

## Supporting Information

### **Biomimetic Organocatalytic Approach to 4-Arylquinolizidine Alkaloids and Application in the Synthesis of (-)-Lasubine II and (+)-Subcosine II**

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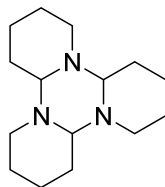
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**General:**

All commercially available reagents were used without purification. All reactions requiring anhydrous conditions were performed under an atmosphere of dry nitrogen using oven dried glassware. CH<sub>2</sub>Cl<sub>2</sub> were distilled from CaH<sub>2</sub>. Commercial precoated silica gel plates were used for TLC. All melting points are uncorrected. Silica gel for flash column chromatography was 230-400 mesh. IR spectra were recorded on a Bruker TENSOR 27 FT-IR instrument. <sup>1</sup>H NMR and <sup>13</sup>C NMR spectra were recorded on a Bruker AVANCE III 300 or an AVANCE 500 instrument. Mass spectra were obtained on an Agilent 1100 series LC/MSD (Trap) or an Agilent 6200 LC/MSD (TOF) chromatographic system. HPLC analyses were performed on a Waters chromatographic system using the Breeze software.

Enones **9** and **20** are commercially available and enones **13**<sup>1</sup> and **21**<sup>2</sup> were prepared according to the literature procedures. The synthesis of enones **14** and **15** is provided.

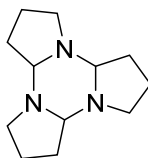
**Dodecahydro-1H,6H,11H-tripyrido[1,2-a:1',2'-c:1'',2''-e][1,3,5]triazine (10)**<sup>3</sup>

To a solution of *N*-chlorosuccinimide (3.78 g, 27.9 mmol) in diethyl ether (75 mL) was added a solution of distilled piperidine (2.48 mL, 25.2 mmol) in ether (50 mL) over 30 min at room temperature. The reaction mixture was stirred for 3 h at ambient temperature after which it was filtered through a pad of Celite<sup>®</sup> and the residue was washed with ether (1 x 25 mL). The combined filtrates were washed with water (3 x 25 mL), dried over anhydrous Na<sub>2</sub>SO<sub>4</sub> and concentrated without heating to give *N*-chloropiperidine.

An ethereal solution of the above *N*-chloropiperidine was added dropwise to ethanolic KOH (prepared by heating 2.1 eq of solid KOH in ethanol (15.0 mL) to 85°C) at room temperature and the reaction was left to stir overnight. The white precipitate of KCl formed was then separated by filtration through a pad of Celite<sup>®</sup>. The filtrate was concentrated to remove ethanol and the residue was diluted with ethyl acetate. The resulting solution was washed with water (3 x 20 mL) to provide the piperidine **10** (1.45 g, 70% yield over two steps). This is a mixture of monomeric (minor) and trimeric (major) forms (<sup>1</sup>H NMR). This material was used as such without purification.

$^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ): Trimer:  $\delta$  3.18-3.06 (m, 3H), 2.80 (dd, 3H,  $J = 7.2, 3.0$  Hz), 2.07-1.95 (m, 3H), 1.80-1.61 (m, 9H), 1.60-1.51 (m, 6H), 1.38-1.20 (m, 3H). Visible peaks for the monomer:  $\delta$  7.83-7.78 (m, 1H), 3.61-3.53 (m, 1H), 2.21-2.12 (m, 2H), 1.80-1.61 (m, 1H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ): Trimer  $\delta$  82.0, 46.4, 29.2, 25.8, 22.3. Visible peaks for the monomer:  $\delta$  163.2, 49.3, 28.8, 18.7; IR (neat): 2924, 2850, 2812, 2775, 2730, 2701, 1446, 1379, 1238, 1131, 1107, 1024, 889, 796  $\text{cm}^{-1}$ ; HRMS (ESI, pos.):  $m/z$  249.2198 (249.2205 calc. for  $\text{C}_{15}\text{H}_{27}\text{N}_3$  ( $\text{M}^+$ )), 250.2275 (250.2283 calc. for  $\text{C}_{15}\text{H}_{28}\text{N}_3$  ( $\text{M}+\text{H}$ ) $^+$ ).

#### Dodecahydrotripyrrolo[1,2-a:1',2'-c:1'',2''-e][1,3,5]triazine (**22**)<sup>4</sup>



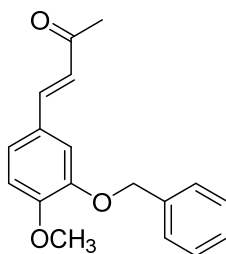
To a stirred mixture of pyrrolidine (2.0 mL, 24.35 mmol),  $\text{AgNO}_3$  (21.3 mg, 0.13 mmol) and  $\text{NaOH}$  (2.0 g, 50 mmol) in water (25 mL) at 0  $^\circ\text{C}$  was added dropwise a 25% aqueous solution of sodium peroxodisulfate  $\text{Na}_2\text{S}_2\text{O}_8$  (6.25 g, 26.3 mmol) in water (25 mL). The reaction mixture was stirred at ambient temperature for 2.5 h after which it was extracted with dichloromethane (3 x 10 mL). The organic layer was washed with brine following which it was dried overnight over  $\text{Na}_2\text{SO}_4$ - $\text{K}_2\text{CO}_3$  in the refrigerator. The organic layer was then concentrated without heating to provide **22** as a mixture of monomeric (minor) and trimeric (major) forms by  $^1\text{H}$  NMR. The crude material was used as such without purification.

IR (neat): 2955, 2871, 2784, 1677, 1613, 1458, 1391, 1337, 1292, 1232, 1194, 1178, 1141, 1065  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ): Trimer:  $\delta$  3.07-2.95 (m, 6H), 2.37-2.26 (m, 3H), 1.97-1.63 (m, 12H). Visible peaks for the monomer:  $\delta$  7.63-7.59 (m, 1H), 3.89-3.80 (m, 2H), 2.58-2.48 (m, 2H), 1.97-1.63 (m, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ): Trimer:  $\delta$  82.0, 45.9, 27.9, 20.3. Visible peaks for monomer:  $\delta$  166.9, 61.2, 36.6, 20.4; HRMS (ESI, pos.):  $m/z$  207.1734 (207.1735 calc. for  $\text{C}_{12}\text{H}_{21}\text{N}_3$  ( $\text{M}^+$ )),  $m/z$  208.1816 (208.1814 calc. for  $\text{C}_{12}\text{H}_{22}\text{N}_3$  ( $\text{M}+\text{H}$ ) $^+$ ).

#### General procedure for the synthesis of enones **14** and **15**:

To a solution of 1-(triphenylphosphoranylidene)-2-propanone in dichloromethane at 0 $^\circ\text{C}$  was added a solution of the aldehyde in dichloromethane and the mixture was left to stir overnight at room temperature. After consumption of the aldehyde (TLC), the solvent was removed in vacuo and the crude product was purified using flash column chromatography on silica gel (hexane/EtOAc, 9:1).

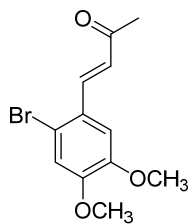
**(E)-4-(3-(Benzyloxy)-4-methoxyphenyl) but-3-en-2-one (14):**



Reaction of 3-(benzyloxy)-4-methoxybenzaldehyde (1.3 gm, 5.4 mmol) with 1-(triphenylphosphoranylidene)-2-propanone (2.4 gm, 8.1 mmol) in CH<sub>2</sub>Cl<sub>2</sub> for 48 hours according to the general procedure gave, after purification by flash chromatography on silica gel, 818 mg (55%) of **14** as a white solid.

Mp.: 111-113 °C; IR (neat): 3065, 3030, 2933, 2874, 2846, 1660, 1640, 1622, 1595, 1511, 1425, 1363, 1380, 1249, 1220, 1160, 1136, 1009, 980, 807, 739, 698 cm<sup>-1</sup>; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>): δ 7.48-7.29 (m, 6H), 7.13 (dd, 1H, *J* = 8.5, 2.1 Hz), 7.10 (d, 1H, *J* = 2.1 Hz), 6.90 (d, 1H, *J* = 8.5 Hz), 6.52 (d, 1H, *J* = 16.4 Hz), 5.17 (s, 2H), 3.91 (s, 3H), 2.34 (s, 3H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>): δ 198.3, 152.1, 148.4, 143.4, 136.6, 128.6, 128.0, 127.3, 127.2, 125.2, 123.3, 112.7, 111.6, 71.1, 56.0, 27.4; HRMS (ESI, pos.): *m/z* 282.1262 (282.1256 calc. for C<sub>18</sub>H<sub>18</sub>O<sub>3</sub> (M<sup>+</sup>)).

**(E)-4-(2-bromo-4,5-dimethoxyphenyl)but-3-en-2-one (15):**



To a solution of veratraldehyde (3.3 g, 20 mmol) in methanol (30 mL), was added bromine (1 mL, 1.05 eq). The reaction was left to stir overnight at room temperature. After consumption of the starting material, the methanol was removed *in vacuo* and the residue was dissolved with dichloromethane (50 mL). The resulting solution was washed with a saturated aqueous solution of sodium thiosulphate (2 x 50 mL) and then with brine (100 mL). The organic layer was dried over anhydrous Na<sub>2</sub>SO<sub>4</sub> and concentrated to provide 2-bromo-4,5-dimethoxybenzaldehyde (4.5 gm, 92%) as a white solid which was pure by <sup>1</sup>H NMR and was used in the next step without purification.

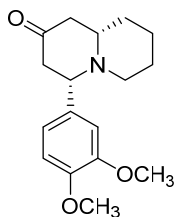
Reaction of 2-bromo-4,5-dimethoxybenzaldehyde (2.8 gm, 11.4 mmol) with 1-(triphenylphosphoranylidene)-2-propanone (5.1 gm, 17.1 mmol) in CH<sub>2</sub>Cl<sub>2</sub> for 48 hours according to the general procedure gave, after purification by flash chromatography on silica gel, 2.27 g (78%) of **15** as a beige solid.

Mp.: 118-119 °C; IR (neat): 2963, 2935, 2919, 2836, 1660, 1637, 1591, 1502, 1435, 1357, 1253, 1210, 1165, 1024, 972 cm<sup>-1</sup>; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>): δ 7.83 (d, 1H, *J* = 16.3 Hz), 7.09 (s, 1H), 7.06 (s, 1H), 6.53 (d, 1H, *J* = 16.3 Hz), 3.91 (s, 3H), 3.90 (s, 3H), 2.41 (s, 3H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>): δ 198.4, 151.6, 148.8, 142.0, 127.9, 126.2, 117.6, 115.6, 109.2, 56.3, 56.1, 26.9; HRMS (ESI, pos.): *m/z* 284.0037 (284.0048 calc. for C<sub>12</sub>H<sub>13</sub>O<sub>3</sub>Br (M<sup>+</sup>)), *m/z* 285.0109 (285.0126 calc. for C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>Br<sup>79</sup> (M+H)<sup>+</sup>), *m/z* 287.0090 (287.0106 calc. for C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>Br<sup>81</sup> (M+2+H)<sup>+</sup>)

#### General procedure for the Mannich/aza-Michael reaction:

To the imine trimer **10** or **22** in a vial were added *S*-proline, the enone and DMF at room temperature and the mixture was stirred at ambient temperature for the specified period. Aqueous HCl (1M) was added and the mixture was extracted with EtOAc. The aqueous layer basified to pH 10 with solid NaOH and the basic mixture was extracted with dichloromethane. The combined extracts were dried and concentrated and the residue was purified by flash chromatography on silica gel (CH<sub>2</sub>Cl<sub>2</sub>/MeOH, 99:1) to provide the required 4-arylquinolizidinone or 5-arylindolizidinone.

#### (4*S*,9*aS*)-4-(3,4-Dimethoxyphenyl)hexahydro-1*H*-quinolizin-2(6*H*)-one (**11**):



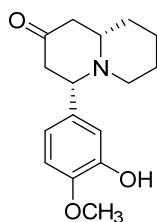
#### Synthesis of **11** on >1 mmol scale:

Reaction of (*E*)-4-(3,4-dimethoxyphenyl)but-3-en-2-one (**9**, 1.48 g, 7.2 mmol) and **10** (300 mg, 1.2 mmol) in the presence of *S*-proline (83 mg, 0.12 mmol) in DMF (3.5 mL) according to the general procedure gave, after purification by flash chromatography on silica gel, 624 mg (60%) of **11** as a pale yellow foam.

*R*<sub>f</sub> = 0.36 (EtOAc/MeOH, 80:20); IR (neat): 2927, 2850, 2835, 2796, 1717, 1593, 1508, 1461, 1443, 1256, 1231, 1146, 1076, 1024, 812 cm<sup>-1</sup>; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>): δ 6.92 (br s, 1H), 6.87-6.78 (br m, 2H), 3.90 (s, 3H), 3.87 (s, 3H), 3.21 (d, 1H, *J* = 12.1, 3.3 Hz), 2.84-2.62 (m,

2H), 2.57-2.21 (m, 4H), 1.80-1.18 (m, 7H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  207.8, 149.3, 148.3, 135.2, 119.5, 111.1, 109.8, 70.0, 62.5, 56.0, 55.9, 52.8, 50.9, 48.7, 34.3, 25.8, 24.2; HRMS (ESI, pos.):  $m/z$  289.1692 (289.1678 calc. for  $\text{C}_{17}\text{H}_{23}\text{NO}_3$  ( $\text{M}^+$ )),  $m/z$  290.1764 (290.1756 calc. for  $\text{C}_{17}\text{H}_{24}\text{NO}_3$  ( $\text{M}+\text{H}$ ) $^+$ );  $[\alpha]_{\text{D}}^{20} = -87.2$  (c 0.83,  $\text{CHCl}_3$ , lit.<sup>5</sup>  $[\alpha]_{\text{D}} = -78.05$  (c 0.30,  $\text{CHCl}_3$ )); HPLC: Chiralpak OJ-H (hexane/*i*-PrOH, 80/20, flow rate 1 mL/min,  $\lambda = 254$  nm),  $t_{\text{major}} = 6.85$  min.,  $t_{\text{minor}} = 9.82$  min., 98% ee.

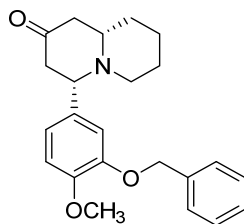
**(4*S*,9*aS*)-4-(3-Hydroxy-4-methoxyphenyl)hexahydro-1*H*-quinolizin-2(6*H*)-one (1):**



Reaction of **10** (200 mg, 0.8 mmol) and (*E*)-4-(3-hydroxy-4-methoxyphenyl)but-3-en-2-one (920 mg, 4.8 mmol) in the presence of *S*-proline (55.2 mg, 0.48 mmol) in DMF (2 mL) according to the general procedure gave, after purification by flash chromatography on silica gel, 265 mg (40%) of **1** as a pale yellow foam.

$R_f = 0.3$  (EtOAc/MeOH, 90:10); IR (neat): 3392, 3010, 2931, 2841, 2795, 1715, 1592, 1441, 1323, 1270, 1218, 1123, 1026, 879, 806, 754  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  6.97 (br d, 1H,  $J = 1.4$  Hz), 6.82-6.76 (m, 2H), 5.65 (broad s, 1H), 3.88 (s, 3H), 3.17 (dd, 1H,  $J = 12.1, 3.3$  Hz), 2.84-2.75 (m, 1H), 2.71-2.59 (m, 1H), 2.55-2.43 (m, 1H), 2.43-2.20 (m, 3H), 1.78-1.38 (m, 6H), 1.34-1.17 (m, 1H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  208.0, 145.9, 136.0, 118.9, 113.2, 110.6, 69.8, 62.4, 56.0, 52.8, 50.9, 48.8, 34.5, 25.9, 24.2; HRMS (ESI, pos.):  $m/z$  275.1533 (275.1521 calc. for  $\text{C}_{16}\text{H}_{21}\text{NO}_3$  ( $\text{M}^+$ )),  $m/z$  276.1606 (276.1600 calc. for  $\text{C}_{16}\text{H}_{22}\text{NO}_3$  ( $\text{M}+\text{H}$ ) $^+$ ), 298.1399 (298.1419 calc. for  $\text{C}_{16}\text{H}_{21}\text{NO}_3\text{Na}$  ( $\text{M}+\text{Na}$ ) $^+$ );  $[\alpha]_{\text{D}}^{20} = -67.0$  (c 0.56,  $\text{CHCl}_3$ ); HPLC: Chiralpak OJ-H (hexane/*i*-PrOH, 80/20, flow rate 1 mL/min,  $\lambda = 254$  nm),  $t_{\text{major}} = 10.95$  min.,  $t_{\text{minor}} = 8.72$  min., 82% ee.

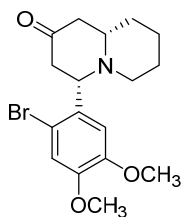
**(4*S*,9*aS*)-4-(3-(Benzyloxy)-4-methoxyphenyl)hexahydro-1*H*-quinolizin-2(6*H*)-one (16):**



Reaction of **10** (50 mg, 0.2 mmol) and (*E*)-4-(3-(benzyloxy)-4-methoxyphenyl)but-3-en-2-one (**14**, 338 mg, 1.2 mmol) in the presence of *S*-proline (13.8 mg, 0.12 mmol) in DMF (1 mL) according to the general procedure gave, after purification by flash chromatography on silica gel, 84 mg (40%) of **16** as a pale yellow foam.

$R_f$  = 0.25 (EtOAc/MeOH, 90:10); IR (neat): 2930, 1714, 1521, 1510, 1263, 1248, 1238, 1223, 1163, 1141, 1044, 831  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  7.46-7.42 (m, 2H), 7.38-7.28 (m, 3H), 6.94 (broad s, 1H), 6.83 (m, 2H), 5.16 (s, 2H), 3.87 (s, 3H), 3.15 (dd, 1H,  $J$  = 12.0, 3.2 Hz), 2.72-2.18 (m, 6H), 1.75-1.18 (m, 7H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  208.0, 149.2, 148.4, 137.0, 135.2, 128.5, 127.9, 127.5, 120.2, 113.1, 111.8, 71.1, 69.8, 62.4, 56.1, 52.7, 50.9, 48.8, 34.4, 25.9, 24.2; HRMS (ESI, pos.):  $m/z$  365.1998 (365.1991 calc. for  $\text{C}_{23}\text{H}_{27}\text{NO}_3$  ( $\text{M}^+$ )),  $m/z$  366.2071 (366.2069 calc. for  $\text{C}_{23}\text{H}_{28}\text{NO}_3$  ( $\text{M}+\text{H}^+$ )), 388.1889 (388.1889 calc. for  $\text{C}_{23}\text{H}_{27}\text{NO}_3\text{Na}$  ( $\text{M}+\text{Na}^+$ ));  $[\alpha]_D^{20}$  = -65.9 (c 0.62,  $\text{CHCl}_3$ ); HPLC: Chiralpak AD-H (hexane/*i*-PrOH, 97/3, flow rate 1 mL/min,  $\lambda$  = 254 nm),  $t_{\text{major}}$  = 17.69 min.,  $t_{\text{minor}}$  = 20.89 min., 95% ee.

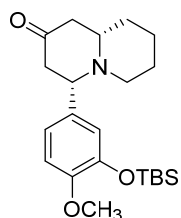
**(4*S*,9*aS*)-4-(2-Bromo-4,5-dimethoxyphenyl)hexahydro-1*H*-quinolizin-2(6*H*)-one (17):**



Reaction of **10** (50 mg, 0.2 mmol) and (*E*)-4-(2-bromo-4,5-dimethoxyphenyl)but-3-en-2-one (**15**, 342 mg, 1.2 mmol) in the presence of *S*-proline (13.8 mg, 0.12 mmol) in DMF (0.5 mL) according to the general procedure gave, after purification by flash chromatography on silica gel, unreacted **15** (244 mg) and 45 mg (20%, 35% based on recovered starting material) of **17** as a pale yellow foam.

