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Supporting Information

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“Dendrimer Folding in Aqueous Media. An Example of Solvent-Mediated Chirality Switching.”

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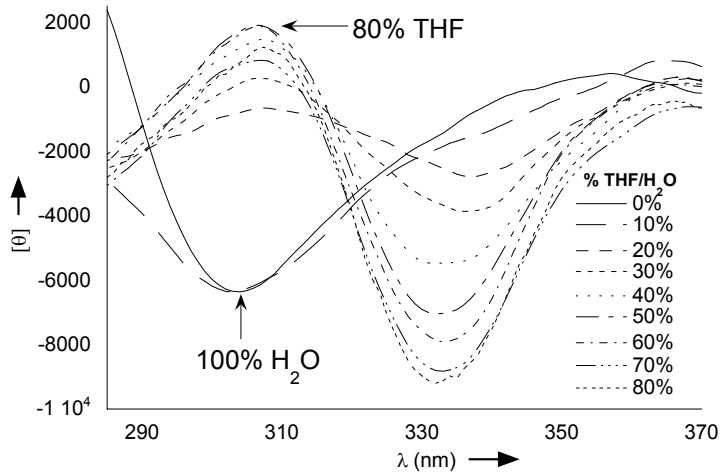


Figure 1. CD spectra of **3** as a function of %THF in water at 25 °C.

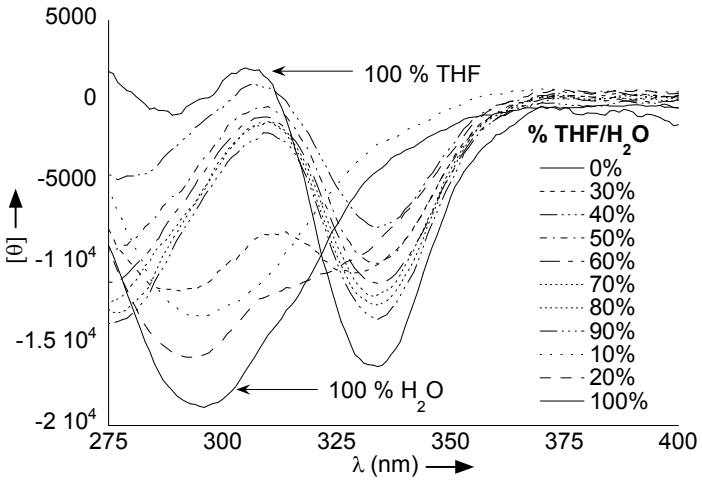


Figure 2. CD spectra of **4** as a function of %THF in water at 25 °C.

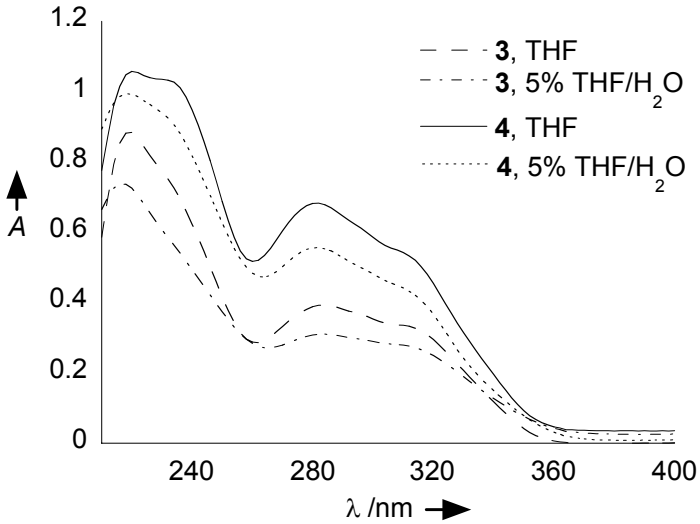


Figure 3. UV spectra of **3**-**4** in 5% THF/H_2O and THF at $5 \cdot 10^{-5}$ M.

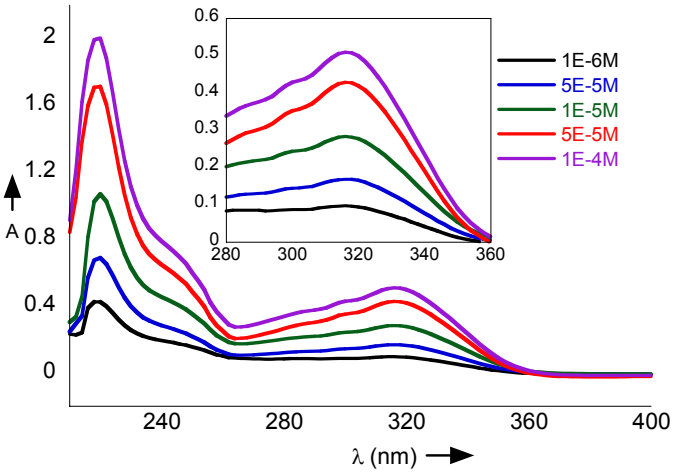


Figure 4. UV spectra of **2** in THF as a function of concentration at 20 °C.

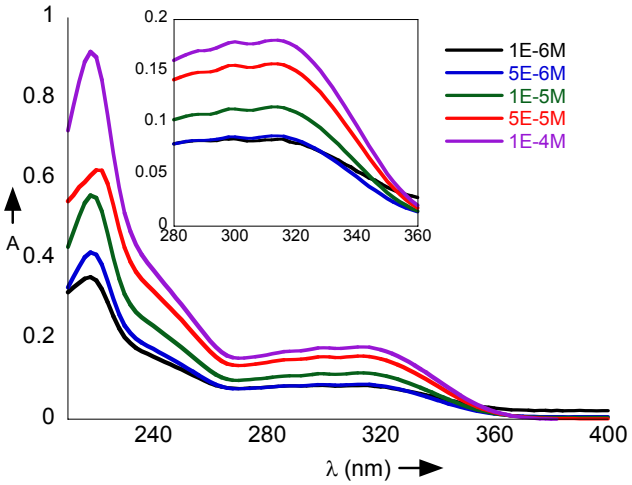


Figure 5. UV spectra of **2** in H_2O as a function of concentration at 20 °C.

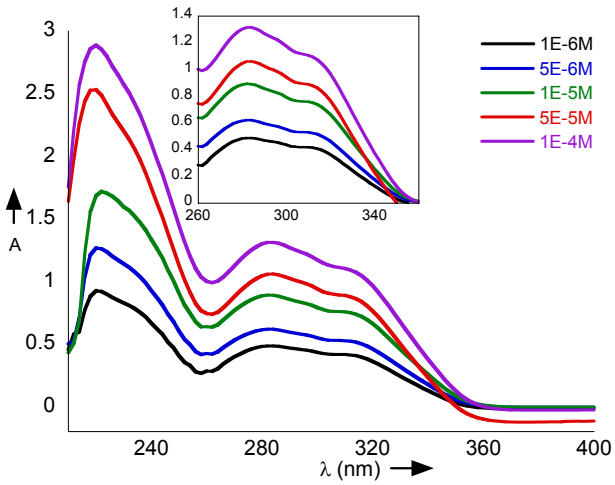


Figure 6. UV spectra of **3** in THF as a function of concentration at 20 °C.

