvent B), both acidified with 0.1% formic acid, was used for gradient elution at an initial composition of 40:60 (A:B, v:v) and a flow rate of 0.5 mL/min. MS/MS analyses were carried out using a 6490 triple-quadrupole mass spectrometer (Agilent Technologies) operating in the positive electrospray ionization mode (ESI+). The following ion source parameters were set: sheath gas temperature, 375 °C; sheath gas flow, 12 L/min of nitrogen; nebulizer pressure, 30 psi; drying gas temperature, 200 °C; drying gas flow, 15 L/min of nitrogen; capillary voltage, 4000 V; nozzle voltage, 1500 V; iFunnel high pressure RF voltage, 150 V and iFunnel low pressure RF voltage, 60 V. The following mass transitions were recorded (collision energies of 25 eV for all transitions): ceramides: *m/z* 520.5 → 264.3 for Cer16, *m/z* 534.5 → 264.3 for Cer17, *m/z* 548.5 → 264.3 for Cer18, *m/z* 576.6 → 264.3 for Cer20, *m/z* 604.6 → 264.3 for Cer22, *m/z* 630.6 → 264.3 for Cer24:1 and *m/z* 632.6 → 264.3 for Cer24; sphingomyelins: *m/z* 703.6 → 184.1 for SM16, *m/z* 731.6 → 184.1 for SM18, *m/z* 734.8 → 184.1 for d_{31}-SM16, *m/z* 759.6 → 184.1 for SM20, *m/z* 787.7 → 184.1 for SM22, *m/z* 813.7 → 184.1 for SM24:1 and *m/z* 815.7 → 184.1 for SM24. Quantification was performed with MassHunter Software (Agilent Technologies).

5. Synthesis

For synthesis of the desired compounds, the literature-known 3,5-diamino-D-myo-inositol **10** was synthesized from N-Acetyl-D-glucosamine (GlcNAc), following a route described by Ogawa et al. (scheme S1).[4] Synthesis proceeded following the original route, but after careful amendment of some of the reaction. Key step is an intramolecular Henry reaction transforming the pyranose ring of intermediate **7** into a carbocycle. This proceeds via nucleophilic attack of the latent aldehyde group by the carbon atom carrying the nitro group, in presence of sodium methoxide. The desired intermediate **8** was separated from the epi-inositol, which was formed as a side-product. The compound was confirmed by the coupling constants of ring protons in the fully acetylated intermediate **9**, which were in agreement with a myo inositol configuration. (Figure S1).

Acid mediated de-protection yielded the literature-known **10**, which was converted into the novel bisazide **11** by copper (II) - mediated diazo transfer.

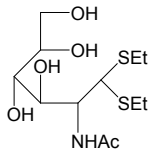
Careful sulfonylation yielded the desired regioisomer **12** as a main product. The latter was either directly subjected to a Staudinger phosphite reaction29 to afford **1** or previously treated with butyric acid anhydride to obtain the more lipophilic compound **2**.



Scheme S1: **a)** Ethanthiol, 12 M HCl, 0 °C, 12 h; **b)** $HgCl_2$, HgO, H_2O, RT, 12 h; **c)** Pyridine, Ac_2O, 0 °C → RT, 3 h; **d)** 0.5 % NaOMe, MeOH, RT, 3 h; **e)** $NaIO_4$, H_2O, 0 °C, 20 min; **f)** 20 % NaOMe, CH_3NO_2, EtOH/H_2O (95:5), 4 °C, 12 h; **g)** $HgCl_2$, H_2O, 50 °C → RT, 12 h; **h)** 1 M NaOMe, MeOH, 4 °C, 12 h; **i)** Pd/C (10 % *w*/*w*), H_2, H_2O, RT, 2 d; **j)** Pyridin, Ac_2O, 0 °C → RT, 12 h; **k)** 6 M HCl, reflux,

150 °C, 4 h. **l)** N_3SO_2Im*HCl, Cu(II)SO_4, K_2CO_3, rt, 12 h; **m)** $ClSO_2C_{16}H_{33}$, DMAP, THF, 0 °C → RT, 2 h **n)** Pyridin, Bt_2O, 0 °C → RT, 2 d. **o)** 1.) $P(ONB)_3$, CH_2Cl_2, 45-50 °C, 24h-50h 2.) MeCN/H2O (1:1)

2-Acetamido-2-deoxy-D-glucose-diethyl-dithioacetal **3**



3

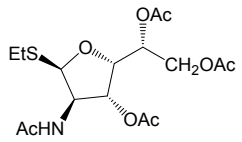
N-acetyl-D-glucosamine (15 g, 67.9 mmol, 1 eq) was dissolved in 40 mL 12 M hydrochloric acid at 0 °C. 40 mL ethanethiol and catalytic amount of zinc chloride were then added to the reaction solution and the solution was stirred at 0 °C for 5 h. The solution was then adjusted to pH ~ 7 with sodium hydrogen carbonate under ice-cooling. The solvent was spun off under reduced pressure, the residue was suspended in ethanol and the remaining solid was separated off. The filtrate was concentrated again and the residue was purified by column chromatography on silica gel (dichloromethane/methanol 9:1). The desired product **3** was obtained as a pale yellow solid (5.5 g, 16.8 mmol, 25 %, R_f = 0.7 in CH_2Cl_2/MeOH 4:1).

^{1}H-NMR (500 MHz, CD_3OD): δ [ppm] = 4.37 (t, 1 H, ^3J= 3.6 Hz, -C*H*-SEt), 4.28 (dd, 1 H, ^3J = 3.5, 7.5 Hz, -C*H*-), 4.11 (d, 1 H, ^3J = 7.6 Hz, -C*H*-), 3.75 (m, 1 H, -C*H*-), 3.62 (m, 2 H, -CH_2-), 3.50 (dd, 1 H, ^3J = 3.5, 7.1 Hz, -CH-), 2.67 (m, 4 H, -S-CH_2-CH_3), 1.99 (s, 3 H, -NHCO-CH_3), 1.24 (td, 6 H, ^3J = 4.9, 7.4 Hz, -S-CH_2-CH_3).

^{13}C-APT-NMR (125 MHz, CD_3OD): δ [ppm] = 173.6 (*C*=O), 74.2 (-*C*H-), 73.5 (-*C*H-), 70.2 (-*C*H-), 64.5 (-*C*H_2-), 56.0 (-*C*H-), 54.8 (-*C*H-), 25.9 (-*C*H_2-), 25.8 (-*C*H_2-), 22.7 (-NH-CO-*C*H_3) 14.7 (-*C*H_3), 14.7 (-*C*H_3).

ESI-MS [m/z]: calc. for $C_{12}H_{26}O_5NS_2$ $[M+H]^+$: 328.1; found: 328.2

2-acetamido-3,5,6-tri-*O*-acetyl-2-deoxy-1-thio-α-D-glucofuranosid **4**



4

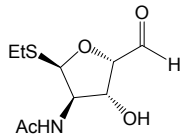
To a freshly prepared mercury (II) oxide suspension (2.2 g, 9.864 mmol, 1.6 eq.) **3** (2.0 g, 6.11 mmol, 1 eq.) was added. Mercury chloride (0.832 g, 3.06 mmol, 0.5 eq.) was added dropwise to the suspension with vigorous stirring over a period of 3 h at room temperature and the suspension was then stirred for a further hour. After adding 10 mL pyridine, the suspension was stored at 4 ° C overnight. The mercury (II) oxide was then separated off by filtration on Celite and the filtrate was concentrated. The residue was taken up in methanol, the undissolved solid was separated off by filtration and the filtrate was concentrated again. The resulting solid was dissolved in 5 mL pyridine and 5 mL acetic anhydride was added to the reaction solution at 0 ° C. The solution was stirred for 2 hours and then poured onto ice. The resulting reaction mixture was extracted twice with dichloromethane, the combined organic extracts were washed with sodium hydrogen carbonate solution and dried over sodium sulfate. After removal of the solvent, the oily residue was purified by repeated recrystallization in an ethanol-water mixture. The desired product **4** (1.213 g, 3.10 mmol, 51 %, R_f =0.5 in CH_2Cl_2/MeOH/NEt_3 95:5:1) was obtained as a white solid.

^{1}H-NMR (500 MHz, $CDCl_3$): δ [ppm] = 6.01 (d, 1 H, ^3J = 7.2 Hz, -N*H*Ac), 5.66 (d, 1 H, ^3J = 6.0 Hz, -C*H*-SEt), 5.40 (dd, 1 H,^3J = 4.0, 5.5 Hz, -C*H*-), 5.24 (m, 1 H, -C*H*-), 4.53 (m, 2 H, -CH_2-), 4.43 (dd, 1 H, ^3J = 5.5, 8.7 Hz, -C*H*-), 4.15 (dd, 1 H, ^3J =5.5, 12.2 Hz, -C*H*-), 2.63 (m, 2 H, -S-CH_2-CH_3), 2.05 (s, 6 H, 2 x -O-CO-CH_3), 2.00 (s, 6 H, -O-CO-CH_3, -NH-CO-CH_3), 1.28 (t, 3 H, ^3J = 7.4 Hz, -S-CH_2-CH_3).

^{13}C-APT-NMR (125 MHz, $CDCl_3$): 173.6 (4 x *C*=O), 86.6 (-*C*H-), 75.6 (-*C*H-), 74.7 (-*C*H-), 68.3 (-*C*H_2-), 63.1 (-*C*H-), 59.2 (-*C*H-), 25.2 (-*C*H_2-), 23.1 (-NH-CO-*C*H_3), 20.9 (2 x -*C*H_3), 15.2 (-*C*H_3).

UPLC-MS [m/z]: calc. for $C_{16}H_{26}NO_8S$ $[M+H]^+$: 392.1; found: 392.2

Ethyl-2-acetamido-2-deoxy-1-thio-α-D-xylo-pentodialdo-1,4-furanosid **5**



5

To 10 mL of a 0.5% sodium methoxide solution **4** (1.213 g, 3.10 mmol, 1 eq) was added and the reaction solution was stirred for two hours at room temperature. The solution was then adjusted to pH ~ 7 with DOWEX cation exchange resin (H +, 50WX2-200). The resin was separated by filtration, washed with methanol and the filtrate was concentrated. The resulting solid was dissolved in distilled water and an aqueous sodium periodate solution (10 mL, 3.20 mmol, 1 eq, 0.32 M) was added at 0 ° C. After 20 min, the reaction was terminated by adding an aqueous barium chloride solution (10 mL, 1.60 mmol, 1.6 eq, 0.16 M) and the barium periodate formed was separated off by filtration. The solution was concentrated under reduced pressure, the crystalline residue was dissolved in 2.5 ml of methanol and the solution was stored at -20 ° C overnight. The yellowish oily residue was then purified by column chromatography (dichloromethane / methanol 85:15). The desired product **5** was obtained as a crystalline residue (0.548 g, 2.35 mmol, 76 %, R_f = 0.7 in CH_2Cl_2/MeOH 85:15).

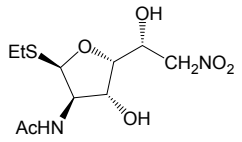
^{1}H-NMR (300 MHz, D_2O): δ [ppm] = 5.70 (d, 1 H, ^3J = 5.8 Hz, -C*H*-SEt), 5.14 (d, 1 H, ^3J = 6.6 Hz, 5-C*H*), 4.48 (dd, 1 H, ^3J = 3.3, 5.8, -C*H*-), 4.32 (t, 1 H, ^3J = 4.1 Hz, -C*H*-), 4.02 (dd, 1 H, ^3J = 4.8, 6.5 Hz, -C*H*-), 2.69 (m, 2 H, -S-CH_2-CH_3), 2.02 (s, 3 H, -NH-CO-CH_3), 1.24 (t, 3 H, ^3J = 7.4 Hz, , -S-CH_2-CH_3).

^{13}C-APT-NMR (75 MHz, D_2O): δ [ppm] = 174.2 (*C*=O), 88.0 (-*C*H-), 86.2 (-*C*H-), 80.7 (-*C*H-), 74.2 (-*C*H-), 60.0 (-*C*H-), 24.8 (-*C*H_2-), 21.5 (-NH-CO-*C*H_3), 14.2 (-*C*H_3).

ESI-MS [m/z]: calc. for $C_9H_{15}NO_4S$ $[M+H]^+$: 234.1;found: 234.1

$C_{10}H_{19}NO_5S$ $[M+CH_3OH+H]^+$: 266.1; found: 266.2

2-Acetamido-6-nitro-2,6-dideoxy-1-thio-α-D-glucofuranosid **6**



6

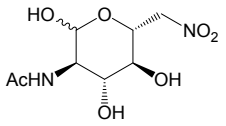
The aldehyde **5** (548 mg, 2.4 mmol, 1 eq) was dissolved in 95% ethanol and nitromethane (0.129 mL, 2.4 mmol, 1 eq) was added. The reaction mixture was cooled to 0 ° C and 0.278 mL of a 20% sodium methoxide solution was slowly added dropwise. The reaction solution was stirred for half an hour at the same temperature and then stored at 4 ° C. for 15 hours. The resulting yellowish solution was adjusted to pH ~ 7 with DOWEX cation exchange resin (H+, 50WX2-200), the resin was separated off by filtration and washed with ethanol. The filtrate was concentrated and purified by column chromatography on silica gel (C18 reversed phase, water / methanol 7: 3). The target compound **6** was obtained as a colorless oil (310 mg, 1.05 mmol, 44 %, R_f = 0.3 in CH_2Cl_2/MeOH 95:5). For larger scale the filtrate was dissolved in ethanol and stored at -20 °C over night. The resulting crystals were washed with cold ethanol, the filtrate was concentrated and the crystallisation repeated for several times. An oily product was obtained on evaporation of the combined mother liquors. Thin layer chromatography showed that it consisted mainly of the desired product.

^{1}H-NMR (500 MHz, $CDCl_3$): δ [ppm] = 5.61 (d, 1 H, ^3J = 5.8 Hz, -C*H*-SEt), 4.57 (m, 1 H, -C*H*-), 4.41 (dd, 1 H, ^3J = 3.3, 5.8 Hz, -C*H*-), 4.23 (dd, 1 H, ^3J = 3.4, 4.7 Hz, -C*H*-), 4.04 (dd, 1 H, ^3J = 4.8, 7.6 Hz, -C*H*-), 2.61 (m, 2 H, -S-CH_2-CH_3), 1.94 (s, 3 H, -NH-CO-CH_3), 1.24 (t, 3 H, ^3J = 7.4 Hz, -S-CH_2-CH_3).

^{13}C-APT-NMR (125 MHz, $CDCl_3$): δ [ppm] = 173.6 (*C*=O), 87.8 (-*C*H-), 80.7 (-*C*H-), 75.9 (-*C*H-), 67.9 (-*C*H-), 62.1 (-*C*H-), 25.8 (-*C*H_2), 22.3 (-NH-CO-*C*H_3), 15.5 (-*C*H_3).

