Supporting Information

Robust Carboxylated Polymer Pores from a Cyclic Peptide Template

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General Methods

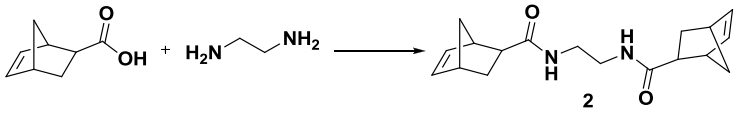
All reagents for synthesis were purchased from commercial suppliers and used without further purification unless stated otherwise. All air-sensitive reactions were performed using oven-dried glassware under an inert atmosphere of nitrogen. Syringe or cannula was used to transfer air-sensitive solvents and solutions. Tetrahydrofuran (THF) was distilled from sodium benzophenone ketyl; methanol was distilled from magnesium methoxide; *N*,*N*-diisopropylethylamine (DIEA), dichloromethane (CH_2Cl_2), chloroform (CH_2Cl_2) were distilled from calcium hydride and *N*,*N*-dimethylformamide (DMF) was dried over 4 Å molecular sieves. All dry solvents were stored over 4 Å molecular sieves prior to use. All peptides were synthesized in solution using *O*-(6-Chlorobenzotriazol-1-yl)-*N,N,N',N"*-teramethyluronium hexafluorophosphate (HCTU) as a coupling reagent. Polymerization reactions were performed by using Grubbs' second generation initiator.

Analytical thin layer chromatography (TLC) was performed on MERCK precoated silica gel 60 F_{254}TLC plates. Eluting solvents are reported as volume percents. Compounds were visualized using UV light, ninhydrin and/or $KMnO_4$ stains. Flash column chromatography was performed using silica gel (200- 400 mesh) from Acme chemicals. All 1D and 2D NMR spectra were recorded on Bruker 400 or Bruker 500 spectrometers using $CDCl_3$ or DMSO-d_6 as solvent. The NMR spectra were referenced using residual solvent peaks as the standard. Chemical shifts are denoted in parts per million (δ), coupling constants (*J*) are reported in Hertz (Hz), and spin multiplicities are reported as singlet (s), broad singlet (bs), doublet (d), triplet (t), quartet (q), quintet (quint), apparent triplet (app. t), doublet of doublet (dd), doublet of triplet (dt) or multiplet (m). Mass spectra were recorded on the Bruker Ultraflex extreme or the MICRO-Q-TOF mass spectrometer using the MALDI or ESI technique, respectively. FT-IR spectra were recorded on a JASCO FT/IR-4100 spectrometer. IR spectra were recorded in the form of a KBr pellet for solid samples and as a thin film in $CHCl_3$ for liquid samples. IR peaks are reported in wavenumbers (cm^{-1}) as strong (s), medium (m), weak (w), and broad (br).

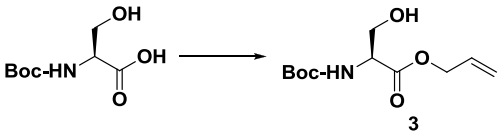
Dynamic light scattering data was recorded at 25 °C on a Horiba Zetasizer ZS instrument using 3 mL quartz cells. TEM images were obtained at a voltage of 120 kV on a CM 12 PHILIPS Scanning Transmission Electron Microscope. Carbon coated holey copper grids from Forevision Instruments were used as supports for the TEM studies. AFM images were obtained using a Park-System XE-100 AFM instrument in non-contact mode. AFM silicon tips were purchased from Applied Nanostructures Inc. SEM images were obtained using

quanta 400. Silicon substrates were used for AFM & SEM analysis. Fluorescence images were recorded by using Olympus 1X51 fluorescence microscope over glass substrate or using Leica DMI 3000 B inverted fluorescence microscope. Thermogravimetric analysis (TGA) was done by using *Q500* Hi-Res TGA from TA Instruments.

Synthesis and analytical data of compounds

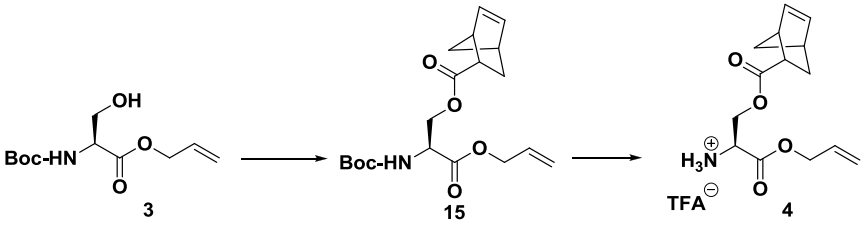


Cross-Linker (2):[1] To a solution of ethylene diamine (0.26 mL, 3.88 mmol, 1 equiv) and norbornene-*exo*-acid[2, 3] (1.18 g, 8.55 mmol, 2.2 equiv) in CH_2Cl_2 (16 mL) was added EDC.HCl (1.64 g, 8.55 mmol, 2.2 equiv) and DMAP (0.24 g, 1.94 mmol, 0.5 equiv). The reaction mixture was allowed to stir at RT for 10h, following which CH_2Cl_2 was removed in vacuo. Ethyl acetate (200 mL) was added to the residue and the solution was washed with 0.1 N aqueous HCl (3 × 50 mL), 5% aqueous $NaHCO_3$ (4 × 50 mL) and saturated aqueous NaCl (2 × 40 mL). The organic layer was dried over anhydrous sodium sulphate, filtered and concentrated in vacuo. The residue was purified by flash column chromatography (2.5% methanol/CH_2Cl_2) to afford 1.16 g of compound **2** (99%) as a white fluffy solid. TLC R_f = 0.21 (2% methanol/dichloromethane). **^{1}H NMR** (400 MHz, $CDCl_3$, 25 °C): δ = 6.44 (bs, 2H; 2 N*H*), 6.14-6.06 (4H; 2 C*H*=C*H*), 3.40 (t, *J* = 2.4 Hz, 4H; 2 *C*H_2), 2.94-2.86 (4H; 4 C*H*), 2.04-1.97 (m, 2H; 2 C*H*), 1.91-1.82 (m, 2H; C*H*$_2$), 1.65 (d, *J* = 8.0 Hz, 2H; C*H*$_2$), 1.36-1.24 (4H; 2 C*H*$_2$); **^{13}C NMR** (100 MHz $CDCl_3$, 25 °C): δ = 177.2, 138.3, 136.1, 47.3, 46.4, 44.7, 41.7, 40.3, 30.6; **IR** (KBr pellet): ν = 3317 (m), 2982 (m), 1658 (s), 1429 (m), 1266 (s), 898 (m), 744 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_8H_{25}N_2O_2$ (MH^+) 301.1916, found 301.1910.



Boc-L-Ser-OAllyl (3):[4] To a solution of Boc-L-ser-OH (1.24 g, 6.05 mmol, 1 equiv) in 1:1 allylbromide/acetonitrile (10 mL) was added DIEA (2.07 mL, 12.1 mmol, 2 equiv). The reaction mixture was allowed to stir at 75 °C for 2h, following which acetonitrile was

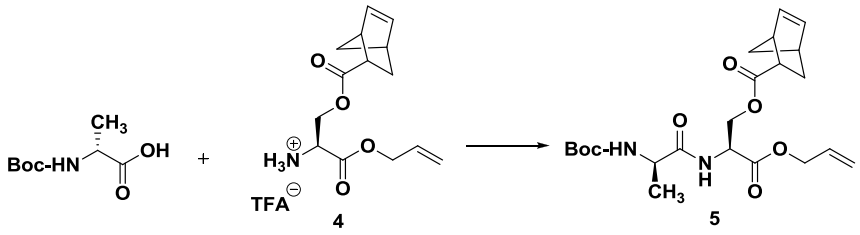
removed in vacuo. The reaction mixture was diluted with ethyl acetate (150 mL), washed with 0.1N aqueous HCl (3 × 50 mL), 5% aqueous $NaHCO_3$ (3 × 50 mL) and saturated aqueous NaCl (2 × 30 mL). The organic layer was dried over anhydrous sodium sulphate, filtered and concentrated in vacuo. Purification by flash column chromatography (20% ethyl acetate/hexane) afforded 1.36 g of compound **3** (92%) as a pale yellow liquid. TLC R_f = 0.43 (25% ethyl acetate/hexane). **^{1}H NMR** (400 MHz, $CDCl_3$, 25°C): δ = 5.95-5.85 (m, 1H; CH_{allyl}), 5.49 (bs, 1H; N*H*), 5.34 (d, *J* = 17.2 Hz, 1H; HCH_{allyl}), 5.25 (d, *J* = 10.4 Hz, 1H; HCH_{allyl}), 4.66 (d, J = 5.6 Hz, 2H; C$H_{2(allyl)}$), 4.39 (bs, 1H, CH_{ser}), 4.0-3.88 (m, 2H, C$H_{2(ser)}$), 2.42 (bs, 1H, OH_{ser}), 1.4 (s, 9H, 3 C$H_{3(Boc)}$) **^{13}C NMR** (100 MHz, $CDCl_3$, 25°C): δ =170.7, 155.9, 131.6, 118.9, 80.4, 66.3, 63.6, 55.9, 28.4; **IR** ($CHCl_3$): ν = 3457 (m), 1736 (s), 1377 (m), 1248 (s), 1050 (s), 922 (m), 735 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{11}H_{19}NO_5Na$ (MNa^+) 268.1161, found 268.1150.



TFA- L-ser-(O-NB)-O-Allyl (4): To a solution of Boc- L-ser-O-allyl **3** (0.93 g, 3.80 mmol, 1 equiv) and norbornene-*exo*-acid (0.5 g, 3.8 mmol, 1 equiv) in CH_2Cl_2 (10 mL) was added EDC.HCl (1.094g, 5.7 mmol, 1.5 equiv) and DMAP (0.139 g, 1.14 mmol, 0.3equiv).The reaction mixture was allowed to stir at RT for 4h, following which CH_2Cl_2 was removed in vacuo. The residue was diluted with ethyl acetate (150 mL) and sequentially washed with 0.1N aqueous HCl (3 × 50 mL), 5% aqueous $NaHCO_3$ (3 × 50 mL) and saturated aqueous NaCl (2 × 30mL). The organic layer was dried over anhydrous sodium sulphate, filtered and concentrated in vacuo. The residue was purified by flash column chromatography (12% ethyl acetate/Hexane) to afford 1.219 g of norbornene coupled product **15** (88%) as a pale yellow liquid. TLC R_f = 0.31 (12% ethyl acetate/hexane). **^{1}H NMR** (400 MHz, $CDCl_3$, 25°C): δ = 6.15-6.06 (2H; C*H*=CH_{nb}), 5.95-5.84 (m, 1H; CH_{allyl}), 5.36-5.22 (3H; C$H_{2(allyl)}$ & N*H*), 4.7-4.57 (3H; C$H_{2(allyl)}$ & CH_{ser}), 4.56-4.46 (m, 1H; C*H*H$_{ser}$), 4.37-4.28 (m, 1H; C*H*H$_{ser}$), 3.04-2.95 (1H; CH_{nb}), 2.91 (bs, 1H; CH_{nb}), 2.24-2.16 (m, 1H; CH_{nb}), 1.94-1.82 (m, 1H; HCH_{nb}), 1.63 (d, *J* = 1.6 Hz, 1H; HCH_{nb}), 1.45 (s, 9H; C$H_{3(Boc)}$), 1.4-1.30 (2H; HCH_{nb}, HCH_{nb}); **^{13}C NMR** (100 MHz, $CDCl_3$, 25°C): δ =175.9, 169.7, 155.3, 138.3, 135.7, 131.5, 119.1, 80.5,

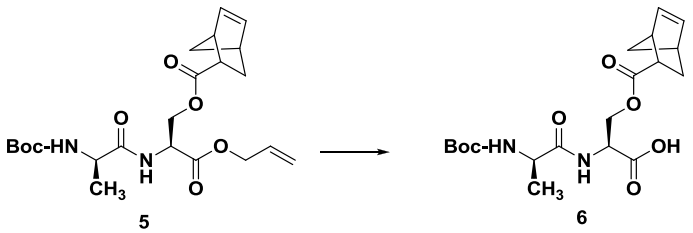
66.5, 64.3, 53.3, 46.9, 46.5, 43.1, 41.7, 30.6, 28.4; **IR** ($CHCl_3$): ν = 3439 (m), 1724 (s), 1506 (m), 1317 (m), 1166 (s), 930 (m), 765 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{19}H_{27}NO_6Na$ (MNa^+) 388.1736, found 388.1735.

To a solution of Boc-L-ser(O-NB)-O-allyl **15** (1.12 g, 3.07 mmol, 1 equiv) in CH_2Cl_2 (6 mL) at 0 °C was added TFA (3.54 mL, 46.03 mmol, 15 equiv) over a period of 5 min. The reaction mixture was allowed to stir at RT for 3h, following which CH_2Cl_2 was removed in vacuo. Excess TFA was removed as an azeotrope with water. The product was dissolved in water (5 mL) and lyophilized to give 1.14 g trifluoroacetate salt **4** (99%) as a pale yellow gummy solid. R_f = 0.17 (3% methanol/dichloromethane and 2 drops of TEA for 3mL).
^{1}H NMR (400 MHz, $CDCl_3$, 25°C): δ = 8.35 (bs, 3H;NH_3), 6.17-6.03 (2H; CH=CH_{nb}), 5.95-5.81(m, 1H; CH_{allyl}), 5.35 (d, J = 17.6 Hz, 1H; HCH_{allyl}), 5.30 (d, J = 10.4 Hz, 1H; HCH_{allyl}), 4.72-4.3 (5H; OC$H_{2(allyl)}$, C$H_{2(ser)}$, CH_{ala}), 3.0-2.85 (2H; CH_{nb}), 2.23-2.2 (m, 1H; CH_{nb}), 1.9-1.75 (m, 1H; HCH_{nb}), 1.43-1.3 (3H; C$H_{2(nb)}$ & HCH_{nb}); **^{13}C NMR** (100 MHz, $CDCl_3$, 25°C): δ =176.1, 166.7, 138.2, 135.5, 130.4, 120.5, 68.0, 61.6, 53.1, 46.8, 46.4, 42.7, 41.7, 30.7; **IR** ($CHCl_3$): 3438 (s), 2976 (s), 1710 (s), 1504 (s), 1345 (m), 1211 (s), 1045 (m), 932 (m), 674 (s) ν = cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{16}H_{21}NO_6F_3$ (MH^+) 380.1321, found 380.1310.

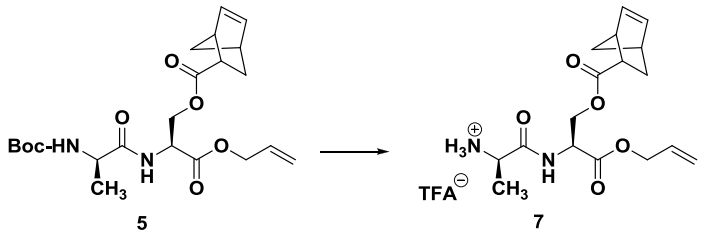


Boc-D-ala- L-ser(O-NB)-O-allyl (5): To a solution of Boc-D-ala-OH (0.499 g, 2.64 mmol, 1 equiv) and TFA-L-ser-(O-NB)-O-allyl **4** (1.0 g, 2.64 mmol, 1 equiv) in CH_2Cl_2 (12 mL) was added HCTU (1.31 g, 3.17 mmol, 1.2 equiv) and DIEA (1.6 mL, 9.2 mmol, 3.5 equiv). The reaction mixture was allowed to stir at RT for 7h, following which CH_2Cl_2 removed in vacuo. The reaction mixture was diluted with ethyl acetate (150 mL) and sequentially washed with 0.1N aqueous HCl (3 × 50 mL), 5% aqueous $NaHCO_3$ (3 × 50 mL) and saturated aqueous NaCl (2 × 30mL). The organic layer was dried over anhydrous sodium sulphate, filtered and concentrated in vacuo. The residue was purified by flash column chromatography (26% ethyl acetate/Hexane) to afford 1.06 g of dipeptide **5** (92%) as a dense pale yellow liquid. TLC R_f = 0.38 (30% ethyl acetate/hexane). **^{1}H NMR** (400 MHz, $CDCl_3$, 25°C): δ = 7.03 (bs, 1H; NH),

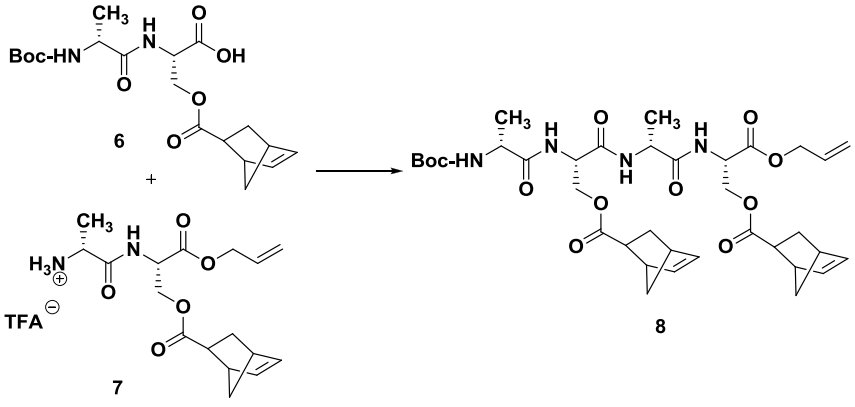
6.15-6.05 (2H; C*H*=C*H*$_{nb}$), 5.95-5.83 (m, 1H; C*H*$_{allyl}$), 5.35-5.22 (2H; C*H*$_{allyl}$), 4.95 (bs, 1H; N*H*), 4.89-4.8 (m, 1H; C*H*$_{ser}$), 4.66-4.62 (m, 2H; OC*H*$_{2(allyl)}$), 4.57-4.47 (m, 1H; HC*H*$_{ser}$), 4.42-4.32 (m, 1H; HC*H*$_{ser}$), 4.3-4.25 (m, 1H; C*H*$_{ala}$), 3.03-2.89 (2H; 2 C*H*$_{nb}$), 2.23-2.16 (m, 1H; C*H*$_{nb}$), 1.92-1.82 (m, 1H; HC*H*$_{nb}$), 1.7-1.66 (m, 1H; HC*H*$_{nb}$), 1.45 (s, 9H; 3 C*H*$_{3(Boc)}$), 1.38-1.32 (5H; C*H*$_{3ala}$, HC*H*$_{nb}$, HC*H*$_{nb}$); **^{13}C NMR** (100 MHz, $CDCl_3$, 25°C): δ =175.8, 172.7, 169.1, 155.7, 138.3, 135.7, 131.4, 119.2, 80.4, 66.5, 63.8, 52.1,50.0, 46.7, 46.5, 43.1, 41.7, 30.4, 28.4, 18.1; **IR** (KBr pellet): ν = 3427 (m), 3020 (s), 1722 (s), 1512 (m), 1216 (s), 1039 (m), 761 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{22}H_{32}N_2O_7Na$ (MNa^+) 459.2107, found 459.2115.



