Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry.

Polymeric mannosides prevent DC-SIGN-mediated cell-infection by cytomegalovirus

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General Methods

All reagents were purchased from Acros Organics, Alfa Aesar, Carbosynth or Aldrich and were used without further purification. Dichloromethane ethyl acetate and petroleum ether were distilled on a *Buchi rotavapor R-220-SE*. Acetonitril, pyridine, benzene and DMF were freshly distilled from calcium hydride under argon. THF was distillated on sodium, benzophenone and under argon. Reactions requiring anhydrous conditions were performed under argon. Column chromatography was conducted on silica gel Kieselgel SI60 (40−63 µm) from Merck, or on Silica cartridge from Interchim and eluted via a Puriflash 430 with an UV and ELSD detection. Thin layer chromatography (TLC): *Merck Silica gel 60 F254* analytical plates, detection either with UV (254 nm) or dipping in a solution of cerium molybdate, potassium permanganate, ninhydrine and subsequent heating. Microwave experiments were conducted in sealed vials in commercial microwave reactors especially designed for synthetic chemistry (MultiSYNTH, Milestone). The instrument features a special shaking system that ensures high homogeneity of the reaction mixtures. 1H and 13C NMR spectra were recorded on *Bruker Avance 300* spectrometer fitted with a 5 mm i.d. BBO probe carefully tuned to the recording frequency of 300.13 MHz (for 1H) and 75.47 MHz (for 13C), the temperature of the probe was set at room temperature (around 293-294 K), on a *Bruker Avance 400* spectrometer fitted with a 5 mm i.d. BBFO+ probe carefully tuned to the recording frequency of 400.13 MHz (for 1H) and 100.61 MHz (for 13C), the temperature of the probe was set at 303 K, on a *Bruker Avance III 500* spectrometer fitted with a 5mm i.d. 13C/1H cryoprobe carefully tuned to the recording frequency of 500.13 MHz (for 1H) and 125.76 MHz (for 13C), the temperature of the probe was set at 303 K. The spectra are referenced to the solvent in which they were run (7.26 ppm for 1H $CDCl_3$ and 77.16 ppm for 13C $CDCl_3$, 2.50 ppm for 1H DMSO-d6 and 39.52 ppm for 13C DMSO-d6, 3.31 ppm for 1H CD_3OD and 49.00 ppm for 13C, 7.16 ppm for 1H C_6D_6 and 128.06 ppm for 13C C_6D_6, 5.32ppm for 1H CD_2Cl_2 and 53.84 ppm for 13C, 4.79 ppm for 1H D_2O). Chemical shifts (*δ*) are given in parts per million (ppm) and coupling constants (*J*) are given in Hz. Multiplicity of signals is indicated as following: s (singulet), d (doublet), t (triplet), q (quadruplet), m (multiplet), brs (broad singulet), dd (doublet of doublet), dt (doublet of triplet)... The numbering used for NMR attribution is different from UPAC numbering, and written on each molecule.

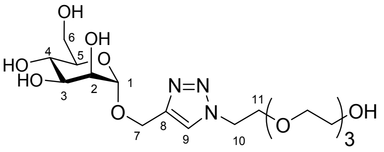
Copper Catalyzed Azide-Alkyne Cycloaddition Method 1.

The azide derivative and the alkyne derivative (1.1 eq./azide function) were dissolved in dioxane (2mL/mmol). A solution of copper sulfate (0.2 eq./azide function) and sodium ascorbate (0.4 eq./azide function) in water (0.5mL/mmol) was added and the mixture was heated at 60°C until completion. The mixture was dissolved in DCM (50mL/mmol), washed with a solution of EDTA (50 mL/mmol) and the aqueous layer was extracted twice with DCM (2 x 50mL/mmol). The organic layer was then dried over $MgSO_4$, filtered, concentrated under reduced pressure and purified.

Deprotection of acetyl groups using sodium methanolate method 2.

The protected carbohydrate (1eq.) was dissolved in MeOH/H_2O (1:1, 1 mL/mmol). Amberlite resin IRN 78 OH- 1.25 meq/mL (150 mg/mmol) was added, and the mixture was stirred overnight at rt. The resin was filtered off and washed with methanol and water. The solvent was evaporated under reduced pressure.

Compound **1**

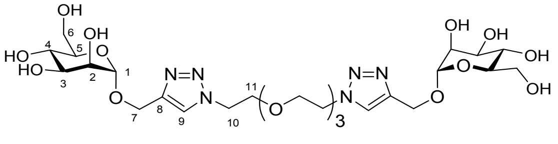


Obtained following the acetate deprotection method 2 to afford **1** (89% yield) as a colorless gum. . $[\alpha]_{D}^{20}$ = + 29 (C = 1, MeOH); ^{1}H NMR (400 MHz, MeOD): δ = 8.07 (1H, s, H-9), 4.85 (1H, d, *J* = 1.9Hz, H-1), 4.80 (1H, d, *J* = 12.7Hz, H-7a), 4.65 (1H, d, *J* = 12.7Hz, H-7b), 4.59 (1H, t, *J* = 5.2Hz, H-10), 3.90 (2H, t, *J* = 5.2Hz, H-11), 3.85 (1H, dd, *J* = 1.9Hz, *J* = 12.4Hz, H-6a), 3.79 (1H, dd, *J* = 1.9Hz, *J* = 3.7Hz, H-2), 3.74-3.R3 (16H, m, H-3, H-4, H-5, H-6b,12xCH_2O); ^{13}C NMR (100 MHz, MeOD): δ = 145.1 (C-8), 126.2 (C-9), 100.8 (C-1), 75.0 (C-5), 73.7 (C-3), 72.5 (C-2), 71.5-71.4 (CH_2O), 70.3 (C-10), 68.6 (C-4), 63.0 (C-6), 62.2 (C-7), 51.5 (C-7); HRMS (MALDI) m/z calcd for $C_{17}H_{31}N_3O_{10}Na$: 460.1907, found 460.1903.

Compound **2**

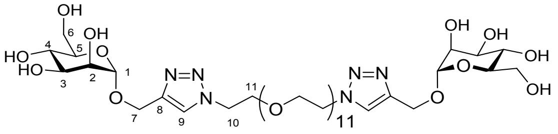
Obtained following the acetate deprotection method 2 to afford **2** (83% yield) as a colorless gum. . $[\alpha]_{D}^{20}$ = + 36 (C = 0.8, MeOH); ^{1}H NMR (400 MHz, MeOD): δ = 7.90 (1H, s, H-10), 4.72 (1H, d, *J* = 1.6Hz, H-1), 4.67 (2H, s, H-12), 4.40 (2H, t, *J* = 7.1Hz, H-9), 3.82 (1H, dd, *J* = 2.4Hz, *J* = 11.8Hz, H-6a), 3.77 (1H, dd, *J* = 1.7Hz, *J* = 3.3Hz, H-2), 3.74-3.65 (3H, m, H-3, H-6b, H-7a), 3.53-3.57 (1H, m, H-4), 3.55-3.48 (1H, m, H-5), 3.44-3.37 (1H, m, H-7b), 1.97-1.85 (2H, m, 2XH-8), 1.65-1.51 (2H, m, 2XH-8), 1.44-1.27 (6H, m, 6XH-8); ^{13}C NMR (100 MHz, MeOD): δ = 149.1(C-11), 124.0 (C-10), 101.5 (C-1), 74.6 (C-5), 72.7 (C-3), 72.3 (C-2), 68.7 (C-4), 68.4 (C-7), 63.0 (C-6), 56.5 (C-12), 51.3 (C-9), 31.2, 30.4, 29.8, 27.4, 27.1(C-8); HRMS (ES$^+$) m/z calcd for $C_{16}H_{30}N_3O_7$: 376.2084, found 373.2073.

Compound **3**



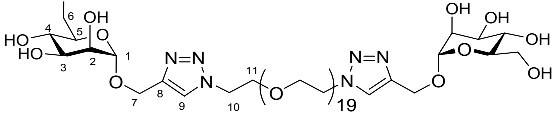
Obtained following the acetate deprotection to afford **3** (97% yield) as a colorless gum. $[\alpha]_{D}^{20} = +$ 78 (C = 1, MeOH); ^{1}H NMR (400 MHz, D_2O): δ = 8.14 (2H, s, H-9), 5.03 (2H, d, *J* = 1.9Hz, H-1), 4.88 (2H, d, *J* = 12.7Hz, H-7a), 4.75 (2H, d, *J* = 12.7Hz, H-7b), 4.69 (4H, t, *J* = 5.2Hz, H-10), 4.02 (t, *J* = 5.2Hz, 4 H, H-11), 3.98 (dd, *J* = 1.9Hz, 2H, *J* = 12.4Hz, H-6a), 3.91 (dd, *J* = 1.9Hz, *J* = 3.7Hz, 2 H, H-2), 3.87-3.78 (4H, m, H-3, H-6b), 3.77-3.70 (4H, m, H-4, H-5), 3.69-3.65 (4H, m, CH_2O), 3.62-3.57 (4H, m, CH_2O); ^{13}C NMR (100 MHz, $CDCl_3$): δ = 143.5 (C-8), 126.6 (C-9), 99.5 (C-1), 73.0 (C-5), 70.5(C-3), 70.0 (C-2), 69.7-69.5 (CH_2O), 68.7 (C-10), 66.7 (C-4), 60.9 (C-6), 59.8 (C-7), 50.1 (C-11); HRMS (MALDI) m/z calcd for $C_{26}H_{44}N_6O_{15}Na$: 703.2762, found 703.2766.

Compound **4**



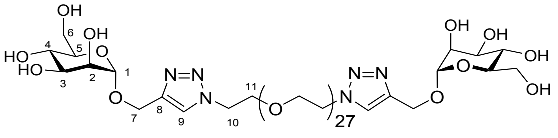
Obtained following the acetate deprotection to afford **4** (73% yield) as a colorless gum. $[\alpha]_{D}^{20} = +$ 64 (C = 1, MeOH); ^{1}H NMR (400 MHz, D_2O): δ = 8.19 (2H, s, H-9), 5.04 (2H, d, *J* = 1.9Hz, H-1), 4.91 (2H, d, *J* = 12.7 Hz, H-7a), 4.79 (2H, d, *J* = 12.7Hz, H-7b), 4.71 (4H, t, *J* = 5.2Hz, H-10), 4.05 (4H, t, *J* = 5. 2Hz, H-11), 3.99 (2H, dd, *J* = 1.9Hz, *J* = 12.4Hz, H-6a), 3.92 (2H, dd, *J* = 1.9Hz, *J* = 3.7Hz, H-2), 3.87-3.78 (4H, m, H-3, H-6b), 3.77-3.73 (28H, m, H-4, H-5, CH_2O), 3.72-3.66 (16H, m, CH_2O).; ^{13}C NMR (100 MHz, D_2O): δ = 143.6 (C-8), 125.7 (C-9), 99.5 (C-1), 73.0 (C-5), 70.5 (C-3), 70.0 (C-2), 69.7-69.3 (CH_2O), 68.8 (C-10), 66.7 (C-4), 60.9 (C-6), 59.8 (C-8), 50.1 (C-11); HRMS (ES+) m/z calcd for $C_{42}H_{76}N_6O_{23}Na$: 1055.4860, found 1055.4860.

Compound **5**



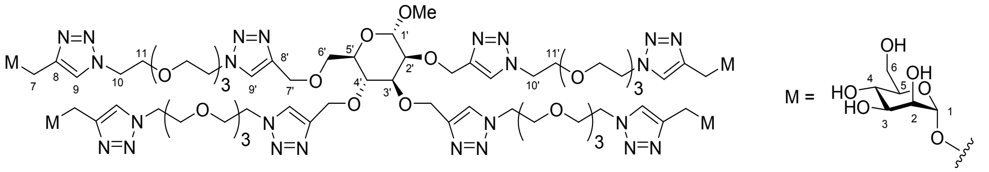
Obtained following the acetate deprotection to afford **5** (71% yield) as a colorless gum. $[\alpha]_{D}^{20} = +$ 60 (C = 1, MeOH); ^{1}H NMR (400 MHz, D_2O): δ = 8.19 (2H, s, H-9), 5.04 (2H, d, *J* = 1.9Hz, H-1), 4.91 (2H, d, *J* = 12.7Hz, H-7a), 4.79 (2H, d, *J* = 12.7 Hz, H-7b), 4.70 (4H, t, *J* = 5.2Hz, H-10), 4.04 (4H, t, *J* = 5.2Hz, H-11), 3.96 (dd, *J* = 1.9Hz, *J* = 12.4Hz, H-6a), 3.90 (2H, dd, *J* = 1.9Hz, 2H, *J* = 3.7Hz, H-2), 3.87-3.78 (4H, m, H-3, H-6b), 3.77-3.69 (4H, m, H-4, H-5), 3.70-3.63 (m, 76 H, CH_2O); ^{13}C NMR (100 MHz, D_2O): δ = 143.6 (C-8), 125.6 (C-9), 99.5 (C-1), 73.0 (C-5), 70.5 (C-3), 70.0 (C-2), 69.6 (CH_2O), 68.8 (C-10), 66.7 (C-4), 60.9 (C-6), 59.7 (C-7), 50.1 (C-11); HRMS (MALDI) m/z calcd for $C_{58}H_{108}N_6O_{31}Na$: 1407.6957, found 1407.6953.

Compound **6**



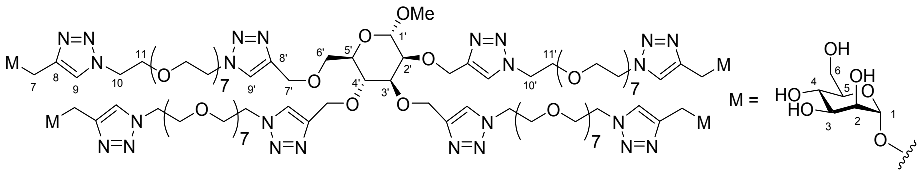
Obtained following the acetate deprotection to afford **6** (74% yield) as a colorless gum. $[\alpha]_D^{20} = +58$ (C = 1, MeOH); ^1H NMR (400 MHz, CD_3OD): δ = 8.07 (2H, s, H-9), 4.86 (2H, d, *J* = 1.9Hz, H-1), 4.79 (2H, d, *J* = 12.7 Hz, H-7a), 4.65 (2H, d, H-7b), 4.59 (4H, t, *J* = 5.2Hz, H-10), 3.91 (4H, t, *J* = 5.2Hz, H-11), 3.96 (2H, dd, *J* = 1.9Hz, *J* = 12.4Hz, H-6a), 3.90 (2H, dd, *J* = 1.9Hz, *J* = 3.7Hz, H-2), 3.75-3.67 (4H, m, H-3, H-6b), 3.67-3.58 (108H, m, H-4, H-5, 104xCH_2O); ^{13}C NMR (100 MHz, CD_3OD): δ = 145.1 (C-8), 126.2 (C-9), 100.8 (C-1), 75.0 (C-5), 72.6(C-3), 72.0 (C-2), 71.5 (CH_2O), 70.3 (C-10), 68.7 (C-4), 63.0 (C-6), 60.7 (C-7), 51.5 (C-11); HRMS (MALDI) m/z calcd for $C_{74}H_{140}N_6O_{39}Na_2$: 1782.8952, found 1782.8946.

Compound **7**



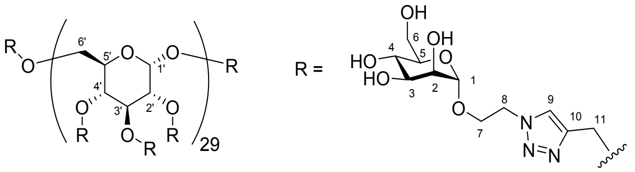
Obtained following the acetate deprotection to afford **7** (78% yield) as a colorless gum. $[\alpha]_D^{20} = +81$ (C = 1, MeOH); ^1H NMR (400 MHz, D_2O): δ = 8.13-8.01 (8 H, s, H-9, H-9'), 5.02 (4 H, bs, H-1), 4.89-4.67 (16 H, m, H-7, H7'), 4.67-4.55 (18 H, m, H-11, H1', H-2', H-11'), 3.97 (21 H, m, H-2, H-10, H-4', H-10'), 3.92-3.80 (12 H, m, H-3, H-6), 3.78-3.68 (8 H, m, H-4, H-5), 3.67-3.52 (36 H, m, H-3', H-5', H-6', CH_2O), 3.41 (3 H, s, OCH_3); ^{13}C NMR (100 MHz, D_2O): δ = 143.9, 143.8, 143.5 (C-8, C-8'), 125.7 (C-9), 99.5 (C-1), 98.4 (C-1'), 78.4, 74.5, 73.9 (C-3', C-4', C-5'), 73.0 (C-5), 70.6 (C-3), 70.3 (C-6'), 70.0 (C-2), 69.7-69.5 (CH_2O), 68.7 (C-10), 66.7 (C-4), 63.3 (C-2'), 63.2 (C-7'), 60.9 (C-6), 59.8 (C-7), 55.0 (OCH_3), 50.1 (C-11); HRMS (MALDI) m/z calcd for $C_{87}H_{144}N_{24}O_{42}$: 1098.4935, found 1098.4933.

Compound **8**



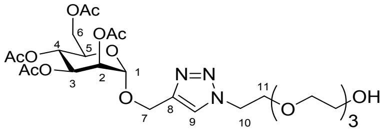
Obtained following the acetate deprotection method 2 to afford **8** (65% yield) as a colorless gum. $[\alpha]_D^{20}$ = + 68 (C = 1, MeOH); ^{1}H NMR (400 MHz, D_2O): δ = 8.08-8.01 (8 H, s, H-9, H-9'), 4.94 (4 H, bs, H-1), 4.82-4.65 (16 H, m, H-7, H7'), 4.61 (18 H, m, H-11, H1', H-2', H-11'), 3.94 (21 H, m, H-2, H-10, H-4', H-10'), 3.92-3.80 (12 H, m, H-3, H-6), 3.78-3.68 (8 H, m, H-4, H-5), 3.67-3.52 (116 H, m, H-3', H-5', H-6', CH_2O), 3.41 (3 H, s, OCH_3); ^{13}C NMR (100 MHz, D_2O): δ = 143.9, 143.8, 143.6 (C-8, C-8'), 125.6, (C-9), 99.5 (C-1), 73.0 (C-5), 70.5 (C-3), 70.0 (C-2), 69.6 (CH_2O), 68.7 (C-10), 66.7 (C-4), 60.9 (C-6), 59.8 (C-7), 50.1 (C-11); HRMS (MALDI) m/z calcd for $C_{119}H_{208}N_{24}O_{58}$: 1451.2049, found 1451.2045.

Compound **9**



Obtained following the acetate deprotection method to afford **9** (74% yield) as a yellowish solid. ^{1}H NMR (400 MHz, D_2O): δ = 8.18 (3 H, m broad, H-9), 5.20 (1 H, s broad, H-1'), 5.00-4.60 (m broad, 9 H, H-1, H-11), 4.20-4.07 (m broad, 3 H, H-6a), 4.04-3.86 (m broad, 9 H, 3xH-2, 3xH-6b, H-2', H-3', H-4'), 3.85-3.49 (21H, H-3, H-4, H-7, H-8, H-5', H-6'), 3.17 (3H, s broad, H-5); ^{13}C NMR (100 MHz, D_2O): δ = 144.4 (C-10), 125.6 (C-9), 99.7 (C-1), 96.7 (C-1'), 79.2 (C-3'), 77.8 (C-2'), 77.1 (C-4'), 73.0 (C-5), 70.6 (C-3'), 70.1 (C-2'), 69.8 (C-5', C-4), 66.6 (C-8), 65.5 (C-6), 63.3 (C-6'), 60.9 (C-7), 50.2 (C-11).

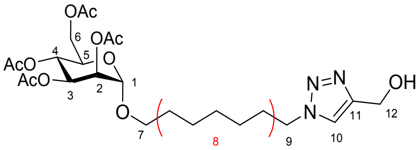
Compound **16**.



Obtained following the CuAAC method 1. The crude product was chromatographed on a silica gel column with 96/4 (DCM/MeOH) as eluent to afford **16** (88% yield) as a yellowish gum. $[\alpha]_D^{20}$ = + 42 (C = 1, $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$): δ = 7.84 (1H, s, H-9), 5.31-5.24 (2H, m, H-3, H-4), 5.20 (1H, br s, H-2), 4.93 (1H, br s, H-1), 4.81 (1H, d, J = 10.5Hz, H-7a), 4.64 (1H, d, J = 10.5Hz, H-7b), 4.54 (2H, t, J = 4.7Hz, H-11), 4.26 (1H, dd, J = 5.0Hz, J = 12.2Hz, H-6a), 4.12–4.02 (2H, m, H-5, H-6b), 3.86 (2H, t, J = 4.7Hz, H-10), 3.71-3.55 (12 H, m, CH_2O), 2.11,2.08, 1.99, 1.94 (12H, 4 s, CH_3CO); ^{13}C NMR (100 MHz, $CDCl_3$): δ = 170.7, 170.1, 169.9, 169.7

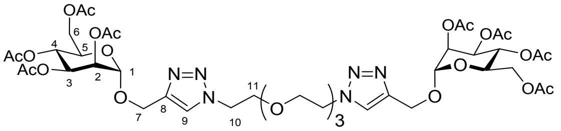
(COCH3), 143.7 (C-8), 124.8 (C-9), 96.9 (C-1), 72.5,70.6-70.3 (CH2O), 69.5 (C-11), 69.5 (C-2), 69.2 (C-3), 68.8 (C-5), 66.2 (C-4), 62.5 (C-6), 61.7 (C*H*$_2$OH), 61.0 (C-7), 50.5 (C-10), 20.9-20.6 (COCH$_3$); HRMS (ES+) m/z calcd for $C_{25}H_{40}N_3O_{14}$: 606.2510 found 606.2500.

Compound **18**.



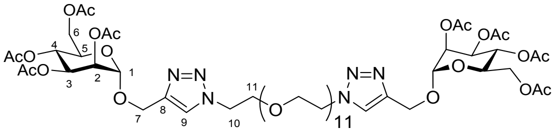
Obtained following the CuAAC method 1. The crude product was chromatographed on a silica gel column with 96/4 (DCM/MeOH) as eluent to afford **18** (73% yield) as a yellowish gum. $[\alpha]_D^{20} = +48$ (C = 1, CHCl$_3$); ^{1}H NMR (400 MHz, CDCl$_3$): δ = 7.52 (1H, s, H-10), 5.30 (1H, dd, $J_{3\text{-}2}$ = 3.4Hz, $J_{3\text{-}4}$ = 10.0 Hz, H-3), 5.27-5.20 (1H, m, H-4), 5.18 (1H, dd, $J_{2\text{-}1}$ = 1.8Hz, $J_{2\text{-}3}$ = 3.4Hz, H-2), 4.77-4.72 (3H, m, H-1, H-12), 4.32 (2H, t, J = 7.0Hz, H-9), 4.23 (1H, dd, $J_{6a\text{-}5}$ = 5.3Hz, $J_{6a\text{-}6b}$ = 12.3Hz, H-6a), 4.07 (1H, dd, $J_{6b\text{-}5}$ = 2.5Hz, $J_{6b\text{-}6a}$ = 12.3Hz, H-6b), 3.96-3.90 (1H, m, H-5), 3.68-3.58 (1H, m, H-7a), 3.44-3.36 (1H, m, H-7b), 2.12, 2.05, 2.00, 1.96 (12H, 4 s, CH$_3$CO), 1.92-1.83 (2H, m, H-8), 1.61-1.49 (2H, m, H-8), 1.36-1.27 (6H, m, H-8); ^{13}C NMR (100 MHz, CDCl$_3$): δ = 170.7, 170.2, 170.1, 169.8 (COCH3), 147.9 (C-11), 121.6 (C-10), 97.6 (C-1), 69.8 (C-2), 69.2 (C-3), 68.5 (C-5), 68.4 (C-7), 66.4 (C-4), 62.6 (C-6), 56.5 (C-12), 50.3 (C-9), 30.2, 29.1, 28.7, 26.4, 26.0 (C-8), 20.9, 20.8, 20.74 (CH$_3$); HRMS (ES+) m/z calcd for $C_{24}H_{38}N_3O_{11}$: 544.2506 found 544.2504.

Compound **23**.



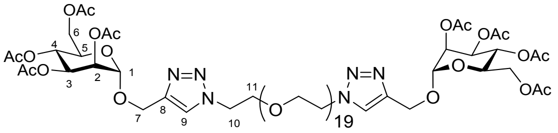
Obtained following the CuAAC method. The crude product was chromatographed on a silica gel column with 95/5 (DCM/MeOH) as eluent to afford **23** (92% yield) as a colorless gum. $[\alpha]_D^{20} = +29$ (C = 1, CHCl$_3$); ^{1}H NMR (400 MHz, CDCl$_3$): δ = 7.76 (2H, s, H-9), 5.32-5.28 (4H, m, H-3, H-4), 5.22 (2H, bs, H-2), 4.96 (2H, d, J = 1.6 Hz, H-1), 4.82 (2H, d, J = 12.4Hz, H-7a), 4.66 (2H, d, J = 12.4Hz, H-7b), 4.55 (4H, t, J = 4.7Hz, H-11), 4.29 (2H, dd, J = 5.0Hz, J = 12.3Hz, H-6a), 4.13–4.04 (4H, m, H-5, H-6b), 3.85 (4H, t, J = 4.7Hz, H-10), 3.64-3.57 (8 H, m, CH$_2$O), 2.14,2.11, 2.02, 1.96 (24H, 4 s, CH$_3$CO); ^{13}C NMR (100 MHz, CDCl$_3$): δ = 170.8, 170.2, 170.0, 169.7 (COCH3), 143.4 (C-8), 124.3 (C-9), 96.9 (C-1), 70.6-69.6 (CH2O), 69.5 (C-11), 69.4 (C-2), 69.2 (C-3), 68.8 (C-5), 66.2 (C-4), 62.5 (C-6), 61.0 (C-7), 52.8 (C-10), 21.0, 20.9, 20.8, 20.7(COCH$_3$); HRMS (ESI) m/z calcd for $C_{43}H_{63}N_6O_{23}Na$: 1039.3608 found 1039.3615.

