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SUPPLEMENTARY INFORMATION

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A general strategy for synthesis of cyclophane-braced peptide macrocycles via palladium-catalysed intramolecular sp^3 C—H arylation

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Supporting Information

A General Strategy for Synthesis of Cyclophane-Braced Peptide Macrocycles via Palladium-Catalyzed Intramolecular sp^3 C−H Arylation

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1. Reagents

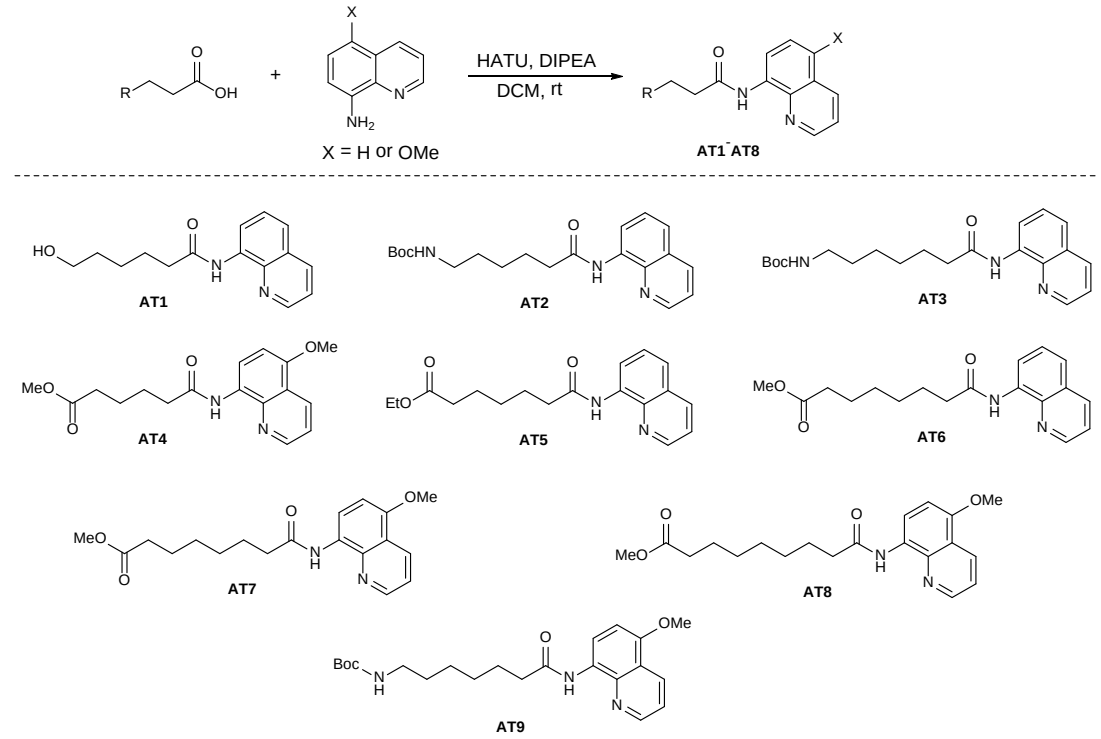
All commercial materials were used as received unless otherwise noted. DCM and was dried by distillation over CaH_2. CH_3CN and *t*BuOH were purchased from *J&K* Chemical and used without further purification. TLC were performed on silica gel Huanghai HSGF254 plates and visualization of the developed chromatogram was performed by fluorescence quenching of UV fluorescence (λ_{max} = 254 nm). Flash chromatography was performed using Silica gel (200-300 mesh) purchased from Qingdao Haiyang Chemical Co. Ag_2CO_3 (99%, *J&K* Chemical), $Pd(OAc)_2$ (98%, *J&K* Chemical), 2-Phenylbenzoic Acid (98%, Energy Chemical), CAN (98%, TCI Chemical) were used in the Pd-catalyzed reactions.

2. Instruments

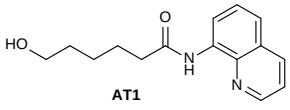
NMR spectra were recorded on Bruker AVANCE AV 400 instruments and all NMR experiments were reported in units, parts per million (ppm), using residual solvent peaks as internal reference. Multiplicities are recorded as: s = singlet, d = doublet, t = triplet, dd = doublet of doublets, td = triplet of doublets, br s = broad singlet, m = multiplet. High resolution EI mass experiments were operated on a Varian 7.0T FTMS instrument.

3. Preparation of alkyl tails (ATs)

General coupling procedure for condensation of carboxylic acid with amine and alcohol: A mixture of the corresponding carboxylic acid (1.0 equiv), amine (1.0 equiv) or alcohol (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) in anhydrous CH_2Cl_2 (0.2 M) was stirred at room temperature overnight. Then the reaction mixture was washed with water and brine. The organic phase was dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo*. The residue was purified by silica gel flash chromatography to give the desired product.

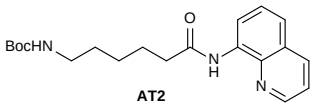


Supplementary Figure 1



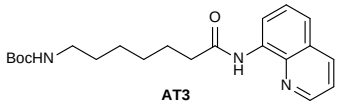
R_f = 0.5, 25% Acetone in Hexane

Compound **AT1** was prepared following the general amide coupling procedure in 77% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.79-8.75 (m, 2H), 8.14 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.54-7.42 (m, 3H), 3.67 (t, *J* = 6.5 Hz, 2H), 2.57 (t, *J* = 7.4 Hz, 2H), 1.88-1.80 (m, 2H), 1.66-1.61 (m, 2H), 1.54-1.47 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.91, 148.24, 138.39, 136.52, 134.53, 128.04, 127.51, 121.69, 121.56, 116.59, 62.64, 38.12, 32.48, 25.48, 25.34.



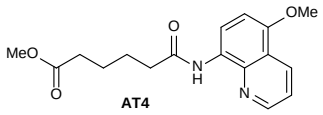
R_f = 0.6, 25% Acetone in Hexane

Compound **AT2** was prepared following the general amide coupling procedure in 81% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.80-8.76 (m, 2H), 8.15 (d, *J* = 8.2 Hz, 1H), 7.55-7.43 (m, 3H), 4.59 (s, 1H), 3.14-3.11 (m, 2H), 2.57 (t, *J* = 7.4 Hz, 2H), 1.89-1.81 (m, 2H), 1.59-1.52 (m, 2H), 1.49-1.42 (m, 11H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.62, 156.05, 148.17, 138.31, 136.39, 134.49, 127.94, 127.40, 121.63, 121.45, 116.43, 79.02, 40.42, 38.00, 29.88, 28.45, 26.46, 25.26.



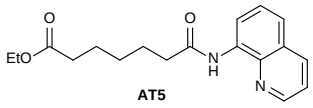
AT3 R_f = 0.6, 25% Acetone in Hexane

Compound **AT3** was prepared following the general amide coupling procedure in 78% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.81-8.77 (m, 2H), 8.16 (dd, *J* = 8.2, 1.4 Hz, 1H), 7.55-7.44 (m, 3H), 4.53 (s, 1H), 3.12-3.09 (m, 2H), 2.56 (t, *J* = 7.4 Hz, 2H), 1.86-1.78 (m, 2H), 1.54-1.36 (m, 15H); ^{13}C NMR (101 MHz, CDCl3) δ 171.52, 155.93, 147.97, 138.12, 136.16, 134.36, 127.74, 127.17, 121.43, 121.23, 116.21, 78.66, 40.36, 37.86, 29.79, 28.77, 28.32, 26.43, 25.37.



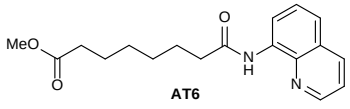
AT4 R_f = 0.6, 25% Acetone in Hexane

Compound **AT4** was prepared by coupling of adipic acid monoester with 5-methoxyl-8-aminoquinoline[1] following the general amide coupling procedure in 75% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.50 (s, 1H), 8.73 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.63 (d, *J* = 8.5 Hz, 1H), 8.48 (dd, *J* = 8.4, 1.6 Hz, 1H), 7.36 (dd, *J* = 8.4, 4.2 Hz, 1H), 6.75 (d, *J* = 8.6 Hz, 1H), 3.90 (s, 3H), 3.62 (s, 3H), 2.50 (t, *J* = 7.3 Hz, 2H), 2.35 (t, *J* = 7.2 Hz, 2H), 1.85-1.67 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.79, 170.72, 150.14, 148.54, 138.98, 131.18, 127.91, 120.64, 120.36, 116.53, 104.29, 55.70, 51.48, 37.58, 33.81, 25.12, 24.57.



AT5 R_f = 0.6, 25% Acetone in Hexane

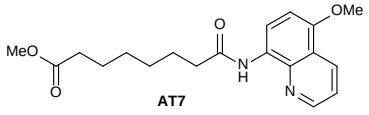
Compound **AT5** was prepared following the general amide coupling procedure in 83% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.80-8.76 (m, 2H), 8.15 (d, *J* = 8.2 Hz, 1H), 7.54-7.43 (m, 3H), 4.14-4.09 (m, 2H), 2.57 (t, *J* = 7.4 Hz, 2H), 2.32 (t, *J* = 7.4 Hz, 2H), 1.87-1.80 (m, 2H), 1.74-1.67 (m, 2H), 1.51-1.43 (m, 2H), 1.24 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.78, 171.68, 148.23, 138.44, 136.48, 134.62, 128.04, 127.54, 121.69, 121.48, 116.51, 60.34, 38.05, 34.28, 28.86, 25.38, 24.83, 14.35.



AT6 R_f = 0.5, 25% Acetone in Hexane

Compound **AT6** was prepared following the general amide coupling procedure in 74%

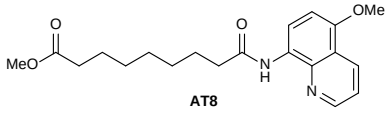
yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.81-8.77 (m, 2H), 8.17 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.55-7.44 (m, 3H), 3.66 (s, 3H), 2.56 (t, *J* = 7.5 Hz, 2H), 2.32 (t, *J* = 7.5 Hz, 2H), 1.86-1.79 (m, 2H), 1.69-1.62 (m, 2H), 1.49-1.39 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.38, 171.88, 148.26, 138.45, 136.52, 134.64, 128.07, 127.58, 121.72, 121.50, 116.53, 51.62, 38.24, 34.15, 29.04, 25.58, 24.93; HRMS: Calcd for $C_{18}H_{23}N_2O_3$ [M+H$^+$]: 315.1703, found: 315.1708.



AT7

R_f = 0.5, 25% Acetone in Hexane

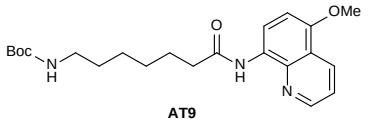
Compound **AT7** was prepared following the general amide coupling procedure in 68% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.56 (s, 1H), 8.82 (d, *J* = 4.2 Hz, 1H), 8.69 (d, *J* = 8.5 Hz, 1H), 8.59 (d, *J* = 8.4 Hz, 1H), 7.46 (dd, *J* = 8.4, 4.2 Hz, 1H), 6.84 (d, *J* = 8.6 Hz, 1H), 3.98 (s, 3H), 3.65 (s, 3H), 2.53 (t, *J* = 7.5 Hz, 2H), 2.31 (t, *J* = 7.5 Hz, 2H), 1.87-1.75 (m, 2H), 1.71-1.59 (m, 2H), 1.52-1.35 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.17, 171.33, 150.20, 148.48, 138.90, 131.51, 127.88, 120.65, 120.47, 116.94, 104.45, 55.78, 51.45, 37.99, 34.04, 28.94, 25.55, 24.83.



AT8

R_f = 0.5, 25% Acetone in Hexane

Compound **AT8** was prepared following the general amide coupling procedure in 73% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.54 (s, 1H), 8.79 (d, *J* = 1.8 Hz, 1H), 8.68 (d, *J* = 8.4 Hz, 1H), 8.55 (d, *J* = 7.5 Hz, 1H), 7.44-7.41 (m, 1H), 6.81 (d, *J* = 6.9 Hz, 1H), 3.96 (s, 3H), 3.65 (s, 3H), 2.51 (t, *J* = 7.4 Hz, 2H), 2.28 (t, *J* = 7.4 Hz, 2H), 1.81-1.76 (m, 2H), 1.65-1.60 (m, 2H), 1.41-1.35 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.34, 171.47, 150.20, 148.65, 139.12, 131.33, 128.09, 120.75, 120.49, 116.62, 104.44, 55.83, 51.53, 38.18, 34.14, 29.20, 29.12, 29.07, 25.74, 24.98.



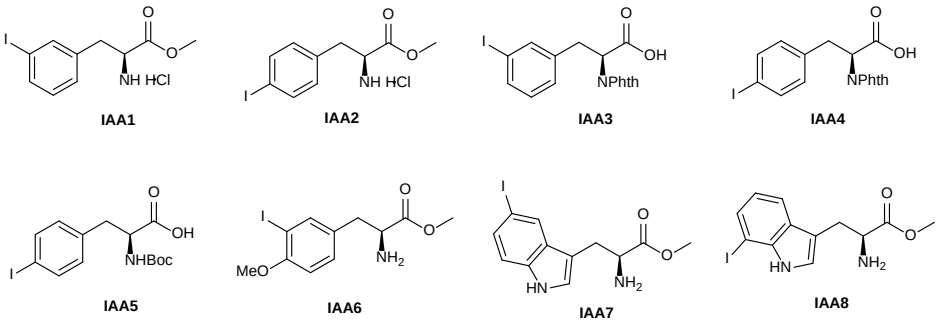
AT9

R_f = 0.6, 25% acetone in Hex

Compound **AT9** was prepared following the general amide coupling procedure in 78% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.54 (s, 1H), 8.80 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.68 (d, *J* = 8.5 Hz, 1H), 8.56 (dd, *J* = 8.4, 1.6 Hz, 1H), 7.42 (dd, *J* = 8.4, 4.2 Hz, 1H), 6.82

(d, *J* = 8.6 Hz, 1H), 4.55 (s, 1H), 3.97 (s, 3H), 3.17-3.00 (m, 2H), 2.52 (t, *J* = 7.5 Hz, 2H), 1.86-1.74 (m, 2H), 1.53-1.33 (m, 15H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.43, 156.11, 150.25, 148.69, 139.15, 131.37, 128.08, 120.79, 120.52, 116.66, 104.46, 79.12, 55.86, 40.62, 38.10, 30.03, 29.05, 28.54, 26.68, 25.72.

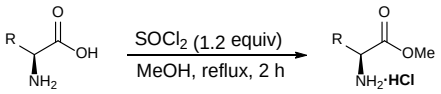
4. Synthesis of iodinated aromatic amino acids (IAAs)



Supplementary Figure 2. Iodinated aromatic amino acid used in this study

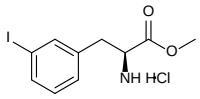
Compounds **IAA5**[2], **IAA6**[3], **IAA7**[4], **IAA8**[5] are known compounds, and were prepared following the reported procedure, spectra data are consistent with those reported in the literature.

4.1 synthesis of **IAA1** and **IAA2**



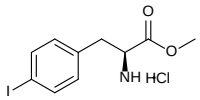
Supplementary Figure 3

General procedure for esterification of iodinated aromatic amino acid: To a stirred solution of the corresponding amino acid (1.0 equiv) in methanol (0.2 M) at room temperature, thionyl chloride (1.2 equiv) was added dropwise and the solution was then heated at reflux for 2 hours. After being cooled to room temperature, the mixture was concentration *in vacuo* to give the desired product.



IAA1 R_f = 0.3, 10% CH_3OH in DCM

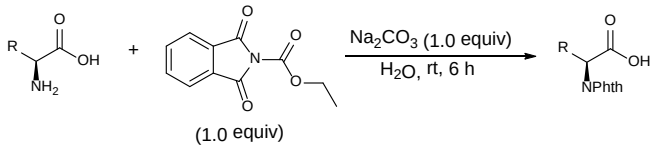
Compound **IAA1** was prepared following the general esterification procedure in 86% yield. ^{1}H NMR (400 MHz, MeOD) δ 7.65-7.64 (m, 2H), 7.25 (d, *J* = 7.2 Hz, 1H), 7.11 (t, *J* = 7.5 Hz, 1H), 4.30 (s, 1H), 3.77 (s, 3H), 3.19 (dd, *J* = 14.6, 5.6 Hz, 1H), 3.11 (dd, *J* = 13.8, 5.9 Hz, 1H); ^{13}C NMR (101 MHz, MeOD) δ 170.17, 139.50, 138.10, 137.90, 131.89, 129.87, 95.44, 54.96, 53.71, 36.73.



IAA2 R_f = 0.3, 10% CH_3OH in DCM

Compound **ISAA2** was prepared following the general esterification procedure in 83% yield. ^{1}H NMR (400 MHz, MeOD) δ 7.73 (d, *J* = 8.1 Hz, 2H), 7.07 (d, *J* = 8.1 Hz, 2H), 4.34 (t, *J* = 6.7 Hz, 1H), 3.81 (s, 3H), 3.23 (dd, *J* = 7.2, 6.4 Hz, 1H), 3.16 (dd, *J* = 10.8, 7.2 Hz, 1H); ^{13}C NMR (101 MHz, MeOD) δ 170.25, 139.31, 135.17, 132.57, 94.11, 54.87, 53.65, 36.79.

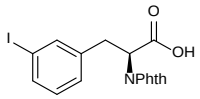
4.2 synthesis of **IAA3** and **IAA4**



Supplementary Figure 4

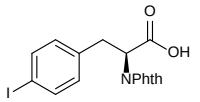
General procedure for preparation of *N*-Phth-protected amino acids: A mixture of the corresponding amino acid (1.0 equiv), N-ethoxycarbonylphthalimide (1.0 equiv) and sodium carbonate (1.0 equiv) in water (0.2 M) was stirred at room temperature for 6 hours. Then the mixture was filtered through a short pad of celite. The filtrate was acidified with 2 M hydrochloric acid to pH = 3-4 and extracted with ethyl acetate for three times. The combined organic phase was washed with brine, dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo*. The residue was purified by

silica gel flash chromatography to give the desired product.



IAA3 R_f = 0.5, 10% CH_3OH in DCM

Compound **IAA3** was prepared following the general procedure in 53% yield. ^1H NMR (400 MHz, $CDCl_3$) δ 7.64-7.59 (m, 4H), 7.39-7.26 (m, 2H), 7.00-6.98 (m, 1H), 6.82 (t, *J* = 7.5 Hz, 1H), 4.90 (s, 1H), 3.29-3.22 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 167.95, 139.92, 138.03, 135.78, 134.19, 131.50, 130.27, 128.22, 123.60, 94.44, 54.01, 34.57.

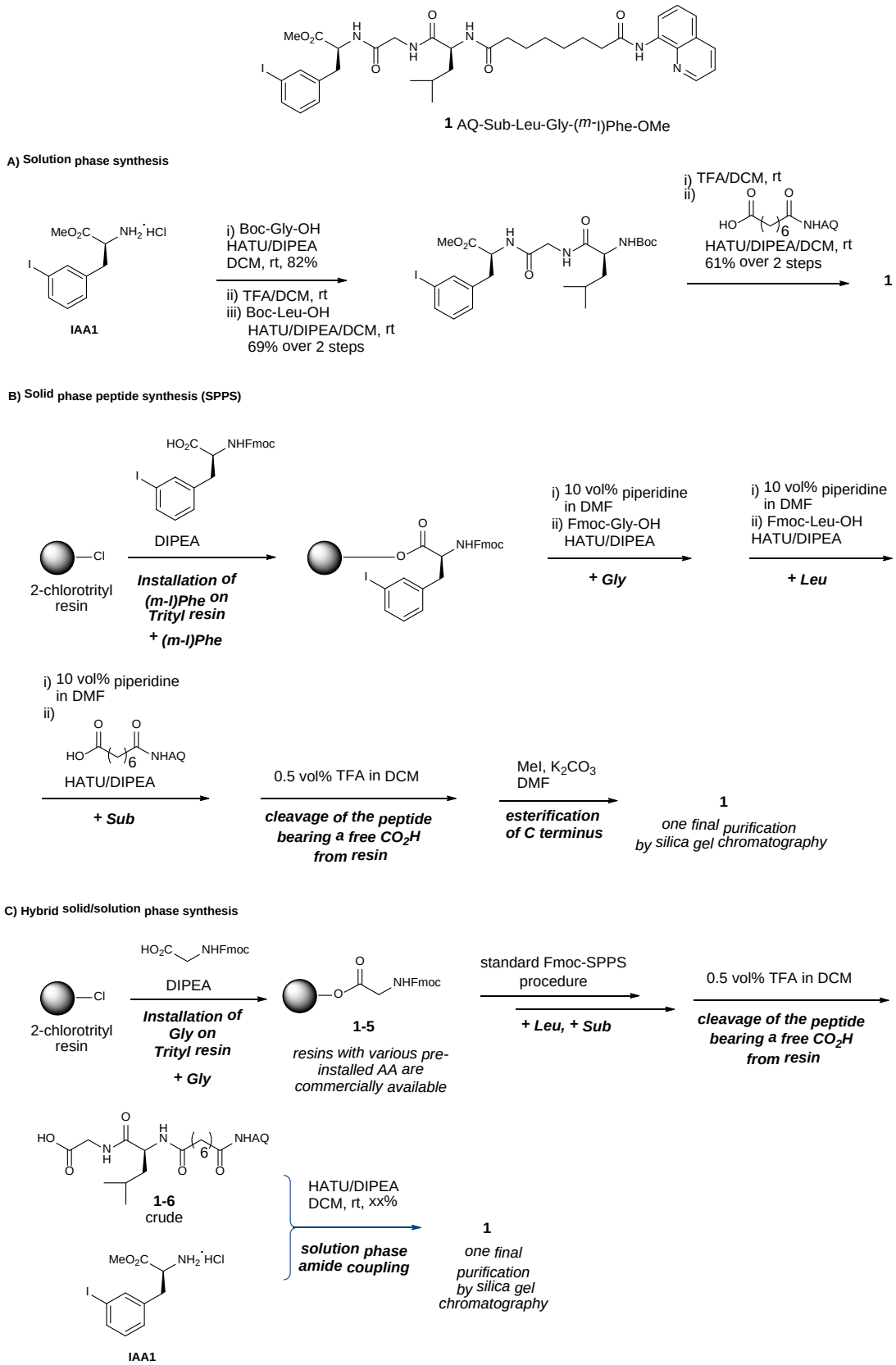


IAA4 R_f = 0.5, 10% CH_3OH in DCM

Compound **IAA4** was prepared following the general procedure in 48% yield. ^1H NMR (400 MHz, $CDCl_3$) δ 7.62-7.58 (m, 4H), 7.38 (d, *J* = 7.8 Hz, 2H), 6.74 (d, *J* = 7.4 Hz, 2H), 4.93 (br s, 1H), 3.29 (br s, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 167.97, 137.59, 137.04, 134.19, 131.50, 130.95, 123.58, 92.22, 53.86, 34.43.

5. Synthesis of linear peptides

The liner peptide precursors can be synthesized via either conventional solution phase amide coupling procedure or by solid phase peptide synthesis (SPPS) on 2-chlorotrityl resin. Lliner peptides can also be prepared by combined solid/solution phase synthesis method. All three methods were demonstrated in the synthesis of compound **1** (Supplementary Figure 5). Combined solid/solution phase method was also demonstrated in the synthesis of compound **10-4** (precursor for compound **10**, see Supplementary Figure 18), compound **12-4** (precursor for compound **12**, see Supplementary Figure 21), and compound **13-4** (precursor for compound **13**, see Supplementary Figure 23)

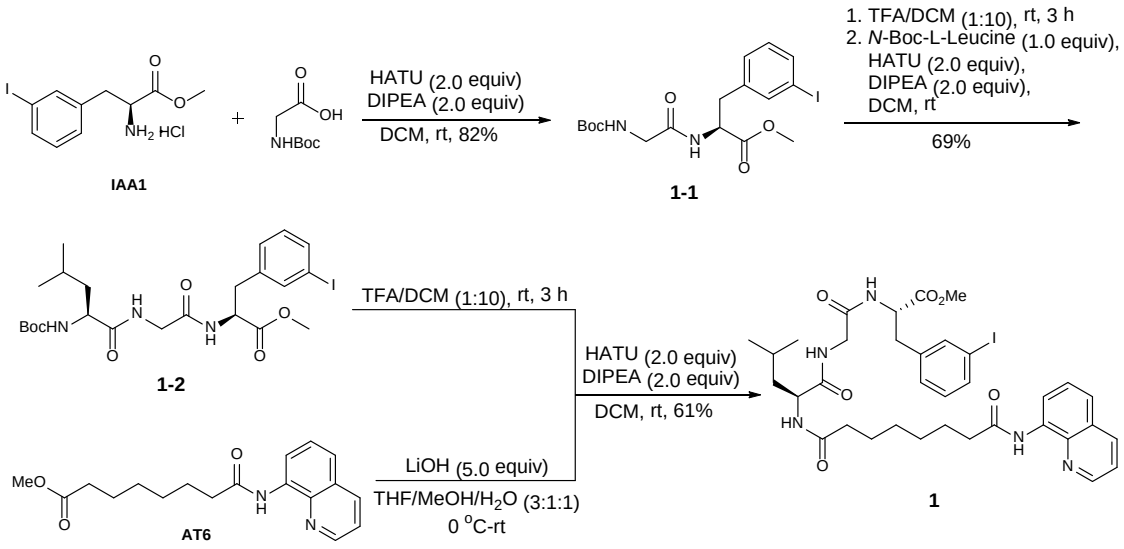


Supplementary Figure 5. Synthesis of linear peptide **1** using three different methods

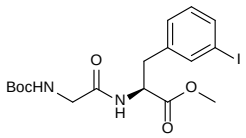
5.1 Synthesis of linear peptide 1 in solution

General procedure for deprotection of Boc: The Boc protected peptide (1.0 equiv) was added to a solution of trifluoroacetic acid in dichloromethane (v/v = 1/10, 0.2M) at room temperature. The mixture was stirred at the same temperature for 3 hour, and then the solvent was removed under reduced pressure. The residue was used directly for next step without further purification.

General procedure for hydrolysis of ester: The corresponding carboxylic ester (1.0 equiv) was dissolved in a mixture of THF/MeOH/H_2O (3/1/1, 0.2 M) at room temperature. LiOH (5.0 equiv) was added at 0 ^oC, and the reaction mixture was stirred overnight from 0 ^oC to room temperature. Most of the organic solvent was then removed under reduced pressure. The resulting aqueous solution was acidified with 2 M hydrochloric acid to pH = 3-4 and extracted with ethyl acetate for three times. The combined organic phase was washed with brine, dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo*. The residue was used directly for next step without further purification.



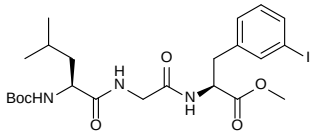
Supplementary Figure 6



1-1

R_f = 0.4, 25% acetone in Hex

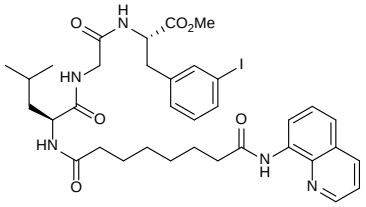
Compound **1-1** was prepared following the general amide coupling procedure in 82% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56 (d, *J* = 7.8 Hz, 1H), 7.46 (s, 1H), 7.08 (d, *J* = 7.7 Hz, 1H), 7.01 (t, *J* = 7.7 Hz, 1H), 6.71 (d, *J* = 5.7 Hz, 1H), 5.18 (s, 1H), 4.85-4.80 (m, 1H), 3.84-3.73 (m, 2H), 3.71 (s, 3H), 3.08 (dd, *J* = 13.9, 5.8 Hz, 1H), 3.00 (dd, *J* = 13.9, 6.0 Hz, 1H), 1.43 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.58, 169.45, 156.13, 138.33, 138.29, 136.21, 130.33, 128.58, 94.47, 80.29, 53.13, 52.54, 44.26, 37.46, 28.35; HRMS: Calcd for $C_{17}H_{23}IN_2NaO_5$ [M+Na^+]: 485.0544, found: 485.0547.



1-2

R_f = 0.3, 25% acetone in Hex

The Boc group of compound **1-1** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-Leucine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **1-2** in 69% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (d, *J* = 7.9 Hz, 1H), 7.48 (s, 1H), 7.35 (d, *J* = 7.1 Hz, 1H), 7.23 (t, *J* = 5.2 Hz, 1H), 7.10 (d, *J* = 7.7 Hz, 1H), 6.98 (t, *J* = 7.7 Hz, 1H), 5.27 (d, *J* = 7.0 Hz, 1H), 4.75 (dd, *J* = 13.8, 6.9 Hz, 1H), 4.15 (s, 1H), 4.00 (dd, *J* = 16.8, 5.2 Hz, 1H), 3.83 (dd, *J* = 16.8, 4.8 Hz, 1H), 3.66 (s, 3H), 3.04 (dd, *J* = 13.8, 5.9 Hz, 1H), 2.94 (dd, *J* = 13.8, 7.0 Hz, 1H), 1.66-1.55 (m, 2H), 1.50-1.46 (m, 1H), 1.39 (s, 9H), 0.95-0.85 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.51, 171.66, 168.82, 155.83, 138.57, 138.25, 136.15, 130.31, 128.60, 94.42, 80.08, 53.47, 52.47, 43.05, 41.42, 37.46, 28.39, 24.77, 23.10, 21.88; HRMS: Calcd for $C_{23}H_{24}IN_3NaO_6$ [M+Na^+]: 598.1384, found: 598.1388.



1

R_f = 0.2, 25% acetone in Hex

The Boc group of compound **1-2** was removed following the general deprotection procedure. The residue was treated with carboxylic acid hydrolyzed from **AT6** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **1** in 61% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.80 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.76 (dd, *J* = 7.0, 1.7 Hz, 1H), 8.16 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.55-7.44 (m, 5H), 7.11-7.08 (m, 2H), 7.04-6.98 (m, 2H), 6.17 (d, *J* = 7.2 Hz, 1H), 4.80-4.75 (m, 1H), 4.43-4.35 (m, 1H), 4.09 (dd, *J* = 17.0, 6.5 Hz, 1H), 3.78 (dd, *J* = 16.9, 4.9 Hz, 1H), 3.69 (s, 3H), 3.07 (dd, *J* = 13.9, 5.8 Hz, 1H), 3.00 (dd, *J* = 13.9, 6.8 Hz, 1H), 2.54 (t, *J* = 7.4 Hz, 2H), 2.18 (t, *J* = 7.6 Hz, 2H), 1.82-1.75 (m, 2H), 1.69-1.52 (m, 5H), 1.46-1.34 (m, 4H), 0.92 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.04, 172.92, 171.96, 171.80, 168.74, 148.30, 138.67, 138.44, 138.33, 136.55, 136.22, 134.58, 130.38, 128.70, 128.08, 127.55, 121.76, 121.60, 116.58, 94.51, 53.42, 52.59, 52.24, 43.13, 40.61, 38.10, 37.34, 36.22, 28.90, 28.87, 25.50, 25.40, 24.90, 22.99, 22.19; HRMS: Calcd for $C_{35}H_{44}IN_5NaO_6$ [M+Na^+]: 780.2228, found: 780.2216.

5.2 Synthesis of linear peptide 1 by Fmoc-SPPS.

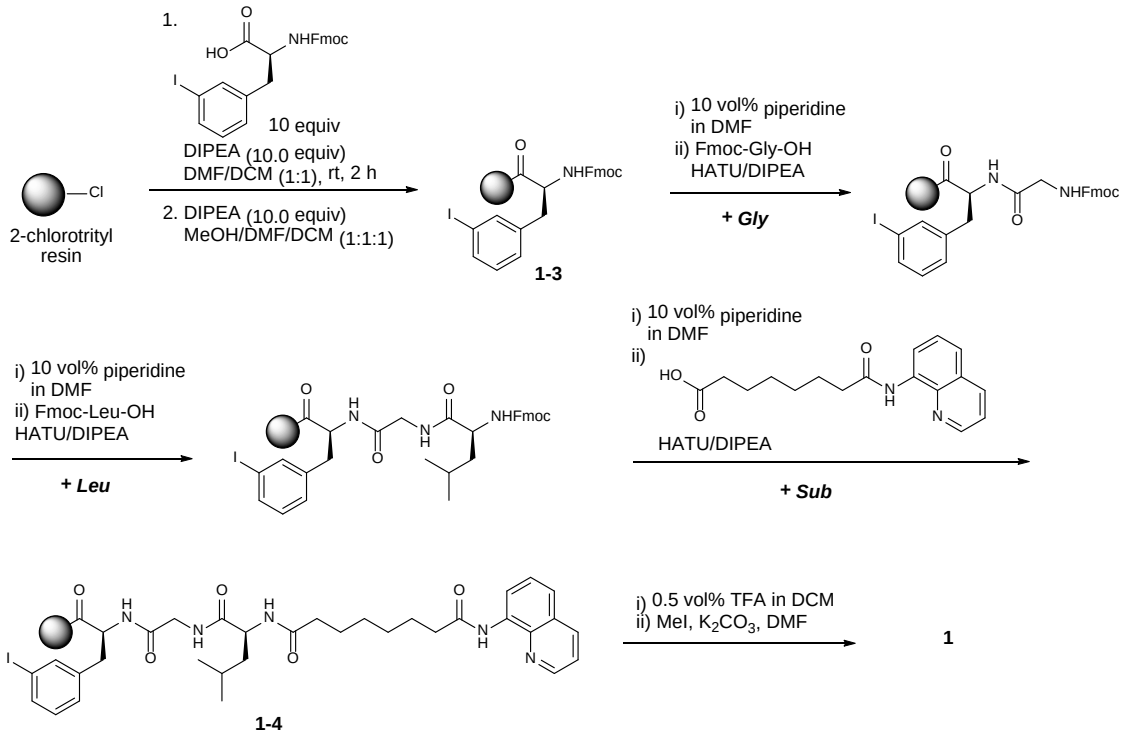
General procedure for HATU coupling on resin: The loaded resin was shaken for 2 h at room temperature with a solution of the desired Fmoc-protected amino acid (4 equiv), HATU (4 equiv) and DIPEA (8 equiv) in DMF (0.1 M in regard to loaded amino acid). The coupling mixture was filtered and the resin washed with CH_2Cl_2 (10 mL x 5) and CH_3OH (10 mL x 5).

General procedure for deprotection of Fmoc: The loaded resin was treated with a solution of 10 vol% piperidine in DMF for 30 min and then filtered. The resin was

washed with CH_2Cl_2 (10 mL x 5) and CH_3OH (10 mL x 5).

General procedure for cleavage of linear peptide from resin: The loaded resin was treated with a solution of 0.5 vol% TFA in DCM for 30 min and then filtered. The resin was washed with CH_2Cl_2 (10 mL x 5) and CH_3OH (10 mL x 5). The filtration were combined and concentrated *in vacuo*. The crude carboxylic acid was used directly for the next step.

All reagent equivalents are in regard to the amount of amino acid loaded to resin.

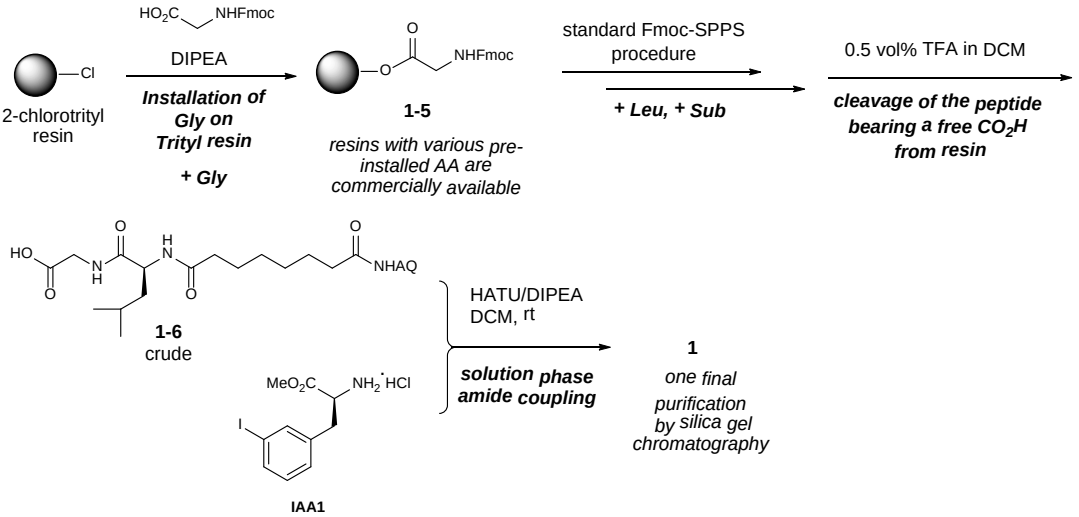


Supplementary Figure 7

N-Fmoc-*m*-I-Phenylalanine (1.02 g, 2 mmol, 10 equiv) was dissolved in a mixture of DMF/DCM (1:1), and DIPEA (340 µL, 2 mmol, 10 equiv) was then added to the solution. This mixture was shaken for 24 h at room temperature with 2-chlorotrityl resin (500 mg, 0.4 mmol/g) in a fritted syringe. The resin was filtered, washed with CH_2Cl_2 (10 mL x 5) and CH_3OH (10 mL x 5), then treated with DIPEA (340 µL, 2 mmol, 10 equiv) in MeOH/DMF/DCM (1:1:1) for 24 h and washed with CH_2Cl_2 (10 mL x 5) and CH_3OH (10 mL x 5) affording the Fmoc-*m*-I-Phe loaded resin **1-3**. The

loaded resin was then subjected to the standard Fmoc-SPPS procedure to install glycine, leucine and AQ-capped suberic acid successively to afford peptide loaded resin **1-4.** The linear peptide was then cleavaged from the resin under acidic conditions. The crude carboxylic acid was dissolved in DMF (2 mL), then K_2CO_3 (138 mg, 1 mmol, 5 equiv) and MeI (2.8 g, 20 mmol, 100 equiv) were added at room temperature. The reaction mixture was heated at 50 ^oC for 2 h. After been cooled to room temperature, the mixture was diluted with water and extracted with ethyl acetate. The combined organic phase was washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo*. The residue was purified by silica gel flash chromatography to give compound **1** in 18% yield (based on 2-chlorotrityl resin).

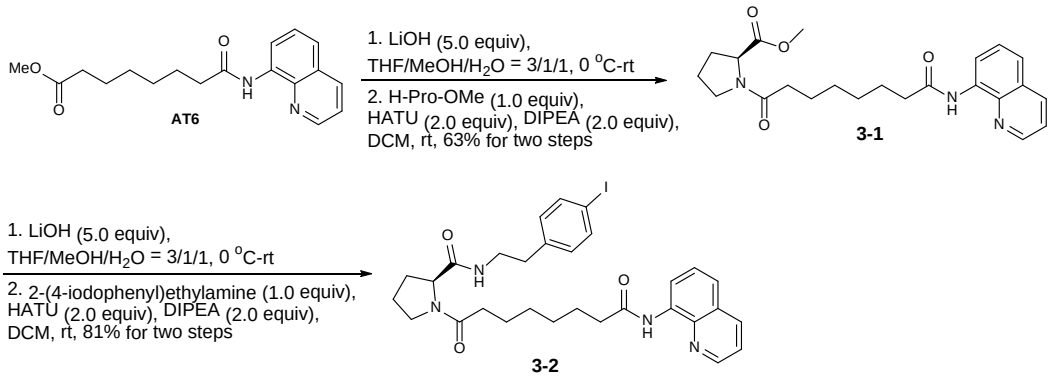
5.3 Preparation of linear peptide 1 by hybrid solid/solution phase synthesis.



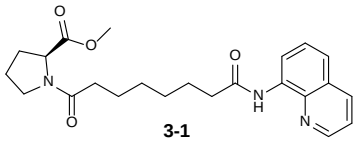
Supplementary Figure 8

Linear peptide **1-6** was prepared following the general Fmoc-SPPS procedure starting from 2-chlorotrityl resin or Fmoc-glycine loaded trityl resin. After been cleavaged from the resin, the crude **1-6** was coupled with *m*-I-Phe-OMe (**IAA1**) under the general coupling condition in DCM to give compound **1** in 36% yield.

5.4 Synthesis of linear peptide 3-2



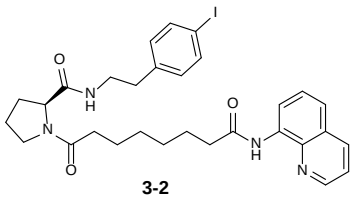
Supplementary Figure 9



R_f = 0.5, 25% acetone in Hex

Compound **AT6** was hydrolyzed following the general procedure and the crude product was treated with H-Pro-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **3-1** in 63% yield. ^{1}H NMR (400 MHz, $CDCl_3$, 5.6:1 mixture of two rotamers) δ 9.77 (s, 1H), 8.76-8.72 (m, 2H), 8.10 (d, *J* = 8.2 Hz, 1H), 7.50-7.39 (m, 3H), 4.42 (dd, *J* = 8.6 Hz, *J* = 3.8 Hz, 0.95H), 4.34 (d, *J* = 8.5 Hz, *J* = 2.1 Hz, 0.17H), 3.70 (s, 0.59H), 3.67 (s, 2.77H), 3.60-3.57 (m, 1H), 3.46-3.42 (m, 1H), 2.51 (t, *J* = 7.5 Hz, 2H), 2.34-2.21 (m, 2H), 2.16-2.08 (m, 1H), 2.02-1.97 (m, 1H), 1.95-1.89 (m, 2H), 1.82-1.75 (m, 2H), 1.67-1.60 (m, 2H), 1.41-1.39 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.97, 171.98, 171.90, 171.80, 171.76, 148.13, 138.26, 136.33, 134.50, 127.89, 127.34, 121.58, 121.33, 116.30, 59.34, 58.55, 52.53, 52.13, 46.97, 46.28, 38.09, 34.27, 34.19, 31.44,

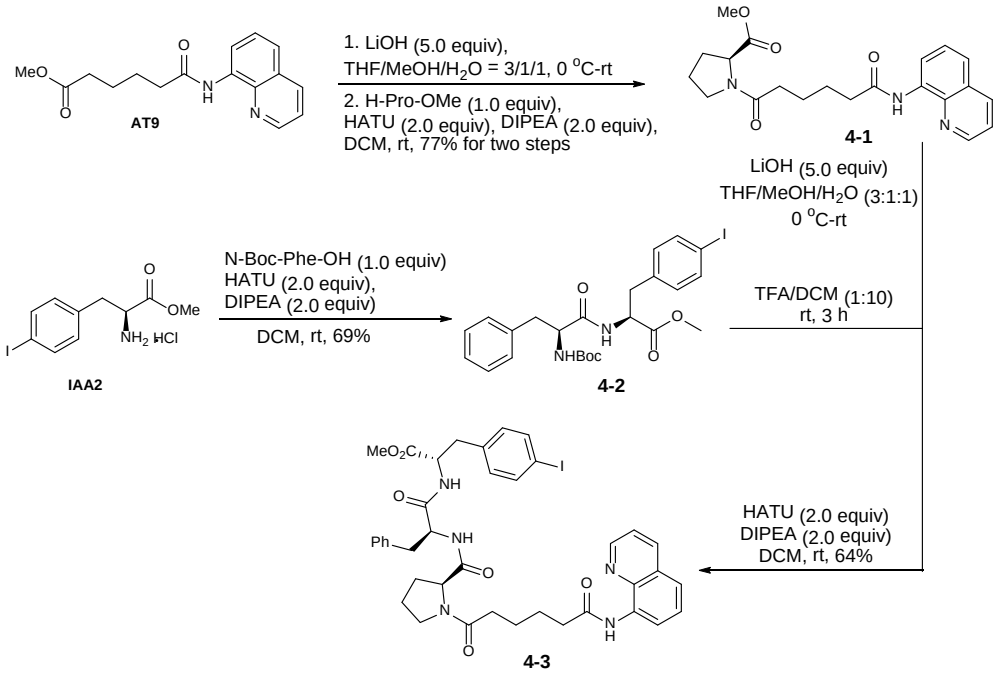
29.19, 29.09, 29.03, 29.02, 25.48, 24.78, 24.71, 24.42, 22.55.



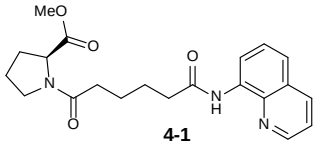
3-2 R_f = 0.4, 25% acetone in Hex

Compound **3-1** was hydrolyzed following the general procedure and the crude product was treated with 2-(4-iodophenyl)ethylamine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **3-2** in 81% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.79 (s, 1H), 8.79-8.75 (m, 2H), 8.14 (dd, *J* = 8.2, 1.5 Hz, 1H), 7.55 (d, *J*=8.2 Hz, 2H), 7.52-7.42 (m, 3H), 7.26-7.25 (m, 1H), 6.90 (d, *J* = 8.2 Hz, 2H), 4.50 (d, *J* = 7.4 Hz, 1H), 3.53-3.29 (m, 4H), 2.78-2.64 (m, 2H), 2.56 (t, *J* = 7.5 Hz, 2H), 2.41-2.36 (m, 1H), 2.27-2.17 (m, 2H), 2.01-1.92 (m, 2H), 1.84-1.74 (m, 2H), 1.72-1.70 (m, 1H), 1.63-1.58 (m, 2H), 1.50-1.40 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.64, 171.85, 171.37, 148.26, 138.83, 138.43, 137.51, 136.53, 134.64, 131.01, 128.07, 127.57, 121.73, 121.51, 116.51, 91.63, 59.63, 47.56, 40.35, 38.24, 35.19, 34.57, 29.26, 29.18, 26.91, 25.62, 25.10, 24.57.

5.5 Synthesis of linear peptide 4-3

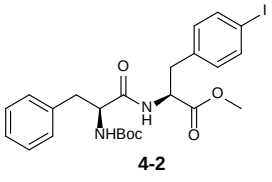


Supplementary Figure 10



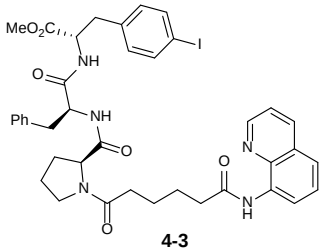
R_f = 0.5, 20% acetone in Hex

Compound **AT9** was hydrolyzed following the general procedure and the crude product was treated with H-Pro-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **4-1** in 77% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.85 (s, 1H), 8.86-8.72 (m, 2H), 8.17 (d, *J* = 7.9 Hz, 1H), 7.57-7.42 (m, 3H), 4.46 (d, *J* = 7.7 Hz, 0.84H), 4.41 (d, *J* = 8.2 Hz, 0.21H), 3.74 (s, 0.58H), 3.70 (s, 2.60H), 3.65-3.61 (m, 1H), 3.56-3.46 (m, 1H), 2.60 (t, *J* = 6.9 Hz, 2H), 2.49-2.29 (m, 2H), 2.16-1.74 (m, 8H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.07, 171.72, 148.02, 136.86, 134.48, 128.10, 127.64, 121.67, 121.56, 116.89, 59.47, 58.72, 52.71, 52.28, 47.11, 46.45, 38.02, 34.21, 34.12, 31.58, 29.32, 25.36, 24.91, 24.57, 24.28, 22.67.



R_f = 0.5, 20% acetone in Hex

Compound **4-2** was prepared following the general amide coupling procedure in 69% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (d, *J* = 8.2 Hz, 2H), 7.29-7.25 (m, 3H), 7.19 (d, *J* = 7.1 Hz, 2H), 6.72 (d, *J* = 8.0 Hz, 2H), 6.31 (d, *J* = 7.2 Hz, 1H), 4.93 (s, 1H), 4.78-4.73 (m, 1H), 4.34-4.32 (m, 1H), 3.67 (s, 3H), 3.04-2.94 (m, 4H), 1.41 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.16, 171.01, 155.38, 137.61, 136.50, 135.42, 131.32, 129.38, 128.71, 127.03, 92.72, 80.30, 55.73, 53.09, 52.43, 38.20, 37.46, 28.31.

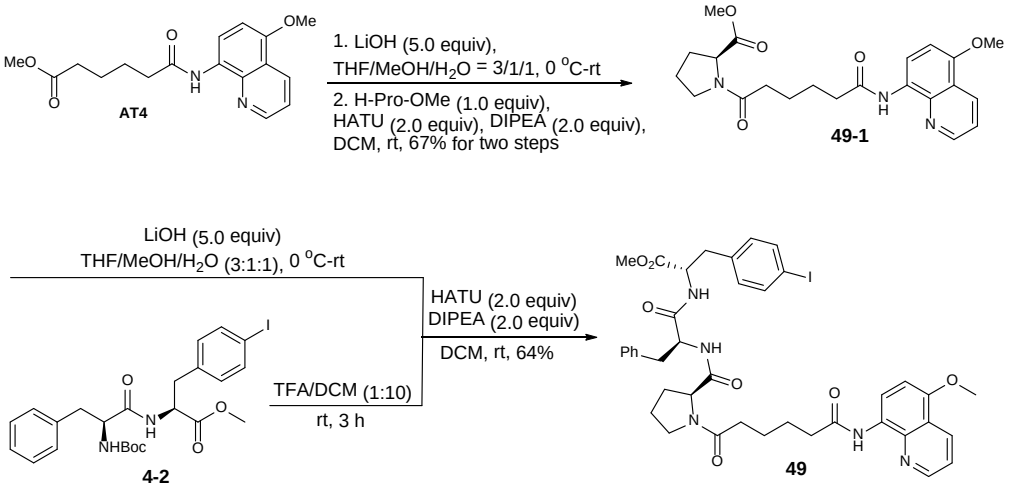


4-3

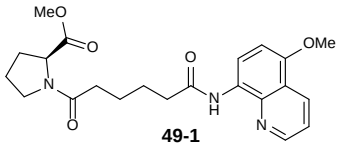
R_f = 0.3, 25% acetone in Hex

The Boc group of compound **4-2** was removed following the general deprotection procedure. The residue was treated with carboxylic acid hydrolyzed from **4-1** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **4-3** in 64% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.85 (s, 1H), 8.80 (d, *J* = 3.7 Hz, 1H), 8.77-8.67 (m, 1H), 8.16 (d, *J* = 8.2 Hz, 1H), 7.56 (d, *J* = 7.5 Hz, 2H), 7.53-7.42 (m, 3H), 7.31 (d, *J* = 7.9 Hz, 1H), 7.29-7.17 (m, 3H), 7.12 (d, *J* = 6.8 Hz, 2H), 6.88 (d, *J* = 7.6 Hz, 1H), 6.84 (d, *J* = 7.8 Hz, 2H), 4.79-4.74 (m, 1H), 4.70-4.64 (m, 1H), 4.43 (d, *J* = 5.6 Hz, 1H), 3.67 (s, 3H), 3.30-3.25 (m, 2H), 3.16 (dd, *J* = 14.5, 5.4 Hz, 1H), 3.08 (dd, *J* = 13.9, 5.9 Hz, 1H), 3.02-2.96 (m, 2H), 2.61-2.57 (m, 2H), 2.30-2.20 (m, 1H), 219-2.12 (m, 2H), 1.92-1.77 (m, 5H), 1.74-1.69 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.30, 171.67, 171.47, 171.44, 170.81, 148.32, 138.38, 137.61, 137.06, 136.52, 135.96, 134.49, 131.38, 129.19, 128.50, 128.06, 127.47, 126.83, 121.79, 121.67, 116.50, 92.55, 60.12, 53.85, 53.24, 52.45, 47.46, 37.85, 37.30, 36.78, 34.07, 27.57, 24.92, 24.87, 24.20.

5.6 Synthesis of linear peptide 49

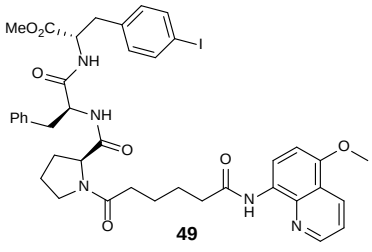


Supplementary Figure 11



R_f = 0.5, 20% acetone in Hexane

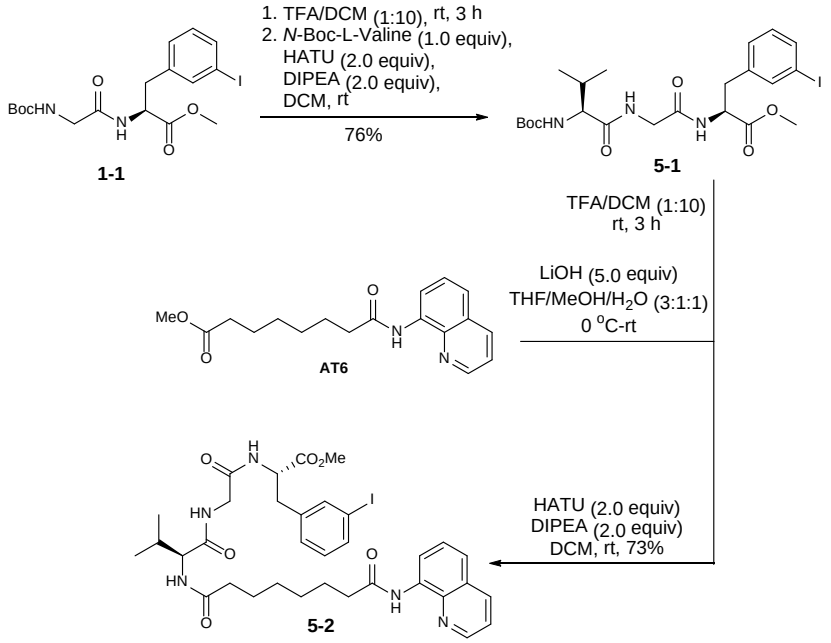
Compound **AT4** was hydrolyzed following the general procedure and the crude product was treated with H-Pro-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **49-1** in 67% yield. ^{1}H NMR (400 MHz, $CDCl_3$, 5.2:1 mixture of rotamers) δ 9.47 (s, 1H), 8.74-8.67 (m, 1H), 8.58 (d, *J* = 8.5 Hz, 1H), 8.44 (dd, *J* = 8.4, 1.2 Hz, 1H), 7.32 (dd, *J* = 8.4, 4.2 Hz, 1H), 6.71 (d, *J* = 8.6 Hz, 1H), 4.38 (dd, *J* = 8.4, 3.7 Hz, 0.83H), 4.33 (dd, *J* = 8.5, 2.4 Hz, 0.16H), 3.86 (s, 3H), 3.62 (2s, 3H), 3.58-3.50 (m, 1H), 3.45-3.34 (m, 1H), 2.48 (t, *J* = 7.2 Hz, 2H), 2.38-2.22 (m, 1.85H), 2.10-1.69 (m, 8.22H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.81, 172.63, 171.48, 171.40, 170.88, 170.85, 149.99, 148.46, 138.85, 131.02, 127.82, 120.56, 120.21, 116.36, 104.13, 59.21, 58.49, 55.60, 52.44, 51.99, 46.85, 46.19, 37.71, 33.96, 33.86, 31.30, 29.07, 25.21, 24.66, 24.37, 24.10, 22.43.



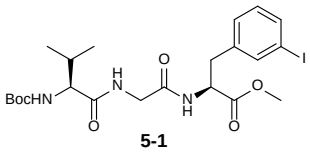
R_f = 0.3, 25% acetone in Hex

The methyl ester of compound **49-1** was hydrolyzed following the general procedure. The residue was treated with amine made from deprotection of **4-2** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **49** in 64% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.59 (s, 1H), 8.80 (dd, *J* = 4.2, 1.5 Hz, 1H), 8.63 (d, *J* = 8.6 Hz, 1H), 8.56 (dd, *J* = 8.4, 1.6 Hz, 1H), 7.56 (d, *J* = 8.2 Hz, 2H), 7.44 (dd, *J* = 8.4, 4.2 Hz, 1H), 7.34 (d, *J* = 8.2 Hz, 1H), 7.25-7.17 (m, 3H), 7.13-7.11 (m, 2H), 6.89 (d, *J* = 7.7 Hz, 1H), 6.83 (d, *J* = 8.2 Hz, 2H), 6.77 (d, *J* = 8.6 Hz, 1H), 4.78-4.73 (m, 1H), 4.71-4.65 (m, 1H), 4.42 (d, *J* = 5.6 Hz, 1H), 3.97 (s, 3H), 3.66 (s, 3H), 3.31-3.21 (m, 2H), 3.16 (dd, *J* = 14.5, 5.5 Hz, 1H), 3.07 (dd, *J* = 14.0, 6.1 Hz, 1H), 3.01-2.94 (m, 2H), 2.63-2.48 (m, 2H), 2.30-2.10 (m, 3H), 1.89-1.65 (m, 7H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.32, 171.63, 171.39, 170.99, 170.81, 150.36, 148.76, 139.10, 137.60, 137.11, 135.99, 131.41, 131.37, 129.18, 128.49, 127.93, 126.79, 120.87, 120.55, 116.67, 104.38, 92.53, 60.11, 55.88, 53.76, 53.24, 52.43, 47.45, 37.77, 37.29, 36.75, 34.04, 27.55, 24.96, 24.87, 24.24; HRMS: Calcd for $C_{40}H_{45}IN_5O_7$ [M+H$^+$]: 834.2358, found: 834.2360.

5.7 Synthesis of linear peptide 5-2



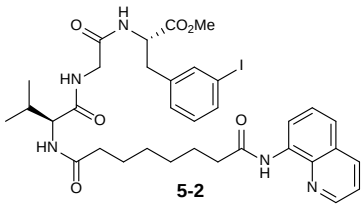
Supplementary Figure 12



5-1

R_f = 0.3, 25% acetone in Hexane

The Boc group of compound **1-1** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-Valine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **5-1** in 76% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54 (d, *J* = 7.8 Hz, 1H), 7.48 (s, 1H), 7.27-7.21 (m, 1H), 7.15-7.09 (m, 2H), 6.99 (t, *J* = 7.7 Hz, 1H), 5.34-5.33 (m, 1H), 4.80-4.75 (m, 1H), 4.02-3.87 (m, 3H), 3.68 (s, 3H), 3.05 (dd, *J* = 13.8, 5.9 Hz, 1H), 2.95 (dd, *J* = 13.8, 6.8 Hz, 1H), 2.09-2.06 (m, 1H), 1.41 (s, 9H), 0.92 (d, *J* = 6.7 Hz, 3H), 0.87 (d, *J* = 6.7 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.55, 171.55, 168.77, 155.87, 138.49, 138.15, 135.98, 130.17, 128.51, 94.32, 79.59, 59.65, 53.40, 52.36, 42.92, 37.38, 31.15, 28.31, 19.27, 17.86; HRMS: Calcd for $C_{22}H_{32}IN_3NaO_6$ [M+Na^+]: 584.1228, found: 584.1226.



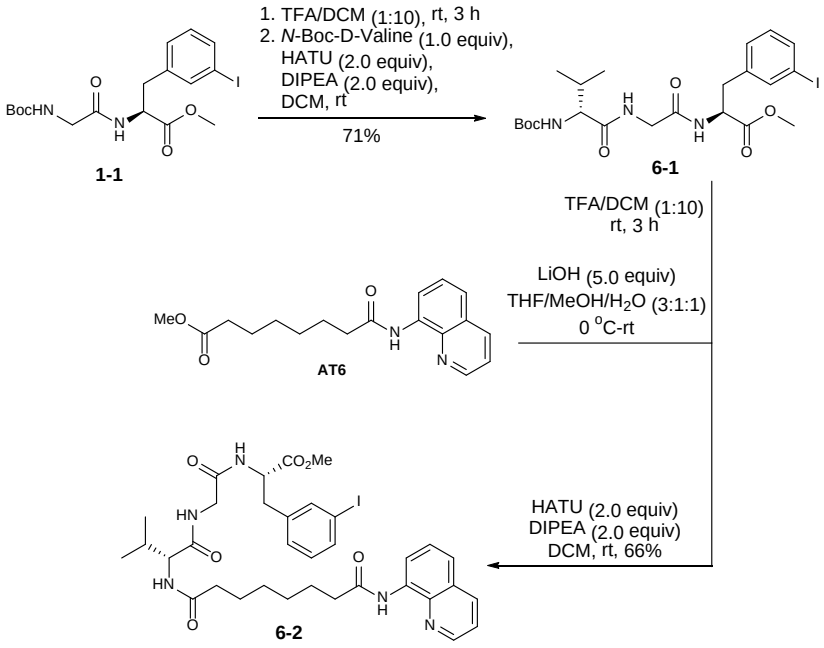
5-2

R_f = 0.2, 25% acetone in Hex

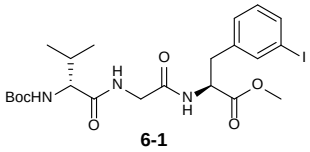
The Boc group of compound **5-1** was removed following the general deprotection procedure. The residue was treated with carboxylic acid hydrolyzed from **AT6** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **5-2** in 73% yield. ^{1}H NMR (400 MHz, DMSO) δ 10.03 (s, 1H), 8.92 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.62 (d, *J* = 7.0 Hz, 1H), 8.40 (dd, *J* = 8.3, 1.5 Hz, 1H), 8.29 (d, *J* = 7.6 Hz, 1H), 8.21 (t, *J* = 5.9 Hz, 1H), 7.88 (d, *J* = 8.2 Hz, 1H), 7.66-7.62 (m, 2H), 7.58-7.55 (m, 3H), 7.23-7.20 (m, 1H), 7.10-7.04 (m, 1H), 4.48-4.42 (m, 1H), 4.07 (t, *J* = 7.6 Hz, 1H), 3.74 (dd, *J* = 16.8, 6.1 Hz, 1H), 3.65-3.57 (m, 4H), 3.00-2.95 (m, 1H), 2.90-2.84 (m, 1H), 2.54 (t, *J* = 7.4 Hz, 2H), 2.24-2.07 (m, 2H), 1.94-1.89 (m, 1H), 1.65-1.57 (m, 2H), 1.49-1.43 (m, 2H), 1.36-1.28 (m, 4H),

0.83 (d, *J* = 6.7 Hz, 6H); ^{13}C NMR (101 MHz, DMSO) δ 172.63, 171.70, 171.64, 171.59, 168.88, 148.85, 139.82, 138.06, 137.68, 136.63, 135.38, 134.60, 130.43, 128.58, 127.86, 127.01, 122.14, 121.71, 116.56, 94.74, 58.15, 53.38, 51.92, 41.46, 36.72, 36.15, 35.06, 30.06, 28.53, 28.45, 25.26, 25.12, 19.26, 18.38; HRMS: Calcd for $C_{34}H_{42}IN_5NaO_6$ [M+Na$^+$]: 766.2072, found: 766.2064.

5.8 Synthesis of linear peptide 6-2



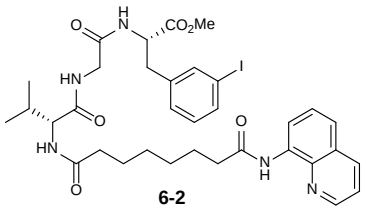
Supplementary Figure 13



6-1

R_f = 0.4, 25% acetone in Hex

The Boc group of compound **1-1** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-D-Valine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **6-1** in 71% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56 (d, *J*=7.9 Hz, 1H), 7.52 (s, 1H), 7.12 (d, *J* = 7.6 Hz, 1H), 7.03-7.00 (m, 2H), 6.85 (s, 1H), 5.18 (d, *J* = 7.9 Hz, 1H), 4.79-4.74 (m, 1H), 3.99-3.89 (m, 3H), 3.69 (s, 3H), 3.09 (dd, *J* = 13.8, 5.6 Hz, 1H), 2.98 (dd, *J* = 13.8, 7.2 Hz, 1H), 2.17-2.09 (m, 1H), 1.43 (s, 9H), 0.95 (d, *J* = 6.8 Hz, 3H), 0.90 (d, *J* = 6.8 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.47, 171.63, 168.93, 156.17, 138.64, 138.28, 136.14, 130.35, 128.59, 94.44, 80.12, 60.17, 53.56, 52.51, 42.97, 37.26, 30.95, 28.40, 19.36, 17.88.



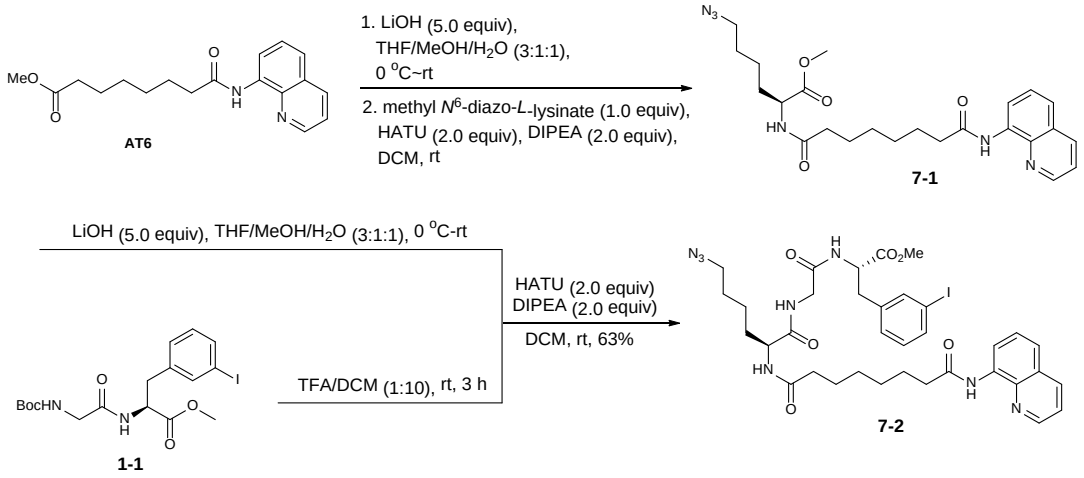
6-2

R_f = 0.2, 25% acetone in Hex

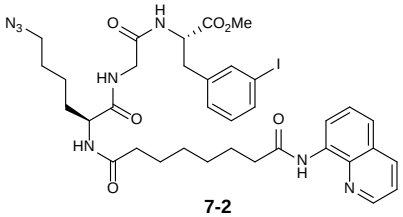
The Boc group of compound **6-1** was removed following the general deprotection procedure. The residue was treated with carboxylic acid hydrolyzed from **AT6** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **6-2** in 66% yield. ^{1}H NMR (400 MHz, DMSO) δ 10.02 (s, 1H), 8.92-8.91 (m, 1H), 8.64 (d, *J* = 7.5 Hz, 1H), 8.38 (d, *J* = 8.2 Hz, 1H), 8.30 (d, *J* = 7.7 Hz, 1H), 8.17 (t, *J* = 5.5 Hz, 1H), 7.90 (d, *J* = 8.2 Hz, 1H), 7.65-7.53 (m, 5H), 7.23 (d, *J* = 7.5 Hz, 1H), 7.07 (t, *J* = 7.7 Hz, 1H), 4.48-4.43 (m, 1H), 4.10 (t, *J* = 7.6 Hz, 1H), 3.72-3.65 (m, 2H), 3.57 (s, 3H), 3.00 (dd, *J* = 13.6, 5.5 Hz, 1H), 2.88 (dd, *J* = 13.6, 9.1 Hz, 1H), 2.55 (t, *J* = 7.3 Hz, 2H), 2.27-2.10 (m, 2H), 1.99-1.90 (m, 1H), 1.68-1.60 (m, 2H), 1.56-1.44 (m, 2H), 1.37-1.24 (m, 4H), 0.84 (d, *J* = 6.7 Hz, 6H); ^{13}C NMR (101 MHz, DMSO) δ 172.74, 171.67, 171.59, 171.54, 168.96, 148.80, 139.85, 138.04, 137.70, 136.59, 135.37, 134.59, 130.44, 128.60, 127.84, 126.99,

122.09, 121.67, 116.52, 94.73, 58.19, 53.46, 51.89, 41.52, 36.76, 36.10, 35.08, 30.04, 28.55, 28.47, 25.24, 25.13, 19.27, 18.32; HRMS: Calcd for $C_{34}H_{42}IN_5NaO_6$ [M+Na^+]: 766.2072, found: 766.2059.

5.9 Synthesis of linear peptide 7-2



Supplementary Figure 14

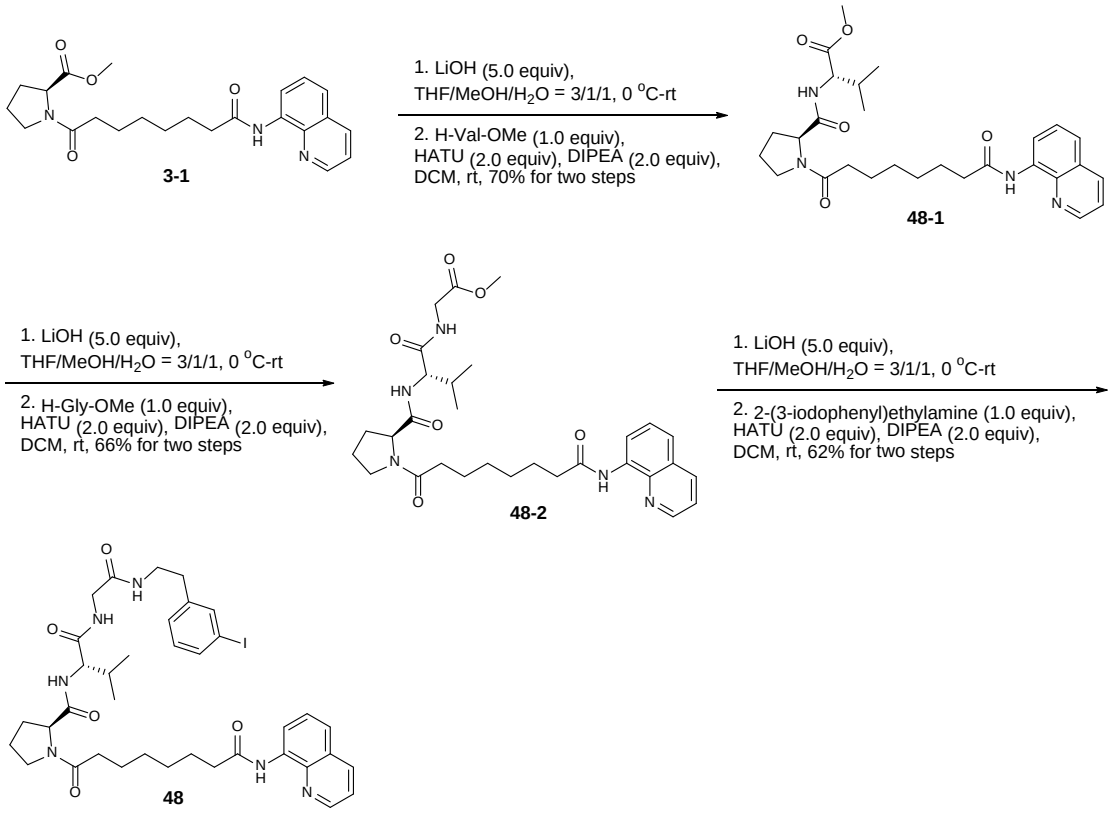


R_f = 0.25, 25% acetone in Hex

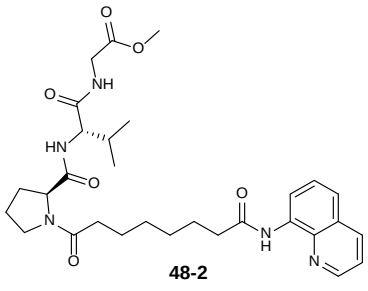
The Boc group of compound **1-1** was removed following the general deprotection procedure. The residue was treated with carboxylic acid hydrolyzed from **7-1** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **7-2** in 63% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.79 (s, 1H), 8.84-8.69 (m, 2H), 8.14 (d, *J* = 9.4 Hz, 1H), 7.56-7.36 (m, 7H), 7.11-7.04 (m, 1H), 7.02-6.94 (m, 1H), 6.73 (d, *J* = 7.4 Hz, 1H), 4.83-4.78 (m, 1H), 4.51-4.47 (m, 1H), 4.03-3.97 (m, 2H), 3.68 (s, 3H), 3.24-3.21 (m, 2H), 3.04-2.97 (m, 2H), 2.56-2.47 (m, 2H), 2.27-2.14 (m, 2H), 1.87-1.70 (m, 3H), 1.62-1.52 (m, 5H), 1.41-1.24 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.72, 172.46, 171.87, 171.84, 168.61, 148.26, 138.59, 138.41, 138.35, 136.48, 136.17, 134.56, 130.32, 128.65, 128.03, 127.48, 121.71, 121.55, 116.52, 94.47, 53.44, 53.10, 52.57, 51.17, 43.11,

38.08, 37.48, 36.24, 31.98, 29.01, 28.94, 28.61, 25.50, 22.85.

5.10 Synthesis of linear peptide 48



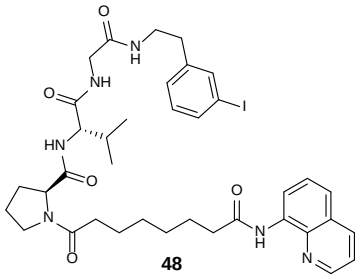
Supplementary Figure 15



R_f = 0.4, 20% acetone in Hex

Compound **48-1** was hydrolyzed following the general procedure and the crude product was treated with H-Gly-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **48-2** in 66%

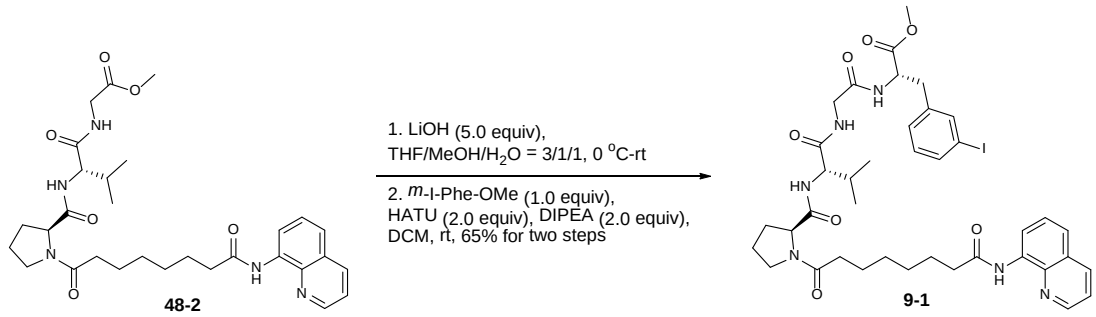
yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.78 (dd, *J* = 4.2, 1.5 Hz, 1H), 8.73 (dd, *J* = 6.7, 2.0 Hz, 1H), 8.14 (dd, *J* = 8.3, 1.4 Hz, 1H), 7.57-7.38 (m, 3H), 7.29 (d, *J* = 8.4 Hz, 1H), 7.03 (t, *J* = 5.5 Hz, 1H), 4.62-4.47 (m, 1H), 4.25-4.21 (m, 1H), 4.02 (dd, *J* = 17.9, 5.5 Hz, 1H), 3.93 (dd, *J* = 17.9, 5.5 Hz, 1H), 3.68 (s, 3H), 3.56 (dd, *J* = 12.1, 5.5 Hz, 1H), 3.48-3.38 (m, 1H), 2.54 (t, *J* = 7.4 Hz, 2H), 2.38-2.20 (m, 4H), 2.08-1.89 (m, 3H), 1.81-1.78 (m, 2H), 1.67-1.60 (m, 2H), 1.42-1.39 (m, 4H), 0.88 (t, *J* = 6.0 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.16, 172.18, 171.92, 171.80, 170.45, 148.29, 138.34, 136.48, 134.48, 128.00, 127.40, 121.75, 121.58, 116.41, 60.31, 58.70, 55.50, 52.37, 47.75, 41.12, 38.08, 34.56, 30.03, 29.11, 28.97, 27.86, 25.46, 25.08, 24.61, 19.44, 17.43.



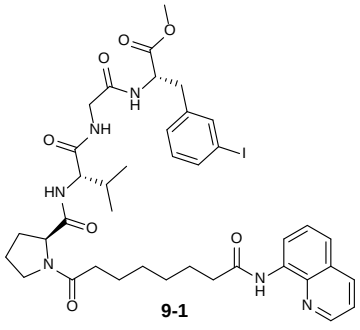
48 R_f = 0.3, 20% acetone in Hex

Compound **48-2** was hydrolyzed following the general procedure and the crude product was treated with 2-(4-iodophenyl)ethylamine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **48** in 62% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.83-8.70 (m, 2H), 8.15 (d, *J* = 8.3 Hz, 1H), 7.57-7.40 (m, 5H), 7.37 (d, *J* = 6.5 Hz, 1H), 7.15 (d, *J* = 7.6 Hz, 1H), 7.10 (t, *J* = 5.7 Hz, 1H), 6.99 (d, *J* = 7.1 Hz, 2H), 4.49 (d, *J* = 5.4 Hz, 1H), 4.02 (t, *J* = 6.1 Hz, 1H), 3.94-3.88 (m, 2H), 3.58-3.55 (m, 1H), 3.51-3.38 (m, 3H), 2.75 (t, *J* = 7.4 Hz, 2H), 2.55 (t, *J* = 7.4 Hz, 2H), 2.33 (t, *J* = 7.4 Hz, 2H), 2.23-2.21 (m, 2H), 2.06-1.90 (m, 3H), 1.82-1.78 (m, 2H), 1.73-1.62 (m, 2H), 1.46-1.38 (m, 4H), 0.90 (t, *J* = 7.6 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.20, 172.64, 171.86, 171.57, 169.19, 148.31, 141.73, 138.45, 137.89, 136.56, 135.50, 134.60, 130.36, 128.25, 128.10, 127.53, 121.78, 121.62, 116.51, 94.56, 60.35, 60.21, 47.89, 43.26, 40.77, 38.15, 35.19, 34.69, 29.53, 29.22, 29.08, 27.78, 25.53, 25.27, 24.75, 19.62, 17.94.

5.11 Synthesis of linear peptide 9-1



Supplementary Figure 16

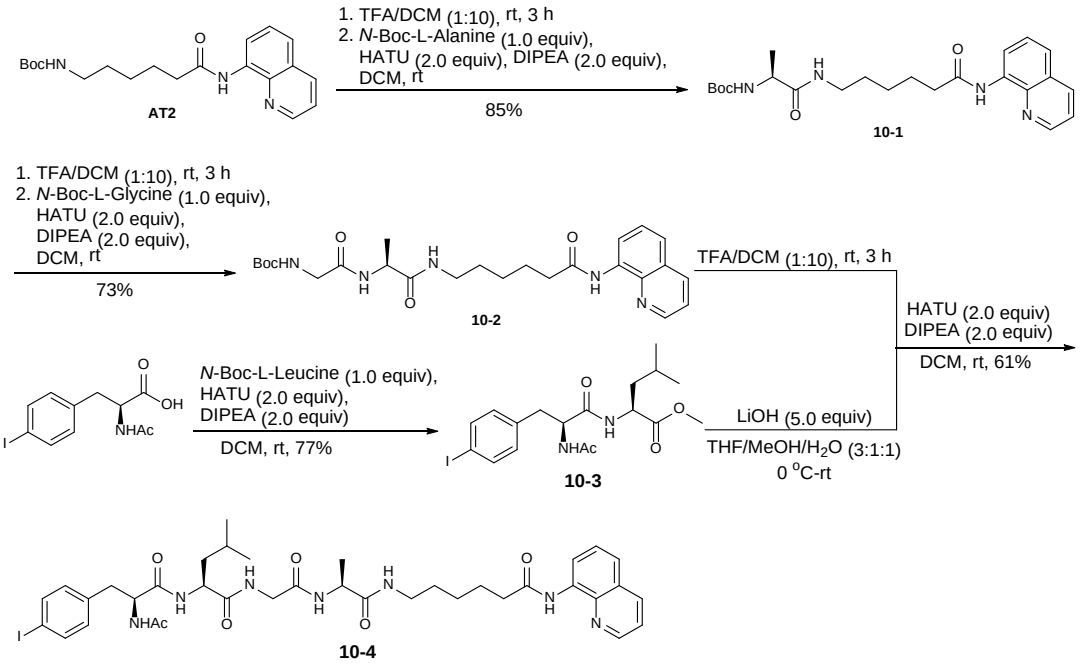


R_f = 0.25, 20% acetone in Hex

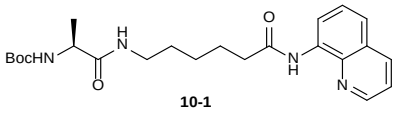
Compound **48-2** was hydrolyzed following the general procedure and the crude product was treated with *p*-I-Phe-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **9-1** in 69% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.79 (s, 1H), 8.85-8.62 (m, 2H), 8.14 (d, *J* = 8.2 Hz, 1H), 7.56-7.39 (m, 6H), 7.24 (d, *J* = 11.5 Hz, 2H), 7.10 (d, *J* = 7.2 Hz, 1H), 6.99 (t, *J* = 7.5 Hz, 1H), 4.74 (dd, *J* = 12.3, 5.6 Hz, 1H), 4.53 (d, *J* = 7.6 Hz, 1H), 4.10 (t, *J* = 5.7 Hz, 1H), 3.98 (dd, *J* = 16.5, 5.6 Hz, 1H), 3.85 (dd, *J* = 16.5, 4.2 Hz, 1H), 3.65 (s, 3H), 3.58-3.52 (m, 1H), 3.45-3.40 (m, 1H), 3.06 (dd, *J* = 13.5, 5.3 Hz, 1H), 2.97 (dd, *J* = 13.3, 7.1 Hz, 1H), 2.54 (t, *J* = 6.5 Hz, 2H), 2.31 (t, *J* = 6.9 Hz, 2H), 2.25-2.18 (m,

2H), 2.02-1.88 (m, 3H), 1.82-1.76 (m, 2H), 1.70-1.59 (m, 2H), 1.48-1.36 (m, 4H), 0.93-0.84 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.97, 172.29, 171.86, 171.82, 171.69, 169.09, 148.26, 138.81, 138.36, 138.22, 136.48, 136.07, 134.52, 130.34, 128.66, 128.01, 127.45, 121.71, 121.54, 116.46, 94.37, 60.11, 59.52, 53.47, 52.44, 47.74, 43.03, 38.11, 37.25, 34.61, 29.85, 29.16, 29.03, 27.66, 25.50, 25.13, 24.67, 19.51, 17.82.

5.12 Synthesis of linear peptide 10-4 in solution



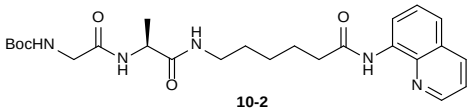
Supplementary Figure 17



R_f = 0.5, 20% acetone in Hex

The Boc group of compound **AT2** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-Alanine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **10-1** in 85% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.79 (d, *J* = 4.0 Hz, 1H), 8.76 (d, *J* = 7.2 Hz, 1H), 8.15 (d, *J* = 8.2 Hz, 1H), 7.54-7.43 (m, 3H), 6.40 (s, 1H), 5.12 (s, 1H), 4.12 (s, 1H), 3.29-3.24 (m, 2H), 2.56 (t, *J* = 7.4 Hz, 2H),

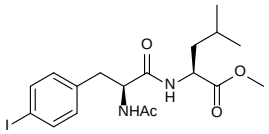
1.85-1.79 (m, 2H), 1.61-1.54 (m, 2H), 1.48-1.42 (m, 11H), 1.32 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.77, 171.62, 155.61, 148.20, 138.33, 136.42, 134.47, 127.96, 127.42, 121.66, 121.51, 116.46, 79.96, 50.16, 39.25, 37.89, 29.25, 28.38, 26.44, 25.13, 18.72.



10-2

R_f = 0.4, 20% acetone in Hex

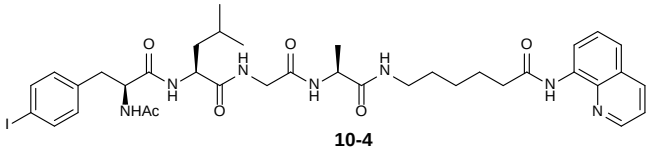
The Boc group of compound **10-1** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-Glycine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **10-2** in 73% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.78 (s, 1H), 8.75 (d, *J* = 3.8 Hz, 1H), 8.69 (d, *J* = 7.0 Hz, 1H), 8.10 (d, *J* = 8.3 Hz, 1H), 7.49-7.38 (m, 3H), 7.21-7.19 (m, 1H), 7.06-7.04 (m, 1H), 5.75-5.71 (m, 1H), 4.50-4.43 (m, 1H), 3.84-3.72 (m, 2H), 3.23-3.18 (m, 2H), 2.51 (t, *J* = 6.6 Hz, 2H), 1.80-1.73 (m, 2H), 1.58-1.51 (m, 2H), 1.44-1.38 (m, 11H), 1.33 (d, *J* = 6.8 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.26, 171.77, 169.65, 156.30, 148.19, 138.27, 136.43, 134.36, 127.94, 127.35, 121.65, 121.58, 116.51, 80.13, 48.92, 44.30, 39.34, 37.85, 28.98, 28.32, 26.43, 25.12, 18.49.



10-3

R_f = 0.4, 20% acetone in Hex

Compound **10-3** was prepared following the general amide coupling procedure in 77% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60 (d, *J* = 8.2 Hz, 2H), 6.96 (d, *J* = 8.2 Hz, 2H), 6.28 (d, *J* = 7.9 Hz, 1H), 6.23 (d, *J* = 7.8 Hz, 1H), 4.69-4.64 (m, 1H), 4.53-4.47 (m, 1H), 3.71 (s, 3H), 2.99 (d, *J* = 6.8 Hz, 2H), 1.97 (s, 3H), 1.63-1.45 (m, 3H), 0.89 (d, *J* = 5.8 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.74, 170.47, 170.07, 137.78, 136.12, 131.53, 92.67, 54.18, 52.59, 51.05, 41.54, 38.00, 24.91, 23.29, 22.83, 22.02.



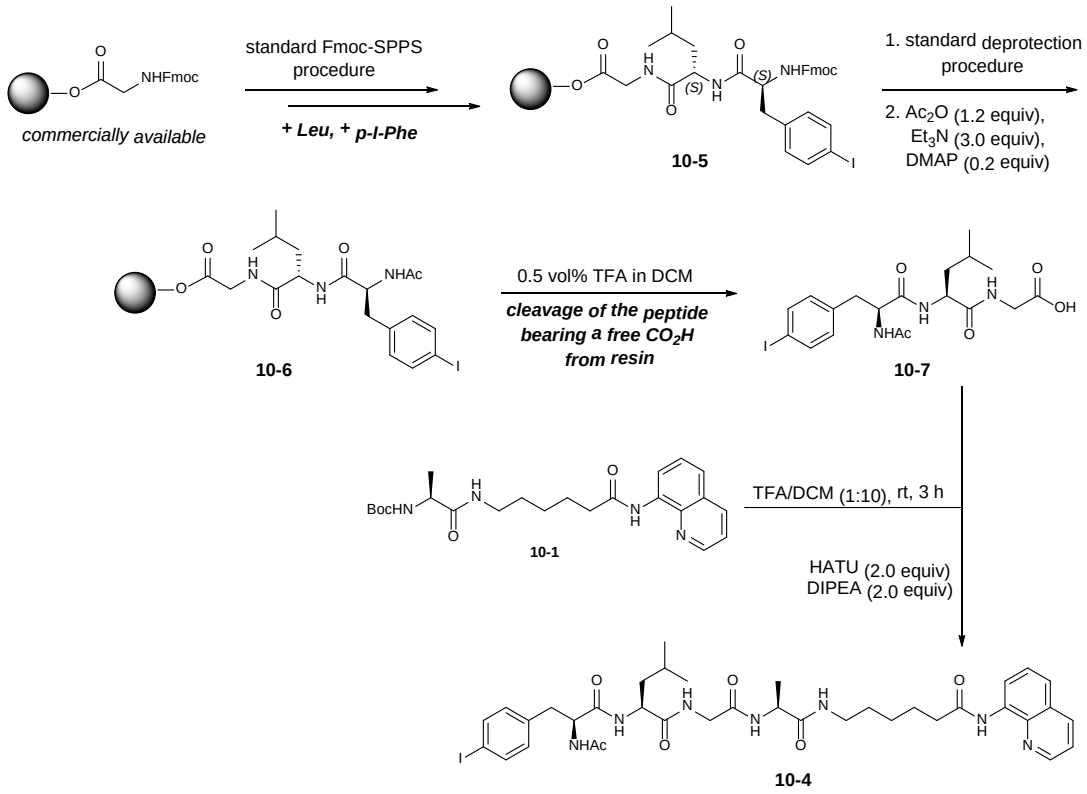
10-4

R_f = 0.5, 5% MeOH in DCM

The Boc group of compound **10-2** was removed following the general deprotection

procedure. The residue was treated with carboxylic acid hydrolyzed from **10-3** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **10-4** in 61% yield. ^{1}H NMR (400 MHz, DMSO) δ 10.03 (s, 1H), 8.92 (dd, *J* = 4.1, 1.2 Hz, 1H), 8.63 (d, *J* = 7.5 Hz, 1H), 8.39 (dd, *J* = 8.3, 1.2 Hz, 1H), 8.29 (d, *J* = 7.8 Hz, 1H), 8.24 (d, *J* = 7.1 Hz, 1H), 8.18 (t, *J* = 5.7 Hz, 1H), 7.76 (t, *J* = 5.7 Hz, 2H), 7.64-7.54 (m, 5H), 7.02 (d, *J* = 8.1 Hz, 2H), 4.49-4.44 (m, 1H), 4.24-4.17 (m, 1H), 4.12-4.07 (m, 1H), 3.70-3.65 (m, 2H), 3.07-3.04 (m, 2H), 2.80-2.78 (m, 2H), 2.58-2.50 (m, 2H), 1.79 (s, 3H), 1.67-1.63 (m, 2H), 1.45-1.43 (m, 2H), 1.37-1.33 (m, 4H), 1.18 (d, *J* = 7.1 Hz, 3H), 1.11-1.02 (m, 1H), 0.78 (d, *J* = 6.6 Hz, 3H), 0.68 (d, *J* = 6.4 Hz, 3H); ^{13}C NMR (101 MHz, DMSO) δ 172.51, 171.68, 171.55, 171.19, 169.55, 168.17, 148.75, 138.02, 137.05, 136.75, 136.52, 134.54, 131.57, 127.79, 126.91, 122.03, 121.62, 116.48, 92.16, 54.33, 51.21, 48.15, 42.22, 38.41, 37.17, 36.67, 28.76, 25.93, 24.86, 23.78, 23.11, 22.29, 21.19, 18.27.

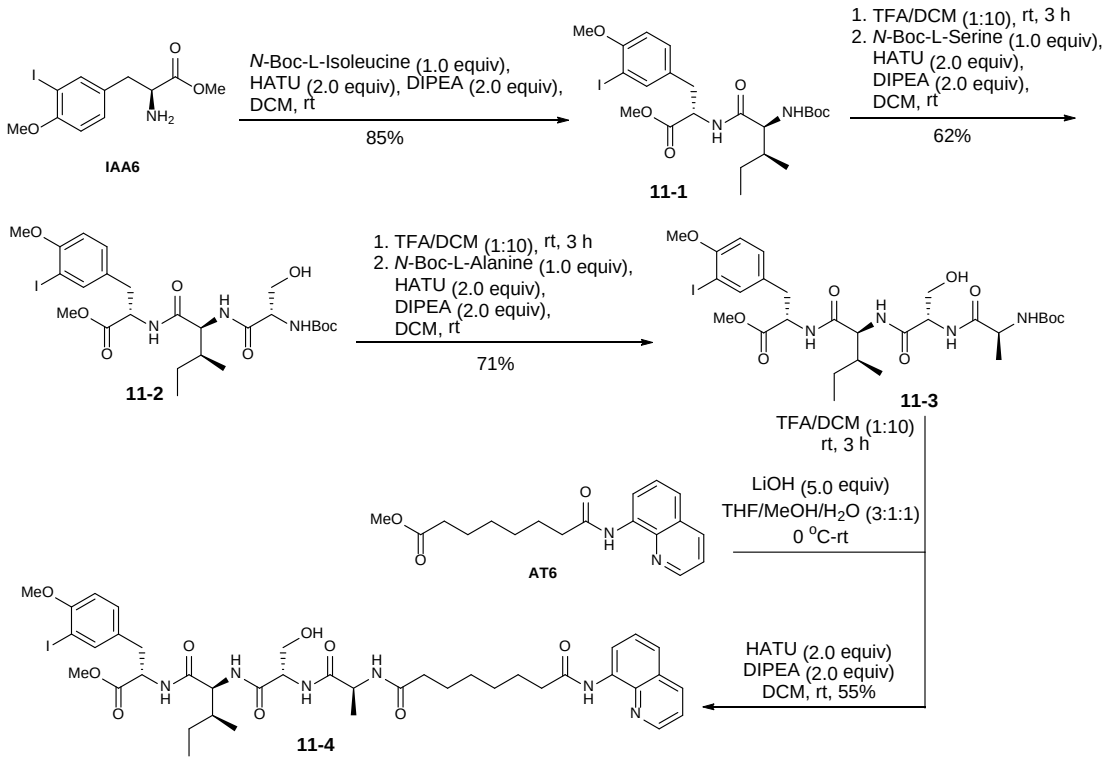
5.13 Synthesis of linear peptide 10-4 via combined solid/solution phase synthesis strategy



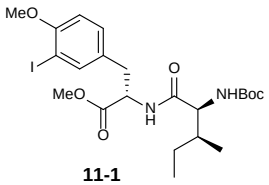
Supplementary Figure 18

The short peptide compound **10-5** was prpepared via SPPS. Then the Fmoc group was deprotected under the general procedure and the resin was treated with Et_3N (3.0 equiv), Ac_2O (1.2 equiv) and DMAP (0.2 equiv), replacing the protecting group from Fmoc to Ac. The linear peptide **10-7** was cleavaged from the resin under acidic conditions and used directly without further purification The Boc group of compound **10-1** was removed following the general deprotection procedure, then the residue was coupled with compound **10-5** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **10-4** in 7% yield.

5.14 Synthesis of linear peptide 11-4



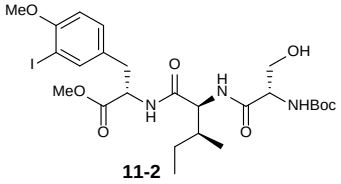
Supplementary Figure 19



11-1

R_f = 0.6, 20% acetone in Hex

Compound **11-1** was prepared following the general amide coupling procedure in 85% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (s, 1H), 7.04 (d, *J* = 8.3 Hz, 1H), 6.71 (d, *J* = 8.4 Hz, 1H), 6.50-6.48 (m, 1H), 5.12 (s, 1H), 4.81-4.78 (m, 1H), 3.96-3.93 (m, 1H), 3.82 (s, 3H), 3.70 (s, 3H), 3.00-2.97 (m, 2H), 1.85-1.83 (m, 1H), 1.42 (s, 10H), 1.10-1.03 (m, 1H), 0.89-0.85 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.62, 171.40, 157.34, 155.78, 140.20, 130.41, 129.99, 110.92, 85.99, 80.04, 59.45, 56.39, 53.26, 52.46, 37.16, 36.72, 28.40, 24.75, 15.56, 11.57.

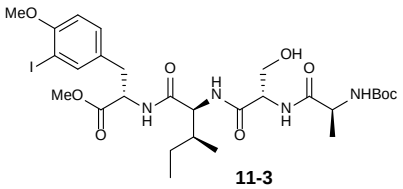


11-2

R_f = 0.3, 20% acetone in Hex

The Boc group of compound **11-1** was removed following the general deprotection

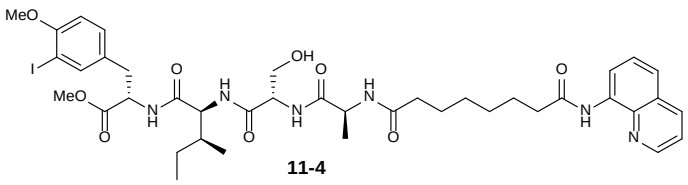
procedure. The residue was treated with *N*-Boc-L-Serine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **11-2** in 62% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51-7.50 (m, 1H), 7.12-7.06 (m, 3H), 6.71 (d, *J* = 8.4 Hz, 1H), 5.68 (d, *J* = 7.0 Hz, 1H), 4.79-4.74 (m, 1H), 4.32-4.26 (m, 2H), 3.99-3.92 (m, 1H), 3.81 (s, 3H), 3.68 (s, 3H), 3.63-3.61 (m, 1H), 3.02-2.88 (m, 2H), 1.93-1.88 (m, 1H), 1.41 (s, 10H), 1.11-1.00 (m, 1H), 0.86-0.80 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.90, 171.65, 171.08, 157.27, 156.00, 140.13, 130.41, 130.11, 110.94, 85.92, 80.46, 62.99, 58.56, 56.39, 55.10, 53.43, 52.50, 36.56, 28.37, 24.60, 15.52, 11.45.



11-3

R_f = 0.2, 20% acetone in Hex

The Boc group of compound **11-2** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-Alanine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **11-3** in 71% yield. ^{1}H NMR (400 MHz, DMSO) δ 8.30 (d, *J* = 7.3 Hz, 1H), 7.80 (d, *J* = 7.6 Hz, 1H), 7.62-7.60 (m, 2H), 7.20 (dd, *J* = 8.4, 1.7 Hz, 1H), 7.02 (d, *J* = 7.3 Hz, 1H), 6.89 (d, *J* = 8.4 Hz, 1H), 5.03-5.01 (m, 1H), 4.42-4.38 (m, 2H), 4.21 (t, *J* = 7.5 Hz, 1H), 4.04-3.95 (m, 1H), 3.78 (s, 3H), 3.59-3.50 (m, 5H), 2.94 (dd, *J* = 14.0, 5.9 Hz, 1H), 2.81 (dd, *J* = 14.0, 9.0 Hz, 1H), 1.72-1.66 (m, 1H), 1.38 (s, 10H), 1.17 (d, *J* = 7.0 Hz, 3H), 1.04-0.97 (m, 1H), 0.77-0.74 (m, 6H); ^{13}C NMR (101 MHz, DMSO) δ 172.87, 171.56, 170.86, 169.80, 156.52, 155.13, 139.35, 131.22, 130.32, 111.29, 85.77, 78.19, 61.66, 56.78, 56.30, 54.62, 53.57, 51.76, 49.83, 36.85, 35.05, 28.20, 23.73, 18.12, 15.11, 11.30



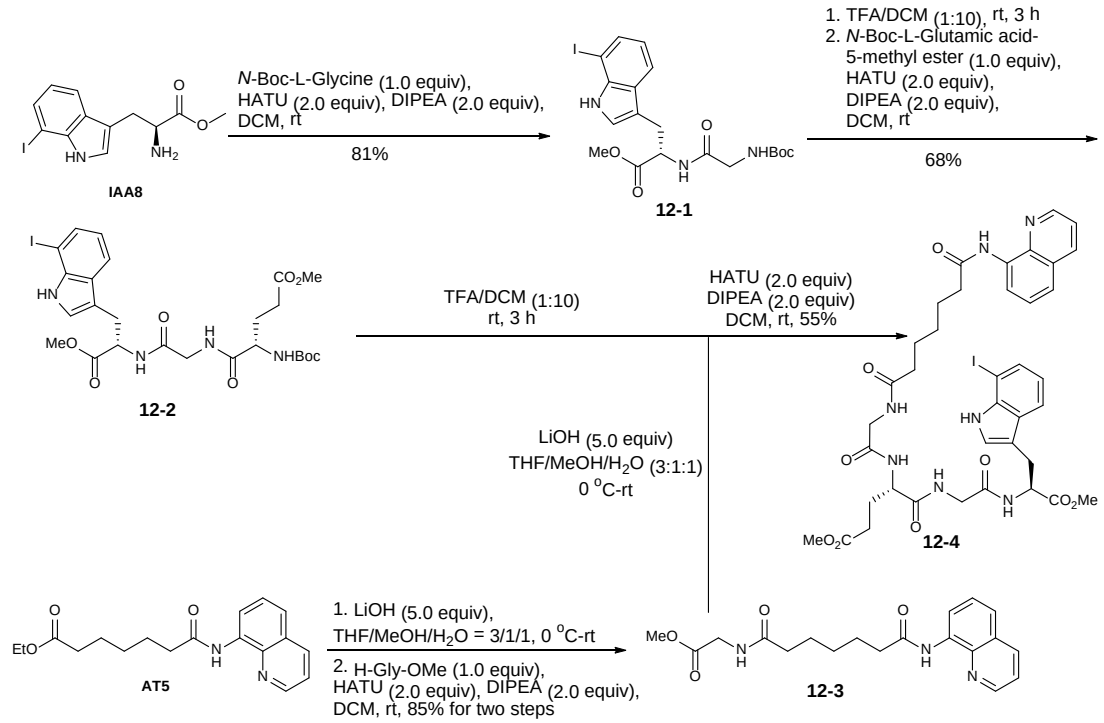
11-4

R_f = 0.5, 5% MeOH in DCM

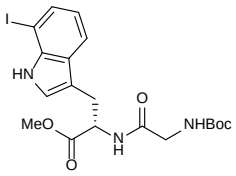
The Boc group of compound **11-3** was removed following the general deprotection procedure. The residue was treated with carboxylic acid hydrolyzed from **AT6** (1.0

equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **11-4** in 55% yield. ^{1}H NMR (400 MHz, DMSO) δ 10.04 (s, 1H), 8.93 (d, *J* = 2.6 Hz, 1H), 8.64 (d, *J* = 7.4 Hz, 1H), 8.40 (d, *J* = 8.0 Hz, 1H), 8.31 (d, *J* = 7.2 Hz, 1H), 8.06 (d, *J* = 6.7 Hz, 1H), 7.95 (d, *J* = 7.3 Hz, 1H), 7.64-7.55 (m, 5H), 7.20 (d, *J* = 8.2 Hz, 1H), 6.89 (d, *J* = 8.4 Hz, 1H), 5.03 (s, 1H), 4.44-4.39 (m, 1H), 4.32-4.27 (m, 2H), 4.24-4.15 (m, 1H), 3.78 (s, 3H), 3.56 (s, 5H), 2.97-2.78 (m, 2H), 2.57 (t, *J* = 7.1 Hz, 2H), 2.13 (t, *J* = 7.2 Hz, 2H), 1.68-1.63 (m, 3H), 1.52-1.49 (m, 2H), 1.32-1.24 (m, 9H), 1.03-0.98 (m, 1H), 0.77-0.73 (m, 6H); ^{13}C NMR (101 MHz, DMSO) δ 172.65, 172.30, 171.72, 171.56, 170.86, 169.73, 156.52, 148.85, 139.37, 138.07, 136.61, 134.59, 131.22, 130.32, 127.85, 127.00, 122.12, 121.71, 116.57, 111.28, 85.78, 61.44, 56.79, 56.29, 54.86, 53.57, 51.77, 48.28, 39.52, 36.89, 36.75, 35.13, 35.09, 28.55, 28.50, 25.13, 23.78, 18.16, 15.09, 11.26; HRMS: Calcd for $C_{40}H_{54}IN_6O_9$ [M+H$^+$]: 889.2991, found: 889.2996.

5.15 Synthesis of linear peptide 12-4

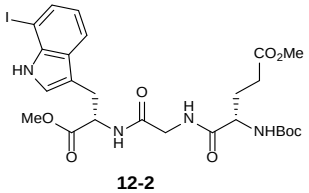


Supplementary Figure 20



R_f = 0.5, 20% acetone in Hexane

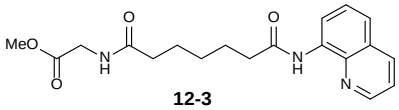
Compound **12-1** was prepared following the general amide coupling procedure in 81% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.29 (s, 1H), 7.53 (d, *J* = 7.5 Hz, 1H), 7.47 (d, *J* = 7.9 Hz, 1H), 7.07 (s, 1H), 6.88 (t, *J* = 7.7 Hz, 1H), 6.66 (d, *J* = 7.0 Hz, 1H), 5.12 (s, 1H), 4.94-4.90 (m, 1H), 3.83-3.70 (m, 2H), 3.65 (s, 3H), 3.28 (d, *J* = 5.1 Hz, 2H), 1.41 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.11, 169.56, 156.13, 137.96, 130.80, 127.63, 123.77, 121.25, 118.60, 111.12, 80.21, 52.77, 52.52, 44.18, 28.33, 27.87.



R_f = 0.4, 20% acetone in Hex

The Boc group of compound **12-1** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-Glutamic acid-5-methyl ester (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide

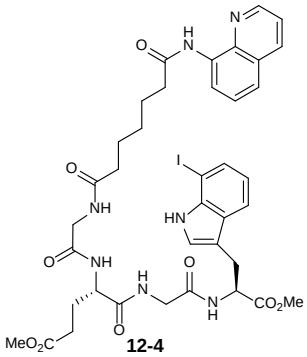
coupling procedure to give compound **12-2** in 68% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.75 (s, 1H), 7.51 (d, *J* = 7.4 Hz, 1H), 7.44 (d, *J* = 7.9 Hz, 1H), 7.11 (s, 1H), 7.08 (s, 1H), 6.91-6.83 (m, 2H), 5.44 (d, *J* = 7.9 Hz, 1H), 4.89-4.85 (m, 1H), 4.20-4.19 (m, 1H), 3.84 (d, *J* = 5.5 Hz, 2H), 3.67 (s, 3H), 3.63 (s, 3H), 3.30-3.23 (m, 2H), 2.48-2.37 (m, 2H), 2.11-2.07 (m, 1H), 1.88-1.82 (m, 1H), 1.42 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.78, 172.58, 172.08, 168.91, 155.93, 137.91, 130.55, 127.53, 124.25, 120.92, 118.45, 110.71, 80.11, 76.63, 53.77, 52.52, 52.43, 51.87, 42.93, 30.10, 28.33, 27.76, 27.55.



12-3

R_f = 0.5, 20% acetone in Hex

The ester group of compound **AT5** was removed following the general hydrolyzation procedure. The residue was treated with Gly-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **12-3** in 85% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.78 (s, 1H), 8.77-8.71 (m, 2H), 8.11 (d, *J* = 8.2 Hz, 1H), 7.50-7.39 (m, 3H), 6.33 (s, 1H), 3.99 (d, *J* = 5.3 Hz, 2H), 3.68 (s, 3H), 2.54 (t, *J* = 7.4 Hz, 2H), 2.25 (t, *J* = 7.5 Hz, 2H), 1.84-1.74 (m, 2H), 1.72-1.66 (m, 2H), 1.49-1.41 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.43, 171.58, 170.30, 147.97, 137.96, 136.11, 134.12, 127.64, 126.98, 121.43, 121.32, 116.09, 51.95, 40.89, 37.55, 35.57, 28.39, 25.03, 24.89.



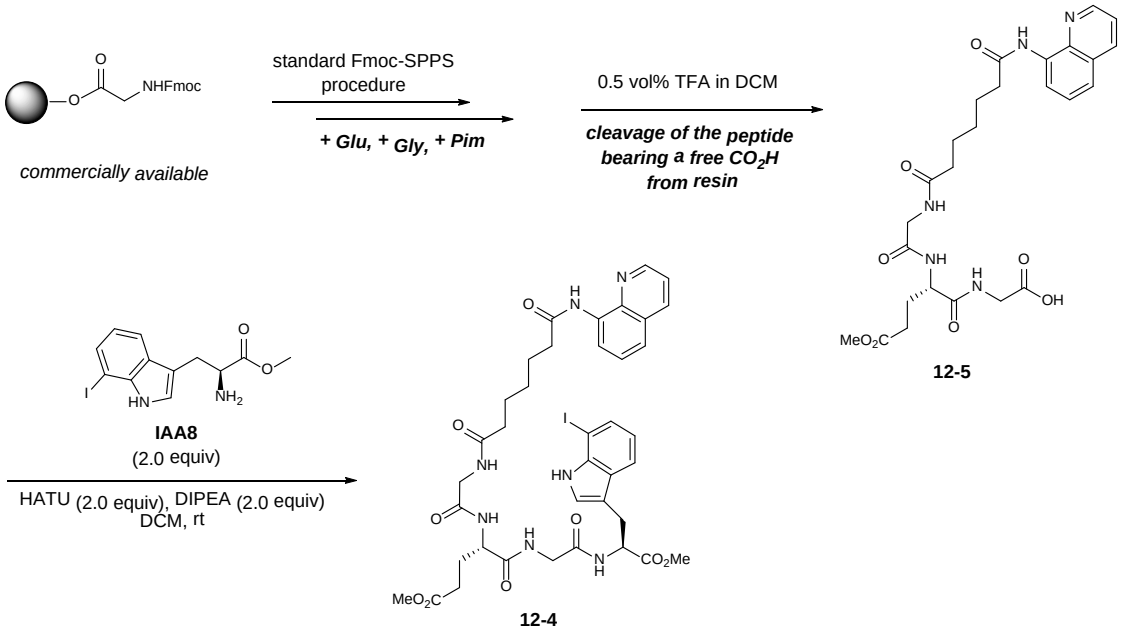
12-4

R_f = 0.3, 30% acetone in Hex

The Boc group of compound **12-2** was removed following the general deprotection procedure. The residue was treated with carboxylic acid hydrolyzed from **12-3** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **12-4** in 55% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.79 (s, 1H), 9.01 (s, 1H), 8.79-8.76 (m, 2H), 8.14 (d, *J* = 8.1 Hz, 1H), 7.84-7.82 (m,

1H), 7.72-7.70 (m, 2H), 7.55-7.44 (m, 5H), 7.13 (s, 1H), 6.88-6.77 (m, 1H), 6.70-6.98 (m, 1H), 4.89-4.87 (m, 1H), 4.63-4.62 (m, 1H), 4.05-3.82 (m, 4H), 3.67-3.63 (m, 6H), 3.28-3.26 (m, 2H), 2.52-2.39 (m, 4H), 2.13-2.11 (m, 2H), 1.79-1.72 (m, 4H), 1.57-1.54 (m, 2H), 1.36-1.33 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.11, 174.08, 172.35, 171.91, 171.71, 169.81, 168.86, 148.34, 138.49, 138.12, 136.54, 134.60, 130.82, 128.12, 127.84, 127.55, 124.19, 121.77, 121.66, 121.22, 118.74, 116.66, 111.44, 52.94, 52.83, 52.59, 52.12, 43.42, 43.37, 37.91, 35.81, 30.16, 28.86, 27.91, 27.53, 25.24, 25.22; HRMS: Calcd for $C_{38}H_{45}IN_7O_9$ [M+H$^+$]: 870.2318, found: 870.2319.

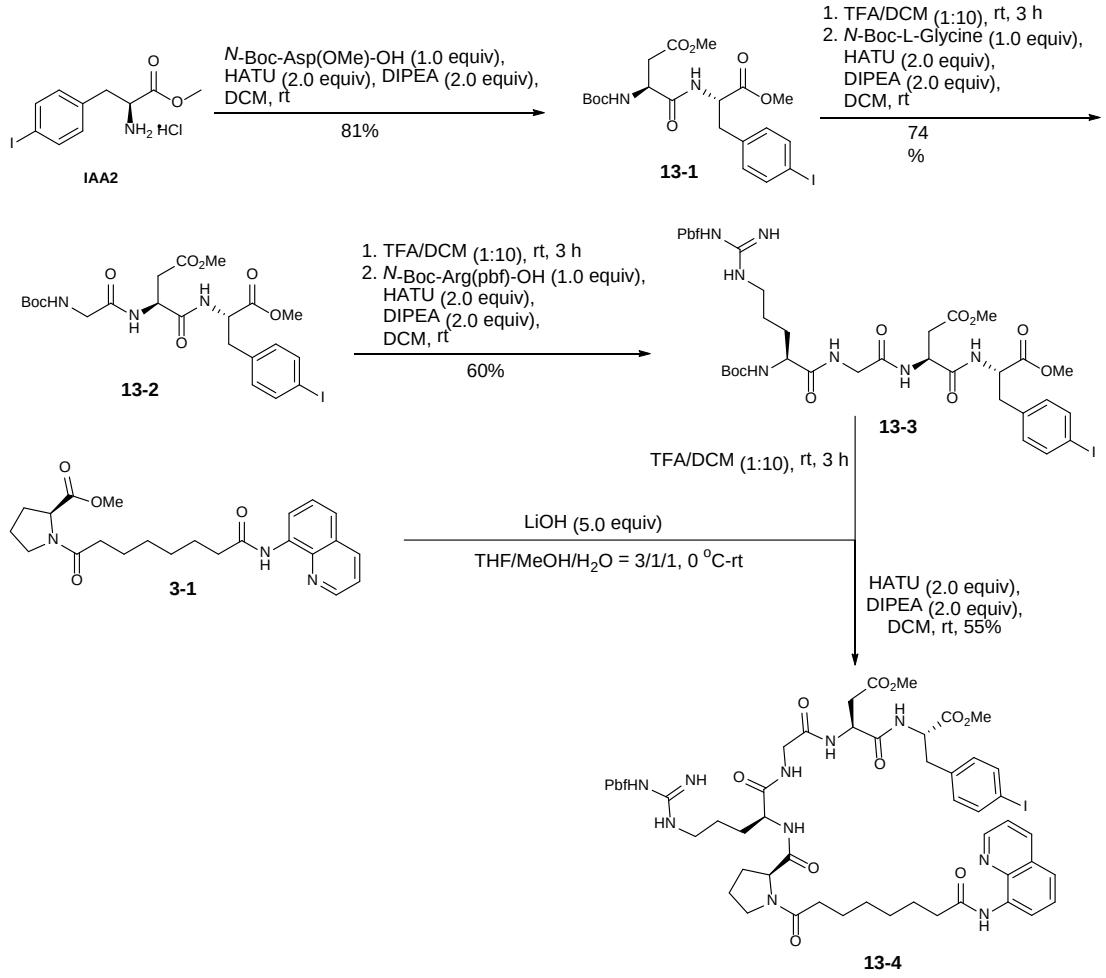
5.16 Synthesis of linear peptide 12-4 via combined solid/solution phase synthesis method



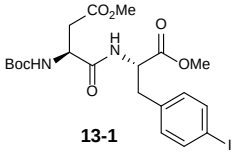
Supplementary Figure 21

The short peptide compound **12-5** was prpepared via SPPS. After been cleavaged from the resin, the crude carboxylic acid was coupled with **IAA8** (2.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **12-4** in 24% yield.

5.17 Synthesis of linear peptide 13-4

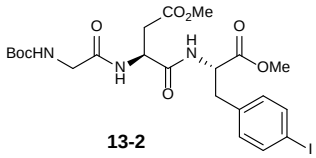


Supplementary Figure 22



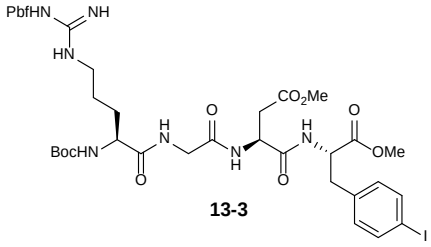
13-1 R_f = 0.6, 20% acetone in Hex

Compound **13-1** was prepared following the general amide coupling procedure in 81% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61 (d, *J* = 8.1 Hz, 2H), 6.96 (d, *J* = 6.1 Hz, 1H), 6.89 (d, *J* = 8.1 Hz, 2H), 5.65 (d, *J* = 7.6 Hz, 1H), 4.81-4.77 (m, 1H), 4.49 (s, 1H), 3.69 (s, 6H), 3.11-3.00 (m, 3H), 2.64 (dd, *J* = 17.2, 5.9 Hz, 1H), 1.43 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.49, 171.23, 170.56, 155.58, 137.69, 135.51, 131.47, 92.76, 80.73, 53.32, 52.50, 52.18, 50.55, 37.36, 35.63, 28.34; HRMS: Calcd for $C_{20}H_{27}IN_2NaO_7$ [M+Na^+]:557.0755, found: 557.0758.



13-2 R_f = 0.5, 20% acetone in Hex

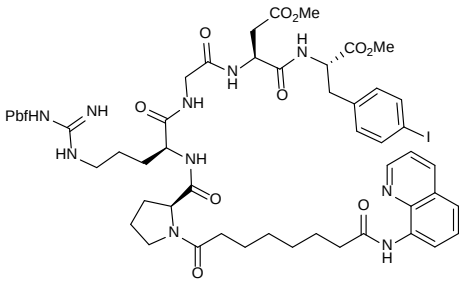
The Boc group of compound **13-1** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-Glycine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **13-2** in 74% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61 (d, *J* = 8.1 Hz, 2H), 7.34 (d, *J* = 8.0 Hz, 1H), 7.13 (d, *J* = 7.5 Hz, 1H), 6.89 (d, *J* = 8.1 Hz, 2H), 5.21 (t, *J* = 5.6 Hz, 1H), 4.79 (dt, *J* = 6.6, 5.5 Hz, 1H), 4.73 (dd, *J* = 13.5, 7.0 Hz, 1H), 3.80-3.71 (m, 2H), 3.68 (s, 3H), 3.66 (s, 3H), 3.08 (dd, *J* = 14.0, 5.6 Hz, 1H), 3.03-2.89 (m, 2H), 2.61 (dd, *J* = 17.1, 6.4 Hz, 1H), 1.44 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.19, 171.28, 170.04, 169.88, 156.19, 137.63, 135.78, 131.39, 92.60, 80.53, 53.46, 52.48, 52.19, 49.04, 44.49, 37.14, 35.29, 28.36; HRMS: Calcd for $C_{22}H_{30}IN_3NaO_8$ [M+Na^+]:614.0970, found: 614.0972.



13-3 R_f = 0.3, 25% acetone in Hex

The Boc group of compound **13-2** was removed following the general deprotection procedure. The residue was treated with *N*- Boc-Arg(pbf)-OH (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **13-3** in 60% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.90 (s, 1H), 7.54 (d, *J* = 8.0 Hz, 3H), 7.43 (d, *J* = 7.7 Hz, 1H), 6.88 (d, *J* = 8.1 Hz, 2H), 6.30 (s, 2H), 6.17 (s, 1H), 5.81 (s, 1H), 4.80 (d, *J* = 6.0 Hz, 1H), 4.65 (dd, *J* = 14.0, 7.4 Hz, 1H), 4.10 (s, 1H), 3.97 (dd, *J* = 16.5, 5.0 Hz, 1H), 3.88 (d, *J* = 14.8 Hz, 1H), 3.63 (s, 3H), 3.61 (s, 3H), 3.30 (s, 1H), 3.20 (s, 1H), 3.02 (dd, *J* = 13.9, 5.8 Hz, 1H), 2.98-2.88 (m, 3H), 2.88-2.71 (m, 2H), 2.56 (s, 3H), 2.48 (s, 3H), 2.26-2.20 (m, 1H), 2.07 (s, 3H), 1.88-1.77 (m, 1H), 1.72-1.56 (m, 3H), 1.44 (s, 6H), 1.40 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.26, 171.81, 171.64, 170.56, 170.22, 158.90, 156.71, 138.31, 137.51,

136.19, 132.56, 132.23, 131.29, 124.79, 117.68, 92.33, 86.53, 80.24, 54.66, 53.68, 52.48, 52.15, 49.80, 43.46, 43.25, 36.81, 35.51, 29.26, 28.65, 28.37, 25.64, 19.46, 18.12, 12.57; HRMS: Calcd for $C_{41}H_{58}IN_7NaO_{12}S$ [M+Na^+]:1022.2801, found: 1022.2801.

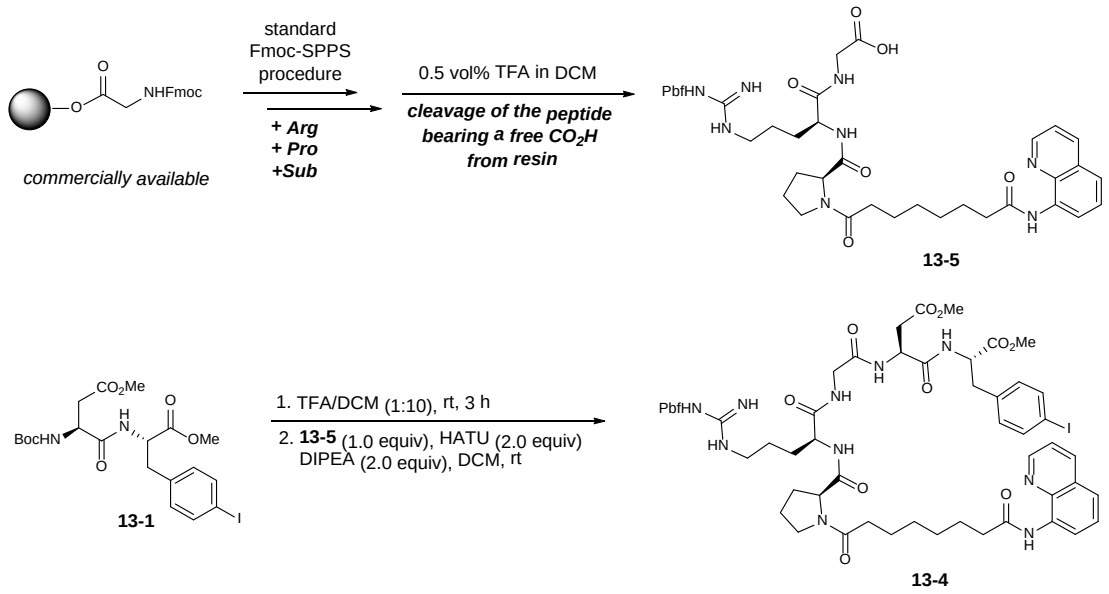


13-4

R_f = 0.4, 5% MeOH in DCM

Compound **13-3** (1.0 equiv) was added to a mixture of HCl in dioxane (4M) and dichloromethane (v/v = 1/10, 0.2M) at room temperature. The mixture was stirred at the same temperature for 3 hour, and then the solvent was removed under reduced pressure.The residue was treated with carboxylic acid hydrolyzed from compound **3-1** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **13-4** in 55% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.78 (d, *J* = 3.8 Hz, 1H), 8.72 (d, *J* = 5.1 Hz, 1H), 8.13 (d, *J* = 8.2 Hz, 1H), 7.94 (s, 1H), 7.83 (s, 1H), 7.64-7.37 (m, 7H), 6.88 (d, *J* = 8.0 Hz, 2H), 6.39 (s, 3H), 4.82-4.78 (m, 1H), 4.66-4.63 (m, 1H), 4.38 (s, 1H), 4.30 (s, 1H), 3.96 (d, *J* = 13.6 Hz, 1H), 3.82 (d, *J* = 12.6 Hz, 1H), 3.61 (s, 3H), 3.59 (s, 3H), 3.43-3.40 (m, 1H), 3.23 (s, 2H), 3.05-2.94 (m, 2H), 2.90 (s, 2H), 2.82-2.78 (m, 2H), 2.59-2.49 (m, 5H), 2.46 (s, 3H), 2.28-2.23 (m, 2H), 2.14-1.93 (m, 7H), 1.80-1.70 (m, 3H), 1.63-1.49 (m, 4H), 1.41 (s, 8H), 0.89-0.78 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.54, 173.34, 171.78, 171.49, 170.34, 169.72, 158.72, 156.52, 148.21, 138.27, 138.15, 137.44, 136.37, 136.11, 134.42, 132.85, 132.05, 131.37, 127.92, 127.32, 124.66, 121.67, 121.50, 117.53, 116.33, 92.37, 86.40, 60.59, 53.63, 52.31, 51.98, 49.67, 47.69, 43.48, 43.21, 37.98, 37.01, 35.44, 34.52, 29.67, 29.01, 28.96, 28.58, 25.43, 25.02, 24.41, 19.34, 17.99, 12.52.

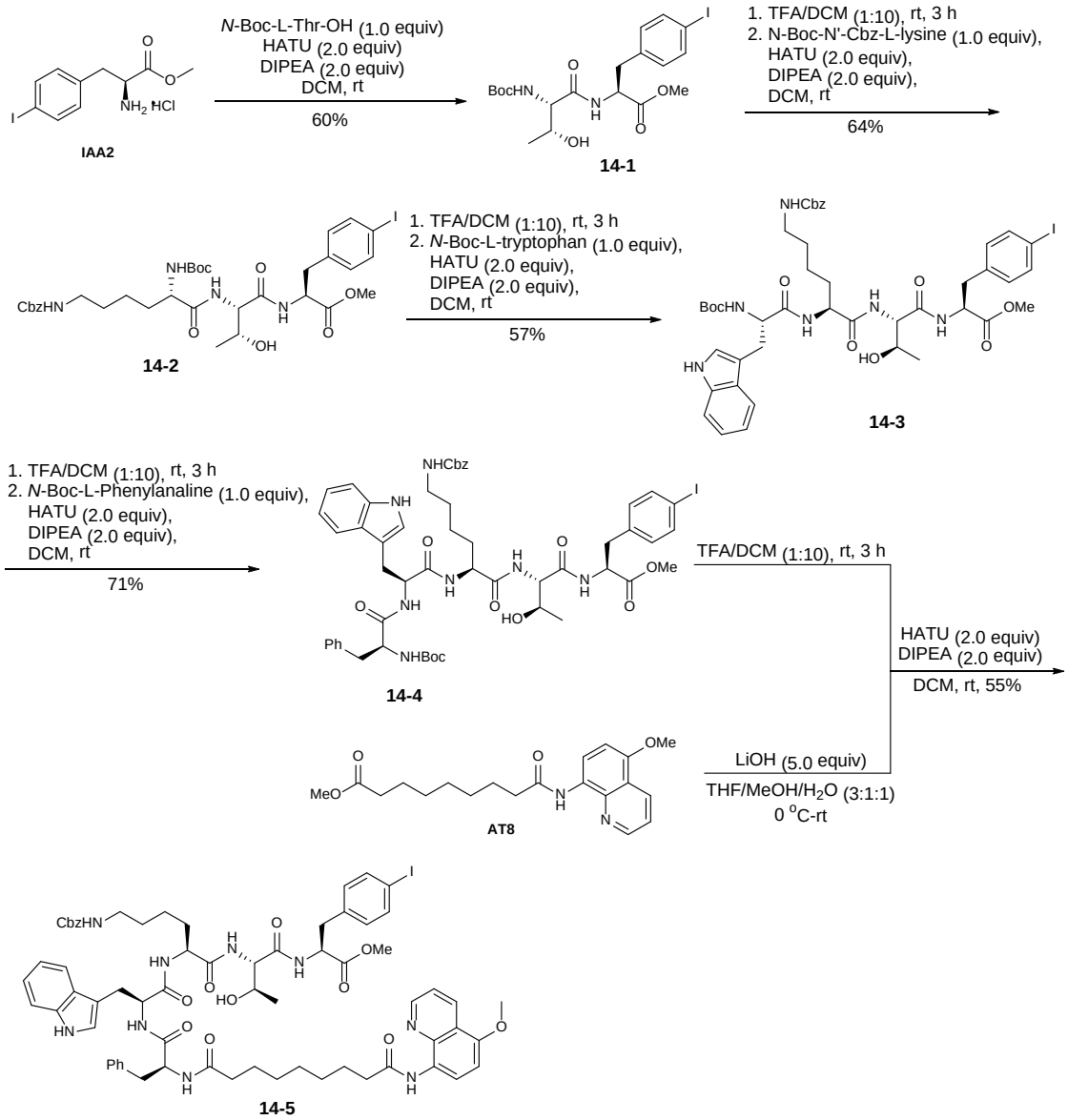
5.18 Synthesis of linear peptide 13-4 via combined solid/solution phase synthesis strategy



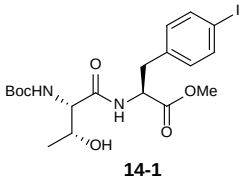
Supplementary Figure 23

The short peptide compound **13-5** was prpepared via SPPS and used directly without further purification. The Boc group of compound **13-1** was removed following the general deprotection procedure, then the residue was coupled with crude compound **13-5** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **13-4** in 11% yield.

5.19 Synthesis of linear peptide 14-5



Supplementary Figure 24

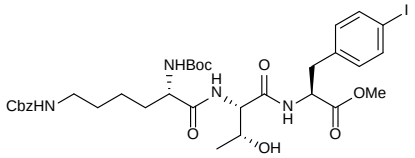


14-1

R_f = 0.3, 20% acetone in Hex

Compound **14-1** was prepared following the general amide coupling procedure in 60% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (d, *J* = 8.3 Hz, 2H), 7.23 (d, *J* = 7.6 Hz, 1H), 6.85 (d, *J* = 8.2 Hz, 2H), 5.57 (d, *J* = 8.0 Hz, 1H), 4.79-4.74 (m, 1H), 4.28-4.23 (m, 1H), 4.07 (d, *J* = 7.8 Hz, 1H), 3.68 (s, 4H), 3.06 (dd, *J* = 14.0, 5.6 Hz, 1H), 2.95 (dd, *J* = 13.9, 6.6 Hz, 1H), 1.40 (s, 9H), 1.12 (d, *J* = 6.4 Hz, 3H); ^{13}C NMR (101 MHz,

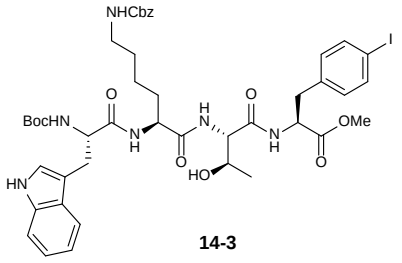
$CDCl_3$) δ 171.43, 171.14, 156.29, 137.64, 135.53, 131.27, 92.71, 80.40, 66.96, 58.36, 53.20, 52.52, 37.26, 28.33, 18.23.



14-2

R_f = 0.2, 20% acetone in Hex

The Boc group of compound **14-1** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-*N'*-Cbz-L-lysine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **14-2** in 64% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (d, *J* = 8.1 Hz, 2H), 7.42-7.38 (m, 1H), 7.35-7.28 (m, 5H), 6.86 (d, *J* = 8.1 Hz, 2H), 5.55 (s, 1H), 5.23 (s, 1H), 5.10-5.06 (m, 2H), 4.77-4.72 (m, 1H), 4.46-4.43 (m, 1H), 4.25 (s, 1H), 4.13 (s, 1H), 3.81 (s, 1H), 3.65 (s, 3H), 3.16-3.11 (m, 2H), 3.04 (dd, *J* = 13.9, 5.7 Hz, 1H), 2.96 (dd, *J* = 13.9, 6.6 Hz, 1H), 1.78-1.68 (m, 1H), 1.63-1.60 (m, 1H), 1.55-1.43 (m, 2H), 1.39 (s, 9H), 1.36-1.31 (m, 2H), 1.11 (d, *J* = 6.4 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.19, 171.57, 170.41, 156.75, 155.99, 137.66, 136.69, 135.70, 131.33, 128.56, 128.17, 128.13, 92.69, 80.27, 66.95, 66.65, 57.60, 54.63, 53.39, 52.51, 40.40, 37.24, 31.72, 29.47, 28.39, 22.53, 18.32.

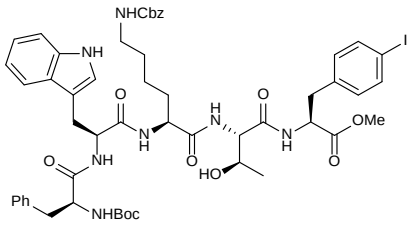


14-3

R_f = 0.3, 25% acetone in Hex

The Boc group of compound **14-2** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-tryptophan (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **14-3** in 57% yield. ^{1}H NMR (400 MHz, DMSO) δ 10.79 (s, 1H), 8.12 (d, *J* = 7.5 Hz, 1H), 8.00 (d, *J* = 7.9 Hz, 1H), 7.83 (d, *J* = 8.4 Hz, 1H), 7.60 (d, *J* = 8.1 Hz, 3H), 7.36-7.27 (m, 6H), 7.21 (t, *J* = 5.3 Hz, 1H), 7.13 (s, 1H), 7.07-6.94 (m, 4H), 6.86 (d, *J* = 8.3 Hz, 1H), 4.90 (s, 1H), 4.53-4.47 (m, 1H), 4.39-4.34 (m, 1H), 4.23-4.16 (m, 2H), 3.92-3.90 (m, 1H), 3.57 (s, 3H), 3.30 (t, *J* = 7.1 Hz, 1H), 3.10-3.07 (m, 1H),

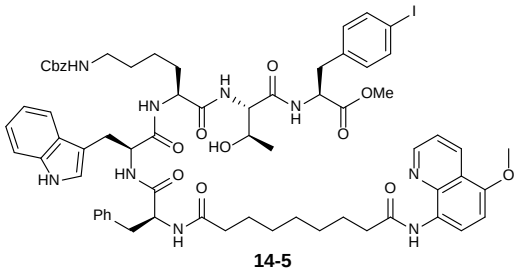
2.96-2.86 (m, 5H), 2.17 (t, *J* = 8.1 Hz, 1H), 1.93-1.85 (m, 1H), 1.71-1.58 (m, 1H), 1.55-1.49 (m, 1H), 1.43-1.36 (m, 2H), 1.29 (s, 9H), 1.02 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (101 MHz, DMSO) δ 172.01, 171.62, 171.38, 169.97, 156.05, 155.19, 137.28, 136.97, 136.68, 136.04, 131.59, 128.33, 127.73, 127.39, 123.67, 120.80, 118.55, 118.13, 111.24, 110.32, 92.55, 78.08, 66.59, 65.12, 57.98, 55.21, 53.13, 52.39, 51.88, 48.50, 36.19, 31.86, 30.13, 29.20, 29.02, 28.13, 22.44, 19.61, 17.24.



14-4

R_f = 0.2, 25% acetone in Hex

The Boc group of compound **14-3** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-phenylanaline (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **14-4** in 71% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.87 (s, 1H), 7.62 (d, *J* = 8.2 Hz, 2H), 7.53 (t, *J* = 7.4 Hz, 2H), 7.45 (t, *J* = 7.3 Hz, 1H), 7.37-7.29 (m, 6H), 7.24 (d, *J* = 7.3 Hz, 2H), 7.17-7.12 (m, 2H), 7.01-6.98 (m, 3H), 6.92 (t, *J* = 7.5 Hz, 1H), 6.82-6.80 (m, 2H), 6.71 (d, *J* = 8.2 Hz, 1H), 6.65 (d, *J* = 7.9 Hz, 1H), 5.18-5.04 (m, 3H), 4.88-4.83 (m, 1H), 4.72 (s, 1H), 4.47-4.33 (m, 4H), 4.10-4.04 (m, 2H), 3.71 (s, 3H), 3.47-3.43 (m, 1H), 3.23-3.08 (m, 5H), 3.04-2.94 (m, 2H), 2.15 (s, 1H), 2.01-1.92 (m, 1H), 1.47-1.31 (m, 2H), 1.15-1.06 (m, 4H), 0.91 (s, 10H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.75, 172.34, 171.59, 171.31, 170.27, 157.26, 156.43, 137.53, 136.51, 136.30, 136.16, 134.88, 131.80, 129.53, 129.32, 128.72, 128.35, 128.22, 127.99, 127.41, 124.43, 122.09, 119.92, 116.72, 112.37, 107.37, 92.36, 81.16, 67.36, 67.03, 59.39, 56.89, 56.39, 53.99, 53.23, 52.51, 41.05, 37.12, 37.00, 30.48, 29.86, 27.54, 25.16, 23.81, 19.65.

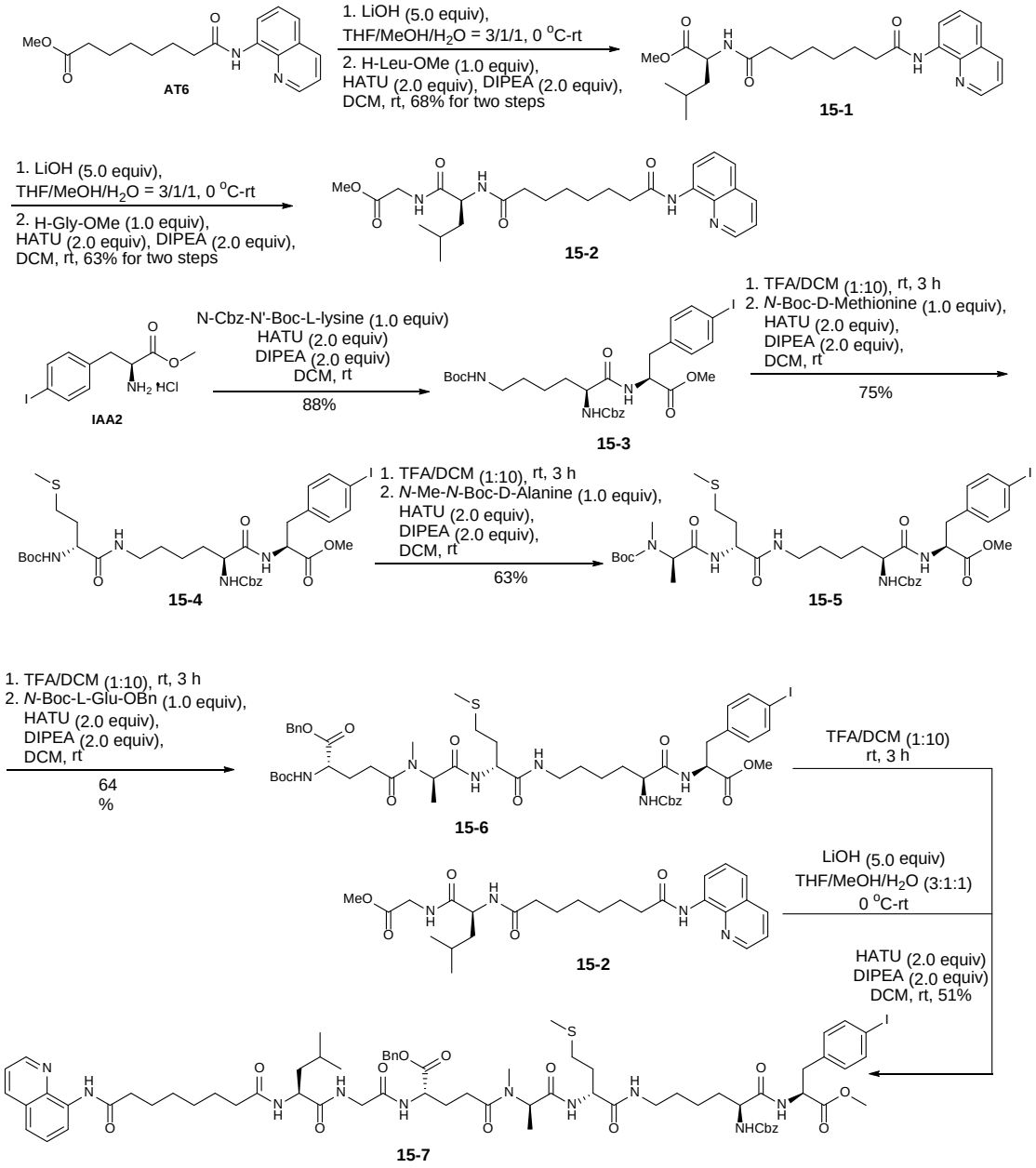


14-5

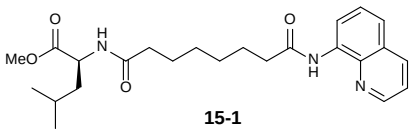
R_f = 0.4, 5% MeOH in DCM

The Boc group of compound **14-4** was removed following the general deprotection procedure. The residue was treated with carboxylic acid hydrolyzed from compound **AT8** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **14-5** in 55% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.32 (s, 1H), 9.59 (s, 1H), 8.85-8.82 (m, 1H), 8.71 (d, *J* = 8.5 Hz, 1H), 8.61 (d, *J* = 8.4 Hz, 1H), 7.65 (d, *J* = 8.0 Hz, 2H), 7.61-7.45 (m, 4H), 7.41-7.36 (m, 5H), 7.33-7.28 (m, 3H), 7.16-7.11 (m, 2H), 7.04 (d, *J* = 8.1 Hz, 3H), 6.82-6.78 (m, 4H), 6.61 (d, *J* = 7.8 Hz, 1H), 6.55 (d, *J* = 5.9 Hz, 1H), 5.51 (s, 1H), 5.24-5.05 (m, 3H), 4.92-4.87 (m, 1H), 4.45-4.43 (m, 1H), 4.37-4.25 (m, 3H), 4.16-4.12 (m, 1H), 4.00 (s, 4H), 3.75 (s, 3H), 3.43 (d, *J* = 14.5 Hz, 1H), 3.27-2.97 (m, 7H), 2.53 (t, *J* = 7.1 Hz, 2H), 1.85-0.90 (m, 17H), 0.70-0.62 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 175.37, 172.62, 172.41, 171.51, 171.36, 170.42, 157.44, 150.49, 148.79, 139.20, 137.56, 136.55, 136.43, 135.00, 131.92, 131.55, 129.55, 128.73, 128.38, 128.05, 127.58, 124.81, 122.00, 120.66, 119.70, 116.79, 112.53, 107.12, 104.50, 92.27, 67.43, 67.13, 59.24, 56.14, 56.07, 55.95, 54.36, 53.29, 52.51, 41.29, 38.06, 37.01, 36.49, 34.36, 30.46, 30.29, 29.83, 29.06, 28.65, 25.68, 25.16, 24.10, 23.83, 19.71; HRMS: Calcd for $C_{67}H_{78}IN_9NaO_{12}$ [M+Na^+]:1350.4707, found: 1350.4708.

5.20 Synthesis of linear peptide 15-7



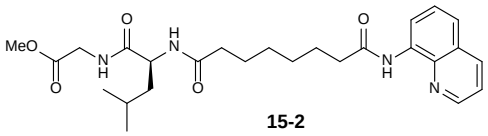
Supplementary Figure 25



R_f = 0.5, 25% acetone in Hex

The ester group of compound **AT6** was removed following the general hydrolyzation procedure. The residue was treated with L-Leu-OMe (1.0 equiv), HATU (2.0 equiv)

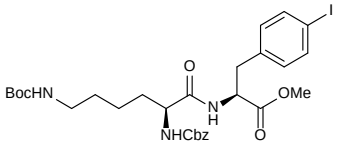
and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **15-1** in 68% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.81-8.76 (m, 2H), 8.16 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.56-7.44 (m, 3H), 5.86 (d, *J* = 8.1 Hz, 1H), 4.67-4.62 (m, 1H), 3.72 (s, 3H), 2.57 (t, *J* = 7.5 Hz, 2H), 2.23 (t, *J* = 7.5 Hz, 2H), 1.85-1.79 (m, 2H), 1.71-1.64 (m, 4H), 1.54-1.38 (m, 5H), 0.94-0.92 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.78, 172.94, 171.82, 148.17, 138.32, 136.39, 134.51, 127.94, 127.40, 121.63, 121.43, 116.40, 52.26, 50.56, 41.58, 38.04, 36.32, 28.88, 28.85, 25.46, 25.44, 24.89, 22.85, 21.93.



15-2

R_f = 0.4, 25% acetone in Hex

The ester group of compound **15-1** was removed following the general hydrolyzation procedure. The residue was treated with Gly-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **15-2** in 63% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.79 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.74 (dd, *J* = 7.2, 1.7 Hz, 1H), 8.14 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.53-7.42 (m, 3H), 7.09 (t, *J* = 4.6 Hz, 1H), 6.38 (d, *J* = 8.2 Hz, 1H), 4.57-4.52 (m, 1H), 4.04 (dd, *J* = 18.1, 5.6 Hz, 1H), 3.95 (dd, *J* = 18.1, 5.4 Hz, 1H), 3.70 (s, 3H), 2.54 (t, *J* = 7.5 Hz, 2H), 2.21 (t, *J* = 7.6 Hz, 2H), 1.83-1.75 (m, 2H), 1.70-1.59 (m, 4H), 1.55-1.51 (m, 1H), 1.45-1.36 (m, 4H), 0.92-0.88 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.46, 173.22, 171.61, 169.86, 147.92, 137.98, 136.15, 134.14, 127.65, 127.05, 121.39, 121.28, 116.25, 51.90, 51.17, 40.85, 37.74, 35.87, 28.70, 25.33, 25.24, 24.47, 22.67, 21.85; HRMS: Calcd for $C_{26}H_{37}N_4O_5$ [M+H$^+$]:485.2758, found: 485.2762.

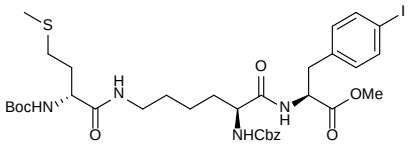


15-3

R_f = 0.5, 20% acetone in Hex

Compound **15-3** was prepared following the general amide coupling procedure in 88% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (d, *J* = 8.2 Hz, 2H), 7.37-7.29 (m, 5H), 6.84 (d, *J* = 8.0 Hz, 2H), 6.53 (d, *J* = 6.8 Hz, 1H), 5.41 (d, *J* = 7.5 Hz, 1H), 5.10 (s, 2H), 4.87-4.80 (m, 1H), 4.62 (s, 1H), 4.12-4.08 (m, 1H), 3.72 (s, 3H), 3.12-3.06 (m, 3H),

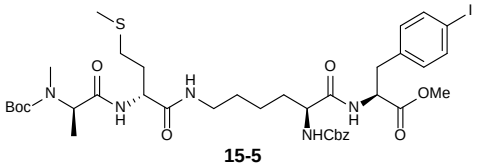
3.04-2.96 (m, 1H), 1.84-1.75 (m, 1H), 1.63-1.57 (m, 1H), 1.41 (s, 11H), 1.35-1.27 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.67, 171.59, 156.26, 137.63, 136.21, 135.53, 131.33, 128.59, 128.25, 128.14, 92.71, 79.19, 67.12, 54.75, 53.02, 52.55, 39.78, 37.33, 31.82, 29.59, 28.47, 22.32; HRMS: Calcd for $C_{29}H_{38}IN_3NaO_7$ [M+Na$^+$]:690.1647, found: 690.1651.



15-4

R_f = 0.4, 20% acetone in Hex

The Boc group of compound **15-3** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-D-Methionine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **15-4** in 75% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (d, *J* = 8.2 Hz, 2H), 7.36-7.30 (m, 5H), 6.86 (d, *J* = 7.9 Hz, 2H), 6.77 (d, *J* = 5.4 Hz, 1H), 6.51 (s, 1H), 5.56 (d, *J* = 7.6 Hz, 1H), 5.32 (d, *J* = 8.4 Hz, 1H), 5.12-5.08 (m, 2H), 4.84-4.79 (m, 1H), 4.24-4.21 (m, 1H), 4.12-4.09 (m, 1H), 3.72 (s, 3H), 3.23-3.11 (m, 2H), 3.09 (dd, *J* = 13.9, 5.5 Hz, 1H), 2.98 (dd, *J* = 13.9, 6.6 Hz, 1H), 2.55-2.45 (m, 2H), 2.07-1.98 (m, 4H), 1.93-1.71 (m, 3H), 1.66-1.57 (m, 1H), 1.52-1.43 (m, 11H), 1.35-1.30 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.94, 171.80, 171.70, 156.33, 155.82, 137.62, 136.24, 135.62, 131.37, 128.61, 128.26, 128.11, 92.70, 80.11, 67.09, 54.60, 53.51, 53.12, 52.57, 38.79, 37.31, 32.07, 31.80, 30.25, 28.94, 28.40, 22.43, 15.39; HRMS: Calcd for $C_{34}H_{47}IN_4NaO_8S$ [M+Na$^+$]:821.2051, found: 821.2058.

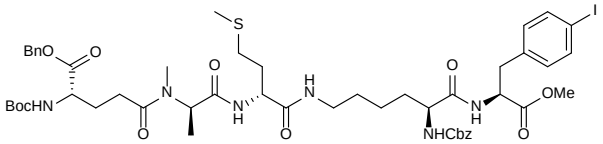


15-5

R_f = 0.5, 25% acetone in Hex

The Boc group of compound **15-4** was removed following the general deprotection procedure. The residue was treated with *N*-Methyl-*N*-Boc-D-alanine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **15-5** in 63% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56 (d, *J* = 8.1 Hz, 2H), 7.40-7.30 (m, 5H), 7.12-6.80 (m, 5H), 5.84 (s, 1H), 5.11-5.04 (m,

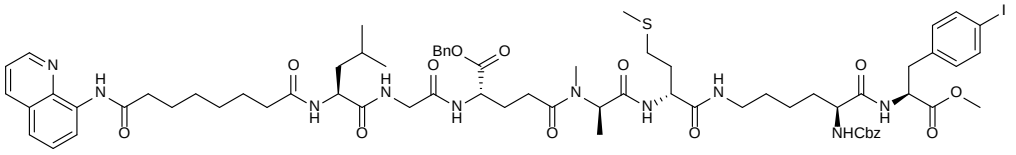
2H), 4.82-4.78 (m, 1H), 4.56-4.52 (m, 2H), 4.17-4.14 (m, 1H), 3.69 (s, 3H), 3.20-3.16 (m, 2H), 3.07 (dd, *J* = 14.0, 5.6 Hz, 1H), 2.96 (dd, *J* = 13.6, 6.7 Hz, 1H), 2.85 (s, 3H), 2.46 (t, *J* = 6.3 Hz, 2H), 2.05 (s, 4H), 1.96-1.90 (m, 1H), 1.77-1.70 (m, 1H), 1.63-1.58 (m, 1H), 1.46 (s, 11H), 1.29 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.10, 171.73, 171.61, 170.98, 156.30, 137.55, 136.26, 135.67, 131.34, 128.54, 128.17, 128.07, 92.61, 80.82, 67.02, 54.71, 53.09, 52.49, 38.88, 37.26, 31.74, 30.63, 30.09, 28.72, 28.39, 22.35, 15.28, 13.83; HRMS: Calcd for $C_{38}H_{54}IN_5NaO_9S$ [M+Na^+]:906.2579, found: 906.2583.



15-6

R_f = 0.3, 25% acetone in Hex

The Boc group of compound **15-5** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-Glu-OBn (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **15-6** in 64% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (d, *J* = 8.0 Hz, 2H), 7.35-7.27 (m, 10H), 7.10 (d, *J* = 7.9 Hz, 1H), 6.92-6.88 (m, 4H), 6.17 (d, *J* = 6.7 Hz, 1H), 5.43 (d, *J* = 8.1 Hz, 1H), 5.15-5.04 (m, 4H), 4.85-4.81 (m, 1H), 4.62-4.58 (m, 1H), 4.50-4.48 (m, 1H), 4.22-4.18 (m, 1H), 4.07-4.03 (m, 1H), 3.78 (s, 3H), 3.25-3.21 (m, 1H), 3.07 (dd, *J* = 13.6, 5.5 Hz, 1H), 3.03-2.74 (m, 5H), 2.50-2.46 (m, 3H), 2.4-2.33 (m, 1H), 2.28-2.24 (m, 1H), 2.19-1.96 (m, 6H), 1.93-1.83 (m, 1H), 1.65-1.60 (m, 2H), 1.53-1.12 (m, 15H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.79, 172.44, 172.14, 171.87, 171.65, 171.33, 156.51, 155.88, 137.52, 136.41, 135.82, 134.91, 131.48, 128.70, 128.61, 128.52, 128.28, 128.15, 92.52, 80.28, 67.62, 66.98, 55.42, 55.36, 53.00, 52.90, 52.39, 52.28, 38.42, 37.44, 31.54, 31.07, 30.99, 29.81, 28.93, 28.71, 28.42, 28.00, 21.81, 15.37, 14.62; HRMS: Calcd for $C_{50}H_{67}IN_6NaO_{12}S$ [M+Na^+]:1125.3475, found: 1125.3478.

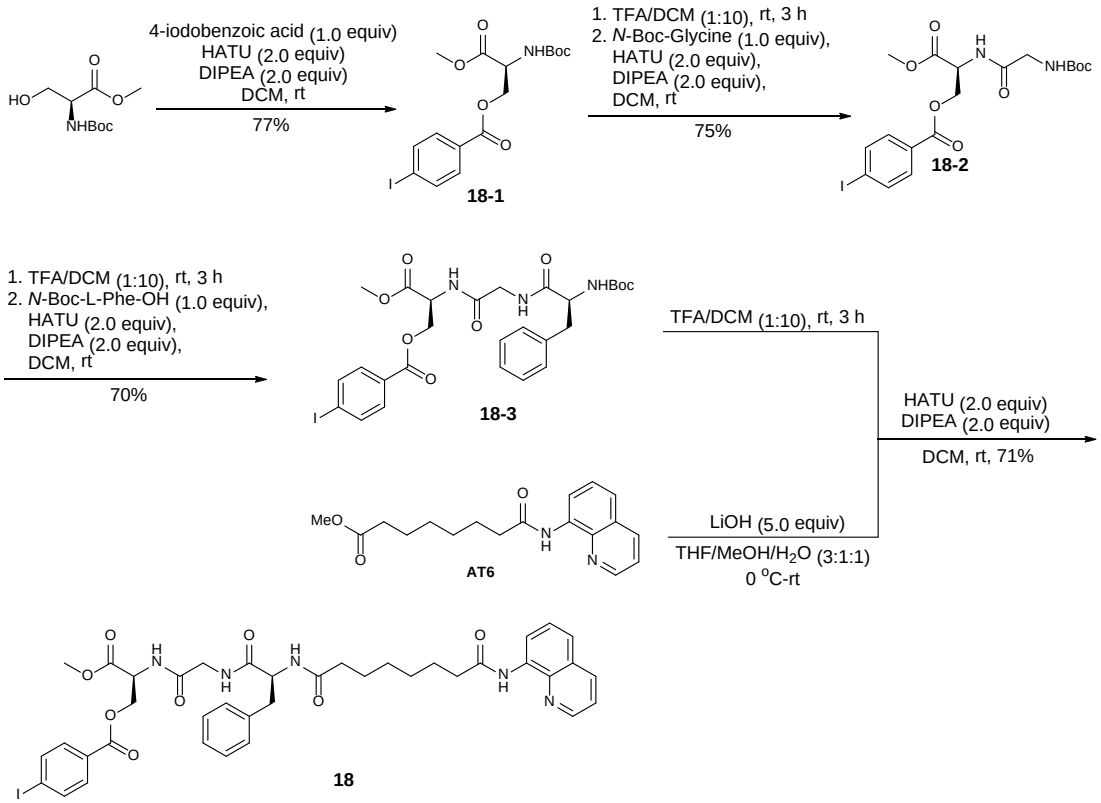


15-7

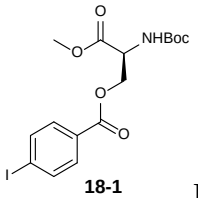
R_f = 0.4, 5% MeOH in DCM

The Boc group of compound **15-6** was removed following the general deprotection procedure. The residue was treated with the carboxylic acid hydrolyzed from **13-2** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **15-7** in 51% yield. ^{1}H NMR (400 MHz, MeOD) δ 8.81 (d, *J* = 2.8 Hz, 1H), 8.59 (d, *J* = 7.5 Hz, 1H), 8.23 (d, *J* = 8.1 Hz, 1H), 7.57-7.46 (m, 5H), 7.35-7.20 (m, 10H), 6.93 (d, *J* = 7.6 Hz, 2H), 5.20-5.08 (m, 5H), 4.65-4.60 (m, 2H), 4.38 (d, *J* = 9.6 Hz, 1H), 4.22 (s, 1H), 4.02-3.87 (m, 1H), 3.92 (d, *J* = 16.9 Hz,, 1H), 3.73 (d, *J* = 16.9 Hz, 1H), 3.63 (s, 4H), 3.27 (s, 2H), 3.15-2.98 (m, 4H), 2.89-2.83 (m, 4H), 2.76 (s, 1H), 2.53-2.35 (m, 6H), 2.28-2.18 (m, 3H), 1.72-1.52 (m, 8H), 1.46-1.30 (m, 8H), 1.28-1.26 (m, 8H), 0.90 (dd, *J* = 14.4, 6.3 Hz, 6H); ^{13}C NMR (101 MHz, MeOD) δ 176.37, 175.82, 175.22, 174.69, 174.31, 174.16, 173.76, 172.94, 172.83, 171.67, 158.23, 149.93, 139.91, 138.62, 138.09, 137.89, 137.72, 137.12, 135.51, 132.59, 129.60, 129.52, 129.36, 129.34, 129.29, 129.22, 129.19, 129.04, 128.95, 128.04, 123.38, 123.03, 118.27, 92.86, 68.09, 67.77, 56.43, 55.53, 54.63, 54.33, 53.83, 52.82, 52.68, 43.84, 41.33, 40.05, 38.44, 37.79, 36.53, 32.64, 32.27, 31.79, 31.60, 30.01, 29.97, 29.93, 29.71, 28.09, 27.97, 26.65, 25.90, 23.85, 23.35, 22.13, 15.34, 14.55; HRMS: Calcd for $C_{70}H_{91}IN_{10}NaO_{14}S$ [M+Na^+]:1477.5374, found: 1477.5406.

5.21 Synthesis of linear peptide 18



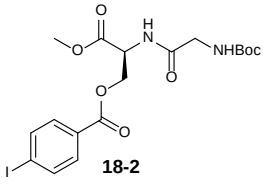
Supplementary Figure 26



18-1

R_f = 0.5, 20% acetone in Hex

Compound **18-1** was prepared following the feneral amide coupling procedure in 77% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, *J* = 8.3 Hz, 2H), 7.69 (d, *J* = 8.3 Hz, 2H), 5.37 (d, *J* = 8.0 Hz, 1H), 4.75-4.71 (m, 1H), 4.63-4.60 (m, 2H), 3.78 (s, 3H), 1.44 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 170.34, 165.63, 155.18, 137.92, 131.19, 128.94, 101.38, 80.53, 65.26, 52.96, 28.35; HRMS: Calcd for $C_{16}H_{20}INNaO_6$ [M+Na^+]:472.0228, found: 472.0230.

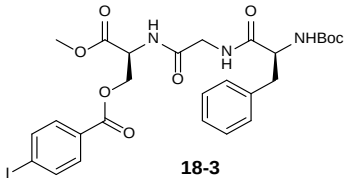


18-2

R_f = 0.4, 20% acetone in Hex

The Boc group of compound **18-1** was removed following the general deprotection

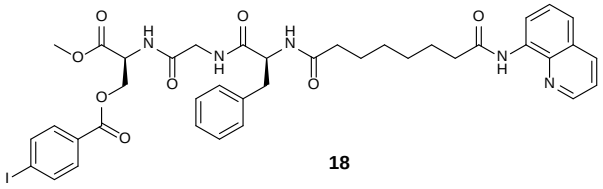
procedure. The residue was treated with *N*-Boc-Glycine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **18-2** in 75% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77 (d, *J* = 8.3 Hz, 2H), 7.66 (d, *J* = 8.2 Hz, 2H), 7.18 (s, 1H), 5.29 (s, 1H), 5.02-4.89 (m, 1H), 4.68-4.55 (m, 2H), 3.93-3.80 (m, 2H), 3.76 (s, 3H), 1.39 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 169.79, 165.67, 156.18, 137.96, 131.18, 128.82, 101.44, 80.44, 64.57, 53.10, 51.78, 44.41, 28.31; HRMS: Calcd for $C_{18}H_{23}IN_2NaO_7$ [M+Na^+]:529.0442, found: 529.0445.



18-3

R_f = 0.3, 20% acetone in Hex

The Boc group of compound **18-2** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-L-Phenylanaline (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **18-3** in 70% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, *J* = 8.3 Hz, 2H), 7.67 (d, *J* = 8.5 Hz, 2H), 7.46 (d, *J* = 6.8 Hz, 1H), 7.29-7.26 (m, 2H), 7.23-7.21 (m, 1H), 7.17 (d, *J* = 6.8 Hz, 2H), 6.97 (t, *J* = 5.2 Hz, 1H), 5.23 (d, *J* = 7.7 Hz, 1H), 4.98-4.95 (m, 1H), 4.63-4.58 (m, 2H), 4.46-4.38 (m, 1H), 4.07 (dd, *J* = 16.8, 5.6 Hz, 1H), 3.86 (dd, *J* = 16.8, 5.1 Hz, 1H), 3.78 (s, 3H), 3.11 (dd, *J* = 13.9, 5.8 Hz, 1H), 2.98-2.88 (m, 1H), 1.34 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.49, 170.00, 168.95, 165.71, 155.72, 137.90, 136.82, 131.16, 129.32, 128.74, 128.63, 126.95, 101.42, 80.24, 64.53, 55.91, 53.06, 51.79, 43.12, 38.40, 28.27; HRMS: Calcd for $C_{27}H_{32}IN_3NaO_8$ [M+Na^+]:676.1126, found: 676.1128.



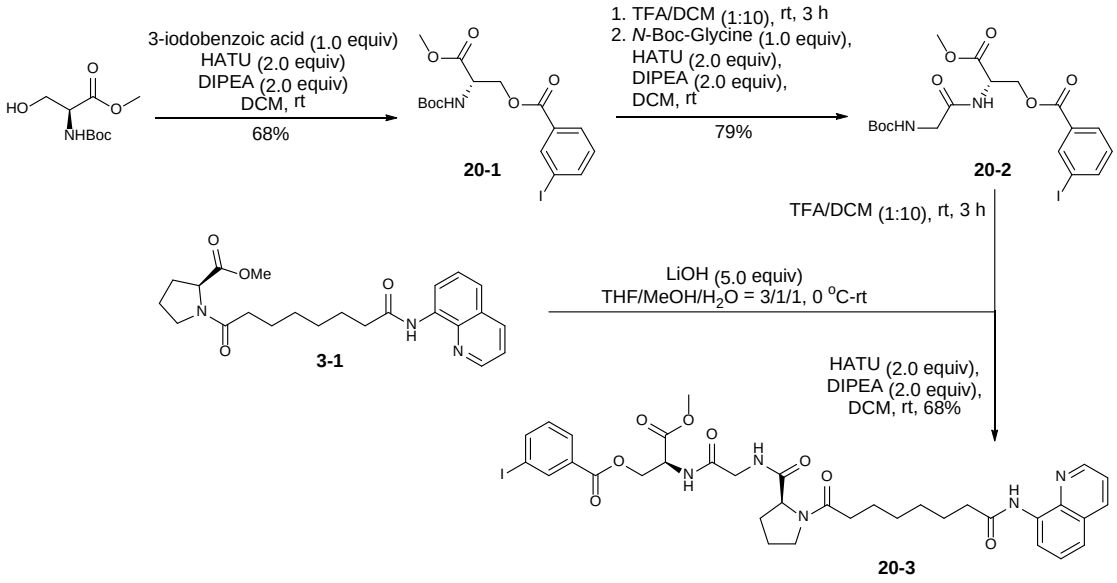
18

R_f = 0.5, 5% DCM in MeOH

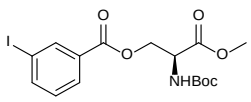
The Boc group of compound **18-3** was removed following the general deprotection procedure. The residue was treated with the carboxylic acid hydrolyzed from **AT6** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **18** in 71% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ

9.80 (s, 1H), 8.80 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.75 (dd, *J* = 6.9, 1.8 Hz, 1H), 8.16 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.73 (d, *J* = 8.5 Hz, 2H), 7.66 (d, *J* = 8.5 Hz, 2H), 7.57-7.38 (m, 4H), 7.31-7.19 (m, 3H), 7.15 (d, *J* = 8.0 Hz, 2H), 6.91 (t, *J* = 5.6 Hz, 1H), 6.25 (d, *J* = 6.7 Hz, 1H), 4.94-4.90 (m, 1H), 4.68-4.50 (m, 3H), 4.09 (dd, *J* = 16.9, 6.4 Hz, 1H), 3.84-3.71 (m, 1H), 3.75 (s, 3H), 3.09 (dd, *J* = 14.0, 6.6 Hz, 1H), 2.95 (dd, *J* = 13.9, 8.3 Hz, 1H), 2.51 (t, *J* = 7.5 Hz, 2H), 2.14-2.02 (m, 2H), 1.75-1.70 (m, 2H), 1.54-1.39 (m, 4H), 1.38-1.30 (m, 2H), 1.25-1.17 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.76, 172.80, 172.22, 170.19, 169.81, 165.90, 148.35, 138.39, 137.90, 136.50, 134.42, 131.23, 129.14, 128.79, 128.04, 127.46, 127.15, 121.78, 121.72, 116.59, 101.49, 64.25, 55.33, 53.17, 51.97, 42.96, 38.02, 37.46, 35.93, 28.68, 28.54, 25.33, 25.10; HRMS: Calcd for $C_{39}H_{42}IN_5NaO_8$ [M+Na^+]:858.1970, found: 858.1970.

5.22 Synthesis of linear peptide 20-3



Supplementary Figure 27

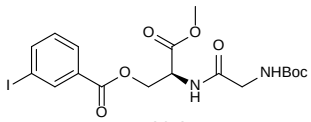


20-1

R_f = 0.5, 20% acetone in Hexane

Compound **20-1** was prepared following the amide coupling procedure in 68% yield.

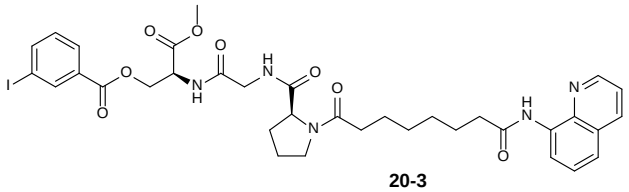
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.31 (s, 1H), 7.95 (d, *J* = 7.8 Hz, 1H), 7.90 (d, *J* = 7.9 Hz, 1H), 7.18 (t, *J* = 7.8 Hz, 1H), 5.37 (d, *J* = 7.6 Hz, 1H), 4.73-4.71 (m, 1H), 4.60 (d, *J* = 3.8 Hz, 2H), 3.80 (s, 3H), 1.45 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 170.24, 164.57, 155.15, 142.19, 138.55, 131.34, 130.17, 128.90, 93.89, 80.45, 65.28, 52.91, 28.32.



20-2

R_f = 0.4, 20% acetone in Hex

The Boc group of compound **20-1** was removed following the general deprotection procedure. The residue was treated with *N*-Boc-Glycine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **20-2** in 79% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.23 (s, 1H), 7.88 (d, *J* = 7.7 Hz, 1H), 7.82 (d, *J* = 7.8 Hz, 1H), 7.32 (d, *J* = 6.4 Hz, 1H), 7.11 (t, *J* = 7.8 Hz, 1H), 5.48 (t, *J* = 5.4 Hz, 1H), 4.93 (d, *J* = 7.0 Hz, 1H), 4.60-4.56 (m, 2H), 3.82-3.75 (m, 2H), 3.73 (s, 3H), 1.35 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 169.86, 169.70, 164.53, 156.14, 142.15, 138.50, 131.18, 130.14, 128.81, 93.82, 80.15, 64.56, 52.96, 51.69, 44.22, 28.24; HRMS: Calcd for $C_{18}H_{23}IN_2NaO_7$ [M+Na^+]:529.0442, found: 529.0446.



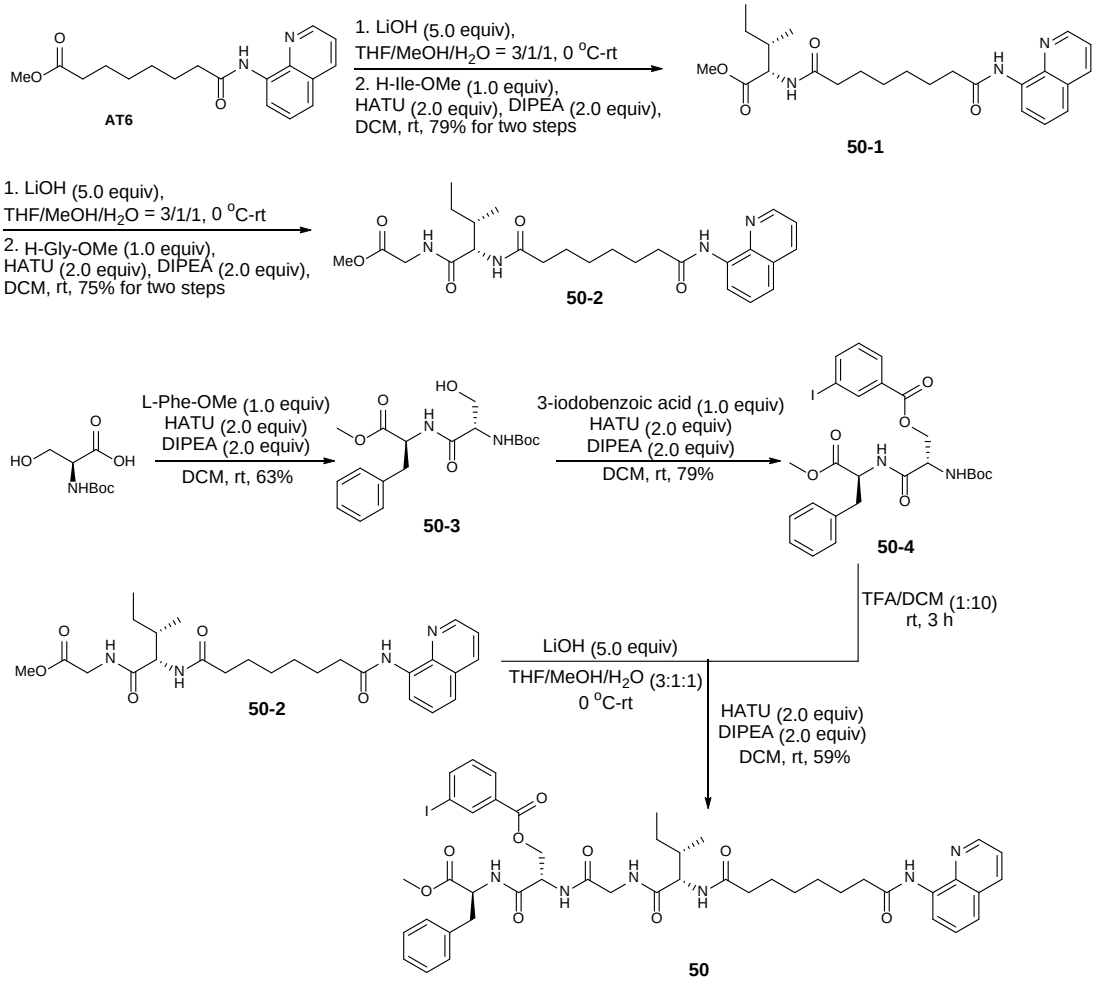
20-3

R_f = 0.5, 5% MeOH in DCM

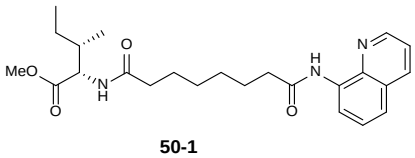
The Boc group of compound **20-2** was removed following the general deprotection procedure. The residue was treated with the carboxylic acid hydrolyzed from compound **3-1** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **20-3** in 68% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.83-8.75 (m, 2H), 8.32 (s, 1H), 8.16 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.96 (d, *J* = 7.8 Hz, 1H), 7.86 (d, *J* = 7.9 Hz, 1H), 7.59 (d, *J* = 7.5 Hz, 1H), 7.57-7.42 (m, 3H), 7.29-7.21 (m, 1H), 7.16 (t, *J* = 7.8 Hz, 1H), 4.95-4.85 (m, 1H), 4.66-4.60 (m, 2H), 4.42-4.38 (m, 1H), 4.17 (dd, *J* = 16.9, 7.2 Hz, 1H), 3.83-3.71 (m, 4H), 3.60-3.50 (m, 1H), 3.46-3.38 (m, 1H), 2.55 (t, *J* = 7.5 Hz, 2H), 2.28-2.22 (m,

3H), 2.11-2.01 (m, 1H), 1.98-1.90 (m, 2H), 1.85-1.78 (m, 2H), 1.64-1.55 (m, 2H), 1.47-1.34 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.40, 172.59, 171.86, 169.88, 169.67, 164.60, 148.24, 142.04, 138.62, 138.37, 136.46, 134.57, 131.54, 130.18, 129.05, 128.00, 127.46, 121.70, 121.48, 116.44, 93.85, 64.10, 60.40, 52.87, 51.85, 47.70, 43.26, 38.11, 34.50, 29.05, 28.97, 28.35, 25.51, 25.18, 24.43; HRMS: Calcd for $C_{35}H_{41}IN_5O_8$ [M+H$^+$]:786.1994, found: 786.1996.

5.23 Synthesis of linear peptide 50

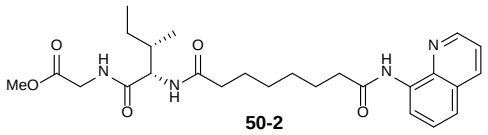


Supplementary Figure 28



R_f = 0.5, 20% acetone in Hex

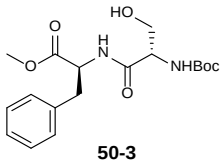
The ester group of compound **AT6** was removed following the general hydrolyzation procedure. The residue was treated with L-Ile-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **50-1** in 79% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.79 (s, 1H), 8.77 (m, 2H), 8.14 (d, *J* = 8.2 Hz, 1H), 7.54-7.40 (m, 3H), 6.04 (d, *J* = 8.5 Hz, 1H), 4.61-4.58 (m, 1H), 3.71 (s, 3H), 2.54 (t, *J* = 7.5 Hz, 2H), 2.23 (t, *J* = 7.5 Hz, 2H), 1.87-1.78 (m, 3H), 1.70-1.61 (m, 2H), 1.49-1.34 (m, 5H), 1.20-1.10 (m, 1H), 0.89 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.90, 172.79, 171.86, 148.22, 138.39, 136.46, 134.59, 128.01, 127.49, 121.68, 121.46, 116.47, 56.29, 52.16, 38.14, 38.01, 36.58, 28.98, 25.56, 25.52, 25.30, 15.52, 11.66.



50-2

R_f = 0.4, 20% acetone in Hex

The ester group of compound **50-1** was removed following the general hydrolyzation procedure. The residue was treated with Gly-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **50-2** in 75% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.81-8.76 (m, 2H), 8.16 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.53-7.44 (m, 3H), 6.58 (t, *J* = 5.1 Hz, 1H), 6.14 (d, *J* = 8.6 Hz, 1H), 4.35 (dd, *J* = 8.6, 7.3 Hz, 1H), 4.10 (dd, *J* = 18.2, 5.6 Hz, 1H), 3.96 (dd, *J* = 18.2, 5.1 Hz, 1H), 3.74 (s, 3H), 2.56 (t, *J* = 7.5 Hz, 2H), 2.23 (t, *J* = 7.6 Hz, 2H), 1.93-1.78 (m, 3H), 1.71-1.62 (m, 2H), 1.57-1.36 (m, 5H), 1.20-1.09 (m, 1H), 0.99-0.85 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.29, 171.91, 171.72, 170.08, 148.28, 138.48, 136.53, 134.65, 128.08, 127.58, 121.73, 121.52, 116.58, 57.56, 52.53, 41.25, 38.17, 37.22, 36.64, 29.01, 28.99, 25.58, 25.54, 25.11, 15.51, 11.40; HRMS: Calcd for $C_{26}H_{37}N_4O_5$ [M+H$^+$]:485.2758, found: 485.2760.

