Supporting Information

A Fluorescence Polarization Activity-Based Protein Profiling Assay in the Discovery of Potent, Selective Inhibitors for Human Non-lysosomal Glucosylceramidase

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Contents

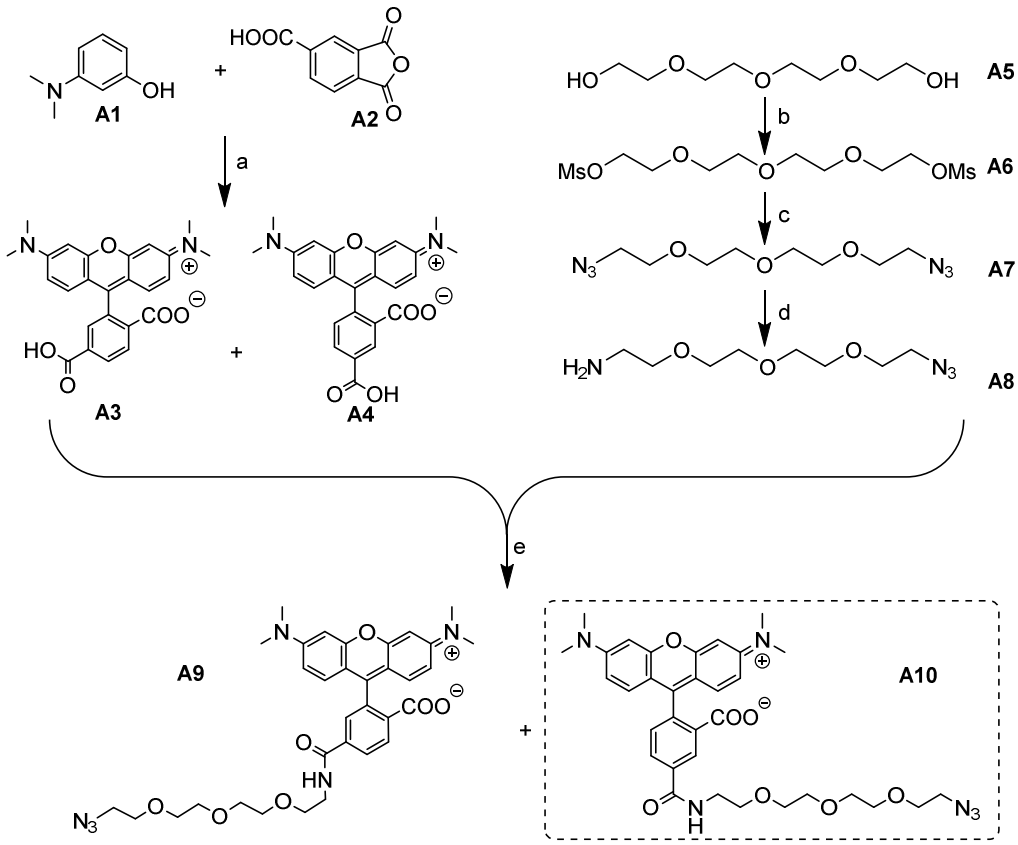
S1. Chemistry - General Information

Chemicals, materials and methods

All solvents and reagents were obtained commercially and used as received unless stated otherwise. Dichloromethane (DCM), dimethylformamide (DMF), tetrahydrofuran (THF) and methanol (MeOH) were dried over molecular sieves (4Å/3Å) for at least 12 hours before use. Moisture sensitive reactions were performed under argon atmosphere and carried out in oven dried glassware. Reactions were monitored by TLC analysis using sheets with pre-coated silica with detection by UV-absorption (254 nm) wherever applicable and by spraying with 20% H_2SO_4 in MeOH, an aqueous solution containing $KMnO_4$ (5 g/L) and K_2CO_3 (95 g/L) or a solution of ninhydrine (6 g/L) in AcOH:MeOH (1:9, v/v) followed by charring at ≈ 200°C. Flash column chromatography was performed on silica gel (40-63 µm). For LC/MS analysis a HPLC-system (detection simultaneously at 213 nm, 254 nm and evaporative light detection) equipped with an analytical C-18 column (4.6 mmD × 250 mmL, 5 µ particle size) in combination with buffers A: H_2O, B: acetonitrile, C: 1.0% aqueous trifluoroacetic acid and coupled with an electrospray interface (ESI) was used. For RP-HPLC purifications, an automated HPLC system equipped with a semi-preperative S2 C18 column (5 µm C18, 10Å, 150 × 21.2 mm) was used. The applied buffers were A: H2O + trifluoroacetic acid (1%) and B: MeCN. HPLC-MS purification was performed on an Agilent Technologies 1200 series automated HPLC system with a Quadropole MS 6130, equipped with a semi-preparative Gemini C18 column (Phenomex, 250 × 10, 5 µm) using buffers A: H_2O + K_2CO_3 (1%) and B: MeCN. Compounds are characterized by ^{1}H NMR, ^{13}C NMR, COSY and HSQC NMR experiments. NMR spectra were recorded on a Bruker DPX-300, DMX-400, AV-400, AV-600 and AV-850 spectrometer in mentioned solvent. Chemical shifts are given in ppm (δ) relative to tetramethylsilane or the deuterated solvent as the internal standard. High resolution mass spectra were recorded by direct injection (2 µL of a 2 µM solution in water/acetonitrile/*tert*-butanol, 1:1:1, v/v) on a mass spectrometer (Thermo Finnigan LTQ Orbitrap) equipped with an electrospray ion source with resolution R = 60000 at m/z 400 (mass range m/z = 150-2000). IR spectra were recorded on a Shimadzu FTIR-8300 fitted with a single bounce Durasample IR diamond crystal ATR-element and are reported in cm^{-1}. Optical rotation were measured on an automatic polarimeter of sodium D-line, at λ = 589 nm. Size-exclusion purifications were performed on an ÄKTA-explorer provided by GE-Healthcare (polymere HW-40S from Toyopearl. The column used, had a d = 26 mm; l = 60 mm and the eluents used was NH_4HCO_3 (0.15 M) in H_2O, with a flow of 1.5 mL/min.

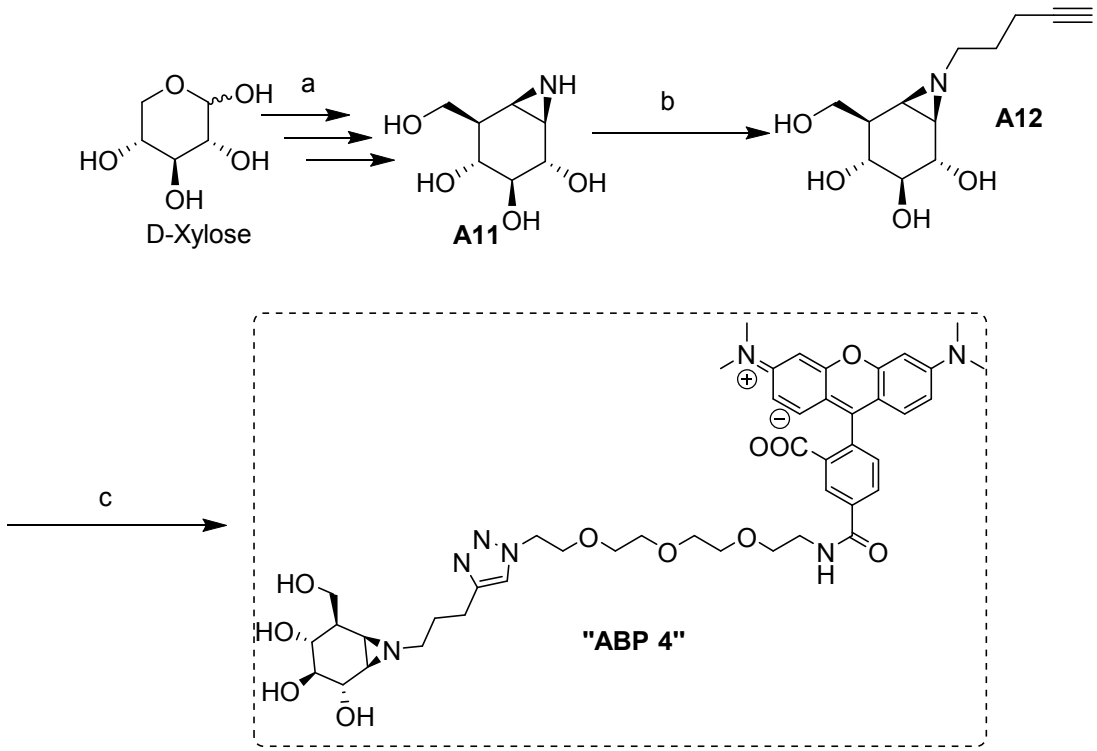
S2. Synthesis and Characterization of ABP 4

Reaction between dimethylaminophenol **A1** and trimellitic anhydride **A2** in acetic acid as solvent using a catalytic amount of sulfuric acid produced stereoisomers **A3** and **A4**. Synthesis of the poly-ethylene-glycol-(PEG)-linker was obtained from di-alcohol **A8** through subsequent mesylation, azide formation, and (selective) reductive amination. Overall yield for the synthesis of linker **A8** was 33% over three steps. **A8** was attached to stereoisomers **A3** and **A4** in the presence of BOP.PF_6 and *N*,*N*-diisopropylethylamine (DIPEA), affording a mixture containing **A9** and **A10**. Desired product **A10**, 5-TAMRA-PEG3-azide, was isolated (2%) using HPLC (scheme S1).



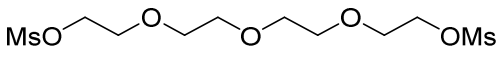
Scheme S1: Synthesis of 5-TAMRA-PEG3-azide [a] cat. H_2SO_4 in AcOH under reflux; [b] MsCl, Et_3N in THF, 45%; [c] NaN_3 in DMF under reflux, 95%; [d] PPh_3 in 5% HCl (aq), 77%; [e] BOP.PF_6, DIPEA in DMSO, 2% over two steps

Synthesis of gluco-aziridine **A11** from the D-xylose was afforded according to experimental procedures described by Madsen et al.[1] and Kallemeijn et al.[2] Crude aziridine **A11** was alkylated using iodo-pentyne and sodium bicarbonate. Copper(I)-catalyzed azide-alkyne cycloaddition of 5-TAMRA-PEG3-azide **A10** with **A12** provided **"ABP 4"** (scheme S2).



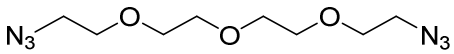
Scheme S2: Synthetic route towards gluco-cyclophellitol aziridine-type **ABP4**, [a] synthesis of **A11** described in references 1 and 2; [b] 5-iodo-pentyne, $NaHCO_3$ in DMF; [c] **A10**, sodium ascorbate, $CuSO_4$ in H_2O, 6% over three steps

((oxybis(ethane-2,1-diyl))bis(oxy))bis(ethane-2,1-diyl) dimethanesulfonate (A6)



A mixture of triethylamine (11.2 g, 110 mmol, 2.2 eq.) in THF (10 mL) was added dropwisely at 0°C into a mixture containing tetra-ethylene glycol (9.7 g, 50 mmol) and mesylchloride (12.6 g, 110 mmol, 2.2 eq.) dissolved in dry THF (50 mL). After 30 minutes the cooling bath was removed and the reaction was stirred for 4 more hours at ambient temperature. THF was removed under reduced pressure. Subsequently a mixture H_2O (100 mL), aqueous HCl (100 mL, 1 M) and DCM (200 mL) was poured into the residue. The organic layer was washed with saturated bicarbonate (3 × 100 mL), dried with $MgSO_4$ and filtrated. Purification via flash column chromatography (DCM → 5% MeOH/DCM) afforded **A6** (7.943 g, 22.62 mmol, 45%) as a brown oil. ^{1}H NMR (300 MHz, $CDCl_3$) δ 4.27 - 4.14 (m, 4H), 3.66 - 3.57 (m, 4H), 3.50 (s, 8H), 2.93 (s, 6H). ^{13}C NMR (75 MHz, $CDCl_3$) δ 70.1, 69.3, 68.5, 37.1. HRMS: found 351.0773 $[M+H]^+$, calculated for $[C_{10}H_{22}O_9S_2+H]^+$ 351.0778.

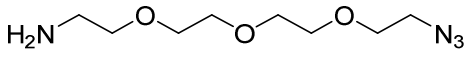
1-azido-2-(2-(2-(2-azidoethoxy)ethoxy)ethoxy)ethane (A7)



A mixture of **A6** (7.1 g, 20 mmol) with sodium azide (5.3 g, 82 mmol, 4 eq.) in absolute ethanol (40 mL) and DMF (10 mL) was refluxed overnight. This mixture was poured into a mixture of H_2O/DCM (200 mL, 1:1, v/v). The organic layer was washed subsequently with H_2O (3 × 100 mL) and brine (3 × 100 mL). The organic layer was dried over $MgSO_4$ and filtered. A yellow oil (4.7 g, 19 mmol, 95%) was obtained after removing the solvents under reduced pressure. R_F = 0.85 (MeOH:DCM, 1:9, v/v). ^{1}H NMR (300

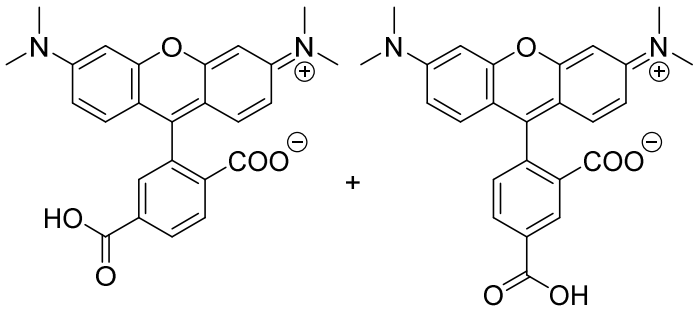
MHz, $CDCl_3$) δ 3.62 - 3.54 (m, 12H), 3.36 - 3.23 (m, 4H). ^{13}C NMR (75 MHz, $CDCl_3$) δ 70.6, 70.0, 50.6. HRMS: found 245.1358 $[M+H]^+$, calculated for $[C_8H_{16}O_3N_6+H]^+$ 245.1357.

1-azido-2-(2-(2-(2-azidoethoxy)ethoxy)ethoxy)ethane (A8)



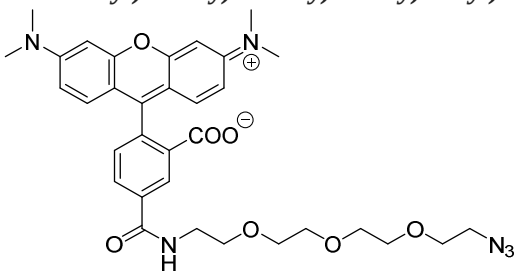
Triphenylphosphine (0.8 g, 3 mmol, 0.9 eq.) dissolved in ether (15 mL) was added into a solution of **A7** (0.8 g, 3.3 mmol) in 5% aqueous HCl (10 mL). Addition was performed in 30 minutes at room temperature and the reaction was stirred for an additional 2.5 hours. Phases were separated using a separation funnel and the aqueous layer was washed using DCM (3 × 25 mL). The aqueous layer was adjusted to pH 10 using KOH pellets. Product was extracted with DCM (4 × 50 mL). Combined organic layers were dried over $MgSO_4$ and filtered. After removal of the organic solvents under reduced pressure a yellow oil (4.7 g, 19 mmol, 77%) was afforded. R_F = 0.2 (MeOH:DCM, 1:9, v/v). ^1H NMR (300 MHz, $CDCl_3$) δ 3.73 - 3.49 (m, 10H), 3.45 (t, *J* = 5.2 Hz, 2H), 3.36 - 3.28 (m, 2H), 2.80 (t, *J* = 5.1 Hz, 2H), 1.44 (s, 2H). ^{13}C NMR (75 MHz, D_2O) δ 73.5, 70.7 - 70.1, 50.8, 41.9. HRMS: found 219.1452 $[M+H]^+$, calculated for $[C_8H_{16}O_3N_4+H]^+$ 219.1452.

5-carboxy-2-(6-(dimethylamino)-3-(dimethyliminio)-3H-xanthen-9-yl)benzoate(A3& A4)



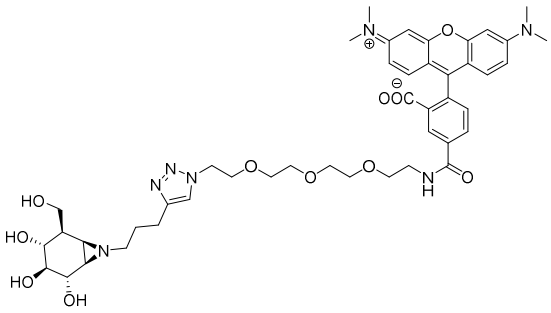
Dimethylaminophenol (6.9 g, 50 mmol) and trimellitic anhydride (4.8 g, 25 mmol) were dissolved in AcOH (400 mL). After adding a catalytic amounts of concentrated H_2SO_4 (ca. 0.5 mL) the mixture was refluxed overnight. Reaction mixture was concentrated under reduced pressure and pre-purified over column chromatography (DCM → 50% MeOH/DCM) to isolate 2.7 g of a mixture containing desired of regio-isomers.

2-(6-(dimethylamino)-3-(dimethyliminio)-3H-xanthen-9-yl)-5-((2-(2-(2-(2-(4-(3-((1R,2S,3S,4R ,5R,6R)-2,3,4-trihydroxy-5-(hydroxymethyl)-7-azabicyclo[4.1.0]heptan-7-yl)propyl)-1H-1,2,3-triazol-1-yl)ethoxy)-ethoxy)ethoxy)-ethyl)carbamoyl)benzoate (A10)



BOP.PF6 (74 mg, 0.168 mmol) and DIPEA (54 µL, 0.31 mmol) were added into a mixture containing isomers **A3** and **A4** (60 mg) and linker **A8** (30 mg, 0.14 mmol) dissolved in DMSO (2 mL). The reaction was stirred for 24 hours at ambient temperature. Desired stereoisomeric product **A10** (7.41 mg, 11.7 µmol, 2% estimated yield over two steps) was isolated using HPLC purification. ^1H NMR (600 MHz, MeOD) δ 8.79 (d, *J* = 1.7 Hz, 1H), 8.31 - 8.25 (m, 1H), 7.54 (d, *J* = 7.9 Hz, 1H), 7.15 (d, *J* = 9.5 Hz, 2H), 7.07 (dd, *J* = 9.5, 2.5 Hz, 2H), 7.00 (d, *J* = 2.4 Hz, 2H), 3.77 - 3.60 (m, 14H), 3.35 - 3.33 (m, 2H), 3.32 (s, 12H). ^{13}C NMR (150 MHz, MeOD) δ 168.6, 167.7, 161.0, 159.4, 159.3, 138.4, 138.0, 133.2, 132.7, 132.2, 132.2, 131.7, 115.9, 115.0, 97.8, 72.0 - 70.8, 52.0, 49.9, 41.5, 41.2. HRMS: found 631.2877 $[M+H]^+$, calculated for $[C_{33}H_{38}O_7N_6+H]^+$ 631.2875.

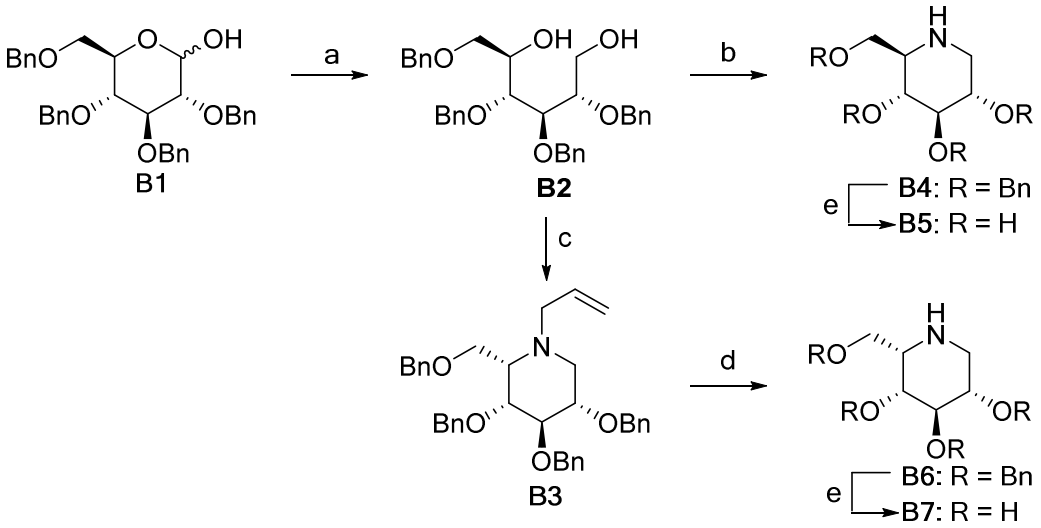
2-(6-(dimethylamino)-3-(dimethyliminio)-3H-xanthen-9-yl)-5-((2-(2-(2-(2-(4-(3-((1R,2S,3S,4R,5R ,6R)-2,3,4-trihydroxy-5-(hydroxymethyl)-7-azabicyclo[4.1.0]heptan-7-yl)propyl)-1H-1,2,3-triazol-1-yl)ethoxy)ethoxy)ethoxy)ethyl)carbamoyl)benzoate (ABP4)



Sodium bicarbonate (4.8 mg, 57 µmol) and iodopentyne (2.9 mg, 15 µmol) were added into a roundbottomflask containing crude aziridine **A11** (5 mg) dissolved in dry DMF (0.5 mL). The reaction was stirred for 24h at ca. 60°C. The volatiles were removed under reduced pressure, the residue was dissolved in water (10 mL) and washed with DCM (3 × 10 mL) and EtOAc (3 × 10 mL). The aqueous layer was concentrated under reduced pressure. The residue containing compound **A12** was redissolved in H_2O (0.5 mL). Sodium ascorbate and $CuSO_4$ (5 µL of 1 M solution) were added into the aqueous solution containing **A12**. After the mixture turned yellow-green TAMRA **A10** (1.25 mg, 1.98 µmol dissolved in 1.5 mL H_2O) was added. The reaction was completed after 3 days according to LC/MS analysis. Solvents were evaporated and product **ABP4** (1.457 mg, 1.670 µmol, 6% yield over three steps) was isolated as a purple solid after HPLC-purification. R_F = 0.1 (MeOH:DCM, 1:3, v/v). ^{1}H NMR (600 MHz, MeOD) δ 8.56 (s, 1H), 8.07 (d, *J* = 7.9 Hz, 1H), 7.81 (s, 1H), 7.38 (d, *J* = 7.9 Hz, 1H), 7.26 (d, *J* = 9.5 Hz, 2H), 7.04 (d, *J* = 9.5 Hz, 2H), 6.96 (s, 2H), 4.60 (s, 2H), 4.52 (t, *J* = 5.1 Hz, 2H), 4.00 (dd, *J* = 10.1, 4.4 Hz, 1H), 3.88 (t, *J* = 5.1 Hz, 2H), 3.74 (t, *J* = 5.3 Hz, 2H), 3.72 - 3.60 (m, 14H), 3.31 (d, *J* = 3.7 Hz, 12H), 3.12 (dd, *J* = 9.9, 8.2 Hz, 1H), 3.03 (t, *J* = 9.8 Hz, 1H), 2.81 - 2.71 (m, 2H), 2.45 - 2.37 (m, 1H), 2.24 - 2.16 (m, 1H), 2.03 - 1.99 (m, 1H), 1.96 - 1.85 (m, 3H), 1.61 (d, *J* = 12.0 Hz, 1H). ^{13}C NMR (150 MHz, MeOD) δ 169.2, 169.0, 162.9, 159.0, 158.7, 137.0, 136.9, 132.8, 132.6, 130.8, 129.5, 129.5, 124.1, 115.0, 114.8, 102.0, 97.3, 79.0, 74.0, 71.6 - 70.4, 70.14, 63.7, 61.2, 51.3, 49.8, 49.6, 45.5, 45.5, 43.1, 41.2, 40.8, 30.2, 24.1. HRMS: found 872.4184 $[M+H]^+$, calculated for $[C_{45}H_{57}O_{11}N_7+H]^+$ 872.4189.

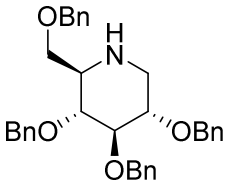
S3. Synthetic Procedure and Spectral Data of Second Generation Deoxynojirimycins

Synthesis of D-gluco and L-ido Deoxynojirimycins



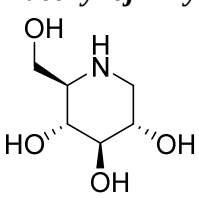
Scheme S3: Synthesis of 1-deoxynojirinmycin and L-*ido*-1-deoxynojirinmycin [**a**] $LiAlH_4$, THF; [**b**] $(COCl)_2$, DMSO, DCM, $CHOONH_4$, Na_2SO_4, $NaBH_3CN$, MeOH, 12% 2 steps; [**c**] MsCl, pyridine, allyl amine, reflux, 78% 2 steps; [**d**] KOtBu, DMSO, HCl, 92%; [**e**] Pd/C, H_2, 82% (**B5**), 76% (**B7**).

2,3,4,6-Tetra-O-benzyl-1-deoxynojirimycin (B4)



A solution of $(COCl)_2$ (0.70 mL, 8.16 mmol) in dry DCM (5 mL) under argon atmosphere, was cooled to -78℃. DMSO (0.71 mL, 10.0 mmol) dissolved in dry DCM (5 mL) was added dropwise. After 40 minutes **B2** (1.02 g, 1.88 mmol), which was co-evaporated 3 times with toluene, in dry DCM (3 mL), was added dropwise to the mixture. The reaction was stirred for 2 hours at -78℃, after which Et_3N (3.40 mL, 24.4 mmol) was added dropwise to quench the reaction. The mixture was gradually warmed to -5℃ after which it was poured into a cooled (0℃) MeOH solution (50 mL) of $NaCNBH_3$ (0.503 g, 8.00 mmol), $HCOONH_4$ (2.53 g, 40.1 mmol), and Na_2SO_4 (0.887 g, 6.24 mmol). The mixture was stirred overnight allowing the temperature to reach rt. TLC analysis showed complete consumption of the starting material (PE:EtOAc = 1:1, R_F = 0.36). After filtration, the solvent was evaporated, as the residue was dissolved in EtOAc (70 mL), washed with sat aq. $NaHCO_3$ solution (70 mL). The organic layer was dried over Na_2SO_4 and after filtration and concentration, the residue was purified with silica gel column (2:1→1:2, PE:EtOAc) to give the pure product **B4** in 12% overall yield (0.114 g, 0.218 mmol). R_F = 0.36 (1:1, PE:EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.53 - 7.22 (m, 20H), 5.09 (d, *J* = 10.9 Hz, 1H), 4.96 (t, *J* = 10.4 Hz, 2H), 4.82 - 4.72 (m, 2H), 4.65 - 4.48 (m, 3H), 3.77 (dd, *J* = 9.0, 2.6 Hz, 1H), 3.71 - 3.56 (m, 3H), 3.47 (t, *J* = 9.2 Hz, 1H), 3.35 (dd, *J* = 12.3, 4.9 Hz, 1H), 2.83 (ddd, *J* = 9.8, 5.8, 2.6 Hz, 1H), 2.61 (dd, *J* = 12.3, 10.2 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.9, 138.5, 138.4, 138.0, 128.4, 128.4, 128.4, 128.4, 128.0, 128.0, 127.9, 127.8, 127.8, 127.7, 127.7, 127.5, 87.3, 80.6, 80.1, 75.7, 75.2, 73.4, 72.8, 70.2, 59.7, 48.1.

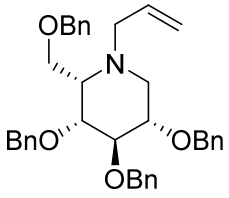
1-deoxynojirimycin (B5)



B4 (2.00 g, 3.82 mmol) was dissolved in EtOH (120 mL) and pH was adjusted to 2 with HCl solution (1 M). The solution was flushed with argon for 3 times, after which two spatula tips of Pd/C (20%) was added. Then the solution was exposed to

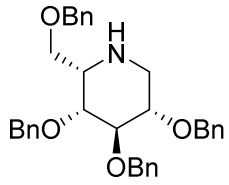
H_2 atmosphere (4 bar) for 24 hours. The product was purified on silica gel column (4:1, EtOAc:MeOH + 1% NH_4OH → 6:4:1, EtOH:H_2O:NH_4OH) to give the **B5** in 82% yield (511 mg, 3.13 mmol). ^{1}H NMR (400 MHz, MeOD) δ 3.92 (dd, *J* = 10.9, 3.1 Hz, 1H), 3.68 (dd, *J* = 10.9, 6.5 Hz, 1H), 3.57 - 3.44 (m, 1H), 3.34 - 3.21 (m, 2H), 3.18 (dd, *J* = 12.1, 5.1 Hz, 1H), 2.68 - 2.42 (m, 2H).^{13}C NMR (100 MHz, MeOD) δ 81.5, 74.2, 73.4, 63.9, 63.7, 51.9.

2,3,4,6-Tetra-O-benzyl-L-ido-N-allyl-1-deoxynojimycin (B3)



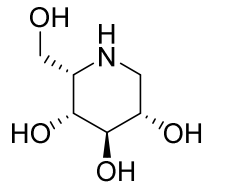
MsCl (4.2 mL, 53.1 mmol) was added dropwise to a cooled solution (0℃) of pyridine (90 mL) and **B2** (11.5 g, 21.2 mmol) was kept under argon atmosphere. The mixture was stirred for 3 hours at r.t., after which TLC analysis (2:1, PE:EtOAc, R_F = 0.13) showed complete consumption of the starting material. Water (60 mL) was added and the solution was concentrated. Then after adding EtOAc (130 mL) it was washed with HCl (100 mL, 1M, 2 times), sat. aq. $NaHCO_3$ (100 mL) and brine (100 mL) successively. The organic layer was dried (Na_2SO_4), filtered and concentrated, and then it was co-evaporated 3 times with toluene. Allylamine (90 mL) was added to dissolve the methanesulfonylated product, and the solution was heated to reflux for 14 hours. The reaction was then stirred for 2 more hours at rt until TLC analysis (2:1, PE:EtOAc) showed complete consumption of the starting material. After concentrating, EtOAc (110 mL) was added and was washed with sat aq. $NaHCO_3$ (100 mL, 2 ×) and brine (100 mL). The organic layer was dried on Na_2SO_4 and after filtering and concentrating, the residue was purified on silica gel column (17:3, PE:EtOAc) to give **B3** in 78% yield (9.30 g, 16.5 mmol). R_F = 0.76 (2:1, PE:EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33 - 7.23 (m, 20H), 5.77 (ddt, *J* = 16.8, 10.3, 6.3 Hz, 1H), 5.12 (dd, *J* = 23.6, 6.2 Hz, 2H), 4.90 - 4.46 (m, 8H), 3.84 (dd, *J* = 10.2, 6.8 Hz, 1H), 3.72 (dd, *J* = 10.2, 2.5 Hz, 1H), 3.69 (dd, *J* = 7.6, 4.2 Hz, 1H), 3.60 - 3.50 (m, 2H), 3.42 (ddd, *J* = 10.1, 5.8, 1.6 Hz, 1H), 3.37 (dd, *J* = 6.9, 2.0 Hz, 1H), 3.18 (dd, *J* = 14.1, 6.9 Hz, 1H), 2.92 (dd, *J* = 11.9, 4.9 Hz, 1H), 2.53 (dd, *J* = 11.8, 9.8 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.3, 138.8, 138.7, 138.6, 136.3, 128.5, 117.2, 83.1, 80.3, 78.9, 75.5, 73.4, 73.1 72.8, 64.8, 60.1, 58.1, 49.2.

2,3,4,6-Tetra-O-benzyl-L-ido-1-deoxynojirimycin (B6)



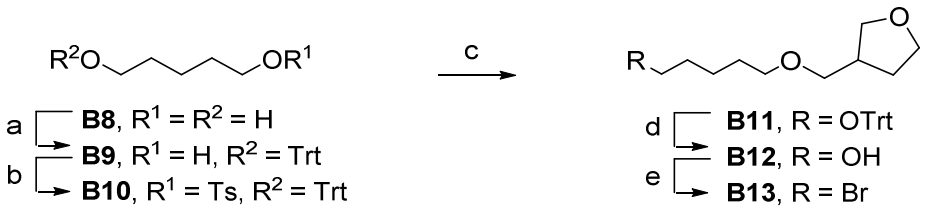
A mixture of DMSO (35 mL), tBuOK (1.00 g, 8.91 mmol) and **B3** (9.30 g, 16.5 mmol), which was co-evaporated 3 times with toluene, were stirred and heated to 100℃ under argon atmosphere. After 1 hour stirring, HCL solution (30 mL, 1M) was added and the heating resource was removed. After 30 minutes, the mixture was poured into sat aq. $NaHCO_3$ (100 mL). Sat aq. $NaHCO_3$ (200 mL) and Et_2O (150 mL) was added to the reaction mixture and the organic layer were separated. The water layer was re-extracted with Et_2O (150 mL, 2 ×) and the combined organic layers were dried (Na_2SO_4) filtered and concentrated. The residue was purified with silica gel column (2:1→1:2→ 0:1, PE:EtOAc) to give the pure product **B6** with a yield of 92% (7.93 g, 15.1 mmol). R_F = 0.13 (1:1, PE:EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54 - 7.17 (m, 20H), 4.69 - 4.43 (m, 8H), 3.82 (t, *J* = 5.2 Hz, 1H), 3.69 - 3.54 (m, 3H), 3.50 (q, *J* = 4.7 Hz, 1H), 3.31 (td, *J* = 6.8, 3.6 Hz, 1H), 3.01 (dd, *J* = 13.5, 3.6 Hz, 1H), 2.94 (dd, *J* = 13.5, 5.1 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.7, 140.6, 140.5, 140.4, 130.3, 130.2, 130.2, 130.1, 129.9, 129.8, 129.6, 129.6, 129.5, 77.6, 77.0, 75.3, 75.1, 74.4, 73.6, 56.4, 46.4.

L-Ido-1-deoxynojimycin (B7)



B6 (2.30 g, 4.39 mmol) was dissolved in EtOH (150 mL) and pH was adjusted to 2 with HCl solution (1 M). The solution was flushed with argon for 3 times, after which two spatula tips of Pd/C (20%) was added. Then the solution was exposed to H_2 atmosphere (4 bar) for 24 hours. The product was purified with silica gel column (4:1, EtOAc:MeOH + 1% NH_4OH → 6:4:1, EtOH:H_2O:NH_4OH) to give the 12 in 76% yield (840 mg, 3.32 mmol). ^{1}H NMR (400 MHz, MeOD) δ 3.94 (ddd, *J* = 6.5, 3.9, 2.6 Hz, 2H), 3.89 (dd, *J* = 5.7, 2.0 Hz, 1H), 3.85 (dd, *J* = 11.0, 2.1 Hz, 1H), 3.81 (dd, *J* = 11.7, 5.1 Hz, 1H), 3.51 (ddd, *J* = 8.9, 5.0, 1.9 Hz, 1H), 3.41 (dd, *J* = 13.2, 2.0 Hz, 1H), 3.27 (dd, *J* = 13.2, 1.7 Hz, 1H). ^{13}C NMR (100 MHz, MeOD) δ 70.1, 69.2, 68.7, 61.5, 59.1, 47.9.

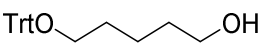
Synthesis of the Bromide-spacers



Scheme S4: [**a**] TrtCl, TEA, EtOAc, 85 ℃, 3h, 99%; [**b**] *p*-TsCl, TEA, DMAP, DCM, 0 ℃ to r.t., 2h, 70%; [**c**] 1) THF-3-yl-methanol, NaH, DMF, r.t., 90 min; 2) **15**, 75 ℃, 1h, 56%; [**d**] $BF_3{\cdot}OEt_2$, toluene/MeOH (1:1), 1.5h, 72%; [**e**] 1) PPh_3, DCM, rt, 0 ℃; 2) CBr_4, Ar, 2h, 91%

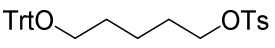
General procedure A: Substitution of the tosyl group. A dry solution of alcohol (5 mmol) in DMF (15 mL) was charged with NaH (10 mmol) and stirred for 90 min. Then a dry solution of **B10** (4.5 mmol) in DMF (15 mL) was added. The reaction mixture was heated to 75 ℃ for 1 h. After complete consumption of the starting material (TLC monitored), the mixture was cooled to room temperature, quenched with water (3 mL) and concentrated. The residue was dissolved in a mixture of TEAA (0.1 M), EtOAc and sat. aq. $NaHCO_3$ (80 mL, 2:3:3) and extracted with EtOAc (3 × 30 mL). The organic phase was dried ($MgSO_4$), filtered and concentrated. Purification by silica gel column chromatography (0 -10% EtOAc in PE) gave the target compound.

5-trityloxy-1-pentanol (B9)



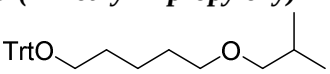
Trityl chloride (55.82 g, 200.2 mmol), 1,5-pentanediol (100 mL, 954.4 mmol), EtOAc (500 mL) and TEA (56 mL, 396 mmol) were added together. The mixture was stirred for 3h at 85℃. After complete conversion (TLC, 1:1, EtOAc:PE) the mixture was washed successively with HCl (4 × 100 mL, 1M) and sat. aq. $NaHCO_3$ (4 × 100 mL), dried ($MgSO_4$) and concentrated to give compound **B9** (68.67 g, 99% yield). R_F = 0.70 (1:1, EtOAc:PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 -7.36 (m, 6H), 7.29 -7.17 (m, 9H), 3.56 (t, *J* = 6.6, 2H), 3.06 (t, *J* = 6.6, 2H), 1.64 (m, 2H), 1.55 - 1.35 (m, 4H), ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.7, 128.9, 128.0, 127.1, 86.6, 63.7, 63.1, 32.8, 30.1, 22.8.

5-(toluene-4-sulfonyl)-1-trityloxypentane (B10)



Para-toluene sulfonic chloride (8.83 g, 46.30 mmol) was added to a dry and cooled (0℃) solution of **B9** (10.72 g, 30.94 mmol), TEA (7 mL, 49.5 mmol) and DMAP (0.19 g, 1.56 mmol) in DCM (93 mL). The mixture was stirred for 2h warming to rt. The mixture was washed successively with HCl (100 mL, 1M), sat. aq. $NaHCO_3$ (100 mL) and sat. aq. NaCl (100 mL). The organic phase was dried ($MgSO_4$) and concentrated. Purification with silica gel chromatography (10 -16% EtOAc in PE) gave compound **B10** (10.86 g, 70%) as a white solid. R_F = 0.78 (25% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, *J* = 8.1 Hz, 2H), 7.41 (dd, *J* = 7.8, 1.6 Hz, 6H), 7.31 - 7.05 (m, 11H), 3.94 (t, *J* = 6.4 Hz, 2H), 3.00 (t, *J* = 6.3 Hz, 2H), 1.94 (s, 3H), 1.51 (h, *J* = 6.9 Hz, 4H), 1.34 (td, *J* = 8.5, 4.1 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.6, 144.3, 133.1, 129.8, 128.6, 127.8, 127.7, 126.9, 86.3, 70.5, 63.0, 60.2, 29.2, 28.5, 22.2, 21.5, 14.2.

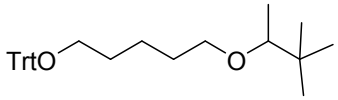
5-(2-methyl-1-propyloxy)-1-trityloxypentane (B14)



Compound **B10** (4.60 mmol) was subjected to general procedure A, using 2-methyl-1-propanol (5.05 mmol) to provide **B14** (0.77 g, 1.92 mmol) in a yield of 42%, as thick oil, after silica gel column purification. R_F = 0.65 (10% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 - 7.43 (m, 7H), 7.32 - 7.22 (m, 8H), 7.22 - 7.12 (m, 4H), 3.37 (t, *J* = 6.4 Hz, 2H), 3.14 (d, *J* = 6.7 Hz, 2H), 3.06 (t, *J* = 6.6 Hz, 2H), 1.84 (dt, *J* = 13.3, 6.7 Hz, 1H), 1.64 (dq, *J* = 15.0, 8.2, 7.5 Hz, 3H), 1.54 (dq, *J* = 8.5, 6.5 Hz,

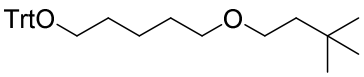
2H), 1.44 (ddd, *J* = 8.9, 7.5, 4.3 Hz, 2H), 0.90 (s, 3H), 0.88 (s, 3H).^{13}C NMR (100 MHz, $CDCl_3$) δ 144.6, 128.8, 127.7, 126.9, 86.4, 77.9, 71.0, 63.6, 30.0, 29.7, 28.5, 23.1, 19.5. IR/cm^{-1}: 3061, 2930, 2901, 2866, 1597, 1489, 1448, 1392, 1364, 1176, 1072, 902.

5-(3,3-dimethyl-2-butoxy)-1-trityloxypentane (B15)



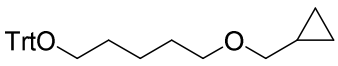
Compound **B10** (4.43 mmol) was subjected to general procedure A, using 3,3-dimethyl-2-butanol (5.06 mmol) to provide **B15** (0.95 g, 2.21 mmol) in a 50% yield, as thick oil, after silica gel column purification. R_F = 0.79 (5% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 - 7.36 (m, 6H), 7.28 - 7.11 (m, 12H), 3.53 (dt, *J* = 9.4, 5.8 Hz, 1Ha), 3.21 (dd, *J* = 9.2, 6.2 Hz, 1H), 3.06 (t, *J* = 6.6 Hz, 2H), 2.93 (q, *J* = 6.3 Hz, 1H, H-6), 1.74 - 1.35 (m, 6H), 1.01 (d, *J* = 6.3 Hz, 3H), 0.87 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.7, 129.1, 127.9, 127.0, 86.5, 83.4, 69.9, 63.8, 35.3, 30.3, 26.2, 23.4, 14.2. IR/cm^{-1} : 3059, 3022, 2936, 2866, 1597, 1489, 1448, 1389, 1362, 1219, 1090, 1072, 899.

5-(3,3-dimethyl-1-butoxy)-1-trityloxypentane (B16)



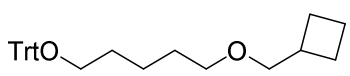
Compound **B10** (4.41 mmol) was subjected to general procedure A, using 3,3-dimethyl-1-butanol (5.07 mmol) to provide **B16** (1.02 g, 2.36 mmol) in a 54% yield, as thick oil, after silica gel column purification. R_F = 0.67 (5% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44 (dt, *J* = 8.3, 2.2 Hz, 6H), 7.25 - 7.16 (m, 6H), 7.16 - 7.10 (m, 3H), 3.41 (t, *J* = 7.4 Hz, 2H), 3.34 (t, *J* = 6.4 Hz, 2H), 3.06 (td, *J* = 6.9, 3.0 Hz, 2H), 1.63 (p, *J* = 6.8 Hz, 2H), 1.52 (q, *J* = 7.2 Hz, 4H), 1.48 - 1.38 (m, 2H), 0.90 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.7, 128.9, 127.9, 127.0, 71.0, 68.3, 63.7, 43.2, 30.1, 29.8, 23.3.. IR/cm^{-1}: 3057, 3022, 2936, 2864, 1597, 1489, 1448, 1364, 1219, 1111, 1072, 899.

5-(cyclopropylmethoxy)-1-trityloxypentane (B17)



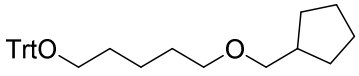
Compound **B10** (4.41 mmol) was subjected to general procedure A, using cyclopropylmethanol (5.02 mmol) to provide **B17** (0.10 g, 2.49 mmol) in a 56% yield, as thick oil, after silica gel column purification. R_F = 0.63 (10% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 - 7.41 (m, 6H, Trt), 7.28 - 7.19 (m, 6H), 7.20 - 7.13 (m, 3H), 3.38 (t, *J* = 6.6 Hz, 2H), 3.20 (d, *J* = 6.9 Hz, 2H), 3.06 (t, *J* = 6.6 Hz, 2H), 1.65 (p, *J* = 6.8 Hz, 2H), 1.55 (dq, *J* = 8.9, 6.3 Hz, 2H), 1.47 - 1.38 (m, 2H), 1.08 - 0.97 (m, 1H), 0.52 - 0.45 (m, 2H), 0.16 (dt, *J* = 6.0, 4.5 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.6, 128.8, 127.8, 126.9, 86.4, 75.7, 70.7, 63.7, 30.1, 29.8, 23.1, 10.9, 3.2. IR/cm^{-1} : 3082, 3057, 3022, 2933, 2862, 1732, 1597, 1489, 1448, 1382, 1219, 1087, 1074, 899.

5-(cyclobutylmethoxy)-1-trityloxypentane (B18)



Compound **B10** (4.40 mmol) was subjected to general procedure A, using cyclobutylmethanol (5.01 mmol) to provide **B18** (0.79 g, 1.91 mmol) in a 43% yield, as thick oil, after silica gel column purification. R_F = 0.74 (10% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 -7.43 (m, 6H) 7.22 -7.17 (m, 6H), 7.14 -7.10 (m, 3H), 3.37 -3.32 (m, 4H), 3.07 (t, 2H), 2.56 -2.49 (m, 1H), 2.04 -1.97 (m, 2H), 1.86 - 1.79 (m, 2H), 1.75 -1.40 (m, 8H, H_2-2). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.6, 128.8, 127.8, 126.9, 86.4, 75.5, 71.0, 63.6, 60.3, 35.3, 29.7, 25.2, 23.1, 18.8. IR/cm^{-1} : 3084, 3059, 2934, 2862, 1597, 1489, 1448, 1363, 1219, 1111, 1072, 898.

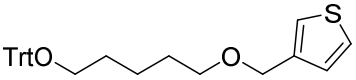
5-(cyclopentylmethoxy)-1-trityloxypentane (B19)



Compound **B10** (4.43 mmol) was subjected to general procedure A, using cyclopentylmethanol (5.09 mmol) to provide **B19** (1.29 g, 3.02 mmol) in a 68% yield, as thick oil after silica gel column purification. R_F = 0.77 (10% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44 (m, 6H), 7.18 - 7.06 (m, 9H), 3.39 - 3.29 (m, 2H), 3.21 (dd, *J* = 7.0, 1.0 Hz, 2H), 3.05 (dt, *J* = 11.1, 6.5 Hz, 2H), 2.10 (q, *J* = 7.4 Hz, 1H), 1.74 - 1.57 (m, 4H1), 1.57 - 1.36 (m, 8H), 1.31 - 1.17 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.4 -

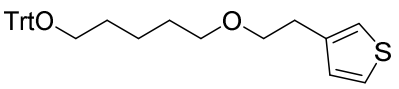
125.6, 75.2, 70.6, 63.3, 38.4, 29.4, 28.7, 25.3, 25.1, 22.8. IR/cm^{-1} : 3084, 3057, 3022, 2939, 2864, 1597, 1489, 1448, 1367, 1176, 1072.

5-(thiophen-3-methoxy)-1-trityloxypentane (B20)



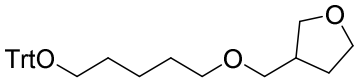
Compound **B10** (4.56 mmol) was subjected to general procedure A, using 3-thiophenmethanol (4.57 mmol) to provide **B20** (0.73 g, 2.13 mmol) in a 56% yield, as thick oil, after silica gel column purification. R_F = 0.79 (15% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 - 7.38 (m, 6H), 7.28 - 7.20 (m, 6H), 7.20 - 7.14 (m, 3H), 7.12 (dq, *J* = 3.0, 1.0 Hz, 1H), 7.04 (dd, *J* = 4.9, 1.3 Hz, 1H), 7.02 (dd, *J* = 4.9, 1.3 Hz, 1H), 4.44 (d, *J* = 0.8 Hz, 2H), 3.40 (t, *J* = 6.5 Hz, 2H), 3.05 (t, *J* = 6.6 Hz, 2H), 1.70 - 1.49 (m, 4H), 1.51 - 1.36 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.6, 128.9, 127.9, 127.4, 127.0, 126.0, 122.6, 114.7, 86.5, 70.4, 68.3, 63.7, 30.0, 29.8, 23.1. IR/cm^{-1} : 3501, 3088, 3059, 3024, 2938, 2864, 2316, 1734, 1448, 1364, 1242, 1068, 1034.

5-(thiophen-3-ethoxy)-1-trityloxypentane (B21)



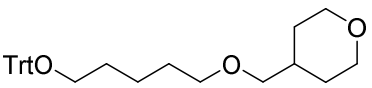
Compound **B10** (4.56 mmol) was subjected to general procedure A, using 3-thiophenethanol (4.57 mmol) to provide **B21** (0.97 g, 1.65 mmol) in a 47% yield as oil after silica gel column purification. R_F = 0.70 (10% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 - 7.38 (m, 6H), 7.33 - 7.26 (m, 6H), 7.25 - 7.11 (m, 3H), 7.04 - 6.81 (m, 2H), 4.10 (q, *J* = 7.1 Hz, 2H), 3.59 (t, *J* = 7.0 Hz, 2H), 3.41 (t, *J* = 6.5 Hz, 2H), 3.05 (t, *J* = 6.6 Hz, 2H), 2.88 (t, *J* = 7.0 Hz, 2H), 1.63 (q, *J* = 7.1 Hz, 2H), 1.59 - 1.48 (m, 2H), 1.42 (qd, *J* = 7.3, 4.0 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.5, 128.8, 128.0, 127.8, 126.9, 125.2, 121.1, 114.6, 86.4, 71.1, 71.0, 63.6, 30.8, 29.9, 29.6, 23.0. IR/cm^{-1} : 3524, 3086, 3057, 2934, 2862, 1738, 1717, 1489, 1447, 1387, 1364, 1242, 1159, 1113, 1069, 1034.

5-(R/S-tetrahydrofuran-3-ylmethoxy)-1-trityloxypentane (B11)



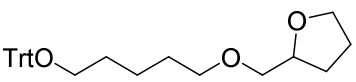
Compound **B10** (4.61 mmol) was subjected to General procedure A, using *R/S* tetrahydrofuran-3-ylmethanol (4.96 mmol) to provide **B11** (1.11 g, 2.58 mmol) in a 56% yield as oil after silica gel column purification. R_F = 0.40 (15% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 - 7.40 (m, 6H), 7.21 (dd, *J* = 8.5, 6.8 Hz, 6H), 7.16 - 7.10 (m, 3H), 3.75 (ddd, *J* = 12.1, 8.3, 6.2 Hz, 2H), 3.68 - 3.55 (m, 1H), 3.53 (dd, *J* = 8.7, 5.4 Hz, 1H), 3.40 - 3.18 (m, 4H), 3.07 (t, *J* = 6.5 Hz, 2H), 2.49 - 2.35 (m, 1H), 1.87 (ddt, *J* = 13.9, 8.1, 4.0 Hz, 1H), 1.62 (p, *J* = 6.8 Hz, 2H), 1.51 (m, 3H), 1.46 - 1.37 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.6, 128.8, 127.0, 86.4, 73.0, 71.1, 71.1, 67.8, 39.4, 30.0, 29.6, 29.2, 23.1. IR/cm^{-1} : 3445, 2934, 2866, 2347, 1716, 1489, 1448, 1339, 1163, 1074.

5-(tetrahydro-2H-pyran-4-ylmethoxy)-1-trityloxypentane (B22)



Compound **B10** (4.68 mmol) was subjected to general procedure A, using tetrahydro-2H-pyran-4-ylmethanol (4.34 mmol) to provide **B22** (0.79 g, 1.78 mmol) in a yield of 38% as oil after silica gel column purification. R_F = 0.48 (15% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.50 - 7.38 (m, 6H), 7.29 - 7.12 (m, 11H), 3.90 (ddd, *J* = 11.5, 4.6, 1.8 Hz, 2H), 3.39 - 3.26 (m, 4H), 3.20 (d, *J* = 6.5 Hz, 2H), 3.06 (t, *J* = 6.5 Hz, 2H), 1.89 - 1.71 (m, 1H), 1.70 - 1.57 (m, 4H), 1.57 - 1.47 (m, 2H), 1.47 - 1.38 (m, 2H), 1.35 - 1.25 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.5, 128.7, 127.7, 126.9, 86.4, 75.9, 71.1, 67.7, 63.5, 35.5, 30.1, 29.9, 29.6, 23.0. IR/cm^{-1} : 3085, 3056, 3023, 2932, 2849, 1558, 1506, 1506, 1489, 1227, 1163, 1097.

5-(R/S-tetrahydrofuran-1-ylmethoxy)-1-trityloxypentane (B23)

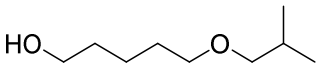


Compound **B10** (5.03 mmol) was subjected to general procedure A, using *R/S* tetrahydrofuran-1-ylmethanol (5.73 mmol) to provide **B23** (1.06 g, 2.46 mmol) in a yield of 49% as oil after silica gel column purification. R_F = 0.52 (15% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 - 7.37 (m, 6H), 7.32 - 7.23 (m, 6H), 7.23 - 7.16 (m, 3H), 4.02 (tt, *J* = 7.3, 5.3 Hz, 1H), 3.85 (ddd, *J* = 8.2, 6.9, 6.1 Hz, 1H),

3.73 (ddd, *J* = 8.2, 7.2, 6.3 Hz, 1H), 3.53 - 3.37 (m, 4H), 3.05 (t, *J* = 6.6 Hz, 2H), 1.96 - 1.77 (m, 3H), 1.69 - 1.60 (m, 2H), 1.60 - 1.52 (m, 3H), 1.47 - 1.37 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.5, 128.7, 127.7, 126.9, 86.3, 77.9, 73.6, 71.6, 68.4, 63.6, 30.0, 29.6, 28.2, 25.7, 22.9. IR/cm^{-1} : 3084, 3055, 3022, 2934, 2862, 1597, 1489, 1448, 1373, 1219, 1111, 1074.

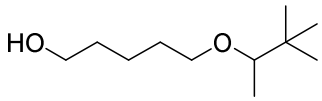
General Procedure B: Deprotection of the trityl-group. To a solution of alkyloxyl-1-trityloxpentane (2.0 mmol) in toluene/MeOH (1:1, 20 mL, 0.1 M) was added $BF_3{\cdot}Et_2O$ (3.0 mmol, 1.5 eq). This mixture was stirred for 1.5 h at r.t. After completion of the starting material (TLC monitored), the mixture was diluted with EtOAc (30 mL) and washed with sat. aq. $NaHCO_3$ (50 mL). The water layer was re-extracted with EtOAc (3 × 30 mL) and the combined organic layers were dried ($MgSO_4$), filtered, concentrated and the residue purified by silica gel column chromatography (1:9 → 1:4 → 1:1 →1:0, EtOAc:PE) to give target alcohol chains.

5-(2-methyl-1-propyloxy)-1-pentanol (B24)



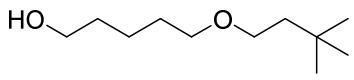
Compound **B14** (3.56 mmol) was subjected to general procedure B to provide **B24** (0.33 g, 2.07 mmol) in a yield of 73% as oil after silica gel column purification. R_F = 0.24 (20% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.46 (t, *J* = 6.6 Hz, 2H), 3.29 (t, *J* = 6.5 Hz, 2H), 3.04 (d, *J* = 6.8 Hz, 2H), 1.73 (dt, *J* = 13.4, 6.7 Hz, 1H), 1.62 - 1.39 (m, 4H), 1.38 - 1.22 (m, 2H), 0.78 (d, *J* = 0.8 Hz, 3H), 0.76 (d, *J* = 0.8 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 77.8, 70.8, 62.1, 32.3, 29.3, 28.2, 22.3, 19.3. IR/cm^{-1} : 3335, 2934, 2859, 1470, 1383, 1366, 1115, 1055, 1007.

5-(3,3-dimethyl-2-butoxy)-1-pentanol (B25)



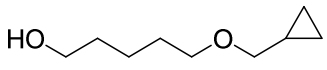
Compound **B15** (2.21 mmol) was subjected to general procedure B to provide **B27** (0.2089 g, 1.11 mmol) in a 50% yield as an oil after silica gel column purification. R_F = 0.32 (20% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.64 (t, *J* = 6.6 Hz, 2H), 3.57 (dt, *J* = 9.2, 6.1 Hz, 1H), 3.26 (dt, *J* = 9.2, 6.6 Hz, 1H), 2.95 (q, *J* = 6.3 Hz, 1H), 1.64 - 1.51 (m, 4H), 1.50 - 1.36 (m, 2H), 1.03 (d, *J* = 6.3 Hz, 3H), 0.87 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 83.4, 69.8, 62.8, 35.1, 32.5, 29.8, 26.0, 22.5, 14.0. IR/cm^{-1} : 3296, 2938, 2866, 1474, 1456, 1388, 1371, 1339, 1209, 1099, 1057.

5-(3,3-dimethyl-1-butoxy)-1-pentanol (B26)



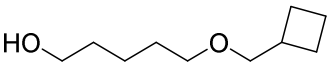
Compound **B16** (2.36 mmol) was subjected to general procedure B to provide **B26** (0.2142 g, 1.14 mmol) in a yield of 48% as oil after silica gel column purification. R_F = 0.22 (20% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.63 (t, *J* = 6.5 Hz, 2H), 3.51 - 3.36 (m, 4H), 1.60 (dq, *J* = 14.6, 6.6 Hz, 4H), 1.54 - 1.49 (m, 2H), 1.48 - 1.37 (m, 2H), 0.92 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 70.9, 68.2, 62.6, 42.9, 32.4, 29.7, 29.6, 29.5, 22.5. IR/cm^{-1}: 3345, 2938, 2864, 1472, 1364, 1244, 1194, 1113, 1055.

5-(cyclopropylmethoxy)-1-pentanol (B27)



Compound **B17** (2.49 mmol) was subjected to general procedure B to provide **B27** (0.19 g, 1.19 mmol) in a yield of 48% as oil after silica gel column purification. R_F = 0.27 (30% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.63 (t, *J* = 6.5 Hz, 2H), 3.45 (t, *J* = 6.6 Hz, 2H), 3.25 (d, *J* = 6.9 Hz, 2H), 1.61 (m, 4H), 1.49 - 1.36 (m, 2H), 1.12 - 0.98 (m, 1H), 0.59 - 0.47 (m, 4H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 75.6, 70.6, 62.5, 32.4, 29.4, 22.4, 10.6, 3.0. IR/cm^{-1} :3348, 2934, 2858, 1456, 1382, 1339, 1107, 1051.

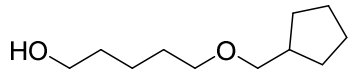
5-(cyclobutylmethoxy)-1-pentanol (B28)



Compound **B18** (1.91 mmol) was subjected to general procedure B to provide **B28** (0.18 g, 1.02 mmol) in a yield of 53% as oil after silica gel

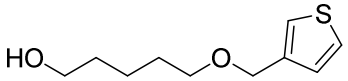
column purification. R_F = 0.41 (30% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.61 (t, *J* = 6.6 Hz, 2H), 3.42 (t, *J* = 6.5 Hz, 2H), 3.27 (d, *J* = 7.2 Hz, 2H), 2.12 - 2.18 (m, 1H), 1.81 - 1.68 (m, 1H), 1.64 - 1.50 (m, 7H), 1.47 - 1.37 (m, 2H), 1.26 - 1.15 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 75.6, 70.9, 62.4, 39.3, 32.4, 29.6, 29.3, 25.4, 22.4, 18.6. IR/cm^{-1} : 3360, 2933, 2858, 1456, 1364, 1113, 1057.

5-(cyclopentylmethoxy)-1-pentanol (*B29*)



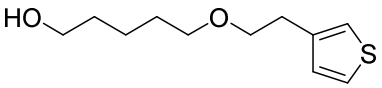
Compound **B19** (3.02 mmol) was subjected to general procedure B to provide **B29** (0.27 g, 1.43 mmol) in a yield of 47% as oil after silica gel column purification. R_F = 0.45 (30% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.63 (t, *J* = 6.5 Hz, 2H), 3.45 - 3.37 (m, 4H), 2.56 (p, *J* = 7.5 Hz, 1H), 2.11 - 2.00 (m, 2H), 1.97 - 1.79 (m, 2H1), 1.77 - 1.65 (m, 2H), 1.59 (dq, *J* = 14.6, 6.6 Hz, 4H), 1.46 - 1.37 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 75.6, 70.9, 62.6, 35.1, 32.4, 29.7, 29.3, 25.2, 22.4 IR/cm^{-1} : 3333, 2939, 2862, 1456, 1373, 1361, 1115, 1057.

5-(thiophen-3-methoxy)-1-pentanol (B30)



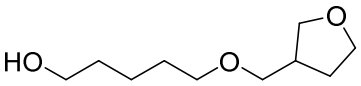
Compound **B20** (2.13 mmol) was subjected to general procedure B to provide **B30** (0.23 g, 1.15 mmol) in a yield of 69% as oil after silica gel column purification. R_F = 0.27 (30% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28 (dd, *J* = 4.9, 3.0 Hz, 1H), 7.19 (ddt, *J* = 2.1, 1.5, 0.9 Hz, 1H), 7.06 (dd, *J* = 4.9, 1.3 Hz, 1H), 4.49 (s, 2H), 3.57 (t, *J* = 6.6 Hz, 2H), 3.46 (t, *J* = 6.5 Hz, 2H), 1.66 - 1.57 (m, 2H), 1.57 - 1.50 (m, 2H), 1.45 - 1.36 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.6, 127.3, 125.9, 122.7, 70.2, 68.1, 62.4, 32.4, 29.4, 22.4.

5-(thiophen-3-ethoxy)-1-pentanol (B31)



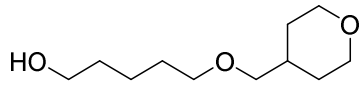
Compound **B21** (1.65 mmol) was subjected to General procedure B to provide **B31** (0.3318 g, 1.55 mmol) in a 73% yield as an oil after silica gel column purification. R_F = 0.30 (30% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.23 (dd, *J* = 4.9, 3.0 Hz, 1H), 7.00 - 7.03 (m, 1H), 6.97 (dd, *J* = 4.9, 1.3 Hz, 1H), 3.62 (m,4H), 3.45 (t, *J* = 6.5 Hz, 2H), 2.90 (td, *J* = 7.0, 0.8 Hz, 2H), 1.65 - 1.52 (m, 4H), 1.45 - 1.35 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.3, 128.5, 125.2, 121.1, 71.0, 70.9, 62.6, 32.4, 30.7, 29.4, 22.4. IR/cm^{-1}: 3360, 2934, 2860, 1456, 1418, 1348, 1250, 1225, 1155, 1094, 1053.

5-(R/S-tetrahydrofuran-3-ylmethoxy)-1-pentanol (B12)



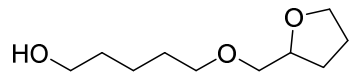
Compound **B11** (3.56 mmol) was subjected to general procedure B to provide **B12** (0.48 g, 2.56 mmol) in a yield of 72% as oil, after silica gel column purification. R_F = 0.33 (2:1, EtOAc:PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.82 (ddd, *J* = 8.4, 6.2, 2.4 Hz, 2H), 3.72 (dt, *J* = 8.4, 7.3 Hz, 1H), 3.63 - 3.52 (m, 3H), 3.47 - 3.36 (m, 3H), 3.31 (dd, *J* = 9.2, 7.9 Hz, 1H), 2.58 - 2.42 (m, 1H), 2.04 - 1.93 (m, 1H), 1.59 (dddd, *J* = 16.3, 14.7, 8.0, 4.7 Hz, 5H), 1.41 (tdd, *J* = 12.4, 6.5, 3.4 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 73.0, 71.0, 67.8, 62.4, 39.2, 32.5, 29.4, 29.1, 22.5. IR/cm^{-1}: 3385, 2934, 2858, 1456, 1375, 1211, 1113, 1072, 1056.

5-(tetrahydro-2H-pyran-4-ylmethoxy)-1-pentanol (B32)



Compound **B23** (1.78 mmol) was subjected to general procedure B to provide **B32** (0.1409 g, 0.697 mmol) in a yield of 39% as oil after silica gel column purification. R_F = 0.31 (2:1, EtOAc:PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.96 (m, 2H), 3.60 (t, *J* = 6.6 Hz, 2H), 3.45 - 3.34 (m, 4H), 3.25 (d, *J* = 6.6 Hz, 2H), 1.83 (t, *J* = 3.4 Hz, 1H), 1.70 - 1.51 (m, 6H), 1.46 - 1.36 (m, 2H), 1.36 - 1.21 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 75.9, 71.0, 67.6, 62.3, 35.3, 32.4, 29.9, 29.3, 22.4. IR/cm^{-1} : 3445, 2931, 2851, 1437, 1364, 1236, 1117, 1092, 1012, 987.

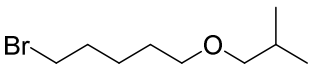
5-(R/S-tetrahydrofuran-1-ylmethoxy)-1-pentanol (B33)



Compound **B25** (2.46 mmol) was subjected to general procedure B to provide **B33** (0.35 g, 1.86 mmol) in a yield of 76% as oil after silica gel column purification. R_F = 0.28 (2:1, EtOAc:PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.04 (ddd, *J* = 12.4, 6.9, 5.2 Hz, 1H), 3.87 (dt, *J* = 8.3, 6.6 Hz, 1H), 3.81 - 3.71 (m, 1H), 3.61 (t, *J* = 6.5 Hz, 2H), 3.48 (td, *J* = 6.6, 2.2 Hz, 2H), 3.44 - 3.39 (m, 2H), 2.02 - 1.79 (m, 3H), 1.66 - 1.54 (m, 5H), 1.48 - 1.36 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 77.8, 73.4, 71.4, 68.2, 62.3, 32.4, 29.3, 28.0, 25.5, 22.3. IR/cm^{-1}: 3410, 2934, 2858, 1645, 1454, 1375, 1109, 1072, 1055.

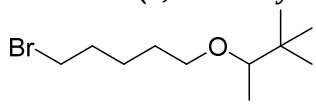
General Procedure C: Bromination. To a solution of alkyloxyl-1-pentanol (1 mmol) in DCM (100 mL, 0.01 M) was added PPh_3 (0.40 g, 1.5 mmol, 1.5 eq) and cooled to 0 ℃. Then CBr_4 (0.5 g, 1.5 mmol, 1.5 eq) was added and the reaction mixture was kept stirred at 0 ℃ until TLC monitored the completion of starting compound. After which Celite was added and the volatiles were evaporated. The residue was purified with silica gel column chromatography (0 - 100% toluene in heptane → 2 - 20% EtOAc in toluene) to give the bromide spacers.

1-bromo-5-(2-methyl-1-propyloxy)pentane (B34)



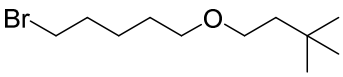
Alcohol **B24** (2.07 mmol) was subjected to general procedure C to provide **B34** (0.24 g, 1.08 mmol) in a yield of 52% after silica gel column purification. R_F = 0.71 (100% tol) ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.41 (t, *J* = 6.9 Hz, 2H). 3.40 (t, *J* = 6.3 Hz, 2H), 3.16 (d, *J* = 6.7 Hz, 2H), 1.90 - 1.85 (m, 3H), 1.65 - 1.56 (m, 2H), 1.56 - 1.47 (m, 2H), 0.90 (d, *J* = 6.7 Hz, 6H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 77.9, 70.6, 33.7, 32.6, 28.9, 28.4, 25.0, 19.4. IR/cm^{-1} : 2940, 2863, 1473, 1363, 1332, 1100.

1-bromo-5-(3,3-dimethyl-2-butoxy)pentane (B35)



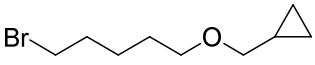
Alcohol **B25** (1.11 mmol) was subjected to general procedure C to provide **B35** (0.2477 g, 0.986 mmol) in a yield of 89% after silica gel column purification. R_F = 0.71 (1:1, PE:tol). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.56 (dt, *J* = 9.5, 5.8 Hz, 1H), 3.41 (t, *J* = 6.9 Hz, 2H), 3.24 (dt, *J* = 9.5, 6.1 Hz, 1H), 2.94 (q, *J* = 6.3 Hz, 1H), 1.88 (p, *J* = 7.0 Hz, 2H), 1.64 - 1.44 (m, 4H), 1.03 (d, *J* = 6.3 Hz, 3H), 0.87 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 83.3, 69.3, 35.1, 33.8, 32.7, 29.3, 26.0, 25.1, 13.9. IR/cm^{-1}: 2938, 2866, 1477, 1369, 1335, 1099.

1-bromo-5-(3,3-dimethyl-1-butoxy)pentane (B36)



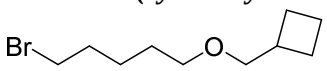
Alcohol **B26** (1.14 mmol) was subjected to general procedure C to provide **B36** (0.14 g, 0.54 mmol) in a yield of 48% after silica gel column purification. R_F = 0.71 (100% tol). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.52 - 3.36 (m, 6H), 2.00 - 1.79 (m, 2H), 1.65 - 1.55 (m, 2H), 1.55 - 1.47 (m, 4H), 0.92 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 70.6, 68.2, 43.0, 33.7, 32.7, 29.8, 29.6, 29.0, 25.0. IR/cm^{-1}: 2951, 2862, 1734, 1486, 1364, 1111.

1-bromo-5-(cyclopropylmethoxy)pentane (B37)



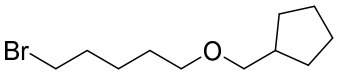
Alcohol **B27** (1.19 mmol) was subjected to general procedure C to provide **B37** (0.12 g, 0.54 mmol) in a yield of 46% after silica gel column purification. R_F = 0.52 (100% tol). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.44 (t, *J* = 6.4 Hz, 2H), 3.42 (t, *J* = 6.8 Hz, 2H), 3.25 (d, *J* = 6.9 Hz, 2H), 1.89 (dt, *J* = 14.8, 7.0 Hz, 2H), 1.67 - 1.56 (m, 2H), 1.58 - 1.47 (m, 2H), 1.13 - 0.98 (m, 1H), 0.58 - 0.49 (m, 2H), 0.20 (dt, *J* = 6.1, 4.5 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 75.6, 70.3, 33.8, 32.6, 28.9, 24.9, 10.6, 3.0. IR/cm^{-1}: 2934, 2857, 1732, 1456, 1381, 1337, 1250, 1107, 1016.

1-bromo-5-(cyclobutylmethoxy)pentane (B38)



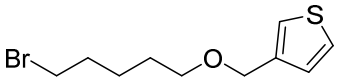
Alcohol **B28** (1.02 mmol) was subjected to general procedure C to provide **B38** (0.1276 g, 0.54 mmol) in a yield of 53% after silica gel column purification. R_F = 0.67 (100% tol) ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.41, (t, *J* = 6.7 Hz, 2H), 3.41 (t, *J* = 6.9 Hz, 2H), 3.38 (d, *J* = 6.8 Hz, 2H), 2.55 -2.59 (m, 1H), 2.14 - 2.01 (m, 2H), 1.97 - 1.81 (m, 4H), 1.80 - 1.67 (m, 2H), 1.66 - 1.56 (m, 2H), 1.56 - 1.45 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 75.6, 70.7, 35.2, 33.8, 32.6, 28.9, 25.2, 24.9, 18.6. IR/cm^{-1}: 2932, 2855, 1732, 1456, 1364, 1246, 1111.

1-bromo-5-(cyclopentylmethoxy)pentane (B39)



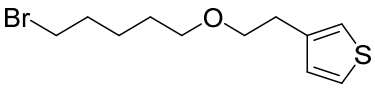
Alcohol **B29** (1.43 mmol) was subjected to general procedure C to provide **B39** (0.25 g, 1.01 mmol) in a yield of 71% after silica gel column purification. R_F = 0.71 (100% tol) ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.43 (dd, *J* = 6.7, 6.0 Hz, 2H), 3.43 (t, *J* = 6.8 Hz, 1H), 3.27 (d, *J* = 7.1 Hz, 2H), 2.13 (dq, *J* = 14.8, 7.4 Hz, 1H), 1.89 (dt, *J* = 14.1, 7.0 Hz, 2H), 1.79 - 1.66 (m, 2H), 1.64 - 1.45 (m, 8H), 1.29 - 1.16 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 75.6, 70.6, 39.5, 33.8, 32.6, 29.6, 28.9, 25.4, 25.0. IR/cm^{-1}: 2940, 2857, 1734, 1452, 1366, 1250, 1111.

1-bromo-5-(thiophen-3-methoxy)pentane (B40)



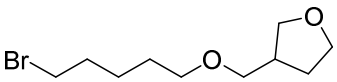
Alcohol **B30** (1.15 mmol) was subjected to general procedure C to provide **B40** (0.19 g, 0.74 mmol) in a yield of 45% after silica gel column purification. R_F = 0.67 (100% tol). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 (dd, *J* = 5.0, 3.0 Hz, 1H), 7.23 (dd, *J* = 2.9, 1.2 Hz, 1H), 7.10 (dd, *J* = 5.0, 1.2 Hz, 1H), 4.56 - 4.51 (s, 2H), 3.50 (t, *J* = 6.3 Hz, 2H), 3.44 (t, *J* = 6.8 Hz, 2H), 1.90 (p, *J* = 7.0 Hz, 2H), 1.72 - 1.59 (m, 2H), 1.62 - 1.48 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.7, 127.3, 126.0, 122.6, 70.0, 68.2, 33.8, 32.6, 28.9, 25.0. IR/cm^{-1}: 3000, 2934, 2857, 1732, 1153, 1096.

1-bromo-5-(thiophen-3-ethoxy)pentane (B41)



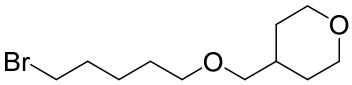
Alcohol **B31** (1.55 mmol) was subjected to general procedure C to provide **B41** (0.28 g, 0.99 mmol) in a yield of 46% after silica gel column purification. R_F = 0.67 (100% tol). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.25 - 7.21 (m, 1H), 7.00 (dq, *J* = 3.0, 1.0 Hz, 1H), 6.97 (dd, *J* = 4.9, 1.3 Hz, 1H), 3.62 (t, *J* = 7.0 Hz, 2H), 3.44 (t, *J* = 6.3 Hz, 2H), 3.39 (t, *J* = 6.8 Hz, 2H), 2.90 (td, *J* = 7.0, 0.8 Hz, 2H), 1.92 - 1.79 (m, 2H), 1.64 - 1.54 (m, 2H), 1.53 - 1.44 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.4, 128.5, 125.2, 121.1, 71.1, 70.6, 33.9, 32.6, 30.8, 28.9, 25.0. IR/cm^{-1}: 3102, 2934, 2857, 1734, 1109.

1-bromo-5-(R/S-tetrahydrofuran-3-ylmethoxy)pentane (B13)



Alcohol **B12** (1.86 mmol) was subjected to general procedure C to provide **B13** (0.58 g, 2.32 mmol) in a yield of 91% after silica gel column purification. R_F = 0.33 (5% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.87 - 3.78 (m, 2H), 3.78 - 3.66 (m, 1H), 3.56 (dd, *J* = 8.7, 5.4 Hz, 1H), 3.46 - 3.25 (m, 6H), 2.51 (tt, *J* = 7.1, 1.4 Hz, 1H), 2.06 - 1.94 (m, 1H), 1.92 - 1.83 (m, 2H), 1.65 - 1.54 (m, 3H), 1.54 - 1.45 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 73.2, 71.2, 71.0, 68.0, 39.4, 33.9, 32.8, 29.3, 29.0, 25.1. IR/cm^{-1}: 2934, 2857, 1486, 1111, 1076.

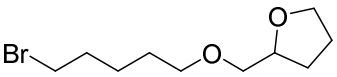
1-bromo-5-(tetrahydro-2H-pyran-4-ylmethoxy)pentane (B42)



Alcohol **B32** (0.31 mmol) was subjected to general procedure C to provide **B42** (0.061 g, 0.23 mmol) in a 33% yield after silica gel column purification. R_F = 0.35 (5% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.01 - 3.94 (m, 2H), 3.45 - 3.35 (m, 6H), 3.25 (d, *J* = 6.6 Hz, 2H), 1.93 - 1.77 (m, 3H), 1.68 - 1.55 (m, 4H), 1.55 - 1.46 (m, 2H), 1.42 - 1.19 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 76.0, 70.8, 67.8, 35.5, 33.8, 32.6, 30.0, 28.9, 24.9. IR/cm^{-1} : 2924, 2845, 1734, 1384,

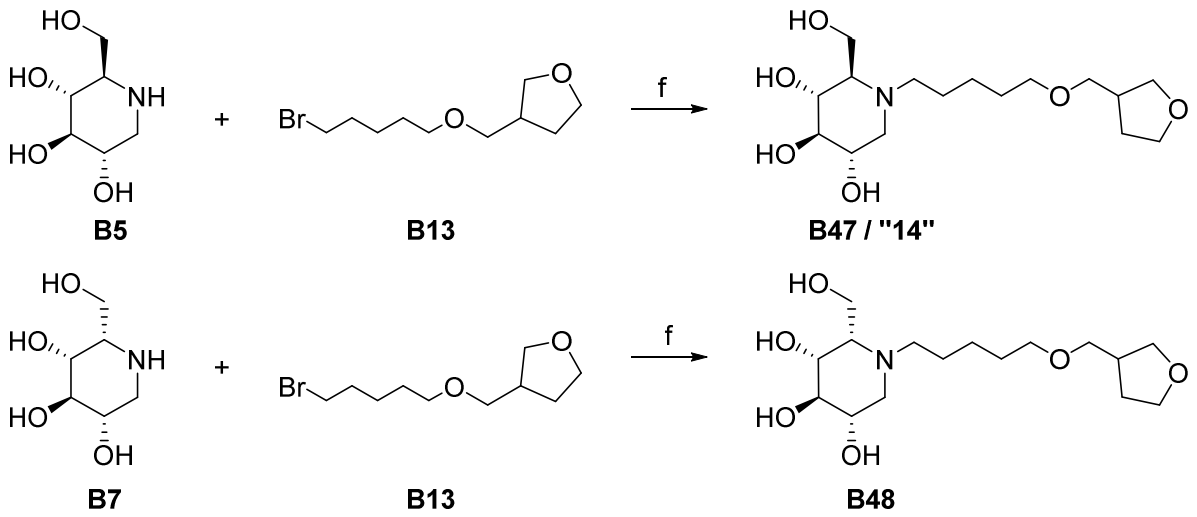
1115, 1092.

1-bromo-5-(R/S-tetrahydrofuran -1-ylmethoxy) pentane (B43)



Alcohol **B33** (1.86 mmol) was subjected to general procedure C to provide **B43** (0.33 g, 1.30 mmol) in a yield of 70% after silica gel column purification. R_F = 0.33 (5% EtOAc in PE). ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.04 (m, 1H), 3.88 (m, 1H), 3.75 (m, 1H), 3.49 (m, 2H), 3.47 - 3.39 (m, 4H), 1.99-1.83 (m, 5H), 1.66 - 1.62 (m, 3H), 1.61 - 1.53 (m, 2H). ^{13}C NMR (400 MHz, $CDCl_3$) δ 77.9, 73.6, 71.2, 68.3, 33.8, 32.6, 28.8, 28.1, 25.6, 24.9. IR/cm^{-1}: 2938, 2860, 1456, 1437, 1117, 1070.

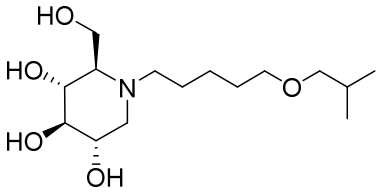
Synthesis of the Alkylated Iminosugars



Scheme S5: *N-Alkylation strategy of DNM and L-ido DNM*: [**a**] TrtCl, TEA, EtOAc, 85℃, 3h, 99%; [**b**] *p*-TsCl, TEA, DMAP, DCM, 0℃ to r.t., 2h, 70%; [**c**] 1) THF-3-yl-methanol, NaH, DMF, rt, 90 min; 2) **15**, 75℃, 1h, 56%; [**d**] $BF_3{\cdot}OEt_2$, toluene/MeOH (1:1), 1.5h, 72%; [**e**] 1) PPh_3, DCM, rt, 0 ℃; 2) CBr_4, Ar, 2h, 91%; [**f**] DMF, K_2CO_3, 80 ℃, 88% (**B47**), 30% (**B48**).

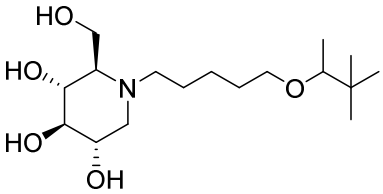
General Procedure D: Alkylation of iminosugars. To a mixture of the 1-bromo-5-alkyloxy-pentane (0.3 mmol, 1.5 eq) and di-isopropylethylamine (DiPEA, 0.1 mL, 0.6 mmol, 3 eq) was added a solution of iminosugar (0.03 g, 0.2 mmol) in DMF (1 mL). This was stirred overnight at 70 ℃. After cooling to r.t., the mixture was filtered and concentrated. The crude compound was purified using HPLC.

N-[5-(2-methyl-1-propyloxy)pentyl]-1-deoxynojirimycin (B44/11)



Bromide chain **B34** (0.19 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B44** (28 mg, 0.092 mmol, yield 46%). ^{1}H NMR (400 MHz, MeOD) δ 4.07 (d, *J* = 12.4 Hz, 1H), 3.93 (dd, *J* = 12.5, 2.9 Hz, 1H), 3.67 (td, *J* = 10.1, 4.5 Hz, 1H), 3.58 (t, *J* = 9.6 Hz, 1H), 3.47 (t, *J* = 6.3 Hz, 3H), 3.43 - 3.24 (m, 3H), 3.22 (d, *J* = 6.6 Hz, 2H), 3.10 (br s, 1H), 2.92 - 2.74 (m, 2H), 1.81 - 1.89 (m, 2H), 1.80 - 1.72 (m, 2H), 1.71 - 1.62 (m, 2H), 1.54 - 1.41 (m, 2H), 0.93 (d, *J* = 6.7 Hz, 6H), ^{13}C NMR (100 MHz, MeOD) δ 77.6, 77.2, 70.2, 68.1, 67.0, 66.1, 55.5, 54.0, 52.6, 28.9, 28.2, 23.3, 22.9, 18.3. $[\alpha]^{20}_D$: -7.17, (c = 0.56, MeOH). IR/cm^{-1}:3333, 2871, 1670, 1432, 1383, 1201, 1131, 1031. HRMS: found 306.2276 $[M+H]^+$, calculated for $[C_{15}H_{31}NO_5+H]^+$ 306.2275.

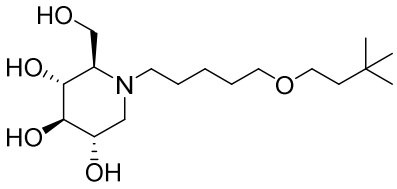
N-[5-(3,3-dimethyl-2-butoxy)pentyl]-1-deoxynojirimycin (B45/13)



Bromide chain **B35** (0.32 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B45** (31 mg, 0.094 mmol, yield 47%). ^{1}H NMR (400 MHz, MeOD) δ 4.14 (d, *J* = 12.4 Hz, 1H), 3.93 (dd, *J* = 12.6, 2.7 Hz, 1H), 3.72 (td, *J* = 10.4, 4.9 Hz, 1H), 3.68 - 3.58 (m, 3H), 3.48 (dd, *J* = 12.0, 4.9 Hz, 1H), 3.43 -

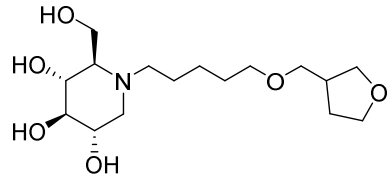
3.35 (m, 3H), 3.22 (td, *J* = 12.2, 5.1 Hz, 1H), 3.07 (br d, *J* = 9.8 Hz, 1H), 3.03 (d, *J* = 6.3 Hz, 2H), 3.01 (dd, *J* = 12.5, 10.9 Hz, 1H), 1.81 (dt, *J* = 11.1, 5.7 Hz, 2H), 1.65 (dt, *J* = 8.8, 5.8 Hz, 2H), 1.57 - 1.44 (m, 2H), 1.07 (d, *J* = 6.3 Hz, 3H), 0.90 (s, 9H). ^{13}C NMR (100 MHz, MeOD) δ 83.3, 76.7, 68.9, 67.4, 66.4, 66.0, 53.5, 53.5, 52.9, 34.6, 29.3, 25.0, 23.2, 22.6, 12.8. $[\alpha]^{20}_{D}$: -6.94 (c = 0.63, MeOH). IR/cm^{-1}:3330, 2956, 2875, 1672, 1439, 1203, 1134, 1029. HRMS: found 334.2588 $[M+H]^+$, calculated for $[C_{17}H_{35}NO_5+H]^+$ 334.2588.

N-[5-(3,3-dimethyl-1-butoxy)pentyl]-1-deoxynojirimycin (B46)



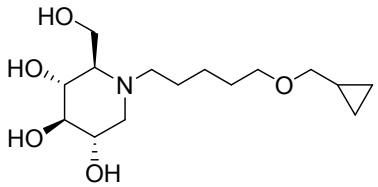
Bromide chain **B36** (0.299 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B46** (28 mg, 0.085 mmol, yield 43%). ^{1}H NMR (400 MHz, MeOD) δ 4.12 (d, *J* = 12.5 Hz, 1H), 3.93 (dd, *J* = 12.3, 2.8 Hz, 1H), 3.71 (td, *J* = 10.4, 10.0, 4.4 Hz, 1H), 3.62 (t, *J* = 9.7 Hz, 1H), 3.50 (t, *J* = 7.3 Hz, 2H), 3.50 (dd, *J* = 9.0, 1.5 Hz, 1H), 3.46 (t, *J* = 6.3 Hz, 3H), 3.43 - 3.36 (m, 2H), 3.22 (td, *J* = 12.1, 5.2 Hz, 1H), 3.07 (br d, *J* = 10.3 Hz, 1H), 3.00 (t, *J* = 11.7 Hz, 1H), 1.90 - 1.71 (m, 2H), 1.65 (ddd, *J* = 13.7, 7.5, 6.0 Hz, 2H), 1.51 (t, *J* = 7.4 Hz, 2H), 1.53 - 1.43 (m, 2H), 0.94 (s, 9H). ^{13}C NMR (100 MHz, MeOD) δ 76.7, 70.0, 67.9, 67.4, 66.4, 66.0, 53.4, 53.3, 52.9, 42.6, 29.7, 28.7, 25.8, 25.0, 22.6. $[\alpha]^{20}_{D}$: +0.56 (c = 0.57, MeOH). IR/cm^{-1}: 3343, 2954, 2870, 1673, 1433, 1203, 1134. HRMS: found 334.2589 $[M+H]^+$, calculated for $[C_{17}H_{35}NO_5+H]^+$ 334.2588.

N-[5-(R/S-tetrahydrofuran-3-ylmethoxy)pentyl]-1-deoxynojirimycin (B47/14)



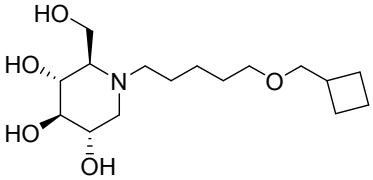
Bromide chain **B13** (0.29 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B47** (58.5 mg, 0.17 mmol, yield 88%). ^{1}H NMR (400 MHz, MeOD) δ 4.14 (d, *J* = 12.6 Hz, 1H), 3.93 (dd, *J* = 12.4, 3.0 Hz, 1H), 3.85 (dd, *J* = 8.3, 5.5 Hz, 1H), 3.83 (dd, *J* = 8.7, 7.2 Hz, 1H), 3.78 - 3.69 (m, 2H), 3.63 (t, *J* = 9.8 Hz, 1H), 3.58 (dd, *J* = 8.6, 5.5 Hz, 2H), 3.52 - 3.47 (m,1H), 3.50 (td, *J* = 6.3, 1.7 Hz, 2H), 3.44 (dd, *J* = 9.2, 6.3 Hz, 1H), 3.43 - 3.35 (m, 3H), 3.22 (td, *J* = 12.2, 5.2 Hz, 1H), 3.07 (br d, *J* = 9.9 Hz, 1H), 3.01 (t, *J* = 11.7 Hz, 1H), 2.59 - 2.48 (m, 1H), 2.04 (dddd, *J* = 12.8, 8.5, 7.7, 5.5 Hz, 1H), 1.91 - 1.72 (m, 2H), 1.72 - 1.60 (m, 3H), 1.53 - 1.47 (m, 1H). ^{13}C NMR (100 MHz, MeOD) δ 76.7, 72.5, 70.5, 70.3, 67.4, 67.3, 66.4, 66.0, 53.5, 53.5, 52.9, 39.0, 28.7, 28.5, 23.1, 22.5. IR/cm^{-1}: 3346, 2970, 2942, 1738, 1670, 1430, 1366, 1199, 1132, 898. $[\alpha]^{20}_{D}$: -1.89 (c = 1.17, MeOH). HRMS: found 334.2228 $[M+H]^+$, calculated for $[C_{16}H_{31}NO_6+H]^+$ 334.2224.

N-[5-(cyclopropylmethoxy)pentyl]-1-deoxynojirimycin (B49)



Bromide chain **B37** (0.30 mmol) was subjected to General Procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B49** (30 mg, 0.097 mmol, yield 49%). ^{1}H NMR (400 MHz, MeOD) δ 4.13 (d, *J* = 12.6 Hz, 1H), 3.94 (dd, *J* = 12.7, 3.1 Hz, 1H), 3.73 (td, *J* = 10.3, 4.7 Hz, 1H), 3.64 (t, *J* = 9.8 Hz, 1H), 3.52 (t, *J* = 6.3 Hz, 2H), 3.51 - 3.46 (m, 1H), 3.40 (t, *J* = 9.2 Hz, 1H), 3.40 - 3.36 (m, 1H), 3.30 (d, *J* = 6.9 Hz, 2H), 3.23 (td, *J* = 12.3, 5.3 Hz, 1H), 3.08 (br d, *J* = 10.1 Hz, 1H), 3.01 (t, *J* = 11.7 Hz, 1H), 1.91 - 1.73 (m, 2H), 1.72 - 1.63 (m, 2H), 1.55 - 1.45 (m, 2H), 1.06 (dddd, *J* = 13.3, 6.9, 5.0, 2.6 Hz, 1H), 0.57 - 0.51 (m, 2H), 0.22 (dt, *J* = 6.1, 4.4 Hz, 2H). ^{13}C NMR (100 MHz, MeOD) δ 76.7, 75.3, 69.8, 67.4, 66.4, 66.0, 53.6, 53.4, 52.9, 28.7, 23.1, 22.5, 10.0, 2.1. $[\alpha]^{20}_{D}$: -6.08 (c = 0.59, MeOH). IR/cm^{-1}: 3346, 2866, 1672, 1430, 1202, 1134, 1032. HRMS: found 304.2119 $[M+H]^+$, calculated for $[C_{15}H_{29}NO_5+H]^+$ 304.2118.

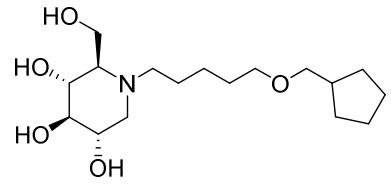
N-[5-(cyclobutylmethoxy)pentyl]-1-deoxynojirimycin (B50)



Bromide chain **B38** (0.31 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B50** (25 mg, 0.079 mmol, yield 39%). ^{1}H NMR (400 MHz, MeOD) δ 4.14 (d, *J* = 12.5 Hz, 1H), 3.93 (dd, *J* = 12.7, 3.1 Hz, 1H), 3.71 (td, *J* = 10.7, 10.2,

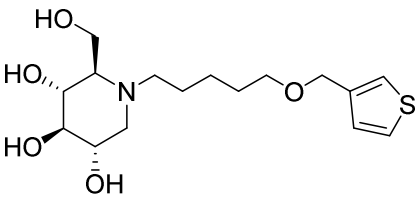
4.7 Hz, 1H), 3.63 (t, *J* = 9.8 Hz, 1H), 3.49 (t, *J* = 6.2 Hz, 2H), 3.48 (dd, *J* = 11.8, 5.2 Hz, 1H), 3.43 (d, *J* = 6.8 Hz, 2H), 3.43 - 3.36 (m, 1H), 3.39 (t, *J* = 9.4 Hz, 1H), 3.22 (td, *J* = 12.3, 5.3 Hz, 1H), 3.06 (br d, *J* = 11.2 Hz, 1H), 3.01 (t, *J* = 11.7 Hz, 1H), 2.58 (dq, *J* = 14.6, 7.3 Hz, 1H), 2.14 - 2.03 (m, 2H), 2.03 - 1.91 (m, 2H), 1.91 - 1.72 (m, 4H), 1.67 (ddd, *J* = 13.7, 7.5, 5.9 Hz, 2H), 1.49 (td, *J* = 10.6, 7.2 Hz, 2H). ^{13}C NMR (100 MHz, MeOD) δ 76.7, 75.2, 70.2, 67.4, 66.4, 66.0, 53.5, 53.4, 52.9, 35.1, 28.7, 24.6, 23.1, 22.5, 18.0. $[\alpha]^{20}_{D}$: -6.02 (c = 0.50, MeOH). IR/cm^{-1}: 3341, 2938, 2865, 1673, 1431, 1202, 1135, 1031. HRMS: found 318.2276 $[M+H]^+$, calculated for $[C_{16}H_{31}NO_5+H]^+$ 318.2275.

N-[5-(cyclopentylmethoxy)pentyl]-1-deoxynojirimycin (B51)



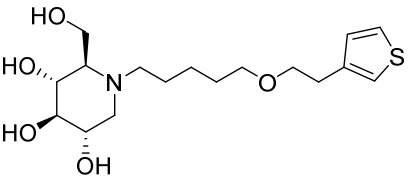
Bromide chain **B39** (0.30 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B51** (23 mg, 0.069 mmol, yield 35%). ^{1}H NMR (400 MHz, MeOD) δ 4.13 (d, *J* = 12.5 Hz, 1H), 3.93 (dd, *J* = 12.6, 3.1 Hz, 1H), 3.72 (dt, *J* = 14.7, 4.6 Hz, 1H), 3.63 (t, *J* = 9.7 Hz, 1H), 3.52 - 3.44 (m, 1H),, 3.49 (t, *J* = 6.2 Hz, 2H), 3.43 - 3.35 (m,2H), 3.33 (d, *J* = 7.1 Hz, 2H), 3.22 (td, *J* = 12.3, 5.3 Hz, 1H), 3.07 (d, *J* = 9.5 Hz, 1H), 3.00 (t, *J* = 11.7 Hz, 1H), 2.21 - 2.12 (m, 1H), 1.88 - 1.71 (m, 4H), 1.71 - 1.54 (m, 6H), 1.50 (qd, *J* = 7.9, 5.1 Hz, 2H), 1.35 - 1.22 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 76.7, 75.3, 70.1, 67.4, 66.4, 66.0, 53.5, 53.5, 52.8, 39.3, 29.2, 28.7, 25.0, 23.1, 22.7. $[\alpha]^{20}_{D}$: -4.76 (c = 0.46, MeOH). IR/cm^{-1}: 3346, 2950, 2867, 1673, 1433, 1203, 1133, 1032. HRMS: found 332.2432 $[M+H]^+$, calculated for $[C_{17}H_{33}NO_5+H]^+$ 332.2432.

N-[5-(thiophen-3-methoxy)pentyl]-1-deoxynojirimycin (B52)



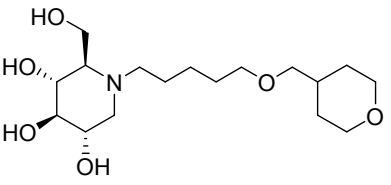
Bromide chain **B40** (0.29 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B52** (41 mg, 0.12 mmol, yield 59%). ^{1}H NMR (400 MHz, MeOD) δ 7.41 (dd, *J* = 5.0, 3.0 Hz, 1H), 7.34 - 7.31 (m, 1H), 7.10 (dd, *J* = 5.0, 1.2 Hz, 1H), 4.54 (s, 2H), 4.12 (d, *J* = 12.2 Hz, 1H), 3.92 (dd, *J* = 12.7, 3.1 Hz, 1H), 3.71 (td, *J* = 10.1, 4.5 Hz, 1H), 3.62 (t, *J* = 9.8 Hz, 1H), 3.54 (t, *J* = 6.2 Hz, 2H), 3.46 (dd, *J* = 12.1, 4.8 Hz, 1H), 3.43 - 3.36 (m, 2H), 3.21 (td, *J* = 12.3, 5.2 Hz, 1H), 3.11 - 3.02 (m, 1H), 2.99 (t, *J* = 11.7 Hz, 1H), 1.89 - 1.74 (m, 2H), 1.69 (ddd, *J* = 13.6, 7.5, 6.0 Hz, 2H), 1.53 - 1.45 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 139.5, 127.1, 125.6, 122.6, 76.7, 69.3, 67.6, 67.4, 66.4, 66.0, 53.5, 53.5, 52.9, 28.6, 23.1, 22.5. $[\alpha]^{20}_{D}$: -3.16 (c = 0.82, MeOH). IR/cm^{-1}: 3346, 2963, 2867, 1672, 1429, 1366, 1202, 1133, 1032. HRMS: found 346.1684 $[M+H]^+$, calculated for $[C_{16}H_{27}NO_5S+H]^+$ 346.1684.

N-[5-(thiophen-3-ethoxy)pentyl]-1-deoxynojirimycin (B53)



Bromide chain **B41** (0.29 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B53** (10 mg, 0.028 mmol, yield 14%). ^{1}H NMR (400 MHz, MeOD) δ 7.33 (dd, *J* = 5.0, 2.9 Hz, 1H), 7.11 (dd, *J* = 3.0, 1.1 Hz, 1H), 7.02 (dd, *J* = 4.9, 1.3 Hz, 1H), 4.12 (d, *J* = 12.5 Hz, 1H), 3.92 (d, *J* = 12.3 Hz, 1H), 3.74 - 3.70 (m, 1H), 3.68 (t, *J* = 6.7 Hz, 2H), 3.62 (t, *J* = 9.7 Hz, 1H), 3.52 (t, *J* = 6.2 Hz, 2H), 3.45 (dd, *J* = 12.1, 4.8 Hz, 1H), 3.42 - 3.34 (m, 2H), 3.23 - 3.13 (m, 1H), 3.06 - 3.00 (m, 1H), 2.97 (t, *J* = 11.7 Hz, 1H), 2.91 (dd, *J* = 7.1, 6.3 Hz, 2H), 1.86 - 1.70 (m, 2H), 1.70 - 1.62 (m, 2H), 1.52 - 1.40 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 139.3, 128.1, 124.7, 120.7, 76.8, 70.8, 69.9, 67.5, 66.4, 66.0, 53.4, 53.0, 30.2, 28.7, 24.0, 23.1. $[\alpha]^{20}_{D}$: -9.09 (c = 0.20, MeOH). IR/cm^{-1}: 3358, 3018, 2943, 2870, 1736, 1677, 1439, 1366, 1205, 1134, 1031. HRMS: found 360.1849 $[M+H]^+$, calculated for $[C_{17}H_{29}NO_5S+H]^+$ 360.1839.

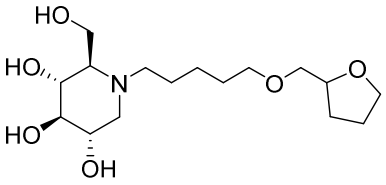
N-[5-(tetrahydro-2H-pyran-4-ylmethoxy)pentyl]-1-deoxynojirimycin (B54)



Bromide chain **B42** (0.29 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B54** (35 mg, 0.10 mmol, yield 50%). ^{1}H NMR (400 MHz, MeOD) δ 4.14 (d, *J* = 12.5 Hz, 1H), 3.92 (dd, *J* = 11.8, 2.6 Hz, 1H), 3.99 -

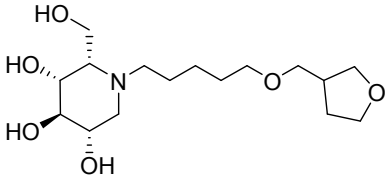
3.94 (m, 2H), 3.70 (ddd, *J* = 11.2, 9.3, 4.9 Hz, 1H), 3.62 (dd, *J* = 10.4, 9.2 Hz, 1H), 3.49 (t, *J* = 6.2 Hz, 2H), 3.48 - 3.35 (m, 5H), 3.31 (d, *J* = 6.4 Hz, 2H), 3.23 (dd, *J* = 12.1, 5.3 Hz, 1H), 3.06 (dd, *J* = 10.3, 2.7 Hz, 1H), 3.01(t, *J* = 11.7 Hz, 1H), 1.92 - 1.84 (m, 1H), 1.84 - 1.72 (m, 2H), 1.72 - 1.62 (m, 4H), 1.57 - 1.45 (m, 2H), 1.30 - 1.38 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 76.8, 75.5, 70.2, 67.3, 67.3, 66.4, 66.0, 53.5, 53.4, 52.8, 35.2, 29.6, 28.7, 23.1, 22.5. $[\alpha]^{20}_{D}$: -4.01 (c = 0.70, MeOH). IR/cm^{-1}: 3333, 2923, 2859, 1671, 1433, 1387, 1200, 1136, 1088, 1032. HRMS: found 348.2381 $[M+H]^+$, calculated for $[C_{17}H_{33}NO_6+H]^+$ 348.2381.

N-[5-(R/S-tetrahydrofuran-1-ylmethoxy)pentyl]-1-deoxynojirimycin (B55/15)



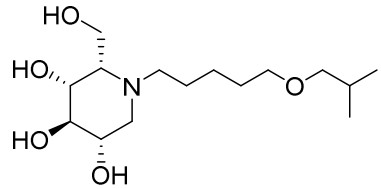
Bromide chain **B43** (0.29 mmol) was subjected to general procedure D with 1-deoxynojirimycin (0.20 mmol) to provide **B55** (10 mg, 0.030 mmol, yield 15%). ^{1}H NMR (600 MHz, MeOD) δ 4.12 (d, *J* = 11.5 Hz, 1H), 4.07 - 4.01 (m, 1H), 3.91 (dd, *J* = 12.5, 3.2 Hz, 1H), 3.85 (dt, *J* = 8.2, 6.7 Hz, 1H), 3.76 (td, *J* = 7.7, 6.1 Hz, 1H), 3.64 - 3.72 (m, 1H), 3.60 (dd, *J* = 12.7, 6.6 Hz, 1H), 3.51 (td, *J* jj= 6.2, 3.8 Hz, 1H), 3.47 - 3.34 (m, 5H), 3.20 (td, *J* = 12.4, 5.0 Hz, 1H), 3.04 (d, *J* = 9.9 Hz, 1H), 2.99 (t, *J* = 11.7 Hz, 1H), 2.01 - 1.95 (m, 1H), 1.94 - 1.87 (m, 1H), 1.87 - 1.71 (m, 2H), 1.66 (tt, *J* = 7.5, 5.9 Hz, 2H), 1.63 - 1.57 (m, 1H), 1.54 - 1.43 (m, 2H). ^{13}C NMR (150 MHz, MeOD) δ 80.3, 79.0, 75.4, 72.8, 70.1, 69.6, 68.7, 68.3, 63.2, 55.8, 55.2, 33.7, 30.8, 29.8, 27.4, 25.4. 24.7. IR/cm^{-1}: 3367, 2964, 2902, 1674, 1396, 1066. $[\alpha]^{20}_{D}$: -9.8 (c = 0.20, MeOH). HRMS: found 334.2227 $[M+H]^+$, calculated for $[C_{16}H_{31}NO_6+H]^+$ 334.2224.

N-[5-(R/S-tetrahydrofuran-3-ylmethoxy)pentyl]-L-ido-1-deoxynojirimycin (B48)



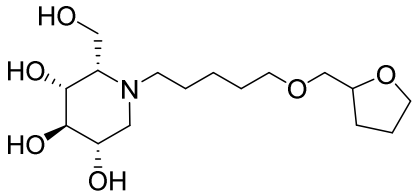
Bromide chain **B13** (0.29 mmol) was subjected to general procedure D with L-*ido*-1-deoxynojirimycin (0.20 mmol) to provide **B48** (20 mg, 0.060 mmol, yield 30%). ^{1}H NMR (400 MHz, MeOD) δ 4.05 - 3.95 (m, 3H), 3.90 (t, *J* = 3.0 Hz, 1H), 3.88 - 3.80 (m, 2H), 3.77 - 3.70 (m, 1H), 3.58 (dd, *J* = 8.6, 5.5 Hz, 1H), 3.56 - 3.52 (m, 2H), 3.50 (td, *J* = 6.3, 1.8 Hz, 2H), 3.44 (dd, *J* = 9.3, 6.2 Hz, 1H), 3.41 - 3.32 (m, 4H), 2.50 - 2.58 (m, 1H), 2.00 - 2.08 (m, 2H), 1.97 - 1.72 (m, 2H), 1.71 - 1.60 (m, 2H), 1.48 (p, *J* = 7.6 Hz, 2H). ^{13}C NMR (100 MHz, MeOD) δ 72.5, 70.9, 70.5, 70.3, 67.5, 67.3, 66.7, 62.4, 60.0, 53.7, 53.0, 39.0, 28.7, 28.5, 23.1, 21.9. IR/cm^{-1}: 3355, 2971, 1674, 1201, 1132, 1066. $[\alpha]^{20}_{D}$: +10.50 (c = 0.40, MeOH). HRMS: found 334.2230 $[M+H]^+$, calculated for $[C_{16}H_{31}NO_6+H]^+$ 334.2224.

N-[5-(2-methyl-1-propyloxy)pentyl]-L-ido-1-deoxynojirimycin (B56/12)



Bromide chain **B34** (0.19 mmol) was subjected to general procedure D with L-*ido*-1-deoxynojirimycin (0.20 mmol) to provide **B56** (28 mg, 0.092 mmol, yield 46%). ^{1}H NMR (400 MHz, MeOD) 3.85 (t, *J* = 5.7 Hz, 2H), 3.72 (dd, *J* = 8.9, 5.2 Hz, 1H), 3.61 - 3.51 (m, 1H), 3.46 (t, *J* = 6.5 Hz, 2H), 3.43 - 3.37 (m, 1H), 3.21 (d, *J* = 6.7 Hz, 2H), 3.05 (q, *J* = 5.3 Hz, 1H), 2.85 - 2.73 (m, 2H), 2.71 - 2.64 (m, 1H), 2.59 (dd, *J* = 12.4, 9.7 Hz, 1H), 1.68 - 1.50 (m, 6H), 1.41 (p, *J* = 7.4 Hz, 3H), 0.94 (s, 3H), 0.92 (s, 3H).^{13}C NMR (100 MHz, MeOD) δ 79.8, 76.8, 73.6, 72.8, 72.1, 65.2, 58.5, 56.4, 53.7, 31.5, 30.4, 29.3, 25.8, 20.6.. $[\alpha]^{20}_{D}$: +1.73, (c = 0.69, MeOH). IR/cm^{-1}:3345, 2870, 1673, 1430, 1381, 1198, 1132, 1028. HRMS: found 320.2432 $[M+H]^+$, calculated for $[C_{16}H_{33}NO_5+H]^+$ 320.2431.

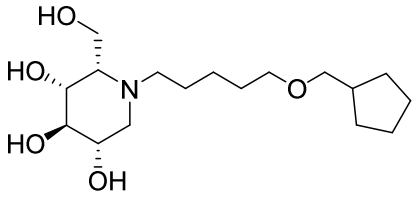
N-[5-(R/S-tetrahydrofuran-1-ylmethoxy)pentyl]-L-ido-1-deoxynojirimycin (B57)



Bromide chain **B43** (0.29 mmol) was subjected to General Procedure D with L-*ido*-1-deoxynojirimycin (0.20 mmol) to provide **B57** (23 mg, 0.069 mmol, yield 34%). ^{1}H NMR (400 MHz, MeOD) δ 4.12 - 3.94 (m, 5H), 3.93 - 3.83 (m, 2H), 3.82 - 3.74 (m, 1H), 3.58 - 3.48 (m, 5H), 3.48 - 3.29 (m, 3H), 2.08 - 1.85 (m, 4H), 1.85 - 1.73 (m, 1H), 1.70 - 1.59 (m, 3H), 1.50 (q, *J*

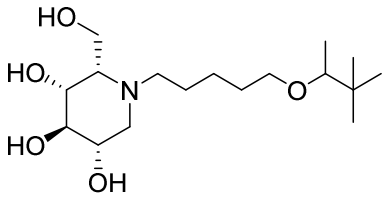
= 7.5 Hz, 2H). ^{13}C NMR (100 MHz, MeOD) δ 78.0, 73.1, 70.9, 70.6, 67.8, 67.6, 66.7, 62.4, 59.9, 53.7, 53.0, 28.6, 27.5, 25.2, 23.1, 21.8. IR/cm^{-1}: 3346, 2871, 1673, 1432, 1200, 1132, 1071. $[\alpha]^{20}_{D}$: +12.5 (c = 0.46, MeOH). HRMS: found 334.2228 $[M+H]^+$, calculated for $[C_{16}H_{31}NO_6+H]^+$ 334.2224.

N-[5-(cyclopentylmethoxy)pentyl]-L-ido-1-deoxynojirimycin (B58)



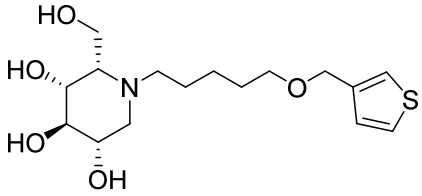
Bromide chain **B39** (0.30 mmol) was subjected to General Procedure D with L-*ido*-1-deoxynojirimycin (0.20 mmol) to provide **B58** (23 mg, 0.069 mmol, yield 35%). ^{1}H NMR (400 MHz, MeOD) δ 4.05 (br s, 1H), 4.03 - 3.94 (m, 3H), 3.90 (br s, 1H), 3.60 - 3.51 (m, 2H), 3.49 (t, *J* = 6.3 Hz, 2H), 3.40 - 3.33 (m, 5H), 2.17 (dt, *J* = 14.9, 7.6 Hz, 1H), 1.96 - 1.72 (m, 4H), 1.71 - 1.54 (m, 6H), 1.48 (p, *J* = 7.7 Hz, 2H), 1.24 - 1.32 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 75.3, 70.9, 70.2, 67.5, 66.6, 62.4, 60.0, 53.6, 53.0, 39.3, 29.2, 28.7, 25.0, 23.1, 21.9. IR/cm^{-1}: 3374, 2953, 2873, 1678, 1440, 1205, 1136, 1072. $[\alpha]^{20}_{D}$: +4.33 (c = 0.46, MeOH). HRMS: found 332.2436 $[M+H]^+$, calculated for $[C_{17}H_{33}NO_5+H]^+$ 332.2432.

N-[5-(3,3-dimethyl-2-butoxy)pentyl]-L-ido-1-deoxynojirimycin (B59)



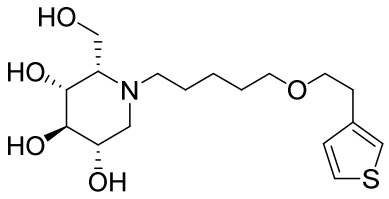
Bromide chain **B35** (0.32 mmol) was subjected to general procedure D with L-*ido*-1-deoxynojirimycin (0.20 mmol) to provide **B59** (14 mg, 0.042 mmol, yield 21%). ^{1}H NMR (400 MHz, MeOD) δ 4.05 (br s, 1H), 4.03 - 3.95 (m, 3H), 3.93 - 3.86 (m, 1H), 3.64 (ddd, *J* = 8.9, 7.6, 4.7 Hz, 1H), 3.58 - 3.47 (m, 2H), 3.41 - 3.30 (m, 4H), 3.04 (q, *J* = 6.3 Hz, 1H), 1.95 - 1.72 (m, 2H), 1.66 (dt, *J* = 12.9, 6.2 Hz, 2H), 1.56 - 1.44 (m, 2H), 1.08 (d, *J* = 6.4 Hz, 3H), 0.91 (s, 9H). ^{13}C NMR (100 MHz, MeOD) δ 83.3, 70.9, 68.9, 67.5, 66.6, 62.4, 60.0, 53.7, 53.0, 34.6, 29.4, 25.0, 23.3, 22.0, 12.8. IR/cm^{-1}: 3372, 2972, 1673, 1393, 1203, 1139, 1066. $[\alpha]^{20}_{D}$: +1.44 (c = 0.28, MeOH). HRMS: found 334.2594 $[M+H]^+$, calculated for $[C_{17}H_{35}NO_5+H]^+$ 334.2588.

N-[5-(thiophen-3-methoxy)pentyl]-L-ido-1-deoxynojirimycin (B60)



Bromide chain **B40** (0.29 mmol) was subjected to general procedure D with L-*ido*-1-deoxynojirimycin (0.20 mmol) to provide **B60** (14 mg, 0.042 mmol, yield 21%). ^{1}H NMR (400 MHz, MeOD) δ 7.41 (dd, *J* = 5.0, 2.9 Hz, 1H), 7.33 (dd, *J* = 2.8, 1.2 Hz, 1H), 7.11 (dd, *J* = 5.0, 1.2 Hz, 1H), 4.54 (d, *J* = 0.7 Hz, 2H), 4.04 (br s, 1H), 4.01 - 3.93 (m, 3H), 3.89 (t, *J* = 3.7 Hz, 1H), 3.54 (t, *J* = 6.2 Hz, 2H), 3.55 - 3.44 (m, 2H), 3.39 - 3.28 (m, 3H), 1.98 - 1.72 (m, 2H), 1.69 (dt, *J* = 8.3, 6.3 Hz, 2H), 1.50 (q, *J* = 7.6 Hz, 2H). ^{13}C NMR (100 MHz, MeOD) δ 139.5, 127.1, 125.6, 122.6, 70.9, 69.3, 67.6, 67.5, 66.6, 62.4, 60.0, 53.6, 53.0, 28.7, 23.1, 21.8. IR/cm^{-1}: 3346, 2970, 1673, 1409, 1201, 1133, 1066. $[\alpha]^{20}_{D}$: +8.28 (c = 0.29, MeOH). HRMS: found 346.1682 $[M+H]^+$, calculated for $[C_{16}H_{27}NO_5S+H]^+$ 346.1683.

N-[5-(thiophen-3-ethoxy)pentyl]-L-ido-1-deoxynojirimycin (B61)

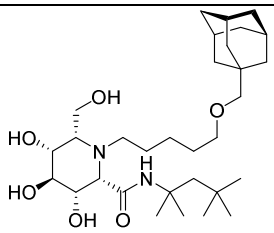
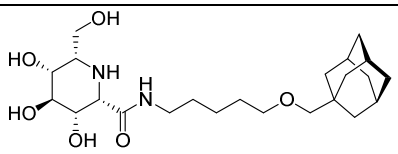
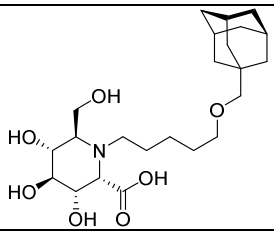
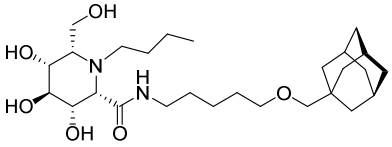
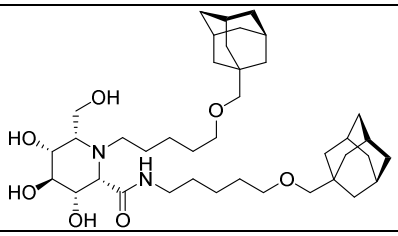
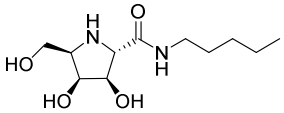
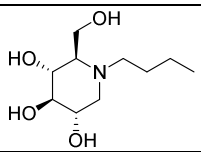


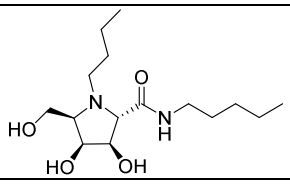
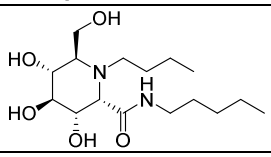
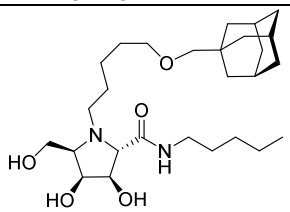
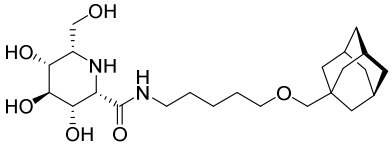
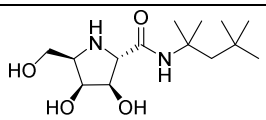
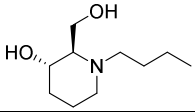
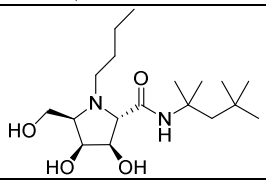
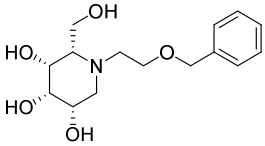
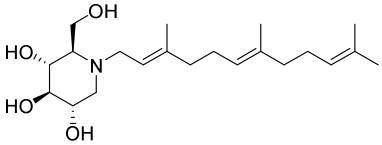
Bromide chain **B41** (0.29 mmol) was subjected to general procedure D with L-*ido*-1-deoxynojirimycin (0.20 mmol) to provide **B61** (36 mg, 0.099 mmol, yield 49%)**.** ^{1}H NMR (400 MHz, MeOD) δ 7.33 (dd, *J* = 4.9, 3.0 Hz, 2H), 7.14 - 7.09 (m, 1H), 7.02 (dd, *J* = 4.9, 1.3 Hz, 1H), 4.05 (br s, 1H), 4.01 - 3.95 (m, 3H), 3.90 (t, *J* = 3.7 Hz, 1H), 3.68 (t, *J* = 6.7 Hz, 2H), 3.56 - 3.47 (m, 2H), 3.52 (t, *J* = 6.2 Hz, 2H), 3.38 - 3.28 (m, 3H), 2.94 - 2.88 (m, 2H), 1.93 - 1.70 (m, 2H), 1.67 (dq, *J* = 8.3, 6.3 Hz, 2H), 1.53 - 1.37 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 139.3, 128.1, 124.7, 120.7, 70.9, 70.8, 70.0, 67.5, 66.6, 62.4, 60.0, 53.7, 53.0, 30.2, 28.7, 23.1, 21.8. IR/cm^{-1}: 3355, 2971, 1674, 1394, 1202, 1066. $[\alpha]^{20}_{D}$: +2.52 (c = 0.71, MeOH). HRMS: found 360.1840 $[M+H]^+$, calculated for $[C_{17}H_{29}NO_5S+H]^+$ 360.1839.

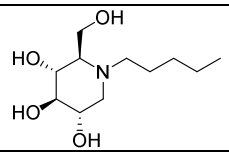
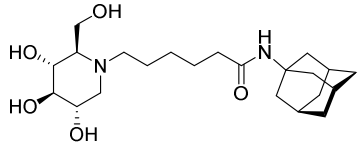
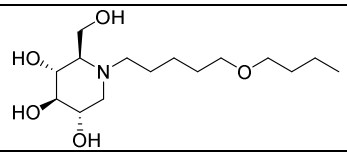
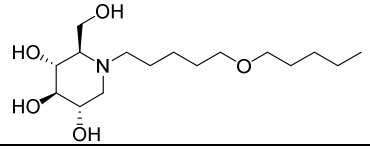
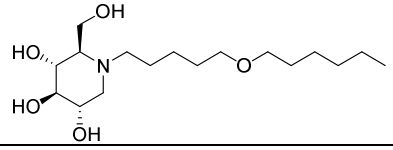
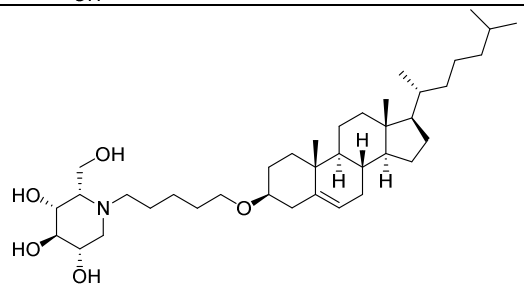
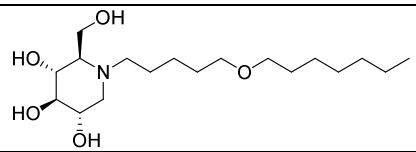
S4. Synthetic Procedure and Spectral Data of Iminosugar Library Compounds

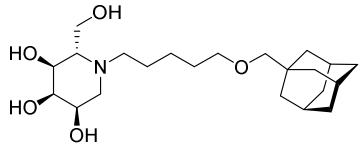
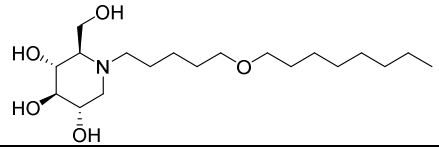
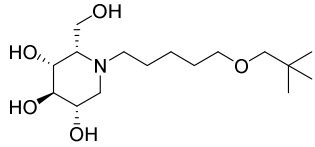
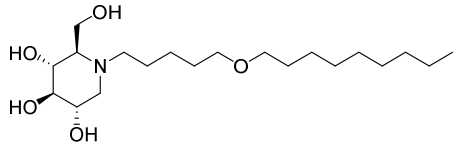
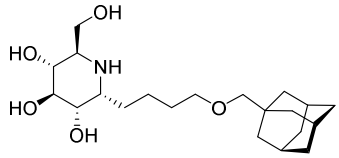
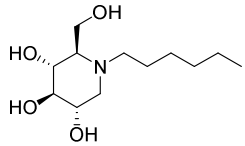
The synthesis of deoxynojirimycin congeners was performed similar as described in previous section (procedure D). For non D-*gluco* or L-*ido* configured iminosugars the procedure was slightly adjusted with the use of the proper configured deoxynojirimycin in order to obtain the desired products.[3, 4 & 5] The following list contains the chemical structures and names for all entries in the library. The spectral data are given for unpublished iminosugar derivatives (table S1).

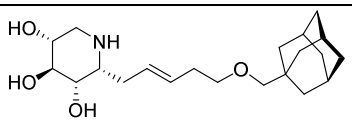
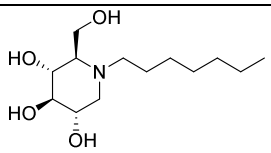
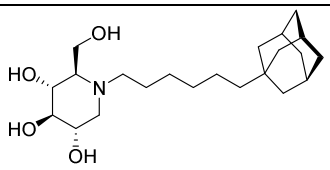
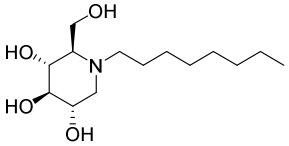
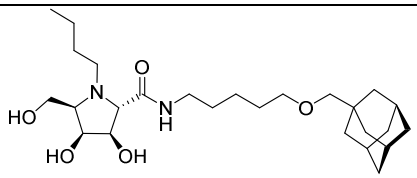
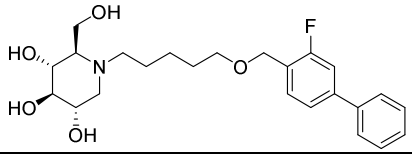
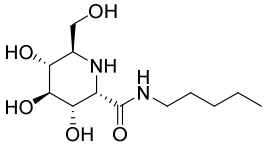
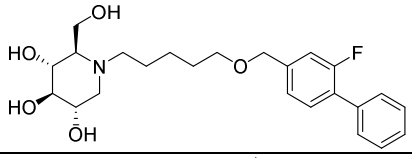
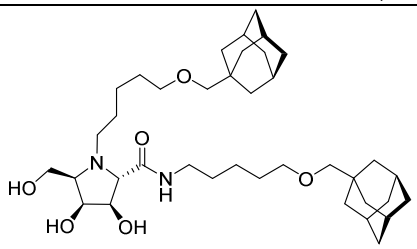
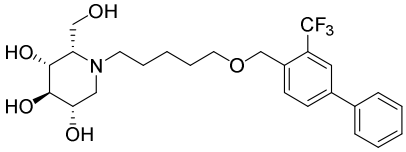
Table S1: Compound Numbering and Structures of the Iminosugar Library

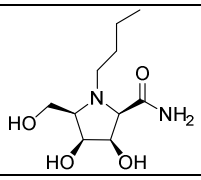
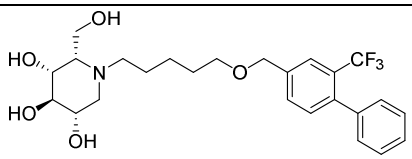
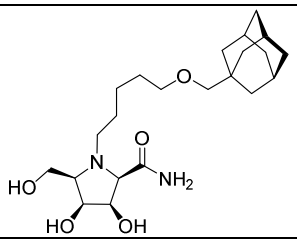
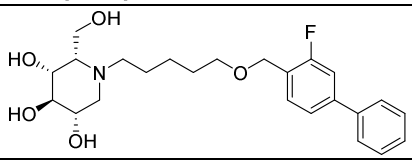
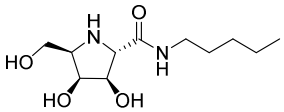
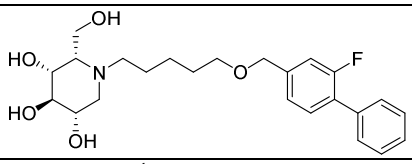
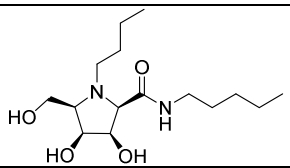
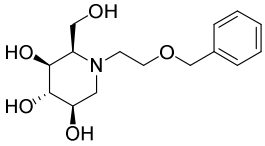
Entry	Name	Structure	Reference or Spectral Data
C1	(2S,3S,4S,5R,6S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)piperidine-2-carboxamide		[6]
C2	(2S,3S,4S,5R,6S)-N-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]
C3	(2S,3S,4S,5R,6R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxylic acid		[6]
C4	(2S,3S,4S,5R,6S)-N-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]
C5	(2S,3S,4S,5R,6S)-N,1-bis(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]
C6	(2S,3R,4S,5R)-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C7	(2R,3R,4R,5S)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]

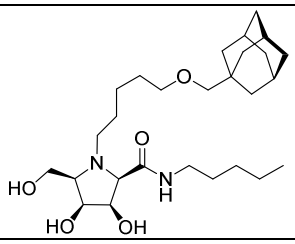
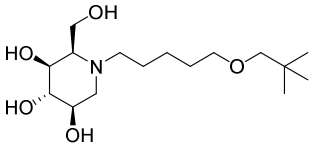
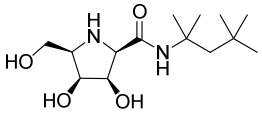
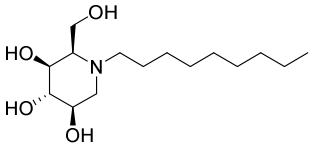
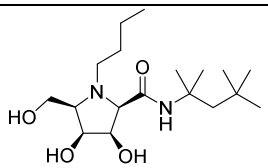
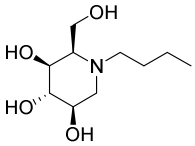
C8	(2S,3R,4S,5R)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C9	(2S,3S,4S,5R,6R)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C10	(2S,3R,4S,5R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C11	(2S,3S,4S,5R,6S)-N-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]
C12	(2S,3R,4S,5R)-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C13	(2R,3S)-1-butyl-2-(hydroxymethyl)piperidin-3-ol		[9]
C14	(2S,3R,4S,5R)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C15	(2S,3R,4S,5S)-1-(2-(benzyloxy)ethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 7.51 - 7.31 (m, 5H), 4.58 (s, 2H), 4.22 (s, 1H), 4.17 (s, 1H), 3.99 (m, 2H), 3.94 - 3.85 (m, 2H), 3.82 (s, 1H), 3.74 - 3.43 (m, 4H), 3.36 (d, *J* = 13.1 Hz, 1H). ^{13}C NMR (100 MHz, D_2O) δ 136.86, 128.90, 128.66, 128.61, 73.08, 69.88, 66.98, 66.52, 65.60, 63.00, 59.17, 55.91, 52.75. $[\alpha]^{25}_D$ = +13.0 (c = 0.4, MeOH). IR/cm^{-1}: 3341, 1674, 1435, 1200, 1130, 1042. LCMS: 10 - 50, R_t 3.10 min, $[M+H]^+$ = 298.13. HRMS : calcd for $[C_{15}H_{23}NO_5+H]^+$ 298.1649, found 298.1656 $[M+H]^+$.
C16	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-((2E,6E)-3,7,11-trimethyldodeca-2,6,10-trien-1-yl)piperidine-		^{1}H NMR (400 MHz, MeOD) δ 5.48 - 5.29 (m, 1H), 5.27 - 5.02 (m, 2H,), 4.23 - 4.05 (m, 1H), 4.04 - 3.85 (m, 2H), 3.83 - 3.73 (m, 1H), 3.73 - 3.62

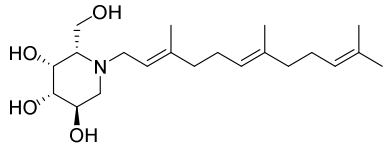
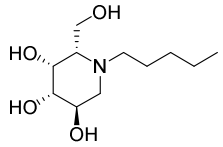
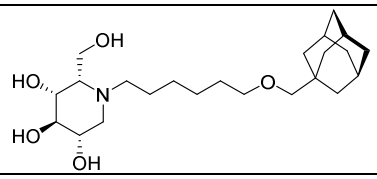
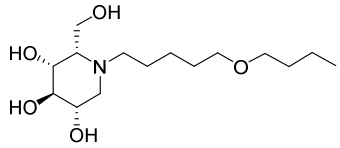
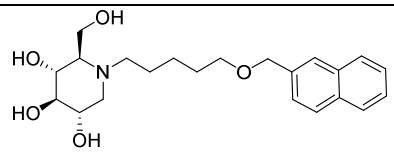
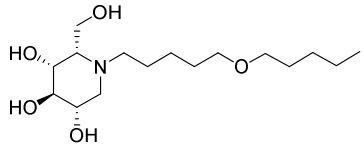
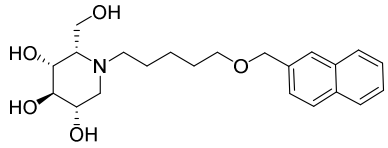
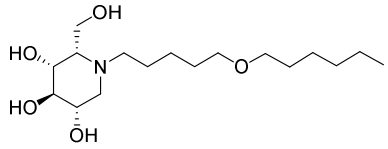
	3,4,5-triol		(m, 1H), 3.62 - 3.51 (m, 1H), 3.46 - 3.33 (m, 2H), 3.05 - 2.88 (m, 1H), 2.86 - 2.66 (m, 1H), 2.40 - 1.91 (m, 8H), 1.91 - 1.46 (m, 12H). ^{13}C NMR (50 MHz, MeOD) δ 149.1, 137.0, 132.3, 125.5, 124.8, 114.0, 78.6, 69.3, 68.2, 67.3, 55.7, 54.6, 51.7, 41.0, 40.9, 27.9, 27.3, 26.0, 17.9, 17.2, 16.3. $[\alpha]^{20}_{D}$ = −1.3 (c = 0.9, MeOH). IR/cm^{-1}: 3333, 2962, 2924, 1643, 1443, 1381, 1080, 1026. HRMS: calcd for $[C_{21}H_{37}O_4N+H]^+$ 368.2795 found 368.2820 $[M+H]^+$.
C17	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-pentylpiperidine-3,4,5-triol		[8]
C18	N-((3S,5S,7S)-adamantan-1-yl)-6-((2R,3R,4R,5S)-3,4,5-trihydroxy-2-(hydroxymethyl)piperidin-1-yl)hexanamide		[10]
C19	(2R,3R,4R,5S)-1-(5-butoxypentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C20	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(pentyloxy)pentyl)piperidine-3,4,5-triol		[8]
C21	(2R,3R,4R,5S)-1-(5-(hexyloxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C22	(2S,3R,4R,5S)-1-(5-(((3S,8S,9S,10R,13R,14S,17R)-10,13-dimethyl-17-((R)-6-methylheptan-2-yl)-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclopenta[a]phenanthren-3-yl)oxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C23	(2R,3R,4R,5S)-1-(5-(heptyloxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]

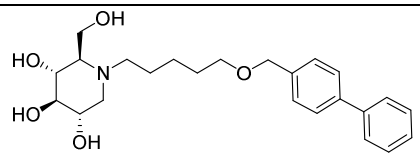
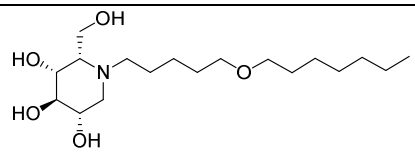
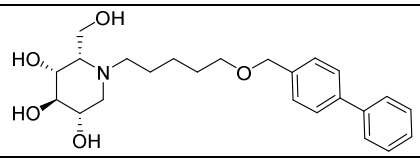
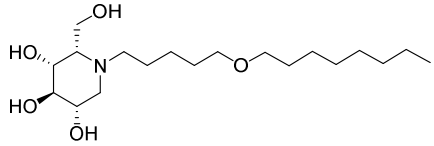
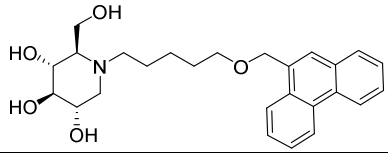
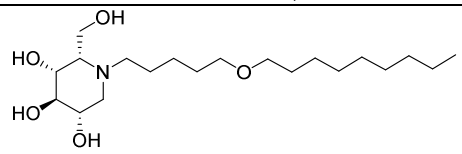
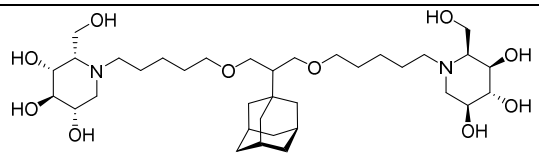
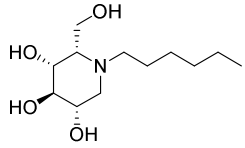
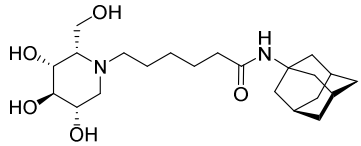
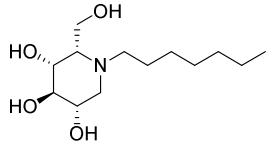
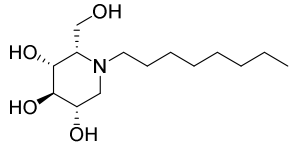
C24	(2S,3S,4R,5R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.14 (s, 1H), 4.08 - 3.94 (m, 2H), 3.94 - 3.80 (m, 2H), 3.39 (t, *J* = 6.2 Hz, 2H), 3.31 - 3.10 (m, 5H), 2.97 (s, 2H), 1.91 (s, 3H), 1.63 (m, 10H), 1.49 (s, 6H), 1.42 - 1.30 (m, 2H). ^{13}C NMR (100 MHz, D_2O) δ 81.7, 71.4, 69.5, 64.7, 63.8, 60.3, 53.6, 53.0, 48.9, 40.0, 37.0, 33.8, 28.4, 28.2, 22.8, 22.2. $[\alpha]^{25}_{D}$ = +3.5 (c = 1.3, MeOH). IR/cm^{-1}: 3368, 2901, 2847, 1670, 1454, 1188, 1134, 1080. LCMS: 10-50, R_t 9.55 min, $[M+H]^+$ = 398.33. HRMS : calcd for $[C_{22}H_{39}NO_5+H]^+$ 398.2901, found 398.2900 $[M+H]^+$.
C25	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(octyloxy)pentyl)piperidine-3,4,5-triol		[8]
C26	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(neopentyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 3.89 (d, *J* = 5.3 Hz, 2H), 3.82 (dd, *J* = 7.2, 4.2 Hz, 1H), 3.71 - 3.64 (m, 1H), 3.56 (t, *J* = 7.0 Hz, 1H), 3.43 (t, *J* = 6.3 Hz, 1H), 3.27 - 3.18 (m, 1H), 3.07 (s, 2H), 3.10 - 2.87 (m, 4H), 1.82 - 1.53 (m, 4H), 1.51 - 1.37 (m, 2H), 0.90 (s, 9H). ^{13}C NMR (100 MHz, MeOD) δ 82.4, 72.4, 72.3, 70.3, 64.0, 55.8, 55.3, 53.3, 32.9, 30.4, 26.7, 24.8, 13.3. IR/cm^{-1}: 3369, 2935, 2860, 1066. LC/MS analysis: R_t 4.98 min (linear gradient 10-90% B), ES: = 320.3 $[M+H]^+$. HRMS : calcd for $[C_{16}H_{33}O_5N+H]^+$ 320.2432 found 320. 2431 $[M+H]^+$.
C27	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(nonyloxy)pentyl)piperidine-3,4,5-triol		[8]
C28	(2R,3S,4R,5R,6R)-2-(4-(((3R,5R,7R)-adamantan-1-yl)methoxy)butyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C29	(2R,3R,4R,5S)-1-hexyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]

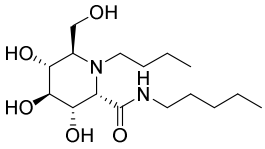
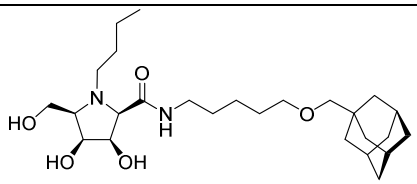
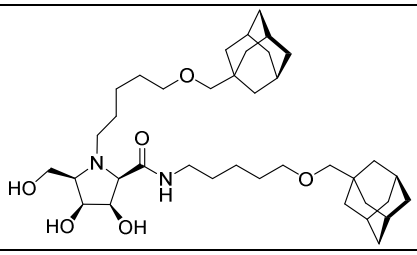
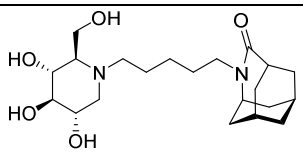
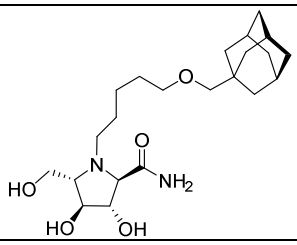
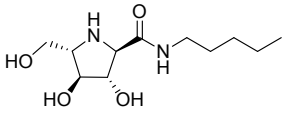
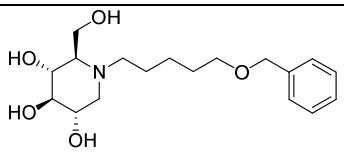
C30	(2R,3S,4S,5R)-2-((E)-5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pent-2-en-1-yl)piperidine-3,4,5-triol		[11]
C31	(2R,3R,4R,5S)-1-heptyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C32	(2R,3R,4R,5S)-1-(6-((3R,5R,7R)-adamantan-1-yl)hexyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C33	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-octylpiperidine-3,4,5-triol		[8]
C34	(2S,3R,4S,5R)-N-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C35	(2R,3R,4R,5S)-1-(5-((3-fluoro-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C36	(2S,3S,4S,5R,6R)-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C37	(2R,3R,4R,5S)-1-(5-((2-fluoro-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C38	(2S,3R,4S,5R)-N,1-bis(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C39	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((3-(trifluoromethyl)-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		[10]

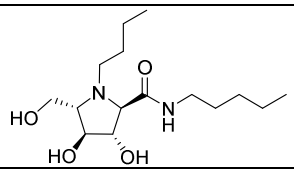
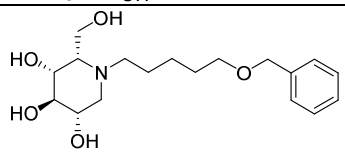
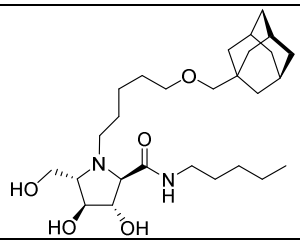
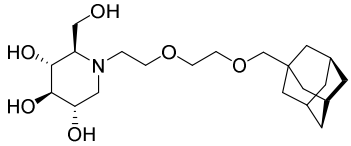
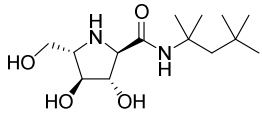
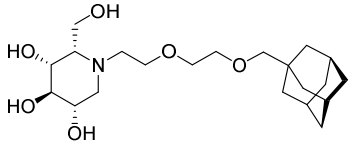
C40	(2R,3R,4S,5R)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C41	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((2-(trifluoromethyl)-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		[10]
C42	(2R,3R,4S,5R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C43	(2S,3R,4R,5S)-1-(5-((3-fluoro-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C44	(2S,3R,4S,5R)-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C45	(2S,3R,4R,5S)-1-(5-((2-fluoro-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C46	(2R,3R,4S,5R)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C47	(2R,3S,4S,5R)-1-(5-(benzyloxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 7.42 -7.24 (m, 5H), 4.60 (s, 2H), 4.05 - 3.76 (m, 5H), 3.76 - 3.27 (m, 5H). ^{13}C NMR (100 MHz, MeOD) δ 138.7, 129.6, 129.1, 129.0, 74.1, 71.63, 68.7, 68.6, 64.5, 64.1 60.2, 54.6, 54.1. $[\alpha]^{20}_{D}$ = -0.02 (c = 0.5, MeOD). IR/cm^{-1}: 3363, 1674, 1203, 1134, 1072. LC/MS analysis: R_t 3.03 min (linear gradient 10-90% B), ES : = 298.1 $[M+H]^+$. HRMS : calcd for $[C_{15}H_{23}O_5N+H]^+$ 298.1655 found 298.1660 $[M+H]^+$.