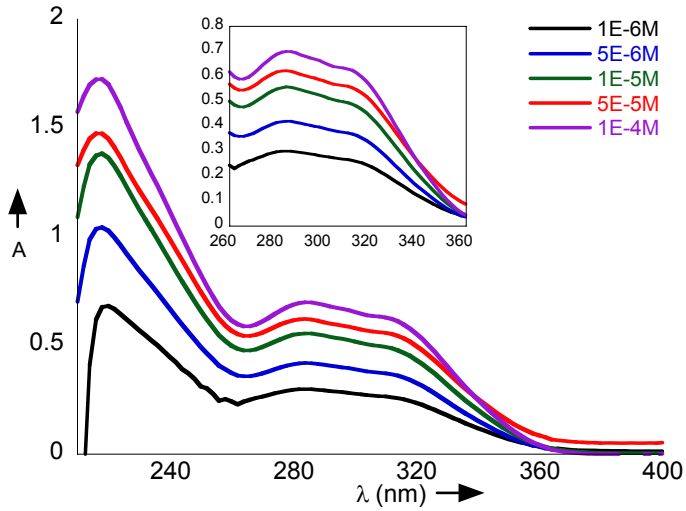


Figure 7. UV spectra of **3** in 5% THF/H_2O as a function of concentration at 20 °C.

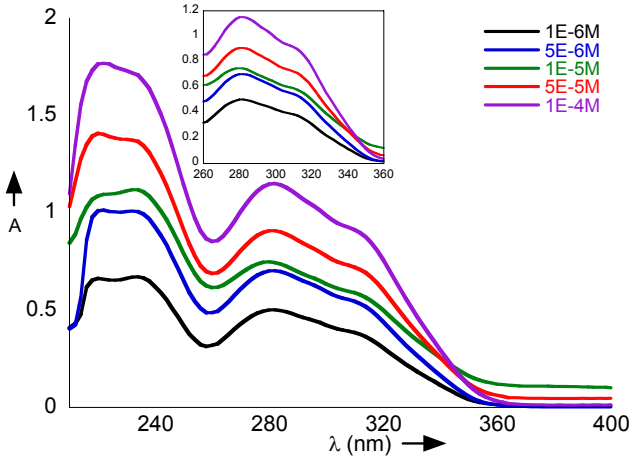


Figure 8. UV spectra of **4** in THF as a function of concentration at 20 °C.

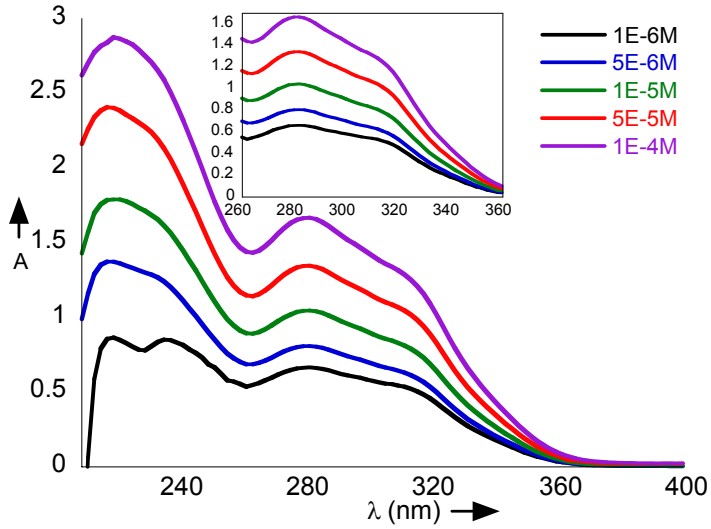


Figure 9. UV spectra of **4** in 5% THF/H_2O as a function of concentration at 20 °C.

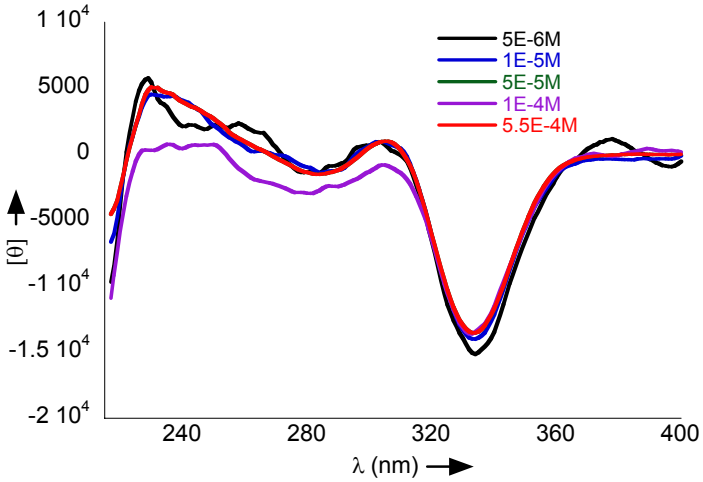


Figure 10. CD spectra of **2** in THF as a function of concentration at 20 °C.

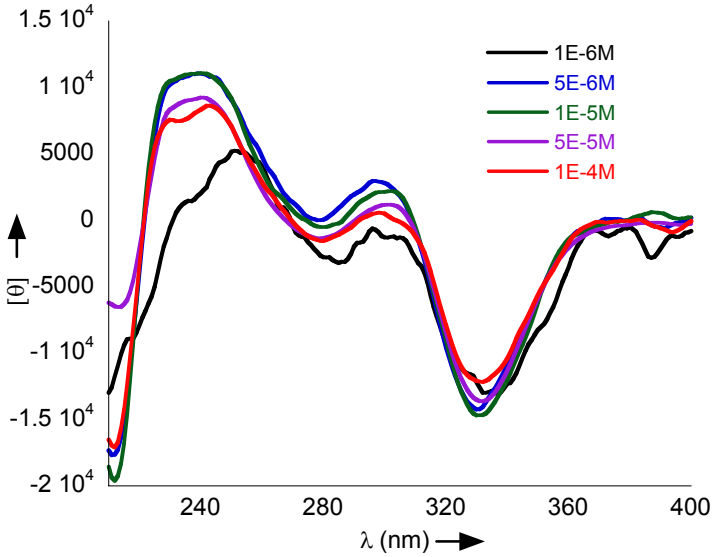


Figure 11. CD spectra of **2** in H_2O as a function of concentration at 20 °C.

