

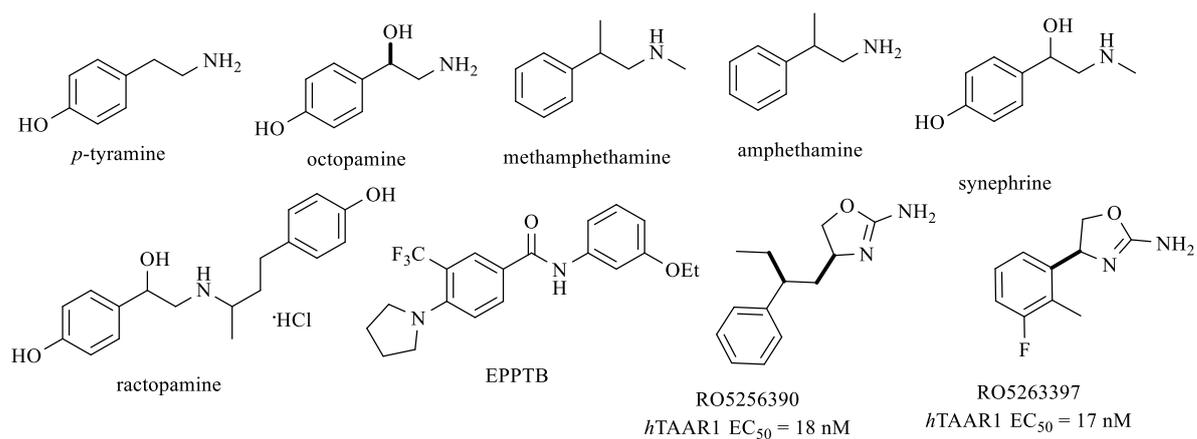
**Rare *cis*-configured 2,4-disubstituted 1-alkylpiperidines:  
synthesized and tested against trace-amine-associated receptor 1 (TAAR1)**

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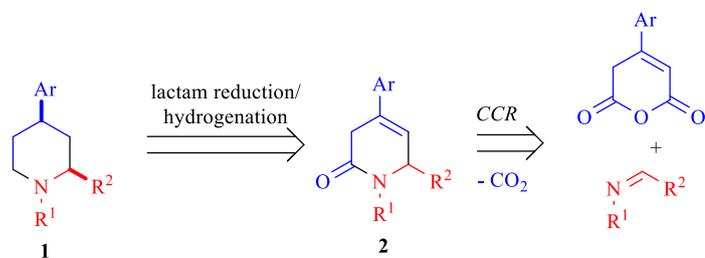
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## Supplementary figures



