Supporting Information

for

Exploring chemical diversity via a modular reaction pairing strategy

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Experimental procedures, tabulated results for all libraries, and full characterization data for 20 representative compounds

Table of contents

General experimental methods

Stirring was achieved with oven-dried, magnetic stir bars. CH_2Cl_2 was purified by passage through the Solv-Tek purification system employing activated Al_2O_3 [1]. Et_3N was purified by passage through basic alumina and was stored over KOH. Flash column chromatography was performed with SiO_2 from Mallinckrodt Chemicals (V120-25, Silica gel, 60 A, 40–63 μm). Thin layer chromatography was performed on silica gel 60 F254 plates (EMD-5715-7, Merck). Deuterated solvents were purchased from Cambridge Isotope Laboratories. ^1H and ^{13}C NMR spectra were recorded on a Bruker Avance spectrometer operating at 400, 500 MHz and 126 MHz, respectively. High-resolution mass spectrometry (HRMS) and FAB spectra were obtained either on a VG Instrument ZAB double-focusing mass spectrometer boron a LCT Premier Spectrometer (Micromass UK Ltd) operating in the ESI mode (MeOH). All library syntheses were carried out in 1 dram vials utilizing a reaction heating block in an Anton Paar® Synthos 3000 synthesizer. Parallel evaporations were performed using a GeneVac EZ-2 Plus evaporator. Automated preparative reverse-phase HPLC purification was performed using a Waters Mass-Directed Fractionation system (Prep Pump 2525, Make-up pump 515, Sample Manager 2767, UV-DAD detection 2996, and Micromass ZD quadrapole mass spectrometer). Purification via preparative chromatography was achieved utilizing a Waters X-Bridge C18 column (19 × 150 mm, 5 μm, w/ 19 × 10 mm guard column) at a flow rate of 20 mL/min. Samples were diluted in DMSO and purified using a elution mixture of water (modified to pH 9.8 by the addition of NH_4OH) and CH_3CN, running a concentration gradient which increased to 20% CH_3CN over a 4 min period. The corresponding preparative gradient, triggering thresholds, and UV wavelength were selected based on the HPLC analysis of each crude sample. Analytical analysis of each sample after preparative chromatography utilized a Waters Acquity system with UV-detection and mass-detection (Waters LCT Premier). The analytical method conditions included a Waters Aquity BEH C18 column (2.1 × 50 mm, 1.7μm) and elution with a linear gradient of 5% water (modified to pH 9.8 through addition of NH_4OH) to 100% CH_3CN at 0.6 mL/min flow rate. Purity of each sample was determined using UV peak area detected at 214 nm wavelength.

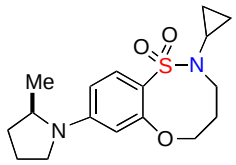
Note:

1. 20 of the 80 compounds were fully characterized with mp, FTIR, ^{1}H, ^{13}C NMR and HRMS.
2. As this is a library synthesis, compounds with a low yield were not resynthesized.

General procedure: Microwave-assisted S_NAr diversification of benzoxathiazocine-1,1-dioxides 1–8 cores

Into a 1-dram vial was added benzoxathiazocine-1,1-dioxides **1**–**8** (1 equiv, 80 mg), dry DMSO (0.5 M) and the corresponding amine (5 equiv). The reaction vessel was capped, placed in Anton Paar Synthos 3000® microwave and heated at 180 °C for 50 min [power = 1200 W, 8 min ramp then 50 min hold]. Afterwards, the reaction was diluted with 10% MeOH on CH_2Cl_2, filtered through a SiO_2 SPE and concentrated. The crude reaction was concentrated and QC/purified by an automated preparative reverse phase HPLC (detected by mass spectroscopy).

(*R*)-2-Cyclopropyl-8-(2-methylpyrrolidin-1-yl)-2,3,4,5-tetrahydrobenzo[*b*][1,4,5]oxa-thiazocine 1,1-dioxide 5{1}



Yellow solid, 79.8 mg (80%).

mp 92.5 °C;

$[\alpha]_D^{20}$ = −66.0° (*c* = 0.106, CH_2Cl_2);

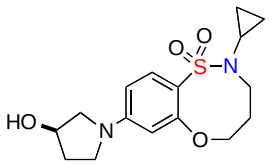
FTIR (thin film) 2964, 2930, 1595, 1497, 1464, 1383, 1335, 1202, 1150, 1049 cm^{-1};

^{1}H NMR (500 MHz, DMSO) δ ppm 7.51 (d, *J* = 8.8 Hz, 1H), 6.47– 6.34 (m, 2H), 4.27– 4.16 (m, 2H), 3.98– 3.90 (m, 1H), 3.54 (td, *J* = 5.8, 2.7 Hz, 2H), 3.40 (dd, *J* = 6.0, 3.8 Hz, 1H), 3.15 (dd, *J* = 17.7, 8.2 Hz, 1H), 2.10–1.92 (m, 3H), 1.85 (tt, *J* = 6.9, 3.6 Hz, 1H), 1.74–1.66 (m, 3H), 1.10 (d, *J* = 6.2 Hz, 3H), 0.74–0.66 (m, 2H), 0.64–0.56 (m, 2H);

^{13}C NMR (126 MHz, DMSO) δ ppm 157.5, 151.1, 131.1, 117.3, 106.5, 105.4, 74.6, 53.3, 47.6, 46.6, 32.3, 27.6, 22.9, 22.5, 18.4, 7.7, 7.4;

HRMS calculated for $C_{17}H_{25}N_2O_3S$ $(M + H)^+$ 337.1586; found 337.1580 (TOF MS ES^+).

(*R*)-2-Cyclopropyl-8-(3-hydroxypyrrolidin-1-yl)-2,3,4,5-tetrahydrobenzo[*b*][1,4,5]oxa-thiazocine 1,1-dioxide 5{3}



Yellow oil, 75.8 mg (76%).

[α]$_D^{20}$ = +9.88° (*c* = 0.162, CH_2Cl_2);

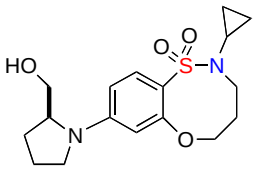
FTIR (neat) 3404, 3394, 2937, 2918, 1597, 1502, 1331, 1254, 1148, 1026 cm^{-1};

^{1}H NMR (500 MHz, DMSO) δ ppm 7.52 (d, *J* = 8.8 Hz, 1H), 6.43 (d, *J* = 2.3 Hz, 1H), 6.35 (dd, *J* = 8.8, 2.3 Hz, 1H), 5.03 (d, *J* = 3.7 Hz, 1H), 4.40 (s, 1H), 4.24 (t, *J* = 6.1 Hz, 2H), 3.57–3.51 (m, 2H), 3.43 (dd, *J* = 10.7, 4.6 Hz, 1H), 3.37 (dd, *J* = 9.6, 2.7 Hz, 2H), 3.14 (d, *J* = 10.7 Hz, 1H), 2.03 (dtd, *J* = 13.2, 8.8, 4.6 Hz, 1H), 1.94–1.87 (m, 1H), 1.82 (dt, *J* = 10.4, 3.5 Hz, 1H), 1.73–1.67 (m, 2H), 0.72–0.68 (m, 2H), 0.61 (dd, *J* = 6.7, 2.0 Hz, 2H);

^{13}C NMR (126 MHz, DMSO) δ ppm 157.4, 151.9, 131.1, 117.5, 106.2, 105.2, 74.5, 69.0, 55.9, 46.7, 45.5, 33.5, 27.6, 22.8, 7.6, 7.5;

HRMS calculated for $C_{16}H_{23}N_2O_4S$ $(M + H)^+$ 339.1379; found 339.1339 (TOF MS ES^+).

(*S*)-2-Cyclopropyl-8-(2-(hydroxymethyl)pyrrolidin-1-yl)-2,3,4,5-tetrahydro-benzo[*b*][1,4,5]oxathiazocine1,1-dioxide 5{5}



Dark yellow oil, 85.7 mg (83%).

[α]$_D^{20}$ = −66.4° (*c* = 0.128, CH_2Cl_2);

FTIR (neat) 3381, 2918, 1595, 1498, 1331, 1153, 1045, 1026 cm^{-1};

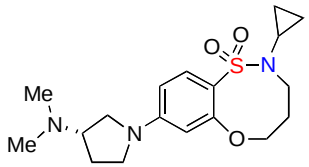
^{1}H NMR (500 MHz, DMSO) δ ppm 7.51 (d, *J* = 8.8 Hz, 1H), 6.51 (d, *J* = 2.2 Hz, 1H), 6.44 (dd, *J* = 8.9, 2.3 Hz, 1H), 4.83 (dd, *J* = 6.4, 5.3 Hz, 1H), 4.23 (t, *J* = 6.1 Hz, 2H), 3.77 (td, *J* = 7.8, 3.6 Hz, 1H), 3.54 (qt, *J* = 11.7, 5.9 Hz, 2H), 3.48–3.42 (m, 1H), 3.39 (t, *J* = 7.7 Hz, 1H), 3.22 (ddd, *J*

= 10.9, 8.1, 6.7 Hz, 1H), 3.11 (td, *J* = 9.7, 7.3 Hz, 1H), 2.02–1.83 (m, 5H), 1.75–1.67 (m, 2H), 0.74–0.66 (m, 2H), 0.65–0.57 (m, 2H);

^{13}C NMR (126 MHz, DMSO) δ ppm 157.4, 151.8, 131.0, 117.8, 106.6, 105.7, 74.6, 60.6, 60.1, 48.1, 46.6, 27.8, 27.6, 22.9, 22.5, 7.7, 7.4;

HRMS calculated for $C_{17}H_{25}N_2O_4S$ $(M + H)^+$ 353.1535; found 353.1510 (TOF MS ES$^+$).

(*S*)-2-Cyclopropyl-8-(3-(dimethylamino)pyrrolidin-1-yl)-2,3,4,5-tetrahydro-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 5{8}



Light brown solid, 49.2 mg (46%).

mp 170.5 °C;

$[\alpha]_D^{20}$ = −32.9° (*c* = 0.140, CH_2Cl_2);

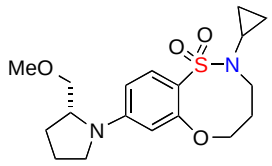
FTIR (thin film) 2947, 2866, 2775, 1597, 1501, 1437, 1387, 1333, 1194, 1150, 1074 cm^{-1};

^{1}H NMR (500 MHz, DMSO) δ ppm 7.52 (d, *J* = 8.8 Hz, 1H), 6.47 (d, *J* = 2.3 Hz, 1H), 6.37 (dd, *J* = 8.9, 2.3 Hz, 1H), 4.24 (td, *J* = 6.1, 1.6 Hz, 2H), 3.56–3.48 (m, 3H), 3.46–3.41 (m, 1H), 3.27 (td, *J* = 10.0, 6.9 Hz, 1H), 3.08–3.03 (m, 1H), 2.77 (dt, *J* = 15.1, 7.5 Hz, 1H), 2.20 (s, 6H), 2.16 (dd, *J* = 11.9, 6.4 Hz, 1H), 1.81 (ddd, *J* = 18.6, 9.2, 6.2 Hz, 2H), 1.71 (ddd, *J* = 9.8, 6.0, 4.0 Hz, 2H), 0.74–0.66 (m, 2H), 0.61 (d, *J* = 6.5 Hz, 2H);

^{13}C NMR (126 MHz, DMSO) δ ppm 157.4, 151.7, 131.0, 117.7, 106.1, 105.3, 74.5, 64.8, 51.9, 46.7, 46.7, 43.9, 40.4, 29.5, 27.6, 22.8, 7.7, 7.4;

HRMS calculated for $C_{18}H_{28}N_3O_3S$ $(M + H)^+$ 366.1851; found 366.1826 (TOF MS ES$^+$).

(*R*)-2-Cyclopropyl-8-(2-(methoxymethyl)pyrrolidin-1-yl)-2,3,4,5-tetrahydro-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 5{10}



Dark yellow oil, 83.7 mg (78%).

[α]$_D^{20}$ = +91.9° (*c* = 0.124, CH_2Cl_2);

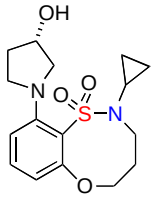
FTIR (neat) 2968, 2922, 2878, 1595, 1498, 1435, 1377, 1333, 1177, 1151, 1024 cm^{-1};

^{1}H NMR (500 MHz, DMSO) δ ppm 7.52 (d, *J* = 8.8 Hz, 1H), 6.50 (d, *J* = 2.3 Hz, 1H), 6.45 (dd, *J* = 8.9, 2.3 Hz, 1H), 4.23 (td, *J* = 6.2, 2.7 Hz, 2H), 3.98–3.92 (m, 1H), 3.55 (td, *J* = 7.9, 2.8 Hz, 2H), 3.38 (ddd, *J* = 13.7, 13.1, 6.3 Hz, 2H), 3.28–3.24 (m, 4H), 3.13 (dt, *J* = 13.0, 4.8 Hz, 1H), 2.08–1.98 (m, 1H), 1.97–1.90 (m, 3H), 1.88–1.84 (m, 1H), 1.72 (dd, *J* = 9.4, 4.4 Hz, 2H), 0.71 (dd, *J* = 5.8, 2.7 Hz, 2H), 0.62 (dd, *J* = 6.8, 2.4 Hz, 2H);

^{13}C NMR (126 MHz, DMSO) δ ppm 157.4, 151.7, 131.0, 118.1, 106.7, 105.9, 74.6, 72.0, 58.5, 57.5, 48.1, 46.6, 28.3, 27.6, 22.9, 22.6, 7.8, 7.4;

HRMS calculated for $C_{18}H_{27}N_2O_4S$ $(M + H)^+$ 367.1692; found 367.1680 (TOF MS ES^+).

(*S*)-2-Cyclopropyl-10-(3-hydroxypyrrolidin-1-yl)-2,3,4,5-tetrahydrobenzo[*b*][1,4,5]oxa-thiazocine 1,1-dioxide 6{4}



Dark brown oil, 61.0 mg (61%).

[α]$_D^{20}$ = +266.8° (*c* = 0.196, CH_2Cl_2);

FTIR (neat) 3385, 2943, 2918, 1589, 1549, 1323, 1236, 1151, 1028 cm^{-1};

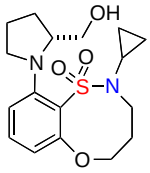
^{1}H NMR (400 MHz, DMSO) δ ppm 7.22 (dd, *J* = 8.5, 8.0 Hz, 1H), 6.58 (dd, *J* = 10.2, 8.3 Hz, 2H), 4.86 (s, 1H), 4.36 (t, *J* = 6.8 Hz, 2H), 4.25 (d, *J* = 2.7 Hz, 1H), 3.72 (s, 2H), 3.49 (d, *J* = 7.0 Hz, 1H), 3.35 (s, 1H), 3.29 (d, *J* = 4.3 Hz, 1H), 3.05 (d, *J* = 10.9 Hz, 1H), 1.95 (ddd, *J* = 12.5,

11.4, 6.9 Hz, 2H), 1.81 (d, *J* = 2.8 Hz, 2H), 1.55 (d, *J* = 3.5 Hz, 1H), 0.73 (s, 1H), 0.52 (ddt, *J* = 14.0, 11.4, 5.8 Hz, 3H);

^{13}C NMR (126 MHz, DMSO) δ ppm 159.6, 151.6, 132.0, 115.5, 109.2, 105.2, 70.1, 68.9, 62.0, 54.9, 49.2, 45.8, 33.2, 27.2, 23.1, 5.8;

HRMS calculated for $C_{16}H_{23}N_2O_4S$ $(M + H)^+$ 339.1379; found 339.1356 (TOF MS ES$^+$).

(*R*)-2-Cyclopropyl-10-(2-(hydroxymethyl)pyrrolidin-1-yl)-2,3,4,5-tetrahydro-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 6{6}



Brown oil, 67.7 mg (65%).

$[\alpha]_D^{20}$ = +76.0° (*c* = 0.550, CH_2Cl_2);

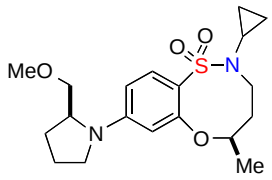
FTIR (neat) 3474, 2945, 2872, 1585, 1474, 1458, 1327, 1237, 1151, 1059 cm^{-1};

^{1}H NMR (500 MHz, DMSO) δ ppm 7.32 (t, *J* = 8.2 Hz, 1H), 6.96 (d, *J* = 8.4 Hz, 1H), 6.77 (d, *J* = 7.8 Hz, 1H), 4.42–4.34 (m, 1H), 4.33–4.24 (m, 1H), 4.14 (dd, *J* = 6.9, 4.8 Hz, 1H), 3.91 (d, *J* = 3.5 Hz, 1H), 3.87–3.76 (m, 2H), 3.43 (ddd, *J* = 10.3, 7.0, 3.1 Hz, 1H), 3.32–3.25 (m, 2H), 2.92–2.87 (m, 1H), 2.13–1.98 (m, 2H), 1.84–1.63 (m, 5H), 0.86–0.78 (m, 1H), 0.58–0.48 (m, 3H);

^{13}C NMR (126 MHz, DMSO) δ ppm 158.4, 151.0, 132.5, 113.7, 110.1, 71.3, 62.4, 60.7, 56.9, 46.7, 28.7, 27.6, 24.6, 23.0, 9.7, 5.1;

HRMS calculated for $C_{17}H_{25}N_2O_4S$ $(M + H)^+$ 353.1530; found 353.1519 (TOF MS ES$^+$).