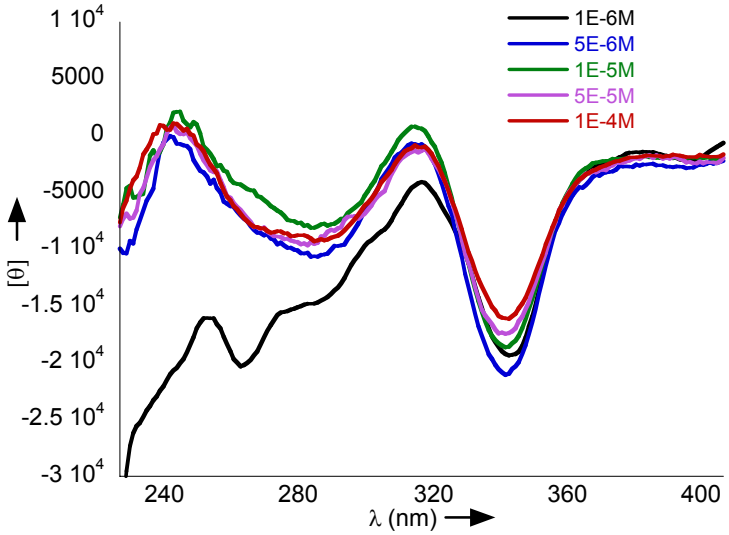


Figure 12. CD spectra of **3** in THF as a function of concentration at 20 °C.

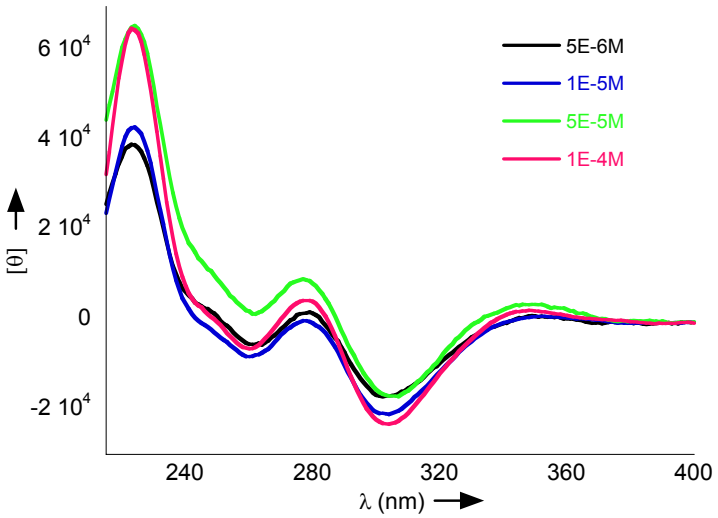


Figure 13. CD spectra of **3** in 5% THF/H_2O as a function of concentration at 35 °C.

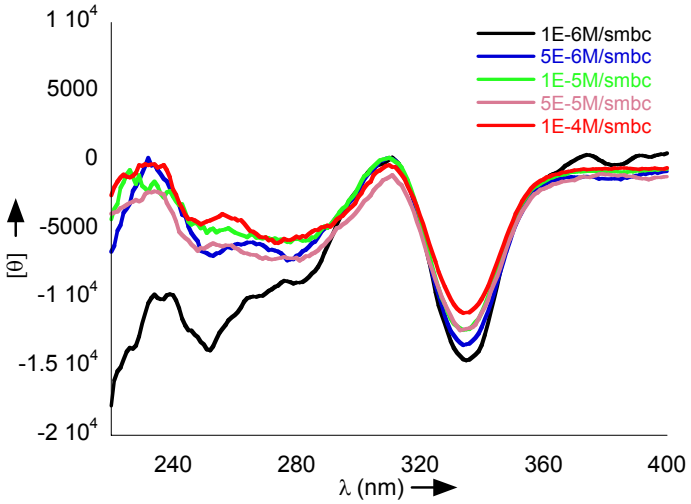


Figure 14. CD spectra of **4** in THF as a function of concentration at 20 °C.

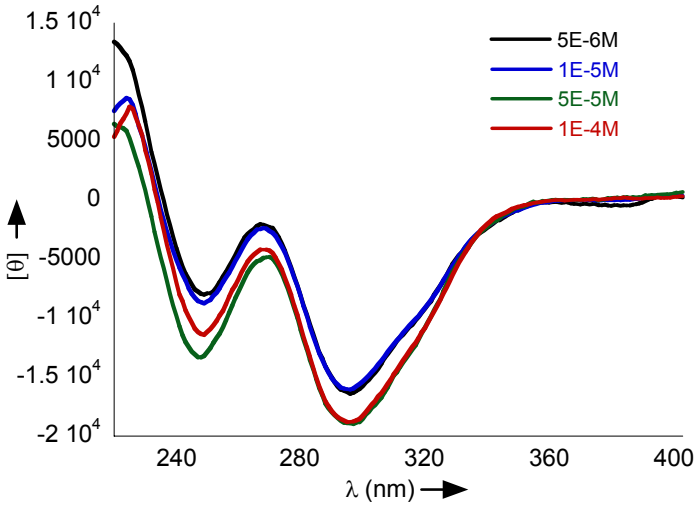
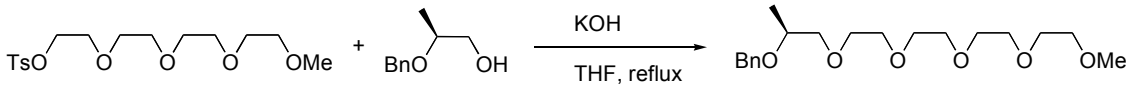


Figure 15. CD spectra of **4** in 1% THF/H_2O as a function of concentration at 20 °C.

General Methods. THF and ether were dried by distillation from sodium benzophenone ketyl just prior to use. CH_2Cl_2 was dried by distillation from CaH_2. TLC analysis was performed using Whatman silica gel 60 F_{254} on aluminum-backed plates. Silica gel used for column chromatography was E. Merck silica gel 60 (230-400 mesh). Circular dichroism (CD) measurements were carried out on an Aviv 202 CD spectrometer, using optical grade solvents and 10 mm quartz glass cuvettes. ^{1}NMR and ^{13}C NMR spectra were recorded on a Bruker DPX-400. IR spectroscopy was performed on a Perkin Elmer 1320 spectrometer and, for aqueous solutions, IR spectra were measured with a horizontal ZnSe crystal using a 45 ° single bounce ATR accessory. MS analysis was performed by electron impact, electrospray or MALDI-TOF mass spectrometry as indicated. MALDI-TOF spectrometry was performed using a BHT matrix in THF by The Ohio State University Campus Chemical Instrumentation Center.