Boc-D-ala-L-ser(O-NB)-OH (6): To a solution of Boc-D-ala-L-ser(O-NB)-O-allyl **5** (0.51 g, 1.17 mmol, 1 equiv) in CH_2Cl_2 (8 mL) at 0 °C was added $Pd(PPh_3)_4$ (0.068 g, 0.059 mmol, 0.05 equiv), PPh_3 (0.062 g, 0.235 mmol, 0.2 equiv) and pyrrolidine (0.12 mL, 1.41 mmol, 1.2 equiv). The reaction mixture was allowed to stir at 0 °C for 15 min., following which CH_2Cl_2 was removed in vacuo. The reaction mixture was acidified with 0.1N HCl (50 mL) and extracted with ethyl acetate (3 × 75 mL). The combined organic layers were dried over anhydrous sodium sulphate, filtered and concentrated in vacuo. The product was purified by flash column chromatography (4% MeOH/ CH_2Cl_2) to afford 0.403 g of compound **8** (87%) as a pale yellow gummy solid. R_f = 0.13 (30% ethyl acetate/hexane and 2 drops of AcOH for 3mL). **^{1}H NMR** (400 MHz, $CDCl_3$, 25°C): δ = 8.61 (bs, 1H; COO*H*), 7.34 (bs, 1H; N*H*), 6.13-6.02 2H; C*H*=C*H*$_{nb}$), 5.57 (d, *J* = 7.2 Hz, 1H; N*H*), 4.85-4.75 (m, 1H; C*H*$_{ser}$), 4.55-4.10 (3H; C*H*$_{2(ser)}$ & C*H*$_{ala}$), 3.06-2.85 (2H; 2 C*H*$_{nb}$), 2.22-2.15 (m, 1H; C*H*$_{nb}$), 1.92-1.82 (m, 1H; HC*H*$_{nb}$), 1.52-1.39 (10H; 3 C*H*$_{3(Boc)}$ & HC*H*$_{nb}$), 1.38-1.28 (5H; C*H*$_{3(ala)}$, HC*H*$_{nb}$ & HC*H*$_{nb}$); **IR** (KBr pellet): ν = 3419 (s), 3058 (m), 2980 (s), 1721 (s), 1513 (s), 1374 (m),1262 (s),1167 (s),1039 (m), 738 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{19}H_{28}N_2O_7Na$ (MNa^+) 419.4316, found 419.4303.

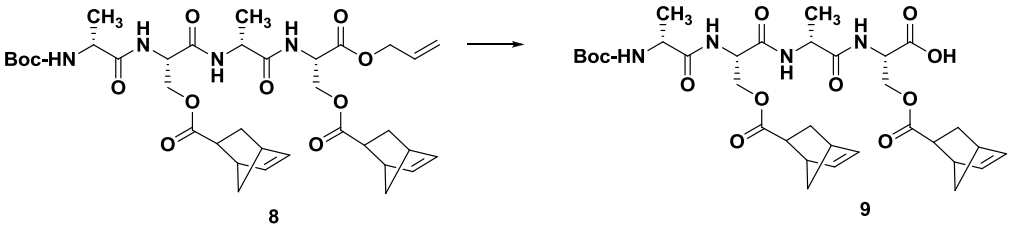


TFA-D-ala-L-ser(O-NB)-O-allyl (7): To a solution of Boc-D-ala-L-ser(O-NB)-O-allyl **5** (0.39 g, 0.88 mmol, 1 equiv) in CH_2Cl_2 (6 mL) at 0 °C was added TFA (1.02 mL, 13.24 mmol, 15 equiv) over a period of 3 min. The reaction mixture was allowed to stir at RT for 3h, following which CH_2Cl_2 was removed in vacuo. Excess TFA was removed as an azeotrope with water. The product was dissolved in water (3 mL) and lyophilized to give 0.393 g of **7** (99%) as a pale yellow gummy solid. R_f = 0.12 (30% ethyl acetate/hexane and 2 drops of TEA for 3mL). **^{1}H NMR** (400 MHz, DMSO-d_6, 25°C): δ = 9.08 (d, J = 8 Hz, 1H; N*H*), 8.21 (s, 3H; NH_3), 6.2-6.1 (2H; C*H*=CH_{nb}), 5.96-5.85 (m, 1H; CH_{allyl}), 5.33 (d, J = 17.6 Hz, 1H; HCH_{allyl}), 5.23 (d, J = 10.4 Hz, 1H; HCH_{allyl}), 4.8-4.72 (m, 1H; CH_{ser}), 4.63 (d, J = 4.8Hz, 2H; C$H_{2(allyl)}$), 4.45-4.25 (m, 2H; C$H_{2(ser)}$), 3.95 (app. s, 1H; CH_{ala}), 3.0-2.87 (2H; 2 CH_{nb}), 2.2-2.13 (m, 1H; CH$_{nb}$), 1.85-1.76 (m, 1H; HCH_{nb}), 1.4-1.2 (6H; C$H_{3(ala)}$, C$H_{2(nb)}$, HCH_{nb}); **^{13}C NMR** (100 MHz, DMSO-d_6, 25°C): δ =174.8, 170.0, 168.5, 138.0, 135.5, 132.0, 118.1, 65.5, 62.8, 51.4, 48.1, 46.0, 45.9, 42.4, 41.1, 29.8, 17.3; **IR** (KBr pellet): ν = 3449 (s), 2992 (s), 2362 (m), 1683 (s), 1192 (s), 1022 (m), 763 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{17}H_{25}N_2O_5$ (MH^+) 337.1763, found 337.1778.



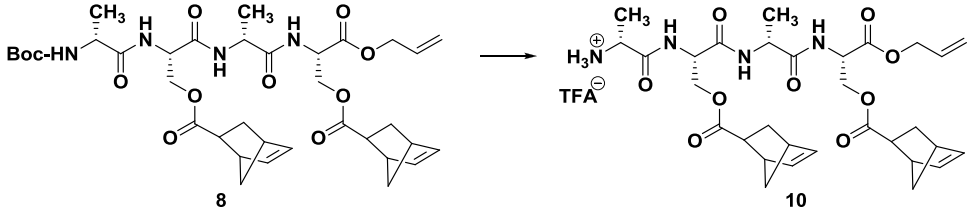
Boc-[D-ala-L-ser(O-NB)]$_2$-O-allyl (8): To a solution of Boc-D-ala-L-ser(O-NB)-OH **6** (0.349 g, 0.88 mmol, 1 equiv) and TFA-D-ala-L-ser-(O-NB)-O-allyl **7** (0.397 g, 0.88 mmol, 1 equiv) in CH_2Cl_2 (10 mL) was added HCTU (0.437 g, 1.057 mmol, 1.2 equiv) and DIEA (0.53 mL, 3.08 mmol, 3.5 equiv). The reaction mixture was allowed to stir at RT for 9h, following

which CH_2Cl_2 removed in vacuo. The reaction mixture was diluted with ethyl acetate (150 mL), washed with 0.1N aqueous HCl (3 × 50 mL), 5% aqueous $NaHCO_3$ (3 × 50 mL) and saturated aqueous NaCl (2 × 30mL). The organic layer was dried over anhydrous sodium sulphate, filtered and concentrated in vacuo. The residue was purified by flash column chromatography (40% ethyl acetate/Hexane) to afford 0.466 g of tetrapeptide **8** (74%) as a pale yellow dense liquid. TLC R_f = 0.34 (40% ethyl acetate/hexane). **^{1}H NMR** (500 MHz, $CDCl_3$, 25°C): δ = 7.48 (bs, 2H; 2 N*H*), 7.37 (bs, 1H; N*H*), 6.13-6.04 (4H; 2 C*H*=CH_{nb}), 5.92-5.83 (m, 1H; CH_{allyl}), 5.38 (bs, 1H; N*H*), 5.32 (d, *J* = 17.0 Hz, 1H; HCH_{allyl}), 5.24 (d, *J* = 10.5 Hz, 1H; HCH_{allyl}), 4.89-4.77 (2H; 2 CH_{ser}), 4.68-4.6 (2H, OC$H_{2(allyl)}$), 4.5-4.38 (4H; 2 C$H_{2(ser)}$), 4.36-4.3 (m, 1H; CH_{ala}), 4.22-4.12 (1H; CH_{ala}), 3.04-2.96 (2H; 2 CH_{nb}), 2.89 (bs, 2H; 2 CH_{nb}), 2.23-2.17 (2H; 2 CH_{nb}), 1.90-1.83 (2H; 2 HCH_{nb}), 1.5-1.40 (11H; 2 HCH_{nb}, 3 C$H_{3(Boc)}$), 1.4-1.3 (10H; 2 C$H_{3(ala)}$, 2 HCH_{nb}, 2 HCH_{nb}); **^{13}C NMR** (125 MHz, $CDCl_3$, 25°C): δ =176.1, 176.0, 173.7, 172.3, 169.4, 169.0, 155.8, 138.2, 138.1, 135.60, 135.55, 131.2, 119.1, 80.4, 66.6, 63.5, 63.3, 52.3, 52.1, 50.5, 49.0, 46.6, 46.5, 46.4, 43.0, 42.96, 42.93, 41.6, 30.4, 30.3, 28.3, 17.9,17.7; **IR** ($CHCl_3$): ν = 3323 (m), 3022 (s), 1723 (s), 1520 (m), 1217 (s), 766 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{36}H_{51}N_4O_{11}$ (MH^+) 715.3554, found 715.3542.

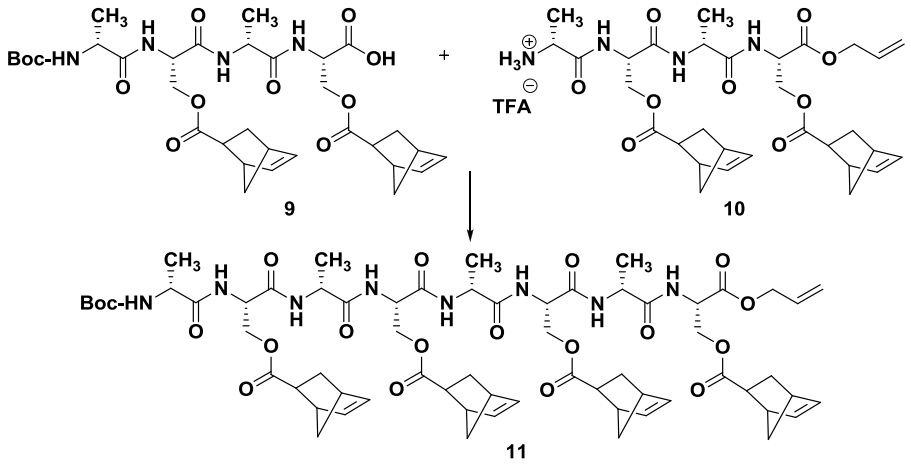


Boc-[D-ala-L-ser(O-NB)]$_2$-OH (9): To a solution of Boc-[D-ala-L-ser(O-NB)]$_2$-O-allyl **8** (0.46 g, 0.64 mmol, 1 equiv) in CH_2Cl_2 (7 mL) at 0 °C was added $Pd(PPh_3)_4$ (0.037 g, 3.22 × 10^{-2} mmol, 0.05 equiv), PPh_3 (0.034 g, 12.9 × 10^{-2} mmol, 0.2 equiv) and pyrrolidine (0.064 mL, 0.77 mmol, 1.2 equiv). The reaction mixture allowed to stir at 0 °C for 15 min., following which CH_2Cl_2 was removed in vacuo. The reaction mixture acidified with 0.1N HCl (50 mL) and extracted with ethyl acetate (3 × 75 mL). The combined organic layers were dried over anhydrous sodium sulphate, filtered and concentrated in vacuo. The product was purified by flash column chromatography (6% MeOH/CH_2Cl_2) to afford 0.351 g of compound **9** (81%) as a pale yellow solid. R_f = 0.14 (4% methanol/ CH_2Cl_2 and 2 drops of AcOH for 3mL). **^{1}H NMR** (500 MHz, DMSO-d_6, 25°C): δ = 8.24 (bs, 1H; NH), 8.08 (app. bs, 2H; 2 N*H*), 7.06 (bs, 1H; N*H*), 6.2-6.09 (2H; C*H*=CH_{nb}), 4.63-4.55 (m, 1H; CH_{ser}), 4.45-

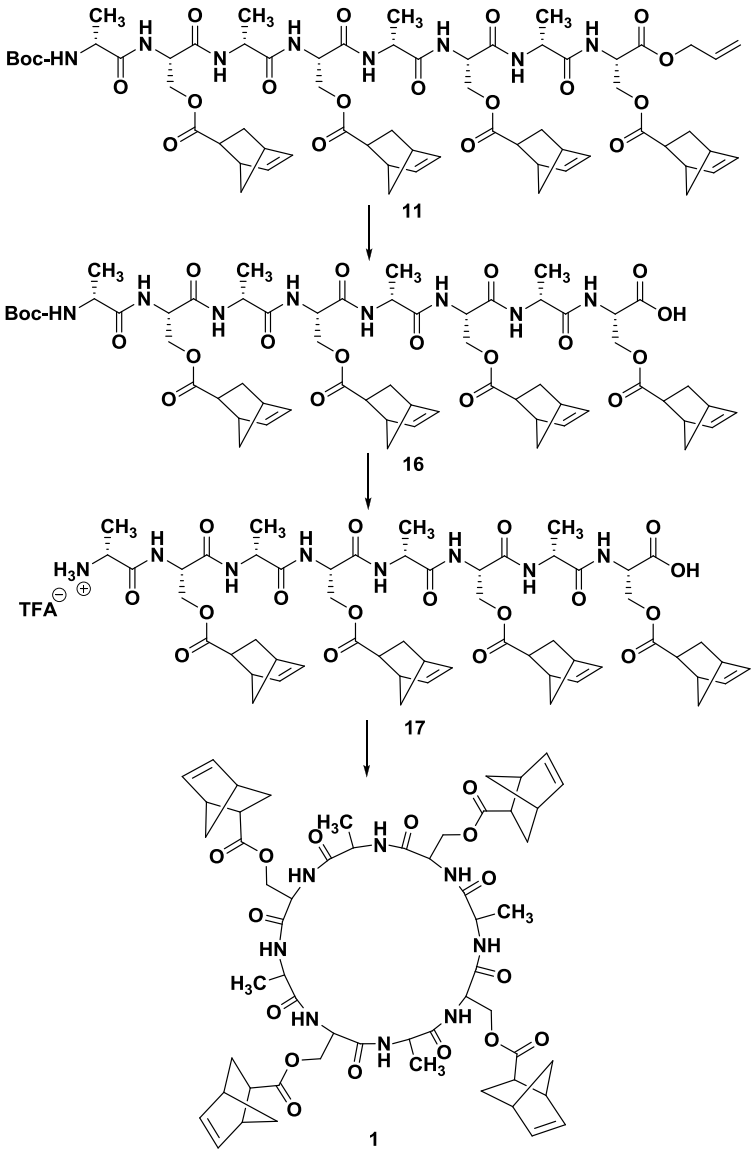
4.07 (6H; CH_{ser}, CH_{ala} & 2 C$H_{2(ser)}$), 4.0 (app. quint, 1H; CH_{ala}), 3.0-2.93 (2H; 2 CH_{nb}), 2.86 (bs, 2H; 2 CH_{nb}), 2.15-2.08 (2H; 2 CH_{nb}), 1.84-1.76 (m, 2H; 2 HCH_{nb}), 1.41-1.3 (11H; 2 HCH_{nb}, 3 C$H_{3(Boc)}$), 1.28-1.1 (10H; 2 C$H_{3(ala)}$, 2 HCH_{nb}, 2 HCH_{nb}); **^{13}C NMR** (125 MHz, DMSO-d_6, 25°C): (some overlapping signals) δ =174.96, 174.7, 172.9, 171.6, 170.4, 167.8, 155.1, 137.9, 135.7, 135.6, 78.1, 63.97, 63.5, 52.0, 51.6, 49.8, 48.1, 46.0, 45.97, 45.8, 42.5, 42.5, 41.1, 29.8, 29.79, 29.0, 28.2, 18.4, 17.9; **IR** (KBr pellet): ν = 3316 (m), 3058 (m), 2980 (s), 1724 (s), 1663 (s), 1263 (s), 1166 (s), 735 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{33}H_{46}N_4O_{11}Na$ (MNa^+) 697.3061, found 697.3060.



