SUPPORTING INFORMATION

General experimental details. All chemicals were used as purchased from commercial suppliers. Methylene chloride and THF were dried by being passed through two packed columns of neutral alumina using a commercial solvent purification system prior to use.

Unless otherwise noted, ^{1}H and ^{13}C NMR spectra were recorded on a Bruker AM 400 spectrometer (operating at 400 and 101 MHz respectively) in $CDCl_3$ with 0.03% TMS as an internal standard. Chemical shifts are reported in parts per million (ppm) downfield from TMS. ^{13}C multiplicities were determined with the aid of an APT pulse sequence, differentiating the signals for methyl and methane carbons as "d" from methylene and quarternary carbons as "u". The infrared (IR) spectra were acquired as thin films on a PerkinElmer Spectrum One FT-IR spectrometer equipped with an universal ATR sampling accessory and the absorbtion frequencies are reported in cm^{-1}. Melting points were determined on an Electrothermal Mel-Temp model number 101D apparatus and are uncorrected.

HPLC analysis was carried out using a Xterra MS C-18 column (5 μM, 4.6× 150 mm) with gradient elution (10% CH_3CN to 100% CH_3CN) on a Waters mass-directed fractionation instrument using a Waters 2767 sample manager, a Waters 2525 HPLC pump, a 2487 dual λ absorbance detector and a Waters/MicroMass ZQ (quadrupole) MS connected to a PC with a MassLynx workstation. Purification was carried out using an Xterra MS C-18 column (5 μM, 19× 150 mm) with narrow gradient elution (acetonitrile and water) with a UV fraction trigger. High resolution mass spectra (HRMS) [ESI+] were obtained using a Waters/MicroMass LCT Premier (TOF instrument).

A. Substrate syntheses: experimental details

Electrochemical oxidation substrates ethyl 5-oxooctahydro-1H-pyrrolo[1,2-a]azepine-9a-carboxylate **5a**,[1] 9a-methylhexahydro-1H-pyrrolo[1,2-a]azepin-5(6H)-one **7a**,[1] octahydrobenzo[b]pyrrolo[1,2-a]azepine-5,10(1H,6H)-dione **1a**[2] and 8-ethyloctahydroazepino[3,2,1-hi]indole-4,9(3H,5H)-dione **12a**[3] were prepared as previously reported.

Ethyl 1-(3-azidopropyl)-2-oxocyclopentanecarboxylate. A mixture of the known chloride[4] (1.48 g, 6.36 mmol) and sodium azide (1.65 g, 25.44 mmol) in DMSO (10 mL) were stirred at 55 °C for 15 h. The reaction mixture was cooled to rt and partitioned between water (100 mL) and ethyl ether (3 × 40 mL). The combined organic layers were dried (Na_2SO_4), concentrated to a light brown oil and chromatographed to yield the azide product (1.50 g, 6.27 mmol, 99% yield) as a colorless oil. R_f = 0.42 (25% EtOAC/hexanes); ^{1}H NMR δ 1.26 (t, *J* = 7.2 Hz, 3 H), 1.50–1.72 (complex, 3 H), 1.85–2.07 (complex, 4 H), 2.28 (m, 1 H), 2.44 (m, 1 H), 2.53 (m, 1 H), 3.29 (t, *J* = 6.0 Hz, 2 H), 4.17 (q, *J* = 7.2 Hz, 2 H); ^{13}C NMR δ d 14.1; u 19.6, 24.4, 30.9, 33.2, 37.8, 51.5, 59.9, 61.5, 170.9, 214.5; IR 2968, 2093, 1749, 1719 cm^{-1}; HRMS calcd for $C_{11}H_{18}NO_3$ (M^++ H - N_2): 212.1281, found 212.1280.

Ethyl 5-oxooctahydroindolizine-8a-carboxylate 6a. The above azide (1.50 g, 6.27 mmol) was dissolved in trifluroacetic acid (30 mL) and strirred at rt for 14 h, then concentrated to a dark brown oil. The oil was partitioned between saturated aqueous

$NaHCO_3$ (100 mL) and CH_2Cl_2 (3 × 25 mL). The combined organic layers were dried (Na_2SO_4), concentrated and chromatographed to afford the lactam ester **7a** as a colorless oil (900 mg, 4.26 mmol, 68% yield). R_f = 0.49 (1:2 acetone: CH_2Cl_2); ^{1}H NMR δ 1.28 (t, *J* = 7.2 Hz, 3 H), 1.51–1.95 (complex, 6 H), 2.31 (m, 1 H), 2.51 (m, 3 H), 3.55 (t, *J* = 9.4 Hz, 1 H), 3.71 (m, 1 H), 4.21 (dq, *J* = 2.8, 7.2 Hz, 2 H); ^{13}C NMR δ d 14.1; u 18.7, 20.4, 30.2, 32.0, 38.1, 44.9, 61.6, 69.5, 168.9, 173.4; IR 2955, 2888, 1729, 1637 cm^{-1}; HRMS calcd for $C_{11}H_{17}NNaO_3$ (M^++ Na): 234.1101, found 234.1101.

2-(4-Chlorobutyl)-2-methylcyclohexanone. The procedure for the one-pot 1,4 reduction/alkylation of unsaturated carbonyl compounds developed by Ganem and Fortunato[5] was utilized with slight modification. Thus, to a solution of 2-methyl cyclohexenone[6] (1.51 g, 13.7 mmol) in THF (48 mL) at -78 °C was added a solution of L-Selectride (13.7 mL, 1 M, 13.7 mmol) in THF. The temperature was maintained for 75 minutes, followed by the addition of a solution of 1-chloro-4-iodobutane (6.0 g, 27.4 mmol) and HMPA (7.4 g, 41.1 mmol) in THF (5 mL). The reaction was stirred for 16 h, slowly warming to rt. The reaction was partitioned between saturated, aqueous NH_4Cl and CH_2Cl_2 (3 × 75 mL). The combined organics were dried (Na_2SO_4), concentrated and chromatographed to afford the chloroketone (1.12 g, 5.5 mmol, 40% yield) as a colorless oil. R_f = 0.35 (8% EtOAc in hexanes); ^{1}H NMR δ 1.07 (s, 3 H), 1.22 (m, 1 H), 1.43 (m, 2 H), 1.56–1.80 (complex, 8 H), 1.88 (m, 1 H), 2.37 (m, 2 H), 3.53 (t, *J* = 6.8 Hz, 2 H); ^{13}C

NMR δ d 22.5; u 20.9, 21.1, 27.3, 33.0, 36.7, 38.7, 39.0, 44.6, 48.3, 215.6; IR 2936, 2866, 1701 cm^{-1}; HRMS calcd for $C_{11}H_{20}ClO$ (M^+ + H): 203.1197, found 203.1202.

2-(4-Azidobutyl)-2-methylcyclohexanone. The above chloroketone (870 mg, 4.3 mmol) and sodium azide (1,116 mg, 17.2 mmol) in DMF (4 mL) were stirred at 40 °C for 16 h. The reaction mixture was cooled to rt and partitioned between water (40 mL) and ether (3 × 25 mL). The combined organics were dried (Na_2SO_4), concentrated and chromatographed to afford the azidoketone (754 mg, 3.6 mmol, 84% yield) as a colorless oil. R_f = 0.35 (8% EtOAc in hexanes); ^{1}H NMR δ 1.07 (s, 3 H), 1.17 (m, 1 H), 1.33 (m, 2 H), 1.55–1.66 (complex, 4 H), 1.68-1.81 (complex, 4 H), 1.88 (m, 1 H), 2.37 (t, *J* = 6.4 Hz, 2 H), 3.27 (t, *J* = 6.8 Hz, 2 H); ^{13}C NMR δ d 22.6; u 21.0 (× 2), 27.4, 29.5, 37.1, 38.8, 39.1, 48.5, 51.2, 215.8; IR 2936, 2866, 2092, 1703 cm^{-1}; HRMS calcd for $C_{11}H_{20}NO$ (M^+ + H - N_2): 182.1539, found 182.1543.

10a-Methyloctahydropyrido[1,2-a]azepin-6(7H)-one 7a. To a solution of the above azidoketone (654 mg, 3.1 mmol) in DCE (6 mL) was added a solution of $TiCl_4$ in CH_2Cl_2 (4.7 mL, 1 M, 4.7 mmol). The reaction was heated at 60 °C for 13 h then partitioned between saturated, aqueous NH_4Cl and CH_2Cl_2 (3 × 50 mL). The combined organics were dried (Na_2SO_4), concentrated and chromatographed to afford the bicyclic amide **7a** (274 mg, 1.5 mmol, 48% yield) as a colorless oil. R_f = 0.26 (50% EtOAc in hexanes); ^{1}H NMR δ 1.34 (s, 3 H), 1.42 (m, 2 H), 1.55-1.83 (complex, 9 H), 1.90 (m, 1 H), 2.61 (m, 2 H), 2.80 (dt, *J* = 2.8, 13.2 Hz, 1 H), 4.47 (td, *J* = 3.6, 13.6 Hz, 1 H); ^{13}C NMR δ d 22.1; u 20.4, 20.7, 21.5, 24.7, 35.7, 39.4, 39.6, 40.3, 57.6, 174.2; IR 2932, 2866, 1617 cm^{-1}; HRMS calcd for $C_{11}H_{20}NO$ (M^+ + H): 182.1539, found 182.1555.

7a-Hydroxy-4a-methylhexahydrocyclopenta[b]pyran-5(6H)-one. A modification of the procedure of Zhang and coworkers[7] was employed. Thus, to 2-methyl-1,3-cyclopentanedione (5.0 g, 44.6 mmol) in water (200 mL) was added neat acrolein (10 mL, 149.7 mmol). After stirring for 15 h at rt, the reaction was extracted with CH_2Cl_2 (3 × 75 mL), dried (Na_2SO_4) and concentrated to afford the known aldehyde[8] as a light yellow oil (3.2 g), which was used without further purification. ^{1}H NMR δ 1.14 (s, 3 H), 1.94 (t, *J* = 7.2 Hz, 2 H), 2.49 (dt, *J* = 0.8, 7.6 Hz, 2 H), 2.81 (s, 4 H), 9.68 (s, 1 H); ^{13}C NMR δ d 19.3, 200.8; u 26.0, 34.8, 38.3, 215.6.

To the crude aldehyde (3.2 g) in *t*-butanol (90 mL) and benzene (3 mL) was added formic acid (4.2 mL) and $NaCNBH_3$ (1.19 g, 19.0 mmol). After 1.5 h at rt the reaction was partitioned between saturated aqueous $NaHCO_3$ and ethyl ether (3 × 50 mL). The organics were combined, dried (Na_2SO_4), concentrated and chromatographed to give the hemiketal as a white solid (1.5 g, 8.8 mmol, 20% yield for two steps). R_f = 0.48 (50% EtOAc in hexanes); mp = 63–65 °C; ^{1}H NMR δ 1.00 (s, 3 H), 1.41 (m, 2 H), 1.51 (m, 1 H), 2.09 (m, 3 H), 2.46 (m, 2 H), 3.36 (s, 1 H), 3.59 (dd, *J* = 1.6, 10.4 Hz, 1 H), 3.84 (m, 1 H); ^{13}C NMR δ d 20.8; u 22.8, 26.5, 32.8, 35.3, 51.1, 60.6, 102.9, 218.3; IR 3391, 2936, 2878, 1728 cm^{-1}; HRMS calcd for $C_9H_{15}O_3$ (M^+ + H): 171.1016, found 171.1012.

3-(1-Methyl-2,5-dioxocyclopentyl)propyl methanesulfonate. To a solution of the hemiketal (125 mg, 0.74 mmol) in CH_2Cl_2 (8 mL) was added methanesulfonyl chloride (0.14 mL, 1.84 mmol) and pyridine (0.36 mL, 4.44 mmol). After 13 h at rt, the reaction

was diluted with water and extracted with CH_2Cl_2 (3 × 25 mL). The combined organics were washed with 10% aqueous $CuSO_4$ then water, dried (Na_2SO_4), concentrated and chromatographed to give the mesylate as a colorless oil (122 mg, 0.49 mmol, 66% yield). R_f = 0.20 (33% EtOAc in hexanes); ^{1}H NMR δ 1.15 (s, 3 H), 1.66 (m, 2 H), 1.76 (dt, *J* = 3.2, 7.2 Hz, 2 H), 2.81 (m, 4 H), 3.01 (s, 3 H), 4.14 (t, *J* = 6.0 Hz, 2 H); ^{13}C NMR δ d 19.5, 37.1; u 24.0, 30.1, 34.8, 55.7, 69.4, 215.7; IR 2938, 1763, 1717 cm^{-1}; HRMS calcd for $C_{10}H_{20}NO_5S$ (M^+ + NH_4): 266.1057, found 266.1085.

2-(3-Azidopropyl)-2-methylcyclopentane-1,3-dione. The above mesylate (587 mg, 2.36 mmol) and sodium azide (922 mg, 14.18 mmol) in DMF (10 mL) were stirred at rt for 16 h. The reaction was partitioned between water (75 mL) and ethyl ether (3 × 30 mL). The combined organics were dried (Na_2SO_4), concentrated and chromatographed to give the azide as a colorless oil (423 mg, 2.17 mmol, 92% yield). ^{1}H NMR δ 1.12 (s, 3 H), 1.45 (m, 2 H), 1.68 (m, 2 H), 2.77 (m, 4 H), 3.22 (t, *J* = 6.4 Hz, 2 H); ^{13}C NMR δ d 19.7; u 24.1, 31.8, 35.1, 51.3, 56.2, 215.9. These data are congruent with those previously reported.[9]

8a-methylhexahydroindolizine-5,8-dione 9a. To a solution of the above azide (72 mg, 0.37 mmol) in CH_2Cl_2 (3 mL) was added a solution of $TiCl_4$ in CH_2Cl_2 (0.74 mL, 1.0 M, 0.74 mmol). After 10 h, the reaction was partitioned between saturated aqueous NH_4Cl (10 mL) and CH_2Cl_2 (3 × 10 mL). The combined organics were dried (Na_2SO_4), concentrated and chromatographed to give the ketoamide **9a** as a colorless oil (44 mg, 0.26 mmol, 71% yield). ^{1}H NMR δ 1.34 (s, 3 H), 1.95 (m, 4 H), 2.61 (m, 3 H), 2.77 (m, 1 H), 3.52 (m, 1 H), 3.64 (m, 1 H); ^{13}C NMR δ d 23.6; u 20.8, 30.0, 34.3, 35.7, 45.0, 69.1, 168.2, 209.5. These data are congruent with those previously reported.[9]

Methyl 1-(3-chloropropyl)-2-oxo-1,2,3,4-tetrahydronaphthalene-1-carboxylate. Methyl 2-oxo-1,2,3,4-tetrahydronaphthalene-1-carboxylate (280 mg, 1.37 mmol), potassium carbonate (947 mg, 6.86 mmol), and 1-chloro-3-iodopropane (420 mg, 2.06 mmol) were dissolved in acetone (75 mL) and heated at reflux for 2.5 h. The reaction was cooled to rt, filtered and adsorbed on celite. Chromatography afforded the alkylated product (257 mg, 0.92 mmol, 67% yield) as a faintly yellow oil. R_f = 0.54 (25% EtOAc in hexanes); ^{1}H NMR δ 1.45 (m, 2 H), 2.32 (m, 1 H), 2.52 (m, 1 H), 2.64 (m, 1 H), 2.95 (m, 1 H), 3.05 (m, 1 H), 3.17 (m, 1 H), 3.42 (m, 2 H), 3.63 (s, 3 H), 7.22-7.29 (complex, 4 H); ^{13}C NMR δ d 53.0, 127.1, 127.6, 127.9, 128.7; u 27.7, 28.1, 33.9, 39.2, 44.8, 62.5, 135.7, 136.4, 171.4, 208.2; IR 2954, 1742, 1714 cm^{-1}; HRMS calcd for $C_{15}H_{17}O_3$ (M^+-Cl): 245.1172, found 245.1159.

Methyl 1-(3-azidopropyl)-2-oxo-1,2,3,4-tetrahydronaphthalene-1-carboxylate. Methyl 1-(3-chloropropyl)-2-oxo-1,2,3,4-tetrahydronaphthalene-1-carboxylate (256 mg, 0.91 mmol) and sodium azide (474 mg, 7.29 mmol) were dissolved in DMSO (20 ml) and heated at 55° C for 17 h. The reaction was cooled to rt and partitioned between water and ethyl ether (3 × 30 mL). The organic layers were combined, dried (Na_2SO_4) and adsorbed on celite. Chromatography afforded the azide product (167 mg, 0.58 mmol, 64 % yield) as a colorless oil. R_f = 0.45 (25% EtOAc); ^{1}H NMR δ 1.24 (m, 1 H), 2.22 (m, 1 H), 2.47 (m, 1 H), 2.65 (m, 1 H), 2.91–3.26 (complex, 5 H), 3.63 (s, 3 H), 7.22-7.29 (complex, 4

H); ^{13}C NMR δ d 53.0, 127.0, 127.7, 127.9, 128.8; u 24.0, 28.1, 33.6, 39.2, 62.5, 135.7, 136.4, 171.4, 208.3; IR 2952, 2094, 1741, 17147 cm^{-1}; HRMS calcd for $C_{15}H_{18}NO_3$ (M^++ H - N_2): 260.1281, found 260.1277.

Methyl 5-oxo-2,3,5,6,7,11b-hexahydro-1H-benzo[c]pyrrolo[1,2-a]azepine-11b-carboxylate 10a. To a solution of methyl 1-(3-chloropropyl)-2-oxo-1,2,3,4-tetrahydronaphthalene-1-carboxylate (90 mg, 0.32 mmol) in CH_2Cl_2 (10 ml) was added a solution of $TiCl_4$ in CH_2Cl_2 (0.64 ml, 1.0 M, 0.64 mmol) and the reaction stirred for 16 h at rt. The reaction was partitioned between saturarte, aqueous $NaHCO_3$ (50 mL) and CH_2Cl_2 (3 x 30mL). The combined organics were dried (Na_2SO_4), adsorbed onto celite and chromatographed to afford the lactam **10a** (62 mg, 0.24 mmol, 75 % yield) as a colorless oil. R_f = 0.15 (50% EtOAc); ^{1}H NMR δ 1.91 (m, 2 H), 2.59 (m, 1 H), 2.75–2.98 (complex, 5 H), 3.62 (m, 1 H), 3.70 (s, 3 H), 4.04 (m, 1 H), 7.16 (dd, *J* = 3.2, 5.6 Hz, 1 H), 7.28 (m, 2 H), 7.48 (dd, *J* = 3.6, 5.2 Hz, 1 H); ^{13}C NMR δ d 53.4, 126.7, 127.8, 128.6, 129.8; u 20.5, 29.4, 35.9, 40.4, 49.4, 71.1, 137.4, 139.7, 172.3, 174.1; IR 2953, 2885, 1731 cm^{-1}; HRMS calcd for $C_{15}H_{18}NO_3$ (M^++ H): 260.1281, found 260.1279.

***rel*-(8aS,10R,12aR)-10-hydroxydecahydrobenzo[b]pyrrolo[1,2-a]azepin-5(1H)-one 11a**. A solution of *rel*-(8aS,12aR)-octahydrobenzo[b]pyrrolo[1,2-a]azepine-5,10(1H,6H)-dione **1a** (173 mg, 0.78 mmol) in CH_2Cl_2 (10 ml) was cooled in an acetone/dry ice bath and a solution of L-Selectride (0.94 mL, 1.0 M in THF, 0.94 mmol) in small portions over 15 min. After complete L-Sectride addition, the reaction was stirred for 17h, slowly

warming to rt. The reaction was partitioned between saturated, aqueous NH_4Cl and CH_2Cl_2 (3 × 30 ml). The combined organics were were dried (Na_2SO_4), adsorbed onto celite and chromatographed to afford the alcohol **11a** (90 mg, 0.40 mmol, 52 % yield) as a colorless oil. R_f = 0.16 (100% EtOAc); ^{1}H NMR δ 1.34-1.47 (m, 2 H), 1.68–1.98 (complex, 10 H), 2.18–2.39 (m, 3 H2.48 (t, *J* = 12.8 Hz, 1 H), 2.56–2.66 (m, 2 H), 3.49 (m, 1 H), 3.76 (m, 1 H), 4.06 (br s, 1 H); ^{13}C NMR δ d 43.8, 64.8; u 20.2, 23.6, 24.3, 31.3, 34.5, 38.2, 38.4, 38.9, 48.9, 66.5, 174.5; IR 3374, 2930, 2870, 1591 cm^{-1}; HRMS calcd for $C_{13}H_{22}NO_2$ (M^+ + H): 224.1645, found 224.1647.

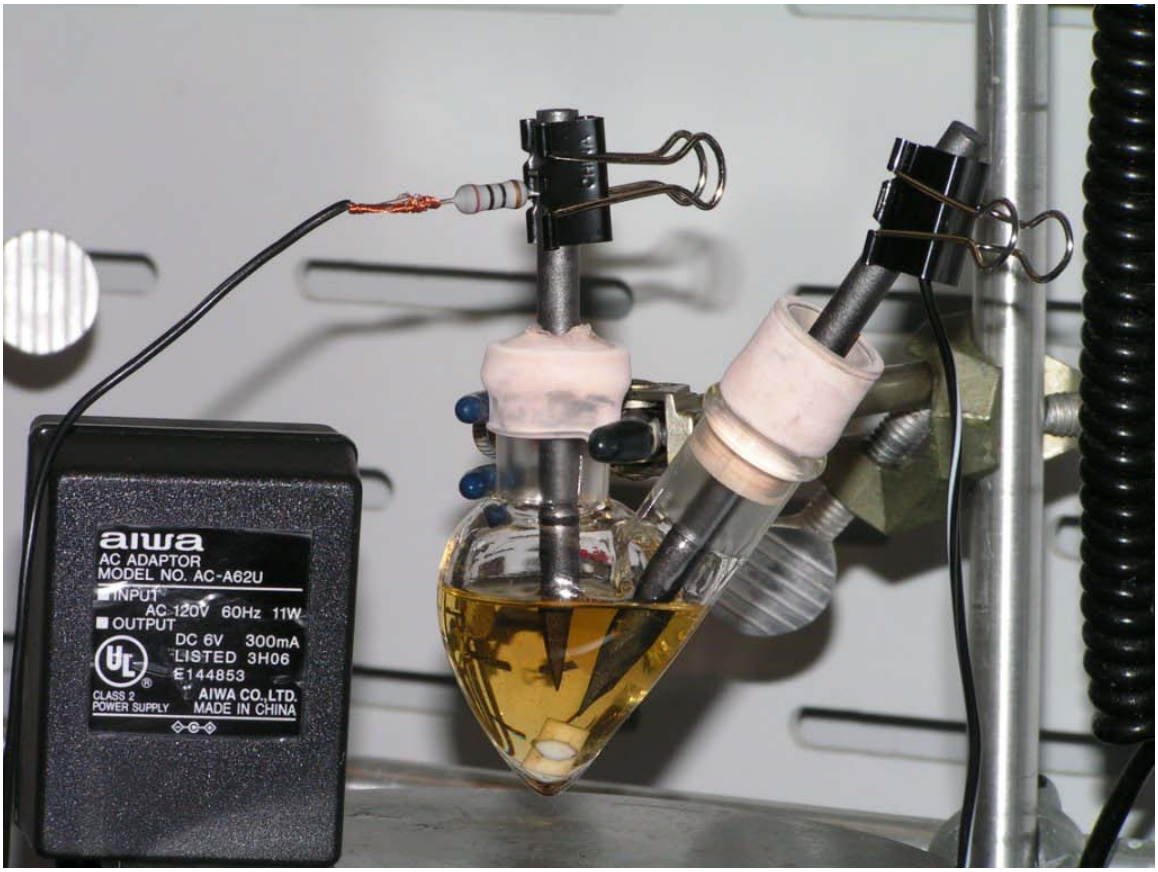
B. Electrochemical oxidation of amides: device details and safety precautions:

CAUTION: All electrochemical experiments, using any power supply, should be carried out to avoid electric shock and fire/explosion. It is strongly recommended that the following best practices be followed:

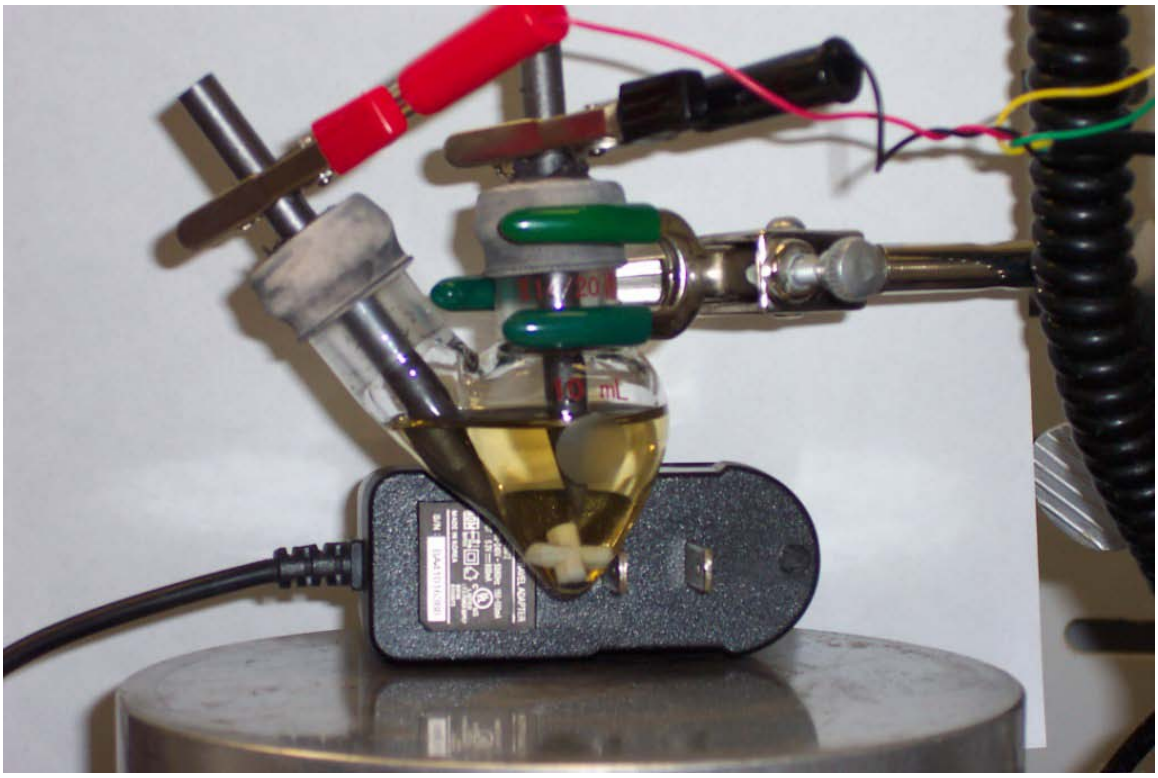
- **Do not touch electrodes or any exposed metal attached to the power source wires**
- **Ensure that hands and working area are dry**
- **Do not submerge any portion of the power source or wires in water**
- **Do not modify internal components of the power source**
- **Unplug power source prior to cleaning or modifying the power source 'alligator clips' or wires**
- **Do not connect the positive and negative wires or short circuit the power source**
- **Do not connect the power source to the reaction in the presence of open flammable solvents**
- **Disconnect the power source outside of the reaction hood prior to opening up the hood and working up the reaction**

General notes: The power supply devices used in this work were repurposed from either a portable CD player power source (6 V device) or a cellular phone charger (5.2 V device), however any Direct Current (D.C.) power supply or transformer having an appropriate voltage and current output can be utilized. The output plug was removed and the positive and negative output wires determined using a multimeter. These wires were connected directly to the reaction anode and cathode or alligator clips soldered onto the ends of the wires to facilitate connection to the reaction electrodes. Note that the positive terminal of the power supply is connected to the reaction anode and the negative terminal of the power supply is connected to the reaction cathode.

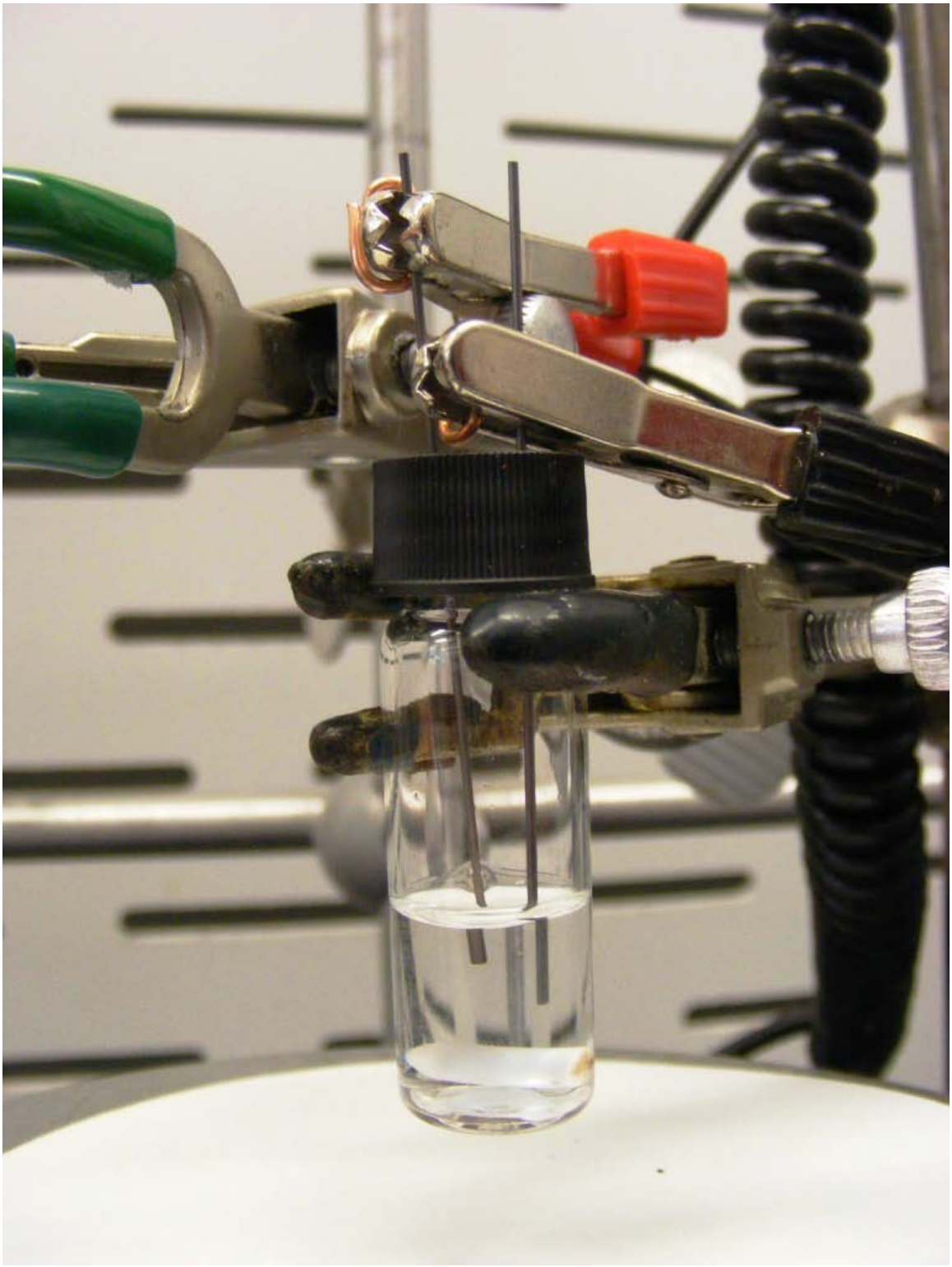
6V, 30 mA device: A 6 V, 300 mA D.C. power supply was wired as shown below. Between the negative terminal wire and the reaction cathode was wired a 10 Ohm resistor to reduce the current supplied to the reaction to approximately 30 mA (neglecting any resistance contributions of the reaction solvent).


aiwa
AC ADAPTOR
MODEL NO. AC-A62U
INPUT
AC 120V 60Hz 11W
OUTPUT
DC 6V 300mA
LISTED 3H06
E144853
CLASS 2
POWER SUPPLY
AIWA CO.,LTD.
MADE IN CHINA

5.2 V, 800 mA DC power supply: The 5.2 V, 800 mA DC power supply was used without added resistors and wired as shown below. Note only the positive and negative lead wires were used, the ground and neutral wires were left unused.



Microscale apparatus using #7 automatic pencil refills for electrodes:



C. Electrochemical oxidation of amides: experimental details

General Procedure A (Et_4NOTs electrolyte): An undivided electrochemical cell was assembled from a two-neck flask and two carbon electrodes (GR-12 graphite rods, purchased from Electrolytica) inserted through rubber septa and sharpened at the ends submerged in the reaction solution. Current was passed through a solution of the amide substrate (0.17–0.78 mmol) and tetraethylammonium toslylate (0.1 M in reaction solvent) in MeOH (7–10 mL) until starting material was consumed. The reaction was concentrated and chromatographed on silica gel to afford the methoxy amide products.

General Procedure B ($LiClO_4$ electrolyte): An undivided electrochemical cell was assembled from a two-neck flask and two carbon electrodes (GR-12 graphite rods, purchased from Electrolytica) inserted through rubber septa and sharpened at the ends in the reaction solution. Current was passed through a solution of amide substrate (0.64– 2.0 mmol) and lithium perchlorate (0.1 M in reaction solvent) in MeOH (7–10 mL) until starting material was consumed. The reaction mixture was buffered with K_2CO_3 (300 mg) and water (5 drops) and reduced in volume to remove the methanol. The residue was partitioned between water (15 mL) and CH_2Cl_2 (3 × 10 mL). The combined organic layers were dried (Na_2SO_3), concentrated and chromatographed on silica gel to afford the methoxy amide products.

General Procedure C (microscale apparatus): An undivided electrochemical cell was assembled from a 1 dram vial and two carbon electrodes (#7 automatic pencil refills) inserted through septum cap solution. Current was passed through a solution of amide substrate (0.39–0.44 mmol) and tetraethylammonium toslylate (0.1 M in reaction solvent)

in MeOH (2 mL) until starting material was consumed. The reaction was concentrated and chromatographed on silica gel to afford the methoxy amide products.

***N*-Ethyl-N-(1-methoxyethyl)propanamide (4b).** *N*,*N*-Diethylpropanamide **4a** (100 mg, 0.78 mmoles) was reacted according to general electrochemical oxidation procedure A to afford the rotomeric mixture of methoxy amides **4b** as a colorless oil (70 mg, 0.44 mmol, 57% yield). ^{1}H NMR δ 1.15–1.24 (complex, 6 H), 2.30–2.48 (m, 2 H), 1.29 and 1.39 (d, *J* = 6.0 Hz, 3 H total), 3.20 and 3.22 (s, 3 H total), 3.24–3.42 (m, 2 H), 5.01 and 5.88 (q, *J* = 6.0 Hz, 1 H total); ^{13}C NMR (CPD pulse sequence) δ 9.5, 9.6, 14.4, 16.4, 19.8, 20.6, 26.7, 27.1, 34.7, 35.2, 54.8, 55.4, 80.8, 84.7, 173.1, 175.0; IR 2983, 2939, 1644 cm^{-1}; HRMS calcd for $C_8H_{17}NNaO_2$ (M^++ Na^+): 182.1151, found 182.1140.

(±)-Ethyl 3-methoxy-5-oxooctahydro-1H-pyrrolo[1,2-a]azepine-9a-carboxylate 5b. Lactam ester **5a** (450 mg, 2.00 mmol) was reacted according to general electrochemical oxidation procedure B to give an inseparable diastereomeric mixture (approximate ratio = 1:4) of methoxy amides **5b** as a colorless oil (469 mg, 1.84 mmol, 91% yield). R_f = 0.55 (EtOAc); ^{1}H NMR (major isomer) δ 1.30 (t, *J* = 7.2 Hz, 3 H), 1.56 (m, 3 H), 1.73-1.90 (complex, 4 H), 2.24 (m, 2 H), 2.33 (dd, *J* = 6.8, 13.2 Hz, 1 H), 2.59 (m, 2 H), 3.40 (s, 3 H), 4.24 (m, 2 H), 5.58 (d, *J* = 4.4 Hz, 1 H); ^{13}C NMR (major isomer) δ d 14.1, 56.1,

89.5; u 22.8, 26.7, 28.5, 38.3, 38.4, 39.6, 61.5, 69.1, 173.1, 175.7; ^{1}H NMR (minor isomer, diagnostic peaks only) δ 1.32 (t, *J* = 7.2 Hz, 3 H), 3.41 (s, 3 H), 5.71 (d, *J* = 3.6 Hz, 1 H); ^{13}C NMR (minor isomer) δ d 14.1, 56.1, 88.9; u 22.8, 26.8, 29.4, 38.3 (× 2), 39.8, 61.4, 68.5, 173.4, 175.7; IR 2937, 2865, 2833, 1733, 1658 cm^{-1}; HRMS calcd for $C_{12}H_{18}NO_3$ (M^+- OMe^-): 224.1284, found 224.1278.

(±)-Ethyl 3-methoxy-5-oxooctahydroindolizine-8a-carboxylate 6b. Lactam ester **6a** (98 mg, 0.46 mmol) was reacted according to the general electrochemical oxidation procedure A to give a single diastereomeric methoxy lactam **6b** as a colorless oil (70 mg, 0.29 mmol, 63% yield). R_f = 0.70 (17% acetone in CH_2Cl_2); ^{1}H NMR δ 1.30 (t, *J* = 7.1 Hz, 3 H), 1.60 (dt, *J* = 5.3, 12.9 Hz, 1 H), 1.75–2.00 (complex, 5 H), 2.33 (m, 2 H), 2.52 (dd, *J* = 4.8, 18.4 Hz, 1 H), 2.52 (qd, *J* = 3.6, 18.0 Hz, 1 H), 2.69 (m, 1 H), 3.40 (s, 3 H), 4.22 (q, *J* = 7.1 Hz, 2 H), 5.65 (dd, *J* = 1.0, 5.0 Hz, 1 H); ^{13}C NMR δ d 14.0, 56.0, 87.6; u 17.7, 29.4, 29.9, 33.0, 35.2, 61.5, 67.5, 170.4, 173.8; IR 3474, 2955, 2836, 1739, 1657 cm^{-1}; HRMS calcd for $C_{12}H_{20}NO_4$ (M^++ H): 242.1387, found 242.1371.

(±)-3-Methoxy-9a-methylhexahydro-1H-pyrrolo[1,2-a]azepin-5(6H)-one 7b. Lactam **7a** (74 mg, 0.44 mmol) was reacted according to the general electrochemical procedure C to give a separable mixture of diastereomeric methoxy lactams **7b** as a colorless oil (49

mg, 0.25 mmol, 56% combined yield, isolated ratio minor:major = 1:1.7). Minor diastereomer: R_f = 0.27 (50% EtOAc in hexanes); ^{1}H NMR δ 1.52 (s, 3 H), 1.65-1.88 (complex, 9 H), 2.28 (m, 1 H), 2.55 (dd, *J* = 6.8, 14.0 Hz, 1 H), 2.65 (dt, *J* = 2.4, 14.4 Hz, 1 H), 3.36 (s, 3 H), 5.58 (m, 1 H); ^{13}C NMR δ d 26.1, 56.0, 89.9; u 23.9, 25.0, 28.6, 37.8, 40.4, 42.2, 62.0, 175.1; IR 3567, 2976, 2935, 1641 cm^{-1}; HRMS calcd for $C_{10}H_{16}NO$ (M^+- OMe^-): 166.1226, found 166.1230. Major diastereomer: R_f = 0.22 (50% EtOAc in hexanes); ^{1}H NMR δ 1.32 (s, 3 H), 1.56–2.03 (complex, 9 H), 2.16 (q, *J* = 10.2 Hz, 1 H), 2.63 (dd, *J* = 4.4, 10.0 Hz, 2 H), 3.38 (s, 3 H), 5.43 (m, 1 H); ^{13}C NMR δ d 23.4, 56.2, 89.5; u 24.1, 24.8, 27.9, 38.4, 41.3, 41.8, 62.0, 175.2; IR 3555, 2968, 2933, 1634 cm^{-1}; HRMS calcd for $C_{10}H_{16}NO$ (M^+- OMe^-): 166.1226, found 166.1220.