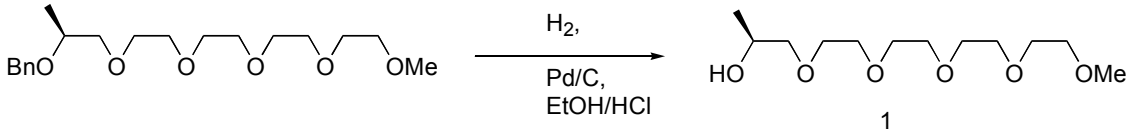
DOSY-NMR Experiments. Diffusion ordered 2D-NMR (DOSY) spectra were obtained for **2**-**4** in THF-d_8 and in mixtures of THF-d_8/D_2O. Diffusion coefficients, ***D***, were calculated from DOSY-NMR spectra recorded on a Bruker DPX-500. Effective hydrodynamic radii were calculated using the Stokes-Einstein equation, $R_H = k_BT/(D6\pi\eta)$, where k_B is the Boltzmann constant, T is the absolute temperature, and η is the viscosity of the solvent. The viscosity of THF-d_8 at 300K was taken to be the same as THF at 300K, 0.452 cP.[1] The viscosity of D_2O at 298K is 1.6740 cP.[2] The viscosities of the 2% THF-d_8/D_2O and 10% THF-d_8/D_2O were determined experimentally to be 1.74 cP and 2.26 cP, respectively. Solutions of THF-d_8/D_2O and the decreased temperature (10 °C) were necessary to ensure complete solubility of the PEG containing compounds.

[1] T. E. Hogen-Esch, J. Smid, *J. Am. Chem. Soc* **1966**, *88*, 318.



(2S)-2-(Benzyloxy)-1-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)propane.

Solid KOH, 85% (2.5 g, 38.4 mmol) was added to a stirred solution of 2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethyl *p*-tosylate[3] (3.5 g, 9.6 mmol) followed by (*S*)-2-*O*-benzyl propan-1,2-diol[4] (1.6 g, 9.6 mmol) in dry THF (20 mL) was added. The mixture was heated to reflux for 18 h. After cooling to room temperature water (20 mL) was added to the mixture and then was extracted with diethyl ether (3 x 20 mL). The organic extracts were combined, dried over Mg_2SO_4, and the solvent was removed *in vacuo* (40 mmHg) to give a light yellow oil. Purification by flash chromatography (SiO_2) with 50% diethyl ether/dichloromethane afforded (2S)-2-(benzyloxy)-1-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)propane (2.4 g, 6.7 mmol, 71%) as a clear oil: ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.20 (d, J = 6.3 Hz, 3H), 3.38 (s, 3H), 3.36 (dd, J = 10.0, 4.6 Hz, 1H), 3.54 – 3.56 (m, 3H), 3.63 – 3.67 (m, 14H), 3.67 – 3.68 (m, 1H), 4.62 (s, 2H), 7.31 – 7.37 (m, 5H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 16.9, 58.6, 70.1, 70.2, 70.3, 70.5, 70.7, 71.6, 73.6, 75.1, 127.1, 127.2, 128.0, 138.7; IR ($CDCl_3$) 3034, 2880, 1454, 1098 cm^{-1}; HRMS for $C_{19}H_{32}O_6Na$ (M + Na) (ES) calcd. 379.2091, obsd. 379.2077.



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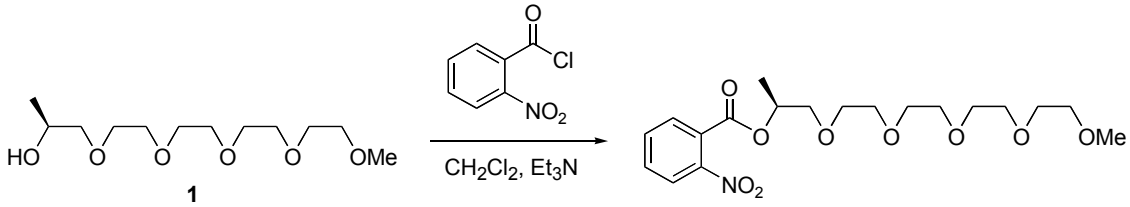
(2S)-1-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)propan-2-ol. (2S)-2-(Benzyloxy)-1-(2-{2-[2-(2-methoxy)ethoxy]ethoxy}ethoxy)propane (2.25 g, 6.3 mmol) was dissolved in dry ethanol (50 mL) and one drop of concentrated HCl (10 μL). Pd/C (10%) (0.3 g) was added to the solution and it was placed under vacuum (40 mmHg) and flushed with $H_{2\ (g)}$ (5x). A hydrogen balloon was placed over the sealed flask for 14 h. The Pd/C was removed by filtration through celite (5 g) with ethyl

[2] A. Kellomäki, *Finn. Chem. Lett.* **1975**, 51.

[3] L. Brunsveld, H. Zhang, M. Glasbeek, J. A. J. M. Vekemans, E. W. Meijer, *J. Am. Chem. Soc.* **2000**, *122*, 6175.

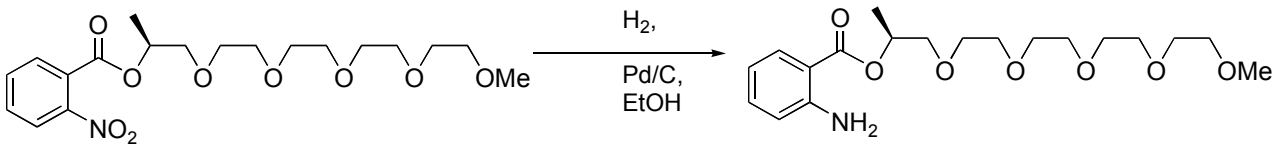
acetate (200 mL). The solvent was removed under reduced pressure (40 mmHg) to yield **1** (1.64 g, 6.2 mmol, 98%) as a pale yellow oil: ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.14 (d, *J* = 6.4 Hz, 3H), 2.50 (bs, 1H, OH), 3.28 (dd, *J* = 9.7, 8.6 Hz, 1H), 3.39 (s, 3H), 3.51 (dd, *J* = 9.9, 2.9 Hz, 1H), 3.54 – 3.57 (m, 2H), 3.61 – 3.77 (m, 14H), 3.98 (dqd, *J* = 14.8, 4.6, 2.9 Hz, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 18.3, 58.9, 61.7, 66.2, 70.2, 70.42, 70.47, 70.48, 70.5, 70.8, 72.4; IR ($CDCl_3$) 3470, 2892, 1453, 1096 cm^{-1}; HRMS for $C_{12}H_{26}O_6Na$ (M + Na) (ES) calcd. 289.1622, obsd. 289.1641.