TFA-[D-ala-L-ser(O-NB)]$_2$-O-allyl (10): To a solution of Boc-[D-ala-L-ser(O-NB)]$_2$-O-allyl **8** (0.312 g, 0.437 mmol, 1 equiv) in CH_2Cl_2 (5 mL) at 0 °C was added TFA (0.505 mL, 6.55 mmol, 15 equiv) over a period of 3 min. The reaction mixture allowed to stir at RT for 3h, following which CH_2Cl_2 was removed in vacuo. Excess TFA was removed as an azeotrope with water. The product was dissolved in water (3 mL) and lyophilized to give 0.313 g of **10** (99%) as a pale yellow gummy solid. R_f = 0.14 (4% methanol/dichloromethane and 2 drops of TEA for 3mL). **^{1}H NMR** (500 MHz, DMSO-d_6, 25 °C): δ = 8.77 (dd, J = 10, 6.5 Hz, 1H; NH), 8.67 (d, J = 9.5 Hz, 1H; NH), 8.51 (d, J = 10 Hz, 1H; NH), 8.10 (bs, 3H; NH_3), 6.10-6.09(4H; 2 CH=CH_{nb}), 5.95-5.83 (m, 1H; CH_{allyl}), 5.32 (dt, J = 21.5, 2 Hz, 1H; HCH_{allyl}), 5.22 (dt, J = 13, 1.5 Hz, 1H; HCH_{allyl}), 4.82-4.75 (m, 1H; CH_{ser}), 4.72-4.65 (m, 1H; CH_{ser}), 4.60 (d, J = 6.5 Hz, 2H; C$H_{2(allyl)}$), 4.47 (app. quint, 1H; CH_{ala}), 4.4-4.12 (4H; 2 C$H_{2(ser)}$), 4-3.3 (m, 1H; CH_{ala}), 3.1-2.9 (2H; 2 CH_{nb}), 2.88 (bs; 2 CH_{nb}), 2.2-2.1 (2H; 2 CH_{nb}), 1.85-1.76 (2H; 2 HCH_{nb}), 1.40-1.10 (12H; 2 HCH_{nb}, 2 C$H_{3(ala)}$ & 2 C$H_{2(nb)}$), **^{13}C NMR** (125 MHz, DMSO-d_6, 25 °C): (some overlapping signals) δ =174.9, 174.7, 172.3, 169.7, 168.9, 167.4, 138.0, 135.5, 132.1, 117.9,65.3, 63.6, 63.0, 51.6, 51.2, 48.1, 47.9, 46.0, 45.9, 42.5, 41.1, 29.9, 29.8, 18.7, 17.3 ; **IR** ($CHCl_3$): ν = 3417 (m), 1729 (s), 1525 (m), 1429 (m), 1216 (s), 930 (m), 755 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{31}H_{43}N_4O9$ (MH^+) 615.3030, found 615.2158.



Boc-[D-ala-L-ser(O-NB)]$_4$-O-allyl (11): To a solution of Boc-[D-ala-L-ser(O-NB)]$_2$-OH **9** (0.161 g, 0.239 mmol, 1 equiv) and TFA-[D-ala-L-ser-(O-NB)]$_2$-O-allyl **10** (0.174 g, 0.239 mmol, 1 equiv) in CH_2Cl_2 (5 mL) was added HCTU (0.119 g, 0.287 mmol, 1.2 equiv) and DIEA (0.143 mL, 0.836 mmol, 3.5 equiv). The reaction mixture was allowed to stir at RT for 14 h, following which CH_2Cl_2 removed in vacuo. The reaction mixture was diluted with ethyl acetate (200 mL), washed with 0.1N aqueous HCl (3 × 50 mL) and 5% aqueous $NaHCO_3$ (3 × 50 mL). The organic layer was dried over anhydrous sodium sulphate, filtered and concentrated in vacuo. The residue was purified by flash column chromatography (3% methanol/CH_2Cl_2) to afford 0.195 g of compound **11** (64%) as a pale yellow solid. TLC R_f = 0.39 (4% methanol/ CH_2Cl_2). **^{1}H NMR** (500 MHz, DMSO-d_6, 25°C): δ = 8.56-8.54 (m, 1H; N*H*), 8.38-8.3 (2H; 2 N*H*), 8.27-8.19 (3H; 3 N*H*), 8.07 (d, *J* = 7 Hz, 1H; N*H*), 7.06-7.01 (m, 1H; N*H*), 6.18-6.08 (8H; 4 C*H*=C*H*$_{nb}$), 5.93-5.85 (m, 1H; C*H*$_{allyl}$), 5.33 (dt, *J* = 22, 2 Hz, 1H; HC*H*$_{allyl}$), 5.21 (dt, *J* = 10.5, 1.5 Hz, 1H; HC*H*$_{allyl}$), 4.72-4.58 (6H; 4 C*H*$_{ser}$, OC*H*$_{2(allyl)}$), 4.45-4.12 (11H; 4 C*H*$_{2(ser)}$, 3 C*H*$_{ala}$), 4.0 (app. quint, 1H; C*H*$_{ala}$), 3.0-2.94 (4H; 4 C*H*$_{nb}$), 2.87 (bs, 4H; 4 C*H*$_{nb}$), 2.18-2.1 (4H; 4 C*H*$_{nb}$), 1.85-1.77 (4H; 4 HC*H*$_{nb}$), 1.41-1.32 (13H; 4 HC*H*$_{nb}$, 3 C*H*$_{3(Boc)}$), 1.3-1.18 (17H; 3 C*H*$_{3(ala)}$, 4 HC*H*$_{nb}$, 4 HC*H*$_{nb}$), 1.15 (d, *J* = 7.5 Hz, 3H; C*H*$_{3(ala)}$); **^{13}C NMR** (125 MHz, DMSO-d_6, 25°C): (some overlapping signals) δ =174.9, 174.85, 174.8, 173.0, 172.3, 168.9, 168.3, 168.2, 168.0, 155.2, 138.0, 137.97, 135.6, 135.5, 132.1, 118.0, 78.2, 65.3, 63.6, 63.0, 51.6, 51.5, 51.2, 59.9, 48.6, 48.0, 46.0, 45.9, 42.54, 42.5, 42.4, 41.1, 29.9, 29.86, 29.82, 29.8, 29.0, 28.2, 18.5, 18.1, 18.0, 17.8; **IR** (KBr pellet): ν = 3316 (s), 2977 (s), 1734 (s), 1666 (m), 1525 (s), 1246 (m), 1167 (s), 1040 (m), 852 (s) cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{64}H_{86}N_8O_{19}Na$ (MNa^+) 1293.5907, found 1293.5908.



Cyclo-[D-ala-L-ser(O-NB)]$_4$ (1): To a solution of Boc-[D-ala-L-ser(O-NB)]$_4$ -O-allyl **11** (0.072 g, 5.66 × 10^{-2} mmol, 1 equiv) in CH_2Cl_2 (3 mL) at 0 °C was added $Pd(PPh_3)_4$ (0.0032 g, 2.8 × 10^{-3} mmol, 0.05 equiv), PPh_3 (0.003 g, 1.13 × 10^{-2} mmol, 0.2 equiv) and pyrrolidine (0.006 mL,6.79 × 10^{-2} mmol, 1.2 equiv). The reaction mixture allowed to stir at 0 °C temperature for 20 min., following which CH_2Cl_2 was removed in vacuo. The reaction mixture was acidified with 0.1N HCl (10 mL) and extracted with ethyl acetate (3 × 50 mL). The combined organic layers were dried over anhydrous sodium sulphate, filtered and concentrated in vacuo. The product was purified by flash column chromatography (15% methanol/CH_2Cl_2) to afford 0.067 g of alloc deprotected linear octapeptide **16** (95%) as a pale yellow solid. R_f = 0.17 (12% methanol/CH_2Cl_2 and 1 drop of AcOH for 3mL). **^{1}H NMR** (500 MHz, DMSO-d_6, 25°C): δ = 9.09 (bs, 1H; N*H*), 8.74 (bs, 1H; N*H*), 8.55-8.3 (4H; 4 N*H*), 7.63-7.52 (m, 1H; N*H*), 7.05 (d, *J* = 6Hz, 1H; N*H*), 6.16-6.06 (8H; 4 C*H*=C*H*$_{nb}$), 4.65-4.52

(3H; 3 CH_{ser}), 4.47-4.38 (m, 1H; CH_{ser}), 4.36-3.95 (12H; 4 C$H_{2(ser)}$, 4 CH_{ala}), 3.0-2.91 (4H; 4 CH_{nb}), 2.88-2.8 (4H; 4 CH_{nb}), 2.16-2.04 (4H; 4 CH_{nb}), 1.84-1.74 (4H; 4 HCH_{nb}), 1.4-1.3 (13H; 4 HCH_{nb}, 3C$H_{3(Boc)}$), 1.28-1.12 (20H; 4 C$H_{3(ala)}$, 4 HCH_{nb}, 4 HCH_{nb}); **IR** (KBr pellet): ν = 3332 (m), 3024 (s), 2403 (m), 1727 (s), 1664 (s), 1522 (s), 1217 (s), 929 (m), 767 (s), cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{61}H_{82}N_8O_{19}Na$ (MNa^+) 1253.5594, found 1253.5602.

To a solution of alloc deprotected linear octapeptide **16** (0.060 g, 4.87×10^{-2} mmol, 1 equiv) in CH_2Cl_2 (3 mL) at 0 °C was added TFA (2 mL) over a period of 3 min. The reaction mixture was allowed to stir at RT for 3h, following which CH_2Cl_2 was removed in vacuo. Excess TFA was removed as an azeotrope with water. The product was dissolved in water (2 mL) and lyophilized to give 0.060 g of deprotected linear octapeptide **17** (99%) as a pale yellow solid liquid. R_f = 0.17 (20% methanol/dichloromethane). **^{1}H NMR** (500 MHz, DMSO-d_6, 25°C): δ = 8.75 (bs, 1H; N*H*), 8.53-8.22 (8H; 5 N*H* & NH_3), 7.7-7.5 (m, 1H; N*H*), 4.8 - 4.5 (4H; 4 CH_{ser}), 4.44-4.25 (11H; C$H_{2(ser)}$ & 3 CH_{ala}), 3.93 (app. bs, 1H; CH_{ala}), 2.98 (bs, 4H; 4 CH_{nb}), 2.87 (bs, 4H; 4 CH_{nb}), 2.18-2.11 (4H; 4 CH_{nb}), 1.85-1.78 (4H; 4 HCH_{nb}), 1.4-1.15 (24H; 4 HCH_{nb}, 4 C$H_{2(nb)}$ & 3 C$H_{3(Boc)}$); **IR** (KBr pellet): ν = 3290 (s), 2970 (m), 2354 (s), 1730 (s), 1642 (s), 1536 (s), 1166 (s), 712 (m), cm^{-1}; **HRMS (ESI$^+$):** calcd. for $C_{56}H_{75}N_8O_{17}$ (MH^+) 1131.5250, found 1131.5293.

To a solution of deprotected peptide **17** (0.052 g, 4.2×10^{-2} mmol, 1 equiv) in DMF (14 mL, [0.003] mM) at 0 °C was added HCTU (0.035 g, 8.35×10^{-2} mmol, 2 equiv) and DIEA (0.029 mL, 16.7×10^{-2} mmol, 4 equiv). The reaction mixture allowed to stir at 0 °C for 2h, then warmed to RT. The reaction mixture was stirred at RT for 48h, following which the solvent was removed in vacuo. The residue was precipitated with water to obtaine the crude cyclic peptide **1**. The Crude cyclic peptide residue was washed sequentially with water (5 × 10mL) and methanol (4 × 10mL) to afford 0.034 g of cyclic peptide **1** (72%) as a pale yellow solid. **^{1}H NMR** (500 MHz, DMSO-d_6, 25°C): δ = 8.7-8.0 (8H; 8 N*H*), 6.2-6 (8H; 4 C*H*=CH_{nb}), 4.8-4.0 (16H; 4 CH_{ser}, 4 C$H_{2(ser)}$ & 4 CH_{ala}), 2.9-2.7 (8H; 8 CH_{nb}), 2.12 (bs, 4H; 4 CH_{nb}), 1.80 (4H; 4 HCH_{nb}), 1.4-1.1 (24H; 4 HCH_{nb}, 4 C$H_{2(nb)}$ & 4 C$H_{3(ala)}$); **IR** (KBr pellet): ν = 3285 (s), 2975 (s), 2354 (s), 1733 (s), 1641 (s), 1535 (s), 1339 (m), 1165 (s), 1035 (m), 715 (m) cm^{-1}; **MS (MALDI$^+$)** for $C_{56}H_{72}N_8O_{16}Na$ (MNa^+) 1135.496, found 1135.731.

General procedure for synthesis of PPC 12

A solution of cyclic peptide **1** in 1:4 DMF–THF was allowed to stand for 5 days at RT. The solution was subsequently deoxygenated using stream of nitrogen gas. Deoxygenated solutions of Grubbs' second generation initiator and cross-linker **2** in 1:4 DMF–THF were added to this solution over a period of 15 min using a syringe pump. The reaction mixture was allowed to stir at room temperature. After completion of polymerization, ethyl vinyl ether (1mL) was added to the reaction mixture and it was stirred for an additional 30 min, following which it was concentrated in vacuo to a minimum volume. Methanol (10 mL) was added to precipitate the PPC **12**. The precipitate was washed sequentially with methanol (4 × 10mL) followed by water (4 × 10mL) to afford PPC **12** as a solid.

Table S1. Reaction conditions used to obtain PPC **12**

No.	**1** (equiv)[a]	**2** (equiv)[a]	Conc. (mM)	Time (h)	PPC **12**	Yield[b]
1.	80	160	0.8	8	**12a**	68%
2.	100	0	0.6	4	**12b**	79%
3.	100	0	0.6	6	**12c**	76%
4.	100	0	0.6	8	**12d**	82%
5.	100	200	0.6	4	**12e**	77%
6.	100	200	0.4	4	**12f**	87%
7.	200	0	0.2	2	**12g**	88%
8.	200	400	0.2	2	**12h**	87%

[a] Equiv with respect to Ru. [b] Based on weight of isolated polymer.

PPC 12a:

Grubbs second generation initiator (0.05 mg, 5.9×10^{-5} mmol, 1 equiv) in 1:4 DMF-THF (0.5 mL) and cross-linker **2** (2.8 mg, 9.4×10^{-3} mmol, 160 equiv) in 1:4 DMF-THF (0.5 mL) were added to a solution of self-assembled cyclic peptide **1** (5.2 mg, 4.7×10^{-3} mmol, 80 equiv) in 1:4 DMF-THF (5 mL) to afford PPC **12a** in 68% yield (5.44 mg).

PPC 12b:

Grubbs second generation initiator (0.03 mg, 3.5×10^{-5} mmol, 1 equiv) in 1:4 DMF-THF (2 mL) was added to a solution of self-assembled cyclic peptide **1** (3.9 mg, 3.5×10^{-3} mmol, 100 equiv) in 1:4 DMF-THF (4 mL) to afford PPC **12b** in 79% yield (3.08 mg).

PPC 12c:

Grubbs second generation initiator (0.04 mg, 4.7×10^{-5} mmol, 1 equiv) in 1:4 DMF-THF (2 mL) was added to a solution of self-assembled cyclic peptide **1** (5.2 mg, 4.7×10^{-3} mmol, 100 equiv) in 1:4 DMF-THF (6 mL) to afford PPC **12c** in 76% yield (3.95 mg).

PPC 12d:

Grubbs second generation initiator (0.04 mg, 4.7×10^{-5} mmol, 1 equiv) in 1:4 DMF-THF (2 mL) was added to a solution of self-assembled cyclic peptide **1** (5.2 mg, 4.7×10^{-3} mmol, 100 equiv) in 1:4 DMF-THF (6 mL) to afford PPC **12d** in 82% yield (4.26 mg).

PPC 12e:

Grubbs second generation initiator (0.05 mg, 5.9×10^{-5} mmol, 1 equiv) in 1:4 DMF-THF (2 mL) and cross-linker **2** (3.6 mg, 11.8×10^{-3} mmol, 200 equiv) in 1:4 DMF-THF (1 mL) were added to a solution of self-assembled cyclic peptide **1** (6.6 mg, 5.9×10^{-3} mmol, 100 equiv) in 1:4 DMF-THF (12 mL) to afford PPC **12e** in 77% yield (7.85 mg).

PPC 12f:

Grubbs second generation initiator (0.04 mg, 4.3×10^{-5} mmol, 1 equiv) in 1:4 DMF-THF (2 mL) and cross-linker **2** (2.6 mg, 8.6×10^{-3} mmol, 200 equiv) in 1:4 DMF-THF (1 mL) were added to a solution of self-assembled cyclic peptide **1** (4.8 mg, 4.3×10^{-3} mmol, 100 equiv) in 1:4 DMF-THF (8 mL) to afford PPC **12f** in 87% yield (6.44 mg).