(±)-4-Methoxy-10a-methyloctahydropyrido[1,2-a]azepin-6(2H)-one 8b. Lactam **8a** (71 mg, 0.39 mmol) was reacted according to the general electrochemical procedure C (KSC-5-51, 78, 180-51) to give an inseparable mixture of diastereomeric methoxy lactams **8b** as a colorless oil (55 mg, 0.26 mmol, 67% combined yield, ratio (^{1}H NMR) major:minor = 3:2). R_f = 0.45 (50% EtOAc in hexanes); major diastereomer: ^{1}H NMR, δ 1.47 (s, 3 H), 1.52–1.98 (complex, 12 H), 2.61 (dd, *J* = 2.8, 6.8 Hz, 1 H), 2.70–2.81 (complex, 1 H), 3.24 (s, 3 H), 6.02 (t, *J* = 2.8 Hz, 1 H); ^{13}C NMR δ d 25.7, 55.35, 81.4; u 15.2, 22.4, 24.64, 29.1, 36.9, 40.8, 44.3, 57.4, 176.5; minor diastereomer: ^{1}H NMR δ 1.40 (s, 3 H), 1.52–1.98 (complex, 12 H), 2.39 (m, 1 H), 2.70–2.81 (complex, 1 H), 3.32 (s, 3 H), 5.90 (t, *J* = 2.8 Hz, 1 H); ^{13}C NMR δ d 22.5, 55.26, 81.1; u 13.4, 21.7, 24.55, 25.1,

36.5, 40.7, 39.4, 56.2, 177.1; IR 2935, 1629 cm^{-1}; HRMS calcd for $C_{11}H_{18}NO$ (M^+- OMe^-): 180.1383, found 180.1381.

(±)-3-Methoxy-8a-methylhexahydroindolizine-5,8-dione 9b. Ketolactam **9a** (107 mg, 0.64 mmol) was reacted according to the general electrochemical oxidation procedure B to give the methoxy amide **9b** as a colorless oil (58 mg, 0.30 mmol, 47% yield), isolated as a single disastereomer. R_f = 0.40 (EtOAc); ^{1}H NMR δ 1.52 (s, 3 H), 1.67 (m, 1 H), 1.91 (m, 1 H), 2.10 (m, 1 H), 2.50 (m, 2 H), 2.71 (m, 2 H), 2.90 (m, 1 H), 3.43 (s, 3 H), 5.57 (d, *J* = 5.2 Hz, 1 H); ^{13}C NMR δ d 26.4, 56.1, 88.5; u 30.0, 30.1, 33.5, 34.6, 69.3, 169.2, 208.5; IR 2939, 2248, 1726, 1662 cm^{-1}; HRMS calcd for $C_{10}H_{16}NO_3$ (M^++ H): 198.1125, found 198.1130.

Methyl 3-methoxy-5-oxo-2,3,5,6,7,11b-hexahydro-1H-benzo[c]pyrrolo[1,2-a]azepine-11b-carboxylate 10b. Lactam **10a** (107 mg, 0.64 mmol) was reacted according to the general electrochemical oxidation procedure B to give the methoxy amide **10b** as a colorless oil (58 mg, 0.30 mmol, 40% yield), isolated as a single disastereomer. R_f = 0.64 (3:1, EtOAc:hexanes); ^{1}H NMR δ 1.90–1.96 (m, 2 H), 2.67–2.70 (m, 2 H), 2.78–2.83 (m, 1 H), 2.91–3.01 (m, 2 H), 3.11–3.19 (m, 1 H), 3.31 (s, 3 H), 3.71 (s, 3 H), 5.80–5.82 (m, 1 H), 7.12–7.15 (m, 1 H), 7.22–7.27 (m, 2 H), 7.45–7.48 (m,

1 H); ^{13}C NMR δ d 53.7, 56.2, 89.0, 126.5, 128.0, 129.7, 130.4; u 28.5, 30.3, 35.6, 39.5, 72.3, 137.7, 138.0, 174.2, 175.9; IR 2950, 1730, 1673, 1644, 1441cm^{-1}; HRMS calcd for $C_{16}H_{20}NO4_3$ (M^++ H): 290.1387, found 290.1340.

(±)- (8aS,12aR)-3-Methoxyoctahydrobenzo[b]pyrrolo[1,2-a]azepine-5,10(1H,6H)-dione 1b. Ketolactam **1a** (95 mg, 0.43 mmol) was reacted according to the general electrochemical oxidation procedure A to give the methoxy amide **1b** as a colorless oil (84 mg, 0.33 mmol, 78% yield). R_f = 0.41 (EtOAc); ^{1}H NMR δ 1.53–1.96 (complex, 8 H), 2.09–2.34 (complex, 3 H), 2.43–2.80 (complex, 4 H), 3.15–3.17 (m, 2 H), 3.39 (s, 3 H), 5.64 (d, *J* = 4.8 Hz, 1 H); ^{13}C NMR δ d 46.1, 56.5, 89.2; u 23.2, 27.6, 27.8, 33.8, 36.7, 38.6, 38.7, 47.4, 65.2, 175.5, 208.7; IR 2938, 1710, 1633, 1395 cm^{-1}; HRMS calcd for $C_{13}H_{18}NO_2$ (M^+ - $^-$OMe): 220.1332, found 220.1283.

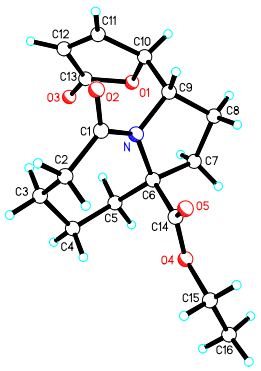
(±)-(8aS,10R,12aS)-10-Hydroxy-3-methoxydecahydrobenzo[b]pyrrolo[1,2-a]azepin-5(1H)-one 11b. Hydroxylactam **11a** (38 mg, 0.17 mmol) was reacted according to the general electrochemical oxidation procedure A to give the diastereomeric mixture of methoxy amides **11b** as a colorless oil (28 mg, 0.11 mmol, 65% yield). R_f = 0.12 (EtOAc); ^{1}H NMR (major isomer) δ 1.30 (m, 1 H), 1.43 (m, 1 H), 1.64–1.97 (complex, 12 H), 2.28 (m, 1 H), 2.56–2.72 (m, 3 H), 3.37 (s, 3H), 4.06 (br s, 1 H), 5.58 (d, *J* = 4.8

Hz, 1 H); ^{1}H NMR (minor isomer, diagnostic peaks only) δ 3.39 (s, 3H), 5.53 (d, *J* = 4.4 Hz, 1 H); ^{13}C NMR (major isomer) δ d 44.8, 56.1, 64.9, 88.9; u 23.6, 27.1, 29.0, 32.0, 34.5, 35.4, 37.7, 38.9, 67.2, 176.7; ^{13}C NMR (minor isomer) δ d 40.3, 56.3, 65.1, 90.1; u 23.8, 27.1, 28.1, 31.4, 34.9, 36.5, 38.4, 39.1, 67.0, 176.2; IR 3391, 2929, 2868, 1712, 1610 cm^{-1}; HRMS calcd for $C_{13}H_{20}NO_2$ (M^+ - $^-$OMe): 222.1489, found 222.1477.

(±)-(2R,31S,7aR,8R,10aS)-8-Ethyl-2-methoxyoctahydroazepino[3,2,1-hi]indole-4,9(31H,5H)-dione 12b. Ketolactam **12a** (108 mg, 0.46 mmol) was reacted according to the general electrochemical oxidation procedure A to give a single diastereomeric methoxy amide product **12b** as a colorless oil (23 mg, 0.09 mmol, 19% yield). R_f = 0.45 (5% MeOH in CH_2Cl_2); ^{1}H NMR δ 0.79 (t, *J* = 7.2 Hz, 3 H), 1.46–1.79 (complex, 5 H), 1.94–2.01 (m, 1 H), 2.05–2.14 (m, 2 H), 2.33–2.36 (m, 2 H), 2.41–2.48 (m, 3 H), 2.61–2.66 (m, 1 H), 3.00 (dq, *J* = 3.6, 8.4 Hz, 1 H), 4.25 (d, *J* = 8.0 Hz, 1 H), 5.49 (d, *J* = 4.8 Hz, 1 H); ^{13}C NMR δ d 9.3, 34.7, 36.2, 44.4, 55.6, 61.5, 87.4; u 18.2, 20.2, 30.9, 38.3, 38.6, 45.5, 175.7, 212.1; IR 2934, 1707, 1644, 1394 cm^{-1}; HRMS calcd for $C_{15}H_{24}NO_3$ (M^+ + H): 266.1751, found 266.1752.

D. Diversification reactions of the representative methoxy amides 6b, 8b or 1b

(±)-Dimethyl 2-(9a-(ethoxycarbonyl)-5-oxooctahydro-1H-pyrrolo[1,2-a]azepin-3-yl)malonate 13. To a mixture of methoxy amide **5b** (79 mg, 0.31 mmol) and dimethyl malonate (69 mg, 0.53 mmol) in CH_2Cl_2 (3 mL) at 0 °C was added DIEA (0.1 mL, 0.70 mmol) followed by a solution of $TiCl_4$ (0.7 mL, 1.0 M in CH_2Cl_2, 0.70 mmol, 2.0 equiv). The reaction was stirred overnight, warming to rt. The reaction was partitioned between saturated aqueous NH_4Cl and CH_2Cl_2 (3 × 10 mL). The combined organics were dried (Na_2SO_4), concentrated and chromatographed to yield the malonate derivative **13** as a separable mixture of isomers (isomer A: 46 mg, 0.13 mmol, 42% yield; isomer B: 59 mg, 0.17 mmol, 55% yield) For isomer A: R_f = 0.79 (17% acetone in CH_2Cl_2); ^{1}H NMR δ 1.32 (t, *J* = 7.2 Hz, 3H), 1.52 (m, 2H), 1.73 (m, 3 H), 2.00 (m, 2 H), 2.18 (m, 1 H), 2.36-2.53 (complex, 4 H), 3.72 (s, 3 H), 3.73 (s, 3 H), 4.25 (q, *J* = 7.2 Hz, 2 H), 4.35 (d, *J* = 6.0 Hz, 1 H), 4.81 (m, 1 H);^{13}C NMR δ d 14.2, 52.3, 52.4, 52.7, 60.1; u 22.7, 25.2, 26.1, 27.9, 38.4, 40.0, 61.6, 69.8, 168.5, 168.7, 172.8, 175.1; IR 3462, 2952, 1735, 1643 cm^{-1}; HRMS calcd for $C_{17}H_{26}NO_7$ (M^++H): 356.1704, found 356.1714. For isomer B: R_f = 0.55 (EtOAc); ^{1}H NMR δ 1.29 (t, *J* = 8.0 Hz, 3H), 1.50 (d, *J* = 8.0 Hz, 2H), 1.76 (m, 1 H), 1.80 (m, 1 H), 2.00-2.25 (complex, 5 H), 2.52 (dd, *J* = 12.0, 4.0 Hz, 1 H), 2.60 (dd, *J* = 16.0, 8.0 Hz, 1 H), 3.72 (s, 3 H), 3.75 (s, 3 H), 4.23 (m, 3 H), 4.87 (t, *J* = 8.0 Hz, 1 H); ^{13}C NMR δ d 14.2, 52.3, 52.4, 52.8, 60.0; u 22.5, 24.8, 26.7, 37.8, 38.6, 40.5, 61.7, 70.0, 168.2, 169.0, 173.2, 175.5; IR 3458, 2952, 1730, 1647 cm^{-1}; HRMS calcd for $C_{17}H_{26}NO_7$ (M^++H): 356.1704, found 356.1712.



(±)-Ethyl 5-oxo-3-((R)-5-oxo-2,5-dihydrofuran-2-yl)octahydro-1H-pyrrolo[1,2-a]azepine-9a-carboxylate 14. To a mixture of methoxy amide **5b** (81 mg, 0.32 mmol) and 2-(trimethylsiloxy)furan (169 mg, 1.08 mmol) in CH_2Cl_2 (3 mL) at -78 °C was added trimethylsilyl triflate (0.1 mL, 0.54 mmol). The reaction was stirred overnight, warming to rt, then partitioned between saturated aqueous NH_4Cl and CH_2Cl_2 (3 × 10 mL). The combined organic layers were dried (Na_2SO_4), concentrated and chromatographed to yield the butenolide derivative **14** as a single diastereomer (69 mg, 0.23 mmol, 72% yield). Recrystallization from EtOAc/hexanes afforded crystals suitable for X-ray crystallography. R_f = 0.14 (50% EtOAc in Hexanes); ^{1}H NMR δ 1.24 (m, 1 H), 1.29 (t, *J* = 7.2 Hz, 3H), 1.49 (q, *J* = 11.2 Hz, 2H), 1.68 (m, 1 H), 1.81 (m, 1 H), 1.93 (dd, *J* = 7.2, 12.8 Hz, 1 H), 2.11 (m, 2 H), 2.21 (m, 1 H), 2.48-2.56 (m, 3 H), 4.23 (m, 2 H), 4.78 (d, *J* = 8.8 Hz, 1 H), *5*.16 (d, *J* = 2.0 Hz, 1 H), 5.98 (dd, *J* = 2.0, 6.0 Hz, 1 H), 7.65 (dd, *J* = 1.2, 5.6 Hz, 1 H);^{13}C NMR δ d 14.2, 59.9, 86.6, 119.0, 155.9; u 22.5, 25.5, 26.6, 36.7, 38.5, 40.7, 61.8, 70.4, 173.3, 176.3; IR 2927, 2861, 1758, 1731, 1640 cm^{-1}; HRMS calcd for $C_{16}H_{22}NO_5$ (M^++H): 308.1492, found 308.1498.

(±)-Ethyl 3-(1-methyl-1H-indol-3-yl)-5-oxooctahydro-1H-pyrrolo[1,2-a]azepine-9a-carboxylate 15. To a mixture of methoxy amide **5b** (64 mg, 0.25 mmol) and N-methylindole (112 mg, 0.85 mmol) in CH_2Cl_2 (2 mL) at -40 °C was added a solution of $TiCl_4$ (0.57 mL, 1.0 M in CH_2Cl_2, 0.57 mmol). The reaction was stirred overnight, warming to rt. The reaction was partitioned between saturated aqueous NH_4Cl and CH_2Cl_2 (3 × 10 mL). The combined organics were dried (Na_2SO_4), concentrated and chromatographed to yield the idole derivative **15** as a mixture of isomers (70 mg, 0.20 mmol, 80% yield) Preparative TLC afforded single isomeric compounds for characterization. For isomer A: R_f = 0.34 (50% EtOAc in hexanes); mp = 117–119 °C; ^{1}H NMR δ 1.35 (t, *J* = 7.2 Hz, 3 H), 1.49–1.65 (m, 2 H), 1.77–1.97 (complex, 3 H), 2.03–2.11 (m, 2 H), 2.28–2.43 (complex, 3 H), 2.57–2.61 (m, 2 H), 3.71 (s, 3 H), 4.25–4.38 (m, 2 H), 5.78 (d, *J* = 6.0 Hz, 1 H), 7.05–7.09 (m, 1 H), 7.16–7.20 (m, 1 H), 7.23 (td, *J* = 0.8, 8.0 Hz, 1 H), 7.27 (d, *J* = 1.2 Hz, 1 H), 7.54 (td, *J* = 0.8, 8.0 Hz, 1 H); ^{13}C NMR δ d 14.4, 32.8, 58.0, 109.2, 118.6, 118.9, 121.2, 127.5; u 23.1, 27.0, 29.4, 38.1 (2 CH_2), 40.0, 61.6, 69.4, 114.8, 126.0, 137.5, 173.9, 173.9, 174.6; IR 2933, 1731, 1640 cm^{-1}; HRMS calcd for $C_{21}H_{27}N_2O_3$ (M^++H): 355.2016, found 355.2017. For isomer B: R_f = 0.29 (50% EtOAc in hexanes); mp = 166–169 °C; ^{1}H NMR δ 1.34 (t, *J* = 7.2 Hz, 3 H), 1.58–1.68 (m, 2 H), 1.75(dt, *J* = 3.2, 14.0 Hz, 1 H), 1.85–2.02 (complex, 3 H), 2.17–2.38 (m, 4 H), 2.66–2.72 (m, 2 H), 3.73 (s, 3 H), 4.27–4.32 (m, 2 H), 5.81 (d, *J* = 7.2 Hz, 1 H), 6.75 (d,

J = 0.8 Hz, 1 H), 7.07–7.11 (m, 1 H), 7.18–7.22 (m, 1 H), 7.24–7.26 (m, 1 H), 7.58 (td, *J* = 0.8, 8.0 Hz, 1 H); ^{13}C NMR δ d 14.4, 32.8, 57.7, 109.3, 118.8, 119.3, 121.6, 125.5; u 23.3, 26.9, 28.5, 38.4, 38.7, 40.5, 61.7, 69.8, 116.5, 125.8, 137.7, 173.4, 174.7, 174.6; IR 2934, 1730, 1640 cm^{-1}; HRMS calcd for $C_{21}H_{27}N_2O_3$ (M^++H): 355.2016, found 355.1984.

(±)-Ethyl 5-oxo-3-(2,4,6-trimethoxyphenyl)octahydro-1H-pyrrolo[1,2-a]azepine-9a-carboxylate 16. To a mixture of methoxy amide **5b** (61 mg, 0.24 mmol) and 1,3,5-trimethoxybenzene (136 mg, 0.81 mmol) in CH_2Cl_2 (2 mL) at -40 °C was added a solution of $SnCl_4$ (0.35 mL, 1.0 M, 0.35 mmol).The reaction was stirred overnight, warming to rt. The reaction was partitioned between saturated aqueous NH_4Cl and CH_2Cl_2 (3 × 10 mL). The combined organics were dried (Na_2SO_4), concentrated and chromatographed to yield a single isomer of the trimethoxyphenyl derivative **16** as white solid (67 mg, 0.17 mmol, 72% yield). Recrystallization from CH_2Cl_2/heptane gave crystals suitable for X-ray analysis. R_f = 0.27 (50% EtOAc in hexanes); mp = 145–147 °C; ^{1}H NMR δ 1.31 (t, *J* = 7.2 Hz, 3H), 1.51 (m, 2H), 1.70 (m, 1 H), 1.78 (m, 1 H), 1.88 (m, 1 H), 1.99 (dt, *J* = 3.6, 13.2 Hz, 1 H), 2.10–2.27 (complex, 3 H), 2.41–2.54 (complex, 3 H), 3.77 (s, 3 H), 3.81 (s, 6 H), 4.26 (t, *J* = 6.8 Hz, 2 H), 5.69 (dd, *J* = 3.6, 9.6 Hz, 1 H), 6.12 (s, 2 H);^{13}C NMR δ d 14.2, 55.1, 55.5, 56.4, 91.0 (×2); u 22.8, 26.8, 28.9, 35.9,

39.0, 41.7, 61.3, 70.6, 112.2, 158.2 (×2), 159.4, 174.0, 174.2; IR 2935, 2839, 1729, 1632, 1606 cm^{-1}; HRMS calcd for $C_{21}H_{30}NO_6$ (M^++H): 392.2068, found 392.2064

(±)-Ethyl 5-oxo-5,6,7,8,9,9a-hexahydro-1H-pyrrolo[1,2-a]azepine-9a-carboxylate 17. To methoxy amide **5b** (50 mg, 0.20 mmol) in CH_2Cl_2 (4 mL) at -78 °C was added a solution of $TiCl_4$ (0.27 mL, 1.0 M in CH_2Cl_2, 0.27 mmol).After 30 minutes at -78 °C, a solution of Et_3N (67 mg, 0.66 mmol) in CH_2Cl_2 (1 mL) was added. The reaction was stirred for 5 h, warming to rt. The reaction was partitioned between saturated aqueous NH_4Cl and CH_2Cl_2 (3 × 10 mL). The combined organic layers were dried (Na_2SO_4), concentrated and chromatographed to yield the enamide derivative **17** as a colorless oil (19 mg, 0.09 mmol, 45% yield). R_f = 0.49 (30% acetone in CH_2Cl_2); ^{1}H NMR δ 1.31 (t, *J* = 7.2 Hz, 3H), 1.57 (m, 2H), 1.78–1.93 (complex, 3 H), 2.35 (dt, *J* = 2.0, 12.8 Hz, 1 H), 2.45 (m, 1 H), 2.60 (dd, *J* = 7.0, 15.2 Hz, 1 H), 2.85 (td, *J* = 2.4, 17.2 Hz, 1 H), 3.11 (td, *J* = 2.0, 17.2 Hz, 1 H), 4.28 (q, *J* = 6.8 Hz, 2 H), 5.02 (m, 1 H), 6.97 (t, *J* = 2.4 Hz, 1 H); ^{13}C NMR δ d 14.2, 105.5, 130.7; u 23.8, 26.9, 37.9, 38.9, 47.5, 61.8, 69.1, 171.7, 172.7; IR 3422, 2978, 2937, 2864, 1734, 1652 cm^{-1}; HRMS calcd for $C_{12}H_{18}NO_3$ (M^++H): 224.1281, found 224.1286.

Ethyl 5-oxo-3-(thiophen-2-yl)octahydro-1H-pyrrolo[1,2-a]azepine-9a-carboxylate 18. To a mixture of methoxy amide **5b** (93 mg, 0.36 mmol) and thiopheneboronic acid (158 mg, 1.24 mmol) in CH_2Cl_2 (3 mL) at 0 °C was added boron trifluoride diethyl etherate (0.21 mL, 1.65 mmol). The reaction was slowly warmed to rt and stirred for 15 h, then partitioned between aqueous $NaHCO_3$ (8 mL) and CH_2Cl_2 (3 × 10 mL). The combined organic layers were dried (Na_2SO_4), concentrated and chromatographed to yield the thiophene derivatives **18** as a colorless oil (29 mg for both isomers, 0.09 mmol, 26% yield). Preparative TLC afforded samples of the individual diastereomers in approximately equal quantity. Isomer A: R_f = 0.60 (50% EtOAc in hexanes); ^{1}H NMR δ 1.32 (t, *J* = 7.2 Hz, 3 H), 1.55 (m, 2 H), 1.77 (m, 2 H), 1.91 (dd, *J* = 4.8, 6.0 Hz, 2 H), 2.22 (m, 2 H), 2.35 (m, 2 H), 2.64 (m, 2 H), 4.27 (m, 2 H), 5.72 (d, *J* = 8.4 Hz, 1 H), 6.93 (m, 2 H), 7.12 (dd, *J* = 1.2, 4.4 Hz, 1 H); ^{13}C NMR δ d 14.3, 59.5, 123.2, 123.4, 126.8; u 22.7, 26.9, 30.4, 38.0, 38.5, 40.5, 61.8, 69.9, 147.7, 173.2, 174.6; IR 2980, 2934, 2864, 1731, 1651 cm^{-1}; HRMS calcd for $C_{16}H_{22}NO_3S$ (M^++H): 308.1320, found 308.1344. Isomer B: R_f = 0.42 (50% ethyl acetate in hexanes); ^{1}H NMR δ 1.28 (t, *J* = 7.2 Hz, 3H), 1.54 (m, 2 H), 1.77 (dt, *J* = 2.8, 14.0 Hz, 2 H), 1.89 (m, 1 H), 2.04 (m, 1 H), 2.32 (m, 1 H), 2.42 (m, 1 H), 2.53 (m, 3 H), 4.25 (m, 2 H), 5.63 (dd, *J* = 2.4, 7.6 Hz, 1 H), 6.89 (dd, *J* = 3.6, 4.8 Hz, 1 H), 7.09 (d, *J* = 3.2 Hz, 1 H), 7.14 (dd, *J* = 1.0, 4.8 Hz, 1 H); ^{13}C NMR δ d 14.2, 59.9, 123.7, 124.8, 126.2; u 22.9, 26.9, 31.2, 38.0, 38.3, 40.4, 61.6, 69.5, 145.5, 173.1, 174.4; IR 2976, 2932, 2864, 1731, 1643 cm^{-1}; HRMS calcd for $C_{16}H_{22}NO_3S$ (M^++H): 308.1315, found 308.1339.

Ethyl 3-allyl-5-oxooctahydro-1H-pyrrolo[1,2-a]azepine-9a-carboxylate 19. To a solution of methoxy amide **5b** (71 mg, 0.29 mmol) in CH_2Cl_2 (3 mL) at -78 °C was added a solution of $TiCl_4$ (0.35 mL, 1.0 M in CH_2Cl_2, 0.35 mmol). After maintaining the reaction for 10 mins at -78 °C, a solution of allyltrimetylsilane (66 mg, 0.58 mmol) in CH_2Cl_2 (2 mL) was added. The reaction was slowly warmed to rt and stirred for 4 h, then partitioned between aqueous $NaHCO_3$ (15 mL) and CH_2Cl_2 (3 × 10 mL). The combined organic layers were dried (Na_2SO_4), adsorbed onto celite and chromatographed to yield the allyl derivative **19** as a mixture of diastereomers as a colorless oil (52 mg for both isomers, 1:1.6 ratio by ^{1}H NMR, 0.21 mmol, 70% yield). R_f = 0.38 (2% MeOH in CH_2Cl_2); ^{1}H NMR δ 1.31 (t, *J* = 7.2 Hz, 3 H, major isomer), 1.28 (t, *J* = 7.2 Hz, 3 H, minor isomer), 1.45–2.41 (complex, 6 H), 2.48–2.59 (m, 2 H), 2.75–2.80 (m, 1 H), 3.24–3.52 (m, 3 H), 3.66–3.83 (m, 2 H), 4.17–4.39 (m, 3 H), 5.00–5.07 (m, 2 H), 5.72–5.82 (m, 1 H);); ^{13}C NMR (major isomer) δ d 14.4, 60.6, 135.7; u 23.0, 25.9, 26.6, 36.7, 38.2, 38.7, 40.4, 61.7, 69.4, 117.0, 173.4, 173.8; ^{13}C NMR (minor isomer) δ d 14.4, 60.2, 135.5; u 23.0, 25.2, 26.9, 37.9, 38.3, 38.6, 40.7, 61.8, 70.0, 117.3, 173.4, 174.4; IR 2942, 1734, 1637 cm^{-1}; HRMS calcd for $C_{15}H_{24}NO_3$ (M^++H): 266.1751, found 266.1721.

9a-Methyl-3-(phenylethynyl)hexahydro-1H-pyrrolo[1,2-a]azepin-5(6H)-one 20. To a solution of methoxy amide **7b** (36 mg, 0.18 mmol) in THF (3 mL) at -78 °C was added a solution of $TiCl_4$ (0.36 mL, 1.0 M in CH_2Cl_2, 0.36 mmol) and the reaction maintained at -78 °C for 10 mins. To the reaction was added a premixed, -40 °C solution of copper(I) bromide dimethylsulfide complex (182 mg, 0.89 mmol) and phenylethynyl magnesium bromide (0.9 mL, 1.0 M in THF, 0.9 mmol) in THF (2 mL). The reaction was slowly warmed to rt and stirred for 4 h, then partitioned between aqueous $NaHCO_3$ (15 mL) and CH_2Cl_2 (3 × 10 mL). The combined organic layers were dried (Na_2SO_4), adsorbed onto celite and chromatographed to yield the phenylethynyl derivative as a colorless oil (24 mg for both isomers (80:20 ratio by ^{1}H NMR), 0.09 mmol, 50% yield). R_f = 0.28 (50% EtOAc in hexanes); ^{1}H NMR δ 1.35 (s, 3 H), 1.68–2.02 (complex, 8 H), 2.08–2.18 (m, 1 H), 2.37 (dt, *J* = 6.4, 12.8 Hz, 1 H), 2.59–2.63 (m, 2 H), 5.06 (d, *J* = 7.6 Hz, 1 H, major isomer), 5.13 (dd, *J* = 2.4, 7.2 Hz, 1 H, minor isomer), 7.25–7.28 (complex, 3 H), 7.39–7.41 (m, 2 H); ^{13}C NMR (major isomer) δ d 24.0, 51.27, 128.0, 128.2, 131.9; u 24.1, 24.8, 29.0, 37.9, 42.3, 43.2, 62.2, 81.3, 90.0, 123.5, 173.2; ^{13}C NMR (minor isomer) δ d 25.8, 51.34, 128.0, 128.2, 131.9; u 24.1, 24.9, 29.6, 37.7, 40.5, 43.5, 62.4, 81.3, 90.0, 123.5, 173.2; IR 2934, 1707, 1624, 1586 cm^{-1}; HRMS calcd for $C_{18}H_{22}NO$ (M^++H): 268.1696, found 268.1696.

(±)-(8aS,12aR)-3-Allyloctahydrobenzo[b]pyrrolo[1,2-a]azepine-5,10(1H,6H)-dione 21. A solution of methoxyamide **1b** (59 mg, 0.24 mmol) and allyltrimethylsilane (80 mg, 0.70 mmol) in CH_2Cl_2 (10 mL) was cooled to -40 °C and a solution of titanium tetrachloride in CH_2Cl_2 (0.35 mL, 1 M, 0.35 mmol) was added portionwise via syringe over a span of 3 min. The reaction was warmed to rt over 2 h and partitioned between aqueous $NaHCO_3$ (10 mL) and CH_2Cl_2 (3 × 10 mL). The combined organic layers were dried (Na_2SO_4), adsorbed onto celite and chromatographed to afford a diastereomeric mixture of allyl products **21** as a colorless oil (10 mg, 0.04 mmol, 17% yield). R_f = 0.27 (2% MeOH in CH_2Cl_2); ^{1}H NMR δ 1.53–1.60 (m, 2 H), 1.76–1.95 (complex, 6 H), 1.98–2.04 (m, 1 H), 2.07–2.16 (m, 2 H), 2.23 (dd, *J* = 2.4, 15.2 Hz, 1 H), 2.36–2.47 (m, 3 H), 2.50–2.57 (m, 2 H), 2.66–2.72 (m, 1 H), 2.75 (dd, *J* = 5.2, 15.2 Hz, 1 H), 4.45 (dt, *J* = 3.6, 8.8 Hz, 1 H), 5.05 (t, *J* = 1.2 Hz, 1 H), 5.07–5.10 (m, 1 H), 5.75–5.86 (m, 1 H); ^{13}C NMR (CPD pulse sequence) δ 23.2, 24.2, 28.0, 33.9, 37.5, 38.1, 38.4, 38.5, 46.3, 47.7, 59.5, 65.7, 117.4, 135.5, 174.2, 208.7; IR 2927, 1709, 1612, 1407 cm^{-1}; HRMS calcd for $C_{16}H_{24}NO_2$ (M^++H): 262.1802, found 262.1784.

E. Synthesis and diversification of tricyclic lactam 27

2-(4-Chlorobutyl)hept-6-enoic acid 25.[10] Following the reported procedure,[11] *n*-BuLi (2.43M in hexane, 8.23 mL, 20.0 mmol) was slowly added to a solution of diisopropylamine (2.02 g, 20.0 mmol) in THF (20 mL) at 0 °C under a N_2 atmosphere. After 1 h at 0 °C, a precooled solution (0 °C) of hept-6-enoic acid (1.02 g, 8.00 mmol) and 1,3-dimethyl-3,4,5,6-tetrahydro-2(1*H*)-pyrimidinone (DMPU) (2.0 g, 16 mmol) in

THF (10 mL) was slowly added. After 1.5 h at room temperature, 1-bromo-4-chlorobutane (1.65 g, 9.60 mmol) was slowly added. After stirring overnight, the resulting mixture was quenched with saturated ammonium chloride. The aqueous layer was washed with ethyl ether three times. The combined organic layers were washed with brine, dried over anhydrous sodium sulfate, and concentrated. The residue was chromatographed (5-50% EtOAc/hexanes) to yield the acid **25** (1.20 g, 5.49 mmol, 69%) as a colorless oil. R_f = 0.35 (20% EtOAc/hexanes); ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.42–1.55 (m, 6 H), 1.63–1.73 (m, 2 H), 1.76–1.83 (m, 2 H), 2.08 (q, *J* = 6.9 Hz, 2 H), 2.35–2.42 (m, 1 H), 3.54 (t, *J* = 6.7 Hz, 2 H), 4.96-5.01 (dm, *J* = 10.2 Hz, 1 H), 5.03 (dq, *J* = 17.1, 1.6 Hz, 2 H), 5.80 (ddt, *J* = 16.9, 10.2, 6.7 Hz, 1 H), 11.07 (br, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 24.7 (*C*H_2), 26.5 (*C*H_2), 31.3 (*C*H_2), 31.5 (*C*H_2), 32.4 (*C*H_2), 33.5 (*C*H_2), 44.7 (*C*H_2), 45.2 (*C*H), 114.8 (*C*H_2), 138.3 (*C*H), 182.8 (*C*); IR 3071, 2942, 1702, 1286 cm^{-1};. HRMS calculated for $C_{22}H_{37}Cl_2O_4$ ($2M^+$+H) 435.2069, found 435.2035.

(±)-(1*R*,5*S*)-5-(4-Chlorobutyl)bicyclo[3.2.0]heptan-6-one 26.[10] To a solution of acid **25** (1.20 g, 5.50 mmol) and two drops of DMF in benzene (15 mL) at 0 °C under a N_2 atmosphere was dropwise added oxalyl chloride (2.40 mL, 27.5 mmol). After 0.5 h at room temperature, the reaction mixture was heated to reflux for 1.5 h, and then cooled to rt. The solvent and excess oxalyl chloride was removed under reduced pressure. Toluene (10 mL) was added to the above residue and removed again, and this procedure was repeated twice. To a refluxing solution of triethylamine (4.63 mL, 33 mmol) in toluene (50 mL) under N_2 atmosphere was added dropwise a solution of the above residue in

toluene (15 mL) using a syringe pump over 3 h. After the addition, the reaction mixture was continued to reflux for another 24 h. After the reaction mixture was cooled to rt, water was added. After separation, diethyl ether was used to extract the product. The combined organic layers were washed with brine, died over anhydrous sodium sulfate, and concentrated. The concentrated residue was purified by chromatography (0.5-5% EtOAc/hexanes) to afford fused cyclobutanone **26 (**850 mg, 4.24 mmol, 83%) as a colorless oil. R_f = 0.30 (20% EtOAc/hexanes); ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.32–1.41 (m, 2 H), 1.54-1.66 (m, 4 H), 1.73–1.83 (m, 6 H), 1.97 (dd, *J* = 6.4 Hz, 12.8 Hz, 1 H), 2.41 (dd, *J* = 4.4 Hz, 18.4 Hz, 1 H), 2.53–2.57 (m, 1 H), 3.09 (dd, *J* = 9.6 Hz, 18.4 Hz, 1 H), 3.49 (t, *J* = 6.8 Hz, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 23.0 (*C*H_2), 24.9 (*C*H_2), 32.3 (*C*H_2), 32.6 (*C*H_2), 32.92 (*C*H_2), 34.0 (*C*H), 35.3 (*C*H_2), 44.7 (*C*H_2), 49.2 (*C*H_2), 75.6 (*C*), 217.7 (*C*); IR 2945, 1771, 1449 cm^{-1}; HRMS calculated for $C_{11}H_{18}ClO$ (M^++H) 201.1046, found 201.1029.

(±)-(1*R*,5*S*)-5-(4-Azidobutyl)bicyclo[3.2.0]heptan-6-one. A suspension of ketone **26** (243 mg, 1.20 mmol) and sodium azide (390 mg, 6.00 mmol) in DMF (3 mL) under N_2 atmosphere was heated to 80 °C for 4 h. After the reaction mixture was cooled to room temperature, diethyl ether and water were added. After the separation, the aqueous layer was extracted with diethyl ether three times. The combined layers were washed with water, brine, and dried over anhydrous sodium sulfate. The concentrated residue was directly used in the next step without further purification. ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.29–1.46 (m, 3 H), 1.50–1.70 (m, 5 H), 1.75–1.89 (m, 3 H), 2.03 (dd, *J* = 12.7, 6.2 Hz, 1

H), 2.46 (dd, *J* = 18.5, 4.6 Hz, 1 H), 2.54–2.61 (m, 1 H), 3.13 (dd, *J* = 18.4, 9.5 Hz, 1 H), 3.29 (t, *J* = 6.7 Hz, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$, CPD pulse sequence) δ 22.9, 25.0, 29.3, 32.68, 32.70, 34.0, 35.3, 49.3, 51.2, 75.6, 217.8.

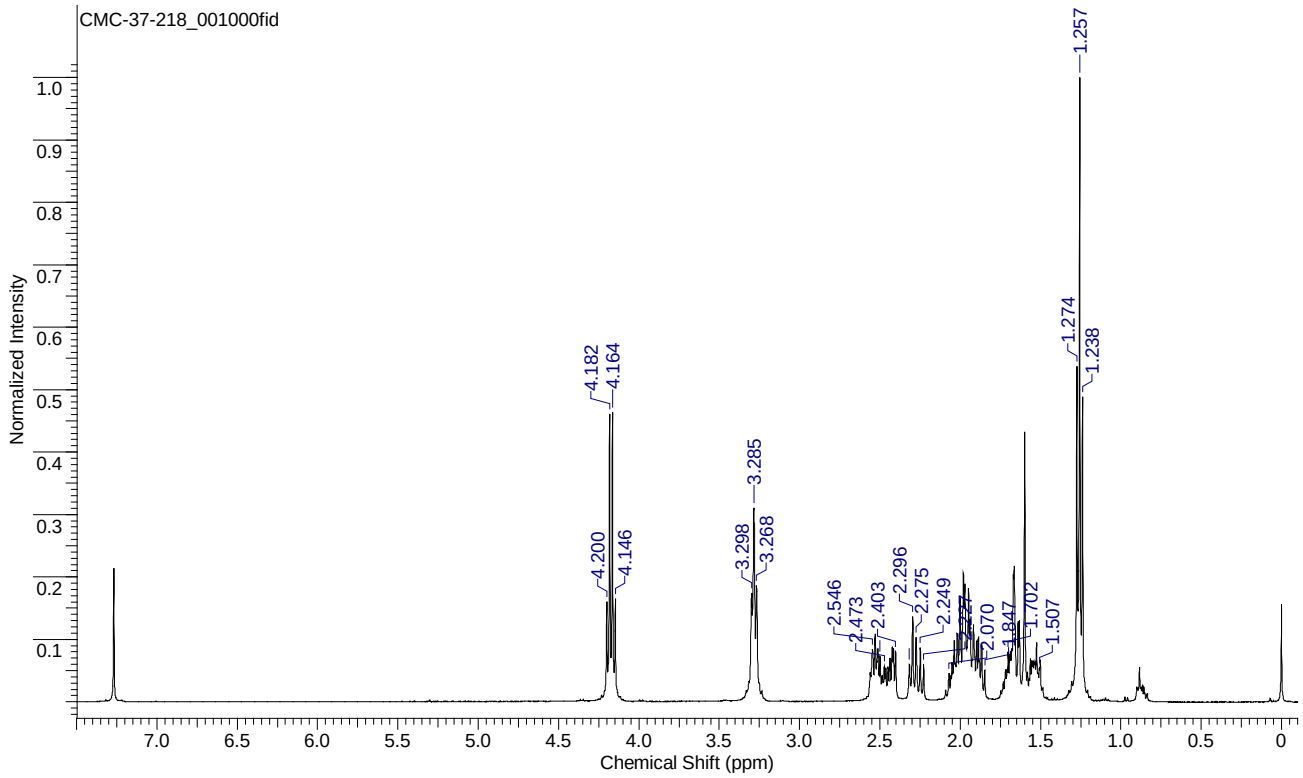
(±)-(7a*R*,10a*S*)-Octahydrocyclopenta[*i*]indolizin-6(7*H*)-one 27. To a solution of the above azide residue in dichloromethane (10 mL) at 0 °C under N_2 atmosphere was added slowly titanium tetrachloride (1 M in DCM, 3.6 mL, 3.6 mmol). After the reaction mixture was stirred overnight, saturated aqueous sodium bicarbonate was used to quench the reaction. After the separation, the aqueous layer was extracted with DCM three times. The combined organic layers were washed with brine and dried over anhydrous sodium sulfate. The concentrated residue was purified by chromatography (50-200% EtOAc/hexanes) to afford lactam **27** (200 mg, 1.12 mmol, 93%) as a colorless oil. R_f = 0.35 (100% EtOAc/hexanes); ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.20–1.60 (m, 9 H), 1.64–1.68 (m, 1 H), 1.72-1.84 (m, 2 H), 1.94-2.00 (m, 1 H), 2.11–2.18 (m, 1 H), 2.52–2.60 (m, 2 H), 3.97 (dd, *J* = 2.8 Hz, 13.2 Hz, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 21.7 (*C*H_2), 24.5 (*C*H_2), 25.0 (*C*H_2), 33.9 (*C*H_2), 34.9 (*C*H_2), 37.5 (*C*H_2), 37.8 (*C*H_2), 37.8 (*C*H_2), 41.8 (*C*H), 71.3 (*C*), 172.3 (*C*); IR 2936, 1682, 1417 cm^{-1}; HRMS calculated for $C_{11}H_{18}NO$ (M^++H) 180.1388, found 180.1391.