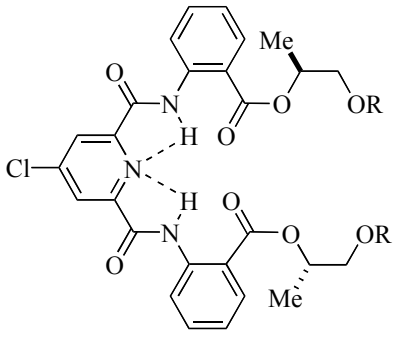
((*1S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl)-2-nitrobenzoate. A stirred suspension of 2-nitrobenzoic acid (1.73 g, 10.3 mmol), dry CH_2Cl_2 (50 mL), and one drop of dry DMF (10 μL) was charged with oxalyl chloride (1.8 mL, 2.6 g, 20.7 mmol) and allowed to react at room temperature for 1 h. The solution was then concentrated under vacuum (0.2mmHg), then taken up in dry CH_2Cl_2 (2 x 15 mL portions) and added to the mixture of **1** (2.5 g, 9.4 mmol), triethylamine (2.1 g, 3 mL, 21.56 mmol), and activated sieves (4 Å) in dry CH_2Cl_2 (25 mL). After 2 h, the mixture was filtered, washed with CH_2Cl_2 (30 mL), and concentrated in vacuo (40 mmHg). The residue was taken up into ethyl acetate (40 mL), filtered to remove salts, and concentrated to an orange oil. Purification by flash chromatography (SiO_2) with 1% methanol/ethyl acetate afforded ((*1S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]-ethoxy}ethoxy)-1-methylethyl)-2-nitrobenzoate (3.4 g, 8.2 mmol, 87%) as a clear oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.37 (d, *J* = 6.5 Hz, 3H), 3.38 (s, 3H), 3.54 – 3.56 (m, 2H), 3.60 (d, *J* = 4.3 Hz, 1H), 3.63 – 3.71 (m, 15H), 5.34 (dqd, *J* = 6.4, 6.4, 4.4 Hz, 1H), 7.62 (td, *J* = 7.7, 1.6 Hz 1H), 7.68 (td, *J* = 7.5, 1.2 Hz, 1H), 7.76 (dd, *J* = 7.5, 1.6 Hz, 1H), 7.92 (dd, *J* = 8.0, 1.2 Hz, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 16.12, 59.02, 70.52, 70.58, 70.60, 70.61, 70.63, 70.80, 71.87, 71.94,

[4] K. Takai, C. H. Heathcock, *J. Org. Chem.* **1985**, *50*, 3247.

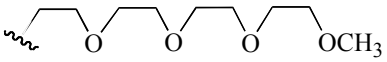
73.18, 123.83, 128.12, 129.93, 131.51, 132.86, 164.92; IR ($CDCl_3$) 2892, 1731, 1537, 1293, 1257, 1098 cm^{-1}; HRMS for $C_{19}H_{29}NO_9Na$ (M + Na) (ES) calcd 438.1734, obsd 438.1722.



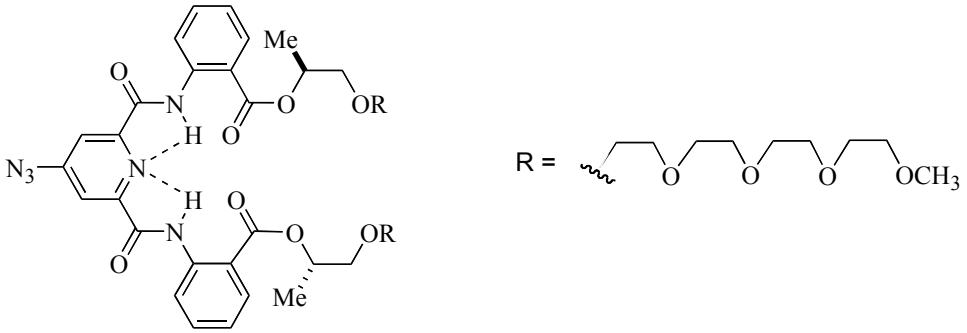
(1*S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl anthranilate. ((1S)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl)-2-nitro benzoate (2.20 g, 5.3 mmol) was taken up into dry ethanol (30 mL) and placed in a Parr hydrogenation bottle. Pd/C (10%) (56 mg, 0.53 mmol) was added to the solution. The bottle was placed under vacuum (10 mmHg) and purged with hydrogen (5x). The bottle was placed under hydrogen (50 psi) on the Parr apparatus for 8 h. The Pd/C was filtered off through celite (10 g) and washed with ethyl acetate (500 mL). The solvent was removed under reduced pressure (40 mmHg). Purification by flash chromatography (SiO_2) with 2% methanol/dichloromethane to yield (1*S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl anthranilate (1.91 g, 5.0 mmol, 96%) as a light yellow oil. ^{1}H NMR (400 MHz, DMSO-d^6) δ 1.24 (d, *J* = 6.4 Hz, 3H), 3.22 (s, 3H), 3.39 – 3.41 (m, 2H), 3.45 – 3.62 (m, 16H), 5.12 (dqd, *J* = 6.4, 6.4, 4.1 Hz, 1H), 6.51 (td, *J* = 7.1, 1.1 Hz, 1H), 6.58 (s, 2H), 6.74 (dd, *J* = 8.4, 0.8 Hz, 1H), 7.23 (td, *J* = 7.0, 1.6 Hz, 1H), 7.67 (dd, *J* = 8.1, 1.6 Hz, 1H); ^{13}C NMR (400 MHz, DMSO-d^6) δ 16.44, 57.90, 68.90, 69.43, 69.57, 69.63, 69.67, 69.97, 71.13, 72.70, 109.01, 114.54, 116.36, 130.52, 133.82, 151.18, 166.77; IR (CH_2Cl_2) 3508, 3380, 2882, 1687, 1616, 1589, 1293, 1247, 1101 cm^{-1}; HRMS for $C_{19}H_{31}NO_7Na$ (M + Na) (ES) calcd 408.1993, obsd 408.1973.