PPC 12g:

Grubbs second generation initiator (0.03 mg, 3.5×10^{-5} mmol, 1 equiv) in 1:4 DMF-THF (2 mL) was added to a solution of self-assembled cyclic peptide **1** (7.9 mg, 7.0×10^{-3} mmol, 200 equiv) in 1:4 DMF-THF (34 mL) to afford PPC **12g** in 88% yield (6.95 mg). **IR** (KBr pellet): ν = 3389 (b), 2962 (m), 1729 (s), 1652 (s), 1530 (m), 1163 (s), 714 (m) cm^{-1}.

PPC 12h:

Grubbs second generation initiator (0.03 mg, 3.5×10^{-5} mmol, 1 equiv) in 1:4 DMF-THF (2 mL) and cross-linker **2** (2.8 mg, 14.1×10^{-3} mmol, 400 equiv) in 1:4 DMF-THF (2 mL) were added to a solution of self-assembled cyclic peptide **1** (7.9 mg, 7.0×10^{-3} mmol, 200 equiv) in 1:4 DMF-THF (32 mL) to afford PPC **12h** in 87% yield (9.31 mg). **IR** (KBr pellet): ν = 3398 (b), 3286 (s), 2926 (m), 1732 (s), 1639 (s), 1538 (m), 1018 (b), 709 (m) cm^{-1}.

FP 13: To a solution of PPC **12h** (5 mg) in 1:1 MeOH/H_2O (16 mL) was added LiOH.H_2O (10mg). The reaction mixture was sonicated for 30 min, following which the mixture was allowed to stir at RT. After 48 h, the solvent was removed in vacuo and the residue was washed with methanol to obtained crude FP **13**. The crude FP residue was sequentially washed with 1:1 TFA/water (3 × 5mL) and 1:1 TFA/methanol (3 × 5mL) to afford 0.8 mg of FP **13** in 16% yield (0.8 mg) with respect to the weight of PPC **12h**. **IR** (KBr pellet): ν = 3406 (b), 2924 (m), 1636 (m), 1535 (s), 1441 (s), 1074 (m), 863 (s) cm^{-1}.

NAcid-CL Polymer 14: A solution of norbornene acid (6.5 mg, 4.7×10^{-2} mmol, 400 equiv) in 1:4 DMF/THF (40 mL) was deoxygenated using a stream of nitrogen gas. Deoxygenated solutions of Grubbs second generation initiator (0.1 mg, 1.16×10^{-4} mmol, 1 equiv) in 1:4 DMF/THF (10 mL) and cross-linker **2** (7 mg, 2.36×10^{-2} mmol, 200 equiv) in 1:4 DMF/THF (10 mL) were added over a period of 15 min. The reaction mixture was allowed to stir at RT for 2h, following which ethyl vinyl ether (1 mL) was added and the mixture was stirred for an additional 30 min. The mixture was concentrated in vacuo to a minimum volume. Methanol (10 mL) was added to precipitate the polymer residue. The residue was washed sequentially with methanol (4 × 10mL) and water (4 × 10mL) to afford NAcid-CL polymer **14** in 96%

yield (12.9 mg). **IR** (KBr pellet): ν = 3269 (b), 2924 (m), 1644 (s), 1637 (s), 1240 (m), 971 (m), 734 (m) cm^{-1}.

Self-assembly studies with cyclic peptide 1

Sample preparation for TEM

A solution of cyclic peptide **1** in 1:4 DMF –THF (0.1mg/mL) was allowed to stand at room temperature for 5 days. The solution was drop-casted onto a copper grid and dried in vacuo for TEM analysis.

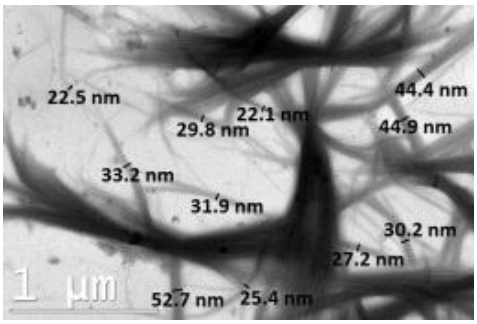


Figure S1. TEM image of peptide **1**.

Characterization of PPC 12a-g by microscopy

Sample preparation for SEM

A solution of the PPC **12** in 1:4 DMF-THF (0.1mg/5mL) was drop-casted onto a silicon grid and dried in vacuo for SEM analysis.

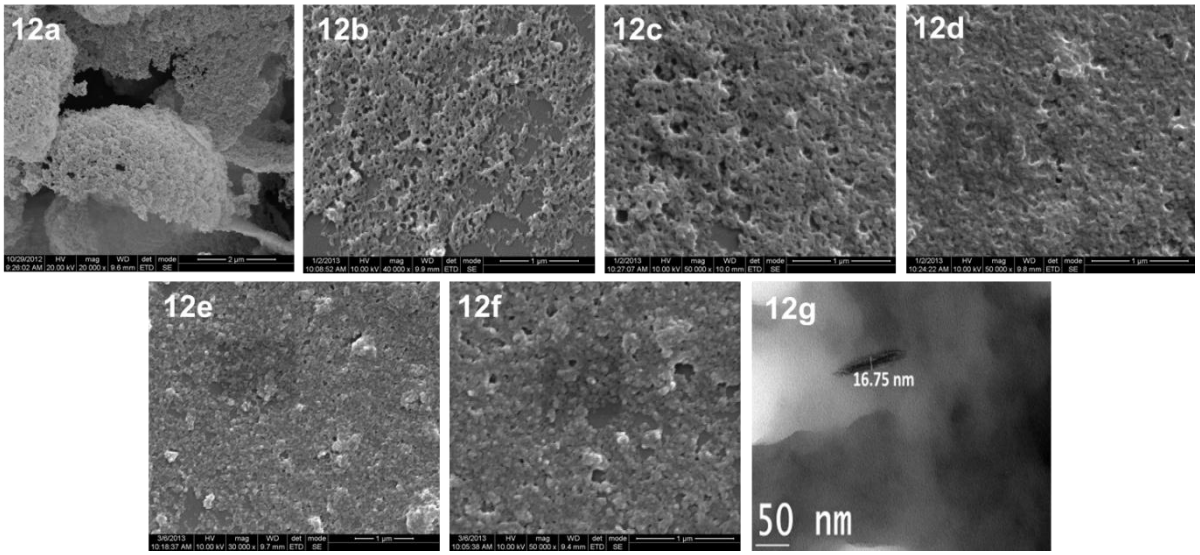


Figure S2. SEM images of PPC**12a-f**, TEM image of 12g.

Dynamic Light Scattering (DLS) studies

Sample preparation for DLS studies

A solution of cyclic peptide **1**, PPC **12** or FP **13** (0.1 mg/10mL) in 5% DMF-THF (v/v) was allowed to self-assemble for 3 days and the DLS data was obtained for the solution. The solution was concentrated to a minimum volume (approximately 0.5 mL) in vacuo and re-dispersed in 10 mL DMF/TFA (3:1 v/v) and the DLS data was obtained.

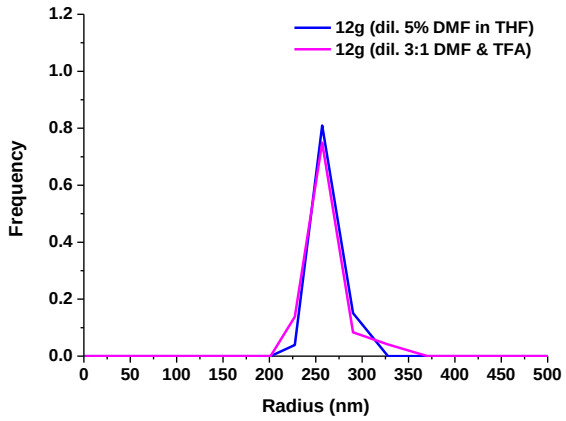


Figure S3. DLS data to indicate stability of PPC **12g** in the presence of TFA.

TGA data

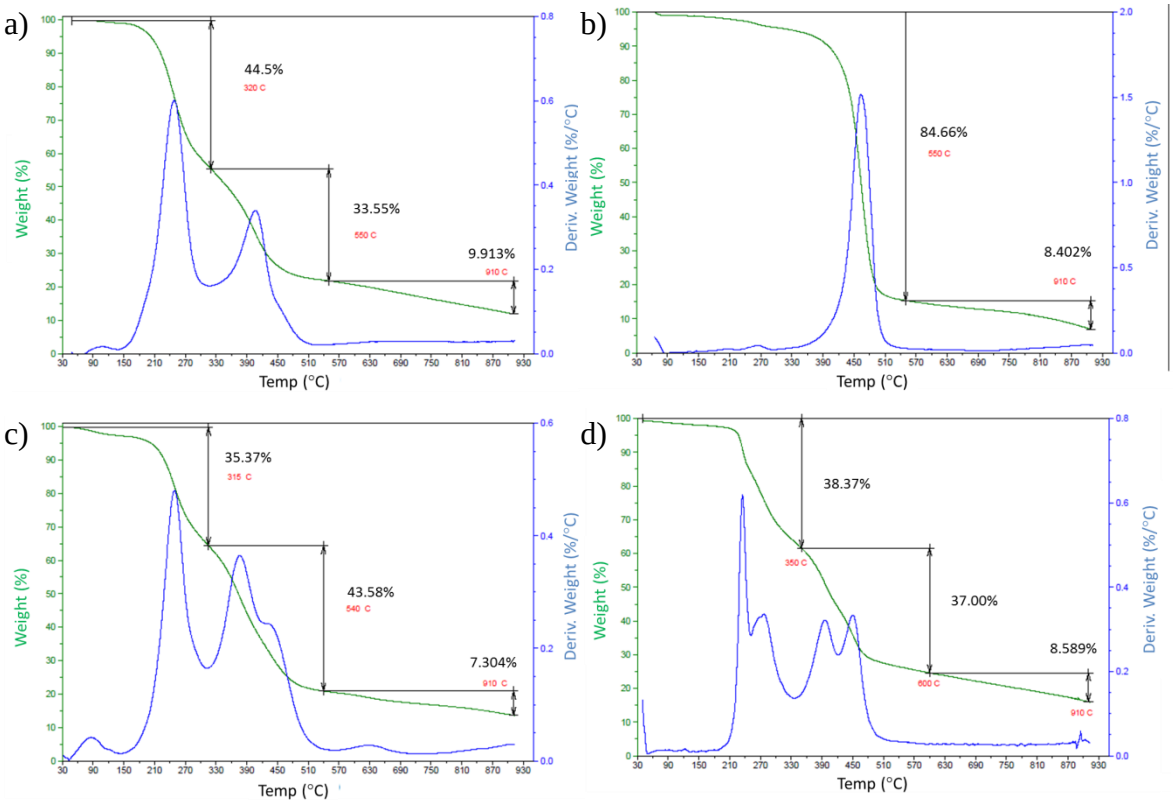


Figure S4. TGA data under nitrogen for a) cyclic peptide **1**; b) polymer **14**; c) PPC **12g**; d) PPC **12h**.

IR Data

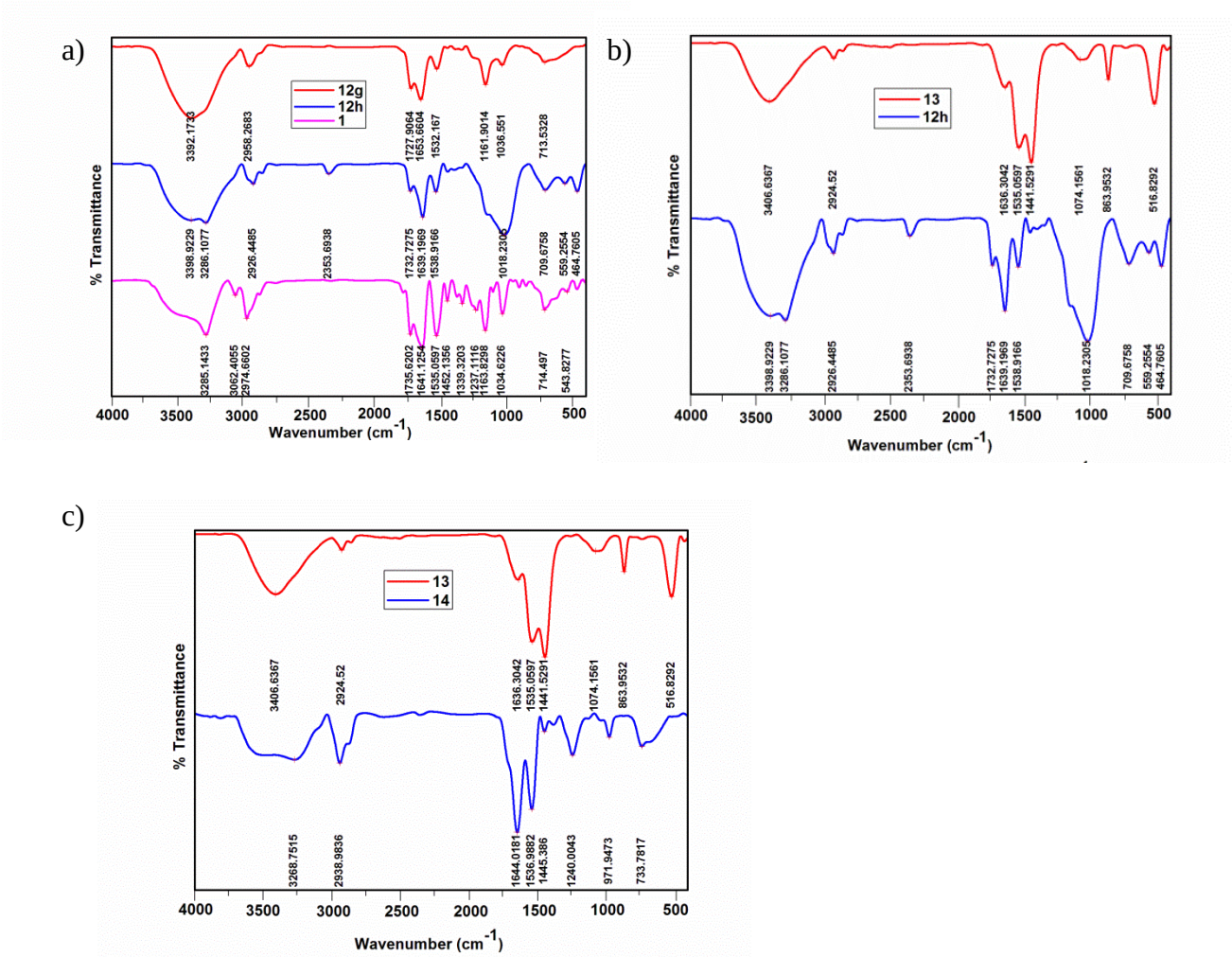


Figure S5. Stacked IR plots of a) PPC **12g**, PPC **12h** & peptide **1**; b) FP **13** and PPC **12h**; c) FP **13** and polymer **14**.

Characterization of FP 13 by microscopy

Sample preparation for SEM & TEM

A solution of functionalized pores **13** in 1:4 DMF –THF (0.1mg/5mL) was drop-casted onto a silicon grid and dried in vacuo for SEM analysis. The remaining solution was concentrated in vacuo and redispersed in 5mL DMF/TFA (3:1 v/v). This solution was drop-casted over copper grid for TEM analysis.

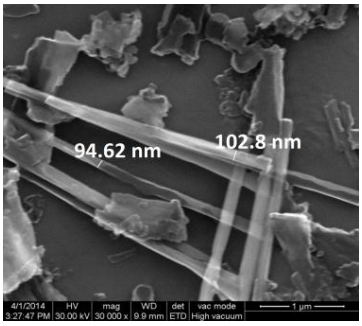


Figure S6. SEM image of FP **13**.

Procedure for incorporation of lucigenin dye into FP 13 and PPC 12h.

FP **13** (0.2 mg)/PPC **12h** (0.2 mg) was dissolved in DMF (0.5 mL) and the resultant solution was treated with 0.1 mL of an aqueous solution of lucigenin dye (1 mM). This solution was further diluted with deionized water (4 mL) and allowed to stir at RT for 14h. The solution was concentrated in vacuo to half of its original volume and methanol was added. This precipitate was washed with water (10 × 5 mL) to remove unreacted dye and analysed using fluorescence microscopy.

Fluorescence microscopy with dye incorporated FP 13/ PPC 12h

Sample preparation for studies with Leica inverted fluorescence microscope

A solution of dye treated PPC **12h** or FP **13** in 1:4 DMF-THF (0.2mg/5 mL) was coated over a glass slide. Fluorescence images were acquired without drying the solution.

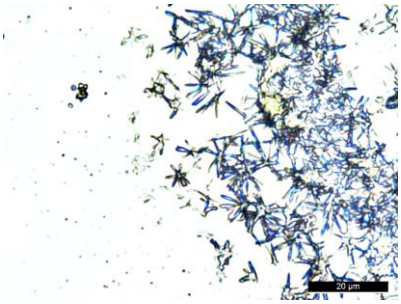


Figure S7. Bright field image after dye encapsulation experiment with PPC **12h**.

Sample preparation and images using Olympus 1X51 fluorescence microscope

A solution of dye incorporated functionalized pore in 1:4 DMF –THF (0.1mg/5mL) was coated over a glass slide. Fluorescence images were acquired without drying the solution.