ESI-MS [m/z]: calc. for $C_{10}H_{19}N_2O_6S$ $[M+H]^+$: 295.1; found: 295.1

2-Acetamido-6-nitro-2,6-dideoxy-D-glucopyranose **7**



7

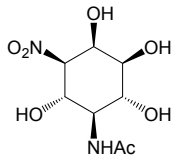
The nitro compound **6** (0.126 g, 0.428 mmol, 1 eq.) was dissolved in 10 mL water, the solution was heated to 60 °C and an aqueous solution of mercury (II) chloride (175 mg, 0.65 mmol, 1.5 eq.) was added. The resulting suspension was stirred for 10 minutes at the same temperature and then stored overnight at room temperature. The resulting ethyl mercapto mercury chloride was filtered off, silver acetate (350 mg, 2.1 mmol, 4.9 eq.) was added to the clear solution and the suspension formed was stirred for three hours at room temperature. Precipitated silver chloride was removed by centrifugation and the residue was freed from the excess silver acetate by introducing hydrogen sulfide. Silver sulfide was separated by filtration over Celite and the solvent of the filtrate was removed under reduced pressure. The slightly yellowish crystalline residue was recrystallized in dichloromethane/methanol (4:1) to give the desired product **7** (0.086 g, 0.344 mmol, 80 %, R_f = 0.2 in CH_2Cl_2/MeOH 4:1) as colorless needles in an anomeric ratio of 1:4 (α form: β form).

^{1}H-NMR (500 MHz, $CDCl_3$): δ [ppm] = 5.02 (d, 1 H, ^3J = 2.7 Hz, -C*H*-SEt), 4.53 (m, 3 H, -C*H*-, -CH_2-), 3.99 (t, 0.2 H, ^3J = 8.8 Hz, -C*H*- (α)), 3.84 (dd, 0.8 H, ^3J = 2.0, 10.0 Hz, -C*H*- (β)), 3.71 (t, 0.8 H, ^3J = 9.5 Hz, -C*H*- (β)), 3.59 (t, 0.2 H, ^3J = 9.6 Hz, -CH- (α)), 3.47 (t, 0.2 H, ^3J = 8.8 Hz, -C*H*- (α)), 3.24 (t, 0.8 H, ^3J = 8.7 Hz, -C*H*-(β)), 1.93 (s, 3 H, -NH-CO-CH_3).

^{13}C-APT-NMR (125 MHz, $CDCl_3$): δ [ppm] = 96.8 (-*C*H-(α)), 92.8 (-*C*H-(β)), 78.1 (-*C*H_2-(β)), 77.8 (-*C*H_2-(α)), 75.6 (-*C*H-(α)), 74.4 (-*C*H-(α)), 73.4 (-*C*H-(β)), 72.8 (-*C*H-(α)), 72.4 (-*C*H-(β)), 70.2 (-*C*H-(β)), 58.5 (-*C*H-(α)), 55.6 (-*C*H-(β)), 22.9 (-NH-CO-*C*H_3(α)), 22.6 (-NH-CO-*C*H_3(β)).

ESI-MS [m/z]: calc. for $C_8H_{15}N_2O_7$ $[M+H]^+$: 251.1; found: 251.2

D-3-nitro-5-acetamido-3,5-dideoxy-*myo*-inositol **8**



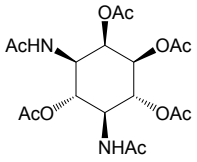
8

A solution of **7** (0.086 g, 0.344 mmol, 1 eq) in 15 mL of absolute methanol was cooled to 0-5 °C, and then 330 µL of 1 M sodium methoxide in absolute methanol was added, with stirring. The reaction mixture was kept in a refrigerator overnight, neutralized with DOWEX 50W-X2-200 (H+) and filtered. The filtrate was evaporated under reduced pressure to give a crude product, which was purified by column chromatography on silica gel (dichloromethane/methanol 4:1). The yellowish residue was then crystallized in ethanol at 40 °C to give a white solid (0.032 g, 0.127 mmol, 37%).

^{1}H-NMR (500 MHz, CD_3OD): δ [ppm] = 4.63 (dd, 1 H, ^3J = 2.8, 10.4 Hz, 2-C$H_{äq}$), 4.42 (t, 1 H, ^3J = 2.8 Hz, 3-CH_{ax}), 4.38 (t, 1 H, ^3J = 10.2 Hz, 4-CH_{ax}), 3.77 (t, 1 H, ^3J = 10.2 Hz, 6-CH_{ax}), 3.71 (t, 1 H, ^3J = 9.8 Hz, 5-CH_{ax}), 3.56 (dd, 1 H, ^3J = 2.8, 9.3 Hz, 1-CH_{ax}), 2.05 (s, 3 H, -NH-CO-CH_3).

ESI-MS [m/z]: calc. for $C_8H_{15}N_2O_7$ $[M+H]^+$: 251.1; found: 251.2

D-*myo*-Inositol-3,5-bis(acetylamino)-3,5-dideoxy-1,2,4,6-tetraacetat **9**



9

The nitroinositol **8** (0.420 g, 1.68 mmol, 1 eq) was hydrogenated in 40 mL of water containing 8 mL of 0.5 M hydrochloric acid in the presence of platinum catalyst at room temperature. The reaction mixture was stirred for two days at room temperature. The catalyst was filtered, and the filtrate was evaporated under reduced pressure to give a white crystalline residue which was allowed to stand with aceticanhydride (20 mL) and pyridine (20 mL) at room temperature. After a reaction time of 5 h, the reaction solution was heated to 100 °C for half an hour and then diluted with 10 ml of water. After removal of the solvent, the crude product was purified by column chromatography (dichloromethane / methanol 95: 5). The oily residue was then recrystallized from ethanol and the desired product **9** was obtained as a white solid (0.420 g, 0.981 mmol, 53 **%**).

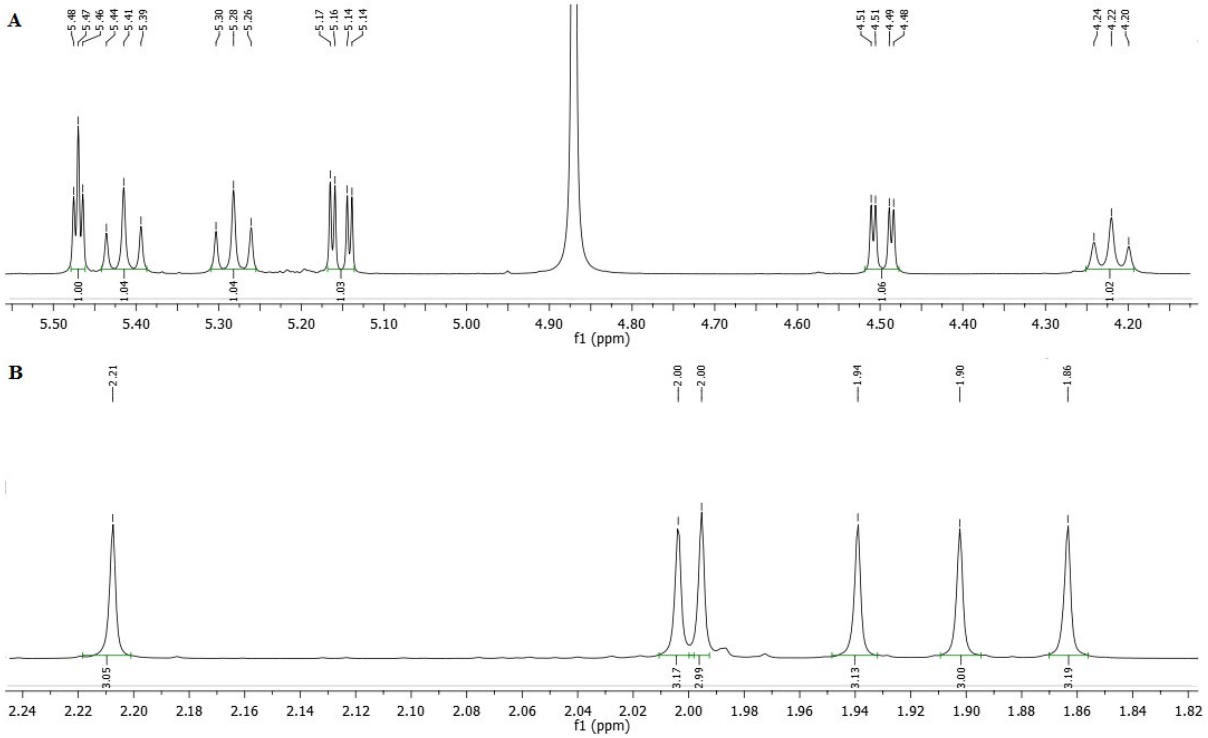


Figure S10: ^{1}H NMR spectrum of compound **9** in deuterated methanol at 500 MHz. **A** shows the signals of the methine groups in the selected area. **B** shows the signals of the acetyl groups in the range of 1.82-2.24 ppm.

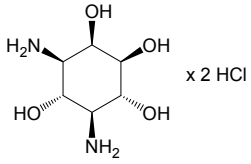
m.p.: 284-287 °C (Lit.: 285.5 – 286.5 °C)

^{1}H-NMR (500 MHz, CD_3OD): δ [ppm] = 5.47 (t, 1 H, ^3J = 2.8 Hz, 2-C$H_{äq}$), 5.41 (t, 1 H, ^3J = 10.5 Hz, 6-CH_{ax}), 5.28 (t, 1 H, ^3J = 10.6 Hz, 4-CH_{ax}), 5.15 (dd, 1 H, ^3J = 2.9, 10.3 Hz, 1-CH_{ax}), 4.50 (dd, 1 H, ^3J = 2.6, 11.0 Hz, 3-CH_{ax}), 4.22 (t, 1 H, 3 J = 10.5 Hz, 5-CH_{ax}), 2.21 (s, 3 H, -O-CO-CH_3), 2.00 (s, 3 H, -NH-CO-CH_3), 1.99 (s, 3 H, -NH-CO-CH_3), 1.94 (s, 3 H, -O-CO-CH_3), 1.90 (s, 3 H, -O-CO-CH_3), 1.86 (s, 3 H, -O-CO-CH_3).

^{13}C-APT-NMR (125 MHz, CD_3OD): δ [ppm] = 173.6 (*C*=O), 173.4 (*C*=O), 171.9 (*C*=O), 171.8 (*C*=O), 171.7 (*C*=O), 171.4 (*C*=O), 72.4 (-*C*H-O-), 71.7 (-*C*H-O-), 71.1 (-*C*H-O-), 70.8 (-*C*H-O-), 54.0 (-*C*H-NH-), 50.8 (-*C*H-NH-), 22.7 (-O-CO-*C*H_3), 22.3 (2 x -NH-CO-*C*H_3), 20.7 (-O-CO-*C*H_3), 20.5 (-O-CO-*C*H_3), 20.4 (-O-CO-*C*H_3).

ESI-MS [m/z]: calc. for $C_{18}H_{25}N_2O_{10}$ $[M+H]^+$: 431.2; found: 431.2

D-3,5-Diamino-3,5-dideoxy-*myo*-inositol-Dihydrochlorid **10**



10

D-*myo*-Inositol-3,5-bis(acetylamino)-3,5-dideoxy-1,2,4,6-tetraacetate **9** (0.230 g, 0.535 mmol, 1 eq.) was dissolved in 5 mL 6 M hydrochloric acid and the solution was stirred under reflux at 150 °C for 4 h. The solvent was then removed under reduced pressure. The desired product **10** was obtained as a colorless hygroscopic solid (0.130 g, 0.52 mmol, 97%) after lyophilisation.

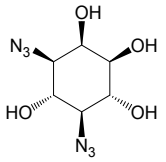
m.p.: n.d. (hygrocopic).

^{1}H-NMR (500 MHz, CD_3OD): δ [ppm] = 4.12 (t, 1 H, ^3J = 2.7, 2-C*H*), 3.93 (t, 1 H, ^3J = 10.4 Hz, 6-C*H*), 3.77 (t, 1 H, ^3J = 10.3 Hz, 4-C*H*), 3.50 (dd, 1 H, ^3J = 2.7, 9.4 Hz, 1-C*H*), 3.27 (dd, 1 H, ^3J = 2.7, 10.3 Hz, 3-C*H*), 2.95 (t, 1 H , ^3J = 10.5 Hz, 5-C*H*).

^{13}C-APT-NMR (125 MHz, CD_3OD): δ [ppm] = 74.1 (2-*C*H), 70.2 (6-*C*H), 69.9 (4-*C*H), 67.7 (1-*C*H), 58.9 (3-*C*H), 56.3 (5-*C*H).

ESI-MS [m/z]: calc. for $C_8H_{15}N_2O_7$ $[M+H]^+$: 179.1; found: 179.2

D-3,5-Diazido-3,5-dideoxy-*myo*-inositol **11**



11

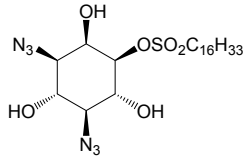
D-3,5-diamino-3,5-dideoxy-*myo*-inositol dihydrochloride **10** (0.065 g, 0.26 mmol, 1 eq) was dissolved in 5 mL of a methanol / water mixture (2: 1) and potassium carbonate (0.137 g, 0.988 mmol, 3.8 eq) was added with stirring at room temperature. After 10 minutes, copper sulfate was added in catalytic amounts and after a further 10 minutes N_3SO_2Im*HCl (0.162 g, 0.78 mmol, 3 eq) was added slowly. The reaction solution was stirred at room temperature for three hours, and then the solvent was removed under reduced pressure. The residue was purified by column chromatography (dichloromethane / methanol 85:15) and the desired product **11** (0.045 g, 0.195 mmol, 75%, R_f = 0.6 in CH_2Cl_2 / MeOH 85:15) was obtained as a colorless oil.

^{1}H-NMR (500 MHz, CD_3OD): δ [ppm] = 3.97 (t, 1 H, ^3J = 2.6 Hz, 2-C*H*), 3.75 (t, 1 H, ^3J = 10.0 Hz, 6-C*H*), 3.77 (t, 1 H, ^3J = 9.8 Hz, 4-C*H*), 3.38 (dd, 1 H, ^3J = 2.8, 9.7 Hz, 1-C*H*), 3.25 (dd, 1 H, ^3J = 2.5, 10.3 Hz, 3-C*H*), 3.13 (t, 1 H , ^3J = 9.8 Hz, 5-C*H*).

^{13}C-APT-NMR (125 MHz, CD_3OD): δ [ppm] = 73.9 (2-*C*H), 72.8 (6-*C*H), 72.5 (4-*C*H), 71.9 (1-*C*H), 70.8 (3-*C*H), 65.8 (5-*C*H).

ESI-MS [m/z]: calc. for $C_8H_{10}N_6O_4Na$ $[M+Na]^+$: 253.1; found: 253.3

D-1-*O*-Hexadecylsulfonyl-3,5-diazido-3,5-dideoxy-*myo*-inositol **12a**



12a

D-3,5-diazido-3,5-dideoxy-*myo*-inositol (0.035 g, 0.152 mmol, 1 eq) was dissolved in 2 mL anhydrous THF and DMAP (0.020 g, 0.152 mmol, 1 eq) was added. With ice cooling, hexadecylsulfonyl chloride (0.060 g, 0.183 mmol, 1.2 eq) was slowly added and the reaction was stirred for 1.5 h at room temperature. Then an additional 0.5 equiv. Hexadecylsulfonyl chloride was added while cooling with ice and the reaction was stirred for a further hour at room temperature. The resulting suspension was diluted with methanol and the solvent was removed under reduced pressure. The residue was purified by column chromatography (cyclohexane / ethyl acetate 7: 3 → 3: 2) and the desired product **12a** was obtained as a white solid (0.036 g, 0.069 mmol, 45%, R_f = 0.6 in CH / EA 3: 2).

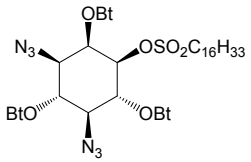
m.p.: 134-137 °C

^{1}H-NMR (500 MHz, CD_3OD): δ [ppm] = 4.45 (dd, 1 H, ^3J = 2.7, 9.9 Hz, 1-C*H*), 4.24 (t, 1 H, ^3J = 2.5 Hz, 2-C*H*), 3.79 (td, 2 H, ^3J = 1.6, 9.8 Hz, 6-C*H*, 4-C*H*), 3.29 (m, 2 H, 3-C*H*, 5-C*H*), 1.89 (m, 2 H, -CH_2-), 1.47 (m, 2 H, -CH_2-), 1.34 (bs, 24 H, -CH_2-), 1.47 (t, 3 H, ^3J = 9.6 Hz -CH_3).