2

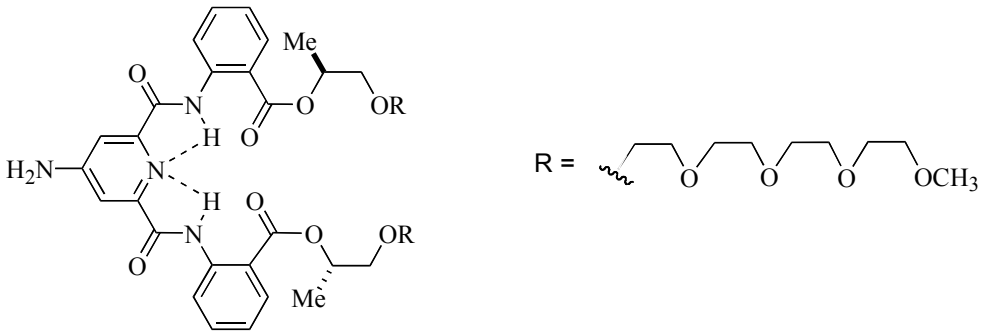
R = 

((1*S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl-$O_2C)_2$G1-Cl (2). A solution of CH_2Cl_2 (50 mL), triethylamine (1.3 mL, 9.2 mmol), and (1*S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl anthranilate (1.80 g, 4.7 mmol) was charged with activated sieves (4 Å). 4-Chloropyridine-2,6-dicarbonyl chloride (0.55 g, 2.3 mmol) was added to the mixture in three portions over 15 min. After 1h, the mol. sieves were removed by filtration with dichloromethane (10 mL), and the solvent was removed under reduced pressure (40 mmHg). The residual salts were removed by filtration and washed with ethyl acetate (50 mL). The solvent was removed under reduced pressure (40 mmHg) to yield an orange oil. Purification by flash chromatography (SiO_2) with 5% methanol/ethyl acetate to yield **2** (2.05 g, 2.2 mmol, 95%) as a clear oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.15 (d, *J* = 6.4, 6H), 3.37 (s, 6H), 3.40 – 3.45 (m, 4H), 3.46 – 3.59 (m, 22H), 3.61 – 3.64 (m, 10H), 4.99 (dqd, *J* = 11.1, 6.4, 1.3 Hz, 2H), 7.21 (td, *J* = 8.1, 1.1 Hz, 2H), 7.64 (td, *J* = 8.6, 1.6 Hz, 2H), 8.08 (dd, *J* = 8.0, 1.5 Hz, 2H), 8.43 (s, 2H), 8.66 (dd, *J* = 8.4, 0.9 Hz, 2H) 12.71 (s, 2H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 16.41, 59.00, 70.46, 70.50, 70.52, 70.56, 70.61, 71.92, 73.22, 118.45, 121.88, 123.78, 125.40, 131.08, 134.14, 139.88, 148.17, 150.73, 161.06, 166.61; IR ($CDCl_3$) 2882, 1683, 1582, 1532, 1453, 1309, 1258, 1086 cm^{-1}; HRMS for $C_{45}H_{62}ClN_3O_{16}Na$ (M + Na) (ES) calcd. 958.3711, obsd. 958.3709.



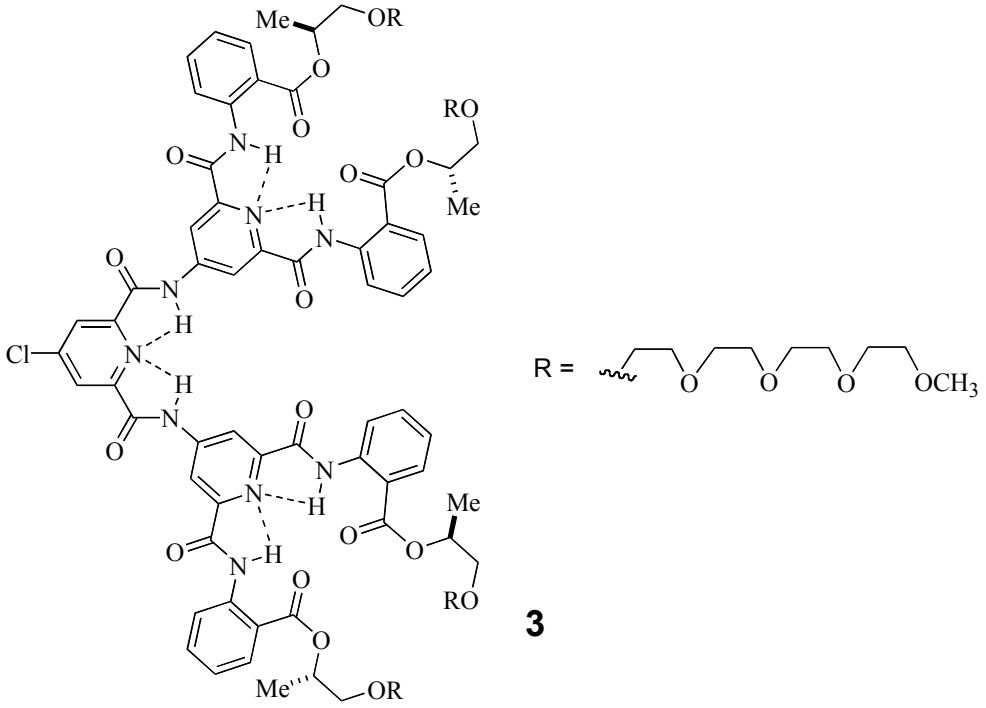
((1*S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl-$O_2C)_2$G1-N_3. Sodium azide (1.3 g, 20.0 mmol) was added to a solution of $(PEGO_2C)_2$G1-Cl (**1**) (1.90 g, 2.0 mmol) in DMF (20 mL). The suspension was heated to 60°C for 24 h. Excess NaN_3 and inorganic salts were removed by filtration and washed with ethyl acetate (100 mL). The ethyl acetate was removed under reduced pressure (40 mmHg). The remaining DMF was removed by Kügelrohr distillation (40°C, 2 mmHg) to

yield $(PEGO_2C)_2G1\text{-}N_3$ (1.80 g, 1.9 mmol, 95%) as a pure yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.14 (d, *J* = 6.4 Hz, 6H), 3.36 (s, 6H), 3.40 – 3.43 (m, 4H), 3.45 – 3.66 (m, 32H), 4.98 (dq, *J* = 12.4, 6.4 Hz 2H), 7.20 (t, *J* = 7.6 Hz, 2H), 7.63 (t, *J* = 8.3 Hz, 2H), 8.02 (s, 2H), 8.07 (dd, *J* = 8.2, 1.3 Hz, 2H), 8.65 (d, *J* = 8.3 Hz, 2H), 12.71 (s, 2H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 16.83, 59.41, 70.87, 70.89, 70.93, 70.96, 70.97, 71.02, 72.32, 73.64, 115.54, 118.90, 122.29, 124.14, 131.51, 134.54, 140.33, 151.68, 153.38, 161.87, 167.02; IR ($CDCl_3$) 2930, 2877, 1674, 1586, 1532, 1453, 1387, 1346, 1259, 1092 cm^{-1}; HRMS for $C_{45}H_{62}N_6O_{16}Na$ (M + Na) (ES) calcd. 965.4115, obsd. 965.4130.



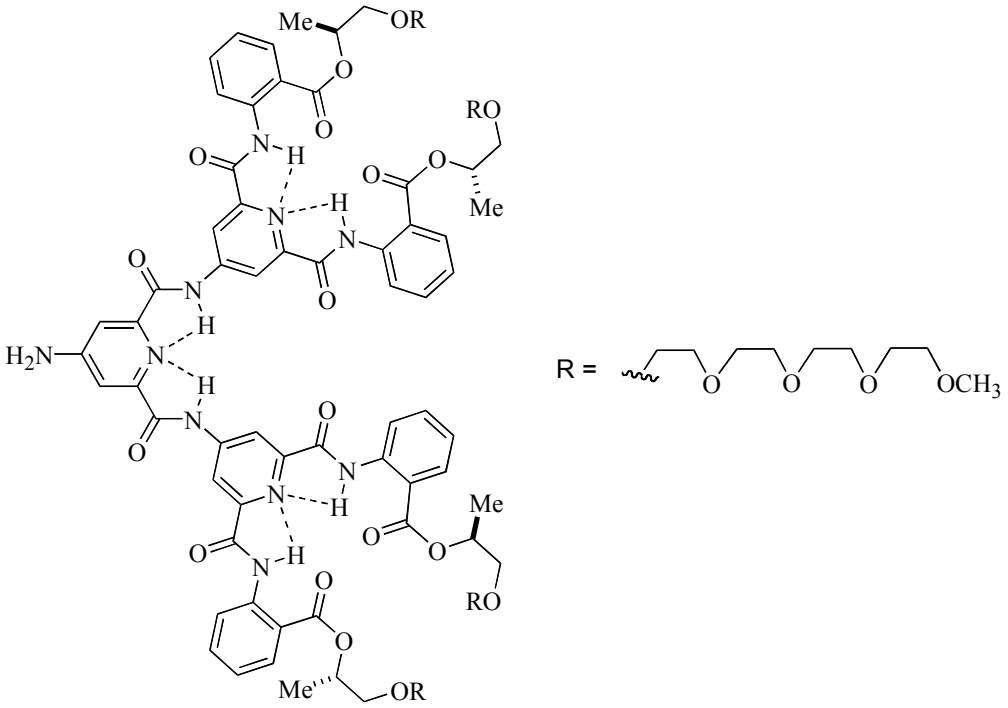
((1S)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl-$O_2C)_2G1\text{-}NH_2$.