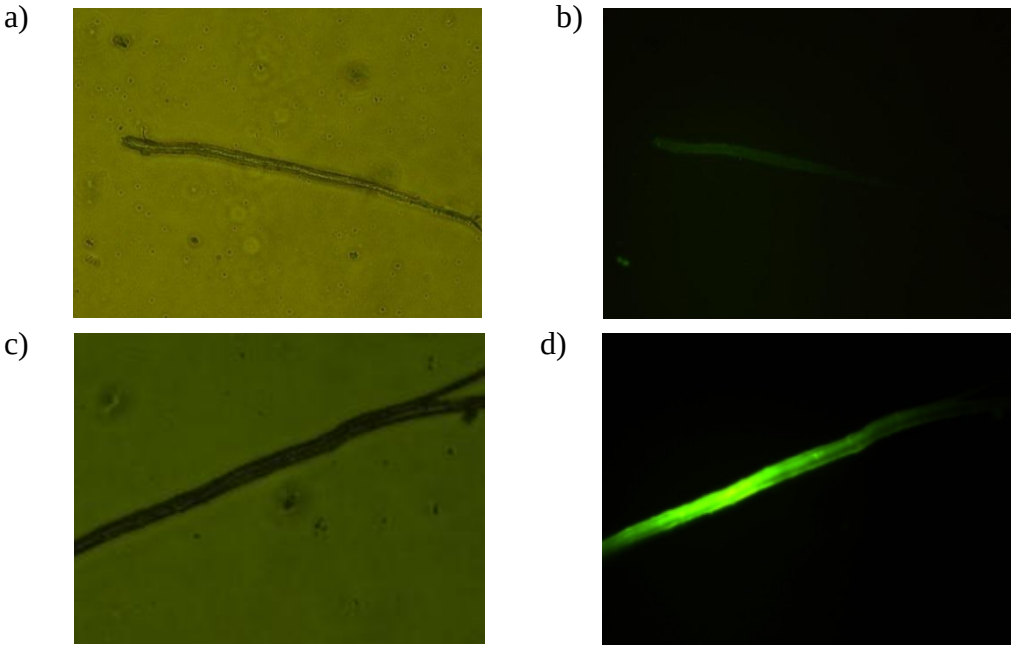


Figure S8. Fluorescent and bright field images of lucigenin incorporated FP **13**.

Sample preparation to determine Zeta potential

To a solution of functional pores **13** (0.3 mg) in DMF (0.5 mL) was added 3 mL of 0.001M $NaNO_3$. The pH of the suspension was maintained at 7.2 by adding HNO_3/ NaOH 0.01M. This suspension was sonicated for 10 min. and then zeta potential was measured.

References:

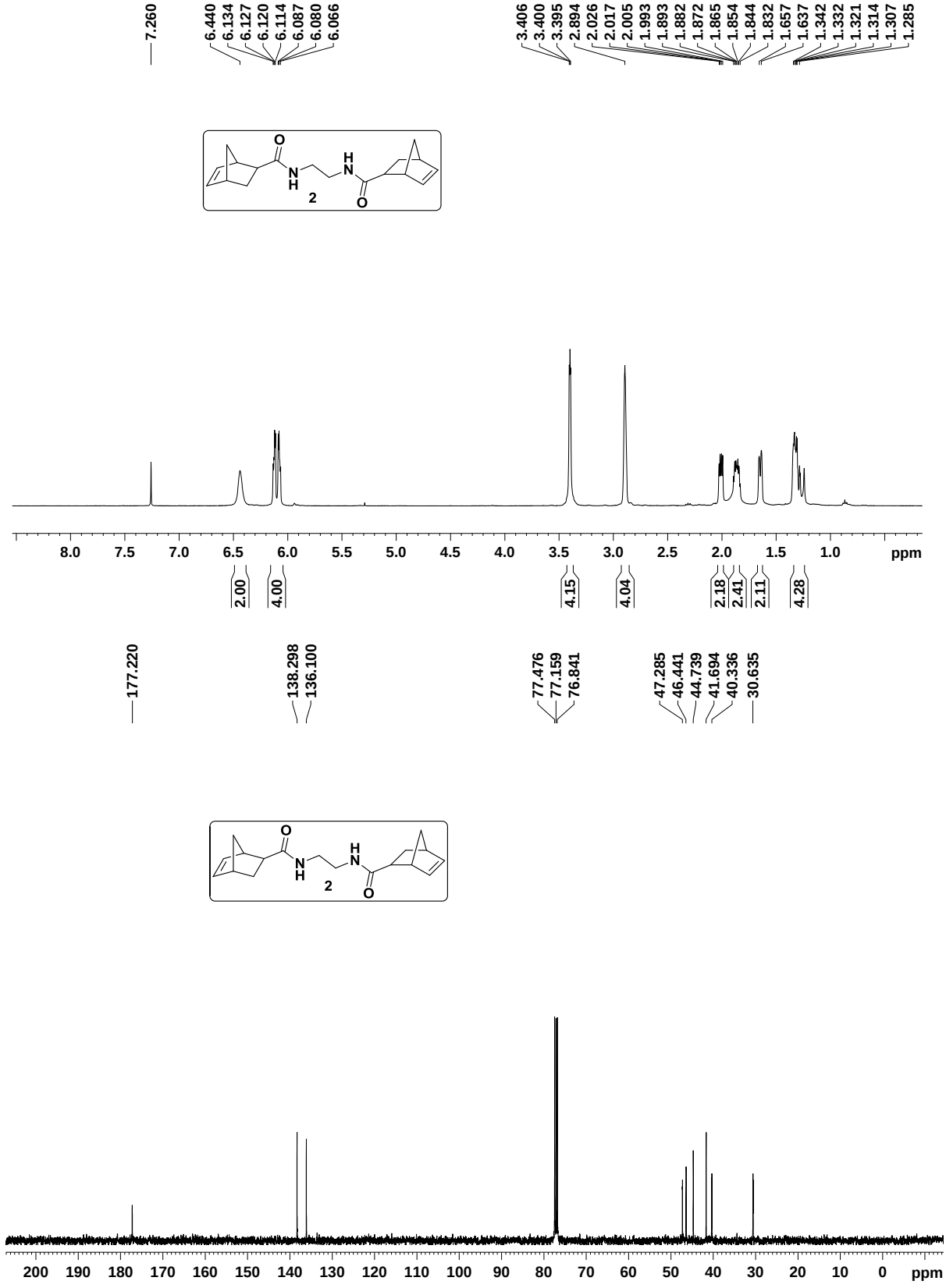
1 S. Sutthasupa, F. Sanda, T. Masuda, *Macromol. Chem. Phy*. 2008, ***209***, 930.

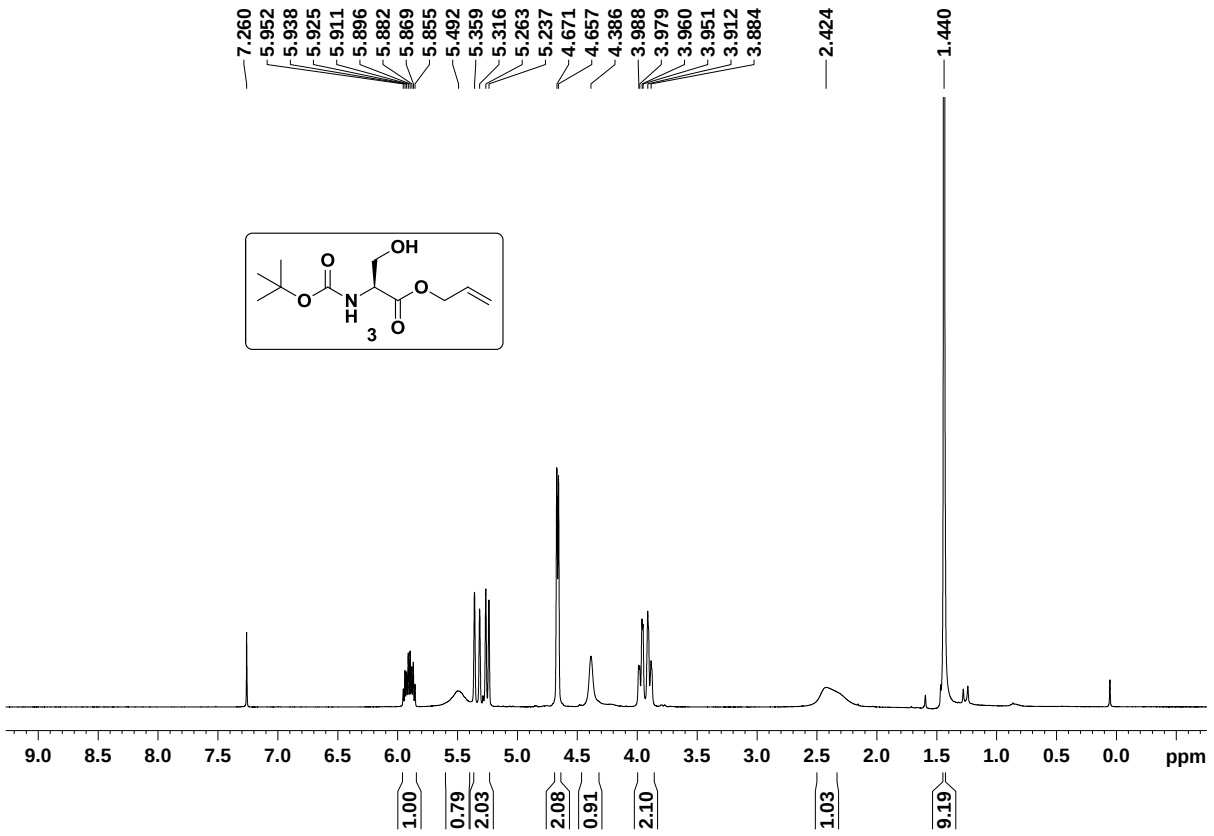
2 D. D. Manning, L. E. Strong, X. Hu, P. J. Beck, L. L. Kiessling, *Tetrahedron* 1997; ***35***, 11937.

3 N. Naganna, N. Madhavan, *Org. Lett*. 2013, ***22***, 5870.

4 K. J. Jensen, J. Alsina, M. F. Songster, J. Vágner, F. Albericio, G. Barany, *J. Am. Chem. Soc*. 1998, ***120***, 5441.