(*R*)-2-Cyclopropyl-8-((*S*)-2-(methoxymethyl)pyrrolidin-1-yl)-5-methyl-2,3,4,5-tetrahydro-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 7{9}



Dark yellow oil, 67.4 mg (63%).

[α]$_D^{20}$ = −33.0° (*c* = 0.224, CH_2Cl_2);

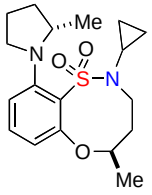
FTIR (neat) 2974, 2930, 2878, 1595, 1489, 1435, 1375, 1329, 1209, 1155, 1074 cm^{-1};

^{1}H NMR (400 MHz, DMSO) δ ppm 7.52 (d, *J* = 9.0 Hz, 1H), 6.49–6.42 (m, 2H), 4.28 (m, 1H), 3.98–3.86 (m, 2H), 3.43–3.31 (m, 4H), 3.31–3.27 (m, 1H), 3.27–3.19 (m, 2H), 3.18–3.10 (m, 1H), 2.06–1.89 (m, 6H), 1.55–1.46 (m, 1H), 1.37 (d, *J* = 6.4 Hz, 3H), 0.91–0.82 (m, 1H), 0.75–0.66 (m, 1H), 0.64–0.49 (m, 2H);

^{13}C NMR (126 MHz, DMSO) δ ppm 157.5, 151.5, 130.9, 118.3, 106.8, 106.3, 81.1, 72.2, 58.5, 57.6, 48.1, 43.9, 29.6, 28.3, 27.3, 22.7, 20.9, 9.8, 5.0;

HRMS calculated for $C_{19}H_{29}N_2O_4S$ $(M + H)^+$ 381.1848; found 381.1831 (TOF MS ES$^+$).

(*R*)-2-Cyclopropyl-5-methyl-10-((*S*)-2-methylpyrrolidin-1-yl)-2,3,4,5-tetrahydro-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 8{2}



Dark yellow solid, 33.9 mg (35%).

mp 111.5 °C;

[α]$_D^{20}$ = −29.4° (*c* = 0.330, CH_2Cl_2);

FTIR (thin film) 2968, 2918, 1572, 1454, 1441, 1377, 1319, 1236, 1140, 1055 cm^{-1};

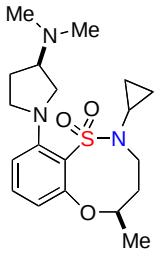
^{1}H NMR (500 MHz, DMSO) δ ppm 7.34 (t, *J* = 8.1 Hz, 1H), 7.03 (d, *J* = 8.2 Hz, 1H), 6.68 (d, *J* = 7.7 Hz, 1H), 4.07 (s, 1H), 3.75 (dd, *J* = 16.0, 7.2 Hz, 3H), 3.50 (d, *J* = 14.8 Hz, 1H), 2.89 (td, *J* = 8.5, 4.9 Hz, 1H), 2.61–2.55 (m, 1H), 2.11–2.04 (m, 1H), 1.93 (dtd, *J* = 14.3, 9.6, 4.6 Hz, 1H),

1.85–1.72 (m, 2H), 1.68 (ddd, J = 16.5, 8.2, 3.9 Hz, 1H), 1.47 (dq, J = 11.8, 8.7 Hz, 1H), 1.31 (d, J = 6.2 Hz, 3H), 0.99 (d, J = 6.0 Hz, 3H), 0.92 (d, J = 9.2 Hz, 1H), 0.72–0.61 (m, 3H);

^{13}C NMR (126 MHz, DMSO) δ ppm 151.1, 132.6, 117.7, 116.3, 82.4, 56.2, 55.7, 54.9, 46.6, 33.1, 31.6, 27.7, 23.5, 21.2, 18.7, 9.1, 6.2;

HRMS calculated for $C_{18}H_{27}N_2O_3S$ $(M + H)^+$ 351.1742; found 351.1700 (TOF MS ES$^+$).

(*R*)-2-Cyclopropyl-10-((*R*)-3-(dimethylamino)pyrrolidin-1-yl)-5-methyl-2,3,4,5-tetrahydro-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 8{7}



Brown solid, 37.9 mg (36%).

mp 91.5 °C;

$[\alpha]_D^{20}$ = −158.6° (c = 0.140, CH_2Cl_2);

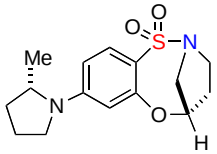
FTIR (thin film) 2972, 2932, 2868, 2824, 1583, 1460, 1377, 1323, 1221, 1155, 1103 cm^{-1};

^{1}H NMR (400 MHz, DMSO) δ ppm 7.27–7.21 (m, 1H), 6.71 (d, J = 8.1 Hz, 1H), 6.54 (d, J = 7.2 Hz, 1H), 4.44–4.35 (m, 1H), 3.71 (s, 1H), 3.56 (dd, J = 10.4, 6.3 Hz, 2H), 3.42 (dd, J = 10.8, 4.7 Hz, 1H), 3.30 (dd, J = 9.7, 7.1 Hz, 1H), 3.21 (dd, J = 10.4, 5.7 Hz, 1H), 2.70 (m, 1H), 2.12 (s, 6H), 1.97 (td, J = 12.6, 6.5 Hz, 3H), 1.83 (td, J = 13.7, 7.0 Hz, 1H), 1.71 (d, J = 6.9 Hz, 1H), 1.35 (d, J = 6.2 Hz, 3H), 0.72 (s, 2H), 0.56 (td, J = 6.7, 2.0 Hz, 2H);

^{13}C NMR (126 MHz, DMSO) δ ppm 158.3, 150.9, 132.4, 119.2, 111.7, 109.4, 79.4, 64.7, 57.2, 54.9, 50.8, 45.4, 43.4, 31.1, 28.9, 27.2, 22.1, 8.2, 6.6;

HRMS calculated for $C_{19}H_{30}N_3O_3S$ $(M + H)^+$ 380.2008; found 380.1976 (TOF MS ES$^+$).

(5*S*)-8-((*S*)-2-Methylpyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methano-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 1{2}



Pale yellow solid, 73.4 mg (72%).

mp 143.0 °C;

[α]$_D^{20}$ = +72.3° (*c* = 0.260, CH_2Cl_2);

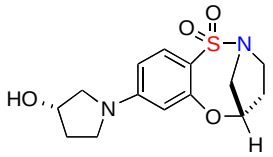
FTIR (thin film) 2964, 2918, 2868, 2847, 1599, 1434, 1327, 1142, 1107 cm^{-1};

^{1}H NMR (400 MHz, DMSO) δ ppm 7.46 (d, *J* = 8.9 Hz, 1H), 6.40 (dd, *J* = 8.9, 2.4 Hz, 1H), 6.12 (d, *J* = 2.4 Hz, 1H), 5.05 (dd, *J* = 6.4, 2.7 Hz, 1H), 4.01–3.89 (m, 2H), 3.38 (t, *J* = 8.8 Hz, 1H), 3.27 (dd, *J* = 8.3, 3.5 Hz, 1H), 3.20–3.08 (m, 3H), 2.05–1.92 (m, 4H), 1.76 (dt, *J* = 15.4, 7.8 Hz, 1H), 1.70–1.62 (m, 1H), 1.08 (d, *J* = 6.2 Hz, 3H);

^{13}C NMR (126 MHz, DMSO) δ ppm 152.1, 150.9, 130.8, 116.1, 107.1, 105.4, 80.0, 56.7, 53.3, 47.6, 47.0, 32.3, 28.2, 22.5, 18.4;

HRMS calculated for $C_{15}H_{21}N_2O_3S$ $(M + H)^+$ 309.1273; found 309.1243 (TOF MS ES^+).

(5*S*)-8-((*S*)-3-Hydroxypyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methano-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 1{4}



Pale yellow solid, 76.7 mg (75%).

mp 208.0 °C;

[α]$_D^{20}$ = +63.1° (*c* = 0.160, CH_2Cl_2);

FTIR (thin film) 3406, 3009, 2945, 2920, 1601, 1504, 1437, 1321, 1140, 1107 cm^{-1};

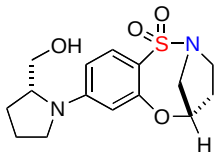
^{1}H NMR (400 MHz, DMSO) δ ppm 7.47 (d, *J* = 8.9 Hz, 1H), 6.37 (dd, *J* = 8.9, 2.4 Hz, 1H), 6.09 (d, *J* = 2.3 Hz, 1H), 5.05 (dd, *J* = 6.4, 2.7 Hz, 1H), 5.01 (d, *J* = 3.6 Hz, 1H), 4.39 (s, 1H), 3.99 (d,

J = 13.9 Hz, 1H), 3.41 (dd, *J* = 10.8, 4.6 Hz, 1H), 3.36 (d, *J* = 6.9 Hz, 1H), 3.32–3.22 (m, 2H), 3.20–3.06 (m, 3H), 2.06–1.94 (m, 2H), 1.93–1.85 (m, 1H), 1.76 (dt, *J* = 15.3, 6.8 Hz, 1H);

^{13}C NMR (126 MHz, DMSO) δ ppm 152.1, 151.7, 130.8, 116.3, 106.8, 105.2, 80.0, 69.0, 56.7, 55.9, 47.0, 45.5, 33.4, 28.1;

HRMS calculated for $C_{14}H_{19}N_2O_4S$ $(M + H)^+$ 311.1066; found 311.1032 (TOF MS ES$^+$).

(5*S*)-8-((*R*)-2-(Hydroxymethyl)pyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methano-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 1{6}



Brown oil, 90.2 mg (85%).

[α]$_D^{20}$ = +105.5° (*c* = 0.254, CH_2Cl_2);

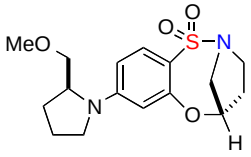
FTIR (neat) 3420, 2972, 2878, 1599, 1497, 1437, 1323, 1140, 1107 cm^{-1};

^{1}H NMR (400 MHz, DMSO) δ ppm 7.46 (d, *J* = 8.9 Hz, 1H), 6.45 (dd, *J* = 8.9, 2.3 Hz, 1H), 6.20 (d, *J* = 2.2 Hz, 1H), 5.05 (dd, *J* = 6.4, 2.6 Hz, 1H), 4.83 (t, *J* = 5.8 Hz, 1H), 3.99 (d, *J* = 13.9 Hz, 1H), 3.74 (td, *J* = 7.8, 3.6 Hz, 1H), 3.41 (ddd, *J* = 11.7, 9.4, 4.6 Hz, 2H), 3.29–3.05 (m, 5H), 2.05–1.95 (m, 3H), 1.94–1.82 (m, 2H), 1.77 (dt, *J* = 13.4, 6.8 Hz, 1H);

^{13}C NMR (126 MHz, DMSO) δ ppm 152.1, 151.6, 130.7, 116.5, 107.3, 105.6, 80.0, 60.5, 60.1, 56.7, 48.1, 47.0, 28.2, 27.7, 22.5;

HRMS calculated for $C_{15}H_{21}N_2O_4S$ $(M + H)^+$ 325.1222; found 325.1183 (TOF MS ES$^+$).

(5*S*)-8-((*S*)-2-(Methoxymethyl)pyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methano-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 1{9}



Light brown solid, 84.7 mg (76%).

mp 152.0 °C;

[α]$_D^{20}$ = −36.1° (*c* = 0.180, CH_2Cl_2);

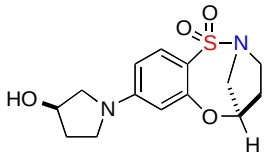
FTIR (thin film) 2972, 2953, 2928, 2876, 1597, 1495, 1435, 1381, 1327, 1142, 1107 cm^{-1};

^{1}H NMR (500 MHz, DMSO) δ ppm 7.47 (d, *J* = 8.9 Hz, 1H), 6.48 (dd, *J* = 8.9, 2.3 Hz, 1H), 6.17 (d, *J* = 2.3 Hz, 1H), 5.06 (dd, *J* = 6.4, 2.6 Hz, 1H), 4.07–3.95 (m, 1H), 3.93 (d, *J* = 10.3 Hz, 1H), 3.44–3.34 (m, 3H), 3.30–3.22 (m, 5H), 3.22–3.06 (m, 3H), 2.05–1.88 (m, 4H), 1.78 (dd, *J* = 14.3, 7.6 Hz, 1H);

^{13}C NMR (126 MHz, DMSO) δ ppm 152.6, 152.0, 131.2, 117.3, 107.9, 106.2, 80.5, 72.4, 59.0, 58.1, 57.2, 48.5, 47.5, 28.8, 28.7, 23.1;

HRMS calculated for $C_{16}H_{23}N_2O_4S$ $(M + H)^+$ 339.1379; found 339.1345 (TOF MS ES$^+$).

(5*R*)-8-((*R*)-3-Hydroxypyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methanobenzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 2{3}



Light yellow solid, 70.0 mg (69%).

mp 202.0 °C;

[α]$_D^{20}$ = −49.2° (*c* = 0.240, CH_2Cl_2);

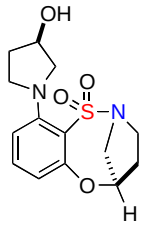
FTIR (thin film) 3394, 2949, 2920, 2858, 1601, 1504, 1437, 1321, 1140, 1107 cm^{-1};

^{1}H NMR (400 MHz, DMSO) δ ppm 7.47 (d, *J* = 8.8 Hz, 1H), 6.37 (dd, *J* = 8.9, 2.4 Hz, 1H), 6.09 (d, *J* = 2.3 Hz, 1H), 5.05 (dd, *J* = 6.3, 2.6 Hz, 1H), 5.01 (d, *J* = 3.6 Hz, 1H), 4.39 (s, 1H), 3.99 (d, *J* = 13.9 Hz, 1H), 3.41 (dd, *J* = 10.8, 4.6 Hz, 1H), 3.36 (d, *J* = 7.0 Hz, 1H), 3.27 (ddd, *J* = 11.9, 9.8, 4.0 Hz, 2H), 3.18 (dd, *J* = 13.9, 2.7 Hz, 1H), 3.14–3.06 (m, 2H), 2.06–1.95 (m, 2H), 1.90 (dd, *J* = 9.7, 6.2 Hz, 1H), 1.81–1.71 (m, 1H);

^{13}C NMR (126 MHz, DMSO) δ ppm 152.1, 151.7, 130.8, 116.3, 106.8, 105.2, 80.0, 69.0, 56.7, 55.9, 47.0, 45.5, 33.4, 28.1;

HRMS calculated for $C_{14}H_{19}N_2O_4S$ $(M + H)^+$ 311.1066; found 311.1014 (TOF MS ES$^+$).

(5*R*)-10-((*R*)-3-Hydroxypyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methanobenzo[*b*][1,4,5]oxa-thiazocine 1,1-dioxide 3{3}



Dark yellow oil, 49.3 mg (48%).

$[\alpha]_D^{20}$ = +183.3° (*c* = 0.084, CH_2Cl_2);

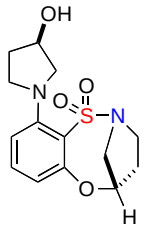
FTIR (neat) 3404, 3394, 2962, 2897, 1585, 1464, 1375, 1327, 1140, 1113 cm^{-1};

^{1}H NMR (500 MHz, DMSO) δ ppm 7.24 (t, *J* = 8.2 Hz, 1H), 6.72 (d, *J* = 8.6 Hz, 1H), 6.37 (d, *J* = 7.7 Hz, 1H), 5.10 (d, *J* = 4.7 Hz, 1H), 4.86 (d, *J* = 4.1 Hz, 1H), 4.22 (dq, *J* = 12.4, 6.4 Hz, 1H), 3.93 (d, *J* = 13.2 Hz, 1H), 3.51 (td, *J* = 9.5, 6.7 Hz, 1H), 3.42–3.35 (m, 2H), 3.31–3.25 (m, 1H), 3.15 (ddd, *J* = 15.0, 10.6, 4.5 Hz, 1H), 3.06 (t, *J* = 12.1 Hz, 2H), 2.10–2.01 (m, 2H), 1.90 (ddd, *J* = 14.7, 10.5, 5.9 Hz, 1H), 1.73 (dq, *J* = 11.5, 8.1 Hz, 1H);

^{13}C NMR (126 MHz, DMSO) δ ppm 153.8, 151.0, 132.0, 119.9, 113.3, 112.2, 79.8, 68.9, 59.8, 56.4, 49.7, 46.4, 33.5, 28.5;

HRMS calculated for $C_{14}H_{19}N_2O_4S$ $(M + H)^+$ 311.1066; found 311.1028 (TOF MS ES^+).