$R_f$  = 0.29 (EtOAc/MeOH, 95:5); IR (neat): 2931, 2842, 1720, 1500, 1461, 1439, 1378, 1363, 1343, 1323, 1276, 1246, 1207, 1160, 1119, 1076, 1027  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ):  $\delta$

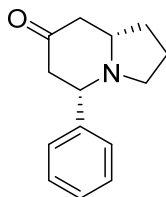
7.14 (s, 1H), 6.96 (s, 1H), 3.91 (s, 3H), 3.86 (s, 3H), 3.82 (dd, 1H,  $J = 10.2, 5.2$  Hz), 2.83-2.74 (m, 1H), 2.55-2.29 (m, 5H), 1.81-1.66 (m, 3H), 1.62-1.22 (m, 4H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  207.3, 149.3, 148.6, 133.3, 115.1, 113.2, 110.4, 67.2, 62.0, 56.2, 56.1, 52.3, 48.9, 48.6, 34.4, 25.8, 24.2; HRMS (ESI, pos.):  $m/z$  367.0776 (367.0783 calc. for  $\text{C}_{17}\text{H}_{22}\text{BrNO}_3$  ( $\text{M}^+$ )),  $m/z$  368.0848 (368.0861 calc. for  $\text{C}_{17}\text{H}_{23}\text{Br}^{79}\text{NO}_3$  ( $\text{M}+\text{H}$ ) $^+$ ),  $m/z$  370.083 (370.0841 calc. for  $\text{C}_{17}\text{H}_{23}\text{Br}^{81}\text{NO}_3$  ( $\text{M}+\text{H}+2$ ) $^+$ );  $[\alpha]_{\text{D}}^{20} = -90.7$  (c 0.57,  $\text{CHCl}_3$ ); HPLC: Chiralpak AD-H (hexane/*i*-PrOH, 97/3, flow rate 1 mL/min,  $\lambda = 254$  nm),  $t_{\text{major}} = 16.82$  min.,  $t_{\text{minor}} = 16.12$  min., 98% ee. **(4*S*,9*aS*)-4-(3-(Tert-butyldimethylsilyloxy)-4-methoxyphenyl)hexahydro-1*H*-quinolizin-2(6*H*)-one (18):**



To **1** (54 mg, 0.15 mmol) dissolved in DCM at 0 °C was added TBDMSOTf (52  $\mu\text{L}$ , 0.23 mmol) and pyridine (24.2  $\mu\text{L}$ , 0.30 mmol). The reaction mixture was stirred for 2 hours, after which the solvent was evaporated and the residue was directly purified by flash chromatography on silica gel ( $\text{CH}_2\text{Cl}_2/\text{MeOH}$ , 99:1) to provide 45 mg (77%) of **18** as a pale yellow gum.  $R_f = 0.24$  ( $\text{EtOAc}/\text{MeOH}$ , 99:1), IR (neat): 2930, 2856, 2791, 1721, 1507, 1272, 1251, 1225, 1126, 889, 835, 780  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ): 6.87 (d, 1H,  $J = 2.1$  Hz), 6.84 (dd, 1H,  $J = 8.3, 2.1$  Hz), 6.79 (d, 1H,  $J = 8.3$  Hz), 3.79 (s, 3H), 3.14 (dd, 1H,  $J = 12.1, 3.2$  Hz), 2.80-2.74 (m, 1H), 2.67-2.59 (m, 1H), 2.52-2.45 (m, 1H), 2.39 (dt, 1H,  $J = 14.0, 2.9$  Hz), 2.31 (dt, 1H,  $J = 14.0, 2.9$  Hz), 2.29-2.21 (m, 1H), 1.75-1.65 (m, 2H), 1.61 (td, 1H,  $J = 12.0, 2.6$  Hz), 1.57-1.38 (m, 3H), 1.32-1.20 (m, 1H), 0.99 (s, 9H), 0.16 (d, 6H,  $J = 0.9$  Hz);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ): 208.1, 150.3, 145.2, 135.2, 120.4, 119.7, 112.0, 69.6, 62.4, 55.5, 52.7, 50.9, 48.8, 34.4, 25.9, 25.8, 24.2, 18.5; HRMS (ESI, pos.):  $m/z$  389.2375 (389.2386 calc. for  $\text{C}_{22}\text{H}_{35}\text{NO}_3\text{Si}$  ( $\text{M}^+$ )),  $m/z$  390.2446 (390.2464 calc. for  $\text{C}_{22}\text{H}_{36}\text{NO}_3\text{Si}$  ( $\text{M}+\text{H}$ ) $^+$ );  $[\alpha]_{\text{D}}^{20} = -64.8$  (c 1.56,  $\text{CHCl}_3$ ).



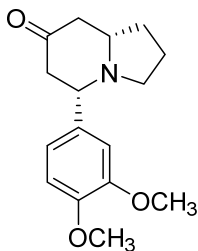
**(5*S*, 8*aS*)-5-Phenylhexahydroindolizin-7(1*H*)-one (23):**



Reaction of **22** (50 mg, 0.24 mmol) and (*E*)-4-phenylbut-3-en-2-one (**20**, 204 mg, 1.4 mmol) in the presence of *S*-proline (16.1 mg, 0.14 mmol) in DMF (0.5 mL) according to the general procedure gave, after purification by flash chromatography on silica gel, 70 mg (47%) of **23** as a pale yellow gum.

$R_f$  = 0.35 (EtOAc/MeOH, 90:10); IR (neat): 2960, 2819, 2781, 1711, 1371, 1348, 1302, 1290, 1245, 1152, 1029, 765, 701  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  7.40-7.24 (m, 5H), 3.32 (dd, 1H,  $J$  = 11.4, 3.6 Hz), 2.86-2.77 (m, 1H), 2.68-2.53 (m, 2H), 2.52-2.36 (m, 3H), 2.05-1.55 (m, 5H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  208.6, 142.2, 128.6, 127.7, 127.1, 66.9, 64.1, 51.5, 49.7, 47.3, 31.1, 21.5; HRMS (ESI, pos.):  $m/z$  215.1304 (215.1310 calc. for  $\text{C}_{14}\text{H}_{17}\text{NO}$  ( $\text{M}^+$ ));  $[\alpha]_{\text{D}}^{20}$  = -100.6 (c 0.76,  $\text{CHCl}_3$ ); HPLC: Chiralpak OJ-H (hexane/*i*-PrOH, 80/20, flow rate 1 mL/min,  $\lambda$  = 254 nm),  $t_{\text{major}}$  = 5.87 min.,  $t_{\text{minor}}$  = 5.10 min., 94% ee.

**(5*S*, 8*aS*)-5-(3,4-Dimethoxyphenyl)hexahydroindolizin-7(1*H*)-one (24):**

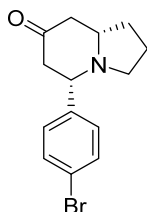


Reaction of **22** (50 mg, 0.24 mmol) and (*E*)-4-(3,4-dimethoxyphenyl)but-3-en-2-one (**9**, 288 mg, 1.4 mmol) in the presence of *S*-proline (16.1 mg, 0.14 mmol) in DMF (0.5 mL) according to the general procedure gave, after purification by flash chromatography on silica gel, 40 mg (21%) of **24** as a yellow gum.

$R_f$  = 0.17 (EtOAc/MeOH, 90:10); IR (neat): 2958, 2834, 2796, 1715, 1592, 1511, 1461, 1259, 1234, 1157, 1136, 1025, 728  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  6.94 (d, 1H,  $J$  = 1.9 Hz), 6.8 (dd, 1H,  $J$  = 8.2, 1.9 Hz), 6.81 (d, 1H,  $J$  = 8.2 Hz), 3.91 (s, 3H), 3.88 (s, 3H), 3.26 (dd, 1H,  $J$  = 11.4, 3.5 Hz), 2.87-2.80 (m, 1H), 2.68-2.55 (m, 2H), 2.52-2.34 (m, 3H), 2.07-1.56 (m, 5H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ): 208.7, 149.2, 148.4, 134.9, 119.3, 110.9, 109.8, 66.6, 64.1, 56.0, 55.9,

51.5, 49.9, 47.3, 31.1, 21.5; HRMS (ESI, pos.):  $m/z$  275.1526 (275.1521 for  $C_{16}H_{21}NO_3$  ( $M^+$ )),  $m/z$  276.1594 (276.1600 for  $C_{16}H_{22}NO_3$  ( $M+H^+$ ));  $[\alpha]_D^{20} = -87.2$  (c 0.83,  $CHCl_3$ ); HPLC: Chiralpak OJ-H (hexane/*i*-PrOH, 80/20, flow rate 1 mL/min,  $\lambda = 254$  nm),  $t_{major} = 8.60$  min.,  $t_{minor} = 10.62$  min., 90% ee.

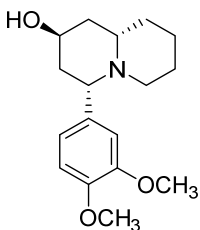
**(5*S*, 8*aS*)-5-(4-Bromophenyl)hexahydroindolizin-7(1*H*)-one (25):**



Reaction of **22** (50 mg, 0.24 mmol) and (*E*)-4-(4-bromophenyl)but-3-en-2-one (**21**, 315 mg, 1.4 mmol) in the presence of *S*-proline (16.1 mg, 0.14 mmol) in DMF (0.5 mL) according to the general procedure gave, after purification by flash chromatography on silica gel, 56 mg (27%) of **25** as a yellow gum.

$R_f = 0.23$  (EtOAc/MeOH, 90:10); IR (neat): 2948, 2923, 2780, 2702, 1717, 1488, 1365, 1347, 1301, 1282, 1159, 1147, 1070, 1008, 838, 811  $cm^{-1}$ ;  $^1H$  NMR (300 MHz,  $CDCl_3$ ):  $\delta$  7.47 (apparent d, 2H,  $J = 8.5$  Hz), 7.26 (apparent d, 2H,  $J = 8.5$  Hz, 2H), 3.29 (dd, 1H,  $J = 11.2$ , 3.8 Hz), 2.84-2.75 (m, 1H), 2.63-2.38 (m, 5H), 2.06-1.53 (m, 5H);  $^{13}C$  NMR (75 MHz,  $CDCl_3$ ):  $\delta$  208.0, 141.4, 131.8, 128.8, 121.4, 66.2, 64.0, 51.5, 49.6, 47.3, 31.1, 21.5; HRMS (ESI, pos.):  $m/z$  293.0419 (293.0415 for  $C_{14}H_{16}BrNO$  ( $M^+$ )),  $m/z$  294.0492 (294.0494 for  $C_{14}H_{17}Br^{79}NO$  ( $M+H^+$ )),  $m/z$  296.0474 (296.0473 for  $C_{14}H_{17}Br^{81}NO$  ( $M+2+H^+$ ));  $[\alpha]_D^{20} = -66.7$  (c 0.51,  $CHCl_3$ ); HPLC: Chiralpak OJ-H (hexane/*i*-PrOH, 90/10, flow rate 1 mL/min,  $\lambda = 254$  nm),  $t_{major} = 7.02$  min.,  $t_{minor} = 7.60$  min., 99% ee.

**(-)-Lasubine II (2):**

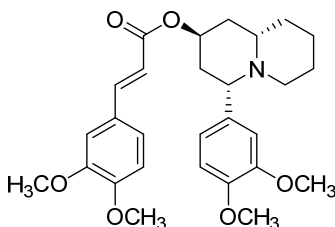


To a solution of **11** (106 mg, 0.37 mmol) in anhydrous THF (1.5 mL) at  $-78$  °C, was added dropwise a solution of L-Selectride (1.0 M in THF, 0.74 mL, 0.74 mmol). The mixture

was stirred at -78 °C for 3 h after which it was warmed to 0 °C and 1N NaOH (2 mL) was added. The resulting mixture was stirred at room temperature for 1 h and the THF was removed under reduced pressure. The residue was dissolved in EtOAc (10 mL) and the solution was washed with brine (1 x 10 mL). The organic layer was dried over anhydrous Na<sub>2</sub>SO<sub>4</sub> and concentrated. The residue was purified by flash chromatography on silica gel using gradient elution (EtOAc→EtOAc/MeOH 8:2) to provide 81 mg (76%) of (-)-lasubine (II) as a colourless oil that solidified after storage at -20 °C for several days. Spectroscopic data is in agreement with reported data.<sup>5</sup>

$R_f$  = 0.20 (EtOAc/MeOH, 90:10); Mp: 96-98 °C; IR (neat): 3388 (br), 2924, 1592, 1512, 1462, 1444, 1259, 1228, 1130, 1026 cm<sup>-1</sup>; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>):  $\delta$  6.91 (br s, 1H), 6.86 (d, 1H,  $J$  = 8.2 Hz), 6.79 (d, 1H,  $J$  = 8.2 Hz), 4.17-4.12 (br m, 1H), 3.88 (s, 3H), 3.86 (s, 3H), 3.31 (dd, 1H,  $J$  = 11.8, 3.3 Hz), 2.72-2.66 (m, 1H), 2.43-2.35 (m, 1H), 1.90-1.83 (m, 1H), 1.83-1.77 (m, 1H), 1.74-1.64 (m, 4H), 1.59-1.23 (m, 6H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>):  $\delta$  149.0, 147.8, 137.3, 119.7, 111.0, 110.5, 65.1, 63.4, 56.5, 56.0, 55.9, 53.2, 42.9, 40.4, 33.7, 26.2, 24.9; HRMS (ESI, pos.):  $m/z$  291.1830 (291.1834 calc. for C<sub>17</sub>H<sub>25</sub>NO<sub>3</sub> (M<sup>+</sup>)),  $m/z$  292.1903 (292.1913 calc. for C<sub>17</sub>H<sub>26</sub>NO<sub>3</sub> (M+H)<sup>+</sup>); [ $\alpha$ ]<sub>D</sub><sup>21</sup> = -76.5 (c 0.67, CHCl<sub>3</sub>), lit.<sup>6</sup> [ $\alpha$ ]<sub>D</sub><sup>20</sup> = +43.4 (c 1.0, CHCl<sub>3</sub>) for (+)-lasubine II.

### (+)-Subcosine II (3):



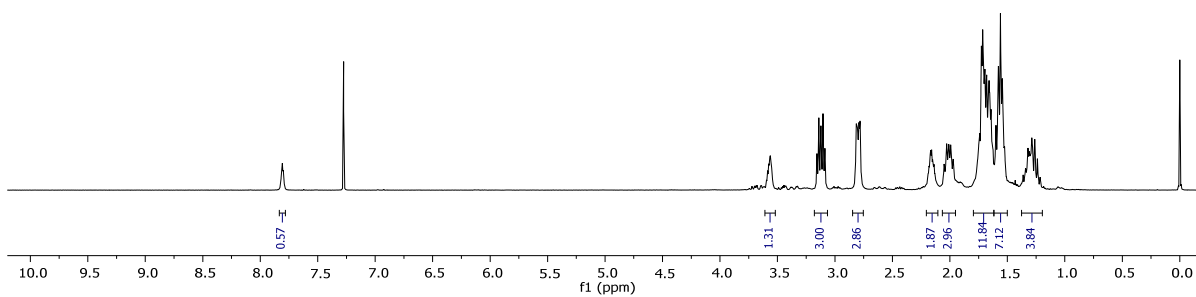
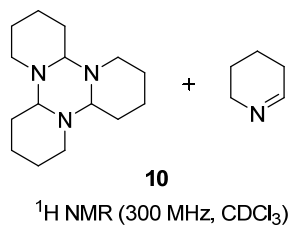
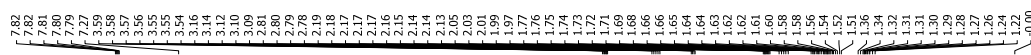
(*E*)-3,4-Dimethoxycinnamic acid (33.3 mg, 0.16 mmol) was added to a solution of crude (-)-lasubine II (48.2 mg, 0.16 mmol) in dichloromethane (2 mL) under nitrogen at ambient temperature. To the resulting solution was added EDCI (36.4 mg, 0.19 mmol) and DMAP (19.5 mg, 0.16 mmol) and the mixture was stirred 19 h at ambient temperature. Water (5 mL) was added and the organic layer was separated, diluted with CH<sub>2</sub>Cl<sub>2</sub> (2 mL) and again washed with water (5 mL) and then with brine (5 mL). The organic layer was dried (Na<sub>2</sub>SO<sub>4</sub>) and concentrated. Purification of the residue by flash chromatography on silica gel (EtOAc) provided 51.3 mg (67%) of **3** as a white foam. Spectroscopic data is in agreement with reported data.<sup>7</sup>

$R_f = 0.41$  (EtOAc/MeOH, 90:10),  $[\alpha]_D^{21} = +89.3$  (c 0.56, MeOH); lit.<sup>5</sup>  $[\alpha]_D^{20} = +85.3$  (c 0.64, MeOH);  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  7.67 (d, 1H,  $J = 15.9$  Hz), 7.16 (dd, 1H,  $J = 8.2, 2.0$  Hz), 7.12 (d, 1H,  $J = 2.0$  Hz), 6.94- 6.83 (m, 2H), 6.90 (d, 1H,  $J = 8.2$  Hz), 6.79 (d, 1H,  $J = 8.2$  Hz), 6.41(d, 1H,  $J = 15.9$  Hz), 5.22-5.18 (m, 1H), 3.95 (s, 3H), 3.93 (s, 3H), 3.90 (s, 3H), 3.86 (s, 3H), 3.29 (dd, 1H,  $J = 11.1, 3.8$  Hz), 2.77-2.67 (m, 1H), 2.43-2.31 (m, 1H), 2.15-1.81 (m, 3H), 1.79-1.19 (m, 8H);  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ ):  $\delta$  166.6, 151.2, 149.3, 149.2, 147.9, 144.6, 137.1, 127.5, 122.8, 116.4, 111.1, 109.7, 68.4, 64.2, 57.2, 56.0, 55.9, 53.2, 39.9, 37.5, 33.7, 26.2, 24.9; HRMS (ESI, pos.):  $m/z$  481.2472 (481.2464 calc. for  $\text{C}_{28}\text{H}_{35}\text{NO}_6$  ( $\text{M}^+$ )),  $m/z$  482.2544 (482.2543 calc. for  $\text{C}_{28}\text{H}_{36}\text{NO}_6$  ( $\text{M}+\text{H}^+$ )).

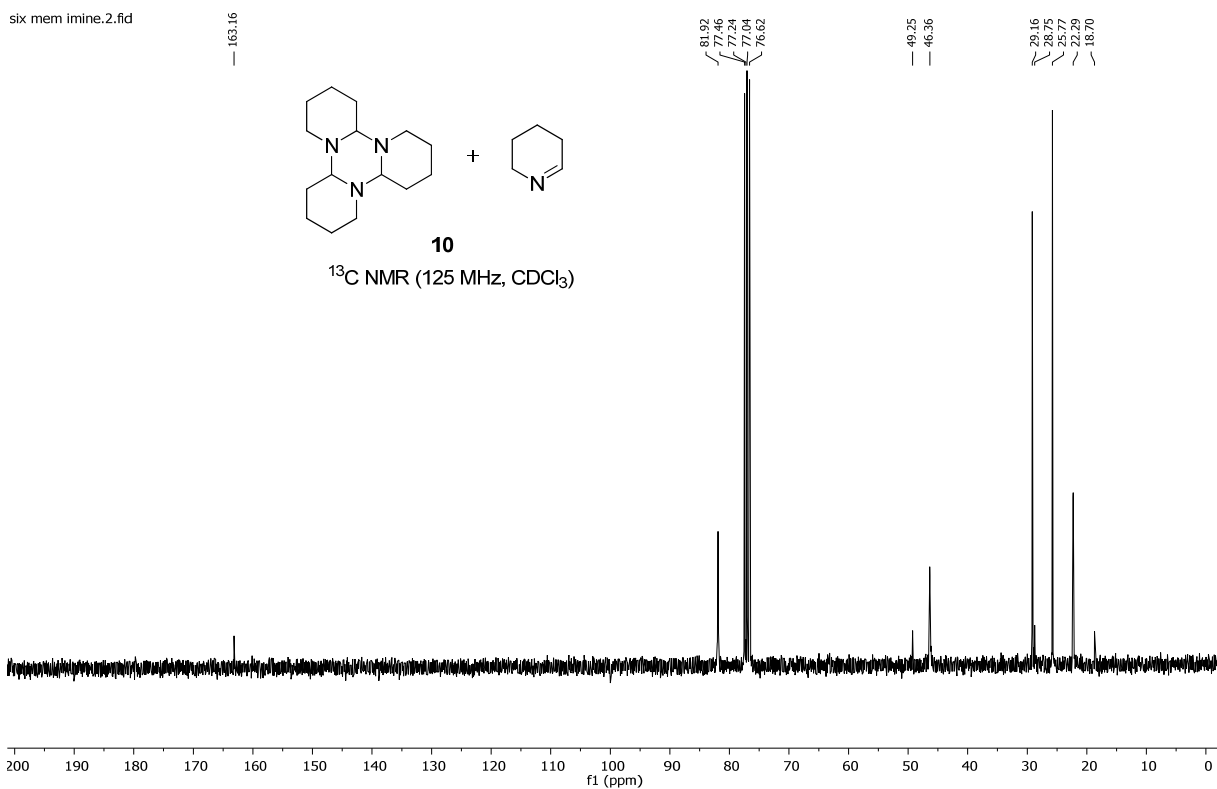
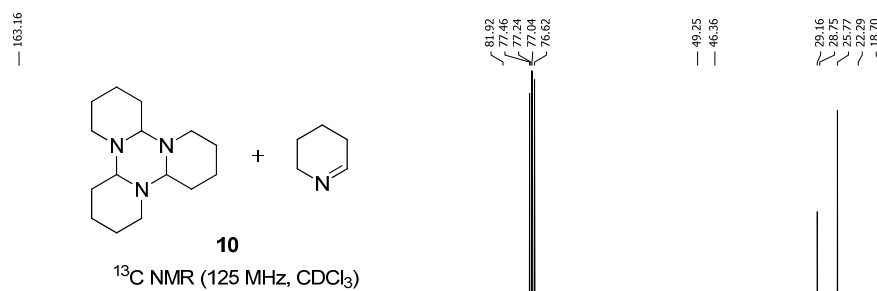
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The crude product was purified by precipitation, see: Baker, J. D.; Heath, R. R.; Millar, J. G. *J. Chem. Ecol.* **1992**, *18*, 1595.
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7. Cui, L.; Li, C.; Zhang, L. *Angew. Chem. Int. Ed.* **2010**, *49*, 9178.