**Figure S1.** Known TAAR1 agonists.



**Figure S2.** Synthetic design of compounds **1** investigated in this work.

## General.

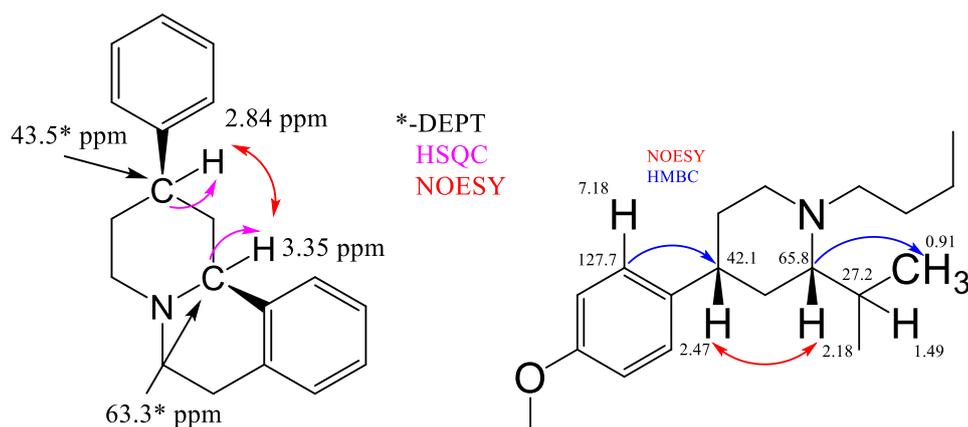
NMR spectroscopic data were recorded with Bruker Avance III 400 MHz spectrometer (400.13 MHz for  $^1\text{H}$  and 100.61 MHz for  $^{13}\text{C}$ ) in  $\text{CDCl}_3$  and were referenced to residual solvent proton signal ( $\delta_{\text{H}} = 7.26$  ppm) and solvent carbon signal ( $\delta_{\text{C}} = 77.2$  ppm). Mass spectra were recorded with a Bruker Maxis HRMS-ESI-qTOF spectrometer (electrospray ionization mode). Flash column chromatography on silica (Merck, 230–400 mesh) was performed with Biotage Isolera Prime instrument. TLC was performed with Macherey-Nagel ‘Alugram Sil G/UV254’ plates. 1,4-Dioxane was distilled from sodium/benzophenone and stored over sodium. All reactions were performed under air unless otherwise noted. Pyridin-2(1*H*)-ones **1a-f,h-k** were prepared according to published procedure [S1].

## General procedure for synthesis of piperidines **2a-k**

**Step 1.** To a solution of corresponding pyridin-2(1*H*)-one (0.5 mmol) in MeOH, Pd/C (10% wt) was added (10 mol%), and the reaction mixture was stirred under  $\text{H}_2$  atmosphere for two days at room temperature. After filtration through a pad of Celite, the filtrate was concentrated *in vacuo*. The obtained crude product was used in the next step without any additional purification.

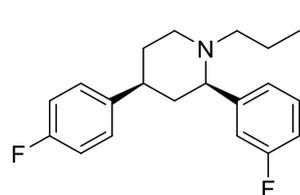
**Step 2.** The corresponding crude piperidin-2-one was placed in a round-bottom flask equipped with  $\text{CaCl}_2$  tube and dissolved in dry 1,4-dioxane followed by addition of  $\text{LiAlH}_4$  (57 mg, 1.5 mmol, 3 equiv.) in one portion. After refluxing for 3 h, the mixture was cooled to room temperature, and the excess of hydride was quenched by careful addition of ethyl acetate (10 mL) and water (5 mL) followed by the extraction of product into ethyl acetate. The organic extract was concentrated *in vacuo* and purified by flash column chromatography on silica eluting with acetone – *n*-hexane (linear gradient 0-20% of  $\text{Me}_2\text{CO}$ , total volume 400 mL, flow - 50 mL  $\text{min}^{-1}$ ) mixture to provide pure product.

Relative configuration of stereochemical centers was assigned according to additional NMR data (DEPT, HSQC, HMBC, NOESY, see pp. S16-17 and S22-23) of compounds **2g** and **2k**:



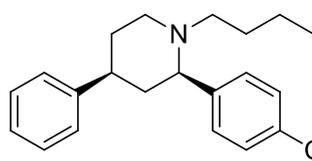
**Figure S3.** Confirmation of relative stereochemistry of compounds **2a-k**.