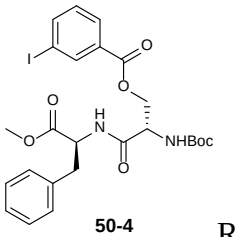


50-3

R_f = 0.3, 20% acetone in Hex

Compound **50-3** was prepared following the general amide coupling procedure in 63% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41-7.17 (m, 4H), 7.13 (d, *J* = 6.7 Hz, 2H),

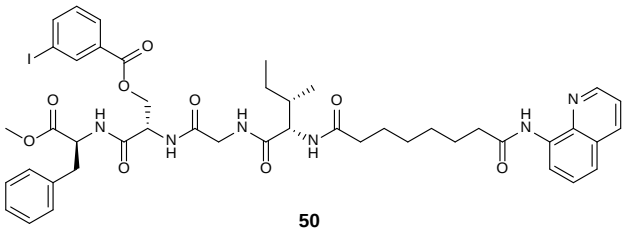
5.83-5.61 (m, 1H), 4.90-4.79 (m, 1H), 4.20 (s, 1H), 3.95-3.92 (m, 1H), 3.69 (s, 3H), 3.63-3.61 (m, 1H), 3.15 (dd, *J* = 13.9, 5.7 Hz, 1H), 3.05 (dd, *J* = 13.9, 6.8 Hz, 1H), 1.42 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.83, 171.00, 155.85, 135.79, 129.16, 128.49, 127.03, 80.19, 62.69, 55.36, 53.49, 52.36, 37.59, 28.20.



50-4

R_f = 0.4, 20% acetone in Hex

Compound **50-4** was prepared following the general amide coupling procedure in 79% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.35 (s, 1H), 7.96 (d, *J* = 7.8 Hz, 1H), 7.92 (d, *J* = 7.8 Hz, 1H), 7.33-7.23 (m, 4H), 7.20 (d, *J* = 7.9 Hz, 1H), 7.10 (d, *J* = 6.7 Hz, 2H), 6.72 (d, *J* = 6.7 Hz, 1H), 5.31 (s, 1H), 4.90-4.86 (m, 1H), 4.64-4.49 (m, 3H), 3.70 (s, 3H), 3.22-3.11 (m, 2H), 1.45 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.47, 168.77, 164.82, 155.39, 142.11, 138.50, 135.66, 131.34, 130.11, 129.21, 128.96, 128.60, 127.18, 93.84, 80.58, 64.97, 53.50, 52.45, 38.64, 37.89, 28.27.



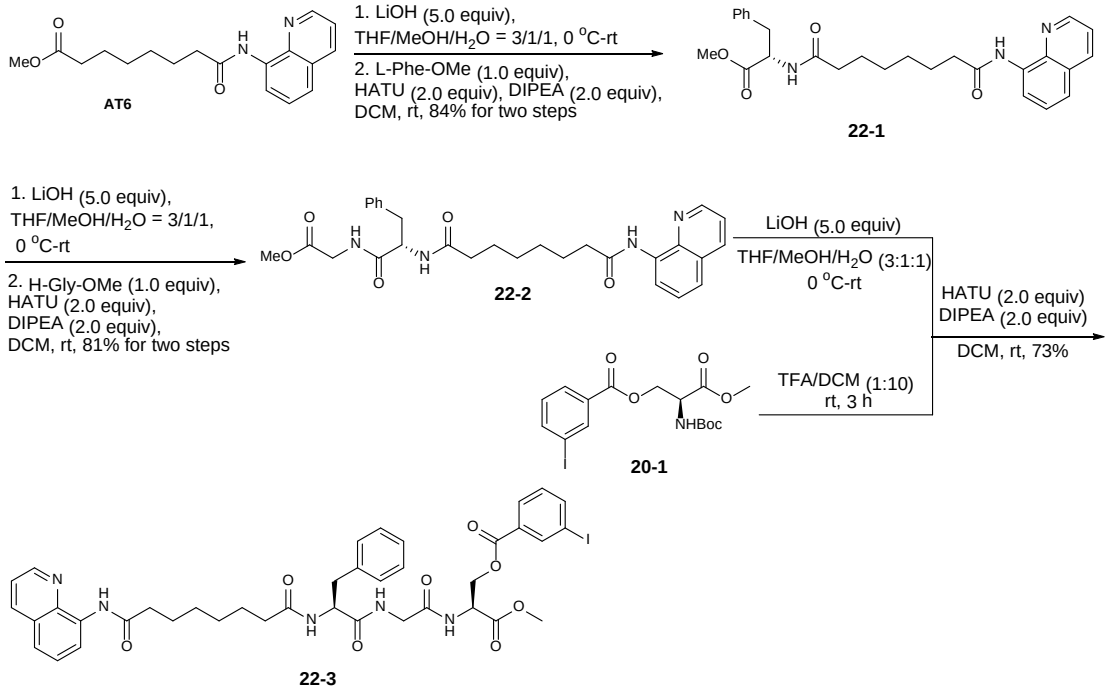
50

R_f = 0.5, 5% MeOH in DCM

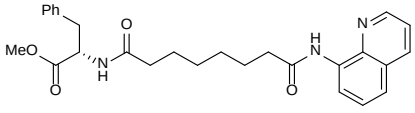
The Boc group of compound **50-4** was removed following the general deprotection procedure. The residue was treated with the carboxylic acid hydrolyzed from compound **50-2** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **50** in 59% yield. ^{1}H NMR (400 MHz, DMSO) δ 10.03 (s, 1H), 8.92 (d, *J* = 3.4 Hz, 1H), 8.68 (d, *J* = 7.2 Hz, 1H), 8.63 (d, *J* = 7.6 Hz, 1H), 8.40 (d, *J* = 8.3 Hz, 1H), 8.35-8.23 (m, 2H), 8.19 (d, *J* = 8.0 Hz, 1H), 8.01 (d, *J* = 7.7 Hz, 1H), 7.95 (d, *J* = 7.7 Hz, 1H), 7.89 (d, *J* = 8.1 Hz, 1H), 7.66-7.61 (m, 2H), 7.56 (t, *J* = 7.9 Hz, 1H), 7.31 (t, *J* = 7.8 Hz, 1H), 7.26-7.19 (m, 5H), 4.79-4.75 (m, 1H), 4.50-4.44 (m, 1H), 4.41-4.30 (m, 2H), 4.12 (t, *J* = 7.8 Hz, 1H), 3.75 (d, *J* = 5.2 Hz, 2H), 3.46 (s, 3H), 3.04 (dd, *J* = 13.7, 6.1 Hz, 1H), 2.95 (dd, *J* = 13.4, 8.7 Hz, 1H), 2.55 (t, *J* = 7.3 Hz, 2H), 2.20-2.05 (m, 2H), 1.70-1.58 (m, 3H),

1.53-1.40 (m, 3H), 1.28-1.25 (m, 4H), 1.13-1.04 (m, 1H), 0.79 (m, 6H); ^{13}C NMR (101 MHz, DMSO) δ 172.49, 171.74, 171.66, 171.46, 168.91, 168.57, 164.14, 148.81, 141.93, 138.04, 137.66, 136.96, 136.59, 134.58, 131.41, 130.71, 129.03, 128.78, 128.27, 127.83, 126.98, 126.61, 122.10, 121.67, 116.52, 94.74, 64.64, 57.09, 53.92, 51.80, 51.01, 41.92, 40.15, 39.94, 39.73, 39.52, 39.31, 39.10, 38.89, 36.72, 36.53, 36.14, 35.08, 28.49, 28.41, 25.24, 25.12, 24.47, 15.36, 10.93.

5.24 Synthesis of linear peptide 22-3



Supplementary Figure 29

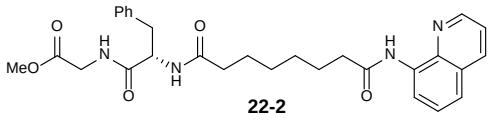


22-1

R_f = 0.5, 20% acetone in Hex

The ester group of compound **AT6** was removed following the general hydrolyzation procedure. The residue was treated with L-Phe-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **22-1** in 84% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.79 (s, 1H), 8.83-8.72 (m, 2H), 8.12 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.53-7.38 (m, 3H), 7.30-7.16 (m, 3H), 7.08 (d,

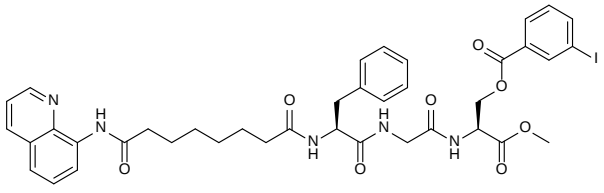
J = 8.2 Hz, 2H), 6.05 (d, *J* = 7.8 Hz, 1H), 4.90-4.86 (m, 1H), 3.70 (s, 3H), 3.14 (dd, *J* = 13.9, 5.7 Hz, 1H), 3.05 (dd, *J* = 13.9, 6.2 Hz, 1H), 2.52 (t, *J* = 7.5 Hz, 2H), 2.16 (t, *J* = 7.4 Hz, 2H), 1.82-1.73 (m, 2H), 1.62-1.58 (m, 2H), 1.44-1.30 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.65, 172.16, 171.68, 148.07, 138.19, 136.27, 135.96, 134.39, 129.12, 128.44, 127.82, 127.26, 126.97, 121.53, 121.34, 116.29, 52.92, 52.19, 37.91, 37.74, 36.15, 28.78, 28.71, 25.33, 25.28; HRMS: Calcd for $C_{27}H_{32}N_3O_4$ [M+H$^+$]:462.2387, found: 462.2388.



22-2

R_f = 0.4, 20% acetone in Hex

The ester group of compound **22-1** was removed following the general hydrolyzation procedure. The residue was treated with Gly-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **22-2** in 81% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.82 (s, 1H), 8.82-8.78 (m, 2H), 8.17 (d, *J* = 8.2 Hz, 1H), 7.61-7.42 (m, 3H), 7.28-7.19 (m, 5H), 6.80 (t, *J* = 5.1 Hz, 1H), 6.37 (d, *J* = 7.8 Hz, 1H), 4.81-7.77 (m, 1H), 4.02 (dd, *J* = 25.4, 5.4 Hz, 1H), 3.94 (dd, *J* = 18.1, 5.3 Hz, 1H), 3.72 (s, 3H), 3.14 (dd, *J* = 13.9, 6.8 Hz, 1H), 3.06 (dd, *J* = 14.0, 7.2 Hz, 1H), 2.55 (t, *J* = 7.5 Hz, 2H), 2.18 (t, *J* = 7.6 Hz, 2H), 1.84-1.73 (m, 2H), 1.64-1.54 (m, 2H), 1.44-1.28 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.42, 171.88, 171.56, 169.91, 148.25, 138.42, 136.66, 136.49, 134.59, 129.34, 128.70, 128.04, 127.52, 127.07, 121.70, 121.51, 116.53, 54.12, 52.44, 41.25, 38.12, 38.06, 36.38, 28.92, 28.82, 25.46, 25.41; HRMS: Calcd for $C_{29}H_{35}N_4O_5$ [M+H$^+$]:519.2602, found: 519.2608.



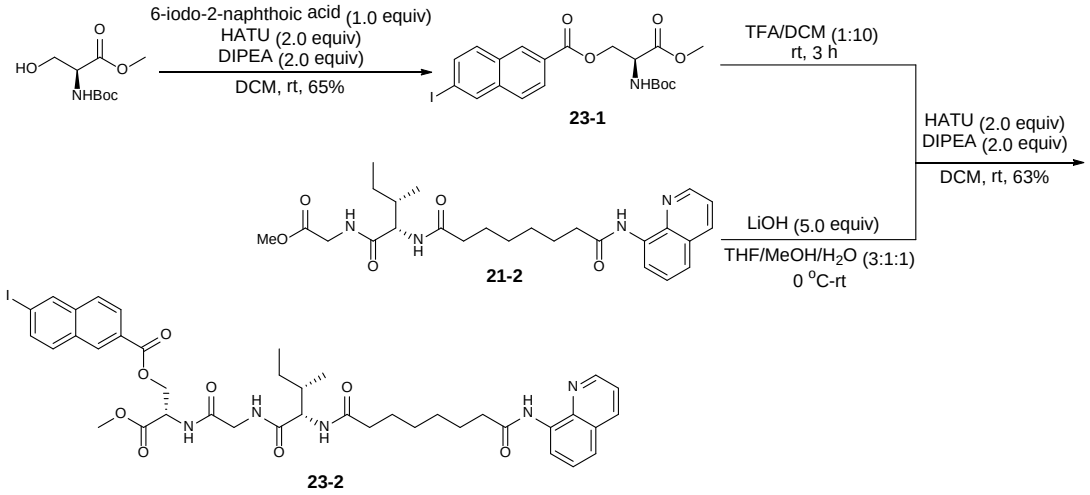
22-3

R_f = 0.5, 5% MeOH in DCM

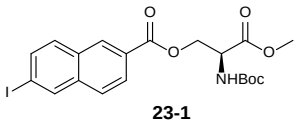
The ester group of compound **22-2** was removed following the general hydrolyzation procedure. The residue was treated the corresponding amine made from **20-1** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide

coupling procedure to give compound **22-3** in 73% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.79 (s, 1H), 8.79 (d, *J* = 4.1 Hz, 1H), 8.75 (d, *J* = 7.1 Hz, 1H), 8.31 (s, 1H), 8.15 (d, *J* = 8.2 Hz, 1H), 7.93 (d, *J* = 7.8 Hz, 1H), 7.84 (d, *J* = 7.8 Hz, 1H), 7.56-7.37 (m, 4H), 7.26-7.09 (m, 6H), 6.95 (t, *J* = 5.4 Hz, 1H), 6.34 (d, *J* = 6.9 Hz, 1H), 4.93-4.91 (m, 1H), 4.72-4.52 (m, 3H), 4.09 (dd, *J* = 16.8, 6.0 Hz, 1H), 3.87-3.71 (m, 4H), 3.09 (dd, *J* = 13.8, 6.7 Hz, 1H), 2.97 (dd, *J* = 13.8, 7.9 Hz, 1H), 2.51 (t, *J* = 7.5 Hz, 2H), 2.15-2.05 (m, 2H), 1.81-1.68 (m, 2H), 1.59-1.45 (m, 2H), 1.38-1.33 (m, 2H), 1.28-1.20 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.72, 172.06, 171.89, 169.91, 169.01, 164.67, 148.25, 142.20, 138.61, 138.39, 136.55, 136.47, 134.55, 131.34, 130.23, 129.23, 128.97, 128.69, 128.02, 127.49, 127.08, 121.70, 121.53, 116.51, 93.95, 64.41, 54.72, 53.04, 51.91, 43.15, 38.09, 37.97, 36.20, 28.88, 28.80, 25.46, 25.36; HRMS: Calcd for $C_{39}H_{43}IN_5O_8$ [M+H$^+$]:836.2151, found: 836.2153.

5.25 Synthesis of linear peptide 23-2



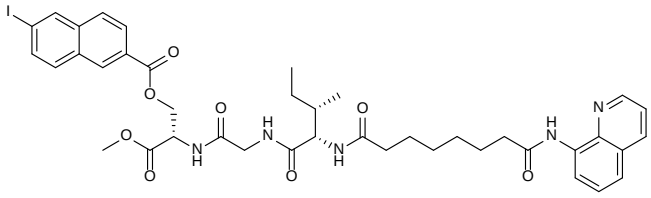
Supplementary Figure 30



R_f = 0.5, 20% acetone in Hex

Compound **23-1** was prepared following the general amide coupling procedure in 65% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.50 (s, 1H), 8.29 (s, 1H), 8.01 (dd, *J* = 8.6, 1.4

Hz, 1H), 7.84-7.72 (m, 2H), 7.68 (d, *J* = 8.7 Hz, 1H), 5.43 (d, *J* = 8.3 Hz, 1H), 4.78-4.76 (m, 1H), 4.73-4.61 (m, 2H), 3.81 (s, 3H), 1.45 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 170.43, 165.92, 155.25, 136.91, 136.69, 135.54, 131.32, 131.15, 130.76, 127.28, 127.22, 126.17, 95.16, 80.51, 65.31, 52.95, 28.37.

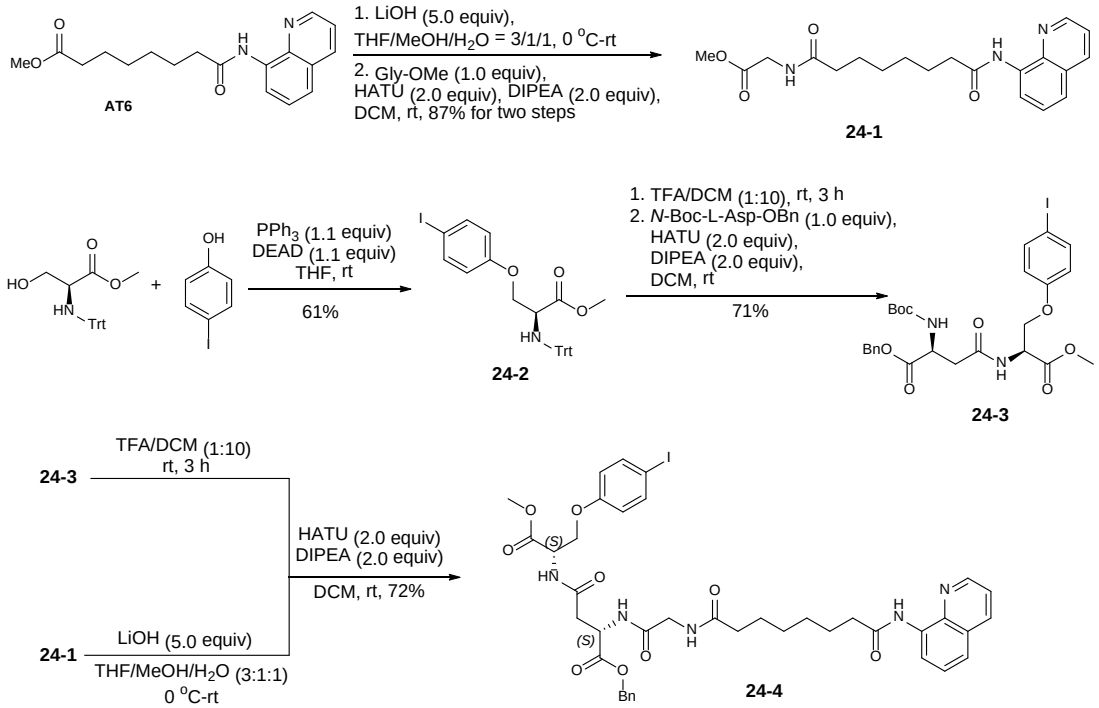


23-2

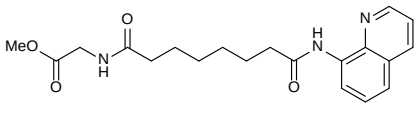
R_f = 0.5, 5% MeOH in DCM

The Boc group of compound **23-1** was removed following the general deprotection procedure. The residue was treated with the carboxylic acid hydrolyzed from compound **21-2** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **23-2** in 63% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.76 (s, 1H), 8.78 (d, *J* = 3.9 Hz, 1H), 8.74 (d, *J* = 7.0 Hz, 1H), 8.49 (s, 1H), 8.23 (s, 1H), 8.14 (d, *J* = 8.1 Hz, 1H), 7.97 (d, *J* = 8.6 Hz, 1H), 7.72-7.68 (m, 3H), 7.61-7.41 (m, 4H), 7.09 (t, *J* = 5.3 Hz, 1H), 6.29 (d, *J* = 7.9 Hz, 1H), 5.05-4.94 (m, 1H), 4.70-4.68 (m, 2H), 4.21 (t, *J* = 7.8 Hz, 1H), 4.11 (dd, *J* = 17.0, 6.0 Hz, 1H), 3.98 (dd, *J* = 16.9, 5.0 Hz, 1H), 3.77 (s, 3H), 2.51 (t, *J* = 7.4 Hz, 2H), 2.12 (t, *J* = 7.6 Hz, 2H), 1.83-1.69 (m, 3H), 1.62-1.53 (m, 2H), 1.43-1.28 (m, 5H), 1.12-1.08 (m, 1H), 0.89-0.79 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.77, 172.38, 171.89, 169.98, 169.17, 165.96, 148.24, 138.39, 136.91, 136.67, 136.48, 135.52, 134.55, 131.48, 131.18, 130.83, 128.02, 127.50, 127.23, 127.20, 126.18, 121.71, 121.53, 116.53, 95.20, 64.39, 58.10, 53.06, 51.98, 43.19, 38.07, 36.86, 36.34, 28.92, 28.87, 25.51, 25.48, 25.16, 15.52, 11.15; HRMS: Calcd for $C_{40}H_{47}IN_5O_8$ [M+H$^+$]:852.2464, found: 852.2477.

5.26 Synthesis of linear peptide 24-4

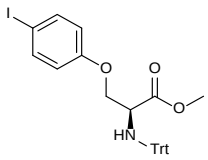


Supplementary Figure 31



R_f = 0.6, 20% acetone in Hex

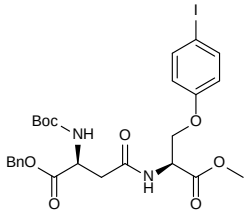
The ester group of compound **AT6** was removed following the general hydrolyzation procedure. The residue was treated with Gly-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **24-1** in 87% yield. ^{1}H NMR (400 MHz, CD_3OD) δ 8.88-8.86 (m, 1H), 8.63-8.61 (m, 1H), 8.33-8.25 (m, 1H), 7.63-7.61 (m, 1H), 7.57-7.53 (m, 2H), 3.91 (s, 2H), 3.70 (s, 3H), 2.60 (t, *J* = 7.5 Hz, 2H), 2.26 (t, *J* = 7.4 Hz, 2H), 1.85-1.76 (m, 2H), 1.68-1.66 (m, 2H), 1.51-1.38 (m, 4H); ^{13}C NMR (101 MHz, CD_3OD) δ 176.54, 174.21, 171.80, 149.80, 139.68, 137.58, 135.34, 129.40, 127.88, 123.28, 122.94, 118.07, 52.53, 41.74, 38.30, 36.54, 29.83, 29.75, 26.56, 26.52; HRMS: Calcd for $C_{20}H_{25}N_3NaO_4$ [M+Na^+]:394.1737, found: 394.1740.



24-2

R_f = 0.5, 20% acetone in Hex

A mixture of 4-Iodophenol (670 mg, 3 mmol, 1.1 equiv), N-Trt-Gly-OMe (1.0 g, 2.8 mmol, 1.0 equiv), PPh_3 (786 mg, 3 mmol, 1.1 equiv) and DEAD (480 mL, 3 mmol, 1.1 equiv) in THF (25 mL) was stirred at room temperature overnight and the solvent was removed under reduced pressure. The residue was purified by silica gel flash chromatography to give compound **24-2** in 61% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52-7.50 (m, 7H), 7.29-7.18 (m, 10H), 6.64 (d, *J* = 8.7 Hz, 2H), 4.20 (dd, *J* = 9.3, 4.9 Hz, 1H), 3.96 (dd, *J* = 9.2, 6.7 Hz, 1H), 3.72-3.70 (m, 1H), 3.22 (s, 3H), 2.86-2.85 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.46, 158.46, 145.75, 138.33, 129.44, 128.83, 128.06, 128.04, 127.78, 127.37, 127.06, 126.70, 117.18, 83.38, 71.06, 70.54, 56.12, 52.08; HRMS: Calcd for $C_{29}H_{26}INNaO_3$ [M+Na^+]:586.0850, found: 586.0858.

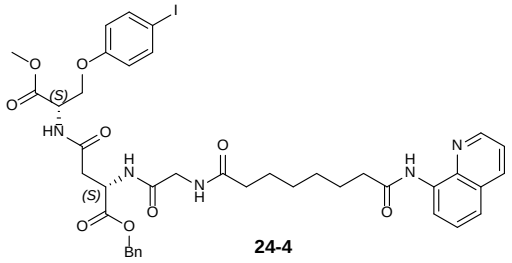


24-3

R_f = 0.3, 20% acetone in Hex

Compound **24-2** (1 g, 1.8 mmol, 1.0 equiv) was dissolved in a mixture of TFA/TIPS/H_2O =95/2.5/2.5 (10 mL) at room temperature. The mixture was stirred for 3 hours and the solvent was removed under reduced pressure. The residue was treated with *N*-Boc-L-Asp-OBn (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **24-3** in 71% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (d, *J* = 8.9 Hz, 2H), 7.30-7.28 (m, 5H), 6.82 (d, *J* = 7.9 Hz, 1H), 6.61 (d, *J* = 8.9 Hz, 2H), 5.79 (d, *J* = 8.6 Hz, 1H), 5.16-5.07 (m, 2H), 4.92-4.88 (m, 1H), 4.60-4.56 (m, 1H), 4.30 (dd, *J* = 9.5, 3.0 Hz, 1H), 4.09 (dd, *J* = 9.3, 2.6 Hz, 1H), 3.73 (s, 3H), 2.98 (dd, *J* = 15.8, 4.6 Hz, 1H), 2.82 (dd, *J* = 15.8, 4.4 Hz, 1H), 1.40 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.28, 169.99, 169.81, 157.97, 155.63, 138.36, 135.39, 128.53, 128.30, 128.06, 117.01, 83.90, 80.04, 67.91, 67.29,

52.96, 52.09, 50.46, 37.76, 28.31; HRMS: Calcd for $C_{26}H_{31}IN_2NaO_8$ [M+Na^+]:649.1017, found: 649.1022.

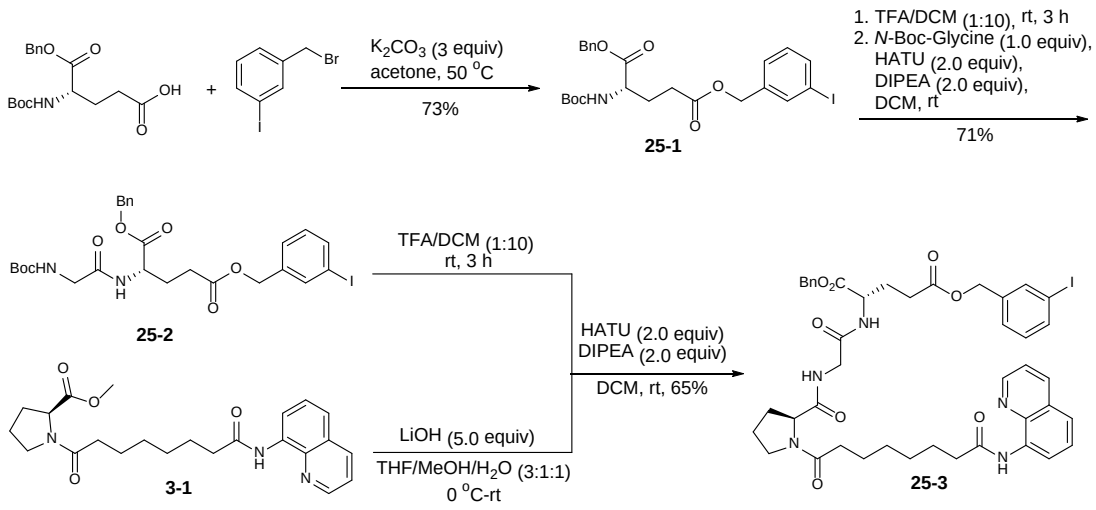


24-4

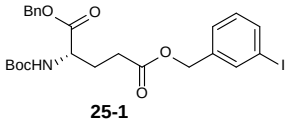
R_f = 0.5, 5% MeOH in DCM

The Boc group of compound **24-3** was removed following the general deprotection procedure. The residue was treated with the carboxylic acid hydrolyzed from compound **24-1** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **24-4** in 72% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.76 (s, 1H), 8.75 (dd, *J* = 4.2, 1.5 Hz, 1H), 8.70 (dd, *J* = 6.9, 1.7 Hz, 1H), 8.10 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.51-7.36 (m, 5H), 7.28-7.24 (m, 6H), 6.90 (d, *J* = 8.1 Hz, 1H), 6.55 (d, *J* = 8.9 Hz, 2H), 6.41 (t, *J* = 5.3 Hz, 1H), 5.15-5.02 (m, 2H), 4.88-4.83 (m, 2H), 4.26 (dd, *J* = 9.5, 3.3 Hz, 1H), 4.05 (dd, *J* = 9.5, 3.0 Hz, 1H), 3.96 (dd, *J* = 18.6, 7.4 Hz, 1H), 3.83 (dd, *J* = 16.8, 5.1 Hz, 1H), 3.69 (s, 3H), 2.88-2.78 (m, 2H), 2.49 (t, *J* = 7.5 Hz, 2H), 2.15 (t, *J* = 7.6 Hz, 2H), 1.80-1.69 (m, 2H), 1.61-1.49 (m, 2H), 1.42-1.31 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.40, 172.15, 170.86, 170.28, 170.14, 169.77, 157.99, 148.32, 138.37, 136.49, 135.16, 134.48, 128.64, 128.49, 128.25, 128.02, 127.47, 121.75, 121.63, 117.06, 116.55, 83.92, 67.72, 53.11, 52.34, 49.30, 43.17, 38.05, 37.56, 36.04, 28.83, 25.42, 25.29; HRMS: Calcd for $C_{40}H_{44}IN_5NaO_9$ [M+Na^+]:888.2076, found: 888.2078.

5.27 Synthesis of linear peptide 25-3

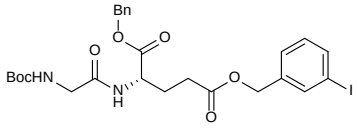


Supplementary Figure 32



R_f = 0.4, 20% acetone in Hex

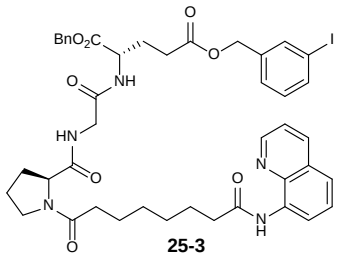
A mixture of 3-Iodobenzyl bromide (1.7 g, 5.8 mmol, 1.3 equiv), Boc-L-Glu-1-Bn (1.5 g, 4.5 mmol, 1.0 equiv) and K_2CO_3 (1.8 g, 13.4 mmol, 3.0 equiv) in acetone (50 mL) was stirred at 50 °C overnight and the solvent was removed under reduced pressure. The residue was dissolved in DCM and washed with water. The organic phase dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo*. The residue was purified by silica gel flash chromatography to give compound **25-1** in 73% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.70 (s, 1H), 7.65 (d, *J* = 7.9 Hz, 1H), 7.42-7.28 (m, 6H), 7.09 (t, *J* = 7.8 Hz, 1H), 5.27 (d, *J* = 7.8 Hz, 1H), 5.23-5.11 (m, 2H), 5.03 (s, 2H), 4.46-4.42 (m, 1H), 2.55-2.37 (m, 2H), 2.23-2.20 (m, 1H), 2.02-1.96 (m, 1H), 1.45 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.24, 171.95, 155.33, 138.08, 137.24, 136.96, 135.25, 130.24, 128.58, 128.42, 128.14, 127.32, 94.30, 79.94, 67.15, 65.28, 52.87, 30.10, 28.29, 27.60; HRMS: Calcd for $C_{24}H_{28}INNaO_6$ [M+Na^+]:576.0854, found: 576.0858.



25-2

R_f = 0.3, 20% acetone in Hex

The Boc group of compound **25-1** was removed following the general deprotection procedure. The residue was treated with Boc-Glycine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **25-2** in 71% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.68 (s, 1H), 7.64 (d, *J* = 7.9 Hz, 1H), 7.37-7.26 (m, 6H), 7.07 (t, *J* = 7.7 Hz, 2H), 5.44 (s, 1H), 5.15 (s, 2H), 5.01 (s, 2H), 4.72-4.68 (m, 1H), 3.81 (s, 2H), 2.46-2.40 (m, 2H), 2.33-2.18 (m, 1H), 2.05-2.00 (m, 1H), 1.44 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.26, 171.41, 169.68, 156.05, 138.03, 137.26, 136.99, 135.12, 130.25, 128.62, 128.49, 128.22, 127.35, 94.29, 80.12, 67.34, 65.36, 51.51, 44.22, 29.98, 28.29, 27.20; HRMS: Calcd for $C_{26}H_{31}IN_2NaO_7$ [M+Na^+]:633.1068, found: 633.1072.



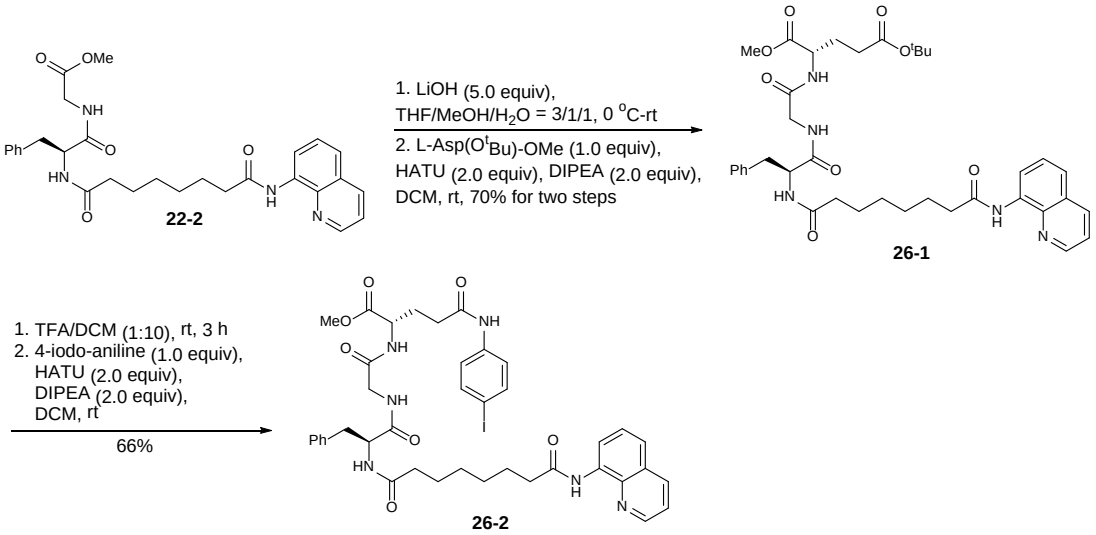
25-3

R_f = 0.5, 5% MeOH in DCM

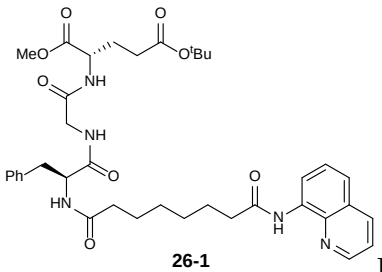
The Boc group of compound **25-2** was removed following the general deprotection procedure. The residue was treated with the carboxylic acid hydrolyzed from compound **3-1** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **25-3** in 65% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.79 (s, 1H), 8.79 (dd, *J* = 4.2, 1.7 Hz, 1H), 8.75 (dd, *J* = 6.9, 2.0 Hz, 1H), 8.14 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.67-7.56 (m, 2H), 7.55-7.40 (m, 4H), 7.35-7.27 (m, 5H), 7.27-7.19 (m, 2H), 7.04 (t, *J* = 7.8 Hz, 1H), 5.12 (s, 2H), 5.02-4.91 (m, 2H), 4.68-4.60 (m, 1H), 4.32-4.28 (m, 1H), 4.17 (dd, *J* = 17.1, 7.4 Hz, 1H), 3.71 (dd, *J* = 19.5, 7.5 Hz, 1H), 3.59-3.55 (m, 1H), 3.46-3.44 (m, 1H), 2.52 (t, *J* = 7.5 Hz, 2H), 2.45-2.33 (m, 2H), 2.28-2.24 (m, 3H), 2.20-2.00 (m, 4H), 1.95-1.87 (m, 1H), 1.82-1.73 (m, 2H), 1.62-1.53 (m, 2H), 1.42-1.31 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.23, 172.80, 172.38, 171.83, 171.71, 169.71, 148.19, 138.27, 138.18,

137.14, 136.88, 136.39, 135.31, 134.46, 130.25, 128.56, 128.33, 128.10, 127.92, 127.36, 127.34, 121.66, 121.46, 116.35, 94.26, 67.14, 65.19, 60.56, 51.61, 47.66, 43.06, 37.97, 34.35, 30.09, 28.91, 28.83, 28.75, 26.56, 25.41, 25.11, 24.27; HRMS: Calcd for $C_{43}H_{49}IN_5O_8$ $[M+H^+]$:890.2620, found: 890.2631.

5.28 Synthesis of linear peptide 26-2



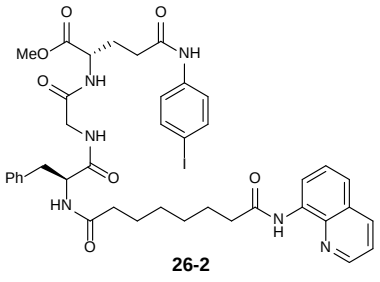
Supplementary Figure 33



R_f = 0.3, 25% acetone in Hex

The ester group of compound **22-2** was removed following the general hydrolyzation procedure. The residue was treated with L-Asp(O^{t}Bu)-OMe (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **26-1** in 70% yield. ^{1}H NMR (400 MHz, CD_3OD) δ 8.86 (d, *J* = 5.1 Hz, 1H), 8.64 (d, *J* = 7.3 Hz, 1H), 8.29 (d, *J* = 8.1 Hz, 1H), 7.61 (d, *J* = 8.1 Hz, 1H), 7.57-7.48 (m, 2H), 7.30-7.20 (m, 4H), 7.18-7.16 (t, *J* = 5.6 Hz, 1H), 4.57-4.41 (m, 2H), 3.97-3.94 (m, 1H), 3.76-3.64 (m, 4H), 3.17-3.13 (m, 1H), 2.95-2.84 (m, 1H), 2.55 (t, *J*

= 7.4 Hz, 2H), 2.35-2.25 (m, 2H), 2.18-2.10 (m, 3H), 1.95-1.92 (m, 1H), 1.78-1.67 (m, 2H), 1.58-1.46 (m, 2H), 1.43-1.33 (m, 11H), 1.28-1.22 (m, 2H); ^{13}C NMR (101 MHz, CD_3OD) δ 176.36, 174.50, 174.42, 173.53, 173.51, 171.56, 149.95, 139.92, 138.45, 137.73, 135.51, 130.22, 129.60, 129.46, 128.02, 127.80, 123.40, 123.04, 118.27, 81.69, 56.71, 52.91, 52.82, 43.33, 38.43, 38.22, 36.59, 32.35, 29.89, 29.78, 28.33, 27.57, 26.63, 26.56; HRMS: Calcd for $C_{38}H_{50}N_5O_8$ [M+H$^+$]:704.3654, found: 704.3664.

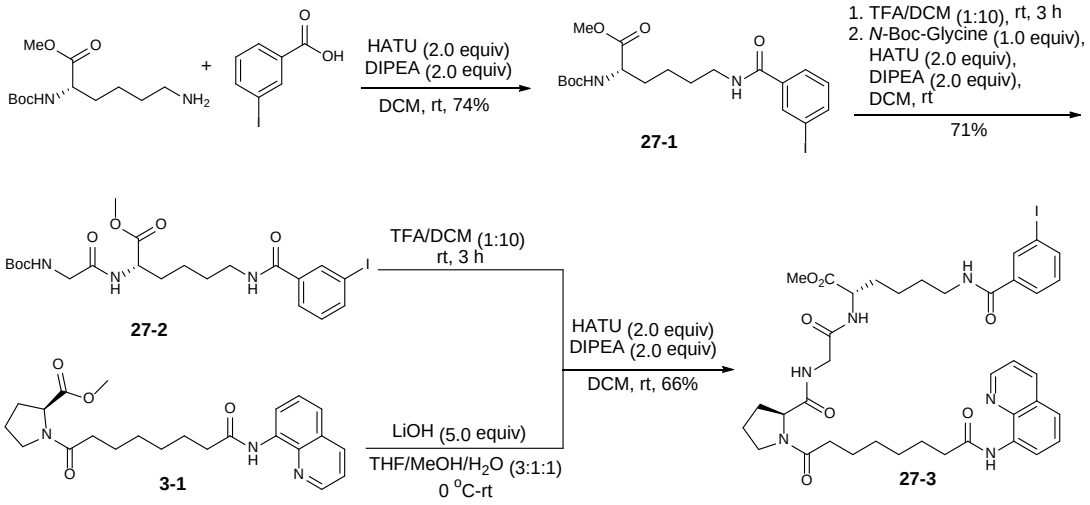


26-2

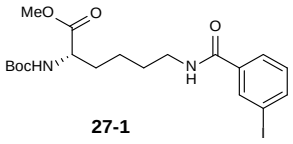
R_f = 0.5, 5% MeOH in DCM

The t-butyl ester group of compound **26-1** was removed following the same procedure for Boc deprotection. The residue was treated with 4-iodo-aniline (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **26-2** in 66% yield. ^{1}H NMR (400 MHz, DMSO) δ 10.02 (s, 2H), 8.93 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.63 (d, *J* = 7.6 Hz, 1H), 8.40 (dd, *J* = 8.3, 1.6 Hz, 1H), 8.35 (t, *J* = 5.8 Hz, 1H), 8.22 (d, *J* = 7.5 Hz, 1H), 8.11 (d, *J* = 7.8 Hz, 1H), 7.69-7.53 (m, 5H), 7.43-7.39 (m, 2H), 7.24 (d, *J* = 4.4 Hz, 4H), 7.16-7.13 (m, 1H), 4.55-4.42 (m, 1H), 4.37-4.24 (m, 1H), 3.84-3.65 (m, 2H), 3.62 (s, 3H), 3.01 (dd, *J* = 14.5, 8.8 Hz, 1H), 2.76-2.73 (m, 1H), 2.38 (t, *J* = 7.5 Hz, 2H), 2.09-1.97 (m, 3H), 1.97-1.83 (m, 1H), 1.62-1.48 (m, 2H), 1.38-1.35 (m, 2H), 1.28-1.08 (m, 6H); ^{13}C NMR (101 MHz, DMSO) δ 172.61, 172.22, 172.00, 171.68, 170.35, 168.98, 148.81, 139.07, 138.06, 137.33, 136.60, 134.61, 129.15, 128.02, 127.85, 127.01, 126.22, 122.11, 121.67, 121.24, 116.50, 86.37, 79.21, 54.24, 51.98, 51.41, 41.83, 36.78, 35.19, 32.44, 28.44, 28.32, 26.44, 25.09; HRMS: Calcd for $C_{40}H_{45}IN_6NaO_7$ [M+Na$^+$]:871.2287, found: 871.2288.

5.29 Synthesis of linear peptide 27-3

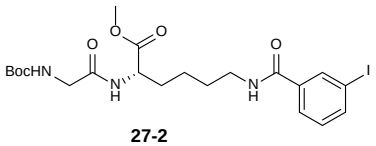


Supplementary Figure 34



27-1 R_f = 0.4, 20% acetone in Hex

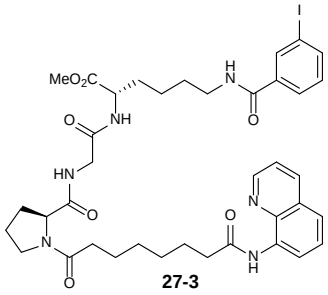
Compound **27-1** was prepared following the general amide coupling procedure in 74% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08 (s, 1H), 7.78 (d, *J* = 7.9 Hz, 1H), 7.71 (d, *J* = 7.8 Hz, 1H), 7.12 (t, *J* = 7.8 Hz, 1H), 6.53 (s, 1H), 5.15 (d, *J* = 7.6 Hz, 1H), 4.26 (m, 1H), 3.71 (s, 3H), 3.42-3.38 (m, 2H), 1.83-1.78 (m, 1H), 1.71-1.56 (m, 3H), 1.39 (s, 11H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.20, 166.24, 155.53, 139.99, 136.54, 136.00, 130.01, 126.24, 94.08, 79.74, 53.17, 52.24, 39.59, 32.06, 28.81, 28.23, 22.61; HRMS: Calcd for $C_{19}H_{27}IN_2NaO_5$ [M+Na^+]:513.0857, found: 513.0862.



27-2 R_f = 0.3, 20% acetone in Hex

The Boc group of compound **27-1** was removed following the general deprotection procedure. The residue was treated with Boc-Glycine (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **27-2** in 71% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.14 (s, 1H), 7.77 (d, *J* = 7.8 Hz, 2H), 7.12 (t, *J* = 7.8 Hz, 1H), 6.99 (d, *J* = 7.0 Hz, 2H), 5.44-5.42 (m, 1H),

4.59-4.56 (m, 1H), 3.79 (d, *J* = 5.4 Hz, 2H), 3.70 (s, 3H), 3.36-3.36 (m, 2H), 1.94-1.80 (m, 1H), 1.72-1.52 (m, 3H), 1.39 (s, 11H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.61, 169.86, 166.26, 156.23, 140.13, 136.57, 136.11, 130.15, 126.46, 94.12, 80.24, 52.49, 51.83, 44.26, 39.64, 31.87, 28.56, 28.29, 22.52; HRMS: Calcd for $C_{21}H_{30}IN_3NaO_6$ [M+Na^+]:570.1071, found: 570.1075.

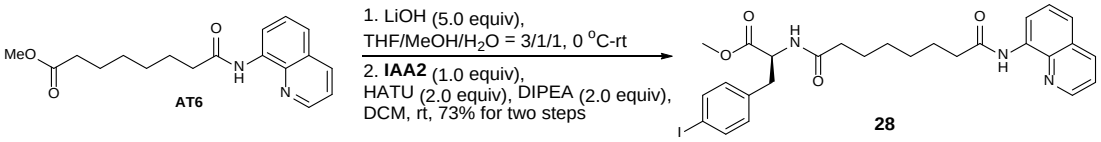


27-3

R_f = 0.5, 5% MeOH in DCM

The Boc group of compound **27-2** was removed following the general deprotection procedure. The residue was treated with the carboxylic acid hydrolyzed from compound **3-1** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **27-3** in 66% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.79 (dd, *J* = 4.0, 1.3 Hz, 1H), 8.72 (dd, *J* = 5.9, 2.9 Hz, 1H), 8.22-8.09 (m, 2H), 7.81 (d, *J* = 7.8 Hz, 1H), 7.73 (d, *J* = 7.8 Hz, 1H), 7.55-7.38 (m, 4H), 7.33-7.26 (m, 2H), 7.10 (t, *J* = 7.8 Hz, 1H), 4.58-4.55 (m, 1H), 4.33-4.25 (m, 1H), 4.11 (dd, *J* = 17.1, 7.0 Hz, 1H), 3.75 (dd, *J* = 16.9, 5.3 Hz, 1H), 3.69 (s, 3H), 3.49-3.31 (m, 4H), 2.54 (t, *J* = 7.4 Hz, 2H), 2.25 (t, *J* = 7.5 Hz, 2H), 2.09-1.96 (m, 3H), 1.92-1.88 (m, 2H), 1.83-1.69 (m, 3H), 1.60-1.56 (m, 4H), 1.42-1.31 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.19, 172.99, 172.83, 171.94, 169.41, 166.25, 148.31, 139.99, 138.41, 136.94, 136.52, 136.31, 134.54, 130.12, 128.06, 127.47, 126.77, 121.77, 121.62, 116.48, 94.06, 60.69, 52.44, 51.99, 47.71, 43.45, 39.75, 38.09, 34.53, 31.04, 29.06, 28.99, 28.83, 28.40, 25.51, 25.20, 24.38, 22.79; HRMS: Calcd for $C_{38}H_{48}IN_6O_7$ [M+H^+]:827.2624, found: 827.2624.

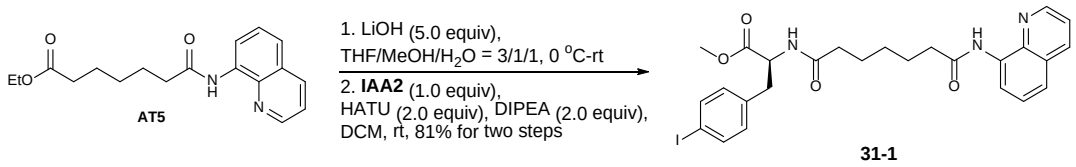
5.30 Synthesis of linear peptide 28



Supplementary Figure 35

The ester group of compound **AT6** was removed following the general hydrolyzation procedure. The residue was treated with **IAA2** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **28** in 73% yield (R_f = 0.5, 20% acetone in Hexane). ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.80 (s, 1H), 8.79-8.76 (m, 2H), 8.14 (d, *J* = 8.2 Hz, 1H), 7.59 (d, *J* = 7.8 Hz, 2H), 7.52-7.42 (m, 3H), 6.83 (d, *J* = 7.7 Hz, 2H), 6.00 (d, *J* = 7.4 Hz, 1H), 4.89-4.84 (m, 1H), 3.71 (s, 3H), 3.09 (dd, *J* = 13.9, 5.7 Hz, 1H), 2.99 (dd, *J* = 13.9, 5.9 Hz, 1H), 2.55 (t, *J* = 7.4 Hz, 2H), 2.17 (t, *J* = 7.3 Hz, 2H), 1.85-1.75 (m, 2H), 1.68-1.55 (m, 2H), 1.46-1.32 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.70, 172.03, 171.83, 148.23, 138.42, 137.69, 136.47, 135.76, 134.61, 131.34, 128.04, 127.52, 121.69, 121.48, 116.52, 92.68, 52.82, 52.52, 38.14, 37.54, 36.42, 28.95, 28.91, 25.51, 25.44; HRMS: Calcd for $C_{27}H_{31}IN_3O_4$ [M+H$^+$]:588.1354, found: 588.1361.

5.31 Synthesis of linear peptide 31-1

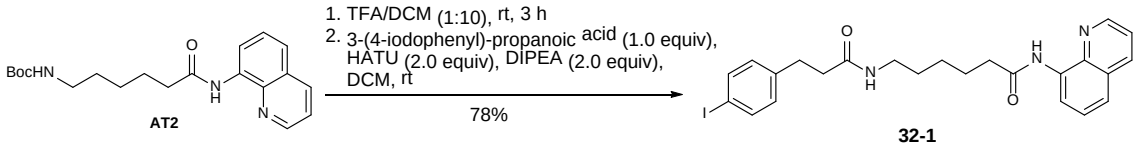


Supplementary Figure 36

The ester group of compound **AT5** was removed following the general hydrolyzation procedure. The residue was treated with **IAA2** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **31-1** in 81% yield (R_f = 0.5, 20% acetone in Hexane). ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.81 (s, 1H), 8.80-8.76 (m, 2H), 8.16 (dd, *J* = 8.3, 1.3 Hz, 1H), 7.59 (d, *J* = 8.2 Hz, 2H), 7.53-7.46 (m, 3H), 6.83 (d, *J* = 8.2 Hz, 2H), 5.94 (d, *J* = 7.6 Hz, 1H), 4.90-4.85

(m, 1H), 3.71 (s, 3H), 3.10 (dd, *J* = 13.9, 5.8 Hz, 1H), 3.00 (dd, *J* = 13.9, 5.9 Hz, 1H), 2.57 (t, *J* = 7.4 Hz, 2H), 2.21-2.19 (m, 2H), 1.87-1.77 (m, 2H), 1.72-1.64 (m, 3H), 1.48-1.37 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.58, 172.02, 171.70, 148.28, 138.45, 137.72, 136.49, 135.77, 134.62, 131.35, 128.07, 127.54, 121.73, 121.53, 116.53, 92.74, 52.86, 52.53, 37.95, 37.59, 36.28, 28.77, 25.30, 25.22; HRMS: Calcd for $C_{26}H_{28}IN_3NaO_4$ [M+Na$^+$]:596.1017, found: 596.1016.

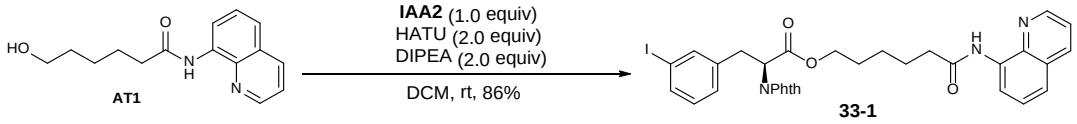
5.32 Synthesis of linear peptide 32-1



Supplementary Figure 37

The Boc group of compound **AT2** was removed following the general deprotection procedure. The residue was treated with 3-(4-iodophenyl)-propanoic acid (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **32-1** in 78% yield (R_f = 0.5, 20% acetone in Hex). ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.81 (s, 1H), 8.80-8.73 (m, 2H), 8.15 (dd, *J* = 8.3, 1.4 Hz, 1H), 7.55 (d, *J* = 8.2 Hz, 2H), 7.52-7.48 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 6.90 (d, *J* = 8.2 Hz, 2H), 5.73 (s, 1H), 3.26-3.21 (m, 2H), 2.87 (t, *J* = 7.6 Hz, 2H), 2.55 (t, *J* = 7.2 Hz, 2H), 2.39 (t, *J* = 7.6 Hz, 2H), 1.81-1.74 (m, 2H), 1.53-1.48 (m, 2H), 1.37-1.33 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.77, 148.31, 140.74, 138.41, 137.57, 136.54, 134.54, 130.64, 128.07, 127.50, 121.77, 121.63, 116.51, 91.40, 39.16, 38.33, 37.86, 31.34, 29.08, 26.31, 24.81; HRMS: Calcd for $C_{24}H_{26}IN_3NaO_2$ [M+Na$^+$]:538.0962, found: 538.0955.

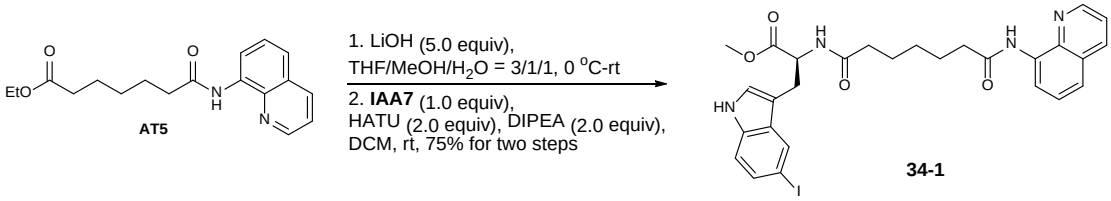
5.33 Synthesis of linear peptide 33-1



Supplementary Figure 38

Compound **33-1** was prepared following the general amide coupling procedure in 86% yield (R_f = 0.4, 20% acetone in Hex). ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.77 (s, 1H), 8.81-8.74 (m, 2H), 8.15 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.84-7.76 (m, 2H), 7.74-7.64 (m, 2H), 7.55-7.42 (m, 5H), 7.13 (d, *J* = 7.7 Hz, 1H), 6.92 (t, *J* = 7.8 Hz, 1H), 5.09 (dd, *J* = 11.1, 5.3 Hz, 1H), 4.30-4.12 (m, 2H), 3.53 (dd, *J* = 14.4, 5.3 Hz, 1H), 3.43 (dd, *J* = 14.4, 11.1 Hz, 1H), 2.49 (t, *J* = 7.5 Hz, 2H), 1.85-1.78 (m, 2H), 1.75-1.64 (m, 2H), 1.43-1.40 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.46, 168.64, 167.56, 148.24, 139.34, 138.39, 138.04, 136.50, 136.04, 134.54, 134.34, 131.60, 130.34, 128.15, 128.03, 127.53, 123.67, 121.71, 121.53, 116.52, 94.50, 66.02, 53.19, 37.95, 34.37, 28.34, 25.59, 25.16; HRMS: Calcd for $C_{32}H_{29}IN_3O_5$ [M+H$^+$]:662.1146, found: 662.1148.

5.34 Synthesis of linear peptide 34-1

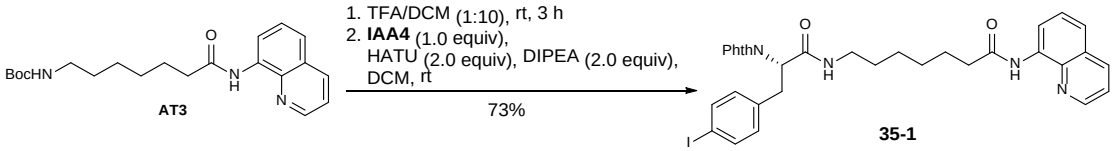


Supplementary Figure 39

The ester group of compound **AT5** was removed following the general hydrolyzation procedure. The residue was treated with **IAA7** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **34-1** in 75% yield (R_f = 0.4, 20% acetone in Hexane). ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.81 (s, 1H), 8.82-8.76 (m, 2H), 8.65 (s, 1H), 8.17 (d, *J* = 8.2 Hz, 1H), 7.82 (s, 1H), 7.57-7.48 (m, 2H), 7.46 (dd, *J* = 8.1, 4.2 Hz, 1H), 7.40 (d, *J* = 8.5 Hz, 1H), 7.11 (d, *J*

= 8.4 Hz, 1H), 6.94 (s, 1H), 6.02 (d, *J* = 7.7 Hz, 1H), 4.95-4.90 (m, 1H), 3.72 (s, 3H), 3.31 (dd, *J* = 14.9, 5.0 Hz, 1H), 3.21 (dd, *J* = 14.9, 5.6 Hz, 1H), 2.52 (t, *J* = 7.4 Hz, 2H), 2.26-2.14 (m, 2H), 1.83-1.75 (m, 2H), 1.70-1.63 (m, 2H), 1.43-1.36 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.62, 172.45, 171.98, 148.36, 138.47, 136.57, 135.33, 134.57, 130.54, 130.39, 128.12, 127.73, 127.54, 123.95, 121.80, 121.68, 116.60, 113.46, 109.62, 83.18, 52.73, 52.63, 38.10, 36.40, 28.83, 27.62, 25.43, 25.32; HRMS: Calcd for $C_{28}H_{29}IN_4NaO_4$ [M+Na^+]:635.1126, found: 635.1123.

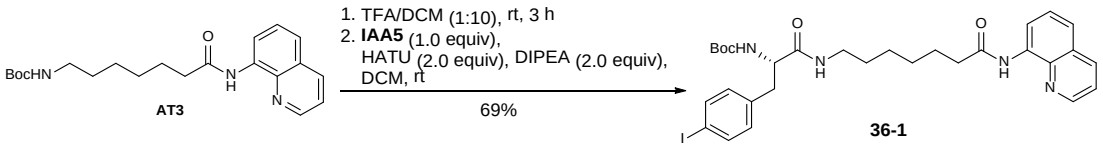
5.35 Synthesis of linear peptide 35-1



Supplementary Figure 40

The Boc group of compound **AT3** was removed following the general deprotection procedure. The residue was treated with **IAA4** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **35-1** in 73% yield (R_f = 0.5, 20% acetone in Hex). ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.75 (s, 1H), 8.77 (dd, *J* = 4.1, 1.4 Hz, 1H), 8.69 (dd, *J* = 6.8, 2.0 Hz, 1H), 8.14 (dd, *J* = 8.2, 1.4 Hz, 1H), 7.75-7.71 (m, 2H), 7.64-7.60 (m, 2H), 7.54-7.41 (m, 5H), 6.89 (d, *J* = 8.2 Hz, 2H), 6.45 (t, *J* = 5.1 Hz, 1H), 5.06 (dd, *J* = 10.2, 6.5 Hz, 1H), 3.57-3.43 (m, 2H), 3.35-3.18 (m, 2H), 2.50 (t, *J* = 7.4 Hz, 2H), 1.80-1.73 (m, 2H), 1.55-1.48 (m, 2H), 1.45-1.33 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.86, 168.20, 168.06, 148.23, 138.33, 137.69, 136.69, 136.47, 134.45, 134.36, 131.38, 130.94, 127.98, 127.47, 123.60, 121.70, 121.54, 116.49, 92.41, 55.65, 39.68, 37.83, 34.37, 29.05, 28.46, 26.22, 25.45; HRMS: Calcd for $C_{33}H_{31}IN_4NaO_4$ [M+Na^+]:697.1282, found: 697.1276.

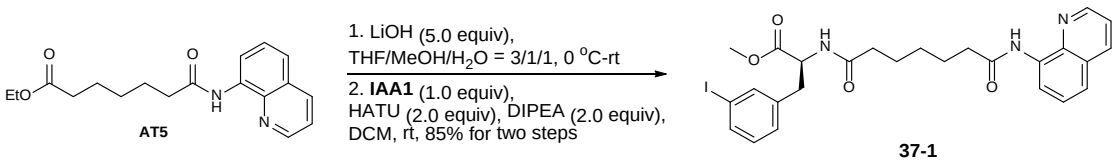
5.36 Synthesis of linear peptide 36-1



Supplementary Figure 41

The Boc group of compound **AT3** was removed following the general deprotection procedure. The residue was treated with **IAA5** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **36-1** in 69% yield (R_f = 0.5, 20% acetone in Hex). ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.81 (s, 1H), 8.80-8.76 (m, 2H), 8.16 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.59 (d, *J* = 8.2 Hz, 2H), 7.56-7.48 (m, 2H), 7.45 (dd, *J* = 8.3, 4.2 Hz, 1H), 6.94 (d, *J* = 8.2 Hz, 2H), 5.98 (s, 1H), 5.16 (d, *J* = 7.2 Hz, 1H), 4.28-4.23 (m, 1H), 3.24-3.08 (m, 2H), 2.97 (d, *J* = 6.8 Hz, 2H), 2.55 (t, *J* = 7.4 Hz, 2H), 1.84-1.72 (m, 2H), 1.39 (s, 13H), 1.31-1.24 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.85, 170.85, 148.27, 138.46, 137.75, 136.69, 136.53, 134.61, 131.53, 128.08, 127.58, 121.73, 121.55, 116.61, 92.41, 55.94, 39.46, 38.36, 38.12, 29.23, 28.87, 28.39, 26.58, 25.53; HRMS: Calcd for $C_{30}H_{37}IN_4NaO_4$ [M+Na^+]:667.1752, found: 667.1747.

5.37 Synthesis of linear peptide 37-1

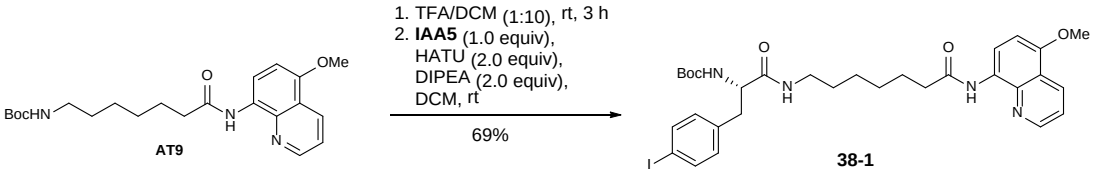


Supplementary Figure 42

The ester group of compound **AT5** was removed following the general hydrolyzation procedure. The residue was treated with **IAA1** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **37-1** in 85% yield (R_f = 0.5, 20% acetone in Hexane). ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.81 (s, 1H), 8.79 (dd, *J* = 14.9, 5.6 Hz, 2H), 8.16 (d, *J* = 8.2 Hz, 1H), 7.70-7.38 (m,

5H), 7.06-6.99 (m, 2H), 5.96 (d, *J* = 7.5 Hz, 1H), 4.88-4.84 (m, 1H), 3.73 (s, 3H), 3.11 (dd, *J* = 13.8, 5.9 Hz, 1H), 3.00 (dd, *J* = 13.8, 5.9 Hz, 1H), 2.58 (t, *J* = 7.5 Hz, 2H), 2.23 (t, *J* = 7.4 Hz, 2H), 1.90-1.78 (m, 2H), 1.72-1.66 (m, 2H), 1.49-1.41 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.64, 171.95, 171.76, 148.30, 138.51, 138.43, 136.52, 136.25, 134.61, 130.37, 128.54, 128.06, 127.55, 121.74, 121.54, 116.53, 94.57, 52.99, 52.59, 37.98, 37.48, 36.39, 28.84, 25.43, 25.26; HRMS: Calcd for $C_{26}H_{28}IN_3NaO_4$ [M+Na^+]:596.1017, found: 596.1012.

5.38 Synthesis of linear peptide 38-1

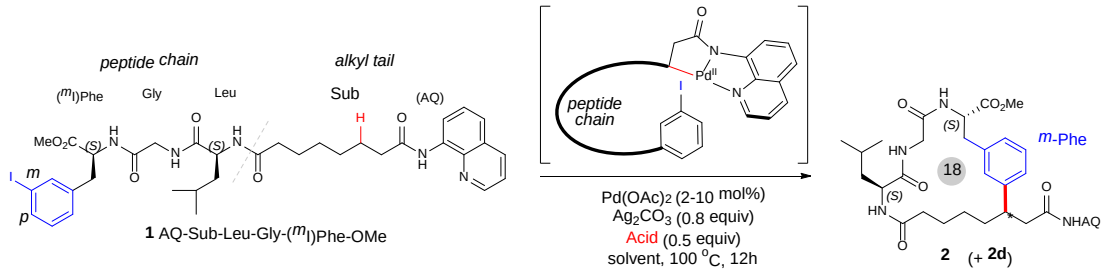


Supplementary Figure 43

The Boc group of compound **AT9** was removed following the general deprotection procedure. The residue was treated with **IAA5** (1.0 equiv), HATU (2.0 equiv) and DIPEA (2.0 equiv) following the general amide coupling procedure to give compound **38-1** in 72% yield (R_f = 0.5, 20% acetone in Hex). ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.55 (s, 1H), 8.79 (d, *J* = 2.5 Hz, 1H), 8.68 (d, *J* = 8.5 Hz, 1H), 8.56 (d, *J* = 8.1 Hz, 1H), 7.58 (d, *J* = 7.8 Hz, 2H), 7.43 (dd, *J* = 8.1, 4.1 Hz, 1H), 6.93 (d, *J* = 7.7 Hz, 2H), 6.83 (d, *J* = 8.5 Hz, 1H), 6.05 (s, 1H), 5.18 (s, 1H), 4.27 (d, *J* = 6.4 Hz, 1H), 3.97 (s, 3H), 3.26-3.05 (m, 2H), 2.99 (t, *J* = 17.2 Hz, 2H), 2.52 (t, *J* = 7.2 Hz, 2H), 1.82-1.71 (m, 2H), 1.39 (s, 15H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.36, 170.99, 155.52, 150.20, 148.62, 139.03, 137.51, 136.68, 131.47, 131.30, 127.87, 120.72, 120.41, 116.74, 104.35, 92.24, 80.06, 55.77, 39.35, 38.43, 37.91, 29.71, 29.11, 28.80, 28.30, 26.51, 25.51.

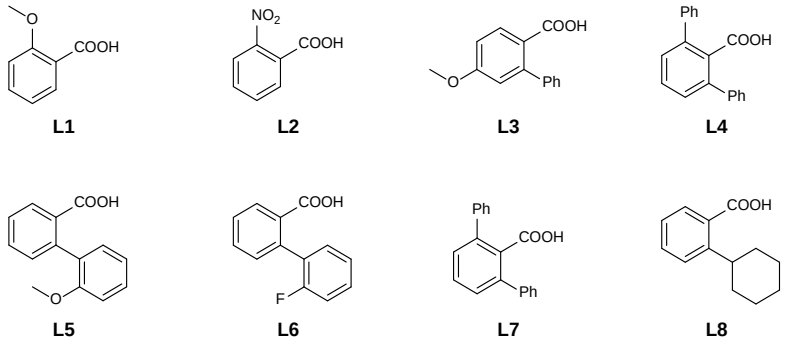
6. Optimization of Pd-Catalyzed Intramolecular sp^3 C-H Arylation Reaction

General procedure for Pd-catalyzed intramolecular sp^3 C-H arylation reaction: The linear peptide (0.1 mmol, 1.0 equiv), $Pd(OAc)_2$, Ag_2CO_3, additive and solvent were added into a 40 mL glass vial according the specific conditions listed below. The vial was sealed with PTFE cap (air and moisture were not vigorously excluded). The reaction mixture was heated at 100 ^oC for 12 hours. After being cooled to room temperature, the reaction mixture was diluted with ethyl acetate (50 mL) and filtered through a short pad of celite. The filtrate was concentrated *in vacuo*. The residue was dissolved in DCM (50 mL), and washed with saturated aqueous solution of sodium bicarbonate. The organic phase was dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo*. The crude residue was dissolved in 1 mL of deuterated chloroform for ^{1}H-NMR analysis. 1,1,2,2-tetrachloroethane (16.8 mg, 0.1 mmol, 1 equiv, a singlet peak around 5.95 ppm was set as 1.00) was added as internal standard.

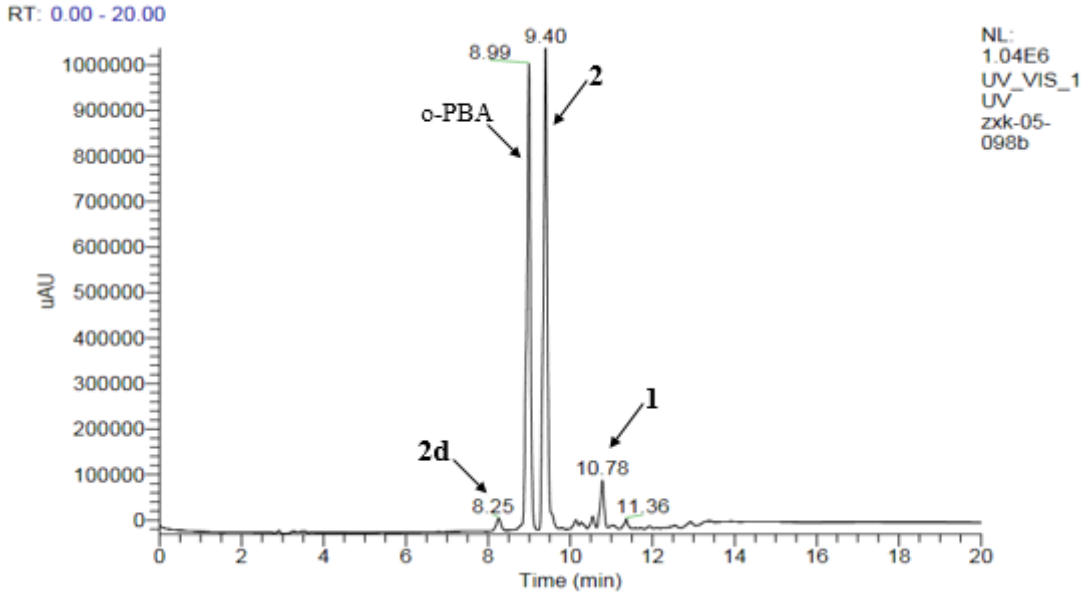


entry	$Pd(OAc)_2$	additive	T (^oC)	solvent	concentration	LC-yield **2**	LC-yield **2d**	NMR yield **2**
1	**10 mol%**	**o-PBA (0.5)**	**100**	***t*BuOH**	**5 mM**	**88%**	**<5%**	**77%**
2	10 mol%	BP (0.2)	100	AmylOH	5 mM	48%	<5%	—
3	10 mol%	o-PBA (0.5)	100	DCE	5 mM	36%	<5%	—
4	10 mol%	o-PBA (0.5)	100	TCE	5 mM	10%	<5%	—
5	10 mol%	o-PBA (0.5)	100	Toluene	5 mM	<10%	<5%	—
6	10 mol%	o-PBA (0.5)	100	HFIP	5 mM	Trace	Trace	—
7	10 mol%	o-PBA (0.5)	100	dioxane	5 mM	Trace	<5%	—
8	**10 mol%**	**o-PBA (0.5)**	**100**	***t*BuOH**	**25 mM**	**88%**	**<5%**	**79%**
9	10 mol%	o-PBA (0.5)	60	*t*BuOH	25 mM	38%	Trace	—
10	10 mol%	o-PBA (0.5)	80	*t*BuOH	25 mM	62%	Trace	—
11	10 mol%	o-PBA (0.5)	130	*t*BuOH	25 mM	72%	<5%	—
12	**5 mol%**	**o-PBA (0.5)**	**100**	***t*BuOH**	**25 mM**	**89%**	**<5%**	**78%**
13	**2 mol%**	**o-PBA (0.5)**	**100**	***t*BuOH**	**25 mM**	**83%**	**<5%**	**77%**
14	1 mol%	o-PBA (0.5)	100	*t*BuOH	25 mM	68%	<5%	—
15	5 mol%	o-PBA (0.5)	100	*t*BuOH	50 mM	72%	10%	—
16	5 mol%	o-PBA (0.5)	100	*t*BuOH	100 mM	58%	22%	—

17	**5 mol%**	**o-PBA (0.5)**	**100**	***t*BuOH**	**5 mM**	**86%**	**<5%**	**78%**
18	**2 mol%**	**o-PBA (0.5)**	**100**	***t*BuOH**	**5 mM**	**81%**	**<5%**	**73%**
19	5 mol%	PivOH (0.5)	100	*t*BuOH	5 mM	58%	Trace	—
20	5 mol%	HOAc (0.5)	100	*t*BuOH	5 mM	44%	Trace	—
21	5 mol%	TFA (0.5)	100	*t*BuOH	5 mM	48%	Trace	—
22	5 mol%	**L1** (0.5)	100	*t*BuOH	5 mM	51%	Trace	—
23	5 mol%	**L2** (0.5)	100	*t*BuOH	5 mM	73%	<5%	—
24	5 mol%	**L3** (0.5)	100	*t*BuOH	5 mM	78%	<5%	—
25	5 mol%	**L4** (0.5)	100	*t*BuOH	5 mM	82%	<5%	—
26	5 mol%	**L5** (0.5)	100	*t*BuOH	5 mM	76%	<5%	—
27	5 mol%	**L6** (0.5)	100	*t*BuOH	5 mM	71%	<5%	—
28	5 mol%	**L7** (0.5)	100	*t*BuOH	5 mM	79%	<5%	—
29	5 mol%	**L8** (0.5)	100	*t*BuOH	5 mM	85%	<5%	—
30	5 mol%	None	100	*t*BuOH	5 mM	37%	Trace	—



Supplementary Table 1. Optimization of Pd-catalyzed intramolecular sp^3 C-H arylation reaction



Supplementary Figure 44. LC-MS spectrum of the intramolecular sp^3 C-H arylation reaction of **compound 1** under the conditions of entry 17 (**general conditions C**)

LC/MS: Low-resolution mass spectra (ESI) were collected on an HPLC paired to a single-quad mass spectrometer. Compounds were resolved on a Thermo syncronis

C18, 5 μm, 4.6 x 250 mm column at 40 ^{o}C with a flow of 1 mL/min. The gradient consisted of eluent A (0.05% trifluoroacetic acid in double distilled water) and eluent B (0.05% trifluoroacetic acid in HPLC-grade acetonitrile). Absorbance was monitored at λ=220nm.

LC/MS Method: The gradient method started at 10% of eluent B followed by a linear gradient from 10% to 100% in 8 minutes. The column was then washed with 100% B for 10 minutes and re-equilibrated at 10% B for 2 minutes.

7. Macrocyclization of peptides at iodinated aromatic amino acid units

General conditions A: A mixture of linear peptide (0.1 mmol, 1.0 equiv), Ag_2CO_3 (22 mg, 0.08 mmol, 0.8 equiv), *o*PBA (10 mg, 0.05 mmol, 0.5 equiv), and $Pd(OAc)_2$ (0.5 mg, 2 μmol, 0.02 equiv) in *t*BuOH (20 mL) in a 40 mL glass vial sealed with PTFE cap was heated at 100 ^{o}C for 12 hours (Air and moisture were not excluded). After been cooled to room temperature, the reaction mixture was diluted with ethyl acetate (50 mL) and filtered through a pad of celite. The filtrate was concentrated *in vacuo*. The residue was dissolved in DCM (50 mL), and washed with saturated aqueous solution of sodium bicarbonate. The organic phase was dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo*. The resulting residue was purified by silica gel flash chromatography to give the cyclized product.

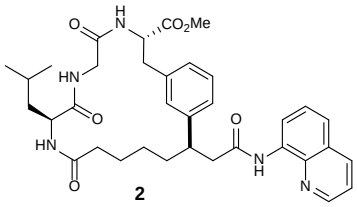
General conditions B: $Pd(OAc)_2$ (1.1 mg, 5 μmol, 0.05 equiv) in *t*BuOH (4 mL).

General conditions C: $Pd(OAc)_2$ (1.1 mg, 5 μmol, 0.05 equiv) in *t*BuOH (20 mL).

General conditions D: $Pd(OAc)_2$ (2.2 mg, 10 μmol, 0.10 equiv) in *t*BuOH (20 mL).

General conditions E: $Pd(OAc)_2$ (2.2 mg, 10 μmol, 0.10 equiv) in *t*BuOH (4 mL).

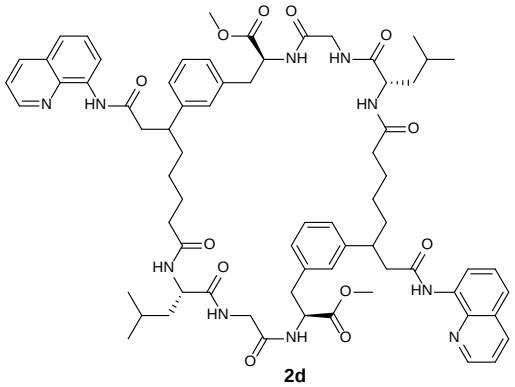
General conditions F: $Pd(OAc)_2$ (1.1 mg, 5 μmol, 0.05 equiv) in *t*BuOH (1 mL).



2

R_f = 0.4, 5% CH_3OH in DCM

Compound **2** (1:1 mixture of diastereomeric isomers) was isolated in 73% yield under the **general conditions C**. ^1H NMR (400 MHz, $CDCl_3$) δ 9.75 (s, 0.49H), 9.67 (s, 0.45H), 8.75-8.74 (m, 1H), 8.71-8.68 (m, 1H), 8.14-8.11 (m, 1H), 7.53-7.41 (m, 3H), 7.25-7.11 (m, 3H), 7.01 (d, *J* = 5.8 Hz, 1H), 6.93 (d, *J* = 7.3 Hz, 0.56H), 6.89-6.85 (m, 1H), 6.76 (d, *J* = 8.4 Hz, 0.48H), 6.22 (d, *J* = 7.6 Hz, 0.49H), 6.06 (d, *J* = 7.7 Hz, 0.46H), 4.98-4.89 (m, 1H), 4.42-4.30 (m, 1H), 4.20 (dd, *J* = 17.0, 7.3 Hz, 0.51H), 4.11 (dd, *J* = 16.9, 7.0 Hz, 0.57H), 3.76 (s, 1.5H), 3.75 (s, 1.5H), 3.57-3.43 (m, 1H), 3.25-3.18 (m, 2H), 2.98-2.89 (m, 1H), 2.85-2.74 (m, 2H), 2.27-2.18 (m, 1H), 2.11-1.99 (m, 1H), 1.81-1.78 (m, 1H), 1.72-1.41 (m, 6H), 1.17-1.05 (m, 2H), 0.93-0.84 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.61, 173.56, 173.06, 172.85, 171.86, 170.56, 170.37, 168.77, 168.74, 148.19, 144.12, 143.98, 138.51, 138.35, 136.50, 136.42, 136.08, 135.98, 134.40, 128.82, 128.79, 128.49, 128.40, 128.15, 128.04, 127.98, 127.43, 127.41, 126.41, 125.84, 121.75, 121.70, 121.67, 121.63, 116.98, 116.55, 53.00, 52.74, 52.70, 52.65, 51.98, 51.95, 46.57, 45.71, 43.17, 43.09, 42.94, 42.57, 40.52, 37.63, 37.56, 36.17, 36.04, 35.79, 35.67, 27.05, 26.55, 25.50, 25.14, 24.89, 23.04, 22.98, 21.89, 21.82; HRMS: Calcd for $C_{35}H_{43}N_5NaO_6$ [M+Na^+]:652.3106, found: 652.3104.

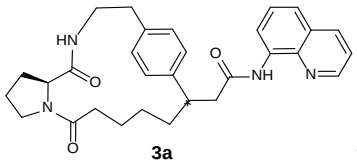


2d

R_f = 0.3, 5% CH_3OH in DCM

Compound **2d** was isolated in 16% yield under the **general conditions F**. ^1H NMR (400 MHz, $CDCl_3$) δ 9.97-9.55 (m, 2H), 8.81-8.64 (m, 4H), 8.19-8.10 (m, 2H),

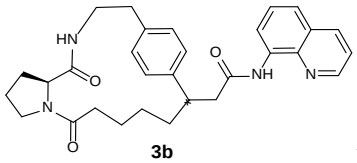
7.95-7.88 (m, 1H), 7.60-7.40 (m, 9H), 7.13-7.10 (m, 5H), 7.02-6.76 (m, 2H), 5.07-4.72 (m, 2H), 4.72-4.36 (m, 2H), 4.00-3.58 (m, 9H), 3.32-2.92 (m, 5H), 2.86-5.78 (m, 3H), 2.28-1.95 (m, 4H), 1.78-1.36 (m, 16H), 0.95-0.73 (m, 12H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.87, 173.83, 173.74, 173.67, 173.59, 173.52, 173.34, 173.24, 173.20, 173.17, 172.65, 172.60, 172.57, 172.48, 172.19, 172.16, 172.13, 172.10, 171.95, 170.63, 170.52, 170.39, 168.96, 168.89, 168.72, 168.64, 168.59, 168.40, 168.34, 168.28, 168.11, 168.06, 148.01, 147.86, 147.81, 144.24, 144.09, 144.04, 143.90, 138.66, 138.43, 136.35, 136.11, 134.14, 133.92, 130.35, 129.50, 129.34, 128.96, 128.67, 128.43, 128.10, 127.82, 127.74, 121.71, 121.59, 117.38, 117.17, 54.23, 53.50, 52.60, 46.02, 45.74, 45.45, 43.10, 42.21, 41.49, 37.95, 37.48, 36.31, 36.13, 35.84, 35.42, 30.06, 29.80, 29.70, 29.49, 28.86, 27.24, 25.57, 24.93, 24.91, 24.80, 24.74, 23.10, 23.04, 22.99, 22.90, 22.84, 22.77, 22.36, 22.25, 22.20, 22.09, 19.26, 19.21, 18.07.



3a

R_f = 0.3, 25% acetone in Hex

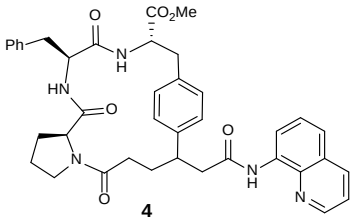
Compound **3a** was isolated in 37% yield under the **general conditions C**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.75 (s, 1H), 8.76-8.72 (m, 2H), 8.13 (d, *J* = 8.2 Hz, 1H), 7.52-7.42 (m, 3H), 7.28-7.25 (m, 1H), 7.21 (d, *J* = 7.8 Hz, 1H), 7.08 (d, *J* = 7.6 Hz, 1H), 6.96 (d, *J* = 7.8 Hz, 1H), 6.67-6.66 (m, 1H), 4.49 (d, *J* = 7.9 Hz, 1H), 3.90-3.82 (m, 1H), 3.41 (t, *J* = 8.4 Hz, 1H), 3.30-3.20 (m, 2H), 3.04-2.81 (m, 4H), 2.76-2.71 (m, 1H), 2.52-2.47 (m, 1H), 2.15-1.93 (m, 4H), 1.90-1.83 (m, 1H), 1.70-1.57 (m, 3H), 1.42-1.30 (m, 2H), 1.19-0.98 (m, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.18, 171.26, 170.27, 148.16, 142.74, 138.39, 137.42, 136.48, 134.48, 131.70, 130.08, 128.47, 128.01, 127.52, 124.41, 121.69, 121.58, 116.59, 59.56, 47.30, 46.16, 42.59, 40.75, 34.15, 33.69, 31.35, 26.74, 25.46, 24.99, 21.91; HRMS: Calcd for $C_{30}H_{35}N_4O_3$ [M+H$^+$]: 499.2704; found: 499.2708.



3b

R_f = 0.25, 25% acetone in Hex

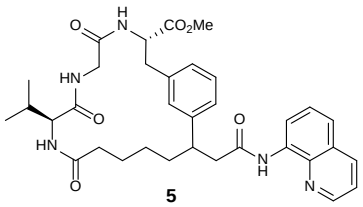
Compound **3b** was isolated in 36% yield under the **general conditions C**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.81 (s, 1H), 8.78-8.72 (m, 2H), 8.14 (dd, *J* = 8.2, 1.4 Hz, 1H), 7.52-7.42 (m, 3H), 7.34 (d, *J* = 8.0 Hz, 1H), 7.24 (d, *J* = 8.4 Hz, 1H), 7.18 (d, *J* = 6.4 Hz, 1H), 6.94 (d, *J* = 7.6 Hz, 1H), 6.31 (s, 1H), 4.52 (d, *J* = 7.8 Hz, 1H), 3.85-3.77 (m, 1H), 3.37-3.23 (m, 3H), 3.21-3.14 (m, 1H), 3.00 (dd, *J* = 14.8, 7.3 Hz, 1H), 2.89 (dd, *J* = 14.7, 7.6 Hz, 1H), 2.84-2.76 (m, 2H), 2.46-2.43 (m, 1H), 2.02-1.92 (m, 5H), 1.75-1.65 (m, 2H), 1.59-1.50 (m, 1H), 1.32-1.11 (m, 3H), 1.02-0.92 (m, 1H), 0.82-0.72 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.69, 171.22, 170.36, 148.21, 142.79, 138.41, 137.21, 136.46, 134.51, 130.11, 129.30, 129.17, 128.02, 127.49, 126.57, 121.71, 121.59, 116.56, 59.70, 47.48, 44.72, 42.80, 40.47, 36.34, 34.52, 34.02, 27.37, 27.35, 24.96, 24.91; HRMS: Calcd for $C_{30}H_{35}N_4O_3$ [M+H$^+$]: 499.2704; found: 499.2706.



4

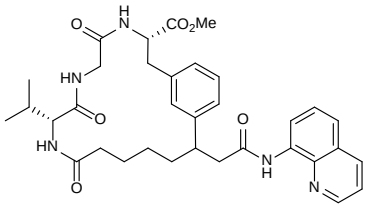
R_f = 0.2, 25% acetone in Hex

Compound **4** (1:1 mixture of diastereomeric isomers) was isolated in 62% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.78 (s, 1H), 8.85-8.63 (m, 2H), 8.13 (dd, *J* = 7.6, 3.0 Hz, 1H), 7.57 (d, *J* = 8.2 Hz, 0.45H), 7.49-7.42 (m, 3.43H), 7.38-7.15 (m, 5H), 7.12-7.04 (m, 2H), 7.00 (d, *J* = 7.4 Hz, 0.53H), 6.83 (d, *J* = 7.2 Hz, 0.53H), 6.53 (d, *J* = 8.9 Hz, 0.41H), 6.34 (d, *J* = 8.3 Hz, 0.48H), 6.20 (d, *J* = 7.3 Hz, 0.38H), 6.02 (d, *J* = 9.4 Hz, 0.46H), 5.00-4.75 (m, 1H), 4.63-4.39 (m, 1H), 4.06 (dd, *J* = 22.5, 7.8 Hz, 1H), 3.75 (d, *J* = 5.7 Hz, 3H), 3.55-3.39 (m, 1H), 3.36-3.31 (m, 2H), 3.17-3.08 (m, 1H), 3.02-2.76 (m, 4H), 2.58-2.39 (m, 1H), 2.13-1.98 (m, 3H), 1.80-1.58 (m, 3H), 1.51-1.38 (m, 1H), 1.36-1.26 (m, 1H).



5 R_f = 0.2, 30% acetone in Hex

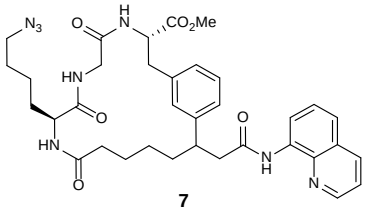
Compound **5** (1:1 mixture of diastereomeric isomers) was isolated in 75% yield under the **general conditions C**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.74 (s, 0.49H), 9.67 (s, 0.48H), 8.76-8.74 (m, 1H), 8.71-8.68 (m, 1H), 8.14-8.11 (m, 1H), 7.52-7.35 (m, 4H), 7.24-7.13 (m, 2H), 6.99-6.92 (m, 1.56H), 6.88 (d, *J* = 7.4 Hz, 0.52H), 6.80 (d, *J* = 8.1 Hz, 0.51H), 6.72 (d, *J* = 8.2 Hz, 0.48H), 6.05 (dd, *J* = 17.4, 8.2 Hz, 1H), 4.93-4.83 (m, 1H), 4.27-4.11 (m, 2H), 3.76 (s, 1.5H), 3.74 (s, 1.5H), 3.55-3.44 (m, 1H), 3.25-3.18 (m, 2H), 3.03-2.92 (m, 1H), 2.87-2.72 (m, 2H), 2.27-2.17 (m, 2H), 2.12-2.00 (m, 2H), 1.86-1.39 (m, 4H), 1.14-1.06 (m, 1H), 0.86 (dd, *J* = 14.5, 6.6 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.61, 173.55, 172.29, 172.13, 171.79, 171.75, 170.51, 170.35, 168.89, 168.85, 148.19, 144.12, 143.94, 138.50, 138.36, 136.48, 136.41, 135.91, 134.41, 128.98, 128.90, 128.81, 128.55, 128.51, 128.04, 127.98, 127.82, 127.43, 126.71, 125.57, 121.72, 121.69, 121.68, 121.61, 116.93, 116.54, 59.06, 58.91, 53.03, 52.80, 52.69, 52.63, 46.47, 45.67, 43.22, 43.12, 42.99, 42.72, 37.35, 37.31, 36.30, 36.17, 35.74, 35.63, 30.17, 30.08, 27.12, 26.65, 25.65, 25.04, 19.46, 19.41, 18.38, 18.27; HRMS: Calcd for $C_{34}H_{41}N_5NaO_6$ [M+Na^+]: 638.2949; found: 638.2937.



6 R_f = 0.2, 30% acetone in Hex

Compound **6** (1:1 mixture of diastereomeric isomers) was isolated in 81% yield under the **general conditions B**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.70 (d, *J* = 4.5 Hz, 1H), 8.73-8.65 (m, 2H), 8.09 (dd, *J* = 8.2, 1.5 Hz, 1H), 7.58-7.38 (m, 4H), 7.19-7.09 (m, 2.5H), 6.98-6.91 (m, 1.5H), 6.84 (d, *J* = 7.2 Hz, 1H), 6.45 (d, *J* = 8.1 Hz, 0.45H), 6.39 (d, *J* = 7.7 Hz, 0.55H), 4.70-4.60 (m, 1H), 4.27-4.15 (m, 1H), 4.02-3.98 (m, 1H), 3.77 (s, 1.38H), 3.73 (s, 1.69H), 3.49-3.42 (m, 1H), 3.27-3.08 (m, 3H), 2.85-2.74 (m, 2H), 2.25-2.21 (m, 1H), 2.12-1.96 (m, 2H), 1.85-1.26 (m, 4.5H), 1.07-1.01 (m, 1.5H), 0.87

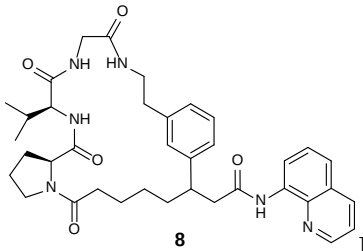
(d, *J* = 6.7 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.99, 173.84, 172.26, 172.24, 171.76, 171.74, 170.41, 170.34, 169.23, 168.80, 148.14, 148.12, 144.00, 143.69, 138.33, 138.24, 136.40, 136.37, 136.29, 134.30, 134.29, 128.71, 128.69, 128.64, 128.39, 128.37, 128.27, 127.92, 127.90, 127.35, 127.32, 125.80, 125.49, 121.64, 121.62, 116.74, 116.47, 58.97, 53.97, 53.75, 52.61, 52.56, 45.75, 43.55, 43.39, 43.07, 42.05, 36.58, 36.27, 36.18, 35.91, 35.80, 35.44, 29.85, 29.62, 27.00, 26.25, 25.03, 24.80, 19.44, 18.53, 18.45; HRMS: Calcd for $C_{34}H_{41}N_5NaO_6$ [M+Na^+]: 638.2949; found: 638.2936.



7

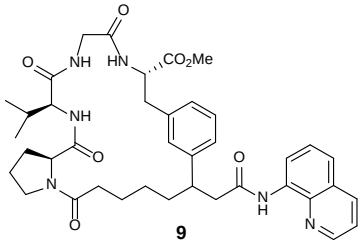
R_f = 0.2, 20% acetone in Hex

Compound **7** (1:1 mixture of diastereomeric isomers) was isolated in 55% yield under the **general conditions B**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.74 (s, 0.53H), 9.68 (s, 0.46H), 8.76-8.68 (m, 2H), 8.13 (d, *J* = 7.9 Hz, 1H), 7.53-7.41 (m, 3H), 7.28-7.11 (m, 3H), 7.02 (d, J = 10.3 Hz, 1H), 6.94-6.88 (m, 1H), 6.70 (d, *J* = 8.4 Hz, 0.49H), 6.61 (d, *J* = 8.5 Hz, 0.46H), 6.08 (d, *J* = 7.6 Hz, 0.44H), 6.00 (d, *J* = 7.6 Hz, 0.41H), 5.00-4.86 (m, 1H), 4.40-4.24 (m, 1H), 4.22-4.07 (m, 1H), 3.76 (d, *J* = 2.3 Hz, 3H), 3.58-3.45 (m, 1H), 3.28-3.18 (m, 4H), 2.98-2.71 (m, 3H), 2.25-2.20 (m, 1H), 2.13-2.03 (m, 1H), 1.88-1.68 (m, 3H), 1.63-1.54 (m, 4H), 1.45-1.27 (m, 4H), 1.14-1.03 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.67, 173.63, 172.43, 172.26, 171.86, 171.81, 170.49, 170.33, 168.57, 168.51, 148.20, 144.12, 144.02, 138.46, 138.34, 136.51, 136.44, 136.02, 135.93, 134.39, 128.80, 128.49, 128.33, 128.03, 127.98, 127.45, 127.42, 126.32, 125.91, 121.72, 121.65, 116.86, 116.53, 53.28, 53.23, 52.97, 52.75, 52.72, 52.67, 51.13, 46.56, 45.72, 43.15, 43.07, 42.98, 42.64, 37.72, 37.69, 36.24, 36.09, 35.82, 35.68, 31.05, 29.81, 28.51, 27.06, 26.63, 25.49, 25.20, 23.09.



8 R_f = 0.1, 25% acetone in Hex

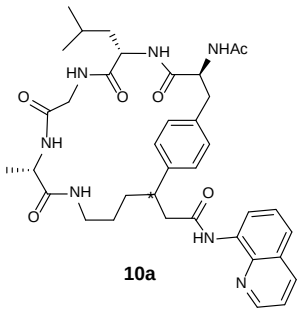
Compound **8** (1:1 mixture of diastereomeric isomers) was isolated in 76% yield under the **general conditions B**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.76-9.67 (m, 1H), 8.76-8.72 (m, 1H), 8.64-8.60 (m, 1H), 8.12-8.07 (m, 1H), 7.74 (t, *J* = 5.9 Hz, 0.37H), 7.55-7.34 (m, 4H), 7.24-7.01 (m, 4H), 6.92 (d, *J* = 7.2 Hz, 1H), 6.80 (d, *J* = 7.1 Hz, 0.42H), 4.40-4.22 (m, 2H), 4.17-3.99 (m, 1H), 3.75-3.32 (m, 5H), 2.90-2.67 (m, 5H), 2.45-2.26 (m, 1H), 2.26-1.87 (m, 6H), 1.85-1.60 (m, 3H), 1.57-1.39 (m, 1H), 1.31-1.26 (m, 1H), 0.91-0.81 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.96, 173.67, 172.95, 172.55, 172.29, 171.75, 171.01, 170.57, 169.86, 148.23, 148.18, 143.77, 143.41, 139.79, 139.48, 138.29, 138.24, 136.42, 136.37, 134.29, 134.24, 128.61, 127.96, 127.91, 127.81, 127.30, 127.22, 125.44, 125.09, 121.71, 121.68, 121.63, 116.43, 116.37, 60.99, 60.80, 59.19, 58.94, 47.80, 45.89, 45.68, 43.46, 43.33, 42.41, 42.23, 40.50, 39.88, 35.57, 34.93, 34.78, 34.52, 34.06, 33.49, 29.77, 29.62, 29.50, 29.27, 26.58, 25.68, 25.03, 24.96, 24.62, 24.07, 19.51, 19.47, 18.30, 18.04.



9 R_f = 0.1, 25% acetone in Hex

Compound **9** (1:1 mixture of diastereomeric isomers) was isolated in 72% yield under the **general conditions B.** ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.71 (s, 0.49H), 9.65 (s, 0.48H), 8.79-8.61 (m, 1.55H), 8.61-8.54 (m, 0.42H), 8.10-8.07 (m, 1H), 7.56-7.35 (m, 5H), 7.31 (s, 0.50H), 7.17-7.03 (m, 2.45H), 6.98-6.83 (m, 0.57H), 6.84 (dd, *J* = 6.6, 1.9 Hz, 1H), 6.63-6.58 (m, 0.45H), 4.95-4.80 (m, 1H), 4.57-4.42 (m, 0.48H), 4.44-4.33 (m, 1H), 4.08-3.98 (m, 0.57H), 3.97-3.82 (m, 1H), 3.81-3.65 (m, 1H), 3.56 (d, *J* = 4.0 Hz, 3H), 3.48-3.36 (m, 1H), 3.35-3.09 (m, 2H), 3.08-2.72 (m, 4H),

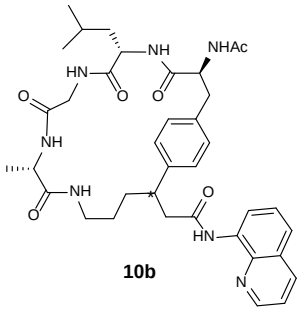
2.48-2.31 (m, 1H), 2.29-1.45 (m, 10H), 1.44-1.34 (m, 1H), 0.95 – 0.79 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.10, 173.67, 172.97, 172.18, 171.96, 171.77, 171.52, 171.47, 171.37, 171.13, 170.68, 170.40, 169.36, 169.15, 148.18, 148.14, 144.15, 143.80, 138.27, 138.23, 136.34, 134.32, 134.30, 128.84, 128.49, 127.87, 127.42, 127.37, 127.27, 126.32, 125.92, 121.62, 121.47, 116.46, 116.33, 61.43, 61.01, 57.70, 53.29, 53.15, 52.23, 52.16, 47.62, 47.54, 44.89, 43.18, 42.77, 37.36, 35.72, 35.59, 33.26, 31.03, 29.53, 26.82, 26.67, 25.64, 25.00, 24.83, 24.43, 19.53, 19.40, 17.83, 17.43.



10a

R_f = 0.4, 5% MeOH in DCM

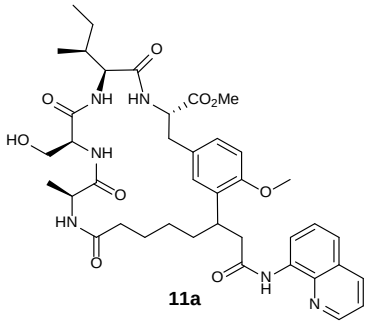
Compound **10a** was isolated in 33% yield under the **general conditions D**. ^{1}H NMR (400 MHz, DMSO) δ 10.04 (s, 1H), 8.91 (d, *J* = 3.4 Hz, 1H), 8.65-8.62 (m, 1H), 8.57 (d, *J* = 7.6 Hz, 1H), 8.39 (d, *J* = 8.2 Hz, 1H), 7.86 (d, *J* = 7.2 Hz, 1H), 7.82 (d, *J* = 7.7 Hz, 1H), 7.64-7.61 (m, 2H), 7.59-7.51 (m, 2H), 7.21 (d, *J* = 7.8 Hz, 2H), 7.06 (d, *J* = 6.2 Hz, 1H), 7.00 (d, *J* = 7.8 Hz, 2H), 4.58-4.54 (m, 1H), 4.22-4.16 (m, 1H), 4.10-4.03 (m, 1H), 3.77 (dd, *J* = 16.4, 6.8 Hz, 1H), 3.45-3.43 (m, 1H), 3.16-3.07 (m, 1H), 2.99-2.90 (m, 3H), 2.83-2.70 (m, 3H), 1.91 (s, 3H), 1.70-1.62 (m, 1H), 1.54-1.45 (m, 2H), 1.33-1.17 (m, 4H), 1.11-1.01 (m, 4H), 0.89 (dd, *J* = 6.3, 3.2 Hz, 6H); ^{13}C NMR (101 MHz, DMSO) δ 172.33, 171.15, 170.53, 170.05, 169.10, 168.55, 148.89, 142.59, 138.06, 136.67, 134.57, 134.47, 129.64, 127.90, 127.59, 127.04, 122.22, 121.85, 116.62, 53.59, 51.50, 48.66, 43.69, 42.86, 41.96, 41.40, 37.74, 33.74, 27.25, 24.23, 22.86, 22.57, 22.16, 17.25; HRMS: Calcd for $C_{37}H_{48}N_7O_6$ [M+H$^+$]: 686.3661; found: 686.3667.



10b

R_f = 0.4, 5% MeOH in DCM

Compound **10b** was isolated in 21% yield under the **general conditions D**. ^{1}H NMR (400 MHz, DMSO) δ 10.02 (s, 1H), 8.91 (d, *J* = 3.9 Hz, 1H), 8.56 (d, *J* = 7.6 Hz, 1H), 8.42-8.37 (m, 2H), 8.03 (d, *J* = 8.0 Hz, 1H), 7.92 (d, *J* = 7.0 Hz, 1H), 7.64-7.60 (m, 2H), 7.53 (t, *J* = 7.9 Hz, 1H), 7.43-7.40 (m, 1H), 7.20 (d, *J* = 7.8 Hz, 2H), 7.02 (d, *J* = 7.8 Hz, 2H), 6.84 (d, *J* = 7.9 Hz, 1H), 4.40-4.35 (m, 1H), 4.33-4.27 (m, 1H), 4.13-4.06 (m, 1H), 3.83 (dd, *J* = 16.5, 6.4 Hz, 1H), 3.51 (dd, *J* = 16.4, 3.7 Hz, 1H), 3.33-3.26 (m, 1H), 3.23-3.16 (m, 1H), 2.92-2.85 (m, 3H), 2.66 (t, *J* = 11.8 Hz, 2H), 1.85 (s, 3H), 1.74-1.65 (m, 1H), 1.61-1.55 (m, 1H), 1.52-1.43 (m, 1H), 1.36-1.27 (m, 3H), 1.17 (d, *J* = 7.2 Hz, 4H), 0.87 (dd, *J* = 9.0, 6.8 Hz, 6H); ^{13}C NMR (101 MHz, DMSO) δ 172.56, 171.79, 170.60, 170.04, 169.15, 168.57, 148.98, 142.43, 138.12, 136.71, 134.55, 134.49, 129.49, 127.94, 127.75, 127.08, 122.27, 121.97, 116.77, 54.92, 50.91, 48.73, 44.13, 43.04, 41.54, 41.05, 38.49, 38.21, 32.46, 26.93, 24.35, 22.91, 22.66, 22.18, 17.43; HRMS: Calcd for $C_{37}H_{48}N_7O_6$ [M+H$^+$]: 686.3661; found: 686.3666.

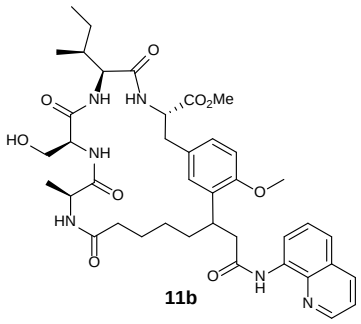


11a

R_f = 0.4, 5% MeOH in DCM

Compound **11a** was isolated in 32% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.82 (s, 1H), 8.82 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.60-8.55 (m, 1H), 8.12 (dd, *J* = 8.3, 1.6 Hz, 1H), 8.02 (d, *J* = 8.6 Hz, 1H), 7.65 (s, 1H), 7.56-7.52 (m, 1H), 7.49-7.42 (m, 3H), 6.86-6.75 (m, 2H), 6.58 (d, *J* = 8.4 Hz, 1H), 5.05-5.01 (m, 1H), 4.79-4.76 (m, 1H), 4.66 (t, *J* = 7.5 Hz, 1H), 4.57-4.51 (m, 2H), 4.01 (d, *J* = 9.1

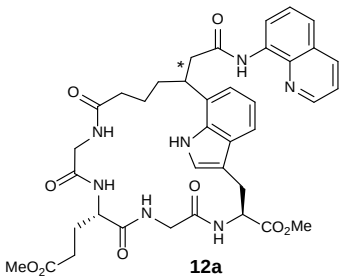
Hz, 1H), 3.88-3.84 (m, 1H), 3.72-3.61 (m, 2H), 3.56-3.54 (m, 5H), 3.35 (t, *J* = 12.6 Hz, 1H), 3.06-2.98 (m, 2H), 2.79 (dd, *J* = 13.8, 5.3 Hz, 1H), 2.41-2.37 (m, 1H), 2.21-2.10 (m, 3H), 1.95-1.75 (m, 4H), 1.61-1.49 (m, 2H), 1.39 (d, *J* = 7.3 Hz, 3H), 1.18-1.11 (m, 1H), 0.93 (d, *J* = 6.7 Hz, 3H), 0.79 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.41, 172.89, 172.28, 172.25, 171.14, 170.79, 156.17, 148.19, 138.41, 136.35, 134.73, 131.19, 130.59, 127.93, 127.74, 127.41, 127.22, 121.65, 121.27, 116.41, 110.37, 63.51, 59.46, 55.32, 54.61, 53.64, 52.10, 49.58, 42.53, 37.18, 36.23, 35.79, 34.86, 34.78, 25.33, 25.33, 24.85, 24.41, 18.15, 15.52, 10.83; HRMS: Calcd for $C_{40}H_{53}N_6O_9$ [M+H$^+$]: 761.3869; found: 761.3872.



11b

R_f = 0.3, 5% MeOH in DCM

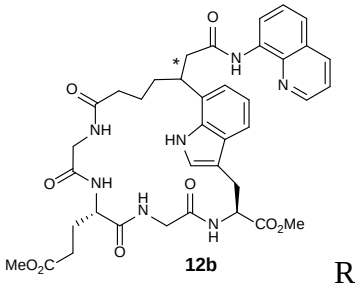
Compound **11b** was isolated in 31% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.72 (s, 1H), 8.75-8.69 (m, 2H), 8.12 (d, *J* = 8.3 Hz, 1H), 8.04-7.85 (m, 3H), 7.49-7.41 (m, 3H), 7.10 (s, 1H), 6.74 (d, *J* = 8.2 Hz, 1H), 6.65 (d, *J* = 8.5 Hz, 1H), 4.75-4.74 (m, 1H), 4.38-4.24 (m, 3H), 4.03-4.01 (m, 1H), 3.75 (s, 5H), 3.52 (s, 3H), 2.97-2.85 (m, 3H), 2.67-2.59 (m, 1H), 2.31-2.15 (m, 5H), 1.89-1.81 (m, 1H), 1.74-1.62 (m, 4H), 1.42 (d, *J* = 7.0 Hz, 3H), 1.12 (d, *J* = 4.5 Hz, 4H), 0.90 (t, *J* = 6.7 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 182.68, 175.94, 173.80, 173.37, 171.62, 170.97, 169.89, 156.69, 148.11, 138.41, 136.35, 134.67, 131.37, 128.21, 128.19, 128.03, 127.69, 127.41, 121.64, 121.34, 116.40, 110.74, 62.03, 60.13, 56.98, 55.46, 54.06, 52.07, 51.62, 45.33, 37.34, 36.27, 34.13, 33.90, 26.70, 25.33, 24.91, 17.17, 15.74, 10.24; HRMS: Calcd for $C_{40}H_{53}N_6O_9$ [M+H$^+$]: 761.3869; found: 761.3872.



12a

R_f = 0.2, 30% acetone in Hex

Compound **12a** was isolated in 36% yield under the **general conditions C**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.83 (s, 1H), 9.75 (s, 1H), 8.70 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.62 (dd, *J* = 5.6, 3.4 Hz, 1H), 8.09 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.75-7.72 (m, 1H), 7.44-7.38 (m, 3H), 7.33-7.30 (m, 2H), 7.10-7.00 (m, 4H), 6.23 (s, 1H), 4.93-4.88 (m, 1H), 4.47-4.41 (m, 1H), 4.18 (dd, *J* = 16.7, 7.2 Hz, 1H), 4.02 (dd, *J* = 16.7, 6.6 Hz, 1H), 3.85-3.77 (m, 1H), 3.67 (s, 3H), 3.59 (s, 3H), 3.49-3.37 (m, 2H), 3.31-3.18 (m, 2H), 3.03-2.93 (m, 2H), 2.54-2.46 (m, 1H), 2.40-2.33 (m, 1H), 2.25-2.16 (m, 1H), 2.12-2.03 (m, 2H), 1.95-1.91 (m, 1H), 1.78-1.69 (m, 1H), 1.67-1.59 (m, 1H), 1.54-1.38 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.76, 174.50, 172.69, 172.17, 171.36, 170.56, 168.90, 148.24, 138.30, 136.42, 135.59, 134.28, 127.96, 127.81, 127.53, 127.33, 124.33, 121.77, 121.72, 120.02, 118.94, 116.59, 116.50, 109.46, 52.68, 52.62, 52.44, 52.41, 44.31, 43.33, 43.23, 36.35, 35.55, 35.35, 30.11, 27.75, 25.48, 23.95; HRMS: Calcd for $C_{38}H_{44}N_7O_9$ [M+H$^+$]: 742.3195; found: 742.3198.

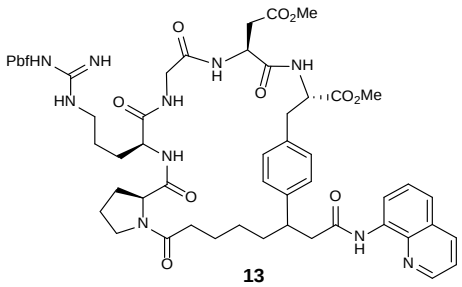


12b

R_f = 0.15, 30% acetone in Hex

Compound **12b** was isolated in 35% yield under the **general conditions C**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.79 (s, 1H), 9.64 (s, 1H), 8.71-8.65 (m, 2H), 8.13-8.11 (m, 1H), 7.55-7.37 (m, 5H), 7.12-7.03 (m, 4H), 6.87 (d, *J* = 7.4 Hz, 1H), 6.18 (s, 1H), 4.95-4.93 (m, 1H), 4.53-4.49 (m, 1H), 4.16-4.06 (m, 2H), 3.65-3.50 (m, 8H), 3.28-3.21 (m, 2H), 3.12-3.02 (m, 2H), 2.56-2.48 (m, 1H), 2.36-2.28 (m, 1H), 2.19-1.95 (m, 5H), 1.84-1.76 (m, 1H), 1.63-1.55 (m, 1H), 1.48-1.41 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 175.02, 174.52, 172.82, 172.08, 171.33, 170.75, 168.65,

148.24, 138.44, 136.46, 135.00, 134.34, 128.14, 128.04, 127.40, 127.11, 124.14, 121.87, 121.74, 121.17, 120.03, 117.24, 116.82, 109.97, 52.63, 52.58, 52.55, 52.43, 43.79, 43.60, 43.34, 34.68, 32.86, 30.04, 28.18, 25.09, 23.34; HRMS: Calcd for $C_{38}H_{44}N_7O_9$ [M+H$^+$]: 742.3195; found: 742.3095.

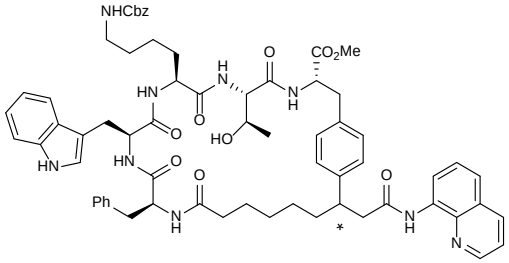


13

R_f = 0.4, 5% MeOH in DCM

Compound **13** (1:1 mixture of diastereomeric isomers) was isolated in 61% yield under the **general conditions C**. ^{1}H NMR (400 MHz, DMSO) δ 10.01 (d, *J* = 10.6 Hz, 1H), 8.93-8.90 (m, 1H), 8.62-8.58 (m, 1H), 8.38 (d, *J* = 8.0 Hz, 1H), 8.33-8.27 (m, 1H), 8.23-8.14 (m, 1H), 8.11-8.08 (m, 1H), 7.91 (d, *J* = 7.7 Hz, 0.64H), 7.84 (d, *J* = 7.3 Hz, 0.63H), 7.63-7.60 (m, 2H), 7.56-7.53 (m, 1H), 7.21-7.09 (m, 5H), 6.84-6.72 (m, 1H), 6.54-6.37 (m, 1H), 4.75-4.72 (m, 0.50H), 4.67-4.54 (m, 1H), 4.50-4.48 (m, 1.47H), 4.30-4.28 (m, 1.48H), 4.25-4.21 (m, 0.52H), 4.02-3.96 (m, 1H), 3.68-3.62 (m, 4H), 3.57 (d, *J* = 4.6 Hz, 3H), 3.38-3.30 (m, 6H), 3.06-3.01 (m, 3H), 2.96-2.88 (m, 4H), 2.53-2.48 (m, 6H), 2.45-2.40 (m, 4H), 2.03-1.96 (m, 4H), 1.79 (s, 3H), 1.64-1.58 (m, 4H), 1.48-1.36 (m, 9H); ^{13}C NMR (101 MHz, DMSO) δ 173.10, 173.02, 172.68, 172.60, 172.25, 172.15, 172.07, 171.95, 171.76, 171.72, 171.62, 171.56, 171.32, 170.49, 170.47, 170.36, 170.19, 170.14, 170.08, 168.45, 168.37, 168.35, 168.31, 168.23, 157.41, 156.04, 148.71, 142.29, 142.23, 137.93, 137.25, 136.49, 134.69, 134.64, 134.51, 134.47, 134.16, 131.40, 129.33, 128.92, 128.66, 127.75, 127.59, 127.49, 126.89, 124.28, 122.03, 121.68, 118.76, 116.43, 116.24, 115.17, 86.25, 79.15, 62.98, 62.86, 60.59, 59.79, 59.54, 54.21, 53.33, 52.99, 52.86, 52.73, 52.60, 52.06, 51.53, 49.25, 49.11, 48.62, 46.81, 46.75, 46.31, 44.52, 44.40, 43.96, 43.79, 42.42, 41.46, 41.37, 41.29, 35.72, 35.59, 35.34, 35.15, 33.48, 33.38, 33.15, 32.89, 31.56, 31.26, 29.75, 29.23, 28.88, 28.61, 28.24, 27.98, 27.19, 26.26, 26.00, 25.57, 25.33, 24.51, 24.45, 24.21, 23.92, 23.12, 22.98, 22.59, 22.33, 18.93, 17.58; HRMS: Calcd

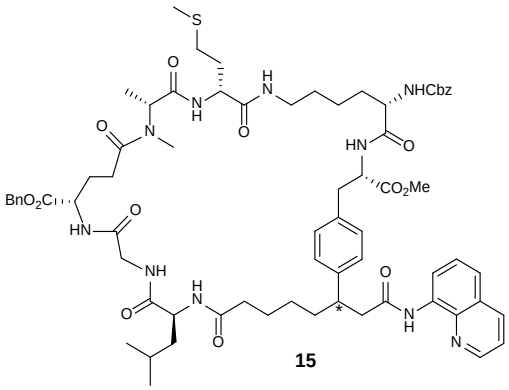
for $C_{58}H_{74}N_{10}NaO_{13}S$ [M+Na^+]: 1173.5050; found: 1173.5058.



14

R_f = 0.3, 5% MeOH in DCM

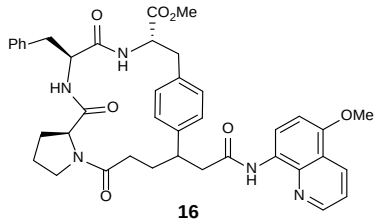
Compound **14** (1:1 mixture of diastereomeric isomers) was isolated in 66% yield under the **general conditions D**. ^{1}H NMR (400 MHz, DMSO) δ 10.82 (s, 1H), 9.72 (s, 0.5H), 9.71 (s, 0.5H), 8.90 (s, 1H), 8.52 (d, *J* = 8.4 Hz, 1H), 8.43 (d, *J* = 8.6 Hz, 1H), 8.19-7.93 (m, 3H), 7.82-7.54 (m, 4H), 7.36-7.22 (m, 7H), 7.19-7.06 (m, 9H), 7.01-6.96 (m, 4H), 5.08-4.99 (m, 2H), 4.77 (dd, *J* = 18.0, 5.0 Hz, 1H), 4.64-4.40 (m, 2H), 4.22-4.18 (m, 3H), 3.93 (s, 4H), 3.64 (s, 3H), 3.11-2.97 (m, 5H), 2.89-2.72 (m, 4H), 2.64-2.60 (m, 1H), 2.08-1.96 (m, 1H), 1.90-1.82 (m, 1H), 1.65-1.51 (m, 4H), 1.39 (d, *J* = 9.7 Hz, 4H), 1.24-1.15 (m, 4H), 1.04 (d, *J* = 5.8 Hz, 3H); ^{13}C NMR (101 MHz, DMSO) δ 172.63, 172.61, 171.96, 171.94, 171.29, 171.24, 171.20, 171.09, 171.02, 156.10, 149.73, 149.69, 149.18, 142.87, 142.78, 138.91, 138.84, 137.91, 137.29, 136.16, 134.77, 134.68, 130.69, 128.80, 128.33, 128.10, 127.82, 127.71, 127.48, 127.39, 126.23, 123.51, 121.27, 120.94, 119.70, 118.63, 118.52, 118.22, 117.36, 117.22, 111.29, 110.31, 110.25, 104.65, 66.68, 66.64, 65.14, 57.72, 57.60, 55.87, 55.32, 55.27, 54.93, 53.40, 53.14, 53.04, 52.85, 52.73, 52.07, 52.04, 43.92, 43.88, 41.60, 41.59, 36.84, 36.75, 35.70, 35.50, 35.32, 35.23, 31.53, 31.34, 29.77, 29.22, 28.85, 28.42, 27.06, 26.73, 25.24, 25.00, 22.60, 22.48, 19.82, 19.70; HRMS: Calcd for $C_{67}H_{78}N_9O_{12}$ [M+H^+]: 1200.5764; found: 1200.5895.



15

R_f = 0.3, 5% MeOH in DCM

Compound **15** (1:1 mixture of diastereomeric isomers) was isolated in 57% yield under the **general conditions D**. ^{1}H NMR (400 MHz, MeOD) δ 8.77 (s, 1H), 8.53 (d, *J* = 5.0 Hz, 1H), 8.18 (d, *J* = 8.0 Hz, 1H), 7.49-7.45 (m, 3H), 7.35-7.20 (m, 10H), 7.18-7.14 (m, 2H), 7.09-7.05 (m, 2H), 5.18-5.08 (m, 4H), 4.68-4.61 (m, 3H), 4.44-4.38 (m, 1H), 4.32-4.17 (m, 1H), 4.07 (dd, *J* = 36.9, 23.2 Hz, 2H), 3.76 (s, 1H), 3.64 (t, *J* = 22.7 Hz, 4H), 3.35 (s, 0.57H), 3.24-2.98 (m, 4H), 2.97-2.69 (m, 6.59H), 2.48-2.42 (m, 3.56H), 2.30-2.28 (m, 2H), 2.15-2.08 (m, 3H), 2.02-1.96 (m, 5.45H), 1.75-1.20 (m, 15H), 0.92 (dd, *J* = 16.0, 4.9 Hz, 6H); ^{13}C NMR (101 MHz, MeOD) δ 176.30, 176.27, 175.82, 175.77, 175.03, 174.92, 174.63, 174.54, 174.47, 174.27, 173.98, 173.87, 173.66, 173.63, 173.01, 172.95, 172.91, 172.84, 172.76, 172.72, 171.81, 171.71, 171.67, 171.46, 171.42, 158.10, 149.75, 143.74, 139.66, 138.04, 137.57, 137.04, 135.98, 135.29, 130.64, 129.56, 129.49, 129.37, 129.30, 129.16, 129.14, 128.98, 128.86, 128.80, 128.74, 127.92, 123.31, 122.95, 118.09, 68.03, 67.60, 56.59, 56.26, 56.09, 54.64, 54.24, 54.19, 54.05, 53.89, 52.86, 52.77, 49.85, 46.09, 45.93, 43.83, 43.41, 41.68, 41.13, 40.11, 37.79, 37.72, 36.82, 36.65, 36.60, 36.55, 32.98, 32.80, 32.54, 31.50, 30.67, 30.32, 30.12, 29.83, 29.56, 28.23, 28.10, 27.79, 27.59, 26.60, 25.80, 24.05, 23.30, 22.25, 22.21, 15.39, 15.32, 14.44; HRMS: Calcd for $C_{70}H_{91}N_{10}O_{14}S$ [M+H^{+}]: 1327.6431; found: 1327.6444.



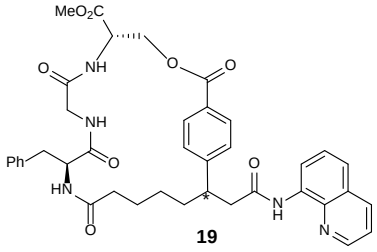
16

R_f = 0.2, 25% acetone in Hex

Compound **16** (1:1 mixture of diastereomeric isomers) was isolated in 59% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.53 (s, 1H), 8.79-8.75 (m, 1H), 8.60 (t, *J* = 7.7 Hz, 1H), 8.54 (dd, *J* = 8.2, 3.4 Hz, 1H), 7.41 (dd, *J* = 8.3, 4.1 Hz, 1H), 7.34-7.20 (m, 6H), 7.18-7.05 (m, 3H), 7.00 (d, *J* = 7.3 Hz, 0.55H), 6.83 (d, *J* = 7.5 Hz, 0.59H), 6.77 (t, *J* = 8.0 Hz, 1H), 6.53 (d, *J* = 8.7 Hz, 0.42H), 6.30 (d, *J* = 7.8 Hz, 0.51H), 6.14 (d, *J* = 7.3 Hz, 0.43H), 5.97 (d, *J* = 9.4 Hz, 0.56H), 4.95-4.82 (m, 1H), 4.57-4.43 (m, 1H), 4.09 (d, *J* = 8.3 Hz, 0.54H), 4.04-4.03 (m, 0.49H), 3.96 (s, 1.5H), 3.95 (s, 1.5H), 3.76 (s, 1.5H), 3.76 (s, 1.5H), 3.48-3.42 (m,

1H), 3.35-3.28 (m, 2H), 3.14-3.00 (m, 2H), 2.96-2.81 (m, 3H), 2.57 (t, *J* = 12.5 Hz, 0.54H), 2.46 (t, *J* = 12.9 Hz, 0.61H), 2.21-1.96 (m, 3H), 1.82-1.40 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.31, 172.92, 171.91, 171.76, 171.13, 169.68, 169.53, 169.18, 169.13, 150.26, 150.22, 148.58, 148.55, 141.86, 141.20, 139.02, 136.48, 135.98, 134.66, 134.33, 131.27, 131.20, 131.11, 130.90, 130.15, 129.92, 129.84, 129.31, 129.10, 128.93, 128.70, 128.60, 127.89, 127.82, 127.13, 127.09, 125.25, 124.17, 120.72, 120.39, 120.38, 116.75, 116.63, 104.33, 104.28, 61.63, 61.45, 55.80, 55.79, 54.04, 53.43, 53.34, 52.92, 52.71, 52.63, 46.91, 46.76, 44.42, 43.52, 41.58, 41.10, 39.31, 39.23, 38.29, 36.87, 32.69, 32.66, 32.22, 32.02, 31.44, 22.51, 22.08; HRMS: Calcd for $C_{40}H_{44}N_5O_7$ [M+H$^+$]: 706.3235; found: 706.3240.

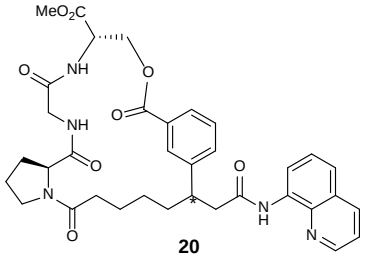
8. Macrocyclization of peptides at modifiable nonaromatic amino acid units



19 R_f = 0.4, 5% DCM in MeOH

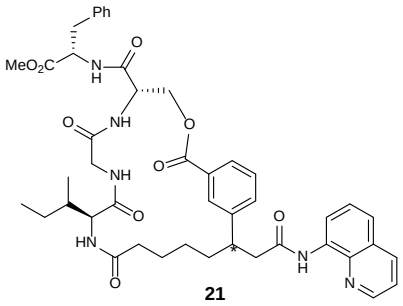
Compound **19** (1:1 mixture of diastereomeric isomers) was isolated in 75% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.72 (d, *J* = 9.5 Hz, 1H), 8.76 (d, *J* = 3.9 Hz, 1H), 8.69 (dd, *J* = 6.2, 2.7 Hz, 1H), 8.13 (d, *J* = 8.3 Hz, 1H), 7.98 (d, *J* = 8.2 Hz, 1H), 7.93 (d, *J* = 8.2 Hz, 1H), 7.53-7.37 (m, 5.50H), 7.33-7.18 (m, 3.50H), 7.08 (d, *J* = 6.9 Hz, 1H), 7.03 (d, *J* = 6.9 Hz, 1H), 6.07-6.03 (m, 1.53H), 5.90 (t, *J* = 6.0 Hz, 0.49H), 4.98-4.93 (m, 1H), 4.72-4.68 (m, 1H), 4.58-4.54 (m, 1H), 4.48-4.43 (m, 1H), 3.96 (dd, *J* = 15.4, 5.8 Hz, 0.54H), 3.90-3.77 (m, 3.57H), 3.65 (dd, *J* = 15.7, 6.7 Hz, 0.64H), 3.53-3.48 (m, 1H), 3.38-3.34 (m, 0.56H), 2.93-2.81 (m, 2.49H), 2.75 (dd, *J* = 13.6, 5.0 Hz, 0.60H), 2.19-2.16 (m, 1H), 2.09-1.97 (m, 2H), 1.90-1.85 (m, 2H), 1.73-1.51 (m, 2H), 1.39-1.28 (m, 1H), 1.20-1.15 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.43, 172.31, 171.99, 171.92, 169.81, 169.67, 169.59, 168.74, 168.65, 165.83, 165.78, 150.48, 150.00, 148.26, 148.23, 138.34, 136.52,

136.47, 134.30, 134.28, 130.59, 130.38, 129.29, 129.22, 129.04, 129.01, 128.12, 128.03, 128.01, 127.73, 127.48, 127.46, 121.75, 116.69, 116.63, 64.17, 63.91, 54.63, 53.22, 51.53, 51.42, 45.99, 45.17, 44.52, 44.29, 43.18, 42.41, 39.48, 39.39, 36.32, 35.49, 35.12, 34.97, 26.41, 26.11, 24.96, 24.54; HRMS: Calcd for $C_{39}H_{41}N_5NaO_8$ [M+Na^+]: 730.2847; found: 730.2850.



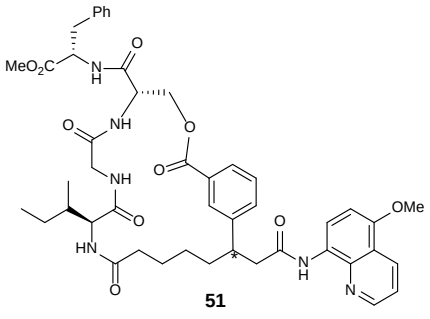
20 R_f = 0.4, 5% MeOH in DCM

Compound **20** (1.2:1 mixture of diastereomeric isomers) was isolated in 74% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.68 (s, 1H), 8.78-8.60 (m, 2H), 8.19-8.07 (m, 1H), 8.01 (s, 0.40H), 7.93 (s, 0.48H), 7.89-7.76 (m, 1H), 7.58-7.31 (m, 6H), 7.21 (t, *J* = 5.9 Hz, 0.45H), 7.10 (t, *J* = 5.9 Hz, 0.46H), 5.02-4.82 (m, 1H), 4.75-4.58 (m, 2H), 4.39-4.22 (m, 1H), 4.03 (dd, *J* = 17.2, 6.6 Hz, 1H), 3.97-3.84 (m, 1H), 3.78 (d, *J* = 8.6 Hz, 3H), 3.52-3.39 (m, 2H), 3.39-3.28 (m, 1H), 2.92-2.78 (m, 2H), 2.29-2.06 (m, 3.50H), 1.98-1.75 (m, 5.66H), 1.56-1.39 (m, 1H), 1.18-1.10 (m, 1H), 0.90-0.80 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.39, 173.12, 172.29, 172.15, 169.97, 169.93, 169.46, 169.40, 169.32, 166.55, 166.45, 148.23, 148.20, 144.05, 143.89, 138.32, 136.49, 136.42, 134.40, 134.36, 132.20, 132.11, 130.27, 129.97, 129.74, 129.69, 128.91, 128.90, 128.20, 128.14, 127.98, 127.97, 127.41, 121.74, 121.71, 121.67, 121.61, 116.51, 116.49, 64.54, 63.57, 60.43, 60.40, 52.99, 52.93, 52.64, 52.35, 47.71, 47.63, 46.00, 43.02, 41.85, 41.78, 35.13, 34.29, 34.08, 28.44, 28.14, 26.54, 26.20, 25.08, 25.04, 24.09, 23.67; HRMS: Calcd for $C_{35}H_{40}N_5O_8$ [M+H^+]: 658.2871; found: 658.2875.



21 R_f = 0.4, 5% MeOH in DCM

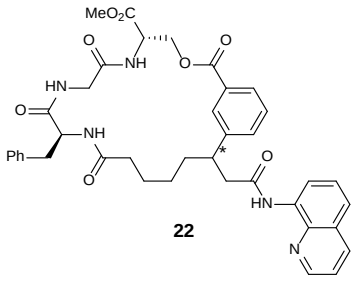
Compound **21** (1:1 mixture of diastereomeric isomers) was isolated in 71% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.72 (d, *J* = 5.1 Hz, 1H), 8.74-8.64 (m, 2H), 8.13-8.10 (m, 1H), 8.00 (s, 0.46H), 7.93 (s, 0.55H), 7.88-7.76 (m, 1H), 7.55-7.32 (m, 7H), 7.23-7.08 (m, 6H), 6.94 (d, *J* = 7.6 Hz, 0.53H), 6.74 (d, *J* = 6.9 Hz, 0.54H), 5.00-4.93 (m, 1H), 4.83-4.75 (m, 1H), 4.68-4.63 (m, 0.53H), 4.61-4.42 (m, 1.5H), 4.28-4.03 (m, 2H), 3.77-3.55 (m, 4H), 3.52-3.43 (m, 0.55H), 3.39-3.36 (m, 1H), 3.16-2.99 (m, 2H), 2.91 (dd, *J* = 14.5, 7.9 Hz, 0.55H), 2.84-2.77 (m, 1.55H), 2.26-2.11 (m, 2H), 1.90-1.65 (m, 4H), 1.60-1.52 (m, 1H), 1.50-1.29 (m, 2H), 1.18-1.05 (m, 2H), 0.87-0.76 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.24, 173.95, 172.65, 172.47, 171.83, 170.26, 170.20, 169.86, 169.71, 168.22, 166.70, 166.66, 148.31, 148.25, 144.30, 144.16, 138.40, 138.32, 136.46, 136.16, 136.13, 134.31, 134.26, 132.25, 131.91, 129.98, 129.94, 129.87, 129.61, 129.31, 129.23, 129.01, 128.94, 128.69, 128.62, 128.25, 128.00, 127.38, 127.35, 127.13, 121.81, 121.78, 121.72, 116.80, 116.62, 64.92, 64.48, 58.35, 53.92, 52.95, 52.82, 52.46, 52.44, 45.42, 45.22, 43.52, 43.38, 42.14, 41.29, 37.84, 36.67, 36.51, 35.74, 35.19, 34.87, 34.20, 29.79, 25.75, 25.08, 25.03, 24.96, 24.74, 15.73, 11.42.



51 R_f = 0.4, 5% MeOH in DCM

Compound **51** (1:1 mixture of diastereomeric isomers) was isolated in 73% yield under the **general conditions D**. ^{1}H NMR (400 MHz, MeOD) δ 8.81-8.79 (m, 1H), 8.55 (td, *J* = 8.7, 1.6 Hz, 1H), 8.36 (d, *J* = 8.5 Hz, 0.55H), 8.30 (d, *J* = 8.5 Hz, 0.52H),

8.00-7.95 (m, 1H), 7.79 (dd, *J* = 7.7, 2.6 Hz, 1H), 7.64 (d, *J* = 7.8 Hz, 0.56H), 7.58 (d, *J* = 7.7 Hz, 0.57H), 7.52-7.38 (m, 2H), 7.25-7.13 (m, 5H), 6.89 (d, *J* = 8.6 Hz, 0.54H), 6.80 (d, *J* = 8.6 Hz, 0.52H), 4.88-4.83 (m, 2H), 4.72-4.64 (m, 1H), 4.55-4.50 (m, 1.50H), 4.41 (dd, *J* = 11.4, 6.2 Hz, 0.53H), 4.17-4.14 (m, 0.53H), 4.11-4.08 (m, 0.57H), 4.00-3.91 (m, 4H), 3.63 (s, 1.56H), 3.55 (s, 1.50H), 3.45-3.36 (m, 1H), 3.19-3.16 (m, 1H), 3.07-2.98 (m, 1H), 2.93-2.83 (m, 2H), 2.28-2.15 (m, 2H), 1.90-1.72 (m, 4H), 1.61-1.56 (m, 1H), 1.21-1.11 (m, 4H), 0.91-0.86 (m, 6H); ^{13}C NMR (101 MHz, MeOD) δ 176.79, 176.67, 174.32, 173.11, 173.08, 172.46, 172.42, 171.60, 171.53, 170.43, 170.36, 167.77, 167.69, 152.46, 152.40, 150.38, 150.33, 145.68, 145.58, 141.00, 138.13, 138.09, 133.44, 132.85, 132.21, 131.66, 131.06, 131.03, 130.98, 130.85, 130.25, 130.02, 129.89, 129.52, 129.42, 128.97, 128.46, 128.41, 127.89, 127.80, 122.04, 122.00, 119.72, 119.59, 105.11, 65.51, 65.07, 60.07, 59.89, 56.37, 55.54, 55.51, 53.97, 53.63, 52.78, 52.75, 45.86, 45.73, 44.03, 43.90, 43.67, 38.17, 37.84, 37.78, 36.56, 36.22, 36.17, 35.89, 30.81, 30.72, 30.61, 30.45, 30.30, 28.09, 27.33, 27.27, 26.92, 26.23, 26.03, 25.90, 16.02, 16.00, 11.80, 11.70.

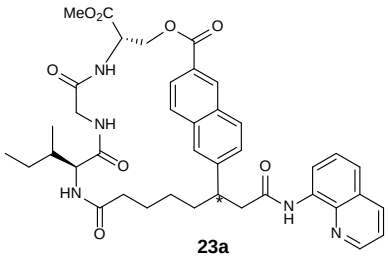


22

R_f = 0.4, 5% MeOH in DCM

Compound **22** (1:1 mixture of diastereomeric isomers) was isolated in 76% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.78 (s, 1H), 8.76-8.73 (m, 2H), 8.20-8.10 (m, 1H), 8.01 (s, 0.48H), 7.86 (d, *J* = 5.7 Hz, 1.47H), 7.59 (d, *J* = 8.0 Hz, 0.52H), 7.56-7.38 (m, 5.46H), 7.32-7.15 (m, 4H), 7.11 (d, *J* = 6.7 Hz, 1H), 6.90-6.86 (m, 1H), 6.78 (dd, *J* = 13.5, 7.0 Hz, 1H), 5.02-4.89 (m, 1H), 4.75 (dd, *J* = 11.3, 4.6 Hz, 0.57H), 4.66 (dd, *J* = 11.3, 4.5 Hz, 0.54H), 4.63-4.50 (m, 2H), 4.19 (dd, *J* = 16.6, 7.1 Hz, 1H), 3.75 (d, *J* = 8.6 Hz, 3H), 3.64-3.50 (m, 1.49H), 3.48-3.36 (m, 1.60H), 3.16-2.81 (m, 4H), 2.23-2.12 (m, 1H), 2.11-1.91 (m, 3H), 1.80-1.76 (m, 1H), 1.58-1.55 (m, 1H), 1.19-1.04 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.13, 173.73, 172.88, 172.73, 170.72, 170.33, 169.74, 169.67, 169.41,

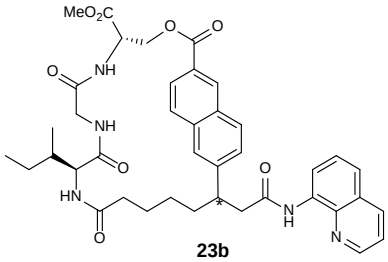
169.28, 166.49, 166.26, 148.35, 144.17, 144.11, 138.43, 138.35, 136.99, 136.77, 136.57, 134.35, 134.27, 132.30, 131.96, 129.98, 129.71, 129.57, 129.24, 129.21, 129.15, 129.01, 128.83, 128.37, 128.27, 128.06, 127.41, 127.17, 121.90, 121.84, 121.80, 116.83, 116.72, 64.87, 64.53, 55.48, 55.17, 53.09, 52.21, 52.01, 45.16, 44.45, 43.99, 43.85, 42.26, 40.70, 37.91, 35.57, 34.96, 34.26, 33.82, 29.83, 25.24, 24.65, 24.29; HRMS: Calcd for $C_{39}H_{42}N_5O_8$ [M+H$^+$]: 708.3028; found: 708.3032.



23a

R_f = 0.4, 5% MeOH in DCM

Compound **23a** was isolated in 23% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.85 (s, 1H), 8.72-8.68 (m, 3H), 8.10 (t, *J* = 8.8 Hz, 2H), 8.01 (d, *J* = 8.3 Hz, 1H), 7.86-7.84 (m, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.61 (d, *J* = 8.3 Hz, 1H), 7.52-7.35 (m, 3H), 7.30 (s, 1H), 5.06-4.94 (m, 1H), 4.81 (d, *J* = 8.7 Hz, 1H), 4.67 (d, *J* = 13.4 Hz, 1H), 4.46 (d, *J* = 10.9 Hz, 1H), 4.23 (dd, *J* = 14.7, 5.2 Hz, 1H), 4.00-3.76 (m, 4H), 3.58-3.52 (m, 1H), 3.33 (dd, *J* = 14.8, 5.7 Hz, 1H), 3.17 (dd, *J* = 14.8, 7.6 Hz, 1H), 3.03 (dd, *J* = 14.8, 7.2 Hz, 1H), 2.17-2.05 (m, 1H), 1.90 (s, 1H), 1.81-1.53 (m, 3H), 1.49-1.35 (m, 1H), 1.00-0.98 (m, 1H), 0.70-0.68 (m, 1H), 0.53 (t, *J* = 6.7 Hz, 3H), 0.35-0.26 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.71, 172.25, 169.99, 169.89, 169.62, 166.00, 148.17, 145.22, 138.33, 136.47, 136.04, 134.32, 132.79, 131.46, 130.04, 127.98, 127.92, 127.46, 125.87, 121.73, 116.60, 64.48, 55.94, 53.19, 50.96, 44.97, 44.16, 43.58, 38.40, 37.73, 35.72, 27.13, 26.10, 24.69, 14.72, 10.95; HRMS: Calcd for $C_{40}H_{45}N_5NaO_8$ [M+Na$^+$]: 746.3160; found: 746.3165.

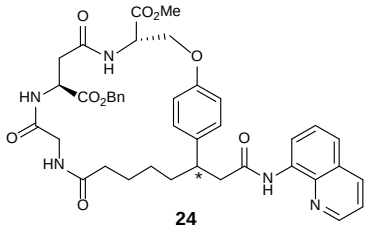


23b

R_f = 0.35, 5% MeOH in DCM

Compound **23b** was isolated in 22% yield under the **general conditions D**. ^{1}H NMR

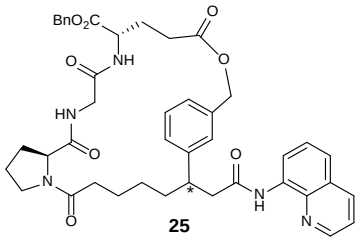
(400 MHz, $CDCl_3$) δ 9.75 (s, 1H), 8.79-8.58 (m, 3H), 8.25 (d, *J* = 8.5 Hz, 1H), 8.11 (d, *J* = 7.8 Hz, 1H), 7.99 (d, *J* = 8.2 Hz, 1H), 7.85-7.67 (m, 4H), 7.50-7.37 (m, 3H), 7.29 (s, 1H), 5.02-4.98 (m, 1H), 4.80 (d, *J* = 9.0 Hz, 1H), 4.66 (d, *J* = 11.0 Hz, 1H), 4.42 (dd, *J* = 10.9, 3.6 Hz, 1H), 4.31 (dd, *J* = 14.7, 5.6 Hz, 1H), 3.97-3.79 (m, 4H), 3.54-3.42 (m, 1H), 3.32 (dd, *J* = 14.8, 5.7 Hz, 1H), 3.08-2.91 (m, 2H), 2.02-1.89 (m, 1H), 1.89-1.69 (m, 3H), 1.58-1.48 (m, 1H), 1.14-0.94 (m, 3H), 0.55-0.53 (m, 1H), 0.39 (t, *J* = 7.0 Hz, 3H), 0.19 (d, *J* = 6.6 Hz, 4H), -0.24 (t, *J* = 13.1 Hz, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.83, 172.79, 170.05, 169.75, 169.72, 165.83, 148.18, 145.01, 138.35, 136.46, 136.03, 134.32, 133.25, 131.52, 130.72, 128.08, 127.99, 127.46, 125.89, 125.84, 125.06, 121.71, 116.64, 64.58, 56.02, 53.20, 51.00, 46.17, 45.05, 43.94, 38.28, 36.28, 33.75, 26.88, 25.14, 24.55, 14.63, 10.71.



24

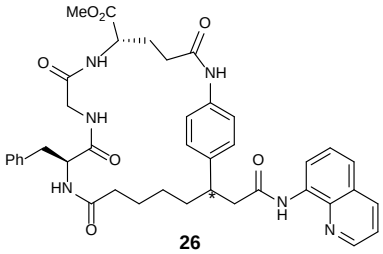
R_f = 0.4, 5% MeOH in DCM

Compound **24** (1:1 mixture of diastereomeric isomers) was isolated in 68% yield under the **general conditions D**. ^{1}H NMR (400 MHz, DMSO) δ 9.99 (d, *J* = 9.9 Hz, 1H), 8.90 (d, *J* = 3.1 Hz, 1H), 8.66 (dd, *J* = 24.8, 8.1 Hz, 1H), 8.56-8.53 (m, 1H), 8.41 (dd, *J* = 27.9, 7.9 Hz, 2H), 7.62-7.60 (m, 2H), 7.52 (t, *J* = 7.9 Hz, 1H), 7.38-7.35 (m, 5H), 7.26-7.04 (m, 3H), 6.75 (t, *J* = 7.2 Hz, 2H), 5.21-5.05 (m, 2H), 4.90-4.78 (m, 1H), 4.67-4.59 (m, 0.68H), 4.58-4.52 (m, 0.47H), 4.15-4.08 (m, 2H), 3.76-3.59 (m, 4H), 3.17-2.94 (m, 2H), 2.92-2.81 (m, 2H), 2.70-2.54 (m, 2H), 2.15-2.08 (m, 1H), 1.95-1.90 (m, 1H), 1.68-1.42 (m, 4H), 1.29-1.12 (m, 1H), 0.83-0.78 (m, 1H); ^{13}C NMR (101 MHz, DMSO) δ 172.15, 171.88, 170.86, 170.82, 170.46, 170.41, 169.77, 168.95, 168.85, 168.55, 168.53, 156.55, 156.36, 148.75, 137.97, 136.65, 136.55, 136.27, 135.83, 134.47, 128.99, 128.84, 128.46, 128.44, 128.06, 128.03, 127.79, 127.66, 126.93, 122.08, 121.69, 116.47, 114.34, 114.26, 67.88, 66.23, 66.18, 52.36, 51.81, 51.71, 49.92, 44.57, 43.76, 41.25, 41.22, 40.94, 37.26, 37.06, 35.29, 34.75, 34.50, 33.41, 31.29, 24.84, 24.80, 24.51, 24.22; HRMS: Calcd for $C_{40}H_{43}N_5NaO_9$ [M+Na^+]: 760.2953; found: 760.2958.



25 R_f = 0.4, 5% MeOH in DCM

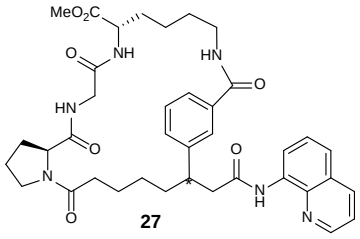
Compound **25** (1:1 mixture of diastereomeric isomers) was isolated in 81% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.72 (d, *J* = 6.8 Hz, 1H), 8.82-8.66 (m, 2H), 8.13 (d, *J* = 8.2 Hz, 1H), 7.74 (dd, *J* = 15.3, 7.9 Hz, 1H), 7.54-7.41 (m, 3.40H), 7.39-7.27 (m, 6.49H), 7.23-7.18 (m, 1H), 7.10-7.06 (m, 1.50H), 7.00-6.98 (m, 0.45H), 5.29-5.07 (m, 3H), 4.98 (dd, *J* = 28.6, 12.5 Hz, 1H), 4.72-4.55 (m, 1H), 4.29-4.10 (m, 2H), 3.73-3.60 (m, 1H), 3.60-3.47 (m, 1H), 3.46-3.24 (m, 2H), 2.91-2.73 (m, 2H), 2.46-2.42 (m, 2H), 2.32-1.97 (m, 8H), 1.93-1.80 (m, 2H), 1.73-1.52 (m, 2H), 1.46-1.43 (m, 1H), 1.21-1.10 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.21, 173.03, 172.59, 172.49, 172.42, 172.39, 171.75, 171.74, 170.34, 170.31, 169.79, 169.72, 148.25, 144.11, 144.01, 138.35, 136.77, 136.63, 136.42, 135.52, 134.45, 128.80, 128.74, 128.66, 128.64, 128.41, 128.38, 128.28, 127.99, 127.79, 127.53, 127.39, 126.93, 126.63, 126.14, 126.09, 121.74, 121.63, 116.47, 67.22, 66.13, 60.95, 52.25, 52.08, 47.86, 47.71, 45.97, 45.73, 43.01, 41.65, 41.52, 34.74, 34.59, 34.39, 31.29, 31.00, 28.96, 27.06, 26.86, 26.27, 26.04, 25.28, 25.27, 24.08, 23.80; HRMS: Calcd for $C_{43}H_{48}N_5O_8$ [M+H$^+$]: 762.3497; found: 762.3503.



26 R_f = 0.4, 5% MeOH in DCM

Compound **26** (1:1 mixture of diastereomeric isomers) was isolated in 65% yield under the **general conditions D**. ^{1}H NMR (400 MHz, DMSO) δ 9.99 (d, *J* = 10.8 Hz, 1H), 9.81 (d, *J* = 21.7 Hz, 1H), 8.90 (s, 1H), 8.56 (d, *J* = 7.7 Hz, 1H), 8.38 (d, *J* = 7.9 Hz, 1H), 8.21 (d, *J* = 8.0 Hz, 0.58H), 8.04 (d, *J* = 8.4 Hz, 0.48H), 7.95 (d, *J* = 7.8 Hz, 0.51H), 7.88 (d, *J* = 7.6 Hz, 0.54H), 7.68-7.36 (m, 5H), 7.31-7.10 (m, 6H), 4.63-4.02 (m, 2H), 3.72-3.46 (m, 4H), 3.18-2.62 (m, 5H), 2.38-2.34 (m, 2H), 2.13-1.77 (m, 4H),

1.64-1.47 (m, 2H), 1.28-1.20 (m, 2H), 0.99-0.78 (m, 2H); ^{13}C NMR (101 MHz, DMSO) δ 172.58, 172.09, 172.01, 171.32, 171.22, 170.44, 170.39, 170.33, 168.63, 168.31, 148.75, 138.30, 138.21, 138.08, 137.95, 137.34, 137.10, 136.53, 134.44, 128.97, 128.06, 127.76, 127.71, 127.60, 126.91, 126.18, 122.06, 121.68, 119.16, 119.02, 116.48, 116.42, 55.00, 54.50, 51.98, 51.67, 51.49, 44.69, 44.02, 42.64, 41.40, 40.92, 36.89, 36.79, 36.17, 35.49, 34.94, 34.49, 33.61, 33.38, 26.99, 26.31, 26.19, 25.74, 25.19, 24.10; HRMS: Calcd for $C_{40}H_{45}N_6O_7$ [M+H$^+$]: 721.3344; found: 721.3348.

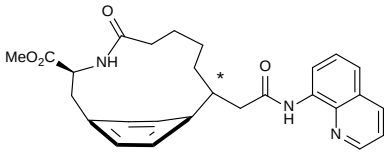


27

R_f = 0.4, 5% MeOH in DCM

Compound **27** (1:1 mixture of diastereomeric isomers) was isolated in 67% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.72 (d, *J* = 9.0 Hz, 1H), 8.80-8.72 (m, 1H), 8.72-8.63 (m, 1H), 8.18-8.06 (m, 1H), 7.78 (s, 0.44H), 7.69 (dd, *J* = 6.0, 1.6 Hz, 1H), 7.64 (d, *J* = 7.5 Hz, 0.42H), 7.56 (dd, *J* = 12.7, 6.6 Hz, 0.56H), 7.51-7.31 (m, 5.50H), 7.20-7.08 (m, 1H), 6.98-6.95 (m, 1H), 4.68-4.54 (m, 1H), 4.55-4.42 (m, 1H), 3.94 (dd, *J* = 16.5, 6.2 Hz, 1H), 3.76-3.65 (m, 3.54H), 3.57-3.19 (m, 5H), 3.03 (dd, *J* = 16.9, 5.6 Hz, 0.44H), 2.89-2.80 (m, 2H), 2.27-2.11 (m, 5H), 1.98-1.55 (m, 10H), 1.47-1.37 (m, 2H), 1.09-0.95 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.63, 173.56, 172.85, 172.74, 172.57, 172.47, 170.30, 170.15, 169.89, 169.43, 168.29, 168.27, 148.32, 144.17, 143.95, 138.33, 136.45, 136.39, 135.32, 135.24, 134.38, 134.35, 131.58, 129.72, 129.10, 128.69, 127.99, 127.97, 127.40, 127.35, 126.94, 126.21, 126.00, 125.74, 121.75, 121.72, 121.67, 116.57, 116.49, 59.92, 59.68, 53.89, 52.65, 51.78, 50.95, 47.76, 47.65, 45.83, 43.18, 42.77, 42.59, 42.08, 38.99, 38.94, 35.94, 35.18, 34.33, 34.00, 31.43, 30.89, 29.37, 27.94, 27.79, 27.41, 27.24, 27.09, 26.42, 25.03, 24.94, 24.59, 24.34, 21.85, 21.60; HRMS: Calcd for $C_{38}H_{47}N_6O_7$ [M+H$^+$]: 699.3501; found: 699.3506.

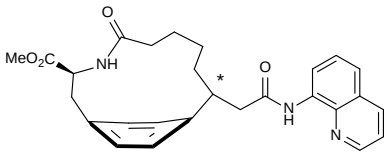
9. Synthesis of small-sized cyclophanes



29a

R_f = 0.4, 20% acetone in Hex

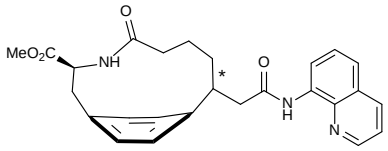
Compound **29a** was isolated in 31% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.94 (s, 1H), 8.81 (d, *J* = 3.6 Hz, 1H), 8.77 (d, *J* = 13.7 Hz, 1H), 8.15 (d, *J* = 8.2 Hz, 1H), 7.57-7.41 (m, 3H), 7.02 (d, *J* = 7.9 Hz, 1H), 5.00 (d, *J* = 10.1 Hz, 1H), 4.94-4.87 (m, 1H), 3.77 (s, 3H), 3.68-3.62 (m, 1H), 3.55 (dd, *J* = 13.3, 6.1 Hz, 1H), 3.04 (dd, *J* = 14.6, 7.0 Hz, 1H), 2.86 (dd, *J* = 14.7, 8.3 Hz, 1H), 2.60 (t, *J* = 12.4 Hz, 1H), 1.91-1.88 (m, 1H), 1.67-1.58 (m, 1H), 1.52-1.40 (m, 2H), 1.19-0.74 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.70, 172.59, 170.48, 148.35, 142.28, 138.46, 136.45, 135.00, 134.56, 130.75, 130.08, 128.86, 128.05, 127.63, 127.51, 121.77, 121.61, 116.57, 51.90, 40.85, 40.48, 38.57, 34.82, 34.11, 25.04, 21.36; HRMS: Calcd for $C_{27}H_{29}N_3NaO_4$ [M+Na^+]: 482.2050; found: 482.2040.



29b

R_f = 0.3, 20% acetone in Hex

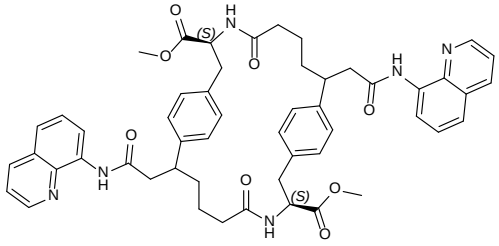
Compound **29b** was isolated in 31% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.89 (s, 1H), 8.84-8.67 (m, 2H), 8.13 (d, *J* = 8.1 Hz, 1H), 7.53-7.40 (m, 3H), 7.32 (d, *J* = 7.8 Hz, 1H), 7.23-7.18 (m, 2H), 7.06 (d, *J* = 7.8 Hz, 1H), 5.08 (d, *J* = 10.3 Hz, 1H), 5.00-4.96 (m, 1H), 3.76 (s, 3H), 3.54 (dd, *J* = 13.2, 5.7 Hz, 1H), 3.20-3.06 (m, 2H), 2.94-2.90 (m, 1H), 2.56 (t, *J* = 12.5 Hz, 1H), 2.08-1.98 (m, 1H), 1.78-1.68 (m, 3H), 1.45-1.32 (m, 2H), 0.93-0.85 (m, 1H), 0.78-0.68 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.77, 172.21, 170.30, 148.18, 142.03, 138.46, 136.46, 135.22, 134.55, 133.06, 131.17, 128.71, 128.03, 127.52, 125.53, 121.69, 121.55, 116.62, 51.61, 43.66, 42.89, 38.81, 36.16, 34.32, 26.36, 23.22; HRMS: Calcd for $C_{27}H_{29}N_3NaO_4$ [M+Na^+]: 482.2050; found: 482.2042



31

R_f = 0.3, 20% acetone in Hex

Compound **31** (1.6:1 mixture of diastereomeric isomers) was isolated in 23% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.90 (s, 1H), 8.79-8.72 (m, 2H), 8.14 (dd, *J* = 8.2, 1.5 Hz, 1H), 7.52-7.41 (m, 3H), 7.36 (d, *J* = 7.8 Hz, 1H), 7.27-7.25 (m, 1H), 7.16 (d, *J* = 7.8 Hz, 1H), 7.05 (d, *J* = 8.0 Hz, 1H), 4.90-4.69 (m, 1H), 4.56 (d, *J* = 10.9 Hz, 1H), 3.75 (s, 3H), 3.56 (dd, *J* = 13.0, 7.0 Hz, 1H), 3.27-3.16 (m, 1H), 3.11 (dd, *J* = 14.7, 8.1 Hz, 1H), 2.93 (dd, *J* = 14.7, 6.8 Hz, 1H), 2.56 (dd, *J* = 12.8, 11.0 Hz, 1H), 2.33-2.12 (m, 2H), 1.74-1.69 (m, 2H), 1.45-1.40 (m, 1H), 1.22-1.13 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.58, 172.57, 170.14, 148.21, 141.65, 138.40, 136.49, 135.91, 134.46, 132.89, 131.59, 130.41, 128.01, 127.51, 125.43, 121.71, 121.61, 116.60, 52.50, 52.19, 43.75, 43.60, 40.29, 39.05, 37.79, 19.66; HRMS: Calcd for $C_{26}H_{27}N_3NaO_4$ [M+Na^+]: 468.1894; found: 468.1888.

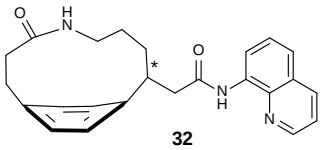


31d

R_f = 0.2, 25% acetone in Hex

Compound **31d** was isolated in 51% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.77-9.61 (m, 2H), 8.75-8.65 (m, 4H), 8.10 (dd, *J* = 7.7, 4.2 Hz, 2H), 7.51-7.35 (m, 6H), 7.21-7.09 (m, 4H), 7.02-6.92 (m, 4H), 6.11 (d, *J* = 7.1 Hz, 0.53H), 6.00 (dd, *J* = 13.9, 7.4 Hz, 1.46H), 4.83-4.76 (m, 2H), 3.69 (dd, *J* = 6.5, 2.8 Hz, 6H), 3.33-3.06 (m, 4H), 3.02-2.74 (m, 6H), 2.05-1.62 (m, 10H), 1.43-1.40 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.46, 172.40, 172.38, 172.36, 172.10, 172.00, 171.93, 170.04, 169.95, 148.21, 148.14, 142.93, 142.81, 142.68, 142.62, 138.26, 136.38, 136.32, 134.52, 134.48, 134.46, 134.33, 129.80, 129.76, 129.72, 129.64, 127.91, 127.72, 127.66, 127.42, 127.39, 127.34, 121.66, 121.57, 116.52, 116.44, 53.17, 53.15, 52.96, 52.89, 52.45, 52.42, 52.38, 45.96, 45.89, 45.84, 45.51, 42.65,

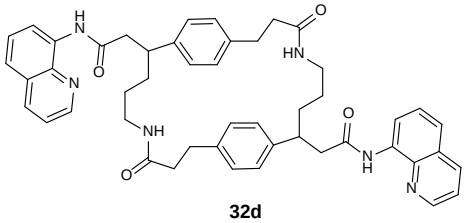
42.53, 42.40, 42.24, 37.50, 37.25, 37.07, 36.92, 36.58, 36.35, 35.84, 35.74, 35.32, 35.22, 34.86, 34.84, 24.06, 23.98, 23.31, 23.24.



32

R_f = 0.4, 20% acetone in Hex

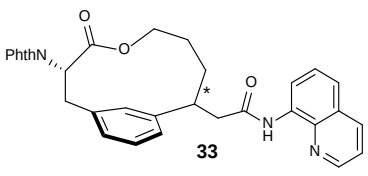
Compound **32** was isolated in 21% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.92 (s, 1H), 8.79-8.76 (m, 2H), 8.15 (d, *J* = 8.1 Hz, 1H), 7.54-7.42 (m, 3H), 7.40-7.26 (m, 2H), 7.20 (t, *J* = 6.8 Hz, 2H), 3.68 (s, 1H), 3.24-3.22 (m, 1H), 3.15-3.11 (m, 1H), 3.06-2.87 (m, 4H), 2.40-2.38 (m, 1H), 2.28-2.15 (m, 1H), 2.10-1.98 (m, 2H), 1.76-1.62 (m, 1H), 1.26-1.22 (m, 1H), 0.92-0.83 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.99, 170.10, 148.23, 141.52, 140.94, 138.38, 136.44, 134.45, 131.29, 130.43, 128.37, 128.00, 127.44, 126.52, 121.71, 121.63, 116.57, 43.01, 42.76, 42.69, 42.09, 38.43, 32.78, 24.26; HRMS: Calcd for $C_{24}H_{25}N_3NaO_2$ [M+Na^+]: 410.1839; found: 410.1836.



32d

R_f = 0.2, 25% acetone in Hex

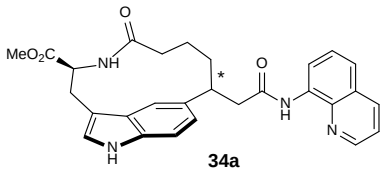
Compound **32d** was isolated in 53% yield under the **general conditions D**. ^{1}H NMR (400 MHz, DMSO) δ 9.98 (d, *J* = 8.6 Hz, 2H), 8.88 (s, 2H), 8.57 (d, *J* = 6.3 Hz, 2H), 8.37 (d, *J* = 8.0 Hz, 2H), 7.81-7.69 (m, 2H), 7.64-7.51 (m, 6H), 7.14 (t, *J* = 6.0 Hz, 4H), 7.02 (d, *J* = 6.6 Hz, 4H), 3.14-2.70 (m, 14H), 2.32-2.27 (m, 4H), 1.70-1.52 (m, 4H), 1.30-1.18 (m, 2H), 1.18-1.06 (m, 2H); ^{13}C NMR (101 MHz, DMSO) δ 171.53, 171.45, 170.59, 148.96, 141.94, 139.36, 139.34, 138.09, 136.71, 134.54, 128.48, 128.42, 127.94, 127.41, 127.10, 122.27, 121.98, 116.70, 44.52, 44.36, 41.75, 41.60, 36.25, 36.11, 33.11, 29.79, 29.70, 27.76, 27.59; HRMS: Calcd for $C_{48}H_{51}N_6O_4$ [M+H^+]: 775.3966; found: 775.3970.



33

R_f = 0.3, 20% acetone in Hex

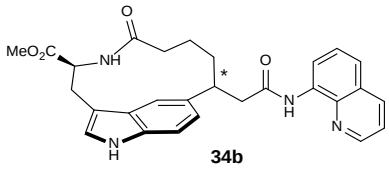
Compound **33** (3:1 mixture of diastereomeric isomers) was isolated in 64% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.90 (s, 0.69H), 9.79 (s, 0.22H), 8.86-8.69 (m, 2H), 8.21-8.08 (m, 1H), 7.93-7.79 (m, 2H), 7.77-7.66 (m, 2H), 7.58-7.41 (m, 3H), 7.36 (d, *J* = 9.1 Hz, 1H), 7.32-7.28 (m, 1H), 7.24-7.13 (m, 2H), 5.02 (dd, *J* = 11.3, 6.4 Hz, 0.73H), 4.72 (dd, *J* = 12.5, 5.0 Hz, 0.23H), 4.55 (t, *J* = 11.2 Hz, 0.23H), 4.42-4.38 (m, 0.73H), 4.23-4.08 (m, 1H), 3.69-3.41 (m, 1.84H), 3.25 (dd, *J* = 13.2, 6.4 Hz, 1H), 3.10 (dd, *J* = 14.7, 6.7 Hz, 1H), 2.99-2.90 (m, 0.27H), 2.88-2.83 (m, 1H), 2.20-2.16 (m, 1H), 1.90-1.69 (m, 2H), 1.65-1.56 (m, 1H), 1.50-1.46 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 170.27, 170.13, 169.86, 169.50, 167.95, 167.86, 148.27, 142.61, 138.37, 136.91, 136.48, 136.36, 134.43, 134.33, 131.85, 131.80, 131.25, 130.70, 129.20, 128.00, 127.49, 127.26, 125.39, 123.61, 121.74, 121.67, 116.61, 116.51, 67.36, 66.55, 56.91, 55.77, 45.83, 43.06, 42.49, 41.14, 36.56, 35.41, 34.83, 34.19, 24.69; HRMS: Calcd for $C_{32}H_{28}N_3O_5$ [M+H$^+$]: 534.2023; found: 534.2028.



34a

R_f = 0.3, 20% acetone in Hex

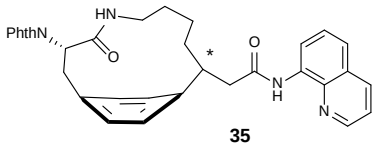
Compound **34a** was isolated in 44% yield under the **general conditions E**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.75 (s, 1H), 8.81 (dd, *J* = 7.4, 1.1 Hz, 1H), 8.70 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.24 (s, 1H), 8.11 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.55-7.45 (m, 3H), 7.39 (dd, *J* = 8.3, 4.2 Hz, 1H), 7.16 (d, *J* = 8.3 Hz, 1H), 7.07 (dd, *J* = 8.3, 1.3 Hz, 1H), 6.82 (d, *J* = 2.1 Hz, 1H), 5.80 (d, *J* = 6.8 Hz, 1H), 5.02-4.93 (m, 1H), 3.83 (dd, *J* = 14.6, 5.2 Hz, 1H), 3.75 (s, 3H), 3.46-3.29 (m, 1H), 3.23 (dd, *J* = 14.7, 2.2 Hz, 1H), 2.92 (dd, *J* = 14.4, 6.3 Hz, 1H), 2.73 (dd, *J* = 14.4, 8.2 Hz, 1H), 2.20-2.07 (m, 4H), 1.81-1.71 (m, 1H), 1.20-1.10 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.98, 172.03, 170.87, 148.24, 138.35, 136.30, 134.57, 134.50, 133.26, 129.46, 127.94, 127.38, 124.28, 121.77, 121.66, 121.58, 118.26, 116.47, 111.05, 110.42, 55.12, 52.53, 48.08, 40.82, 37.33, 31.69, 26.52, 22.64; HRMS: Calcd for $C_{28}H_{28}N_4NaO_4$ [M+Na$^+$]: 507.2003; found: 507.2000.



34b

R_f = 0.2, 20% acetone in Hex

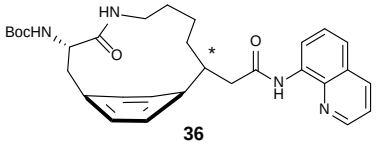
Compound **34b** was isolated in 43% yield under the **general conditions E**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.87 (s, 1H), 8.79 (d, *J* = 7.3 Hz, 1H), 8.77-8.68 (m, 1H), 8.17 (s, 1H), 8.13 (d, *J* = 8.3 Hz, 1H), 7.58 (s, 1H), 7.56-7.45 (m, 2H), 7.45-7.37 (m, 1H), 7.20 (d, *J* = 8.3 Hz, 1H), 7.07 (d, *J* = 8.4 Hz, 1H), 6.88 (s, 1H), 5.80 (s, 1H), 4.64 (s, 1H), 3.78 (s, 3H), 3.69-3.49 (m, 2H), 3.28 (dd, *J* = 14.5, 5.0 Hz, 1H), 3.10 (dd, *J* = 14.5, 6.3 Hz, 1H), 2.85-2.70 (m, 1H), 2.32-2.17 (m, 2H), 1.87-1.56 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.55, 172.09, 170.92, 148.27, 138.45, 136.41, 134.87, 134.58, 129.10, 128.02, 127.50, 122.18, 121.70, 121.58, 119.57, 116.61, 111.47, 55.40, 53.90, 52.57, 37.14, 29.82, 29.44, 27.09, 21.28; HRMS: Calcd for $C_{28}H_{28}N_4NaO_4$ [M+Na^+]: 507.2003; found: 507.1998.



35

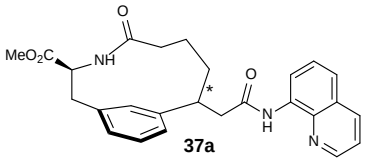
R_f = 0.3, 20% acetone in Hex

Compound **35** (4:1 mixture of diastereomeric isomers) was isolated in 52% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.96 (s, 0.80H), 9.87 (s, 0.18H), 8.89-8.68 (m, 2H), 8.16-8.13 (m, 1H), 7.82 (dd, *J* = 5.3, 3.0 Hz, 2H), 7.68 (dd, *J* = 5.4, 2.9 Hz, 2H), 7.55-7.43 (m, 3H), 7.41-7.30 (m, 4H), 4.66-4.51 (m, 1H), 4.47-4.40 (m, 0.18H), 4.33-4.25 (m, 1.85H), 3.81-3.67 (m, 0.85H), 3.26-3.22 (m, 1H), 3.15-3.03 (m, 1H), 2.97-2.72 (m, 2H), 2.69-2.46 (m, 1H), 1.75-1.69 (m, 1H), 1.60-1.54 (m, 1H), 1.20-1.14 (m, 2H), 1.05-0.91 (m, 1H), 0.75-0.59 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 170.19, 170.13, 168.35, 168.13, 148.27, 148.21, 142.36, 141.91, 138.35, 136.50, 136.41, 136.37, 136.10, 134.41, 134.15, 132.68, 131.85, 131.46, 128.00, 127.64, 127.50, 127.41, 127.30, 127.23, 123.44, 121.74, 121.67, 121.61, 116.60, 58.65, 58.55, 43.92, 42.77, 40.84, 39.94, 37.63, 34.82, 33.18, 27.59, 21.42, 18.82; HRMS: Calcd for $C_{33}H_{30}N_4NaO_4$ [M+Na^+]: 569.2159; found: 569.2151.



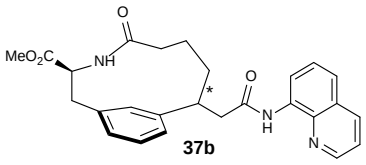
36 R_f = 0.4, 20% acetone in Hex

Compound **36** (1.4:1 mixture of diastereomeric isomers) was isolated in 63% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.93 (s, 0.58H), 9.86 (s, 0.42H), 8.84-8.69 (m, 2H), 8.14 (td, *J* = 8.2, 1.6 Hz, 1H), 7.56-7.39 (m, 3H), 7.36-7.23 (m, 3H), 7.10 (dd, *J* = 20.9, 7.8 Hz, 1H), 5.52-5.34 (m, 1H), 4.57-4.56 (m, 0.49H), 4.48-4.42 (m, 0.63H), 4.07-3.92 (m, 1H), 3.82-3.55 (m, 1H), 3.34 (dd, *J* = 12.3, 6.1 Hz, 1H), 3.21-2.96 (m, 2H), 2.96-2.57 (m, 3.50H), 2.41-2.29 (m, 0.59H), 2.05-2.01 (m, 1H), 1.73-1.55 (m, 1H), 1.44-1.42 (m, 10H), 1.12-1.08 (m, 1H), 0.70-0.68 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.01, 170.95, 170.32, 170.25, 155.25, 148.28, 148.22, 141.94, 138.40, 136.55, 136.48, 136.17, 134.43, 132.49, 131.55, 131.01, 128.05, 128.01, 127.53, 127.48, 127.40, 127.17, 127.09, 121.76, 121.72, 121.65, 116.68, 116.62, 80.04, 58.04, 43.93, 42.75, 40.28, 37.60, 37.55, 34.88, 28.45, 21.35; HRMS: Calcd for $C_{30}H_{36}N_4NaO_4$ [M+Na^+]: 539.2629; found: 539.2625.



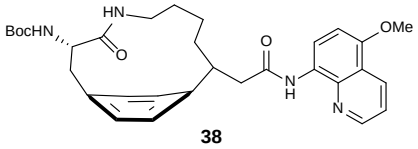
37a R_f = 0.4, 20% acetone in Hex

Compound **37a** was isolated in 38% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.75 (s, 1H), 8.86-8.69 (m, 2H), 8.13 (dd, *J* = 8.2, 1.1 Hz, 1H), 7.51-7.44 (m, 3H), 7.22-7.06 (m, 3H), 6.75 (d, *J* = 3.9 Hz, 1H), 5.35 (d, *J* = 7.0 Hz, 1H), 4.79-4.74 (m, 1H), 3.82 (s, 3H), 3.60-3.55 (m, 1H), 3.30-3.25 (m, 1H), 3.06 (dd, *J* = 13.4, 2.6 Hz, 1H), 2.89 (dd, *J* = 14.6, 7.0 Hz, 1H), 2.76 (dd, *J* = 14.6, 7.7 Hz, 1H), 2.28-2.11 (m, 2H), 2.03 (td, *J* = 13.3, 2.4 Hz, 1H), 1.97-1.86 (m, 1H), 1.7-1.75 (m, 2H), 0.94-0.85 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.11, 172.41, 170.27, 148.29, 142.86, 138.37, 136.40, 135.51, 134.46, 130.62, 128.88, 128.61, 127.99, 127.45, 125.76, 121.73, 121.63, 116.54, 53.00, 52.87, 47.19, 45.94, 41.41, 38.19, 36.54, 33.09, 23.27; HRMS: Calcd for $C_{26}H_{27}N_3NaO_4$ [M+Na^+]: 468.1894; found: 468.1889.



37b R_f = 0.3, 20% acetone in Hex

Compound **37b** was isolated in 37% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.74 (s, 1H), 8.75-8.71 (m, 2H), 8.11 (dd, *J* = 8.2, 1.4 Hz, 1H), 7.56-7.44 (m, 2H), 7.40 (dd, *J* = 8.2, 4.2 Hz, 1H), 7.23-7.14 (m, 2H), 7.14-7.00 (m, 2H), 6.38 (d, *J* = 9.7 Hz, 1H), 4.66-4.60 (m, 1H), 3.82 (s, 3H), 3.31-3.23 (m, 2H), 2.84 (dd, *J* = 14.4, 7.2 Hz, 1H), 2.73 (dd, *J* = 14.4, 7.6 Hz, 1H), 2.57 (t, *J* = 12.0 Hz, 1H), 2.39-2.26 (m, 1H), 2.23-2.12 (m, 1H), 1.92-1.80 (m, 2H), 1.79-1.69 (m, 1H), 1.32-1.25 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.64, 172.53, 170.10, 148.11, 142.04, 138.28, 136.39, 136.35, 134.35, 129.21, 128.91, 127.93, 127.41, 127.31, 121.64, 121.59, 116.55, 53.74, 52.65, 46.50, 43.02, 40.06, 39.41, 36.32, 22.01; HRMS: Calcd for $C_{26}H_{27}N_3NaO_4$ [M+Na$^+$]: 468.1894; found: 468.1884.