(5*S*)-10-((*R*)-3-Hydroxypyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methanobenzo[*b*][1,4,5]oxa-thiazocine 1,1-dioxide 4{3}



Light brown oil, 54.1 mg (53%).

$[\alpha]_D^{20}$ = −378.0° (*c* = 2.60, CH_2Cl_2);

FTIR (neat) 3439, 3418, 1643, 1634, 1589, 1327, 1227, 1138 cm^{-1};

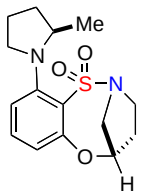
^{1}H NMR (500 MHz, $CDCl_3$) δ ppm 7.17 (dd, *J* = 8.4, 7.9 Hz, 1H), 6.71 (dd, *J* = 8.6, 1.0 Hz, 1H), 6.41 (dd, *J* = 7.8, 1.0 Hz, 1H), 4.93 (d, *J* = 4.7 Hz, 1H), 4.47 (s, 1H), 4.37 (d, *J* = 13.2 Hz, 1H),

3.87 (ddd, J = 14.2, 8.4, 5.4 Hz, 2H), 3.28–3.13 (m, 4H), 3.05 (dd, J = 13.2, 1.2 Hz, 1H), 2.37 (s, 1H), 2.29–2.21 (m, 1H), 2.10–2.00 (m, 2H), 1.93–1.84 (m, 1H);

^{13}C NMR (126 MHz, $CDCl_3$) δ ppm 154.2, 152.0, 132.0, 121.3, 115.3, 113.3, 80.2, 71.1, 61.7, 58.1, 49.6, 46.6, 33.9, 28.8;

HRMS calculated for $C_{14}H_{19}N_2O_4S$ $(M + H)^+$ 311.1066; found 311.1051 (TOF MS ES$^+$).

(5*S*)-10-((*R*)-2-Methylpyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methanobenzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 4{1}



Pale yellow solid, 70.8 mg (70%).

mp 139.0 °C;

$[\alpha]_D^{20}$ = −359.0° (c = 0.286, CH_2Cl_2);

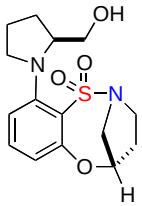
FTIR (thin film) 2964, 2928, 2889, 2868, 1583, 1460, 1373, 1333, 1227, 1142, 1115 cm^{-1};

^{1}H NMR (400 MHz, $CDCl_3$) δ ppm 7.14 (dd, J = 8.5, 7.8 Hz, 1H), 6.72 (d, J = 8.1 Hz, 1H), 6.36 (dd, J = 7.7, 1.0 Hz, 1H), 4.92 (d, J = 4.7 Hz, 1H), 4.42 (dd, J = 13.2, 2.3 Hz, 1H), 4.03–3.91 (m, 2H), 3.32–3.24 (m, 1H), 3.20–3.11 (m, 2H), 3.04 (dd, J = 13.2, 1.2 Hz, 1H), 2.29–2.16 (m, 2H), 1.95–1.81 (m, 2H), 1.72–1.59 (m, 2H), 1.19 (d, J = 6.0 Hz, 3H);

^{13}C NMR (126 MHz, $CDCl_3$) δ ppm 154.5, 151.6, 131.4, 121.8, 114.6, 113.5, 80.1, 58.4, 55.7, 55.3, 46.4, 34.3, 28.7, 25.3, 19.1;

HRMS calculated for $C_{15}H_{21}N_2O_3S$ $(M + H)^+$ 309.1273; found 309.1259 (TOF MS ES$^+$).

(5*S*)-10-((*S*)-2-(Hydroxymethyl)pyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methanobenzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 4{5}



White solid, 72.9 mg (68%).

mp 149.0 °C;

$[\alpha]_D^{20}$ = −128.0° (*c* = 0.530, CH_2Cl_2);

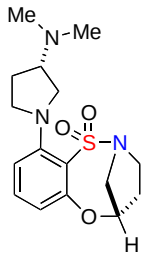
FTIR (thin film) 3472, 2968, 2874, 1582, 1456, 1331, 1142, 1115, 1067 cm^{-1};

^{1}H NMR (400 MHz, $CDCl_3$) δ ppm 7.21 (t, *J* = 8.1 Hz, 1H), 6.95 (d, *J* = 8.1 Hz, 1H), 6.53 (dd, *J* = 7.9, 1.0 Hz, 1H), 4.97 (dd, *J* = 5.1, 1.3 Hz, 1H), 4.37 (d, *J* = 13.5 Hz, 1H), 4.07 (t, *J* = 7.7 Hz, 1H), 3.98 (td, *J* = 9.5, 6.0 Hz, 1H), 3.77 (dd, *J* = 11.3, 2.9 Hz, 1H), 3.42 (t, *J* = 10.0 Hz, 1H), 3.28–3.14 (m, 4H), 3.10 (dd, *J* = 13.5, 1.6 Hz, 1H), 2.26–2.17 (m, 1H), 2.16–2.07 (m, 1H), 2.03 (ddd, *J* = 7.2, 5.6, 2.6 Hz, 1H), 2.00–1.88 (m, 2H), 1.82 – 1.70 (m, 1H);

^{13}C NMR (126 MHz, $CDCl_3$) δ ppm 153.9, 151.6, 132.1, 125.6, 117.7, 115.9, 80.1, 61.3, 60.7, 57.7, 57.3, 46.7, 29.0, 27.4, 25.7;

HRMS calculated for $C_{15}H_{21}N_2O_4S$ $(M + H)^+$ 325.1222; found 325.1194 (TOF MS ES^+).

(5*S*)-10-((*S*)-3-(Dimethylamino)pyrrolidin-1-yl)-4,5-dihydro-3*H*-2,5-methano-benzo[*b*][1,4,5]oxathiazocine 1,1-dioxide 4{8}



Dark brown oil, 86.3 mg (78%).

$[\alpha]_D^{20}$ = −449.0° (*c* = 0.152, CH_2Cl_2);

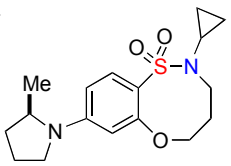
FTIR (neat) 2955, 1637, 1585, 1464, 1375, 1331, 1223, 1142, 1115 cm^{-1};

^{1}H NMR (400 MHz, $CDCl_3$) δ ppm 7.19–7.09 (m, 1H), 6.66 (d, *J* = 8.6 Hz, 1H), 6.40–6.31 (m, 1H), 4.93 (d, *J* = 4.5 Hz, 1H), 4.41 (d, *J* = 13.2 Hz, 1H), 3.88 (td, *J* = 10.8, 6.2 Hz, 1H), 3.58–3.46 (m, 2H), 3.40 (t, *J* = 9.0 Hz, 1H), 3.16 (dd, *J* = 8.8, 6.5 Hz, 2H), 3.04 (d, *J* = 13.1 Hz, 1H), 2.74 (tt, *J* = 10.1, 6.1 Hz, 1H), 2.31 (s, 6H), 2.28–2.21 (m, 1H), 2.20–2.11 (m, 1H), 1.91–1.72 (m, 2H);

^{13}C NMR (126 MHz, $CDCl_3$) δ ppm 154.5, 151.9, 131.6, 120.0, 114.4, 112.1, 80.2, 65.5, 58.4, 57.2, 52.3, 46.5, 44.6, 31.0, 29.7, 28.7;

HRMS calculated for $C_{16}H_{24}N_3O_3S$ $(M + H)^+$ 338.1538; found 338.1517 (TOF MS ES^+).

5{1}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N
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S
N
O

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4E+07
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2E+07
2E+07
1E+07
5E+06
0
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9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
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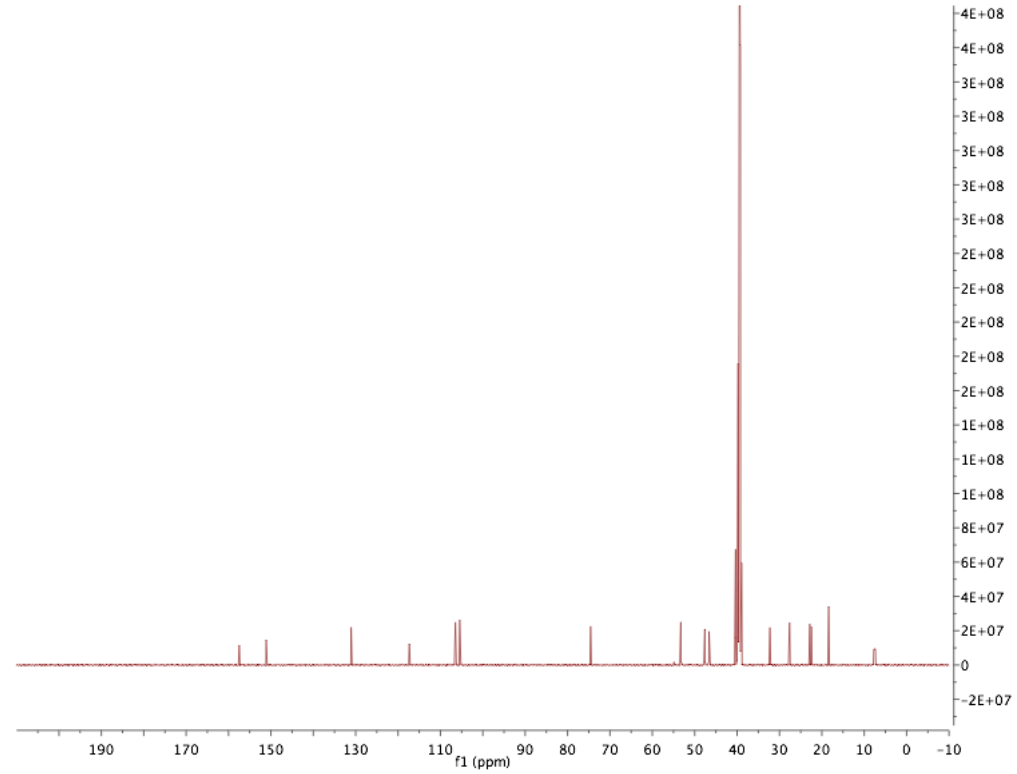
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)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4E+08
3E+08
3E+08
3E+08
3E+08
3E+08
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2E+08
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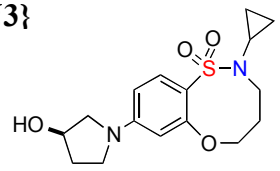
4E+07
2E+07
0
-2E+07
190
170
150
130
110
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

5{3}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O
S
N
HO
N
O

2E+08
2E+08
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2E+08
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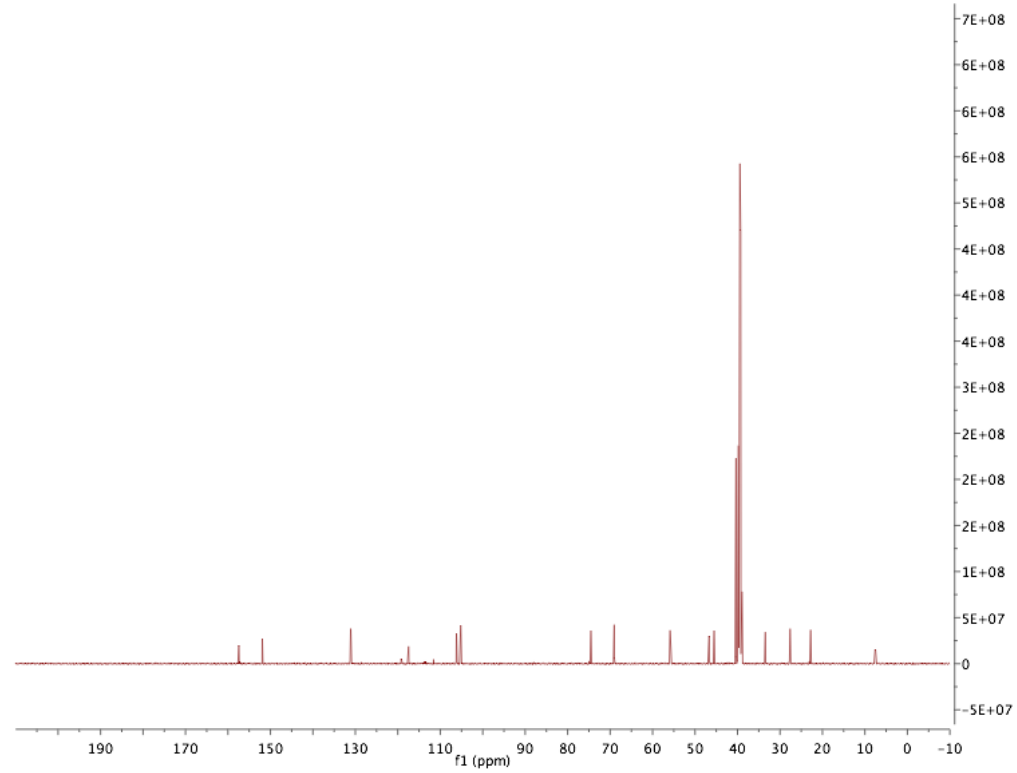
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)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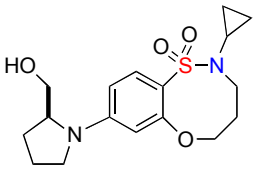
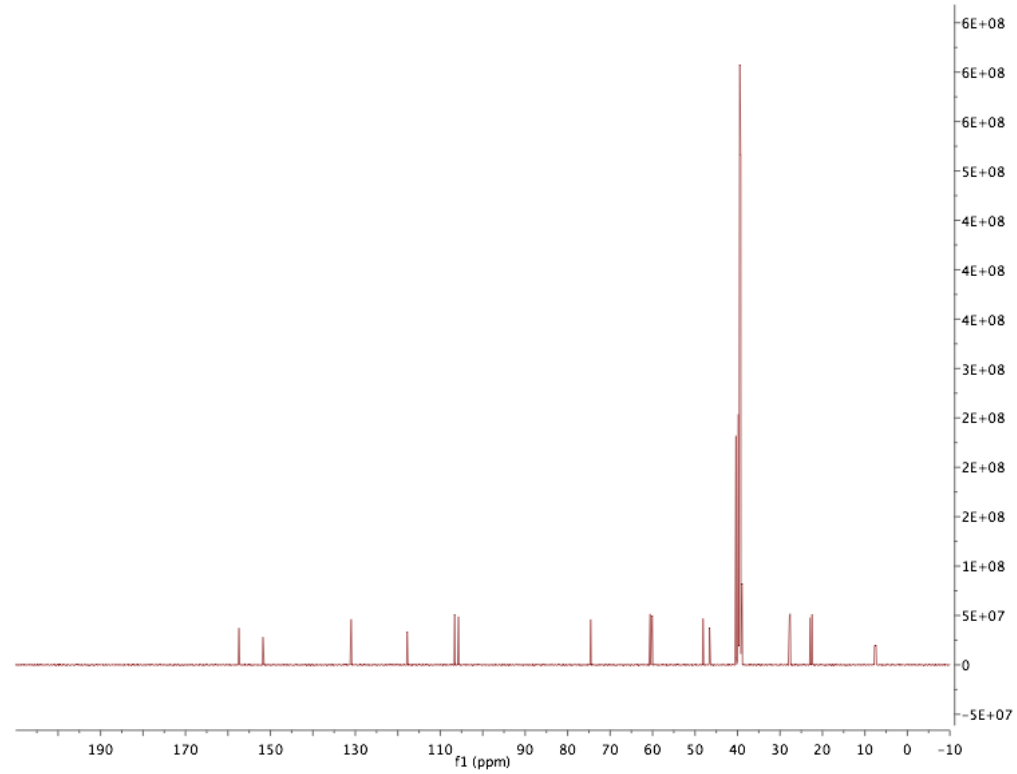
6E+08
6E+08
5E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
-5E+07
190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