**(2*RS*,4*SR*)-2-(3-Fluorophenyl)-4-(4-fluorophenyl)-1-propylpiperidine (2a)**



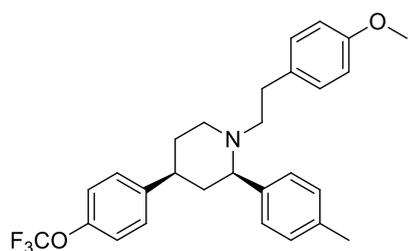
Was prepared from 1-allyl-6-(3-fluorophenyl)-4-(4-fluorophenyl)-1,6-dihydropyridin-2(3*H*)-one [S2]; Yield 55% (87 mg); yellow oil. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.35 – 7.21 (m, 1H), 7.20 – 7.14 (m, 2H), 7.14 – 7.07 (m, 2H), 7.02 – 6.81 (m, 3H), 3.32 (dt, *J* = 11.6, 3.3 Hz, 1H), 3.19 (dd, *J* = 11.1, 2.8 Hz, 1H), 2.66 (tt, *J* = 12.0, 3.8 Hz, 1H), 2.43 (ddd, *J* = 12.5, 9.2, 7.5 Hz, 1H), 2.20 (td, *J* = 11.7, 3.1 Hz, 1H), 2.03 – 1.80 (m, 4H), 1.75 – 1.58 (m, 1H), 1.52 – 1.38 (m, 2H), 0.77 (t, *J* = 7.4 Hz, 3H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 163.2 (d, *J* = 245.3 Hz), 161.5 (d, *J* = 243.8 Hz), 147.9, 141.6 (d, *J* = 3.2 Hz), 129.9 (d, *J* = 8.2 Hz), 128.2 (d, *J* = 7.8 Hz), 123.2 (d, *J* = 2.7 Hz), 115.2 (d, *J* = 20.9 Hz), 114.3 (d, *J* = 21.5 Hz), 113.9 (d, *J* = 21.3 Hz), 68.7 (d, *J* = 1.9 Hz), 57.1, 53.0, 44.5, 42.4, 33.6, 19.6, 11.9. HRMS *m/z* [M+H]<sup>+</sup> calculated for C<sub>20</sub>H<sub>24</sub>F<sub>2</sub>N<sup>+</sup> 316.1871, found 316.1862.

**(2*RS*,4*SR*)-1-Butyl-4-phenyl-2-(4-trifluoromethylphenyl)piperidine (2b)**



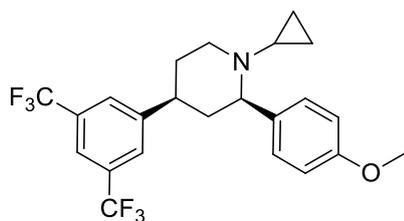
Was prepared from 1-butyl-4-phenyl-6-(4-trifluoromethylphenyl)-3,6-dihydropyridin-2(1*H*)-one [S2]. Yield 74% (134 mg); yellow oil. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.57 (d, *J* = 8.1 Hz, 2H), 7.49 (d, *J* = 8.0 Hz, 2H), 7.33 – 7.24 (m, 2H), 7.25 – 7.15 (m, 3H), 3.36 (dt, *J* = 11.5, 3.2 Hz, 1H), 3.27 (dd, *J* = 11.1, 2.9 Hz, 1H), 2.70 (ddt, *J* = 12.0, 7.8, 4.1 Hz, 1H), 2.50 – 2.38 (m, 1H), 2.23 (td, *J* = 11.5, 3.2 Hz, 1H), 2.02 – 1.90 (m, 3H), 1.91 – 1.87 (m, 1H), 1.79 – 1.65 (m, 1H), 1.48 – 1.36 (m, 2H), 1.34 – 1.19 (m, 2H), 1.19 – 1.04 (m, 1H), 0.82 (t, *J* = 7.3 Hz, 3H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 149.3, 145.7, 129.1 (q, *J* = 32.2 Hz), 128.4, 127.7, 126.7, 126.2, 125.4 (q, *J* = 3.8 Hz), 124.3 (q, *J* = 271.9 Hz), 68.8, 55.0, 52.9, 44.3, 42.9, 33.3, 28.6, 20.5, 14.0. HRMS *m/z* [M+H]<sup>+</sup> calculated for C<sub>22</sub>H<sub>27</sub>F<sub>3</sub>N<sup>+</sup> 362.2090, found 362.2087.