Compound **24**.



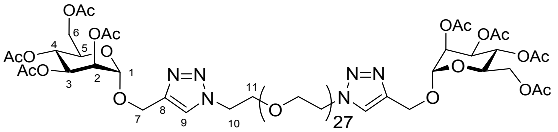
Obtained following the CuAAC method. The crude product was chromatographed on a silica gel column with 95/5 (DCM/MeOH) as eluent to afford **24** (90% yield) as a colorless gum. $[\alpha]_D^{20}$ = + 36 (C = 1, CHCl$_3$); ^{1}H NMR (400 MHz, CDCl$_3$): δ = 7.76 (2H, s, H-9), 5.29-5.25 (4H, m, H-3, H-4), 5.20 (2H, m, H-2), 4.94 (2H, d, *J* = 1.6 Hz, H-1), 4.80 (2H, d, *J* = 12.4Hz, H-7a), 4.65 (2H, d, *J* = 12.4Hz, H-7b), 4.53 (4H, t, *J* = 4.7Hz, H-11), 4.27 (2H, dd, *J* = 5.0 Hz, *J* = 12.3Hz, H-6a), 4.11–4.02 (4H, m, H-5, H-6b), 3.87 (4H, t, *J* = 4.7Hz, H-10), 3.64-3.57 (40 H, m, CH$_2$O), 2.11, 2.09, 2.00, 1.94 (24H, 4 s, CH$_3$CO); ^{13}C NMR (100 MHz, CDCl$_3$): δ = 170.7, 170.0, 169.9, 169.7 (COCH$_3$), 143.4 (C-8), 124.3 (C-9), 96.9 (C-1), 70.6 (CH$_2$O), 69.6 (C-11), 69.5 (C-2), 69.2 (C-3), 68.8 (C-5), 66.2 (C-4), 62.5 (C-6), 61.0 (C-7), 50.4 (C-10), 20.9, 20.8, 20.7 (COCH$_3$); HRMS (ESI) m/z calcd for $C_{58}H_{92}N_6O_{31}Na$: 1391.5705 found 1391.5708.

Compound **25**



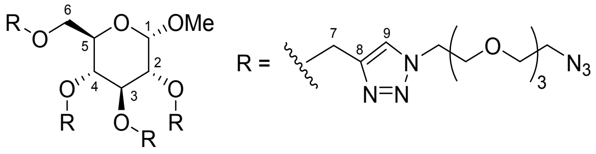
Obtained following the CuAAC method. The crude product was chromatographed on a silica gel column with 9/1 (DCM/MeOH) as eluent to afford **25** (85% yield) as a white solid. $[\alpha]_D^{20}$ = + 54 (C = 1, CHCl$_3$); ^{1}H NMR (400 MHz, CDCl$_3$): δ = 7.78 (2H, s, H-9), 5.33-5.26 (4H, m, H-3, H-4), 5.22 (2H, bs, H-2), 4.95 (2H, bs, H-1), 4.82 (2H, d, *J* = 12.4Hz, H-7a), 4.67 (2H, d, *J* = 12.4Hz, H-7b), 4.55 (4H, t, *J* = 4.7Hz, H-11), 4.30 (2H, dd, *J* = 5.0Hz, *J* = 12.3Hz, H-6a), 4.13–4.05 (4H, m, H-5, H-6b), 3.88 (4H, t, *J* = 4.7Hz, H-10), 3.66-3.58 (72 H, m, CH$_2$O), 2.14, 2.11, 2.02, 1.96 (24H, 4 s, CH$_3$CO); ^{13}C NMR (100 MHz, CDCl$_3$): δ = 170.8, 170.1, 169.9, 169.8 (COCH$_3$), 143.4 (C-8), 124.4 (C-9), 96.9 (C-1), 70.7 (CH$_2$O), 69.5 (C-11), 69.5 (C-2), 69.2 (C-3), 68.7 (C-5), 66.2 (C-4), 62.5 (C-6), 61.1 (C-7), 50.4 (C-10), 20.9, 20.8 (COCH$_3$); HRMS (ESI) m/z calcd for $C_{74}H_{124}N_6O_{39}Na$: 1743.7802 found 1743.7811.

Compound **26**.



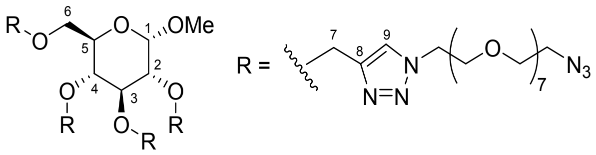
Obtained following the CuAAC method. The crude product was chromatographed on a silica gel column with 9/1 (DCM/MeOH) as eluent to afford **25** (70% yield) as a white solid. $[\alpha]^{20}_{D}$ = + 43 (C = 1, CHCl$_3$); ^{1}H NMR (400 MHz, CDCl$_3$): δ = 7.80 (2H, s, H-9), 5.32-5.28 (4H, m, H-3, H-4), 5.23 (2H, m, H-2), 4.97 (2H, d, *J* = 1.6 Hz, H-1), 4.84 (2H, d, *J* = 12.4Hz, H-7a), 4.67 (2H, d, *J* = 12.4Hz, H-7b), 4.56 (4H, t, *J* = 4.7Hz, H-11), 4.31 (2H, dd, *J* = 5.0Hz, *J* = 12.3Hz, , H-6a), 4.13–4.05 (4H, m, H-5, H-6b), 3.89 (4H, t, *J* = 4.7Hz, H-10), 3.64 (104 H, m, CH$_2$O), 2.14, 2.12, 2.03, 1.97 (24H, 4 s, CH$_3$CO); ^{13}C NMR (100 MHz, CDCl$_3$): δ = 170.8, 170.1, 169.9, 169.8 (COCH$_3$), 143.4 (C-8), 124.4 (C-9), 97.0 (C-1), 70.7 (CH$_2$O), 69.5 (C-11), 69.5, 69.2, 68.7, (C-2, C-3, C-5), 66.2 (C-4), 62.5 (C-6), 61.1 (C-7), 50.4 (C-10), 20.9, 20.8, (COCH$_3$); HRMS (ESI) m/z calcd for $C_{90}H_{156}N_6O_{47}Na$: 2095.9899 found 2095.9895.

Compound **30**.



Obtained following the CuAAC method. This reaction afforded the compound **30** (84% yield) as a colorless gum. $[\alpha]^{20}_{D}$ = + 16 (C = 1, CHCl$_3$); ^{1}H NMR (400 MHz, CDCl$_3$): δ = 7.93, 7.87, 7.78, 7.75 (4H, s, H-9), 4.92 (1 H, d, *J* = 11.3Hz, H-7), 4.81 (2 H, bs, H-7), 4.73 (1H, d, *J* = 11.3Hz, H-7), 4.72 (1H, bs, H-2), 4.71 (1H, d, *J* =3.2Hz, H-1), 4.67 (1H, d, *J* = 11.3Hz, H7), 4.58 (1H, d, *J* = 11.3Hz, H-7), 4.56 (2 H, m, H-7), 4.53-4.48 (6H, m, H-4, CH$_2$O), 3.89-3.75 (m, 13 H, H-3, H-5, H-6, CH$_2$O), 3.67-3.56 (42 H, m, CH$_2$O), 3.36 (m, 8 H, CH$_2$N$_3$), 3.30 (3 H, bs, OCH$_3$); ^{13}C NMR (100 MHz, CDCl$_3$): δ = 145.2-145.0 (C-8), 124.4-124.0 (C-9), 99.0 (C-1), 79.8, 74.8, 74.5, (C-3, C-4, C-5), 70.8-69.4 (CH$_2$O), 69.2, 66.2, 64.9, 64.3 (C-2, C-6, C-7), 54.9 (OCH$_3$), 50.8 (CH$_2$N$_3$), 50.3-50.2 (CH$_2$N); HRMS (ESI) m/z calcd for $C_{51}H_{87}N_{24}O_{18}$: 1323.6630 found 1323.6626.

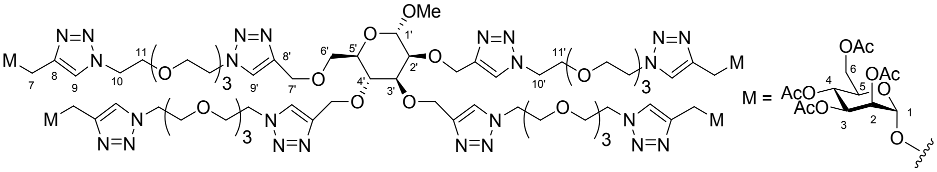
Compound **31**.



Obtained following the CuAAC method. This reaction afforded the compound **31** (75% yield) as a colorless gum. $[\alpha]^{20}_{D}$ = + 14 (C = 1, CHCl$_3$); ^{1}H NMR (400 MHz, CDCl$_3$): δ = 7.92, 7.86, 7.78, 7.75 (4H, s, H-9), 4.94 (1 H, d, *J* = 11.3Hz, H-7), 4.82 (2 H, bs, H-7), 4.73 (1H, d, *J* = 11.3Hz, H-7), 4.72 (1H, bs, H-2), 4.67 (1H, d, H-1), 4.64 (1H, d, H7), 4.58 (1H, d, H-7), 4.56 (2H, m, H-7), 4.53-4.50 (6H, m, H-4, CH$_2$O), 3.89-3.75 (m, 13 H, H-3, H-5, H-6, CH$_2$O), 3.68-3.55 (106 H, m, CH$_2$O), 3.36 (m, 8 H, CH$_2$N$_3$), 3.31 (3 H, bs, OCH$_3$); ^{13}C NMR (100 MHz, CDCl$_3$): δ = 144.9 (C-8), 124.2-124.0 (C-9), 98.9 (C-1), 79.7, 74.8, 74.5, (C-3, C-4, C-5), 70.8-69.4 (CH$_2$O), 69.3, 66.1, 64.7, 64.1

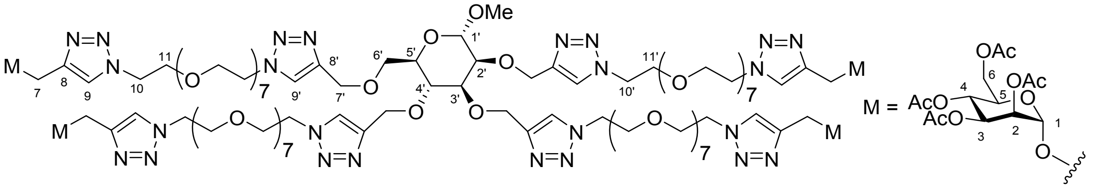
(C-2, C-6, C-7), 54.8 (OCH_3), 50.8 (CH_2N_3), 50.7, 50.1 (CH_2N); HRMS (ESI) [m+2H]/2z calcd for $C_{83}H_{152}N_{24}O_{34}$: 1014.5452 found 1014.5455.

Compound **32**.



Obtained following the CuAAC method. The crude product was chromatographed on a silica gel column with 9/1 (DCM/MeOH) as eluent to afford **32** (78% yield) as a colorless gum. $[\alpha]_{D}^{20} = +36$ (C = 1, $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$): δ = 7.93, 7.85, 7.78, 7.75, 7.74 (8H, s, H-9, H-9’), 5.26 (8H, m, H-3, H-4), 5.20 (4H, bs, H-2), 4.94 (4 H, *J* = 2.0, H-1), 4.91-4.60 (16 H, m, H-7, H-1’, H-2’, H7’), 4.54-4.45 (18 H, m, H-7, H-11, H-11’, H-7’) 4.28 (4 H, dd, *J* = 12.3, 5.2Hz, H-6a), 4.12–4.01 (9 H, m, H-5, H-6b, H-4’), 3.85 (20 H, m, H-10, H-3’, H-5’, H-6’, H-10’), 3.56 (32 H, m, CH_2O), 3.27 (3 H, s, OCH_3), 2.12, 2.09, 2.00, 1.94 (48 H, 4 s, CH_3CO); ^{13}C NMR (100 MHz, $CDCl_3$): δ = 170.7, 170.1, 169.9, 169.8 (*C*OCH$_3$), 145.0, 144.9, 144.8, 143.3 (C-8, C-8’), 124.3, 124.1, 124.0 (C-9, C-9’), 99.0, 96.9 (C-1’), 96.9 (C-1), 79.8, 74.7, 74.7, (C-3’, C-4’, C-5’), 71.4 (C-6’), 70.6, 69.5, 69.4, 69.2, 68.8 (C-11, C-11’, CH_2O), 69.3, 69.2, 68.8, 66.2, 64.8 (C-2, C-3, C-4, C-5, C-7, C-7’), 64.2 (C-2’), 63.6 (C-7’), 62.5 (C-6), 61.0 (C-7’), 55.0 (OCH_3), 53.5, 50.4, 50.2(C10, C-10'), 20.9, 20.8, 20.7, (CO*C*H$_3$).

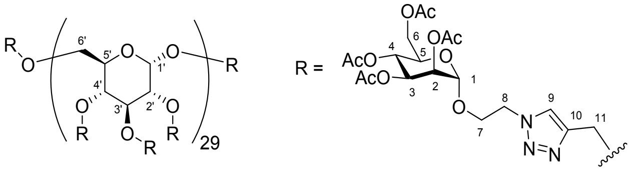
Compound **33**.



Obtained following the CuAAC method. The crude product was chromatographed on a silica gel column with 9/1 (DCM/MeOH) as eluent to afford **32** (90% yield) as a colorless gum. $[\alpha]_{D}^{20} = +18$ (C = 1, $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$): δ = 7.95, 7.88, 7.79, 7.72 (8H, s, H-9, H-9’), 5.39-5.29 (8H, m, H-3, H-4), 5.29-5.26 (4H, m, H-2), 4.87 (4 H, *J* = 2.0, H-1), 4.92-4.68 (18 H, m, H-7, H-1’, H-2’, H7’), 4.67-4.49 (18 H, m, H-7, H-11, H-11’, H-7’) 4.31 (4 H, dd, *J* = 5.2Hz, *J* =

12.3, H-6a), 4.16–4.04 (9 H, m, H-5, H-6b, H-4’), 3.93-3.80 (20 H, m, H-10, H-3’, H-5’, H-6’, H-10’), 3.60 (106 H, m, CH_2O), 3.30 (3 H, s, OCH_3), 2.14, 2.09, 2.03, 1.98 (48 H, s, CH_3CO); ^{13}C NMR (100 MHz, $CDCl_3$): δ = 170.8, 170.1, 170.0, 169.9 (*C*OCH_3), 145.1-143.4 (C-8, C-8’), 124.4, 124.3, 124.2, 124.1 (C-9, C-9’), 99.1 (C-1’), 96.8 (C-1), 79.6, 74.7, 74.3 (C-3’, C-4’, C-5’), 71.3 (C-6’), 70.6-69.1 (C-11, C-11’, CH_2O), 69.2, 69.1, 68.8, 66.3, 64.3 (C-2, C-3, C-4, C-5, C-7, C-7’), 64.2 (C-2’), 63.6 (C-7’), 62.3 (C-6), 61.2 (C-7’), 55.3 (OCH_3), 52.9, 52.6 (C10, C-10'), 21.0, 20.8, 20.7, (CO*C*H_3).

Compound **35**



Copper sulfate (40 mg, 0.16 mmol) and sodium ascorbate (65 mg, 0.32 mmol) were added to a solution of propargyl dextran (20mg, 72.4 µmol of monosaccharide unit) and **15** (125 mg, 0.30 mmol) in dioxane-H_2O (5 mL, 4–1). The mixture was irradiated at 80 °C for 2 x 45 min in a sealed vessel, with addition of copper sulfate sulfate (13.3 mg, 53.3 µmol) and sodium ascorbate sulfate (21.7 mg, 0.11 mmol) for the second run. Residual copper was removed with EDTA (94 mg, 0.32 mmol) for 2 h, and the mixture was poured into a NH_4Cl satd. solution (20 mL) and extracted with ethyl acetate (20 mL). The organic layer was dried ($MgSO_4$), filtered and the solvent removed under reduced pressure. The crude product was dissolved in a small amount of CH_2Cl_2 and the product was precipitated with Et_2O (30mL). The precipitate was collected by filtration, washed with Et_2O (50mL) and precipitate twice from Et_2O, to afford **35** (64 mg, 54%) as a yellow solid.^{1}H NMR (500 MHz, $CDCl_3$): δ = 8.17-7.70 (3H, br s, H-9), 5.18 (6H, br, H-3, H-4) 5.00-4.41 (13H, m broad, H-1, H-2, H-11, H-1’), 4.37-3.20 (27H, br, H-6a, H-8, H-7, H-2’,3’,4’,5’,6’), 2.27-2.77 (36H, m, C*H*$_3$CO); ^{13}C NMR (100 MHz, $CDCl_3$): δ = 171.2, 170.7, 170.0, 169.8 (CH_3*C*O), 145.4 (C-10), 124.4 (C-9), 97.7 (C-1, C-1’), 77.3 (C-3’), 69.3, 69.2, 68.9 (C-2, C-5’, C-3, C-5), 66.4 (C-4), 65.9 (C-11), 62.4 (C-6), 60.5 (C-7), 60.1 (C-6‘), 49.7 (C-8), 21.1, 20.9, 20.8 (*C*H_3CO).

Materials and Methods

Cells

U937 cells (monocytic leukemia; ATCC® CRL-1593.2™, LGC Standards, UK) stably expressing full length DC-SIGN were generated by lentiviral transduction and propagated as already described elsewhere (Halary, Immunity, 2002). DC-SIGN expression was validated by flow cytometry with an APC-conjugated anti-human DC-SIGN mAb (clone DCN46) on a LSR II apparatus (BD Biosciences, Franklin Lakes, NJ). MRC-5 fibroblasts (RD Biotech, France) were propagated in DMEM, 2mM glutamine, 10% FCS (HyClone/GE Healthcare, Wauwatosa, WI). MRC-5 cells were used at 80-90% confluency for *trans*-infection assays.

Viral envelope glycoprotein binding assay

Parental or DC-SIGN-expressing U937 cells were resuspended in TBS, 1 mM $CaCl_2$, 2mM $MgCl_2$, 0.1% bovine serum albumin (BSA) and then seeded in 96-well plates at 1.10^5 cells per well. Biotin-labelled recombinant HCMV gB (2 µg/ml) was then added to cells for 20 min at 4°C. Cells were washed three times with cold TBS, 1 mM $CaCl_2$, 2 mM $MgCl_2$, 0.1% BSA and further stained with APC- or PE-conjugated streptavidin (BD Biosciences, Franklin Lakes, NJ) before being analyzed on a LSR II flow cytometer (BD Biosciences, Franklin Lakes, NJ) and the FlowJo software (Tree Star, Ashland, OR).

***Trans*-infection experiments**

To assess the blocking properties of HM-based compounds described above in this section, a DC-SIGN-expressing U937 cell line and the parental U937 cells as a negative control were used in a *trans*-infection assay described elsewhere (Halary, Immunity, 2002). MRC-5 fibroblasts were seeded in flat-bottom 96-well plates the day before starting the *trans*-infection assay in DMEM, 2mM glut, 10% FCS. Briefly, DC-SIGN-expressing U937 cells were incubated with inhibitors at indicated concentrations for 30 min at 4°C before adding a constant dose of AD-GFP (MOI=2), a AD169 genetically-modified CMV strain that allowed for the GFP expression in infected cells (REF princeps). After being washed thoroughly, CMV-loaded cells were applied on a MRC-5 cell monolayer. A short centrifugation step (5’, x300g) was used to favour cell-to-cell contact and viral transmission which was assessed after 48h by counting the total number of GFP positive MRC-5 cells in each cell culture well through an automated processing described hereafter.

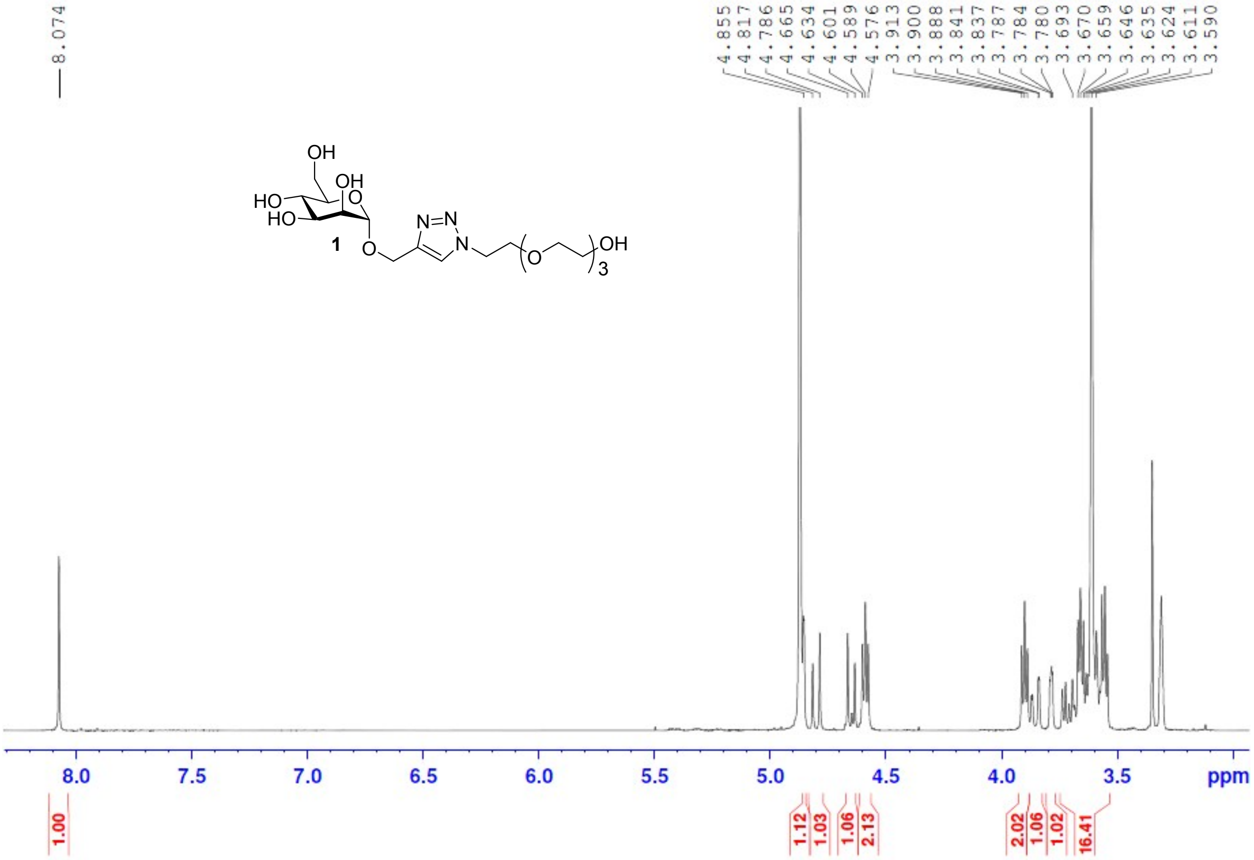
Automated infected cell counting

Absolute numbers of infected cells were obtained by analysing the total well area with a Cellomics® ArrayScan® VTI HCS Reader (Thermo Scientific) equipped with a x10 objective. For each field, phase-contrast and fluorescence (band-path filter 485nm±20nm) channels were recorded simultaneously. Image stitching was performed with the HCS Studio Cell Analysis Software (Thermo Scientific) and allowed to reconstruct an image of the whole well for all conditions. Digitalized images were processed with the “particles analysis” plugin from the Fiji software. Results were plotted as absolute numbers of infected cells (GFP positive cells) per well against the base 10 logarithm of the inhibitor concentrations. IC50 values were determined on the GraphPad Prism 5.0 software using a nonlinear regression analysis (GraphPad Software Inc., La Jolla, CA, USA).

Cell viability assay

Cell viability was determined by DAPI (4',6-Diamidino-2-Phenylindole, Dihydrochloride) exclusion after incubation of U937 cells with all tested compounds for two hours at 37°C. Cells were then washed and resuspended into 300µL of PBS per condition. Ten microliters of a 1µM DAPI solution were extemporaneously to cells and immediately analysed on a LSR II flow cytometer.