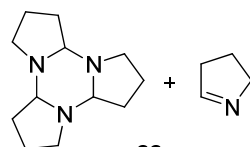
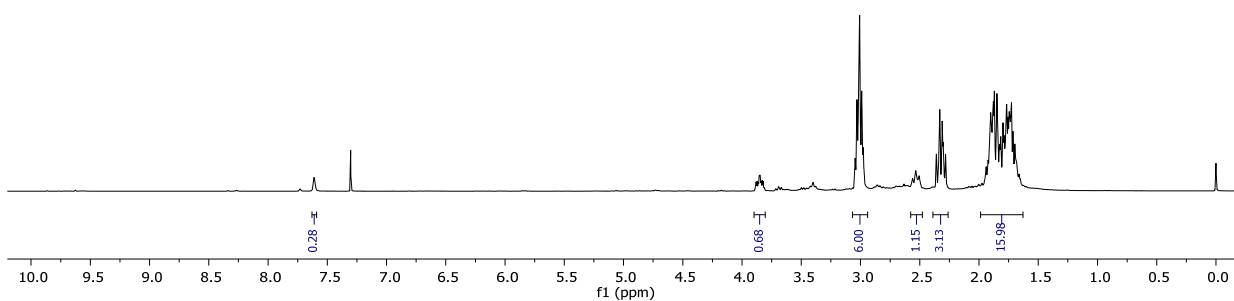
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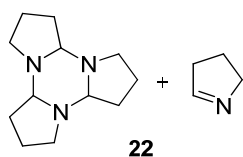
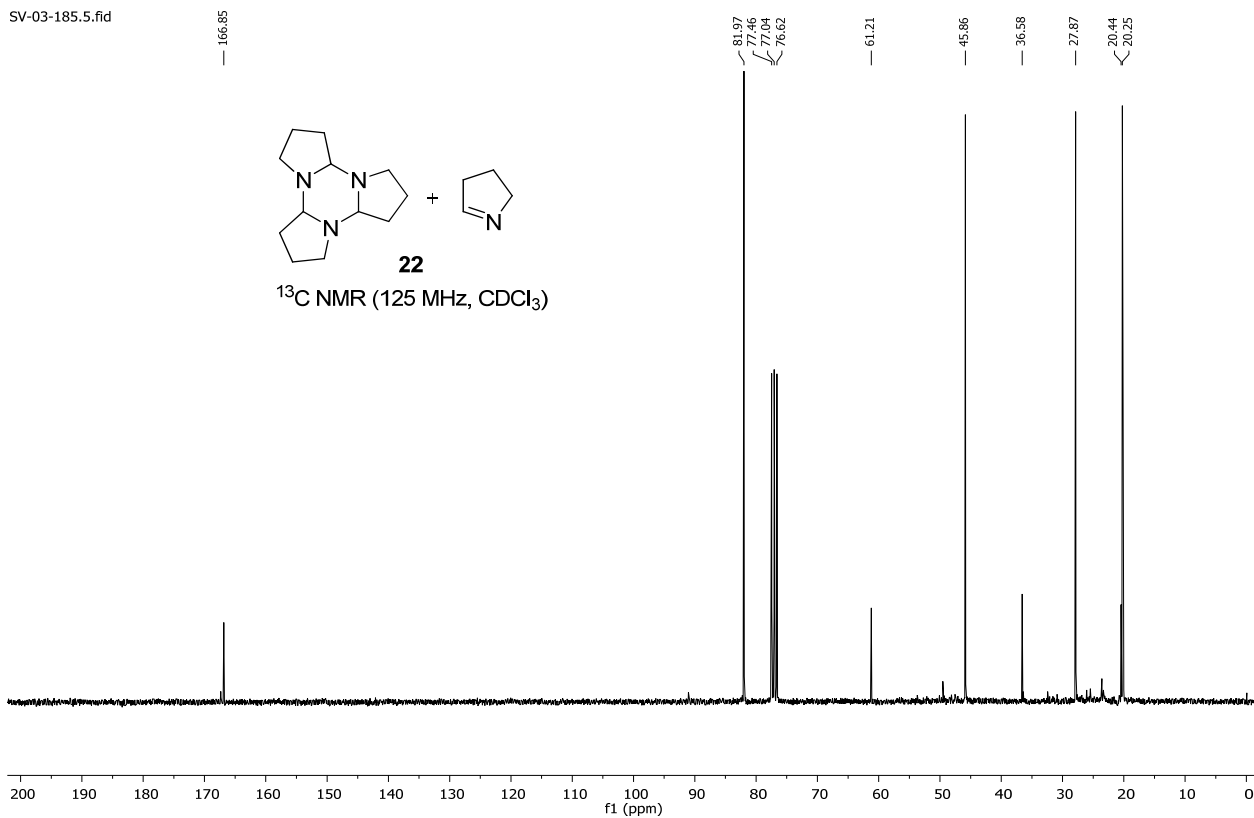


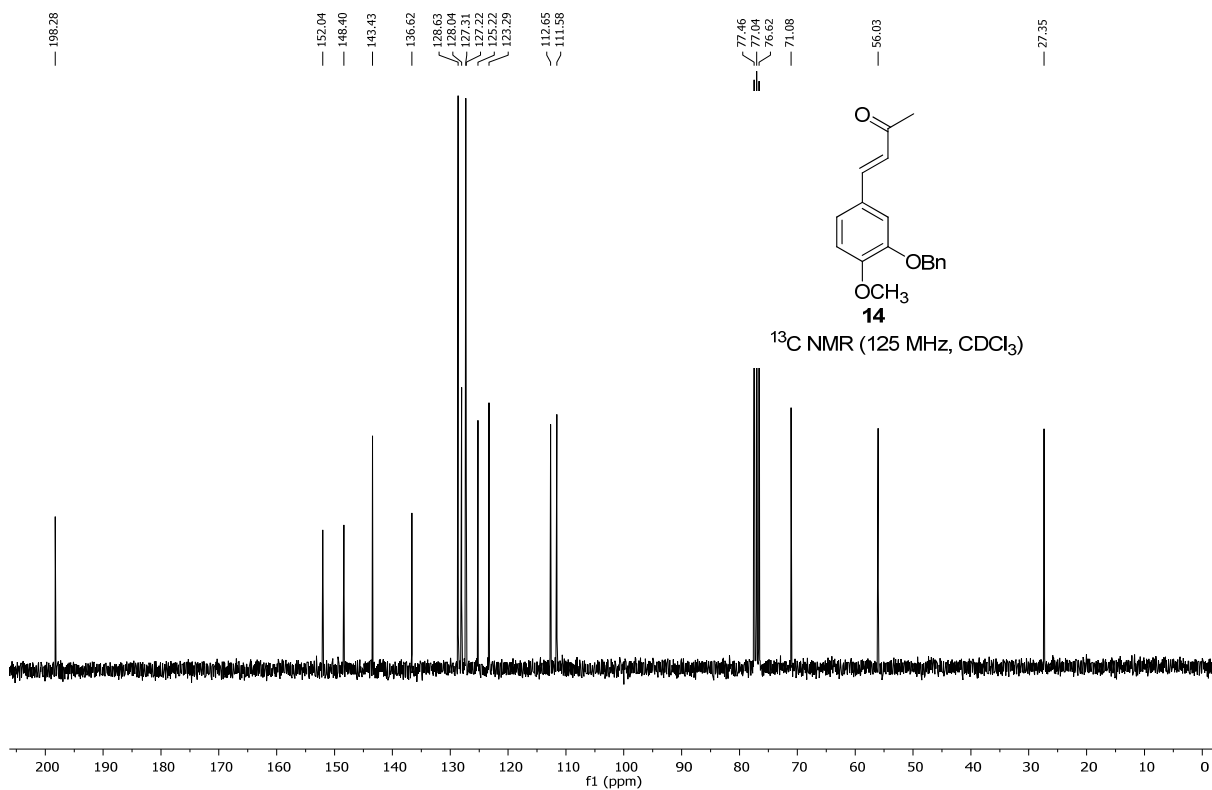
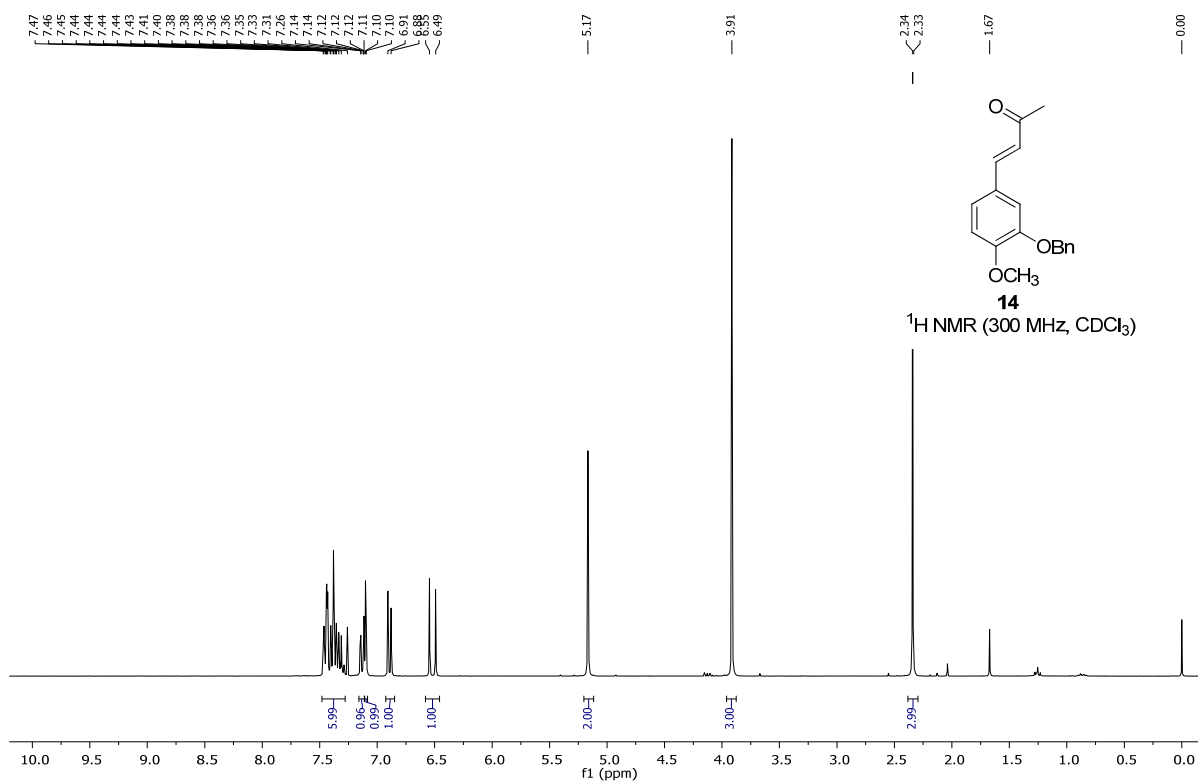
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-0.00**22**<sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>)

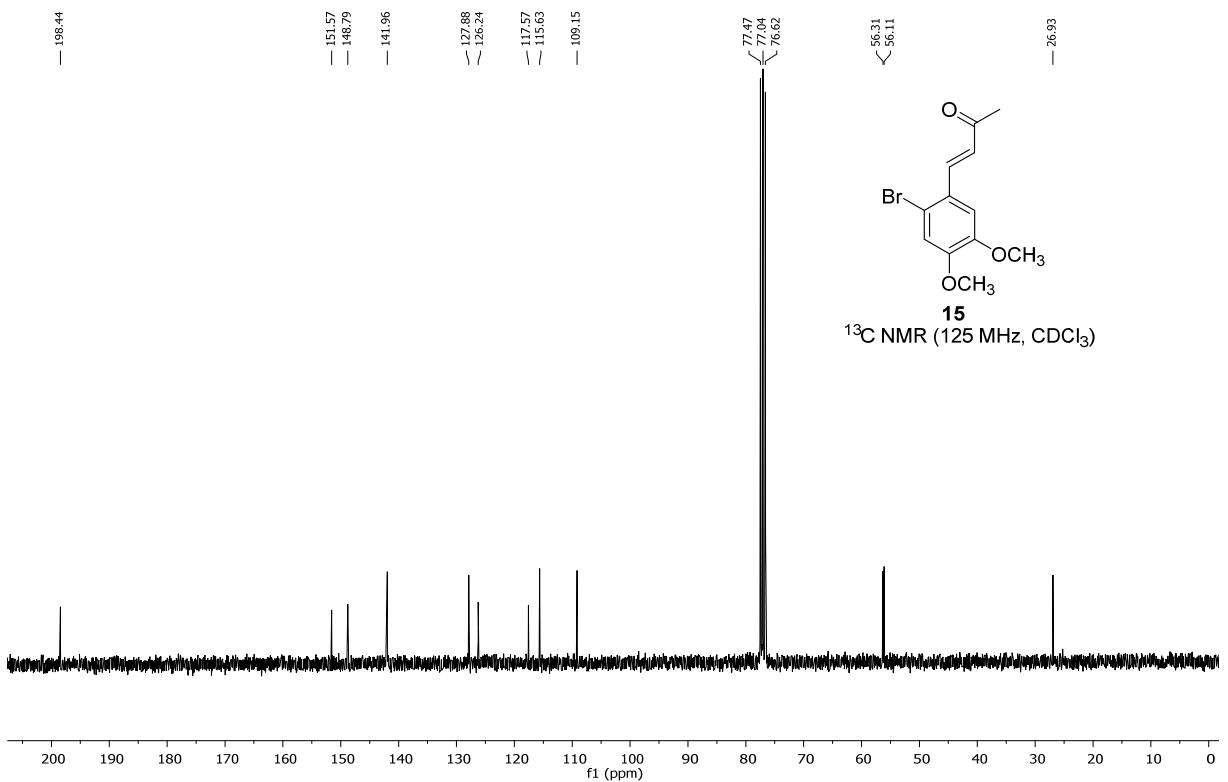
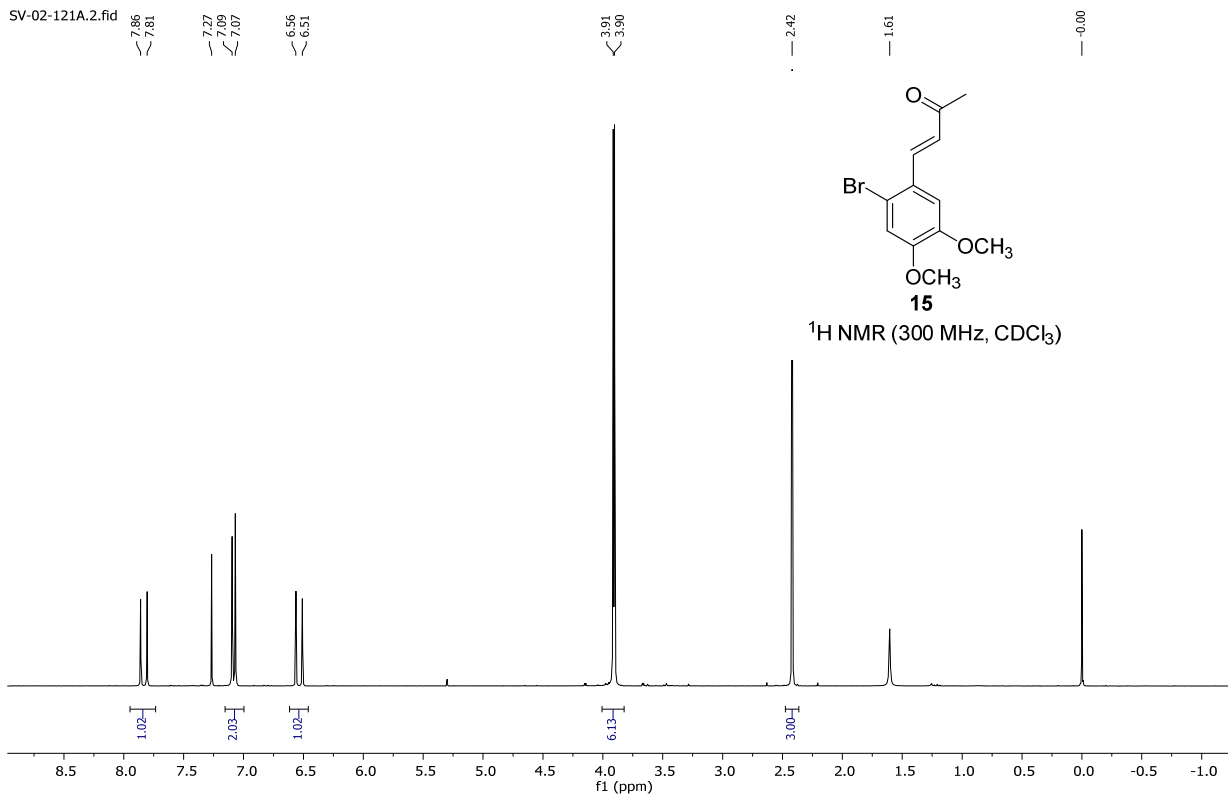
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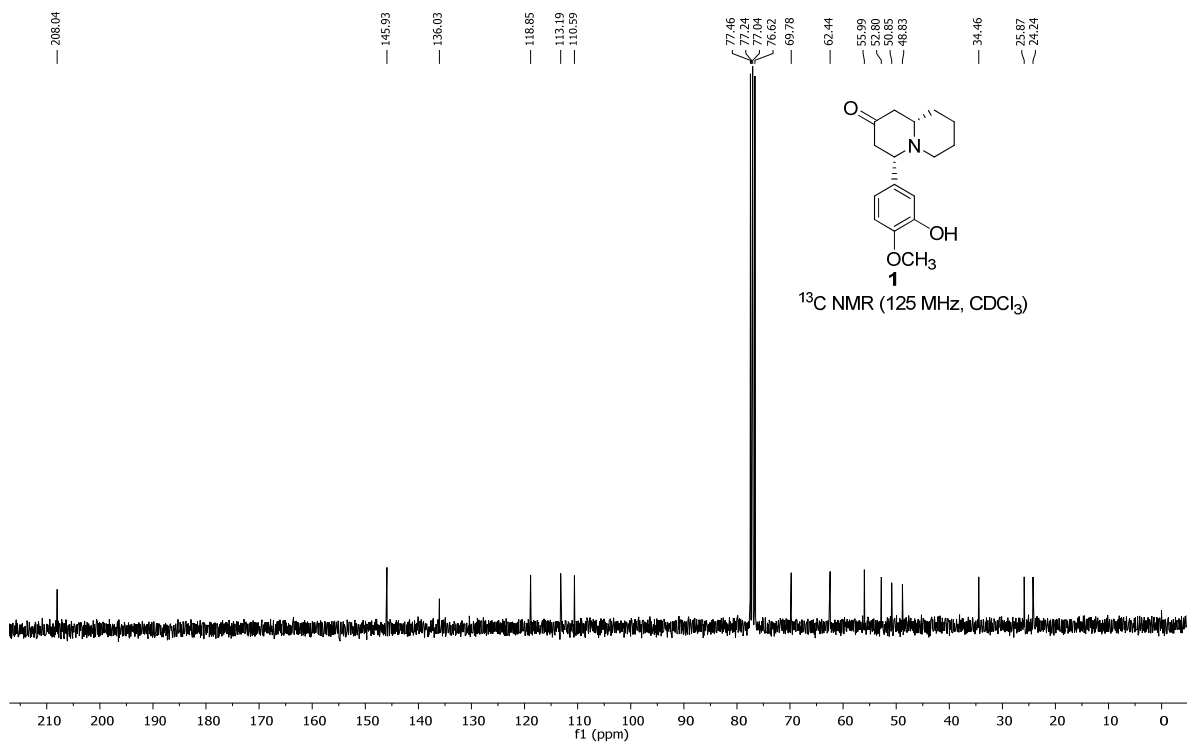
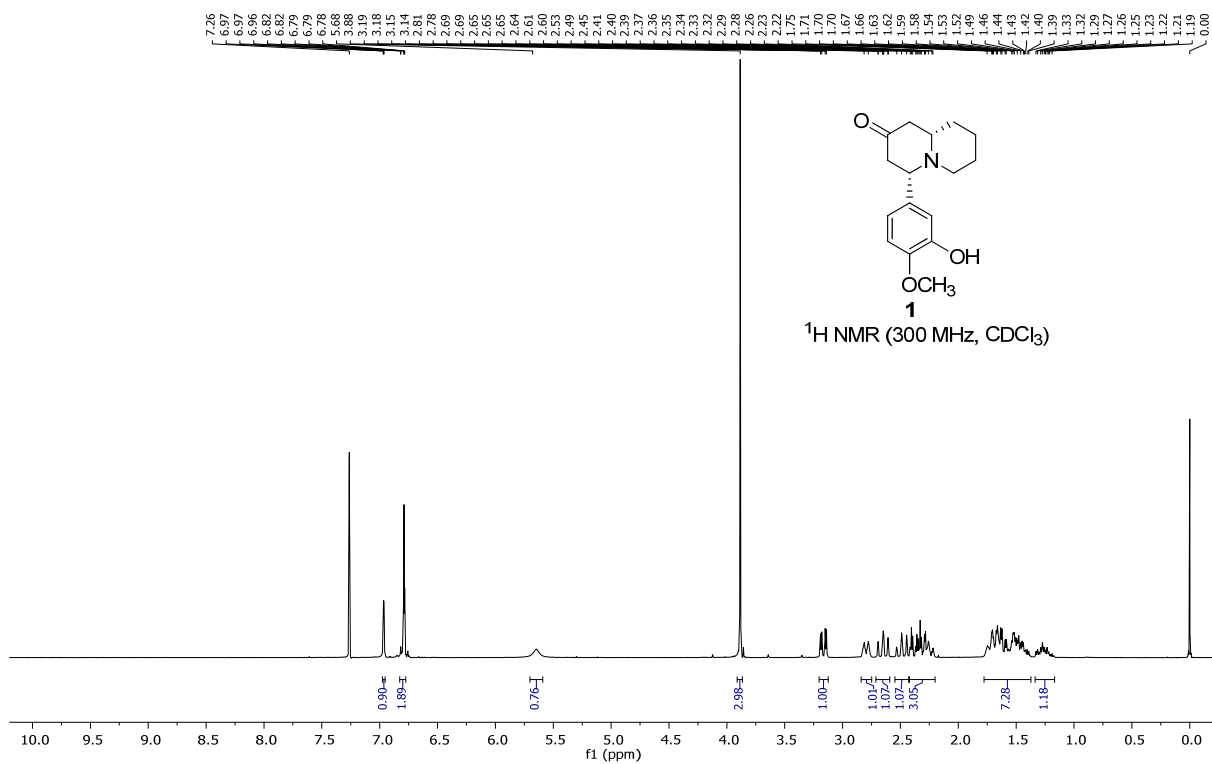
**22**<sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>)