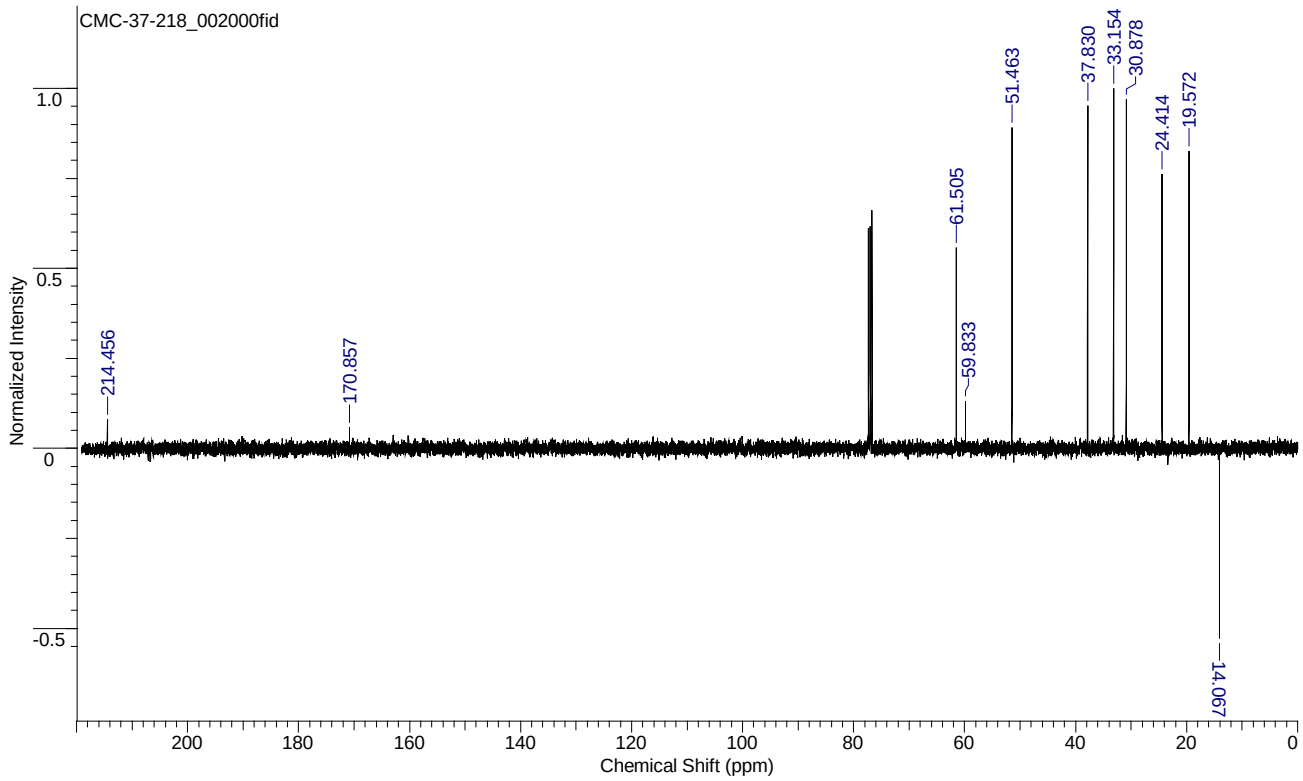
(±)-(4*R*,7a*R*,10a*S*)-4-Methoxyoctahydrocyclopenta[*i*]indolizin-6(7*H*)-one 28. To a three-necked round-bottom flask equipped with graphite anode, graphite cathode, and stirring bar, was added under N_2 atmosphere a solution of lactam **27** (19 mg, 0.11 mmol) and tetraethylammonium tosylate (603 mg, 2.00 mmol) in anhydrous methanol (20 mL). Our home-made apparatus was used to supply direct current (5.2 V, 800 mA as labelled on the power source). Current was passed through the reaction mixture while stirred for 48 h. The solvent was removed under reduced pressure. Diethyl ether was added to the residue and some white solid formed. After the filtration, the filtrate was concentrated to afford lactam **28**, which was used in the next step without further purification. Pure sample as a colorless oil was obtained for characterization after column chromatography (50-200% EtOAc/hexanes). R_f = 0.55 (EtOAc); ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.42–1.75 (m, 8 H), 1.81–1.93 (m, 3 H), 2.11–2.26 (m, 3 H), 2.69 (dd, *J* = 2.8 Hz, 8.6 Hz, 1 H), 3.26 (s, 3 H), 5.25 (d, *J* = 4.8 Hz, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 17.1 (*C*H_2), 25.1 (*C*H_2), 30.1 (*C*H_2), 33.7 (*C*H_2), 37.8 (*C*H_2), 38.0 (*C*H_2), 38.1 (*C*H_2), 42.4 (*C*H), 55.2 (*C*H_3), 70.8 (*C*), 79.7 (*C*H), 175.2 (*C*); IR 2939, 1689, 1398 cm^{-1}; HRMS calculated for $C_{12}H_{19}NO_2Na$ (M^++Na) 232.1313, found 232.1290.

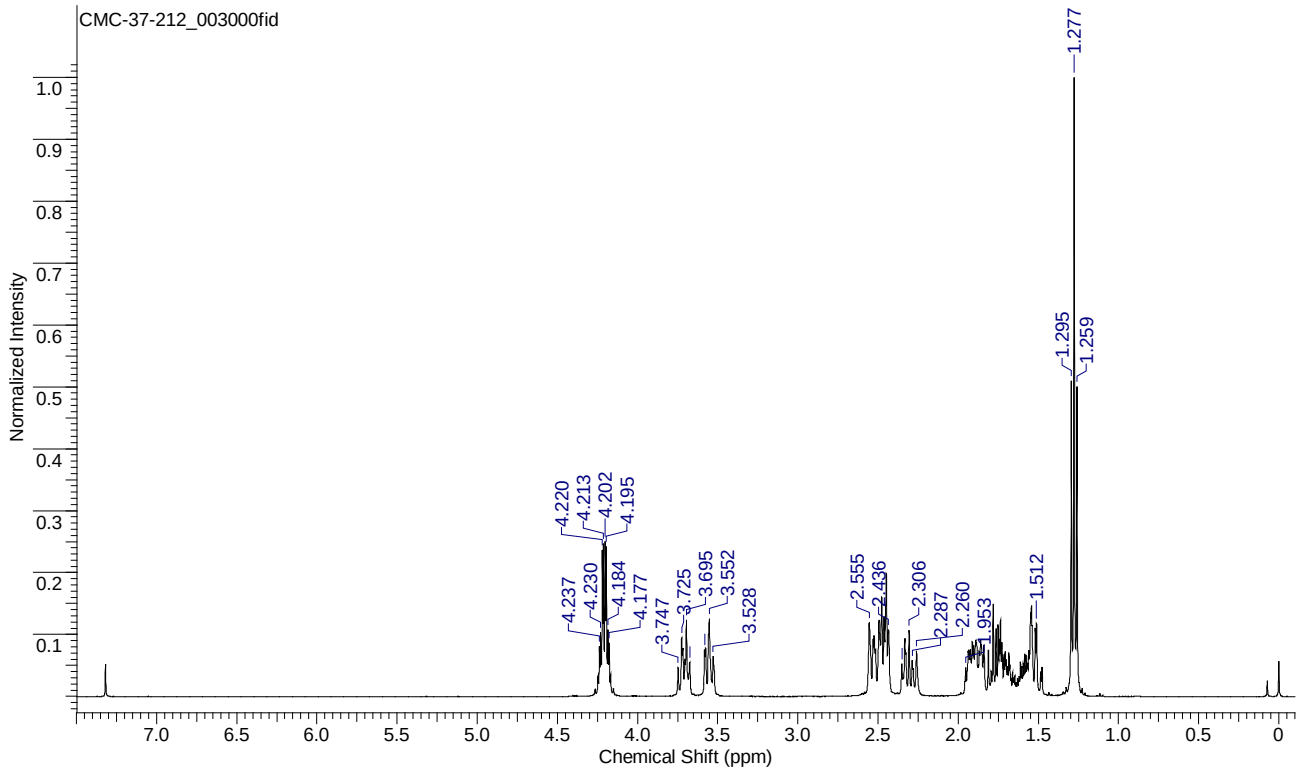
(±)-(4*S,7a*R**,10a*S**)-4-Allyloctahydrocyclopenta[*i*]indolizin-6(7*H*)-one 29**. To a solution of the above residue and allyl trimethylsilane (103 mg, 0.90 mmol) in anhydrous dichloromethane (10 mL) at 0 °C under N_2 atmosphere was added dropwise titanium tetrachloride (1 M in DCM, 0.3 mL, 0.3 mmol). The resulting reaction mixture was

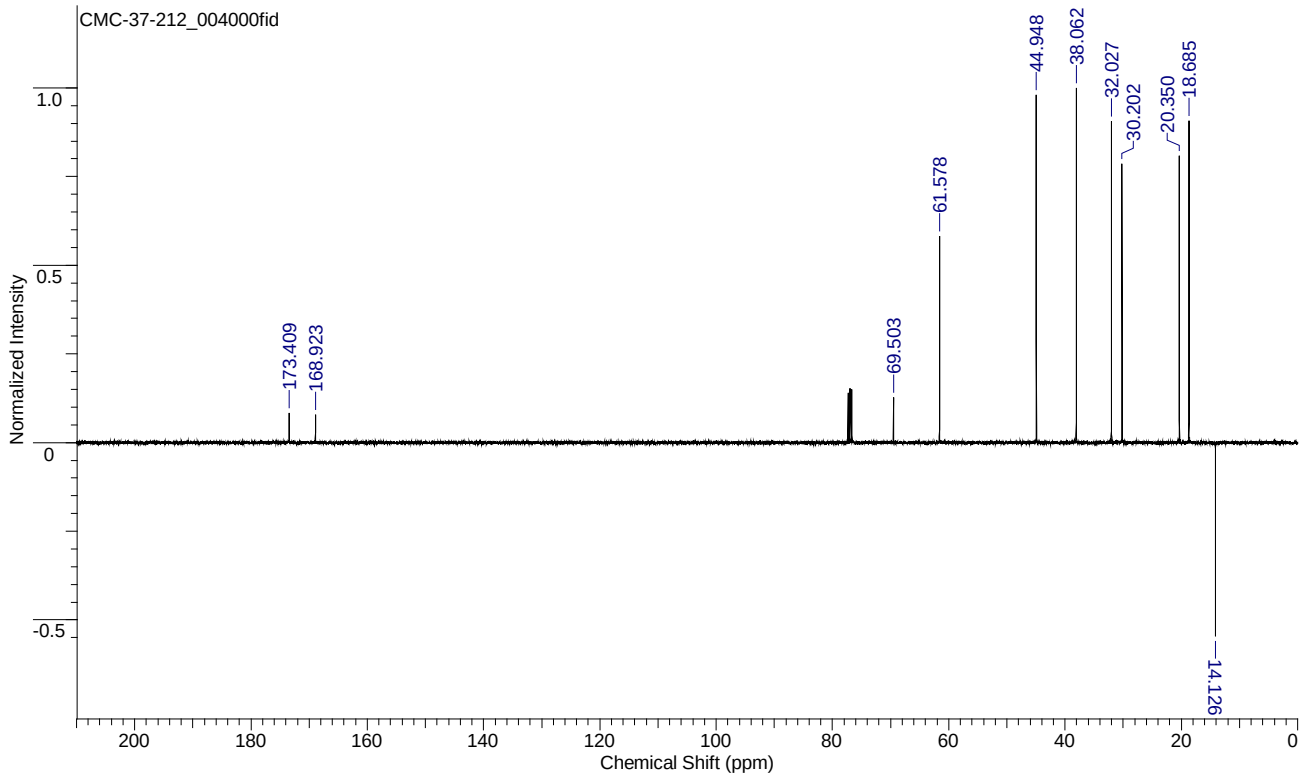
stirred overnight at room temperature. Saturated aqueous sodium bicarbonate was used to quench the reaction. After separation, the aqueous layer was extracted with DCM three times. The combined organic layers were washed with brine and dried over anhydrous sodium sulfate. The concentrated residue was purified by chromatography (20-200% EtOAc/hexanes) to afford lactam **29** (13 mg, 0.06 mmol, 56%) as a colorless oil. R_f = 0.35 (100% EtOAc/hexanes); ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.32–1.42 (m, 2 H), 1.44–1.69 (m, 3 H), 1.69–1.85 (m, 6 H), 1.92–2.02 (m, 1 H), 2.11–2.18 (m, 1 H), 2.18–2.25 (m, 1 H), 2.28–2.47 (m, 2 H), 2.61–2.70 (m, 1 H), 4.41 (q, *J* = 7.4 Hz, 1H), 5.04–5.06 (m, 1 H), 5.06–5.12 (m, 1 H), 5.80 (ddt, *J* = 17.1, 10.3, 6.8 Hz, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 17.3 (*C*H_2), 25.6 (*C*H_2), 27.2 (*C*H_2), 33.4 (*C*H_2), 37.3 (*C*H_2), 37.9 (*C*H_2), 38.0 (*C*H_2), 38.3 (*C*H_2), 43.5 (*C*H), 47.9 (*C*H), 70.6 (*C*), 117.0 (*C*H_2), 135.9 (*C*H), 173.5 (*C*); IR 2936, 1678, 1404 cm^{-1}; HRMS calculated for $C_{14}H_{22}NO$ (M^++H) 220.1701, found 220.1694.

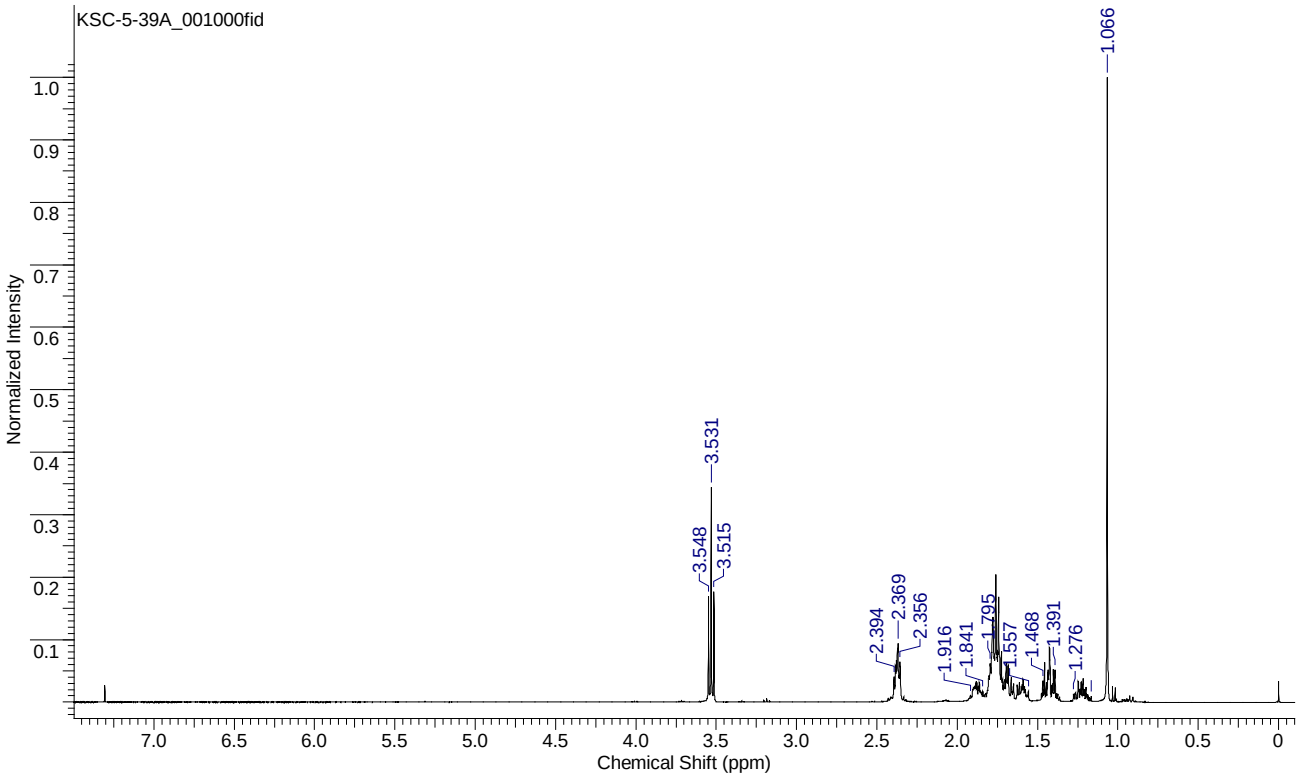
F. ^{1}H and ^{13}C NMR spectra for new compounds

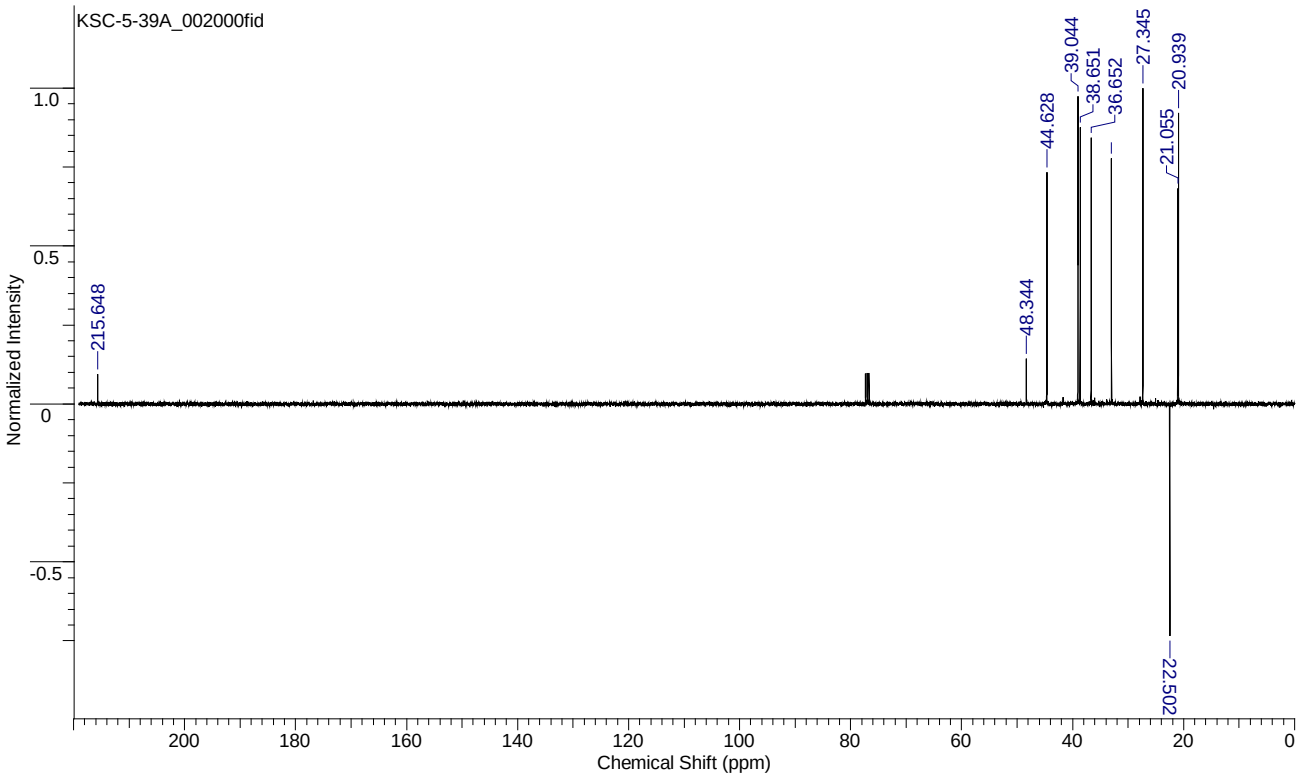

CMC-37-218_001000fid
Normalized Intensity
Chemical Shift (ppm)
1.257
4.182
4.164
3.285
1.274
1.238
4.200
4.146
3.298
3.268
2.546
2.473
2.403
2.296
2.275
2.249
2.070
1.847
1.702
1.507

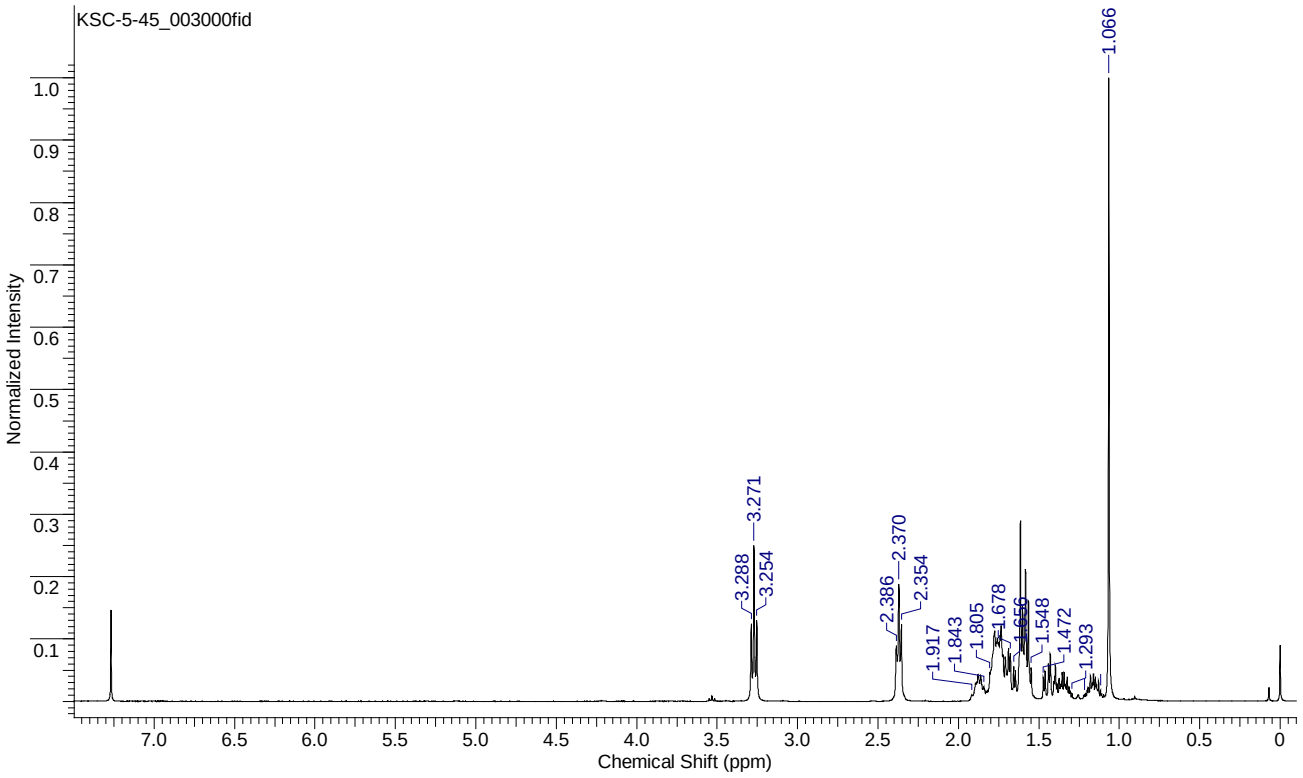

CMC-37-218_002000fid
Normalized Intensity
Chemical Shift (ppm)
214.456
170.857
61.505
59.833
51.463
37.830
33.154
30.878
24.414
19.572
14.067

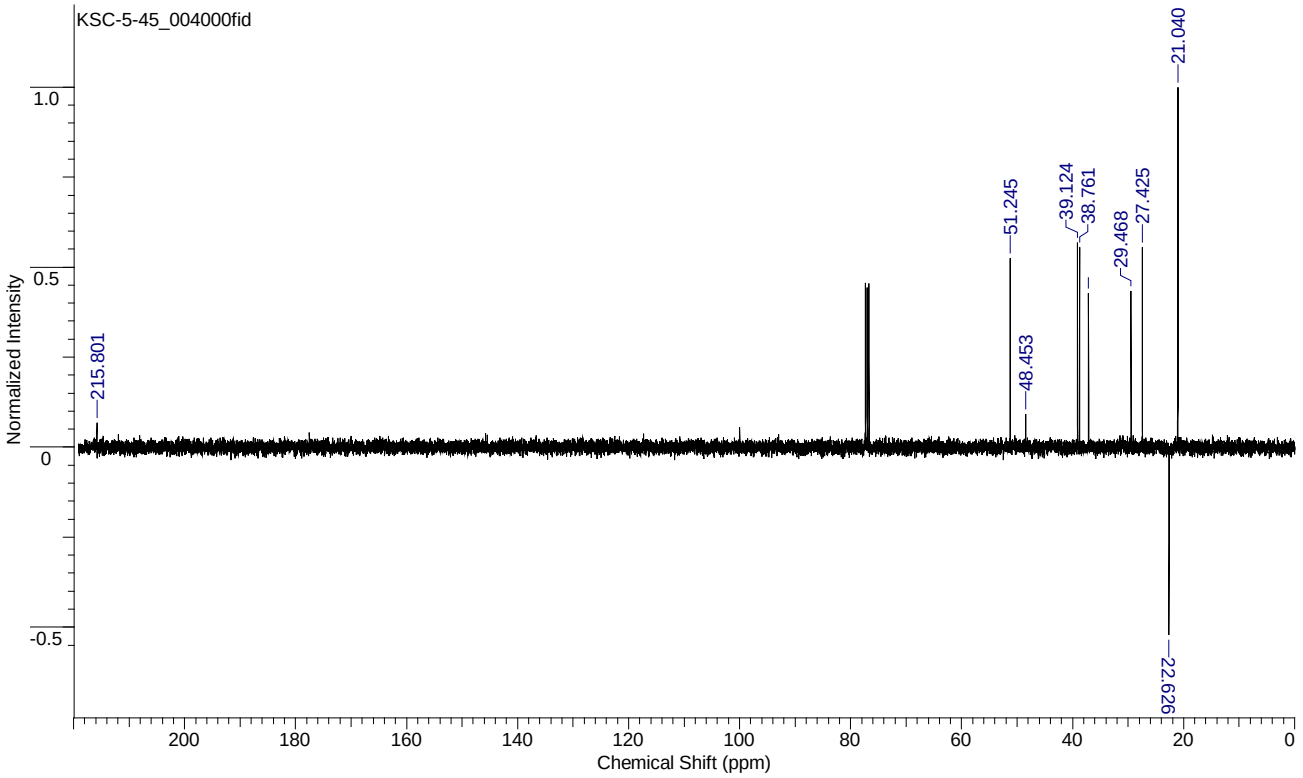

CMC-37-212_003000fid
Normalized Intensity
Chemical Shift (ppm)
1.277
1.295
1.259
4.220
4.213
4.202
4.195
4.237
4.230
4.184
4.177
3.747
3.725
3.695
3.552
3.528
2.555
2.436
2.306
2.287
2.260
1.953
1.512

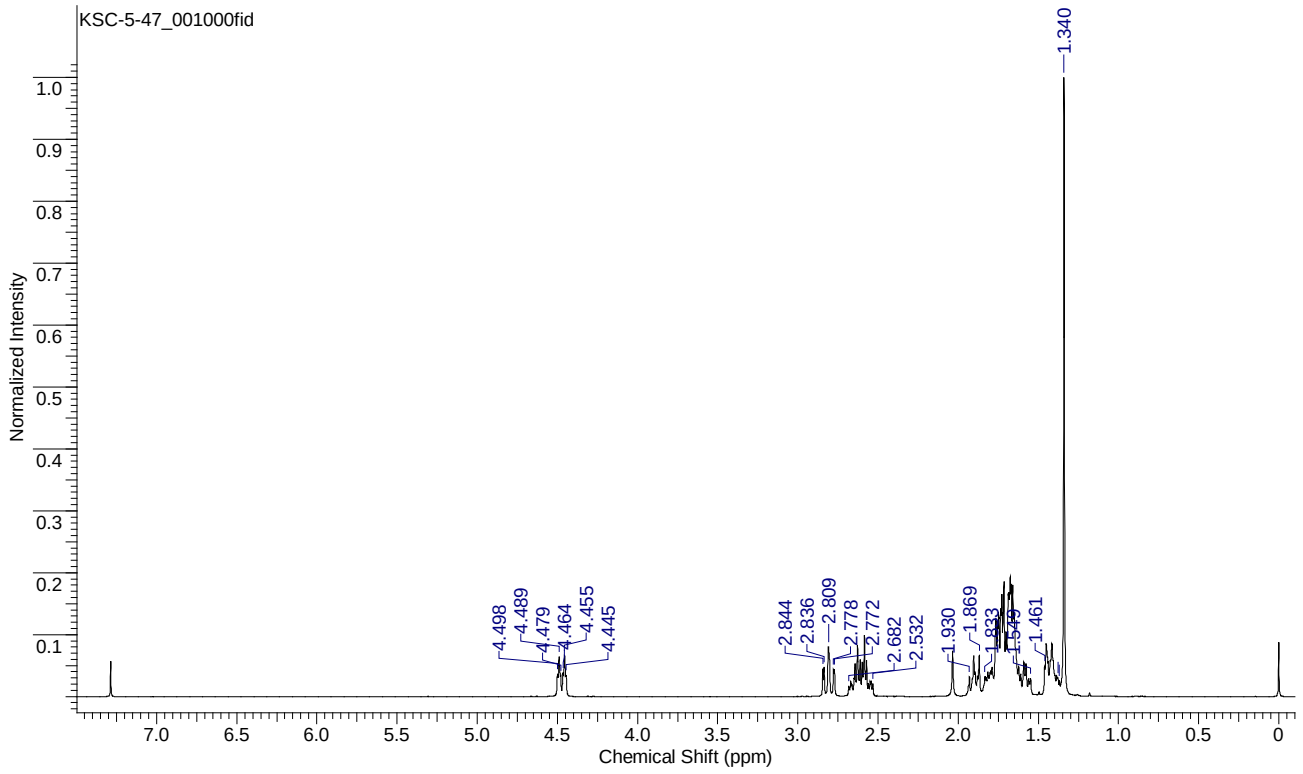

CMC-37-212_004000fid
Normalized Intensity
Chemical Shift (ppm)
44.948
38.062
32.027
30.202
20.350
18.685
61.578
69.503
173.409
168.923
14.126

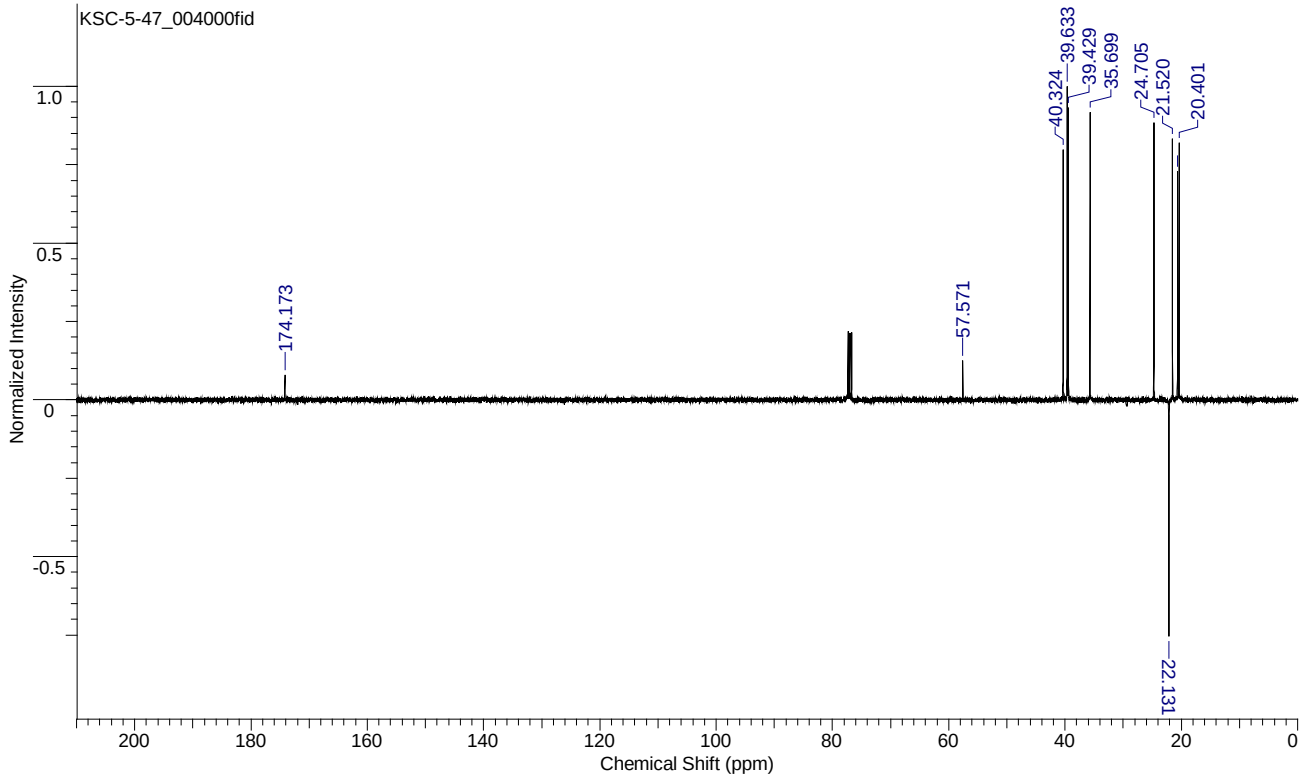

KSC-5-39A_001000fid
Normalized Intensity
Chemical Shift (ppm)
1.066
3.531
3.548
3.515
2.394
2.369
2.356
1.916
1.841
1.795
1.557
1.468
1.391
1.276

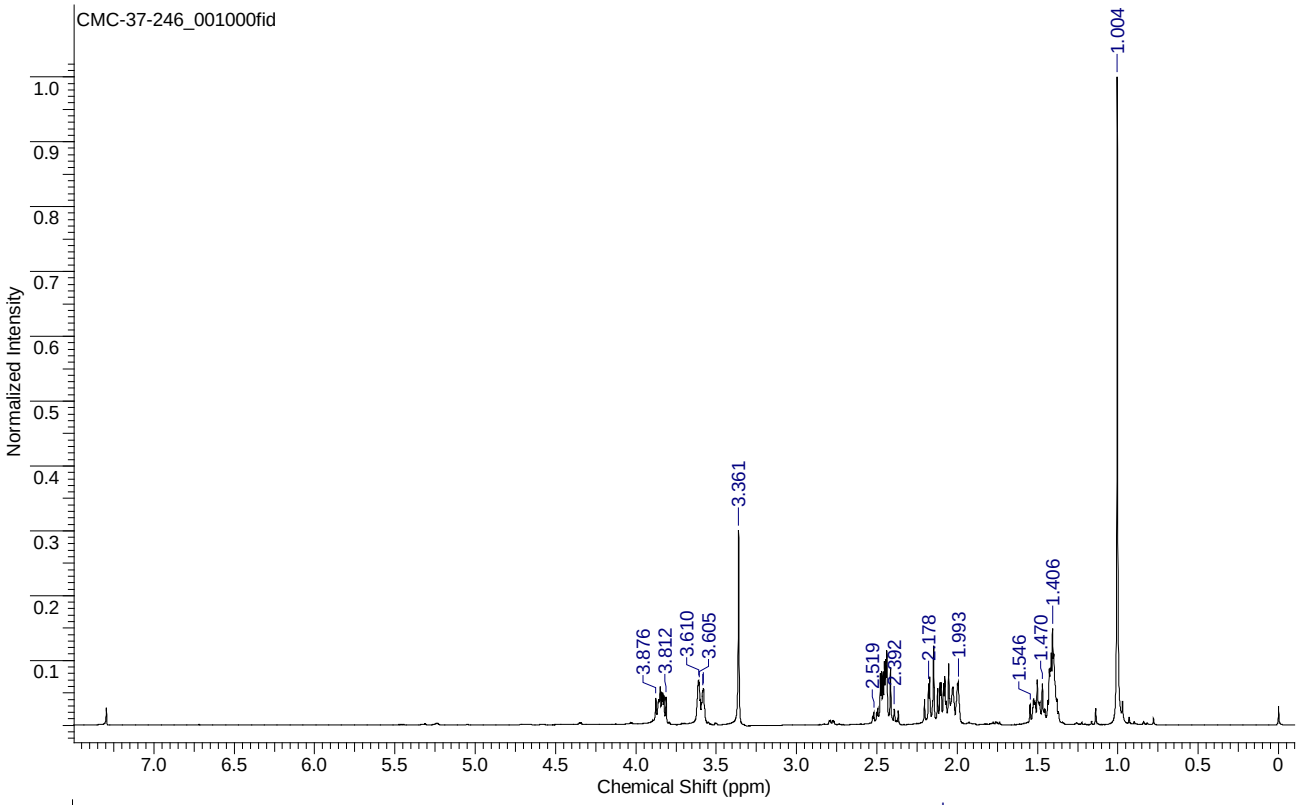

KSC-5-39A_002000fid
Normalized Intensity
Chemical Shift (ppm)
215.648
48.344
44.628
39.044
38.651
36.652
27.345
21.055
20.939
22.502