$(PEGO_2C)_2G1\text{-}N_3$ (1.80 g, 1.9 mmol) was dissolved in ethyl acetate (50 mL) and added to a Parr hydrogenation bottle. Pd/C (10%) (0.02 g, 0.2 mmol) was added to the solution and the bottle was placed under vacuum (40 mmHg) followed by flushing with hydrogen (5x). The reaction was placed on a Parr apparatus under hydrogen (50 psi) for 12 h. The Pd/C was removed by filtration with celite (10 g) with ethyl acetate (200 mL). The solvent was removed under reduced pressure (40 mmHg). Purification by flash chromatography (SiO_2) with 5% methanol/ CH_2Cl_2 afforded pure $(PEGO_2C)_2G1\text{-}NH_2$ (1.59 g, 1.73 mmol, 94%) as a yellow oil. ^{1}H NMR (400 MHz, DMSO-d^6) δ 1.03 (d, *J* = 6.4 Hz, 6H), 3.19 (s, 6H), 3.31 – 3.46 (m, 36H), 4.86 (dq, *J* = 10.7, 6.3 Hz, 2H), 6.96 (bs, 2H, NH_2), 7.27 (t, *J* = 7.4 Hz, 2H), 7.48 (s, 2H), 7.70 (td, *J* = 7.3, 1.2 Hz, 2H), 7.99 (dd, *J* = 7.9, 1.2 Hz, 2H), 8.51 (d, *J* = 8.1, 2H), 12.39 (s, 2H); ^{13}C NMR (400 MHz, DMSO-d^6) δ 15.87, 57.92, 69.46, 69.61, 69.65, 69.77, 70.19, 71.16, 72.25, 108.66, 118.44, 121.28, 123.62, 130.79, 134.03, 139.20, 148.84, 157.69, 162.20, 166.00; IR (CH_2Cl_2) 3508, 33.80, 2928, 1686, 1587, 1257, 1452, 1259, 1089 cm^{-1}; HRMS for $C_{45}H_{64}N_4O_{16}Na$ (M + Na) (ES): calcd. 939.4210, obsd. 939.4176.



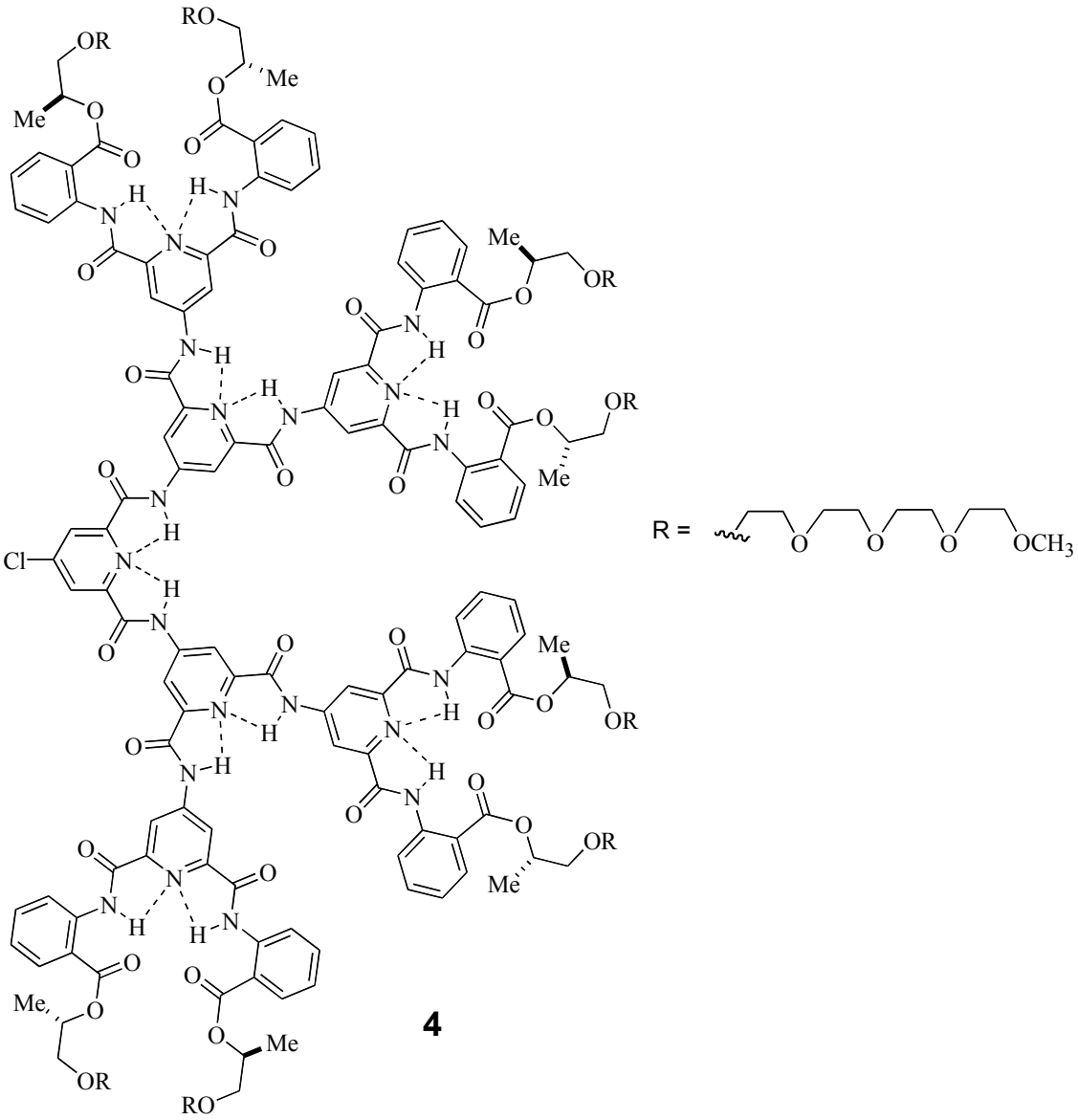
((1*S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl-$O_2C)_4$G2-Cl (3). Activated sieves (4 Å) were added to a solution of CH_2Cl_2 (6 mL), pyridine (2 mL), and $(PEGO_2C)_2$G1-NH_2 (1.4 g, 1.5 mmol). 4-Chloropyridine-2,6-dicarbonylchloride (0.18 g, 0.76 mmol) was added to the mixture in three portions over 45 min. The reaction was allowed to stir at room temperature for 2 h then the sieves were filtered, washed with CH_2Cl_2 (20 mL). The solvent was removed under reduced pressure (40 mmHg) and the residual salts were filtered and washed with CH_2Cl_2 (10 mL) and ethyl acetate (10 mL). The solvent was removed under reduced pressure (40 mmHg) to yield a light yellow oil. Purification of the oil by flash chromatography (SiO_2) with 5% methanol/CH_2Cl_2 afforded $(PEGO_2C)_4$G2-Cl **(3)** (1.4 g, 0.7 mmol, 92%) as a white, waxy oil. ^{1}H NMR (400 MHz, DMSO-d^6) δ 1.07 (d, *J* = 6.3 Hz, 12H), 3.18 (s, 12H), 3.33 – 3.46 (m, 72H), 4.90 (dq, *J* = 10.6, 5.8 Hz, 4H), 7.33 (t, *J* = 7.8 Hz, 4H), 7.76 (t, *J* = 7.8 Hz, 4H), 8.04 (d, *J* = 7.8 Hz, 4H), 8.51 (s, 2H), 8.58 (d, *J* = 8.2 Hz, 4H), 9.07 (s, 4H), 11.77 (bs, 2H), 12.56 (s, 4H); ^{13}C NMR (400 MHz, DMSO-d^6) δ 15.94, 57.96, 69.50, 69.54, 69.66, 69.69, 69.83, 70.42, 71.19, 72.30, 114.97, 118.51, 121.51, 124.09, 126.34, 130.91, 134.30, 139.04, 147.14, 148.88, 149.54, 149.74, 161.32, 161.98, 166.14; IR