Compound **1**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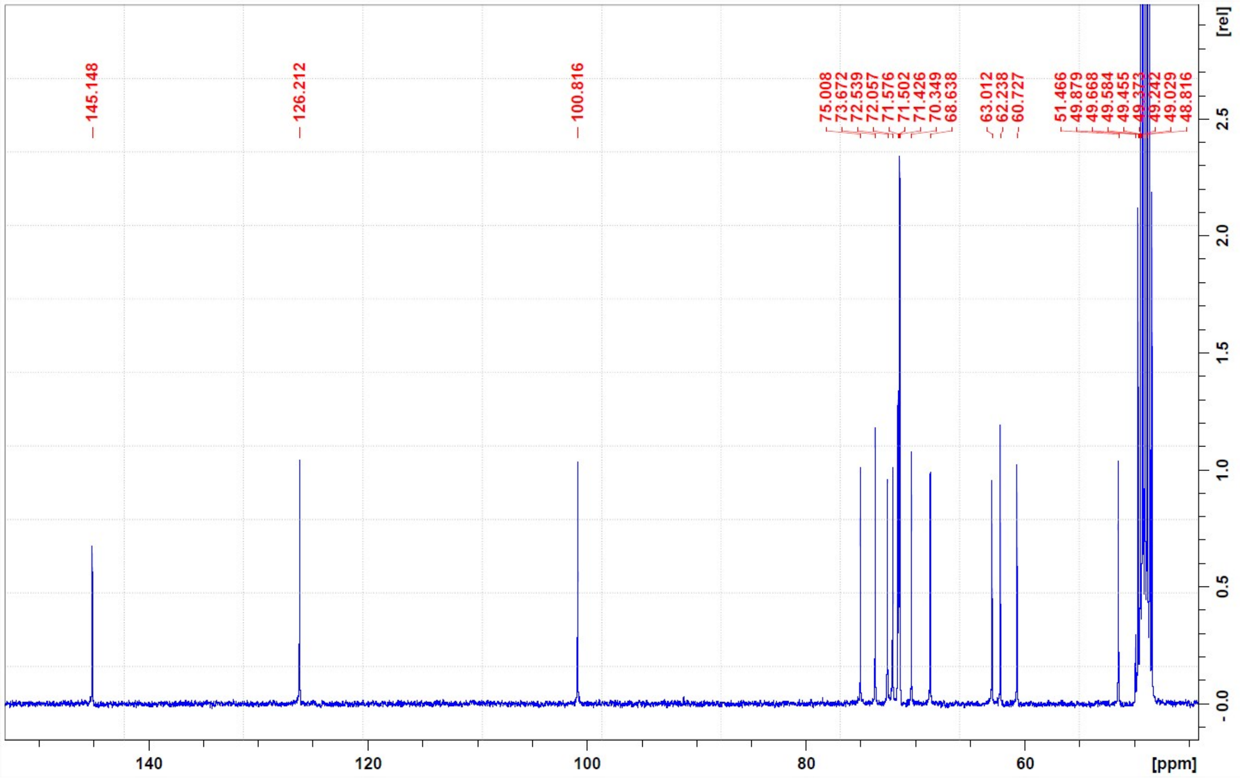
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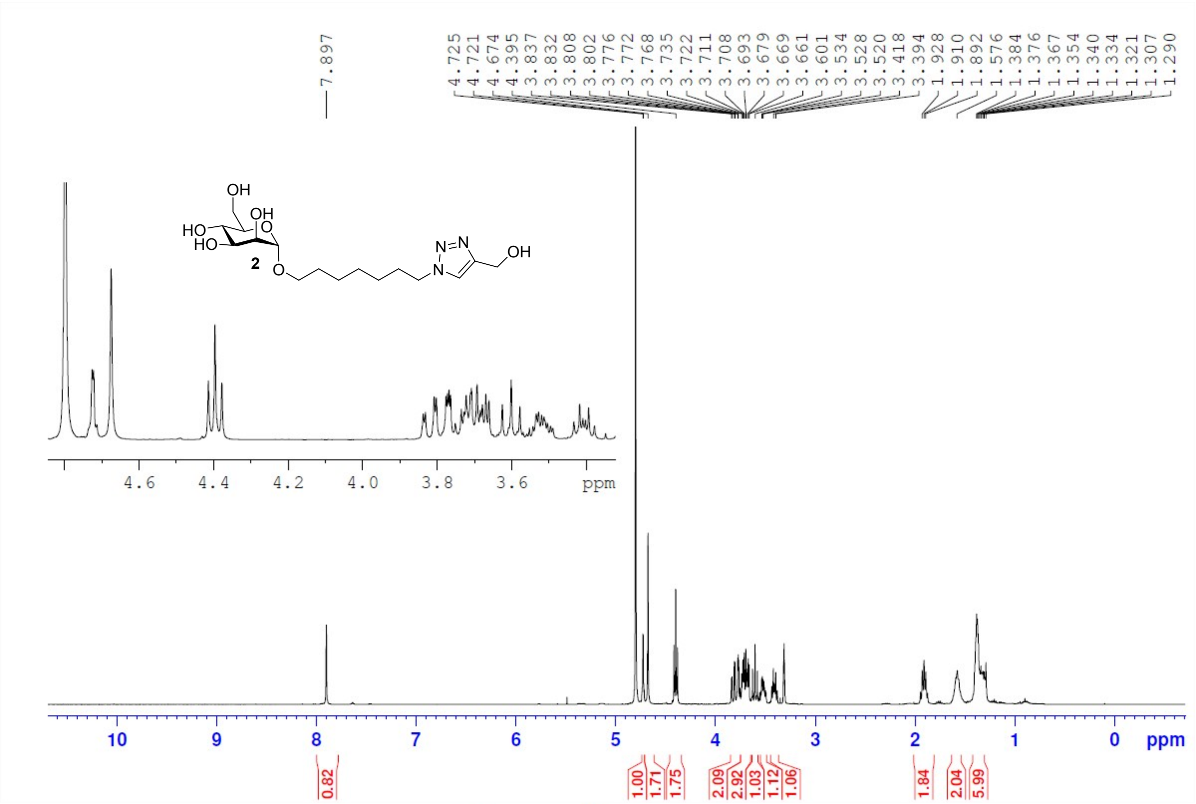
Compound **2**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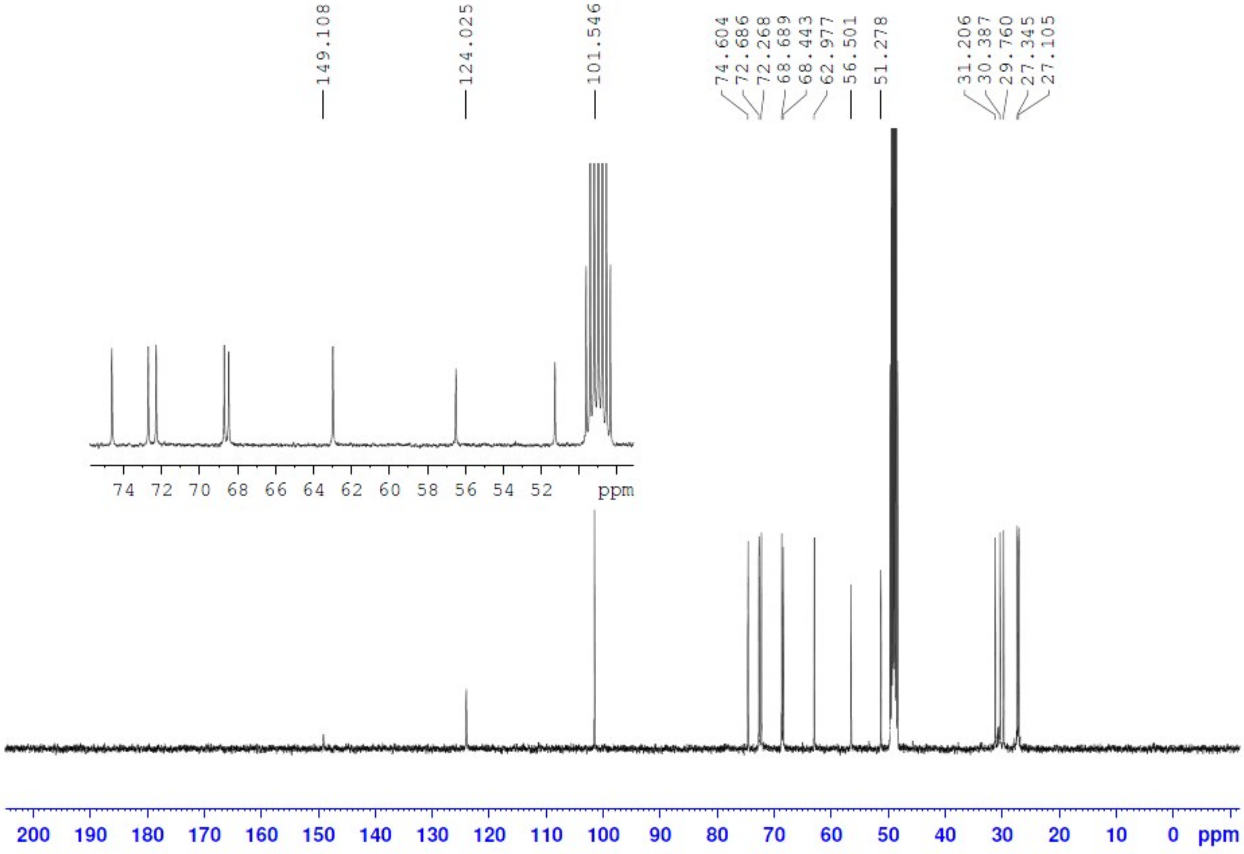
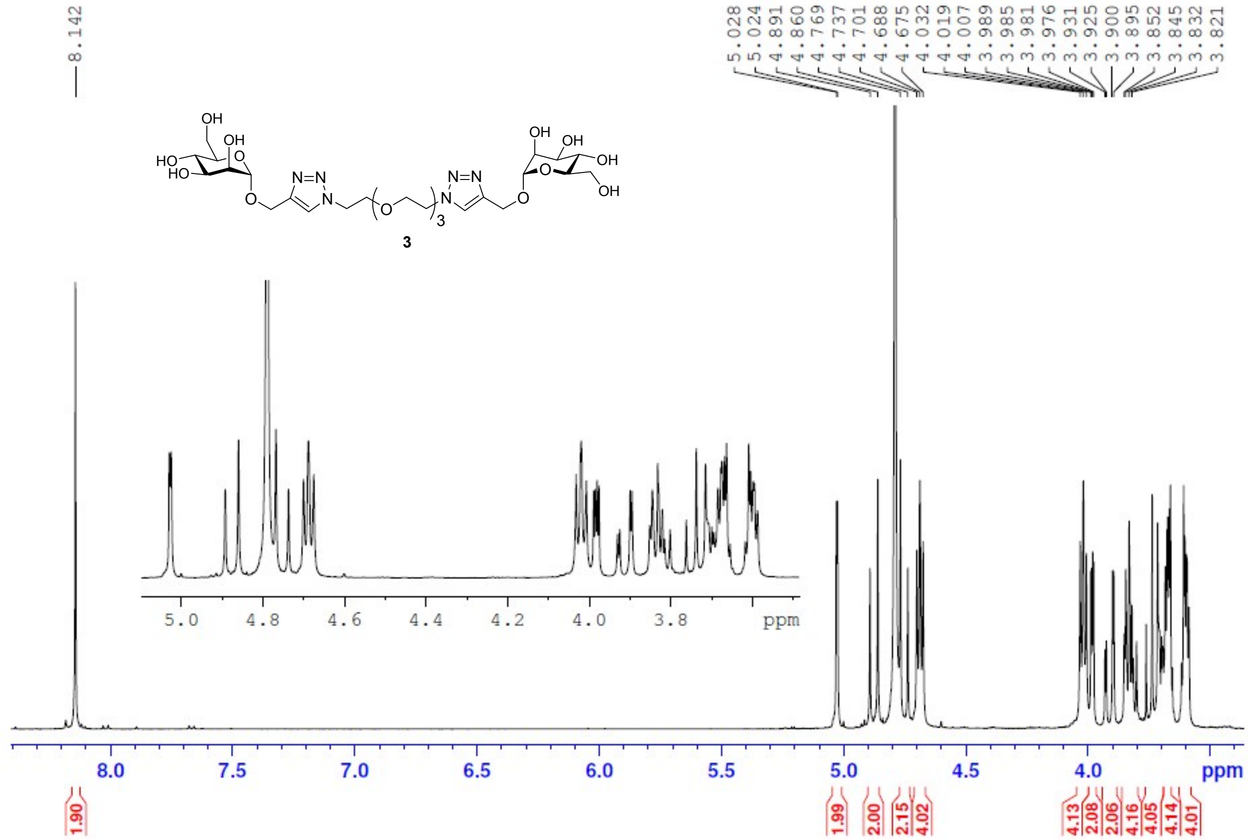
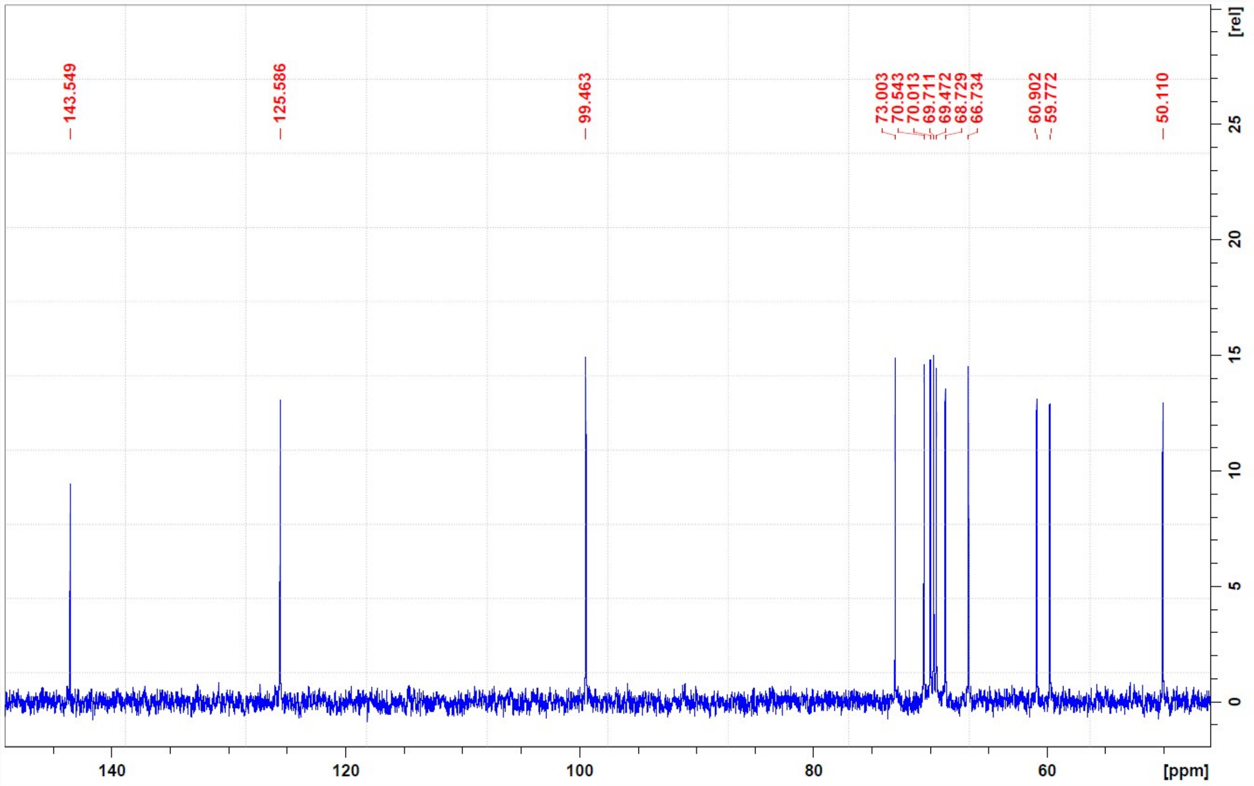
1.84
2.04
5.99


149.108
124.025
101.546
74.604
72.686
72.268
68.689
68.443
62.977
56.501
51.278
31.206
30.387
29.760
27.345
27.105
74
72
70
68
66
64
62
60
58
56
54
52
ppm
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm

Compound **3**

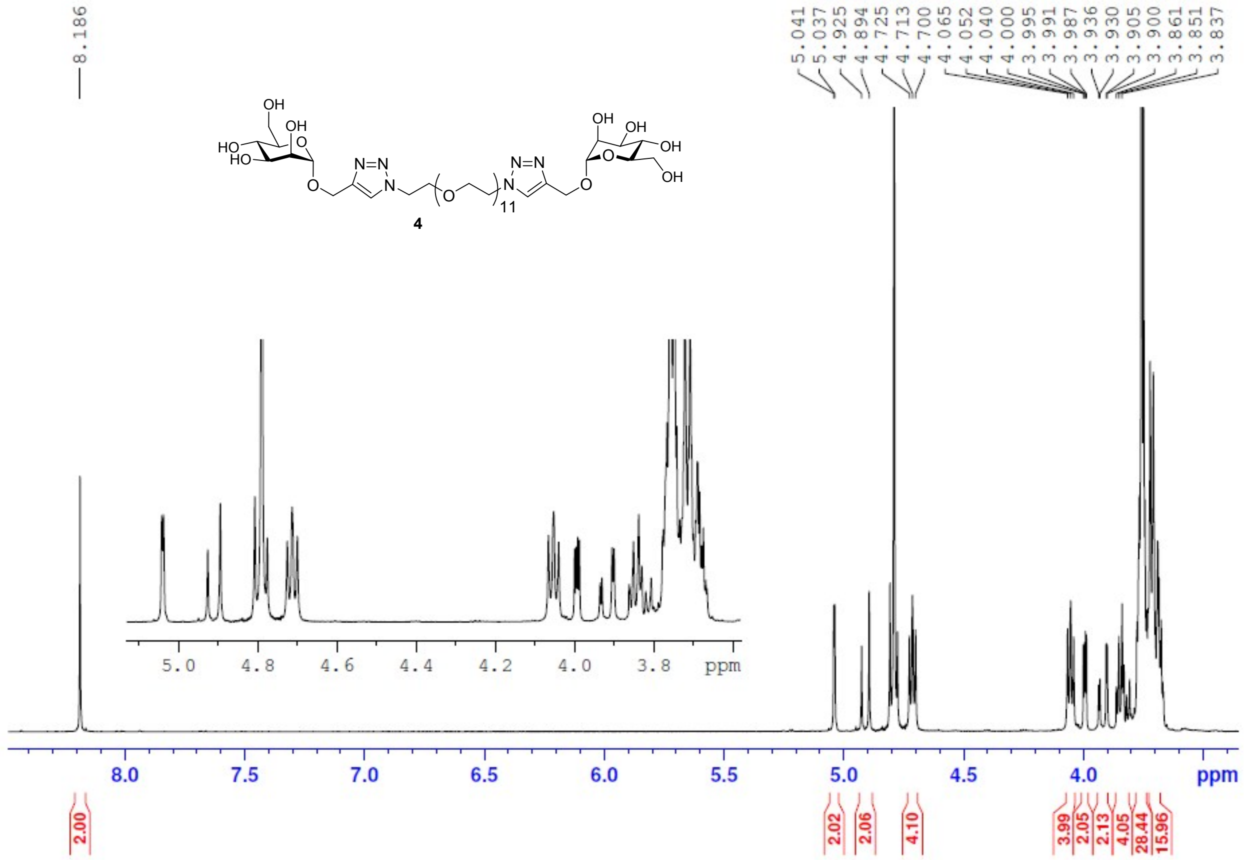


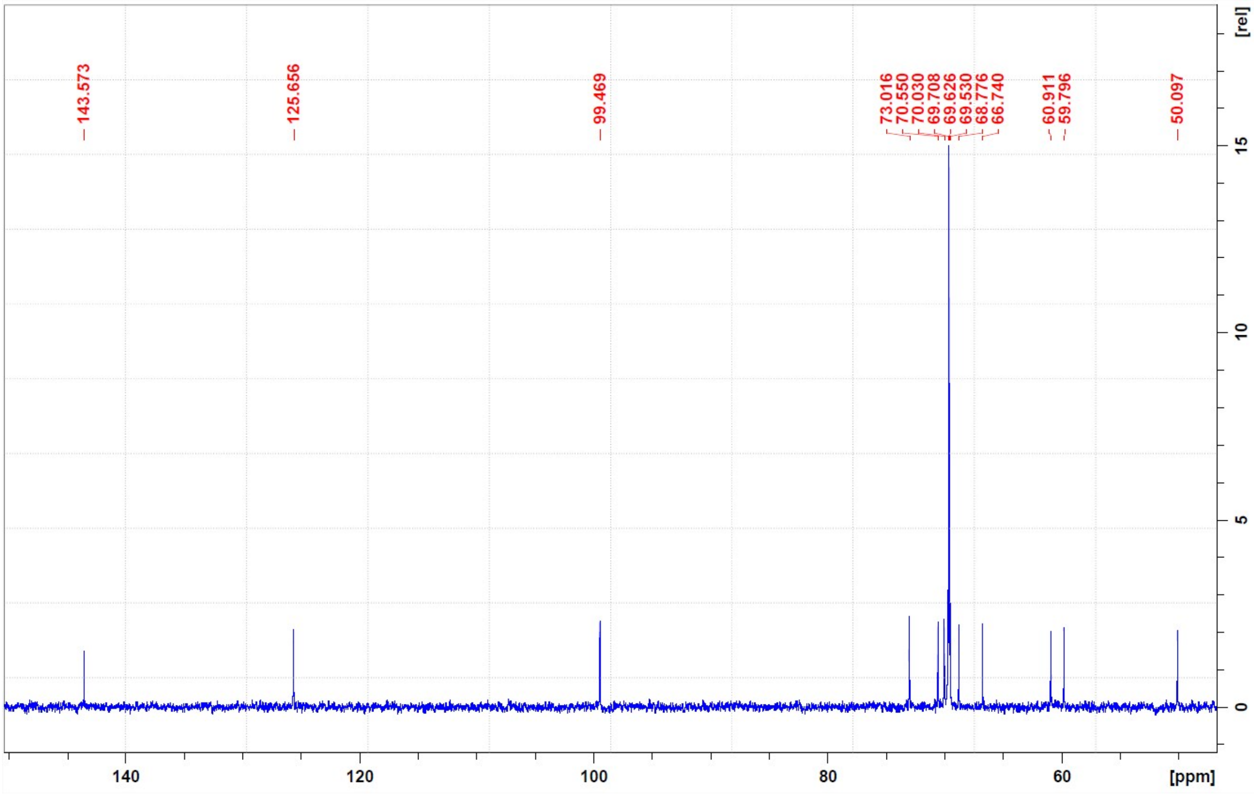
8.142
5.028
5.024
4.891
4.860
4.769
4.737
4.701
4.688
4.675
4.032
4.019
4.007
3.989
3.985
3.981
3.976
3.931
3.925
3.900
3.895
3.852
3.845
3.832
3.821
3
5.0
4.8
4.6
4.4
4.2
4.0
3.8
ppm
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
ppm
1.90
1.99
2.00
2.15
4.02
4.13
2.08
2.06
4.16
4.05
4.14
4.01



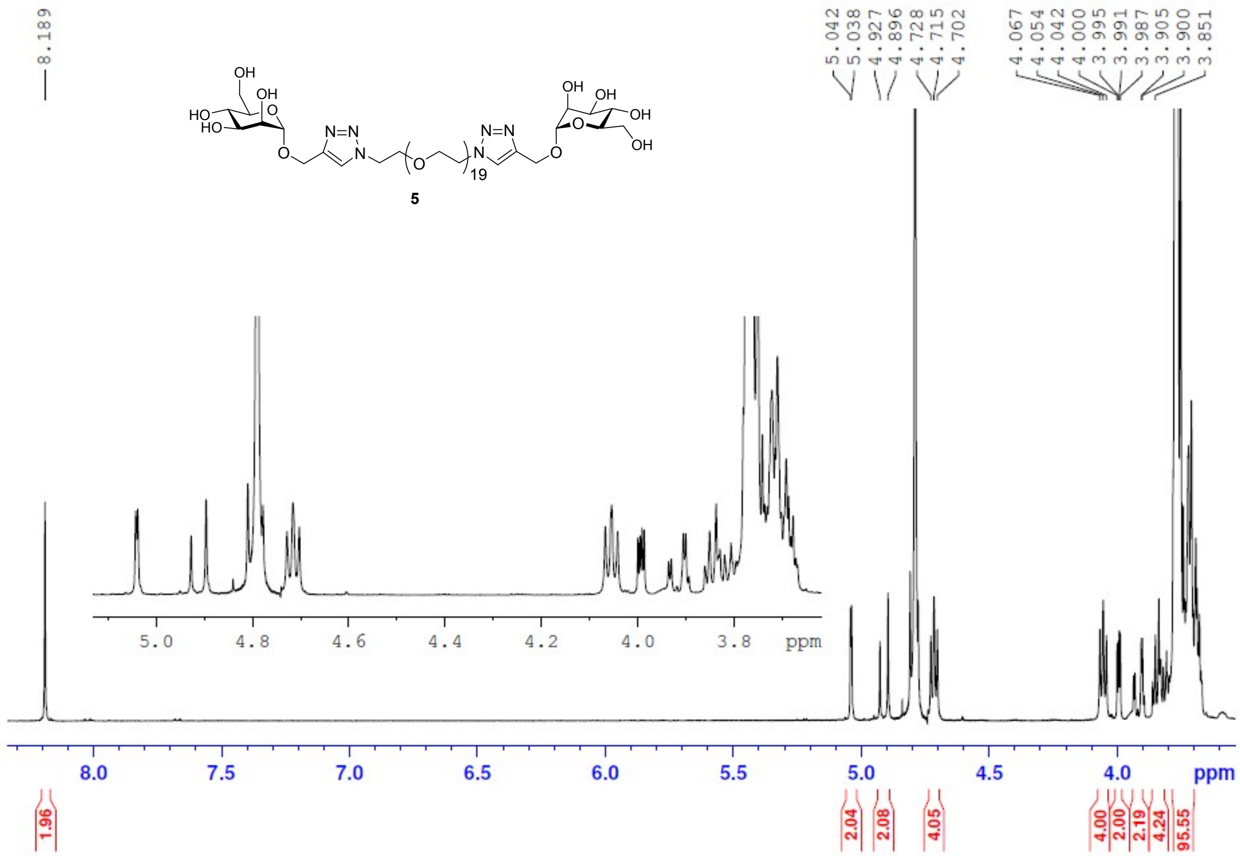
143.549
125.586
99.463
73.003
70.543
70.013
69.711
69.472
68.729
66.734
60.902
59.772
50.110
[rel]
25
20
15
10
5
0
140
120
100
80
60
[ppm]