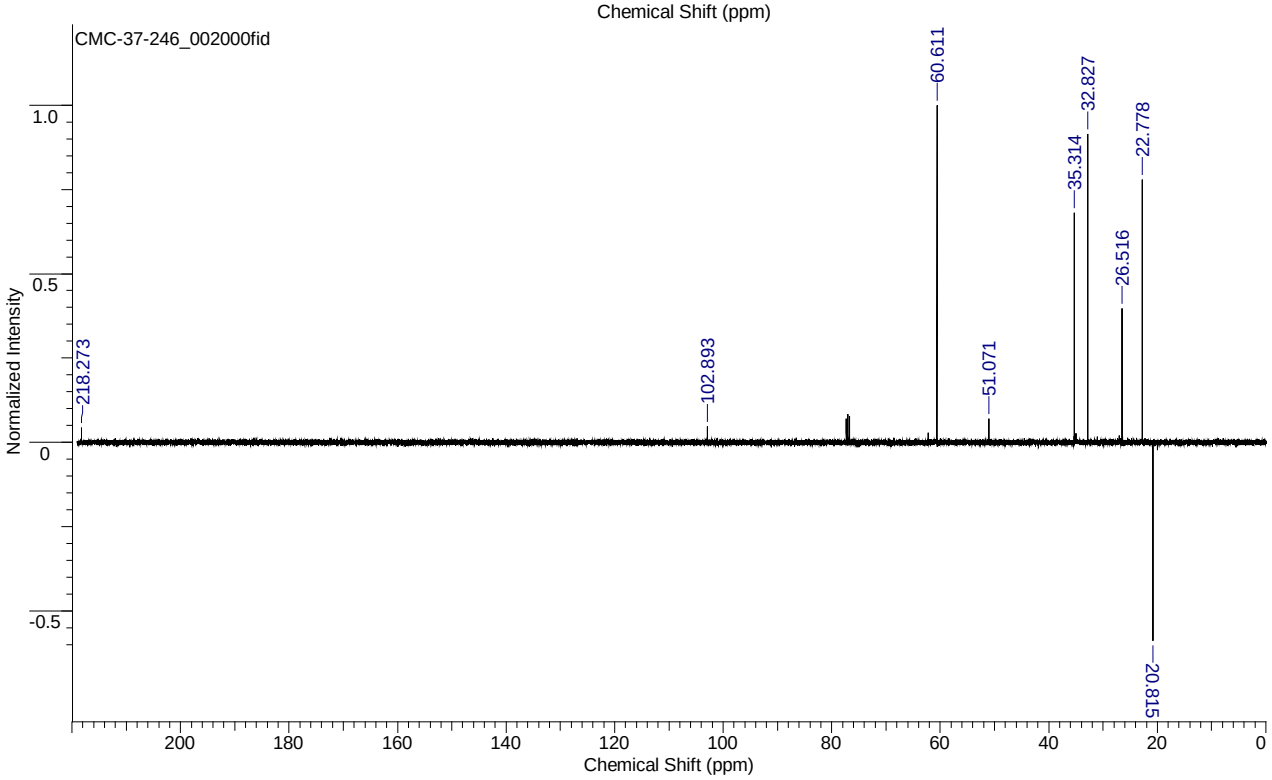

KSC-5-45_003000fid
Normalized Intensity
Chemical Shift (ppm)
1.066
3.271
3.288
3.254
2.370
2.386
2.354
1.917
1.843
1.805
1.678
1.656
1.548
1.472
1.293

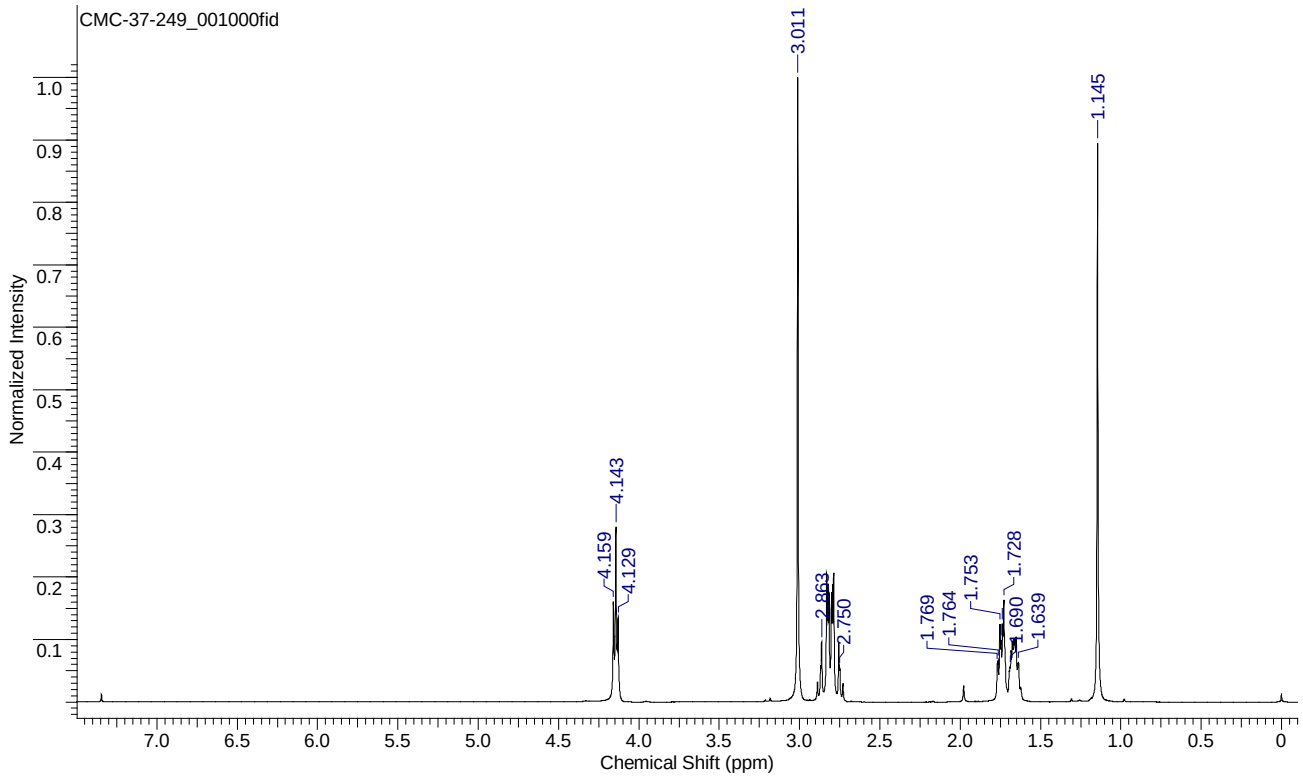

KSC-5-45_004000fid
Normalized Intensity
Chemical Shift (ppm)
21.040
51.245
39.124
38.761
29.468
27.425
215.801
48.453
22.626

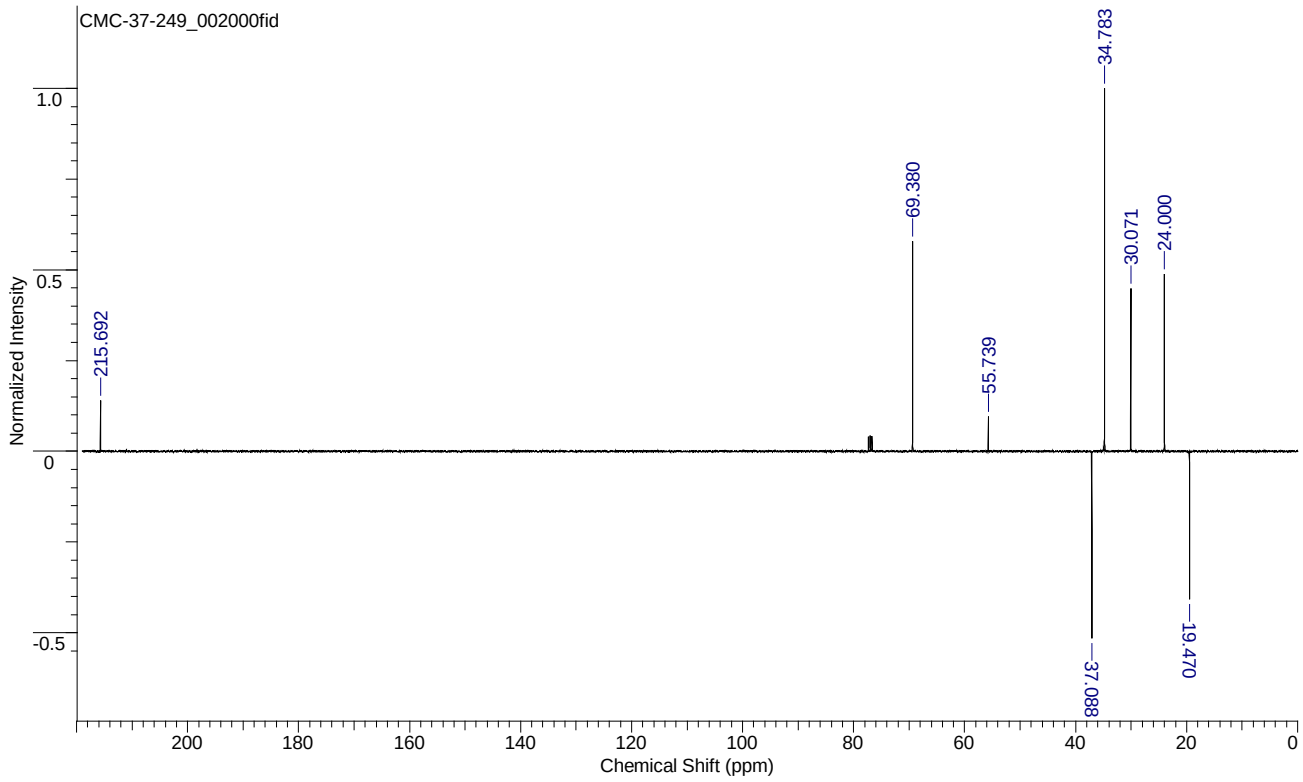

KSC-5-47_001000fid
Normalized Intensity
Chemical Shift (ppm)
1.340
4.498
4.489
4.479
4.464
4.455
4.445
2.844
2.836
2.809
2.778
2.772
2.682
2.532
1.930
1.869
1.833
1.549
1.461

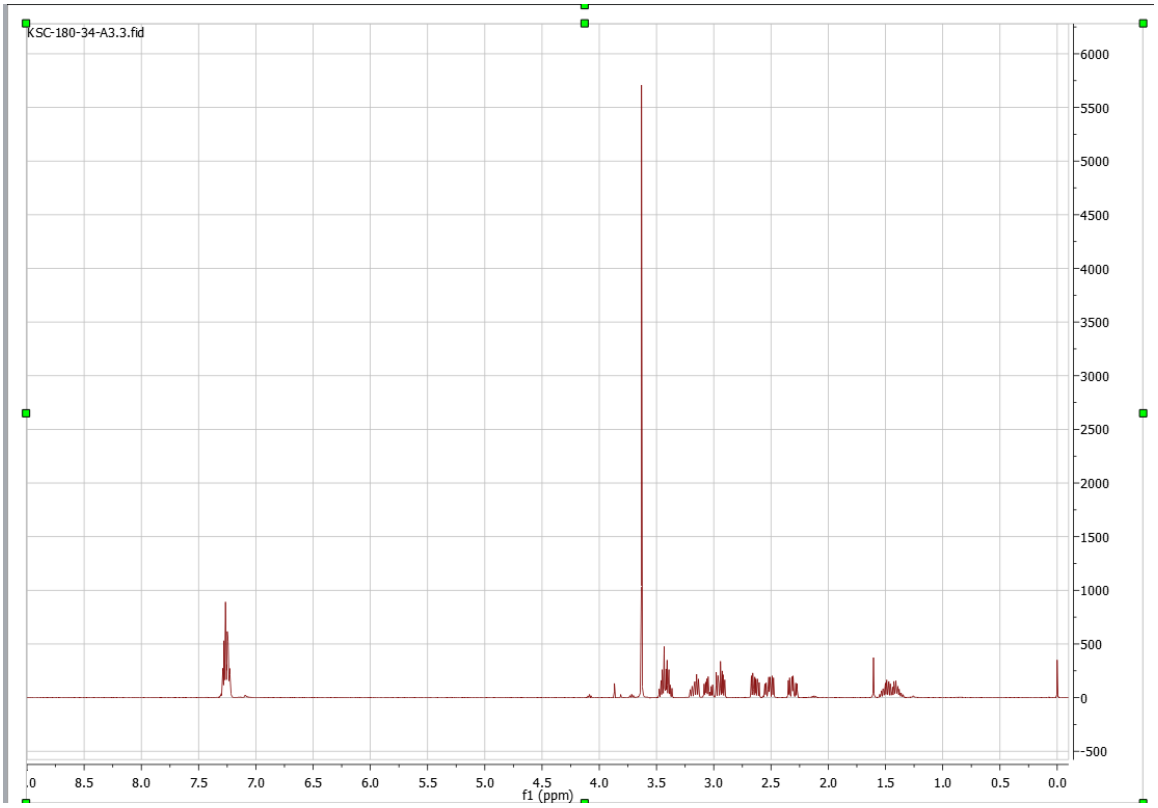

KSC-5-47_004000fid
Normalized Intensity
Chemical Shift (ppm)
174.173
57.571
40.324
39.633
39.429
35.699
24.705
21.520
20.401
22.131

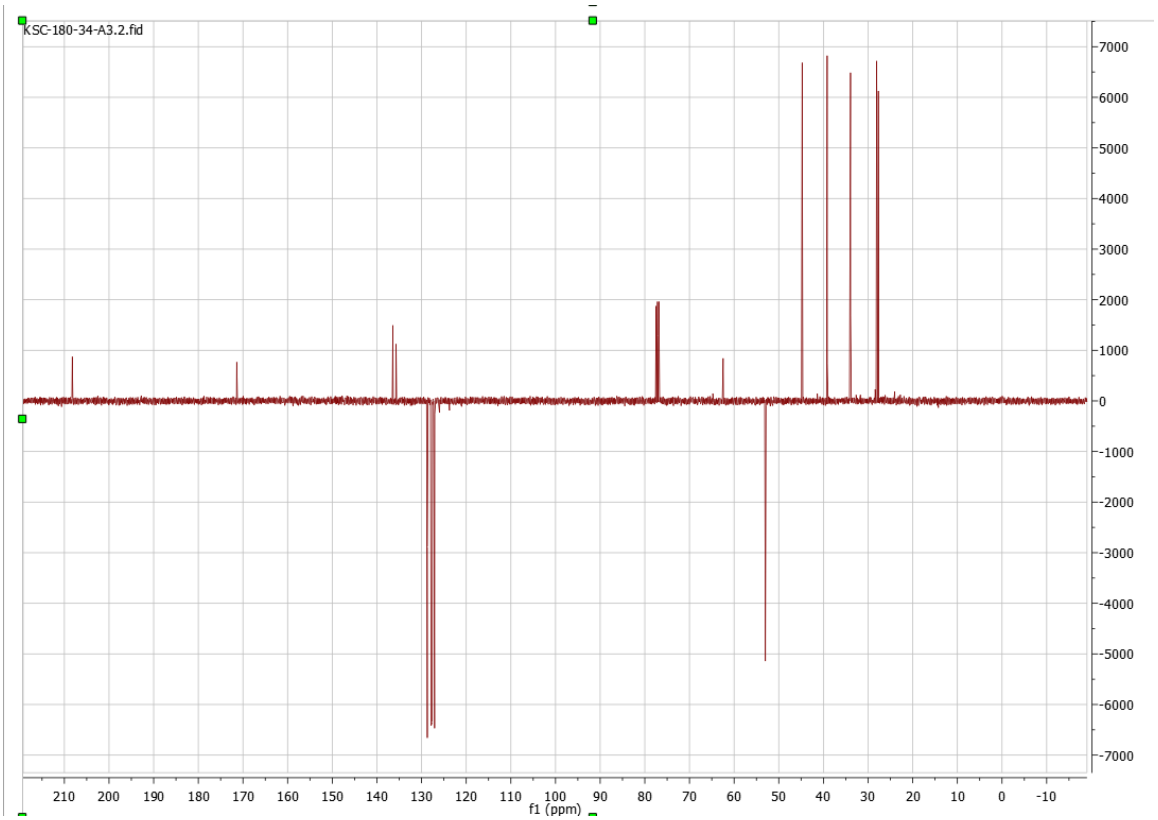

CMC-37-246_001000fid
Normalized Intensity
Chemical Shift (ppm)
1.004
3.361
3.876
3.812
3.610
3.605
2.519
2.392
2.178
1.993
1.546
1.470
1.406

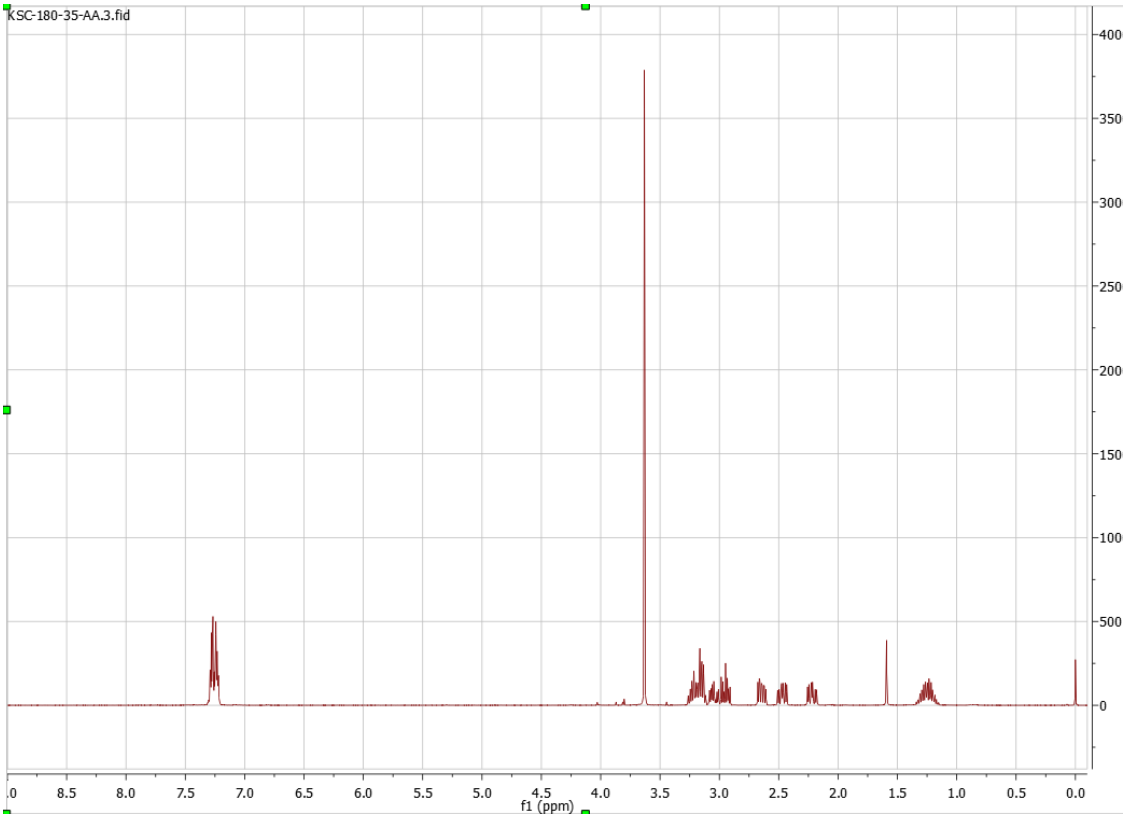

CMC-37-246_002000fid
Normalized Intensity
Chemical Shift (ppm)
60.611
32.827
35.314
22.778
26.516
218.273
102.893
51.071
20.815

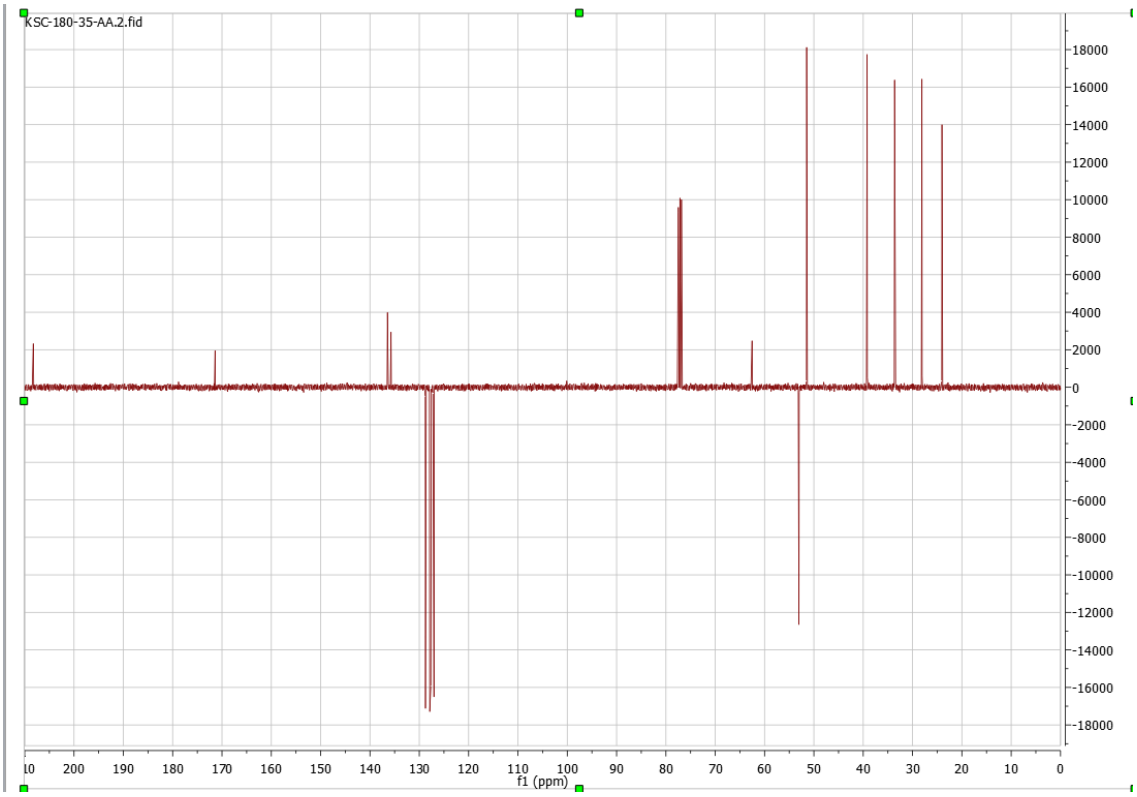

CMC-37-249_001000fid
Normalized Intensity
Chemical Shift (ppm)
3.011
1.145
4.143
4.159
4.129
2.863
2.750
1.769
1.764
1.753
1.728
1.690
1.639

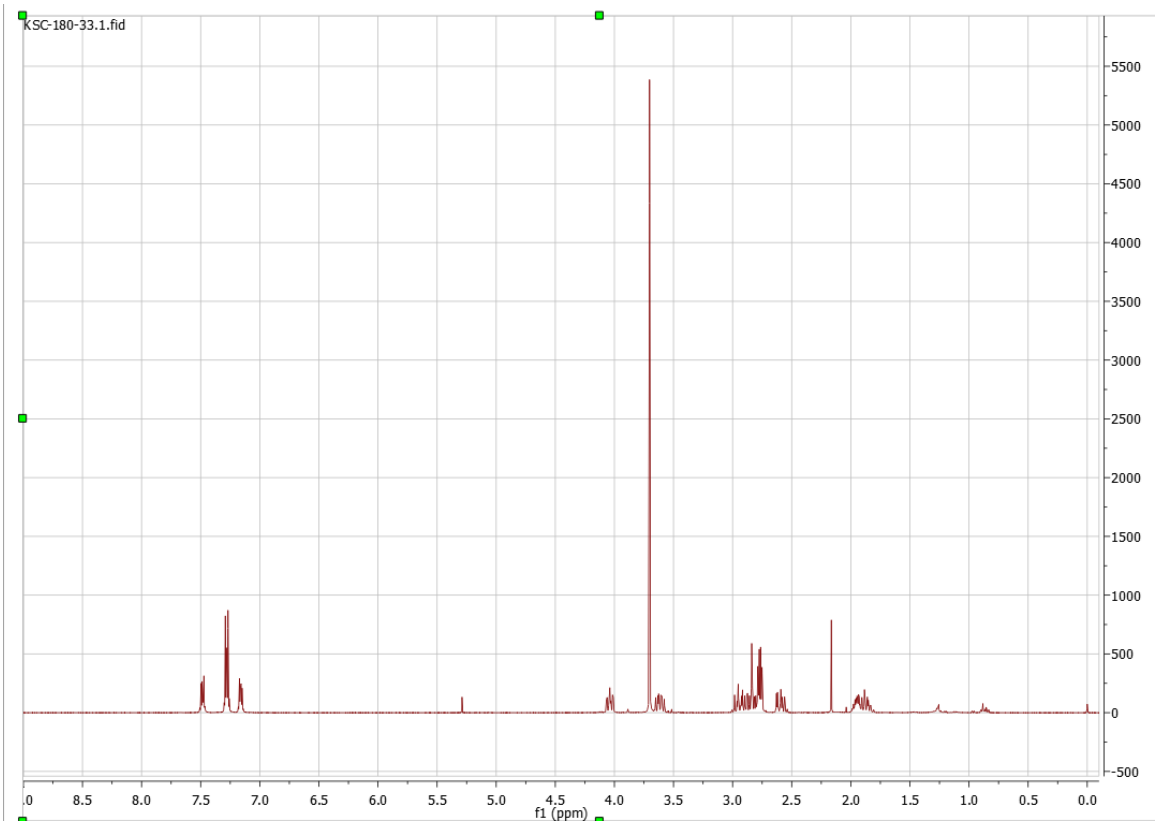

CMC-37-249_002000fid
Normalized Intensity
Chemical Shift (ppm)
34.783
69.380
30.071
24.000
215.692
55.739
37.088
19.470

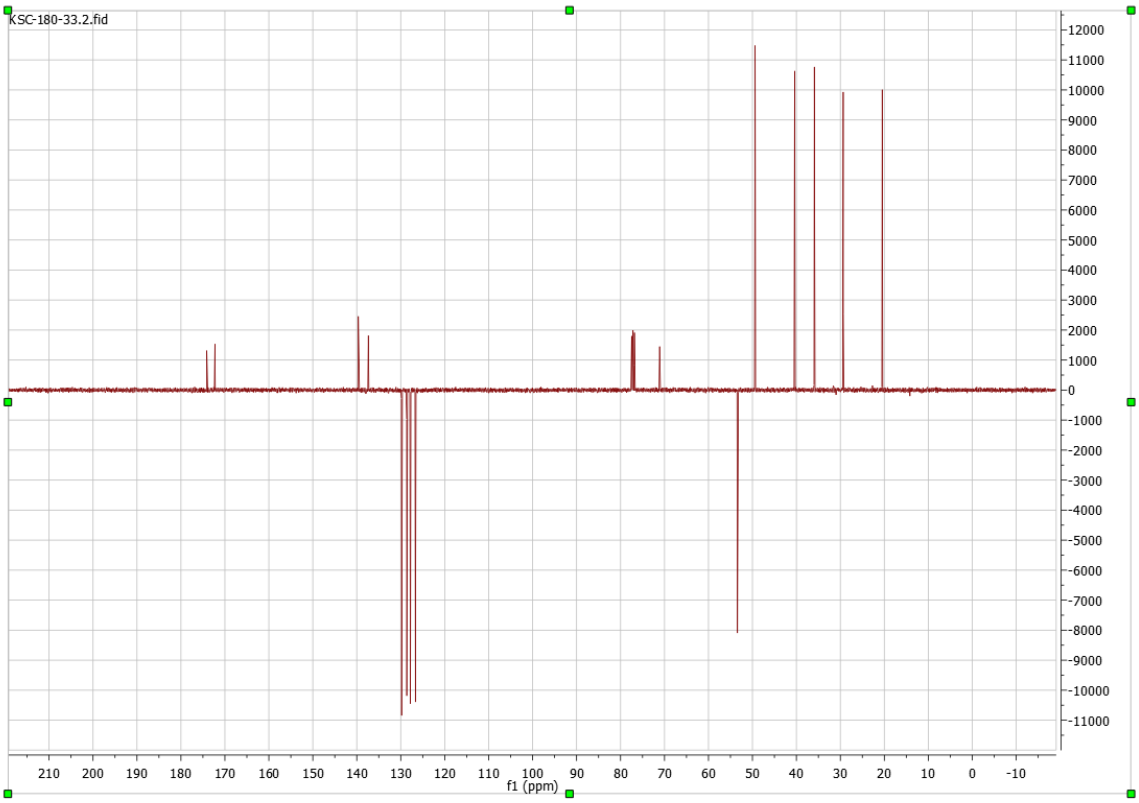

KSC-180-34-A3.3.fid
f1 (ppm)

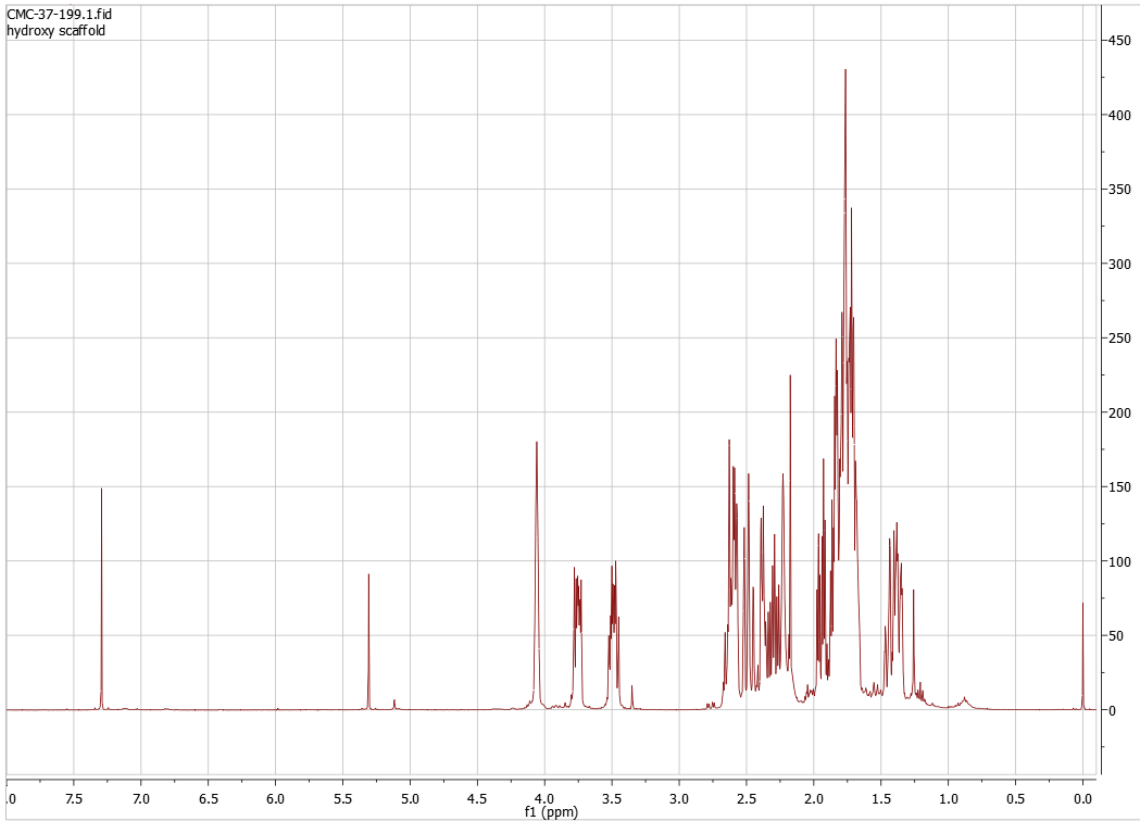

KSC-180-34-A3.2.fid
f1 (ppm)

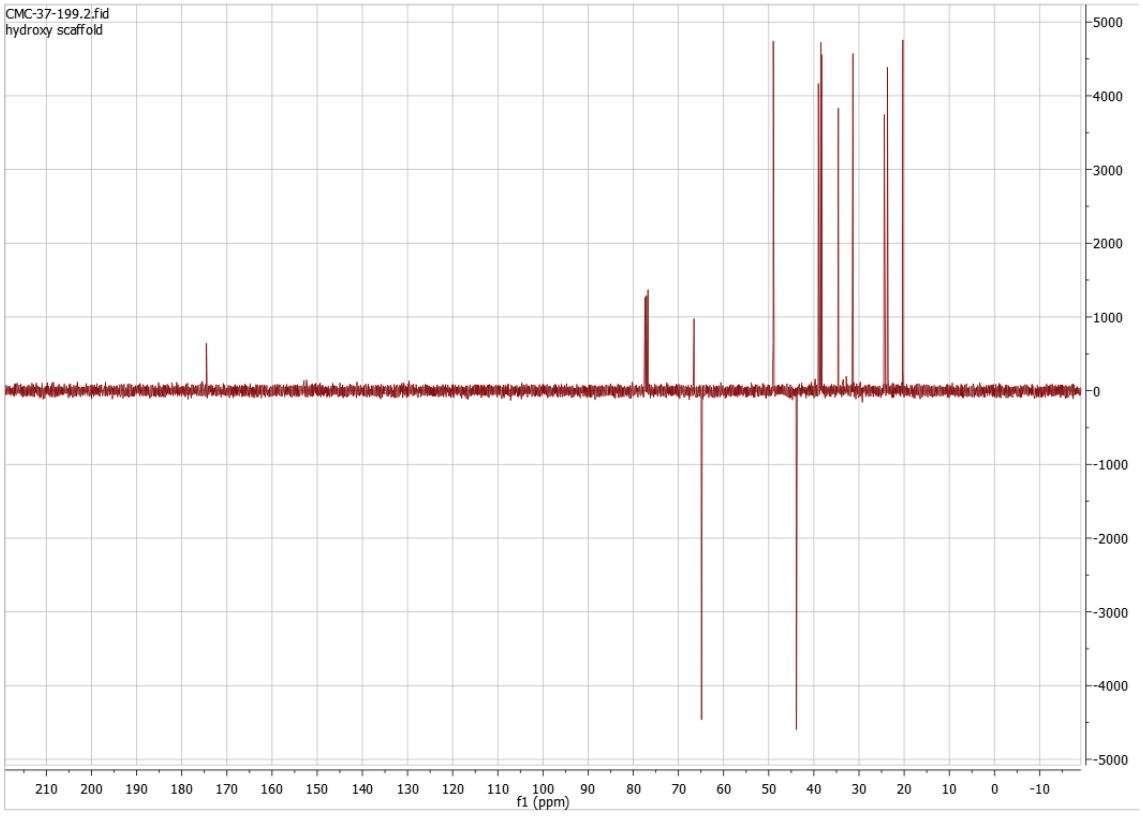

KSC-180-35-AA.3.fid
400
350
300
250
200
150
100
500
0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

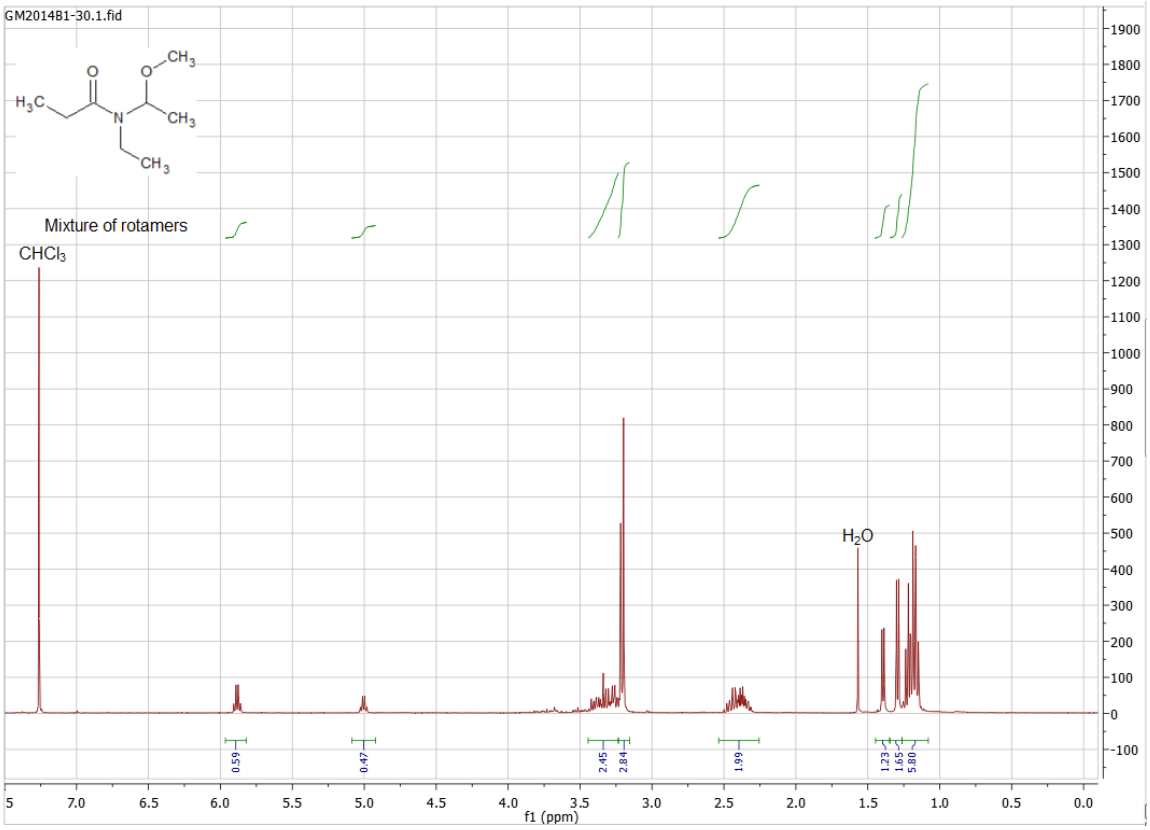

KSC-180-35-AA.2.fid
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
-2000
-4000
-6000
-8000
-10000
-12000
-14000
-16000
-18000
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

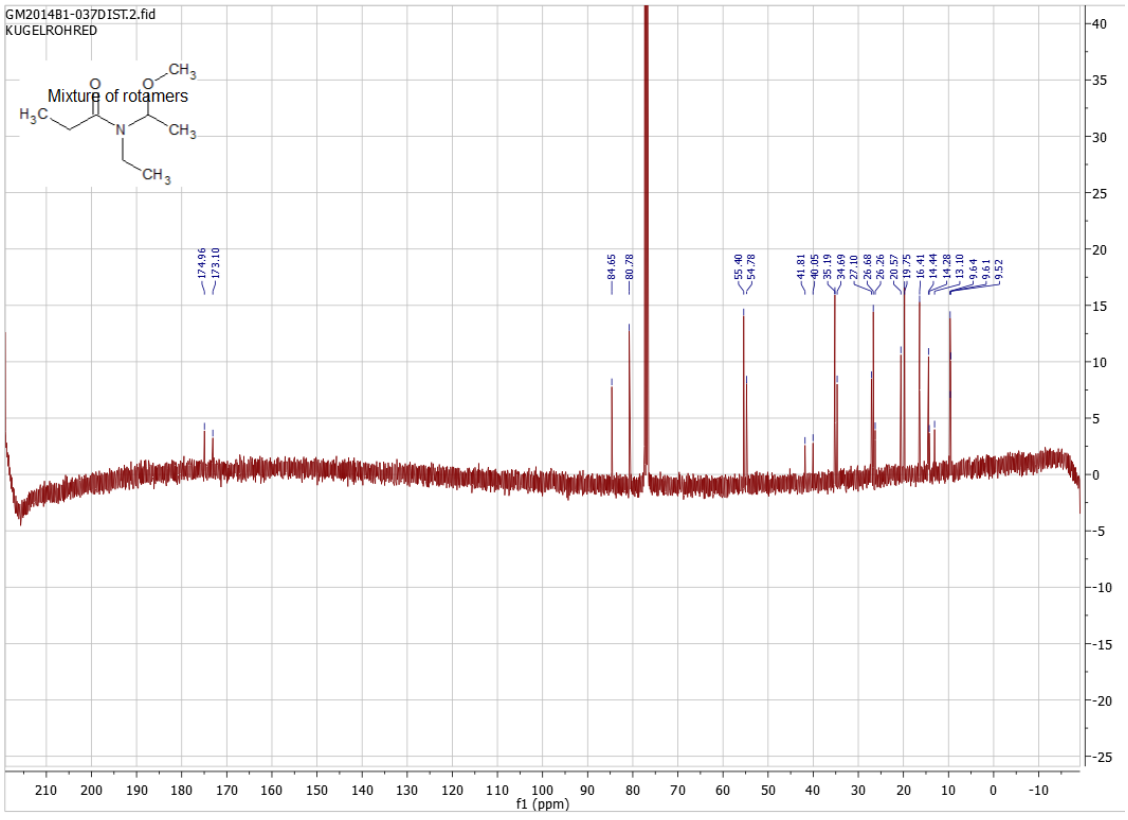

KSC-180-33.1.fid
f1 (ppm)