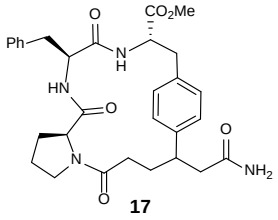
38 R_f = 0.4, 20% acetone in Hex

Compound **38** (1:1 mixture of diastereomeric isomers) was isolated in 66% yield under the **general conditions D**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.67 (s, 0.49H), 9.60 (s, 0.48H), 8.79 (dd, *J* = 4.2, 1.7 Hz, 0.50H), 8.76 (dd, *J* = 4.2, 1.7 Hz, 0.48H), 8.65 (dd, *J* = 10.9, 8.6 Hz, 1H), 8.54 (td, *J* = 8.3, 1.7 Hz, 1H), 7.44-7.39 (m, 1H), 7.31 (d, *J* = 7.9 Hz, 0.53H), 7.29-7.21 (m, 3.57H), 7.12 (d, *J* = 8.0 Hz, 0.53H), 7.07 (d, *J* = 7.7 Hz, 0.54H), 6.79 (t, *J* = 8.4 Hz, 1H), 5.43-5.36 (m, 1H), 4.58 (s, 0.47H), 4.44 (s, 0.44H), 4.07-3.89 (m, 4H), 3.65 (s, 0.47H), 3.34 (dd, *J* = 12.3, 6.1 Hz, 1H), 3.20-3.11 (m, 0.48H), 3.06-2.97 (m, 1H), 2.92-2.77 (m, 1H), 2.60 (t, *J* = 6.2 Hz, 1H), 2.40-2.29 (m, 0.53H), 2.09-2.06 (m, 0.57H), 1.72-1.50 (m, 1H), 1.42 (d, *J* = 2.1 Hz, 9H), 1.31-1.28 (m, 1H), 1.13-0.94 (m, 2H), 0.78-0.61 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 170.93, 170.87, 169.80, 169.74, 155.20, 150.38, 150.33, 148.71, 148.65, 142.03, 139.11, 136.13, 132.44, 131.51, 131.40, 131.33, 130.97, 127.92, 127.90, 127.40, 127.13, 127.08, 120.83, 120.79, 120.53, 120.47, 116.79, 116.72, 104.40, 104.36, 80.07, 79.92, 58.00, 55.87, 55.85, 43.83, 42.79, 40.29, 37.55, 37.51, 34.85,

29.63, 28.45, 21.36.

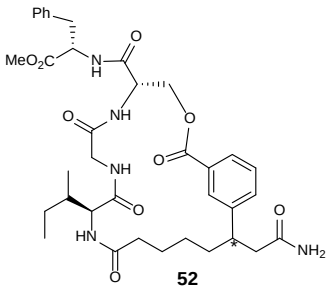
10. Deprotection of MQ group of cyclized peptides.

General procedure for deprotection of MQ group: The cyclic peptide (30 μmol, 1.0 equiv) was dissolved in a mixture of CH_3CN and H_2O (5/1, 300 μL) at room temperature. Ceric ammonium nitrate (CAN, 89 mg, 0.15 mmol, 5.0 equiv) was added, and the reaction mixture was heated at 50 ^oC for 12 hours. After being cooled to room temperature, the mixture was concentrated *in vacuo*. The resulting residue was purified by silica gel flash chromatography to give desired product.



17 R_f = 0.3, 5% CH_3OH in DCM

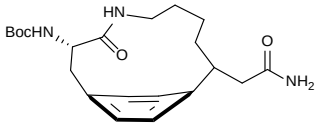
Compound **17** (1:1 mixture of diastereomeric isomers) was isolated in 71% yield (12% of compound **16** was recovered) under the **general conditions**. ^1H NMR (400 MHz, MeOD) δ 7.31 (d, *J* = 8.0 Hz, 0.53H), 7.23-6.99 (m, 7.55H), 6.95 (d, *J* = 6.6 Hz, 0.50H), 6.89 (d, *J* = 8.5 Hz, 0.50H) 4.81-4.70 (m, 2H), 4.16-4.10 (m, 1H), 3.77 (s, 1.51H), 3.75 (s, 1.43H), 3.40-3.30 (m, 3.5H), 3.03-2.82 (m, 2.5H), 2.62-2.47 (m, 3H), 2.18-2.01 (m, 1.5H), 1.88-1.65 (m, 2H), 1.57-1.38 (m, 4.5H); ^{13}C NMR (101 MHz, MeOD) δ 178.17, 176.35, 175.88, 174.38, 174.26, 173.70, 173.65, 172.81, 172.57, 143.65, 142.89, 138.87, 138.50, 137.47, 137.39, 132.54, 132.09, 131.80, 131.75, 131.43, 131.26, 131.08, 130.21, 130.12, 128.70, 128.68, 127.02, 126.69, 64.02, 63.74, 55.69, 55.48, 55.00, 54.91, 53.86, 48.77, 43.70, 43.49, 42.63, 41.71, 41.18, 40.27, 40.12, 39.86, 34.48, 33.86, 33.75, 33.45, 33.15, 31.81, 31.61, 24.47, 24.14; HRMS: Calcd for $C_{30}H_{36}N_4NaO_6$ [$M+Na^+$]: 571.2527; found: 571.2519.



52

R_f = 0.25, 5% CH_3OH in DCM

Compound **52** (1:1 mixture of diastereomeric isomers) was isolated in 45% yield under the **general conditions**. ^{1}H NMR (400 MHz, MeOD) δ 7.78 (d, *J* = 17.7 Hz, 1H), 7.75-7.68 (m, 1H), 7.42-7.40 (m, 1H), 7.34-7.31 (m, 1H), 7.19-7.07 (m, 5H), 4.77-4.72 (m, 2H), 4.64 (dd, *J* = 8.8, 5.7 Hz, 0.54H), 4.58 (dd, *J* = 8.7, 5.7 Hz, 0.50H), 4.52-4.40 (m, 1.58H), 4.34 (dd, *J* = 11.5, 6.7 Hz, 0.55H), 4.01 (dd, *J* = 23.0, 6.1 Hz, 1H), 3.86 (dd, *J* = 16.9, 5.8 Hz, 1H), 3.73 (d, *J* = 16.9 Hz, 0.57H), 3.61 (d, *J* = 16.9 Hz, 0.55H), 3.54 (s, 1.38H), 3.49 (s, 1.71H), 3.13-3.05 (m, 2H), 2.99-2.91 (m, 1H), 2.50-2.33 (m, 2H), 2.16-2.03 (m, 2H), 1.77-1.73 (m, 1H), 1.68-1.59 (m, 2H), 1.38-1.28 (m, 1H), 1.11-0.96 (m, 3H), 0.82-0.76 (m, 6H); ^{13}C NMR (101 MHz, MeOD) δ 177.24, 177.14, 176.67, 176.57, 174.24, 173.15, 171.49, 170.44, 170.31, 167.76, 145.74, 145.62, 138.14, 137.99, 131.41, 130.27, 129.54, 128.90, 127.89, 65.44, 65.14, 59.99, 59.80, 55.44, 53.52, 52.87, 44.10, 43.83, 43.62, 43.32, 38.19, 37.82, 36.18, 35.83, 30.68, 30.57, 28.10, 27.13, 26.09, 25.92, 16.01, 11.80, 11.73.



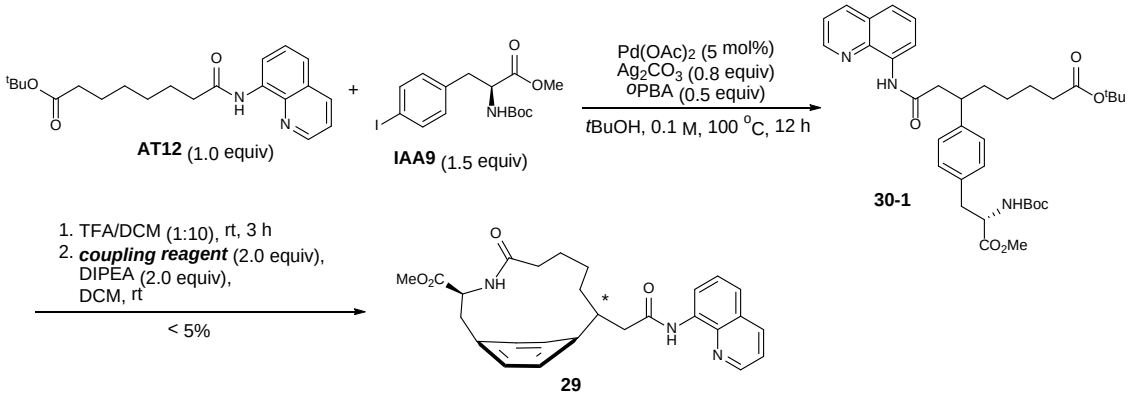
39

R_f = 0.4, 5% CH_3OH in DCM

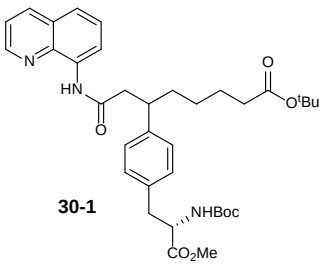
Compound **39** (1:1 mixture of diastereomeric isomers) was isolated in 48% yield under the **general conditions**. ^{1}H NMR (400 MHz, MeOD) δ 7.28-7.10 (m, 3H), 7.04-6.99 (m, 1H), 4.10-3.84 (m, 1H), 3.41-3.29 (m, 1H), 3.19-3.17 (m, 1H), 3.07-2.84 (m, 1H), 2.77-2.64 (m, 2H), 2.60-2.48 (m, 1H), 2.26-2.12 (m, 1H), 1.93-1.90 (m, 1H), 1.64-1.49 (m, 1H), 1.43 (s, 9H), 1.32-1.30 (m, 1H), 1.25-1.15 (m, 1H), 0.97-0.84 (m, 2H), 0.66-0.50 (m, 1H); ^{13}C NMR (101 MHz, MeOD) δ 177.72, 177.62, 173.54, 173.46, 157.29, 157.19, 142.96, 142.73, 136.55, 136.30, 133.36, 132.04, 131.43, 130.39, 129.74, 129.00, 128.06, 127.79, 80.63, 80.49, 58.77, 44.02,

42.16, 41.74, 40.20, 39.83, 39.51, 38.87, 38.82, 36.00, 34.66, 31.36, 29.69, 28.68, 22.62, 20.84, 20.79.

11. Cyclization by macrolactamization



Supplementary Figure 45



R_f = 0.5, 20% acetone in Hex

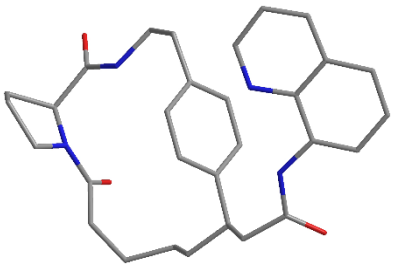
Compound **30-1** was prepared by AQ directed palladium catalyzed intermolecular β arylation reaction under the **general conditions F** in 73% yield. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.68 (s, 1H), 8.76 (s, 1H), 8.71 (d, *J* = 6.8 Hz, 1H), 8.12 (d, *J* = 8.2 Hz, 1H), 7.53-7.37 (m, 3H), 7.19 (d, *J* = 7.3 Hz, 2H), 7.03 (d, *J* = 7.3 Hz, 2H), 4.95 (d, *J* = 6.9 Hz, 1H), 4.52 (d, *J* = 6.4 Hz, 1H), 3.58 (s, 3H), 3.26 (s, 1H), 3.07-2.90 (m, 2H), 2.89-2.71 (m, 2H), 2.12 (t, *J* = 7.4 Hz, 2H), 1.84-1.74 (m, 1H), 1.74-1.46 (m, 4H), 1.38 (d, *J* = 4.8 Hz, 18H), 1.19-1.12 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.16, 172.47, 170.30, 155.16, 148.18, 142.98, 138.36, 136.41, 134.48, 134.17, 129.58, 127.98, 127.78, 127.47, 121.67, 121.51, 116.52, 80.02, 54.51, 52.15, 45.79, 42.15, 38.14, 35.89, 35.56, 28.39, 28.16, 27.02, 25.17.

The Boc and t-butyl ester group of **30-1** was removed with 50% TFA/DCM at rt. The resulting crude intermediate in DMF (25 mM) was treated with several commonly

used macrolactamilzation reagents, including HATU/ DIPEA (with or without HOBt), PyBOP/DIPEA, DPPA/$NaHCO_3$, and FDPP/DIPEA at rt. After 24 hours, only trace amount (<5%) of compound **29** was obtained based on LC-MS analysis under all the conditions tested.

12. X-ray crystallographic data

12.1 X-ray crystallographic data for compound **3a**



Supplementary Figure 46. X-ray structure of compound **3a**

3a and **3b**, two diastereomers of compound **3**, were separated by silica gel chromatography. Single crystals for X-ray studies were grown by slow evaporation of a solution of compound **3a** in a mixture of acetone and hexane at room temperature. The X-ray data of **3a** is deposited in the Cambridge Crystallographic Data Centre with a number of CCDC 1526698.

Supplementary Table 2 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent Isotropic Displacement Parameters ($Å^2 \times 10^3$) for compound **3a**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	***x***	***y***	***z***	**U(eq)**
O1	-2361(4)	-1917(2)	-5125(4)	29.4(9)
N2	-3260(4)	-720(3)	-4424(4)	24.5(10)
N3	-6679(4)	2121(3)	-806(4)	24.1(11)

N4	-3682(4)	2247(3)	-299(4)	25.4(11)
N5	-5938(4)	-626(3)	-7090(4)	21.7(10)
O6	-8863(4)	1728(3)	-547(4)	38.7(11)
C7	-3966(5)	2346(3)	912(5)	21.7(12)
O8	-7423(4)	-1646(3)	-6639(4)	31.5(10)
C9	-2791(5)	2491(4)	2337(5)	23.5(12)
C11	-6015(5)	-24(4)	-1970(5)	26.9(13)
C12	-5946(5)	2391(4)	1813(6)	25.9(12)
C13	-2060(5)	-733(4)	-2895(5)	27.3(13)
C14	-6913(5)	609(3)	-2974(5)	19.6(11)
C15	-8660(5)	732(3)	-3381(6)	23.4(12)
C16	-4706(5)	-1259(3)	-6958(5)	19.7(12)
C17	-3735(5)	340(4)	-2348(5)	21.3(12)
C18	-9949(5)	-487(4)	-7135(5)	30.0(14)
C19	-6200(5)	1118(3)	-3655(6)	23.6(13)
C20	-8212(5)	1841(3)	-1350(6)	24.2(13)
C21	-3364(5)	-1330(3)	-5418(6)	21.3(12)
C22	-4617(5)	988(3)	-3330(5)	22.5(12)
C23	-2074(5)	135(3)	-2126(6)	25.8(13)
C24	-7289(6)	-899(4)	-7029(6)	24.8(13)
C25	-9001(5)	1663(3)	-2972(5)	23.4(12)
C26	-927(5)	2425(4)	1325(6)	32.1(14)
C27	-4120(6)	-893(3)	-8028(6)	25.9(13)
C28	-1212(5)	2536(4)	2520(6)	32.0(14)
C29	-5808(5)	210(4)	-7787(6)	31.4(14)
C30	-4441(5)	-155(4)	-1655(6)	26.4(13)
C31	-9648(5)	552(4)	-5035(6)	27.0(13)
C32	-2185(5)	2275(4)	-64(6)	29.6(14)

C33	-4256(5)	103(3)	-7906(6)	28.1(13)
C34	-9529(5)	-401(4)	-5491(6)	28.7(14)
C35	-4737(6)	2545(3)	3258(6)	28.8(13)
C36	-3183(6)	2603(3)	3532(6)	29.6(13)
C37	-8606(5)	-211(4)	-7498(6)	30.2(14)
C	-5592(5)	2284(3)	661(5)	21.9(12)

Supplementary Table 3 Anisotropic Displacement Parameters ($Å^2 \times 10^3$) for compound **3a**. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	**U_{11}**	**U_{22}**	**U_{33}**	**U_{23}**	**U_{13}**	**U_{12}**
O1	23.0(17)	19(2)	45(3)	-5.4(18)	13.4(18)	6.7(17)
N2	21(2)	19(3)	30(3)	-2(2)	8(2)	5(2)
N3	19(2)	29(3)	29(3)	0(2)	14.8(19)	-4(2)
N4	22(2)	24(3)	32(3)	-4(2)	13(2)	-4(2)
N5	18(2)	17(3)	29(3)	1(2)	9.4(19)	-2(2)
O6	26.1(19)	55(3)	42(3)	-8(2)	21.5(19)	-9(2)
C7	25(2)	13(3)	29(3)	-3(2)	14(2)	-2(3)
O8	29(2)	27(2)	42(3)	5(2)	19.5(19)	-2.9(19)
C9	31(3)	10(3)	25(3)	0(3)	8(2)	3(3)
C11	22(2)	33(4)	30(3)	-1(3)	15(2)	-4(3)
C12	25(3)	16(3)	39(3)	-5(3)	16(2)	3(3)
C13	20(2)	30(4)	30(3)	-1(3)	9(2)	4(3)
C14	19(2)	17(3)	25(3)	-3(3)	12(2)	-3(2)
C15	19(2)	19(3)	36(3)	-4(3)	16(2)	-3(2)
C16	16(2)	16(3)	26(3)	-2(2)	8(2)	-1(2)
C17	17(2)	24(3)	20(3)	-5(3)	5(2)	1(2)
C18	17(2)	35(4)	36(4)	-4(3)	10(2)	-2(3)

C19	17(2)	19(3)	34(3)	2(3)	10(2)	6(2)
C20	20(3)	22(3)	36(3)	0(3)	18(3)	2(3)
C21	19(2)	16(3)	35(3)	-3(3)	18(2)	-4(3)
C22	24(3)	16(3)	28(3)	-5(3)	12(2)	-8(2)
C23	17(2)	27(3)	30(3)	-2(3)	7(2)	0(2)
C24	22(3)	31(4)	20(3)	1(3)	8(2)	-2(3)
C25	18(2)	23(3)	33(3)	-2(3)	14(2)	0(2)
C26	19(2)	35(4)	37(4)	-3(3)	7(3)	-6(3)
C27	24(3)	21(3)	35(4)	-3(3)	15(3)	-1(3)
C28	27(3)	25(3)	37(4)	-1(3)	7(3)	-4(3)
C29	27(3)	23(3)	45(4)	11(3)	16(3)	7(3)
C30	26(3)	24(3)	27(3)	3(3)	9(2)	5(3)
C31	17(2)	31(3)	35(3)	-4(3)	13(2)	-2(3)
C32	25(3)	30(4)	37(4)	-3(3)	17(3)	-4(3)
C33	26(3)	23(3)	36(3)	2(3)	15(2)	-4(3)
C34	19(2)	28(4)	41(4)	-7(3)	15(2)	-8(3)
C35	40(3)	17(3)	34(4)	-2(3)	21(3)	1(3)
C36	36(3)	21(3)	25(3)	-4(3)	7(3)	-2(3)
C37	22(2)	34(4)	33(3)	5(3)	10(2)	6(3)
C	26(3)	10(3)	30(3)	2(3)	13(2)	2(2)

Supplementary Table 4 Bond Lengths for compound **3a**

Atom	**Atom**	**Length/Å**	**Atom**	**Atom**	**Length/Å**
O1	C21	1.238(6)	C14	C15	1.529(6)
N2	C13	1.458(6)	C14	C19	1.390(6)
N2	C21	1.337(6)	C15	C25	1.545(7)
N3	C20	1.372(5)	C15	C31	1.536(6)
N3	C	1.403(6)	C16	C21	1.516(6)

N4	C7	1.372(5)	C16	C27	1.520(6)
N4	C32	1.329(5)	C17	C22	1.384(7)
N5	C16	1.471(6)	C17	C23	1.518(6)
N5	C24	1.371(6)	C17	C30	1.384(7)
N5	C29	1.481(6)	C18	C34	1.532(6)
O6	C20	1.228(5)	C18	C37	1.529(6)
C7	C9	1.394(6)	C19	C22	1.398(6)
C7	C	1.447(6)	C20	C25	1.494(7)
O8	C24	1.224(6)	C24	C37	1.532(7)
C9	C28	1.424(6)	C26	C28	1.358(6)
C9	C36	1.421(6)	C26	C32	1.401(6)
C11	C14	1.383(7)	C27	C33	1.527(7)
C11	C30	1.393(6)	C29	C33	1.534(6)
C12	C35	1.421(7)	C31	C34	1.538(7)
C12	C	1.355(6)	C35	C36	1.374(6)
C13	C23	1.531(7)			

Supplementary Table 5 Bond Angles for compound **3a**

Atom	**Atom**	**Atom**	**Angle/°**	**Atom**	**Atom**	**Atom**	**Angle/°**
C21	N2	C13	123.4(4)	C14	C19	C22	120.6(5)
C20	N3	C	129.0(4)	N3	C20	C25	115.0(4)
C32	N4	C7	116.8(4)	O6	C20	N3	121.9(5)
C16	N5	C29	112.0(3)	O6	C20	C25	123.1(4)
C24	N5	C16	121.0(4)	O1	C21	N2	121.6(5)
C24	N5	C29	123.8(4)	O1	C21	C16	120.2(4)
N4	C7	C9	123.9(4)	N2	C21	C16	118.2(4)
N4	C7	C	116.7(4)	C17	C22	C19	120.8(4)
C9	C7	C	119.5(4)	C17	C23	C13	110.0(4)

C7	C9	C28	117.0(4)	N5	C24	C37	115.2(5)
C7	C9	C36	120.6(4)	O8	C24	N5	121.7(5)
C36	C9	C28	122.4(5)	O8	C24	C37	123.1(4)
C14	C11	C30	121.0(5)	C20	C25	C15	113.3(4)
C	C12	C35	120.7(4)	C28	C26	C32	119.8(4)
N2	C13	C23	110.4(4)	C16	C27	C33	103.6(4)
C11	C14	C15	121.5(4)	C26	C28	C9	119.2(5)
C11	C14	C19	118.3(4)	N5	C29	C33	103.3(4)
C19	C14	C15	120.2(5)	C17	C30	C11	120.9(5)
C14	C15	C25	111.6(4)	C15	C31	C34	113.8(4)
C14	C15	C31	109.7(4)	N4	C32	C26	123.4(5)
C31	C15	C25	110.8(4)	C27	C33	C29	103.2(4)
N5	C16	C21	114.3(4)	C18	C34	C31	112.7(5)
N5	C16	C27	102.7(4)	C36	C35	C12	121.5(5)
C21	C16	C27	110.6(4)	C35	C36	C9	118.6(5)
C22	C17	C23	120.6(4)	C18	C37	C24	112.8(5)
C30	C17	C22	118.4(4)	N3	C	C7	115.0(4)
C30	C17	C23	120.9(5)	C12	C	N3	125.8(4)
C37	C18	C34	113.1(4)	C12	C	C7	119.2(5)

Supplementary Table 6 Torsion Angles for compound **3a**.

A	**B**	**C**	**D**	**Angle/°**	**A**	**B**	**C**	**D**	**Angle/°**
N2	C13	C23	C17	51.4(5)	C20	N3	C	C12	-16.2(9)
N3	C20	C25	C15	84.1(5)	C21	N2	C13	C23	169.7(4)
N4	C7	C9	C28	-0.2(8)	C21	C16	C27	C33	-87.9(5)
N4	C7	C9	C36	178.8(5)	C22	C17	C23	C13	-105.1(5)
N4	C7	C	N3	0.6(7)	C22	C17	C30	C11	1.9(7)
N4	C7	C	C12	-178.9(5)	C23	C17	C22	C19	173.2(4)

N5	C16	C21	O1	170.9(4)	C23	C17	C30	C11	-173.6(5)
N5	C16	C21	N2	-12.2(6)	C24	N5	C16	C21	-97.1(5)
N5	C16	C27	C33	34.4(5)	C24	N5	C16	C27	143.2(4)
N5	C24	C37	C18	-169.1(4)	C24	N5	C29	C33	-166.7(4)
N5	C29	C33	C27	28.3(5)	C25	C15	C31	C34	-172.8(4)
O6	C20	C25	C15	-94.3(5)	C27	C16	C21	O1	-73.9(6)
C7	N4	C32	C26	-2.0(8)	C27	C16	C21	N2	103.0(5)
C7	C9	C28	C26	-0.8(7)	C28	C9	C36	C35	-179.6(5)
C7	C9	C36	C35	1.5(8)	C28	C26	C32	N4	1.1(9)
O8	C24	C37	C18	11.5(7)	C29	N5	C16	C21	102.8(5)
C9	C7	C	N3	-178.9(5)	C29	N5	C16	C27	-17.0(5)
C9	C7	C	C12	1.6(8)	C29	N5	C24	O8	169.3(5)
C11	C14	C15	C25	118.6(5)	C29	N5	C24	C37	-10.1(7)
C11	C14	C15	C31	-118.2(5)	C30	C11	C14	C15	177.2(5)
C11	C14	C19	C22	0.2(7)	C30	C11	C14	C19	-0.5(8)
C12	C35	C36	C9	-1.1(8)	C30	C17	C22	C19	-2.3(7)
C13	N2	C21	O1	-5.4(7)	C30	C17	C23	C13	70.3(6)
C13	N2	C21	C16	177.8(4)	C31	C15	C25	C20	173.6(3)
C14	C11	C30	C17	-0.5(8)	C32	N4	C7	C9	1.6(8)
C14	C15	C25	C20	-63.9(5)	C32	N4	C7	C	-177.9(5)
C14	C15	C31	C34	63.5(5)	C32	C26	C28	C9	0.4(8)
C14	C19	C22	C17	1.3(7)	C34	C18	C37	C24	75.3(6)
C15	C14	C19	C22	-177.6(4)	C35	C12	C	N3	179.4(5)
C15	C31	C34	C18	-157.5(3)	C35	C12	C	C7	-1.2(8)
C16	N5	C24	O8	11.5(7)	C36	C9	C28	C26	-179.7(5)
C16	N5	C24	C37	-167.9(4)	C37	C18	C34	C31	79.2(5)
C16	N5	C29	C33	-7.1(5)	C	N3	C20	O6	3.1(8)
C16	C27	C33	C29	-39.3(5)	C	N3	C20	C25	-175.3(5)

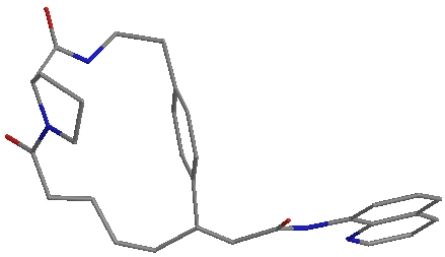
C19	C14	C15	C25	-63.7(6)	C	C7	C9	C28	179.3(5)
C19	C14	C15	C31	59.5(6)	C	C7	C9	C36	-1.8(7)
C20	N3	C	C7	164.3(5)	C	C12	C35	C36	1.0(8)

Supplementary Table 7 Hydrogen Atom Coordinates ($Å \times 10^4$) and Isotropic Displacement Parameters ($Å^2 \times 10^3$) for compound **3a**

Atom	***x***	***y***	***z***	**U(eq)**
H2	-3953	-289	-4707	29
H3	-6328	2210	-1470	29
H11	-6479	-375	-1488	32
H12	-7013	2363	1653	31
H13A	-1010	-821	-2866	33
H13B	-2262	-1230	-2367	33
H15	-8962	291	-2815	28
H16	-5186	-1853	-7300	24
H18A	-10234	-1107	-7443	36
H18B	-10883	-117	-7710	36
H19	-6793	1558	-4346	28
H22	-4141	1350	-3789	27
H23A	-1363	87	-1058	31
H23B	-1686	618	-2538	31
H25A	-8644	2106	-3478	28
H25B	-10153	1733	-3338	28
H26	121	2450	1431	39
H27A	-4785	-1099	-9046	31
H27B	-3015	-1070	-7737	31
H28	-368	2641	3466	38
H29A	-5765	722	-7165	38

H29B	-6708	283	-8774	38
H30	-3844	-591	-956	32
H31A	-9301	956	-5604	32
H31B	-10765	685	-5301	32
H32	-1956	2189	-881	36
H33A	-4301	407	-8791	34
H33B	-3357	338	-7019	34
H34A	-8441	-618	-4902	34
H34B	-10246	-779	-5263	34
H35	-5010	2609	4052	35
H36	-2386	2717	4501	35
H37A	-8158	353	-6995	36
H37B	-9033	-110	-8575	36

12.2 X-ray crystallographic data for compound **3b**



Supplementary Figure 47. X-ray structure of compound **3b**

Single crystals for X-ray studies were grown by slow evaporation of a solution of compound **3b** in a mixture of acetone and hexane at room temperature. The X-ray data of **3b** is deposited in the Cambridge Crystallographic Data Centre with a number of CCDC 1526699.

Supplementary Table 8 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent

Isotropic Displacement Parameters ($Å^2 \times 10^3$) for compound **3b**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	***x***	***y***	***z***	**U(eq)**
N1	5005(7)	88(2)	1659.8(18)	22(1)
O26	1808(6)	-311.2(19)	1775.1(17)	31.2(10)
N28	9867(7)	-6372(2)	1260.6(17)	22.9(10)
O23	12131(6)	-3741.3(18)	1714.1(17)	30.2(10)
N14	4741(8)	-502(2)	535.5(18)	29.1(12)
C8	5008(9)	-1619(2)	2218(2)	21.4(13)
C12	8157(8)	-2671(2)	1524(2)	14.9(11)
O25	4028(7)	671.4(19)	137.0(16)	40.4(12)
C33	14939(9)	-6214(3)	588(2)	27.0(13)
C13	4392(9)	266(3)	568(2)	24.3(13)
C6	8971(9)	-1646(3)	833(2)	25.1(13)
C11	6172(9)	-2070(3)	2690(2)	25.5(14)
C7	6186(9)	-2466(3)	641(2)	24.8(14)
N24	10618(7)	-4898(2)	1520.9(17)	23.6(11)
C15	4514(9)	635(2)	1182(2)	22.0(12)
C9	9375(8)	-2053(3)	1352(2)	21.5(12)
C31	13977(9)	-5011(3)	1063(2)	25.1(13)
C20	8443(8)	-3056(2)	2122(2)	19.2(12)
C4	7354(9)	-1840(3)	470(2)	22.0(13)
C30	12136(9)	-5309(3)	1222(2)	22.3(13)
C16	4820(10)	-952(3)	-8(2)	31.1(15)
C27	6640(9)	-2921(3)	2542(2)	23.4(13)
C22	10662(8)	-4165(3)	1746(2)	20.6(12)
C29	11668(9)	-6098(3)	1073(2)	22.2(13)
C36	10686(10)	-7592(3)	808(2)	32.6(15)

C34	13077(9)	-6545(3)	748(2)	22.8(13)
C21	8739(9)	-3939(3)	2065(2)	20.4(12)
C5	4251(9)	-834(2)	2451(2)	25.0(13)
C35	12528(9)	-7324(3)	621(2)	27.5(14)
C10	6565(9)	-2869(3)	1155(2)	24.3(13)
C37	9450(10)	-7102(3)	1127(2)	30.0(14)
C17	7109(9)	182(3)	1866(2)	30.9(14)
C2	6838(10)	-1362(3)	-70(2)	32.8(16)
C19	6239(9)	1212(3)	1199(2)	26.3(13)
C3	3563(9)	-325(3)	1946(2)	21.3(13)
C32	15358(9)	-5464(3)	743(2)	27.4(14)
C18	8033(9)	713(3)	1402(2)	30.9(14)

Supplementary Table 9 Anisotropic Displacement Parameters ($Å^2 \times 10^3$) for compound **3b**. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	**U_{11}**	**U_{22}**	**U_{33}**	**U_{23}**	**U_{13}**	**U_{12}**
N1	21(3)	23(2)	22(2)	-2.0(17)	0(2)	2(2)
O26	22(2)	23.6(18)	48(3)	-0.4(18)	2(2)	-0.7(18)
N28	19(3)	24(2)	26(3)	0.8(18)	-1(2)	-3(2)
O23	27(2)	23.0(18)	41(2)	-1.1(16)	0(2)	-7.1(19)
N14	43(3)	27(2)	17(2)	0.5(18)	-6(3)	4(3)
C8	22(3)	24(2)	18(3)	-3(2)	-3(3)	2(3)
C12	17(3)	17(2)	11(3)	-2.8(19)	0(2)	-3(2)
O25	61(3)	30.9(19)	30(2)	7.1(17)	-20(2)	3(2)
C33	25(3)	32(3)	25(3)	-4(2)	6(3)	2(3)
C13	16(3)	33(3)	24(3)	3(2)	-7(3)	1(3)
C6	27(3)	24(2)	25(3)	7(2)	7(3)	0(3)

C11	30(4)	27(3)	19(3)	0(2)	-1(3)	2(3)
C7	34(4)	24(2)	17(3)	-3(2)	-7(3)	-2(3)
N24	17(3)	22(2)	32(3)	-0.4(18)	2(2)	-3(2)
C15	16(3)	21(2)	29(3)	0(2)	-2(3)	2(2)
C9	19(3)	28(2)	18(3)	2(2)	-1(3)	-4(3)
C31	26(3)	32(3)	18(3)	1(2)	-4(3)	-5(3)
C20	24(3)	17(2)	16(3)	2(2)	-2(3)	-1(3)
C4	34(4)	21(2)	11(3)	-2(2)	1(3)	5(3)
C30	22(3)	23(2)	22(3)	4(2)	2(3)	1(3)
C16	44(4)	32(3)	17(3)	-1(2)	-8(3)	9(3)
C27	28(3)	26(3)	16(3)	7(2)	2(3)	3(3)
C22	24(3)	17(2)	21(3)	6(2)	-4(3)	3(3)
C29	23(3)	24(3)	20(3)	6(2)	0(3)	0(3)
C36	43(4)	21(2)	34(3)	-3(2)	-3(3)	-5(3)
C34	20(3)	28(3)	20(3)	2(2)	1(3)	1(3)
C21	25(3)	19(2)	17(3)	6(2)	-3(3)	-1(3)
C5	30(4)	22(2)	23(3)	-3(2)	6(3)	0(3)
C35	30(4)	27(3)	26(3)	-5(2)	0(3)	3(3)
C10	32(4)	16(2)	25(3)	-2(2)	-8(3)	-5(3)
C37	30(4)	27(3)	33(3)	-2(2)	-1(3)	-7(3)
C17	27(3)	37(3)	28(3)	5(3)	-5(3)	-5(3)
C2	48(4)	33(3)	17(3)	1(2)	2(3)	7(3)
C19	25(3)	26(3)	28(3)	-3(2)	-2(3)	-6(3)
C3	21(3)	21(3)	22(3)	-12(2)	2(3)	4(3)
C32	18(3)	37(3)	27(3)	4(2)	2(3)	-5(3)
C18	22(3)	36(3)	35(4)	1(3)	5(3)	-3(3)

Supplementary Table 10 Bond Lengths for compound **3b**

Atom	Atom	Length/Å	Atom	Atom	Length/Å
N1	C15	1.466(6)	C7	C4	1.382(7)
N1	C17	1.482(7)	C7	C10	1.373(6)
N1	C3	1.357(7)	N24	C30	1.404(6)
O26	C3	1.229(7)	N24	C22	1.359(5)
N28	C29	1.355(7)	C15	C19	1.517(7)
N28	C37	1.320(6)	C31	C30	1.375(8)
O23	C22	1.220(6)	C31	C32	1.404(7)
N14	C13	1.342(6)	C20	C27	1.546(7)
N14	C16	1.451(6)	C20	C21	1.536(6)
C8	C11	1.527(6)	C4	C2	1.510(6)
C8	C5	1.533(6)	C30	C29	1.430(6)
C12	C9	1.391(7)	C16	C2	1.522(8)
C12	C20	1.512(6)	C22	C21	1.518(7)
C12	C10	1.388(7)	C29	C34	1.416(7)
O25	C13	1.220(5)	C36	C35	1.375(8)
C33	C34	1.409(8)	C36	C37	1.379(8)
C33	C32	1.365(6)	C34	C35	1.417(7)
C13	C15	1.525(6)	C5	C3	1.507(7)
C6	C9	1.390(6)	C17	C18	1.519(7)
C6	C4	1.391(7)	C19	C18	1.538(8)
C11	C27	1.532(6)			

Supplementary Table 11 Bond Angles for compound **3b**

Atom	Atom	Atom	Angle/°	Atom	Atom	Atom	Angle/°
C15	N1	C17	111.7(4)	N24	C30	C29	115.7(5)
C3	N1	C15	121.9(5)	C31	C30	N24	125.2(4)
C3	N1	C17	125.0(4)	C31	C30	C29	119.1(5)

C37	N28	C29	116.4(5)	N14	C16	C2	110.9(5)
C13	N14	C16	125.2(4)	C11	C27	C20	115.7(4)
C11	C8	C5	111.9(4)	O23	C22	N24	123.3(5)
C9	C12	C20	120.6(5)	O23	C22	C21	123.3(4)
C10	C12	C9	117.6(4)	N24	C22	C21	113.4(4)
C10	C12	C20	121.5(5)	N28	C29	C30	116.7(5)
C32	C33	C34	119.7(5)	N28	C29	C34	123.8(4)
N14	C13	C15	116.7(4)	C34	C29	C30	119.5(5)
O25	C13	N14	123.6(5)	C35	C36	C37	119.1(5)
O25	C13	C15	119.7(5)	C33	C34	C35	123.7(5)
C9	C6	C4	121.5(5)	C29	C34	C33	119.6(4)
C8	C11	C27	115.9(4)	C29	C34	C35	116.6(5)
C10	C7	C4	121.7(5)	C22	C21	C20	113.6(4)
C22	N24	C30	129.1(4)	C3	C5	C8	110.6(4)
N1	C15	C13	114.4(4)	C36	C35	C34	118.9(5)
N1	C15	C19	103.4(4)	C7	C10	C12	121.5(5)
C19	C15	C13	109.6(4)	N28	C37	C36	125.1(6)
C6	C9	C12	120.5(5)	N1	C17	C18	103.4(4)
C30	C31	C32	120.6(5)	C4	C2	C16	112.3(5)
C12	C20	C27	112.6(4)	C15	C19	C18	103.2(4)
C12	C20	C21	112.0(4)	N1	C3	C5	116.7(5)
C21	C20	C27	107.3(4)	O26	C3	N1	120.7(5)
C6	C4	C2	121.2(5)	O26	C3	C5	122.5(5)
C7	C4	C6	117.2(5)	C33	C32	C31	121.5(5)
C7	C4	C2	121.5(5)	C17	C18	C19	103.1(5)

Supplementary Table 12 Torsion Angles for compound **3b**.

A	**B**	**C**	**D**	**Angle/**°	**A**	**B**	**C**	**D**	**Angle/**°

N1	C15	C19	C18	32.2(5)	C4	C6	C9	C12	-0.2(8)
N1	C17	C18	C19	30.6(5)	C4	C7	C10	C12	-0.7(8)
N28	C29	C34	C33	-178.1(5)	C30	N24	C22	O23	0.1(8)
N28	C29	C34	C35	-0.3(8)	C30	N24	C22	C21	-177.3(5)
O23	C22	C21	C20	23.5(7)	C30	C31	C32	C33	-1.2(8)
N14	C13	C15	N1	0.0(7)	C30	C29	C34	C33	1.6(7)
N14	C13	C15	C19	115.6(5)	C30	C29	C34	C35	179.4(5)
N14	C16	C2	C4	53.1(6)	C16	N14	C13	O25	2.7(10)
C8	C11	C27	C20	79.5(6)	C16	N14	C13	C15	-175.9(6)
C8	C5	C3	N1	-83.7(6)	C27	C20	C21	C22	-170.6(4)
C8	C5	C3	O26	92.3(6)	C22	N24	C30	C31	-4.7(8)
C12	C20	C27	C11	-60.0(6)	C22	N24	C30	C29	175.9(5)
C12	C20	C21	C22	65.3(6)	C29	N28	C37	C36	-0.9(8)
O25	C13	C15	N1	-178.7(5)	C29	C34	C35	C36	0.9(7)
O25	C13	C15	C19	-63.1(7)	C34	C33	C32	C31	0.5(8)
C33	C34	C35	C36	178.6(5)	C21	C20	C27	C11	176.3(4)
C13	N14	C16	C2	122.2(6)	C5	C8	C11	C27	168.7(5)
C13	C15	C19	C18	-90.1(5)	C35	C36	C37	N28	1.6(9)
C6	C4	C2	C16	-113.7(6)	C10	C12	C9	C6	1.1(7)
C11	C8	C5	C3	166.3(5)	C10	C12	C20	C27	-60.5(6)
C7	C4	C2	C16	63.0(6)	C10	C12	C20	C21	60.5(6)
N24	C30	C29	N28	-3.1(7)	C10	C7	C4	C6	1.6(8)
N24	C30	C29	C34	177.2(4)	C10	C7	C4	C2	-175.3(5)
N24	C22	C21	C20	-159.1(4)	C37	N28	C29	C30	-179.4(4)
C15	N1	C17	C18	-11.0(5)	C37	N28	C29	C34	0.3(7)
C15	N1	C3	O26	7.1(7)	C37	C36	C35	C34	-1.5(8)
C15	N1	C3	C5	-176.8(4)	C17	N1	C15	C13	105.6(5)
C15	C19	C18	C17	-39.4(5)	C17	N1	C15	C19	-13.6(5)

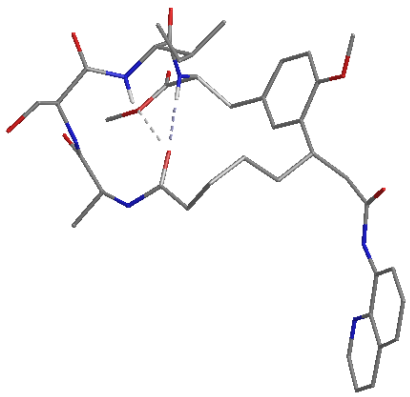
C9	C12	C20	C27	113.2(5)	C17	N1	C3	O26	172.9(5)
C9	C12	C20	C21	-125.8(5)	C17	N1	C3	C5	-11.0(7)
C9	C12	C10	C7	-0.7(7)	C3	N1	C15	C13	-86.9(6)
C9	C6	C4	C7	-1.1(8)	C3	N1	C15	C19	153.9(4)
C9	C6	C4	C2	175.8(5)	C3	N1	C17	C18	-178.0(4)
C31	C30	C29	N28	177.5(5)	C32	C33	C34	C29	-0.7(8)
C31	C30	C29	C34	-2.3(7)	C32	C33	C34	C35	-178.3(5)
C20	C12	C9	C6	-172.8(5)	C32	C31	C30	N24	-177.3(5)
C20	C12	C10	C7	173.2(5)	C32	C31	C30	C29	2.1(8)

Supplementary Table 13 Hydrogen Atom Coordinates ($Å \times 10^4$) and Isotropic Displacement Parameters ($Å^2 \times 10^3$) for **3b**.

Atom	***x***	***y***	***z***	**U(eq)**
H14	4936	-752	871	35
H8A	3846	-1934	2084	26
H8B	5891	-1530	1871	26
H33	15899	-6512	374	32
H6	9817	-1224	724	30
H11A	5389	-2056	3063	31
H11B	7459	-1797	2764	31
H7	5093	-2622	397	30
H24	9478	-5150	1569	28
H15	3222	907	1274	26
H9	10492	-1909	1590	26
H31	14319	-4493	1171	30
H20	9672	-2830	2311	23
H16A	4611	-602	-352	37
H16B	3726	-1342	-7	37

H27A	5428	-3156	2360	28
H27B	6903	-3201	2918	28
H36	10272	-8108	720	39
H21A	8753	-4170	2467	24
H21B	7578	-4161	1849	24
H5A	3120	-921	2729	30
H5B	5346	-570	2671	30
H35	13418	-7655	409	33
H10	5719	-3293	1260	29
H37	8200	-7305	1260	36
H17A	7813	-325	1880	37
H17B	7156	424	2264	37
H2A	6801	-1705	-422	39
H2B	7905	-969	-135	39
H19A	5966	1636	1485	32
H19B	6486	1440	803	32
H32	16612	-5243	631	33
H18A	8596	410	1067	37
H18B	9109	1040	1575	37

12.3 X-ray crystallographic data for compound **11a**



Supplementary Figure 48. X-ray structure of compound **11a**

11a, one of the two diastereomers of compound **11**, was obtained by silica gel chromatography. Single crystals for X-ray studies were grown by slow evaporation of a solution of compound **11a** in DMSO at room temperature. Two DMSO molecules in the asymmetric unit were omitted for clarity. The X-ray data of **11a** is deposited in the Cambridge Crystallographic Data Centre with a number of CCDC 1526702.

Supplementary Table 14 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **11a**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	***x***	***y***	***z***	**U(eq)**
S2	7741.4(9)	-571.7(12)	1527.7(8)	27.6(3)
S1	677.9(11)	2185.8(15)	4648.5(9)	43.6(4)
O11	7434(2)	835(3)	1742.6(19)	24.6(8)
O6	6590(2)	7809(3)	3278(2)	25.5(9)
O2	5995(2)	2784(3)	3096(2)	21.5(8)
O4	8150(2)	3128(3)	4624.5(19)	25.7(9)
O3	9639(3)	1642(3)	2472(2)	32(1)
O9	2817(2)	6044(3)	1034(2)	32.1(10)
N5	7344(3)	4701(4)	2609(2)	16.3(9)
N3	6569(3)	801(4)	3588(2)	15.6(9)
O1	1452(3)	2370(4)	712(2)	44.7(11)
N6	6048(3)	5778(4)	3619(2)	18.0(9)
O10	973(3)	2268(5)	3761(2)	51.6(12)
O5	8668(3)	5640(4)	2556(3)	46.0(12)
O7	6588(3)	5058(4)	5271(2)	40.3(11)
N4	8039(2)	2319(4)	3252(2)	14.6(9)
N1	1232(3)	-1310(4)	2794(2)	24.7(11)

N2	1502(3)	860(4)	1815(2)	22.7(10)
C17	6014(3)	1528(4)	3049(3)	17.5(12)
C29	6491(3)	6597(4)	3132(3)	15.6(11)
O8	6051(4)	6906(5)	5788(2)	83.9(18)
C20	7807(3)	2357(4)	4069(3)	16.9(11)
C34	4156(3)	5778(5)	3495(3)	23.3(12)
C18	7105(3)	1399(4)	4308(3)	17.7(12)
C39	3842(3)	4642(5)	3033(3)	19.2(11)
C10	1656(3)	2101(5)	1467(3)	25.7(12)
C24	6850(3)	5922(4)	2356(3)	14.9(11)
C9	1014(3)	-1435(5)	1914(3)	19.8(12)
C38	3380(3)	4716(5)	2219(3)	20.4(12)
C22	9138(3)	2794(5)	2245(3)	22.6(13)
C31	6112(4)	6144(5)	5209(3)	25.7(13)
C21	8646(3)	3330(4)	2982(3)	17.6(12)
C23	8207(4)	4668(5)	2703(3)	22.3(12)
C5	699(3)	-2664(5)	1521(3)	22.2(12)
C14	4525(3)	2524(5)	1517(3)	20.2(12)
C30	5593(3)	6294(5)	4334(3)	19.1(12)
C25	6115(3)	5619(4)	1636(3)	18.0(11)
C1	1130(3)	-274(5)	1388(3)	21.0(12)
C13	3647(3)	2237(5)	1836(3)	19.1(11)
C26	6448(4)	4892(5)	857(3)	27.6(14)
C19	7504(4)	278(5)	4899(3)	27.5(14)
C37	3239(3)	6015(5)	1857(3)	22.0(12)
C12	3032(3)	3462(4)	1748(3)	19.3(12)
C15	5143(3)	1316(5)	1548(3)	28.6(14)
C16	5400(3)	702(5)	2440(3)	24.5(12)

C4	483(3)	-2701(6)	617(3)	29.7(13)
C2	908(3)	-363(6)	510(3)	27.7(13)
C36	3511(3)	7163(5)	2320(3)	30.4(13)
C33	4714(3)	5610(5)	4345(3)	24.3(13)
C6	623(4)	-3779(5)	2068(4)	32.0(14)
C43	8458(4)	-1105(5)	2434(3)	34.7(16)
C8	1137(4)	-2415(5)	3267(3)	33.9(15)
C35	3966(4)	7040(5)	3128(3)	30.9(14)
C11	2146(3)	3107(5)	2073(3)	26.1(13)
C28	5607(4)	6903(5)	1364(3)	30.2(14)
C44	8536(4)	-364(5)	778(3)	34.3(15)
C3	577(4)	-1563(6)	135(3)	34.3(15)
C7	844(4)	-3661(5)	2938(4)	35.2(15)
C40	2840(4)	7300(5)	573(3)	35.4(14)
C41	1553(4)	1629(6)	5374(4)	54.0(19)
C27	7126(4)	5678(6)	422(3)	36.8(15)
C32	7126(4)	4843(6)	6080(3)	44.4(17)
C42	39(4)	689(6)	4657(4)	54.5(19)

Supplementary Table 15 Anisotropic Displacement Parameters ($Å^2×10^3$) for Compound **11a**. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	**U_{11}**	**U_{22}**	**U_{33}**	**U_{23}**	**U_{13}**	**U_{12}**
S2	28.4(9)	24.2(7)	31.0(8)	-10.0(6)	7.7(6)	-5.6(7)
S1	54.6(12)	31.0(8)	43.6(9)	2.1(7)	-3.6(8)	8.9(9)
O11	22(2)	25.9(18)	26.6(19)	-10.9(16)	6.9(16)	0.5(18)
O6	38(3)	10.7(17)	29(2)	-0.4(14)	4.7(17)	-0.4(17)
O2	21(2)	14.5(17)	29(2)	-2.8(14)	3.3(16)	2.0(17)

O4	35(3)	26(2)	16.2(19)	-3.3(15)	2.1(16)	-12.3(18)
O3	25(3)	31(2)	41(3)	-12.4(17)	6.6(18)	4.3(19)
O9	38(3)	19.5(19)	37(2)	11.8(16)	-7.2(18)	0.3(19)
N5	18(3)	11(2)	20(2)	4.6(17)	2.6(18)	-3(2)
N3	18(3)	6.7(18)	22(2)	-1.7(17)	3.4(18)	-0.4(19)
O1	45(3)	42(2)	42(2)	27(2)	-21(2)	-11(2)
N6	25(3)	10.0(19)	21(2)	-4.8(18)	7.7(18)	-1(2)
O10	44(3)	70(3)	39(2)	17(2)	-3.7(19)	-22(3)
O5	17(3)	23(2)	98(3)	18(2)	8(2)	-2(2)
O7	44(3)	43(2)	30(2)	-14.8(18)	-18.3(19)	19(2)
N4	17(2)	11.9(18)	16(2)	-5.3(17)	4.8(17)	-4.2(19)
N1	27(3)	29(2)	17(2)	0.7(19)	-1(2)	-4(2)
N2	30(3)	22(2)	16(2)	0.7(19)	-0.9(19)	-2(2)
C17	12(3)	13(2)	29(3)	-6(2)	11(2)	0(2)
C29	17(3)	14(3)	15(3)	3(2)	-5(2)	7(2)
O8	148(5)	66(3)	32(2)	-29(2)	-24(3)	46(3)
C20	20(3)	13(2)	17(3)	0(2)	-3(2)	5(2)
C34	21(3)	25(3)	24(3)	-4(2)	6(2)	1(3)
C18	18(3)	18(2)	18(3)	-3(2)	7(2)	2(2)
C39	16(3)	15(2)	27(3)	4(2)	6(2)	1(2)
C10	11(3)	25(3)	41(3)	7(3)	0(2)	2(3)
C24	14(3)	13(2)	18(3)	5(2)	3(2)	1(2)
C9	11(3)	22(3)	27(3)	1(2)	5(2)	-3(2)
C38	20(3)	20(3)	22(3)	1(2)	6(2)	-1(2)
C22	24(4)	23(3)	22(3)	3(2)	8(2)	-7(3)
C31	34(4)	25(3)	19(3)	-3(2)	6(2)	0(3)
C21	21(3)	15(2)	17(3)	0(2)	3(2)	-2(2)
C23	21(4)	17(3)	30(3)	-2(2)	6(2)	-2(3)

C5	11(3)	23(3)	33(3)	-6(2)	3(2)	-1(2)
C14	20(3)	24(3)	17(3)	-1(2)	0(2)	-4(2)
C30	24(3)	18(2)	17(3)	-7(2)	6(2)	3(2)
C25	20(3)	20(3)	14(3)	-1(2)	1(2)	-4(2)
C1	14(3)	26(3)	23(3)	-1(2)	2(2)	1(3)
C13	20(3)	14(2)	22(3)	2(2)	-2(2)	-4(3)
C26	35(4)	27(3)	20(3)	-1(2)	1(2)	-1(3)
C19	29(4)	26(3)	26(3)	4(2)	-2(3)	-3(3)
C37	17(3)	21(3)	28(3)	3(2)	3(2)	-1(2)
C12	22(3)	15(2)	20(3)	6(2)	-1(2)	-2(2)
C15	22(4)	32(3)	33(3)	-11(2)	7(3)	-3(3)
C16	19(3)	17(2)	37(3)	-2(2)	-3(2)	3(3)
C4	21(3)	37(3)	31(3)	-17(3)	1(2)	-8(3)
C2	20(3)	41(3)	21(3)	6(3)	-2(2)	5(3)
C36	28(4)	16(3)	47(3)	0(3)	-4(3)	2(3)
C33	30(4)	28(3)	16(3)	-2(2)	8(2)	2(3)
C6	21(4)	23(3)	52(4)	-8(3)	8(3)	-13(3)
C43	50(5)	21(3)	34(3)	1(2)	9(3)	1(3)
C8	34(4)	39(3)	27(3)	13(3)	-1(3)	-7(3)
C35	32(4)	20(3)	40(3)	-8(3)	-3(3)	-1(3)
C11	22(4)	20(3)	38(3)	6(2)	10(3)	4(3)
C28	26(4)	36(3)	27(3)	-3(2)	0(2)	0(3)
C44	43(4)	34(3)	29(3)	-11(3)	16(3)	8(3)
C3	26(4)	57(4)	19(3)	-10(3)	-1(3)	1(3)
C7	35(4)	28(3)	43(4)	8(3)	6(3)	-13(3)
C40	35(4)	22(3)	48(3)	17(3)	-3(3)	0(3)
C41	70(6)	38(3)	49(4)	-5(3)	-19(4)	11(4)
C27	40(4)	46(4)	25(3)	-6(3)	12(3)	4(3)

C32	49(5)	51(4)	29(3)	-6(3)	-18(3)	6(4)
C42	47(5)	59(4)	60(4)	21(4)	18(4)	-13(4)

Supplementary Table 16 Bond Lengths for Compound **11a**

Atom	**Atom**	**Length/Å**	**Atom**	**Atom**	**Length/Å**
S2	O11	1.518(3)	C34	C39	1.394(7)
S2	C43	1.783(5)	C34	C33	1.513(7)
S2	C44	1.785(5)	C34	C35	1.392(7)
S1	O10	1.493(4)	C18	C19	1.529(6)
S1	C41	1.763(6)	C39	C38	1.390(6)
S1	C42	1.781(6)	C10	C11	1.520(7)
O6	C29	1.226(5)	C24	C25	1.544(6)
O2	C17	1.244(5)	C9	C5	1.423(7)
O4	C20	1.231(5)	C9	C1	1.430(6)
O3	C22	1.404(5)	C38	C37	1.410(7)
O9	C37	1.376(6)	C38	C12	1.512(6)
O9	C40	1.435(5)	C22	C21	1.529(6)
N5	C24	1.462(5)	C31	C30	1.515(7)
N5	C23	1.331(6)	C21	C23	1.530(6)
N3	C17	1.347(6)	C5	C4	1.410(6)
N3	C18	1.449(6)	C5	C6	1.402(7)
O1	C10	1.211(5)	C14	C13	1.518(6)
N6	C29	1.342(5)	C14	C15	1.529(6)
N6	C30	1.462(5)	C30	C33	1.520(7)
O5	C23	1.231(6)	C25	C26	1.537(6)
O7	C31	1.301(6)	C25	C28	1.530(6)
O7	C32	1.452(6)	C1	C2	1.374(6)
N4	C20	1.350(5)	C13	C12	1.539(6)

N4	C21	1.462(6)	C26	C27	1.517(7)
N1	C9	1.379(6)	C37	C36	1.386(7)
N1	C8	1.332(6)	C12	C11	1.548(7)
N2	C10	1.370(6)	C15	C16	1.526(6)
N2	C1	1.398(6)	C4	C3	1.365(7)
C17	C16	1.512(7)	C2	C3	1.396(7)
C29	C24	1.526(6)	C36	C35	1.381(7)
O8	C31	1.183(5)	C6	C7	1.364(7)
C20	C18	1.515(6)	C8	C7	1.392(7)

Supplementary Table 17 Bond Angles for Compound **11a**.

Atom	**Atom**	**Atom**	**Angle/°**	**Atom**	**Atom**	**Atom**	**Angle/°**
O11	S2	C43	106.4(2)	O7	C31	C30	113.2(4)
O11	S2	C44	106.8(2)	O8	C31	O7	123.8(5)
C43	S2	C44	97.6(3)	O8	C31	C30	122.9(5)
O10	S1	C41	108.6(3)	N4	C21	C22	111.0(4)
O10	S1	C42	105.8(3)	N4	C21	C23	113.1(4)
C41	S1	C42	97.4(3)	C22	C21	C23	109.1(4)
C37	O9	C40	116.6(4)	N5	C23	C21	117.8(4)
C23	N5	C24	123.0(4)	O5	C23	N5	123.6(5)
C17	N3	C18	122.9(4)	O5	C23	C21	118.5(5)
C29	N6	C30	121.9(4)	C4	C5	C9	119.0(5)
C31	O7	C32	117.2(4)	C6	C5	C9	117.3(4)
C20	N4	C21	119.2(4)	C6	C5	C4	123.7(5)
C8	N1	C9	116.2(4)	C13	C14	C15	114.9(4)
C10	N2	C1	127.7(4)	N6	C30	C31	113.1(4)
O2	C17	N3	120.9(5)	N6	C30	C33	110.6(4)
O2	C17	C16	124.0(5)	C31	C30	C33	110.0(4)

N3	C17	C16	115.0(4)	C26	C25	C24	112.2(4)
O6	C29	N6	123.1(4)	C28	C25	C24	111.1(4)
O6	C29	C24	121.7(4)	C28	C25	C26	112.0(4)
N6	C29	C24	115.1(4)	N2	C1	C9	116.3(4)
O4	C20	N4	122.5(4)	C2	C1	N2	124.9(5)
O4	C20	C18	119.2(4)	C2	C1	C9	118.7(5)
N4	C20	C18	118.4(4)	C14	C13	C12	113.0(4)
C39	C34	C33	120.0(4)	C27	C26	C25	114.2(4)
C35	C34	C39	117.6(4)	O9	C37	C38	115.4(4)
C35	C34	C33	122.3(5)	O9	C37	C36	123.7(4)
N3	C18	C20	115.9(4)	C36	C37	C38	120.9(5)
N3	C18	C19	109.5(4)	C38	C12	C13	114.5(4)
C20	C18	C19	110.1(4)	C38	C12	C11	108.3(4)
C38	C39	C34	123.1(4)	C13	C12	C11	110.7(4)
O1	C10	N2	122.5(5)	C16	C15	C14	116.5(4)
O1	C10	C11	121.4(5)	C17	C16	C15	116.3(4)
N2	C10	C11	116.0(4)	C3	C4	C5	119.7(5)
N5	C24	C29	111.8(3)	C1	C2	C3	120.8(5)
N5	C24	C25	111.3(4)	C35	C36	C37	119.9(5)
C29	C24	C25	110.8(4)	C34	C33	C30	112.1(4)
N1	C9	C5	122.7(4)	C7	C6	C5	120.1(5)
N1	C9	C1	117.4(4)	N1	C8	C7	125.0(5)
C5	C9	C1	119.9(4)	C36	C35	C34	121.2(5)
C39	C38	C37	117.1(5)	C10	C11	C12	110.6(4)
C39	C38	C12	121.5(4)	C4	C3	C2	121.8(5)
C37	C38	C12	121.4(4)	C6	C7	C8	118.7(5)
O3	C22	C21	113.4(4)				

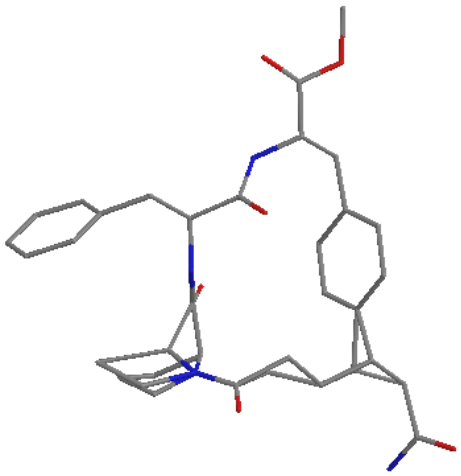
Supplementary Table 18 Hydrogen Atom Coordinates (Å×10^4) and Isotropic Displacement Parameters (Å^2×10^3) for Compound **11a.**

Atom	***x***	***y***	***z***	**U(eq)**
H3	10036	1845	2838	48
H5	7064	3973	2702	20
H3A	6608	-55	3501	19
H6	6030	4926	3507	22
H4	7833	1707	2895	18
H2	1653	768	2360	27
H18	6719	1920	4646	21
H39	3948	3794	3280	23
H24	7248	6563	2121	18
H22A	8724	2576	1754	27
H22B	9515	3501	2064	27
H21	9072	3517	3479	21
H14A	4801	3247	1865	24
H14B	4433	2844	924	24
H30	5489	7261	4233	23
H25	5709	5001	1882	22
H13A	3731	1967	2439	23
H13B	3378	1486	1508	23
H26A	6694	4029	1050	33
H26B	5960	4710	432	33
H19A	7052	-296	5072	41
H19B	7813	674	5404	41
H19C	7897	-246	4593	41
H12	2929	3685	1130	23
H15A	4876	612	1176	34

H15B	5668	1595	1305	34
H16A	4875	543	2719	29
H16B	5666	-171	2359	29
H4A	277	-3495	349	36
H2A	979	385	160	33
H36	3387	8016	2086	37
H33A	4801	4654	4464	29
H33B	4415	5994	4809	29
H6A	421	-4601	1836	38
H43A	8911	-448	2550	52
H43B	8708	-1962	2308	52
H43C	8141	-1193	2933	52
H8	1278	-2350	3863	41
H35	4149	7816	3432	37
H11A	2239	2724	2651	31
H11B	1804	3924	2105	31
H28A	5318	7230	1842	45
H28B	5186	6702	885	45
H28C	6000	7581	1194	45
H44A	8272	50	257	51
H44B	8765	-1232	643	51
H44C	8997	201	1031	51
H3B	416	-1588	-458	41
H7	799	-4397	3304	42
H40A	2610	7167	-19	53
H40B	3429	7611	590	53
H40C	2497	7961	839	53
H41A	1709	725	5226	81

H41B 1387	1643	5954	81
H41C 2041	2218	5336	81
H27A 7249	5219	-98	55
H27B 7647	5745	809	55
H27C 6911	6569	279	55
H32A 7379	3956	6080	67
H32B 6777	4920	6556	67
H32C 7579	5509	6139	67
H42A -479	798	4270	82
H42B -114	527	5234	82
H42C 365	-65	4473	82

12.4 X-ray crystallographic data for compound **17**



Supplementary Figure 49. X-ray structure of compound **17**

Single crystals for X-ray studies were grown by slow evaporation of a solution of compound **17** in a mixture of acetone and hexane at room temperature. **17a** and **17b**, two inseparable diastereomers of compound **17**, were co-crystallized and their structures were resolved in X-ray crystallography of the resulting crystal. The X-ray data of **17** is deposited in the Cambridge Crystallographic Data Centre with a number

of CCDC 1526701. There was a level B alerts in this data:"Deprecated RES file style based SQUEEZE job", because the electron density of disordered guest solvent molecules were treated as a diffuse contribution using the program SQUEEZE. (A a similar situation see: Spek, A. L. *Acta Cryst*., D65, 148-155 (2009)).

Supplementary Table 19 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **17**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	***x***	***y***	***z***	**U(eq)**
O1	-5685(3)	-9151.0(18)	-2381.8(10)	39.1(7)
O9AA	-11047(3)	-9832.3(17)	-3357.1(11)	40.4(7)
N3	-3359(3)	-9602(2)	-2451.8(11)	30.3(7)
C1BA	-4646(4)	-9369(2)	-2679.3(14)	27.7(8)
N5	-6152(3)	-9654(2)	-3513.4(12)	33.1(8)
O2BA	-12019(3)	-13024(2)	-1531.7(12)	63.4(9)
C3BA	-4794.4(18)	-11092.3(12)	-1793.2(8)	37.8(10)
C25	-5897(2)	-10900.9(16)	-1410.5(9)	50.0(11)
C58	-7311(2)	-11165(2)	-1527.6(12)	66.0(13)
C35	-7623(2)	-11620(2)	-2027.4(13)	64.7(13)
C29	-6520(3)	-11811.1(19)	-2410.1(11)	57.9(12)
C7AA	-5106(2)	-11547.4(15)	-2293.0(9)	46.1(10)
C4BA	-4710(4)	-9367(2)	-3325.1(13)	27.2(8)
C5BA	-11183(4)	-13008(2)	-1929.6(15)	33.1(9)
C0AA	-4363(5)	-8440(2)	-3555.4(15)	36.1(10)
N11	-11537(4)	-13344(2)	-2416.1(13)	47.3(9)
C1AA	-4313(4)	-8428(2)	-4196.7(15)	34.9(9)
C2AA	-3170(4)	-9720(2)	-1848.0(14)	30.3(9)
C3AA	-9865(4)	-10200(2)	-3397.6(18)	42.9(11)

O4AA	-1017(3)	-8820(3)	-1902.0(13)	64.8(10)
C5AA	-3296(4)	-10736(3)	-1689.8(16)	37.7(10)
C6AA	-1776(4)	-9310(3)	-1639.8(16)	39.3(10)
C8AA	-3237(3)	-8910(3)	-4475.3(17)	50.9(12)
C0BA	-9811(4)	-11388(3)	-2618.4(16)	40.9(10)
C21	-4110(6)	-8389(3)	-5374.4(17)	60.5(15)
N22	-9021(3)	-10114(3)	-3836.7(15)	60.3(11)
O23	-5422(4)	-11083(2)	-3718.5(18)	82.5(11)
O24	-1412(4)	-9608(3)	-1152.4(15)	84.3(11)
C26	-5295(6)	-7948(3)	-4495.8(18)	60.2(14)
C27	-5196(7)	-7934(4)	-5101.3(17)	72.2(16)
C31	-3131(5)	-8865(4)	-5057(2)	69.4(16)
C32	-9340(8)	-10526(5)	-2761(3)	33.7(12)
C34	-6401(4)	-10469(3)	-3738.0(18)	64.3(13)
C37	-9335(8)	-11743(5)	-2019(3)	32.5(13)
C6BA	-9664(5)	-12630(3)	-1871.7(18)	56.9(12)
C9AA	-39(7)	-9255(4)	-910(3)	99(2)
C4AA	-9101(8)	-10981(5)	-3139(3)	33.7(12)
C2BA	-9154(4)	-12019(4)	-2313(3)	32.5(13)
C7BA	-8278(9)	-10073(5)	-4730(4)	86(3)
C8BA	-9472(7)	-9826(5)	-4321(3)	45.2(15)
C9BA	-7853(9)	-10852(6)	-3862(2)	42.5(16)
C0CA	-7775(10)	-10983(4)	-4510(2)	49.2(17)
C1	-9613(4)	-9232(5)	-4326(2)	45.2(15)
C2	-7710(5)	-10383(5)	-4139.7(19)	42.5(16)
C3	-7662(7)	-10004(4)	-4756(2)	49.2(17)
C4	-8422(9)	-9092(5)	-4761(4)	86(3)

Supplementary Table 20 Anisotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **17**. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
O1	27.8(12)	54.6(14)	34.8(12)	6.2(12)	3.3(11)	13.9(12)
O9AA	26.1(12)	43.3(13)	51.8(14)	12.9(12)	-3.5(11)	6.6(11)
N3	22.1(13)	40.8(15)	28.1(13)	9.5(12)	3.1(12)	-2.8(13)
C1BA	23.4(16)	25.3(15)	34.3(17)	5.8(14)	6.4(15)	4.3(15)
N5	20.3(14)	45.4(16)	33.4(14)	-9.7(14)	-1.3(13)	3.9(13)
O2BA	58.6(17)	80.7(19)	50.8(14)	-24.4(15)	26.5(14)	-37.1(15)
C3BA	25.1(18)	33.3(17)	55(2)	22.6(16)	-14.4(17)	-8.6(15)
C25	32(2)	45(2)	73(2)	20.3(19)	6(2)	-8.0(18)
C58	47(2)	57(2)	94(3)	23(2)	16(2)	-8.8(19)
C35	39(2)	59(2)	96(3)	38(2)	-16(2)	-7.0(19)
C29	49(2)	48(2)	76(2)	17.4(19)	-21(2)	-11.9(19)
C7AA	39(2)	36.4(17)	62(2)	26.8(17)	-20(2)	-7.6(17)
C4BA	25.4(16)	31.5(16)	24.6(14)	7.9(13)	8.4(14)	3.1(14)
C5BA	30.7(19)	33.2(17)	35.6(17)	-0.2(15)	7.8(16)	-5.7(15)
C0AA	48(2)	28.9(16)	31.5(16)	-2.6(14)	0.8(18)	-7.1(18)
N11	30.8(15)	71(2)	39.7(16)	-17.6(16)	15.1(15)	-12.8(17)
C1AA	43(2)	31.1(16)	30.1(16)	1.0(14)	-6.4(17)	-14.5(16)
C2AA	22.0(16)	37.1(18)	31.7(16)	5.4(15)	1.2(14)	-3.7(15)
C3AA	32.6(19)	31.0(18)	65(2)	8.9(18)	-16.8(19)	-4.8(17)
O4AA	48.5(16)	95(2)	51.0(16)	5.2(16)	-0.4(15)	-33.1(16)
C5AA	17.5(17)	52(2)	43.9(19)	12.5(17)	-7.1(16)	-8.7(16)
C6AA	29.7(19)	46(2)	42.5(19)	6.1(17)	5.6(17)	-2.4(17)
C8AA	45(2)	69(3)	39.1(19)	18.3(19)	6.2(18)	19(2)
C0BA	26.3(18)	59(2)	37.7(18)	-1.1(17)	-3.7(17)	-9.2(18)

C21	83(3)	71(3)	27.5(19)	-6.9(19)	9(2)	-5(3)
N22	25.2(16)	98(3)	57.9(18)	-43.4(17)	-10.7(15)	3.7(19)
O23	37.7(16)	58.9(16)	151(3)	-51.4(18)	8(2)	-3.4(16)
O24	89(2)	97(2)	67.5(18)	21.2(17)	-37.4(17)	-36.8(19)
C26	85(3)	52(2)	44(2)	17.3(18)	-2(2)	28(2)
C27	106(4)	81(3)	28.6(19)	15(2)	2(2)	33(3)
C31	60(3)	91(3)	57(3)	12(2)	19(2)	25(3)
C32	31(2)	28(2)	42(2)	2.1(19)	1(2)	-4(2)
C34	43(2)	62(2)	88(3)	-32(2)	6(2)	6(2)
C37	30(2)	33(3)	34(3)	-5(2)	-15(3)	-9(2)
C6BA	52(2)	68(2)	51(2)	10.5(19)	1.8(19)	-33.0(18)
C9AA	95(4)	106(4)	97(3)	12(3)	-53(3)	-35(3)
C4AA	31(2)	28(2)	42(2)	2.1(19)	1(2)	-4(2)
C2BA	30(2)	33(3)	34(3)	-5(2)	-15(3)	-9(2)
C7BA	90(5)	100(5)	70(4)	-8(4)	-1(4)	14(5)
C8BA	31(2)	48(3)	56(3)	32(3)	-1(2)	-8(3)
C9BA	35(3)	50(3)	43(3)	-8(2)	6(3)	-9(3)
C0CA	64(4)	64(3)	19(2)	-2(2)	-11(3)	19(3)
C1	31(2)	48(3)	56(3)	32(3)	-1(2)	-8(3)
C2	35(3)	50(3)	43(3)	-8(2)	6(3)	-9(3)
C3	64(4)	64(3)	19(2)	-2(2)	-11(3)	19(3)
C4	90(5)	100(5)	70(4)	-8(4)	-1(4)	14(5)

Supplementary Table 21 Bond Lengths for Compound **17**.

Atom	**Atom**	**Length/Å**	**Atom**	**Atom**	**Length/Å**
O1	C1BA	1.232(4)	C3AA	C4AA	1.488(8)
O9AA	C3AA	1.224(5)	O4AA	C6AA	1.185(5)
N3	C1BA	1.348(4)	C6AA	O24	1.278(5)

N3	C2AA	1.447(4)	C8AA	C31	1.379(6)
C1BA	C4BA	1.526(4)	C0BA	C32	1.394(8)
N5	C4BA	1.466(4)	C0BA	C37	1.573(8)
N5	C34	1.343(6)	C0BA	C4AA	1.519(8)
O2BA	C5BA	1.216(5)	C0BA	C2BA	1.330(7)
C3BA	C25	1.3900	C21	C27	1.369(7)
C3BA	C7AA	1.3900	C21	C31	1.371(7)
C3BA	C5AA	1.500(4)	N22	C8BA	1.288(8)
C25	C58	1.3900	N22	C9BA	1.539(9)
C58	C35	1.3900	N22	C1	1.831(7)
C35	C29	1.3900	N22	C2	1.461(6)
C35	C37	1.590(7)	O23	C34	1.285(5)
C35	C2BA	1.675(5)	O24	C9AA	1.486(7)
C29	C7AA	1.3900	C26	C27	1.432(6)
C4BA	C0AA	1.516(5)	C34	C9BA	1.485(9)
C5BA	N11	1.294(5)	C34	C2	1.541(5)
C5BA	C6BA	1.517(6)	C37	C6BA	1.397(8)
C0AA	C1AA	1.515(5)	C6BA	C2BA	1.460(7)
C1AA	C8AA	1.389(5)	C7BA	C8BA	1.510(9)
C1AA	C26	1.352(6)	C7BA	C0CA	1.522(9)
C2AA	C5AA	1.559(5)	C9BA	C0CA	1.543(7)
C2AA	C6AA	1.505(5)	C1	C4	1.518(8)
C3AA	N22	1.303(5)	C2	C3	1.562(7)
C3AA	C32	1.652(8)	C3	C4	1.525(8)

Supplementary Table 22 Bond Angles for Compound **17**.

Atom	**Atom**	**Atom**	**Angle/°**	**Atom**	**Atom**	**Atom**	**Angle/°**
C1BA	N3	C2AA	122.0(3)	C32	C0BA	C37	116.0(5)

O1	C1BA	N3	121.7(3)	C2BA	C0BA	C4AA	121.5(4)
O1	C1BA	C4BA	122.6(3)	C27	C21	C31	118.7(4)
N3	C1BA	C4BA	115.6(3)	C3AA	N22	C9BA	112.3(4)
C34	N5	C4BA	122.6(3)	C3AA	N22	C1	113.2(3)
C25	C3BA	C7AA	120.0	C3AA	N22	C2	149.0(4)
C25	C3BA	C5AA	119.74(18)	C8BA	N22	C3AA	123.0(4)
C7AA	C3BA	C5AA	120.04(18)	C8BA	N22	C9BA	115.3(5)
C3BA	C25	C58	120.0	C2	N22	C1	97.7(3)
C35	C58	C25	120.0	C6AA	O24	C9AA	116.7(4)
C58	C35	C37	104.5(3)	C1AA	C26	C27	119.0(5)
C58	C35	C2BA	133.6(3)	C21	C27	C26	120.7(5)
C29	C35	C58	120.0	C21	C31	C8AA	121.4(4)
C29	C35	C37	135.4(3)	C0BA	C32	C3AA	113.4(5)
C29	C35	C2BA	106.4(2)	N5	C34	C9BA	125.4(4)
C7AA	C29	C35	120.0	N5	C34	C2	107.6(4)
C29	C7AA	C3BA	120.0	O23	C34	N5	120.4(3)
N5	C4BA	C1BA	109.7(3)	O23	C34	C9BA	111.6(5)
N5	C4BA	C0AA	110.3(3)	O23	C34	C2	129.2(5)
C0AA	C4BA	C1BA	110.6(3)	C0BA	C37	C35	103.2(4)
O2BA	C5BA	N11	121.2(4)	C6BA	C37	C35	109.1(5)
O2BA	C5BA	C6BA	121.6(3)	C6BA	C37	C0BA	118.7(5)
N11	C5BA	C6BA	117.1(3)	C37	C6BA	C5BA	121.9(5)
C1AA	C0AA	C4BA	112.1(3)	C2BA	C6BA	C5BA	117.7(4)
C8AA	C1AA	C0AA	119.3(3)	C3AA	C4AA	C0BA	116.0(5)
C26	C1AA	C0AA	120.5(4)	C0BA	C2BA	C35	110.6(4)
C26	C1AA	C8AA	120.2(4)	C0BA	C2BA	C6BA	132.8(4)
N3	C2AA	C5AA	110.2(3)	C6BA	C2BA	C35	101.8(4)
N3	C2AA	C6AA	112.1(3)	C8BA	C7BA	C0CA	102.7(6)

C6AA	C2AA	C5AA	112.2(3)		N22	C8BA	C7BA	104.6(6)
O9AA	C3AA	N22	123.4(4)		N22	C9BA	C0CA	99.3(5)
O9AA	C3AA	C32	108.7(4)		C34	C9BA	N22	110.5(5)
O9AA	C3AA	C4AA	137.6(4)		C34	C9BA	C0CA	101.7(6)
N22	C3AA	C32	125.3(4)		C7BA	C0CA	C9BA	102.2(6)
N22	C3AA	C4AA	96.9(4)		C4	C1	N22	108.0(4)
C3BA	C5AA	C2AA	111.9(3)		N22	C2	C34	111.7(4)
O4AA	C6AA	C2AA	125.7(4)		N22	C2	C3	112.4(4)
O4AA	C6AA	O24	121.9(4)		C34	C2	C3	125.5(5)
O24	C6AA	C2AA	112.2(3)		C4	C3	C2	108.3(5)
C31	C8AA	C1AA	119.9(4)		C1	C4	C3	102.0(6)

Supplementary Table 23 Torsion Angles for Compound **17**.

A	**B**	**C**	**D**	**Angle/°**	**A**	**B**	**C**	**D**	**Angle/°**
O1	C1BA	C4BA	N5	-36.4(4)	C2AA	N3	C1BA	O1	8.0(5)
O1	C1BA	C4BA	C0AA	85.5(4)	C2AA	N3	C1BA	C4BA	-173.9(3)
O9AA	C3AA	N22	C8BA	-17.7(8)	C2AA	C6AA	O24	C9AA	179.2(4)
O9AA	C3AA	N22	C9BA	-162.5(4)	C3AA	N22	C8BA	C7BA	-165.0(5)
O9AA	C3AA	N22	C1	10.6(6)	C3AA	N22	C9BA	C34	-109.3(5)
O9AA	C3AA	N22	C2	-172.7(7)	C3AA	N22	C9BA	C0CA	144.4(5)
O9AA	C3AA	C32	C0BA	89.1(5)	C3AA	N22	C1	C4	170.7(5)
O9AA	C3AA	C4AA	C0BA	-11.9(9)	C3AA	N22	C2	C34	-43.6(11)
N3	C1BA	C4BA	N5	145.5(3)	C3AA	N22	C2	C3	169.2(6)
N3	C1BA	C4BA	C0AA	-92.6(4)	O4AA	C6AA	O24	C9AA	4.6(7)
N3	C2AA	C5AA	C3BA	-65.8(3)	C5AA	C3BA	C25	C58	174.6(2)
N3	C2AA	C6AA	O4AA	11.7(6)	C5AA	C3BA	C7AA	C29	-174.6(2)
N3	C2AA	C6AA	O24	-162.7(3)	C5AA	C2AA	C6AA	O4AA	136.3(4)
C1BA	N3	C2AA	C5AA	96.9(4)	C5AA	C2AA	C6AA	O24	-38.1(5)

C1BA	N3	C2AA	C6AA	-137.4(3)	C6AA	C2AA	C5AA	C3BA	168.6(3)
C1BA	C4BA	C0AA	C1AA	176.0(3)	C8AA	C1AA	C26	C27	-1.0(7)
N5	C4BA	C0AA	C1AA	-62.5(4)	C0BA	C37	C6BA	C5BA	-51.0(8)
N5	C34	C9BA	N22	13.8(7)	N22	C3AA	C32	C0BA	-108.7(6)
N5	C34	C9BA	C0CA	118.4(5)	N22	C3AA	C4AA	C0BA	-174.7(5)
N5	C34	C2	N22	-62.4(6)	N22	C9BA	C0CA	C7BA	25.8(7)
N5	C34	C2	C3	79.7(7)	N22	C1	C4	C3	25.3(7)
O2BA	C5BA	C6BA	C37	-95.6(6)	N22	C2	C3	C4	32.5(7)
O2BA	C5BA	C6BA	C2BA	-134.1(5)	O23	C34	C9BA	N22	175.6(4)
C3BA	C25	C58	C35	0.0	O23	C34	C9BA	C0CA	-79.8(6)
C25	C3BA	C7AA	C29	0.0	O23	C34	C2	N22	136.8(5)
C25	C3BA	C5AA	C2AA	-77.7(3)	O23	C34	C2	C3	-81.1(9)
C25	C58	C35	C29	0.0	C26	C1AA	C8AA	C31	3.0(6)
C25	C58	C35	C37	-176.6(3)	C27	C21	C31	C8AA	1.4(8)
C25	C58	C35	C2BA	-178.8(4)	C31	C21	C27	C26	0.8(8)
C58	C35	C29	C7AA	0.0	C32	C3AA	N22	C8BA	-177.4(6)
C58	C35	C37	C0BA	129.6(3)	C32	C3AA	N22	C9BA	37.7(6)
C58	C35	C37	C6BA	-103.3(4)	C32	C0BA	C37	C35	-53.7(6)
C58	C35	C2BA	C0BA	87.3(5)	C32	C0BA	C37	C6BA	-174.4(6)
C58	C35	C2BA	C6BA	-57.8(5)	C34	N5	C4BA	C1BA	-105.9(4)
C35	C29	C7AA	C3BA	0.0	C34	N5	C4BA	C0AA	132.0(4)
C35	C37	C6BA	C5BA	-168.7(4)	C34	C9BA	C0CA	C7BA	-87.5(7)
C29	C35	C37	C0BA	-46.2(6)	C34	C2	C3	C4	-109.3(7)
C29	C35	C37	C6BA	80.8(6)	C37	C35	C29	C7AA	175.3(4)
C29	C35	C2BA	C0BA	-91.7(4)	C37	C0BA	C32	C3AA	179.4(5)
C29	C35	C2BA	C6BA	123.2(3)	C4AA	C3AA	N22	C1	176.8(4)
C7AA	C3BA	C25	C58	0.0	C4AA	C3AA	N22	C2	-6.6(9)
C7AA	C3BA	C5AA	C2AA	96.9(3)	C4AA	C0BA	C2BA	C35	62.9(6)

C4BA	N5	C34	O23	10.6(6)	C4AA	C0BA	C2BA	C6BA	-166.9(6)
C4BA	N5	C34	C9BA	170.9(4)	C2BA	C35	C29	C7AA	179.1(3)
C4BA	N5	C34	C2	-152.2(3)	C2BA	C0BA	C4AA	C3AA	-172.3(5)
C4BA	C0AA	C1AA	C8AA	-65.7(5)	C8BA	N22	C9BA	C34	102.9(6)
C4BA	C0AA	C1AA	C26	114.8(4)	C8BA	N22	C9BA	C0CA	-3.3(8)
C5BA	C6BA	C2BA	C35	169.6(4)	C8BA	C7BA	C0CA	C9BA	-38.6(8)
C5BA	C6BA	C2BA	C0BA	36.4(9)	C9BA	N22	C8BA	C7BA	-21.2(8)
C0AA	C1AA	C8AA	C31	-176.5(4)	C0CA	C7BA	C8BA	N22	37.3(8)
C0AA	C1AA	C26	C27	178.6(4)	C1	N22	C2	C34	133.3(5)
N11	C5BA	C6BA	C37	86.7(6)	C1	N22	C2	C3	-13.9(6)
N11	C5BA	C6BA	C2BA	48.3(6)	C2	N22	C1	C4	-7.6(6)
C1AA	C8AA	C31	C21	-3.3(8)	C2	C3	C4	C1	-34.5(7)
C1AA	C26	C27	C21	-0.9(8)					

Supplementary Table 24 Hydrogen Atom Coordinates ($Å \times 10^4$) and Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **17.**

Atom	***x***	***y***	***z***	**U(eq)**
H3	-2611	-9685	-2677	36
H5	-6882	-9277	-3478	40
H25	-5684	-10590	-1069	60
H58	-8065	-11034	-1266	79
H29	-6733	-12122	-2752	70
H7AA	-4352	-11678	-2555	55
H4BA	-3975	-9802	-3473	33
H0AA	-5109	-8009	-3423	43
H0AB	-3415	-8241	-3404	43
H11A	-12396	-13589	-2464	57
H11B	-10917	-13327	-2699	57

H2AA	-3984	-9398	-1656	36
H5AA	-2593	-11086	-1917	45
H5AB	-3046	-10815	-1285	45
H8AA	-2577	-9269	-4265	61
H0BC	-9448	-11813	-2909	49
H0BD	-10883	-11397	-2637	49
H0BA	-10034	-10885	-2358	49
H0BB	-10753	-11641	-2742	49
H21	-4037	-8374	-5776	73
H26	-6041	-7625	-4307	72
H27	-5890	-7607	-5315	87
H31	-2361	-9172	-5243	83
H32A	-8268	-10510	-2743	40
H32B	-9714	-10094	-2477	40
H37	-9748	-11335	-1724	39
H6BA	-9606	-12309	-1505	68
H6BB	-8980	-13142	-1852	68
H6BC	-9377	-12707	-1471	68
H6BD	-9017	-13022	-2098	68
H9AA	194	-9584	-562	149
H9AB	-153	-8614	-823	149
H9AC	746	-9333	-1185	149
H4AA	-8109	-10788	-3035	40
H4AB	-9009	-11457	-3430	40
H2BA	-8786	-12442	-2610	39
H7BA	-7482	-9626	-4720	104
H7BB	-8651	-10120	-5122	104
H8BA	-9623	-9167	-4312	54

H8BB	-10394	-10122	-4427	54
H9BA	-8093	-11410	-3644	51
H0CA	-6774	-11119	-4635	59
H0CB	-8428	-11472	-4637	59
H1A	-10523	-9414	-4517	54
H1B	-9795	-8666	-4117	54
H2	-7926	-11031	-4216	51
H3A	-6644	-9935	-4882	59
H3B	-8156	-10423	-5019	59
H4A	-7756	-8603	-4646	104
H4B	-8828	-8954	-5139	104

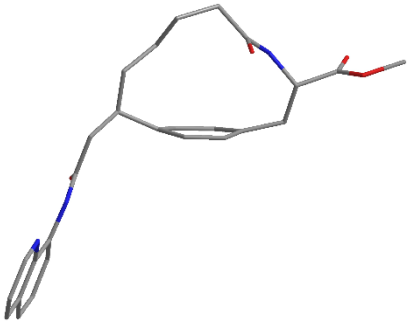
Supplementary Table 25 Atomic Occupancy for Compound **17**.

Atom	***Occupancy***	**Atom**	***Occupancy***	**Atom**	***Occupancy***
H0BC	0.5	H0BD	0.5	H0BA	0.5
H0BB	0.5	C32	0.5	H32A	0.5
H32B	0.5	C37	0.5	H37	0.5
H6BA	0.5	H6BB	0.5	H6BC	0.5
H6BD	0.5	C4AA	0.5	H4AA	0.5
H4AB	0.5	C2BA	0.5	H2BA	0.5
C7BA	0.5	H7BA	0.5	H7BB	0.5
C8BA	0.5	H8BA	0.5	H8BB	0.5
C9BA	0.5	H9BA	0.5	C0CA	0.5
H0CA	0.5	H0CB	0.5	C1	0.5
H1A	0.5	H1B	0.5	C2	0.5
H2	0.5	C3	0.5	H3A	0.5
H3B	0.5	C4	0.5	H4A	0.5
H4B	0.5				

Supplementary Table 26 Solvent masks information for Compound **17**.

Number	X	Y	Z	Volume	Electron count	Content
1	-0.054	0.250	0.000	368	41	
2	0.030	0.750	0.500	368	41	

12.5 X-ray crystallographic data for compound **29a**



Supplementary Figure 50. X-ray structure of compound **29a**

29a and **29b**, two diastereomers of compound **29**, were separated by silica gel chromatography. Single crystals for X-ray studies were grown by slow evaporation of a solution of compound **29a** in a mixture of acetone and hexane at room temperature. The X-ray data of **29a** is deposited in the Cambridge Crystallographic Data Centre with a number of CCDC 1526700.

Supplementary Table 27 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **29a**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	*x*	*y*	*z*	U(eq)
O14	7484.4(18)	5972.9(14)	1326.9(13)	27.8(5)

O24	9245.2(17)	7512.7(14)	-3561.4(13)	25.7(5)
N16	9221.9(19)	5755.9(16)	-3680.1(14)	19.0(5)
N25	8781(2)	9233.0(18)	2609.7(15)	22.3(5)
O21	10681(2)	4352.6(16)	-4690.1(15)	37.3(6)
O19	11740.2(18)	5803.1(15)	-4755.2(13)	26.6(5)
C2	6799(2)	6582(2)	-2143.0(17)	20.8(6)
C18	10958(2)	5183(2)	-4385.6(19)	21.7(6)
C1	7306(2)	6588(2)	-485.3(17)	18.7(6)
C27	8578(2)	7386(2)	2555.5(17)	19.4(6)
C7	7406(2)	6715(2)	-3723.1(16)	18.9(6)
N15	8232(2)	7543.8(17)	1690.7(14)	20.8(5)
C30	9398(3)	7207(2)	4272.4(19)	29.9(7)
C26	8882(2)	8300(2)	3029.8(17)	19.2(6)
C5	9312(2)	6779(2)	-1113.7(18)	22.2(6)
C17	10455(2)	5651(2)	-3563.9(19)	22.0(6)
C13	7704(2)	6876(2)	1135.0(17)	18.6(6)
C11	6762(3)	7169(2)	-1272.4(18)	23.2(6)
C12	7389(2)	7355(2)	272.3(17)	20.4(6)
C6	8514(3)	5080(2)	-976.9(17)	21.3(6)
C33	9516(3)	10057(2)	3904(2)	32.5(8)
C8	10123(3)	6396(2)	-1690(2)	25.2(7)
C31	9288(2)	8204(2)	3893.3(18)	22.8(6)
C22	10768(3)	5001(2)	-2751(2)	27.5(7)
C23	8700(2)	6701.5(19)	-3641.1(16)	17.5(6)
C4	6885(2)	7291(2)	-2938.2(17)	19.0(6)
C34	9090(3)	10072(2)	3046(2)	27.7(7)
C3	8439(2)	6143(2)	-790.5(17)	18.2(6)
C28	8681(3)	6418(2)	2946.9(19)	25.9(7)

C9	9324(3)	4699(2)	-1561.9(18)	23.2(6)
C10	10098(2)	5360(2)	-1968.1(19)	23.0(6)
C20	12262(3)	5427(2)	-5562.2(19)	29.6(7)
C29	9103(3)	6346(2)	3807(2)	30.6(7)
C32	9611(3)	9131(3)	4326(2)	31.0(7)

Supplementary Table 28 Anisotropic Displacement Parameters ($Å^2×10^3$) for Compound **29a**. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	**U_{11}**	**U_{22}**	**U_{33}**	**U_{23}**	**U_{13}**	**U_{12}**
O14	36.9(12)	18.9(10)	27.6(11)	2.9(9)	-6(1)	-8.6(9)
O24	25.1(11)	15.7(10)	36.1(12)	-2.9(8)	1.9(9)	-3.5(9)
N16	18.6(12)	13.4(11)	25.0(12)	-2.8(9)	-0.5(10)	-2.1(10)
N25	20.2(12)	20.9(12)	25.7(12)	-4(1)	-2.8(10)	2.7(10)
O21	43.2(14)	24.6(11)	44.2(14)	-12(1)	17.1(12)	-6.4(11)
O19	31.6(11)	23.8(10)	24.4(10)	-2.0(9)	5.6(9)	-1.8(10)
C2	22.4(14)	17.4(13)	22.5(14)	-0.1(11)	-5.3(12)	2.9(12)
C18	18.1(14)	18.8(14)	28.2(16)	-2.5(12)	0.3(12)	0.9(12)
C1	19.9(14)	18.4(13)	17.9(14)	-1.1(11)	-1.5(11)	-0.2(12)
C27	18.4(14)	22.3(14)	17.6(13)	0.2(11)	-1.4(11)	1.1(12)
C7	21.6(14)	16.8(13)	18.3(13)	0.1(11)	-3.5(12)	2.6(12)
N15	29.5(13)	13.8(11)	19.2(12)	2.0(9)	-2.8(10)	-4.1(10)
C30	25.2(16)	47.8(19)	16.6(14)	9.8(13)	-0.9(13)	-4.7(15)
C26	13.1(13)	24.4(14)	20.2(13)	-0.9(12)	0.4(11)	2.0(12)
C5	23.3(14)	20.7(14)	22.5(14)	-5.9(12)	-5.5(12)	-2.4(13)
C17	16.7(14)	19.4(14)	30.0(16)	-4.7(12)	-0.2(12)	1.6(12)
C13	16.7(13)	19.3(14)	19.8(13)	-3.4(11)	2.4(12)	-0.2(12)
C11	25.5(15)	21.5(14)	22.6(15)	-2.4(12)	-3.7(13)	5.9(12)

C12	23.0(15)	17.3(13)	20.8(14)	-1.9(11)	-0.4(12)	1.3(12)
C6	27.5(15)	20.2(14)	16.3(13)	2.3(11)	-7.0(12)	4.0(12)
C33	22.2(16)	35.7(18)	39.7(19)	-19.9(15)	-5.4(15)	1.5(14)
C8	17.6(15)	30.8(16)	27.3(16)	-6.0(13)	-4.6(13)	-2.6(13)
C31	12.7(13)	37.6(16)	18.2(13)	-3.9(13)	1.9(11)	-1.5(13)
C22	20.7(15)	30.8(16)	31.0(17)	-4.1(13)	-2.3(13)	8.5(14)
C23	22.5(14)	14.8(13)	15.4(13)	-0.9(11)	0.7(11)	0.3(12)
C4	18.0(14)	17.7(13)	21.3(14)	-1.5(11)	-3.5(12)	3.0(12)
C34	22.0(16)	20.9(15)	40.2(18)	-9.6(13)	-2.1(14)	3.1(13)
C3	20.9(15)	21.1(14)	12.6(12)	-1.6(10)	-6.5(12)	2.9(12)
C28	25.4(16)	24.9(15)	27.4(16)	7.3(13)	-3.1(14)	-6.0(13)
C9	28.7(16)	17.5(13)	23.3(15)	-0.8(11)	-8.7(13)	10.5(13)
C10	16.8(14)	27.5(15)	24.6(15)	-2.2(12)	-7.3(12)	8.1(13)
C20	35.7(18)	27.8(16)	25.1(16)	1.7(12)	3.4(14)	-2.0(15)
C29	26.6(16)	33.8(17)	31.4(17)	15.9(14)	-2.3(15)	-5.5(14)
C32	19.2(15)	52(2)	22.2(16)	-14.9(15)	-2.5(13)	2.6(15)

Supplementary Table 29 Bond Lengths for Compound **29a**.

Atom	**Atom**	**Length/Å**	**Atom**	**Atom**	**Length/Å**
O14	C13	1.225(3)	C7	C4	1.539(4)
O24	C23	1.227(3)	N15	C13	1.358(3)
N16	C17	1.456(3)	C30	C31	1.412(4)
N16	C23	1.361(3)	C30	C29	1.361(4)
N25	C26	1.367(4)	C26	C31	1.412(4)
N25	C34	1.319(4)	C5	C8	1.385(4)
O21	C18	1.209(3)	C5	C3	1.397(4)
O19	C18	1.338(3)	C17	C22	1.545(4)
O19	C20	1.461(3)	C13	C12	1.505(4)

C2	C11	1.534(4)	C6	C3	1.399(4)
C2	C4	1.526(4)	C6	C9	1.392(4)
C18	C17	1.516(4)	C33	C34	1.407(4)
C1	C11	1.554(4)	C33	C32	1.359(5)
C1	C12	1.527(4)	C8	C10	1.399(4)
C1	C3	1.516(4)	C31	C32	1.416(4)
C27	N15	1.401(3)	C22	C10	1.506(4)
C27	C26	1.427(4)	C28	C29	1.411(4)
C27	C28	1.386(4)	C9	C10	1.388(4)
C7	C23	1.516(4)			

Supplementary Table 30 Bond Angles for Compound **29a**.

Atom	**Atom**	**Atom**	**Angle/°**	**Atom**	**Atom**	**Atom**	**Angle/°**
C23	N16	C17	121.3(2)	N15	C13	C12	113.8(2)
C34	N25	C26	117.0(2)	C2	C11	C1	115.4(2)
C18	O19	C20	116.5(2)	C13	C12	C1	114.9(2)
C4	C2	C11	113.9(2)	C9	C6	C3	121.2(3)
O21	C18	O19	123.0(3)	C32	C33	C34	119.1(3)
O21	C18	C17	124.6(3)	C5	C8	C10	121.3(3)
O19	C18	C17	112.3(2)	C30	C31	C32	123.1(3)
C12	C1	C11	107.9(2)	C26	C31	C30	119.8(3)
C3	C1	C11	107.3(2)	C26	C31	C32	117.1(3)
C3	C1	C12	115.0(2)	C10	C22	C17	110.8(2)
N15	C27	C26	115.8(2)	O24	C23	N16	122.1(2)
C28	C27	N15	124.4(3)	O24	C23	C7	121.0(2)
C28	C27	C26	119.8(2)	N16	C23	C7	116.9(2)
C23	C7	C4	109.6(2)	C2	C4	C7	111.4(2)
C13	N15	C27	129.3(2)	N25	C34	C33	124.1(3)

C29	C30	C31	119.9(3)	C5	C3	C1	121.6(2)
N25	C26	C27	117.4(2)	C5	C3	C6	117.0(3)
N25	C26	C31	123.2(3)	C6	C3	C1	119.1(2)
C31	C26	C27	119.3(3)	C27	C28	C29	119.6(3)
C8	C5	C3	121.1(3)	C10	C9	C6	121.1(3)
N16	C17	C18	108.6(2)	C8	C10	C22	121.7(3)
N16	C17	C22	112.5(2)	C9	C10	C8	117.3(3)
C18	C17	C22	111.3(2)	C9	C10	C22	120.5(3)
O14	C13	N15	122.9(2)	C30	C29	C28	121.7(3)
O14	C13	C12	123.2(2)	C33	C32	C31	119.5(3)

Supplementary Table 31 Torsion Angles for Compound **29a.**

A	**B**	**C**	**D**	**Angle/°**	**A**	**B**	**C**	**D**	**Angle/°**
O14	C13	C12	C1	-27.6(4)	C11	C1	C3	C6	-103.2(3)
N16	C17	C22	C10	-47.9(3)	C12	C1	C11	C2	169.8(2)
N25	C26	C31	C30	-178.2(3)	C12	C1	C3	C5	-60.8(3)
N25	C26	C31	C32	-0.7(4)	C12	C1	C3	C6	136.7(2)
O21	C18	C17	N16	-58.2(4)	C6	C9	C10	C8	7.4(4)
O21	C18	C17	C22	66.2(4)	C6	C9	C10	C22	-164.9(3)
O19	C18	C17	N16	120.6(2)	C8	C5	C3	C1	-154.3(3)
O19	C18	C17	C22	-115.1(3)	C8	C5	C3	C6	8.6(4)
C18	C17	C22	C10	-170.0(2)	C31	C30	C29	C28	-0.1(5)
C27	N15	C13	O14	-2.8(4)	C23	N16	C17	C18	-119.6(3)
C27	N15	C13	C12	175.8(3)	C23	N16	C17	C22	116.8(3)
C27	C26	C31	C30	0.6(4)	C23	C7	C4	C2	-81.5(3)
C27	C26	C31	C32	178.1(2)	C4	C2	C11	C1	-148.8(2)
C27	C28	C29	C30	1.0(5)	C4	C7	C23	O24	-55.8(3)
N15	C27	C26	N25	1.6(4)	C4	C7	C23	N16	125.6(2)

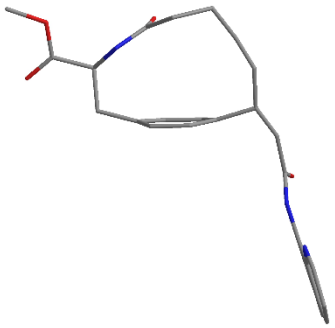
N15	C27	C26	C31	-177.3(2)	C34	N25	C26	C27	-178.4(3)
N15	C27	C28	C29	176.2(3)	C34	N25	C26	C31	0.4(4)
N15	C13	C12	C1	153.9(2)	C34	C33	C32	C31	0.5(4)
C30	C31	C32	C33	177.6(3)	C3	C1	C11	C2	45.3(3)
C26	N25	C34	C33	0.3(4)	C3	C1	C12	C13	-70.5(3)
C26	C27	N15	C13	-166.7(3)	C3	C5	C8	C10	0.0(4)
C26	C27	C28	C29	-1.0(4)	C3	C6	C9	C10	1.2(4)
C26	C31	C32	C33	0.2(4)	C28	C27	N15	C13	15.9(5)
C5	C8	C10	C22	164.2(3)	C28	C27	C26	N25	179.1(3)
C5	C8	C10	C9	-8.0(4)	C28	C27	C26	C31	0.2(4)
C17	N16	C23	O24	4.6(4)	C9	C6	C3	C1	154.1(3)
C17	N16	C23	C7	-176.8(2)	C9	C6	C3	C5	-9.2(4)
C17	C22	C10	C8	-55.5(4)	C20	O19	C18	O21	-0.1(4)
C17	C22	C10	C9	116.5(3)	C20	O19	C18	C17	-178.9(2)
C11	C2	C4	C7	156.5(2)	C29	C30	C31	C26	-0.7(4)
C11	C1	C12	C13	169.7(2)	C29	C30	C31	C32	-178.0(3)
C11	C1	C3	C5	59.3(3)	C32	C33	C34	N25	-0.8(5)

Supplementary Table 32 Hydrogen Atom Coordinates (Å×10^4) and Isotropic Displacement Parameters (Å^2×10^3) for Compound **29a**.

Atom	***x***	***y***	***z***	**U(eq)**
H16	8806	5197	-3777	23
H2A	7464	6105	-2140	25
H2B	6098	6153	-2196	25
H1	6790	6002	-312	22
H7A	7112	5993	-3744	23
H7B	7183	7069	-4270	23
H15	8378	8165	1477	25

H30	9679	7138	4851	36
H5	9349	7486	-935	27
H17	10785	6364	-3488	26
H11A	5952	7324	-1131	28
H11B	7163	7842	-1347	28
H12A	7968	7890	125	24
H12B	6642	7712	336	24
H6	8003	4609	-699	26
H33	9735	10686	4184	39
H8	10707	6846	-1900	30
H22A	10600	4258	-2865	33
H22B	11598	5068	-2632	33
H4A	7367	7901	-2794	23
H4B	6112	7547	-3094	23
H34	9020	10726	2763	33
H28	8468	5807	2638	31
H9	9347	3975	-1685	28
H20A	12683	4783	-5445	44
H20B	12790	5955	-5788	44
H20C	11661	5292	-5994	44
H29	9183	5680	4068	37
H32	9892	9107	4907	37

12.6 X-ray crystallographic data for compound **29b**



Supplementary Figure 51. X-ray structure of compound **29b**

Single crystals for X-ray studies were grown by slow evaporation of a solution of compound **29b** in a mixture of acetone and hexane at room temperature. The X-ray data of **29b** is deposited in the Cambridge Crystallographic Data Centre with a number of CCDC 1526703.

Supplementary Table 33 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **29b**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	***x***	***y***	***z***	**U(eq)**
N24	-7020(4)	-2036(3)	-1519(2)	57.5(13)
N58	3938(4)	-2955(3)	-359.1(19)	54.4(13)
O23	-1381(4)	-6722(3)	-425.2(19)	76.2(14)
N16	-1839(4)	-6224(3)	423.4(19)	62.1(14)
O57	-1434(3)	-3909(3)	-3739.2(17)	67.7(12)
N15	-5225(4)	-2822(3)	-1528.2(19)	60.1(14)
C38	644(5)	-2807(4)	-2323(2)	55.6(16)
N49	-1084(4)	-2502(3)	-3634.9(17)	50.3(12)
C39	-590(5)	-3867(4)	-2133(2)	54.8(16)
O52	-2472(4)	-1682(3)	-4250.9(18)	76.6(14)
C34	1198(5)	-4336(4)	-2207(2)	50.1(14)
C25	-6260(5)	-1622(4)	-1786(2)	53.0(15)

C60	2385(5)	-3694(4)	-250(2)	54.3(15)
C36	407(5)	-3654(4)	-2190(2)	47.1(15)
C50	-2007(5)	-2271(4)	-3371(2)	52.2(15)
C5	-3201(5)	-4571(4)	-810(2)	52.2(15)
N48	2345(4)	-3714(3)	-851.7(18)	55.0(13)
C22	-2027(6)	-6598(4)	-73(3)	58.7(17)
C26	-5304(5)	-2010(4)	-1797(2)	52.0(15)
C59	3225(5)	-3275(4)	-11(2)	50.1(15)
C3	-3528(5)	-4507(4)	-256(2)	60.1(17)
O47	1162(4)	-4714(3)	-1013.7(17)	80.1(14)
C46	1794(5)	-4219(4)	-1193(2)	55.7(16)
C63	2568(6)	-3597(5)	915(3)	78(2)
C41	-109(5)	-2225(4)	-2455(2)	57.0(16)
C2	-2184(5)	-4499(4)	-901(2)	60.1(17)
C13	-4571(5)	-3465(4)	-1643(2)	59.4(17)
O14	-3891(4)	-3391(3)	-1977.9(18)	85.7(16)
C9	-1854(5)	-4517(4)	93(2)	56.7(16)
O54	-3213(4)	-1136(4)	-3492(2)	97.2(17)
C51	-2628(5)	-1634(4)	-3704(3)	60.9(17)
C64	3305(5)	-3216(4)	581(2)	62.4(17)
C45	2074(5)	-4171(4)	-1811(2)	58.8(16)
C42	-1334(5)	-3289(4)	-2271(2)	58.7(17)
C6	-3322(5)	-6431(4)	-1186(2)	68.1(19)
O19	-736(4)	-6622(4)	1312(2)	98.7(18)
C12	-4806(5)	-4289(4)	-1350(2)	60.1(17)
C17	-936(5)	-5746(4)	516(2)	62.5(17)
C29	-5565(8)	-417(5)	-2292(3)	88(3)
C11	-2864(6)	-4477(4)	181(3)	66.6(18)

C8	-4185(5)	-5797(4)	-1160(2)	65.6(18)
C1	-3121(6)	-6854(4)	-165(2)	69.3(19)
C55	-1851(5)	-1925(4)	-2768(2)	59.4(17)
C43	-1104(5)	-2466(4)	-2464(2)	51.4(15)
C65	4147(6)	-2796(5)	799(3)	75(2)
C56	-839(5)	-3320(4)	-3757(2)	54.3(16)
C7	-3885(5)	-4862(4)	-1275(2)	56.9(16)
C62	1796(6)	-4021(6)	679(3)	90(3)
C44	1556(5)	-4432(4)	-2825(2)	60.4(17)
C66	4839(6)	-2483(5)	452(3)	74(2)
C21	-1149(6)	-4770(4)	562(2)	68.8(18)
C10	-1516(5)	-4476(4)	-463(3)	63.1(17)
O20	479(6)	-5751(5)	1116(3)	130(2)
C67	4709(6)	-2582(4)	-127(3)	66.9(18)
C30	-6382(6)	-812(4)	-2035(2)	63.9(19)
C4	-3347(6)	-7149(4)	-756(2)	76(2)
C61	1695(5)	-4065(5)	90(2)	71.7(19)
C33	-7894(5)	-1645(5)	-1502(3)	71.4(19)
C32	-8075(7)	-849(5)	-1740(3)	90(2)
C31	-7334(8)	-444(5)	-2012(3)	88(3)
C40	304(7)	-3458(5)	-3883(4)	115(4)
C35	739(5)	-4654(5)	-3240(2)	75(2)
C18	-343(8)	-6040(6)	1015(3)	90(3)
C27	-4532(6)	-1609(5)	-2052(2)	75(2)
C37	703(8)	-4316(7)	-3813(3)	116(3)
C28	-4659(8)	-811(5)	-2299(3)	90(3)
C53	-3084(7)	-1129(5)	-4604(3)	106(3)
O1	239(4)	-1012(3)	-3674.3(18)	79.2(14)

C0AA	-71(11)	-6890(8)	1783(4)	197(7)

Supplementary Table 34 Anisotropic Displacement Parameters ($Å^2×10^3$) for Compound **29b**. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	**U_{11}**	**U_{22}**	**U_{33}**	**U_{23}**	**U_{13}**	**U_{12}**
N24	55(4)	49(3)	69(3)	-6(2)	-9(3)	4(3)
N58	52(3)	60(3)	52(3)	-3(2)	-3(3)	-2(3)
O23	86(4)	71(3)	71(3)	-16(2)	6(3)	6(3)
N16	65(4)	63(3)	58(3)	2(2)	0(3)	-10(3)
O57	80(3)	47(2)	76(3)	-2(2)	0(2)	-5(3)
N15	55(3)	62(3)	63(3)	10(3)	11(3)	15(3)
C38	57(4)	59(4)	51(3)	-7(3)	-8(3)	-6(4)
N49	50(3)	48(3)	53(3)	0(2)	6(2)	-4(3)
C39	60(4)	57(4)	47(3)	9(3)	7(3)	-3(4)
O52	94(4)	73(3)	63(3)	-6(2)	-16(3)	20(3)
C34	52(4)	49(3)	49(3)	3(3)	-7(3)	-5(3)
C25	67(5)	48(3)	44(3)	-4(3)	-6(3)	7(4)
C60	47(4)	67(4)	49(3)	3(3)	3(3)	-2(3)
C36	56(4)	49(3)	37(3)	-1(2)	-3(3)	-3(3)
C50	46(4)	53(3)	57(3)	0(3)	-2(3)	0(3)
C5	57(4)	46(3)	53(3)	3(3)	1(3)	7(3)
N48	48(3)	68(3)	50(3)	2(2)	2(2)	-8(3)
C22	79(5)	46(3)	51(4)	-1(3)	-4(4)	-2(4)
C26	56(4)	51(3)	49(3)	3(3)	5(3)	0(3)
C59	50(4)	60(4)	41(3)	0(3)	-4(3)	8(3)
C3	54(4)	64(4)	62(4)	-10(3)	6(3)	5(3)
O47	83(4)	96(3)	62(3)	11(2)	-4(3)	-38(3)

C46	53(4)	62(4)	51(3)	2(3)	-10(3)	0(4)
C63	65(5)	120(6)	48(4)	1(4)	4(4)	-2(5)
C41	68(5)	53(4)	50(3)	-10(3)	-3(3)	2(4)
C2	67(5)	60(4)	53(3)	11(3)	3(4)	-2(4)
C13	63(4)	64(4)	51(3)	6(3)	2(3)	18(4)
O14	79(3)	99(4)	79(3)	25(3)	34(3)	36(3)
C9	57(4)	52(4)	61(4)	-8(3)	-9(3)	-4(3)
O54	89(4)	110(4)	92(3)	-9(3)	-9(3)	47(4)
C51	57(4)	58(4)	68(4)	-11(3)	-10(4)	6(4)
C64	60(4)	76(4)	52(4)	-5(3)	1(3)	11(4)
C45	56(4)	65(4)	55(3)	-3(3)	-5(3)	3(3)
C42	56(4)	76(4)	44(3)	1(3)	9(3)	-2(4)
C6	81(5)	55(4)	68(4)	-3(3)	-6(4)	7(4)
O19	96(4)	114(4)	87(3)	29(3)	-20(3)	2(4)
C12	63(4)	56(4)	62(3)	4(3)	-9(3)	10(3)
C17	59(4)	72(4)	57(3)	0(3)	-7(3)	-1(4)
C29	148(9)	59(4)	56(4)	12(3)	-8(5)	-1(6)
C11	71(5)	74(4)	54(3)	-18(3)	-2(4)	10(4)
C8	78(5)	57(4)	62(4)	1(3)	-4(3)	1(4)
C1	87(5)	55(4)	66(4)	11(3)	-10(4)	-13(4)
C55	61(4)	66(4)	51(3)	-11(3)	5(3)	14(4)
C43	57(4)	59(4)	38(3)	1(3)	0(3)	6(3)
C65	79(6)	96(5)	49(4)	-9(4)	-9(4)	4(5)
C56	73(5)	48(4)	42(3)	0(3)	2(3)	11(4)
C7	62(4)	57(4)	52(3)	3(3)	1(3)	13(3)
C62	69(5)	145(8)	55(4)	14(4)	19(4)	-17(6)
C44	65(4)	57(4)	59(3)	-1(3)	3(3)	3(4)
C66	71(5)	85(5)	66(4)	-8(4)	-14(4)	-4(4)

C21	77(5)	65(4)	65(4)	-10(3)	-9(4)	1(4)
C10	58(4)	54(4)	77(4)	9(3)	6(4)	-6(3)
O20	112(5)	124(5)	154(5)	18(4)	-66(5)	-13(5)
C67	70(5)	68(4)	63(4)	-2(3)	1(4)	-11(4)
C30	91(6)	49(4)	52(3)	2(3)	-11(4)	11(4)
C4	103(6)	56(4)	69(4)	0(3)	-19(4)	4(4)
C61	54(4)	99(5)	62(4)	5(3)	1(3)	-13(4)
C33	57(5)	72(5)	85(5)	-22(4)	-16(4)	12(4)
C32	95(7)	74(5)	100(5)	-11(4)	-24(5)	37(5)
C31	137(9)	51(4)	75(5)	-5(4)	-31(5)	32(5)
C40	147(8)	54(4)	145(7)	7(5)	114(7)	4(5)
C35	85(5)	89(5)	53(4)	-13(3)	-8(4)	24(5)
C18	107(8)	78(6)	85(6)	-13(5)	-15(6)	19(6)
C27	82(6)	80(5)	64(4)	5(4)	26(4)	-3(5)
C37	106(8)	146(9)	94(6)	14(6)	30(5)	31(7)
C28	115(8)	77(5)	77(5)	9(4)	22(5)	-17(6)
C53	132(8)	97(6)	89(5)	3(4)	-45(6)	34(6)
O1	82(4)	73(3)	83(3)	17(3)	9(3)	-2(3)
C0AA	317(18)	195(12)	79(6)	15(7)	-15(9)	142(13)

Supplementary Table 35 Bond Lengths for Compound **29b.**

Atom	**Atom**	**Length/Å**	**Atom**	**Atom**	**Length/Å**
N24	C25	1.363(8)	C46	C45	1.517(8)
N24	C33	1.321(8)	C63	C64	1.398(9)
N58	C59	1.359(7)	C63	C62	1.350(9)
N58	C67	1.307(8)	C41	C43	1.385(9)
O23	C22	1.220(7)	C2	C10	1.373(8)
N16	C22	1.339(7)	C13	O14	1.214(7)

N16	C17	1.437(8)	C13	C12	1.495(9)
O57	C56	1.216(7)	C9	C11	1.371(9)
N15	C26	1.421(7)	C9	C21	1.512(9)
N15	C13	1.359(8)	C9	C10	1.398(8)
C38	C36	1.394(8)	O54	C51	1.212(7)
C38	C41	1.392(8)	C64	C65	1.404(9)
N49	C50	1.433(7)	C42	C43	1.397(8)
N49	C56	1.348(7)	C6	C8	1.521(9)
C39	C36	1.384(8)	C6	C4	1.516(8)
C39	C42	1.384(8)	O19	C18	1.262(10)
O52	C51	1.318(7)	O19	C0AA	1.491(11)
O52	C53	1.455(8)	C12	C7	1.534(9)
C34	C36	1.501(8)	C17	C21	1.551(9)
C34	C45	1.526(8)	C17	C18	1.501(10)
C34	C44	1.552(8)	C29	C30	1.396(11)
C25	C26	1.418(8)	C29	C28	1.361(11)
C25	C30	1.404(8)	C8	C7	1.537(9)
C60	N48	1.430(7)	C1	C4	1.509(8)
C60	C59	1.421(8)	C55	C43	1.494(8)
C60	C61	1.357(8)	C65	C66	1.331(9)
C50	C51	1.518(8)	C56	C40	1.576(10)
C50	C55	1.545(8)	C62	C61	1.406(9)
C5	C3	1.390(8)	C44	C35	1.514(8)
C5	C2	1.384(9)	C66	C67	1.396(8)
C5	C7	1.506(8)	O20	C18	1.214(10)
N48	C46	1.350(7)	C30	C31	1.400(11)
C22	C1	1.535(10)	C33	C32	1.384(10)
C26	C27	1.352(9)	C32	C31	1.343(11)

C59	C64	1.414(7)	C40	C37	1.450(11)
C3	C11	1.368(9)	C35	C37	1.459(9)
O47	C46	1.222(7)	C27	C28	1.386(10)

Supplementary Table 36 Bond Angles for Compound **29b**.

Atom	**Atom**	**Atom**	**Angle/°**	**Atom**	**Atom**	**Atom**	**Angle/°**
C33	N24	C25	117.2(6)	O54	C51	O52	123.3(6)
C67	N58	C59	117.5(5)	O54	C51	C50	123.8(6)
C22	N16	C17	121.2(5)	C63	C64	C59	118.9(6)
C13	N15	C26	127.9(5)	C63	C64	C65	123.9(6)
C41	C38	C36	120.1(6)	C65	C64	C59	117.2(6)
C56	N49	C50	122.8(5)	C46	C45	C34	113.5(5)
C42	C39	C36	121.0(6)	C39	C42	C43	121.1(6)
C51	O52	C53	116.5(6)	C4	C6	C8	115.8(6)
C36	C34	C45	114.0(5)	C18	O19	C0AA	111.8(8)
C36	C34	C44	108.2(4)	C13	C12	C7	112.5(5)
C45	C34	C44	111.2(5)	N16	C17	C21	111.4(6)
N24	C25	C26	118.8(5)	N16	C17	C18	114.1(6)
N24	C25	C30	122.4(6)	C18	C17	C21	109.9(6)
C30	C25	C26	118.8(7)	C28	C29	C30	120.5(7)
C59	C60	N48	116.1(5)	C3	C11	C9	121.7(6)
C61	C60	N48	124.2(6)	C6	C8	C7	114.1(6)
C61	C60	C59	119.7(5)	C4	C1	C22	113.8(6)
C38	C36	C34	120.3(6)	C43	C55	C50	110.0(5)
C39	C36	C38	118.0(6)	C41	C43	C42	117.1(6)
C39	C36	C34	120.9(5)	C41	C43	C55	120.0(6)
N49	C50	C51	114.2(5)	C42	C43	C55	121.9(6)
N49	C50	C55	112.1(5)	C66	C65	C64	120.1(6)

C51	C50	C55	109.3(5)	O57	C56	N49	123.1(6)
C3	C5	C7	121.7(6)	O57	C56	C40	122.8(6)
C2	C5	C3	117.0(6)	N49	C56	C40	114.0(6)
C2	C5	C7	120.5(5)	C5	C7	C12	113.6(5)
C46	N48	C60	129.3(5)	C5	C7	C8	108.2(5)
O23	C22	N16	122.7(7)	C12	C7	C8	111.2(6)
O23	C22	C1	122.6(6)	C63	C62	C61	120.6(7)
N16	C22	C1	114.7(6)	C35	C44	C34	114.5(5)
C25	C26	N15	116.1(5)	C65	C66	C67	118.9(7)
C27	C26	N15	123.8(6)	C9	C21	C17	108.5(5)
C27	C26	C25	120.1(6)	C2	C10	C9	120.3(6)
N58	C59	C60	118.8(5)	N58	C67	C66	124.2(6)
N58	C59	C64	121.9(6)	C29	C30	C25	119.3(7)
C64	C59	C60	119.2(6)	C29	C30	C31	123.5(8)
C11	C3	C5	121.0(6)	C31	C30	C25	117.3(8)
N48	C46	C45	114.6(6)	C1	C4	C6	113.4(5)
O47	C46	N48	122.5(5)	C60	C61	C62	120.5(7)
O47	C46	C45	122.7(5)	N24	C33	C32	123.9(8)
C62	C63	C64	120.9(6)	C31	C32	C33	119.2(8)
C43	C41	C38	121.7(6)	C32	C31	C30	120.0(7)
C10	C2	C5	121.6(6)	C37	C40	C56	117.4(7)
N15	C13	C12	113.7(6)	C37	C35	C44	123.4(7)
O14	C13	N15	123.1(6)	O19	C18	C17	116.1(9)
O14	C13	C12	123.1(6)	O20	C18	O19	122.3(9)
C11	C9	C21	121.1(6)	O20	C18	C17	121.5(9)
C11	C9	C10	117.5(6)	C26	C27	C28	120.8(8)
C10	C9	C21	120.4(6)	C40	C37	C35	116.9(7)
O52	C51	C50	112.9(6)	C29	C28	C27	120.5(8)

Supplementary Table 37 Torsion Angles for Compound **29b**.

A	B	C	D	Angle/°	A	B	C	D	Angle/°
N24	C25	C26	N15	0.8(8)	C41	C38	C36	C34	162.8(5)
N24	C25	C26	C27	-179.1(5)	C2	C5	C3	C11	-7.5(9)
N24	C25	C30	C29	178.7(5)	C2	C5	C7	C12	-131.6(6)
N24	C25	C30	C31	-1.6(8)	C2	C5	C7	C8	104.4(7)
N24	C33	C32	C31	0.9(11)	C13	N15	C26	C25	153.0(6)
N58	C59	C64	C63	-176.8(6)	C13	N15	C26	C27	-27.1(10)
N58	C59	C64	C65	1.3(10)	C13	C12	C7	C5	76.6(6)
O23	C22	C1	C4	-8.5(9)	C13	C12	C7	C8	-161.1(5)
N16	C22	C1	C4	171.2(5)	O14	C13	C12	C7	28.2(9)
N16	C17	C21	C9	-45.5(7)	C51	C50	C55	C43	-170.5(5)
N16	C17	C18	O19	-4.6(9)	C64	C63	C62	C61	-2.2(13)
N16	C17	C18	O20	173.2(8)	C64	C65	C66	C67	0.0(11)
O57	C56	C40	C37	-18.4(11)	C45	C34	C36	C38	59.5(6)
N15	C26	C27	C28	-179.1(6)	C45	C34	C36	C39	-130.9(5)
N15	C13	C12	C7	-155.7(5)	C45	C34	C44	C35	176.3(5)
C38	C41	C43	C42	7.5(8)	C42	C39	C36	C38	8.0(8)
C38	C41	C43	C55	-161.4(5)	C42	C39	C36	C34	-161.8(5)
N49	C50	C51	O52	27.9(7)	C6	C8	C7	C5	-65.0(6)
N49	C50	C51	O54	-152.5(6)	C6	C8	C7	C12	169.6(5)
N49	C50	C55	C43	-42.9(7)	C17	N16	C22	O23	16.5(9)
N49	C56	C40	C37	157.7(7)	C17	N16	C22	C1	-163.1(5)
C39	C42	C43	C41	-6.5(8)	C29	C30	C31	C32	-177.7(7)
C39	C42	C43	C55	162.2(5)	C11	C9	C21	C17	95.1(7)
C34	C44	C35	C37	143.1(7)	C11	C9	C10	C2	-7.7(9)
C25	N24	C33	C32	0.2(9)	C8	C6	C4	C1	-72.0(9)

C25	C26	C27	C28	0.8(9)	C55	C50	C51	O52	154.4(5)
C25	C30	C31	C32	2.6(10)	C55	C50	C51	O54	-26.1(9)
C60	N48	C46	O47	5.7(10)	C65	C66	C67	N58	1.0(11)
C60	N48	C46	C45	-169.9(5)	C56	N49	C50	C51	-123.1(6)
C60	C59	C64	C63	2.0(10)	C56	N49	C50	C55	112.0(6)
C60	C59	C64	C65	-180.0(6)	C56	C40	C37	C35	-67.3(12)
C36	C38	C41	C43	-0.7(8)	C7	C5	C3	C11	161.8(6)
C36	C39	C42	C43	-1.2(9)	C7	C5	C2	C10	-161.4(5)
C36	C34	C45	C46	67.0(6)	C62	C63	C64	C59	0.6(11)
C36	C34	C44	C35	-57.8(7)	C62	C63	C64	C65	-177.4(7)
C50	N49	C56	O57	12.4(8)	C44	C34	C36	C38	-64.7(6)
C50	N49	C56	C40	-163.7(5)	C44	C34	C36	C39	104.9(6)
C50	C55	C43	C41	94.9(6)	C44	C34	C45	C46	-170.4(5)
C50	C55	C43	C42	-73.5(7)	C44	C35	C37	C40	-80.9(11)
C5	C3	C11	C9	-0.7(10)	C21	C9	C11	C3	-160.0(6)
C5	C2	C10	C9	-0.5(9)	C21	C9	C10	C2	160.7(6)
N48	C60	C59	N58	-2.3(8)	C21	C17	C18	O19	121.3(7)
N48	C60	C59	C64	178.9(5)	C21	C17	C18	O20	-60.9(11)
N48	C60	C61	C62	179.4(6)	C10	C9	C11	C3	8.3(10)
N48	C46	C45	C34	-150.2(5)	C10	C9	C21	C17	-72.8(8)
C22	N16	C17	C21	109.5(6)	C67	N58	C59	C60	-179.2(6)
C22	N16	C17	C18	-125.3(6)	C67	N58	C59	C64	-0.4(9)
C22	C1	C4	C6	-70.7(8)	C30	C25	C26	N15	178.8(5)
C26	N15	C13	O14	6.2(10)	C30	C25	C26	C27	-1.1(8)
C26	N15	C13	C12	-169.9(6)	C30	C29	C28	C27	0.0(11)
C26	C25	C30	C29	0.8(8)	C4	C6	C8	C7	142.2(6)
C26	C25	C30	C31	-179.5(5)	C61	C60	N48	C46	-15.3(10)
C26	C27	C28	C29	-0.2(11)	C61	C60	C59	N58	175.9(6)

C59	N58	C67	C66	-0.8(10)	C61	C60	C59	C64	-2.9(9)
C59	C60	N48	C46	162.8(6)	C33	N24	C25	C26	178.1(5)
C59	C60	C61	C62	1.3(11)	C33	N24	C25	C30	0.1(8)
C59	C64	C65	C66	-1.0(10)	C33	C32	C31	C30	-2.4(11)
C3	C5	C2	C10	8.1(9)	C18	C17	C21	C9	-172.9(7)
C3	C5	C7	C12	59.4(7)	C28	C29	C30	C25	-0.3(10)
C3	C5	C7	C8	-64.6(7)	C28	C29	C30	C31	-180.0(7)
O47	C46	C45	C34	34.2(9)	C53	O52	C51	C50	176.3(6)
C63	C64	C65	C66	176.9(7)	C53	O52	C51	O54	-3.2(10)
C63	C62	C61	C60	1.2(12)	C0AA	O19	C18	C17	177.9(7)
C41	C38	C36	C39	-7.1(8)	C0AA	O19	C18	O20	0.1(12)

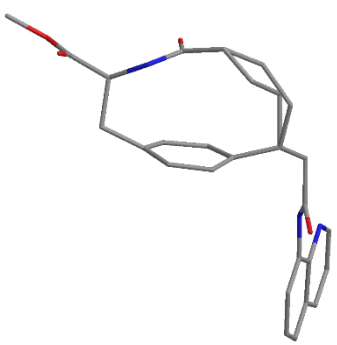
Supplementary Table 38 Hydrogen Atom Coordinates ($Å \times 10^4$) and Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **29b**.

Atom	***x***	***y***	***z***	**U(eq)**
H16	-2266	-6270	692	75
H15	-5642	-2919	-1260	72
H38	1307	-2630	-2324	67
H49	-668	-2102	-3719	60
H39	-763	-4408	-1998	66
H34	887	-4879	-2095	60
H50	-2403	-2797	-3338	63
H48	2728	-3353	-1020	66
H3	-4209	-4484	-181	72
H63	2610	-3558	1305	93
H41	60	-1661	-2538	68
H2	-1947	-4466	-1269	72
H45A	2592	-4590	-1887	71

H45B	2346	-3607	-1889	71
H42	-1999	-3451	-2235	70
H6A	-3309	-6684	-1559	82
H6B	-2704	-6115	-1137	82
H12A	-5306	-4598	-1564	72
H12B	-5087	-4162	-982	72
H17	-515	-5829	183	75
H29	-5641	118	-2459	105
H11	-3104	-4428	547	80
H8A	-4488	-5830	-789	79
H8B	-4686	-5968	-1433	79
H1A	-3289	-7312	96	83
H1B	-3543	-6366	-77	83
H55A	-1618	-1337	-2784	71
H55B	-2480	-1933	-2566	71
H65	4223	-2735	1186	90
H7	-3506	-4849	-1628	68
H62	1325	-4288	908	108
H44A	1867	-3899	-2941	73
H44B	2062	-4877	-2839	73
H66	5398	-2204	594	89
H21A	-1447	-4641	924	83
H21B	-531	-4450	530	83
H10	-836	-4432	-537	76
H67	5204	-2369	-364	80
H4A	-4003	-7413	-762	91
H4B	-2865	-7584	-863	91
H61	1153	-4350	-67	86

H33	-8418	-1920	-1320	86
H32	-8703	-598	-1712	108
H31	-7453	82	-2185	105
H40A	428	-3281	-4269	138
H40B	680	-3075	-3641	138
H35A	736	-5274	-3273	91
H35B	114	-4496	-3063	91
H27	-3909	-1871	-2061	90
H37A	1375	-4324	-3964	139
H37B	305	-4705	-4039	139
H28	-4120	-542	-2472	107
H53A	-2797	-1097	-4974	159
H53B	-3111	-565	-4443	159
H53C	-3746	-1361	-4629	159
H1C	-147	-613	-3786	119
H1D	603	-1178	-3946	119
H0AA	160	-7465	1718	295
H0AB	-435	-6869	2131	295
H0AC	491	-6509	1804	295

12.7 X-ray crystallographic data for compound **31a**



Supplementary Figure 52. X-ray structure of compound **31a**

31a, one of the two diastereomers of compound **31**, was obtained by silica gel chromatography. Single crystals for X-ray studies were grown by slow evaporation of a solution of compound **31a** in a mixture of acetone and hexane at room temperature. A disorder region over the γ and δ positions of pimelic acid was observed. The X-ray data of **31a** is deposited in the Cambridge Crystallographic Data Centre with a number of CCDC 1526704.

Supplementary Table 39 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **31a**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	***x***	***y***	***z***	**U(eq)**
O3	6879(3)	5867(3)	238(3)	45.3(11)
O4	5834(4)	4427(3)	112(3)	50.9(12)
O1	2183(4)	6189(3)	6303(3)	55.6(12)
N3	4322(3)	5673(3)	1313(3)	37.1(12)
C5	3935(5)	8414(5)	7870(4)	42.8(16)
N1	3783(4)	9346(4)	7445(4)	56.3(16)
N2	3185(4)	7658(4)	6441(3)	43.1(13)
C10	2511(5)	7001(5)	5955(4)	45.7(16)
C21	6064(5)	5219(5)	505(4)	40.3(15)
C6	3607(4)	7510(4)	7382(4)	40.1(15)
C20	5520(4)	5640(4)	1413(4)	40.5(15)
C23	3757(5)	6563(4)	1517(4)	42.0(15)
C16	5146(5)	5251(5)	3101(4)	49.9(18)
C4	4431(5)	8293(6)	8787(5)	59(2)
C22	7499(5)	5544(5)	-594(5)	52.8(18)
C11	2155(6)	7360(5)	4988(4)	53.0(18)

C14	4256(6)	6685(6)	3947(5)	65(2)
C15	5173(5)	6256(6)	3461(5)	56.8(19)
C12	2196(6)	6499(6)	4257(5)	62(2)
C9	4554(6)	7306(6)	9186(5)	74(2)
C19	5879(5)	4956(5)	2271(4)	49.2(17)
C3	4785(6)	9221(7)	9253(6)	73(2)
C13	3323(5)	6039(6)	4084(4)	55.6(19)
C18	3395(6)	5007(6)	3860(5)	60(2)
C2	4614(7)	10145(7)	8837(7)	89(3)
C17	4294(5)	4624(6)	3361(5)	54.3(18)
C8	4222(7)	6485(7)	8706(6)	86(2)
C7	3745(7)	6566(6)	7775(6)	74(2)
C1	4111(8)	10176(6)	7939(7)	87(3)
O2	4205(3)	7407(3)	1583(3)	52.9(12)
C25A	1497(10)	6659(9)	3372(9)	45(3)
C24A	2115(9)	7195(10)	2495(9)	49(2)
C24B	1977(9)	6163(10)	2426(9)	49(2)
C25B	1917(11)	7062(9)	3222(9)	45(3)
C24	2523(6)	6441(5)	1637(6)	65(2)

Supplementary Table 40 Anisotropic Displacement Parameters ($Å^2×10^3$) for Compound **31a**. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	**U_{11}**	**U_{22}**	**U_{33}**	**U_{23}**	**U_{13}**	**U_{12}**
O3	34(2)	51(2)	50(2)	-7(2)	8(2)	-5(2)
O4	60(3)	46(2)	46(2)	-10(2)	8(2)	-11(2)
O1	46(2)	67(3)	54(3)	-2(2)	-4(2)	-20(2)
N3	22(2)	47(3)	42(2)	-4(2)	0(2)	6(2)

C5	27(3)	58(3)	44(3)	-3(3)	4(3)	7(3)
N1	48(3)	42(3)	79(4)	-17(3)	-14(3)	7(3)
N2	41(3)	50(3)	38(2)	9(2)	-9(2)	-4(2)
C10	35(3)	54(3)	48(3)	1(3)	5(3)	6(3)
C21	30(3)	53(3)	38(3)	2(3)	-4(3)	2(3)
C6	31(3)	44(3)	45(3)	10(3)	-7(3)	5(3)
C20	28(3)	47(3)	46(3)	-10(3)	3(3)	-1(3)
C23	33(3)	46(3)	47(3)	5(3)	1(3)	0(3)
C16	34(3)	81(5)	34(3)	-4(3)	-6(3)	18(3)
C4	28(3)	104(5)	44(3)	-8(4)	-4(3)	-5(4)
C22	38(3)	69(4)	51(4)	-2(3)	13(3)	-3(3)
C11	48(4)	66(4)	46(3)	-13(3)	-5(3)	21(3)
C14	58(4)	89(5)	49(4)	-19(4)	-13(3)	25(4)
C15	35(3)	87(5)	49(4)	-11(4)	-14(3)	12(3)
C12	47(4)	85(5)	54(4)	-20(4)	-17(3)	18(4)
C9	57(4)	105(6)	60(4)	32(4)	-26(4)	-23(4)
C19	32(3)	79(4)	37(3)	-3(3)	-6(3)	22(3)
C3	42(4)	113(6)	64(4)	-33(5)	-4(4)	3(4)
C13	34(3)	99(5)	33(3)	-6(3)	-4(3)	16(3)
C18	63(4)	71(4)	44(4)	-1(3)	16(4)	12(4)
C2	59(5)	108(6)	99(6)	-61(5)	-11(5)	13(4)
C17	37(3)	80(4)	46(3)	2(3)	2(3)	12(3)
C8	84(4)	87(4)	86(4)	24(4)	-23(4)	-16(4)
C7	74(5)	75(5)	72(5)	23(4)	-35(4)	-17(4)
C1	85(6)	56(4)	121(7)	-22(5)	-39(6)	12(4)
O2	44(2)	43(2)	71(3)	0(2)	3(2)	-3(2)
C25A	43(6)	37(6)	55(5)	-8(5)	-15(5)	-3(4)
C24A	20(4)	71(5)	56(5)	-26(5)	-7(4)	12(4)

C24B	20(4)	71(5)	56(5)	-26(5)	-7(4)	12(4)
C25B	43(6)	37(6)	55(5)	-8(5)	-15(5)	-3(4)
C24	40(4)	54(4)	101(6)	-13(4)	23(4)	6(3)

Supplementary Table 41 Bond Lengths for Compound **31a**.

Atom	**Atom**	**Length/Å**	**Atom**	**Atom**	**Length/Å**
O3	C21	1.344(7)	C16	C17	1.359(9)
O3	C22	1.448(7)	C4	C9	1.394(10)
O4	C21	1.190(7)	C4	C3	1.426(10)
O1	C10	1.218(7)	C11	C12	1.510(9)
N3	C20	1.457(7)	C14	C15	1.414(9)
N3	C23	1.363(7)	C14	C13	1.414(10)
C5	N1	1.350(8)	C12	C13	1.505(9)
C5	C6	1.406(8)	C12	C25A	1.516(14)
C5	C4	1.429(9)	C12	C25B	1.657(15)
N1	C1	1.333(9)	C9	C8	1.315(10)
N2	C10	1.357(8)	C3	C2	1.339(12)
N2	C6	1.427(7)	C13	C18	1.366(10)
C10	C11	1.497(9)	C18	C17	1.384(9)
C21	C20	1.534(8)	C2	C1	1.400(12)
C6	C7	1.342(9)	C8	C7	1.433(11)
C20	C19	1.552(8)	C25A	C24A	1.595(18)
C23	O2	1.216(7)	C24A	C24	1.623(14)
C23	C24	1.511(9)	C24B	C25B	1.608(17)
C16	C15	1.387(9)	C24B	C24	1.338(14)
C16	C19	1.513(8)			

Supplementary Table 42 Bond Angles for Compound **31a**.

Atom	Atom	Atom	Angle/°	Atom	Atom	Atom	Angle/°
C21	O3	C22	115.2(5)	C3	C4	C5	116.7(7)
C23	N3	C20	120.2(5)	C10	C11	C12	112.4(5)
N1	C5	C6	118.6(5)	C15	C14	C13	117.6(7)
N1	C5	C4	123.5(6)	C16	C15	C14	121.4(7)
C6	C5	C4	117.9(6)	C11	C12	C25A	116.0(7)
C1	N1	C5	116.1(6)	C11	C12	C25B	105.6(6)
C10	N2	C6	126.6(5)	C13	C12	C11	115.3(6)
O1	C10	N2	121.8(6)	C13	C12	C25A	115.3(7)
O1	C10	C11	122.3(6)	C13	C12	C25B	102.4(7)
N2	C10	C11	115.9(5)	C8	C9	C4	119.5(7)
O3	C21	C20	109.1(5)	C16	C19	C20	106.9(5)
O4	C21	O3	125.0(6)	C2	C3	C4	119.7(7)
O4	C21	C20	125.8(5)	C14	C13	C12	121.0(7)
C5	C6	N2	116.2(5)	C18	C13	C14	119.1(6)
C7	C6	C5	120.7(6)	C18	C13	C12	118.4(7)
C7	C6	N2	123.0(6)	C13	C18	C17	120.8(7)
N3	C20	C21	110.9(5)	C3	C2	C1	119.0(8)
N3	C20	C19	111.8(5)	C16	C17	C18	121.4(7)
C21	C20	C19	108.9(4)	C9	C8	C7	122.1(8)
N3	C23	C24	115.6(5)	C6	C7	C8	119.4(7)
O2	C23	N3	122.8(5)	N1	C1	C2	125.1(8)
O2	C23	C24	121.6(5)	C12	C25A	C24A	115.4(9)
C15	C16	C19	120.0(6)	C25A	C24A	C24	117.2(9)
C17	C16	C15	118.2(6)	C24	C24B	C25B	113.9(10)
C17	C16	C19	120.2(6)	C24B	C25B	C12	106.6(8)
C9	C4	C5	120.4(7)	C23	C24	C24A	108.8(6)
C9	C4	C3	123.0(6)	C24B	C24	C23	127.4(8)

Supplementary Table 43 Torsion Angles for Compound **31a**.

A	B	C	D	Angle/°	A	B	C	D	Angle/°
O3	C21	C20	N3	130.0(5)	C22	O3	C21	O4	0.0(8)
O3	C21	C20	C19	-106.6(5)	C22	O3	C21	C20	177.6(5)
O4	C21	C20	N3	-52.3(8)	C11	C12	C13	C14	-46.8(9)
O4	C21	C20	C19	71.1(7)	C11	C12	C13	C18	147.0(6)
O1	C10	C11	C12	-45.5(9)	C11	C12	C25A	C24A	92.5(10)
N3	C20	C19	C16	-45.4(7)	C11	C12	C25B	C24B	179.0(8)
N3	C23	C24	C24A	141.8(7)	C14	C13	C18	C17	-10.8(10)
N3	C23	C24	C24B	84.8(10)	C15	C16	C19	C20	-62.4(7)
C5	N1	C1	C2	1.6(12)	C15	C16	C17	C18	8.8(9)
C5	C6	C7	C8	0.6(11)	C15	C14	C13	C12	-157.6(6)
C5	C4	C9	C8	0.8(11)	C15	C14	C13	C18	8.5(9)
C5	C4	C3	C2	1.9(10)	C12	C13	C18	C17	155.7(6)
N1	C5	C6	N2	3.1(8)	C12	C25A	C24A	C24	101.6(11)
N1	C5	C6	C7	179.8(7)	C9	C4	C3	C2	-178.3(7)
N1	C5	C4	C9	179.5(6)	C9	C8	C7	C6	-1.5(13)
N1	C5	C4	C3	-0.7(9)	C19	C16	C15	C14	154.7(6)
N2	C10	C11	C12	137.3(6)	C19	C16	C17	C18	-156.8(6)
N2	C6	C7	C8	177.1(7)	C3	C4	C9	C8	-179.0(8)
C10	N2	C6	C5	-157.4(6)	C3	C2	C1	N1	-0.4(14)
C10	N2	C6	C7	26.0(9)	C13	C14	C15	C16	2.3(10)
C10	C11	C12	C13	-61.6(8)	C13	C12	C25A	C24A	-46.6(12)
C10	C11	C12	C25A	159.4(8)	C13	C12	C25B	C24B	58.0(10)
C10	C11	C12	C25B	-173.8(7)	C13	C18	C17	C16	2.0(10)
C21	C20	C19	C16	-168.3(5)	C17	C16	C15	C14	-10.8(9)
C6	C5	N1	C1	-179.8(7)	C17	C16	C19	C20	102.9(7)

C6	C5	C4	C9	-1.6(9)	O2	C23	C24	C24A	-39.5(10)
C6	C5	C4	C3	178.2(6)	O2	C23	C24	C24B	-96.5(10)
C6	N2	C10	O1	0.6(9)	C25A	C12	C13	C14	92.6(9)
C6	N2	C10	C11	177.9(5)	C25A	C12	C13	C18	-73.7(9)
C20	N3	C23	O2	16.5(9)	C25A	C12	C25B	C24B	-63.9(14)
C20	N3	C23	C24	-164.8(6)	C25A	C24A	C24	C23	-122.0(9)
C23	N3	C20	C21	-128.9(5)	C25A	C24A	C24	C24B	1.2(9)
C23	N3	C20	C19	109.3(6)	C25B	C12	C13	C14	67.3(8)
C4	C5	N1	C1	-1.0(10)	C25B	C12	C13	C18	-98.9(8)
C4	C5	C6	N2	-175.8(5)	C25B	C12	C25A	C24A	19.8(12)
C4	C5	C6	C7	0.9(9)	C25B	C24B	C24	C23	74.1(12)
C4	C9	C8	C7	0.8(13)	C25B	C24B	C24	C24A	-11.7(8)
C4	C3	C2	C1	-1.4(12)	C24	C24B	C25B	C12	-135.6(9)

Supplementary Table 44 Hydrogen Atom Coordinates (Å×10^4) and Isotropic Displacement Parameters (Å^2×10^3) for Compound **31a**.

Atom	***x***	***y***	***z***	**U(eq)**
H3	3962	5116	1119	45
H2	3382	8233	6147	52
H20	5792	6365	1523	49
H22A	6989	5414	-1123	79
H22B	7907	4905	-448	79
H22C	8020	6094	-773	79
H11A	2642	7936	4779	64
H11B	1391	7633	5027	64
H14	4267	7381	4173	78
H15	5820	6664	3380	68
H12	1801	5919	4588	74

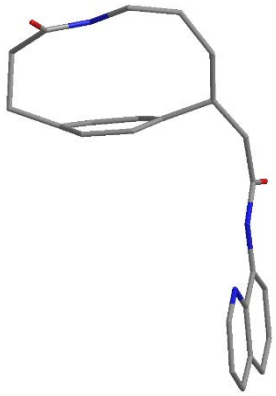
H12A	1644	5944	4406	74
H9	4876	7228	9799	89
H19A	5789	4209	2116	59
H19B	6665	5086	2429	59
H3A	5141	9184	9856	87
H18	2822	4546	4050	71
H2A	4831	10770	9146	107
H17	4315	3907	3195	65
H8	4300	5816	8987	103
H7	3528	5958	7438	89
H1	3994	10841	7660	105
H25A	851	7092	3545	54
H25B	1214	5974	3161	54
H24A	2770	7567	2747	59
H24B	1613	7725	2221	59
H24C	2342	5545	2706	59
H24D	1215	5960	2249	59
H25C	1171	7379	3234	54
H25D	2465	7615	3083	54
H24E	2342	5708	1789	78
H24F	2142	6631	1038	78
H24G	2202	7118	1445	78
H24H	2294	5935	1143	78

Supplementary Table 45 Atomic Occupancy for Compound **31a**.

Atom	***Occupancy***	**Atom**	***Occupancy***	**Atom**	***Occupancy***
H12	0.5	H12A	0.5	C25A	0.5
H25A	0.5	H25B	0.5	C24A	0.5

H24A 0.5	H24B 0.5	C24B 0.5
H24C 0.5	H24D 0.5	C25B 0.5
H25C 0.5	H25D 0.5	H24E 0.5
H24F 0.5	H24G 0.5	H24H 0.5

12.8 X-ray crystallographic data for compound **32**



Supplementary Figure 53. X-ray structure of compound **32**

Single crystals for X-ray studies were grown by slow evaporation of a solution of compound **32** in a mixture of acetone and hexane at room temperature. One water molecule in the asymmetric unit was omitted for clarity. The X-ray structure of **32** is deposited in the Cambridge Crystallographic Data Centre with a number of CCDC 1526705.

Supplementary Table 46 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **32**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	***x***	***y***	***z***	**U(eq)**
O2	2091(3)	4295(3)	4028.2(12)	42.6(5)
O3	1461(3)	4166(2)	5762.5(12)	38.1(5)
N3	5255(3)	4030(2)	4188.3(11)	24.5(5)

O1	12078(4)	-187(3)	2378.1(13)	53.1(6)
N2	9907(3)	-1380(3)	1762.1(13)	38.1(6)
N1	7971(3)	-2868(3)	816.3(14)	42.0(6)
C16	3694(4)	4771(3)	3877.1(15)	30.4(6)
C22	7775(4)	1824(3)	2972.0(16)	34.2(6)
C19	5412(4)	4351(3)	2371.1(14)	34.2(7)
C24	7331(4)	4460(3)	2487.6(15)	32.4(6)
C5	9633(4)	-2348(3)	496.4(16)	31.9(6)
C6	10724(4)	-1545(3)	995.5(16)	32.9(6)
C23	8482(4)	3214(3)	2791.3(15)	33.7(6)
C15	5254(4)	2559(3)	4659.3(16)	30.9(6)
C4	10283(4)	-2585(3)	-292.7(16)	34.6(6)
C10	10560(5)	-755(3)	2393.1(17)	38.8(7)
C18	4030(5)	5743(4)	2410.8(17)	46.8(8)
C20	4760(4)	2895(4)	2441.1(16)	39.7(7)
C7	12400(4)	-1023(3)	706.8(18)	38.8(7)
C21	5964(5)	1634(3)	2735.4(16)	39.5(7)
C17	3960(5)	6160(3)	3300.6(16)	41.4(7)
C9	12018(4)	-2027(3)	-573.5(17)	37.9(7)
C12	8885(4)	597(3)	3515.8(17)	38.5(7)
C14	7263(4)	1746(3)	4776.8(17)	40.7(7)
C8	13029(4)	-1277(3)	-82.6(18)	42.1(7)
C1	6983(5)	-3621(5)	353(2)	56.0(9)
C11	9277(5)	-876(4)	3140.9(18)	45.7(8)
C13	7774(5)	333(3)	4319.5(17)	43.4(8)
C2	7509(5)	-3892(5)	-438(2)	62.8(11)
C3	9140(5)	-3383(4)	-757.7(18)	49.4(8)

Supplementary Table 47 Anisotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **32**. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
O2	21.6(10)	71.7(15)	35.1(11)	-15(1)	1.7(8)	2.7(10)
O3	27(1)	49.4(12)	36.8(11)	-2.6(9)	3.0(8)	-0.5(9)
N3	21.4(11)	31.7(11)	20.2(10)	-2.6(9)	2.6(8)	-1.7(9)
O1	63.6(16)	54.4(14)	43.9(13)	-19.8(11)	8.1(11)	-7.6(12)
N2	40.3(14)	44.2(14)	28.2(12)	-2.4(10)	12.5(10)	0.6(11)
N1	35.6(14)	56.8(16)	31.5(13)	7.9(12)	5.2(11)	-6.0(12)
C16	27.3(14)	44.0(16)	19.4(12)	-11.3(11)	1.5(10)	8.2(12)
C22	35.9(15)	36.8(15)	27.7(14)	-3.0(12)	9.5(12)	6.3(12)
C19	39.5(16)	46.1(17)	13.9(12)	-0.3(11)	0.8(11)	11.4(13)
C24	39.0(16)	35.4(15)	20.8(13)	2.2(11)	8.8(11)	-0.2(12)
C5	30.4(14)	33.7(14)	28.8(14)	7.6(11)	3.8(11)	1.7(12)
C6	38.2(16)	29.6(14)	28.1(14)	0.8(11)	10.9(12)	5.6(12)
C23	29.5(14)	43.5(16)	25.2(13)	3.5(12)	10.3(11)	3.5(12)
C15	32.9(15)	32.4(14)	26.6(13)	-1.8(11)	7.1(11)	-1.6(12)
C4	36.3(15)	37.8(15)	27.8(14)	3.8(12)	3.1(12)	-0.3(13)
C10	45.1(18)	32.1(15)	36.9(16)	-4.9(12)	8.1(13)	7.5(14)
C18	54(2)	56(2)	24.4(14)	-0.4(13)	-3.2(13)	23.6(16)
C20	35.4(16)	60(2)	24.0(14)	-10.9(13)	2.4(12)	-3.4(14)
C7	42.8(17)	37.4(16)	37.6(16)	-9.0(13)	10.8(13)	-8.9(13)
C21	58.0(19)	33.7(15)	27.4(14)	-8.0(12)	9.4(13)	-6.0(14)
C17	48.2(18)	43.3(17)	28.1(15)	-1.3(13)	0.2(13)	20.3(14)
C9	44.6(17)	37.6(16)	30.2(15)	-2.9(12)	14.3(13)	-2.4(13)
C12	43.0(17)	38.9(16)	31.8(15)	-1.6(12)	3.9(13)	2.4(13)
C14	43.6(17)	41.5(16)	33.9(15)	2.9(13)	3.1(13)	5.6(14)

C8	42.7(17)	41.6(17)	42.9(17)	-8.5(14)	19.8(14)	-11.0(14)
C1	40.2(18)	88(3)	40.6(18)	7.0(18)	0.4(15)	-24.5(18)
C11	57(2)	42.8(17)	33.2(16)	-0.6(13)	10.1(14)	11.9(15)
C13	56.1(19)	37.5(16)	32.5(15)	3.3(13)	7.4(14)	9.7(14)
C2	56(2)	101(3)	34.7(18)	-0.1(19)	-6.3(16)	-31(2)
C3	52(2)	69(2)	27.9(15)	1.2(15)	0.8(14)	-14.2(17)

Supplementary Table 48 Bond Lengths for Compound **32**.

Atom	**Atom**	**Length/Å**	**Atom**	**Atom**	**Length/Å**
O2	C16	1.250(3)	C5	C6	1.427(4)
N3	C16	1.327(3)	C5	C4	1.412(4)
N3	C15	1.456(3)	C6	C7	1.365(4)
O1	C10	1.220(4)	C15	C14	1.543(4)
N2	C6	1.405(3)	C4	C9	1.410(4)
N2	C10	1.346(4)	C4	C3	1.411(4)
N1	C5	1.372(4)	C10	C11	1.523(4)
N1	C1	1.318(4)	C18	C17	1.564(4)
C16	C17	1.510(4)	C20	C21	1.402(4)
C22	C23	1.369(4)	C7	C8	1.412(4)
C22	C21	1.379(4)	C9	C8	1.356(4)
C22	C12	1.527(4)	C12	C11	1.495(4)
C19	C24	1.388(4)	C12	C13	1.545(4)
C19	C18	1.506(4)	C14	C13	1.533(4)
C19	C20	1.396(4)	C1	C2	1.400(5)
C24	C23	1.377(4)	C2	C3	1.349(5)

Supplementary Table 49 Bond Angles for Compound 32.

Atom	**Atom**	**Atom**	**Angle/°**	**Atom**	**Atom**	**Atom**	**Angle/°**

C16	N3	C15	123.0(2)	C9	C4	C3	123.6(3)
C10	N2	C6	130.4(3)	C3	C4	C5	117.2(3)
C1	N1	C5	116.9(3)	O1	C10	N2	123.1(3)
O2	C16	N3	121.2(3)	O1	C10	C11	122.7(3)
O2	C16	C17	121.9(2)	N2	C10	C11	114.1(3)
N3	C16	C17	116.8(2)	C19	C18	C17	106.9(2)
C23	C22	C21	118.5(3)	C19	C20	C21	119.8(3)
C23	C22	C12	119.7(3)	C6	C7	C8	119.7(3)
C21	C22	C12	121.3(3)	C22	C21	C20	120.5(3)
C24	C19	C18	119.7(3)	C16	C17	C18	111.1(2)
C24	C19	C20	117.6(3)	C8	C9	C4	119.5(3)
C20	C19	C18	120.3(3)	C22	C12	C13	109.2(2)
C23	C24	C19	121.0(3)	C11	C12	C22	112.8(2)
N1	C5	C6	117.4(2)	C11	C12	C13	110.1(2)
N1	C5	C4	122.7(3)	C13	C14	C15	117.0(3)
C4	C5	C6	119.9(2)	C9	C8	C7	122.2(3)
N2	C6	C5	114.0(2)	N1	C1	C2	124.2(3)
C7	C6	N2	126.5(3)	C12	C11	C10	113.6(3)
C7	C6	C5	119.5(2)	C14	C13	C12	116.2(2)
C22	C23	C24	121.0(3)	C3	C2	C1	119.2(3)
N3	C15	C14	113.2(2)	C2	C3	C4	119.7(3)
C9	C4	C5	119.2(3)				

Supplementary Table 50 Torsion Angles for Compound **32**.

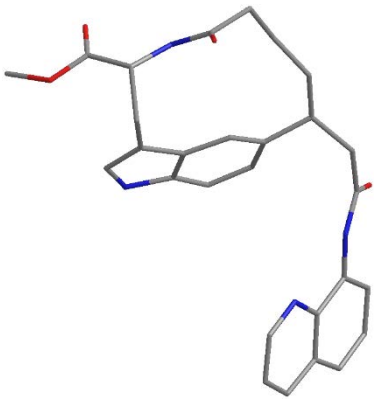
A	**B**	**C**	**D**	**Angle/°**	**A**	**B**	**C**	**D**	**Angle/°**
O2	C16	C17	C18	-81.5(3)	C23	C22	C21	C20	-10.7(4)
N3	C16	C17	C18	95.3(3)	C23	C22	C12	C11	-125.3(3)
N3	C15	C14	C13	-108.7(3)	C23	C22	C12	C13	111.9(3)

O1	C10	C11	C12	50.7(4)	C15	N3	C16	O2	5.9(4)
N2	C6	C7	C8	-179.8(3)	C15	N3	C16	C17	-171.0(2)
N2	C10	C11	C12	-131.6(3)	C15	C14	C13	C12	96.6(3)
N1	C5	C6	N2	-0.7(3)	C4	C5	C6	N2	179.5(2)
N1	C5	C6	C7	179.2(3)	C4	C5	C6	C7	-0.6(4)
N1	C5	C4	C9	-179.4(3)	C4	C9	C8	C7	-0.3(5)
N1	C5	C4	C3	0.4(4)	C10	N2	C6	C5	176.9(3)
N1	C1	C2	C3	1.1(6)	C10	N2	C6	C7	-3.0(5)
C16	N3	C15	C14	165.8(2)	C18	C19	C24	C23	152.1(3)
C22	C12	C11	C10	64.2(4)	C18	C19	C20	C21	-153.4(2)
C22	C12	C13	C14	-55.5(4)	C20	C19	C24	C23	-10.6(4)
C19	C24	C23	C22	1.3(4)	C20	C19	C18	C17	94.9(3)
C19	C18	C17	C16	-48.6(3)	C21	C22	C23	C24	9.4(4)
C19	C20	C21	C22	1.3(4)	C21	C22	C12	C11	62.7(3)
C24	C19	C18	C17	-67.3(3)	C21	C22	C12	C13	-60.1(3)
C24	C19	C20	C21	9.2(4)	C9	C4	C3	C2	179.3(3)
C5	N1	C1	C2	-1.2(5)	C12	C22	C23	C24	-162.8(2)
C5	C6	C7	C8	0.3(4)	C12	C22	C21	C20	161.4(2)
C5	C4	C9	C8	0.0(4)	C1	N1	C5	C6	-179.3(3)
C5	C4	C3	C2	-0.5(5)	C1	N1	C5	C4	0.4(4)
C6	N2	C10	O1	0.7(5)	C1	C2	C3	C4	-0.2(6)
C6	N2	C10	C11	-176.9(3)	C11	C12	C13	C14	-179.9(3)
C6	C5	C4	C9	0.4(4)	C13	C12	C11	C10	-173.5(3)
C6	C5	C4	C3	-179.8(3)	C3	C4	C9	C8	-179.7(3)
C6	C7	C8	C9	0.1(5)					

Supplementary Table 51 Hydrogen Atom Coordinates ($Å \times 10^4$) and Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **32**.

Atom	*x*	*y*	*z*	U(eq)
H3B	1499	4058	5262	57
H3C	390	4605	5890	57
H3	6340	4447	4106	29
H2	8787	-1743	1843	46
H24	7859	5409	2356	39
H23	9787	3321	2877	40
H15A	4468	1891	4388	37
H15B	4657	2713	5192	37
H18A	2753	5524	2247	56
H18B	4460	6602	2048	56
H20	3504	2758	2290	48
H7	13140	-491	1036	47
H21	5528	640	2772	47
H17A	5159	6592	3419	50
H17B	2898	6946	3375	50
H9	12476	-2177	-1103	45
H12	10132	981	3631	46
H14A	8200	2497	4618	49
H14B	7416	1440	5357	49
H8	14198	-910	-277	51
H1	5842	-4005	570	67
H11A	8053	-1238	2997	55
H11B	9881	-1650	3541	55
H13A	6580	-117	4211	52
H13B	8538	-430	4674	52
H2A	6726	-4428	-747	75
H3A	9516	-3561	-1293	59

12.9 X-ray crystallographic data for compound **34a**



Supplementary Figure 54. X-ray structure of compound **34a**

34a, one of the two diastereomers of compound **34**, was obtained by silica gel chromatography. Single crystals for X-ray studies were grown by slow evaporation of a solution of compound **34a** in a mixture of acetone and hexane at room temperature. The X-ray data of **34a** is deposited in the Cambridge Crystallographic Data Centre with a number of CCDC 1526707.

Supplementary Table 52 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent Isotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound **34a**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	***x***	***y***	***z***	**U(eq)**
O1	6847(5)	3304.9(18)	5818.9(19)	31.2(7)
O2	12899(5)	4626.9(18)	1153(2)	30.0(7)

O4	8858(6)	7417.3(17)	735(2)	30.5(7)
O3	5796(5)	6447.0(19)	372.8(19)	30.9(7)
N3	8949(6)	5280.4(19)	1203(2)	20.0(8)
N4	6541(6)	7053(2)	3615(2)	22.5(8)
N2	10603(6)	4079(2)	6140(2)	22.7(8)
C18	8037(8)	6645(3)	699(3)	23.4(10)
N1	13416(6)	5393(2)	6633(2)	27.9(8)
C16	10429(8)	4603(2)	1213(3)	21.0(9)
C23	8816(7)	5918(2)	3327(3)	17.3(9)
C10	9055(8)	3562(3)	5604(3)	23.5(9)
C24	6845(7)	6247(2)	3855(3)	19.8(9)
C22	9635(7)	6541(3)	2741(3)	20.1(9)
C8	10079(8)	4425(2)	6972(3)	25.6(10)
C28	9436(7)	5096(3)	3404(3)	19.0(9)
C27	8047(7)	4596(2)	3937(3)	19.2(9)
C9	11646(8)	5129(2)	7234(3)	23.6(10)
C12	8370(7)	3682(2)	3893(3)	20.9(9)
C25	5512(8)	5764(3)	4444(3)	23.6(10)
C7	8276(8)	4125(3)	7551(3)	30.3(11)
C11	10114(8)	3330(2)	4715(3)	22.9(9)
C17	10152(7)	6078(2)	1120(3)	20.8(9)
C21	8205(7)	7218(3)	2929(3)	22.4(10)
C26	6088(8)	4950(3)	4463(3)	23.7(9)
C13	9429(7)	3412(2)	2994(3)	22.1(9)
C20	11558(7)	6412(3)	2021(3)	21.6(9)
C15	8946(8)	3807(3)	1273(3)	25.3(10)
C14	7542(7)	3658(3)	2153(3)	25.1(10)
C4	11349(9)	5508(3)	8074(3)	31.2(11)

C1	14855(9)	6043(3)	6873(3)	33.0(11)
C6	8004(9)	4523(3)	8384(3)	35.7(12)
C19	6828(9)	8004(3)	406(4)	41.5(13)
C3	12944(9)	6206(3)	8293(3)	38.3(12)
C5	9451(9)	5187(3)	8649(3)	37.6(12)
C2	14717(9)	6465(3)	7694(3)	39.2(12)

Supplementary Table 53 Anisotropic Displacement Parameters ($Å^2 \times 10^3$) for Compound 34a. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	**U_{11}**	**U_{22}**	**U_{33}**	**U_{23}**	**U_{13}**	**U_{12}**
O1	22.4(15)	36.1(18)	35.7(18)	7.2(15)	5.9(13)	-8.2(15)
O2	15.2(14)	33.5(18)	41.4(19)	-1.5(15)	2.9(12)	3.5(14)
O4	27.3(15)	24.7(17)	39.0(19)	10.3(15)	0.9(13)	-0.7(15)
O3	15.8(14)	40.1(19)	36.5(18)	9.7(16)	0.6(12)	-2.3(15)
N3	12.9(16)	25(2)	22.9(18)	-1.1(16)	3.4(13)	-0.2(17)
N4	19.9(17)	17.9(18)	30(2)	-4.9(16)	5.6(15)	2.6(16)
N2	17.6(16)	26(2)	25.5(19)	-0.4(17)	7.6(14)	-1.3(17)
C18	20(2)	30(3)	21(2)	2.6(19)	9.6(18)	-1(2)
N1	24.3(19)	28(2)	31(2)	-0.7(18)	1.3(15)	0.4(18)
C16	23(2)	25(2)	16(2)	-3.1(18)	1.0(16)	1(2)
C23	14.7(19)	22(2)	15(2)	-2.0(17)	-0.5(15)	-1.9(18)
C10	21(2)	22(2)	27(2)	6.1(19)	0.2(17)	2(2)
C24	16.8(19)	23(2)	20(2)	1.4(18)	-0.3(16)	0.7(19)
C22	15.2(18)	24(2)	21(2)	-3.1(18)	0.4(16)	-1(2)
C8	23(2)	29(3)	25(2)	1.7(19)	4.3(18)	5(2)
C28	10.4(18)	26(2)	21(2)	-4.0(18)	-0.4(15)	3.2(19)
C27	14.8(18)	23(2)	19(2)	3.2(18)	-0.5(15)	1(2)

C9	24(2)	21(2)	25(2)	-0.6(19)	1.5(18)	6(2)
C12	16.6(19)	20(2)	26(2)	1.5(18)	0.9(15)	0(2)
C25	18(2)	33(3)	20(2)	-7.0(19)	4.7(17)	-2(2)
C7	25(2)	33(3)	33(3)	9(2)	5.8(19)	6(2)
C11	21(2)	18(2)	29(2)	-1.4(19)	2.3(17)	-2.8(19)
C17	15.1(19)	24(2)	23(2)	3.7(19)	3.6(16)	-0.8(19)
C21	18(2)	23(2)	25(2)	2.8(18)	-1.3(17)	-3(2)
C26	18.2(19)	29(2)	25(2)	5.2(19)	6.2(17)	1(2)
C13	20(2)	20(2)	26(2)	-1.4(19)	1.2(17)	1(2)
C20	16.2(18)	22(2)	27(2)	3.8(19)	3.2(16)	-1.2(19)
C15	26(2)	26(2)	24(2)	-4.2(19)	2.9(16)	-2(2)
C14	23(2)	28(2)	24(2)	-2(2)	1.7(16)	-3(2)
C4	32(2)	30(3)	30(2)	-2(2)	-4(2)	14(2)
C1	36(2)	27(3)	36(3)	-3(2)	0(2)	0(2)
C6	39(3)	43(3)	27(3)	6(2)	12(2)	12(3)
C19	35(3)	34(3)	57(3)	24(2)	11(2)	10(2)
C3	43(3)	37(3)	34(3)	-13(2)	-6(2)	15(3)
C5	45(3)	46(3)	23(2)	-2(2)	6(2)	13(3)
C2	39(3)	29(3)	47(3)	-7(2)	-6(2)	1(3)

Supplementary Table 54 Bond Lengths for Compound **34a**.

Atom	**Atom**	**Length/Å**	**Atom**	**Atom**	**Length/Å**
O1	C10	1.242(4)	C22	C21	1.366(6)
O2	C16	1.237(4)	C22	C20	1.504(5)
O4	C18	1.340(5)	C8	C9	1.433(6)
O4	C19	1.448(5)	C8	C7	1.382(5)
O3	C18	1.214(5)	C28	C27	1.368(5)
N3	C16	1.338(5)	C27	C12	1.521(6)

N3	C17	1.457(5)	C27	C26	1.422(5)
N4	C24	1.383(5)	C9	C4	1.406(6)
N4	C21	1.388(5)	C12	C11	1.536(5)
N2	C10	1.353(5)	C12	C13	1.533(5)
N2	C8	1.396(5)	C25	C26	1.375(6)
C18	C17	1.497(6)	C7	C6	1.410(6)
N1	C9	1.372(5)	C17	C20	1.541(5)
N1	C1	1.320(5)	C13	C14	1.537(5)
C16	C15	1.513(6)	C15	C14	1.545(5)
C23	C24	1.412(5)	C4	C3	1.418(6)
C23	C22	1.425(5)	C4	C5	1.424(6)
C23	C28	1.396(5)	C1	C2	1.401(6)
C10	C11	1.504(5)	C6	C5	1.349(7)
C24	C25	1.390(5)	C3	C2	1.369(6)

Supplementary Table 55 Bond Angles for Compound **34a**.

Atom	**Atom**	**Atom**	**Angle/°**	**Atom**	**Atom**	**Atom**	**Angle/°**
C18	O4	C19	115.2(3)	C28	C27	C26	118.0(4)
C16	N3	C17	122.0(3)	C26	C27	C12	120.7(3)
C24	N4	C21	108.5(3)	N1	C9	C8	116.6(3)
C10	N2	C8	128.9(3)	N1	C9	C4	123.3(4)
O4	C18	C17	112.4(3)	C4	C9	C8	120.1(4)
O3	C18	O4	122.4(4)	C27	C12	C11	113.4(3)
O3	C18	C17	125.2(4)	C27	C12	C13	111.8(3)
C1	N1	C9	116.6(4)	C13	C12	C11	110.9(3)
O2	C16	N3	121.2(4)	C26	C25	C24	117.7(4)
O2	C16	C15	121.5(4)	C8	C7	C6	119.2(4)
N3	C16	C15	117.3(3)	C10	C11	C12	111.9(3)

C24	C23	C22	107.7(3)	N3	C17	C18	108.9(3)
C28	C23	C24	119.3(4)	N3	C17	C20	114.1(3)
C28	C23	C22	132.8(3)	C18	C17	C20	112.2(3)
O1	C10	N2	122.3(4)	C22	C21	N4	109.9(4)
O1	C10	C11	121.3(4)	C25	C26	C27	122.8(4)
N2	C10	C11	116.3(3)	C12	C13	C14	112.7(3)
N4	C24	C23	107.2(3)	C22	C20	C17	113.0(3)
N4	C24	C25	131.8(4)	C16	C15	C14	116.5(3)
C25	C24	C23	121.0(4)	C13	C14	C15	115.4(3)
C23	C22	C20	123.9(4)	C9	C4	C3	117.4(4)
C21	C22	C23	106.7(3)	C9	C4	C5	118.9(4)
C21	C22	C20	129.3(4)	C3	C4	C5	123.6(4)
N2	C8	C9	115.4(3)	N1	C1	C2	124.6(4)
C7	C8	N2	125.2(4)	C5	C6	C7	122.7(4)
C7	C8	C9	119.4(4)	C2	C3	C4	119.1(4)
C27	C28	C23	121.1(3)	C6	C5	C4	119.7(4)
C28	C27	C12	121.0(3)	C3	C2	C1	119.0(4)

Supplementary Table 56 Torsion Angles for Compound **34a**.

A	**B**	**C**	**D**	**Angle/°**	**A**	**B**	**C**	**D**	**Angle/°**
O1	C10	C11	C12	67.0(5)	C8	C9	C4	C5	-0.8(6)
O2	C16	C15	C14	117.9(4)	C8	C7	C6	C5	-0.5(6)
O4	C18	C17	N3	169.9(3)	C28	C23	C24	N4	-177.2(3)
O4	C18	C17	C20	42.7(4)	C28	C23	C24	C25	-0.2(6)
O3	C18	C17	N3	-8.7(5)	C28	C23	C22	C21	175.2(4)
O3	C18	C17	C20	-136.0(4)	C28	C23	C22	C20	-0.6(7)
N3	C16	C15	C14	-63.8(5)	C28	C27	C12	C11	104.7(4)
N3	C17	C20	C22	-63.1(4)	C28	C27	C12	C13	-21.6(5)

N4	C24	C25	C26	173.1(4)	C28	C27	C26	C25	1.2(6)
N2	C10	C11	C12	-111.4(4)	C27	C12	C11	C10	55.3(4)
N2	C8	C9	N1	1.5(5)	C27	C12	C13	C14	-59.8(5)
N2	C8	C9	C4	-177.8(4)	C9	N1	C1	C2	1.0(6)
N2	C8	C7	C6	178.2(4)	C9	C8	C7	C6	0.5(6)
C18	C17	C20	C22	61.3(4)	C9	C4	C3	C2	-1.4(6)
N1	C9	C4	C3	1.1(6)	C9	C4	C5	C6	0.8(6)
N1	C9	C4	C5	179.9(4)	C12	C27	C26	C25	-172.6(4)
N1	C1	C2	C3	-1.3(7)	C12	C13	C14	C15	150.7(3)
C16	N3	C17	C18	153.6(3)	C7	C8	C9	N1	179.5(4)
C16	N3	C17	C20	-80.2(4)	C7	C8	C9	C4	0.2(6)
C16	C15	C14	C13	-77.3(5)	C7	C6	C5	C4	-0.2(6)
C23	C24	C25	C26	-3.0(6)	C11	C12	C13	C14	172.6(3)
C23	C22	C21	N4	0.7(4)	C17	N3	C16	O2	0.0(5)
C23	C22	C20	C17	83.5(5)	C17	N3	C16	C15	-178.3(3)
C23	C28	C27	C12	169.2(4)	C21	N4	C24	C23	2.2(4)
C23	C28	C27	C26	-4.6(6)	C21	N4	C24	C25	-174.3(4)
C10	N2	C8	C9	-161.2(4)	C21	C22	C20	C17	-91.3(5)
C10	N2	C8	C7	20.9(6)	C26	C27	C12	C11	-81.8(4)
C24	N4	C21	C22	-1.8(4)	C26	C27	C12	C13	152.0(3)
C24	C23	C22	C21	0.7(4)	C13	C12	C11	C10	-177.9(3)
C24	C23	C22	C20	-175.1(3)	C20	C22	C21	N4	176.2(4)
C24	C23	C28	C27	4.2(6)	C4	C3	C2	C1	1.4(6)
C24	C25	C26	C27	2.6(6)	C1	N1	C9	C8	179.8(4)
C22	C23	C24	N4	-1.8(4)	C1	N1	C9	C4	-0.9(6)
C22	C23	C24	C25	175.1(4)	C19	O4	C18	O3	3.5(5)
C22	C23	C28	C27	-169.8(4)	C19	O4	C18	C17	-175.2(3)
C8	N2	C10	O1	-1.5(6)	C3	C4	C5	C6	179.6(4)

C8	N2	C10	C11	176.8(4)	C5	C4	C3	C2	179.9(4)
C8	C9	C4	C3	-179.7(4)					

Supplementary Table 57 Hydrogen Atom Coordinates (Å×10^4) and Isotropic Displacement Parameters (Å^2×10^3) for Compound **34a**.