(CH_2Cl_2) 3114, 3052, 2982, 2880, 1710, 1674, 1586, 1532, 1430, 1270, 1102 cm^{-1}; HRMS for $C_{97}H_{128}ClN_9O_{34}Na$ (M + Na) (ES) calcd. 2021.8178, obsd. 2021.8033.



((1*S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl-$O_2C)_4$G2-NH_2 (2b). Sodium azide (130 mg, 2.0 mmol) was added to a solution of ($PEGO_2C)_4$G2-Cl **2** (400 mg, 0.2 mmol) and DMF (1 mL). The mixture was heated to 60°C for 12 h. Excess NaN_3 and inorganic salts were filtered and washed with CH_2Cl_2 (10 mL). The solvent was removed under reduced pressure (40 mmHg). The remaining DMF was removed by Kügelrohr distillation (40°C, 2 mmHg) to yield a thick orange liquid. The residue was taken up into ethyl acetate (30 mL) and added to a Parr hydrogenation bottle. Pd/C (10%, 2 mg, 0.02 mmol) was added to the solution and the bottle was placed under vacuum (40 mmHg) followed by flushing with hydrogen (5x). The reaction was placed on a Parr apparatus under hydrogen (50 psi) for 20 h. The Pd/C was filtered over celite (5 g) and washed with ethyl acetate (20 mL). The solvent was removed under reduced pressure (40 mmHg). Purification by flash chromatography (SiO_2) with 5% methanol/ CH_2Cl_2 afforded pure ($PEGO_2C)_4$G2-NH_2 (353 mg, 0.18 mmol, 89%) as a thick yellow oil. ^{1}H NMR (400 MHz, DMSO-d^6) δ 1.07 (d, J = 6.4 Hz, 12H), 3.17 (s, 12H), 3.32 – 3.44 (m, 72H), 4.90 (dq, J = 10.7, 6.1 Hz, 4H), 7.03 (bs, 2H, NH_2), 7.33 (t, J = 7.6

Hz, 4H), 7.64 (s, 2H), 7.77 (t, *J* = 7.5 Hz, 4H), 8.04 (d, *J* = 6.9 Hz, 4H), 8.59 (d, *J* = 8.2 Hz, 4H), 9.10 (s, 4H), 11.64 (s, 2H), 12.58 (s, 4H); ^{13}C NMR (400 MHz, DMSO-d^6) δ 15.94, 57.96, 69.50, 69.53, 69.66, 69.69, 69.82, 70.41, 71.19, 72.31, 114.95, 118.52, 121.51, 124.08, 130.93, 134.33, 139.09, 148.44, 149.24, 149.64, 161.47, 163.92, 166.15; IR (CH_2Cl_2) 3334, 3048, 2979, 2880, 1676, 1584, 1531, 1425, 1253, 1099 cm^{-1}; HRMS for $C_{97}H_{130}N_{10}O_{34}Na$ (M + Na) (ES); calcd. 2002.8677, obsd. 2002.8606.



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((1*S*)-2-(2-{2-[2-(2-methoxyethoxy)ethoxy]ethoxy}ethoxy)-1-methylethyl-O_2C)$_8$G3-Cl (4). (PEGO_2C)$_4$G2-NH_2 (73 mg, 0.037 mmol) was dissolved in CH_2Cl_2 (100 μL) and pyridine (50 μL).

Activated sieves were added to the solution and it was allowed to stir at room temperature for 15 min. 4-Chloropyridine-2,6-dicarbonyl chloride (4.4 mg, 0.019 mmol) was added to the mixture in four portions over 1 h. The reaction was allowed to stir at room temperature for 12 h. The activated sieves were filtered and washed with CH_2Cl_2 (2 mL). The solvent was removed under reduced pressure. Purification by flash chromatography (SiO_2) with 5% methanol/CH_2Cl_2 afforded pure $(PEGO_2C)_8$G3-Cl (**4**) (30 mg, 0.0073 mmol, 39%). ^{1}H NMR (400 MHz, DMSO-d^6, 60°C) δ 1.09 (d, *J* = 6.4 Hz, 24H), 3.11 (s, 24H), 3.38 – 3.48 (m, 136H), 4.91 (dq, *J* = 6.1, 6.1 Hz, 8H), 7.27 (dt, *J* = 11.2, 7.6 Hz, 8H), 7.69 (t, *J* = 8.3 Hz, 8H), 8.04 (s, 2H), 8.03 (d, *J* = 6.6 Hz, 8H), 8.56 (d, *J* = 8.1 Hz, 8H), 9.13 (s, 8H), 9.18 (s, 4H), 11.71 (bs, 2H), 11.76 (bs, 4H), 12.50 (s, 8H); ^{13}C NMR (500 MHz, DMSO-d^6, 60°C) δ 16.88, 58.84, 61.24, 68.69, 69.10, 70.48, 70.54, 70.69, 70.92, 71.43, 72.19, 73.34, 116.10, 117.40, 119.76, 122.61, 124.76, 130.05, 131.68, 140.02, 147.67, 149.24, 149.88, 150.22, 150.67, 162.30, 162.60, 163.46, 163.78, 167.02; MS for $C_{201}H_{260}ClN_{21}O_{70}Na$ (M + Na) (MALDI-TOF) calcd. 4145.70, obsd. 4145.58. Purity was further verified by GPC (THF) analysis.