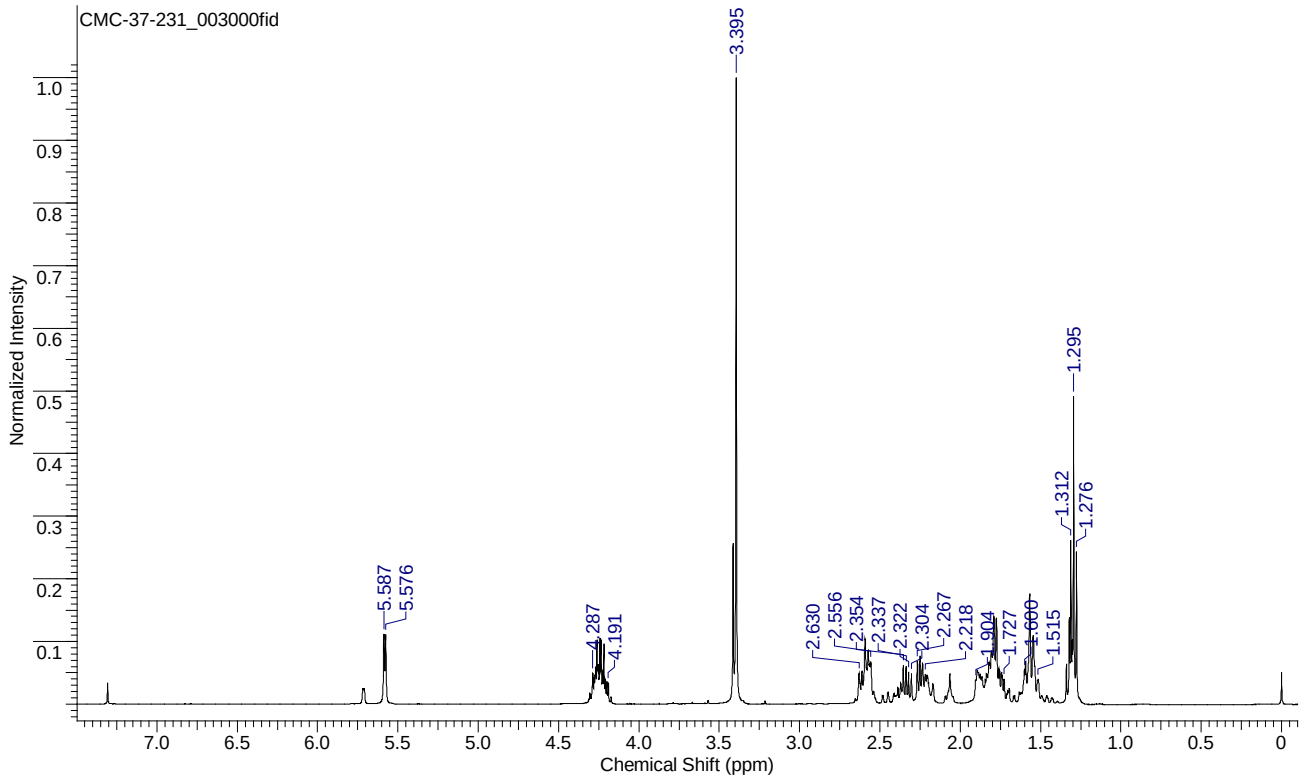

KSC-180-33.2.fid
f1 (ppm)

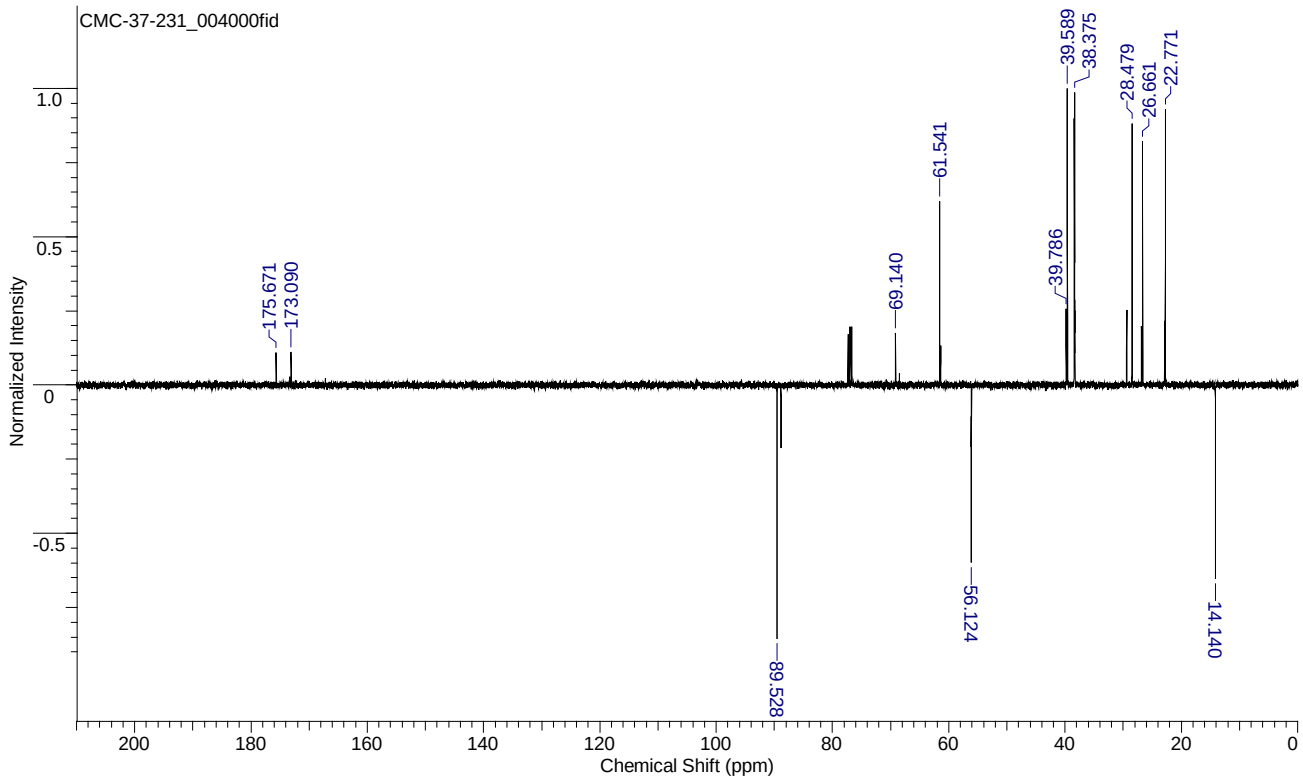

CMC-37-199.1.fid
hydroxy scaffold
f1 (ppm)

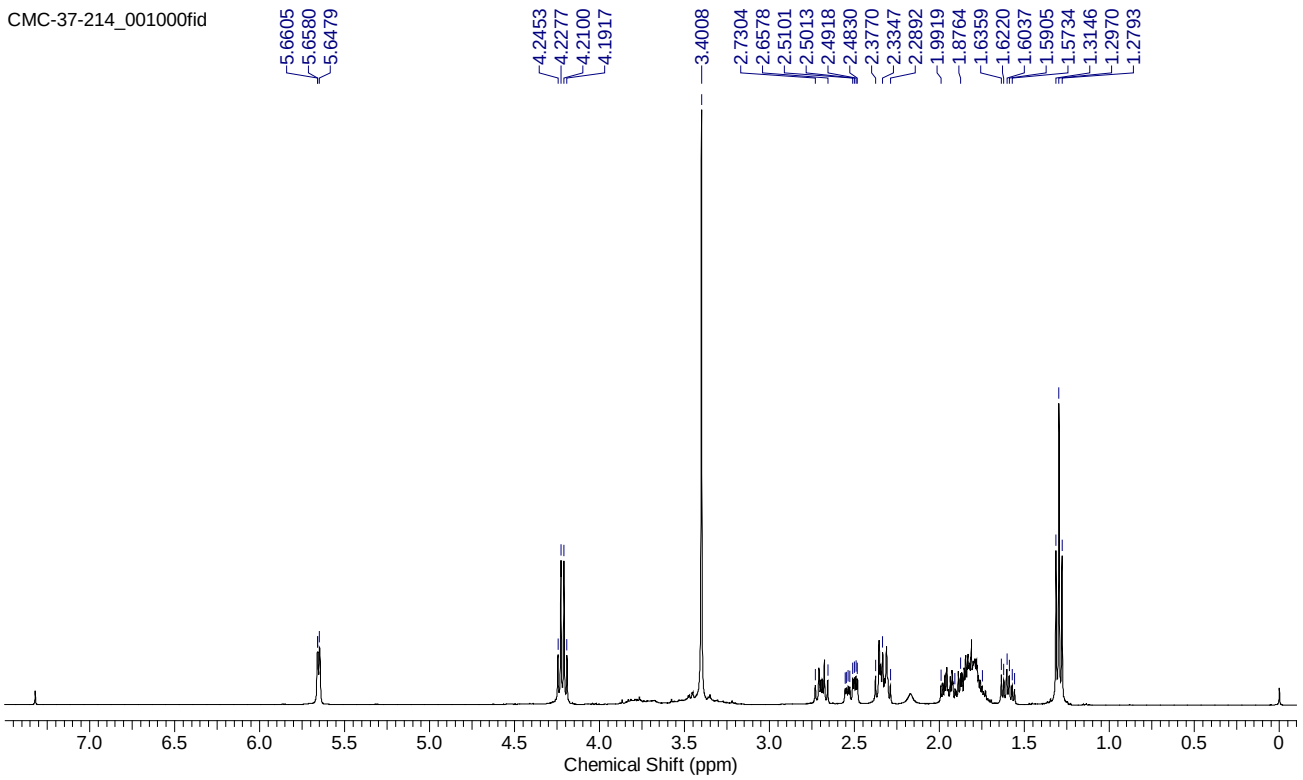

CMC-37-199.2.fid
hydroxy scaffold
f1 (ppm)

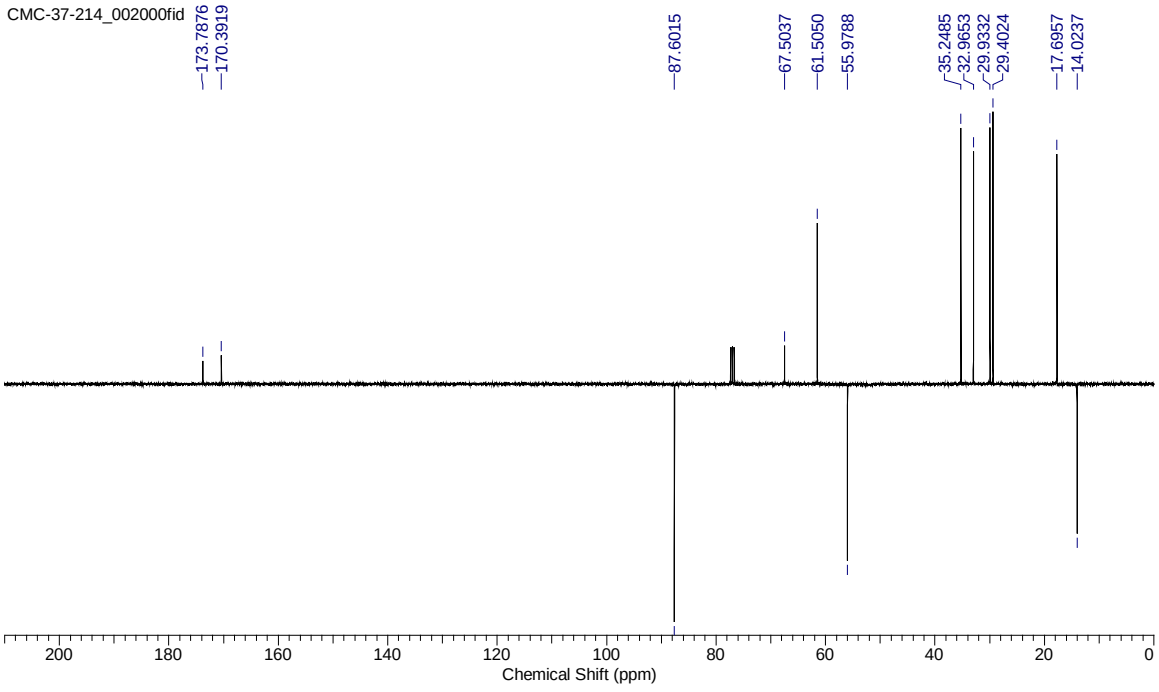

GM2014B1-30.1.fid
Mixture of rotamers
CHCl3
H2O
f1 (ppm)

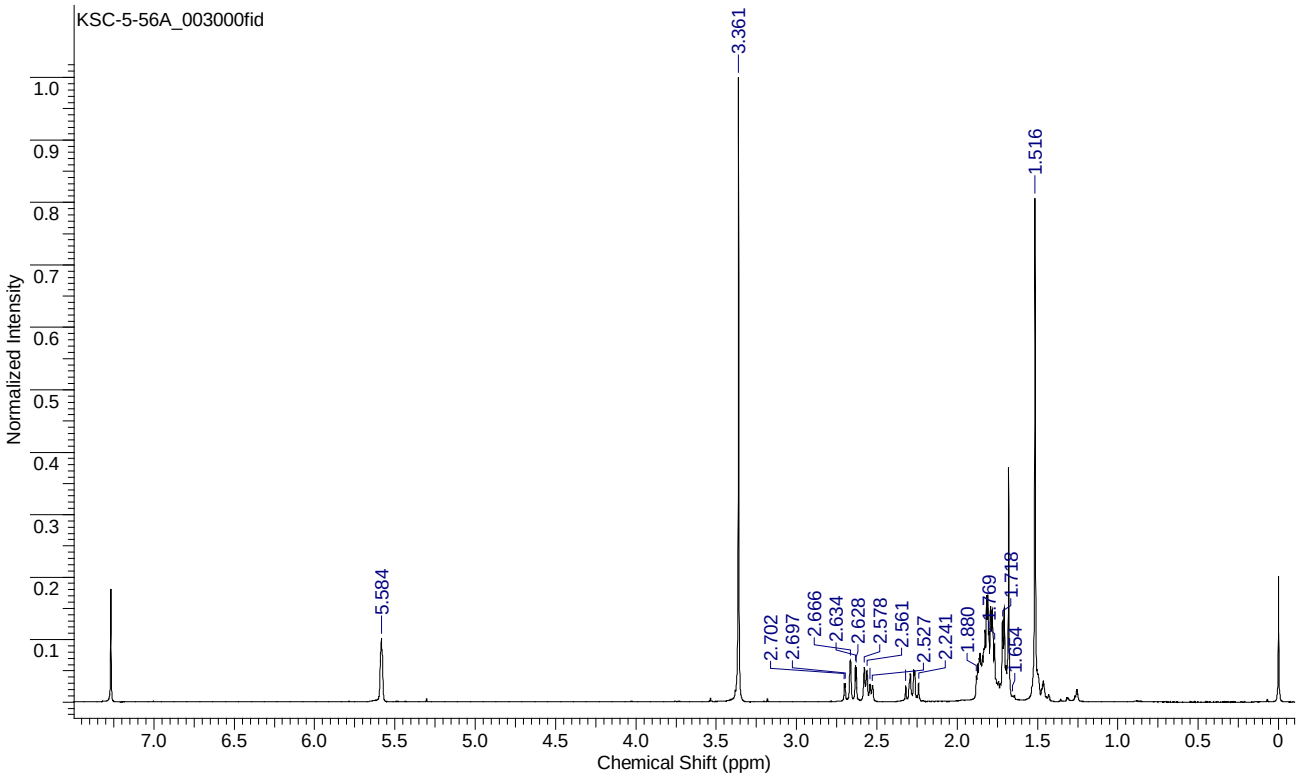

GM2014B1-037DIST.2.fid
KUGELROHRED
Mixture of rotamers
f1 (ppm)

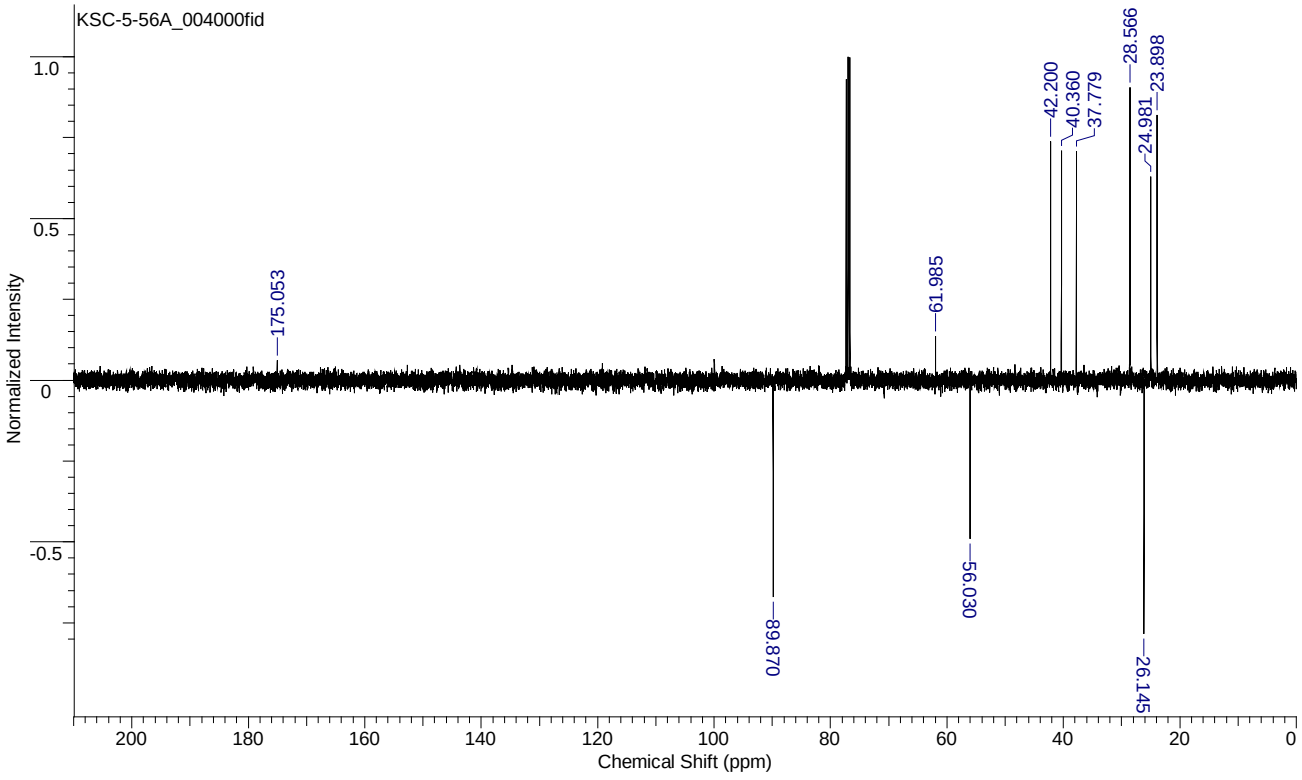

CMC-37-231_003000fid
Normalized Intensity
Chemical Shift (ppm)
3.395
1.295
1.312
1.276
5.587
5.576
4.287
4.191
2.630
2.556
2.354
2.337
2.322
2.304
2.267
2.218
1.904
1.727
1.660
1.515

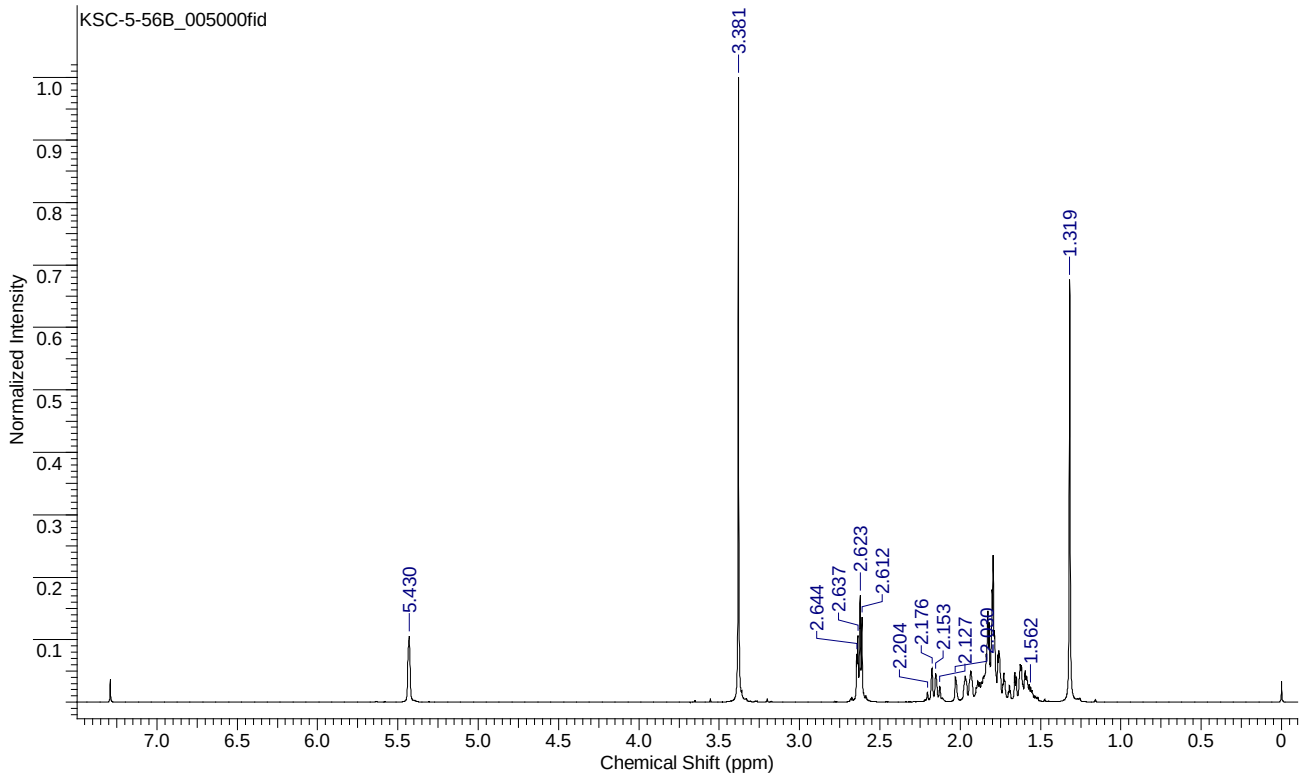

CMC-37-231_004000fid
Normalized Intensity
Chemical Shift (ppm)
39.589
38.375
28.479
26.661
22.771
61.541
39.786
69.140
175.671
173.090
89.528
56.124
14.140

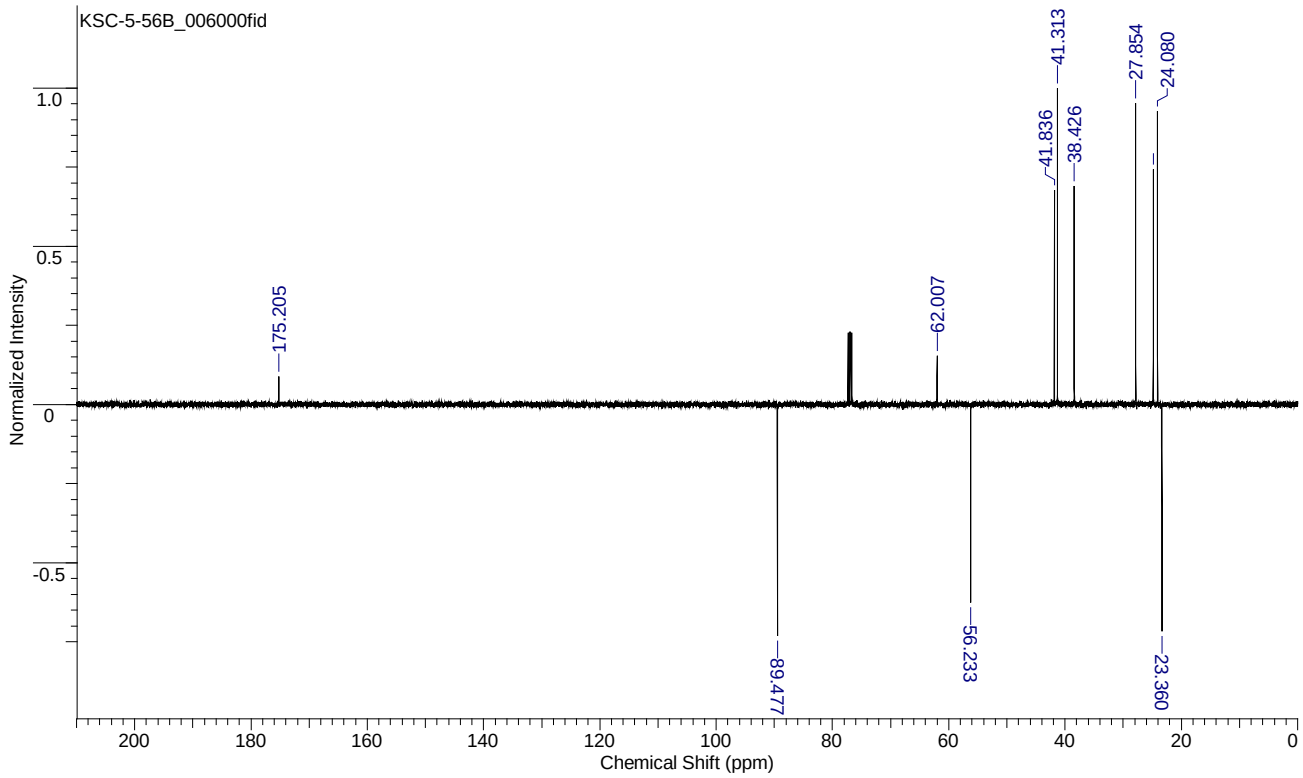

CMC-37-214_001000fid
5.6605
5.6580
5.6479
4.2453
4.2277
4.2100
4.1917
3.4008
2.7304
2.6578
2.5101
2.5013
2.4918
2.4830
2.3770
2.3347
2.2892
1.9919
1.8764
1.6359
1.6220
1.6037
1.5905
1.5734
1.3146
1.2970
1.2793
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
Chemical Shift (ppm)

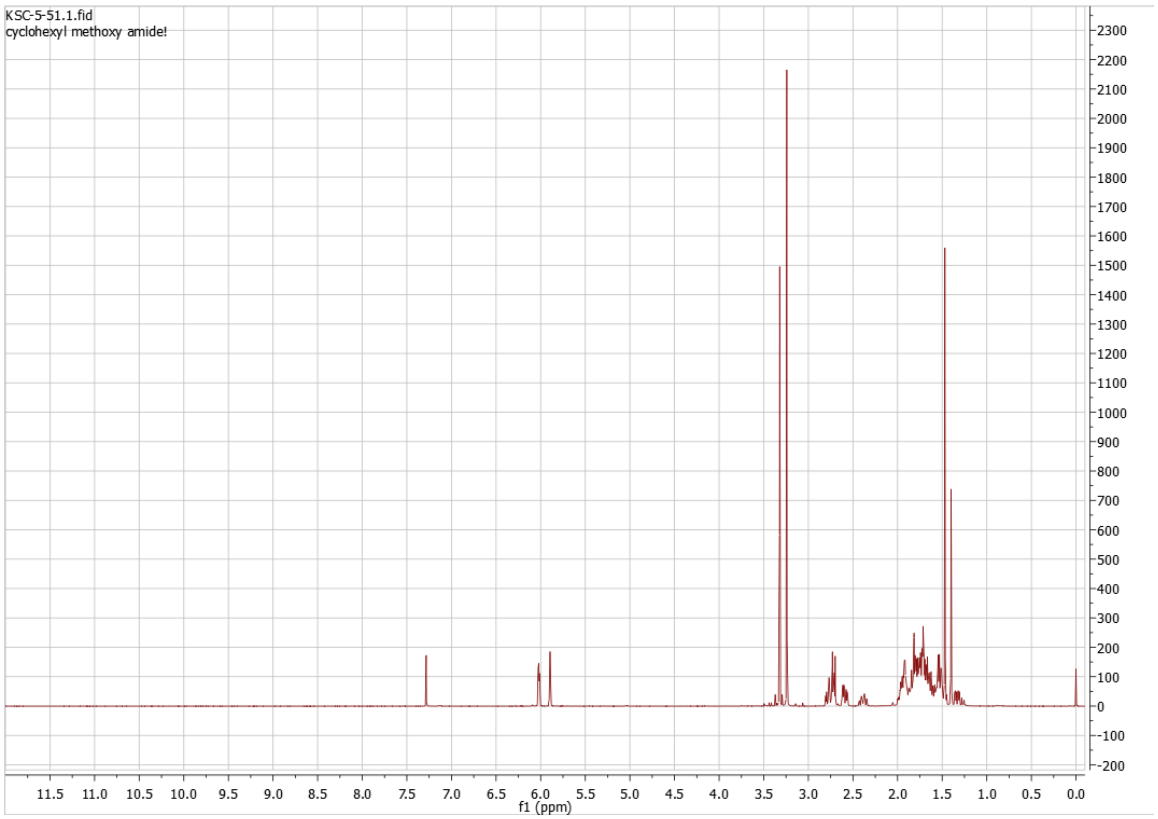

CMC-37-214_002000fid
173.7876
170.3919
87.6015
67.5037
61.5050
55.9788
35.2485
32.9653
29.9332
29.4024
17.6957
14.0237
200
180
160
140
120
100
80
60
40
20
0
Chemical Shift (ppm)

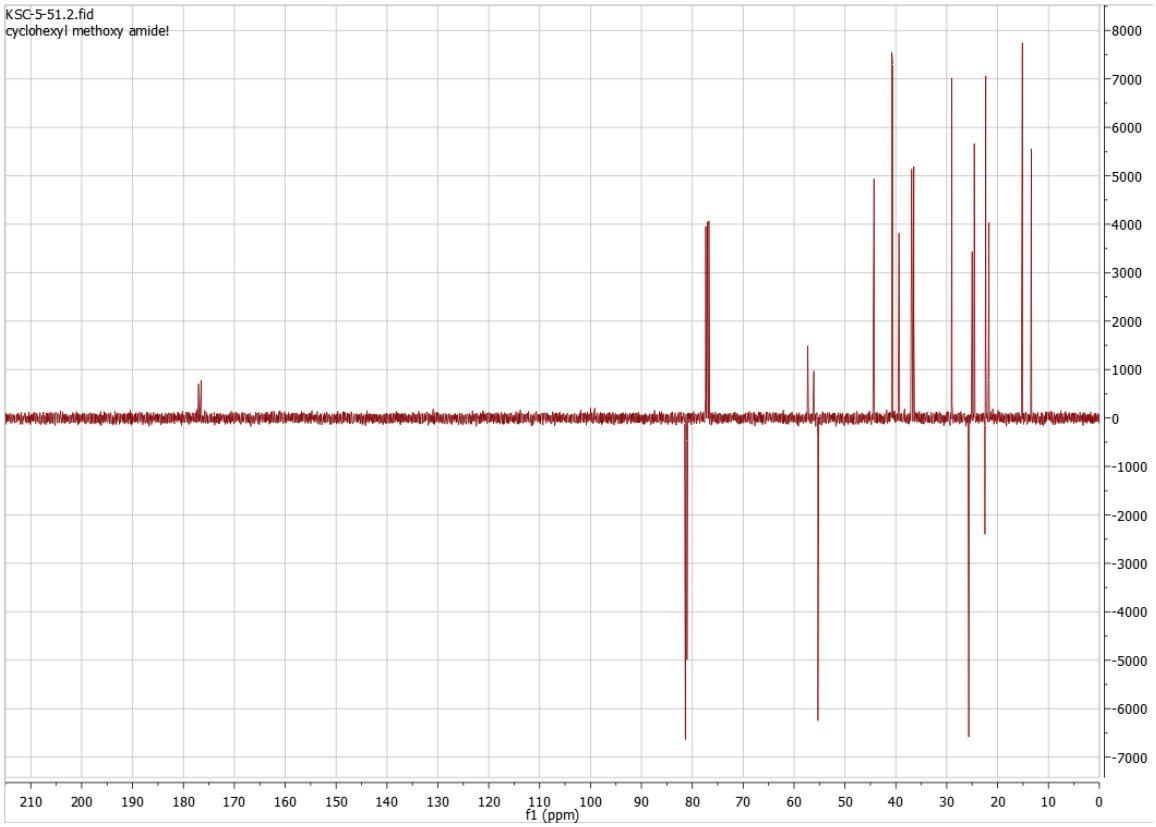

KSC-5-56A_003000fid
Normalized Intensity
Chemical Shift (ppm)
3.361
1.516
5.584
2.702
2.697
2.666
2.634
2.628
2.578
2.561
2.527
2.241
1.880
1.769
1.718
1.654

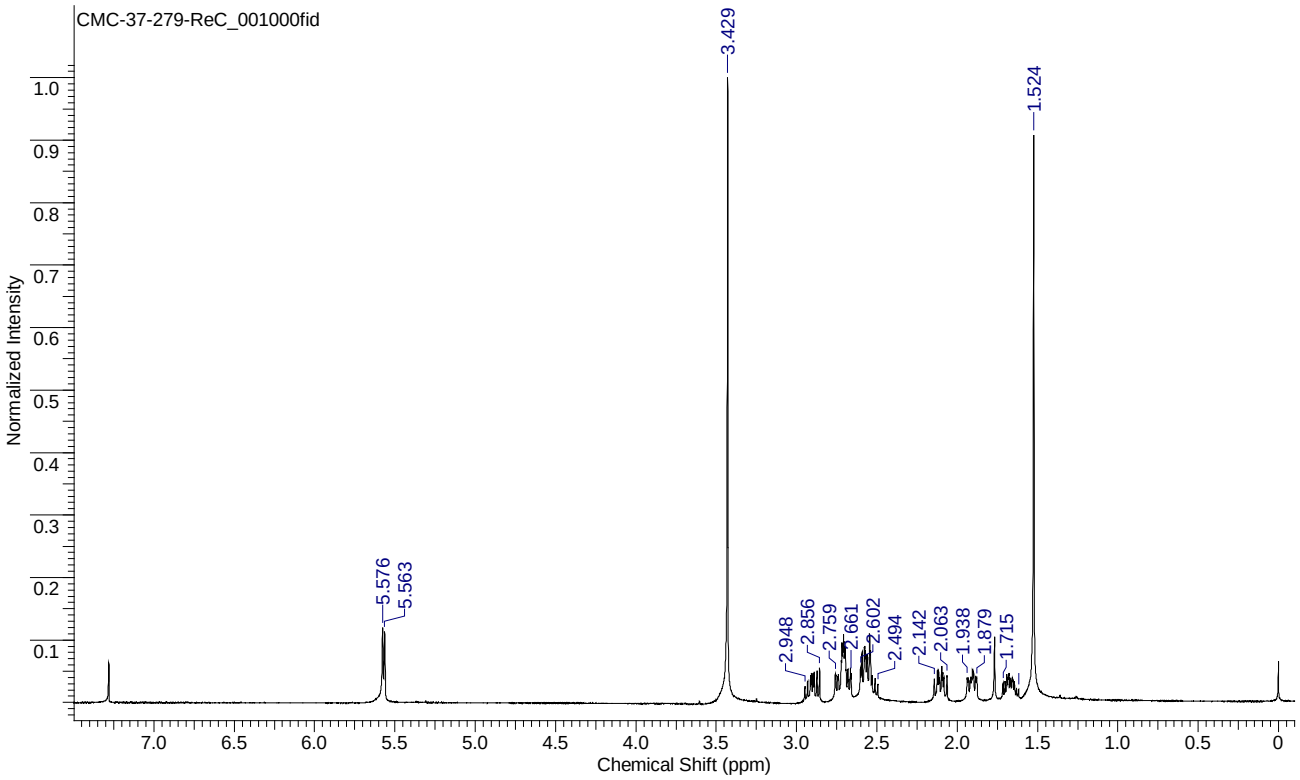

KSC-5-56A_004000fid
Normalized Intensity
Chemical Shift (ppm)
28.566
23.898
42.200
40.360
37.779
24.981
175.053
61.985
89.870
56.030
26.145

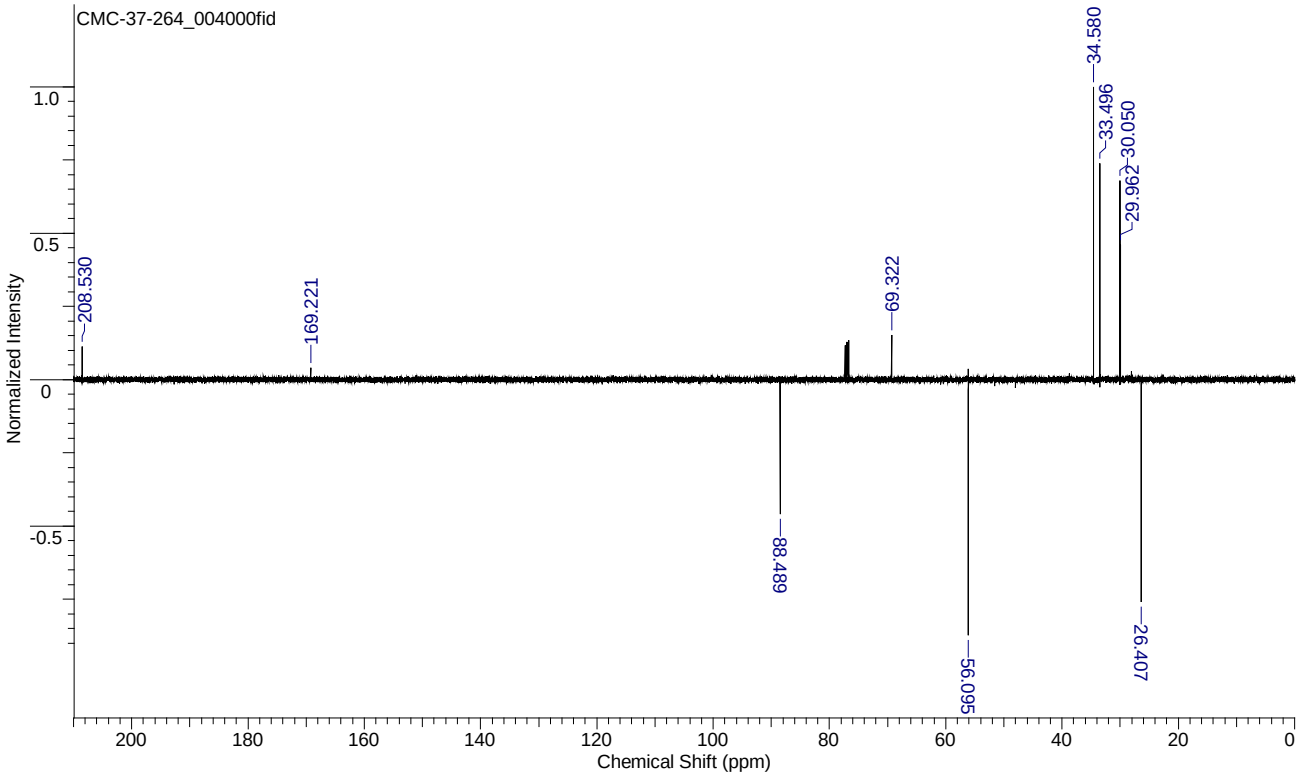

KSC-5-56B_005000fid
Normalized Intensity
Chemical Shift (ppm)
3.381
1.319
5.430
2.644
2.637
2.623
2.612
2.204
2.176
2.153
2.127
1.562