^{13}C-APT-NMR (125 MHz, CD_3OD): δ [ppm] = 83.2 (1-*C*H), 71.7 (2-*C*H), 71.3 (*C*H), 70.5 (*C*H), 70.4 (*C*H), 64.8 (*C*H), 51.8 (-*C*H_2-), 33.1-23.7 (-*C*H_2-), 14.4 (-*C*H_3).

ESI-MS [m/z]: calc. for $C_{22}H_{42}N_6O_6SNa$ $[M+Na]^+$: 541.3; found: 541.1

D-1-*O*-Hexadecylsulfonyl-2,4,6-tri-*O*-butyryl-3,5-diazido-3,5-dideoxy-*myo*-inositol **12b**



12b

D-1-*O*-Hexadecylsulfonyl-3,5-diazido-3,5-dideoxy-*myo*-inositol **12a** (0.012 g, 0.023 mmol, 1 eq) was dissolved in 1 mL pyridine. 1 mL of butyric anhydride were then slowly added dropwise with ice cooling and the reaction solution was stirred for two days at room temperature. The solvent was then removed by coevaporation with toluene under reduced pressure and the crude product was purified by column chromatography on silica gel (cyclohexane / ethyl acetate 8: 2). The desired product **12b** (0.011 g, 0.015 mmol, 66%, R_f = 0.9 in CH / EA 3: 2) was obtained as a colorless oil.

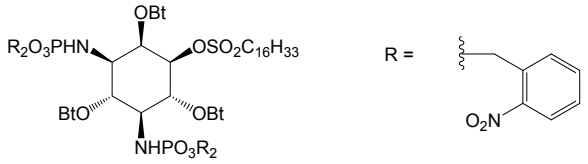
^{1}H-NMR (400 MHz, $CDCl_3$): δ [ppm] = 5.73 (t, 1 H, ^3J = 2.8 Hz, 2-C*H*), 5.33 (m, 2 H, 4-C*H*, 6-C*H*), 4.75 (dd, 1 H, ^3J = 2.9, 10.2 Hz, 1-C*H*), 3.57 (m, 2 H, 3-C*H*, 5-C*H*), 3.08 (t, 2 H, ^3J = 8.0 Hz, -OSO_2-CH_2-) 2.42 (m, 6 H, -CH_2-), 1.70 (m, 2 H, -CH_2-), 1.38 (m, 2 H, -CH_2-), 1.25 (brs, 25 H, -CH_2-), 0.99 (m, 9 H, -CH_3-), 0.88 (t, 3 H, ^3J = 6.9 Hz -CH_3).

^{13}C-APT-NMR (125 MHz, $CDCl_3$): δ [ppm] = 172.1-171.9 (*C*=O), 71.2 (2-*C*H), 69.9 (*C*H), 68.7(*C*H), 68.5 (*C*H), 63.2 (*C*H), 60.0 (*C*H), 52.0 (-*C*H_2-), 35.9-22.7 (-*C*H_2-), 18.4-17.9 (-*C*H_2-), 14.1-13.5 (-*C*H_3).

ESI-MS [m/z]: calc. for $C_{68}H_{120}N_{12}O_{18}S_2Na$ $[2M+Na]^+$: 1479.8; found: 1479.3

$C_{34}H_{64}N_7O_9S$ $[M+NH_3+H]^+$: 746.4; found: 746.2

D-1-*O*-Hexadecylsulfonyl-2,4,6-tri-*O*-butyryl-3,5- di(bis(2-Nitrobenzyl))phosphoamidato-*myo*-inositol **2**



2

Under an argon atmosphere, D-1-*O*-hexadecylsulfonyl-2,4,6-tri-*O*-butyryl-3,5-diazido-3,5-dideoxy-*myo*-inositol **12b** (0.011 g, 0.015 mmol, 1 eq) was dissolved in 1 mL anhydrous dichloromethane and tris (2-nitrobenzyl) phosphite (0.037 g, 0.076 mmol, 5 eq) added. The reaction solution was stirred for 24 hours at room temperature with the exclusion of light. Then 1 mL of a water / acetonitrile mixture (1: 1) was added and the solution was stirred for a further 24 h. The solution was then extracted three times with 5 mL dichloromethane each time and the combined organic extracts were dried over sodium sulfate. The solvent was removed under reduced pressure and the crude product was purified by column chromatography on silica gel (cyclohexane / ethyl acetate 1:1) with the exclusion of light. The desired compound **2** was obtained as a colorless solid (0.017 g, 0.012 mmol, 82%).

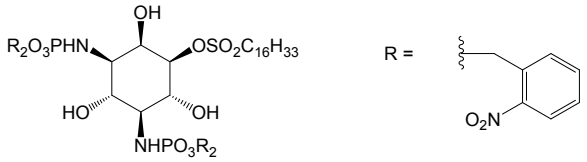
^{1}H-NMR (500 MHz, $CDCl_3$): δ [ppm] = 8.09 (m, 4 H, CH_{Ar}), 7.69 (m, 8 H, CH_{Ar}), 7.49 (m, 4 H, CH_{Ar}), 5.71 (t, 1 H, ^{3}J = 2.8 Hz, 2-C*H*), 5.42 (m, 8 H, -CH_2-), 5.27 (m, 1 H, 6-C*H*), 5.11 (t, 1 H, ^{3}J = 10.5 Hz, 4-C*H*), 4.84 (dd, 1 H, ^{3}J = 3.0, 10.2 Hz, 1-C*H*), 3.58 (m, 2 H, 3-C*H*, 5-C*H*), 3.32 (t, 1 H, ^{3}J = 10.9 Hz), 3.11 (t, 1 H, ^{3}J = 10.3 Hz), 3.02 (t, 2 H, ^{3}J = 7.9 Hz, -OSO_2-CH_2-), 2.95 (s, 1 H, -N*H*-), 2.88 (s, 1 H, -N*H*-) 2.45 (t, 2 H, ^{3}J = 7.5 Hz, -CH_2-), 2.29 (m, 4 H, -CH_2-) 1.77-1.34 (m, 14 H, -CH_2-), 1.25 (brs, 25 H, -CH_2-), 0.97 (t, 3 H, ^{3}J = 7.4 Hz -CH_3), 0.87 (t, 3 H, ^{3}J = 6.8 Hz -CH_3), 0.79 (t, 3 H, ^{3}J = 7.4 Hz -CH_3), 0.69 (t, 3 H, ^{3}J = 7.4 Hz -CH_3).

^{13}C-NMR (125 MHz, $CDCl_3$): δ [ppm] = 174.6-173.8 (C_q), 146.9 (C_q), 146.8 (C_q), 134.2-125.0 (*C*H_{Ar}), 75.0 (*C*H), 71.0 (*C*H), 65.6 (-*C*H-), 65.5 (-*C*H-), 53.0(-*C*H-), 52.2(-*C*H-), 35.9-22.7 (-*C*H_2-), 14.1-13.4 (-*C*H_3).

^{31}P-NMR (202 MHz, CDCl3): δ [ppm] = 7.50 (1 P, -NH-*P*(O)-$(OR)_2$), 6.09 (1 P, -NH-*P*(O)-$(OR)_2$).

ESI-MS [m/z]: calc. for $C_{62}H_{87}N_6O_{23}P_2S_2Na$ $[M+H]^+$: 1377.5; found: 1377.3

D-1-*O*-Hexadecylsulfonyl-3,5- di(bis(2-Nitrobenzyl))phosphoamidato-*myo*-inositol **1**



1

Under an argon atmosphere, D-1-*O*-hexadecylsulfonyl-butyryl-3,5-diazido-3,5-dideoxy-*myo*-inositol **12a** (0.023 g, 0.045 mmol, 1 eq) was dissolved in 1 mL anhydrous dichloromethane and tris (2-nitrobenzyl) phosphite (0.109 g, 0.223 mmol, 5 eq) added. The reaction solution was stirred for 24 hours at 45 °C under reflux with the exclusion of light. Then 1 mL of a water / acetonitrile mixture (1: 1) was added and the solution was stirred for a further 24 h at 45 °C. The solution was then extracted three times with 5 mL dichloromethane each time and the combined organic extracts were dried over sodium sulfate. The solvent was removed under reduced pressure and the crude product was purified by column chromatography on silica gel (dichloromethane / methanol 100:0 → 9:1) with the exclusion of light. The desired compound **1** was obtained as a colorless solid (0.010 g, 0.0109 mmol, 20 %).

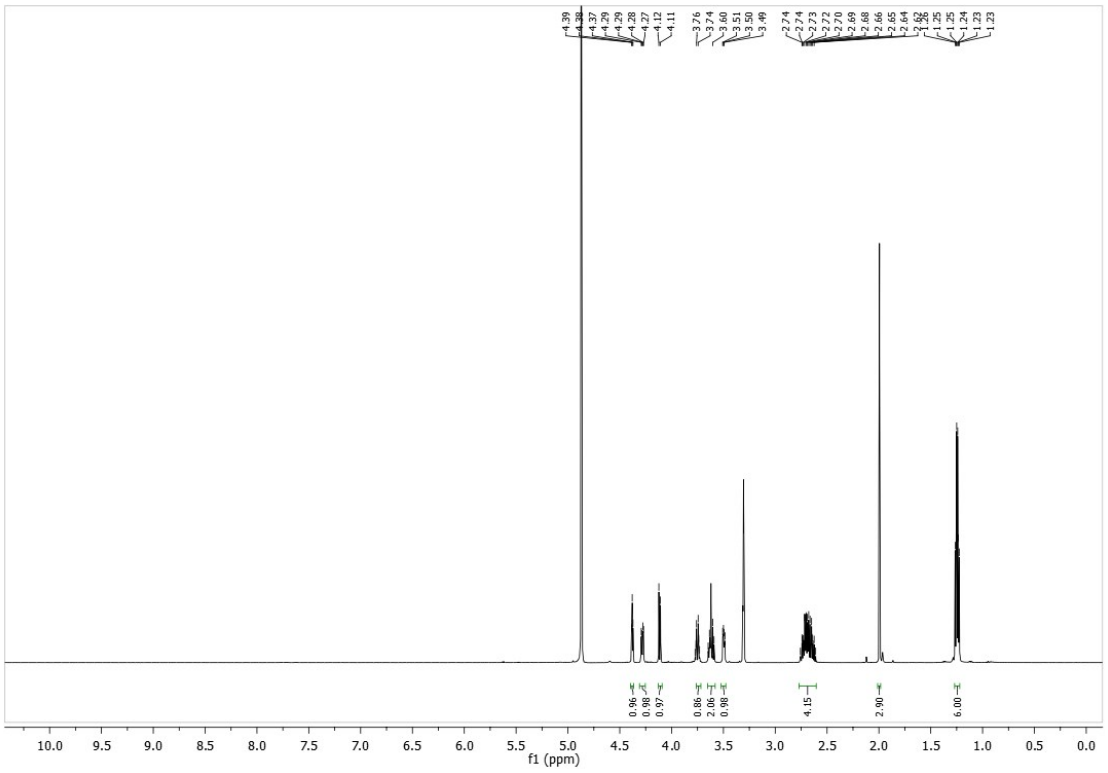
^{1}H-NMR (500 MHz, CD_2Cl_2): δ [ppm] = 8.07 (m, 4 H, CH_{Ar}), 7.72 (m, 8 H, CH_{Ar}), 7.48 (m, 4 H, CH_{Ar}), 5.52 (m, 8 H, -CH_2-), 4.36 (dd, 1 H, ^{3}J = 1.8, 9.5 Hz, 1-C*H*), 4.19 (brs, 1 H), 3.79 (m, 1 H, ^{3}J = 9.8 Hz), 3.51 (t, 1 H, ^{3}J = 10.0 Hz), 3.26 (m, 2 H, -OSO_2-C*H*2-), 3.11 (m, 1 H, 3-C*H*), 2.95 (m, 1 H) , 2.30 (m, 2 H, -CH_2-), 1.85 (m, 3 H, -CH_2-) 1.59 (m, 8 H, -CH_2-), 1.25 (brs, 81 H, -CH_2-), 0.85 (m, 15 H, -CH_3).

^{31}P-NMR (202 MHz, CD_2Cl_2): δ [ppm] = 9.89 (1 P, -NH-*P*(O)-$(OR)_2$), 8.68 (1 P, -NH-*P*(O)-$(OR)_2$).

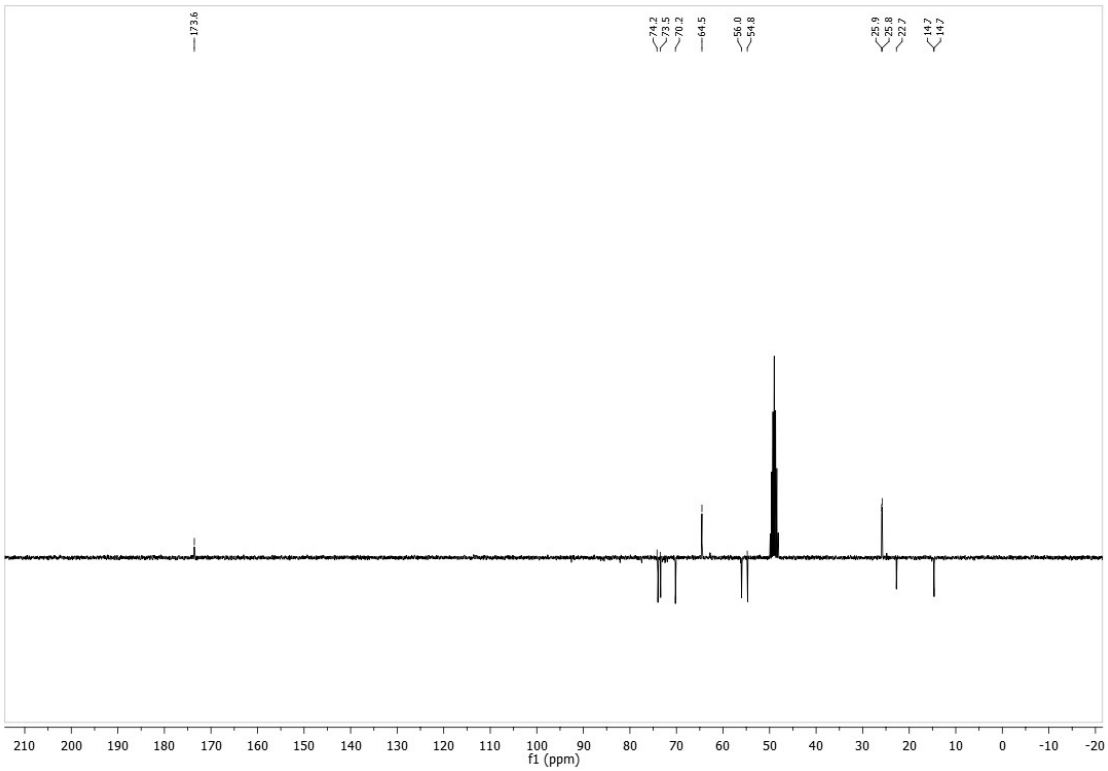
ESI-MS [m/z]: calc. for $C_{50}H_{69}N_6O_{20}P_2S$ $[M+H]^+$: 1167.4; found: 1167.1