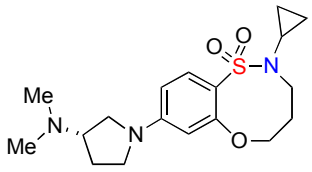
5{5}


HO
O
O
S
N
N
O

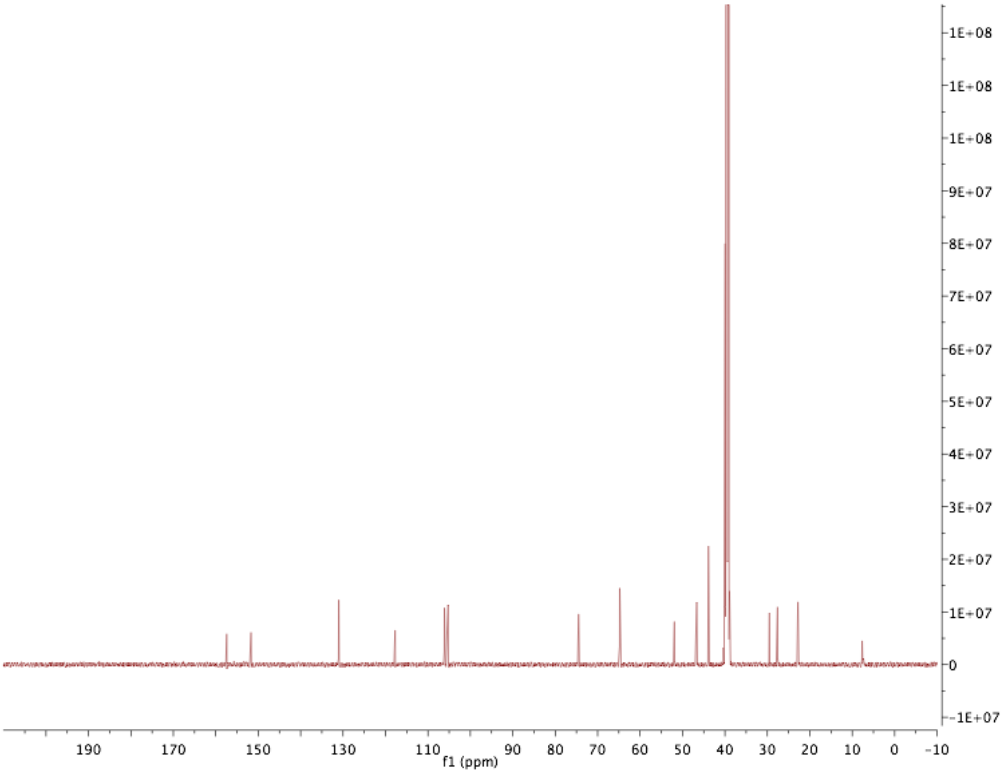
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
1E+08
1E+08
1E+08
1E+08
1E+08
9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
-1E+07
-2E+07
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


6E+08
6E+08
6E+08
5E+08
4E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
-5E+07
190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

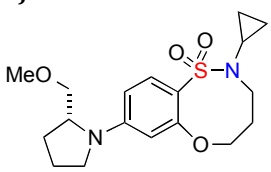
5{8}


O
O
S
N
Me
N
Me
N
O

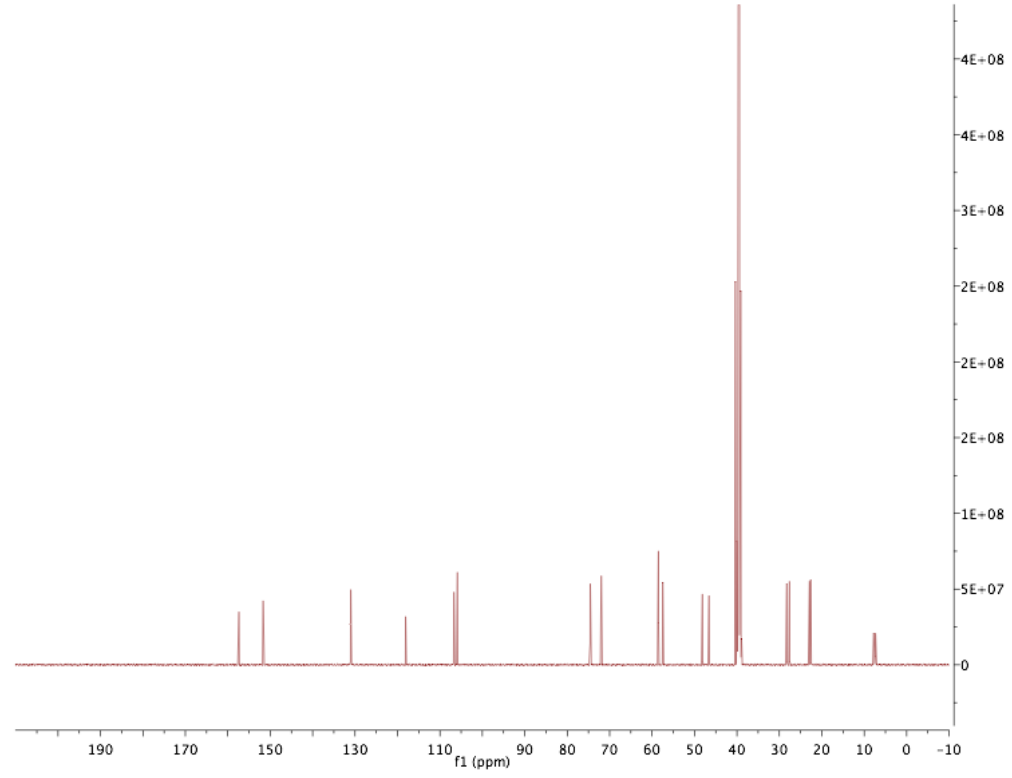
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


1E+08
1E+08
1E+08
9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
-1E+07
190
170
150
130
110
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

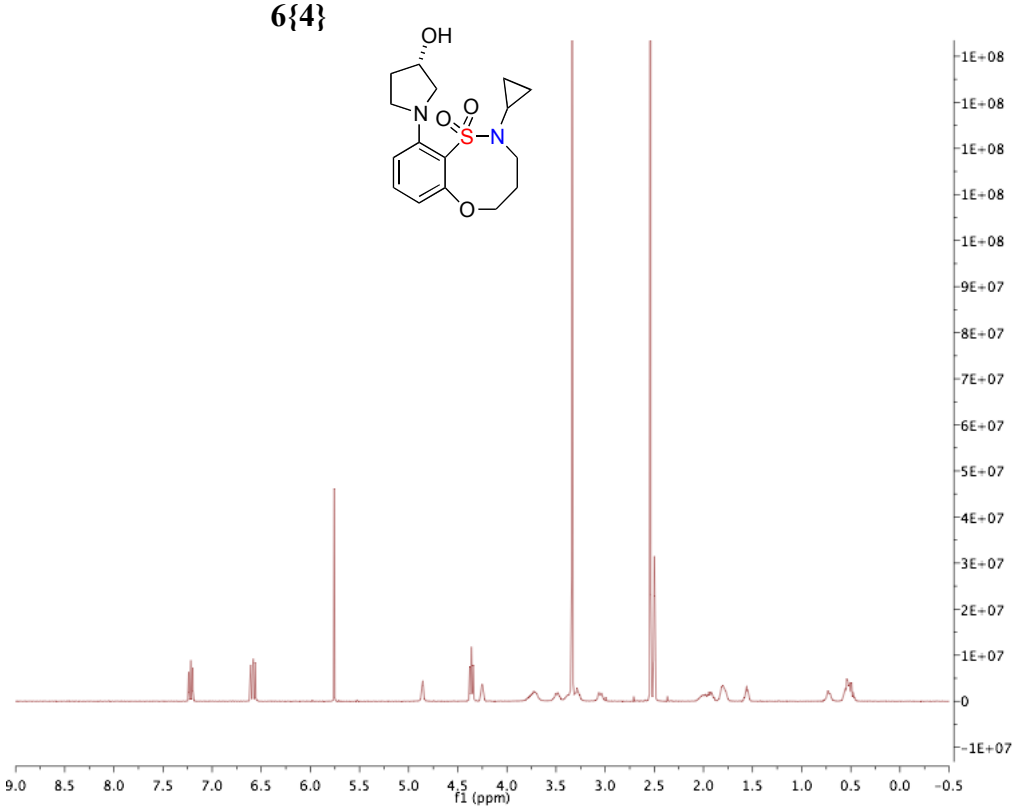
5{10}

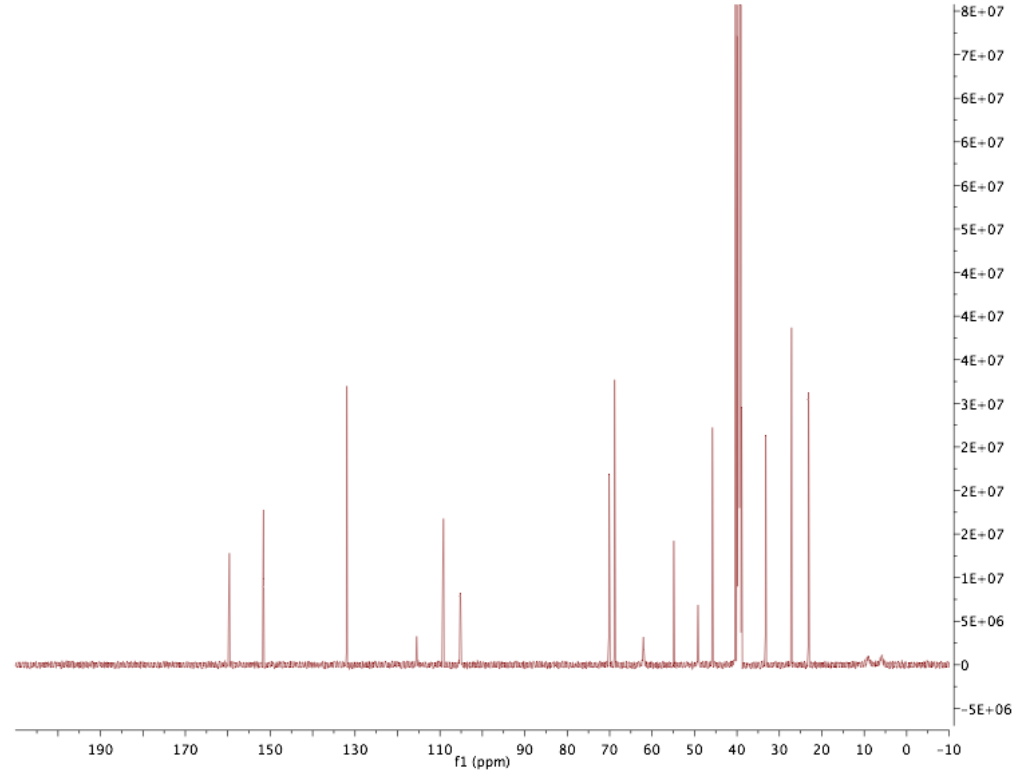

MeO
O
O
S
N
N
O

1E+08
9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
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 -0.5
f1 (ppm)

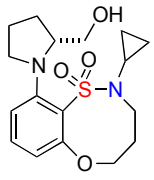

4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

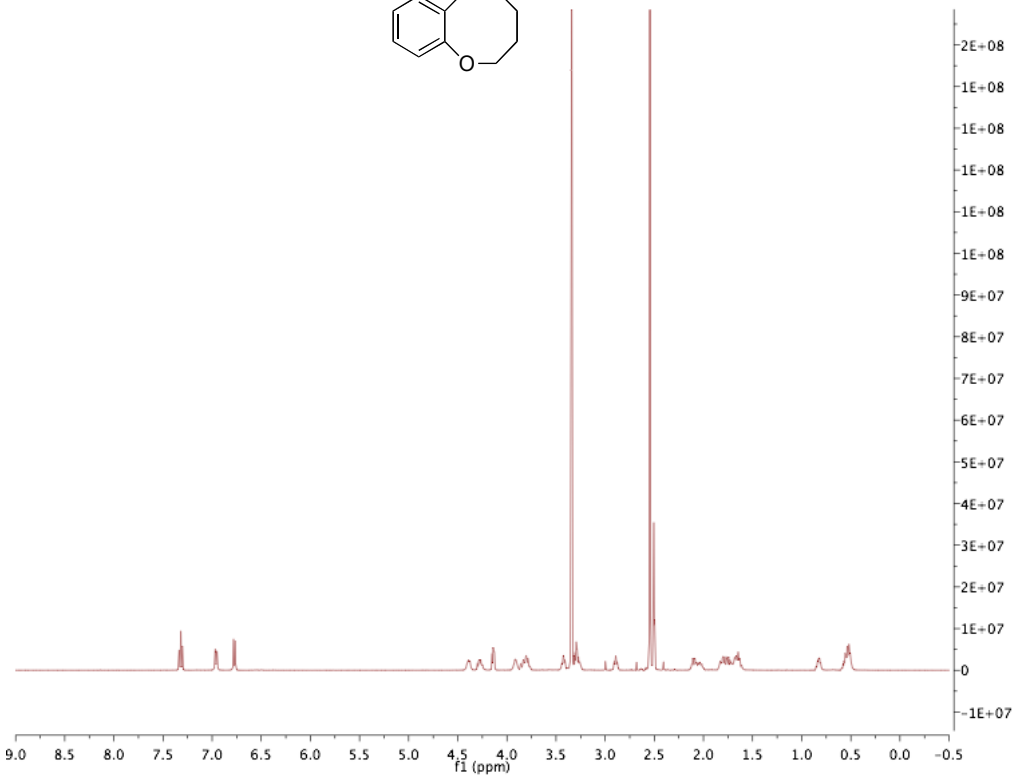
6{4}

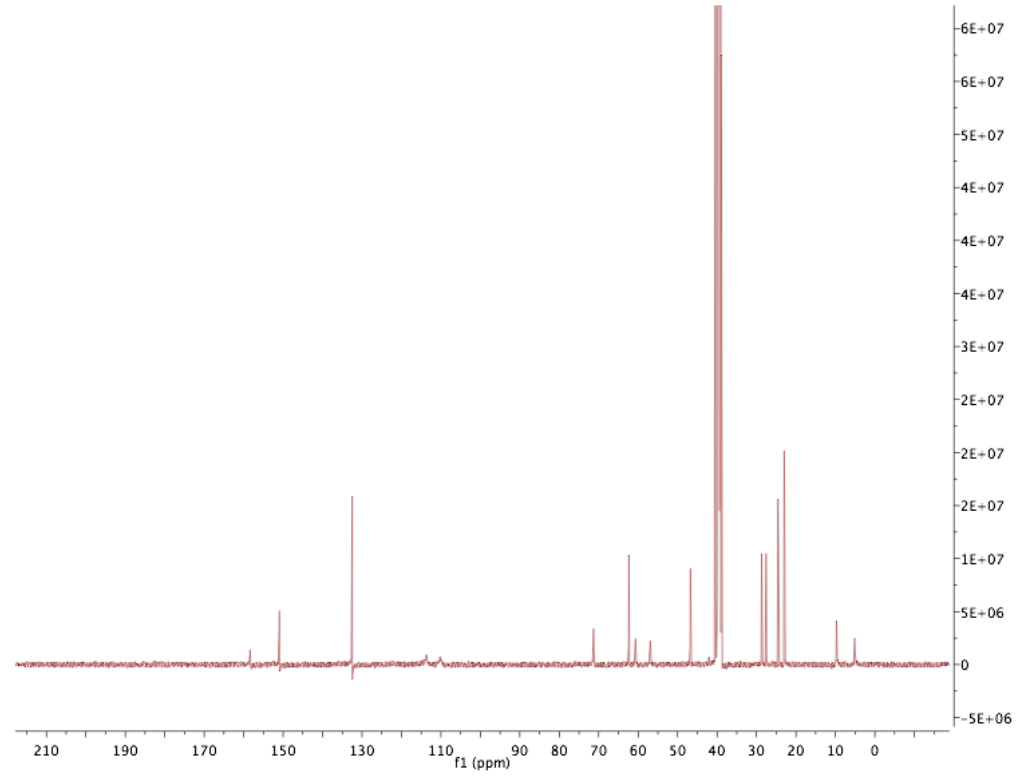

OH
N
O
O
S
N
O
1E+08
1E+08
1E+08
1E+08
1E+08
9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
-1E+07
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


8E+07
7E+07
6E+07
6E+07
6E+07
5E+07
4E+07
4E+07
4E+07
3E+07
2E+07
2E+07
2E+07
1E+07
5E+06
0
-5E+06
190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

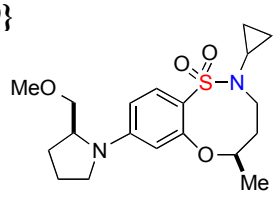
6{6}


OH
N
O
O
S
N
O

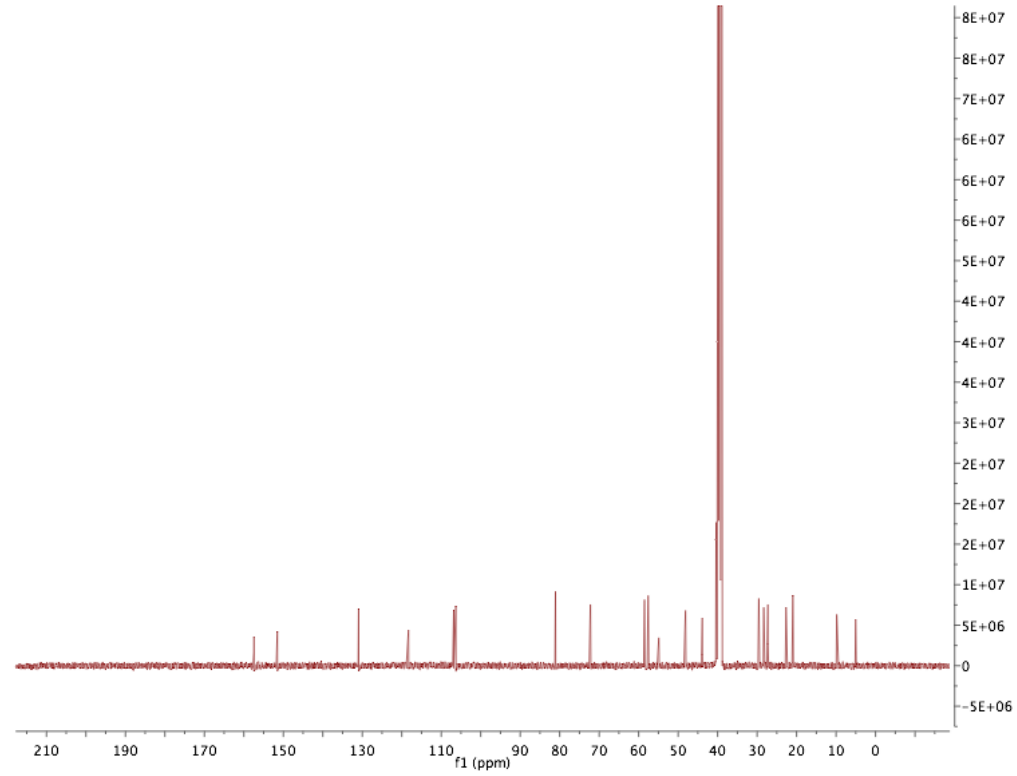

2E+08
1E+08
1E+08
1E+08
1E+08
1E+08
9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
-1E+07
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