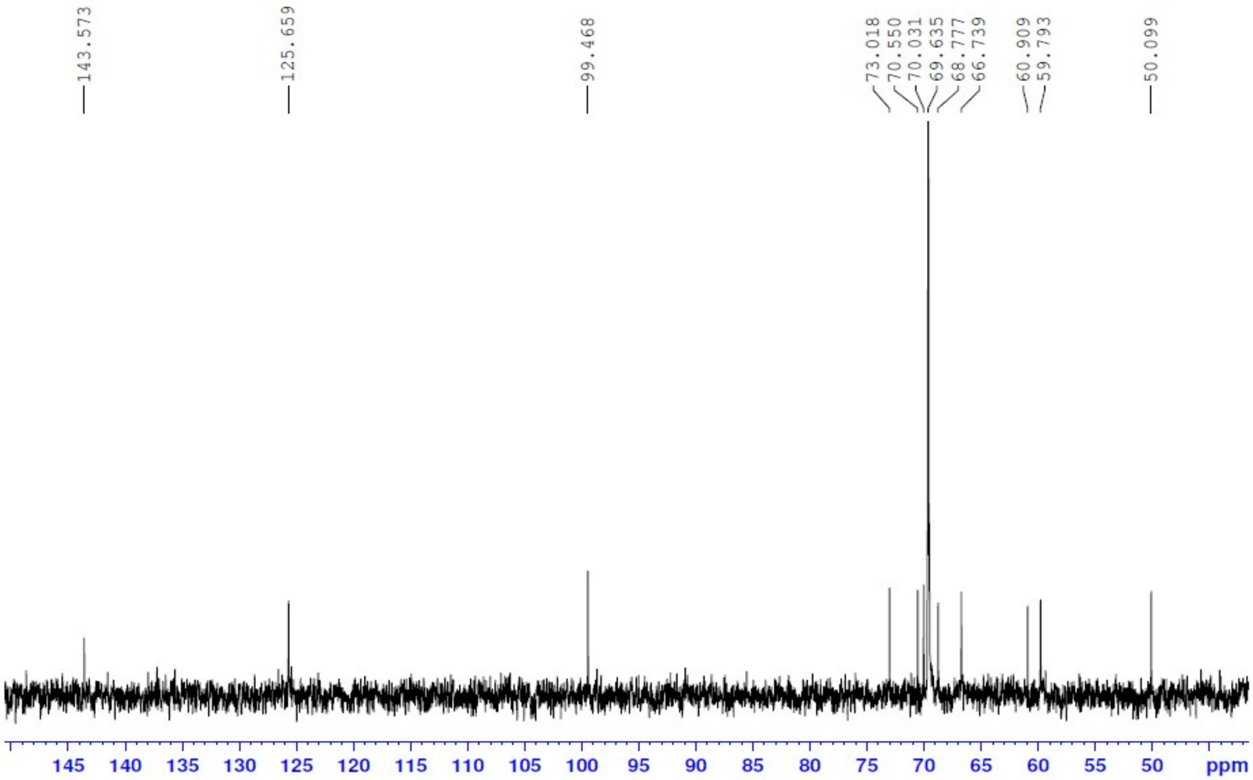
Compound **4**


8.186
5.041
5.037
4.925
4.894
4.725
4.713
4.700
4.065
4.052
4.040
4.000
3.995
3.991
3.987
3.936
3.930
3.905
3.900
3.861
3.851
3.837
4
11
5.0
4.8
4.6
4.4
4.2
4.0
3.8
ppm
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
ppm
2.00
2.02
2.06
4.10
3.99
2.05
2.13
4.05
28.44
15.96

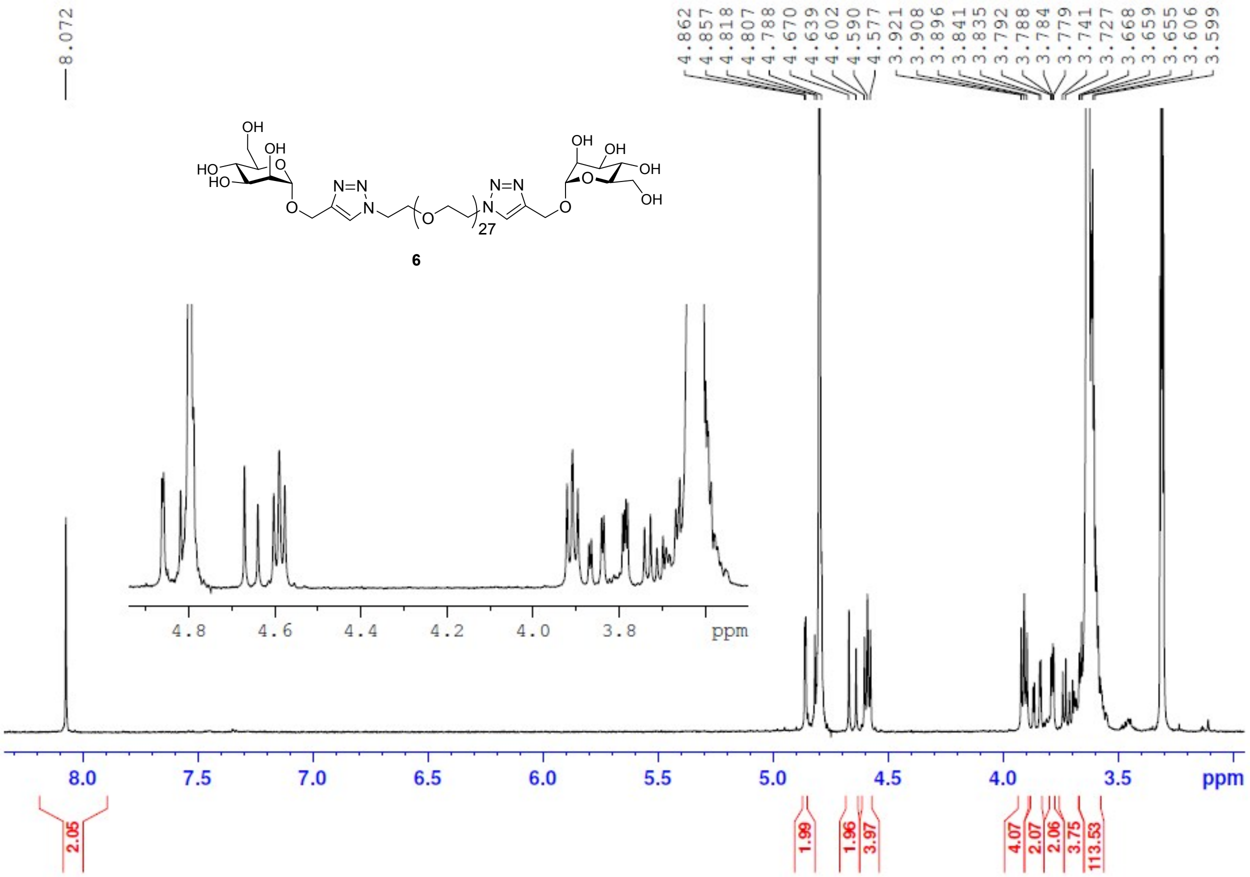

143.573
125.656
99.469
73.016
70.550
70.030
69.708
69.626
69.530
68.776
66.740
60.911
59.796
50.097
[rel]
15
10
5
0
140
120
100
80
60
[ppm]

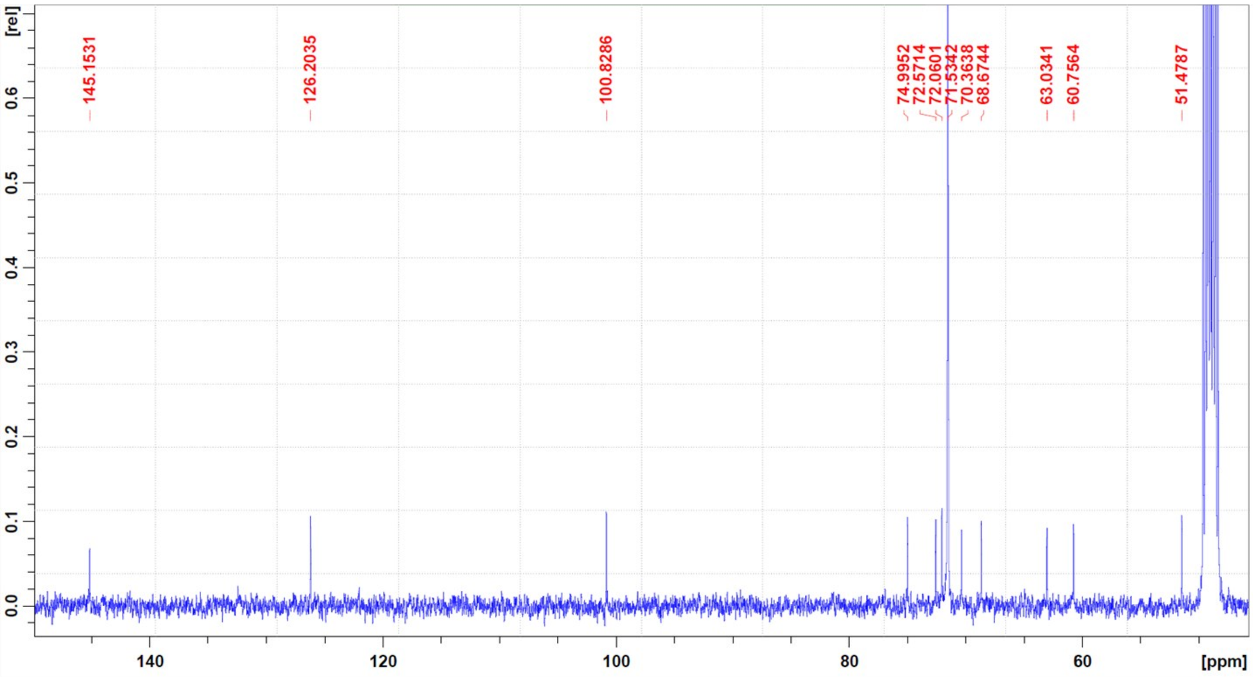
Compound **5**


8.189
5.042
5.038
4.927
4.896
4.728
4.715
4.702
4.067
4.054
4.042
4.000
3.995
3.991
3.987
3.905
3.900
3.851
OH
OH
HO
HO
O
O
N=N
N
O
19
N
N=N
OH
OH
OH
OH
O
5
5.0
4.8
4.6
4.4
4.2
4.0
3.8
ppm
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
ppm
1.96
2.04
2.08
4.05
4.00
2.00
2.19
4.24
95.55

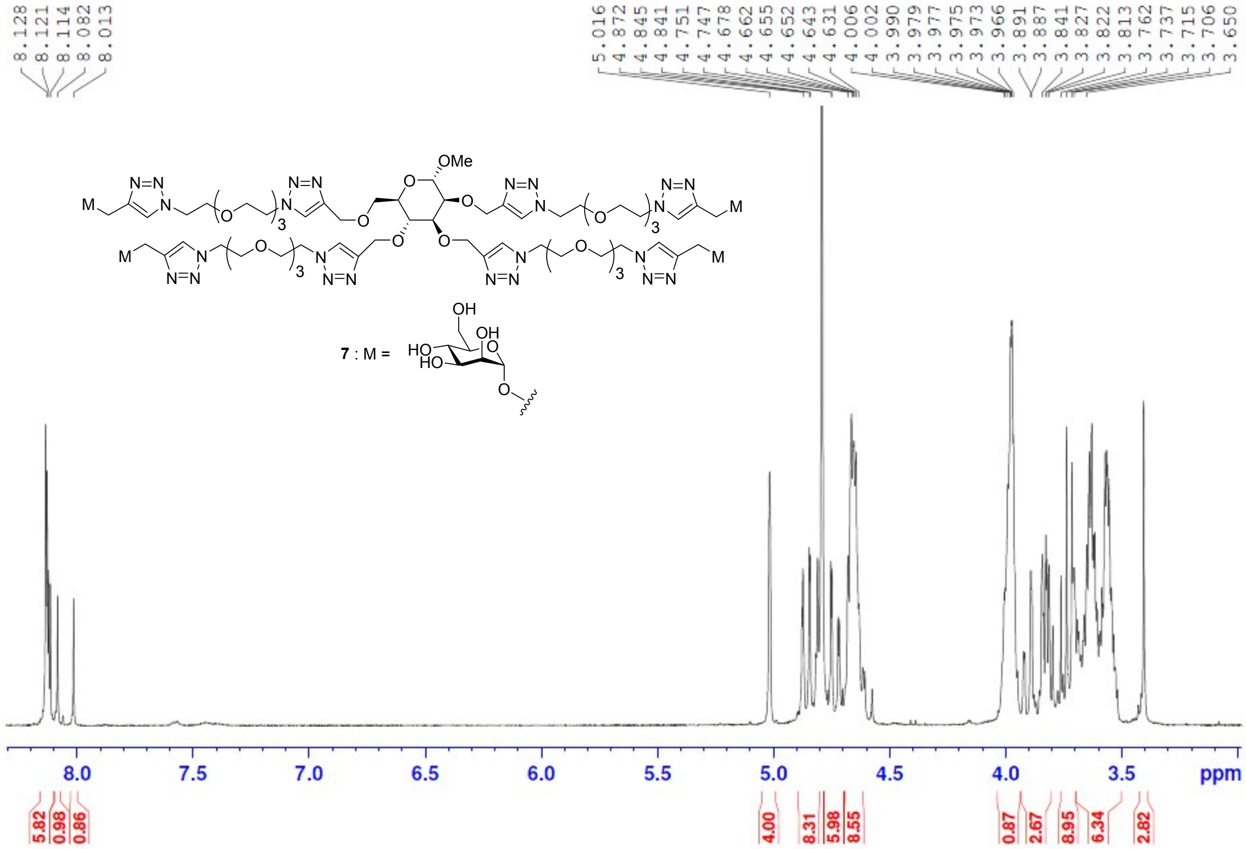

143.573
125.659
99.468
73.018
70.550
70.031
69.635
68.777
66.739
60.909
59.793
50.099
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
ppm

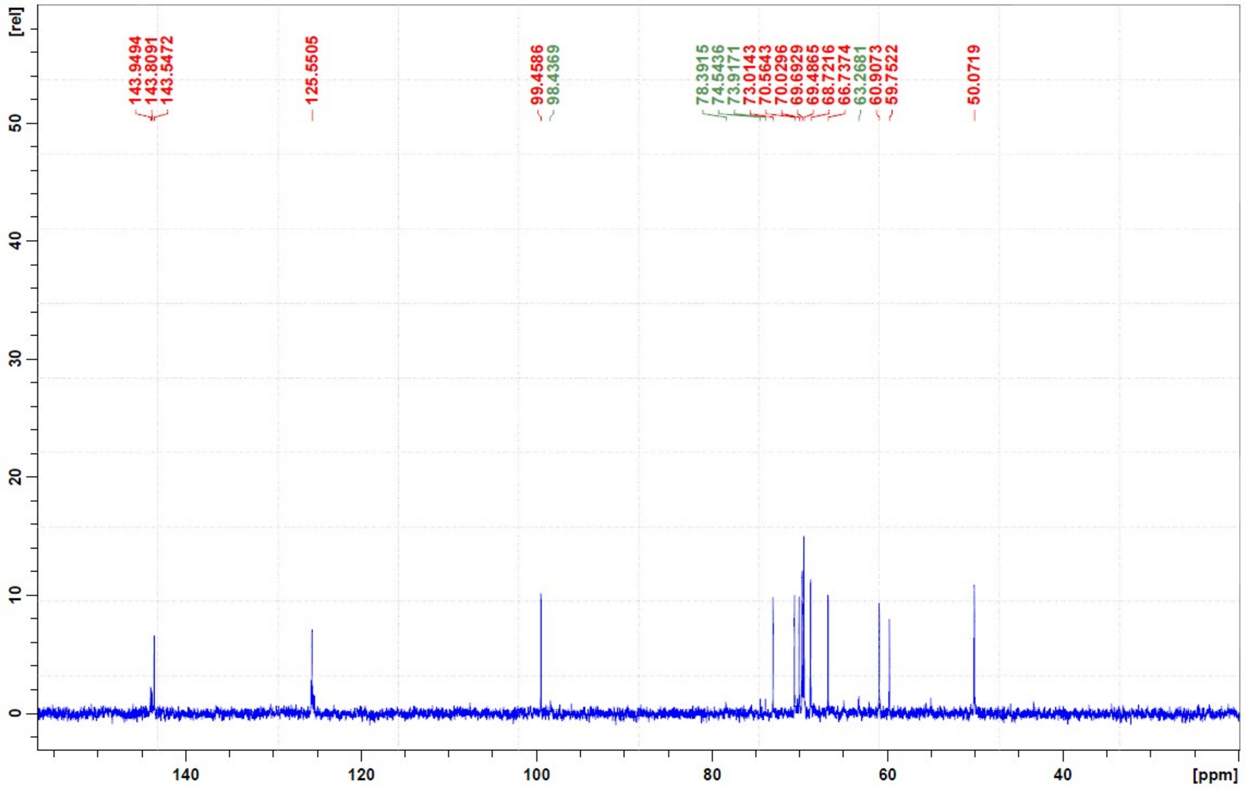
Compound **6**


8.072
4.862
4.857
4.818
4.807
4.788
4.670
4.639
4.602
4.590
4.577
3.921
3.908
3.896
3.841
3.835
3.792
3.788
3.784
3.779
3.741
3.727
3.668
3.659
3.655
3.606
3.599
OH
OH
HO
HO
O
O
N=N
N
O
27
N
N=N
O
OH
OH
O
OH
OH
6
4.8
4.6
4.4
4.2
4.0
3.8
ppm
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
ppm
2.05
1.99
1.96
3.97
4.07
2.07
2.06
3.75
113.53

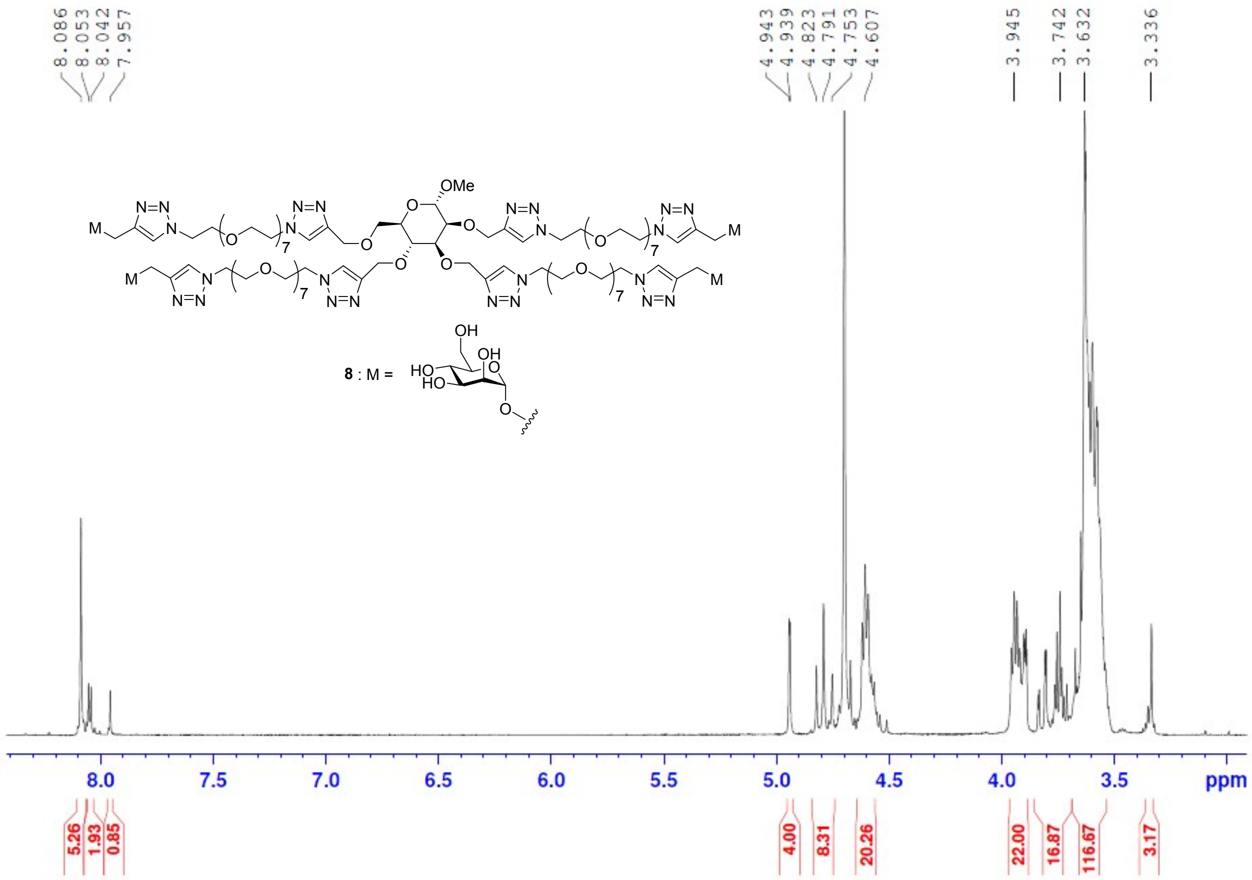

[rel]
0.6
0.5
0.4
0.3
0.2
0.1
0.0
145.1531
126.2035
100.8286
74.9952
72.5714
72.0601
71.5342
70.3638
68.6744
63.0341
60.7564
51.4787
140
120
100
80
60
[ppm]

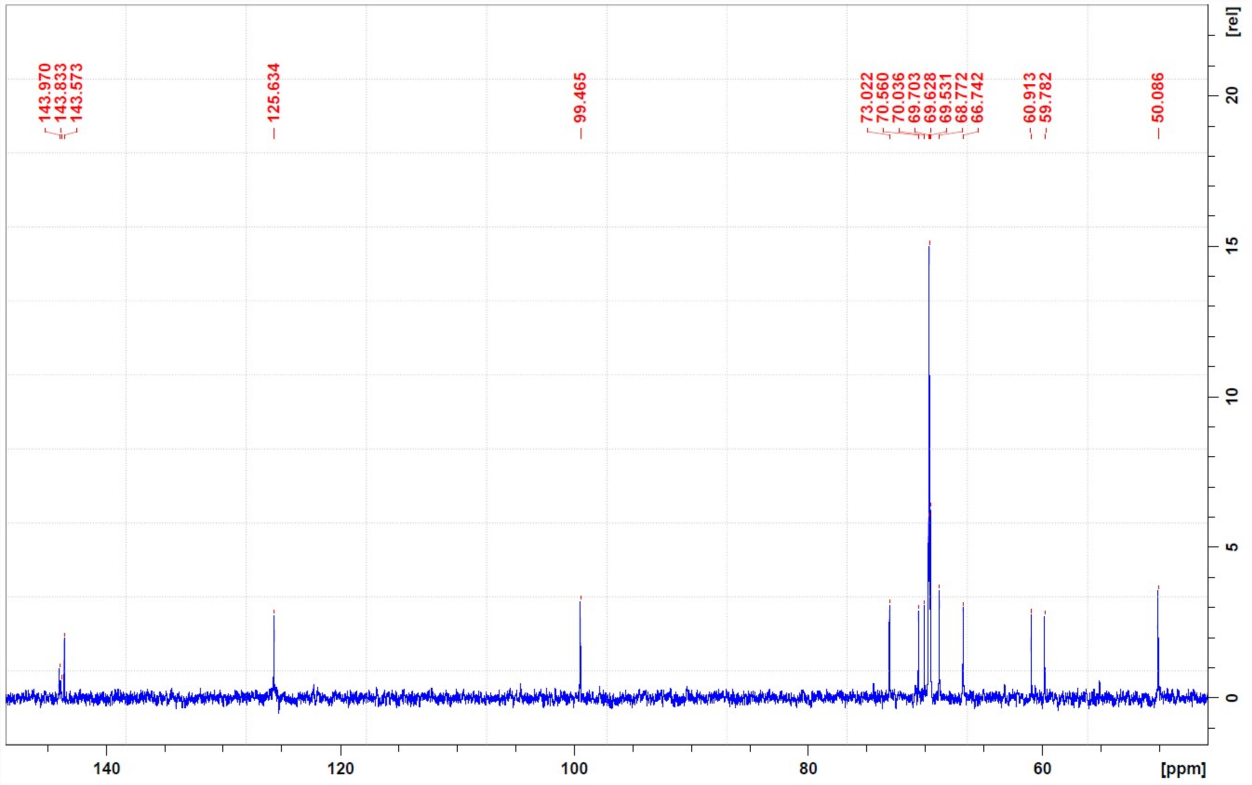
Compound **7**


8.128
8.121
8.114
8.082
8.013
5.016
4.872
4.845
4.841
4.751
4.747
4.678
4.662
4.655
4.652
4.643
4.631
4.006
4.002
3.990
3.979
3.977
3.975
3.973
3.966
3.891
3.887
3.841
3.827
3.822
3.813
3.762
3.737
3.715
3.706
3.650
OMe
M
N=N
N
O
3
7 : M =
OH
HO
O
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
ppm
5.82
0.98
0.86
4.00
8.31
5.98
8.55
0.87
2.67
8.95
6.34
2.82