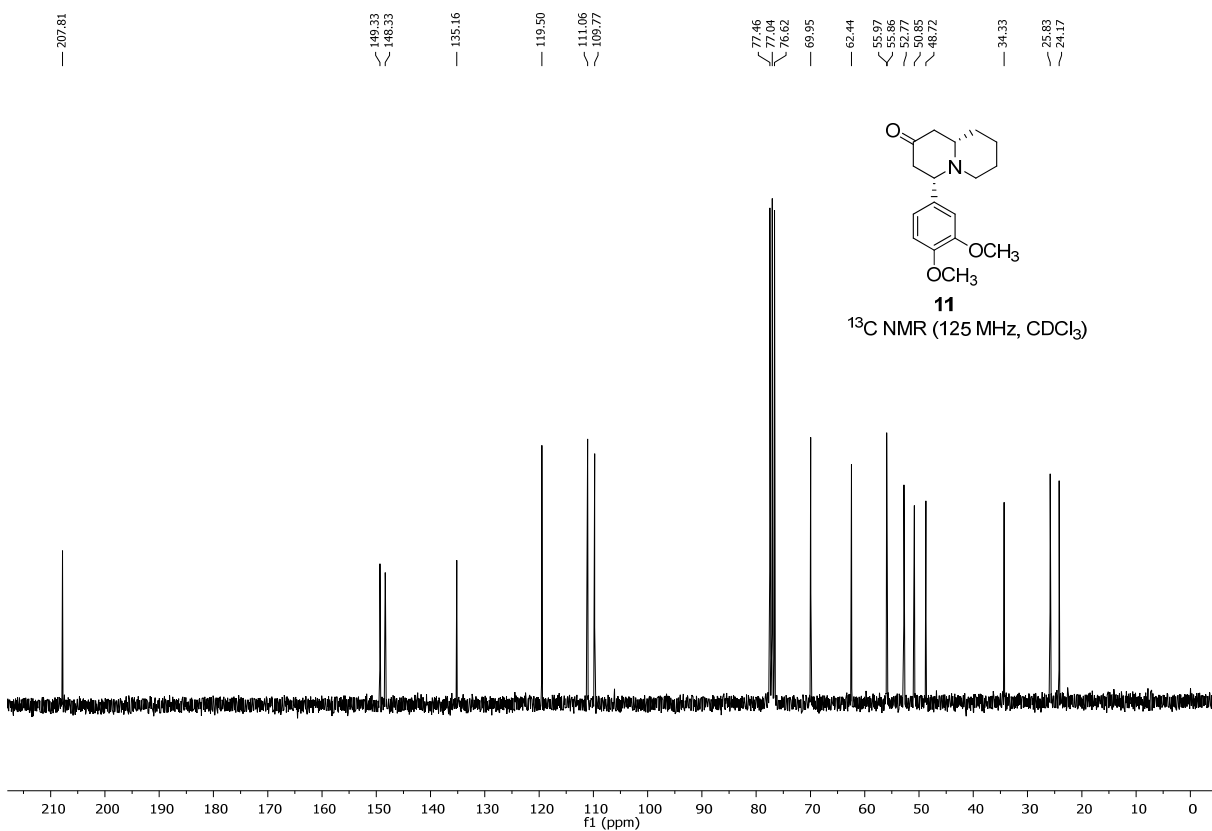
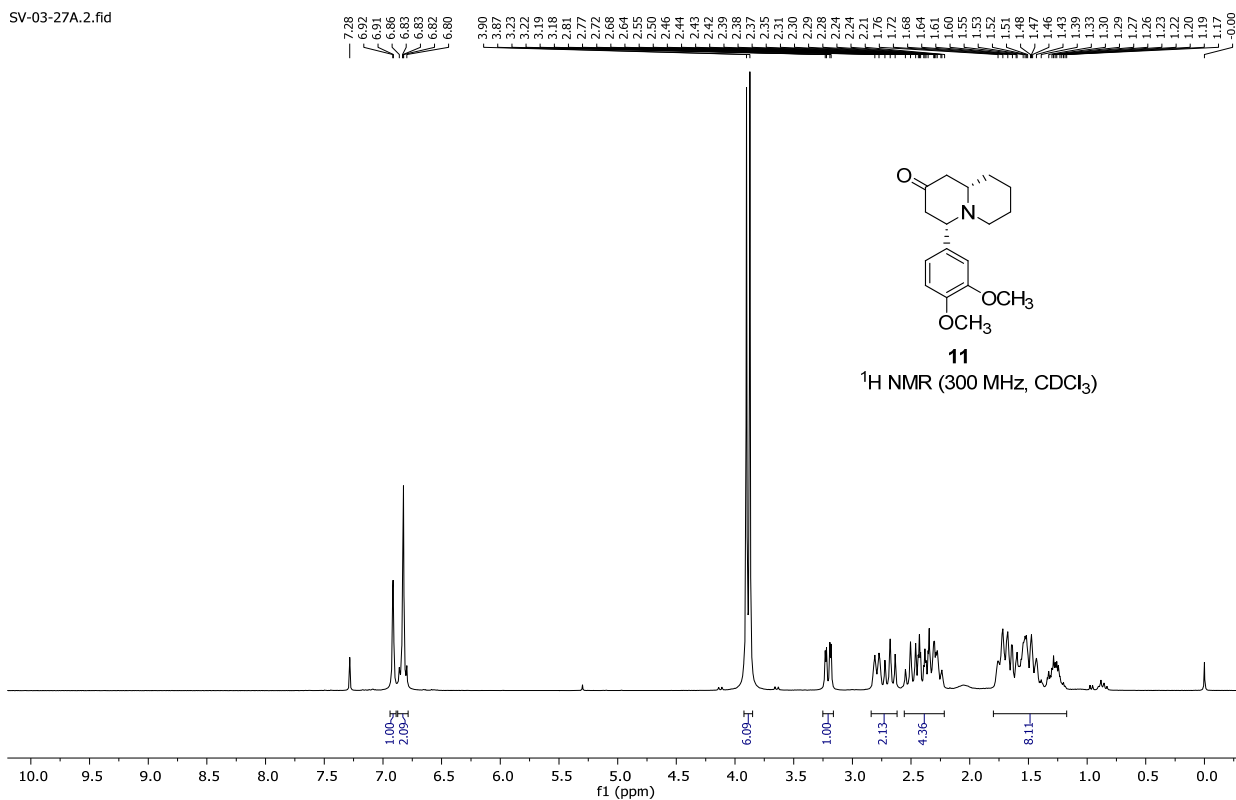


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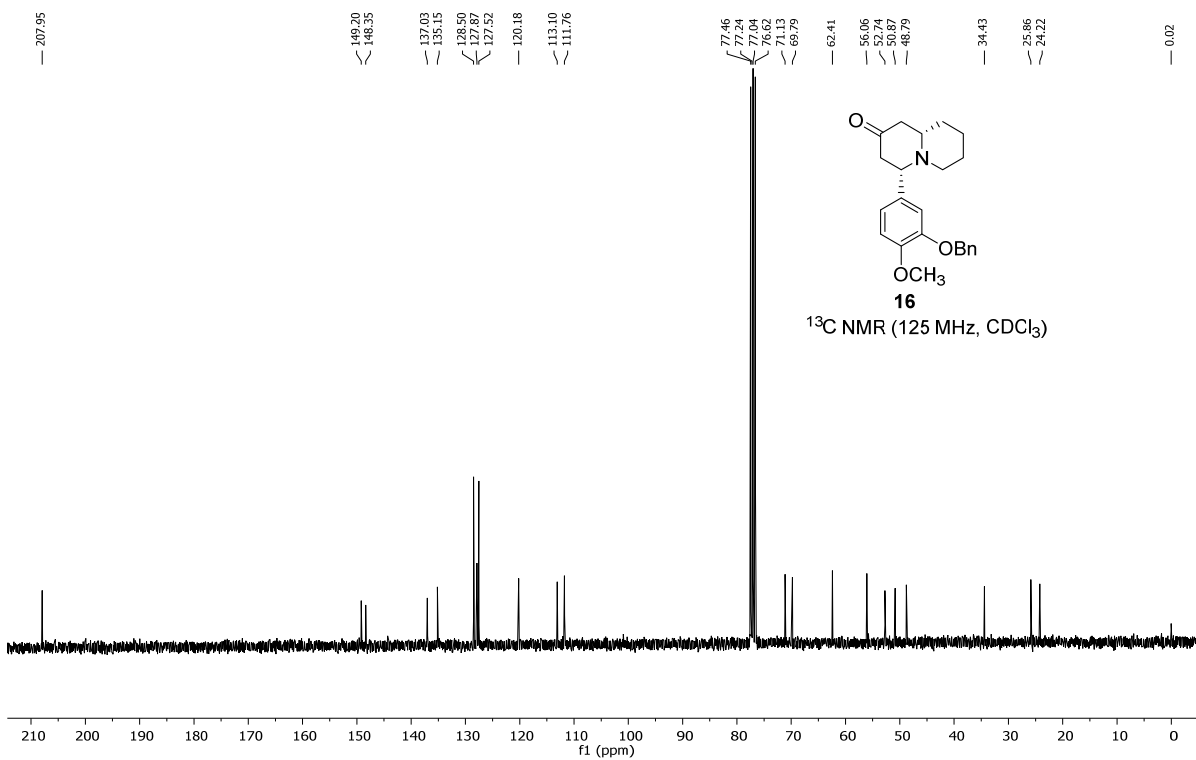
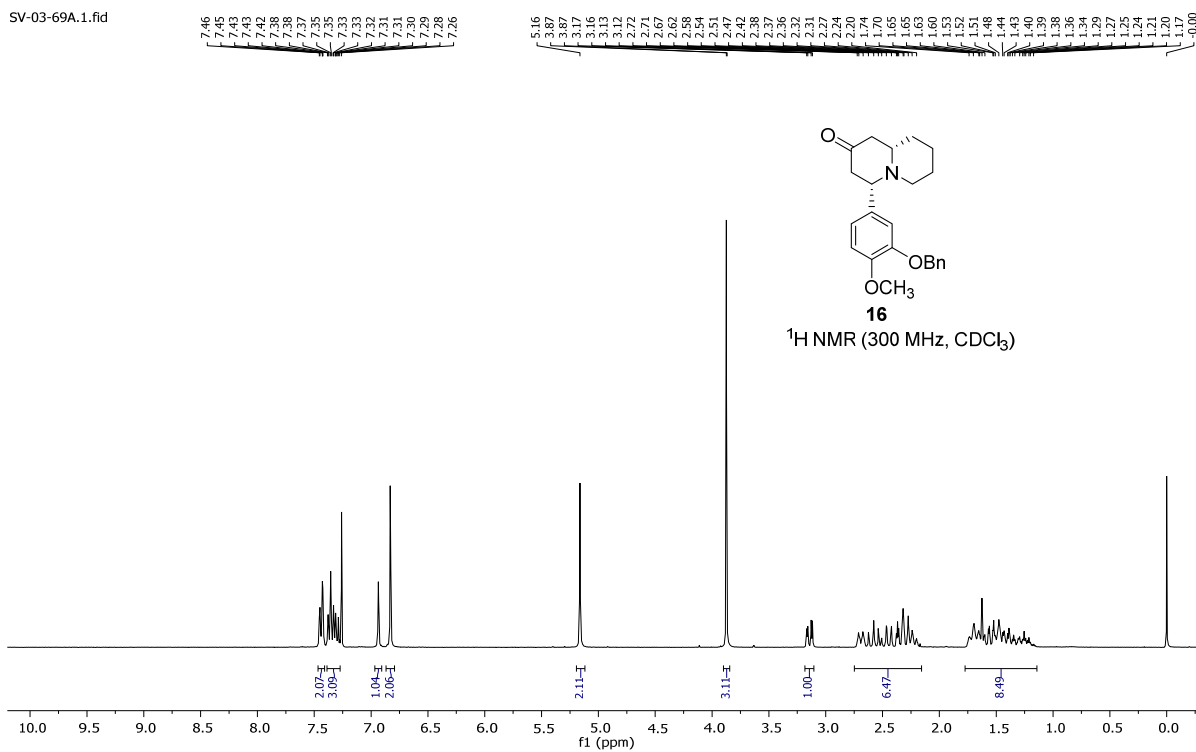




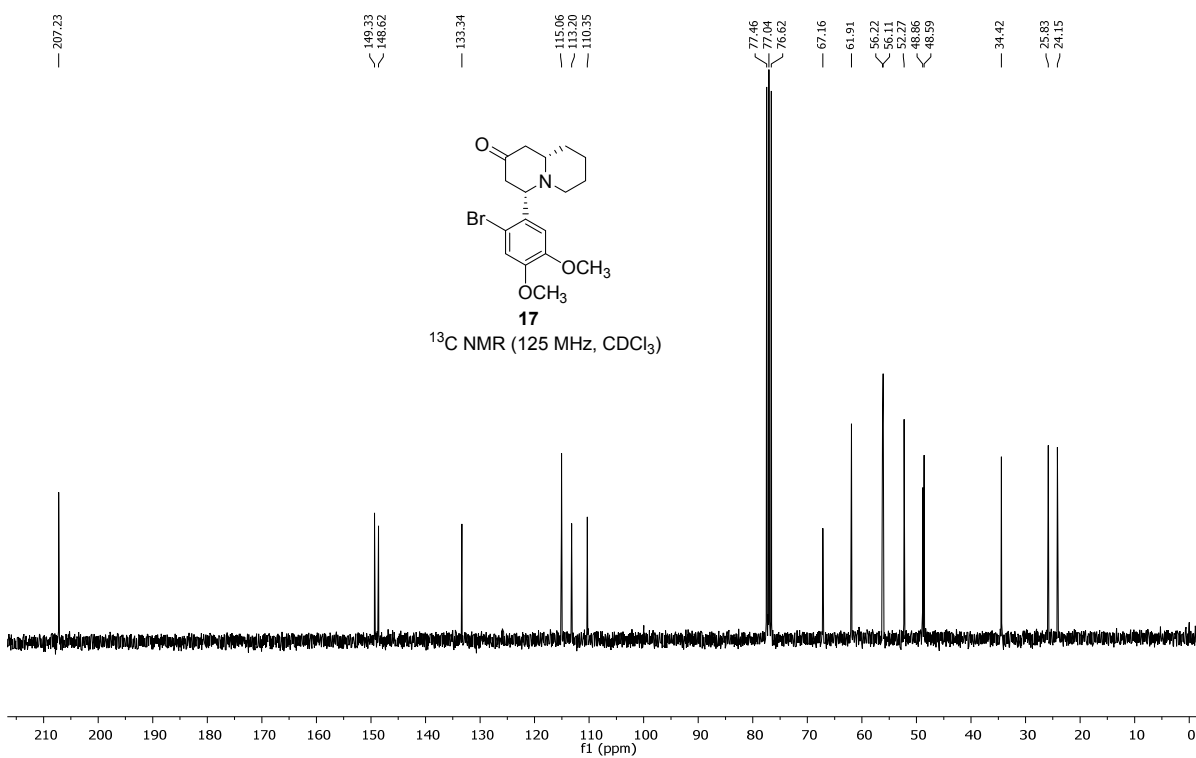
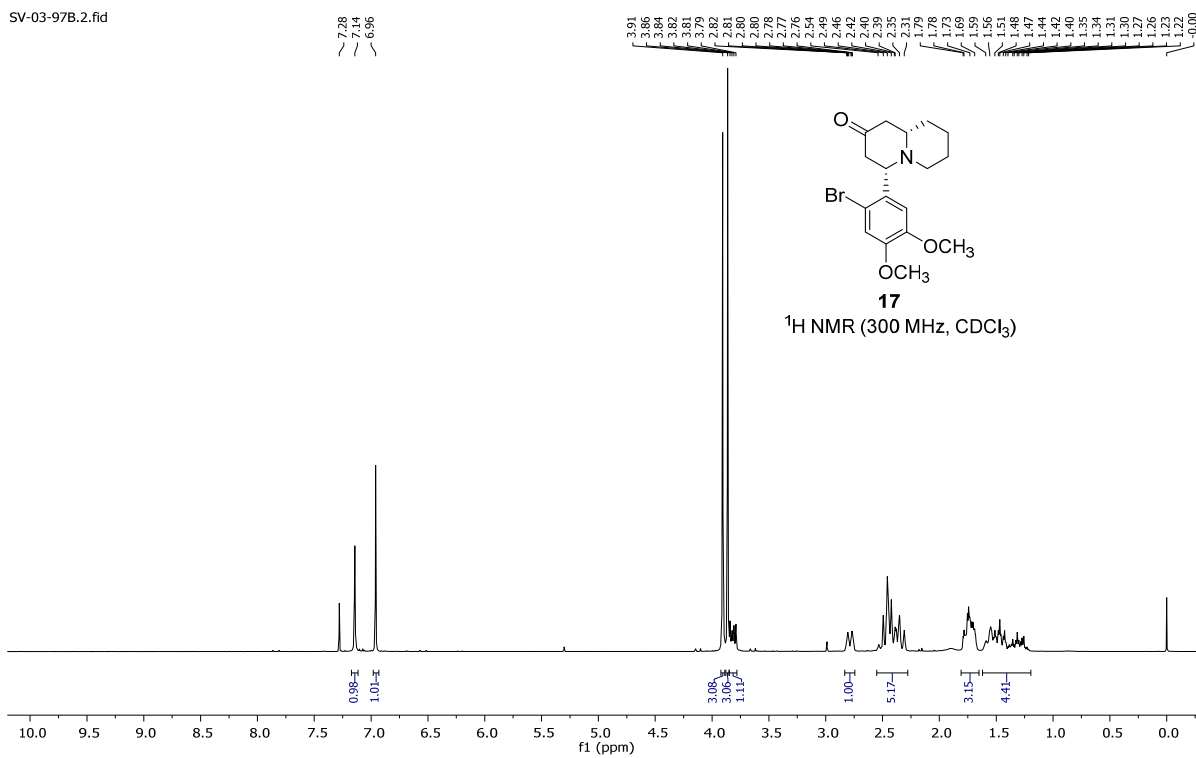


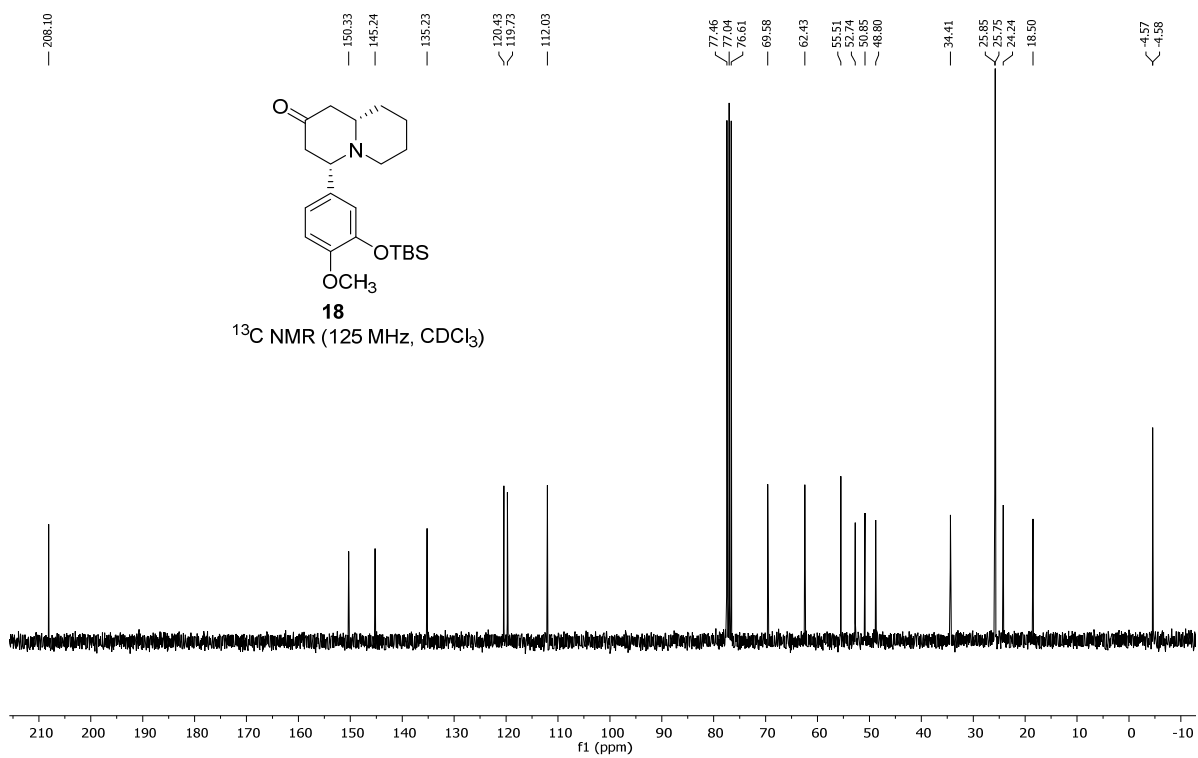
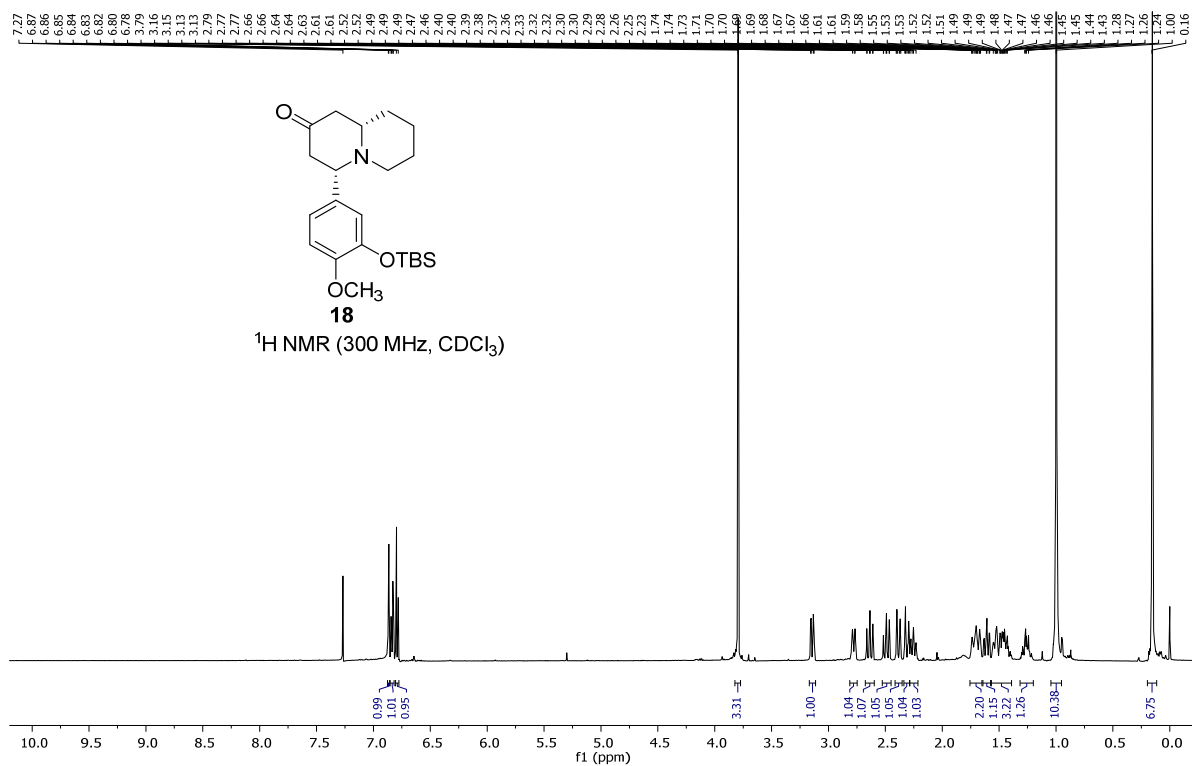