6. Spectra

2-Acetamido-2-deoxy-D-glucose-diethyl-dithioacetal **3**

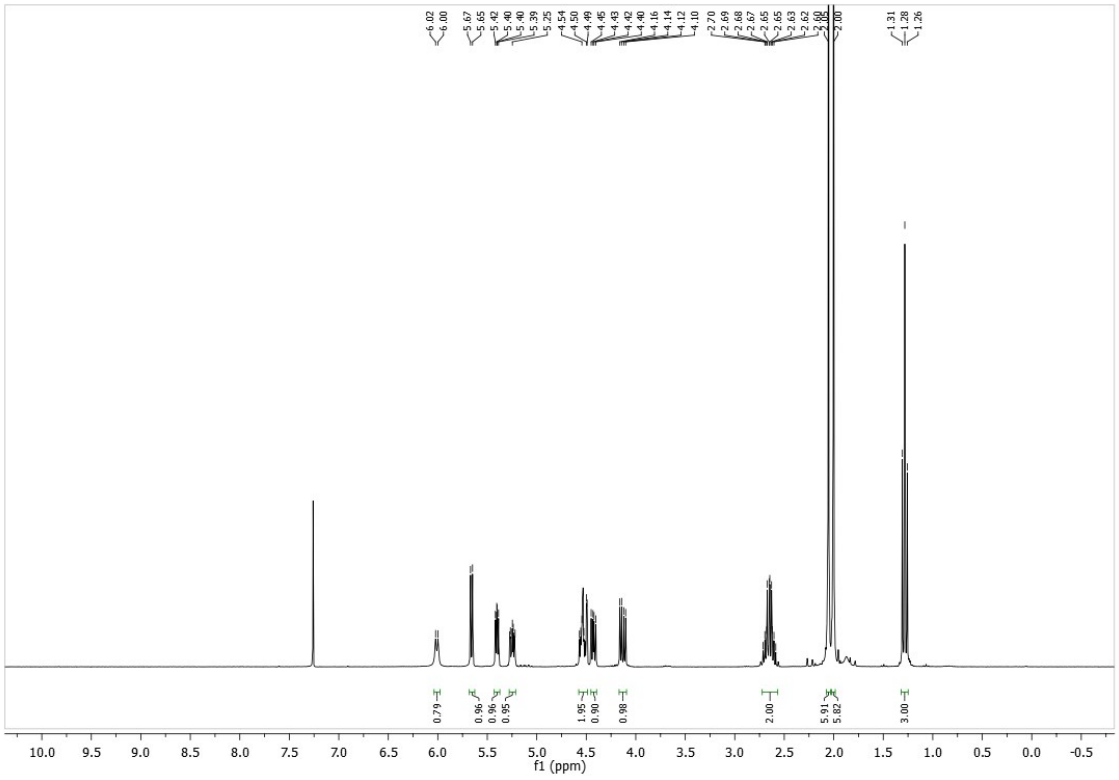


^{1}H-NMR (CD_3OD, 500 MHz)

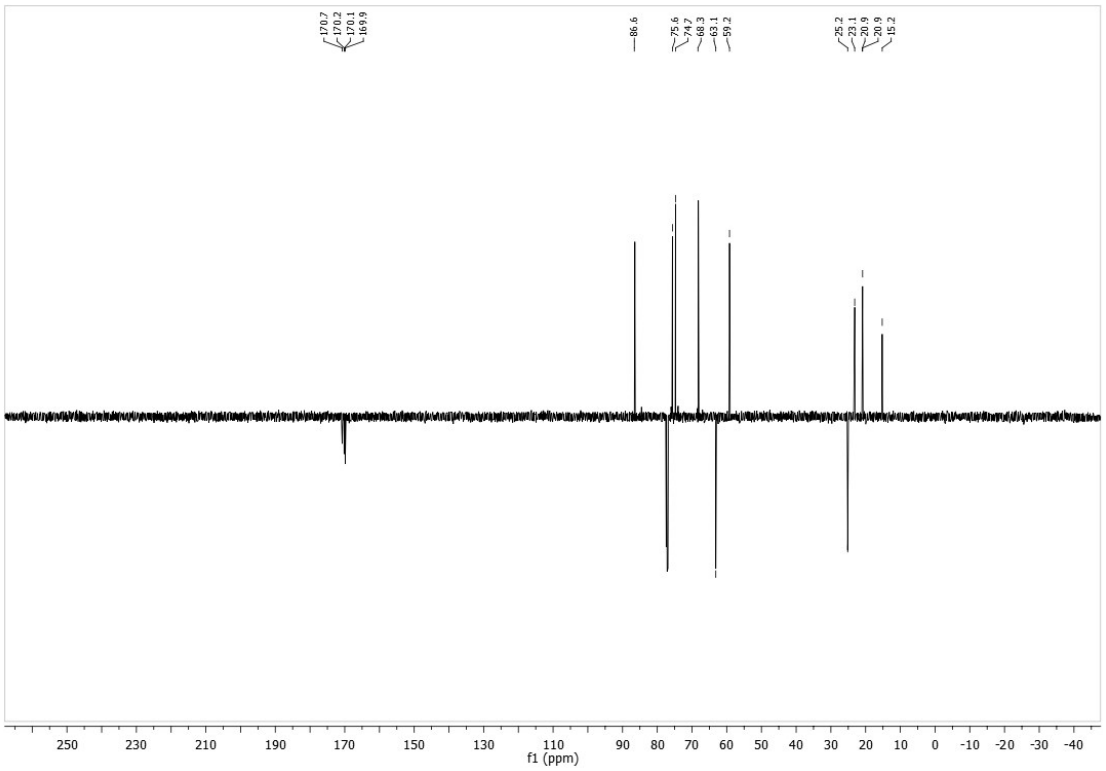


^{13}C-APT-NMR (CD_3OD, 125 MHz)

2-Acetamido-3,5,6-tri-*O*-acetyl-2-deoxy-1-thio-α-D-glucofuranosid **4**

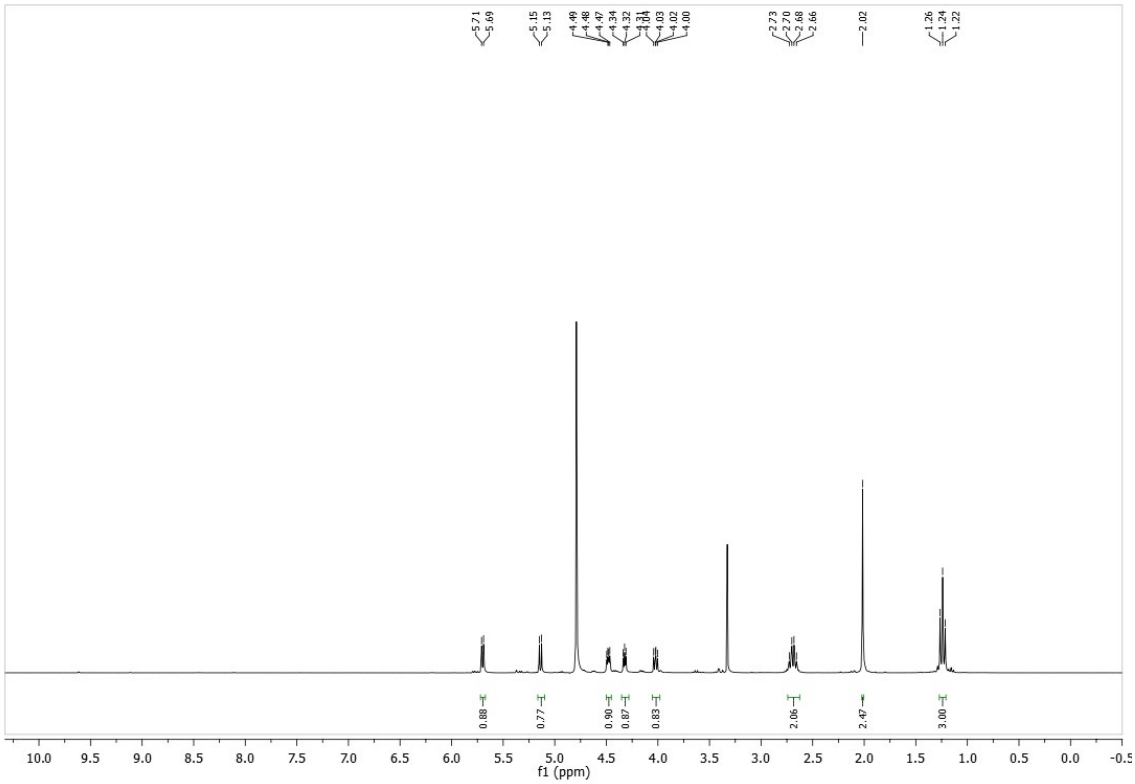


^{1}H-NMR ($CDCl_3$, 500 MHz)

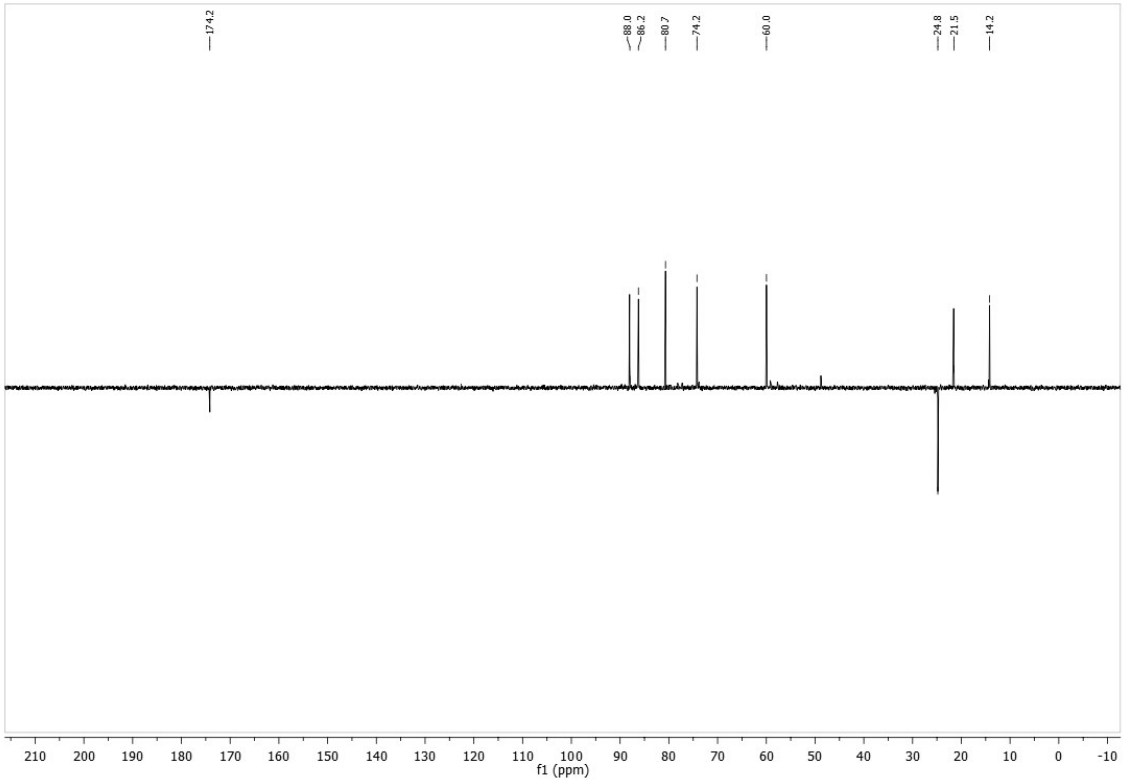


^{13}C-APT-NMR ($CDCl_3$, 125 MHz)

Ethyl-2-acetamido-2-deoxy-1-thio-α-D-xylo-pentodialdo-1,4-furanosid **5**

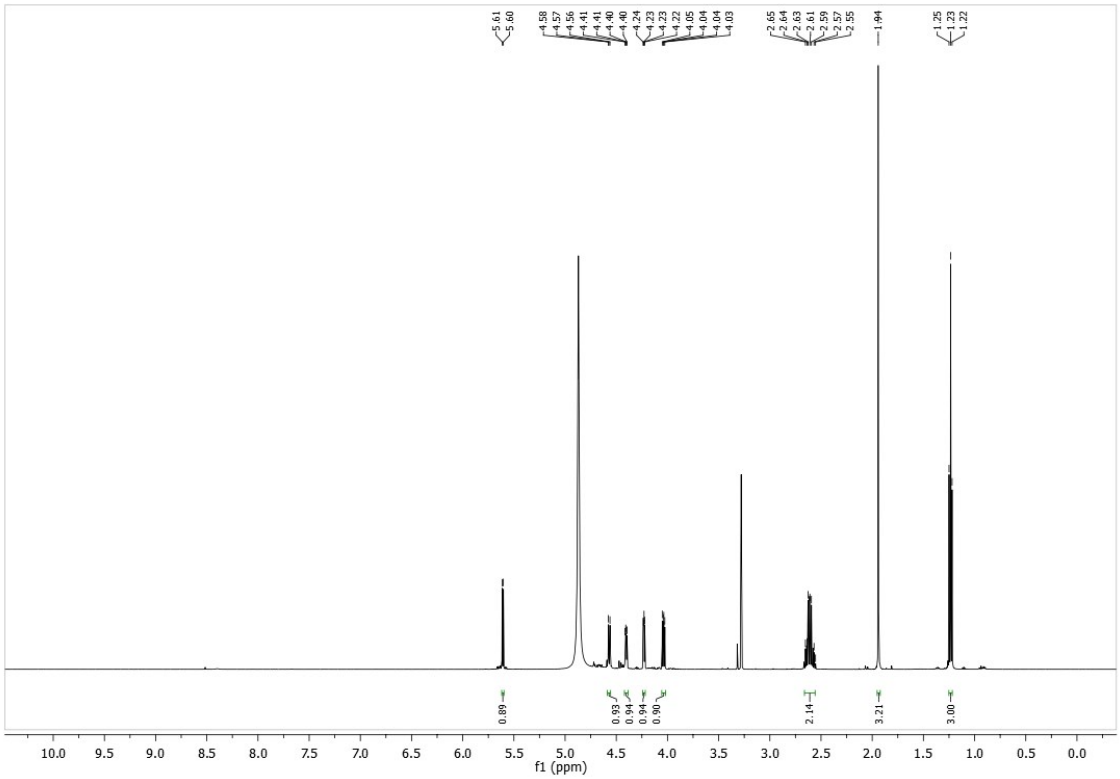


^{1}H-NMR (D_2O, 300 MHz)