Spectra of compounds

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5.938
5.925
5.911
5.896
5.882
5.869
5.855
5.492
5.359
5.316
5.263
5.237
4.671
4.657
4.386
3.988
3.979
3.960
3.951
3.912
3.884
2.424
1.440
OH
O
O
N
H
3
O
O
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
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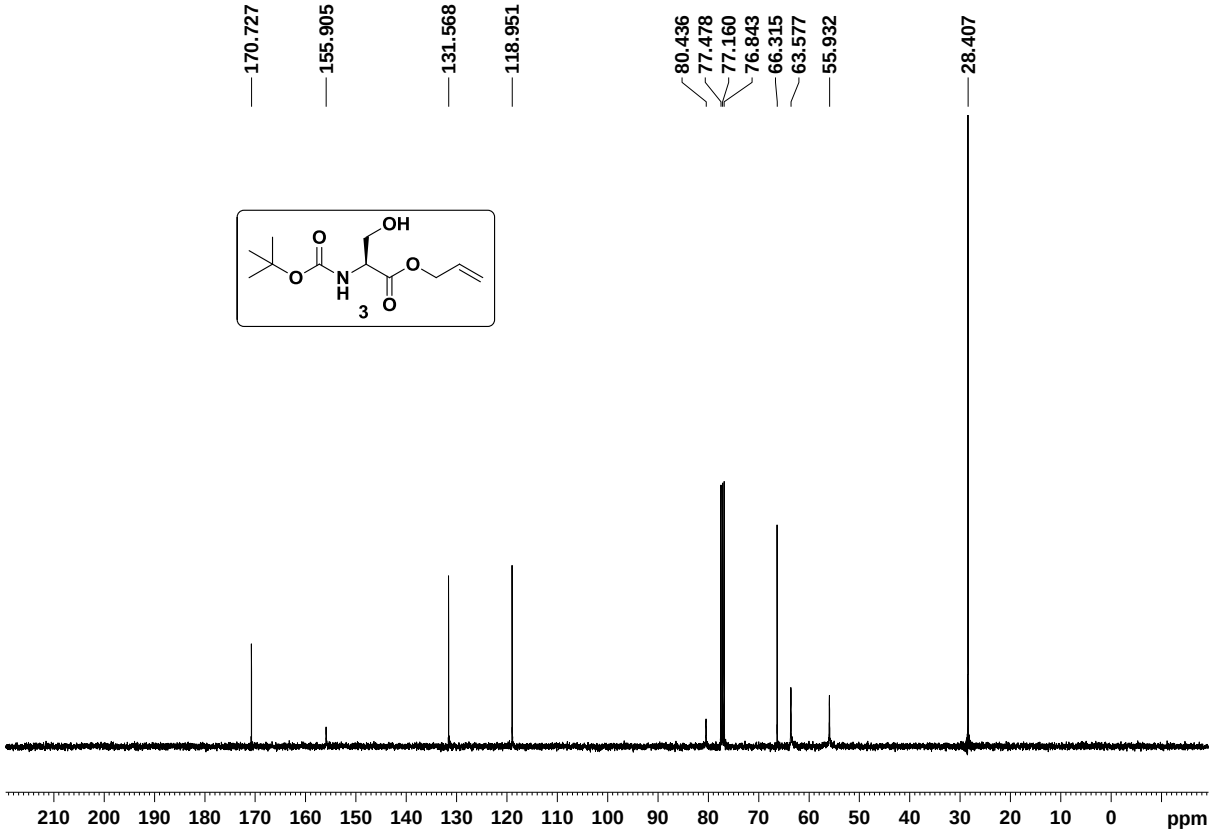
0.79
2.03
2.08
0.91
2.10
1.03
9.19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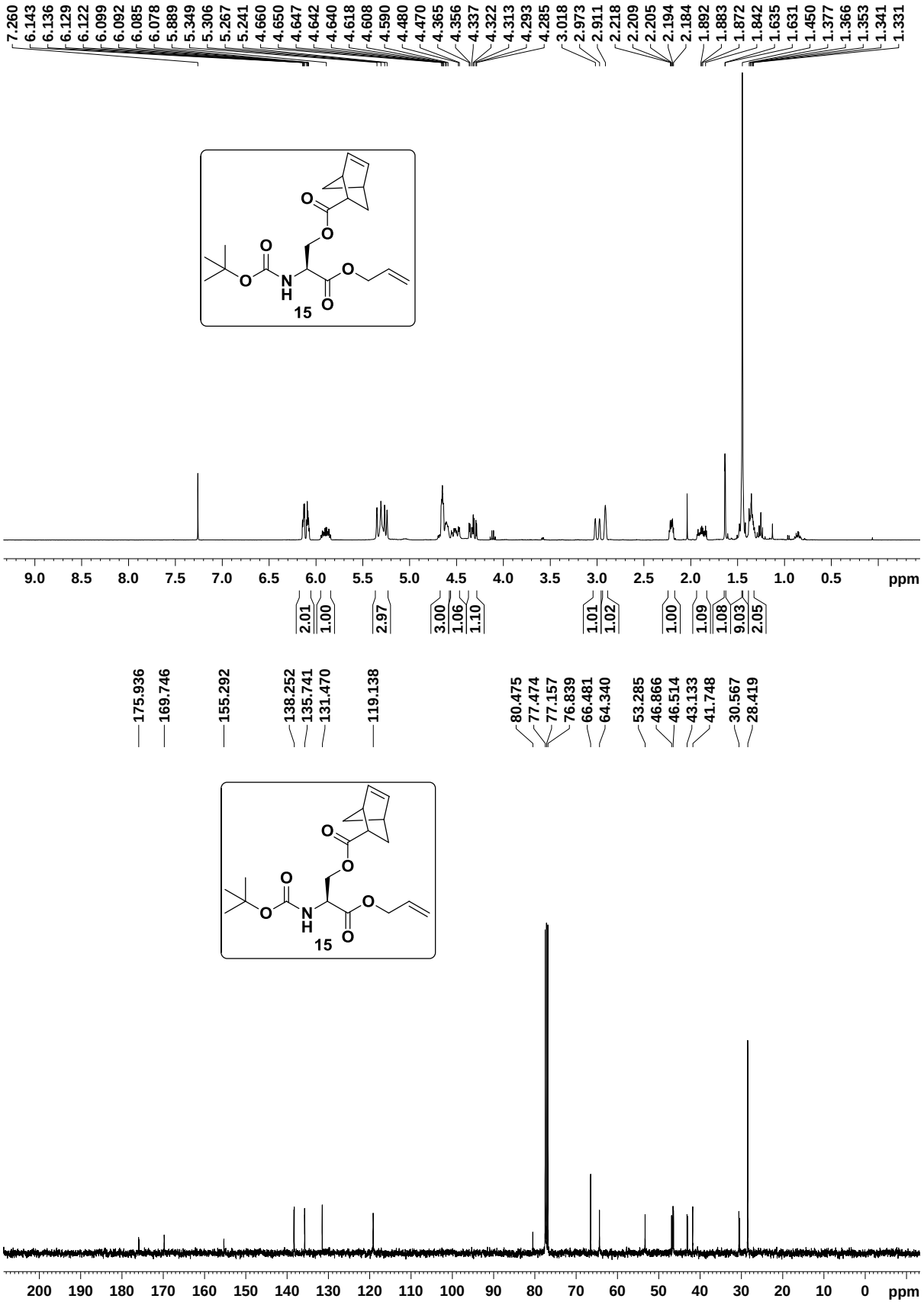
O
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm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5.267
5.241
4.660
4.650
4.647
4.642
4.640
4.618
4.608
4.590
4.480
4.470
4.365
4.356
4.337
4.322
4.313
4.293
4.285
3.018
2.973
2.911
2.218
2.209
2.205
2.194
2.184
1.892
1.883
1.872
1.842
1.635
1.631
1.450
1.377
1.366
1.353
1.341
1.331
15
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 ppm
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1.00
2.97
3.00
1.06
1.10
1.01
1.02
1.00
1.09
1.08
9.03
2.05
175.936
169.746
155.292
138.252
135.741
131.470
119.138
80.475
77.474
77.157
76.839
66.481
64.340
53.285
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41.748
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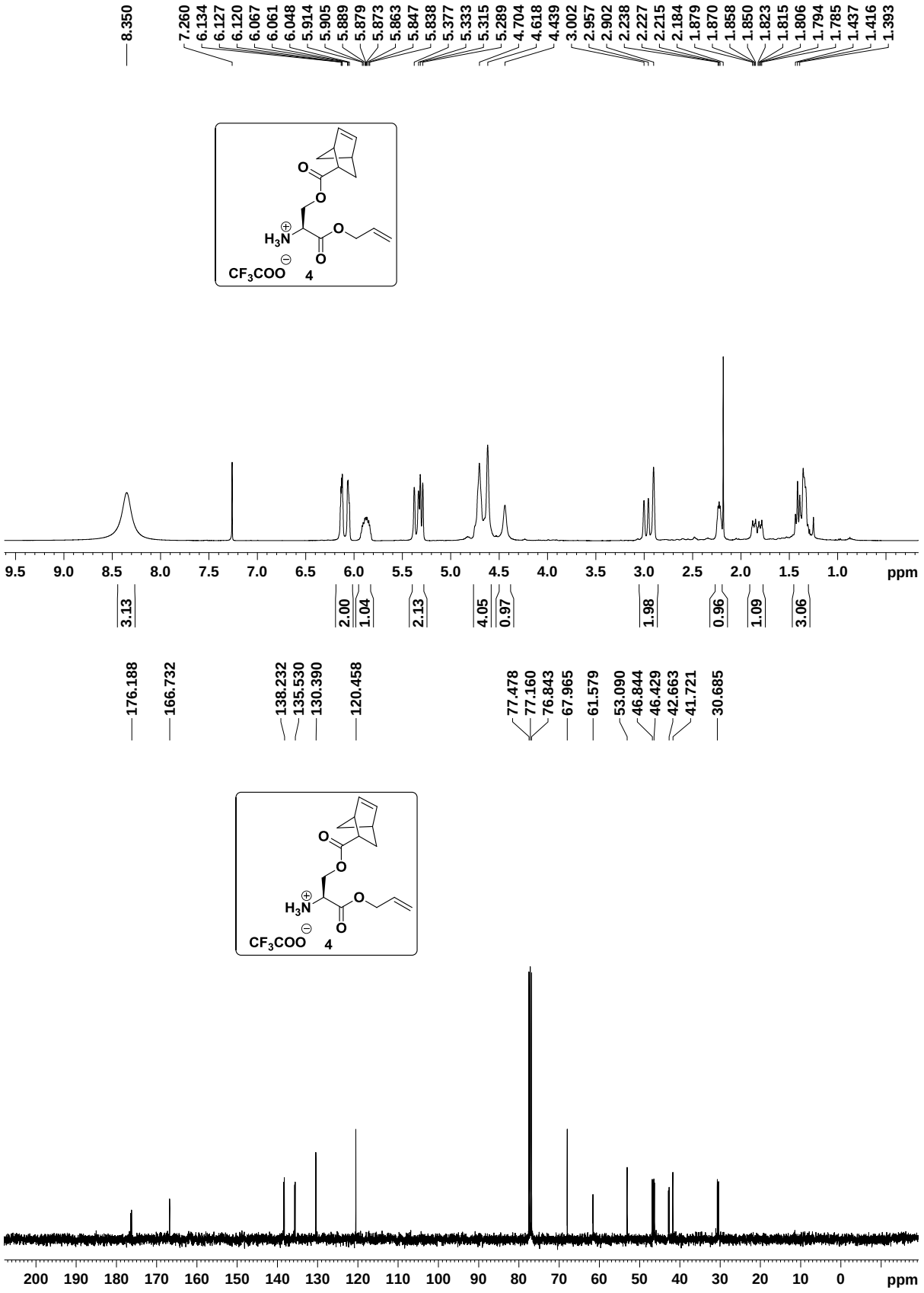
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5.863
5.847
5.838
5.377
5.333
5.315
5.289
4.704
4.618
4.439
3.002
2.957
2.902
2.238
2.227
2.215
2.184
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1.870
1.858
1.850
1.823
1.815
1.806
1.794
1.785
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1.416
1.393
O
O
H3N
O
O
CF3COO
4
9.5 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 ppm
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2.00
1.04
2.13
4.05
0.97
1.98
0.96
1.09
3.06
176.188
166.732
138.232
135.530
130.390
120.458
77.478
77.160
76.843
67.965
61.579
53.090
46.844
46.429
42.663
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H3N
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CF3COO
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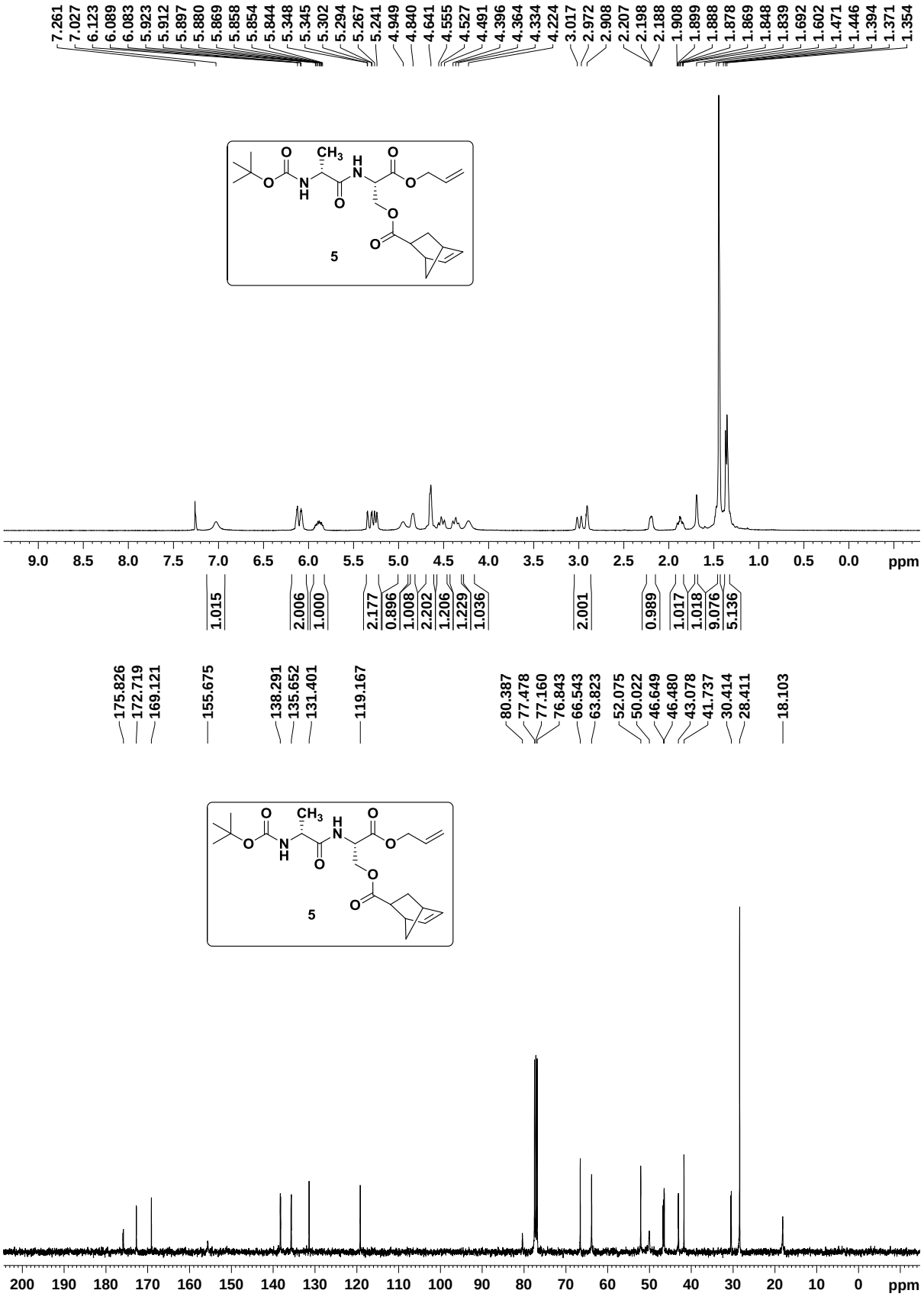
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6.083
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5.897
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5.294
5.267
5.241
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4.527
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4.224
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2.198
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1.869
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1.692
1.602
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1.446
1.394
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1.354
5
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2.006
1.000
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0.896
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1.229
1.036
2.001
0.989
1.017
1.018
9.076
5.136
175.826
172.719
169.121
155.675
138.291
135.652
131.401
119.167
80.387
77.478
77.160
76.843
66.543
63.823
52.075
50.022
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41.737
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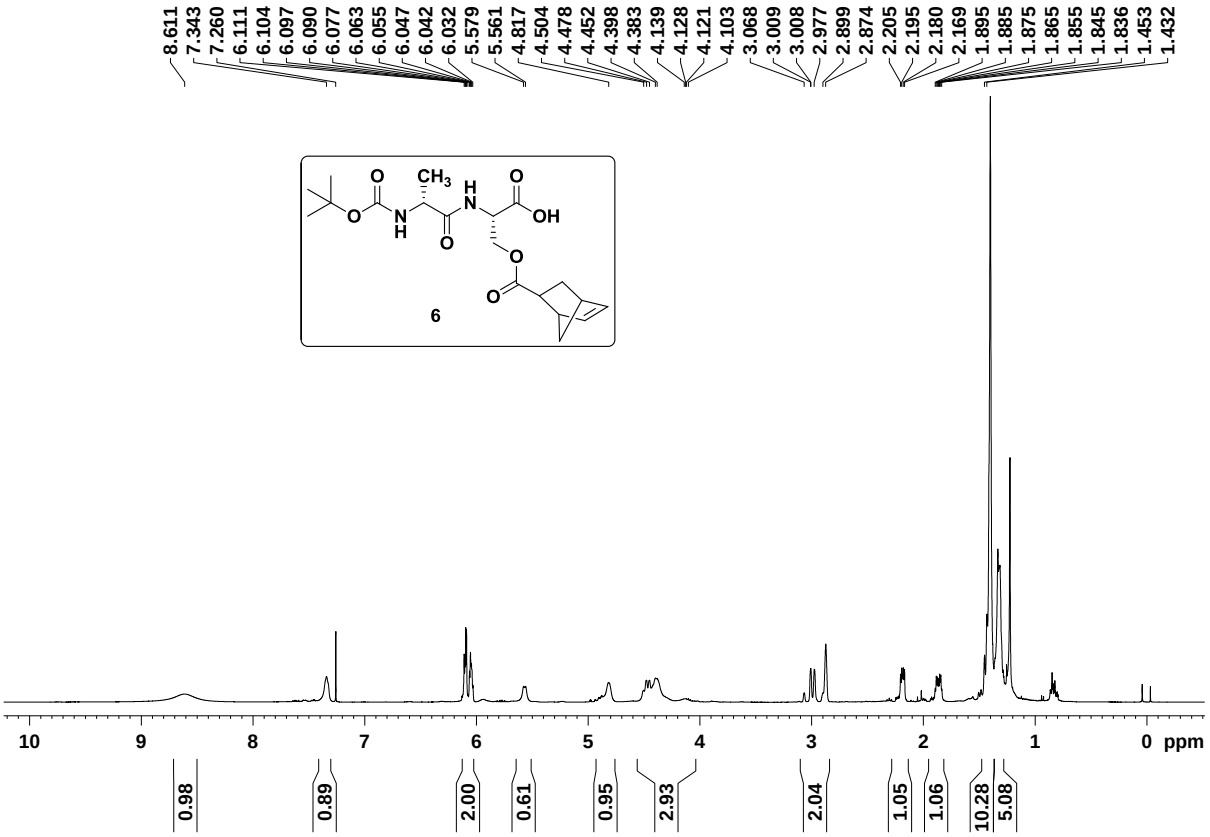
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6.032
5.579
5.561
4.817
4.504
4.478
4.452
4.398
4.383
4.139
4.128
4.121
4.103
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3.009
3.008
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2.874
2.205
2.195
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2.169
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1.885
1.875
1.865
1.855
1.845
1.836
1.453
1.432
6
10
9
8
7
6
5
4
3
2
1
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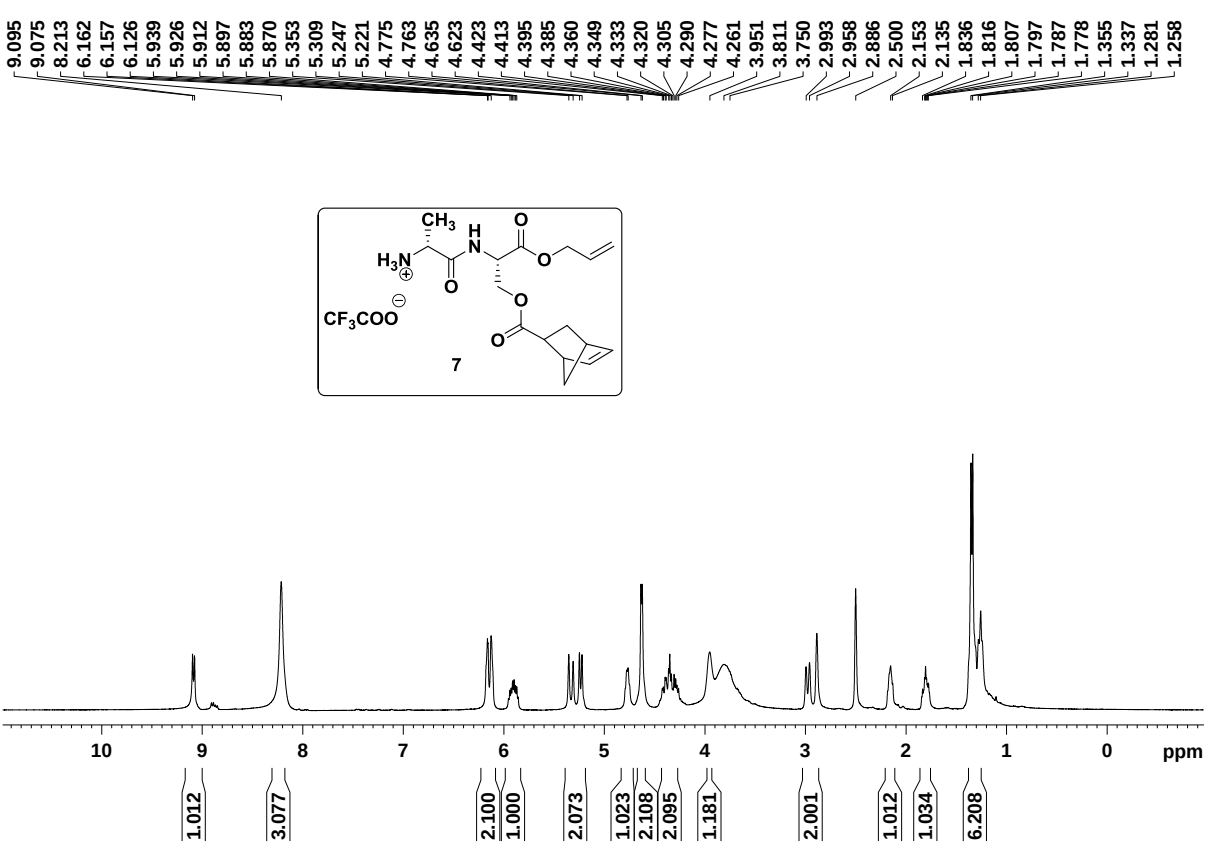
5.08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5.247
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4.763
4.635
4.623
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4.413
4.395
4.385
4.360
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4.320
4.305
4.290
4.277
4.261
3.951
3.811
3.750
2.993
2.958
2.886