**(2*RS*,4*SR*)-1-(4-Methoxyphenethyl)-2-(*p*-tolyl)-4-(4-trifluoromethoxyphenyl)piperidine (2c)**



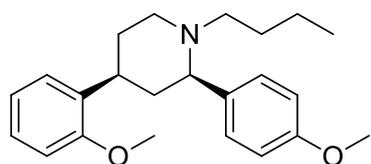
Was prepared from 1-(4-methoxyphenethyl)-6-(*p*-tolyl)-4-(4-trifluoromethoxyphenyl)-3,6-dihydropyridin-2(1*H*)-one [S2]. Yield 31% (73 mg); yellow oil. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.26 – 7.24 (m, 1H), 7.24 – 7.22 (m, 1H), 7.22 – 7.16 (m, 2H), 7.15 – 7.06 (m, 4H), 6.94 – 6.90 (m, 2H), 6.80 – 6.74 (m, 2H), 3.77 (s, 3H), 3.41 (dt, *J* = 11.5, 3.3 Hz, 1H), 3.27 (dd, *J* = 11.0, 2.8 Hz, 1H), 2.81 – 2.65 (m, 3H), 2.66 – 2.58 (m, 1H), 2.43 (td, *J* = 11.7, 3.1 Hz, 1H), 2.33 (s, 3H), 2.31 – 2.24 (m, 1H), 2.02 – 1.85 (m, 3H), 1.79 – 1.68 (m, 1H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 157.9, 147.6, 144.8, 141.3, 136.7, 132.8, 129.7, 129.3, 128.1, 127.5, 121.0, 120.7 (q, *J* = 256.4 Hz), 113.8, 68.2, 56.9, 55.4, 53.3, 44.3, 42.6, 33.6, 31.8, 21.2. HRMS *m/z* [M+H]<sup>+</sup> calculated for C<sub>28</sub>H<sub>31</sub>F<sub>3</sub>NO<sub>2</sub><sup>+</sup> 470.2301, found 470.2289.

**(2*RS*,4*SR*)-4-[3,5-Bis(trifluoromethyl)phenyl]-1-cyclopropyl-2-(4-methoxyphenyl)piperidine (2d)**



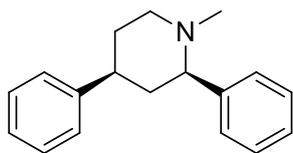
Was prepared from 4-[3,5-bis(trifluoromethyl)phenyl]-1-cyclopropyl-6-(4-methoxyphenyl)-1,6-dihydropyridin-2(3*H*)-one [S2]. Yield 33% (73 mg); yellow oil. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.70 (s, 3H), 7.24 (d, *J* = 8.4 Hz, 2H), 6.84 (d, *J* = 8.7 Hz, 2H), 3.81 (s, 3H), 3.41 – 3.30 (m, 1H), 3.30 – 3.21 (m, 1H), 2.93 – 2.80 (m, 1H), 2.47 (td, *J* = 11.9, 2.9 Hz, 1H), 2.05 – 1.81 (m, 4H), 1.47 – 1.38 (m, 1H), 0.34 – 0.26 (m, 1H), 0.26 – 0.17 (m, 1H), 0.04 – -0.07 (m, 1H), -0.08 – -0.17 (m, 1H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 158.8, 148.4, 135.2, 131.6 (q, *J* = 32.9 Hz), 129.4, 127.1, 123.4 (q, *J* = 272.6 Hz), 120.2, 113.3, 69.8, 55.6, 55.2, 42.7, 41.9, 38.4, 32.9, 9.7, 4.0. HRMS *m/z* [M+Na]<sup>+</sup> calculated for C<sub>23</sub>H<sub>23</sub>F<sub>6</sub>NONa<sup>+</sup> 466.1576, found 466.1564.