Atom	***x***	***y***	***z***	**U(eq)**
H3	7196	5243	1247	24
H4	5474	7403	3857	27
H2	12152	4217	5936	27
H28	10845	4880	3081	23
H12	6519	3445	3905	25
H25	4246	5988	4821	28
H7	7232	3656	7389	36
H11A	10147	2733	4664	28
H11B	11996	3529	4708	28
H17	11572	6027	683	25
H21	8331	7726	2634	27
H26	5137	4609	4844	28
H13A	9639	2816	3000	27
H13B	11239	3653	2948	27
H20A	12989	6028	2256	26
H20B	12442	6932	1897	26
H15A	10256	3363	1209	30
H15B	7557	3773	747	30
H14A	6574	4158	2301	30

H14B	6168	3228	2030	30
H1	16069	6239	6461	40
H6	6749	4316	8776	43
H19A	5219	7940	739	62
H19B	6333	7916	-247	62
H19C	7557	8551	502	62
H3A	12785	6489	8847	46
H5	9205	5439	9216	45
H2A	15836	6923	7832	47

Supplementary Table 58. Parameters of crystallography structures

	3a	**3b**	**11a**	**17**	**29a**
Formula	$C_{30}H_{34}N_4O_3$	$C_{30}H_{34}N_4O_3$	$C_{44}H_{64}N_6O_{11}S_2$	$C_{30}H_{36}N_4O_6$	$C_{27}H_{29}N_3O_4$
Mol. wt.	498.61	498.61	917.13	548.63	459.53
Crystal system	Monoclinic	Orthorhombic	Monoclinic	Orthorhombic	Orthorhombic
Space group	*P*2(1)	*P*2(1)	*P*2(1)	*P*2(1)	*P*2(1)
a (Å)	9.4606(5)	6.6466(6)	15.4887(13)	9.2253(7)	11.6716(4)
b (Å)	15.1773(8)	17.1932(12)	9.8886(5)	14.8660(9)	12.8545(4)
c (Å)	10.0998(8)	22.5467(19)	15.5031(10)	23.6066(14)	15.3380(5)
α (deg)	90	90	90	90	90
β(deg)	116.212(8)	90	95.630(6)	90	90
γ (deg)	90	90	90	90	90
V (Å^3)	1301.08(17)	2576.6(4)	2363.0(3)	3237.5(4)	2301.2(14)
Z	2	4	2	4	4
T(K)	120(10)	120(10)	120(10)	120(10)	120(10)
$\rho_{calcd.}$(Mg /m^3)	1.273	1.285	1.289	1.126	1.326
μ(mm^{-1})	0.083	0.084	0.176	0.079	0.090
Reflns collected	4845	6894	8330	10205	15053
Reflns unique	3375 (R(int) = 0.0389)	4101 (R(int) = 0.0530)	6582 (R(int)= 0.0288)	5459 (R(int) = 0.0802)	4065 (R(int) = 0.0349)
Final *R* indices [*I*> 2σ(*I*)]	R1 = 0.0544 *w*R2 = 0.0938	R1 = 0.0688 *w*R2 = 0.1240	R1 = 0.0526 *w*R2 = 0.0855	R1 = 0.0959 *w*R2 = 0.2342	R1 =0.0378 wR2 = 0.0835

Flack Para.	1.8(10)	1.0(10)	0.11(7)	1.7(10)	-0.1(7)
S	0.989	1.014	1.018	1.023	1.063
$\Delta\rho_{max}$(eÅ^{-3})	0.21	0.28	0.22	0.46	0.28
$\Delta\rho_{min}$(eÅ^{-3})	-0.28	-0.24	-0.24	-0.34	-0.16

Supplementary Table 59. Parameters of crystallography structures

	29b	**31a**	**32**	**34a**
Formula	$C_{54}H_{60}N_6O_9$	$C_{26}H_{27}N_3O_4$	$C_{27}H_{24}N_3O_3$	$C_{28}H_{28}N_4O_4$
Mol. wt.	937.08	445.50	405.48	484.54
Crystal system	Orthorhombic	Orthorhombic	Triclinic	Monoclinic
Space group	*P*2(1)	*P*2(1)	*P*-1	*P*2(1)
a (Å)	13.3988(6)	12.0991(6)	7.0584(7)	4.95874(16)
b (Å)	15.5839(5)	12.8496(9)	8.8227(5)	16.5259(7)
c (Å)	23.7571(6)	14.0321(13)	16.7347(9)	14.7144(7)
α (deg)	90	90	84.780(5)	90
β(deg)	90	90	88.226(6)	95.240(4)
γ (deg)	90	90	85.036(6)	90
V (Å^3)	4960.6(3)	2181.6(3)	1033.65(13)	1200.77(9)
Z	4	4	2	2
T(K)	293	120(3)	120(6)	120(10)
$\rho_{calcd.}$(Mg/m^3)	1.255	1.356	1.303	1.340
μ(mm^{-1})	0.086	0.093	0.087	0.091
Reflns collected	15011	5960	6619	4311
Reflns unique	8435 (R(int) = 0.0350)	3772 (R(int) = 0.0478)	3641 (R(int) = 0.0201)	3440 (R(int) = 0.0218)
Final *R* indices [$I > 2\sigma(I)$]	R1 =0.0631 wR2 = 0.1382	R1 = 0.0873 *w*R2 = 0.1976	R1 = 0.0643 *w*R2 = 0.1441	R1 =0.0446 wR2 = 0.0904
Flack Para.	0.8(10)	-3.6(10)		-0.1(10)
S	1.026	1.072	1.060	1.023
$\Delta\rho_{max}$(eÅ^{-3})	0.50	0.36	0.72	0.17
$\Delta\rho_{min}$(eÅ^{-3})	-0.28	-0.21	-0.25	-0.20

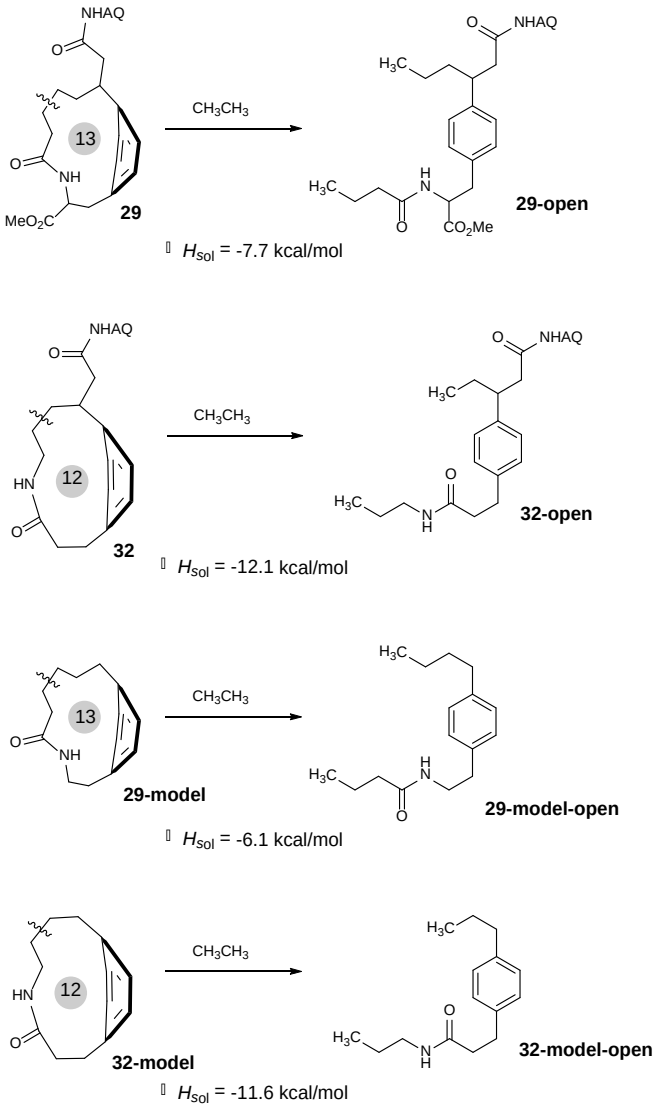
13. Computational details

All calculations were performed with Gaussian 09.[6] The B3LYP density functional and a mixed basis set of LANL2DZ for Pd, I and 6-31G(d) for other atoms were used in geometry optimizations. Single-point energies were Calcd using M06[7] and a mixed basis set of SDD for Pd, I and 6-311+G(d,p) for other atoms. Solvation energy corrections were Calcd using the SMD model[8] with *t*BuOH as the solvent.

13.1 Ring strain energy calculations

The ring strain energies of the cyclized products **29**, **32** and the unsubstituted analogues (**29-model** and **32-model**) were Calcd from the reaction enthalpy of the isodesmic reactions[9] shown in Supplementary Figure 55. The ring strain energies were Calcd at the M06/6-311+G(d,p)/SMD(*t*BuOH)//B3LYP/6-31G(d) level of theory (see above for computational details). Due to the large number of conformers expected, careful conformational search was performed for **29-model**, **32-model**, **29-open**, **32-open**, and **29-model-open** using MacroModel. For **29** and **32**, the conformation from X-ray crystal structures was used as the input geometries for the DFT geometry optimizations. The crystal structure of **29** consists of two diastereomers. Only the most stable diastereomer was used in the ring-strain energy calculations.

The calculations indicated that the 13-membered (**29**) and 12-memberd (**32**) products have ring strain energies of 7.7 and 12.1 kcal/mol, respectively. The 12-membered product is 4.4 kcal/mol more strained, in agreement with the lower reactivity to form the 12-membered product. The model compounds without the AQ directing group and the ester substituent (**29-model** and **32-model**) give similar strain energies compared to the real substrates, 6.1 and 11.6 kcal/mol, respectively.



Supplementary Figure 55. Computed ring strain energies of 13-membered cyclic peptide product **29**, 12-membered product **32**, and the unsubstituted analogues **29-model** and **32-model**.

The ring strain energies of intermediates **42**, **43** and **44** were evaluated via the reaction enthalpies of the following isodesmic reactions with Ph-I (equations 1–3), leading to **45**, **46** and **47**, respectively.

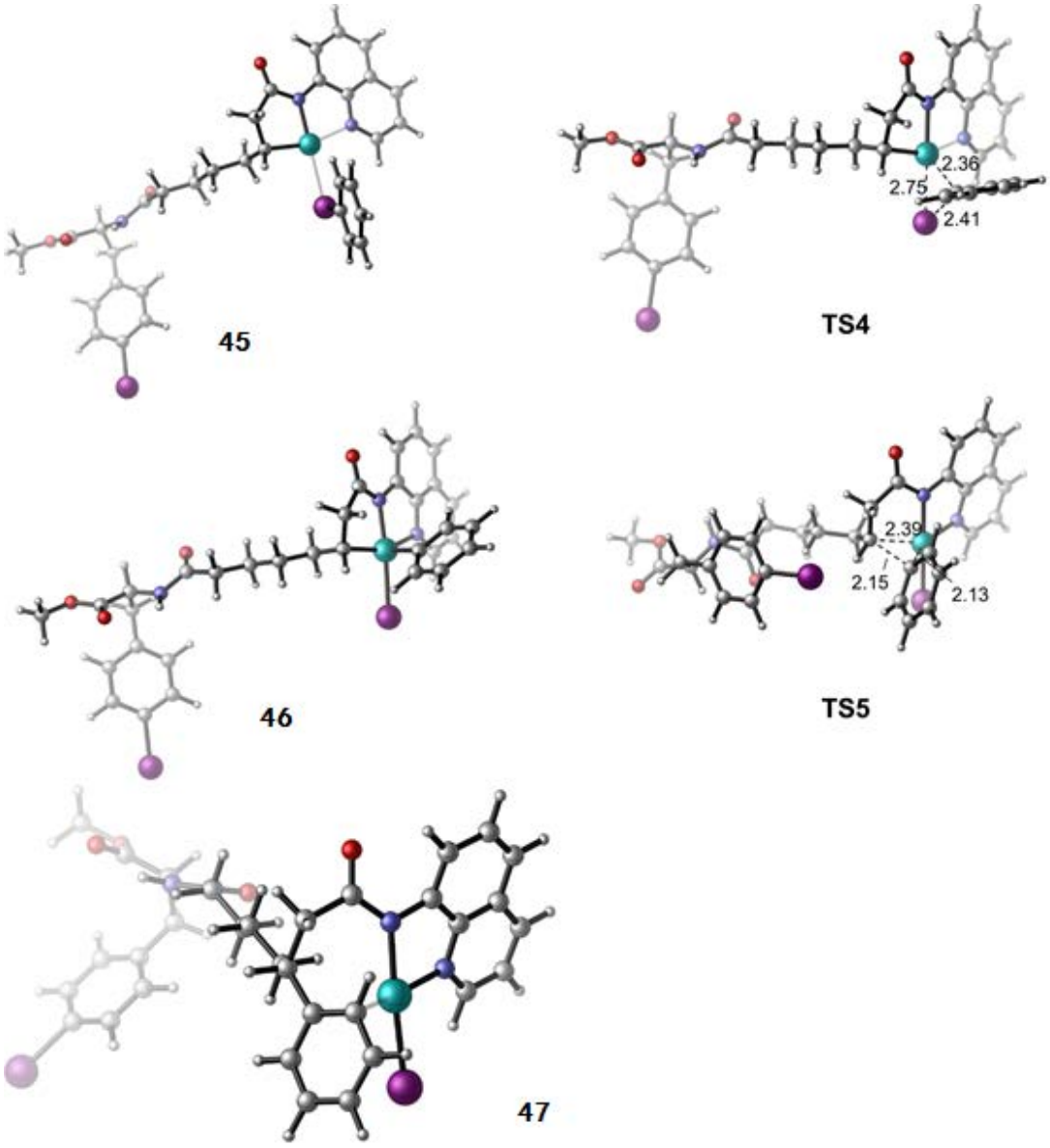
42 + PhI ⟶ **45** (1) ΔH_{sol} = 0.0 kcal/mol

43 + PhI ⟶ **46** (2) ΔH_{sol} = -6.4 kcal/mol

44 + PhI ⟶ **47** (3) ΔH_{sol} = -5.4 kcal/mol

Supplementary Figure 56. Ring strain energies of intermediates **42**, **43** and **44**

13.2 3D structures of intermediates and transition states in the intermolecular pathway



Supplementary Figure 57

13.3 Cartesian coordinates (Å) and energies of the optimized structures.

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B3LYP SCF energy:	-1878.18809814 a.u.		
B3LYP enthalpy:	-1877.571354 a.u.		
B3LYP free energy:	-1877.698007 a.u.		
M06 SCF energy in solution:	-1878.71689433 a.u.		
M06 enthalpy in solution:	-1878.100150 a.u.		
M06 free energy in solution:	-1878.226803 a.u.		
Three lowest frequencies (cm-1):	4.2577	7.8564	9.7018

Cartesian coordinates

ATOM	X	Y	Z
C	0.974539	-1.763322	-0.105486
C	-0.256579	-2.447886	-0.714510
C	-1.490766	-2.382653	0.192895
H	1.203738	-2.228152	0.864708
H	0.732043	-0.712641	0.113602
H	-0.486322	-1.983242	-1.684975
H	-0.018408	-3.499996	-0.930616
H	-1.726017	-1.331932	0.416052
H	-1.281934	-2.861343	1.156333
C	-2.727314	-3.056672	-0.419043
C	-3.899692	-3.092008	0.556112
H	-2.485607	-4.099155	-0.671087
H	-3.013356	-2.563954	-1.357301
N	-5.118947	-2.772785	0.027122
O	-3.766098	-3.385371	1.741923
C	-6.335434	-2.900572	0.803460
H	-5.237260	-2.632023	-0.968332
C	-7.492227	-3.062993	-0.175856
C	-6.558848	-1.722737	1.799358
H	-6.269781	-3.811030	1.412772
O	-8.653189	-3.278914	0.466748
O	-7.385567	-3.006663	-1.383442
C	-6.743482	-0.371937	1.146420
H	-7.430568	-1.969522	2.413850
H	-5.682736	-1.721287	2.454333
C	-9.806404	-3.447492	-0.379291
C	-5.640153	0.417564	0.794326
C	-8.024206	0.122867	0.864717
H	-9.672663	-4.310032	-1.036875
H	-9.965733	-2.554096	-0.988114
H	-10.643710	-3.607668	0.299926

C	-5.802258	1.657226	0.172602
H	-4.636704	0.065150	1.016529
C	-8.207328	1.360650	0.244837
H	-8.897393	-0.463145	1.141052
C	-7.089446	2.117715	-0.098869
H	-4.933547	2.252020	-0.087975
H	-9.208459	1.724706	0.041475
I	-7.355413	4.027325	-1.044753
C	2.211855	-1.824803	-1.010038
C	4.656046	-1.176251	-1.284182
C	8.029823	0.271622	-0.940859
C	6.973798	-0.474639	-1.547353
C	7.258712	-1.056757	-2.788142
C	8.528496	-0.898087	-3.385675
C	9.546986	-0.175129	-2.799465
C	9.312237	0.434288	-1.544285
C	10.268821	1.202575	-0.835653
C	9.955218	1.762149	0.385751
C	8.670000	1.558590	0.922791
H	2.468408	-2.869605	-1.223822
H	1.987013	-1.369480	-1.982614
H	6.492946	-1.630000	-3.285494
H	8.696775	-1.371551	-4.349486
H	10.515702	-0.066458	-3.278077
H	11.255291	1.344783	-1.269718
H	10.675261	2.353270	0.941140
H	8.364931	1.969555	1.879599
N	5.784639	-0.521103	-0.813714
N	7.762148	0.841768	0.272252
O	4.624579	-1.772956	-2.359773
Pd	5.918077	0.475529	0.970591
O	4.129133	0.357332	2.156123
C	4.700555	1.054138	3.055568
O	5.902025	1.443246	2.839690
C	4.004344	1.385859	4.343737
H	4.165718	0.570442	5.058930
H	2.928998	1.482912	4.176153
H	4.412542	2.305051	4.770226
C	3.423181	-1.121693	-0.390400
H	3.666862	-1.566584	0.582446
H	3.184558	-0.073763	-0.170437

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B3LYP SCF energy:	-1878.16920082 a.u.		
B3LYP enthalpy:	-1877.553451 a.u.		
B3LYP free energy:	-1877.678906 a.u.		
M06 SCF energy in solution:	-1878.71452223 a.u.		
M06 enthalpy in solution:	-1878.098772 a.u.		
M06 free energy in solution:	-1878.224227 a.u.		
Three lowest frequencies (cm-1):	4.5214	6.6837	10.8173

Cartesian coordinates

ATOM	X	Y	Z
C	3.261490	-0.508553	-1.473571
C	2.118695	-0.831536	-0.501418
C	4.013629	-1.742257	-2.000818
C	5.226151	-2.135422	-1.152965
C	0.883433	-1.457353	-1.181783
C	7.177091	0.183089	1.005649
C	6.847732	-1.063947	0.364875
C	7.707738	-2.145361	0.571365
C	8.856468	-2.012396	1.378934
C	9.183976	-0.826200	2.001555
C	8.342843	0.299682	1.825171
C	8.591538	1.558518	2.427996
C	7.730112	2.612692	2.219313
C	6.604309	2.412828	1.394033
C	-0.247274	-1.766079	-0.192477
H	2.868982	0.090475	-2.307061
H	2.480419	-1.511323	0.282391
H	1.797586	0.086215	0.011431
H	3.369566	-2.625788	-2.096190
H	4.403089	-1.544932	-3.009786
H	7.472246	-3.087419	0.097661
H	9.495230	-2.882185	1.510021
H	0.517377	-0.772463	-1.961799
H	1.171894	-2.382974	-1.699031
H	10.069287	-0.739149	2.625177
H	9.470358	1.675546	3.057743
H	7.899416	3.583499	2.673969
H	5.897487	3.216825	1.205685
H	-0.547556	-0.843445	0.324324
H	0.105324	-2.451036	0.586540
N	5.695815	-1.067372	-0.411807
N	6.341234	1.253844	0.811222
O	5.727101	-3.255324	-1.186873

Pd	4.644437	0.622080	-0.446987
C	-1.475647	-2.393104	-0.864146
C	-2.533410	-2.826938	0.147003
H	-1.168653	-3.293980	-1.415582
H	-1.908846	-1.708209	-1.605072
N	-3.831527	-2.666676	-0.254866
O	-2.251123	-3.296588	1.245896
C	-4.927850	-3.214146	0.519349
H	-4.051690	-2.399350	-1.206521
C	-6.086974	-3.466891	-0.437862
C	-5.336777	-2.320637	1.728507
H	-4.612480	-4.177068	0.941060
O	-7.119721	-4.058909	0.185885
O	-6.082846	-3.174628	-1.615937
C	-5.905260	-0.970876	1.353966
H	-6.063038	-2.882251	2.324724
H	-4.431427	-2.209320	2.332530
C	-8.264905	-4.337837	-0.641943
C	-5.067982	0.119342	1.079601
C	-7.290335	-0.777170	1.262523
H	-7.988207	-5.005994	-1.461163
H	-8.669354	-3.410936	-1.056070
H	-8.989609	-4.816164	0.016875
C	-5.589724	1.362746	0.716642
H	-3.990975	0.000273	1.158129
C	-7.831484	0.458339	0.901827
H	-7.962048	-1.602498	1.485413
C	-6.971863	1.519837	0.628444
H	-4.923003	2.194084	0.514054
H	-8.906870	0.585376	0.843451
I	-7.793245	3.426968	0.080854
O	3.499960	2.484438	-0.599091
C	3.550517	3.093959	-1.671657
O	4.262409	2.667881	-2.706012
H	4.690738	1.811273	-2.428481
C	2.812998	4.377188	-1.921344
H	3.516863	5.155542	-2.232958
H	2.285581	4.684408	-1.018365
H	2.099874	4.235344	-2.740317

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B3LYP SCF energy: -1649.06525664 a.u.

B3LYP enthalpy: -1648.518864 a.u.
B3LYP free energy: -1648.624368 a.u.
M06 SCF energy in solution: -1649.67224327 a.u.
M06 enthalpy in solution: -1649.125851 a.u.
M06 free energy in solution: -1649.231355 a.u.
Three lowest frequencies (cm-1): 10.7618 19.3229 21.0899

Cartesian coordinates

ATOM	X	Y	Z
C	-0.564209	1.046970	-0.746913
C	3.938518	-1.498438	-0.574588
C	0.125428	1.481309	0.553342
C	-1.084338	2.226269	-1.581793
C	-2.488637	2.671298	-1.170443
C	5.958892	-0.100098	0.246364
C	7.431807	0.146321	-0.088912
C	1.570826	1.974117	0.333976
C	9.083360	1.731260	-0.640925
C	5.398938	-1.137432	-0.764928
C	4.493414	1.439108	1.490969
C	-5.095510	0.410071	0.211371
C	-4.532085	1.654173	-0.248947
C	-5.377865	2.765602	-0.315267
C	-6.734069	2.668599	0.055409
C	1.234417	-2.152000	-0.294924
C	-7.289406	1.487059	0.499324
C	-6.475119	0.331587	0.584425
C	-6.963129	-0.922703	1.028379
C	-6.123595	-2.011541	1.087392
C	-4.778756	-1.847599	0.698222
C	2.218811	2.534566	1.608704
C	2.036504	-2.068058	0.839715
C	1.749834	-1.933639	-1.568879
C	3.739045	2.762823	1.473297
C	3.387703	-1.748910	0.690469
C	3.101849	-1.604574	-1.693345
H	0.112238	0.419461	-1.339401
H	-0.468701	2.270050	1.035957
H	0.163340	0.648841	1.269075
H	-0.421170	3.101081	-1.543055
H	-1.152070	1.937769	-2.640141
H	5.248270	1.796873	-0.393647
H	5.943531	-0.534532	1.250711
H	9.737659	1.423818	0.178342

H	9.129328	2.810453	-0.787051
H	9.378762	1.203170	-1.551100
H	5.538172	-0.753594	-1.783652
H	6.031996	-2.029729	-0.687362
H	-4.966167	3.701892	-0.663176
H	-7.351272	3.560994	-0.012821
H	2.168132	1.134918	-0.046881
H	1.590292	2.746695	-0.447995
H	-8.335512	1.424389	0.785894
H	-8.007434	-1.008091	1.319365
H	-6.472057	-2.982986	1.423119
H	-4.093270	-2.690495	0.733331
H	2.058022	1.848372	2.449174
H	1.738144	3.483437	1.878001
H	1.626305	-2.231083	1.830201
H	1.119988	-2.000333	-2.449228
H	3.961322	3.344126	0.568723
H	4.100484	3.339669	2.332609
H	3.992305	-1.645653	1.584979
H	3.505273	-1.418242	-2.685809
N	-3.191706	1.629002	-0.600342
N	5.168580	1.109673	0.341630
N	-4.280336	-0.694252	0.278755
O	-2.922788	3.801118	-1.380133
O	7.709450	1.444907	-0.317074
O	8.249618	-0.744423	-0.163901
O	4.466405	0.695179	2.467855
I	-0.863740	-2.565331	-0.068797
Pd	-2.212406	-0.101321	-0.287504

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B3LYP SCF energy: -1649.05919339 a.u.
B3LYP enthalpy: -1648.512436 a.u.
B3LYP free energy: -1648.615354 a.u.
M06 SCF energy in solution: -1649.66206273 a.u.
M06 enthalpy in solution: -1649.115305 a.u.
M06 free energy in solution: -1649.218223 a.u.
Three lowest frequencies (cm-1): 16.0182 23.5435 28.8457

Cartesian coordinates

ATOM	X	Y	Z
C	0.992869	-1.579823	1.982902

C	-2.371927	1.572005	-0.910327
C	-0.235510	-2.487132	1.953073
C	-4.809048	1.363266	-0.193387
C	-6.213899	1.814966	-0.591603
C	-1.525249	-1.902299	1.356606
C	-8.304839	1.181512	-1.466724
C	-3.787309	2.032950	-1.169656
C	-4.271200	-0.686004	1.071861
C	0.097667	0.413163	-0.254462
C	-2.801559	-2.646588	1.772292
C	-0.450042	1.384629	0.581406
C	-0.503316	0.099718	-1.472656
C	-4.037950	-2.193233	0.972083
C	-1.683847	1.952079	0.246669
C	-1.739942	0.678050	-1.780356
H	0.016127	-3.415946	1.432695
H	-0.424377	-2.757655	3.007804
H	-4.785113	-0.632043	-0.925512
H	-4.630148	1.741974	0.816636
H	-8.256284	1.909770	-2.280533
H	-8.857449	1.618275	-0.631227
H	-8.779252	0.258745	-1.801345
H	-4.068795	1.793976	-2.203348
H	-3.894215	3.116810	-1.054540
H	-1.638080	-0.855944	1.652736
H	-1.431782	-1.912242	0.265036
H	-2.991378	-2.478515	2.838828
H	-2.680596	-3.729075	1.632024
H	0.031219	1.697733	1.496980
H	-0.067252	-0.619659	-2.151601
H	-3.938662	-2.496098	-0.078432
H	-4.933302	-2.694040	1.364475
H	-2.124177	2.673881	0.930564
H	-2.228331	0.389914	-2.709015
N	-4.645471	-0.070838	-0.098012
O	-6.980463	0.804430	-1.048346
O	-6.574281	2.970959	-0.545212
O	-4.124155	-0.067184	2.120539
H	1.898945	-2.190808	2.114906
Pd	1.752417	-0.669513	0.249648
C	0.948200	-0.478589	3.037599
N	2.414639	0.737274	1.541719
C	1.963223	0.645366	2.846020
O	2.301448	1.390370	3.759109

H	-0.046132	-0.013851	3.066360
H	1.103414	-0.905377	4.037725
C	3.220217	1.752153	1.020059
C	3.575964	1.638145	-0.367301
C	3.710055	2.845755	1.733380
C	4.413119	2.615499	-0.986239
C	4.534483	3.806429	1.107079
H	3.461366	2.936675	2.780641
C	3.414185	0.421143	-2.353508
C	4.727813	2.428687	-2.355468
C	4.888560	3.709397	-0.220231
H	4.895822	4.640079	1.703025
C	4.238021	1.337628	-3.038890
H	3.009286	-0.457774	-2.847753
H	5.362285	3.157612	-2.853801
H	5.526771	4.452105	-0.690521
H	4.470830	1.171357	-4.085498
N	3.096339	0.570773	-1.077823
I	1.592768	-2.931407	-1.288346

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B3LYP SCF energy:	-1649.10347750 a.u.		
B3LYP enthalpy:	-1648.554563 a.u.		
B3LYP free energy:	-1648.657143 a.u.		
M06 SCF energy in solution:	-1649.71178185 a.u.		
M06 enthalpy in solution:	-1649.162867 a.u.		
M06 free energy in solution:	-1649.265447 a.u.		
Three lowest frequencies (cm-1):	12.2686	19.8983	32.6300

Cartesian coordinates

ATOM	X	Y	Z
O	3.593520	3.511021	-0.829470
O	-4.698638	1.764150	-1.369229
N	-4.872719	0.853307	0.710974
H	-5.131226	1.012800	1.676004
N	3.570591	-1.126648	0.017725
O	-6.729734	-0.799359	1.860152
O	-6.488243	-2.319818	0.202216
C	-2.153954	3.428234	0.413406
H	-2.332555	2.360423	0.566354
H	-1.870794	3.825629	1.398475
C	-6.166367	-1.194770	0.860621

C	0.230925	2.657944	-0.297475
H	0.631898	2.920522	0.690066
C	4.119833	1.149320	0.522771
C	-4.710002	3.304039	0.484194
H	-4.684597	3.238643	1.579470
H	-5.626542	3.840198	0.208020
N	2.879301	1.460981	-0.047403
C	6.631129	0.300212	1.575755
H	7.590147	-0.024915	1.968685
C	4.477319	-0.227461	0.532825
C	-1.039207	0.694001	-1.293442
H	-0.877505	1.078488	-2.296450
C	-4.961224	-0.509718	0.224956
H	-5.103987	-0.445615	-0.856320
C	2.721025	2.648449	-0.729373
C	-0.984501	3.592172	-0.571815
H	-0.622768	4.629124	-0.563856
H	-1.348058	3.400446	-1.590074
C	1.345701	2.884172	-1.334889
H	1.195748	2.240998	-2.211562
H	1.346535	3.918822	-1.687657
C	-0.484989	0.629705	1.063887
H	0.077060	1.006554	1.914452
C	5.136078	-2.906239	0.385178
H	5.340326	-3.967513	0.291366
C	-2.093543	-0.172699	-1.065881
H	-2.719476	-0.476774	-1.898605
C	5.743346	-0.660385	1.032797
C	-3.680148	-1.361854	0.522926
H	-3.689380	-1.666491	1.576087
H	-3.736804	-2.277021	-0.077347
C	-4.778403	1.915753	-0.154301
C	-3.479743	4.065419	-0.052771
H	-3.540259	4.039859	-1.146291
H	-3.537715	5.118081	0.248801
C	3.897051	-2.411552	-0.068606
H	3.152642	-3.073074	-0.491073
C	-0.257969	1.207468	-0.215749
C	5.026105	2.061011	1.063061
H	4.786857	3.113617	1.050636
C	-1.540457	-0.260006	1.278177
H	-1.725621	-0.635717	2.280747
C	-2.407569	-0.600594	0.238271
C	-7.577611	-3.079844	0.759478

H	-7.346056	-3.384077	1.783359
H	-7.684773	-3.950473	0.112815
H	-8.493977	-2.484397	0.760614
C	6.260875	1.627612	1.589978
H	6.935039	2.371710	2.005518
C	6.045313	-2.040500	0.946561
H	7.001702	-2.398011	1.320058
Pd	1.694033	-0.222499	-0.293709
I	0.485266	-2.624485	-0.849874

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B3LYP SCF energy:	-1892.09520303 a.u.		
B3LYP enthalpy:	-1891.449925 a.u.		
B3LYP free energy:	-1891.583341 a.u.		
M06 SCF energy in solution:	-1892.58162148 a.u.		
M06 enthalpy in solution:	-1891.936343 a.u.		
M06 free energy in solution:	-1892.069759 a.u.		
Three lowest frequencies (cm-1):	3.8749	5.6062	8.4398

Cartesian coordinates

ATOM	X	Y	Z
C	-2.693562	-0.740214	1.265658
C	-1.552633	-1.295294	0.404750
C	-3.304529	-1.767772	2.231132
C	-4.443139	-2.579071	1.611570
C	-0.245396	-1.545782	1.186675
C	-6.702432	-1.360308	-1.081187
C	-6.186892	-2.286336	-0.105356
C	-6.874553	-3.489593	0.075213
C	-8.033188	-3.781948	-0.673213
C	-8.539966	-2.907250	-1.610779
C	-7.879186	-1.674109	-1.831669
C	-8.327697	-0.715655	-2.774620
C	-7.641717	0.465688	-2.943013
C	-6.491103	0.696630	-2.161093
C	0.891267	-2.048152	0.287533
H	-2.353087	0.149899	1.809669
H	-1.871716	-2.231766	-0.073025
H	-1.325831	-0.597720	-0.413889
H	-2.563086	-2.471160	2.631246
H	-3.735446	-1.254258	3.102237
H	-6.498303	-4.192079	0.804732

H	-8.532531	-4.731566	-0.497946
H	0.060275	-0.613161	1.684344
H	-0.424083	-2.276301	1.987596
H	-9.432013	-3.144765	-2.183703
H	-9.219028	-0.930045	-3.359598
H	-7.965333	1.214974	-3.658390
H	-5.925022	1.618217	-2.266806
H	1.092222	-1.309331	-0.500538
H	0.590664	-2.966261	-0.229342
N	-5.047197	-1.886750	0.579395
N	-6.038688	-0.172942	-1.270834
O	-4.787819	-3.678994	2.033824
Pd	-4.222269	-0.147761	0.013581
I	-3.101211	2.337272	-0.630745
C	-3.837236	3.559826	0.990381
C	-4.776234	5.137296	3.060827
C	-4.661253	2.982901	1.951705
C	-3.467261	4.901256	1.033738
C	-3.946999	5.690084	2.083421
C	-5.130203	3.788799	2.993641
H	-4.930279	1.932172	1.893132
H	-2.821781	5.331789	0.275360
H	-3.666761	6.738727	2.130740
H	-5.774462	3.352529	3.751894
H	-5.145061	5.756303	3.873502
C	2.185028	-2.328479	1.059703
C	3.279161	-2.925092	0.177412
H	1.984223	-3.051559	1.864595
H	2.553554	-1.418424	1.552025
N	4.561086	-2.680210	0.592208
O	3.042914	-3.587291	-0.828846
C	5.685126	-3.357729	-0.022586
H	4.740678	-2.250919	1.491916
C	6.792012	-3.460823	1.020424
C	6.169360	-2.678048	-1.338457
H	5.373155	-4.373379	-0.297019
O	7.840550	-4.162052	0.556216
O	6.739434	-2.973624	2.130786
C	6.752012	-1.294829	-1.156775
H	6.908165	-3.340056	-1.801471
H	5.295082	-2.651085	-1.995803
C	8.941105	-4.309325	1.473516
C	5.928963	-0.161810	-1.094955
C	8.135851	-1.111424	-1.031106

H	8.614206	-4.824611	2.380004
H	9.344535	-3.330159	1.743226
H	9.685452	-4.901387	0.941111
C	6.462697	1.114458	-0.904048
H	4.854024	-0.274464	-1.204508
C	8.688811	0.156401	-0.840904
H	8.797341	-1.972284	-1.089543
C	7.842838	1.261189	-0.775610
H	5.806817	1.977499	-0.862818
H	9.763204	0.273369	-0.751428
I	8.682782	3.216320	-0.485652

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B3LYP SCF energy:	-1892.10156777 a.u.		
B3LYP enthalpy:	-1891.455603 a.u.		
B3LYP free energy:	-1891.585188 a.u.		
M06 SCF energy in solution:	-1892.58192204 a.u.		
M06 enthalpy in solution:	-1891.935957 a.u.		
M06 free energy in solution:	-1892.065542 a.u.		
Three lowest frequencies (cm-1):	4.5804	6.3782	12.0249

Cartesian coordinates

ATOM	X	Y	Z
C	2.651648	0.674086	1.392267
C	1.492370	1.007559	0.455330
C	3.422996	1.881981	1.915358
C	4.400285	2.457825	0.887480
C	0.243472	1.494573	1.227383
C	6.030598	0.549101	-1.872989
C	5.754043	1.684039	-1.033796
C	6.458600	2.863758	-1.280582
C	7.398090	2.939771	-2.331263
C	7.665035	1.864972	-3.151080
C	6.982583	0.642310	-2.933805
C	7.195366	-0.517869	-3.720776
C	6.501330	-1.676923	-3.453403
C	5.584489	-1.687680	-2.381298
C	-0.913105	1.851811	0.286046
H	2.345369	-0.014273	2.179996
H	1.798245	1.780144	-0.262581
H	1.204285	0.122235	-0.124446
H	2.746221	2.688166	2.225032

H	4.010374	1.606253	2.799376
H	6.260384	3.724423	-0.658518
H	7.917383	3.881168	-2.489090
H	-0.071783	0.707765	1.926930
H	0.500724	2.371145	1.837679
H	8.387874	1.936033	-3.958936
H	7.913542	-0.475413	-4.536105
H	6.647121	-2.575600	-4.043587
H	5.016403	-2.578818	-2.128050
H	-1.169851	0.978710	-0.329146
H	-0.607705	2.639867	-0.410882
N	4.784325	1.509231	-0.045056
N	5.364345	-0.623689	-1.625904
O	4.786858	3.619544	0.918898
Pd	3.997857	-0.347176	0.170355
I	2.759634	-2.752078	0.143992
C	5.175256	-0.819519	1.767421
C	6.927678	-1.454983	3.831432
C	6.540950	-0.619788	1.585596
C	4.664945	-1.332522	2.957278
C	5.555338	-1.648536	3.990505
C	7.416683	-0.944517	2.629784
H	6.938067	-0.215379	0.662293
H	3.606507	-1.519063	3.087021
H	5.162016	-2.060373	4.916341
H	8.482882	-0.783708	2.492670
H	7.611637	-1.703028	4.638205
C	-2.162542	2.331447	1.034435
C	-3.238639	2.852602	0.083710
H	-1.893280	3.162640	1.703000
H	-2.566906	1.536572	1.674577
N	-4.527978	2.646787	0.488759
O	-2.973266	3.428813	-0.967583
C	-5.639086	3.264358	-0.208613
H	-4.731114	2.285198	1.412830
C	-6.771534	3.443560	0.796150
C	-6.086383	2.476924	-1.476324
H	-5.324530	4.256571	-0.555855
O	-7.810947	4.099150	0.252958
O	-6.742434	3.047172	1.942967
C	-6.666872	1.108511	-1.198975
H	-6.816611	3.094588	-2.008997
H	-5.196152	2.403150	-2.108194
C	-8.934700	4.311969	1.128764

C	-5.840693	-0.011974	-1.035752
C	-8.052190	0.927766	-1.086348
H	-8.632730	4.900906	1.998277
H	-9.339505	3.354825	1.466616
H	-9.668589	4.853921	0.532391
C	-6.372719	-1.273154	-0.759059
H	-4.764266	0.097169	-1.134218
C	-8.603374	-0.325041	-0.811034
H	-8.716237	1.777599	-1.224092
C	-7.754548	-1.417368	-0.646147
H	-5.714118	-2.126946	-0.641111
H	-9.678837	-0.441087	-0.733869
I	-8.592407	-3.349305	-0.228342

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B3LYP SCF energy:	-1892.13869592 a.u.		
B3LYP enthalpy:	-1891.490614 a.u.		
B3LYP free energy:	-1891.620207 a.u.		
M06 SCF energy in solution:	-1892.62989962 a.u.		
M06 enthalpy in solution:	-1891.981818 a.u.		
M06 free energy in solution:	-1892.111411 a.u.		
Three lowest frequencies (cm-1):	3.9546	5.6058	8.4400

Cartesian coordinates

ATOM	X	Y	Z
C	2.284142	-0.752519	2.494877
C	1.298276	-0.229102	1.419340
C	3.061329	0.364625	3.210531
C	3.840619	1.444813	2.447583
C	0.221433	0.723385	1.959054
C	5.315221	1.996305	-0.815633
C	5.204850	2.148130	0.598057
C	5.791263	3.278476	1.169000
C	6.434360	4.248469	0.370857
C	6.492632	4.139115	-1.000452
C	5.920888	3.004946	-1.626444
C	5.912165	2.815344	-3.029008
C	5.328804	1.692322	-3.567749
C	4.785621	0.718330	-2.707877
C	-0.777811	1.137560	0.871064
H	1.660329	-1.211641	3.278525
H	1.863036	0.273872	0.624180

H	0.808342	-1.087761	0.942134
H	2.363661	0.941463	3.821773
H	3.759069	-0.085747	3.930132
H	5.723380	3.425209	2.235155
H	6.877739	5.109250	0.864044
H	-0.314336	0.240088	2.790658
H	0.690191	1.625233	2.374204
H	6.967370	4.901286	-1.611607
H	6.363992	3.570908	-3.666814
H	5.291608	1.524828	-4.638775
H	4.356099	-0.195168	-3.097175
H	-1.251549	0.241534	0.445106
H	-0.254112	1.630597	0.044436
N	4.500274	1.137710	1.278113
N	4.799148	0.854739	-1.386003
O	3.869530	2.561416	2.971869
Pd	4.347214	-0.564630	0.071734
I	4.146603	-2.604744	-1.722400
C	3.168714	-1.893678	1.998376
C	4.726402	-4.227264	1.549612
C	4.588445	-1.850752	2.034277
C	2.563018	-3.135469	1.692871
C	3.320437	-4.275924	1.493990
C	5.352901	-3.024501	1.801925
H	5.099770	-0.999425	2.469244
H	1.478867	-3.200034	1.663616
H	2.823303	-5.220665	1.292531
H	6.435696	-2.963515	1.856560
H	5.308616	-5.128879	1.386579
C	-1.866409	2.090702	1.382810
C	-2.743912	2.611821	0.247649
H	-1.393168	2.965126	1.851878
H	-2.475315	1.607639	2.157938
N	-4.083032	2.662983	0.511888
O	-2.282539	2.965228	-0.834772
C	-5.014432	3.273943	-0.415245
H	-4.442727	2.464769	1.437271
C	-6.243843	3.695207	0.381889
C	-5.371480	2.360104	-1.626320
H	-4.552337	4.176246	-0.835889
O	-7.126498	4.354549	-0.387774
O	-6.409046	3.469011	1.562887
C	-6.062041	1.067013	-1.257957
H	-5.996554	2.944685	-2.308981

H	-4.423758	2.161013	-2.134817
C	-8.320827	4.800519	0.282583
C	-5.321184	-0.073013	-0.918015
C	-7.460317	0.975325	-1.235774
H	-8.067007	5.487676	1.093483
H	-8.867846	3.948172	0.693048
H	-8.910207	5.307316	-0.481454
C	-5.948997	-1.266624	-0.557239
H	-4.235666	-0.033390	-0.945401
C	-8.107183	-0.209524	-0.878236
H	-8.058196	1.840930	-1.510760
C	-7.341461	-1.322754	-0.538056
H	-5.355221	-2.137796	-0.302815
H	-9.190654	-0.258073	-0.872956
I	-8.319628	-3.154395	0.007975

TS1

B3LYP SCF energy:	-1878.14204542 a.u.		
B3LYP enthalpy:	-1877.531447 a.u.		
B3LYP free energy:	-1877.656183 a.u.		
M06 SCF energy in solution:	-1878.68416569 a.u.		
M06 enthalpy in solution:	-1878.073567 a.u.		
M06 free energy in solution:	-1878.198303 a.u.		
Three lowest frequencies (cm-1):	-1399.5500	2.4035	6.3885
Imaginary frequency:	-1399.5500 cm-1		

Cartesian coordinates

ATOM	X	Y	Z
C	2.094337	-0.334032	-0.870821
C	0.908315	-1.099793	-1.487755
C	-0.154789	-1.469154	-0.445956
H	2.562613	-0.960479	-0.101087
H	1.700863	0.548778	-0.348032
H	0.453950	-0.485333	-2.279897
H	1.266930	-2.016530	-1.975339
H	-0.527351	-0.555345	0.038597
H	0.287503	-2.078711	0.349983
C	-1.337466	-2.244551	-1.040559
C	-2.310558	-2.720945	0.034801
H	-0.962879	-3.140063	-1.557358
H	-1.859858	-1.643288	-1.796136
N	-3.634088	-2.667147	-0.303581

O	-1.939272	-3.131048	1.131461
C	-4.653339	-3.243958	0.550134
H	-3.922850	-2.435496	-1.246071
C	-5.849066	-3.589895	-0.329956
C	-5.041575	-2.330958	1.751901
H	-4.263670	-4.174156	0.982960
O	-6.810928	-4.214230	0.370995
O	-5.927578	-3.337616	-1.514552
C	-5.679080	-1.015935	1.365277
H	-5.715938	-2.902419	2.397702
H	-4.114292	-2.165685	2.308300
C	-7.983170	-4.583553	-0.380016
C	-4.896365	0.098741	1.034333
C	-7.073118	-0.879696	1.317257
H	-7.715932	-5.266825	-1.189867
H	-8.459481	-3.695439	-0.802634
H	-8.643500	-5.073813	0.335263
C	-5.479640	1.310207	0.657862
H	-3.813335	0.024823	1.078980
C	-7.675529	0.323498	0.944232
H	-7.703058	-1.724845	1.583834
C	-6.869138	1.410447	0.613959
H	-4.854107	2.160938	0.410026
H	-8.756561	0.406270	0.919453
I	-7.782353	3.268548	0.044866
C	3.147268	0.127127	-1.898688
C	3.949121	-0.998518	-2.581182
C	4.952372	-1.736247	-1.702576
C	6.910660	-0.226022	1.036836
C	6.489798	-1.274933	0.159750
C	7.141318	-2.504838	0.263157
C	8.177545	-2.684926	1.205785
C	8.590960	-1.678535	2.055295
C	7.957344	-0.413074	1.985911
C	8.292625	0.695290	2.803821
C	7.621073	1.891827	2.668213
C	6.596528	2.000691	1.705860
H	2.581978	0.589689	-2.724428
H	3.280180	-1.747434	-3.020565
H	4.519999	-0.574999	-3.419654
H	6.840462	-3.310425	-0.391113
H	8.659715	-3.657694	1.255844
H	9.388835	-1.838935	2.774551
H	9.086175	0.587224	3.539126

H	7.863624	2.749985	3.286039
H	6.033207	2.915710	1.556284
N	5.466757	-0.928600	-0.715681
N	6.264715	0.979646	0.929152
O	5.280456	-2.902451	-1.905041
Pd	4.762296	0.927600	-0.494996
O	4.220921	2.925034	-0.124933
C	3.531941	3.458084	-1.048623
O	3.123802	2.814686	-2.063599
H	3.439505	1.532083	-1.873959
C	3.179810	4.923164	-0.939707
H	3.606087	5.460385	-1.793290
H	3.557376	5.349118	-0.009245
H	2.092932	5.040886	-0.991447

TS2

B3LYP SCF energy:	-1649.03871694 a.u.		
B3LYP enthalpy:	-1648.493400 a.u.		
B3LYP free energy:	-1648.594512 a.u.		
M06 SCF energy in solution:	-1649.64761705 a.u.		
M06 enthalpy in solution:	-1649.102300 a.u.		
M06 free energy in solution:	-1649.203412 a.u.		
Three lowest frequencies (cm-1):	-123.2962	16.4331	26.1189
Imaginary frequency:	-123.2962 cm-1		

Cartesian coordinates

ATOM	X	Y	Z
C	-1.368898	-0.577703	-2.563433
C	2.852698	-1.384794	0.561143
C	0.033037	-0.157534	-3.022630
C	4.718038	0.375183	0.548862
C	6.235470	0.513420	0.617160
C	0.664799	1.085980	-2.377561
C	8.121310	0.363405	2.022233
C	4.332848	-1.127891	0.729510
C	3.209594	1.837610	-0.735141
C	0.091378	-1.724895	0.163038
C	2.058501	1.379190	-2.955779
C	0.557075	-1.135298	1.345251
C	0.996433	-2.254042	-0.761432
C	2.882101	2.385213	-2.119278
C	1.928336	-0.948797	1.518791

C	2.364005	-2.056648	-0.566057
H	0.725109	-0.993188	-2.885453
H	-0.027632	0.001722	-4.113823
H	4.907630	0.905545	-1.471912
H	4.261627	0.955553	1.355818
H	8.305211	0.169077	3.078798
H	8.493878	1.351491	1.740941
H	8.606233	-0.392771	1.399600
H	4.671422	-1.438566	1.725062
H	4.893614	-1.722371	-0.002132
H	0.022838	1.965208	-2.513046
H	0.739612	0.926408	-1.296751
H	2.627126	0.442050	-3.034480
H	1.964303	1.769168	-3.977963
H	-0.126354	-0.782367	2.104392
H	0.647447	-2.806670	-1.625264
H	3.807551	2.634832	-2.655432
H	2.317670	3.310706	-1.972422
H	2.273846	-0.433996	2.411648
H	3.060916	-2.439517	-1.308054
N	4.253286	0.939044	-0.700004
O	6.691124	0.304333	1.863959
O	6.946951	0.741726	-0.339651
O	2.557349	2.115591	0.265143
H	-1.547073	-1.625796	-2.822566
Pd	-1.691203	-0.513729	-0.484423
C	-2.475604	0.319197	-3.128690
N	-2.432279	1.320250	-0.963166
C	-2.674409	1.583584	-2.300164
O	-3.054161	2.651286	-2.768639
H	-2.275934	0.601948	-4.170528
H	-3.434838	-0.215973	-3.120900
C	-2.722566	2.197510	0.077127
C	-2.759187	1.628188	1.397627
C	-3.017871	3.555026	-0.056225
C	-3.132957	2.428275	2.522891
C	-3.355589	4.338242	1.068237
H	-3.007931	3.991991	-1.043961
C	-2.566792	-0.267780	2.734133
C	-3.207118	1.788451	3.784511
C	-3.420582	3.803647	2.336017
H	-3.575729	5.391550	0.915120
C	-2.940727	0.441981	3.893463
H	-2.349744	-1.332176	2.780536

H	-3.487224	2.373832	4.657063
H	-3.690920	4.412645	3.194176
H	-3.006991	-0.077130	4.844218
N	-2.457764	0.299283	1.542816
I	-1.945152	-3.170896	0.195568

TS3

B3LYP SCF energy: -1649.04630987 a.u.
B3LYP enthalpy: -1648.500140 a.u.
B3LYP free energy: -1648.600766 a.u.
M06 SCF energy in solution: -1649.65301095 a.u.
M06 enthalpy in solution: -1649.106841 a.u.
M06 free energy in solution: -1649.207467 a.u.
Three lowest frequencies (cm-1): -242.1113 20.6384 23.9734
Imaginary frequency: -242.1113 cm-1

Cartesian coordinates

ATOM	X	Y	Z
C	0.513703	-0.668757	2.004716
C	-2.753062	0.472062	-1.245644
C	-0.655732	-1.589492	2.358348
C	-5.224602	0.855946	-0.678097
C	-6.601790	0.843427	-1.330318
C	-2.030721	-0.919216	2.531264
C	-8.102570	2.065392	-2.675146
C	-4.132511	0.746728	-1.797201
C	-4.703299	0.029338	1.576385
C	-0.262729	-0.131380	-0.032664
C	-3.212034	-1.882933	2.347576
C	-0.720330	1.192936	-0.108978
C	-1.045052	-1.146049	-0.599973
C	-4.593952	-1.193767	2.480497
C	-1.950942	1.483437	-0.706684
C	-2.261752	-0.838221	-1.205493
H	-0.697913	-2.412240	1.639235
H	-0.360806	-2.063497	3.310050
H	-5.636925	-1.068001	0.082247
H	-5.079836	1.792651	-0.134383
H	-8.128282	3.055258	-3.130648
H	-8.936331	1.938856	-1.980070
H	-8.152588	1.286144	-3.440014
H	-4.154310	1.679116	-2.372046

H	-4.415044	-0.062356	-2.482240
H	-2.095788	-0.452387	3.522685
H	-2.137199	-0.103324	1.814868
H	-3.139005	-2.351709	1.357972
H	-3.162782	-2.696546	3.083711
H	-0.133731	2.009603	0.291524
H	-0.719604	-2.176995	-0.575676
H	-5.386087	-1.921864	2.263247
H	-4.735602	-0.837761	3.505640
H	-2.290317	2.516331	-0.729167
H	-2.848134	-1.644804	-1.639986
N	-5.150435	-0.208223	0.299723
O	-6.848705	1.999203	-1.970420
O	-7.358289	-0.105648	-1.317052
O	-4.333307	1.140950	1.941743
H	1.440500	-1.222884	2.188620
Pd	1.827032	-0.392163	0.116916
C	0.535274	0.681307	2.690169
N	2.179283	1.400873	1.029590
C	1.589414	1.690820	2.235954
O	1.836905	2.678737	2.922973
H	-0.438287	1.176991	2.627640
H	0.711475	0.510360	3.762496
C	3.248033	2.129282	0.499494
C	4.044880	1.440921	-0.465369
C	3.602948	3.435853	0.832227
C	5.173039	2.071002	-1.070925
C	4.717515	4.054327	0.224697
H	3.023246	3.961824	1.576097
C	4.423549	-0.534954	-1.661485
C	5.915438	1.316180	-2.011921
C	5.494436	3.402757	-0.708114
H	4.958744	5.074819	0.509550
C	5.546261	0.022958	-2.305112
H	4.104785	-1.552092	-1.858865
H	6.777305	1.772132	-2.492922
H	6.348396	3.888721	-1.171198
H	6.098591	-0.578985	-3.018850
N	3.701123	0.146408	-0.781335
I	1.968660	-3.032766	-0.668125

TS4

B3LYP SCF energy: -1892.07575642 a.u.
B3LYP enthalpy: -1891.431682 a.u.
B3LYP free energy: -1891.560342 a.u.
M06 SCF energy in solution: -1892.56412706 a.u.
M06 enthalpy in solution: -1891.920053 a.u.
M06 free energy in solution: -1892.048713 a.u.
Three lowest frequencies (cm-1): -163.6575 5.7718 7.5332
Imaginary frequency: -163.6575 cm-1

Cartesian coordinates

ATOM	X	Y	Z
C	2.593662	0.445850	1.347948
C	1.440232	0.915928	0.459463
C	3.259801	1.547886	2.173266
C	4.217785	2.398093	1.336747
C	0.168654	1.292098	1.252930
C	6.164815	1.155434	-1.583406
C	5.707762	2.108160	-0.604198
C	6.275508	3.384765	-0.626006
C	7.255617	3.728077	-1.580286
C	7.691849	2.834632	-2.534560
C	7.147129	1.527123	-2.555622
C	7.524959	0.550653	-3.510653
C	6.952860	-0.701352	-3.486823
C	6.002369	-0.989600	-2.486132
C	-0.978681	1.734079	0.336074
H	2.271726	-0.392258	1.972837
H	1.757164	1.780201	-0.139336
H	1.175642	0.123655	-0.252685
H	2.533528	2.214264	2.655892
H	3.855363	1.101181	2.981570
H	5.943882	4.107191	0.105572
H	7.666436	4.734181	-1.556304
H	-0.148587	0.430351	1.858826
H	0.396748	2.100587	1.960538
H	8.439008	3.112986	-3.272530
H	8.266785	0.809833	-4.262315
H	7.218328	-1.463111	-4.212814
H	5.532763	-1.968752	-2.431397
H	-1.227595	0.922801	-0.361814
H	-0.664809	2.582075	-0.282496
N	4.729215	1.669309	0.279723
N	5.631084	-0.108766	-1.569738
O	4.501619	3.558568	1.616906

Pd	4.080247	-0.243226	0.077456
I	3.205921	-2.839022	-0.149636
C	4.860872	-2.027769	1.402154
C	6.770415	-2.284806	3.405822
C	6.192546	-2.255725	1.047955
C	4.455074	-1.993170	2.737440
C	5.425713	-2.105552	3.736165
C	7.146429	-2.362669	2.063817
H	6.489877	-2.327911	0.009645
H	3.411341	-1.877323	3.003181
H	5.117735	-2.058398	4.777389
H	8.188126	-2.513352	1.793216
H	7.517411	-2.376701	4.188619
C	-2.238084	2.143952	1.108288
C	-3.310706	2.740372	0.199311
H	-1.978574	2.914603	1.849545
H	-2.646427	1.296625	1.674934
N	-4.601307	2.542710	0.608736
O	-3.046541	3.367143	-0.822799
C	-5.702327	3.230293	-0.036417
H	-4.801966	2.138295	1.515410
C	-6.820535	3.376968	0.989236
C	-6.181952	2.534766	-1.345553
H	-5.365889	4.233879	-0.326110
O	-7.848797	4.088400	0.496606
O	-6.791356	2.913121	2.110458
C	-6.786449	1.163345	-1.146808
H	-6.905708	3.199634	-1.827823
H	-5.301036	2.483452	-1.992404
C	-8.957498	4.277885	1.396320
C	-5.980361	0.019437	-1.066176
C	-8.173356	1.002039	-1.024631
H	-8.631667	4.807761	2.294751
H	-9.382970	3.313103	1.683321
H	-9.683620	4.871521	0.841028
C	-6.533451	-1.246190	-0.860469
H	-4.903481	0.114704	-1.173469
C	-8.745515	-0.254894	-0.819530
H	-8.821987	1.871513	-1.098100
C	-7.916102	-1.371002	-0.735806
H	-5.890471	-2.118056	-0.805266
H	-9.821864	-0.355020	-0.733023
I	-8.785225	-3.309665	-0.423589

TS5

B3LYP SCF energy: -1892.07175697 a.u.
B3LYP enthalpy: -1891.426290 a.u.
B3LYP free energy: -1891.553892 a.u.
M06 SCF energy in solution: -1892.56440620 a.u.
M06 enthalpy in solution: -1891.918939 a.u.
M06 free energy in solution: -1892.046541 a.u.
Three lowest frequencies (cm-1): -254.4878 6.4748 11.4002
Imaginary frequency: -254.4878 cm-1

Cartesian coordinates

ATOM	X	Y	Z
C	-0.706022	0.282173	0.334117
C	5.878938	0.631319	0.478905
C	-0.317946	-1.189944	0.126635
C	-0.844930	0.749390	1.768065
C	-2.116075	0.346803	2.512655
C	6.461634	-1.781216	-0.138998
C	7.648107	-2.744076	-0.202613
C	1.159903	-1.431711	0.521687
C	8.551125	-4.799820	0.511211
C	6.941017	-0.444081	0.497433
C	4.087357	-2.445034	-0.127953
C	-5.126631	-1.333077	1.284277
C	-4.348605	-0.569324	2.206965
C	-4.834829	-0.422750	3.506829
C	-6.055474	-1.018036	3.891792
C	3.871831	2.585638	0.426943
C	-6.808571	-1.768219	3.015917
C	-6.351696	-1.945928	1.686488
C	-7.049548	-2.711822	0.721143
C	-6.537825	-2.849661	-0.548341
C	-5.325818	-2.209524	-0.875001
C	1.589523	-2.869646	0.196021
C	4.549982	2.264360	-0.748657
C	4.182811	1.953722	1.628510
C	3.014309	-3.203991	0.652948
C	5.547990	1.290794	-0.712152
C	5.184084	0.979245	1.642197
H	0.008722	0.895625	-0.203649
H	-0.960476	-1.858633	0.710563
H	-0.436910	-1.461956	-0.926164

H	-0.007105	0.349037	2.352113
H	-0.757971	1.839231	1.826787
H	5.435853	-2.851040	1.374564
H	6.157019	-1.583786	-1.171378
H	8.755291	-5.136188	-0.508145
H	8.230546	-5.634103	1.135355
H	9.451004	-4.332839	0.919517
H	7.257765	-0.636815	1.530337
H	7.830429	-0.124575	-0.056200
H	-4.252917	0.139341	4.221215
H	-6.398299	-0.874878	4.913039
H	1.808836	-0.731251	-0.017465
H	1.301656	-1.243438	1.594621
H	-7.744803	-2.226260	3.321881
H	-7.986559	-3.187171	1.000739
H	-7.046011	-3.433893	-1.308149
H	-4.898181	-2.286096	-1.867765
H	1.522208	-3.030720	-0.885351
H	0.897489	-3.575948	0.673047
H	4.308917	2.759840	-1.682593
H	3.660559	2.209810	2.544018
H	3.132745	-3.017118	1.729021
H	3.204020	-4.276810	0.503062
H	6.071689	1.040593	-1.631720
H	5.426940	0.486957	2.581021
N	-3.151273	-0.052880	1.702822
N	5.295645	-2.335725	0.516957
N	-4.649584	-1.476667	0.000617
O	-2.157555	0.411688	3.739712
O	7.453425	-3.867851	0.519238
O	8.667933	-2.500203	-0.808627
O	3.894630	-1.981536	-1.245377
I	2.318865	4.067084	0.379548
Pd	-2.937821	-0.234702	-0.340258
I	-2.755522	-0.928831	-2.995996
C	-2.014211	1.649810	-0.687072
C	-2.121599	4.310658	-1.579906
C	-2.675615	2.626803	0.073512
C	-1.371612	2.025520	-1.877440
C	-1.433047	3.345299	-2.320207
C	-2.738777	3.947733	-0.384066
H	-3.161640	2.366051	1.005835
H	-0.822541	1.293700	-2.457358
H	-0.935501	3.617508	-3.247078

H	-3.273606	4.687706	0.205641
H	-2.166202	5.338660	-1.929129

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B3LYP SCF energy:	-1511.52231004 a.u.		
B3LYP enthalpy:	-1510.967090 a.u.		
B3LYP free energy:	-1511.063232 a.u.		
M06 SCF energy in solution:	-1510.95435088 a.u.		
M06 enthalpy in solution:	-1510.399131 a.u.		
M06 free energy in solution:	-1510.495273 a.u.		
Three lowest frequencies (cm-1):	6.2319	15.1345	18.4694

Cartesian coordinates

ATOM	X	Y	Z
N	4.987301	-0.980854	1.634098
O	-4.549320	1.708967	-0.732719
N	-4.468116	-0.230159	0.466919
H	-4.172992	-0.652362	1.336296
N	3.590045	0.795567	0.221408
H	3.474937	0.451306	1.170044
C	5.413195	-0.747360	0.361446
C	-0.338240	1.025165	-0.323487
C	-4.292122	1.128956	0.314565
C	4.679567	0.205533	-0.425797
C	-0.526480	-0.020634	0.591461
H	-0.045200	0.012332	1.566256
C	-0.929819	0.898358	-1.587134
H	-0.754190	1.667333	-2.334967
C	2.716458	1.742216	-0.257552
O	2.766939	2.208749	-1.389394
C	-2.130490	-1.091961	-0.888848
C	-2.068139	3.444913	0.409839
H	-2.005275	4.487889	0.074258
H	-2.235301	2.852601	-0.493587
O	-6.070430	-2.376686	0.761579
C	1.669356	2.205988	0.755501
H	1.991103	3.191445	1.119388
H	1.639527	1.545825	1.631016
C	-4.645335	-1.108840	-0.674660
H	-4.861138	-0.456031	-1.522134
C	6.929721	-1.110178	-1.540454
H	7.791588	-1.613431	-1.970535

C	-1.407723	-1.062649	0.311414
H	-1.589211	-1.827936	1.064299
C	-0.723266	3.056682	1.073593
H	-0.898577	2.394265	1.932613
H	-0.243288	3.955919	1.483727
C	-3.774341	1.851765	1.564938
H	-4.584117	1.855485	2.308838
H	-2.962061	1.257799	2.003530
C	0.276136	2.346799	0.112845
H	0.408832	2.972472	-0.777175
C	-3.359186	-1.958835	-1.003822
H	-3.296085	-2.798608	-0.300023
H	-3.491544	-2.381804	-2.005521
C	-1.819562	-0.139606	-1.865400
H	-2.338804	-0.156059	-2.820733
O	-6.416078	-2.553218	-1.466635
C	6.545543	-1.406146	-0.206994
C	-3.321138	3.298014	1.297427
H	-3.155081	3.791101	2.265157
H	-4.150151	3.823534	0.811389
C	5.652595	-1.852889	2.367330
H	5.285889	-2.015840	3.379951
C	6.786659	-2.561136	1.904118
H	7.289172	-3.266021	2.559343
C	7.227627	-2.334787	0.619983
H	8.095231	-2.858799	0.225767
C	-5.821755	-2.066719	-0.530213
C	5.080678	0.471932	-1.724918
H	4.524049	1.188954	-2.311838
C	6.205727	-0.192158	-2.267888
H	6.495984	0.037315	-3.289553
C	-7.133536	-3.321730	0.971221
H	-8.073012	-2.934154	0.569068
H	-7.202615	-3.450561	2.051778
H	-6.903955	-4.272496	0.482638

29-model

B3LYP SCF energy:	-754.76397081 a.u.
B3LYP enthalpy:	-754.358270 a.u.
B3LYP free energy:	-754.433564 a.u.
M06 SCF energy in solution:	-754.42207972 a.u.
M06 enthalpy in solution:	-754.016379 a.u.

M06 free energy in solution: -754.091673 a.u.
Three lowest frequencies (cm-1): 13.8576 20.7948 23.8024

Cartesian coordinates

ATOM	X	Y	Z
O	3.618684	-1.198376	-0.756702
N	3.136026	-0.108071	1.178353
H	3.507038	0.423287	1.952582
C	-6.735554	-0.651769	-0.052234
H	-6.944415	-0.876795	-1.107906
H	-7.225587	0.310298	0.155633
C	-4.602033	0.600634	-0.741994
H	-4.819409	0.376237	-1.794970
C	5.487518	-0.524343	0.618597
H	5.800645	-1.499616	1.018211
H	5.648674	0.207484	1.422100
C	-2.203025	0.022087	-1.341801
H	-2.582204	-0.625552	-2.129890
C	1.694905	-0.127623	0.968555
H	1.447591	-1.076821	0.486515
C	-5.221516	-0.500818	0.142296
H	-5.005740	-0.278261	1.196940
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C	-0.826895	0.127205	-1.143808
H	-0.146489	-0.438757	-1.776727
C	1.188688	1.038221	0.090316
H	1.729866	0.994699	-0.861338
H	1.448740	1.990074	0.571025
C	4.005528	-0.638722	0.264675
C	6.346467	-0.180747	-0.606047
H	6.060133	0.810927	-0.981483
C	-3.107172	0.744848	-0.551209
C	-1.205736	1.685309	0.643835
H	-0.825982	2.349463	1.418033
C	-0.303376	0.961503	-0.146008
H	6.100958	-0.892157	-1.401379
C	7.847449	-0.207244	-0.304986
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H	8.165171	-1.198378	0.042298
H	8.115400	0.517587	0.474211
C	-7.350445	-1.740311	0.834032
H	-8.430818	-1.826539	0.670425

H	-7.190674	-1.522625	1.897330
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32

B3LYP SCF energy:	-1244.33367460 a.u.		
B3LYP enthalpy:	-1243.855631 a.u.		
B3LYP free energy:	-1243.936488 a.u.		
M06 SCF energy in solution:	-1243.83035044 a.u.		
M06 enthalpy in solution:	-1243.352307 a.u.		
M06 free energy in solution:	-1243.433164 a.u.		
Three lowest frequencies (cm-1):	10.2083	20.3397	28.6022

Cartesian coordinates

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O	-1.229831	1.913580	1.476613
N	-2.407584	0.867099	-0.191616
H	-2.410442	0.594600	-1.170564
N	-4.217291	-0.430455	-1.655130
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C	1.583108	0.364600	0.201111
C	3.106996	-1.955001	0.699479
C	2.663063	-1.154965	1.761831
H	2.997536	-1.369716	2.775352
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C	-3.573024	0.468404	0.471095
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H	4.199420	0.845486	-1.872463
H	5.566668	1.827022	-1.388013
C	-5.753104	-0.679199	0.236461
C	-1.330115	1.554737	0.308502
C	4.357679	-2.790701	0.838142
H	4.457021	-3.477928	-0.008660
H	4.367144	-3.388568	1.757675
C	2.587283	-1.703478	-0.576626
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C	-3.851680	0.694228	1.809231
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C	2.207650	2.480621	-1.032804
H	2.181029	2.030343	-2.034473
H	1.874816	3.519131	-1.164548
C	-6.327141	-1.559179	-1.941675
H	-6.997702	-2.078170	-2.619626
C	-6.654927	-1.361374	-0.619603
H	-7.598998	-1.721266	-0.217270

32-model

B3LYP SCF energy:	-635.59361264 a.u.		
B3LYP enthalpy:	-635.299534 a.u.		
B3LYP free energy:	-635.351709 a.u.		
M06 SCF energy in solution:	-635.33211719 a.u.		
M06 enthalpy in solution:	-635.038039 a.u.		
M06 free energy in solution:	-635.090214 a.u.		
Three lowest frequencies (cm-1):	64.2593	99.7035	110.8597

Cartesian coordinates

ATOM	X	Y	Z
O	-1.877939	1.946512	0.962976
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C	-1.274080	-1.545637	0.157825
C	-0.587343	-1.350366	1.359300
H	-1.145397	-1.124707	2.264456
C	0.805407	-1.279617	1.375298
H	1.316701	-1.027283	2.301563
C	0.653084	2.327636	-0.315584
H	0.198978	3.050510	0.366853
H	1.005857	2.878372	-1.198504
C	-2.689885	-1.039539	0.017219
H	-3.154565	-0.926606	1.002218
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C	0.862026	-1.807007	-0.965820
H	1.421346	-1.975826	-1.884539
C	-2.637578	0.351013	-0.688325
H	-2.412131	0.200648	-1.750982
H	-3.618192	0.833952	-0.621710
C	2.900040	-0.737626	0.078681
H	3.393517	-0.705268	1.058198
C	1.855924	1.662053	0.391563
H	2.480327	2.482148	0.769609
H	1.477610	1.139721	1.274648
C	2.737785	0.713226	-0.471576
H	3.738645	1.147485	-0.589791
H	2.325712	0.637567	-1.487279
H	3.559039	-1.296501	-0.598197

14. Biological studies

14.1 Cell lines and culture

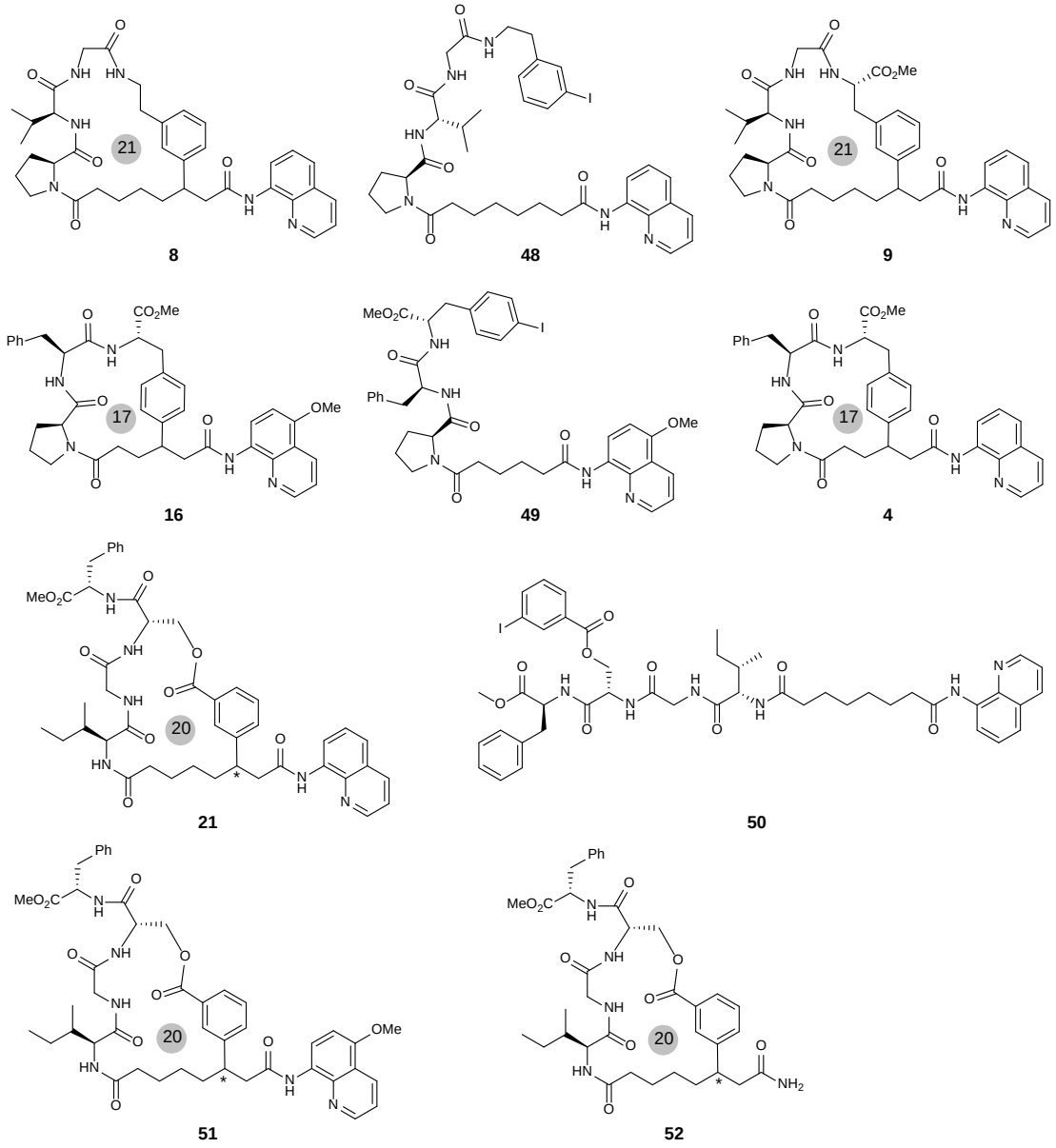
All the cell lines were obtained from ATCC (Manassas, VA). P493-6 cells were grown in RPMI 1640 with 10 % tetracycline-approved FBS. For the assays with P493-6 with tetracycline, 0.1 μg/ml tetracycline was added to the medium on the day of the assay. KG1a cells were grown in RPMI1640 with 10 % FBS and HL-60 cells were grown in Iscove's Modified Dulbecco's Medium with 10 % FBS. HepG2 cells

were grown in DMEM with 10 % FBS and 1mM sodium pyruvate. All the cell lines were maintained in a CO_2 (5%) incubator at 37 °C.

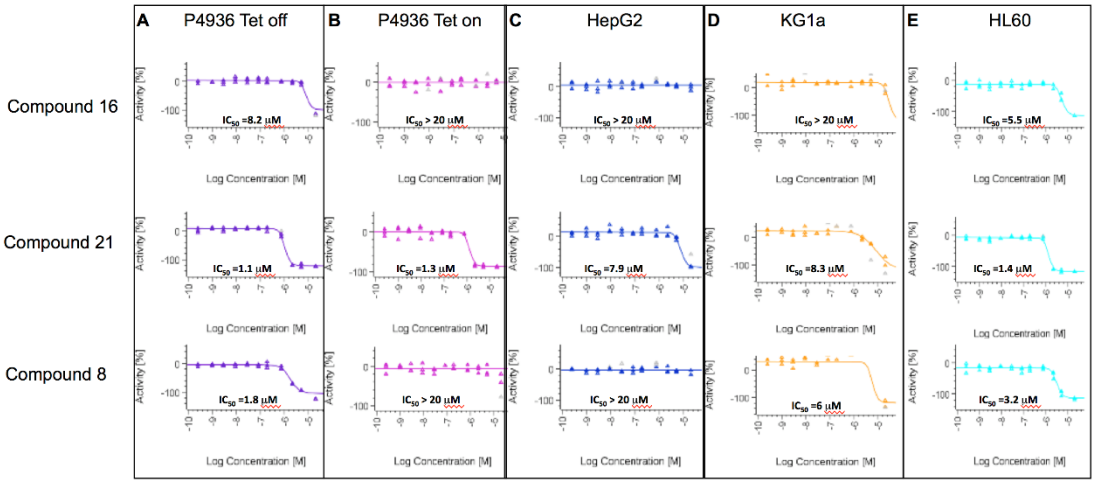
14.2 Cell proliferation assays

All the assays were performed in 1536-well plate format. Compounds of interest were transferred by Echo acoustic liquid handler in 12-point dose response starting at 20 μM. Following compound transfer, optimal number of cells for each cell line were dispensed to each well of the1536-well plate using a bottle valve liquid dispenser: 750 cells per well for P493-6, 2500 cells per well for HepG2, 5000 cells per well for KG1a and 1000 cells per well for HL60. Cells were incubated with the compounds at 37 ^{o}C, 5% CO_2 and 95% relative humidity. After 3 days of incubation, cell proliferation was determined by measuring luminescence after adding 2 μL of cell titer Glo reagent. All the experiments were performed in triplicates. For each cell line, luminescence data was normalized to their respective DMSO controls (100%) and dose response curve were generated by plotting proliferation activity as activity [%] vs compound concentration log[M].

Compound	**Proliferation Inhibition IC50** (μM)				
	Myc-dependent			*Myc-independent*	
	HL60	**KG1a**	**P4936 Tet-off**	**P4936 Tet-on**	**HepG2**
8	3.2	6.0	1.8	> 20	> 20
48 (linear precursor of **8**)	14.4	> 20	> 20	> 20	> 20
9 (**8** with an extra ester)	> 20	> 20	> 20	> 20	> 20
16	5.5	> 20	8.2	> 20	> 20
49 (linear precursor of **16**)	> 20	> 20	> 20	> 20	> 20
4 (MQ of **16** replaced with AQ)	8.9	> 20	14.9	15.0	> 20
21	1.4	8.3	1.1	1.3	7.9
50 (linear precursor of **21**)	> 20	> 20	> 20	> 20	> 20
51 (AQ of **21** replaced with MQ)	8.8	> 20	6.1	4.4	> 20
52 (AQ of **21** replaced with NH_2)	> 20	> 20	> 20	> 20	> 20



Supplementary Figure 58. Cancer cell proliferation assays. Myc-related cancer cell (P4936 cells in the presence or absence of Tet, HepG2, KG1a and HL60) were treated with marocycles with 12-point dose response, starting from 20 μM in triplicate. Cell proliferation was determined by measuring luminescence after adding 2 μL of cell titer Glo reagent. Experiments were performed in 3 independent experiments with triplicates each. For each cell line, data was normalized to their DMSO controls and were plotted as activity [%].



Supplementary Figure 59. Cell proliferation assays. Dose response curves of P4936 in the (**A**) absence or (**B**) presence of tetracycline, (**C**) HepG2, (**D**) KG1a and (**E**) HL-60 in the presence of the macrocycles **16**, **21** and **8**. Cells (P4936 in the absence or presence of tetracycline, HepG2, KG1a and HL60) were dispensed in 1536-well plate and treated with compounds **16**, **21** and **8** in a 12-point dose response starting at 20 µM. Cells with compounds were incubated for 3 days at 37 ^{o}C, 5% CO_2 and 95% relative humidity. Cell proliferation was determined by measuring luminescence after addition of 2 µL of cell titer glo (CTG) reagent. Experiments were performed in 3 independent experiments with triplicates each. For each cell line, data was normalized to their DMSO controls and were plotted as activity [%].

14.3 Parallel artificial membrane permeability assay (PAMPA)

Pre-coated PAMPA plates were purchased from Corning (Cat# 353015). The macrocycles transport experiments were designed to measure unidirectional permeability coefficients (P_e). Control experiments with diltiazem and atenolol were included for each batch of PAMPA experiments. Each compound at 10 µM spiked in donor solution (PBS with total organic solvent ≤ 10%) was added to the donor wells, and acceptor solution (PBS with total organic solvent ≤ 10%) was added to the acceptor wells. Meanwhile, an aliquot of the fresh solution of the compound was transferred into a new tube for LC-MS analysis. After incubation for 7 h at room temperature without agitation, the samples from both donor and acceptor sides were

collected for LC-MS analysis[10]. Unidirectional permeability coefficients (P_e) and the recovery (R) were calculated following the following standard equations[11].

Data Analysis:

Permeability (P_e) was determined as follows:

$$P_e = \{-\ln[(1 - C_A(t)/C_{eq}]\}/[A * \left(\frac{1}{V_D} + \frac{1}{V_A}\right) * t]$$

where A= filter area (0.3 cm^2), V_D= donor well volume (0.3 mL), V_A= acceptor well volume (0.2 mL), t= incubation time (seconds) ,$C_A(t)$= compound concentration in acceptor well at time t, $C_D(t)$= compound concentration in donor well at time t and C_{eq}= $[C_D(t)*V_D+C_A(t)*V_A]/(V_D+V_A)$, respectively.

R was calculated as:

$$R = \frac{C_R \cdot V_R + Q_{donor,end}}{Q_{donor,initial}}$$

where $Q_{donor,initial}$ and $Q_{donor,end}$ represent the amounts of the test compound in the donor compartment at time zero and after an incubation for 7 h, respectively.

LC/MS: Low-resolution mass spectra (ESI) were collected on an HPLC paired to a single-quad mass spectrometer. Compounds were resolved on aThermosyncronis C18, 5 μm, 4.6 x 250 mm column at 40 ^oC with a flow of 1 mL/min. The gradient consisted of eluents A (0.05% trifluoroacetic acidin double distilled water) and B (0.05% trifluoroacetic acidin HPLC-grade acetonitrile). Absorbance was monitored at λ=220 nm.

Supplementary Table 60. PAMPA assay of selected compounds

Compound [*size of ring*]	Concentration (μM)	Recovery (%)	Pe ($cm \cdot s^{-1} \times 10^{-6}$)	-log Pe
37 [*11*]	10	87.6	16.7	4.8
31 [*12*]	10	79.7	10.1	5.0
3 [*16*]	10	78.3	8.99	5.0
16 [*17*]	10	76.5	1.06	6.0
4 [*17*]	10	82.3	2.14	5.7
2 [*18*]	10	87.3	1.48	5.8
6 [*18*]	10	94.5	1.64	5.8
19 [*21*]	10	60.8	1.16	5.9
21 [*20*]	10	97.7	0.19	6.7
8 [*21*]	10	88.9	0.73	6.2
11 [*21*]	10	78.5	0.14	6.9
17 [*17*]	10	99.4	0.004	8.4
1 (*linear precursor of **2***)	10	89.4	0.42	6.4
49 (*linear precursor of **16***)	10	60.3	0.48	6.3
Diltiazem (*control*)	10	71.4	7.31	5.2
Atenolol (*control*)	20	88.8	0.03	7.5

15. Reference

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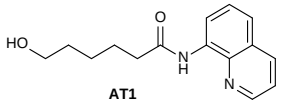
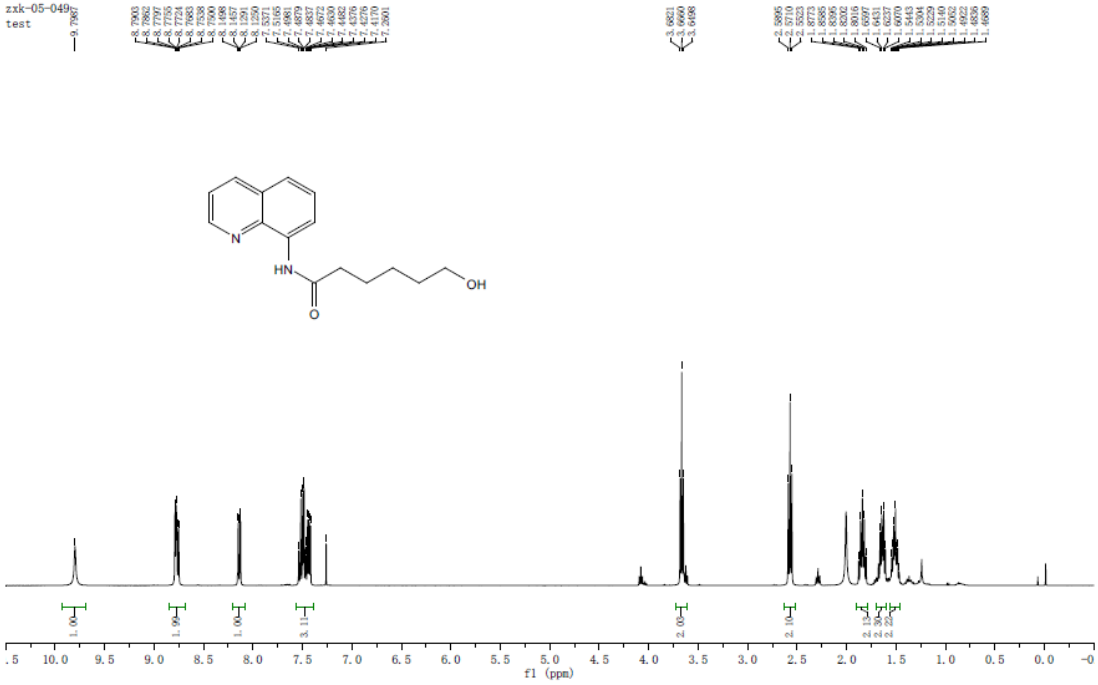
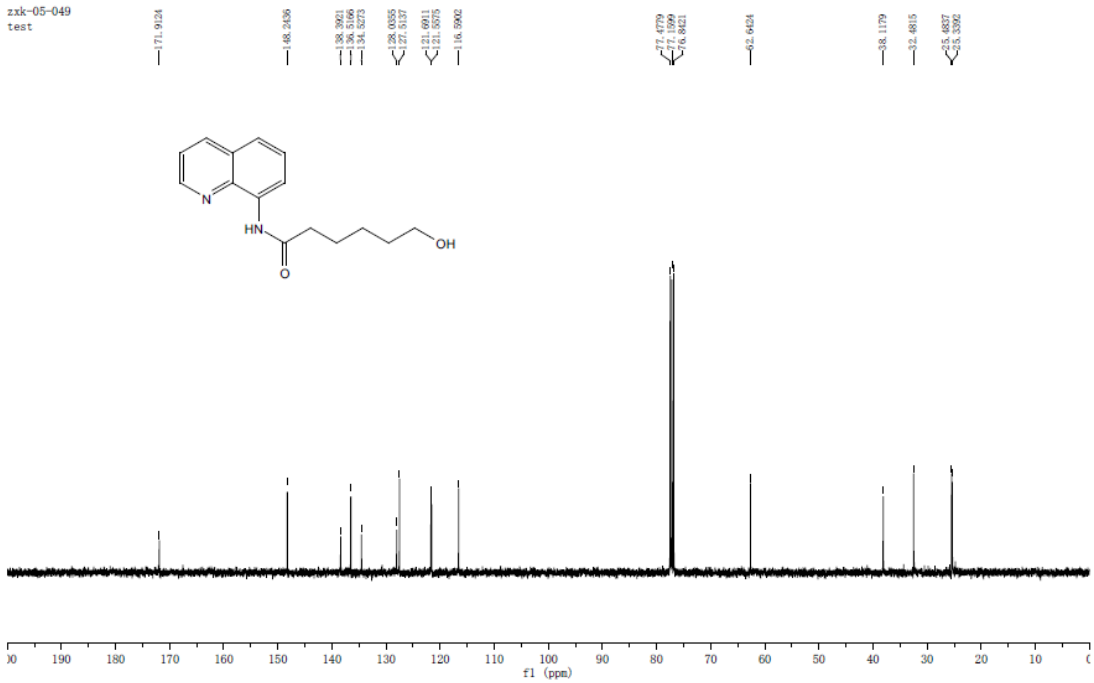
16. NMR Spectra



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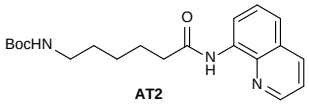
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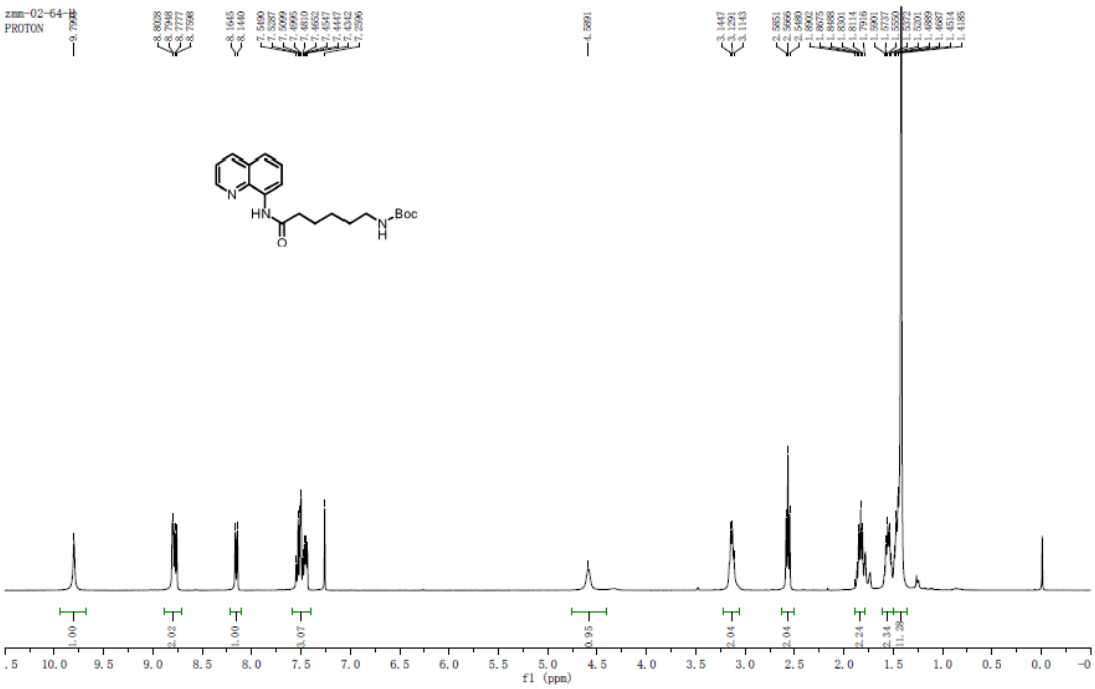
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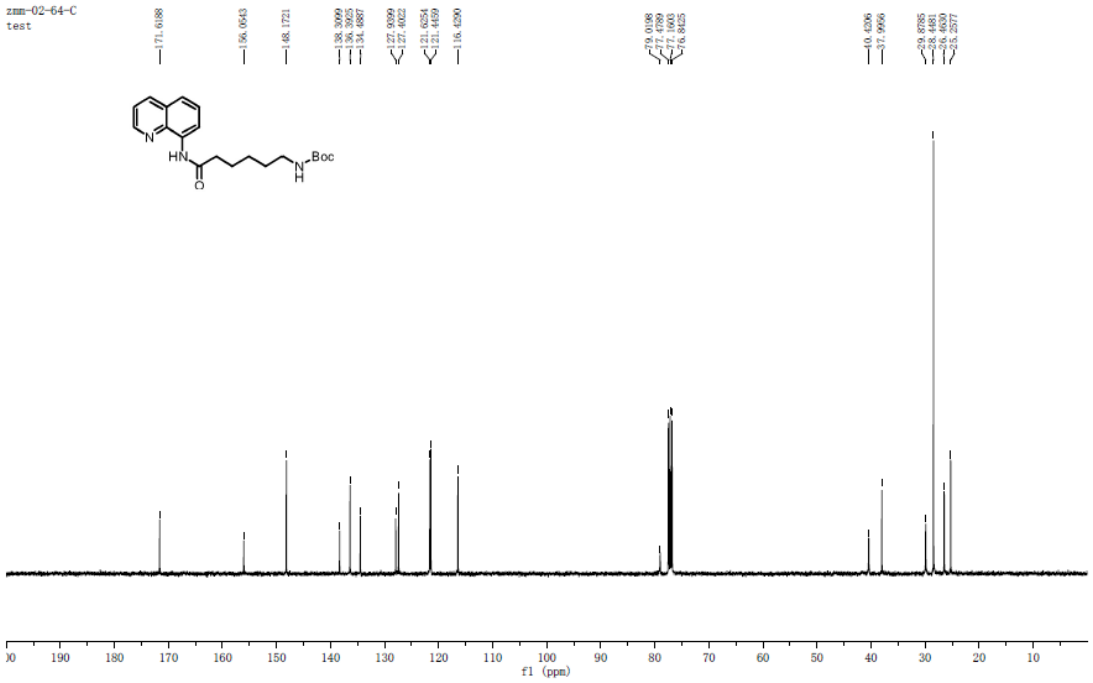
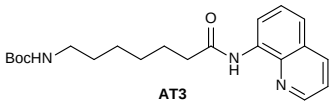
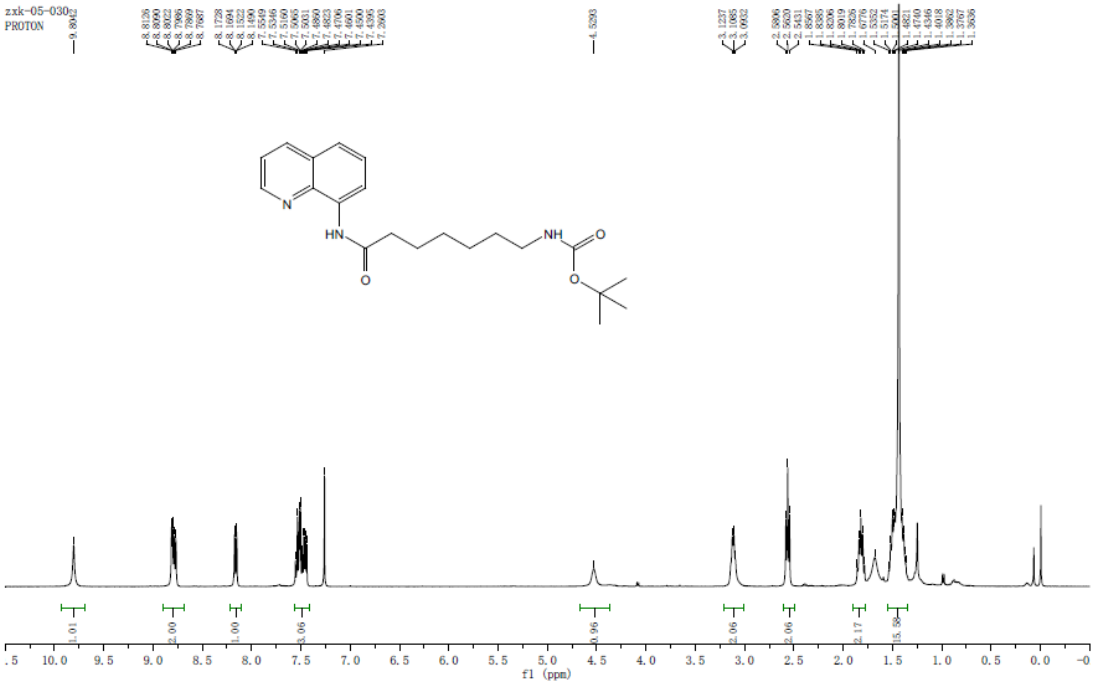
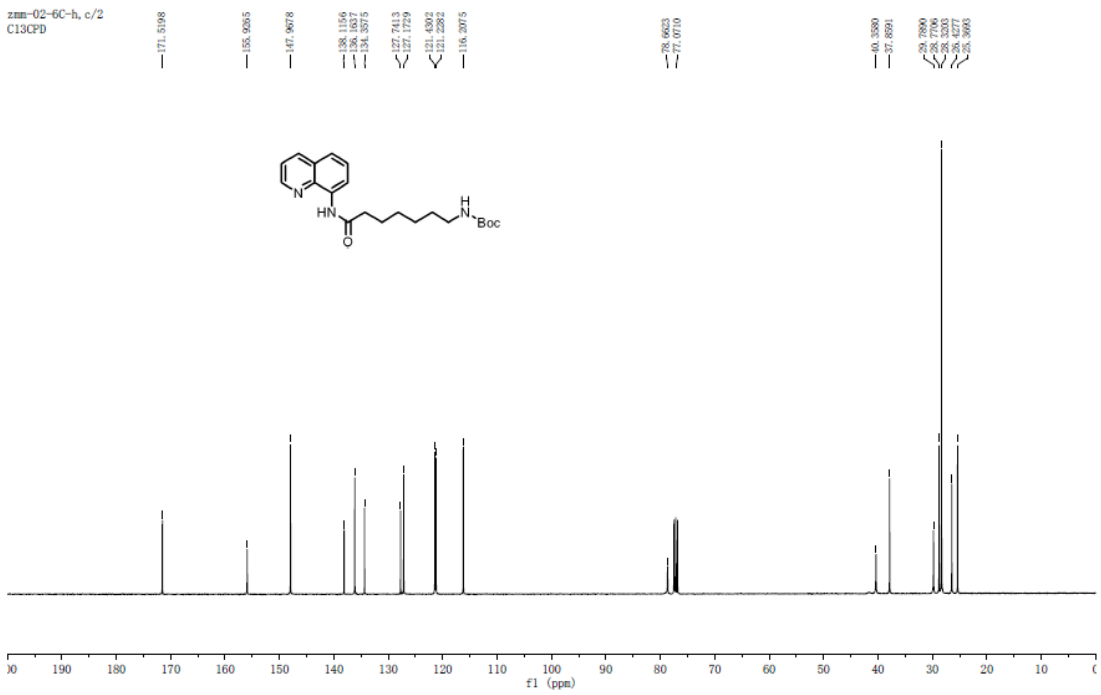
f1 (ppm)

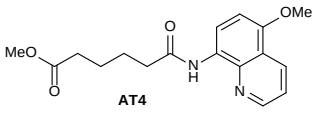

zmm-02-64-C
test
171.6188
156.0643
148.1721
138.3099
136.3925
34.4887
127.9399
127.4022
121.6254
121.4459
116.4290
79.9198
77.3999
77.1003
76.8425
40.4296
37.9956
29.8785
28.4481
25.4630
25.2377
HN
O
N
Boc
H
f1 (ppm)

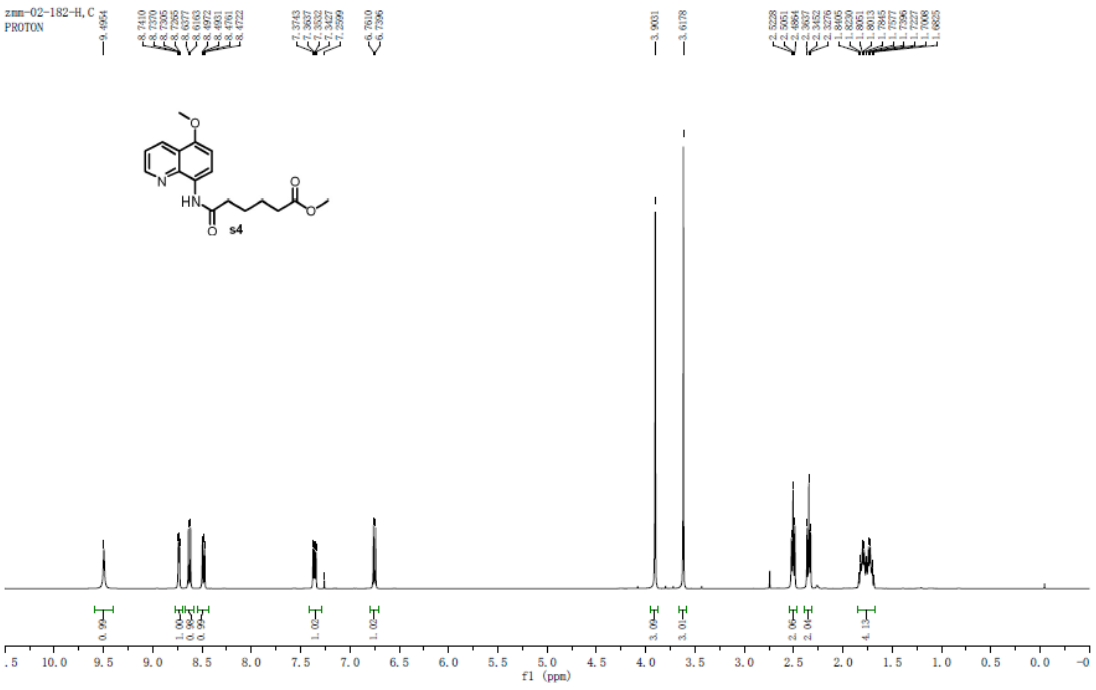

BocHN
O
N
H
N

AT3


zxk-05-030
PROTON
9.8942
8.8129
8.8000
8.7922
8.7886
8.7869
8.7697
8.1728
8.1694
8.1552
8.1490
7.5549
7.5346
7.5160
7.5066
7.5031
7.4860
7.4823
7.4676
7.4600
7.4595
7.2903
4.5293
3.1237
3.1085
3.0952
2.3906
2.3633
2.3451
1.8567
1.8385
1.8206
1.8019
1.7825
1.6776
1.5332
1.5174
1.5044
1.4821
1.4740
1.4546
1.4346
1.3962
1.3767
1.3658
HN
O
NH
O
O
1.01
2.00
1.00
3.06
0.99
2.06
2.06
2.17
15.89
f1 (ppm)


zmm-02-6C-h, c/2
C13CPD
171.5198
155.9365
147.9678
138.1156
136.1637
134.3575
127.7413
127.1729
121.4392
121.2282
116.2075
78.6623
77.0710
60.3380
37.8891
29.7890
28.7706
28.3031
26.4277
25.3660
HN
O
H
N
Boc
f1 (ppm)


MeO
O
O
N
H
OMe
N
AT4


zmm-02-182-H, C
PROTON
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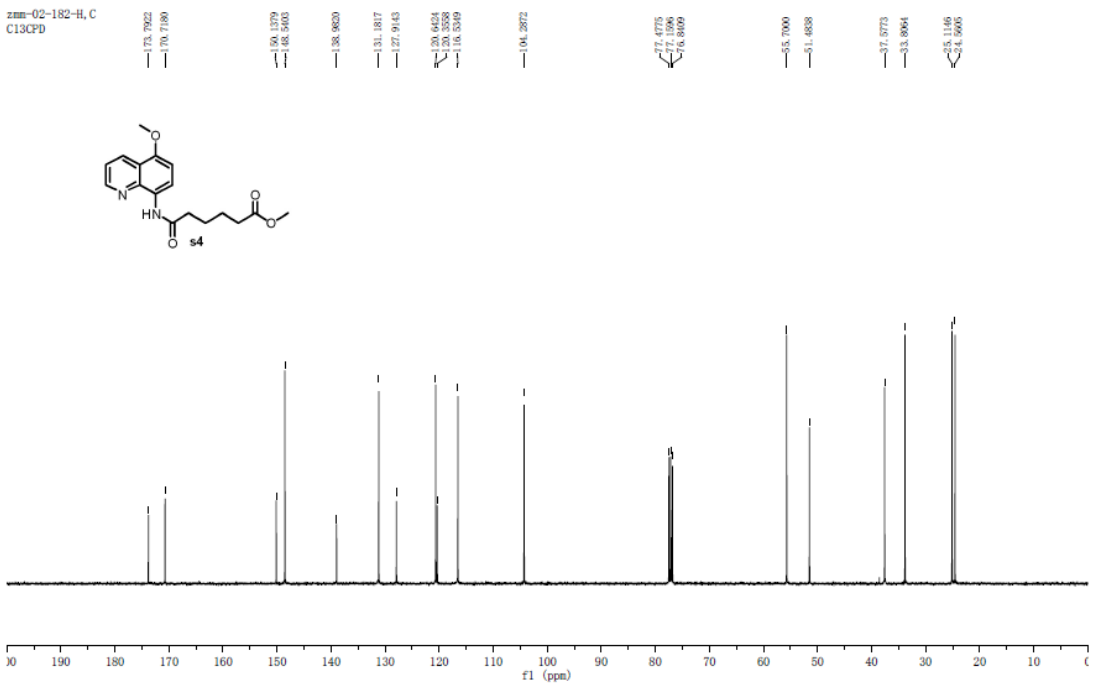
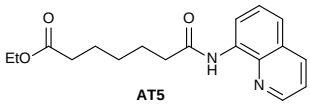
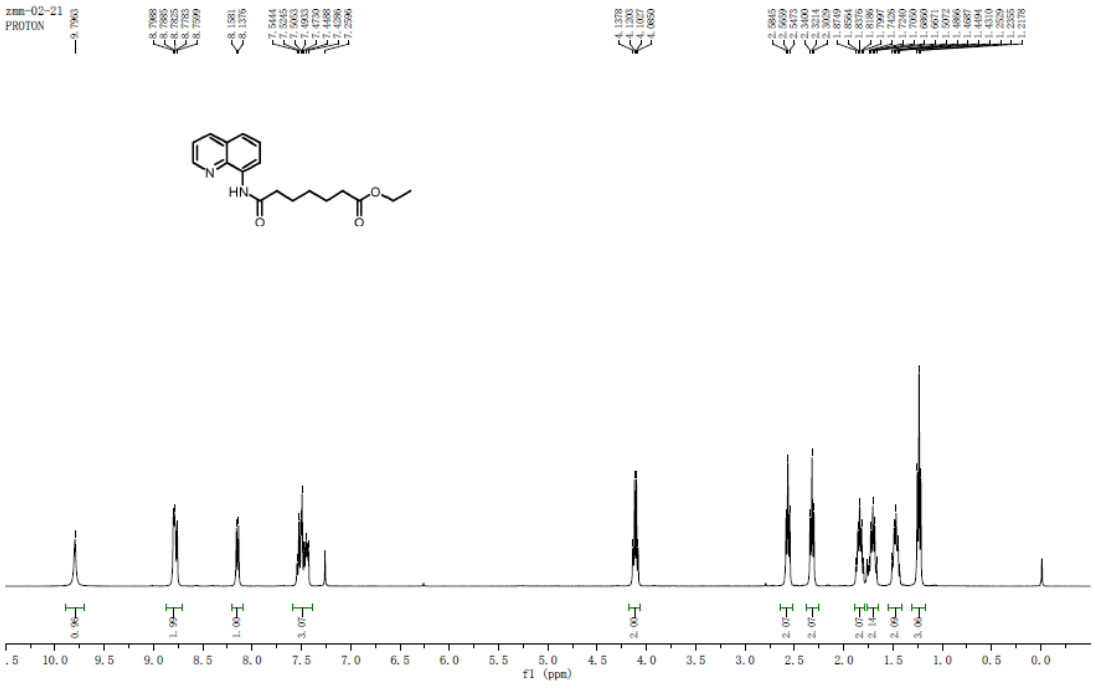
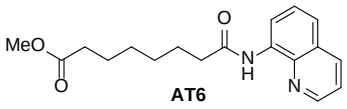
8.7410
8.7370
8.7305
8.7265
8.6977
8.6915
8.6915
8.6972
8.6931
8.6791
8.6722
7.5743
7.5637
7.3532
7.3427
7.2299
6.7610
6.7395
3.9031
3.6178
2.8238
2.5051
2.4894
2.3637
2.3452
2.3270
1.8405
1.8220
1.8051
1.7931
1.7845
1.7577
1.7396
1.7227
1.7048
1.6825
HN
O
O
O
s4
0.99
1.00
0.96
0.99
1.02
1.02
3.09
3.03
2.06
2.04
4.13
f1 (ppm)

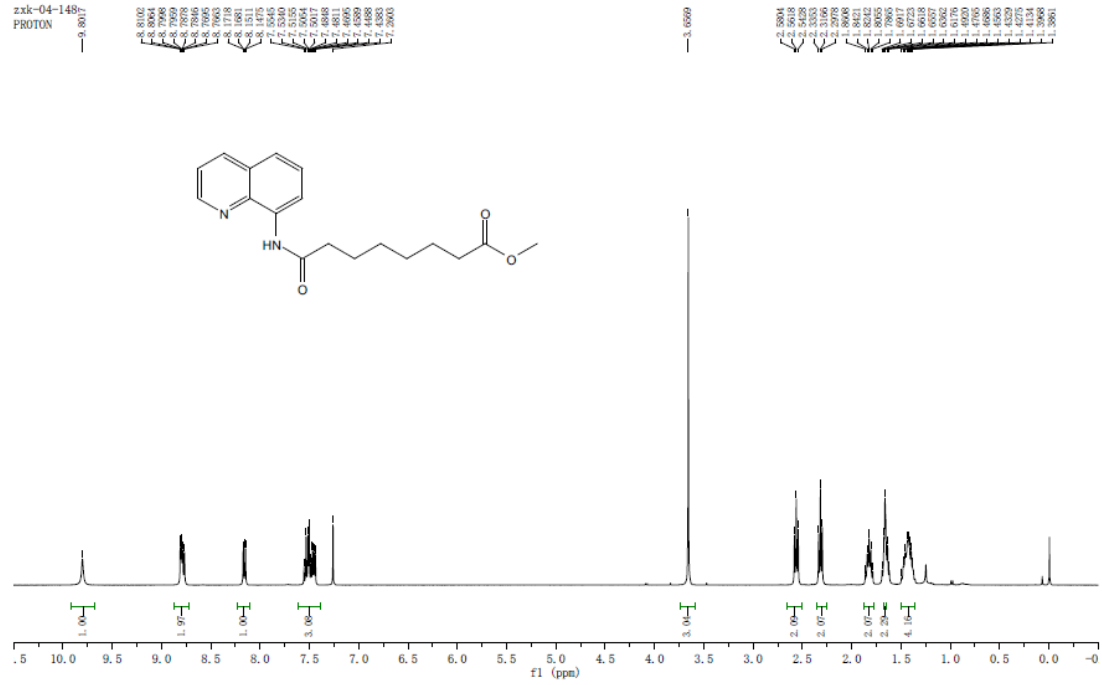

zmm-02-182-H, C
C13CPD
s4
f1 (ppm)

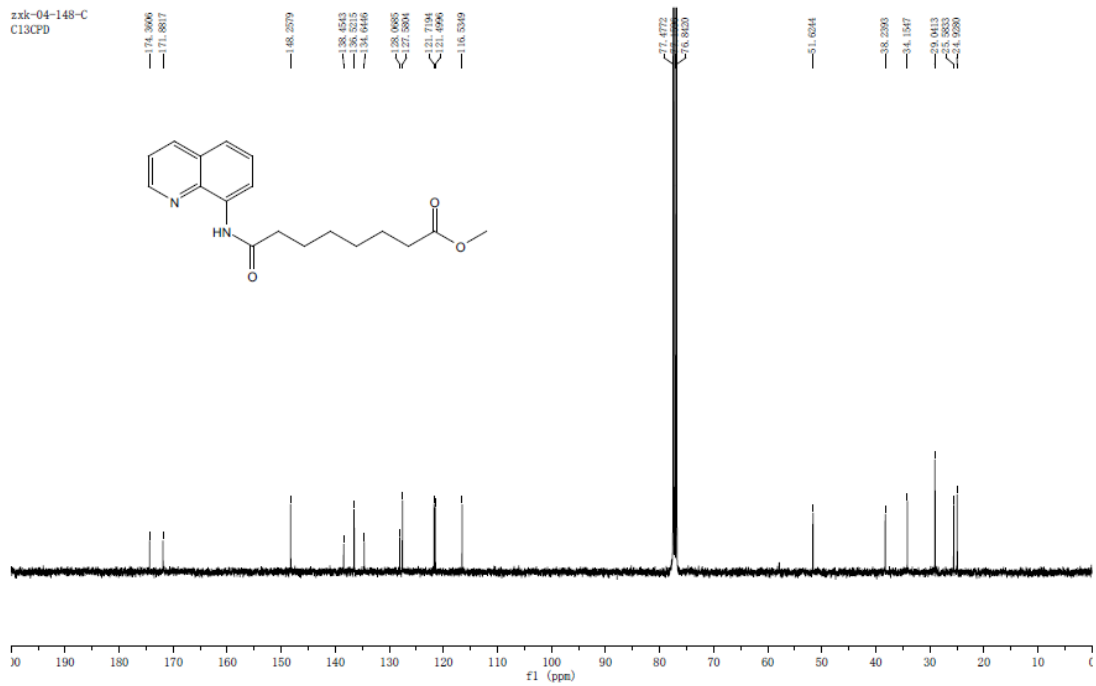

AT5

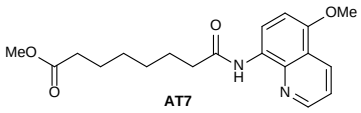

zmm-02-21
PROTON
f1 (ppm)

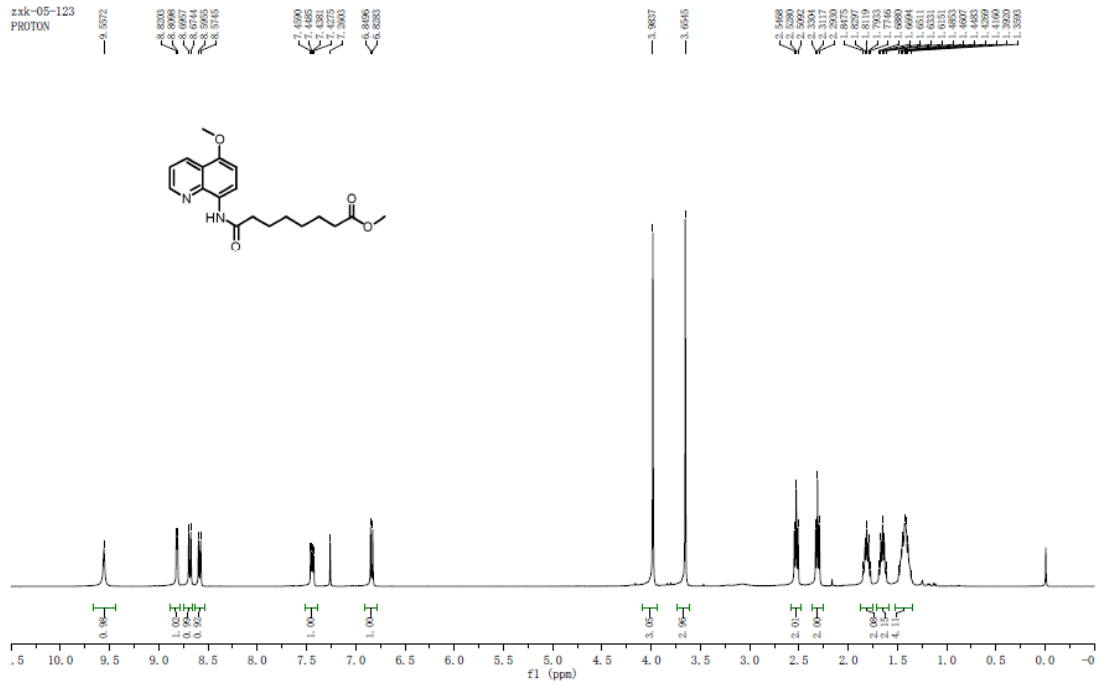

zmm-02-21
C13CPD
f1 (ppm)

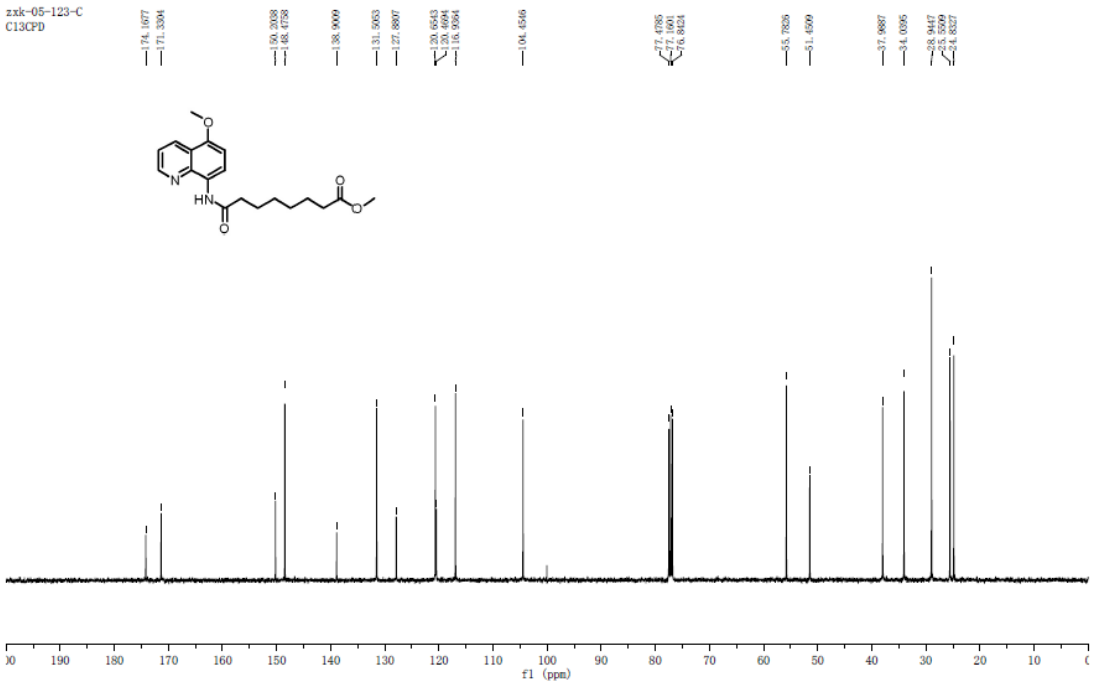

MeO
O
N
H
N
AT6

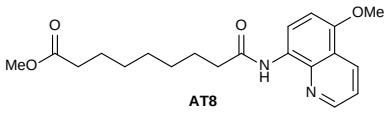

zxk-04-148
PROTON
f1 (ppm)

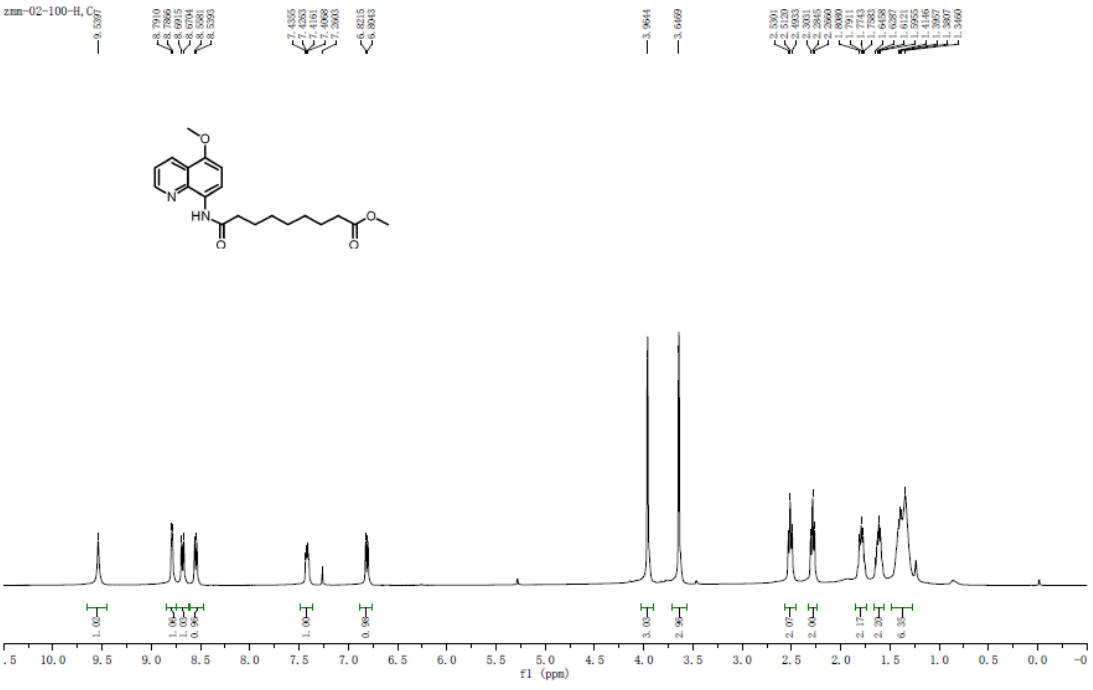

zxk-04-148-C
C13CPD
f1 (ppm)

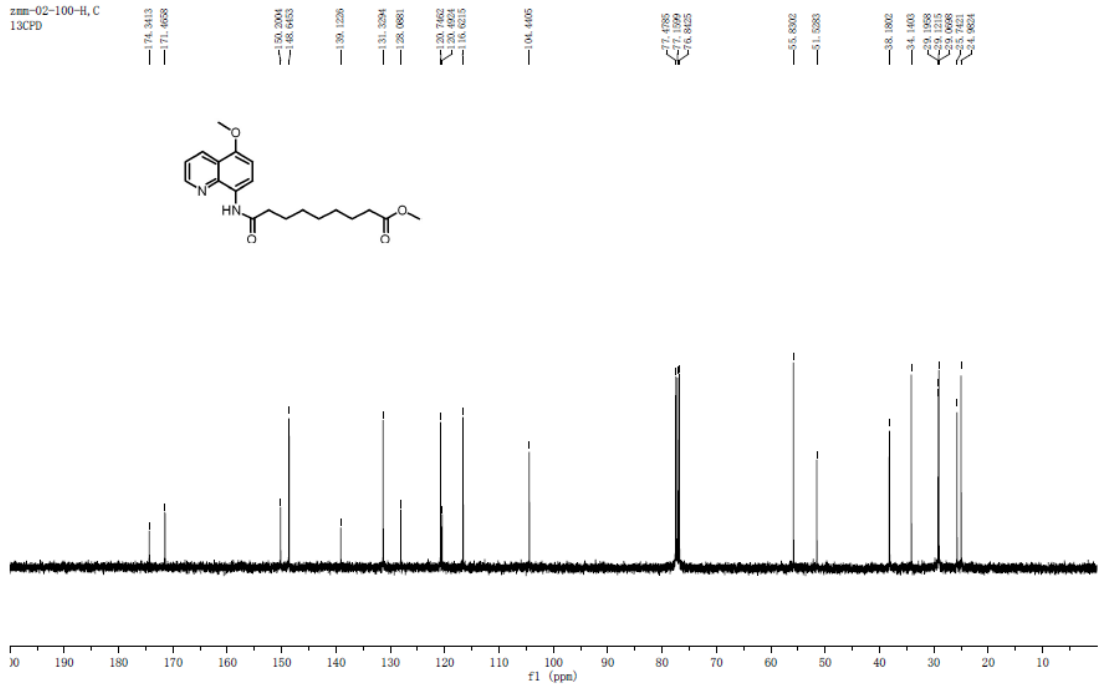

MeO
OMe
AT7

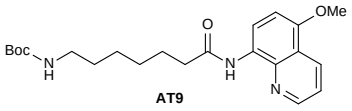

zxk-05-123
PROTON
f1 (ppm)

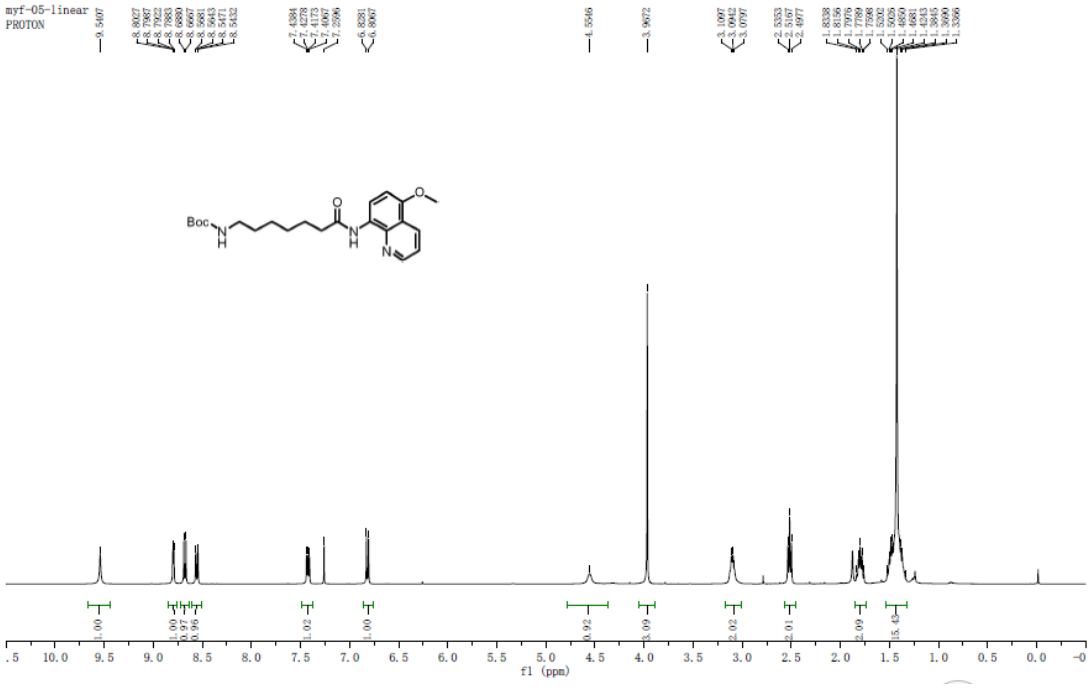

zxk-05-123-C
C13CPD
f1 (ppm)

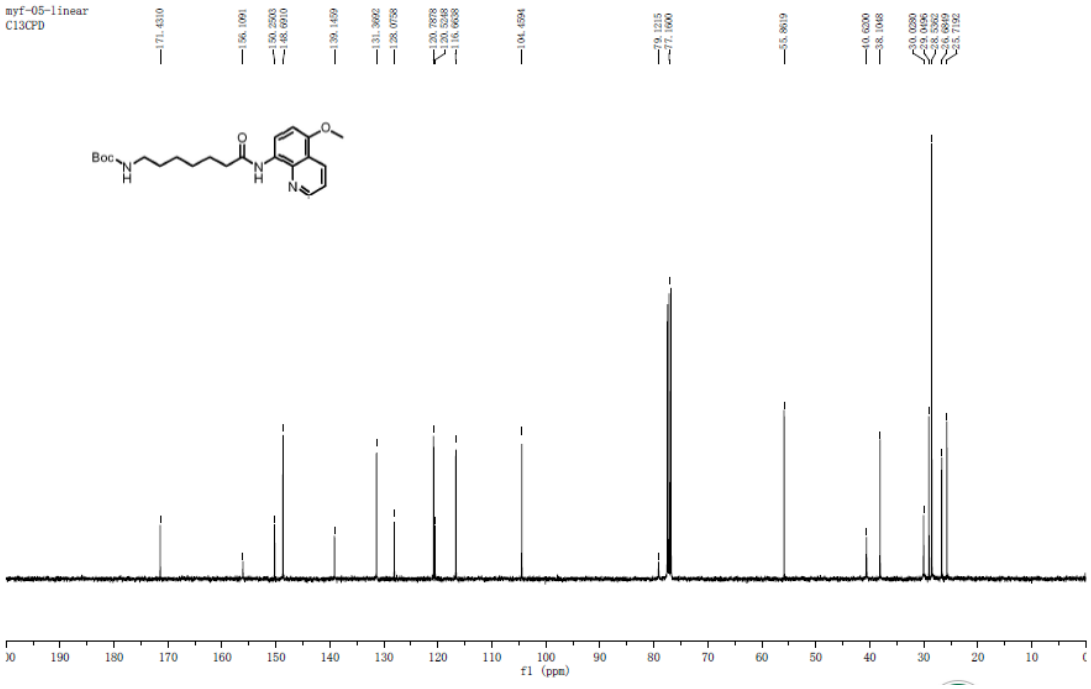

MeO
OMe
AT8

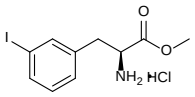

zmm-02-100-H, C
f1 (ppm)


zmm-02-100-H, C
13CPD
f1 (ppm)

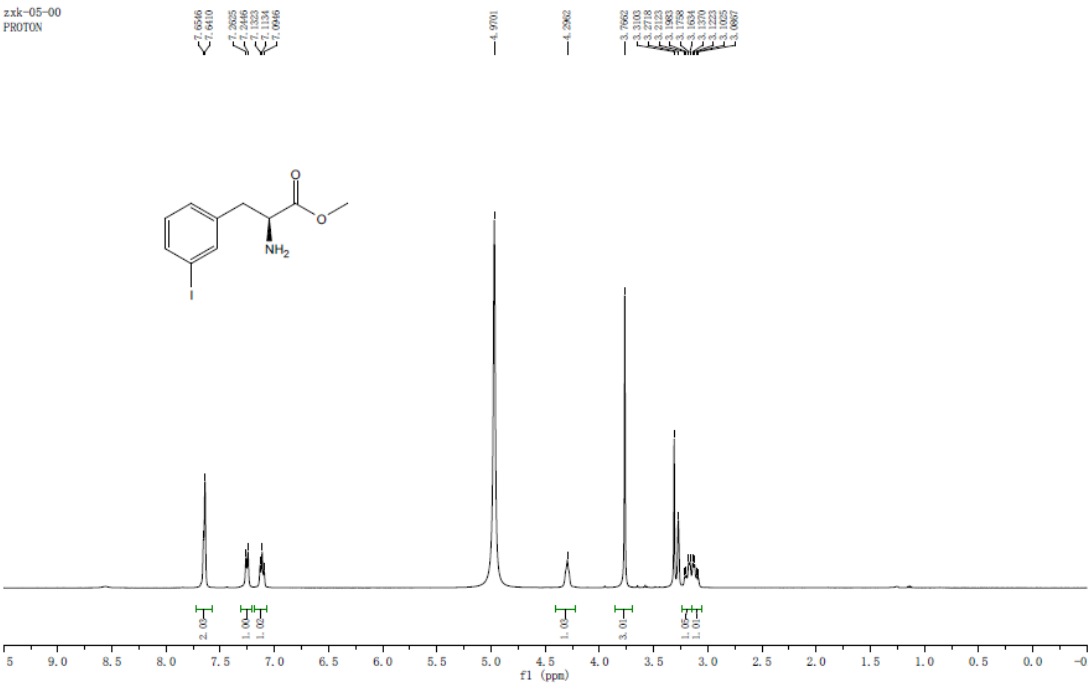

Boc
OMe
AT9


myf-05-linear
PROTON
f1 (ppm)


myf-05-linear
C13CPD
171.4310
156.1091
150.2503
148.6910
139.1459
131.3992
128.0758
120.7878
120.5248
116.6638
104.4594
79.1215
77.1600
55.8619
40.6200
38.1048
30.0280
29.0496
28.5362
25.6949
25.7192
Boc
N
H
O
N
H
O
N
f1 (ppm)


I
O
O
NH2 HCl

IAA1


zxk-05-00
PROTON
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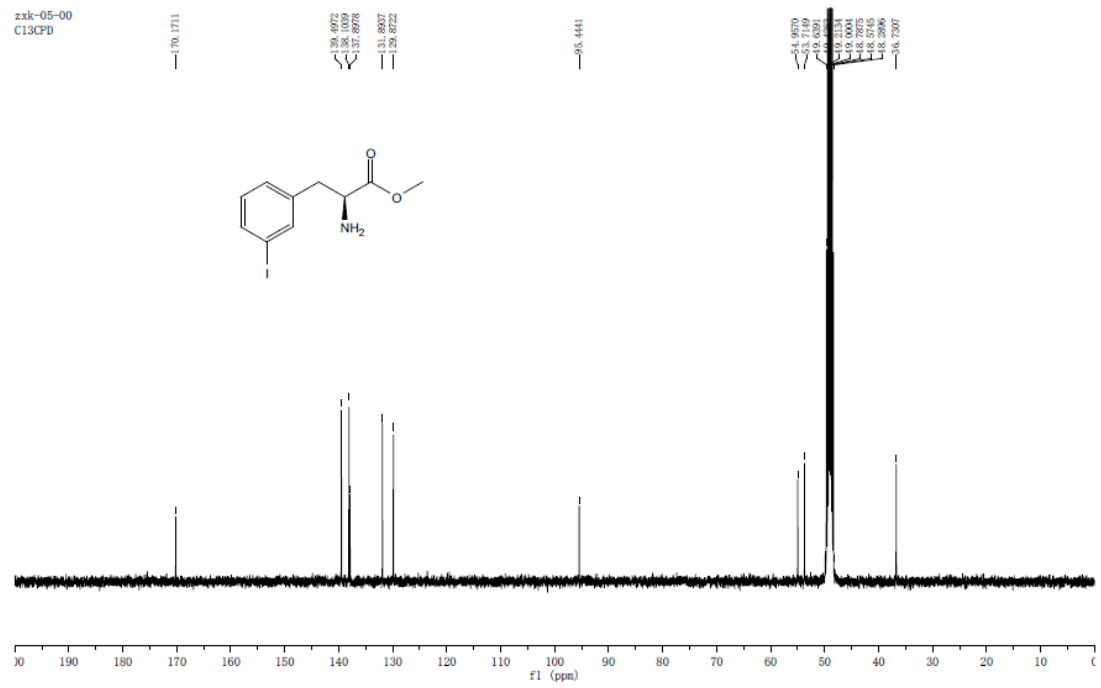
7.6419
7.2625
7.2446
7.1353
7.1134
7.0946
4.9701
4.2962
3.7662
3.3100
3.2718
3.2523
3.1983
3.1788
3.1634
3.1370
3.1223
3.1025
3.0867
O
O
NH2
I
2.00
1.00
1.00
1.00
1.00
3.01
1.05
1.01
f1 (ppm)


zxk-05-00
C13CPD
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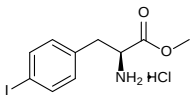
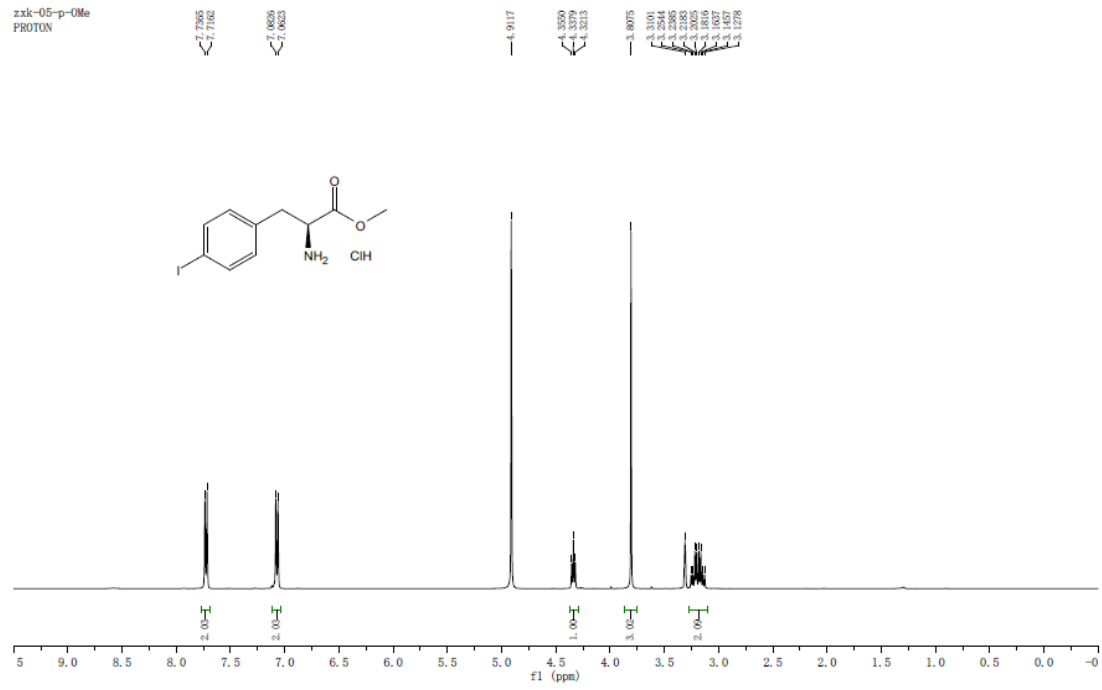
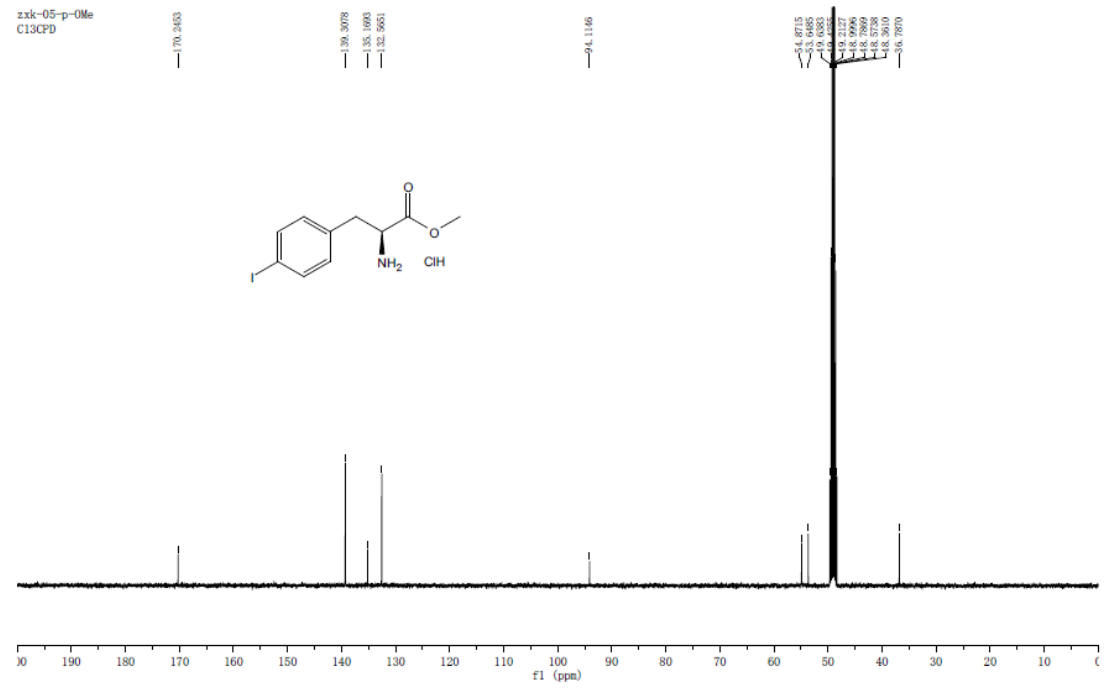
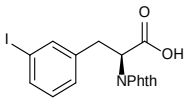
139.4972
138.1039
137.8978
131.8897
129.8722
95.4441
54.9579
53.7149
49.6391
49.4184
49.2334
49.0004
48.7875
48.5745
48.2996
36.7307
O
O
NH2
I
f1 (ppm)


O
O
NH2 HCl
I

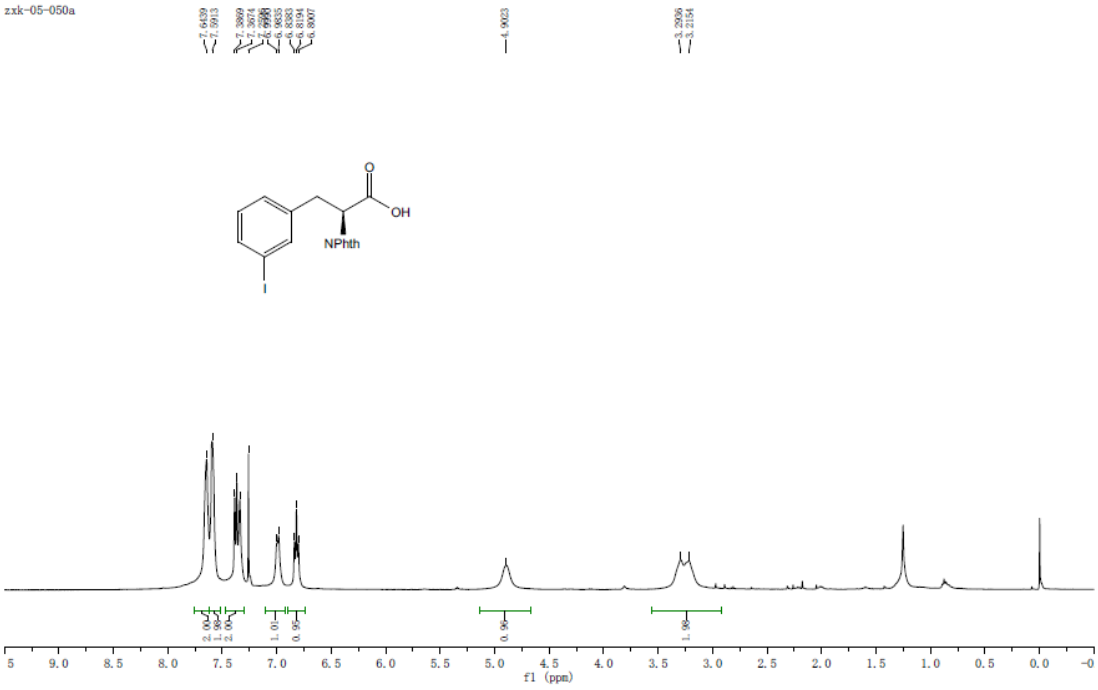
IAA2

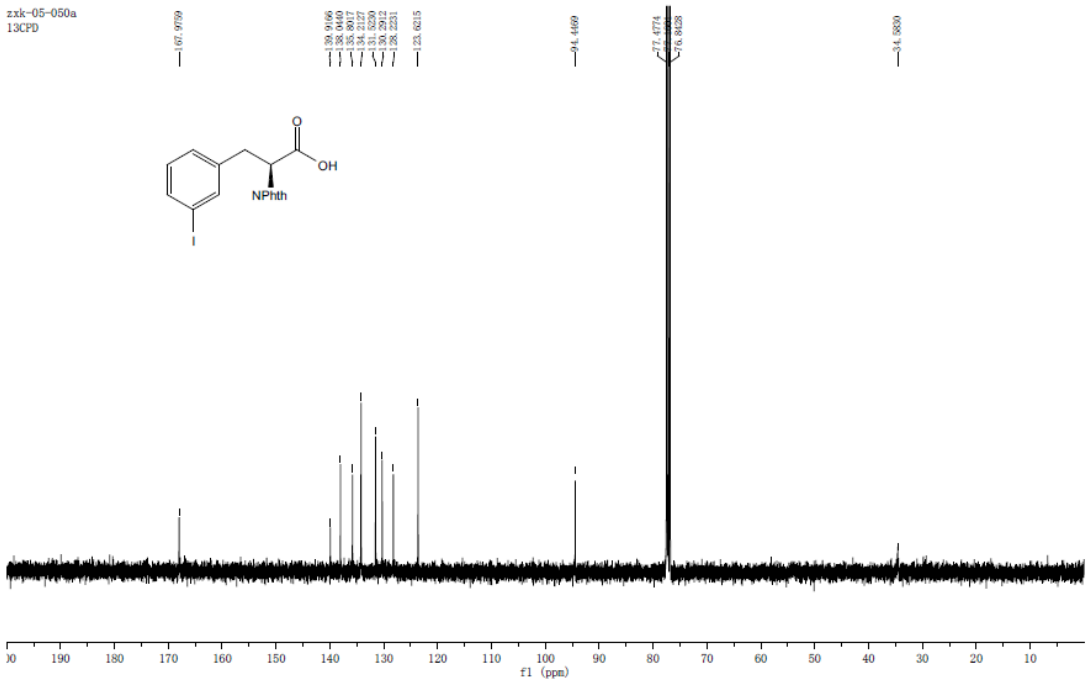

zxk-05-p-OMe
PROTON
7.7365
7.7162
7.0626
7.0423
4.9117
4.3599
4.3378
4.3213
3.8075
3.3101
3.2544
3.2385
3.2165
3.2005
3.1816
3.1657
3.1457
3.1278
O
O
NH2
ClH
I
2.00
2.00
1.00
3.02
2.00
f1 (ppm)

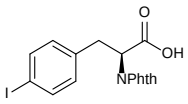

zxk-05-p-OMe
C13CPD
170.2453
139.3078
135.1693
132.5651
94.1146
54.8715
54.6495
19.6383
19.4227
18.7999
18.5738
18.3610
16.1870
O
O
NH2
ClH
I
f1 (ppm)


I
O
OH
NPhth

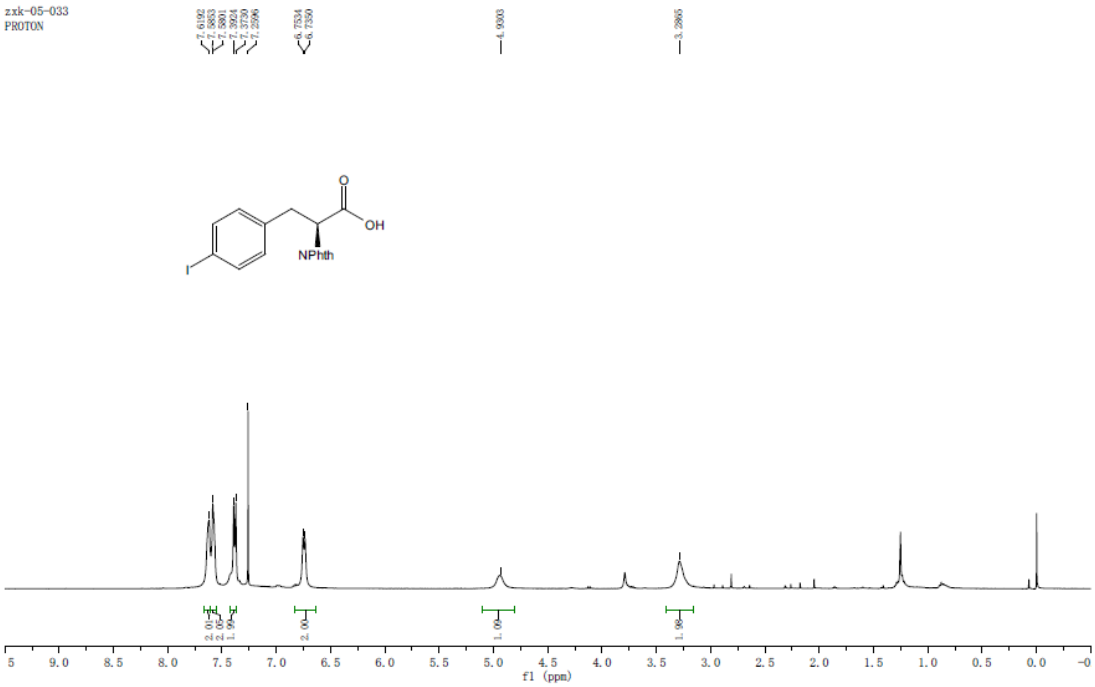
IAA3

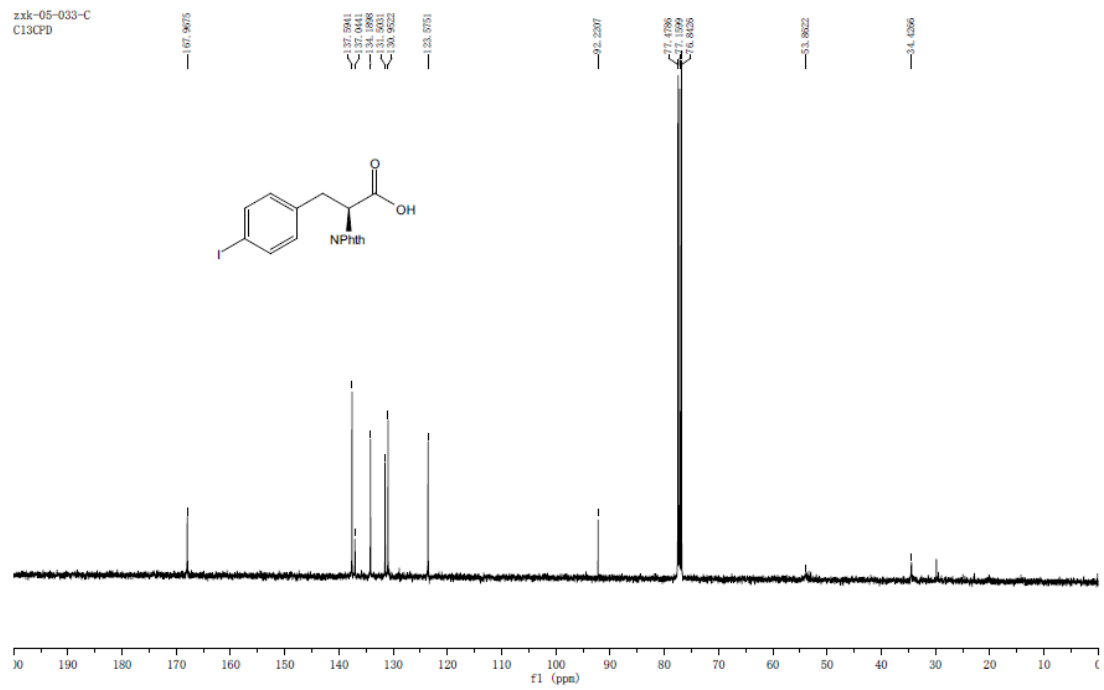

zxk-05-050a
7.6439
7.5915
7.3869
7.3674
6.9835
6.8383
6.8194
6.6807
4.9023
3.3936
3.2154
O
OH
NPhth
I
2.00
1.89
2.04
1.01
0.99
0.96
1.98
f1 (ppm)

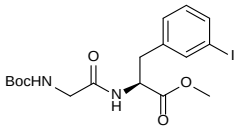

zxk-05-050a
13CPD
167.9799
139.9166
138.0449
135.9977
134.2127
131.5250
130.2912
128.2251
123.6215
94.4469
77.4774
76.8428
34.5830
O
OH
NPhth
I
f1 (ppm)


O
OH
NPhth
I

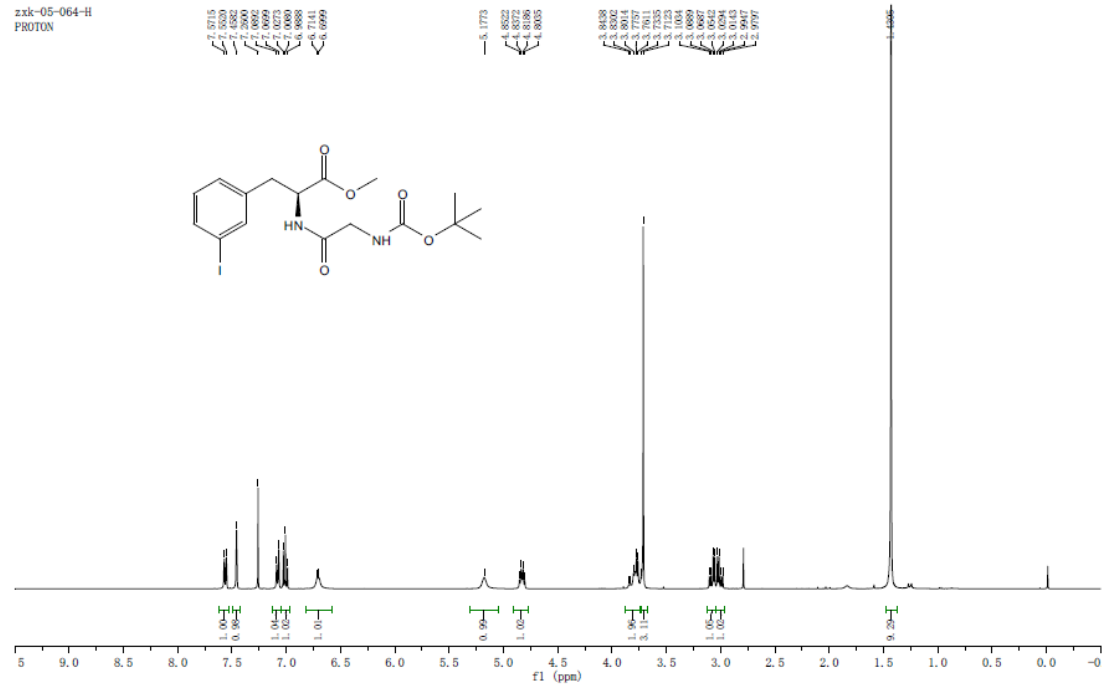
IAA4


zxk-05-033
PROTON
7.6192
7.5953
7.3901
7.3924
7.3730
7.2896
6.7534
6.7350
4.9303
3.2965
O
OH
NPhth
I
2.05
2.00
1.00
1.96
f1 (ppm)


zxk-05-033-C
C13CPD
167.9675
137.5941
137.0441
134.1898
131.5031
130.9022
123.5751
92.2297
77.4786
77.1599
76.8426
53.8622
34.4266
O
OH
NPhth
I
f1 (ppm)


BocHN
O
N
H
O
O
O
I

1-1


zxk-05-064-H
PROTON
8.5715
7.5830
7.4582
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7.0699
7.0657
7.0069
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6.6999
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3.7435
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3.0452
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2.9797
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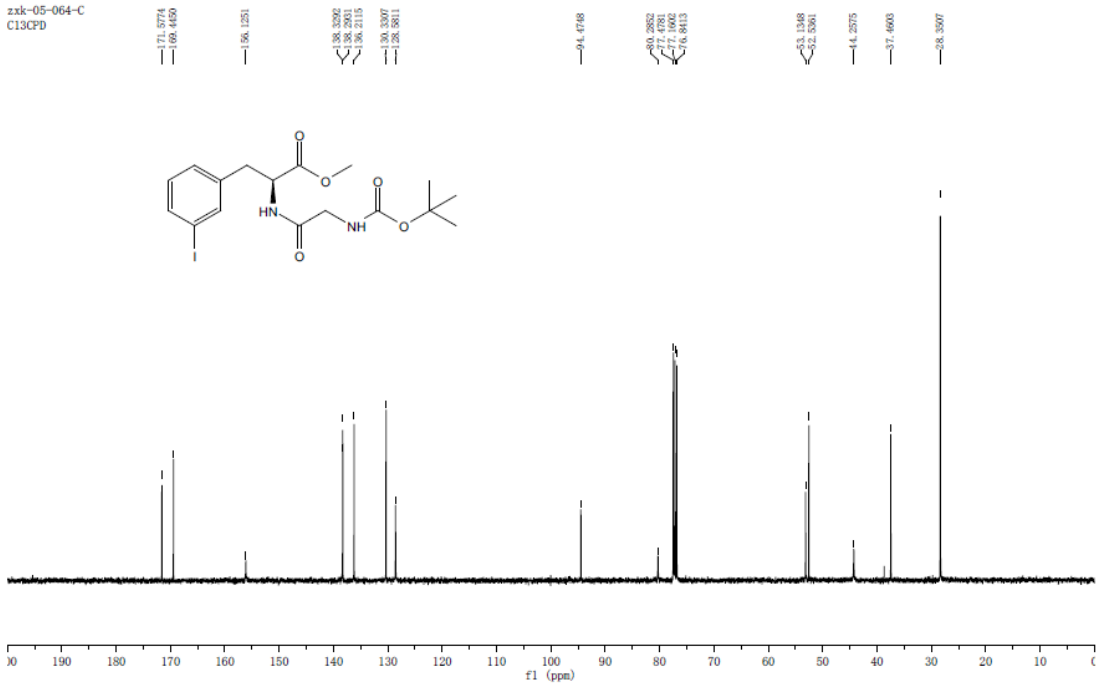

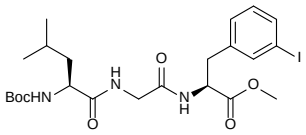

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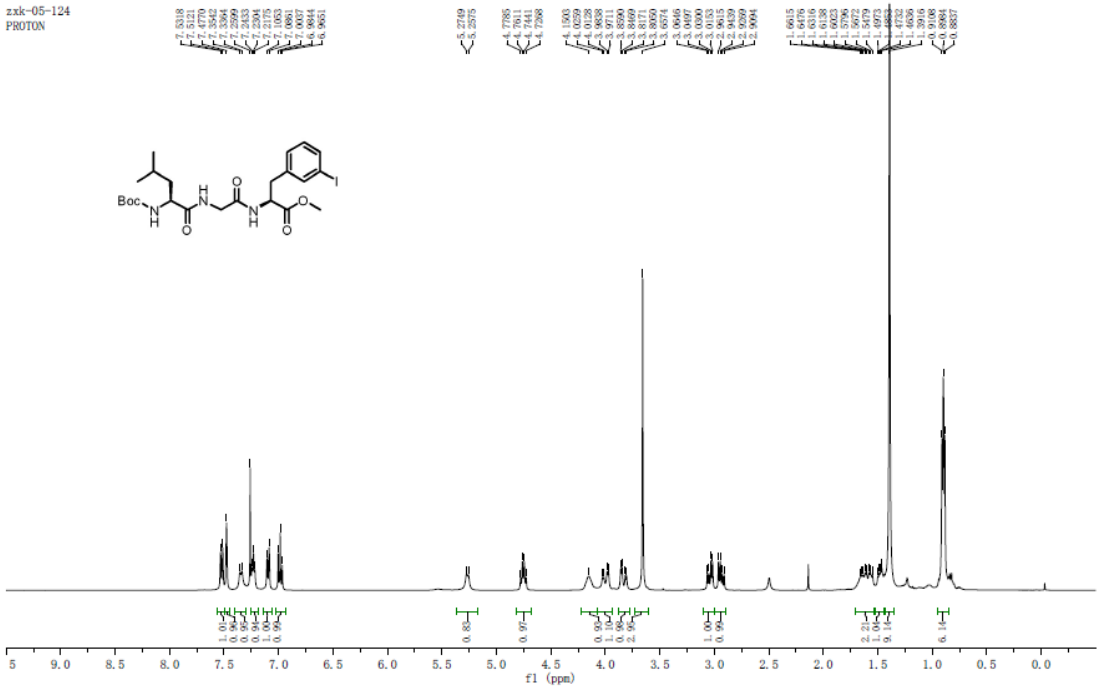

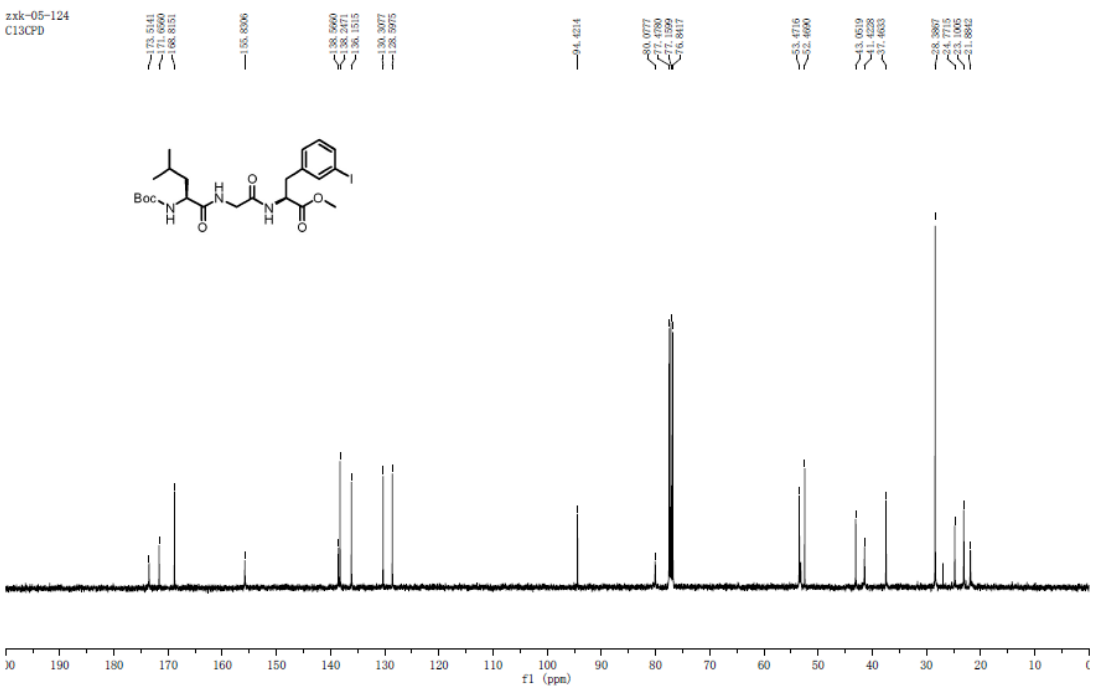
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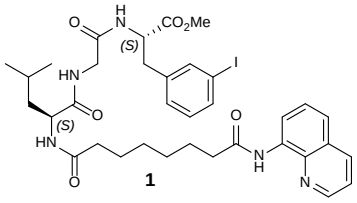
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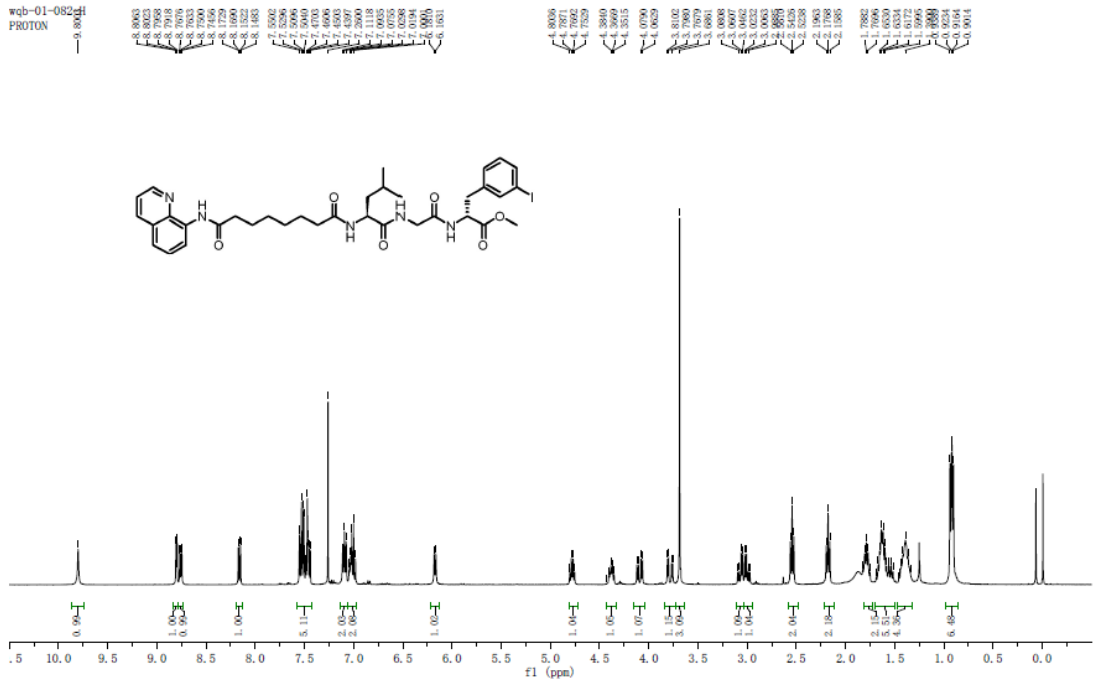
(S)
HN
(S)
HN
I
N
1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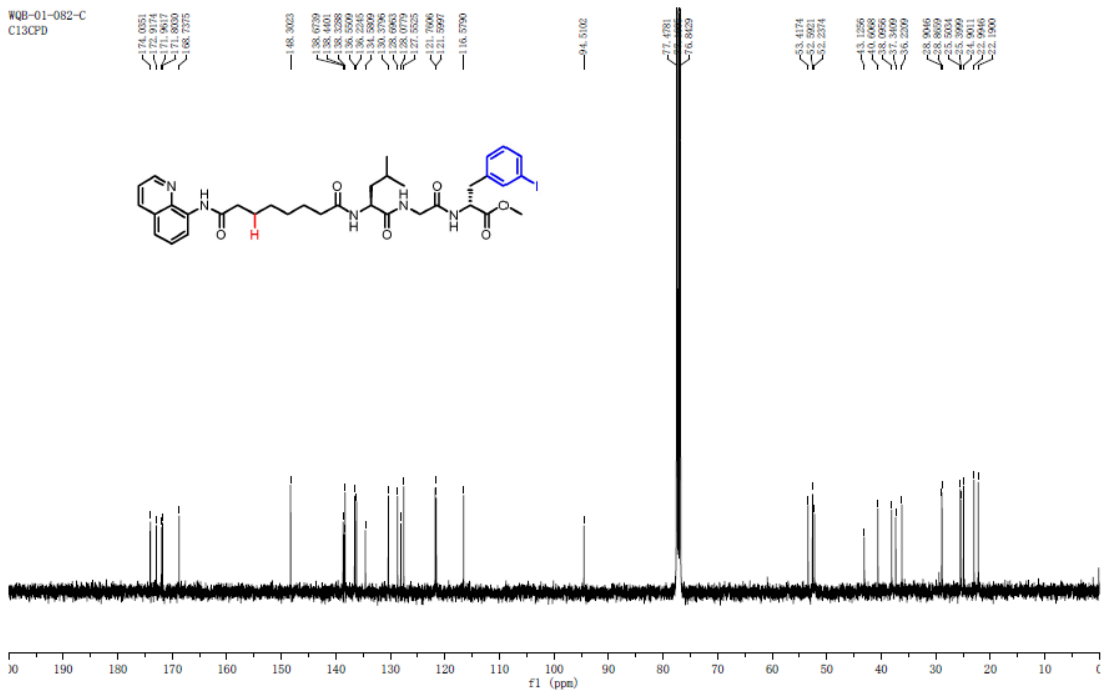
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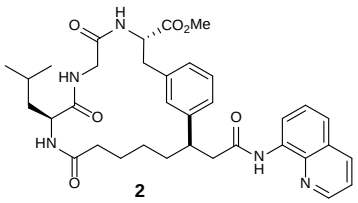
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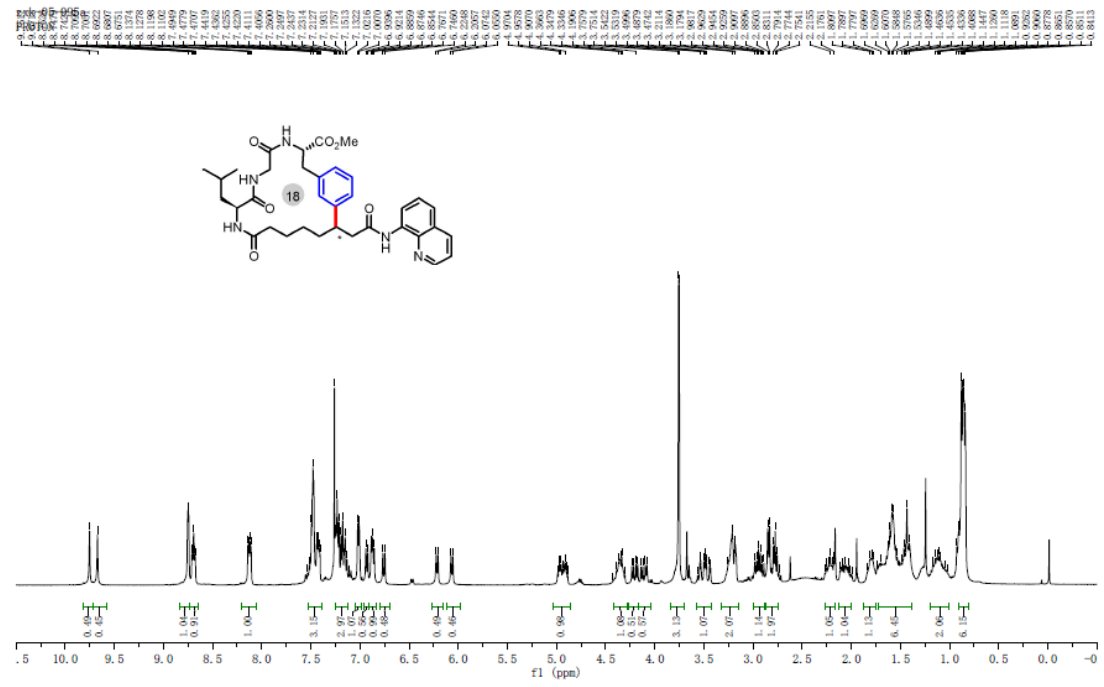
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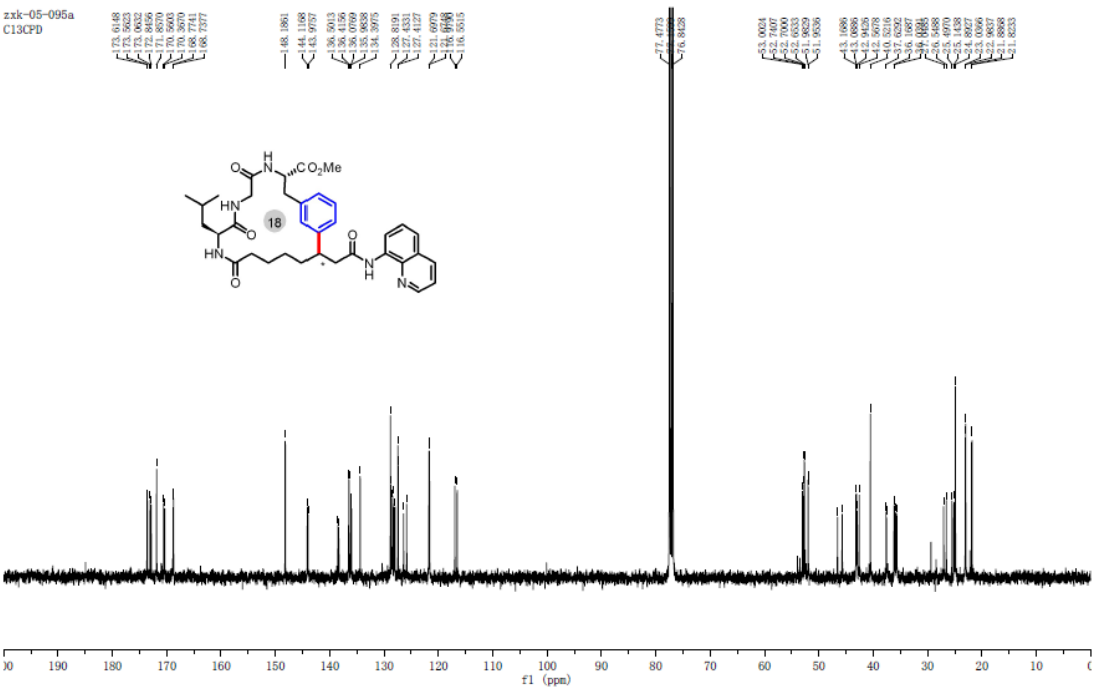

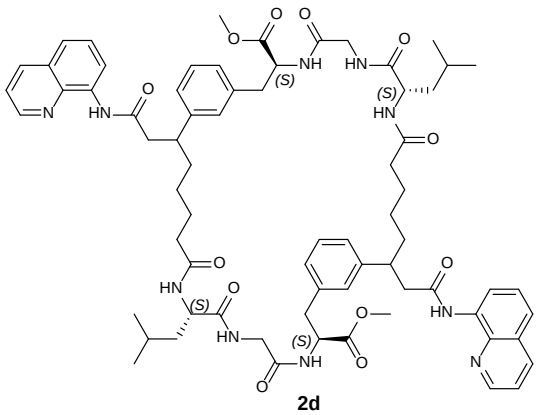

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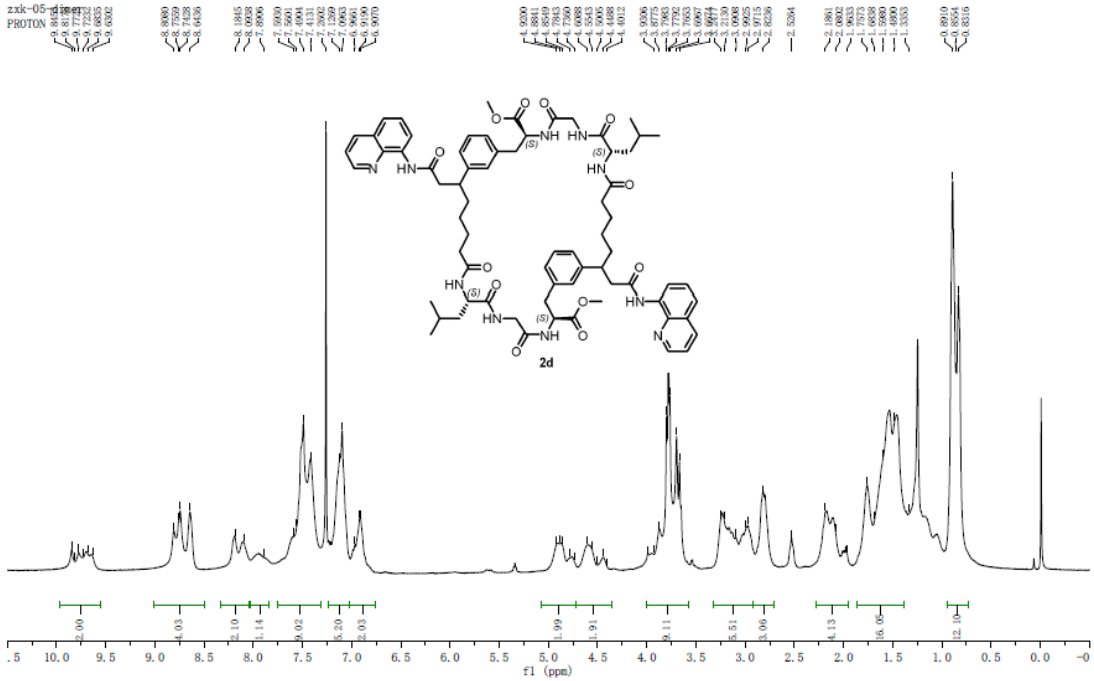