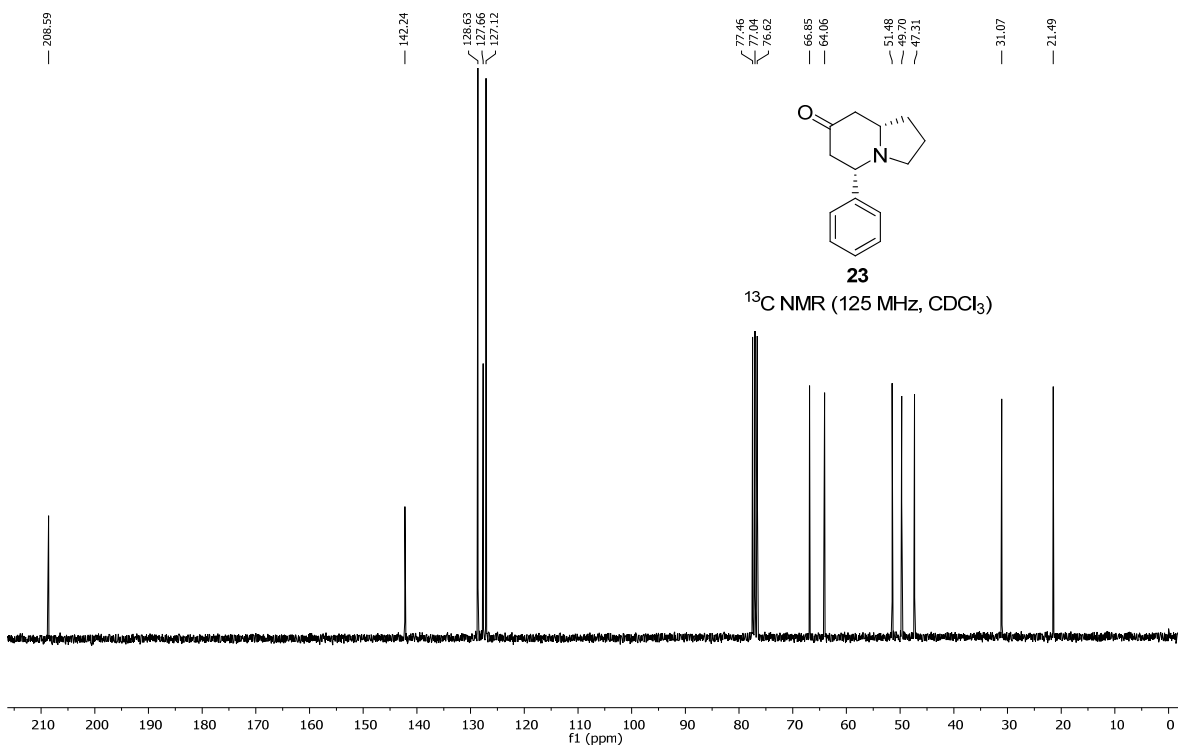
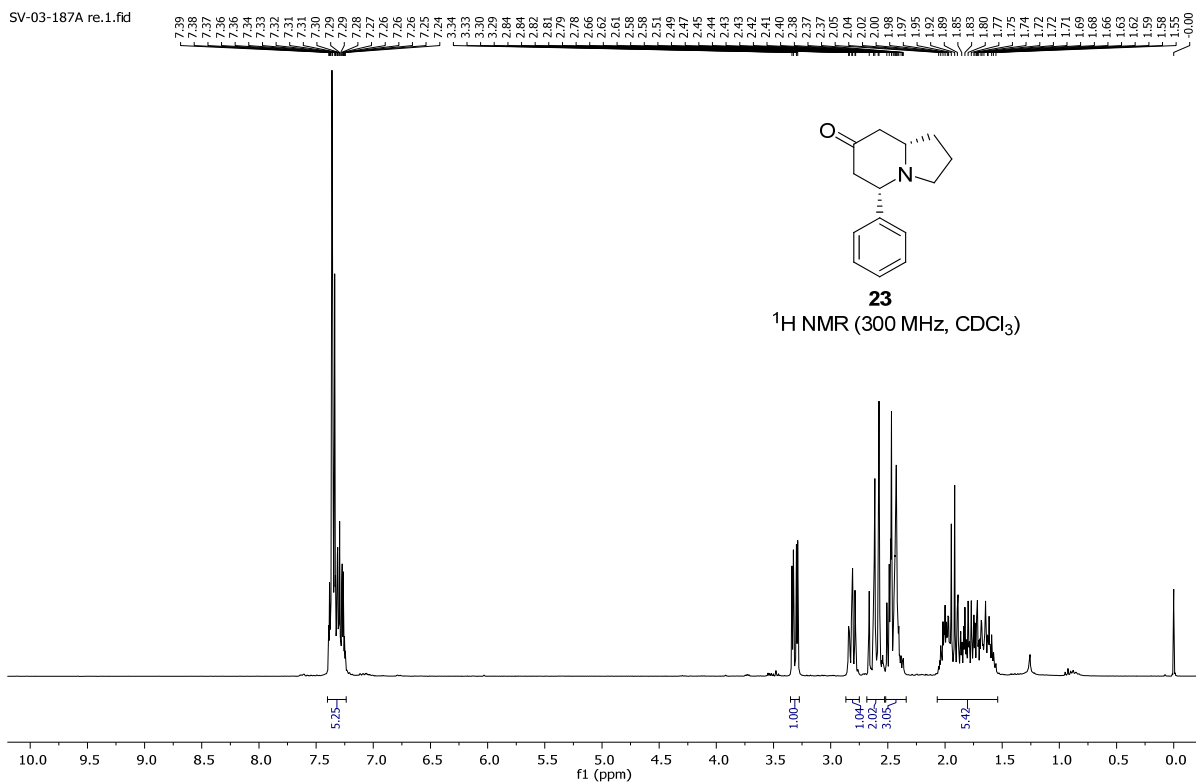
SV-03-69A.1.fid

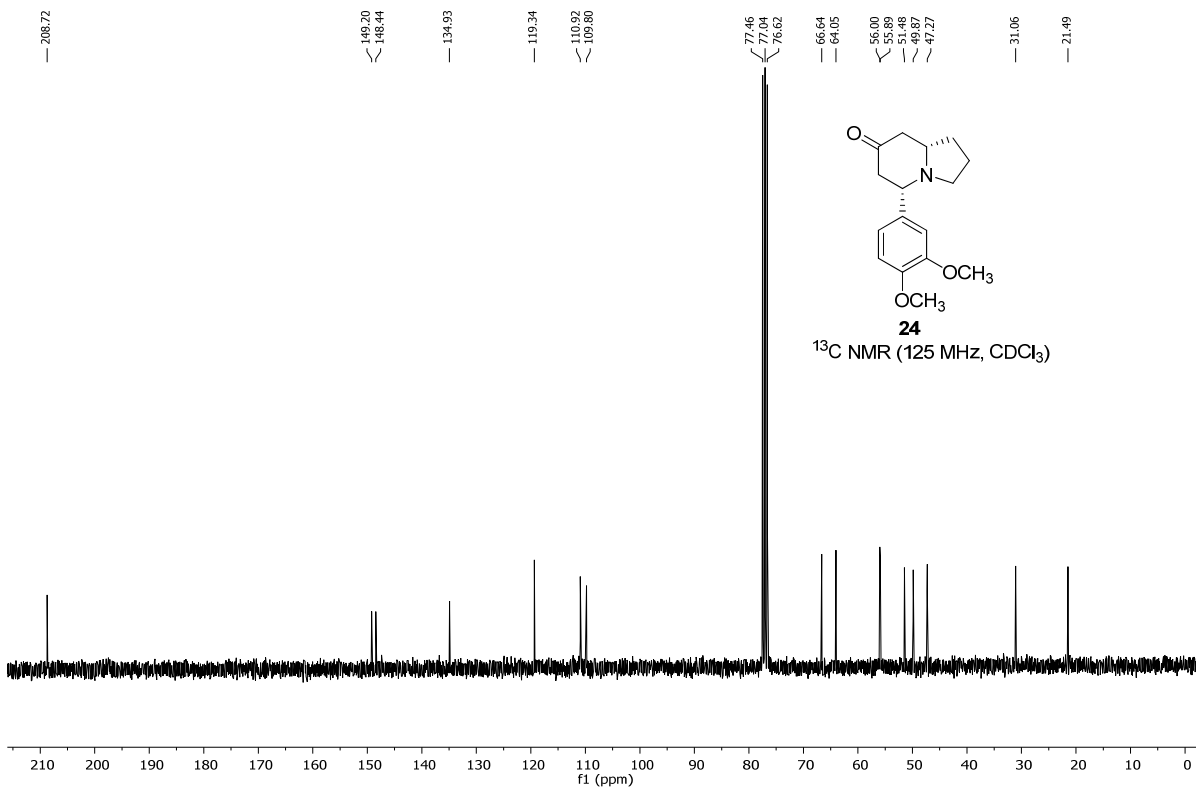
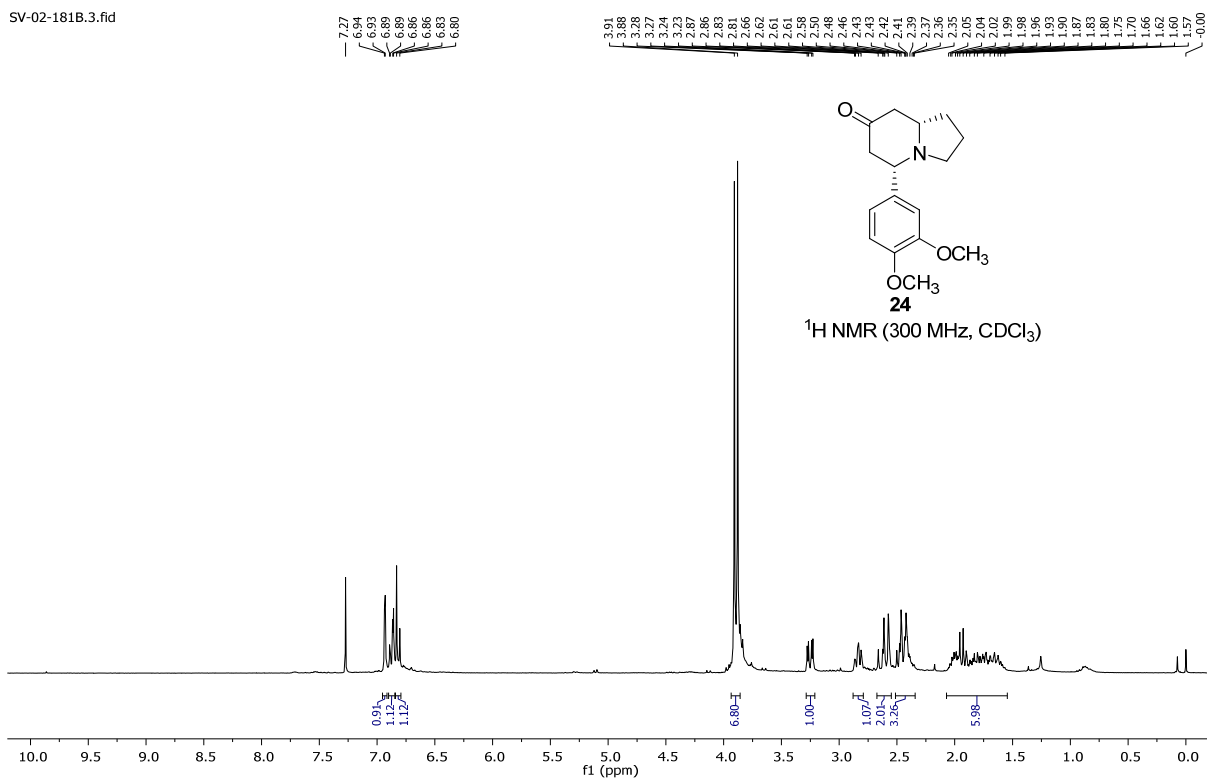


SV-03-97B.2.fid

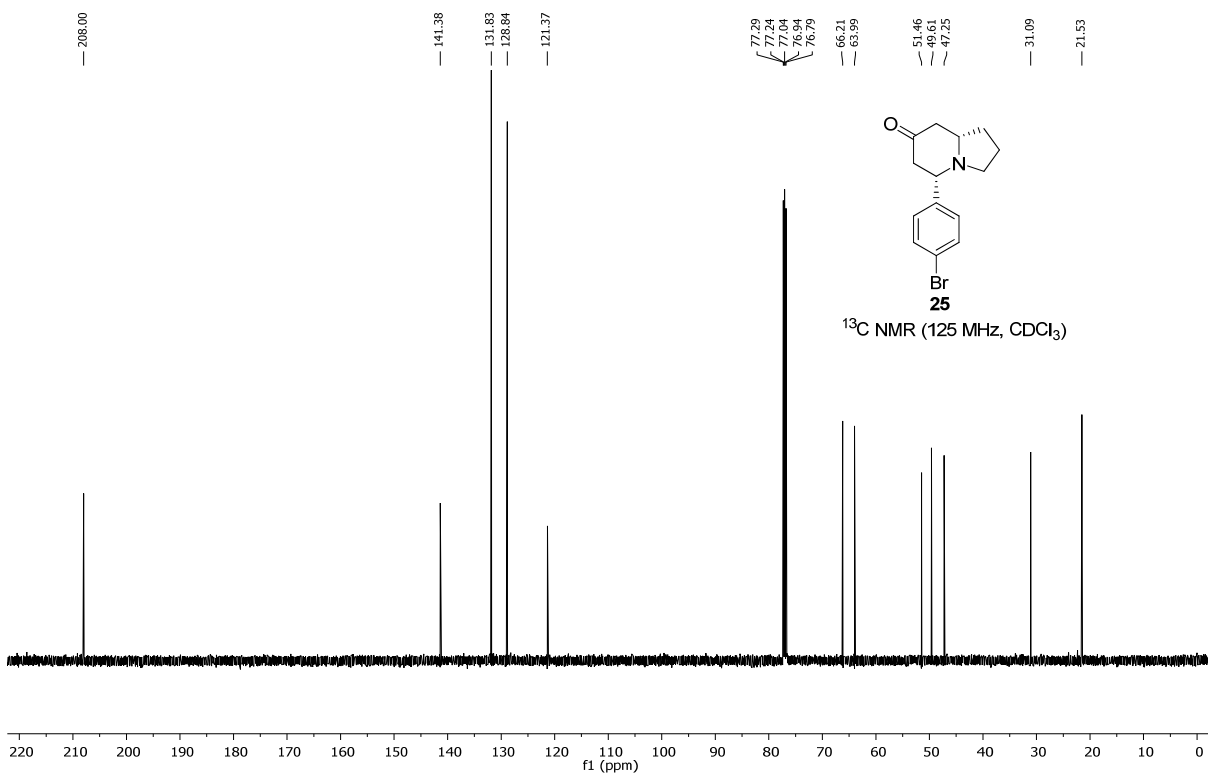
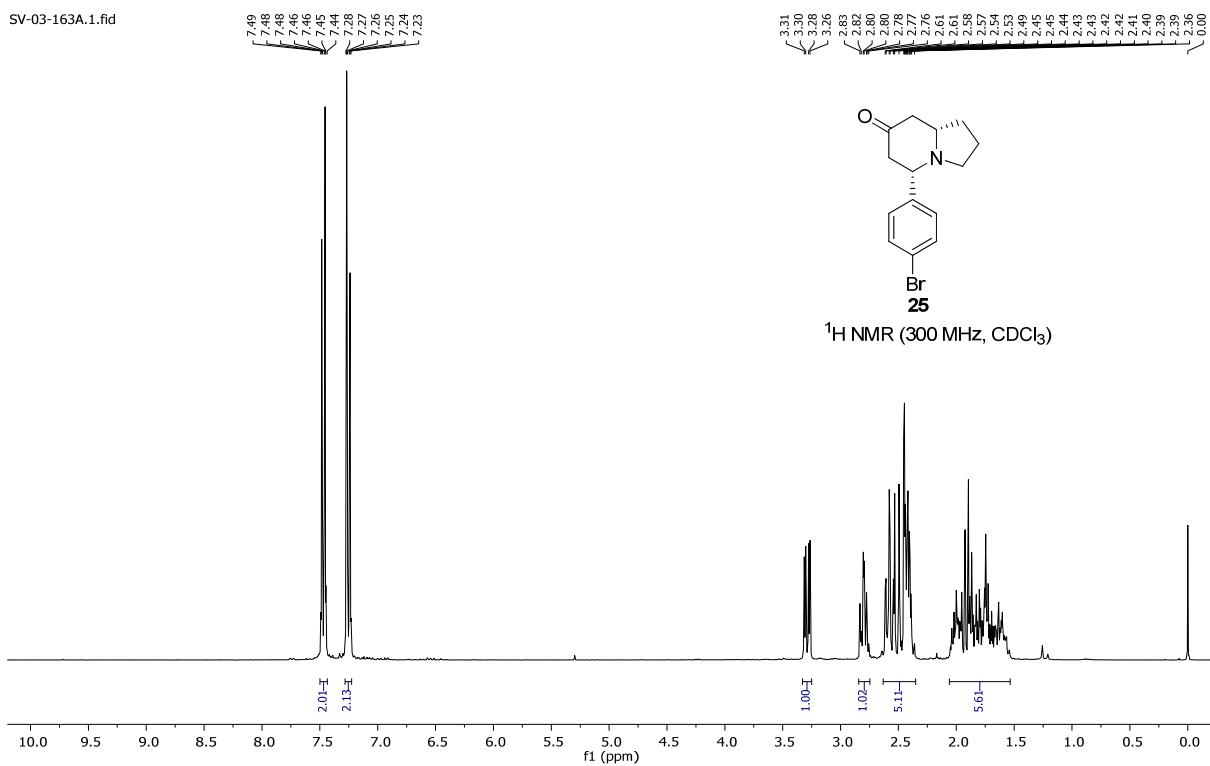