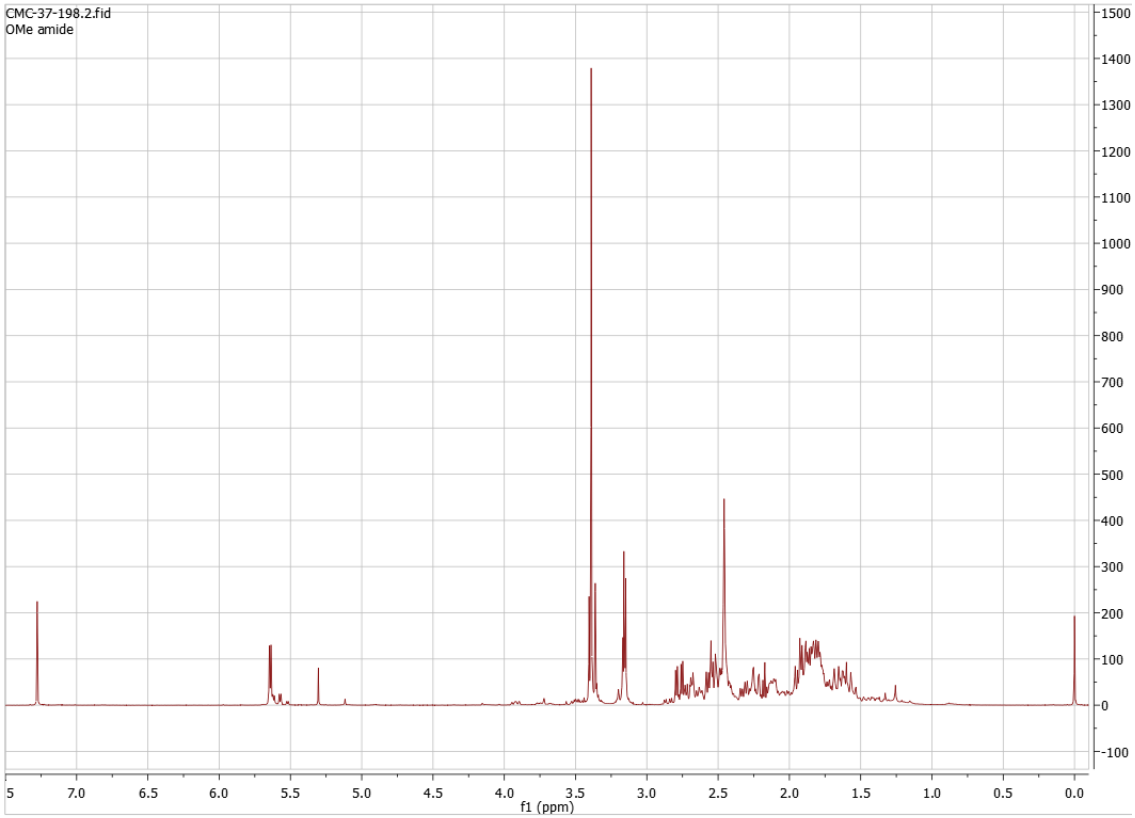

KSC-5-56B_006000fid
Normalized Intensity
Chemical Shift (ppm)
175.205
89.477
62.007
56.233
41.836
41.313
38.426
27.854
24.080
23.360

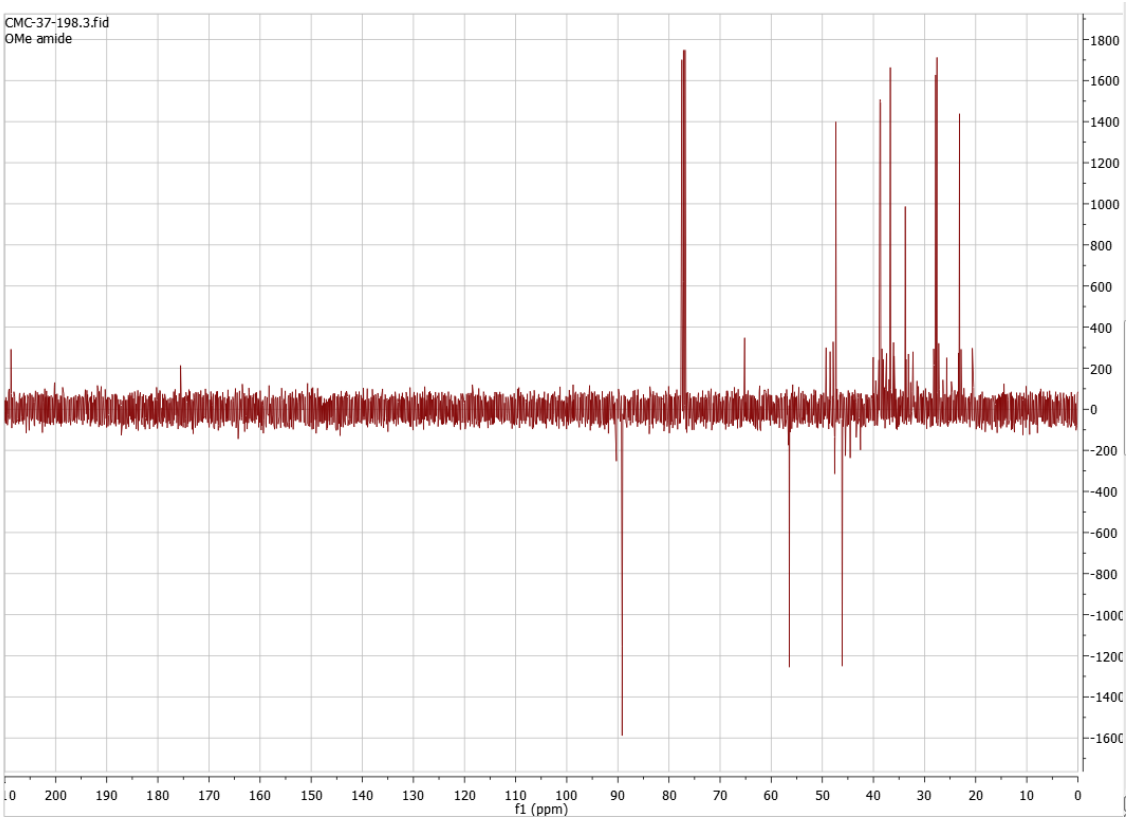

KSC-5-51.1.fid
cyclohexyl methoxy amide!
f1 (ppm)

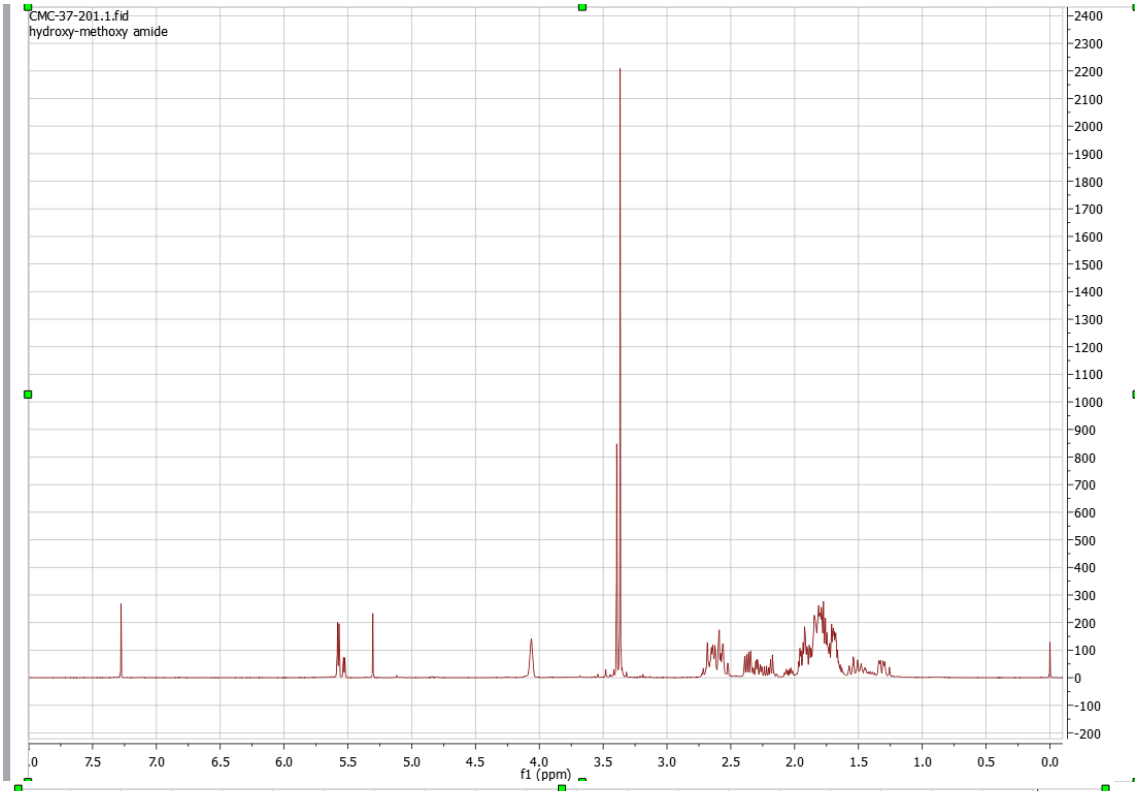

KSC-5-51.2.fid
cyclohexyl methoxy amide!
f1 (ppm)

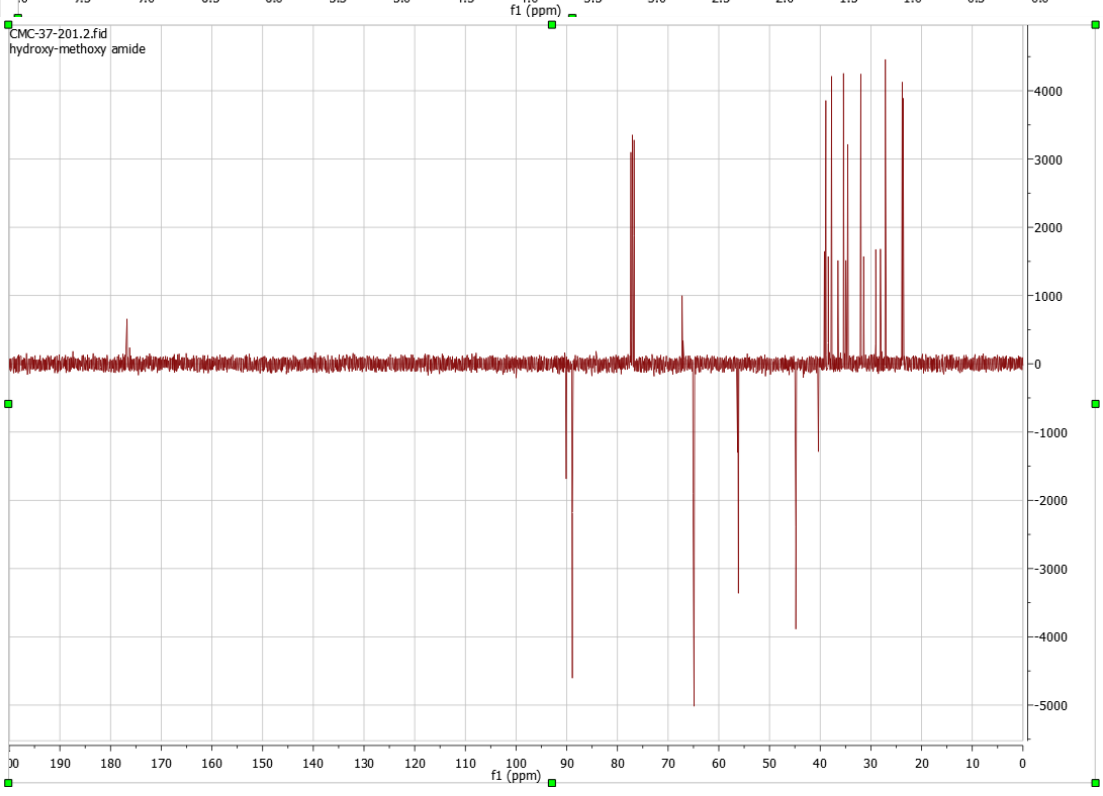

CMC-37-279-ReC_001000fid
Normalized Intensity
Chemical Shift (ppm)
3.429
1.524
5.576
5.563
2.948
2.856
2.759
2.661
2.602
2.494
2.142
2.063
1.938
1.879
1.715

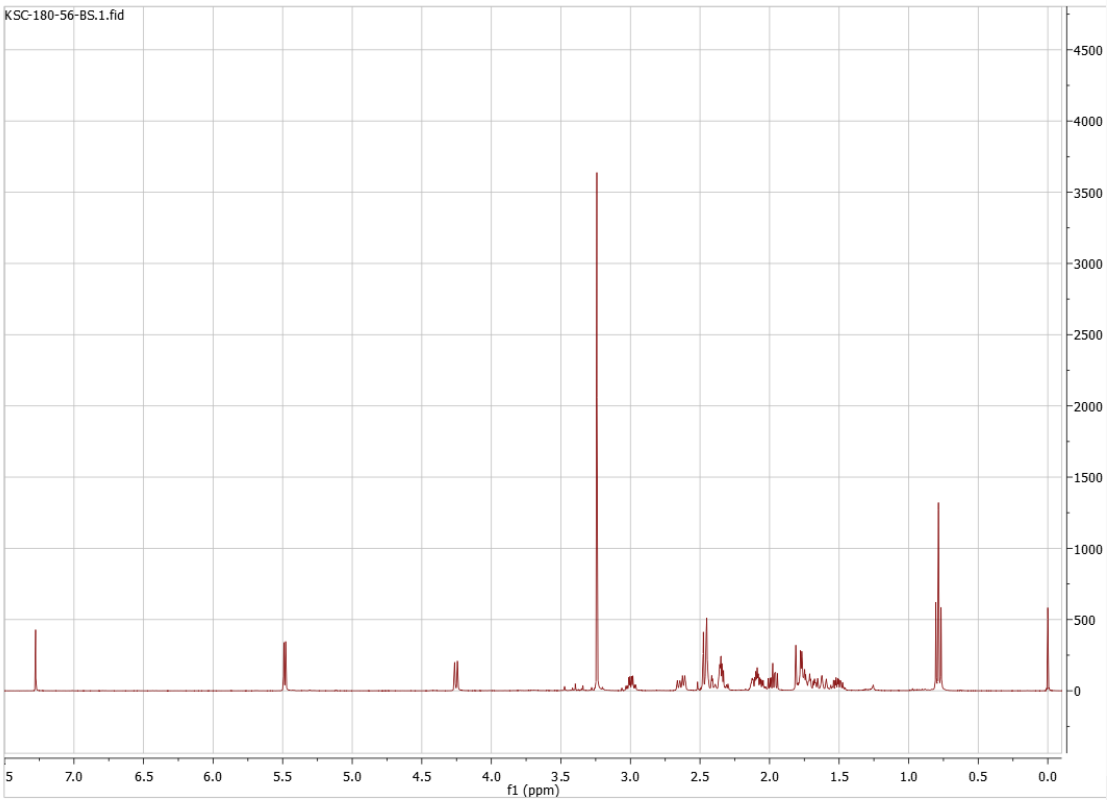

CMC-37-264_004000fid
Normalized Intensity
Chemical Shift (ppm)
208.530
169.221
69.322
34.580
33.496
30.050
29.962
88.489
56.095
26.407

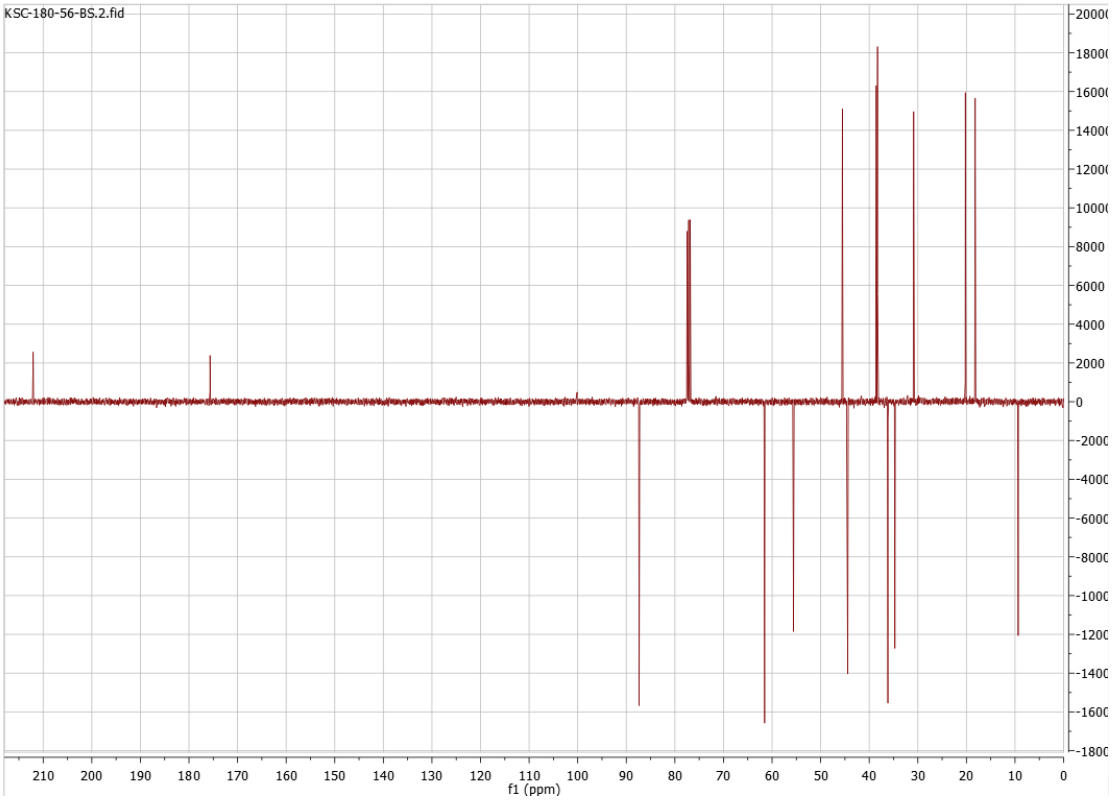

CMC-37-198.2.fid
OMe amide
f1 (ppm)

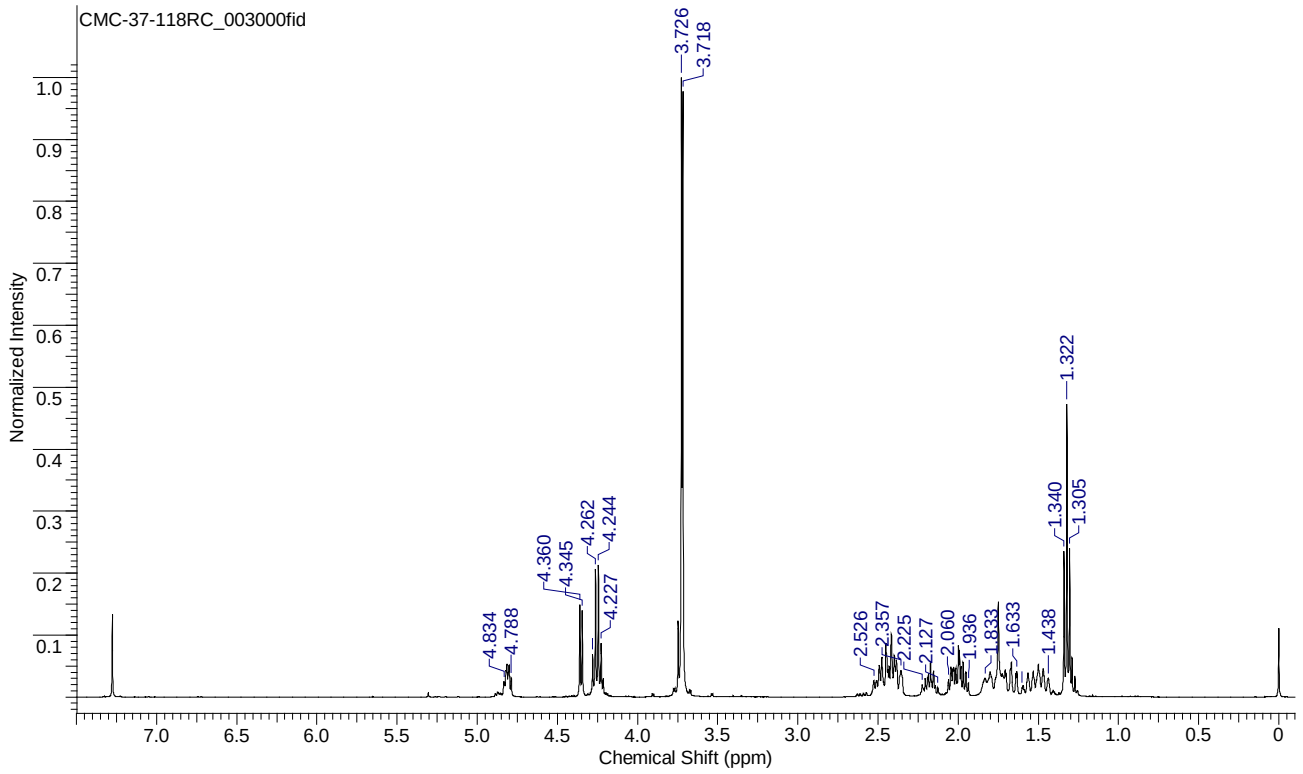

CMC-37-198.3.fid
OMe amide
f1 (ppm)

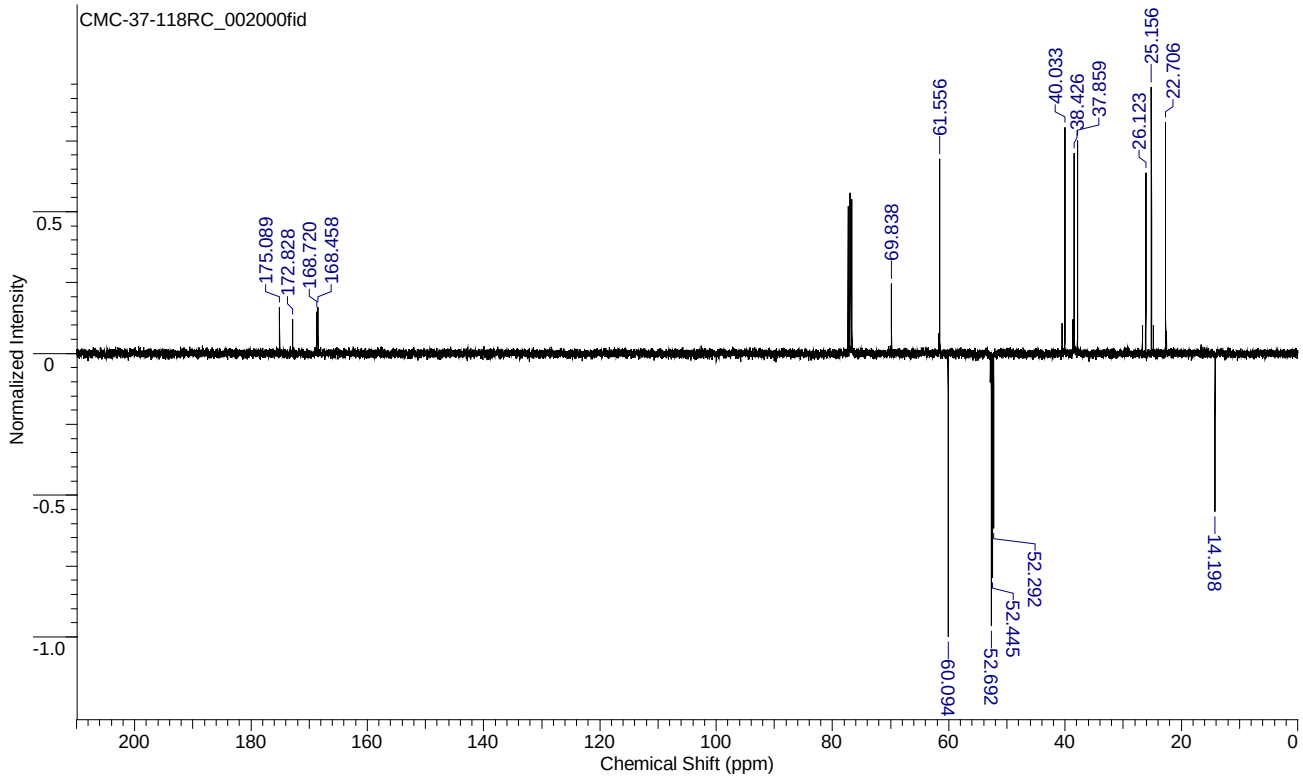

CMC-37-201.1.fid
hydroxy-methoxy amide
f1 (ppm)

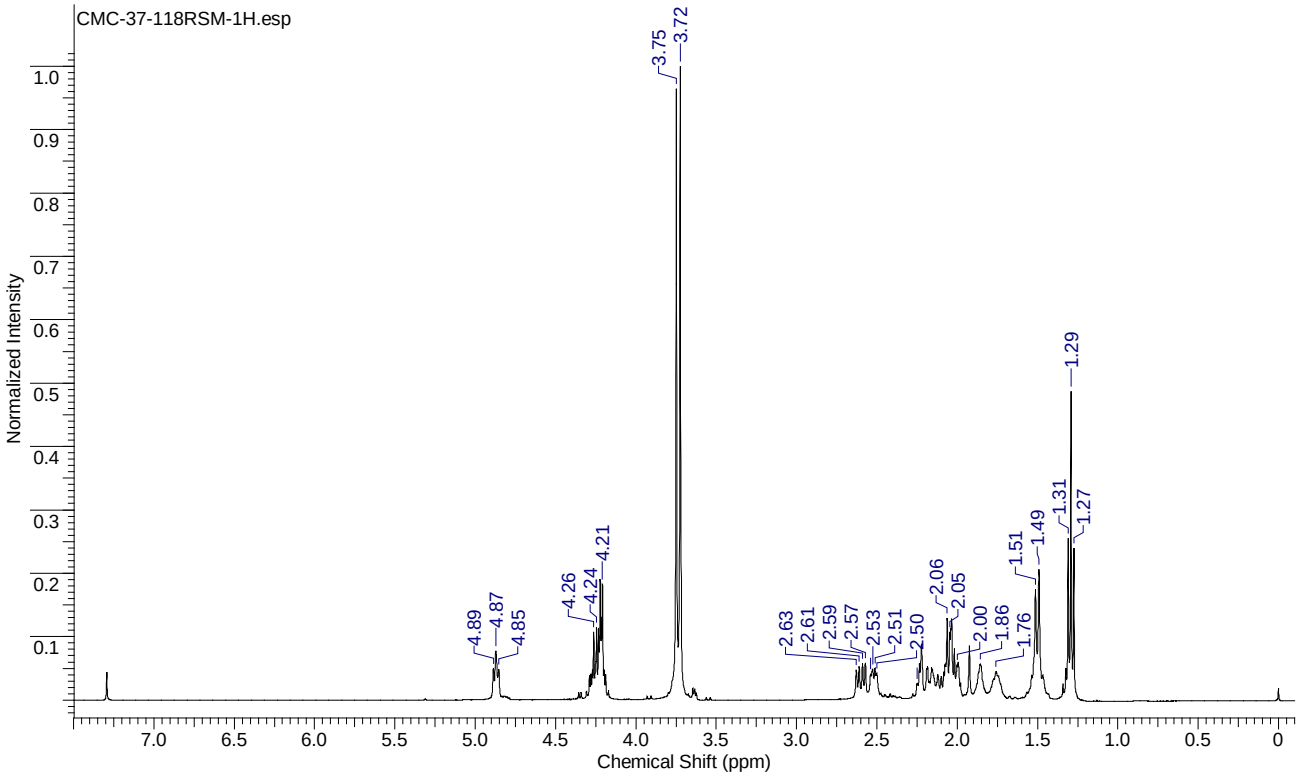

CMC-37-201.2.fid
hydroxy-methoxy amide
f1 (ppm)

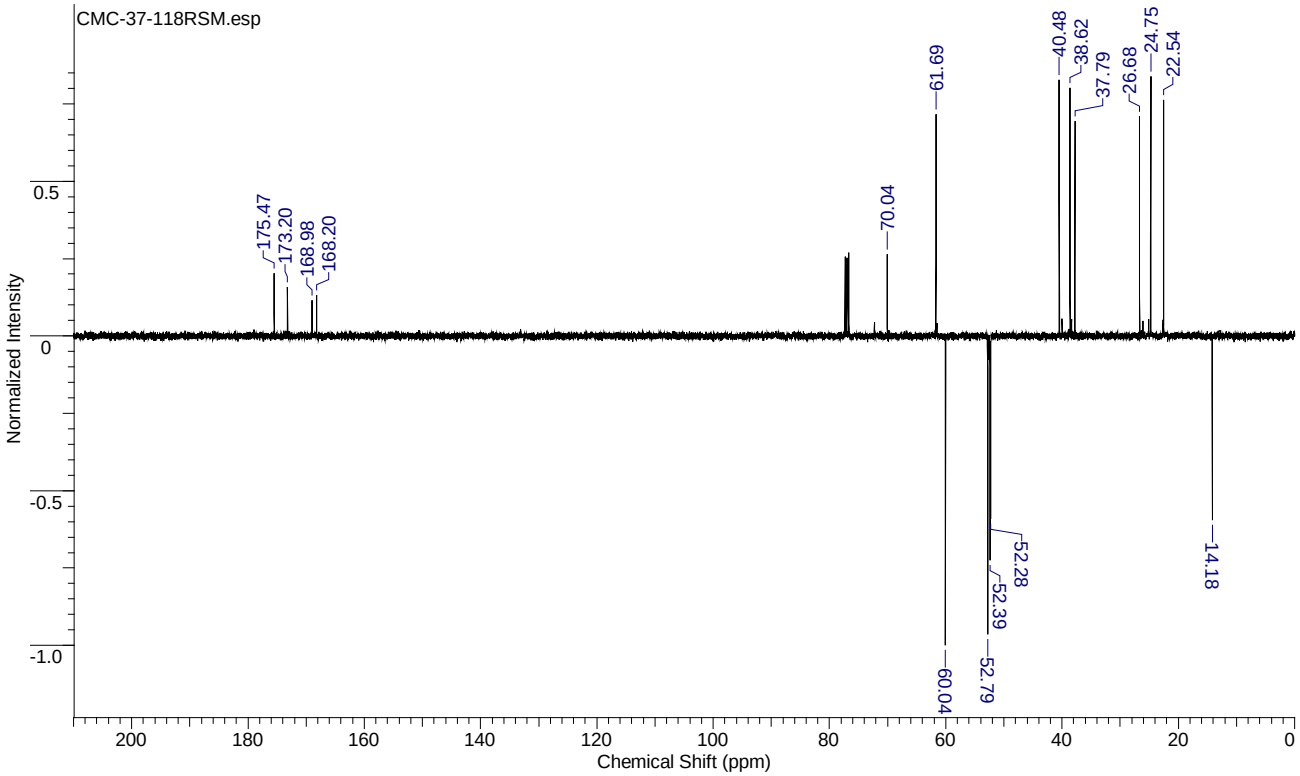

KSC-180-56-BS.1.fid
4500
4000
3500
3000
2500
2000
1500
1000
500
0
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

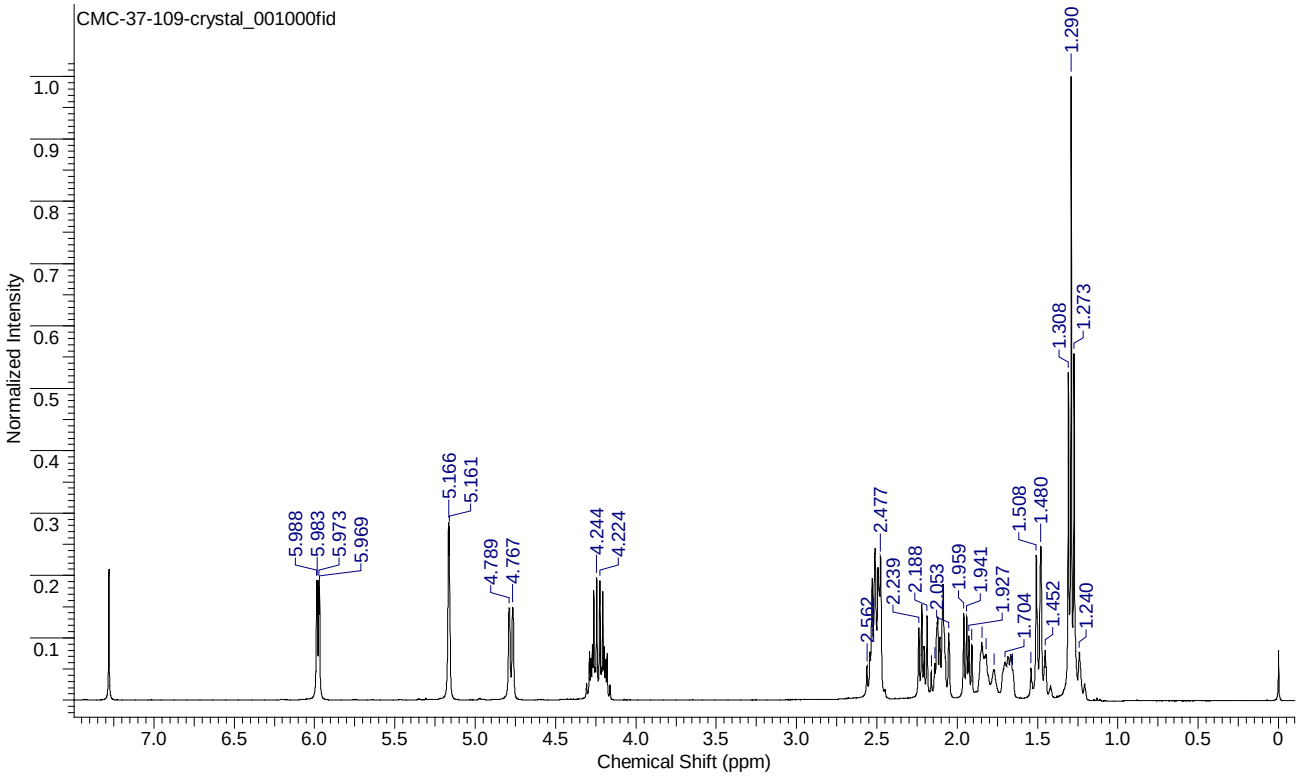

KSC-180-56-BS.2.fid
8000
6000
4000
2000
0
-2000
-4000
-6000
-8000
-10000
-12000
-14000
-16000
-18000
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

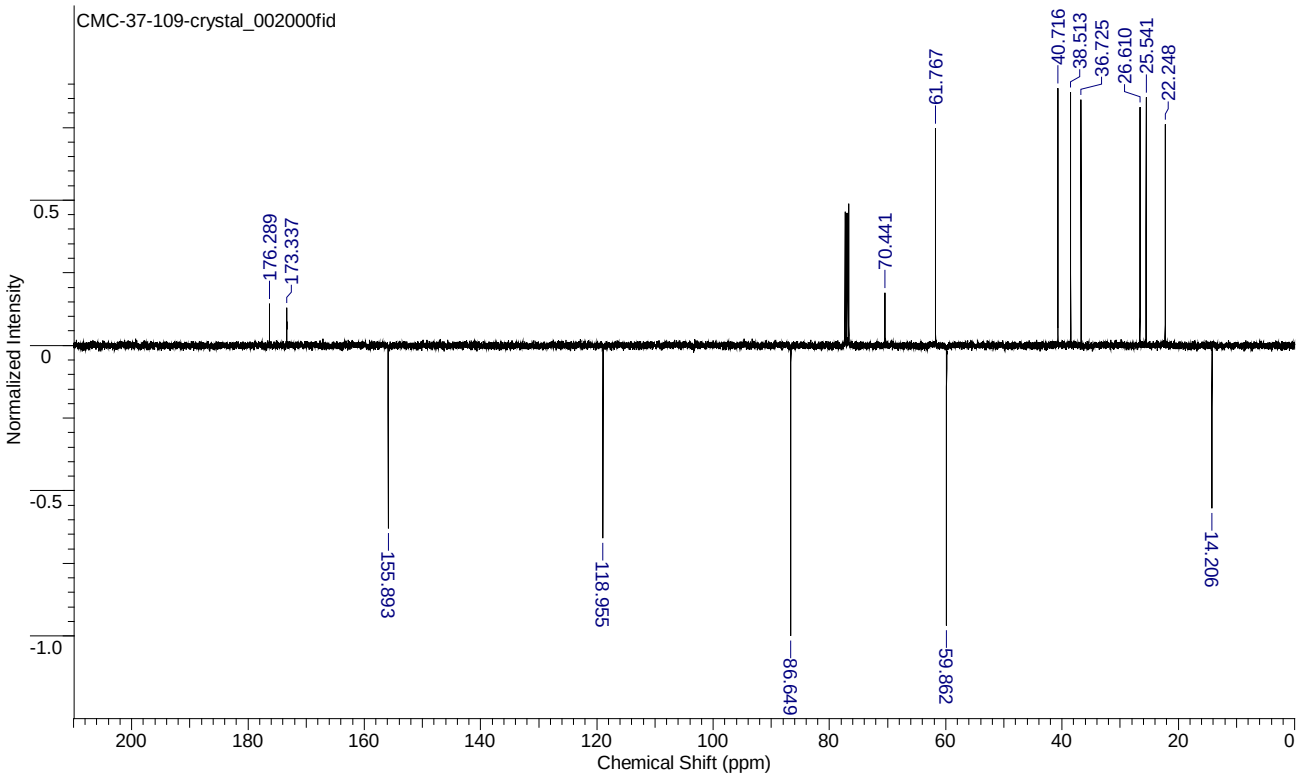

CMC-37-118RC_003000fid
Normalized Intensity
Chemical Shift (ppm)
3.726
3.718
4.834
4.788
4.360
4.345
4.262
4.244
4.227
2.526
2.357
2.225
2.127
2.060
1.936
1.833
1.633
1.438
1.340
1.322
1.305