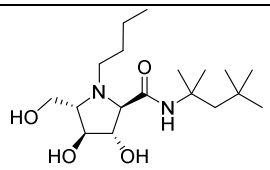
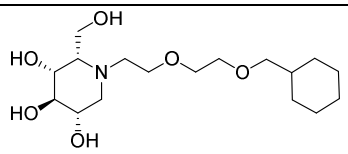
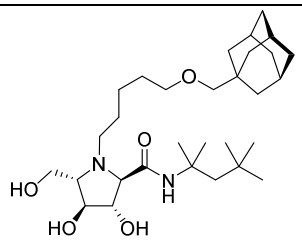
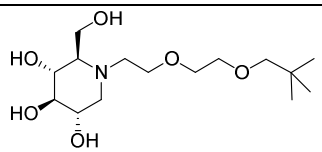
C48	(2R,3R,4S,5R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C49	(2R,3S,4S,5R)-2-(hydroxymethyl)-1-(5-(neopentyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.08 (m, 4H), 3.84 (br s, 1H), 3.53 - 3.32 (m, 7H), 3.08 (s, 2H), 1.87 - 1.73 (m, 2H), 1.69 - 1.59 (m, 2H), 1.51 - 1.43 (m, 2H), 0.91 (s, 9H). ^{13}C NMR (100 MHz, MeOD) δ 82.2, 71.8, 71.7, 68.6, 68.1, 63.4, 60.8, 54.4, 53.9, 29.9, 26.7, 24.1, 23.1. $[\alpha]^{20}_{D}$ = -0.04 (c = 0.6, MeOD). IR/cm^{-1}: 3444, 1680, 1199, 1134, 1068. LC/MS analysis: R_t 4.51 min (linear gradient 10-90% B), ES: = 320.3 $[M+H]^+$. HRMS : calcd for 320.2437 $[C_{16}H_{33}O_5N+H]^+$ found 320.2439 $[M+H]^+$.
C50	(2R,3R,4S,5R)-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C51	(2R,3S,4S,5R)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.03 - 3.87 (m, 4H), 3.82 (br s, 1H), 3.52 - 3.26 (m, 5H), 1.85 - 1.67 (m, 2H), 1.41 - 1.28 (m, 12H), 0.90 (t, J = 7.0 Hz, 3H). ^{13}C NMR (100 MHz, MeOD) δ 71.8, 68.8, 68.0, 63.6, 60.7, 54.7, 53.7, 33.0 - 23.7, 14.4. $[\alpha]^{20}_{D}$ = -0.05 (c = 0.5, MeOD). IR/cm^{-1}: 3363, 1670, 1203, 1134, 1068. LC/MS analysis: R_t 5.02 min (linear gradient 10-90% B), ES: = 290.3 $[M+H]^+$. HRMS: calcd for $[C_{16}H_{31}O_4N+H]^+$ 290.2331 found 290.2335 $[M+H]^+$.
C52	(2R,3R,4S,5R)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C53	(2R,3S,4S,5R)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.02 - 3.76 (m, 5H), 3.52 - 3.22 (m, 5H), 1.77 - 1.65 (m, 2H), 1.47 - 1.37 (m, 2H), 1.01 (t, J = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, MeOD) δ 72.6, 69.0, 64.3, 63.9, 61.1, 54.7, 25.7, 21.1, 14.0. $[\alpha]^{20}_{D}$ = -0.01 (c = 0.2, MeOD). IR/cm^{-1}: 3363, 1670, 1203, 1134, 1068. LC/MS analysis:

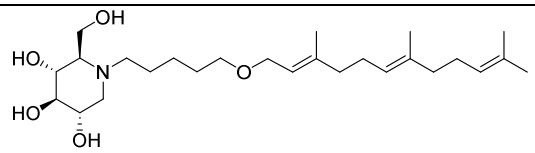
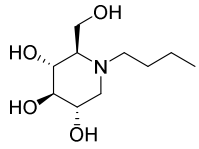
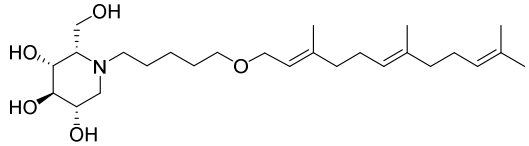
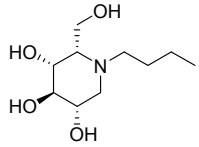
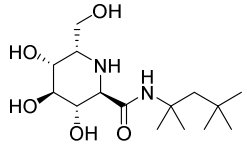
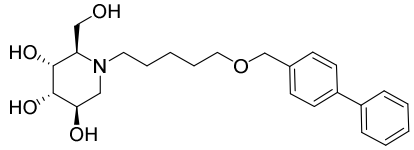
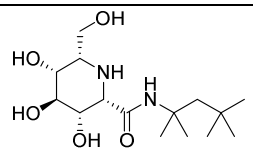
			R_t 0.73 min (linear gradient 10-90% B), ES: = 220.0 $[M+H]^+$. HRMS: calcd for $[C_{10}H_{21}O_4N+H]^+$ 220.1549 found 220.1551 $[M+H]^+$.
C54	(2S,3R,4S,5R)-2-(hydroxymethyl)-1-((2E,6E)-3,7,11-trimethyldodeca-2,6,10-trien-1-yl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 5.32 (t, *J* = 6.9, 1H), 5.17 - 5.01 (m, 2H), 3.91 (d, *J* = 5.2, 2H), 3.87 - 3.78 (m, 1H), 3.73 - 3.63 (m, 1H), 3.63 - 3.46 (m, 3H), 3.26 - 3.12 (m, 1H), 3.07 - 2.93 (m, 1H), 2.92 - 2.71 (m, 1H), 2.22 - 1.95 (m, 8H), 1.73 (s, 3H), 1.67 (s, 3H), 1.61 (s, 3H), 1.60 (s, 3H). ^{13}C NMR (100 MHz, MeOD) δ 136.7, 132.3, 125.6, 125.1, 72.7, 70.6, 64.1, 59.1, 53.1, 53.0, 41.1, 41.0, 27.9, 27.5, 26.0, 17.9, 16.9, 16.3. IR/cm^{-1}: 3317, 2962, 2916, 2862, 1666, 1443, 1381, 1242, 1072, 1042, 980. MS: found 368.5 $[M+H]^+$, calculated for $[C_{21}H_{37}O_4N+H]^+$ 368.3.
C55	(2S,3R,4S,5R)-2-(hydroxymethyl)-1-pentylpiperidine-3,4,5-triol		[8]
C56	(2S,3R,4R,5S)-1-(6-(((3S,5S,7S)-adamantan-1-yl)methoxy)hexyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C57	(2S,3R,4R,5S)-1-(5-butoxypentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C58	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(naphthalen-2-ylmethoxy)pentyl)piperidine-3,4,5-triol		[10]
C59	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(pentyloxy)pentyl)piperidine-3,4,5-triol		[8]
C60	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(naphthalen-2-ylmethoxy)pentyl)piperidine-3,4,5-triol		[10]
C61	(2S,3R,4R,5S)-1-(5-(hexyloxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]

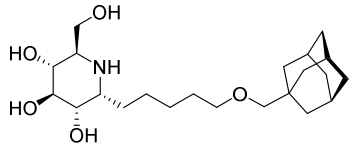
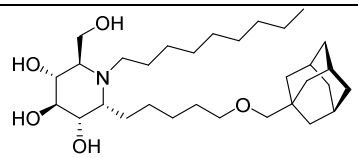
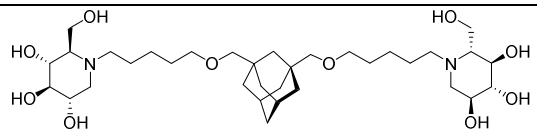
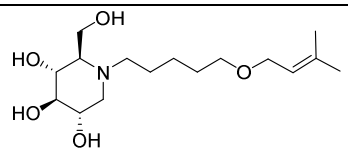
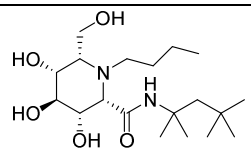
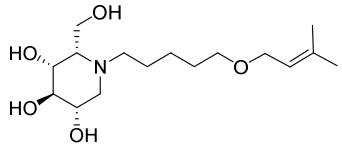
C62	(2R,3R,4R,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10
C63	(2S,3R,4R,5S)-1-(5-(heptyloxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		8
C64	(2S,3R,4R,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10
C65	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(octyloxy)pentyl)piperidine-3,4,5-triol		8
C66	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(phenanthren-9-ylmethoxy)pentyl)piperidine-3,4,5-triol		10
C67	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(nonyloxy)pentyl)piperidine-3,4,5-triol		8
C68	(2S,2'S,3R,3'R,4R,4'R,5S,5'S)-1,1'-(((2-((3S,5S,7S)-adamantan-1-yl)propane-1,3-diyl)bis(oxy))bis(pentane-5,1-diyl))bis(2-(hydroxymethyl)piperidine-3,4,5-triol)		12
C69	(2S,3R,4R,5S)-1-hexyl-2-(hydroxymethyl)piperidine-3,4,5-triol		8
C70	N-((3R,5R,7R)-adamantan-1-yl)-6-((2S,3R,4R,5S)-3,4,5-trihydroxy-2-(hydroxymethyl)piperidin-1-yl)hexanamide		10
C71	(2S,3R,4R,5S)-1-heptyl-2-(hydroxymethyl)piperidine-3,4,5-triol		8
C72	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-octylpiperidine-3,4,5-triol		8

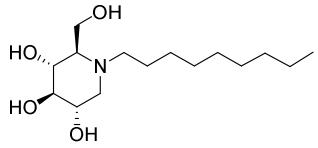
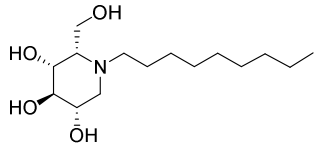
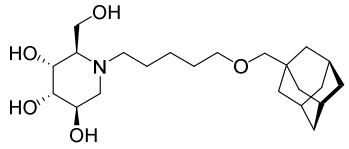
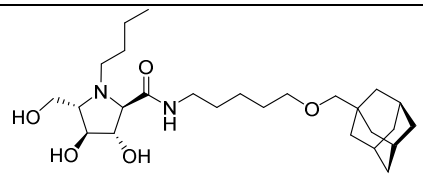
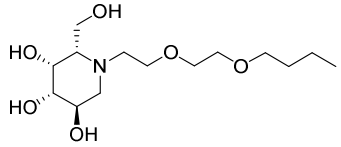
C73	(2S,3S,4S,5R,6R)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C74	(2R,3R,4S,5R)-N-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C75	(2R,3R,4S,5R)-N,1-bis(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C76	(1R,3R,8S)-4-(5-((2R,3R,4R,5S)-3,4,5-trihydroxy-2-(hydroxymethyl)piperidin-1-yl)pentyl)-4-azatricyclo[4.3.1.13,8]undecan-5-one		^{1}H NMR (400 MHz, MeOD) δ 4.02 (dd, *J* = 11.6, 76.8, 2H), 3.85 - 3.74 (m, 3H), 3.68 - 3.59 (m, 1H), 3.54 - 3.30 (m, 6H), 3.16-3.07 (m, 1H), 2.79 (*t*, *J* = 4.0, 1H), 2.08 - 2.01 (m, 4H), 1.88 (s, 4H), 1.82 (d, *J* = 13.6, 4H), 1.77 (s, 2H), 1.62 (t, *J* = 7.2, 2H), 1.45 - 1.37 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 181.0, 68.4, 67.3, 67.0, 60.6, 58.2, 55.1, 54.5, 49.2, 46.8, 43.4, 36.2, 36.2, 34.9, 31.7, 27.7, 27.1, 24.3. $[\alpha]^{20}_{D}$ = - 0.00 (c = 0.4, MeOD). IR/cm^{-1}: 3363, 1666, 1203, 1134, 1091, 1029. LC/MS analysis: R_t 4.02 min (linear gradient 10-90% B), ES: = 397.3 $[M+H]^+$. HRMS: calcd for $[C_{21}H_{36}O_5N_2+H]^+$ 397.2702 found 397.2702 $[M+H]^+$.
C77	(2R,3S,4S,5S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C78	(2R,3S,4S,5S)-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C79	(2R,3R,4R,5S)-1-(5-(benzyloxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]

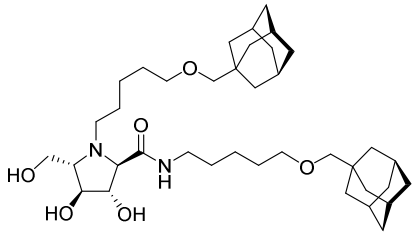
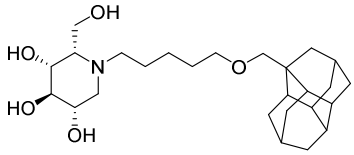
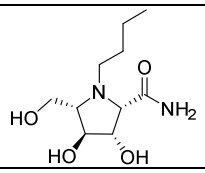
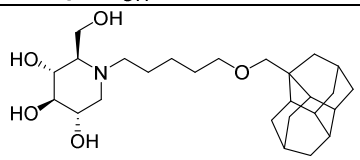
C80	(2R,3S,4S,5S)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C81	(2S,3R,4R,5S)-1-(5-(benzyloxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C82	(2R,3S,4S,5S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C83	(2R,3R,4R,5S)-1-(2-(2-(((3R,5R,7R)-adamantan-1-yl)methoxy)ethoxy)ethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, $CDCl_3$) δ 3.94 (dd, *J* = 12.2, 2.6 Hz, 1H), 3.86 (dd, *J* = 12.2, 2.5 Hz, 1H), 3.66 (t, *J* = 5.4 Hz, 2H), 3.63 - 3.58 (m, 2H), 3.57 - 3.52 (m, 3H), 3.50 (ddd, *J* = 10.4, 9.3, 4.8 Hz, 1H), 3.39 (t, *J* = 9.3 Hz, 1H), 3.17 (t, *J* = 9.1 Hz, 1H), 3.15 - 3.06 (m, 2H), 2.81 (dt, *J* = 14.4, 4.8 Hz, 1H), 2.40 (t, *J* = 11.0 Hz, 1H), 2.33 (dt, *J* = 9.5, 2.4 Hz, 1H), 1.95 (s, 3H), 1.82 - 1.64 (m, 6H), 1.57 (m, 6H). ^{13}C NMR (100 MHz, MeOD) δ 83.5, 80.2, 72.2, 71.5, 71.4, 70.3, 69.1, 67.7, 58.8, 58.2, 52.8, 40.7, 38.3, 35.1, 29.7. $[\alpha]^{20}_D$ = -0.01 (c = 1.3, MeOD). IR/cm^{-1}: 3363, 2900, 2846, 1454, 1246, 1091, 1037, 1014. LC/MS analysis: R_t 5.20 min (linear gradient 10-90% B), ES: = 400.3 $[M+H]^+$. HRMS: calcd for $[C_{21}H_{37}NO_6+H]^+$: 400.2699. found 400.2700 $[M+H]^+$.
C84	(2R,3S,4S,5S)-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C85	(2S,3R,4R,5S)-1-(2-(2-(((3S,5S,7S)-adamantan-1-yl)methoxy)ethoxy)ethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, $CDCl_3$) δ 4.03-3.86 (br m, 6H), 3.82 (br s, 1H), 3.68 - 3.44 (m, 9H), 3.04 (s, 2H), 1.95 (b s, 3H), 1.78 - 1.67 (m, 6H), 1.57 (m, 6H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 83.2, 71.9, 71.7, 71.2, 68.9, 68.8, 65.9, 64.2, 59.9, 54.1, 40.3, 37.9, 29.3. $[\alpha]^{20}_D$ = 0.03 (c = 0.7, MeOD). IR/cm^{-1}: 3313, 2900, 2846, 1674, 1203, 1134, 1080. LC/MS analysis: R_t

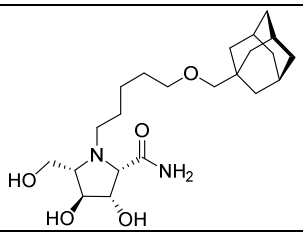
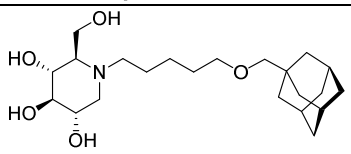
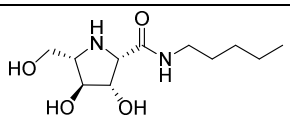
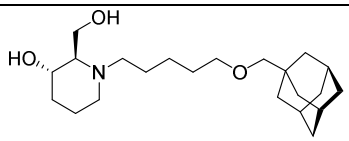
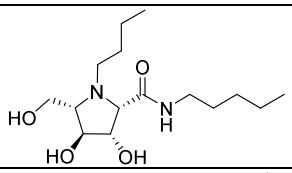
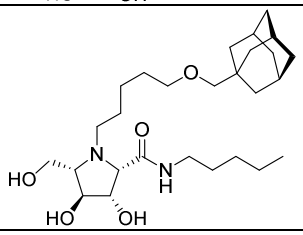
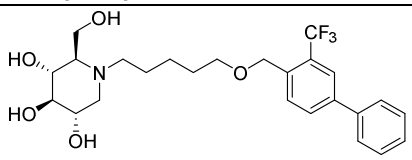
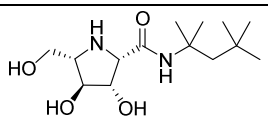
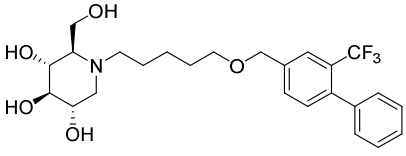
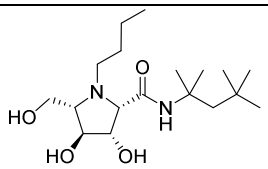
			5.32 min (linear gradient 10-90% B), ES: = 400.3 $[M+H]^+$. HRMS: calcd for $[C_{21}H_{37}O_6N+H]^+$ 400.2699 found 400.2698 $[M+H]^+$.
C86	(2R,3S,4S,5S)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C87	(2S,3R,4R,5S)-1-(2-(2-(cyclohexylmethoxy)ethoxy)ethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, $CDCl_3$) δ 4.08 (d, *J* = 12.8 Hz, 1H), 3.98 (dd, *J* = 12.5, 3.0 Hz, 1H), 3.88 (t, *J* = 4.8 Hz, 2H), 3.71 (ddd, *J* = 11.0,9.2, 5.0 Hz, 1H), 3.67 - 3.58 (m, 6H), 3.55 (dd, *J* = 12.3, 4.8 Hz, 1H), 3.43 (dt, *J* = 14.9, 4.9 Hz, 1H), 3.36 (t, *J* = 9.2 Hz, 1H), 3.29 (d, *J* = 6.6 Hz, 2H), 3.13 (d, *J* = 10.0 Hz, 1H), 3.06 (t, *J* = 11.7 Hz, 1H), 1.81 - 1.65 (m, 4H), 1.63 - 1.56 (m, 1H), 1.33 - 1.19 (m, 4H), 1.01 - 0.88 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 78.3, 78.2, 71.4, 71.30, 68.9, 68.3, 67.8, 65.8, 55.3, 55.1, 53.4, 39.14, 31.11, 27.69, 26.92. $[\alpha]^{20}_D$ = 0.07 (c = 1.2, MeOD). IR/cm^{-1}: 3390, 2924, 1670, 1203, 1134, 1091, 1037. LC/MS analysis: R_t 4.37 min (linear gradient 10-90% B), ES: = 348.3 $[M+H]^+$. HRMS: calcd for $[C_{17}H_{33}NO_6+H]^+$: 348.2386. found: 348.2385.
C88	(2R,3S,4S,5S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C89	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(2-(2-(neopentyloxy)ethoxy)ethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 3.94 (dd, *J* = 12.2, 2.7 Hz, 1H), 3.87 (dd, *J* = 12.2, 2.6 Hz, 1H), 3.71 - 3.66 (m, 2H) 3.64 - 3.61 (m, 2H), 3.59 - 3.56 (m, 2H), 3.51 (ddd, *J* = 10.6, 9.2, 4.9 Hz, 1H), 3.40 (t, *J* = 9.4 Hz, 1H), 3.18 (t, *J* = 9.1 Hz, 1H), 3.17 -3.11 (m, 3H), 2.93 - 2.77 (m, 1H), 2.44 (t, *J* = 11.1 Hz, 1H), 2.38 (dt, *J* = 9.9, 2.3 Hz, 1H), 0.91 (s, 9H). ^{13}C NMR (100 MHz, MeOD) δ 82.9, 80.1, 72.10, 71.54, 71.2, 70.1, 68.9, 67.8, 58.6, 58.0, 52.9, 27.1 . IR/cm^{-1}: 3367, 2954, 2904, 2866, 2461, 1658, 1087,

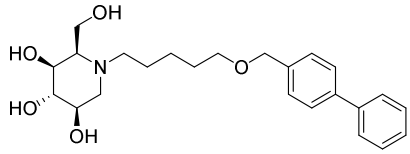
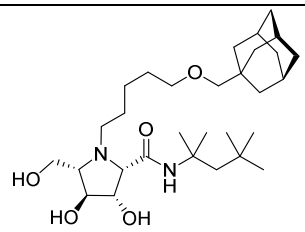
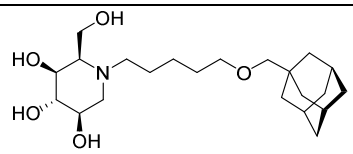
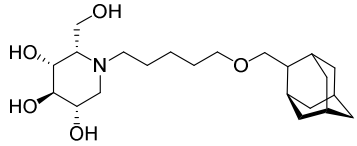
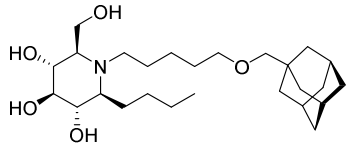
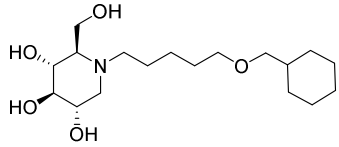
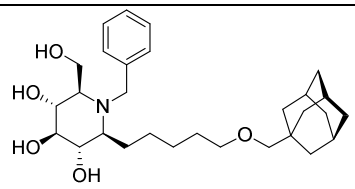
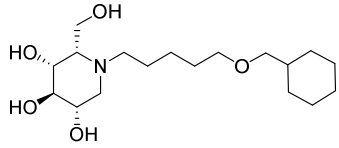
			1037. LC/MS analysis: R_t 3.77 min (linear gradient 10-90% B), ES: = 322.2 $[M+H]^+$. HRMS: calcd for $[C_{15}H_{31}O_6N+H]^+$ 322.2230 found 322.2230 $[M+H]^+$.
C90	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(((2E,6E)-3,7,11-trimethyldodeca-2,6,10-trien-1-yl)oxy)pentyl)piperidine-3,4,5-triol		[10]
C91	(2R,3R,4R,5S)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C92	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(((2E,6E)-3,7,11-trimethyldodeca-2,6,10-trien-1-yl)oxy)pentyl)piperidine-3,4,5-triol		[10]
C93	(2S,3R,4R,5S)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C94	(2R,3S,4S,5R,6S)-3,4,5-trihydroxy-6-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)piperidine-2-carboxamide		[6]
C95	(2R,3R,4S,5R)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 7.19 - 7.09 (m, 4H), 6.99 (d, *J* = 8.0 Hz, 2H), 6.93 (dd, *J* = *J* = 7.5 Hz, 2H), 6.90 - 6.82 (m, 1H),4.13 (s, 2H), 4.07 (dd, *J* = 10.5, 2.1 Hz, 1H), 4.03 - 3.88 (m, 3H), 3.76 (d, *J* = 12.1 Hz, 1H), 3.20 (d, *J* = 12.4 Hz, 1H), 3.15 - 2.92 (m, 6H), 1.49 - 1.24 (m, 4H), 1.13 - 0.95 (m, 2H). ^{13}C NMR (100 MHz, D_2O) δ 140.0, 139.6, 137.1, 128.7, 128.4, 127.2, 126.6, 71.8, 69.6, 68.0, 66.1, 62.9, 61.3, 54.1, 52.8, 51.2, 28.4, 22.6, 21.7. $[\alpha]^{20}_D$ = -2.8 (c = 0.5, MeOH). IR/cm^{-1}: 3366, 2920, 2862, 1674, 1204, 1134, 1090, 1076. LCMS: 10-50, R_t 7.84 min, $[M+H]^+$ = 416.2.
C96	(2S,3S,4S,5R,6S)-3,4,5-trihydroxy-6-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)piperidine-2-carboxamide		[6]

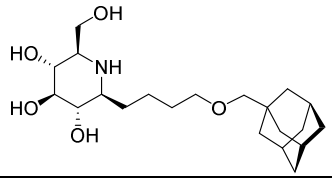
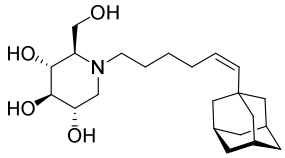
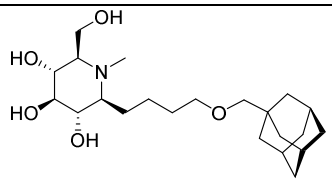
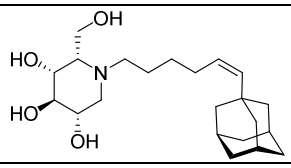
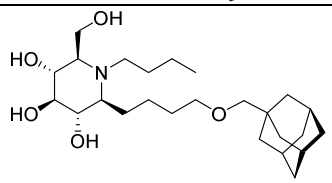
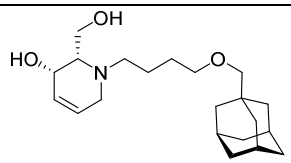
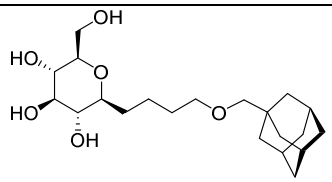
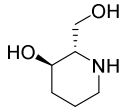
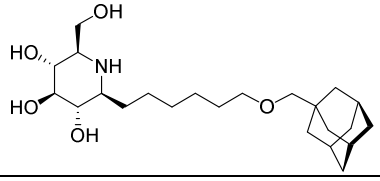
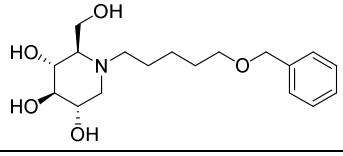
C97	(2R,3S,4R,5R,6R)-2-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C98	(2R,3S,4R,5R,6R)-2-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-6-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		[11]
C99	(2R,2'R,3R,3'R,4R,4'R,5S,5'S)-1,1'-(((((1S,3S,5R,7R)-adamantane-1,3-diyl)bis(methylene))bis(oxy))bis(pentane-5,1-diyl))bis(2-(hydroxymethyl)piperidine-3,4,5-triol)		[12]
C100	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((3-methylbut-2-en-1-yl)oxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (600 MHz, $CDCl_3$) δ 5.28 - 5.21 (m, 1H), 5.10 - 5.01 (m, 1H), 3.93 - 3.87 (m, 2H), 3.56 -3.40 (m, 3H), 3.30 - 3.16 (m, 2H), 3.05 (dd, *J* = 11.1, 4.3 Hz, 1H), 2.26 - 2.18 (m, 2H), 2.11 - 2.00 (m, 4H), 1.66 (s, 6H), 1.59 (s, 3H). ^{13}C NMR (150 MHz, $CDCl_3$) δ 142.4, 133.1, 125.0, 118.8, 80.3, 71.6, 70.4, 66.8, 59.0, 57.2, 51.4, 41.3, 27.7, 26.8, 18.8, 17.5. $[\alpha]^{20}_D$ = - 14.72 (c = 0.98, $CHCl_3$). LC/MS analysis: R_t 5.17 min (linear gradient 0-90% B), ES: = 300.3 $[M+H]^+$, 599.4 $[2M + H]^+$. HRMS: calcd for $[C_{16}H_{31}NO_5+H]^+$ 300.2169, found 300.2169 $[M+H]^+$.
C101	(2S,3S,4S,5R,6S)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)piperidine-2-carboxamide		[6]
C102	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((3-methylbut-2-en-1-yl)oxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, $CDCl_3$) δ 5.31 - 5.25 (m, 1H), 5.17 - 5.10 (m, 1H), 3.93 - 3.83 (m, 2H), 3.87 (dd, *J* = 5.1, 8.6, 1H), 3.60-3.52 (m, 1H), 3.45 (t, *J* = 7.1, 1H), 3.40-3.29 (m, 2H), 3.03 (dd, *J* = 5.2, 10.6, 1H), 2.83 (dd, *J* = 4.8, 12.4, 1H), 2.58 (dd, *J* = 9.3, 12.4, 1H), 2.19 - 2.03 (m, 4H), 1.71 (s, 6H), 1.63 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 132.5, 125.2, 122.7, 75.8, 72.7, 71.2, 64.1, 57.9, 53.0, 52.3, 40.9, 40.1, 27.5, 25.9, 17.8, 16.5. $[\alpha]^{20}_D$ = + 4.71 (c = 0.42, $CHCl_3$). LC/MS analysis: R_t 5.48 min (linear

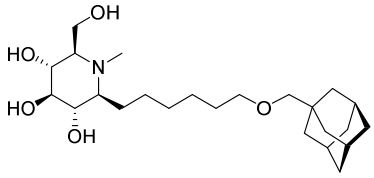
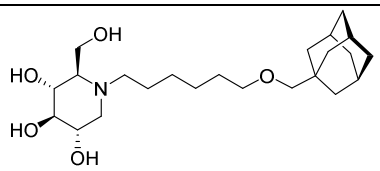
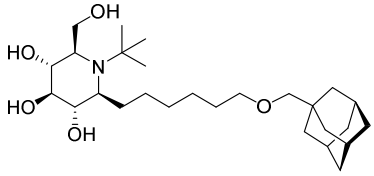
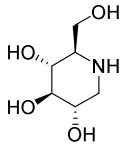
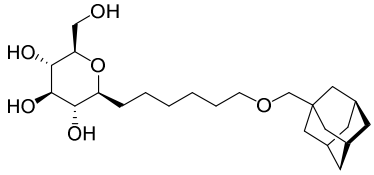
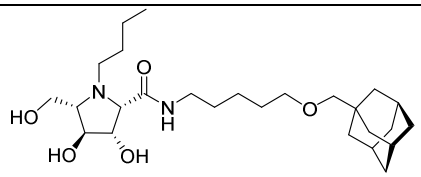
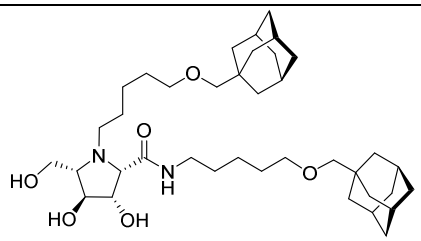
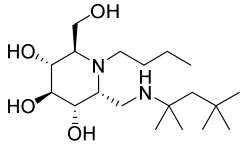
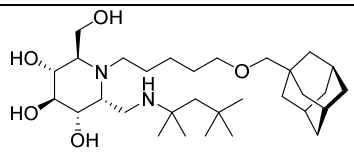
			gradient 0-90% B), ES: = 300.3 $[M+H]^+$, 599.8 $[2M + H]^+$. HRMS: calcd for $[C_{16}H_{31}NO_5+H]^+$ 300.2169, found 300.2169 $[M+H]^+$.
C103	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		[8]
C104	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		[8]
C105	(2R,3R,4S,5R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.17 - 4.08 (m, 2H), 4.09 - 3.89 (m, 3H), 3.48 (d, *J* = 12.5 Hz, 1H) 3.42 (t, *J* = 6.2 Hz, 2H), 3.37 - 3.21 (m, 4H), 3.00 (s, 2H), 1.92 (s, 3H), 1.82 - 1.54 (m, 10H), 1.50 (s, 6H), 1.45 - 1.31 (m, 2H). ^{13}C NMR (100 MHz, D_2O) δ 81.7, 71.4, 68.0, 66.1, 62.9, 61.3, 54.2, 53.0, 514, 39.3, 36.9, 33.74, 28.31, 28.14, 22.74, 21.81. $[\alpha]^{20}_D$ = +1.0 (c = 0.5, MeOH). IR/cm^{-1}: 3368, 2901, 2847, 1674, 1458, 1204, 1134, 1092. HRMS: calcd for $[C_{22}H_{39}NO_5+H]^+$ 398.2901, found 398.2896 $[M+H]^+$.
C106	(2R,3S,4S,5S)-N-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C107	(2S,3R,4S,5R)-1-(2-(2-butoxyethoxy)ethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.04 - 3.78 (m, *7*H), 3.69 - 3.58 (m, 6H), 3.53 - 3.58 (m, 5H), 1.64 - 1.49 (m, 2H), 1.46 - 1.32 (m, 2H), 0.94 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, MeOD) δ 72.4, 72.2, 71.4, 71.1, 69.2, 67.7, 66.1, 64.7, 60.8, 54.5, 32.8, 20.3, 14.3. $[\alpha]^{20}_D$ = 0.03 (c = 0.5, MeOD). IR/cm^{-1}: 3398, 2958, 2495, 1670, 1458, 1203, 1138, 1087. LC/MS analysis: R_t 3.07 min (linear gradient 10-90% B), ES: = 308.2 $[M+H]^+$. HRMS: calcd for $[C_{14}H_{29}O_6N+H]^+$ 308.2073 found 308.2074 $[M+H]^+$.

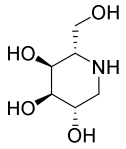
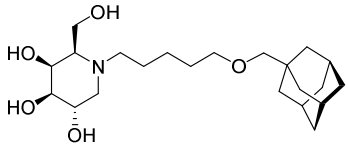
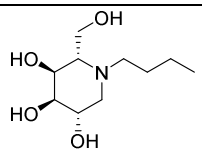
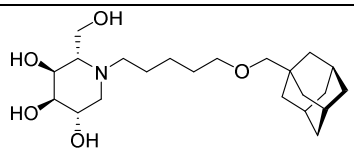
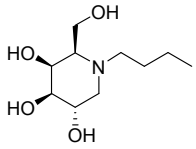
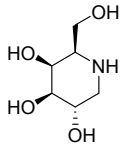
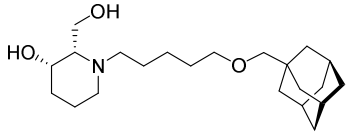
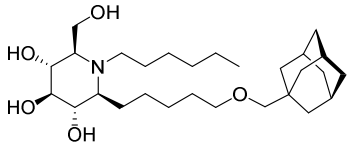
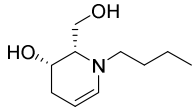
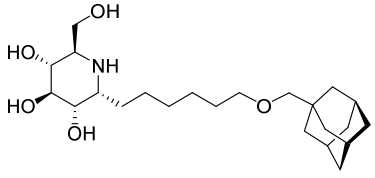
C108	(2R,3S,4S,5S)-N,1-bis(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C109	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(((2S,4s,4aR,6R,8R,8aS,10S,11R)-octahydro-2,8,4,6-(epibutane[1,2,3,4]tetrayl)naphthalen-4(1H)-yl)methoxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.04 - 3.83 (m, *5*H), 3.55 - 3.29 (m, 9H), 2.09 - 2.03 (m, 2H), 1.89 - 1.55 (m, 19H), 1.49 - 1.42 (m, 4H). ^{13}C NMR (100 MHz, MeOD) δ 77.5, 72.0, 71.9, 68.8, 68.5, 63.5, 60.9, 54.5, 53.7, 42.2, 40.2, 39.8, 39.6, 39.3, 39.8, 39.0, 34.1, 31.1, 30.2, 28.8, 27.3, 24.7, 24.1. $[\alpha]^{20}_{D}$ = 0.04 (c = 0.7, MeOD). IR/cm^{-1}: 3363, 2900, 2866, 1674, 1435, 1203, 1134, 1072. LC/MS analysis: R_t 6.50 min (linear gradient 10-90% B), ES: = 450.4 $[M+H]^+$. HRMS: calcd for $[C_{26}H_{43}O_5N+H]^+$ 450.3219 found 450.3214 $[M+H]^+$.
C110	(2S,3S,4S,5S)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C111	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(((2R,4s,4aR,6S,8S,8aS,10S,11R)-octahydro-2,8,4,6-(epibutane[1,2,3,4]tetrayl)naphthalen-4(1H)-yl)methoxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.10 (d, *J* = 12.4 Hz, 1H), 3.90 (dd, *J* = 12.6, 2.8 Hz, 1H), 3.69 (qd, *J* = 9.6, 4.9 Hz, 1H), 3.60 (t, *J* = 9.7, 1H), 3.49 - 3.42 (m, 3H), 3.39 - 3.34 (m, 4H), 3.20 (td, *J* = 12.7, 5.2 Hz, 1H), 3.03 (d, *J* = 9.6 Hz, 1H), 2.97 (t, *J* = 11.7 Hz, 1H), 2.10 - 2.04 (m, 2H), 1.88 - 1.57 (m, 19H), 1.53 - 1.41 (m, 4H). ^{13}C NMR (100 MHz, MeOD) δ 78.1, 77.6, 72.0, 68.8, 67.8, 67.3, 54.9, 54.2, 42.2, 40.1, 39.8, 39.6, 39.2, 39.1, 39.0, 34.0, 31.1, 30.2, 28.8, 27.3, 24.6, 24.0. $[\alpha]^{20}_{D}$ = - 0.01 (c = 1.1, MeOD). IR/cm^{-1}: 3340, 2900, 2866, 1670, 1438, 1203, 1184, 1134, 1033. LC/MS analysis: R_t 6.34 min (linear gradient 10-90% B), ES: = 450.4 $[M+H]^+$. HRMS: calcd for $[C_{26}H_{43}O_5N+H]^+$ 450.3219 found 450.3216 $[M+H]^+$.

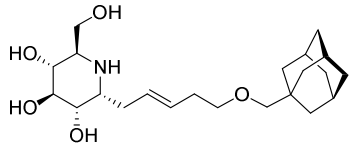
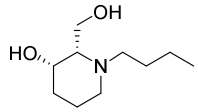
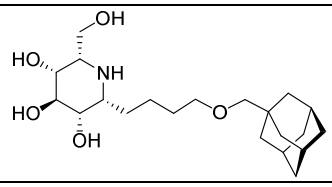
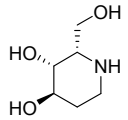
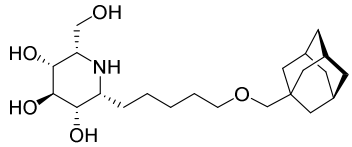
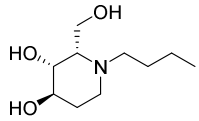
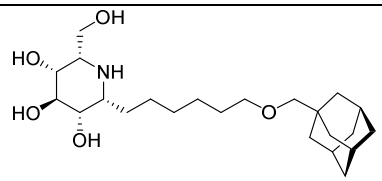
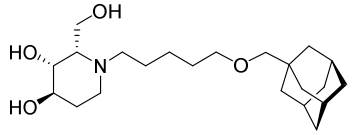
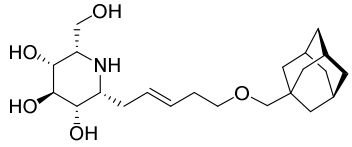
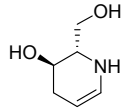
C112	(2S,3S,4S,5S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C113	(2R,3R,4R,5S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[13]
C114	(2S,3S,4S,5S)-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C115	(2R,3S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidin-3-ol		[9]
C116	(2S,3S,4S,5S)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C117	(2S,3S,4S,5S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)-N-pentylpyrrolidine-2-carboxamide		[7]
C118	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((3-(trifluoromethyl)-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		[10]
C119	(2S,3S,4S,5S)-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C120	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((2-(trifluoromethyl)-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		[10]
C121	(2S,3S,4S,5S)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]

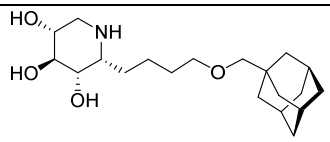
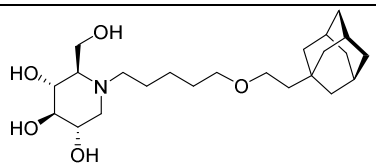
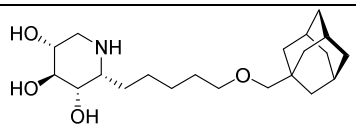
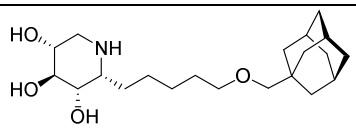
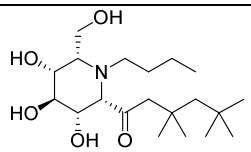
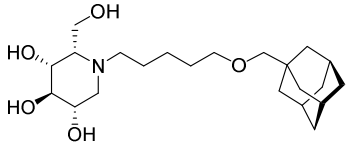
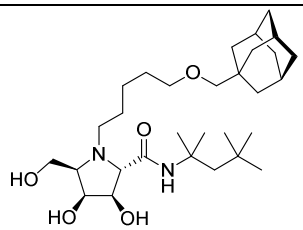
C122	(2R,3S,4S,5R)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C123	(2S,3S,4S,5S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C124	(2R,3S,4S,5R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, $CDCl_3$) δ 4.03 - 3.87 (br m, 4H), 3.84 (br s, 1H), 3.53 - 3.33 (m, 7H), 2.98 (s, 2H), 1.94 (b s, 3H), 1.77 - 1.62 (m, 8H), 1.55 (m, 6H), 1.49 - 1.44 (m, 4H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 83.1, 71.7, 71.7, 68.5, 68.0, 63.8, 60.5, 54.4, 53.7, 40.8, 38.3, 35.1, 31.1, 30.1, 24.6, 23.3. $[\alpha]^{20}_D$ = -0.07 (c = 0.9, MeOD). IR/cm^{-1}: 3363, 2904, 2846, 1670, 1199, 1134, 1072. LC/MS analysis: R_t 5.77 min (linear gradient 10-90% B), ES: = 398.3 $[M+H]^+$. HRMS: calcd for $[C_{22}H_{39}O_5N+H]^+$ 398.2906, found 398.2902 $[M+H]^+$.
C125	(2S,3R,4R,5S)-1-(5-(((1S,3S,5S,7S)-adamantan-2-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C126	(2S,3S,4R,5R,6R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-butyl-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C127	(2R,3R,4R,5S)-1-(5-(cyclohexylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C128	(2S,3S,4R,5R,6R)-2-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-1-benzyl-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C129	(2S,3R,4R,5S)-1-(5-(cyclohexylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]

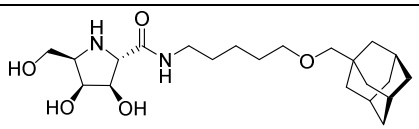
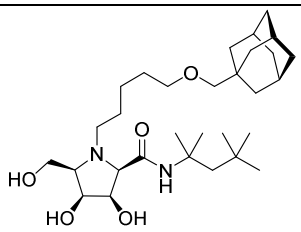
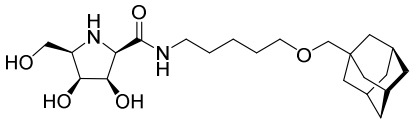
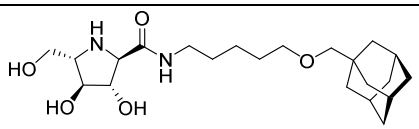
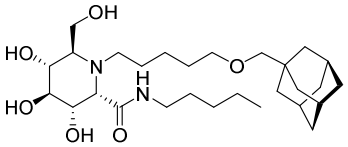
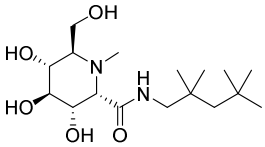
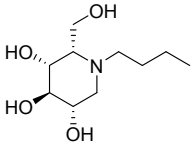
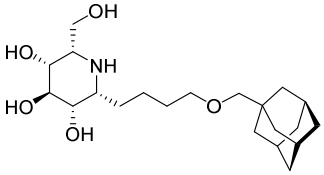
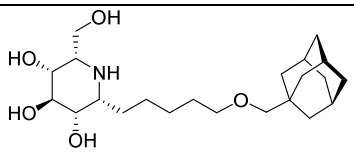
C130	(2S,3S,4R,5R,6R)-2-(4-(((3S,5S,7S)-adamantan-1-yl)methoxy)butyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C131	(2R,3R,4R,5S)-1-((Z)-6-((3R,5R,7R)-adamantan-1-yl)hex-5-en-1-yl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C132	(2S,3S,4R,5R,6R)-2-(4-(((3S,5S,7S)-adamantan-1-yl)methoxy)butyl)-6-(hydroxymethyl)-1-methylpiperidine-3,4,5-triol		[11]
C133	(2S,3R,4R,5S)-1-((Z)-6-((3S,5S,7S)-adamantan-1-yl)hex-5-en-1-yl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C134	(2S,3S,4R,5R,6R)-2-(4-(((3S,5S,7S)-adamantan-1-yl)methoxy)butyl)-1-butyl-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C135	(2S,3S)-1-(4-(((3S,5S,7S)-adamantan-1-yl)methoxy)butyl)-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C136	(2S,3R,4R,5S,6R)-2-(4-(((3S,5S,7S)-adamantan-1-yl)methoxy)butyl)-6-(hydroxymethyl)tetrahydro-2H-pyran-3,4,5-triol		[11]
C137	(2S,3R)-2-(hydroxymethyl)piperidin-3-ol		[9]
C138	(2S,3S,4R,5R,6R)-2-(6-(((3S,5S,7S)-adamantan-1-yl)methoxy)hexyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C139	(2R,3R,4R,5S)-1-(5-(benzyloxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]

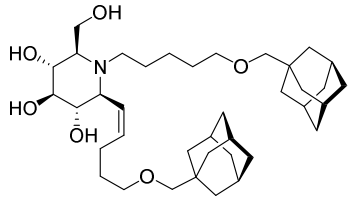
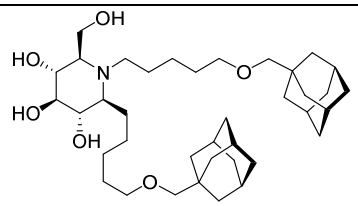
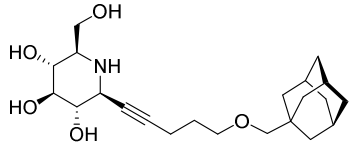
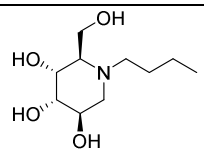
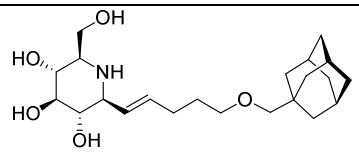
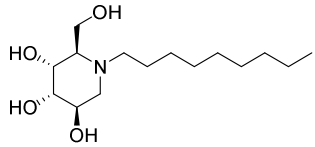
C140	(2S,3S,4R,5R,6R)-2-(6-(((3S,5S,7S)-adamantan-1-yl)methoxy)hexyl)-6-(hydroxymethyl)-1-methylpiperidine-3,4,5-triol		[11]
C141	(2R,3R,4R,5S)-1-(6-(((3R,5R,7R)-adamantan-1-yl)methoxy)hexyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C142	(2S,3S,4R,5R,6R)-2-(6-(((3S,5S,7S)-adamantan-1-yl)methoxy)hexyl)-1-(tert-butyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C143	(2R,3R,4R,5S)-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C144	(2S,3R,4R,5S,6R)-2-(6-(((3S,5S,7S)-adamantan-1-yl)methoxy)hexyl)-6-(hydroxymethyl)tetrahydro-2H-pyran-3,4,5-triol		[11]
C145	(2S,3S,4S,5S)-N-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-1-butyl-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C146	(2S,3S,4S,5S)-N,1-bis(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C147	(2R,3R,4R,5S,6R)-1-butyl-2-(hydroxymethyl)-6-(((2,4,4-trimethylpentan-2-yl)amino)methyl)piperidine-3,4,5-triol		[11]
C148	(2R,3R,4R,5S,6R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)-6-(((2,4,4-trimethylpentan-2-yl)amino)methyl)piperidine-3,4,5-triol		[11]

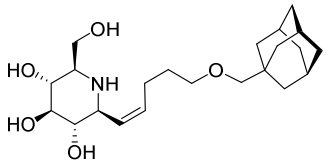
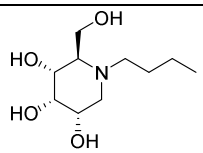
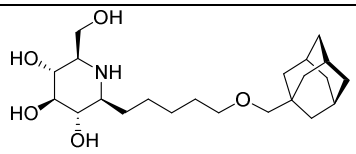
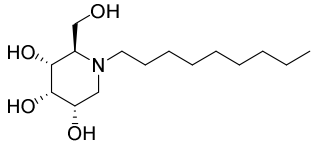
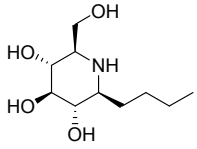
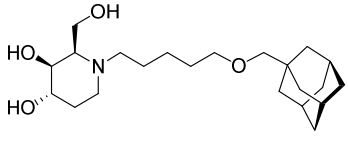
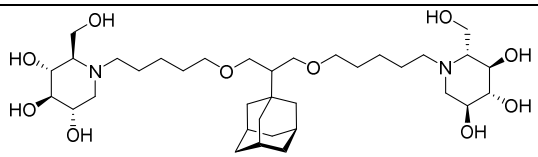
C149	(2S,3S,4R,5S)-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C150	(2R,3S,4R,5S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C151	(2S,3S,4R,5S)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C152	(2S,3S,4R,5S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C153	(2R,3S,4R,5S)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C154	(2R,3S,4R,5S)-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C155	(2S,3S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidin-3-ol		[9]
C156	(2S,3S,4R,5R,6R)-2-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-1-hexyl-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C157	(2S,3S)-1-butyl-2-(hydroxymethyl)-1,2,3,4-tetrahydropyridin-3-ol		[9]
C158	(2R,3S,4R,5R,6R)-2-(6-(((3R,5R,7R)-adamantan-1-yl)methoxy)hexyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]

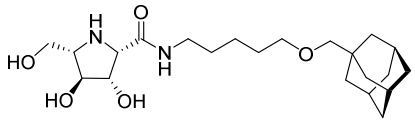
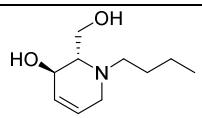
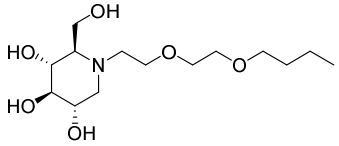
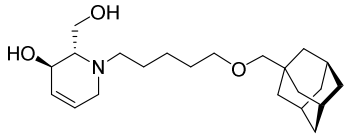
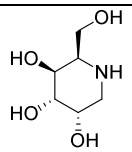
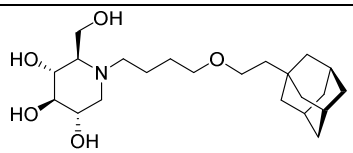
C159	(2R,3S,4R,5R,6R)-2-((E)-5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pent-2-en-1-yl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C160	(2S,3S)-1-butyl-2-(hydroxymethyl)piperidin-3-ol		[9]
C161	(2R,3S,4R,5R,6S)-2-(4-(((3R,5R,7R)-adamantan-1-yl)methoxy)butyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C162	(2S,3R,4R)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C163	(2R,3S,4R,5R,6S)-2-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C164	(2S,3R,4R)-1-butyl-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C165	(2R,3S,4R,5R,6S)-2-(6-(((3R,5R,7R)-adamantan-1-yl)methoxy)hexyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C166	(2S,3R,4R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C167	(2R,3S,4R,5R,6S)-2-((E)-5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pent-2-en-1-yl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C168	(2S,3R)-2-(hydroxymethyl)-1,2,3,4-tetrahydropyridin-3-ol		[9]

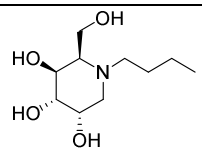
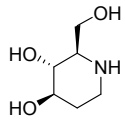
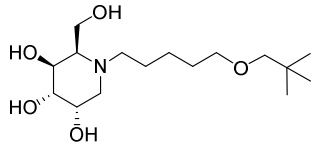
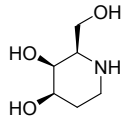
C169	(2R,3S,4S,5R)-2-(4-(((3R,5R,7R)-adamantan-1-yl)methoxy)butyl)piperidine-3,4,5-triol		[11]
C170	(2R,3R,4R,5S)-1-(5-(2-((3R,5R,7R)-adamantan-1-yl)ethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (600 MHz, MeOD) δ 3.89 - 3.82 (m, 2H), 3.51 - 3.44 (m, 3H), 3.42 (t, *J* = 6.5 Hz, 2H), 3.36 (t, *J* = 9.3 Hz, 1H), 3.14 (t, *J* = 9.1 Hz, 1H), 3.01 (dd, *J* = 11.1, 4.7 Hz, 1H), 2.86 - 2.79 (m, 1H), 2.66 - 2.56 (m, 1H), 2.21 (t, *J* = 10.7 Hz, 1H), 2.15 (d, *J* = 7.4 Hz, 1H), 1.93 (s, 3H), 1.77 - 1.65 (m, 6H), 1.62 - 1.48 (m, 8H), 1.35 (m, 4H). ^{13}C NMR (150 MHz, MeOD) δ 80.4, 71.8, 71.7, 70.6, 67.8, 67.4, 59.4, 59.2, 53.7, 44.8, 48.3, 38.2 (CH_2), 32.8, 30.6, 30.2, 25.2, 24.9. $[\alpha]^{20}_D$ = 11.2 (c = 0.8, MeOD). IR/cm^{-1}: 3360, 2360, 2341, 1097, 1089, 1033, 1012. LC/MS analysis: R_t 5.77 min (linear gradient 10-90% B), ES: = 412.1 $[M+H]^+$. HRMS: calcd for $[C_{22}H_{40}NO_5+H]^+$: 412.3057. found: 412.3057
C171	(2R,3S,4S,5R)-2-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)piperidine-3,4,5-triol		[11]
C172	(2R,3S,4S,5R)-2-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)piperidine-3,4,5-triol		[11]
C173	1-((2S,3S,4S,5R,6S)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)piperidin-2-yl)-3,3,5,5-tetramethylhexan-1-one		[6]
C174	(2S,3R,4R,5S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C175	(2S,3R,4S,5R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]

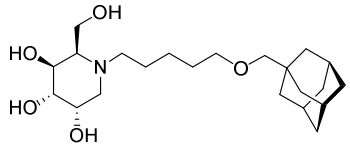
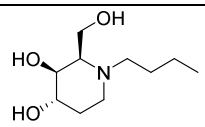
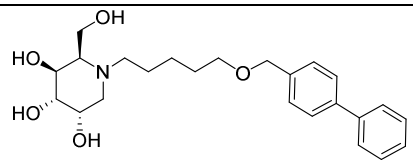
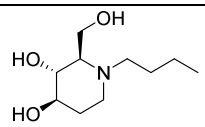
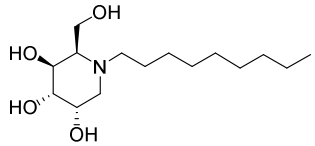
C176	(2S,3R,4S,5R)-N-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C177	(2R,3R,4S,5R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)-N-(2,4,4-trimethylpentan-2-yl)pyrrolidine-2-carboxamide		[7]
C178	(2R,3R,4S,5R)-N-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C179	(2R,3S,4S,5S)-N-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C180	(2S,3S,4S,5R,6R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C181	(2S,3S,4S,5R,6R)-3,4,5-trihydroxy-6-(hydroxymethyl)-1-methyl-N-(2,2,4,4-tetramethylpentyl)piperidine-2-carboxamide		[6]
C182	(2S,3R,4R,5S)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C183	(2R,3S,4R,5R,6S)-2-(4-(((3R,5R,7R)-adamantan-1-yl)methoxy)butyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C184	(2R,3S,4R,5R,6S)-2-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]

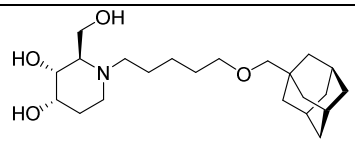
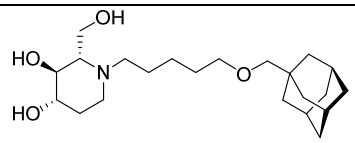
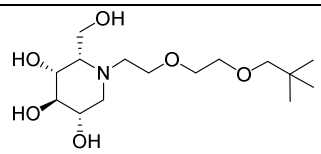
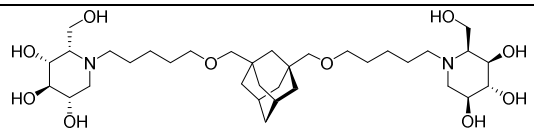
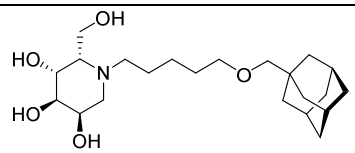
C185	(2S,3S,4R,5R,6R)-2-((Z)-5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pent-1-en-1-yl)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C186	(2S,3S,4R,5R,6R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C187	(2S,3S,4R,5R,6R)-2-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pent-1-yn-1-yl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C188	(2R,3R,4S,5R)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.13 - 4.04 (m, 2H), 4.02 - 3.88 (m, 3H), 3.44 (d, *J* = 13.1 Hz, 1H), 3.32 - 3.14 (m, 4H), 1.73 - 1.54 (m, 2H), 1.32 (h, *J* = 7.1 Hz, 2H), 0.87 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, D_2O) δ 68.1, 66.0, 62.9, 61.2, 54.1, 53.0, 51.3, 23.8, 19.3, 12.7. $[\alpha]^{20}_{D}$ = - 0.5 (c = 0.4, MeOH). IR/cm^{-1}: 3333, 2955, 1674, 1200, 1134, 1072. HRMS: calcd for $[C_{10}H_{21}NO_4+H]^+$ 220.15433, found 220.15434 $[M+H]^+$.
C189	(2S,3S,4R,5R,6R)-2-((E)-5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pent-1-en-1-yl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C190	(2R,3R,4S,5R)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.22 - 4.12 (m, 2H), 4.11 - 3.98 (m, 3H), 3.54 (d, *J* = 12.1 Hz, 1H), 3.46 - 3.21 (m, 4H), 1.95 - 1.63 (m, 2H), 1.52 - 1.15 (m, 12H), 0.97 - 0.76 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, D_2O) δ 68.2, 66.1, 63.0, 61.2, 54.2, 53.3, 51.4, 31.2, 28.4, 28.4, 28.2, 25.8, 22.1, 21.8, 13.4 . $[\alpha]^{20}_{D}$ = 0.0 (c = 1.0, MeOH). IR/cm^{-1}: 3225, 2928, 2859, 1670, 1435, 1184, 1134, 1072. HRMS: calcd for $[C_{15}H_{29}NO_4+H]^+$ 290.2326, found 290.2326 $[M+H]^+$.

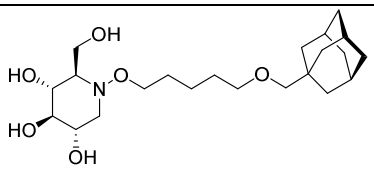
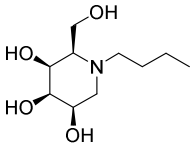
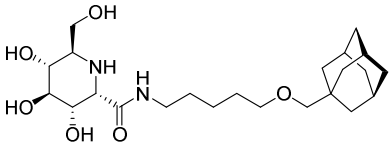
C191	(2S,3S,4R,5R,6R)-2-((Z)-5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pent-1-en-1-yl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C192	(2R,3R,4S,5S)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.20 (s, 1H), 4.14 - 3.96 (m, 3H), 3.90 (dd, *J* = 10.7, 2.4 Hz, 1H), 3.45 - 3.18 (m, 5H), 1.90 - 1.62 (m, 2H), 1.41 (m, 2H), 0.95 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, D_2O) δ 69.5, 64.8, 63.9, 60.2, 53.4, 53.2, 48.8, 24.4, 19.3, 12.8 . $[\alpha]^{20}_D$ = -3.2 (c = 0.5, MeOH). IR/cm^{-1}: 3372, 1670, 1458, 1423, 1184, 1134, 1076, 1043. LCMS: 00-20, RT 1.47 min, $[M+H]^+$ = 220.1. HRMS: calcd for $[C_{10}H_{21}NO_4+H]^+$ 220.1543, found 220.1544 $[M+H]^+$.
C193	(2S,3S,4R,5R,6R)-2-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C194	(2R,3R,4S,5S)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.20 (s, 1H), 4.15 - 3.84 (m, 4H), 3.43 - 3.17 (m, 5H), 1.75 (s, 2H), 1.46 - 1.20 (m, 12H), 0.88 (t, *J* = 6.6 Hz, 3H). ^{13}C NMR (100 MHz, D_2O) δ 69.6, 64.8, 63.9, 60.2, 53.6, 53.2, 48.9, 31.6, 29.2, 28.9, 28.8, 26.2, 22.2, 13.7 . $[\alpha]^{20}_D$ = -5.0 (c = 1.0, MeOH). IR/cm^{-1}: 3352, 2955, 2926, 2857, 1670, 1456, 1200, 1184, 1134, 1076, 1043. LCMS: 10-50, RT 6.67 min, $[M+H]^+$ = 290.3. HRMS: calcd for $[C_{15}H_{31}NO_4+H]^+$ 290.2332, found 290.2326 $[M+H]^+$.
C195	(2S,3S,4R,5R,6R)-2-butyl-6-(hydroxymethyl)piperidine-3,4,5-triol		[11]
C196	(2R,3S,4S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C197	(2R,2'R,3R,3'R,4R,4'R,5S,5'S)-1,1'-(((2-((3R,5R,7R)-adamantan-1-yl)propane-1,3-diyl)bis(oxy))bis(pentane-5,1-diyl))bis(2-		[12]

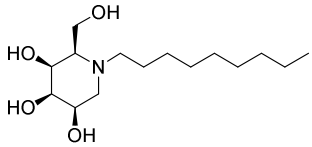
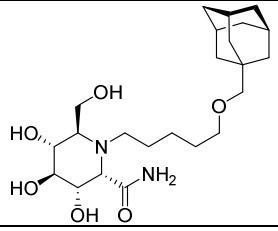
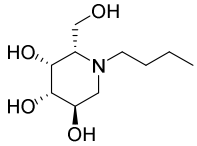
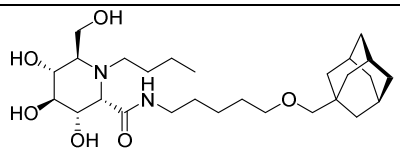
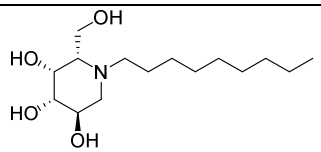
	(hydroxymethyl)piperidine-3,4,5-triol)		
C198	(2S,3S,4S,5S)-N-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4-dihydroxy-5-(hydroxymethyl)pyrrolidine-2-carboxamide		[7]
C199	(2S,3R)-1-butyl-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C200	(2R,3R,4R,5S)-1-(2-(2-butoxyethoxy)ethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.04 (dd, *J* = 12.5, 2.0 Hz, 1H), 3.98 (dd, *J* = 12.5, 2.9 Hz, 1H), 3.83 (t, *J* = 5.0 Hz, 2H), 3.69 (ddd, *J* = 11.0, 9.2, 4.8 Hz, 1H), 3.66 (m, 2H), 3.60 (m, 3H), 3.57 (dd, *J* = 9.9, 9.2 Hz, 1H), 3.50 (t, *J* = 6.7 Hz, 2H), 3.48 (dd, *J* = 12.0, 4.8 Hz, 1H), 3.36 (t, *J* = 9.2 Hz, 1H), 2.98 (d, *J* = 9.9 Hz, 1H), 2.92 (t, *J* = 11.5 Hz, 1H), 1.64 - 1.52 (m, 2H), 1.45 - 1.31 (m, 2H), 0.94 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, MeOD) δ 78.5, 72.1, 71.3, 70.9, 69.4, 68.3, 68.2, 66.5, 56.2, 56.1, 53.5, 32.7, 20.3, 14.3. $[\alpha]^{20}_{D}$ = 0.10 (c = 1.9, MeOD). IR/cm^{-1}: 3379, 2958, 2931, 2873, 2515, 1631, 1458, 1249, 1091, 1033. LC/MS analysis: R_t 2.86 min (linear gradient 10-90% B), ES: = 308.2 $[M+H]^+$. HRMS: calcd for $[C_{14}H_{29}O_6N+H]^+$ 308.2073 found 308.2071 $[M+H]^+$.
C201	(2S,3R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C202	(2R,3S,4S,5S)-2-(hydroxymethyl)piperidine-3,4,5-triol		[4]
C203	(2R,3R,4R,5S)-1-(4-(2-((3R,5R,7R)-adamantan-1-yl)ethoxy)butyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (600 MHz, D_2O) δ 3.98 (d, *J* = 12.6 Hz, 1H), 3.88 (d, *J* = 12.6 Hz, 1H), 3.73 - 3.69 (m, 1H), 3.56 (t, *J* = 9.6, 1H), 3.49 - 3.45 (m, 4H), 3.41 (dd, *J* = 9.6, 9.0, 1H), 3.35 (m, 1H), 3.16 (br m, 1H), 3.06 (br m, 1H), 2.86 (d, *J* = 9.6 Hz, 1H), 2.81 (t, *J* = 11.4 Hz, 1H), 1.90 (s, 3H), 1.67 - 1.52 (m, 10H), 1.51 (s,

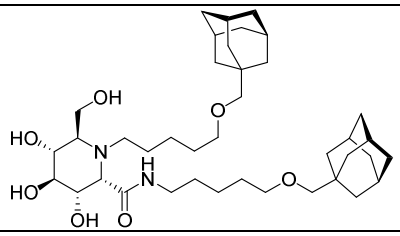
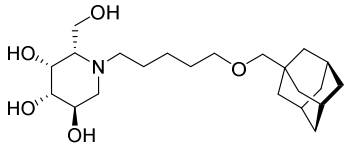
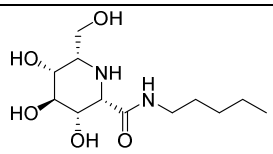
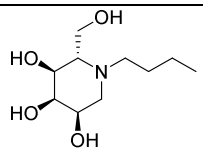
			6H), 1.35 (t, J = 7.2 Hz). ^{13}C NMR (150 MHz, D_2O) δ 77.7, 71.1, 68.9, 67.9, 67.7, 66.3, 56.0, 54.9, 53.4, 44.1, 43.4, 38.1, 32.4, 27.7, 27.6, 20.7. IR/cm^{-1}: 3358, 2899, 2846, 1647, 1450, 1023. LC/MS analysis: R_t 4.60 min (linear gradient 10-90% B), ES: = 398.2 $[M+H]^+$. HRMS: calcd for $[C_{22}H_{39}O_5N+H]^+$ 398.2901, found 398.2899 $[M+H]^+$.
C204	(2R,3S,4S,5S)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.20 (ddd, J = 10.5, 5.6, 2.7 Hz, 1H), 4.08 (dd, J = 4.3, 1.7 Hz, 1H), 4.01 - 3.85 (m, 3H), 3.46 - 3.44 (m, 1H), 3.30 - 3.11 (m, 4H), 1.89 - 1.63 (m, 2H), 1.41 (h, J = 7.4 Hz, 2H), 1.00 (t, J = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, MeOD) δ 72.3, 70.0, 64.1, 61.8, 61.1, 54.9, 51.2, 25.2, 20.9, 13.9. $[\alpha]^{20}_D$ = - 93.1 (c = 0.08, MeOD). IR/cm^{-1}: 3653, 3002, 1669, 1429, 1184, 1131, 800, 722. HRMS: calcd for $[C_{10}H_{21}NO_4+H]^+$ 220.1543, found 220.1544 $[M+H]^+$.
C205	(2R,3R,4R)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C206	(2R,3S,4S,5S)-2-(hydroxymethyl)-1-(5-(neopentyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.20 (ddd, J = 10.8, 5.3, 2.7 Hz, 1H), 4.08 (dd, J = 4.4, 1.8 Hz, 1H), 4.00 - 3.82 (m, 3H), 3.46 - 3.43 (m, 1H), 3.44 (t, J = 6.2 Hz, 2H), 3.30 - 3.11 (m, 4H), 3.08 (s, 2H), 1.91 - 1.69 (m, 2H), 1.65 (q, J = 7.3 Hz, 2H), 1.47 (q, J = 7.3 Hz, 2H), 0.90 (s, 9H). ^{13}C NMR (100 MHz, MeOD) δ 82.5, 72.3, 72.1, 70.1, 64.1, 61.8, 61.2, 55.0, 51.2, 30.2, 27.1, 24.6, 23.1. $[\alpha]^{20}_D$ = - 14.6 (c = 0.49, MeOD). IR/cm^{-1}: 3648, 2954, 1669, 1184, 1135, 839, 799, 722. HRMS: calcd for $[C_{16}H_{33}NO_5+H]^+$ 320.2431, found 320.2431 $[M+H]^+$.
C207	(2R,3S,4R)-2-(hydroxymethyl)piperidine-3,4-diol		[9]

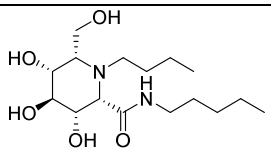
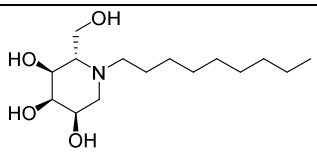
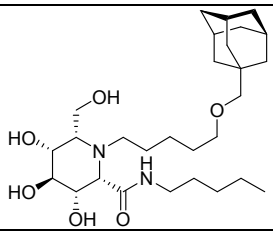
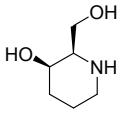
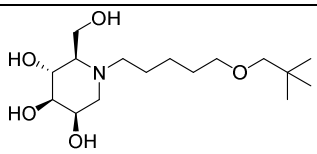
C208	(2R,3S,4S,5S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.20 (ddd, *J* = 9.3, 6.2, 2.7 Hz, 1H), 4.07 (dd, *J* = 4.5, 1.9 Hz, 1H), 3.96 (d, *J* = 4.7 Hz, 2H), 3.88 (dd, *J* = 4.6, 2.7 Hz, 1H), 3.48 (dt, *J* = 5.1, 2.5 Hz, 1H), 3.41 (t, *J* = 6.1 Hz, 2H), 3.28 (dd, *J* = 7.2, 4.1 Hz, 2H), 3.20 (d, *J* = 9.9 Hz, 2H), 2.98 (s, 2H), 1.96 - 1.94 (m, 3H), 1.83 - 1.60 (m, 10H), 1.57 - 1.56 (m, 6H), 1.46 (q, *J* = 7.4 Hz, 2H). ^{13}C NMR (100 MHz, MeOD) δ 83.1, 72.1, 71.9, 70.1, 64.0, 62.0, 60.6, 54.6, 51.2, 40.8, 38.3, 35.1, 31.1, 30.1, 29.7, 24.6. $[\alpha]^{20}_{D}$ = - 12.2 (c = 0.53, MeOD). IR/cm^{-1}: 3668 - 2902, 1669, 1186, 1136, 800, 722, 611. HRMS: calcd for $[C_{22}H_{39}NO_5+H]^+$ 398.2901, found: 398.2887 $[M+H]^+$.
C209	(2R,3S,4S)-1-butyl-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C210	(2R,3S,4S,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 7.61 (d, *J* = 8.4 Hz, 4H), 7.43 (d, *J* = 8.4 Hz, 4H), 7.38 - 7.29 (m, 1H), 4.55 (s, 2H), 4.19 (ddd, *J* = 11.1, 5.2, 2.8 Hz, 1H), 4.07 (dd, *J* = 4.4, 1.8 Hz, 1H), 4.01 - 3.84 (m, 3H), 3.56 (t, *J* = 6.2 Hz, 2H), 3.46 - 3.44 (m, 1H), 3.32 - 3.21 (m, 2H), 3.23 - 3.07 (m, 2H), 1.95 - 1.61 (m, 4H), 1.50 (q, *J* = 8.1 Hz, 2H). ^{13}C NMR (100 MHz, MeOD) δ 142.1, 141.9, 138.9, 129.9, 129.4, 128.4, 128.0, 127.9, 73.7, 72.4, 71.0, 70.1, 64.1, 61.7, 61.1, 55.0, 51.2, 30.2, 24.6, 23.0. $[\alpha]^{20}_{D}$ = - 10.0 (c = 0.20, MeOH). IR/cm^{-1}: 3718, 2989, 1673, 1179, 1134,. HRMS: calcd for $[C_{24}H_{33}NO_5+H]^+$ 416.2431, found 416.2430 $[M+H]^+$.
C211	(2R,3R,4R)-1-butyl-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C212	(2R,3S,4S,5S)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.20 (ddd, *J* = 10.4, 5.4, 2.7 Hz, 1H), 4.08 (dd, *J* = 4.4, 1.8 Hz, H), 4.01 - 3.81 (m, 3H), 3.46 (d, *J* = 4.8 Hz, 1H), 3.29 - 3.06 (m, 4H), 1.89 - 1.60 (m, 2H), 1.46 - 1.26 (m, 12H), 0.90 (t, *J* = 8.0 Hz,

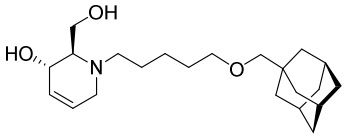
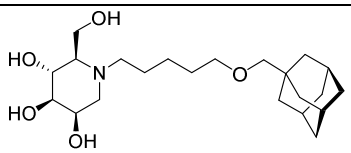
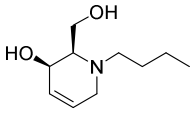
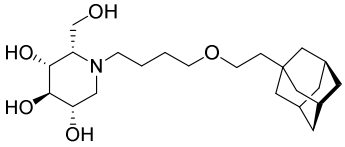
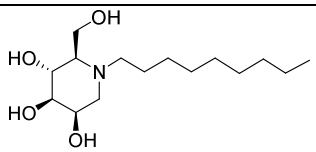
			3H). ^{13}C NMR (100 MHz, MeOD) δ 72.3, 70.1, 64.1, 61.7, 61.1, 55.1, 51.2, 33.0, 30.5, 30.3, 30.2, 27.7, 23.7, 23.2, 14.4. $[\alpha]^{20}_{D}$ = - 15.4 (c = 0.59, MeOD). IR/cm^{-1}: 3685 - 2927, 1668, 1184, 1135, 838, 799, 722. HRMS: calcd for $[C_{15}H_{31}NO_4+H]^+$ 290.2326, found 290.2323 $[M+H]^+$.
C213	(2R,3R,4S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C214	(2S,3S,4S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C215	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(2-(2-(neopentyloxy)ethoxy)ethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, $CDCl_3$) δ 3.99-3.83 (m, 6H), 3.77 (br s, 1H), 3.69-3.67 (m, 2H), 3.63 - 3.59 (br m, 3H), 3.57 - 3.38 (br m, 4H'), 3.14 (s, 2H neopentyl), 0.92 (s, 9H neopentyl). ^{13}C NMR (100 MHz, $CDCl_3$) δ 82.9, 71.9, 71.7, 71.3, 69.4, 69.0, 66.4, 64.3, 59.6, 54.2, 54.1, 27.1 . IR/cm^{-1}: 3394, 2954, 2515, 1674, 1458, 1199, 1134, 1091. LC/MS analysis: R_t 3.88 min (linear gradient 10-90% B), ES: = 322.3 $[M+H]^+$. HRMS: calcd for $[C_{15}H_{31}O_6N+H]^+$ 322.2230 found 322.2230 $[M+H]^+$.
C216	(2S,2'S,3R,3'R,4R,4'R,5S,5'S)-1,1'-(((((1R,3R,5S,7S)-adamantane-1,3-diyl)bis(methylene))bis(oxy))bis(pentane-5,1-diyl))bis(2-(hydroxymethyl)piperidine-3,4,5-triol)		[12]
C217	(2S,3R,4R,5R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 3.98 (ddd, *J* = 3.3, 4.4, 9.7 Hz, 1H), 3.92 (dd, *J* = 2.6, 4.7 Hz, 1H), 3.84 (dd, *J* = 5.3, 11.5 Hz, 1H), 3.79 (dd, *J* = 4.7, 11.5 Hz, 1H), 3.76 (dd, *J* = 3.3, 4.7 Hz, 1H), 3.39 (t, *J* = 6.4 Hz, 2H), 2.97 (s, 2H), 2.79 - 2.76 (m, 1H), 2.75 - 2.69 (m, 2H), 2.66 - 2.57 (m, 2H), 1.95 (s, 3H), 1.72 (dd, *J* = 11.7, 30.9 Hz, 6H), 1.63 - 1.50 (m, 10H), 1.39 - 1.27 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 83.2, 73.1, 72.7, 72.3, 67.6, 61.7, 60.9, 55.0,

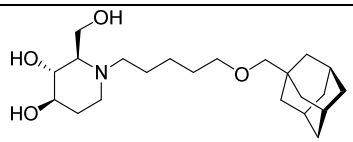
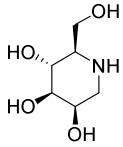
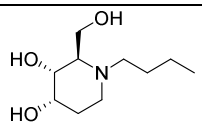
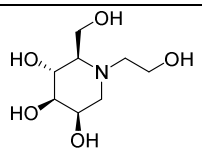
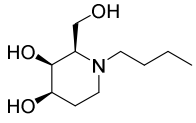
			53.2, 41.0, 38.5, 35.3, 30.7, 29.9, 25.5, 25.4. $[\alpha]^{20}_{D}$ = +24.5 (c = 0.4, MeOH). IR/cm^{-1}: 3359, 2902, 2848, 1453, 1065, 1057. HRMS: calcd for $[C_{22}H_{39}O_5N+H]^+$ 398.2901, found 398.2899 $[M+H]^+$.
C218	(2R,3R,4R,5S)-1-((5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)oxy)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 3.93 (dd, *J* = 3.1, 11.2 Hz, 1H), 3.87 - 3.78 (m, 1H), 3.75 (t, *J* = 6.3 Hz, 2H), 3.50 - 3.44 (m, 1H), 3.47 (dd, *J* = 4.5, 11.4 Hz, 1H), 3.39 (t, *J* = 6.3 Hz, 2H), 3.19 (dd, *J* = 8.9 Hz, 1H), 2.97 (s, 2H), 2.50 - 2.36 (m, 1H), 1.95 (s, 3H), 1.72 (dd, *J* = 11.6, 30.4 Hz, 6H), 1.63 - 1.52 (m, 10H), 1.47 - 1.38 (m, 2H). ^{13}C NMR (100 MHz, MeOD) δ 83.2, 80.4, 74.0, 72.7, 70.6, 69.2, 61.4, 60.2, 41.0, 38.5, 35.3, 30.7, 29.8, 29.9, 24.3. $[\alpha]^{20}_{D}$ = +1.0 (c = 0.4, MeOH). IR/cm^{-1}: 3359, 2902, 2849, 1453, 1105, 1043. HRMS: calcd for $[C_{22}H_{39}O_6N+H]^+$ 414.2850, found 414.2848 $[M+H]^+$.
C219	(2R,3S,4R,5R)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.29 - 4.24 (m, 1H), 4.22 (s, 1H), 3.99 (qd, *J* = 12.9, 5.0 Hz, 2H), 3.83 (t, *J* = 3.4 Hz, 1H), 3.55 (dd, *J* = 13.5, 3.3 Hz, 1H), 3.45 (m, 1H), 3.42 - 3.33 (dd, *J* = 13.5, 1.2 Hz, 1H), 3.28 (m, Hz, 2H), 1.70 (m, 2H), 1.35 (h, *J* = 7.4 Hz, 2H), 0.91 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, D_2O) δ 69.95, 66.93, 66.85, 64.44, 59.20, 55.40, 53.17, 23.88, 19.31, 12.78 . $[\alpha]^{20}_{D}$ = - 13.5 (c = 0.6, MeOH). IR/cm^{-1}: 3310, 2967, 2878, 1671, 1420, 1200, 1130, 1103, 1065. LCMS: 0-20, R_t 2.11 min, $[M+H]^+$ = 220.00. HRMS: calcd for $[C_{10}H_{21}NO_4+H]^+$ 220.1543, found 220.1547 $[M+H]^+$.
C220	(2S,3S,4S,5R,6R)-N-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]

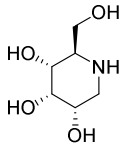
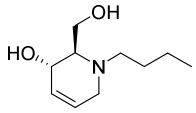
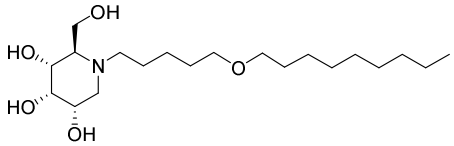
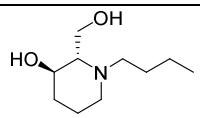
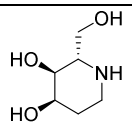
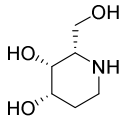
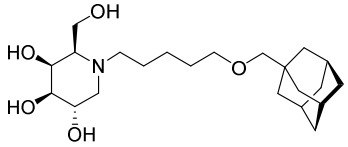
C221	(2R,3S,4R,5R)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.25 (s, 1H), 4.20 (s, 1H), 3.97 (m, 2H), 3.82 (t, *J* = 3.1 Hz, 1H), 3.51 (dd, *J* = 13.4, 2.8 Hz, 1H), 3.42 (s, 1H), 3.35 (d, *J* = 12.8 Hz, 1H), 3.29 - 3.21 (m, 2H), 1.70 (m, 2H), 1.27 (m, 12H), 0.86 - 0.78 (m, 3H). ^{13}C NMR (100 MHz, D_2O) δ 70.0, 66.9, 66.9, 64.5, 59.3, 55.5, 53.4, 31.3, 28.7, 28.6, 28.4, 25.9, 22.2, 21.8, 13.50 . $[\alpha]^{20}_{D}$ = -15.8 (c = 0.5, MeOH). IR/cm^{-1}: 3310, 2995, 2928, 2859, 1670, 1420, 1200, 1185, 1130, 1069. HRMS: calcd for $[C_{15}H_{31}NO_4+H]^+$ 290.2326, found 290.2332 $[M+H]^+$.
C222	(2S,3S,4S,5R,6R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]
C223	(2S,3R,4S,5R)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.27 (s, 1H), 4.08 (td, *J* = 11.0, 5.2 Hz, 1H), 3.98 (m, 2H), 3.60 (dd, *J* = 9.8, 3.0 Hz, 1H), 3.52 (dd, *J* = 12.2, 5.2 Hz, 1H), 3.45 (t, *J* = 4.1 Hz, 1H), 3.29 (dt, *J* = 11.7, 6.5 Hz, 1H), 3.21 (td, *J* = 13.4, 12.5, 5.4 Hz, 1H), 2.98 (t, *J* = 11.8 Hz, 1H), 1.74 -1.64 (m, 2H), 1.41 - 1.32 (m, 2H), 0.92 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, D_2O) δ 72.6, 69.9, 64.5, 63.9, 59.1, 53.3, 53.2, 23.8, 19.3, 12.7. $[\alpha]^{20}_{D}$ = - 6.9 (c = 0.5, MeOH). IR/cm^{-1}: 3333, 2970, 2940, 2878, 1674, 1420, 1200, 1134, 1084. LCMS: 0-20, R_t 1.91 min, $[M+H]^+$ = 220.07. HRMS: calcd for $[C_{10}H_{21}NO_4+H]^+$ 220.1543, found 220.1547 $[M+H]^+$.
C224	(2S,3S,4S,5R,6R)-N-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]
C225	(2S,3R,4S,5R)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.23 (m, 1H), 4.04 (td, *J* = 10.6, 5.1 Hz, 1H), 3.94 (d, *J* = 4.4 Hz, 2H), 3.56 (dd, *J* = 9.7, 2.9 Hz, 1H), 3.47 (dd, *J* = 12.2, 5.1 Hz, 1H), 3.41 (t, *J* = 4.2 Hz, 1H), 3.21 (m, 2H), 2.94 (t, *J* = 11.8 Hz, 1H), 1.77

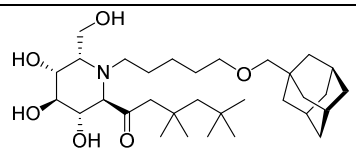
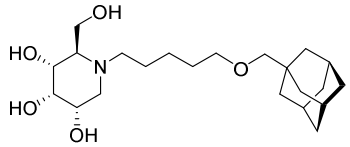
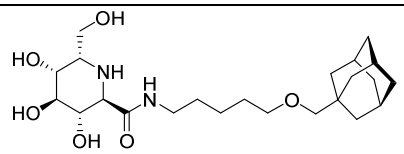
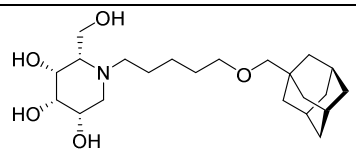
			- 1.57 (m, 2H), 1.38 - 1.16 (m, 12H - H_2-8), 0.80 (t, *J* = 6.4 Hz, 3H). ^{13}C NMR (100 MHz, D_2O) δ 72.6, 69.9, 64.5, 63.8, 59.1, 53.4, 53.3, 31.1, 28.4, 28.3, 28.1, 25.6, 22.0, 21.6, 13.4. $[\alpha]^{20}_D$ = - 0.5 (c = 0.6, MeOH). IR/cm^{-1}: 3333, 2928, 2855, 1674, 1204, 1184, 1134, 1080. LCMS: 0-50, R_t 8.96 min, $[M+H]^+$ = 290.20. HRMS: calcd for $[C_{15}H_{31}NO_4+H]^+$ 290.2326, found 290.2331 $[M+H]^+$.
C226	(2S,3S,4S,5R,6R)-N,1-bis(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]
C227	(2S,3R,4S,5R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.24 (s, 1H), 4.06 (td, *J* = 10.5, 4.9 Hz, 1H), 3.95 (d *J* = 4.0 Hz, 2H), 3.58 (d, *J* = 7.9 Hz, 1H), 3.58 - 3.41 (m, 4H) 3.30 - 3.19 (m, 2H), 3.01 (s, 2H), 2.94 (t, *J* = 11.6 Hz, 1H), 1.90 (s, 3H, CH), 1.72 - 1.54 (m, 10H), 1.48 (s, 6H), 1.43 - 1.28 (m, 2H). ^{13}C NMR (100 MHz, D_2O) δ 81.6, 72.5, 71.3, 69.8, 64.4, 64.1, 59.2, 53.4, 53.2, 39.2, 36.8, 33.6, 28.1, 28.0, 22.6, 21.7. $[\alpha]^{20}_D$ = -5.7 (c = 0.4, MeOH). IR/cm^{-1}: 3310, 2901, 2847, 1674, 1454, 1204, 1184, 1334. LCMS: 10-50, R_t 9.59 min, $[M+H]^+$ = 398.33. HRMS: calcd for $[C_{22}H_{39}NO_5+H]^+$ 398.2901, found 398.2901 $[M+H]^+$.
C228	(2S,3S,4S,5R,6S)-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C229	(2S,3S,4R,5R)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.15 (s, 1H), 4.08 - 3.90 (m, 3H), 3.85 (dd, *J* = 10.7, 2.4 Hz, 1H), 3.41 - 3.10 (m, 5H), 1.82 - 1.57 (m, 2H), 1.40 - 1.32 (m, 2H), 0.90 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, D_2O) δ 69.6, 64.8, 63.9, 60.2, 53.4, 53.2, 48.8, 24.4, 19.3, 12.8 . $[\alpha]^{20}_D$ = +4.2 (c = 0.6, MeOH). IR/cm^{-1}: 3333, 2970, 2940, 2882, 1674, 1435, 1200, 1134, 1080, 1045. LCMS: 0-20, R_t 2.21 min, $[M+H]^+$ = 220.07. HRMS: calcd for $[C_{10}H_{21}NO_4+H]^+$ 220.1543,

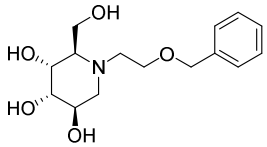
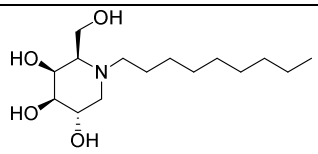
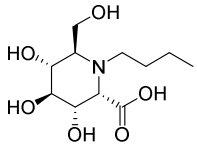
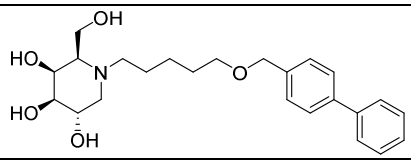
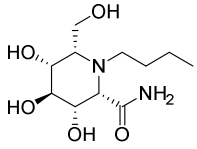
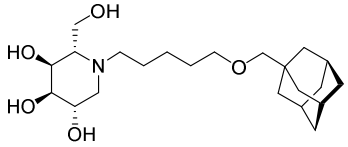
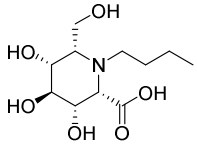
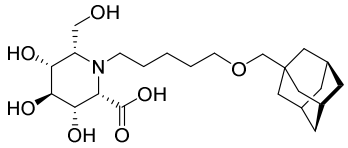
			found 220.1547 $[M+H]^+$.
C230	(2S,3S,4S,5R,6S)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C231	(2S,3S,4R,5R)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.13 (s, 1H), 4.08 - 3.93 (m, 2H), 3.93 - 3.78 (m, 2H), 3.35 - 3.07 (m, 5H), 1.68 (s, 2H), 1.26 (m, 12H), 0.82 (t, *J* = 6.6 Hz, 3H). ^{13}C NMR (100 MHz, D_2O) δ 69.6, 64.8, 63.9, 60.2, 53.6, 53.2, 48.9, 31.6, 29.2, 28.9, 28.8, 26.2, 22.4, 13.7 . $[\alpha]^{20}_D$ = 5.2 (c = 0.9, MeOH). IR/cm^{-1}: 3310, 2928, 2859, 1670, 1420, 1184, 1130, 1076, 1045. LCMS: 0-50, R_t 8.81 min, $[M+H]^+$ = 290.13. HRMS: calcd for $[C_{15}H_{31}NO_4+H]^+$ 290.2326, found 290.2332 $[M+H]^+$.
C232	(2S,3S,4S,5R,6S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C233	(2R,3R)-2-(hydroxymethyl)piperidin-3-ol		[9]
C234	(2R,3R,4R,5R)-2-(hydroxymethyl)-1-(5-(neopentyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.16 - 4.02 (m, 2H), 4.01 - 3.85 (m, 2H), 3.59 - 3.50 (m, 1H), 3.45 (t, *J* = 6.2 Hz, 2H), 3.44 - 3.43 (m, 1H), 3.32 - 3.28 (m, 3H), 3.29 (s, 2H), 3.05 - 2.96 (m, 1H), 1.81 - 1.74 (m, 2H), 1.65 (q, *J* = 8.2 Hz, 2H), 1.47 (q, *J* = 8.2 Hz, 2H), 0.90 (s, 9H). ^{13}C NMR (100 MHz, MeOD) δ 82.5, 74.3, 72.0, 67.8, 67.2, 67.0, 56.1, 54.5, 32.9, 30.2, 27.1, 24.6. $[\alpha]^{20}_D$ = - 21.2 (c = 0.15, MeOD). IR/cm^{-1}: 3634, 2956, 1669, 1172, 1204, 1113. HRMS : calcd for $[C_{16}H_{33}NO_5+H]^+$ 320.2431, found 320.2429 $[M+H]^+$.

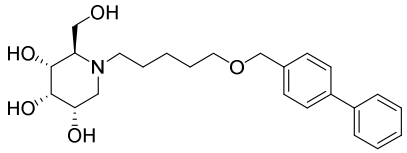
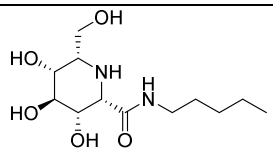
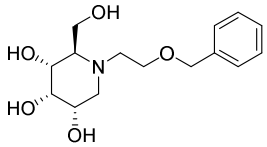
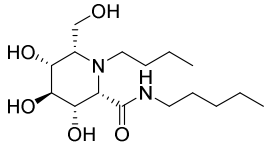
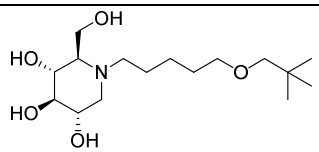
C235	(2R,3S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C236	(2R,3R,4R,5R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.16 - 4.00 (m, 2H), 4.01 - 3.87 (m, 2H), 3.55 (dd, *J* = 9.1, 3.0 Hz, 1H), 3.50 - 3.35 (m, 4H), 3.12 - 2.99 (m, 1H), 2.98 (s, 2H), 1.95 (s, 3H), 1.83 - 1.60 (m, 10H), 1.57 - 1.55 (m, 6H), 1.46 (q, *J* = 8.2 Hz, 2H). ^{13}C NMR (100 MHz, MeOD) δ 83.1, 74.2, 72.1, 67.8, 67.2, 66.9, 56.0, 54.5, 40.9, 38.3, 35.1, 30.2, 29.8, 24.6, 23.5. $[\alpha]^{20}_{D}$ = -16.8 (c = 0.19, MeOD). IR/cm^{-1}: 3685, 2997, 1669, 1200, 1129, 831, 800, 719. HRMS: calcd for $[C_{22}H_{39}NO_5+H]^+$ 298.2901, found 298.2891 $[M+H]^+$.
C237	(2R,3R)-1-butyl-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C238	(2S,3R,4R,5S)-1-(4-(2-((3S,5S,7S)-adamantan-1-yl)ethoxy)butyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (600 MHz, D_2O) δ 3.82 - 3.79 (m, 2H), 3.68 (dd, *J* = 8.4, 4.8 Hz, 1H), (ddd, *J* = 10.2, 9.0, 5.4 Hz, 1H), 3.47 (t, *J* = 7.2 Hz, 2H), 3.41 (br s, 2H), 3.37 (dd, *J* = 8.4, 7.8 Hz, 1H), 3.02 (m, 1H), 2.80 - 2.75 (m, 2H), 2.66 (br m, 1H), 2.57 (dd, *J* = 12.0, 10.2 Hz, 1H), 1.92 (s, 3H), 1.75 - 1.66 (m, 6H), 1.56 -1.35 (m, 10H), 1.35 (t, *J* = 7.2 Hz, 2H). ^{13}C NMR (150 MHz, MeOD) δ 75.8, 72.8, 71.7, 71.3, 67.8, 64.4, 57.7, 55.3, 52.8, 44.8, 43.9, 38.2, 32.8, 30.2, 28.5, 25.4. IR/cm^{-1}: 3342, 2899, 2846, 1654, 1450, 1062. LC/MS analysis: R_t 7.27 min (linear gradient 10-90% B), ES: = 398.2 $[M+H]^+$. HRMS: calcd for $[C_{22}H_{39}O_5N_1+H]^+$ 398.2901, found 398.2899 $[M+H]^+$.
C239	(2R,3R,4R,5R)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.15 - 4.03 (m, 2H), 4.02 - 3.82 (m, 2H), 3.59 - 3.49 (m, 1H), 3.44 (dd, *J* = 12.8, 3.8 Hz, 1H), 3.34 - 3.32 (m, 3H), 3.03 - 3.0 (m, 1H), 1.83 - 1.60 (m, 2H), 1.54 - 1.13 (m, 12H), 0.90 (t, *J* = 8.2 Hz, 3H). ^{13}C NMR (100 MHz, MeOD) δ 74.2, 67.8, 67.2, 67.0, 56.0, 54.6, 33.0, 30.5,

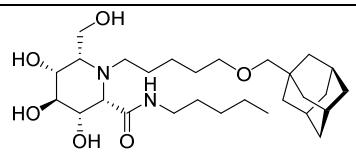
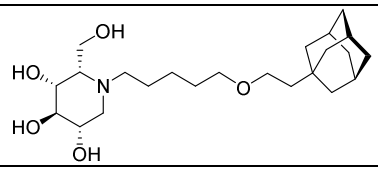
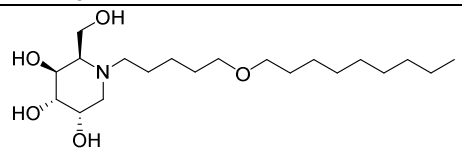
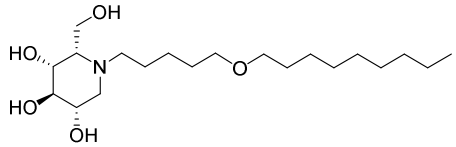
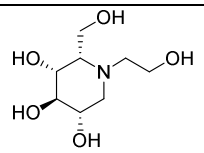
			30.3, 30.2, 27.6, 23.7. $[\alpha]^{20}_{D}$ = - 20.8 (c = 0.17, MeOH). IR/cm^{-1}: 3560, 2924, 1669, 1207, 1175, 1127. HRMS: calcd for $[C_{15}H_{31}NO_4+H]^+$ 290.2326, found: 290.2328 $[M+H]^+$.
C240	(2R,3R,4R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C241	(2R,3R,4R,5R)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (600 MHz, D_2O) δ 4.17 (s, 1H), 3.91 (d, *J* = 12.6 Hz, 1H), 3.80 - 3.74 (m, 2H), 3.61 (d, *J* = 9.3 Hz, 1H), 3.33 (d, *J* = 13.5 Hz, 1H), 3.17 (d, *J* = 13.5 Hz, 1H), 3.09 - 3.06 (m, 1H). ^{13}C NMR (150 MHz, D_2O) δ 73.2, 66.6, 61.2, 58.9, 48.4. $[\alpha]^{20}_{D}$ = - 2.1 (c = 0.17 MeOH). IR/cm^{-1}: 3678, 2619, 1629, 1442, 1033. HRMS: calcd for $[C_6H_{13}NO_4 + H]^+$ 164.0917, found: 164.0916 $[M+H]^+$.
C242	(2R,3R,4S)-1-butyl-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C243	(2R,3R,4R,5R)-1-(2-hydroxyethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (600 MHz, MeOD) δ 4.15 - 4.06 (m, 2H), 4.01 - 3.98 (m, 2H), 3.97 - 3.93 (m, 2H), 3.64 - 3.52 (m, 3H), 3.46 - 3.44 (m, 1H), 3.37 - 3.35 (m, 1H), 3.18 - 3.17 (m, 1H). ^{13}C NMR (150 MHz, MeOD) δ 74.2, 68.6, 67.1, 67.0, 56.6, 56.4, 55.9, 55.7. $[\alpha]^{20}_{D}$ = - 20.7 (c = 0.05, MeOD). IR/cm^{-1}: 3741 - 2786, 1635, 1084, 611. HRMS: calcd for $[C_8H_{17}NO_5+H]^+$ 208.1185, found 208.1180 $[M+H]^+$.
C244	(2R,3S,4R)-1-butyl-2-(hydroxymethyl)piperidine-3,4-diol		[9]

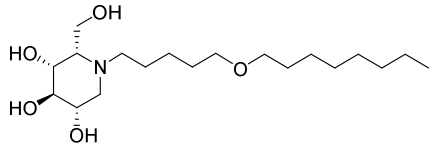
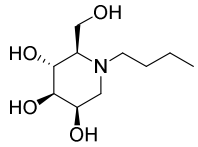
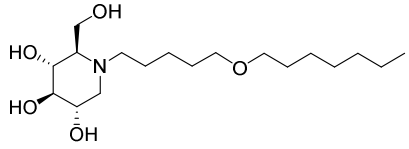
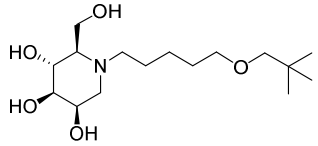
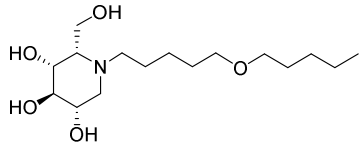
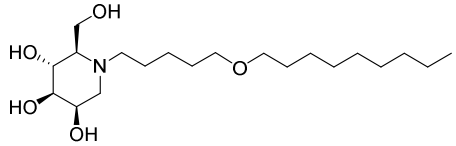
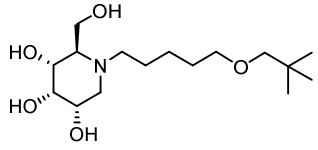
C245	(2R,3R,4S,5S)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (600 MHz, D_2O) δ 4.02 (s, 1H), 3.85 (ddd, *J* = 11.8, 4.8, 2.3 Hz, 1H), 3.79 (dd, *J* = 12.7, 2.9 Hz, 1H), 3.75 - 3.64 (m, 2H), 3.22 - 3.15 (m, 1H), 3.12 (dd, *J* = 11.8, 4.8 Hz, 1H), 2.98 (t, *J* = 11.8 Hz, 1H). ^{13}C NMR (150 MHz, D_2O) δ 70.7, 66.1, 65.3, 58.4, 55.5, 42.3. $[\alpha]^{20}_{D}$ = + 8.2 (c = 0.12, MeOH). IR/cm^{-1}: 3690, 3018, 1634, 1061, 1033, 1015. HRMS: calcd for $[C_6H_{13}NO_4+H]^+$ 164.0917, found 164.0916 $[M+H]^+$.
C246	(2R,3S)-1-butyl-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C247	(2R,3R,4S,5S)-2-(hydroxymethyl)-1-(5-(nonyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.05 - 4.02 (m, 2H), 3.91 (dd, *J* = 12.4, 3.2 Hz, 1H), 3.83 (ddd, *J* = 9.4, 7.1, 2.4 Hz, 1H), 3.75 (dd, *J* = 10.3, 2.4 Hz, 1H), 3.47 - 3.41 (m, 4H), 3.28 - 3.22 (m, 1H), 3.18 - 3.11 (m, 4H), 1.86 - 1.65 (m, 2H), 1.63 (q, *J* = 6.7 Hz, 2H), 1.55 (q, *J* = 6.8 Hz, 2H), 1.46 (dt, *J* = 11.4, 7.8 Hz, 2H), 1.38 - 1.14 (m, 12H), 0.90 (t, *J* = 8.0 Hz, 3H). ^{13}C NMR (100 MHz, MeOD) δ 72.1, 71.5, 67.1, 66.1, 62.2, 55.6, 54.1, 50.9, 33.1, 30.8, 30.7, 30.6, 30.4, 30.2, 27.3, 24.6, 24.2, 23.7, 14.5. $[\alpha]^{20}_{D}$ = - 8.6 (c = 0.17, MeOD). IR/cm^{-1}: 3663, 3016, 1668, 1185, 1116. HRMS: calcd for $[C_{20}H_{41}NO_5+H]^+$ 376.3057, found 376.3058 $[M+H]^+$.
C248	(2S,3R)-1-butyl-2-(hydroxymethyl)piperidin-3-ol		[9]
C249	(2S,3S,4R)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C250	(2S,3R,4S)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C251	(2R,3S,4R,5S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperid		[3]

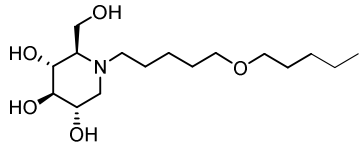
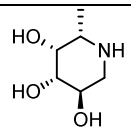
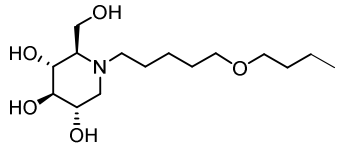
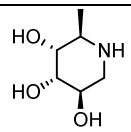
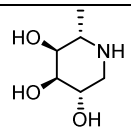
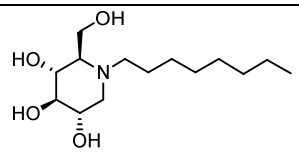
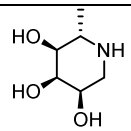
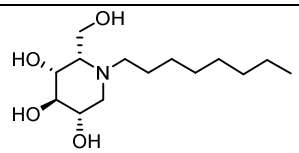
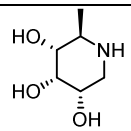
	ine-3,4,5-triol		
C252	1-((2R,3S,4S,5R,6S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidin-2-yl)-3,3,5,5-tetramethylhexan-1-one		[6]
C253	(2R,3R,4S,5S)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.15 (s, 1H), 4.08 - 3.95 (m, 2H), 3.95 - 3.83 (m, 2H), 3.39 (t, *J* = 6.2 Hz, 2H), 3.35 - 3.09 (m, 5H), 2.98 (s, 2H), 1.91 (s, 3H), 1.65 (m, 10H), 1.50 (s, 6H), 1.43 - 1.29 (m, 2H). ^{13}C NMR (100 MHz, D_2O) δ 81.8 71.5, 69.6, 64.8, 63.9, 60.4, 53.7, 53.0, 49.0, 39.5, 37.1, 33.9, 28.6, 28.3, 22.9, 22.4. $[\alpha]^{20}_{D}$ = +2.8 (c = 1.2, MeOH). IR/cm^{-1}: 3333, 2901, 2847, 1674, 1454, 1204, 1134, 1080, 1053. LCMS: 0-50, R_t 10.36 min, $[M+H]^+$ = 398.33. HRMS: calcd for $[C_{22}H_{39}NO_5+H]^+$ 398.2901, found 398.2901 $[M+H]^+$.
C254	(2R,3S,4S,5R,6S)-N-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]
C255	(2S,3R,4S,5S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 4.25 (s, 1H), 4.21 (s, 1H), 3.98 (m, 2H), 3.82 (s, 1H), 3.52 (d, *J* = 11.6 Hz, 1H), 3.41 (m, 3H), 3.35 (d, *J* = 13.2 Hz, 1H), 3.28 (m, 2H), 2.99 (s, 2H), 1.91 (s, 3H), 1.81 - 1.52 (m, 10H), 1.49 (s, 6H), 1.36 (m, 2H). ^{13}C NMR (100 MHz, D_2O) δ 81.7, 71.4, 70.0, 66.9, 66.8, 64.7, 59.4, 55.5, 53.2, 39.3, 36.9, 33.7, 28.3, 28.1, 22.7, 21.8. $[\alpha]^{20}_{D}$ = 12.5 (c = 0.6, MeOH). IR/cm^{-1}: 3368, 2901, 2847, 1674, 1539, 1184, 1130, 1069. LCMS: 10-50, R_t 9.47 min, $[M+H]^+$ = 398.33. HRMS: calcd for $[C_{22}H_{39}NO_5+H]^+$ 398.2901, found 398.2901 $[M+H]^+$.

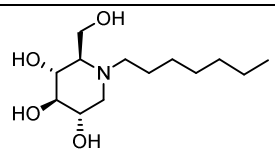
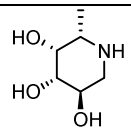
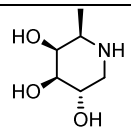
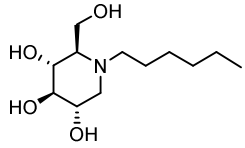
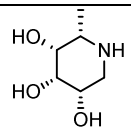
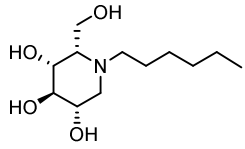
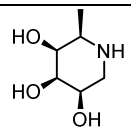
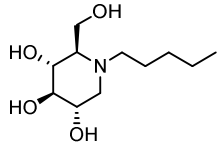
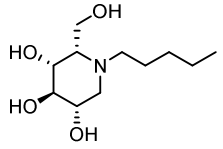
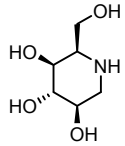
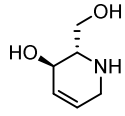
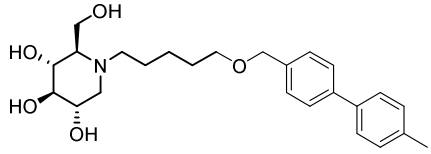
C256	(2R,3R,4S,5R)-1-(2-(benzyloxy)ethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 7.99 - 7.10 (m, 5H), 4.60 (s, 2H), 4.14 (d, *J* = 7.9 Hz, 1H), 4.12 - 4.05 (m, 1H), 4.05 - 3.94 (m, 3H), 3.91 (s, 2H), 3.67 - 3.40 (m, 4H), 3.33 (d, *J* = 14.1 Hz, 1H). ^{13}C NMR (100 MHz, D_2O) δ 136.7, 128.7, 128.4, 73.0, 67.9, 65.7, 63.0, 62.7, 62.1, 54.0, 52.3, 51.9. $[\alpha]^{20}_{D}$ = +2.5 (c = 0.8, MeOH). IR/cm^{-1}: 3356, 1674, 15.20, 1454, 1200, 1134, 1072, 1026. HRMS: calcd for $[C_{15}H_{23}NO_5+H]^+$ 298.1649, found 298.1656 $[M+H]^+$.
C257	(2R,3S,4R,5S)-2-(hydroxymethyl)-1-nonylpiperidine-3,4,5-triol		[8]
C258	(2S,3S,4S,5R,6R)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxylic acid		[6]
C259	(2R,3S,4R,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C260	(2S,3S,4S,5R,6S)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxamide		[6]
C261	(2S,3S,4R,5S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C262	(2S,3S,4S,5R,6S)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxylic acid		[6]
C263	(2S,3S,4S,5R,6S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)piperidine-2-carboxylic acid		[6]

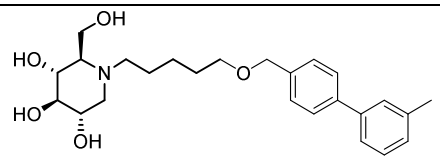
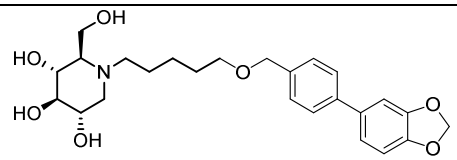
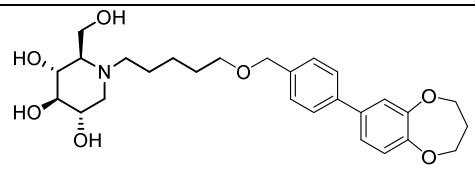
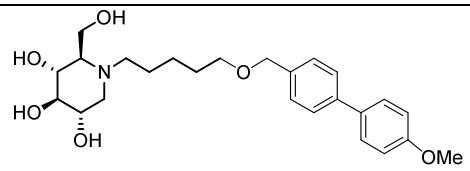
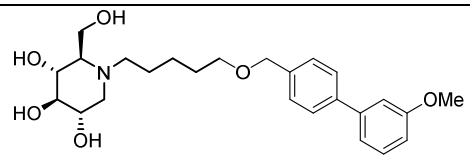
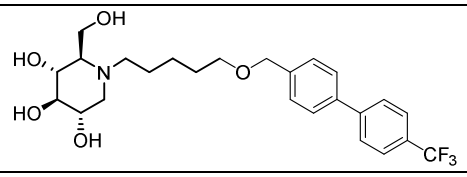
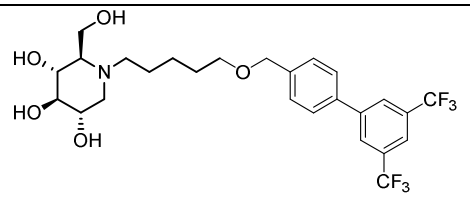
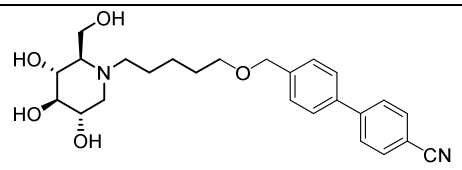
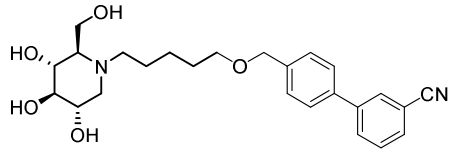
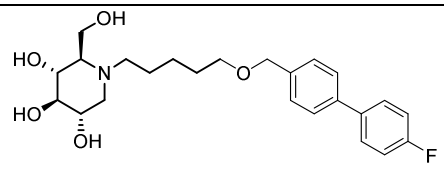
C264	(2R,3R,4S,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, D_2O) δ 7.07 (dd, *J* = 7.5, 3.8 Hz, 4H), 6.92 (d, *J* = 8.0 Hz, 2H), 6.86 (t, *J* = 7.4 Hz, 2H), 6.78 (t, *J* = 7.2 Hz, 1H), 4.11 (s, 1H), 4.08 (s, 2HPh), 3.99 - 3.85 (m, 2H), 3.80 (dd, *J* = 10.7, 1.9 Hz, 1H), 3.69 (d, *J* = 12.0 Hz, 1H), 3.18 - 2.91 (m, 6H), 2.90 - 2.76 (m, 1H), 1.57 - 1.35 (m, 2H), 1.35 - 1.17 (m, 2H), 1.11 - 0.88 (m, 2H). ^{13}C NMR (100 MHz, D_2O) δ 139.9, 139.5, 137.0, 128.6, 128.2, 127.1, 126.5, 71.8, 69.6, 69.4, 64.6, 63.7, 60.2, 53.4, 52.7, 48.8, 28.4, 22.6, 22.1. $[\alpha]^{20}_{D}$ = -3.5 (c = 1.1, MeOH). IR/cm^{-1}: 3310, 3028, 2936, 1674, 1539, 1508, 1458, 1204, 1134, 1057. LCMS: 0-50, R_t 9.82 min, $[M+H]^+$ = 416.20. HRMS: calcd for $[C_{24}H_{33}NO_5+H]^+$ 416.2432, found 416.2334 $[M+H]^+$.
C265	(2S,3S,4S,5R,6S)-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C266	(2R,3R,4S,5S)-1-(2-(benzyloxy)ethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 7.54 - 7.17 (m, 5H), 4.53 (s, 2H), 4.07 - 3.99 (m, 2H), 3.93 (dd, *J* = 10.6, 2.0 Hz, 1H), 3.88 - 3.78 (m, 3H), 3.75 (d, *J* = 10.4 Hz, 1H), 3.58 (d, *J* = 14.0 Hz, 1H), 3.46 (d, *J* = 14.0 Hz, 1H), 3.37 - 3.18 (m, 3H). ^{13}C NMR (100 MHz, MeOD) δ 139.9, 130.9, 130.4, 130.3, 75.7, 72.6, 67.8, 66.9, 65.9, 64.3, 56.2, 55.2, 52.6. $[\alpha]^{20}_{D}$ = +7.6 (c = 1.0, MeOH). IR/cm^{-1}: 3333, 2909, 2886, 1674, 1454, 1420, 1200, 1134, 1080, 1045. LCMS: 0-20, R_t 7.90 min, $[M+H]^+$ = 298.07. HRMS: calcd for $[C_{15}H_{23}NO_5+H]^+$ 298.1649, found 298.1657 $[M+H]^+$.
C267	(2S,3S,4S,5R,6S)-1-butyl-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C268	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(neopentyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.01 (dd, *J* = 12.3, 2.0 Hz, 1H), 3.89 (dd, *J* = 12.3, 3.0 Hz, 1H), 3.62 (ddd, *J* = 10.8, 9.2, 4.9 Hz, 1H), 3.52 (t, *J* = 9.6 Hz, 1H), 3.44 (t, *J* = 6.2 Hz, 2H), 3.32 - 3.24 (m, 2H), 3.17 (td, *J* = 12.1, 11.5, 5.5

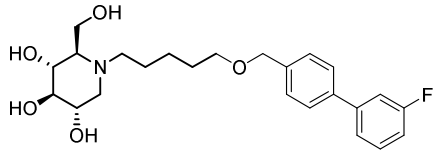
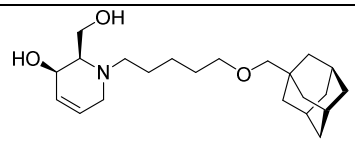
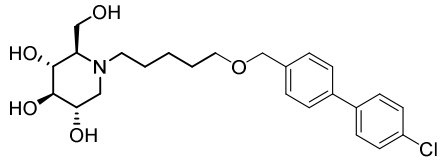
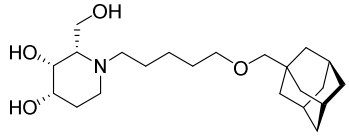
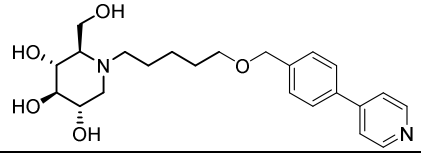
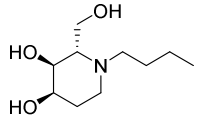
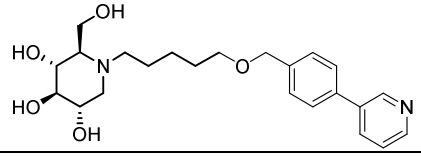
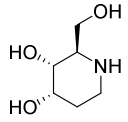
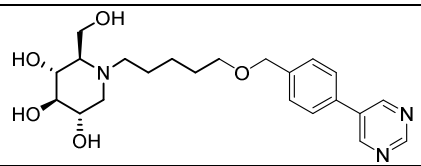
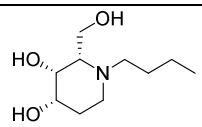
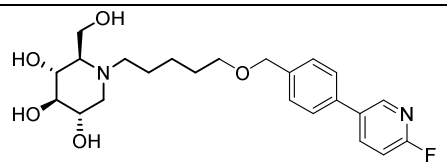
			Hz, 1H), 3.08 (s, 2H), 3.00 (td, *J* = 12.7, 12.0, 5.4 Hz, 1H), 2.78 - 2.70 (m, 1H), 2.72 (t, *J* = 11.4 Hz, 1H), 1.69 - 1.65 (m, 4H), 1.44 (ddd, *J* = 17.2, 9.0, 5.9 Hz, 2H), 0.91 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 82.5, 79.0, 72.1, 69.9, 68.8, 67.4, 56.5, 55.7, 54.0, 32.9, 30.4, 27.1, 24.8, 24.4. IR/cm^{-1}: 3284, 2347, 2326, 1018. LC/MS analysis: R_t 4.89 min (linear gradient 10-90% B), ES: = 320.3 $[M+H]^+$. HRMS: calcd for $[C_{16}H_{33}O_5N+H]^+$ 320.2432 found 320.2431 $[M+H]^+$.
C269	(2S,3S,4S,5R,6S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-3,4,5-trihydroxy-6-(hydroxymethyl)-N-pentylpiperidine-2-carboxamide		[6]
C270	(2S,3R,4R,5S)-1-(5-(2-((3S,5S,7S)-adamantan-1-yl)ethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[3]
C271	(2R,3S,4S,5S)-2-(hydroxymethyl)-1-(5-(nonyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (600 MHz, MeOD) δ 4.22 - 4.06 (m, 1H), 4.06 - 3.96 (m, 1H), 3.97 - 3.88 (m, 2H), 3.85 (dd, *J* = 4.6, 2.8 Hz, 1H), 3.46 - 3.42 (m, 5 H), 3.22 - 3.13 (m, 2H), 3.13 - 3.03 (m, 2H), 1.86 - 1.67 (m, 2H), 1.55 (q, *J* = 7.5 Hz, 2H), 1.55 (q, *J* = 7.5 Hz, 2H), 1.43 (q, *J* = 7.5 Hz, 2H), 1.38 - 1.22 (m, 12H), 0.90 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (150 MHz, MeOD) δ 72.1, 72.1, 71.5, 70.6, 64.8, 61.7, 61.6, 54.9, 51.5, 33.1, 30.8, 30.8, 30.7, 30.6, 30.4, 30.3, 27.3, 24.7, 23.8, 14.5. $[\alpha]^{20}_D$ = -35.8 (c = 0.06, MeOD). IR/cm^{-1}: 3666 - 2994, 1672, 1201, 1127. HRMS: calcd for $[C_{20}H_{41}NO_5+H]^+$ 376.3057, found 376.3059 $[M+H]^+$.
C272	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(nonyloxy)pentyl)piperidine-3,4,5-triol		[8]
C273	(2S,3R,4R,5S)-1-(2-hydroxyethyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[14]

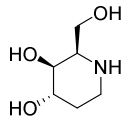
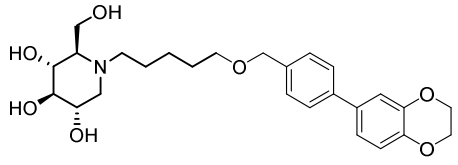
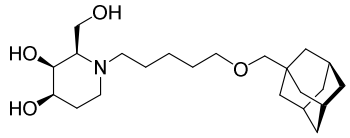
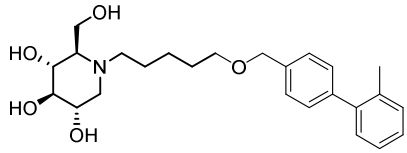
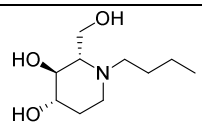
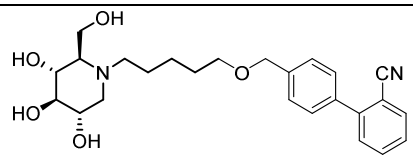
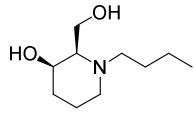
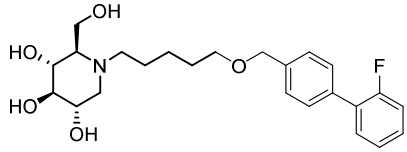
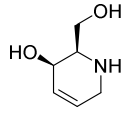
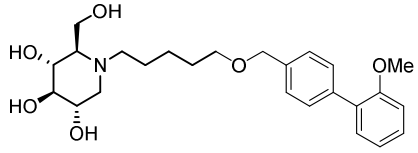
C274	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(octyloxy)pentyl)piperidine-3,4,5-triol		[8]
C275	(2R,3R,4R,5R)-1-butyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[15]
C276	(2R,3R,4R,5S)-1-(5-(heptyloxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C277	(2R,3R,4R,5R)-2-(hydroxymethyl)-1-(5-(neopentyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.16 - 4.02 (m, 2H), 4.01 - 3.85 (m, 2H), 3.59 - 3.50 (m, 1H), 3.45 (t, *J* = 6.2 Hz, 2H), 3.44 - 3.43 (m, 1H), 3.32 - 3.28 (m, 3H), 3.29 (s, 2H), 3.05 - 2.96 (m, 1H), 1.81 - 1.74 (m, 2H), 1.65 (q, *J* = 8.2 Hz, 2H), 1.47 (q, *J* = 8.2 Hz, 2H), 0.90 (s, 9 H). ^{13}C NMR (100 MHz, MeOD) δ 82.5, 74.3, 72.0, 67.8, 67.2, 67.0, 56.1, 54.5, 32.9, 30.2, 27.1, 24.6. $[\alpha]^{20}_{D}$ = -21.2 (c = 0.15, MeOD). IR/cm^{-1}: 3634, 2956, 1669, 1172, 1204, 1113,. HRMS: calcd for $[C_{16}H_{33}NO_5+H]^+$ 320.2431, found 320.2429 $[M+H]^+$.
C278	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(pentyloxy)pentyl)piperidine-3,4,5-triol		[8]
C279	(2R,3R,4R,5R)-2-(hydroxymethyl)-1-(5-(nonyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.15 - 4.03 (m, 2H), 4.02 - 3.82 (m, 2H), 3.59 - 3.49 (m, 1H), 3.44 (dd, *J* = 12.8, 3.8 Hz, 1H), 3.34 - 3.32 (m, 3H), 3.03 - 3.0 (m, 1H), 1.83 - 1.60 (m, 2H), 1.54 - 1.13 (m, 12H), 0.90 (t, *J* = 8.2 Hz, 3H). ^{13}C NMR (100 MHz, MeOD) δ 74.2, 67.8, 67.2, 67.0, 56.0, 54.6, 33.0, 30.5, 30.3, 30.2, 27.6, 23.7. $[\alpha]^{20}_{D}$ = - 20.8 (c = 0.17, MeOD). IR/cm^{-1}: 3560, 2924, 1669, 1207, 1175, 1127. HRMS: calcd for $[C_{15}H_{31}NO_4+H]^+$ 290.2326, found 290.2328 $[M+H]^+$.
C280	(2R,3R,4S,5S)-2-(hydroxymethyl)-1-(5-(neopentyloxy)pentyl)piperidine-3,4,5-triol		^{1}H NMR (400 MHz, MeOD) δ 4.14 - 4.01 (m, 2H), 3.92 (dd, *J* = 12.5, 3.1 Hz, 1H), 3.87 (d, *J* = 2.4 Hz, 1H), 3.82 - 3.75 (m, 1H), 3.45 (t, *J* = 6.1 Hz, 2H), 3.33 - 3.31 (m, 1H), 3.28 - 3.13 (m, 4H), 3.08 (s,

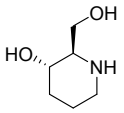
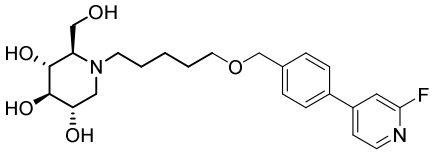
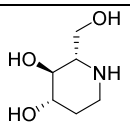
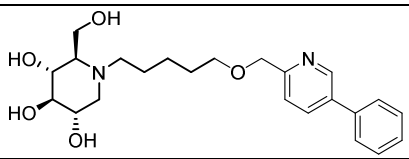
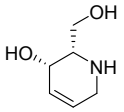
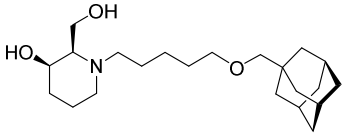
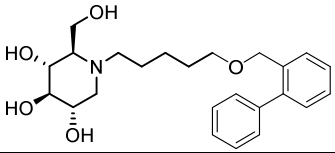
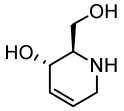
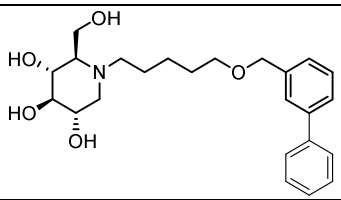
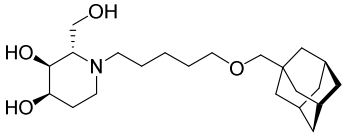
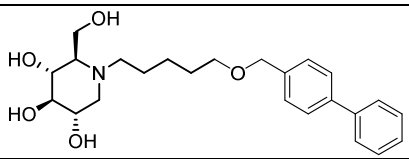
			2H), 1.90 - 1.70 (m, 2H), 1.70 - 1.59 (m, 2H), 1.50 - 1.48 (m, 2H), 0.91 (s, 9 H). ^{13}C NMR (100 MHz, MeOD) δ 82.5, 72.0, 71.4, 66.6, 65.7, 62.2, 55.0, 54.0, 50.7, 32.9, 30.2, 27.1, 24.6, 24.1. $[\alpha]^{20}_{D}$ = -3.5 (c = 0.23, MeOD). IR/cm^{-1}: 3692, 2995, 1671, 1207, 1128, HRMS: calcd for $[C_{16}H_{33}NO_5+H]^+$ 320.2431, found 320.2429 $[M+H]^+$.
C281	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-(pentyloxy)pentyl)piperidine-3,4,5-triol		[8]
C282	(2S,3R,4S,5R)-2-methylpiperidine-3,4,5-triol		[16]
C283	(2R,3R,4R,5S)-1-(5-butoxypentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C284	(2R,3R,4S,5R)-2-methylpiperidine-3,4,5-triol		[16]
C285	(2S,3S,4R,5S)-2-methylpiperidine-3,4,5-triol		[16]
C286	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-octylpiperidine-3,4,5-triol		[8]
C287	(2S,3S,4R,5R)-2-methylpiperidine-3,4,5-triol		[16]
C288	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-octylpiperidine-3,4,5-triol		[8]
C289	(2R,3R,4S,5S)-2-methylpiperidine-3,4,5-triol		[16]

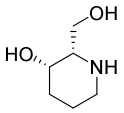
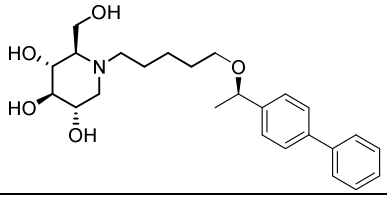
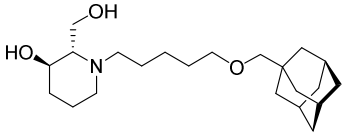
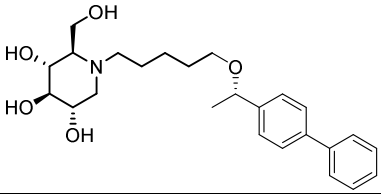
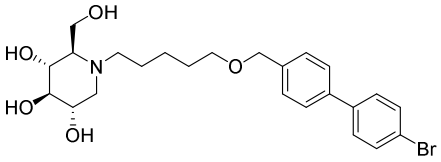
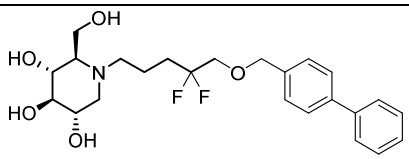
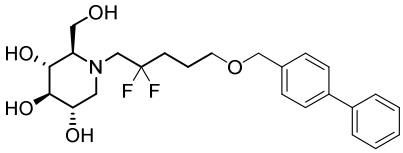
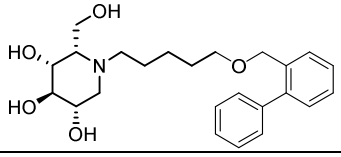
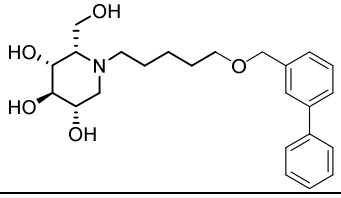
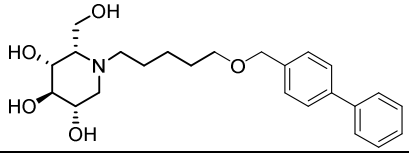
C290	(2R,3R,4R,5S)-1-heptyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C291	(2S,3R,4S,5R)-2-methylpiperidine-3,4,5-triol		[16]
C292	(2R,3S,4R,5S)-2-methylpiperidine-3,4,5-triol		[16]
C293	(2R,3R,4R,5S)-1-hexyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C294	(2S,3R,4S,5S)-2-methylpiperidine-3,4,5-triol		[16]
C295	(2S,3R,4R,5S)-1-hexyl-2-(hydroxymethyl)piperidine-3,4,5-triol		[8]
C296	(2R,3S,4R,5R)-2-methylpiperidine-3,4,5-triol		[16]
C297	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-pentylpiperidine-3,4,5-triol		[8]
C298	(2S,3R,4R,5S)-2-(hydroxymethyl)-1-pentylpiperidine-3,4,5-triol		[8]
C299	(2R,3S,4S,5R)-2-(hydroxymethyl)piperidine-3,4,5-triol		[4]
C300	(2S,3R)-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C301	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((4'-methyl-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		[10]

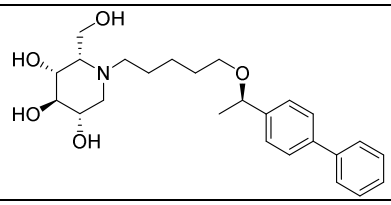
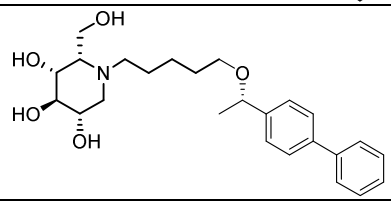
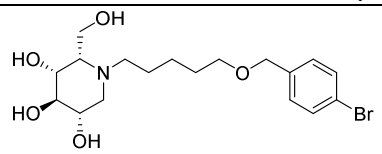
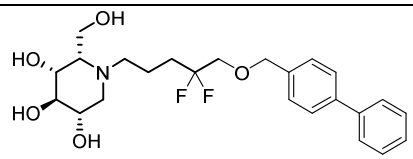
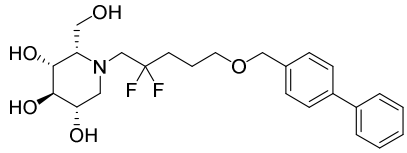
C302	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((3'-methyl-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		10
C303	(2R,3R,4R,5S)-1-(5-((4-(benzo[d][1,3]dioxol-5-yl)benzyl)oxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10
C304	(2R,3R,4R,5S)-1-(5-((4-(3,4-dihydro-2H-benzo[b][1,4]dioxepin-7-yl)benzyl)oxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10
C305	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((4'-methoxy-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		10
C306	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((3'-methoxy-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		10
C307	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((4'-(trifluoromethyl)-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		10
C308	(2R,3R,4R,5S)-1-(5-((3',5'-bis(trifluoromethyl)-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10
C309	4'-(((5-((2R,3R,4R,5S)-3,4,5-trihydroxy-2-(hydroxymethyl)piperidin-1-yl)pentyl)oxy)methyl)-[1,1'-biphenyl]-4-carbonitrile		10
C310	4'-(((5-((2R,3R,4R,5S)-3,4,5-trihydroxy-2-(hydroxymethyl)piperidin-1-yl)pentyl)oxy)methyl)-[1,1'-biphenyl]-3-carbonitrile		10
C311	(2R,3R,4R,5S)-1-(5-((4'-fluoro-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10

C312	(2R,3R,4R,5S)-1-(5-((3'-fluoro-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C313	(2R,3R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C314	(2R,3R,4R,5S)-1-(5-((4'-chloro-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C315	(2S,3R,4S)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C316	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((4-(pyridin-4-yl)benzyl)oxy)pentyl)piperidine-3,4,5-triol		[10]
C317	(2S,3S,4R)-1-butyl-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C318	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((4-(pyridin-3-yl)benzyl)oxy)pentyl)piperidine-3,4,5-triol		[10]
C319	(2R,3R,4S)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C320	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((4-(pyrimidin-5-yl)benzyl)oxy)pentyl)piperidine-3,4,5-triol		[10]
C321	(2S,3R,4S)-1-butyl-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C322	(2R,3R,4R,5S)-1-(5-((4-(6-fluoropyridin-3-yl)benzyl)oxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]

C323	(2R,3S,4S)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C324	(2R,3R,4R,5S)-1-(5-((4-(2,3-dihydrobenzo[b][1,4]dioxin-6-yl)benzyl)oxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C325	(2R,3S,4R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C326	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((2'-methyl-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		[10]
C327	(2S,3S,4S)-1-butyl-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C328	4'-(((5-((2R,3R,4R,5S)-3,4,5-trihydroxy-2-(hydroxymethyl)piperidin-1-yl)pentyl)oxy)methyl)-[1,1'-biphenyl]-2-carbonitrile		[10]
C329	(2R,3R)-1-butyl-2-(hydroxymethyl)piperidin-3-ol		[9]
C330	(2R,3R,4R,5S)-1-(5-((2'-fluoro-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C331	(2R,3R)-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C332	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((2'-methoxy-[1,1'-biphenyl]-4-yl)methoxy)pentyl)piperidine-3,4,5-triol		[10]

C333	(2R,3S)-2-(hydroxymethyl)piperidin-3-ol		[9]
C334	(2R,3R,4R,5S)-1-(5-((4-(2-fluoropyridin-4-yl)benzyl)oxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C335	(2S,3S,4S)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C336	(2R,3R,4R,5S)-2-(hydroxymethyl)-1-(5-((5-phenylpyridin-2-yl)methoxy)pentyl)piperidine-3,4,5-triol		[10]
C337	(2S,3S)-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C338	(2R,3R)-1-(5-(((3R,5R,7R)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidin-3-ol		[9]
C339	(2R,3R,4R,5S)-1-(5-([1,1'-biphenyl]-2-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C340	(2R,3S)-2-(hydroxymethyl)-1,2,3,6-tetrahydropyridin-3-ol		[9]
C341	(2R,3R,4R,5S)-1-(5-([1,1'-biphenyl]-3-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C342	(2S,3S,4R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4-diol		[9]
C343	(2R,3R,4R,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]

C344	(2S,3S)-2-(hydroxymethyl)piperidin-3-ol		[9]
C345	(2R,3R,4R,5S)-1-(5-((R)-1-([1,1'-biphenyl]-4-yl)ethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C346	(2S,3R)-1-(5-(((3S,5S,7S)-adamantan-1-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidin-3-ol		[9]
C347	(2R,3R,4R,5S)-1-(5-((S)-1-([1,1'-biphenyl]-4-yl)ethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C348	(2R,3R,4R,5S)-1-(5-((4'-bromo-[1,1'-biphenyl]-4-yl)methoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C349	(2R,3R,4R,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)-4,4-difluoropentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C350	(2R,3R,4R,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)-2,2-difluoropentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C351	(2S,3R,4R,5S)-1-(5-([1,1'-biphenyl]-2-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C352	(2S,3R,4R,5S)-1-(5-([1,1'-biphenyl]-3-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]
C353	(2S,3R,4R,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		[10]

C354	(2S,3R,4R,5S)-1-(5-((R)-1-([1,1'-biphenyl]-4-yl)ethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10
C355	(2S,3R,4R,5S)-1-(5-((S)-1-([1,1'-biphenyl]-4-yl)ethoxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10
C356	(2S,3R,4R,5S)-1-(5-((4-bromobenzyl)oxy)pentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10
C357	(2S,3R,4R,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)-4,4-difluoropentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10
C358	(2S,3R,4R,5S)-1-(5-([1,1'-biphenyl]-4-ylmethoxy)-2,2-difluoropentyl)-2-(hydroxymethyl)piperidine-3,4,5-triol		10

S5 Additional Biochemical Data for ABP 4

Prolonged Imaging Experiment

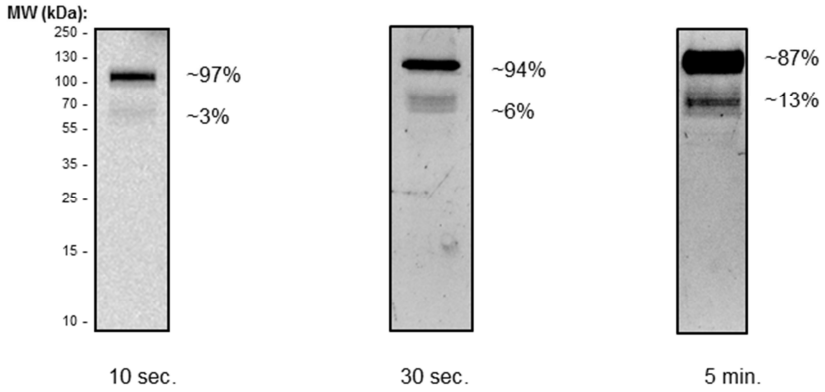


Figure S1. Prolonged fluorescent scanning showing ca. 87% of signal originates from probe bound to GBA2 (102kDa) and approximately 13% from probe bound to GBA1 (60kDa). Intensities of the bands were quantified using Image Lab v4.1.