6E+07
6E+07
5E+07
4E+07
4E+07
4E+07
3E+07
2E+07
2E+07
2E+07
1E+07
5E+06
0
-5E+06
210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

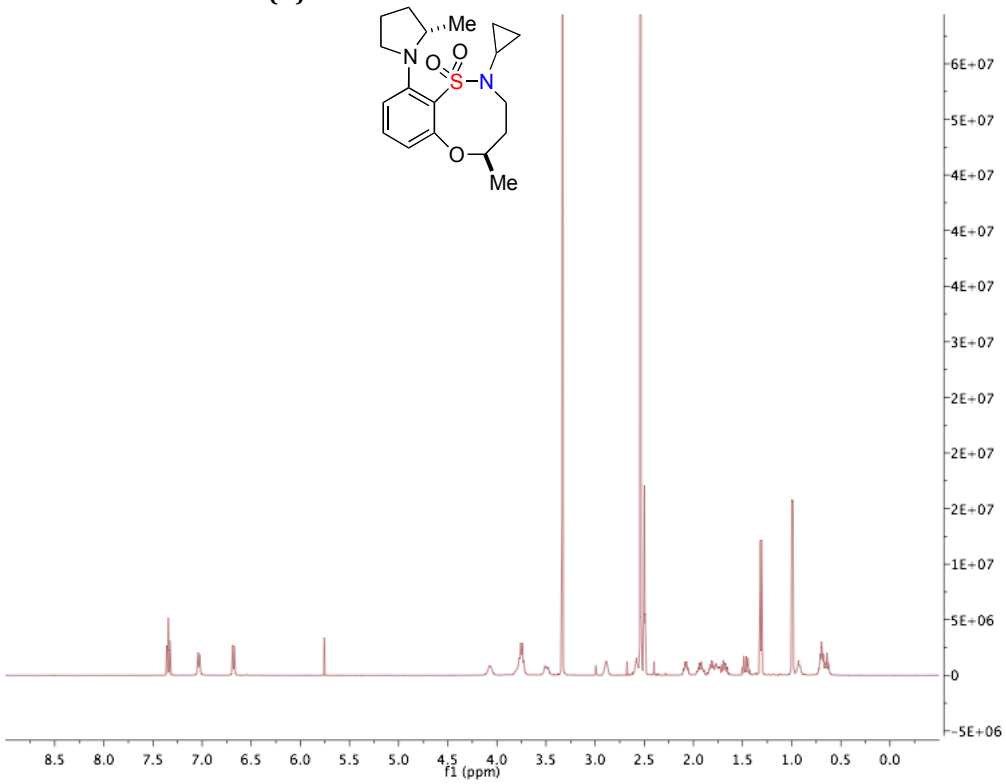
7{9}

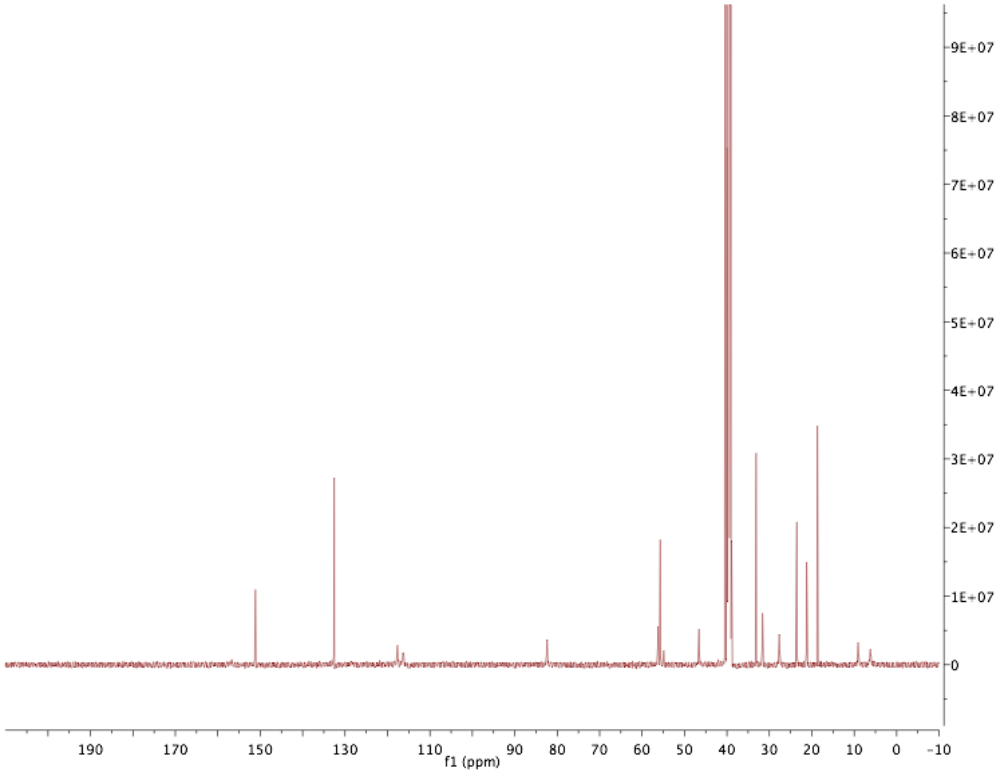

MeO
O
O
S
N
N
O
Me

6E+08
6E+08
5E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
-5E+07
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 -0.5
f1 (ppm)

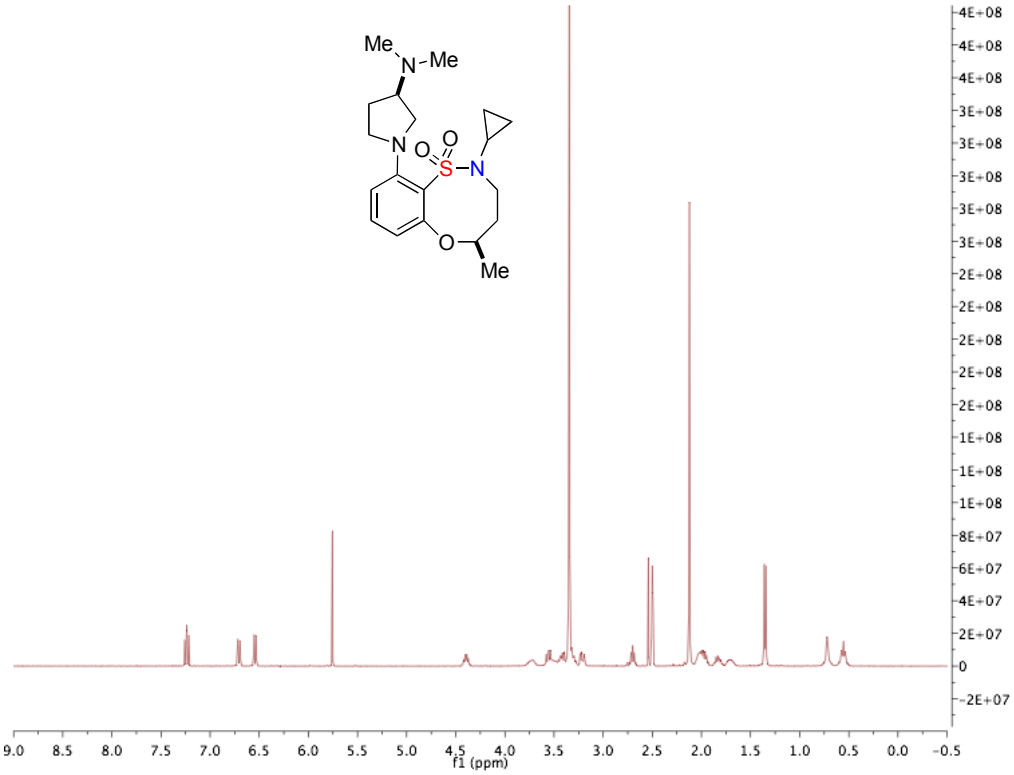

8E+07
8E+07
7E+07
6E+07
6E+07
6E+07
5E+07
4E+07
4E+07
4E+07
4E+07
3E+07
2E+07
2E+07
2E+07
1E+07
5E+06
0
-5E+06
210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

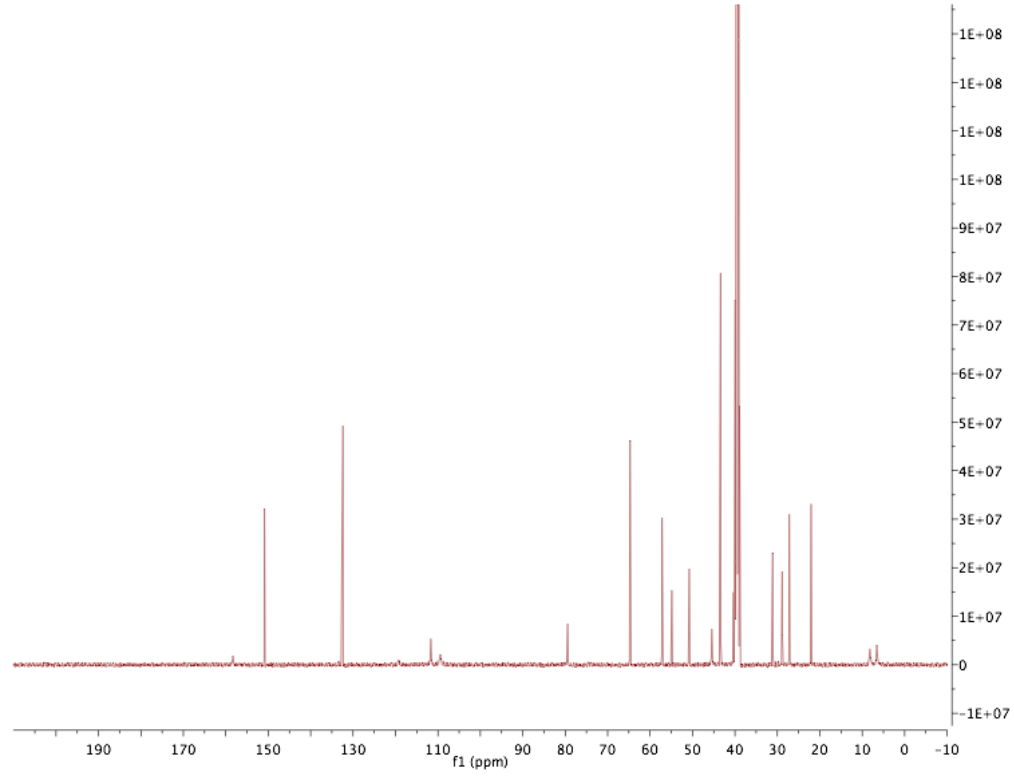
8{2}


Me
N
O
O
S
N
O
Me
6E+07
5E+07
4E+07
4E+07
4E+07
3E+07
2E+07
2E+07
2E+07
1E+07
5E+06
0
-5E+06
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)

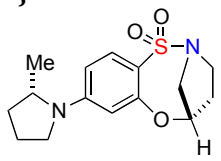

9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
190
170
150
130
110
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

8{7}

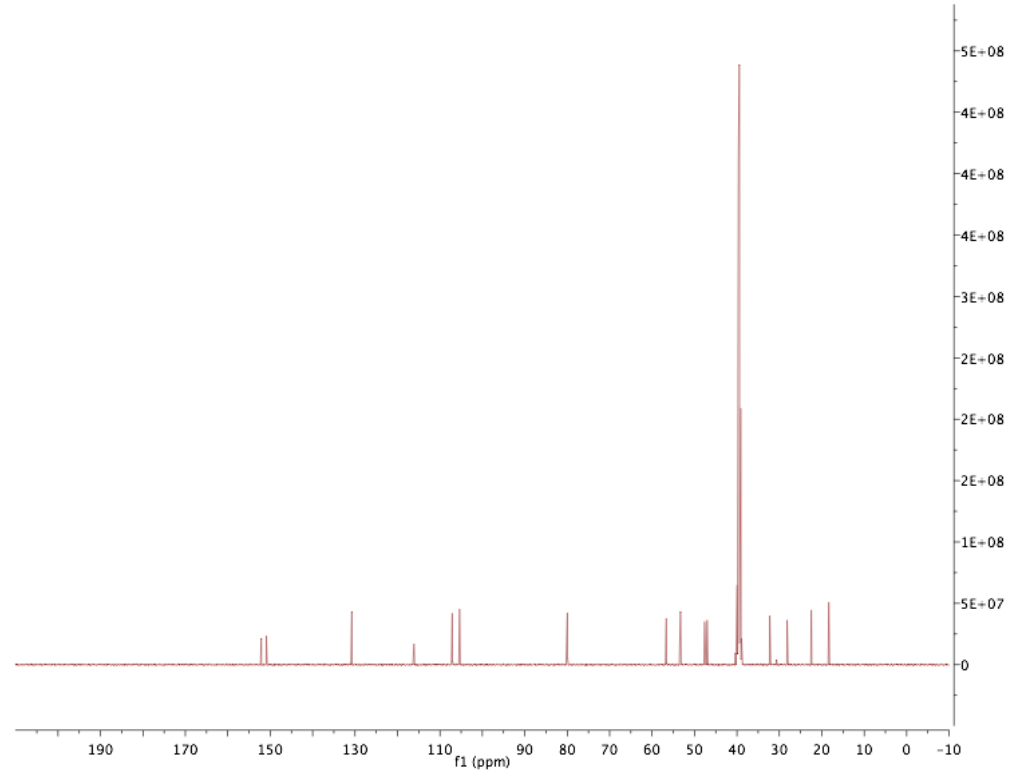




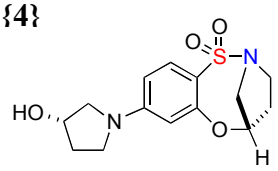
1{2}


O
O
S
N
Me
N
O
H

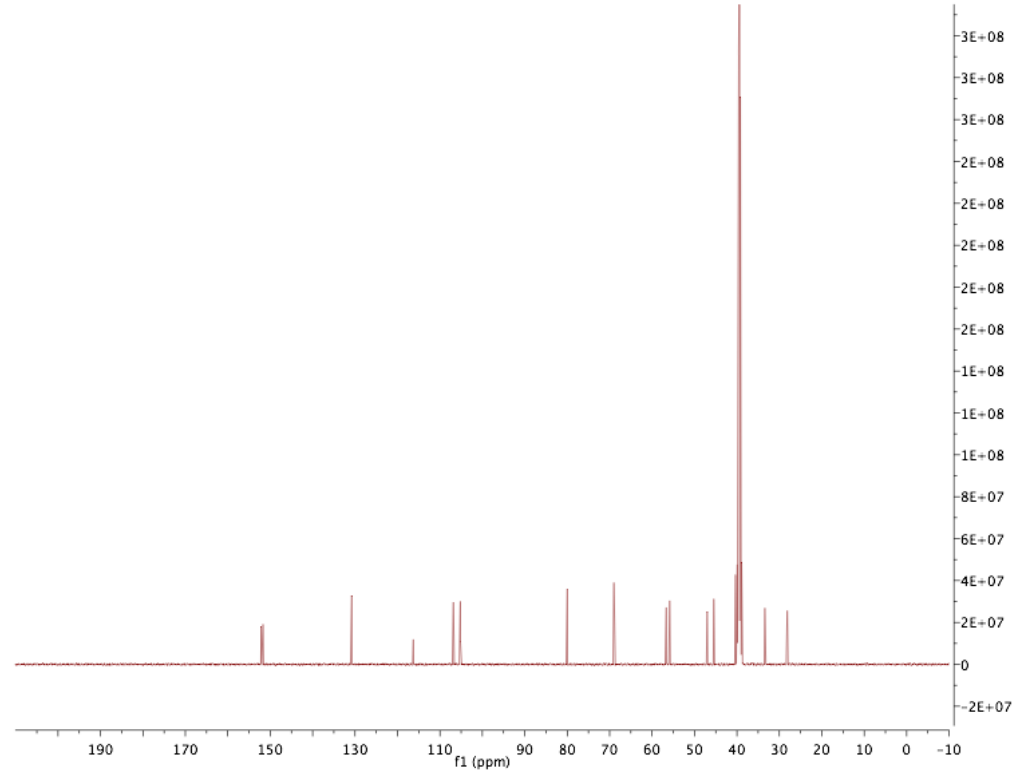
2E+08
2E+08
2E+08
1E+08
5E+07
0
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