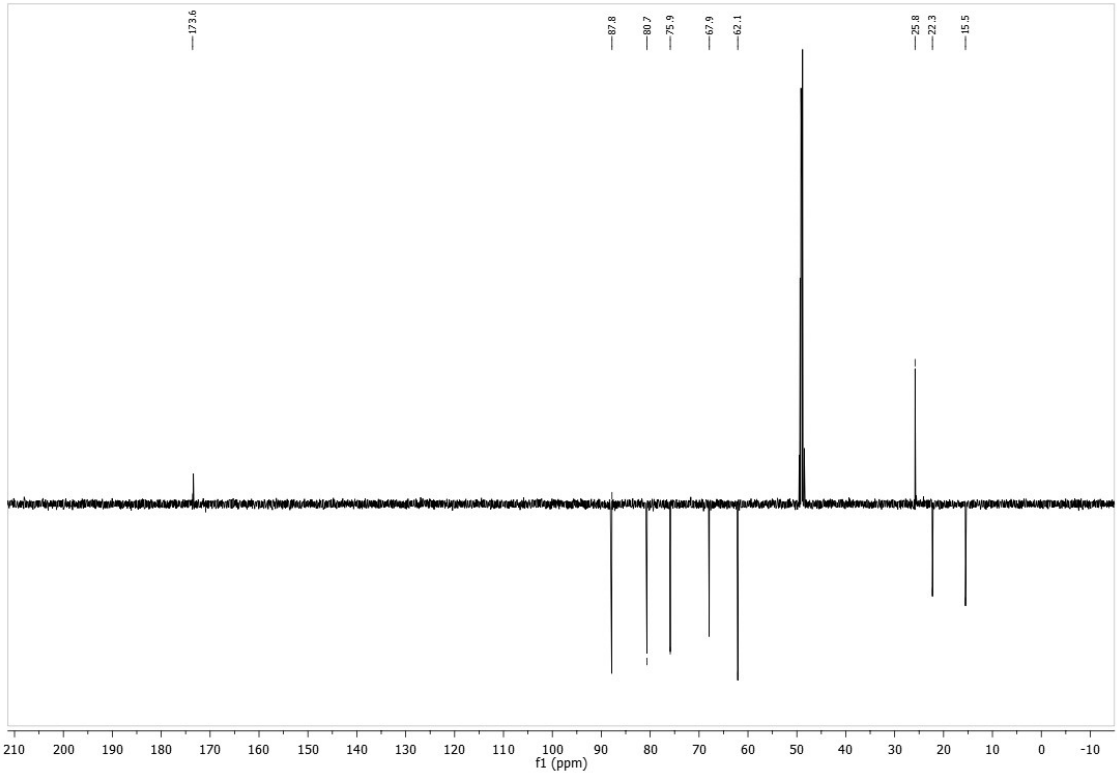


^{13}C-APT-NMR (D_2O, 75 MHz)

2-Acetamido-6-nitro-2,6-dideoxy-1-thio-α-D-glucofuranosid **6**

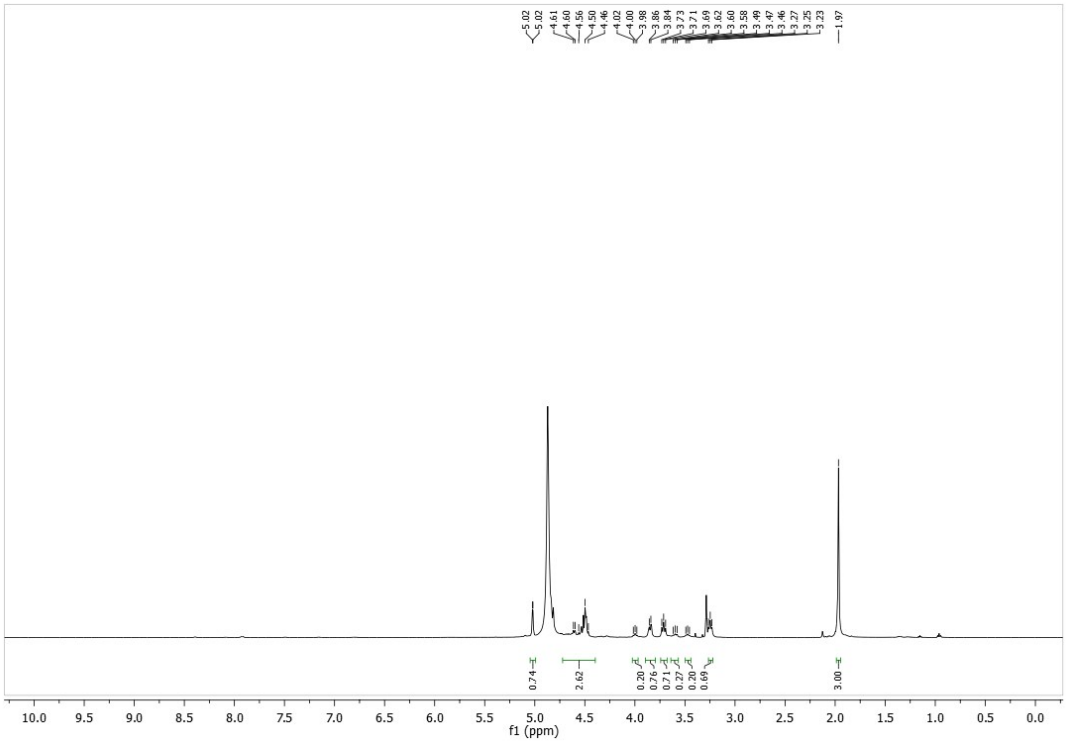


^{1}H-NMR (CD_3OD, 500 MHz)

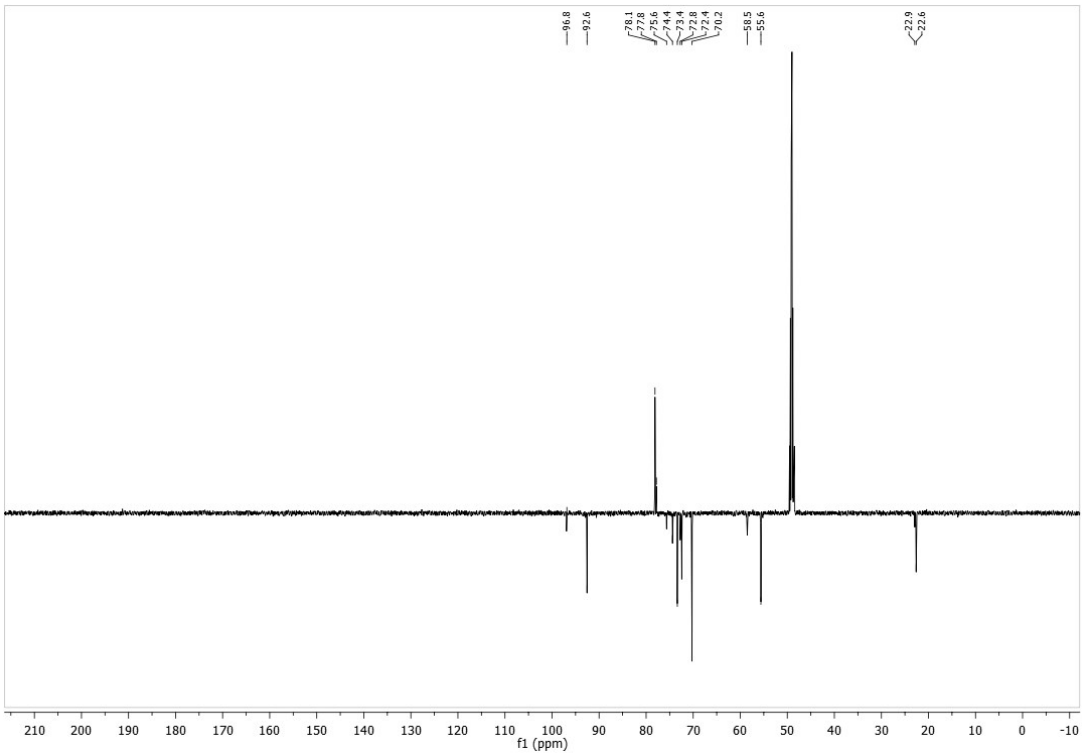


^{13}C-APT-NMR (CD_3OD, 125 MHz)

2-Acetamido-6-nitro-2,6-dideoxy-D-glucopyranose **7**

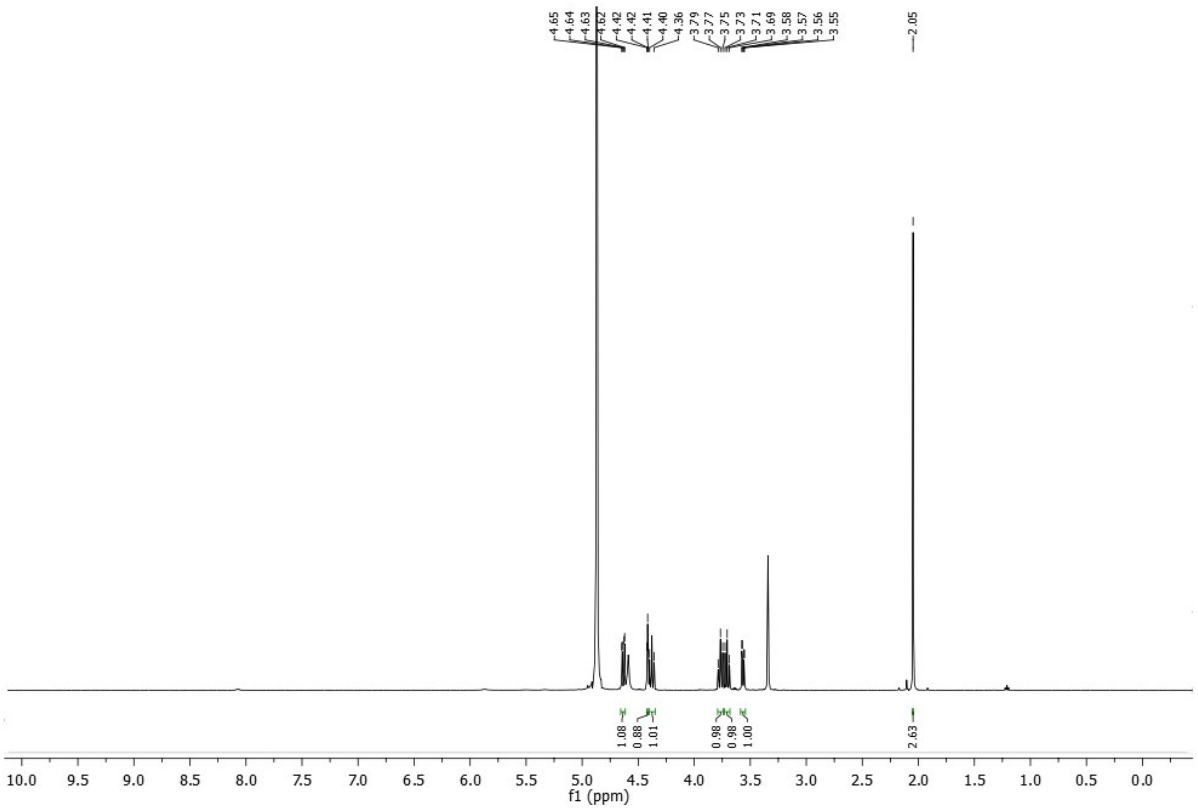


^{1}H-NMR (CD_3OD, 500 MHz)



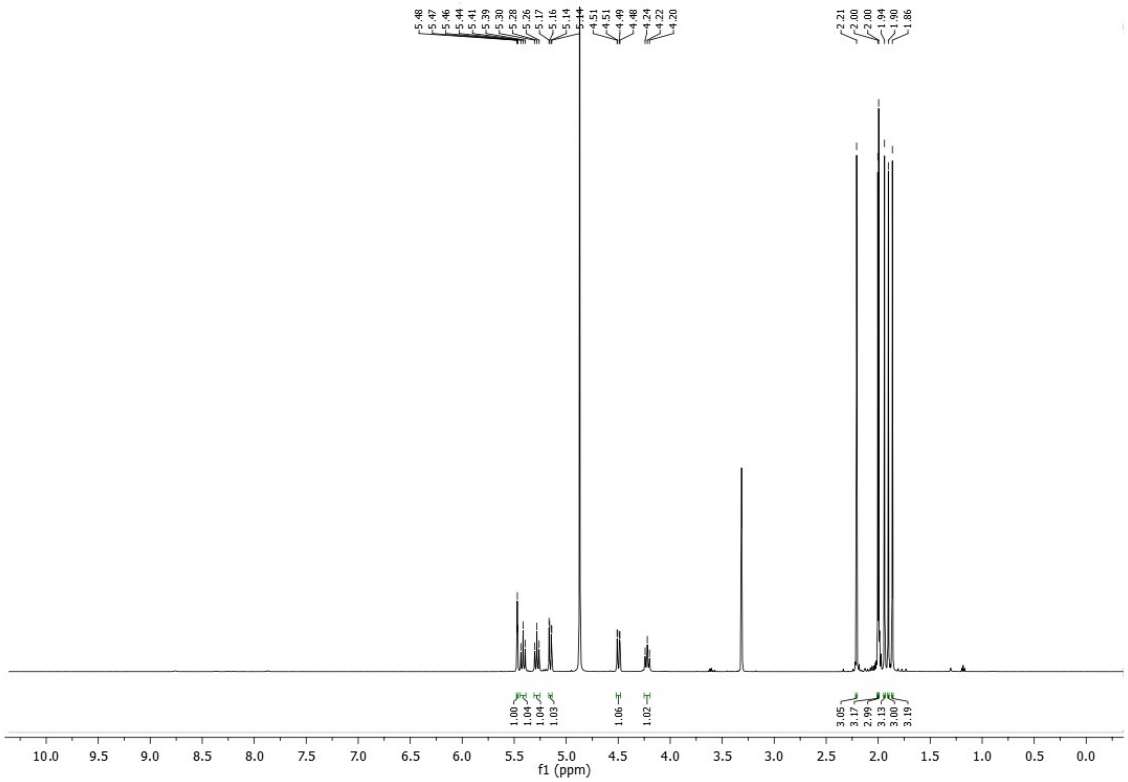
^{13}C-APT-NMR (CD_3OD, 125 MHz)

D-3-nitro-5-acetamido-3,5-dideoxy-*myo*-inositol **8**

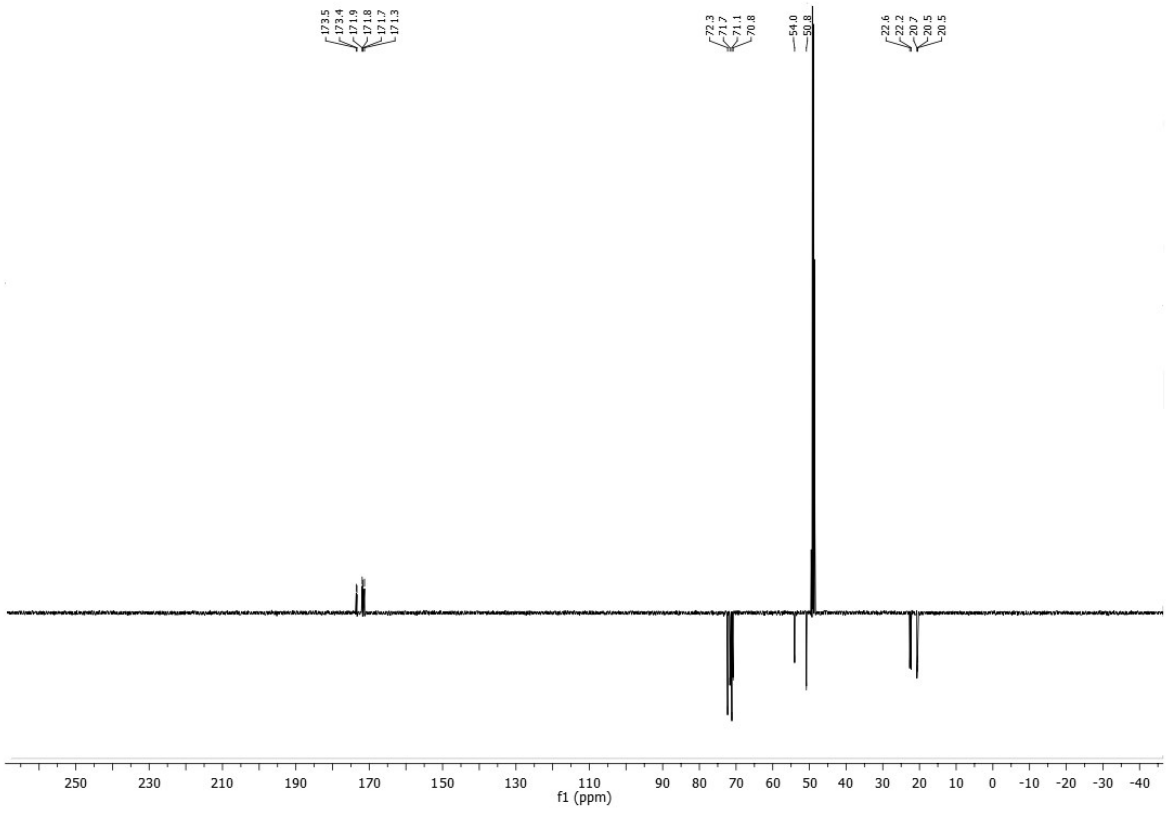


^{1}H-NMR (CD_3OD, 500 MHz)