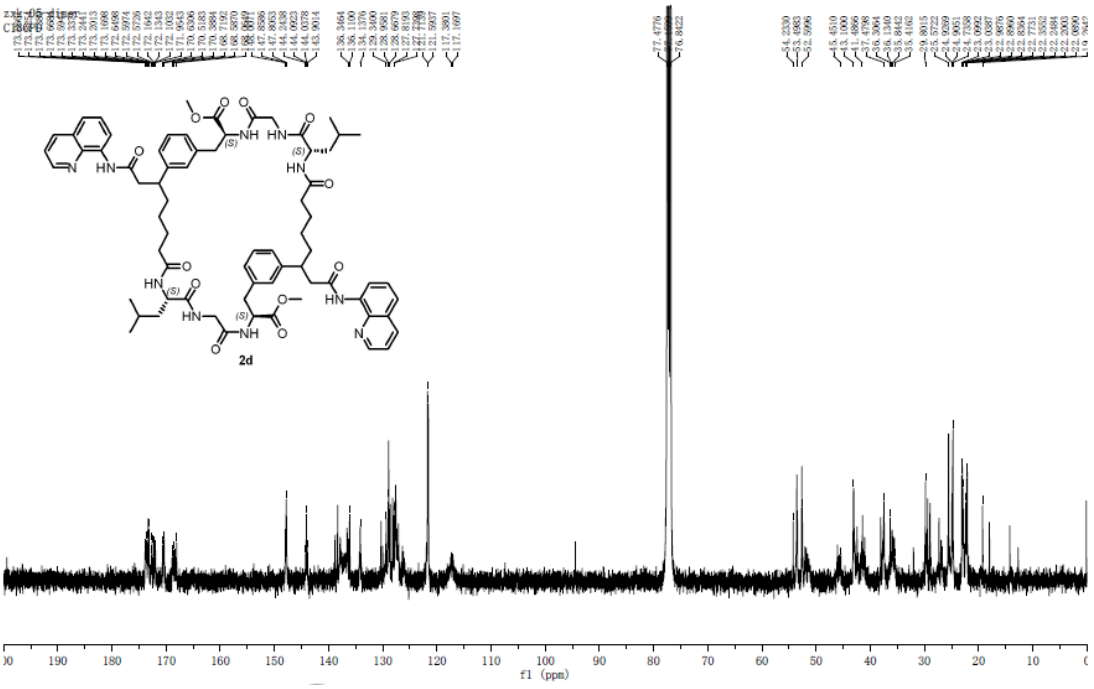

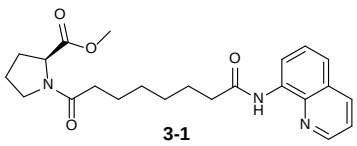

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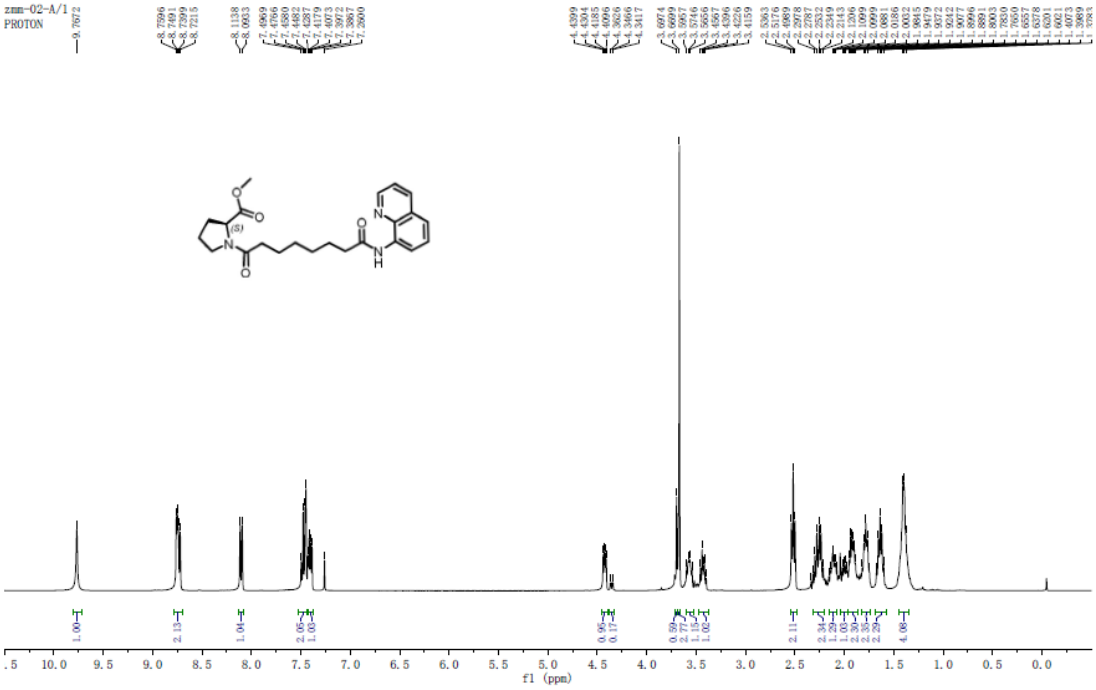

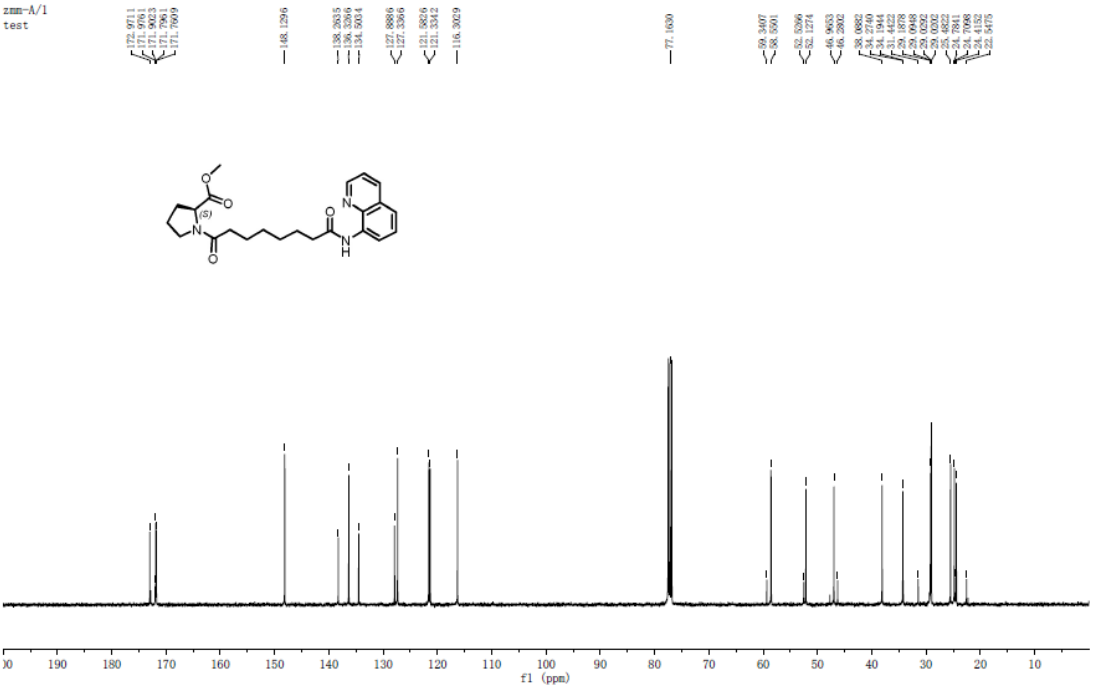

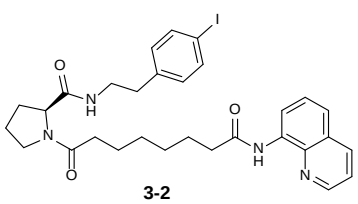

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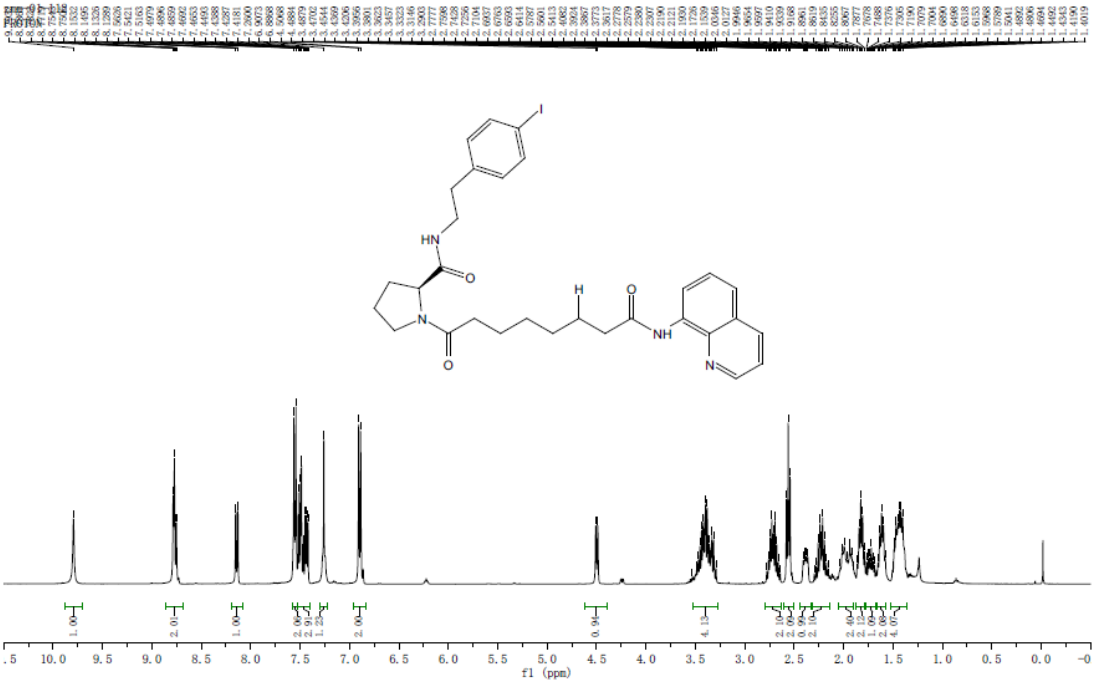
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NH
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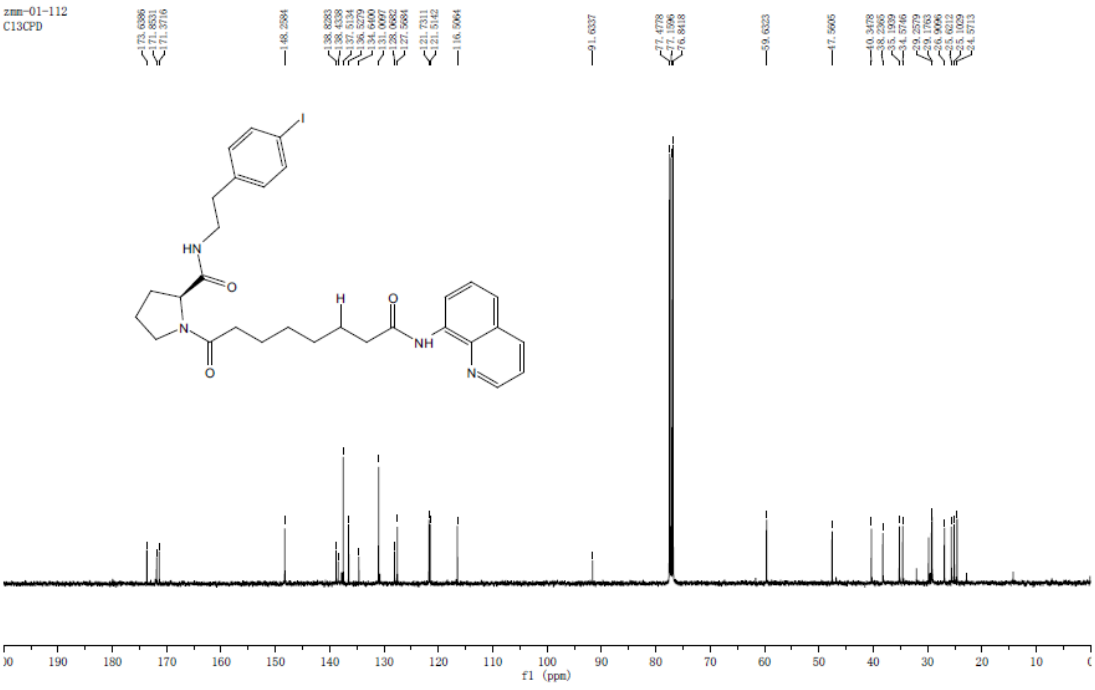
f1 (ppm)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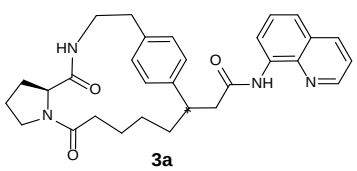
f1 (ppm)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NH
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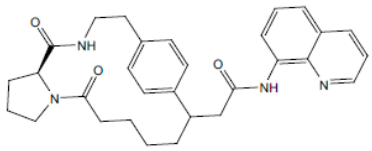
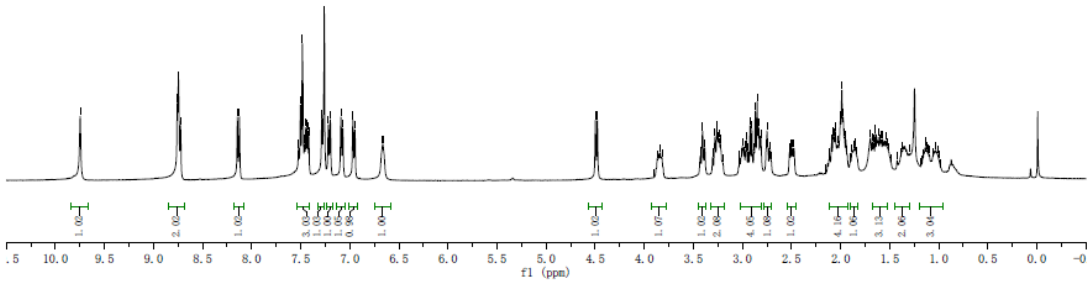
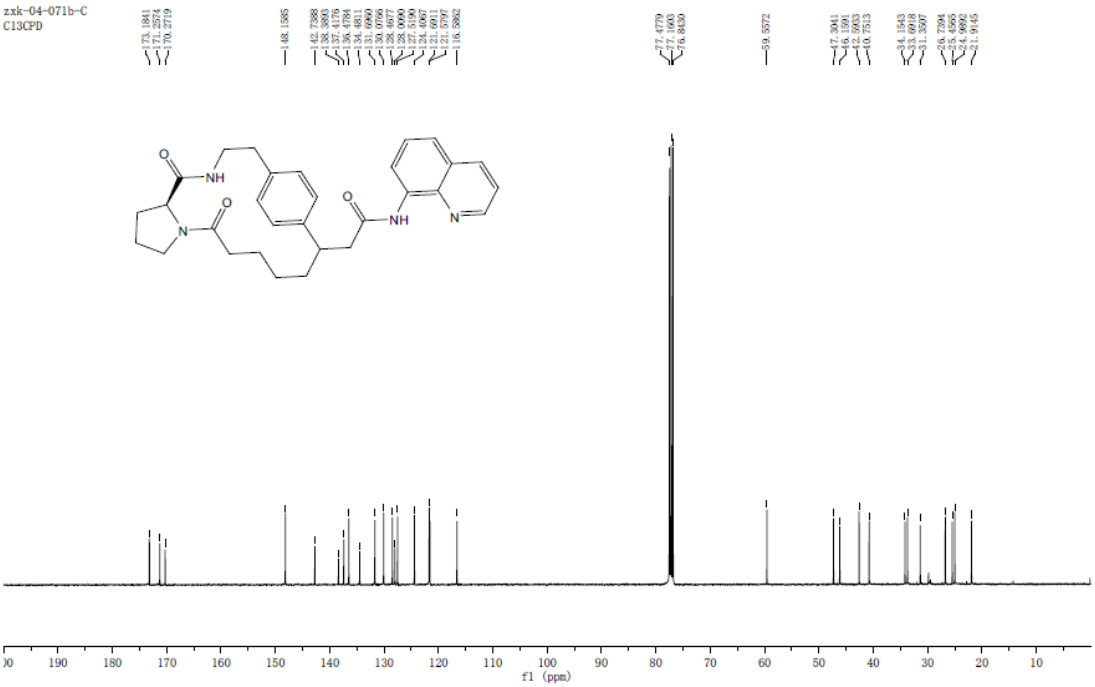
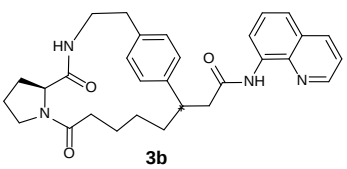
3a









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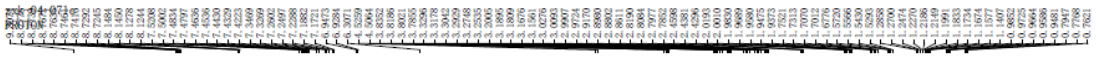

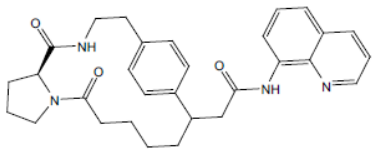

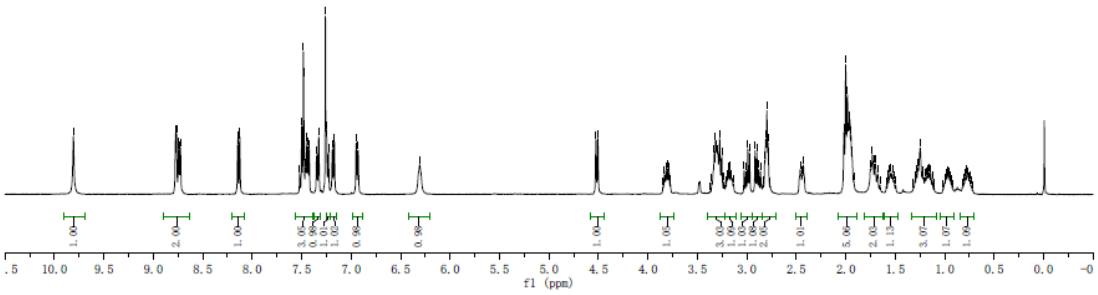

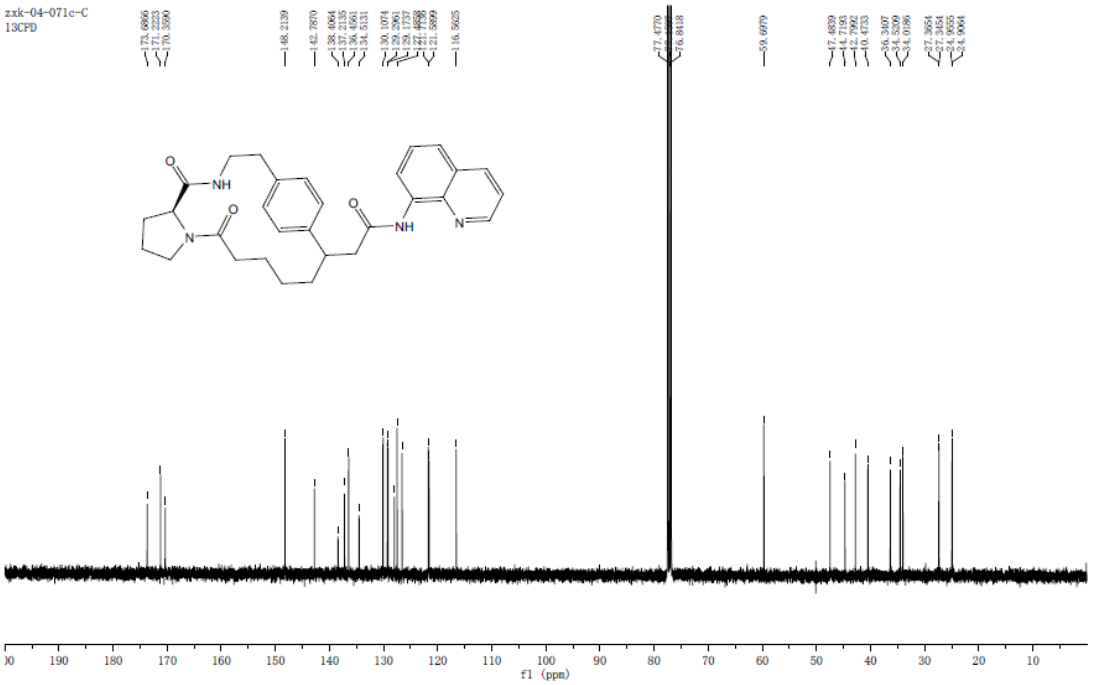

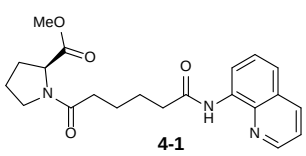

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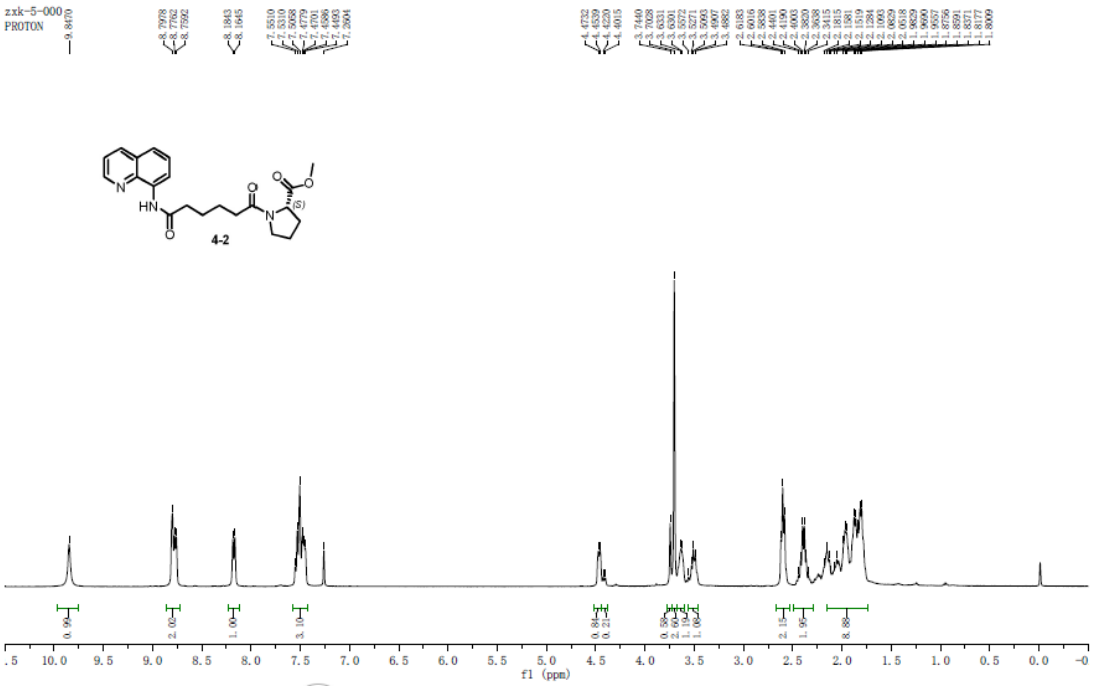

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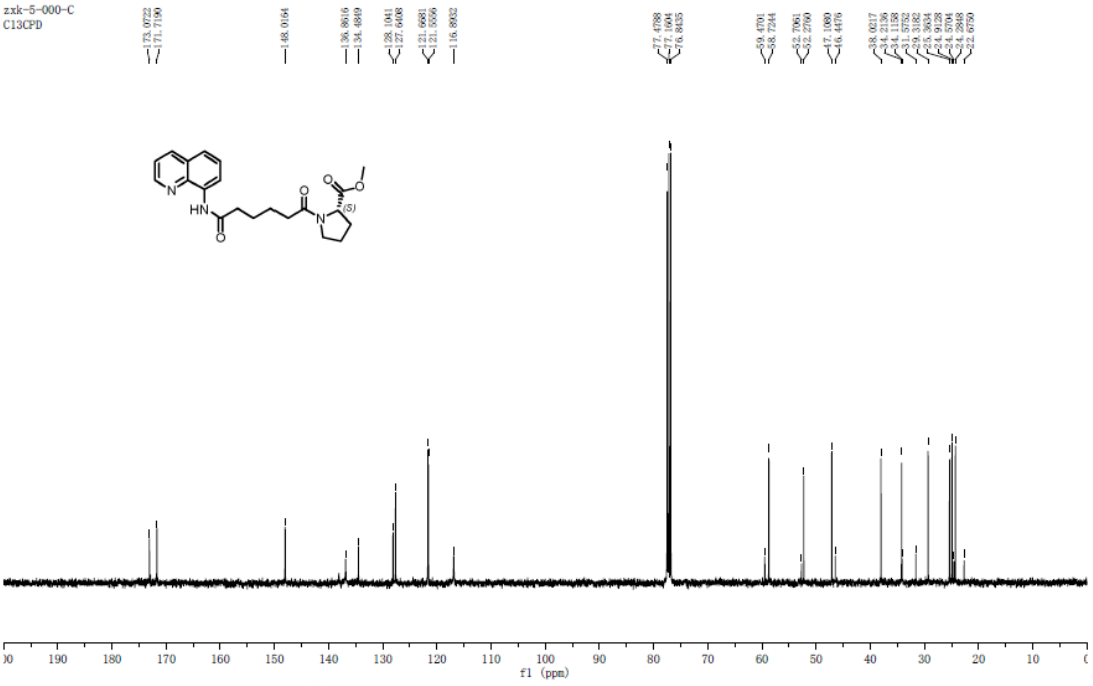

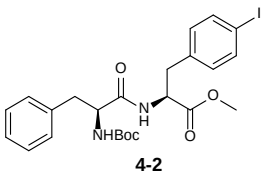

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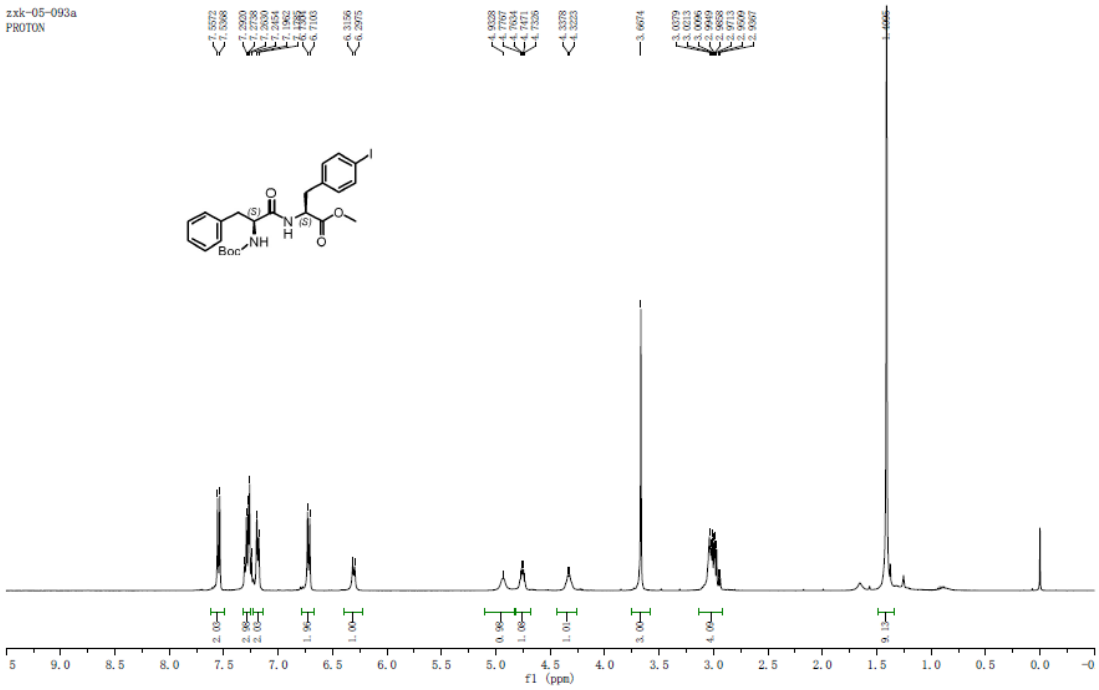
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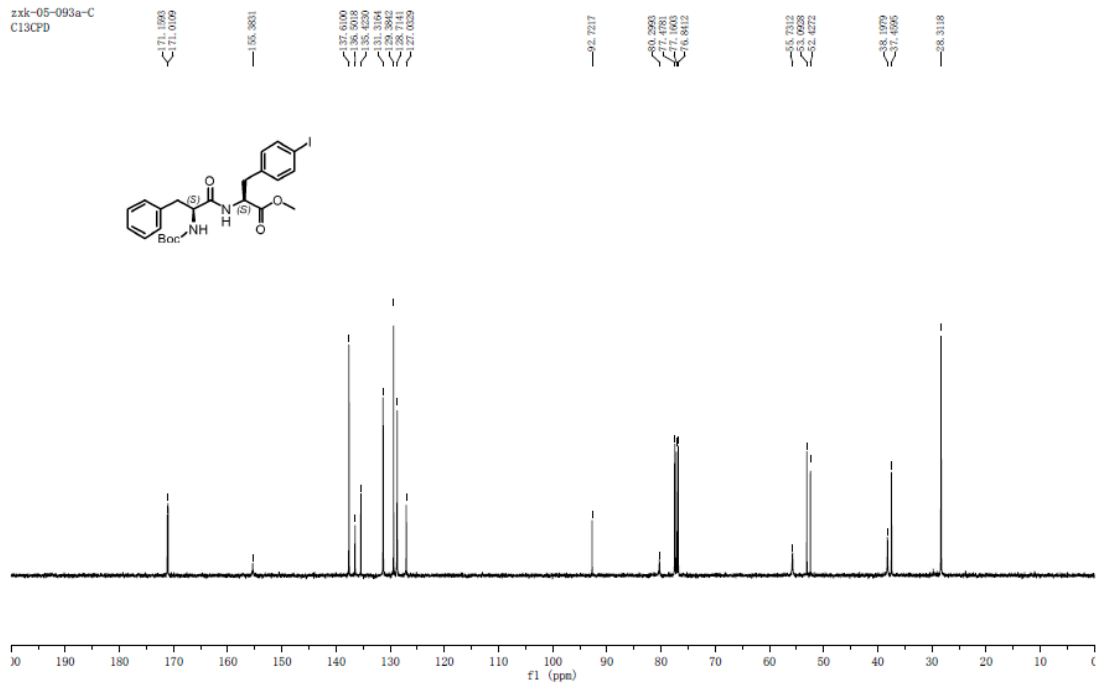
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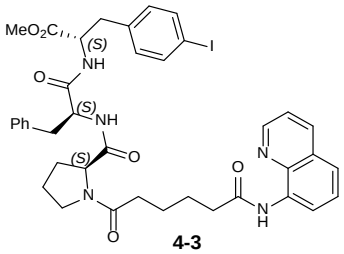

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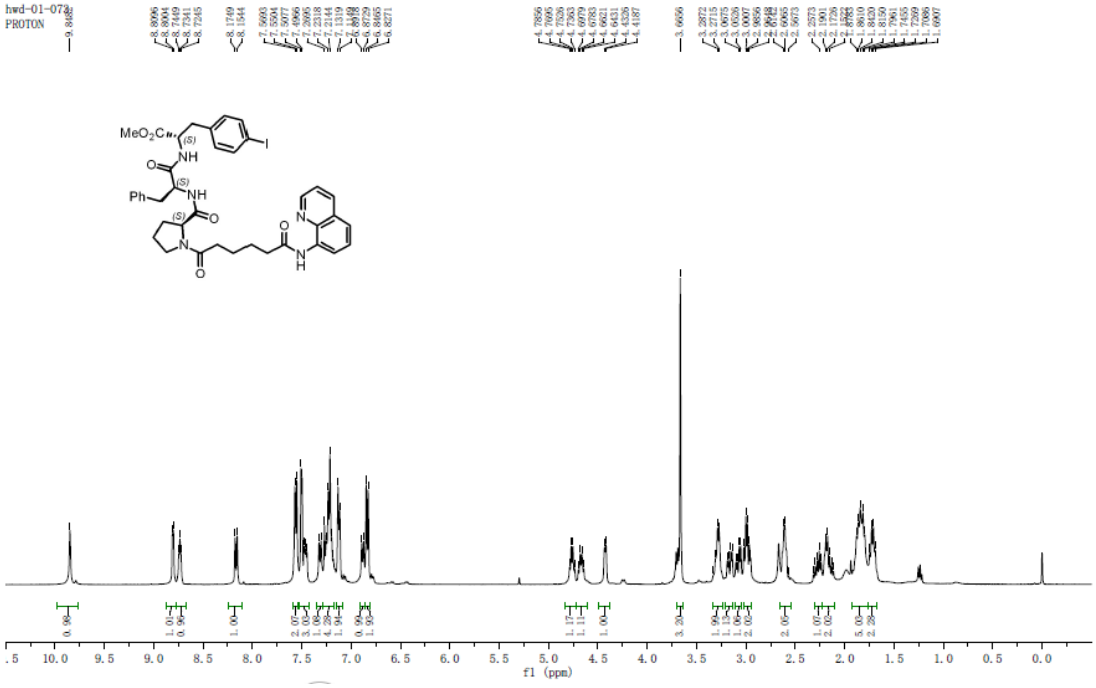

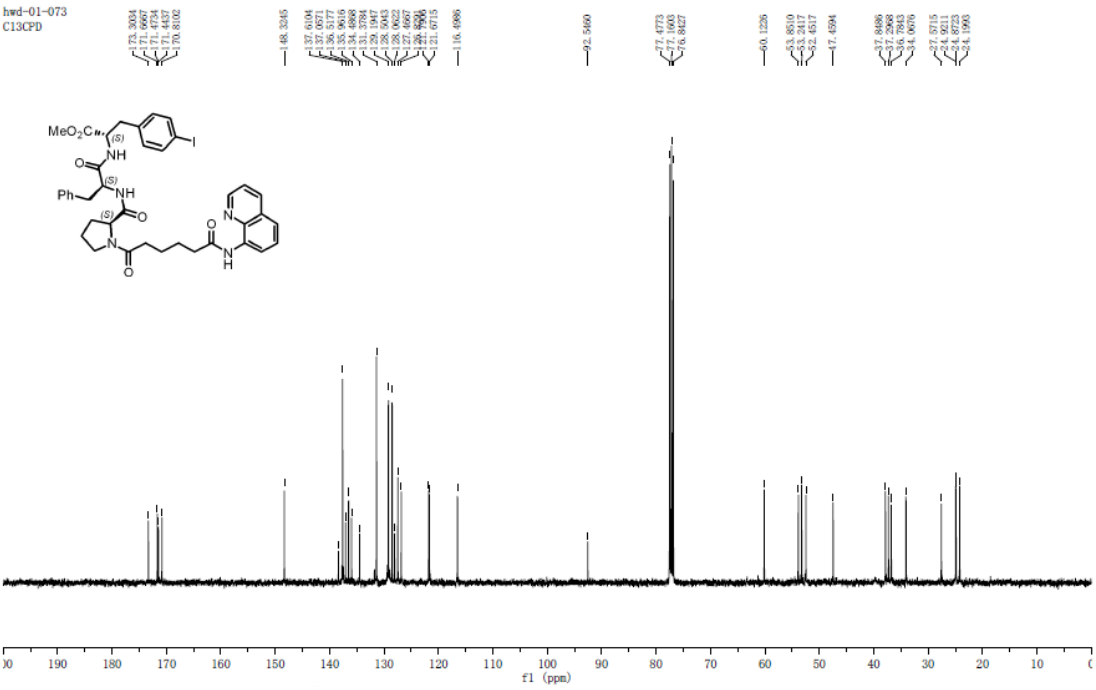

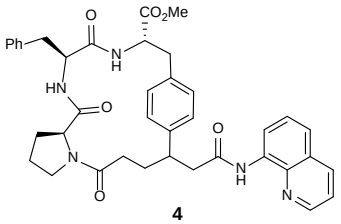
Ph
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CO2Me
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HN
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N
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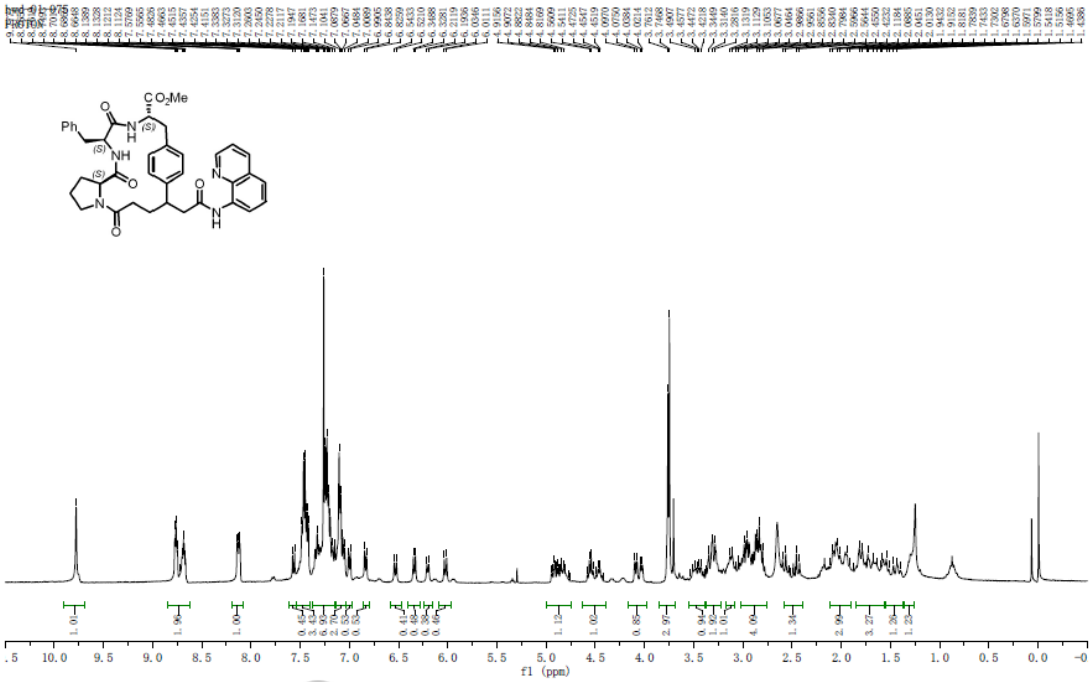
N
H
N

4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CO2Me
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(S)
(S)
NH
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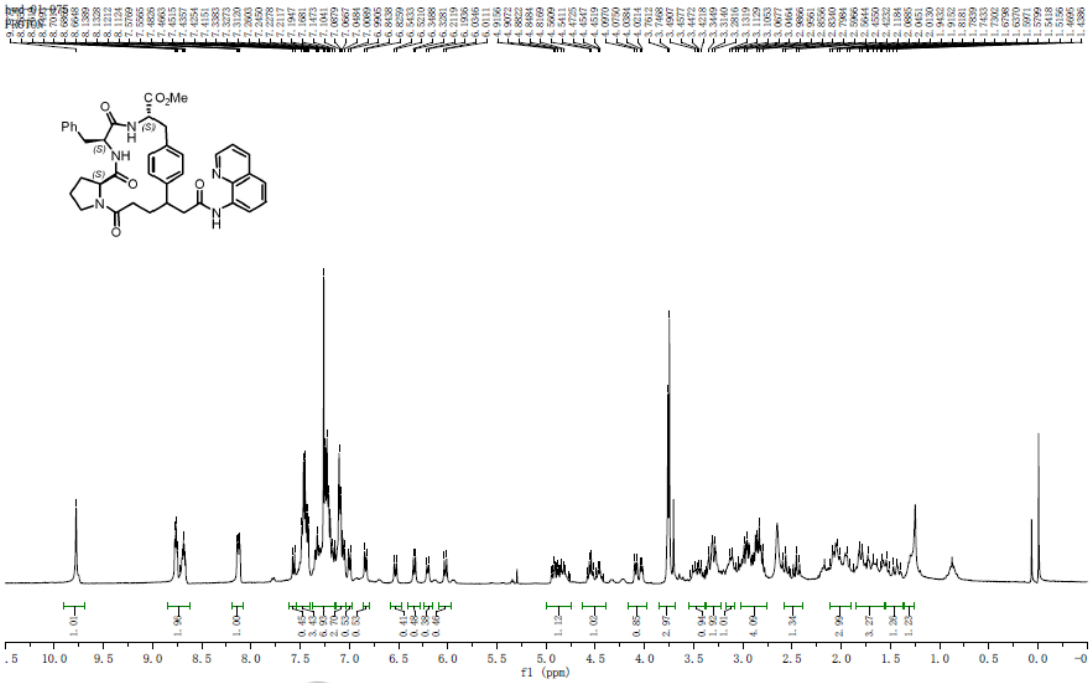
O
O
N
H
f1 (ppm)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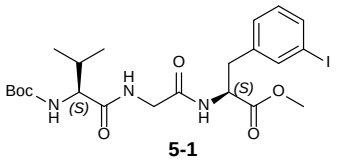
H
f1 (ppm)


Boc
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(S)
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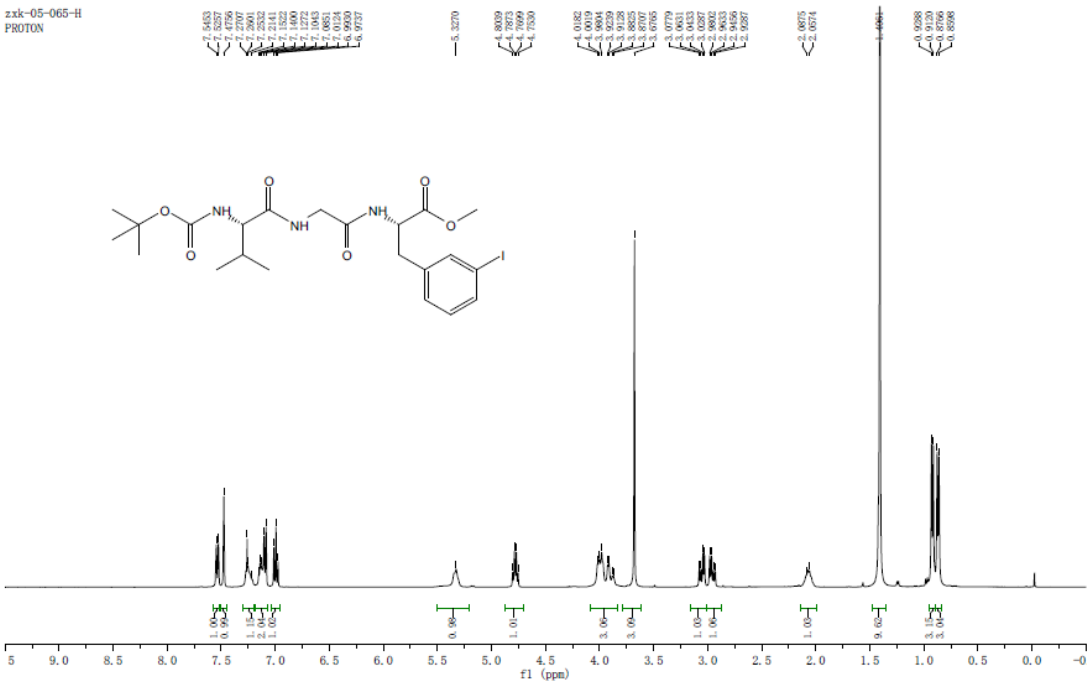
H
(S)
O
O
I

5-1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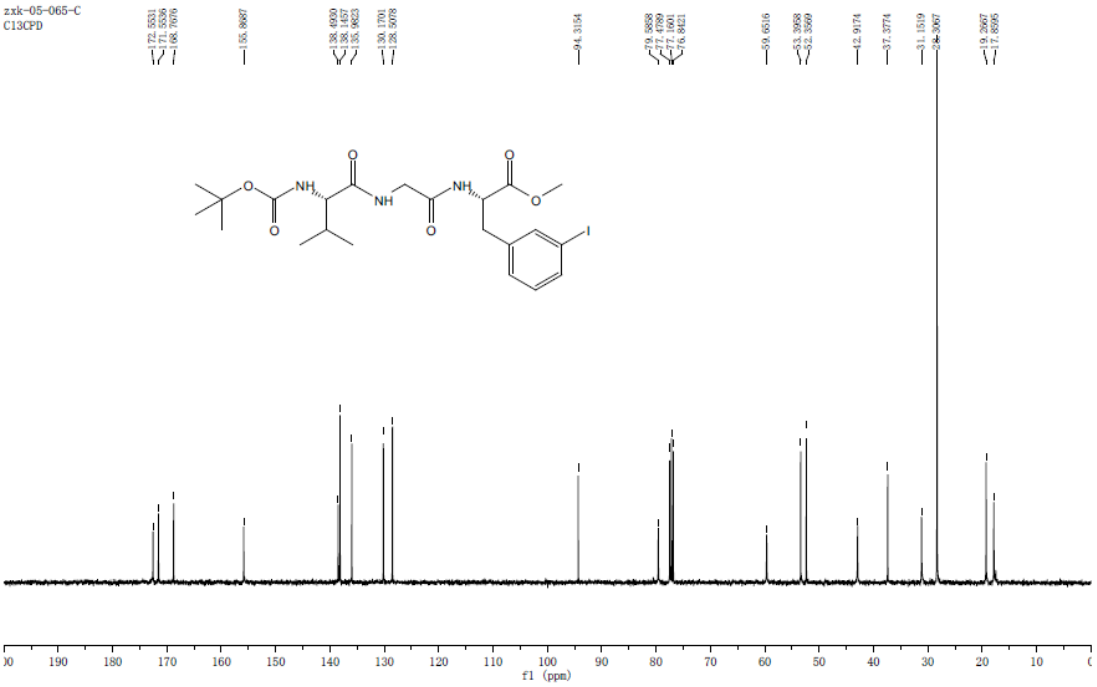
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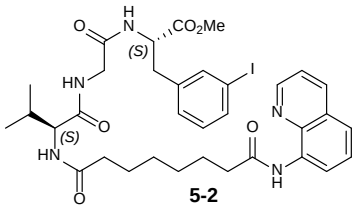

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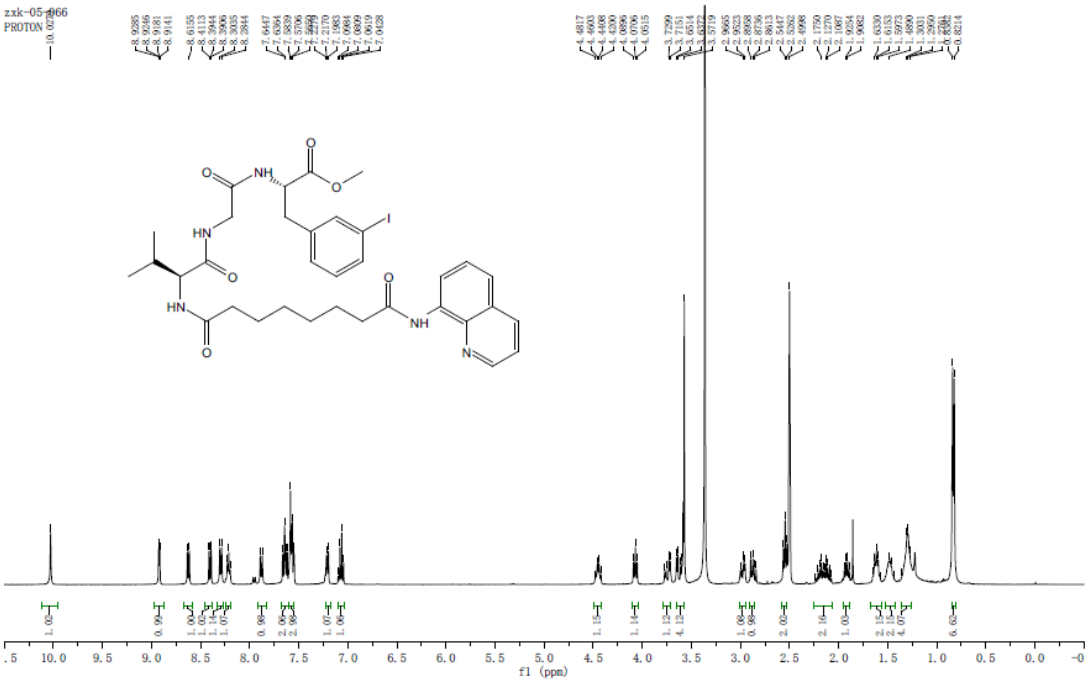
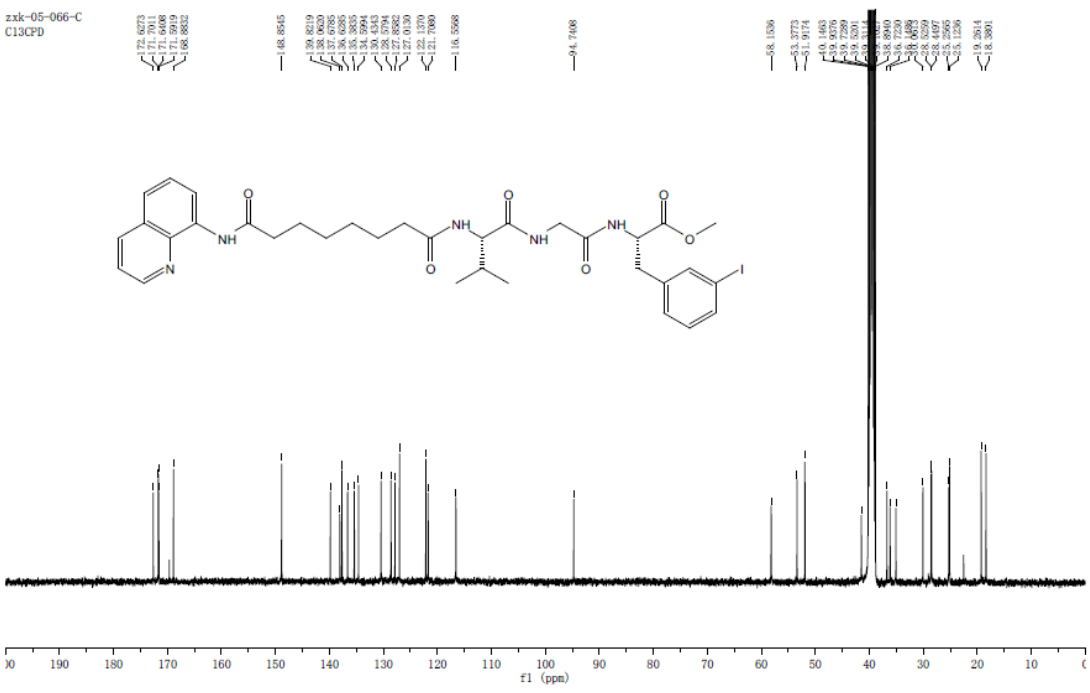
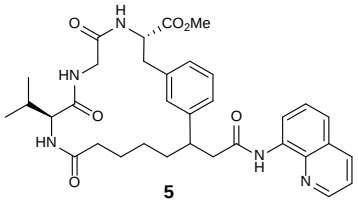
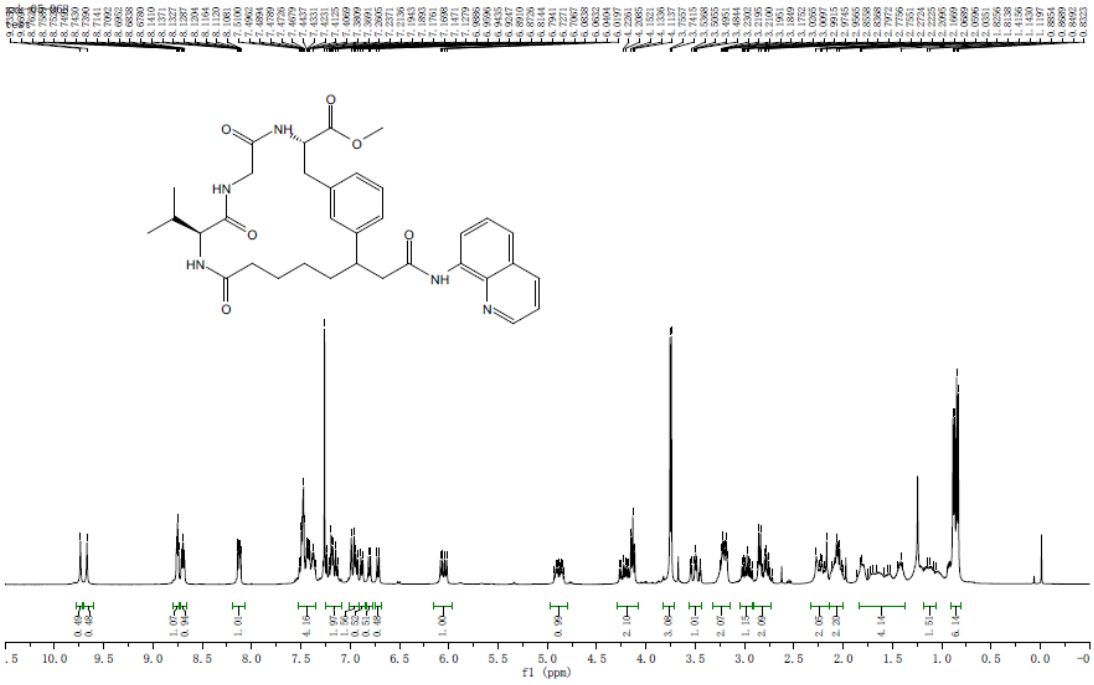
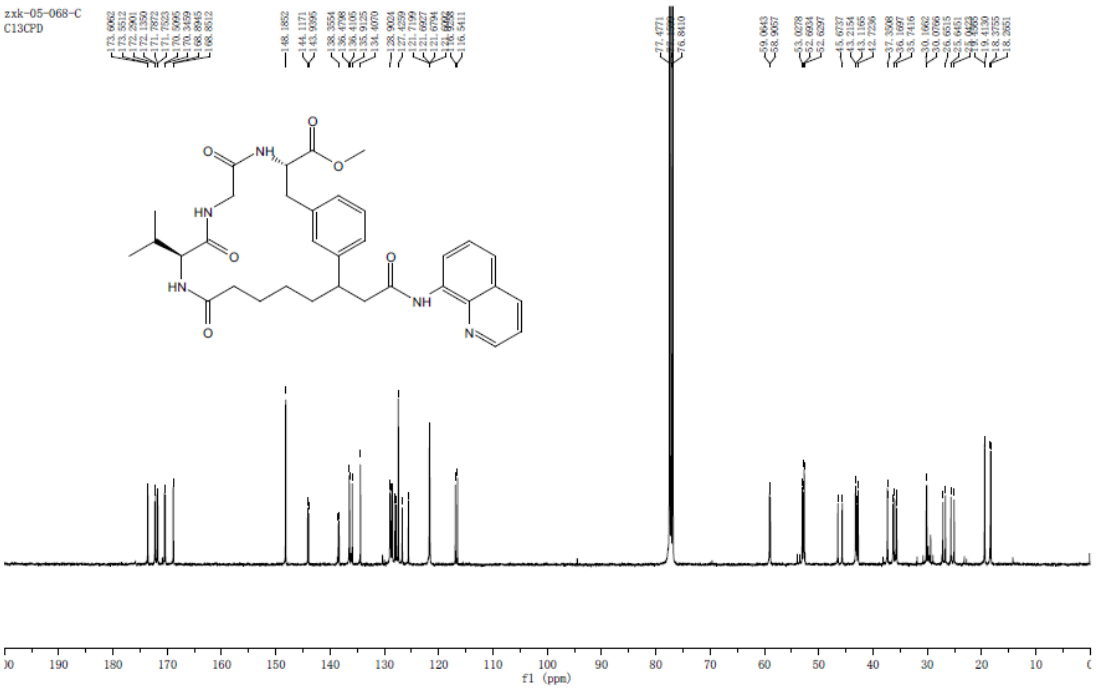


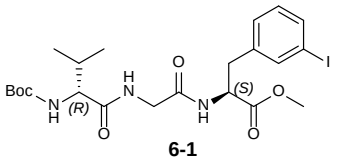




5






Boc
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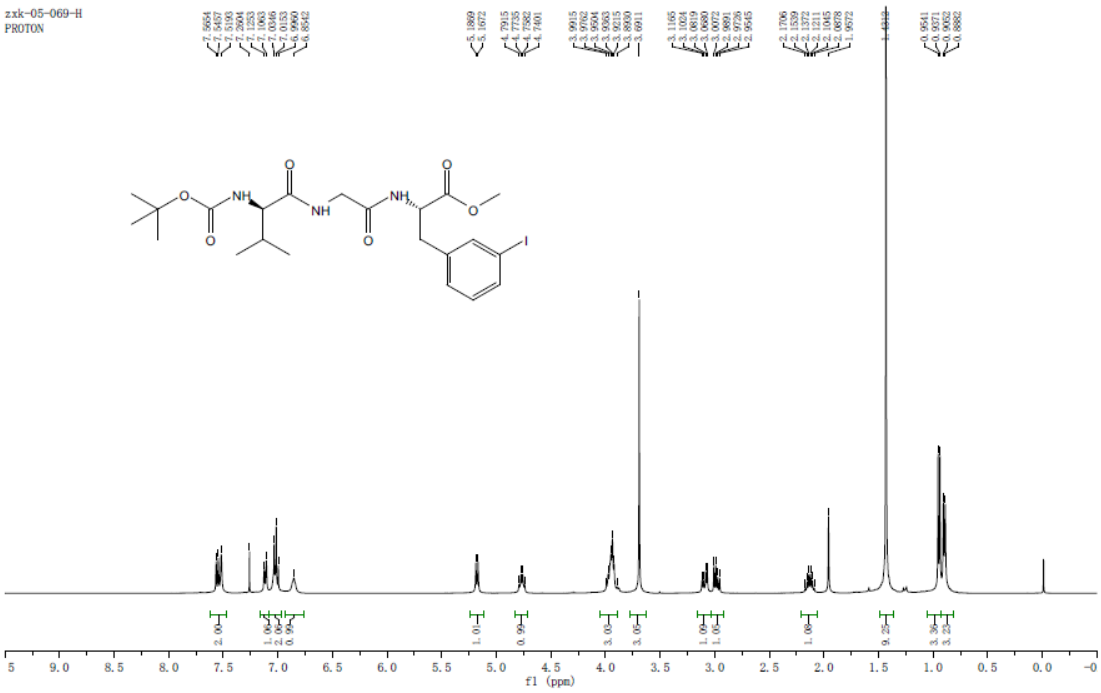
H
(R)
O
H
N
O
O
N
H
(S)
O
O
I

6-1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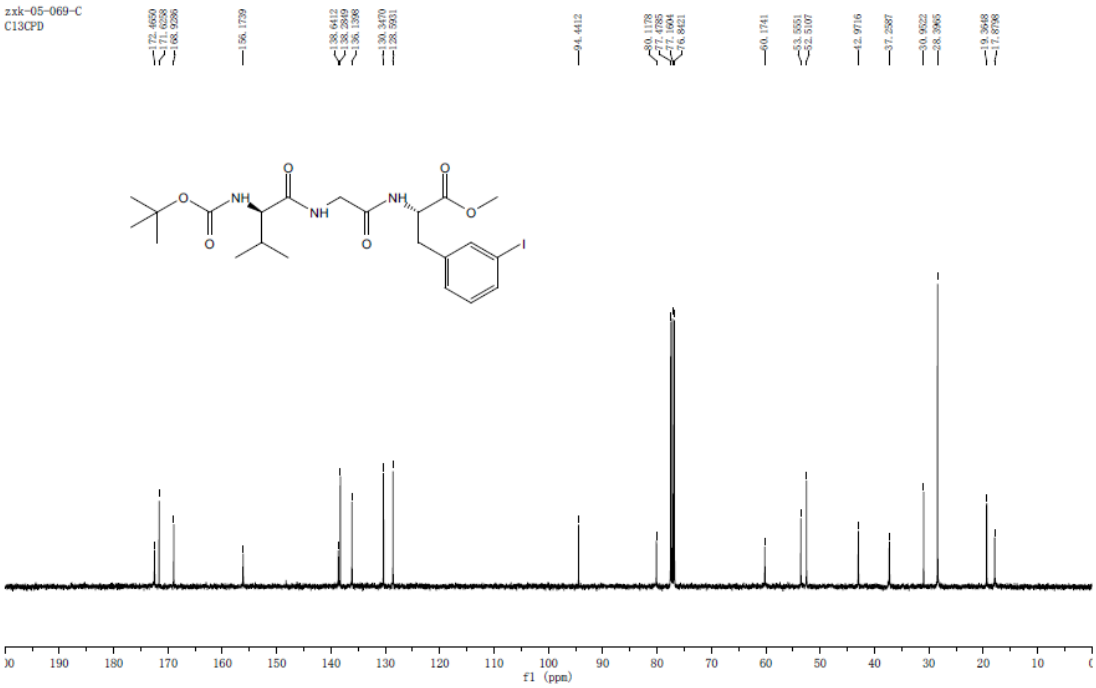
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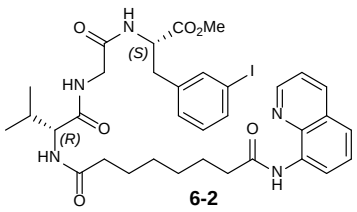
C13CPD
f1 (ppm)


O
H
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CO2Me
(S)
HN
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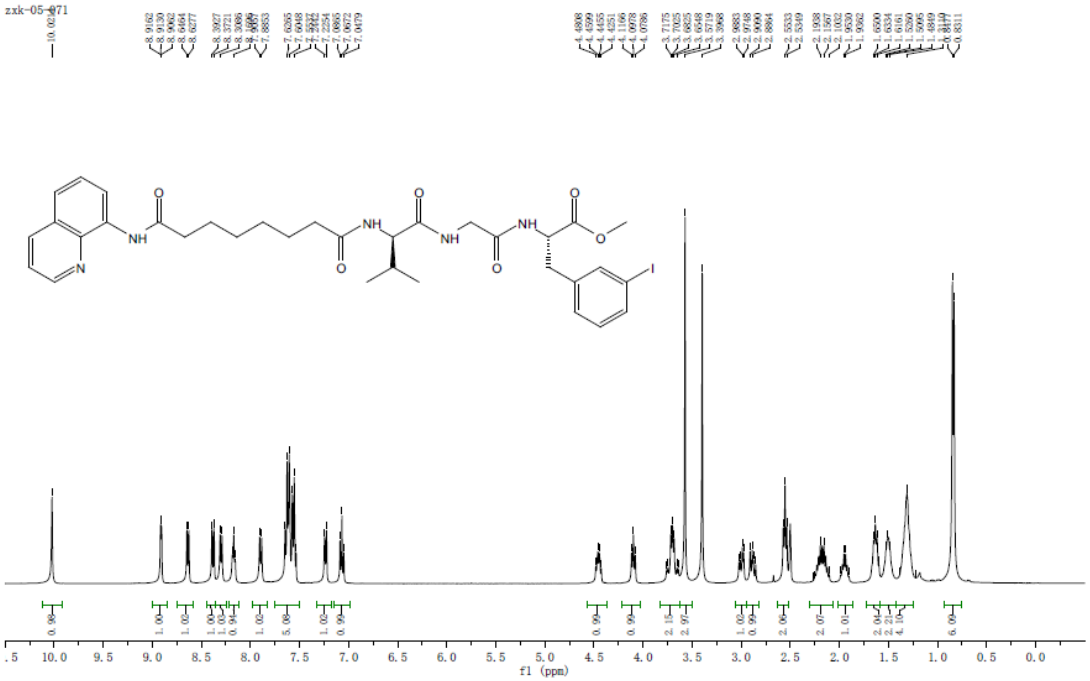
O
(R)
HN
O
N
O
N
H
O

6-2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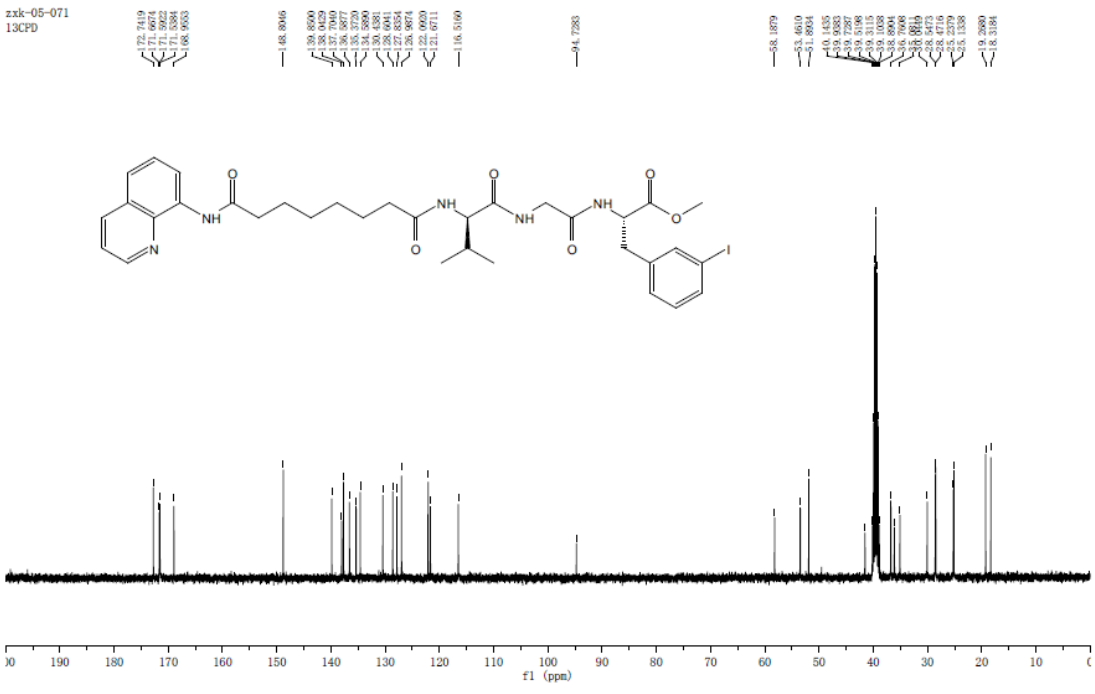
f1 (ppm)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13CPD
NH
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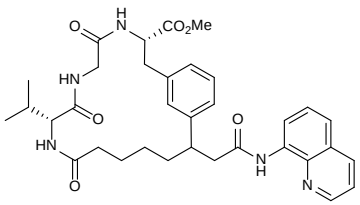
N
I
f1 (ppm)



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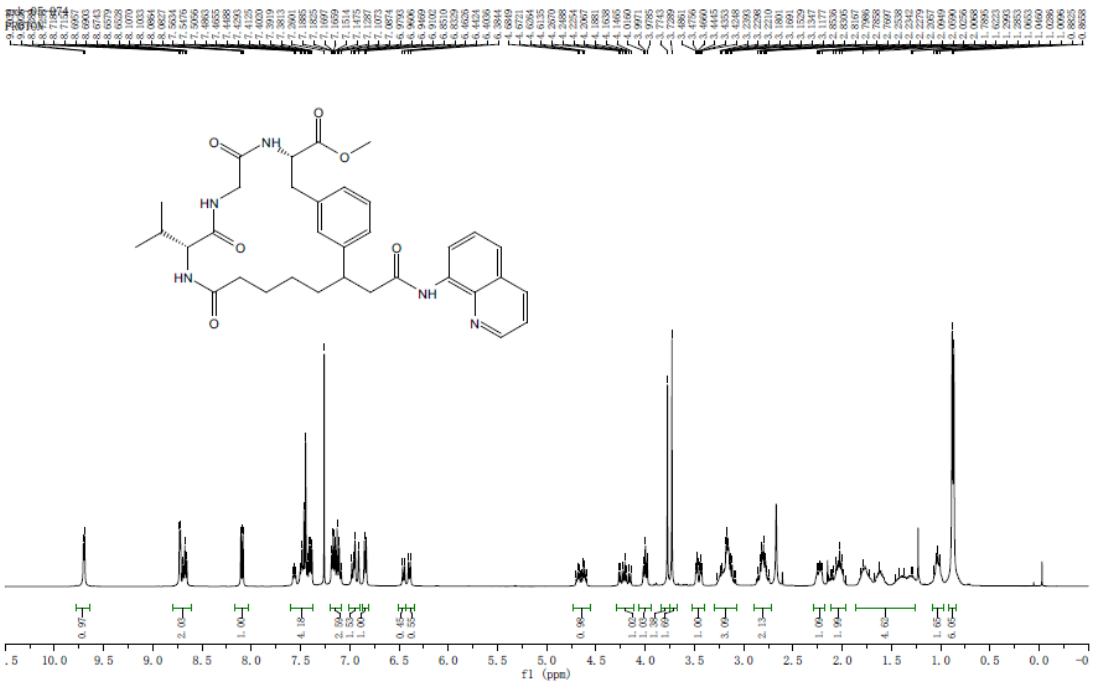

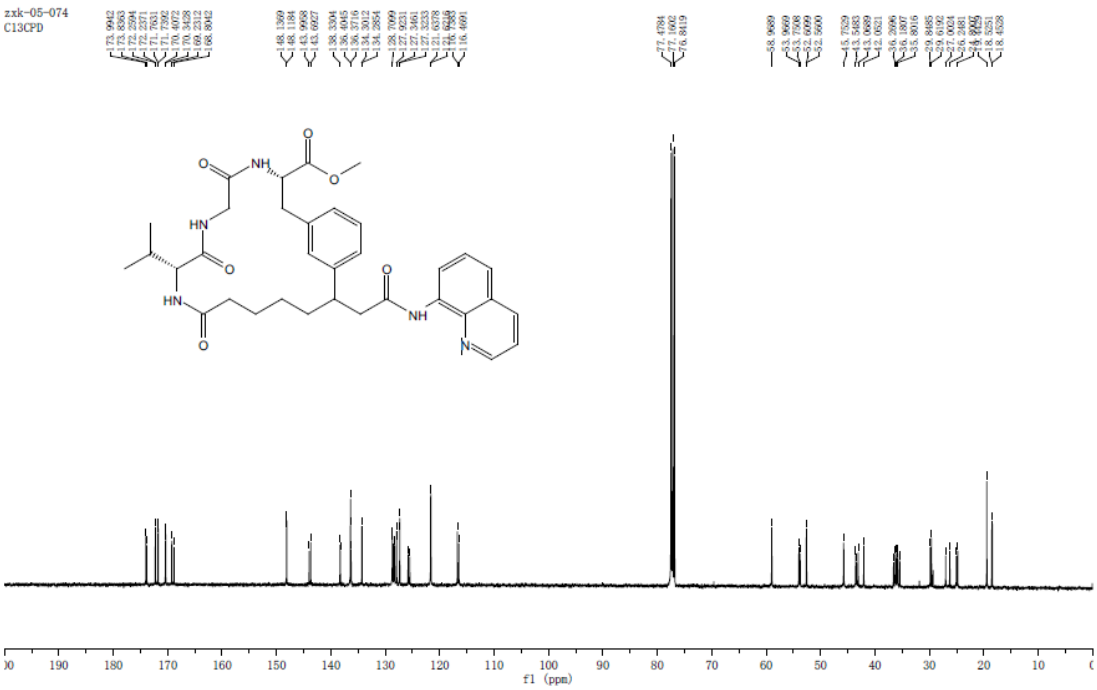

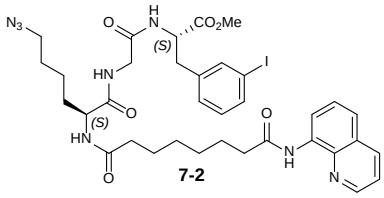
N3
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CO2Me
(S)
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HN
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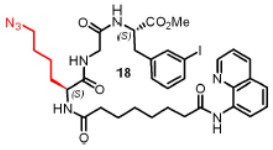
7-2


hwd-1-112-h
PROTON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(S)
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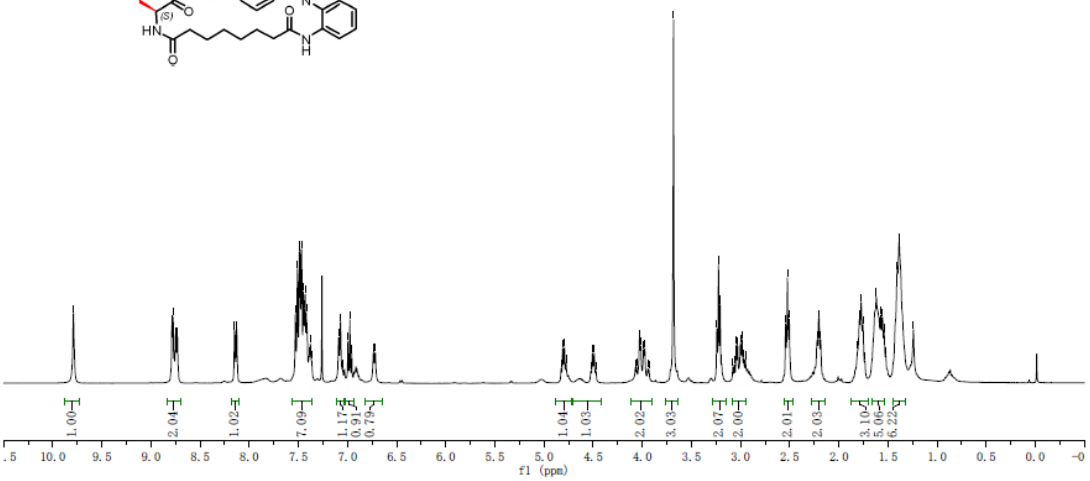
H


1.00
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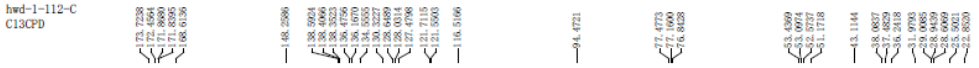
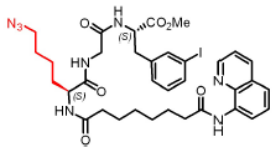
1.02
7.09
1.17
0.91
0.79
1.04
1.03
2.02
3.03
2.07
2.00
2.01
2.03
3.10
5.06
6.22
f1 (ppm)


hwd-1-112-C
C13CPD


N3
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CO2Me
(S)
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(S)
HN
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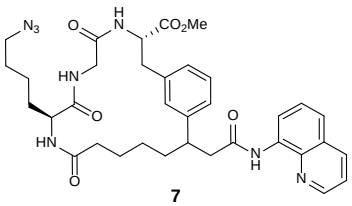
N
H

f1 (ppm)



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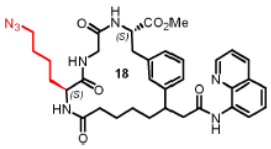

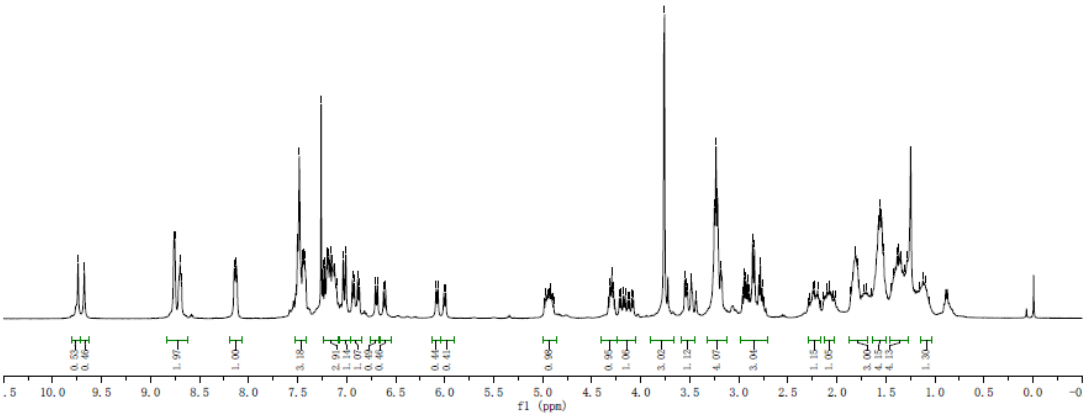

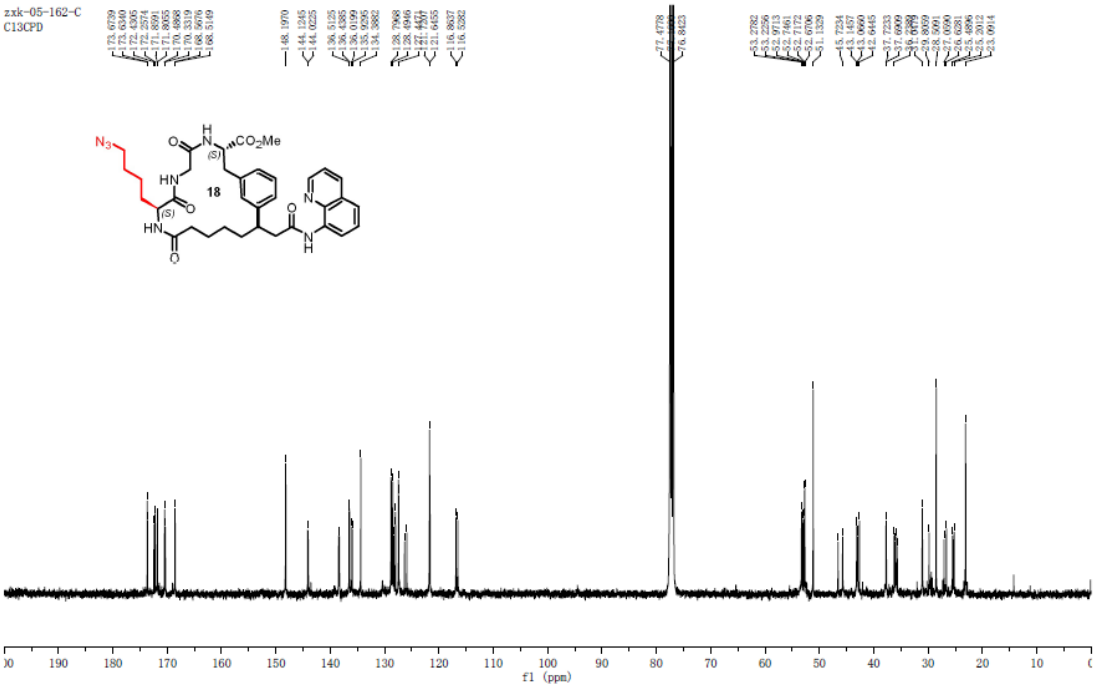

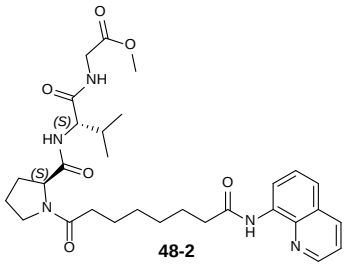

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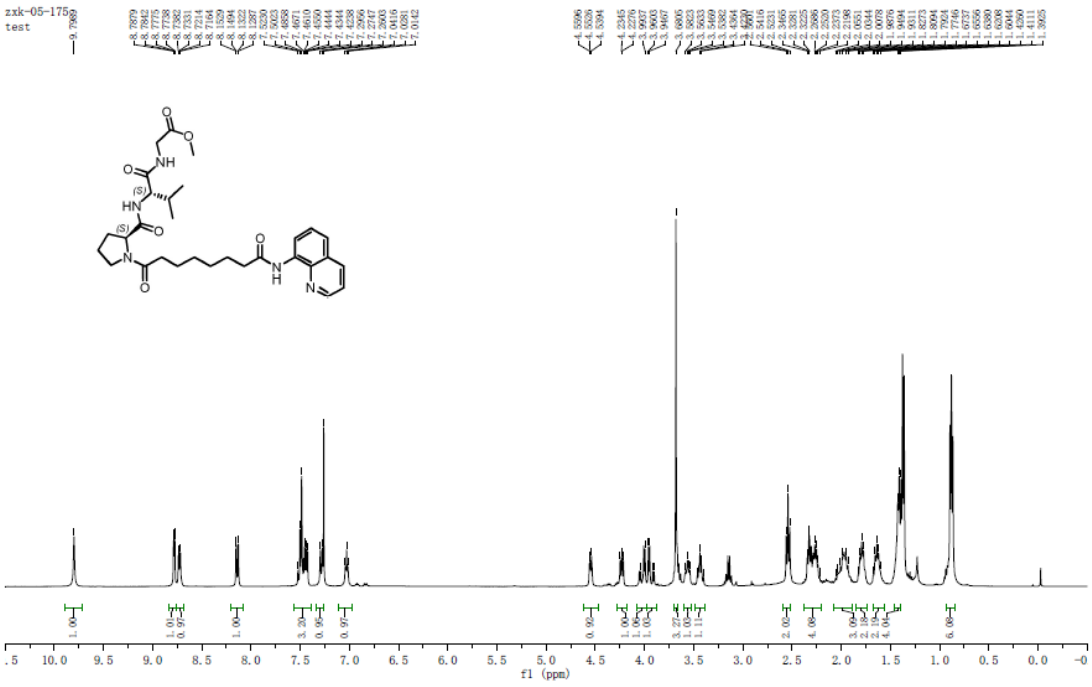

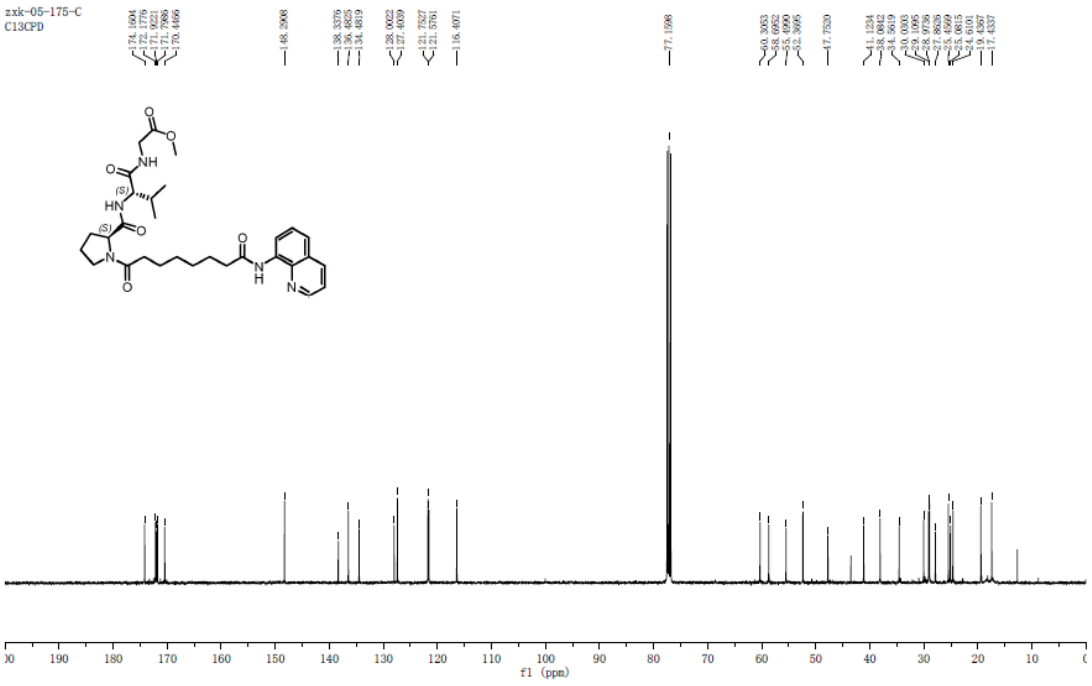

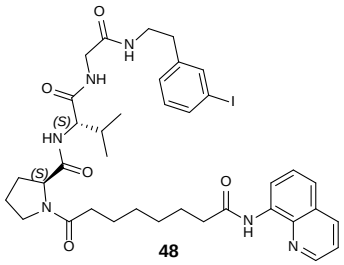

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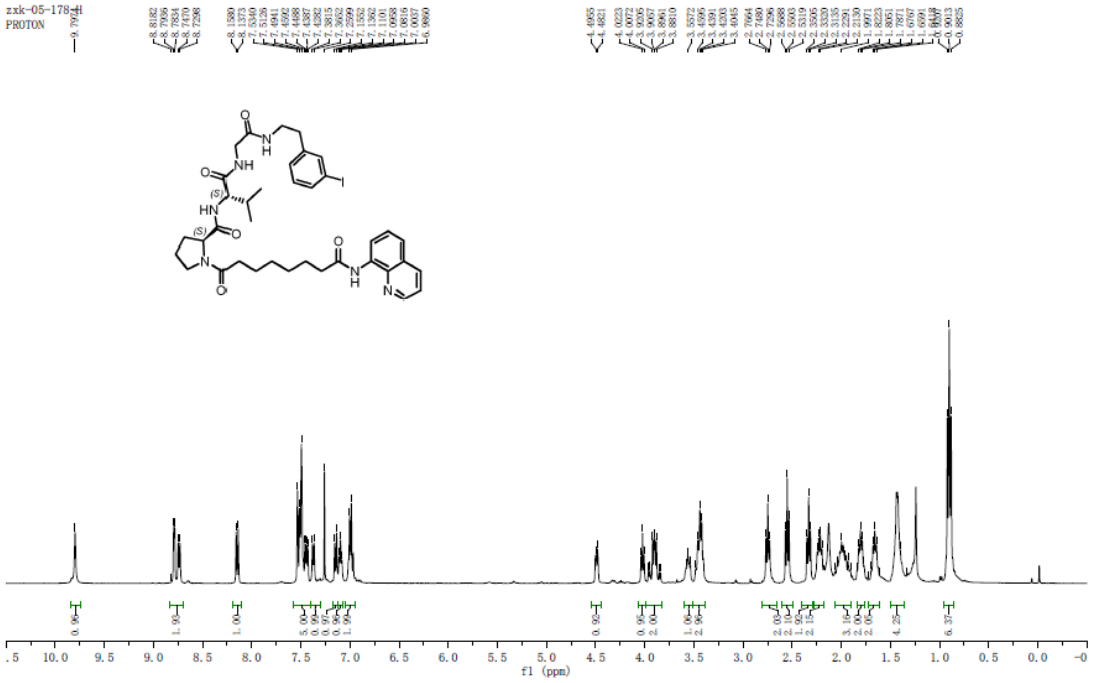

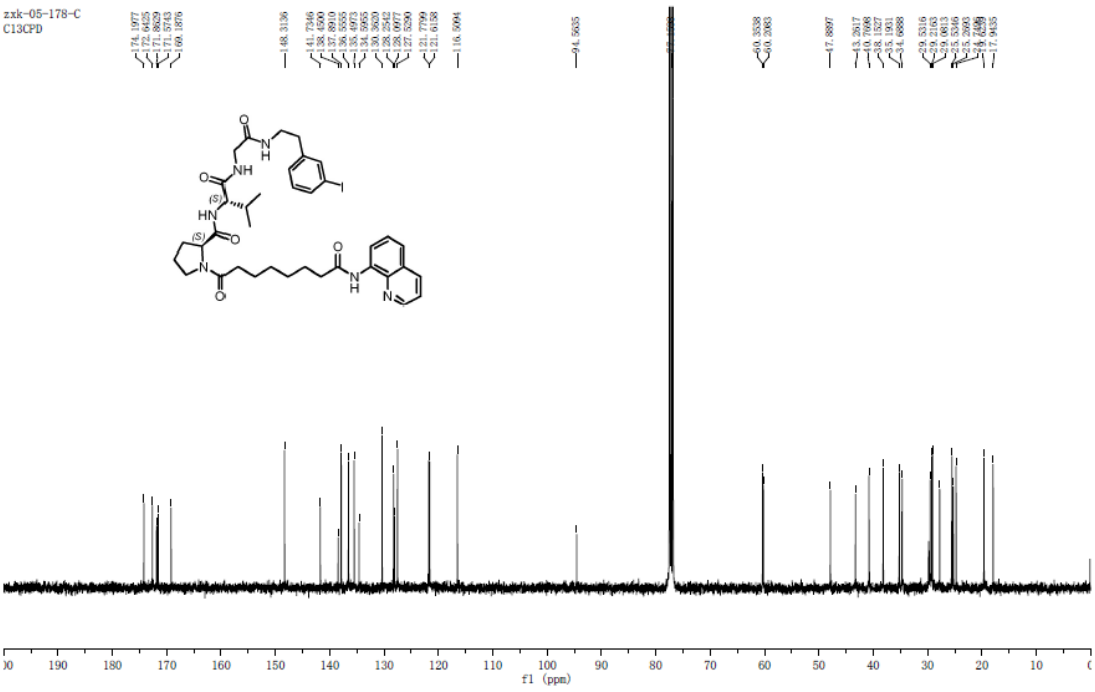

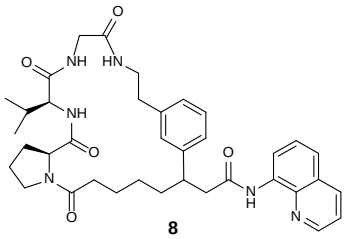

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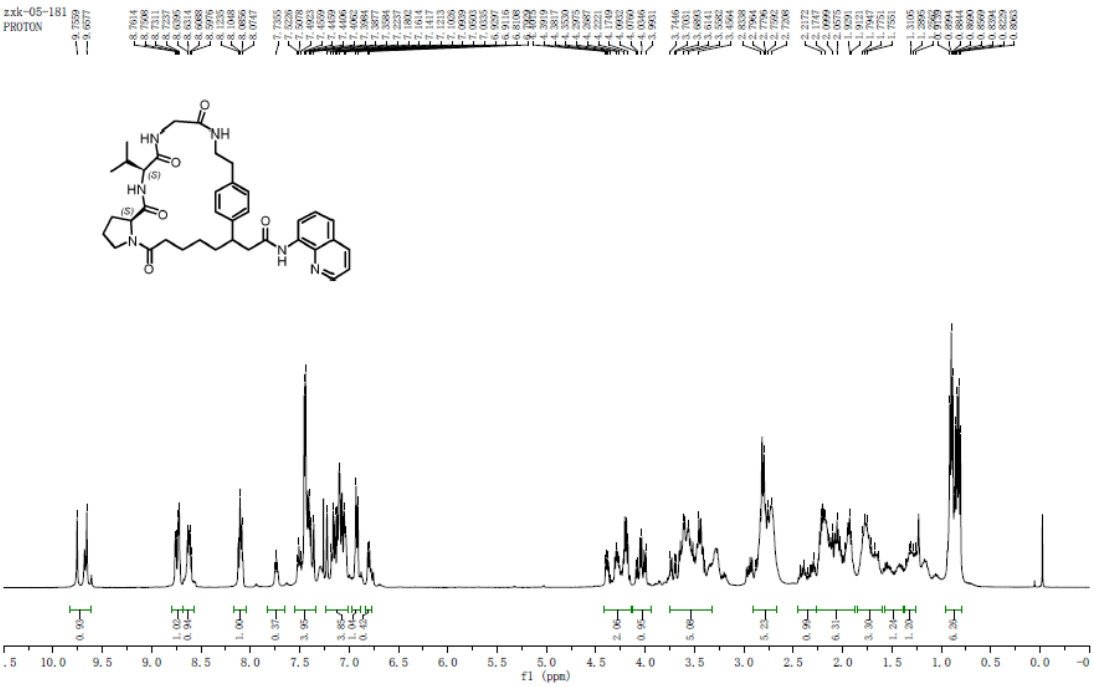
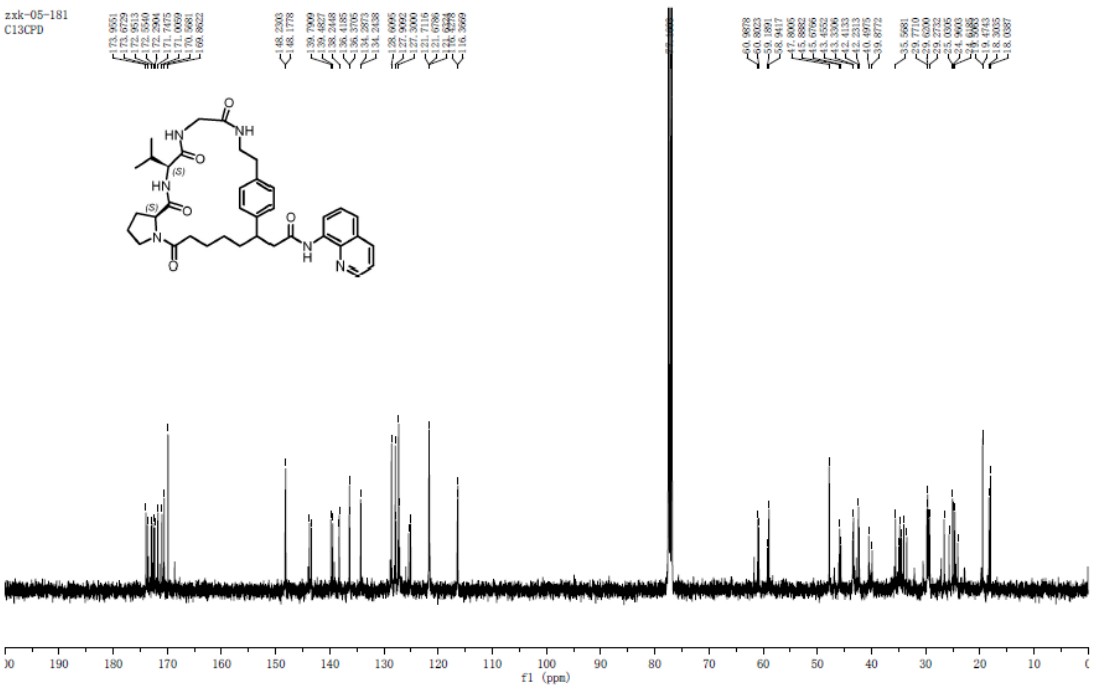
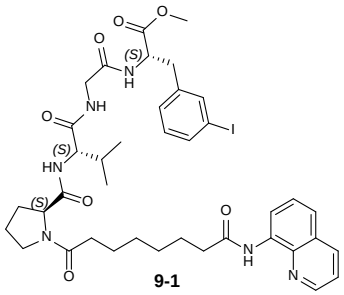
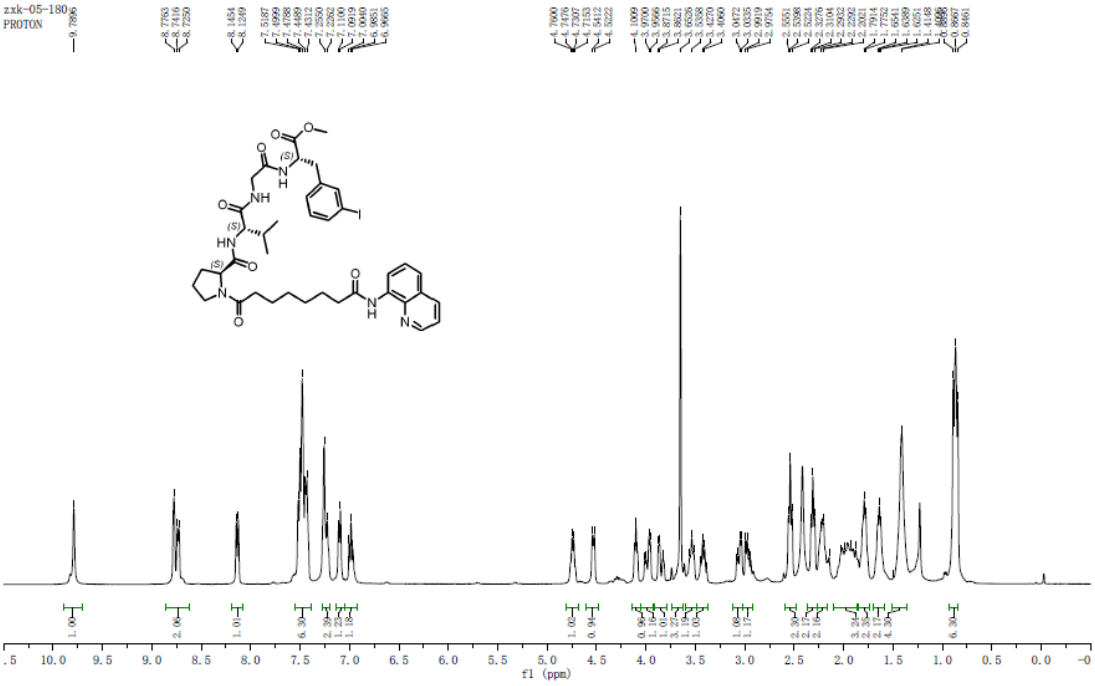
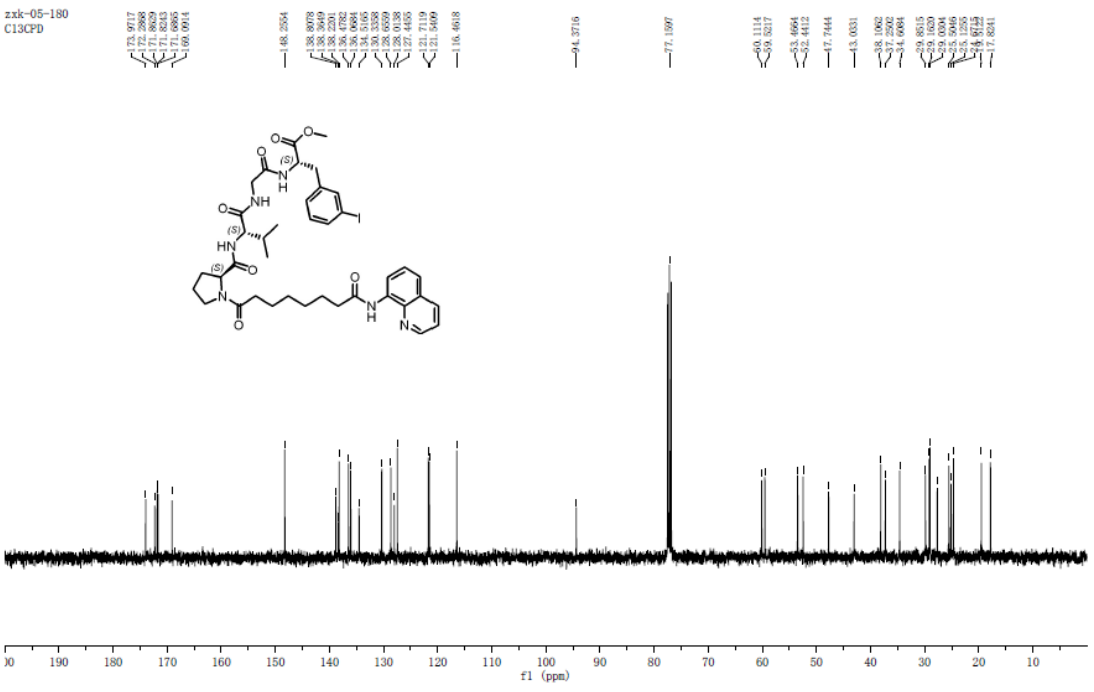


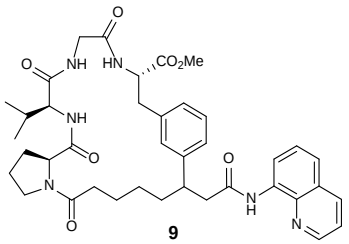




9-1







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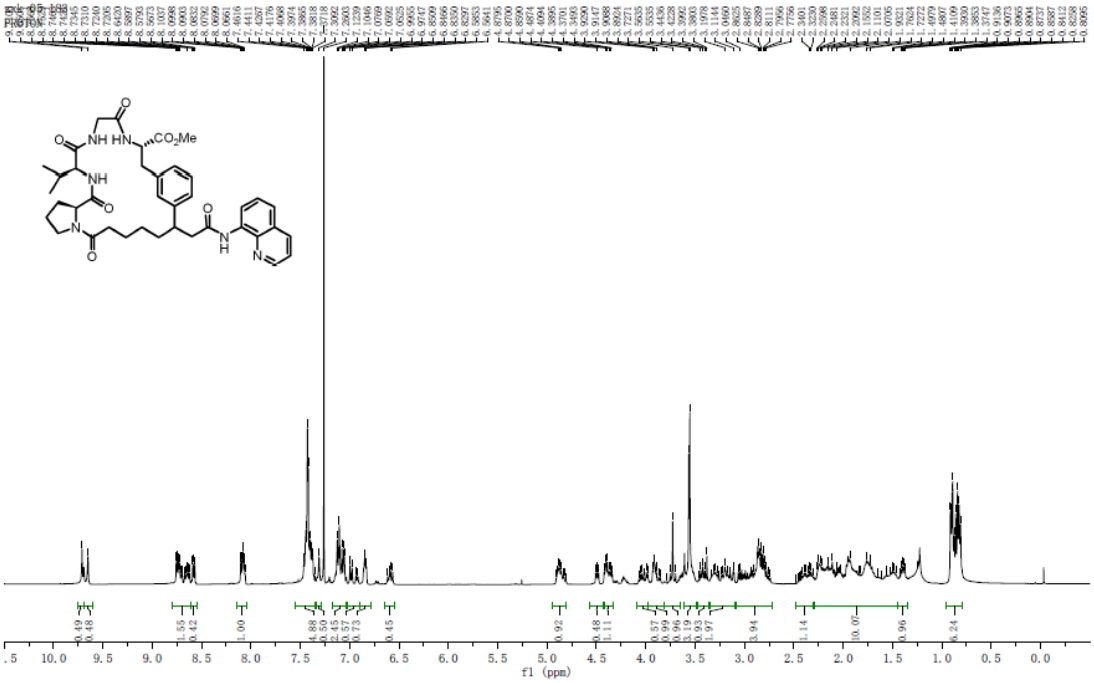

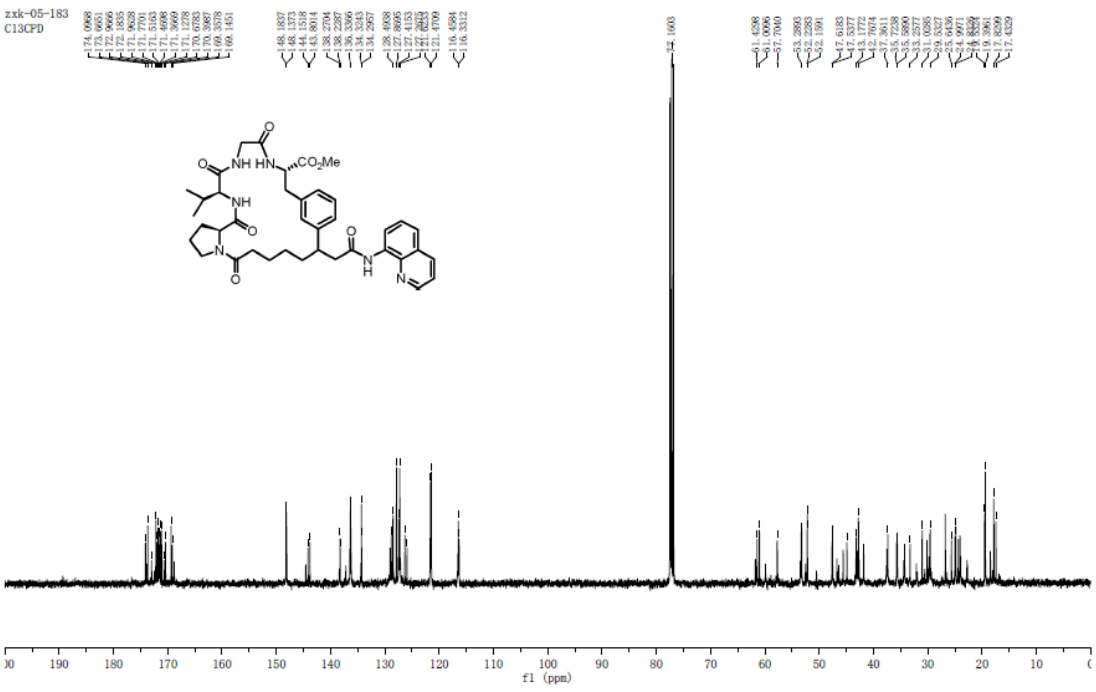

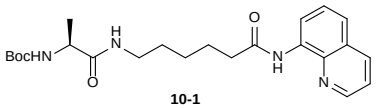

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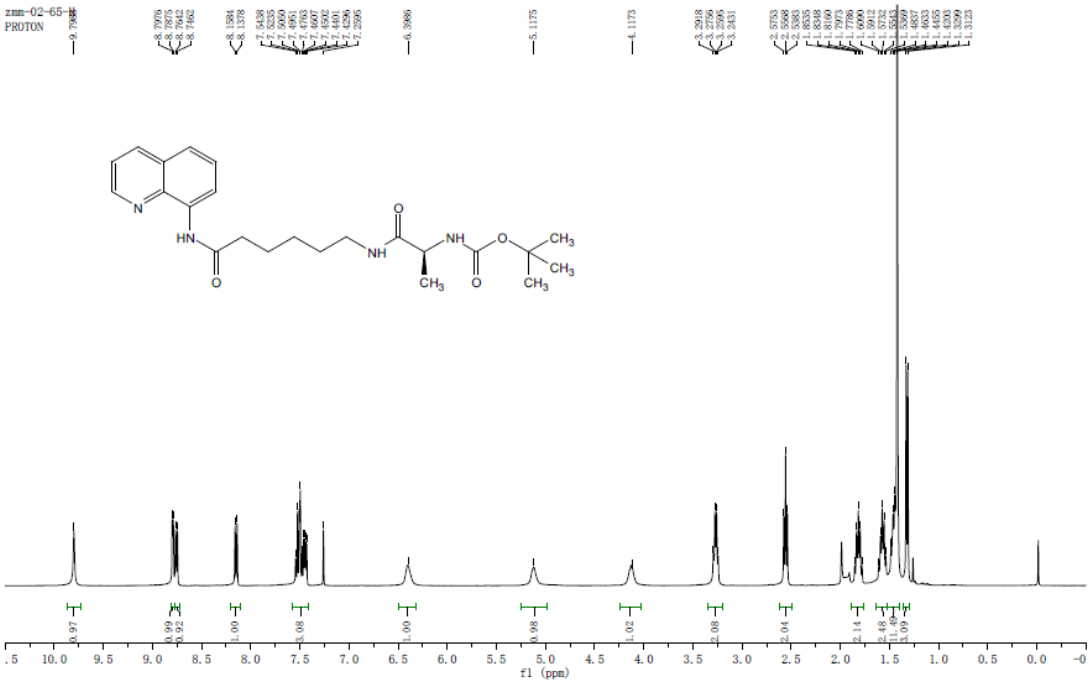

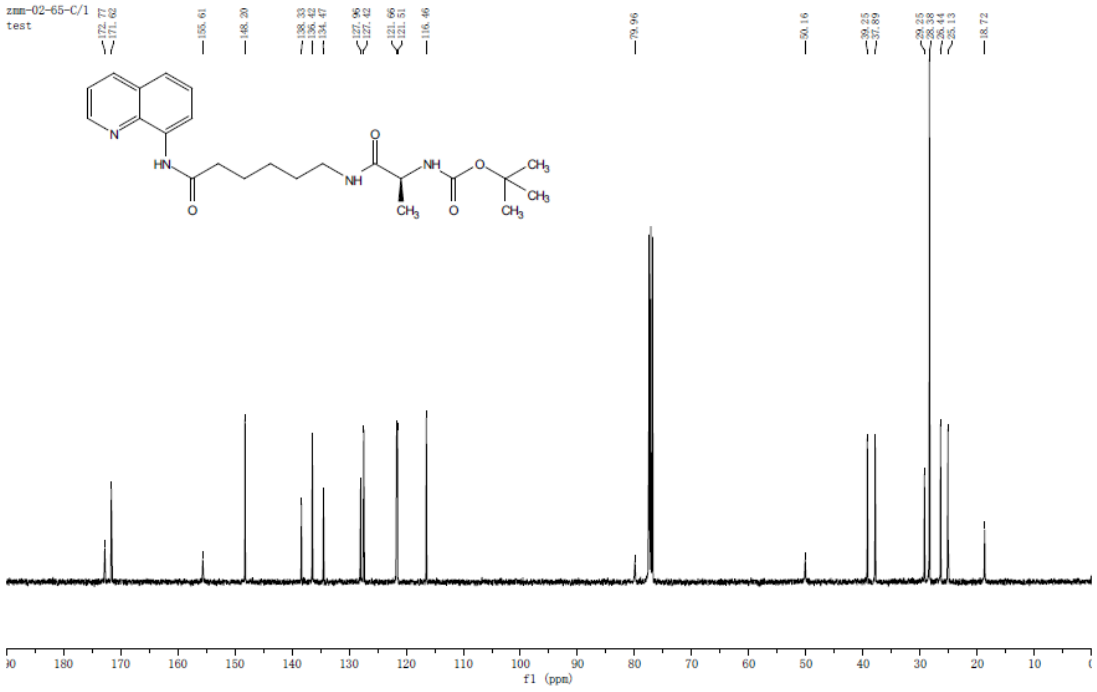

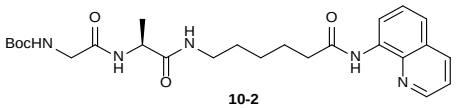
BocHN
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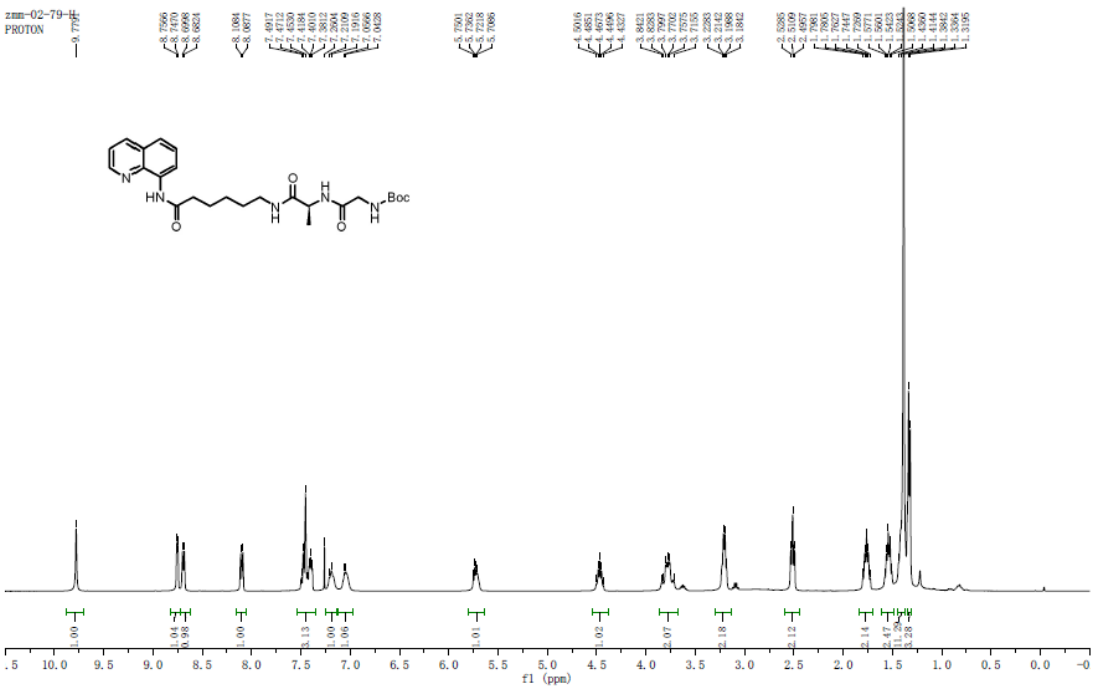
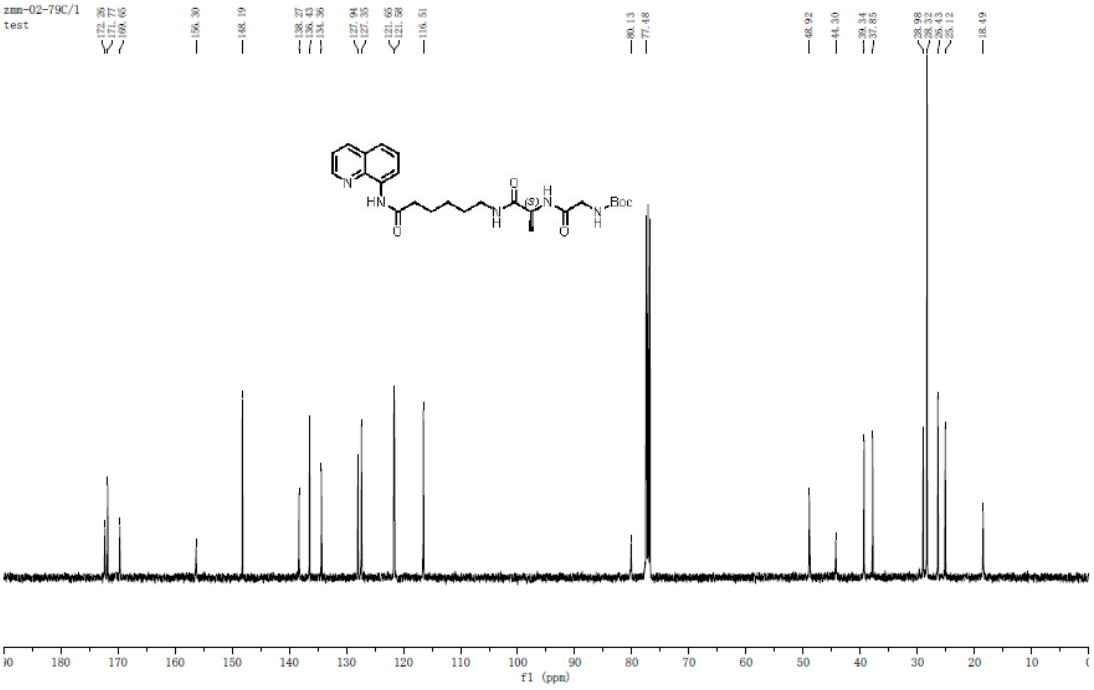
10-2


zmm-02-79-H
PROTON
HN
O
N
H
Boc
f1 (ppm)


zmm-02-79C/1
test
HN
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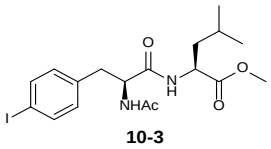
Boc
f1 (ppm)



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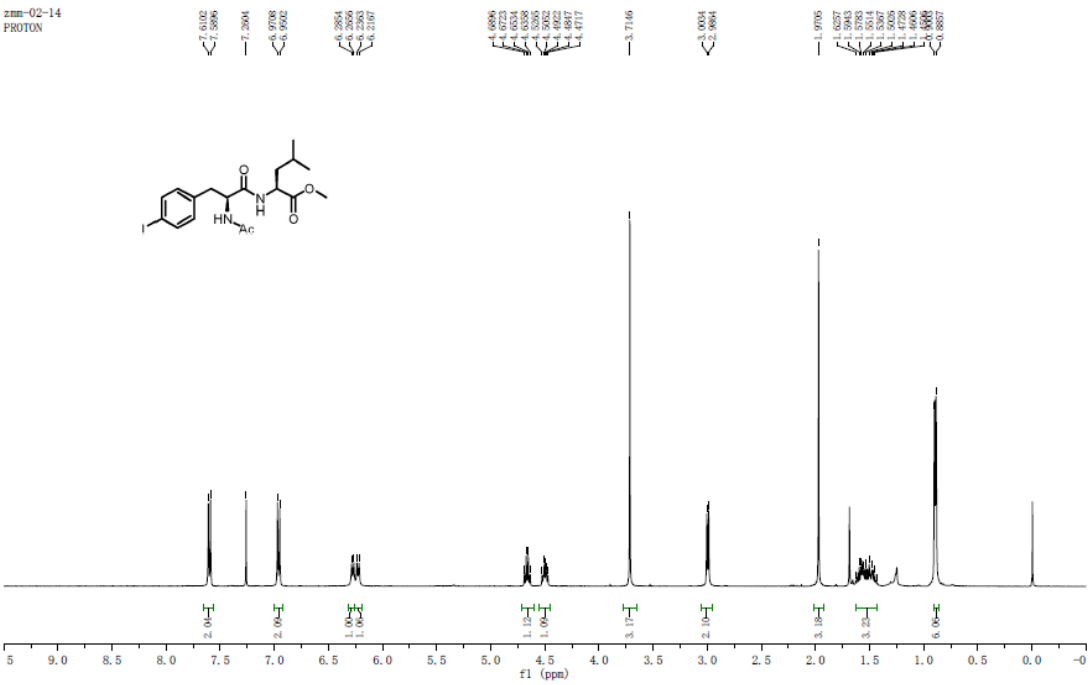

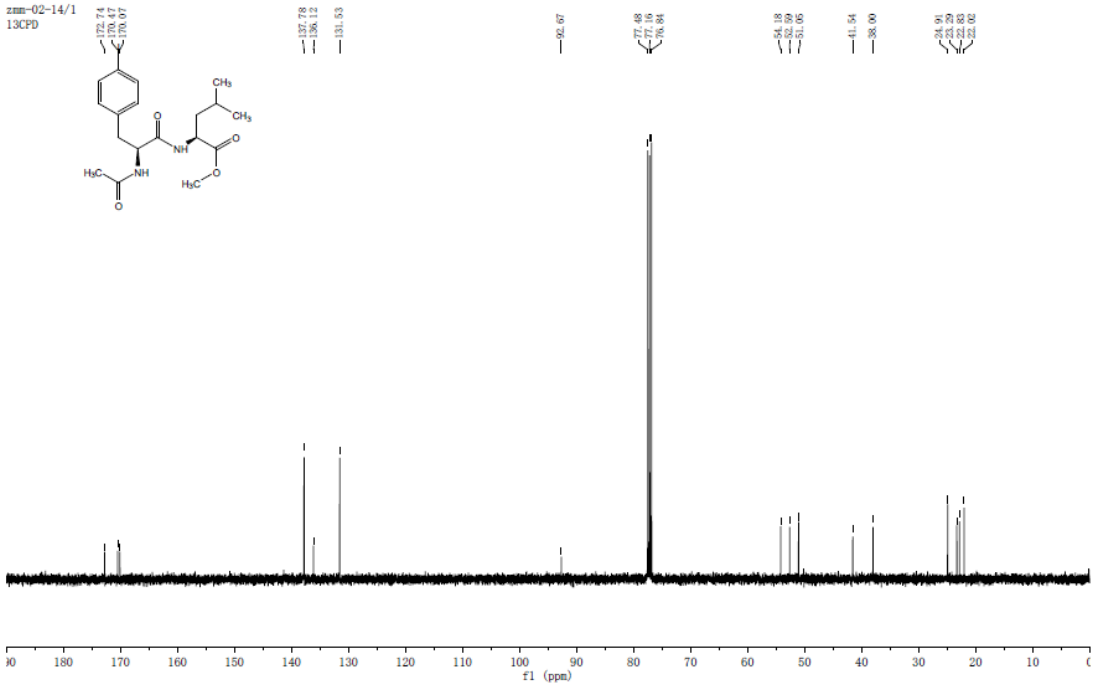

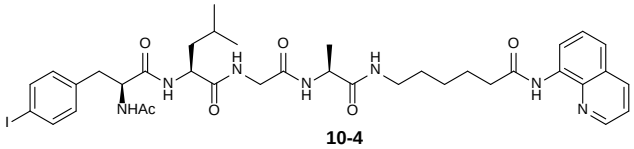

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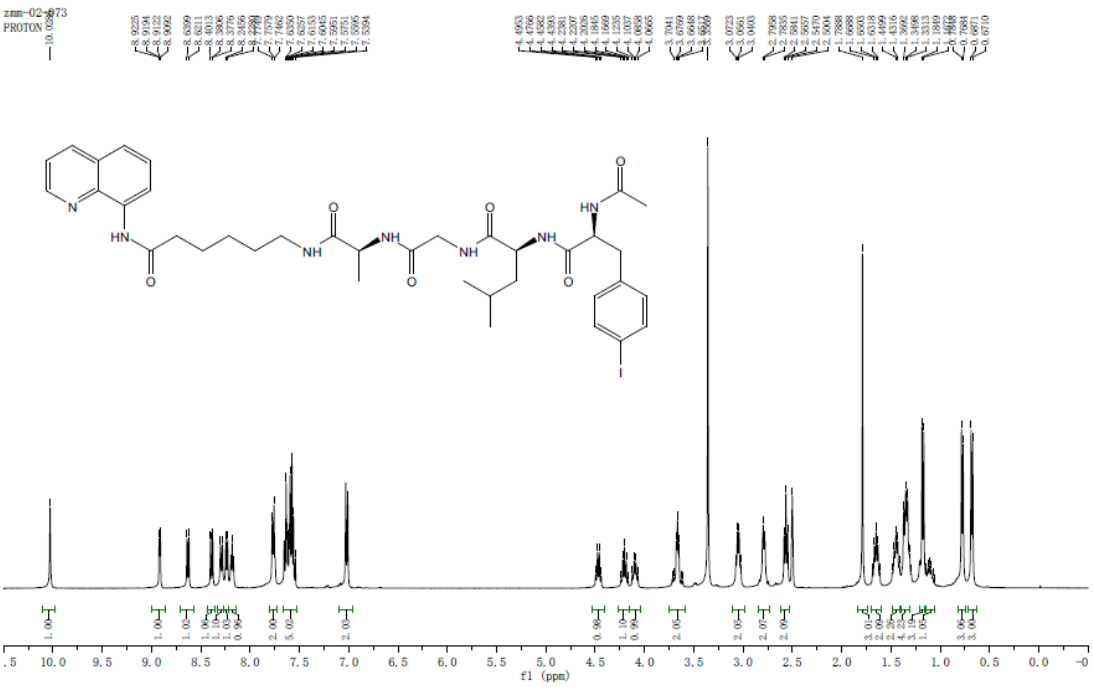
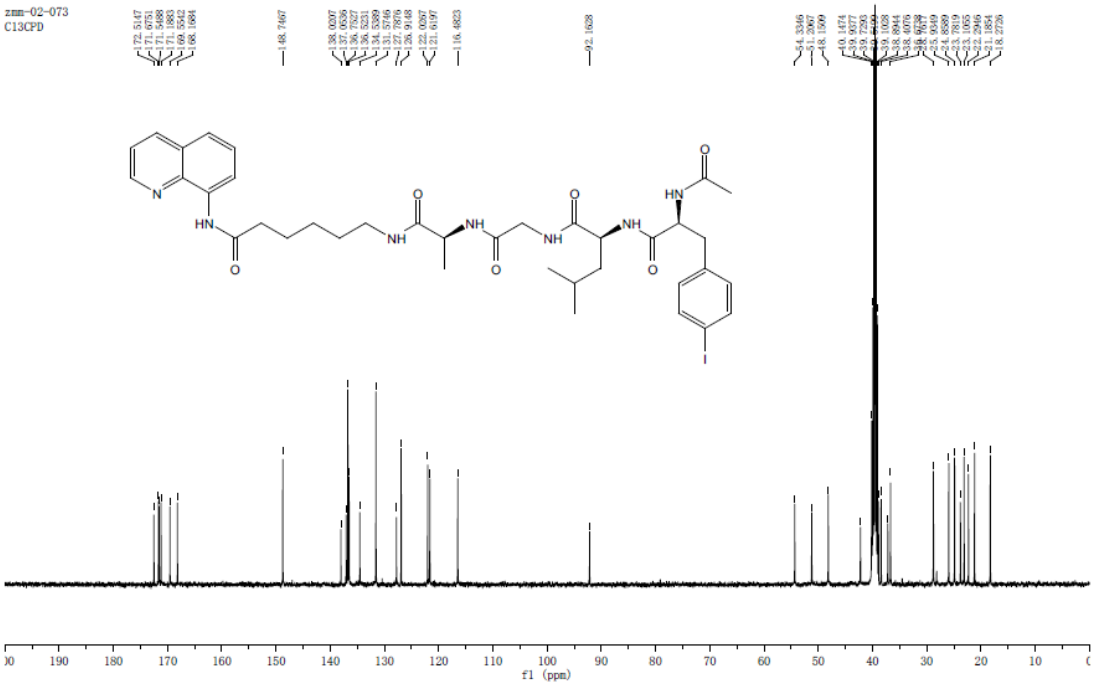
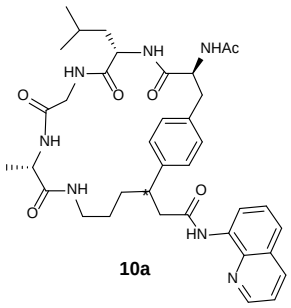
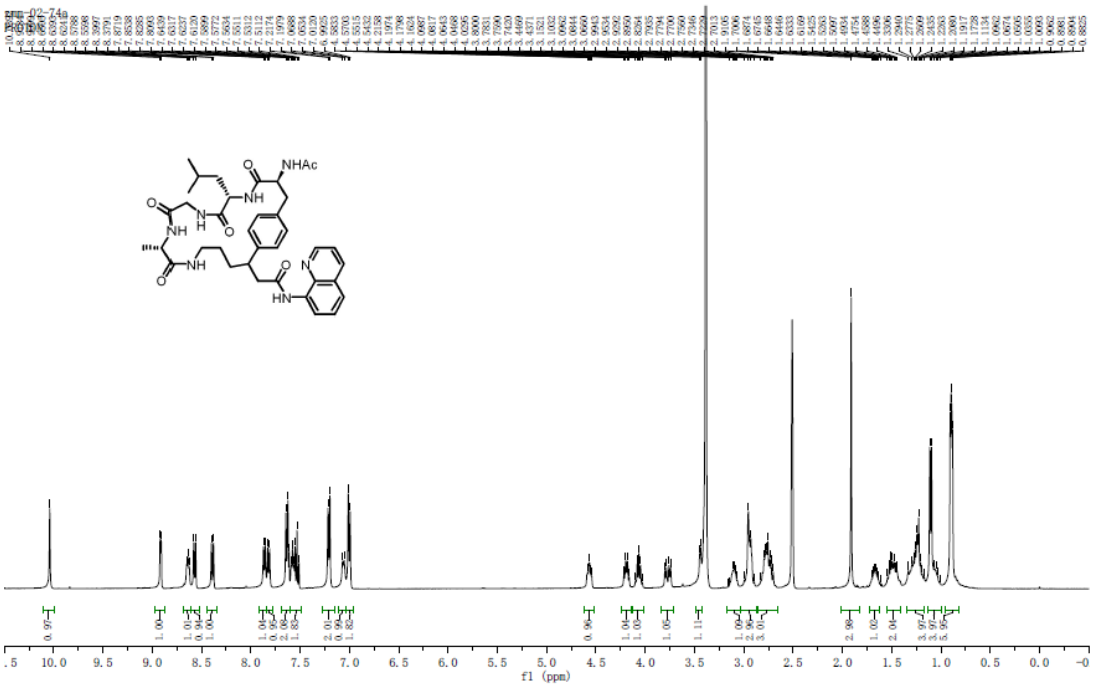
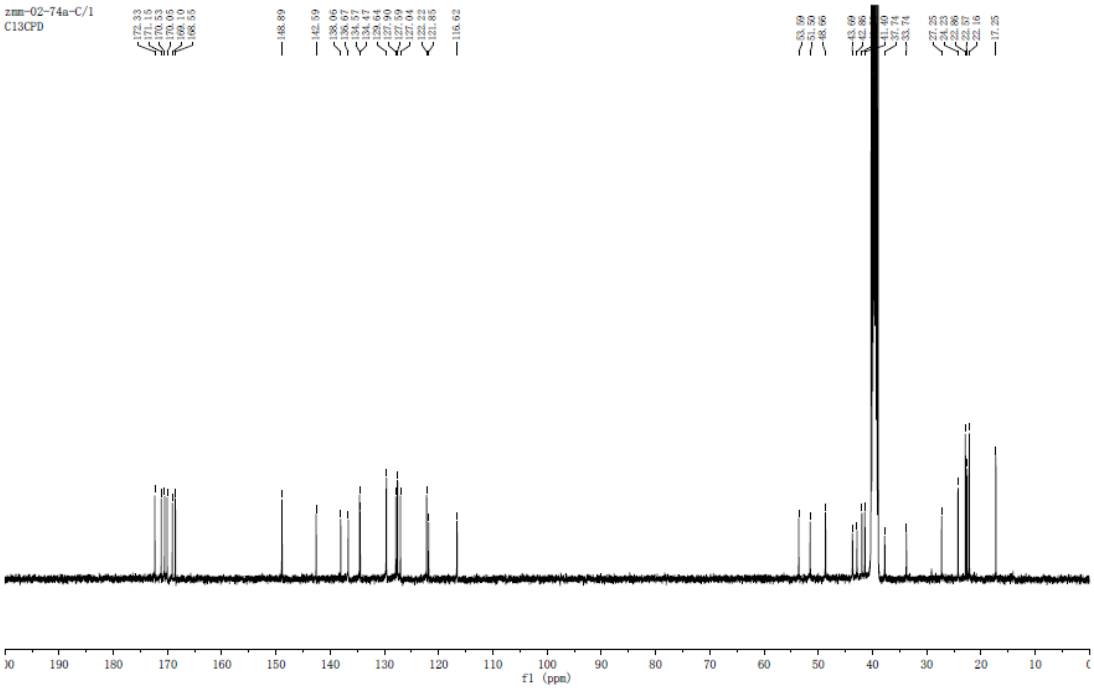


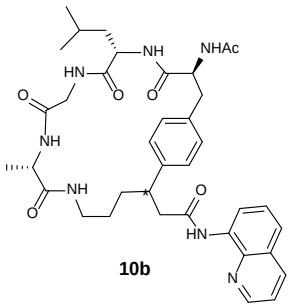



NHAc
NH
HN
O
NH
NH
HN
N

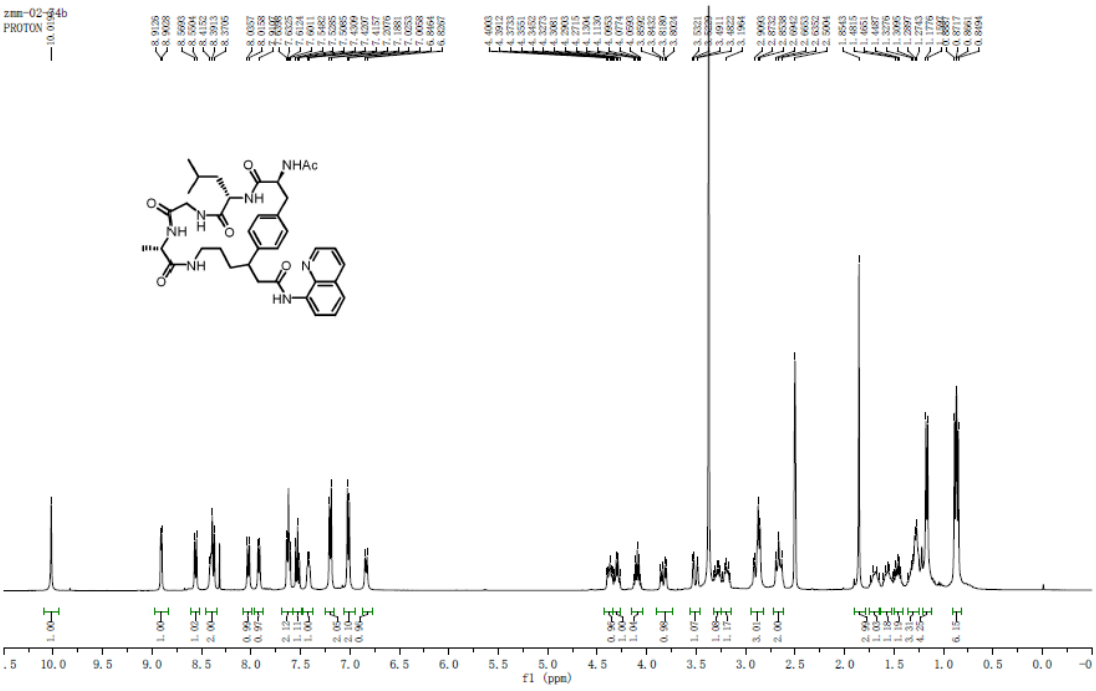
10a

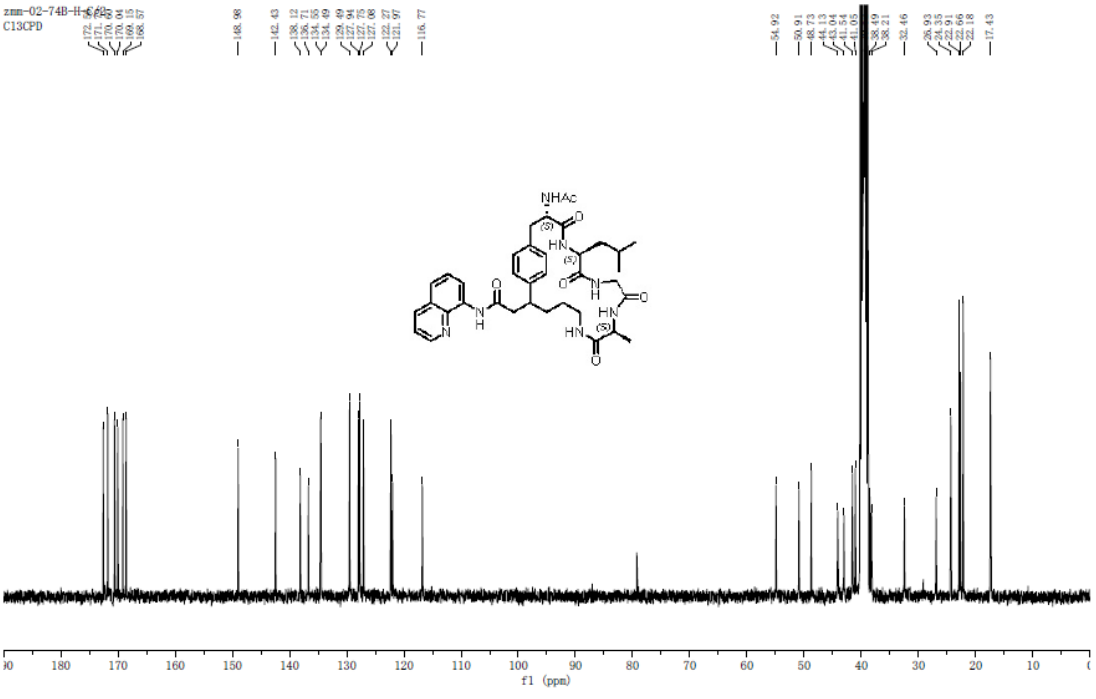

NHAc
NH
NH
NH
HN
N
f1 (ppm)

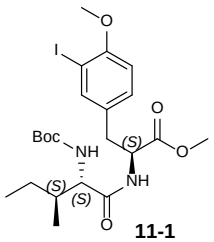

zmm-02-74a-C/1
C13CPD
f1 (ppm)


NHAc
NH
HN
O
NH
NH
HN
N

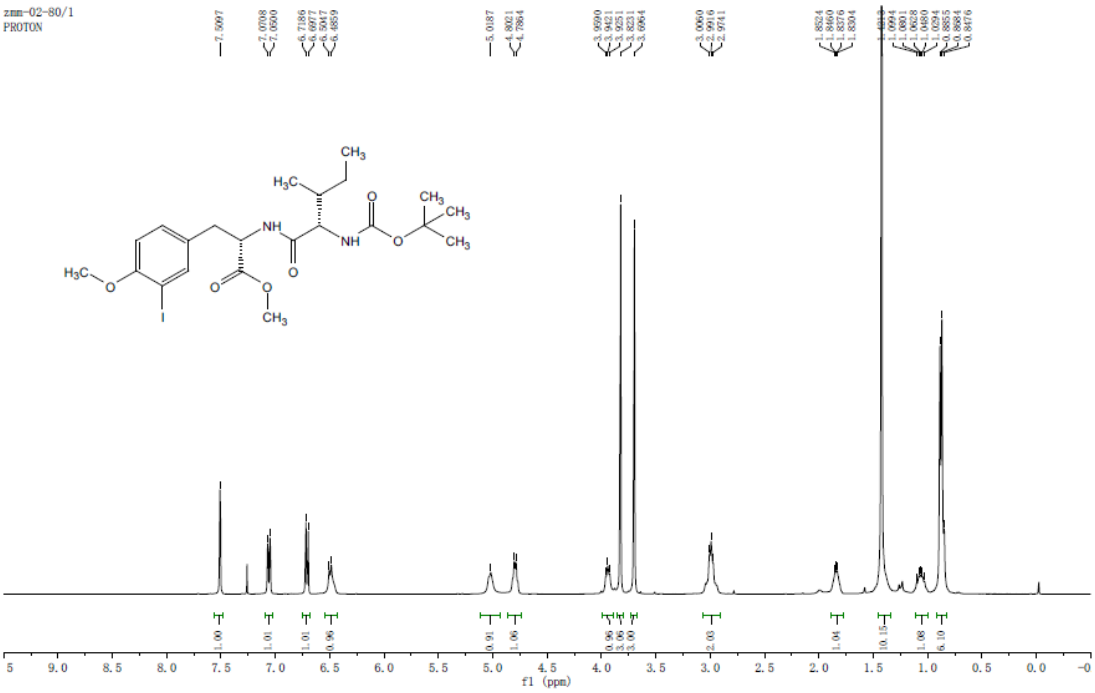
10b

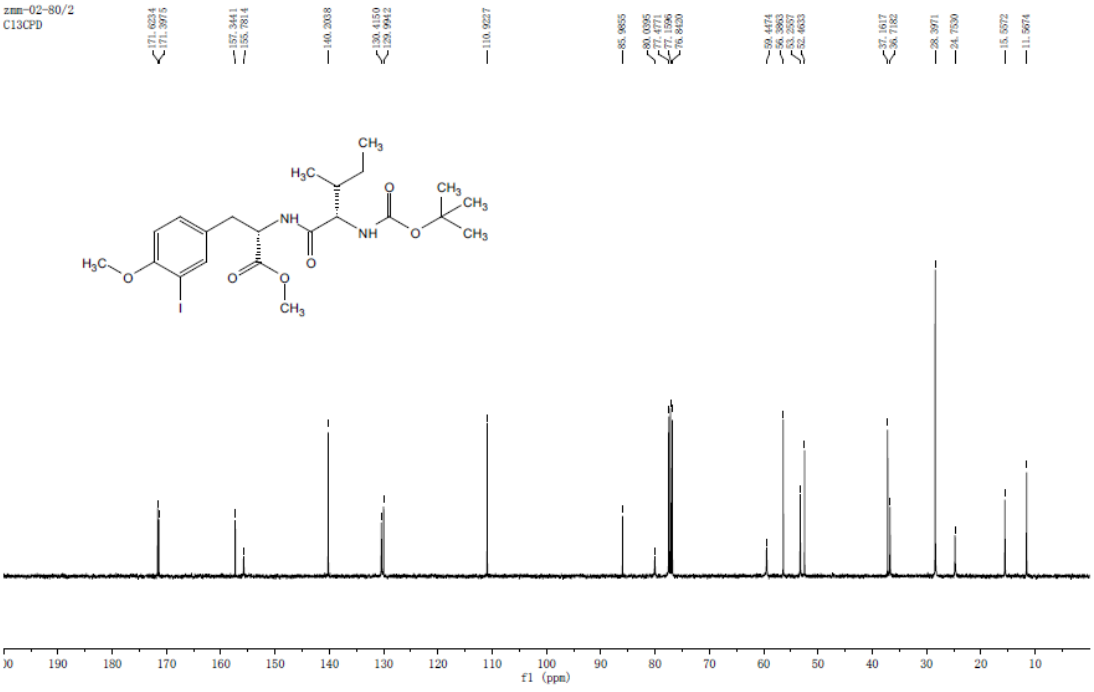

zmm-02-74b
PROTON
NHAc
f1 (ppm)

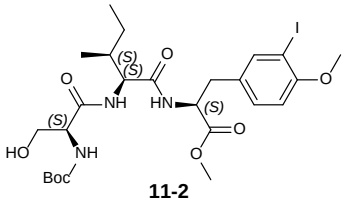

C13CPD
NHAc
f1 (ppm)



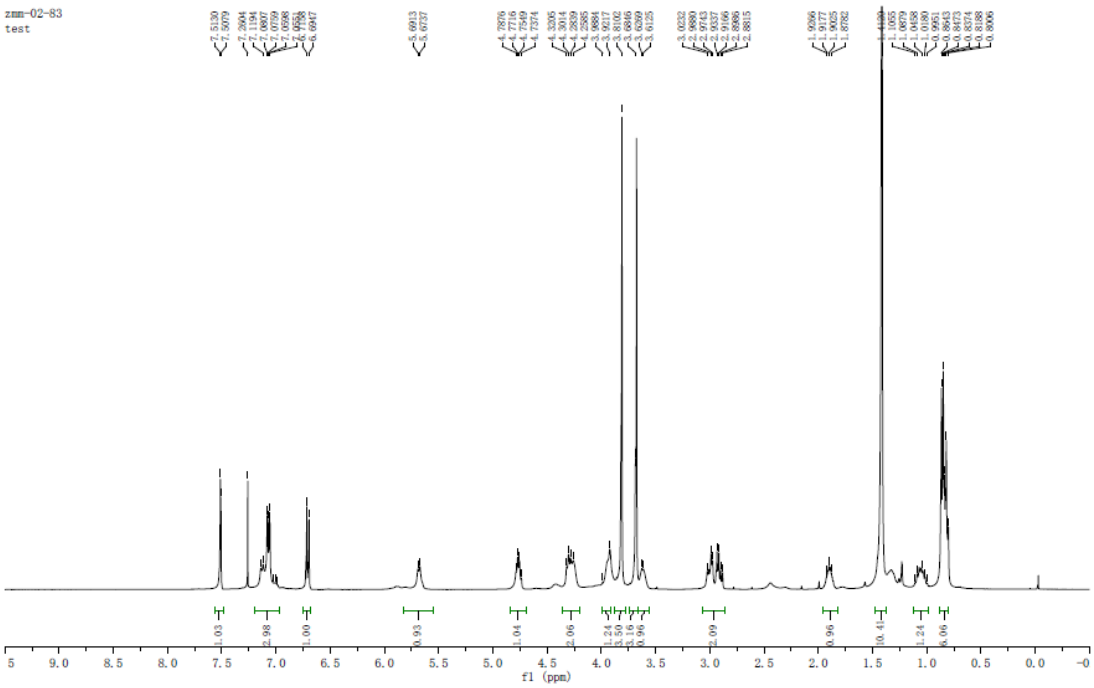
11-1

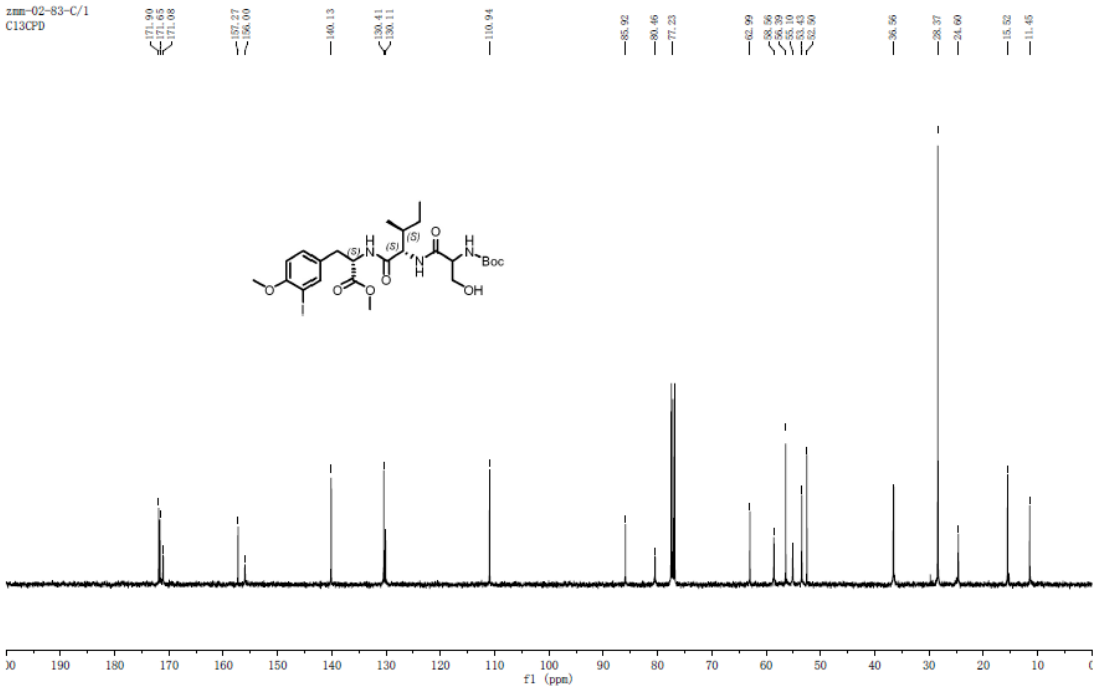


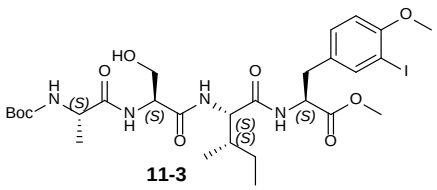



I
O
(S)
(S)
O
O
NH
HN
O
(S)
(S)
HO
NH
O
Boc

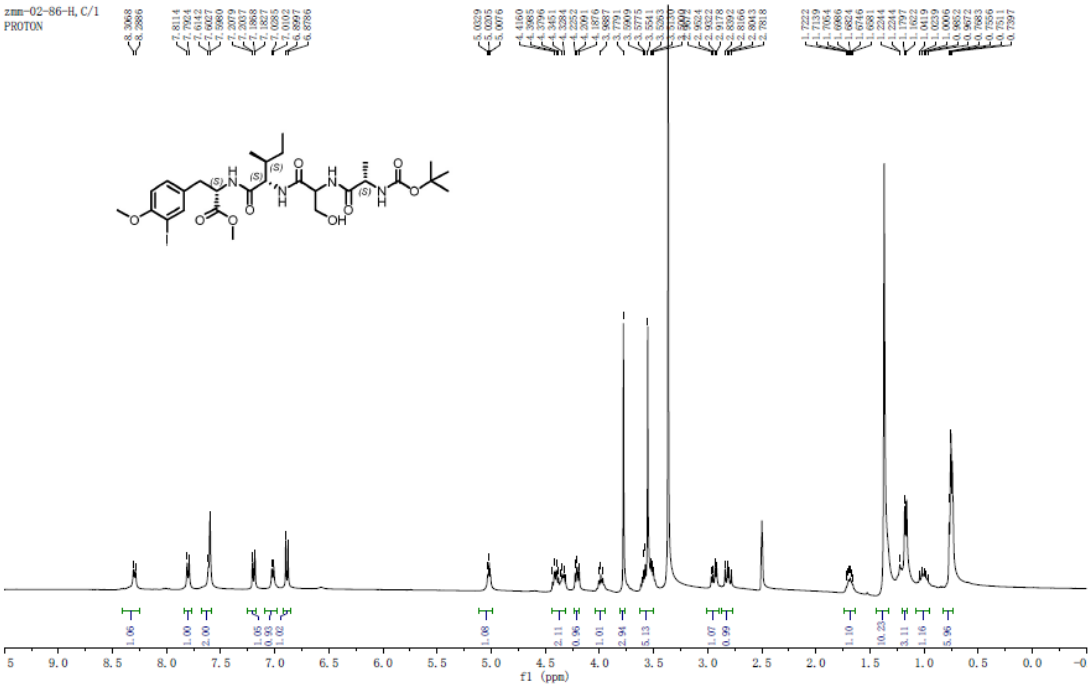
11-2

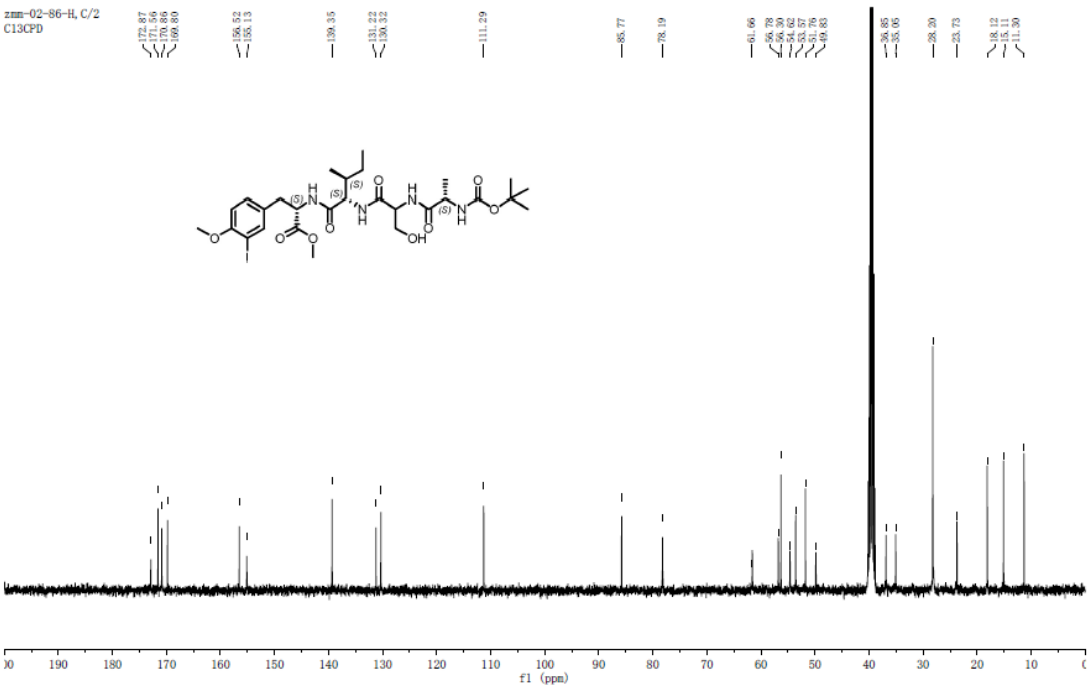

zmm-02-83
test
f1 (ppm)

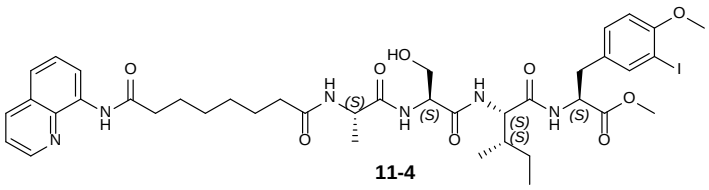

zmm-02-83-C/1
C13CPD
f1 (ppm)


Boc
HO
O
I
(S)
(S)
(S)
(S)
(S)
(S)

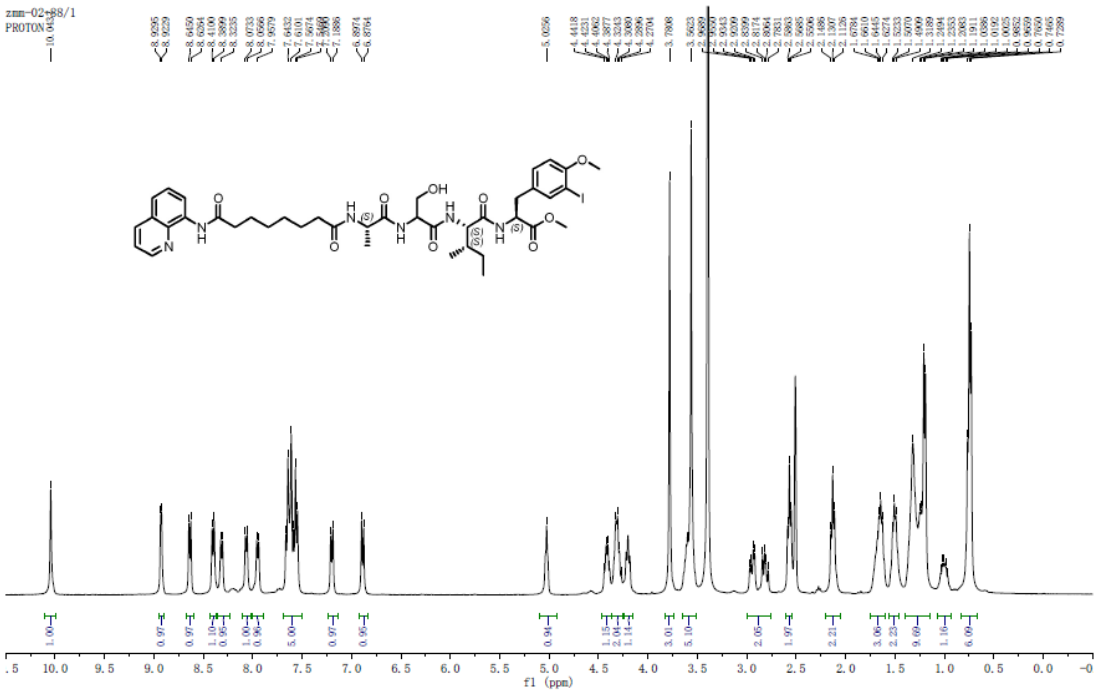
11-3

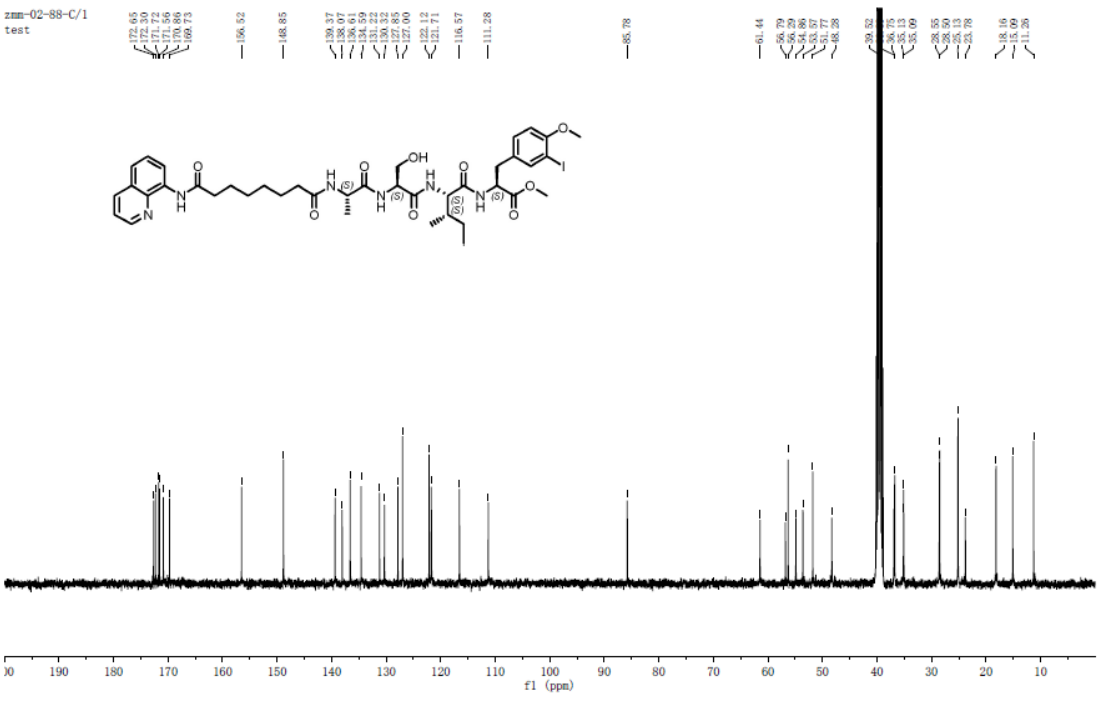

zmm-02-86-H, C/1
PROTON
f1 (ppm)

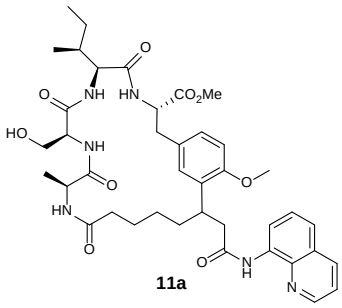

zmm-02-86-H, C/2
C13CPD
f1 (ppm)

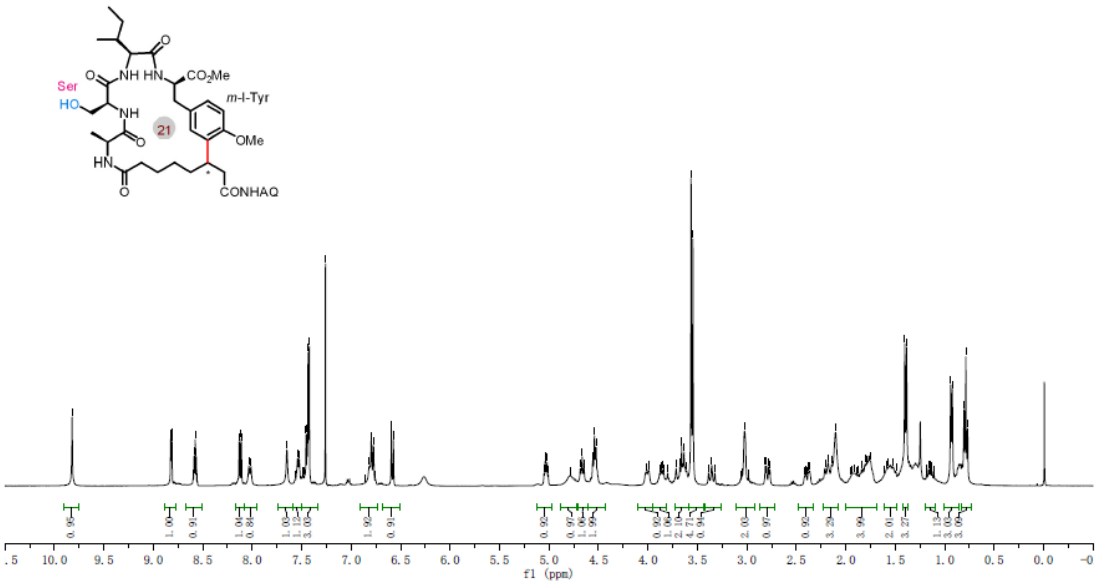


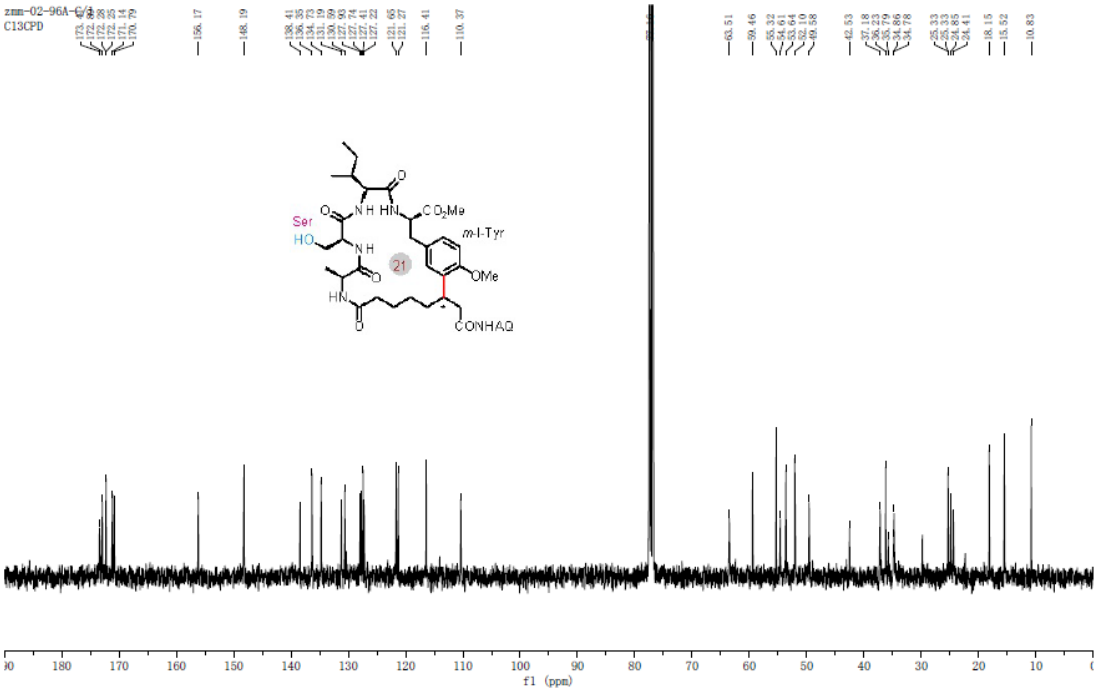
11-4

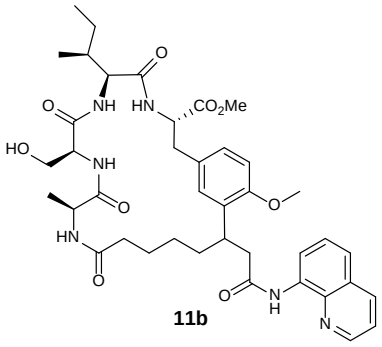




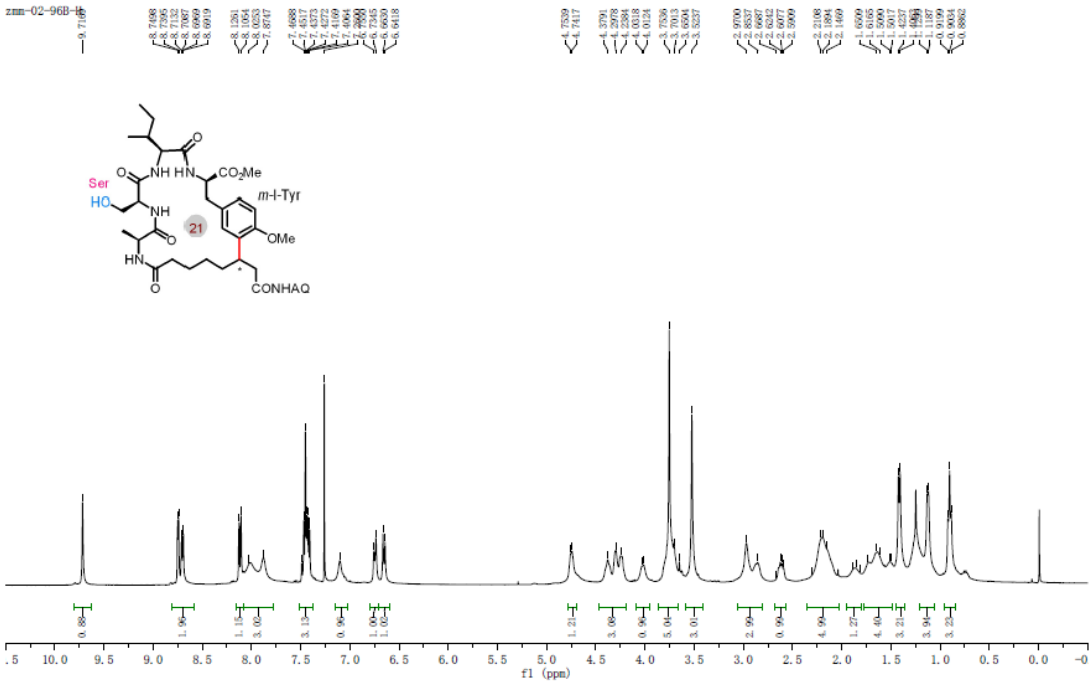

HO
NH
HN
CO2Me
O
NH
HN
O
O
O
O
N
H
N
O
11a

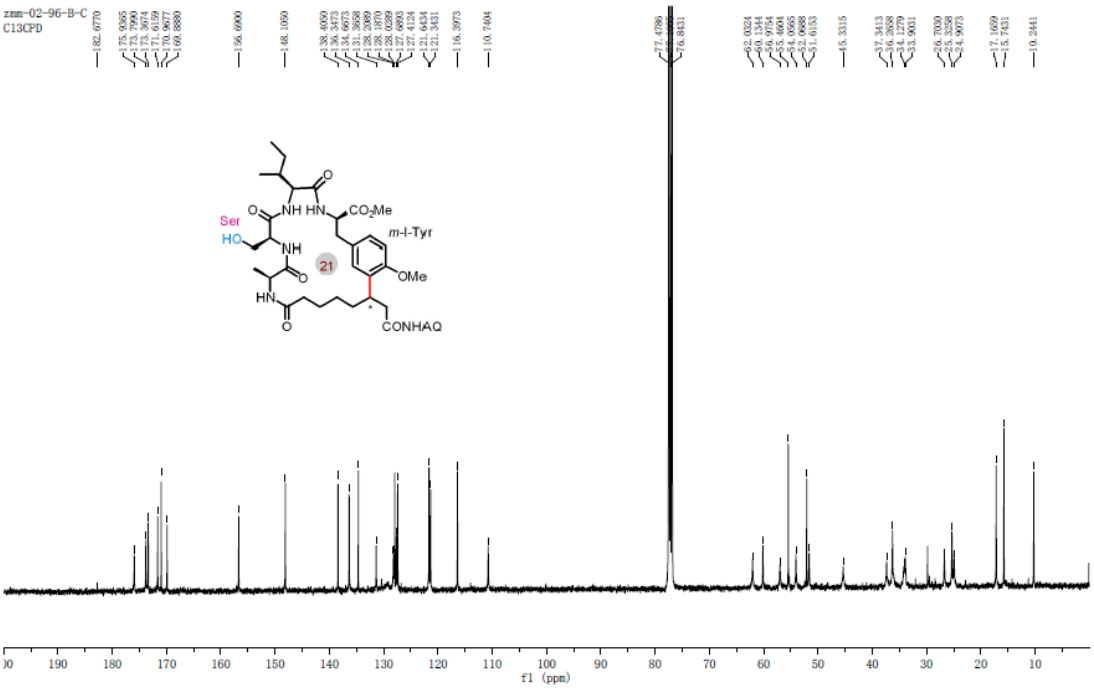

Ser
HO
NH HN
CO2Me
m-I-Tyr
21
OMe
NH
O
HN
O
CONHAQ
f1 (ppm)

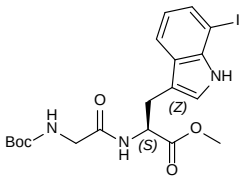

zmm-02-96A-C13
C13CPD
Ser
HO
NH HN
CO2Me
m-I-Tyr
21
OMe
NH
O
HN
O
CONHAQ
f1 (ppm)


HO
NH
HN
CO2Me
O
NH
HN
O
O
O
O
N
H
N
O

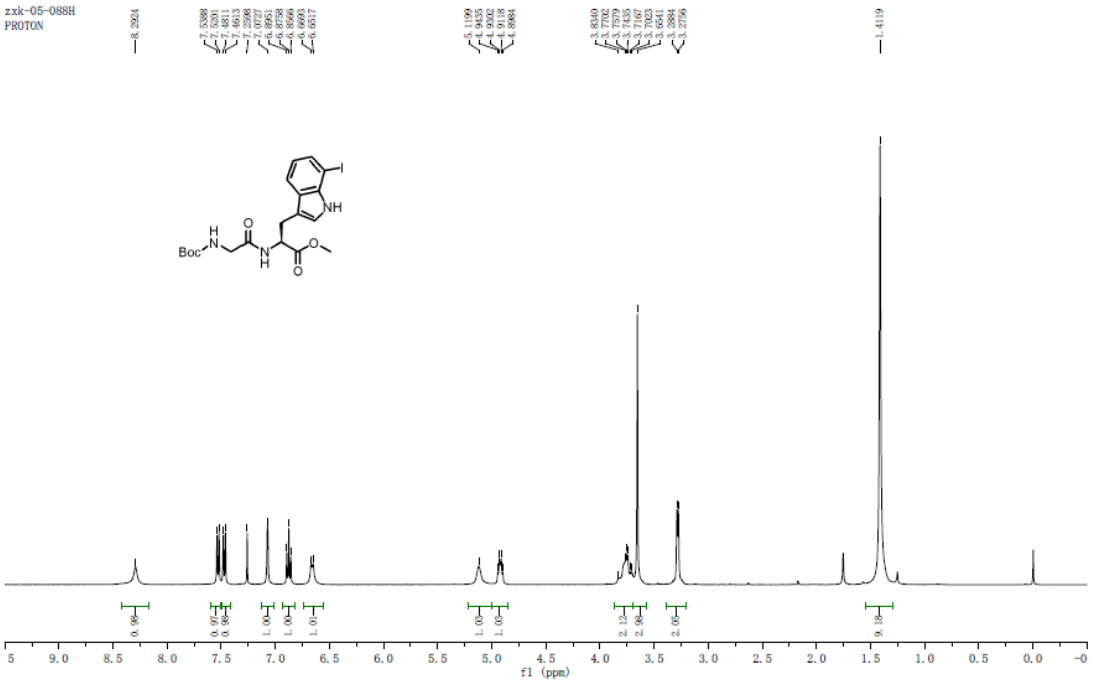
11b

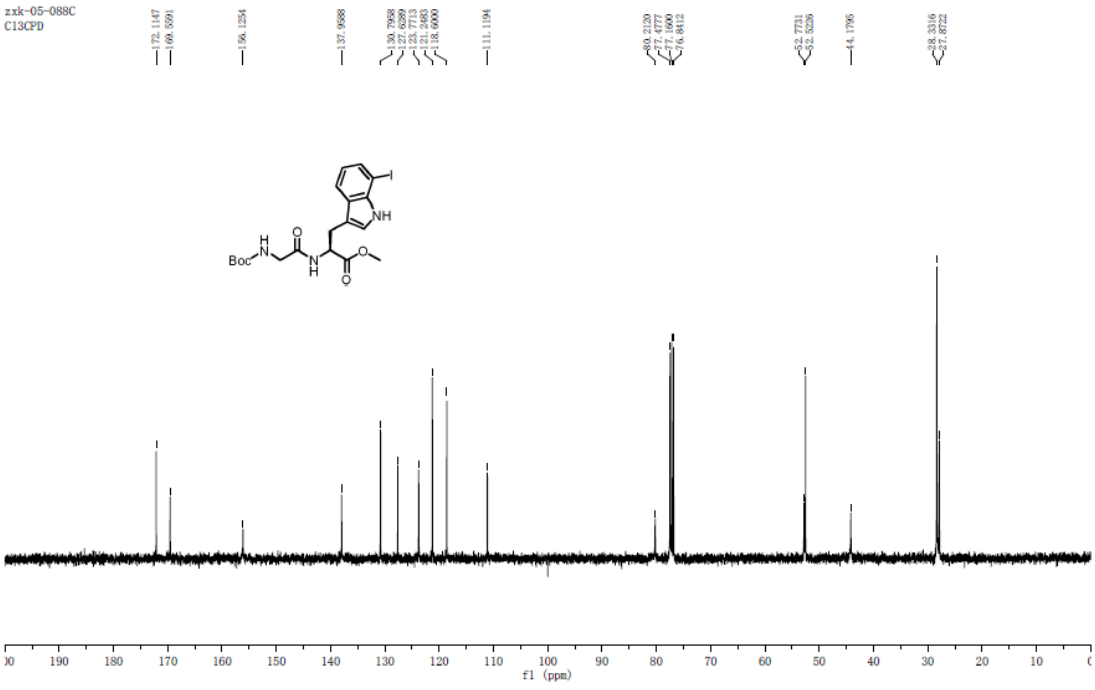

Ser
HO
NH HN
CO2Me
m-I-Tyr
21
OMe
HN
CONHAQ
f1 (ppm)

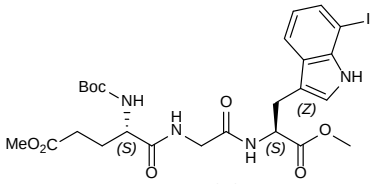

Ser
HO
NH HN
CO2Me
m-I-Tyr
21
OMe
HN
CONHAQ
f1 (ppm)