5E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

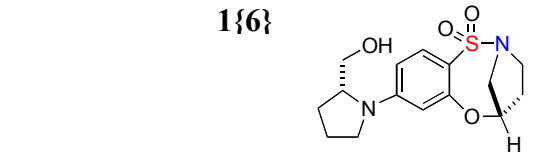
1{4}


O
O
S
N
HO
N
O
H

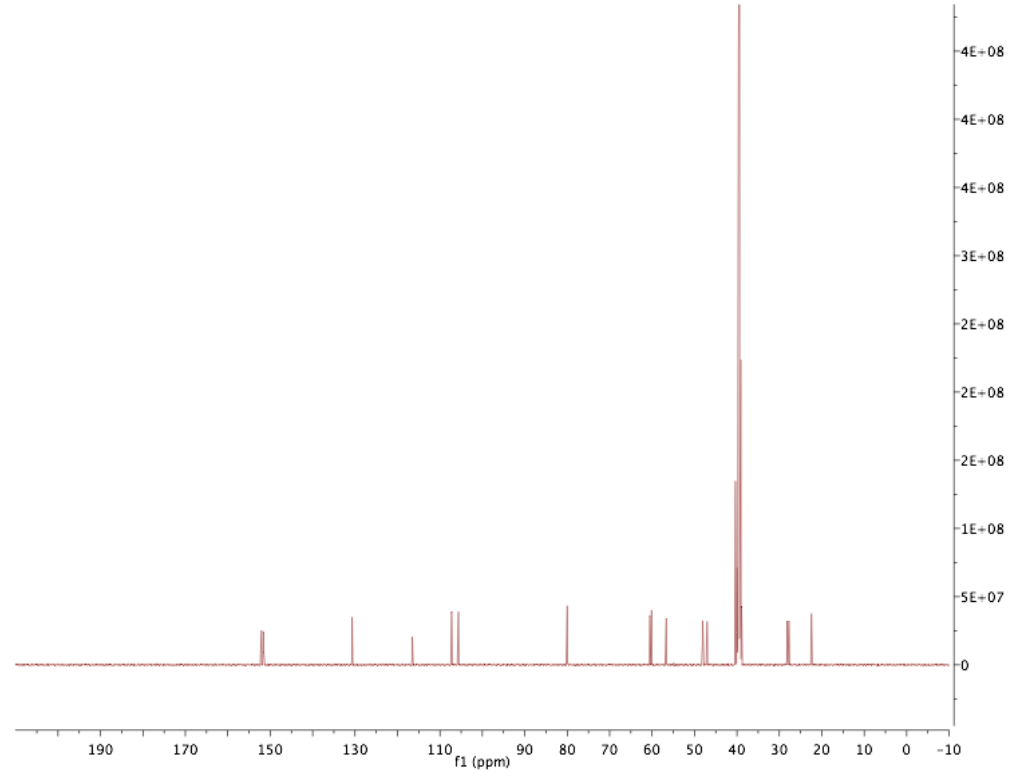
3E+08
3E+08
3E+08
3E+08
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
1E+08
1E+08
1E+08
8E+07
6E+07
4E+07
2E+07
0
-2E+07
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


3E+08
3E+08
3E+08
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
1E+08
1E+08
1E+08
8E+07
6E+07
4E+07
2E+07
0
-2E+07
190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

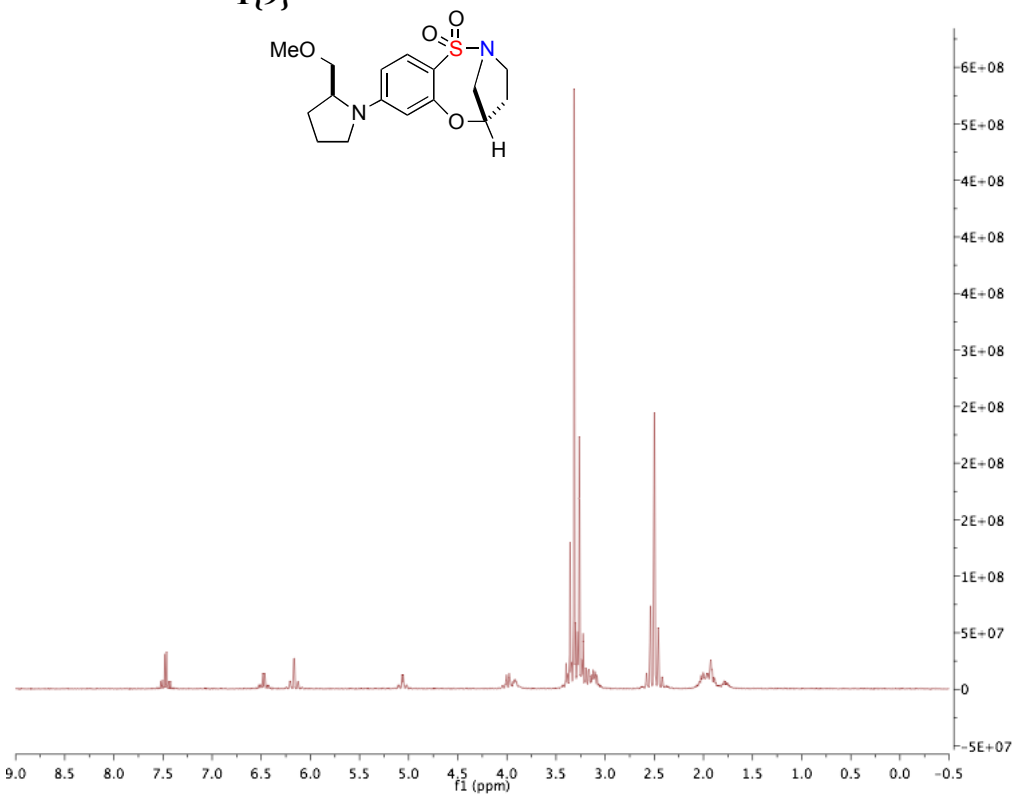
1{6}

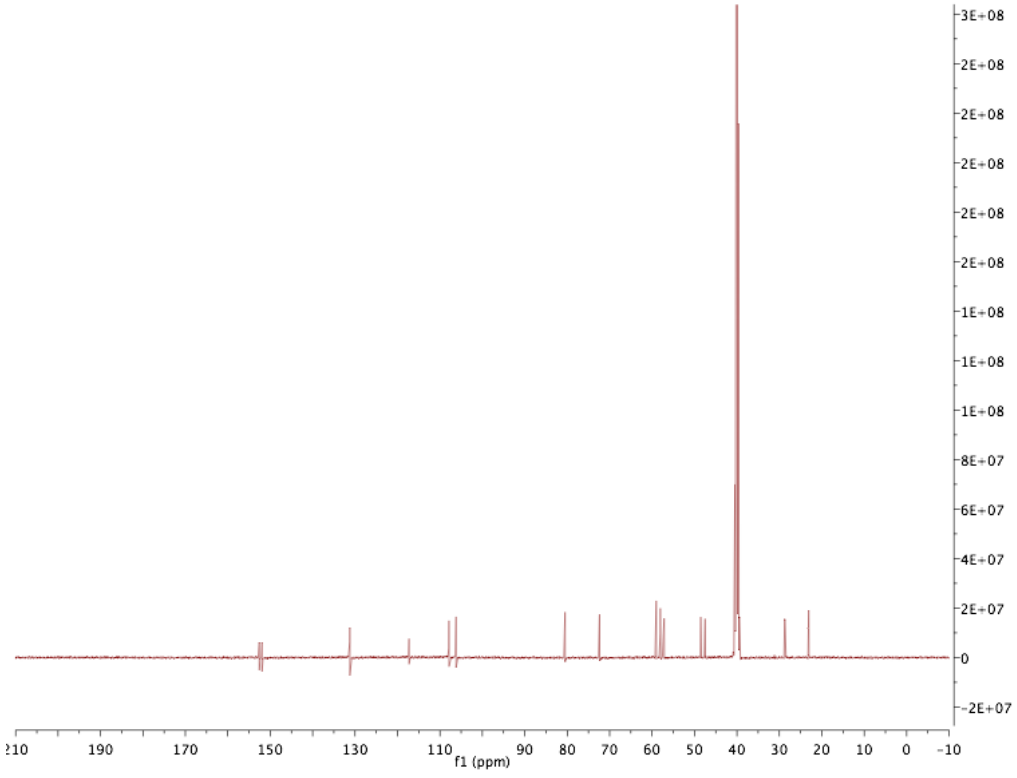

OH
O
O
S
N
N
O
H

2E+08
2E+08
1E+08
1E+08
1E+08
1E+08
1E+08
1E+08
9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
-1E+07
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 -0.5
f1 (ppm)

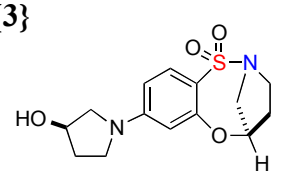

4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

1{9}

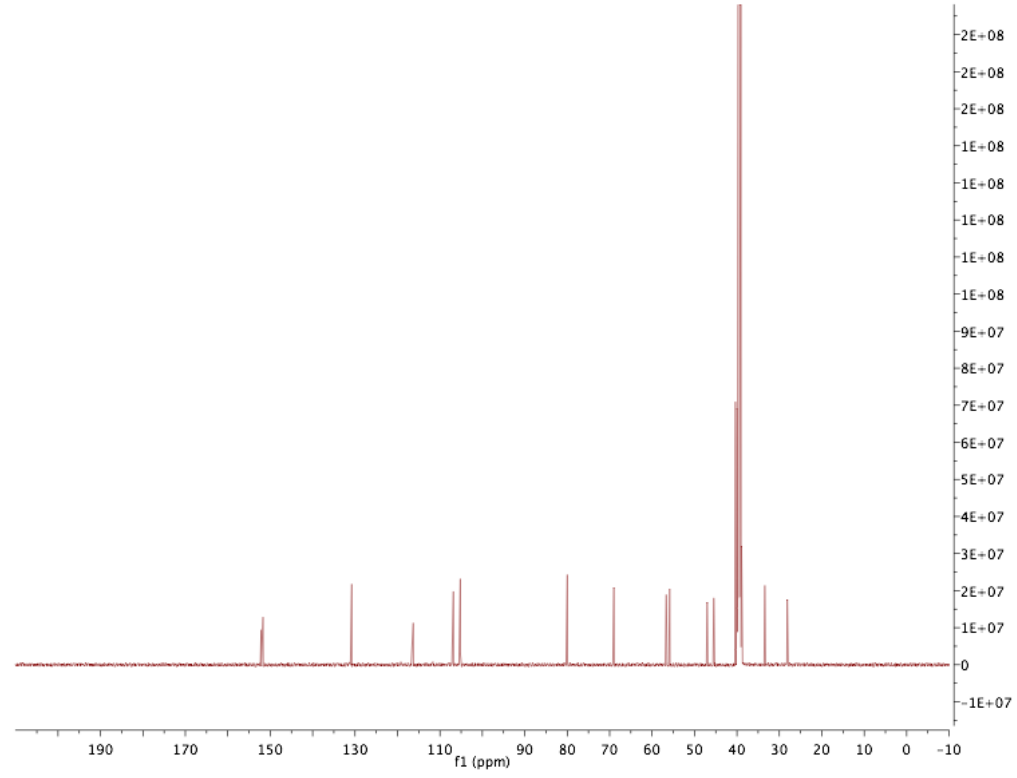

MeO
O
O
S
N
N
O
H
6E+08
5E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
-5E+07
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


3E+08
2E+08
2E+08
2E+08
2E+08
2E+08
1E+08
1E+08
1E+08
8E+07
6E+07
4E+07
2E+07
0
-2E+07
210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

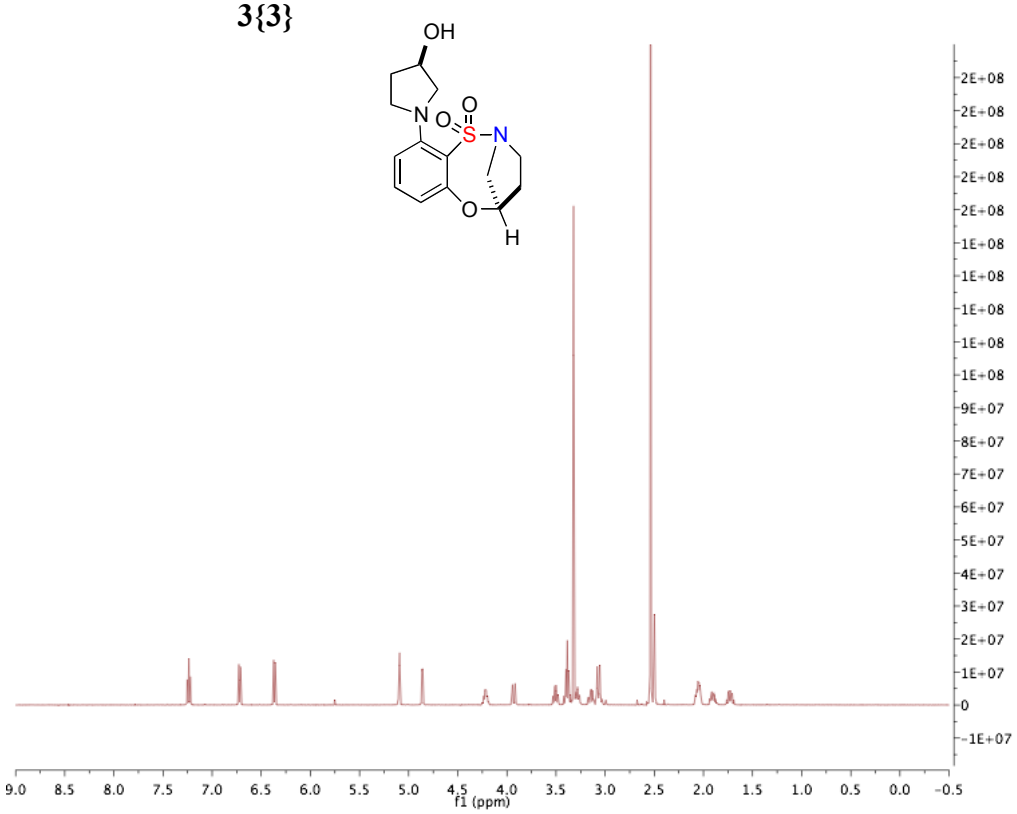
2{3}

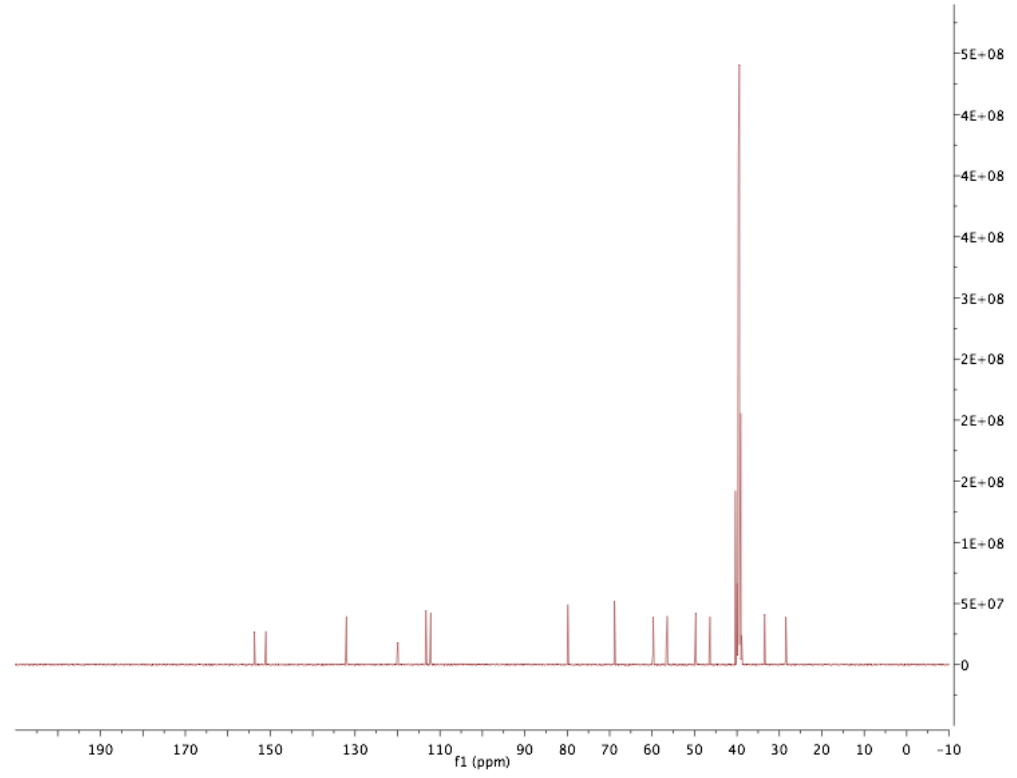

O
O
S
N
HO
N
O
H

2E+08
1E+08
9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
-1E+07
-2E+07
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 -0.5
f1 (ppm)