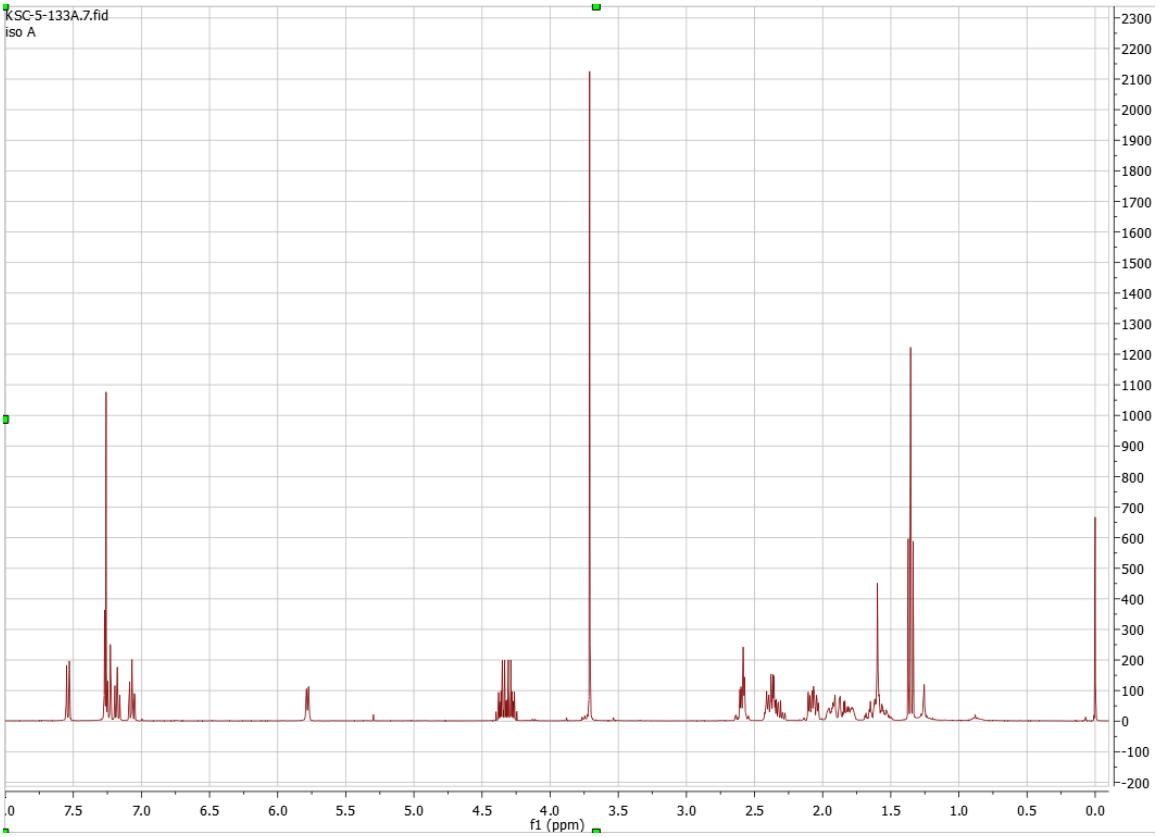

CMC-37-118RC_002000fid
Normalized Intensity
Chemical Shift (ppm)
175.089
172.828
168.720
168.458
69.838
61.556
60.094
52.692
52.445
52.292
40.033
38.426
37.859
26.123
25.156
22.706
14.198

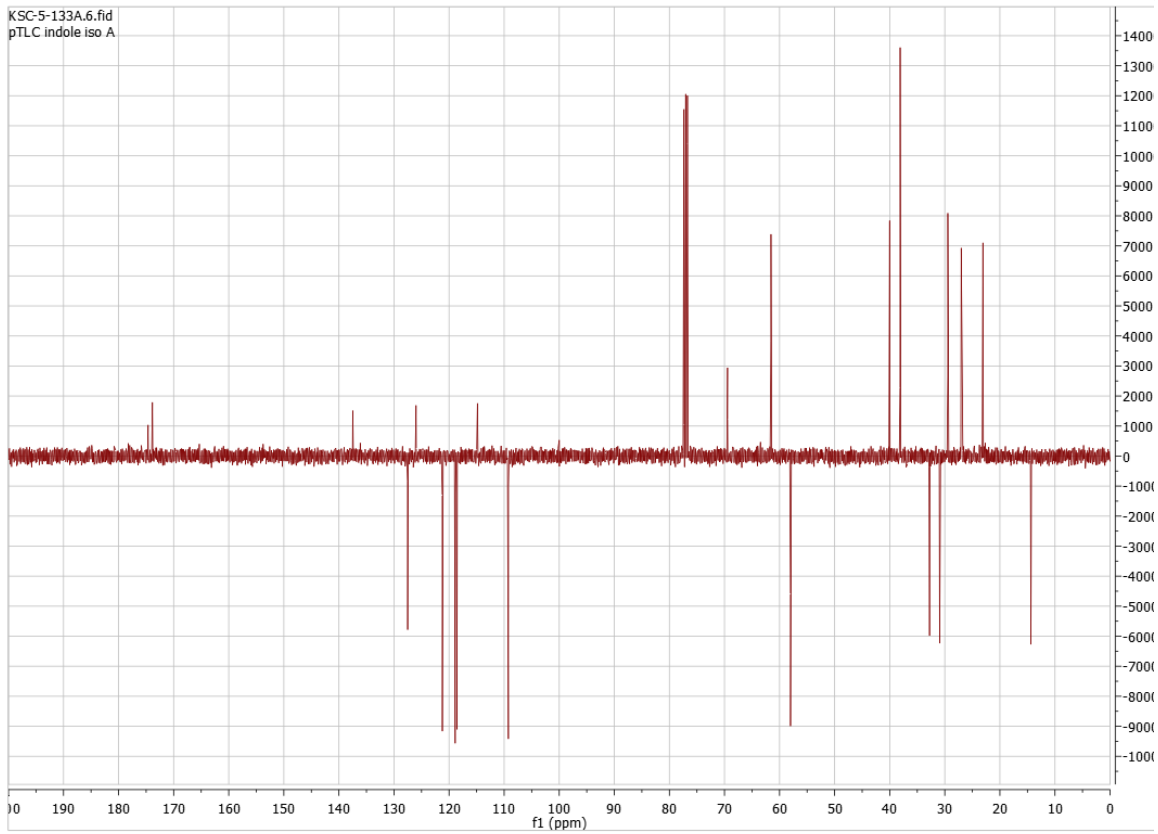

CMC-37-118RSM-1H.esp
Normalized Intensity
Chemical Shift (ppm)
3.75
3.72
4.89
4.87
4.85
4.26
4.24
4.21
2.63
2.61
2.59
2.57
2.53
2.51
2.50
2.06
2.05
2.00
1.86
1.76
1.51
1.49
1.31
1.29
1.27

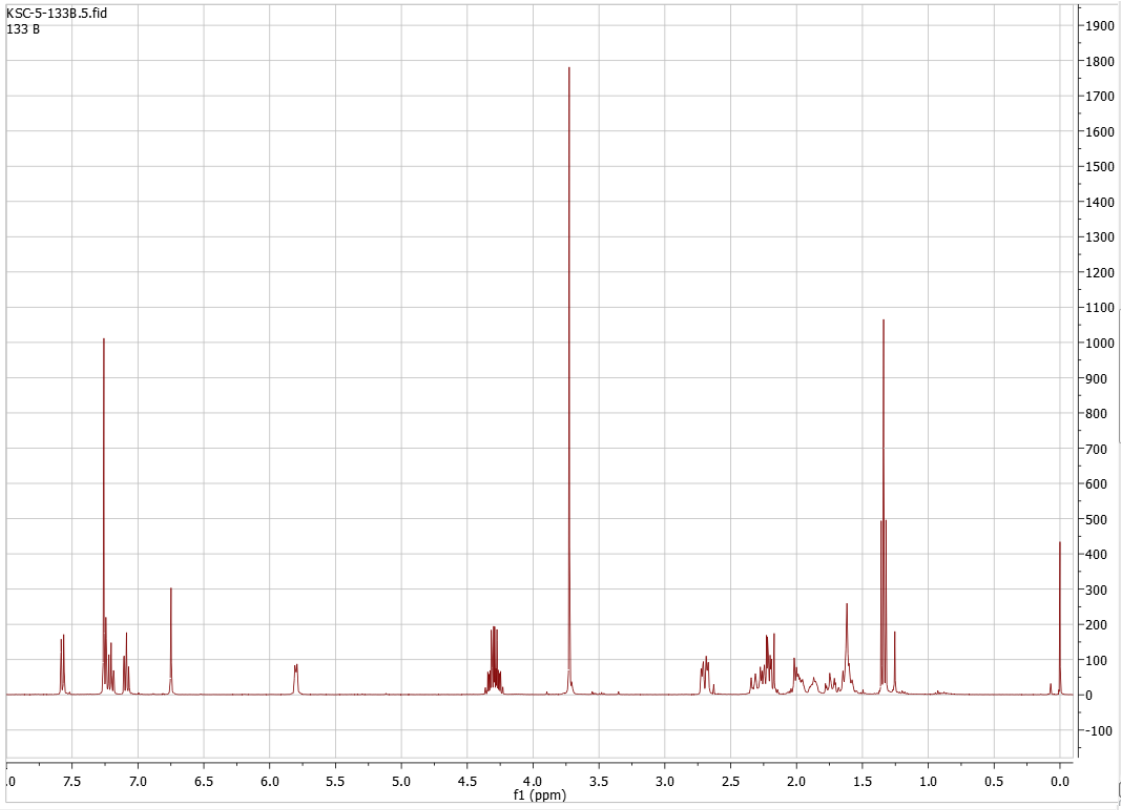

CMC-37-118RSM.esp
Normalized Intensity
Chemical Shift (ppm)
175.47
173.20
168.98
168.20
70.04
61.69
60.04
52.79
52.39
52.28
40.48
38.62
37.79
26.68
24.75
22.54
14.18

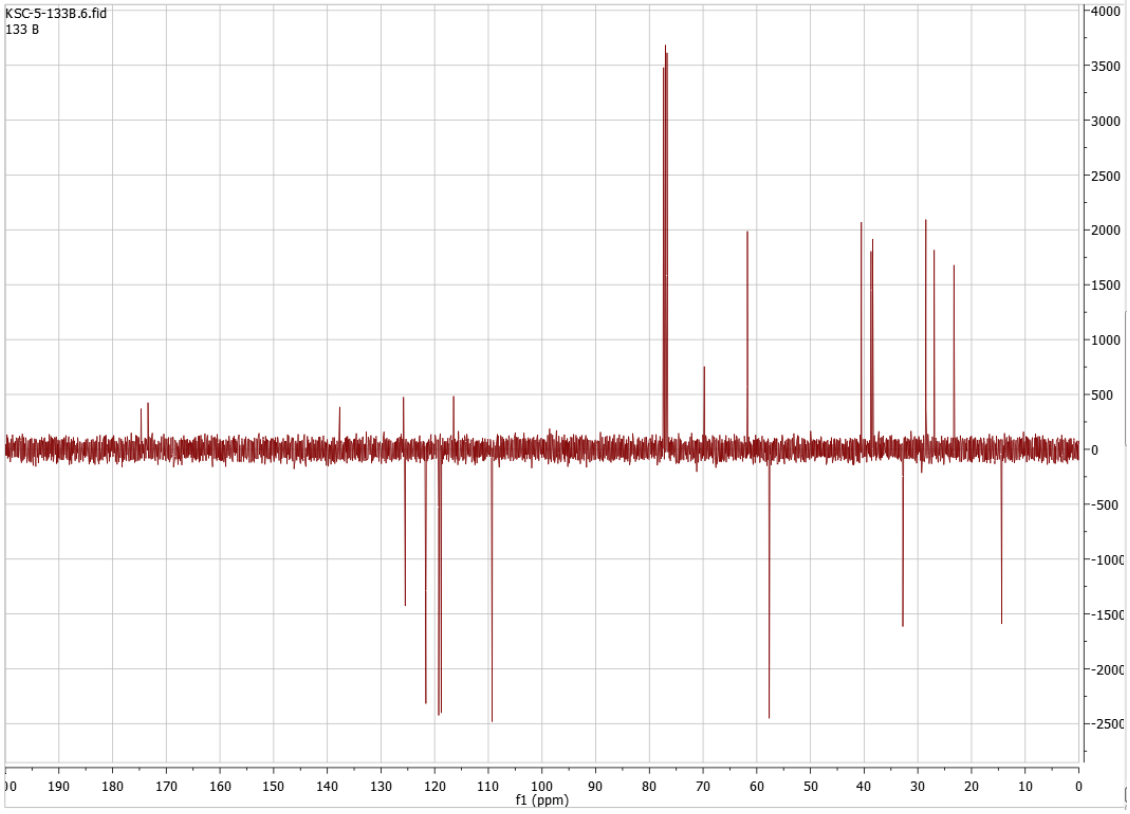

CMC-37-109-crystal_001000fid
Normalized Intensity
Chemical Shift (ppm)
1.290
1.308
1.273
5.166
5.161
5.988
5.983
5.973
5.969
4.789
4.767
4.244
4.224
2.477
2.562
2.239
2.188
2.053
1.959
1.941
1.927
1.704
1.508
1.480
1.452
1.240

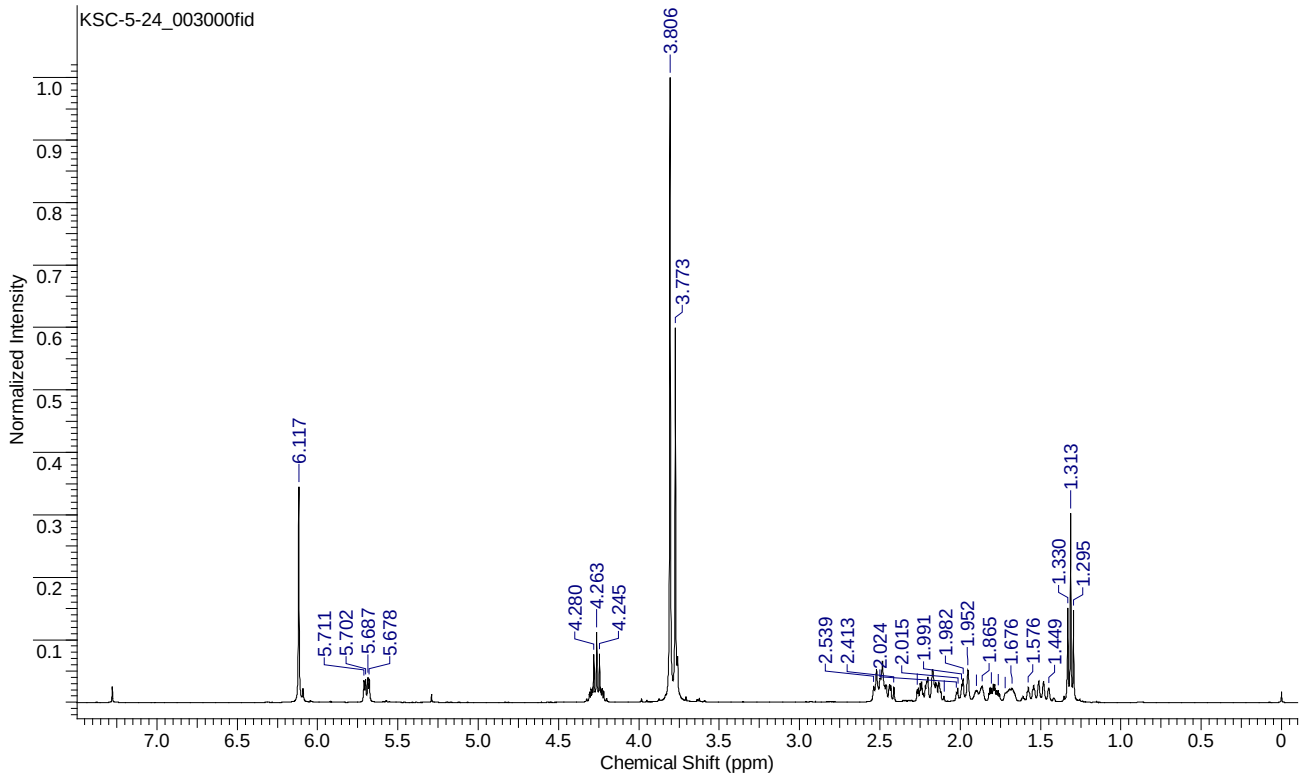

CMC-37-109-crystal_002000fid
Normalized Intensity
Chemical Shift (ppm)
176.289
173.337
155.893
118.955
86.646
70.441
61.767
59.862
40.716
38.513
36.725
26.610
25.541
22.248
14.206

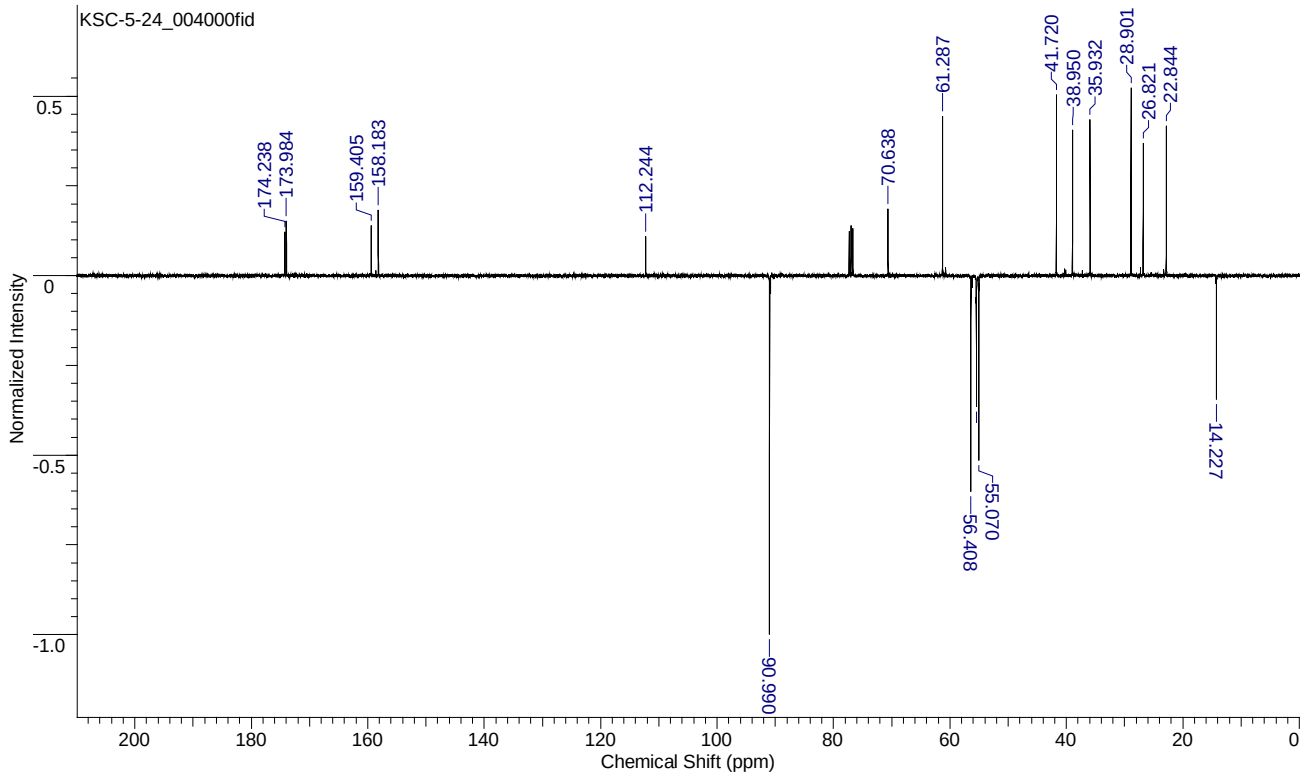

KSC-5-133A.7.fid
iso A
f1 (ppm)

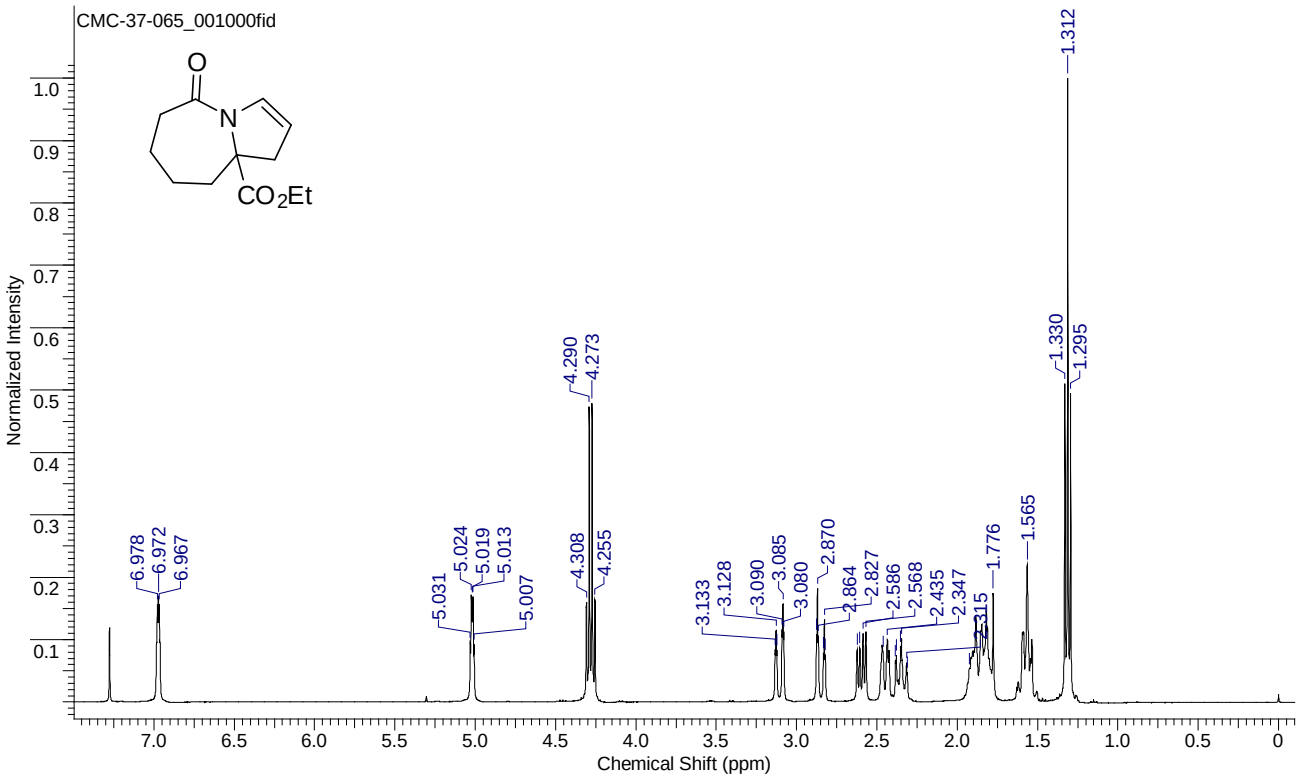

KSC-5-133A.6.fid
pTLC indole iso A
f1 (ppm)

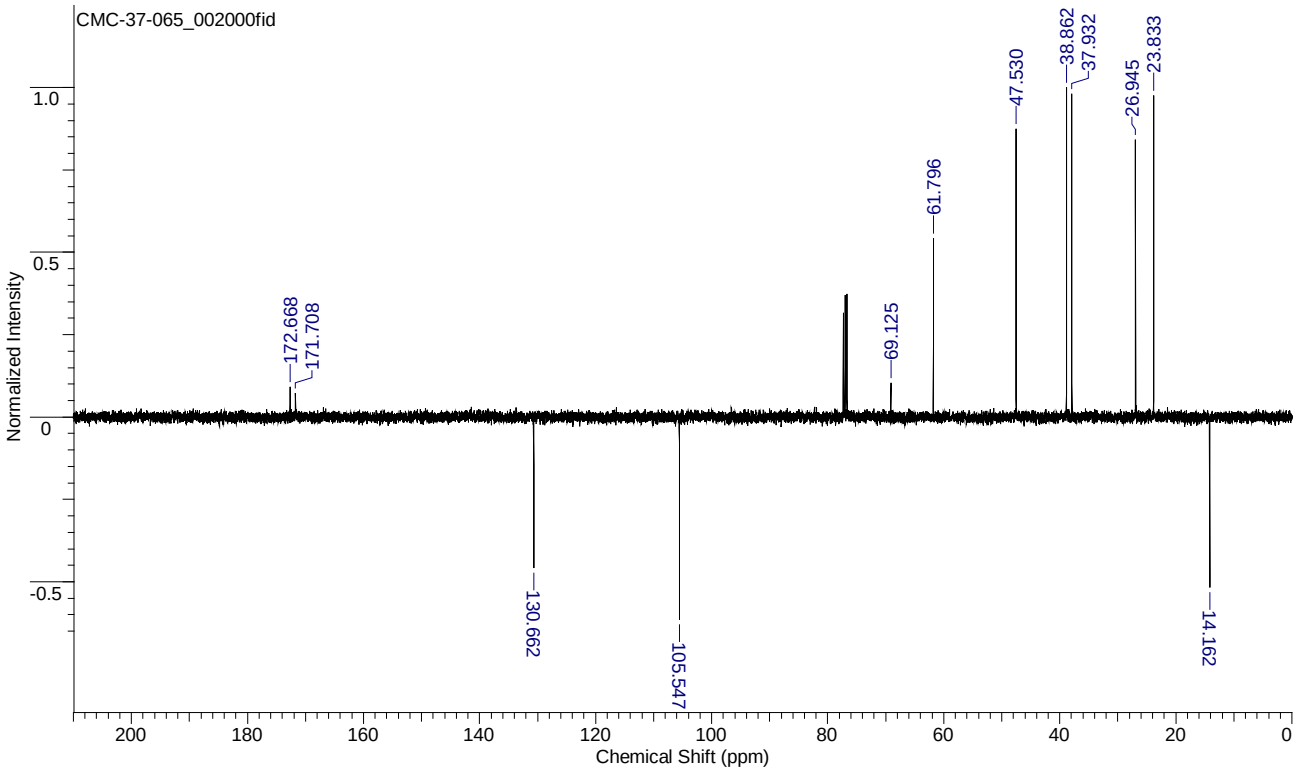

KSC-5-133B.5.fid
133 B
f1 (ppm)

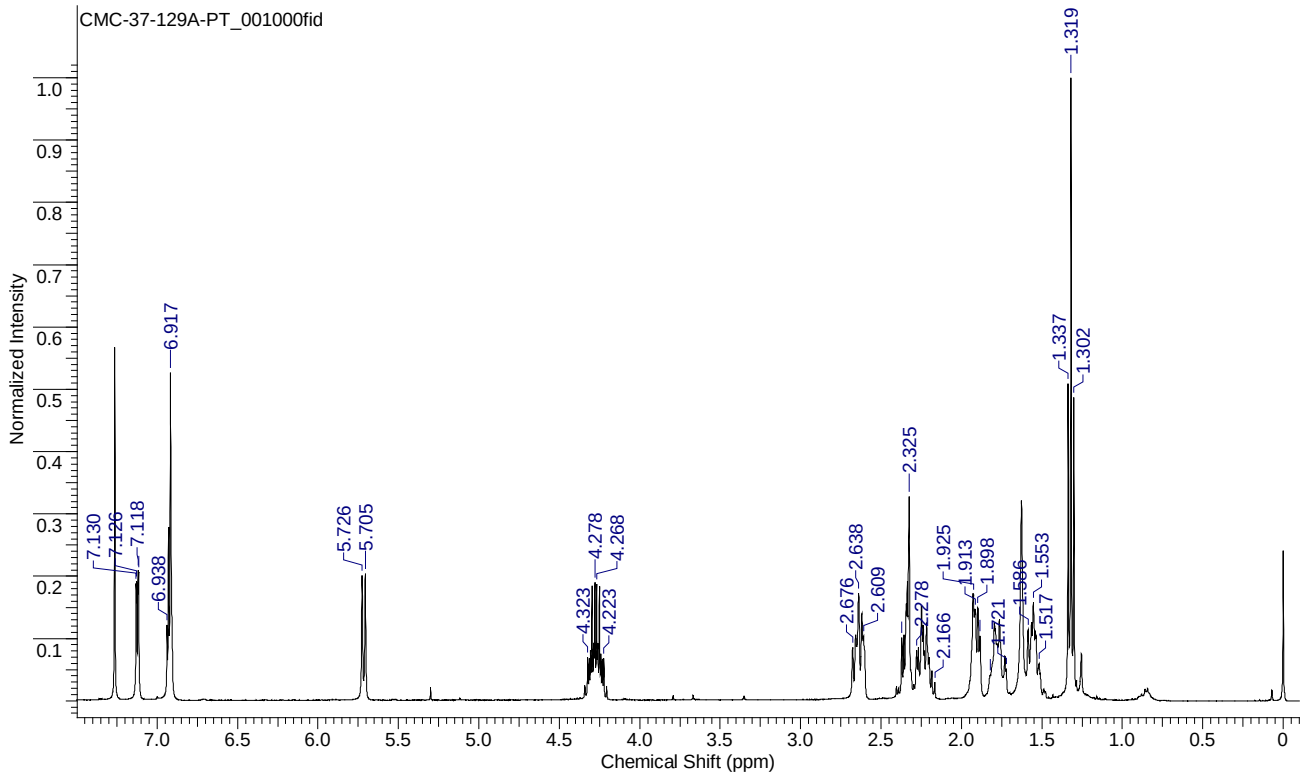

KSC-5-133B.6.fid
133 B
f1 (ppm)

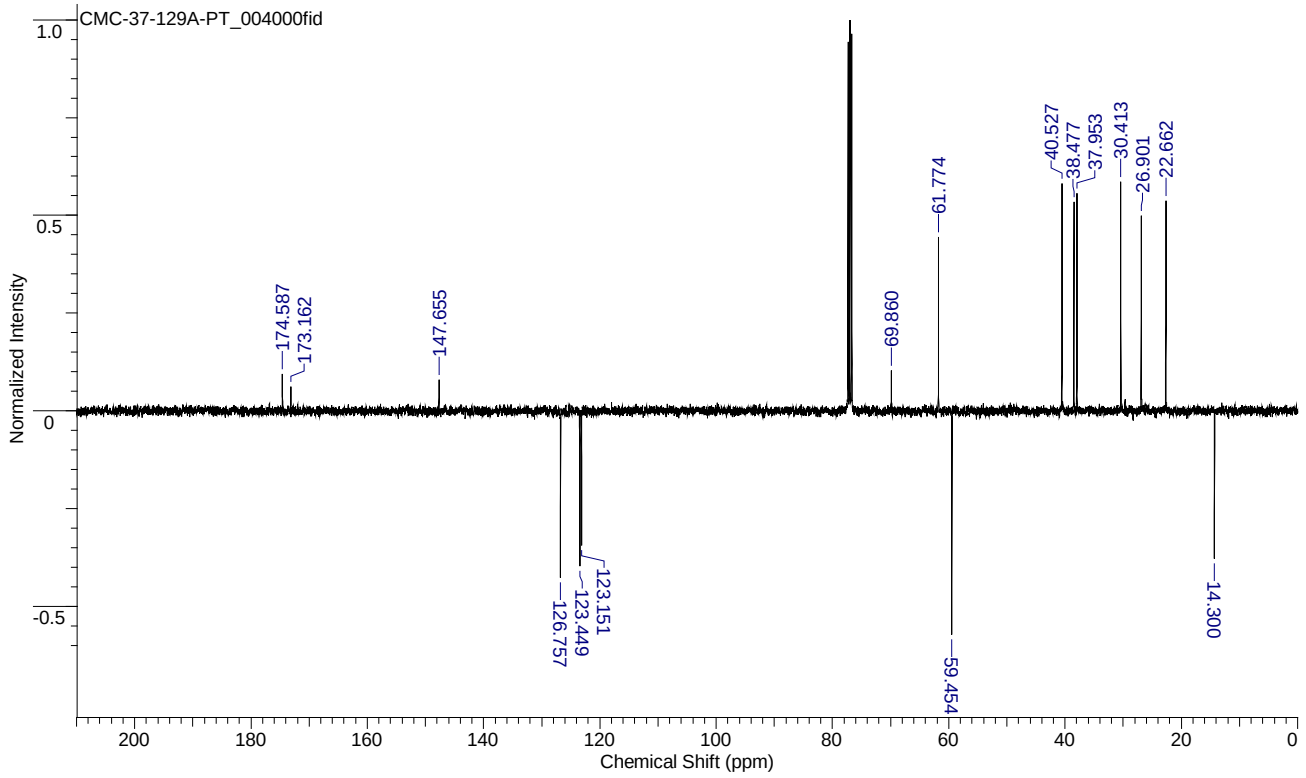

KSC-5-24_003000fid
Normalized Intensity
Chemical Shift (ppm)
3.806
3.773
6.117
5.711
5.702
5.687
5.678
4.280
4.263
4.245
2.539
2.413
2.024
2.015
1.991
1.982
1.952
1.865
1.676
1.576
1.449
1.330
1.313
1.295

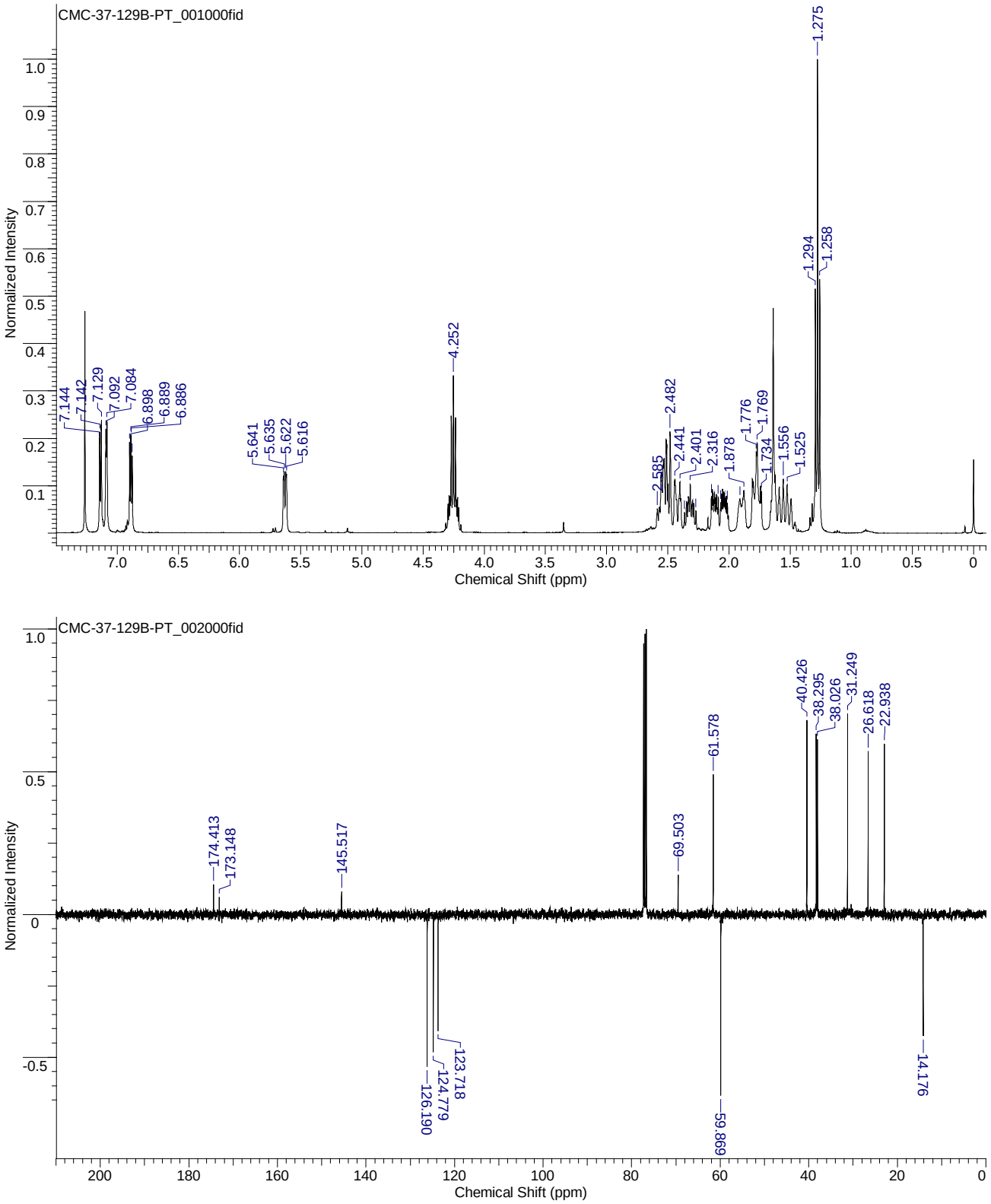

KSC-5-24_004000fid
Normalized Intensity
Chemical Shift (ppm)
174.238
173.984
159.405
158.183
112.244
90.990
70.638
61.287
56.408
55.070
41.720
38.950
35.932
28.901
26.821
22.844
14.227

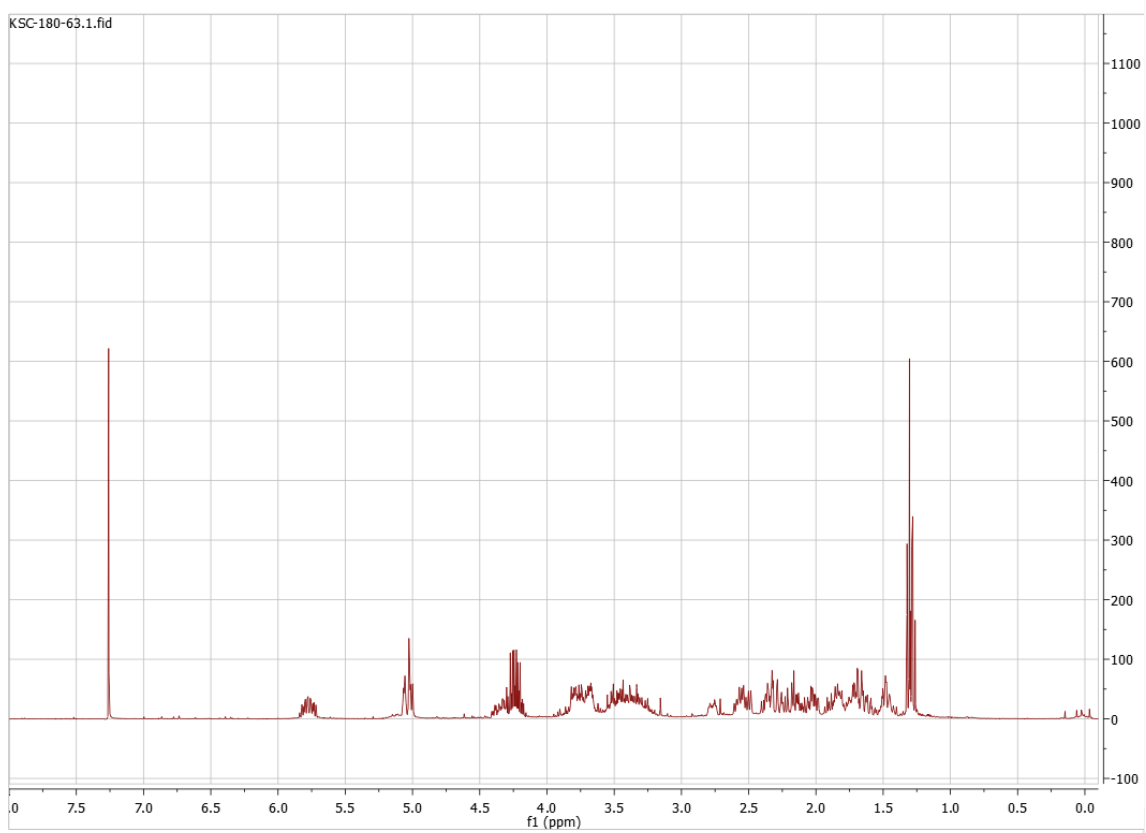

CMC-37-065_001000fid
O
N
CO2Et
Normalized Intensity
Chemical Shift (ppm)
6.978
6.972
6.967
5.031
5.024
5.019
5.013
5.007
4.308
4.290
4.273
4.255
3.133
3.128
3.090
3.085
3.080
2.870
2.864
2.827
2.586
2.568
2.435
2.347
2.315
1.776
1.565
1.330
1.312
1.295