Potency and Selectivity of ABP 4

Potency (IC_{50}) of ABP 4 on GCS was determined as described by method described in the experimental section. The inhibition constants (K_i) of ABP **4** were determined by the method described in Witte et al.[17] Values in table S2 are given in µM.

Table S2: Potency and selectivity of the probe on GCS, GBA1, GBA2 and GBA3

GCS[a]	GBA1[b]	GBA2[b]	GBA3[b]	Ratio GCS/GBA2	Ratio GBA1/GBA2	Ratio GBA3/GBA2
>200	0.249	0.008	0.054	>25000	31	7

(a) in situ (b) in vitro

S6 FluoPol-ABPP - pH Experiments on Established Competitors

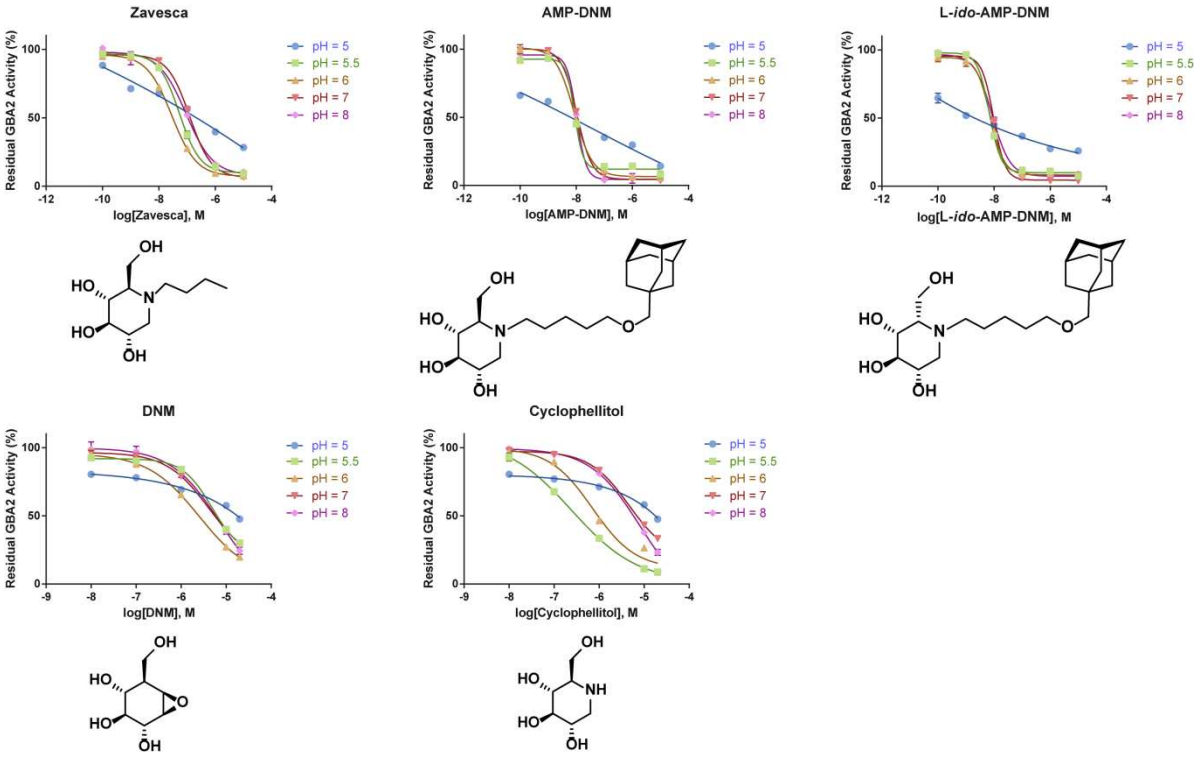


Figure S2. Inhibition by established inhibitors (**1**, **2**, **6**, **7** and **8**) on GBA2 determined via FluoPol-ABPP. Curves represent experiments at a different pH, error bars represent standard error of the mean (SEM).

Table S3: Inhibition values of established inhibitors on GBA2 determined via FluoPol-ABPP

pH	Zavesca (1)	AMP-DNM (2)	L-*ido*-AMP-DNM (6)	DNM (7)	Cyclophellitol (8)
5.0	0.201 ± 0.006	0.0061 ± 0.0008	0.0027 ± 0.006	23.62 ± 0.76	26.70 ± 2.88
5.5	0.065 ± 0.003	0.0098 ± 0.0004	0.0072 ± 0.003	6.52 ± 0.40	0.35 ± 0.04
6.0	0.033 ± 0.002	0.0102 ± 0.0008	0.0072 ± 0.002	2.37 ± 0.08	1.16 ± 0.08
7.0	0.135 ± 0.001	0.0118 ± 0.0001	0.0095 ± 0.001	5.86 ± 0.24	7.48 ± 0.23
8.0	0.116 ± 0.001	0.106 ± 0.0004	0.0095 ± 0.001	5.54 ± 0.56	5.35 ± 0.01

S7 FluoPol-ABPP Screen of the Iminosugar Library - Categorized based on Configuration

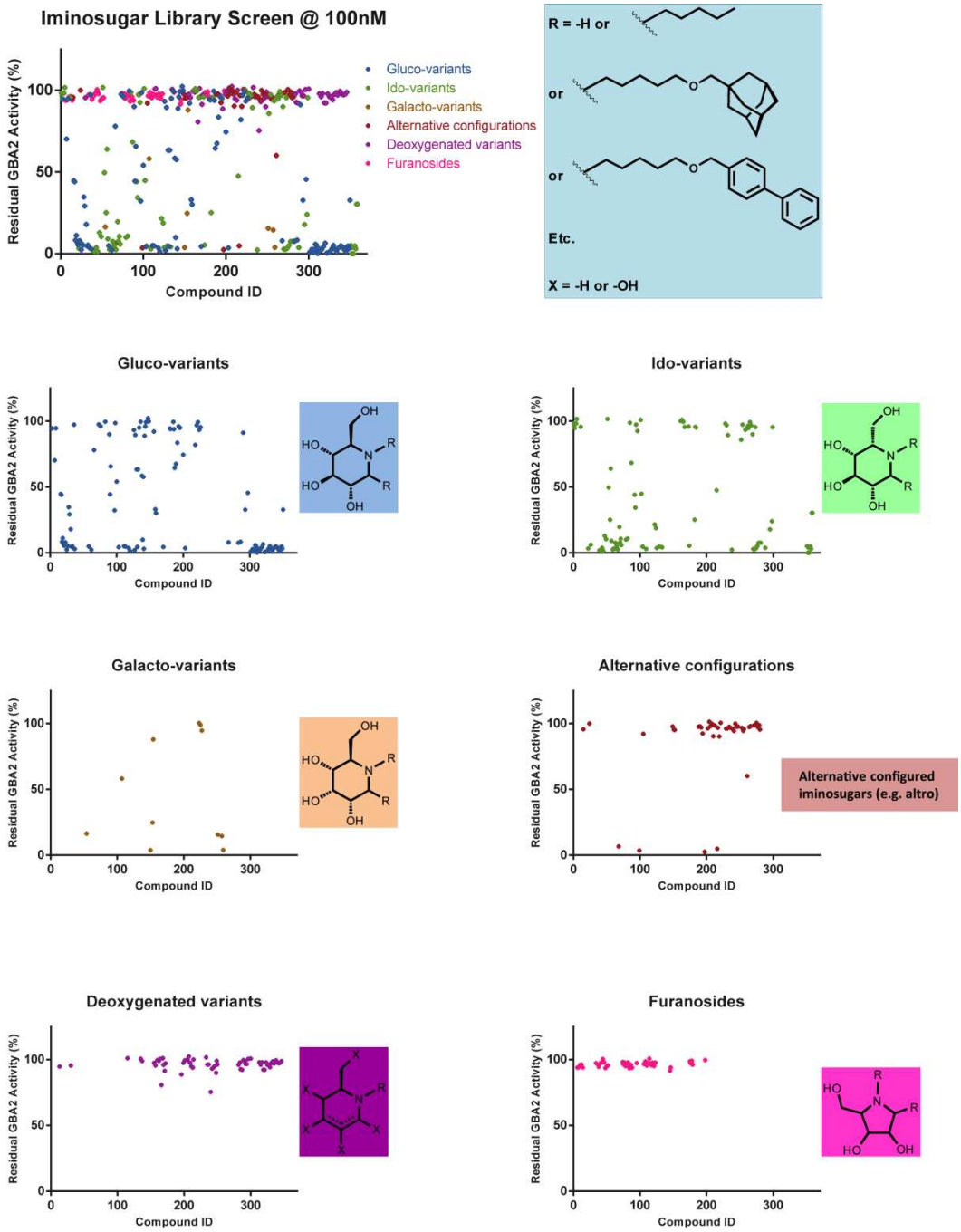


Figure S3. FluoPol-ABPP screen of the iminosugar library. Compounds are categorized based on its sugar configuration (*gluco*, *ido*, *galacto* and others are classified as 'alternative configurations'), deoxygenated variants and furanosides.

S8 Potency and Selectivity Assessment for D-*gluco*- and L-*ido*-deoxynojirmycins

The potency of D-*gluco*- and L-*ido*-deoxynojirimycins on GCS, GBA1 and GBA2 were determined by the method described in the manuscript. The data set displayed here is composed of published IC_{50}-values which were confirmed in our experiments and for unknowns experimentally determined. Calculated ratios GCS/GBA2 and GBA1/GBA2 are colored in green. A stronger shade of green stands for a higher ratio and thus selectivity.

Iminosugar Library

Table S4: Inhibition values of iminosugar library compounds on GCS, GBA1 and GBA2

Entry:	GBA2 Inhibition (%) FluoPol	IC_{50} on GCS (in situ) in uM	IC_{50} on GBA1 (in vitro) in uM	IC_{50} on GBA2 (in vitro) in uM	Ratio GCS/GBA2	Ratio GBA1/GBA2
C16	44.7	2.9	2.17	0.025	116	87
C17	44.1	9.53	500	0.400	24	1250
C18	8.4	1	0.50	0.009	111	56
C19	11.2	4	30	0.060	67	500
C20	6.9	2	705	0.040	50	17625
C21	5.5	1	205	0.008	125	25625
C22	3.3	1	15	0.020	50	750
C23	8.0	0.3	1.75	0.015	20	117
C25	2.4	0.2	0.50	0.010	20	50
C26	6.1	2.77	100	0.007	413	14925
C27	5.3	0.1	0.50	0.040	3	13
C28	34.7	50	0.35	0.068	735	5
C29	29.2	20	80	0.110	182	727
C31	18.0	20	18.5	0.045	444	411
C32	4.7	40.03	0.06	0.010	4003	6
C33	5.3	4	4	0.020	200	200
C35	3.6	0.025	0.25	0.00008	313	3125
C37	3.0	0.025	0.20	0.00008	313	2500
C39	1.9	0.003	5	0.0001	30	50000
C41	1.5	0.003	6	0.0001	30	60000
C43	3.8	0.005	8	0.0004	13	20000
C45	1.4	0.0025	6	0.0006	4	10000
C54	16.4	1.94	100	0.0027	719	37037
C55	25.2	15	1000	0.250	60	4000
C57	9.1	2	1000	1.000	2	1000
C58	4.9	0.003	1	0.001	3	1000
C59	2.5	0.15	100	0.015	10	6667
C60	3.1	0.003	50	0.001	3	50000
C61	3.1	0.1	95	0.025	4	3800
C62	2.3	0.05	0.40	0.002	25	200
C63	7.5	0.05	40	0.015	3	2667
C64	3.2	0.008	20	0.003	3	6667
C65	5.3	0.05	15	0.015	3	1000

C67	2.5	0.05	12	0.045	1	267
C68	6.6	10	5	0.150	67	33
C69	19.6	40	1000	0.140	286	7143
C70	7.9	0.4	40	0.015	27	2667
C71	10.7	4	700	0.040	100	17500
C72	35.0	21.4	35.95	0.031	690	1160
C73	5.9	4	25	0.020	200	1250
C79	10.1	0.75	0.30	0.001	750	300
C81	10.8	0.2	10	0.003	67	3333
C90	44.4	0.5	1.5	0.004	125	375
C92	44.1	2.5	50	0.100	25	500
C93	34.3	20	1000	1.000	20	1000
C97	32.2	50	0.07	0.300	167	0
C99	3.6	20	0.34	0.010	2000	34
C102	44.8	1.9	100	0.0058	328	17241
C103	4.3	4	1.5	0.007	571	214
C104	4.7	2	50	0.010	200	5000
C109	3.0	0.43	11.97	0.0015	287	7980
C111	5.0	0.39	0.84	0.001	390	840
C113	4.8	0.2	0.1	0.002	100	50
C118	3.6	0.025	0.2	0.00012	208	1667
C120	1.4	0.025	0.1	0.00008	313	1250
C122	3.7	0.08	10	0.002	40	5000
C127	2.0	0.5	1.5	0.004	125	375
C129	4.8	0.07	60	0.006	12	10000
C131	4.5	35.2	0.5	0.005	7040	100
C133	4.2	14.35	12	0.008	1794	1500
C139	9.9	0.75	0.3	0.001	750	300
C141	3.1	0.3	0.1	0.002	150	50
C158	33.1	50	0.07	0.034	1471	2
C159	30.2	10	0.25	0.020	500	13
C170	4.4	5	0.19	0.005	1000	38
C174	5.4	0.1	2	0.001	100	2000
C182	25.2	3.88	1000	0.190	20	5263
C197	2.6	40	0.38	0.008	5000	48
C203	3.6	3.63	1.29	0.00415	875	311
C215	47.6	12.06	100	0.0023	5243	43478
C216	4.8	10	6	0.013	769	462
C238	2.3	1.34	33.89	0.00058	2310	58431
C268	8.0	5.05	6.2	0.00495	1020	1253
C270	2.9	5	2	0.006	833	333
C272	2.8	0.05	12	0.045	1	267
C274	3.3	0.05	15	0.015	3	1000
C276	4.9	0.3	1.75	0.015	20	117

C278	7.6	0.15	100	0.015	10	6667
C281	7.7	2	705	0.040	50	17625
C283	7.7	4	30	0.060	67	500
C286	8.4	4	4	0.020	200	200
C288	3.8	4	25	0.020	200	1250
C293	32.8	20	80	0.110	182	727
C295	17.9	40	1000	0.140	286	7143
C297	45.6	20	500	0.400	50	1250
C298	24.0	15	1000	0.250	60	4000
C301	0.7	0.1	0.25	0.003	33	83
C302	1.4	0.1	0.25	0.002	50	125
C303	1.2	0.025	0.5	0.002	13	250
C304	2.8	0.025	3	0.015	2	200
C305	1.9	0.025	2.5	0.010	3	250
C306	0.9	0.15	2.5	0.020	8	125
C307	2.5	0.025	0.4	0.001	25	400
C308	5.8	0.02	0.8	0.015	1	53
C309	5.6	0.15	0.35	0.003	50	117
C310	0.6	0.05	0.7	0.002	25	350
C311	0.2	0.025	0.4	0.001	25	400
C312	3.4	0.025	0.03	0.001	25	25
C314	1.8	0.025	0.5	0.002	13	250
C316	2.8	2	2	0.010	200	200
C318	4.4	2	3	0.010	200	300
C320	6.5	2	10	0.025	80	400
C322	0.5	0.75	3	0.005	150	600
C324	0.9	0.04	0.25	0.030	1	8
C326	1.4	0.025	0.07	0.001	50	140
C328	3.1	0.15	0.6	0.005	30	120
C330	5.2	0.075	0.6	0.002	38	300
C332	2.5	0.05	0.6	0.003	17	200
C334	0.9	0.15	2	0.004	38	500
C336	3.5	0.2	1.5	0.003	67	500
C339	4.9	0.05	1.25	0.003	17	417
C341	4.2	0.075	0.3	0.002	38	150
C343	2.5	0.05	0.4	0.002	25	200
C345	1.0	0.06	300	0.003	20	100000
C347	4.6	0.07	400	0.003	23	133333
C348	4.7	0.33	2.55	0.00004	7500	57955
C349	3.2	0.06	0.3	0.001	60	300
C350	32.8	1.25	0.13	0.010	125	13
C351	5.1	0.025	15	0.003	8	5000
C352	0.1	0.07	20	0.002	35	10000
C353	3.9	0.008	20	0.003	3	6667

C354	0.1	0.03	10	0.001	30	10000
C355	0.2	0.04	10	0.002	20	5000
C356	4.8	0.021	100	0.00025	84	401606
C357	3.1	0.015	12.5	0.002	8	6250
C358	30.4	0.02	500	0.002	10	250000

Second Generation Library

Table S5: Inhibition values of the second generation library compounds on GCS, GBA1 and GBA2

Entry:	**IC_{50} on GCS (in situ) in uM**	**IC_{50} on GBA1 (in vitro) in uM**	**IC_{50} on GBA2 (in vitro) in uM**	**Ratio GCS/GBA2**	**Ratio GBA1/GBA2**
B44	4	23	0.0009	4444	25556
B45	6	3	0.004	1500	750
B46	0.76	4	0.005	152	800
B47	53	156	0.042	1262	3714
B48	1	1000	0.025	40	40000
B49	7.2	51	0.018	400	2833
B50	0.64	13	0.009	71	1444
B51	0.12	13	0.009	13	1444
B52	0.35	11	0.004	88	2750
B53	0.38	6	0.002	190	3000
B54	10	63	0.035	286	1800
B55	50	325	0.12	417	2708
B56	0.729	100	0.0006	1215	166667
B57	2.5	1000	0.021	119	47619
B58	0.1	176	0.003	33	58667
B59	5	196	0.006	833	32667
B60	0.053	328	0.007	8	46857
B61	0.12	205	0.001	120	205000

S9 Crystallography

Gene Expression and Protein Purification for TxGH116

TxGH116 was expressed from a pET-30a plasmid described previously.[18] Competent *E. Coli* BL21 (DE3) cells were transformed and grown in LB media (with 30 µg/mL kanamycin) at 37 ºC until an OD_{600} of 0.6 had been reached. Expression of the TxGH116 gene was then induced with 0.5 mM IPTG and the cells incubated at 16 °C for 18 hr. Cells were lysed by sonication at 14-18 Hz, four runs of 40-50 seconds exposure, in buffer "A" (20 mM $NaPO_4$ pH 7.4, 150 mM NaCl). Cell debris was removed by centrifugation for 15 minutes in a Sorvall SS-34 rotor at 38000 g.

The resulting supernatant was heated at 65 °C for 20 minutes and the resulting precipitated protein removed by centrifugation. The remaining soluble fraction (containing the heat resistant TxGH116) was loaded onto a 5 mL GE sciences (GE healthcare) crude HisTrap column, equilibrated with buffer A. Unbound material was removed by washing with three column volumes of buffer A. Bound protein was eluted with a gradient into buffer B (20 mM $NaPO_4$ pH 7.4, 150 mM NaCl, 500 mM imidazole) across twenty column volumes. The fractions containing TxGH116 were pooled, concentrated and buffer exchanged into "Digest buffer" (20 mM Tris pH 8, 150 mM NaCl). The protein was digested with enterokinase (New England Bio Labs) as per the manufacturer's instructions overnight, in order to remove the cleaved N terminal His and "S" tags, and then buffer exchanged into GF buffer using a 50 kDa MWCO centrifugal filter (Millipore Corp). The protein was then purified over a Superdex S200 gel filtration column, which had been equilibrated with GF buffer (20 mM Tris pH 8, 500 mM NaCl) and the fractions containing TxGH116 pooled, concentrated to 20 mg/mL in a 50 kDa MW cut-off centrifugal filter (Millipore Corp) and flash frozen at -80 °C.

Crystallization, Structure Solution and Refinement of TxGH116 in Complex with 5.

TxGH116 was diluted to ~2 mg/mL and crystallization trials were set up using 350 nL of protein solution and 350 nL of mother liquor (0.2 M ammonium sulfate, 20% PEG 3350, 0.1M BisTris pH 5.5 - 6.7) in 48-well plate format sitting drop plates at 18°C. Crystals of TxGH116 were soaked in compound **5** ligand residue resuspended in the corresponding mother liquor (0.2 M ammonium sulfate, 20% PEG 3350, 0.1M BisTris pH 6.7) overnight to allow covalent binding. A cryoprotectant of 25% (v/v) glycerol together with the mother liquor was used. Diffraction data for the crystals was collected on beamline I03 beamline at the Diamond Light Source.

Data were processed using XDS[20] and the Aimless data reduction pipeline through the CCP4i2 software.[20] The previous TxGH116C PDB structure (5BVU)[18] was used to determine the phases and solve the structure. Refinement of the structures was performed using REFMAC[21] and model building completed using COOT, both programs run through the CCP4i2 software.[22] Ligand coordinates and restraints were built using JLigand.[23] Crystal structure illustrations were generated using CCP4mg.[24] Data collection and refinement statistics are shown in Table S7.

Final refined coordinates, and observed structure factor amplitudes, have been deposited on the PDB with accession code 5NCX.

Table S6: Data collection and Refinement Statistics for the TxGH116 structure in complex with 5

	TxGH116 with 5
PDB Code	5NCX
Data collection	
Space group	$P2_122_1$
Cell dimensions	
a, *b*, *c* (Å)	53.62, 83.30, 177.48
Resolution (Å)	60-1.70 (1.75 - 1.70) *
R_{merge}	0.096 (1.00)
R_{pim}	0.044 (0.46)
CC(1/2)	0.998 (0.58)
I / σI	12.4(1.7)
Completeness (%)	99.5(99.2)
Redundancy	5.7(5.6)
Refinement	
Resolution (Å)	88.90-1.70
No. reflections	87654/4371
R_{work} / R_{free}	0.15/0.18
No. atoms	
Protein	6228
Ligand/ion	26
Water	371
B-factors (Å^2)	
Protein	20
Ligand/ion	34
Water	28
R.m.s. deviations	
Bond lengths (Å)	0.020
Bond angles (°)	1.99

**Values in parentheses are for highest-resolution shell.*

Accessibility of TxGH116 Binding Pocket

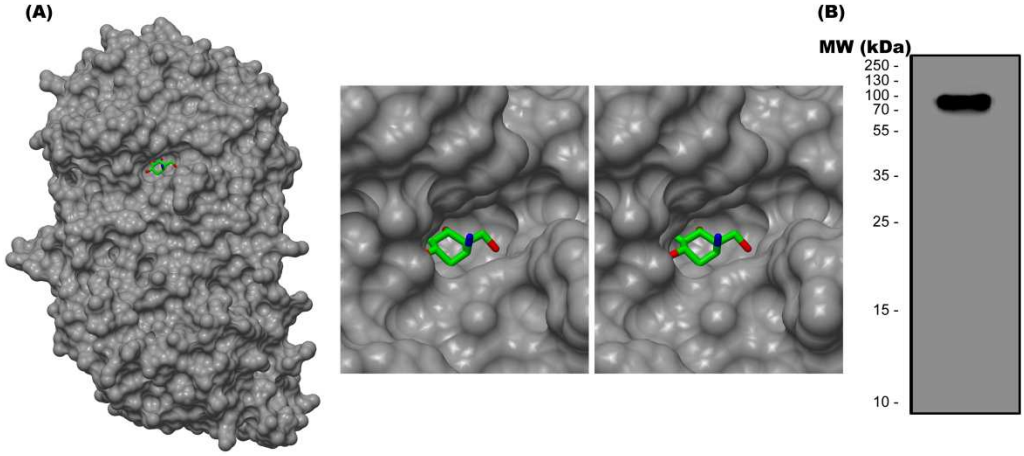


Figure S4. Accessibility of TxGH116 binding pocket to ABPs and other molecules (A) Surface view of TxGH116, with a divergent (wall-eyed) stereo image close up of the enzyme binding pocket containing bound **5** (green). The TxGH116 binding pocket is freely accessible to solvent and can accommodate ABPs with larger linker moieties such as **4**. (B) Fluorescent gel of 0.5 µg/µL TxGH116 (~90kDa) after reaction with 500nM ABP **4**, illustrating that tagged ABPs can readily react with this enzyme.

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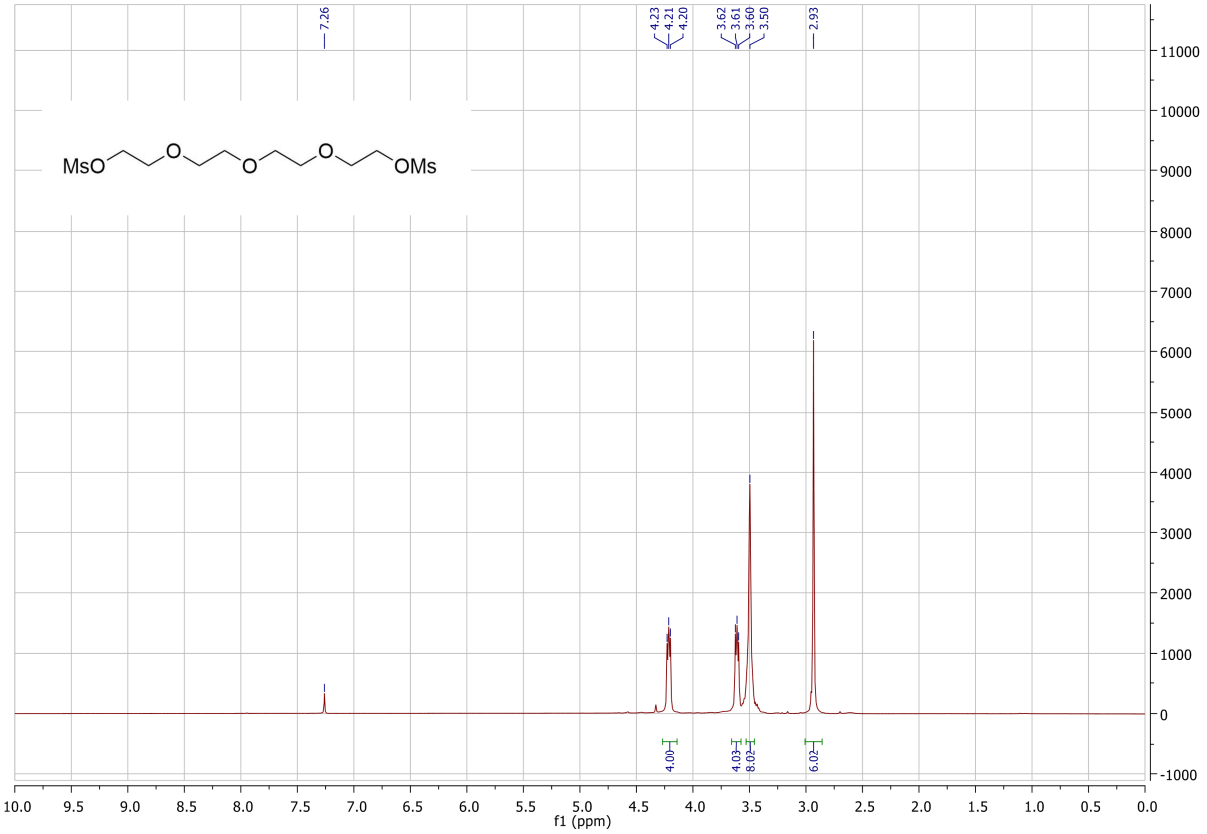
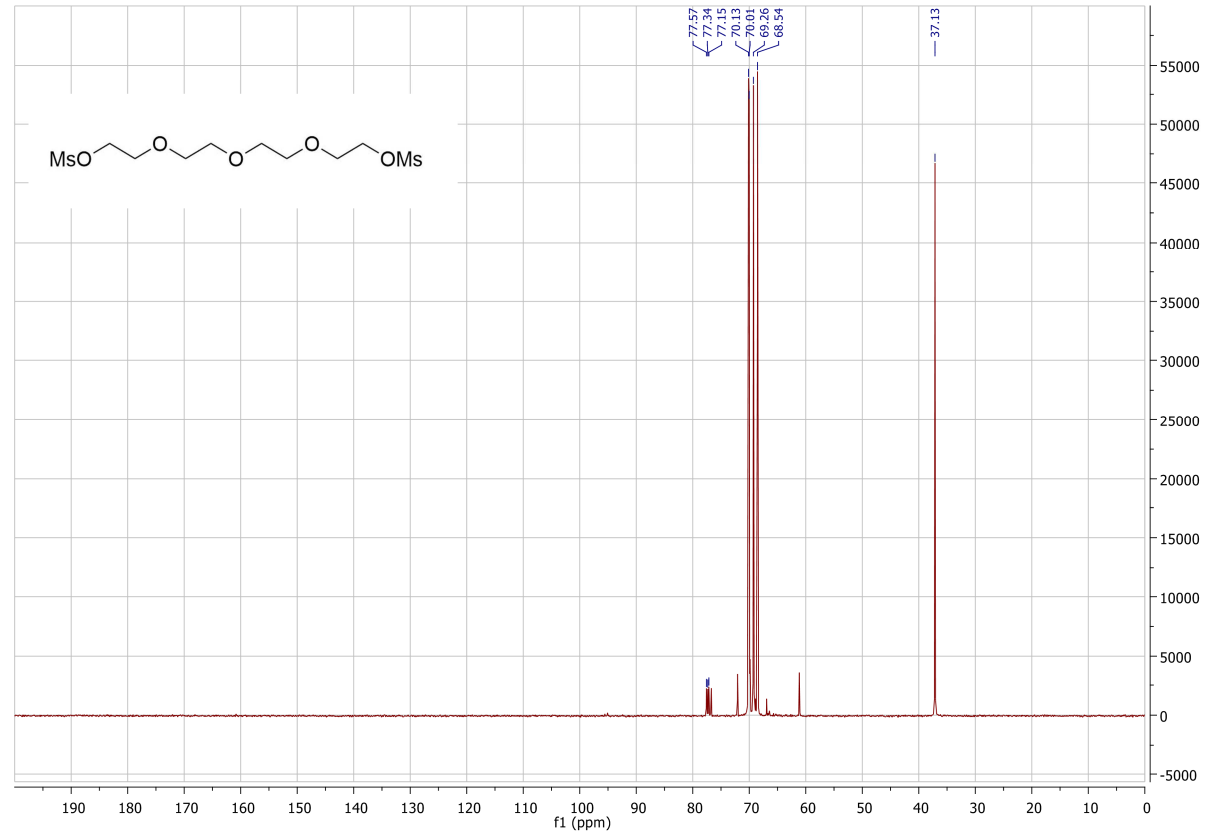
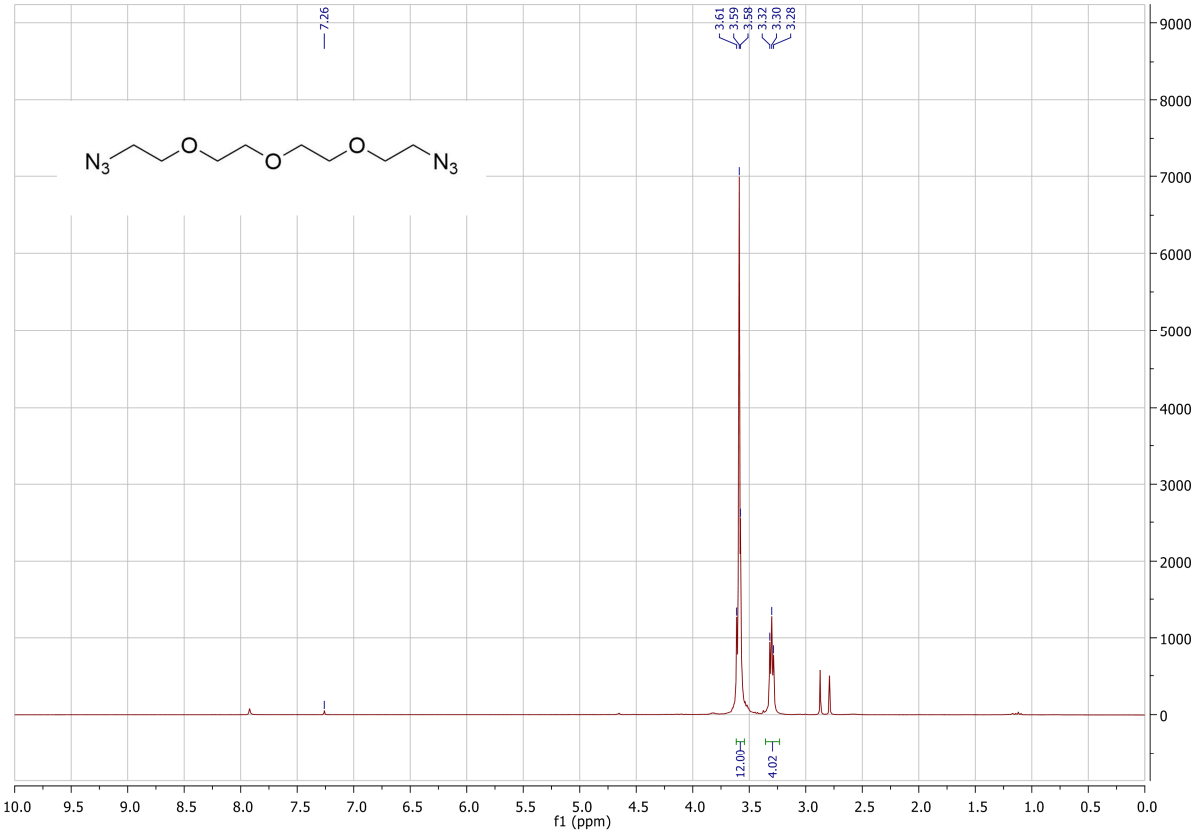
Appendix: Copies of ^{1}H and ^{13}C NMR Spectra

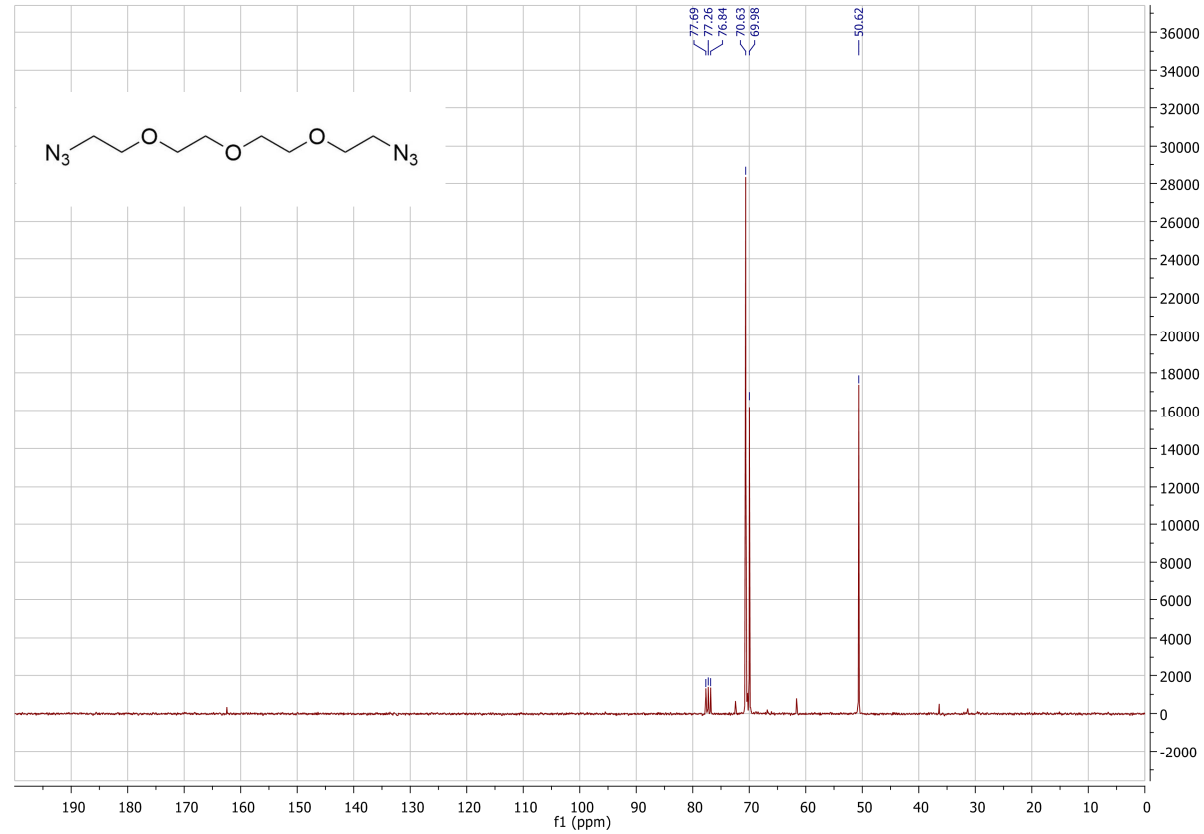
^{1}H-NMR and ^{13}C-NMR of compound A6 in $CDCl_3$.



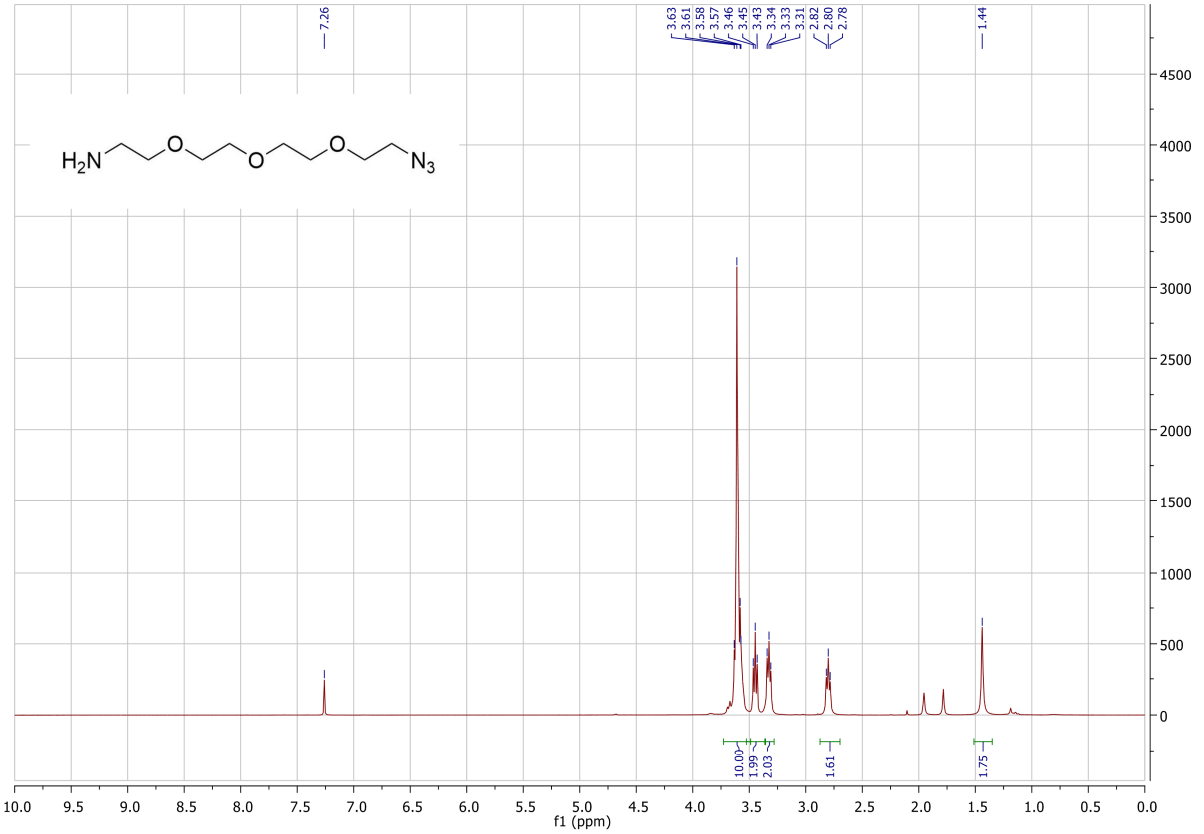


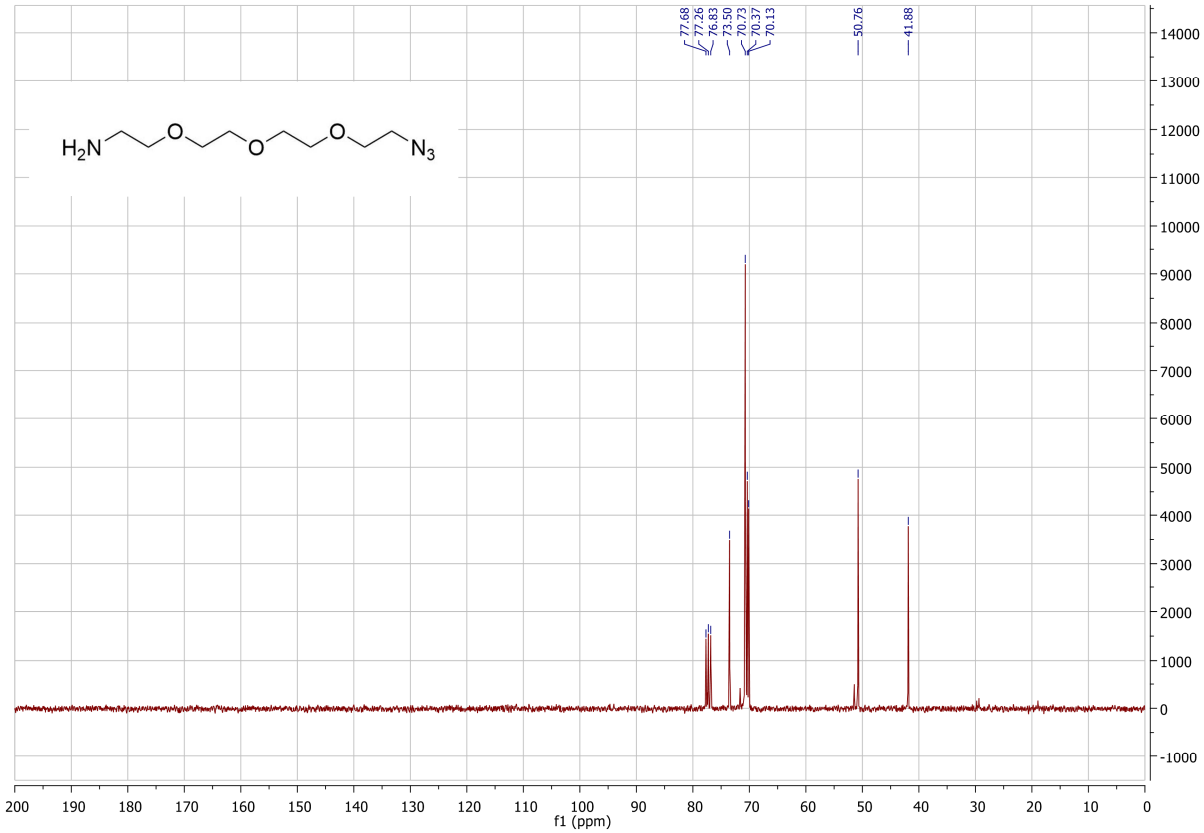
^{1}H-NMR and ^{13}C-NMR of compound A7 in $CDCl_3$.



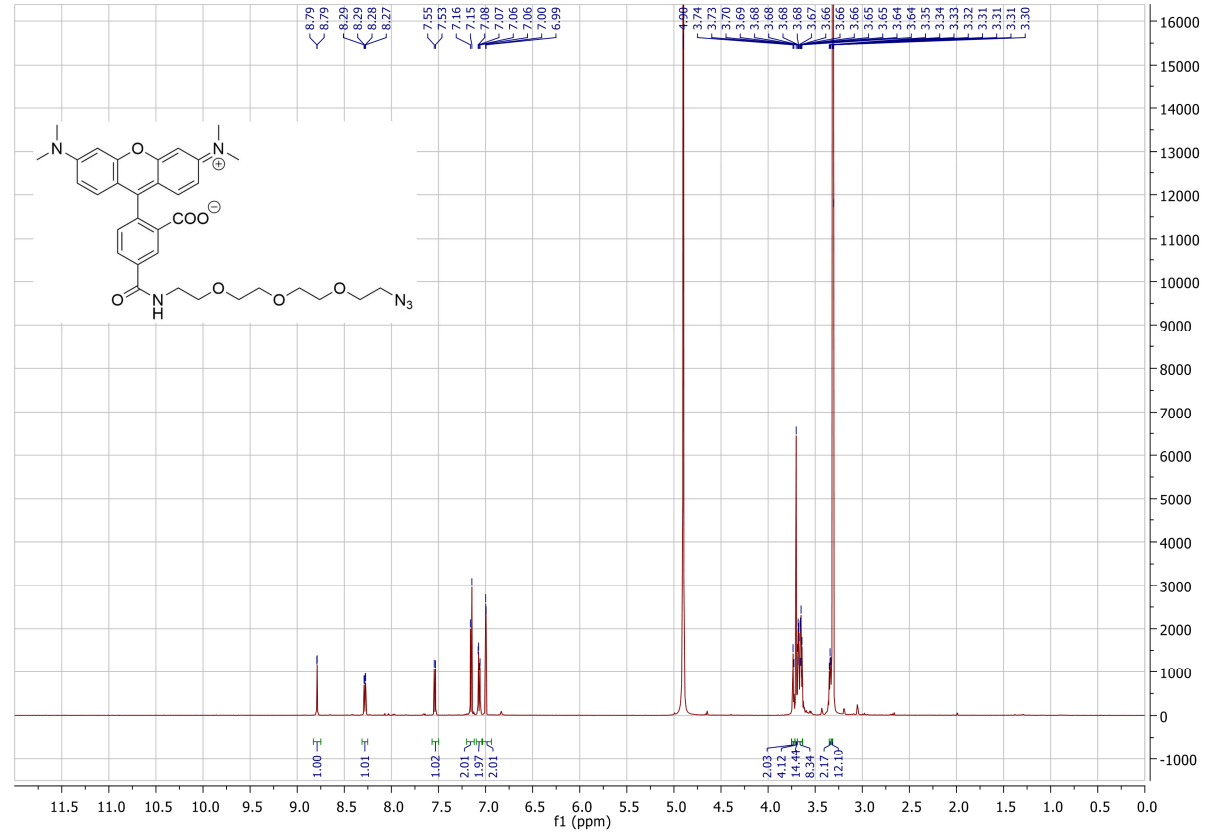


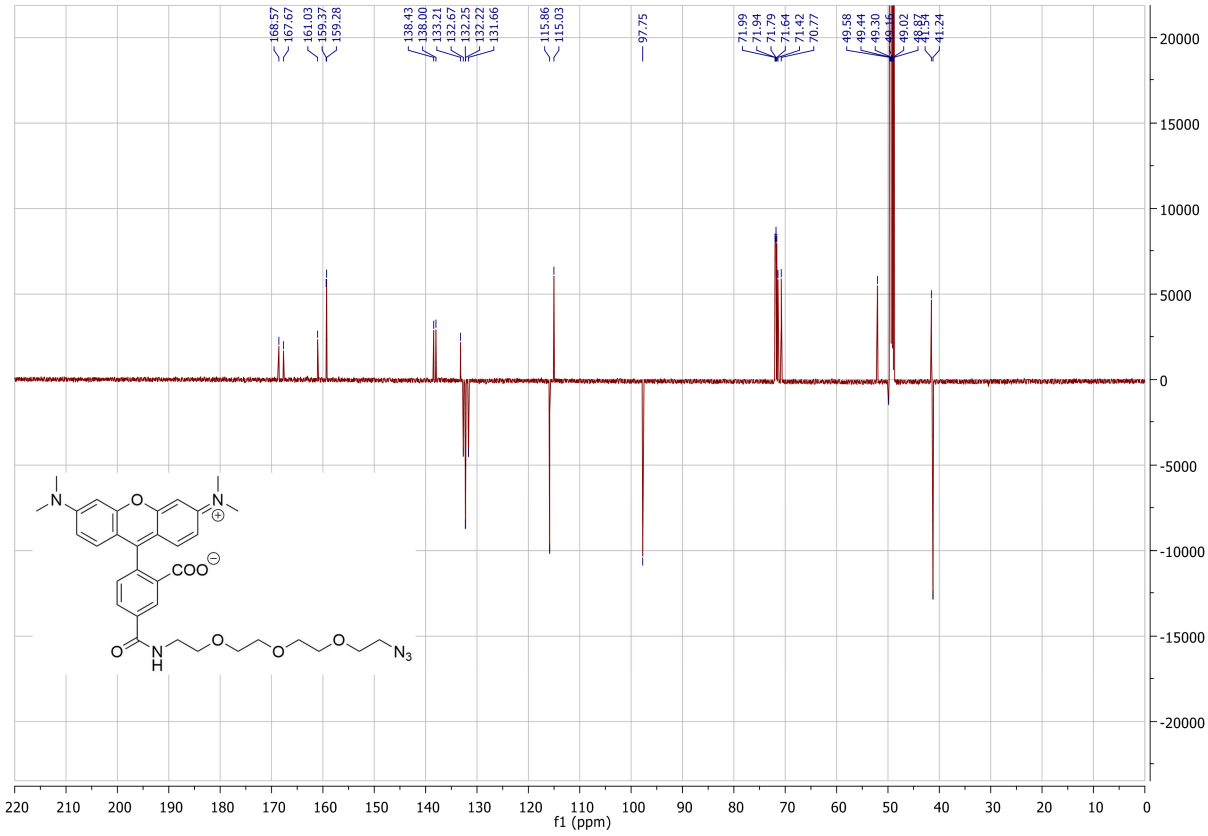
^{1}H-NMR and ^{13}C-NMR of compound A8 in $CDCl_3$.



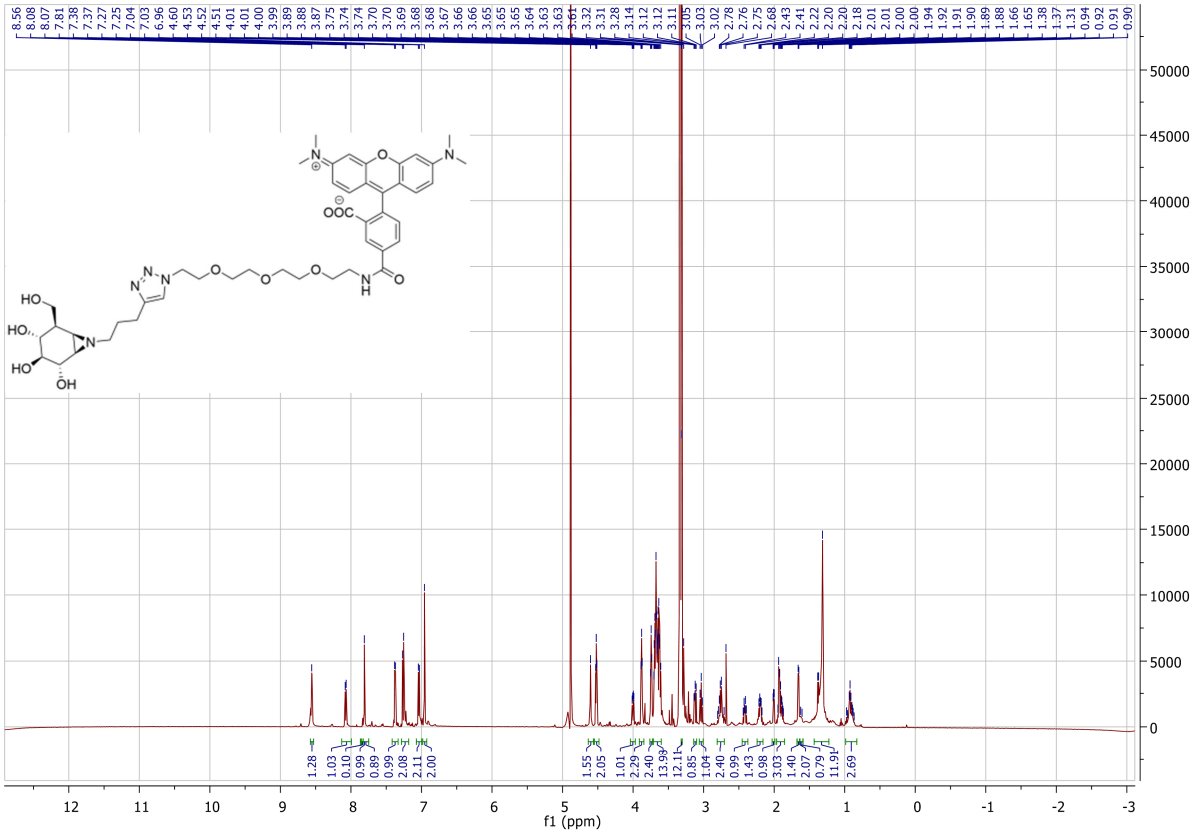


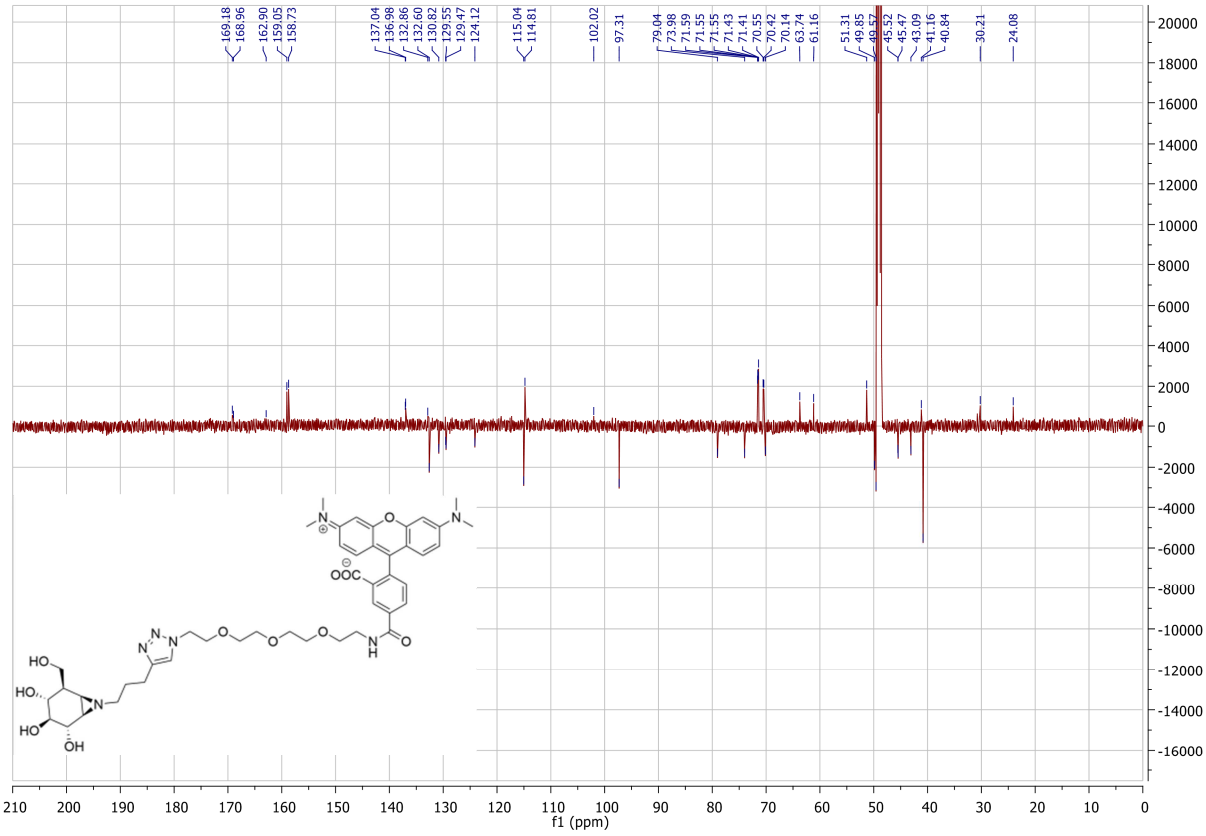
^{1}H-NMR and ^{13}C-NMR of compound A10 in MeOD.



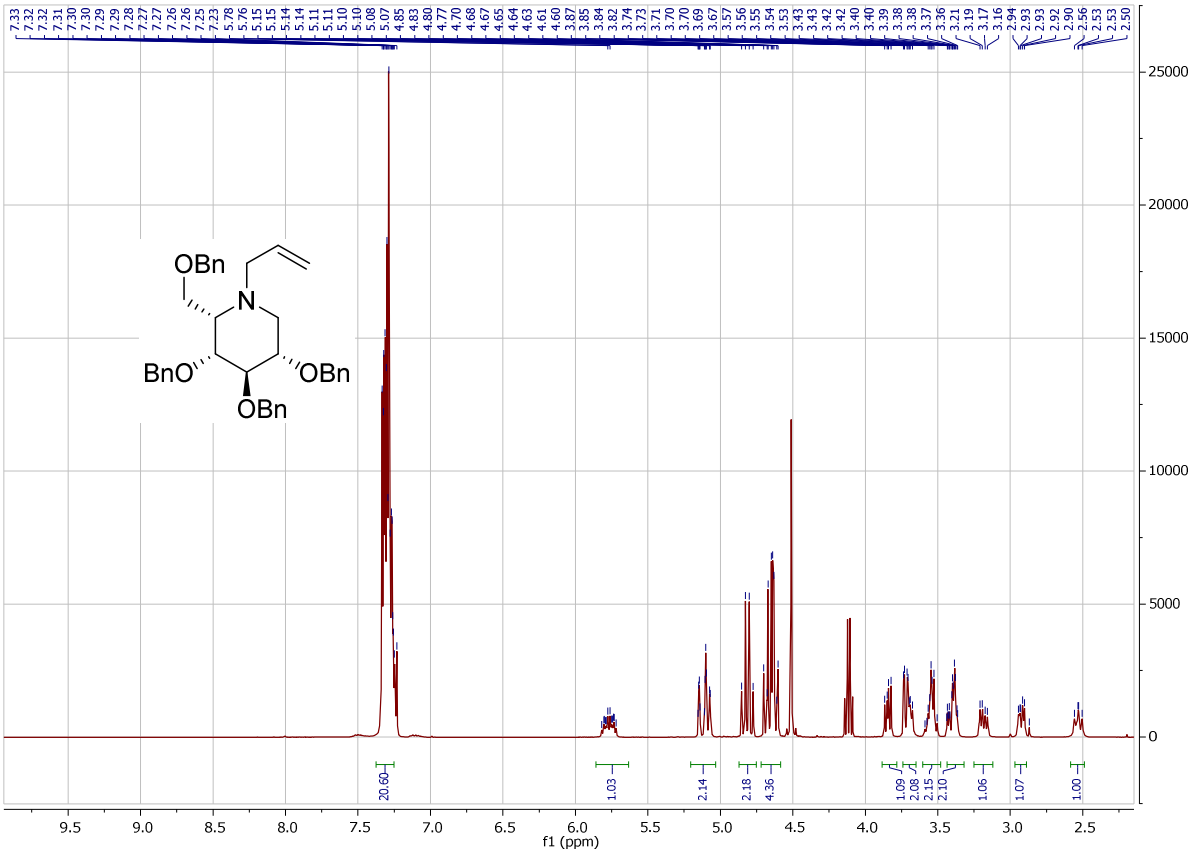


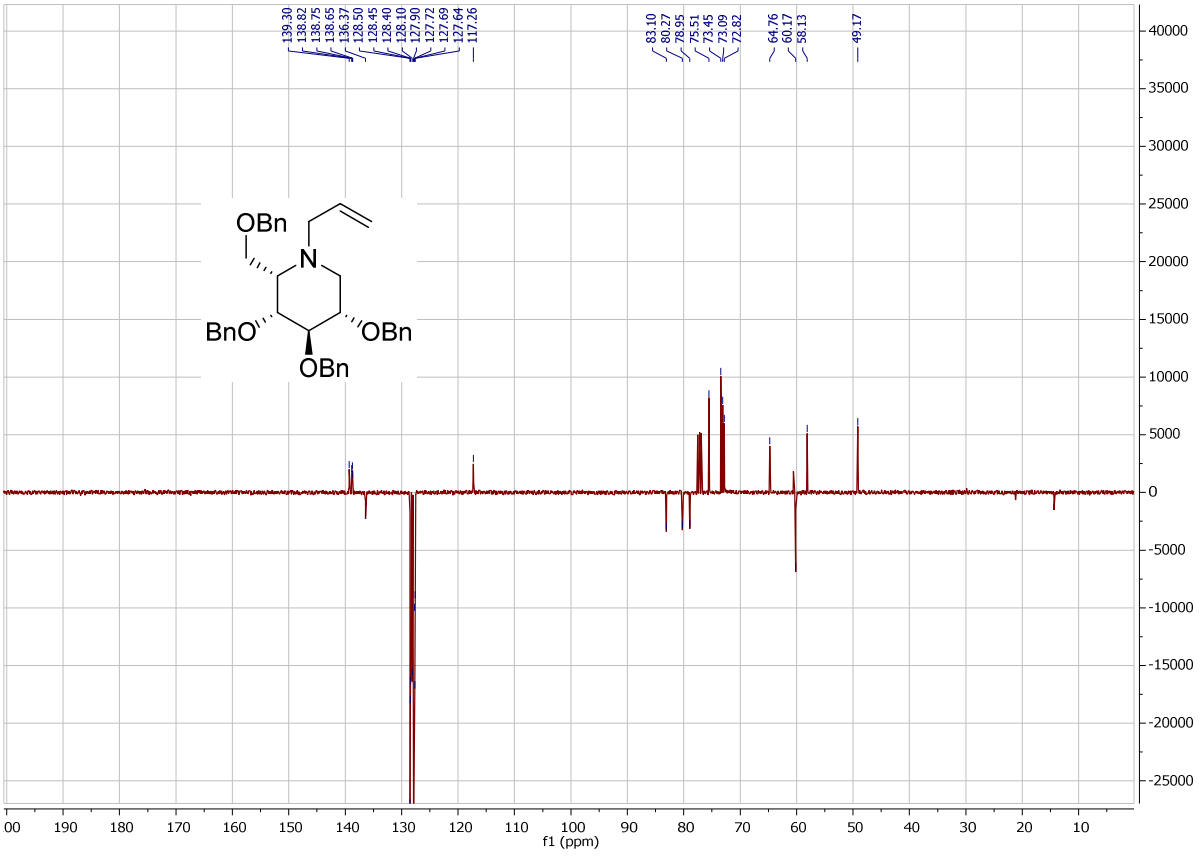
^{1}H-NMR and ^{13}C-NMR of compound ABP4 in $CDCl_3$.



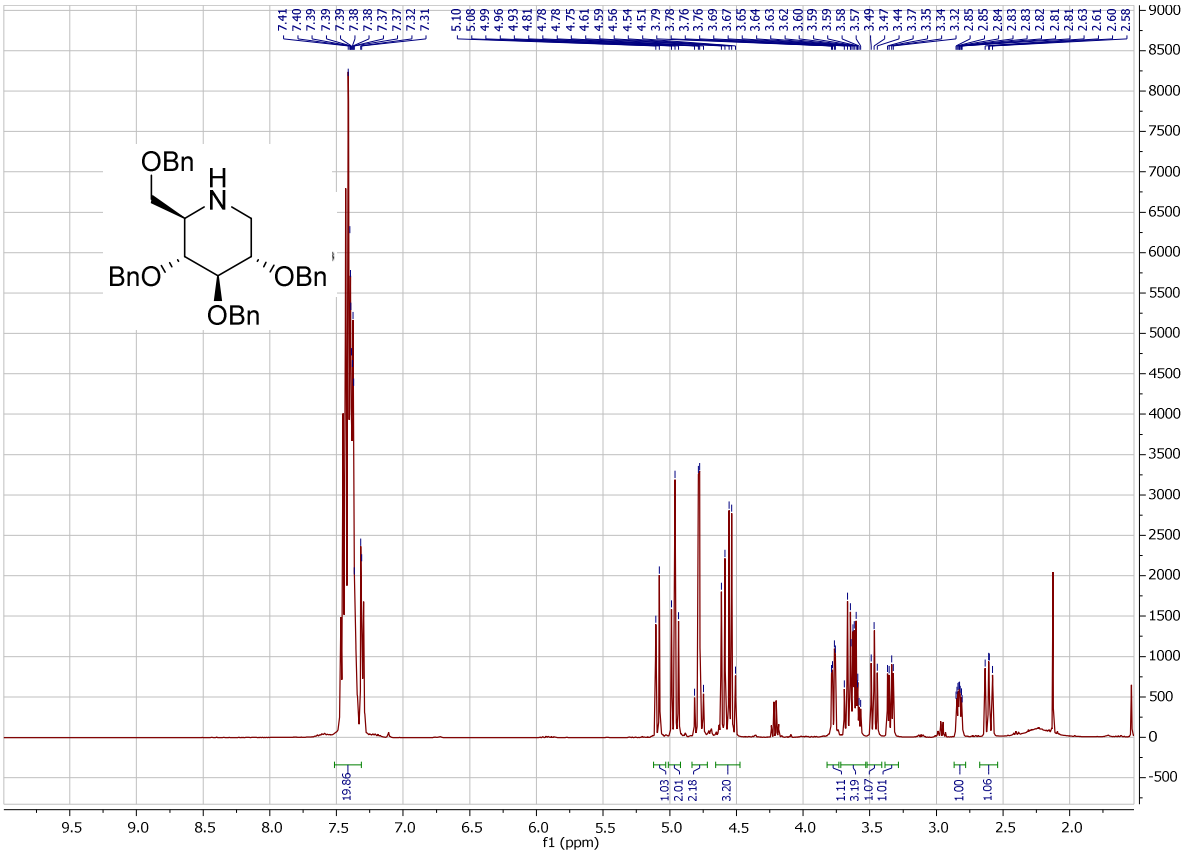


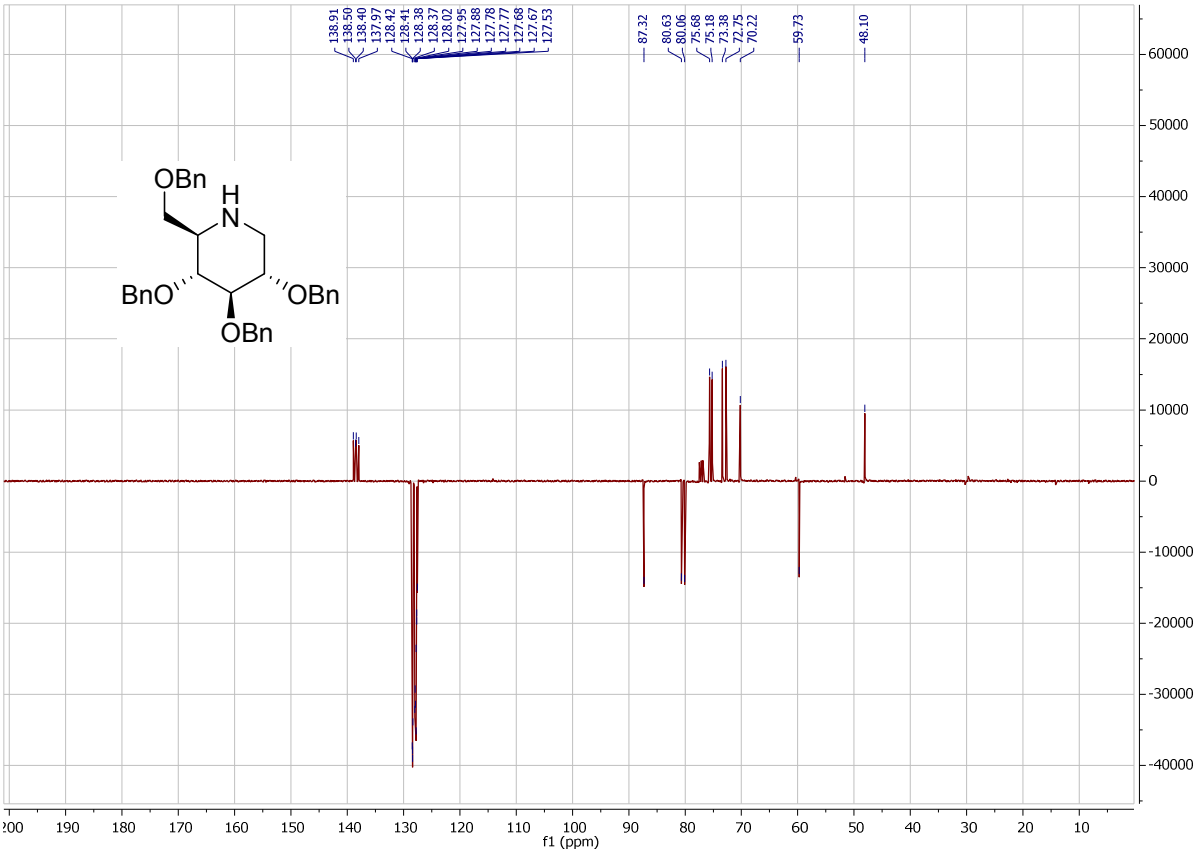
^{1}H-NMR and ^{13}C-NMR of compound B3 in $CDCl_3$.



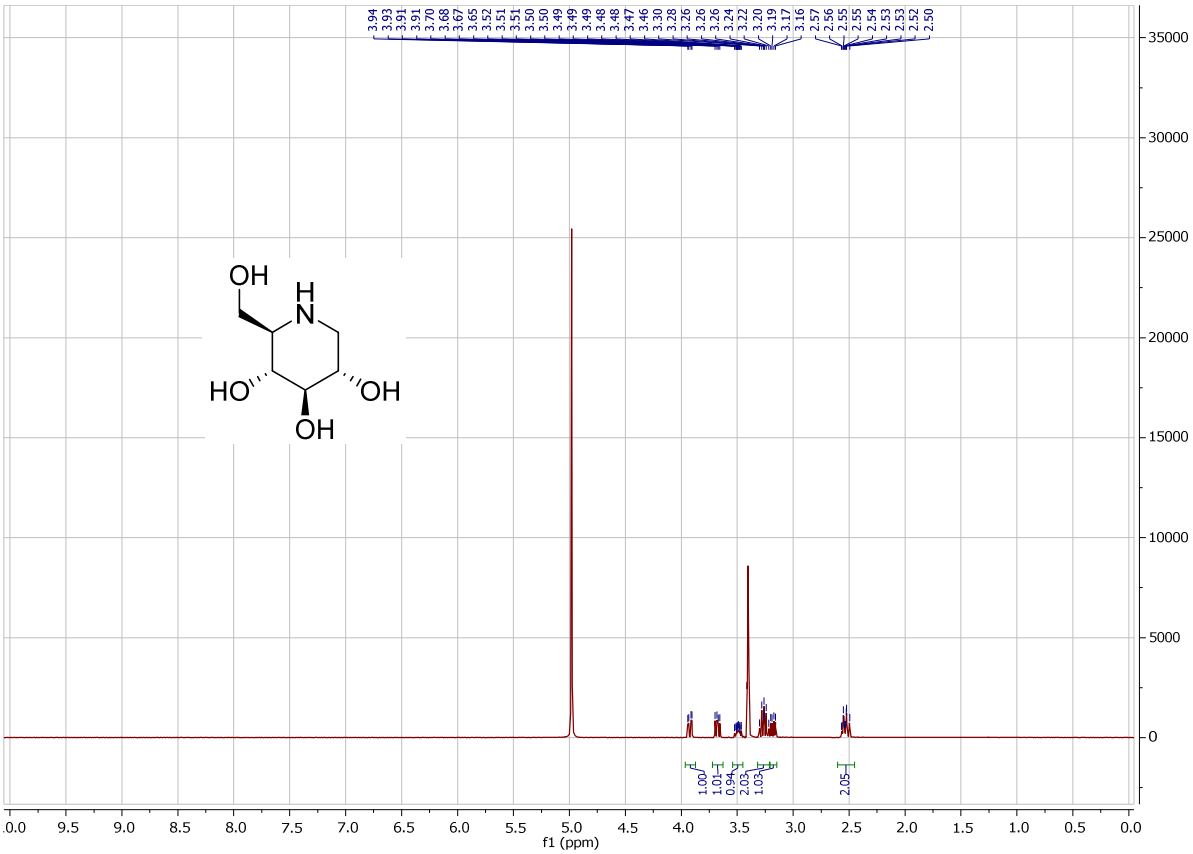


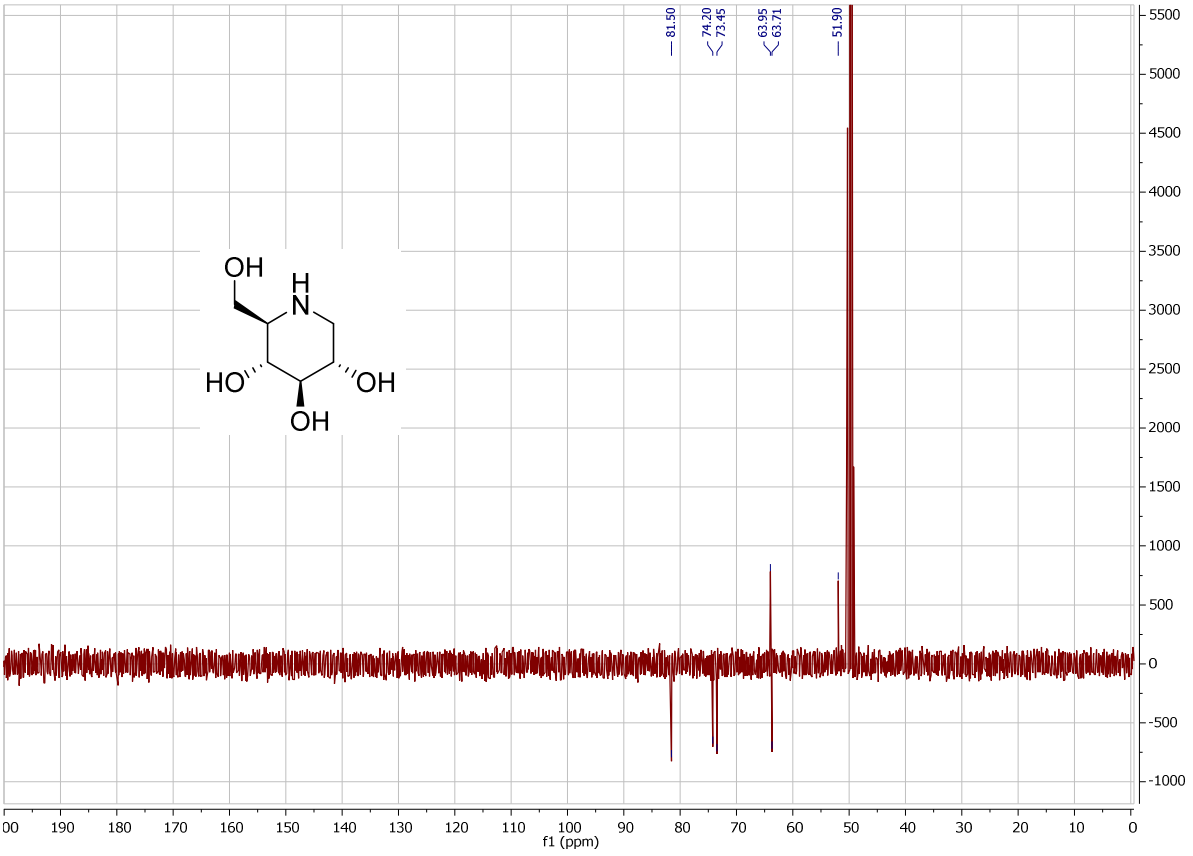
^{1}H-NMR and ^{13}C-NMR of compound B4 in $CDCl_3$.



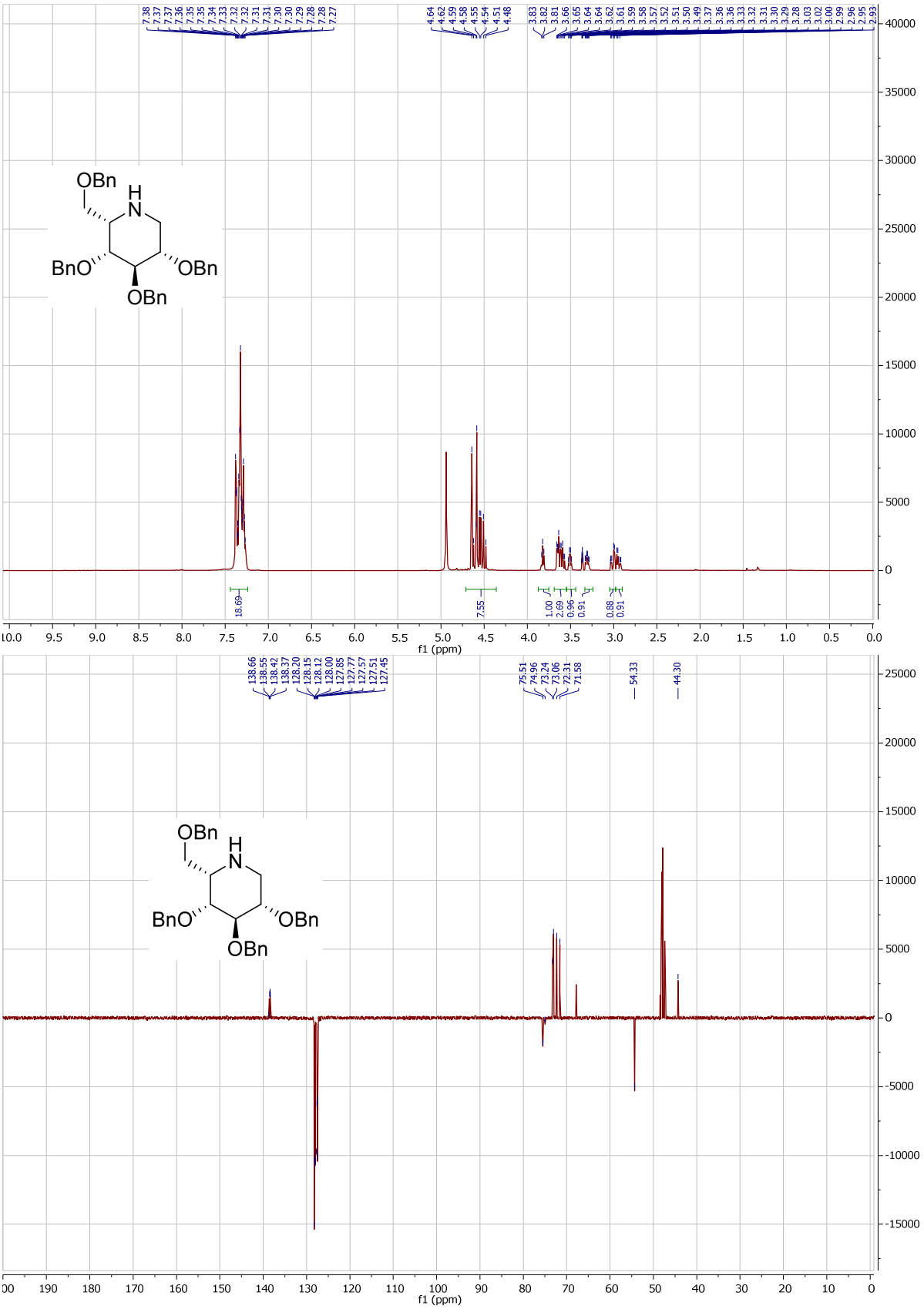


^{1}H-NMR and ^{13}C-NMR of compound B5 in MeOD.

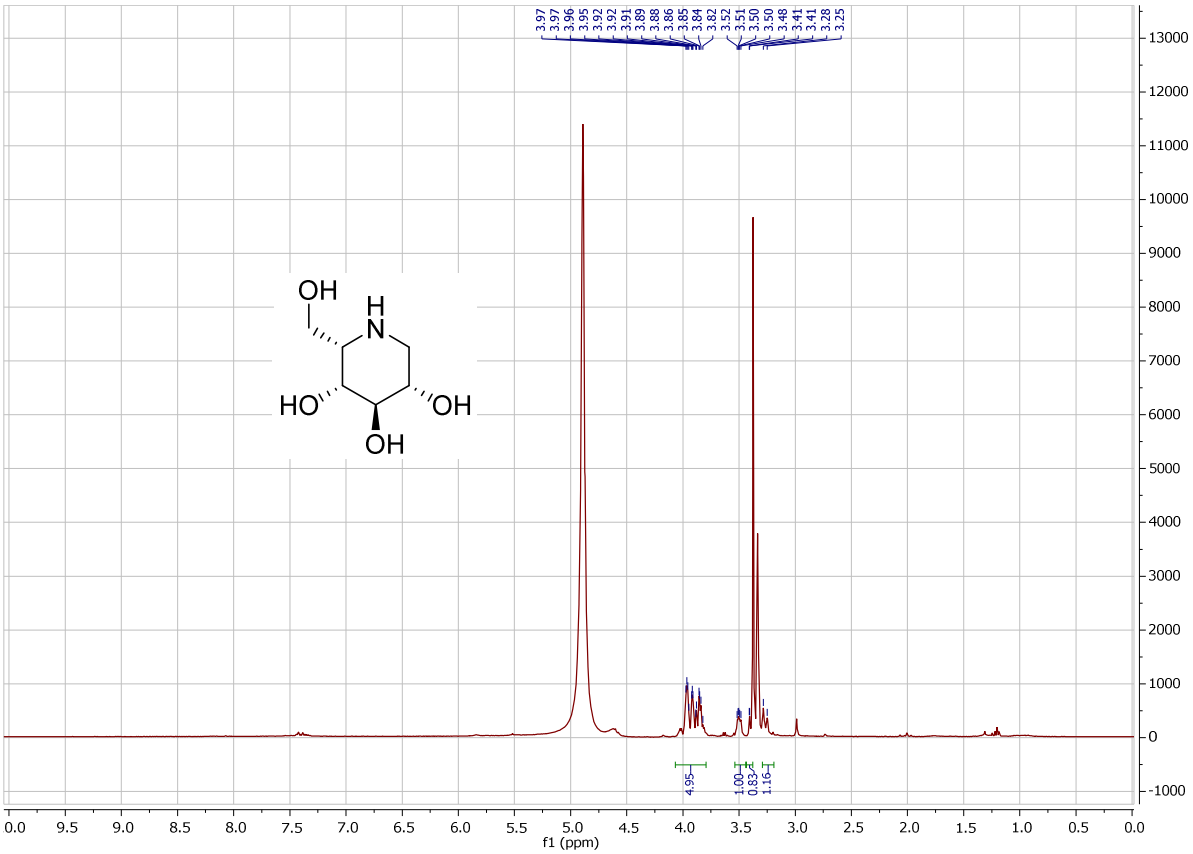


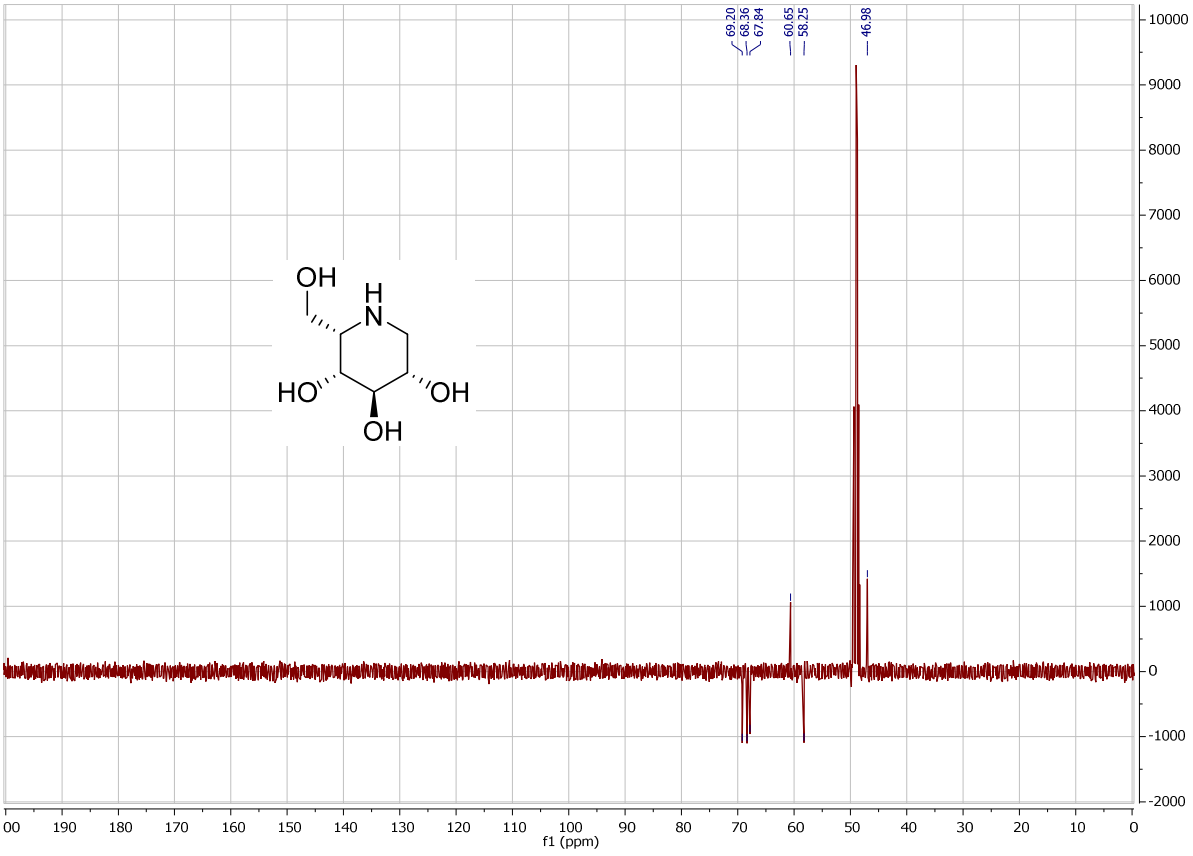


^{1}H-NMR and ^{13}C-NMR of compound B6 in MeOD.

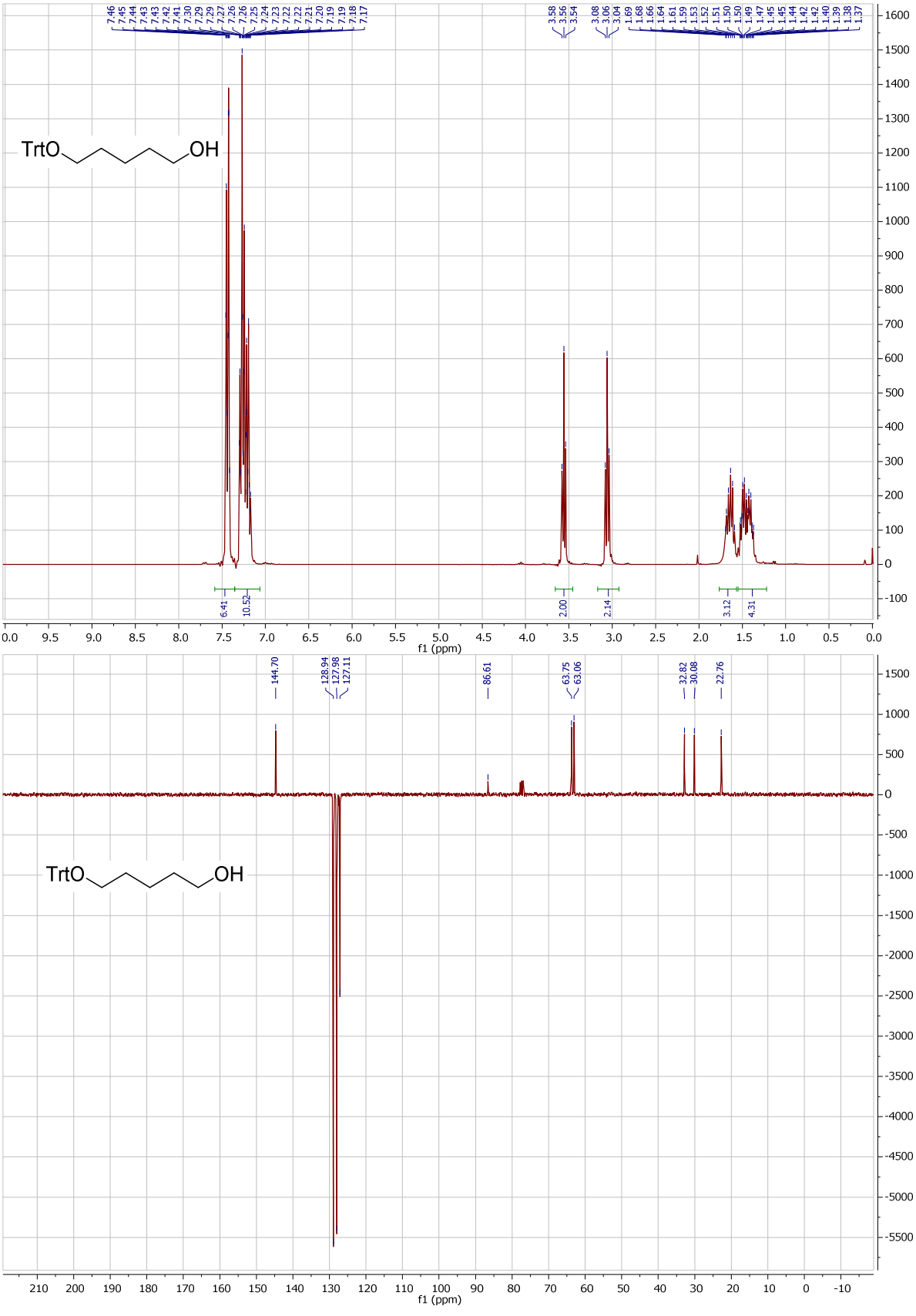


^{1}H-NMR and ^{13}C-NMR of compound B7 in MeOD.

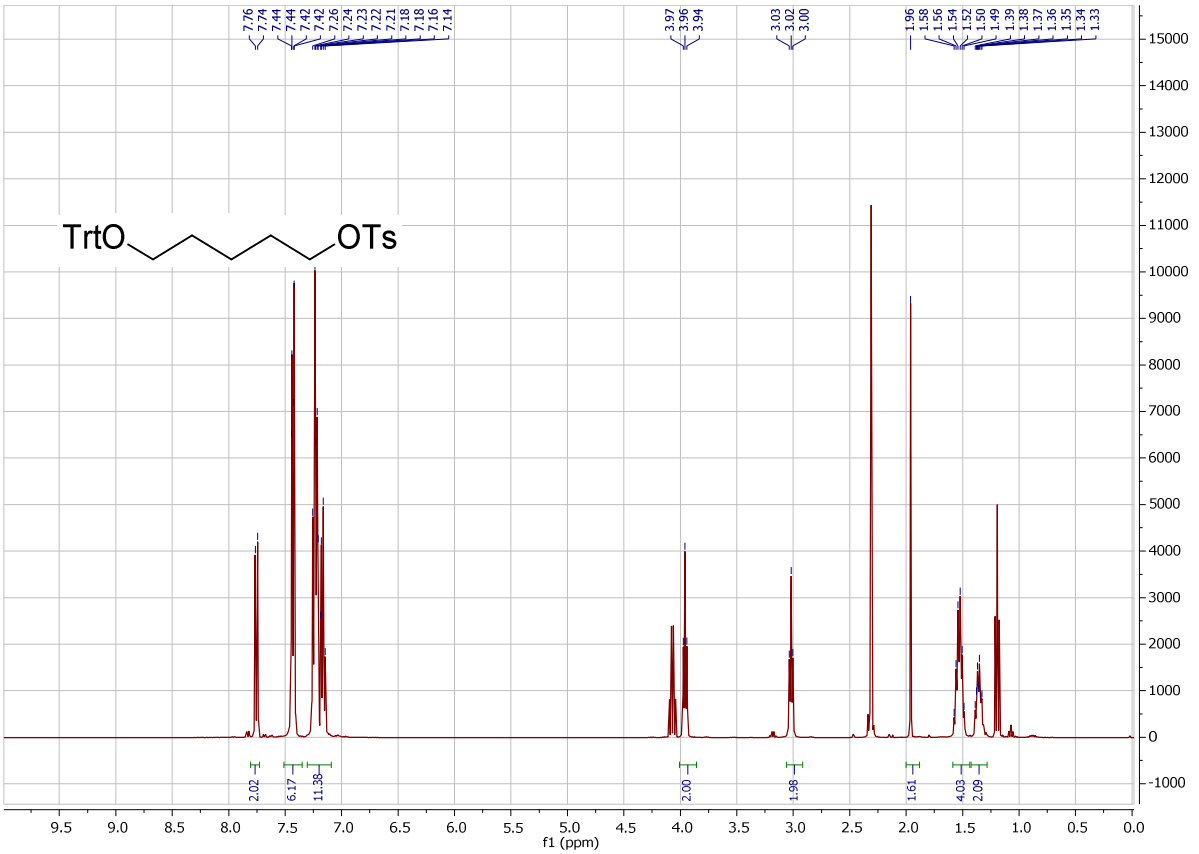


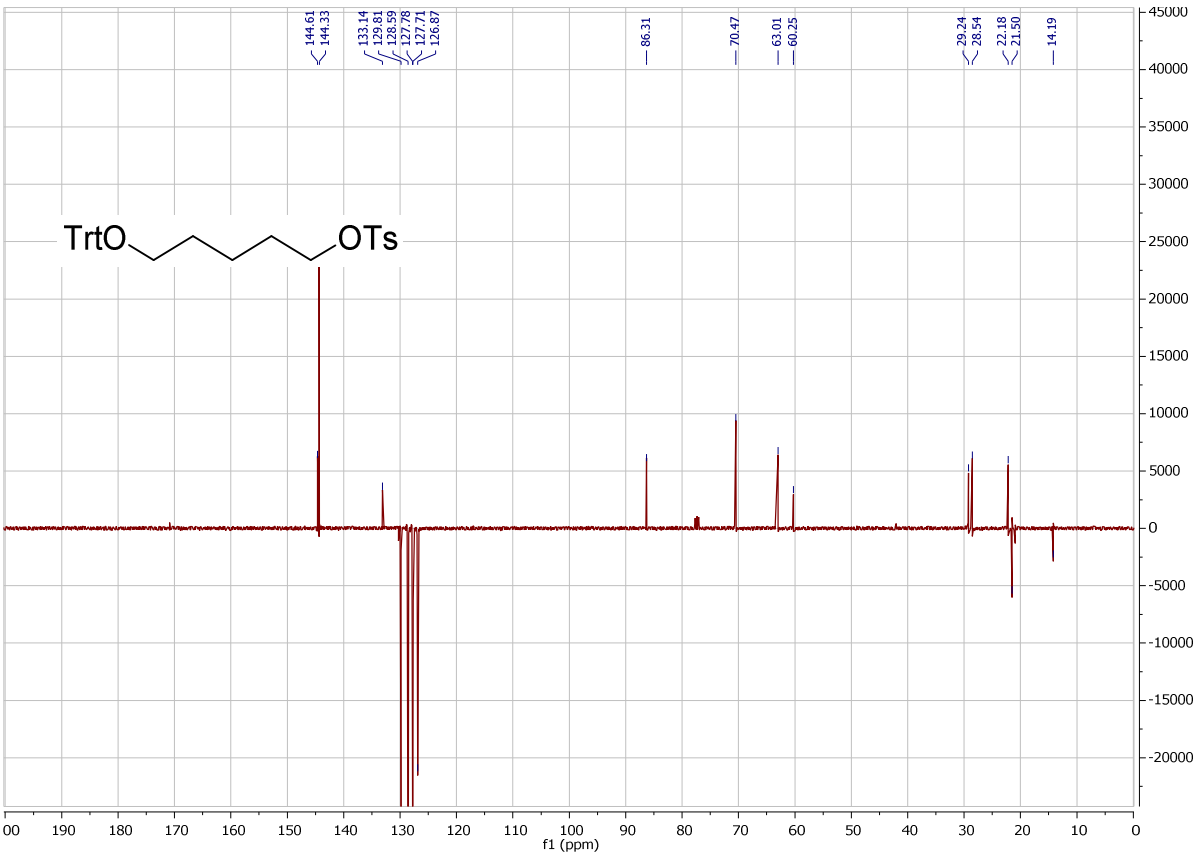


^{1}H-NMR and ^{13}C-NMR of compound B9 in $CDCl_3$.

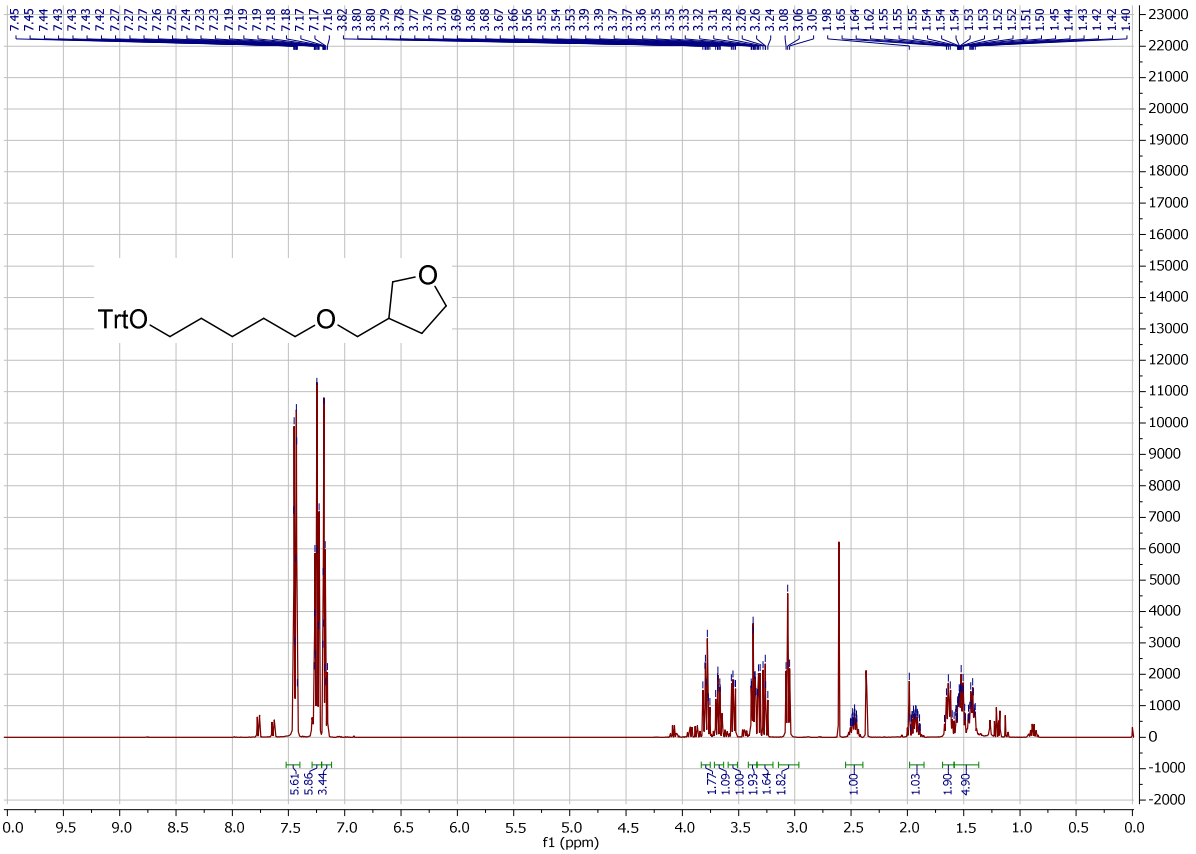


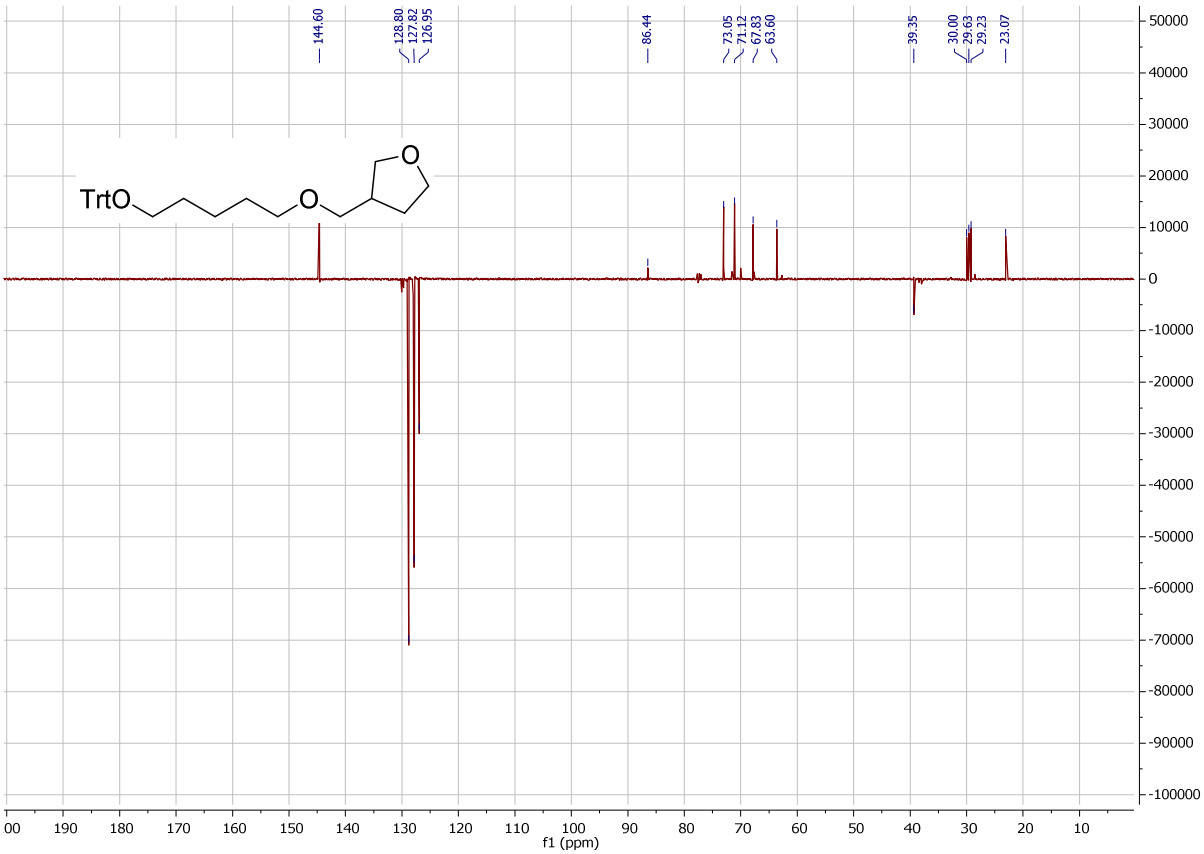
^{1}H-NMR and ^{13}C-NMR of compound B10 in $CDCl_3$.



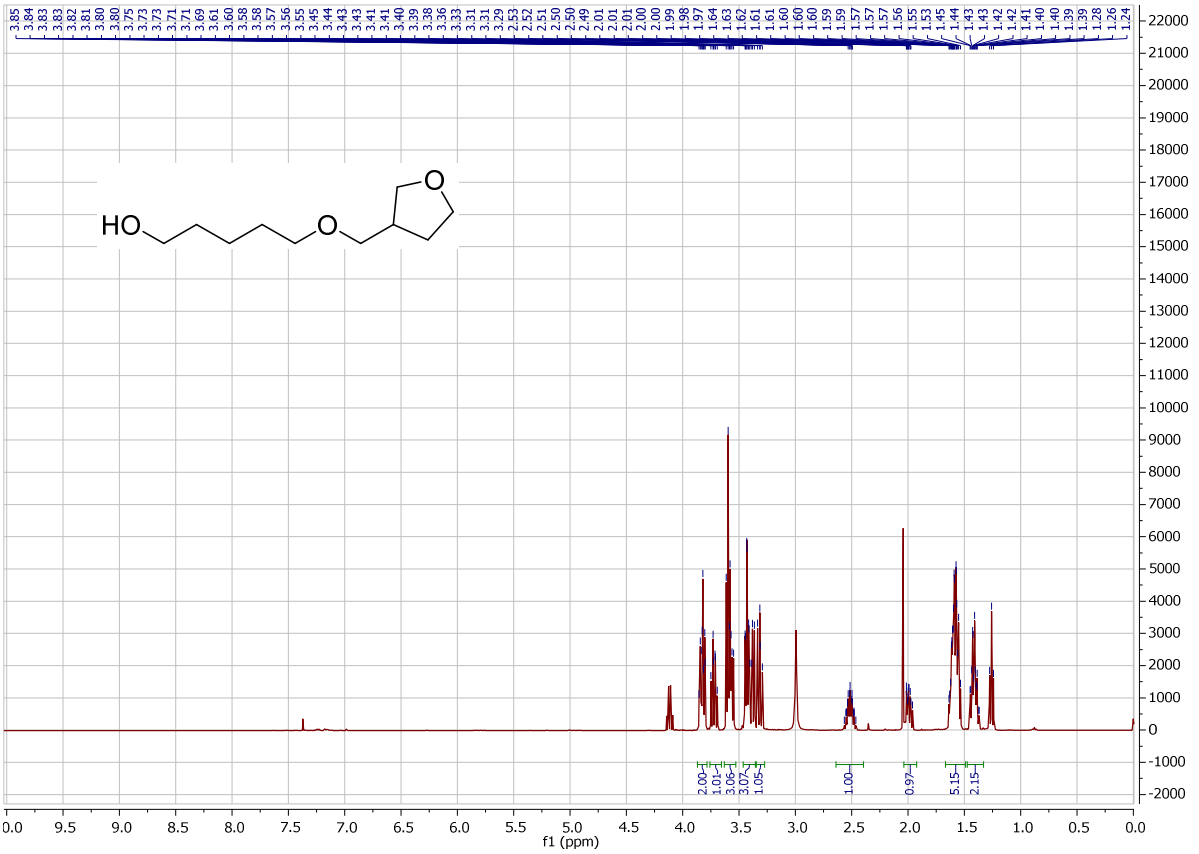


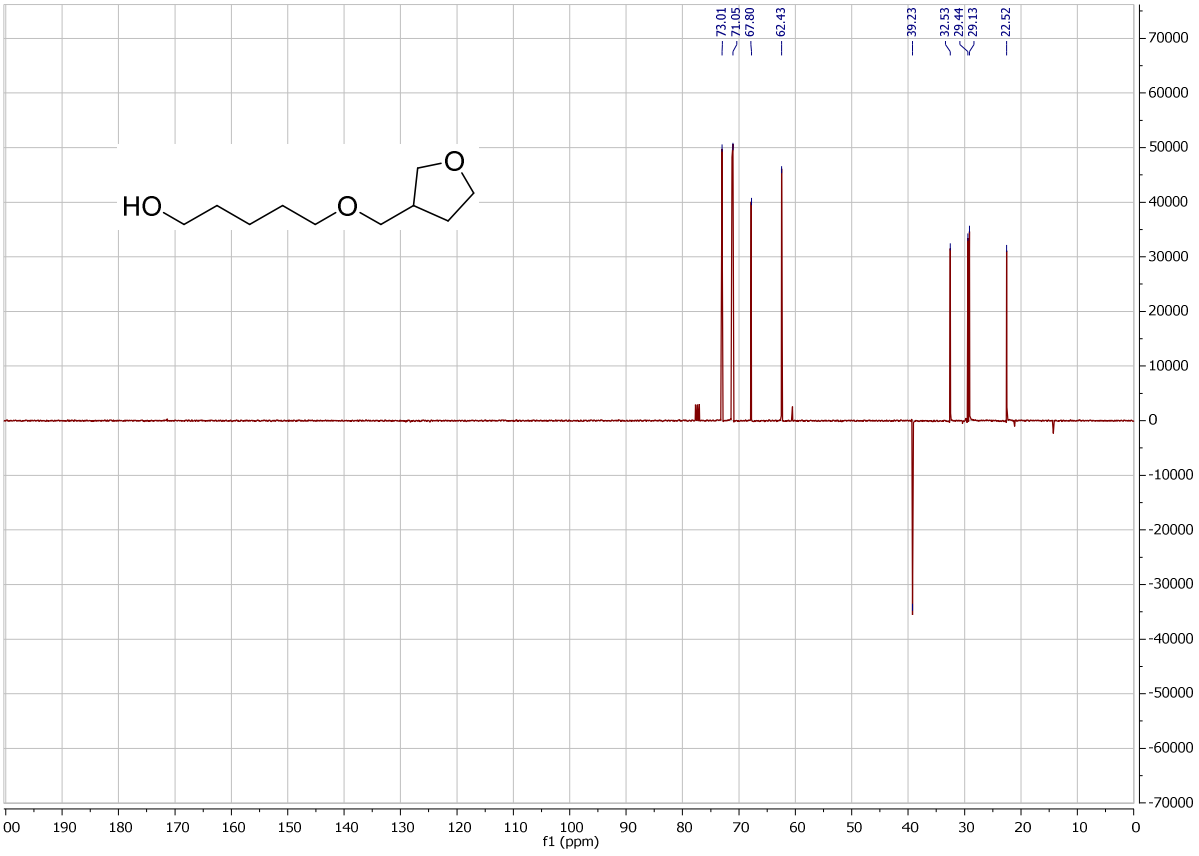
^{1}H-NMR and ^{13}C-NMR of compound B11 in $CDCl_3$.



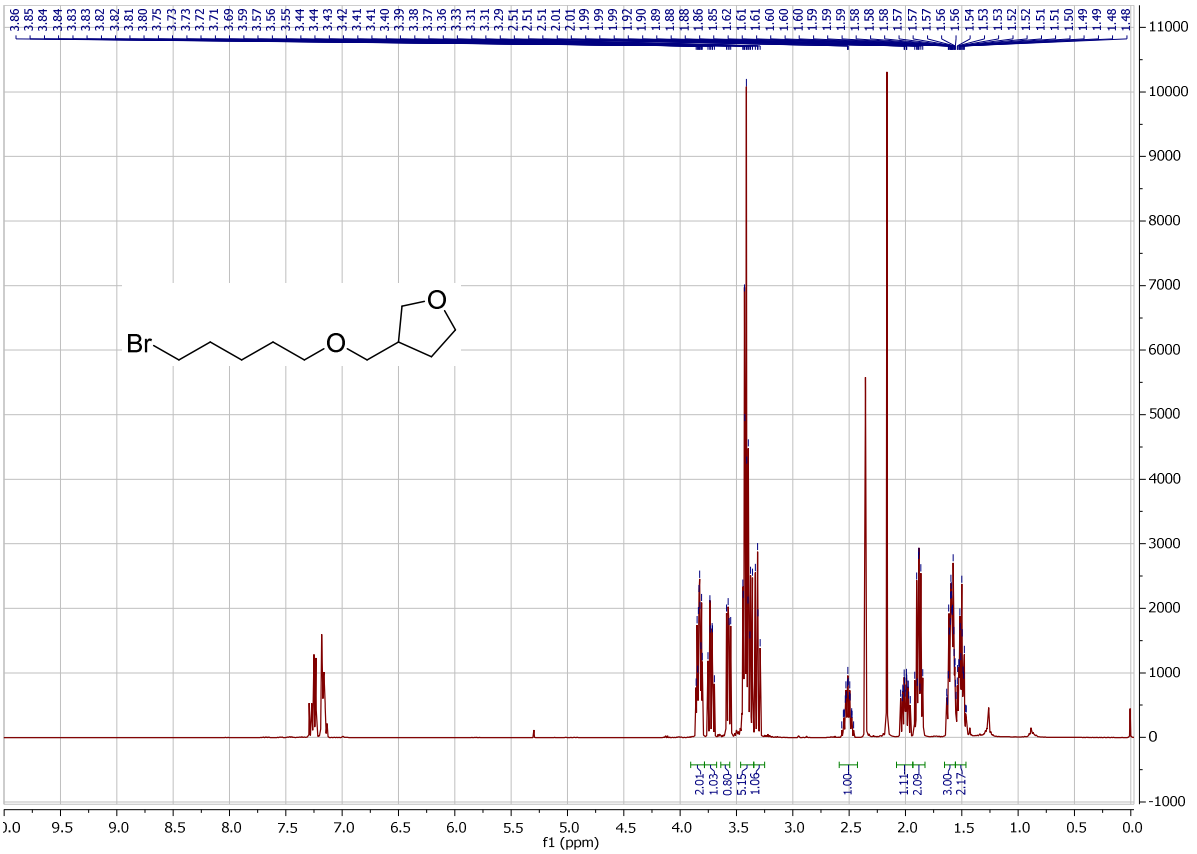


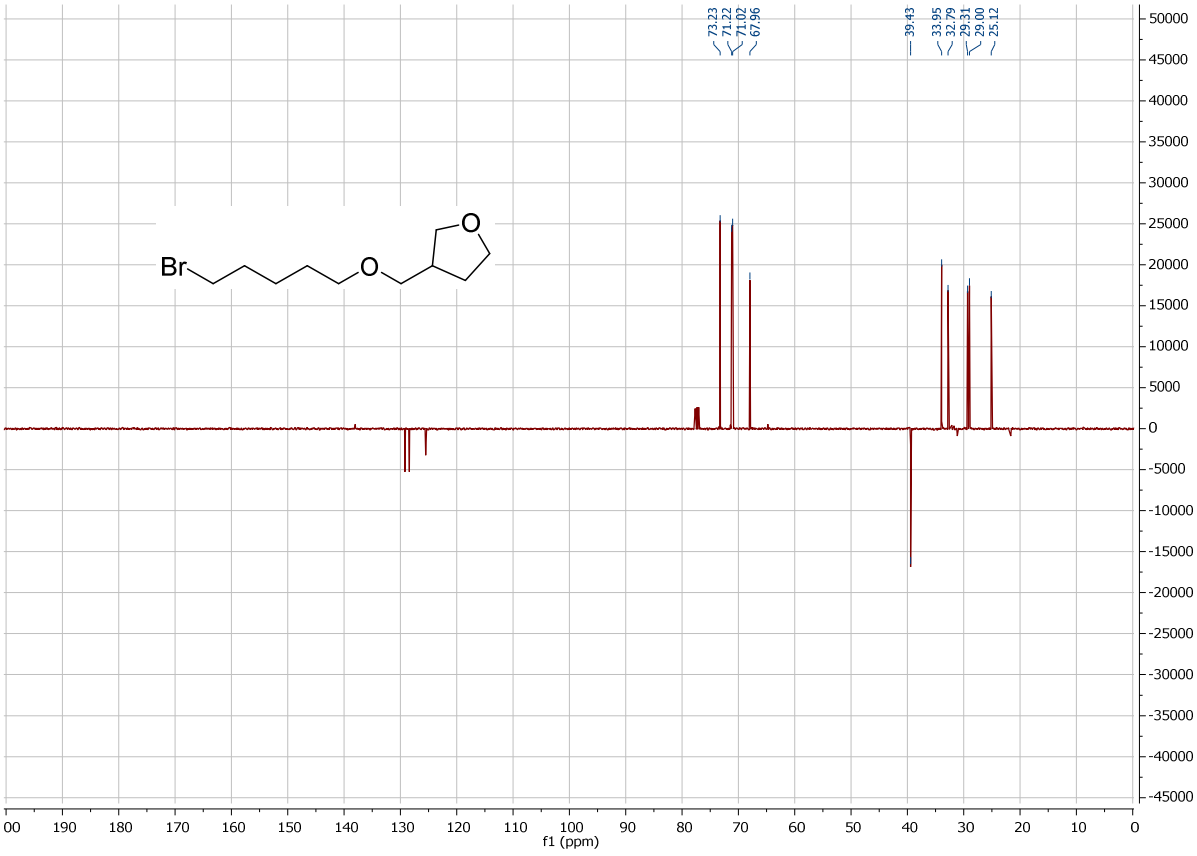
^{1}H-NMR and ^{13}C-NMR of compound B12 in $CDCl_3$.



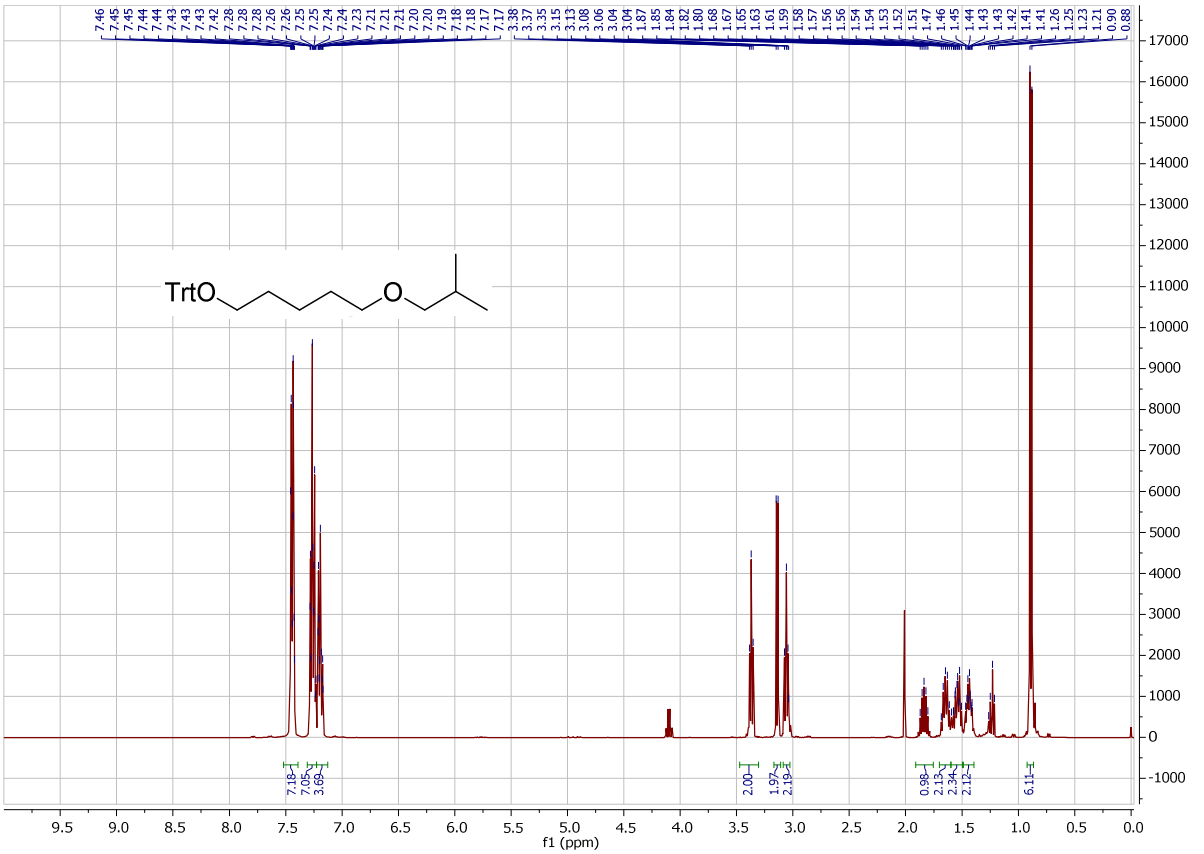


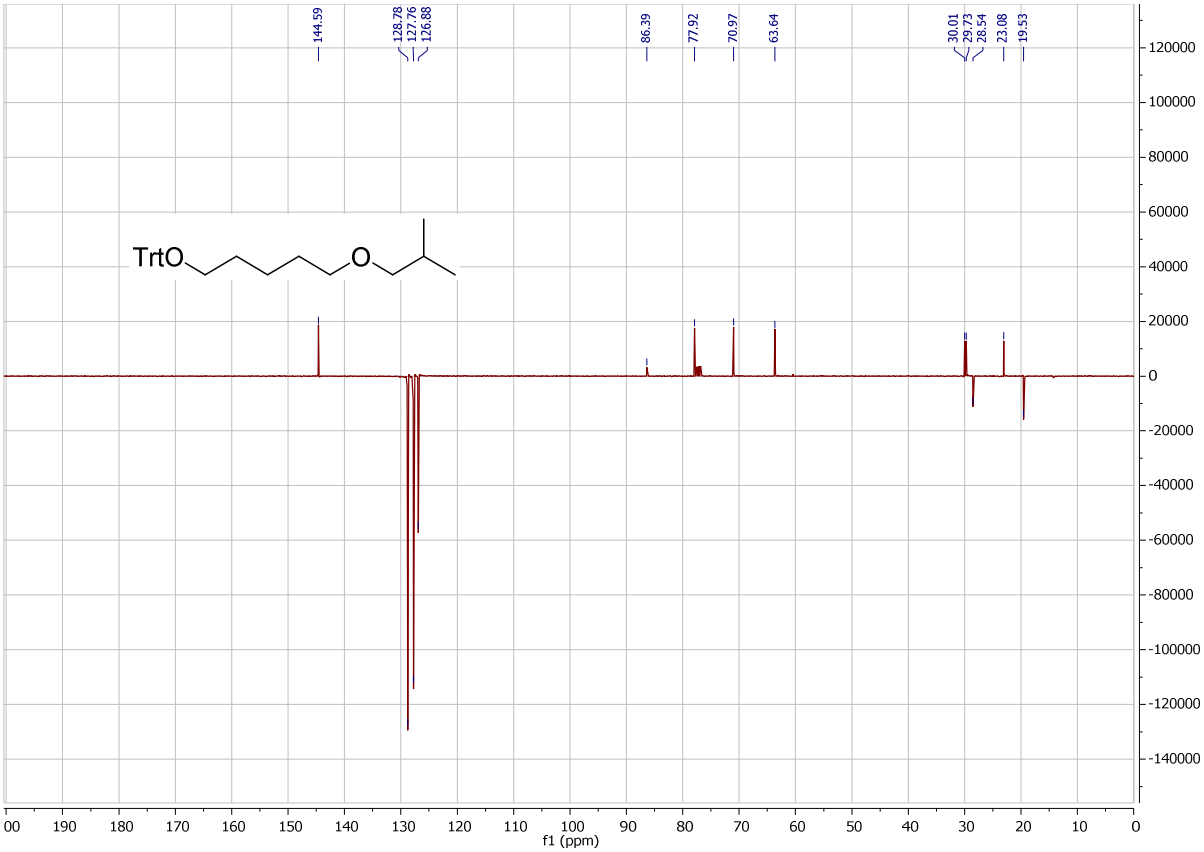
^{1}H-NMR and ^{13}C-NMR of compound B13 in $CDCl_3$.