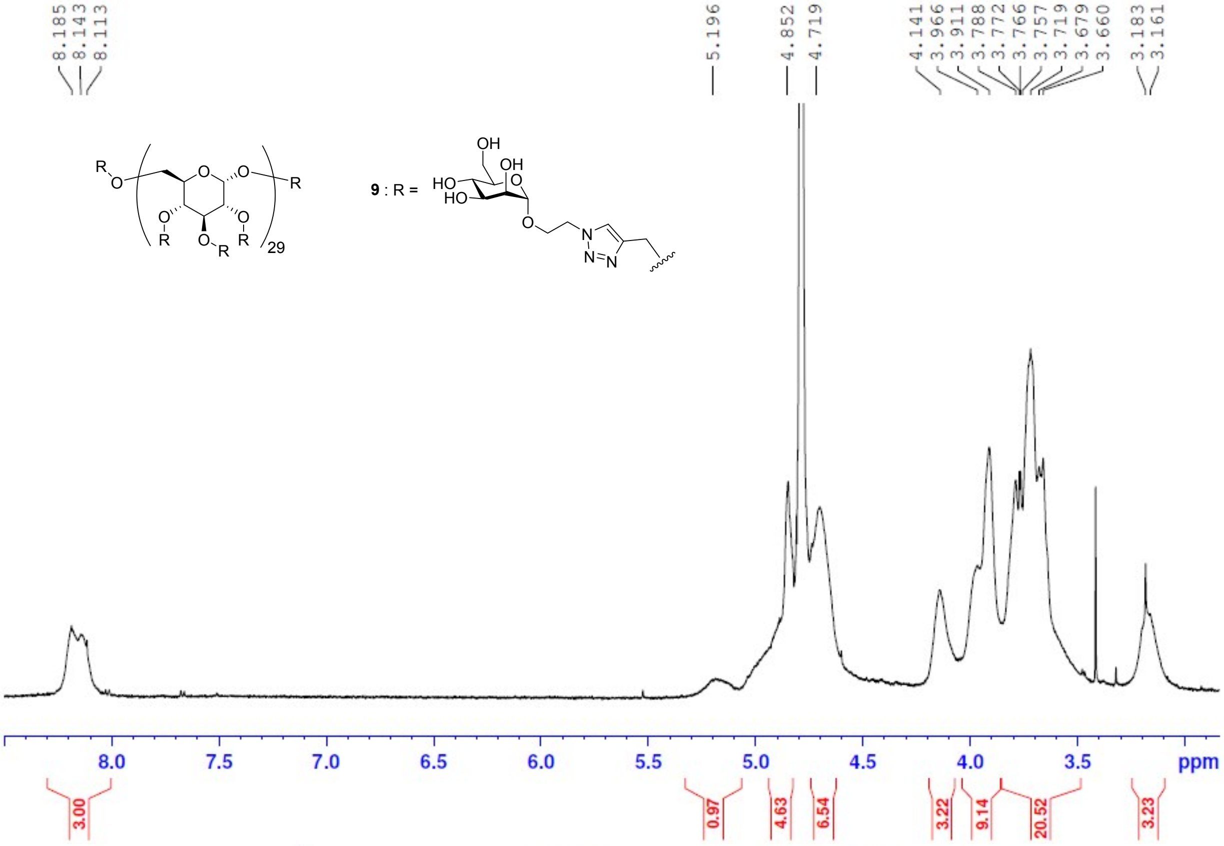

[rel]
143.9494
143.8091
143.5472
125.5505
99.4586
98.4369
78.3915
74.5436
73.9171
73.0143
70.5643
70.0296
69.6929
69.4865
68.7216
66.7374
63.2681
60.9073
59.7522
50.0719
50
40
30
20
10
0
140
120
100
80
60
40
[ppm]

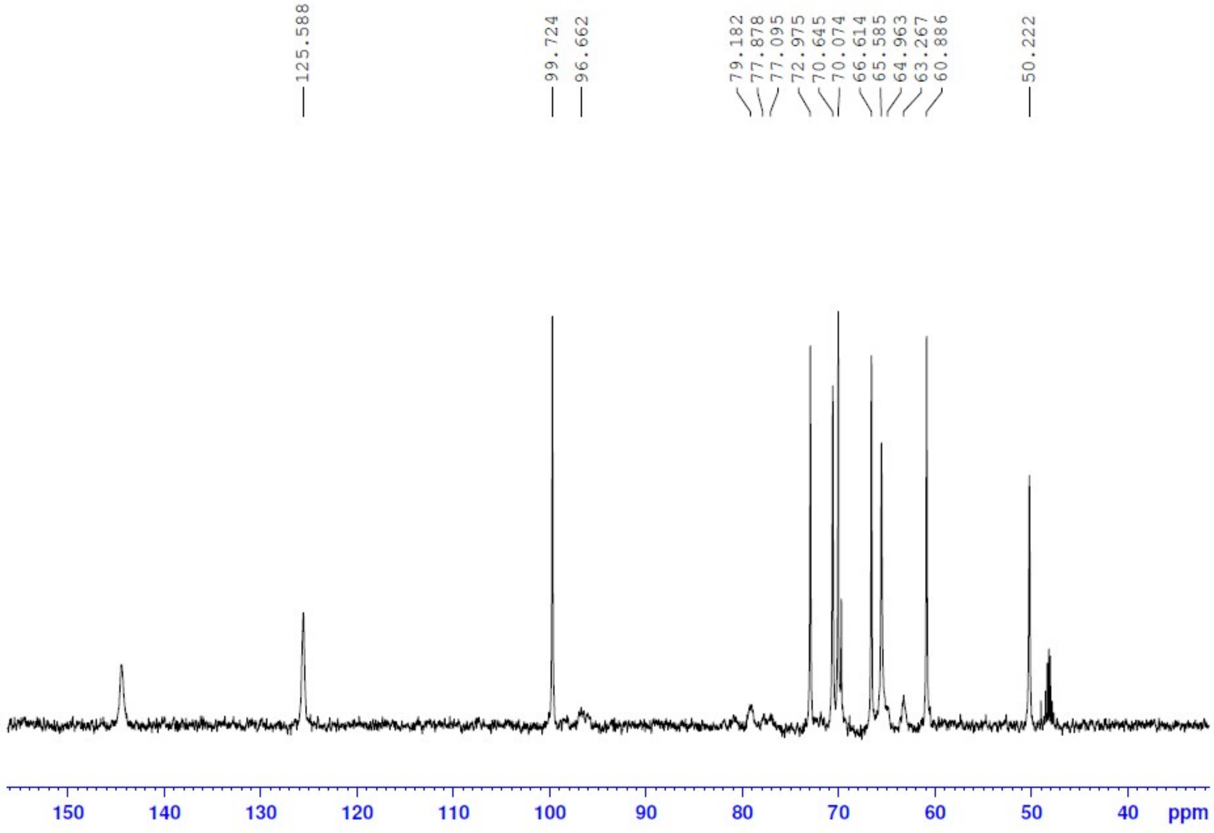
Compound **8**


8.086
8.053
8.042
7.957
4.943
4.939
4.823
4.791
4.753
4.607
3.945
3.742
3.632
3.336
OMe
N=N
M
O
7
OH
8 : M =
HO
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
ppm
5.26
1.93
0.85
4.00
8.31
20.26
22.00
16.87
116.67
3.17

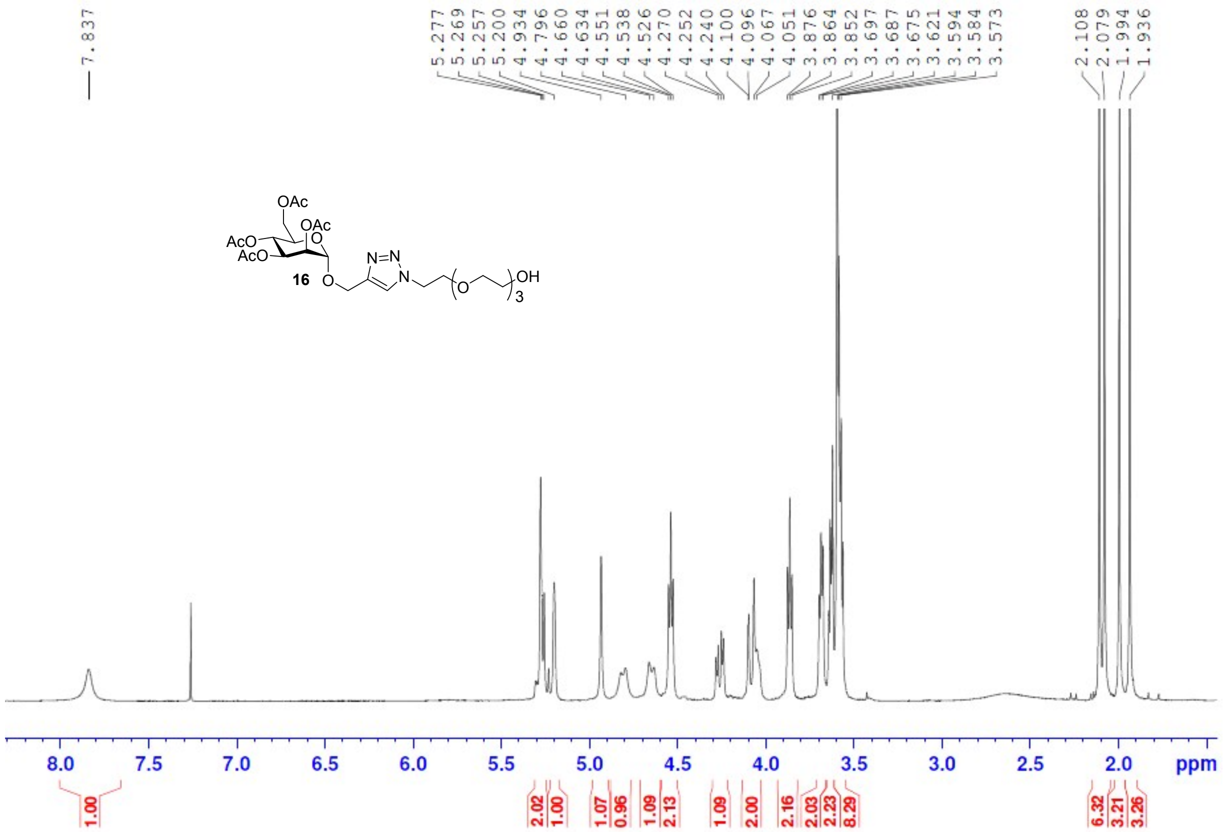

143.970
143.833
143.573
125.634
99.465
73.022
70.560
70.036
69.703
69.628
69.531
68.772
66.742
60.913
59.782
50.086
[rel]
20
15
10
5
0
140
120
100
80
60
[ppm]

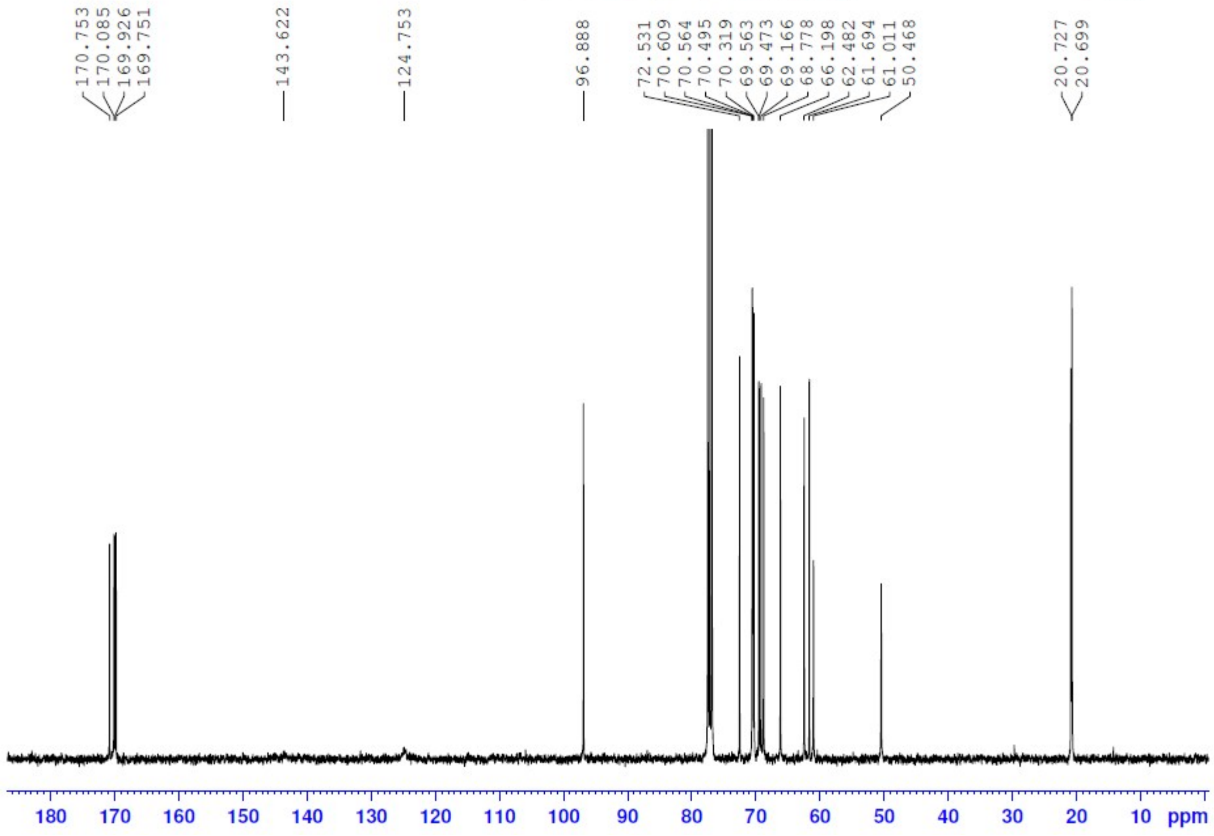
Compound **9**


8.185
8.143
8.113
5.196
4.852
4.719
4.141
3.966
3.911
3.788
3.772
3.766
3.757
3.719
3.679
3.660
3.183
3.161
R
O
O
O
R
O
R
O
R
R
29
9 : R =
OH
OH
HO
HO
O
O
N
N
N
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
ppm
3.00
0.97
4.63
6.54
3.22
9.14
20.52
3.23

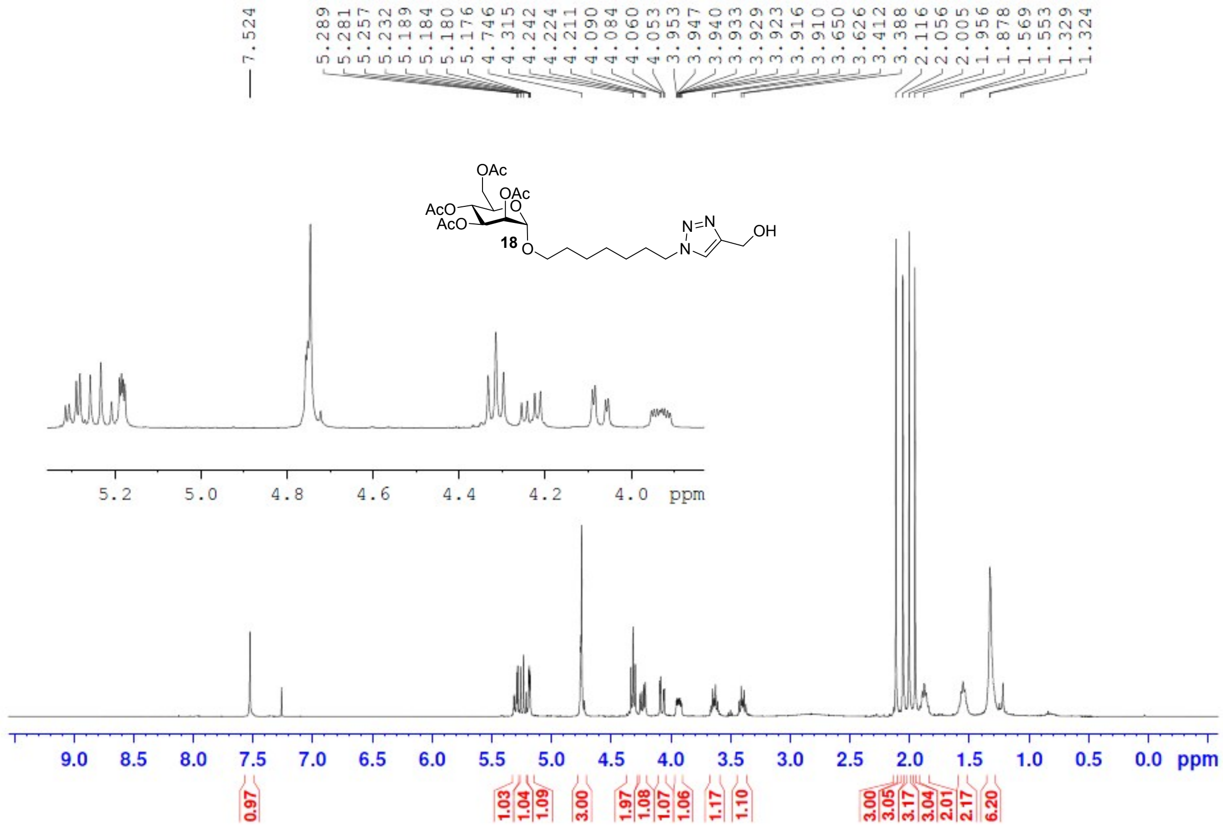

125.588
99.724
96.662
79.182
77.878
77.095
72.975
70.645
70.074
66.614
65.585
64.963
63.267
60.886
50.222
150
140
130
120
110
100
90
80
70
60
50
40
ppm

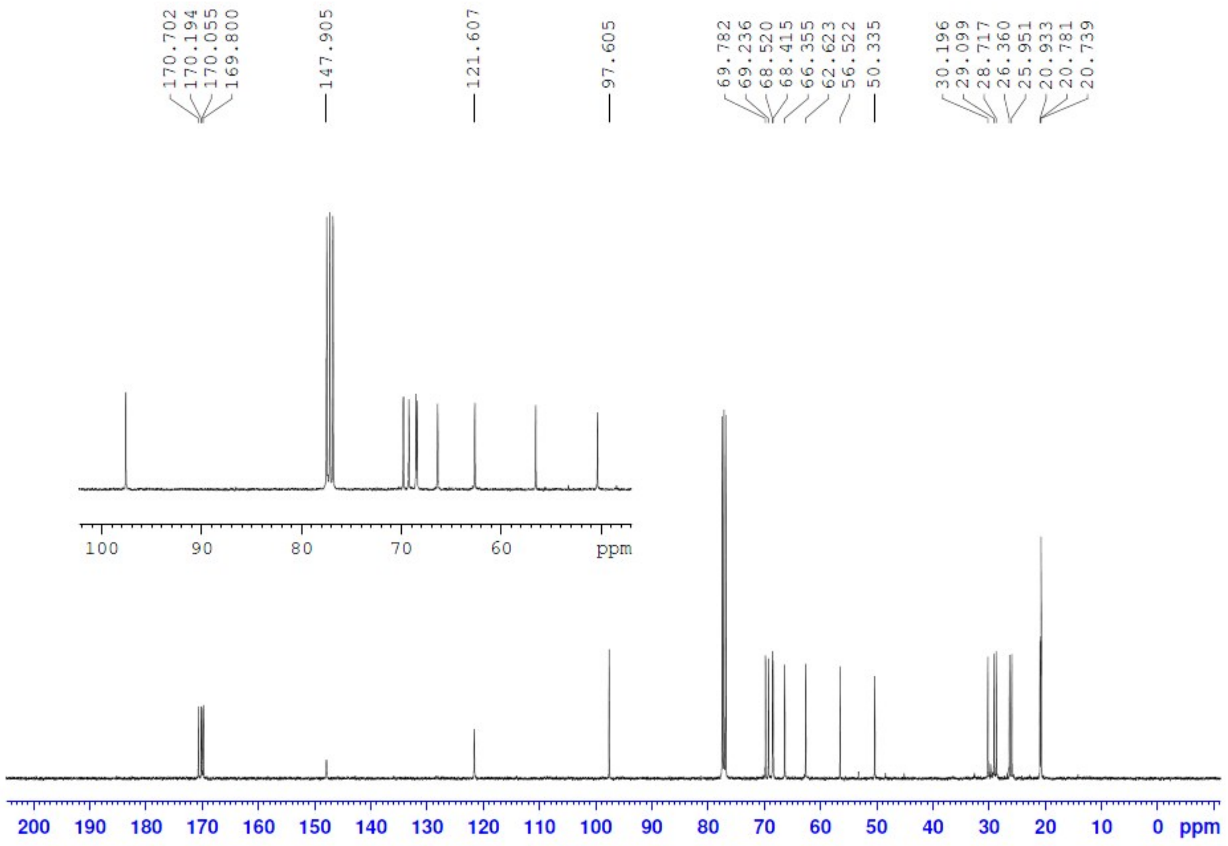
Compound **16**


7.837
5.277
5.269
5.257
5.200
4.934
4.796
4.660
4.634
4.551
4.538
4.526
4.270
4.252
4.240
4.100
4.096
4.067
4.051
3.876
3.864
3.852
3.697
3.687
3.675
3.621
3.594
3.584
3.573
2.108
2.079
1.994
1.936
OAc
OAc
AcO
AcO
16
O
N=N
N
O
OH
3
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
ppm
1.00
2.02
1.00
1.07
0.96
1.09
2.13
1.09
2.00
2.16
2.03
2.23
8.29
6.32
3.21
3.26

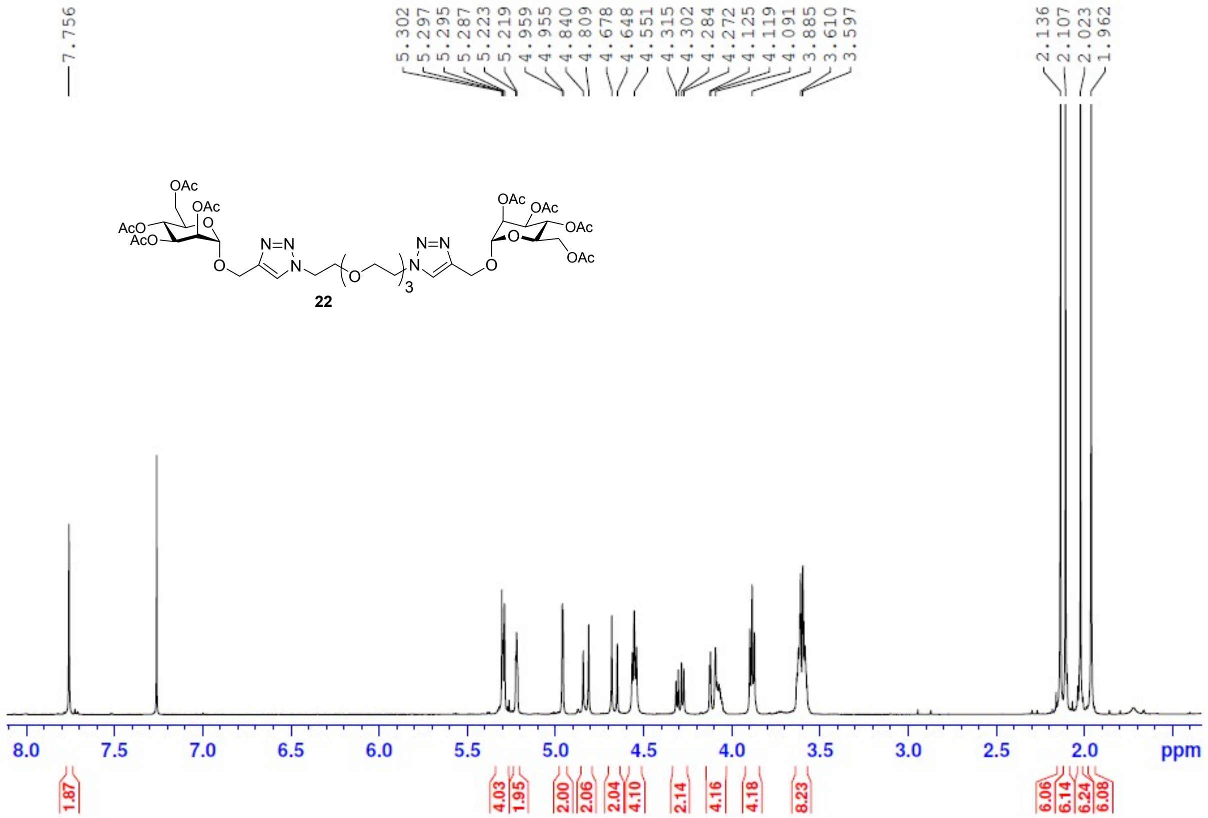

170.753
170.085
169.926
169.751
143.622
124.753
96.888
72.531
70.609
70.564
70.495
70.319
69.563
69.473
69.166
68.778
66.198
62.482
61.694
61.011
50.468
20.727
20.699
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