**(2*RS*,4*SR*)-1-Butyl-4-(2-methoxyphenyl)-2-(4-methoxyphenyl)piperidine (2e)**



Was prepared from 1-butyl-4-(2-methoxyphenyl)-6-(4-methoxyphenyl)-3,6-dihydropyridin-2(1*H*)-one [S2]. Yield 63% (111 mg); yellow oil. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) 7.27 (d, *J* = 8.0 Hz, 2H), 7.20 (dd, *J* = 7.5, 1.7 Hz, 1H), 7.14 (td, *J* = 7.7, 1.7 Hz, 1H), 6.89 (td, *J* = 7.5, 1.2 Hz, 1H), 6.86 – 6.80 (m, 3H), 3.82 (s, 3H), 3.79 (s, 3H), 3.30 (dt, *J* = 11.5, 3.3 Hz, 1H), 3.22 – 3.08 (m, 2H), 2.54 – 2.43 (m, 1H), 2.27 (td, *J* = 11.5, 3.4 Hz, 1H), 1.99 – 1.78 (m, 4H), 1.76 – 1.59 (m, 1H), 1.44 – 1.34 (m, 2H), 1.24 – 1.03 (m, 2H), 0.80 (t, *J* = 7.3 Hz, 3H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 158.6, 157.0, 137.4, 134.4, 128.6, 126.9, 126.6, 120.7, 113.8, 110.4, 68.5, 55.5, 55.4, 54.9, 53.5, 42.9, 35.7, 32.3, 28.4, 20.8, 14.2. HRMS *m/z* [M+Na]<sup>+</sup> calculated for C<sub>23</sub>H<sub>31</sub>NO<sub>2</sub>Na<sup>+</sup> 376.2247, found 376.2231.

### (2*RS*,4*SR*)-1-Methyl-2,4-diphenylpiperidine (2f)

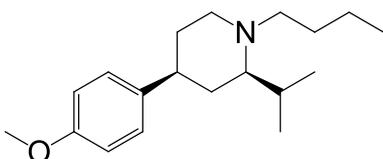


Was prepared from 1-methyl-4,6-diphenyl-3,6-dihydropyridin-2(1*H*)-one [S2].

Yield 76% (96 mg); white solid. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.43 – 7.22 (m, 9H), 7.21 – 7.15 (m, 1H), 3.20 (dt, *J* = 11.6, 3.3 Hz, 1H), 2.98 (dd, *J* = 11.1, 2.7

Hz, 1H), 2.78 – 2.67 (m, 1H), 2.41 – 2.29 (m, 1H), 2.09 (s, 3H), 2.03 – 1.91 (m, 3H), 1.89 – 1.77 (m, 1H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 145.9, 144.3, 128.6, 128.5, 127.6, 127.3, 126.9, 126.3, 71.1, 57.6, 44.3, 43.5, 43.0, 33.5. HRMS *m/z* [M+H]<sup>+</sup> calculated for C<sub>18</sub>H<sub>22</sub>N<sup>+</sup> 252.1747, found 252.1742.

### (2*RS*,4*SR*)-1-Butyl-2-isopropyl-4-(4-methoxyphenyl)piperidine (2g)

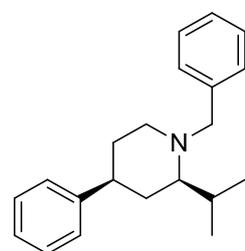


Was prepared from 1-butyl-6-isopropyl-4-(4-methoxyphenyl)-3,6-dihydropyridin-2(1*H*)-one **2g**. Yield 82% (119 mg); yellow oil. <sup>1</sup>H NMR

(400 MHz, CDCl<sub>3</sub>) δ 7.20 – 7.09 (m, 2H), 6.88 – 6.81 (m, 2H), 3.79 (s, 3H), 3.11 (dt, *J* = 11.7, 3.4 Hz, 1H), 2.78 – 2.66 (m, 1H), 2.52 – 2.28 (m,

3H), 2.20 – 2.06 (m, 2H), 1.81 – 1.66 (m, 3H), 1.54 – 1.40 (m, 2H), 1.39 – 1.23 (m, 3H), 0.94 (t, *J* = 7.3 Hz, 3H), 0.89 (d, *J* = 6.7 Hz, 3H), 0.88 (d, *J* = 6.6 Hz, 3H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 158.1, 139.3, 127.9, 114.0, 65.9, 55.4, 53.6, 52.2, 42.4, 33.3, 32.5, 27.4, 26.8, 21.1, 20.3, 15.6, 14.3. HRMS *m/z* [M+Na]<sup>+</sup> calculated for C<sub>19</sub>H<sub>31</sub>NONa<sup>+</sup> 312.2298, found 312.2283.