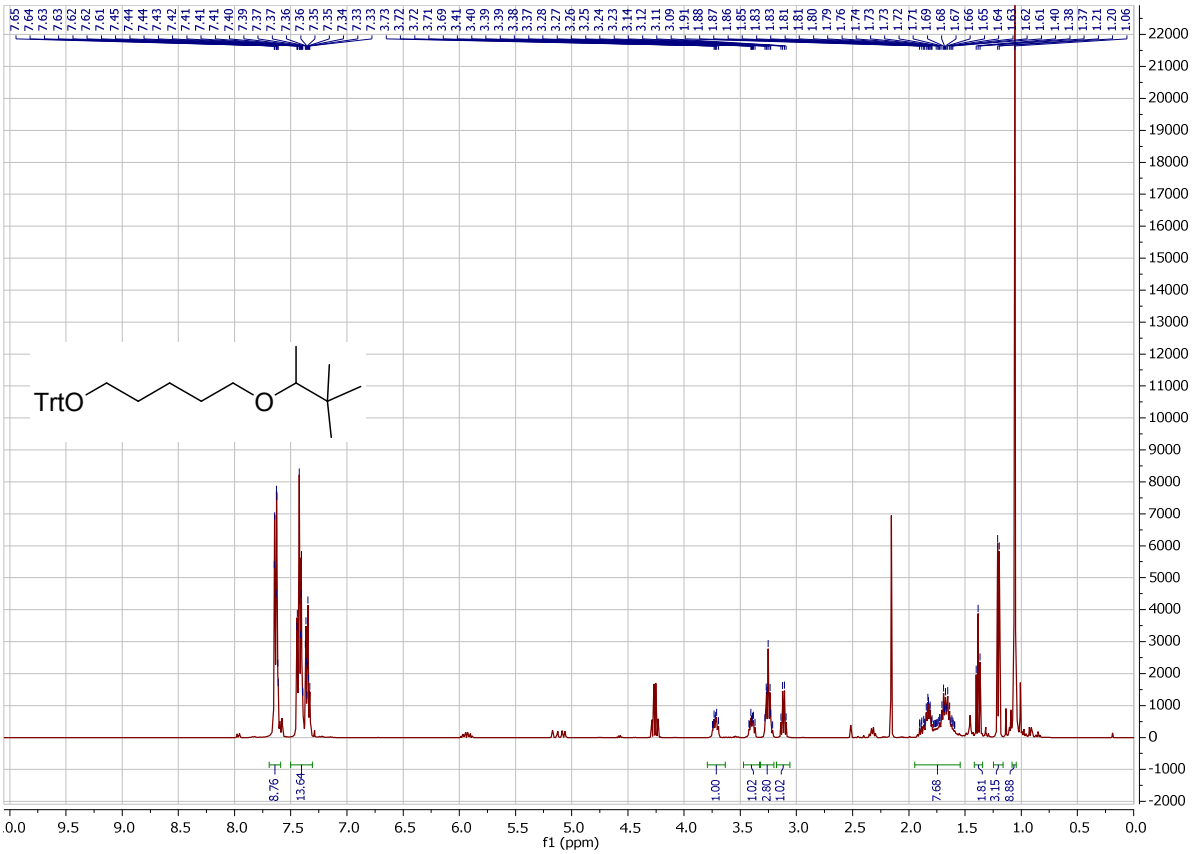


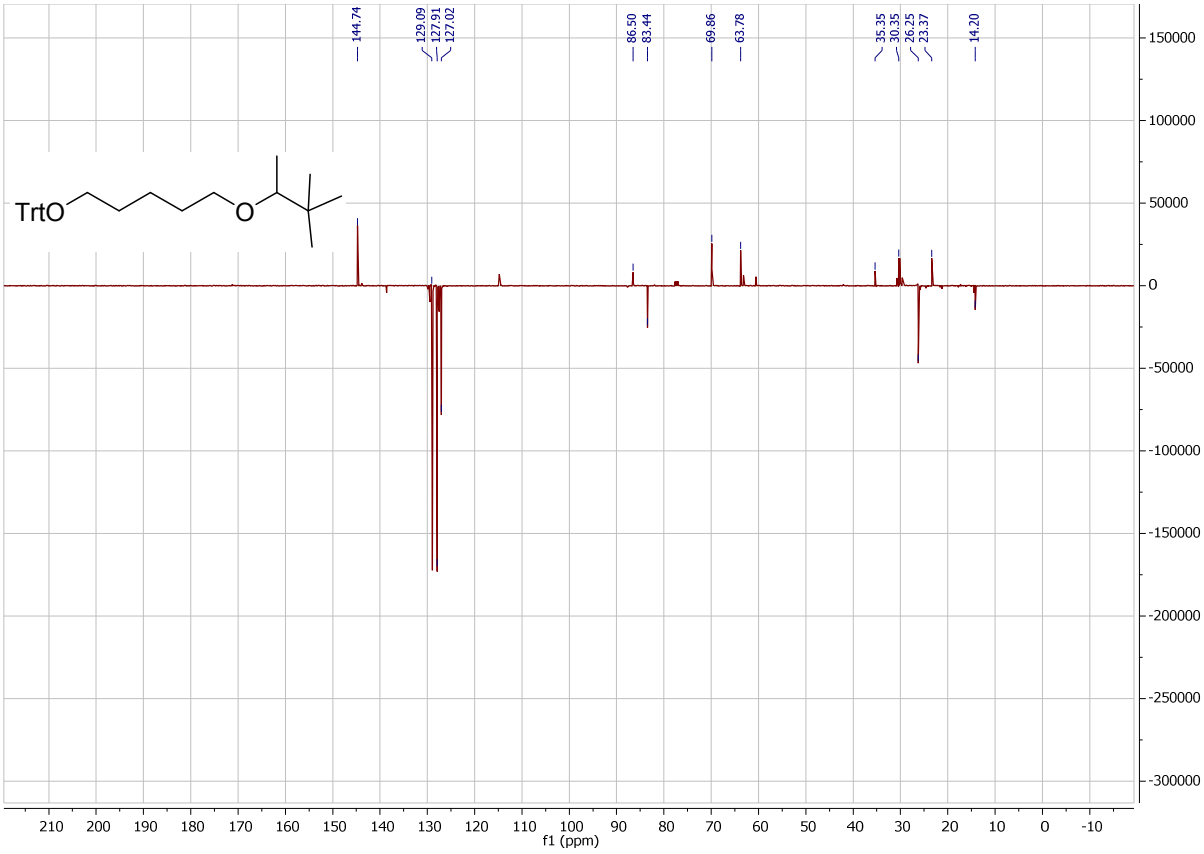
^{1}H-NMR and ^{13}C-NMR of compound B14 in $CDCl_3$.



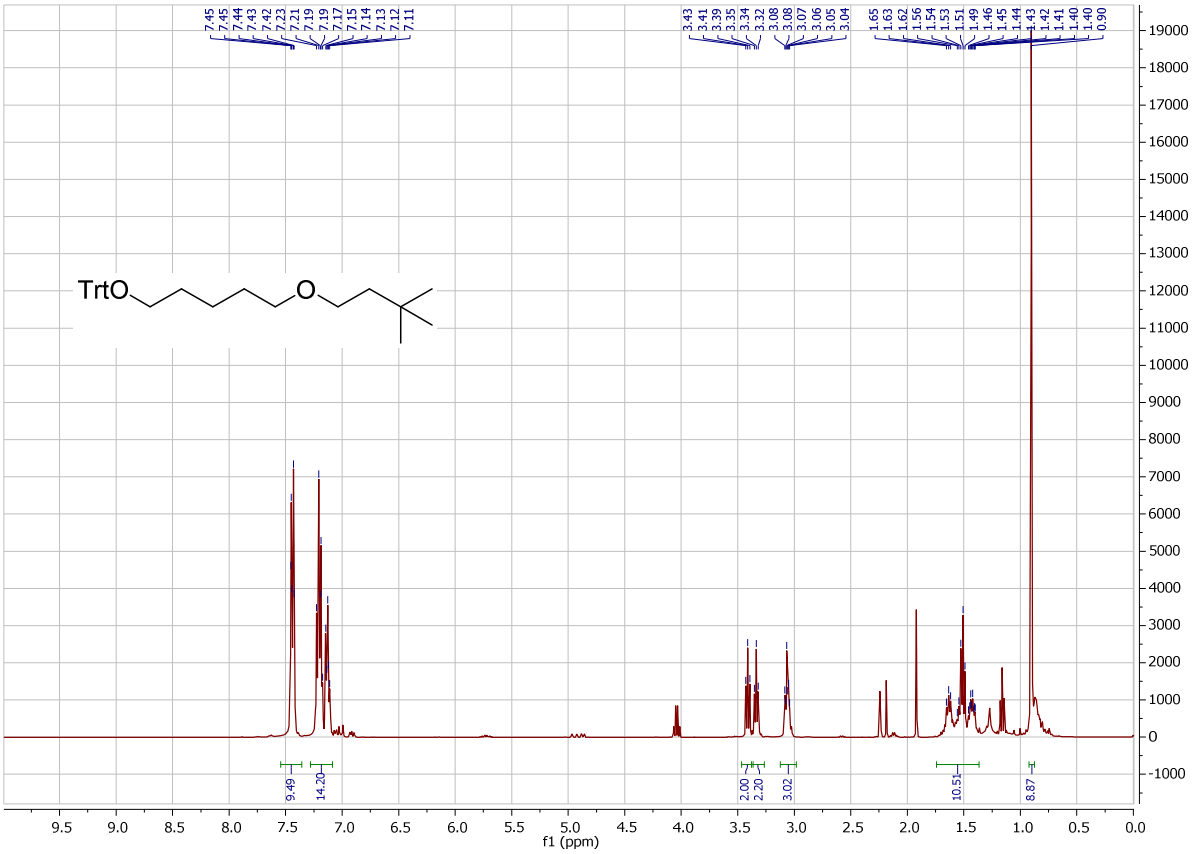


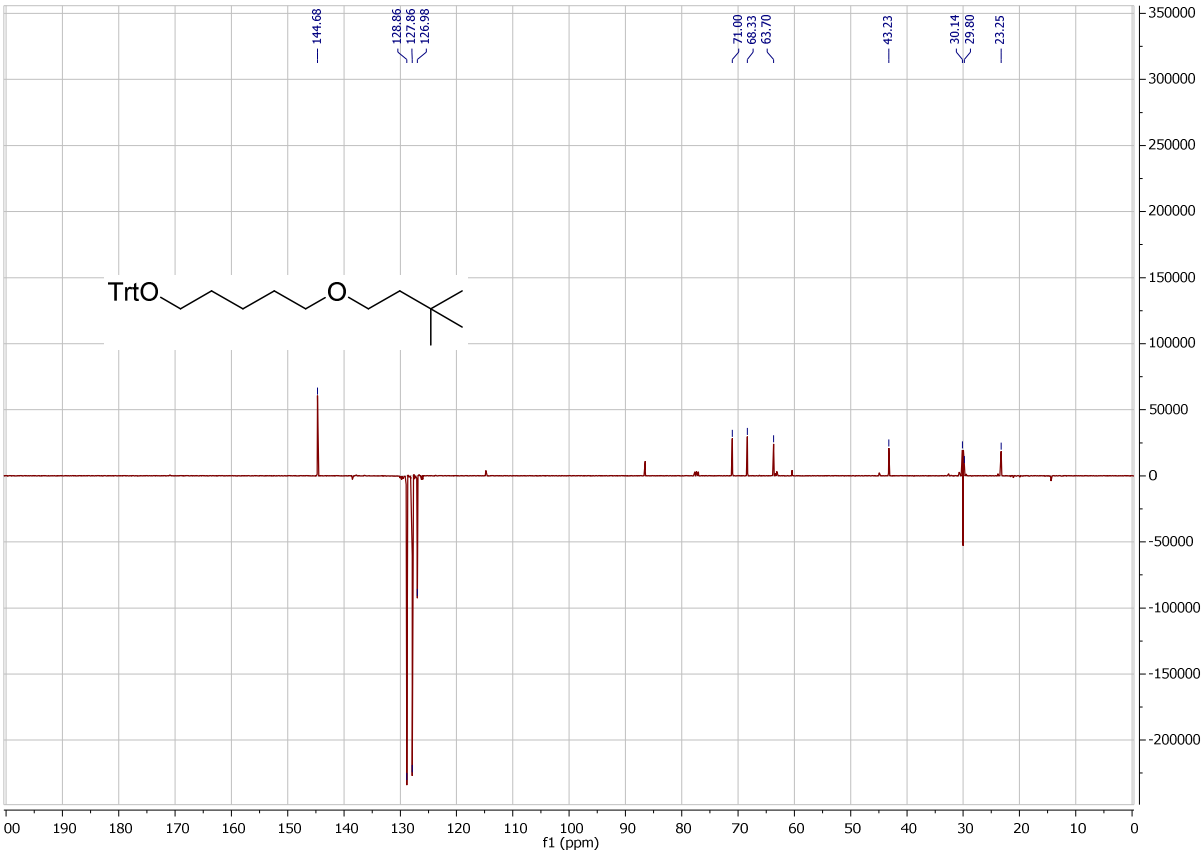
^{1}H-NMR and ^{13}C-NMR of compound B15 in $CDCl_3$.



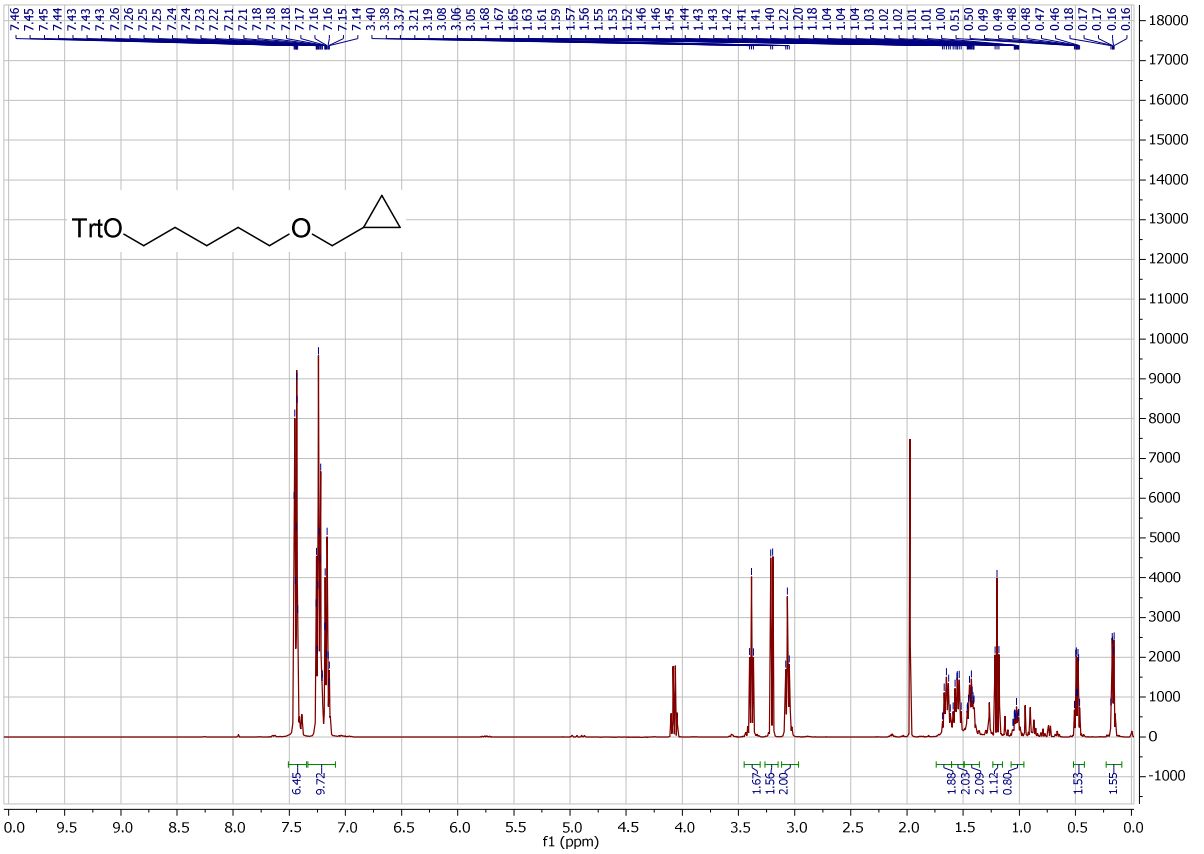


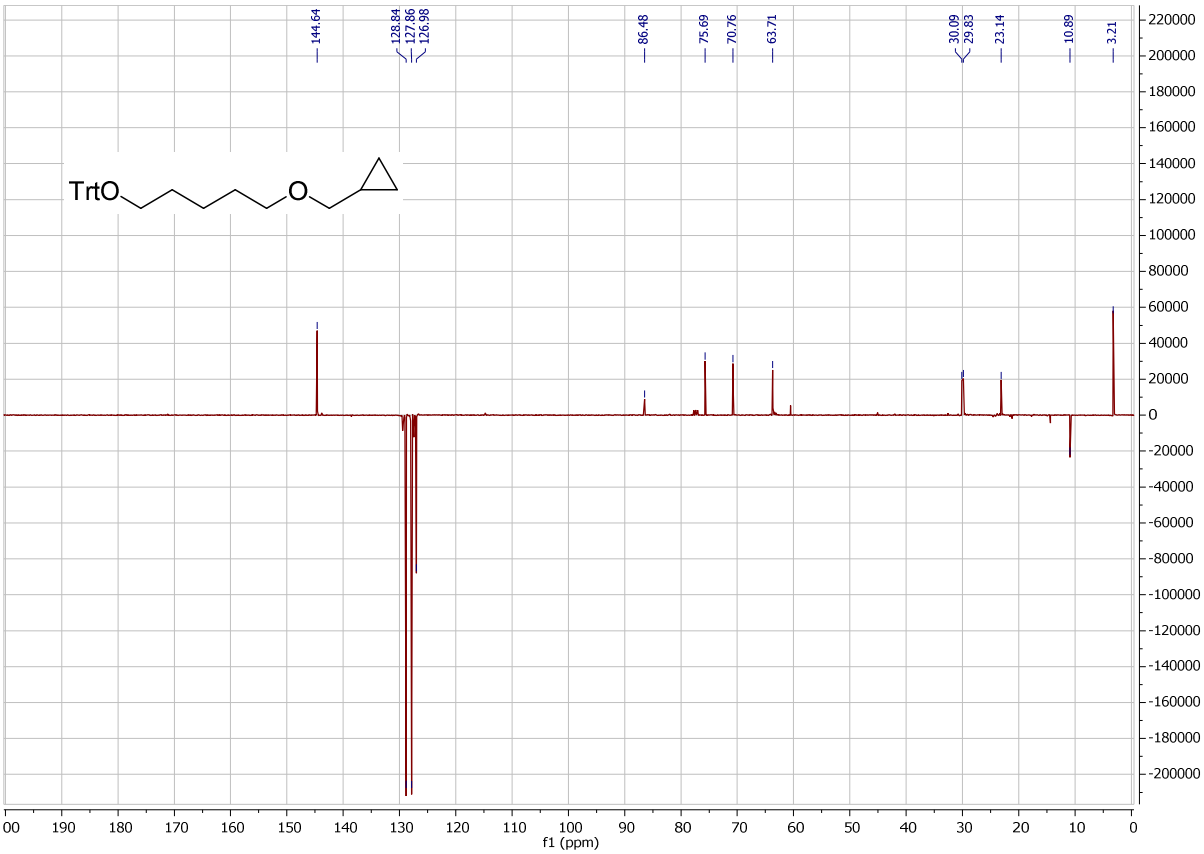
^{1}H-NMR and ^{13}C-NMR of compound B16 in $CDCl_3$.



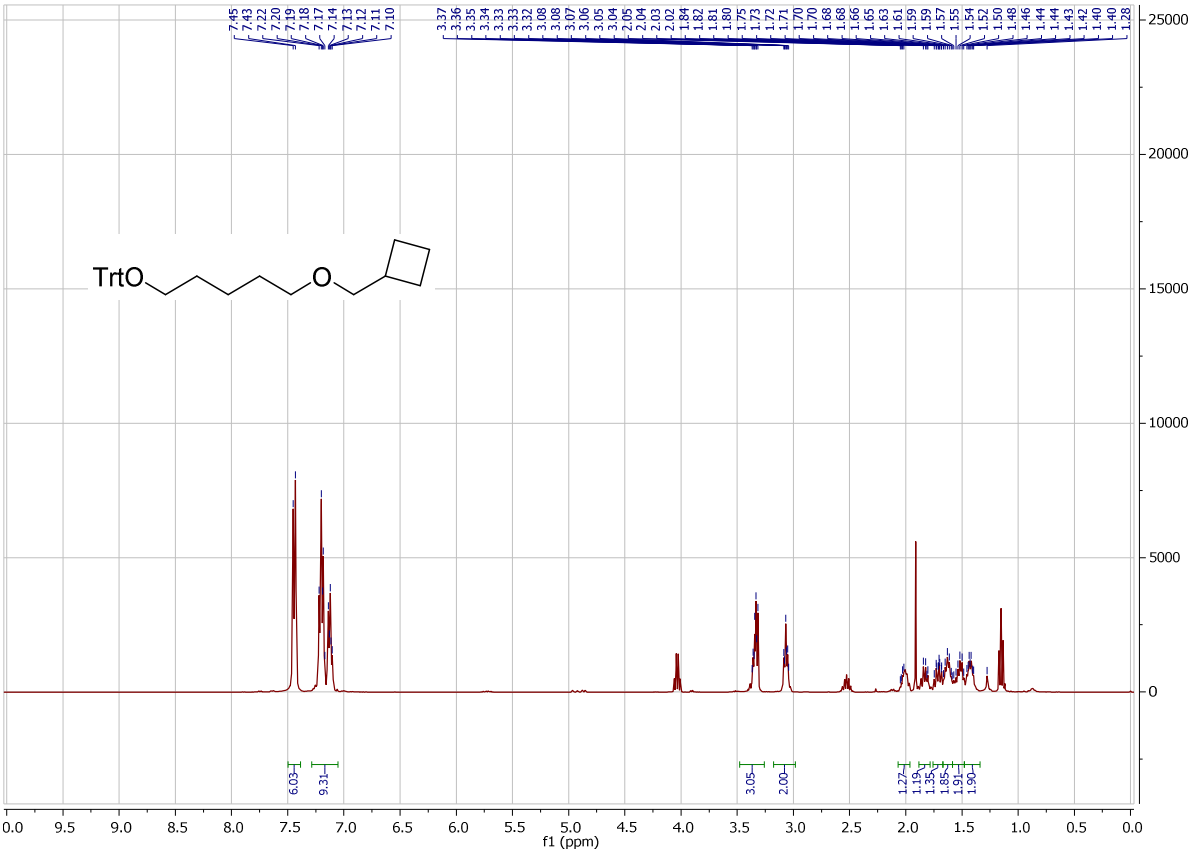


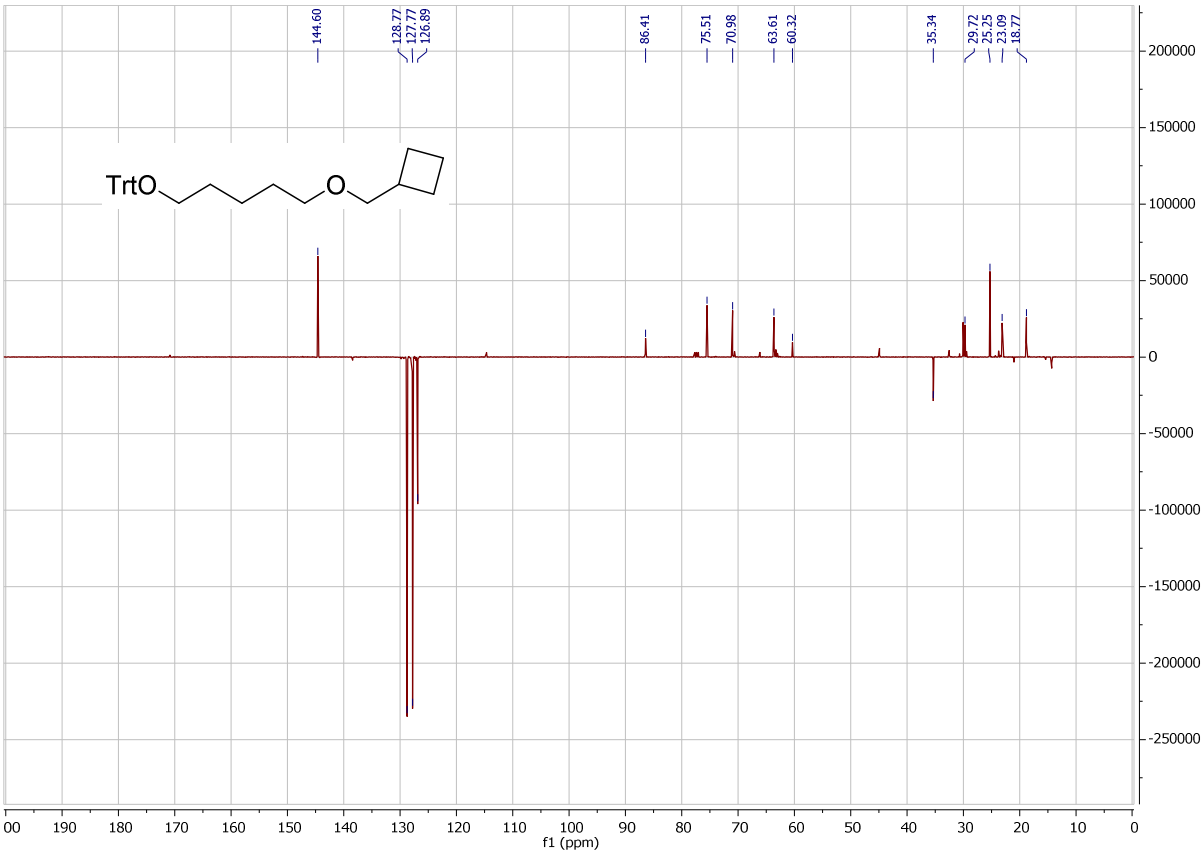
^{1}H-NMR and ^{13}C-NMR of compound B17 in $CDCl_3$.



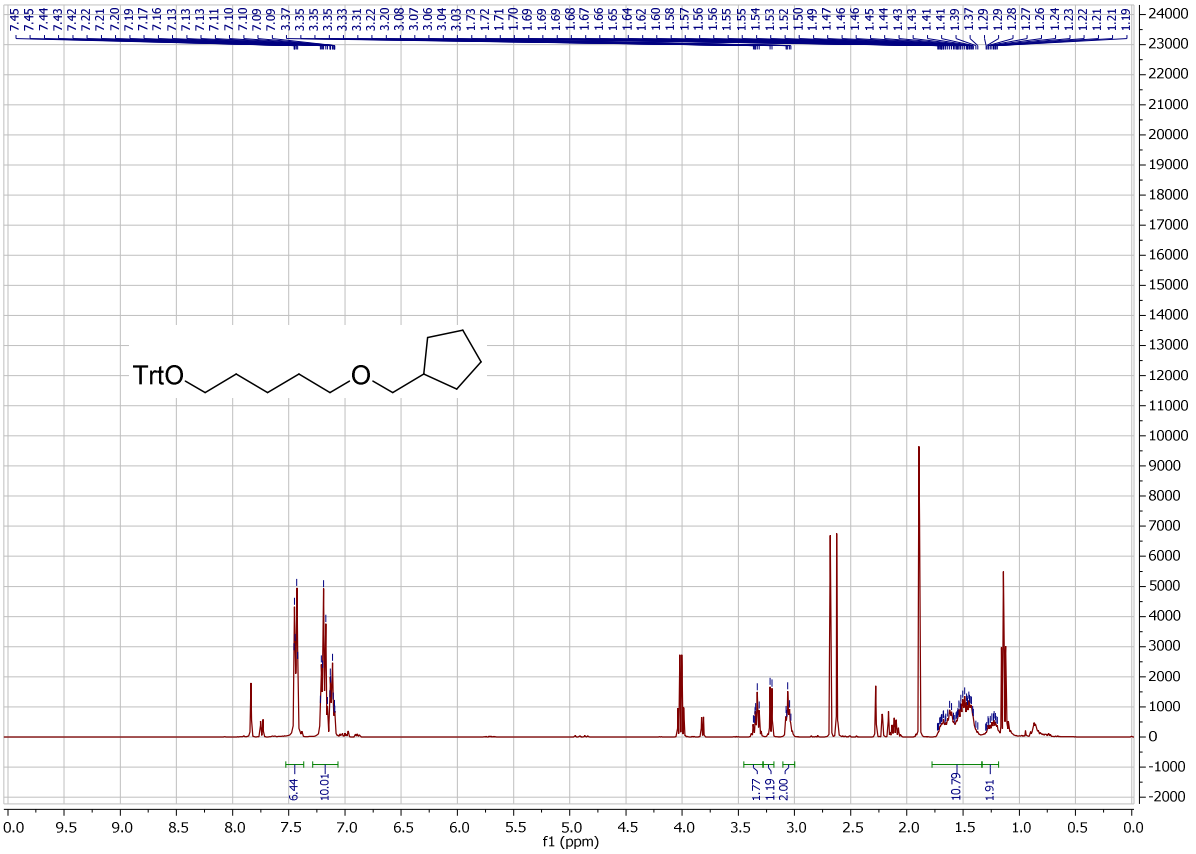


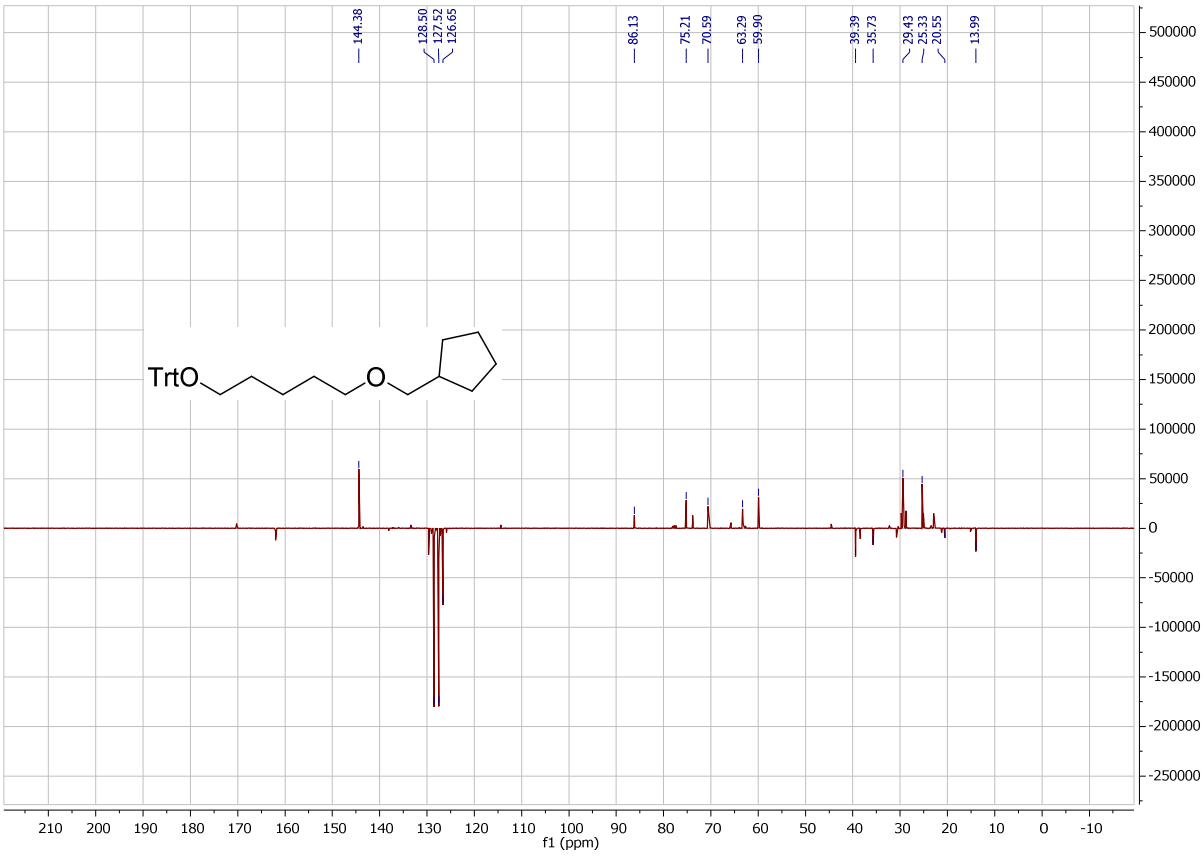
^{1}H-NMR and ^{13}C-NMR of compound B18 in $CDCl_3$.



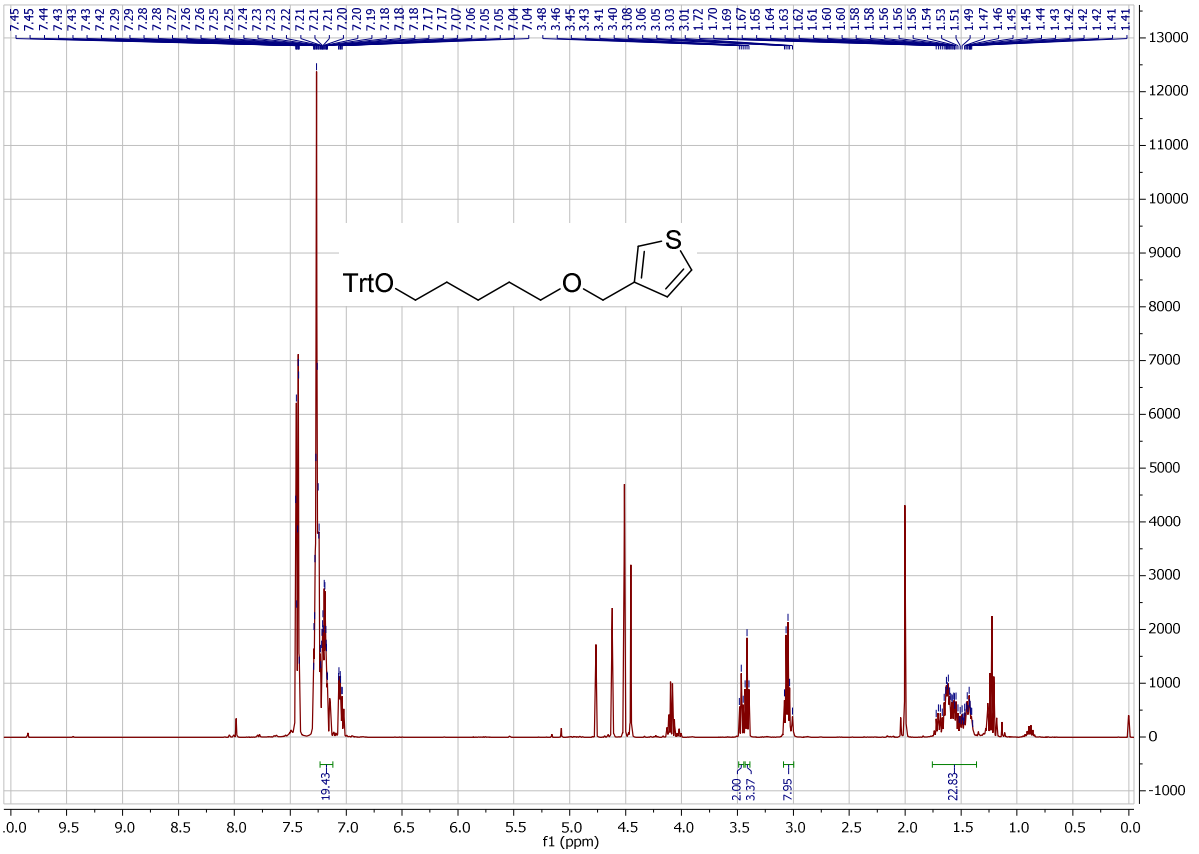


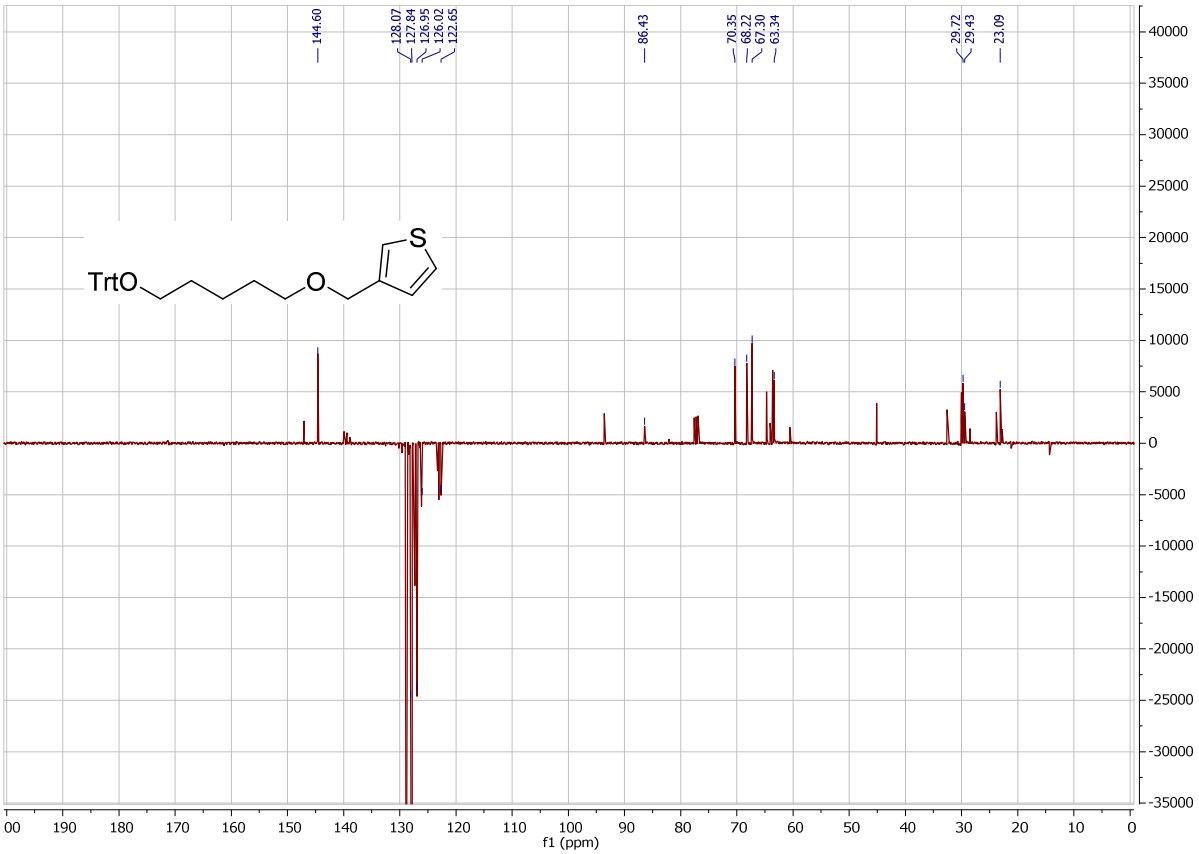
^{1}H-NMR and ^{13}C-NMR of compound B19 in $CDCl_3$.



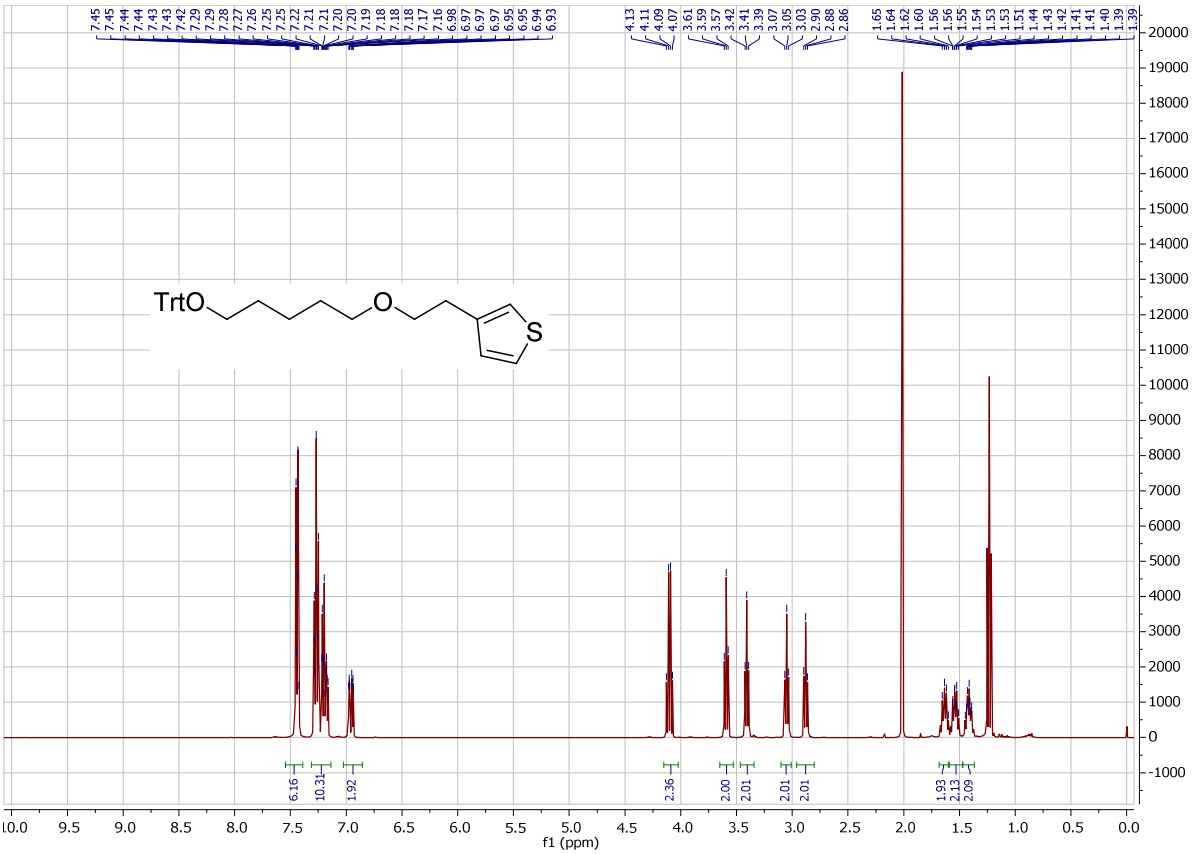


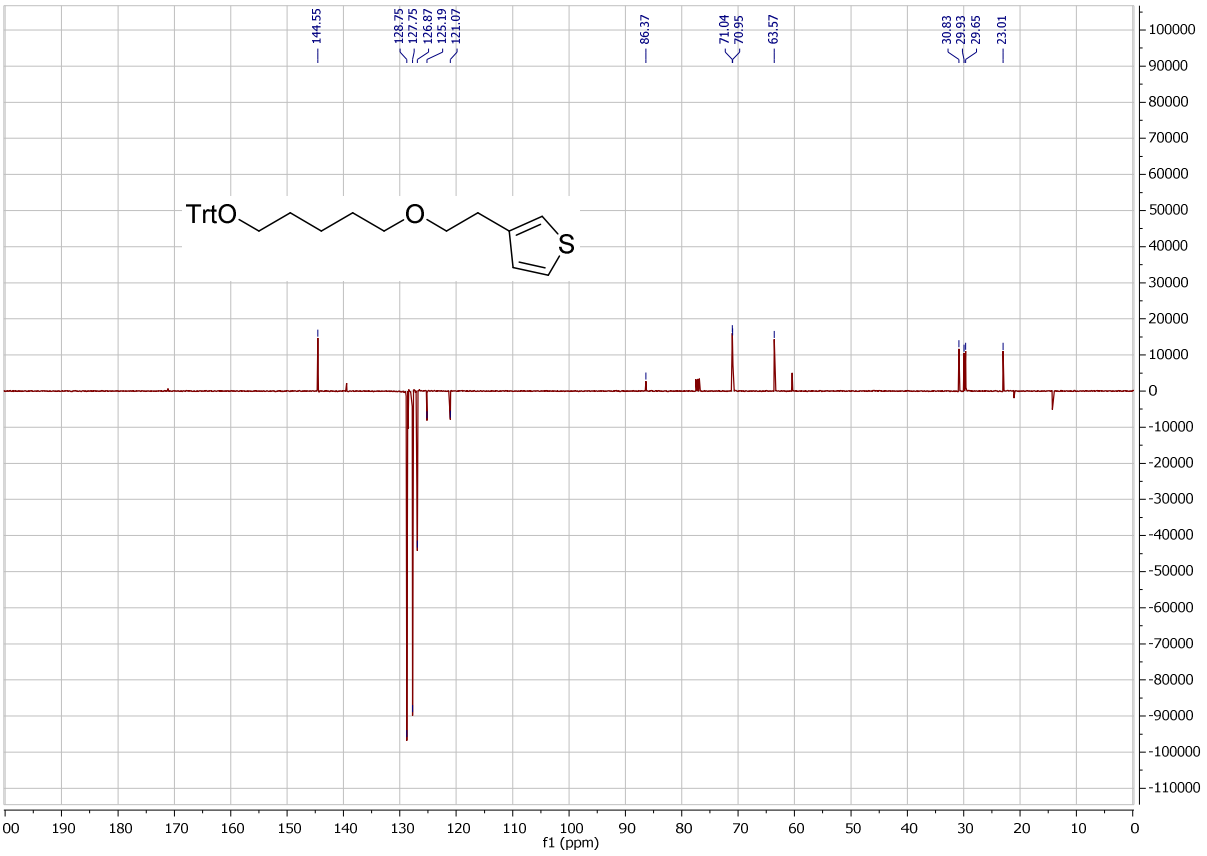
^{1}H-NMR and ^{13}C-NMR of compound B20 in $CDCl_3$.



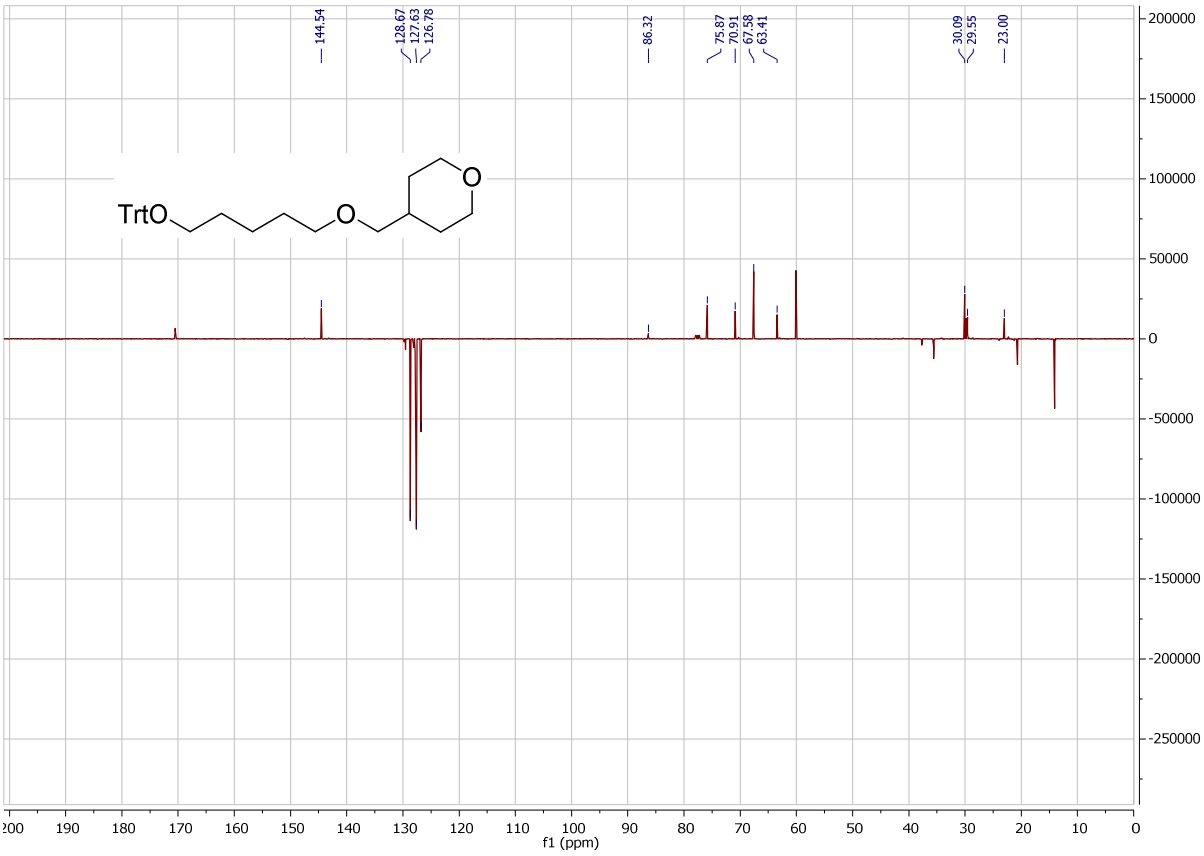


^{1}H-NMR and ^{13}C-NMR of compound B21 in $CDCl_3$.

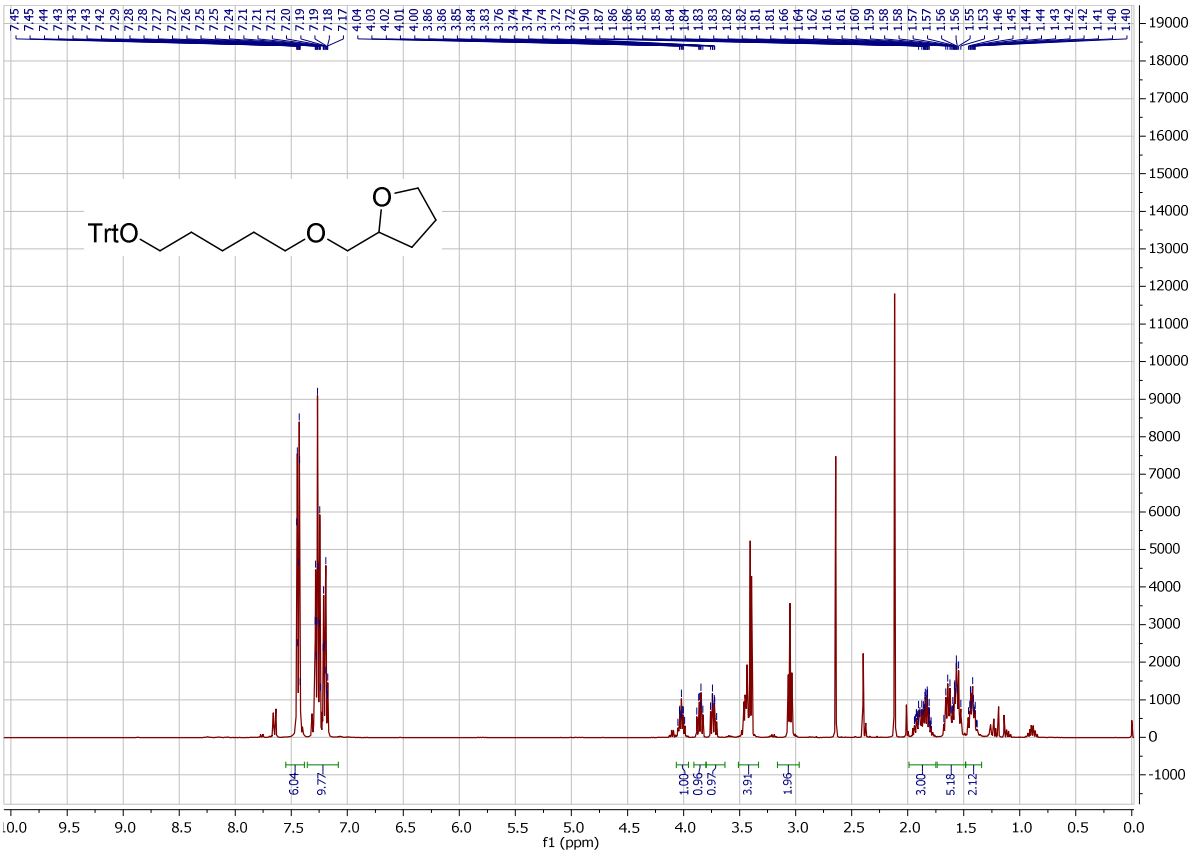


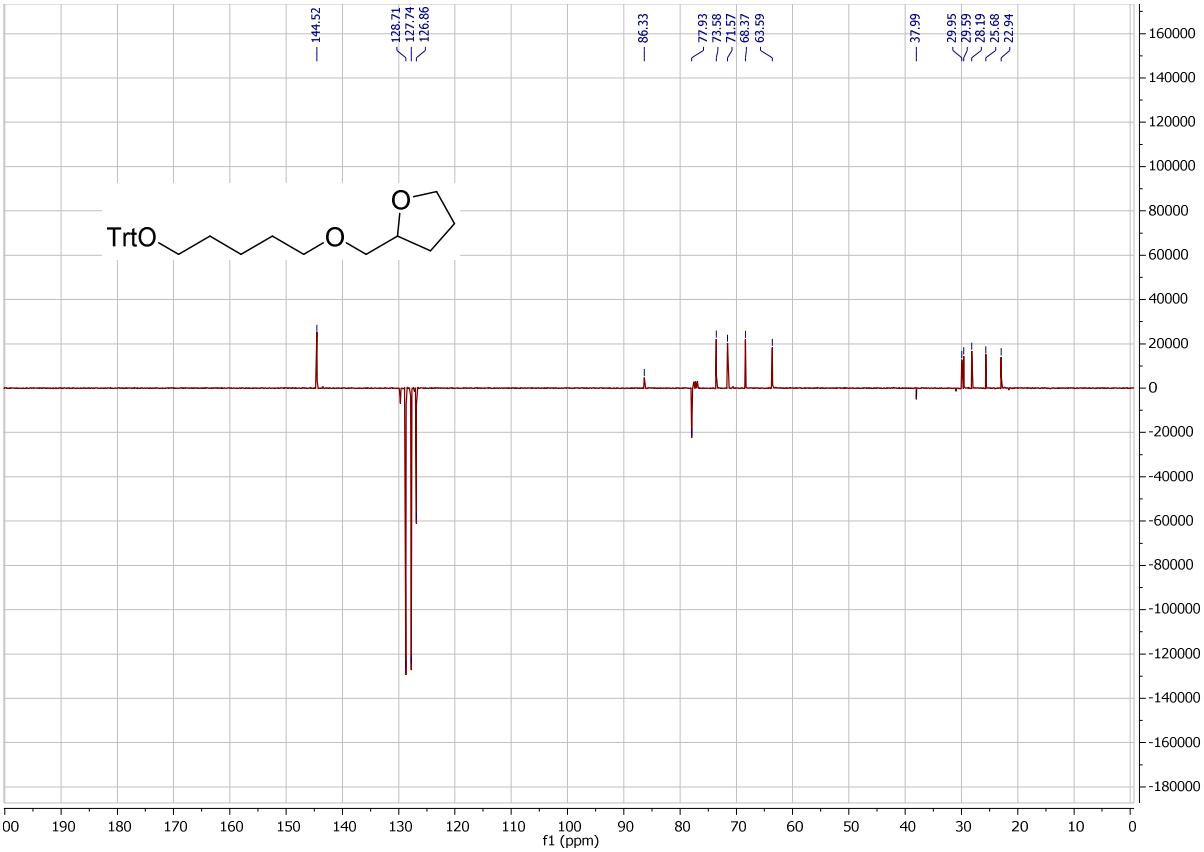


^{1}H-NMR and ^{13}C-NMR of compound B22 in $CDCl_3$.

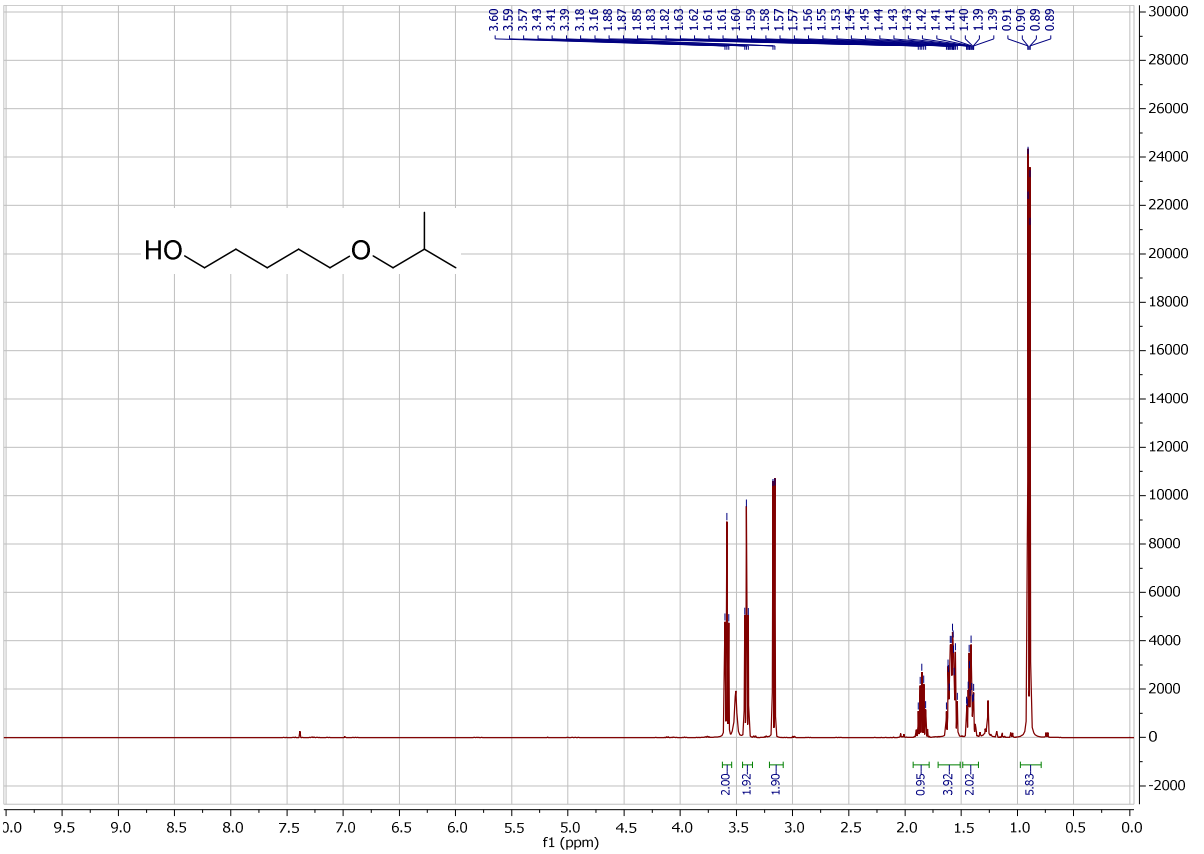


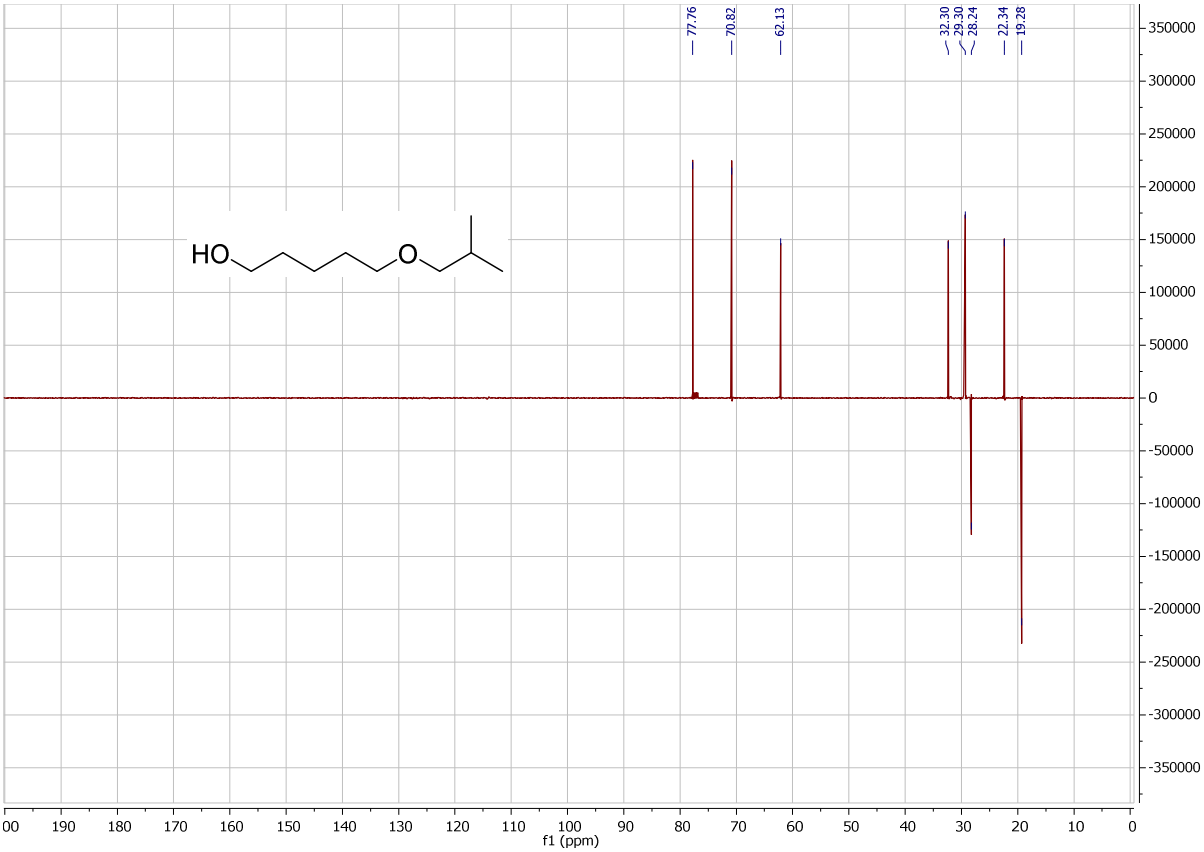
^{1}H-NMR and ^{13}C-NMR of compound B23 in $CDCl_3$.



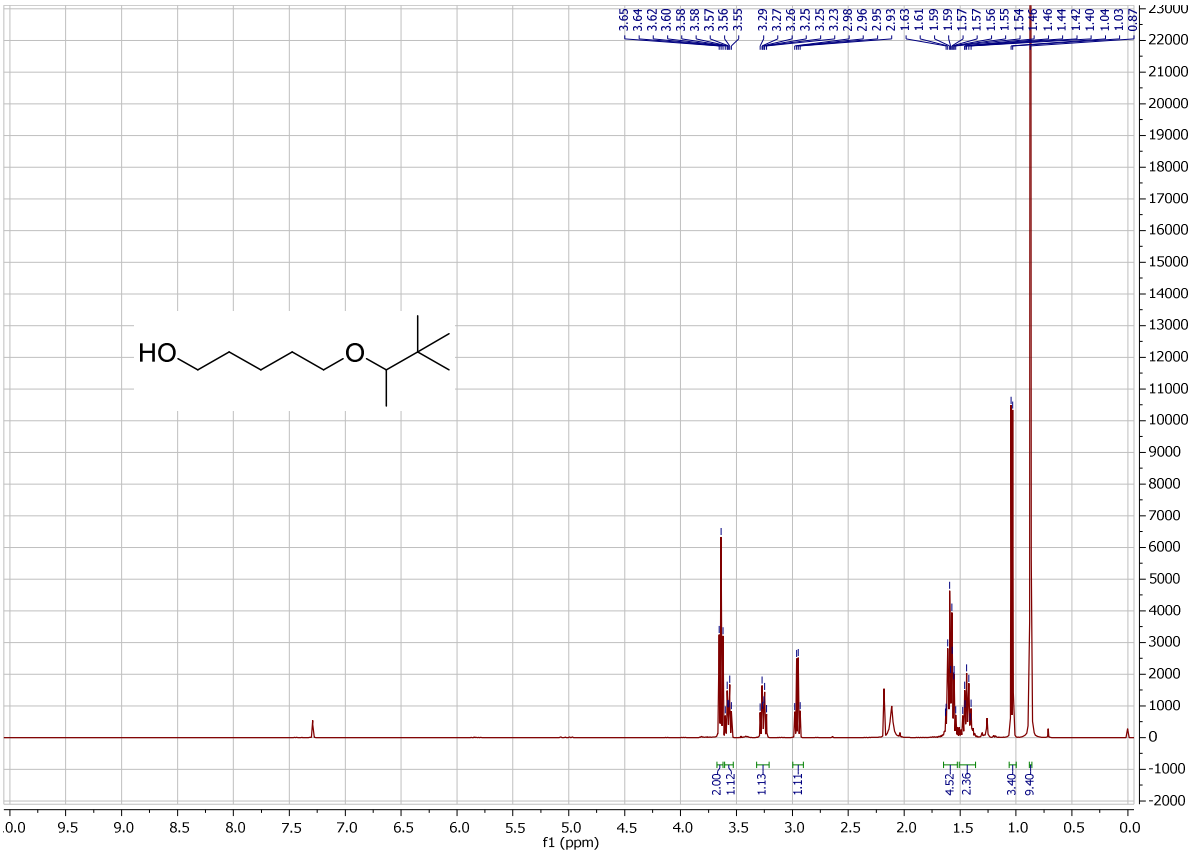


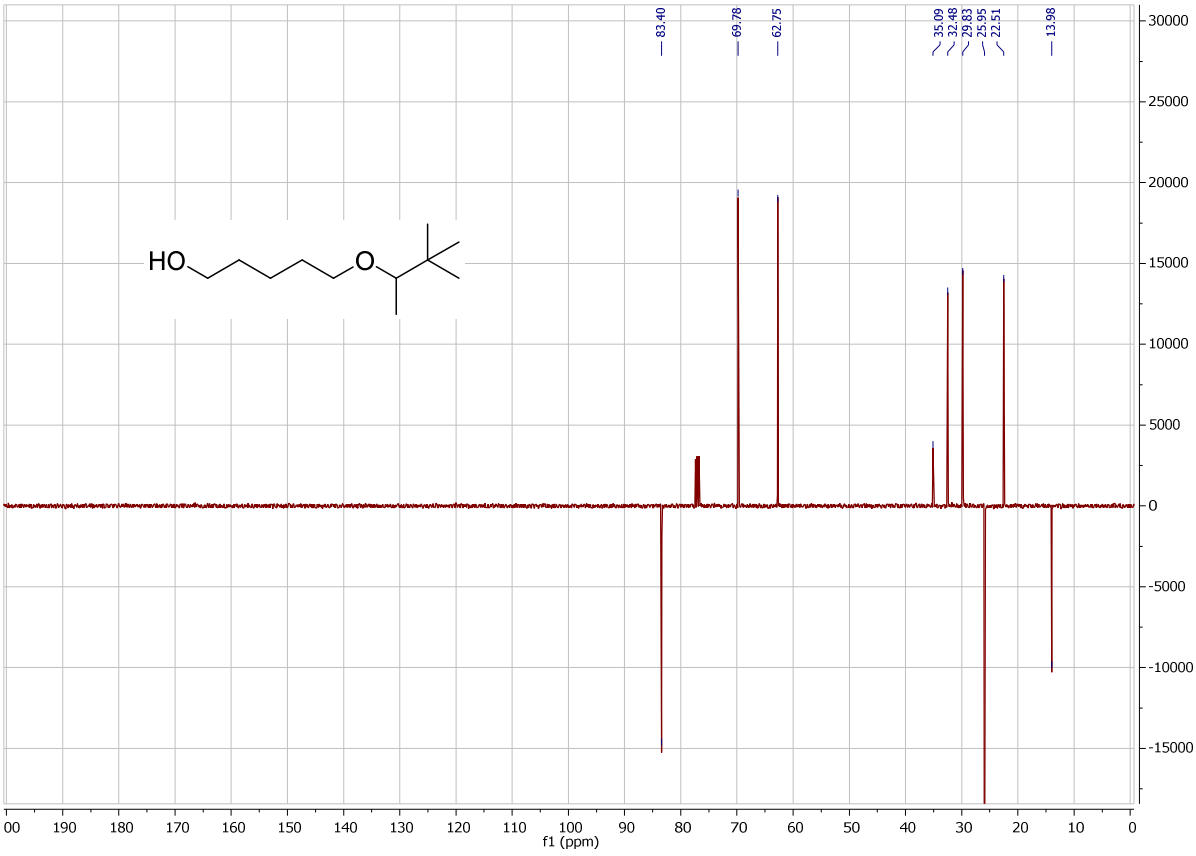
^{1}H-NMR and ^{13}C-NMR of compound B24 in $CDCl_3$.



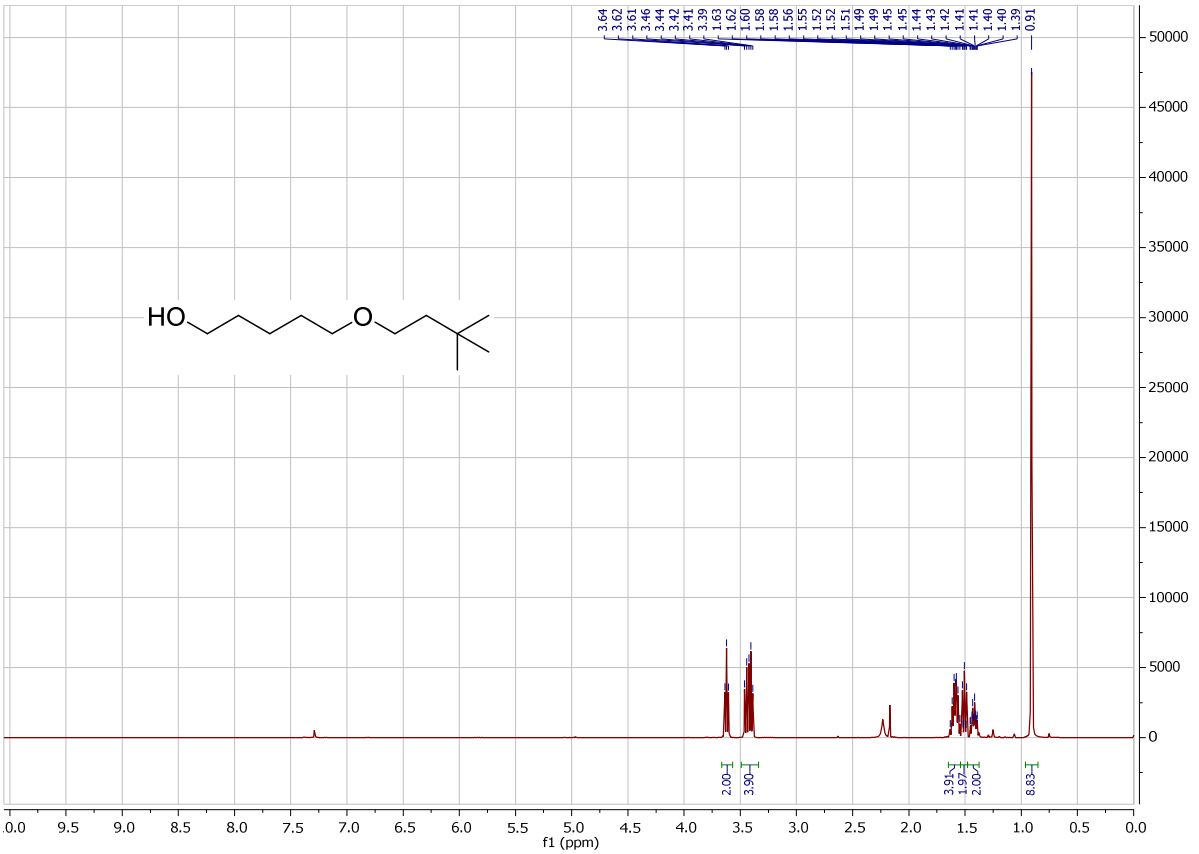


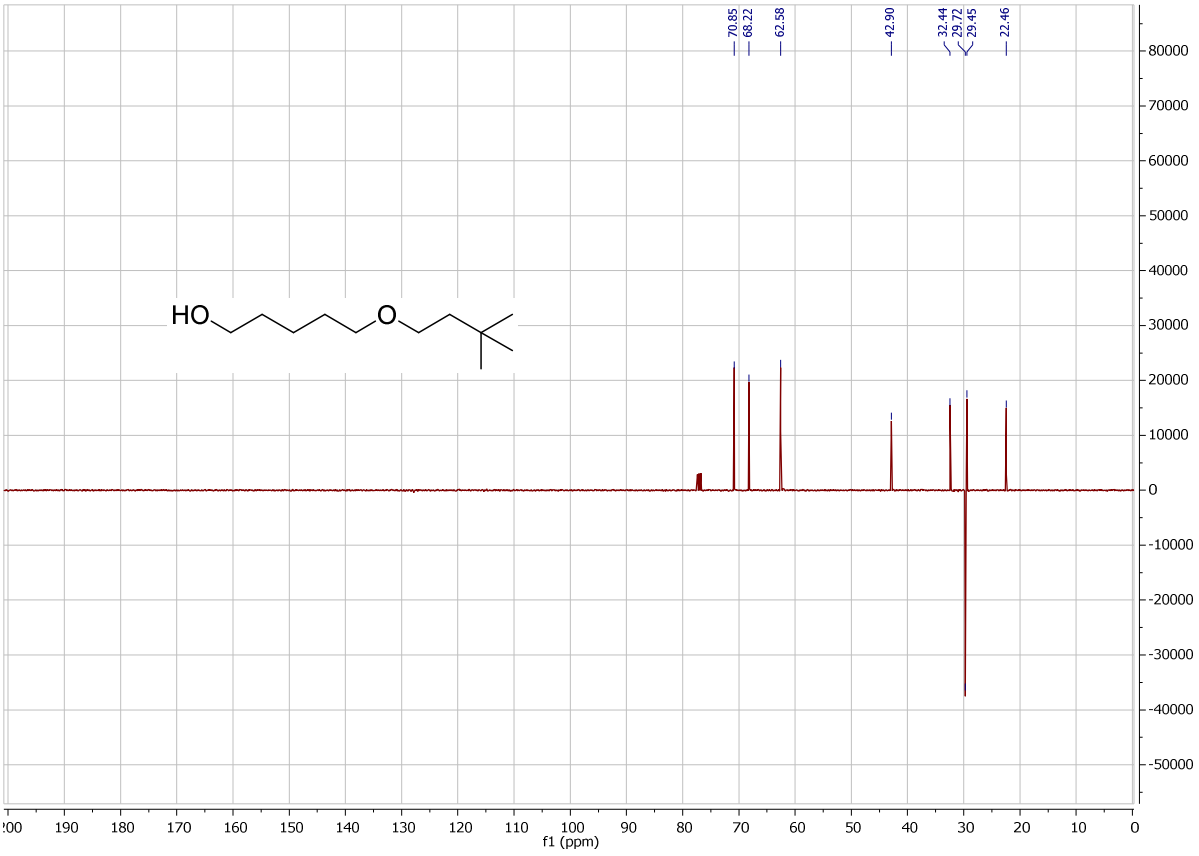
^{1}H-NMR and ^{13}C-NMR of compound B25 in $CDCl_3$.



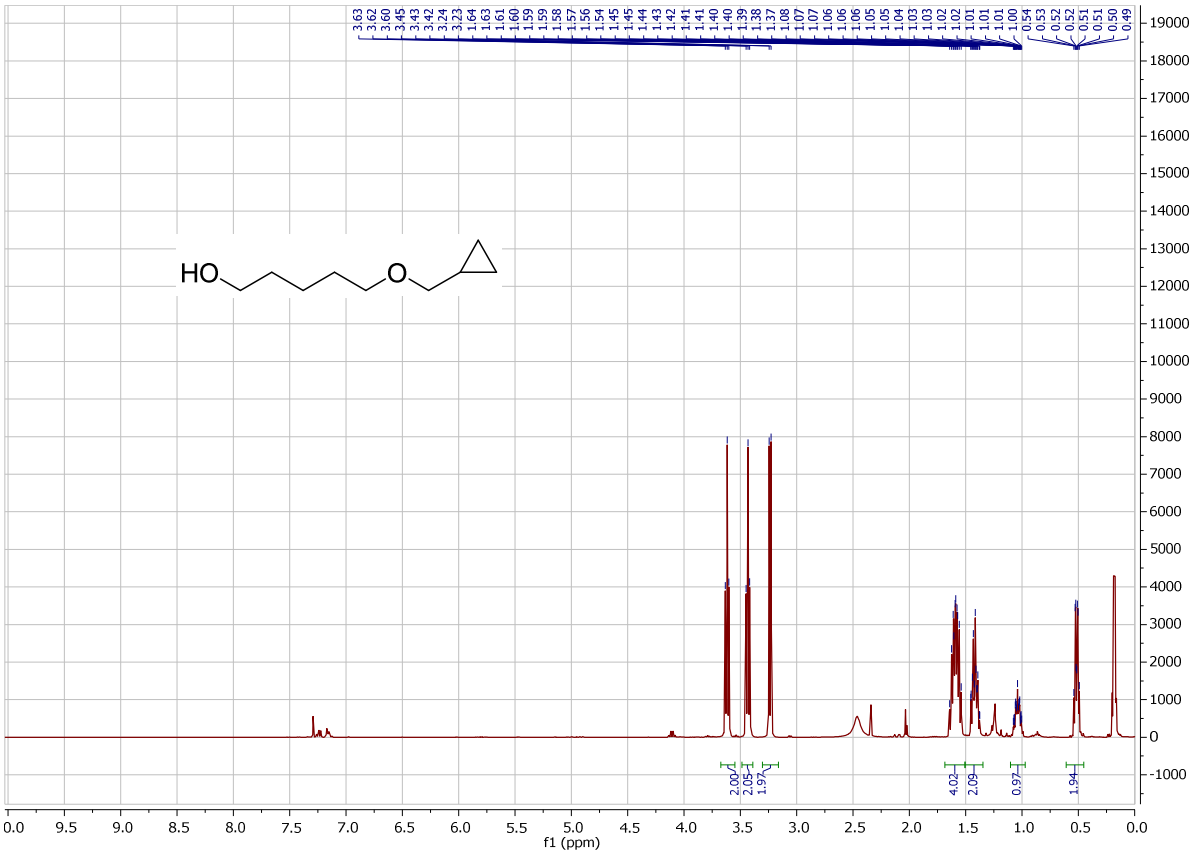


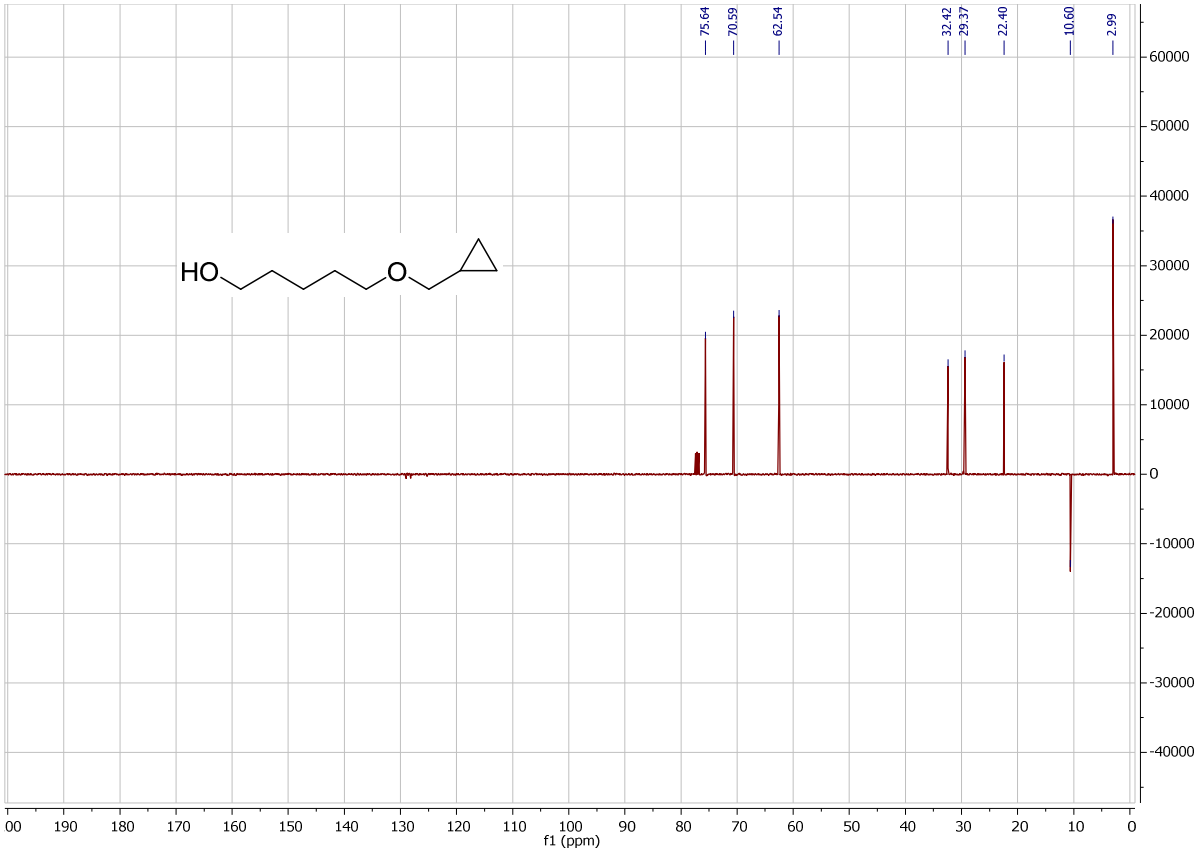
^{1}H-NMR and ^{13}C-NMR of compound B26 in $CDCl_3$.



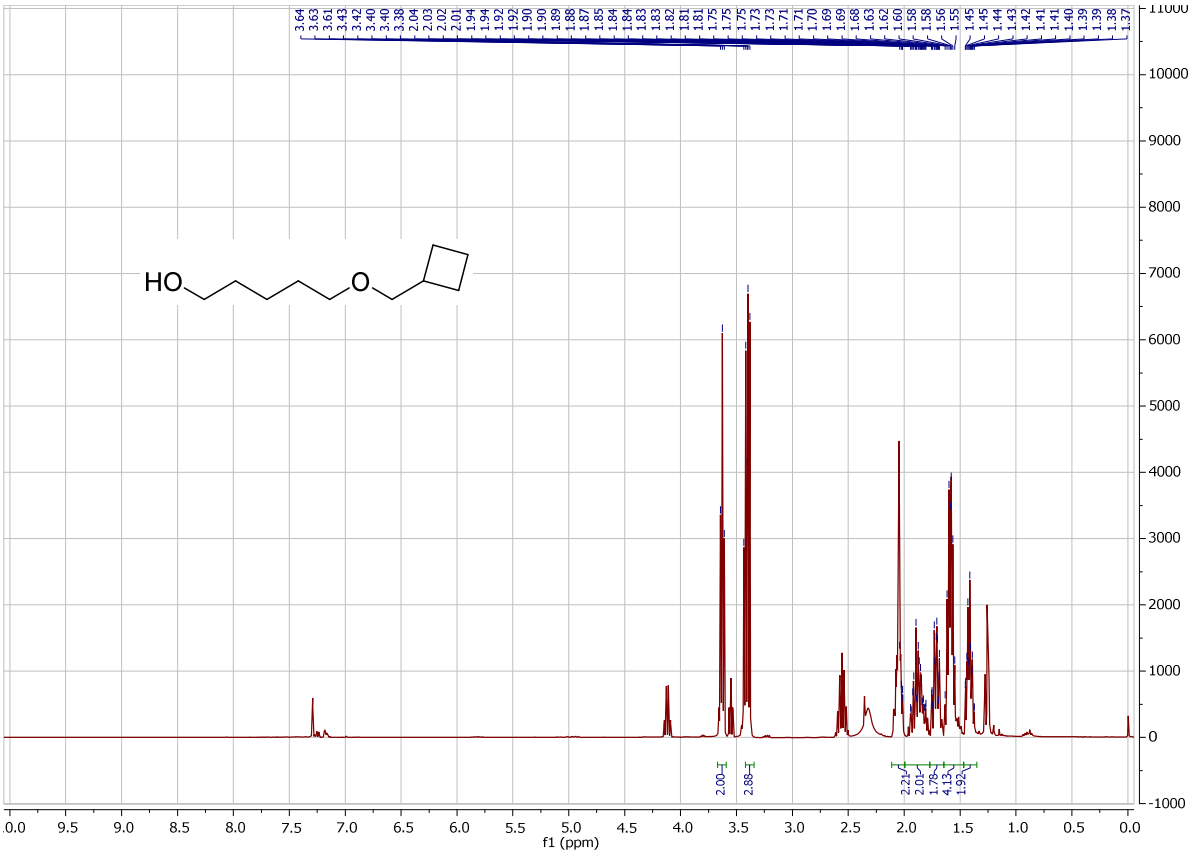


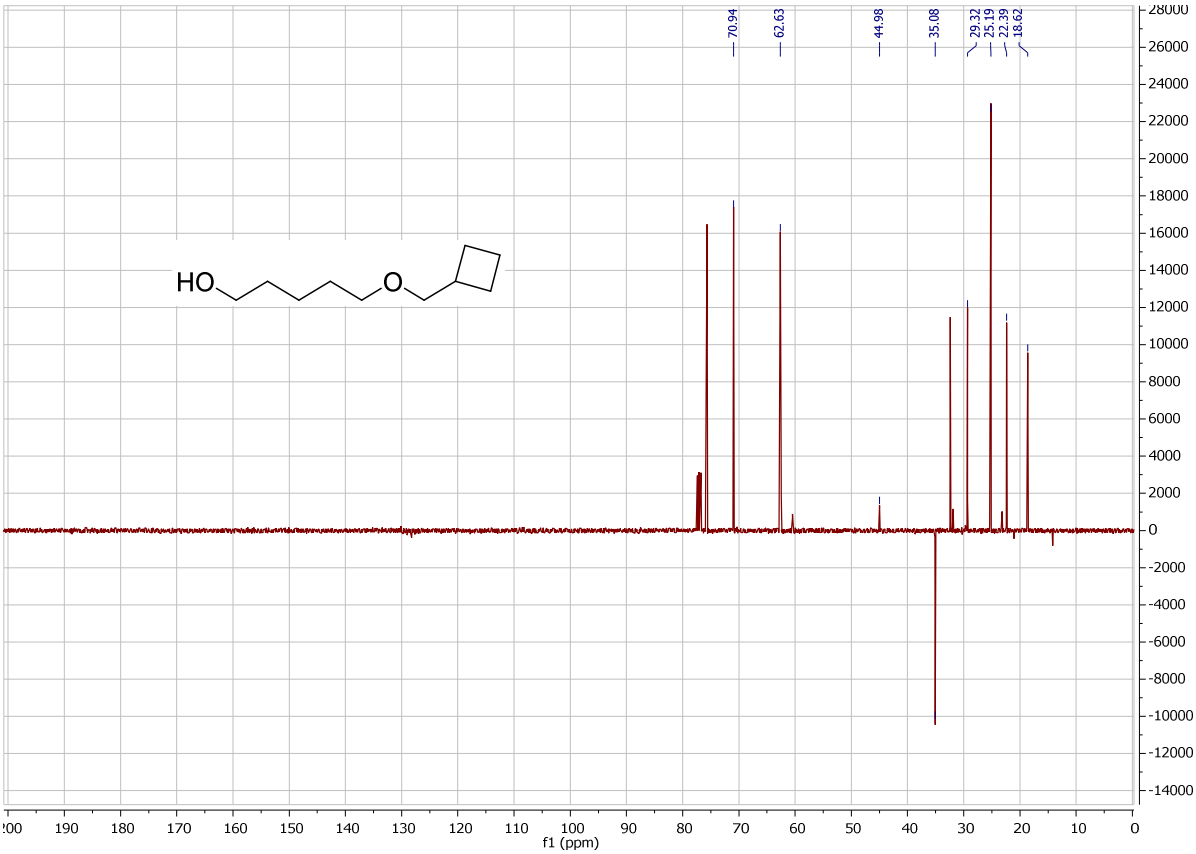
^{1}H-NMR and ^{13}C-NMR of compound B27 in $CDCl_3$.



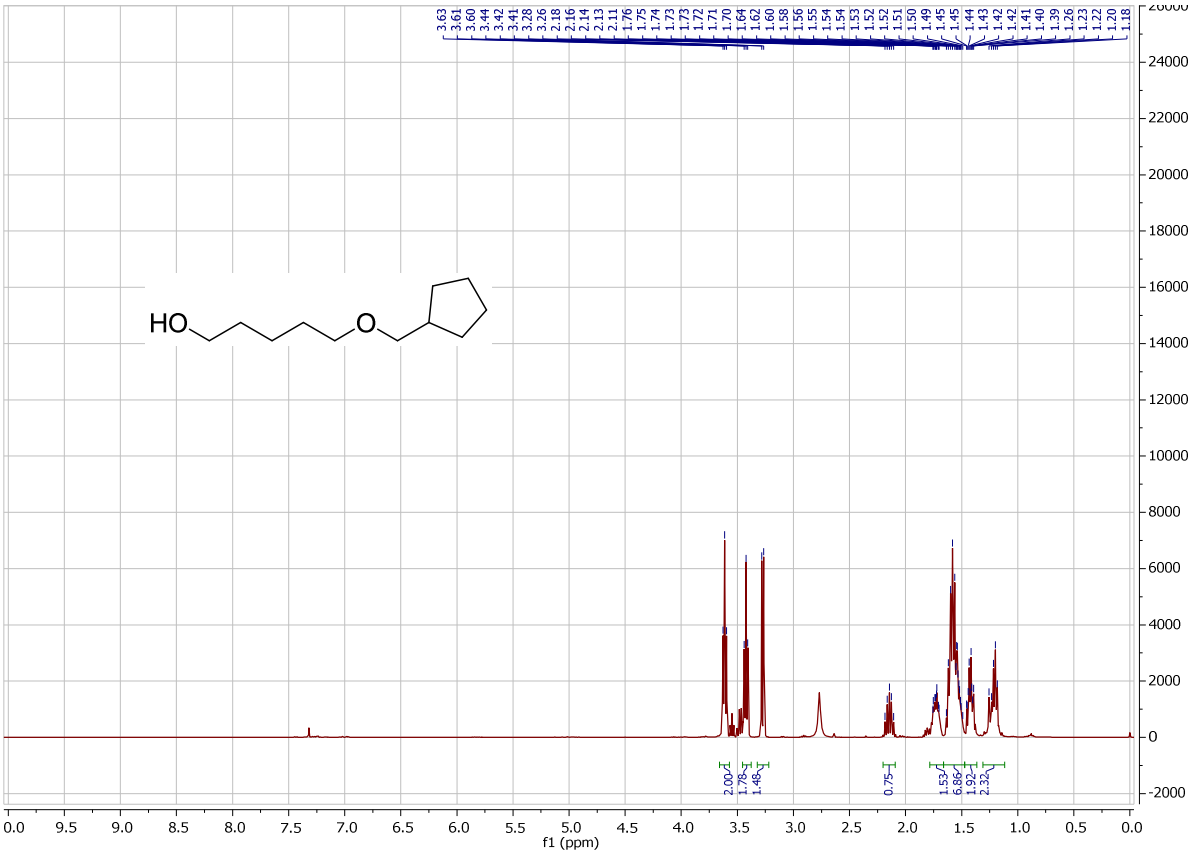


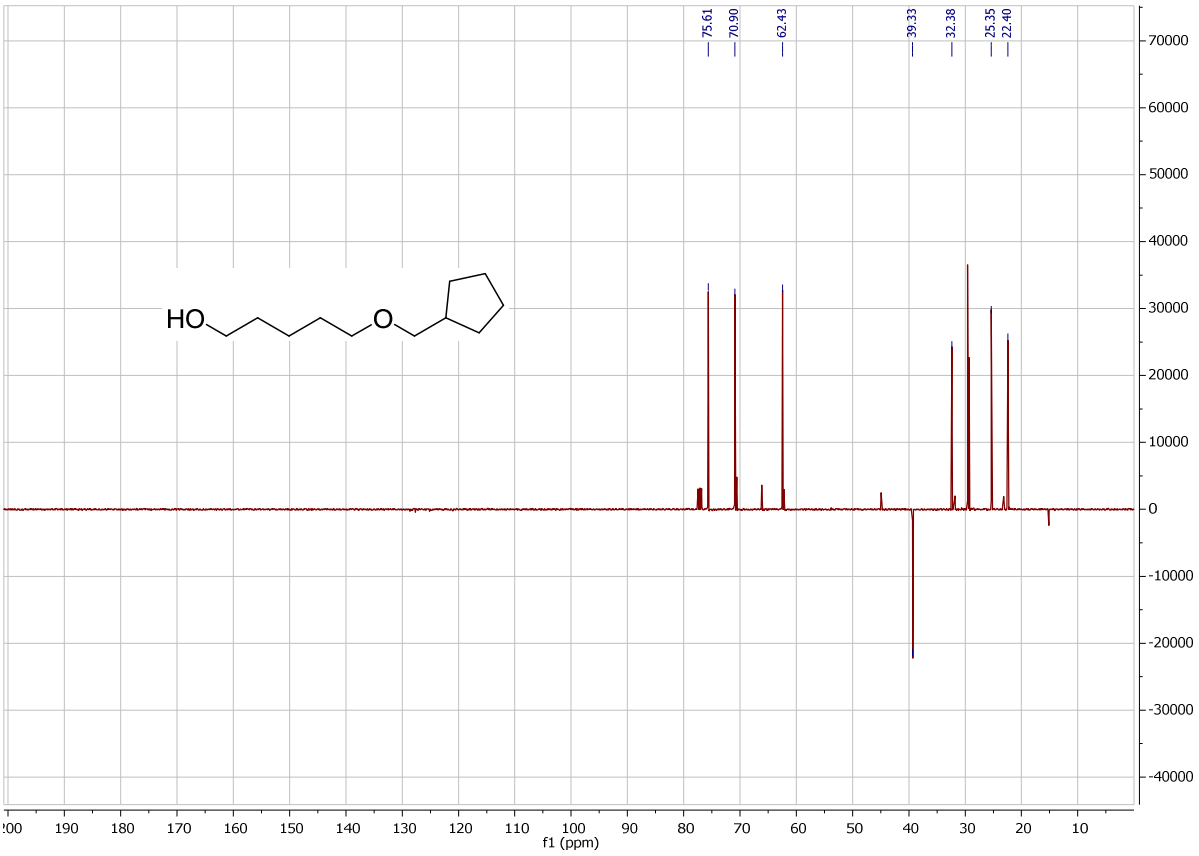
^{1}H-NMR and ^{13}C-NMR of compound B28 in $CDCl_3$.



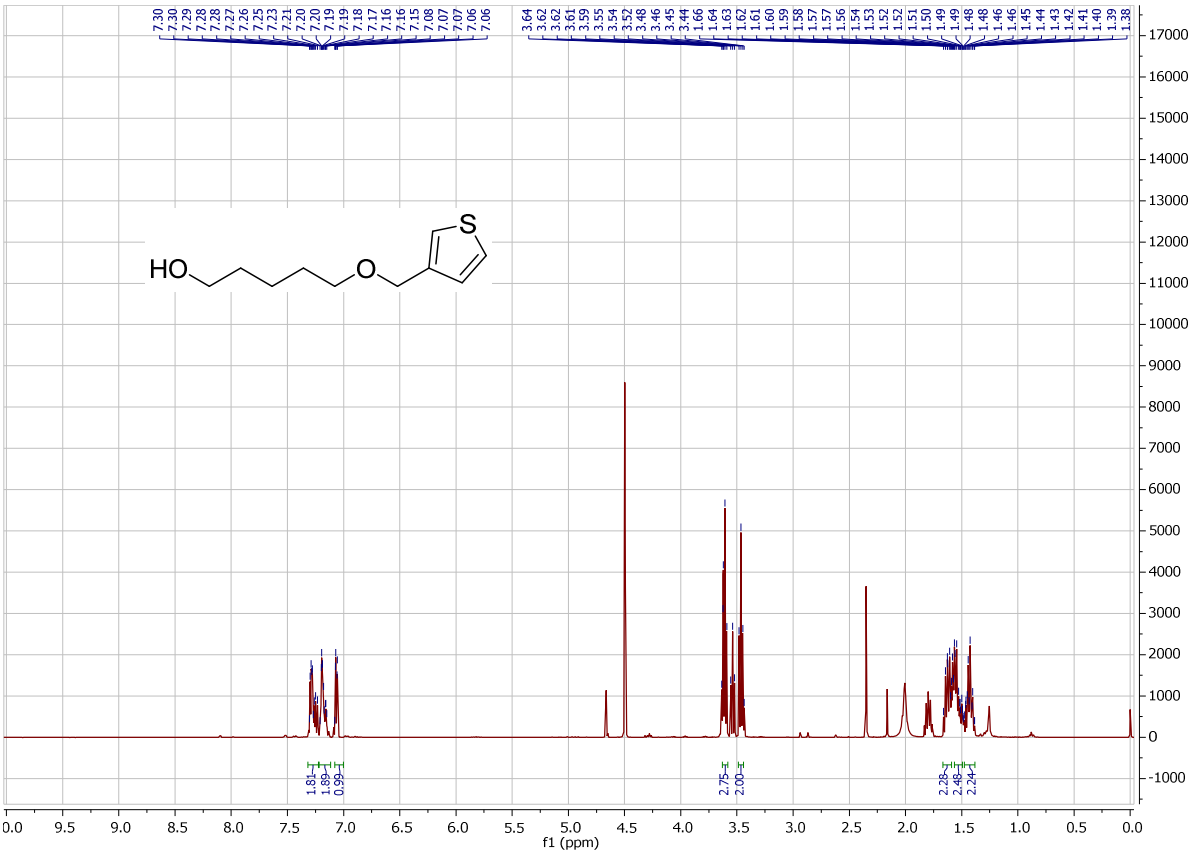


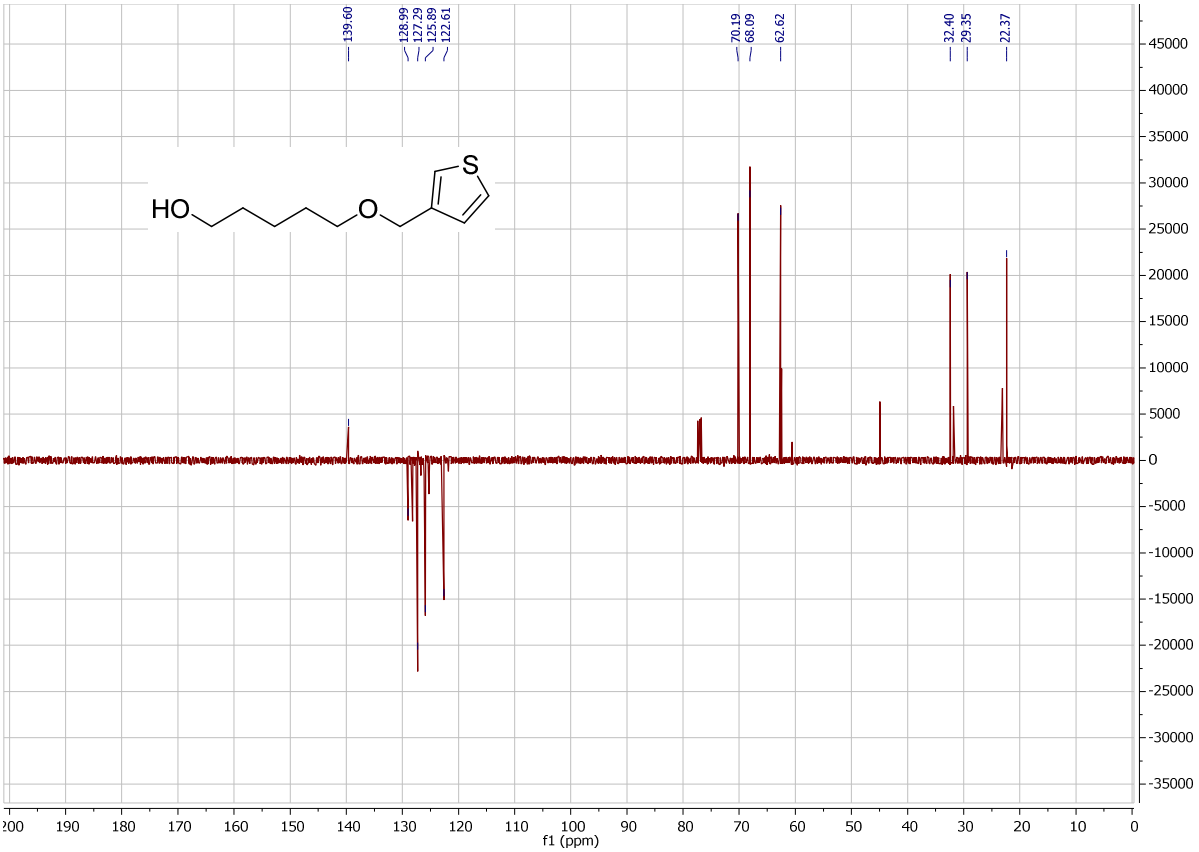
^{1}H-NMR and ^{13}C-NMR of compound B29 in $CDCl_3$.



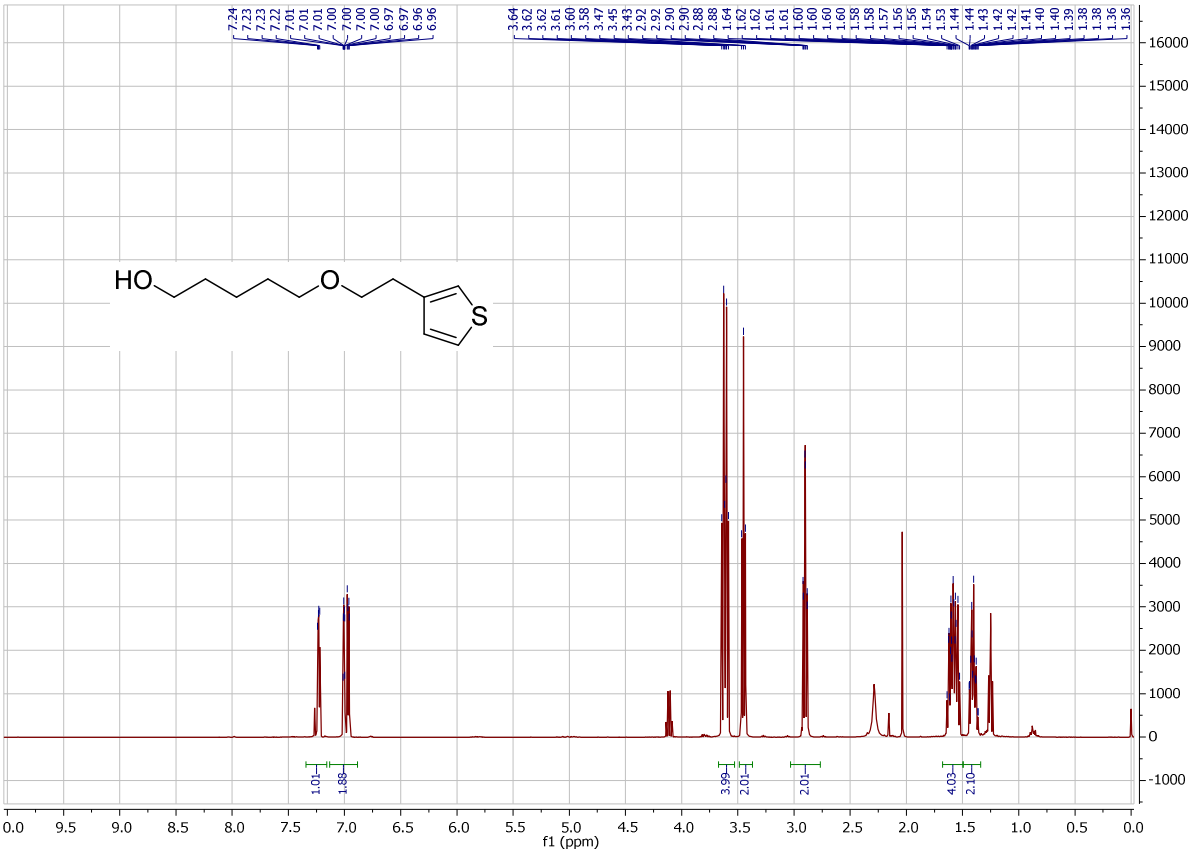


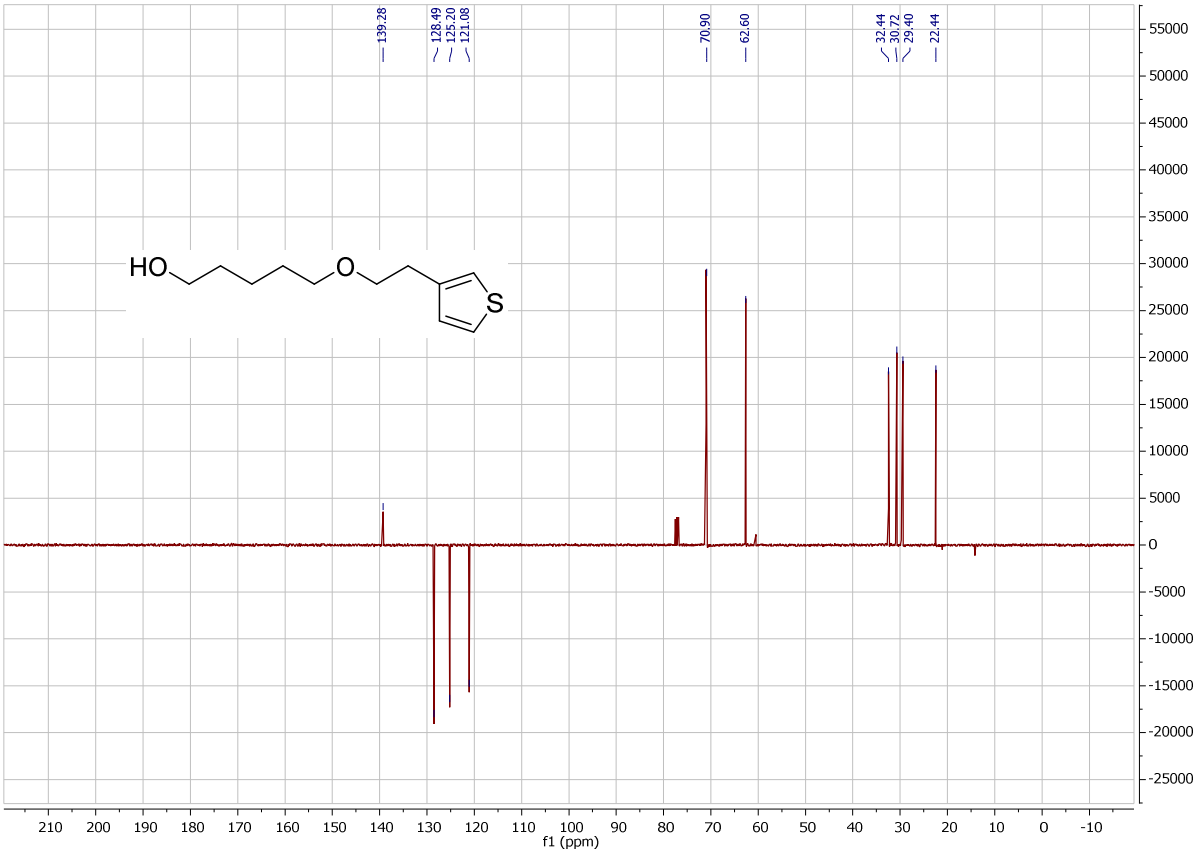
^{1}H-NMR and ^{13}C-NMR of compound B30 in $CDCl_3$.



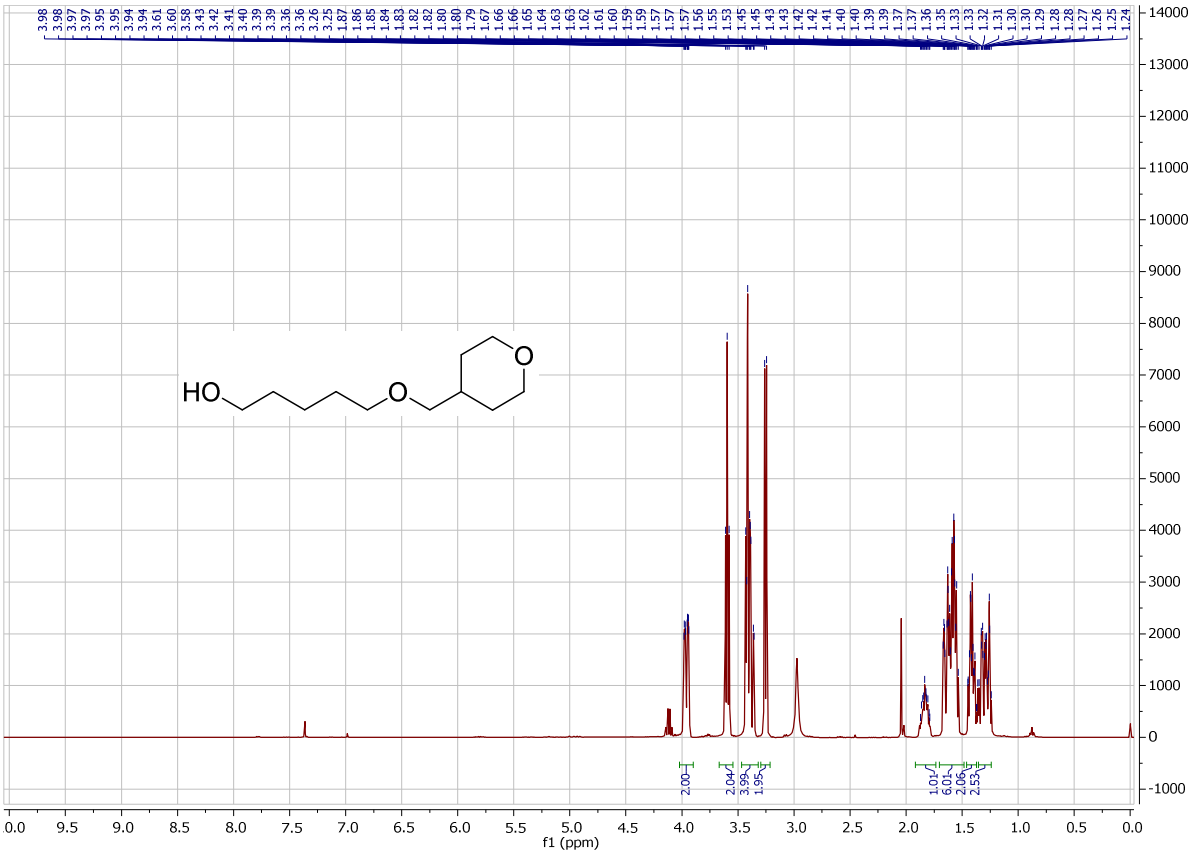


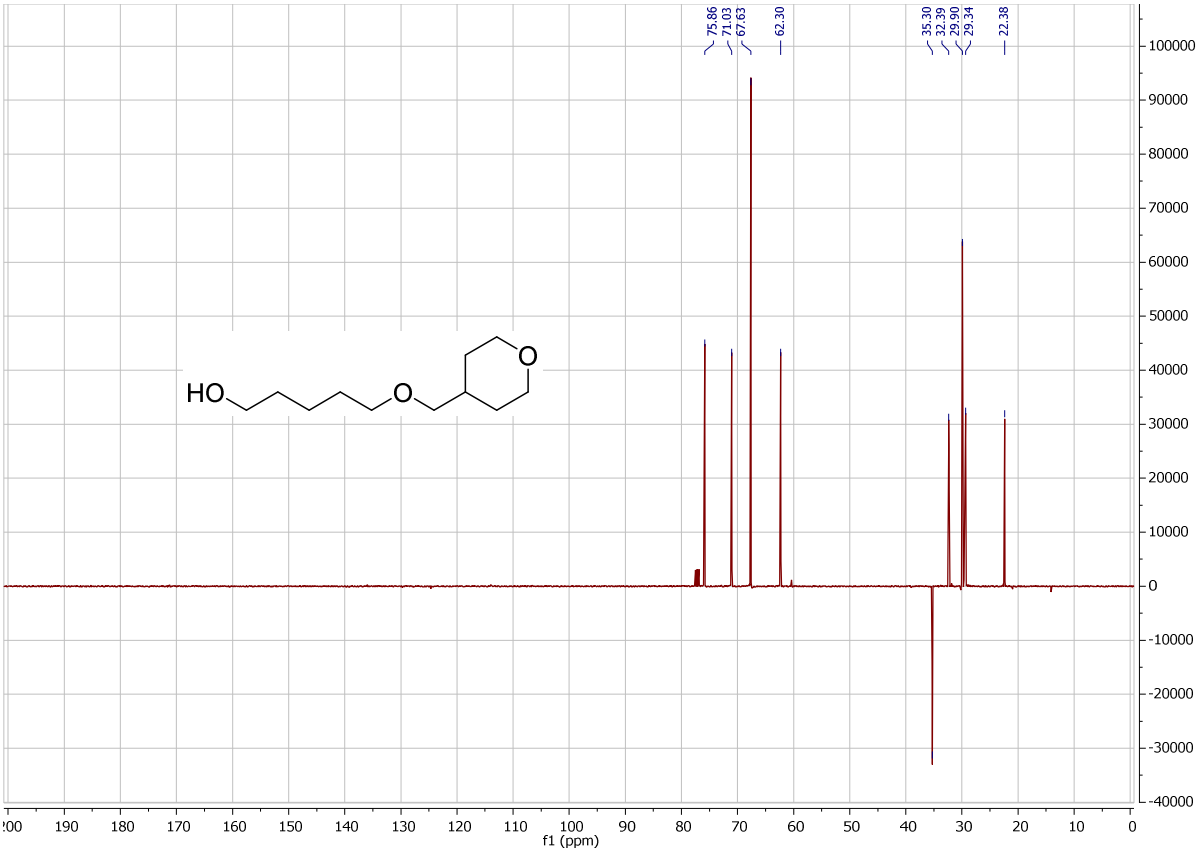
^{1}H-NMR and ^{13}C-NMR of compound B31 in $CDCl_3$.



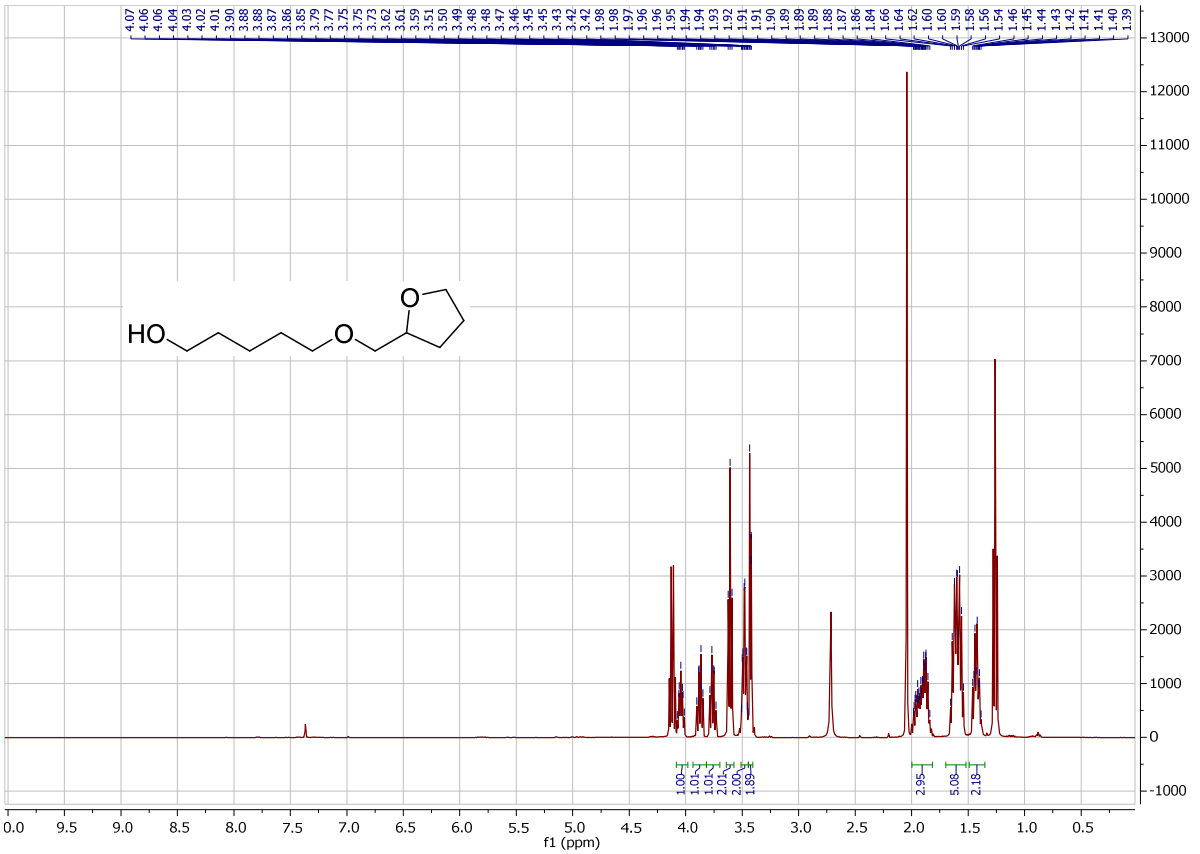


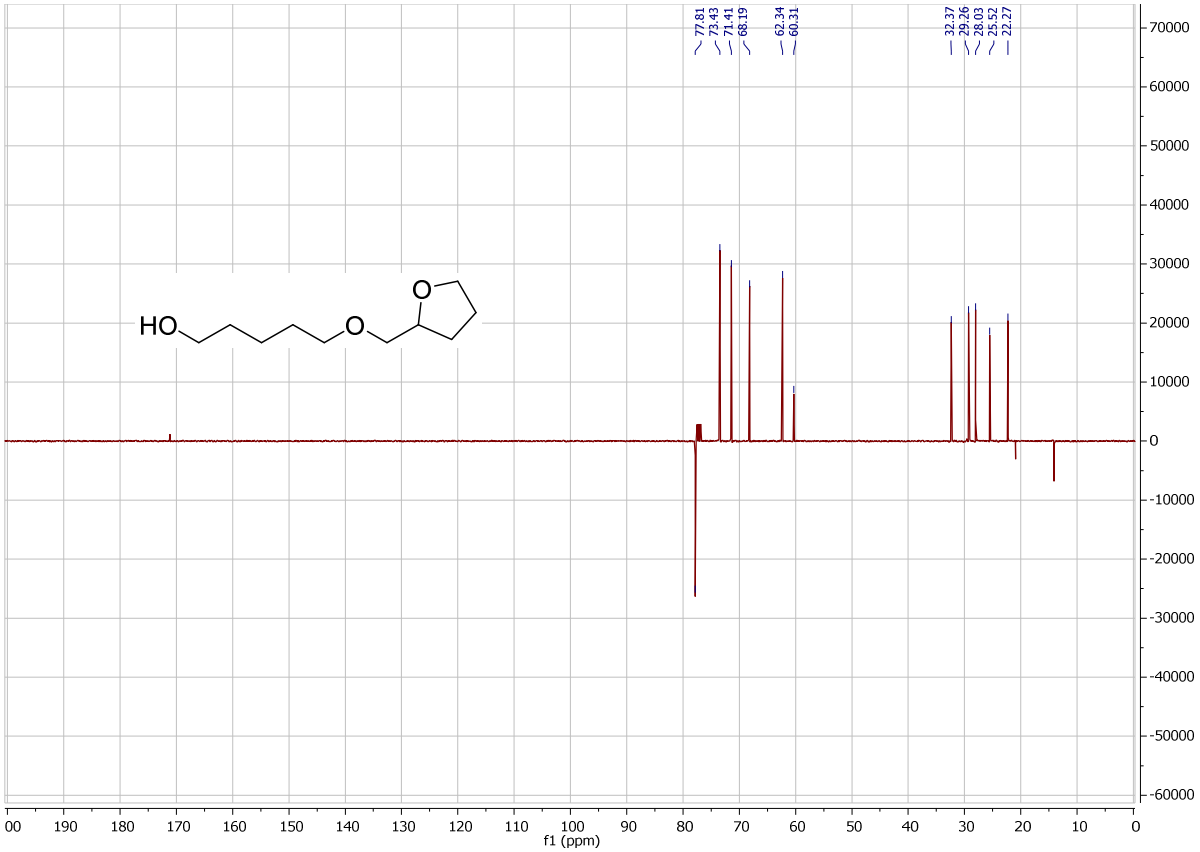
^{1}H-NMR and ^{13}C-NMR of compound B32 in $CDCl_3$.



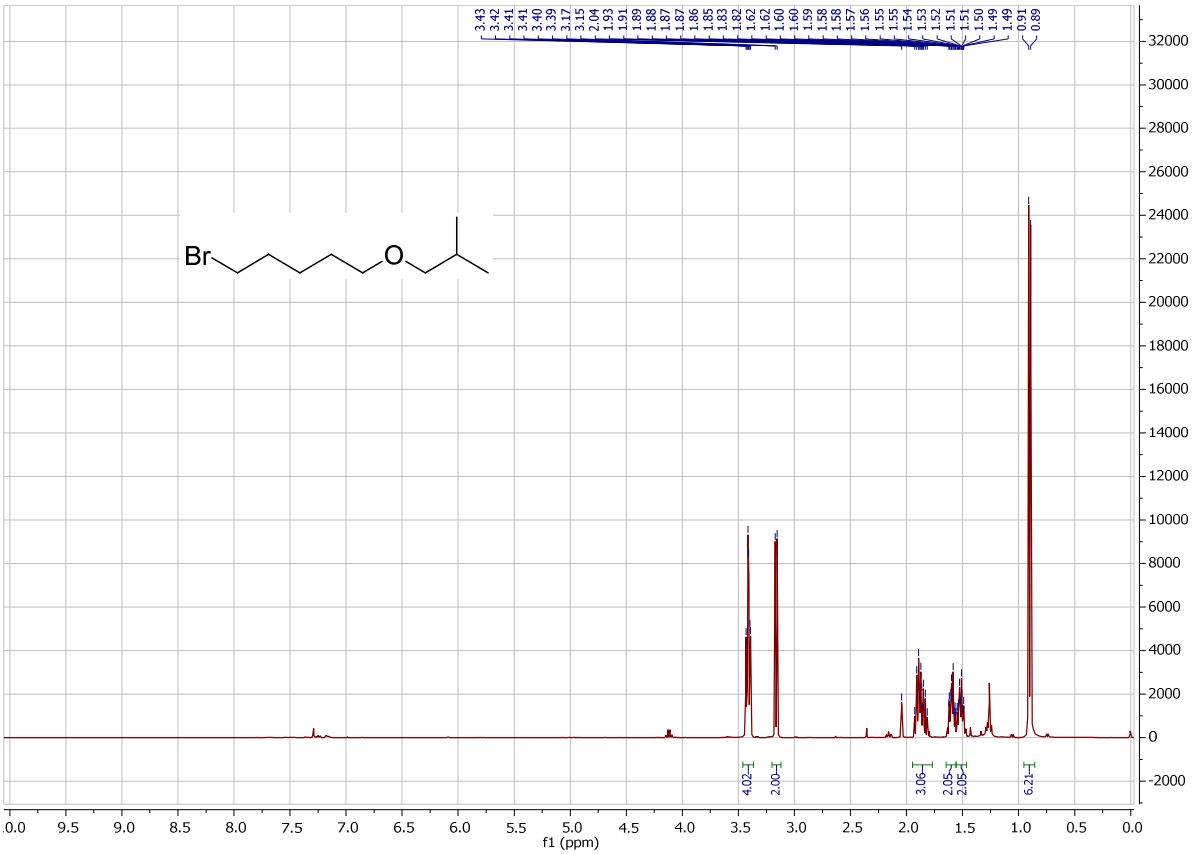


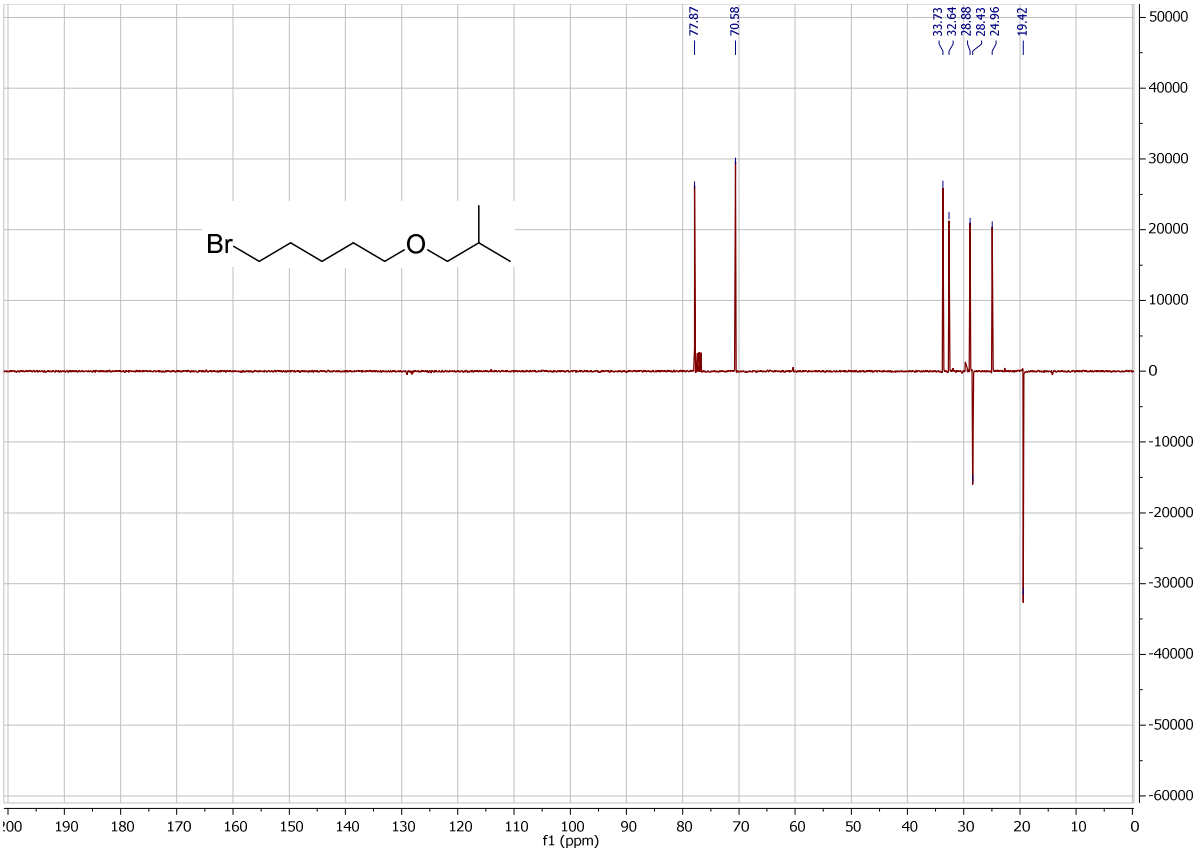
^{1}H-NMR and ^{13}C-NMR of compound B33 in $CDCl_3$.



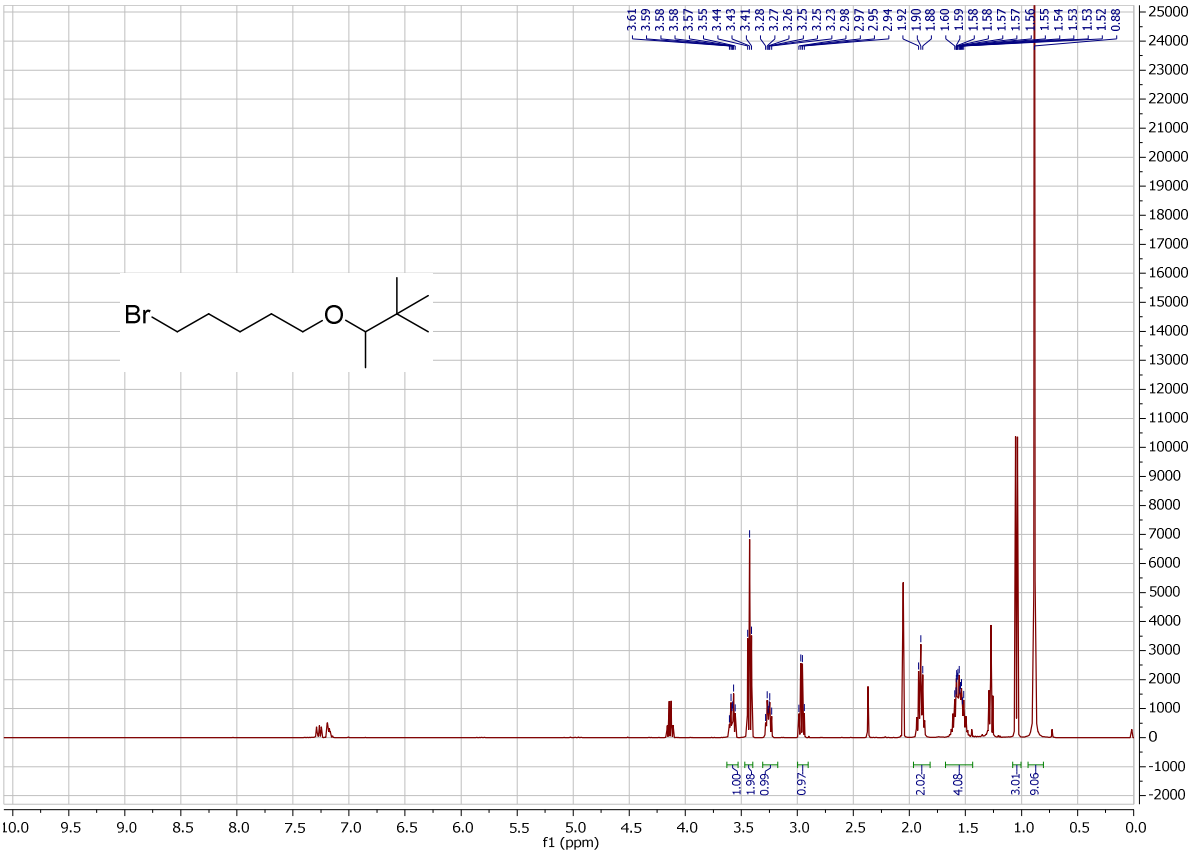


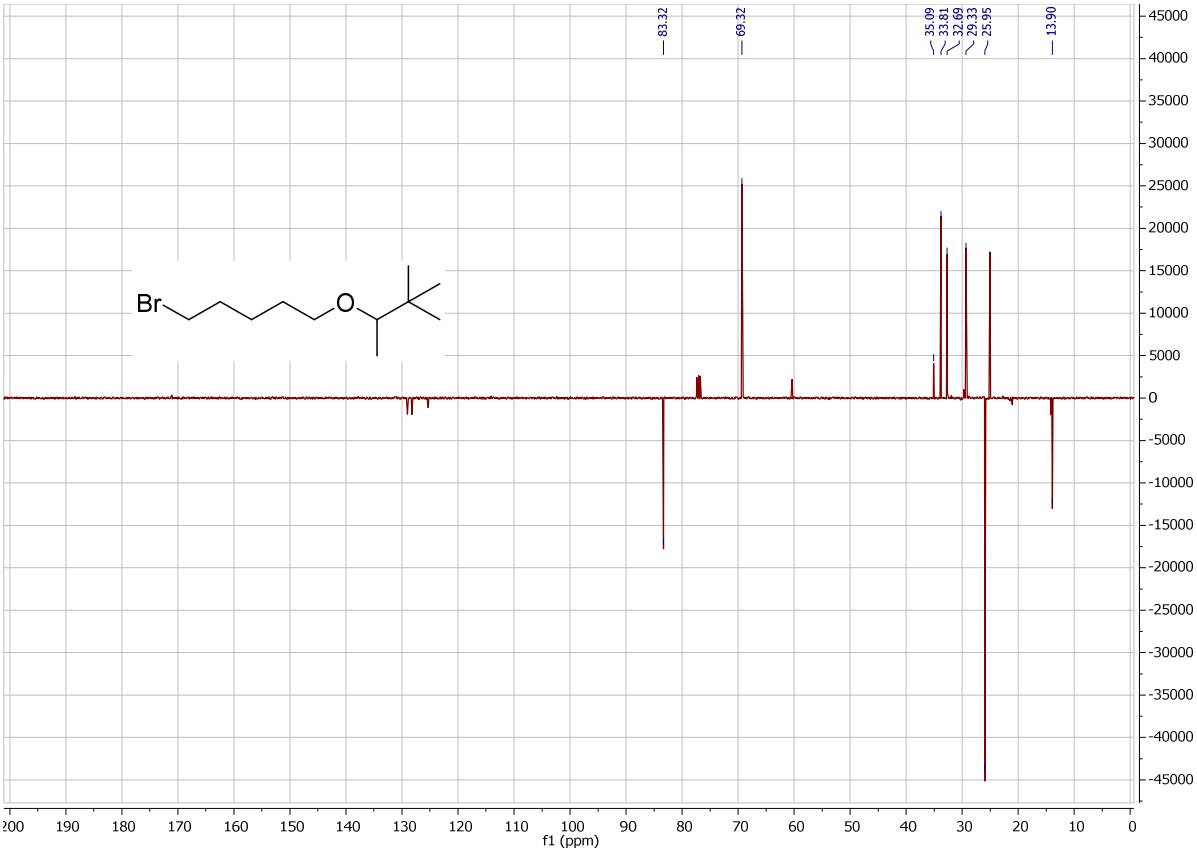
^{1}H-NMR and ^{13}C-NMR of compound B34 in $CDCl_3$.