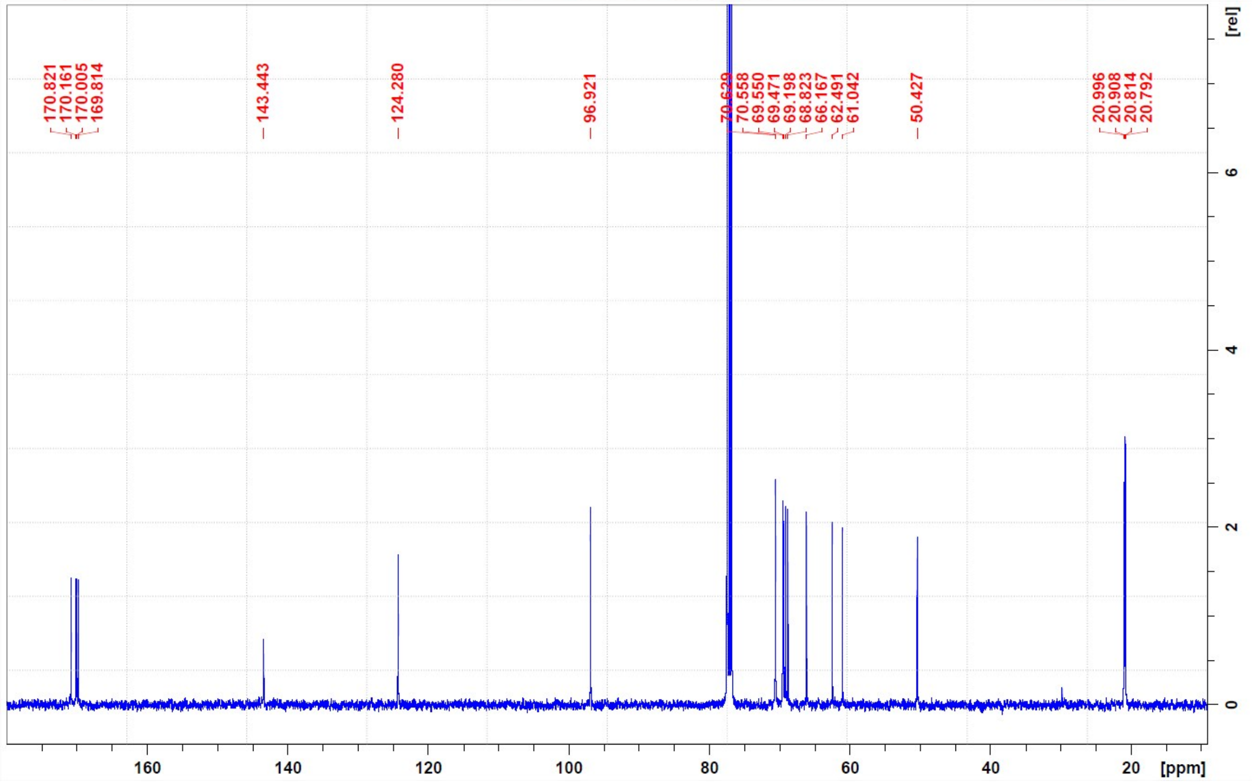
Compound **18**


7.524
5.289
5.281
5.257
5.232
5.189
5.184
5.180
5.176
4.746
4.315
4.242
4.224
4.211
4.090
4.084
4.060
4.053
3.953
3.947
3.940
3.933
3.929
3.923
3.916
3.910
3.650
3.626
3.412
3.388
2.116
2.056
2.005
1.956
1.878
1.569
1.553
1.329
1.324
OAc
AcO
OAc
O
AcO
AcO
18
O
N
N
N
OH
5.2
5.0
4.8
4.6
4.4
4.2
4.0
ppm
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
ppm
0.97
1.03
1.04
1.09
3.00
1.97
1.08
1.07
1.06
1.17
1.10
3.00
3.05
3.17
3.04
2.01
2.17
6.20

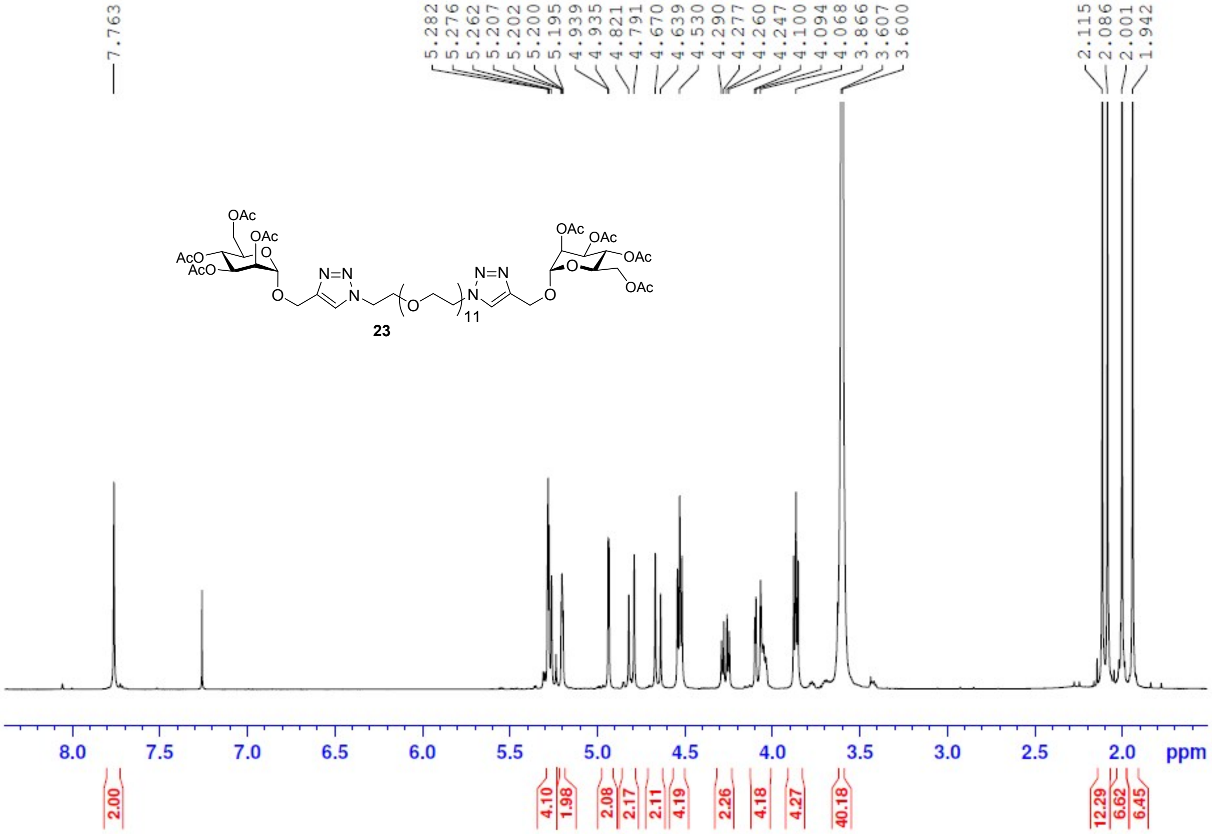

170.702
170.194
170.055
169.800
147.905
121.607
97.605
69.782
69.236
68.520
68.415
66.355
62.623
56.522
50.335
30.196
29.099
28.717
26.360
25.951
20.933
20.781
20.739
100
90
80
70
60
ppm
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm

Compound **22**

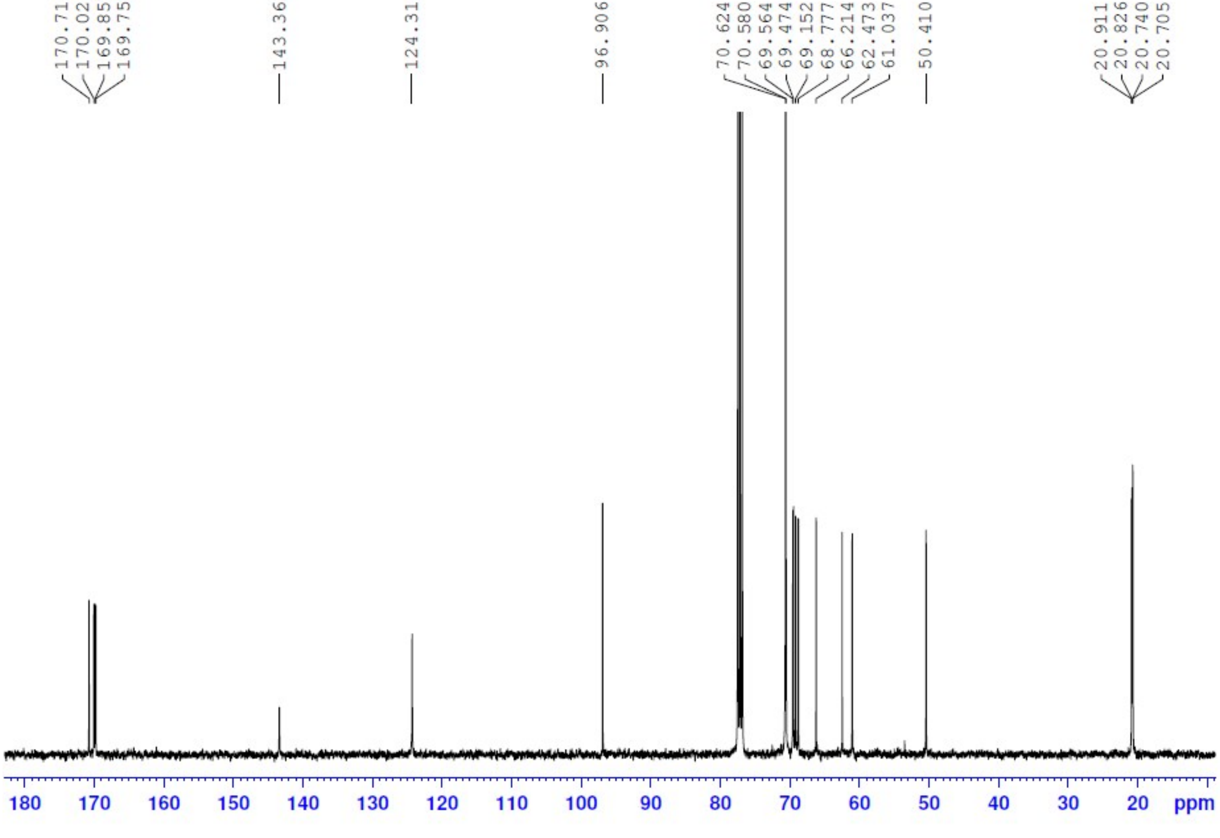

7.756
5.302
5.297
5.295
5.287
5.223
5.219
4.959
4.955
4.840
4.809
4.678
4.648
4.551
4.315
4.302
4.284
4.272
4.125
4.119
4.091
3.885
3.610
3.597
2.136
2.107
2.023
1.962
OAc
OAc
AcO
AcO
O
O
N=N
N
N
O
3
22
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
ppm
1.87
4.03
1.95
2.00
2.06
2.04
4.10
2.14
4.16
4.18
8.23
6.06
6.14
6.24
6.08


170.821
170.161
170.005
169.814
143.443
124.280
96.921
70.629
70.558
69.550
69.471
69.198
68.823
66.167
62.491
61.042
50.427
20.996
20.908
20.814
20.792
[rel]
6
4
2
0
160
140
120
100
80
60
40
20
[ppm]

Compound **23**

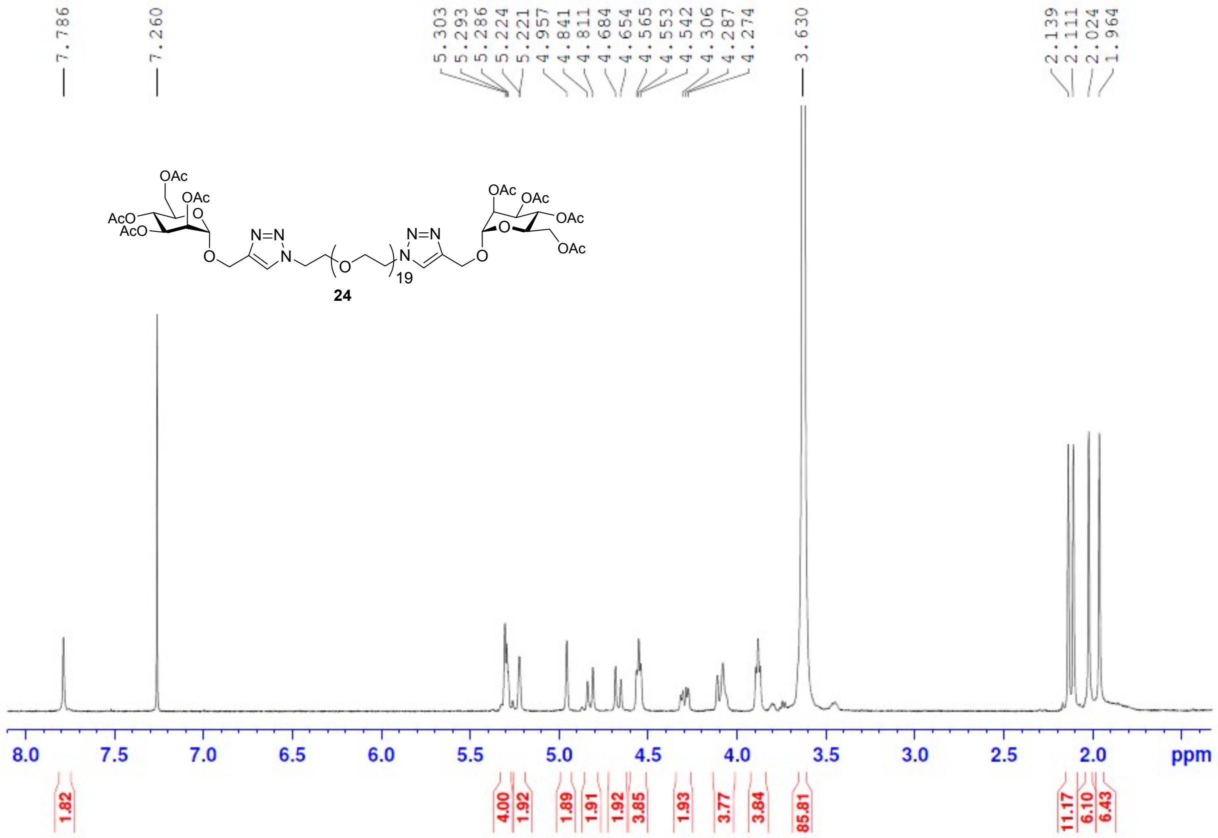


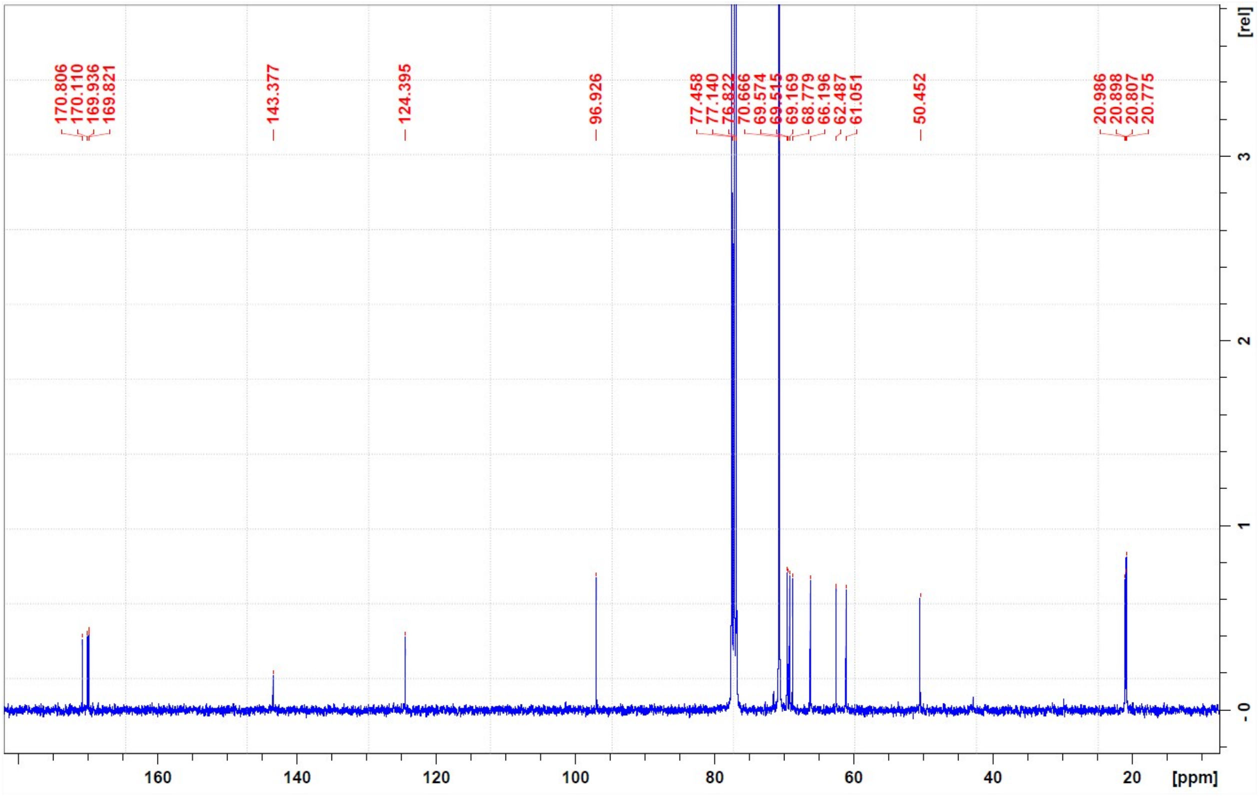
7.763
5.282
5.276
5.262
5.207
5.202
5.200
5.195
4.939
4.935
4.821
4.791
4.670
4.639
4.530
4.290
4.277
4.260
4.247
4.100
4.094
4.068
3.866
3.607
3.600
2.115
2.086
2.001
1.942
OAc
OAc
O
AcO
AcO
O
N=N
N
O
11
N
N=N
O
OAc
OAc
OAc
O
OAc
23
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
ppm
2.00
4.10
1.98
2.08
2.17
2.11
4.19
2.26
4.18
4.27
40.18
12.29
6.62
6.45



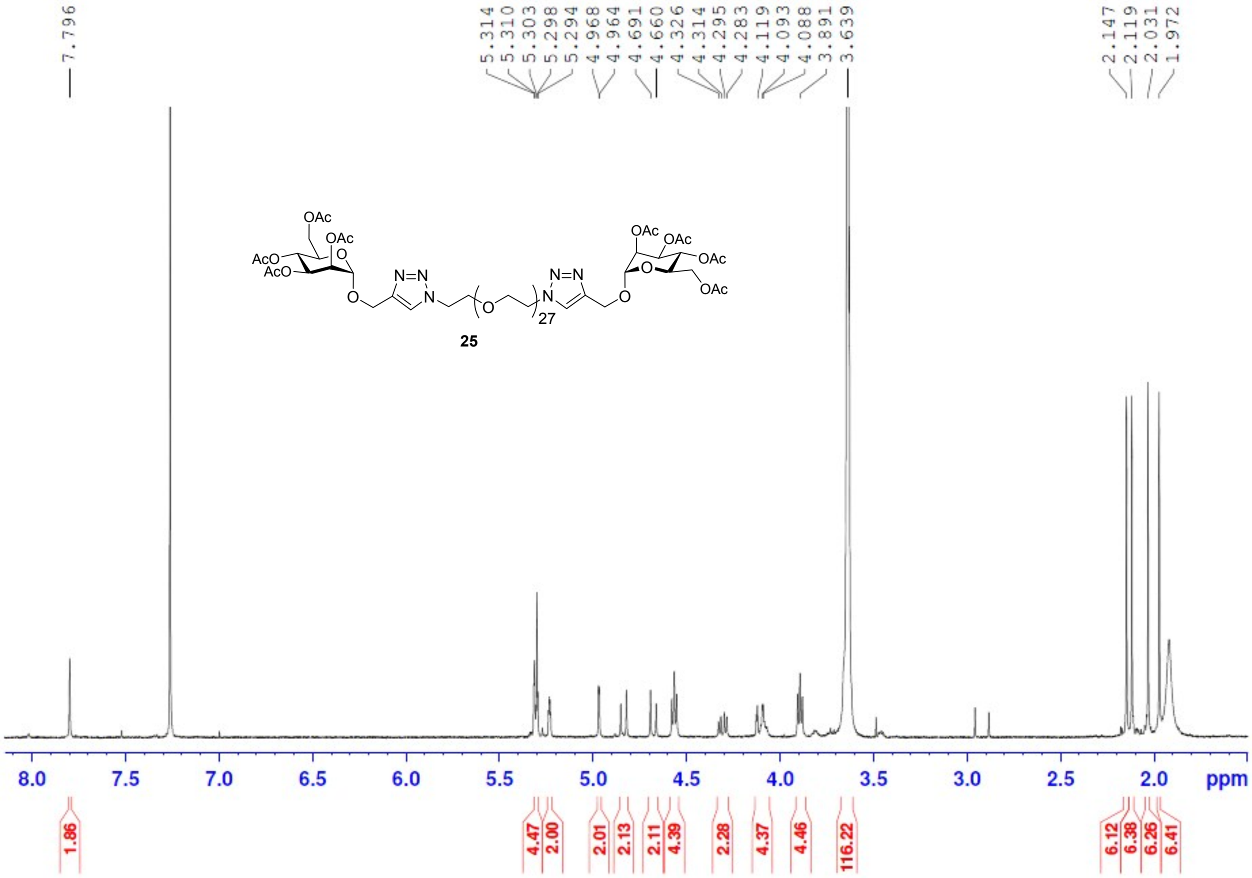
170.717
170.026
169.857
169.751
143.361
124.316
96.906
70.624
70.580
69.564
69.474
69.152
68.777
66.214
62.473
61.037
50.410
20.911
20.826
20.740
20.705
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
ppm

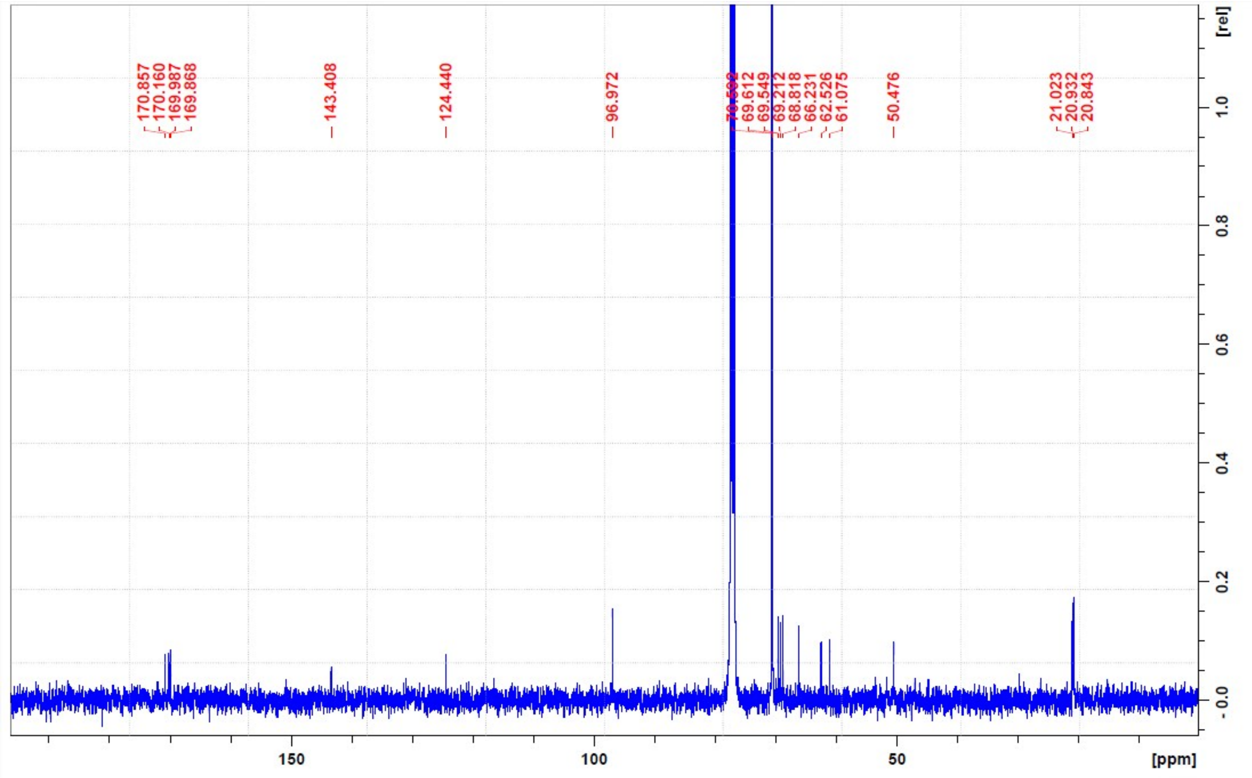
Compound **24**


7.786
7.260
5.303
5.293
5.286
5.224
5.221
4.957
4.841
4.811
4.684
4.654
4.565
4.553
4.542
4.306
4.287
4.274
3.630
2.139
2.111
2.024
1.964
OAc
OAc
AcO
AcO
O
O
N=N
N
O
19
N=N
N
O
OAc
OAc
O
OAc
OAc
24
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
ppm
1.82
4.00
1.92
1.89
1.91
1.92
3.85
1.93
3.77
3.84
85.81
11.17
6.10
6.43