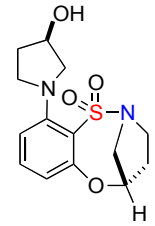

2E+08
1E+08
9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
-1E+07
190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

3{3}

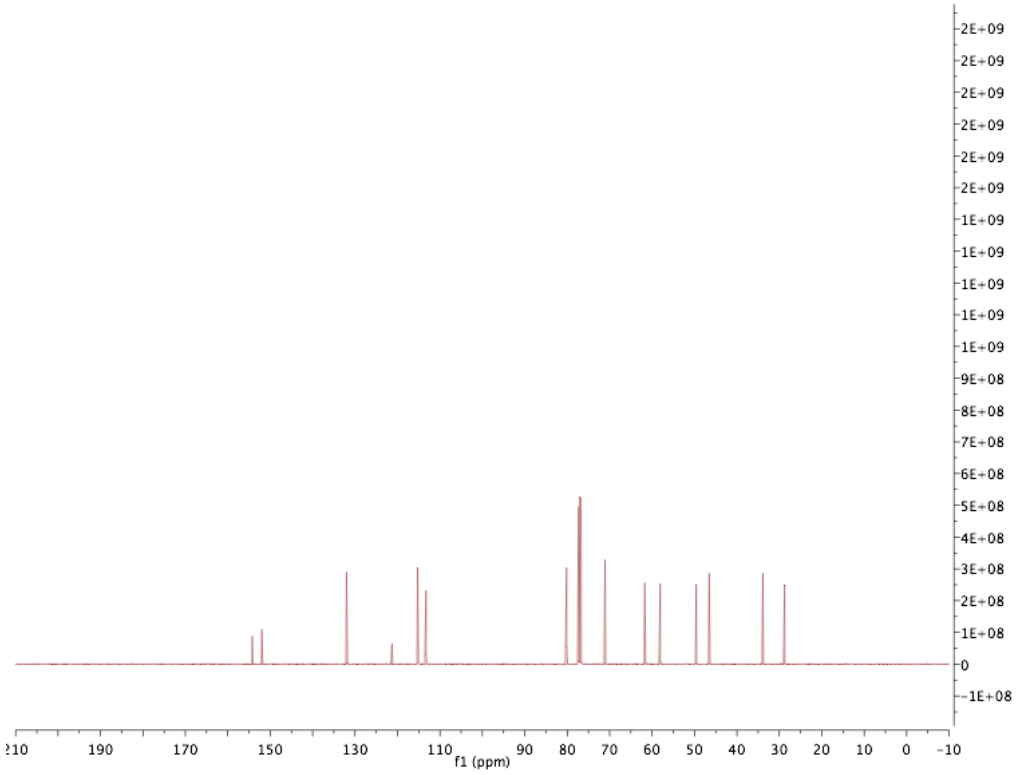

OH
N
O
O
S
N
O
H
2E+08
2E+08
2E+08
2E+08
2E+08
1E+08
1E+08
1E+08
1E+08
1E+08
9E+07
8E+07
7E+07
6E+07
5E+07
4E+07
3E+07
2E+07
1E+07
0
-1E+07
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


5E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

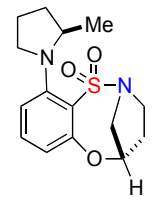
4{3}


OH
N
O
O
S
N
O
H

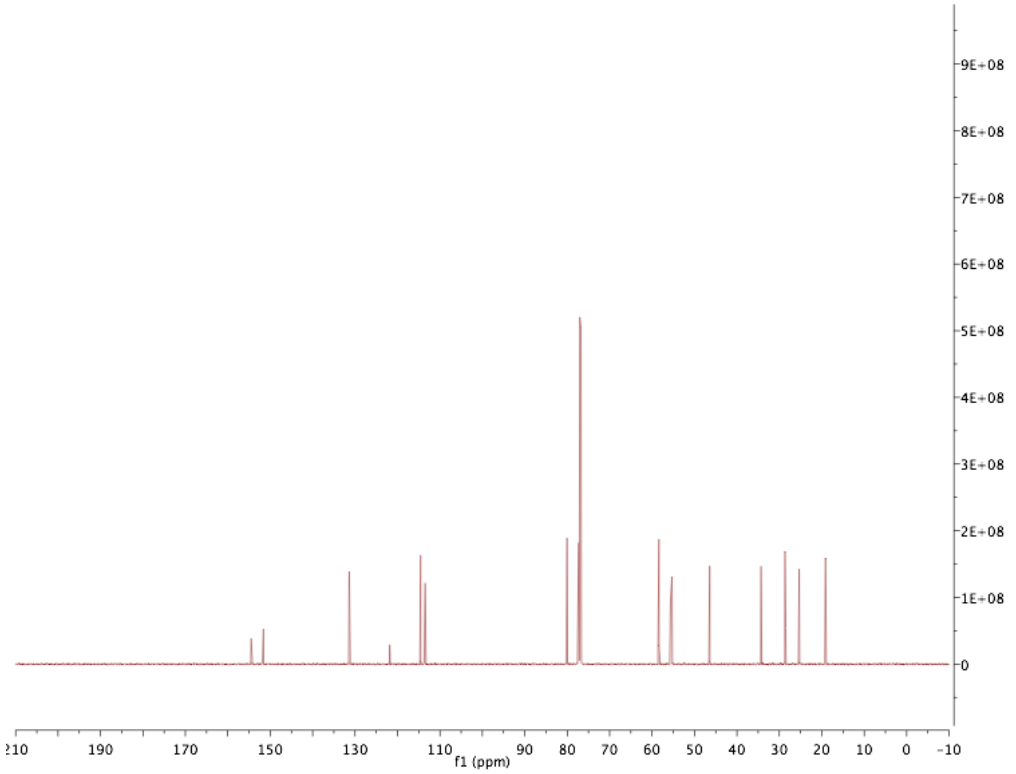
2E+09
2E+09
2E+09
2E+09
2E+09
2E+09
1E+09
1E+09
1E+09
1E+09
1E+09
1E+09
9E+08
8E+08
7E+08
6E+08
5E+08
4E+08
3E+08
2E+08
1E+08
0
-1E+08
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


2E+09
2E+09
2E+09
2E+09
2E+09
2E+09
2E+09
1E+09
1E+09
1E+09
1E+09
1E+09
1E+09
1E+09
9E+08
8E+08
7E+08
6E+08
5E+08
4E+08
3E+08
2E+08
1E+08
0
-1E+08
210
190
170
150
130
110
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

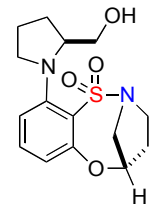
4{1}


Me
N
O
O
S
N
O
H

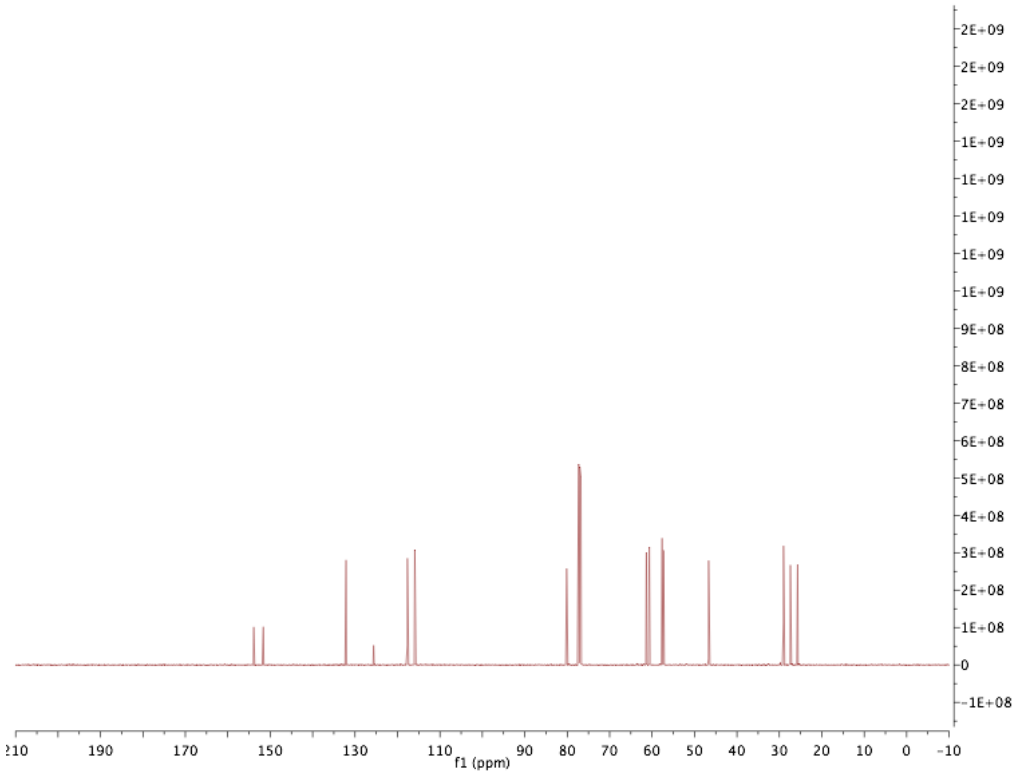
1E+09
1E+09
9E+08
8E+08
7E+08
6E+08
5E+08
4E+08
3E+08
2E+08
1E+08
0
-1E+08
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


9E+08
8E+08
7E+08
6E+08
5E+08
4E+08
3E+08
2E+08
1E+08
0
210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

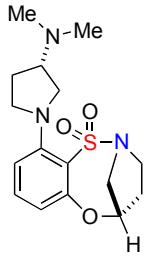
4{5}


OH
N
O
O
S
N
O
H

3E+09
3E+09
3E+09
3E+09
3E+09
2E+09
2E+09
2E+09
2E+09
2E+09
2E+09
1E+09
1E+09
1E+09
8E+08
6E+08
4E+08
2E+08
0
-2E+08
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 -0.5
f1 (ppm)


2E+09
2E+09
2E+09
1E+09
1E+09
1E+09
1E+09
1E+09
1E+09
9E+08
8E+08
7E+08
6E+08
5E+08
4E+08
3E+08
2E+08
1E+08
0
-1E+08
210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

4{8}


Me
N
Me
N
O
O
S
N
O
H

9E+08
8E+08
7E+08
6E+08
5E+08
4E+08
3E+08
2E+08
1E+08
0
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 -0.5
f1 (ppm)

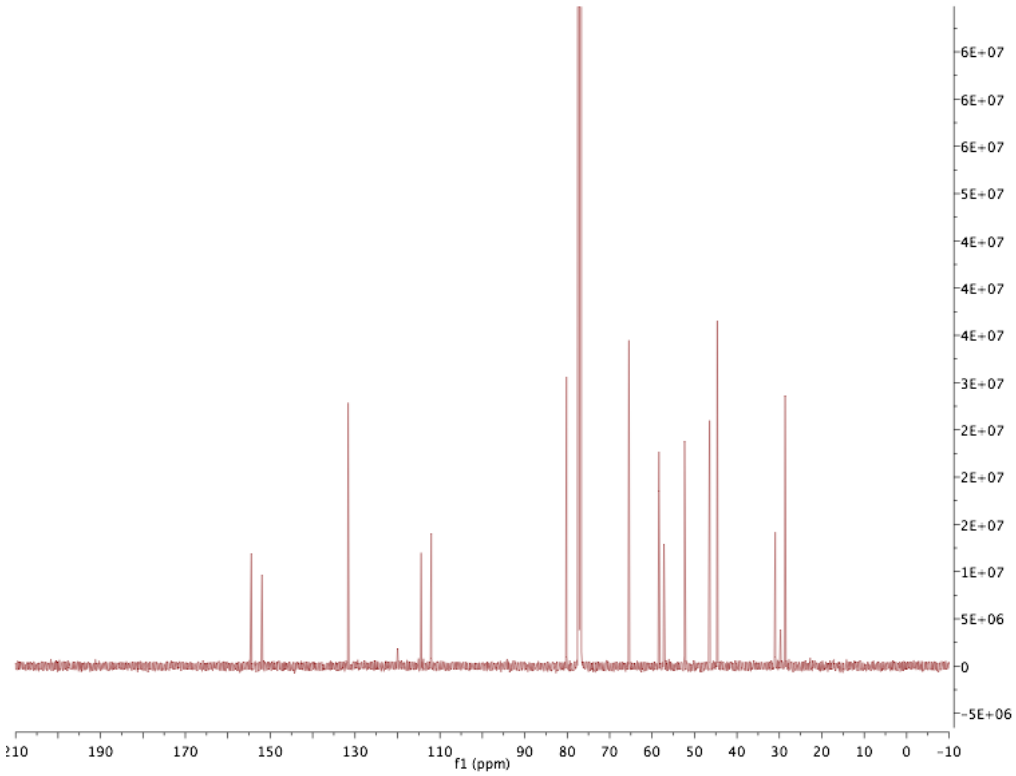

6E+07
6E+07
6E+07
5E+07
4E+07
4E+07
4E+07
3E+07
2E+07
2E+07
2E+07
1E+07
5E+06
0
-5E+06
210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

Table of mass spectroscopy data, final mass and purity for all library compounds.

Comp.	HRMS expected m/z $(M)^+$	HRMS found m/z $(M + H)^+$	Mass (mg)[1]	Purity (%)
1{1}	308.1195	309.1271	71.7	100
1{2}	308.1195	309.1243	73.4	100
1{3}	310.0987	311.1057	79.5	99.8
1{4}	310.0987	311.1032	76.7	99.8
1{5}	324.1144	325.1189	73.6	99.7
1{6}	324.1144	325.1183	90.2	99.6
1{7}	337.1460	338.1500	21.2	99.1
1{8}	337.1460	338.1493	94.9	100
1{9}	338.1300	339.1345	84.7	100
1{10}	338.1300	339.1363	93.9	100
2{1}	308.1195	309.1249	80.5	99.6
2{2}	308.1195	309.1248	69.8	99.5
2{3}	310.0987	311.1014	70.0	99.4
2{4}	310.0987	311.1046	46.1	98.7
2{5}	324.1144	325.1216	83.8	99.1
2{6}	324.1144	325.1199	82.9	99
2{7}	337.1460	338.1511	78.5	99.2
2{8}	337.1460	338.1511	18.2	98.5
2{9}	338.1300	339.1357	39.6	99.9
2{10}	338.1300	339.1364	78.8	100
3{1}	308.1195	309.1248	70.1	99.5
3{2}	308.1195	309.1262	64.5	99.6
3{3}	310.0987	311.1028	49.3	100
3{4}	310.0987	311.1028	63.9	99.3
3{5}	324.1144	325.1205	72.1	99.6
3{6}	324.1144	325.1203	65.3	100
3{7}	337.1460	338.1520	69.4	99.1

3{8}	337.1460	338.1519	69.7	98.6
3{9}	338.1300	339.1353	80.6	99.7
3{10}	338.1300	339.1356	69.4	100
4{1}	308.1195	309.1259	70.8	99.1
4{2}	308.1195	309.1260	70.4	99
4{3}	310.0987	311.1051	54.1	99.7
4{4}	310.0987	311.1035	41.3	99.5
4{5}	324.1144	325.1194	72.9	100
4{6}	324.1144	325.1208	82.2	99.5
4{7}	337.1460	338.1516	83.7	98.6
4{8}	337.1460	338.1517	86.3	99.1
4{9}	338.1300	339.1367	88.5	99.1
4{10}	338.1300	339.1368	83.5	99.7
5{1}	336.1508	337.1580	79.8	100
5{2}	336.1508	337.1584	79.4	100
5{3}	338.1300	339.1339	75.8	100
5{4}	338.1300	339.1344	79.1	100
5{5}	352.1457	353.1510	85.7	100
5{6}	352.1457	353.1508	83.1	100
5{7}	365.1773	366.1813	18.7	98.2
5{8}	365.1773	366.1826	49.2	99.9
5{9}	366.1613	367.1661	85.3	99.1
5{10}	366.1613	367.1680	83.7	99.1
6{1}	336.1508	337.1581	66.1	98.8
6{2}	336.1508	337.1578	69.5	98
6{3}	338.1300	339.1376	77.2	97.6
6{4}	338.1300	339.1356	61.0	97.7
6{5}	352.1457	353.1501	68.6	99.7
6{6}	352.1457	353.1519	67.7	99.6
6{7}	365.1773	366.1834	76.2	96.9
6{8}	365.1773	366.1840	75.2	98.1

6{9}	366.1613	367.1668	76.1	100
6{10}	366.1613	367.1677	81.5	99.9
7{1}	350.1664	351.1730	72.7	99
7{2}	350.1664	351.1709	44.2	99.5
7{3}	352.1457	353.1500	74.0	97.7
7{4}	352.1457	353.1539	61.8	97.7
7{5}	366.1613	367.1680	76.9	98.7
7{6}	366.1613	367.1686	76.7	98.6
7{7}	379.1930	380.1978	46.5	99.5
7{8}	379.1930	380.1995	77.9	99.3
7{9}	380.1770	381.1831	67.4	99.9
7{10}	380.1770	381.1830	92.6	100
8{1}	350.1664	351.1712	50.8	98.6
8{2}	350.1664	351.1700	33.9	98.6
8{3}	352.1457	353.1500	49.9	99.6
8{4}	352.1457	353.1517	42.7	99.6
8{5}	366.1613	367.1684	70.1	99.6
8{6}	366.1613	367.1682	46.1	99.4
8{7}	379.1930	380.1976	37.9	95.5
8{8}	379.1930	380.1981	127.4	97.3
8{9}	380.1770	381.1844	34.6	99.6
8{10}	380.1770	381.1821	22.3	98.9

[1]Low yields obtained are due to several reasons including:

1. Peaks having bad shouldering problems
2. Only a small amount of the peak that satisfies the 90% purity threshold
3. Mechanical/instrumental error: over-pressured.