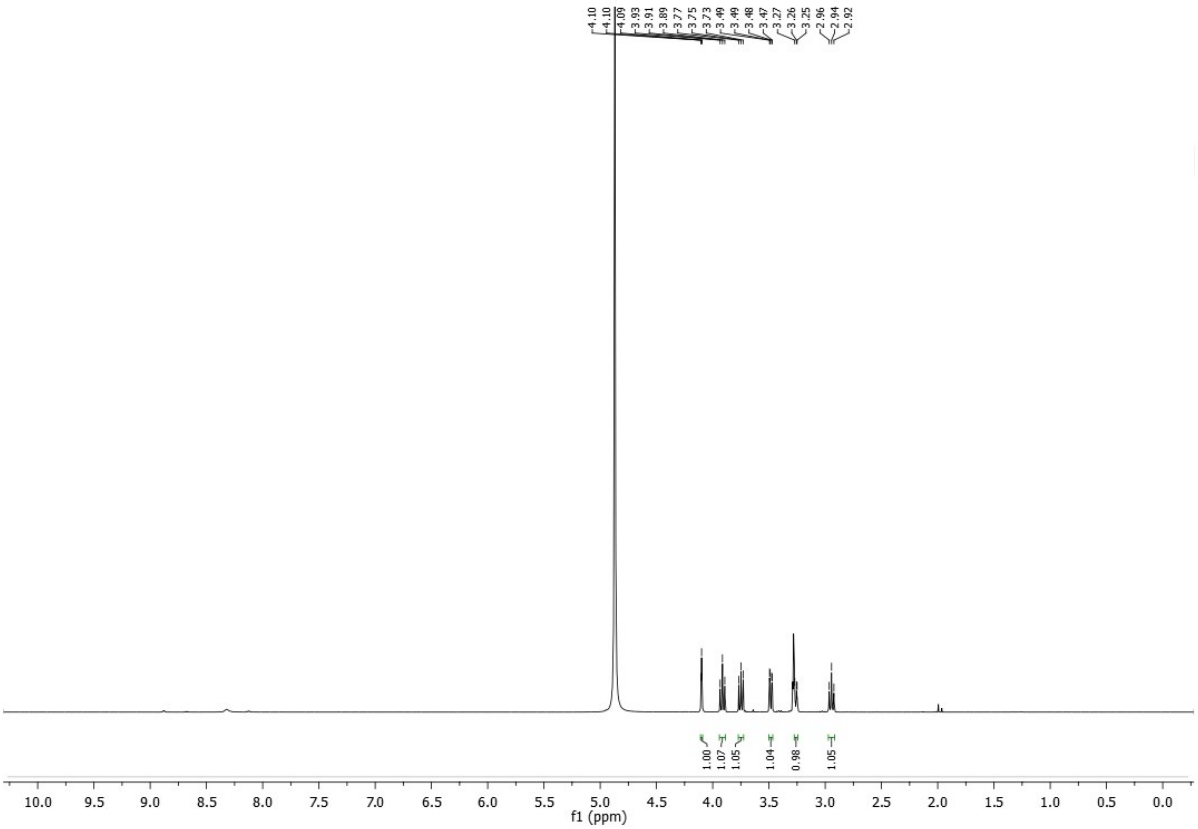
D-myo-Inositol-3,5-bis(acetylamino)-3,5-dideoxy-1,2,4,6-tetraacetat **9**



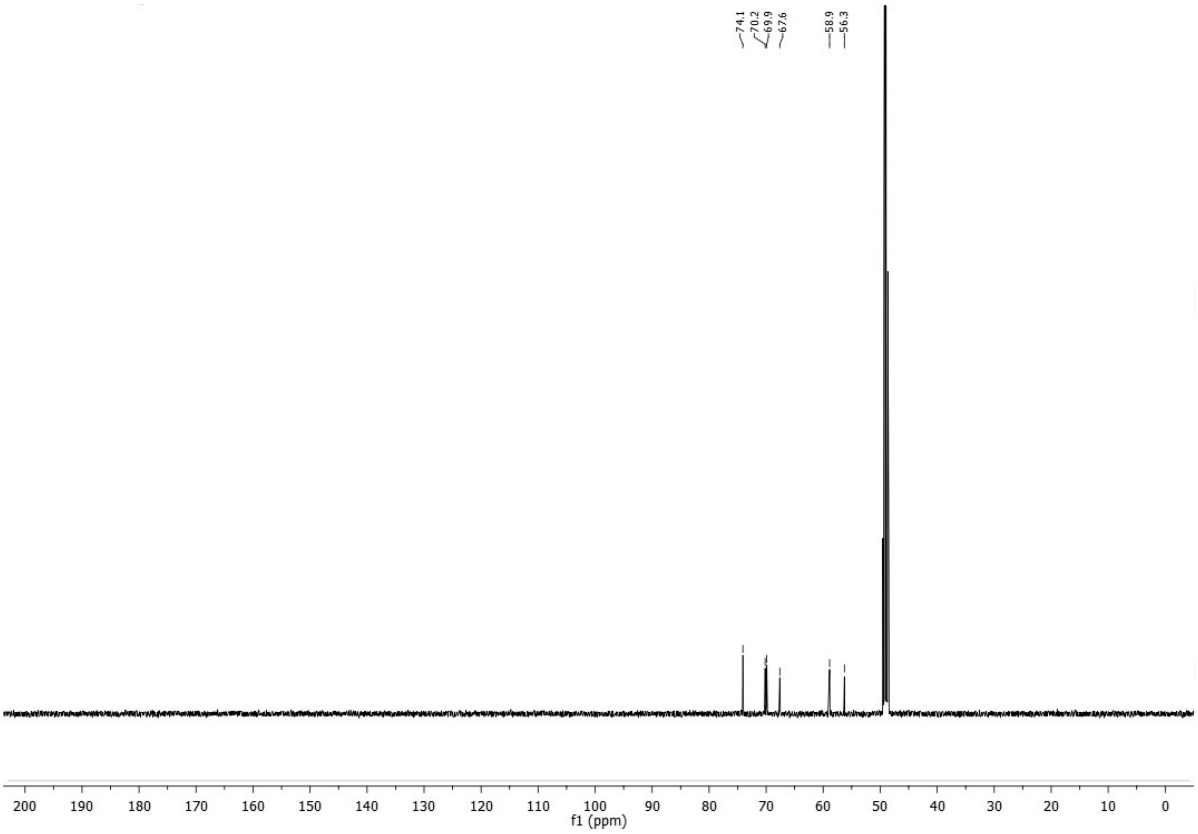
^{1}H-NMR (CD_3OD, 500 MHz)



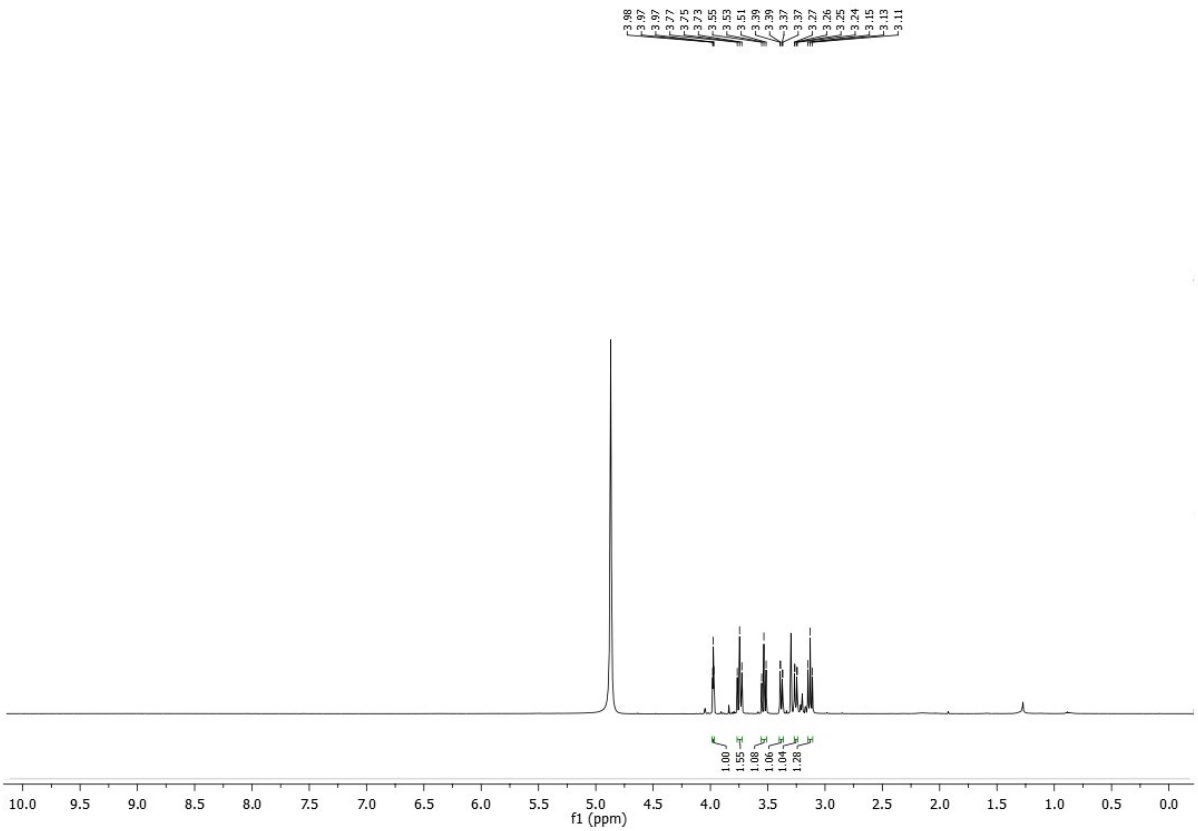
^{13}C-APT-NMR (CD_3OD, 125 MHz)



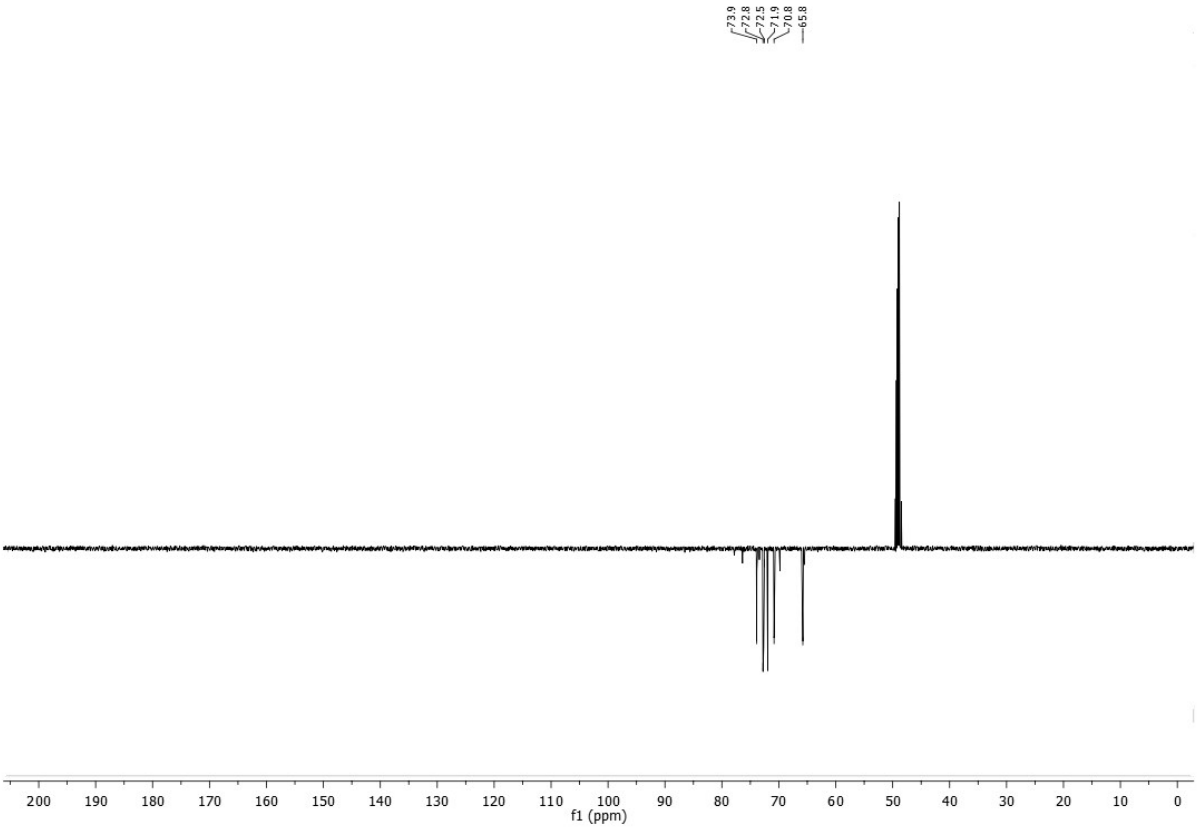
^{1}H-NMR (CD_3OD, 500 MHz)



^{13}C-NMR (CD_3OD, 125 MHz)

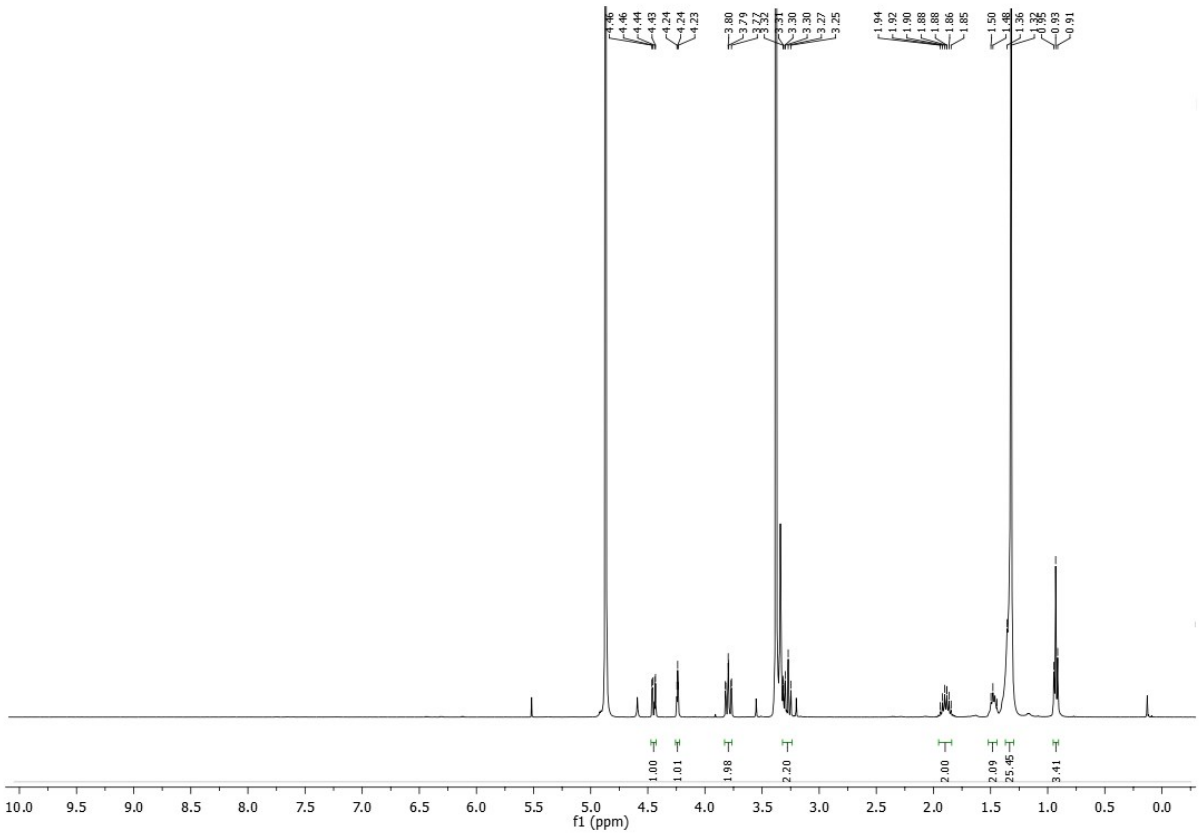


^{1}H-NMR (CD_3OD, 500 MHz)