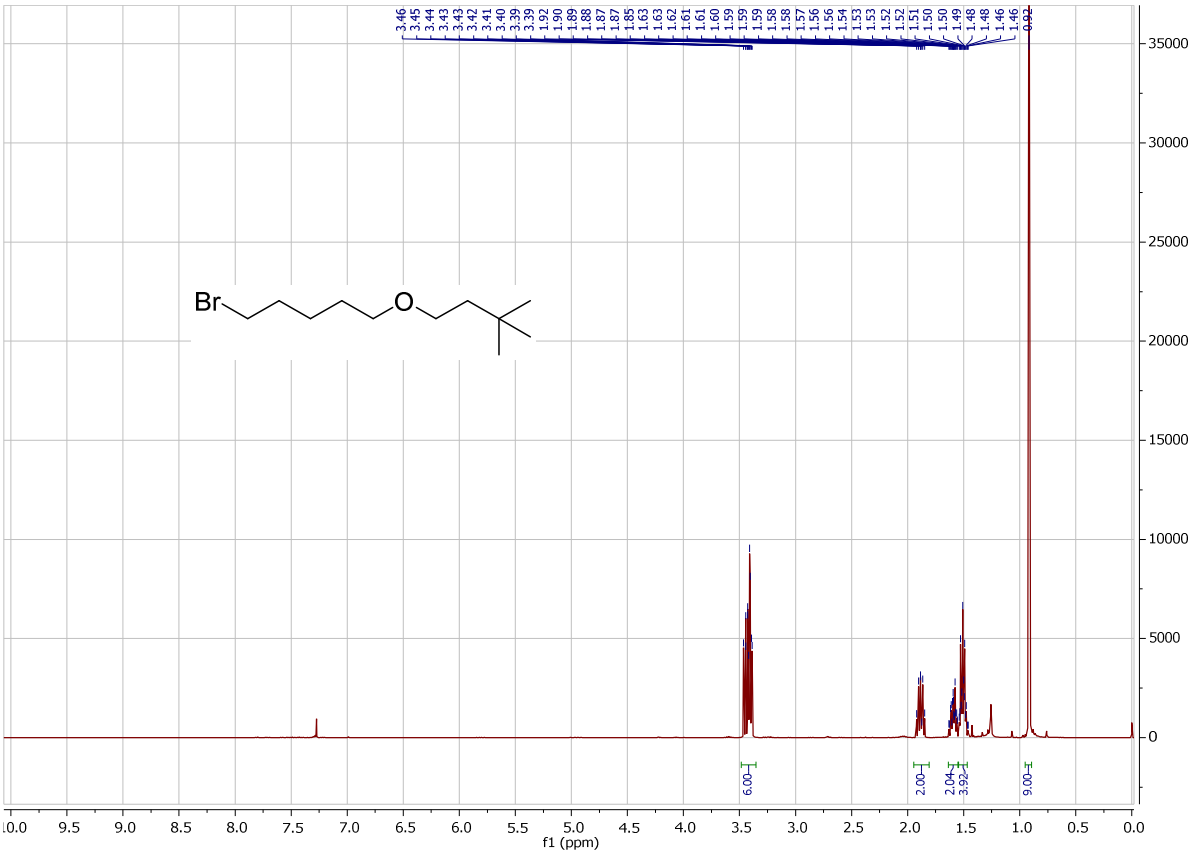


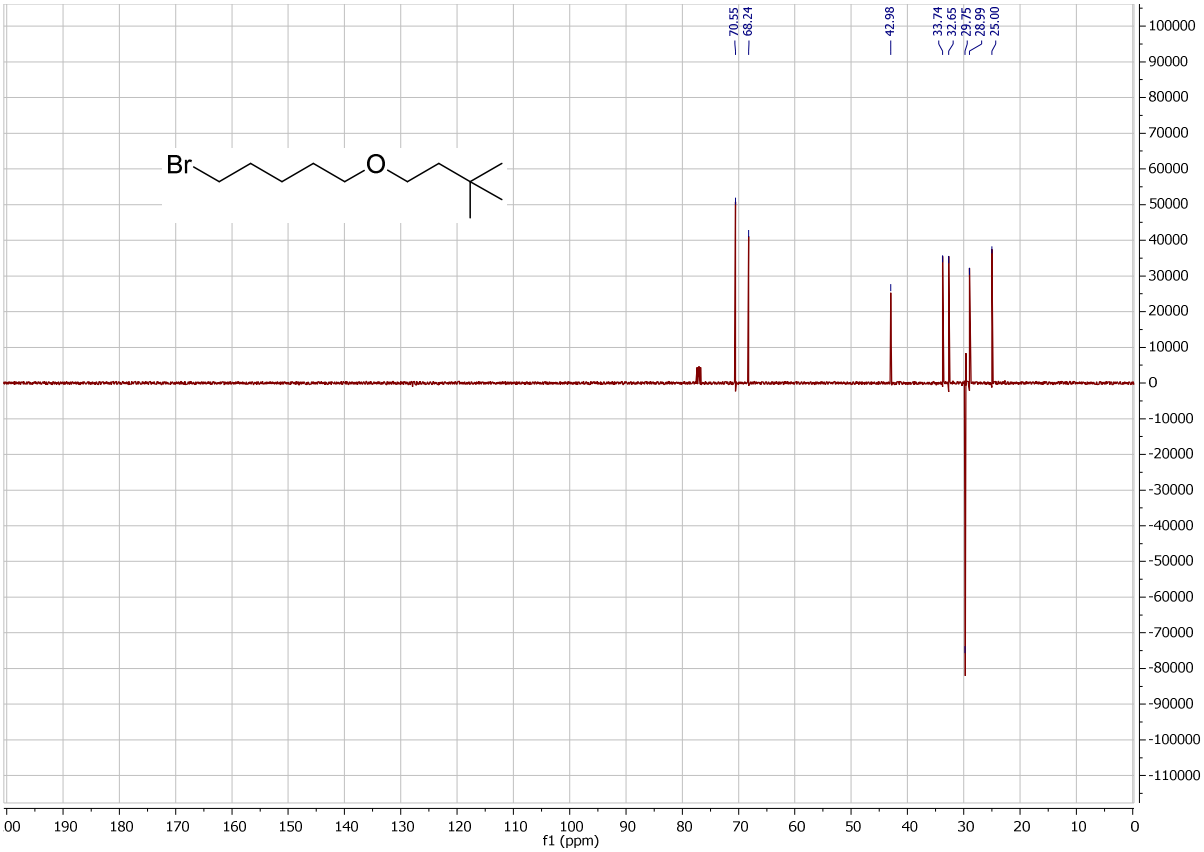
^{1}H-NMR and ^{13}C-NMR of compound B35 in $CDCl_3$.



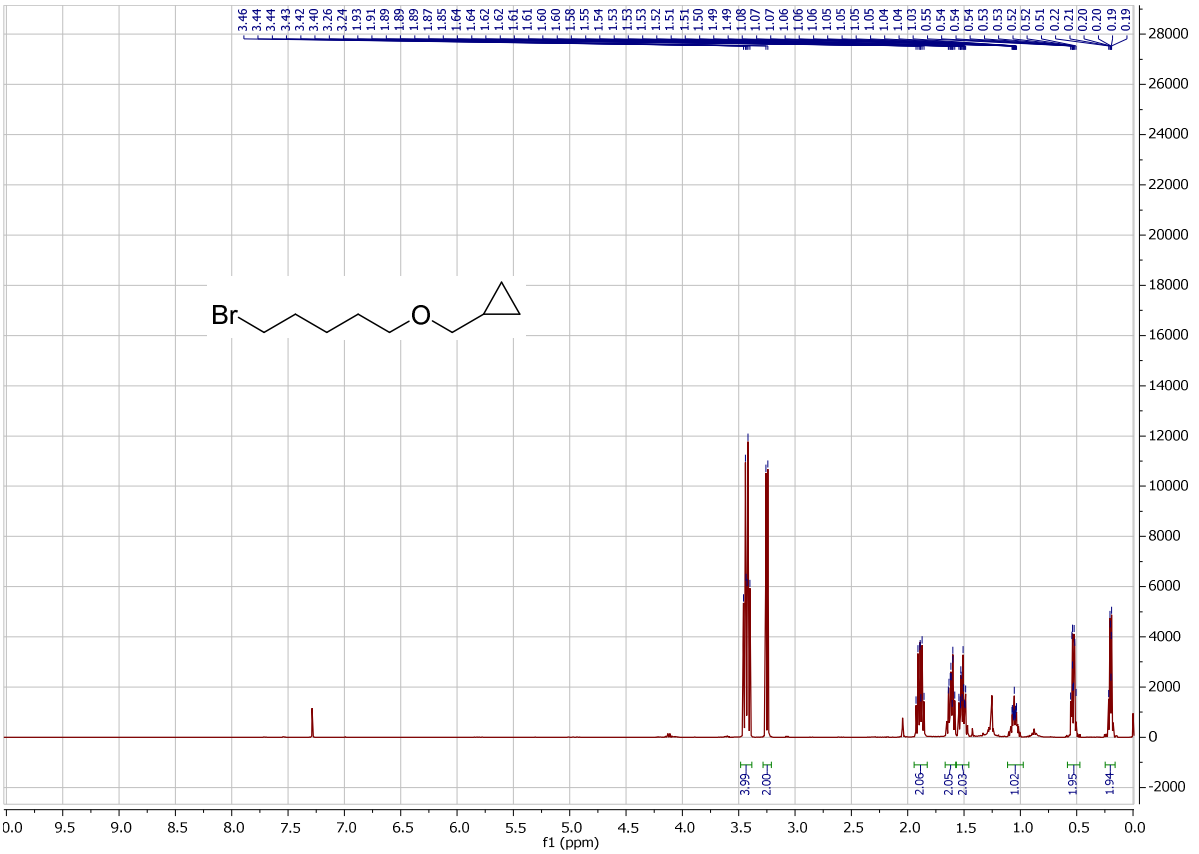


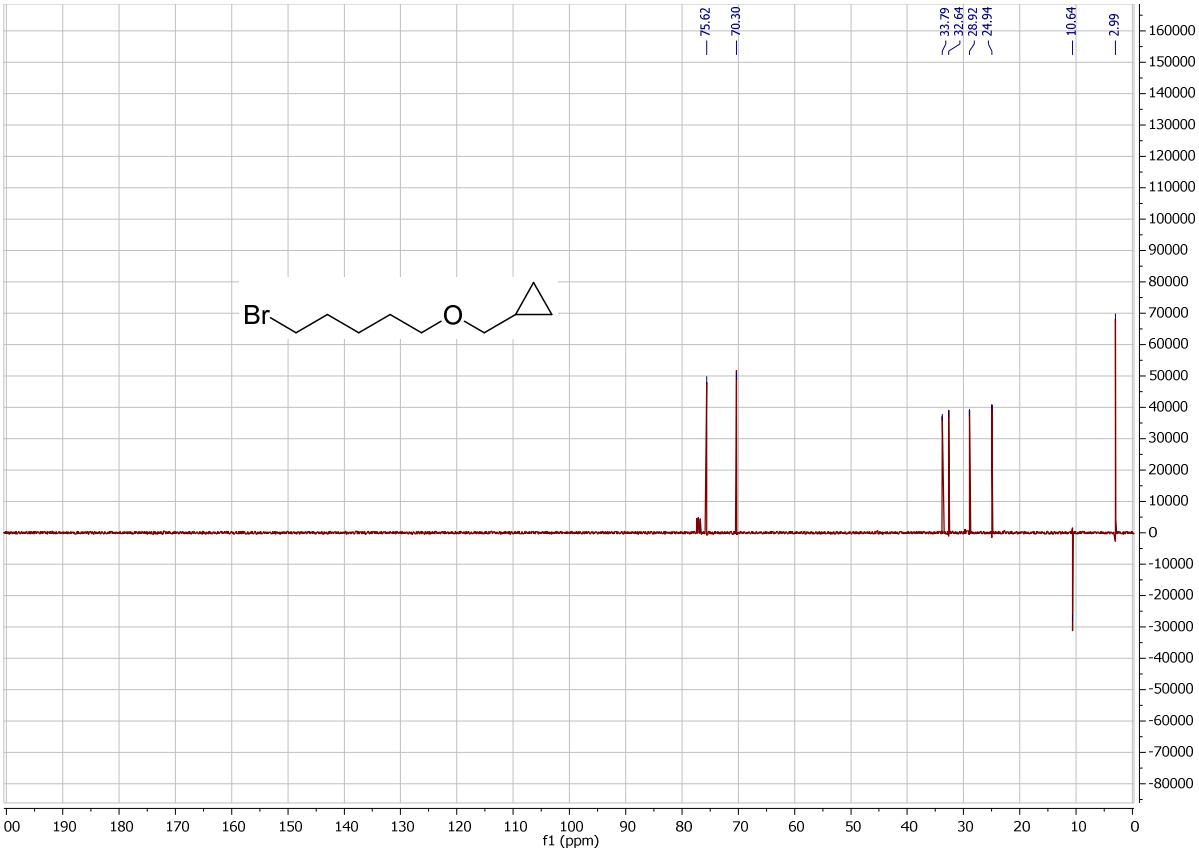
^{1}H-NMR and ^{13}C-NMR of compound B36 in $CDCl_3$.



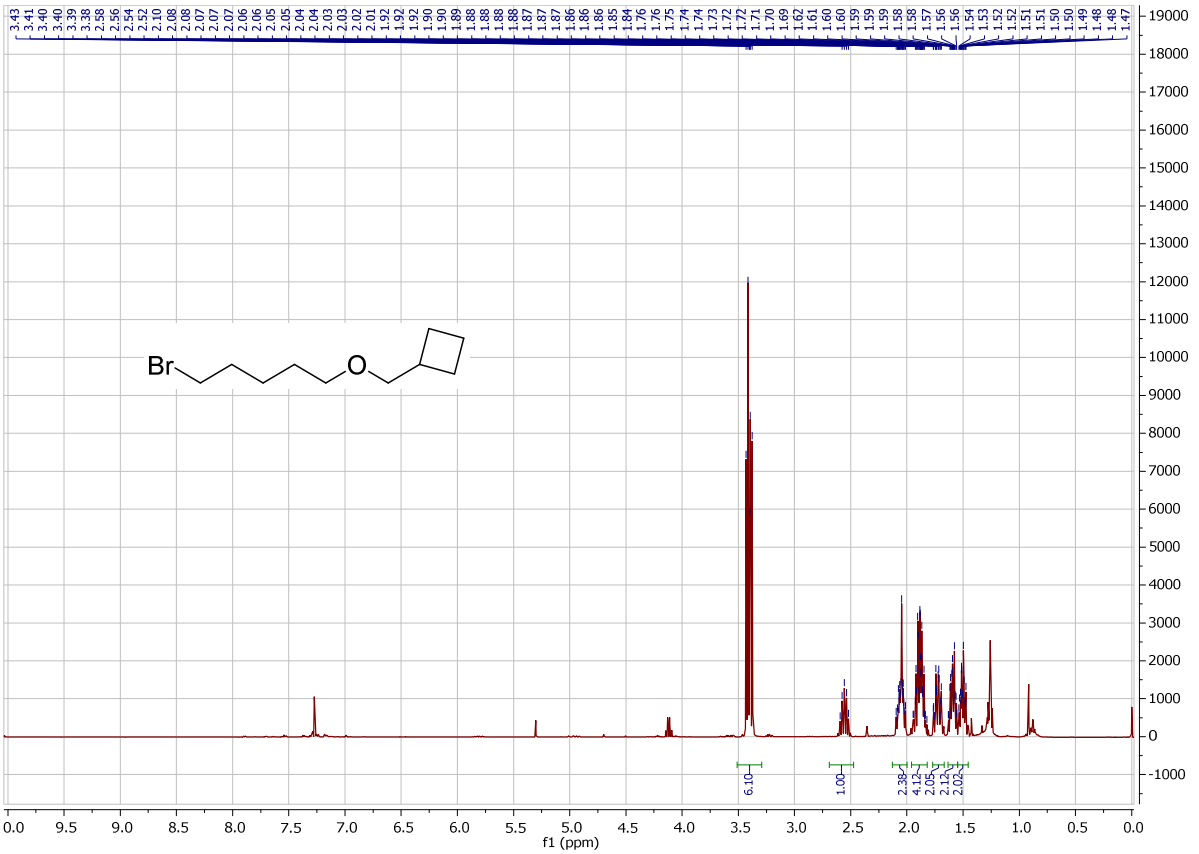


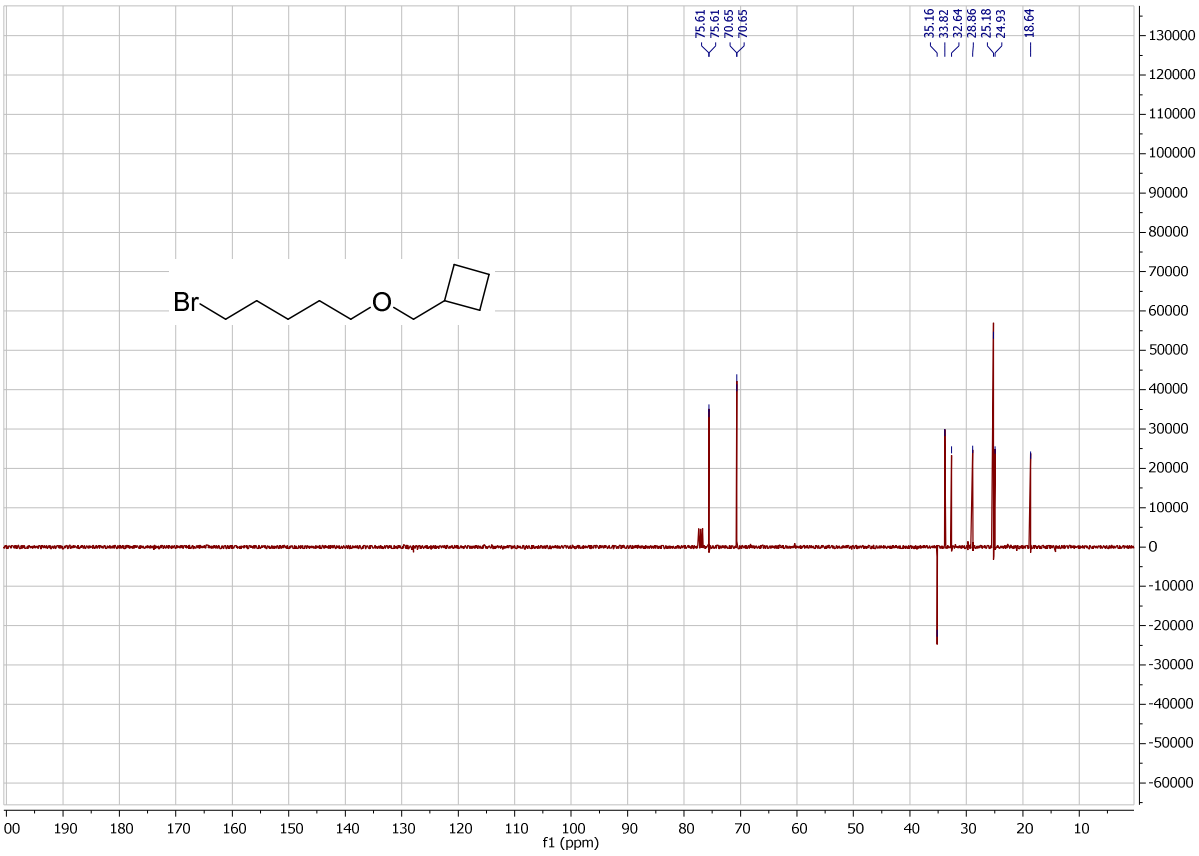
^{1}H-NMR and ^{13}C-NMR of compound B37 in $CDCl_3$.



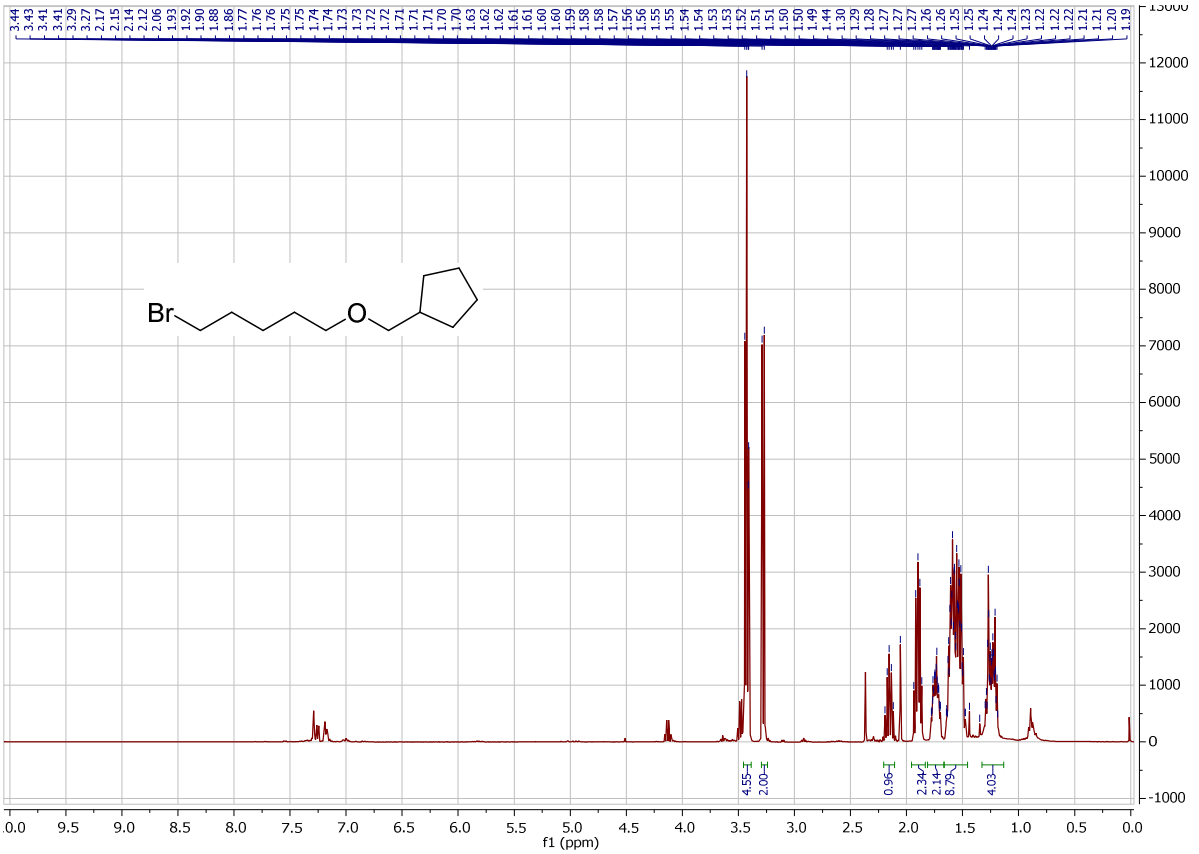


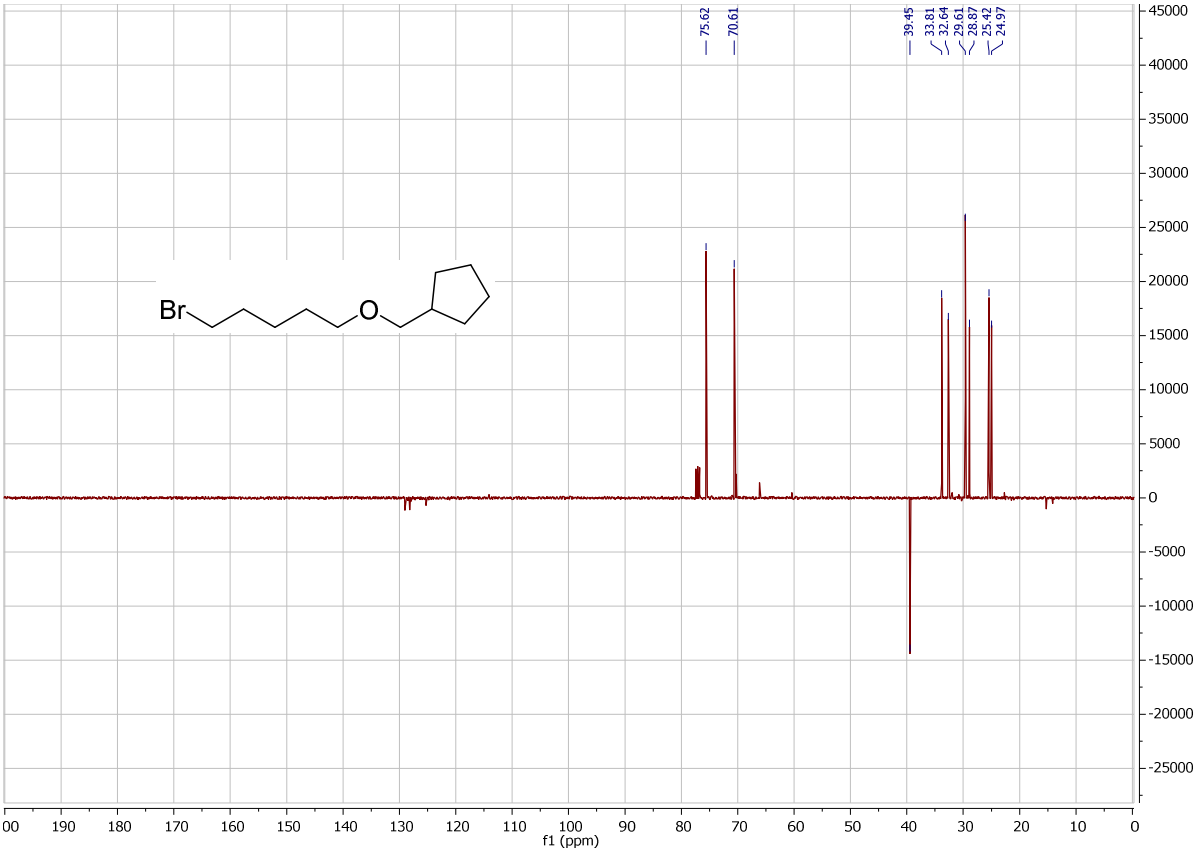
^{1}H-NMR and ^{13}C-NMR of compound B38 in $CDCl_3$.



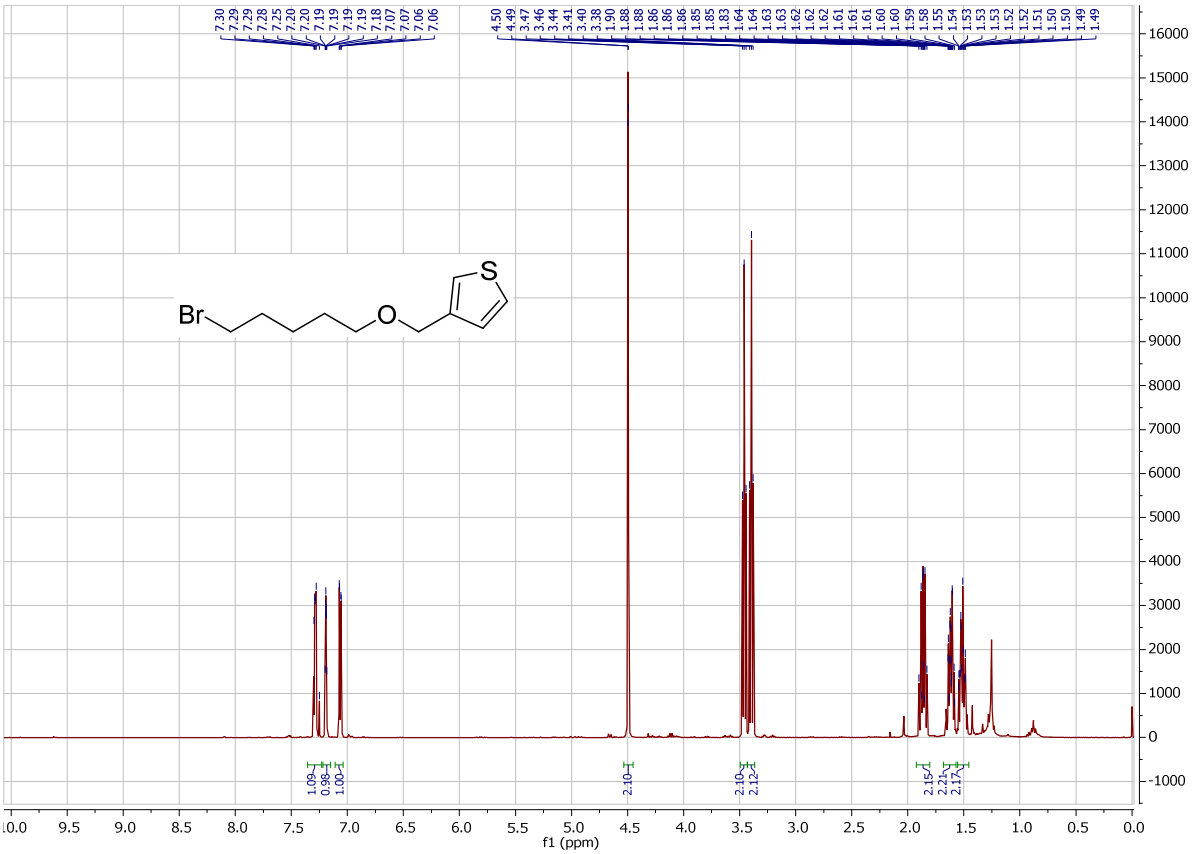


^{1}H-NMR and ^{13}C-NMR of compound B39 in $CDCl_3$.

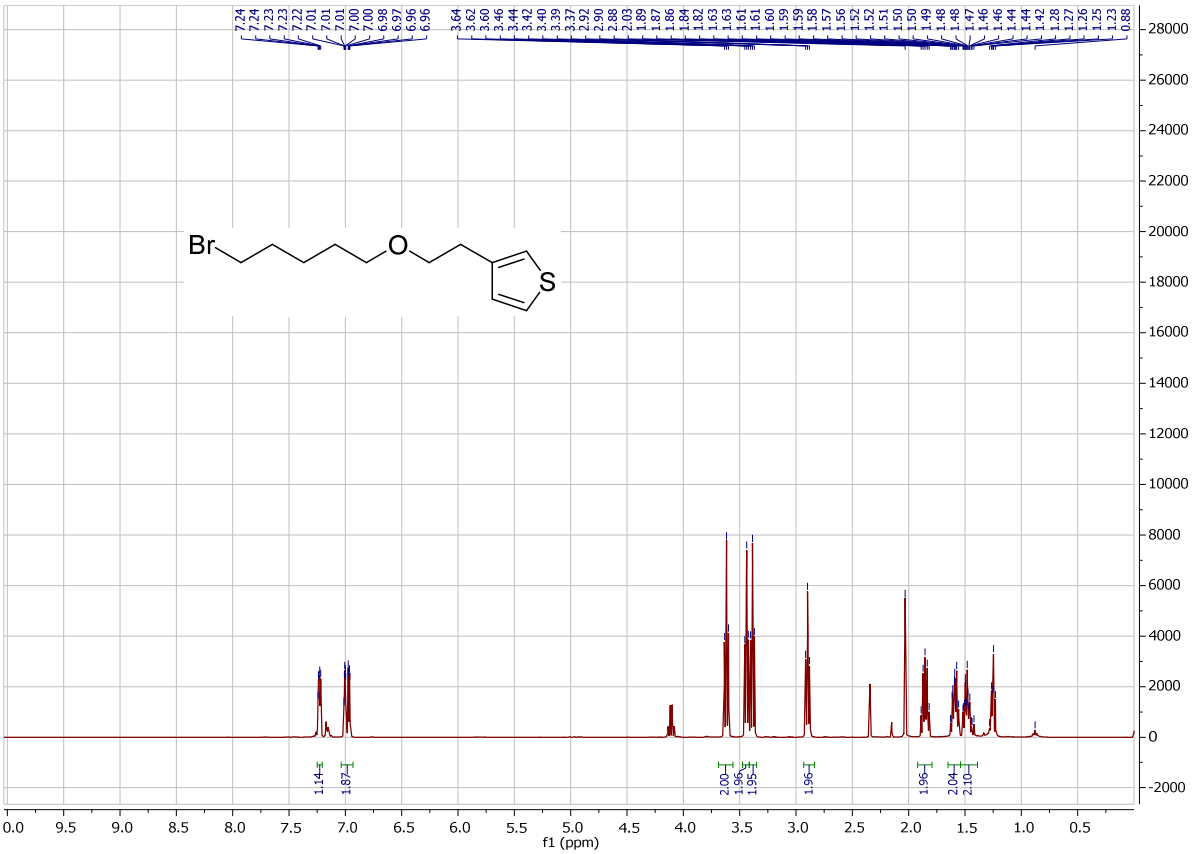


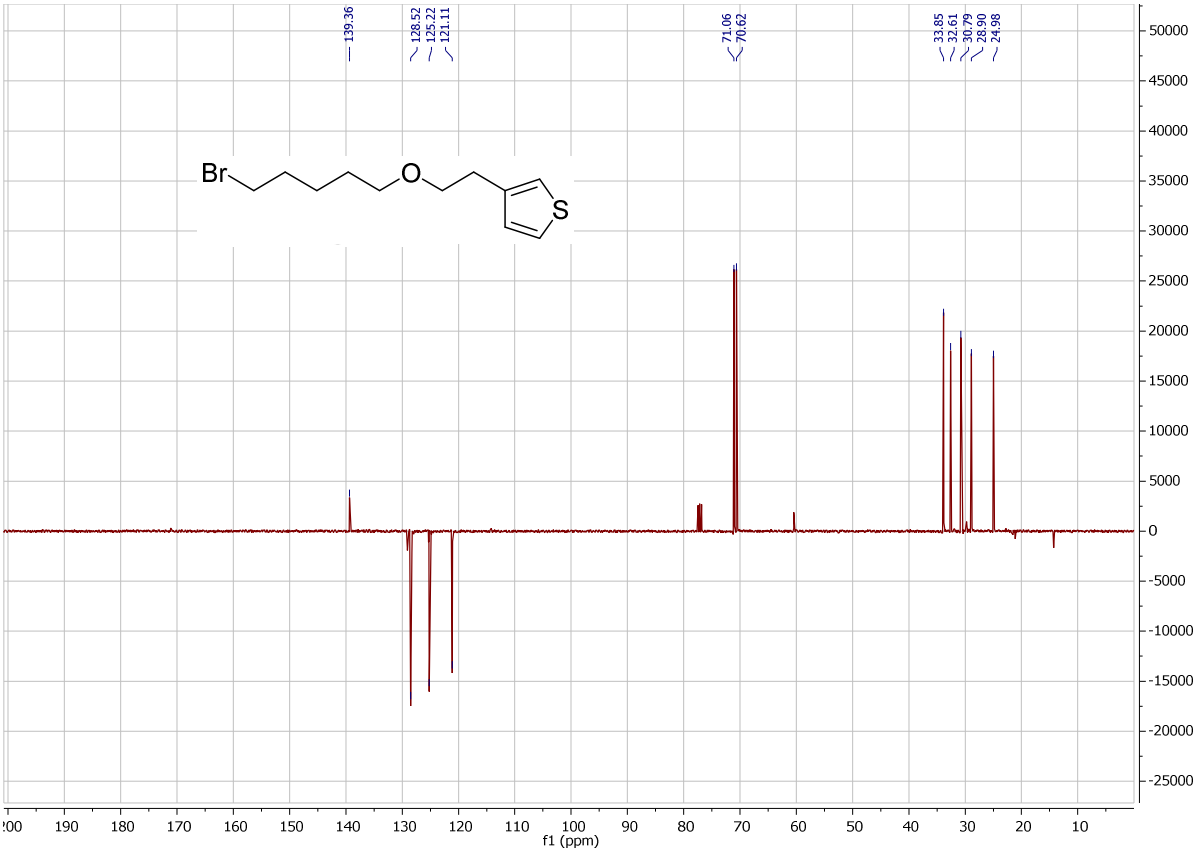


^{1}H-NMR and ^{13}C-NMR of compound B40 in $CDCl_3$.

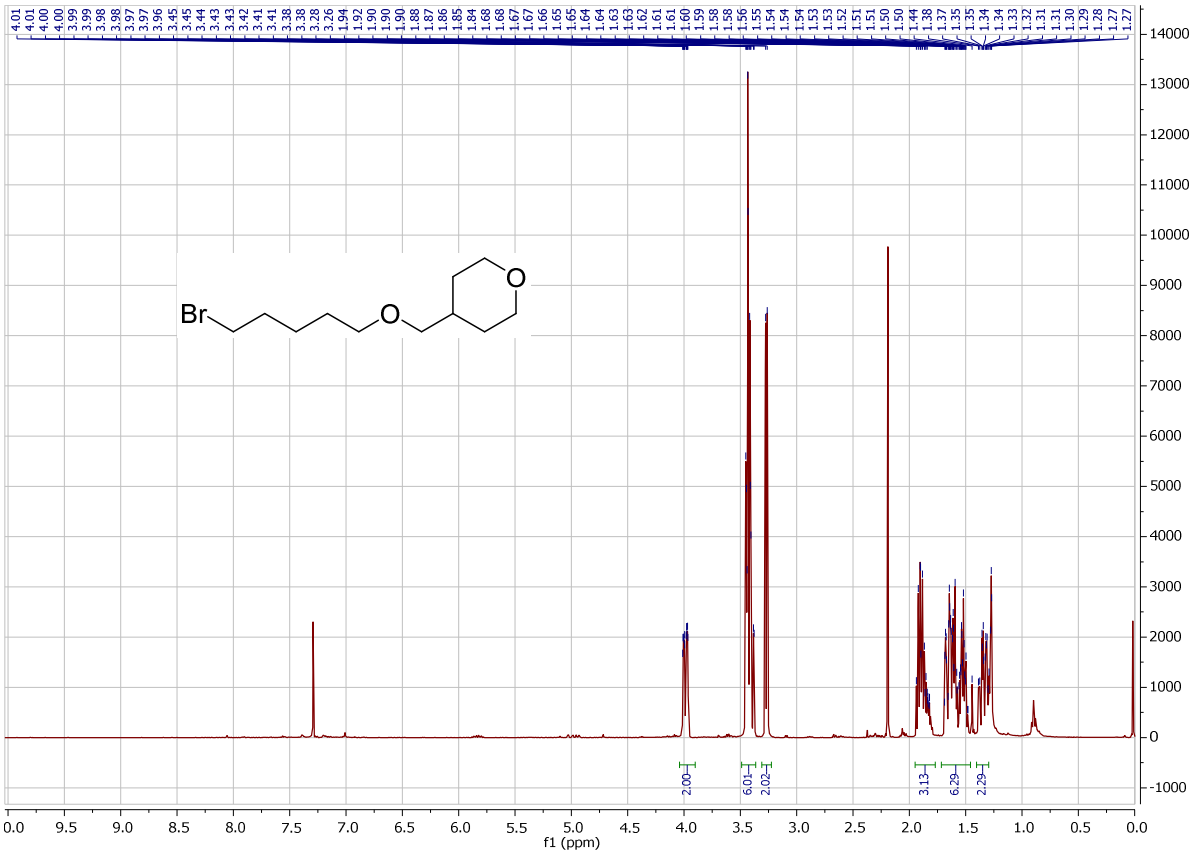


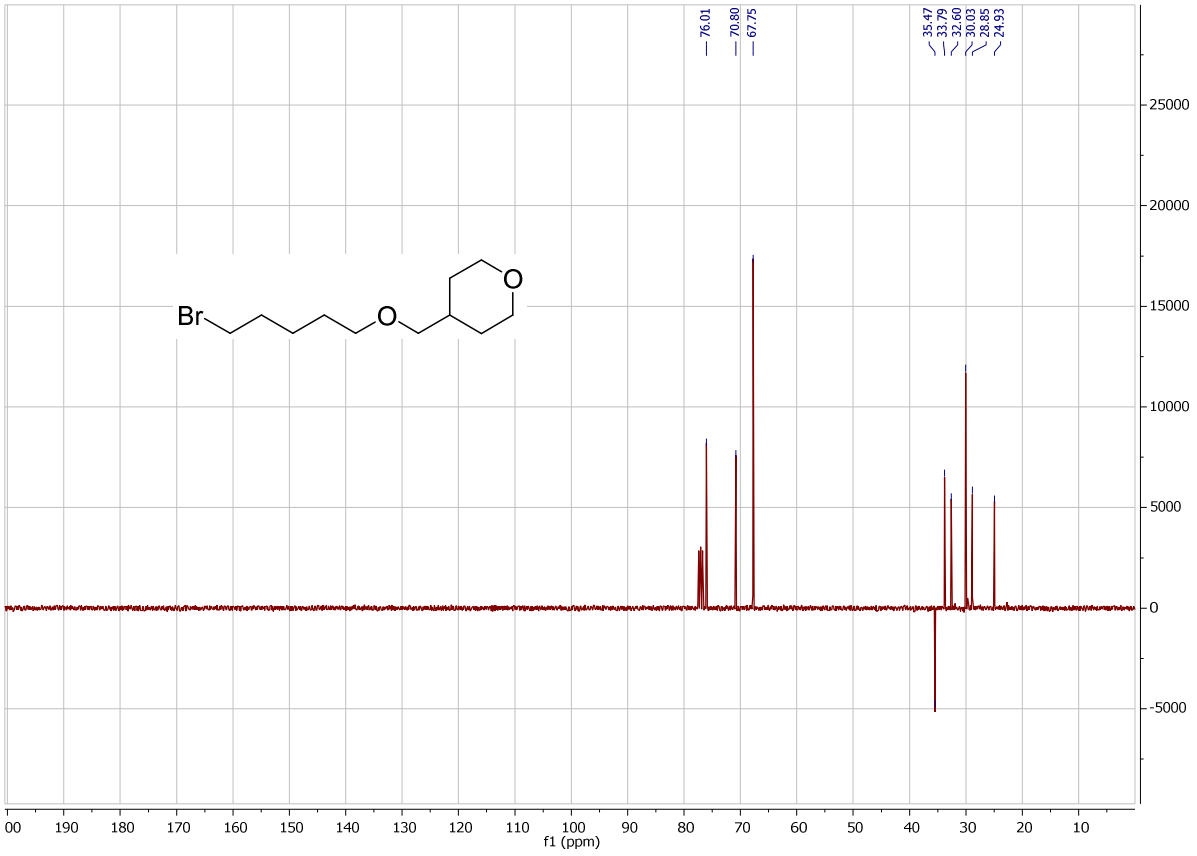
^{1}H-NMR and ^{13}C-NMR of compound B41 in $CDCl_3$.



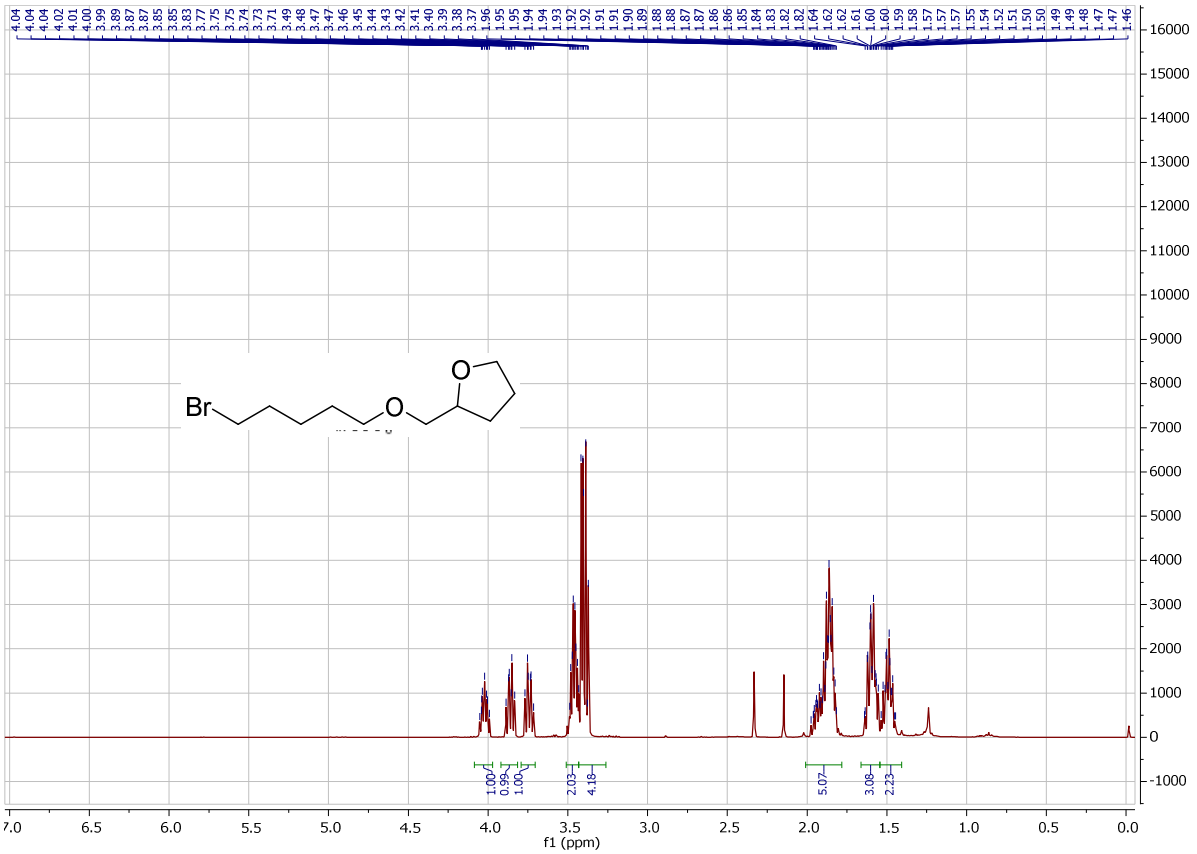


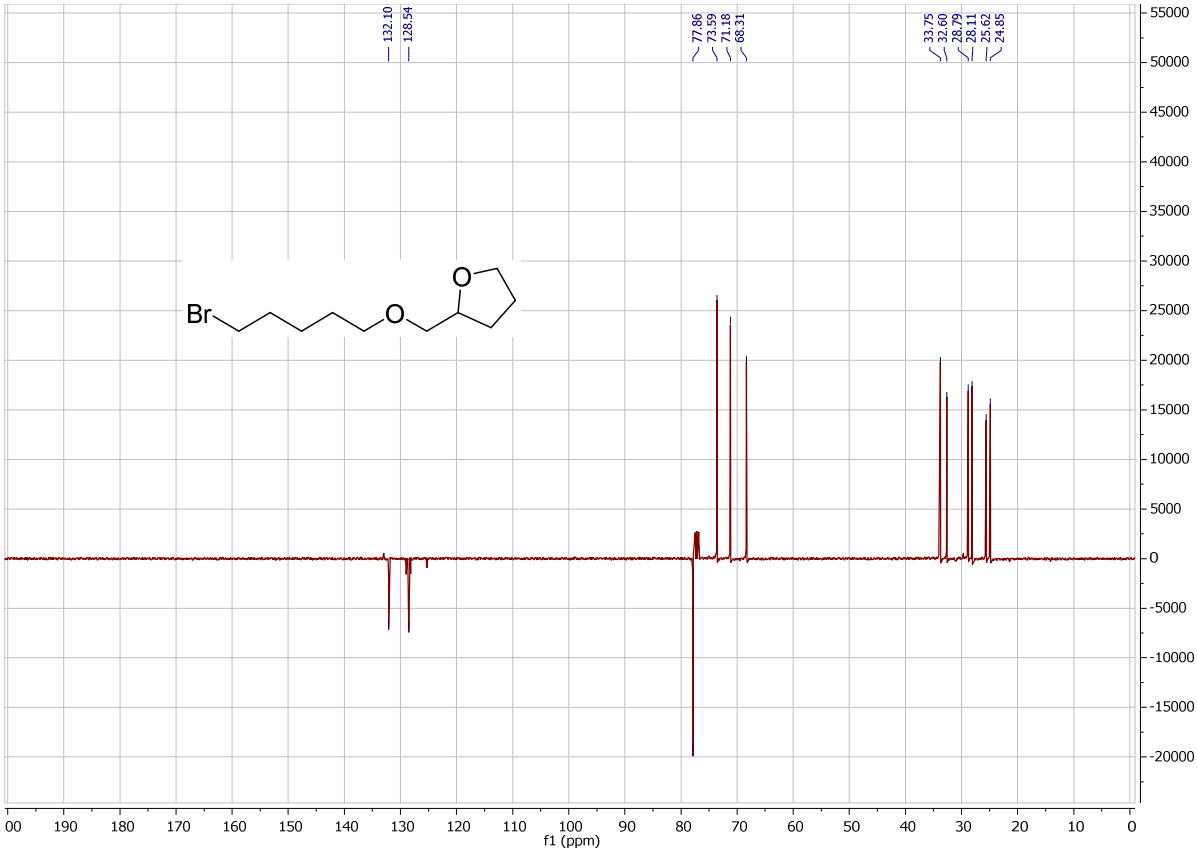
^{1}H-NMR and ^{13}C-NMR of compound B42 in $CDCl_3$.



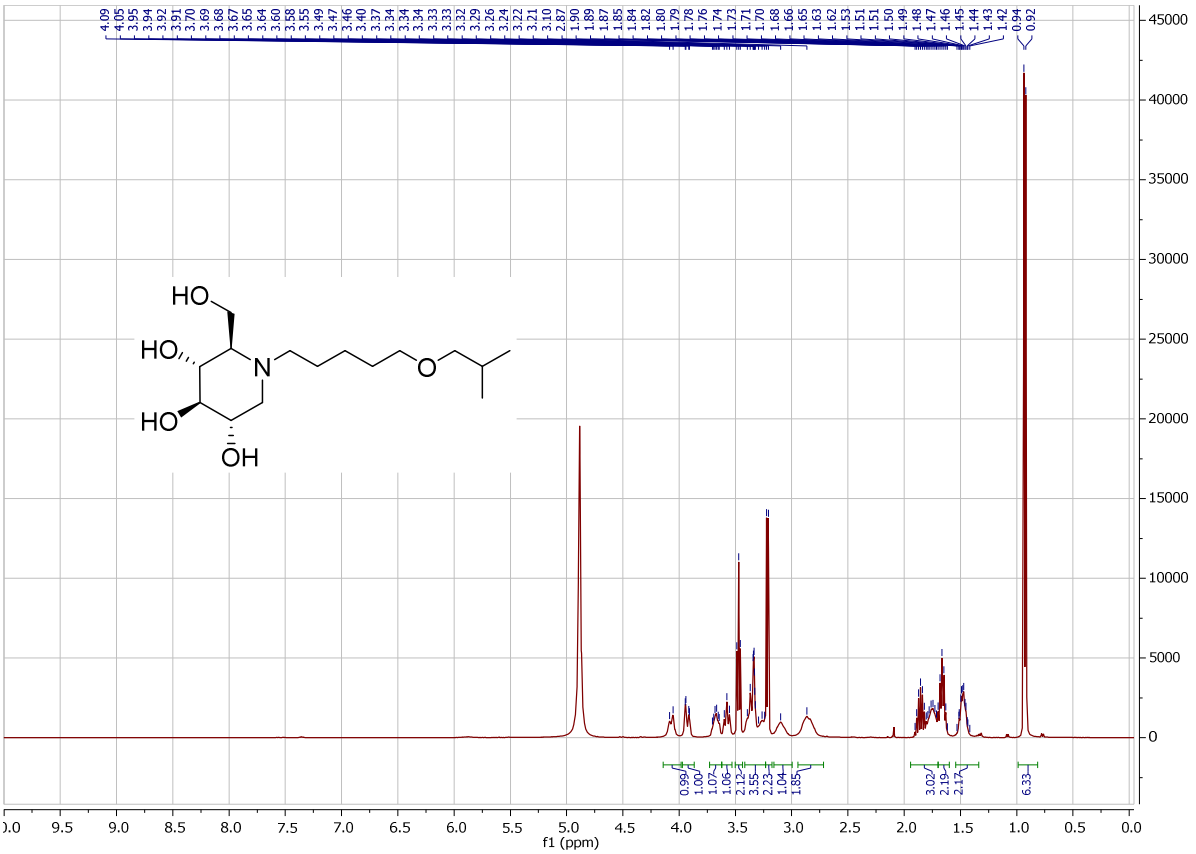


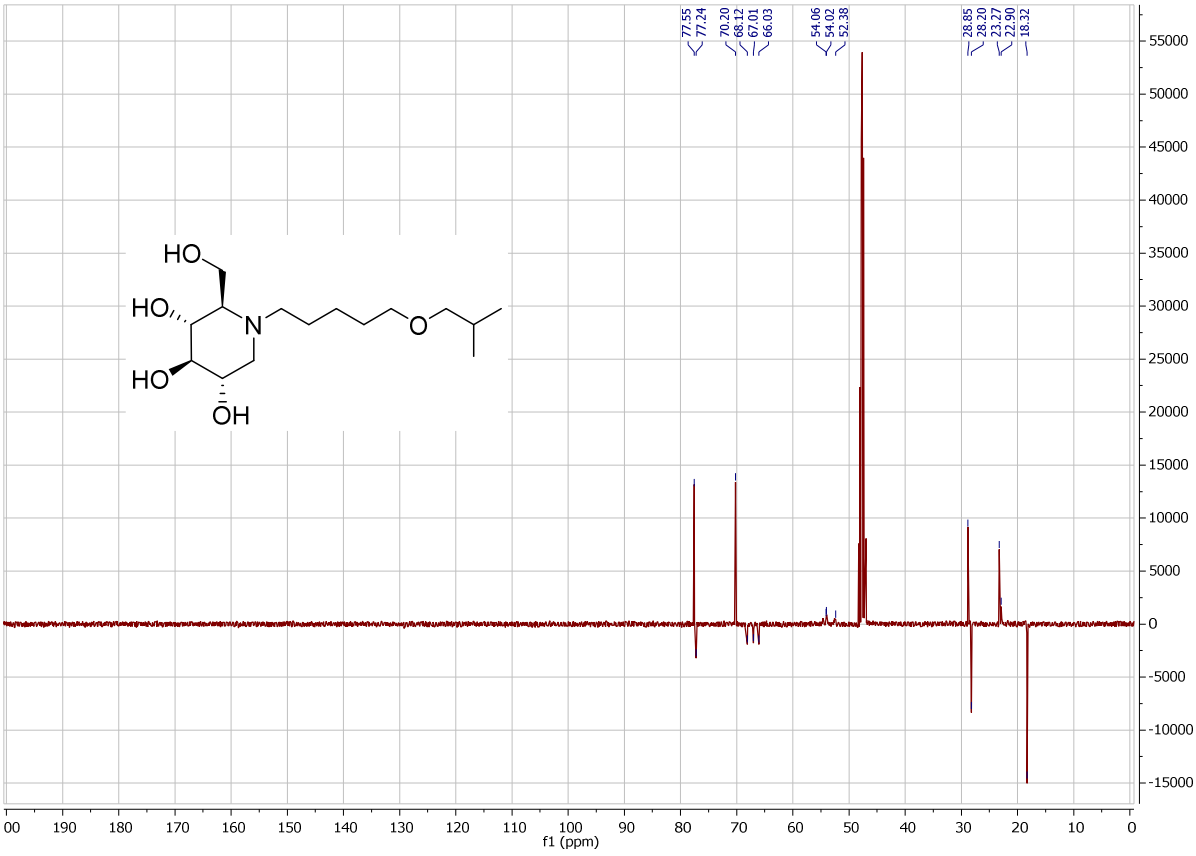
^{1}H-NMR and ^{13}C-NMR of compound B43 in $CDCl_3$.



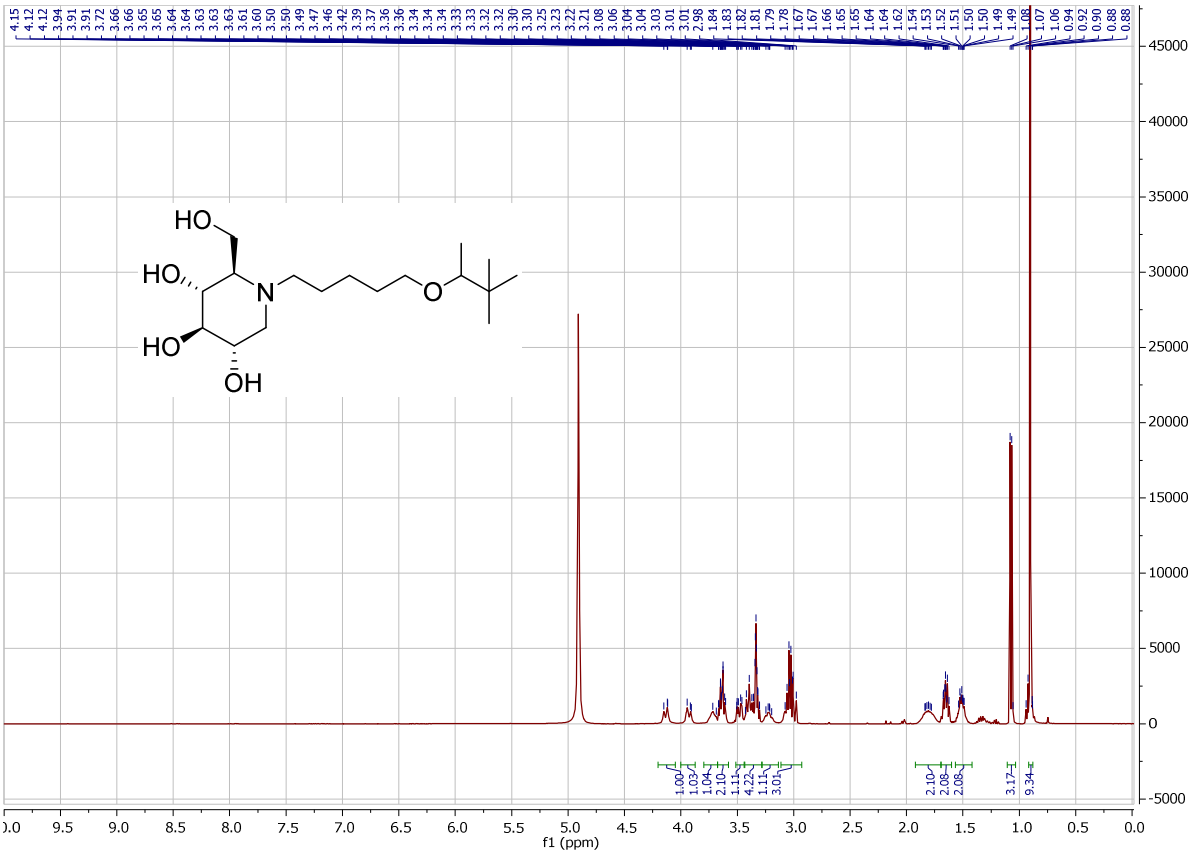


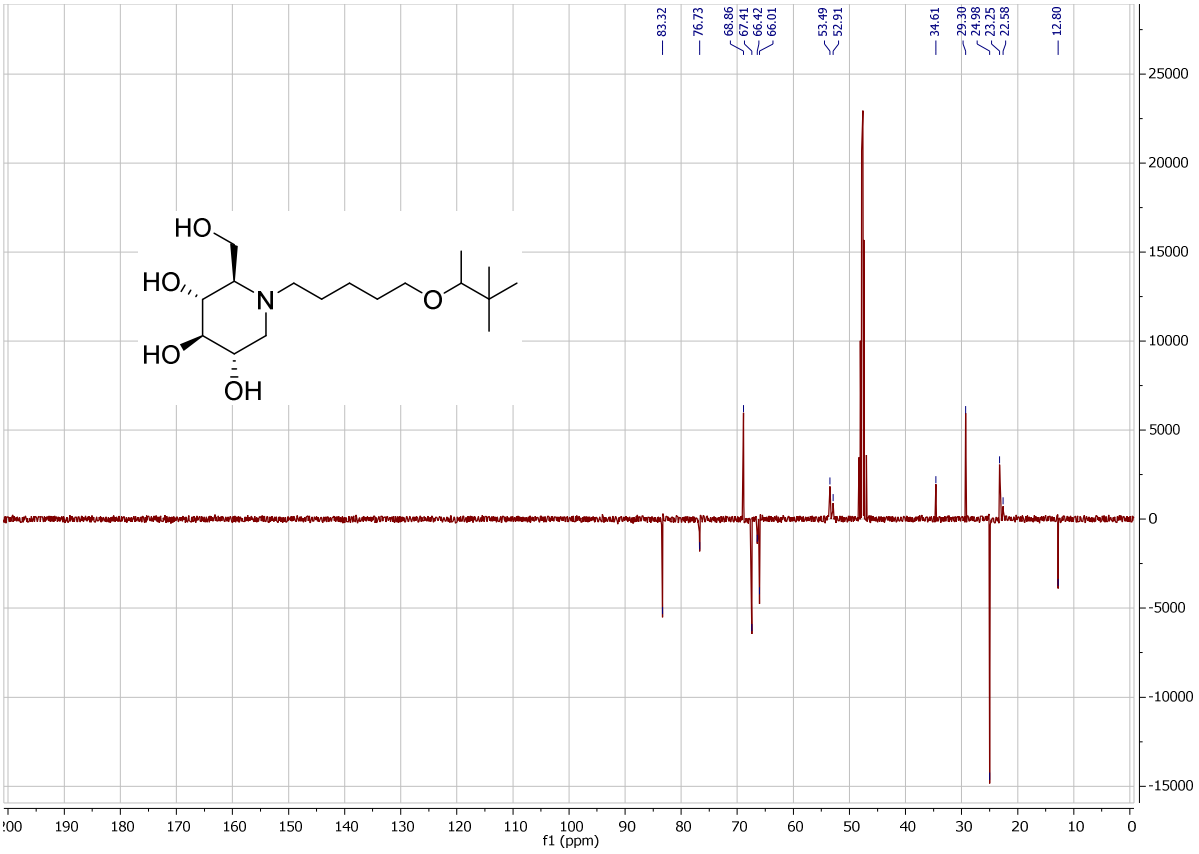
^{1}H-NMR and ^{13}C-NMR of compound B44/11 in MeOD.



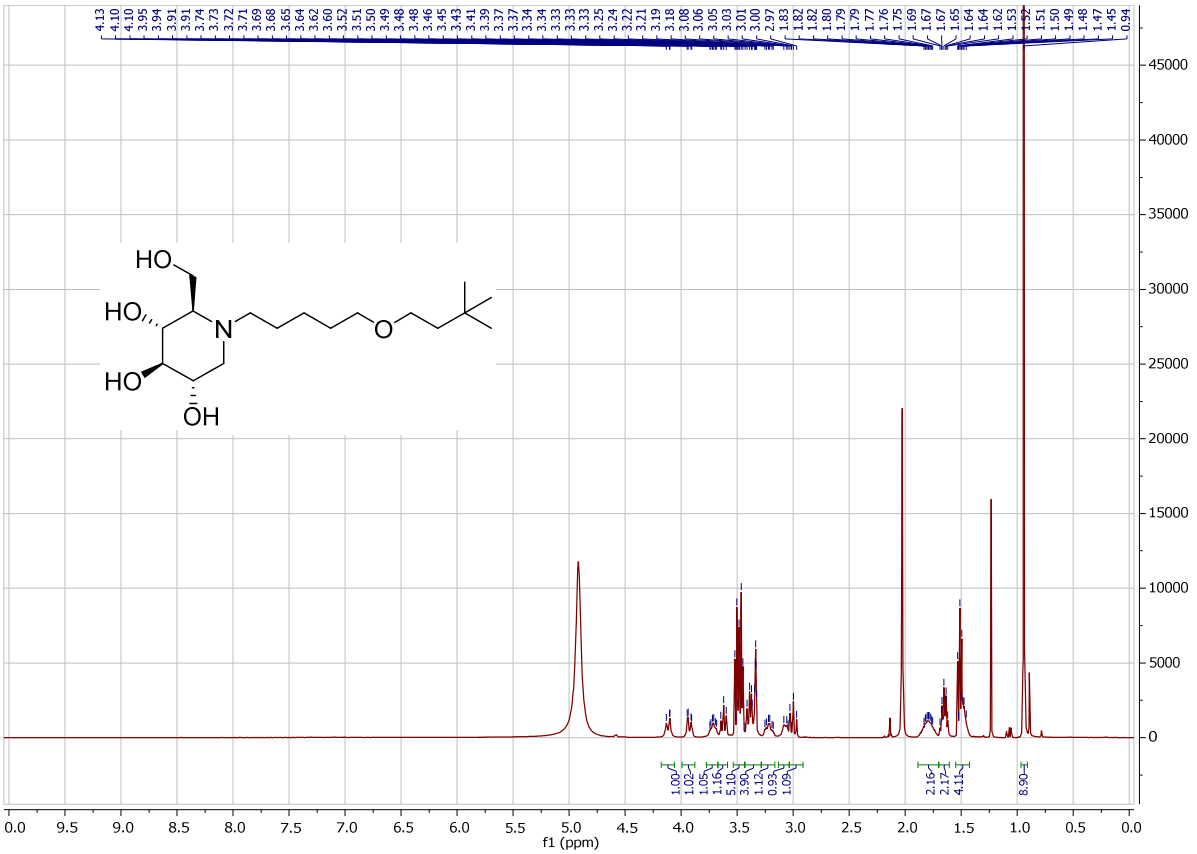


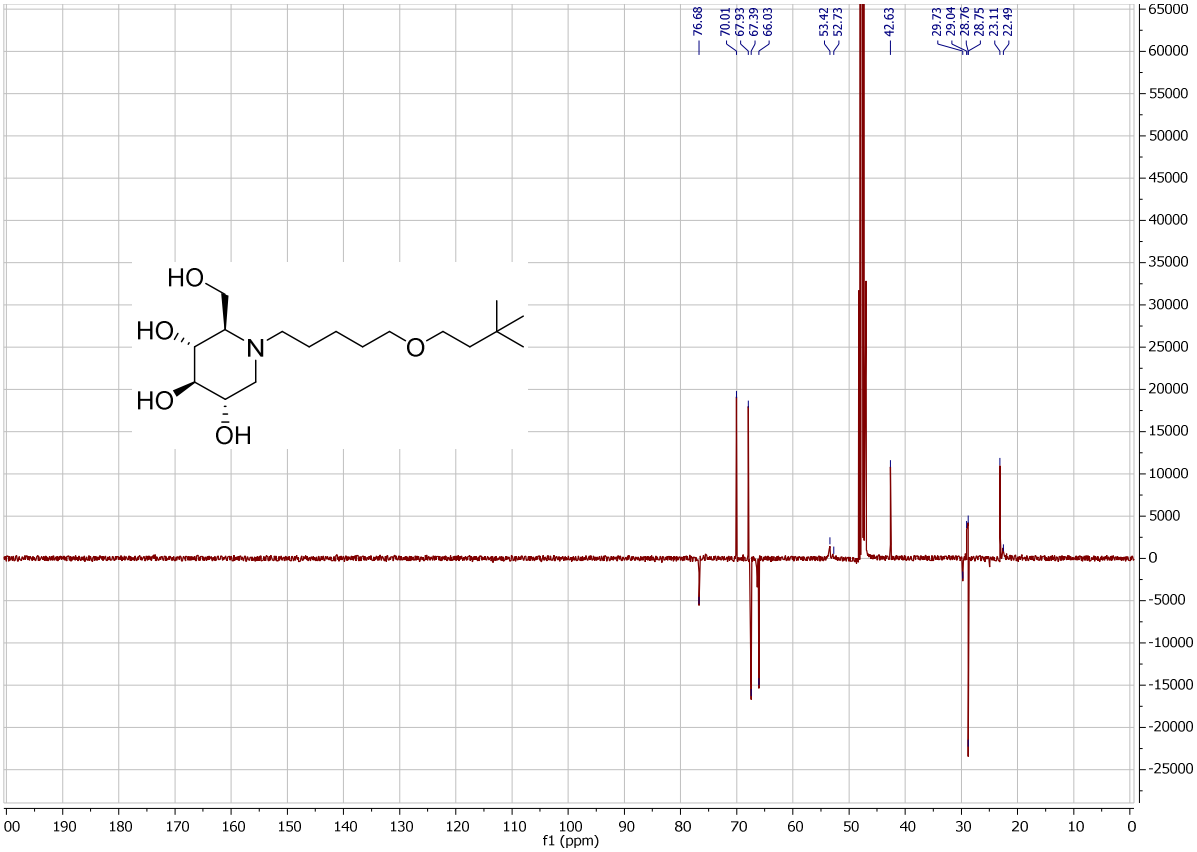
^{1}H-NMR and ^{13}C-NMR of compound B45/13 in MeOD.



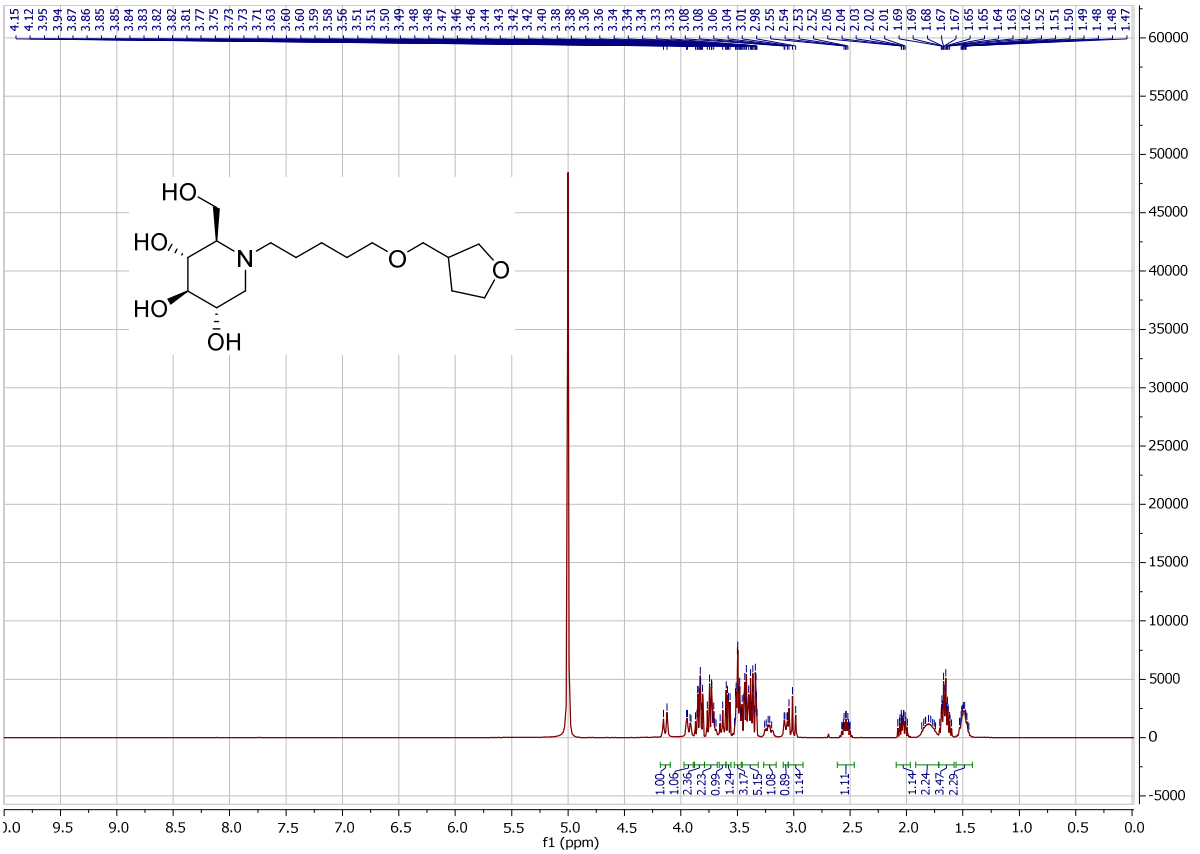


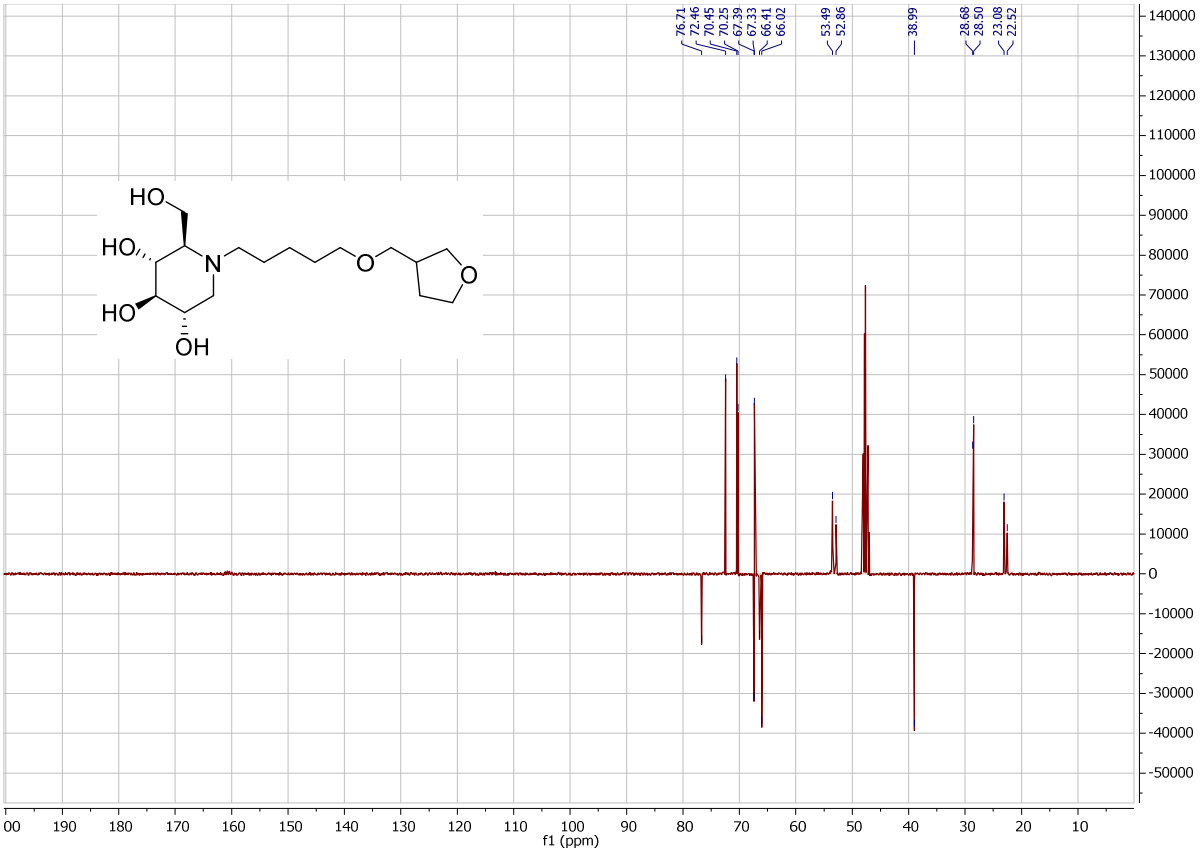
^{1}H-NMR and ^{13}C-NMR of compound B46 in MeOD.



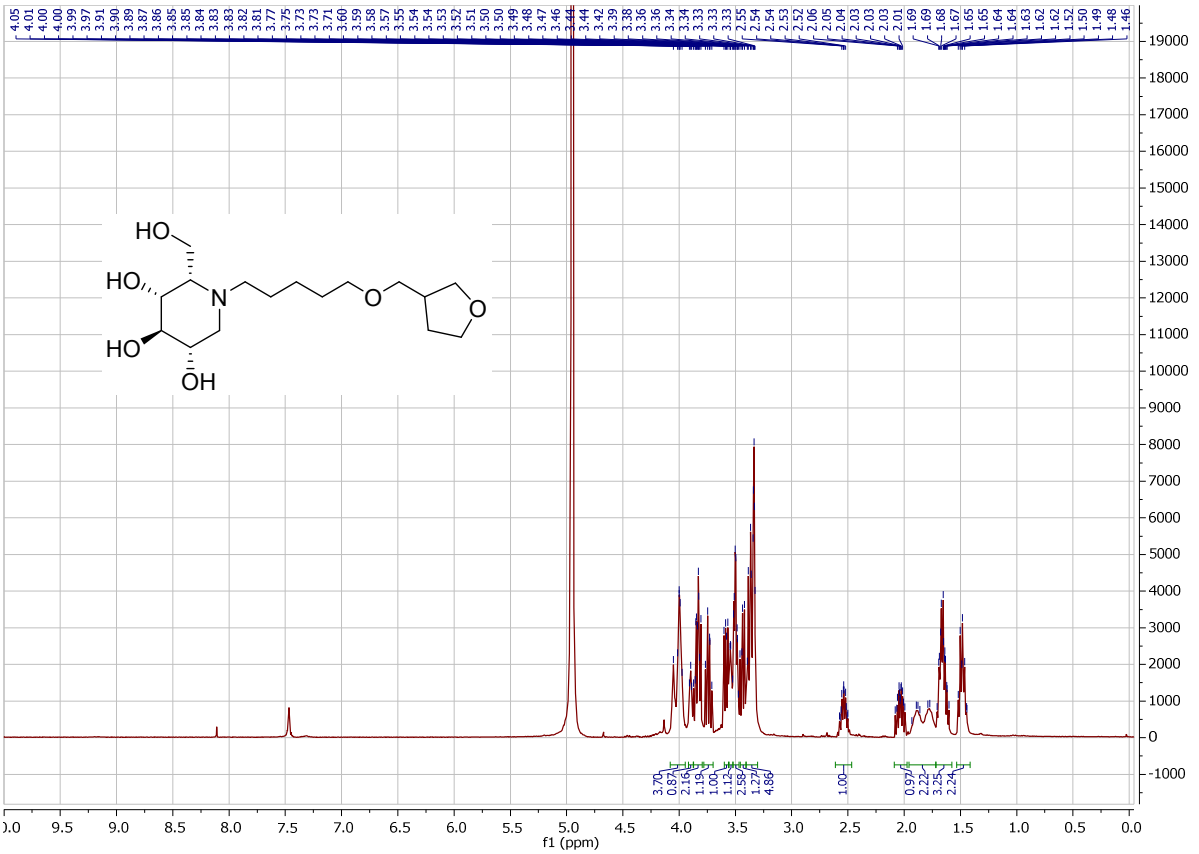


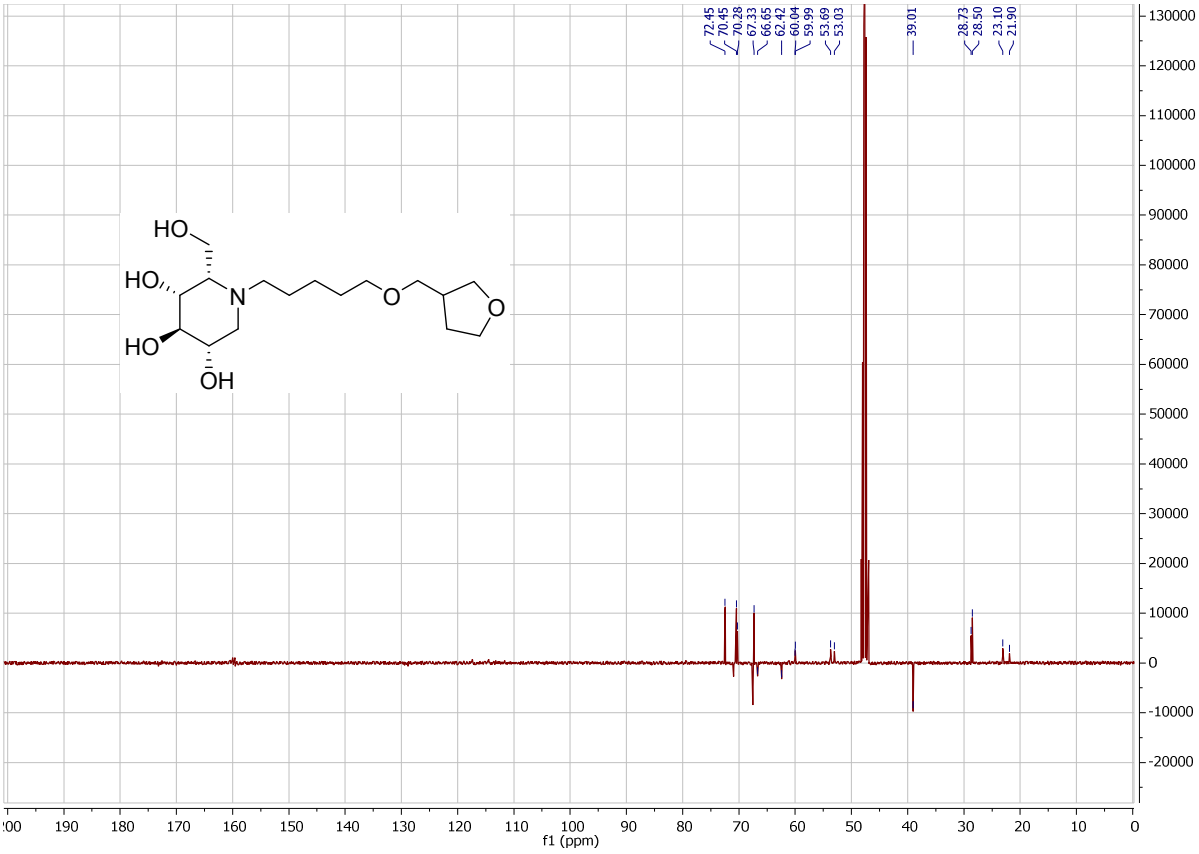
^{1}H-NMR and ^{13}C-NMR of compound B47/14 in MeOD.



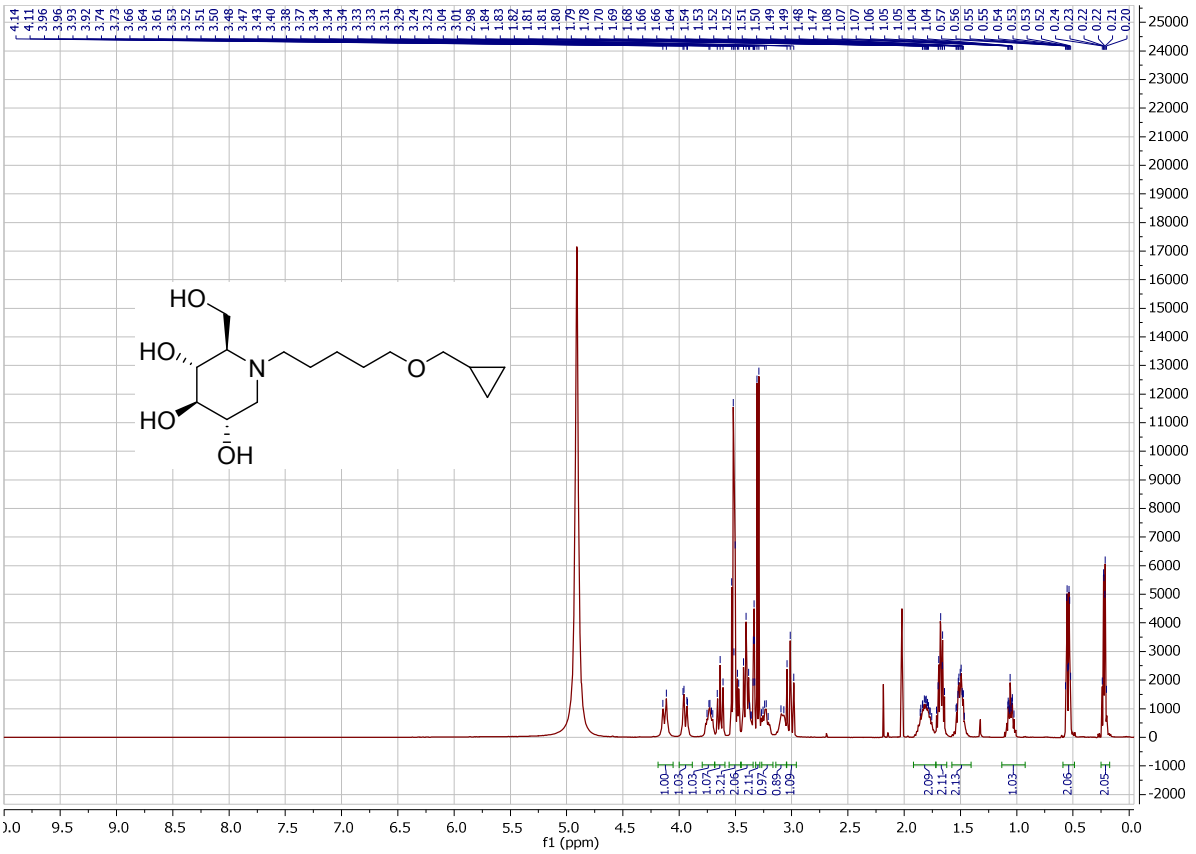


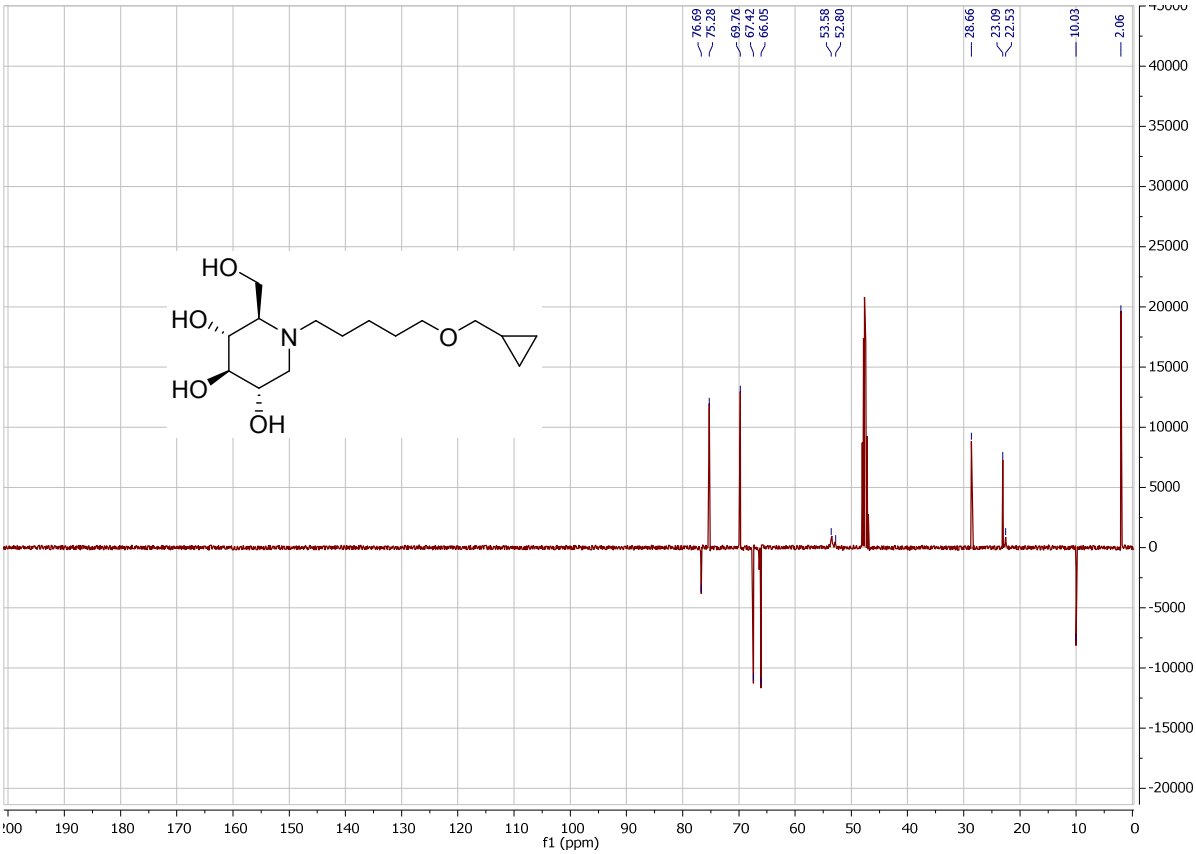
^{1}H-NMR and ^{13}C-NMR of compound B48 in MeOD.



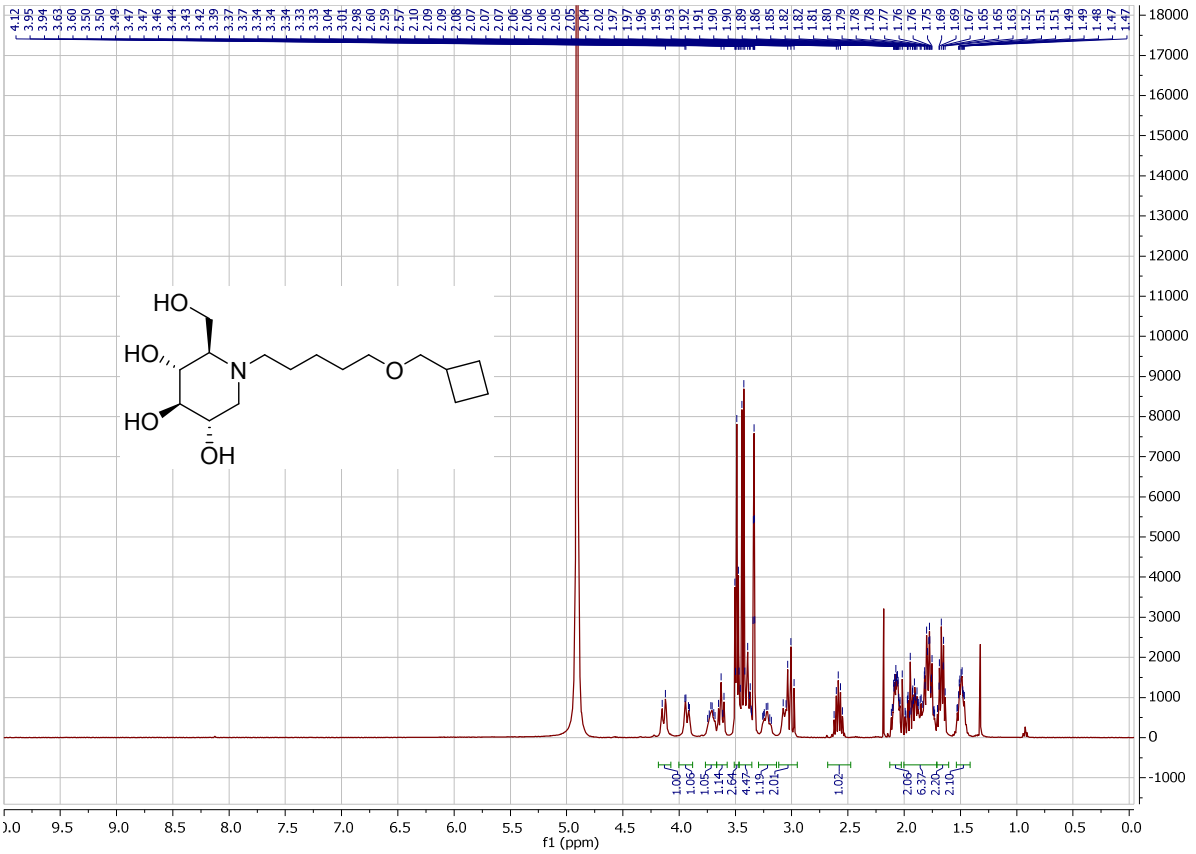


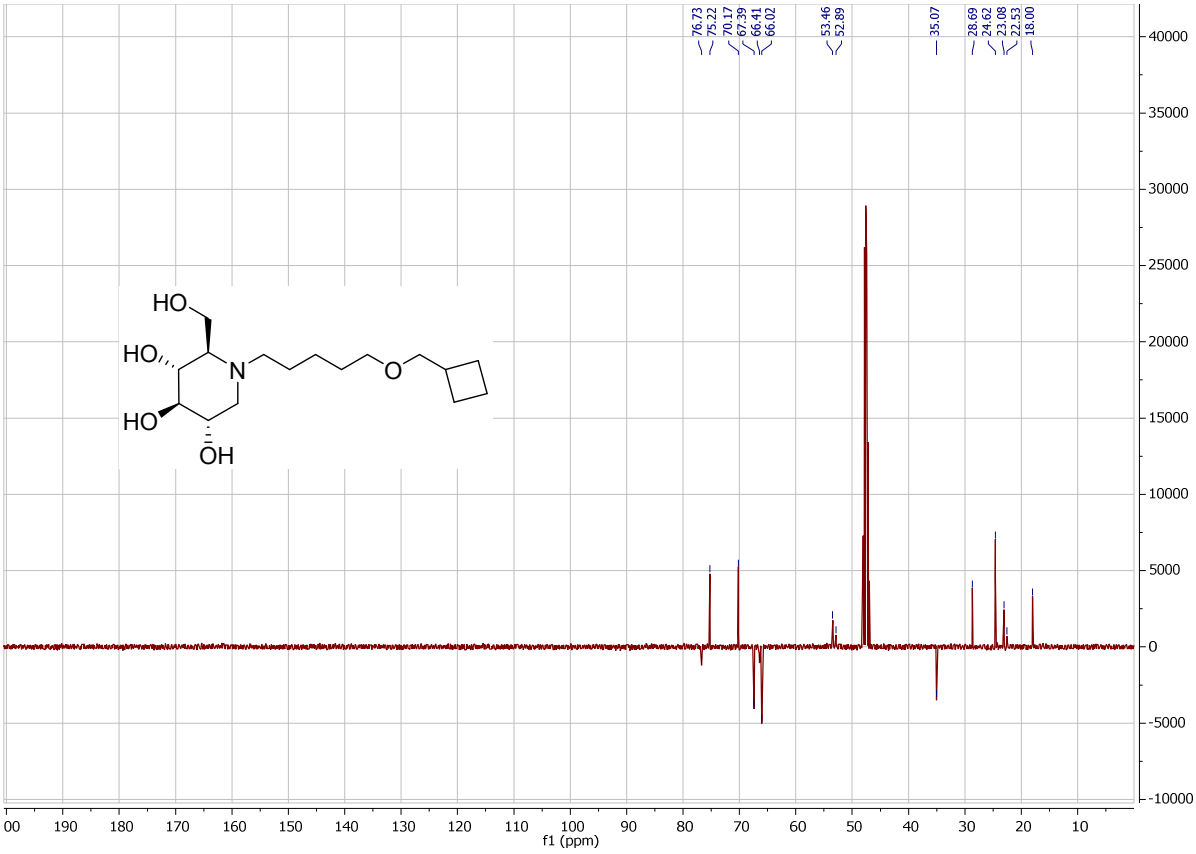
^{1}H-NMR and ^{13}C-NMR of compound B49 in MeOD.



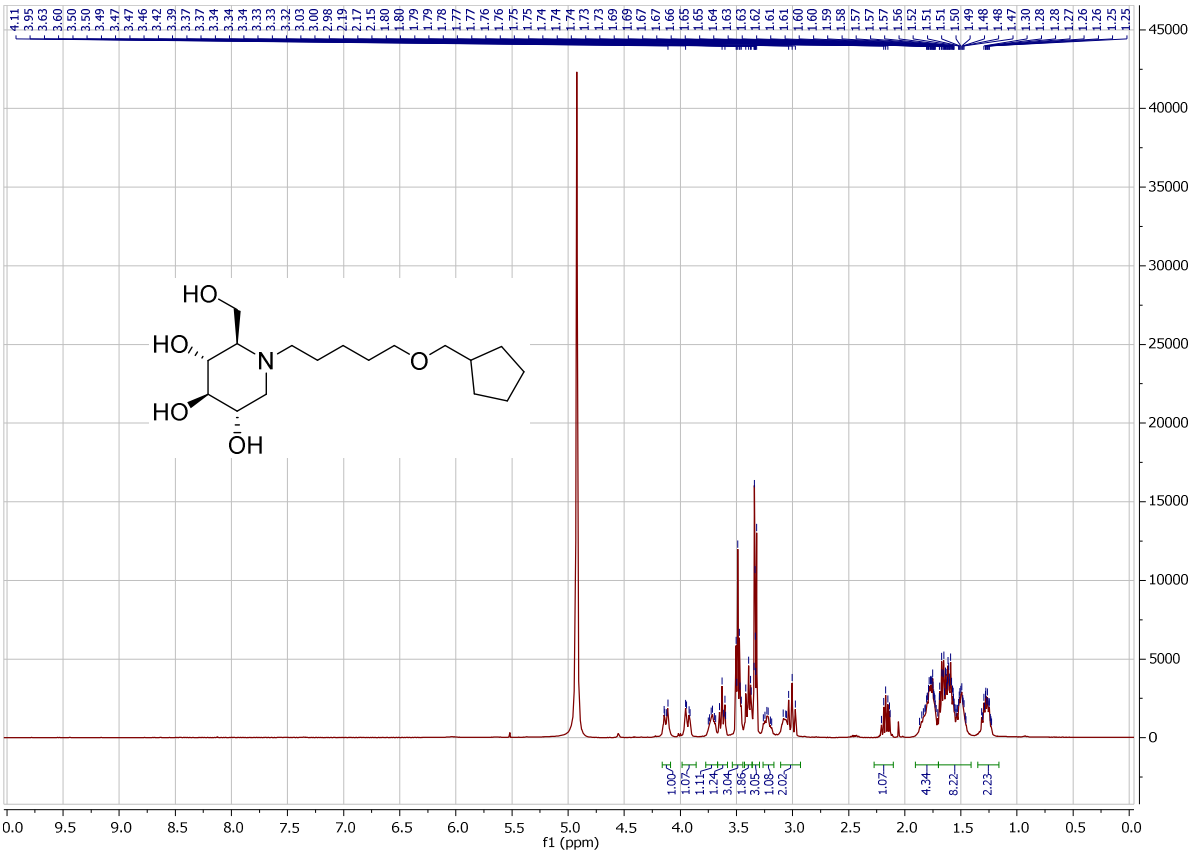


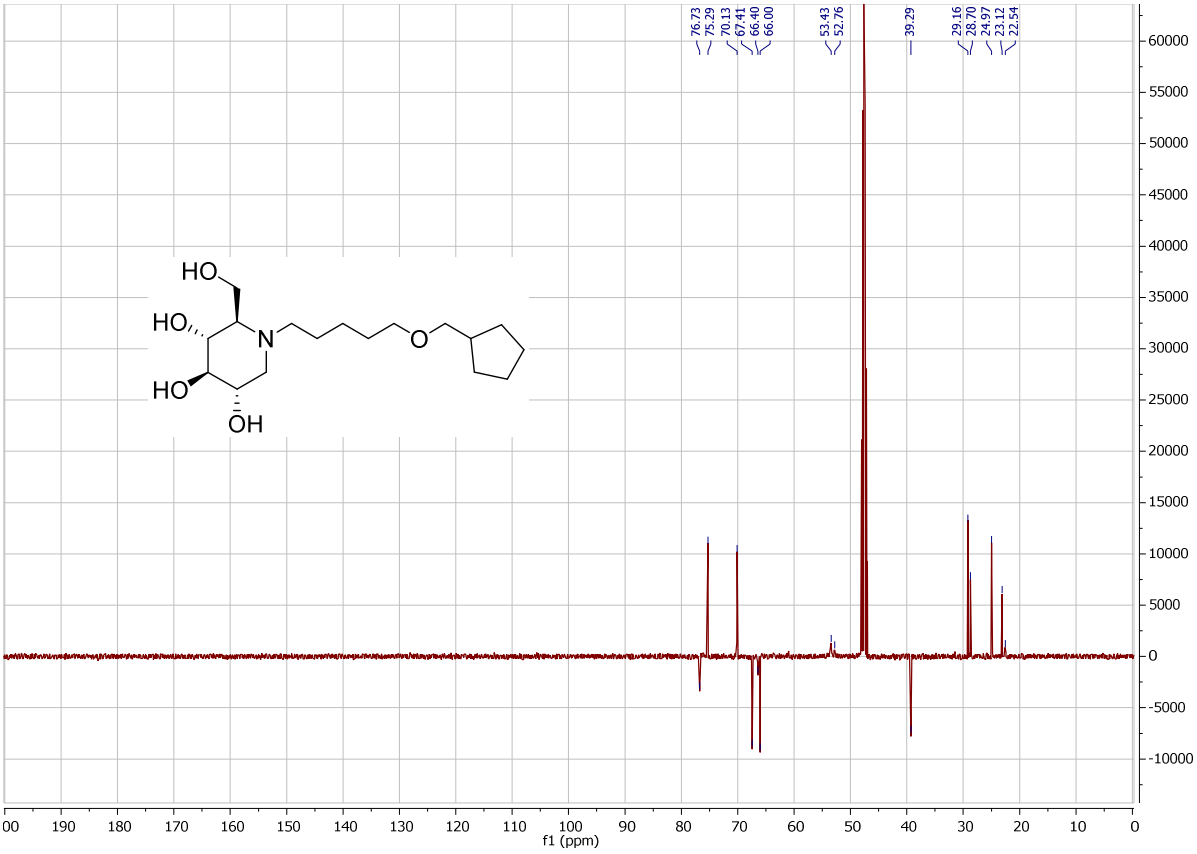
^{1}H-NMR and ^{13}C-NMR of compound B50 in MeOD.



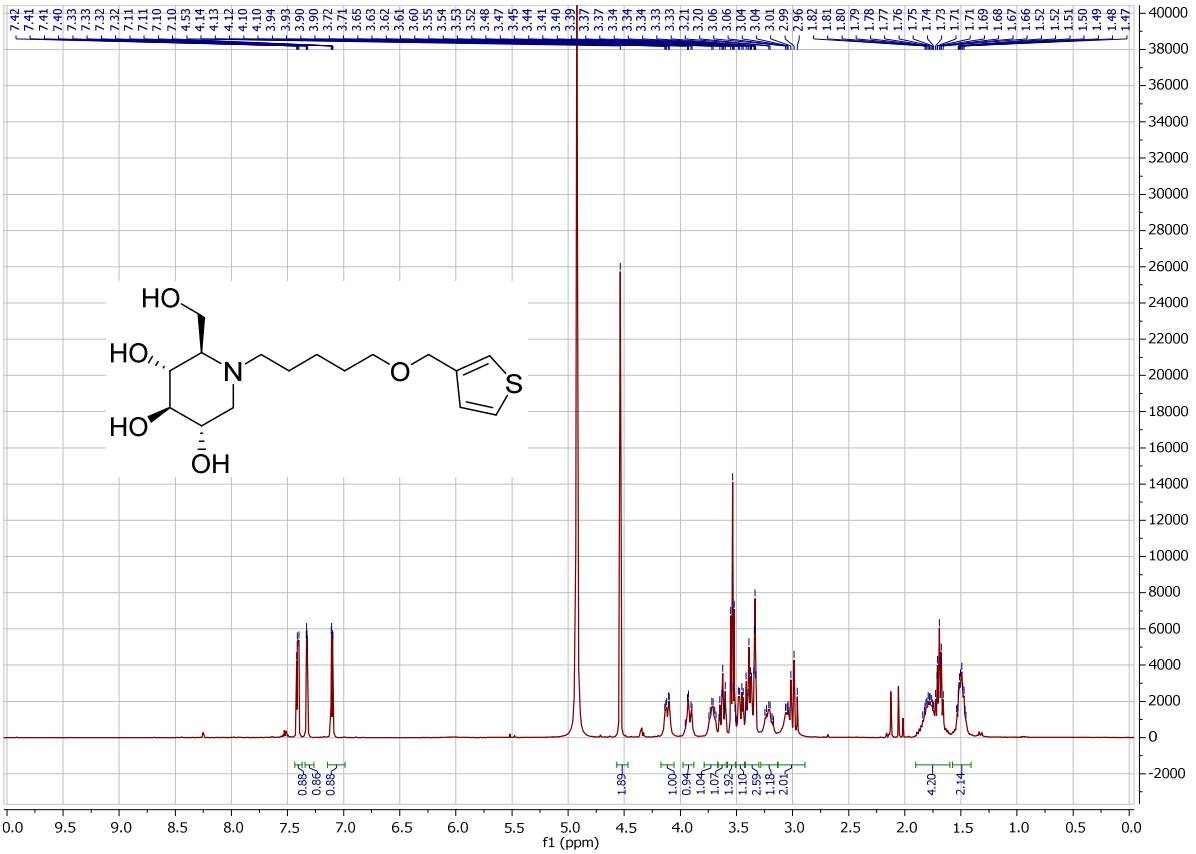


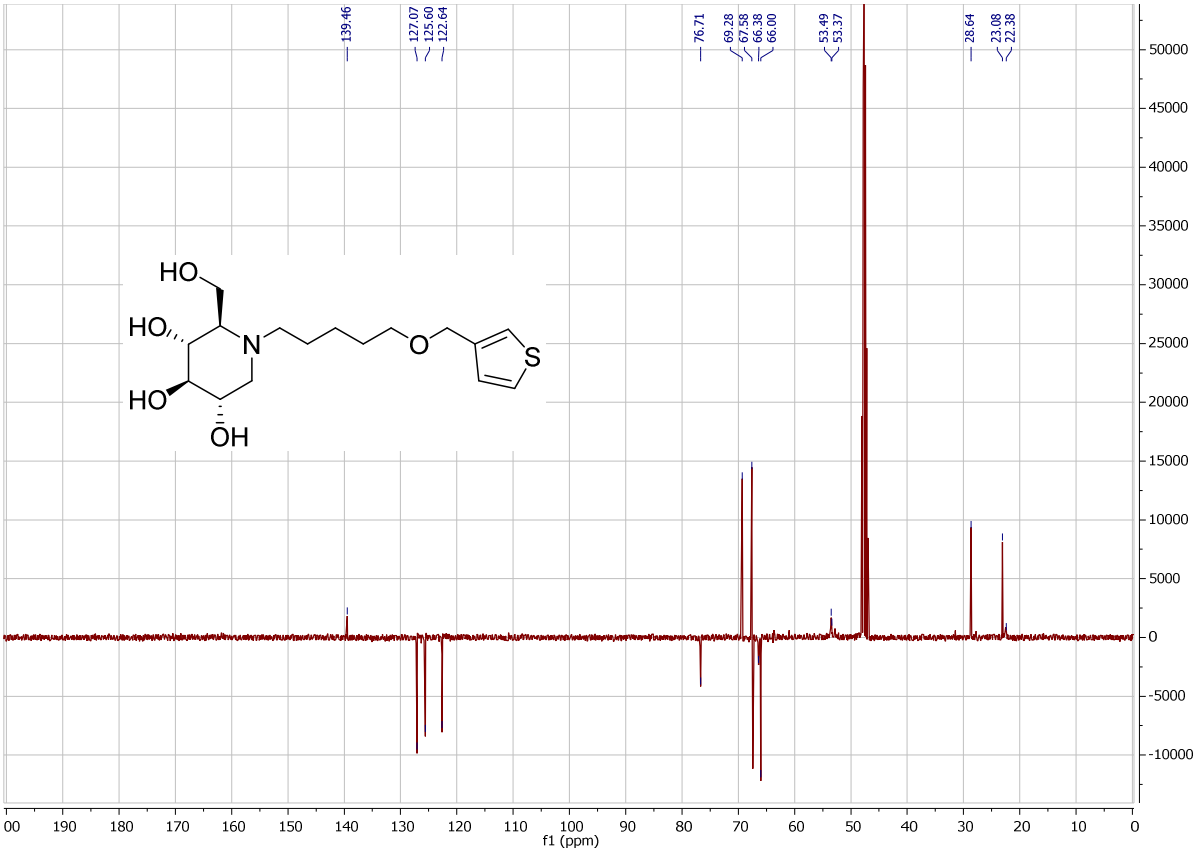
^{1}H-NMR and ^{13}C-NMR of compound B51 in MeOD.



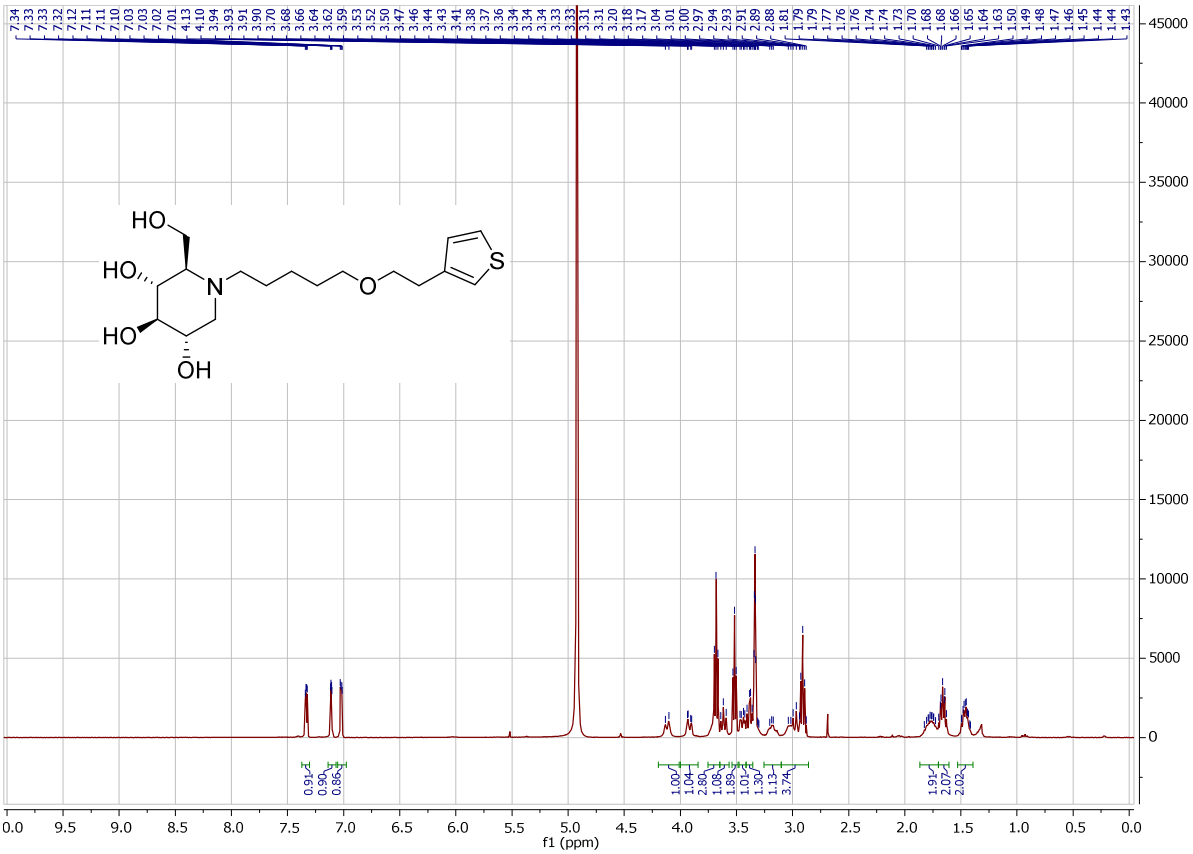


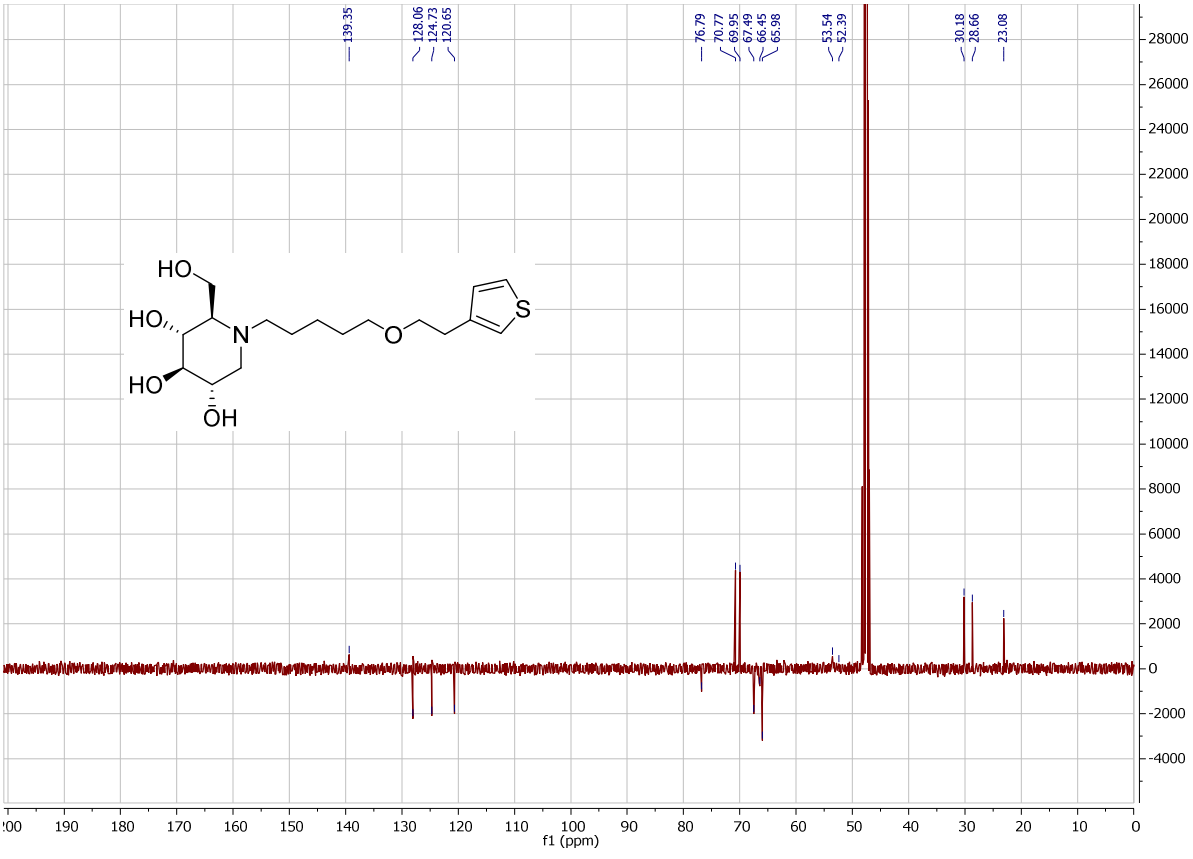
^{1}H-NMR and ^{13}C-NMR of compound B52 in MeOD.



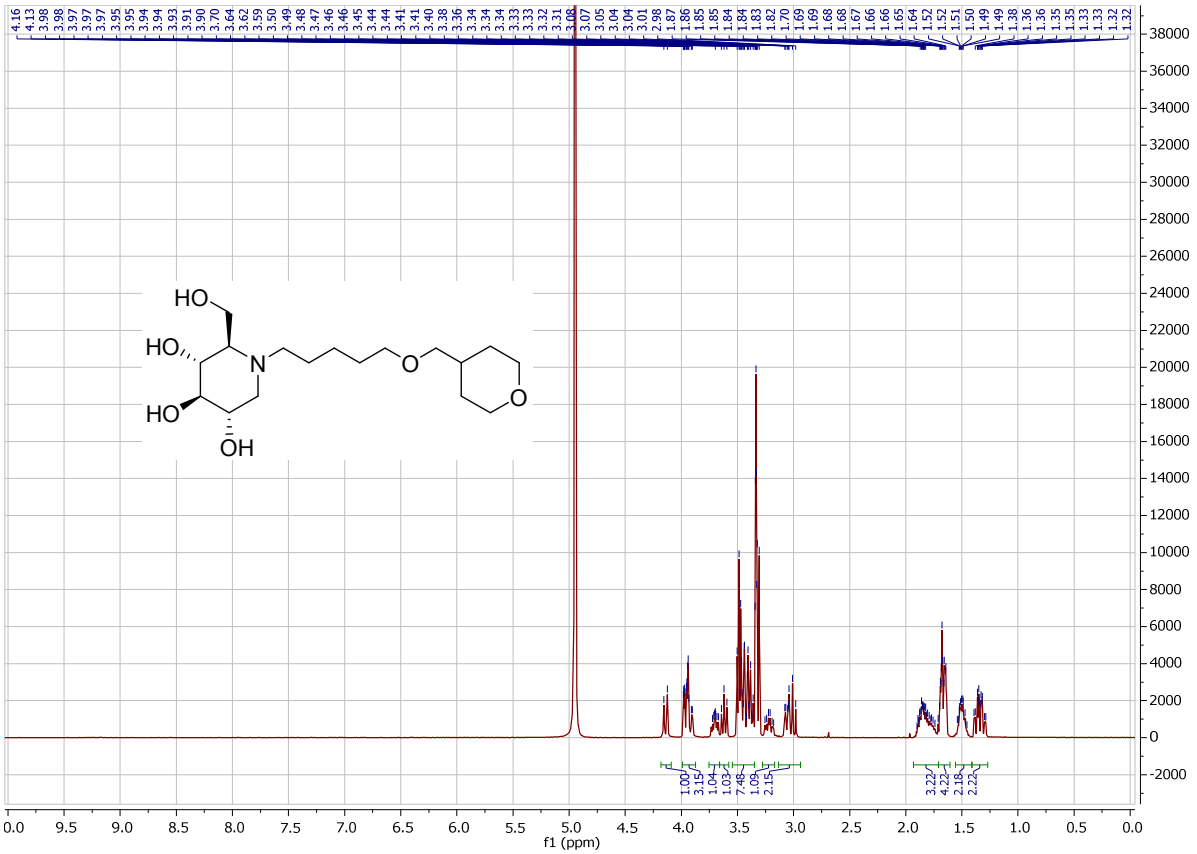


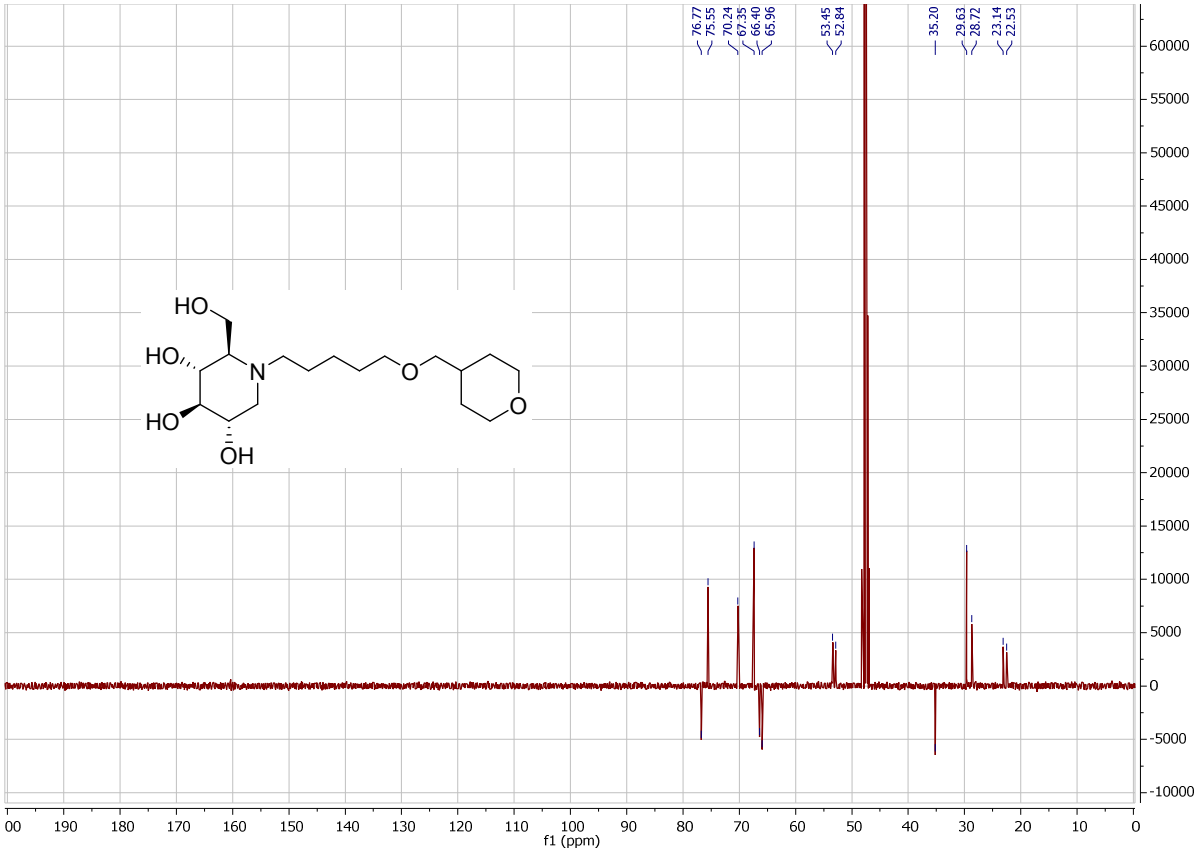
^{1}H-NMR and ^{13}C-NMR of compound B53 in MeOD.



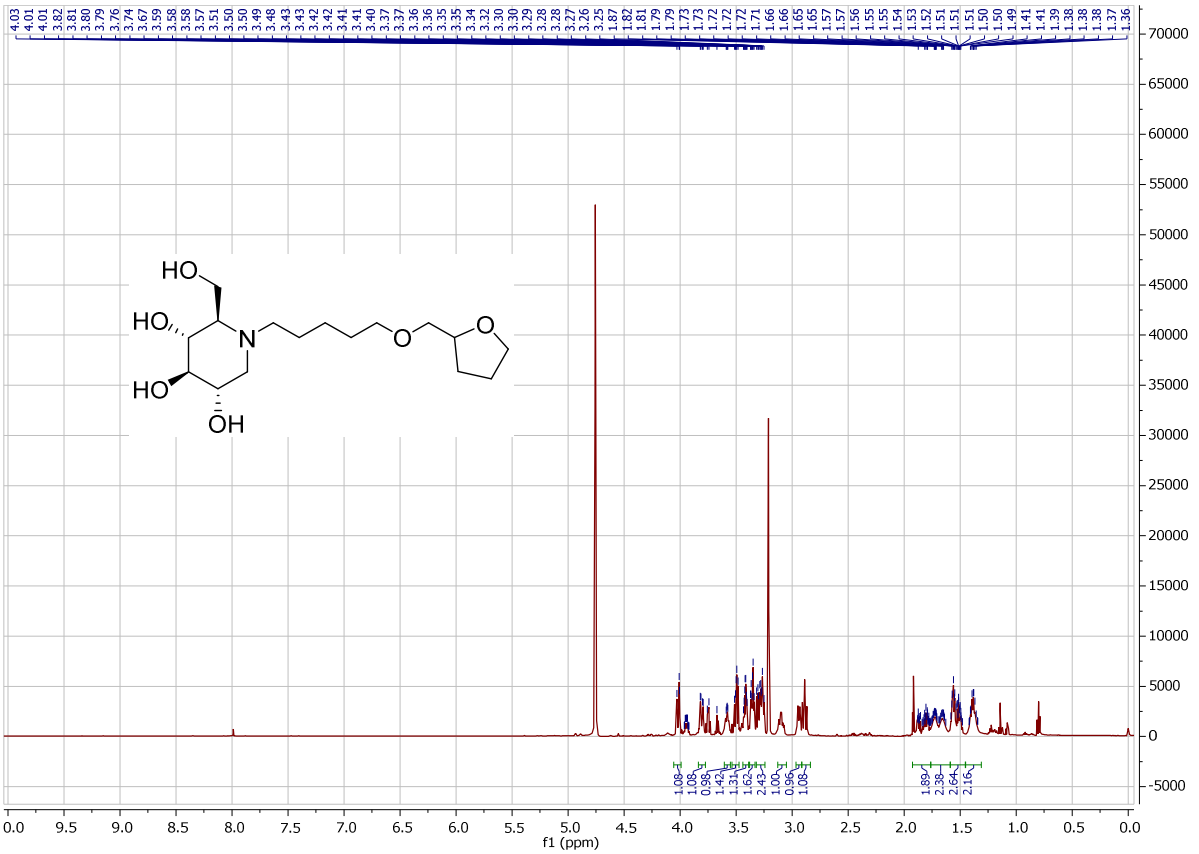


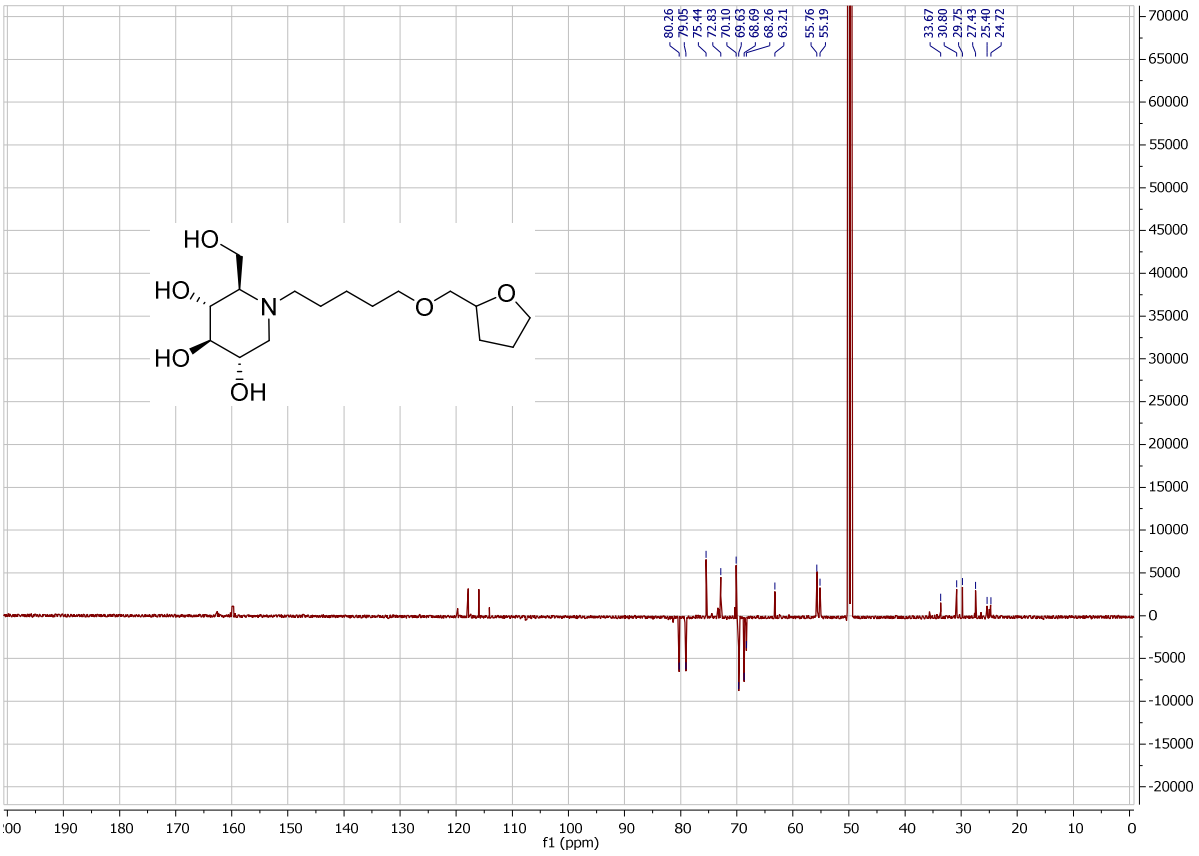
^{1}H-NMR and ^{13}C-NMR of compound B54 in MeOD.



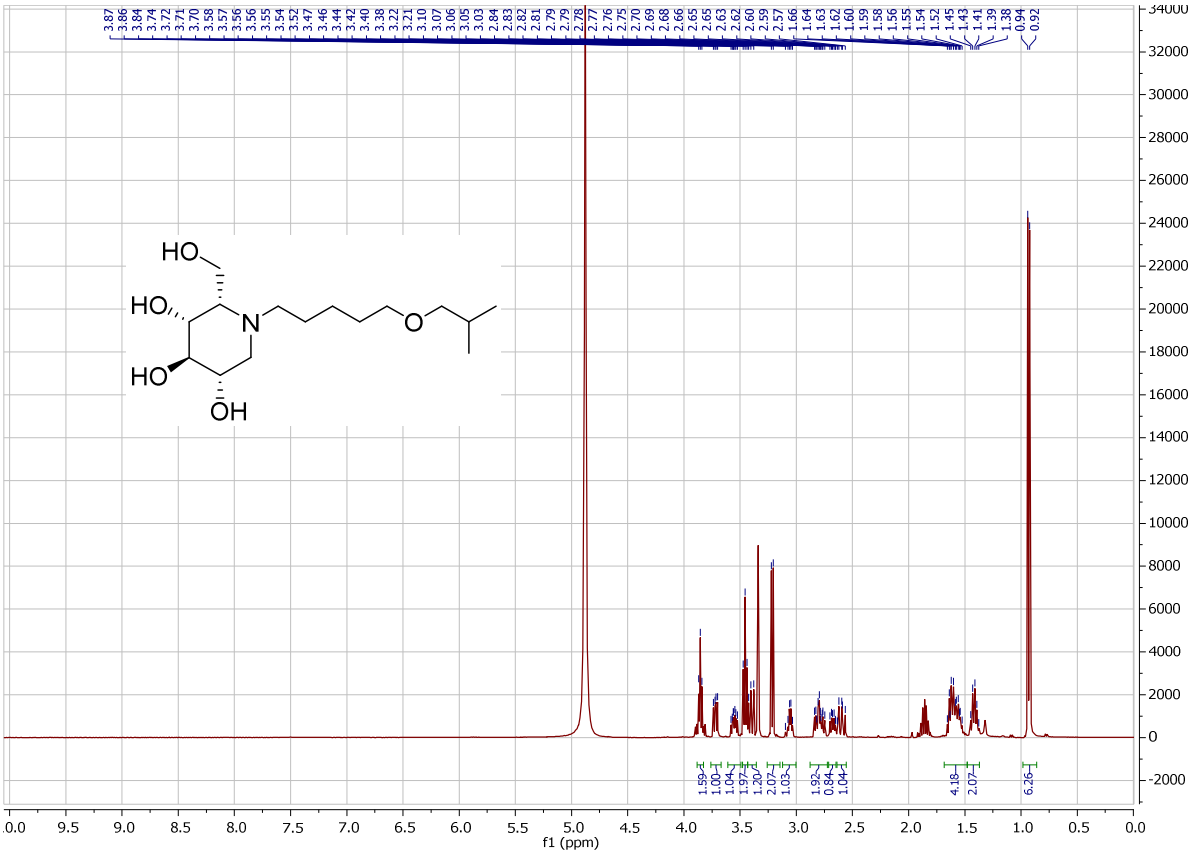


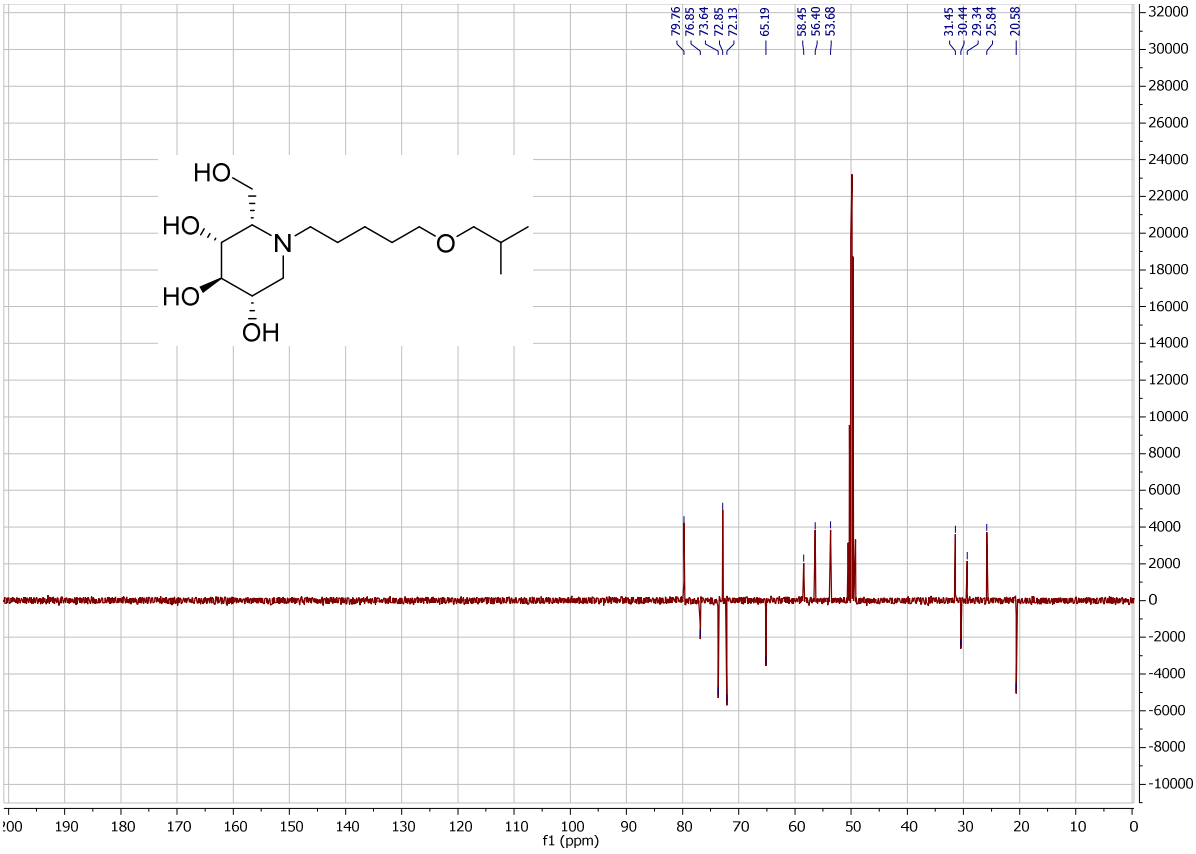
^{1}H-NMR and ^{13}C-NMR of compound B55/15 in MeOD.