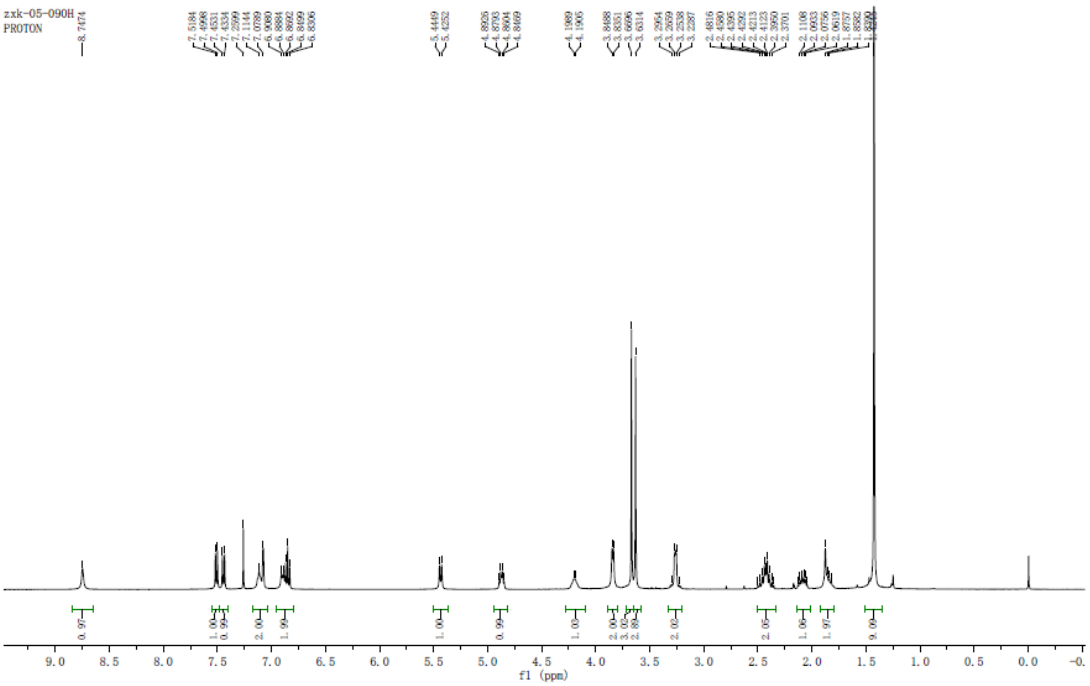
12-1

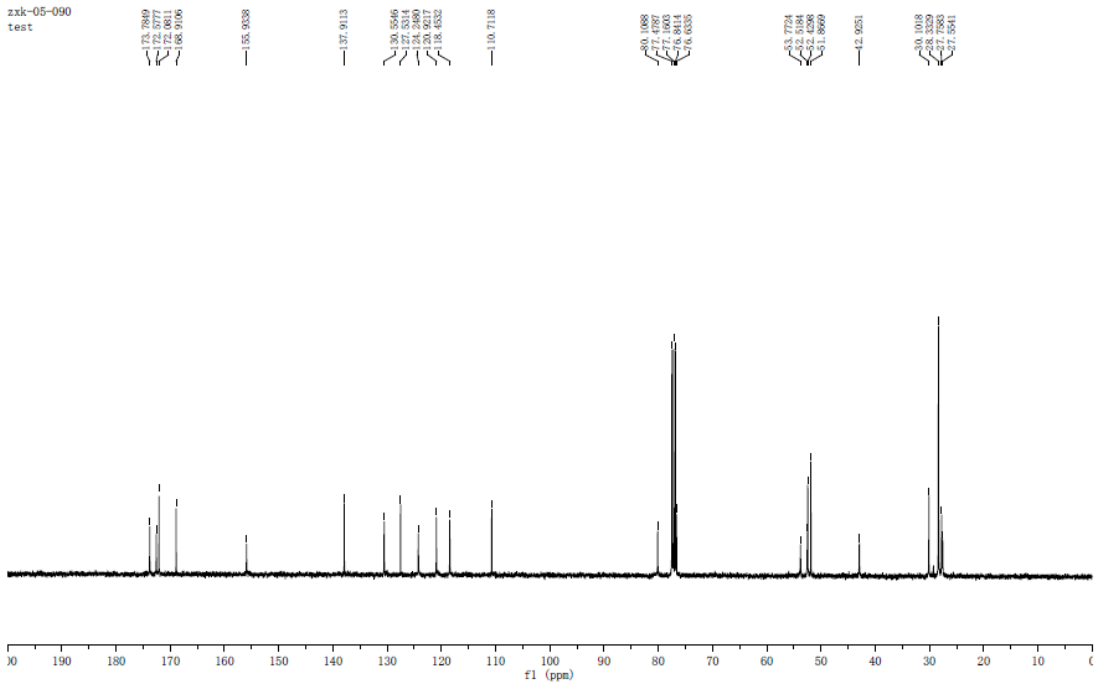


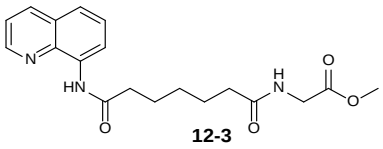



Boc
NH
(S)
O
H
N
O
N
H
(S)
O
O
O
MeO2C
NH
(Z)
I

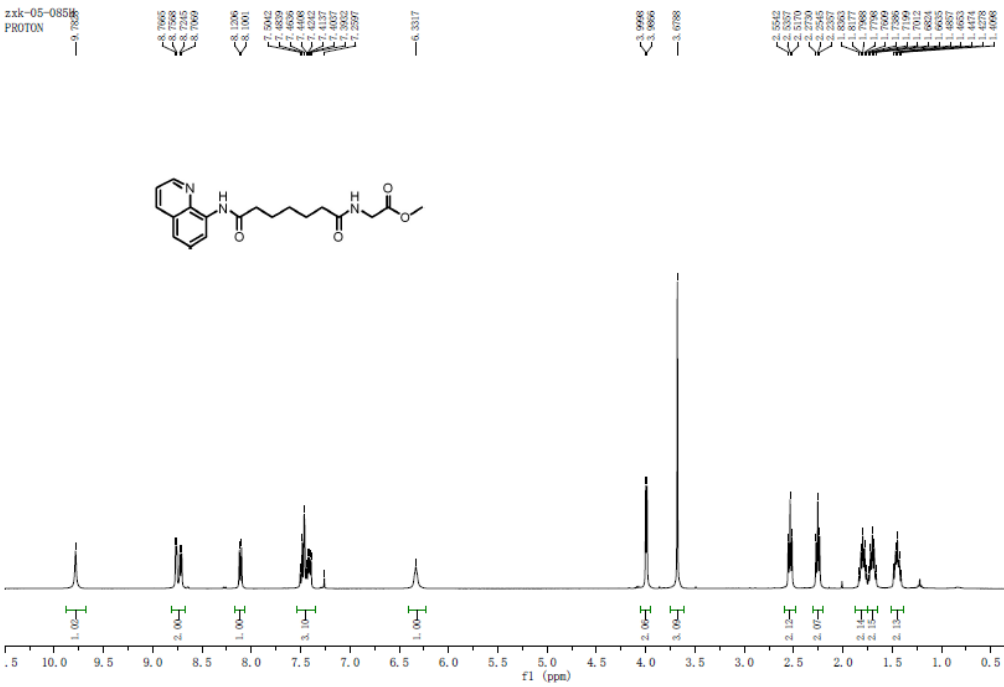
12-2

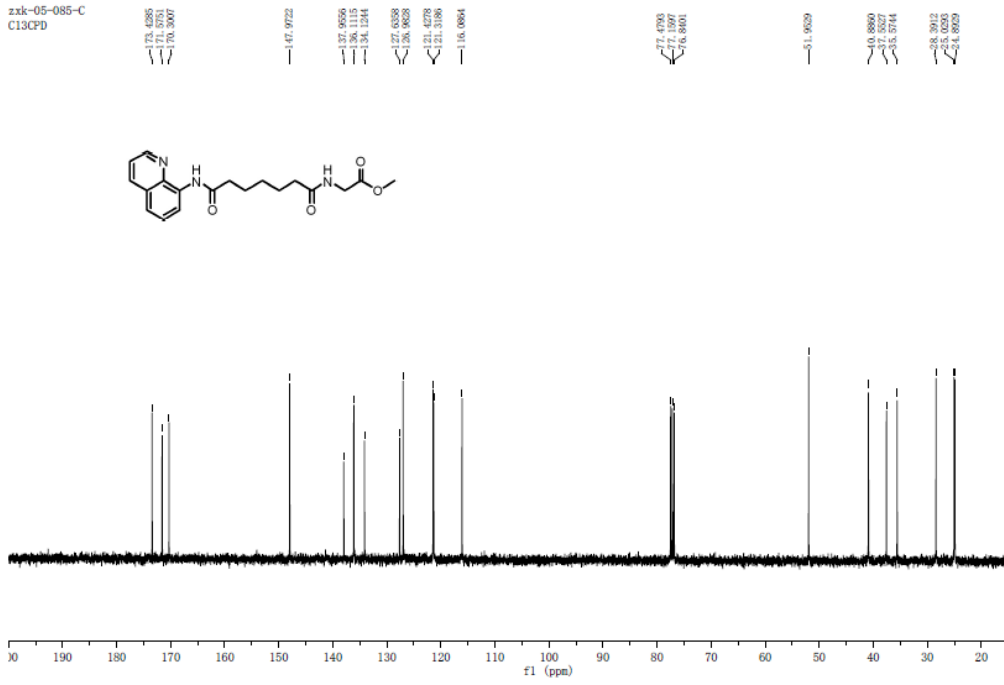

zxk-05-090H
PROTON
f1 (ppm)

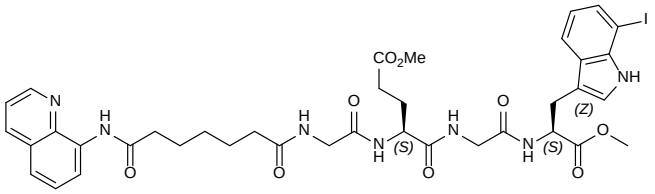

zxk-05-090
test
f1 (ppm)



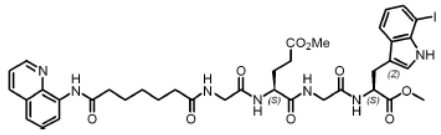
12-3

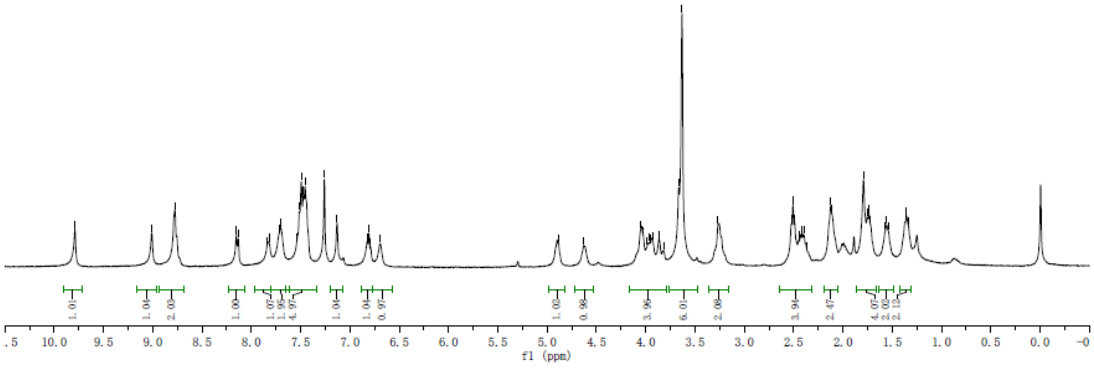


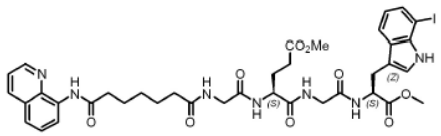


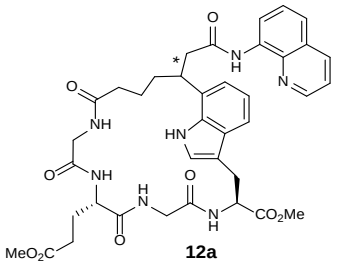


12-4

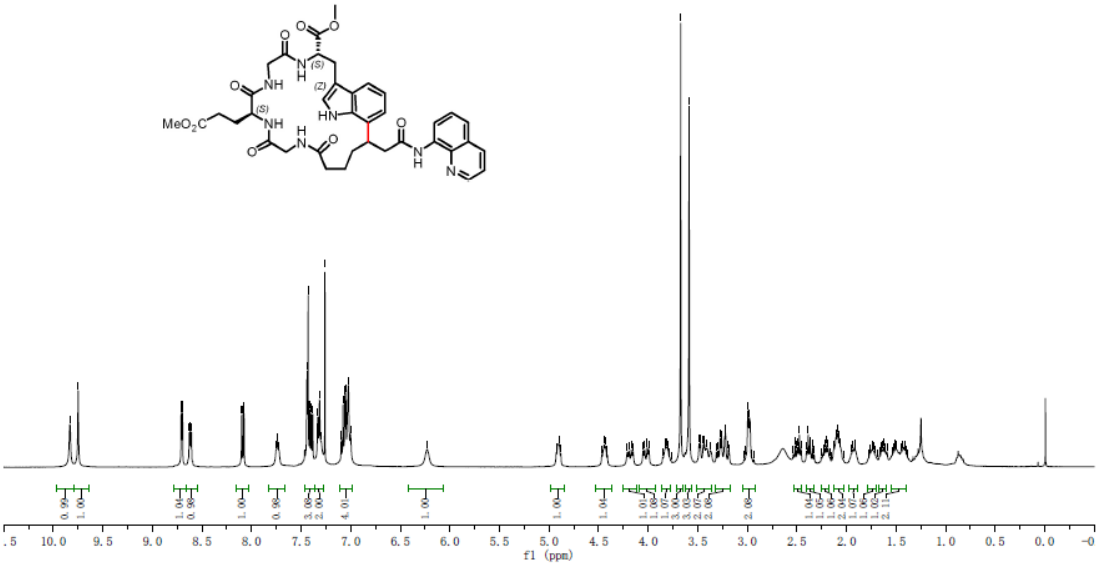


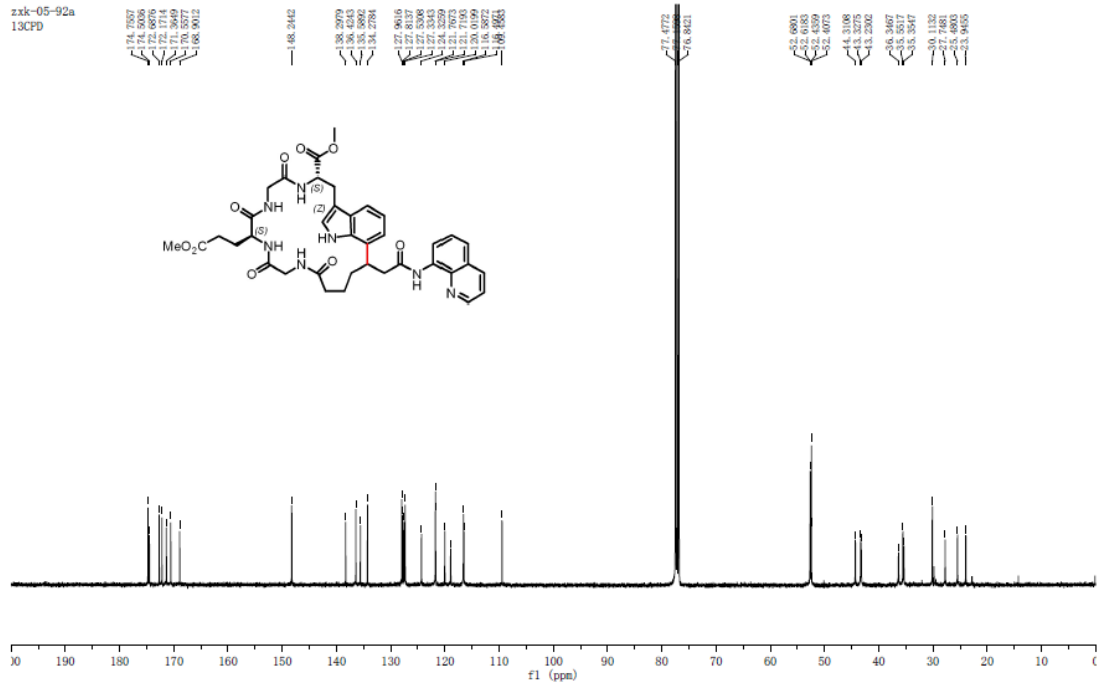


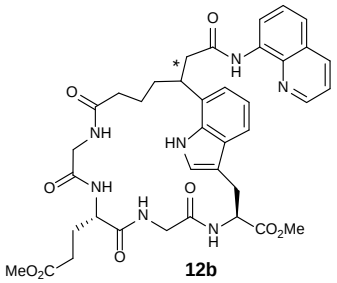




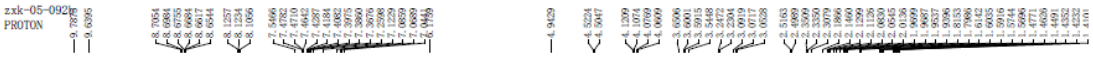
12a

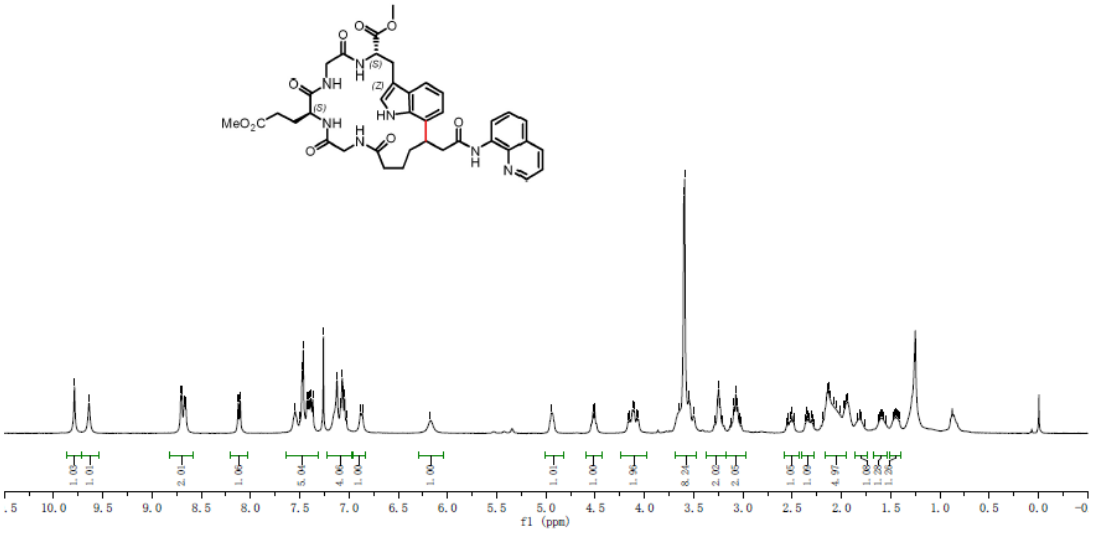


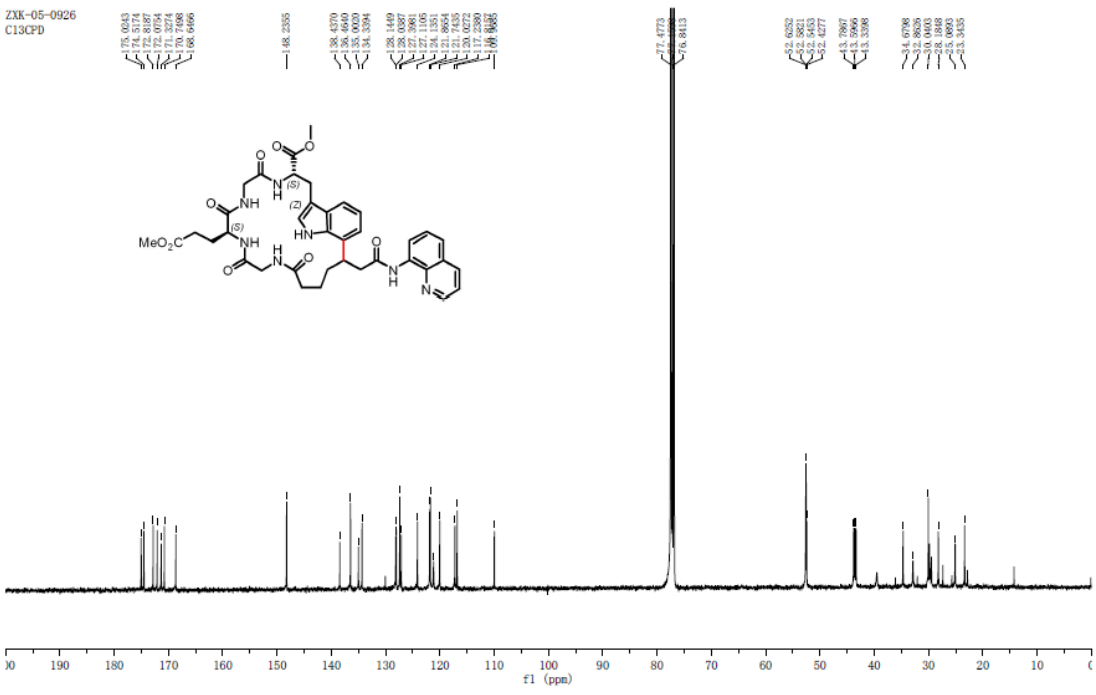


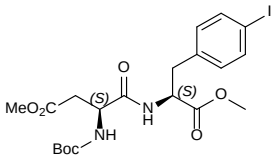


12b

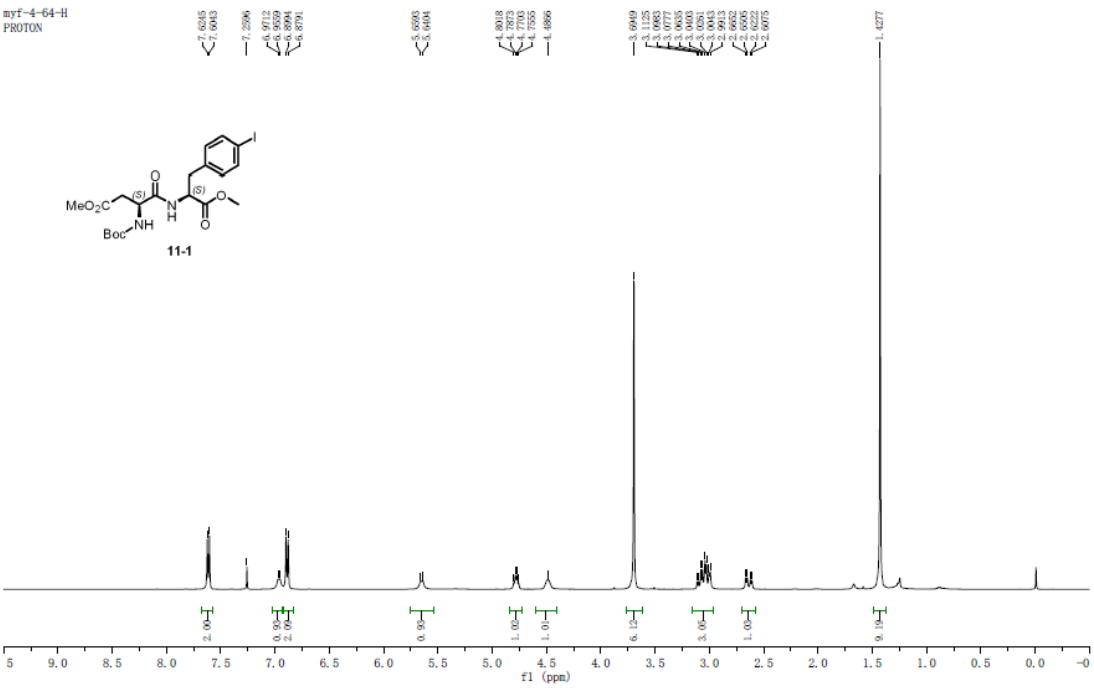






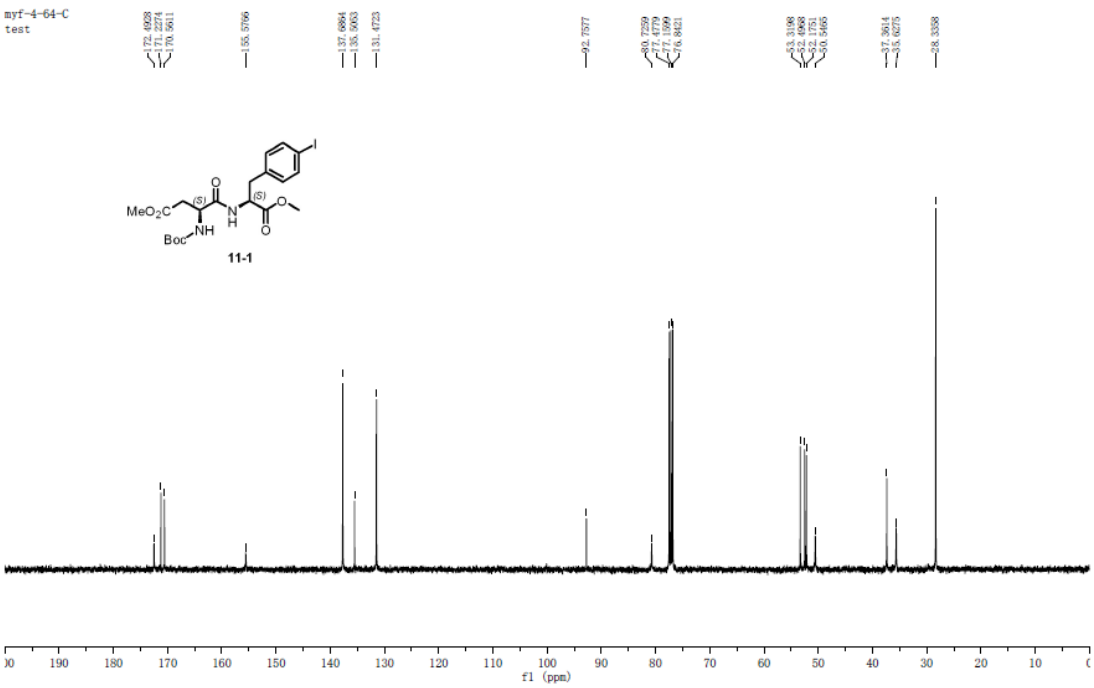

MeO2C
(S)
O
N
H
(S)
O
O
NH
Boc
I

13-1


myf-4-64-H
PROTON
7.6245
7.6043
7.2596
6.9712
6.9559
6.8994
6.8791
5.6693
5.6404
4.8018
4.7873
4.7709
4.7555
4.4866
3.6949
3.1125
3.0983
3.0777
3.0635
3.0491
3.0351
3.0043
2.9913
2.6602
2.6456
2.6222
2.6075
1.4277
2.04
0.99
2.00
0.99
1.02
1.01
6.12
3.06
1.03
9.19
f1 (ppm)

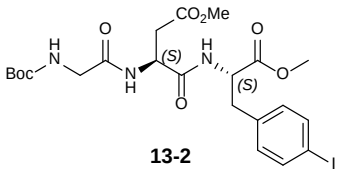
MeO2C
(S)
O
N
H
(S)
O
O
NH
Boc
I

11-1

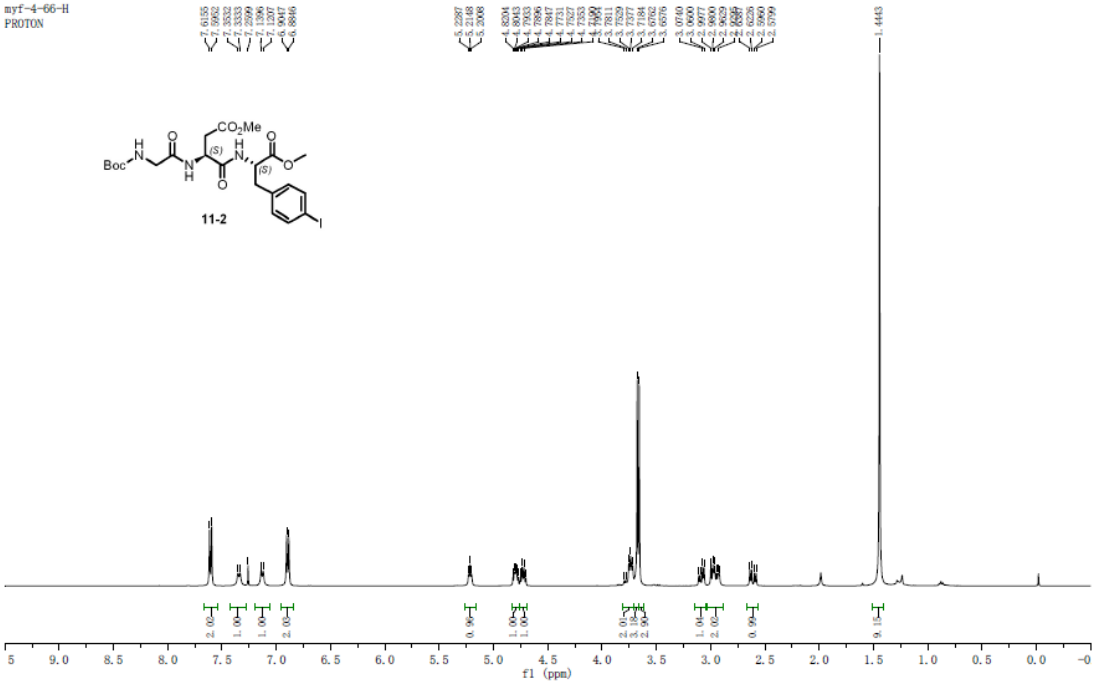

myf-4-64-C
test
172.4928
171.2274
170.5611
155.5766
137.6884
135.9063
131.4723
92.7577
80.7259
77.4779
77.1599
76.8421
53.3198
52.4968
52.1751
50.5465
37.3614
28.6275
28.3358
f1 (ppm)

MeO2C
(S)
O
N
H
(S)
O
O
NH
Boc
I

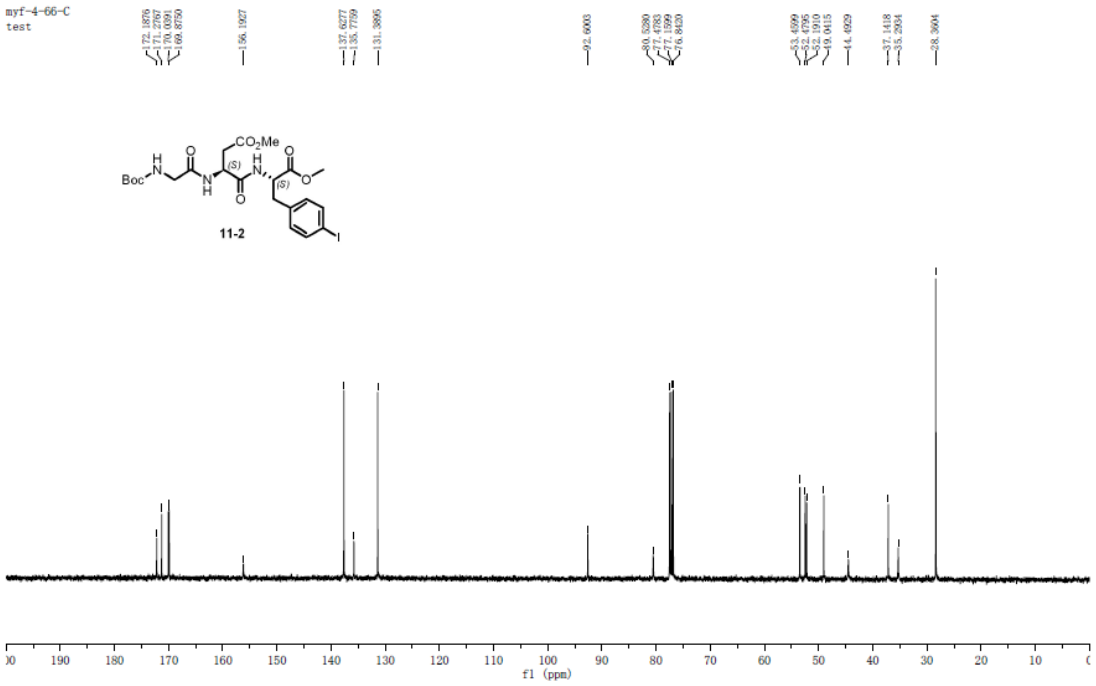
11-1


CO2Me
Boc
(S)
(S)
I

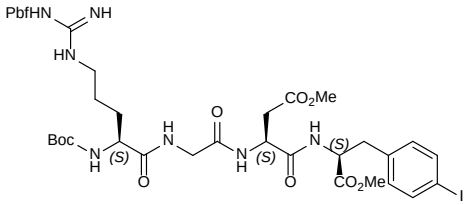
13-2


myf-4-66-H
PROTON
CO2Me
Boc
(S)
(S)
I
f1 (ppm)

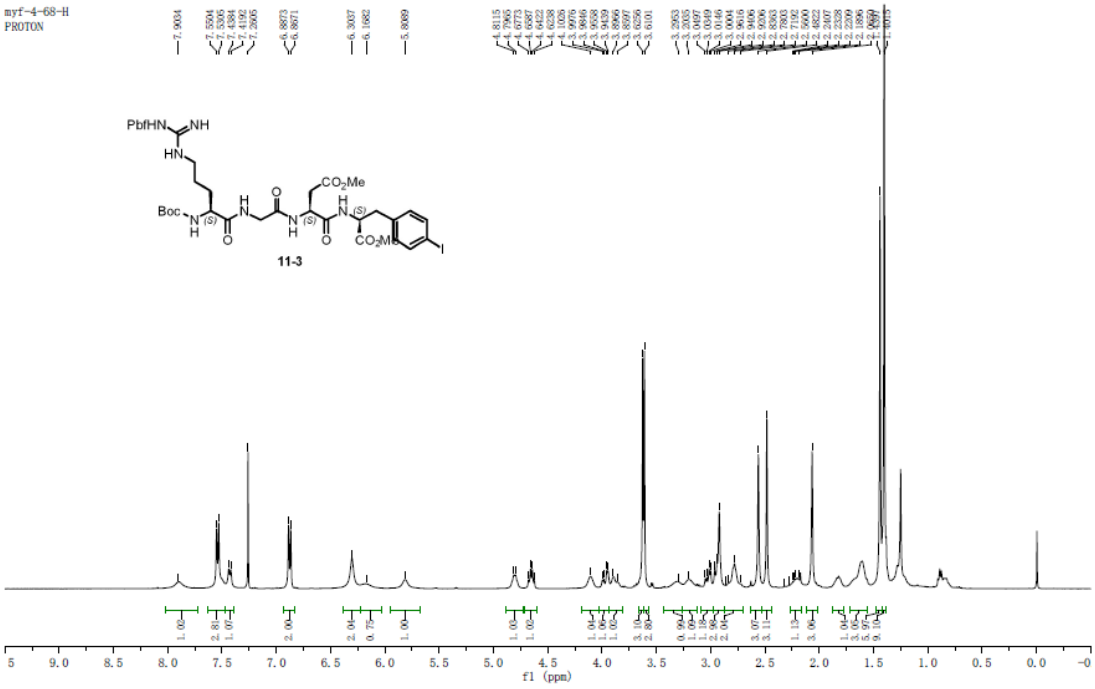
11-2

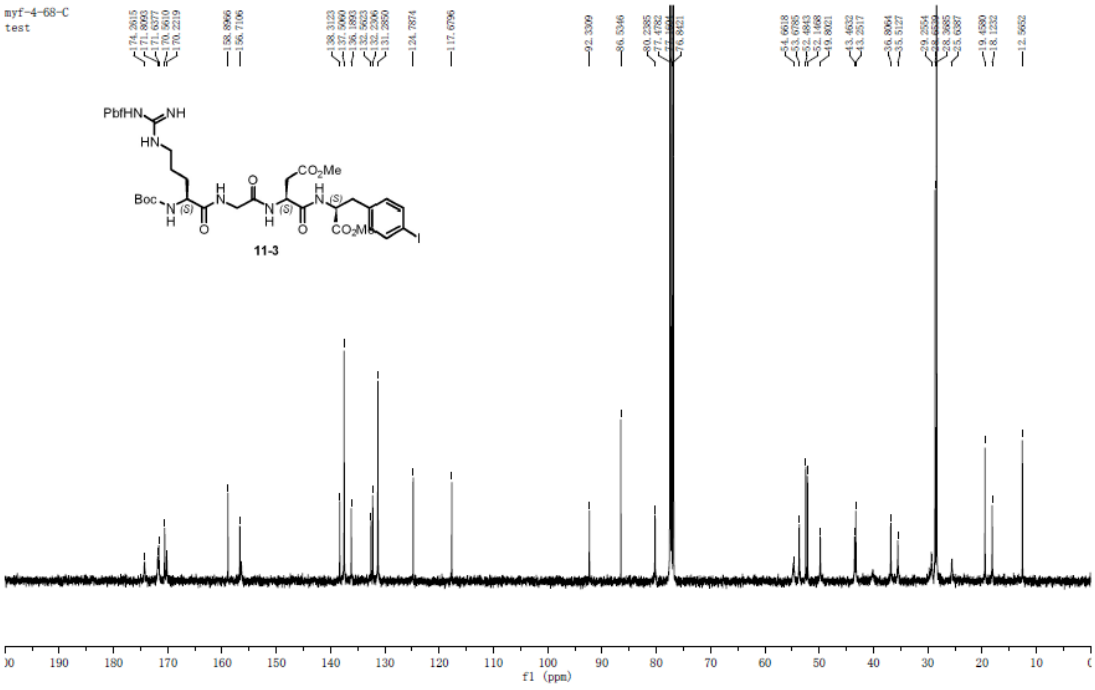

myf-4-66-C
test
CO2Me
Boc
(S)
(S)
I
f1 (ppm)

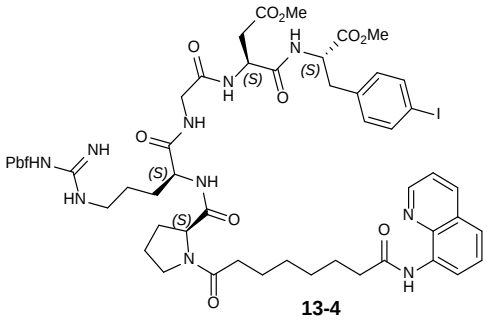
11-2



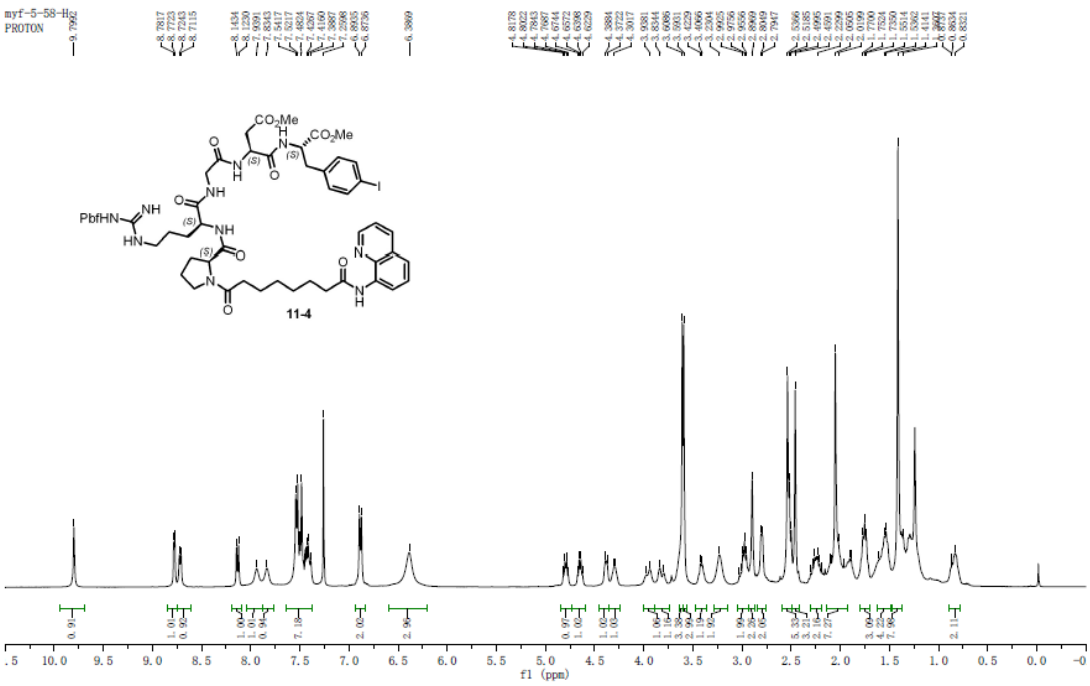
13-3

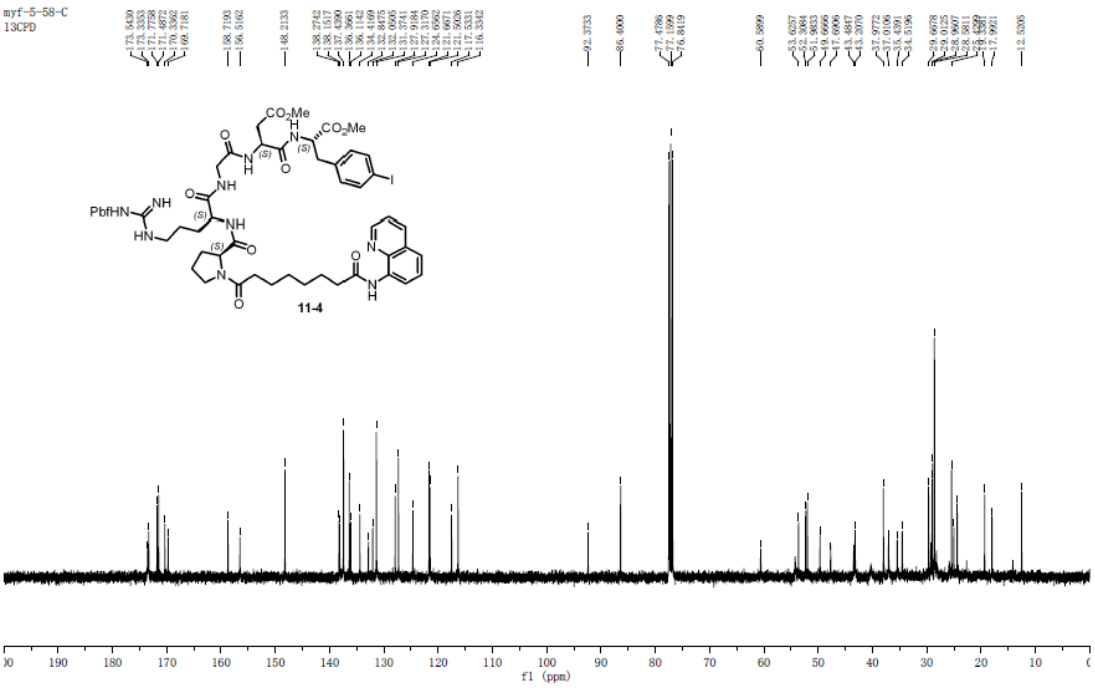


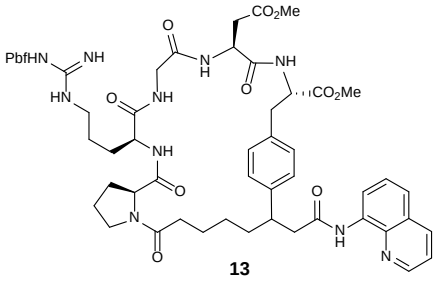




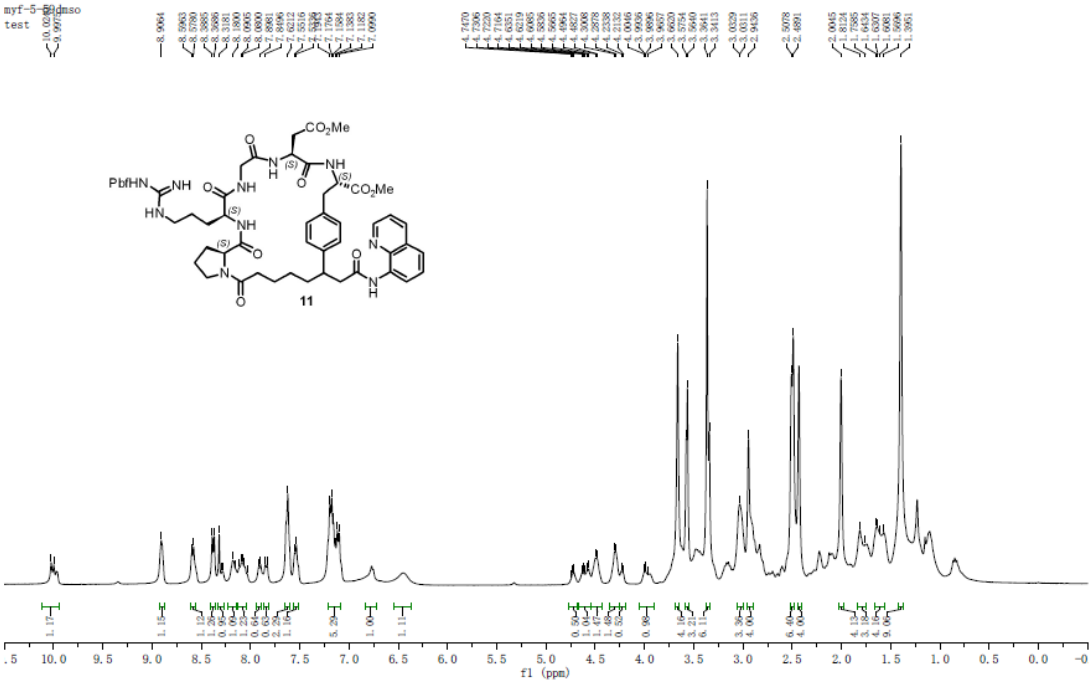
13-4

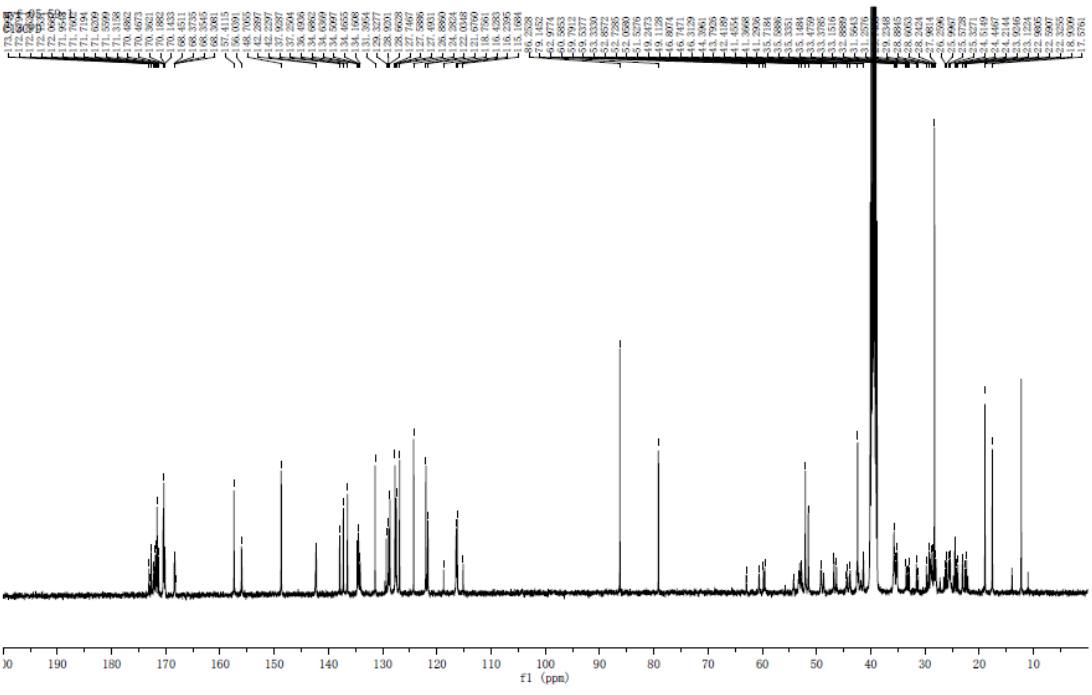


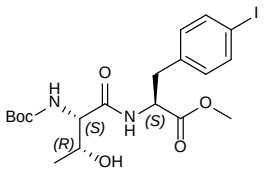



PbfHN
NH
HN
CO2Me
CO2Me
NH
NH
NH
NH
O
N
H
N

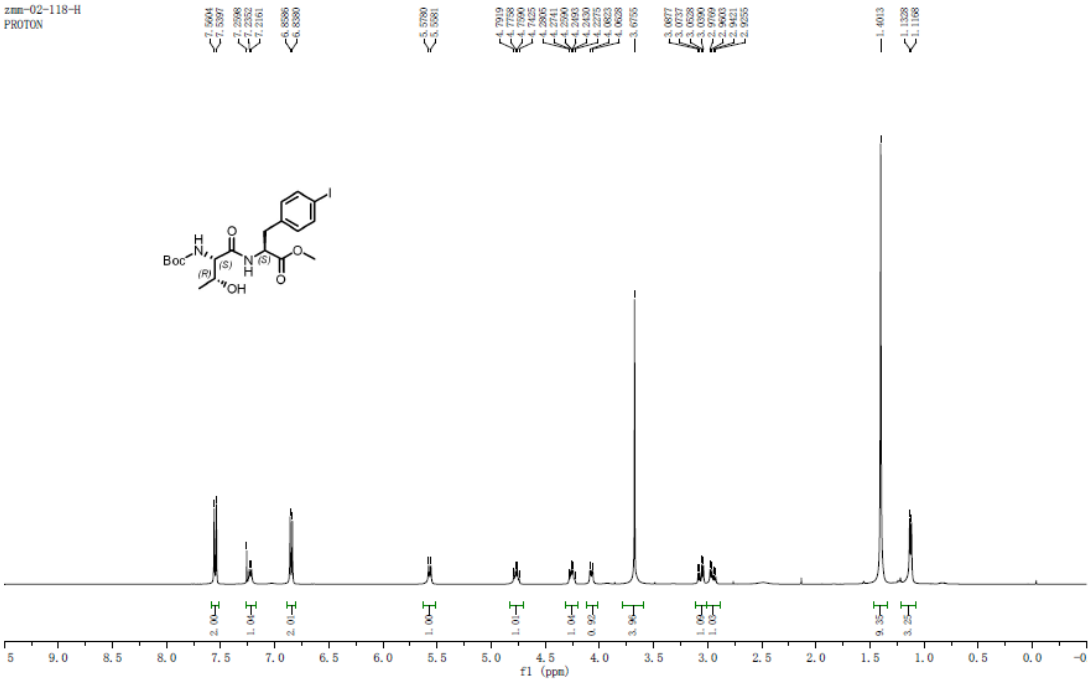
13

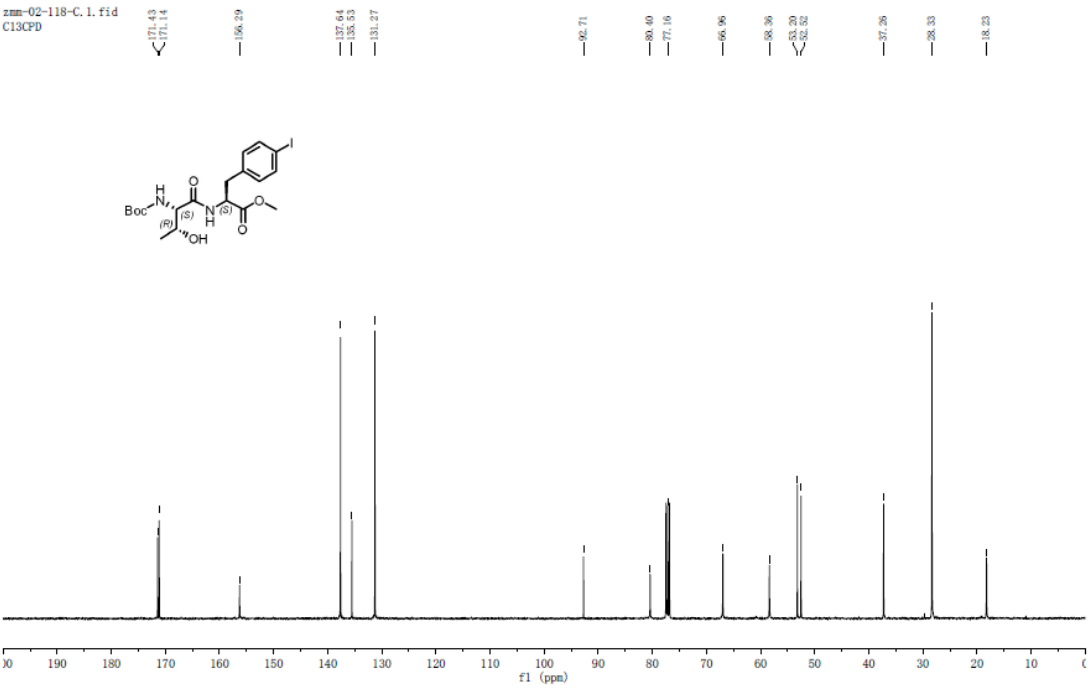

myf-5-DMSO
test
PbfHN
CO2Me
CO2Me
11
f1 (ppm)

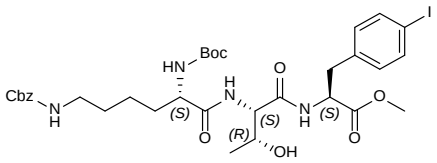

f1 (ppm)



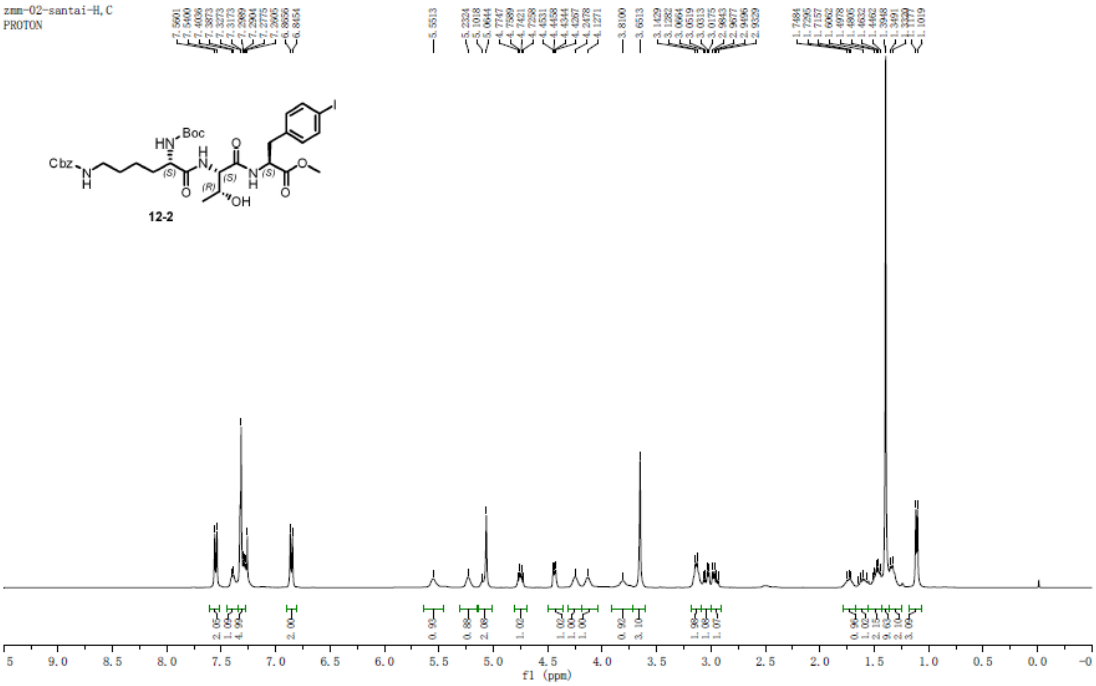
14-1



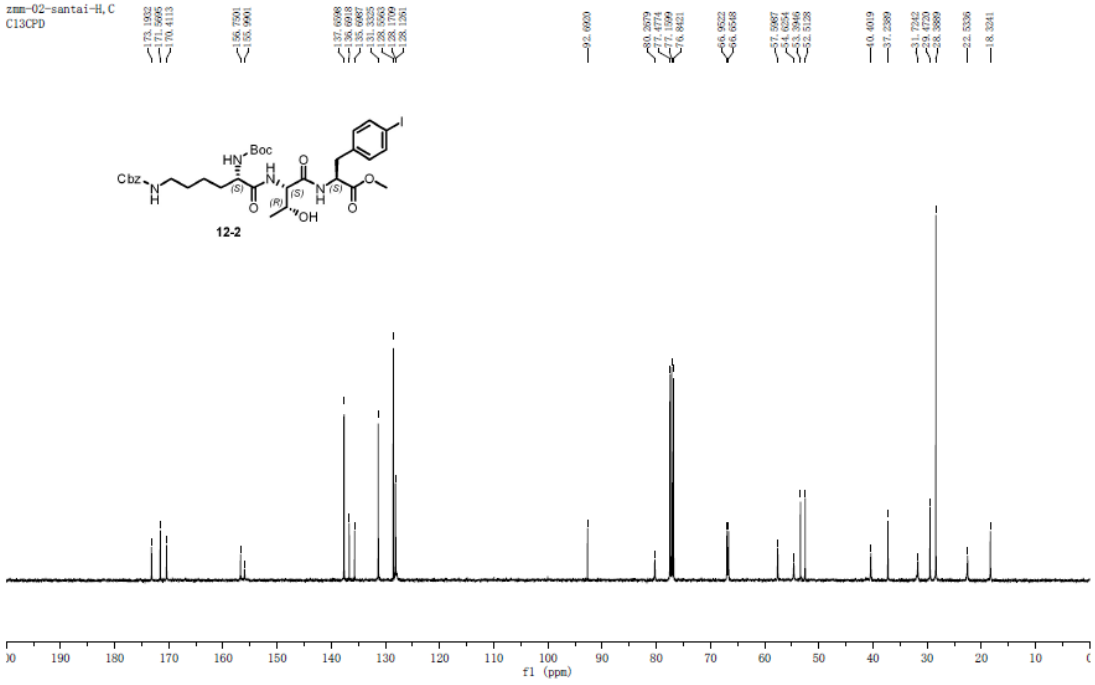



Cbz
HN
Boc
(S)
(R)
(S)
(S)
OH
I

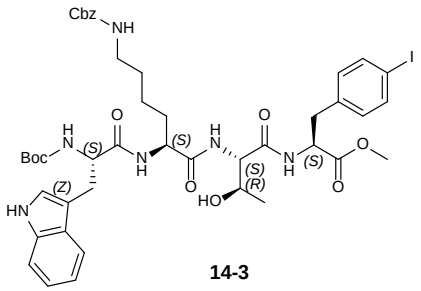
14-2


zmm-02-santai-H,C
PROTON
f1 (ppm)

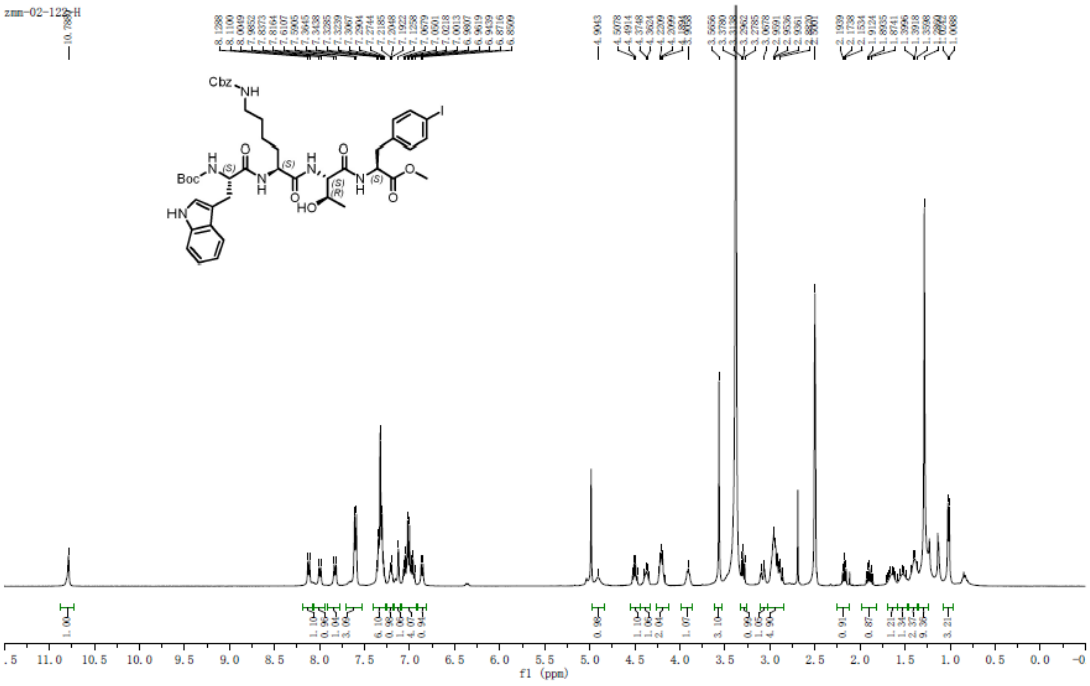
12-2

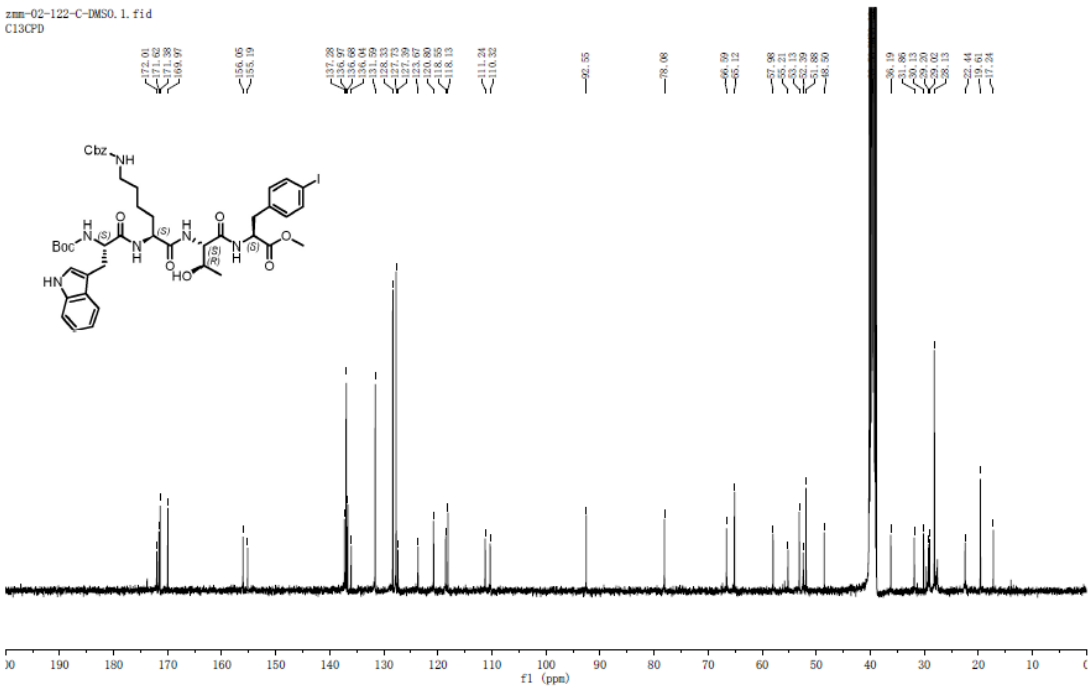

zmm-02-santai-H,C
C13CPD
f1 (ppm)

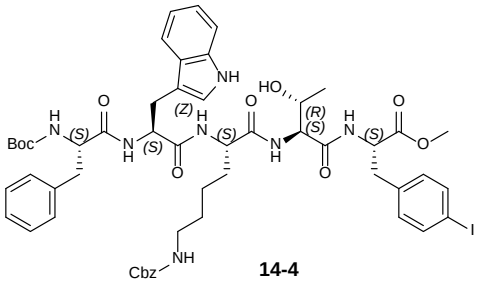
12-2



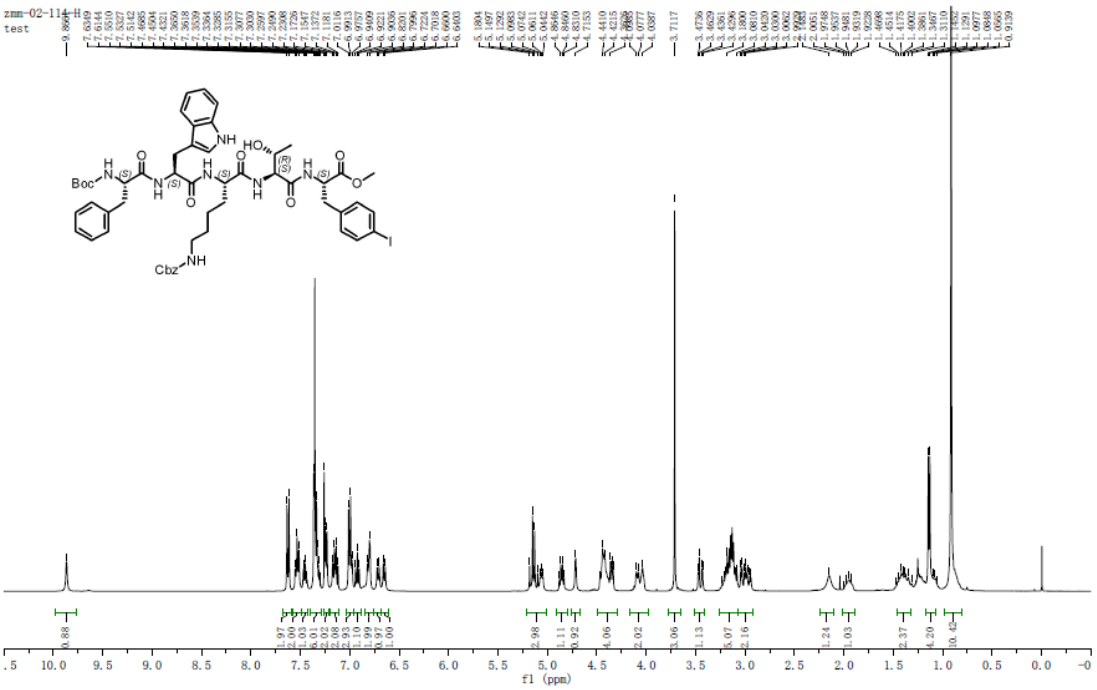
14-3

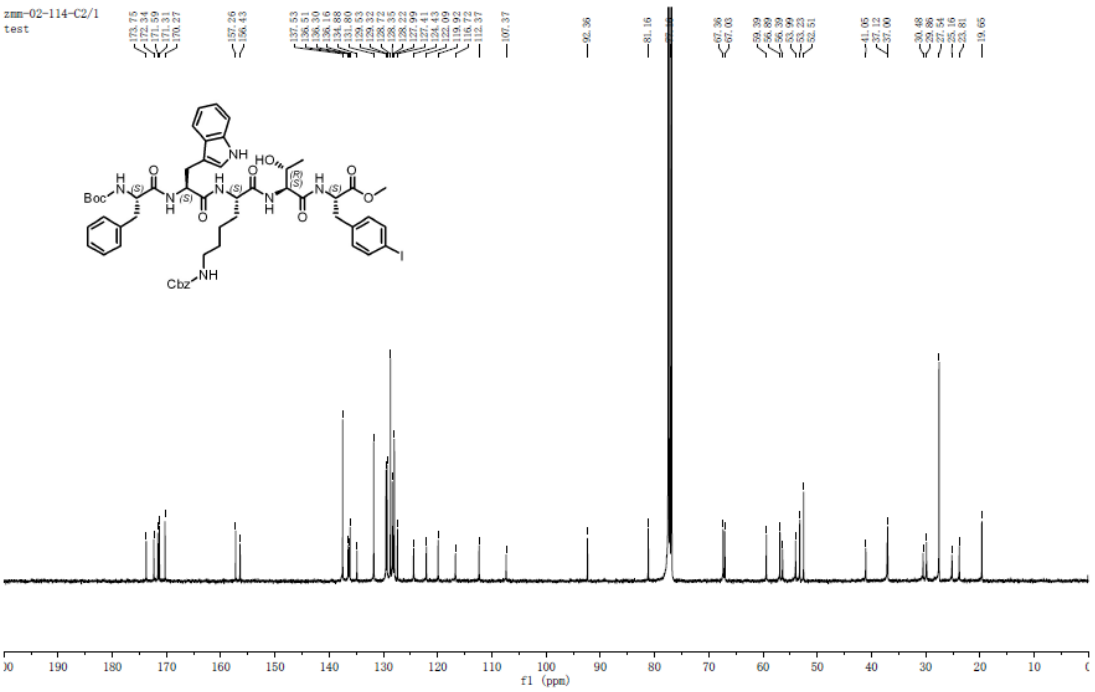


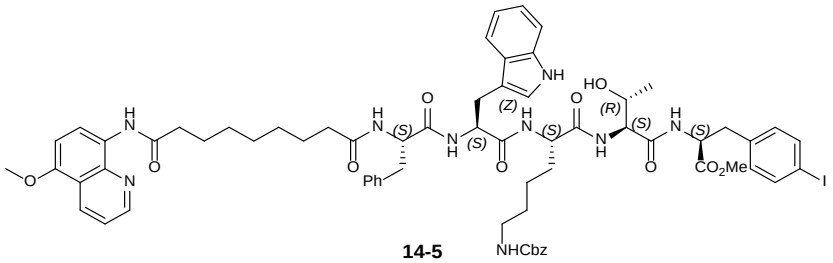




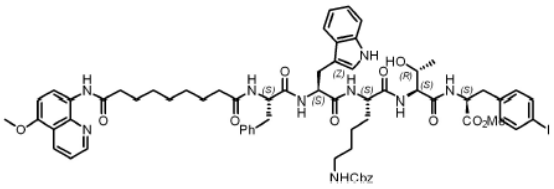
14-4

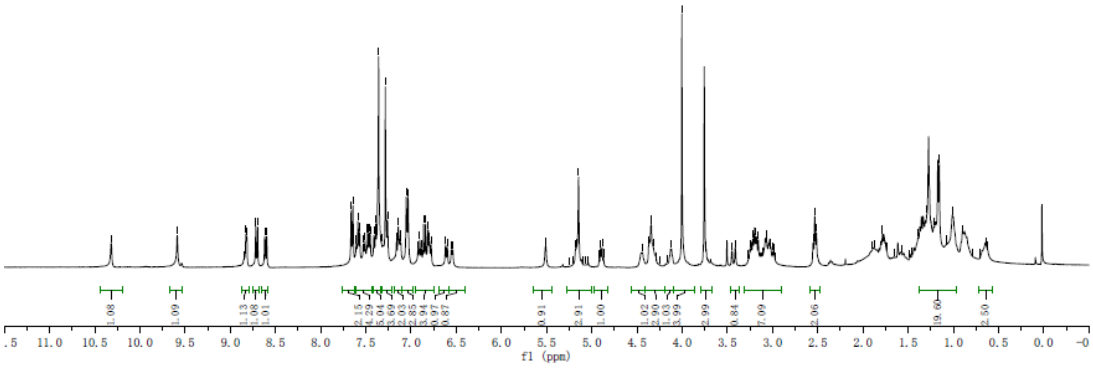


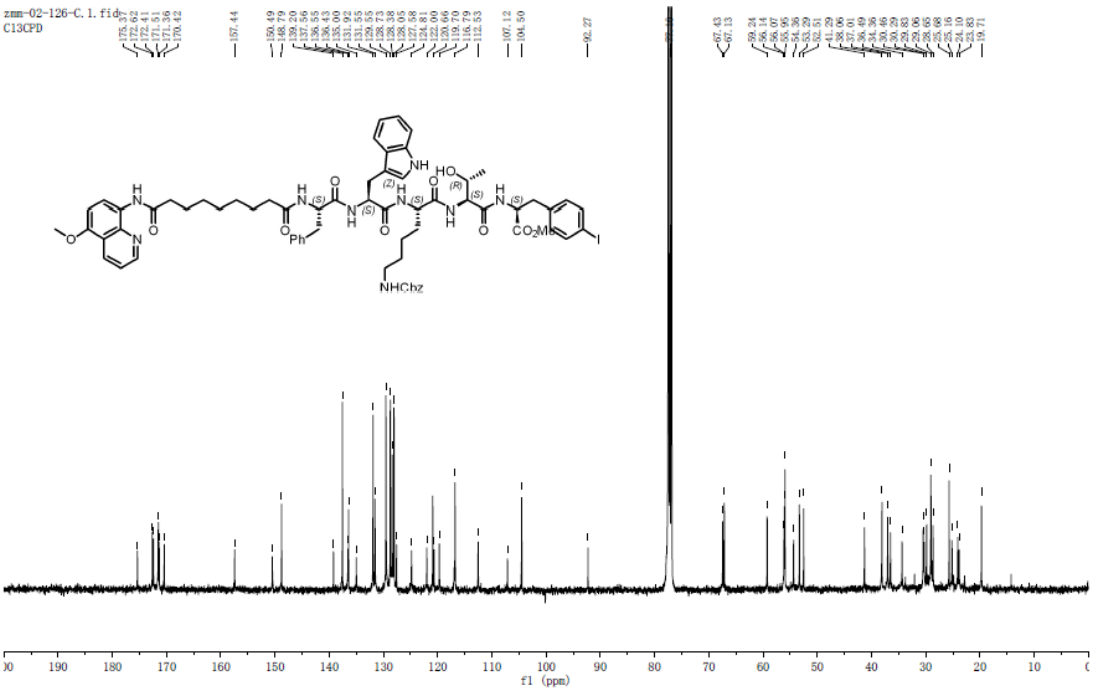


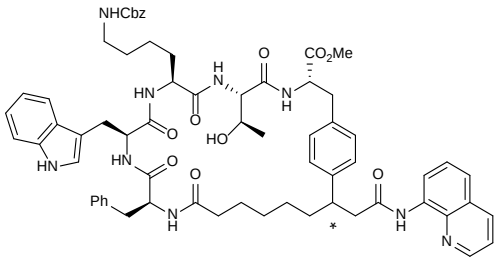


14-5

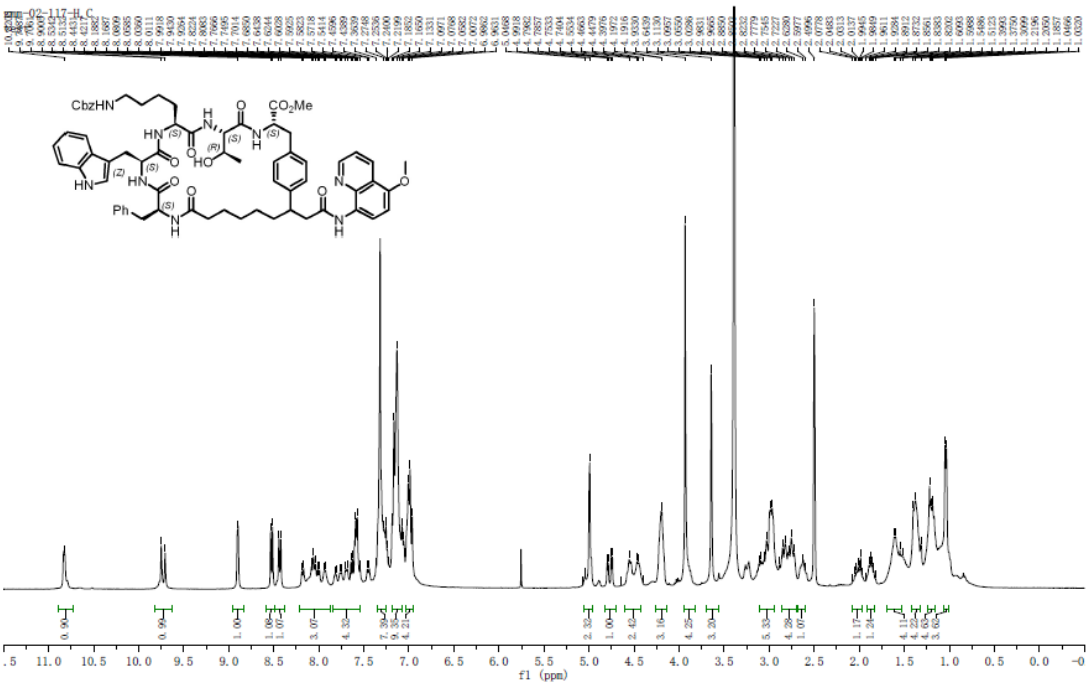


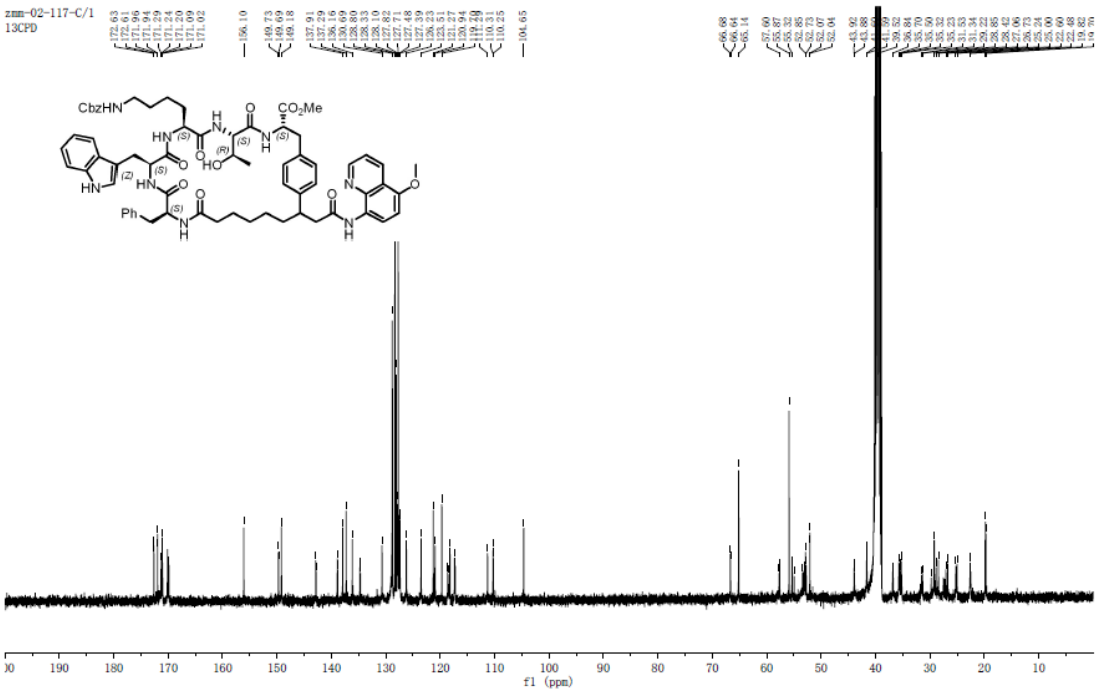


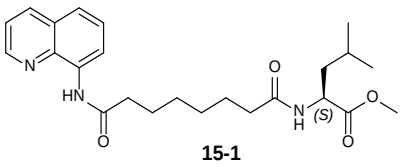



NHCbz
CO2Me
HN
HO
Ph
*

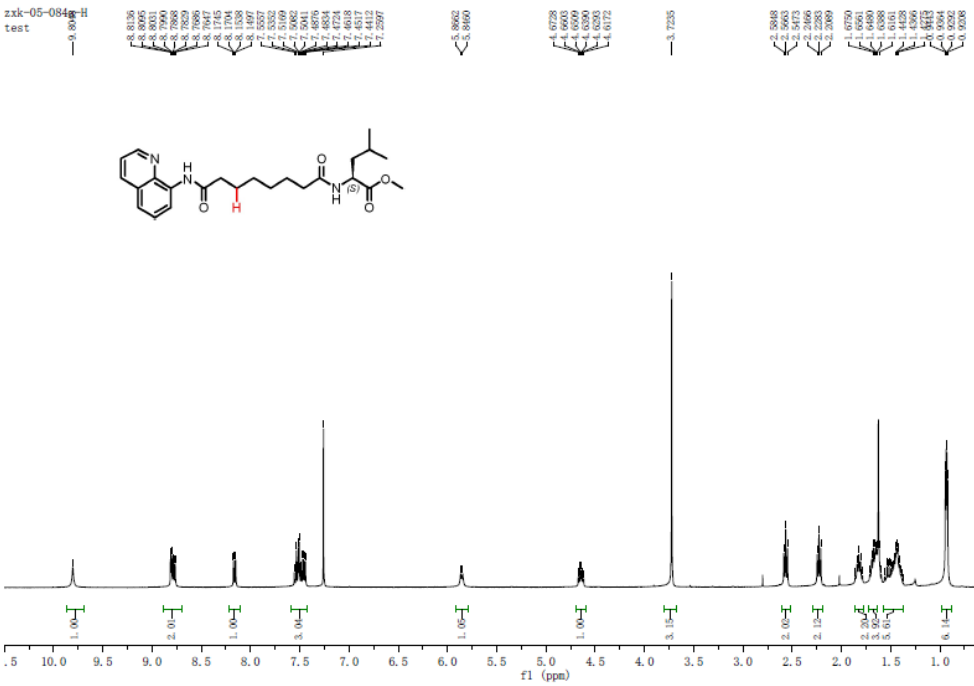
14

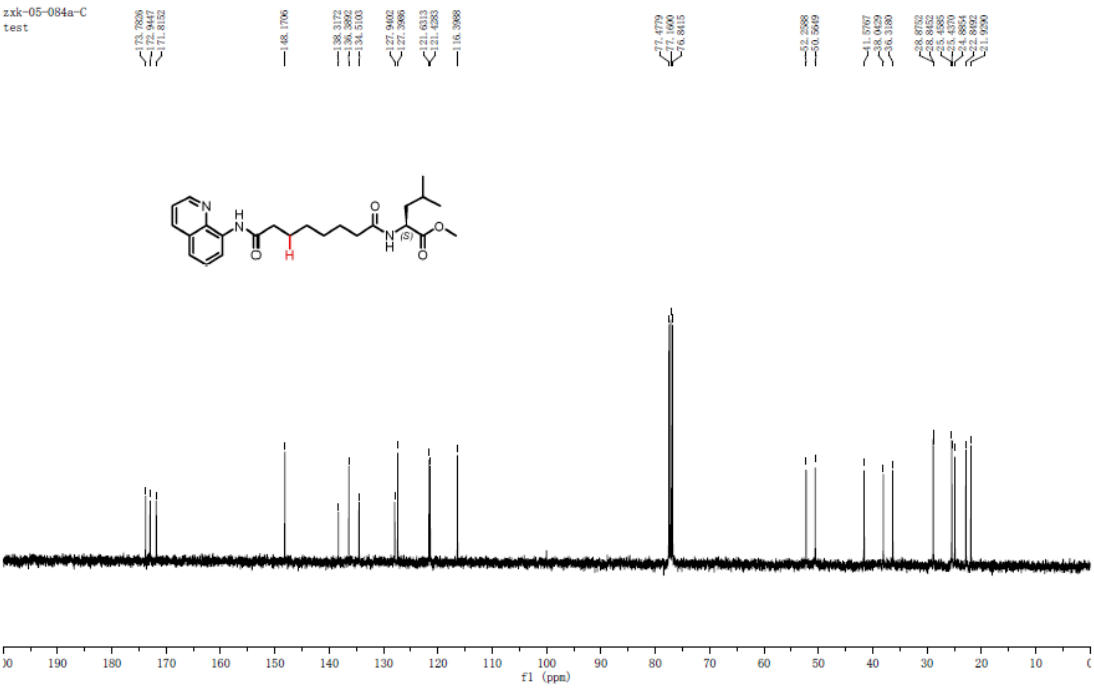

CbzHN
CO2Me
Ph
f1 (ppm)

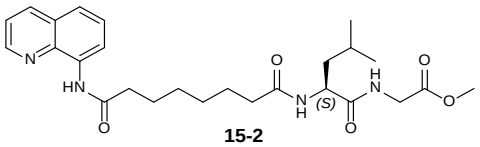

zmm-02-117-C/1
13CPD
CbzHN
CO2Me
Ph
f1 (ppm)



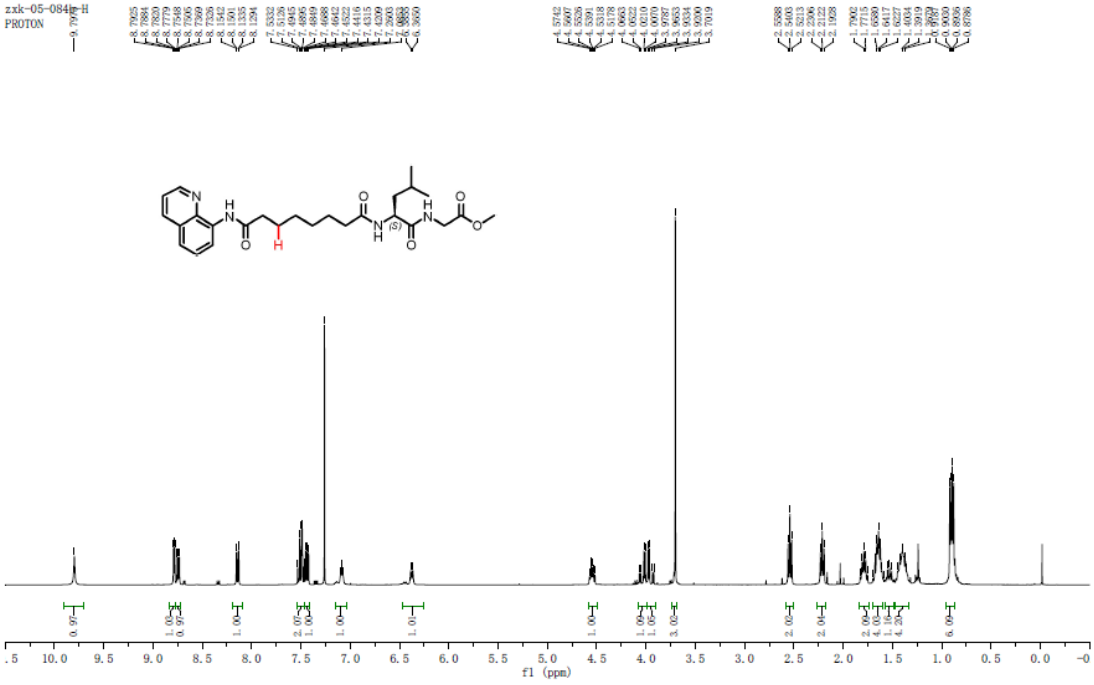
15-1

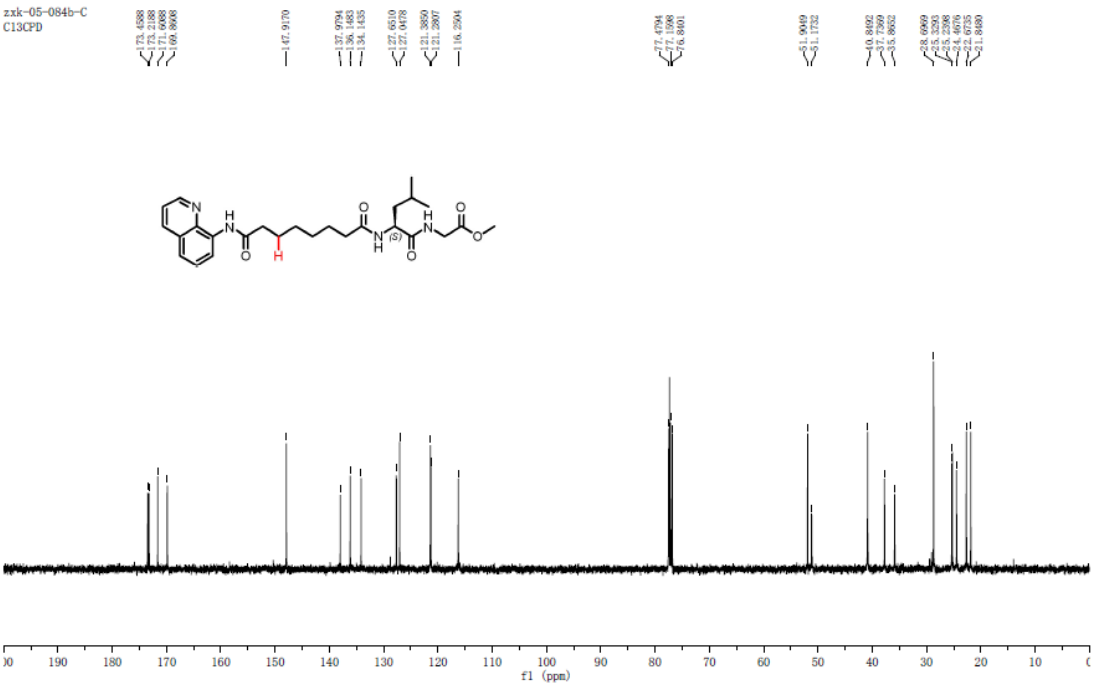


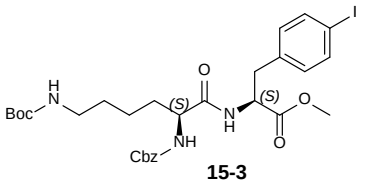




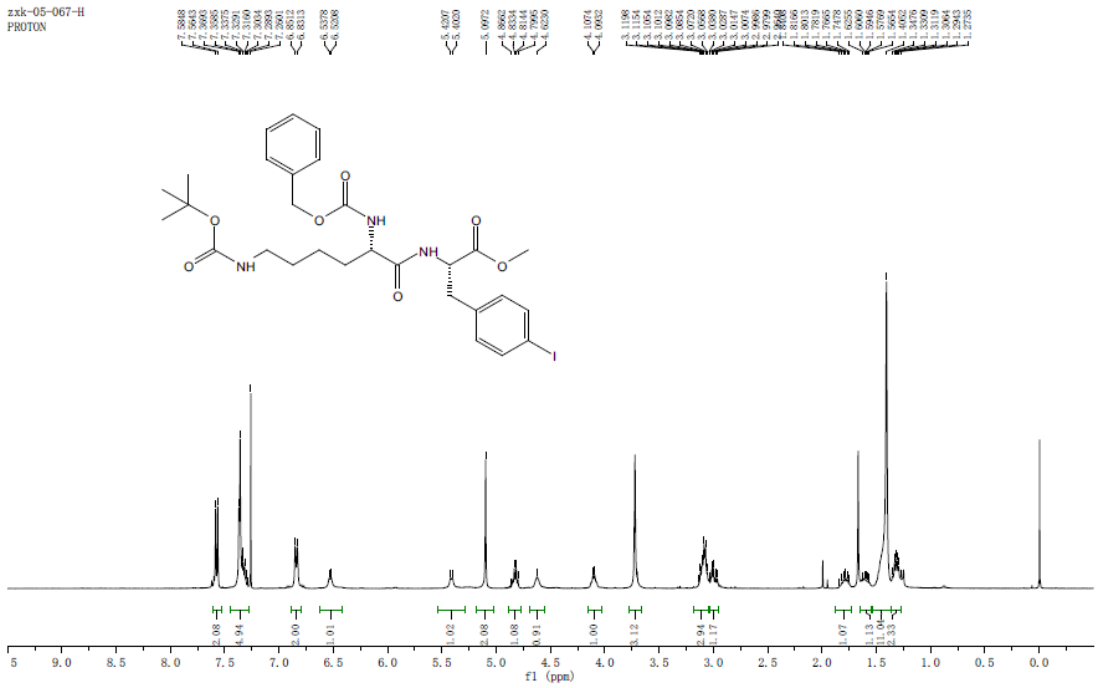
15-2

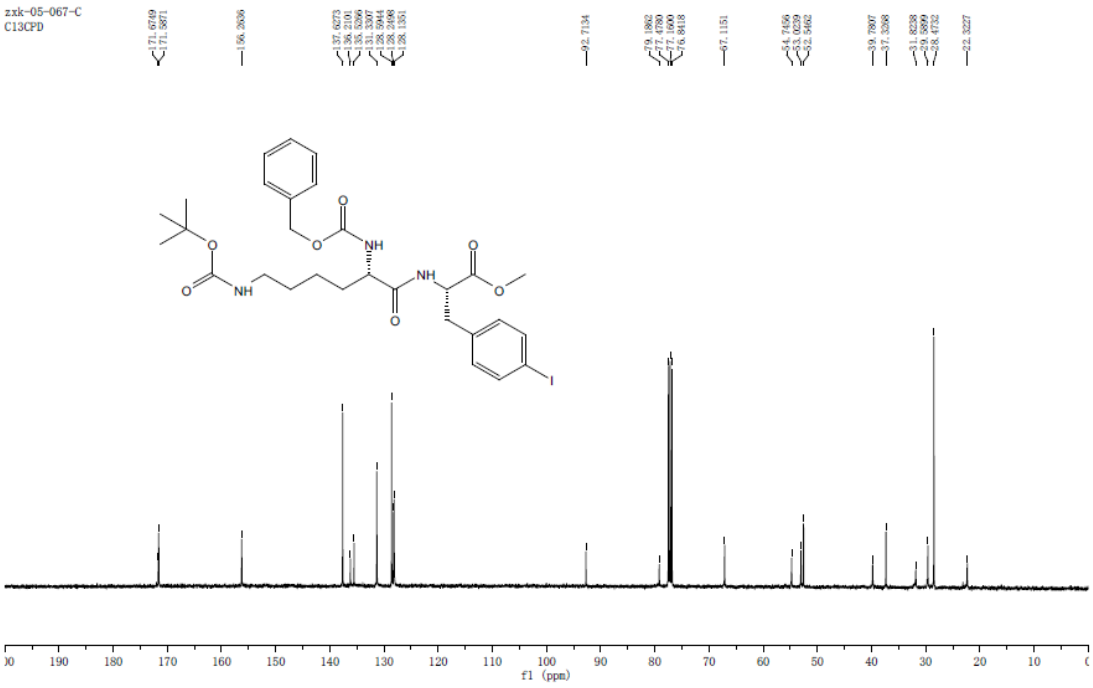


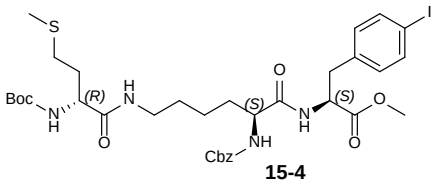




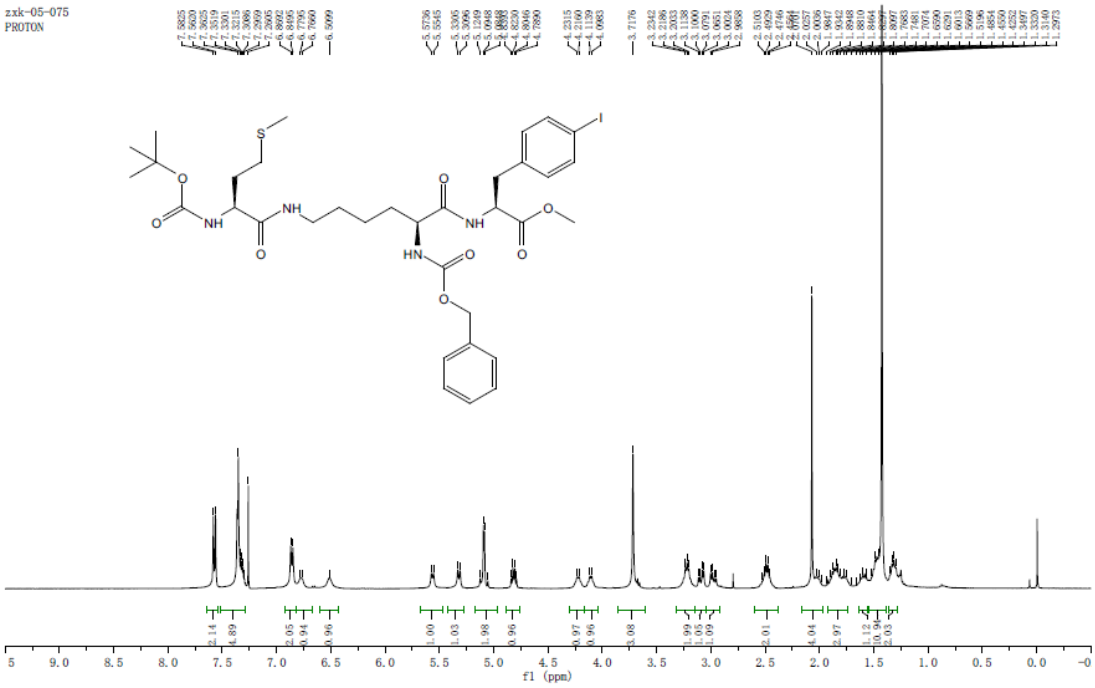
15-3

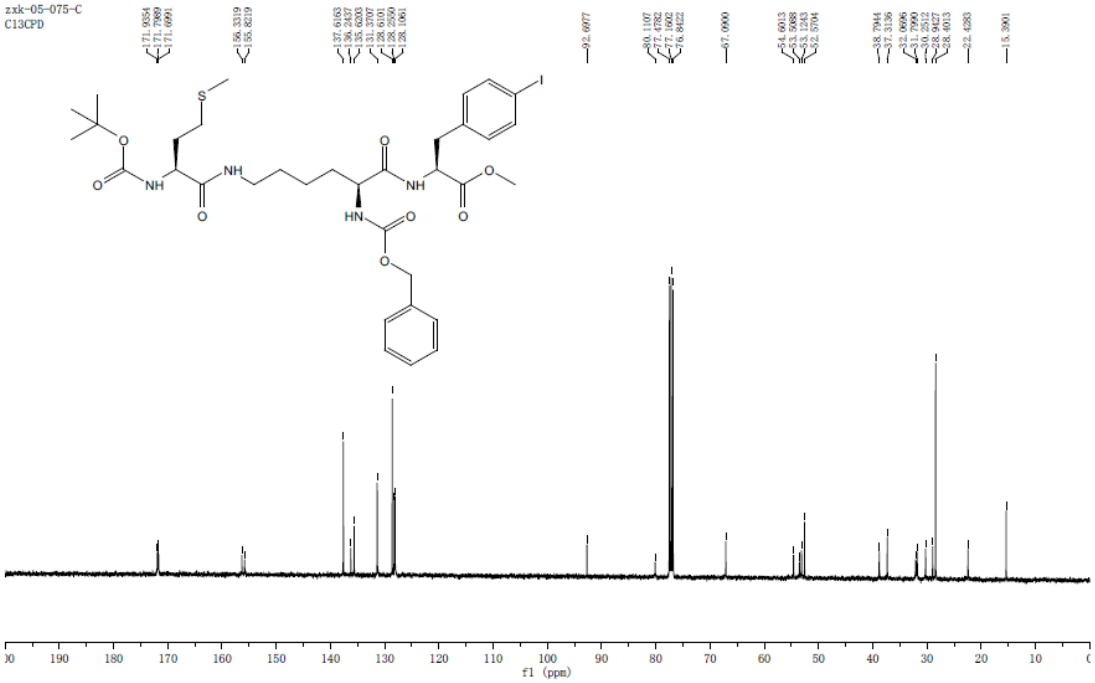


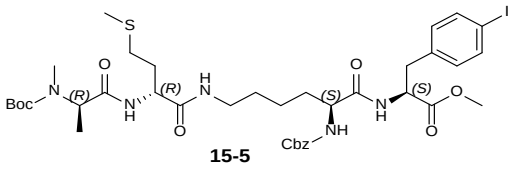



S
Boc
N
H
(R)
H
N
O
O
(S)
NH
Cbz
O
N
H
(S)
O
O
I

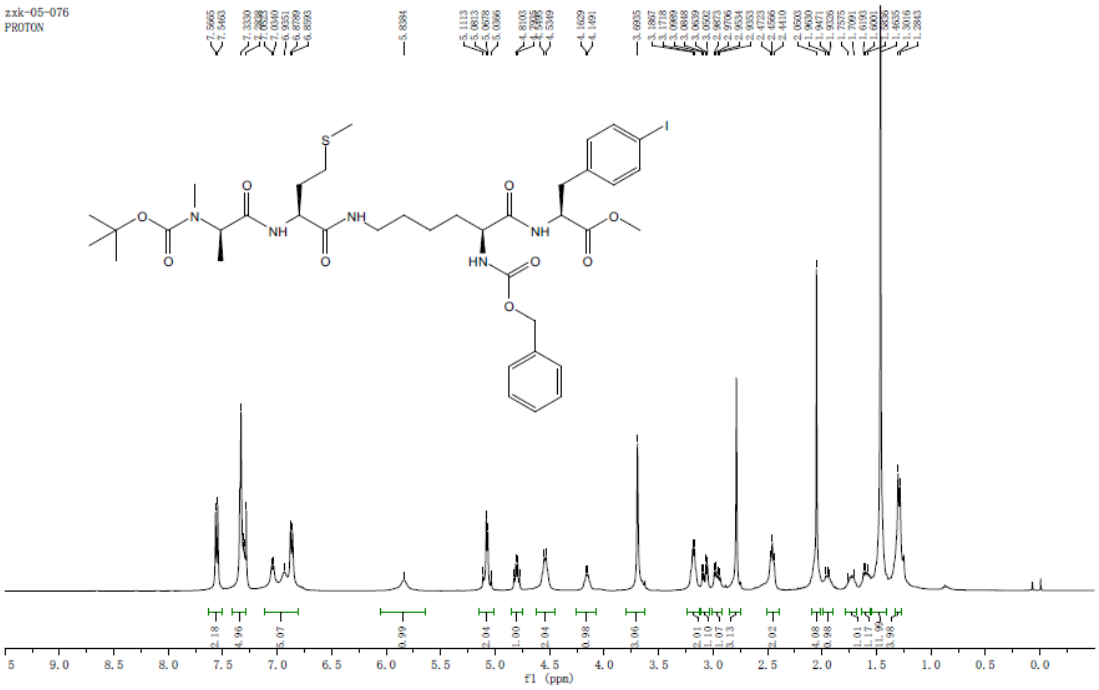
15-4

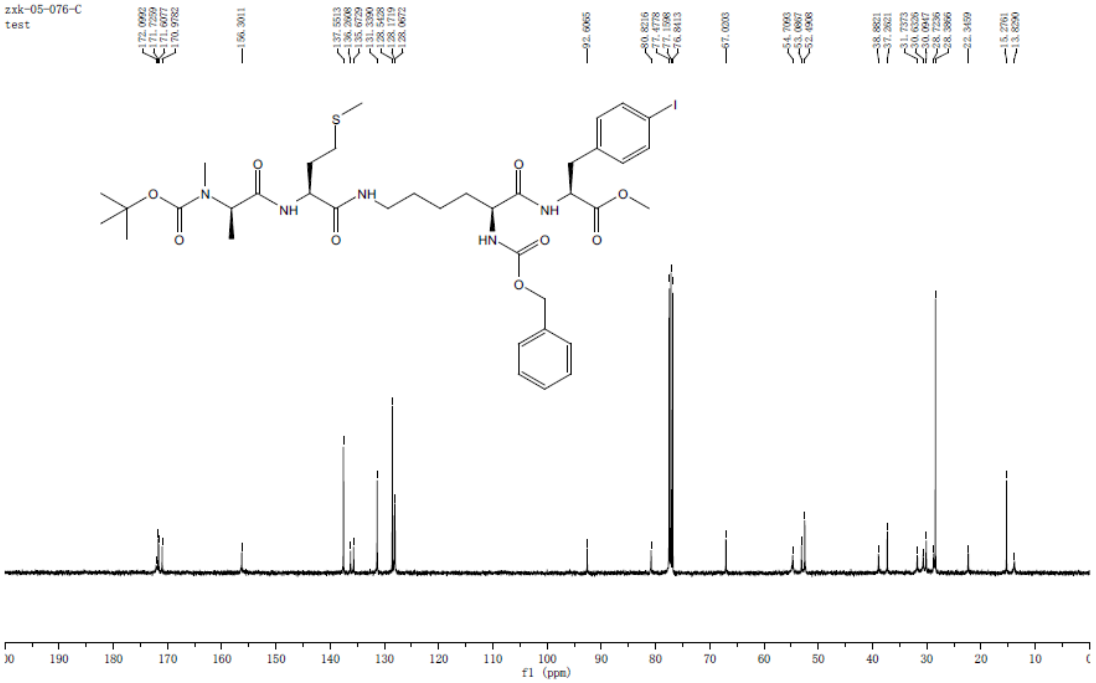

zxk-05-075
PROTON
f1 (ppm)

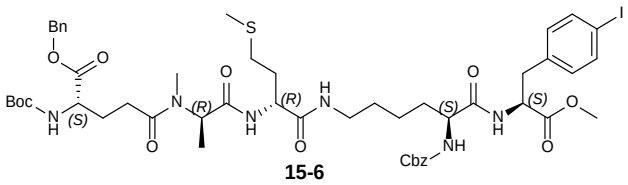

zxk-05-075-C
C13CPD
f1 (ppm)


Boc
N
(R)
O
N
H
(R)
O
H
N
S
(S)
O
N
H
(S)
O
O
I
Cbz
NH

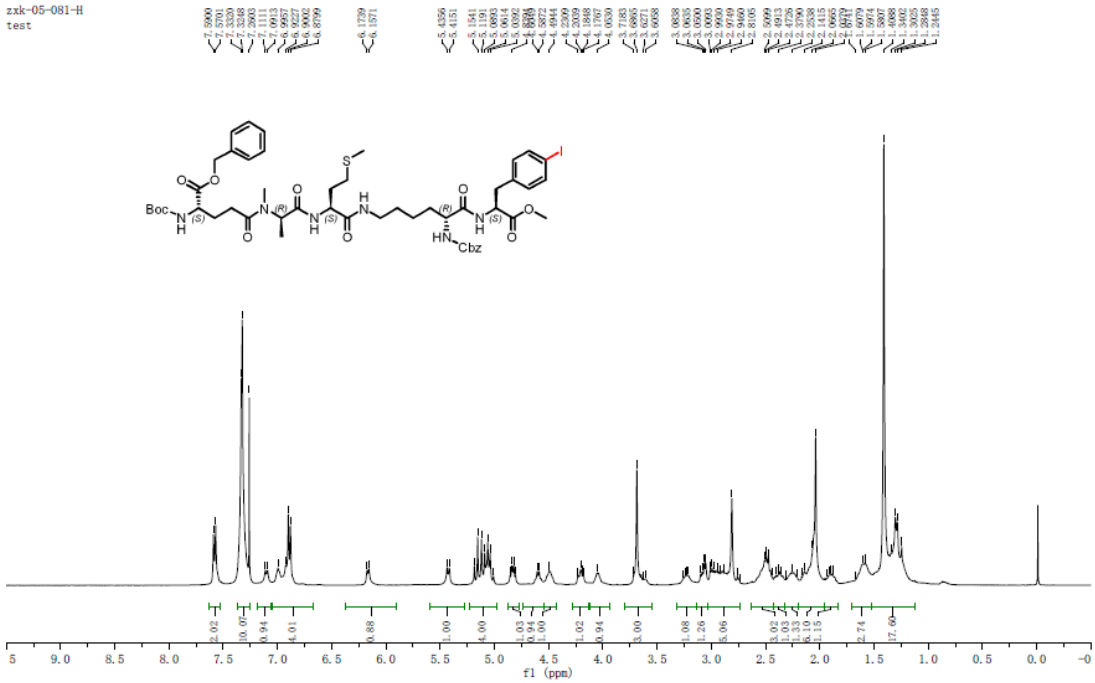
15-5

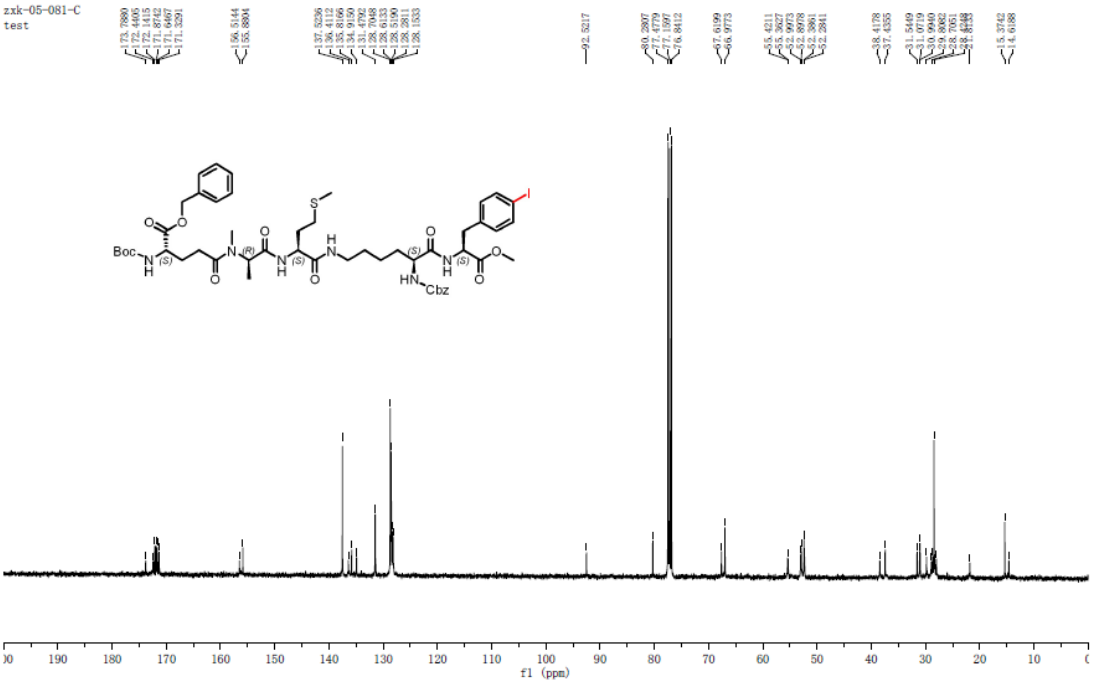

zxk-05-076
PROTON
f1 (ppm)

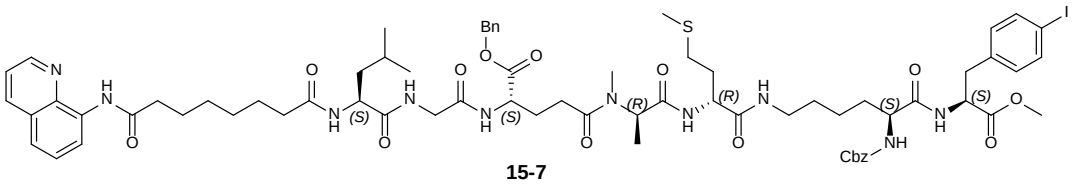

zxk-05-076-C
test
f1 (ppm)



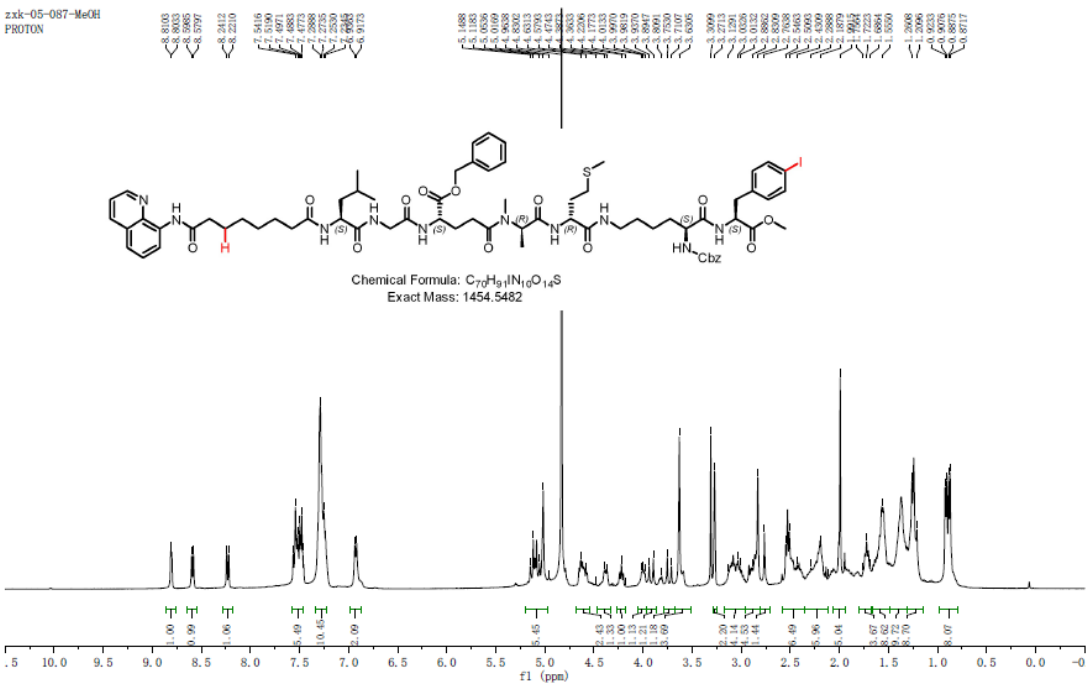
15-6

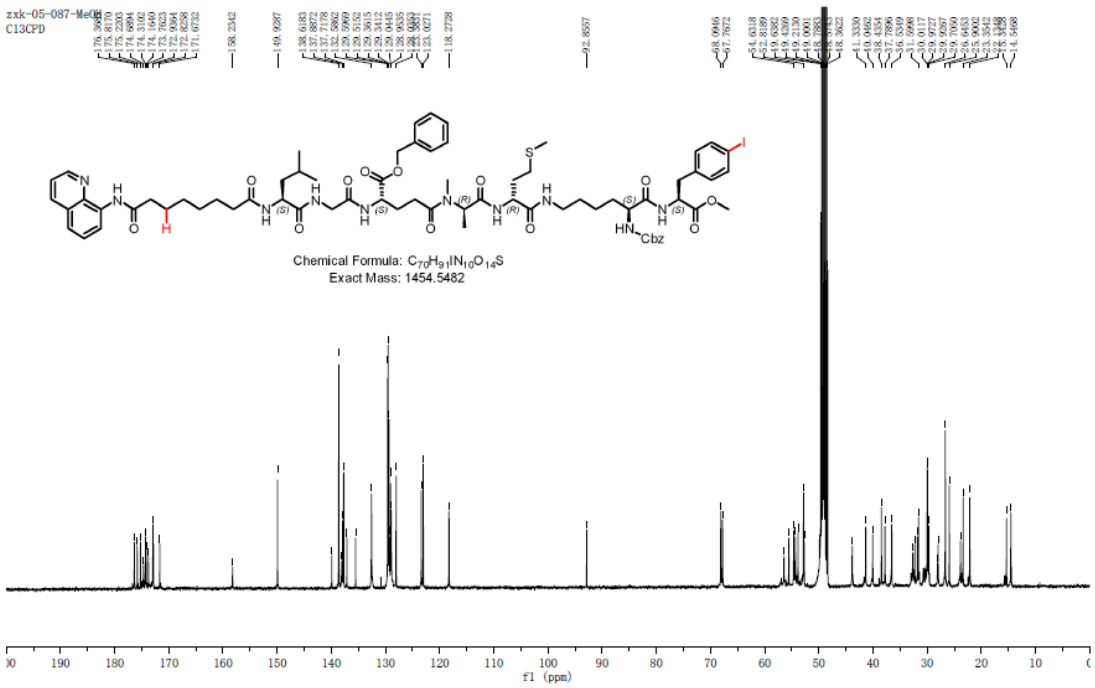


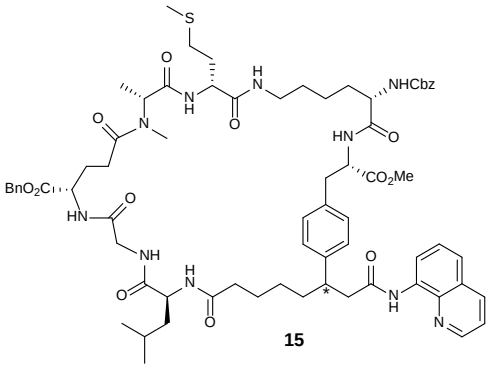




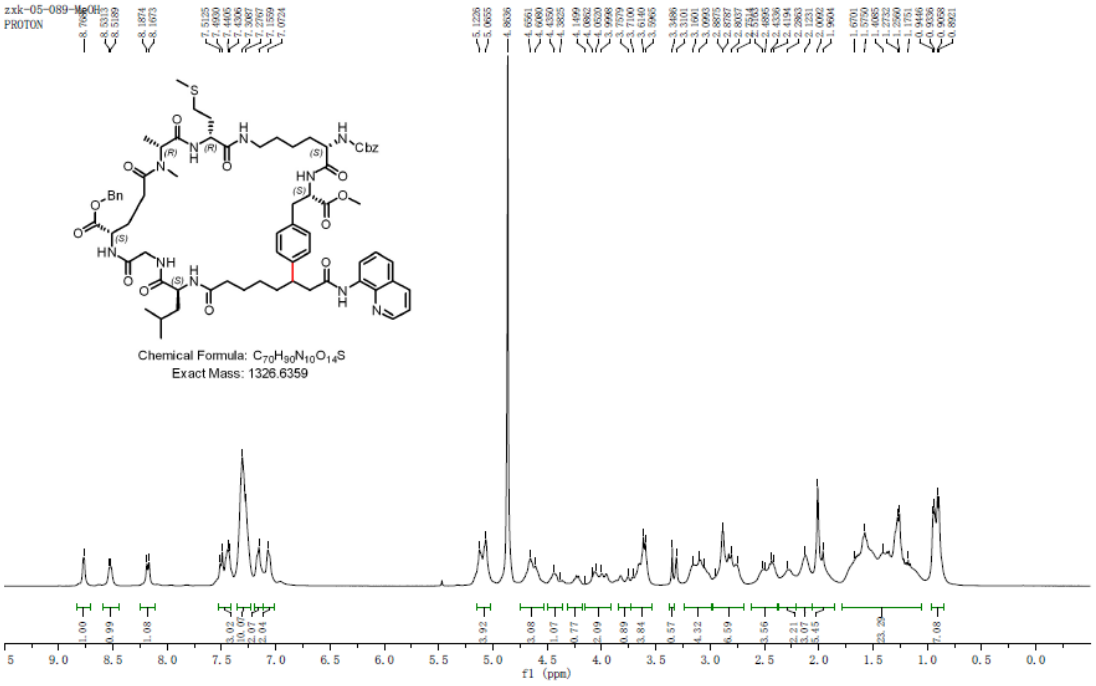
15-7

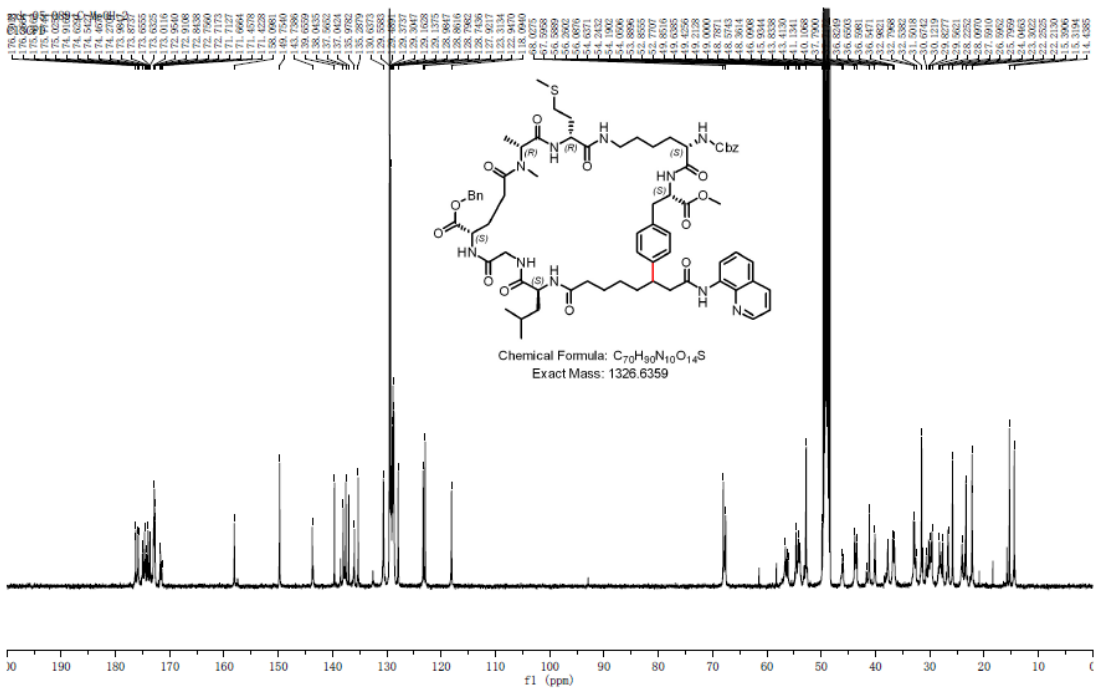

zxk-05-087-MeOH
PROTON
Chemical Formula: C70H91IN10O14S
Exact Mass: 1454.5482
f1 (ppm)

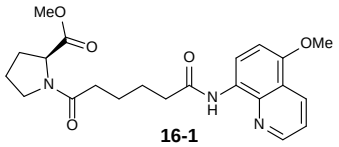

C13CPD
Chemical Formula: C70H91IN10O14S
Exact Mass: 1454.5482
f1 (ppm)



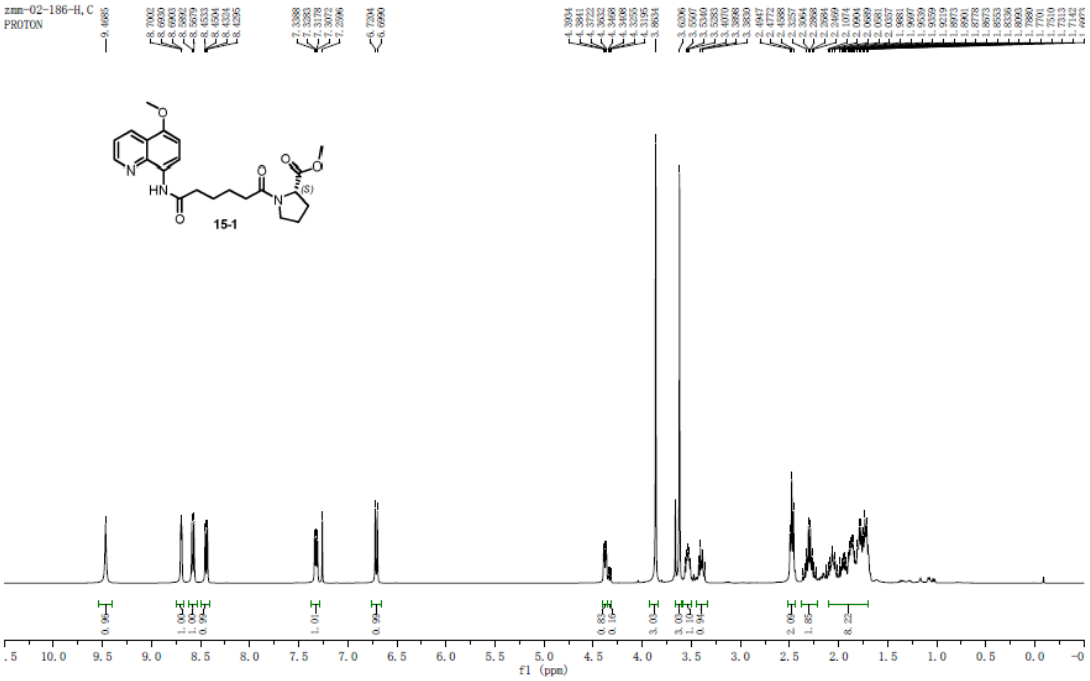
15


zxk-05-089-MeOH
PROTON
Chemical Formula: C70H90N10O14S
Exact Mass: 1326.6359
f1 (ppm)


Chemical Formula: C70H90N10O14S
Exact Mass: 1326.6359
f1 (ppm)

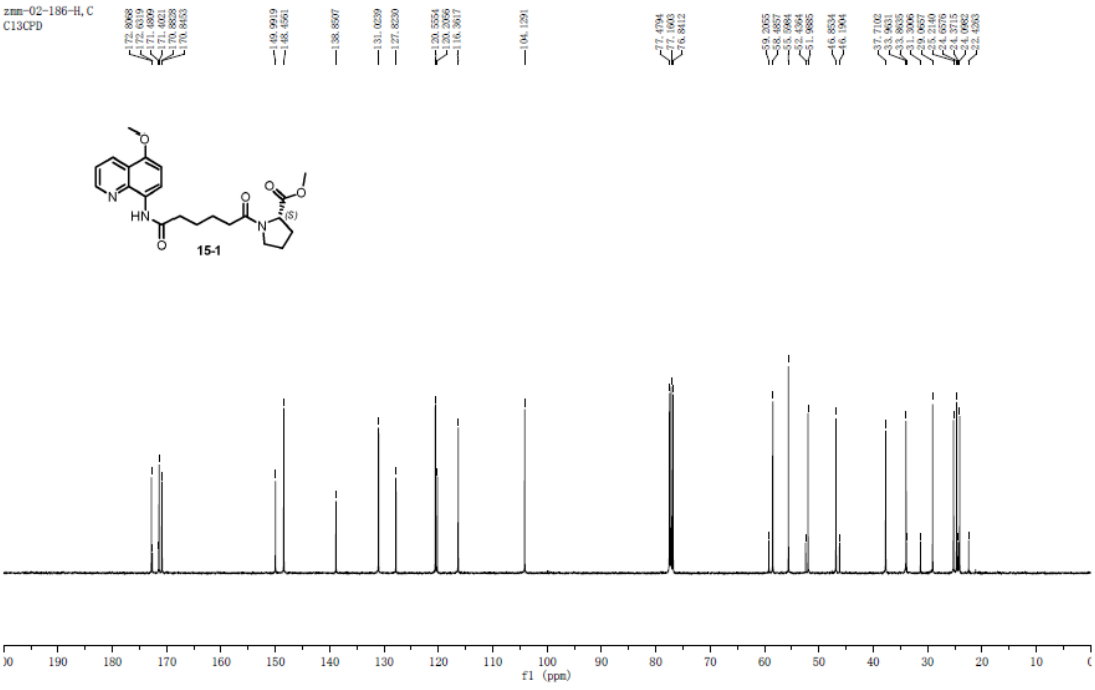

MeO
O
N
O
O
N
H
OMe
N

16-1


zmm-02-186-H, C
PROTON
f1 (ppm)

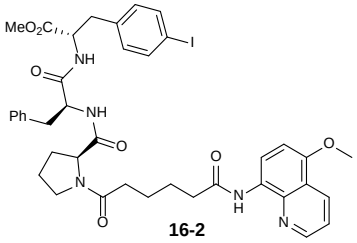
O
N
HN
O
O
O
O
N
(S)

15-1

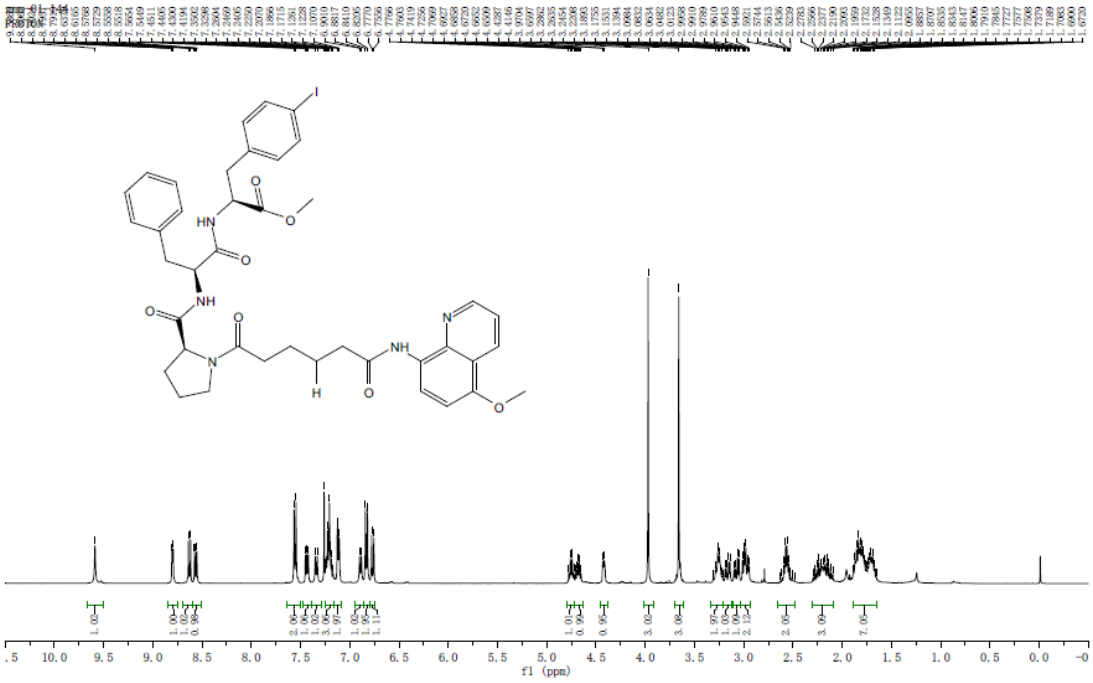

zmm-02-186-H, C
C13CPD
f1 (ppm)

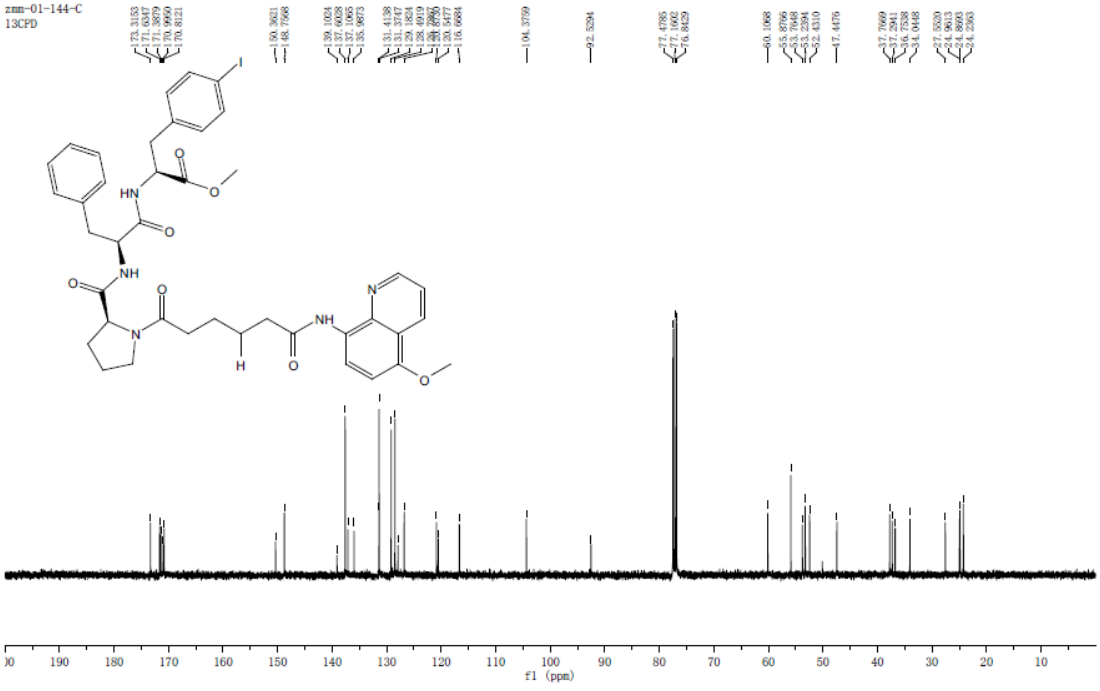
O
N
HN
O
O
O
O
N
(S)

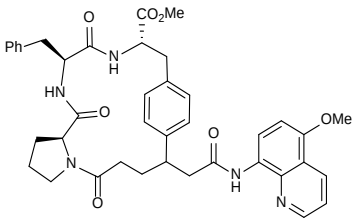
15-1



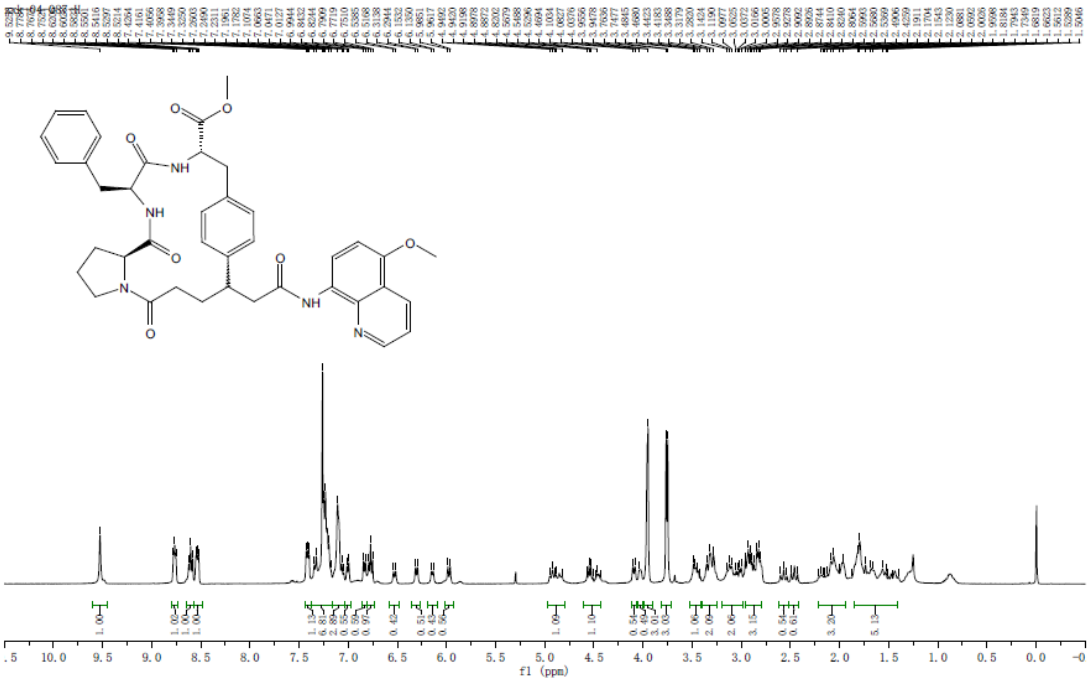
16-2

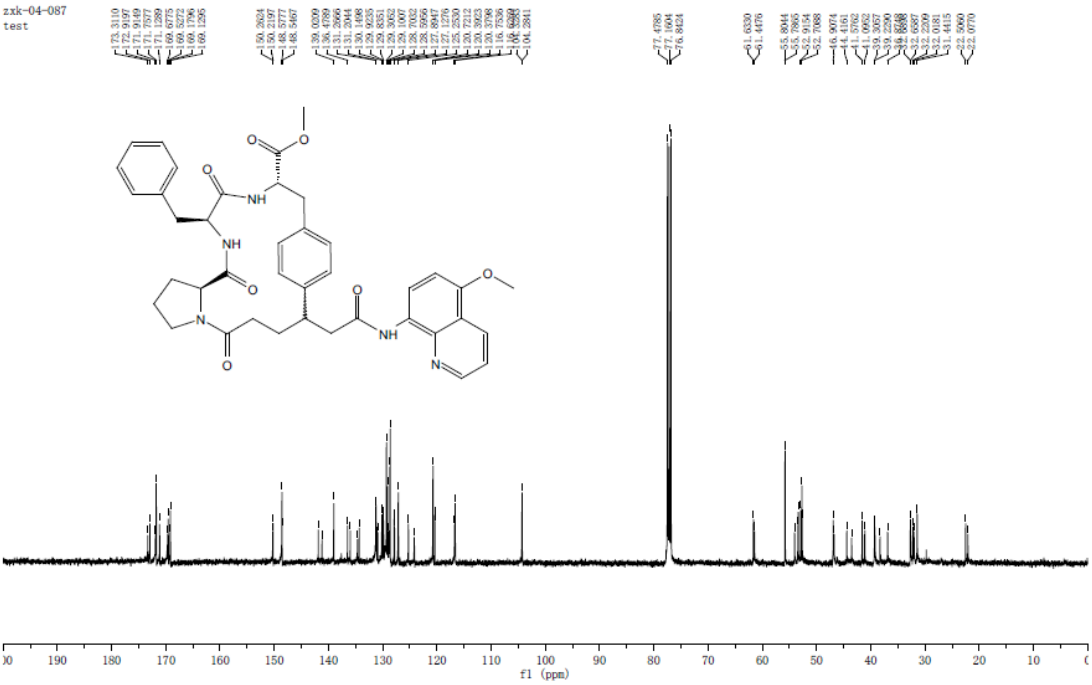


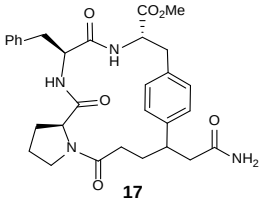




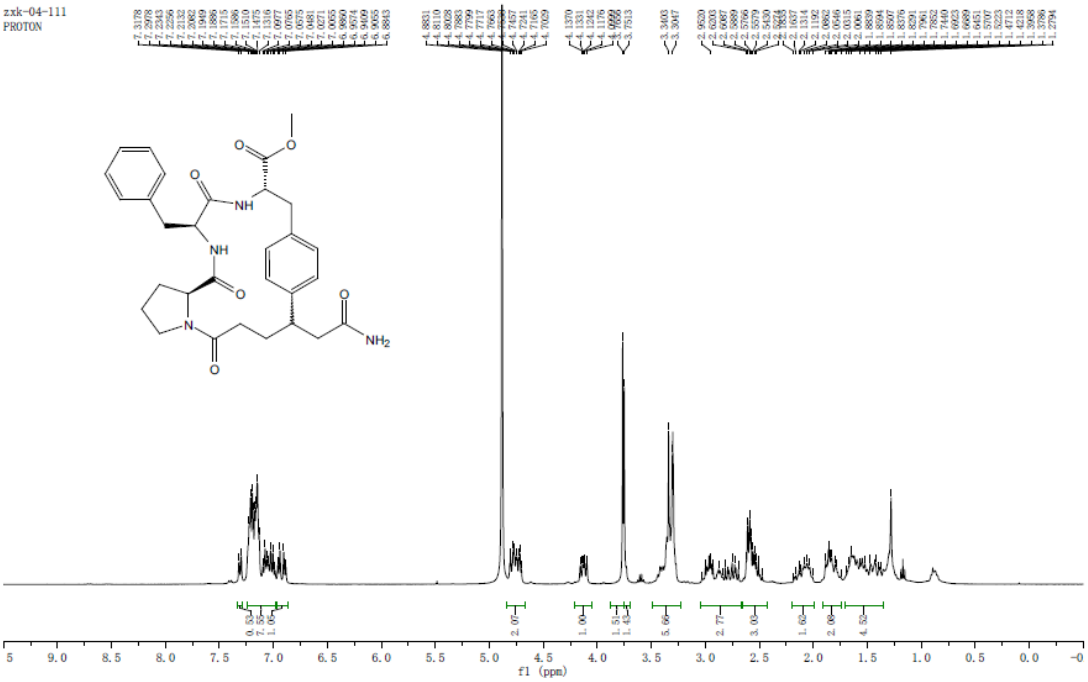
16

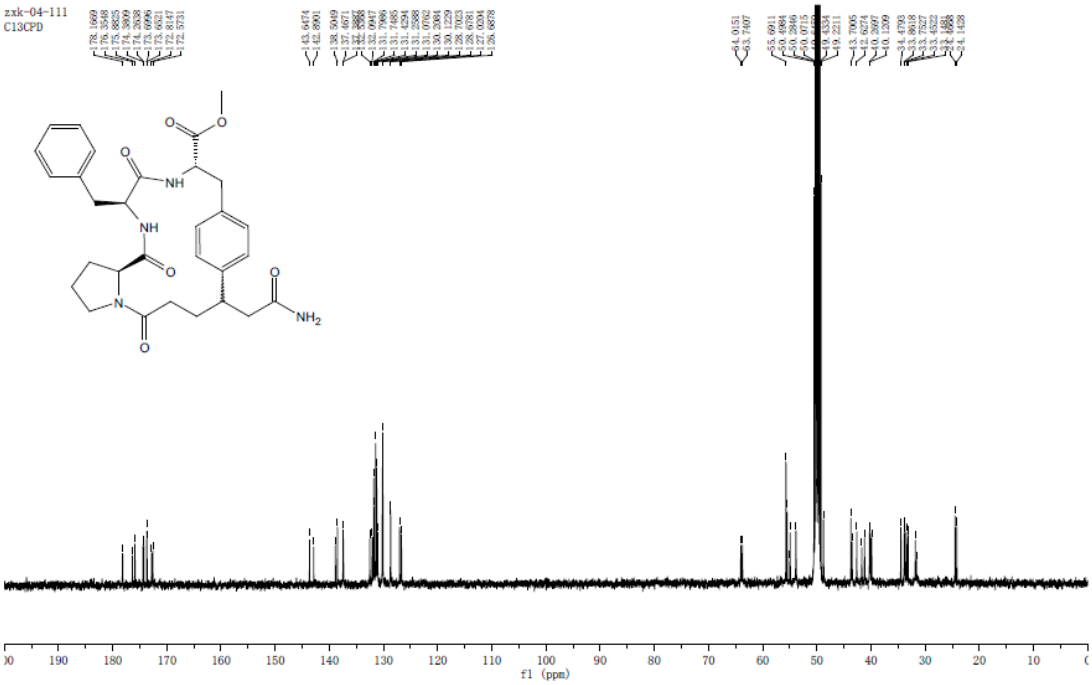


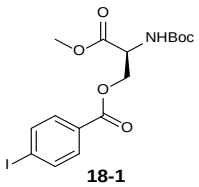



Ph
O
CO2Me
N
H
HN
O
O
N
O
O
NH2

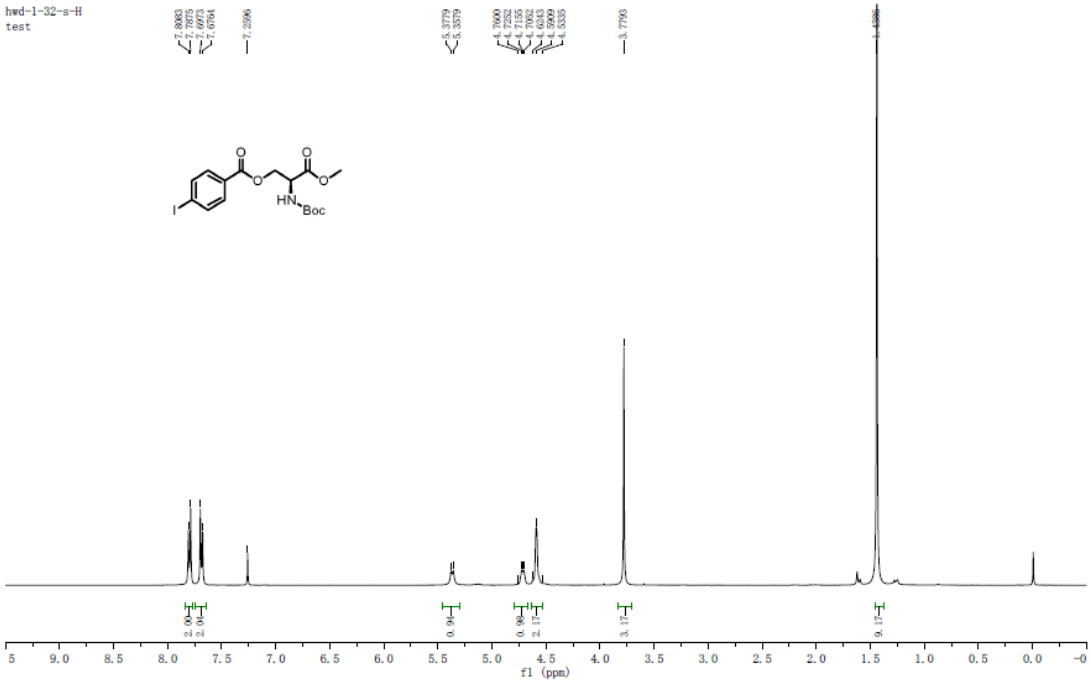
17

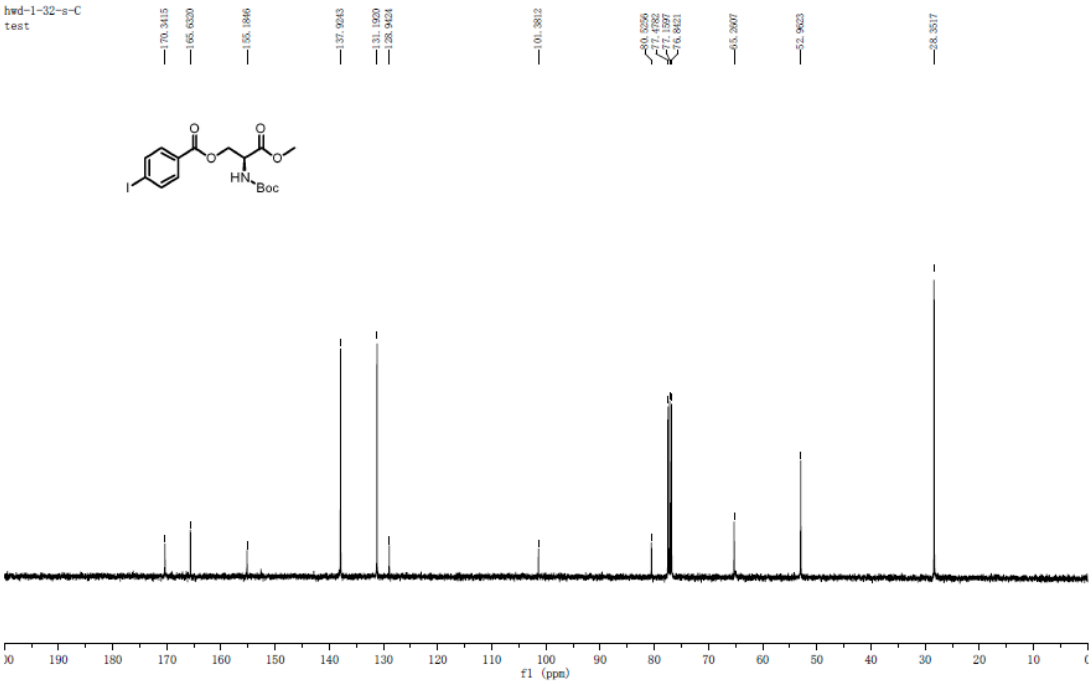

zxk-04-111
PROTON
f1 (ppm)

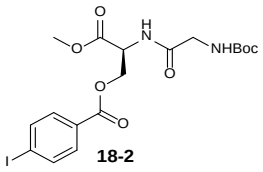

zxk-04-111
C13CPD
f1 (ppm)


O
NHBoc
O
O
O
I

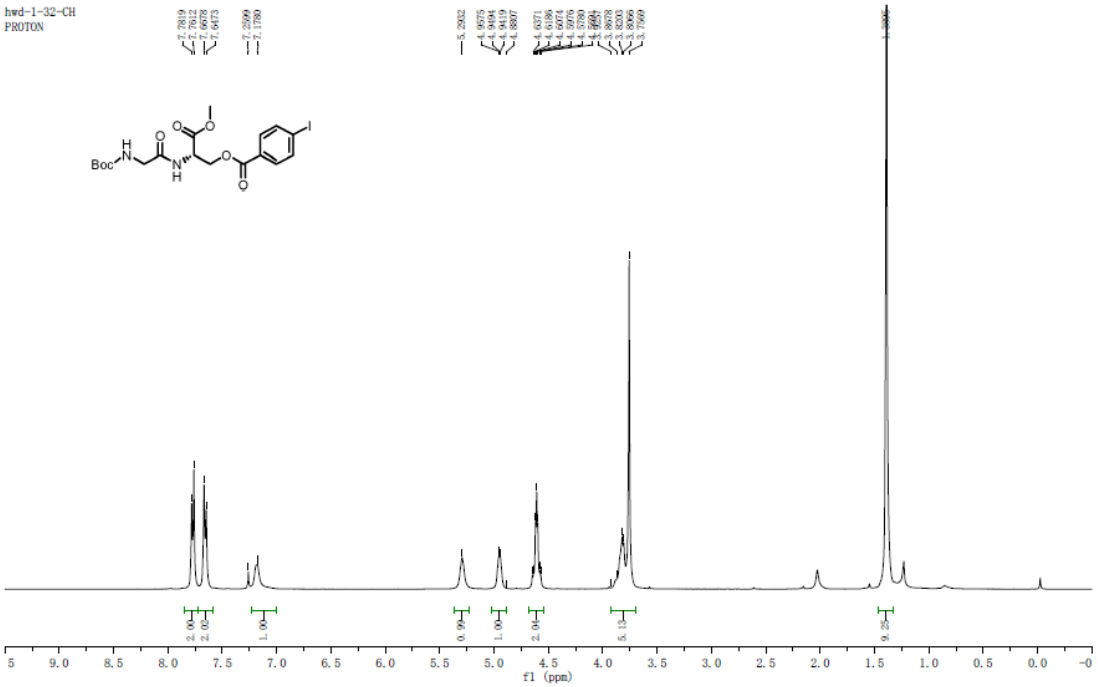
18-1

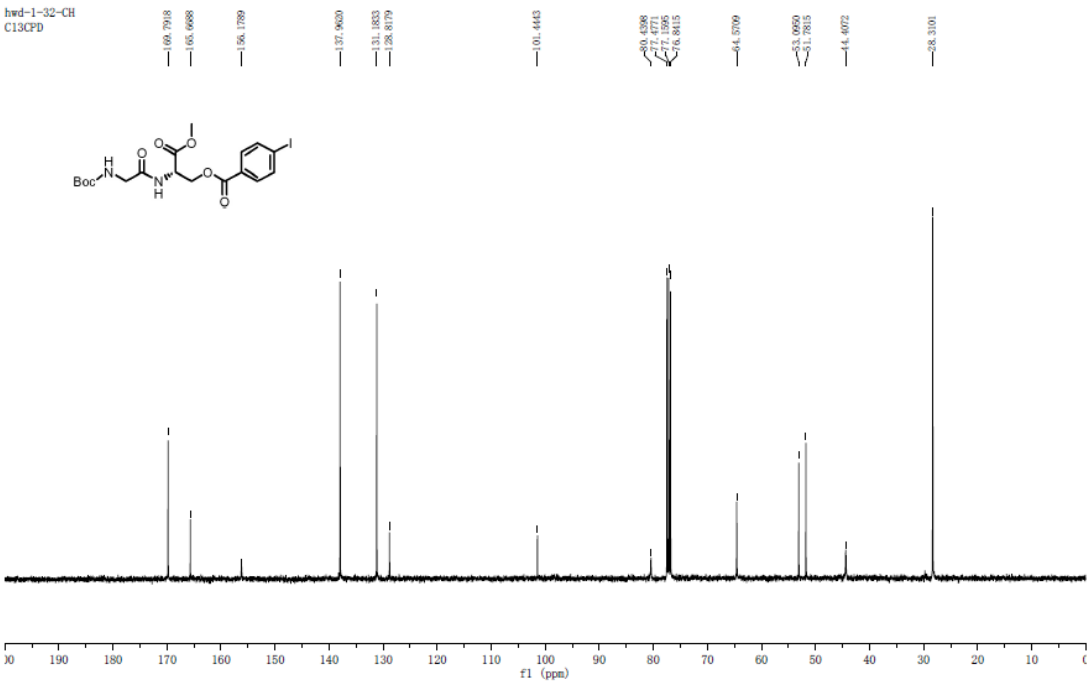

hwd-1-32-s-H
test
7.8083
7.7875
7.6973
7.6764
7.2996
5.3779
5.3579
4.7600
4.7252
4.7155
4.7052
4.6243
4.5909
4.5335
3.7793
1.4386
HN
Boc
I
2.00
2.00
0.94
0.98
2.17
3.17
9.17
5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

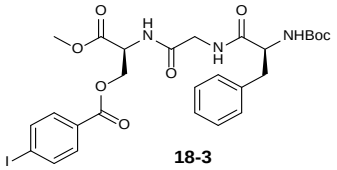

hwd-1-32-s-C
test
170.3415
165.6320
155.1846
137.9043
131.1920
128.9424
101.3812
80.9256
77.4782
77.1597
76.8421
65.2607
52.9623
28.3517
HN
Boc
I
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)



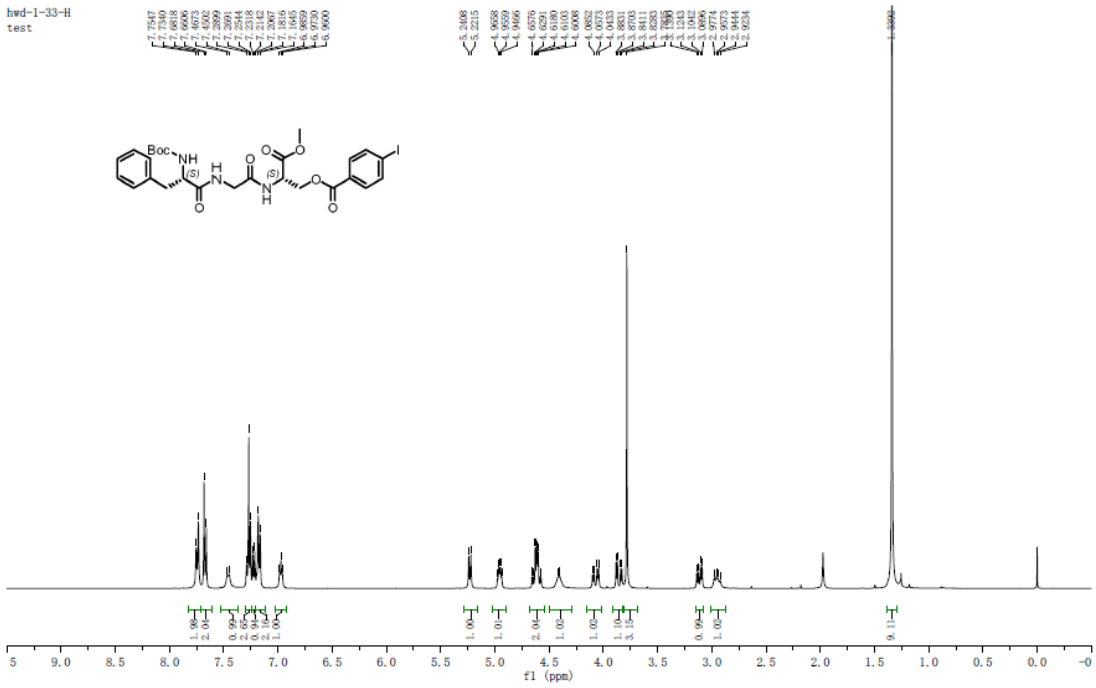
18-2

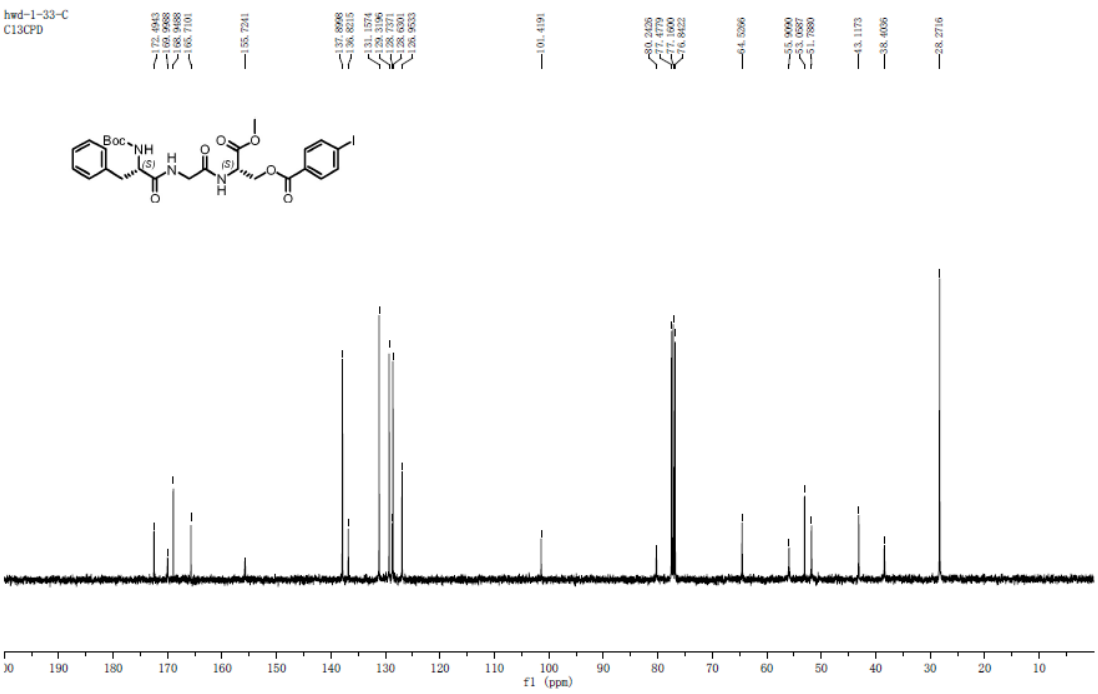


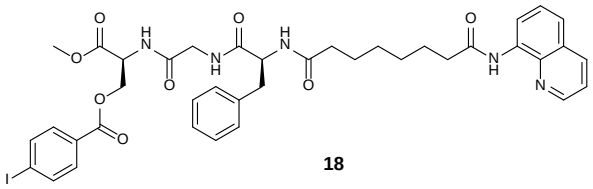




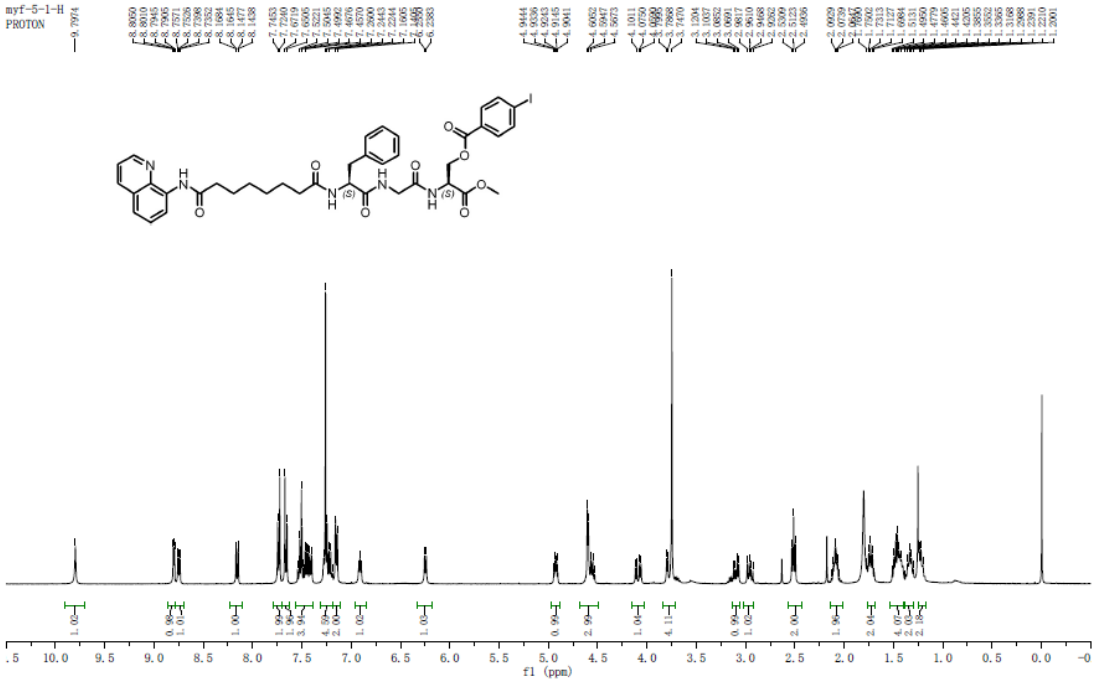
18-3

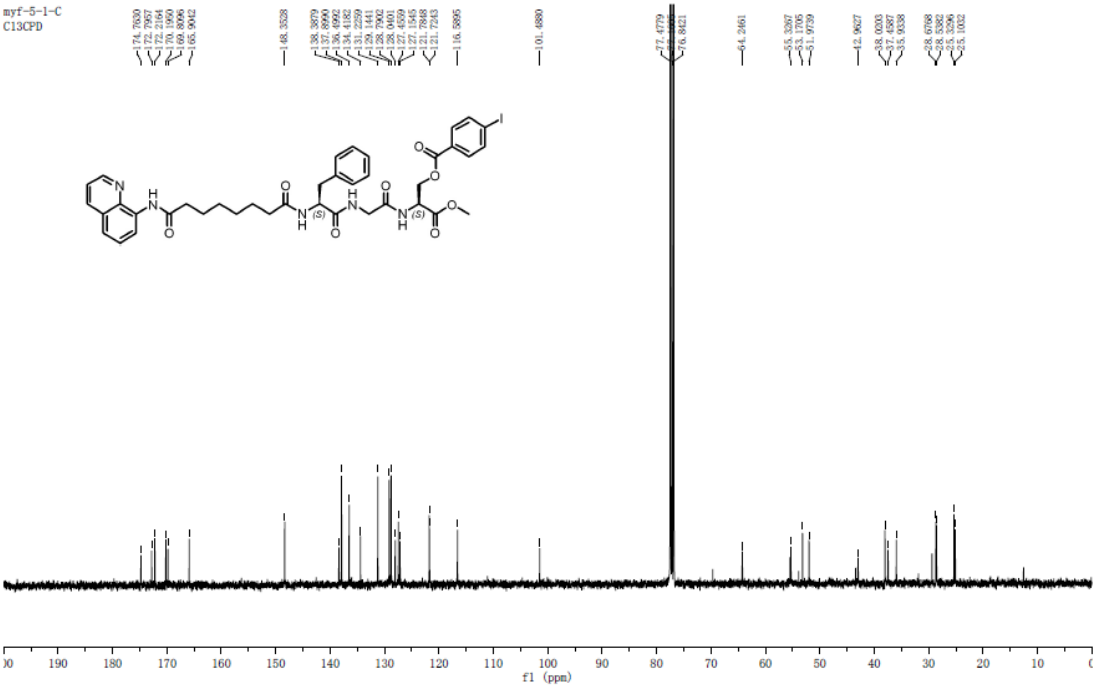


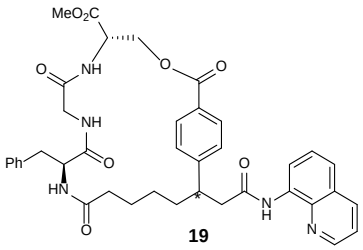




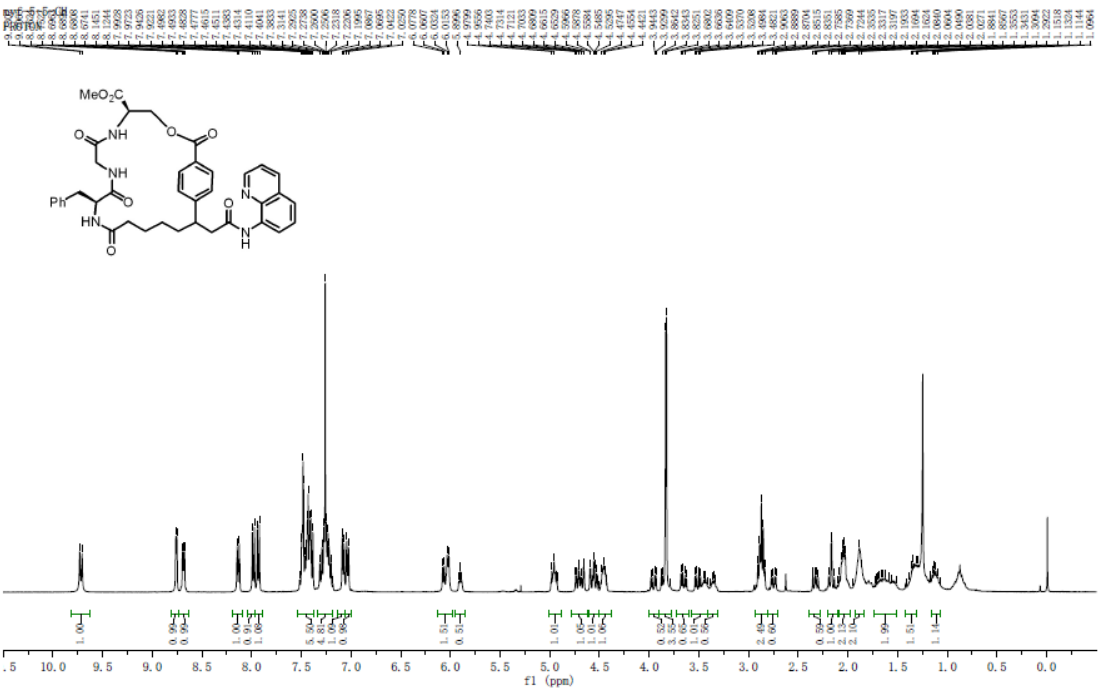
18

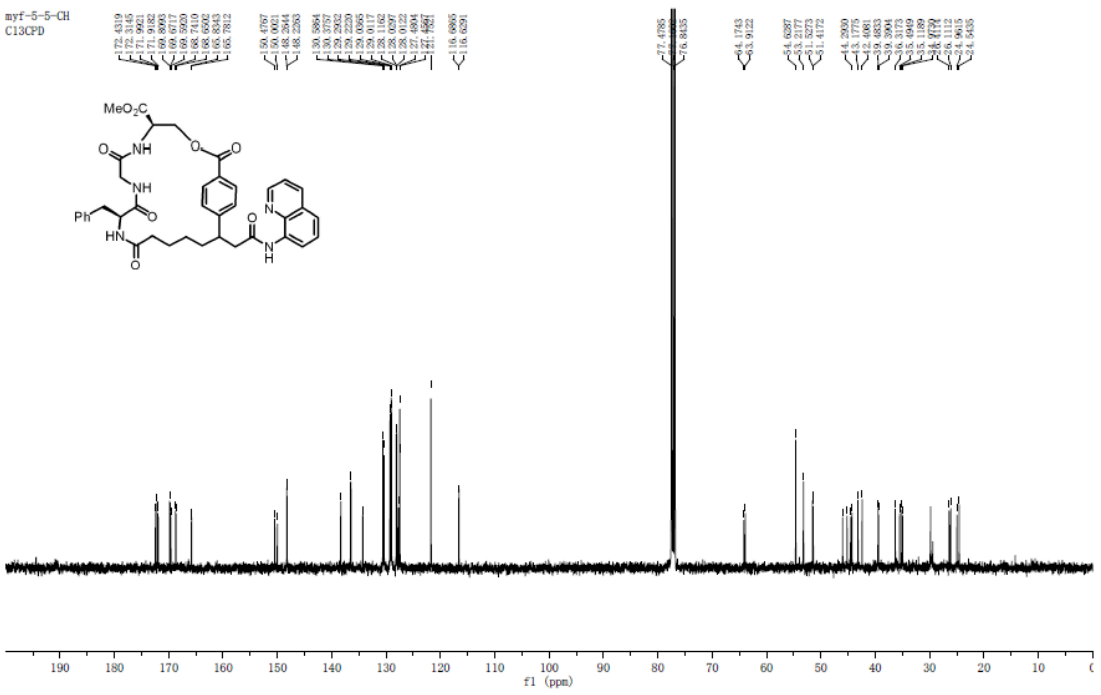


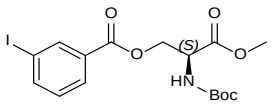




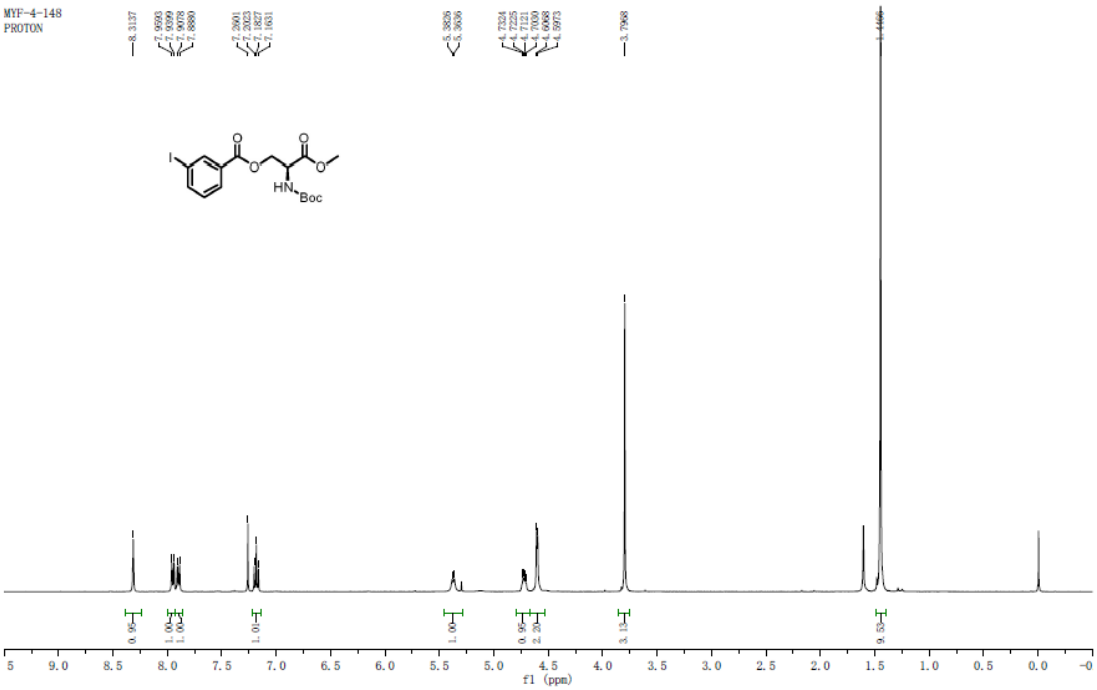
19

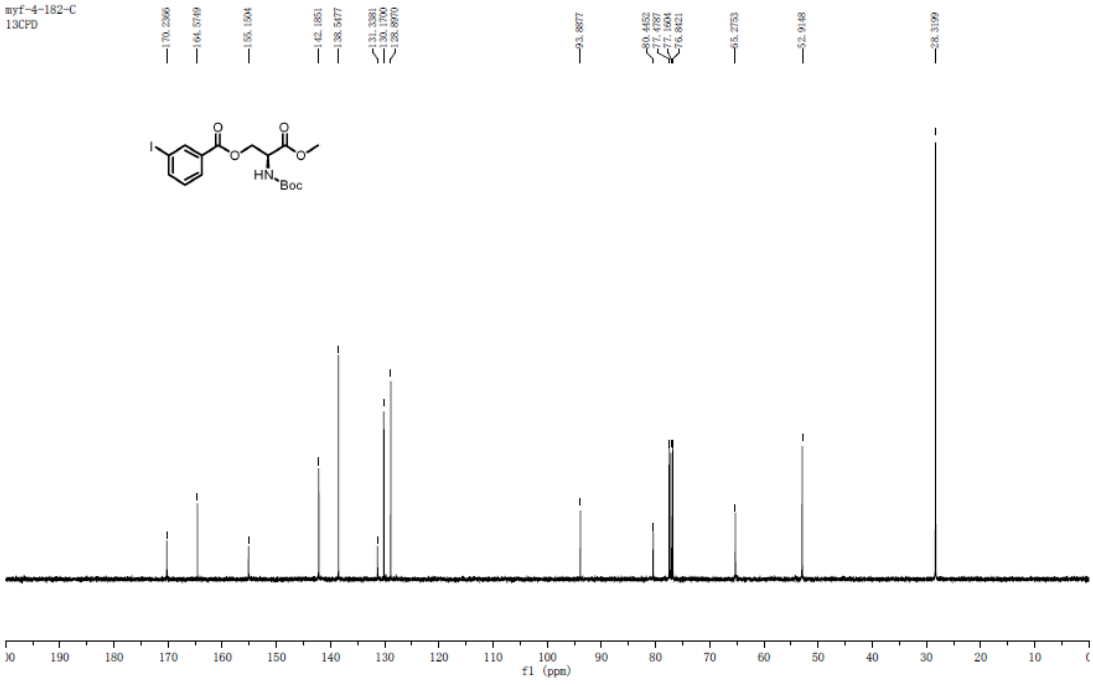


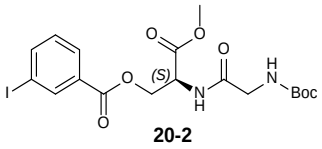




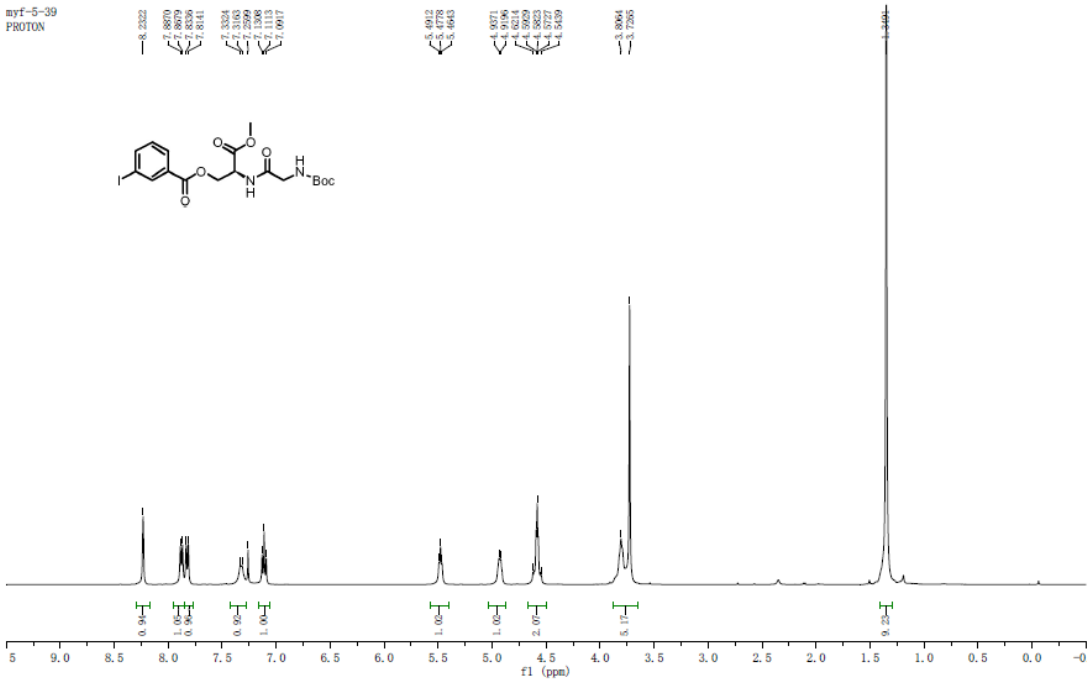
20-1

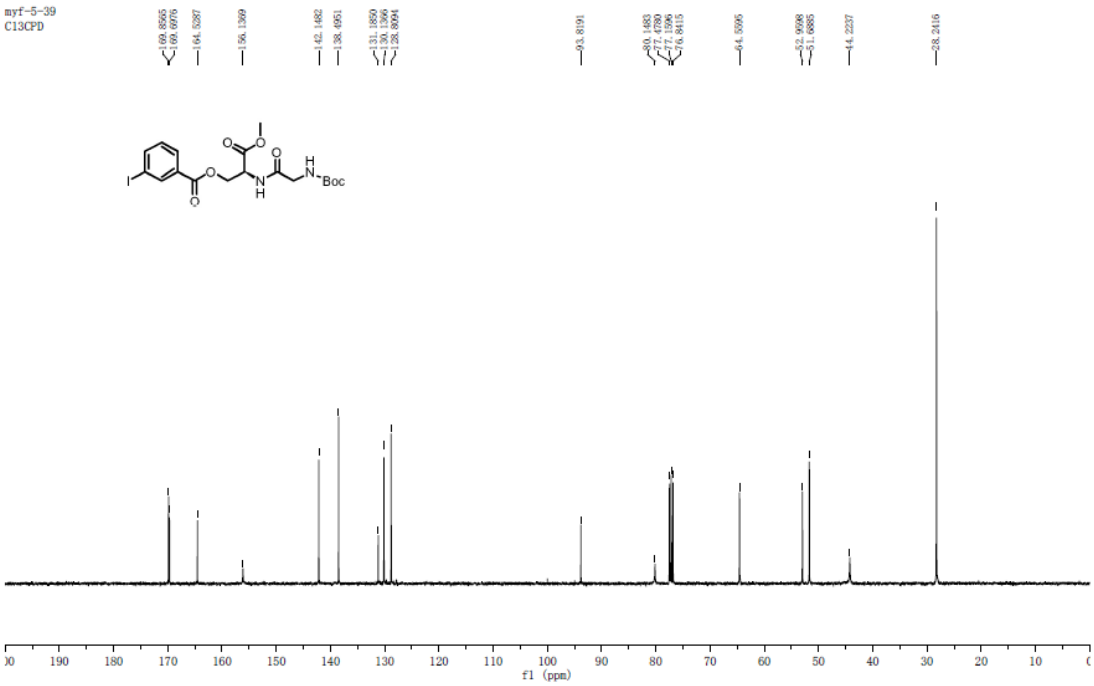


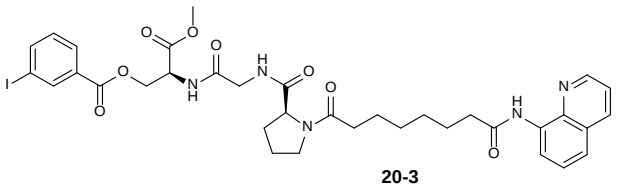




20-2







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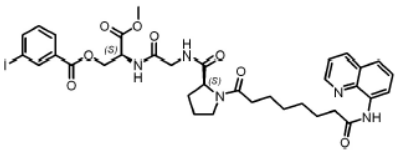