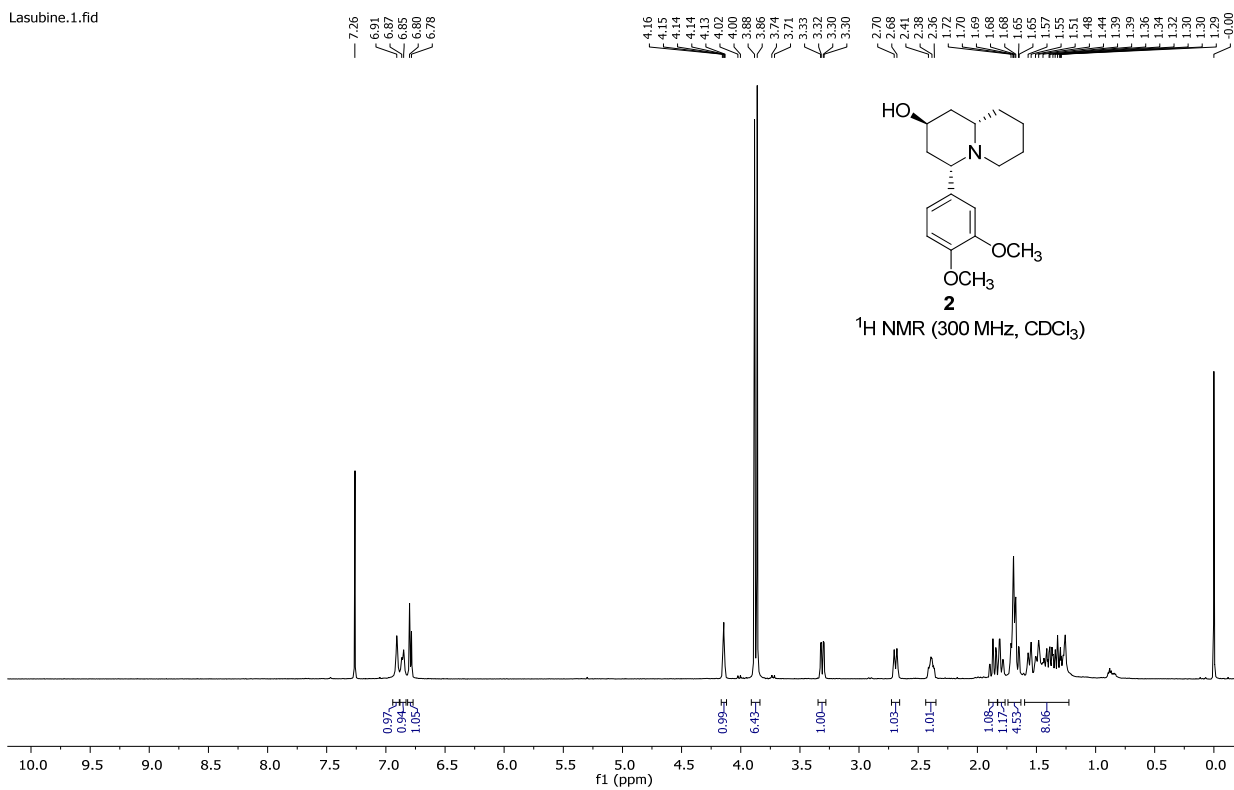


SV-03-163A.1.fid

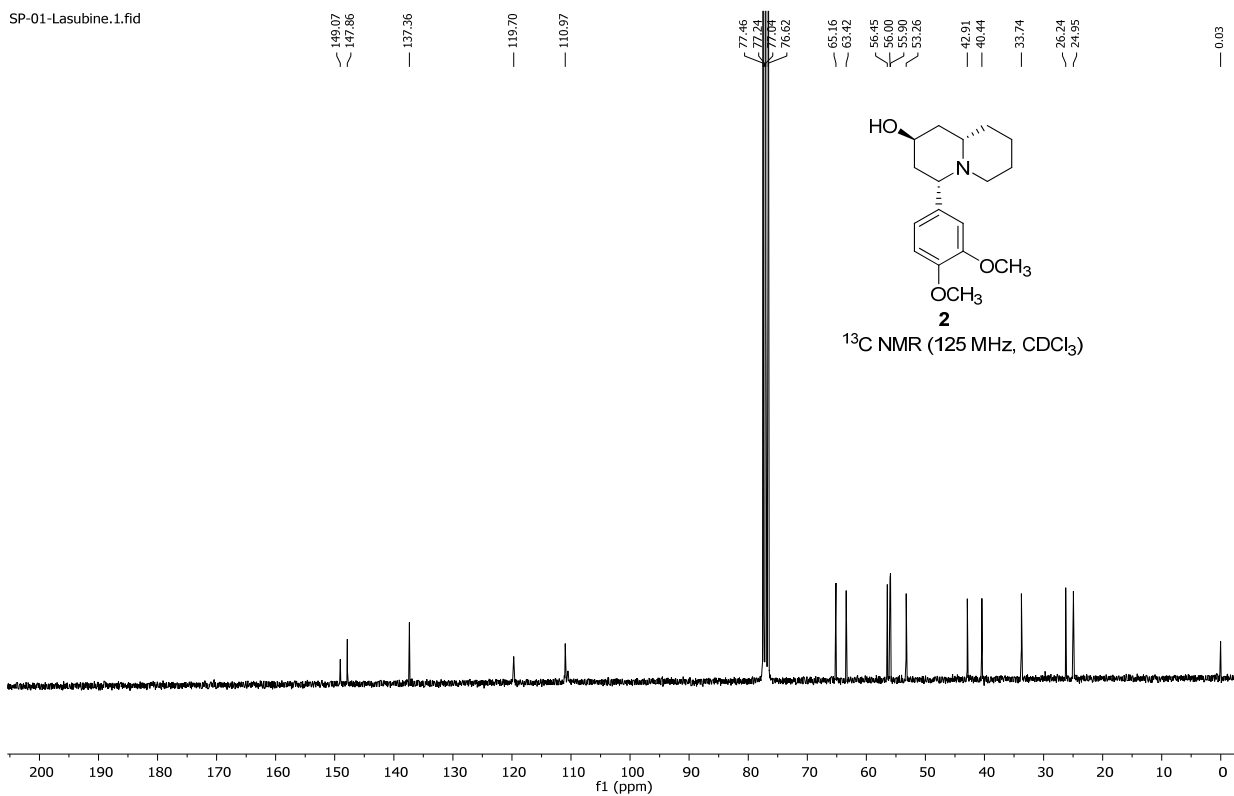




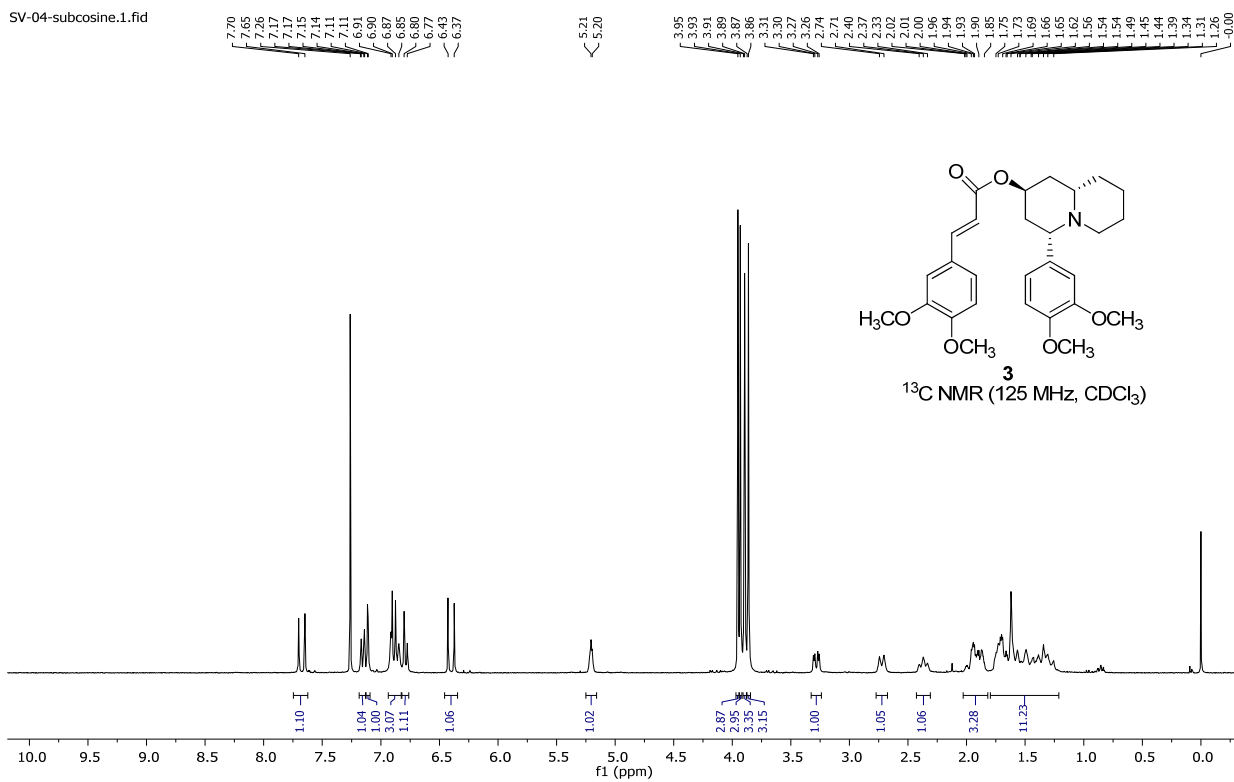
Lasubine.1.fid



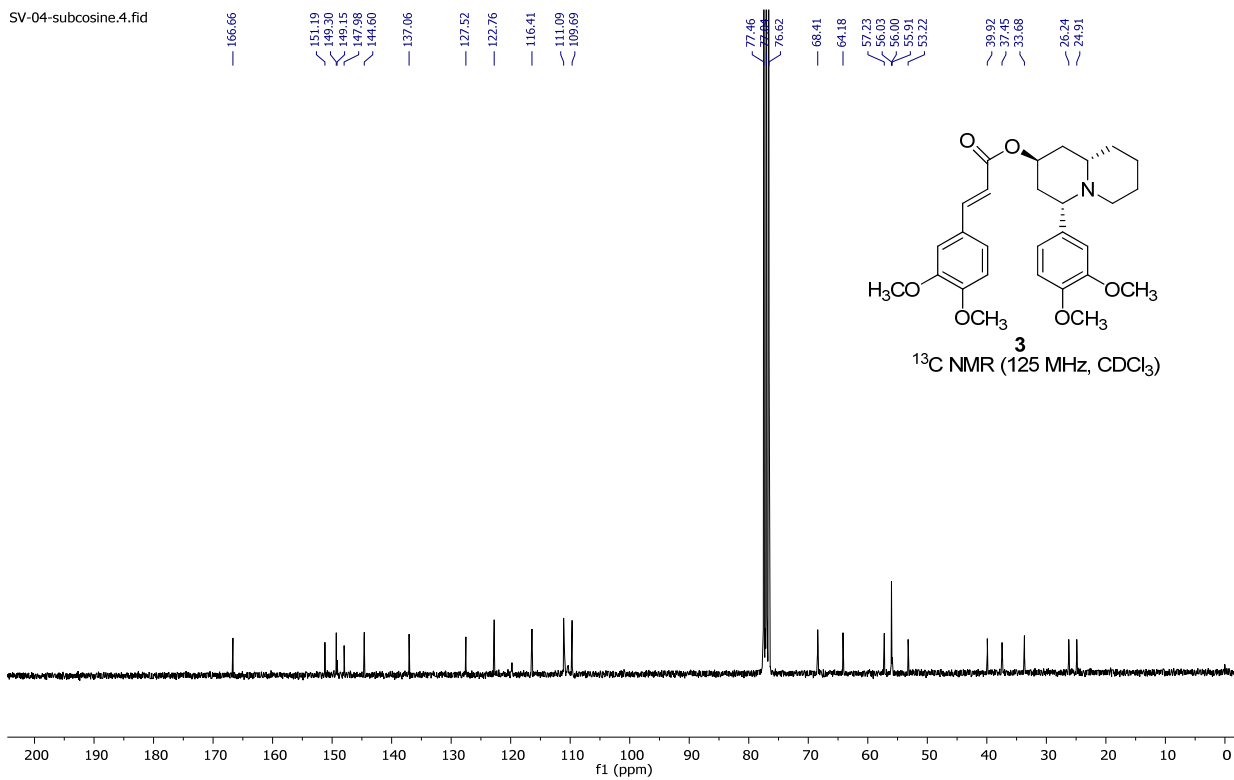
SP-01-Lasubine.1.fid



SV-04-subcosine.1.fid



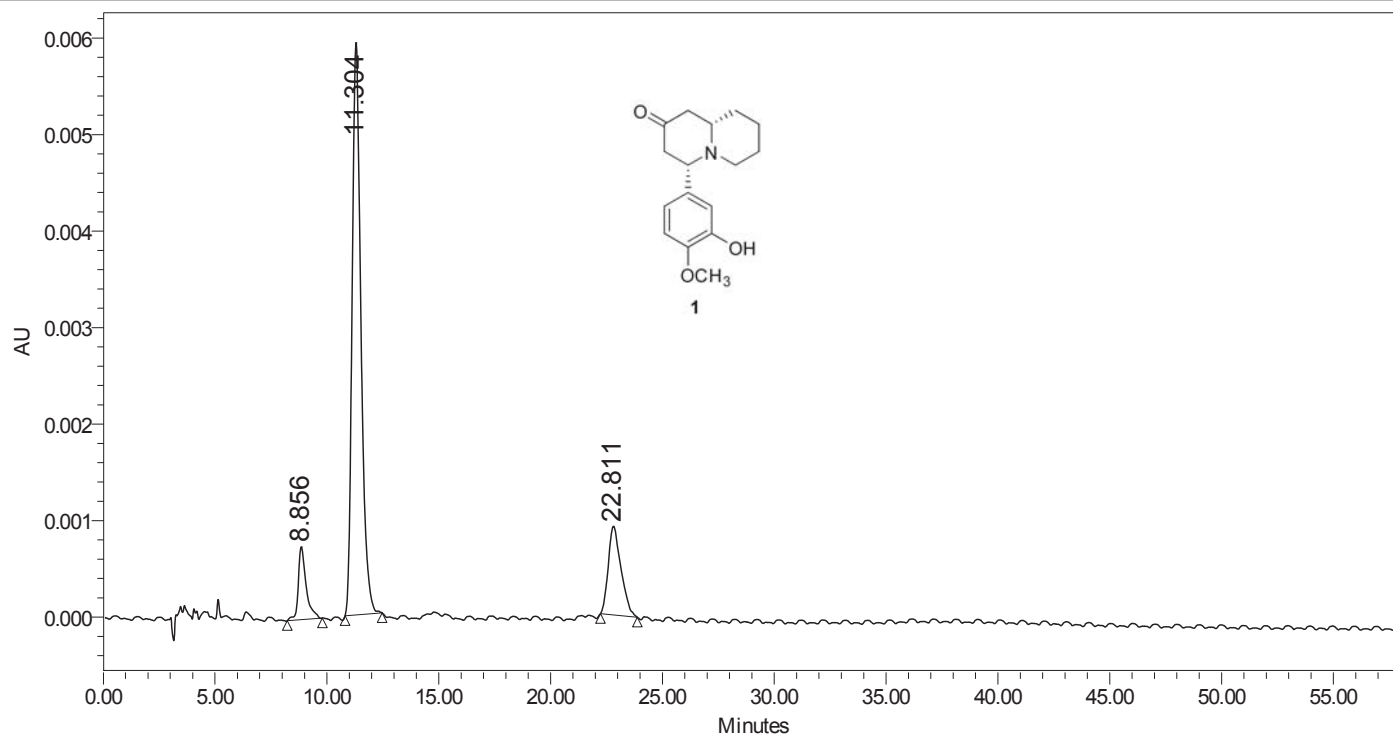
SV-04-subcosine.4.fid



## SAMPLE INFORMATION

Sample Name: SV-02- 191B  
Sample Type: Unknown  
Vial: 1  
Injection #: 1  
Injection Volume: 10.00 ul  
Run Time: 60.00 Minutes

Acquired By: Breeze  
Date Acquired: 10/04/2018 11:18:23 AM NDT  
Acq. Method: OJ\_H 80% HEX 20%IPA  
Date Processed: 17/04/2018 4:06:21 PM NDT  
Channel Name: 2487Channel 1  
Sample Set Name:

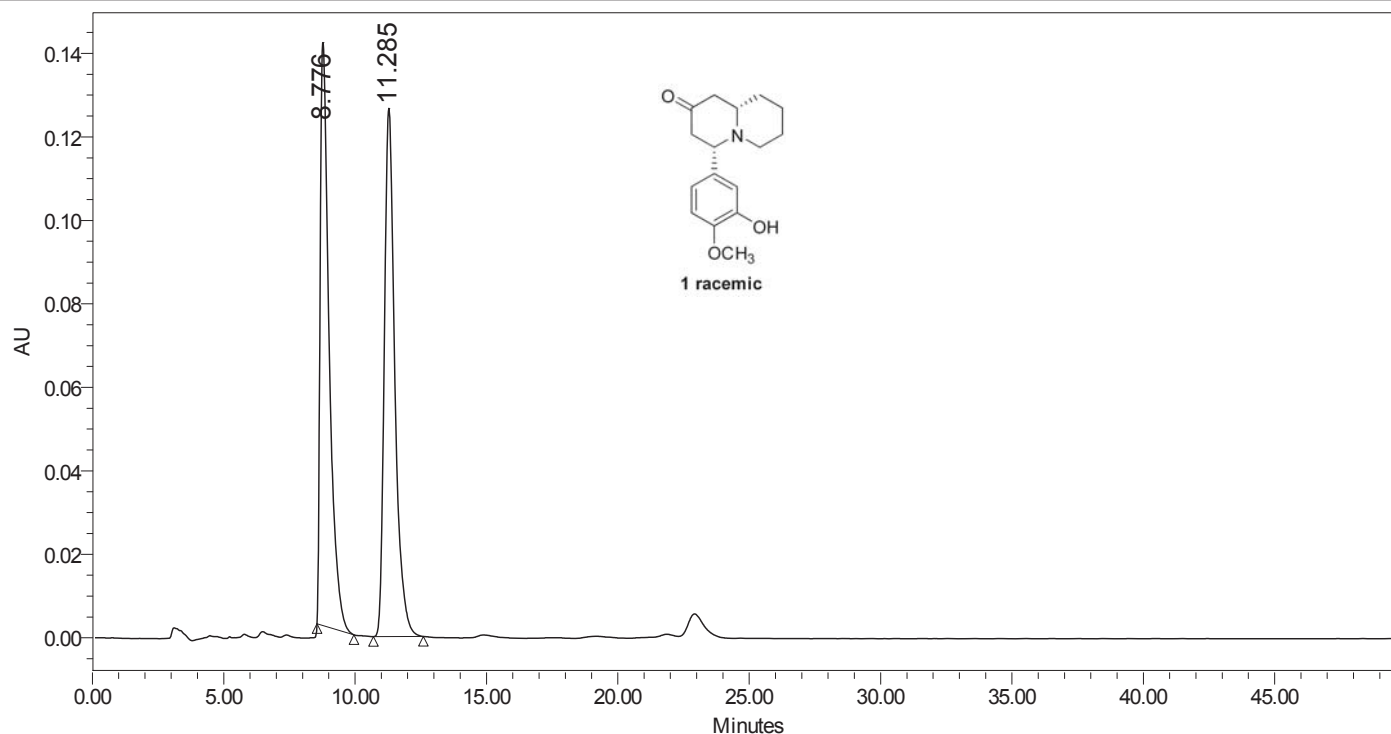


	RT (min)	Area ( $\mu\text{V}\cdot\text{sec}$ )	% Area	Height ( $\mu\text{V}$ )	% Height
1	8.856	18441	8.51	754	9.92
2	11.304	161824	74.68	5930	78.03
3	22.811	36414	16.81	916	12.06

## SAMPLE INFORMATION

Sample Name: SV-02- 193B  
Sample Type: Unknown  
Vial: 1  
Injection #: 1  
Injection Volume: 10.00 ul  
Run Time: 60.00 Minutes

Acquired By: Breeze  
Date Acquired: 09/04/2018 3:40:38 PM NDT  
Acq. Method: OJ\_H 80% HEX 20%IPA  
Date Processed: 17/04/2018 4:04:51 PM NDT  
Channel Name: 2487Channel 1  
Sample Set Name:

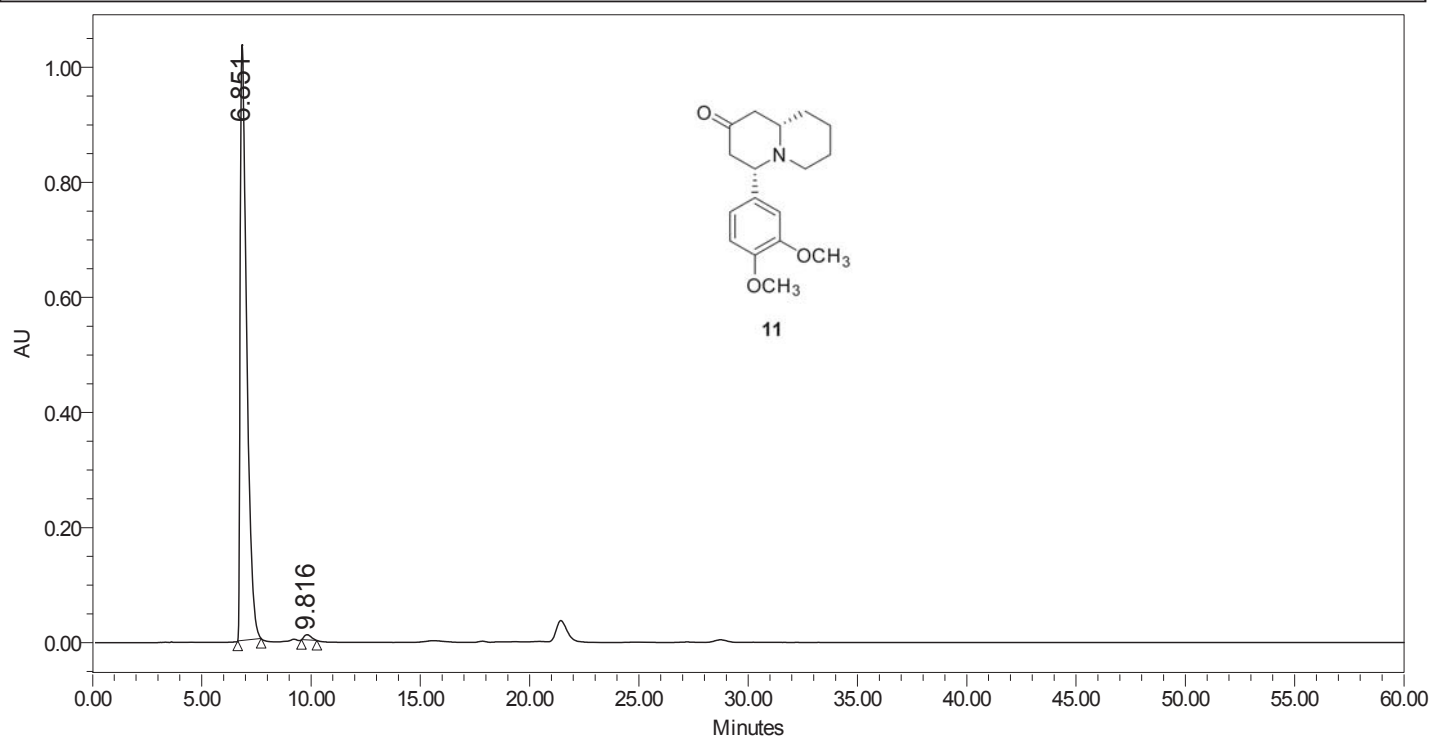


	RT (min)	Area ( $\mu\text{V}\cdot\text{sec}$ )	% Area	Height ( $\mu\text{V}$ )	% Height
1	8.776	3330788	48.59	139772	52.49
2	11.285	3523655	51.41	126527	47.51

## SAMPLE INFORMATION

Sample Name: SV-03-27A  
Sample Type: Unknown  
Vial: 1  
Injection #: 2  
Injection Volume: 10.00  $\mu$ l  
Run Time: 60.00 Minutes

Acquired By: Breeze  
Date Acquired: 23/05/2018 2:32:06 PM NDT  
Acq. Method: OJ\_H 80% HEX 20%IPA  
Date Processed: 23/05/2018 5:01:39 PM NDT  
Channel Name: 2487Channel 1  
Sample Set Name:

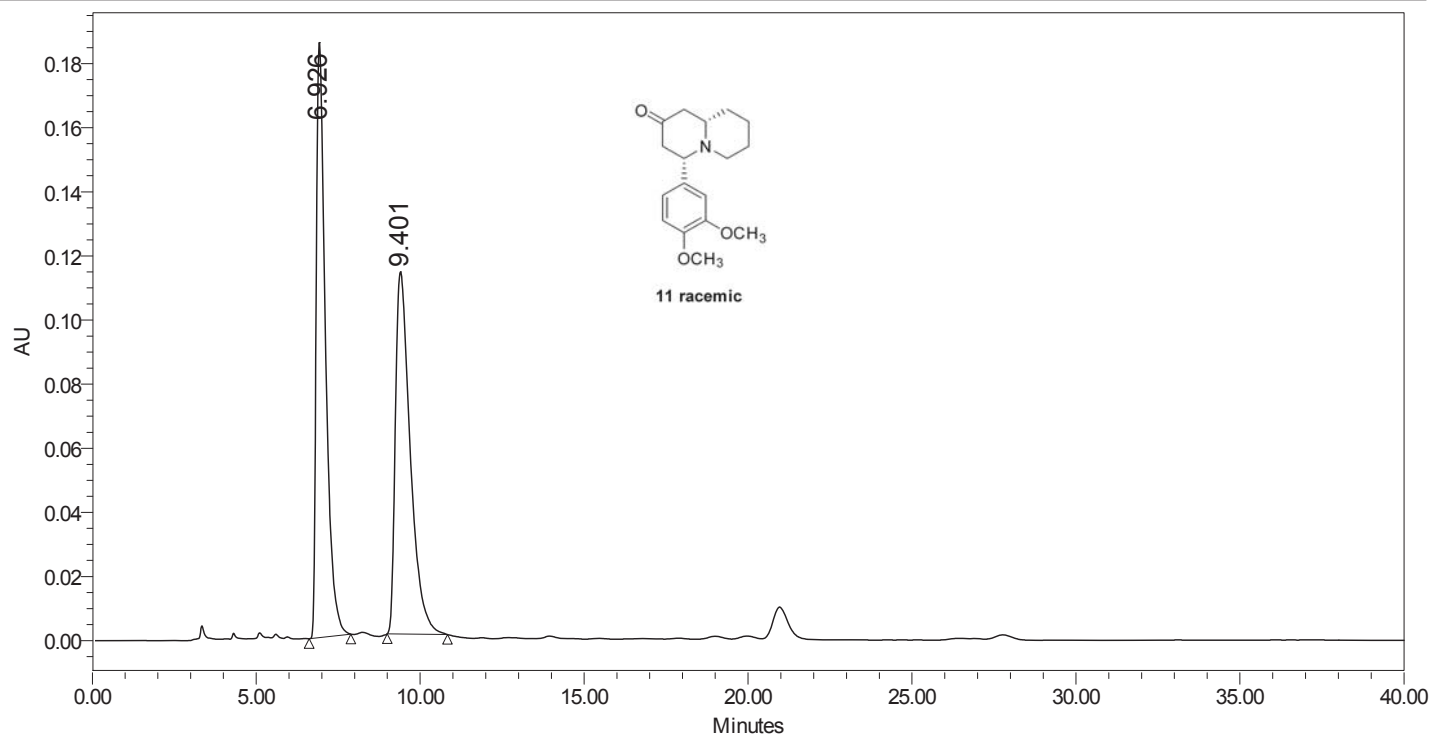


	RT (min)	Area ( $\mu$ V*sec)	% Area	Height ( $\mu$ V)	% Height
1	6.851	21382860	99.04	1035780	99.12
2	9.816	207001	0.96	9200	0.88

## SAMPLE INFORMATION

Sample Name: SV-02-59A  
Sample Type: Unknown  
Vial: 1  
Injection #: 1  
Injection Volume: 10.00  $\mu$ l  
Run Time: 40.00 Minutes

Acquired By: Breeze  
Date Acquired: 21/09/2017 3:01:51 PM NDT  
Acq. Method: OJ\_H 80% HEX 20%IPA  
Date Processed: 21/09/2017 3:43:50 PM NDT  
Channel Name: 2487Channel 1  
Sample Set Name:

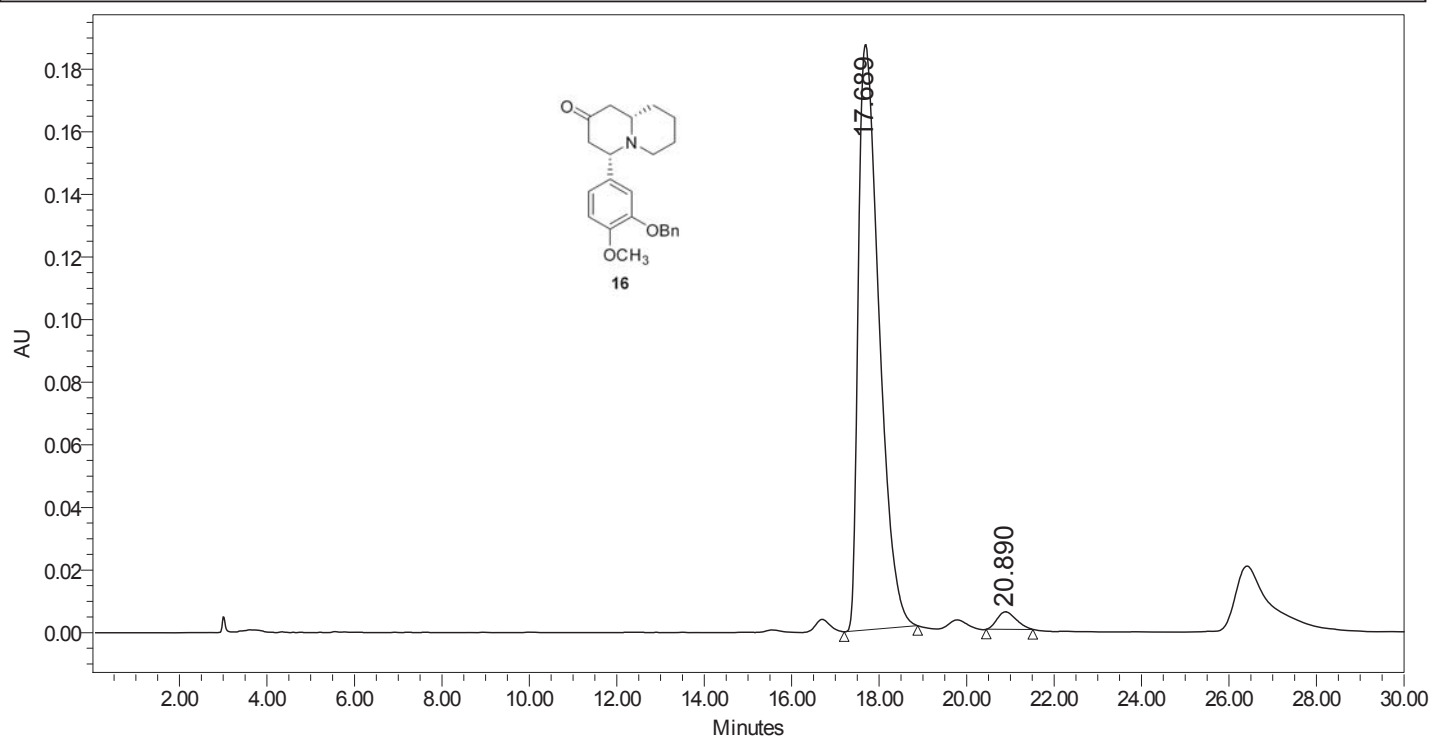


	RT (min)	Area ( $\mu$ V*sec)	% Area	Height ( $\mu$ V)	% Height
1	6.926	3654516	50.67	186275	62.25
2	9.401	3557390	49.33	112948	37.75

## SAMPLE INFORMATION

Sample Name: SV-02-171C  
Sample Type: Unknown  
Vial: 1  
Injection #: 1  
Injection Volume: 10.00 ul  
Run Time: 30.00 Minutes

Acquired By: Breeze  
Date Acquired: 22/08/2018 11:30:10 AM NDT  
Acq. Method: AD\_H 97%HEX 3%IPA  
Date Processed: 22/08/2018 4:15:53 PM NDT  
Channel Name: 2487Channel 1  
Sample Set Name:



	RT (min)	Area ( $\mu\text{V}\cdot\text{sec}$ )	% Area	Height ( $\mu\text{V}$ )	% Height
1	17.689	6178862	97.32	187042	97.09
2	20.890	170136	2.68	5605	2.91

## SAMPLE INFORMATION

Sample Name: SV-02-185A fridge

Sample Type: Unknown

Vial: 1

Injection #: 1

Injection Volume: 10.00  $\mu$ l

Run Time: 30.00 Minutes

Acquired By: Breeze

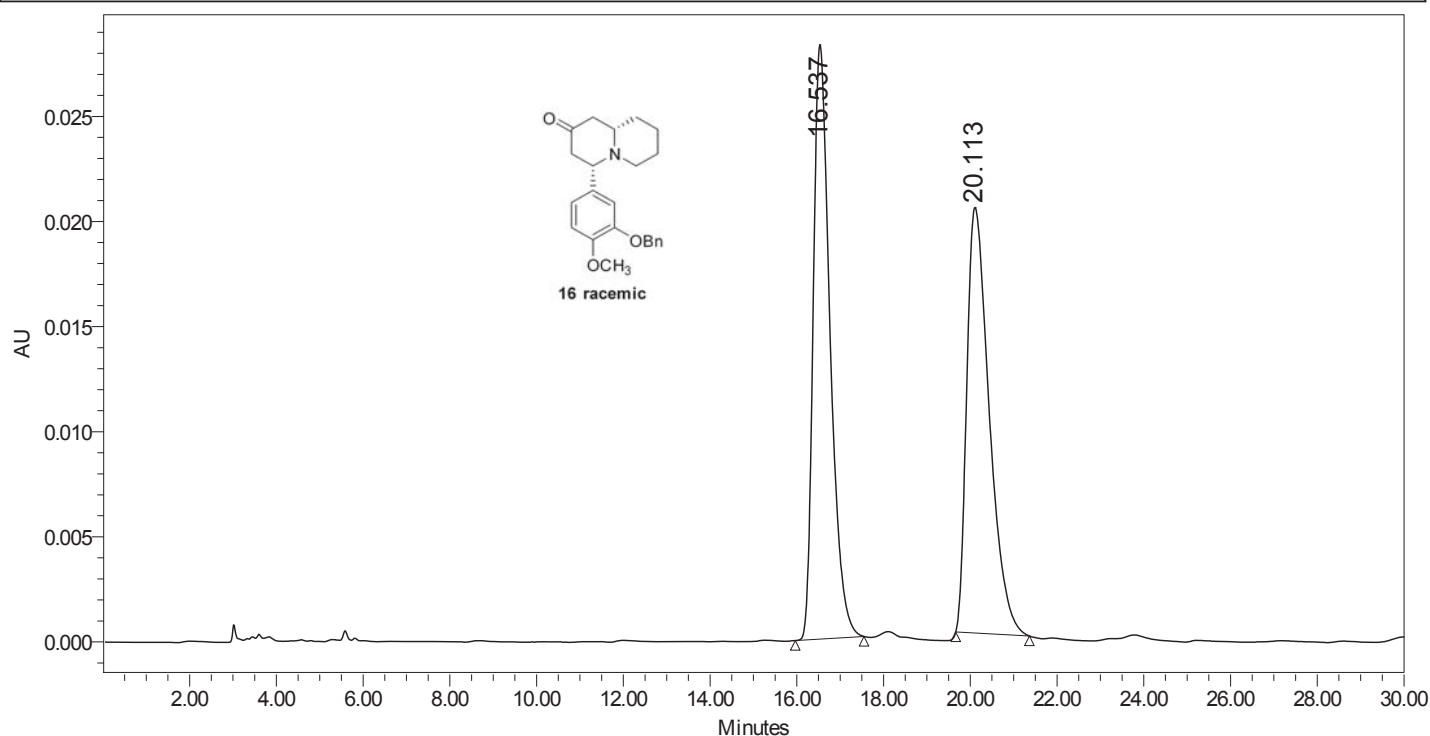
Date Acquired: 22/08/2018 4:50:45 PM NDT

Acq. Method: AD\_H 97%HEX 3%IPA

Date Processed: 19/09/2018 12:59:08 PM NDT

Channel Name: 2487Channel 1

Sample Set Name:



	RT (min)	Area ( $\mu$ V*sec)	% Area	Height ( $\mu$ V)	% Height
1	16.537	760923	51.10	28279	58.27
2	20.113	728147	48.90	20249	41.73



## SAMPLE INFORMATION

Sample Name: SV-02-147C #14

Sample Type: Unknown

Vial: 1

Injection #: 2

Injection Volume: 10.00  $\mu$ l

Run Time: 30.00 Minutes

Acquired By: Breeze

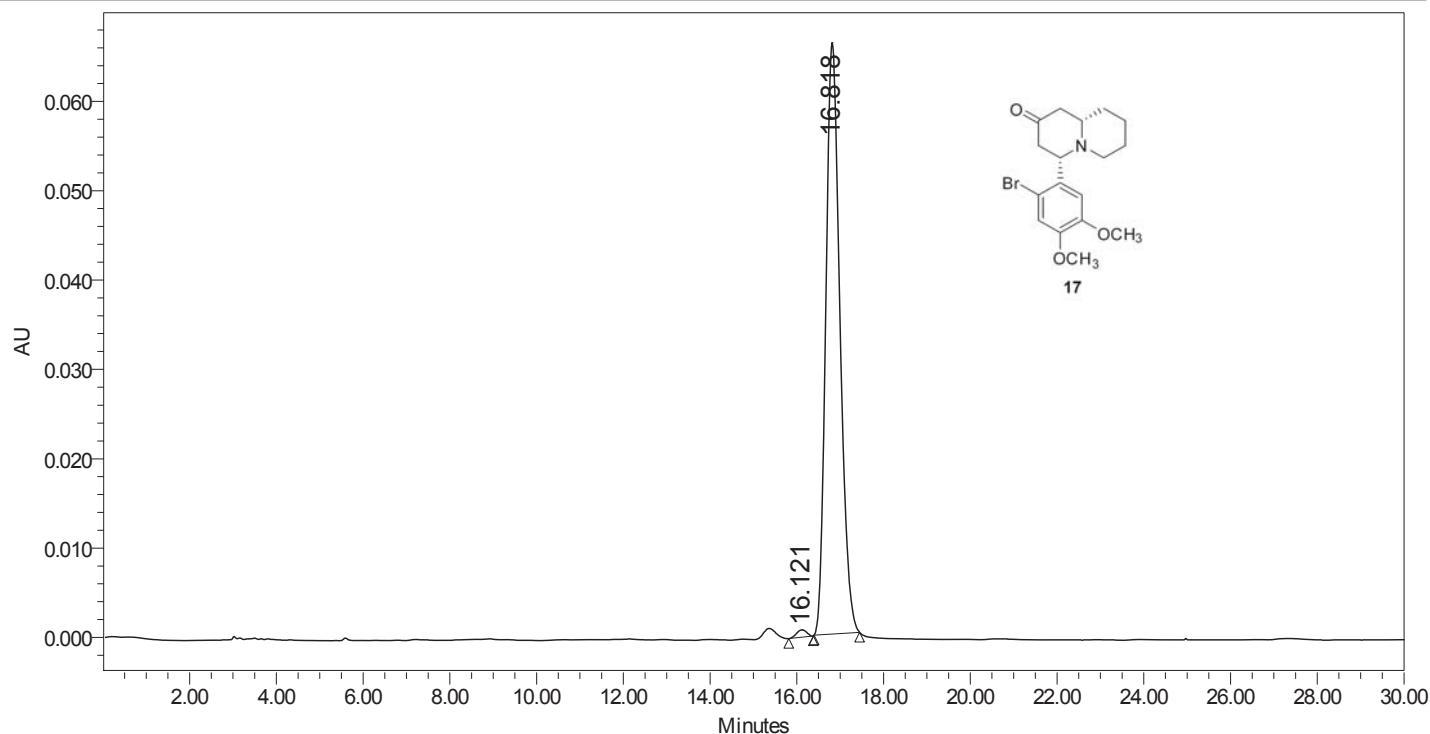
Date Acquired: 28/07/2018 2:23:37 PM NDT

Acq. Method: AD\_H 97%HEX 3%IPA

Date Processed: 28/07/2018 3:14:23 PM NDT

Channel Name: 2487Channel 1

Sample Set Name

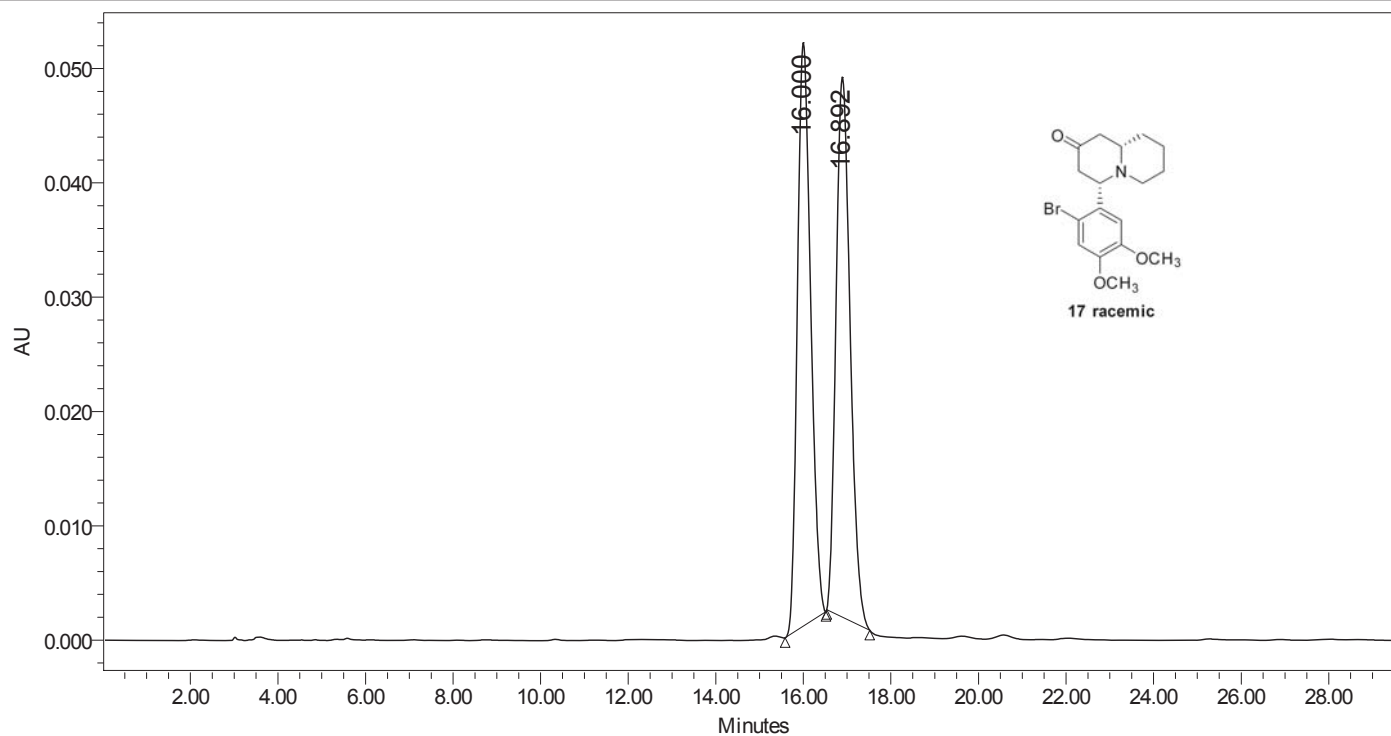


	RT (min)	Area ( $\mu$ V*sec)	% Area	Height ( $\mu$ V)	% Height
1	16.121	13126	0.87	817	1.22
2	16.818	1494509	99.13	66198	98.78

## SAMPLE INFORMATION

Sample Name: SV-02-183C  
Sample Type: Unknown  
Vial: 1  
Injection #: 1  
Injection Volume: 10.00  $\mu$ l  
Run Time: 40.00 Minutes

Acquired By: Breeze  
Date Acquired: 28/07/2018 1:52:23 PM NDT  
Acq. Method: AD\_H 97%HEX 3%IPA  
Date Processed: 28/07/2018 2:36:24 PM NDT  
Channel Name: 2487Channel 1  
Sample Set Name:



	RT (min)	Area ( $\mu$ V*sec)	% Area	Height ( $\mu$ V)	% Height
1	16.000	1072119	50.26	51025	51.90
2	16.892	1061209	49.74	47280	48.10

## SAMPLE INFORMATION

Sample Name: SV-03-187A re

Sample Type: Unknown

Vial: 1

Injection #: 1

Injection Volume: 10.00  $\mu$ l

Run Time: 40.00 Minutes

Acquired By: Breeze

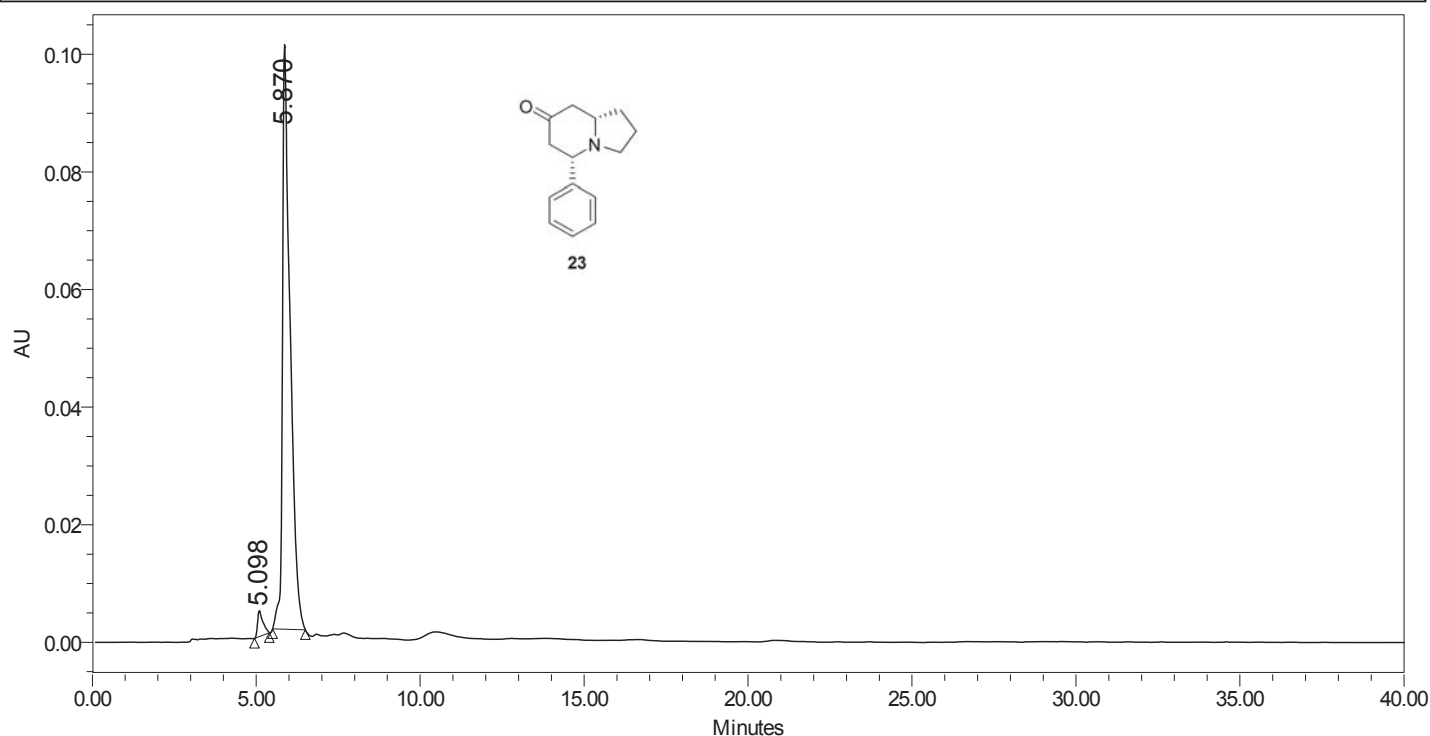
Date Acquired: 14/12/2018 11:38:38 AM NST