### (2*RS*,4*SR*)-1-Benzyl-2-isopropyl-4-phenylpiperidine (2h)



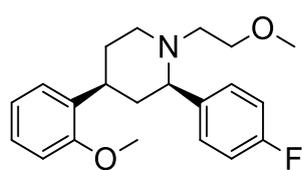
Was prepared from 1-benzyl-6-isopropyl-4-phenyl-1,6-dihydropyridin-2(3*H*)-one [S1]. Yield 57% (84 mg); yellow oil. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.42 – 7.38

(m, 2H), 7.37 – 7.30 (m, 4H), 7.30 – 7.24 (m, 3H), 7.24 – 7.19 (m, 1H), 4.23 (d, *J* = 13.2 Hz, 1H), 3.09 (d, *J* = 13.4 Hz, 1H), 3.00 (dt, *J* = 11.7, 3.3 Hz, 1H), 2.61 –

2.50 (m, 1H), 2.41 – 2.31 (m, 1H), 2.27 – 2.20 (m, 1H), 2.14 – 2.05 (m, 1H), 1.87

– 1.79 (m, 1H), 1.71 (td, *J* = 9.7, 8.6, 3.6 Hz, 2H), 1.51 (td, *J* = 12.6, 11.1 Hz, 1H), 0.99 (dd, *J* = 11.5, 6.8 Hz, 6H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 147.2, 140.1, 129.0, 128.5, 128.3, 127.0, 126.8, 126.2, 66.9, 56.4, 53.5, 43.3, 32.6, 32.3, 27.9, 20.2, 15.6. HRMS *m/z* [M+H]<sup>+</sup> calculated for C<sub>21</sub>H<sub>28</sub>N<sup>+</sup> 294.2216, found 294.2221.

**(2*RS*,4*SR*)-2-(4-Fluorophenyl)-1-(2-methoxyethyl)-4-(2-methoxyphenyl)piperidine (2i)**

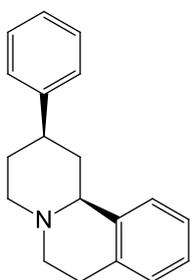


Was prepared from 6-(4-fluorophenyl)-1-(2-methoxyethyl)-4-(2-methoxyphenyl)-3,6-dihydropyridin-2(1*H*)-one [S2]. Yield 55% (94 mg); yellow oil. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.36 – 7.30 (m, 2H), 7.22 – 7.12 (m, 2H), 6.98 (t, *J* = 8.8 Hz, 2H), 6.90 (td, *J* = 7.5, 1.2 Hz, 1H), 6.84 (dd, *J* = 8.1, 1.1 Hz, 1H), 3.82 (s, 3H), 3.50 – 3.41 (m, 1H), 3.41 – 3.33 (m, 2H), 3.31 – 3.28 (m, 1H), 3.26 (s, 3H), 3.21 – 3.09 (m, 1H), 2.80 – 2.66 (m, 1H), 2.45 – 2.34 (m, 1H), 2.16 (dt, *J* = 13.3, 5.5 Hz, 1H), 1.95 – 1.84 (m, 3H), 1.78 – 1.62 (m, 1H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 161.9 (d, *J* = 244.7 Hz), 156.9, 140.7, 134.0, 129.1 (d, *J* = 7.8 Hz), 127.0, 126.5, 120.8, 115.3 (d, *J* = 21.2 Hz), 110.4, 70.8, 68.7, 58.8, 55.5, 54.6, 54.3, 43.0, 35.5, 32.0. HRMS *m/z* [M+H]<sup>+</sup> calculated for C<sub>21</sub>H<sub>27</sub>FNO<sub>2</sub><sup>+</sup> 344.2020, found 344.2010.