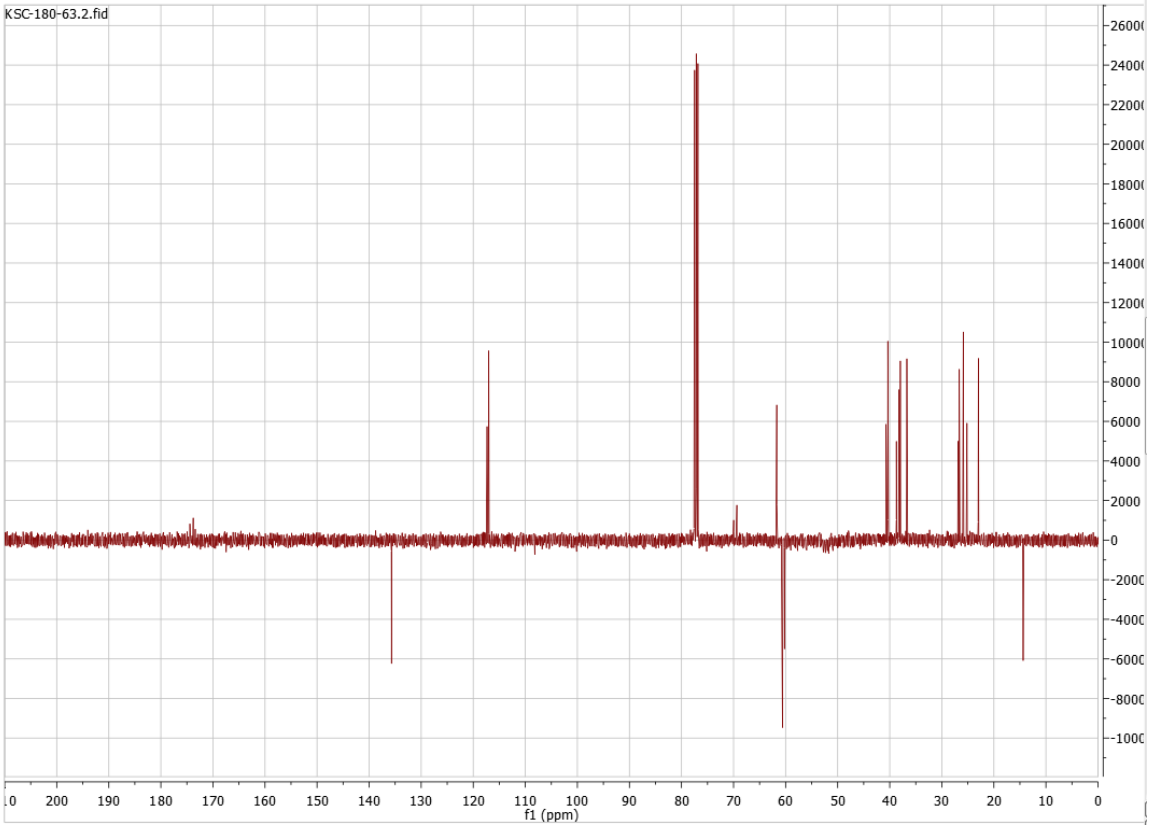

CMC-37-065_002000fid
Normalized Intensity
Chemical Shift (ppm)
172.668
171.708
130.662
105.547
69.125
61.796
47.530
38.862
37.932
26.945
23.833
14.162

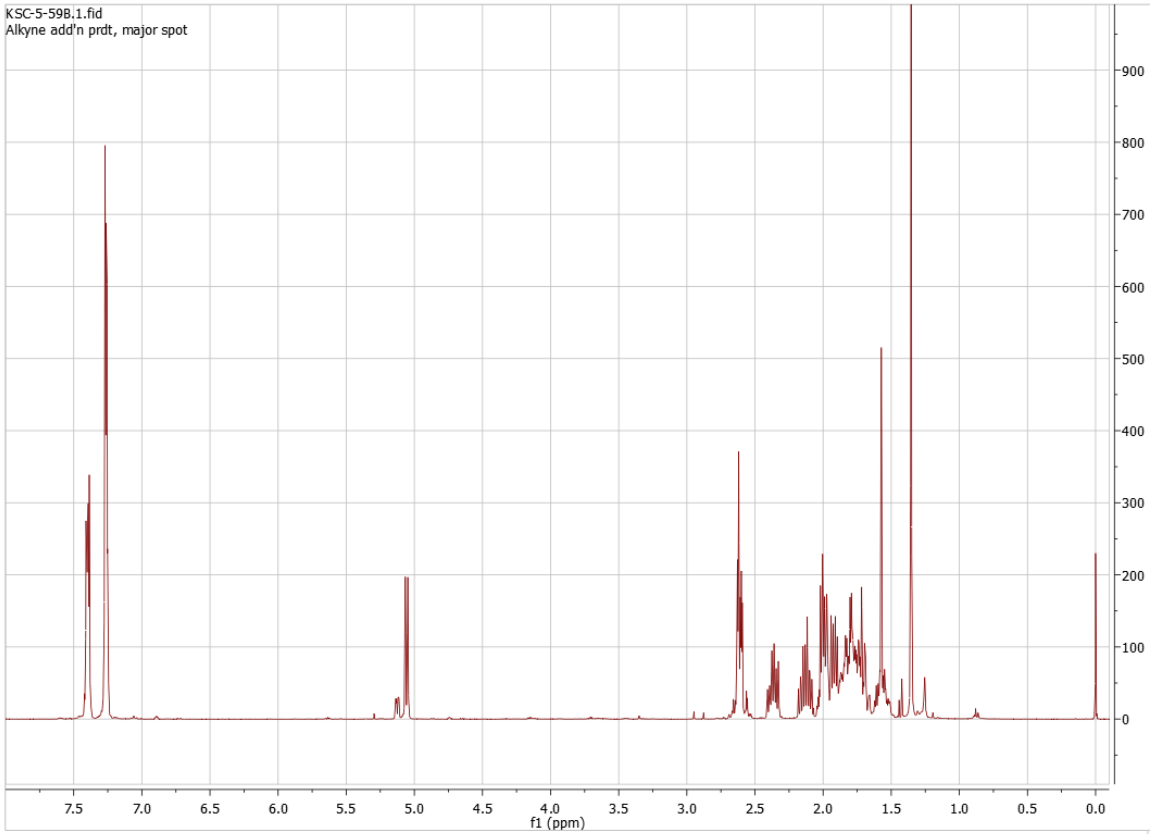

CMC-37-129A-PT_001000fid
Normalized Intensity
Chemical Shift (ppm)
7.130
7.126
7.118
6.938
6.917
5.726
5.705
4.323
4.278
4.268
4.223
2.676
2.638
2.609
2.325
2.278
2.166
1.925
1.913
1.898
1.721
1.586
1.553
1.517
1.337
1.319
1.302

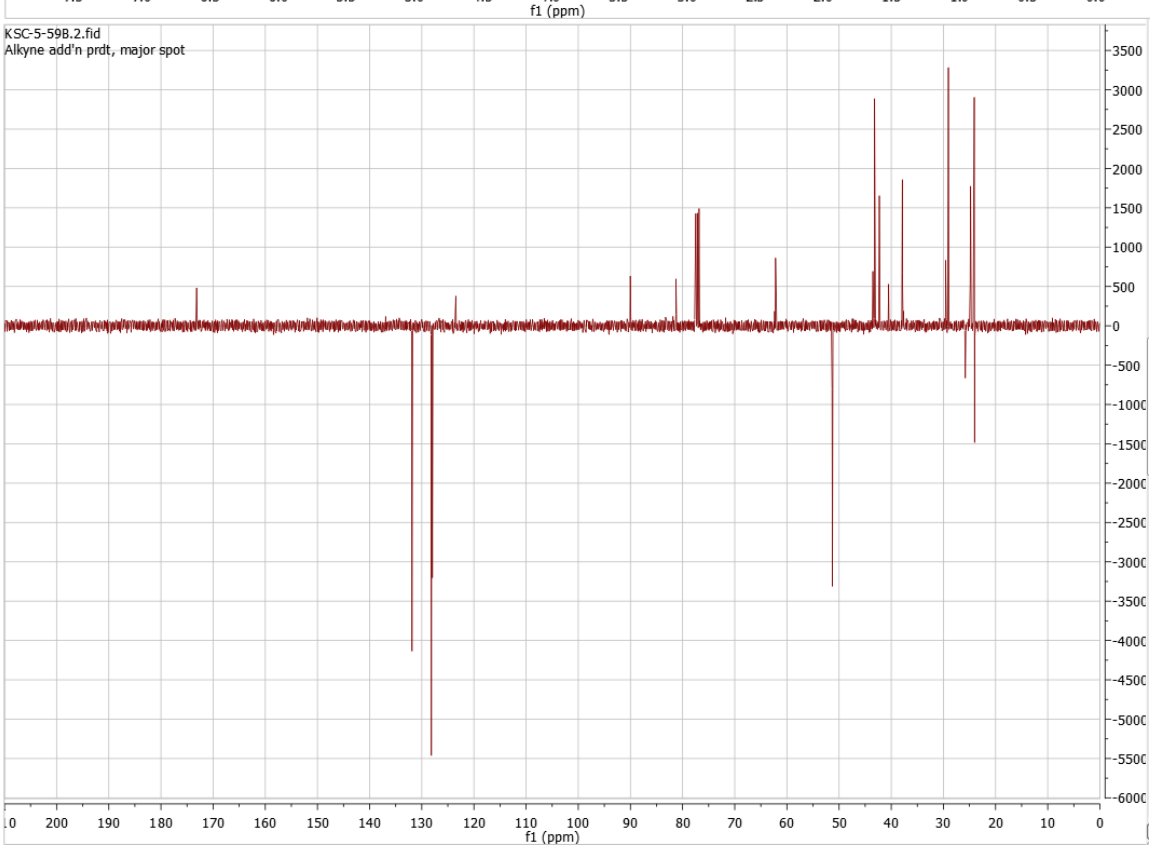

CMC-37-129A-PT_004000fid
Normalized Intensity
Chemical Shift (ppm)
174.587
173.162
147.655
126.757
123.449
123.151
69.860
61.774
59.454
40.527
38.477
37.953
30.413
26.901
22.662
14.300

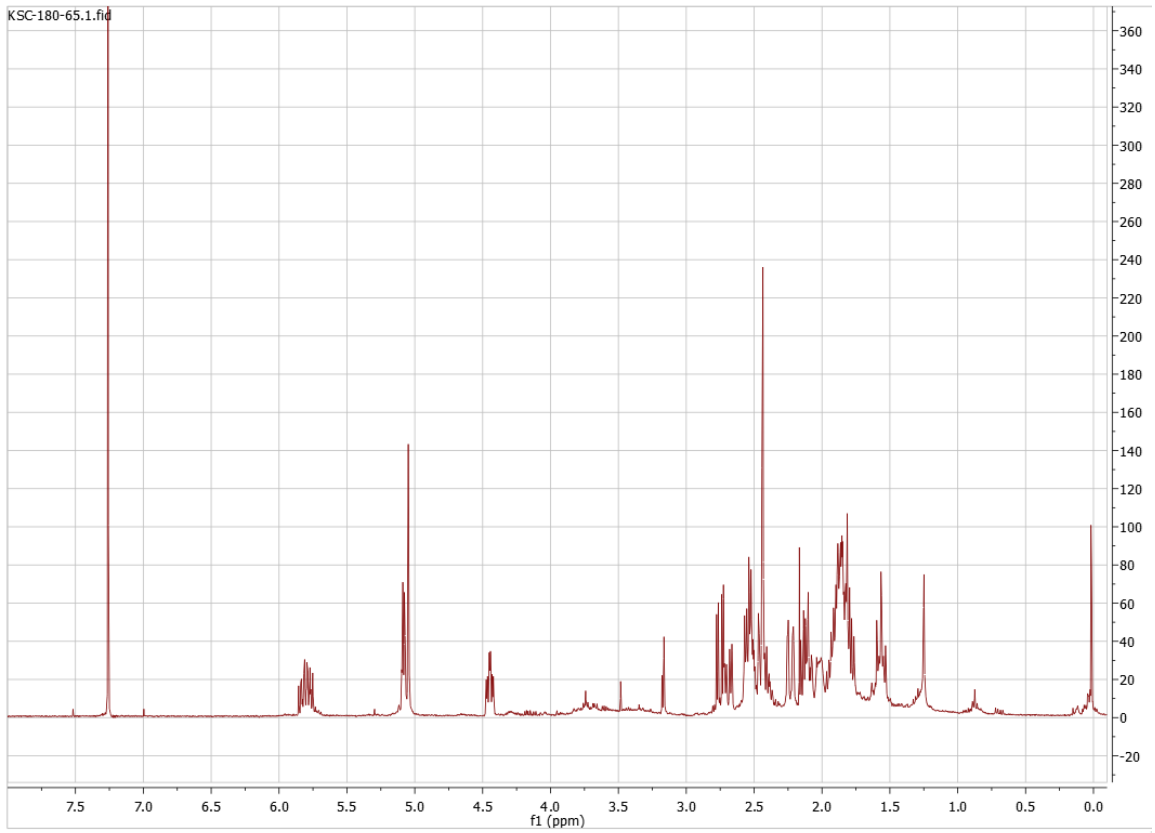

CMC-37-129B-PT_001000fid
Normalized Intensity
Chemical Shift (ppm)
7.144
7.142
7.129
7.092
7.084
6.898
6.889
6.886
5.641
5.635
5.622
5.616
4.252
2.585
2.482
2.441
2.401
2.316
1.878
1.776
1.769
1.734
1.556
1.525
1.294
1.275
1.258
CMC-37-129B-PT_002000fid
Normalized Intensity
Chemical Shift (ppm)
174.413
173.148
145.517
126.190
124.779
123.718
69.503
61.578
59.869
40.426
38.295
38.026
31.249
26.618
22.938
14.176

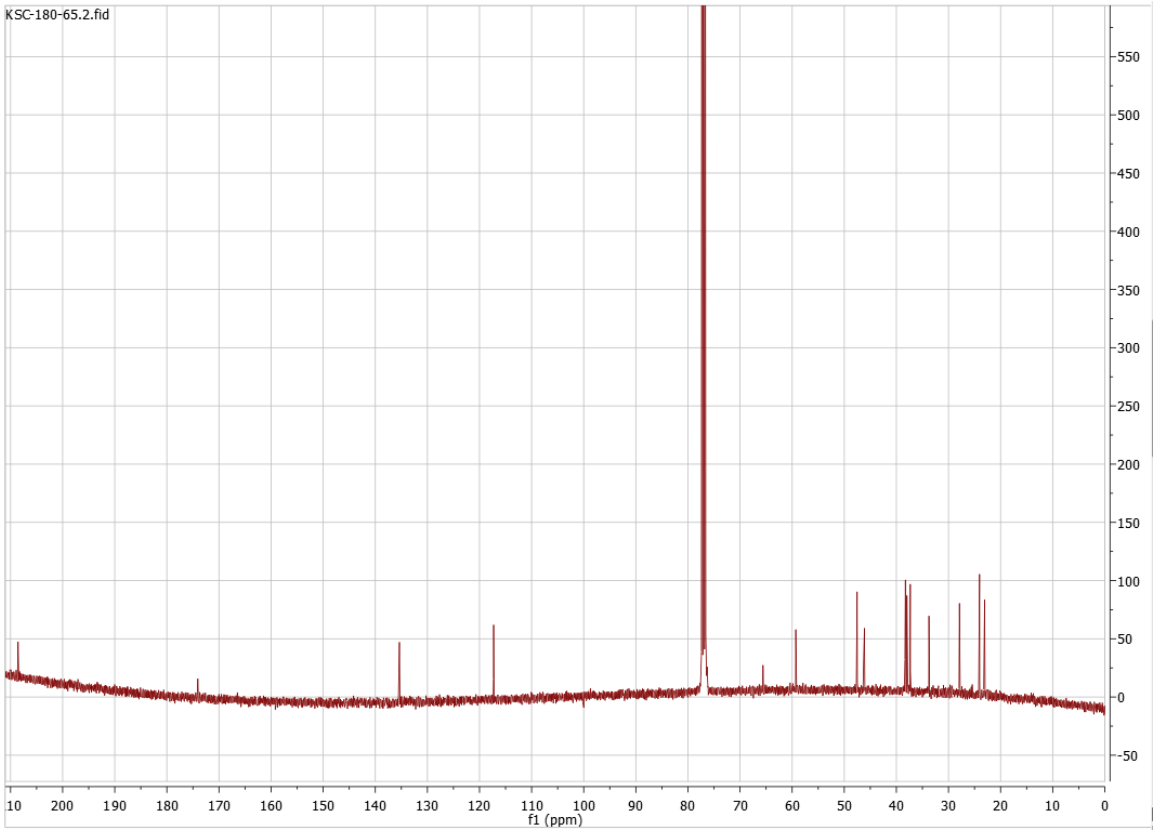

KSC-180-63.1.fid
f1 (ppm)

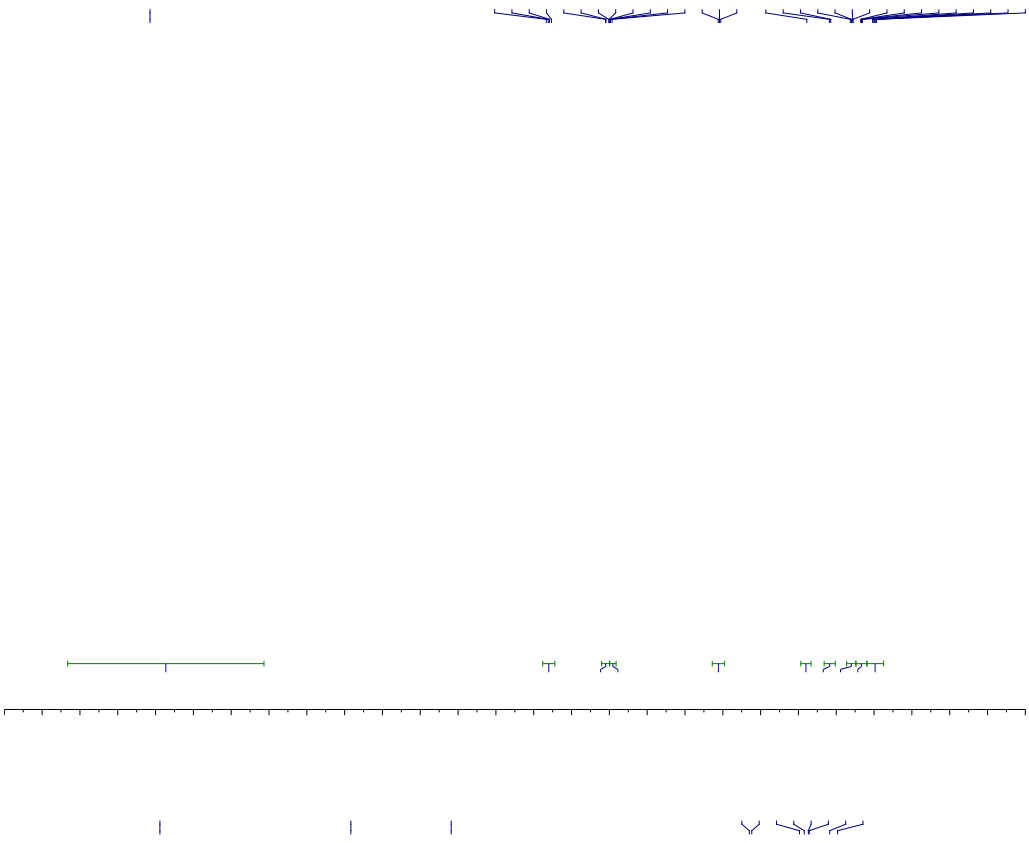

KSC-180-63.2.fid
f1 (ppm)

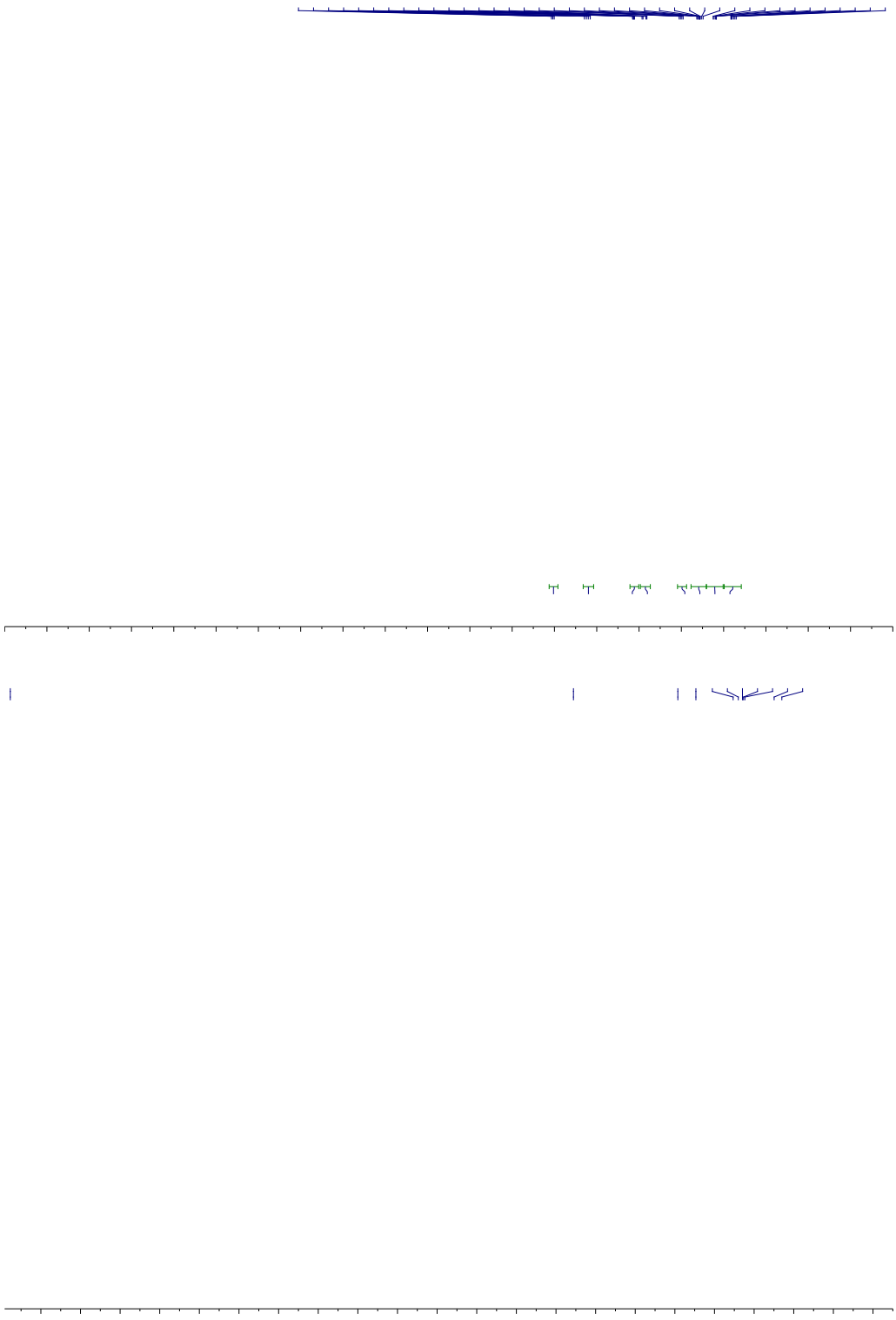

KSC-5-59B.1.fid
Alkyne add'n prdt, major spot
f1 (ppm)

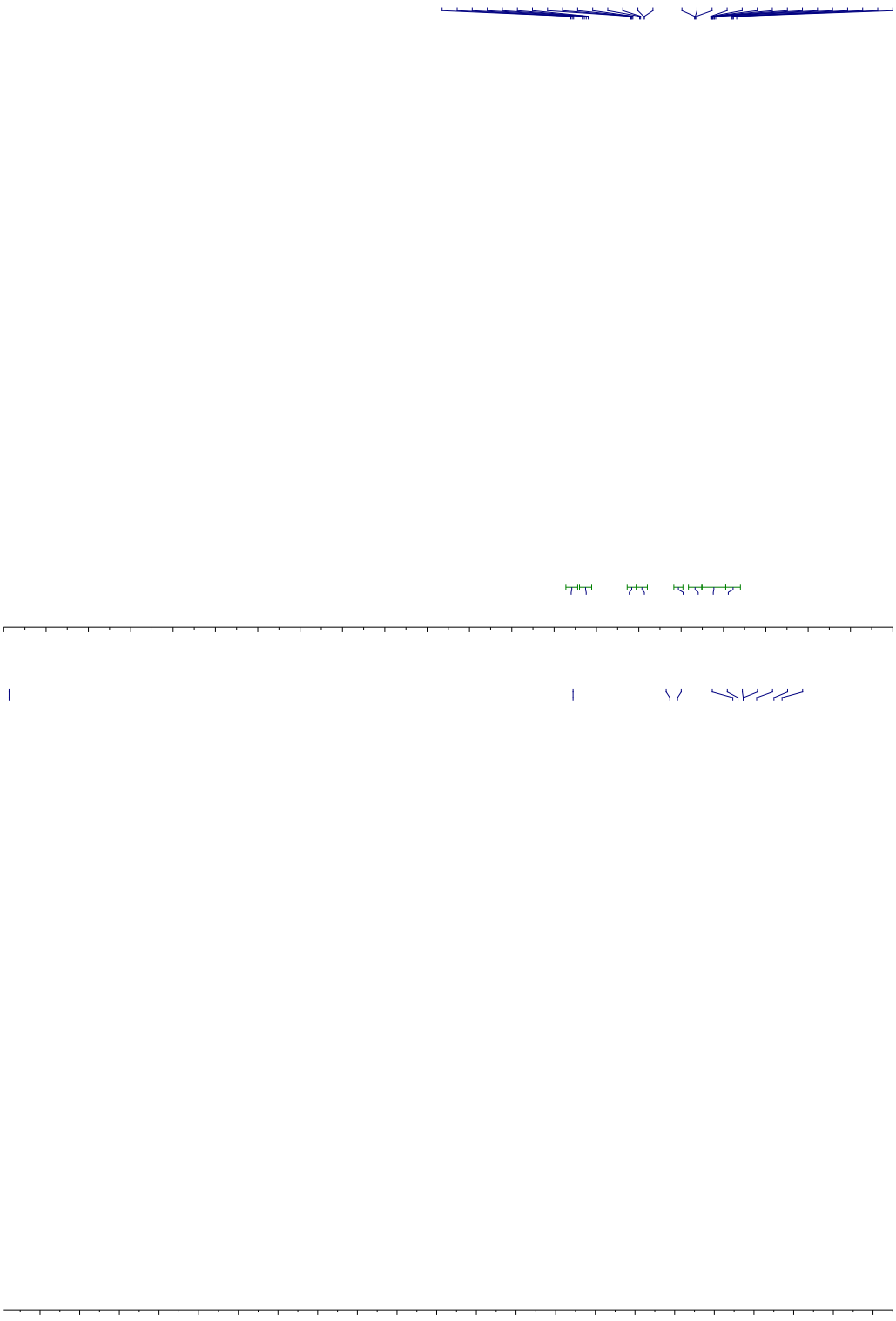

KSC-5-59B.2.fid
Alkyne add'n prdt, major spot
f1 (ppm)

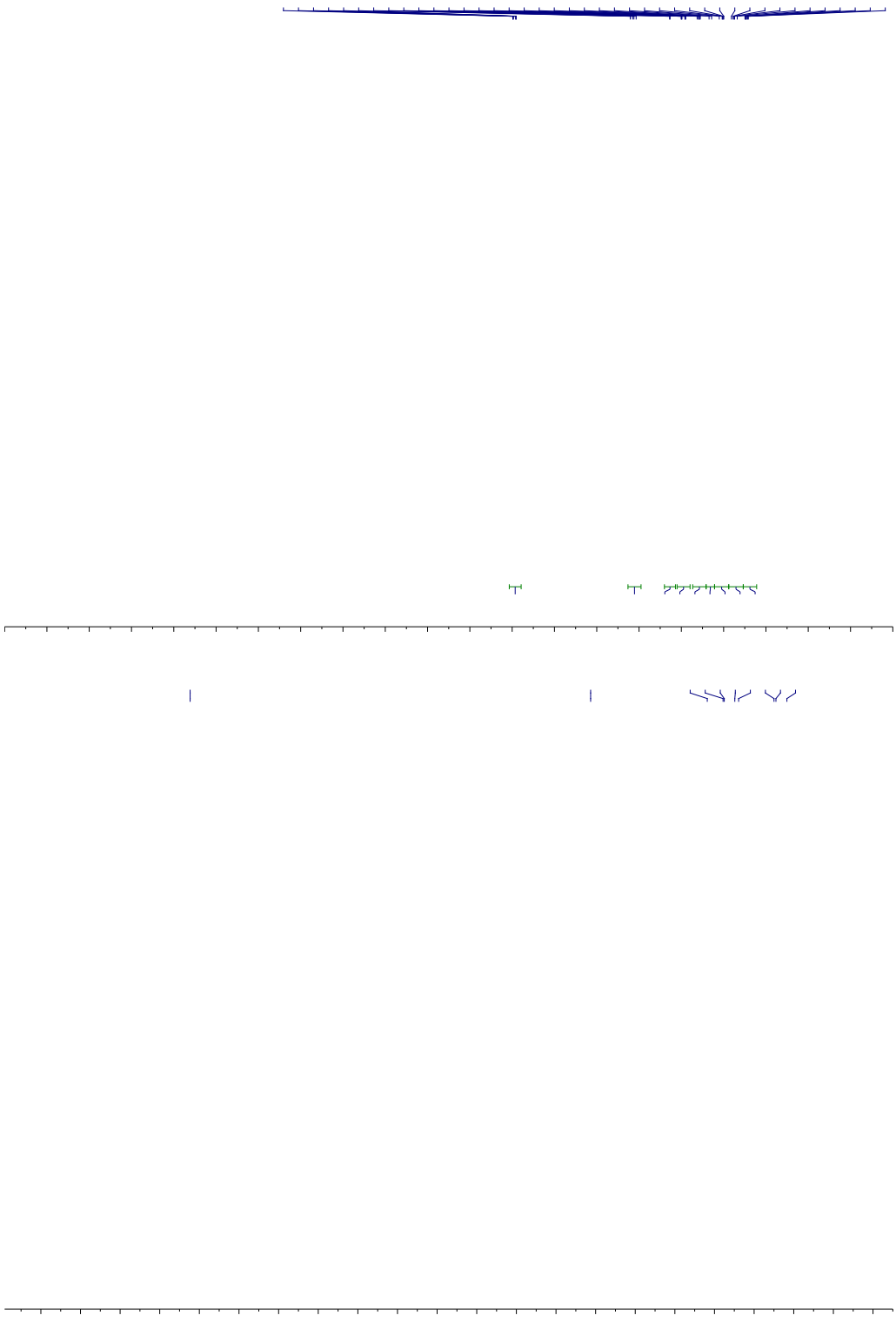

KSC-180-65.1.fid
f1 (ppm)

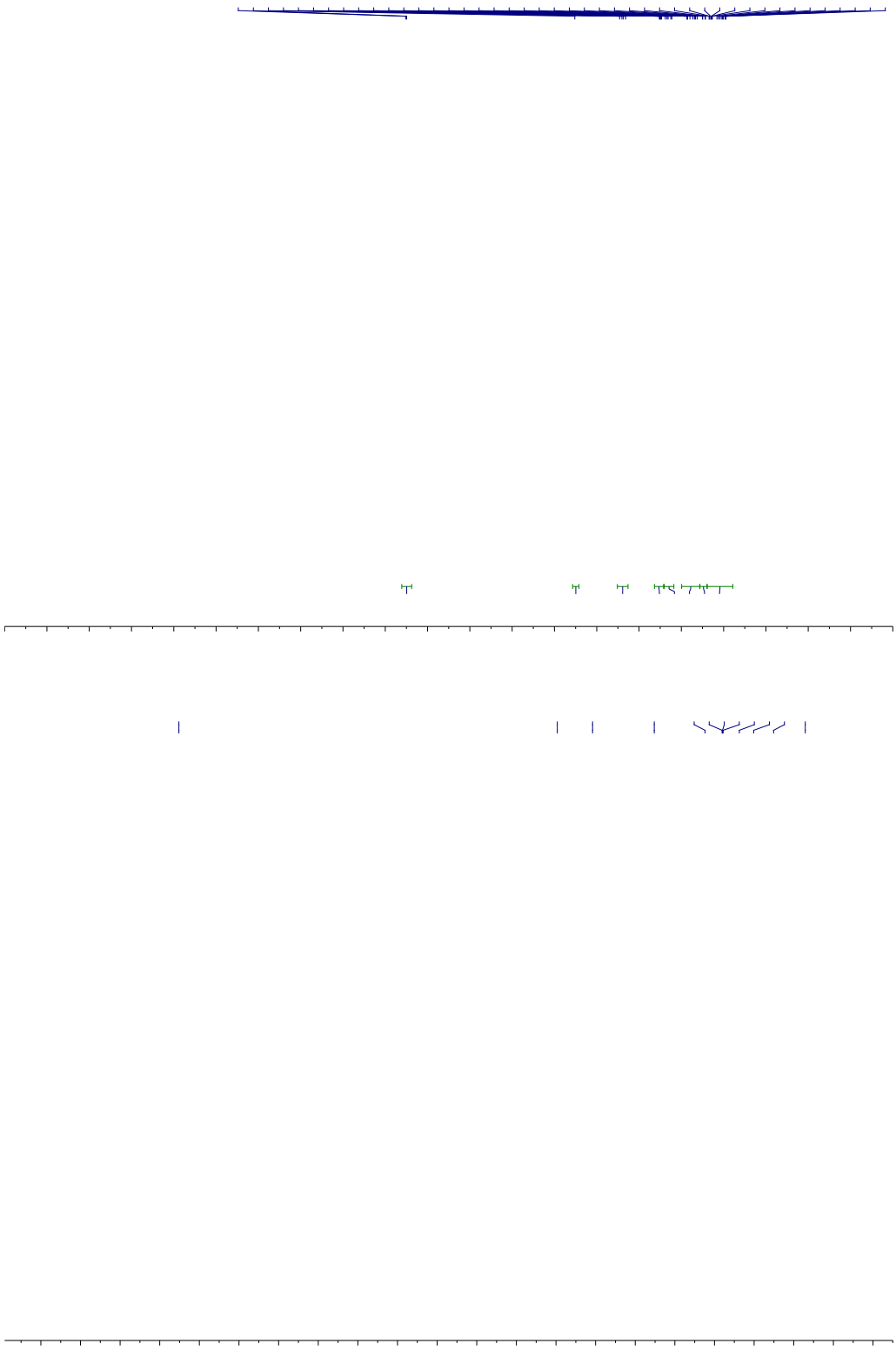

KSC-180-65.2.fid
f1 (ppm)

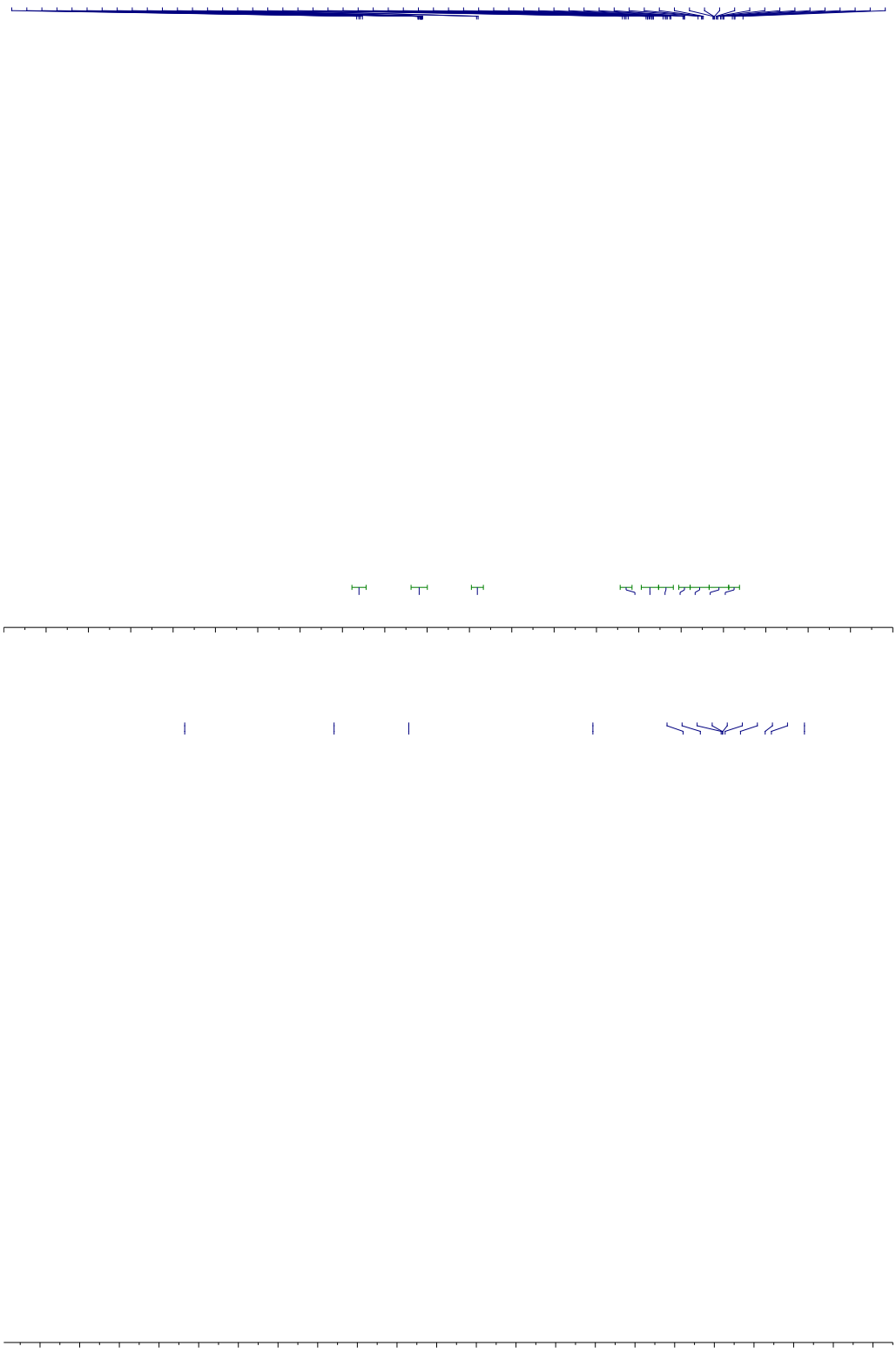












[1] G. L. Milligan, C. J. Mossman, J. Aubé, *J. Am. Chem. Soc.* **1995**, *117*, 10449-10459.
[2] Y. Zeng, S. Reddy, E. Hirt, J. Aubé, *Org. Lett.* **2004**, *6*, 4993-4995.
[3] Y. Zeng, J. Aubé, *J. Am. Chem. Soc.* **2005**, *127*, 15712-15713.
[4] C. Fang, K. Suganuma, H. Suemune, K. Sakai, *J. Chem. Soc., Perkin Trans. 1* **1991**, 1549-1554.
[5] J. M. Fortunato, B. Ganem, *J. Org. Chem.* **1976**, *41*, 2194-2200.
[6] L. C. da Silva Filho, V. L. Júnior, M. G. Constantino, G. V. J. da Silva, P. R. Invernize, *Beilstein J. Org. Chem.***2005**, *1*, 14.
[7] Y.-M. Zhao, P. Gu, H.-J. Zhang, Q.-W. Zhang, C.-A. Fan, Y.-Q. Tu, F.-M. Zhang, *J. Org. Chem.* **2009**, *74*, 3211-3213.
[8] J. F. Lavallee, P. Deslongchamps, *Tetrahedron Lett.* **1988**, 29, 6033-6036.
[9] D. Lertpibulpanya, S. P. Marsden, *Org. Biomol. Chem.* **2006**, *4*, 3498-3504.
[10] Zhang, W.; Collins, M. R.; Mahmood, K.; Dowd, P. *Tetrahedron Lett.* **1995**, *36*, 2729-2732.
[11] Bélanger, G.; Lévesque, F.; Pâquet, J.; Barbe, G. *J. Org. Chem.* **2005**, *70*, 291-296.