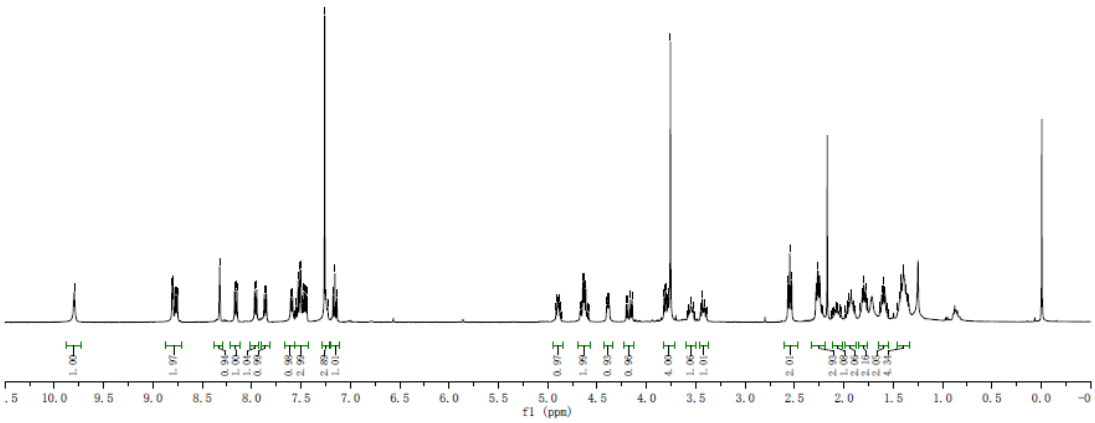

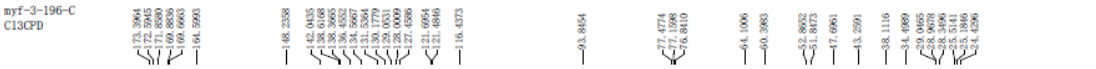

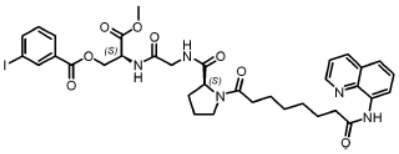

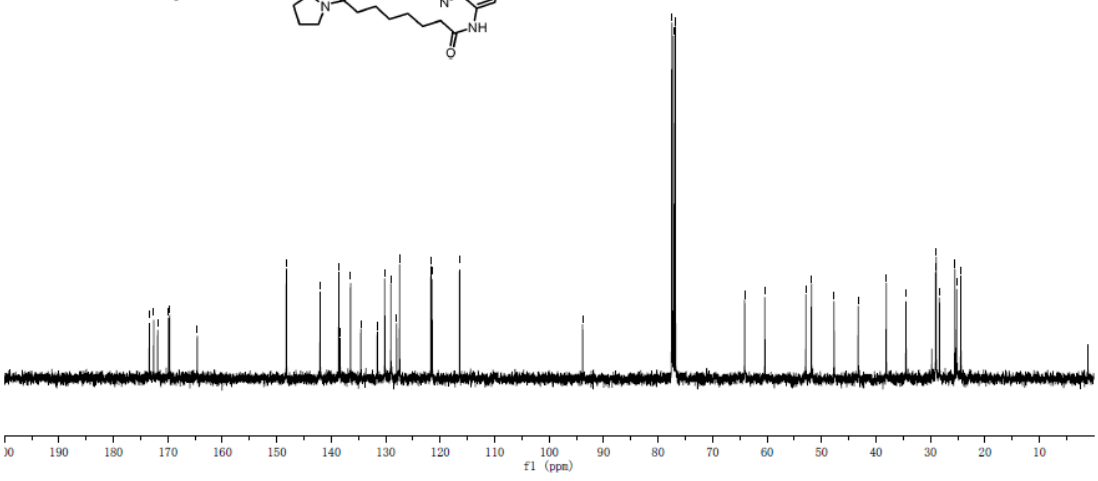

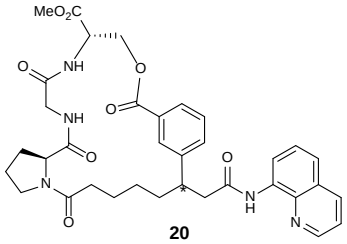

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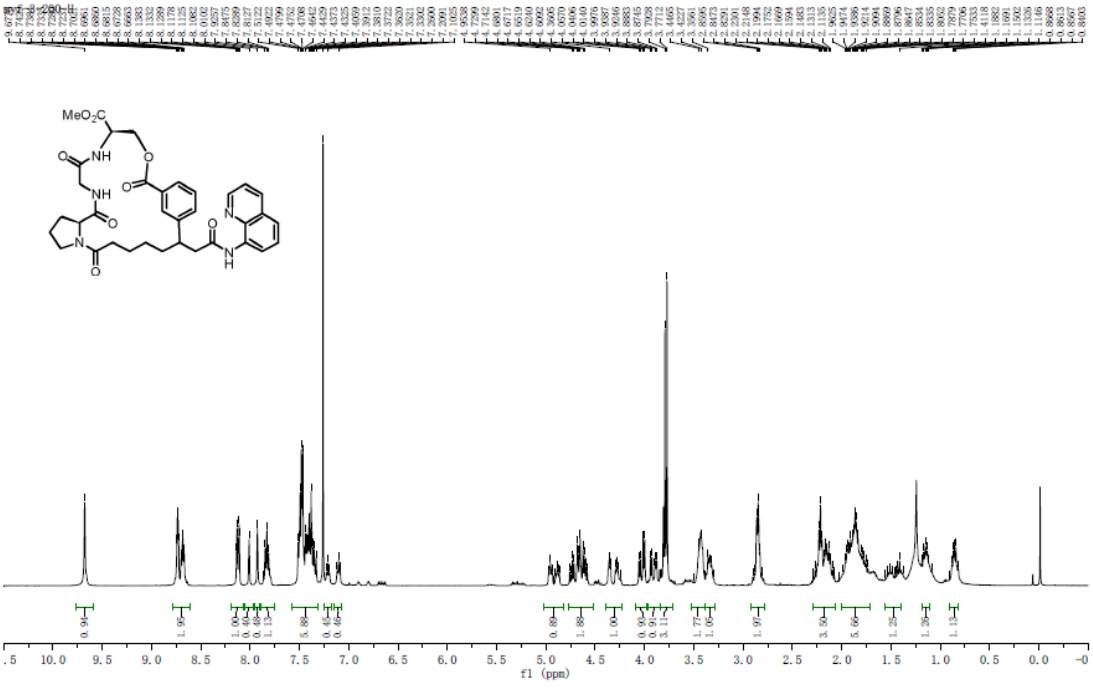

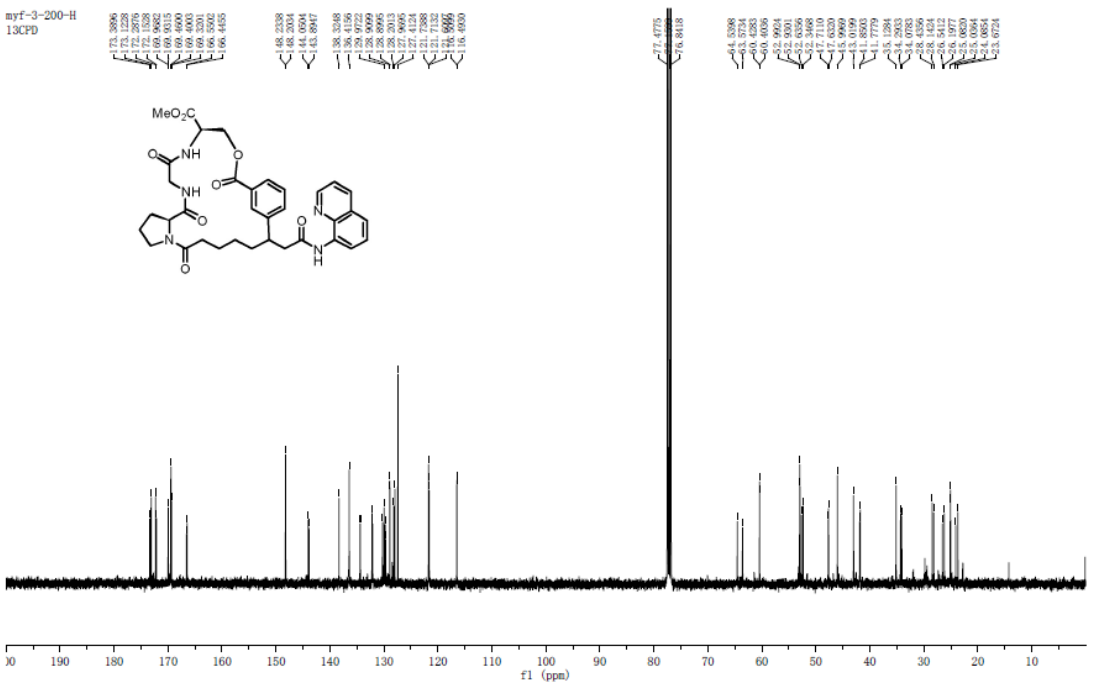

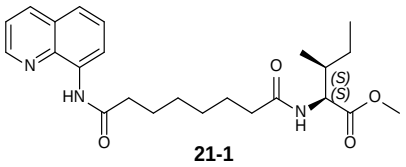

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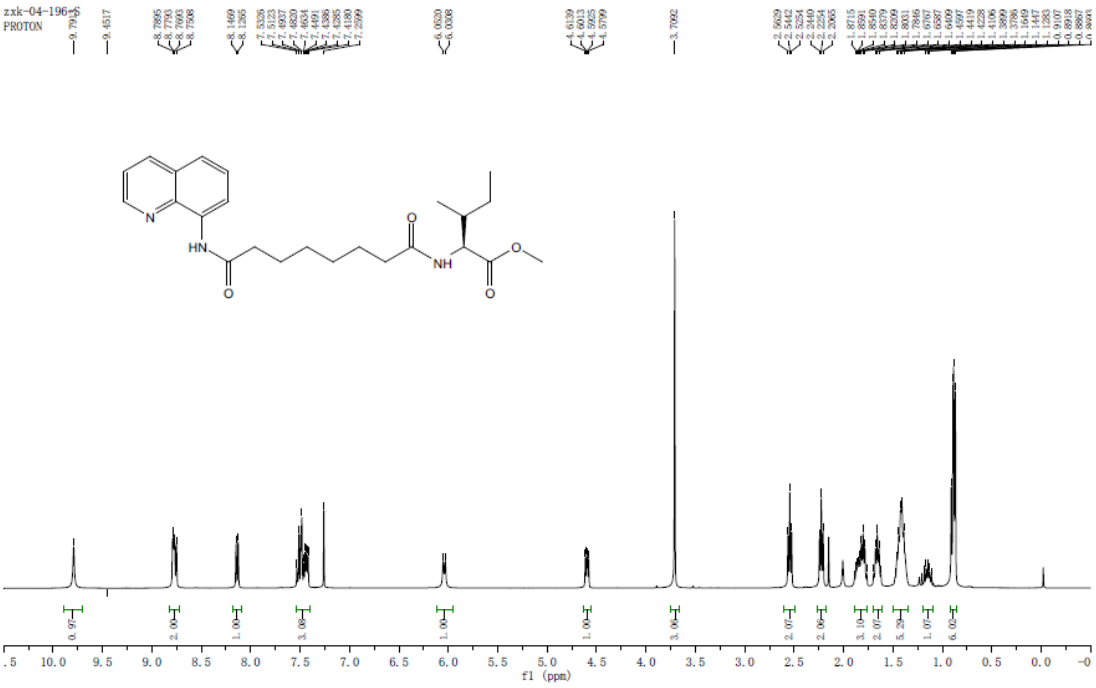

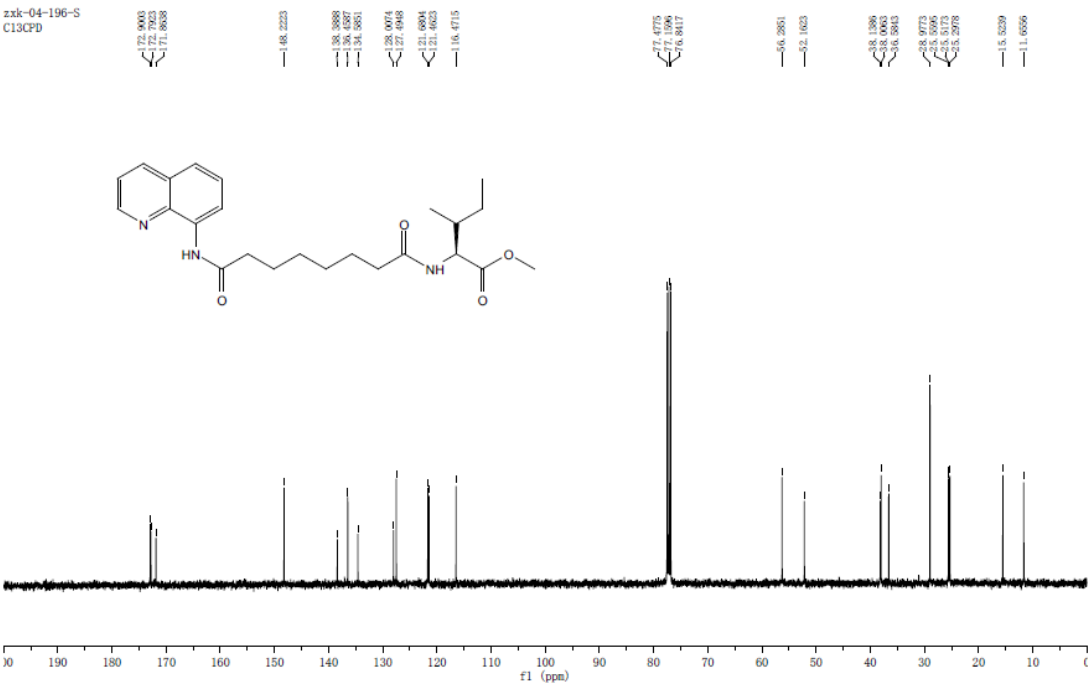

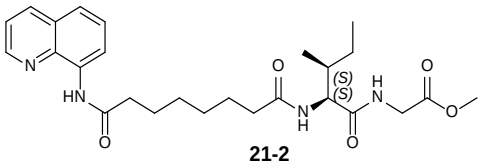

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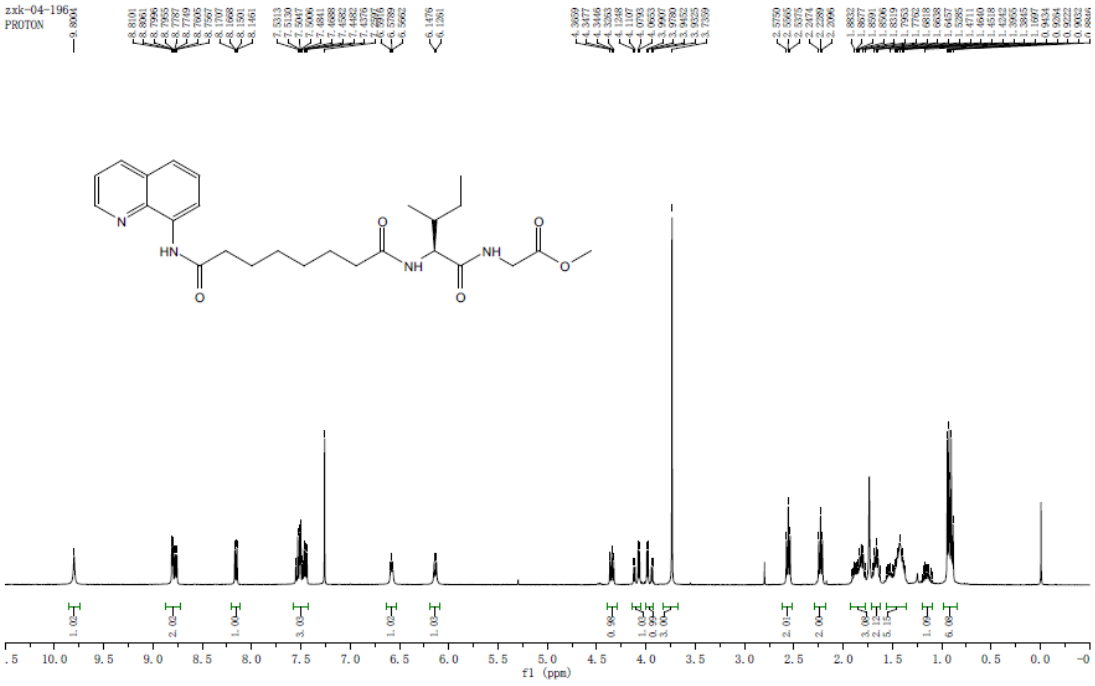

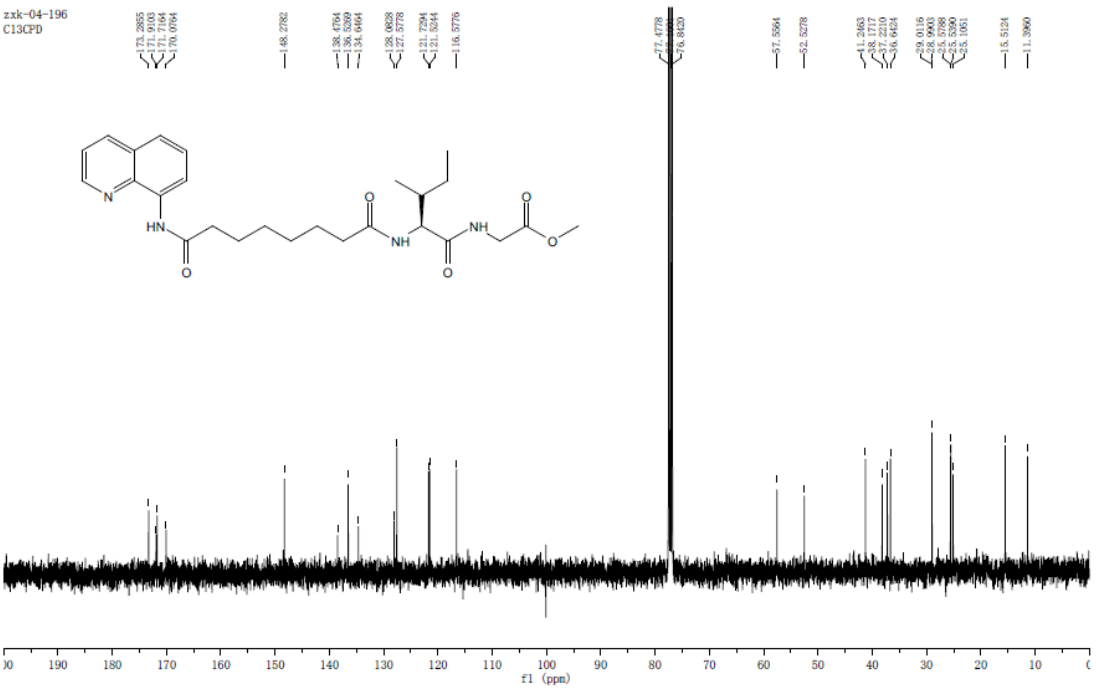

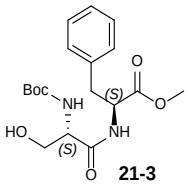

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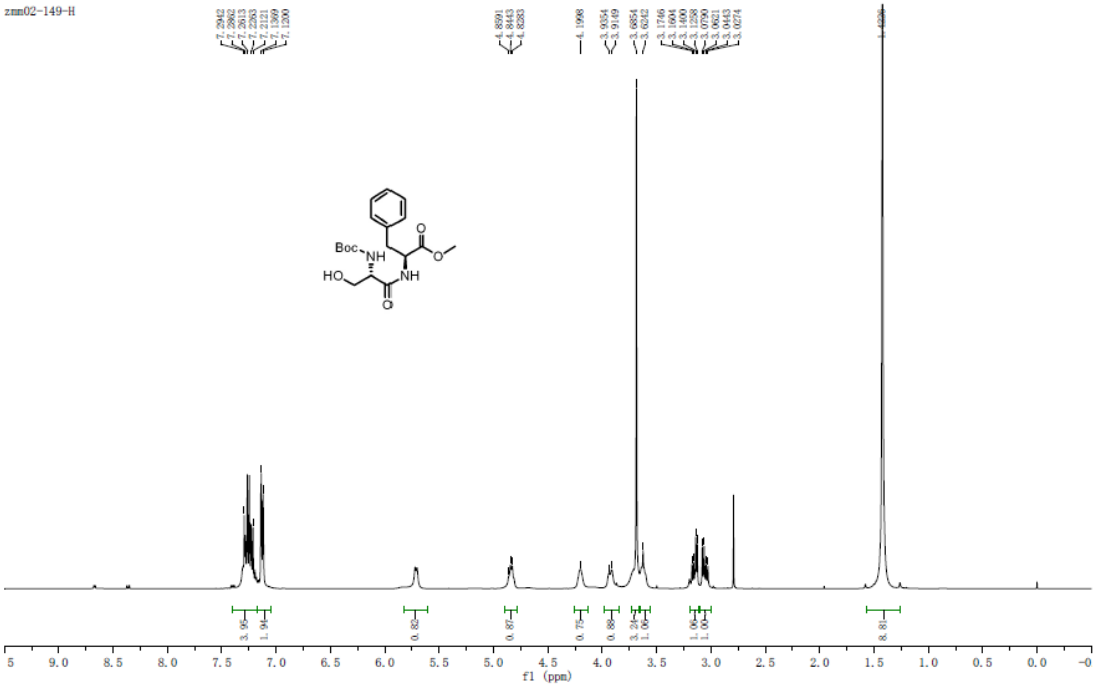

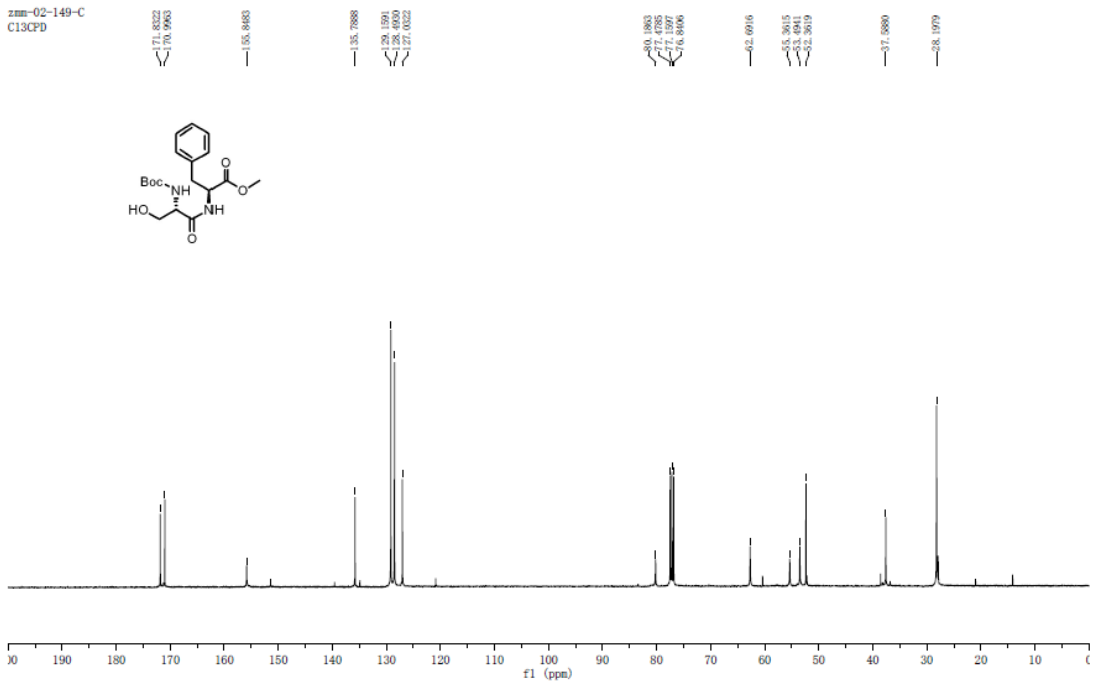

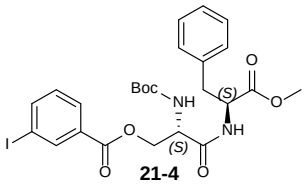
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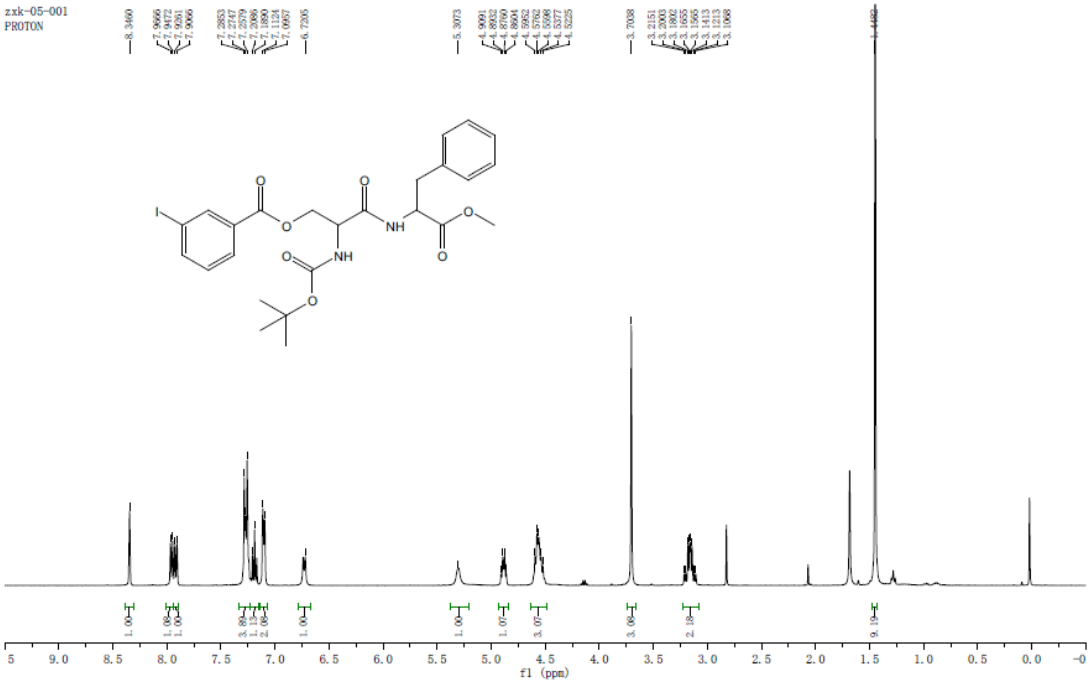
21-4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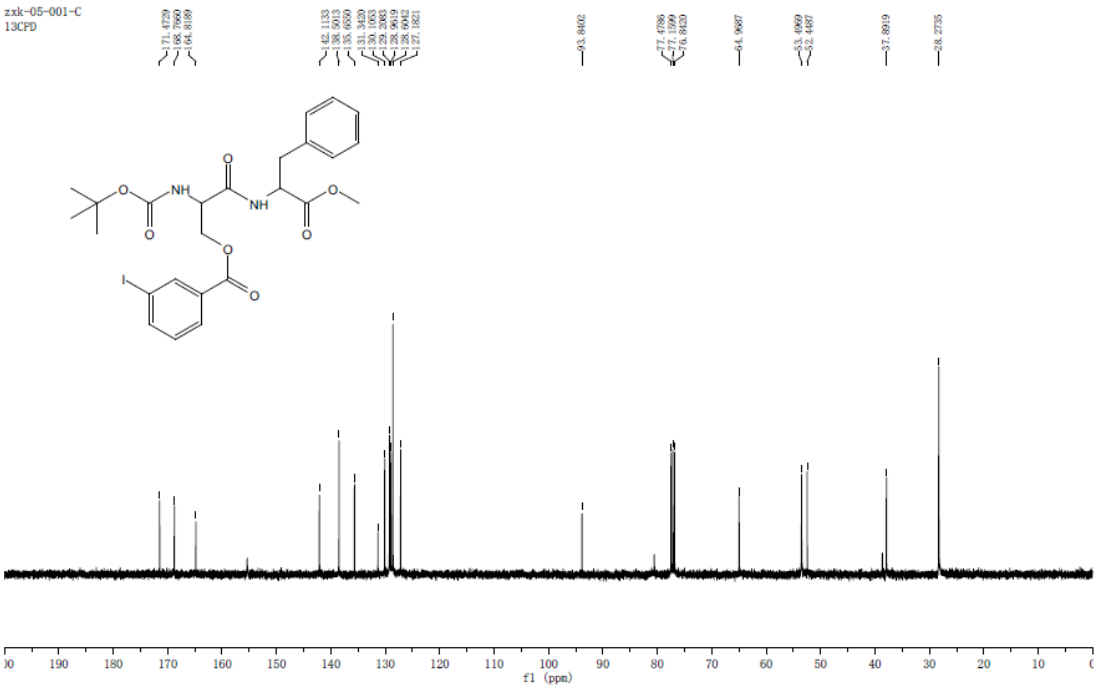
f1 (ppm)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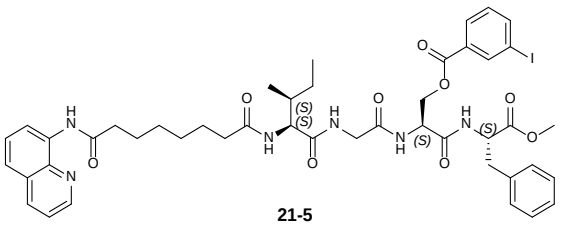

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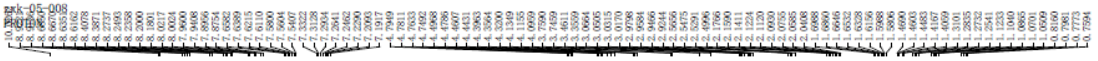

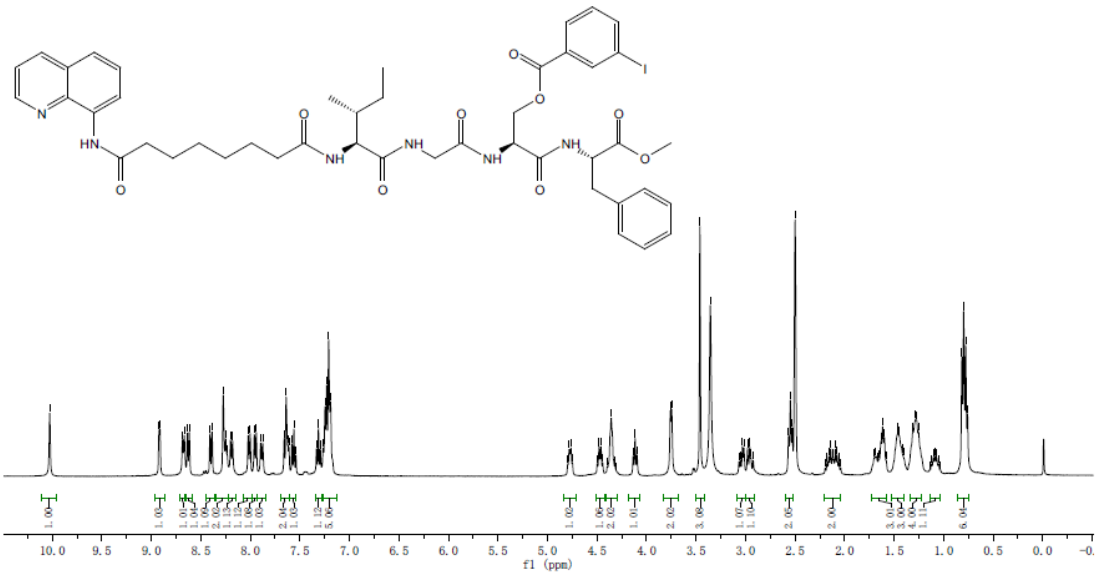

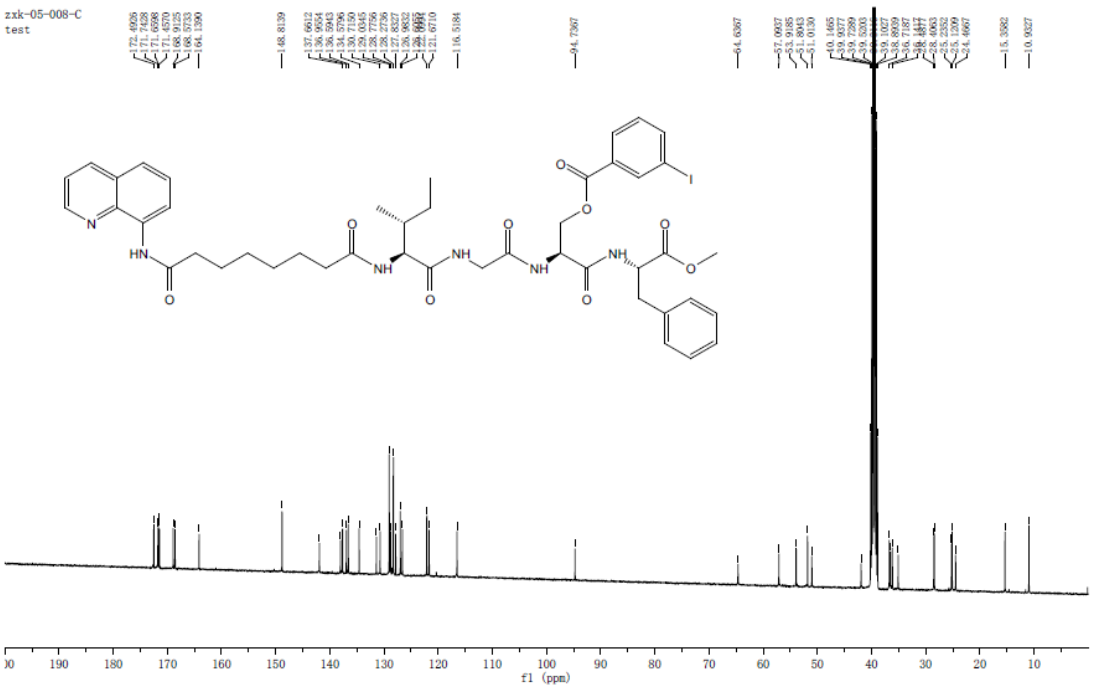

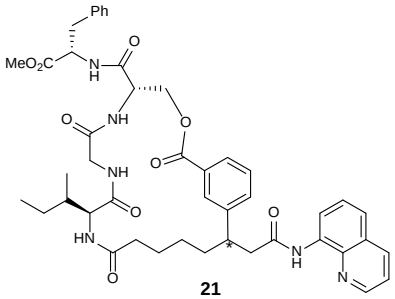

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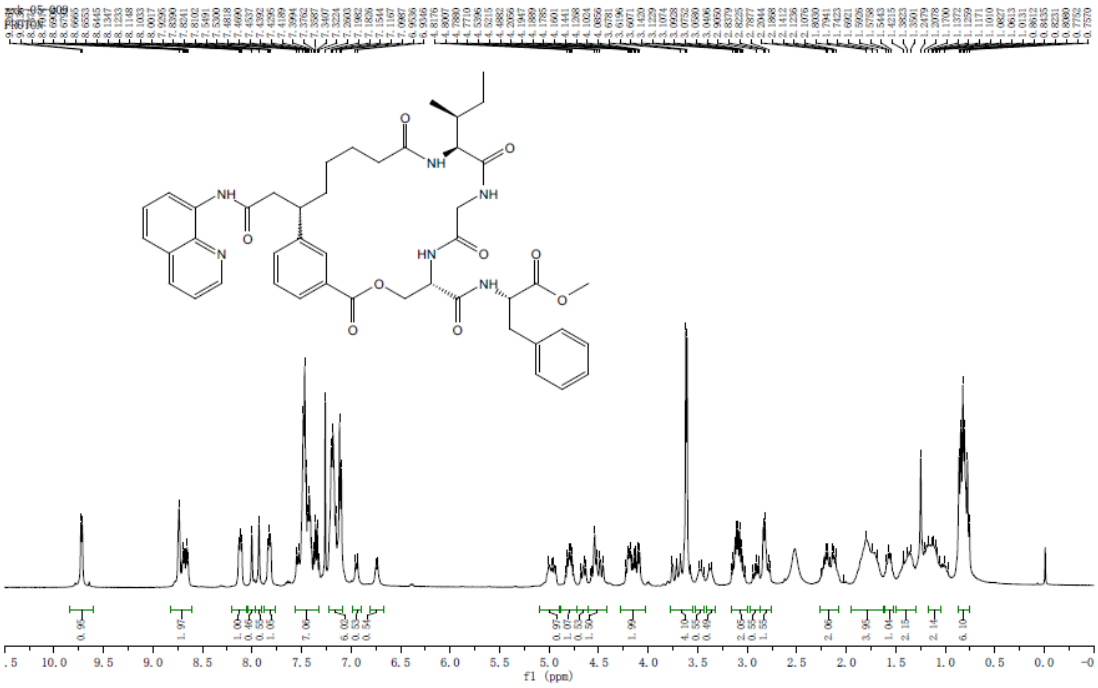
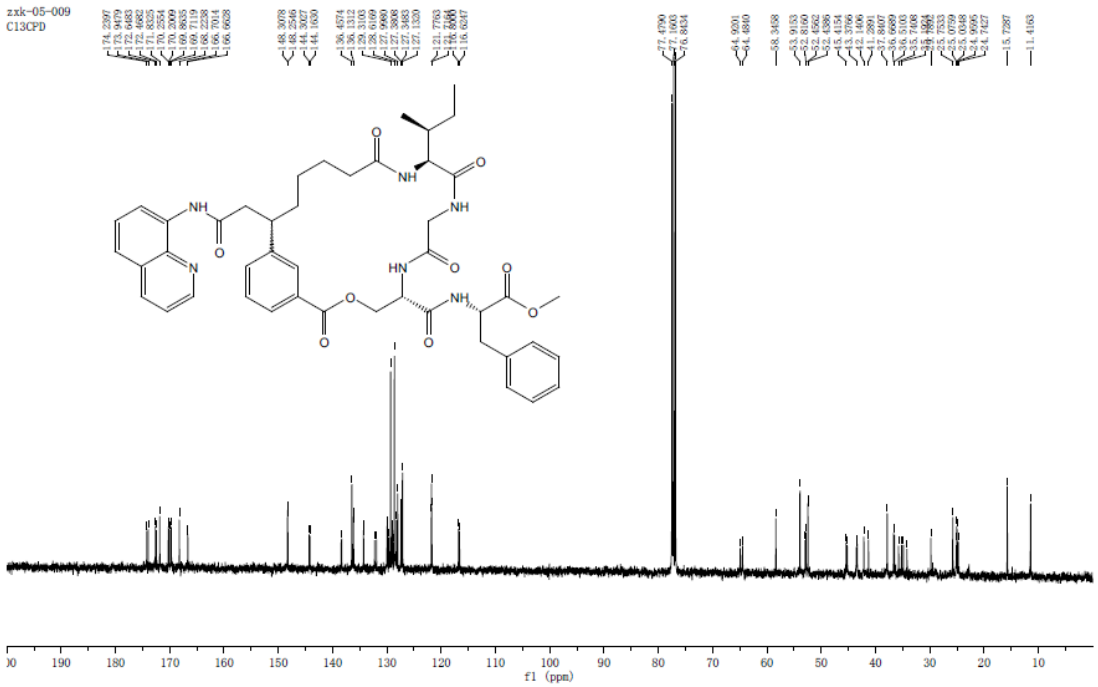
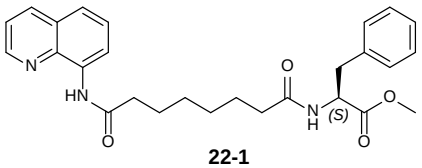
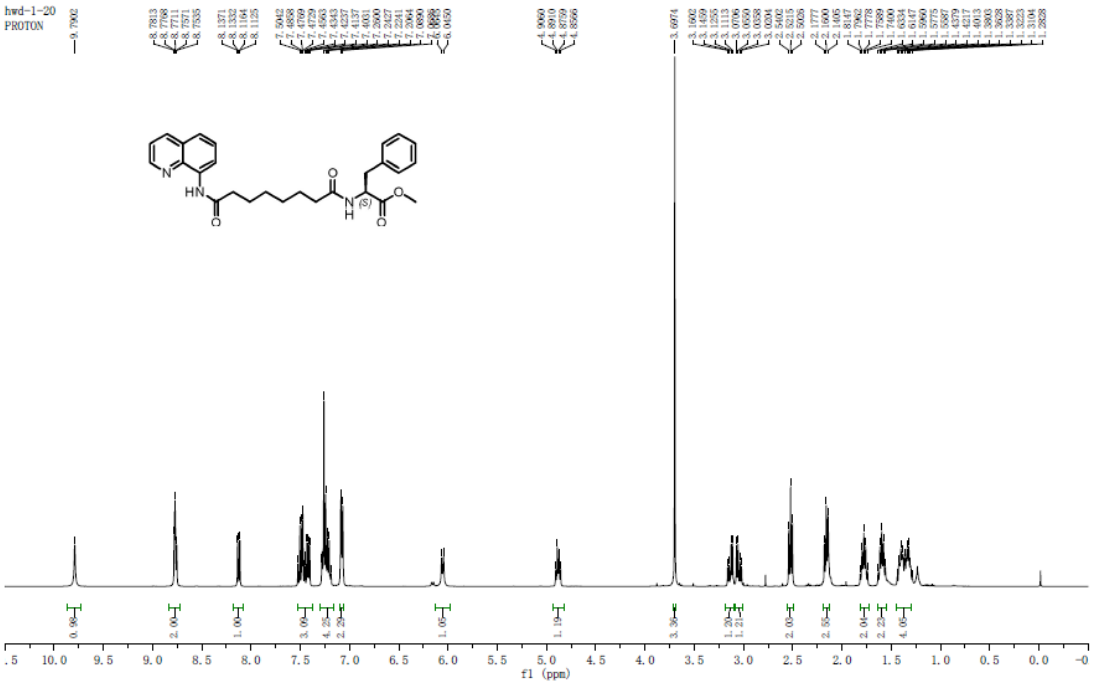
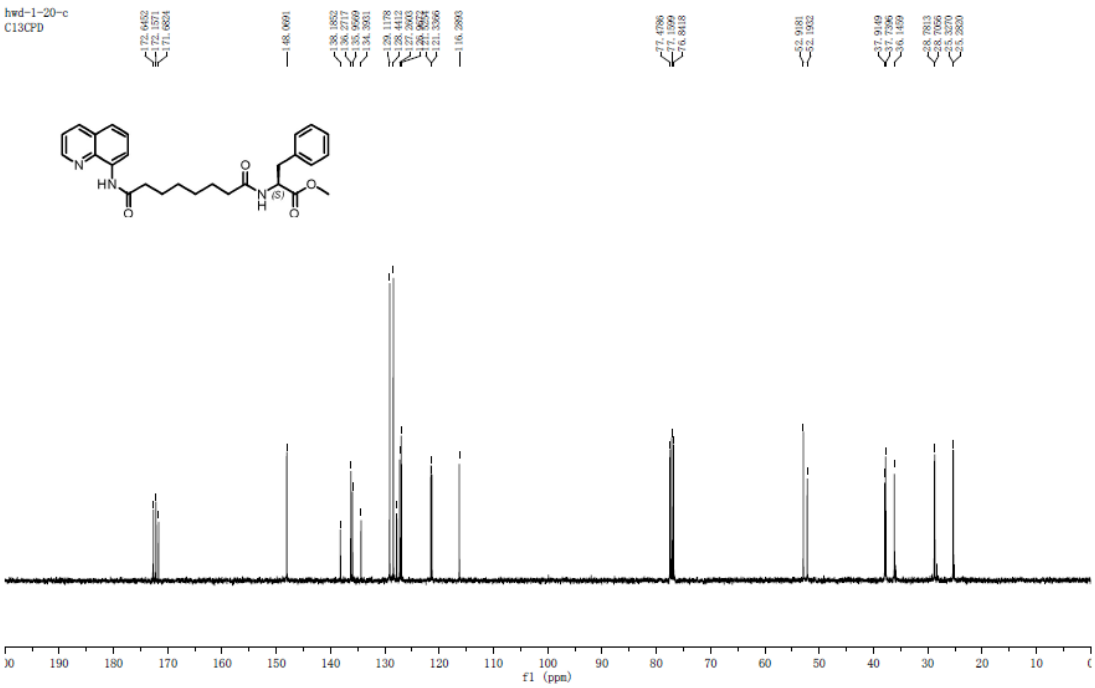


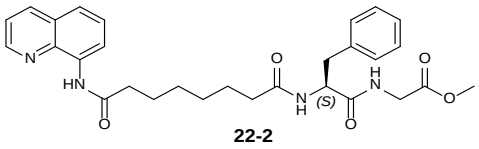




22-1







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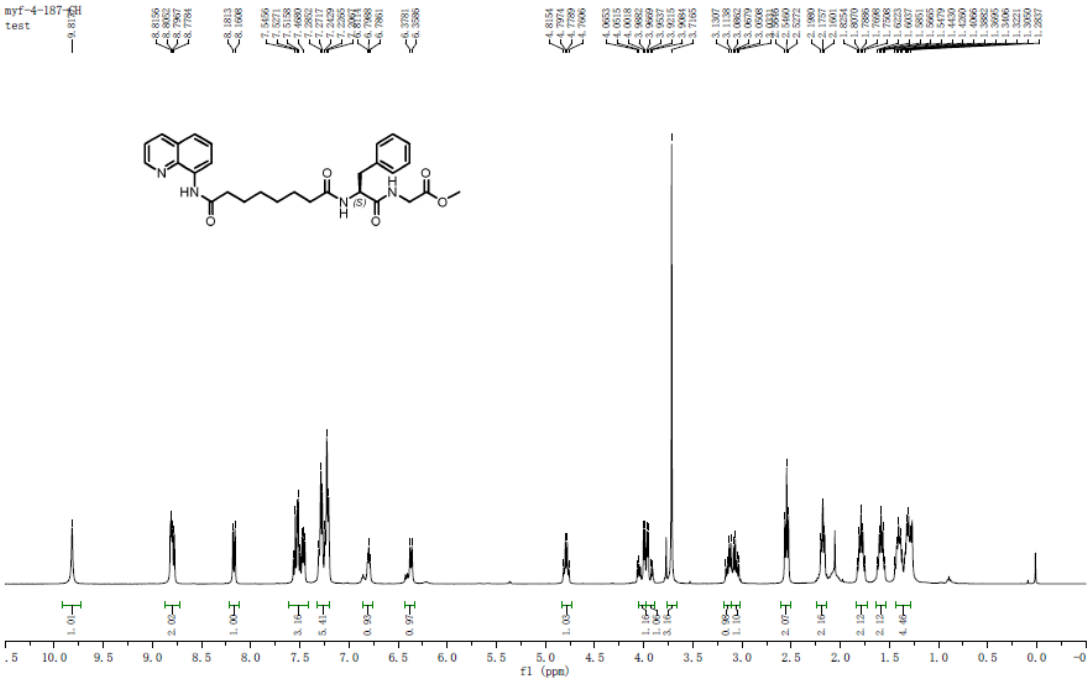
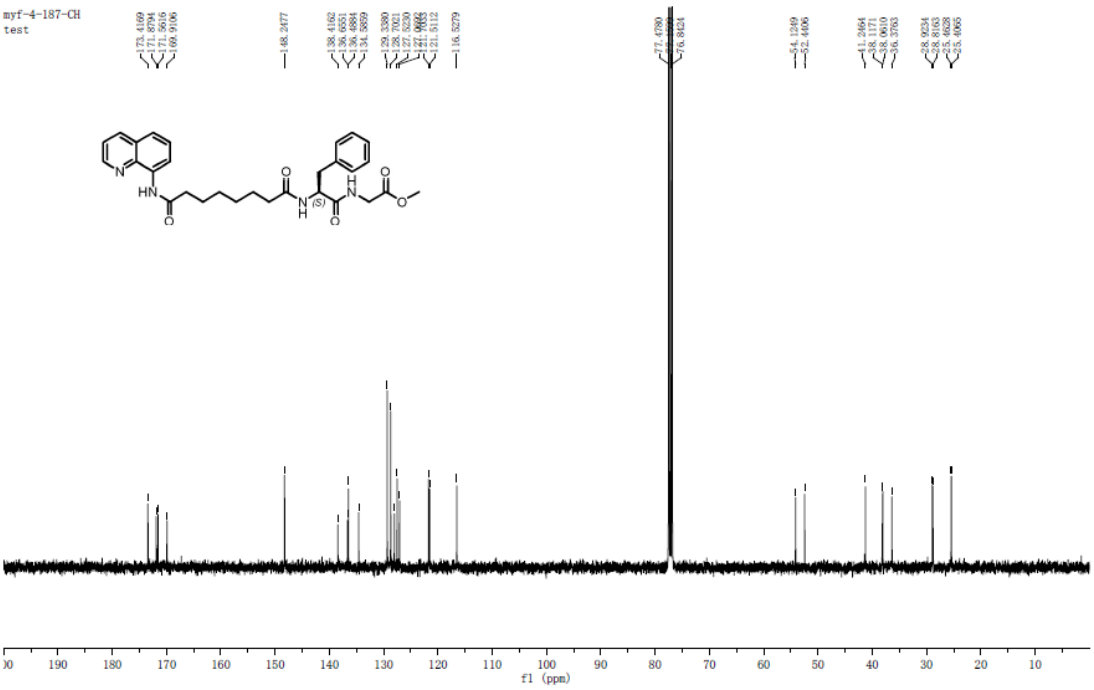
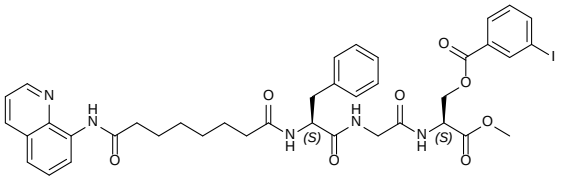
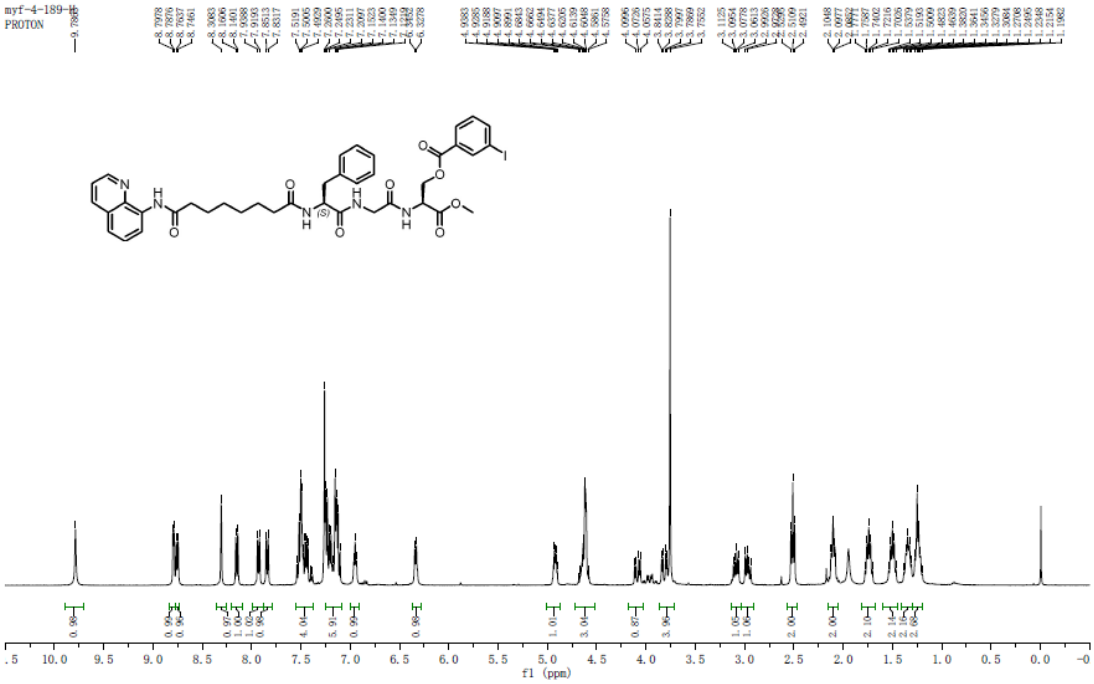
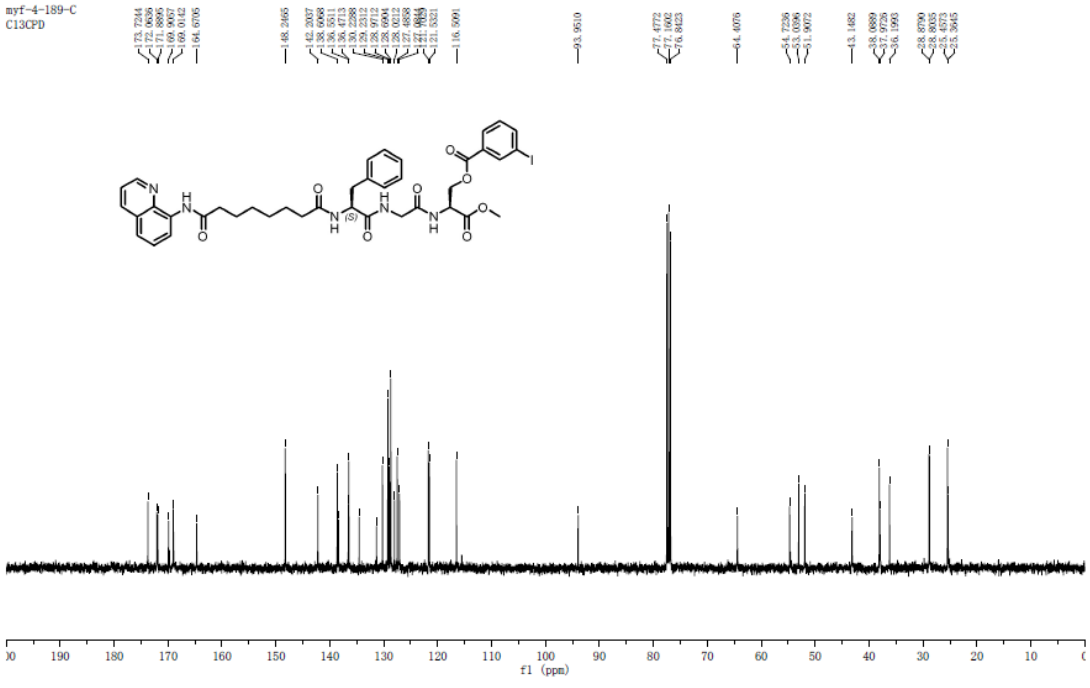


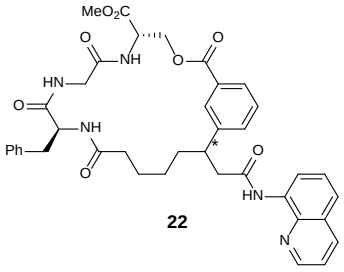




22-3






MeO2C
O
NH
O
O
HN
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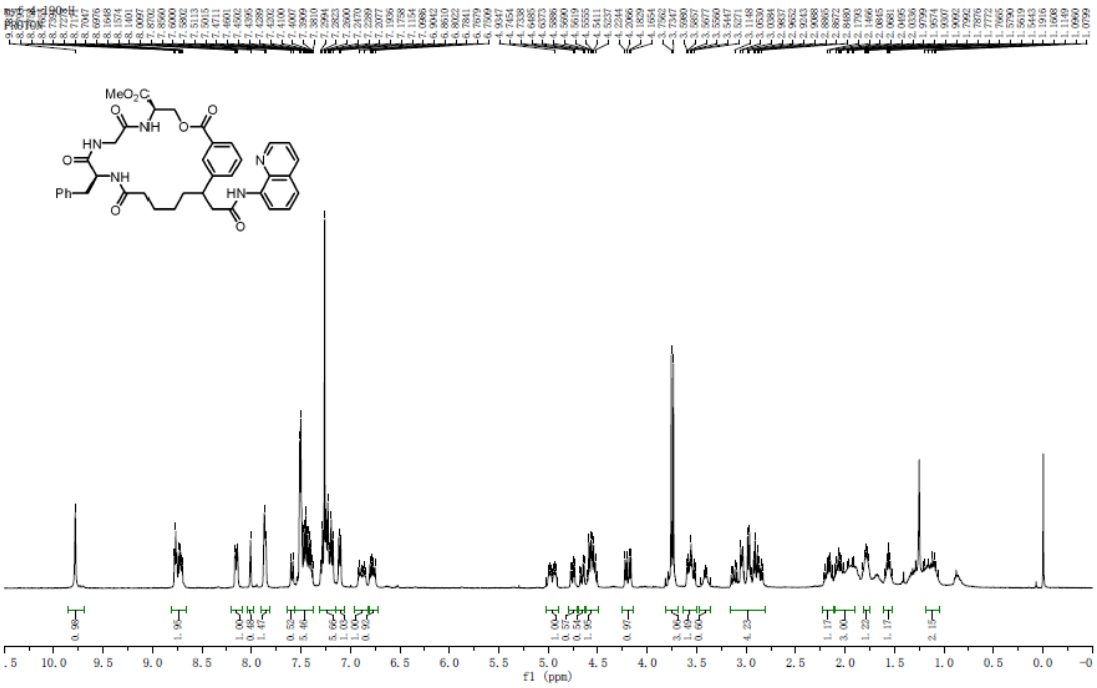
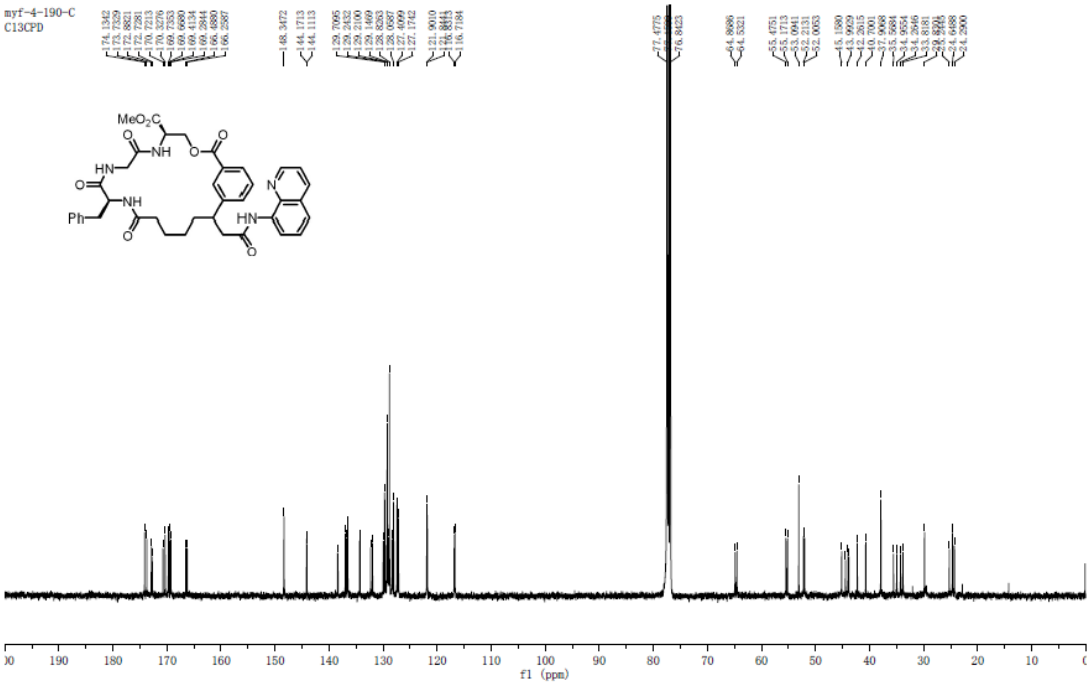
HN
N

22


MeO2C
HN
NH
Ph
HN
N
f1 (ppm)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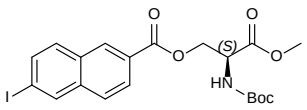
C13CPD
MeO2C
HN
NH
Ph
HN
N
f1 (ppm)



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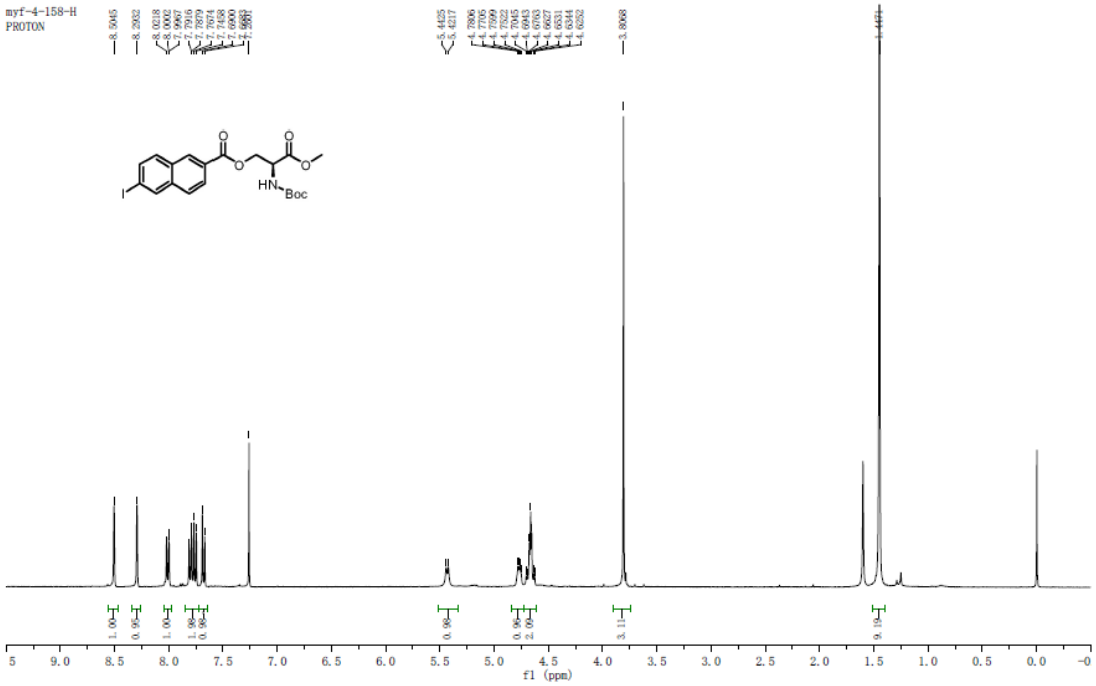
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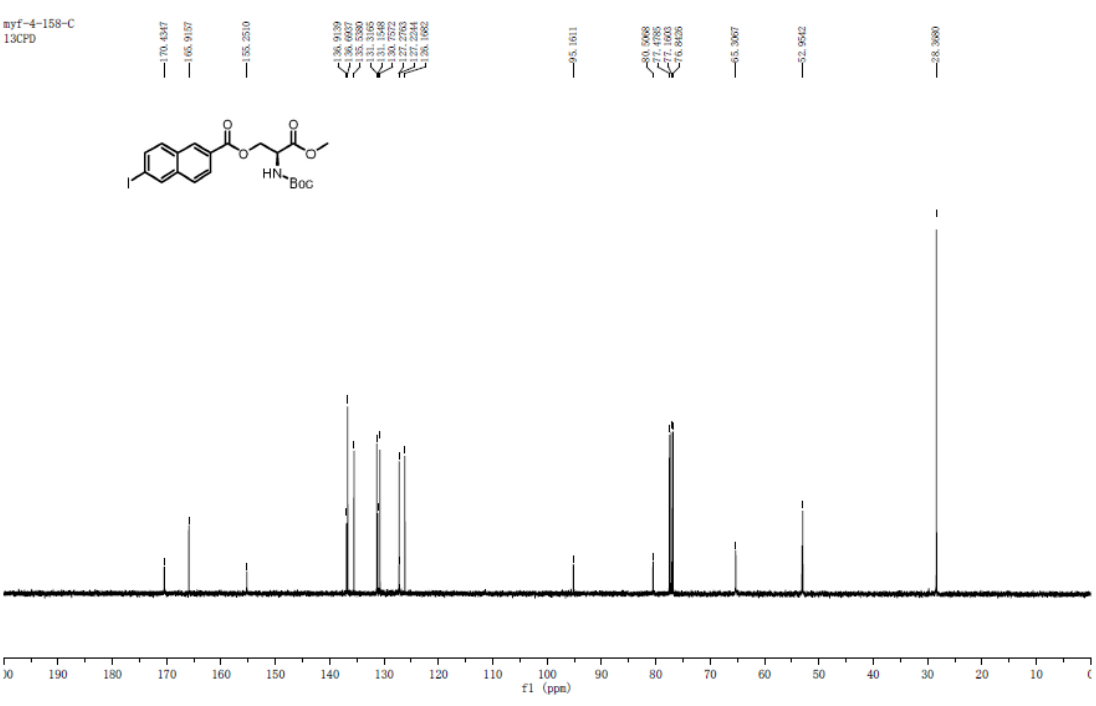
8.2932
8.0018
8.0002
7.9967
7.7916
7.7879
7.7874
7.7468
7.6900
5.4425
5.4217
4.7806
4.7705
4.7599
4.7522
4.7045
4.6943
4.6703
4.6657
4.6631
4.6344
4.6252
3.8068
1.4471
1.00
0.95
1.00
1.96
0.96
0.96
2.09
3.11
9.19
f1 (ppm)


myf-4-158-C
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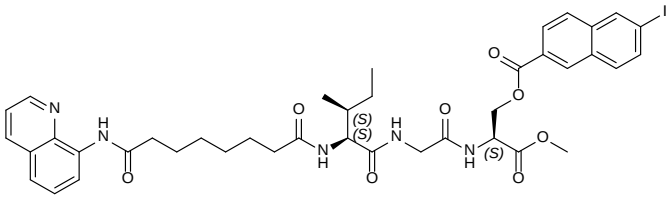
165.9157
155.2510
136.9139
136.6937
135.5380
131.3195
131.1548
130.7572
127.2763
127.2284
126.1982
95.1611
80.9068
77.4786
77.1603
76.8426
65.3067
52.9542
28.3680
f1 (ppm)



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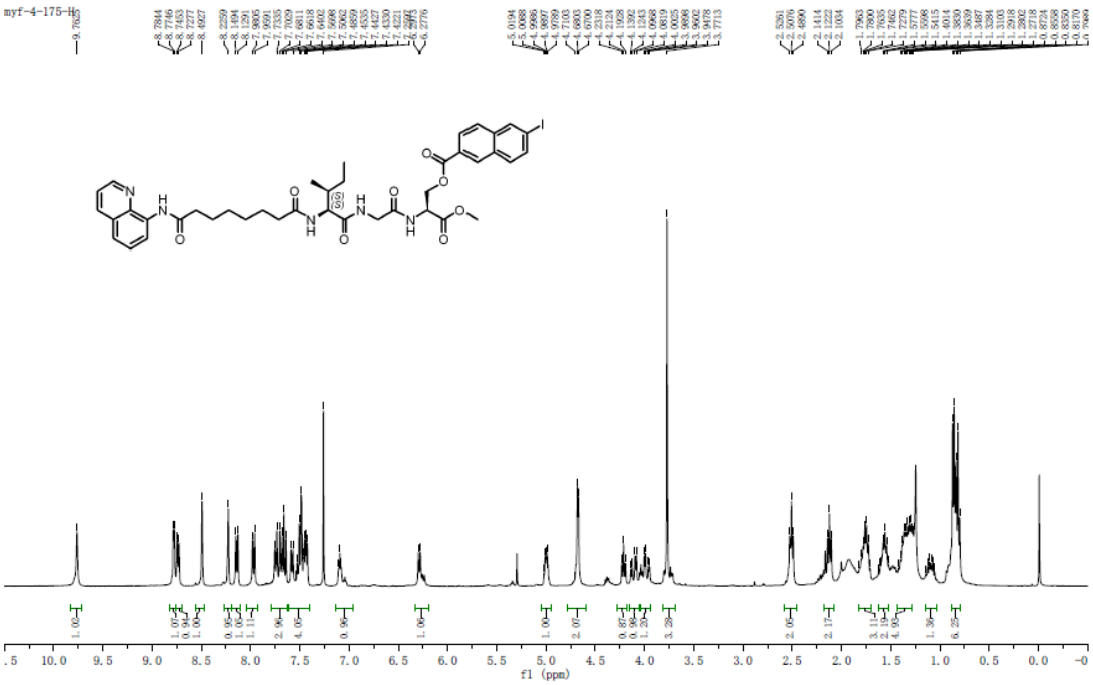

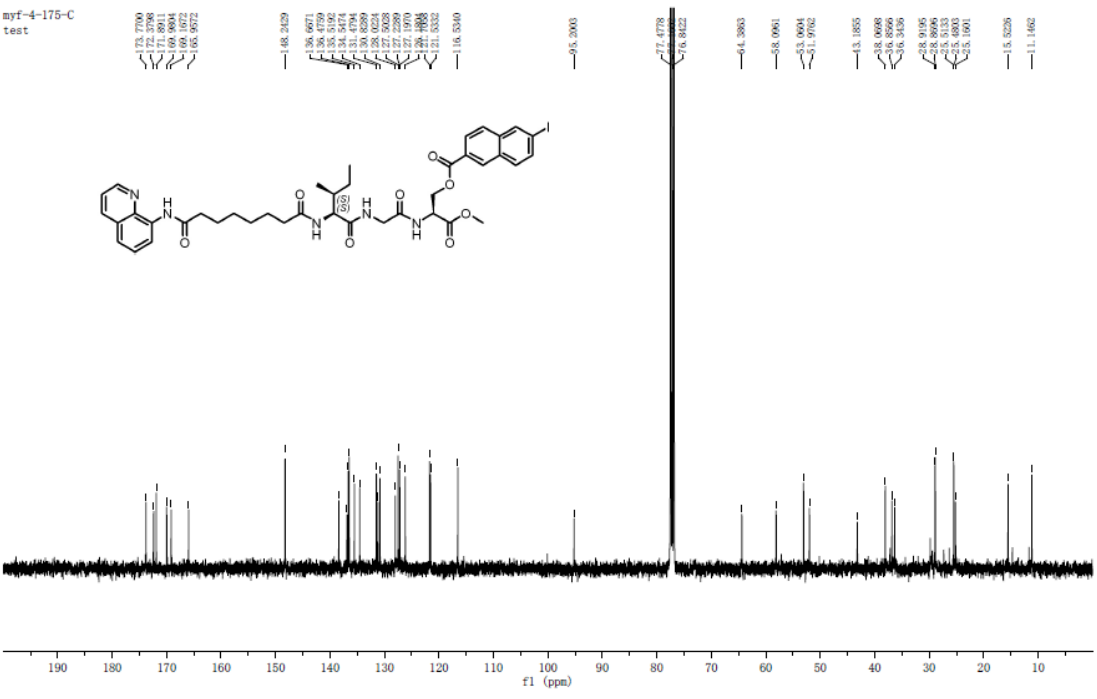

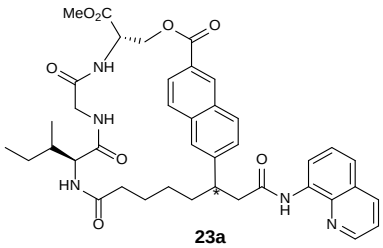

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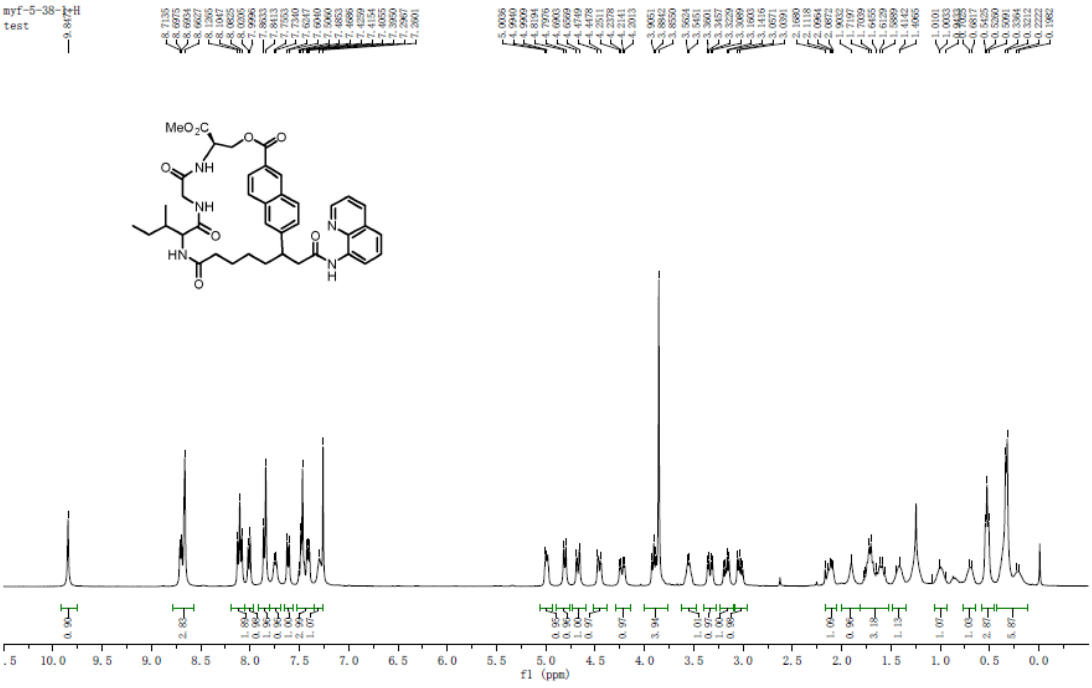
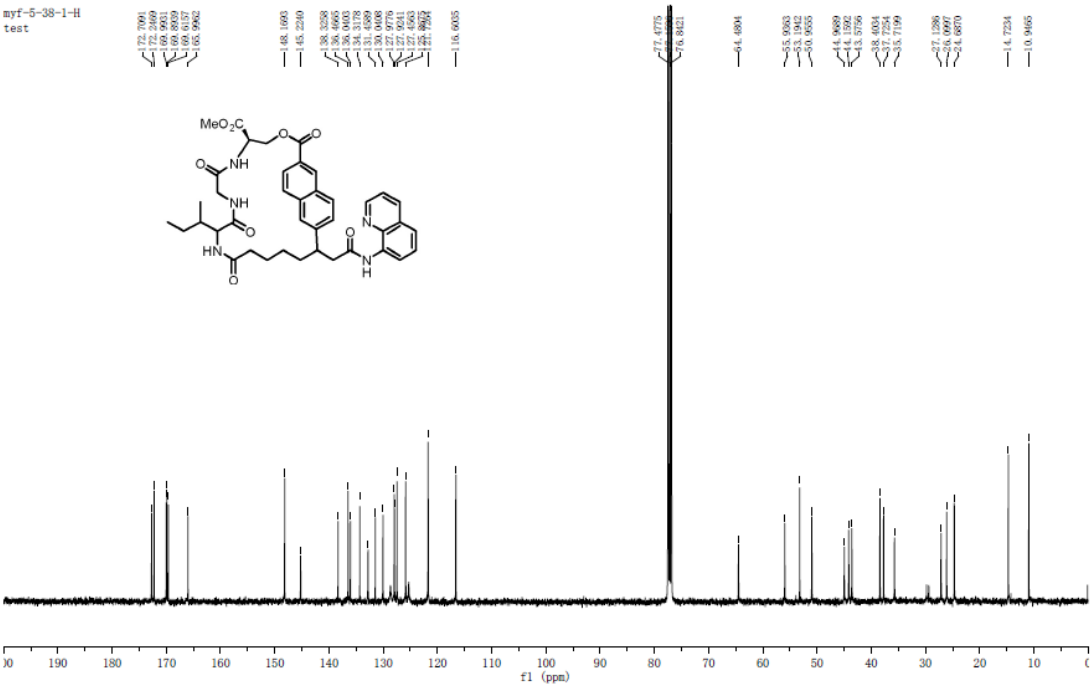
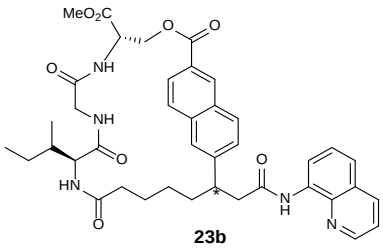
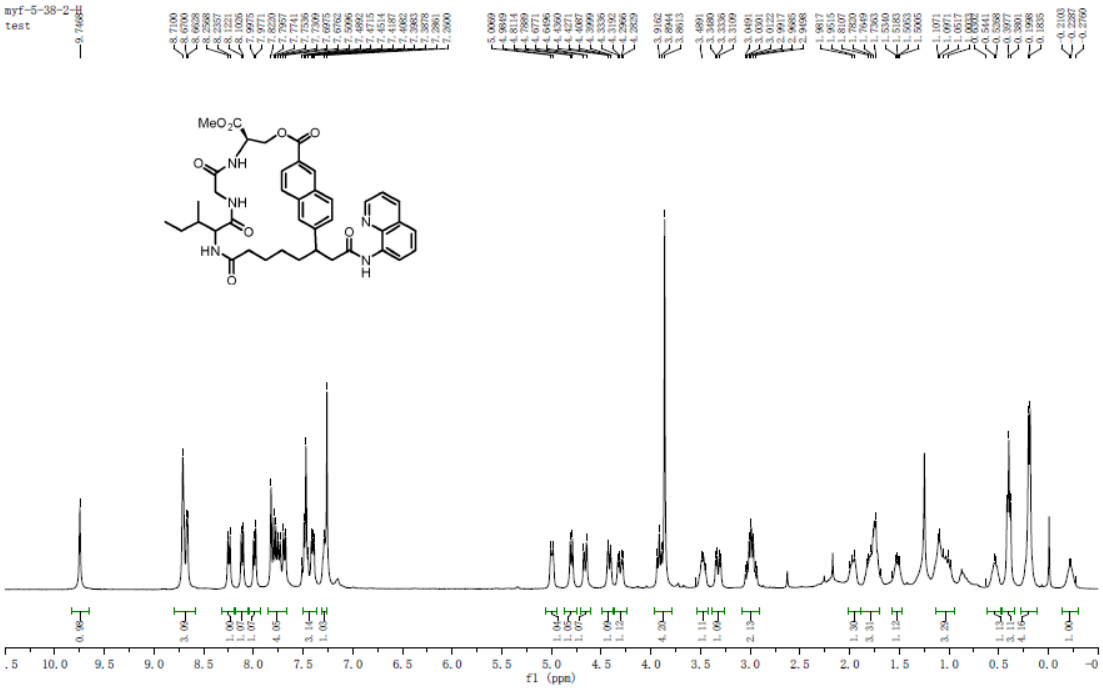
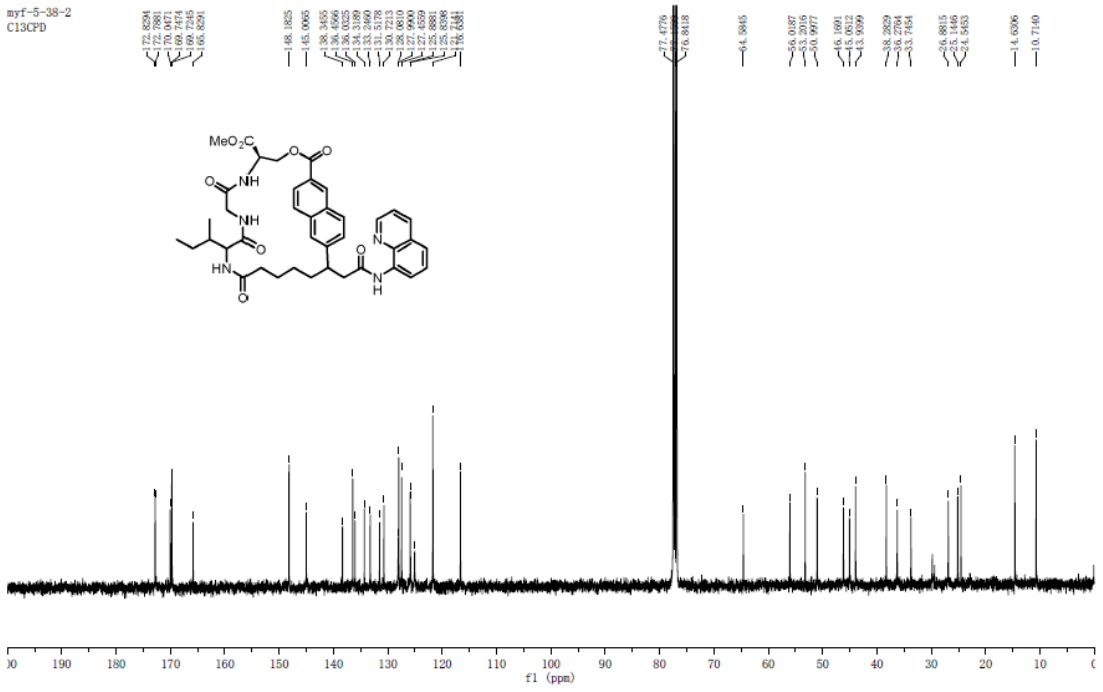


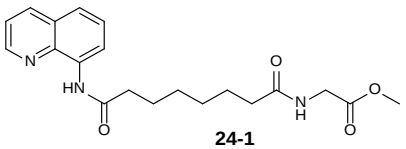




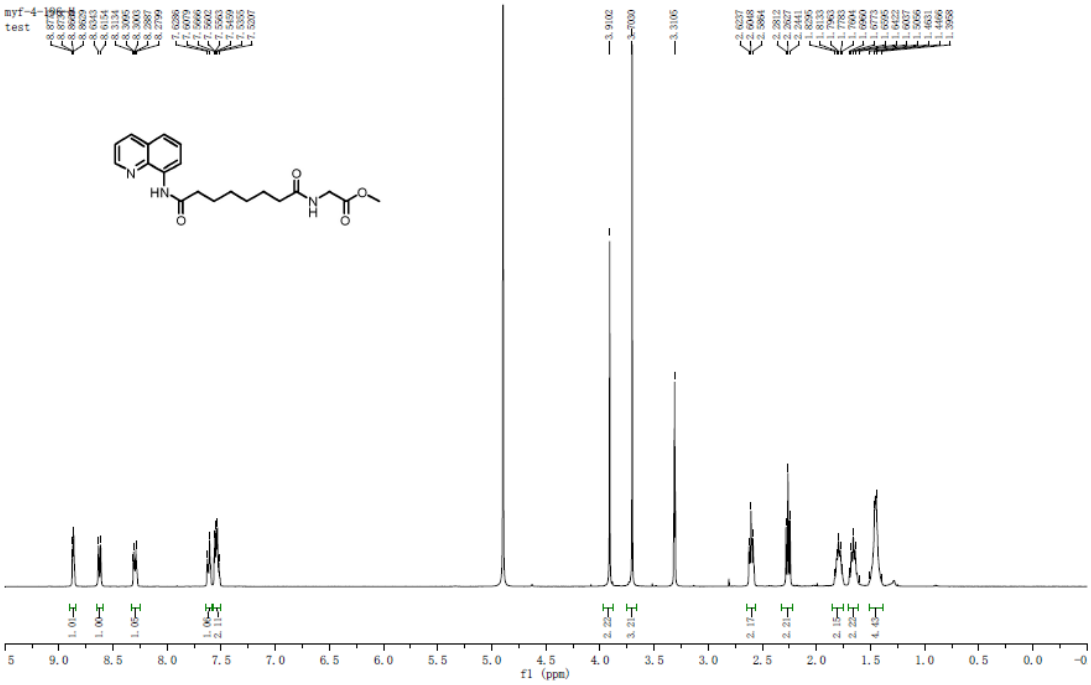
23b

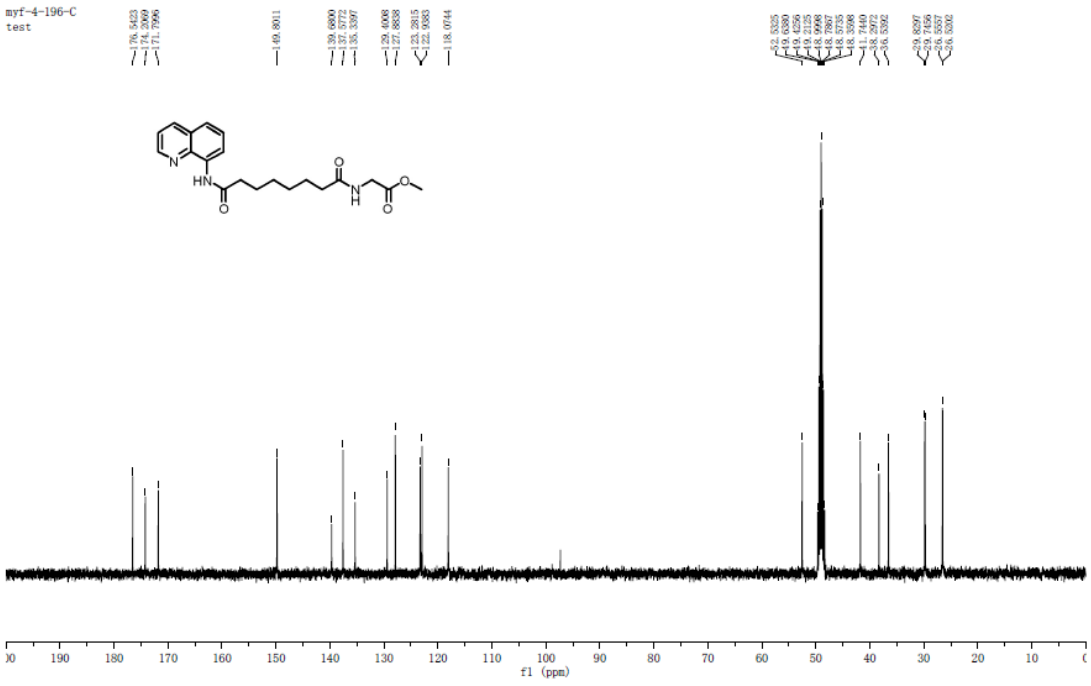


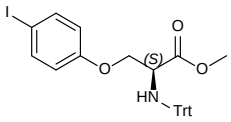




24-1







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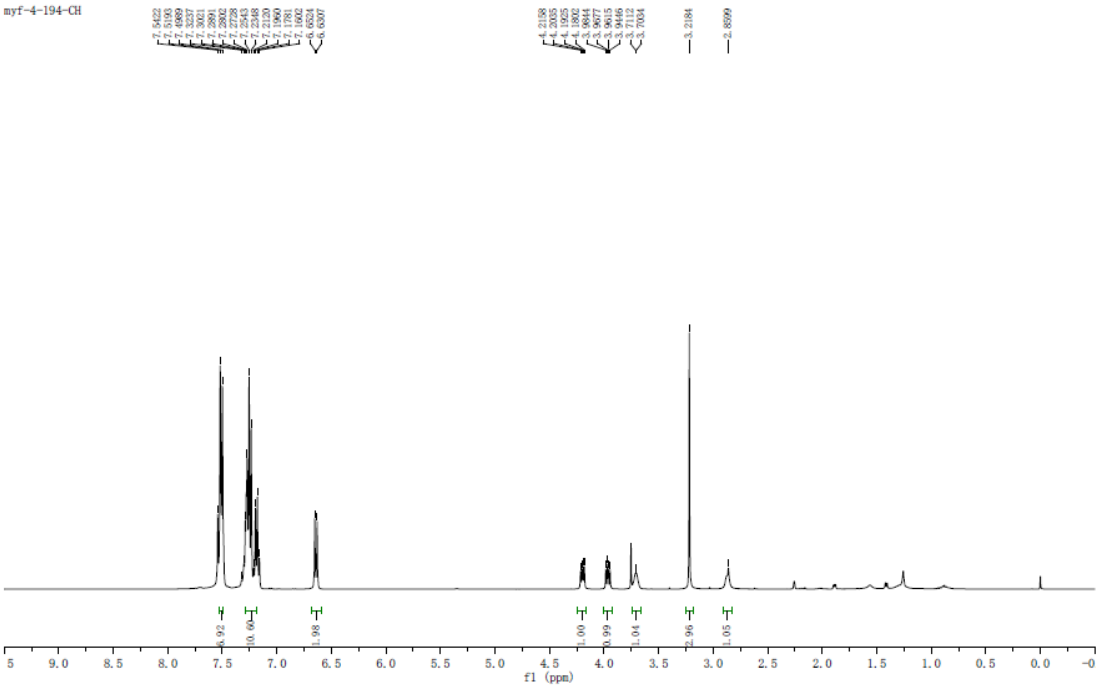

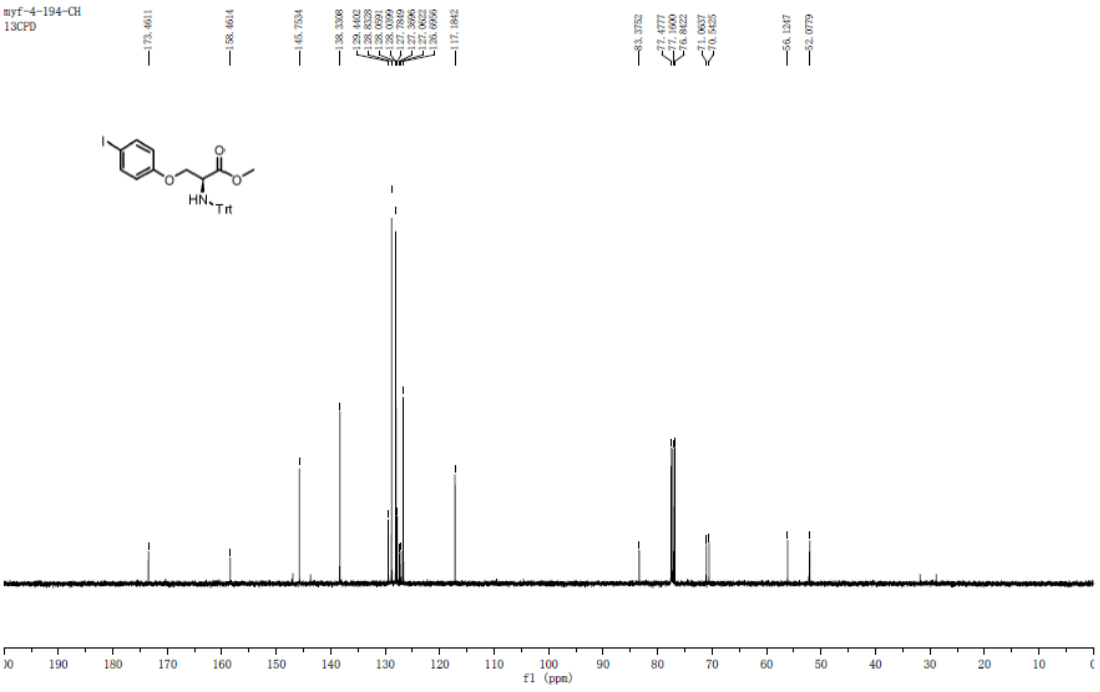

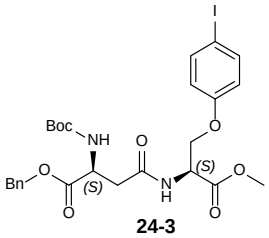
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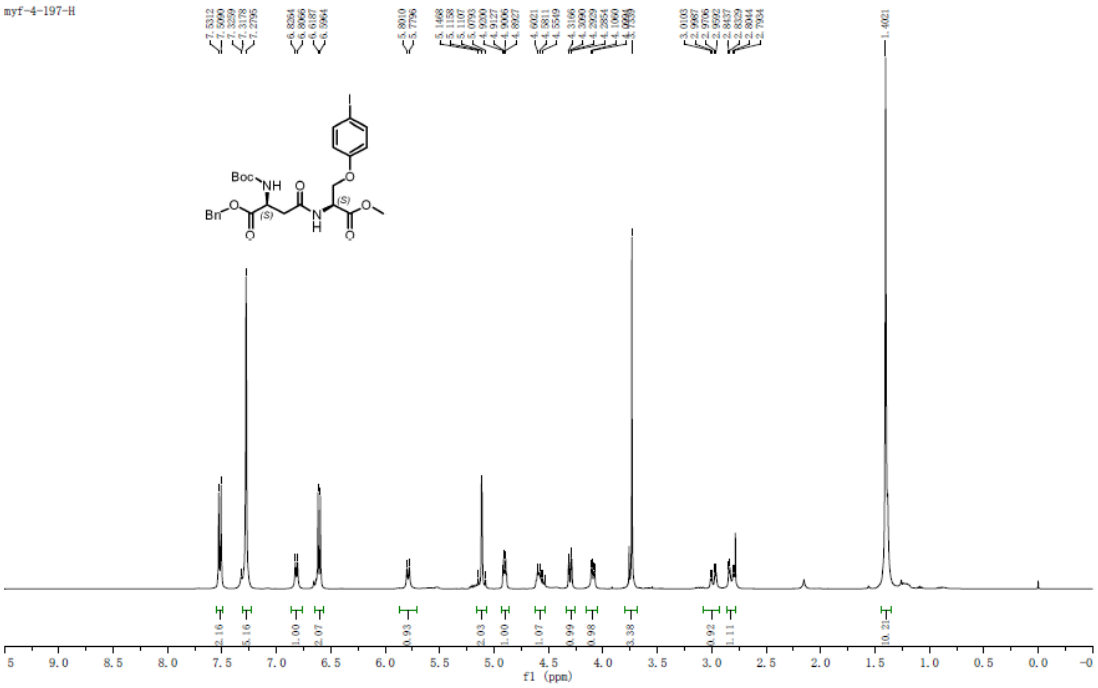
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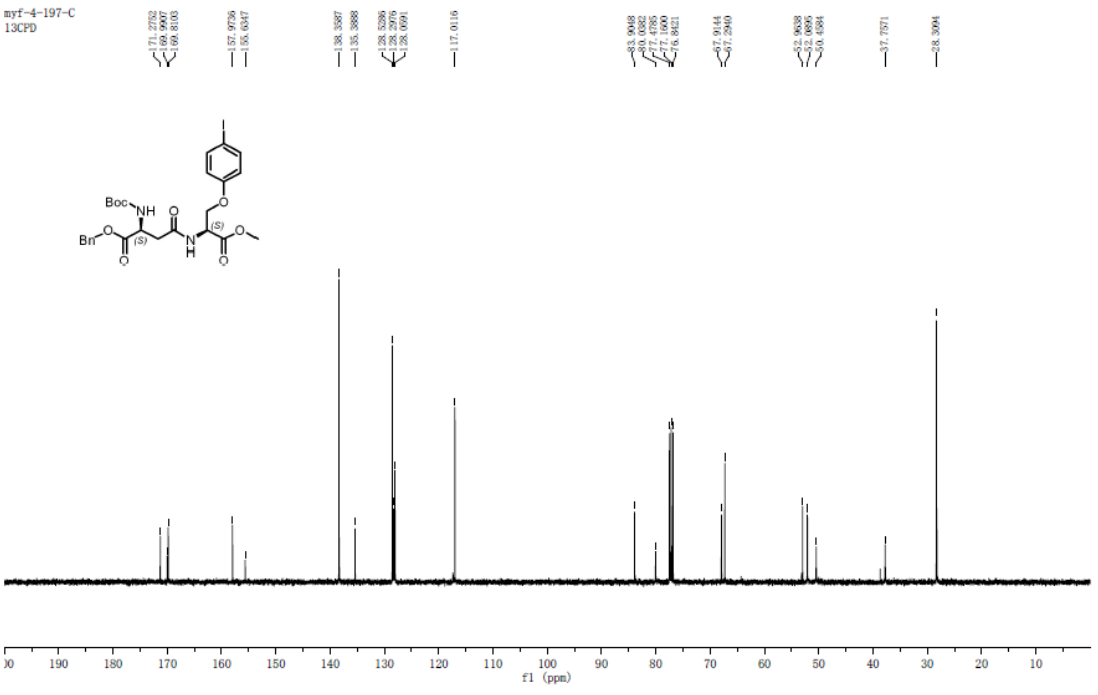
f1 (ppm)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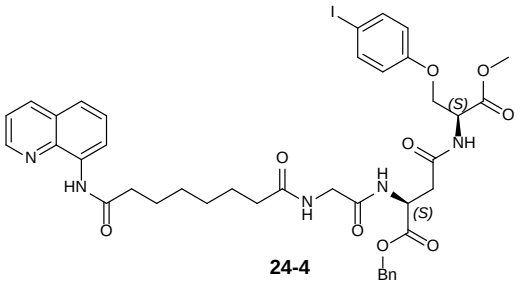
13CPD
f1 (ppm)



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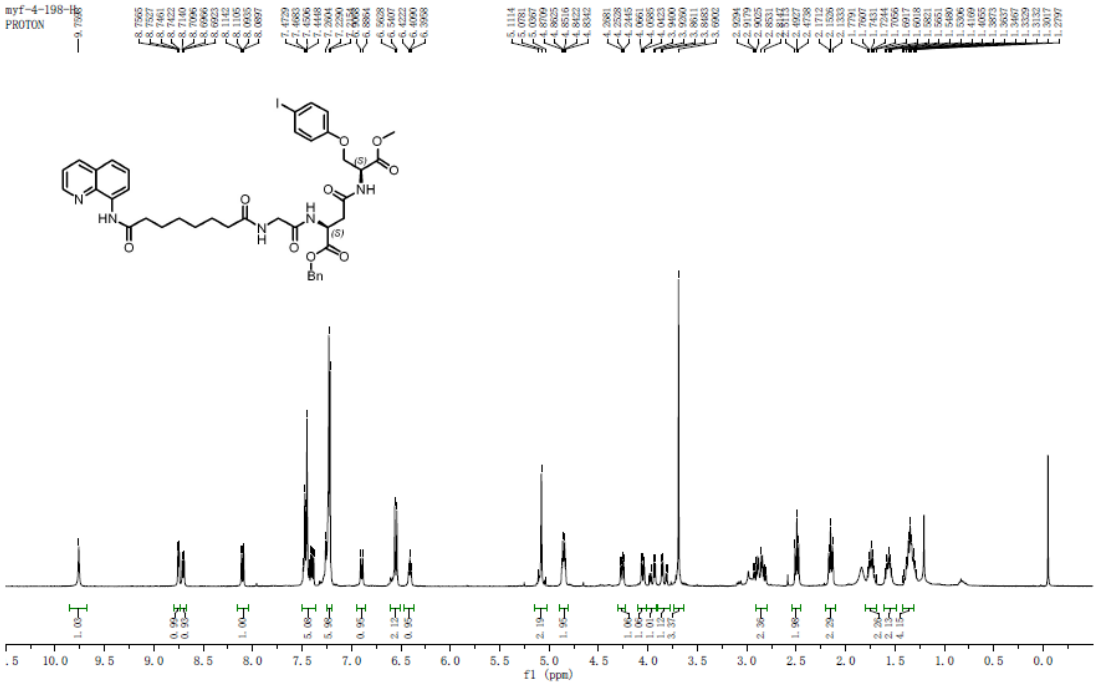

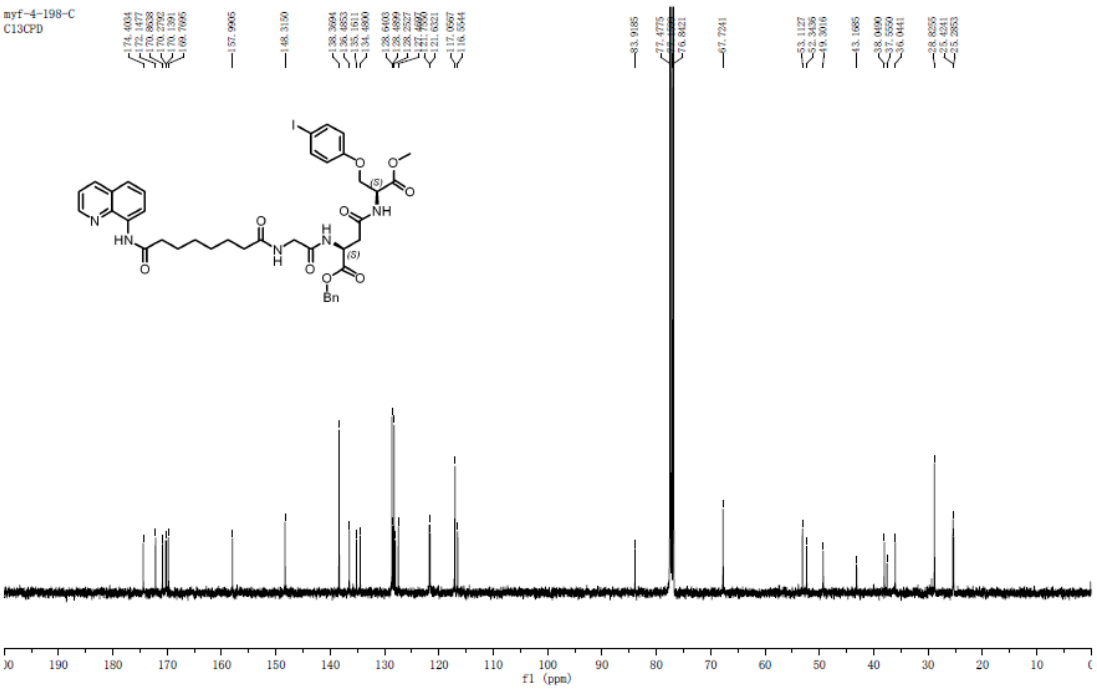

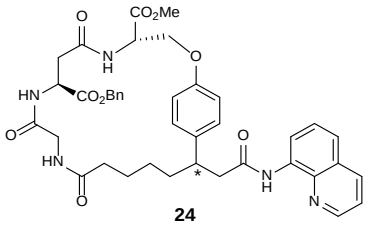

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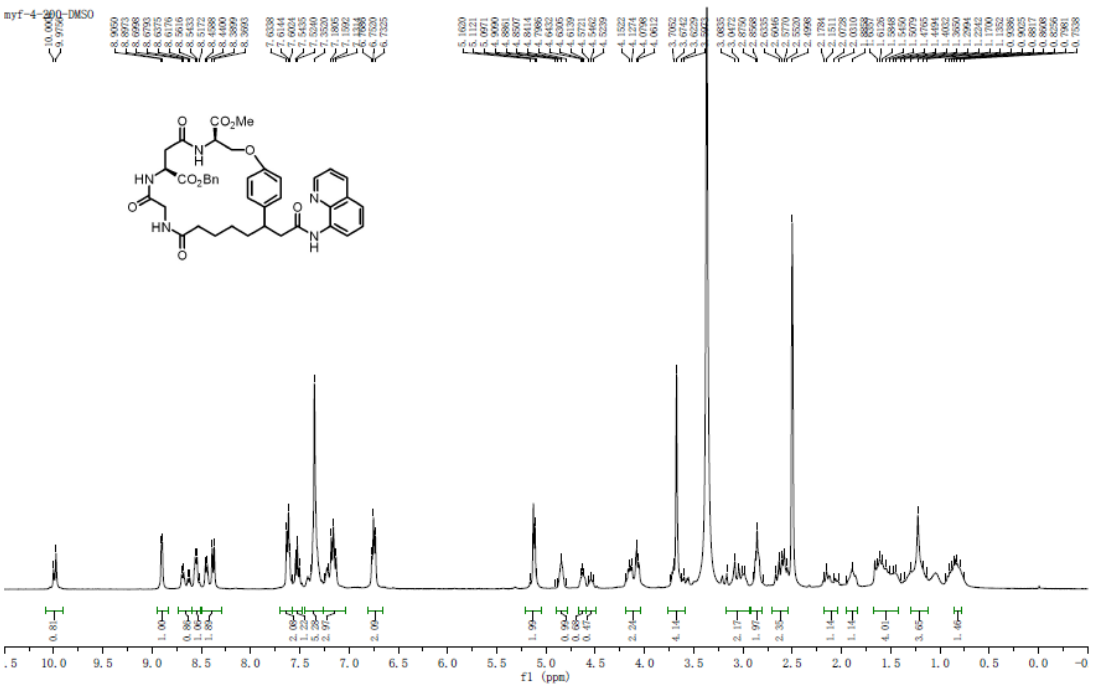
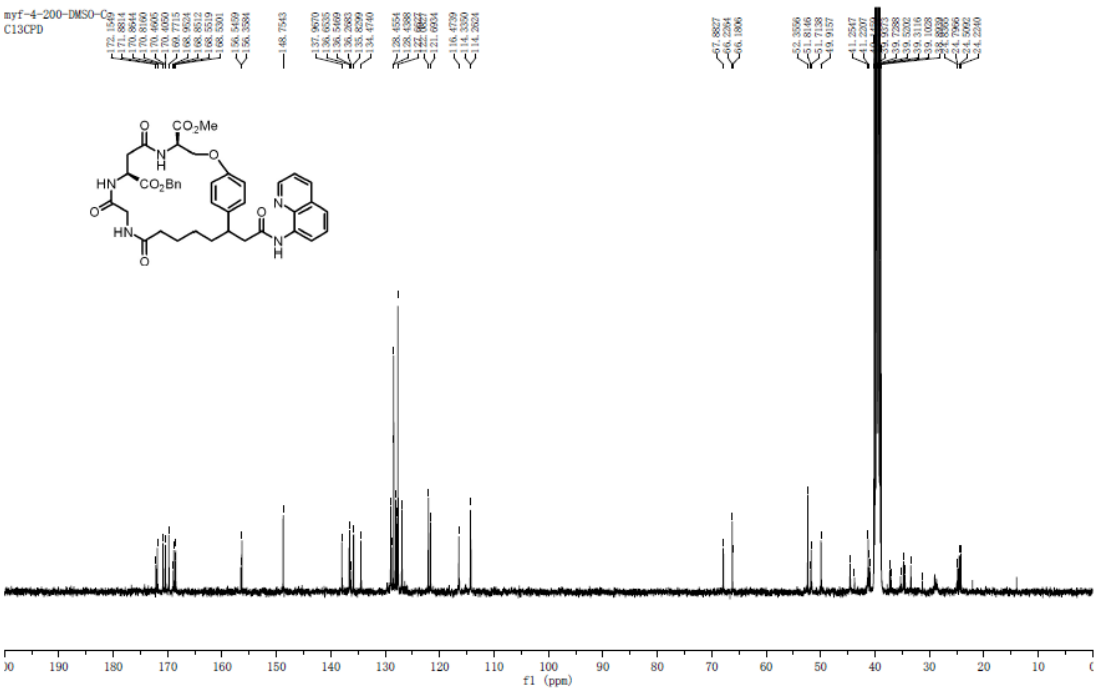
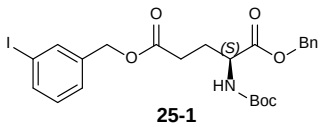
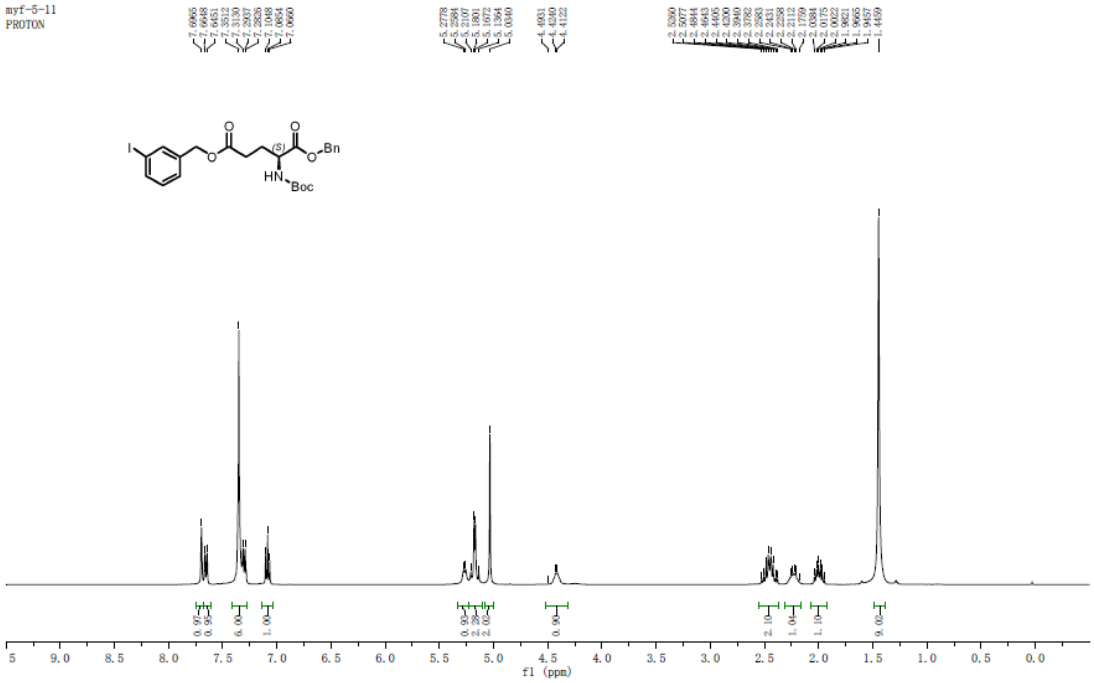
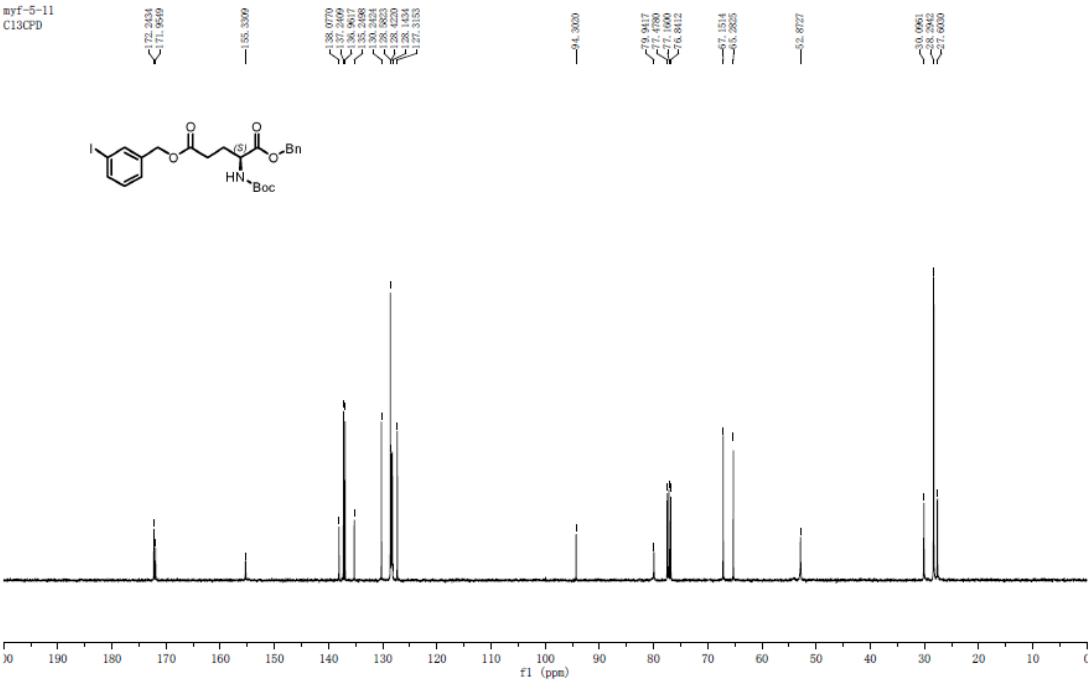


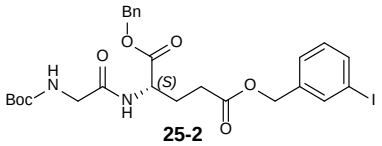




25-1



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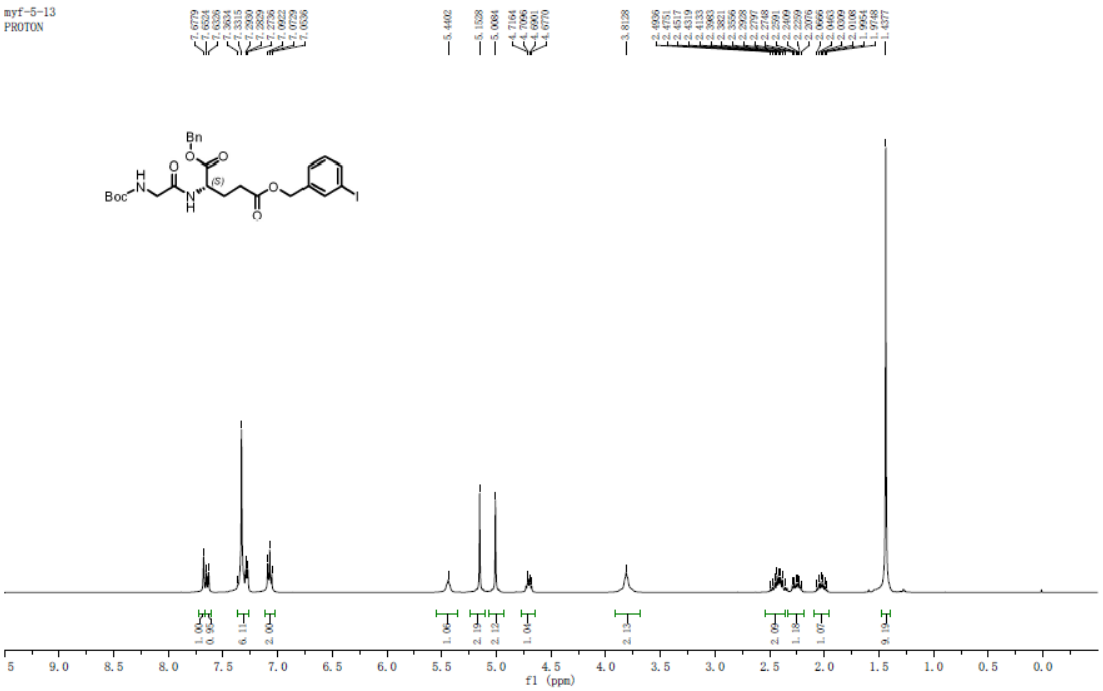
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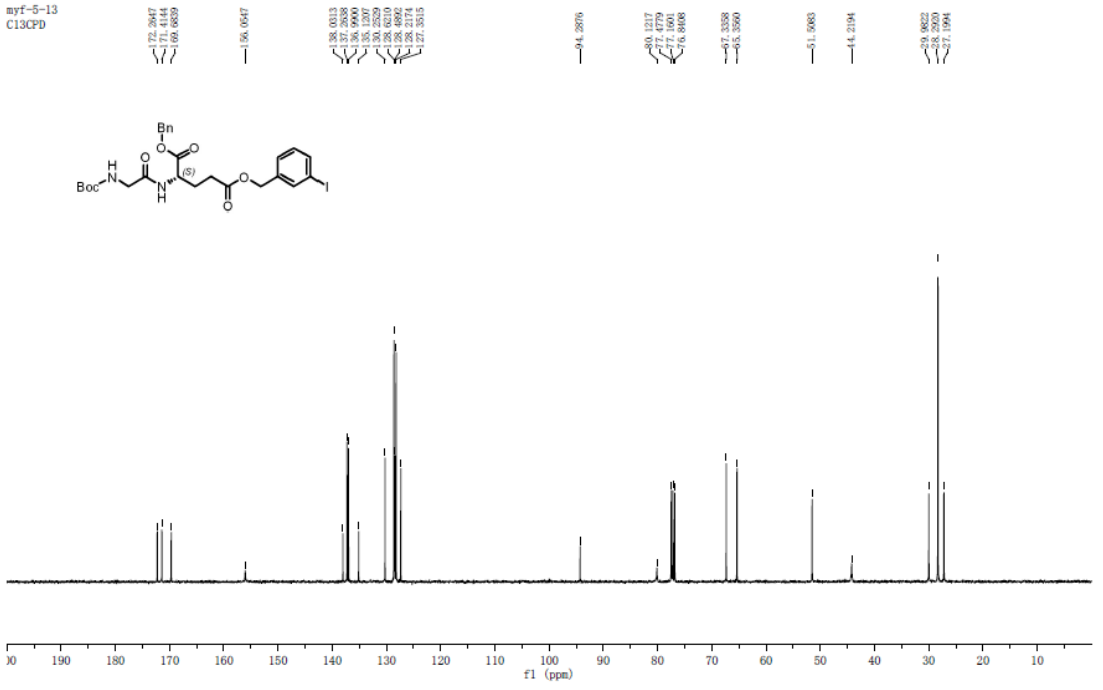
PROTON
f1 (ppm)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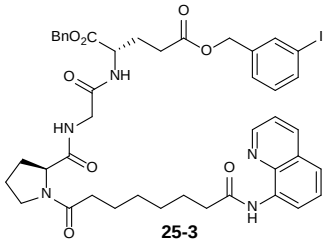
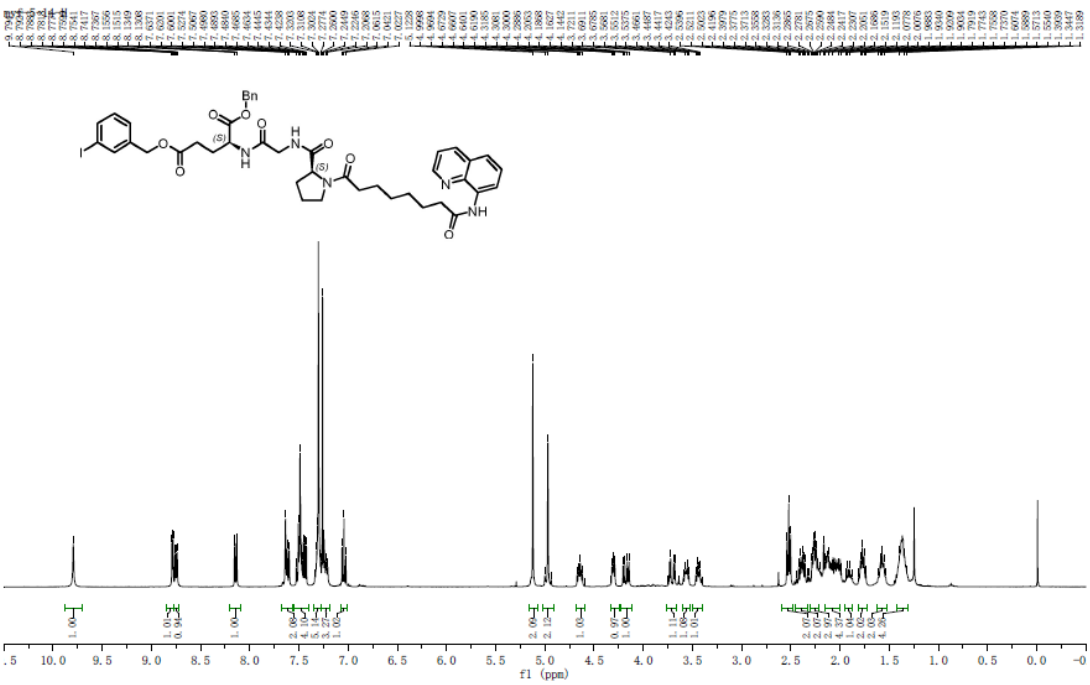
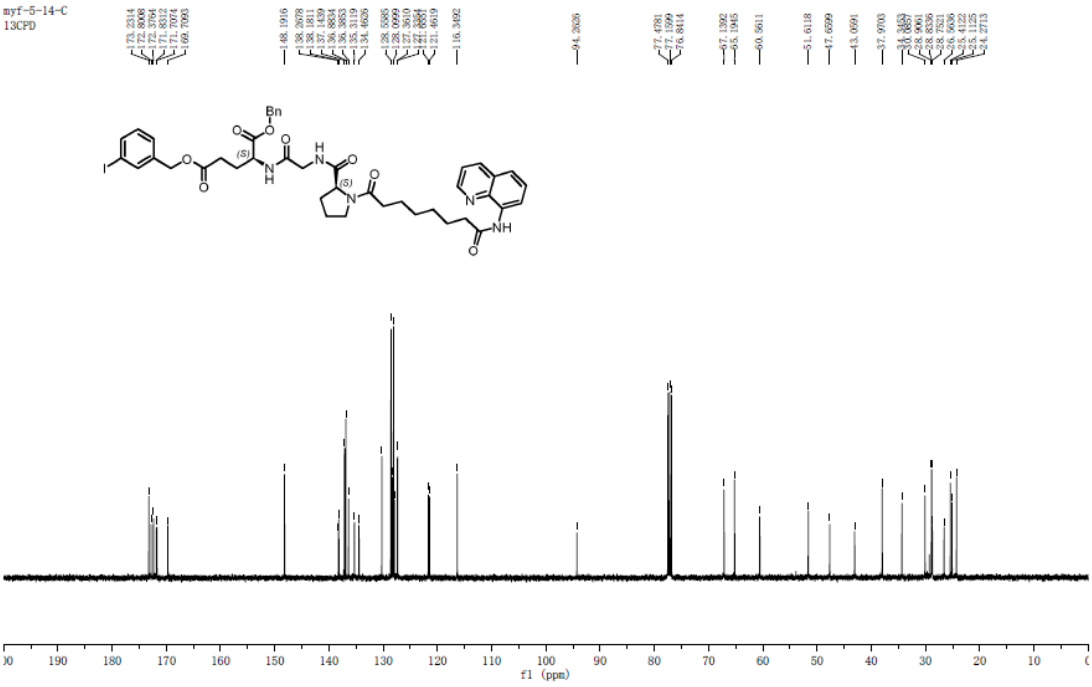
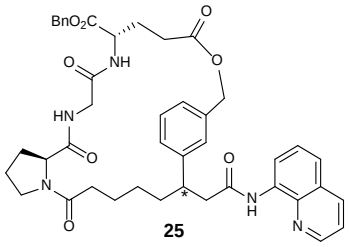
C13CPD
f1 (ppm)



25-3



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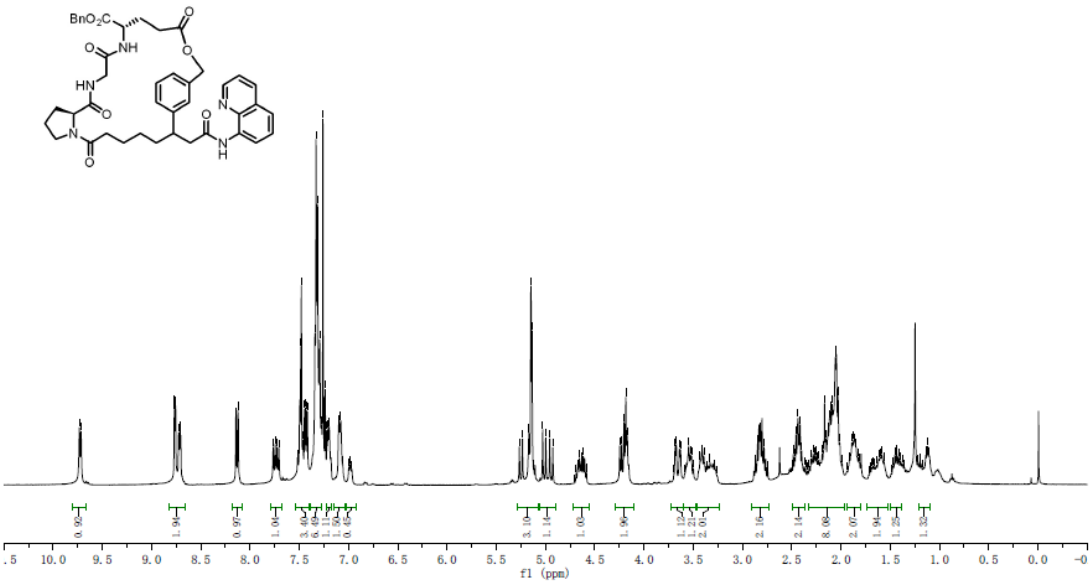
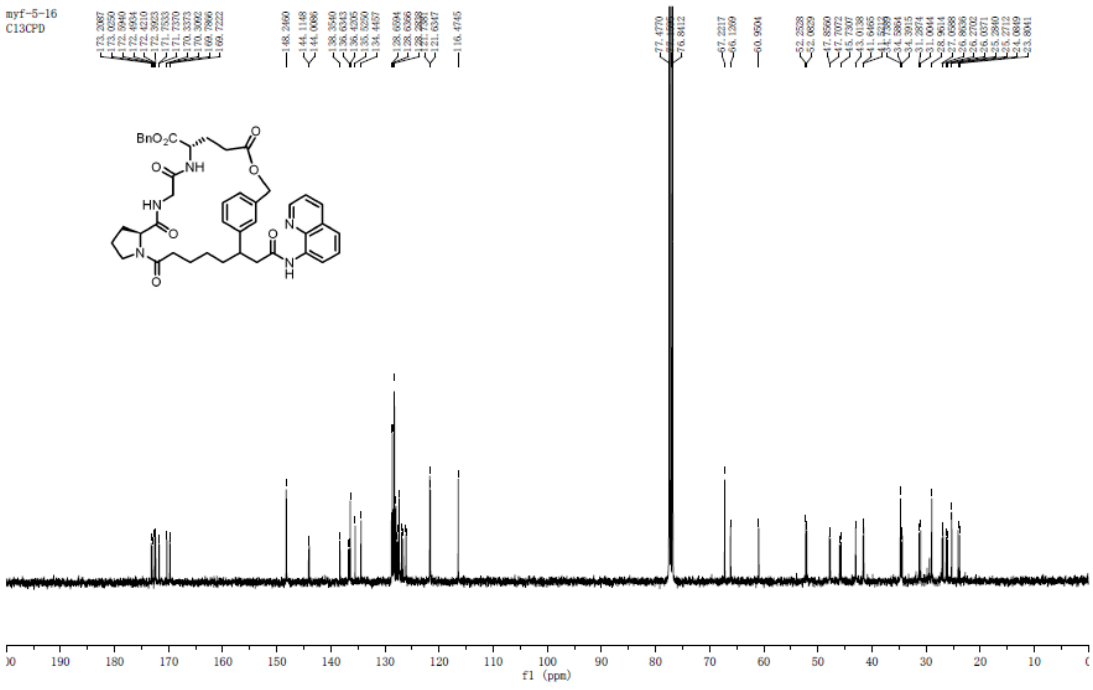

BnO2C
NH
HN
N
NH
f1 (ppm)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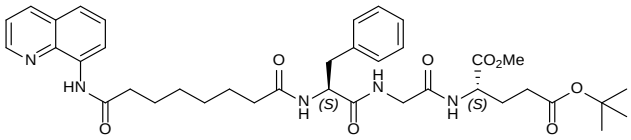
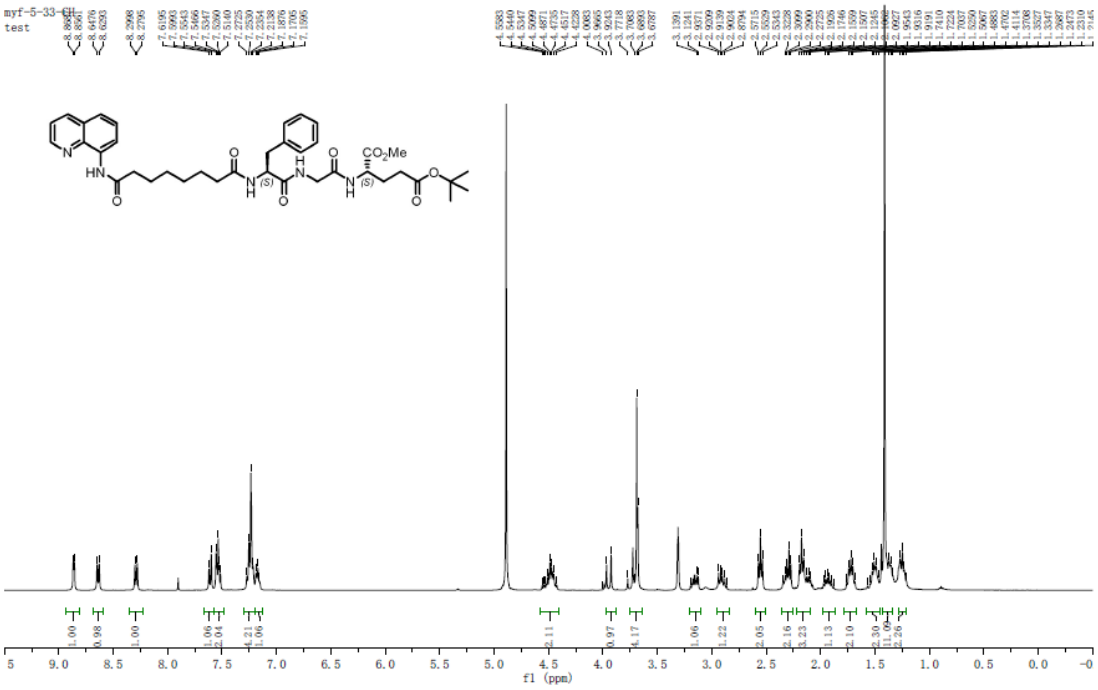
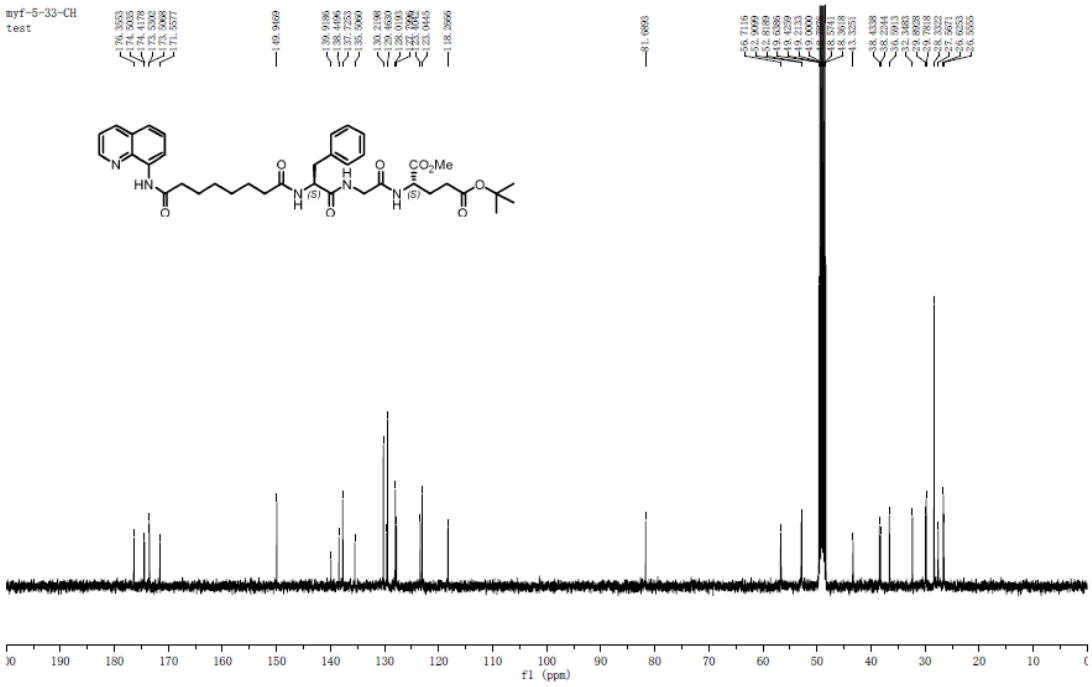
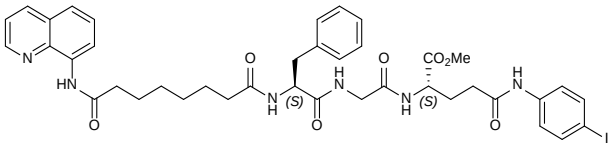
C13CPD
BnO2C
NH
HN
N
NH
f1 (ppm)



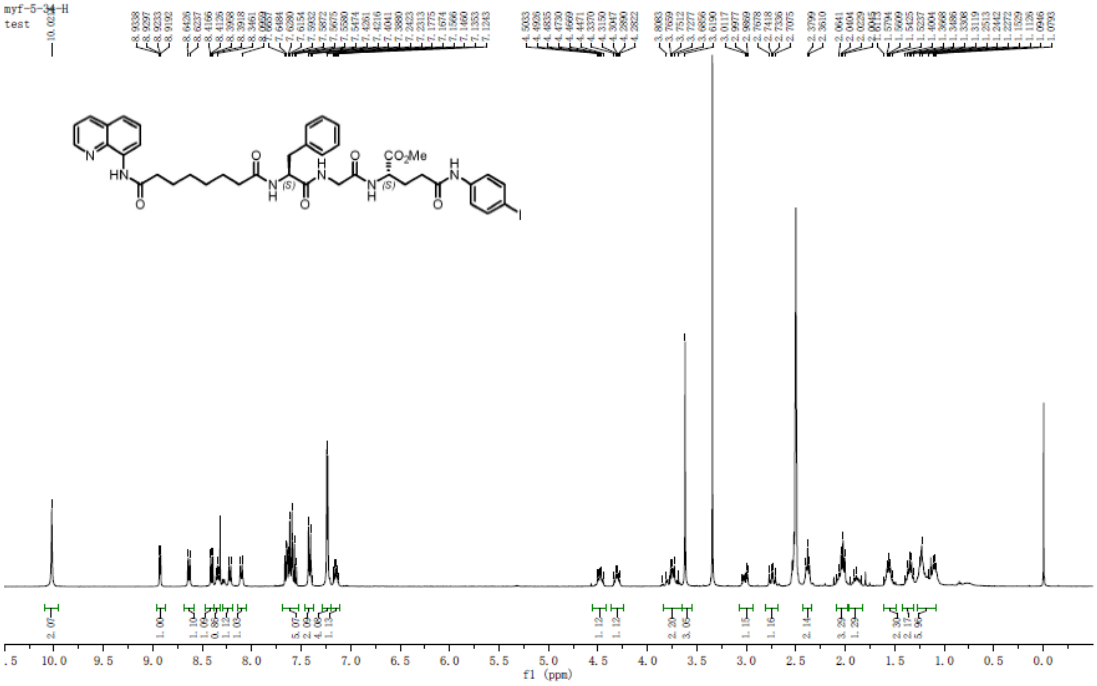
26-1

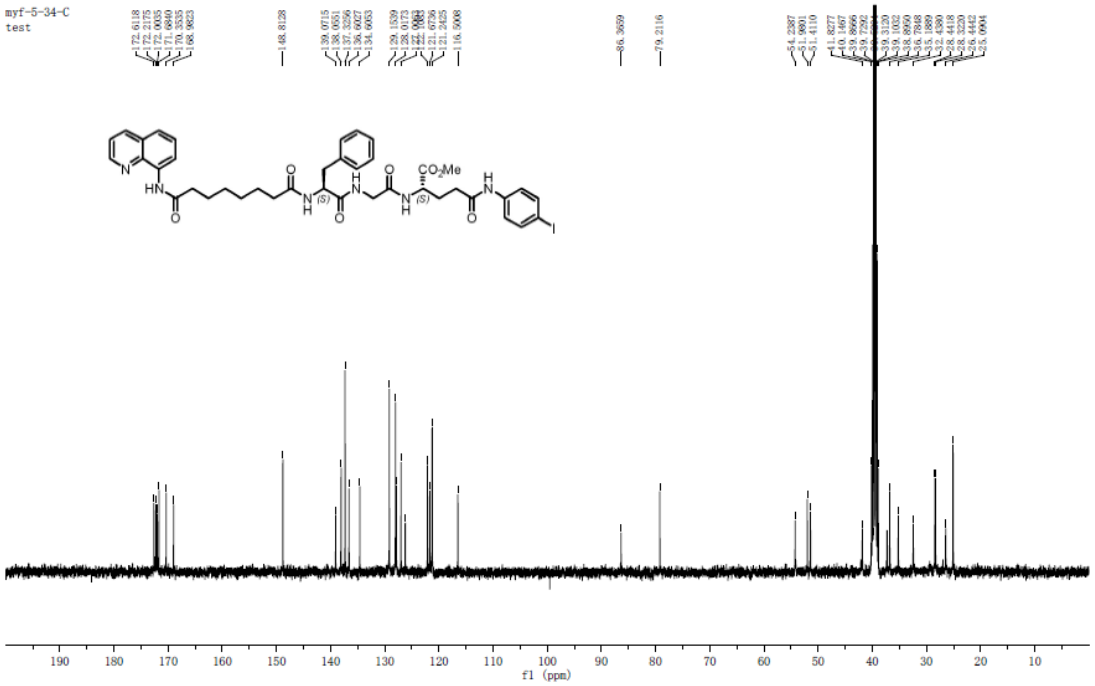


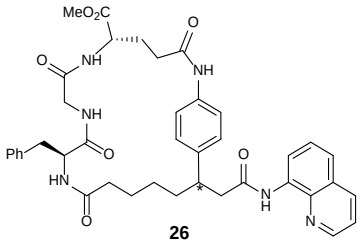




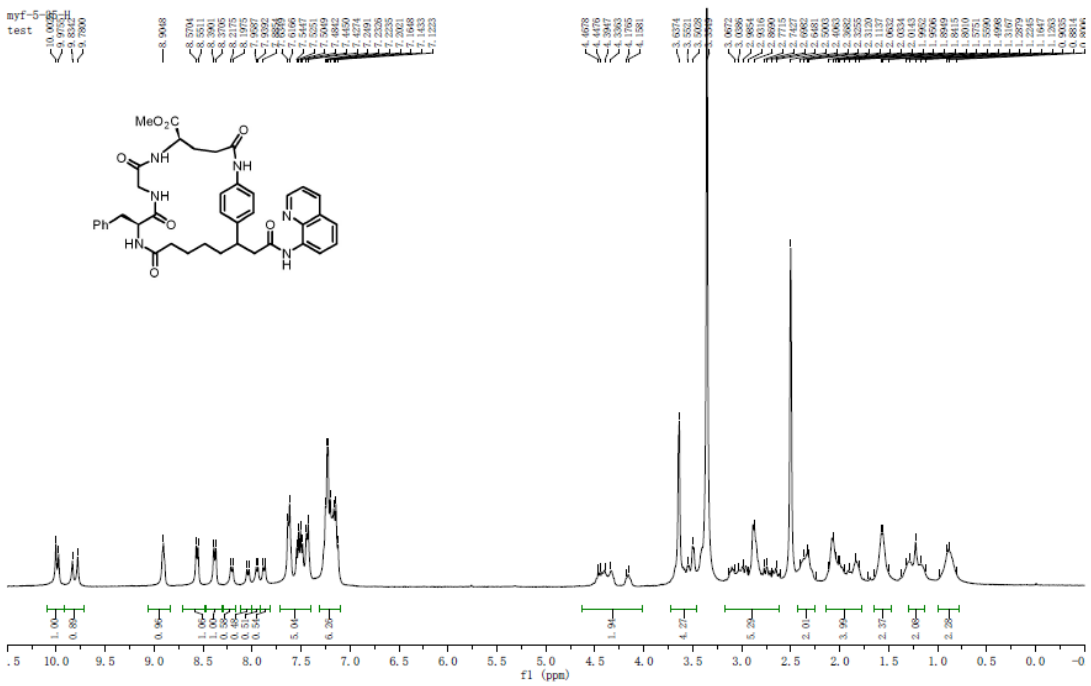
26-2

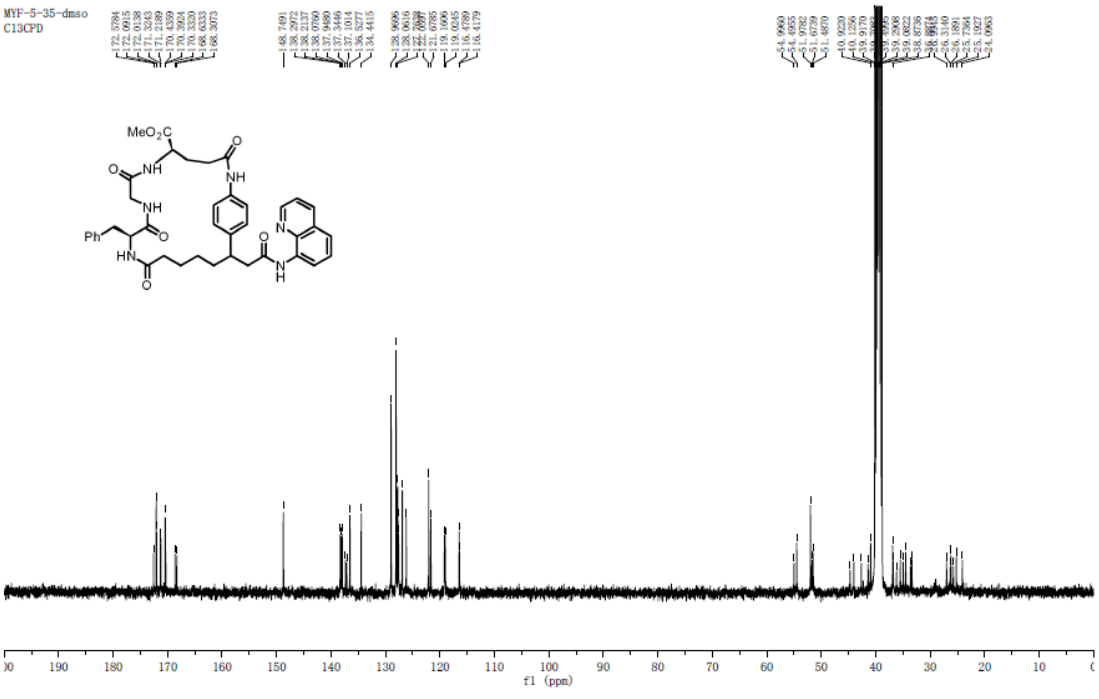


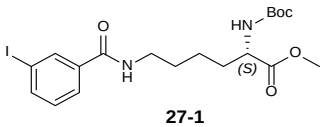




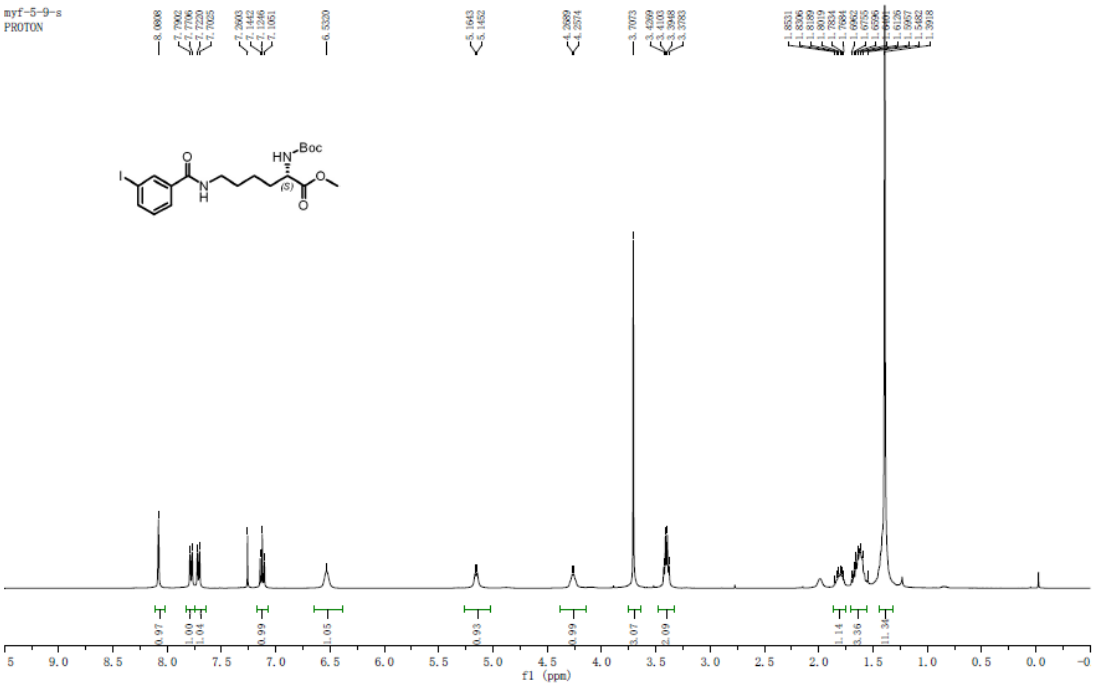
26

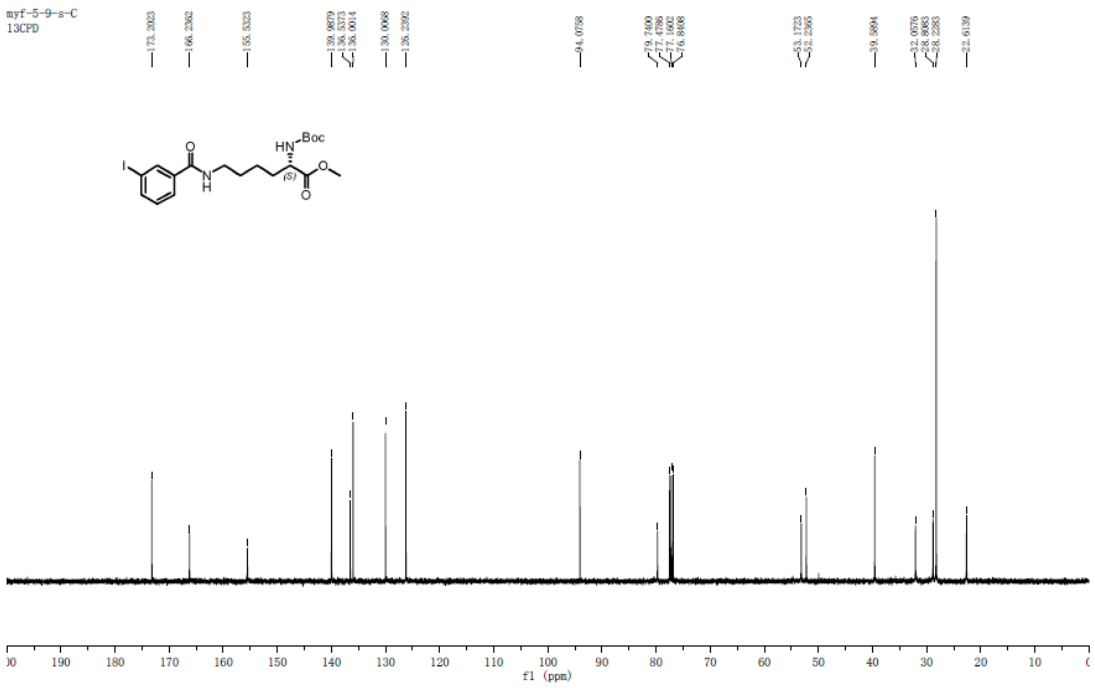


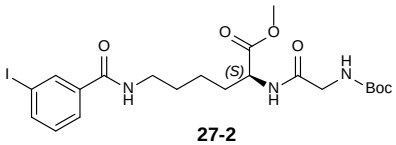




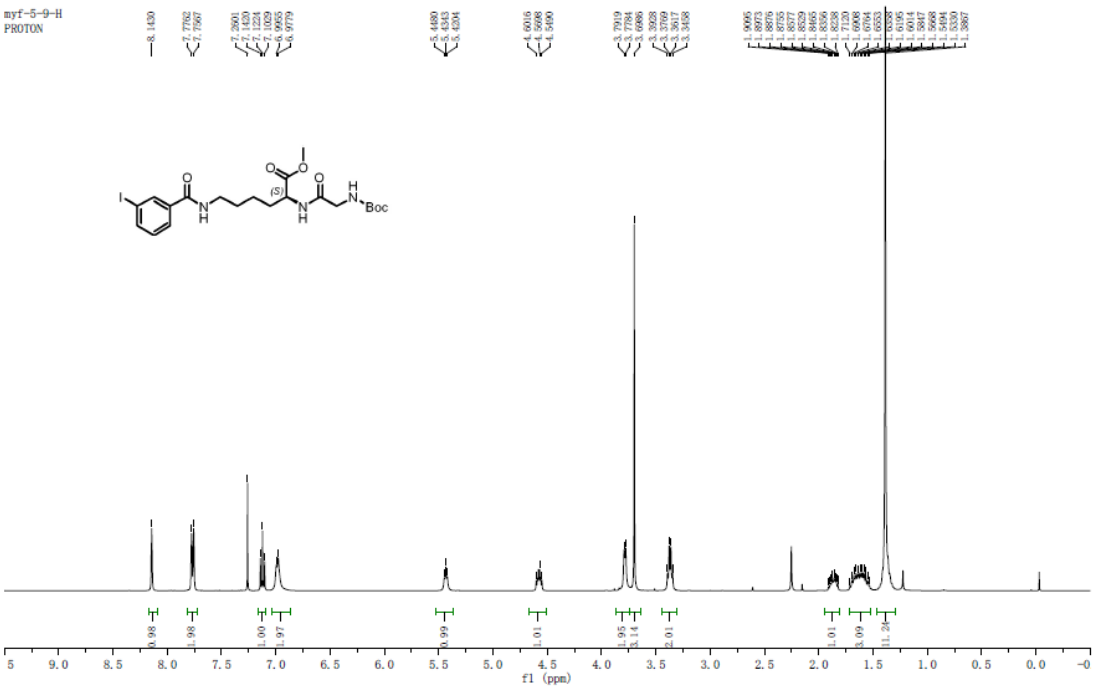
27-1

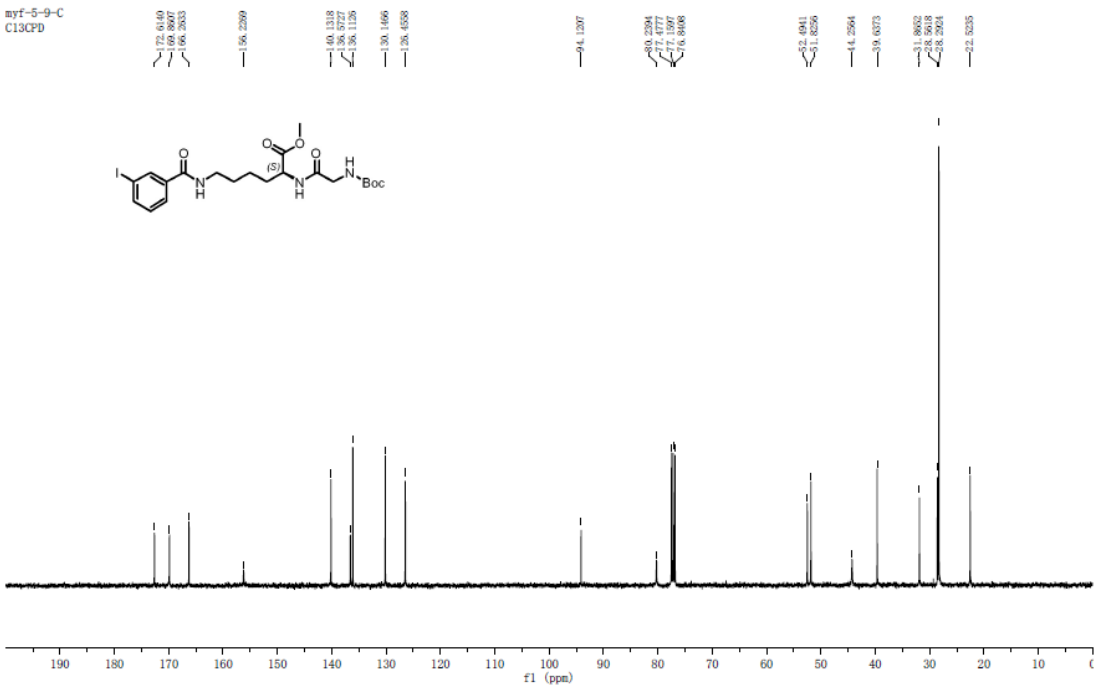


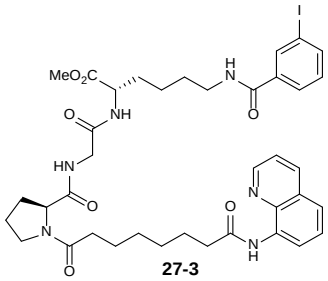




27-2







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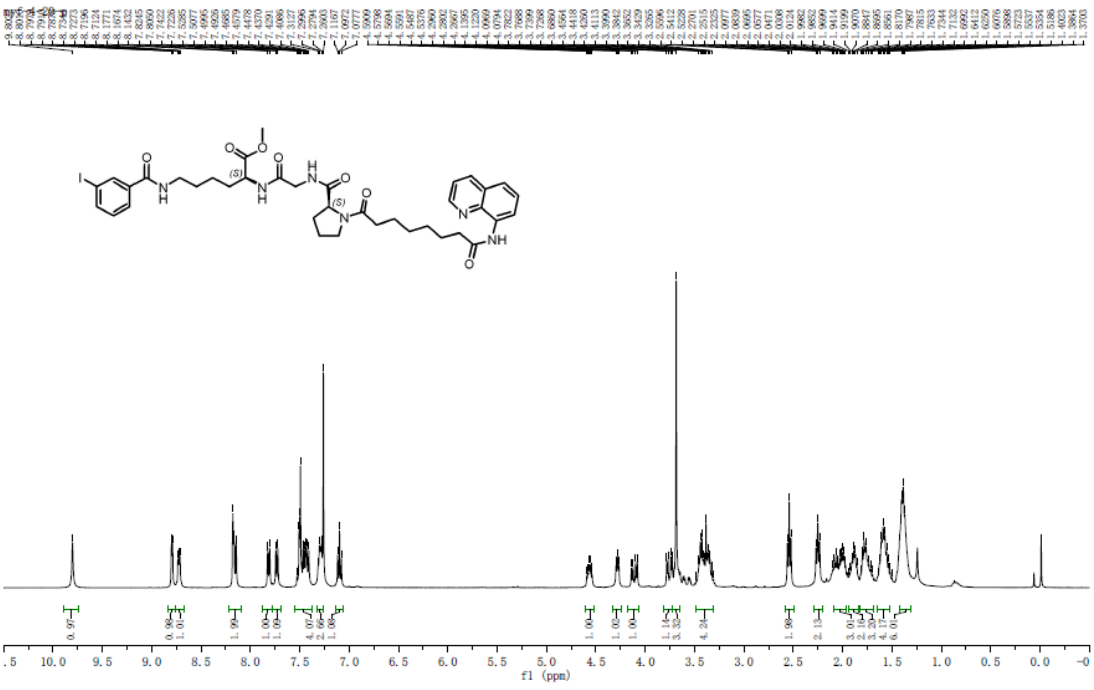

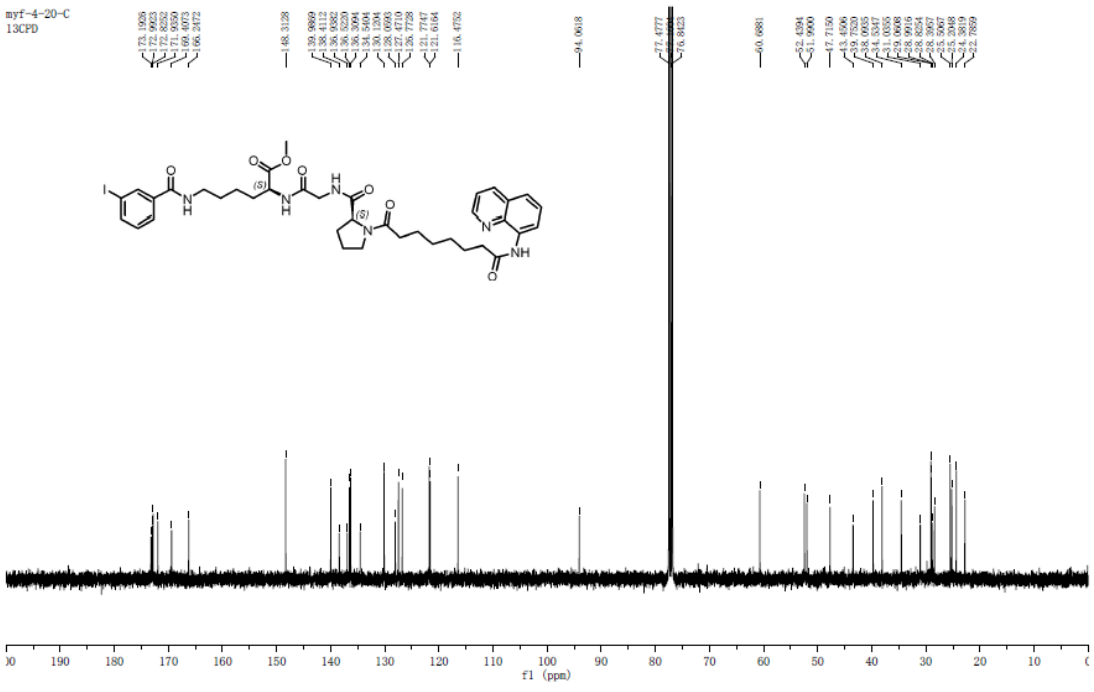

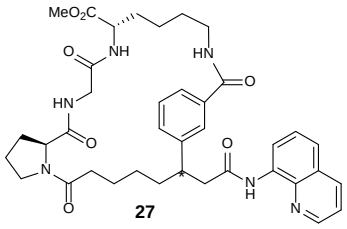

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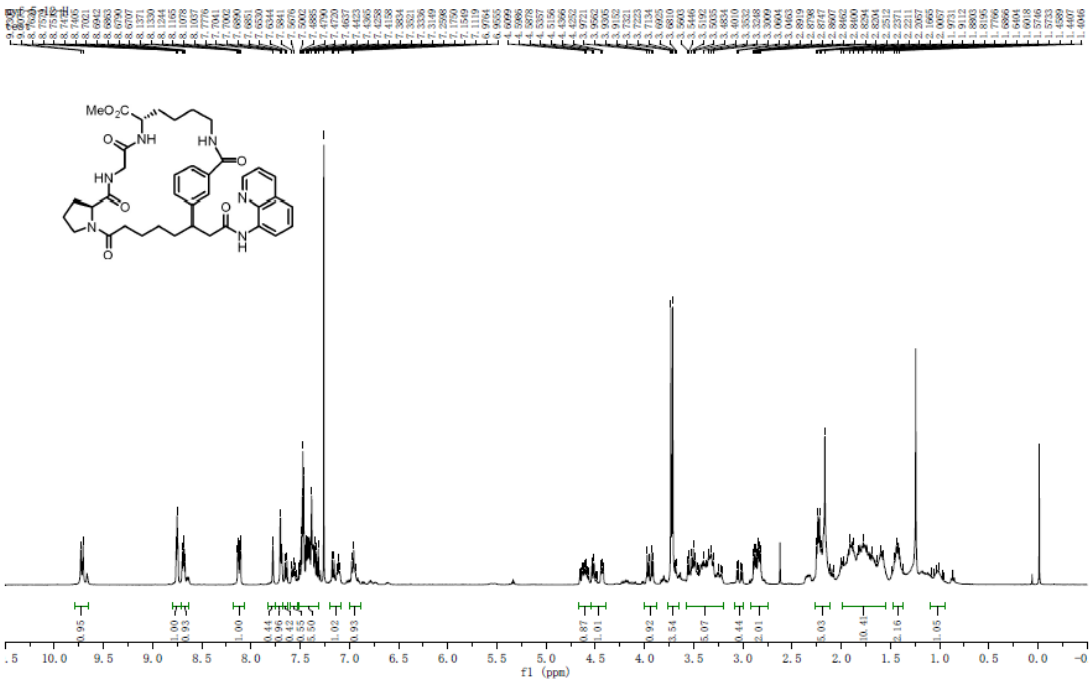

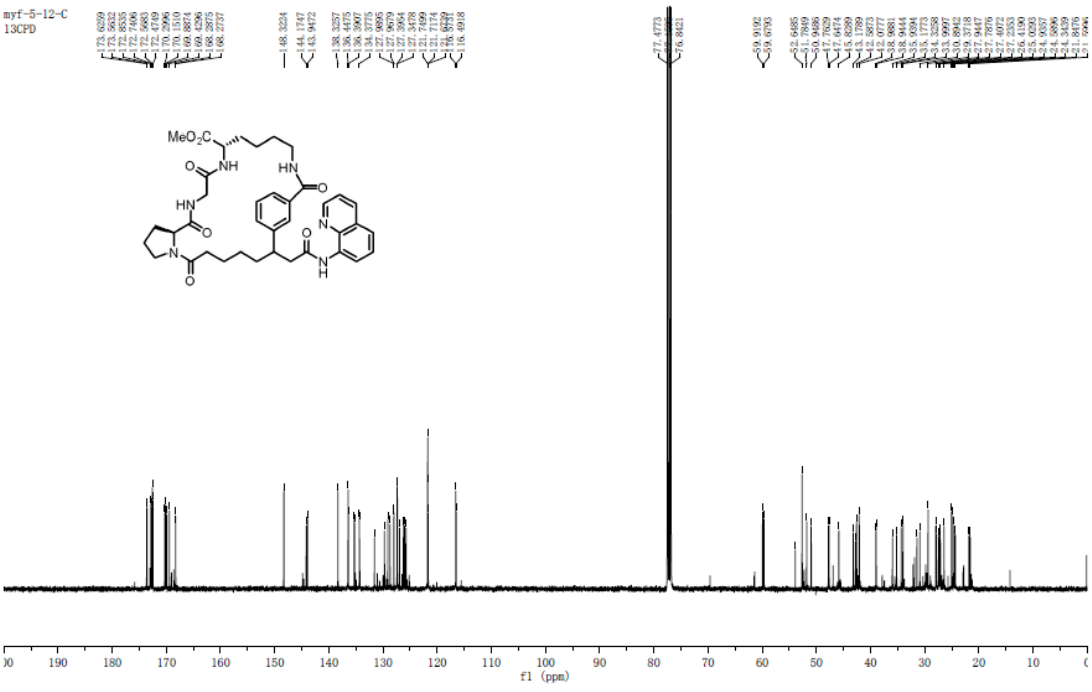

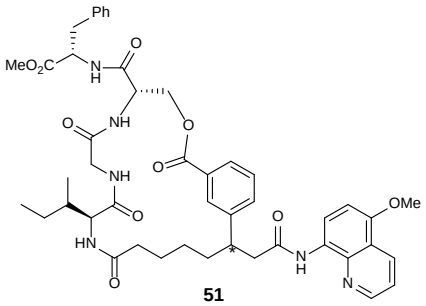

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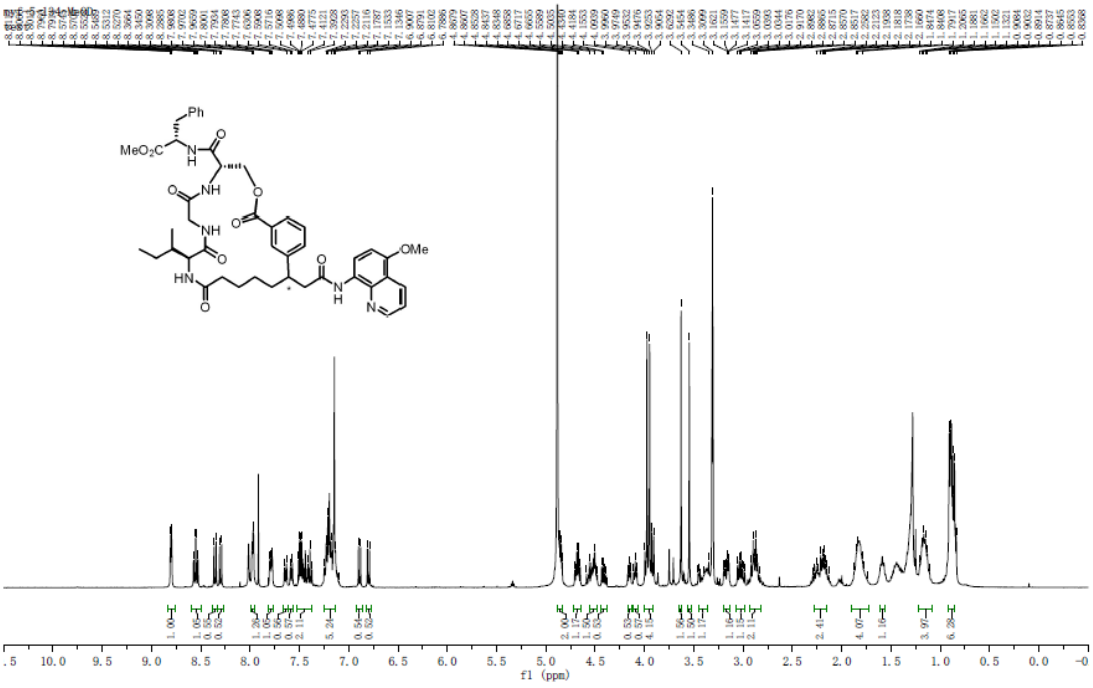

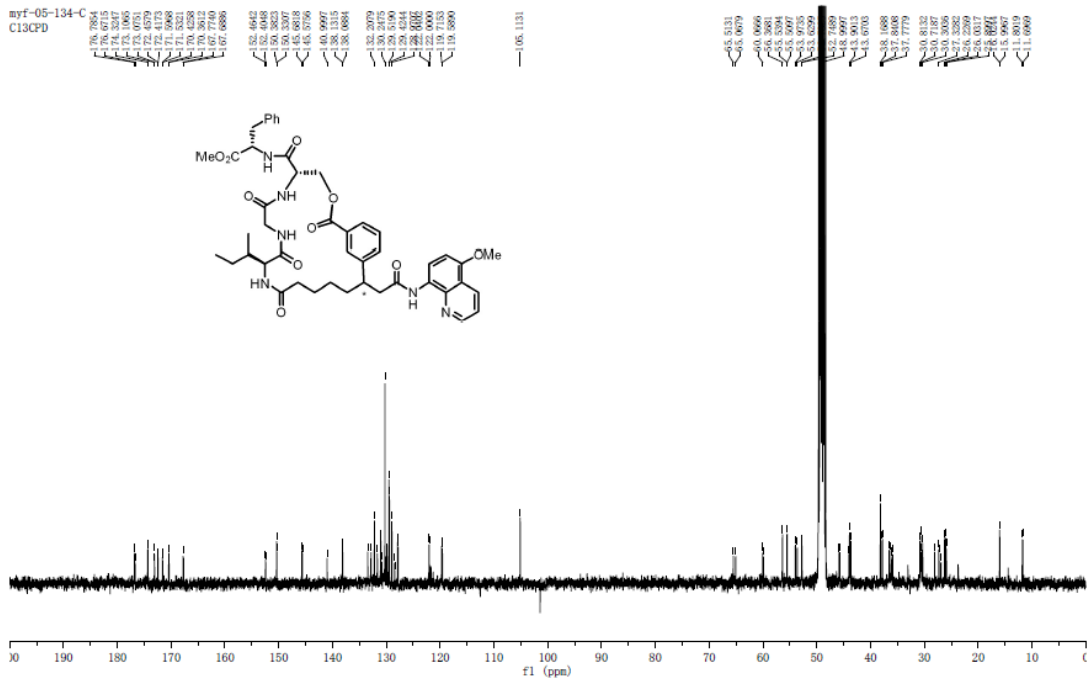

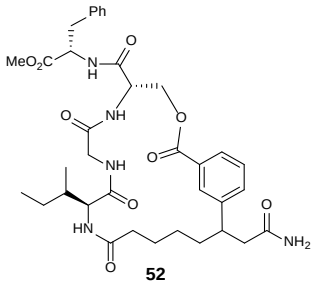

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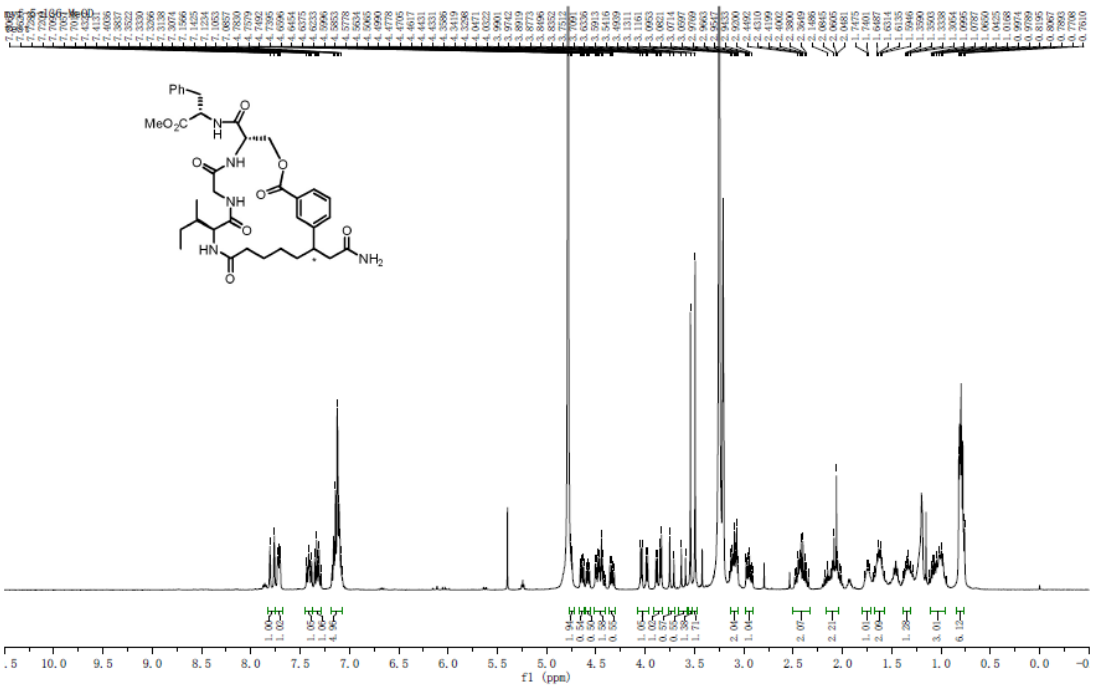
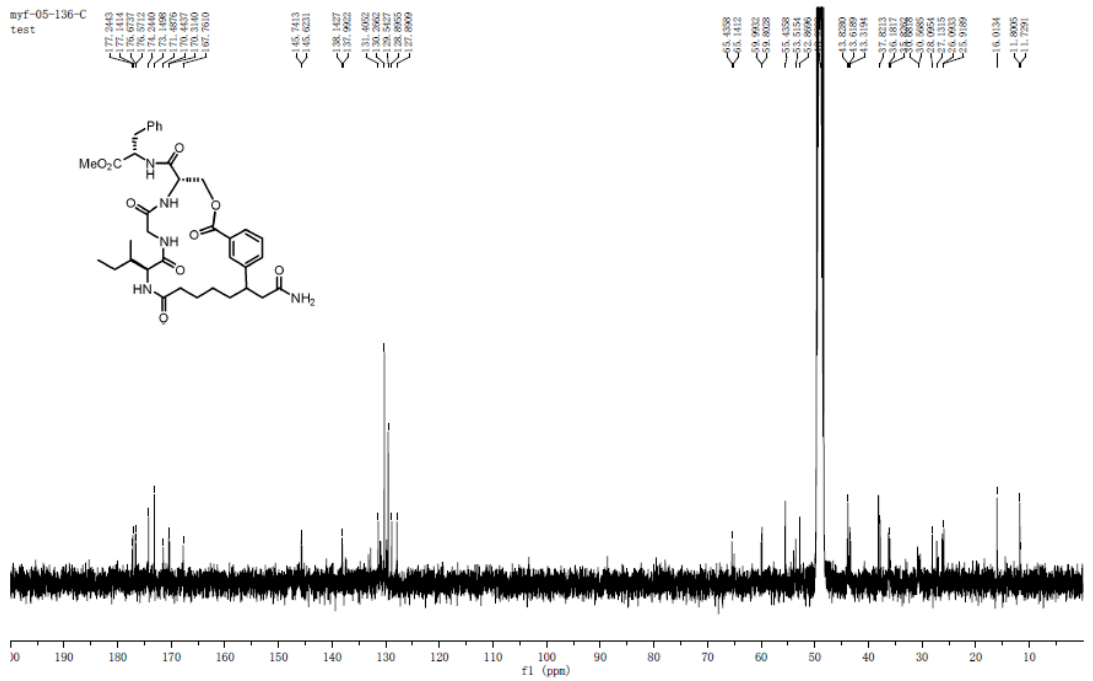
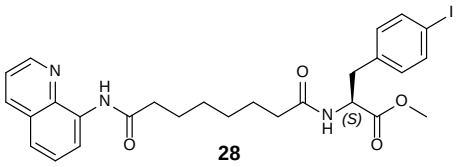
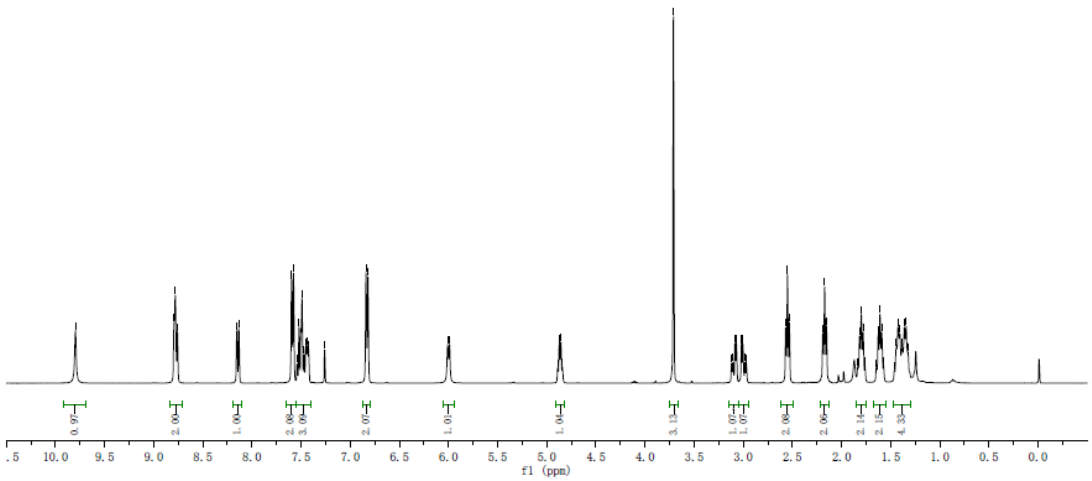
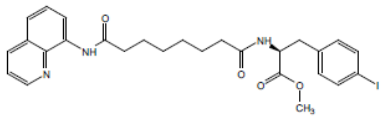