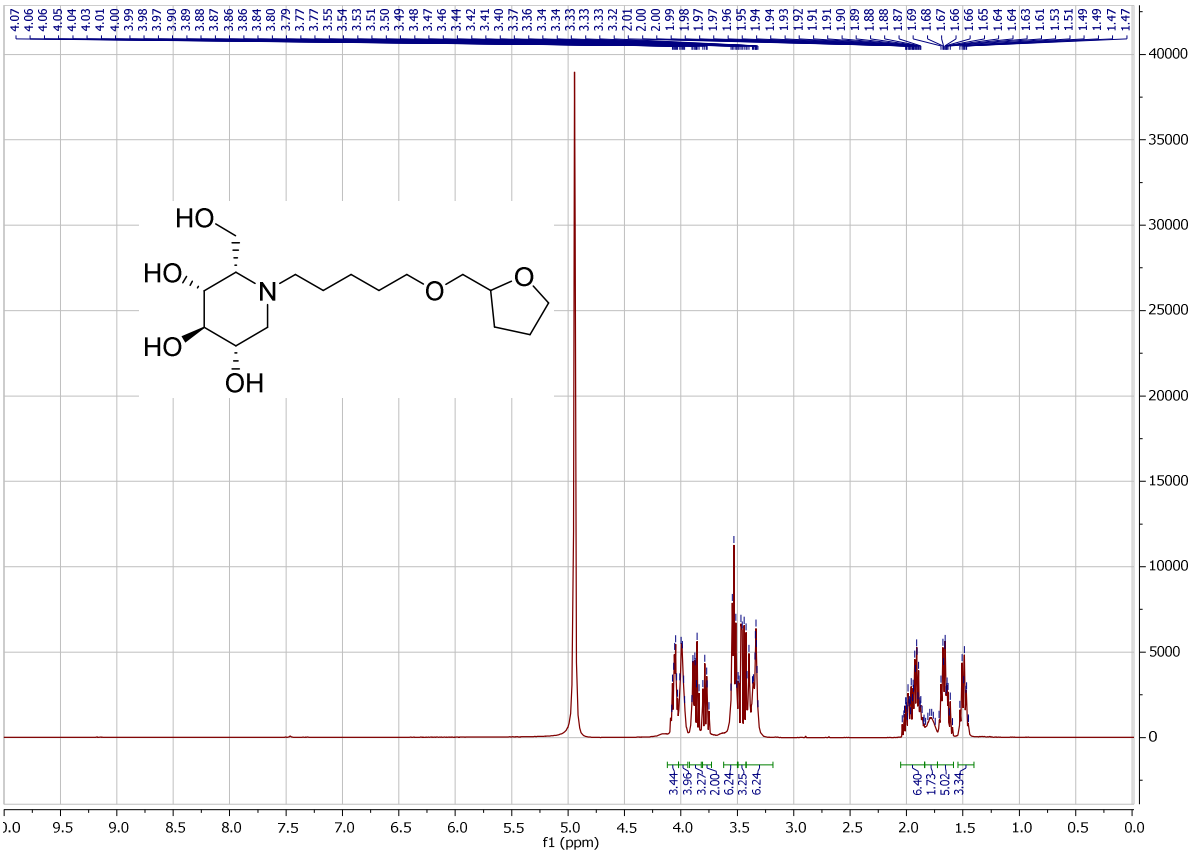


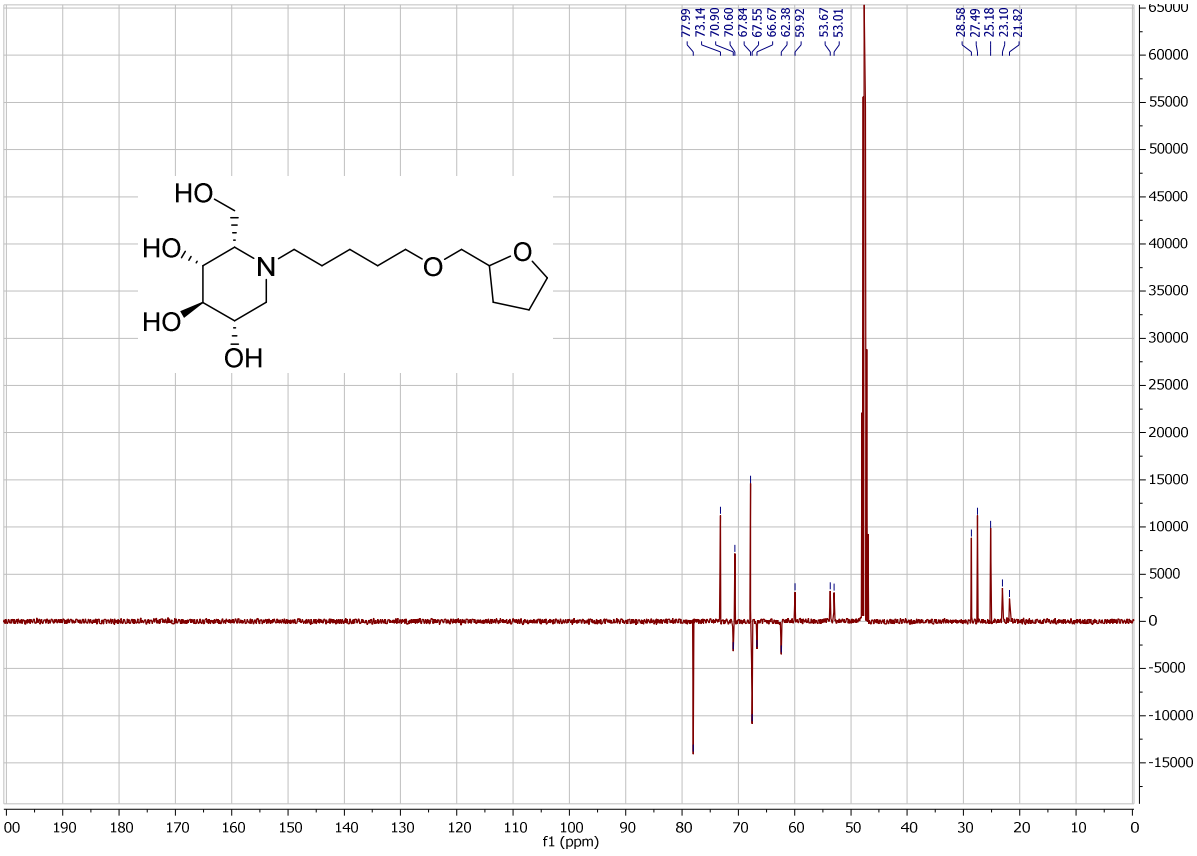
^{1}H-NMR and ^{13}C-NMR of compound B56/12 in MeOD.



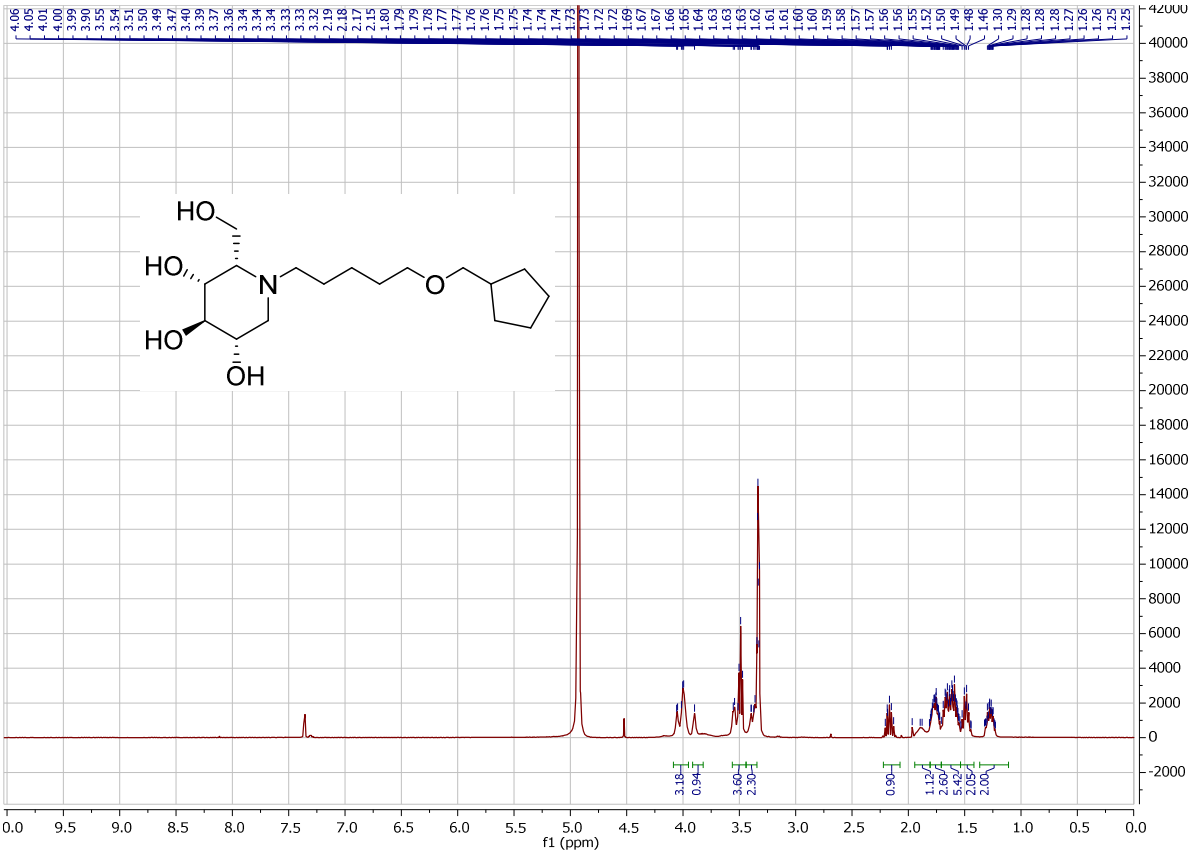


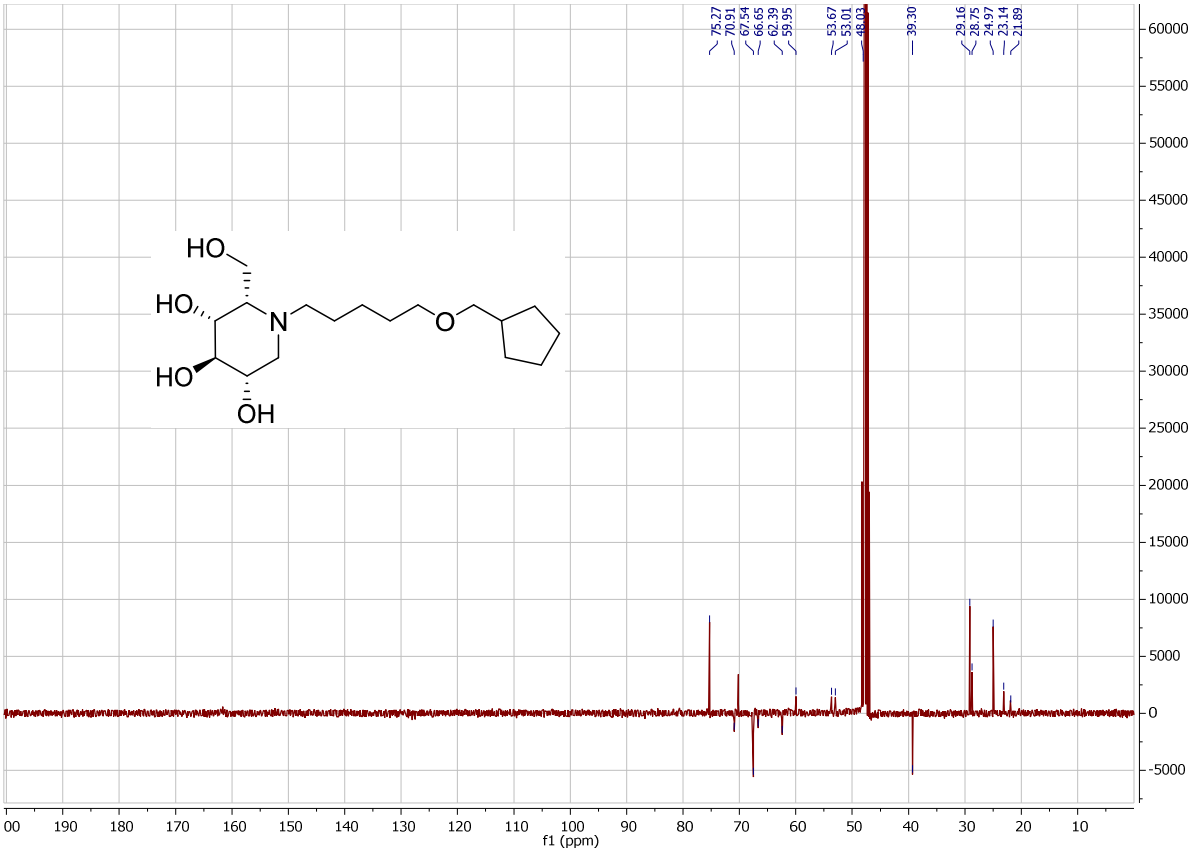
^{1}H-NMR and ^{13}C-NMR of compound B57 in MeOD.



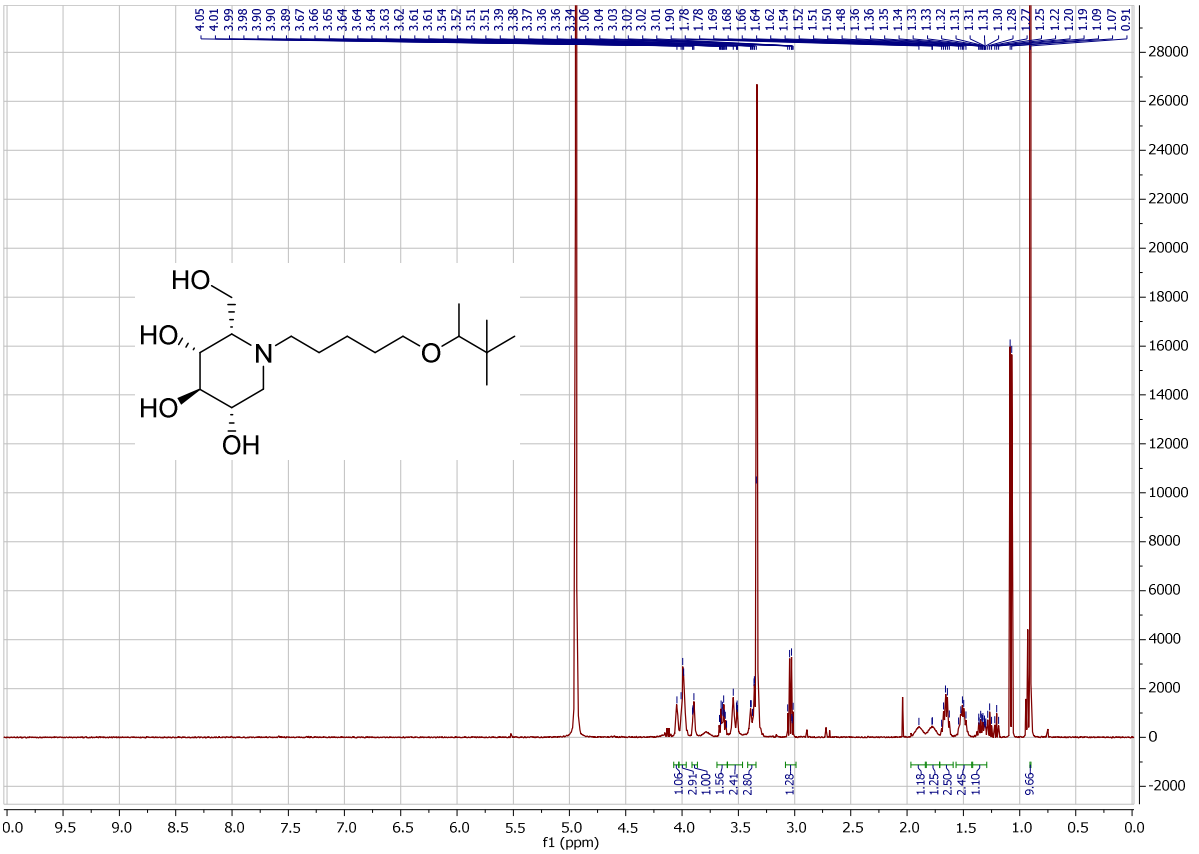


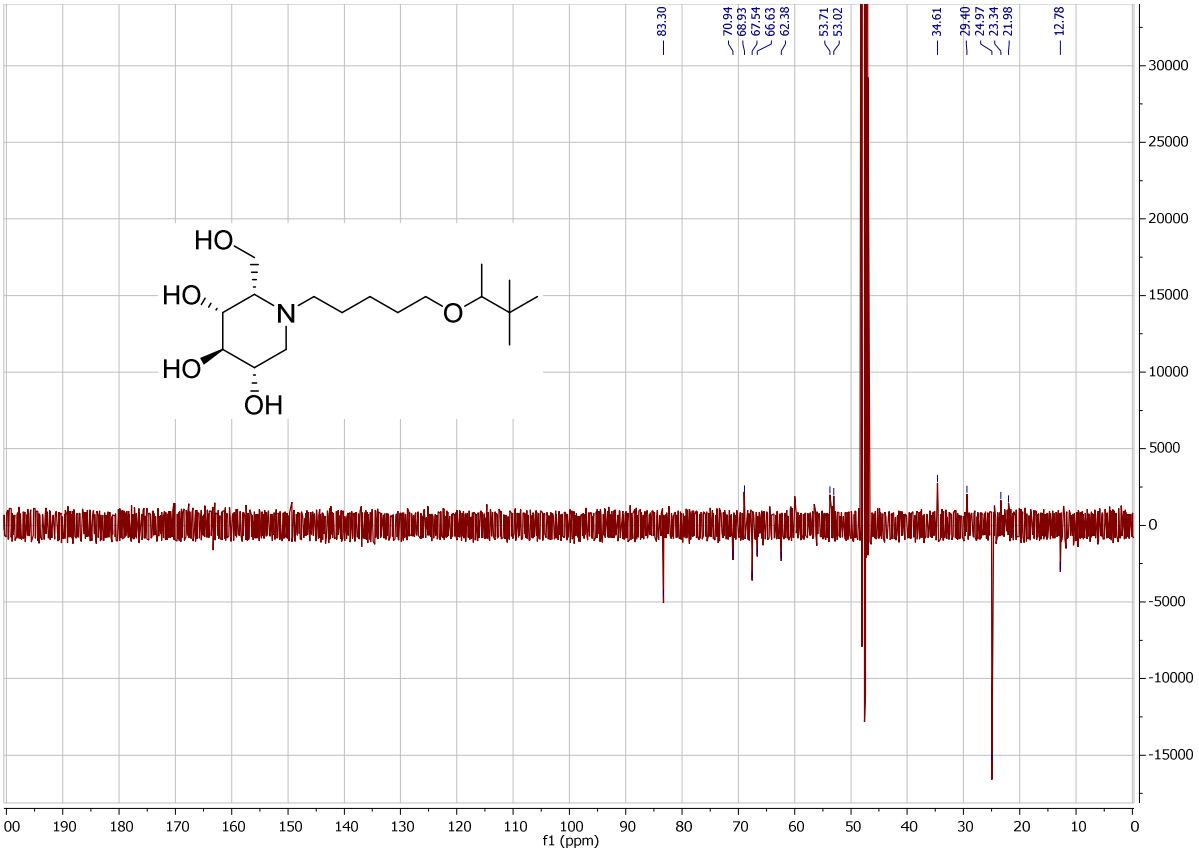
^{1}H-NMR and ^{13}C-NMR of compound B58 in MeOD.



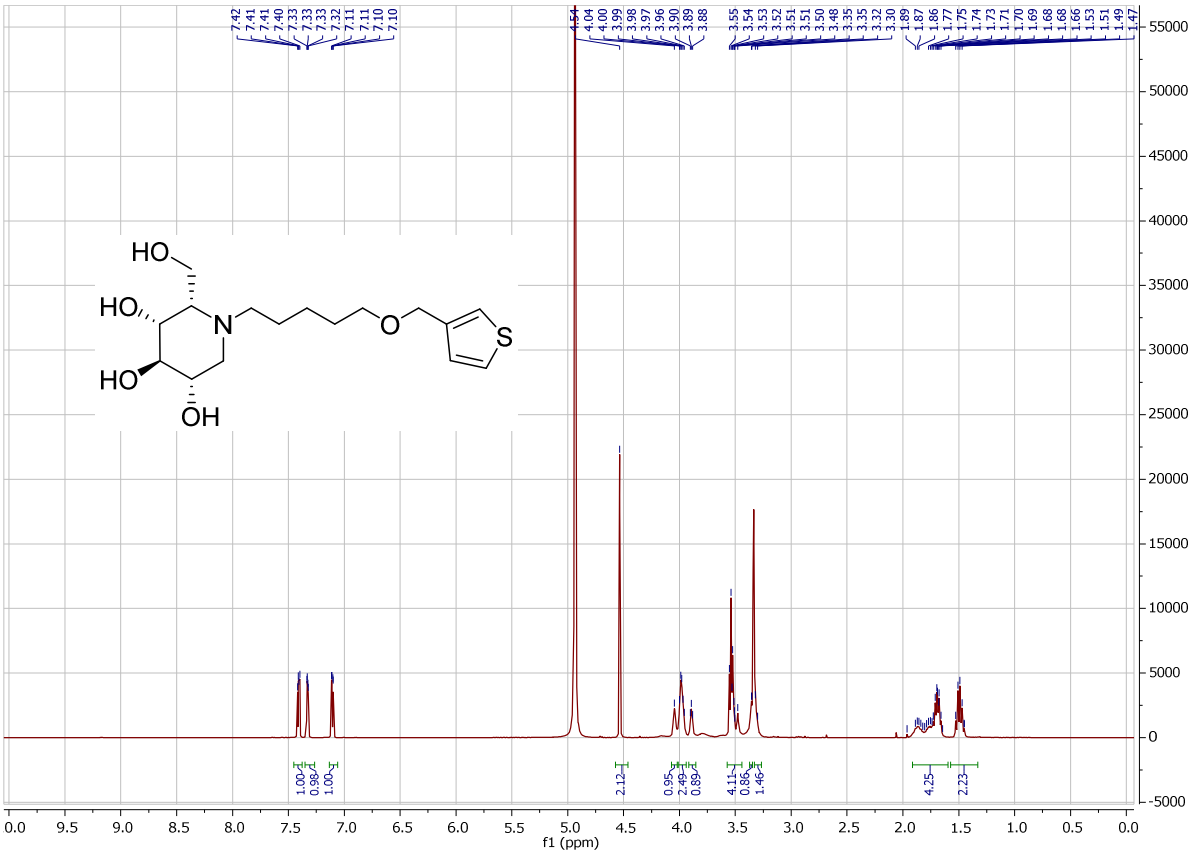


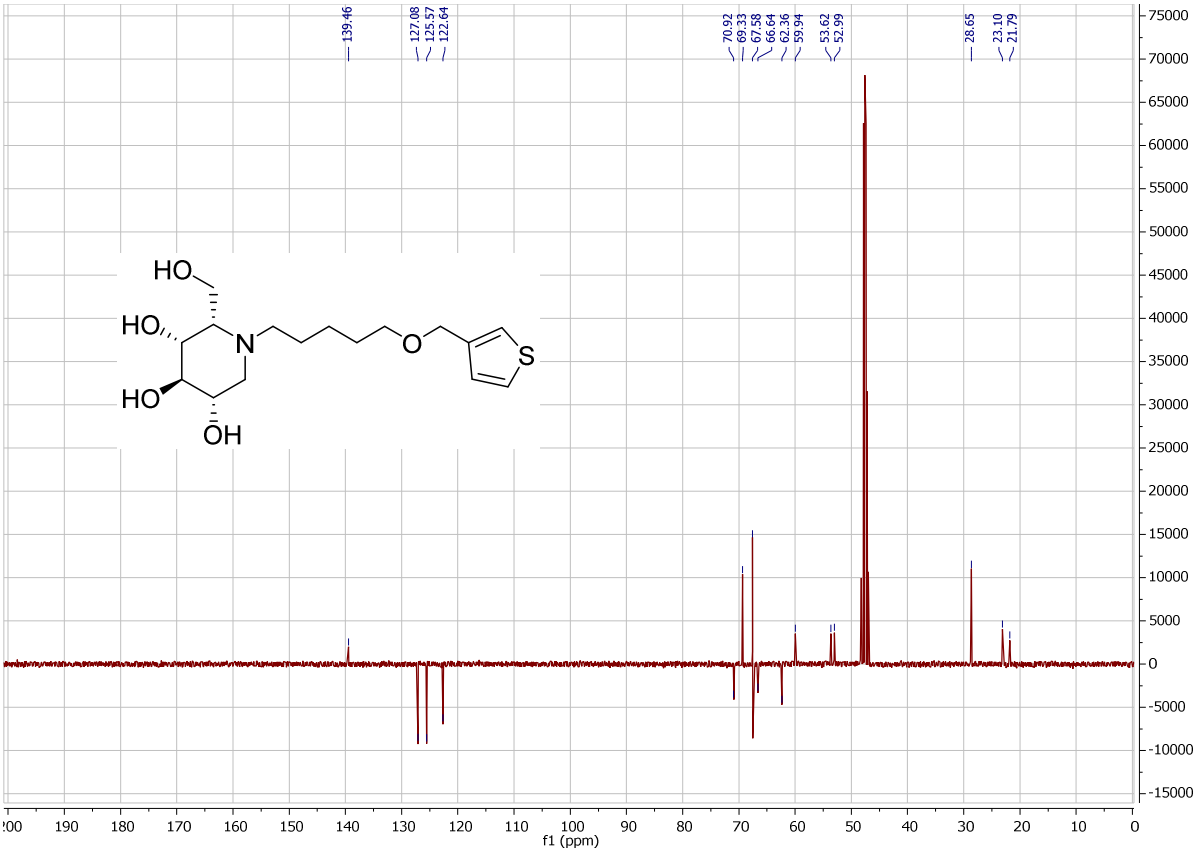
^{1}H-NMR and ^{13}C-NMR of compound B59 in MeOD.



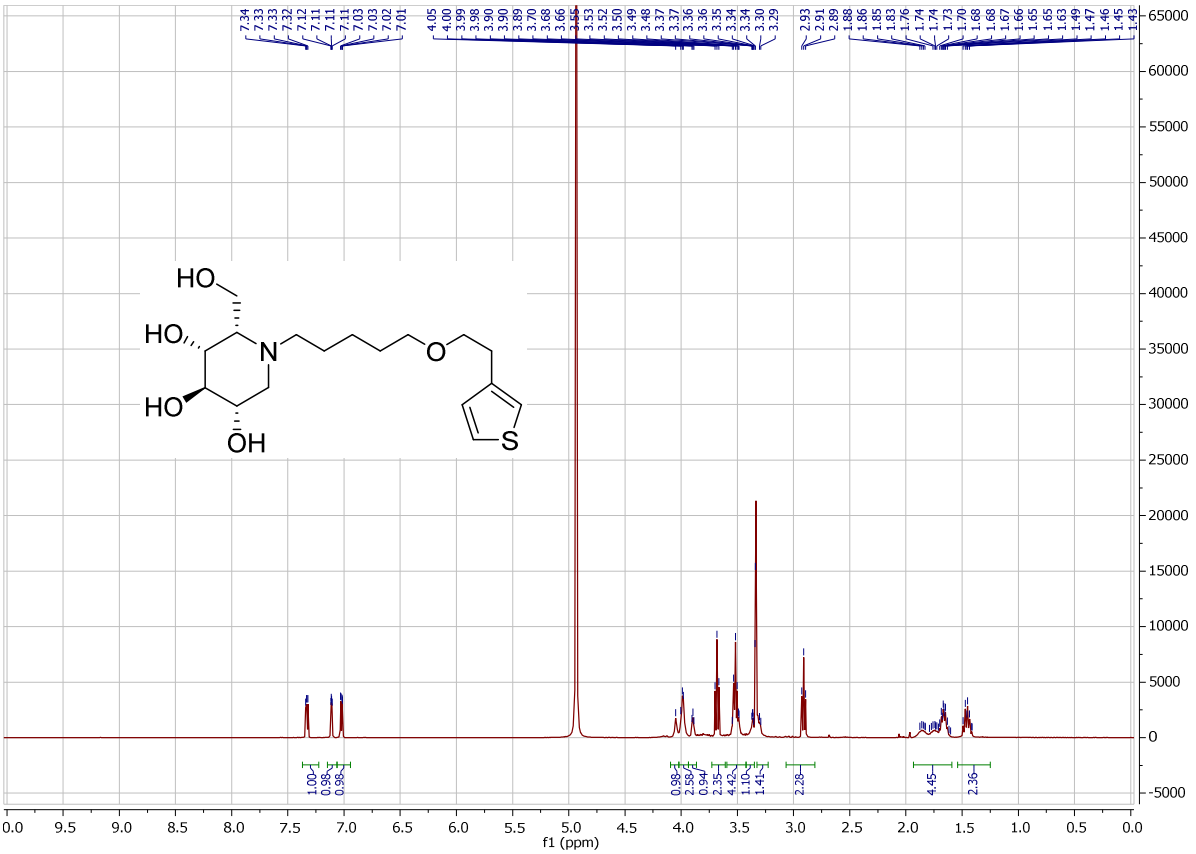


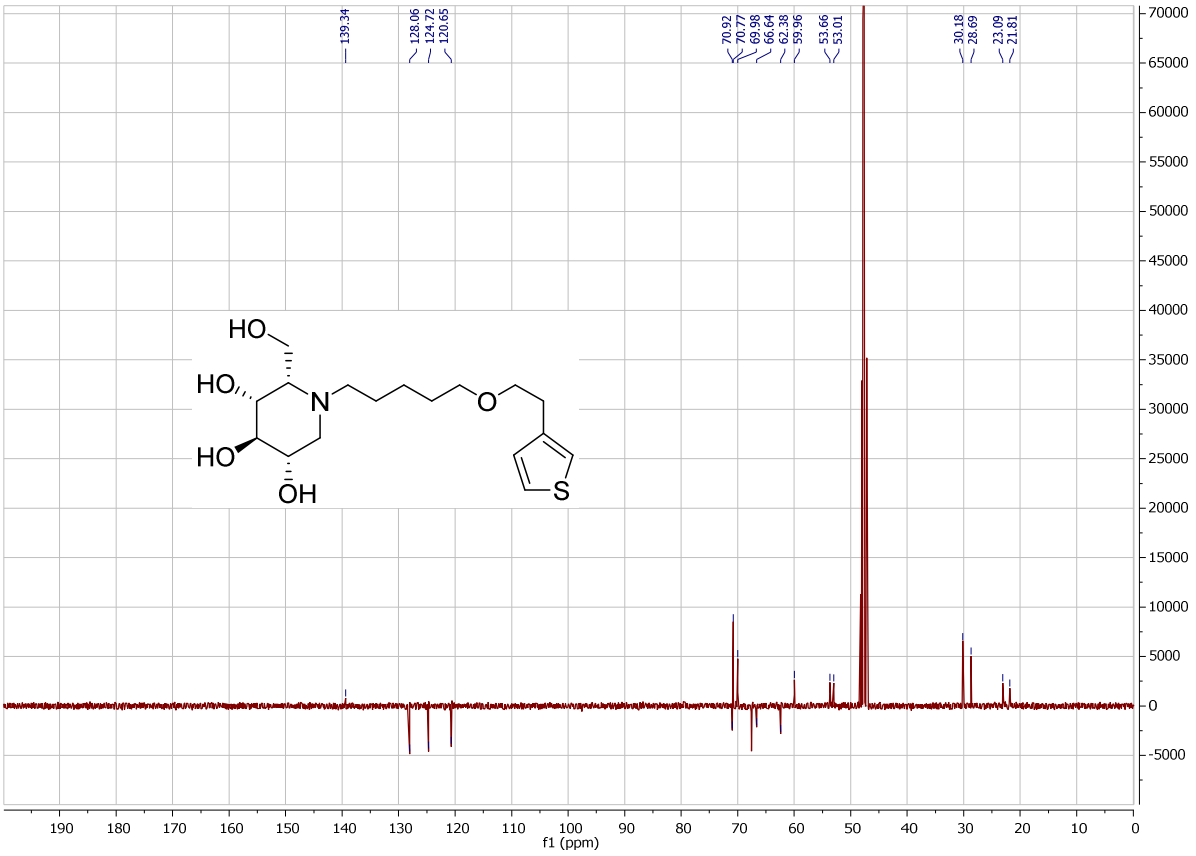
^{1}H-NMR and ^{13}C-NMR of compound B60 in MeOD.



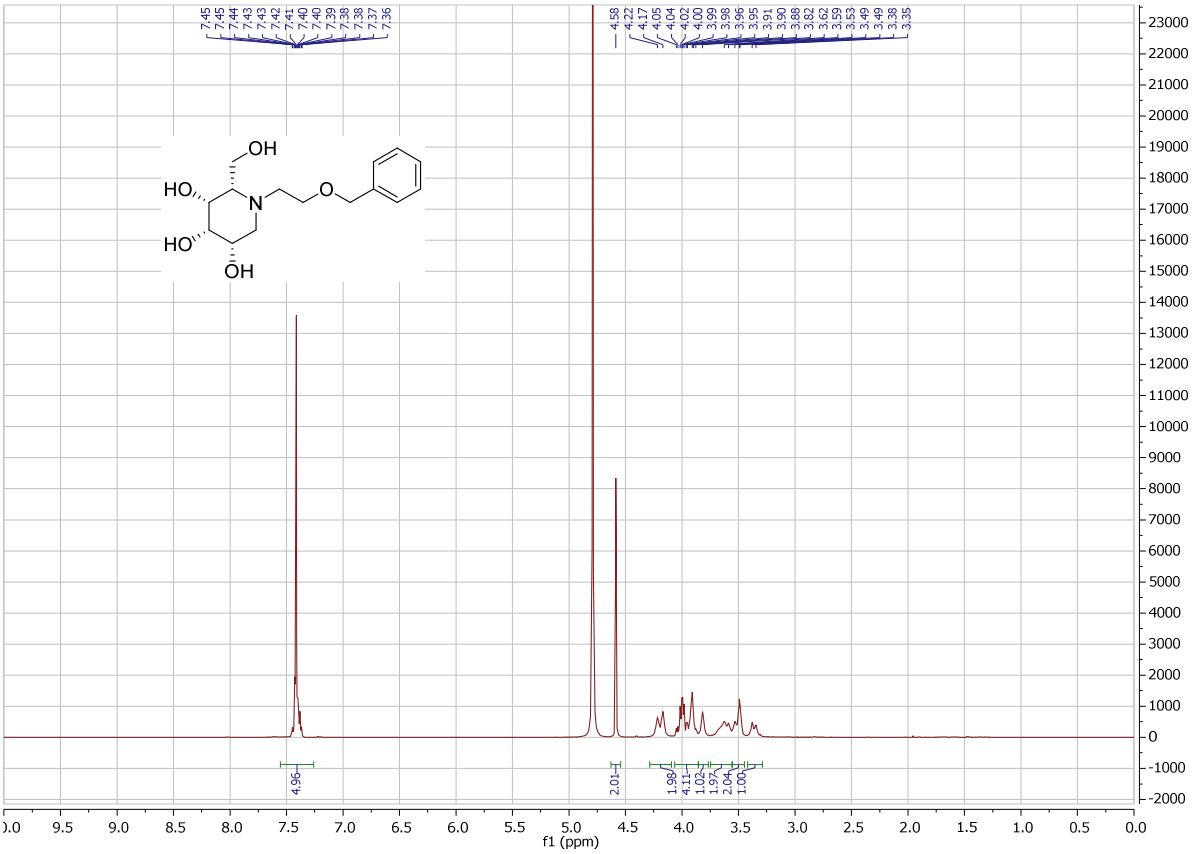


^{1}H-NMR and ^{13}C-NMR of compound B61 in MeOD.

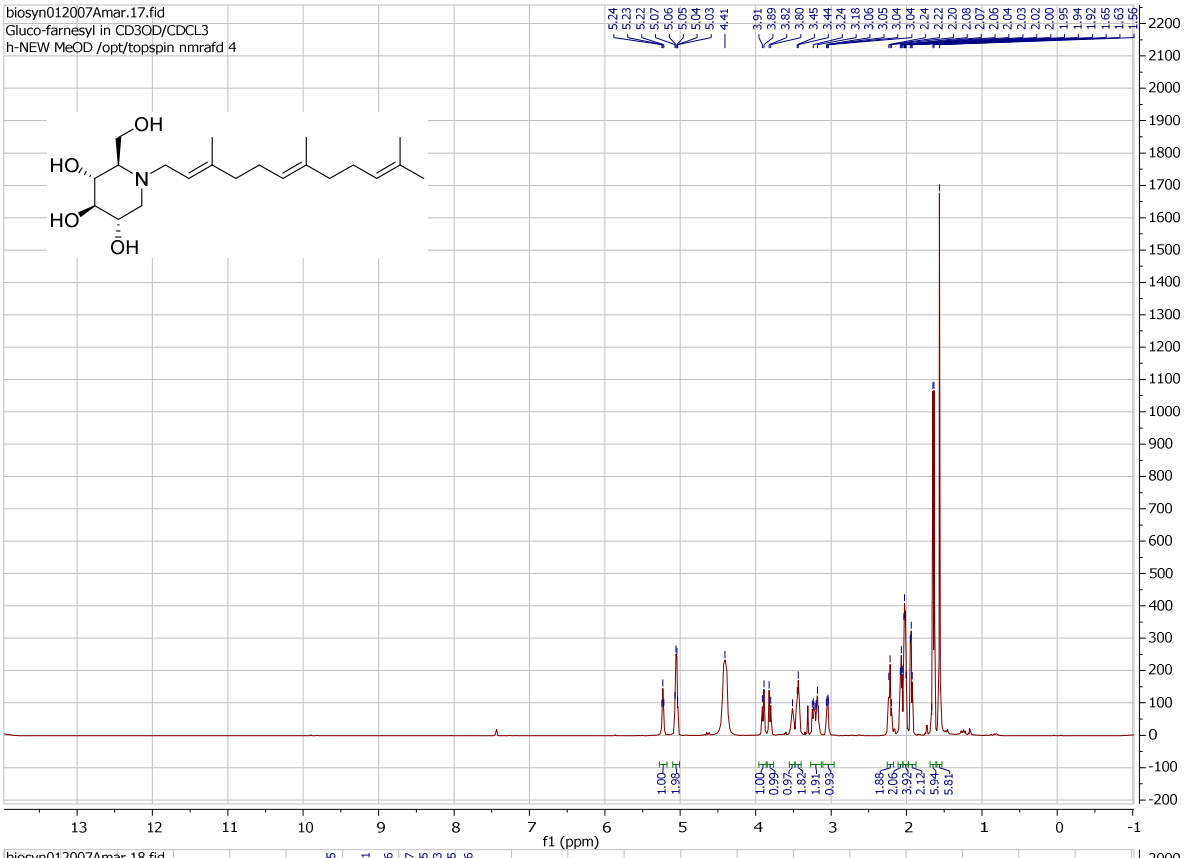


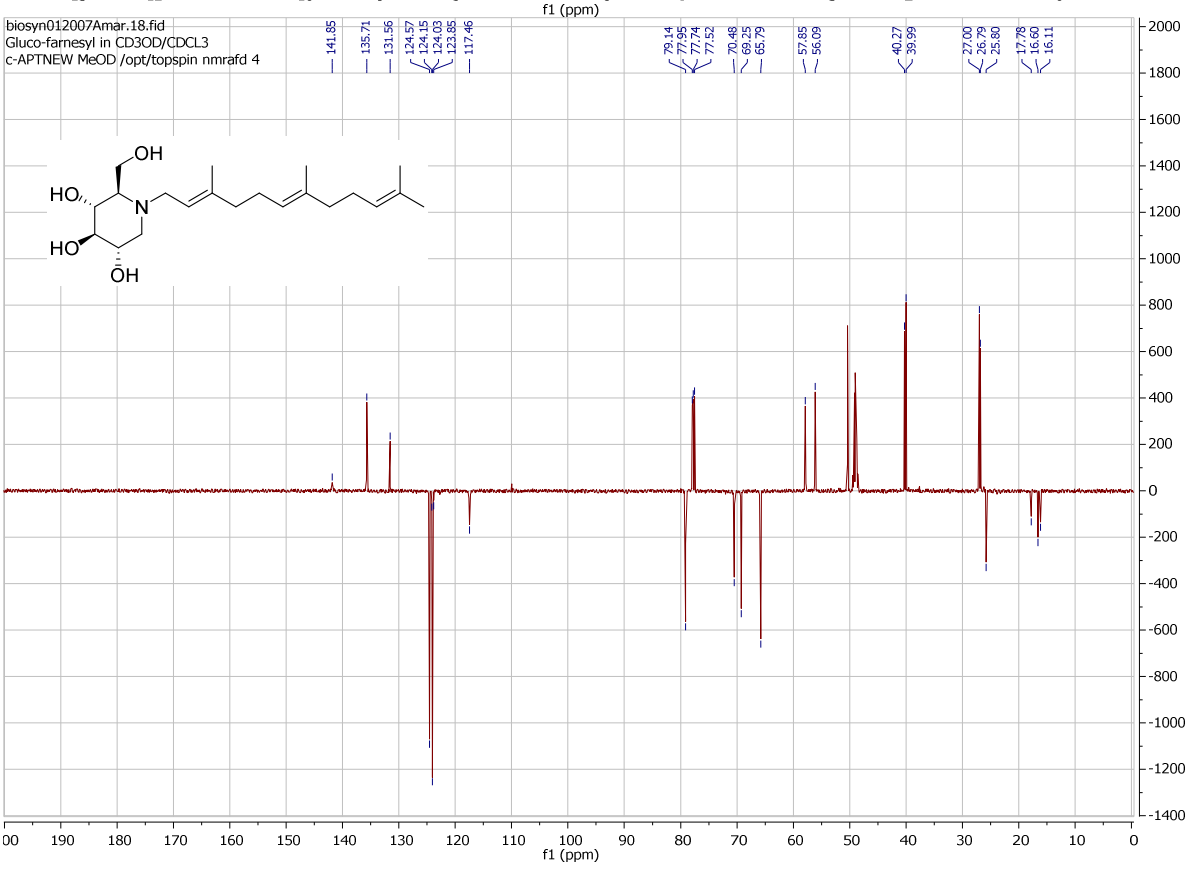


^{1}H-NMR and ^{13}C-NMR of compound C15.TFA in D_2O.

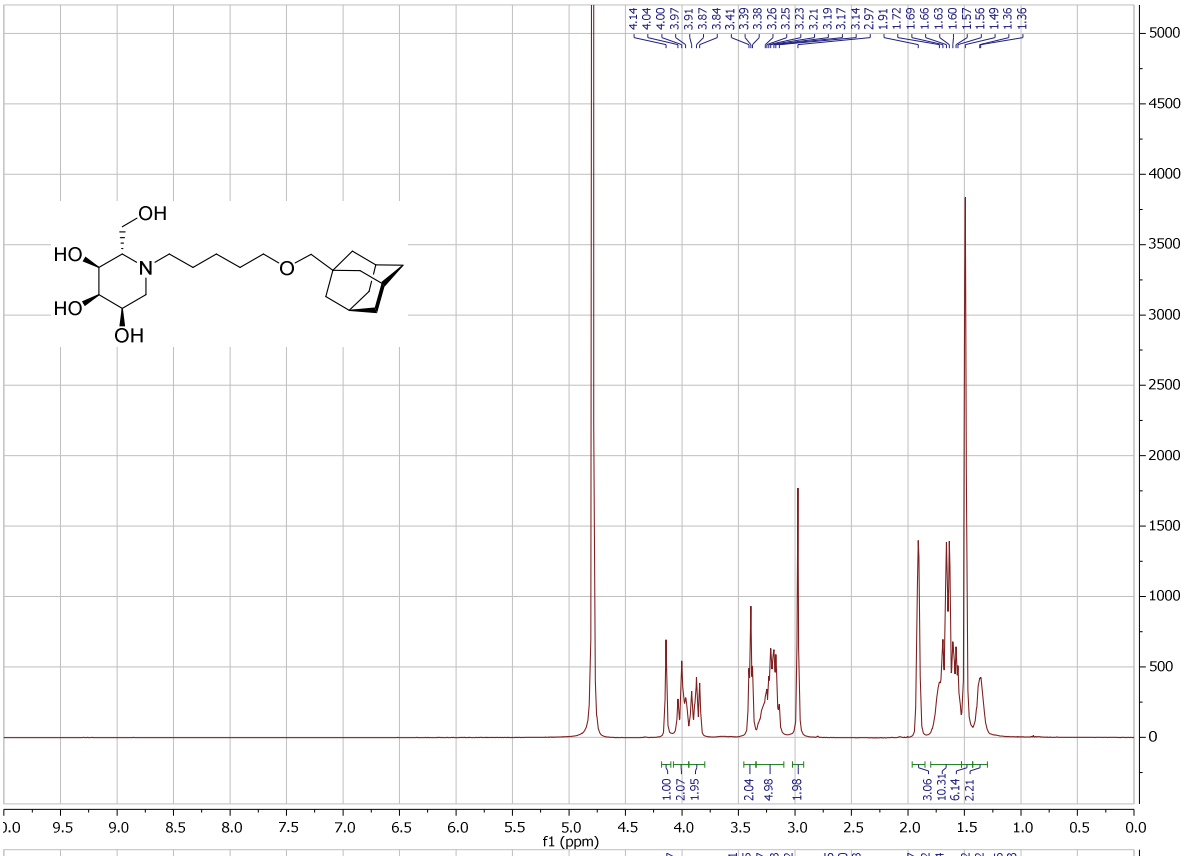


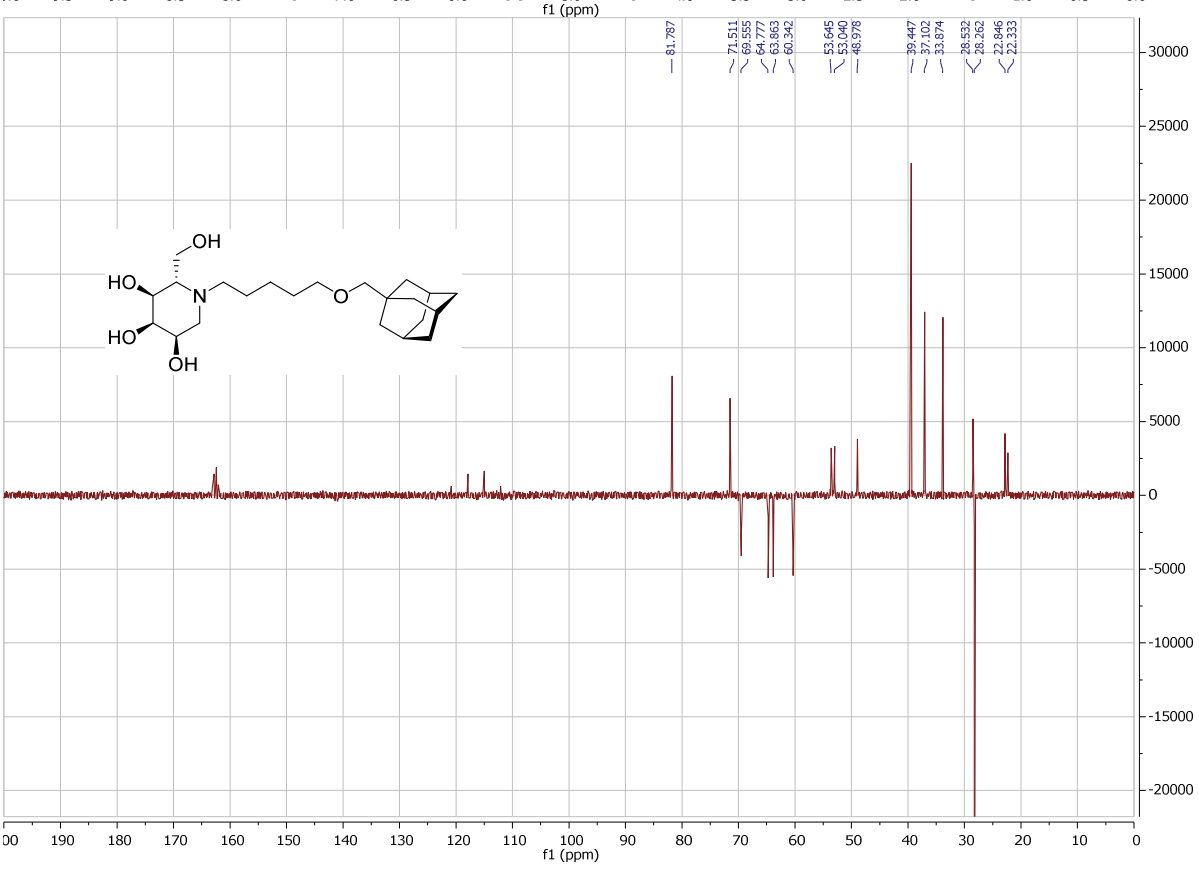
^{1}H-NMR and ^{13}C-NMR of compound C16.TFA in MeOD/$CDCl_3$.



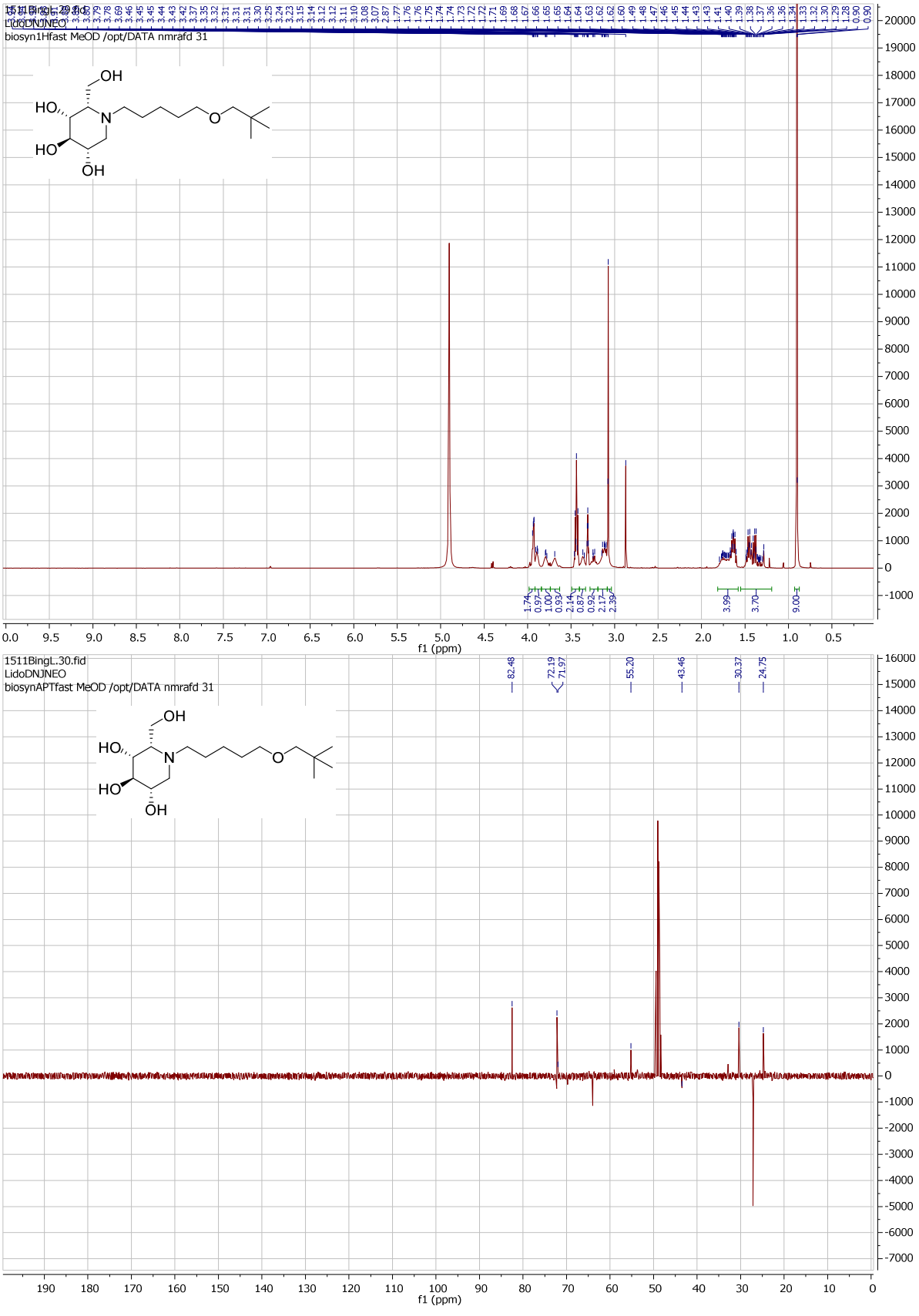


^{1}H-NMR and ^{13}C-NMR of compound C24.TFA in D_2O.

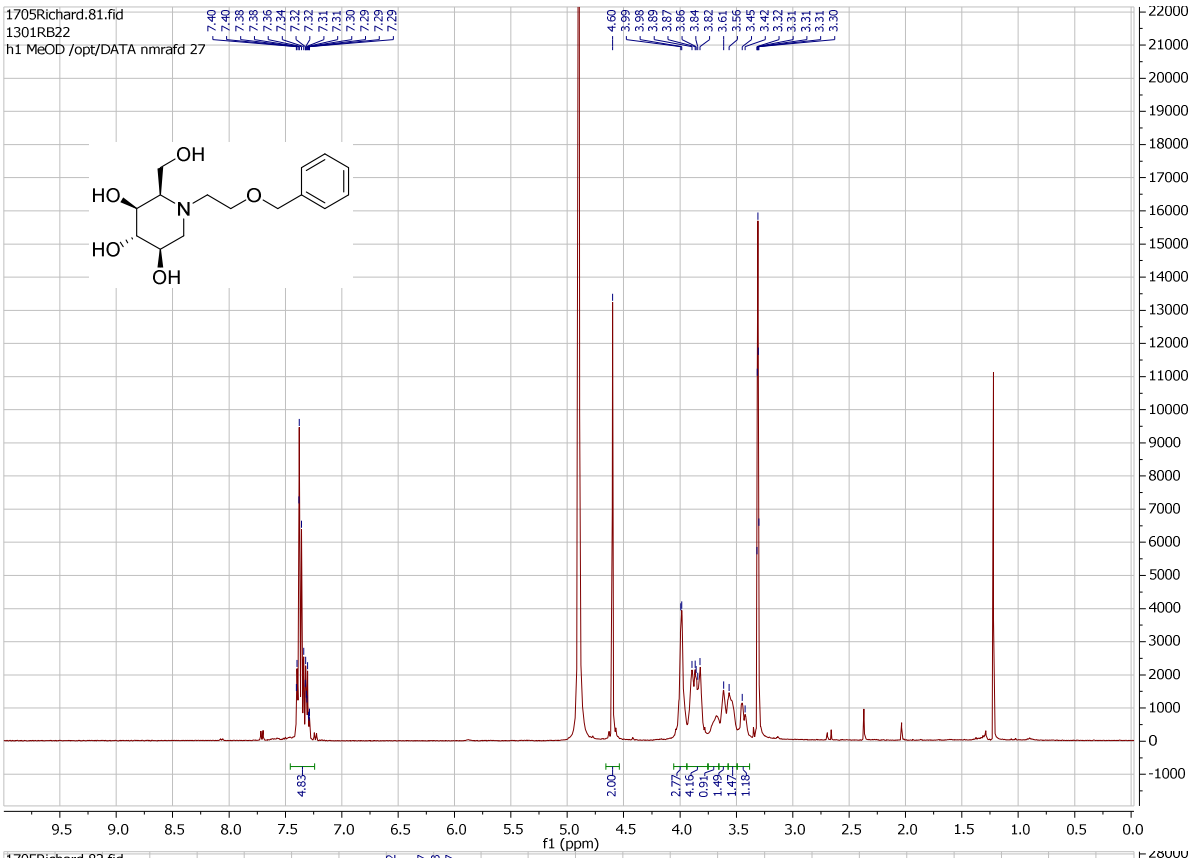


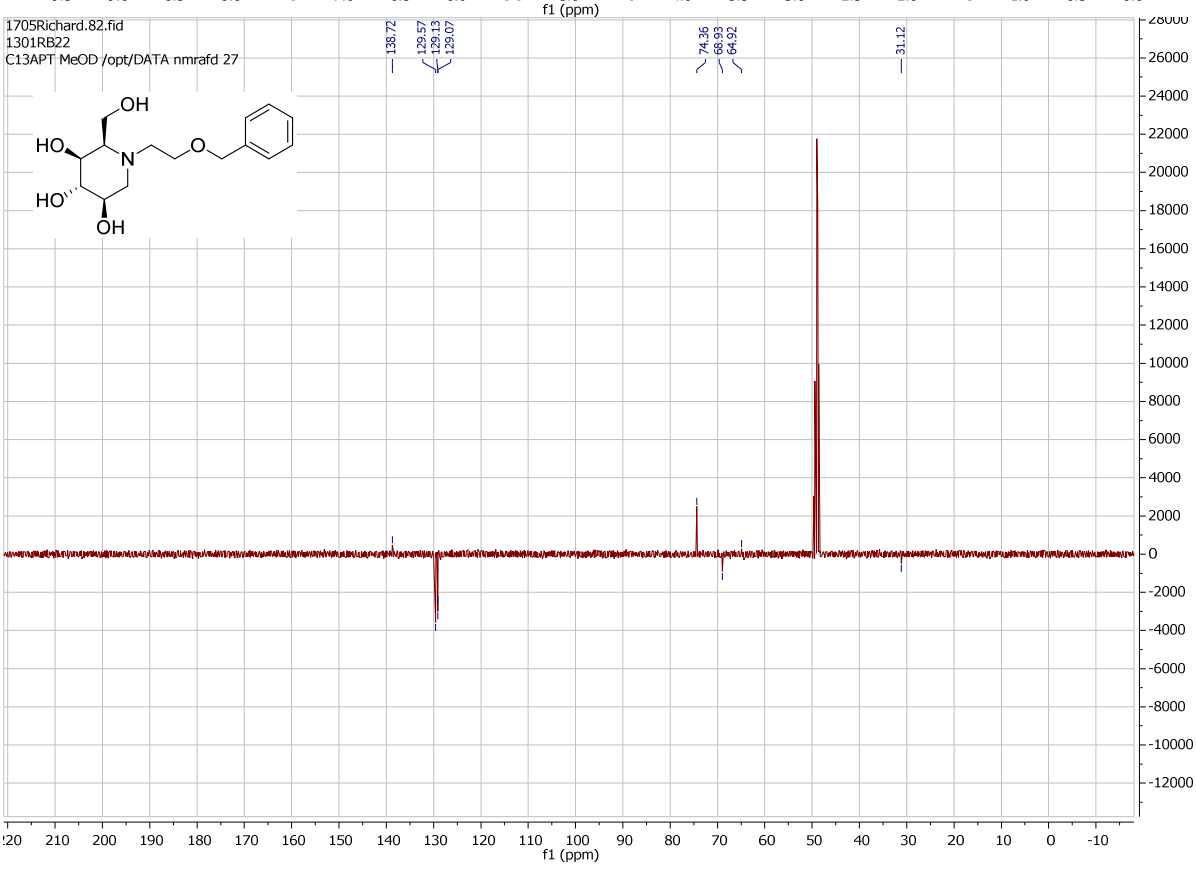


^{1}H-NMR and ^{13}C-NMR of compound C26.TFA in MeOD.

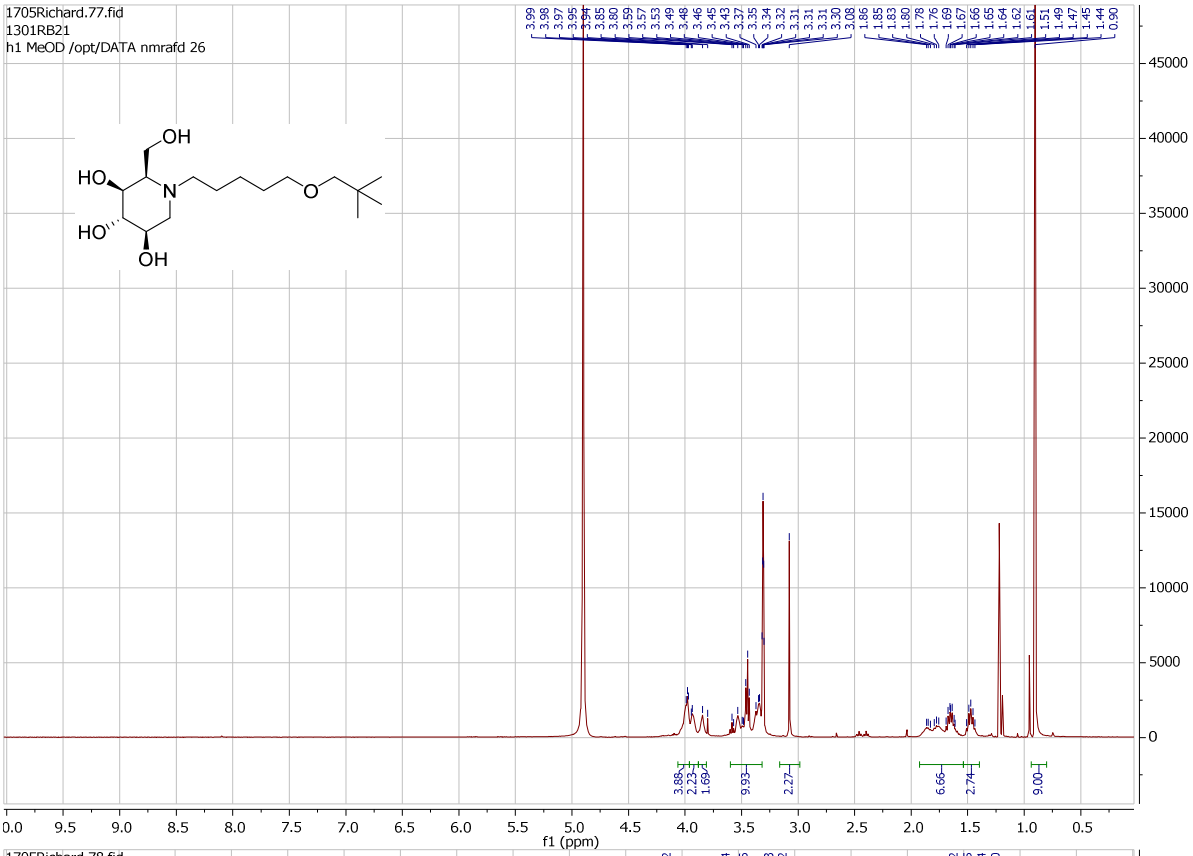


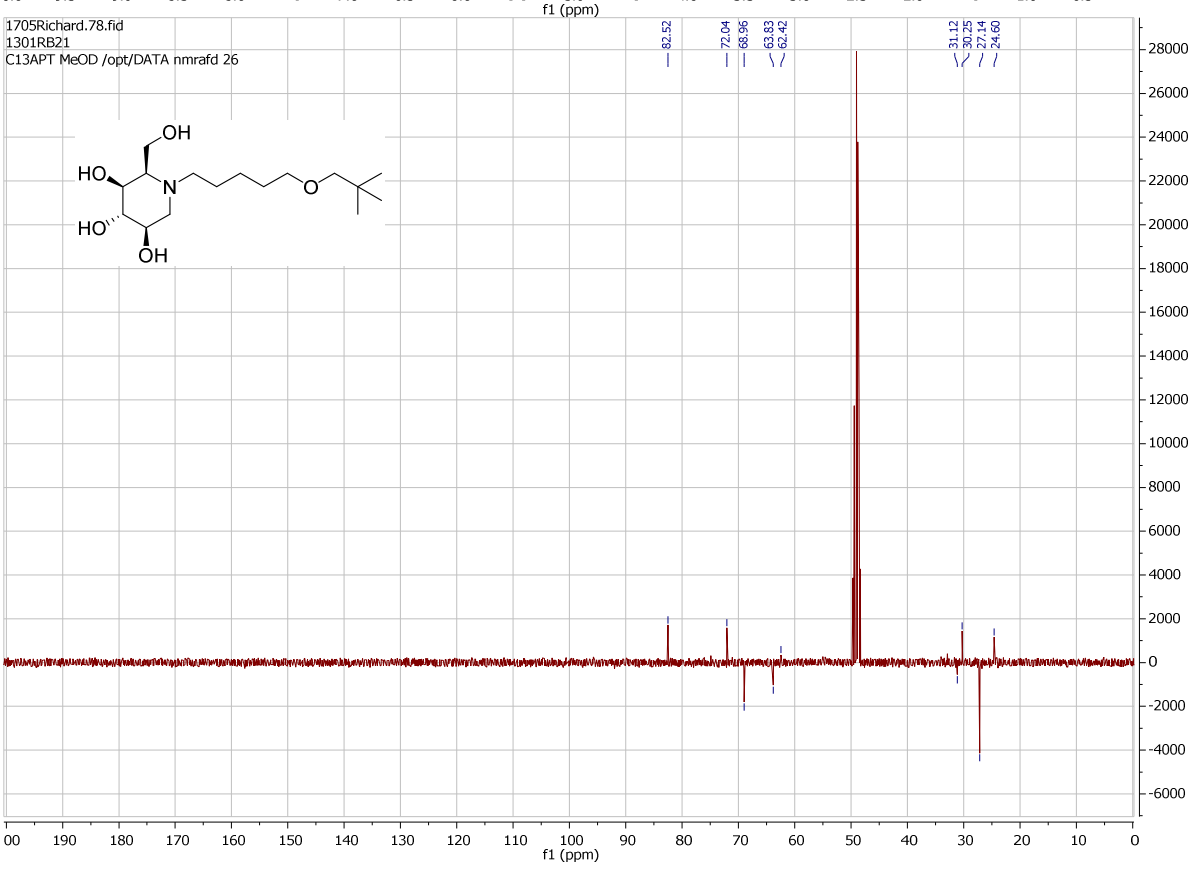
^{1}H-NMR and ^{13}C-NMR of compound C47.TFA in MeOD.



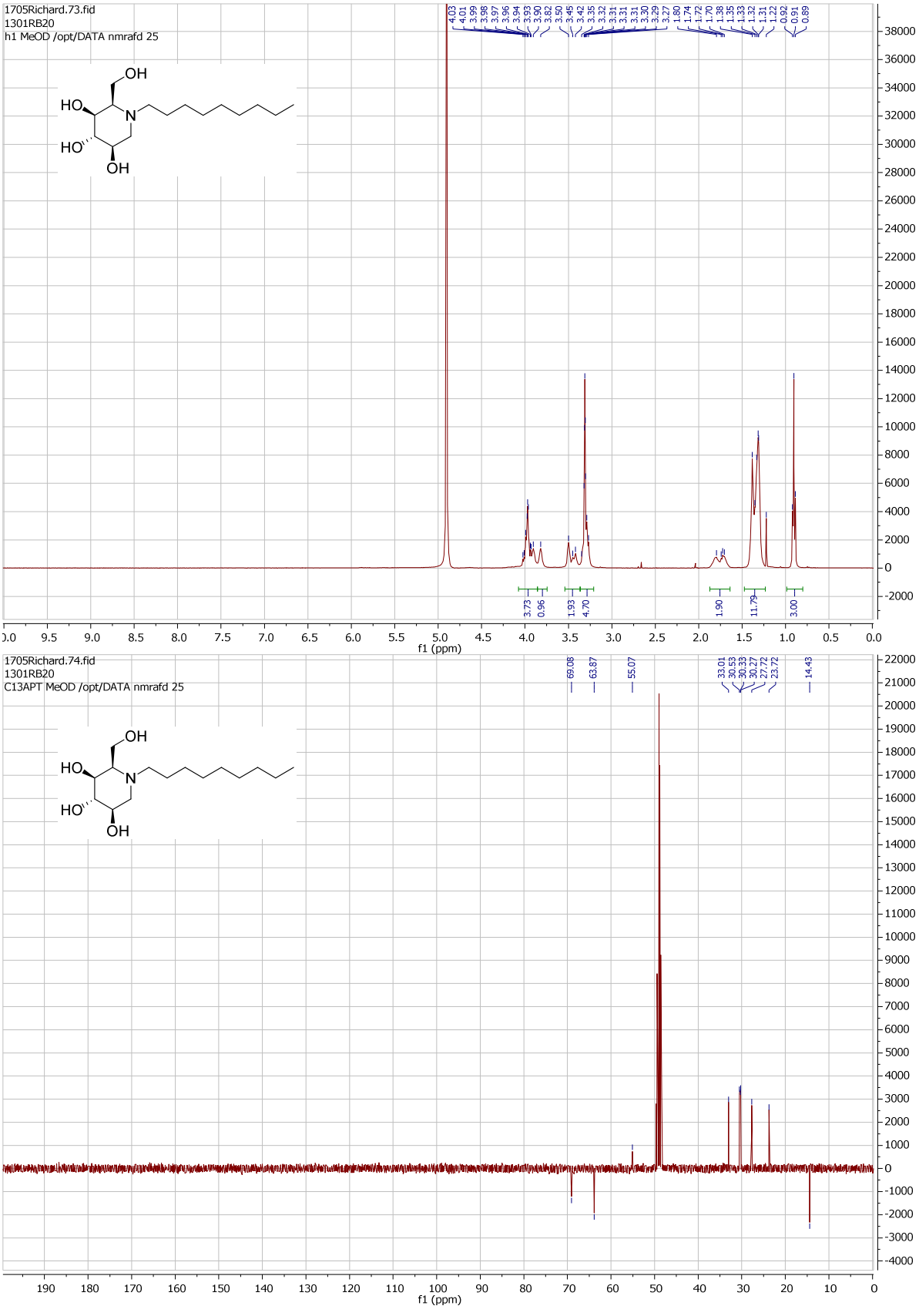


^{1}H-NMR and ^{13}C-NMR of compound C49.TFA in MeOD.

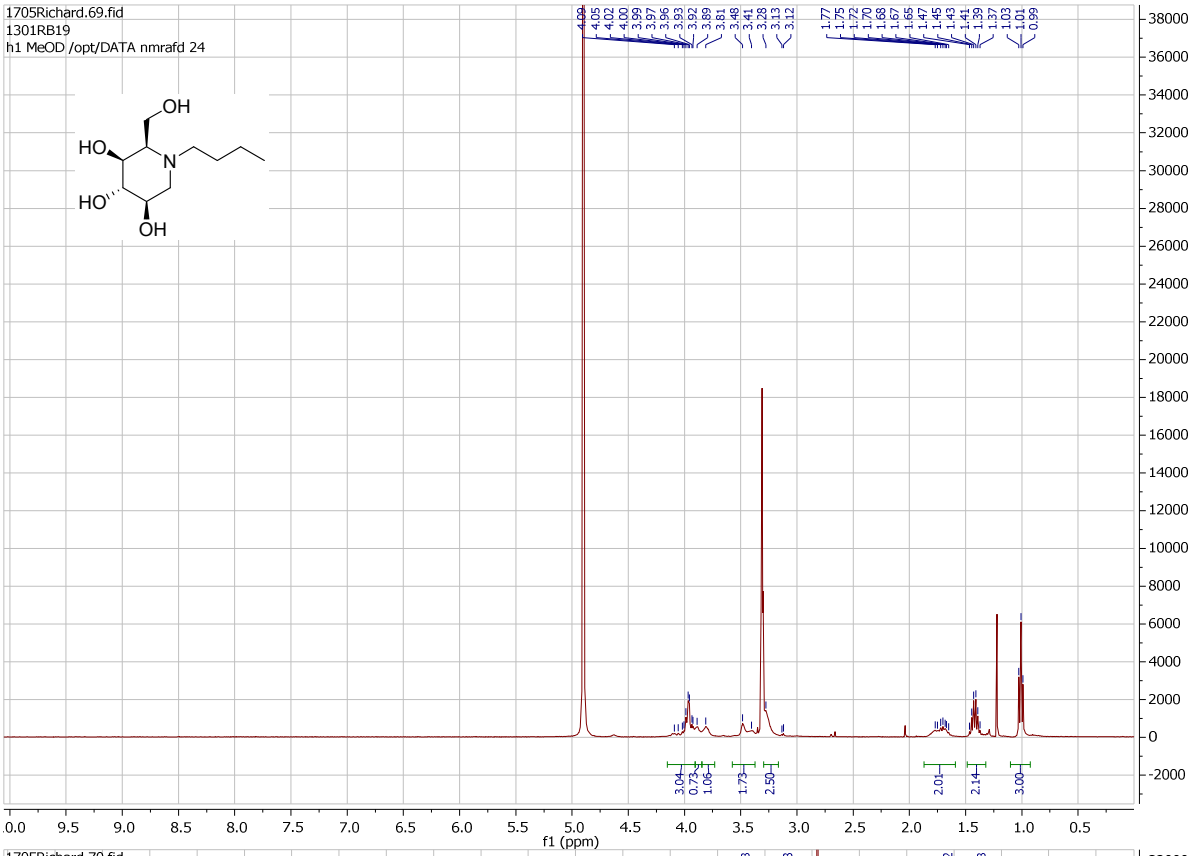


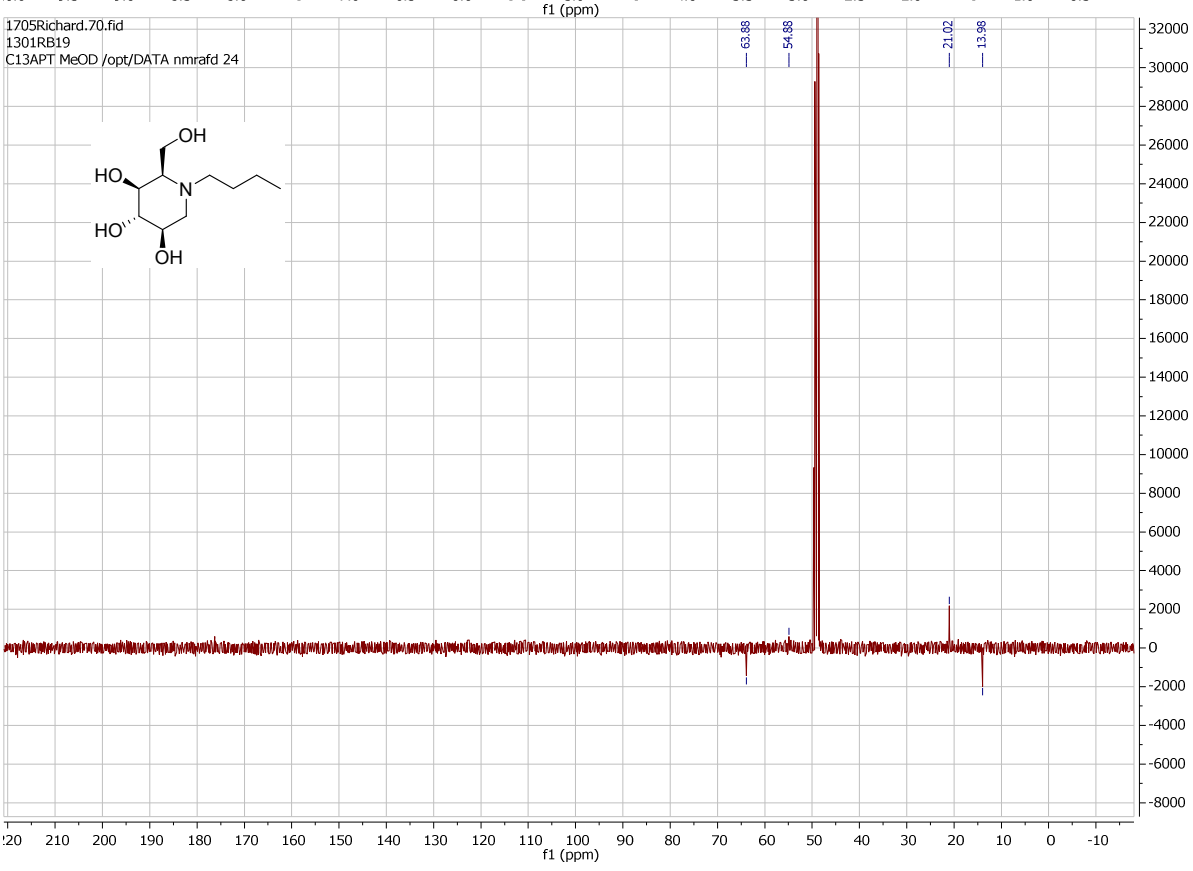


^{1}H-NMR and ^{13}C-NMR of compound C51.TFA in MeOD.

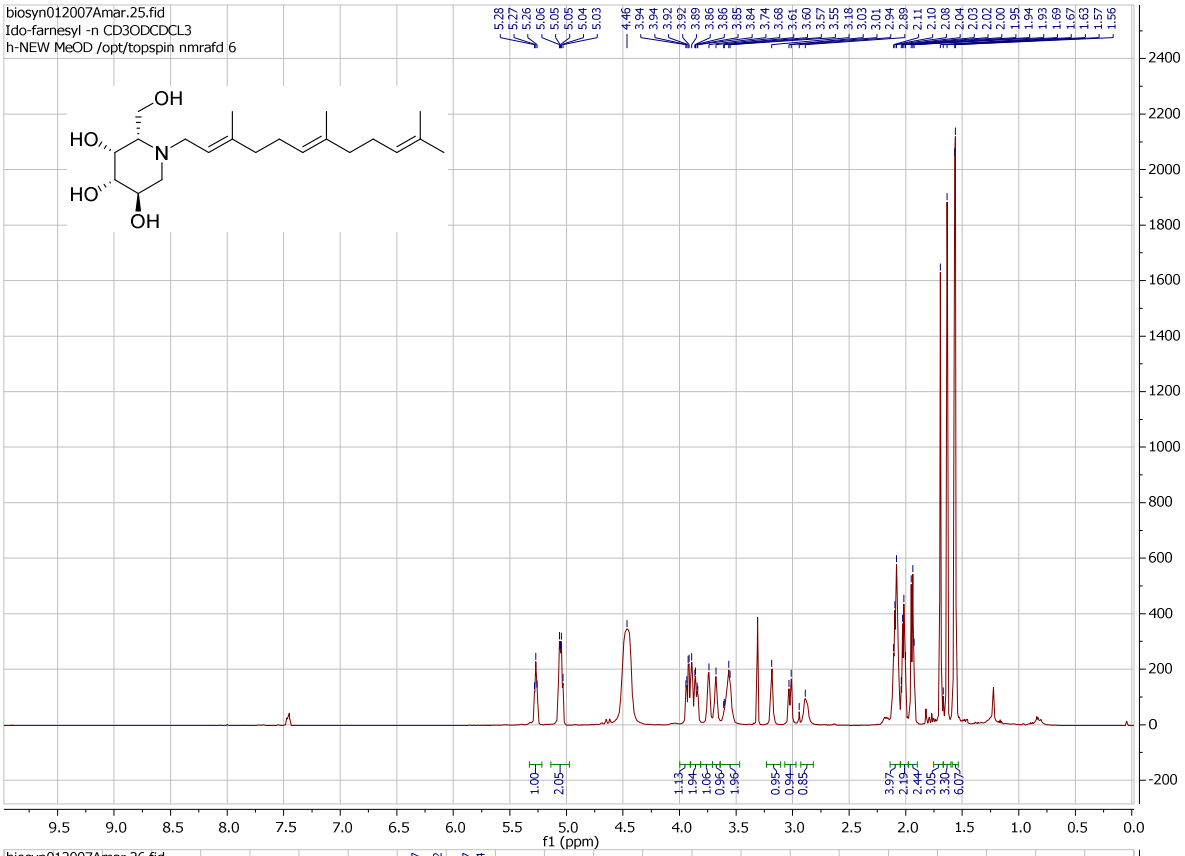


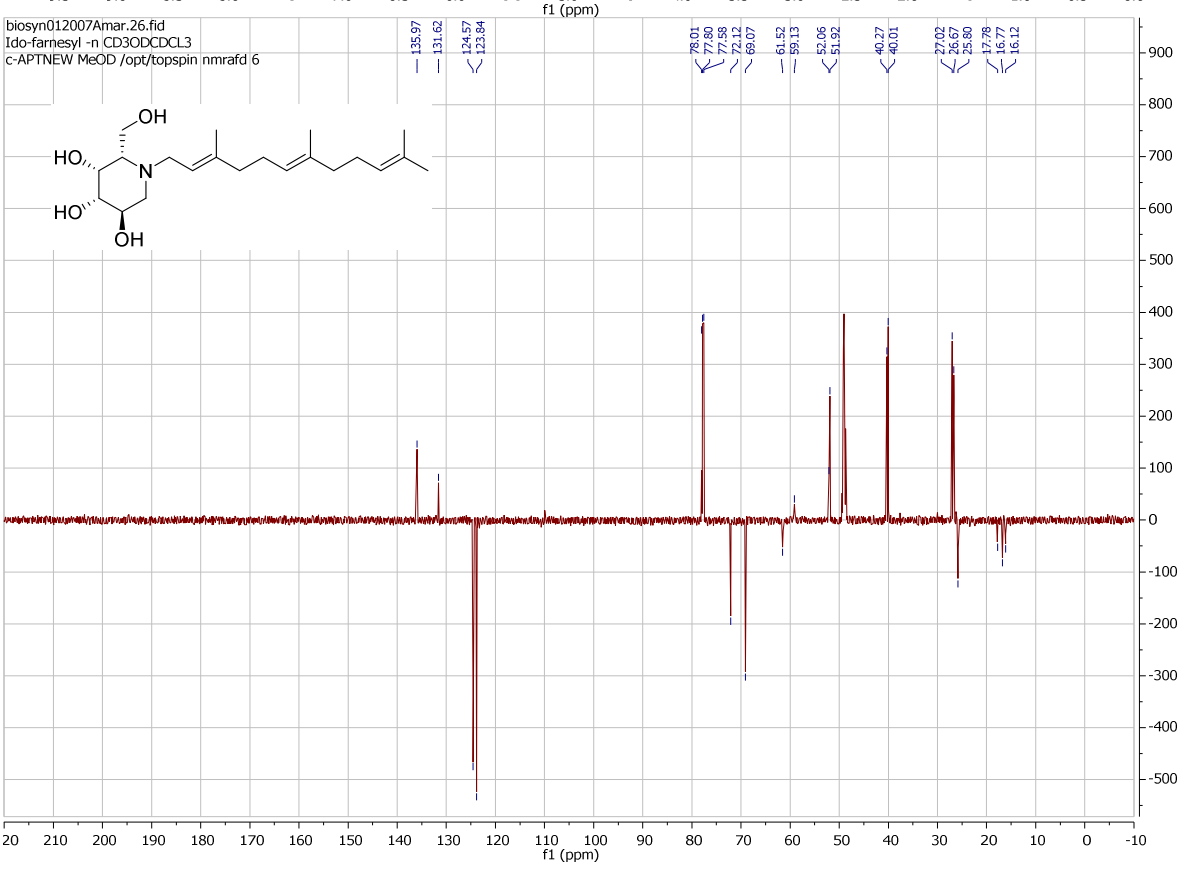
^{1}H-NMR and ^{13}C-NMR of compound C53.TFA in MeOD.



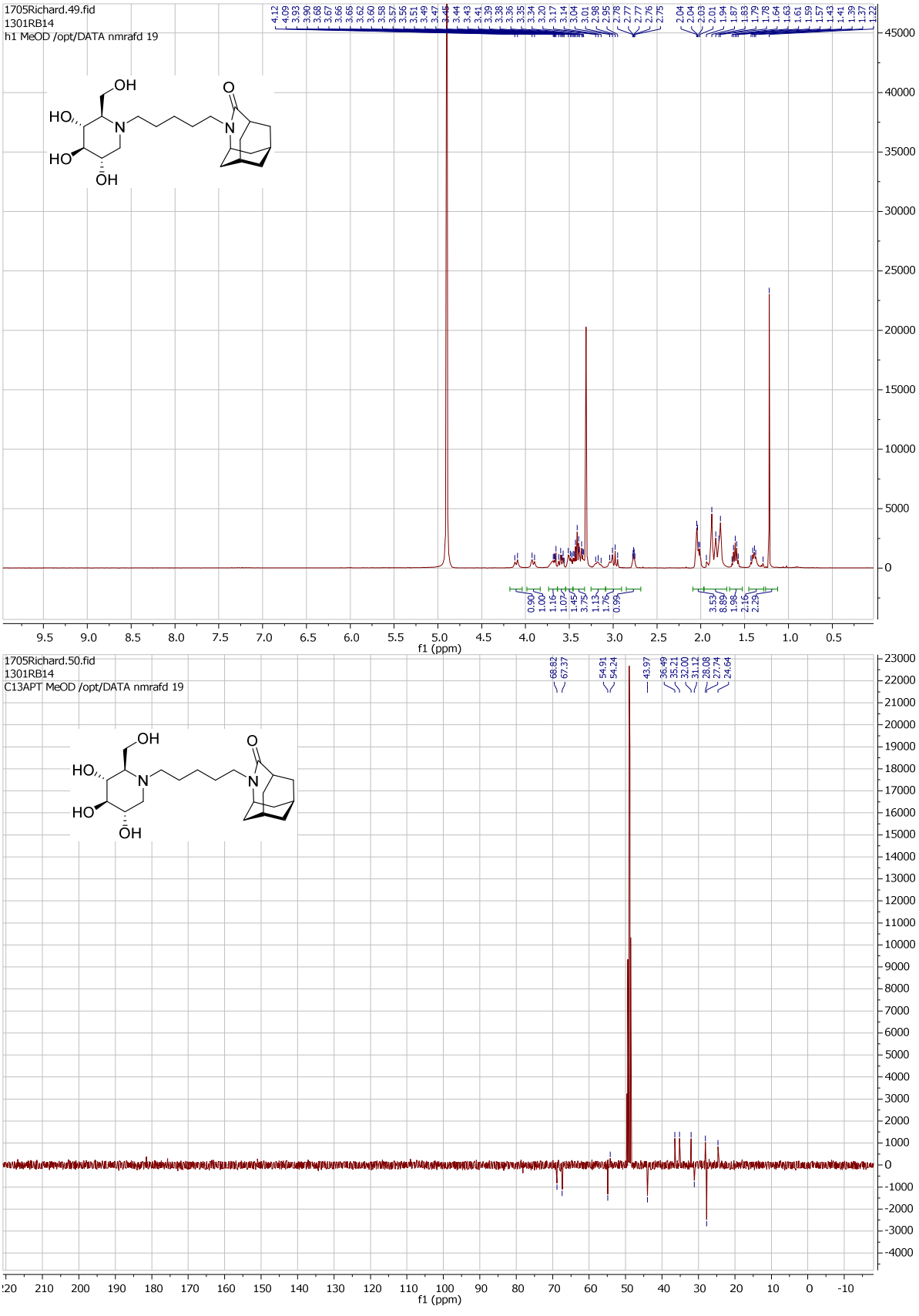


^{1}H-NMR and ^{13}C-NMR of compound C54.TFA in MeOD/$CDCl_3$.

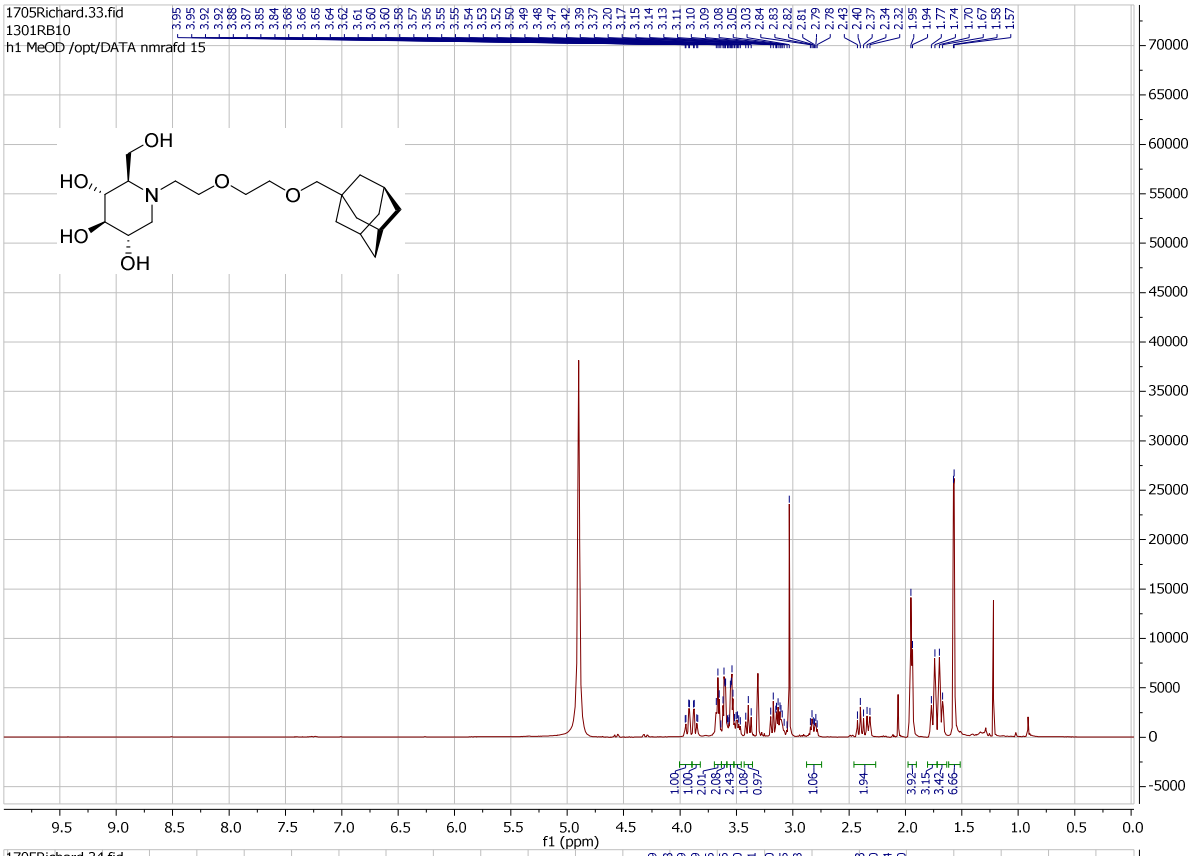


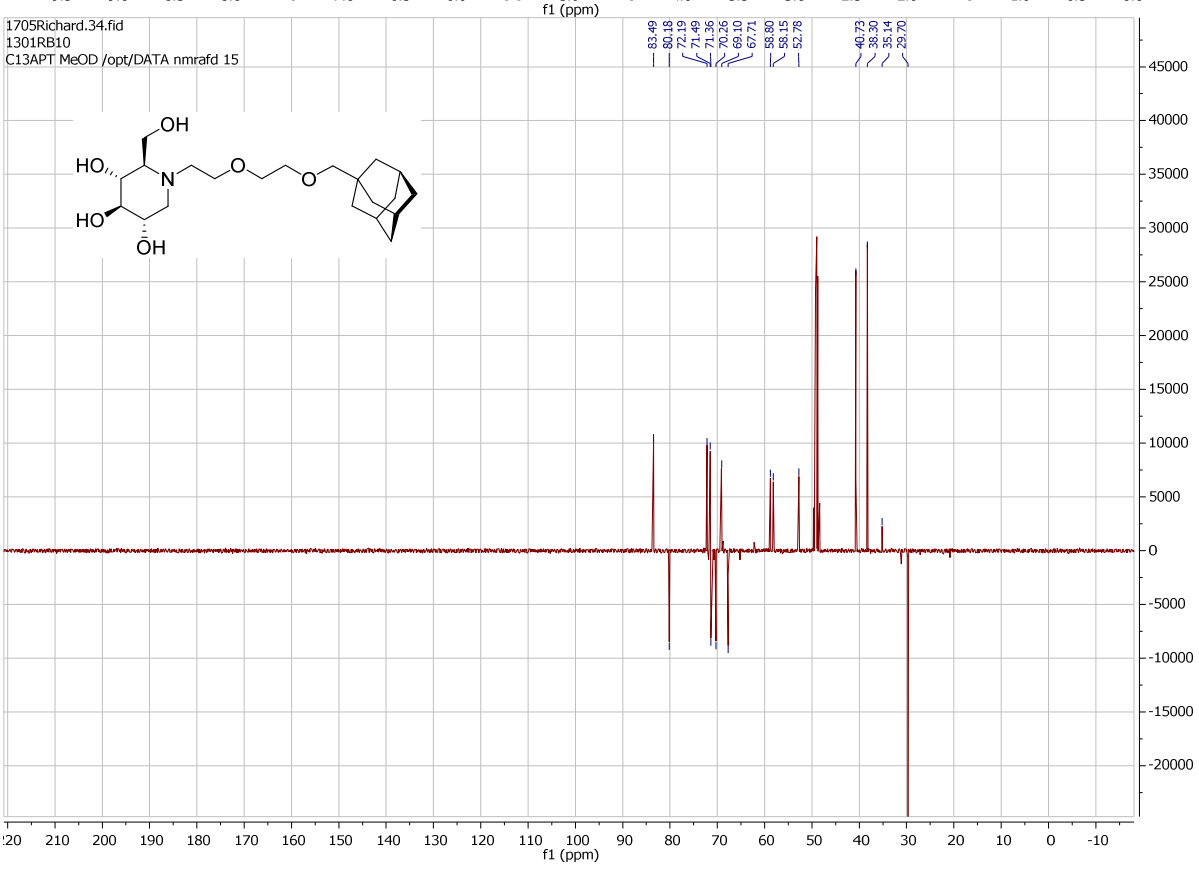


^{1}H-NMR and ^{13}C-NMR of compound C76.TFA in MeOD.

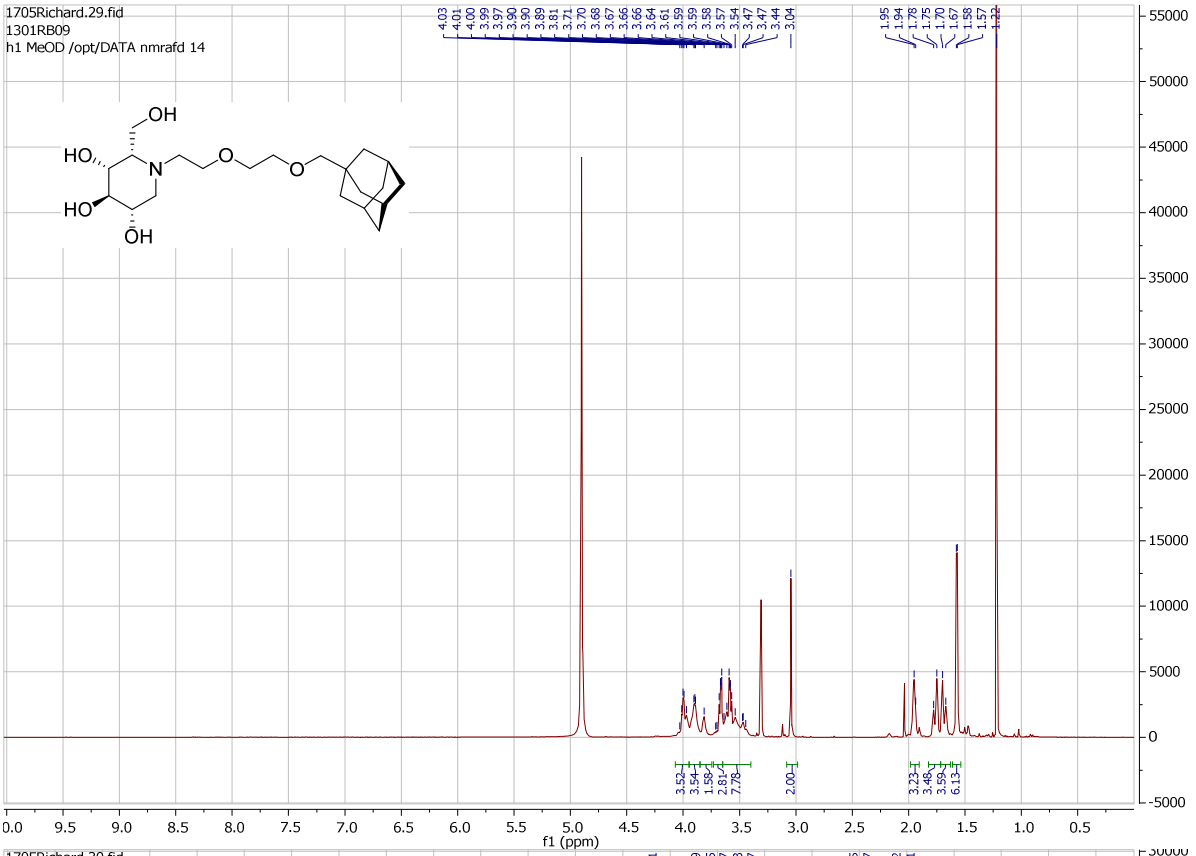


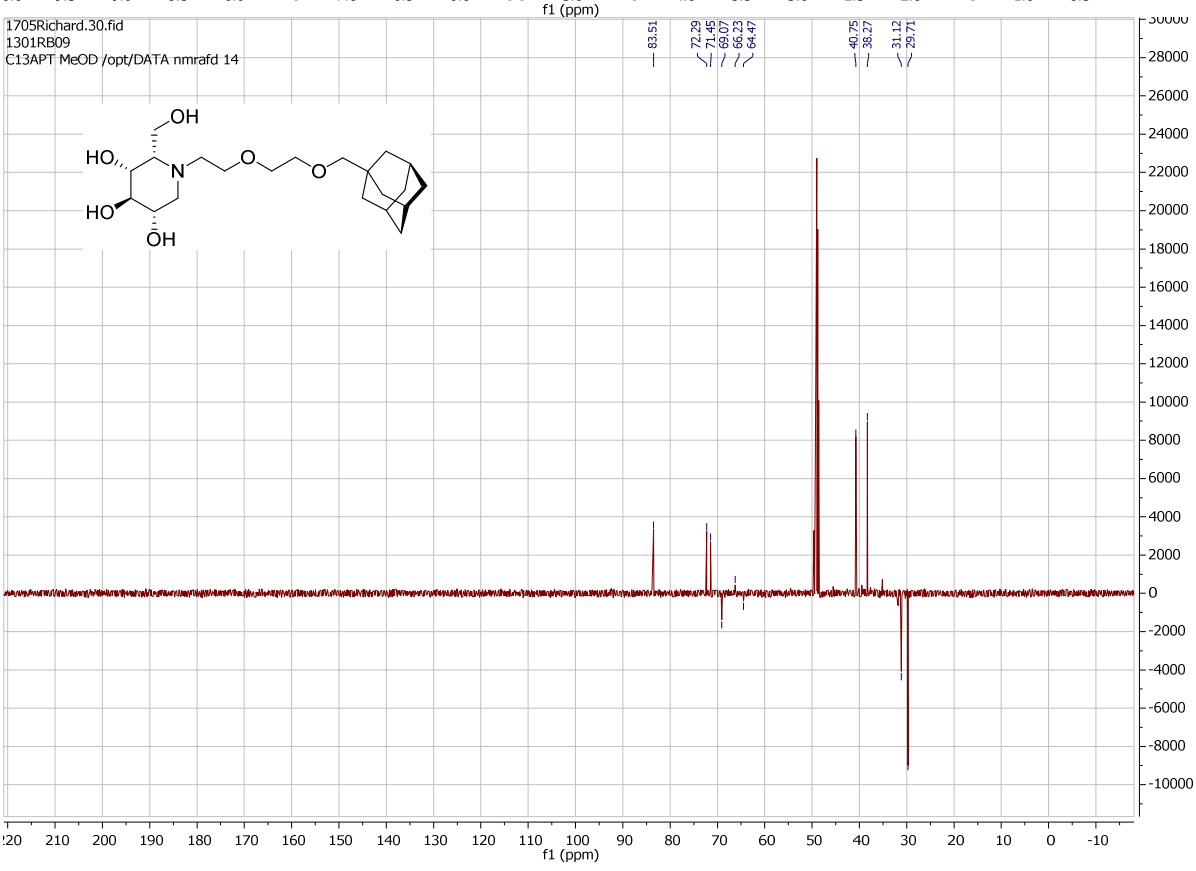
^{1}H-NMR and ^{13}C-NMR of compound C83.TFA in MeOD.



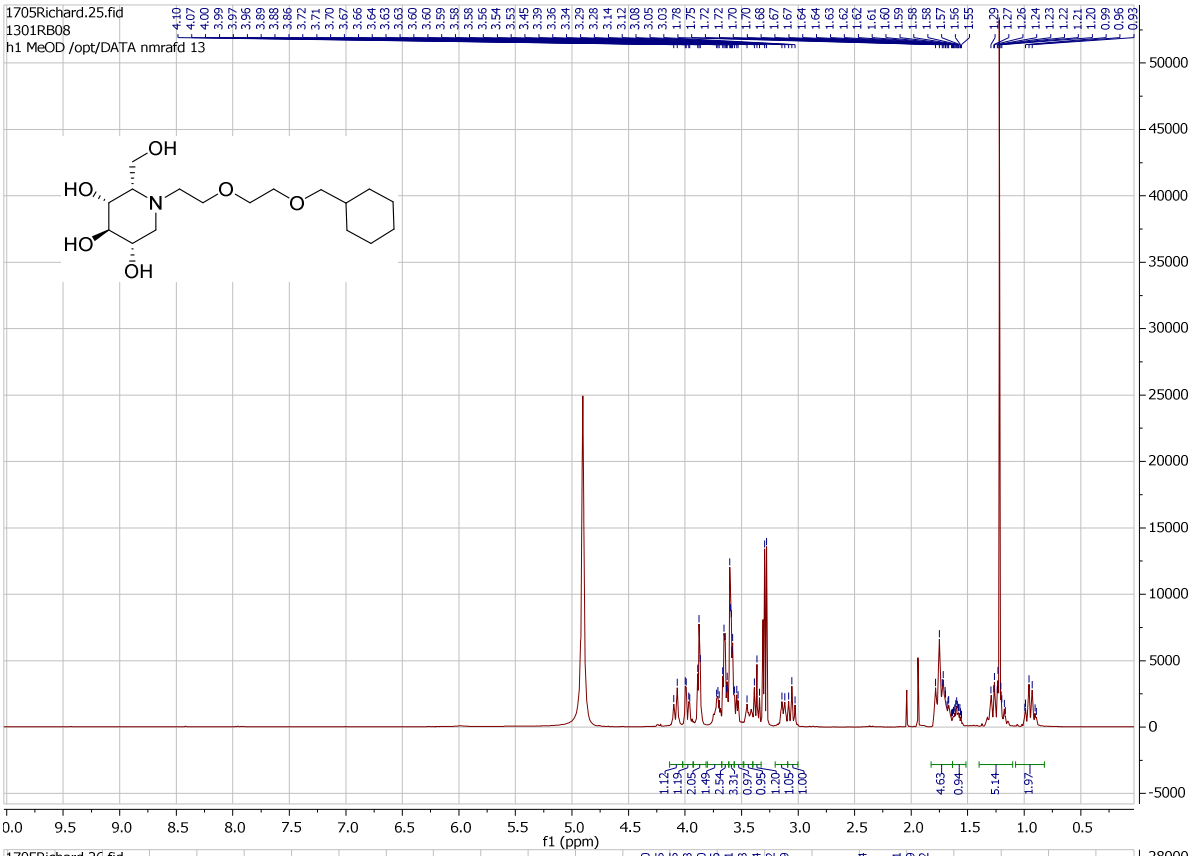


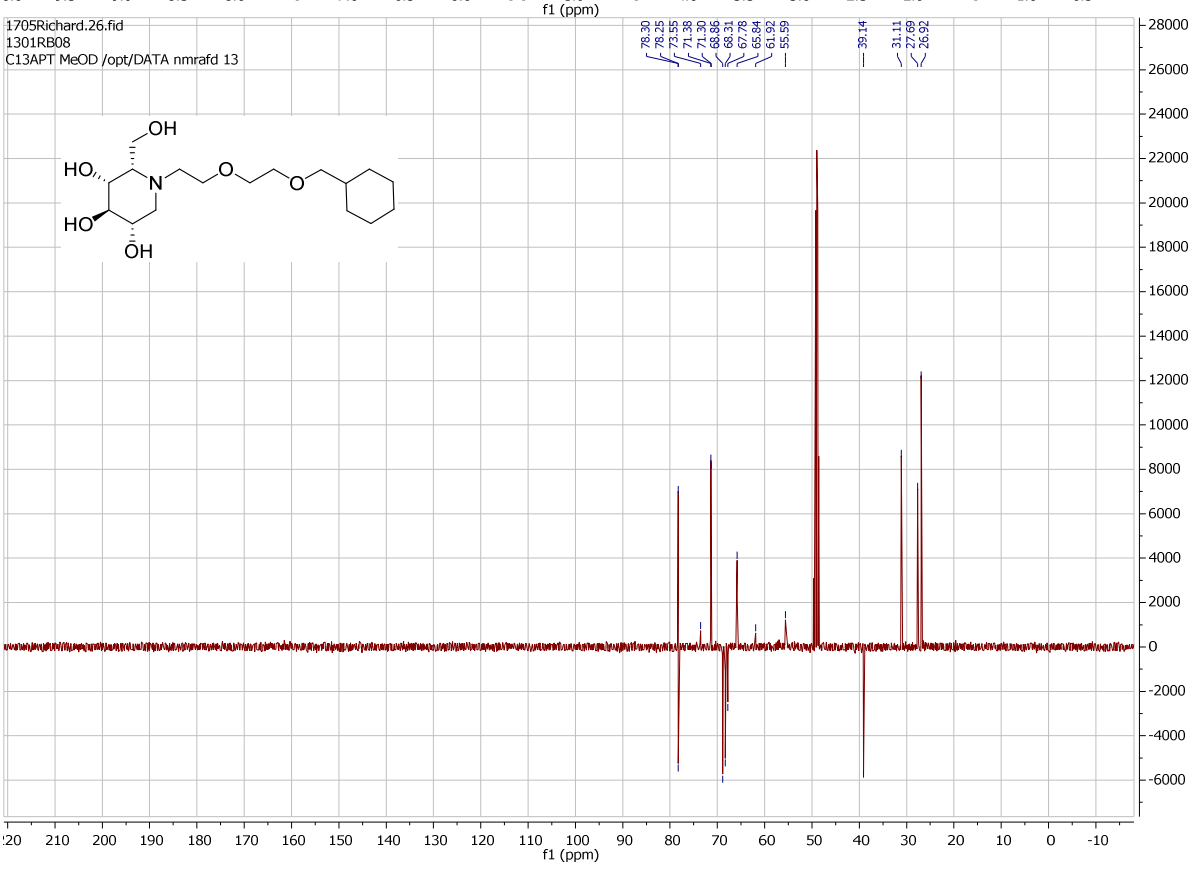
^{1}H-NMR and ^{13}C-NMR of compound C85.TFA in MeOD.



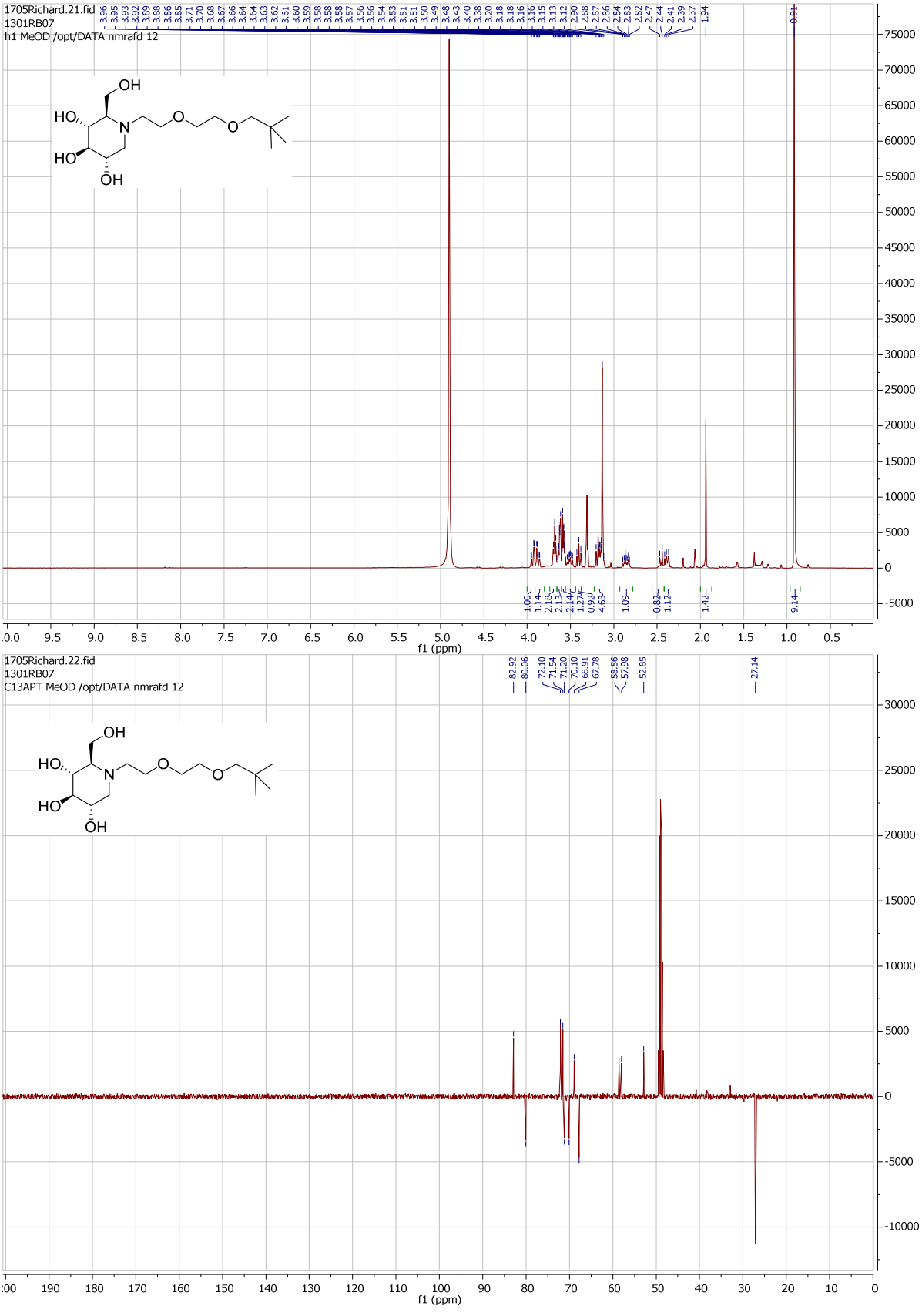


^{1}H-NMR and ^{13}C-NMR of compound C87.TFA in MeOD.

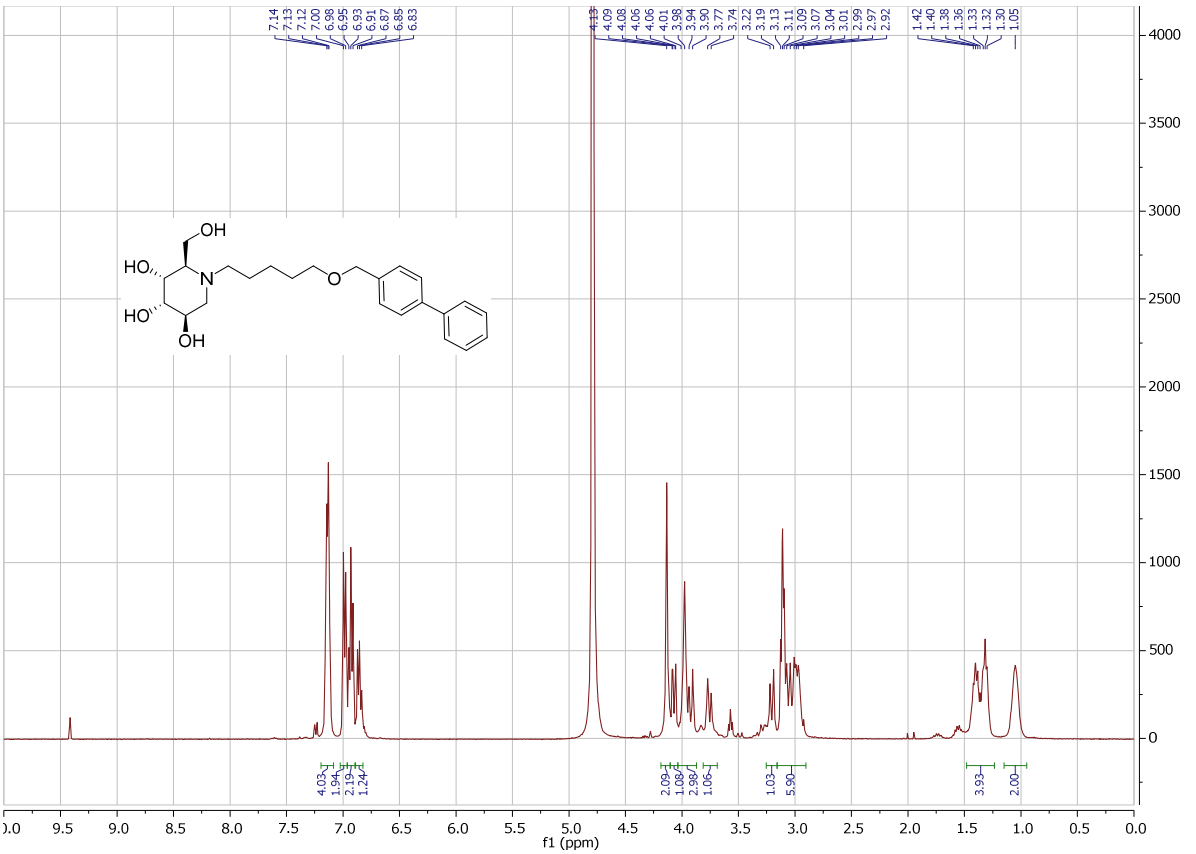


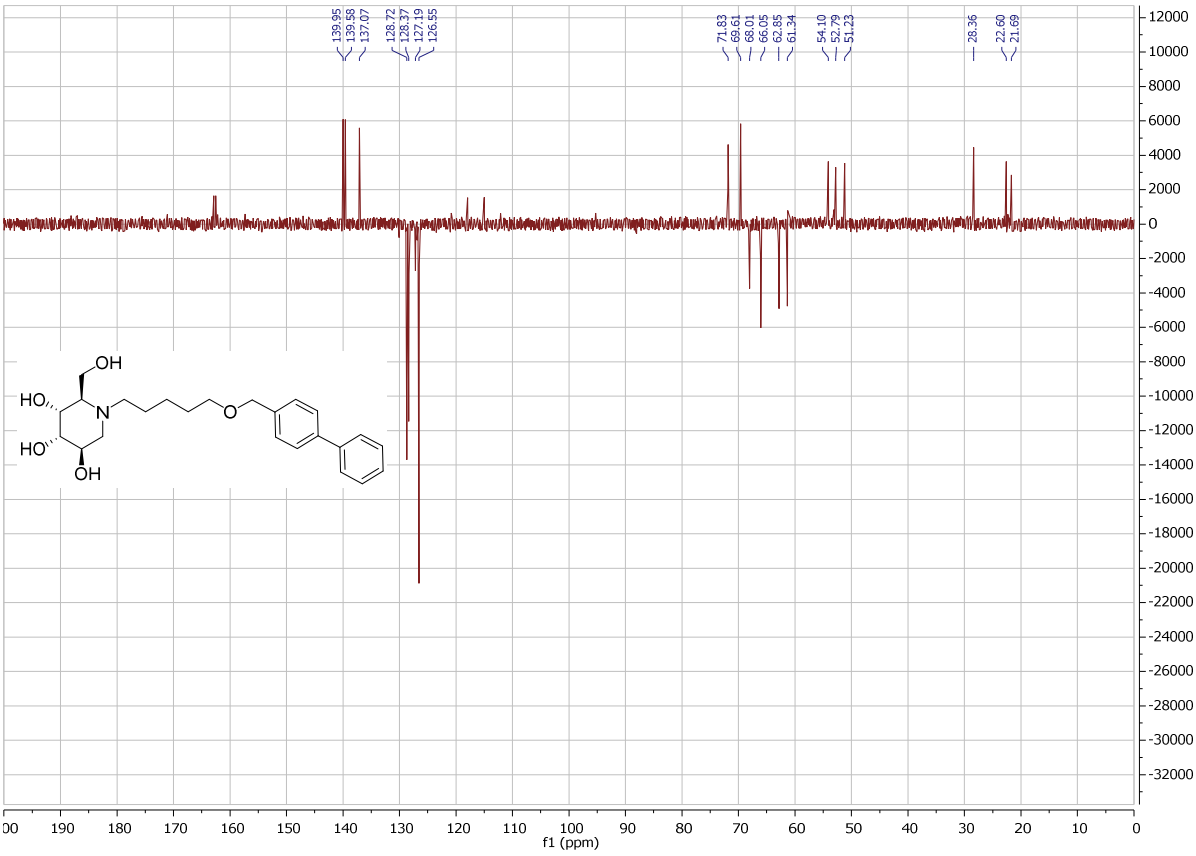


^{1}H-NMR and ^{13}C-NMR of compound C89.TFA in MeOD.

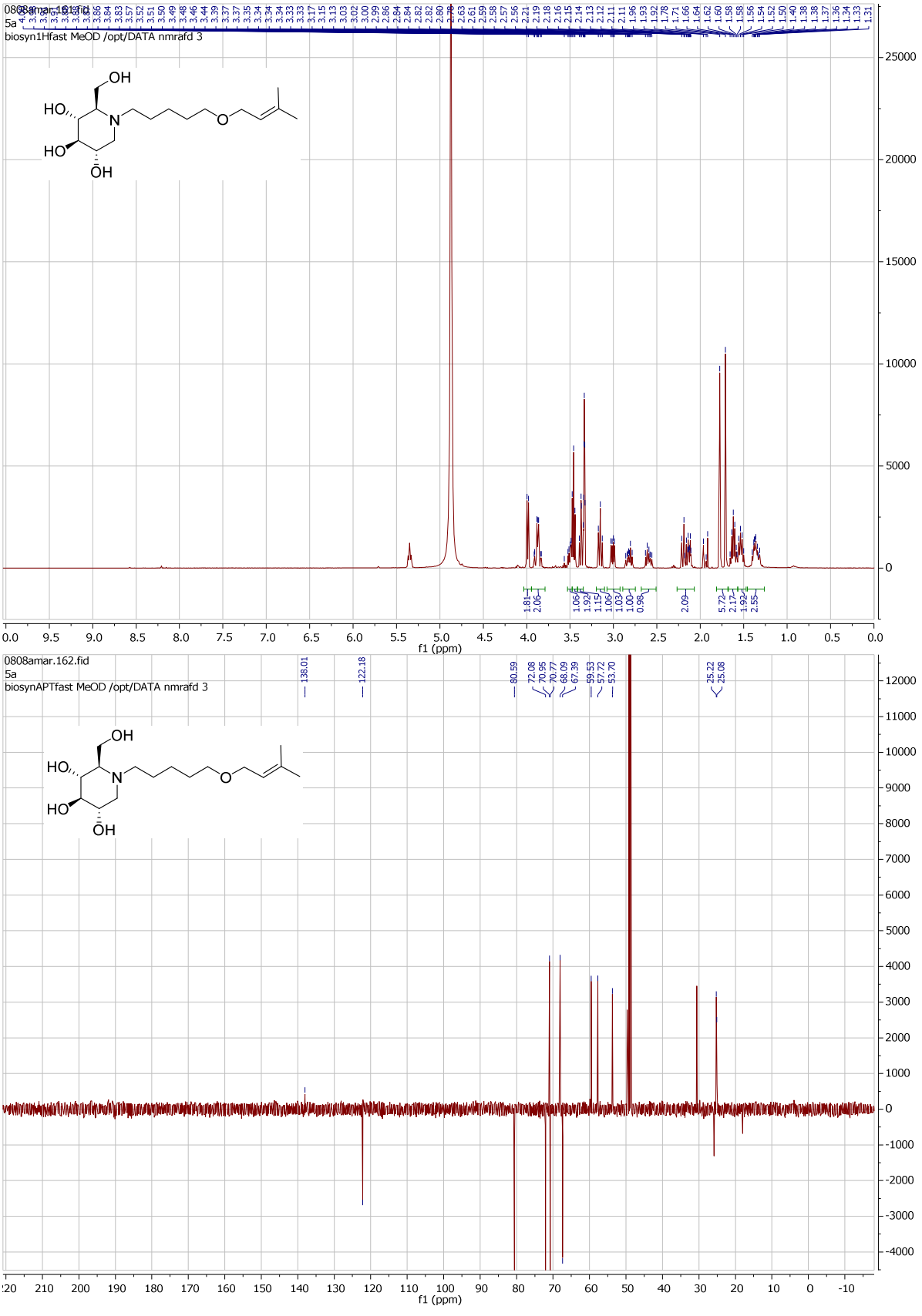


^{1}H-NMR and ^{13}C-NMR of compound C95.TFA in D_2O.

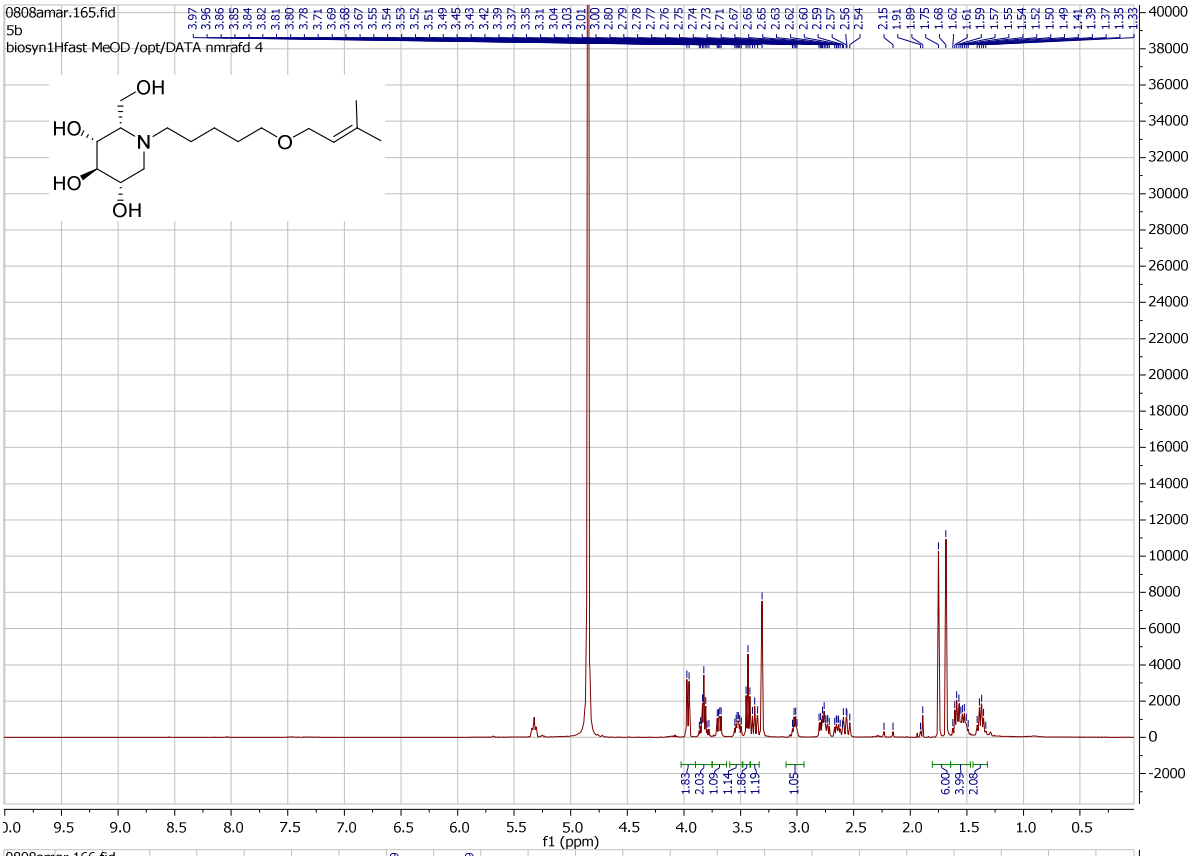


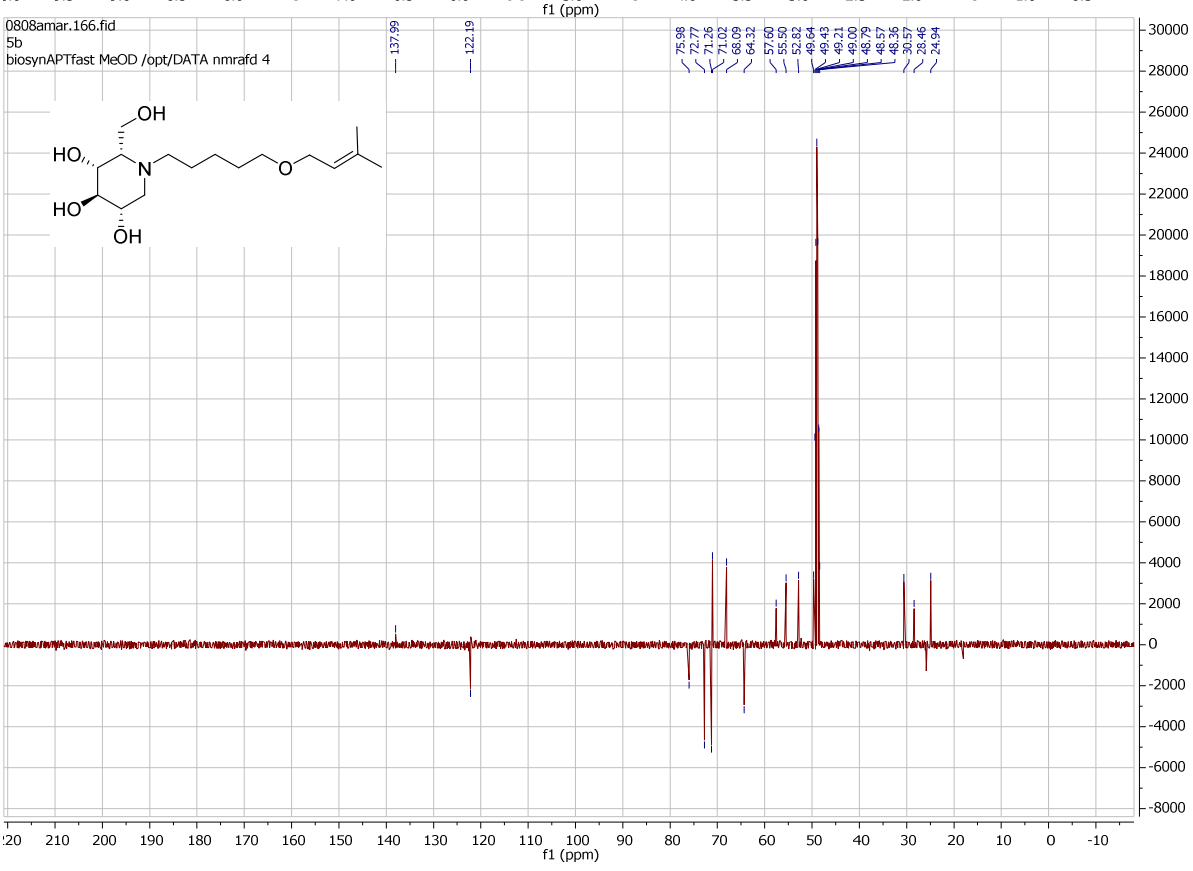


^{1}H-NMR and ^{13}C-NMR of compound C100.TFA in MeOD.

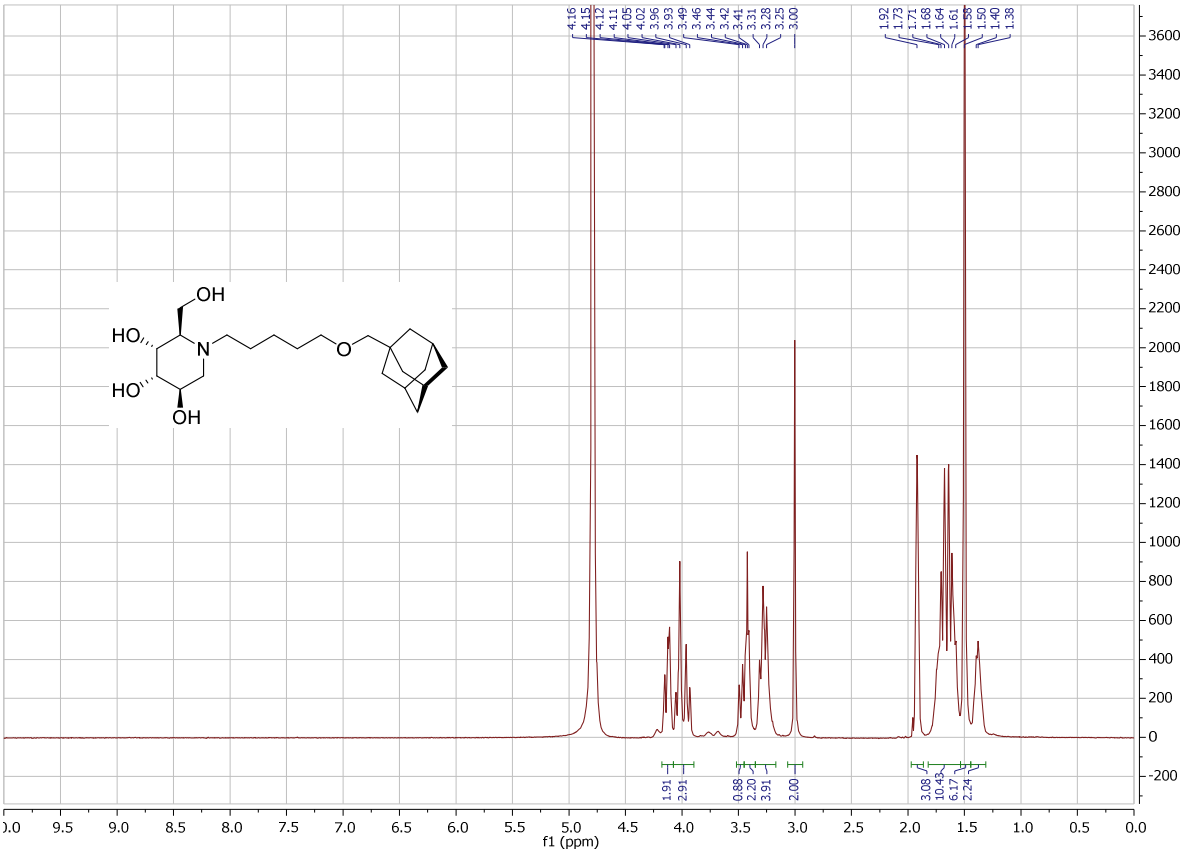


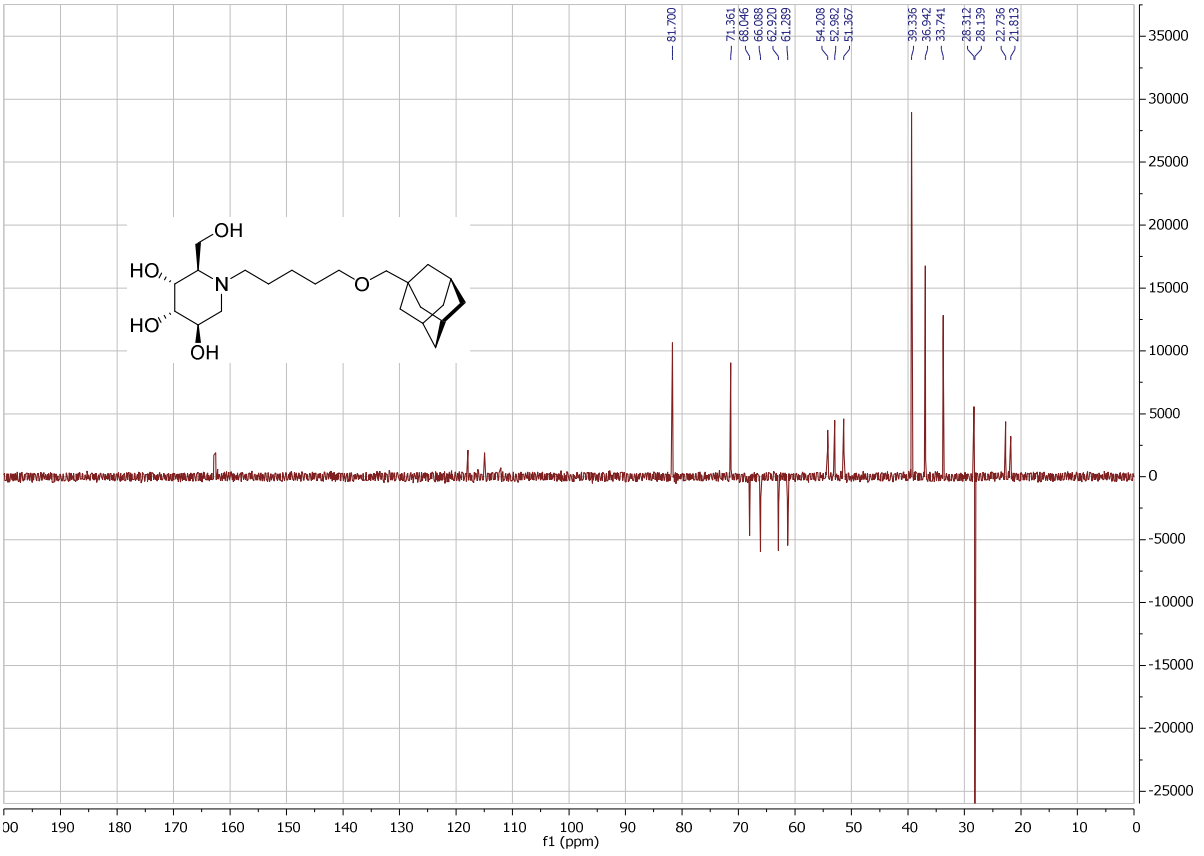
^{1}H-NMR and ^{13}C-NMR of compound C102.TFA in MeOD.