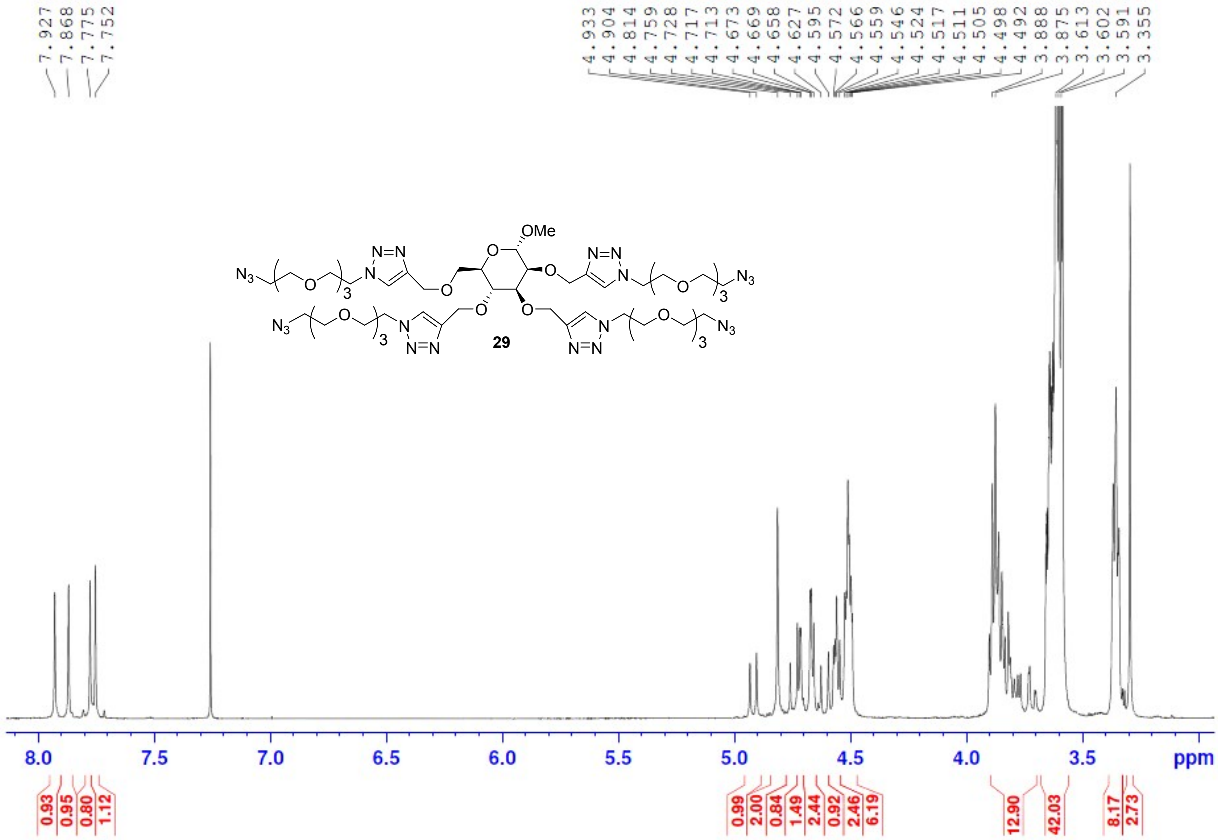

170.806
170.110
169.936
169.821
143.377
124.395
96.926
77.458
77.140
76.822
70.666
69.574
69.515
69.169
68.779
66.196
62.487
61.051
50.452
20.986
20.898
20.807
20.775
[rel]
3
2
1
0
160
140
120
100
80
60
40
20
[ppm]

Compound **25**

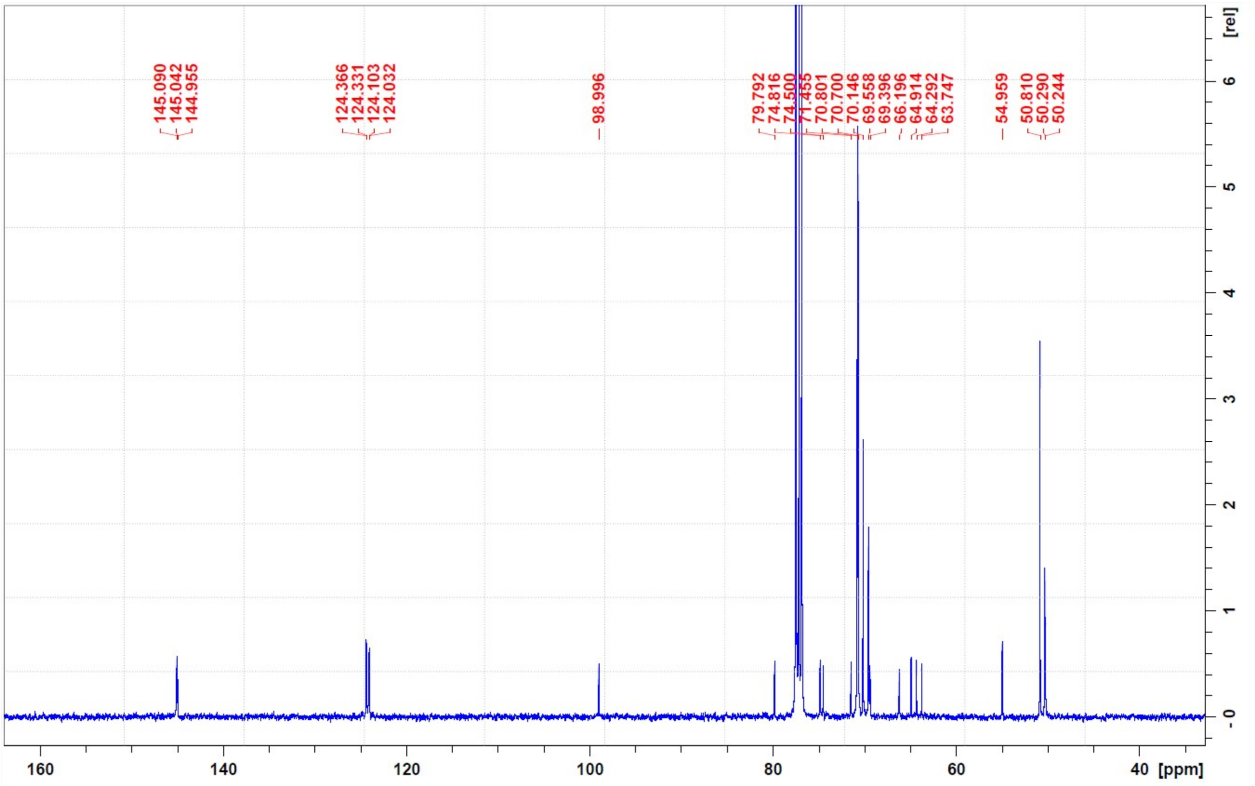

7.796
5.314
5.310
5.303
5.298
5.294
4.968
4.964
4.691
4.660
4.326
4.314
4.295
4.283
4.119
4.093
4.088
3.891
3.639
2.147
2.119
2.031
1.972
OAc
OAc
AcO
AcO
O
O
N=N
N
O
27
N=N
N
O
OAc
OAc
O
OAc
O
OAc
25
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
ppm
1.86
4.47
2.00
2.01
2.13
2.11
4.39
2.28
4.37
4.46
116.22
6.12
6.38
6.26
6.41


170.857
170.160
169.987
169.868
143.408
124.440
96.972
70.592
69.612
69.549
69.212
68.818
66.231
62.526
61.075
50.476
21.023
20.932
20.843
[rel]
1.0
0.8
0.6
0.4
0.2
-0.0
150
100
50
[ppm]

Compound **29**

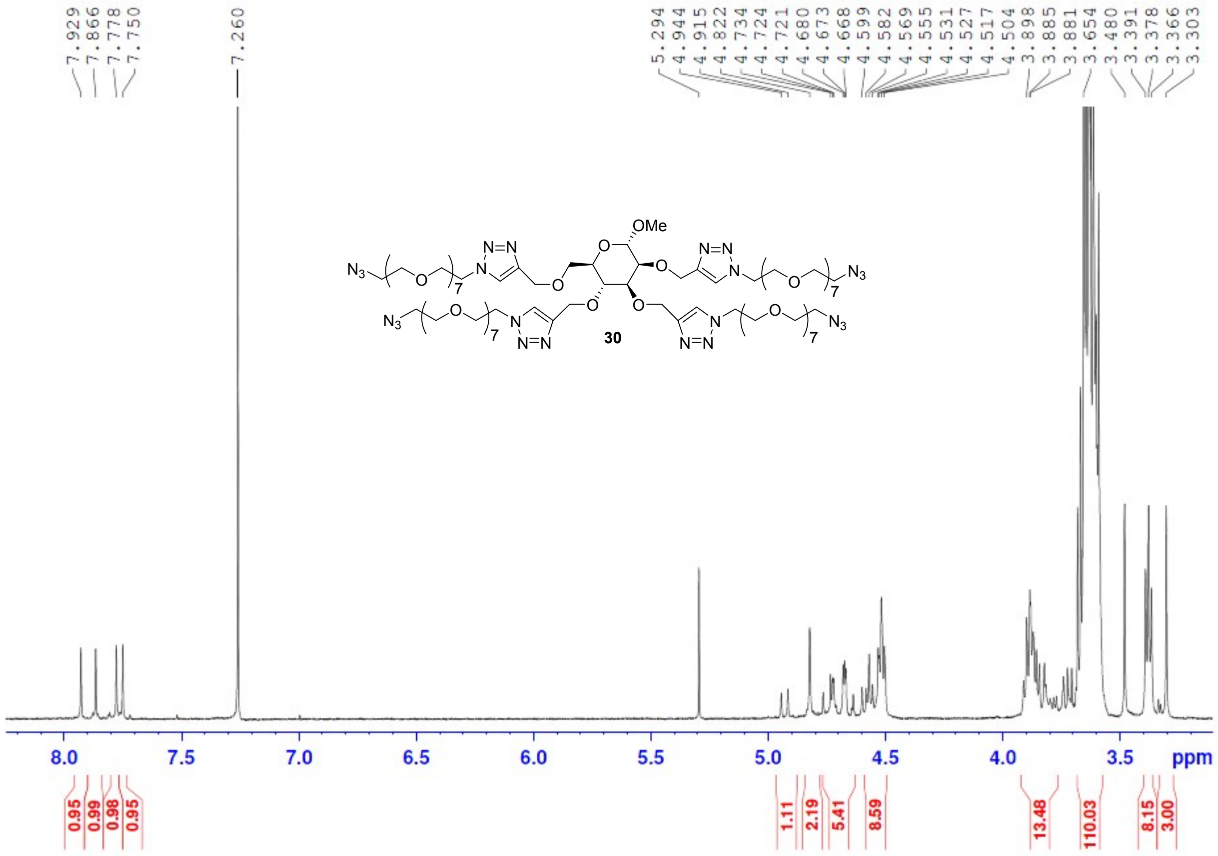


7.927
7.868
7.775
7.752
4.933
4.904
4.814
4.759
4.728
4.717
4.713
4.673
4.669
4.658
4.627
4.595
4.572
4.566
4.559
4.546
4.524
4.517
4.511
4.505
4.498
4.492
3.888
3.875
3.613
3.602
3.591
3.355
OMe
N₃
N=N
O
3
29
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
ppm
0.93
0.95
0.80
1.12
0.99
2.00
0.84
1.49
2.44
0.92
2.46
6.19
12.90
42.03
8.17
2.73

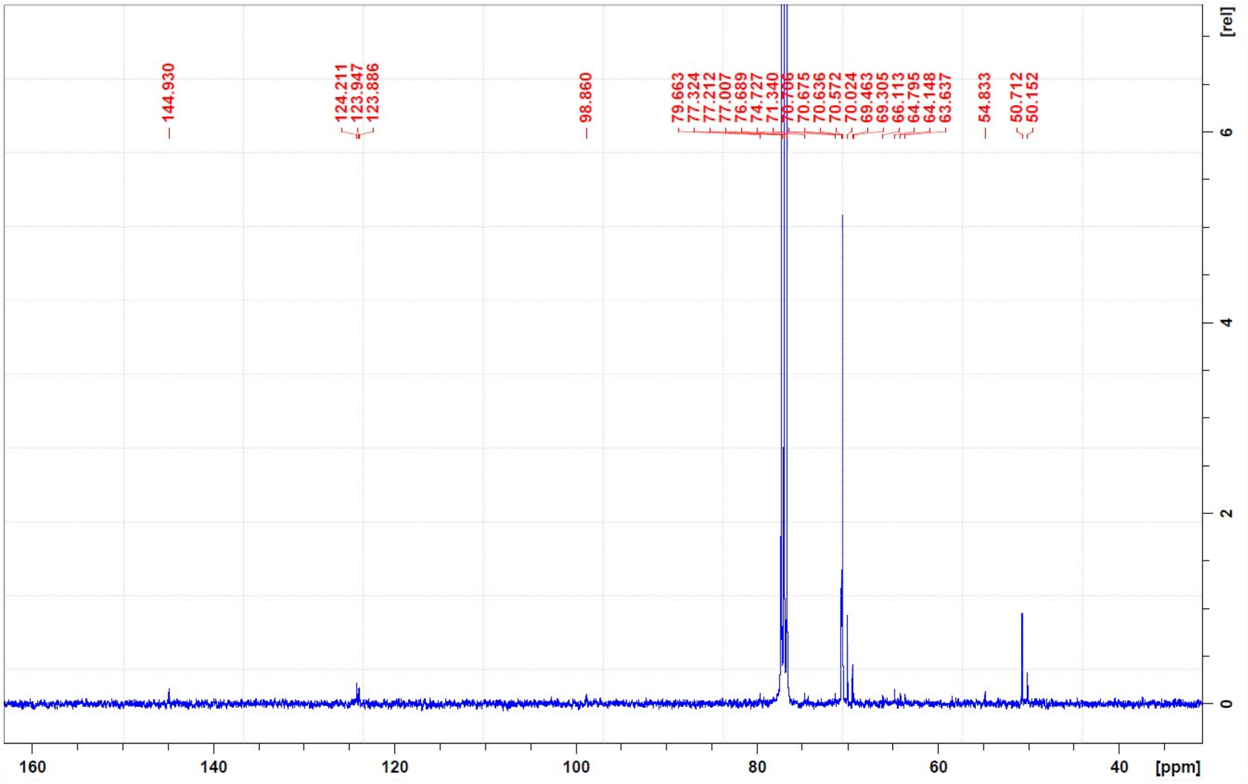


145.090
145.042
144.955
124.366
124.331
124.103
124.032
98.996
79.792
74.816
74.500
71.455
70.801
70.700
70.146
69.558
69.396
66.196
64.914
64.292
63.747
54.959
50.810
50.290
50.244
[rel]
6
5
4
3
2
1
0
160
140
120
100
80
60
40 [ppm]

Compound **30**

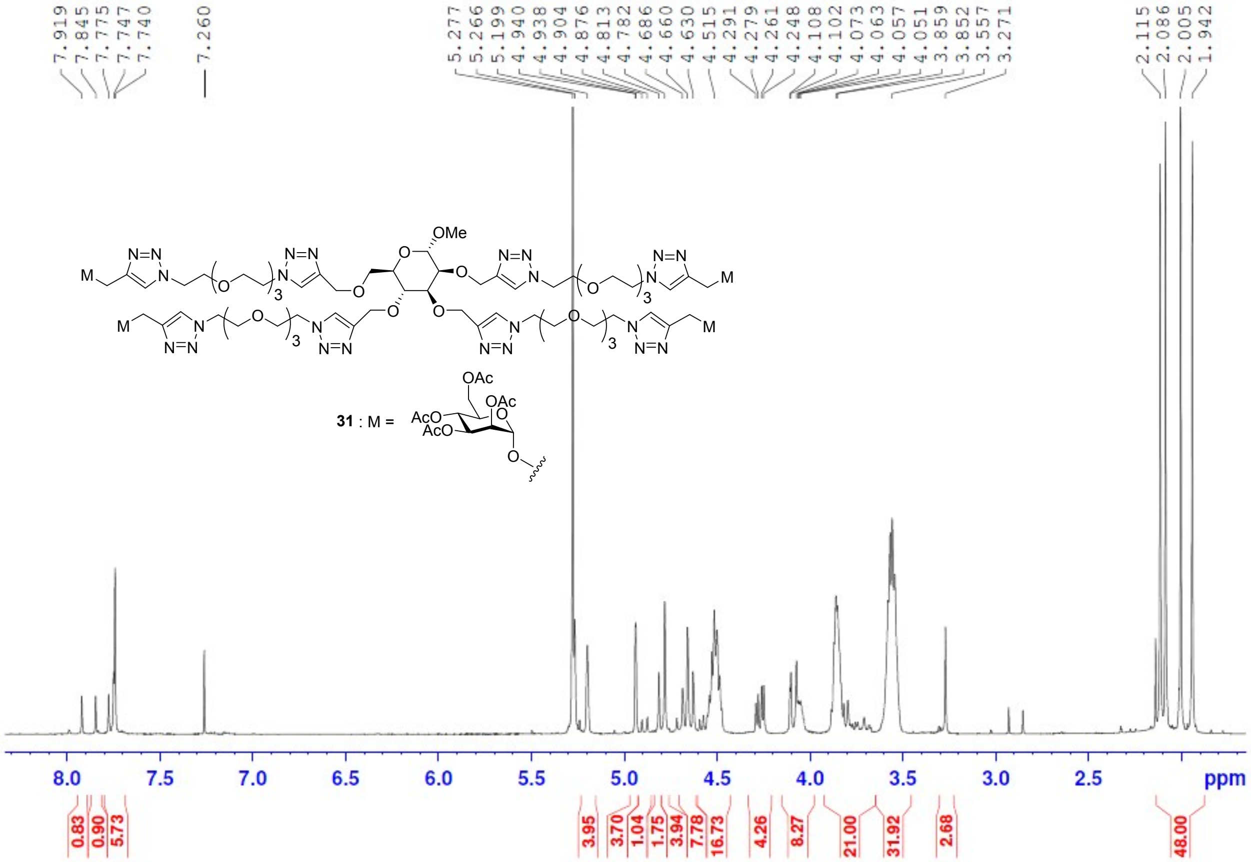


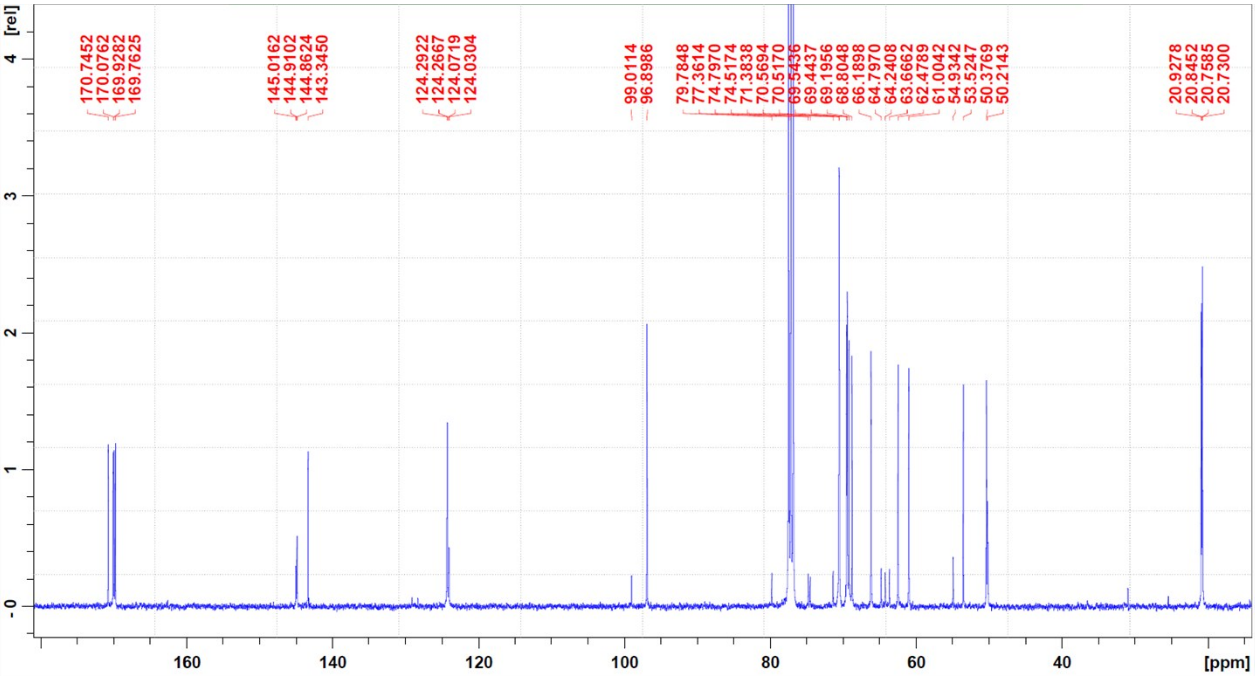
7.929
7.866
7.778
7.750
7.260
5.294
4.944
4.915
4.822
4.734
4.724
4.721
4.680
4.673
4.668
4.599
4.582
4.569
4.555
4.531
4.527
4.517
4.504
3.898
3.885
3.881
3.654
3.480
3.391
3.378
3.366
3.303
OMe
N=N
N
O
N₃
7
30
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
ppm
0.95
0.99
0.98
0.95
1.11
2.19
5.41
8.59
13.48
110.03
8.15
3.00



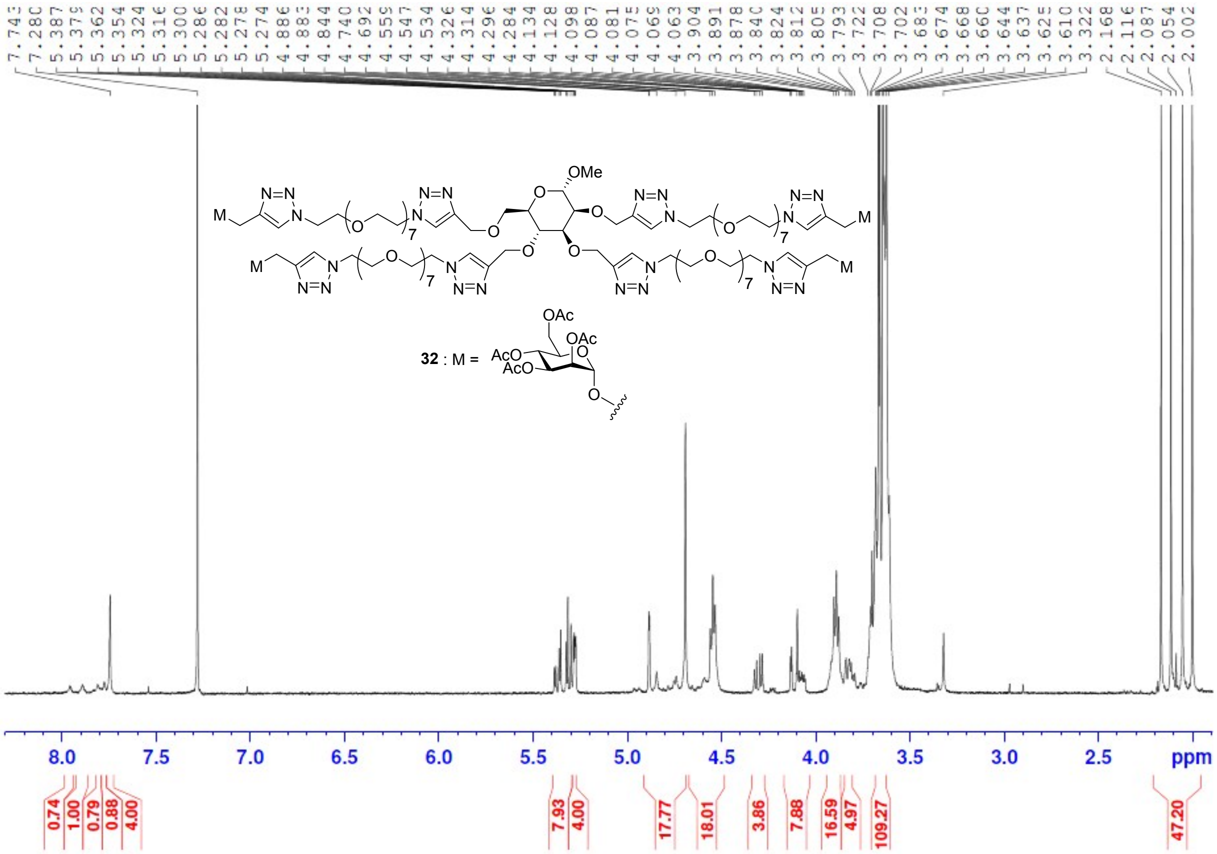
144.930
124.211
123.947
123.886
98.860
79.663
77.324
77.212
77.007
76.689
74.727
71.340
70.706
70.675
70.636
70.572
70.024
69.463
69.305
66.113
64.795
64.148
63.637
54.833
50.712
50.152
[rel]
6
4
2
0
160
140
120
100
80
60
40
[ppm]