2.500
2.153
2.135
1.836
1.816
1.807
1.797
1.787
1.778
1.355
1.337
1.281
1.258
7
10
9
8
7
6
5
4
3
2
1
0
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1.181
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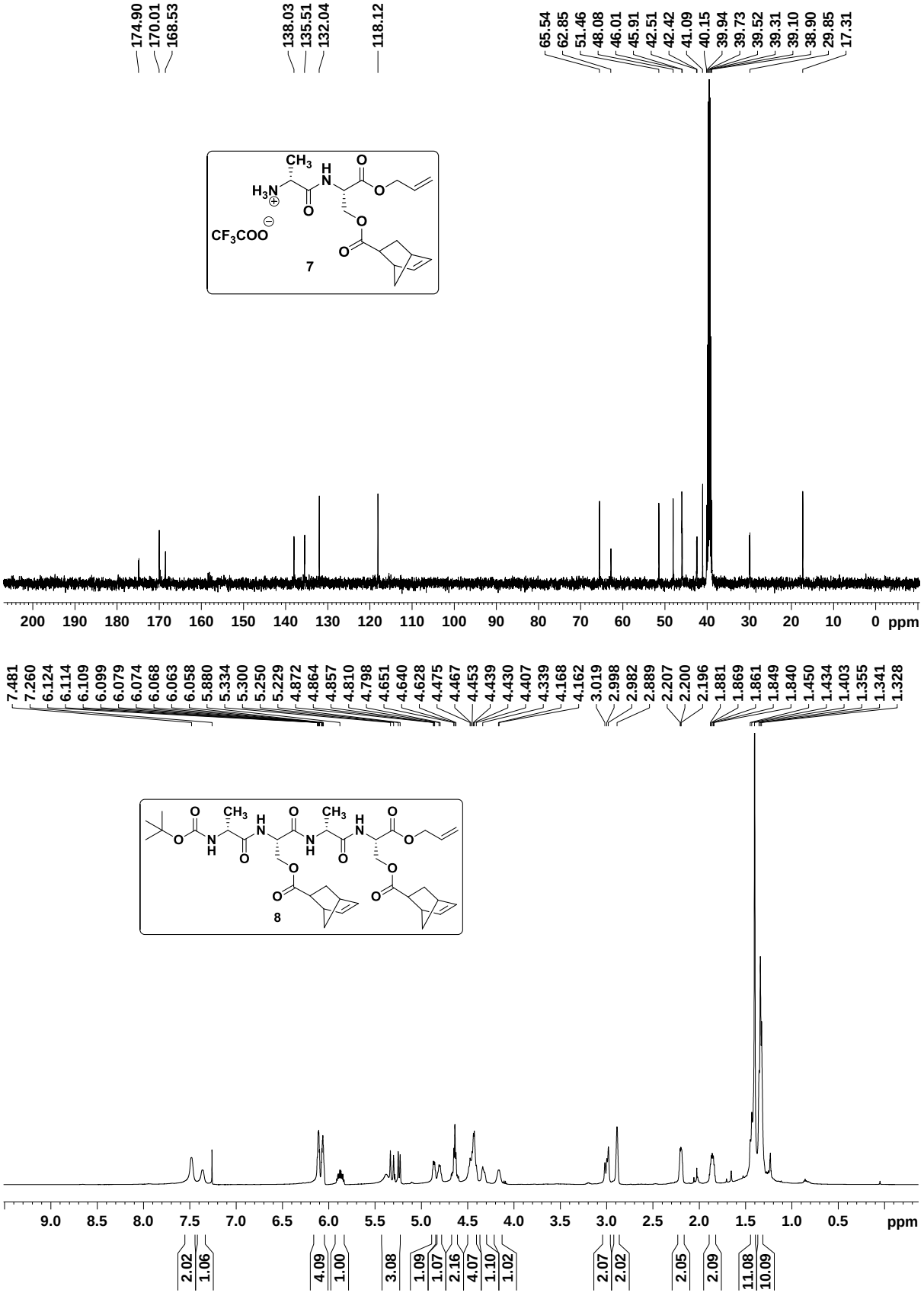
6.208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42.51
42.42
41.09
40.15
39.94
39.73
39.52
39.31
39.10
38.90
29.85
17.31
7
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm
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7.260
6.124
6.114
6.109
6.099
6.079
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6.063
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5.250
5.229
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4.810
4.798
4.651
4.640
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4.162
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1.861
1.849
1.840
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1.434
1.403
1.355
1.341
1.328
8
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 ppm
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1.06
4.09
1.00
3.08
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2.02
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2.09
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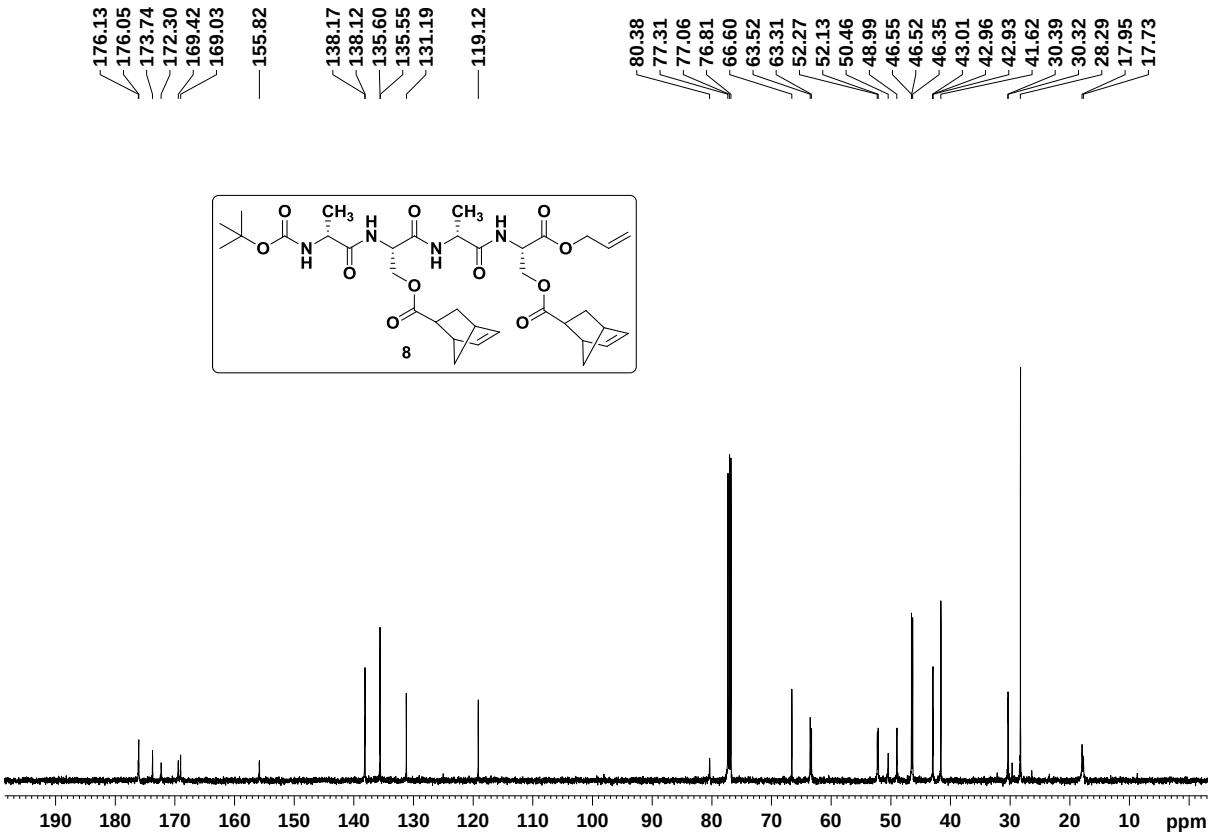
10.09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80.38
77.31
77.06
76.81
66.60
63.52
63.31
52.27
52.13
50.46
48.99
46.55
46.52
46.35
43.01
42.96
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8
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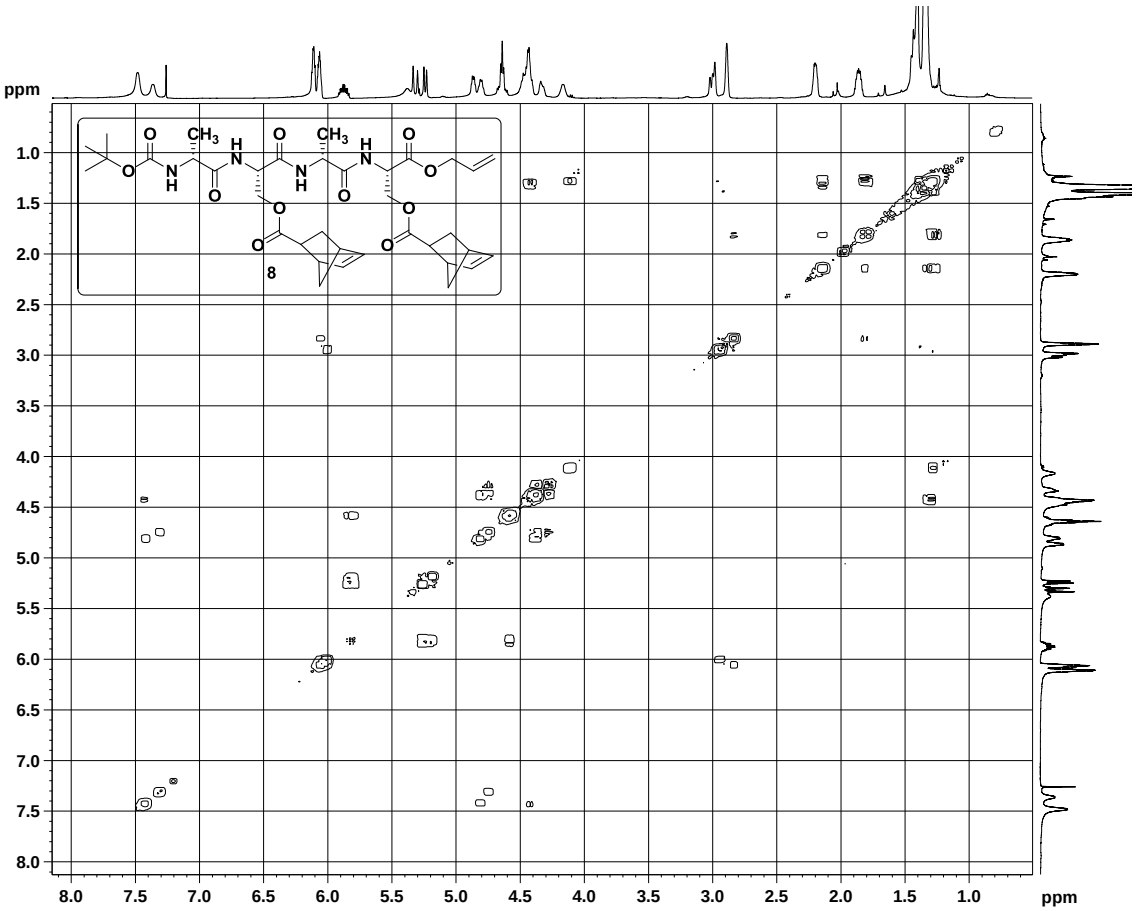
ppm
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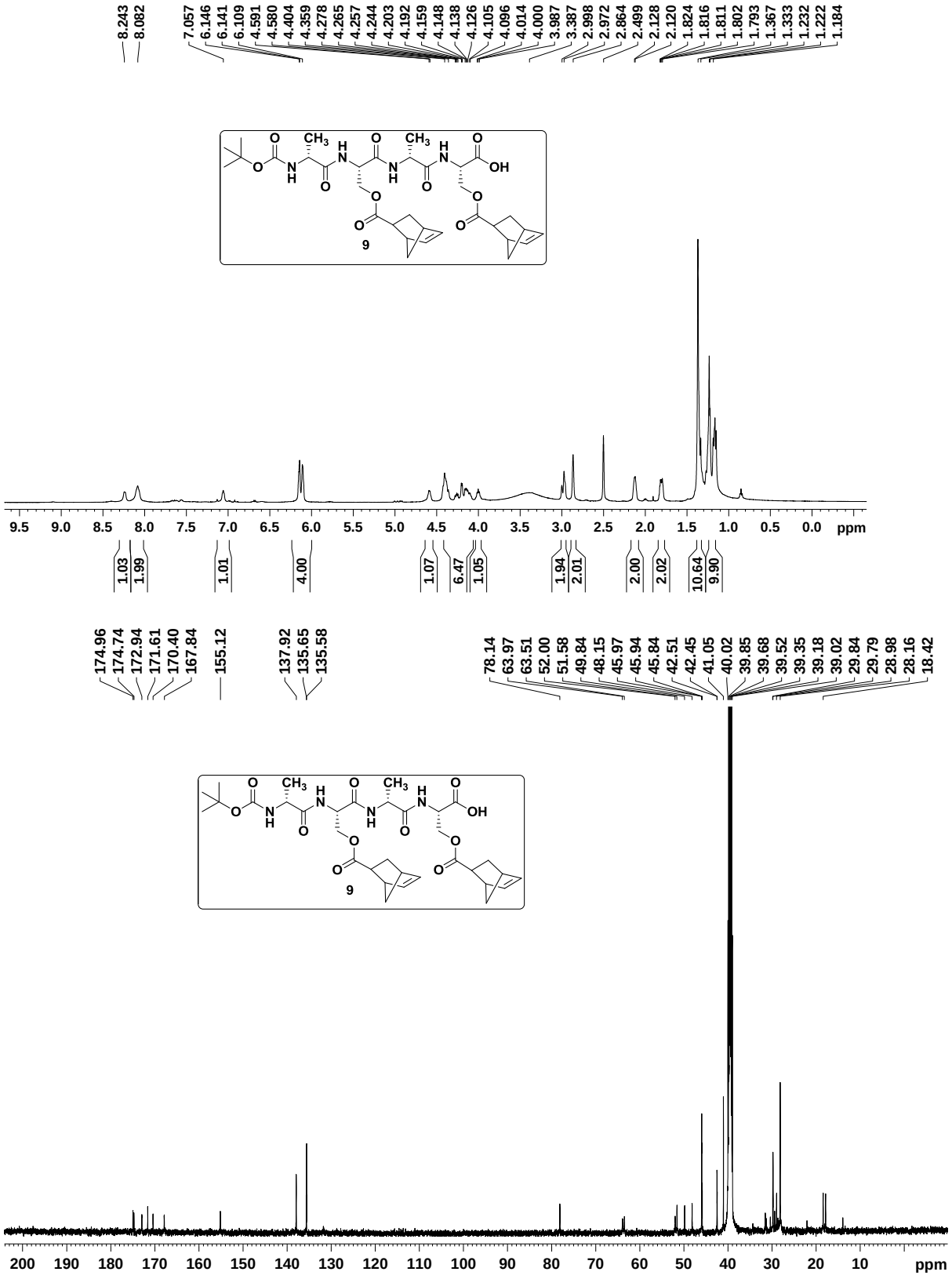
8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 ppm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4.257
4.244
4.203
4.192
4.159
4.148
4.138
4.126
4.105
4.096
4.014
4.000
3.987
3.387
2.998
2.972
2.864
2.499
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2.120
1.824
1.816
1.811
1.802
1.793
1.367
1.333
1.232
1.222
1.184
9
9.5 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
1.03
1.99
1.01
4.00
1.07
6.47
1.05
1.94
2.01
2.00
2.02
10.64
9.90
174.96
174.74
172.94
171.61
170.40
167.84
155.12
137.92
135.65
135.58
78.14
63.97
63.51
52.00
51.58
49.84
48.15
45.97
45.94
45.84
42.51
42.45
41.05
40.02
39.85
39.68
39.52
39.35
39.18
39.02
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28.16
18.42
9
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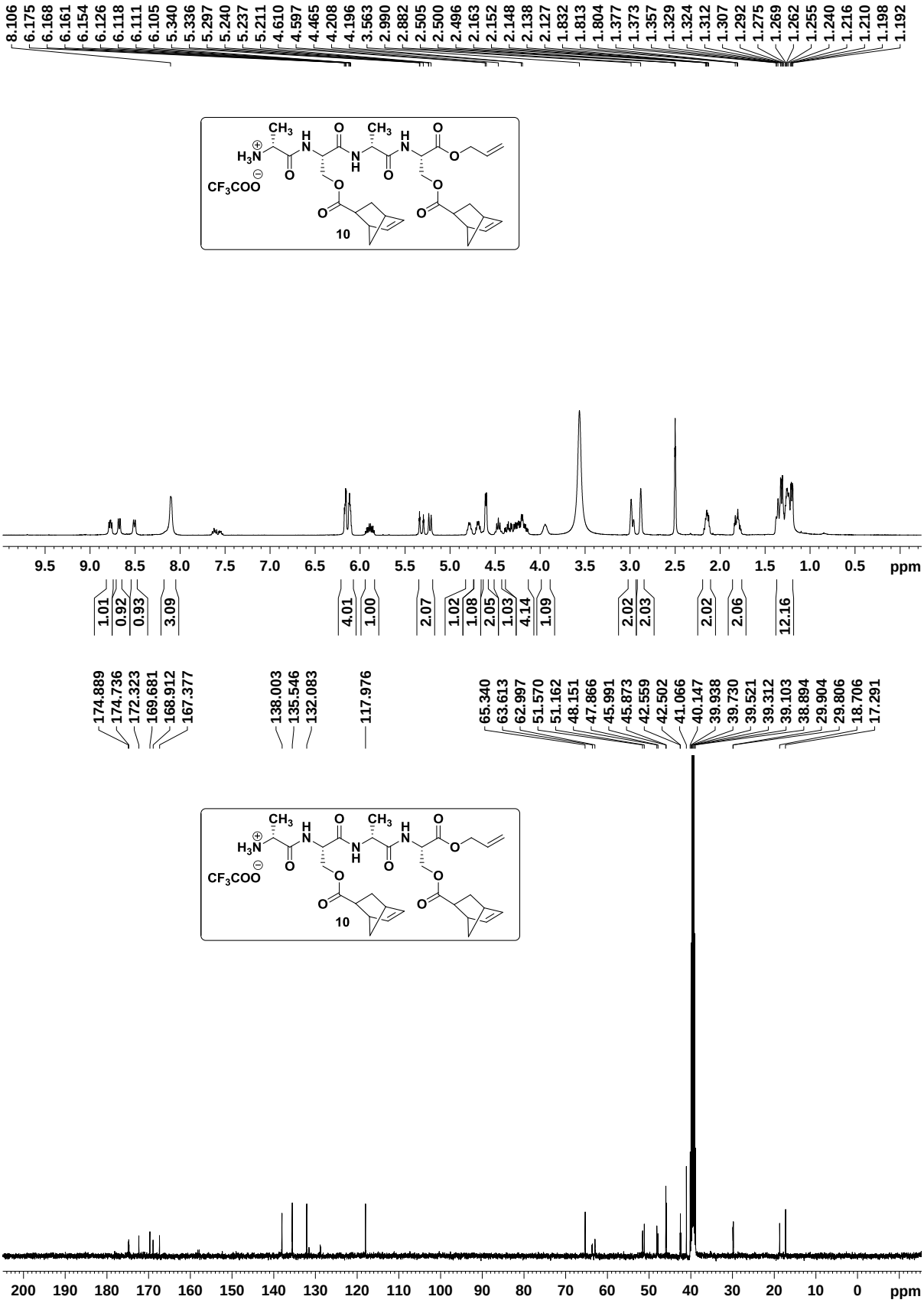
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5.237
5.211
4.610
4.597
4.465
4.208
4.196
3.563
2.990
2.882
2.505
2.500
2.496
2.163
2.152
2.148
2.138
2.127
1.832
1.813
1.804
1.377
1.373
1.357
1.329
1.324
1.312
1.307
1.292
1.275
1.269
1.262
1.255
1.240
1.216
1.210
1.198
1.192
CF3COO
10
9.5 9.0 8.5 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 ppm
1.01
0.92
0.93
3.09
4.01
1.00
2.07
1.02
1.08
2.05
1.03
4.14
1.09
2.02
2.03
2.02
2.06
12.16
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174.736
172.323
169.681
168.912
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132.083
117.976
65.340
63.613
62.997
51.570
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48.151
47.866
45.991
45.873
42.559
42.502
41.066
40.147
39.938
39.730
39.521
39.312
39.103
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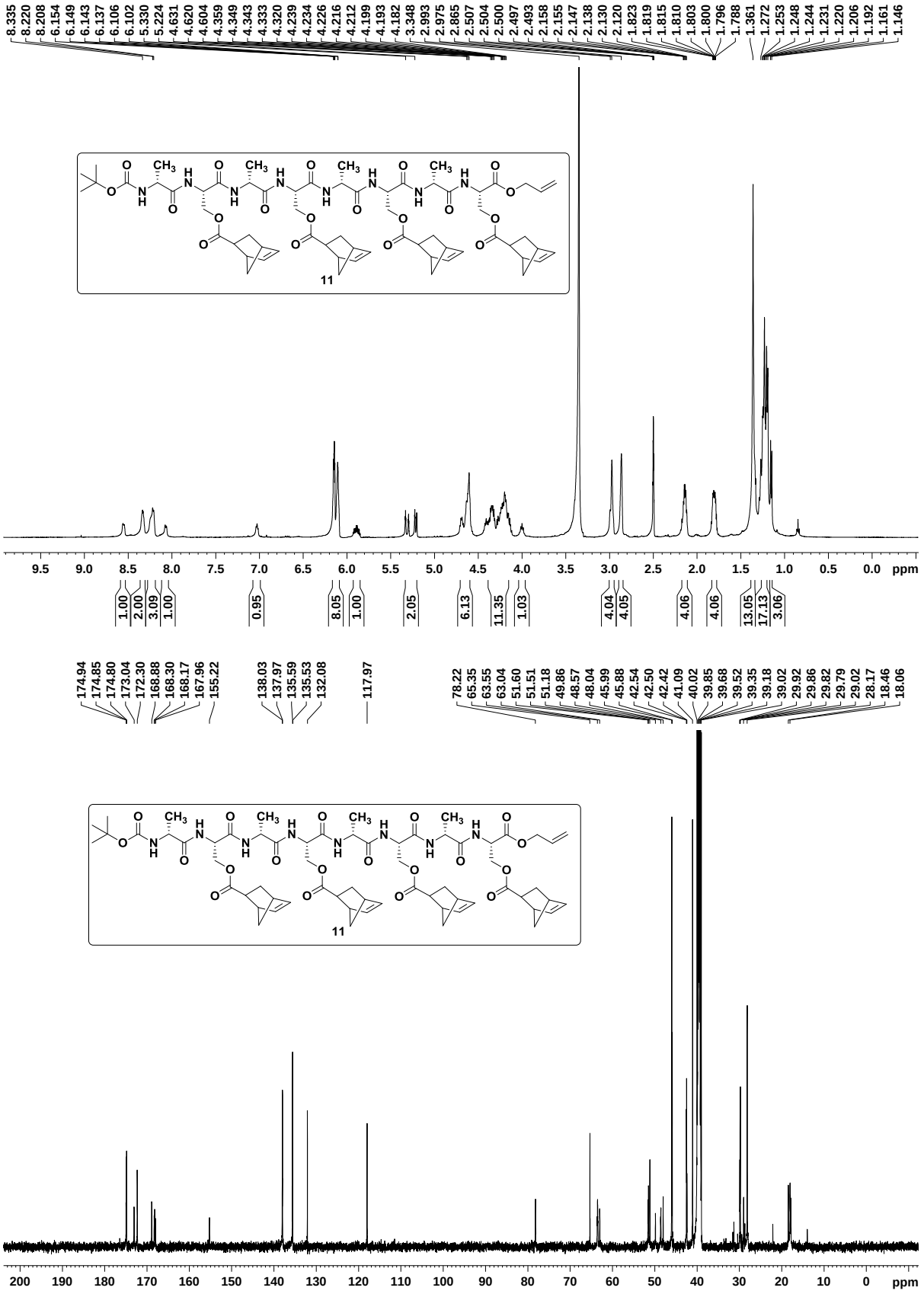
17.291
CF3COO
10
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm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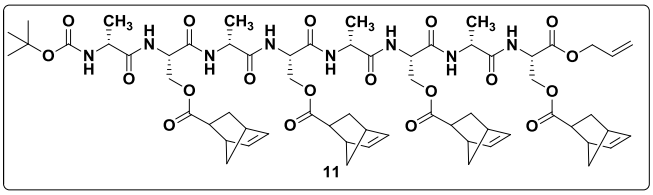
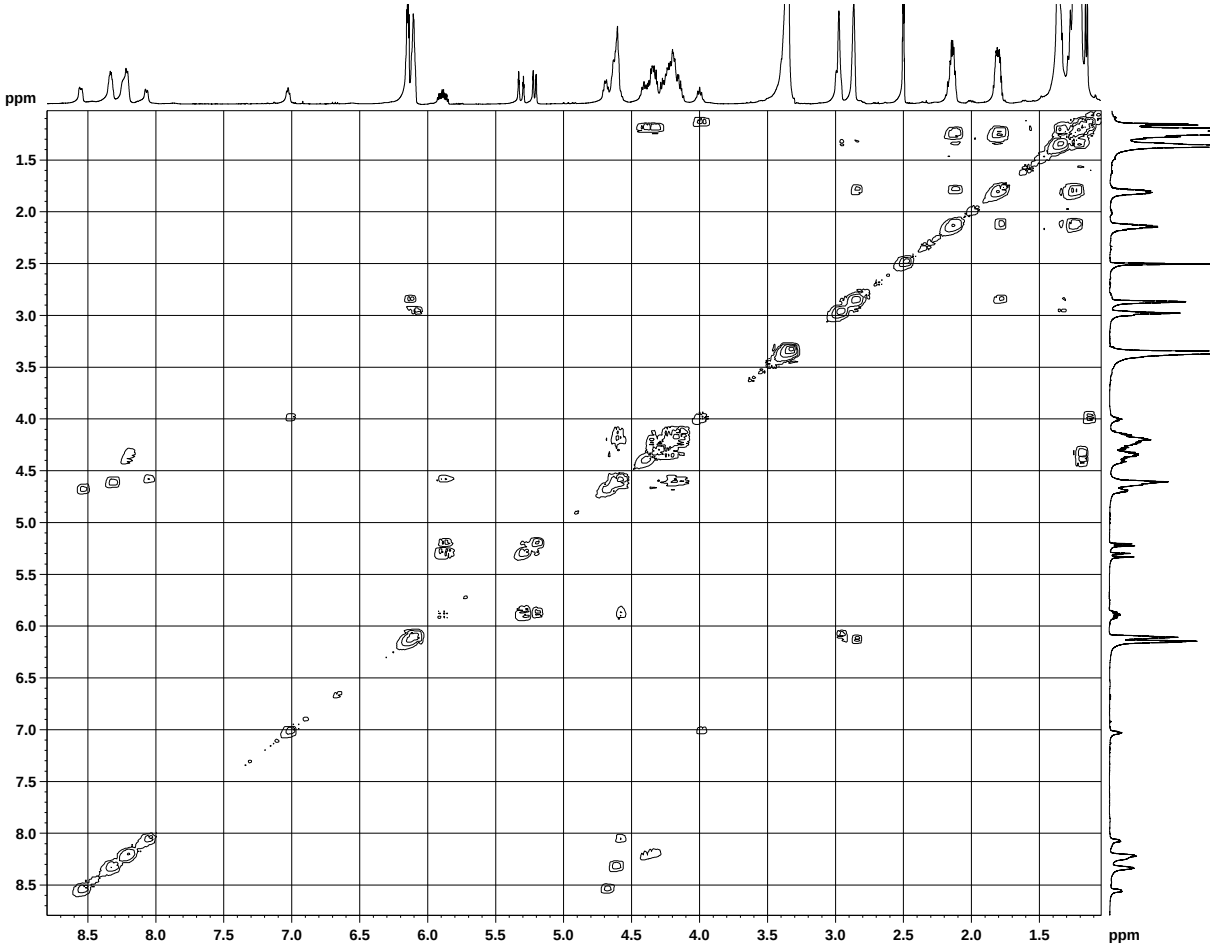
11
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 ppm
1.00 2.00 3.09 1.00 0.95 8.05 1.00 2.05 6.13 11.35 1.03 4.04 4.05 4.06 4.06 13.05 17.13 3.06
174.94 174.85 174.80 173.04 172.30 168.88 168.30 168.17 167.96 155.22 138.03 137.97 135.59 135.53 132.08 117.97 78.22 65.35 63.55 63.04 51.60 51.51 51.18 49.86 48.57 48.04 45.99 45.88 42.54 42.50 42.42 41.09 40.02 39.85 39.68 39.52 39.35 39.18 39.02 29.92 29.86 29.82 29.79 29.02 28.17 18.46 18.06
11
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm