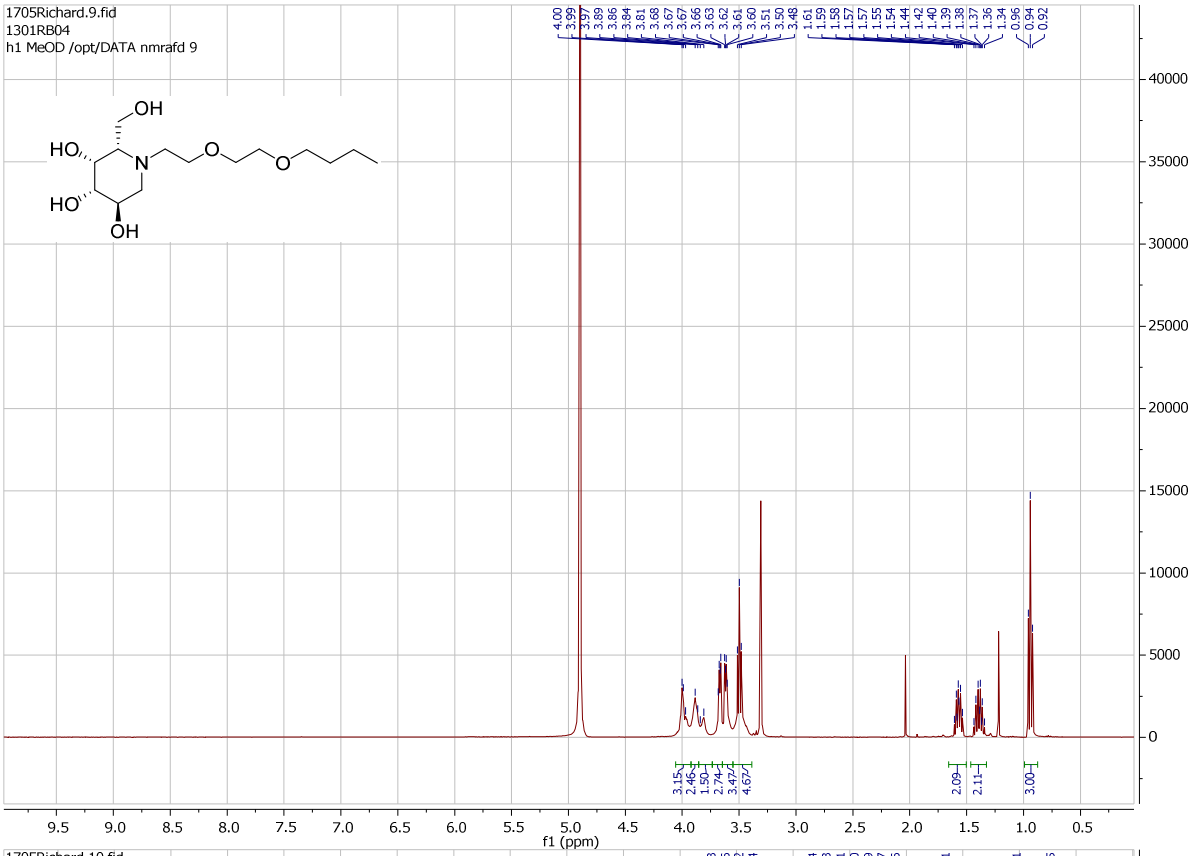


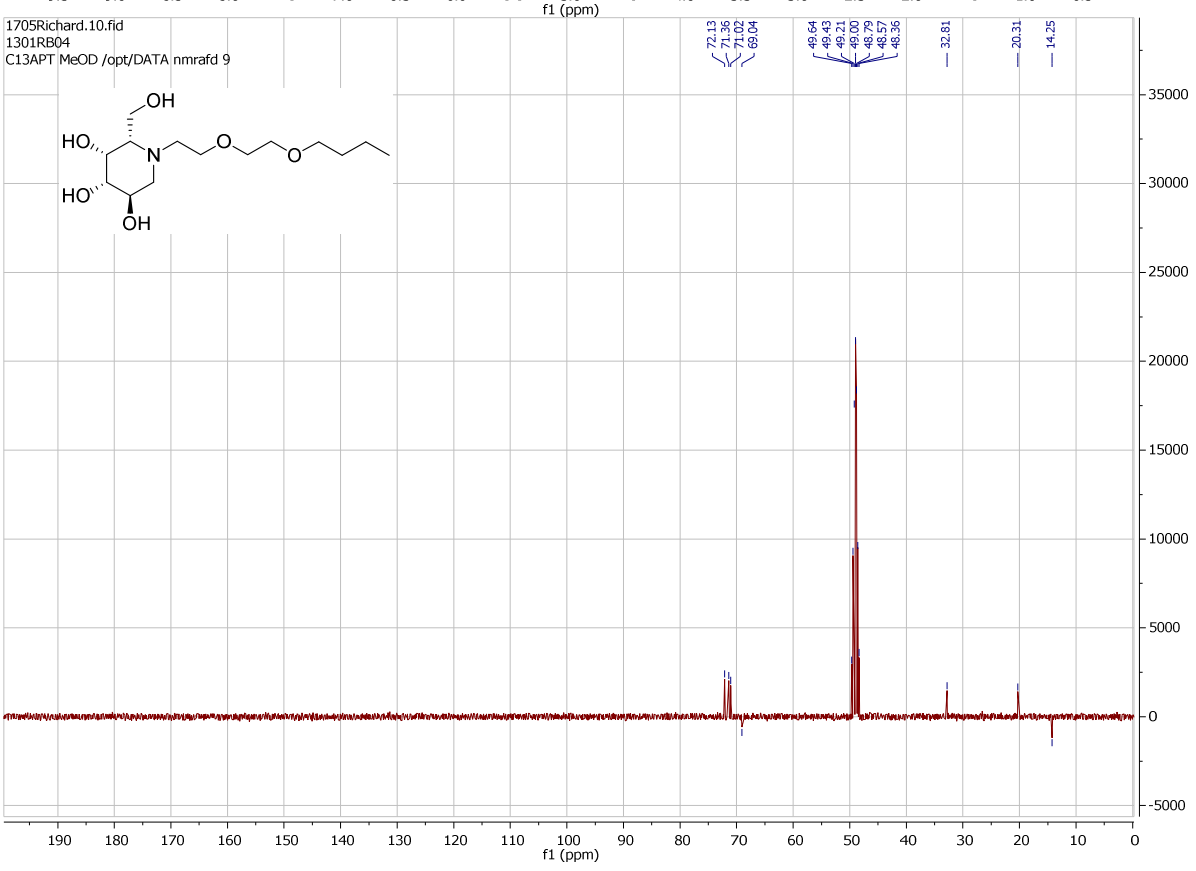
^{1}H-NMR and ^{13}C-NMR of compound C105.TFA in D_2O.



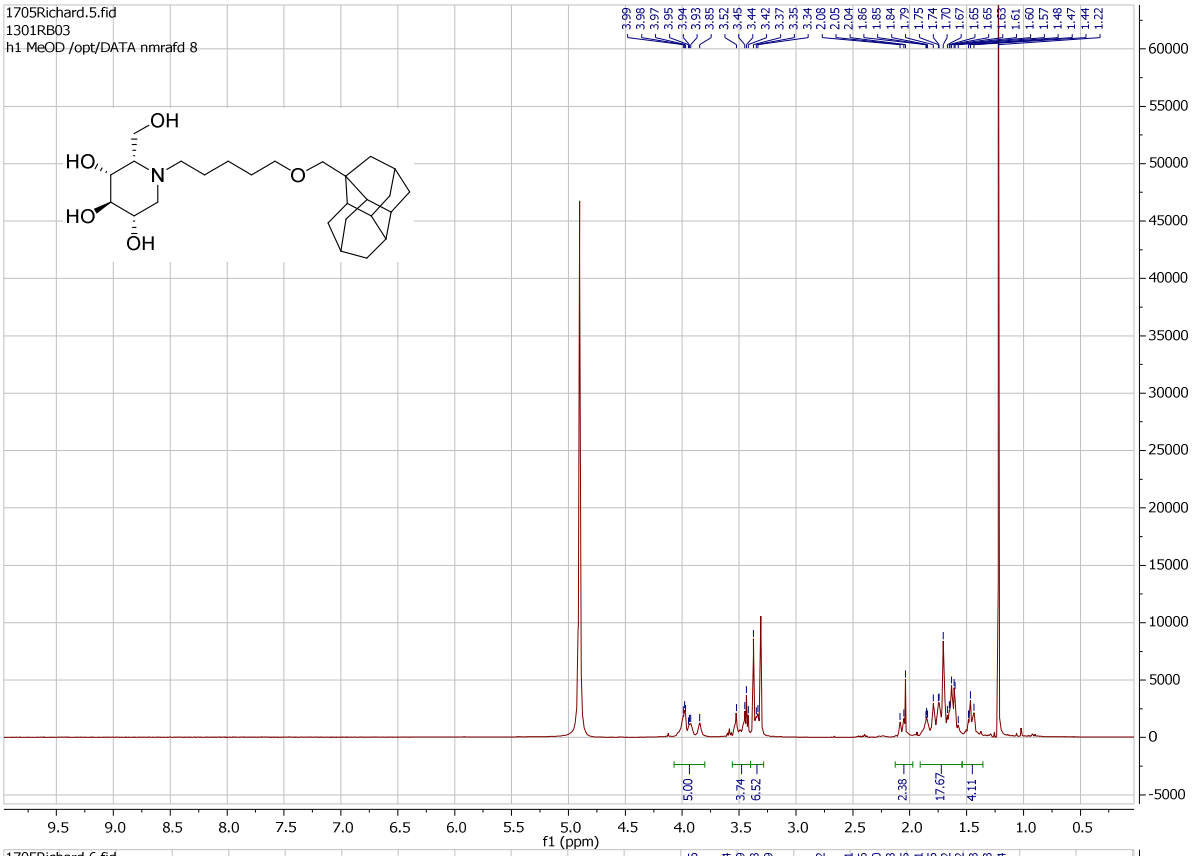


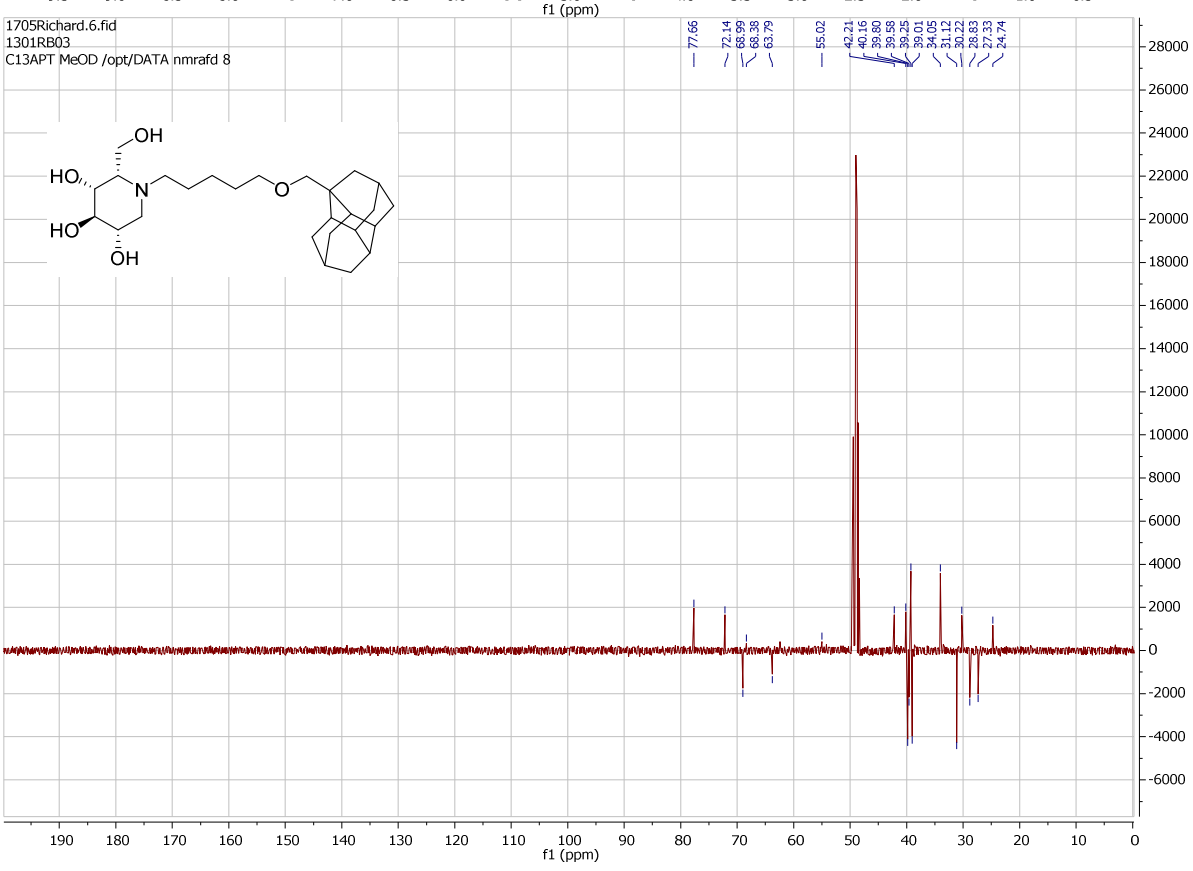
^{1}H-NMR and ^{13}C-NMR of compound C107.TFA in MeOD.



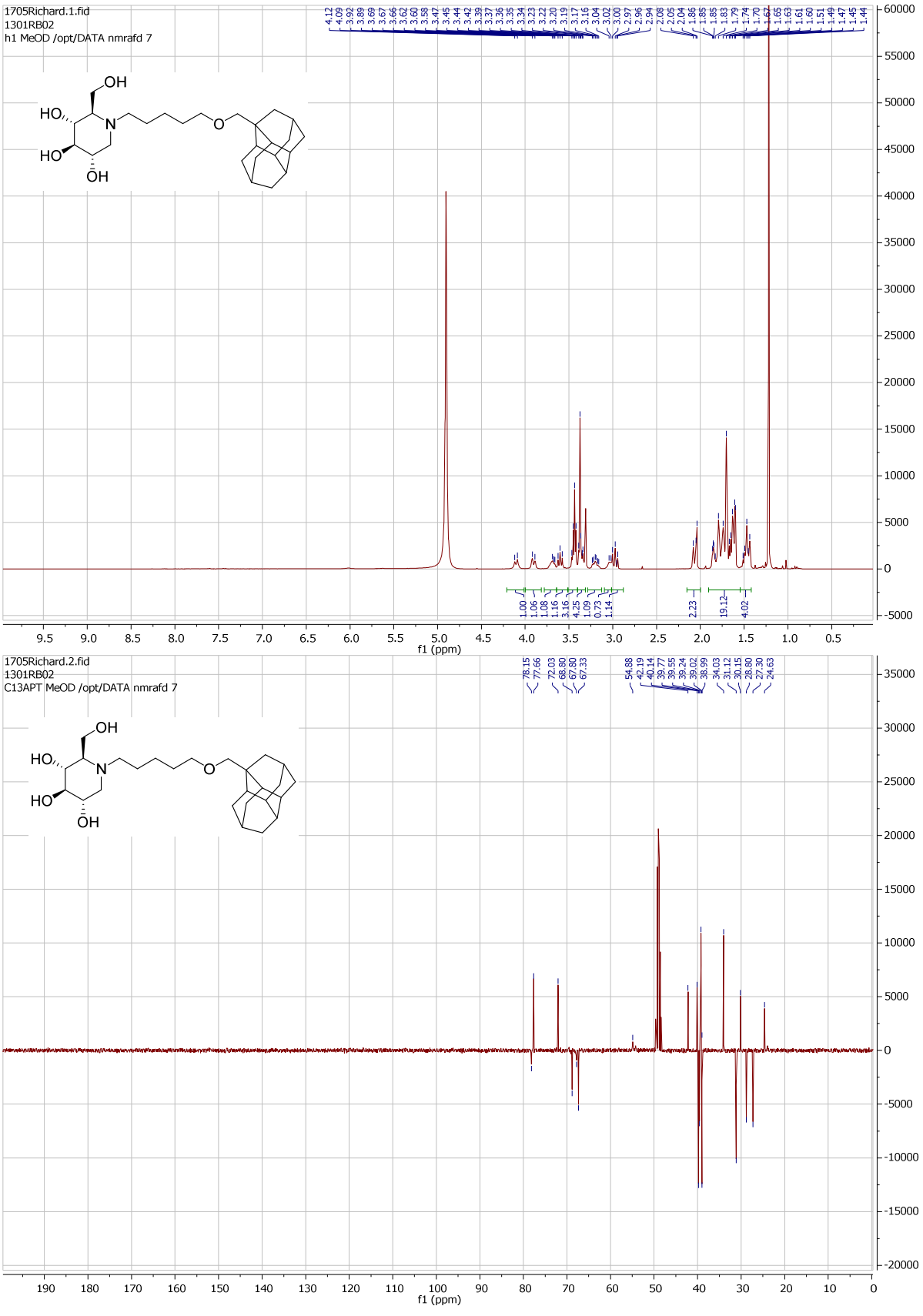


^{1}H-NMR and ^{13}C-NMR of compound C109.TFA in MeOD.

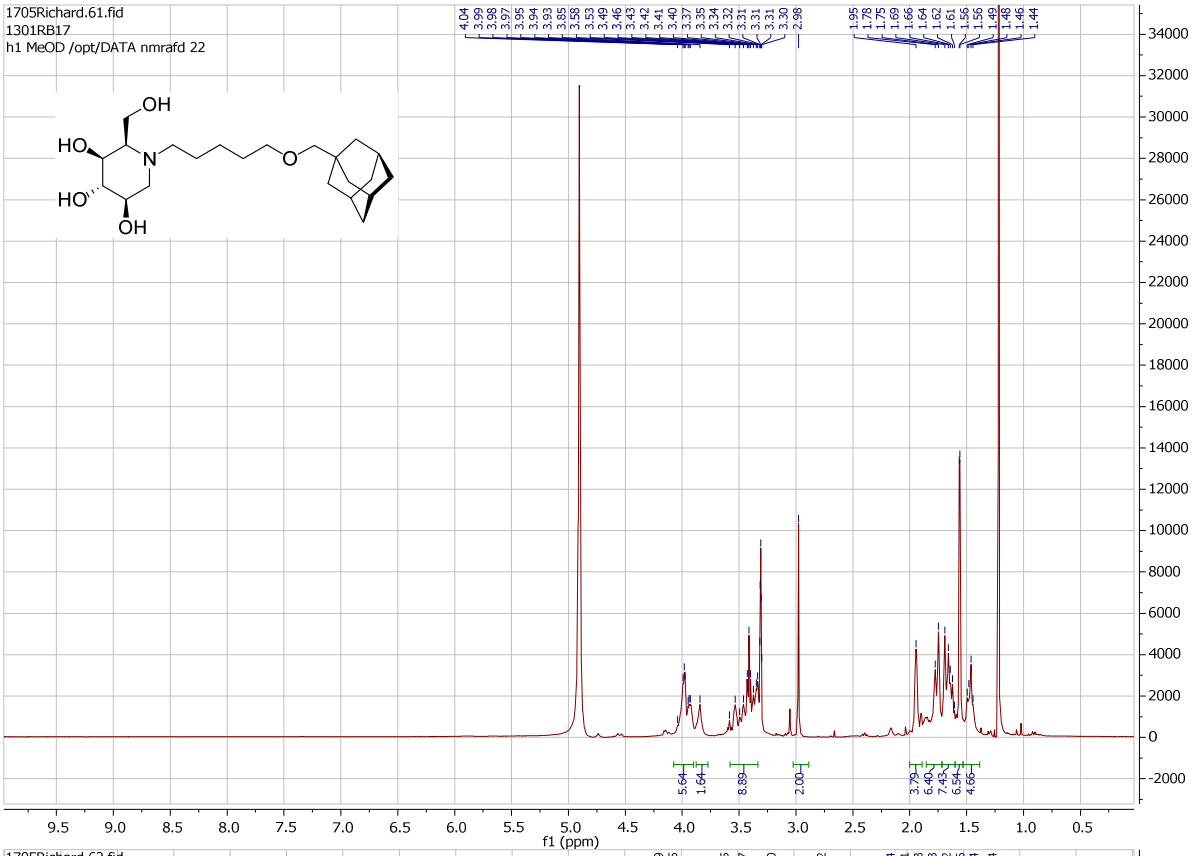


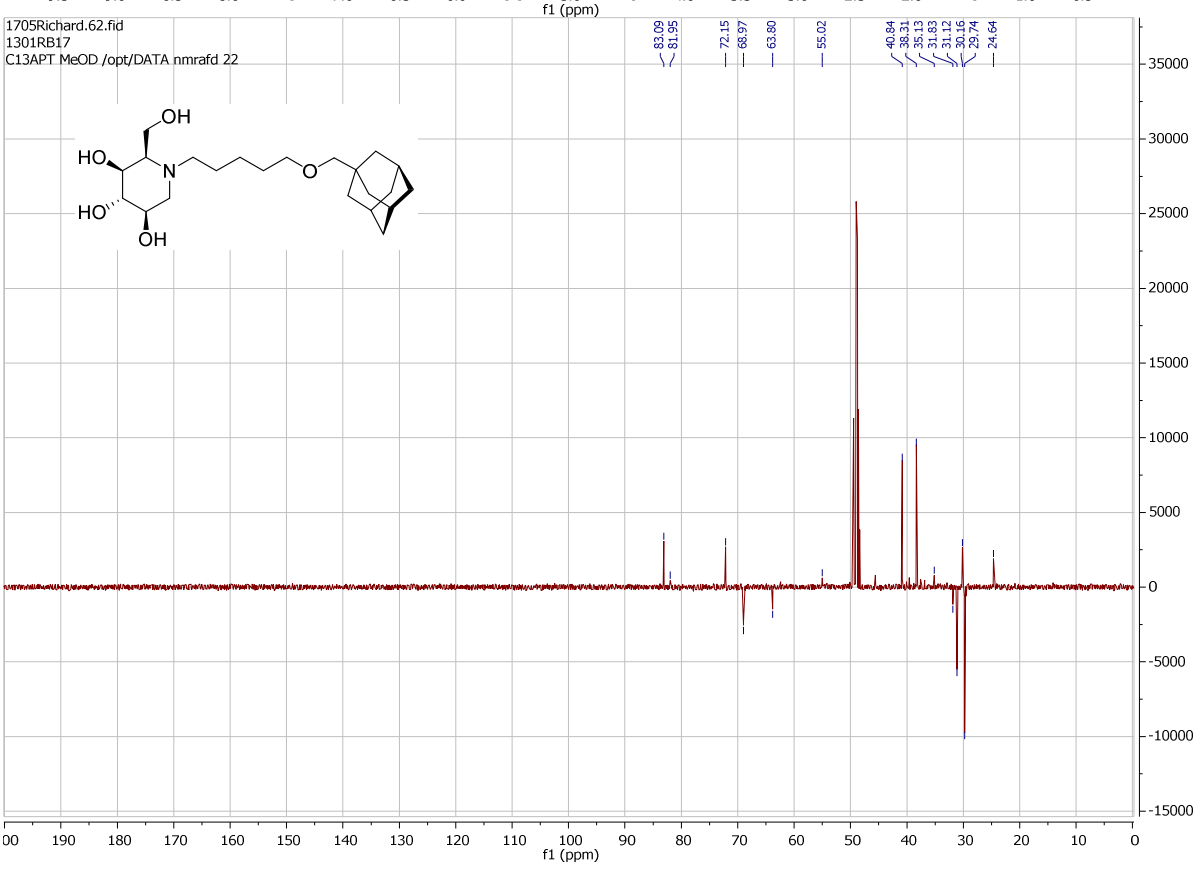


^{1}H-NMR and ^{13}C-NMR of compound C111.TFA in MeOD.

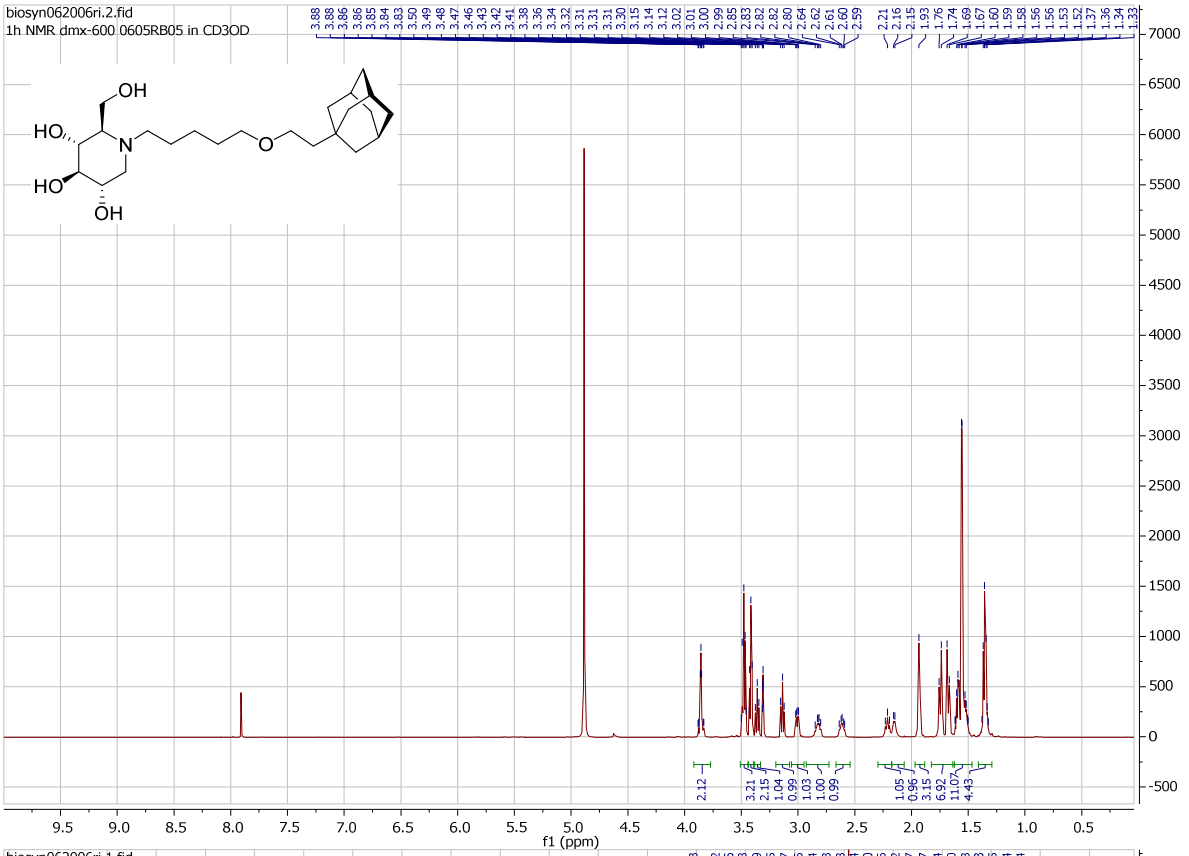


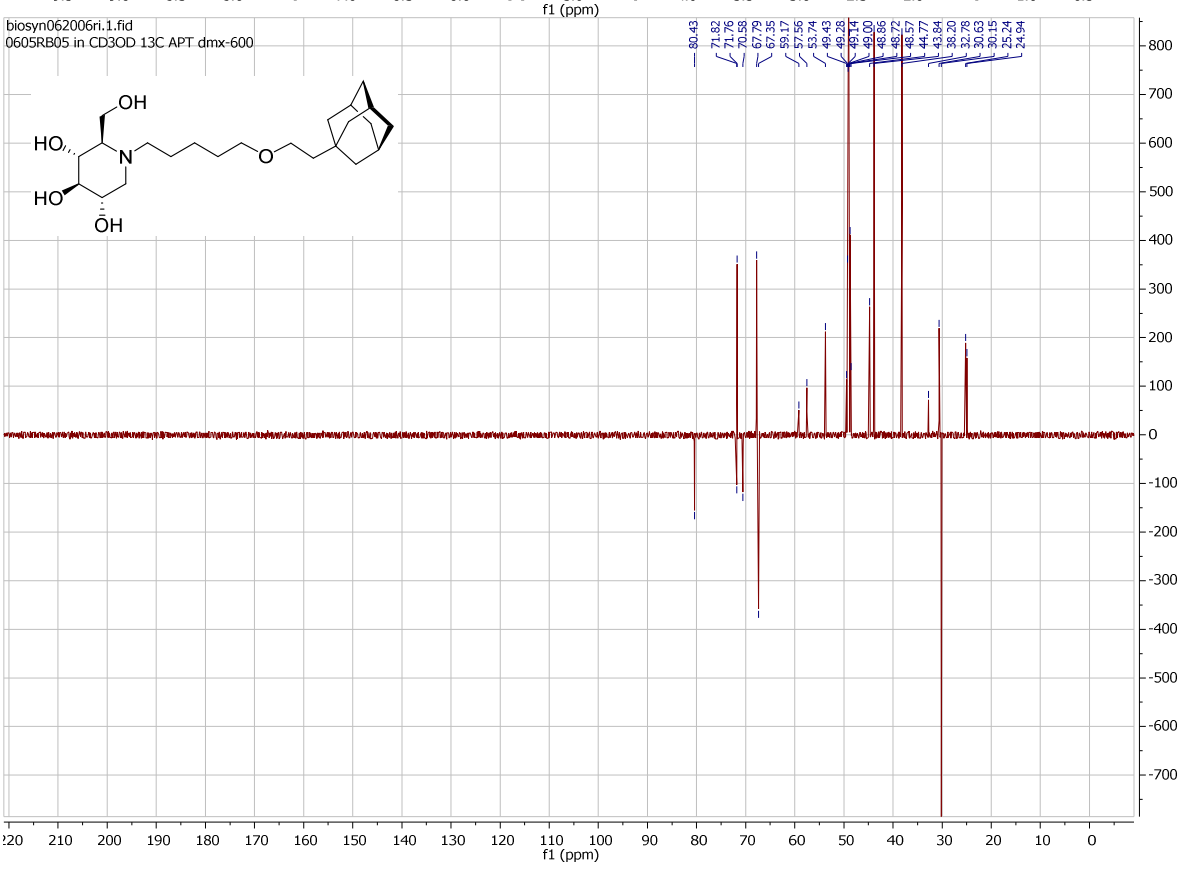
^{1}H-NMR and ^{13}C-NMR of compound C124.TFA in MeOD.



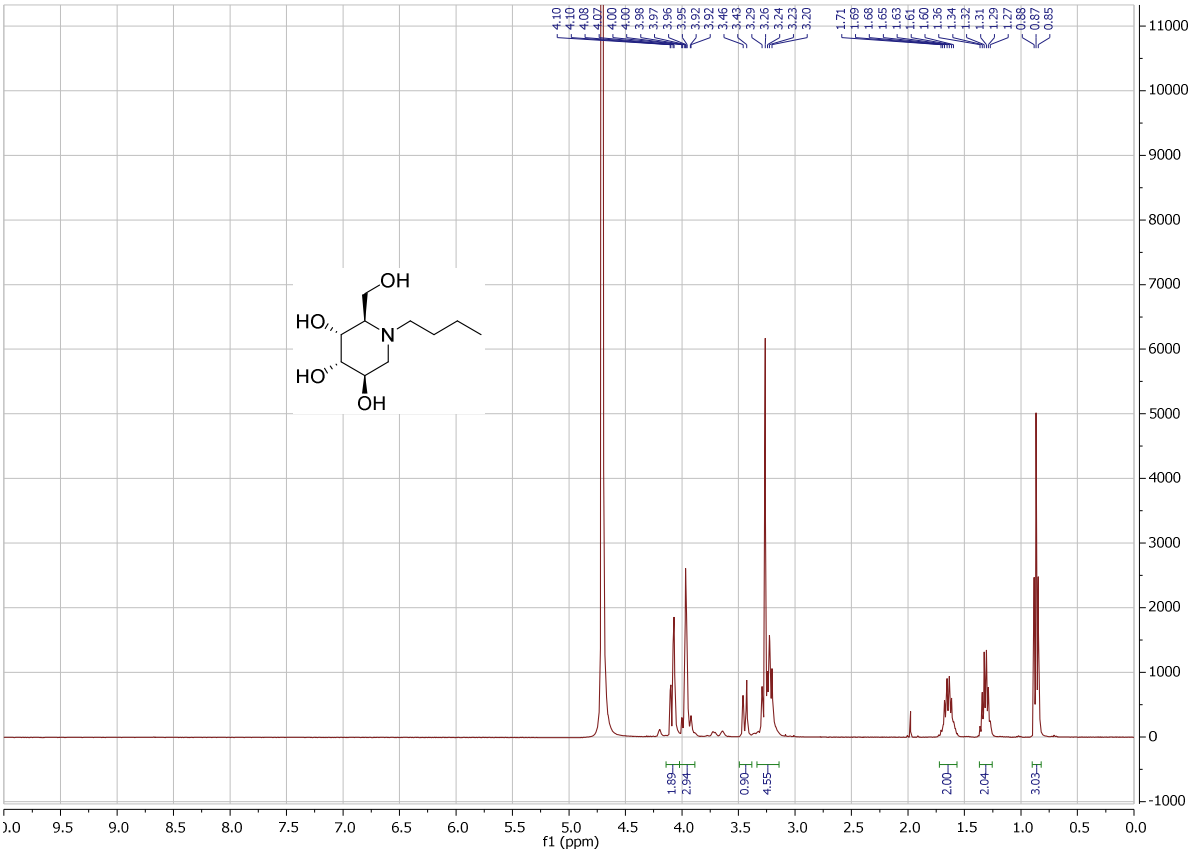


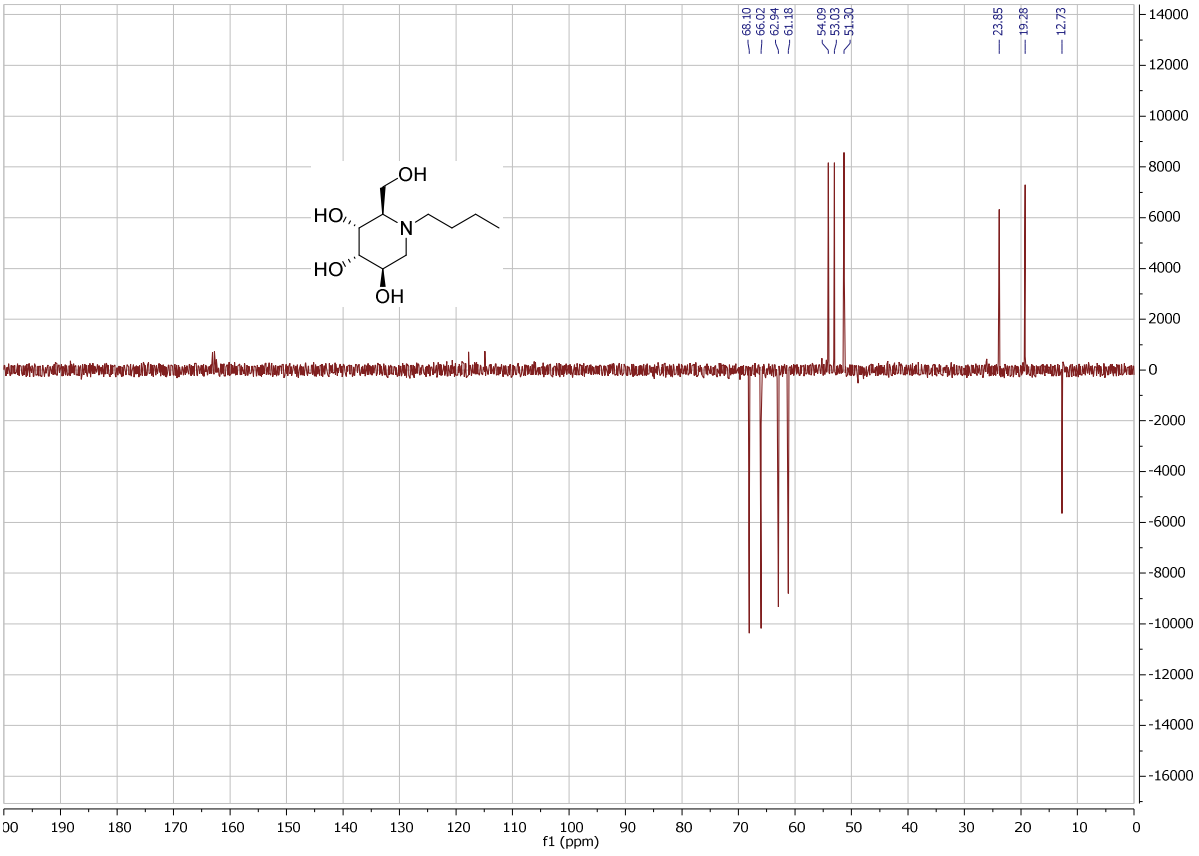
^{1}H-NMR and ^{13}C-NMR of compound C170.TFA in MeOD.



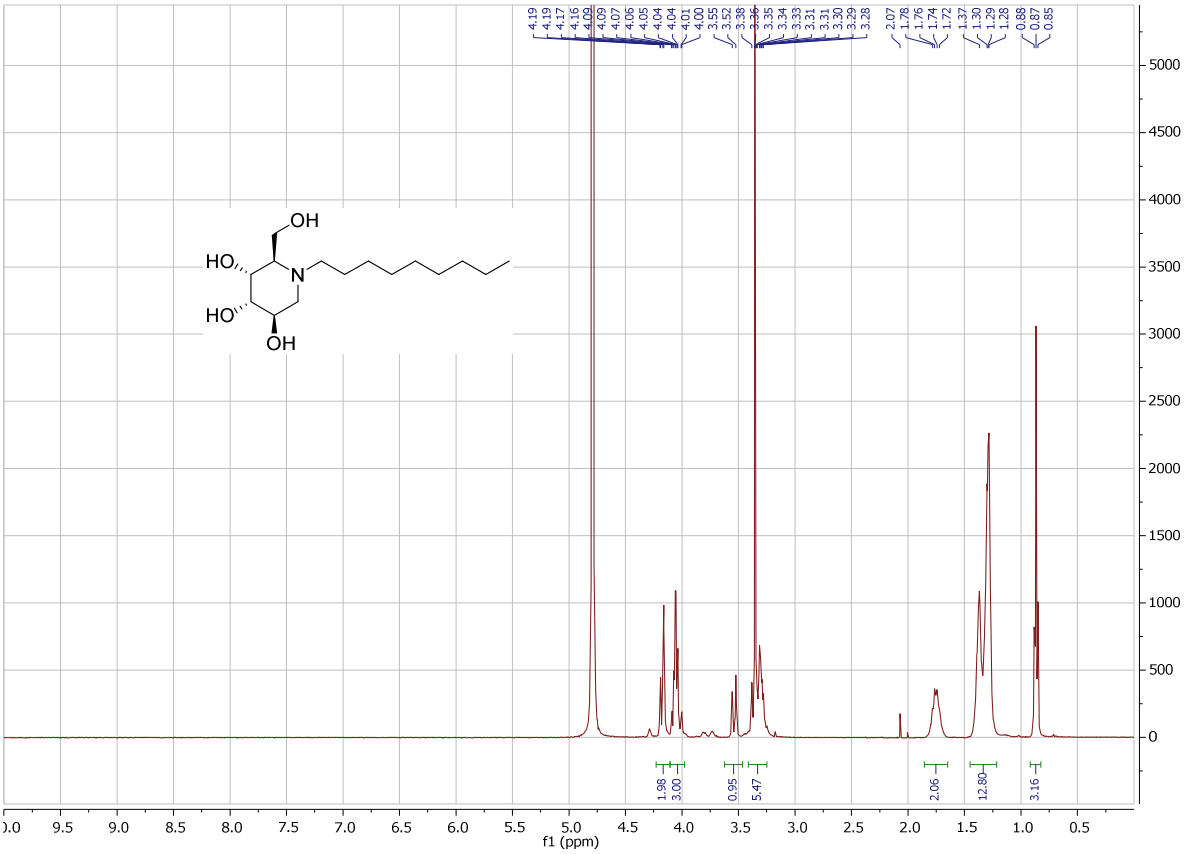


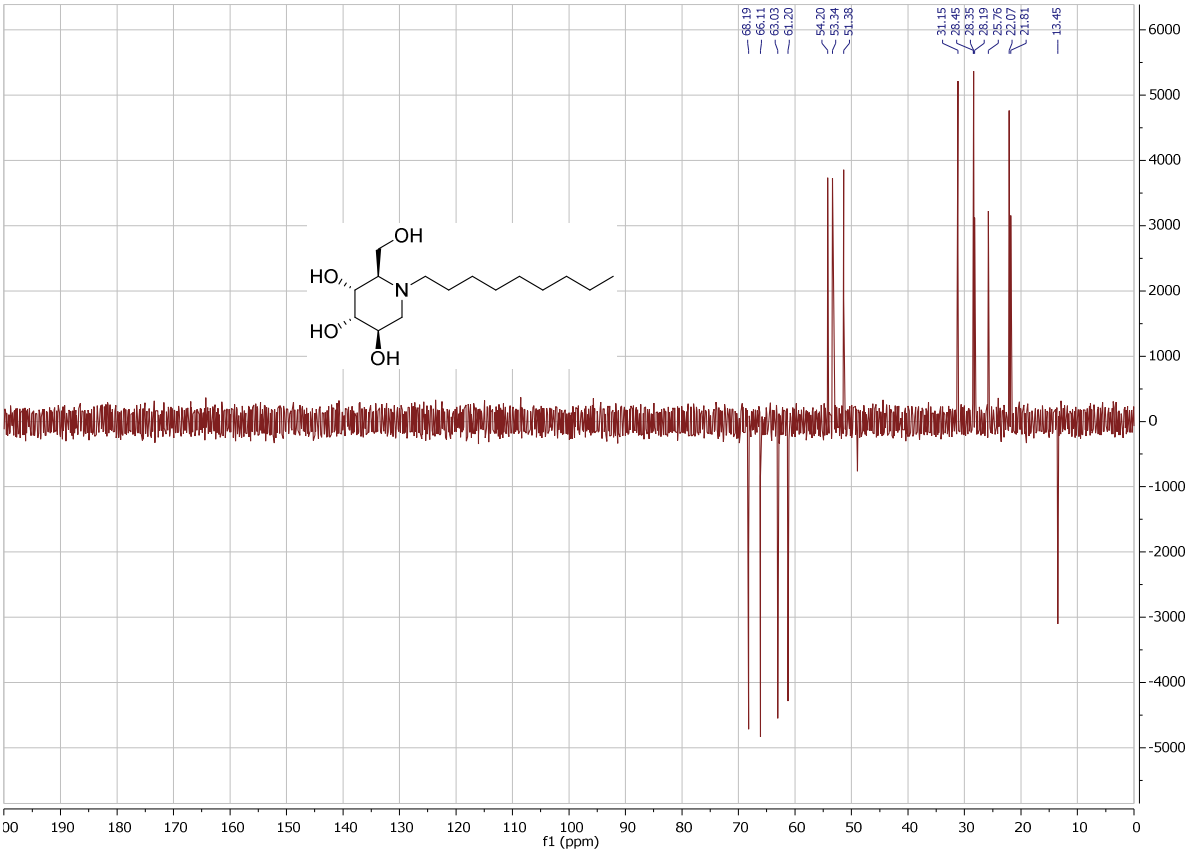
^{1}H-NMR and ^{13}C-NMR of compound C188.TFA in D_2O.



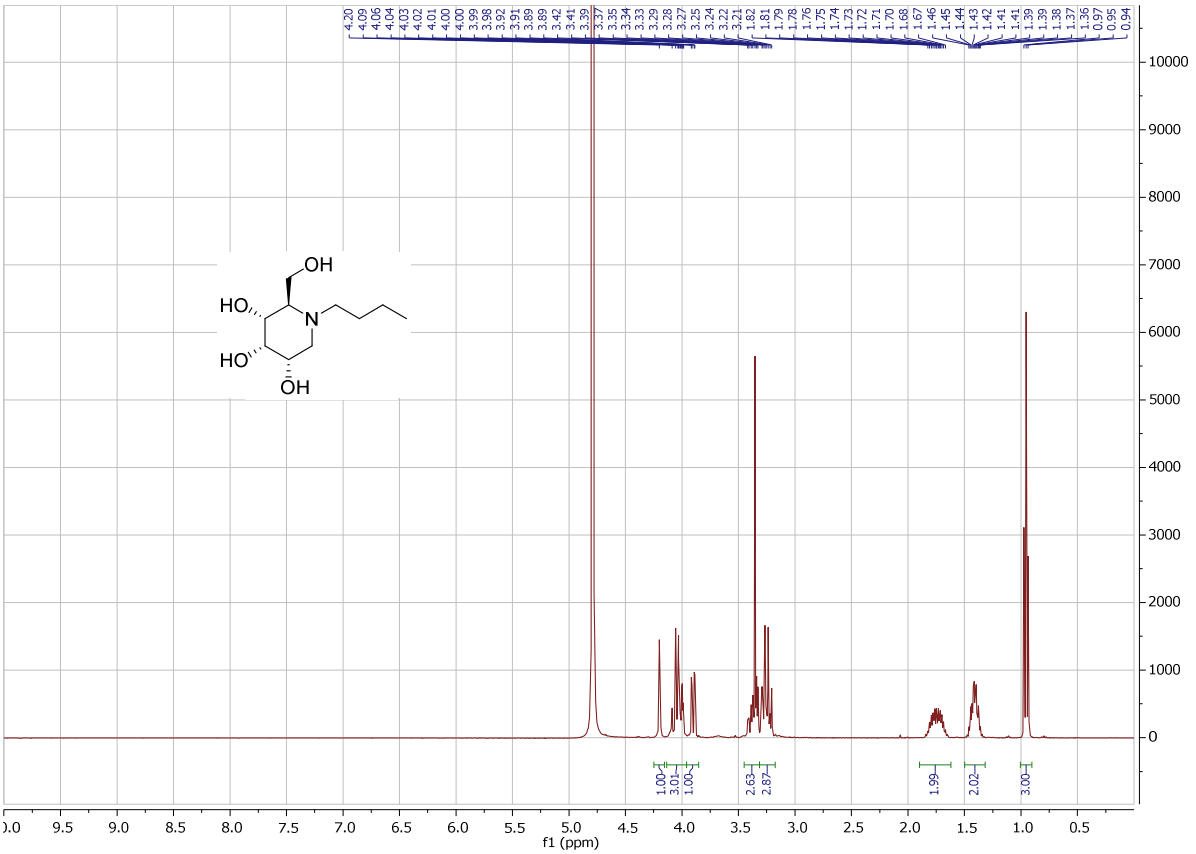


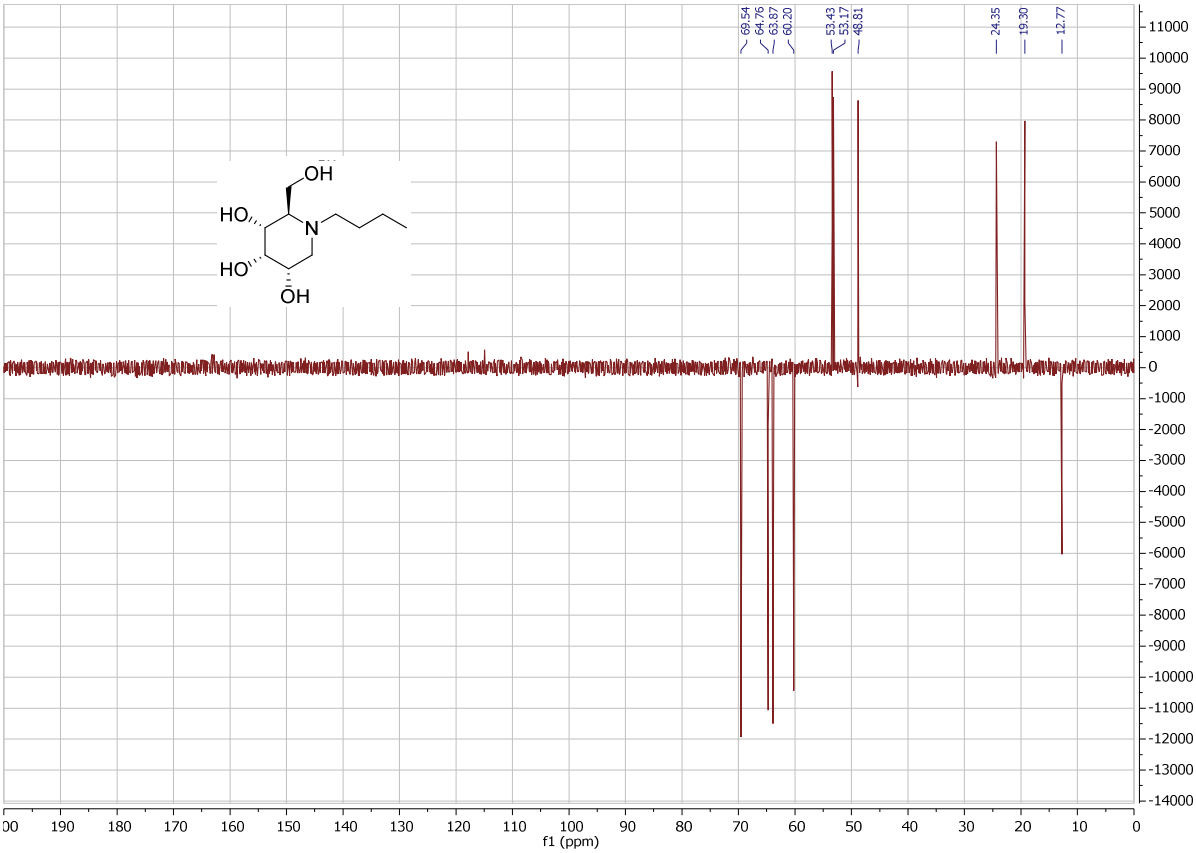
^{1}H-NMR and ^{13}C-NMR of compound C190.TFA in D_2O.



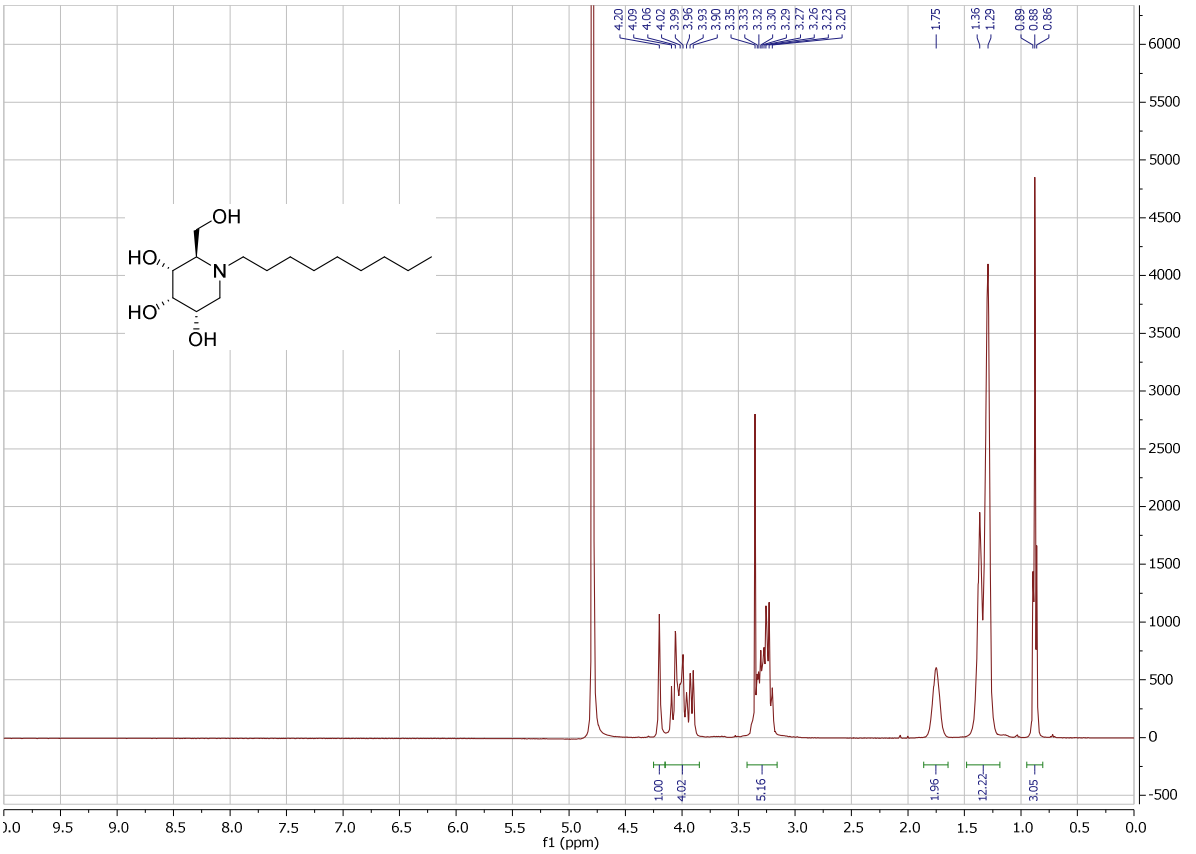


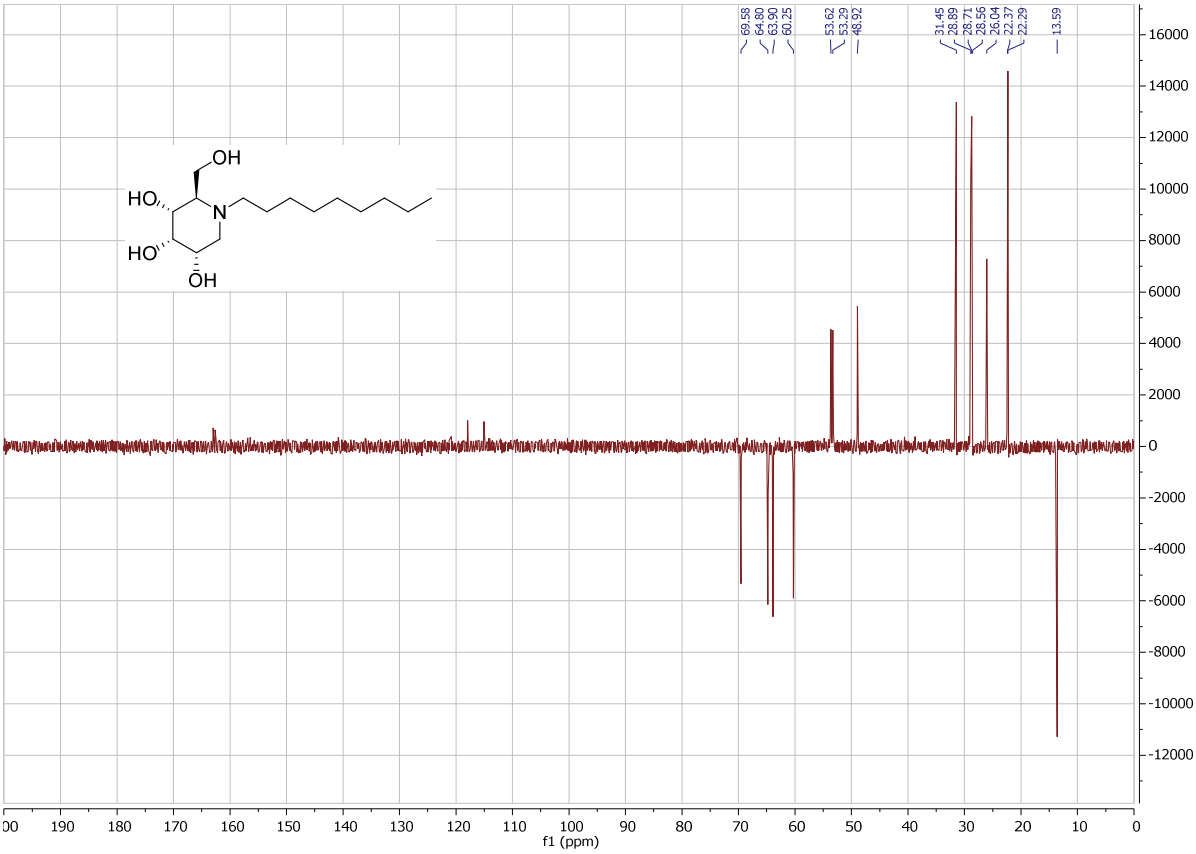
^{1}H-NMR and ^{13}C-NMR of compound C192.TFA in D_2O.



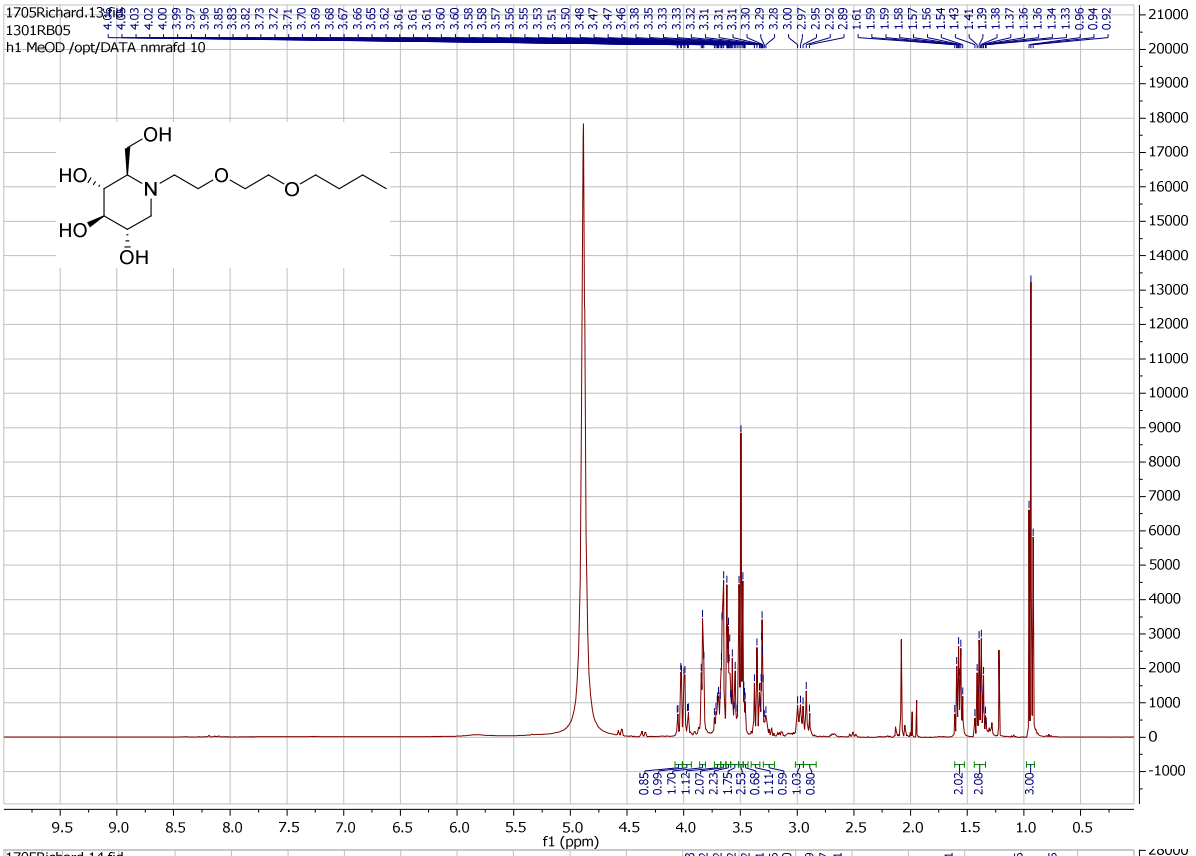


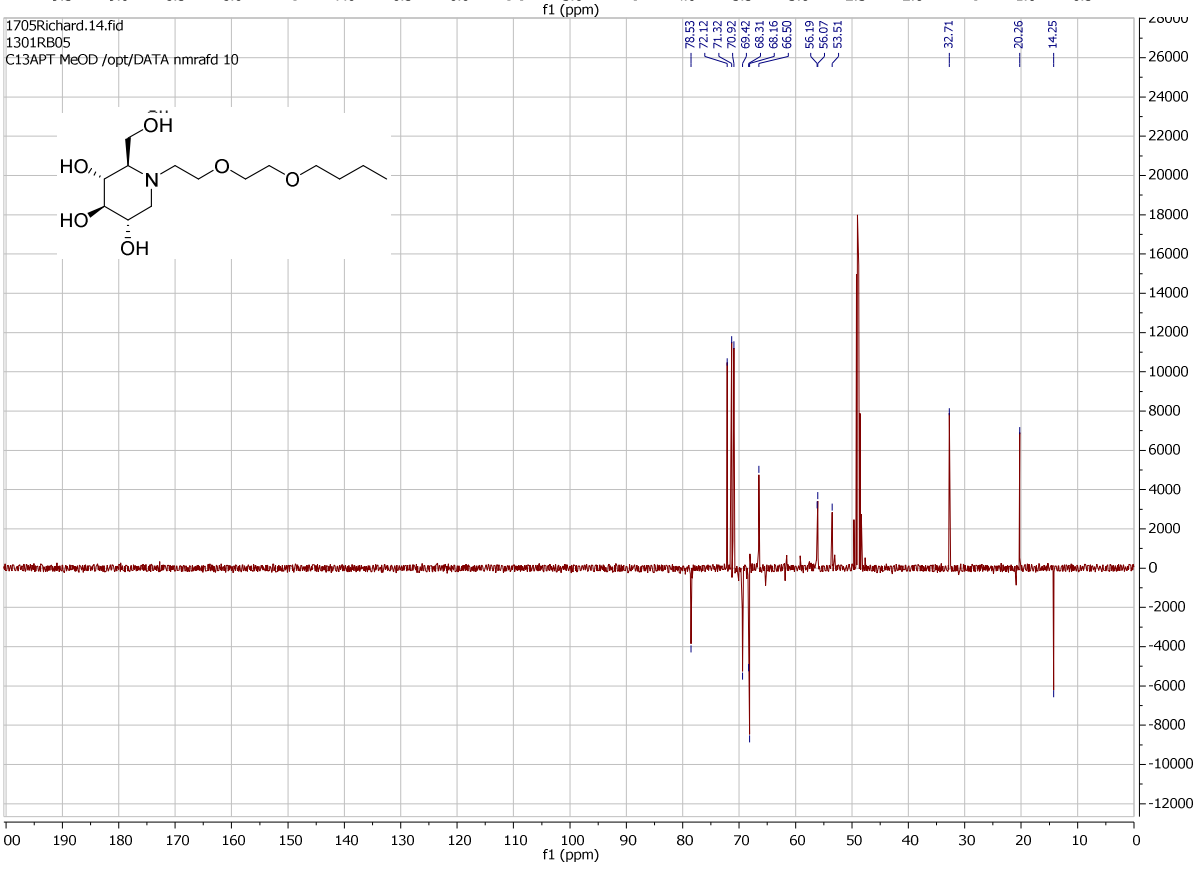
^{1}H-NMR and ^{13}C-NMR of compound C194.TFA in D_2O.



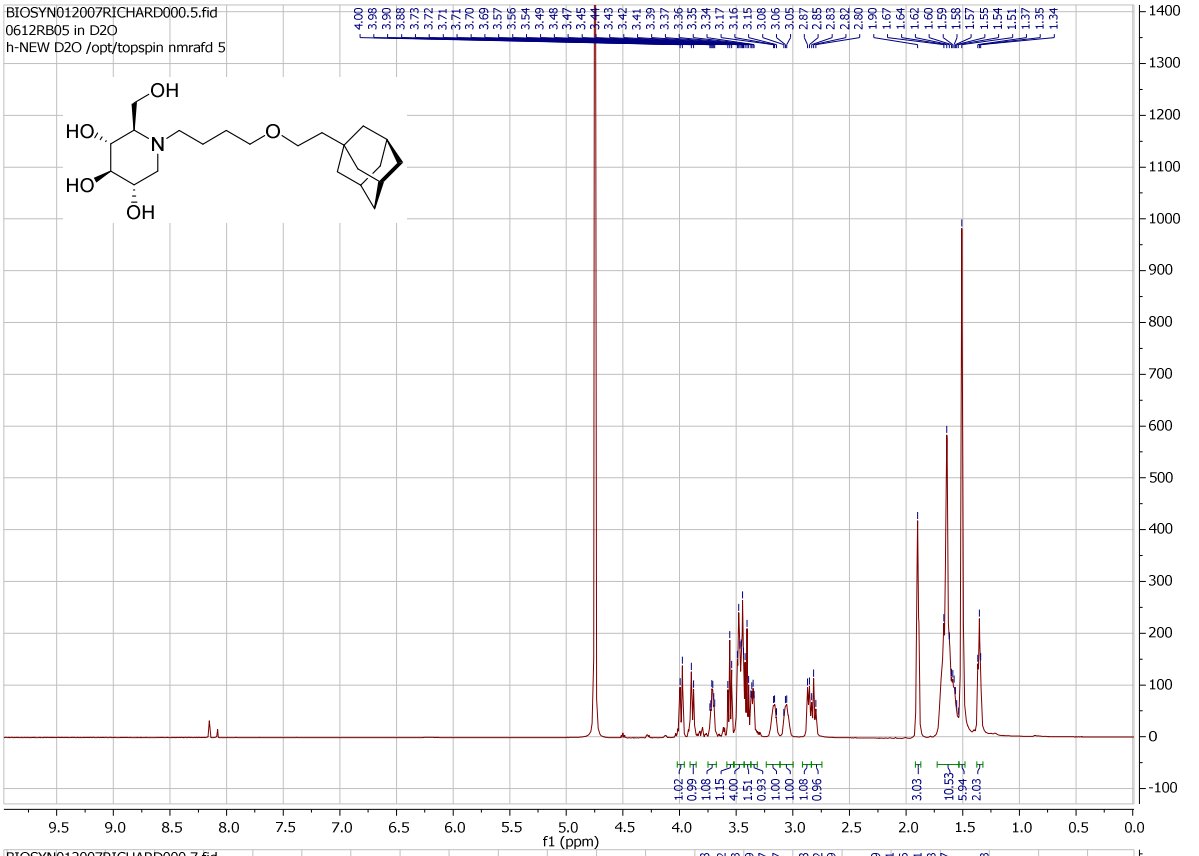


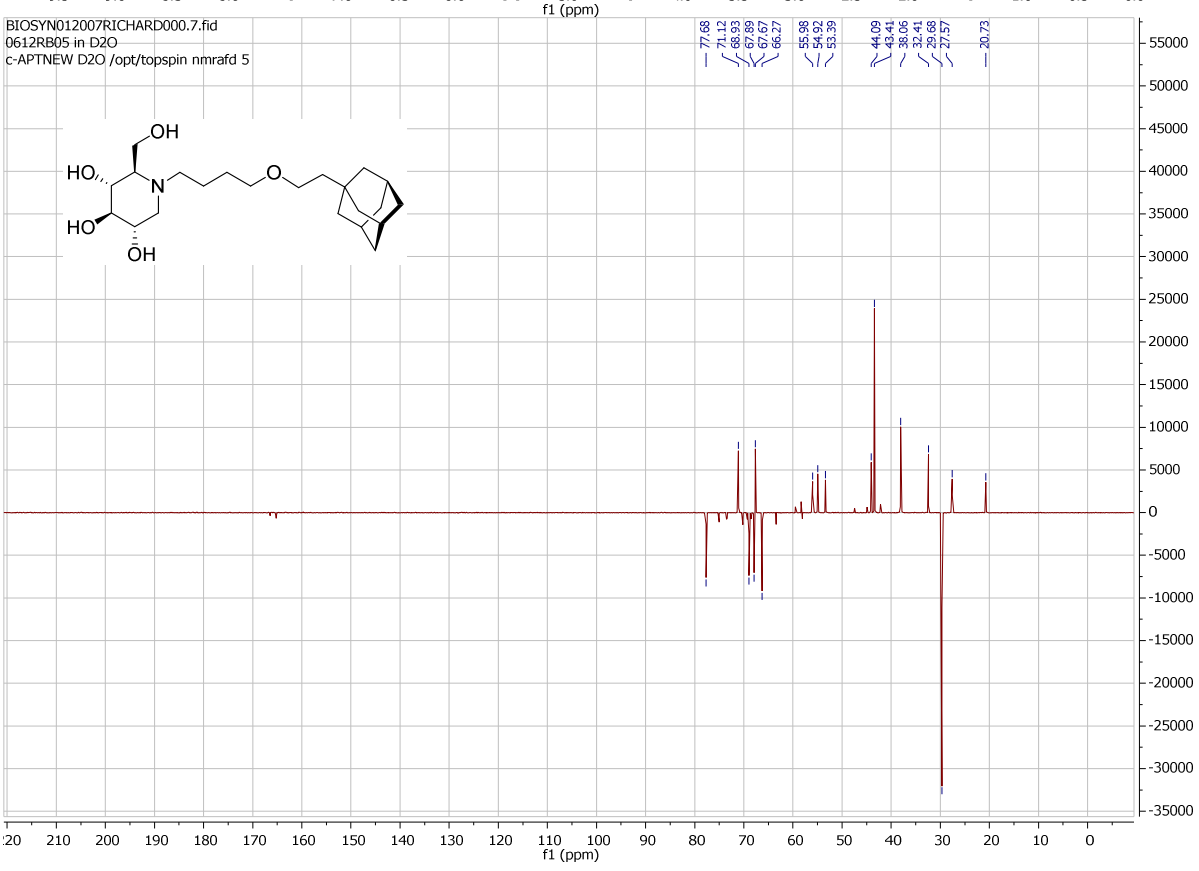
^{1}H-NMR and ^{13}C-NMR of compound C200.TFA in MeOD.



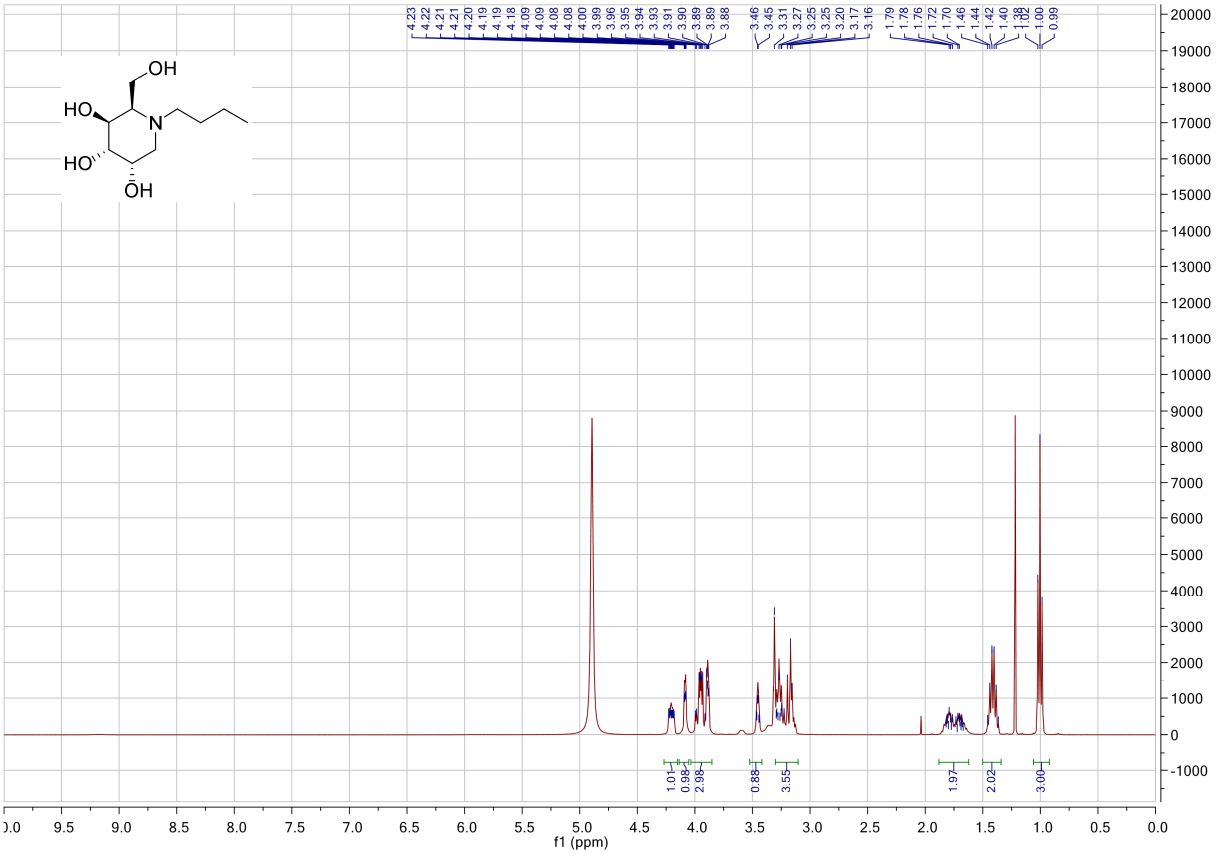


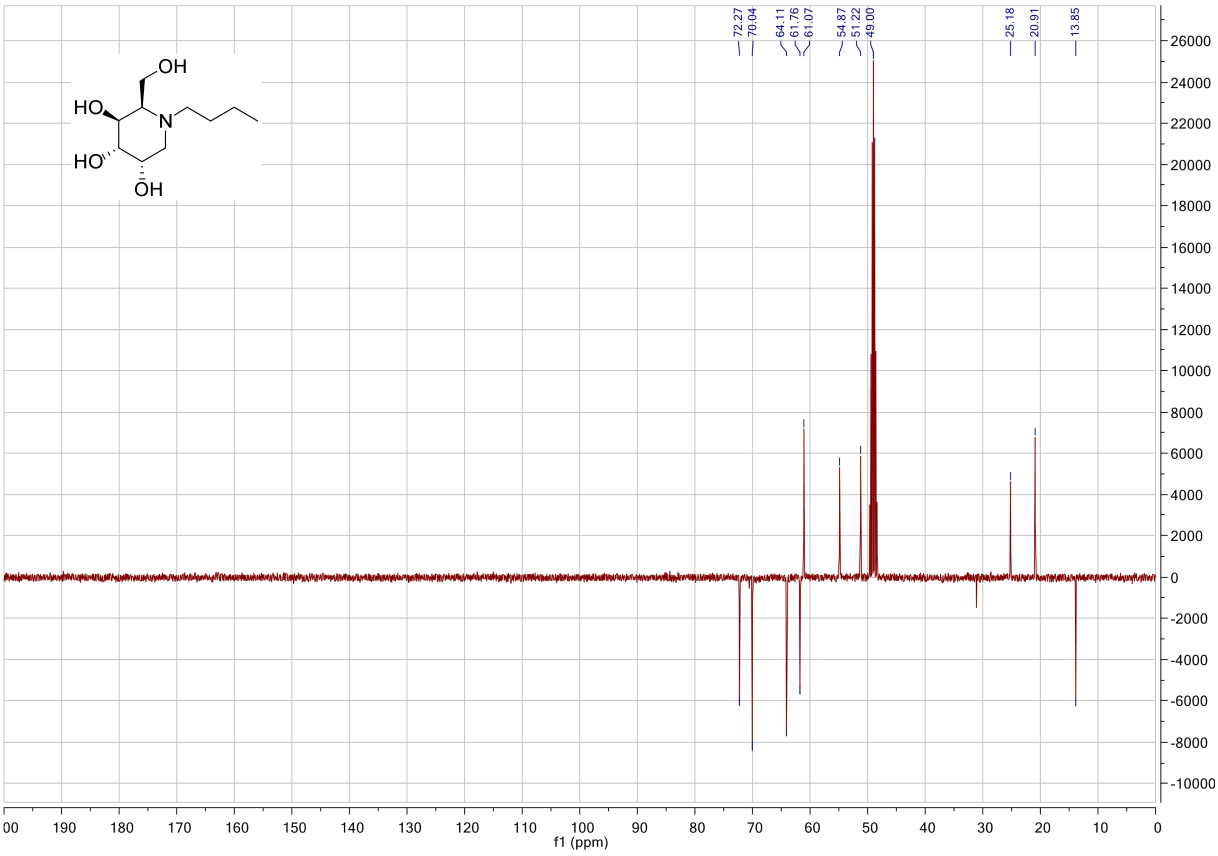
^{1}H-NMR and ^{13}C-NMR of compound C203.TFA in D_2O.



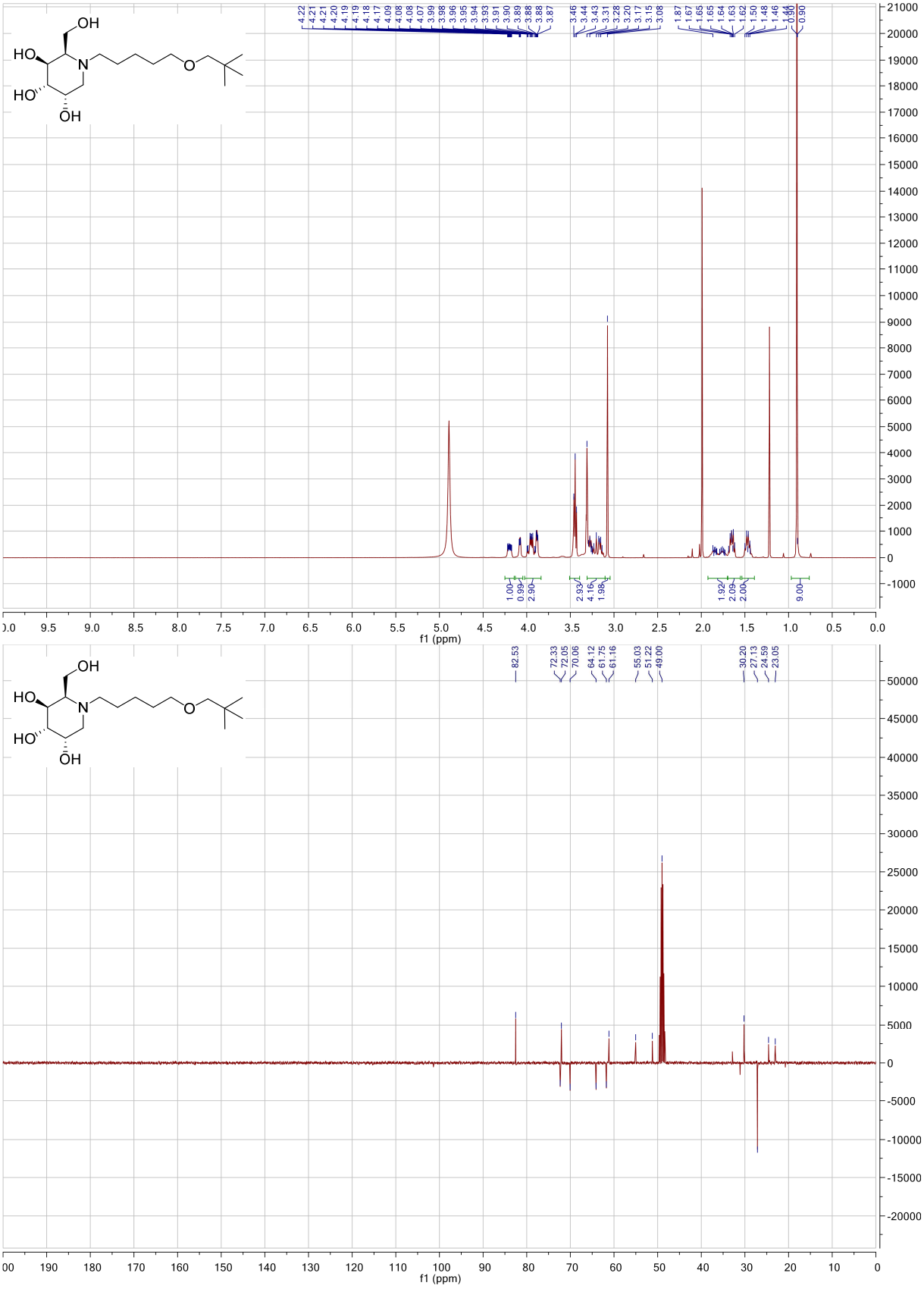


^{1}H-NMR and ^{13}C-NMR of compound C204.TFA in MeOD.

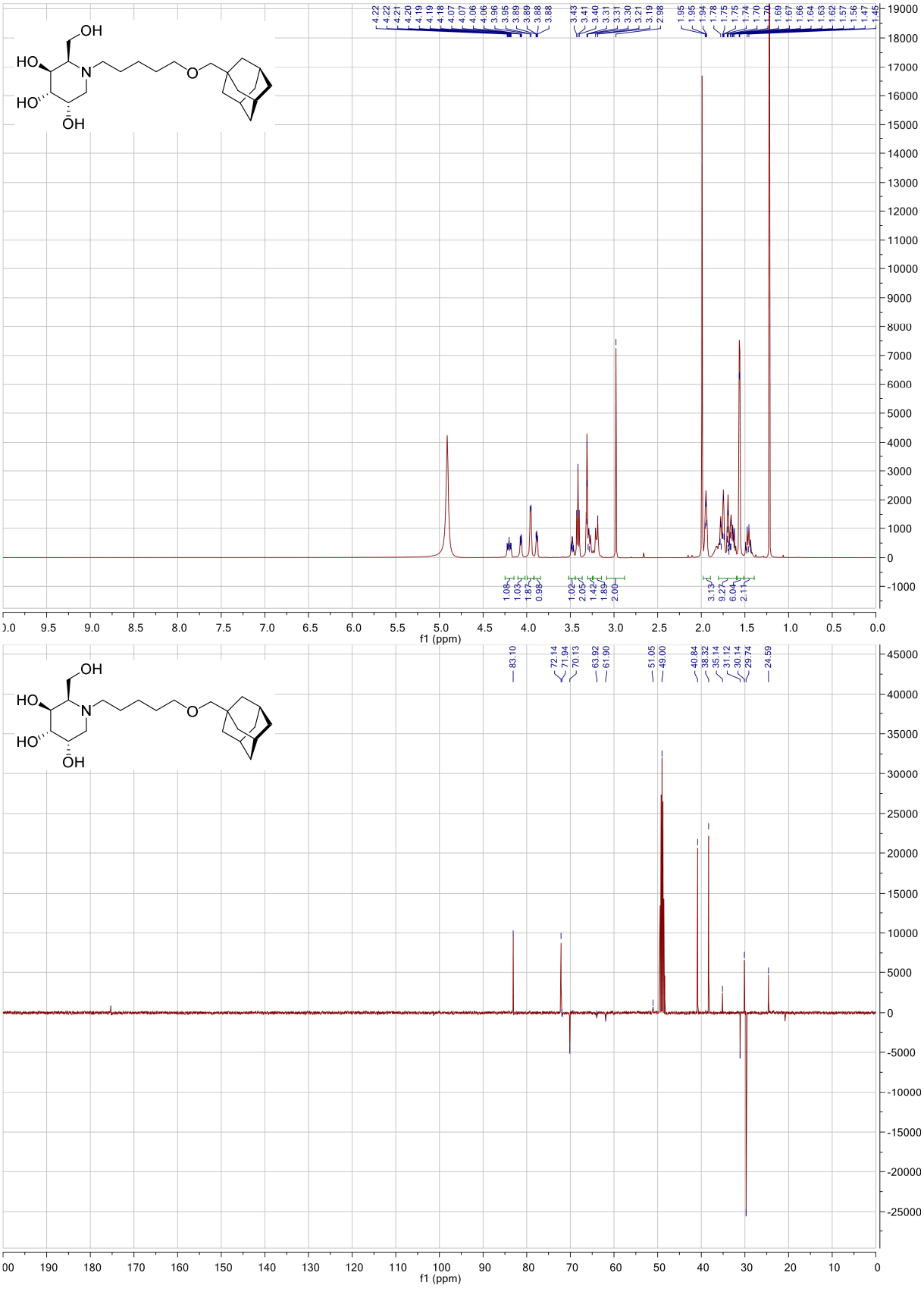




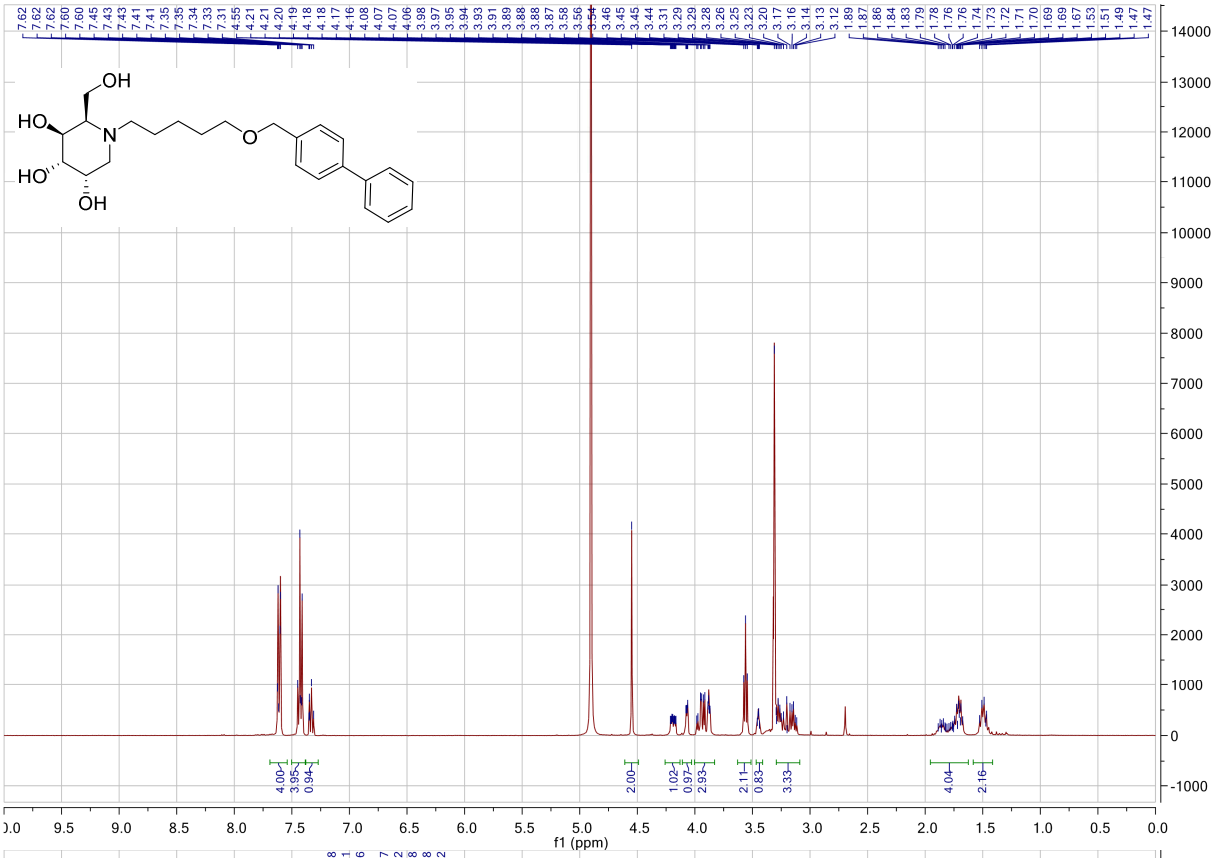
^{1}H-NMR and ^{13}C-NMR of compound C206.TFA in MeOD.

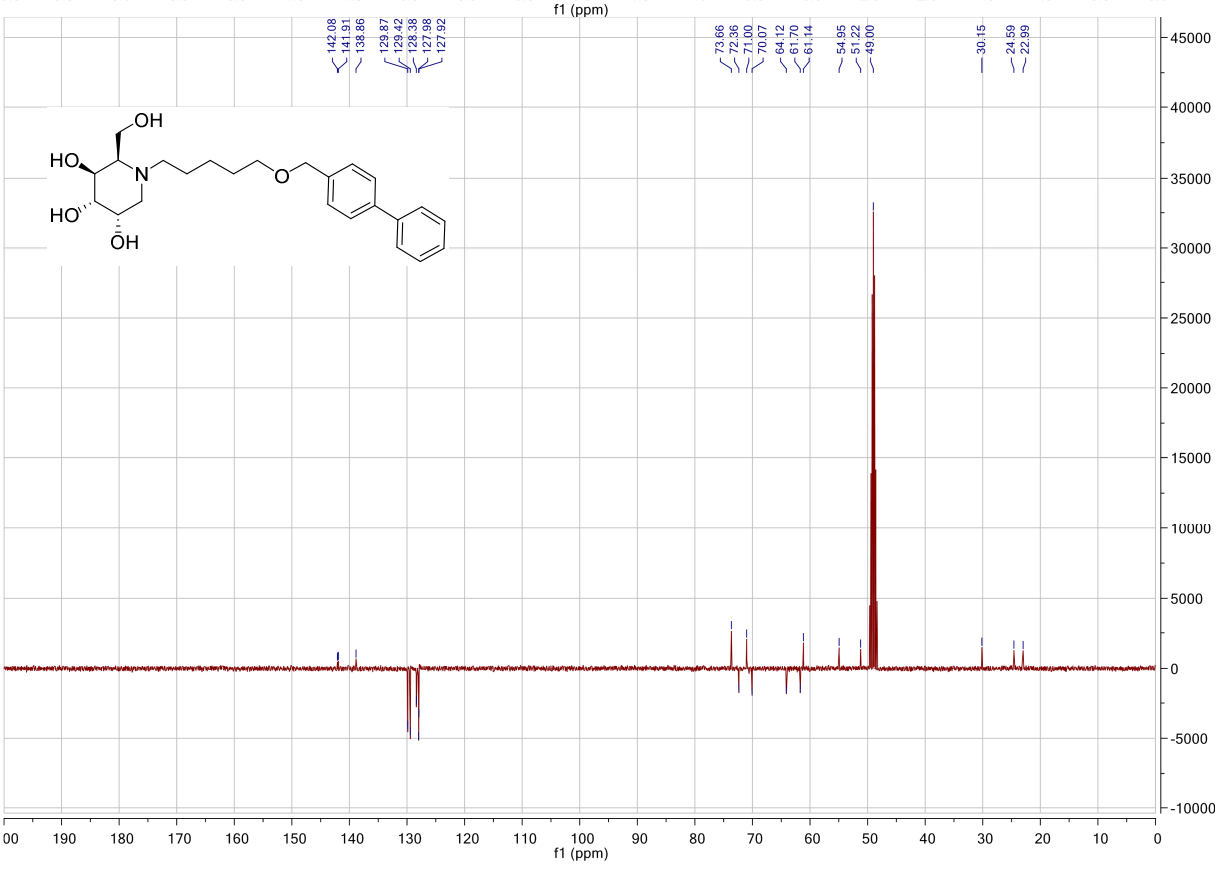


^{1}H-NMR and ^{13}C-NMR of compound C208.TFA in MeOD.

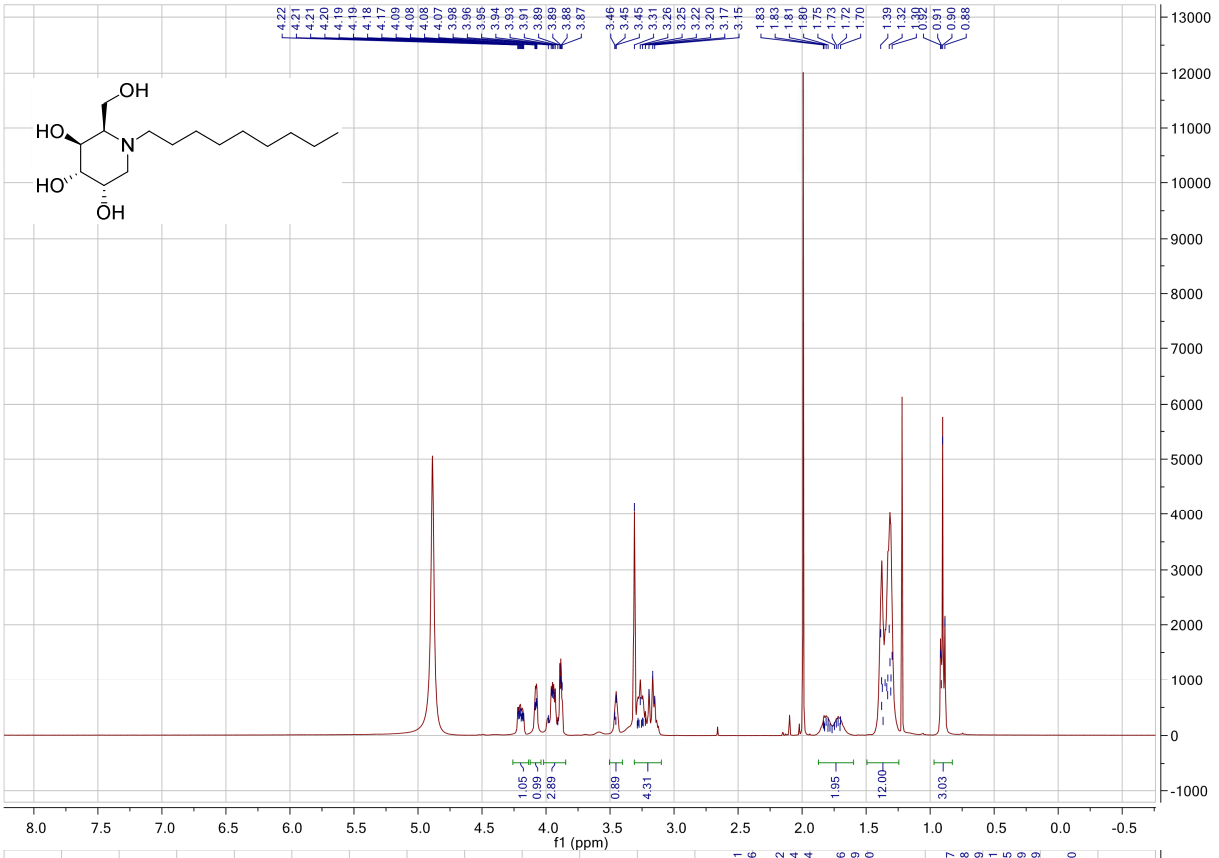


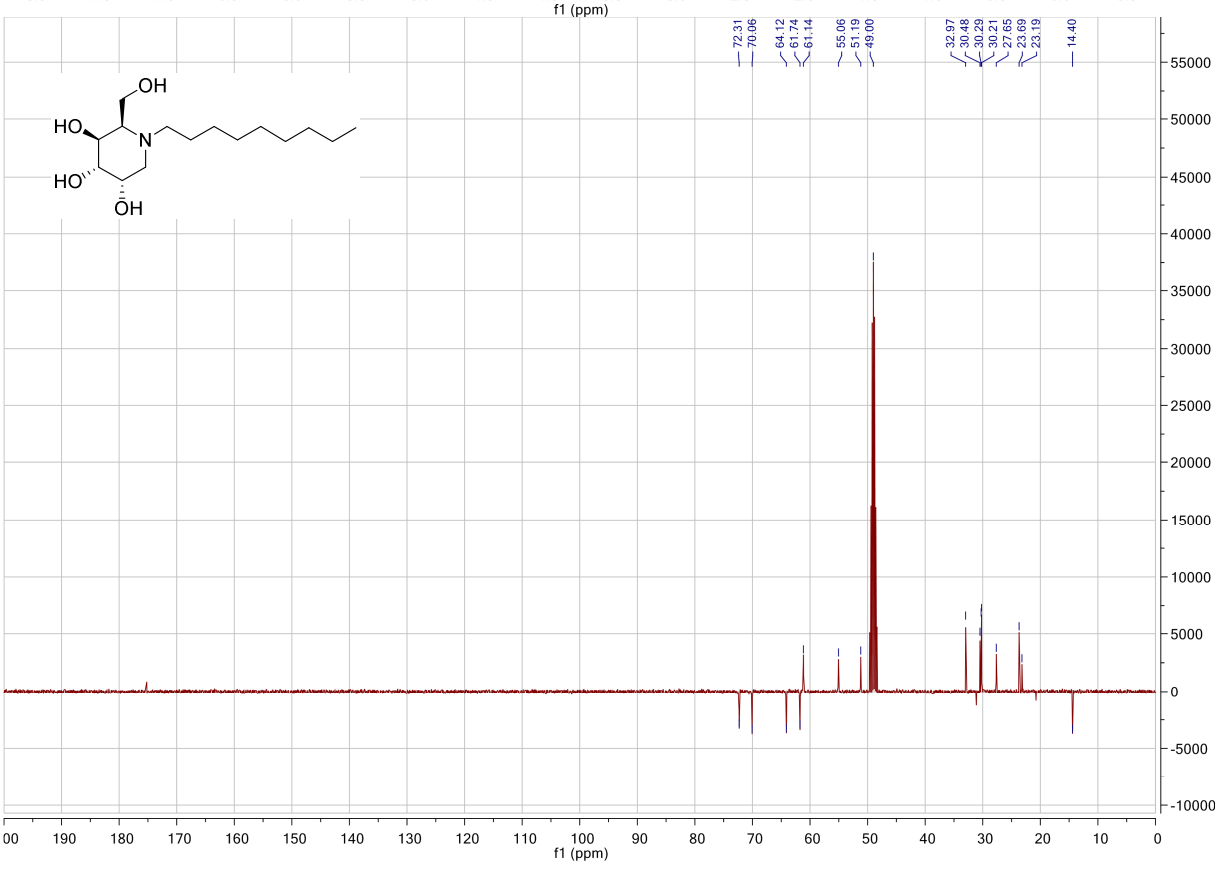
^{1}H-NMR and ^{13}C-NMR of compound C210.TFA in MeOD.



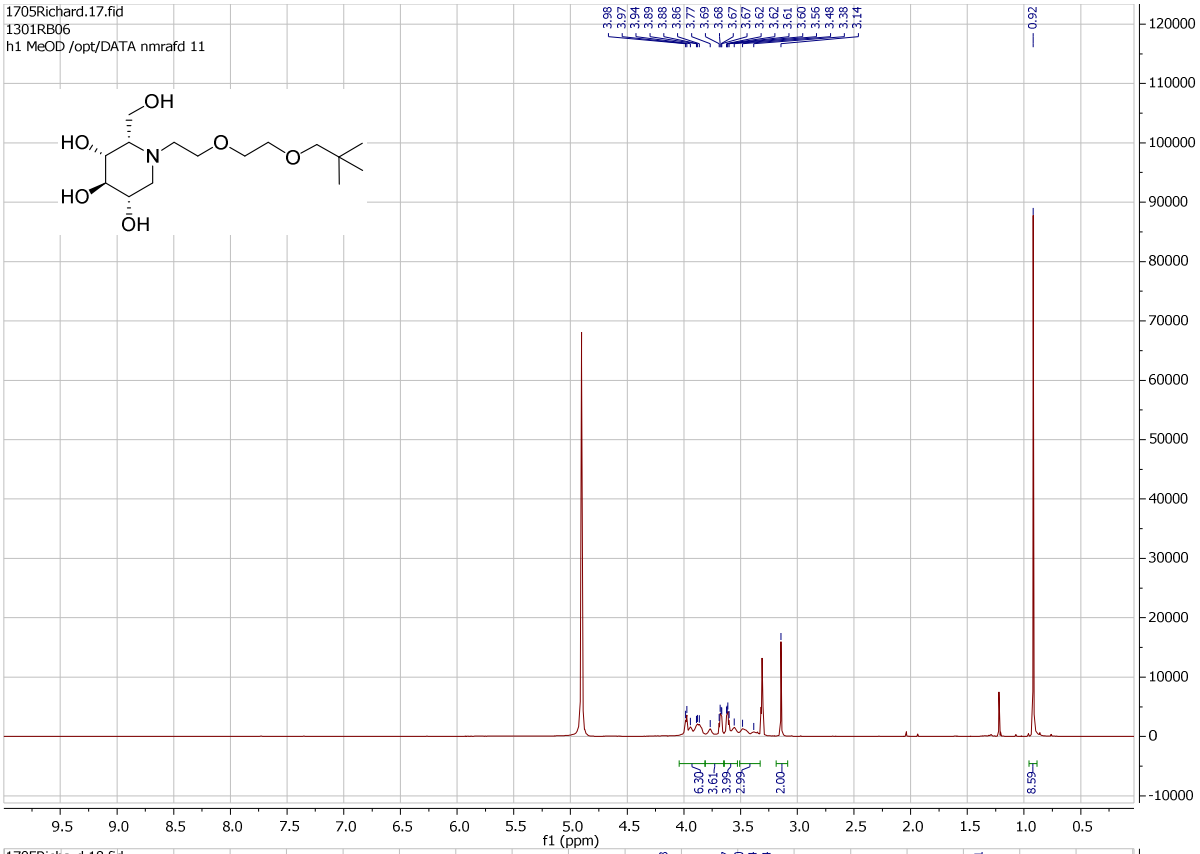


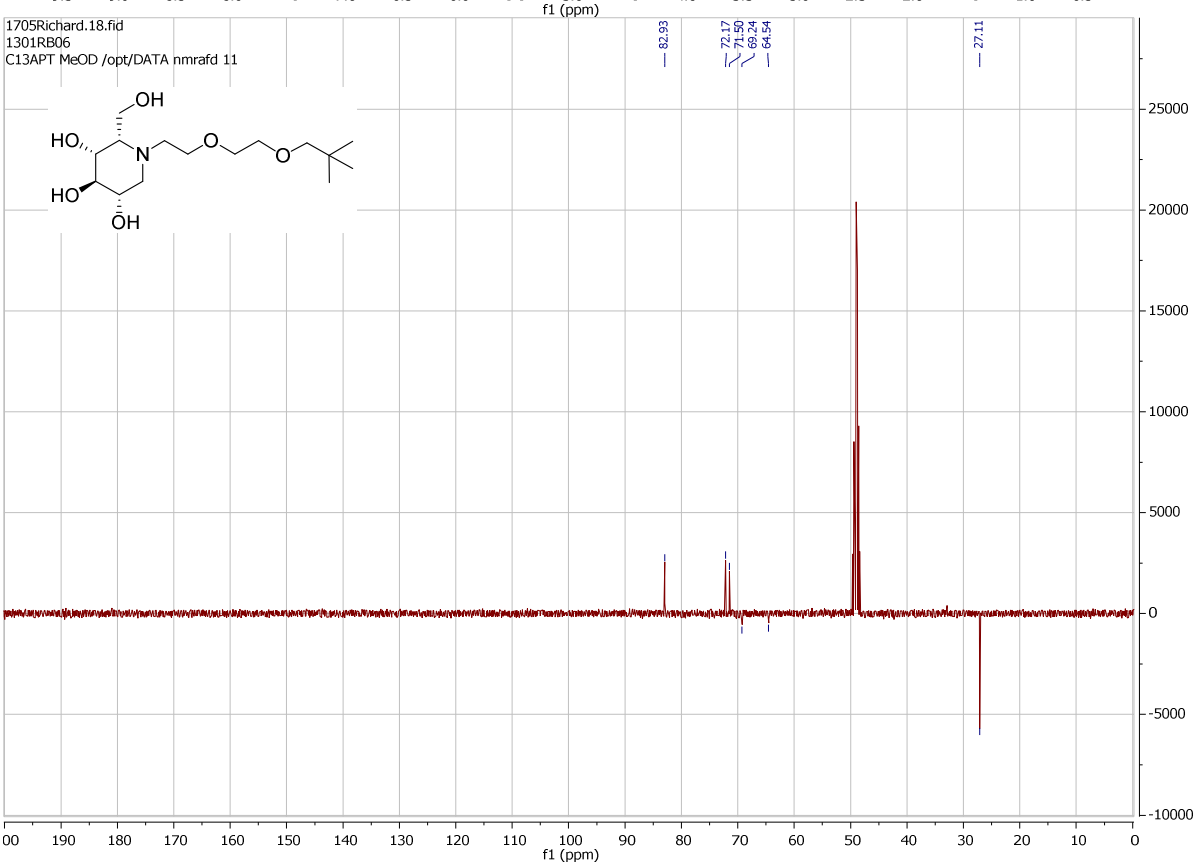
^{1}H-NMR and ^{13}C-NMR of compound C212.TFA in MeOD.



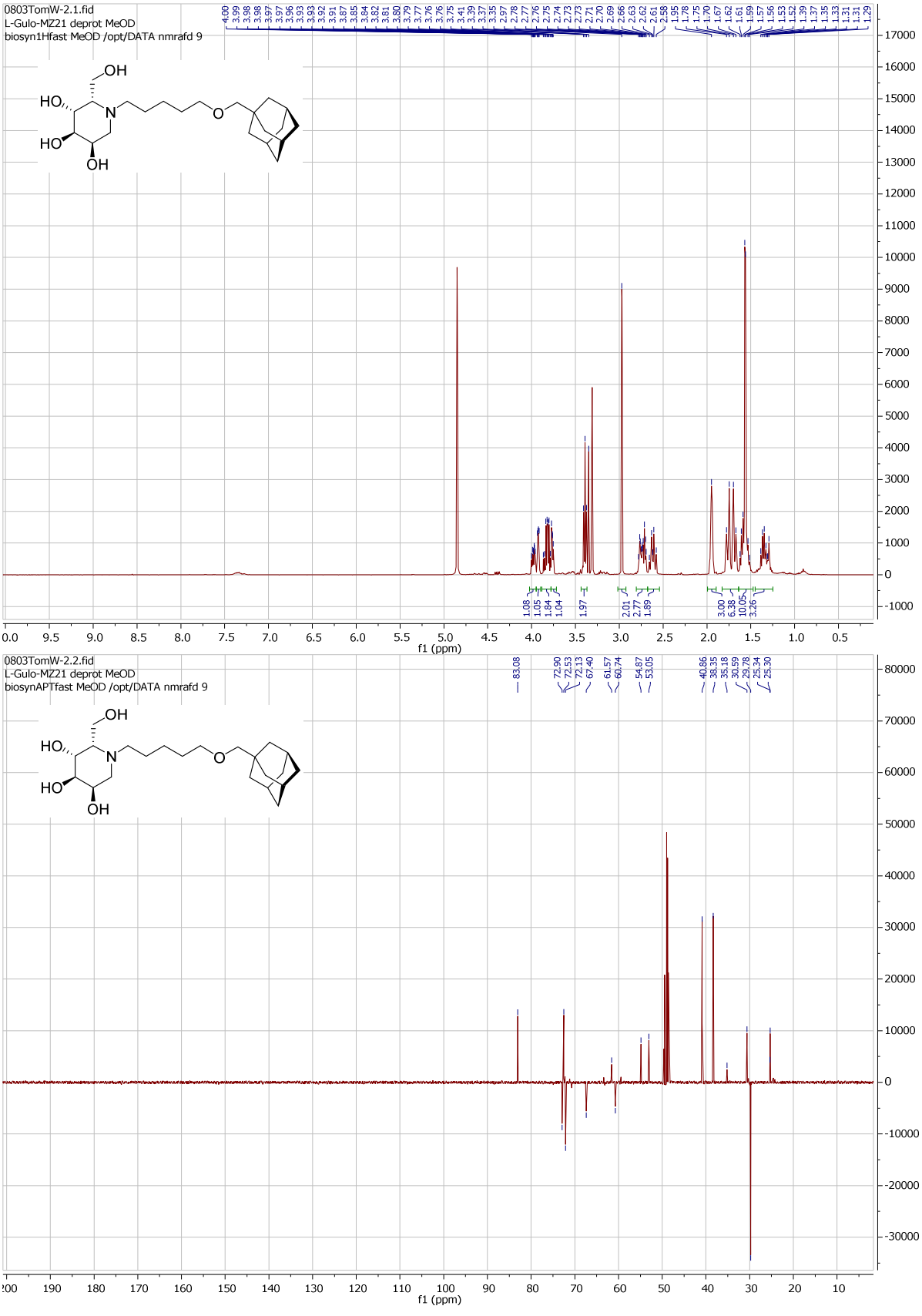


^{1}H-NMR and ^{13}C-NMR of compound C215.TFA in MeOD.

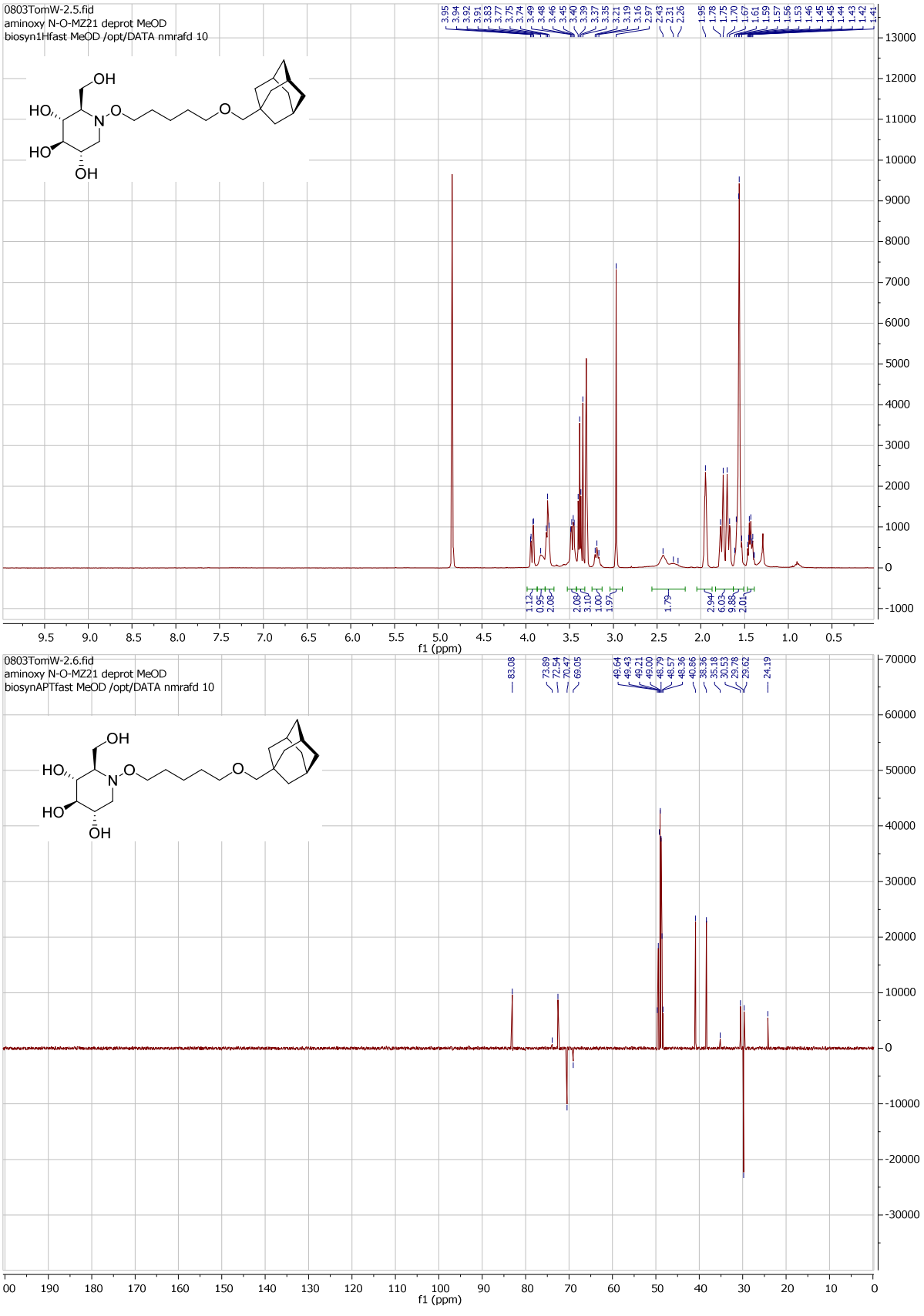




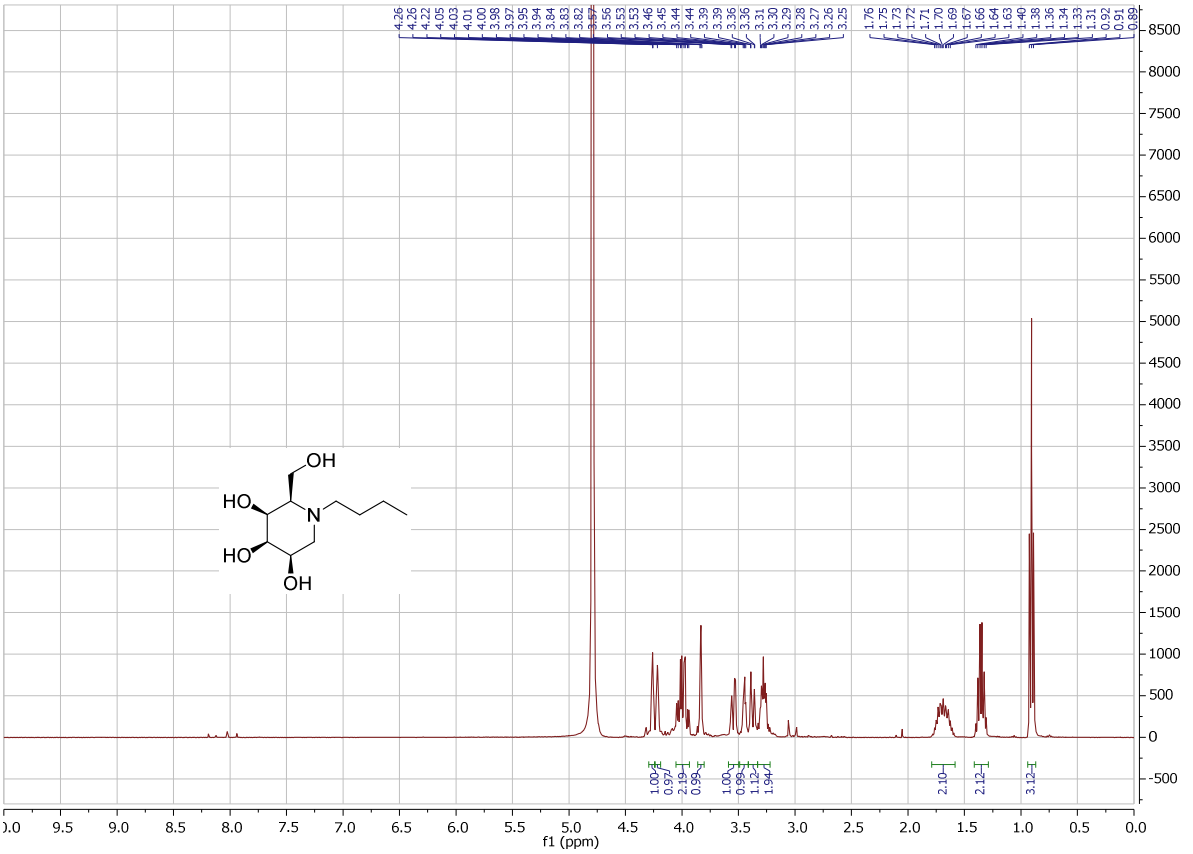
^{1}H-NMR and ^{13}C-NMR of compound C217 in MeOD.

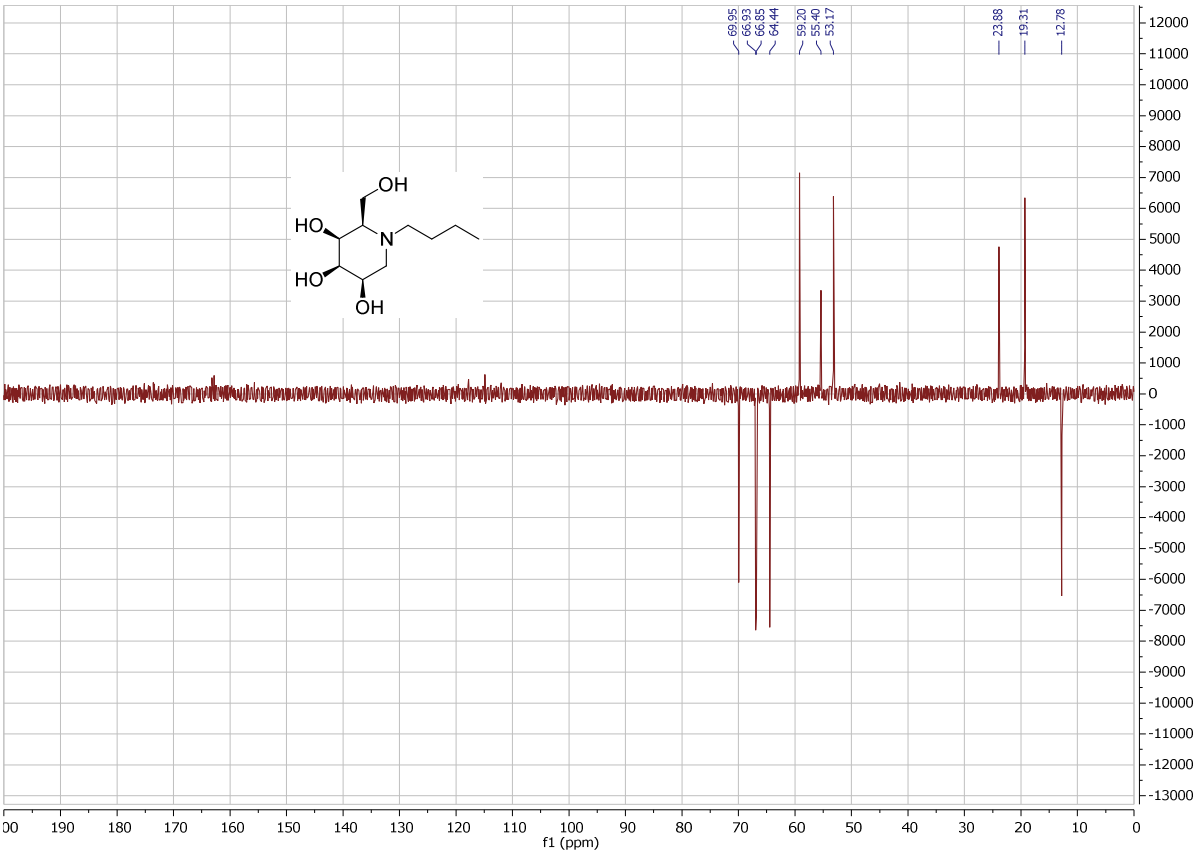


^{1}H-NMR and ^{13}C-NMR of compound C218 in MeOD.

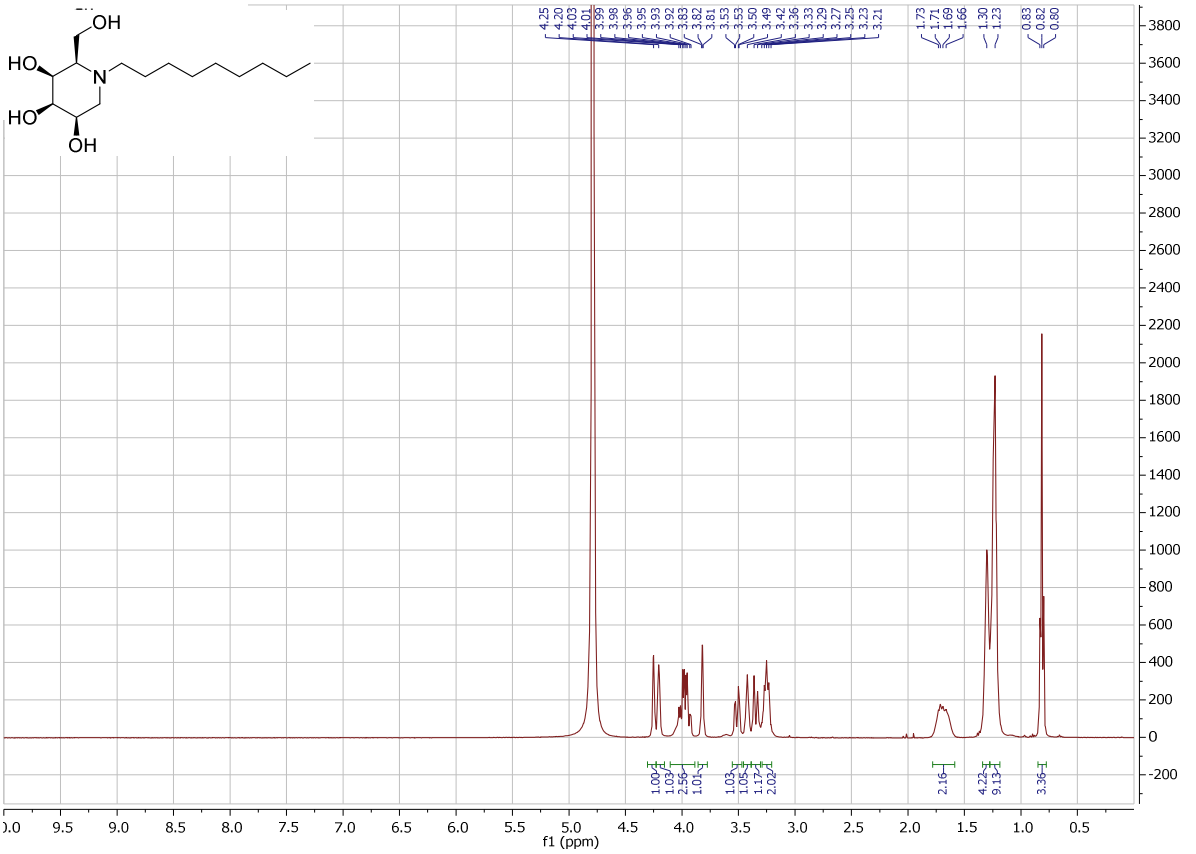


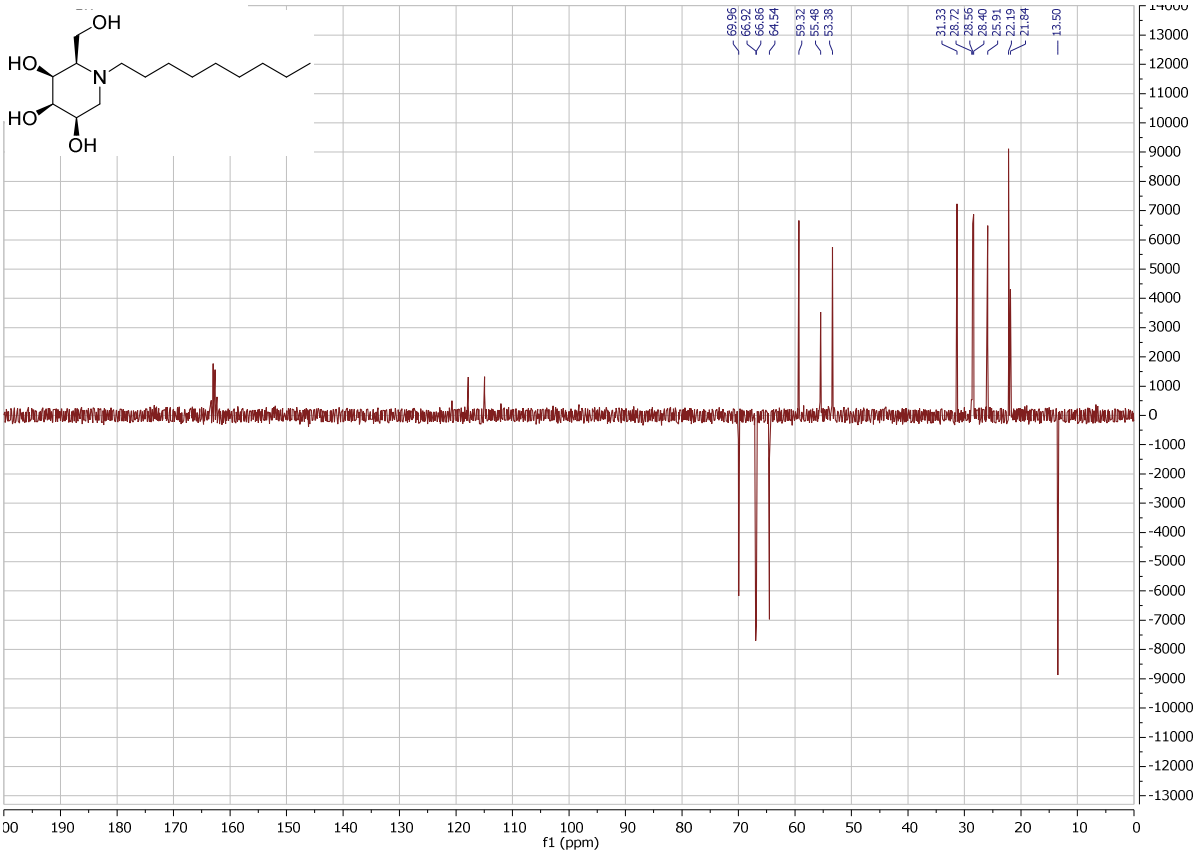
^{1}H-NMR and ^{13}C-NMR of compound C219.TFA in D_2O.



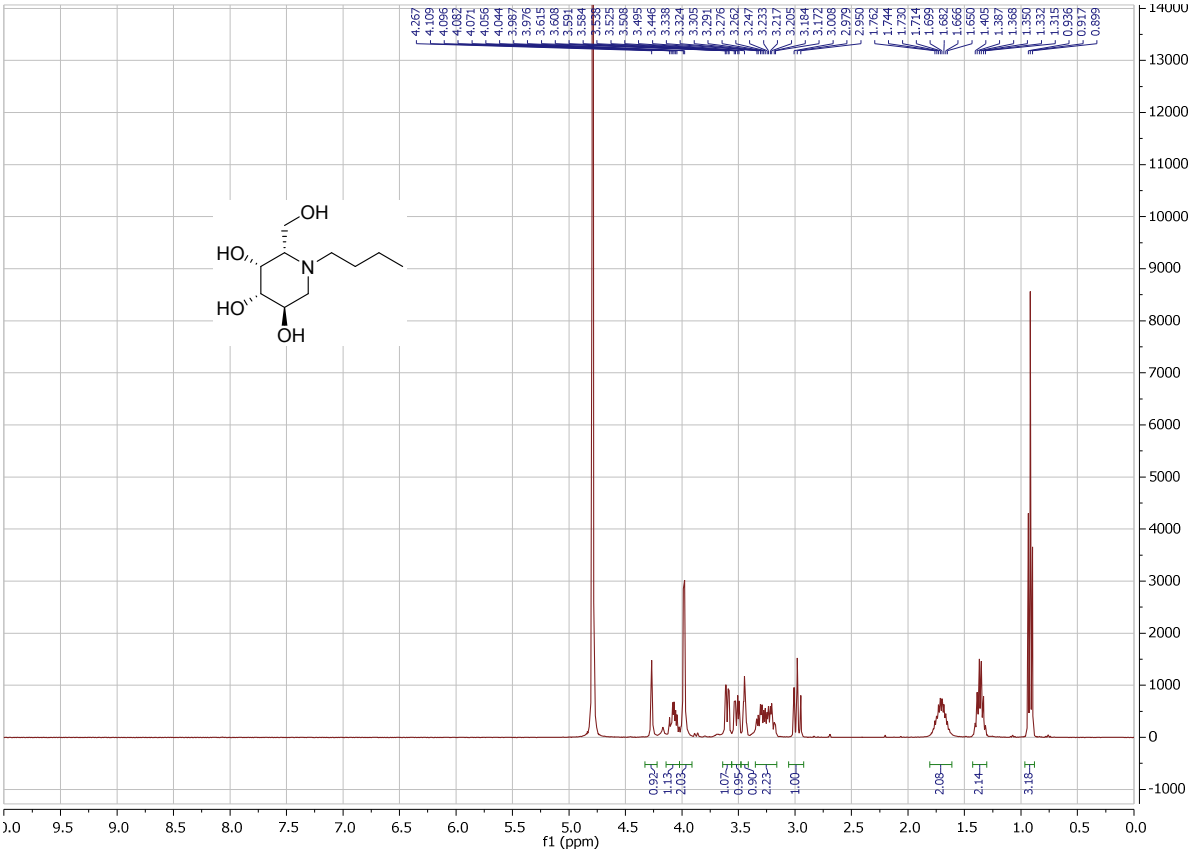


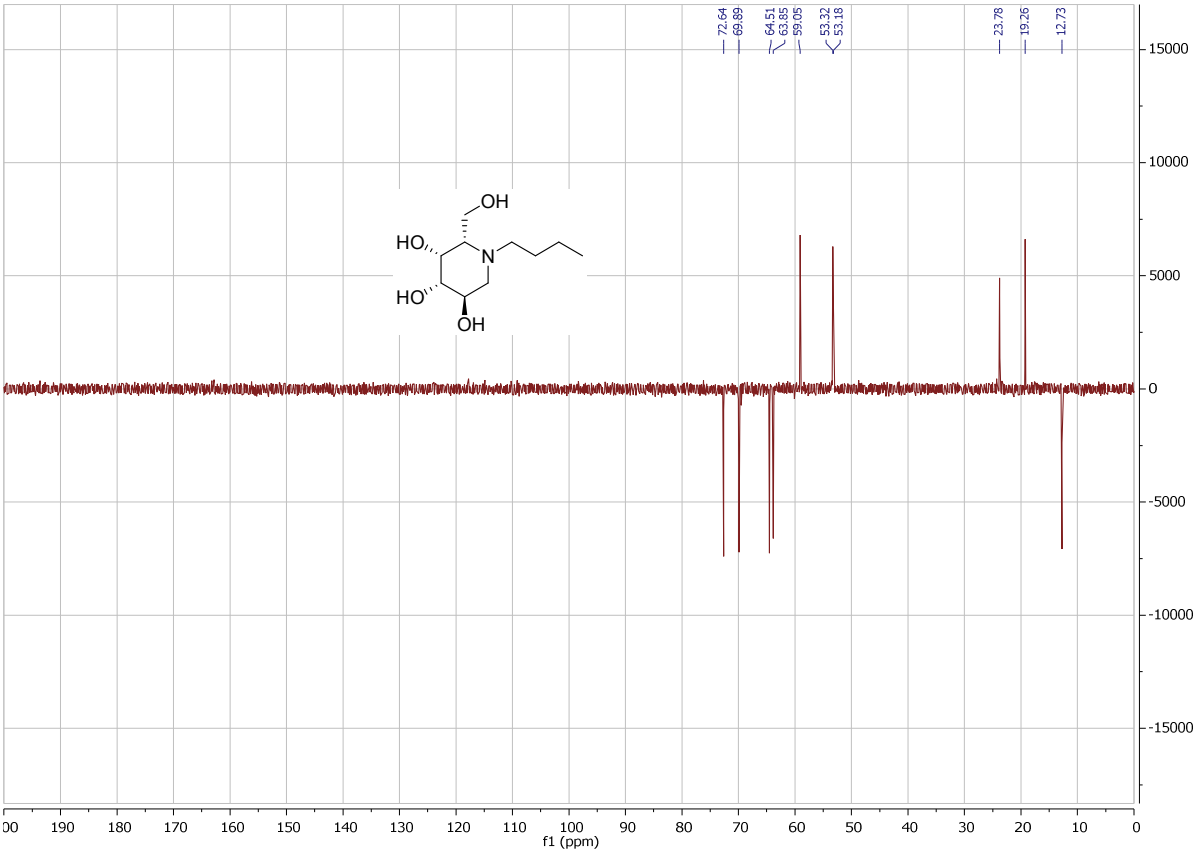
^{1}H-NMR and ^{13}C-NMR of compound C221.TFA in D_2O.