In silico analysis

Sketched electronic versions of the library compounds were imported into the Tripos Molecular Spreadsheet [2] wherein standard Lipinski's rule of five parameters (molecular weight, ClogP, number of H-acceptors, and number of H-donors [3]) plus the number of rotatable bonds and polar surface area were computed. Lipinski violations were specified according to molecular weight > 500, ClogP > 5.0, number of acceptors > 10, number of donors > 5, and number of rotatable bonds > 5. The structures were then exported into SDF format and converted into three-dimensional protonated structures via Concord [4]. Absorption, distribution, metabolism and excretion (ADME) profiles of these compounds were then generated via Volsurf [5]. Descriptors were generated by using three probes (water, hydrophobic and carbonyl oxygen) with a grid space distribution of 1.0 Å. Predictions were then projected onto internal ADME models at the five-component level. Finally, diversity analysis was carried out by using DiverseSolutions [6] using standard H-aware 3D BCUT descriptors. The library was then projected onto a chemical space defined by the following descriptors: gastchrg_invdist2_000.550_K_L, gastchrg_invdist6_000.500_K_H, haccept_invdist2_001.000_K_H, tabpolar_invdist_000.250_K_H, tabpolar_invdist_000.500_K_L and populated (for comparison) by a recent version of the MLSMR screening set (ca. 7/2010; ~330,000 unique chemical structures). Diversity scores (*div(A)*) for our library were then generated for each of our compounds (*A*) according to the expression:

$$div(A) = \frac{pop[Cell(A)]}{\sum_{i \in Occ} pop(i) / N_{occ}}$$

where N_{occ} is the number of cells occupied by PubChem compounds in an evenly distributed 10×10×10×10×10 grid decomposition of the chemistry space, and *pop(i)* is the population of cell *i*.

Molecule	CLOGP	Mol.Wt	Acceptor	Donor	Rot Bond	LIP_VIOLS	PSA	DIVS	BBB	SOLY	CACO2	SP_S	SP_P	PB	VOLD	HERG	Sol_DMSO	METSTAB
1{1}	2.31	308.40	4	1	1	0	82.29	0.12	0.81	-4.32	0.86	0.28	0.64	76.01	-0.27	0.52	0.69	-0.18
1{2}	2.31	308.40	4	1	1	0	82.30	0.12	0.79	-4.24	0.78	0.26	0.66	76.31	-0.23	0.46	0.77	-0.22
1{3}	0.45	310.37	5	2	2	0	131.01	0.13	-0.19	-3.64	0.29	0.48	0.11	64.50	-0.18	0.65	1.76	0.44
1{4}	0.45	310.37	5	2	2	0	130.95	0.13	-0.30	-3.63	0.23	0.50	0.17	63.82	-0.14	0.73	1.87	0.43
1{5}	1.07	324.40	5	2	3	0	134.37	0.39	-0.17	-3.38	0.35	0.43	0.24	62.71	-0.28	0.74	1.91	0.49
1{6}	1.07	324.40	5	2	3	0	130.54	0.39	0.03	-3.93	0.53	0.44	0.12	64.56	-0.40	0.44	1.71	0.37
1{7}	1.40	337.44	4	2	2	0	85.01	0.33	0.59	-4.40	0.67	0.19	0.42	74.82	-0.21	0.36	0.99	-0.29
1{8}	1.40	337.44	4	2	2	0	85.03	0.33	0.37	-4.13	0.66	0.19	0.41	74.36	-0.36	0.39	0.87	-0.21
1{9}	1.83	338.42	5	1	3	0	91.49	0.13	0.40	-3.90	0.63	0.26	0.52	69.78	-0.41	0.69	1.18	0.09
1{10}	1.83	338.42	5	1	3	0	90.32	0.13	0.55	-4.30	0.72	0.27	0.45	74.93	-0.33	0.46	1.10	-0.23
2{1}	2.31	308.40	4	1	1	0	82.29	0.12	0.81	-4.32	0.86	0.28	0.64	76.01	-0.27	0.52	0.69	-0.18
2{2}	2.31	308.40	4	1	1	0	82.30	0.12	0.79	-4.24	0.78	0.26	0.66	76.31	-0.23	0.46	0.77	-0.22
2{3}	0.45	310.37	5	2	2	0	131.01	0.13	-0.19	-3.64	0.29	0.48	0.11	64.50	-0.18	0.65	1.76	0.44
2{4}	0.45	310.37	5	2	2	0	130.95	0.13	-0.30	-3.63	0.23	0.50	0.17	63.82	-0.14	0.73	1.87	0.43
2{5}	1.07	324.40	5	2	3	0	134.37	0.39	-0.17	-3.38	0.35	0.43	0.24	62.71	-0.28	0.74	1.91	0.49
2{6}	1.07	324.40	5	2	3	0	130.54	0.39	0.03	-3.93	0.53	0.44	0.12	64.56	-0.40	0.44	1.71	0.37
2{7}	1.40	337.44	4	2	2	0	85.01	0.33	0.59	-4.40	0.67	0.19	0.42	74.82	-0.21	0.36	0.99	-0.29
2{8}	1.40	337.44	4	2	2	0	85.03	0.33	0.37	-4.13	0.66	0.19	0.41	74.36	-0.36	0.39	0.87	-0.21
2{9}	1.83	338.42	5	1	3	0	91.49	0.13	0.40	-3.90	0.63	0.26	0.52	69.78	-0.41	0.69	1.18	0.09
2{10}	1.83	338.42	5	1	3	0	90.32	0.13	0.55	-4.30	0.72	0.27	0.45	74.93	-0.33	0.46	1.10	-0.23
3{1}	2.31	308.40	4	1	1	0	49.01	0.12	1.24	-4.39	1.10	0.25	0.86	86.48	-0.54	0.83	0.44	-0.31
3{2}	2.31	308.40	4	1	1	0	61.58	0.12	0.75	-4.01	1.09	0.19	0.92	81.13	-0.67	0.66	0.65	-0.03
3{3}	0.45	310.37	5	2	2	0	113.67	0.04	0.13	-3.50	0.59	0.35	0.46	75.01	-0.60	0.95	1.50	0.42
3{4}	0.45	310.37	5	2	2	0	113.88	0.04	-0.09	-3.27	0.51	0.38	0.48	74.02	-0.54	0.99	1.73	0.53
3{5}	1.07	324.40	5	2	3	0	87.94	0.25	0.56	-3.95	0.84	0.39	0.41	70.00	-0.35	0.37	1.28	0.23
3{6}	1.07	324.40	5	2	3	0	109.05	0.10	0.01	-4.16	0.74	0.36	0.34	74.32	-0.58	0.56	1.25	0.48
3{7}	1.40	337.44	4	2	2	0	68.08	0.33	0.79	-4.16	0.85	0.12	0.68	85.87	-0.44	0.63	0.94	-0.01
3{8}	1.40	337.44	4	2	2	0	68.46	0.33	0.82	-4.11	0.91	0.08	0.72	81.83	-0.53	0.53	0.77	0.01
3{9}	1.83	338.42	5	1	3	0	52.34	0.15	1.07	-4.60	1.08	0.26	0.72	78.22	-0.45	0.45	0.69	-0.33
3{10}	1.83	338.42	5	1	3	0	71.81	0.15	0.39	-4.14	0.93	0.24	0.67	74.36	-0.71	0.57	0.81	-0.09
4{1}	2.31	308.40	4	1	1	0	49.01	0.12	1.24	-4.39	1.10	0.25	0.86	86.48	-0.54	0.83	0.44	-0.31
4{2}	2.31	308.40	4	1	1	0	61.58	0.12	0.75	-4.01	1.09	0.19	0.92	81.13	-0.67	0.66	0.65	-0.03
4{3}	0.45	310.37	5	2	2	0	113.67	0.04	0.13	-3.50	0.59	0.35	0.46	75.01	-0.60	0.95	1.50	0.42
4{4}	0.45	310.37	5	2	2	0	113.88	0.04	-0.09	-3.27	0.51	0.38	0.48	74.02	-0.54	0.99	1.73	0.53
4{5}	1.07	324.40	5	2	3	0	87.94	0.25	0.56	-3.95	0.84	0.39	0.41	70.00	-0.35	0.37	1.28	0.23
4{6}	1.07	324.40	5	2	3	0	109.05	0.10	0.01	-4.16	0.74	0.36	0.34	74.32	-0.58	0.56	1.25	0.48
4{7}	1.40	337.44	4	2	2	0	68.08	0.33	0.79	-4.16	0.85	0.12	0.68	85.87	-0.44	0.63	0.94	-0.01
4{8}	1.40	337.44	4	2	2	0	68.46	0.33	0.82	-4.11	0.91	0.08	0.72	81.83	-0.53	0.53	0.77	0.01
4{9}	1.83	338.42	5	1	3	0	52.34	0.15	1.07	-4.60	1.08	0.26	0.72	78.22	-0.45	0.45	0.69	-0.33
4{10}	1.83	338.42	5	1	3	0	71.81	0.15	0.39	-4.14	0.93	0.24	0.67	74.36	-0.71	0.57	0.81	-0.09
5{1}	3.16	336.45	4	1	2	0	44.72	0.45	0.91	-4.50	0.91	0.14	0.66	86.30	-0.51	0.14	0.55	-0.40
5{2}	3.16	336.45	4	1	2	0	44.75	0.45	0.85	-4.62	0.96	0.15	0.62	84.26	-0.47	-0.03	0.58	-0.35
5{3}	1.31	338.42	5	2	3	0	93.34	0.04	0.06	-4.14	0.31	0.34	0.32	81.54	-0.33	0.58	1.50	0.01
5{4}	1.31	338.42	5	2	3	0	93.33	0.04	0.01	-4.04	0.30	0.33	0.34	76.43	-0.35	0.66	1.46	-0.04
5{5}	1.93	352.45	5	2	4	0	97.12	0.79	0.15	-4.35	0.46	0.30	0.17	72.36	-0.22	0.49	1.78	0.11
5{6}	1.93	352.45	5	2	4	0	96.63	0.79	0.19	-4.14	0.54	0.38	0.26	67.72	-0.23	0.60	1.74	0.22
5{7}	2.26	365.49	4	2	3	0	47.44	0.33	0.82	-4.71	0.68	0.09	0.49	83.36	-0.41	0.18	0.66	-0.56
5{8}	2.26	365.49	4	2	3	0	47.39	0.33	0.91	-4.89	0.72	0.04	0.48	83.16	-0.40	0.01	0.60	-0.61
5{9}	2.68	366.48	5	1	4	0	53.95	0.13	0.74	-4.78	0.74	0.11	0.50	84.42	-0.49	0.36	0.90	-0.42
5{10}	2.68	366.48	5	1	4	0	53.76	0.13	0.64	-4.67	0.76	0.14	0.52	78.18	-0.39	0.24	1.14	-0.43
6{1}	3.16	336.45	4	1	2	0	24.09	0.45	1.12	-5.07	1.35	-0.01	0.88	93.64	-0.82	0.19	0.10	-0.32
6{2}	3.16	336.45	4	1	2	0	25.72	0.45	1.13	-4.58	1.41	0.23	0.89	82.01	-0.71	0.01	0.41	-0.24
6{3}	1.31	338.42	5	2	3	0	72.90	0.28	0.02	-4.11	0.67	0.27	0.52	85.13	-0.61	0.80	1.44	0.14
6{4}	1.31	338.42	5	2	3	0	73.01	0.28	-0.06	-3.96	0.71	0.26	0.47	82.31	-0.55	0.66	1.67	0.43
6{5}	1.93	352.45	5	2	4	0	73.24	0.10	0.19	-4.46	0.77	0.25	0.45	81.75	-0.37	0.61	1.89	0.22
6{6}	1.93	352.45	5	2	4	0	60.10	0.13	0.30	-4.12	1.10	0.29	0.62	77.94	-0.63	0.24	1.43	0.16
6{7}	2.26	365.49	4	2	3	0	27.03	0.33	0.96	-5.08	1.05	0.00	0.63	95.81	-0.49	-0.16	0.83	-0.17
6{8}	2.26	365.49	4	2	3	0	27.10	0.33	0.90	-4.92	1.07	0.02	0.67	94.22	-0.50	0.03	0.81	-0.14
6{9}	2.68	366.48	5	1	4	0	31.99	0.15	0.83	-4.91	1.09	0.05	0.73	91.30	-0.63	0.33	0.98	-0.34
6{10}	2.68	366.48	5	1	4	0	25.16	0.17	0.91	-4.85	1.35	0.11	0.84	84.46	-0.61	-0.13	0.68	-0.28
7{1}	3.68	350.48	4	1	2	0	43.13	0.45	0.73	-4.54	0.96	0.07	0.70	85.66	-0.58	0.13	0.67	-0.48
7{2}	3.68	350.48	4	1	2	0	43.15	0.45	0.74	-4.49	1.01	0.09	0.66	81.46	-0.53	0.00	0.67	-0.37
7{3}	1.83	352.45	5	2	3	0	91.74	0.79	-0.11	-4.19	0.38	0.25	0.38	80.29	-0.40	0.55	1.62	-0.05
7{4}	1.83	352.45	5	2	3	0	91.73	0.79	-0.15	-4.11	0.38	0.24	0.41	76.13	-0.42	0.62	1.57	-0.11
7{5}	2.45	366.48	5	2	4	0	95.53	0.79	0.04	-4.32	0.51	0.25	0.22	70.80	-0.24	0.52	1.84	0.04
7{6}	2.45	366.48	5	2	4	0	95.04	0.79	-0.14	-4.19	0.55	0.31	0.27	69.69	-0.36	0.64	1.79	0.21
7{7}	2.78	379.52	4	2	3	0	45.84	0.33	0.65	-4.76	0.71	0.01	0.54	83.56	-0.46	0.15	0.83	-0.63
7{8}	2.78	379.52	4	2	3	0	45.79	0.33	0.73	-4.97	0.74	-0.03	0.53	83.74	-0.45	-0.03	0.76	-0.67
7{9}	3.20	380.50	5	1	4	0	52.35	0.13	0.61	-4.70	0.77	0.09	0.53	81.86	-0.49	0.42	0.98	-0.40
7{10}	3.20	380.50	5	1	4	0	52.17	0.13	0.48	-4.63	0.83	0.14	0.57	78.23	-0.49	0.39	1.07	-0.32
8{1}	3.68	350.48	4	1	2	0	22.49	0.45	1.26	-5.37	1.41	-0.06	0.87	93.74	-0.71	0.00	0.29	-0.61
8{2}	3.68	350.48	4	1	2	0	21.93	0.45	1.05	-4.86	1.40	0.15	0.89	86.02	-0.68	-0.01	0.55	-0.33

8{3}	1.83	352.45	5	2	3	0	71.30	0.79	0.00	-4.22	0.70	0.22	0.54	83.46	-0.63	0.73	1.38	-0.02
8{4}	1.83	352.45	5	2	3	0	71.42	0.79	-0.10	-4.03	0.75	0.21	0.50	81.02	-0.57	0.60	1.63	0.26
8{5}	2.45	366.48	5	2	4	0	71.68	0.89	0.28	-4.38	0.83	0.25	0.47	77.40	-0.41	0.53	1.59	0.10
8{6}	2.45	366.48	5	2	4	0	58.95	0.40	0.56	-4.48	1.09	0.27	0.63	79.78	-0.65	0.13	1.16	-0.09
8{7}	2.78	379.52	4	2	3	0	25.47	0.06	0.92	-5.11	1.09	-0.04	0.67	94.33	-0.54	-0.25	0.82	-0.29
8{8}	2.78	379.52	4	2	3	0	25.55	0.06	0.86	-4.97	1.10	-0.02	0.70	92.80	-0.55	-0.08	0.80	-0.25
8{9}	3.20	380.50	5	1	4	0	30.44	0.17	0.93	-4.81	1.14	0.07	0.73	86.24	-0.67	0.26	0.70	-0.39
8{10}	3.20	380.50	5	1	4	0	23.66	0.16	1.00	-4.67	1.24	0.18	0.81	80.85	-0.65	-0.07	0.64	-0.37
Averages	1.97	341.34	5	2	3	0	73.38	0.29	0.49	-4.29	0.79	0.22	0.53	78.49	-0.46	0.44	1.10	-0.06

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