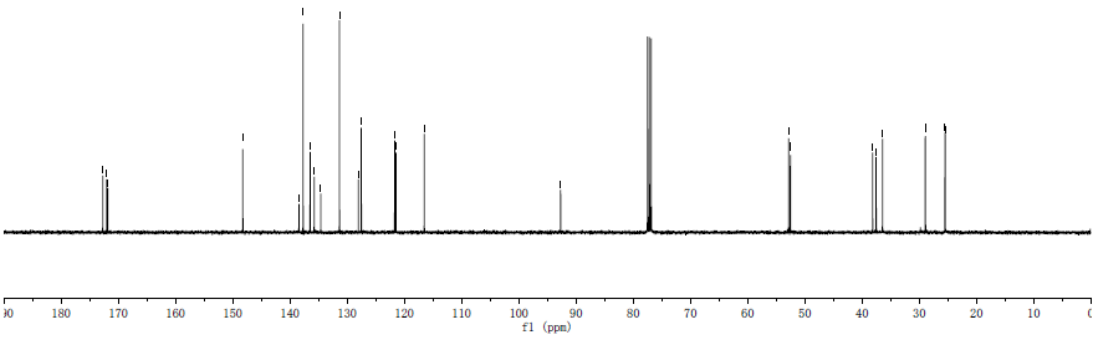


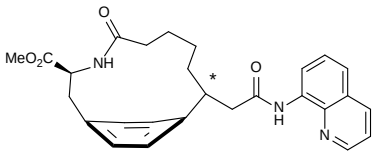


28



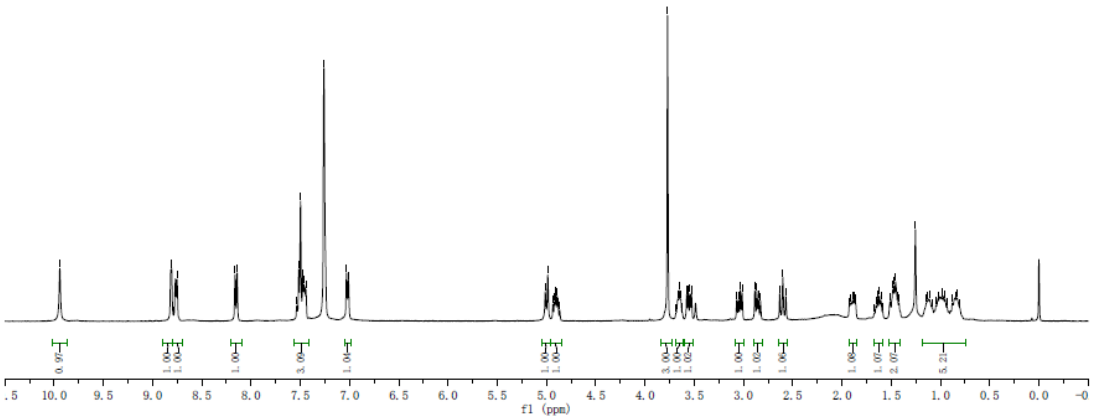


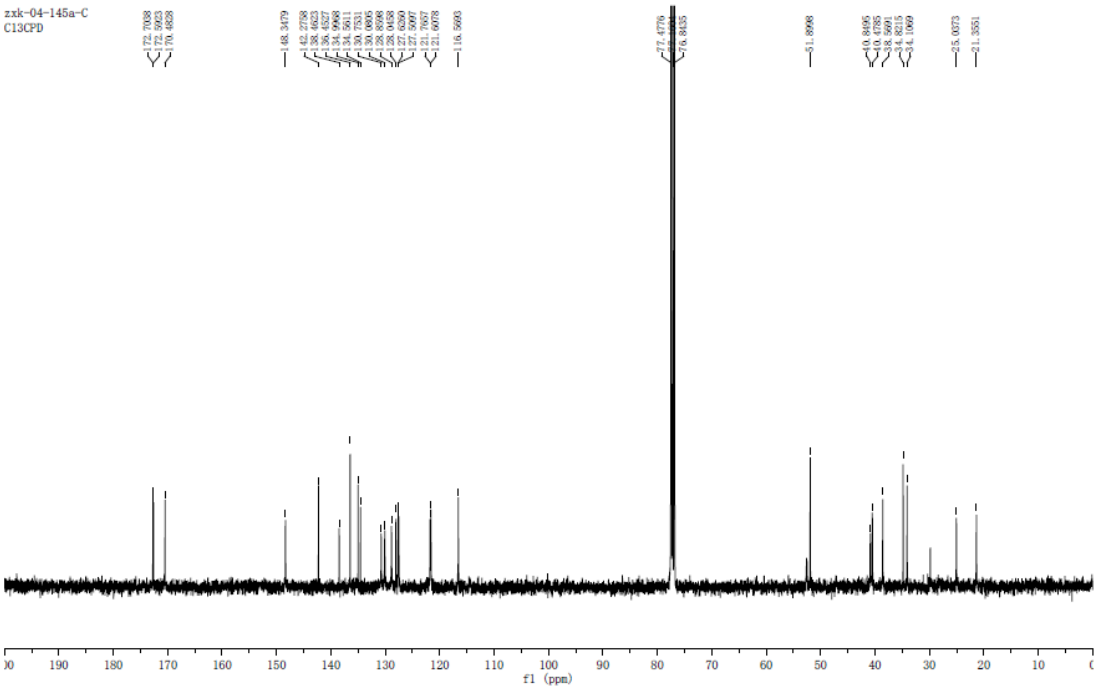


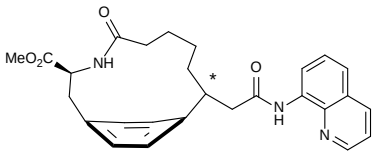

O
MeO2C
NH
*
O
N
H
N

29a

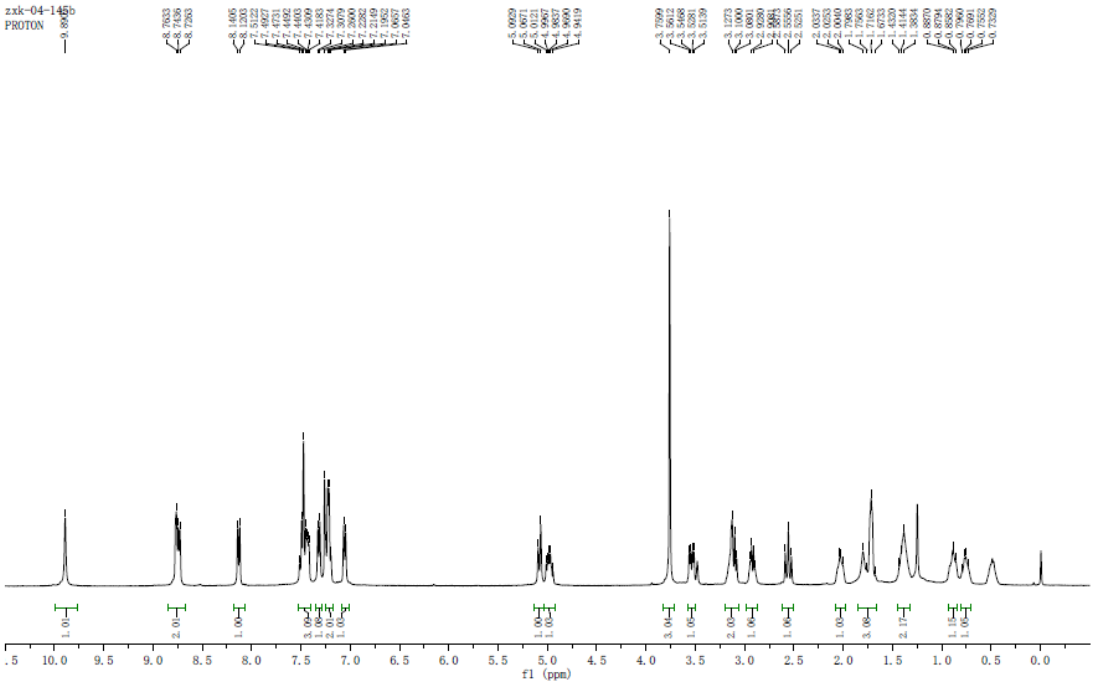

zxk-04-145a
PROTON

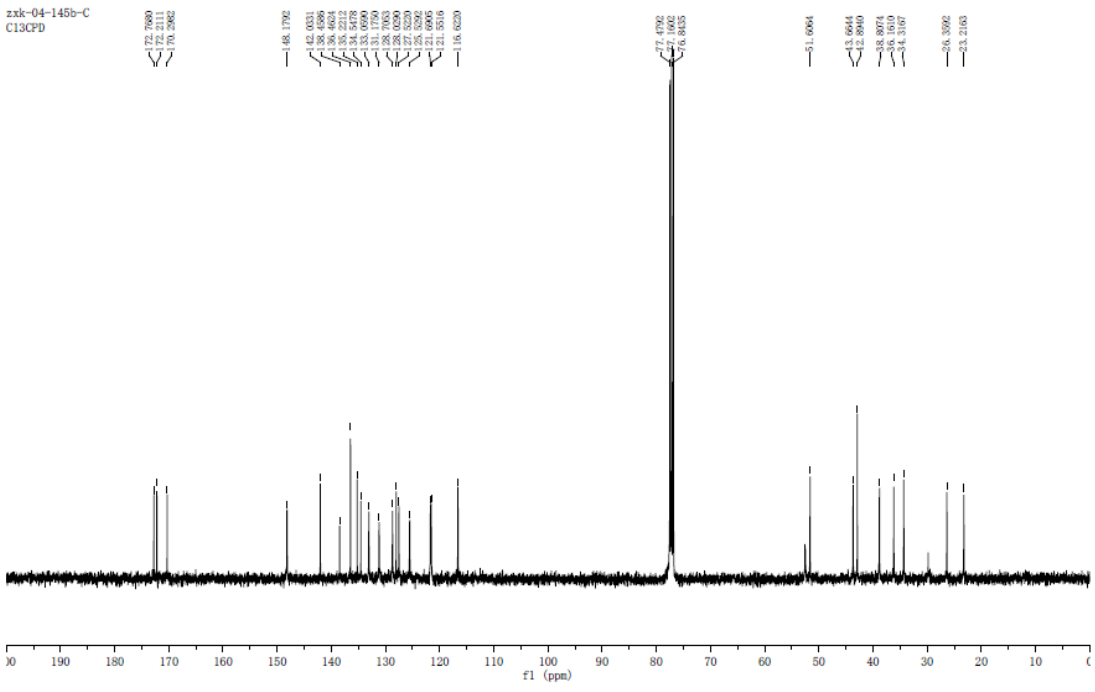

f1 (ppm)

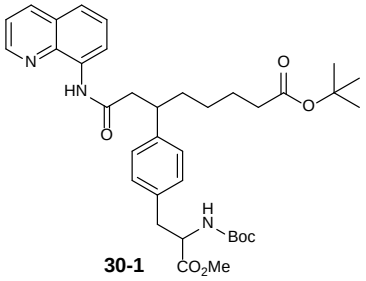

zxk-04-145a-C
C13CPD
f1 (ppm)


O
MeO2C
NH
*
O
N
H
N

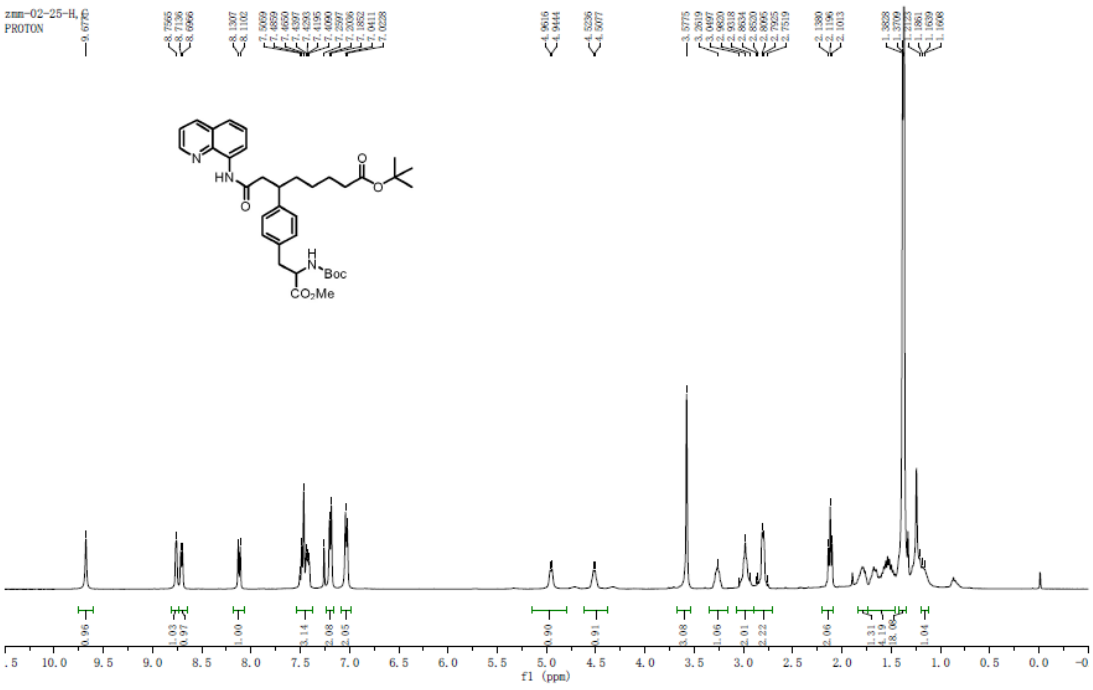
29b

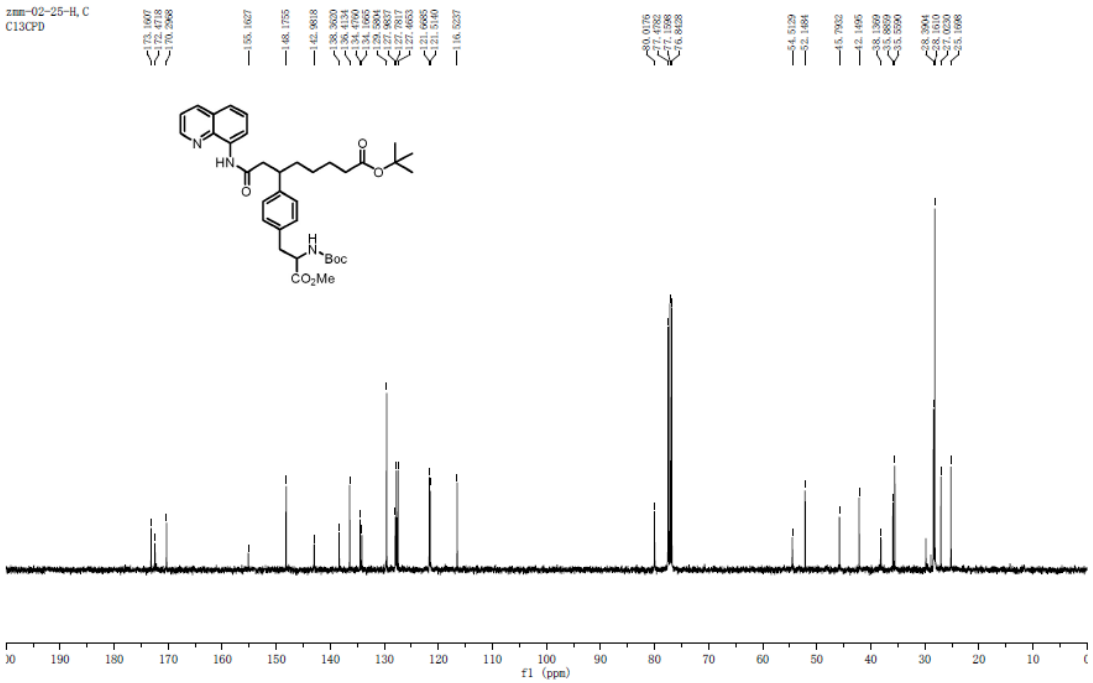

zxk-04-145b
PROTON
f1 (ppm)


zxk-04-145b-C
C13CPD
f1 (ppm)


N
HN
O
O
O
H
N
Boc
CO2Me

30-1


zmm-02-25-H,
PROTON
f1 (ppm)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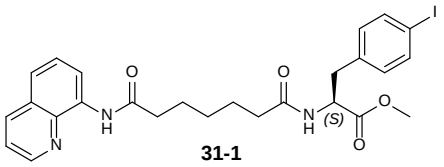
C13CPD
f1 (ppm)



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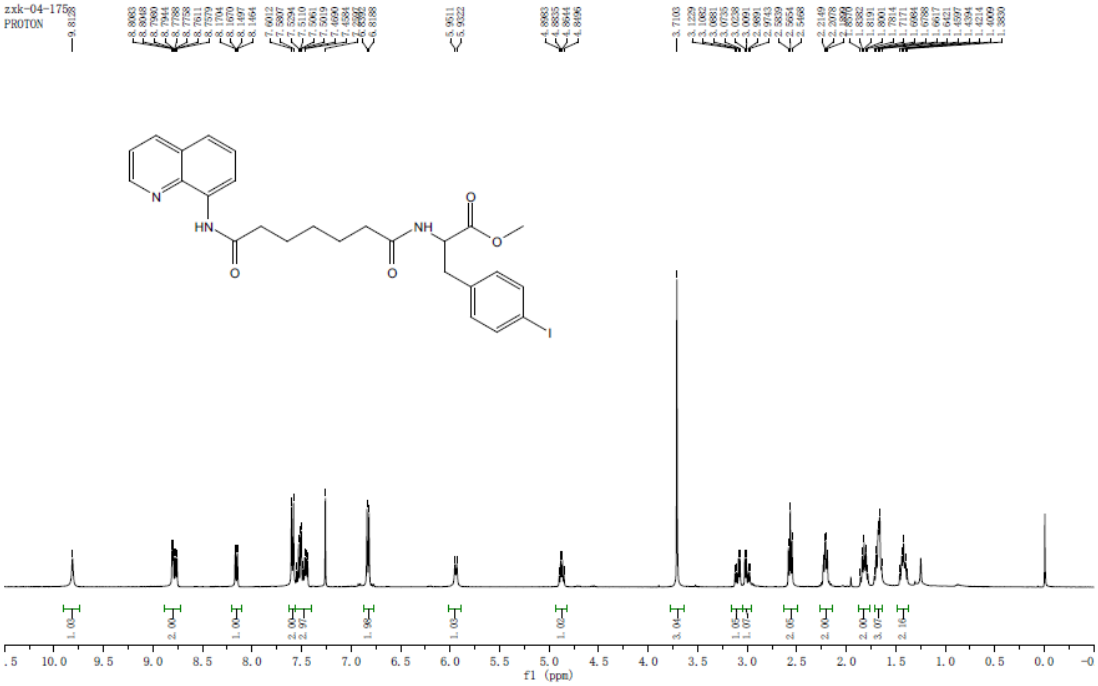
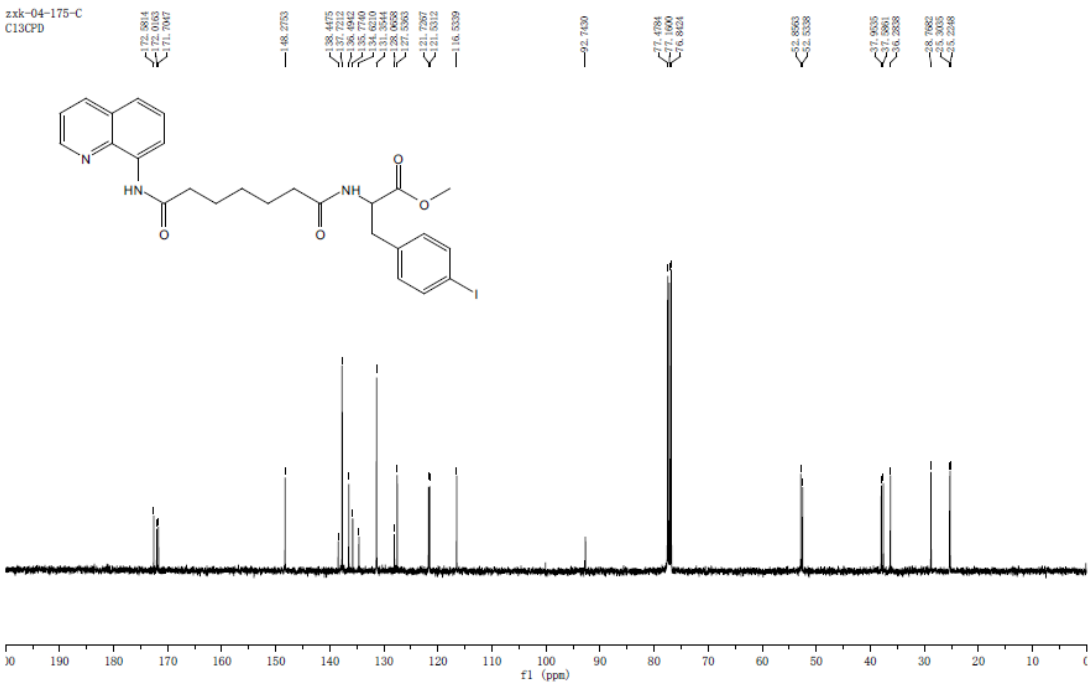
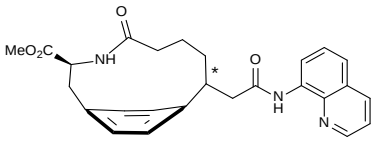
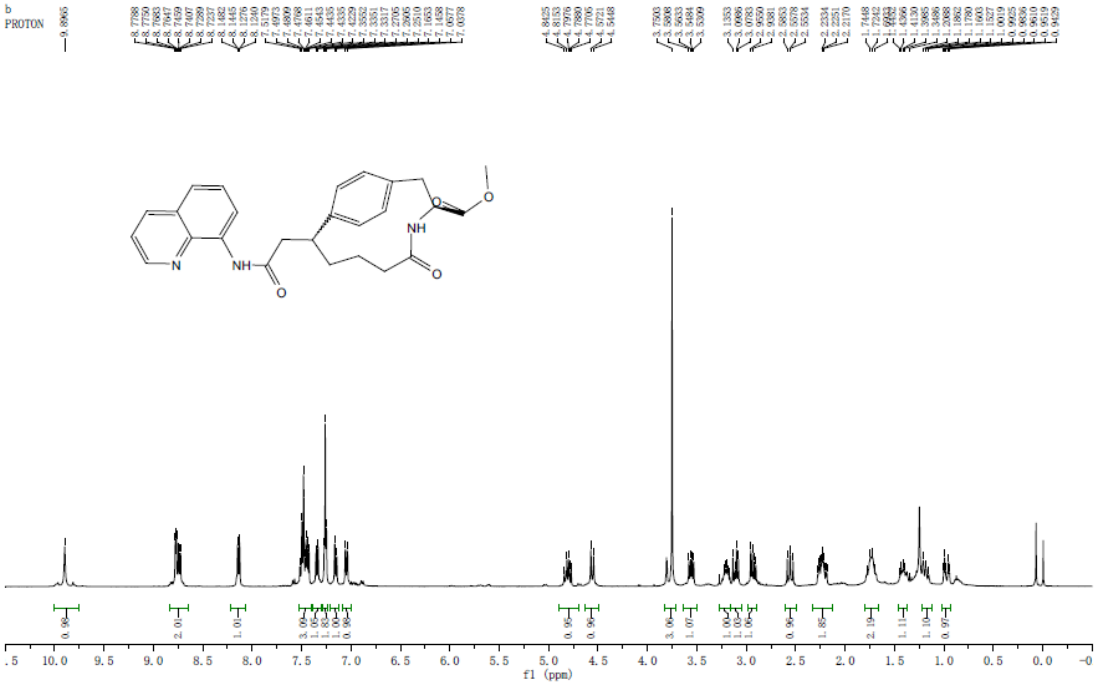
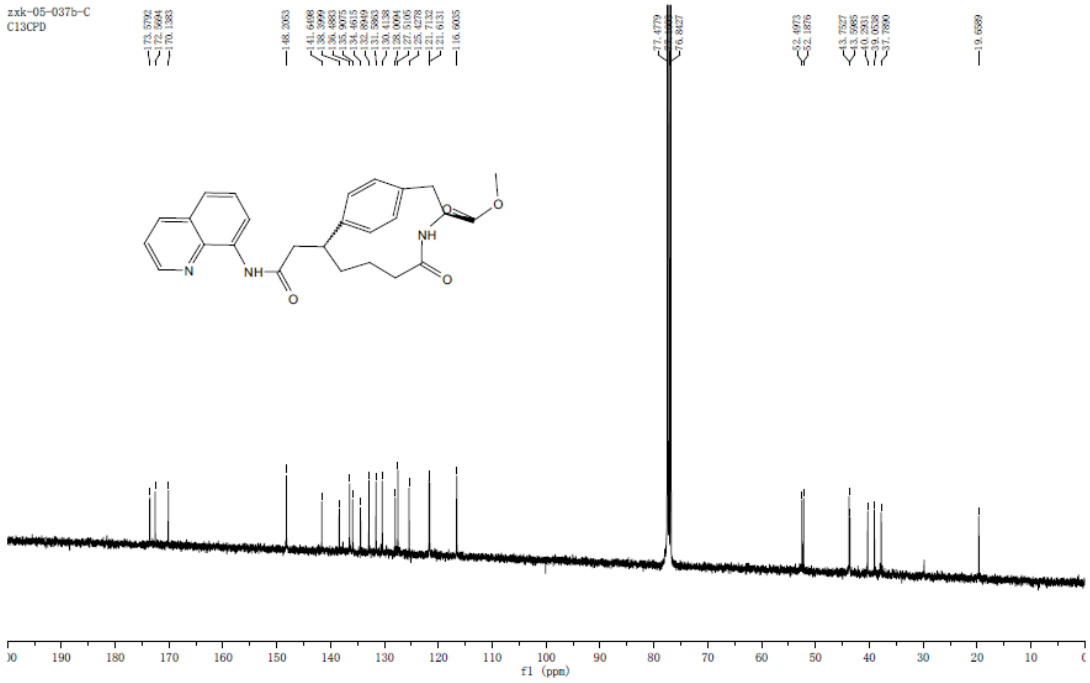


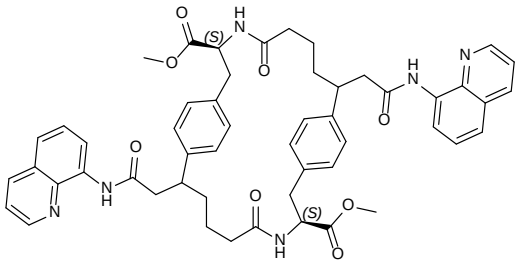



O
MeO2C
NH
*
O
N
H
N

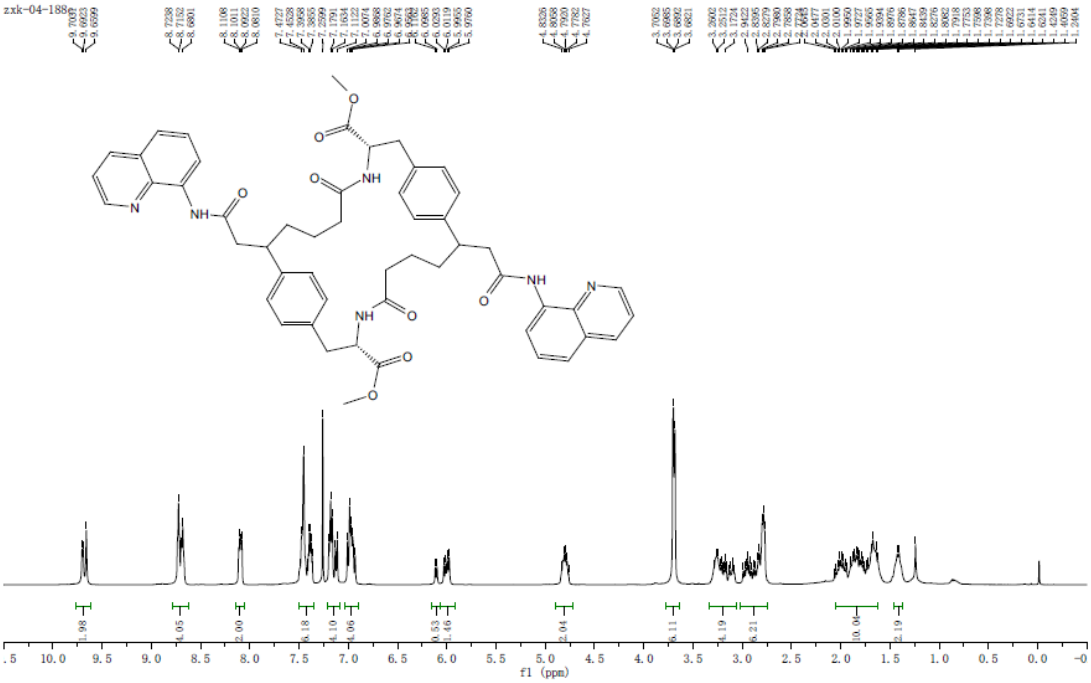
31

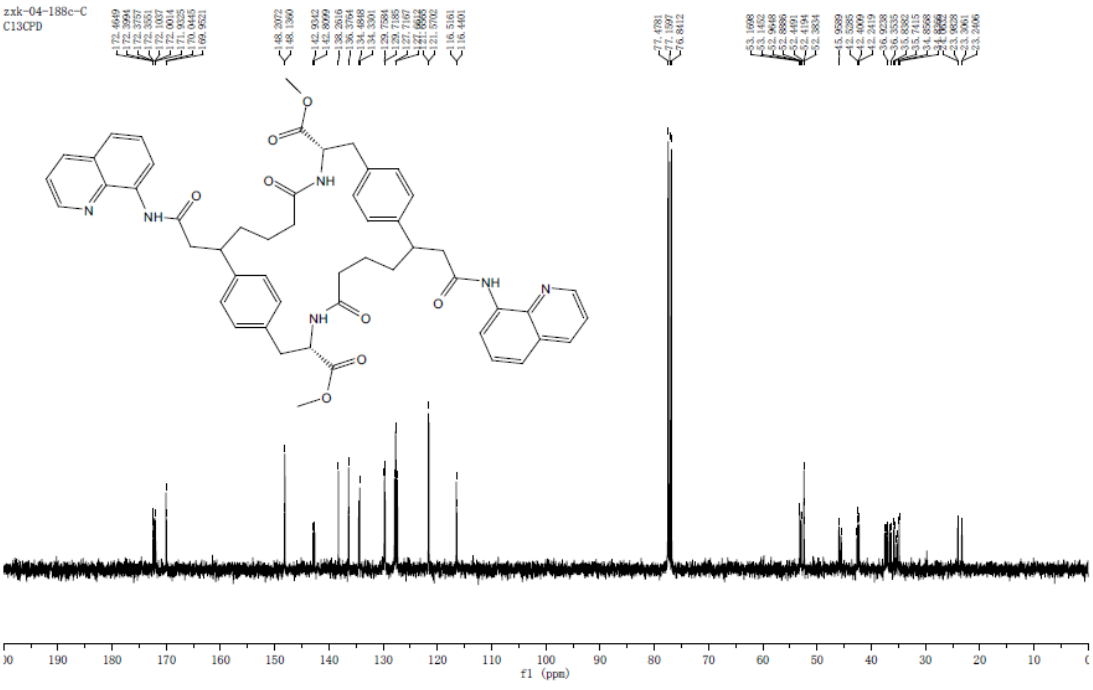

b
PROTON
NH
O
N
NH
O
f1 (ppm)

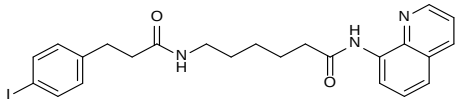

zxk-05-037b-C
C13CPD
NH
O
N
NH
O
f1 (ppm)



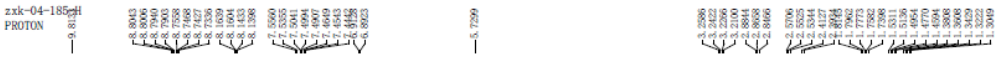
31d

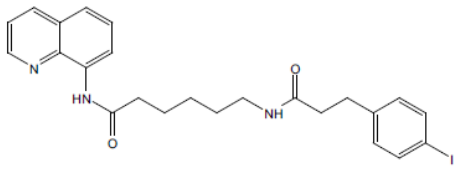


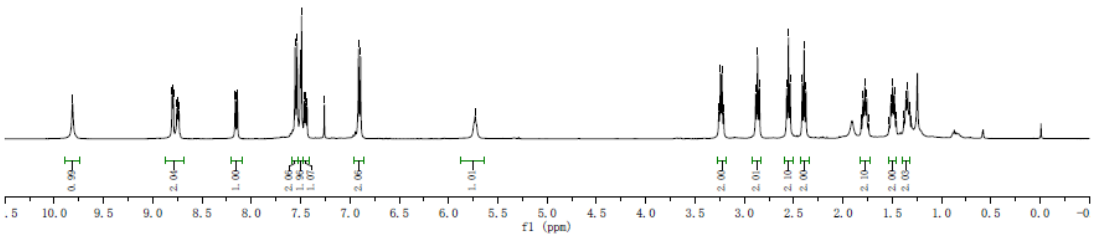


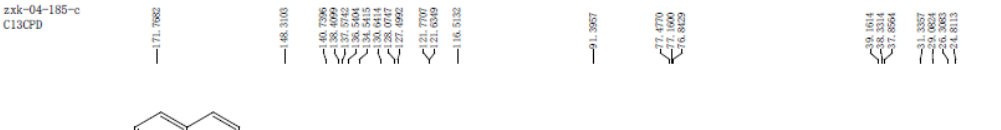


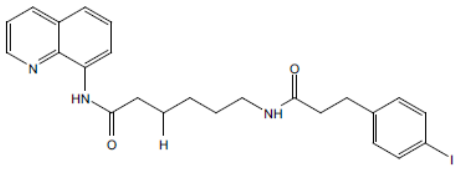
32-1

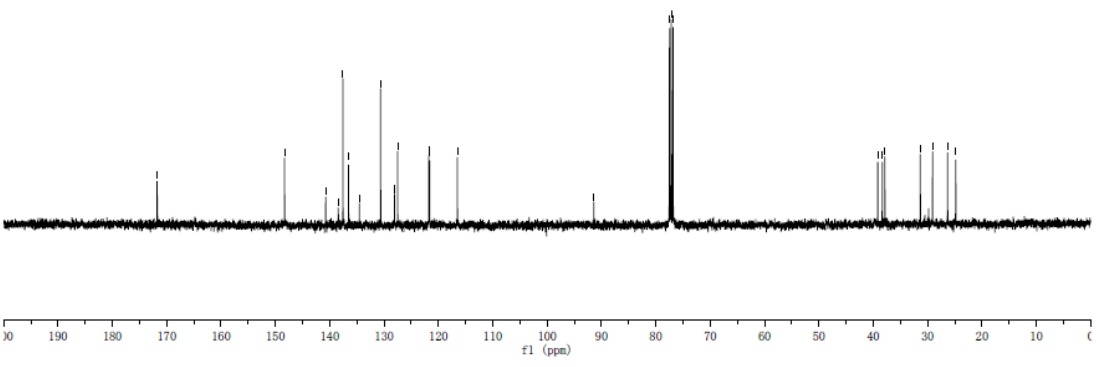


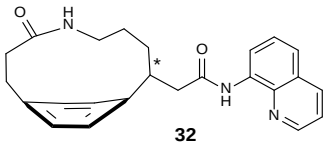




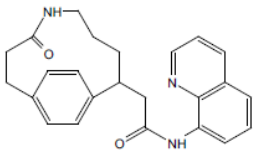


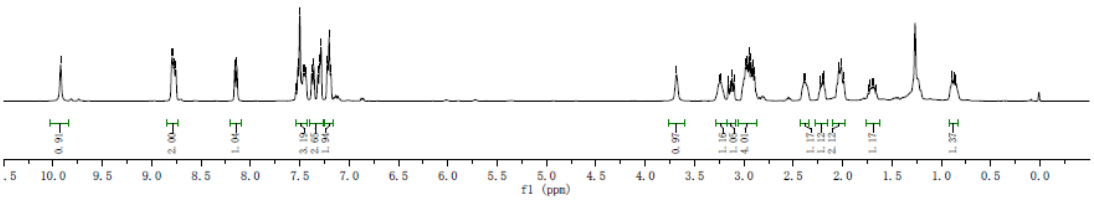


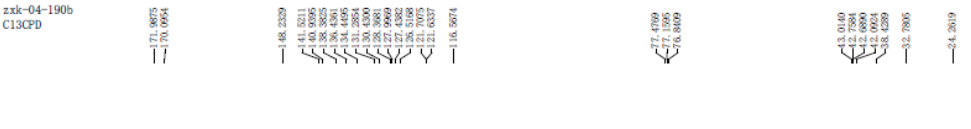


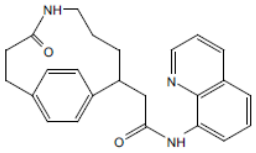


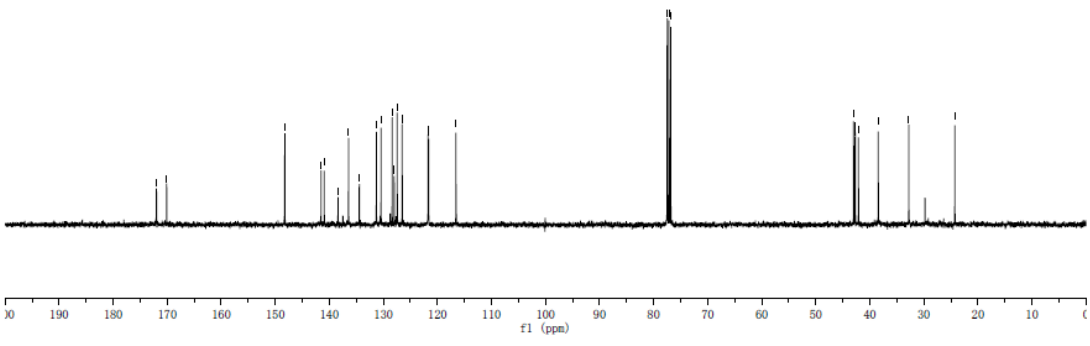
32

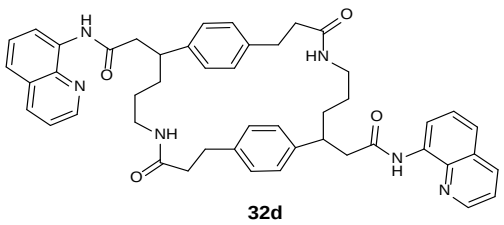




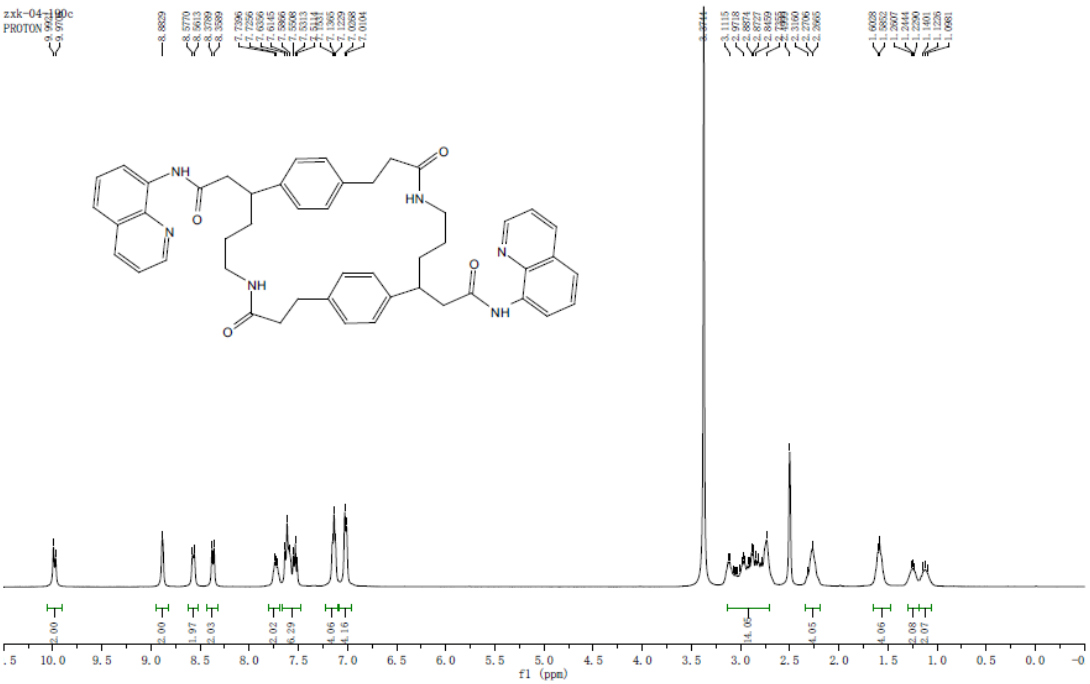


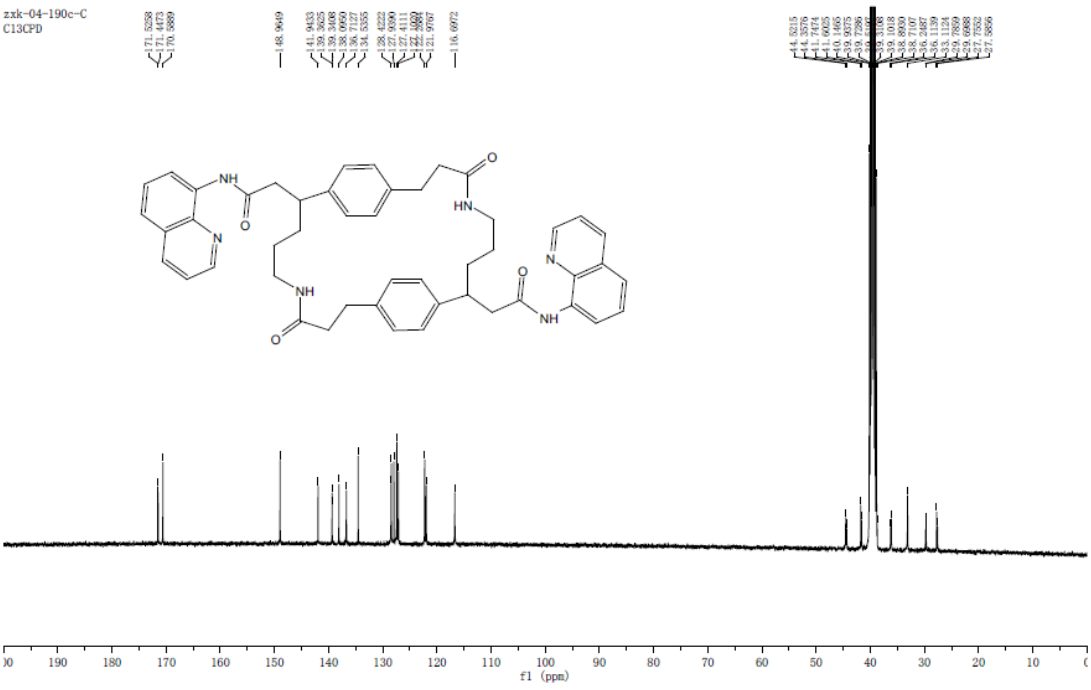


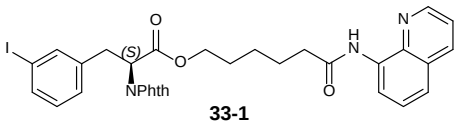




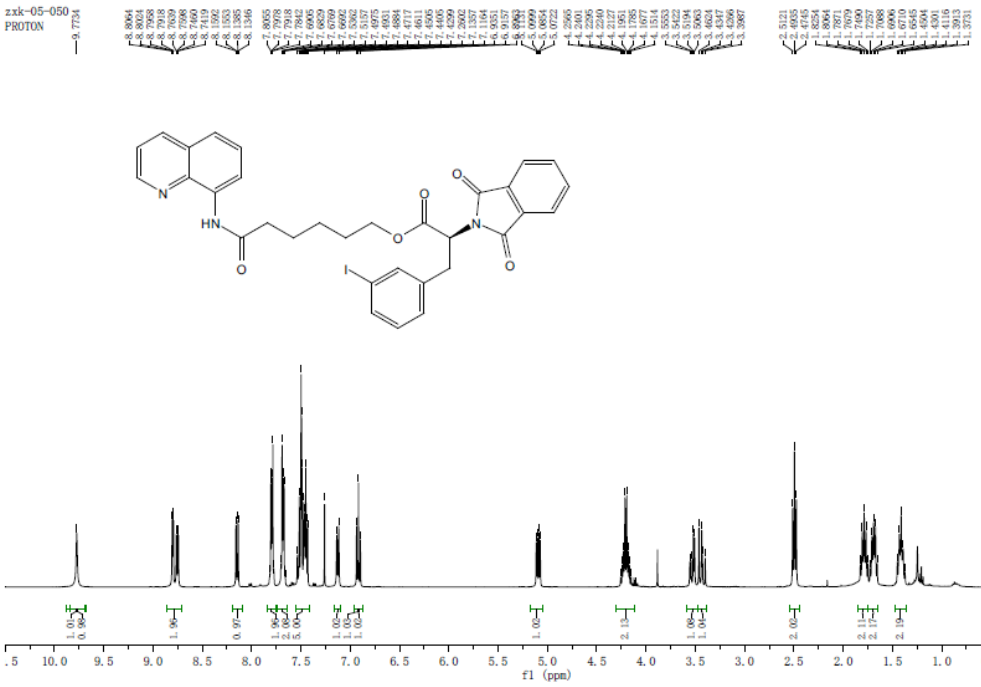
32d

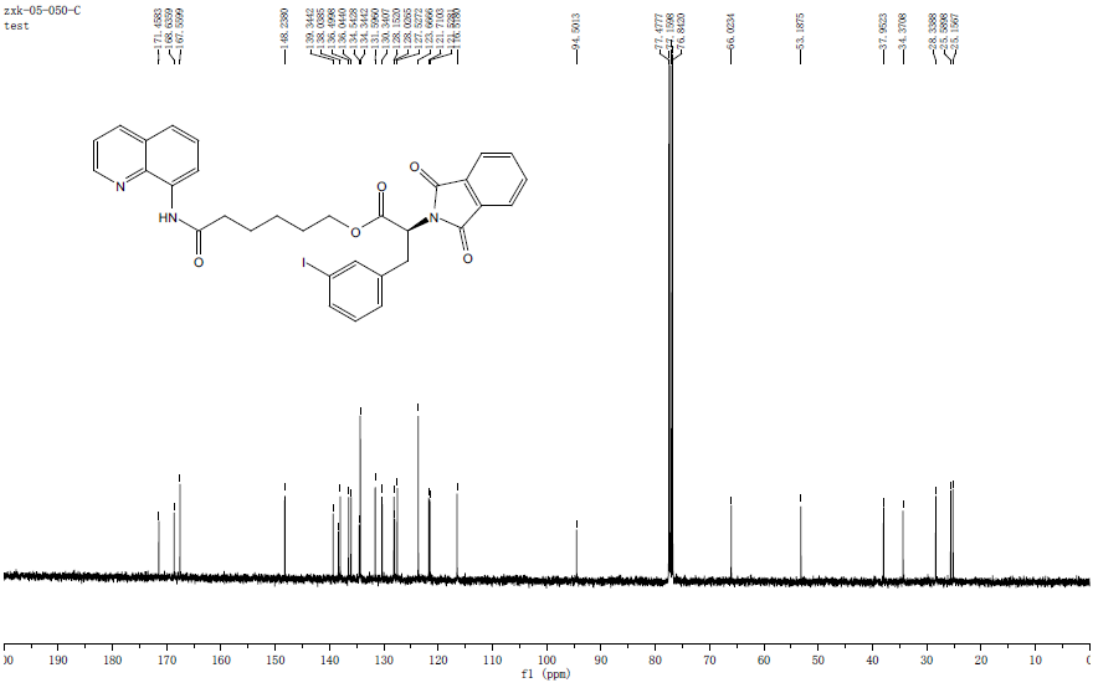


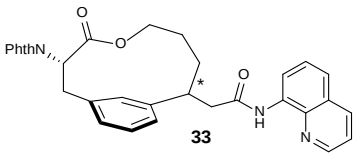



I
O
(S)
O
H
N
N
NPhth
O
O

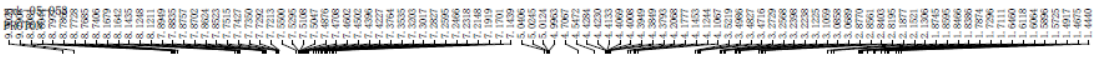
33-1

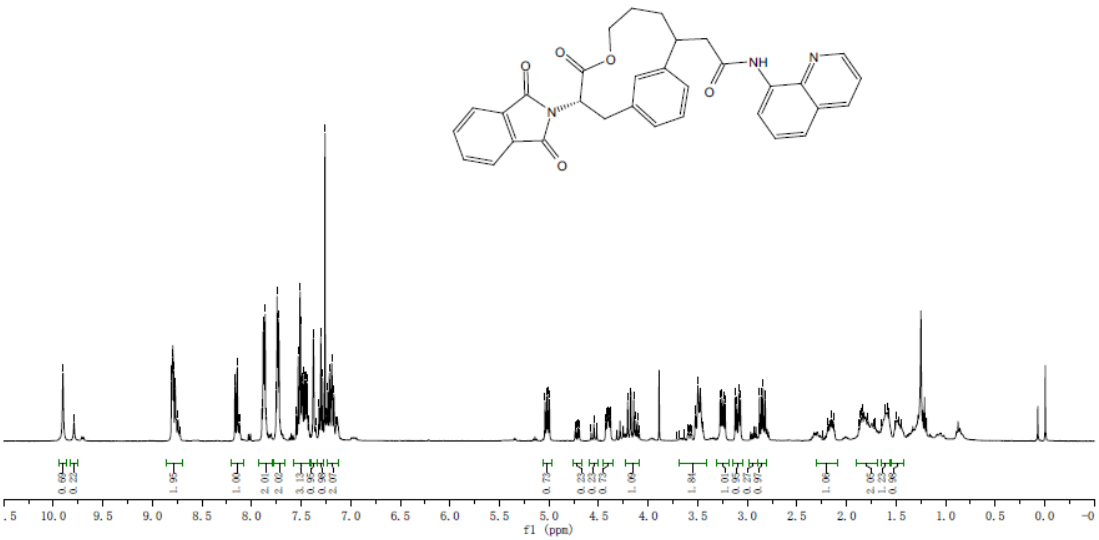

zxk-05-050
PROTON
HN
O
N
O
O
O
O
I
f1 (ppm)

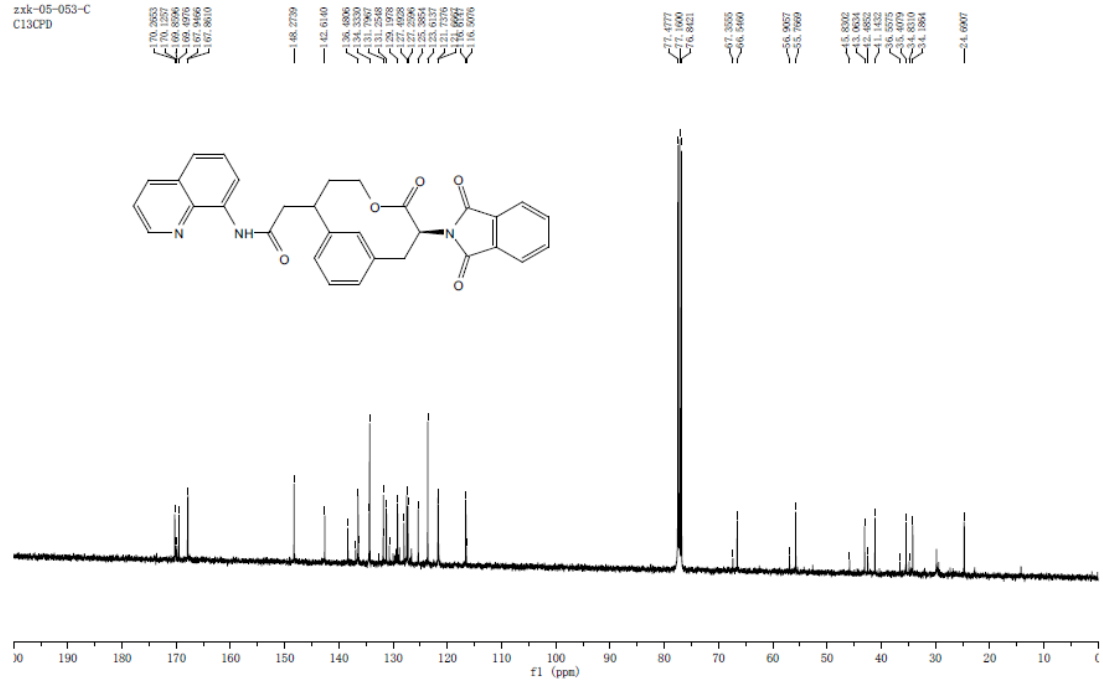

zxk-05-050-C
test
HN
O
N
O
O
O
O
I
f1 (ppm)

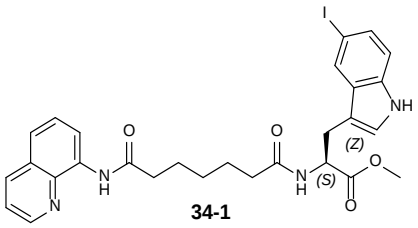

PhthN
O
O
O
*
O
N
H
N

33



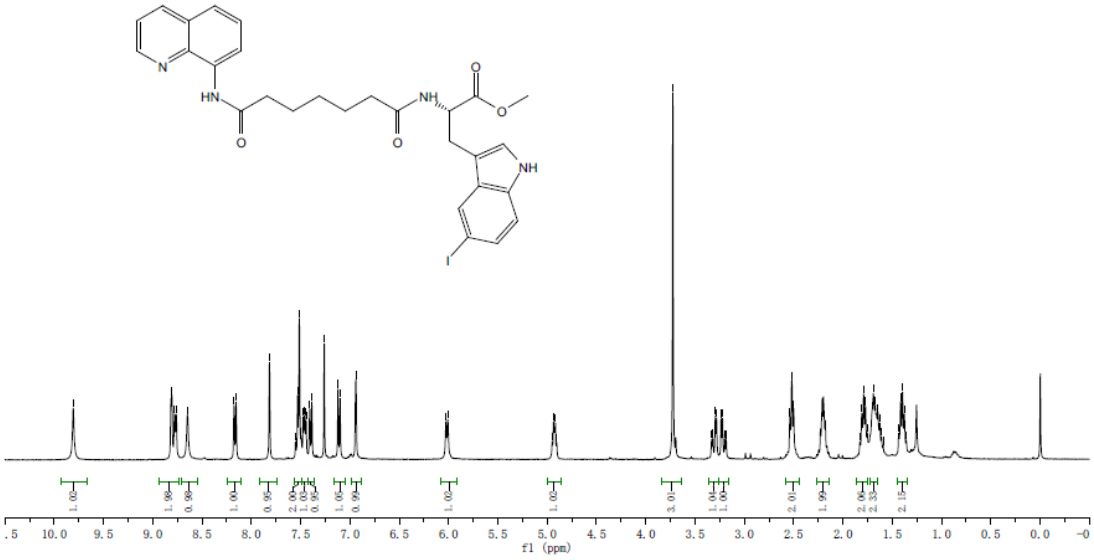

O
O
O
N
O
NH
N
O
f1 (ppm)

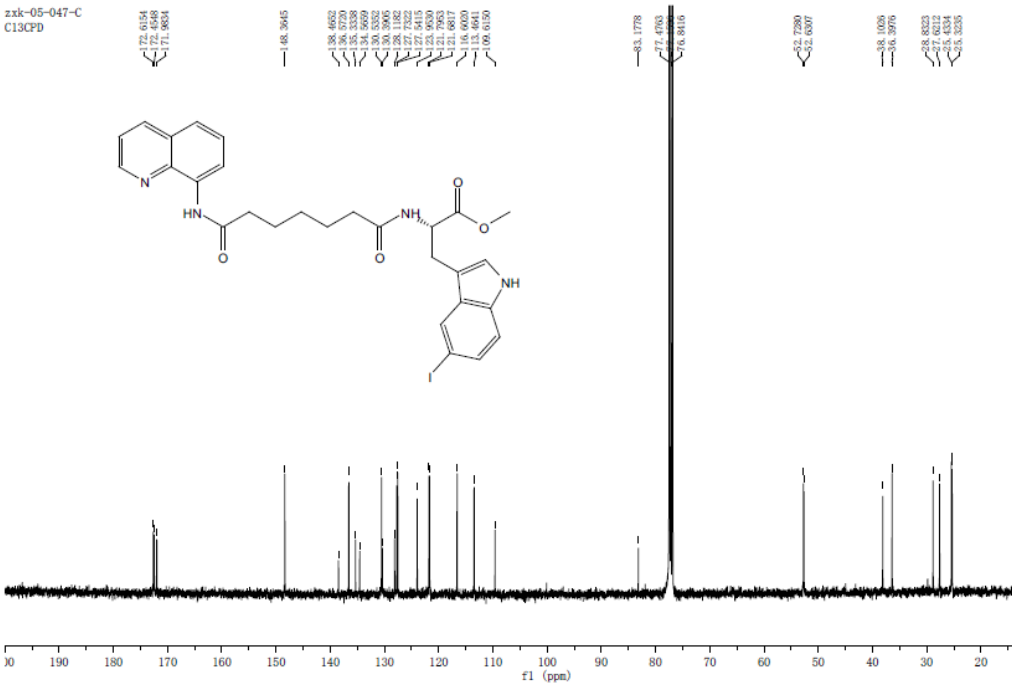

zxk-05-053-C
C13CPD
O
O
O
N
NH
O
O
f1 (ppm)

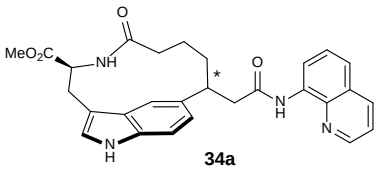

I
NH
O
O
(Z)
N
H
N
(S)
O
N
H
O
O

34-1

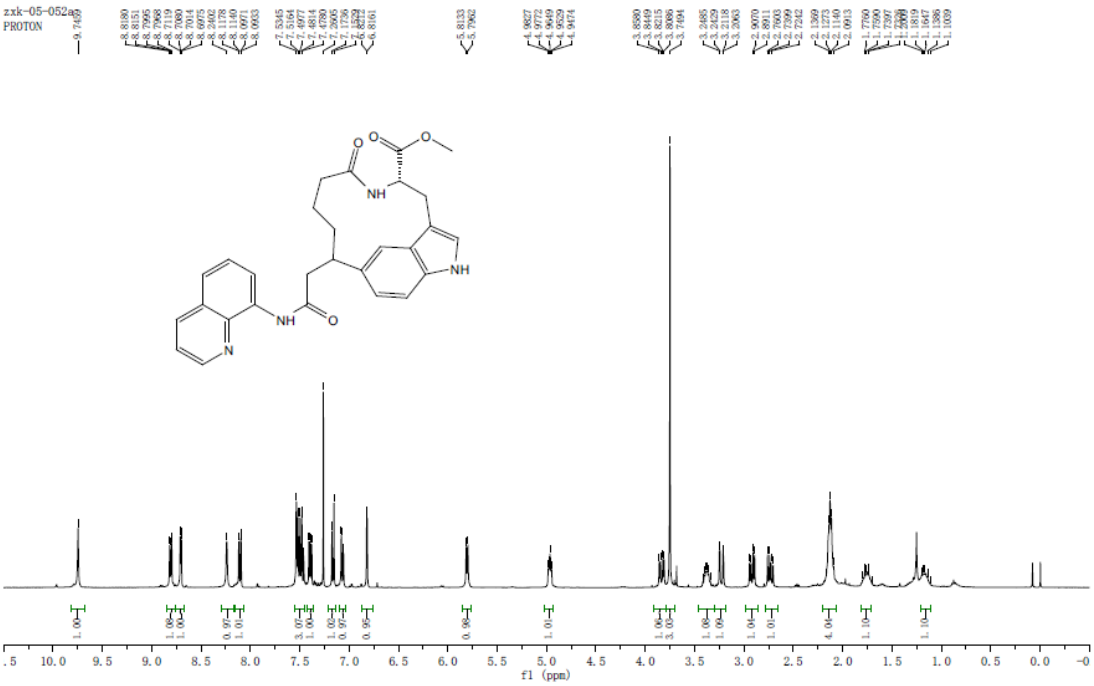

zxk-05-047#1
PROTON

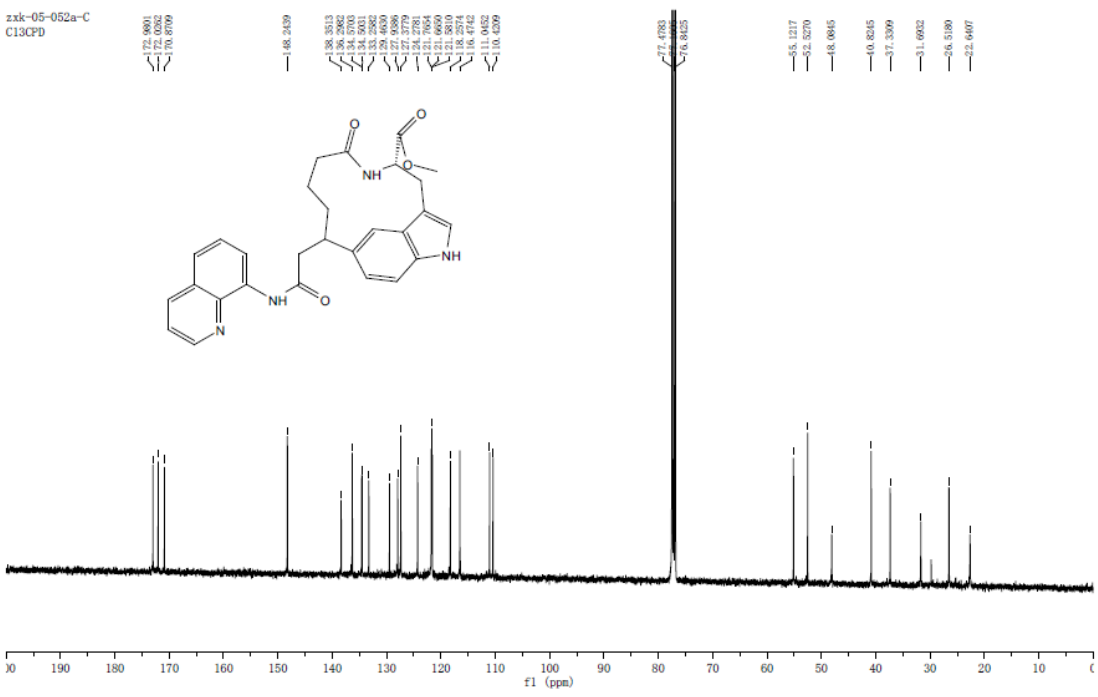

HN
O
O
NH
O
O
NH
I
f1 (ppm)

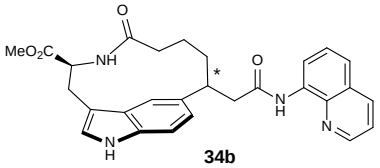

zxk-05-047-C
C13CPD
HN
O
O
NH
O
O
NH
I
f1 (ppm)


MeO2C
NH
O
O
N
H
*
N
H
N

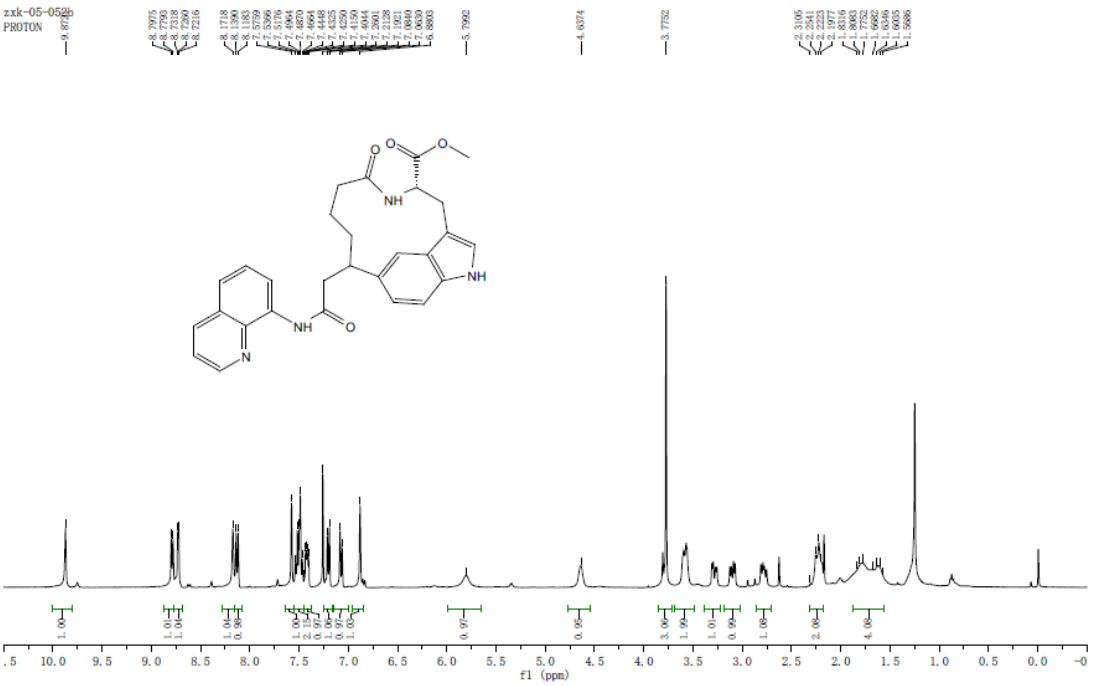
34a

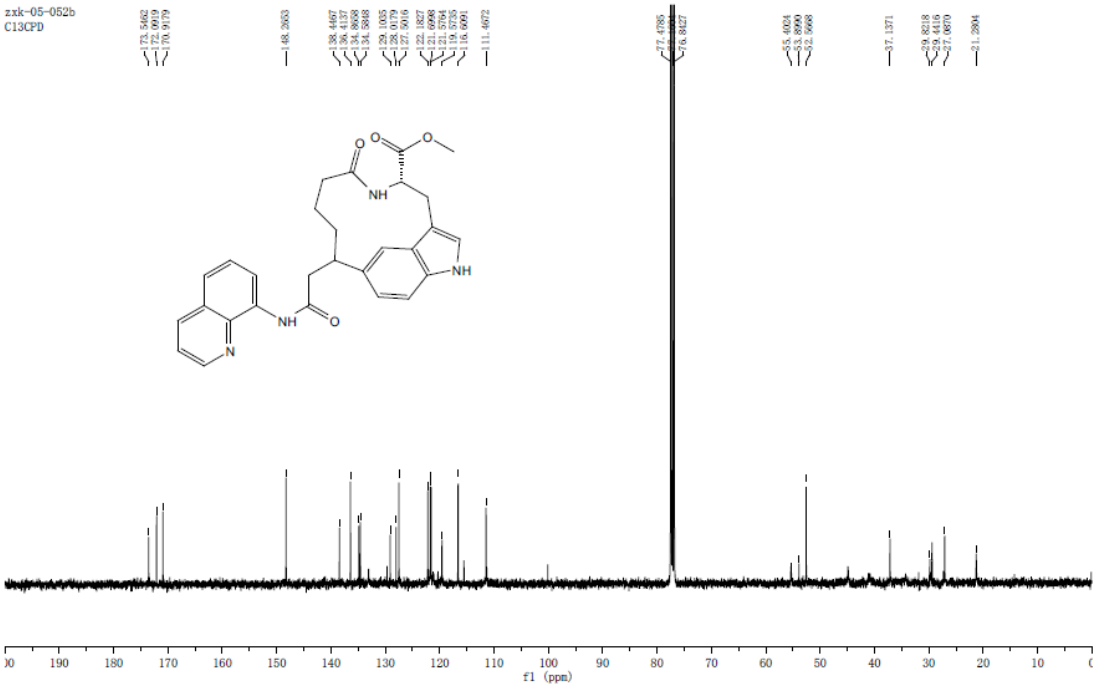

zxk-05-052a
PROTON
f1 (ppm)

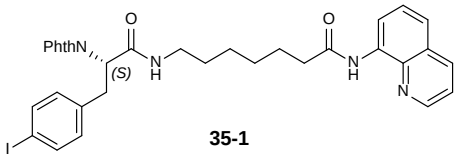

zxk-05-052a-C
C13CPD
f1 (ppm)



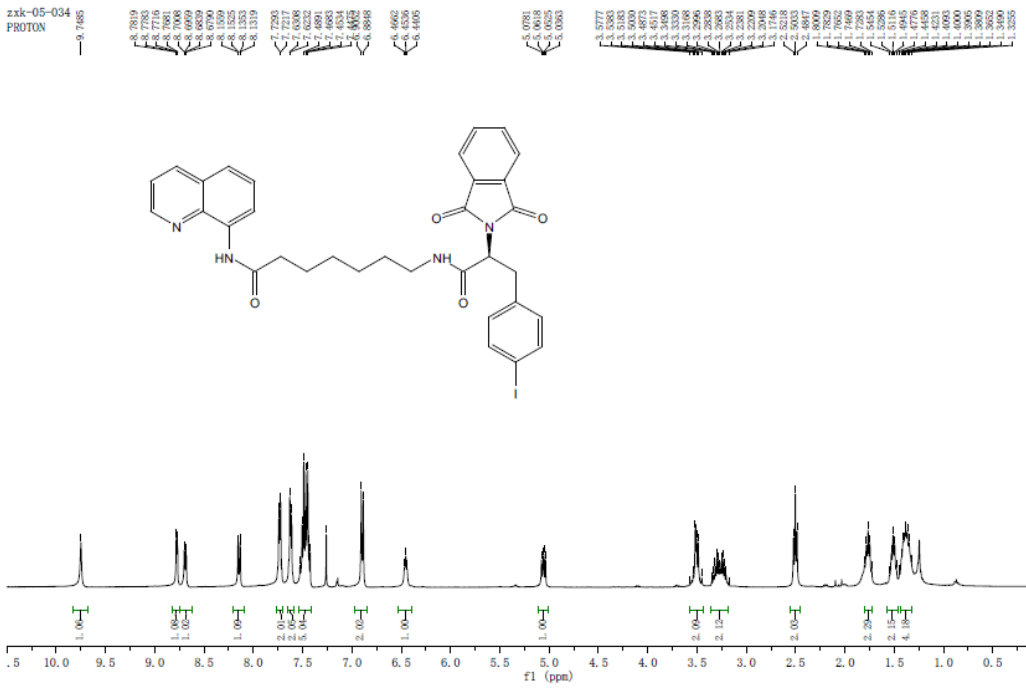
34b

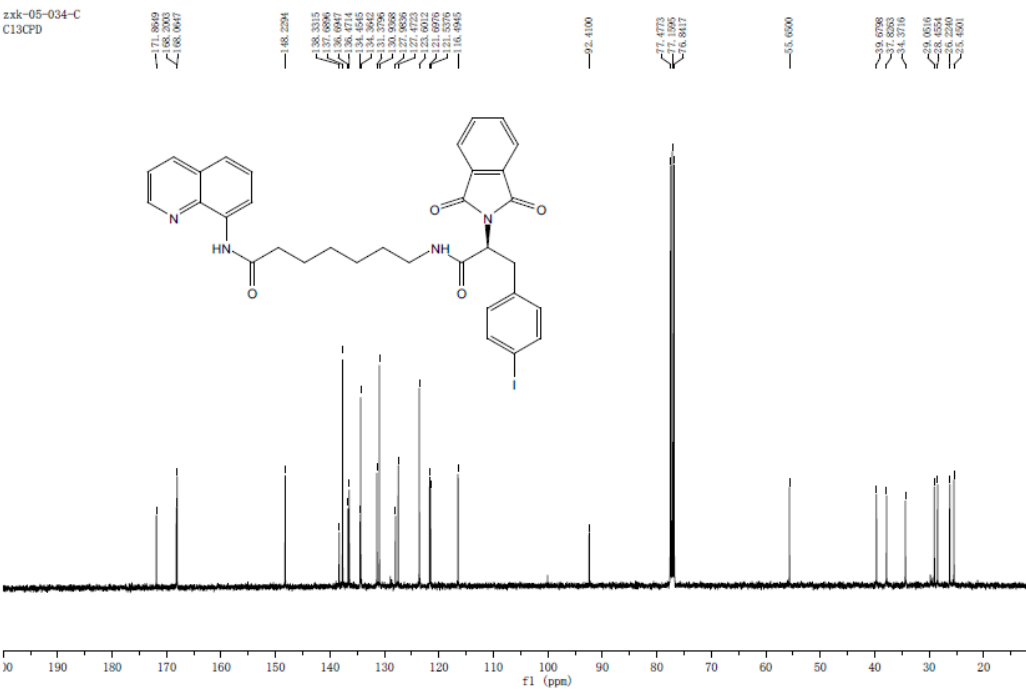


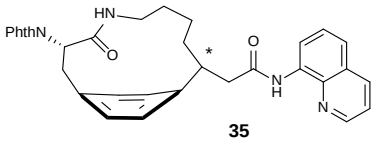



PhthN
O
O
N
H
(S)
N
H
N
I

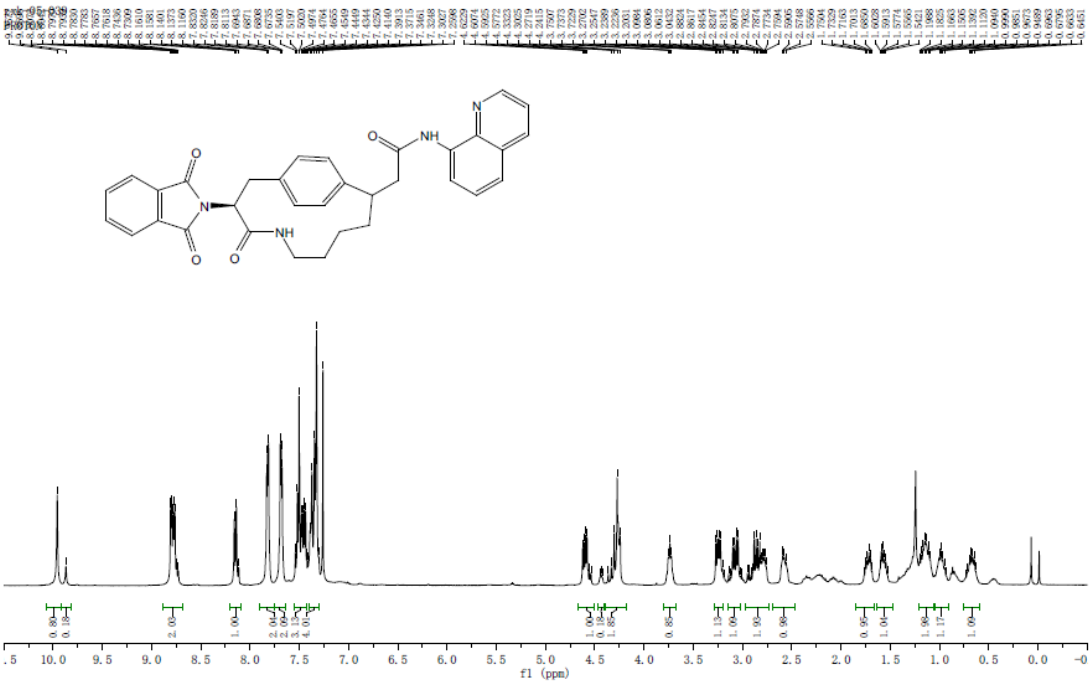
35-1

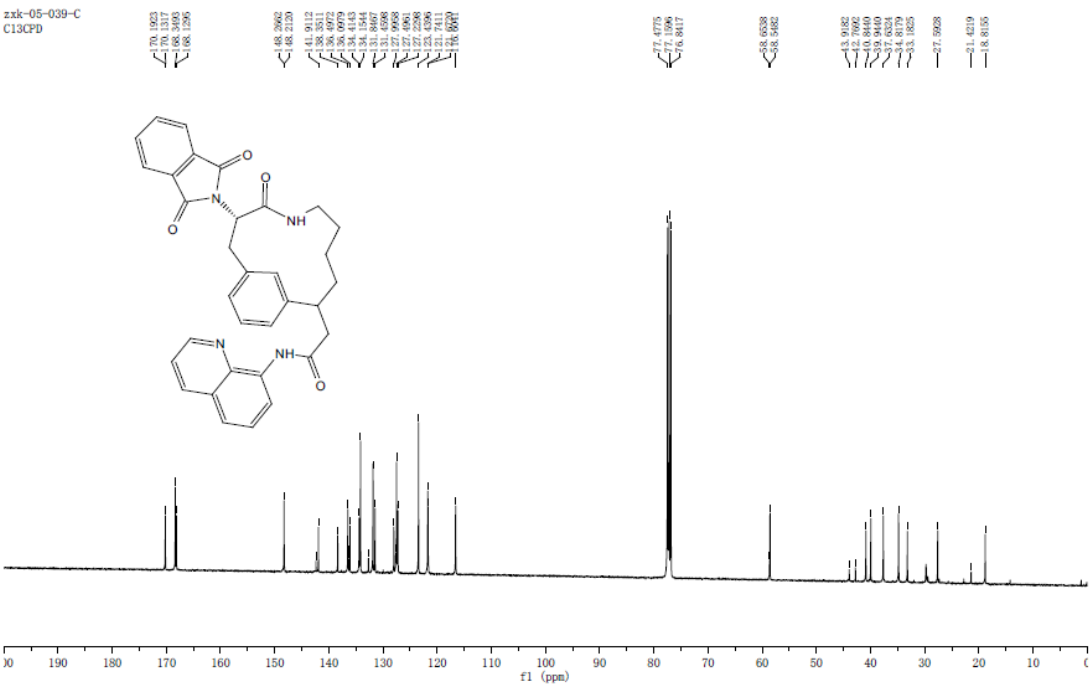

zxk-05-034
PROTON
f1 (ppm)

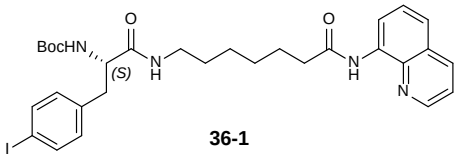

zxk-05-034-C
C13CPD
f1 (ppm)


PhthN
HN
O
*
O
N
H
N

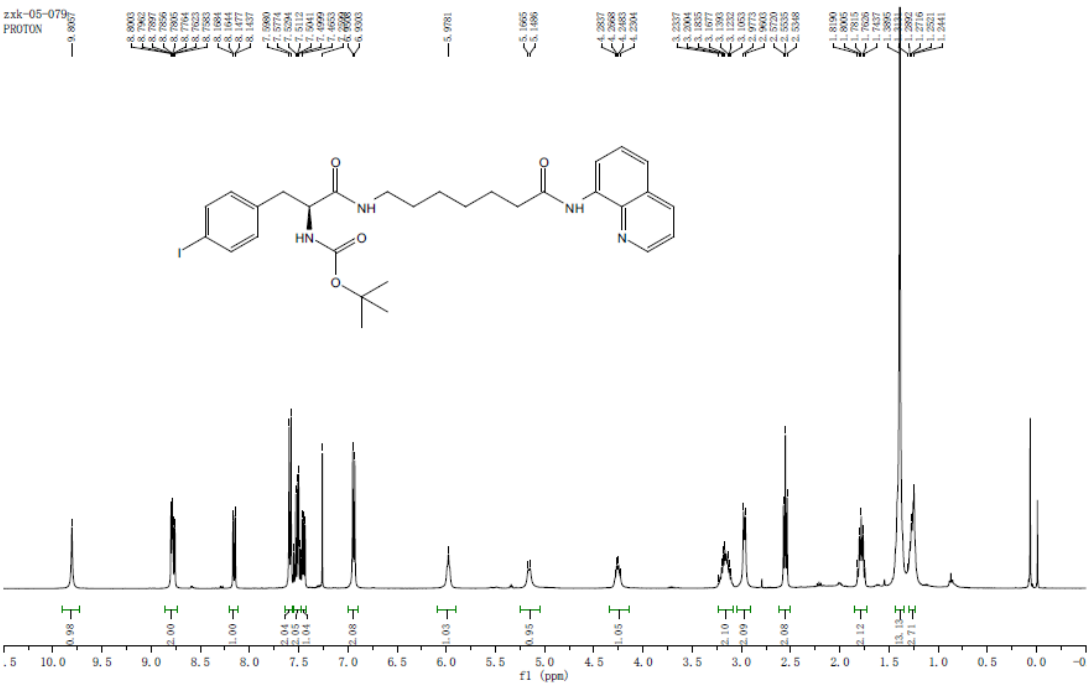
35

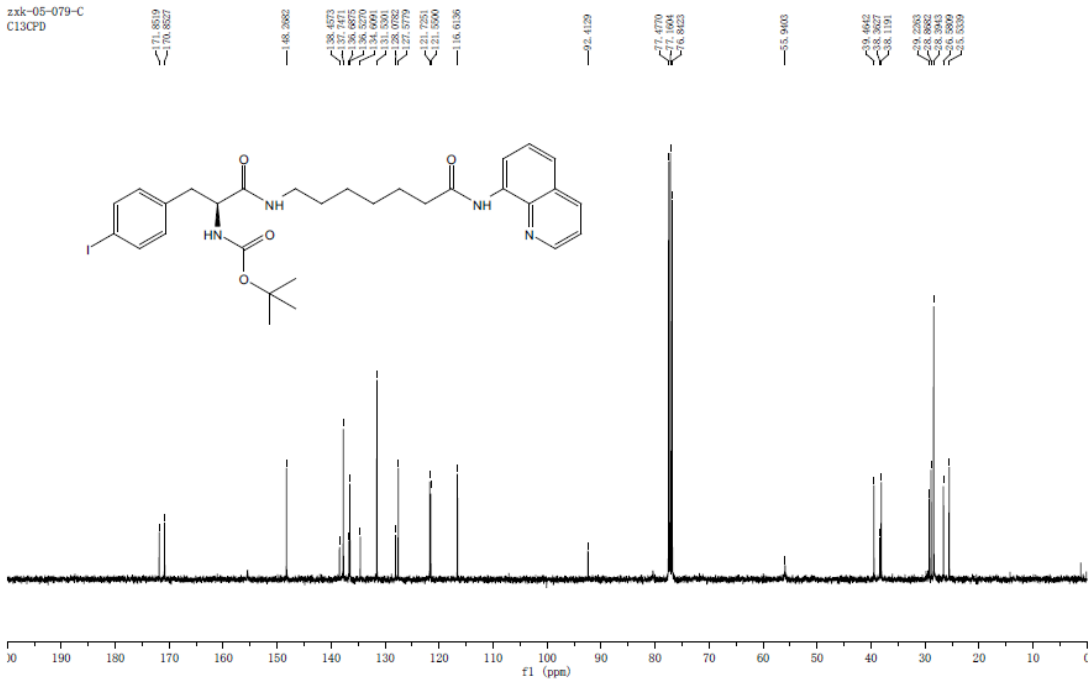

N
O
NH
N
O
O
NH
O
f1 (ppm)

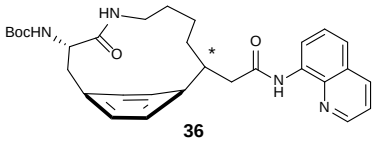

zxk-05-039-C
C13CPD
O
O
N
NH
O
N
NH
O
f1 (ppm)


BocHN
O
(S)
N
H
O
N
H
N
I

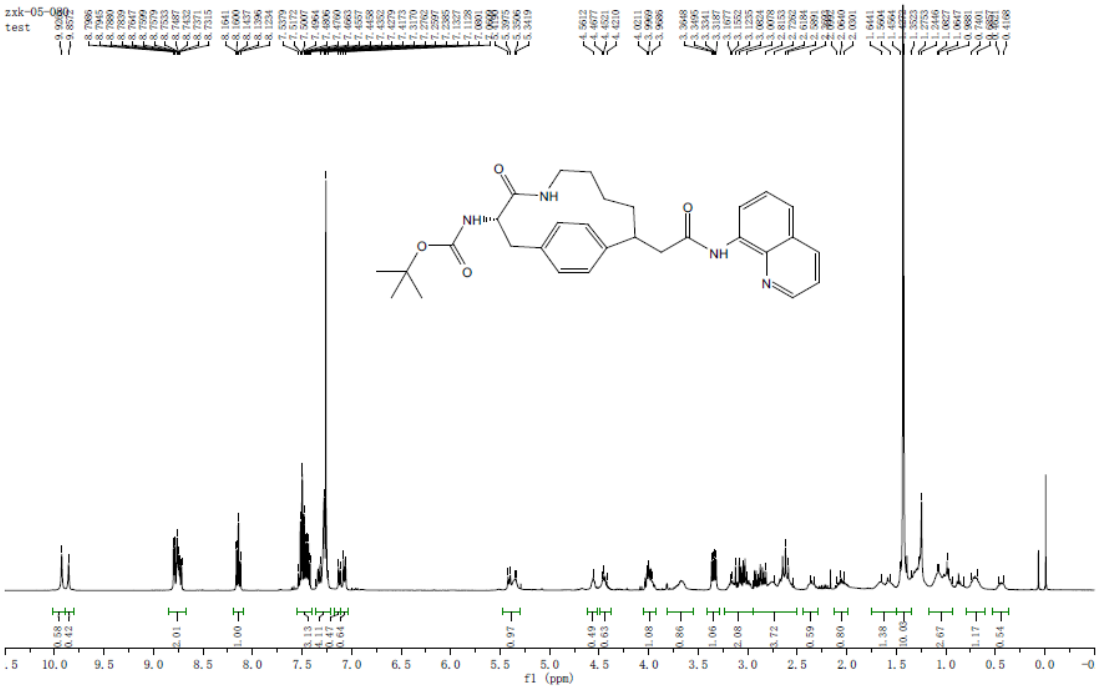
36-1

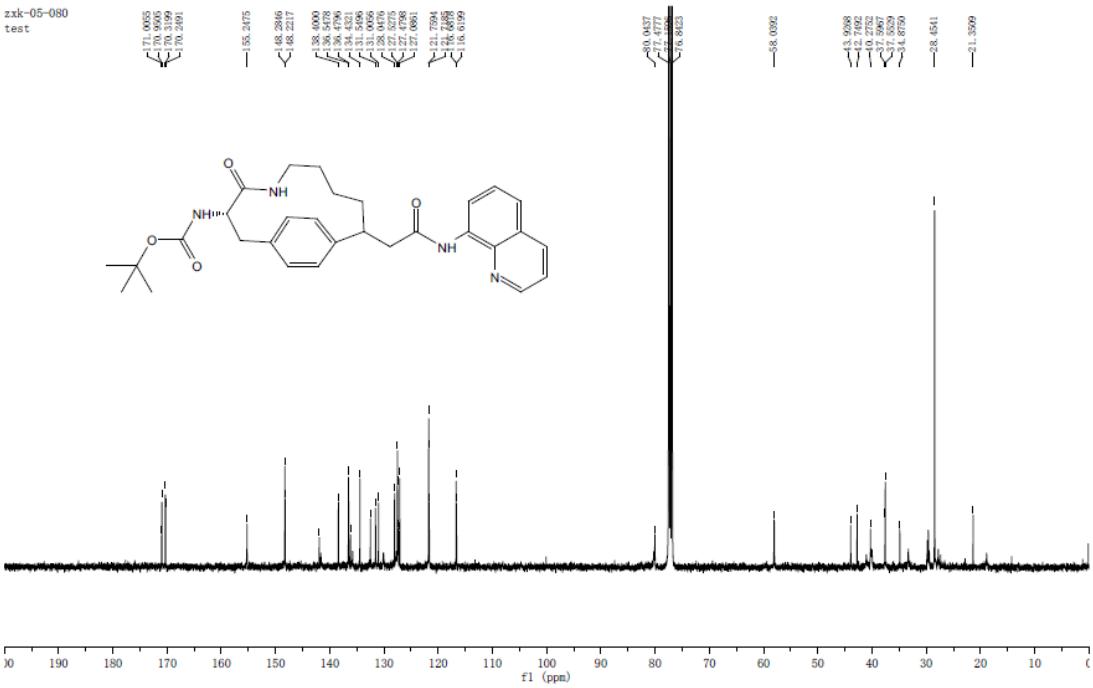

zxk-05-079
PROTON
f1 (ppm)

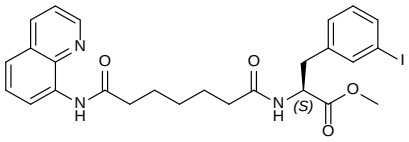

zxk-05-079-C
C13CPD
f1 (ppm)



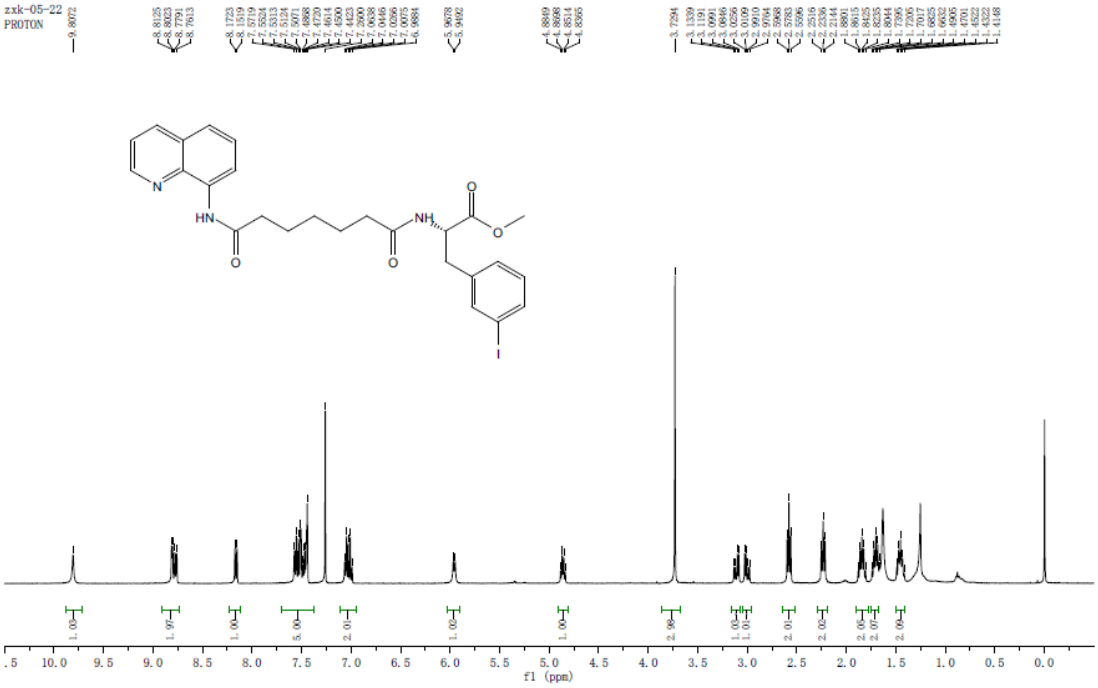
36

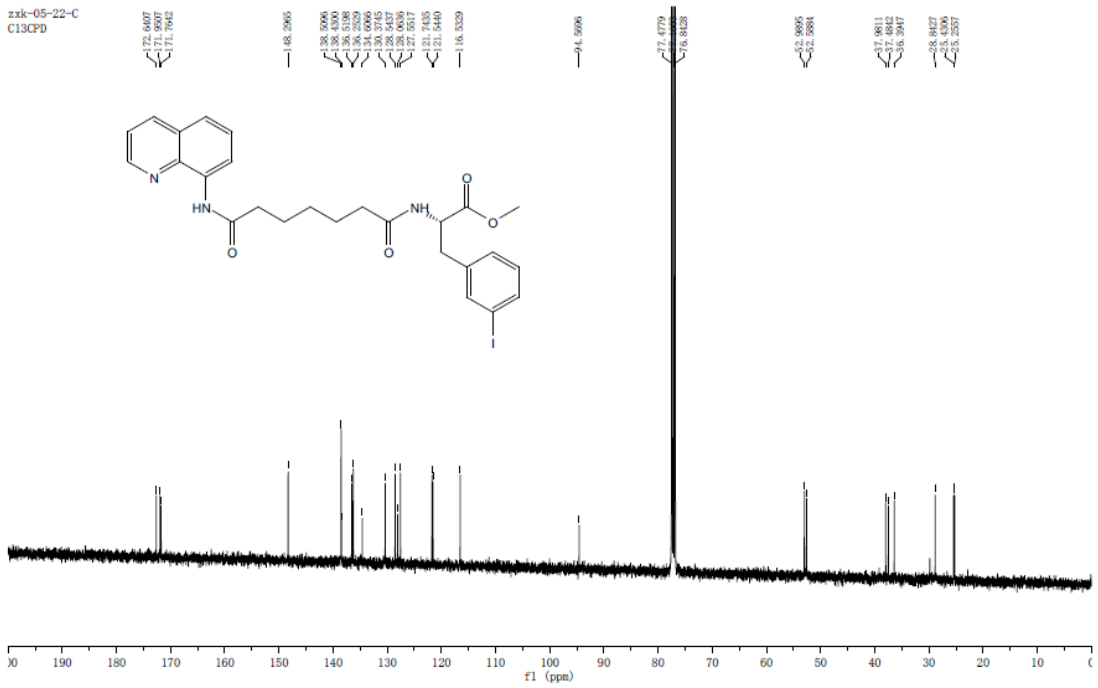


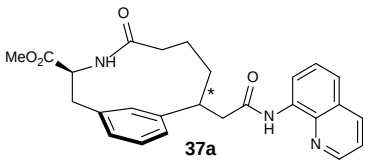




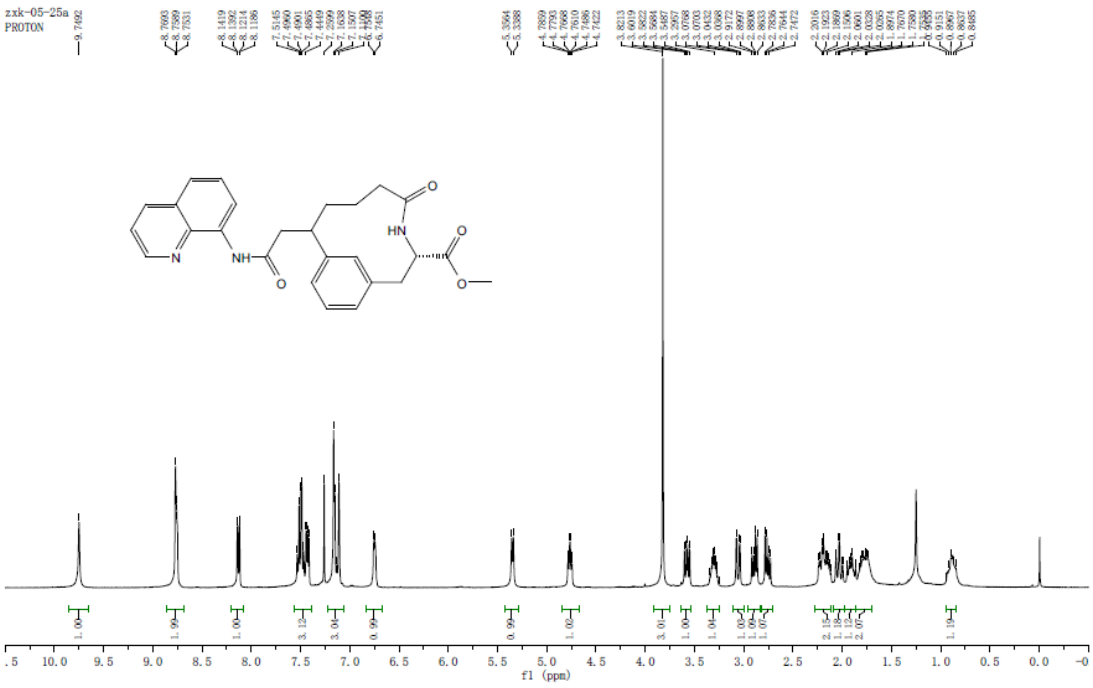
37-1






MeO2C
NH
O
N
H
N
*

37a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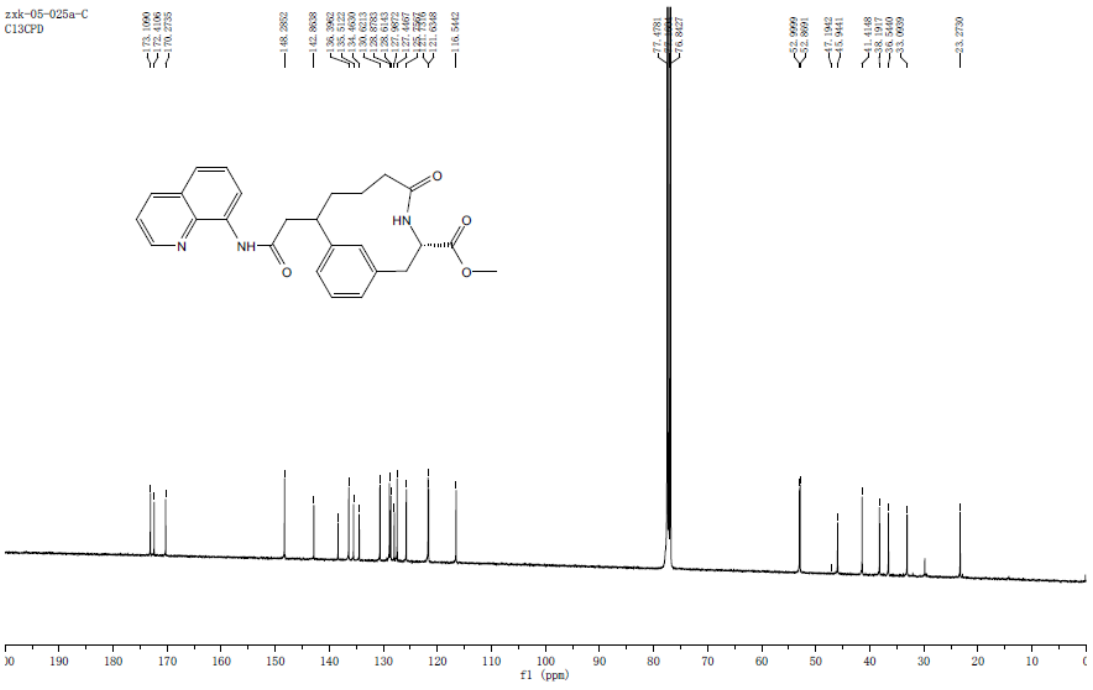
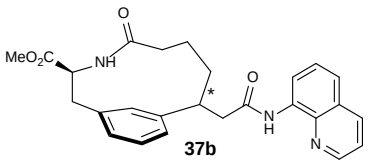
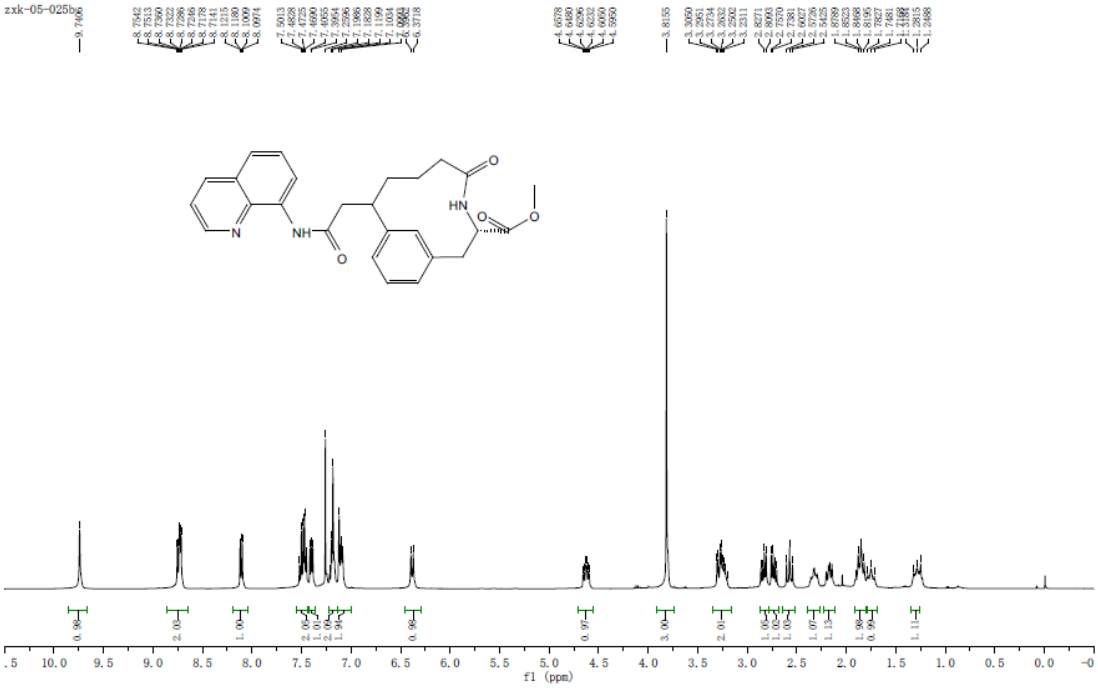
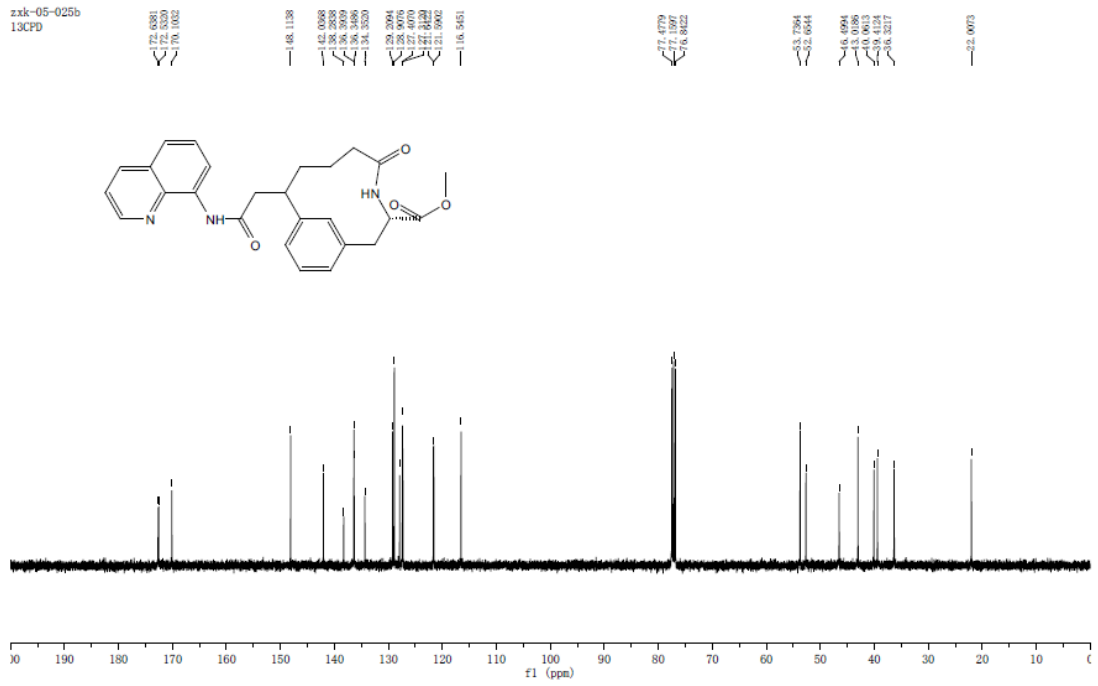
PROTON
f1 (ppm)

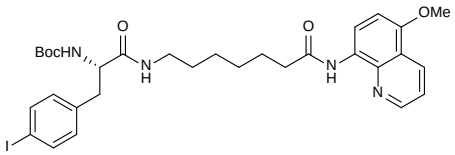

zxk-05-025a-C
C13CPD
f1 (ppm)

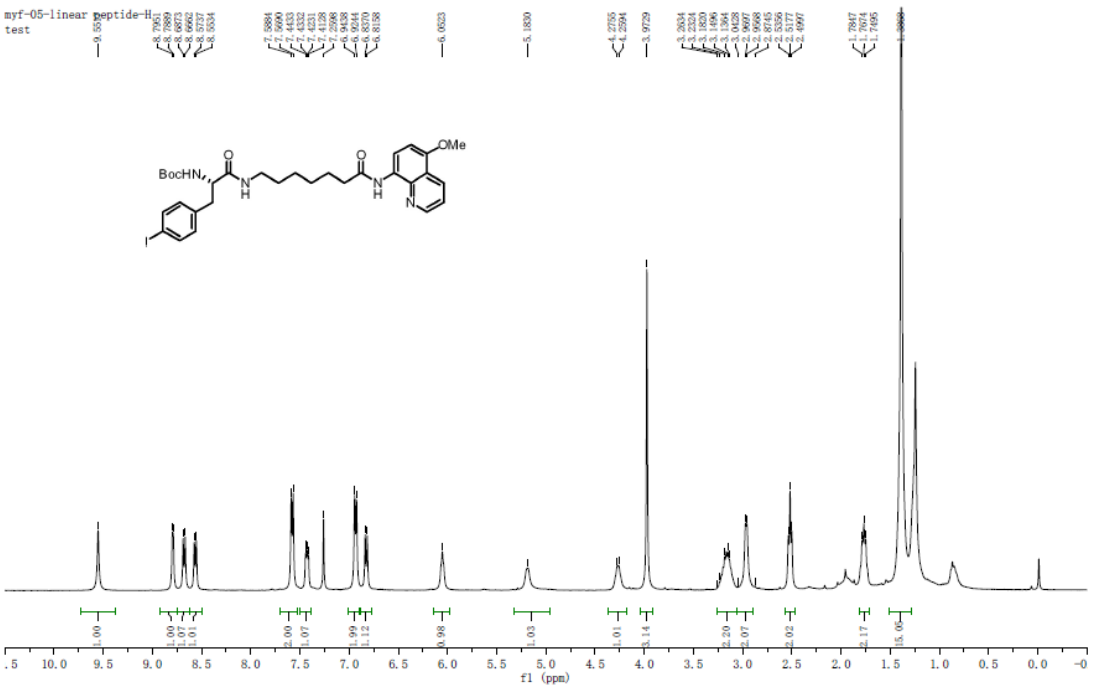

MeO2C
NH
O
O
N
H
N
*

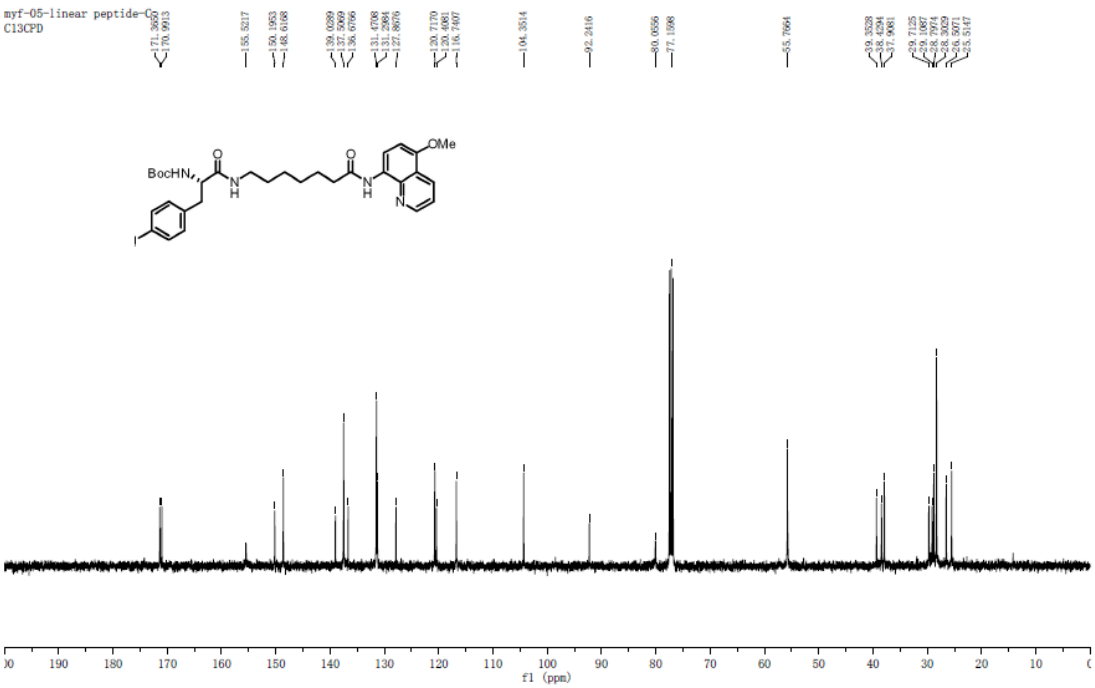
37b

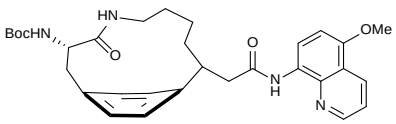

zxk-05-025bc
HN
NH
N
O
f1 (ppm)


zxk-05-025b
13CPD
HN
NH
N
O
f1 (ppm)

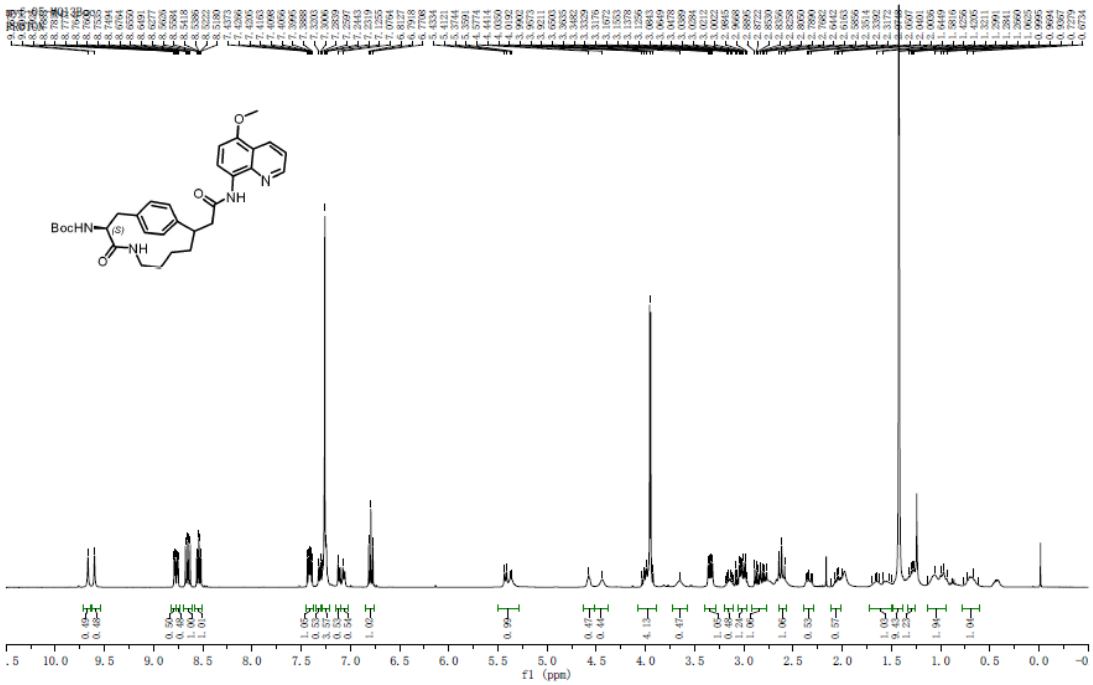

BocHN
O
N
H
O
N
H
OMe
N
I

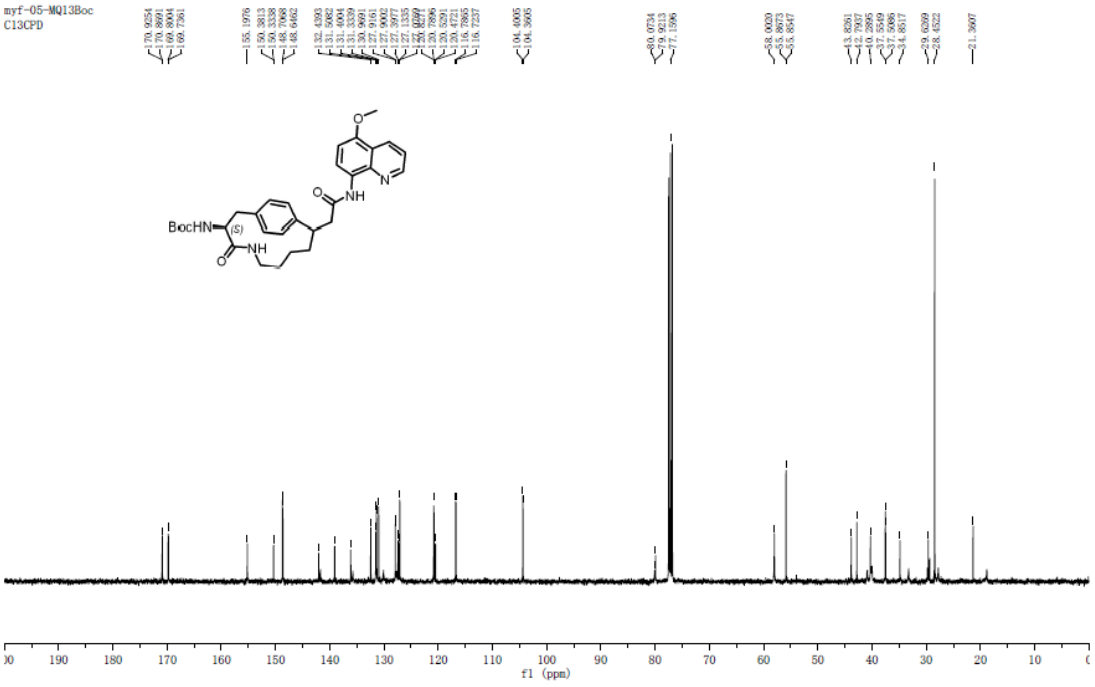

myf-05-linear peptide-H
test
f1 (ppm)

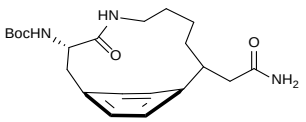

myf-05-linear peptide-C
C13CPD
f1 (ppm)


HN
BocHN
O
O
N
H
OMe
N

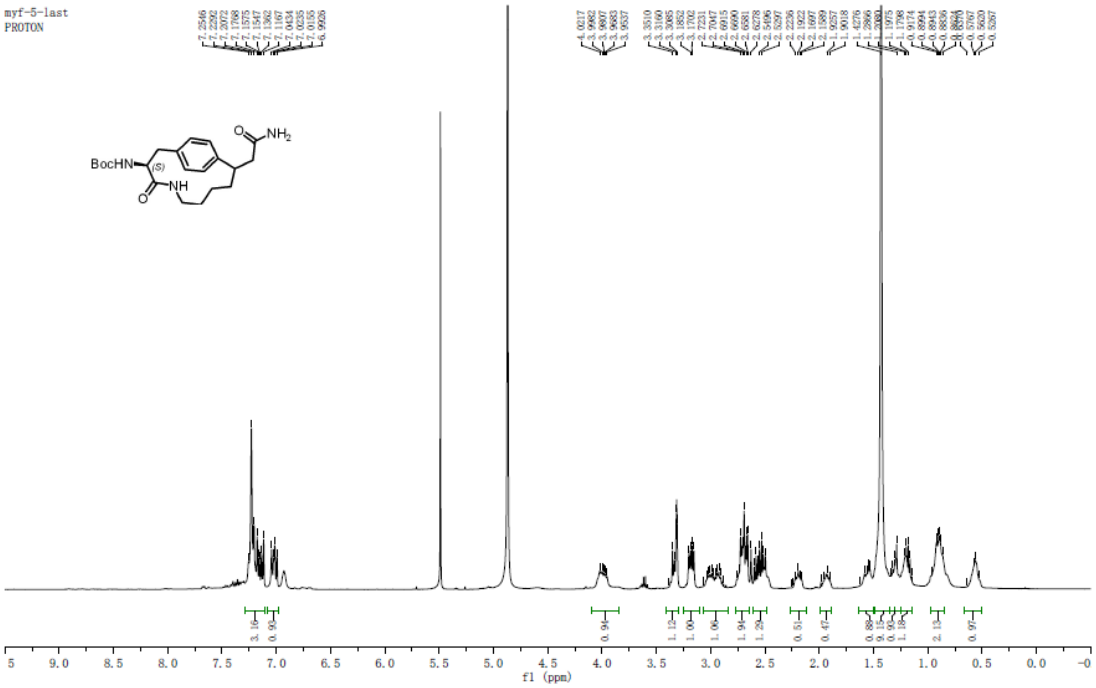
38

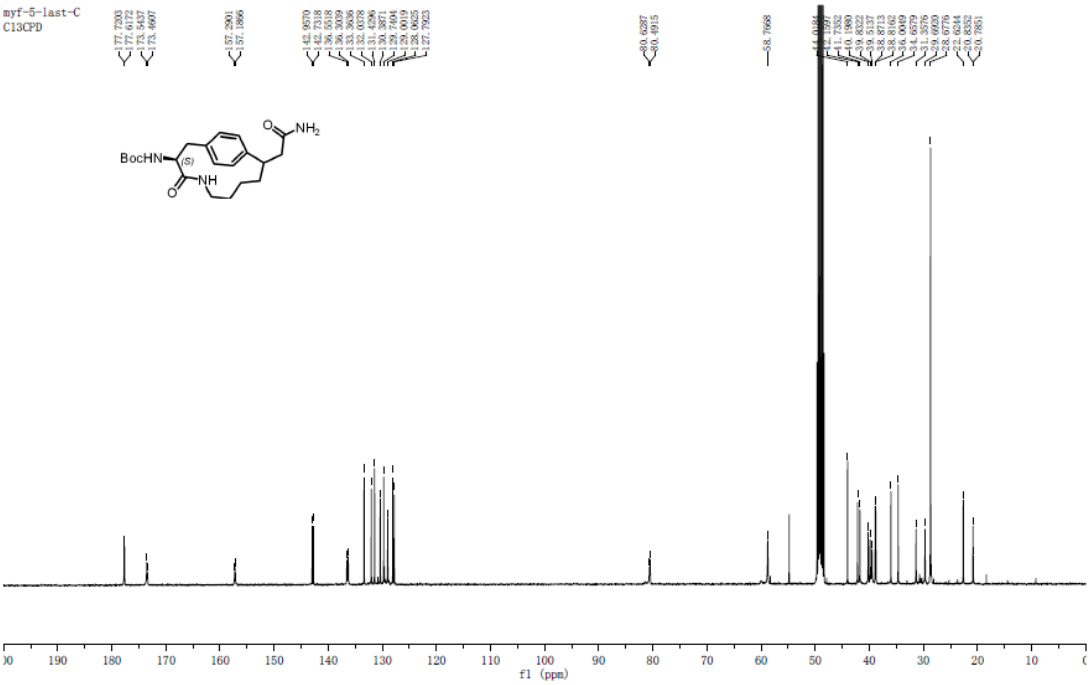

O
N
NH
BocHN
(S)
NH
O
f1 (ppm)


myf-05-MQ13Boc
C13CPD
O
N
NH
BocHN
(S)
NH
O
f1 (ppm)


HN
BocHN
O
O
NH2

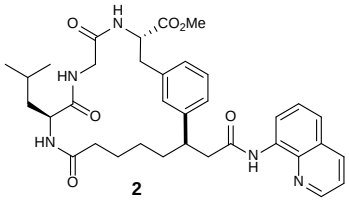
39


myf-5-last
PROTON
BocHN
(S)
NH
O
NH2
f1 (ppm)


myf-5-last-C
C13CPD
BocHN
(S)
NH
O
NH2
f1 (ppm)

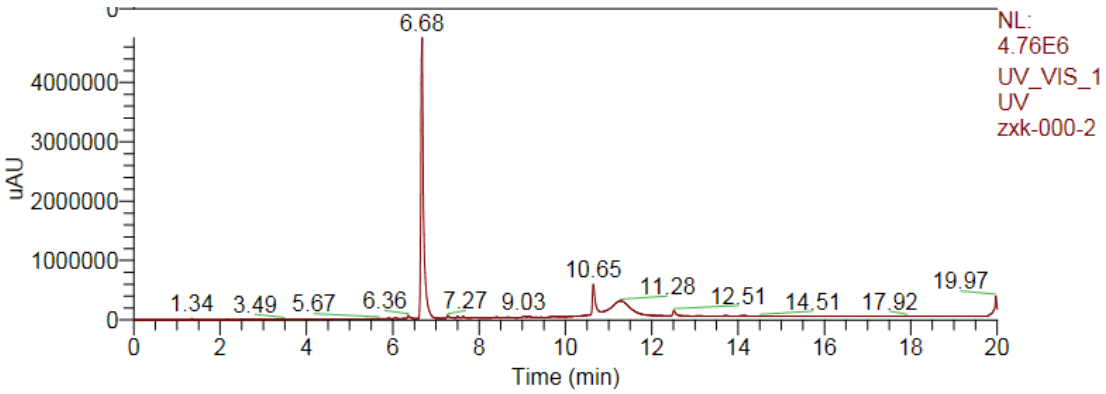
17. HPLC trace

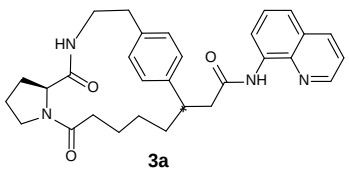
LC Method: Compounds were resolved on a Thermo syncronis C18 column (5 μm, 4.6 x 250 mm) at 40 ^{o}C with a flow of 1 mL/min. The gradient was consisted of eluent A (0.05% trifluoroacetic acid in double distilled water) and eluent B (0.05% trifluoroacetic acid in HPLC-grade acetonitrile). Absorbance was monitored at λ=220nm. The gradient method started at 10% of eluent B followed by a linear gradient from 10% to 100% in 10 minutes. The column was then washed with 100% B for 8 minutes and re-equilibrated at 10% B for 2 minutes.



2

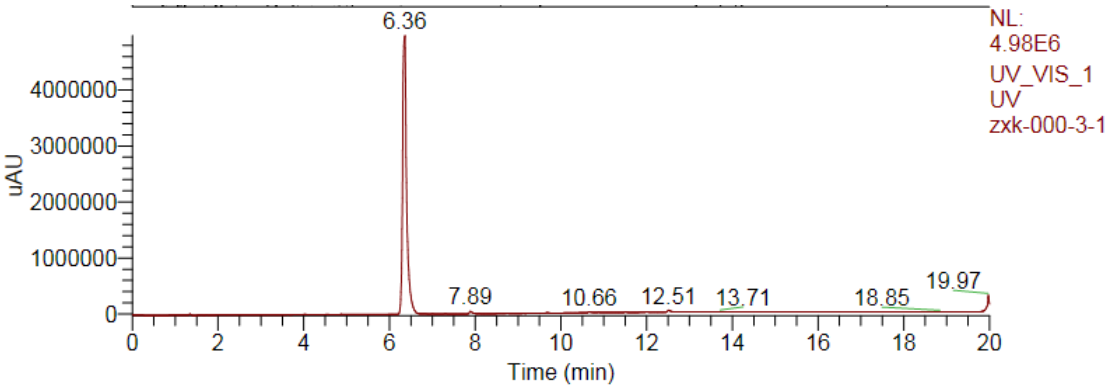
Retention time: 6.68 min

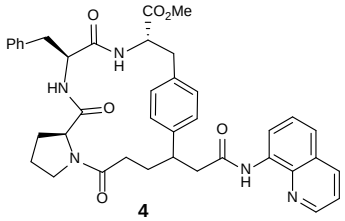




3a

Retention time (isomer a): 6.36 min

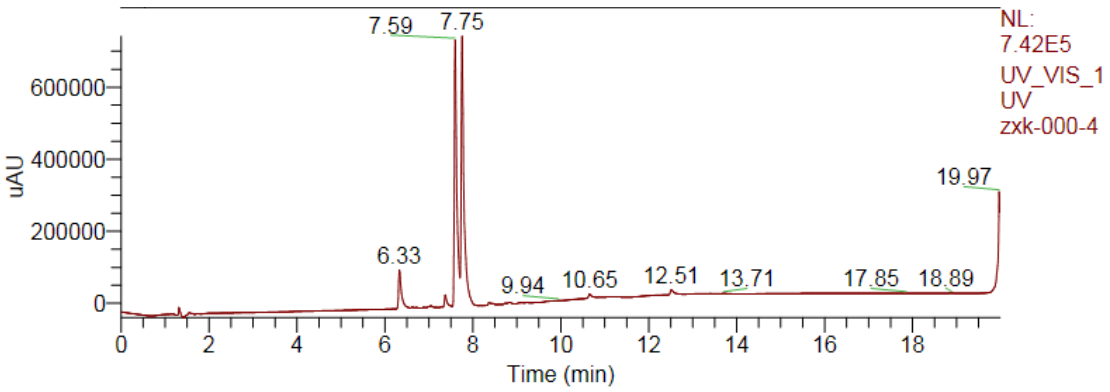


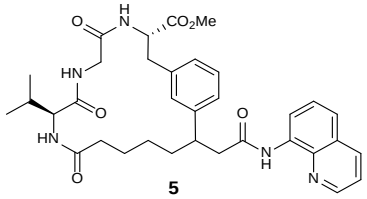


4

Retention time (isomer a): 7.59 min

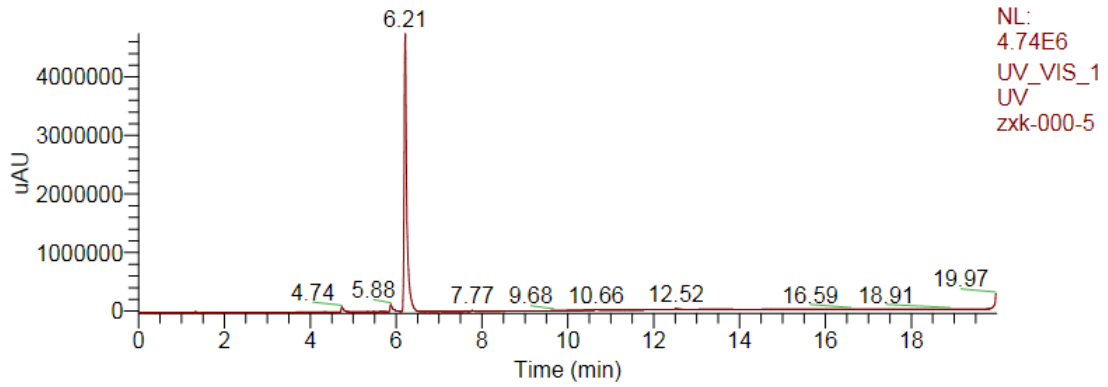
Retention time (isomer b): 7.75 min

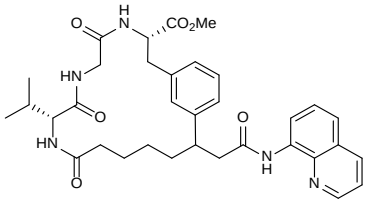




5

Retention time: 6.21 min

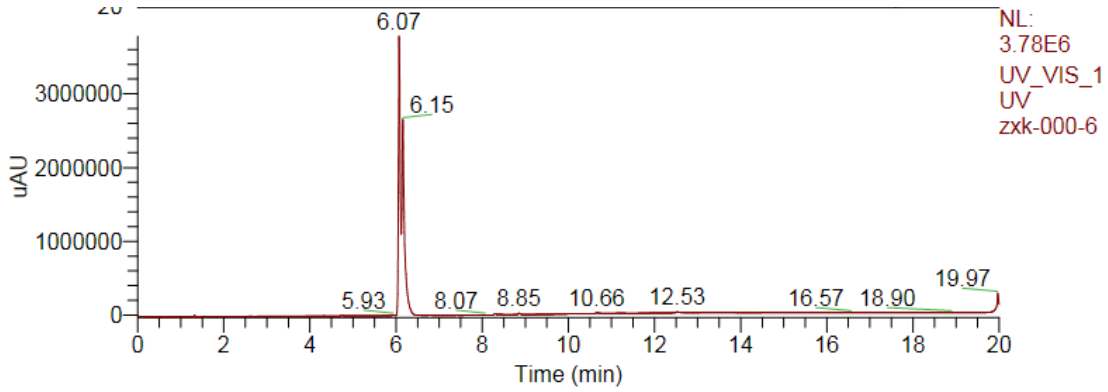


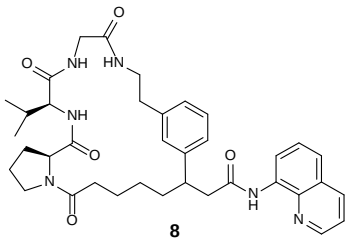


6

Retention time (isomer a): 6.07 min

Retention time (isomer b): 6.15 min

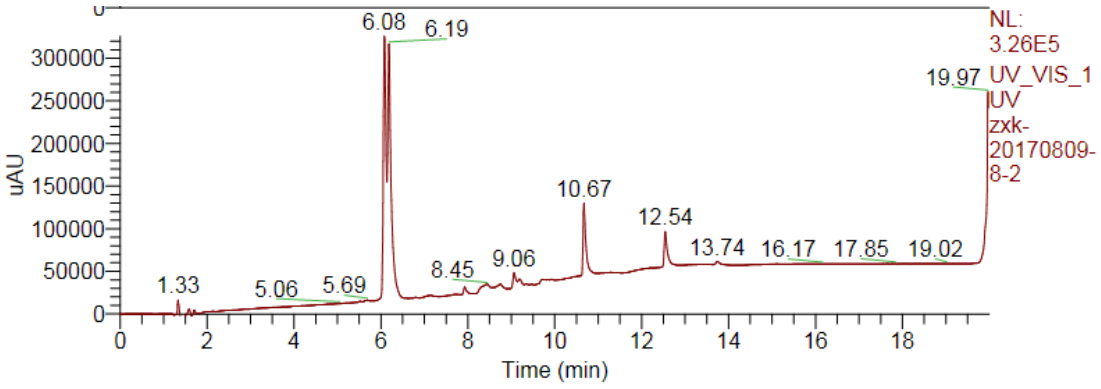


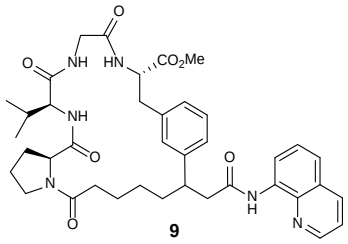


8

Retention time (isomer a): 6.08 min

Retention time (isomer b): 6.19 min

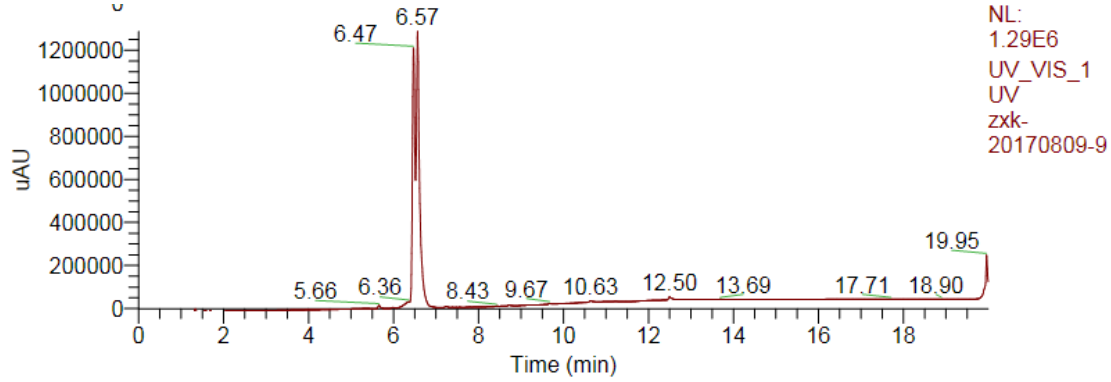


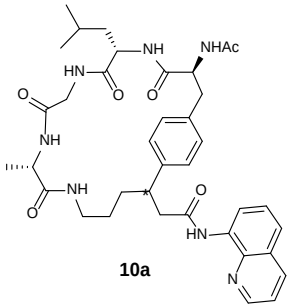


9

Retention time (isomer a): 6.47 min

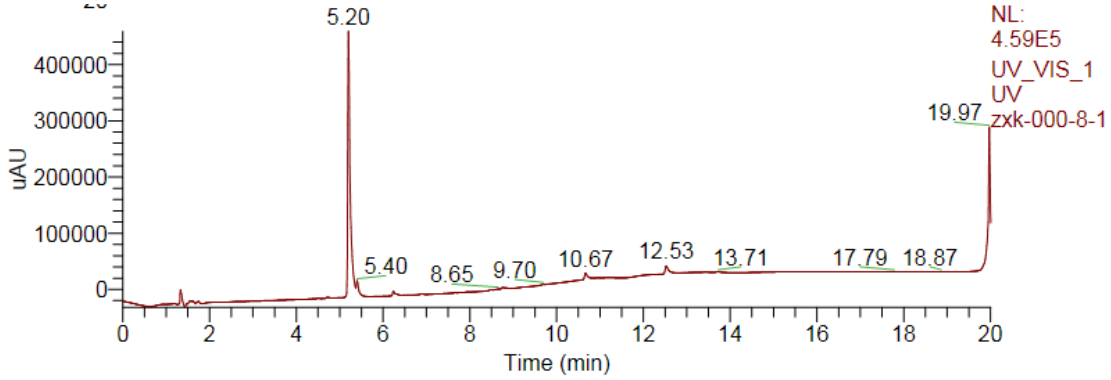
Retention time (isomer b): 6.57 min

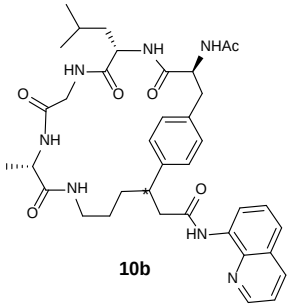




10a

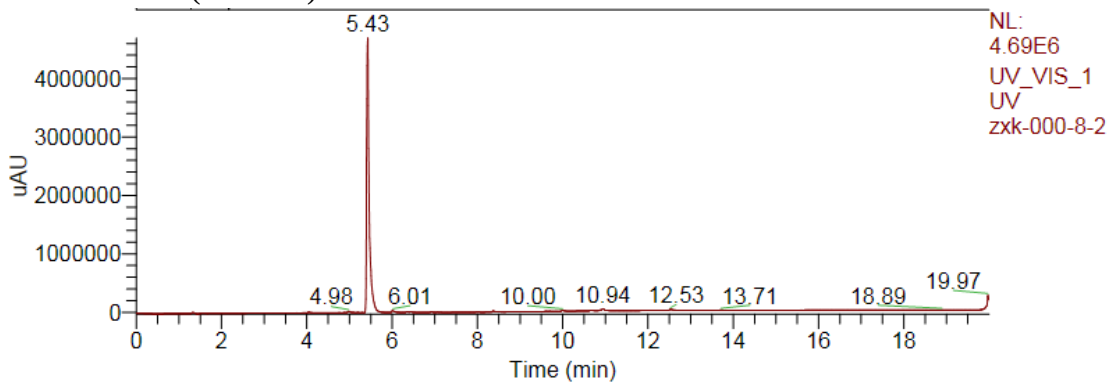
Retention time (isomer a): 5.20 min

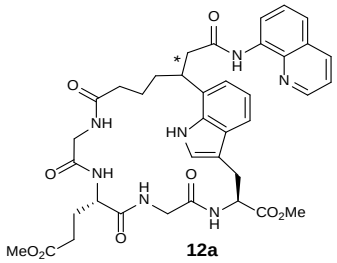




10b

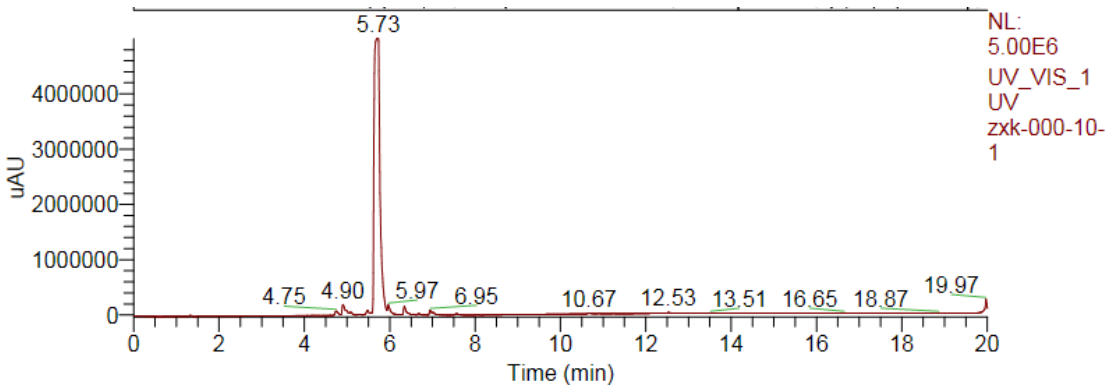
Retention time (isomer b): 5.43 min

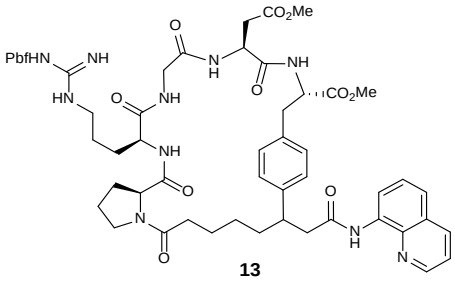




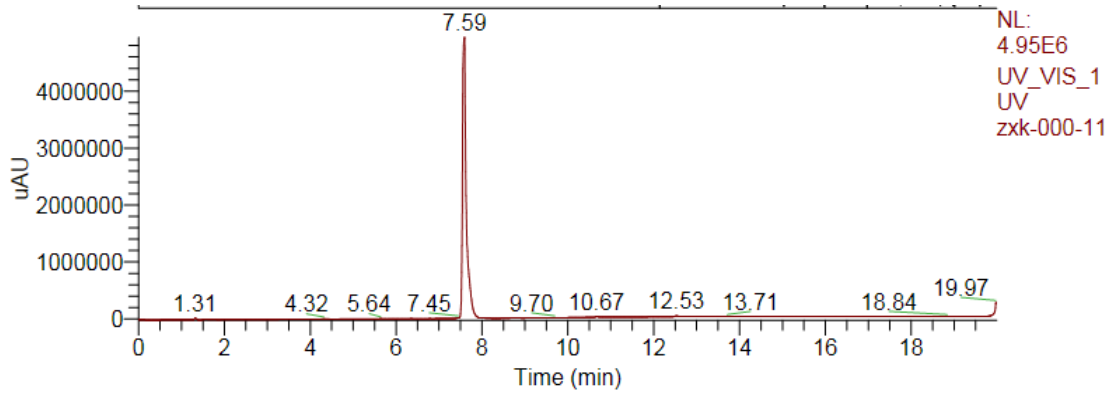
12a

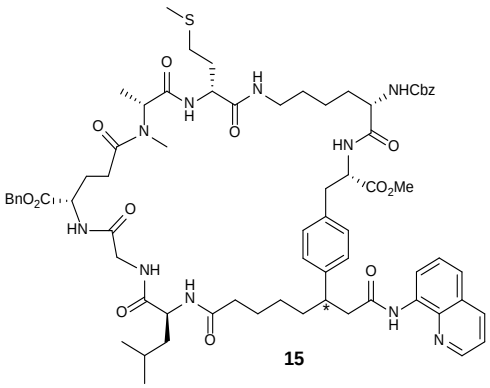
Retention time (isomer a): 5.73 min



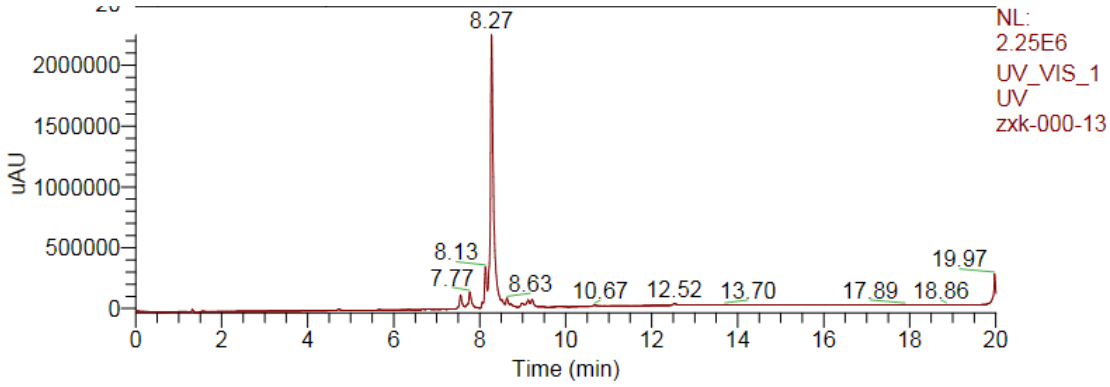


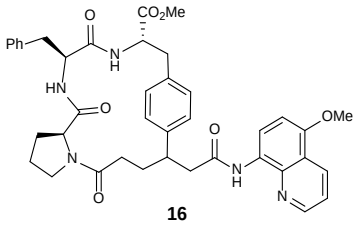
Retention time: 7.59 min





Retention time: 8.27 min

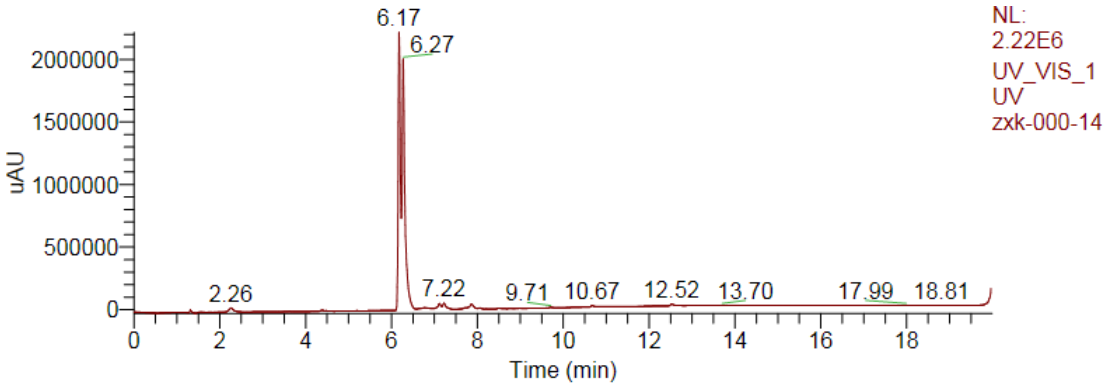


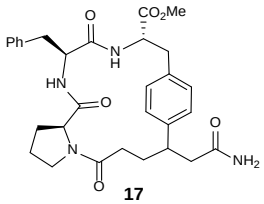


16

Retention time (isomer a): 6.17 min

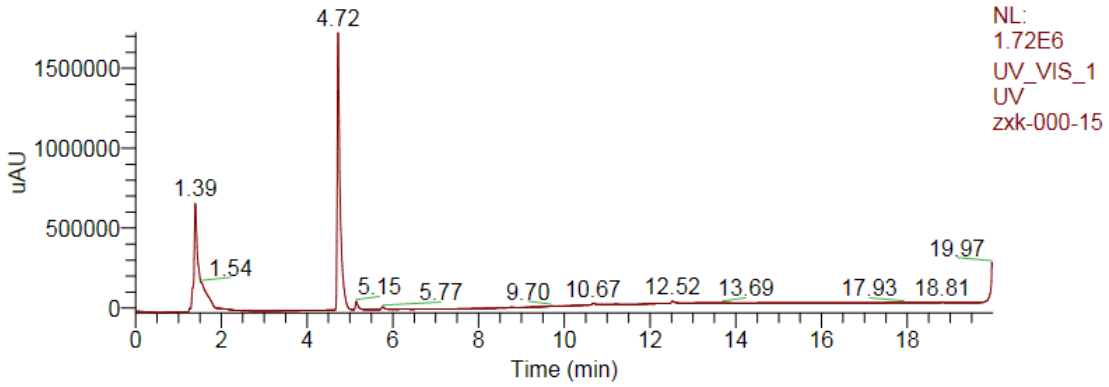
Retention time (isomer b): 6.27 min

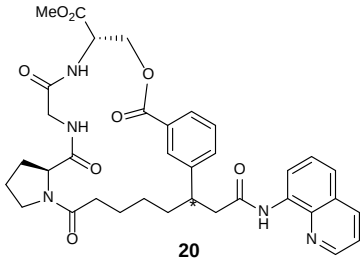




17

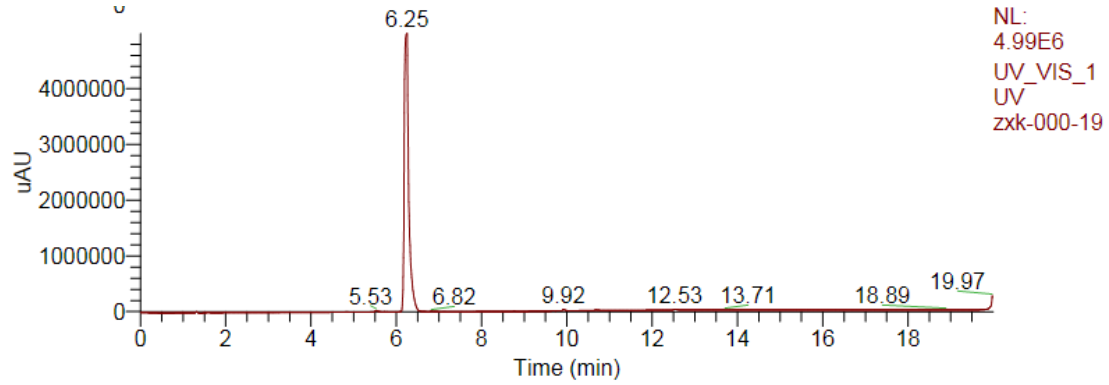
Retention time: 4.72 min

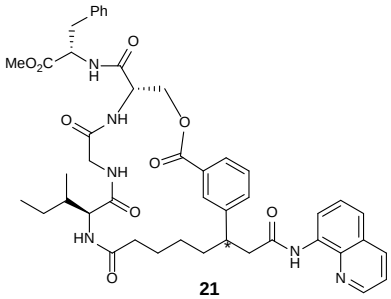




20

Retention time: 6.25 min

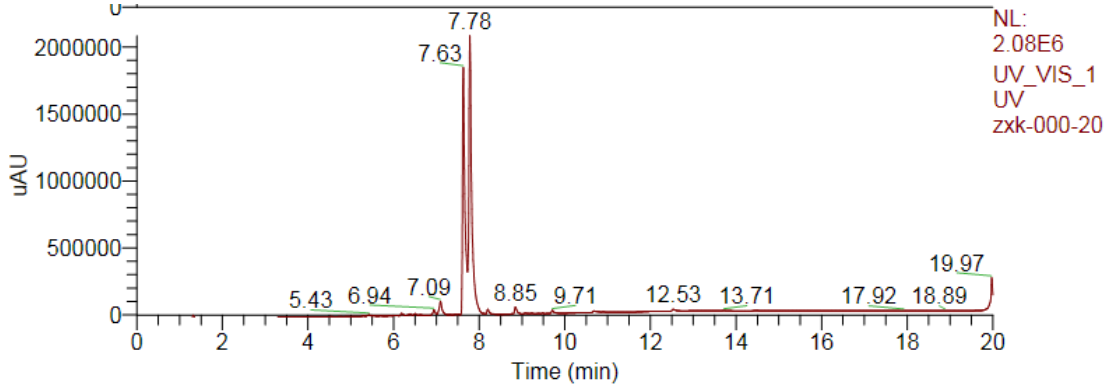


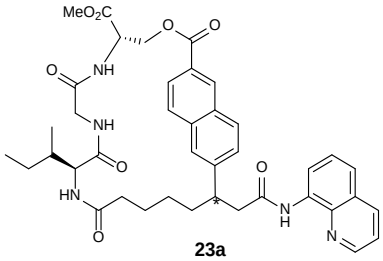


21

Retention time (isomer a): 7.63 min

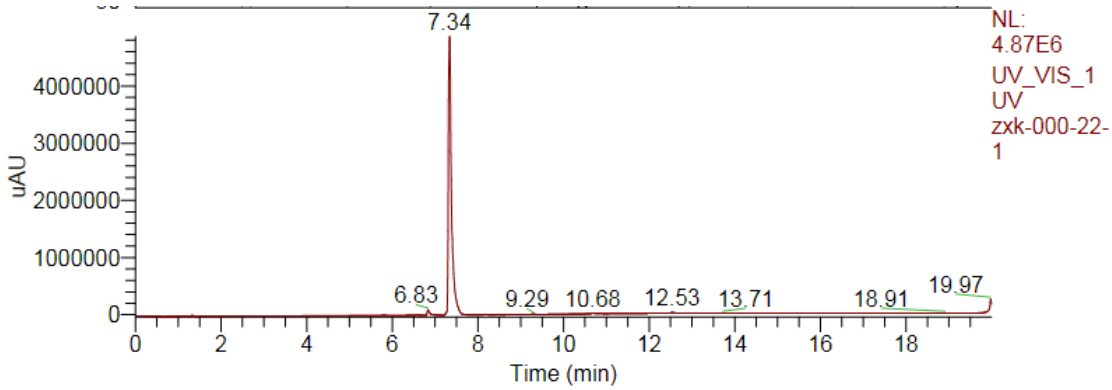
Retention time (isomer b): 7.78 min

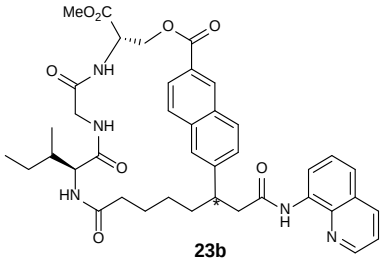




23a

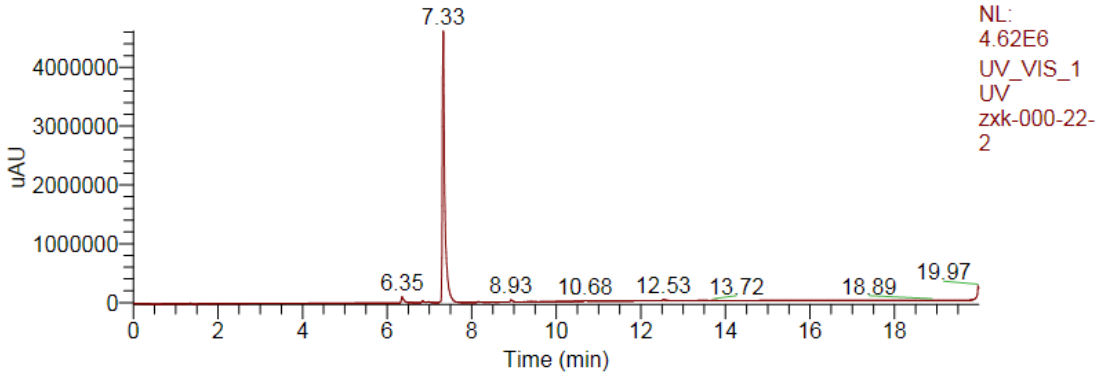
Retention time (isomer a): 7.34 min

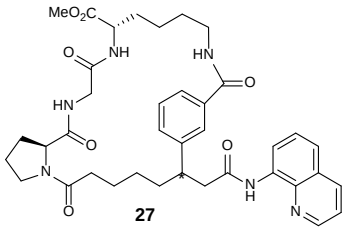




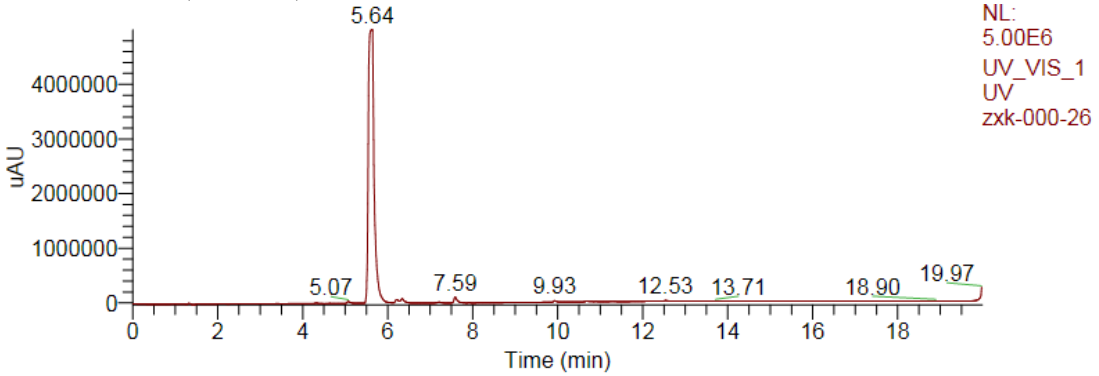
23b

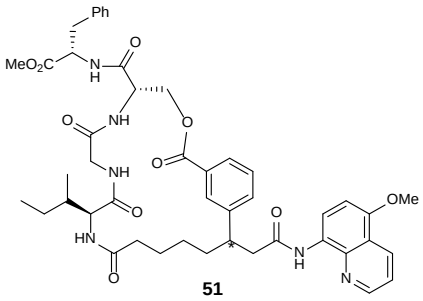
Retention time (isomer b): 7.33 min





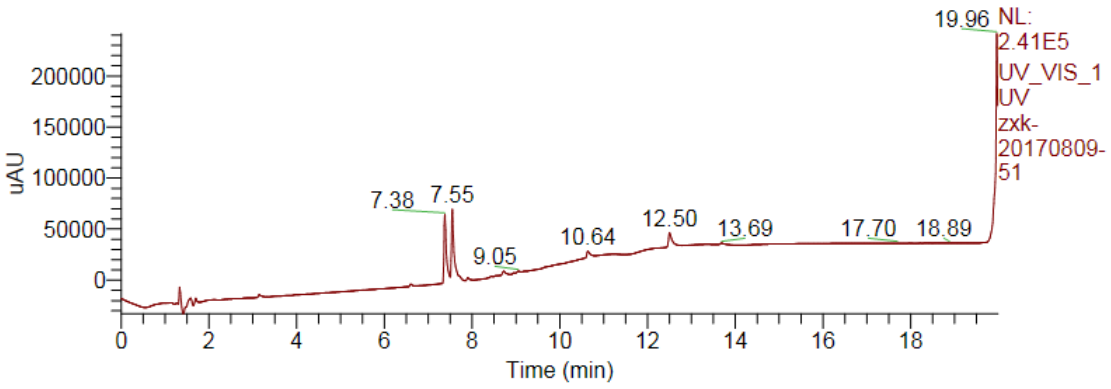
Retention time (isomer a): 5.64 min

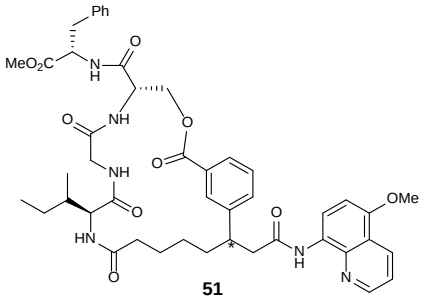




Retention time (isomer a): 7.38 min

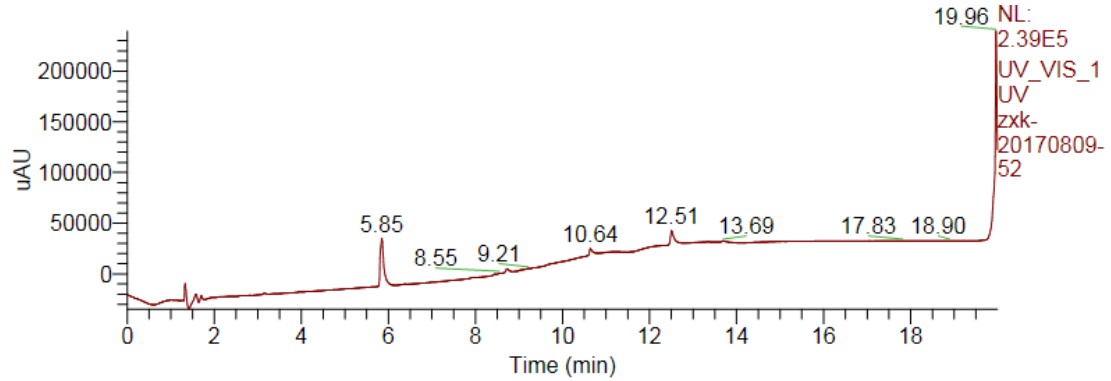
Retention time (isomer b): 7.55 min

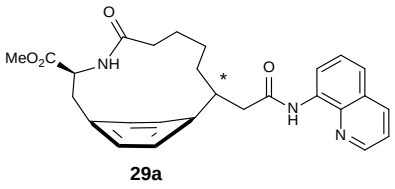




51

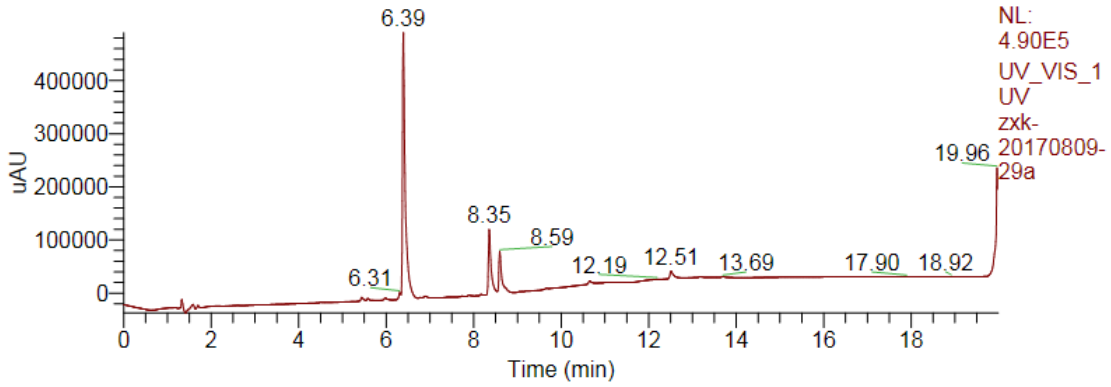
Retention time: 5.85 min

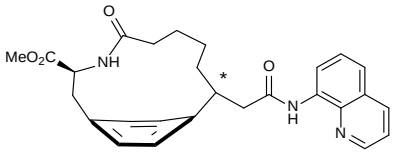




29a

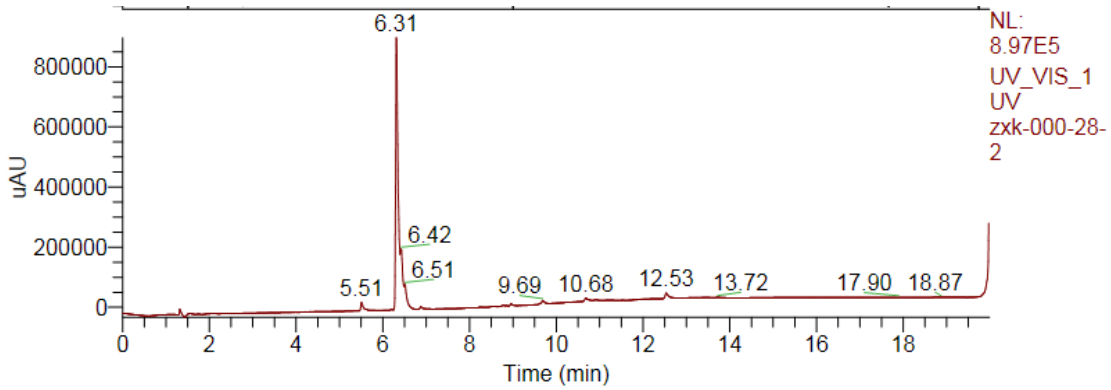
Retention time (isomer a): 6.39 min

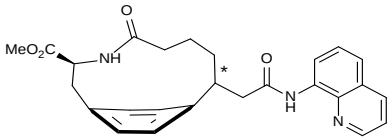




29b

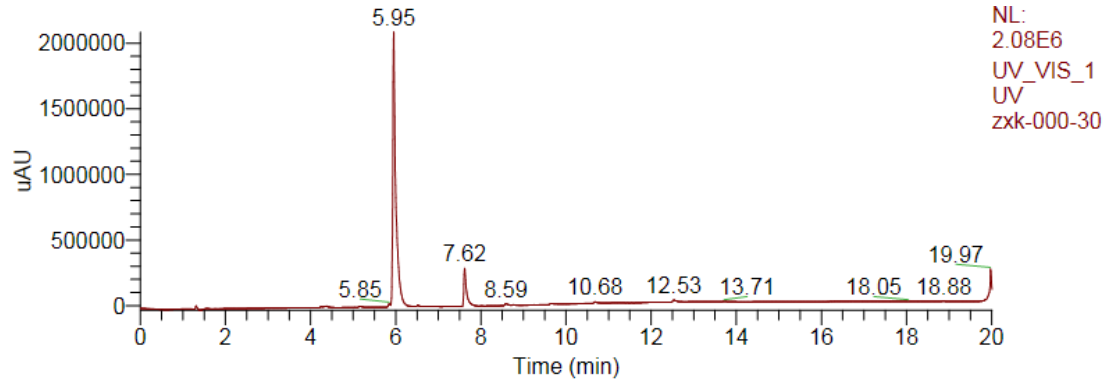
Retention time (isomer b): 6.31 min

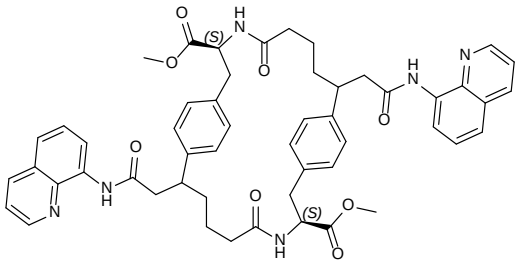




31

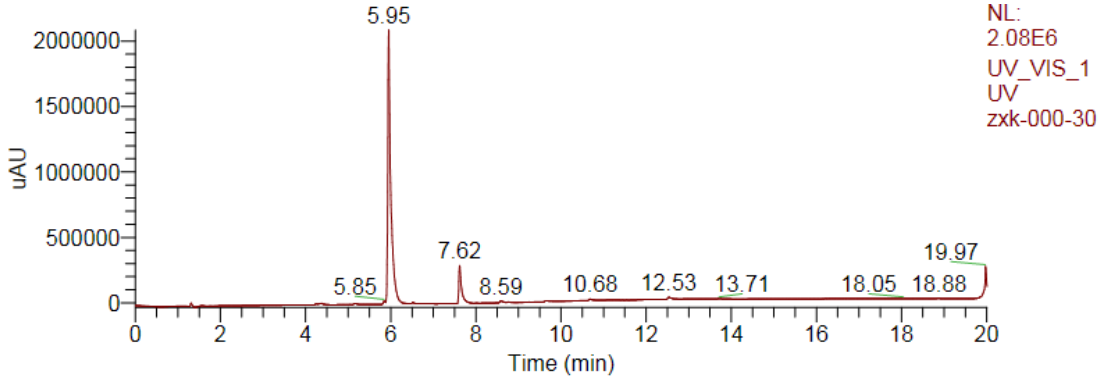
Retention time: 5.95 min

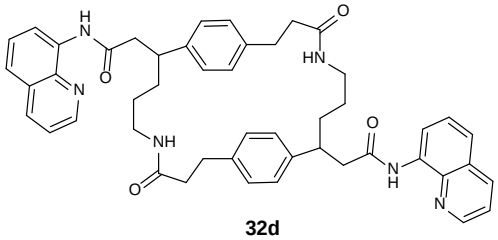




31d

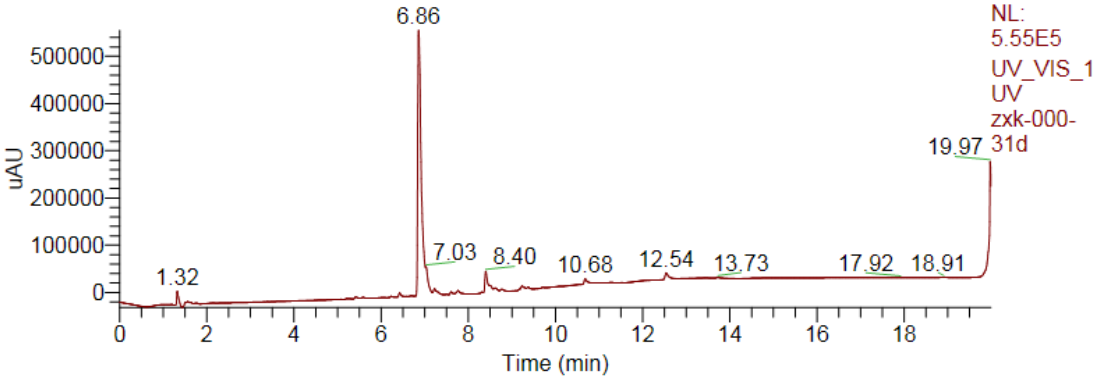
Retention time: 7.33 min

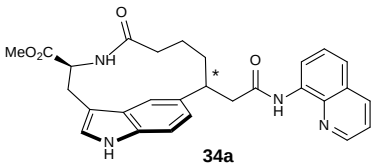




32d

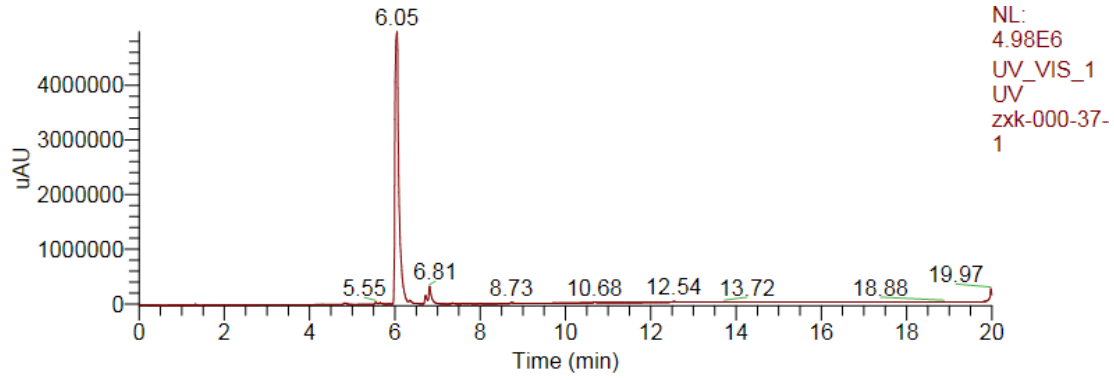
Retention time: 6.86 min

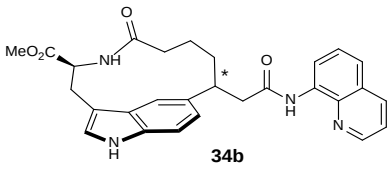




34a

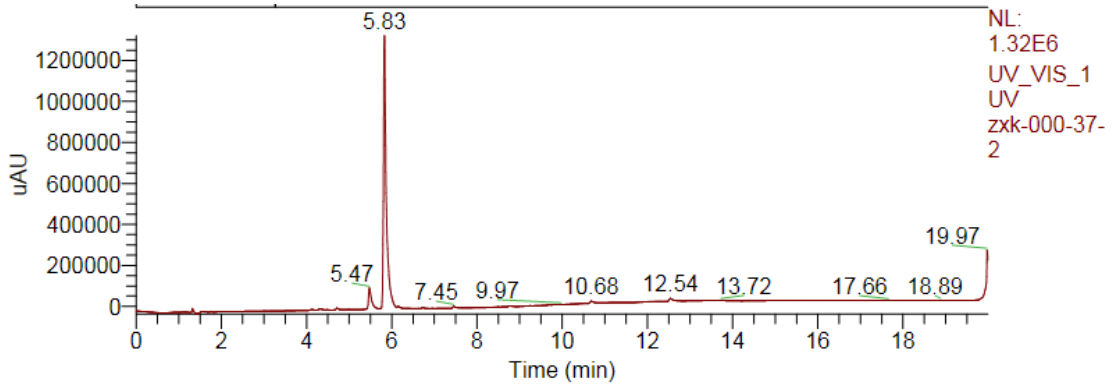
Retention time (isomer a): 6.05 min

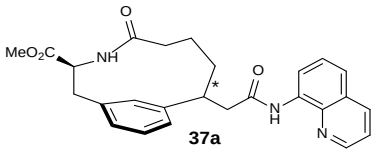




34b

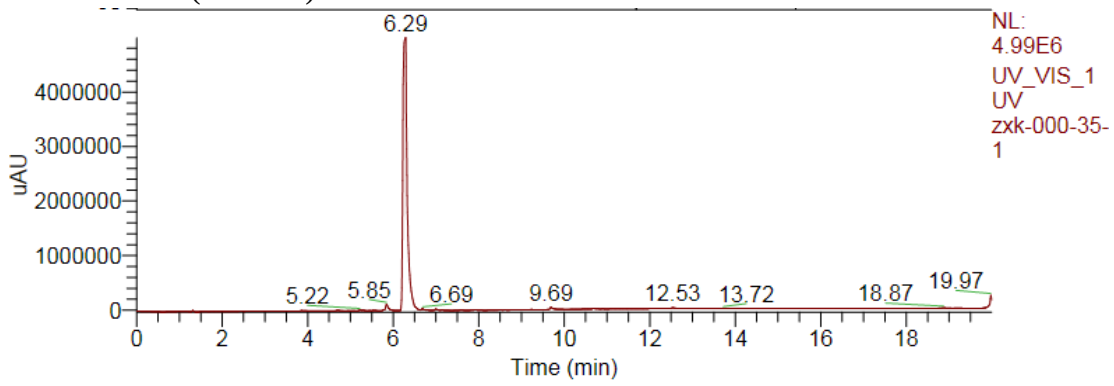
Retention time (isomer b): 5.83 min

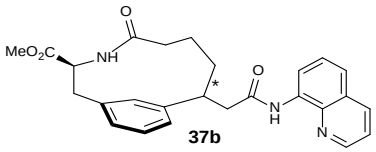




37a

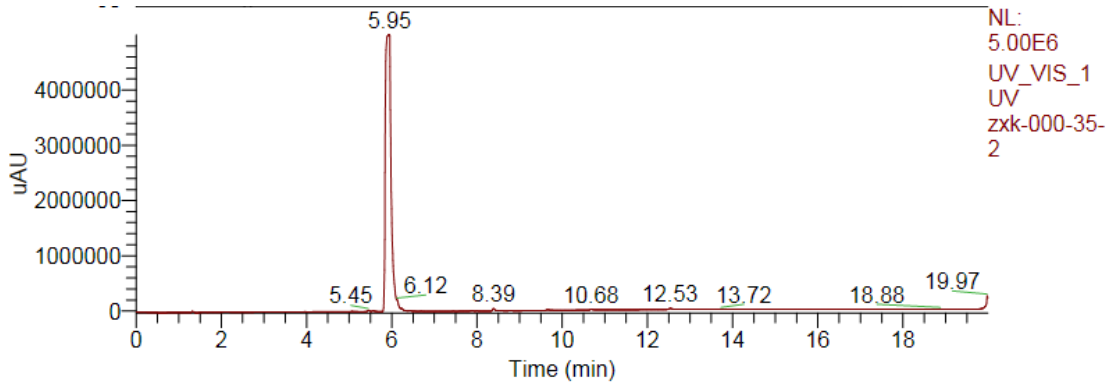
Retention time (isomer a): 6.29 min

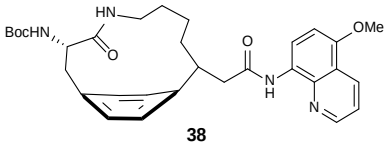




37b

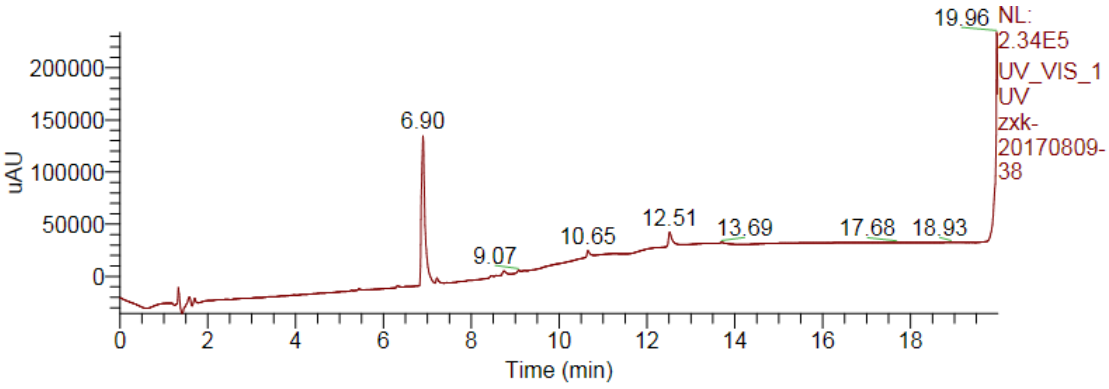
Retention time (isomer b): 5.95 min

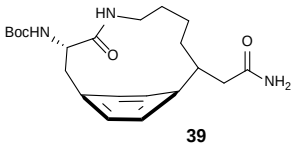




38

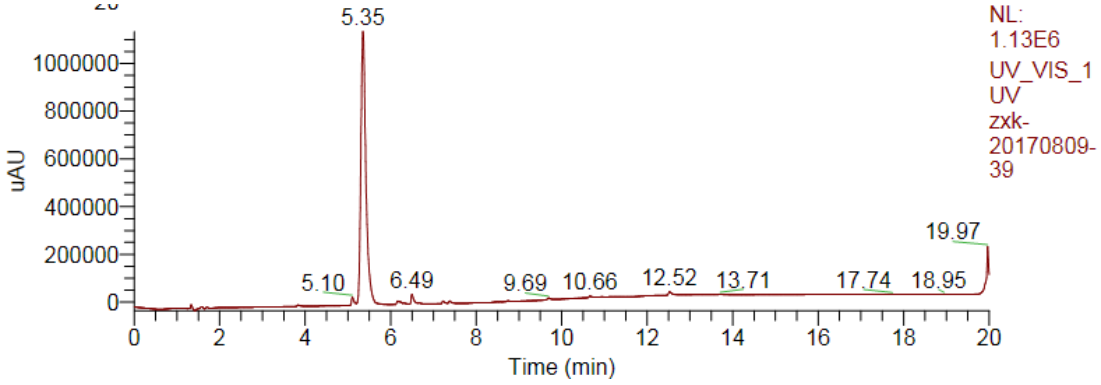
Retention time (isomer a): 6.90 min





39

Retention time (isomer a): 5.35 min


5.35
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Time (min)