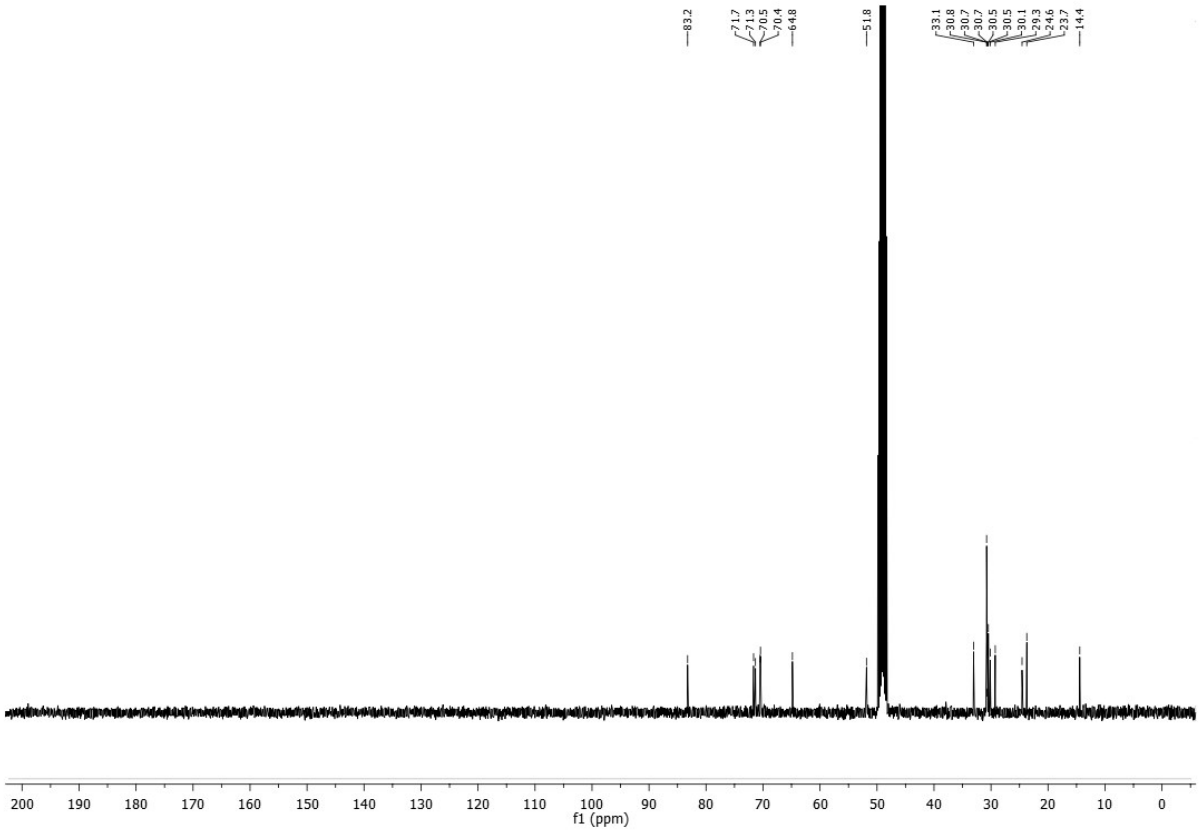


^{13}C-APT-NMR (CD_3OD, 125 MHz)

D-1-*O*-Hexadecylsulfonyl-3,5-diazido-3,5-dideoxy-*myo*-inositol **12a**

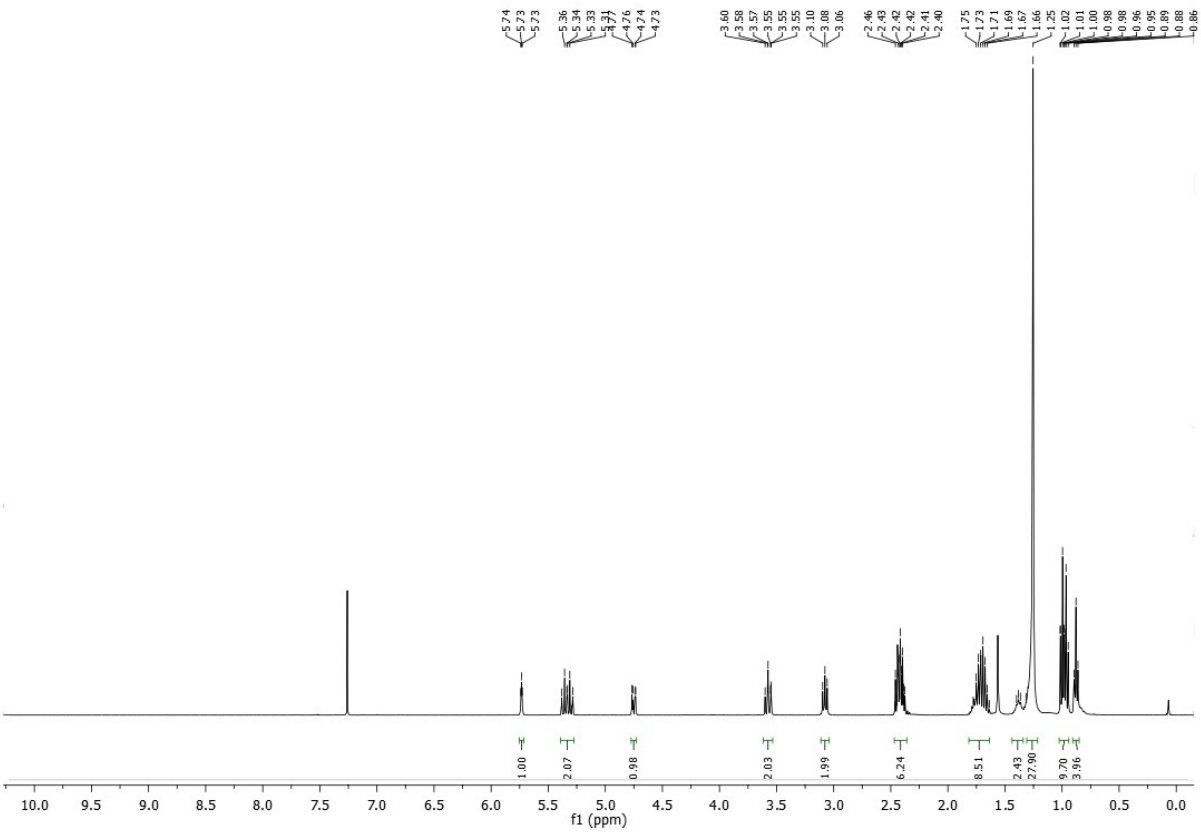


^{1}H-NMR (CD_3OD, 500 MHz)

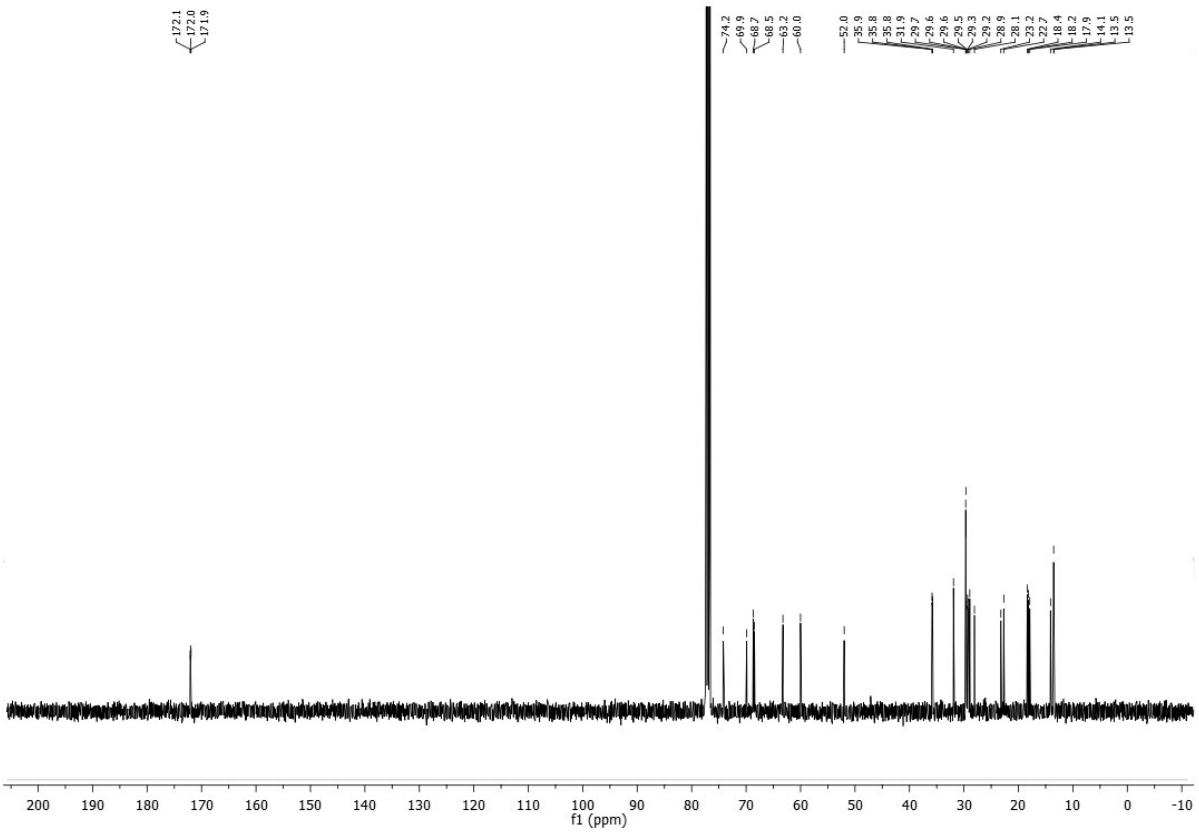


^{13}C -NMR (CD_3OD, 125 MHz)

D-1-*O*-Hexadecylsulfonyl-2,4,6-tri-*O*-butyryl-3,5-diazido-3,5-dideoxy-*myo*-inositol **12b**

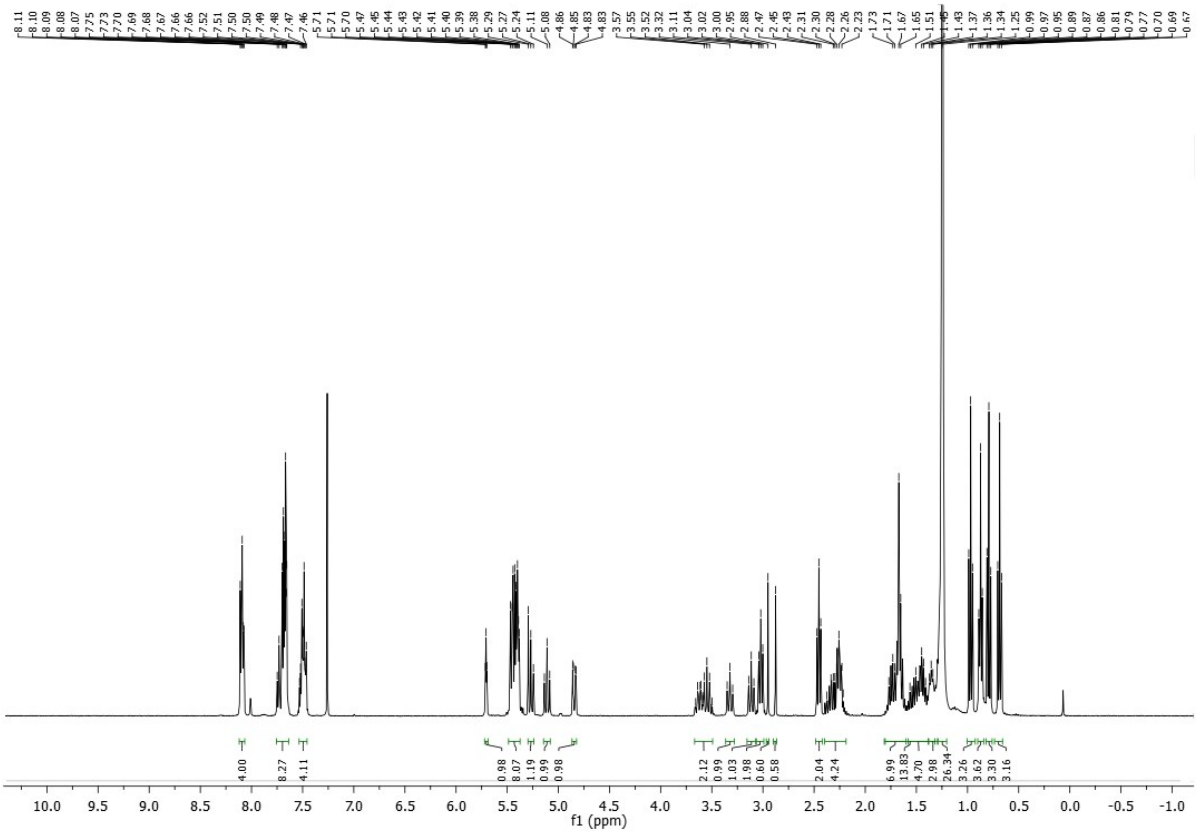


^{1}H-NMR ($CDCl_3$, 400 MHz)