Acq. Method: OJ\_H 80% HEX 20%IPA

Date Processed: 17/12/2018 2:13:02 PM NST

Channel Name: 2487Channel 1

Sample Set Name



	RT (min)	Area ( $\mu$ V*sec)	% Area	Height ( $\mu$ V)	% Height
1	5.098	49840	3.01	4359	4.20
2	5.870	1608134	96.99	99479	95.80

## SAMPLE INFORMATION

Sample Name: SV-03-179 A recolumned

Acquired By: Breeze

Sample Type: Unknown

Date Acquired: 17/12/2018 12:53:26 PM NST

Vial: 1

Acq. Method: OJ\_H 80% HEX 20%IPA

Injection #: 1

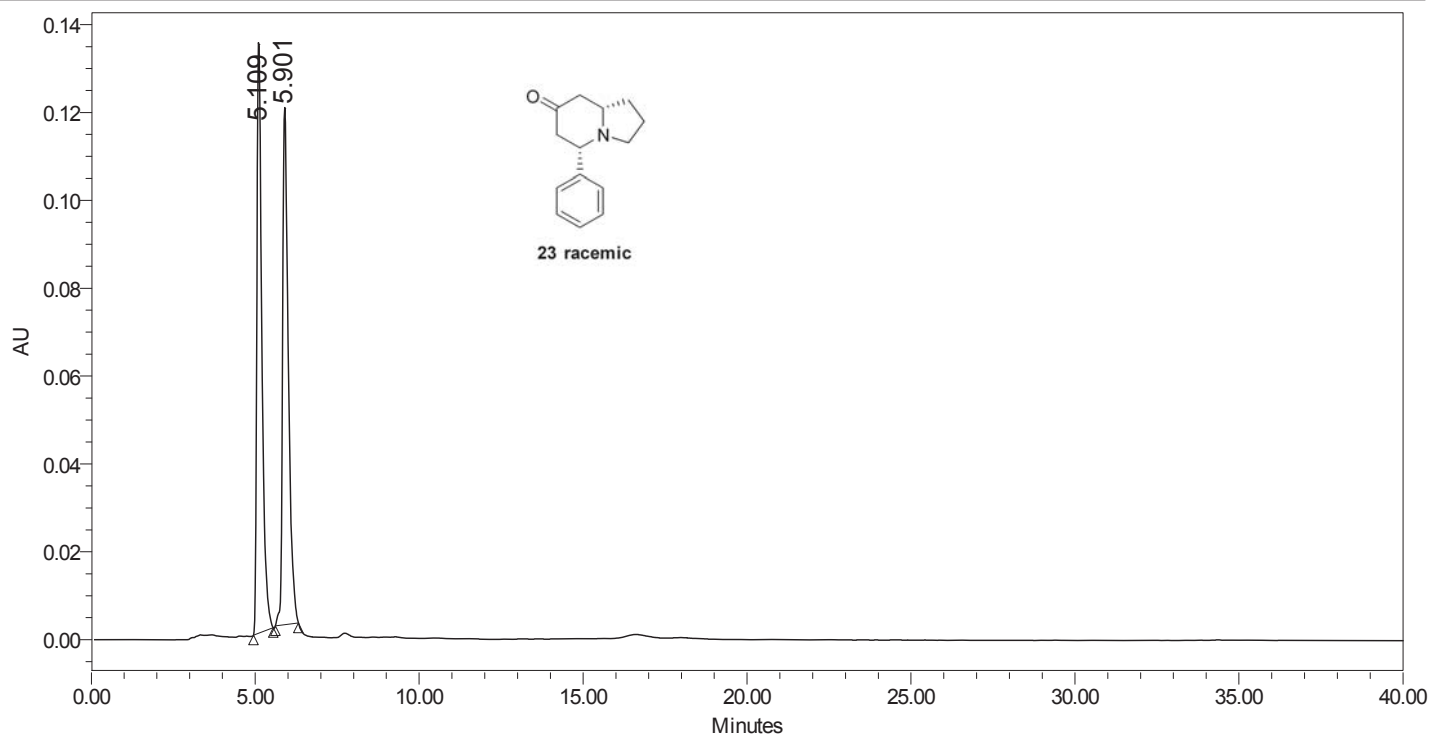
Date Processed: 17/12/2018 2:11:34 PM NST

Injection Volume: 10.00 ul

Channel Name: 2487Channel 1

Run Time: 40.00 Minutes

Sample Set Name:

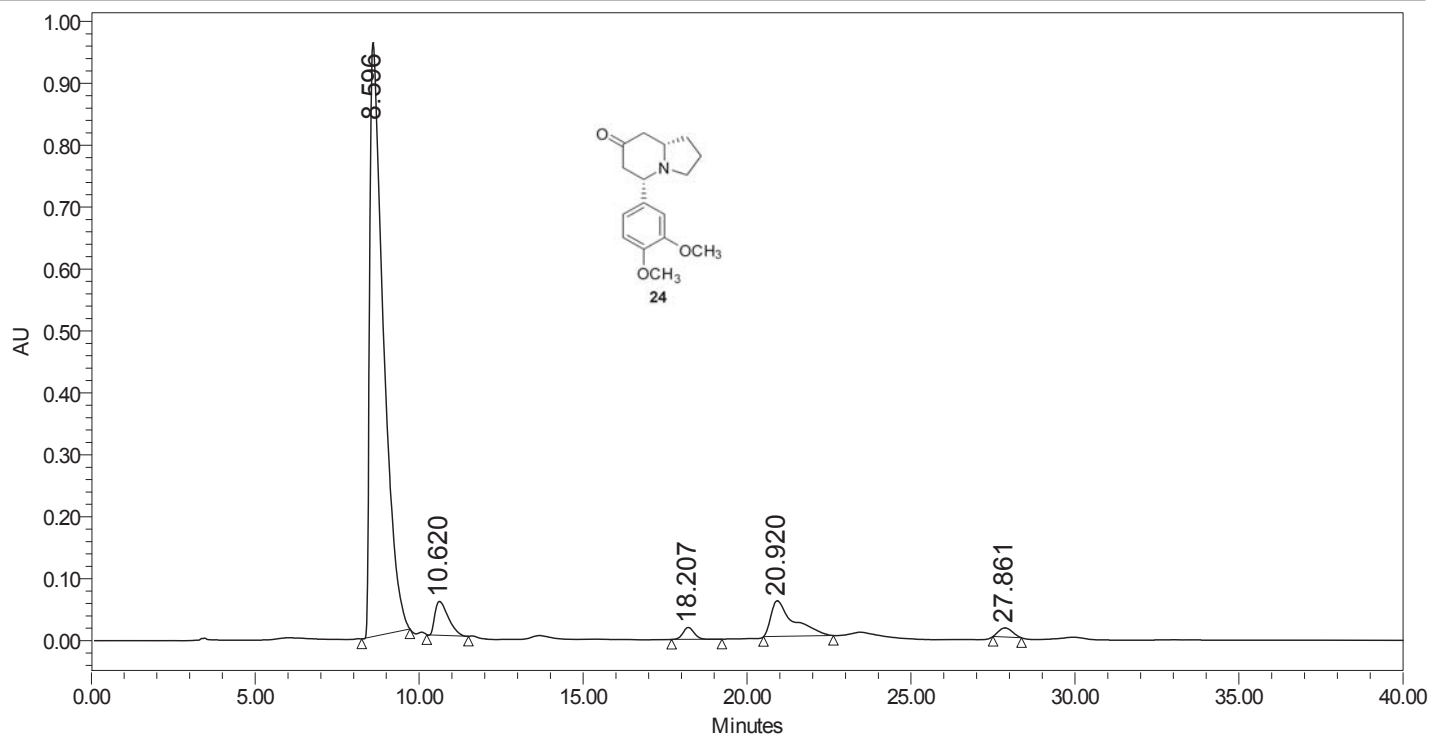


	RT (min)	Area ( $\mu\text{V}\cdot\text{sec}$ )	% Area	Height ( $\mu\text{V}$ )	% Height
1	5.109	1444119	50.34	135498	53.52
2	5.901	1424380	49.66	117679	46.48

## SAMPLE INFORMATION

Sample Name: SV-02- 159B  
Sample Type: Unknown  
Vial: 1  
Injection #: 4  
Injection Volume: 10.00 ul  
Run Time: 40.00 Minutes

Acquired By: Breeze  
Date Acquired: 15/03/2018 2:29:30 PM NDT  
Acq. Method: OJ\_H 80% HEX 20%IPA  
Date Processed: 15/03/2018 4:13:46 PM NDT  
Channel Name: 2487Channel 1  
Sample Set Name:

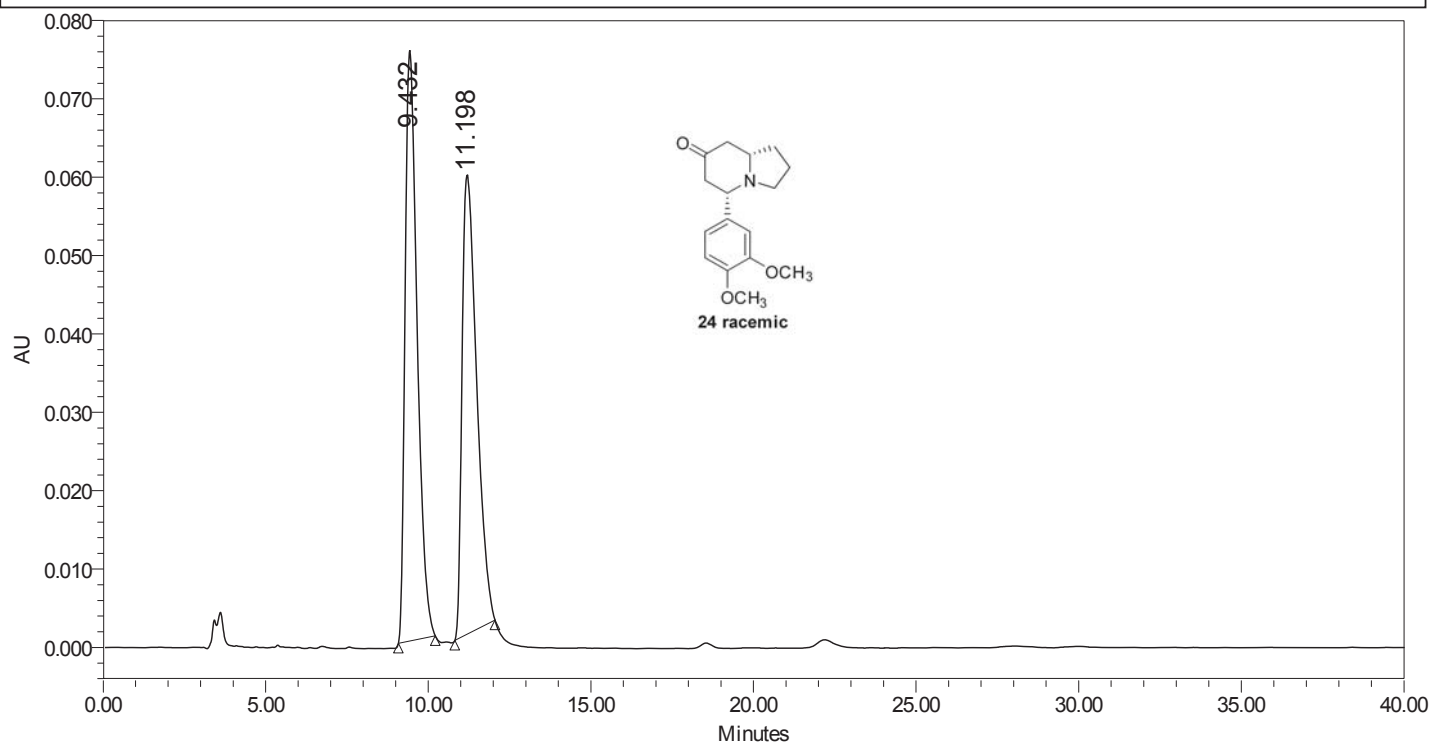


	RT (min)	Area (μV*sec)	% Area	Height (μV)	% Height
1	8.596	27883394	84.32	959554	86.78
2	10.620	1548895	4.68	54536	4.93
3	18.207	449821	1.36	19255	1.74
4	20.920	2764595	8.36	57662	5.21
5	27.861	422941	1.28	14706	1.33

## SAMPLE INFORMATION

Sample Name: SV-02- 181B Racemate  
Sample Type: Unknown  
Vial: 1  
Injection #: 3  
Injection Volume: 10.00  $\mu$ l  
Run Time: 40.00 Minutes

Acquired By: Breeze  
Date Acquired: 22/03/2018 11:49:54 AM NDT  
Acq. Method: OJ\_H 80% HEX 20%IPA  
Date Processed: 22/03/2018 2:18:05 PM NDT  
Channel Name: 2487Channel 1  
Sample Set Name:

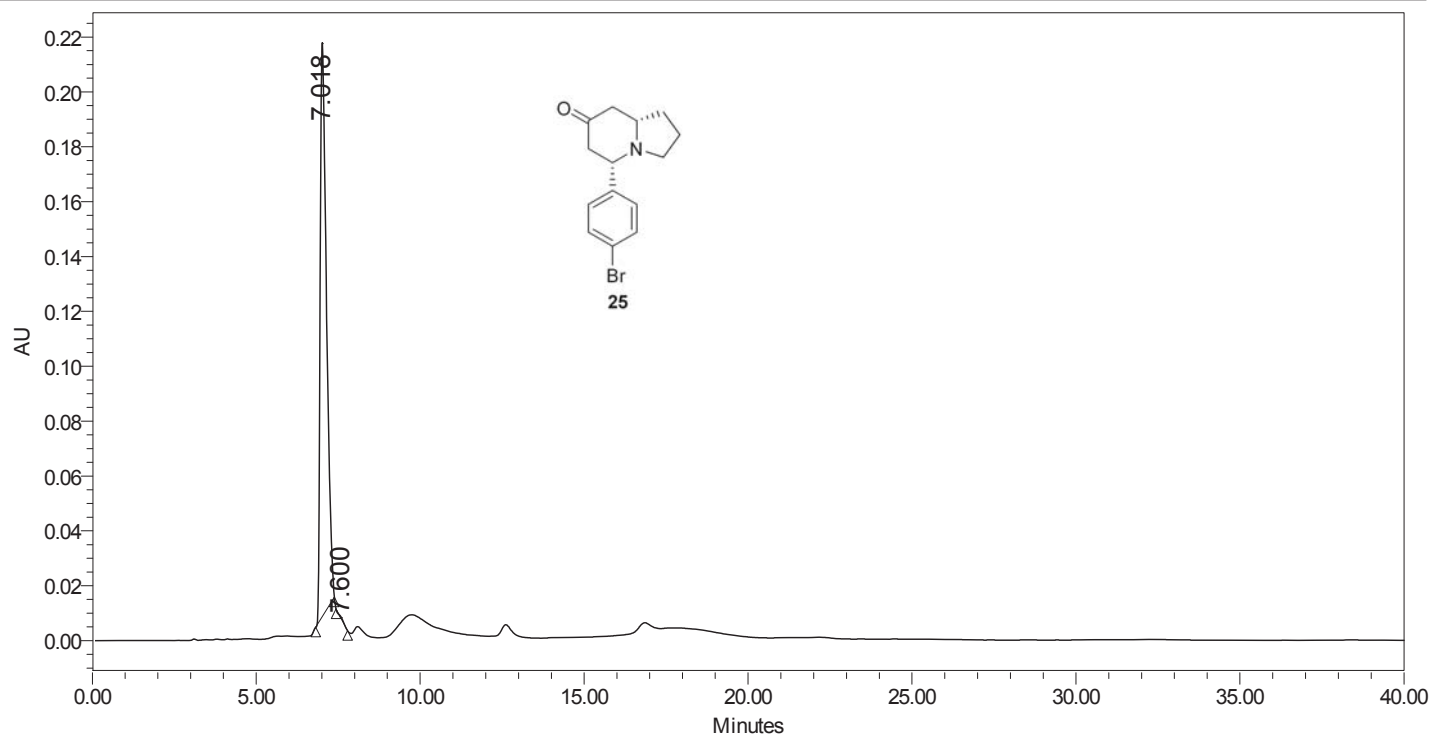


	RT (min)	Area ( $\mu$ V*sec)	% Area	Height ( $\mu$ V)	% Height
1	9.432	1939280	51.43	75326	56.25
2	11.198	1831356	48.57	58582	43.75

## SAMPLE INFORMATION

Sample Name: SV-03-163A  
Sample Type: Unknown  
Vial: 1  
Injection #: 1  
Injection Volume: 10.00  $\mu$ l  
Run Time: 40.00 Minutes

Acquired By: Breeze  
Date Acquired: 12/10/2018 3:40:37 PM NDT  
Acq. Method: OJ\_H 90%HEX 10%IPA  
Date Processed: 17/10/2018 9:30:45 AM NDT  
Channel Name: 2487Channel 1  
Sample Set Name:



	RT (min)	Area ( $\mu$ V*sec)	% Area	Height ( $\mu$ V)	% Height
1	7.018	2791804	99.80	209214	99.73
2	7.600	5724	0.20	565	0.27

## SAMPLE INFORMATION

Sample Name: SV-03-155A recolumn

Acquired By: Breeze

Sample Type: Unknown

Date Acquired: 16/10/2018 1:02:10 PM NDT

Vial: 1

Acq. Method: OJ\_H 90%HEX 10%IPA

Injection #: 1

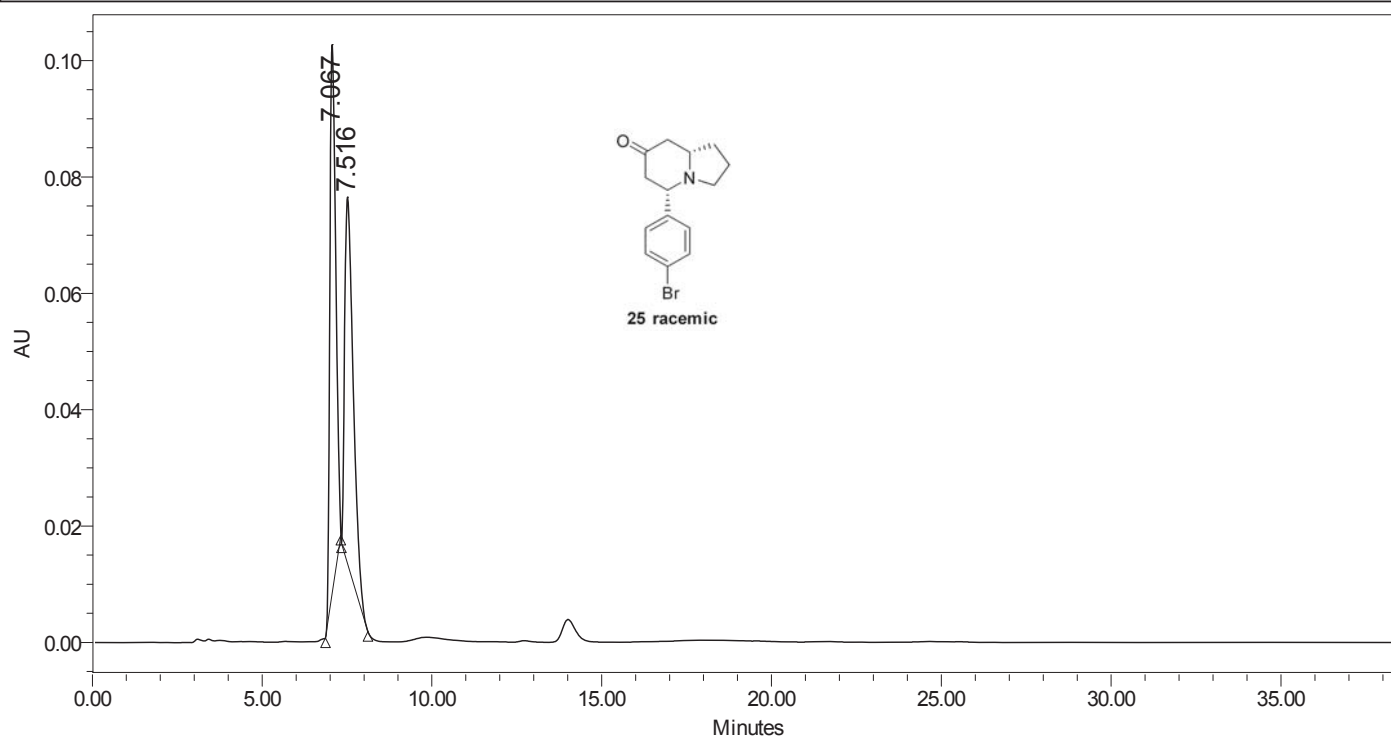
Date Processed: 17/10/2018 9:27:44 AM NDT

Injection Volume: 10.00 ul

Channel Name: 2487Channel 1

Run Time: 40.00 Minutes

Sample Set Name:



	RT (min)	Area ( $\mu\text{V}\cdot\text{sec}$ )	% Area	Height ( $\mu\text{V}$ )	% Height
1	7.067	1140232	50.88	94126	59.90
2	7.516	1100638	49.12	63000	40.10