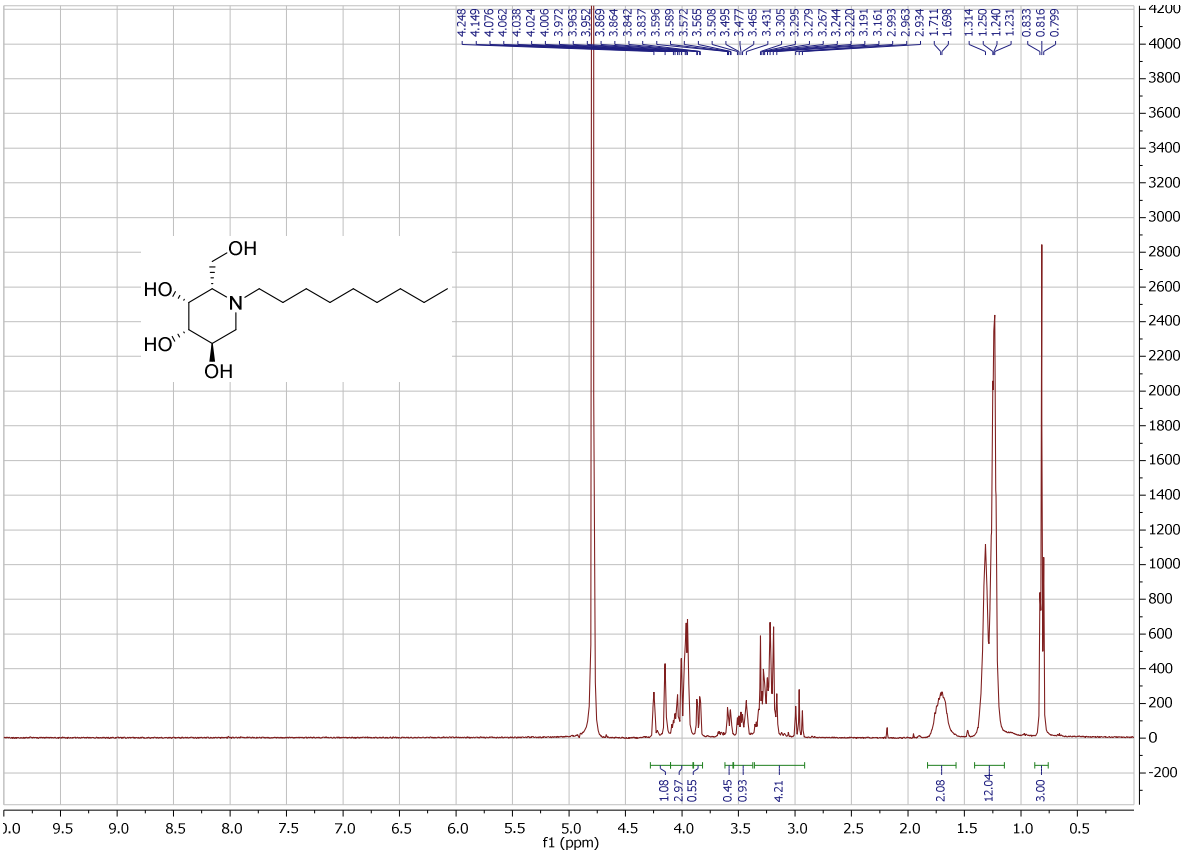


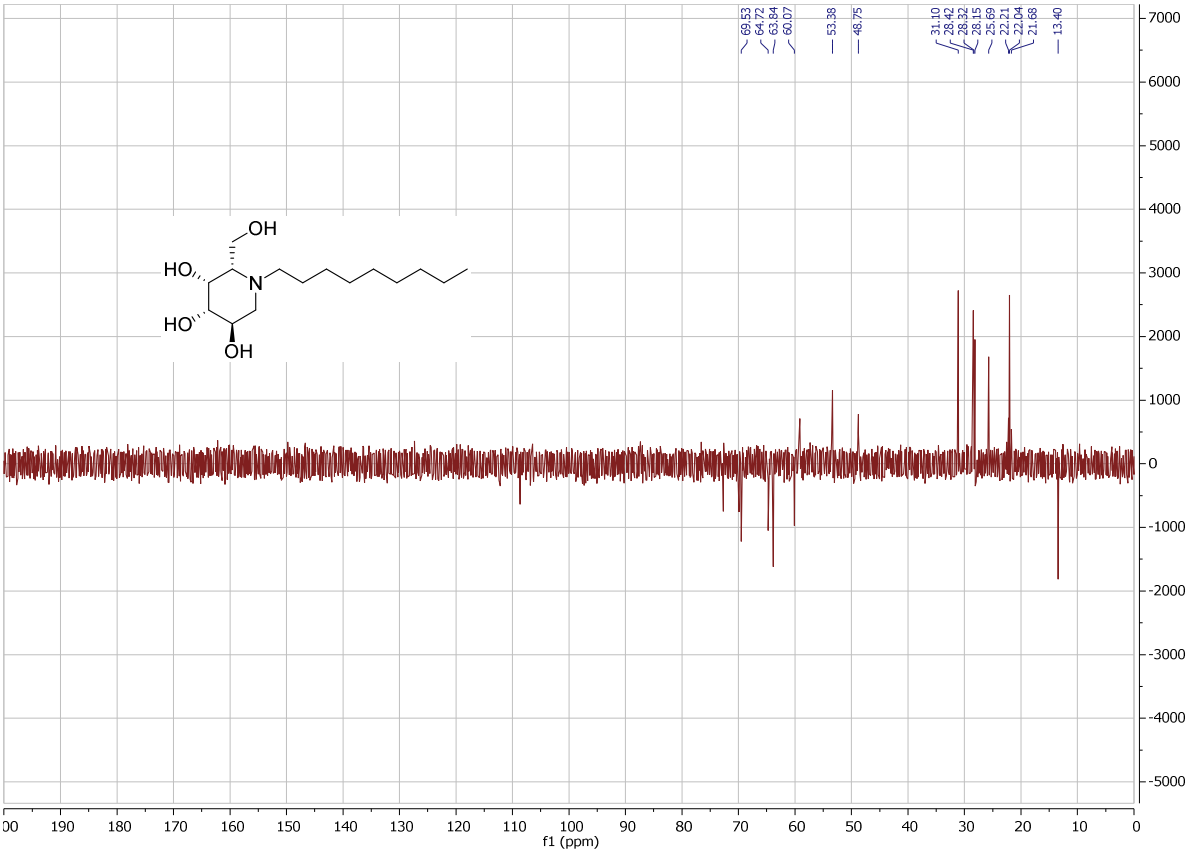
^{1}H-NMR and ^{13}C-NMR of compound C223.TFA in D_2O.



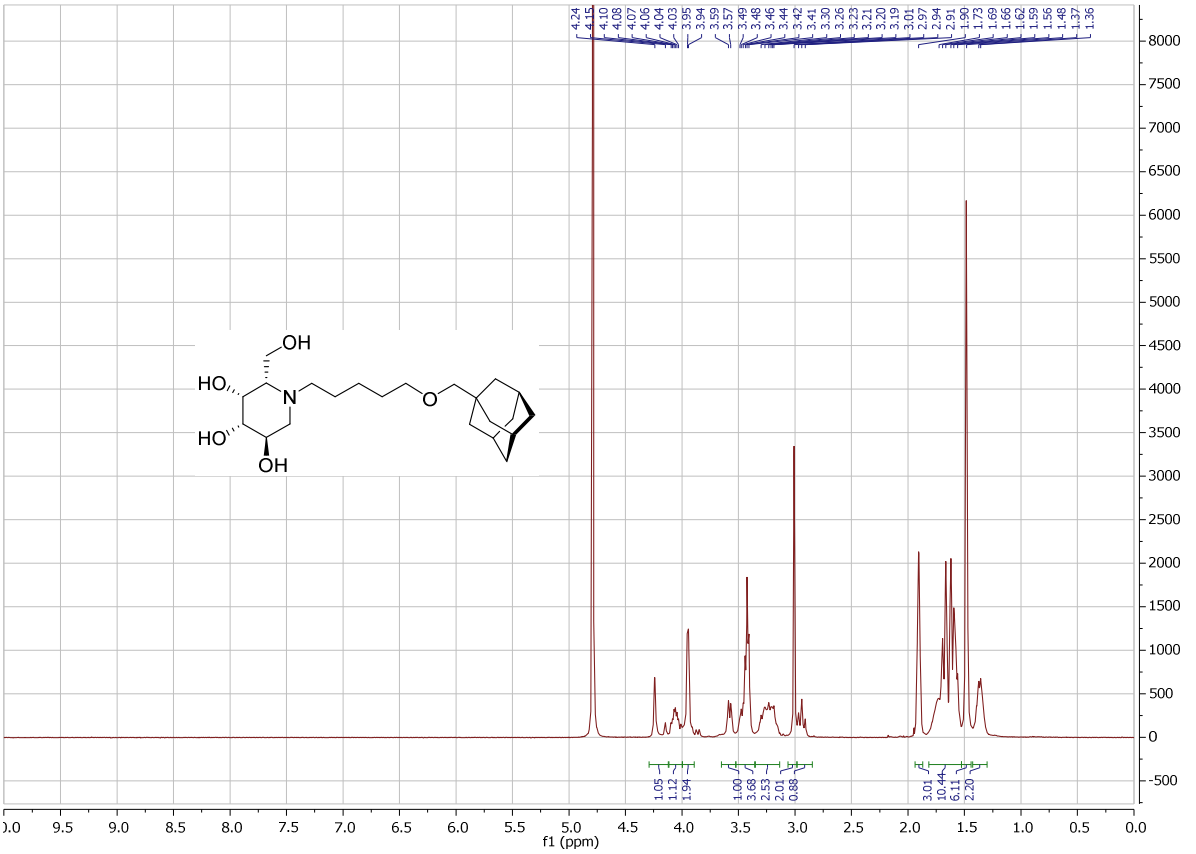


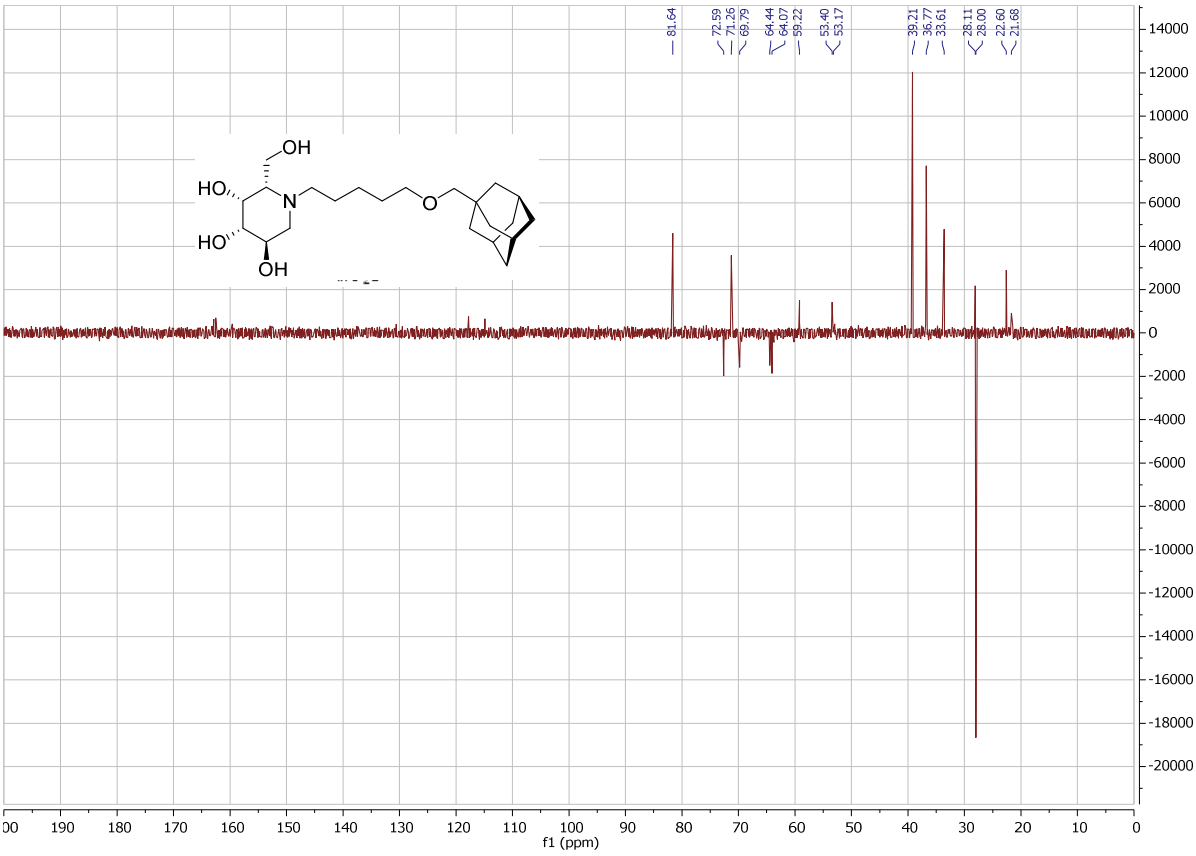
^{1}H-NMR and ^{13}C-NMR of compound C225.TFA in D_2O.



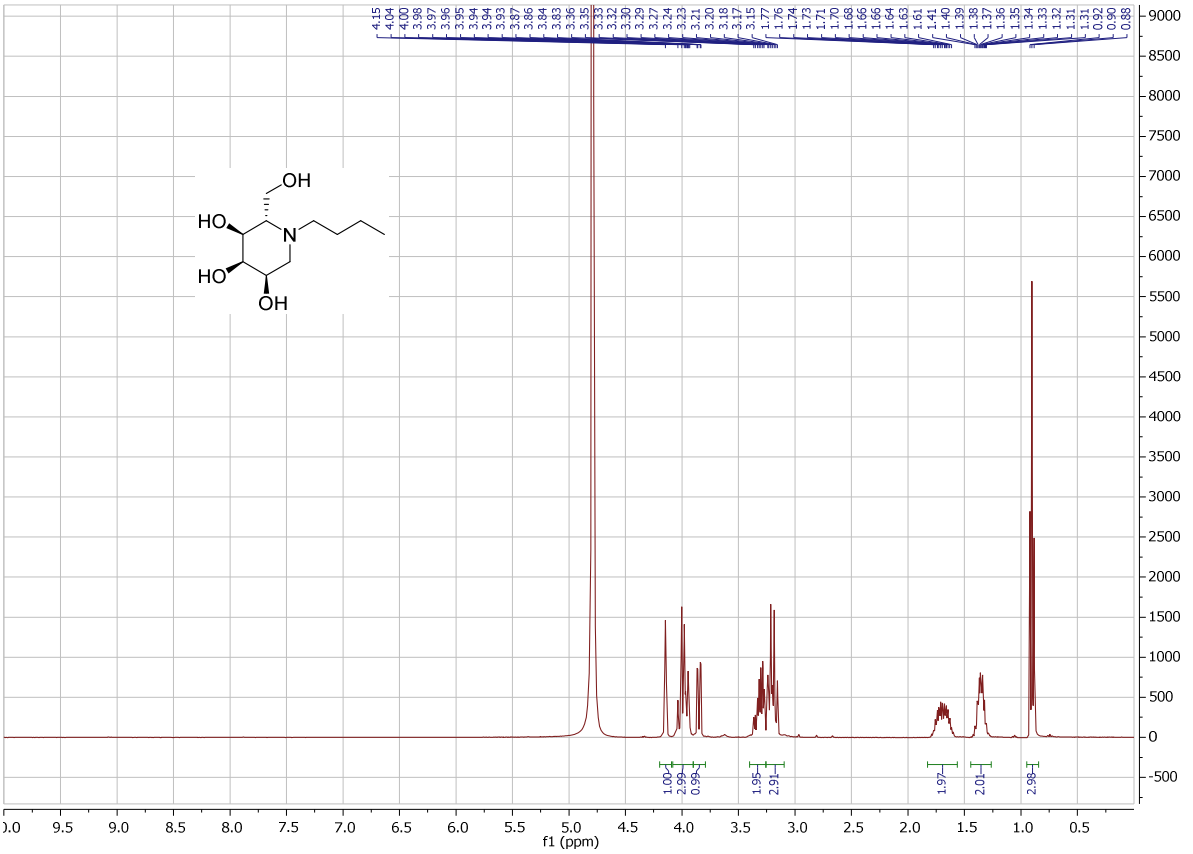


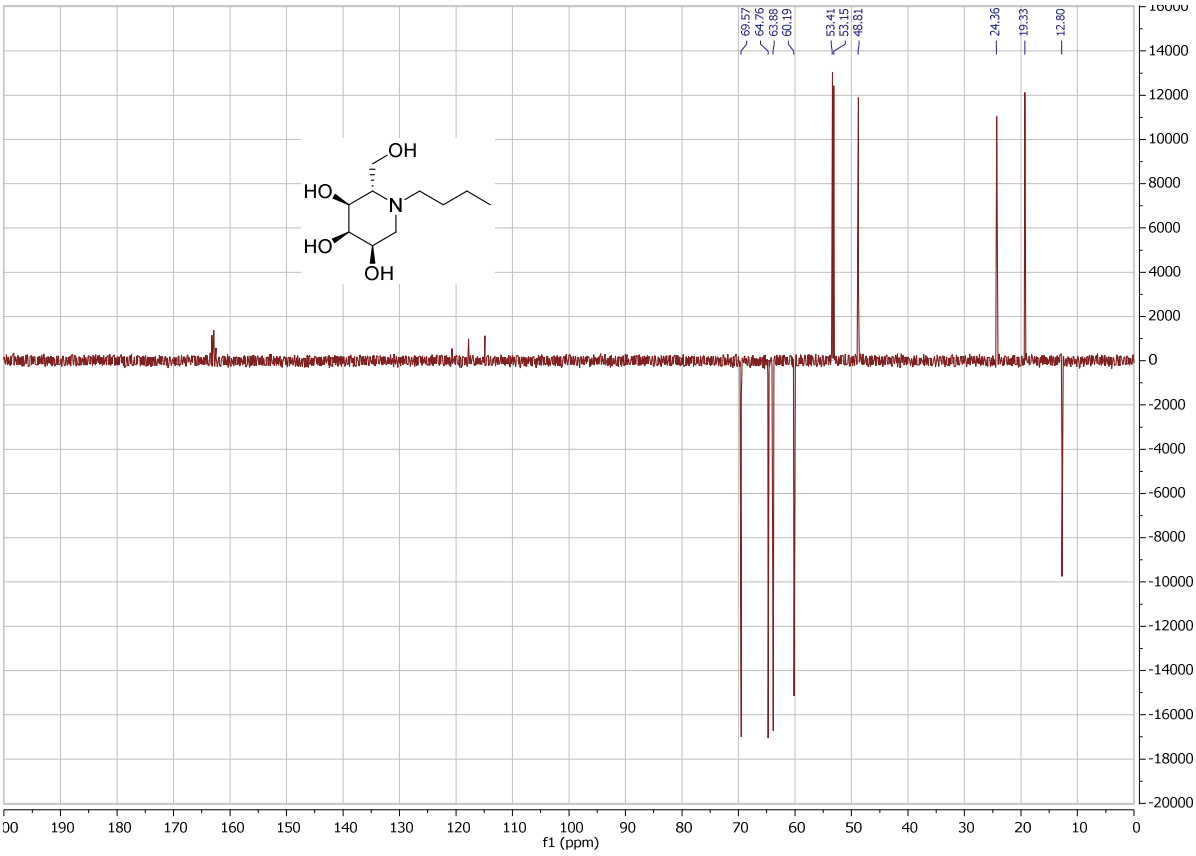
^{1}H-NMR and ^{13}C-NMR of compound C227.TFA in D_2O.



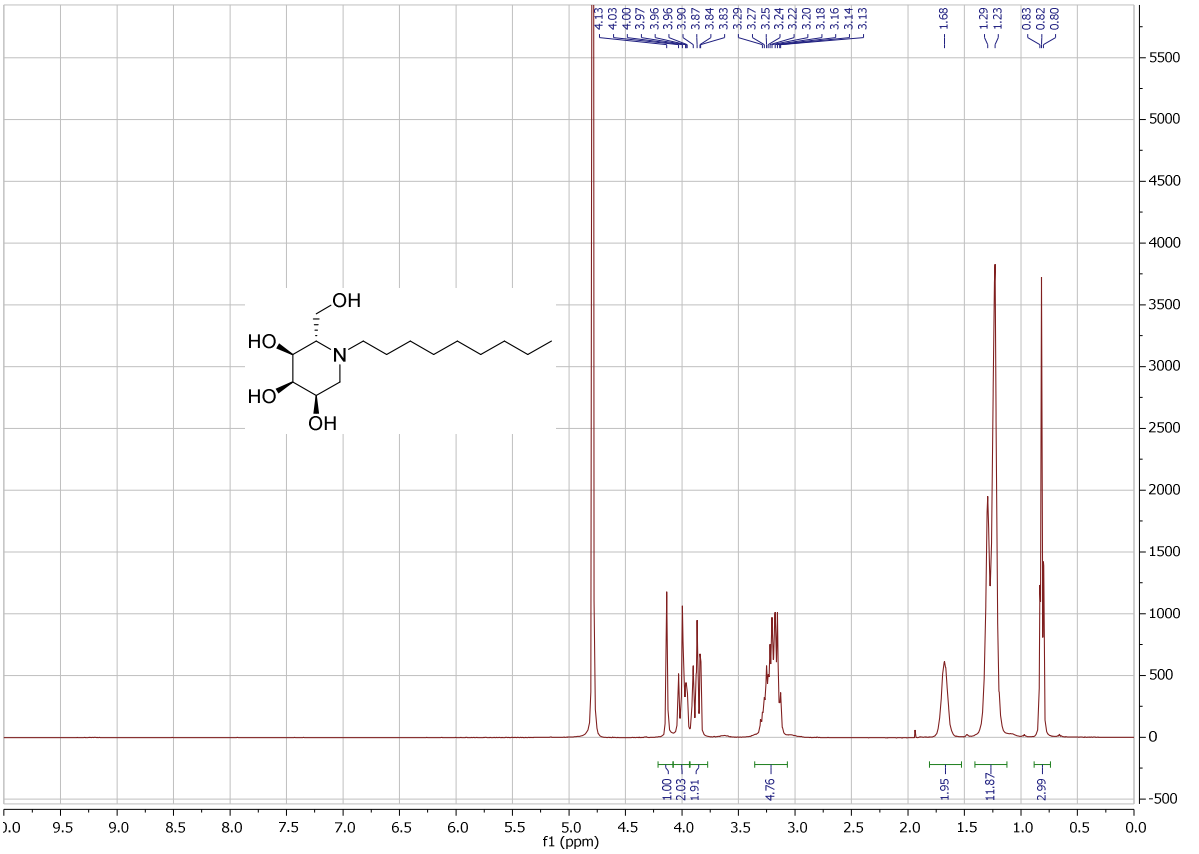


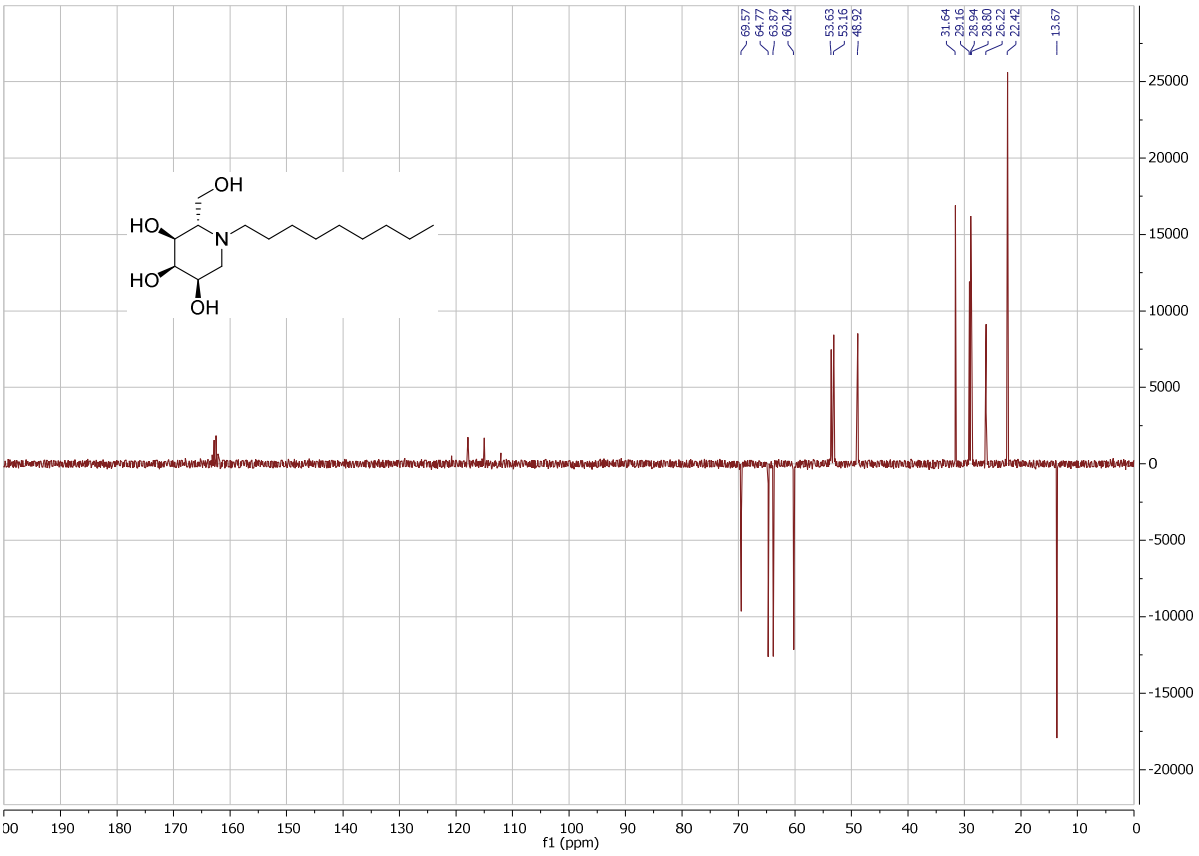
^{1}H-NMR and ^{13}C-NMR of compound C229.TFA in D_2O.



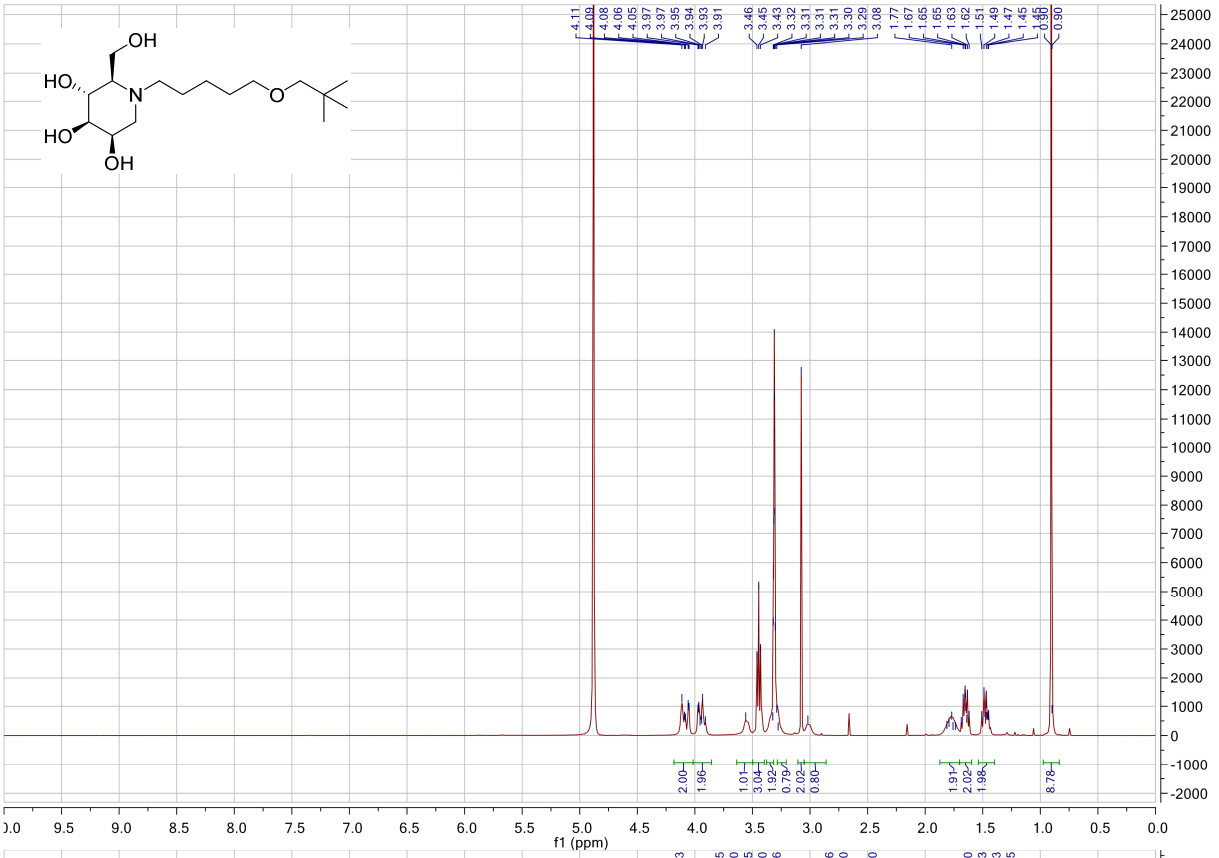


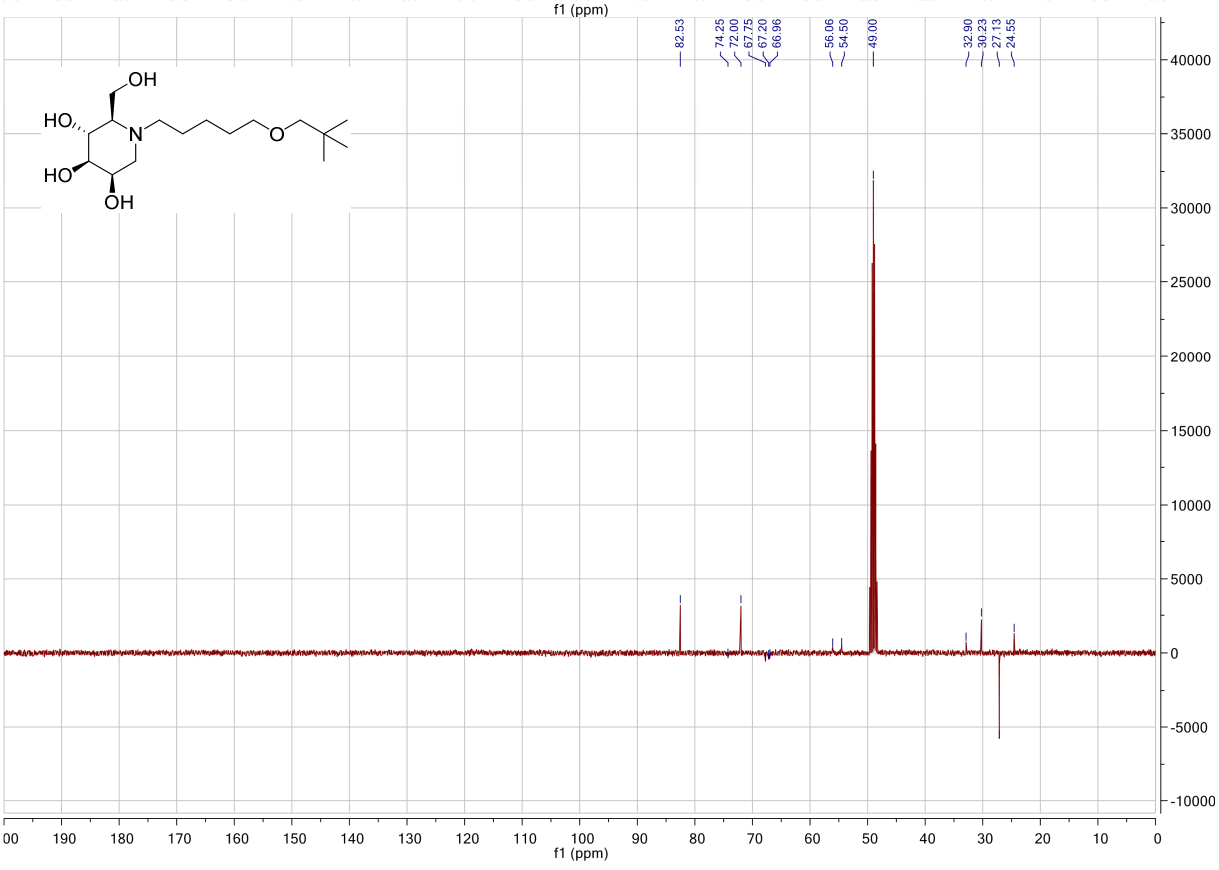
^{1}H-NMR and ^{13}C-NMR of compound C231.TFA in D_2O.



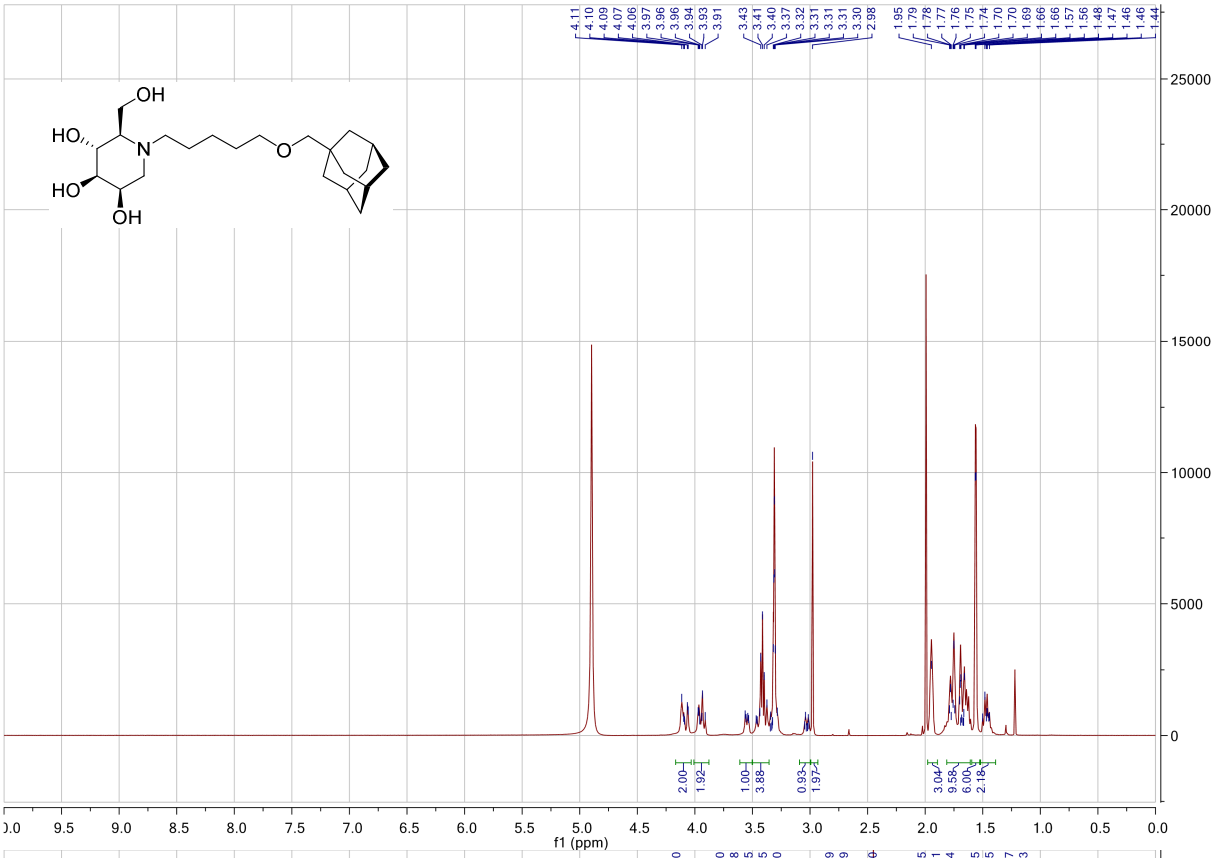


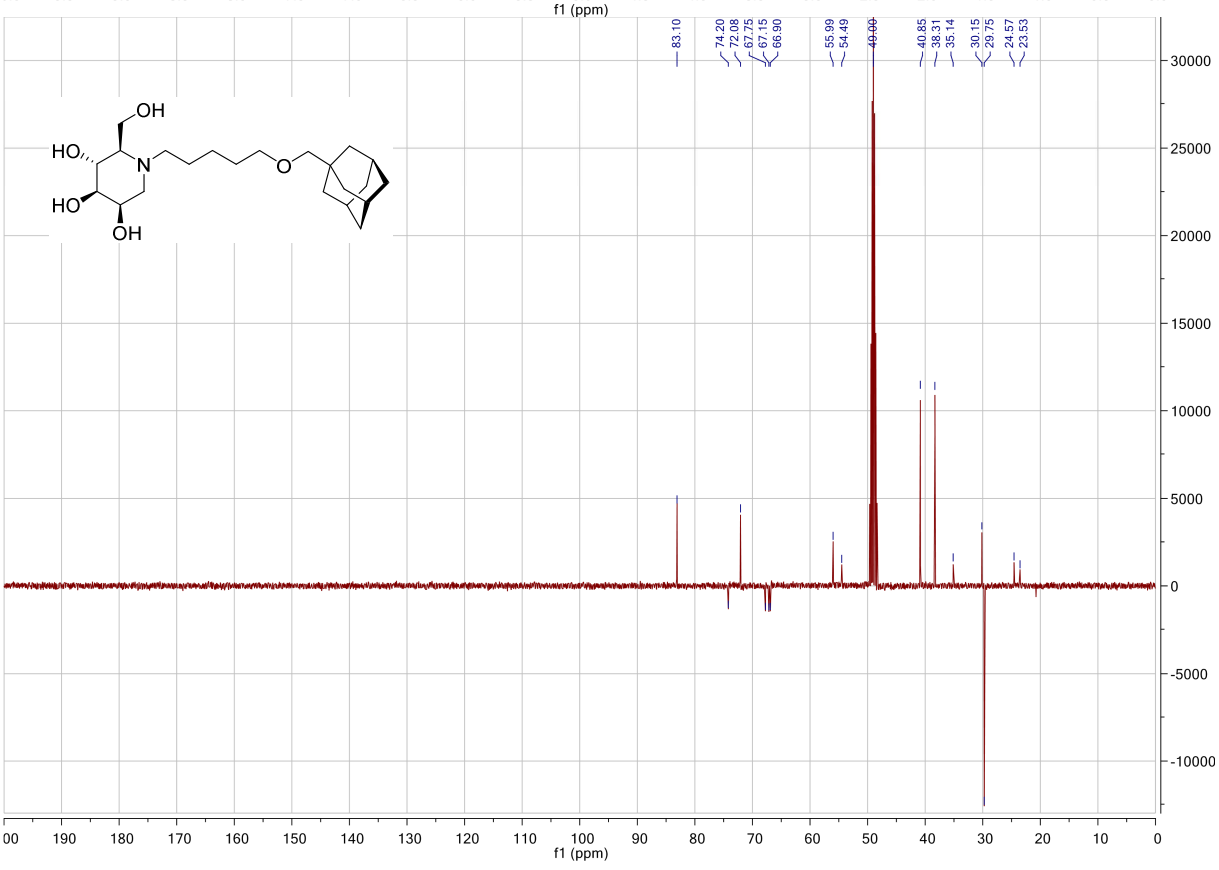
^{1}H-NMR and ^{13}C-NMR of compound C234.TFA in MeOD.



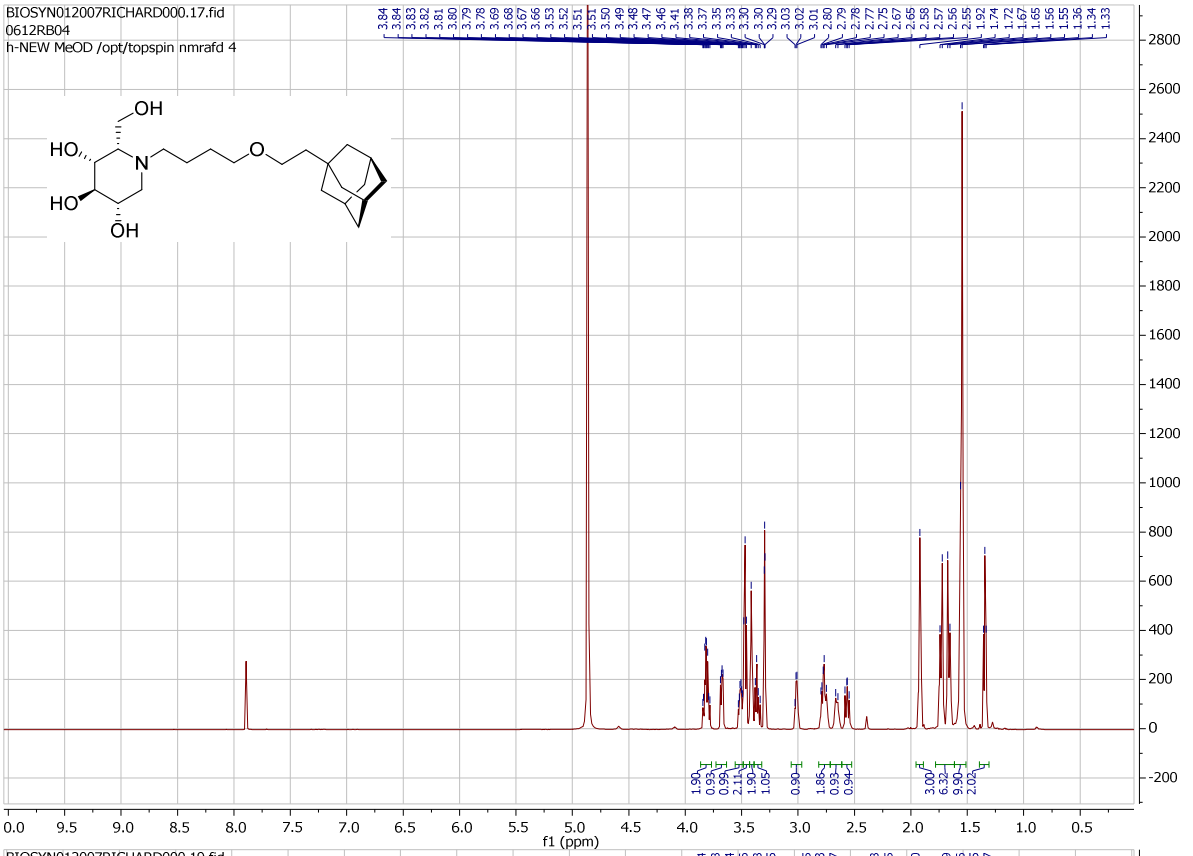


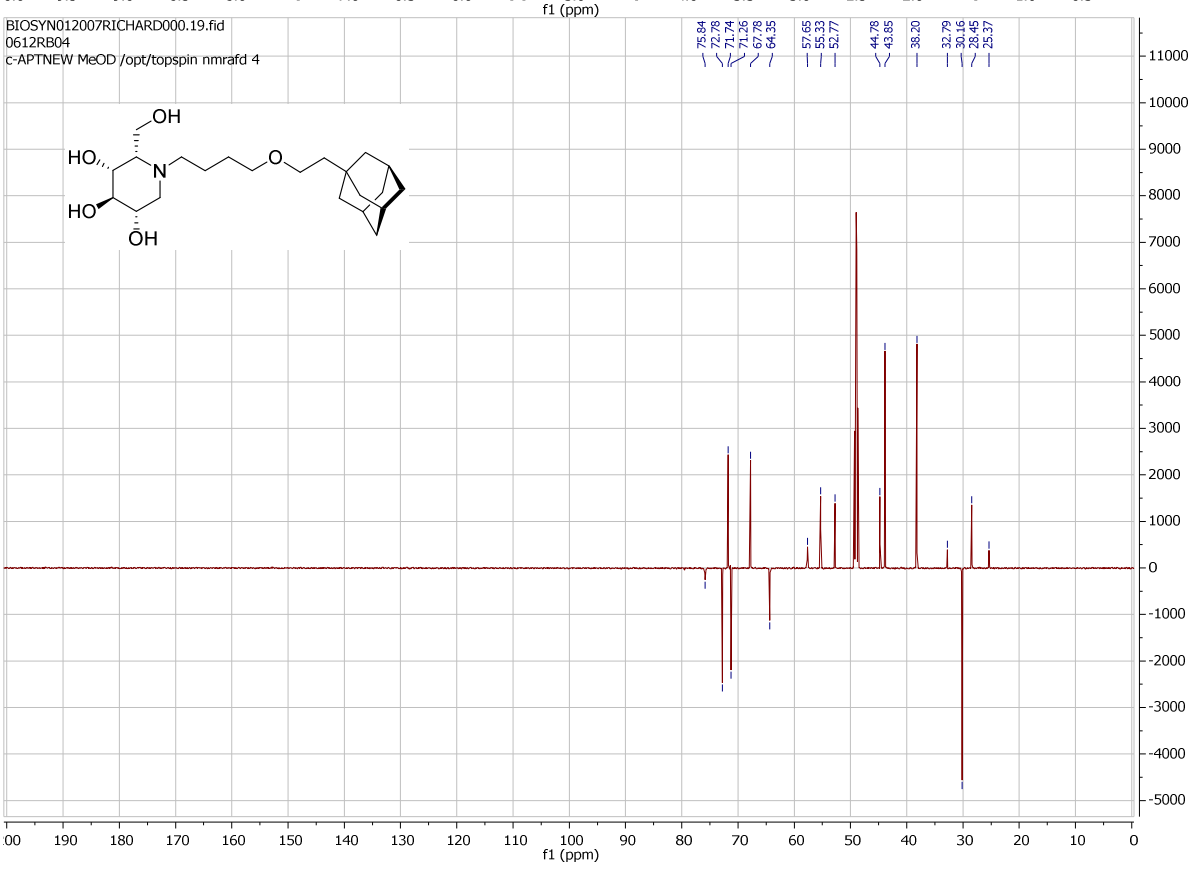
^{1}H-NMR and ^{13}C-NMR of compound C236.TFA in MeOD.



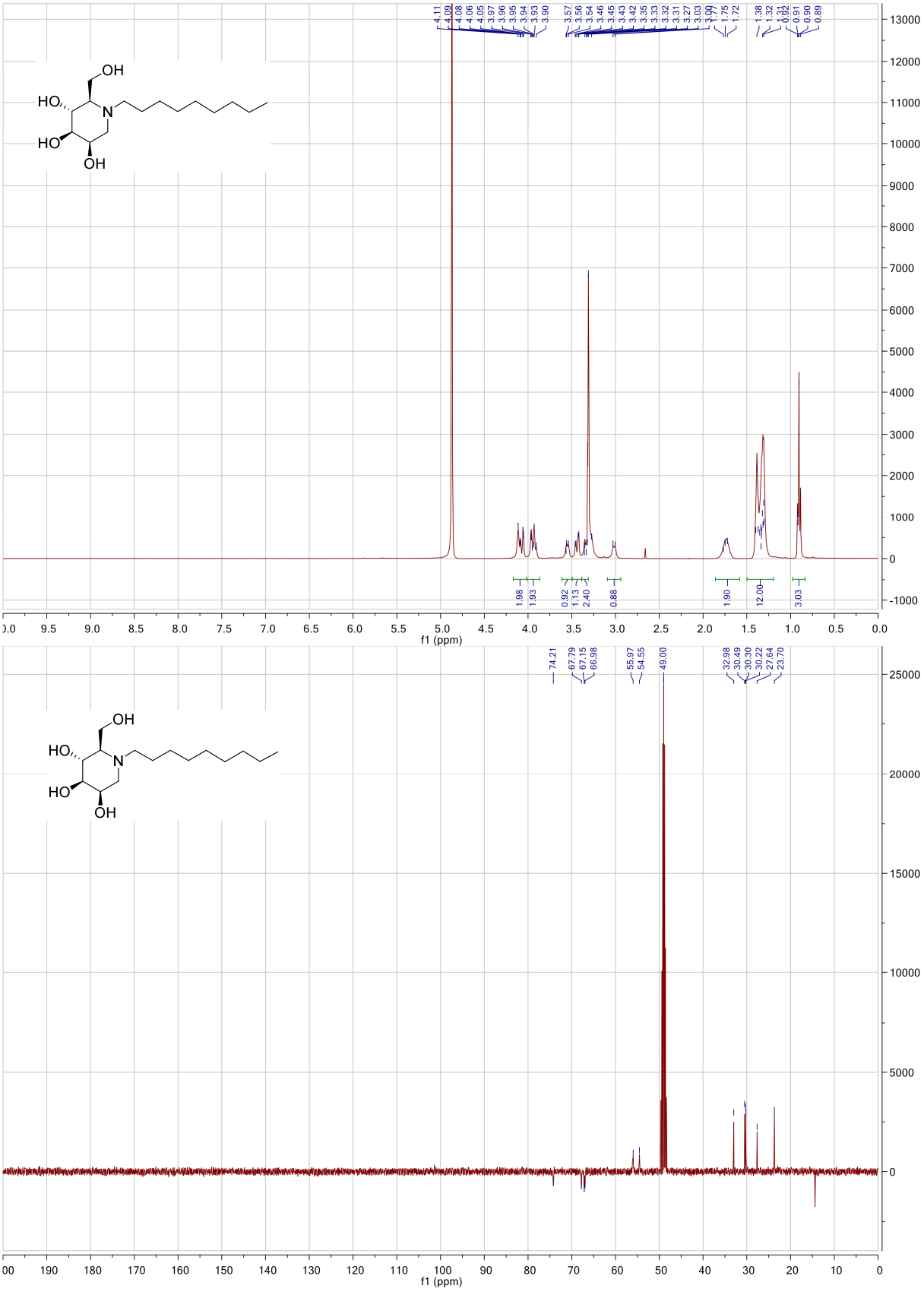


^{1}H-NMR and ^{13}C-NMR of compound C238.TFA in MeOD.

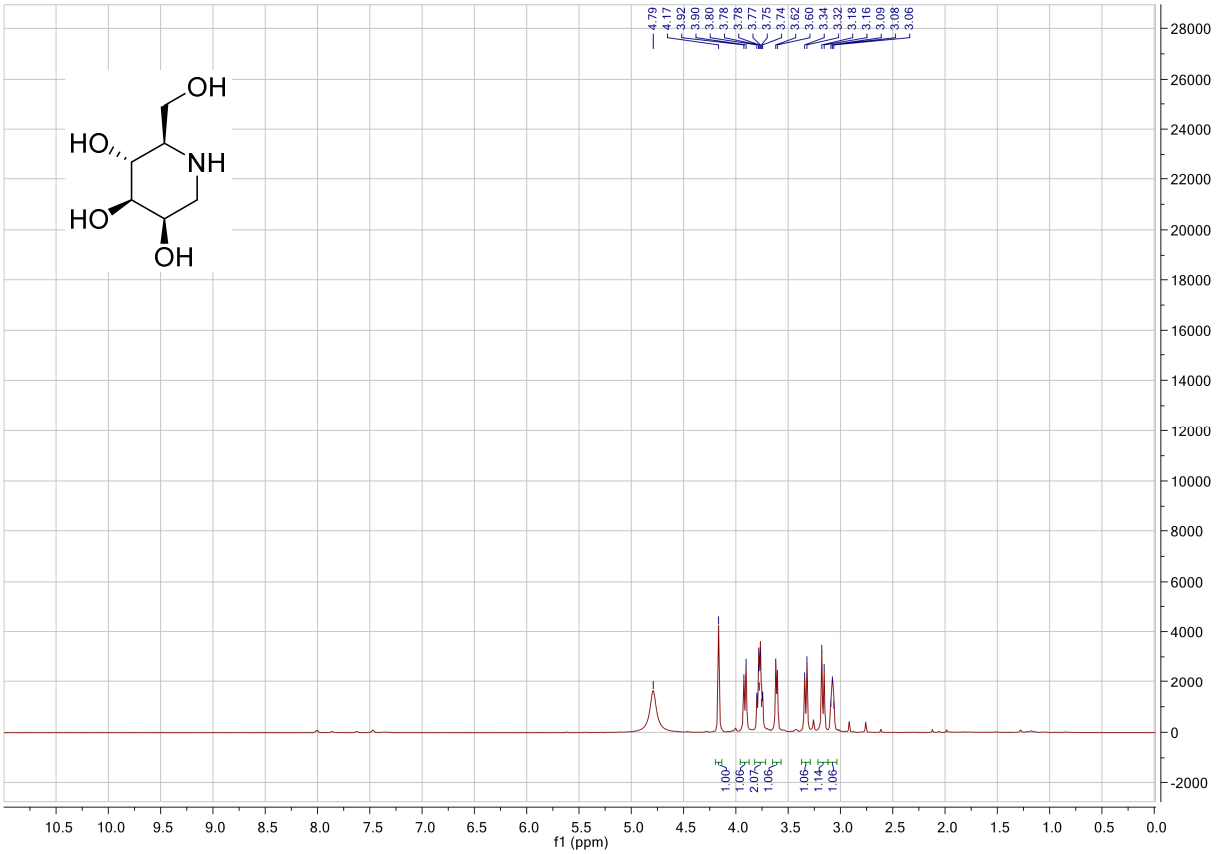


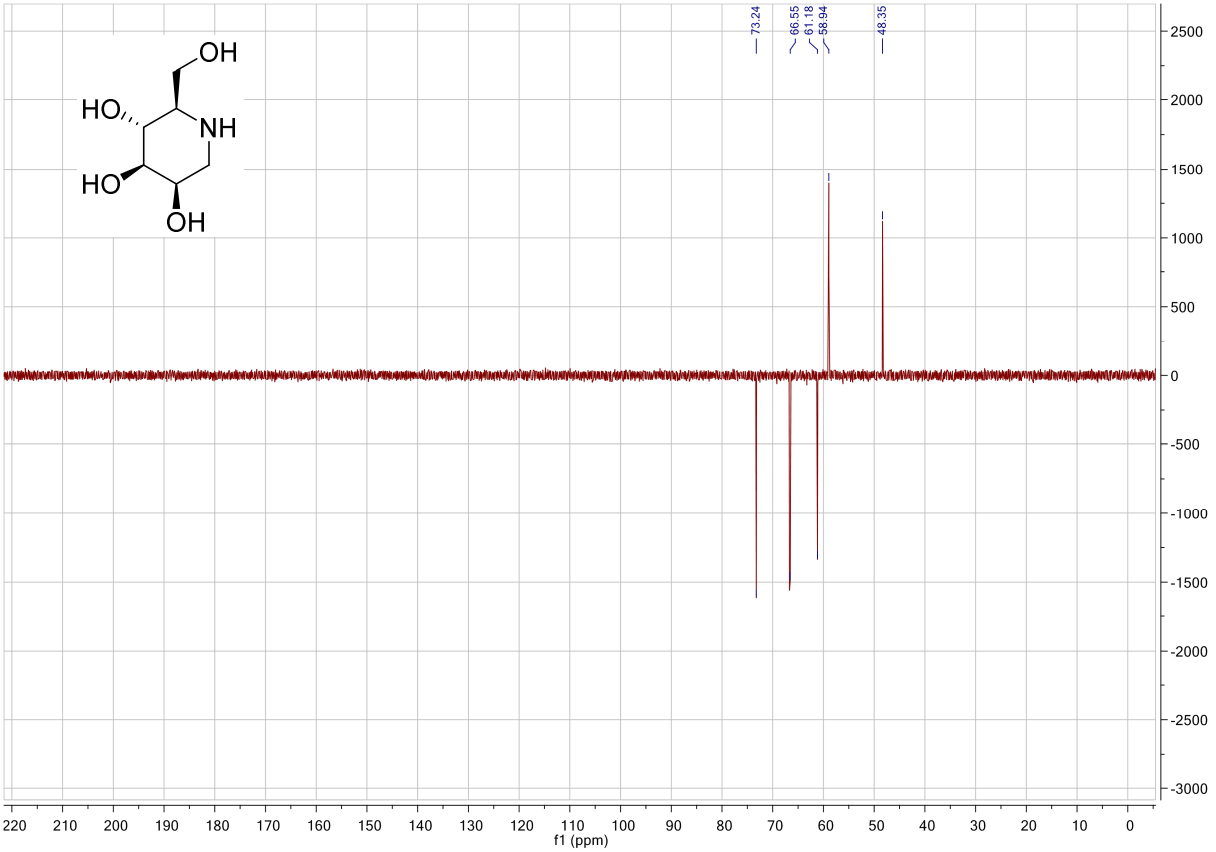


^{1}H-NMR and ^{13}C-NMR of compound C239.TFA in MeOD.

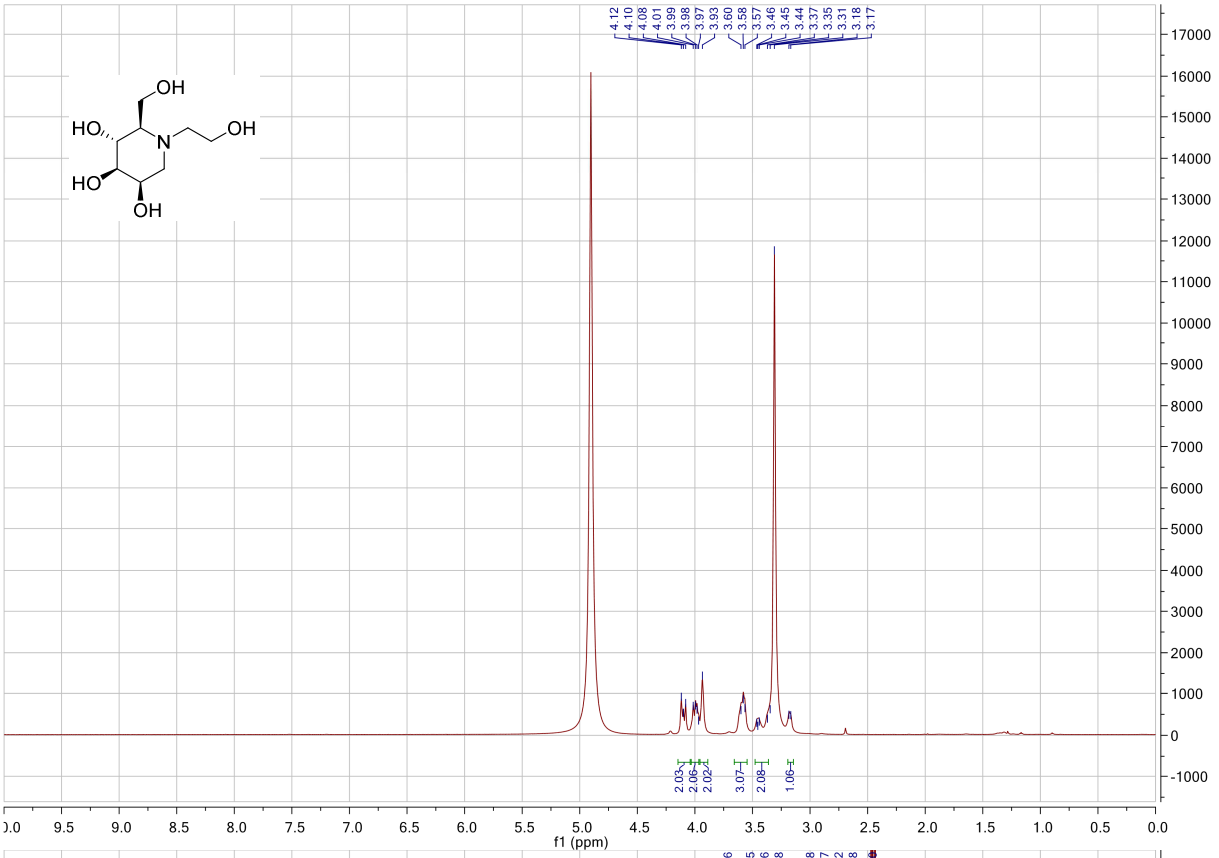


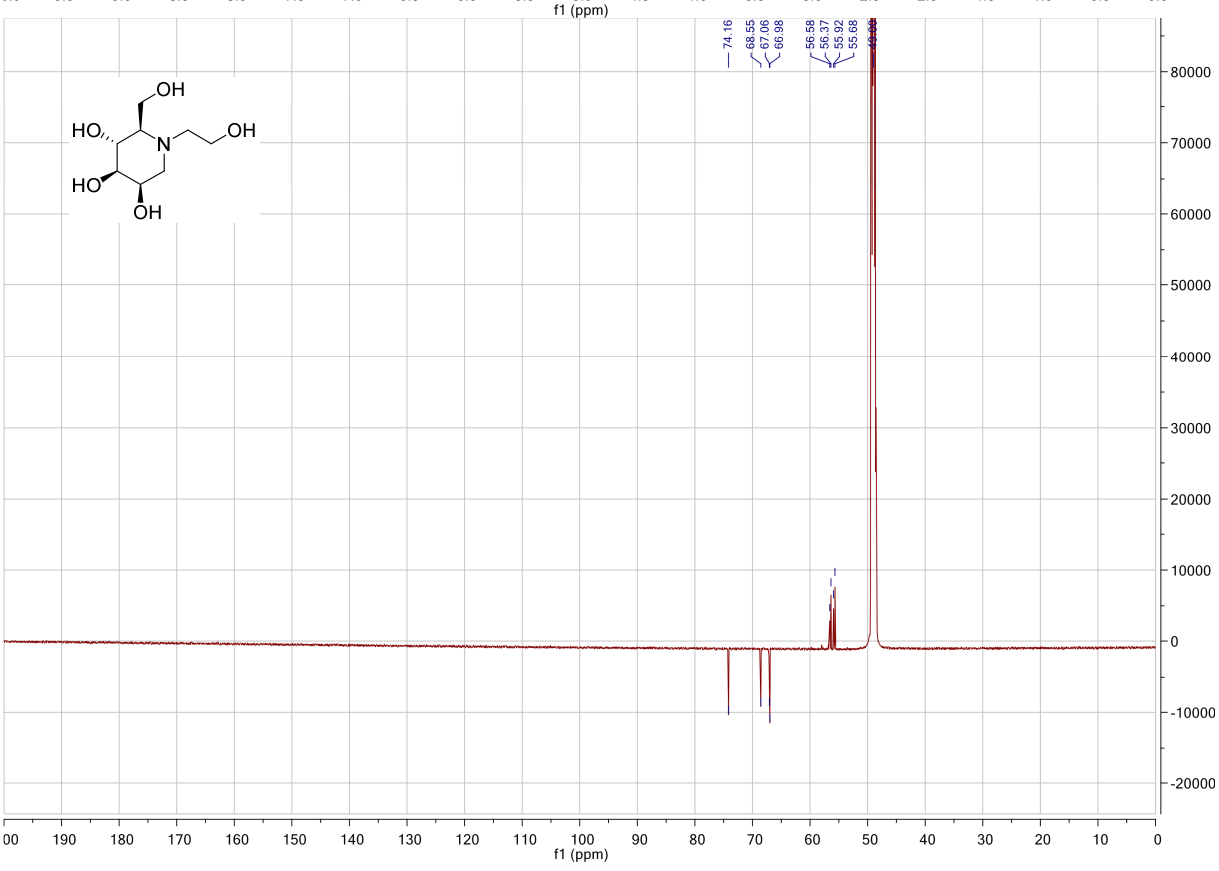
^{1}H-NMR and ^{13}C-NMR of compound C241 in H_2O.



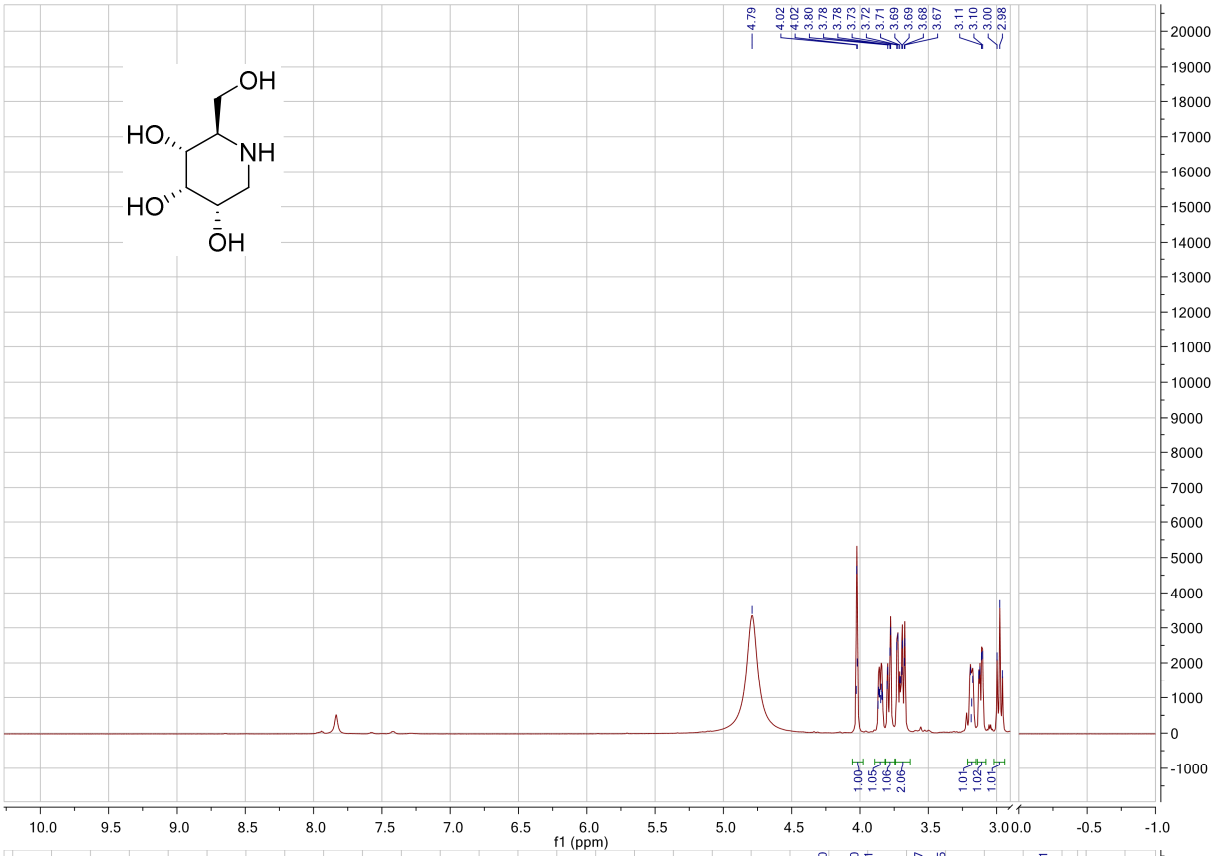


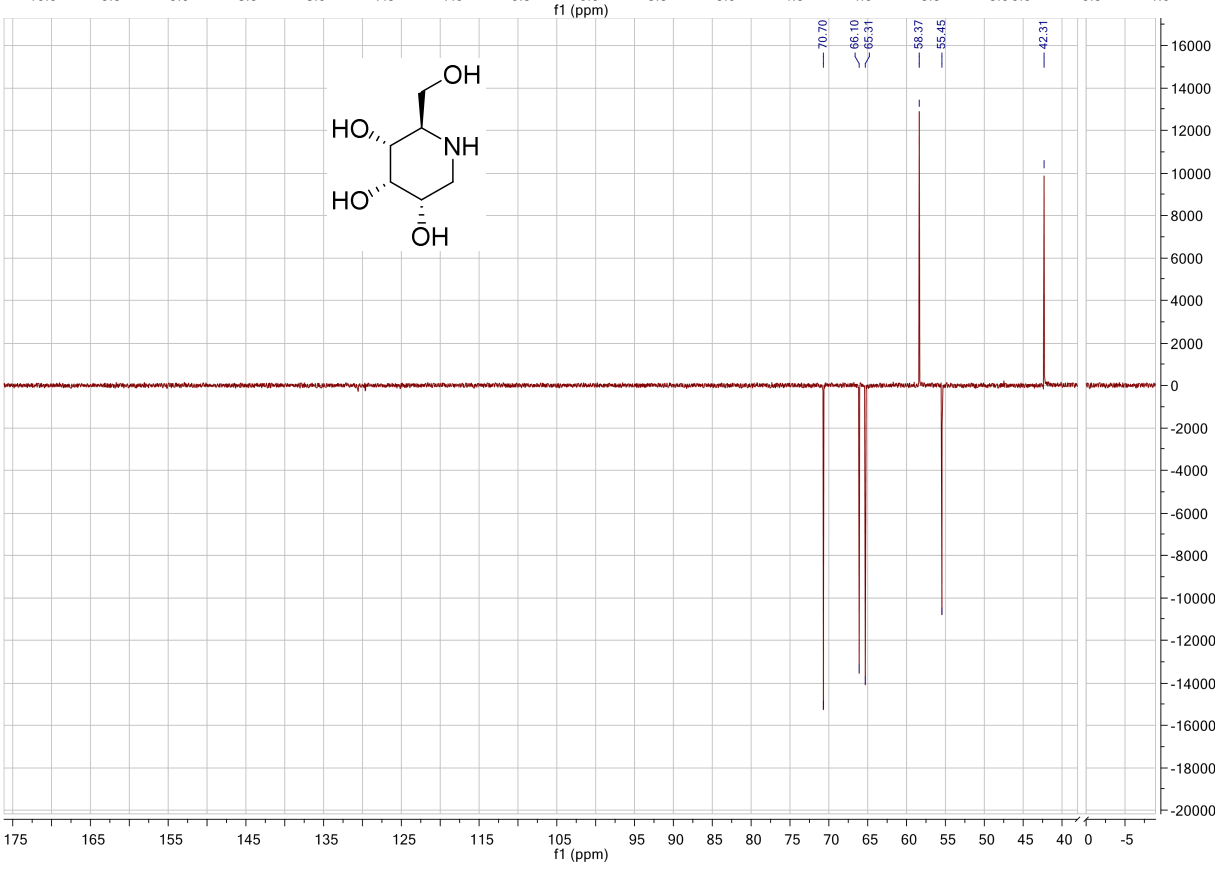
^{1}H-NMR and ^{13}C-NMR of compound C243.TFA in MeOD.



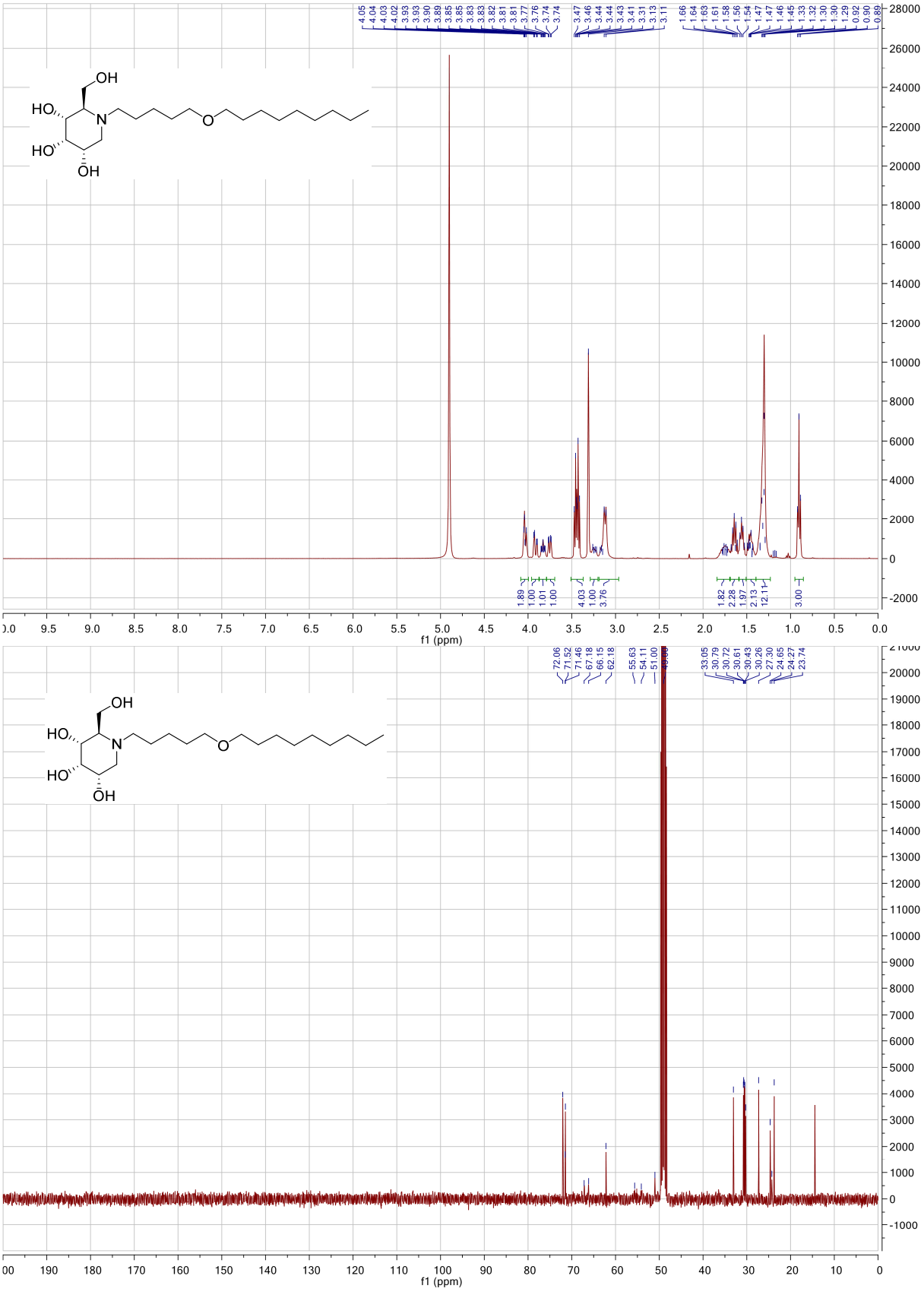


^{1}H-NMR and ^{13}C-NMR of compound C245 in D_2O.

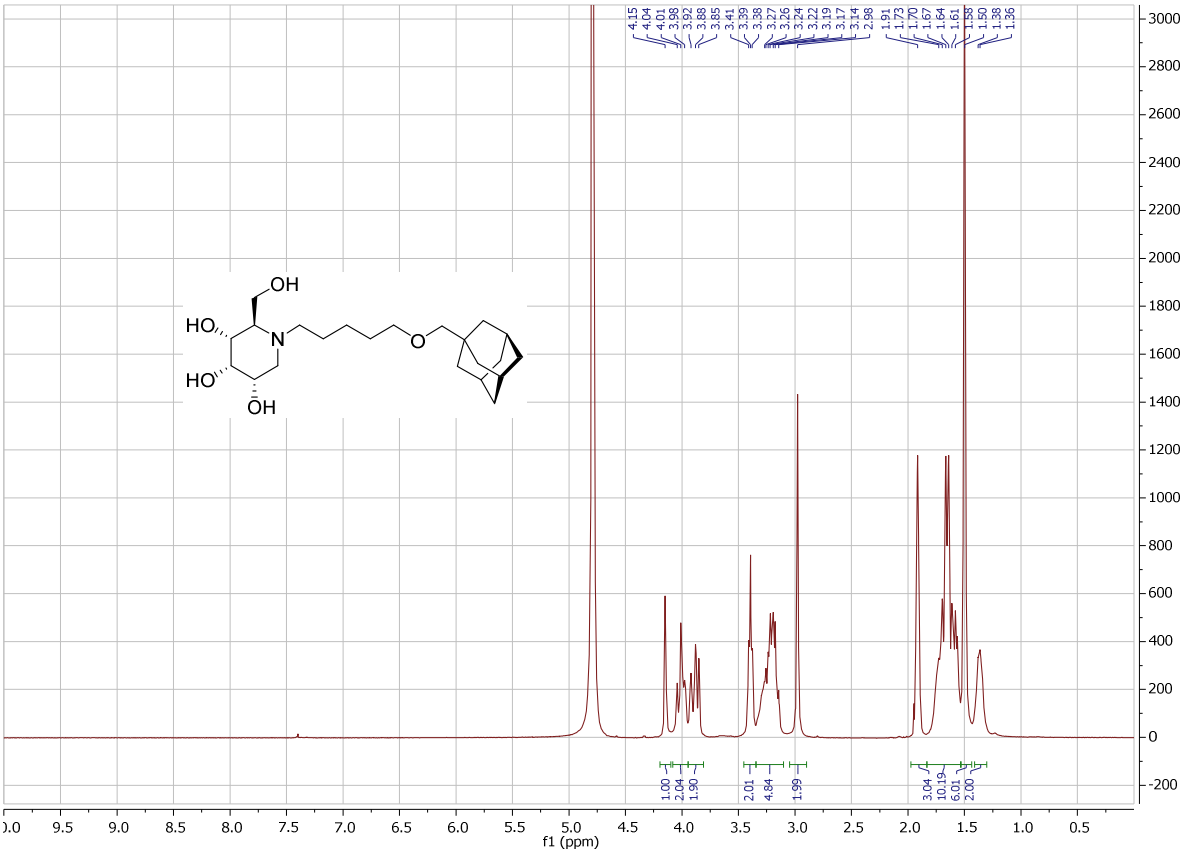


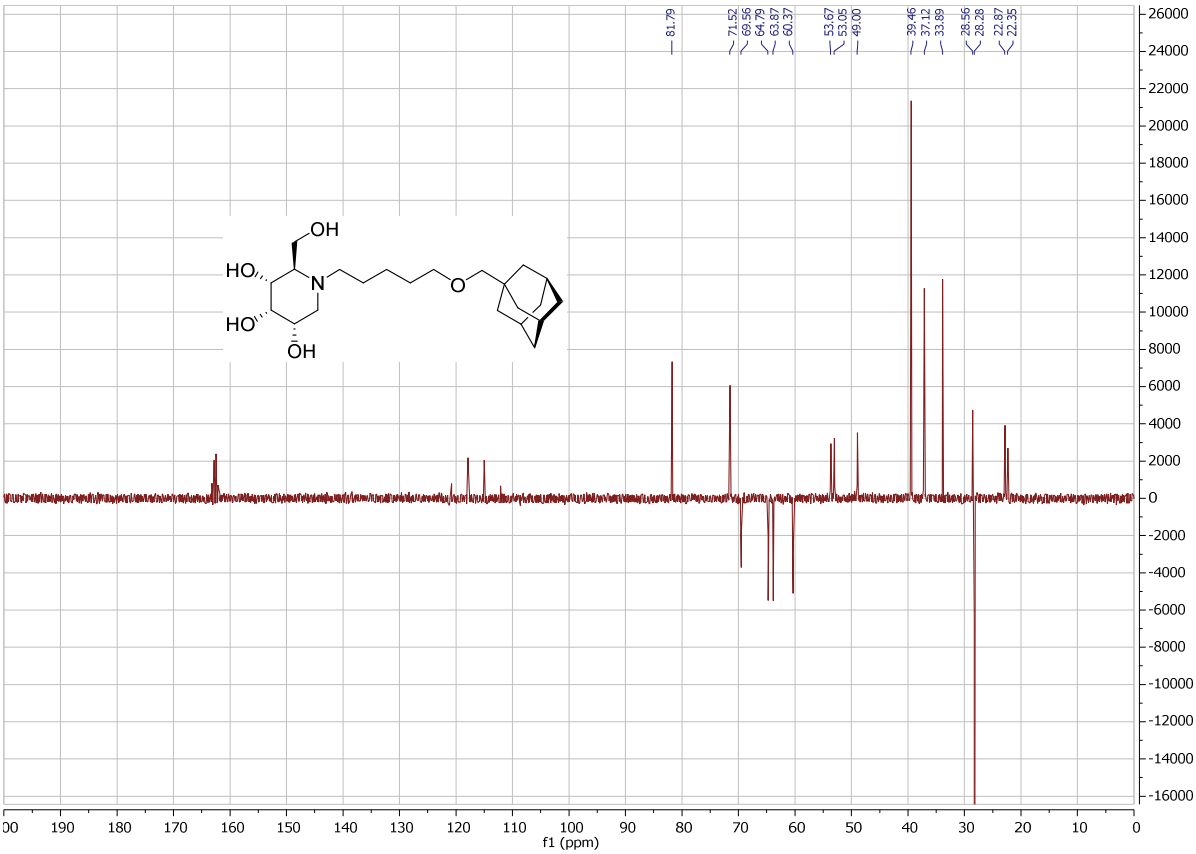


^{1}H-NMR and ^{13}C-NMR of compound C247.TFA in MeOD.

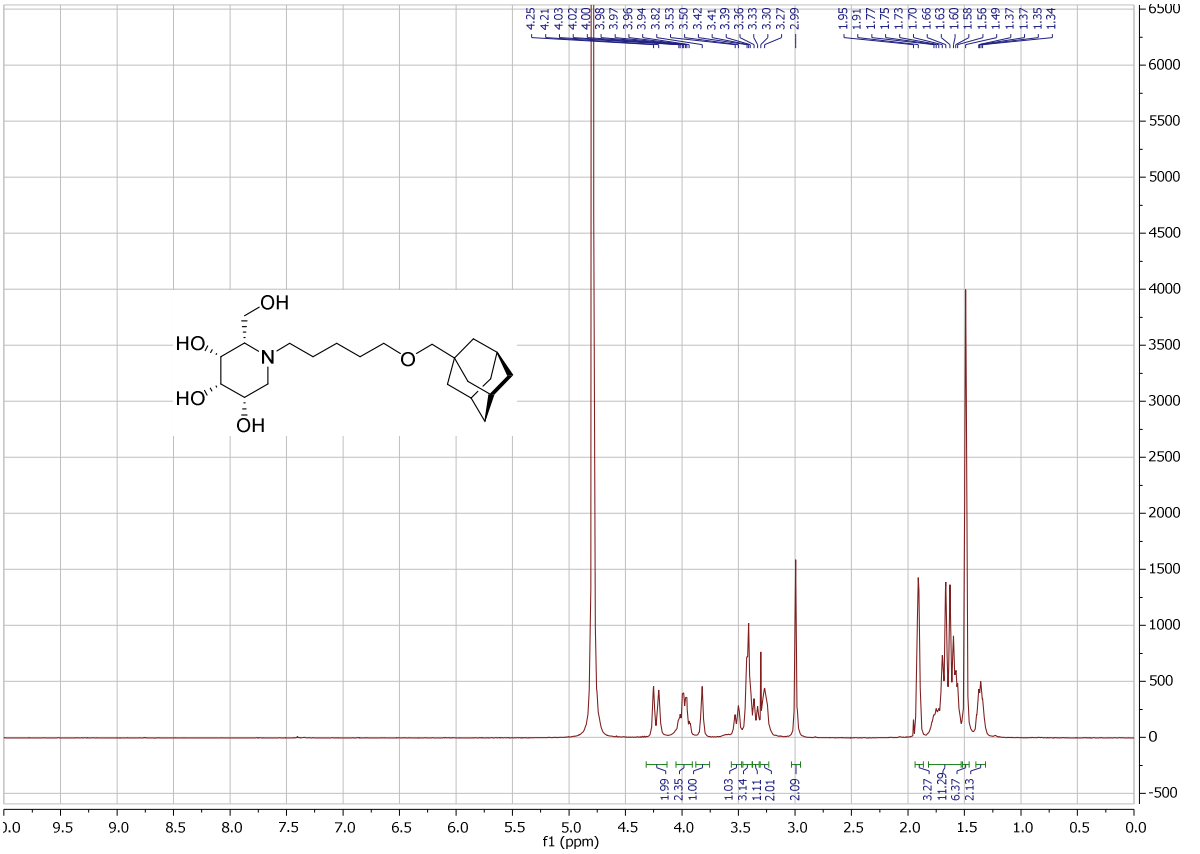


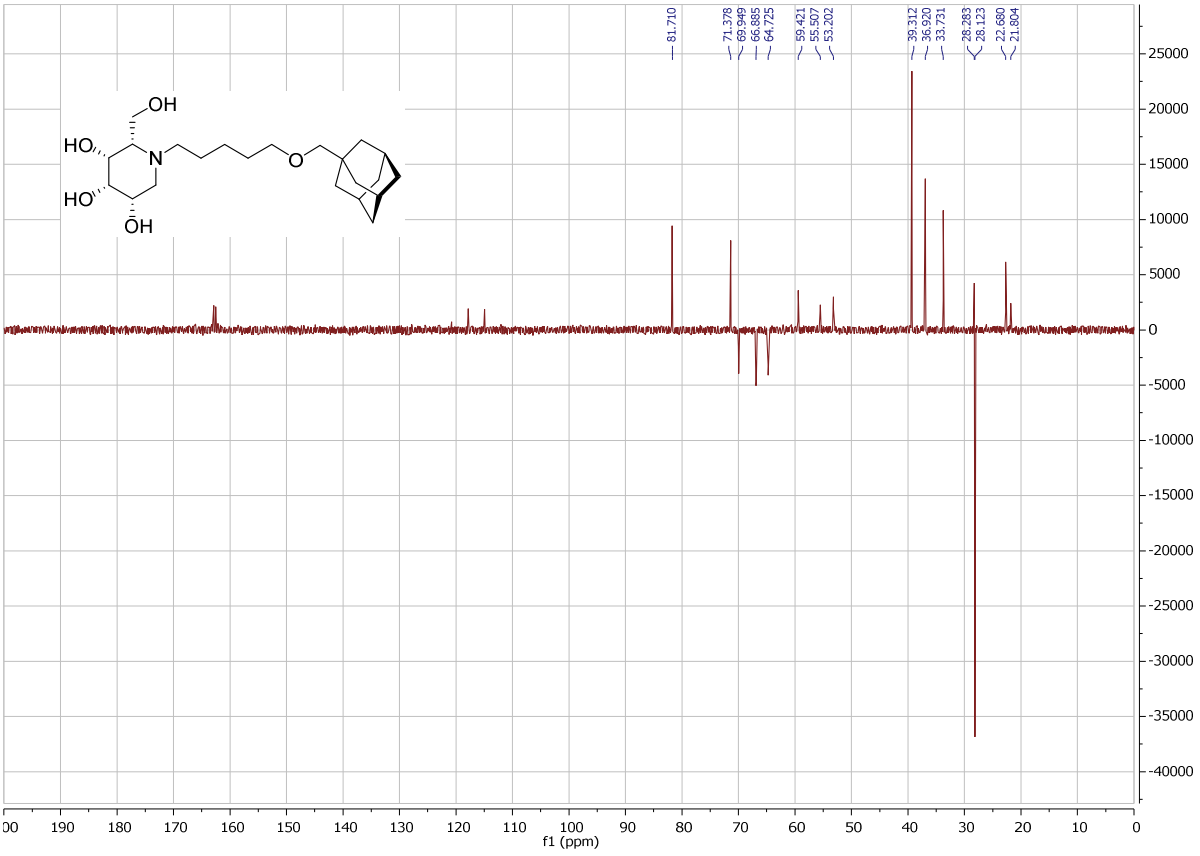
^{1}H-NMR and ^{13}C-NMR of compound C253.TFA in D_2O.



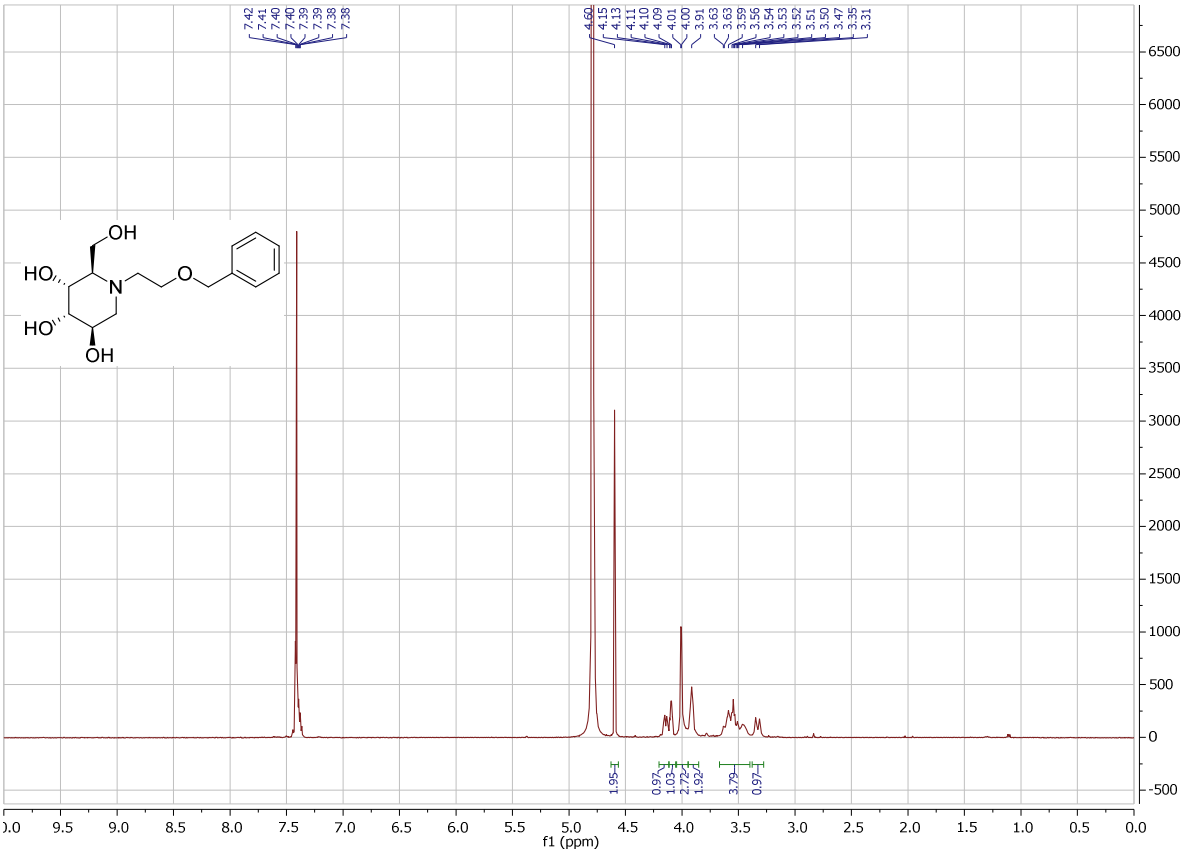


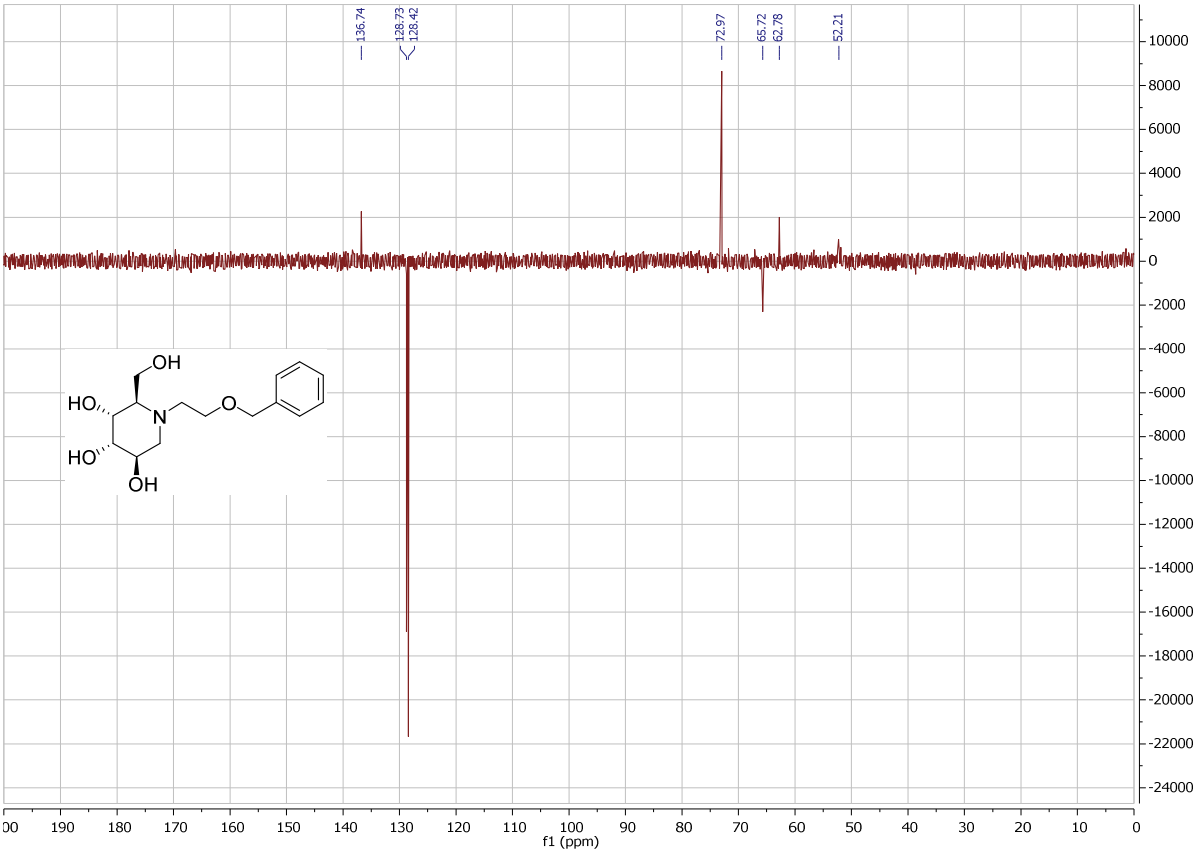
^{1}H-NMR and ^{13}C-NMR of compound C255.TFA in D_2O.



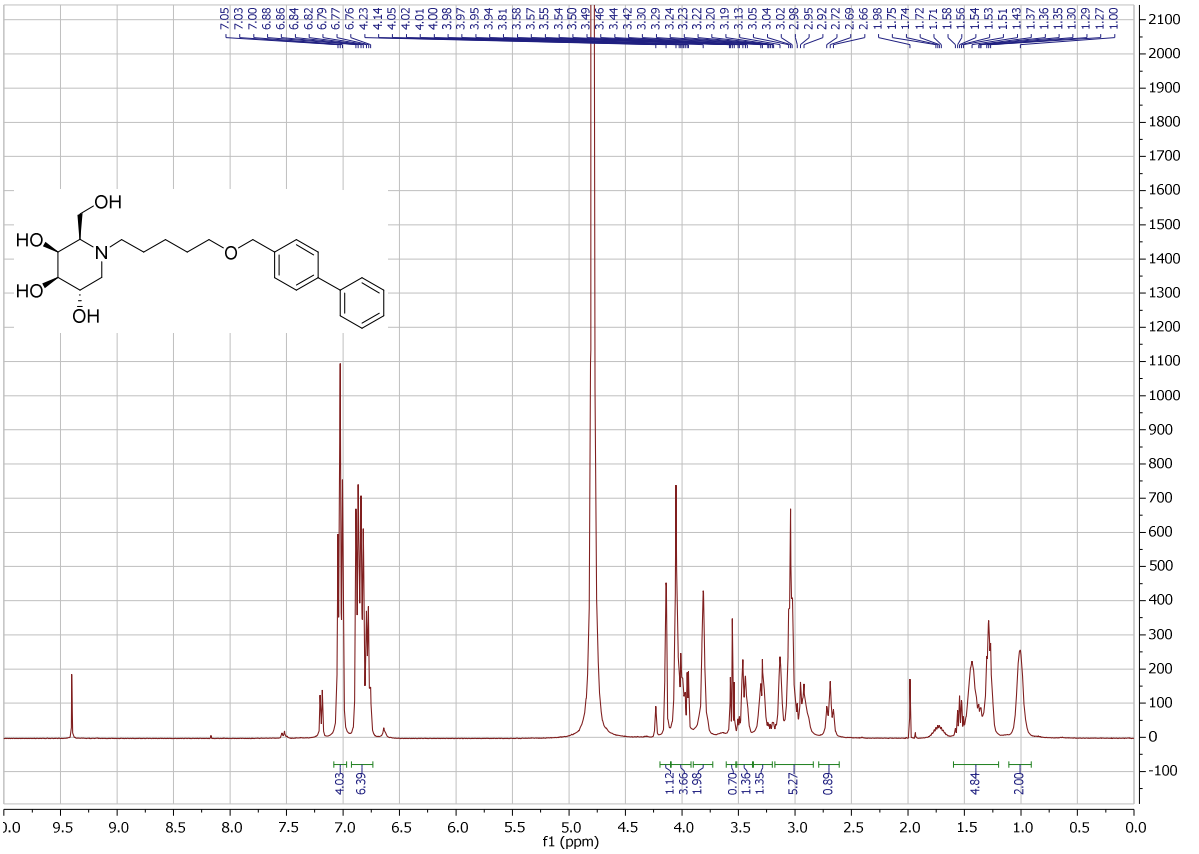


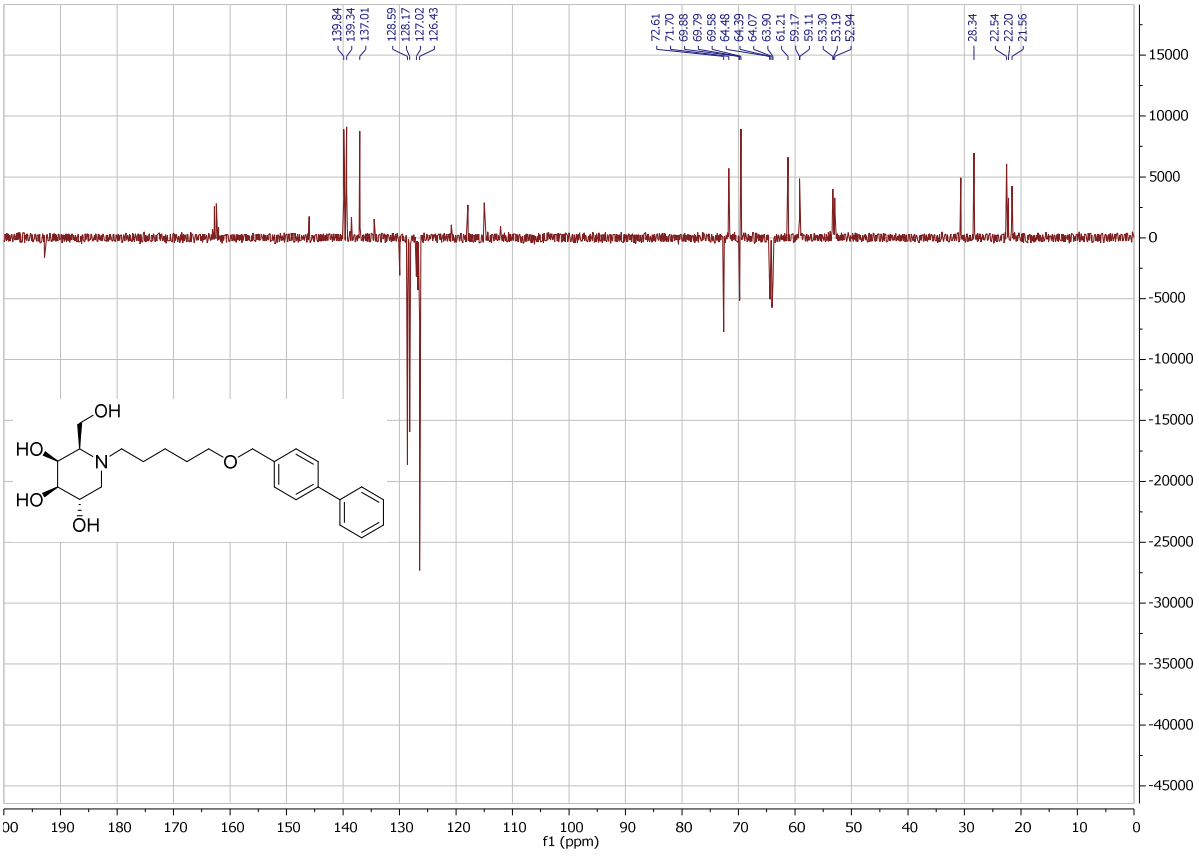
^{1}H-NMR and ^{13}C-NMR of compound C256.TFA in D_2O.



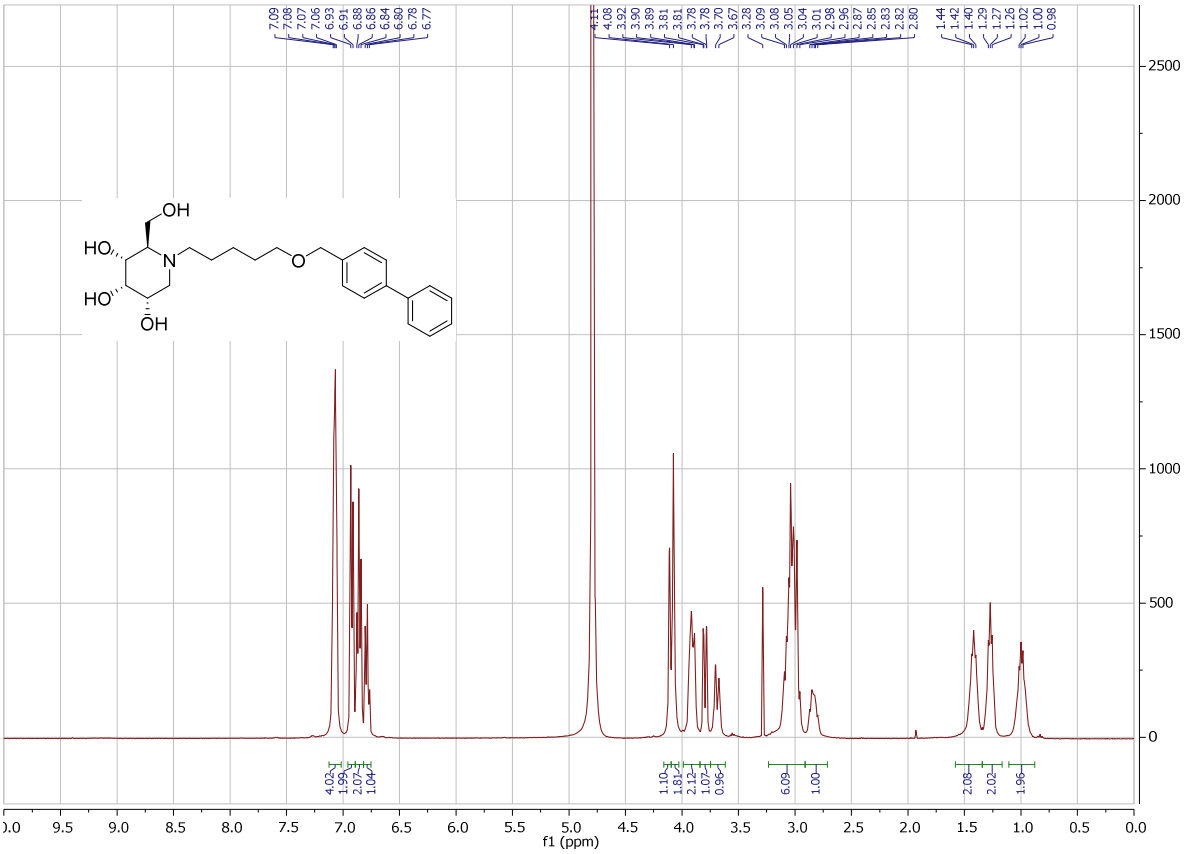


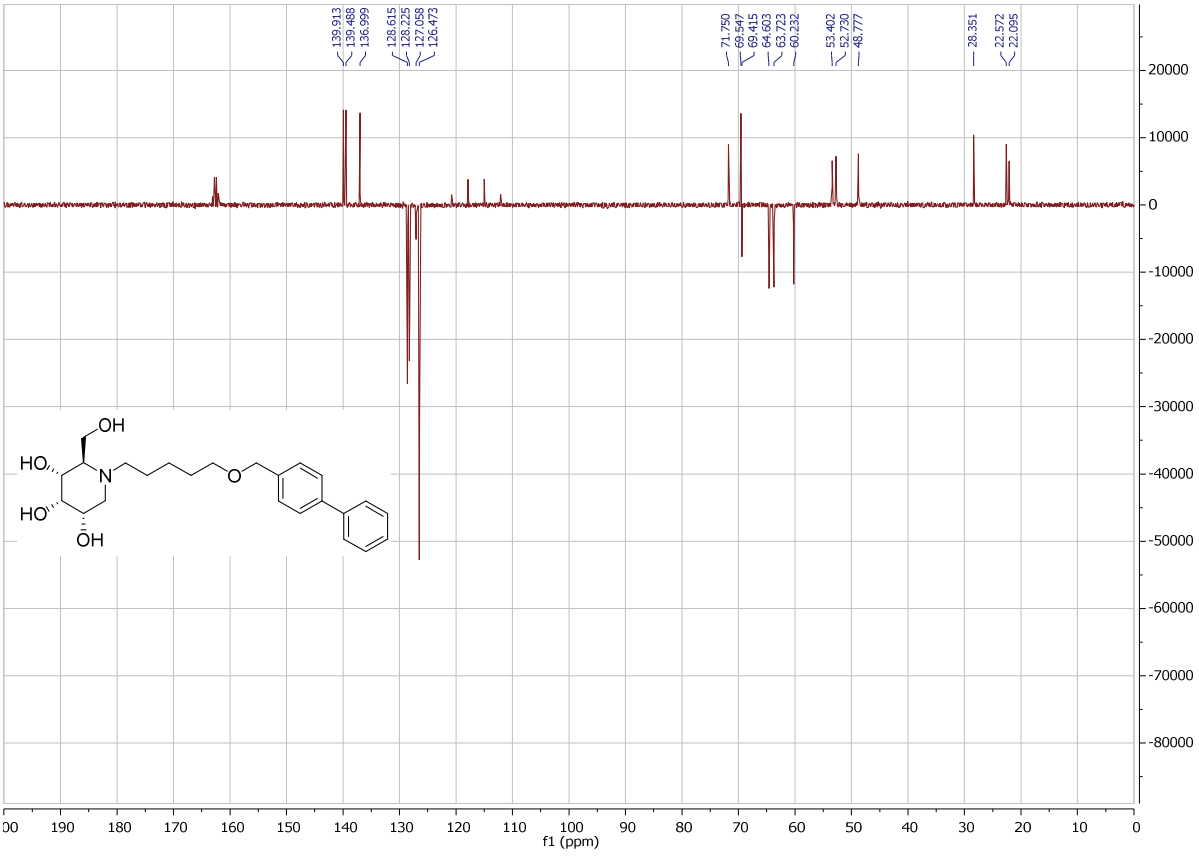
^{1}H-NMR and ^{13}C-NMR of compound C259.TFA in D_2O.



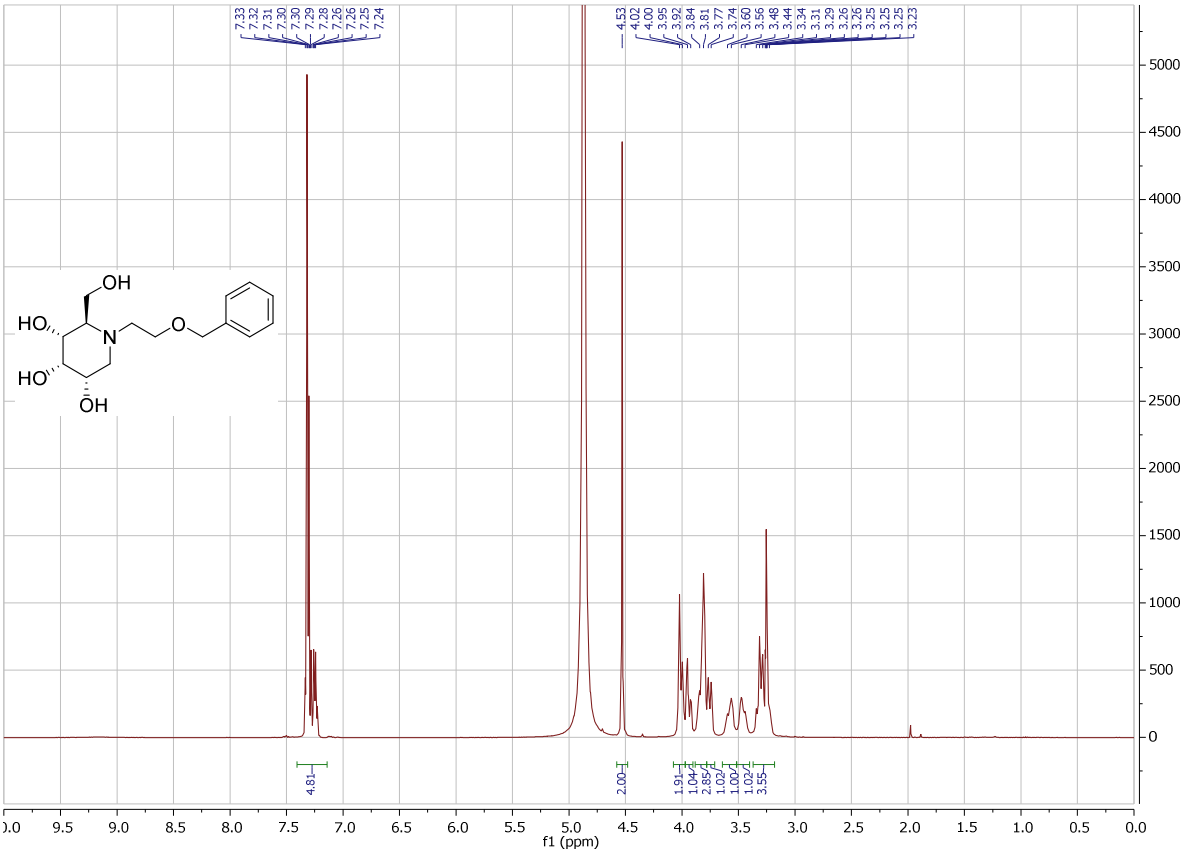


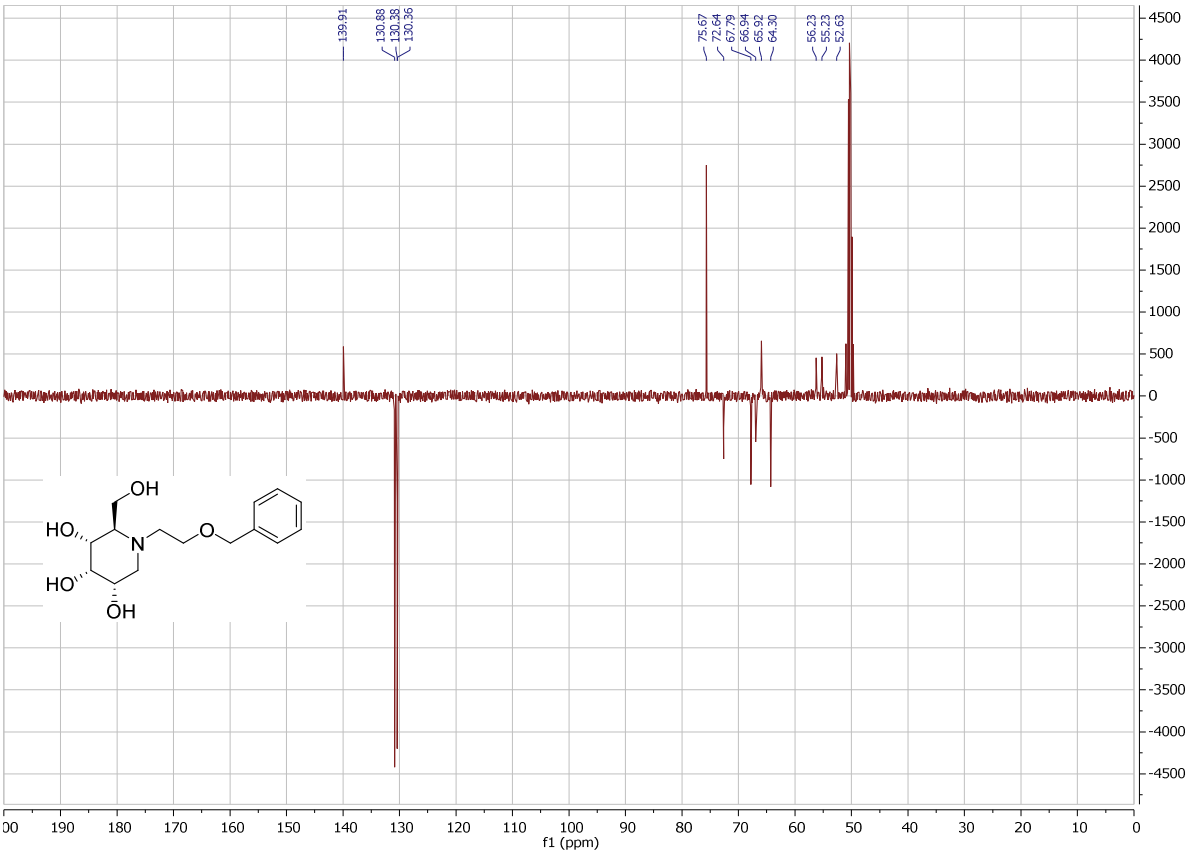
^{1}H-NMR and ^{13}C-NMR of compound C264.TFA in D_2O.



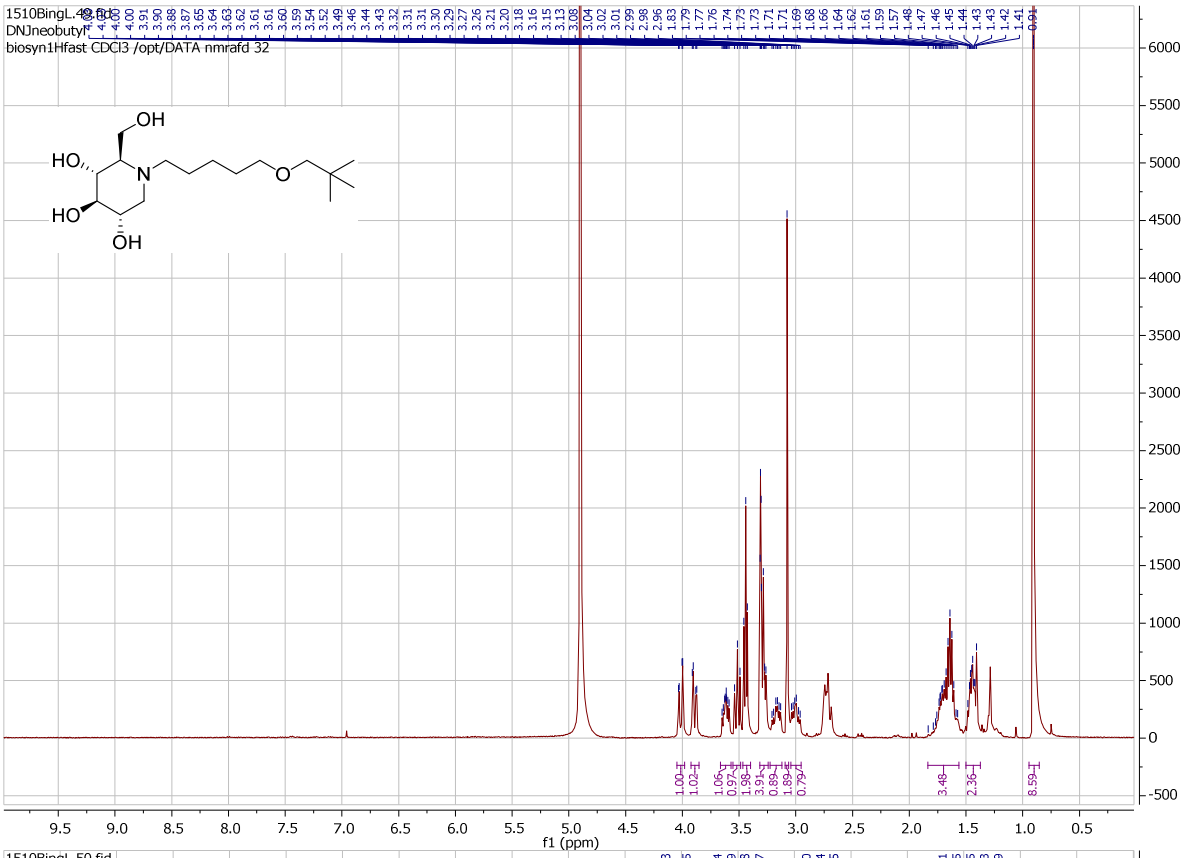


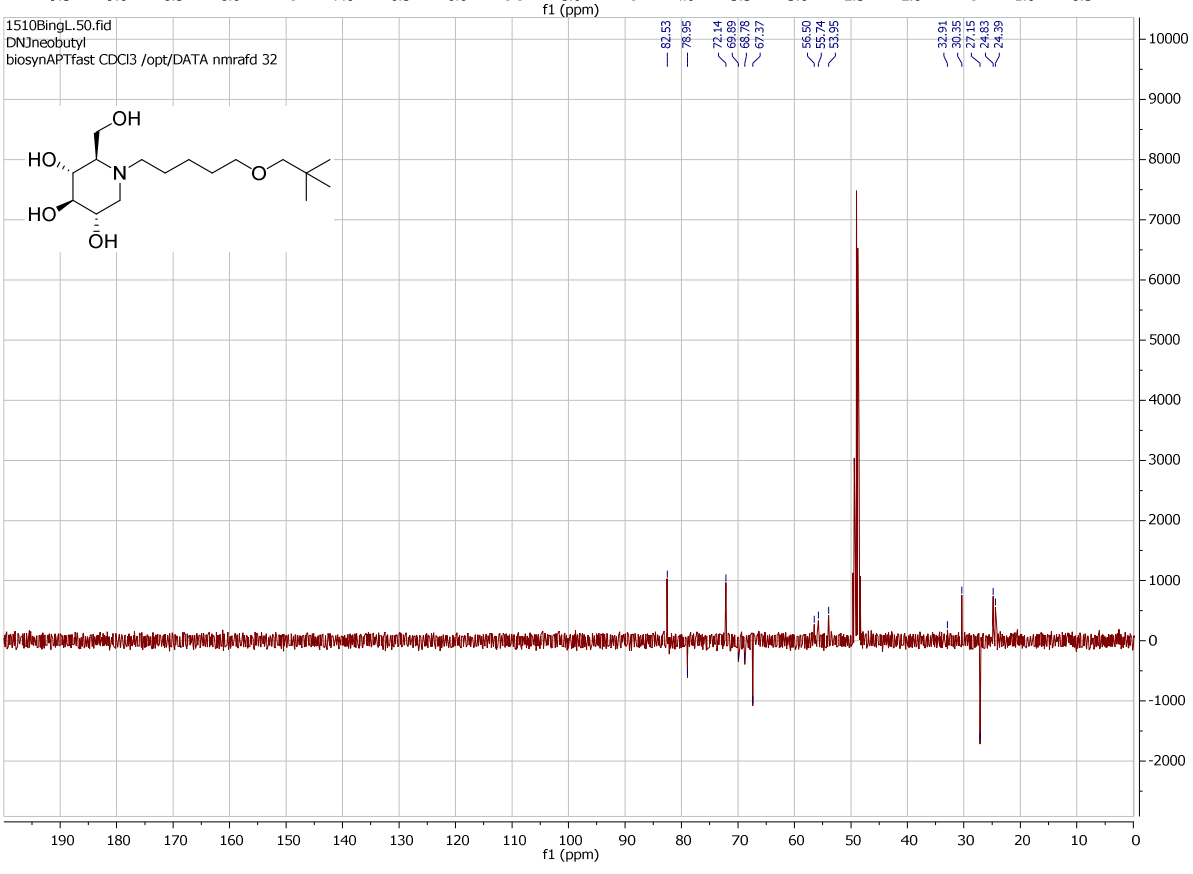
^{1}H-NMR and ^{13}C-NMR of compound C266.TFA in MeOD.



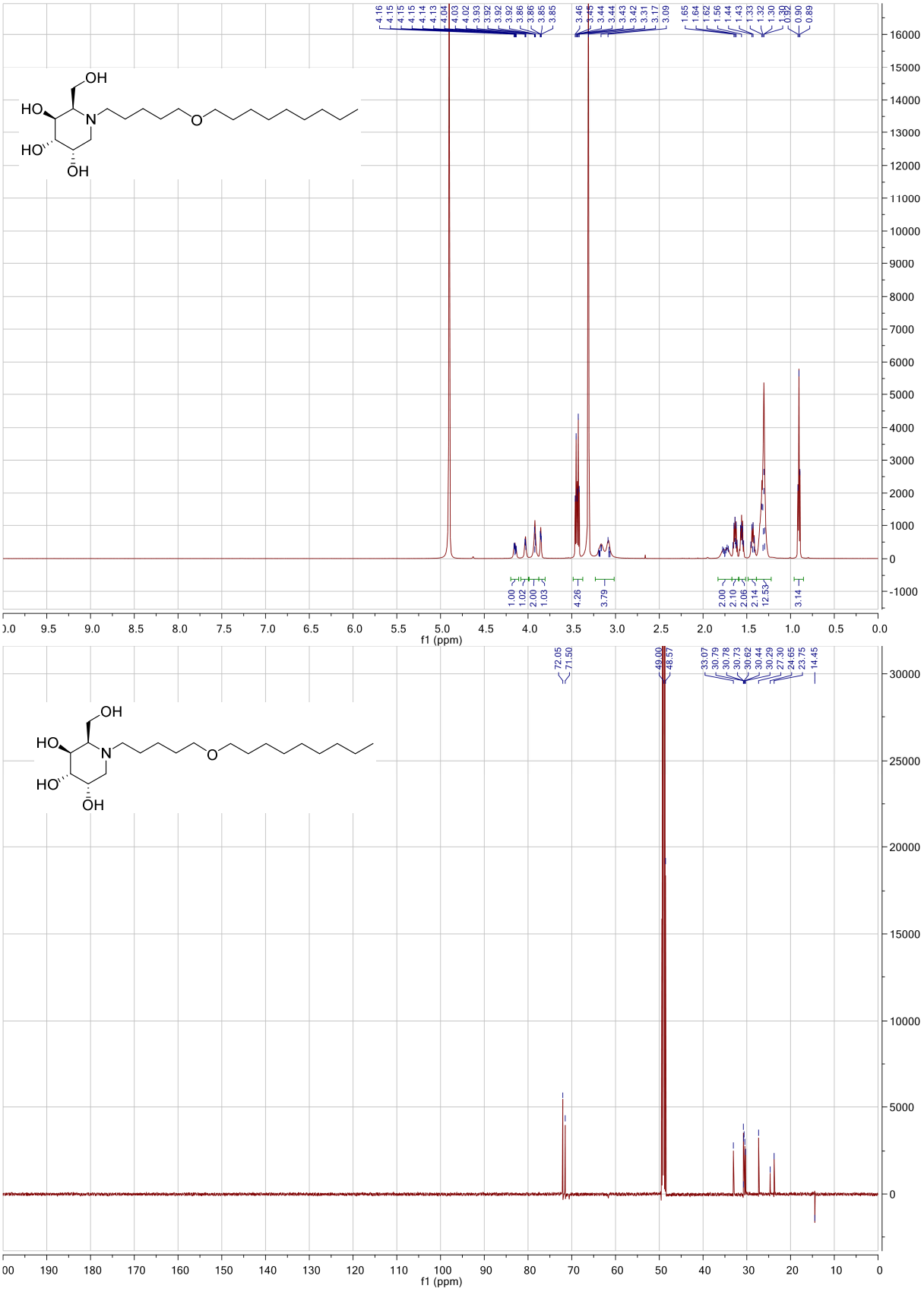


^{1}H-NMR and ^{13}C-NMR of compound C268.TFA in MeOD.

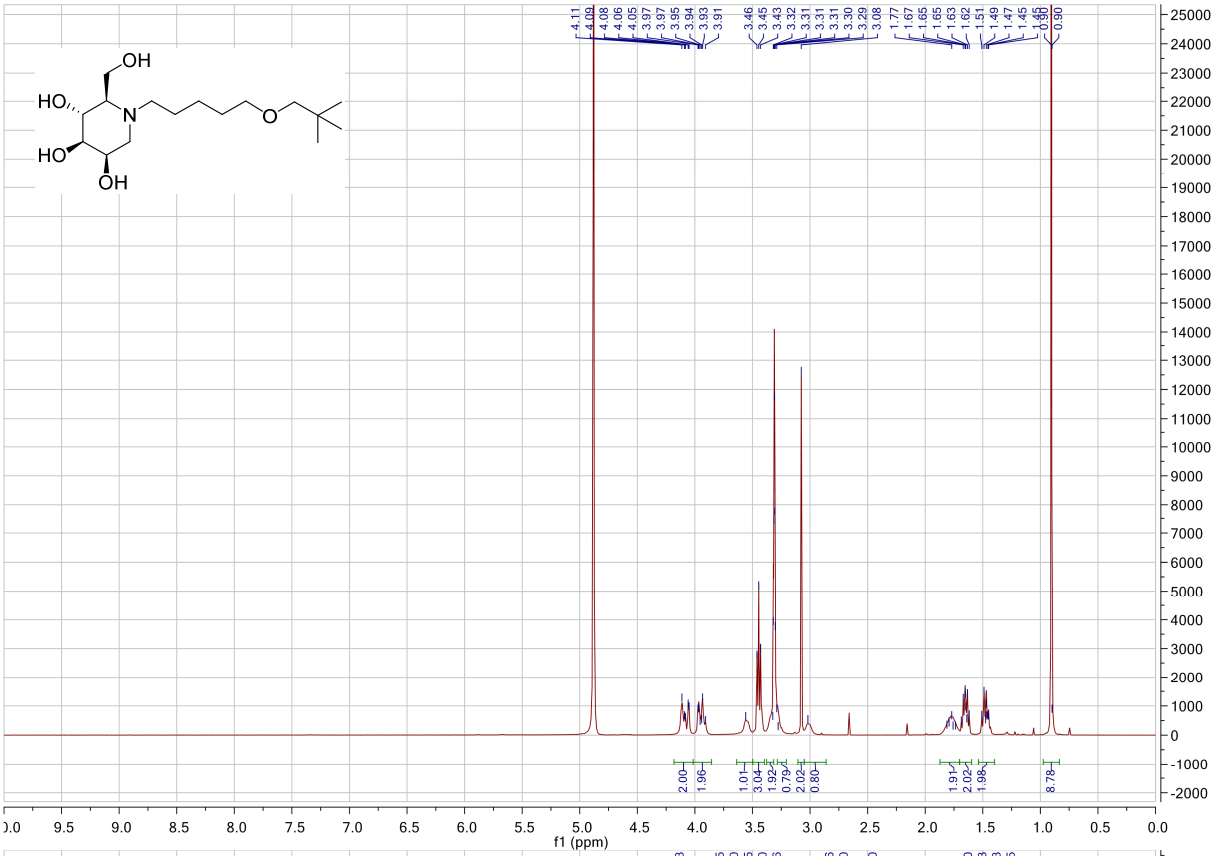


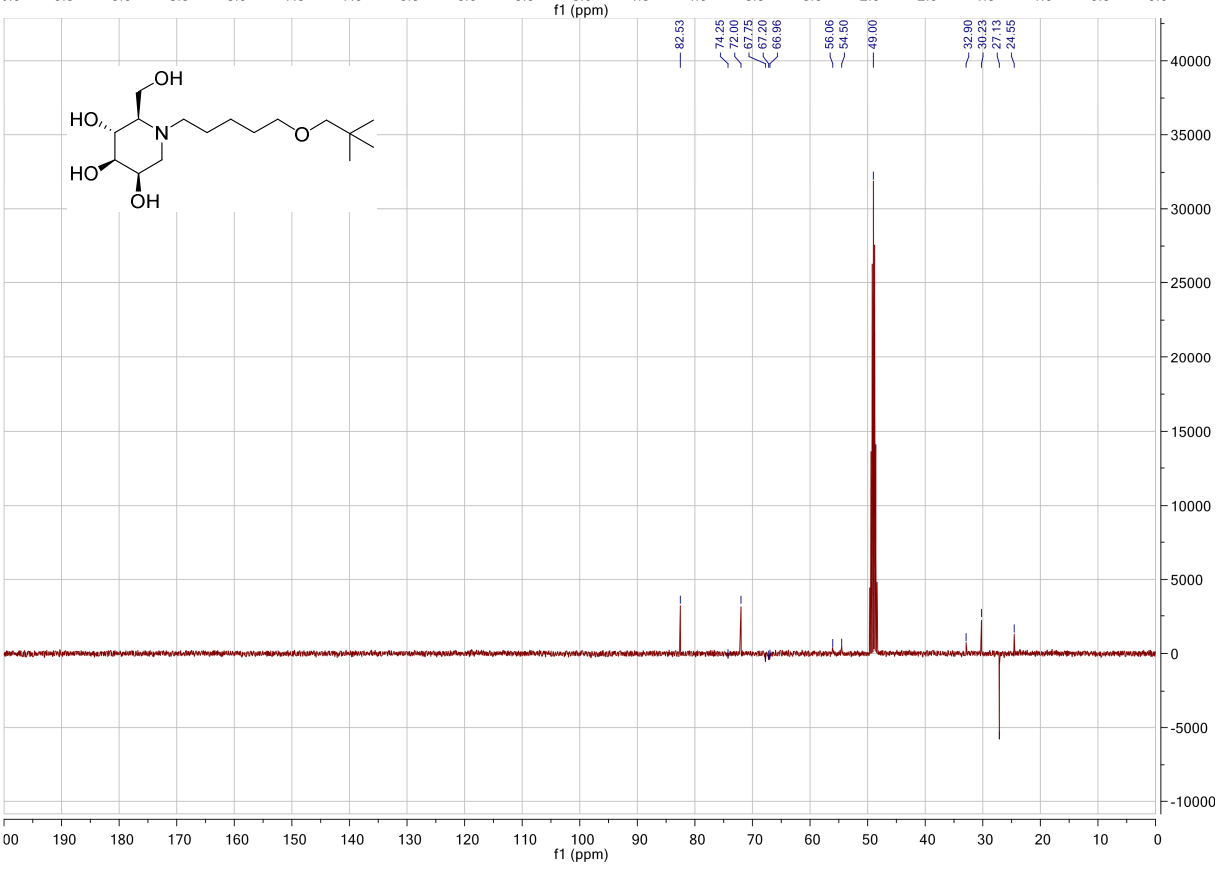


^{1}H-NMR and ^{13}C-NMR of compound C271.TFA in MeOD.

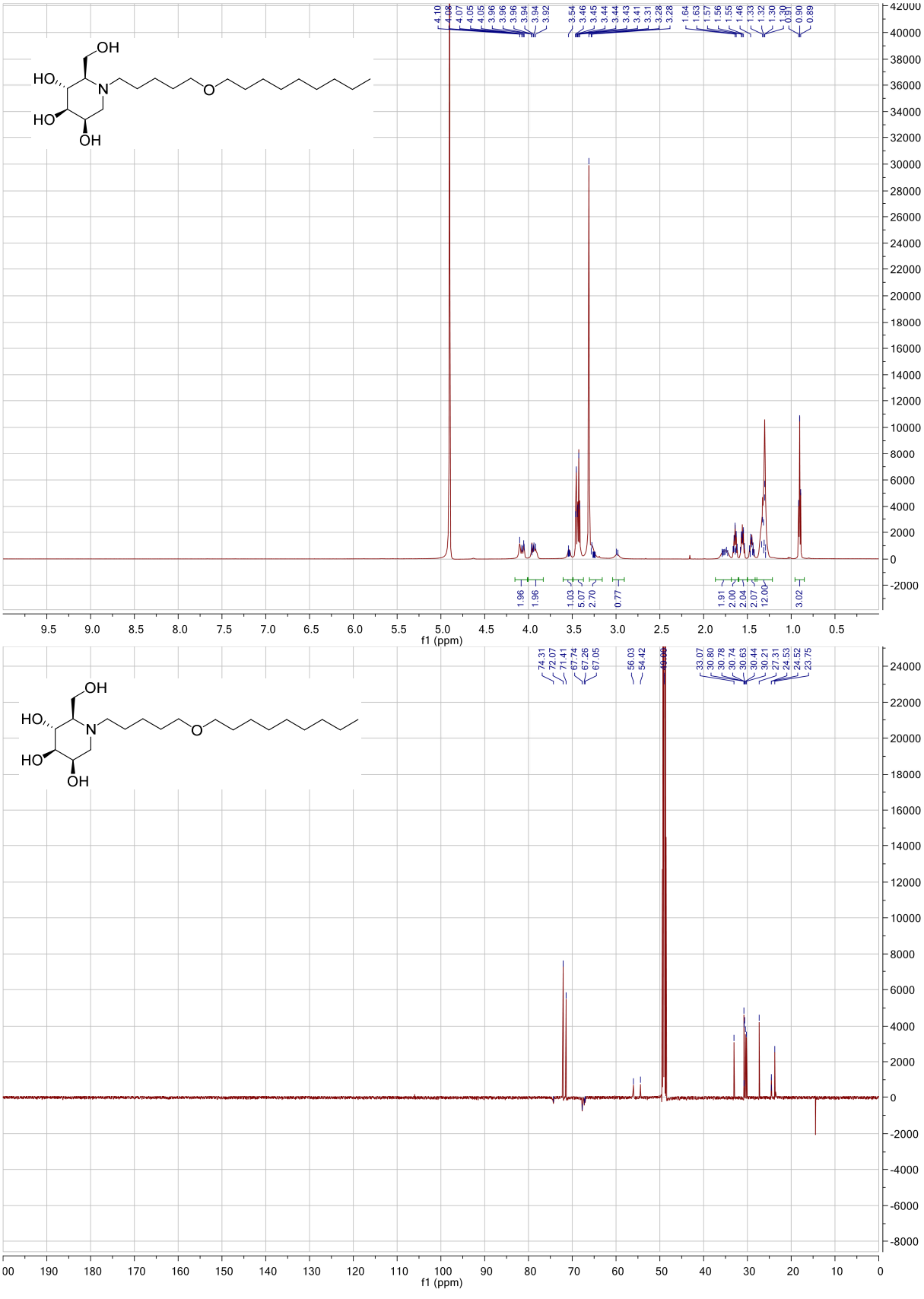


^{1}H-NMR and ^{13}C-NMR of compound C277.TFA in MeOD.





^{1}H-NMR and ^{13}C-NMR of compound C279.TFA in MeOD.



^{1}H-NMR and ^{13}C-NMR of compound C280.TFA in MeOD.