11


ppm
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2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
8.5
8.0
7.5
7.0
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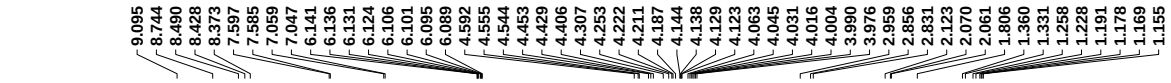
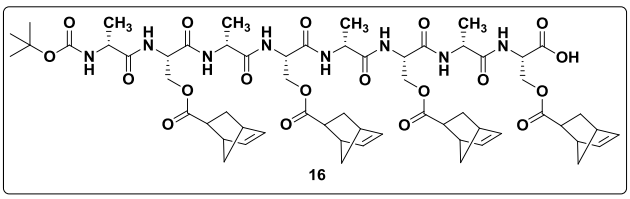
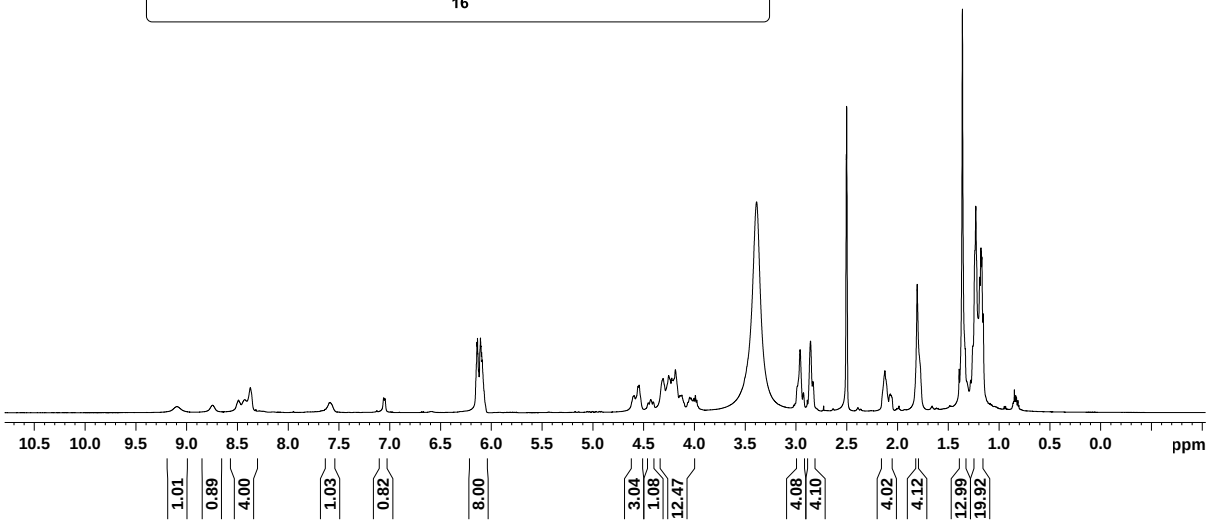
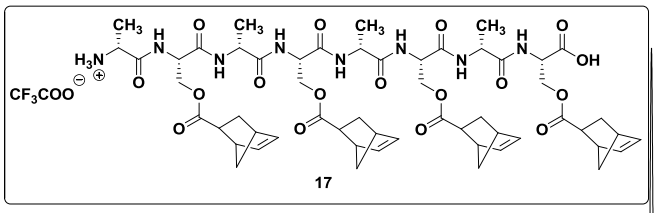
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
ppm

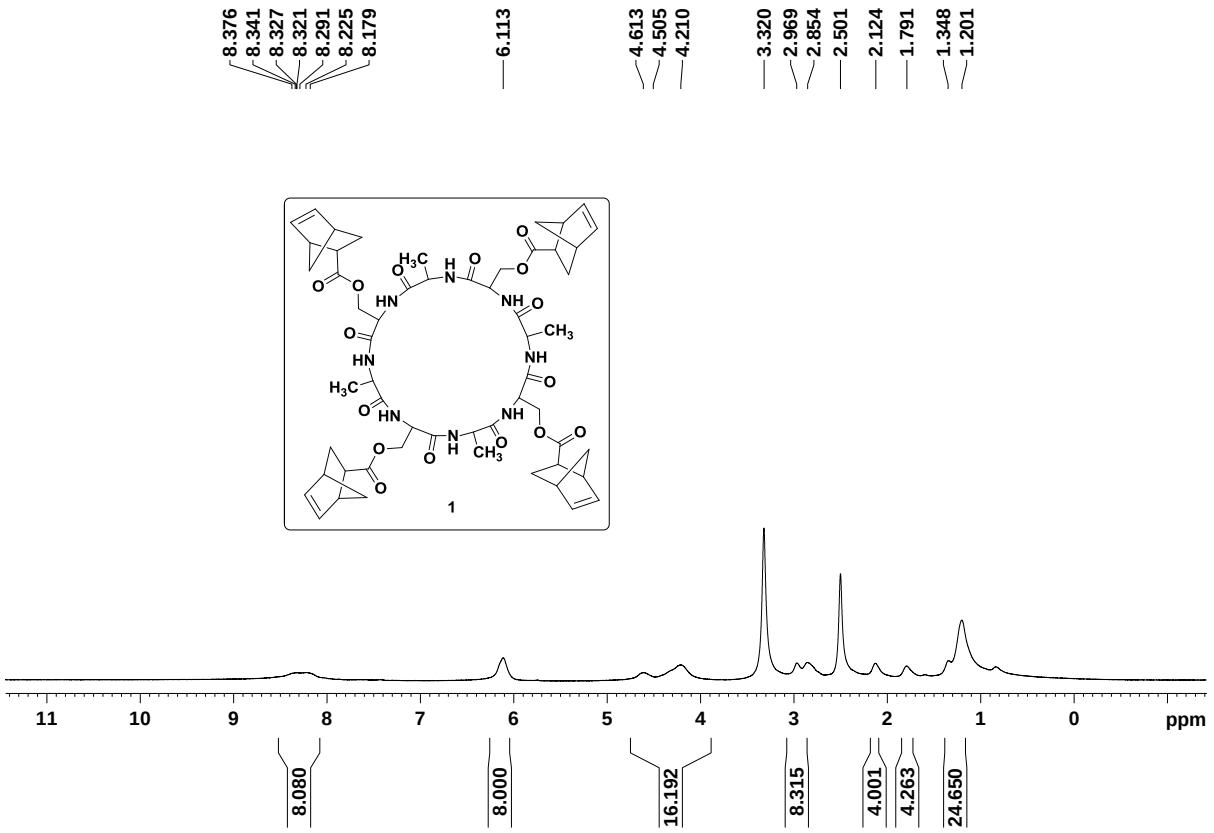






8.753 8.511 8.398 8.380 8.301 8.249 8.110 7.635 7.618 7.565 6.151 6.109 4.777 4.640 4.411 4.348 4.205 4.171 4.128 3.925 3.365 2.976 2.870 2.500 2.141 2.134 1.816 1.807 1.794 1.358 1.348 1.318 1.309 1.278 1.238 1.226 1.190 1.179

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8.327
8.321
8.291
8.225
8.179
6.113
4.613
4.505
4.210
3.320
2.969
2.854
2.501
2.124
1.791
1.348
1.201
1
11
10
9
8
7
6
5
4
3
2
1
0
ppm
8.080
8.000
16.192
8.315
4.001
4.263
24.650