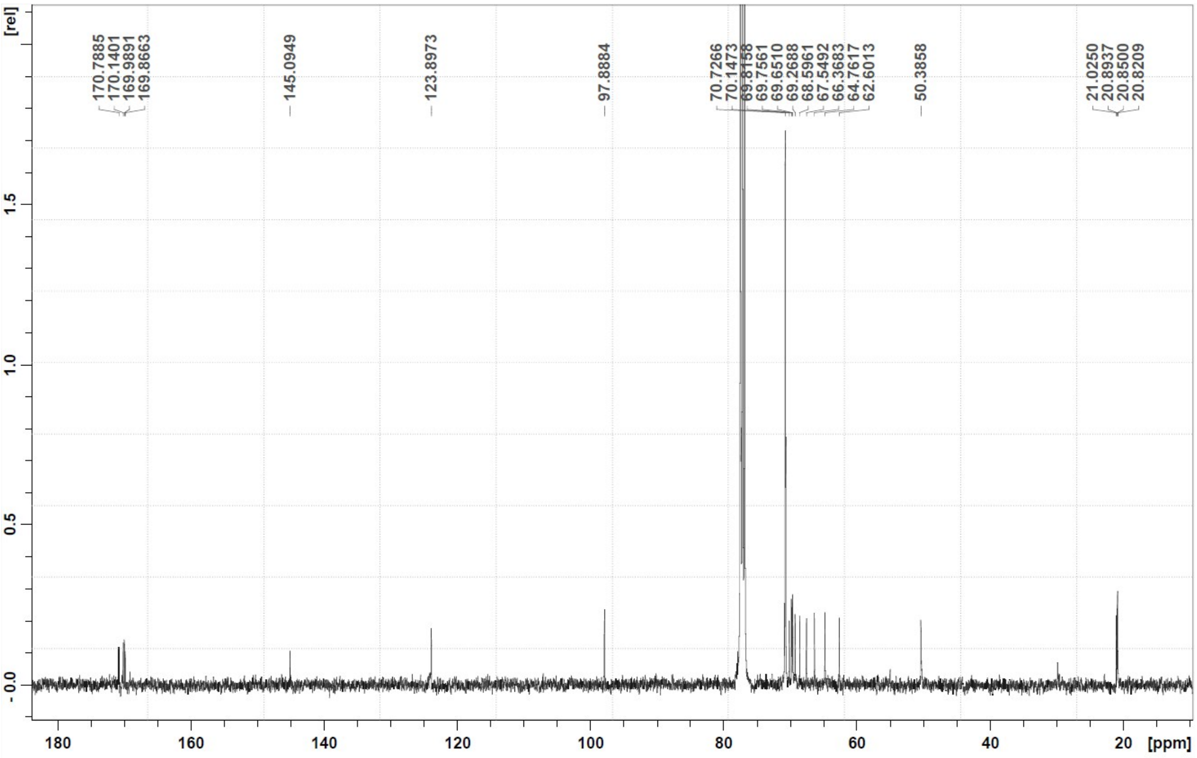
Compound **31**


7.919
7.845
7.775
7.747
7.740
7.260
5.277
5.266
5.199
4.940
4.938
4.904
4.876
4.813
4.782
4.686
4.660
4.630
4.515
4.291
4.279
4.261
4.248
4.108
4.102
4.073
4.063
4.057
4.051
3.859
3.852
3.557
3.271
2.115
2.086
2.005
1.942
OMe
N=N
M
O
3
AcO
OAc
31 : M =
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
ppm
0.83
0.90
5.73
3.95
3.70
1.04
1.75
3.94
7.78
16.73
4.26
8.27
21.00
31.92
2.68
48.00

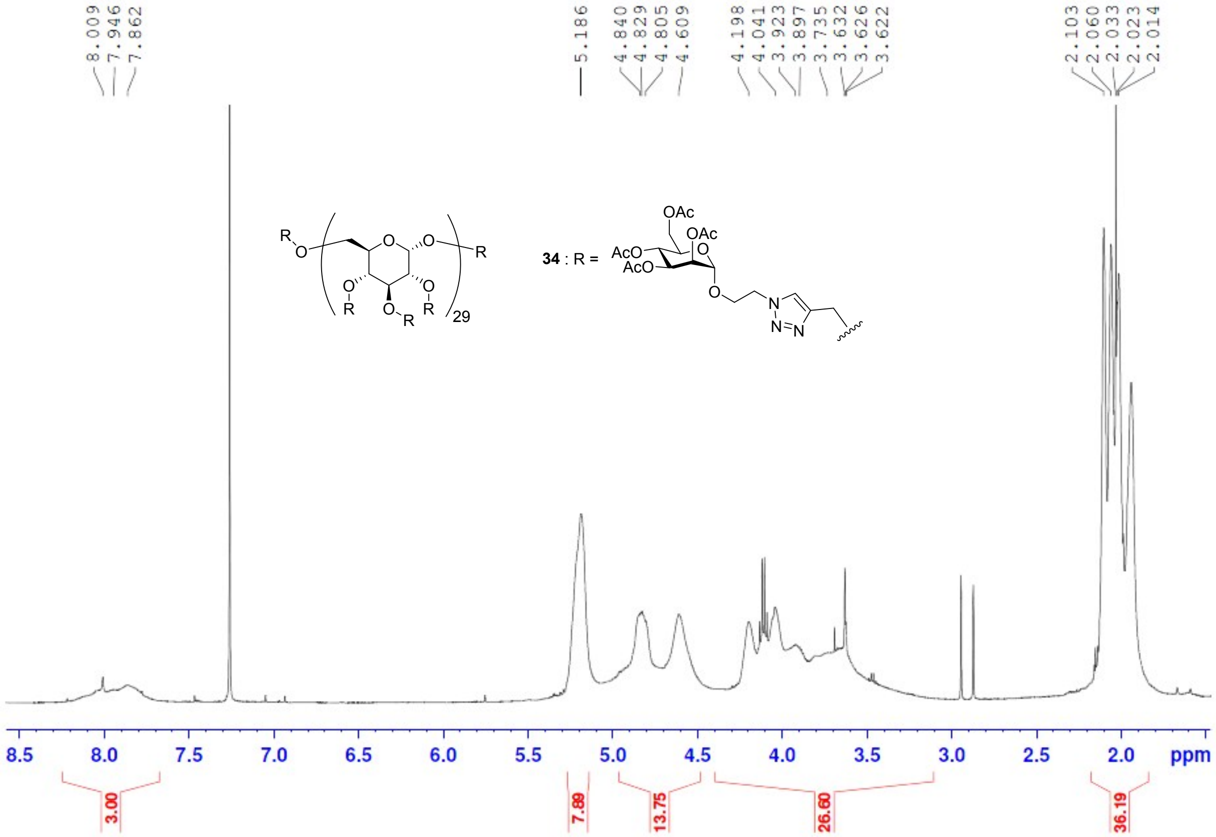

[rel]
4
3
2
1
0
170.7452
170.0762
169.9282
169.7625
145.0162
144.9102
144.8624
143.3450
124.2922
124.2667
124.0719
124.0304
99.0114
96.8986
79.7848
77.3614
74.7970
74.5174
71.3838
70.5694
70.5170
69.5436
69.4437
69.1956
68.8048
66.1898
64.7970
64.2408
63.6662
62.4789
61.0042
54.9342
53.5247
50.3769
50.2143
20.9278
20.8452
20.7585
20.7300
160
140
120
100
80
60
40
[ppm]

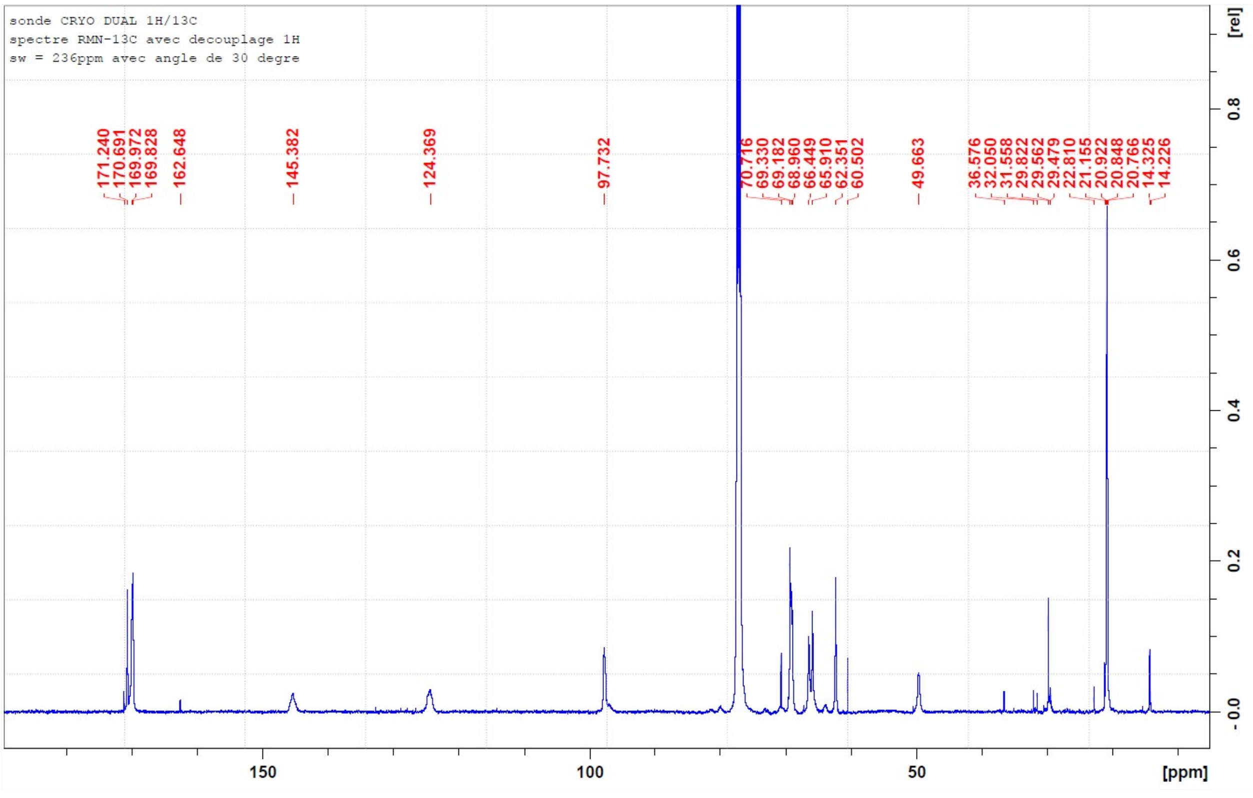
Compound **32**


7.743
7.280
5.387
5.379
5.362
5.354
5.324
5.316
5.300
5.286
5.282
5.278
5.274
4.886
4.883
4.844
4.740
4.692
4.559
4.547
4.534
4.326
4.314
4.296
4.284
4.134
4.128
4.098
4.087
4.081
4.075
4.069
4.063
3.904
3.891
3.878
3.840
3.824
3.812
3.805
3.793
3.722
3.708
3.702
3.683
3.674
3.668
3.660
3.644
3.637
3.625
3.610
3.322
2.168
2.116
2.087
2.054
2.002
OMe
N=N
M
O
7
OAc
AcO
32 : M =
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
ppm
0.74
1.00
0.79
0.88
4.00
7.93
4.00
17.77
18.01
3.86
7.88
16.59
4.97
109.27
47.20

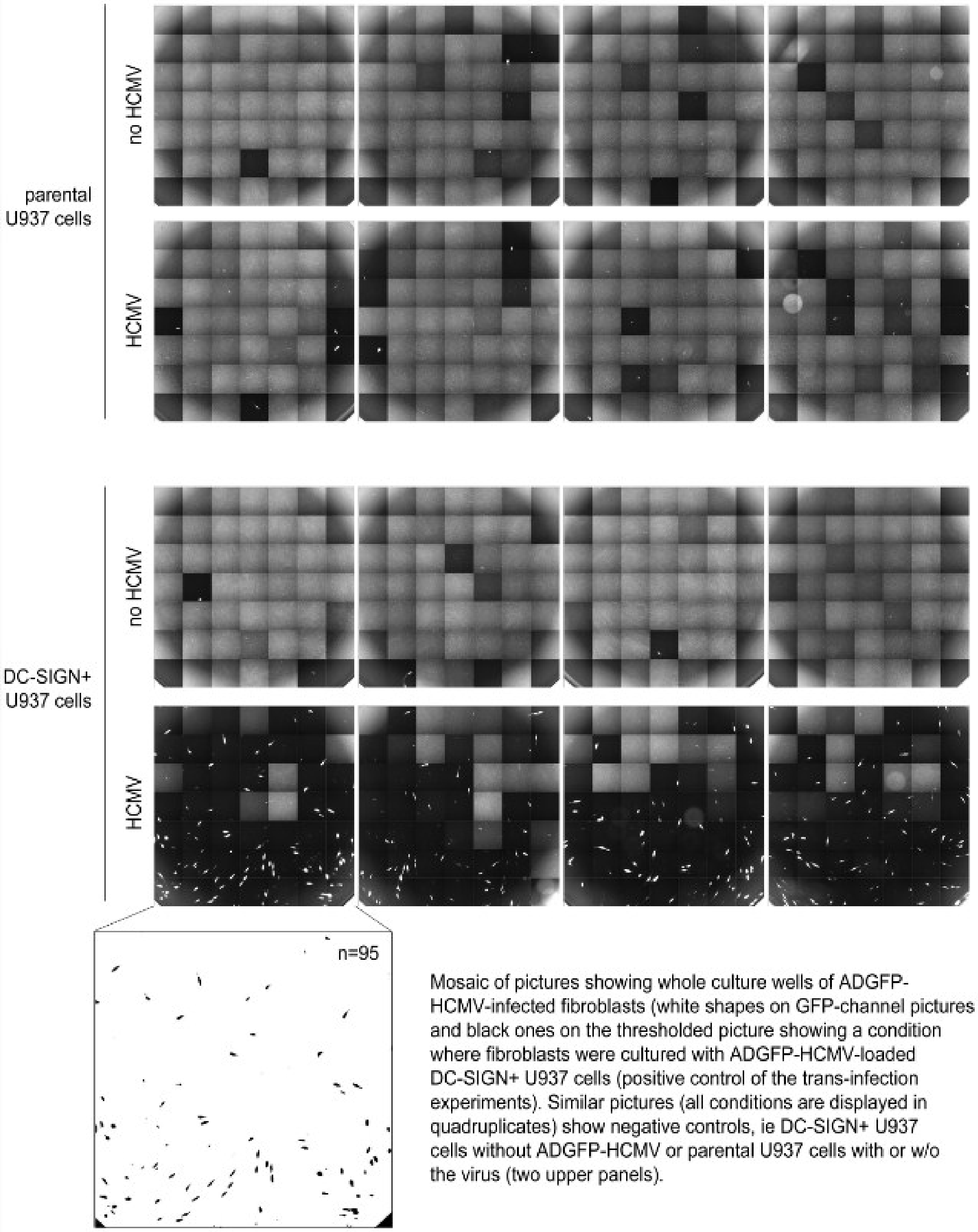

[rel]
170.7885
170.1401
169.9891
169.8663
145.0949
123.8973
97.8884
70.7266
70.1473
69.8158
69.7561
69.6510
69.2688
68.5961
67.5492
66.3683
64.7617
62.6013
50.3858
21.0250
20.8937
20.8500
20.8209
1.5
1.0
0.5
0.0
180
160
140
120
100
80
60
40
20
[ppm]

Compound **34**

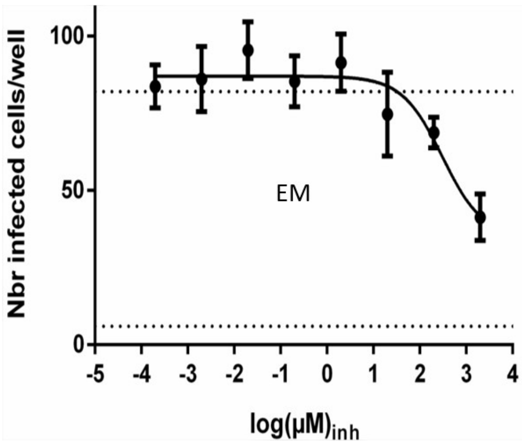

8.009
7.946
7.862
5.186
4.840
4.829
4.805
4.609
4.198
4.041
3.923
3.897
3.735
3.632
3.626
3.622
2.103
2.060
2.033
2.023
2.014
R
O
O
R
O
R
O
R
O
R
29
34 : R =
OAc
OAc
AcO
O
AcO
O
N
N
N
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
ppm
3.00
7.89
13.75
26.60
36.19

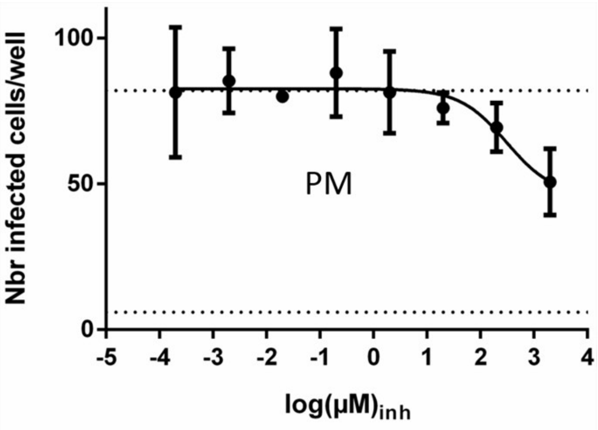

sonde CRYO DUAL 1H/13C
spectre RMN-13C avec decouplage 1H
sw = 236ppm avec angle de 30 degre
171.240
170.691
169.972
169.828
162.648
145.382
124.369
97.732
70.716
69.330
69.182
68.960
66.449
65.910
62.351
60.502
49.663
36.576
32.050
31.558
29.822
29.562
29.479
22.810
21.155
20.922
20.848
20.766
14.325
14.226
[rel]
0.8
0.6
0.4
0.2
-0.0
150
100
50
[ppm]

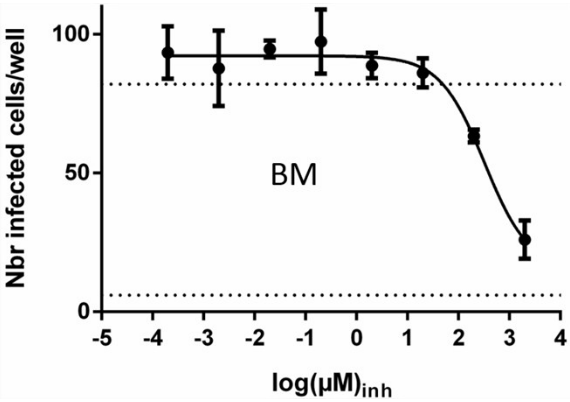
Trans-infection experiments

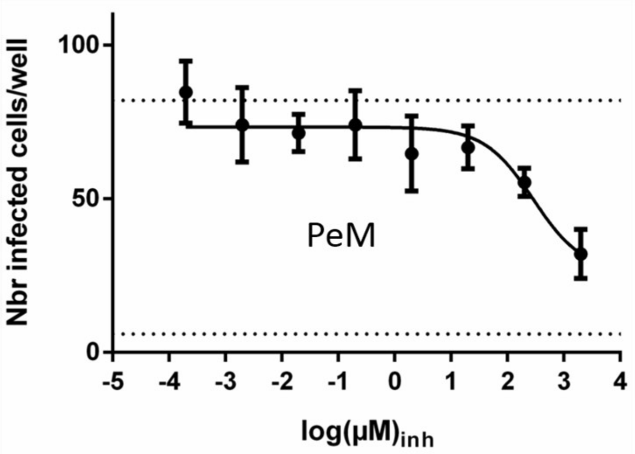


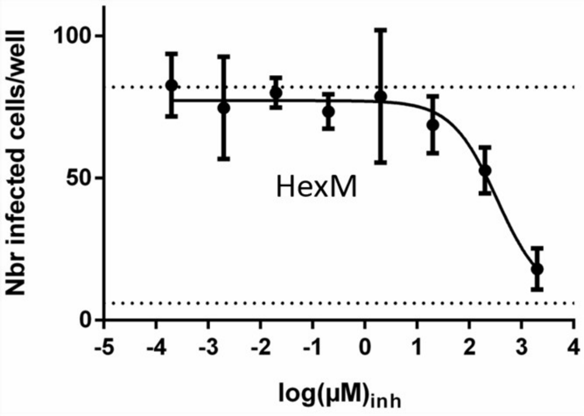
Mosaic of pictures showing whole culture wells of ADGFP-HCMV-infected fibroblasts (white shapes on GFP-channel pictures and black ones on the thresholded picture showing a condition where fibroblasts were cultured with ADGFP-HCMV-loaded DC-SIGN+ U937 cells (positive control of the trans-infection experiments). Similar pictures (all conditions are displayed in quadruplicates) show negative controls, ie DC-SIGN+ U937 cells without ADGFP-HCMV or parental U937 cells with or w/o the virus (two upper panels).

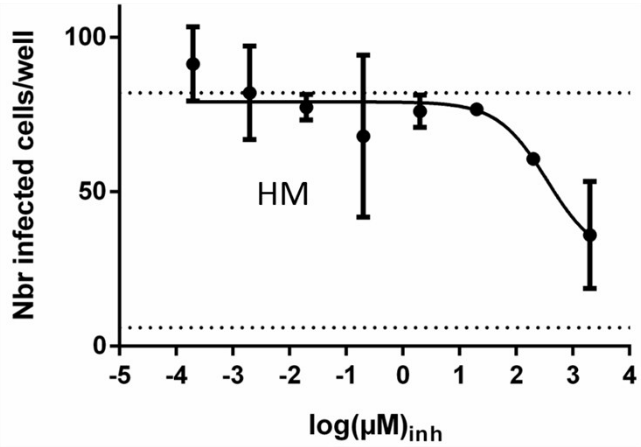

EM
Nbr infected cells/well
100
50
0
-5
-4
-3
-2
-1
0
1
2
3
4
log(µM)$_{inh}$

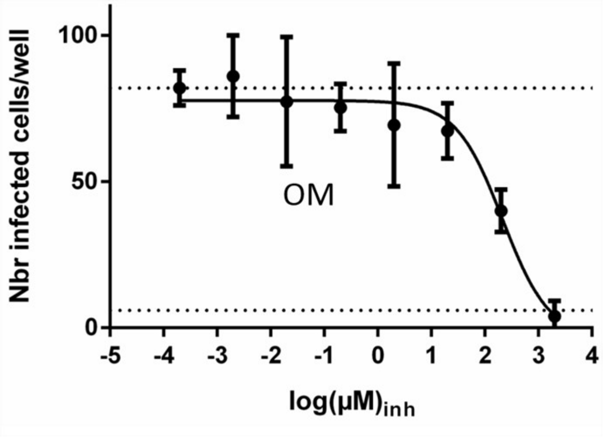

PM
Nbr infected cells/well
100
50
0
-5
-4
-3
-2
-1
0
1
2
3
4
log(µM)$_{inh}$

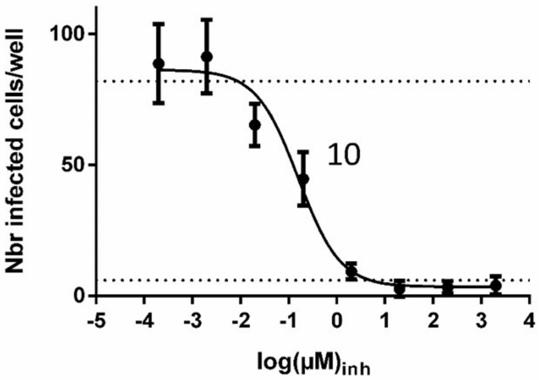

BM
Nbr infected cells/well
100
50
0
-5
-4
-3
-2
-1
0
1
2
3
4
log(µM)$_{inh}$

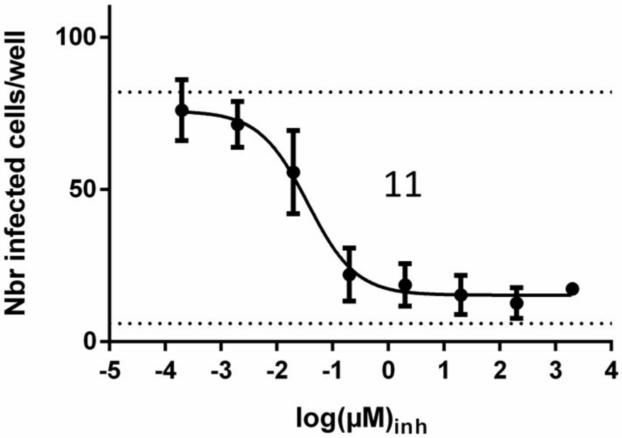

PeM
Nbr infected cells/well
100
50
0
-5
-4
-3
-2
-1
0
1
2
3
4
log(µM)$_{inh}$


HexM
Nbr infected cells/well
100
50
0
-5
-4
-3
-2
-1
0
1
2
3
4
log(µM)$_{inh}$


HM
Nbr infected cells/well
100
50
0
-5
-4
-3
-2
-1
0
1
2
3
4
log(µM)$_{inh}$







Cpds	*Val*	IC_{50}^{Mol} (μM)	IC_{50}^{Lig} (μM)	IC_{50}^{Mon*o} (μM, 95%CI)
MM	1	220	=	= (120-402)
EM	1	307	=	= (33-2900)
PM	1	307	=	= (35-2901)
BM	1	322	=	= (155-669)
PeM	1	289	=	= (65-1269)
HxM	1	337	=	= (97-1166)
HM	1	348	=	= (48-2497)
OM	1	213	=	= (77-594)
2	1	59	=	= (26-130)
10	23	0.021	0.474	0.159 (0.09-0.29)
11	89	0.0012	0.107	0.035 (0.018-0.071)
12	902	0,00002	0.018	0.006 (0.002-0.015)

* IC_{50}^{Mon*} = expressed in mol of monomer; 95% confidence intervals from triplicates