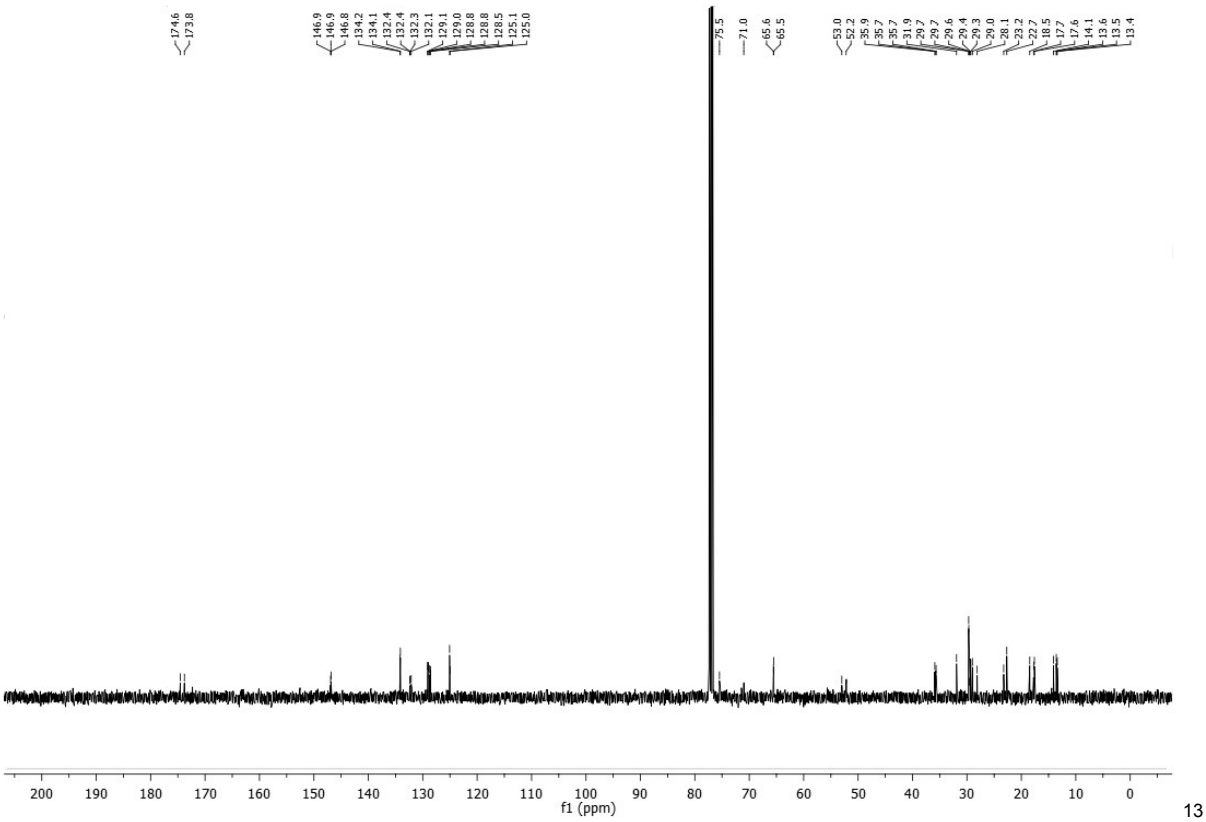


^{13}C- NMR ($CDCl_3$, 125 MHz)

D-1-*O*-Hexadecylsulfonyl-2,4,6-tri-*O*-butyryl-3,5- di(bis(2-Nitrobenzyl))phosphoamidato-*myo*-inositol **2**

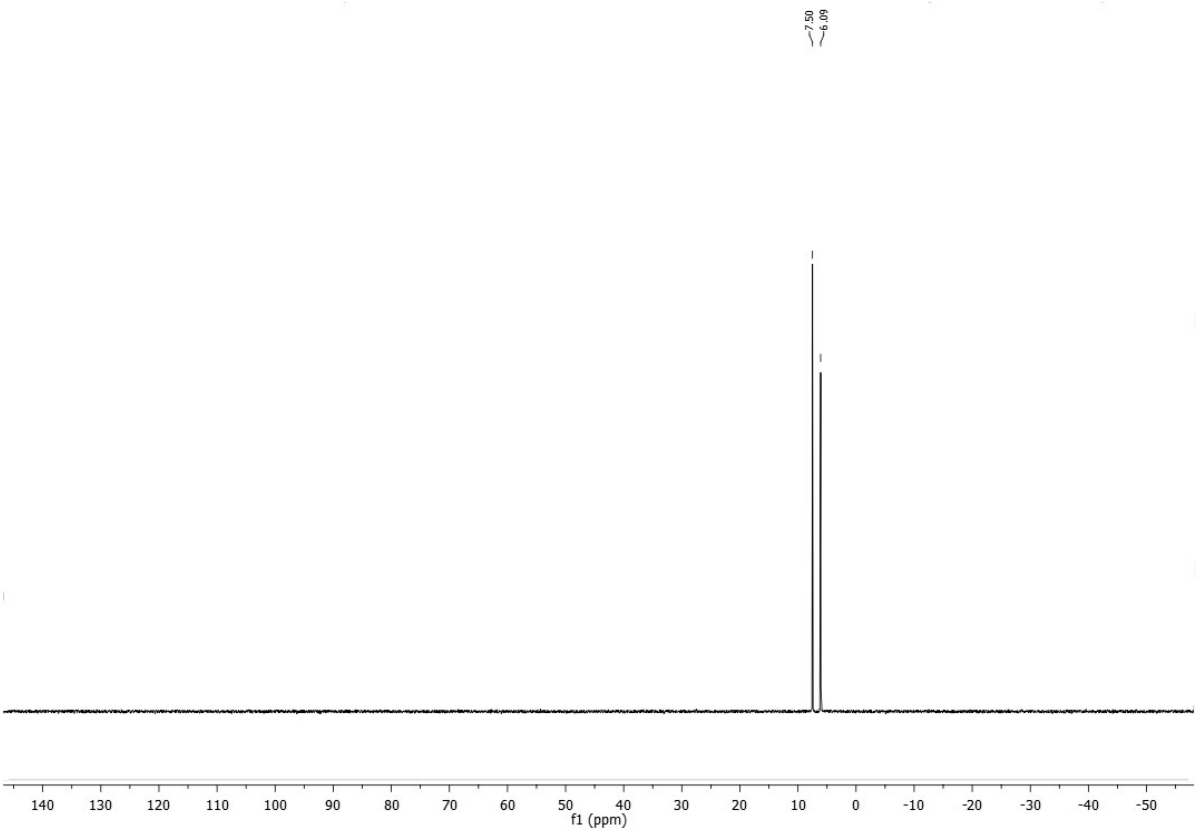


^{1}H-NMR ($CDCl_3$, 500 MHz)



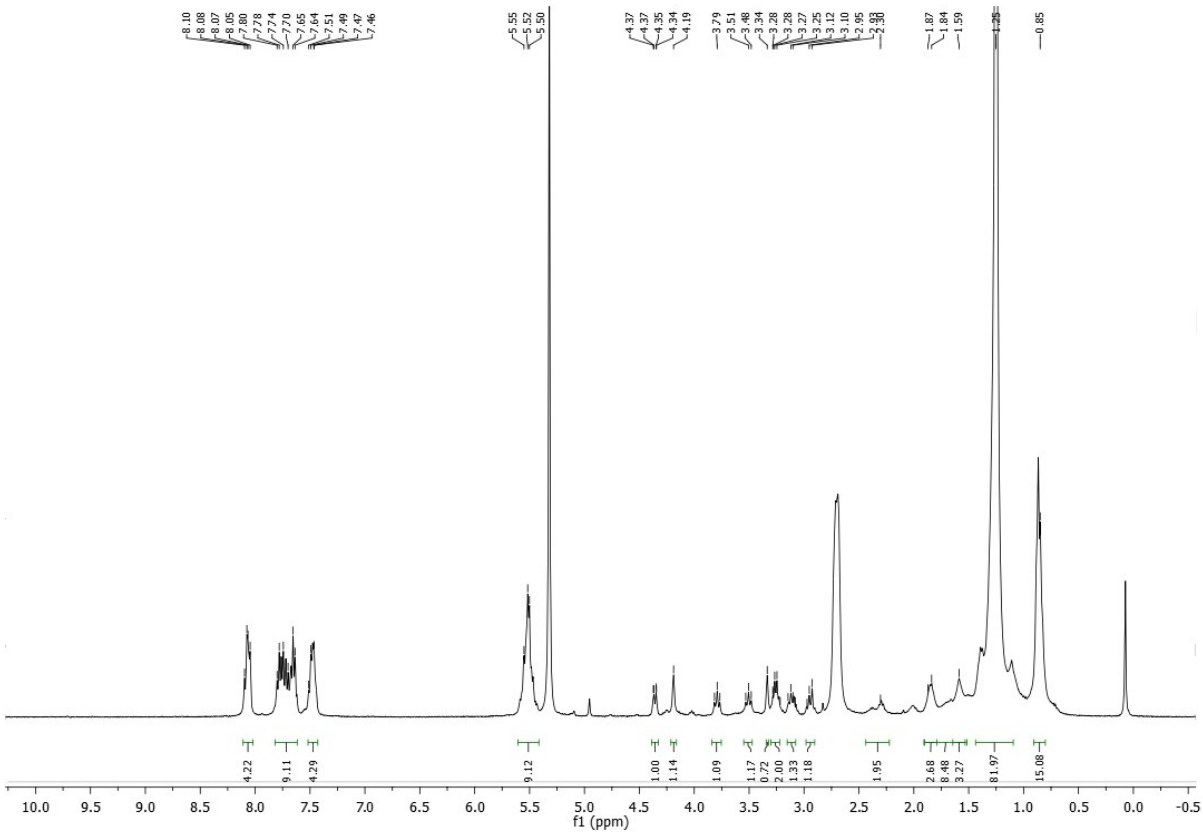
13

C- NMR ($CDCl_3$, 125 MHz)

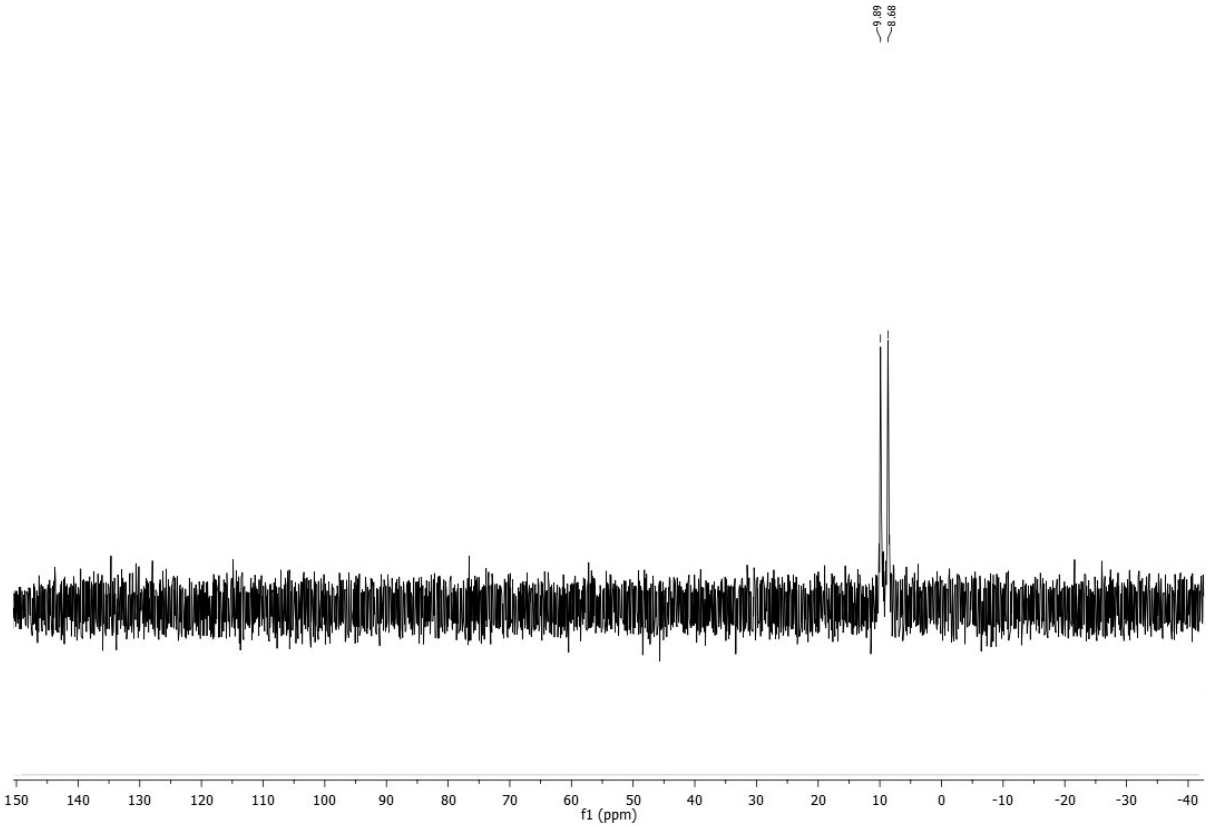


^{31}P- NMR ($CDCl_3$, 202 MHz)

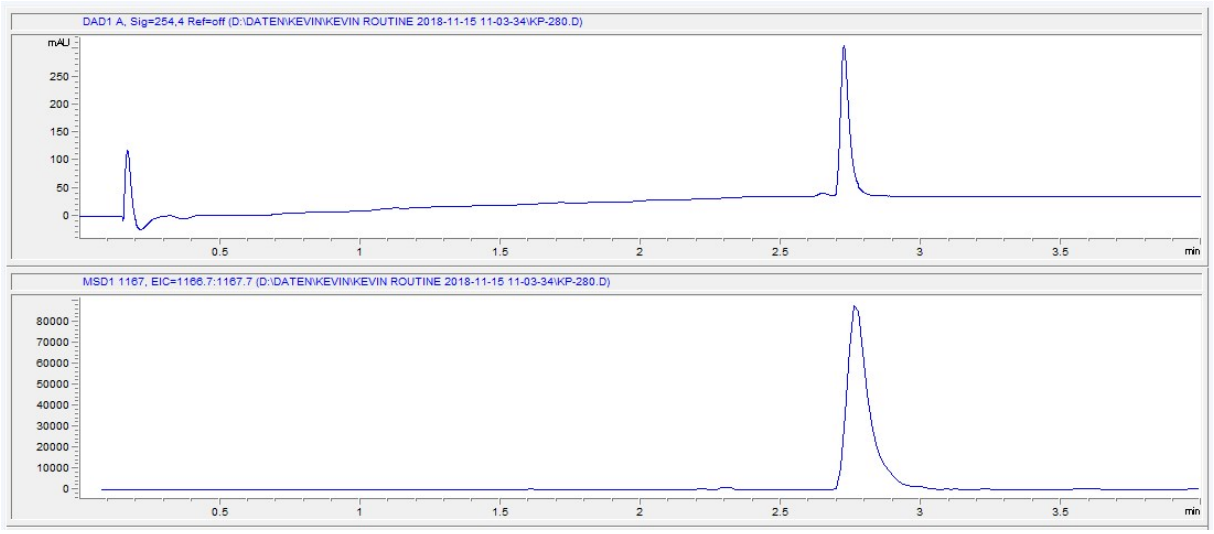
D-1-*O*-Hexadecylsulfonyl-3,5- di(bis(2-Nitrobenzyl))phosphoamidato-*myo*-inositol **1**



^{1}H-NMR (CD_2Cl_2, 500 MHz)



^{31}P- NMR (CD_2Cl_2, 202 MHz)



UPLC-MS (UV 254.4 nm)

7. References

1. S. Lansmann, O. Bartelsen and K. Sandhoff, *Methods Enzymol*, 2000, **311**, 149-156.
2. C. Kappe, Z. H. Mohamed, E. Naser, A. Carpinteiro and C. Arenz, *Chemistry*, 2020, **26**, 5780-5783.
3. E. Naser, S. Kadow, F. Schumacher, Z. H. Mohamed, C. Kappe, G. Hessler, B. Pollmeier, B. Kleuser, C. Arenz, K. A. Becker, E. Gulbins and A. Carpinteiro, *J Lipid Res*, 2020, **61**, 896-910.
4. S. Ogawa, K. L. Rinehart, G. Kimura and R. P. Johnson, *The Journal of Organic Chemistry*, 1974, **39**, 812-821.