**(2*RS*,4*SR*)-1-isopentyl-4-(4-methoxyphenyl)-2-(*p*-tolyl)piperidine (2j)**

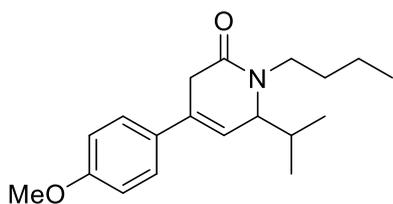
Was prepared from 1-isopentyl-4-(4-methoxyphenyl)-6-(*p*-tolyl)-3,6-dihydropyridin-2(1*H*)-one [S2]. Yield 65% (114 mg); yellow solid. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.25 (d, *J* = 7.7 Hz, 2H), 7.21 – 7.03 (m, 4H), 6.83 (d, *J* = 8.7 Hz, 2H), 3.79 (s, 3H), 3.31 (dd, *J* = 9.4, 6.0 Hz, 1H), 3.16 (dd, *J* = 11.1, 2.7 Hz, 1H), 2.65 (ddt, *J* = 11.8, 7.5, 4.0 Hz, 1H), 2.55 (ddd, *J* = 12.4, 9.6, 6.6 Hz, 1H), 2.34 (s, 3H), 2.23 (td, *J* = 11.6, 2.9 Hz, 1H), 2.00 – 1.68 (m, 5H), 1.49 – 1.24 (m, 4H), 0.80 (d, *J* = 6.5 Hz, 3H), 0.75 (d, *J* = 6.5 Hz, 3H). <sup>13</sup>C NMR (101 MHz, DMSO-*d*<sub>6</sub>, 80 °C) δ 157.3, 141.5, 137.6, 135.3, 128.3, 126.9, 126.8, 113.5, 67.6, 54.7, 52.3, 52.0, 43.9, 41.0, 34.7, 33.0, 25.3, 22.4, 21.7, 20.2. HRMS *m/z* [M+H]<sup>+</sup> calculated for C<sub>24</sub>H<sub>34</sub>NO<sup>+</sup> 352.2635, found 352.2638.

**(2*RS*,11*SR*)-2-Phenyl-2,3,4,6,7,11b-hexahydro-1*H*-pyrido[2,1-*a*]isoquinoline (2k)**



Was prepared from 2-phenyl-6,7-dihydro-3*H*-pyrido[2,1-*a*]isoquinolin-4(11*bH*)-one [S1]. Yield 61% (80 mg); yellow solid. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.38 – 7.28 (m, 4H), 7.26 – 7.18 (m, 2H), 7.18 – 7.08 (m, 3H), 3.33 (d, *J* = 10.9 Hz, 1H), 3.29 – 3.19 (m, 1H), 3.19 – 3.13 (m, 1H), 3.06 (ddd, *J* = 11.4, 6.1, 1.8 Hz, 1H), 2.84 (dt, *J* = 12.1, 4.3 Hz, 1H), 2.81 – 2.73 (m, 1H), 2.62 (dd, *J* = 11.6, 3.9 Hz, 1H), 2.59 – 2.48 (m, 2H), 2.01 – 1.87 (m, 2H), 1.77 – 1.64 (m, 1H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 146.4, 138.1, 134.6, 129.1, 128.6, 127.1, 126.4, 126.2, 125.9, 124.9, 63.4, 57.0, 52.5, 43.7, 39.1, 33.2, 29.8. HRMS *m/z* [M+H]<sup>+</sup> calculated for C<sub>19</sub>H<sub>22</sub>N<sup>+</sup> 264.1747, found 264.1758.

### 1-Butyl-6-isopropyl-4-(4-methoxyphenyl)-3,6-dihydropyridin-2(1H)-one (2g)



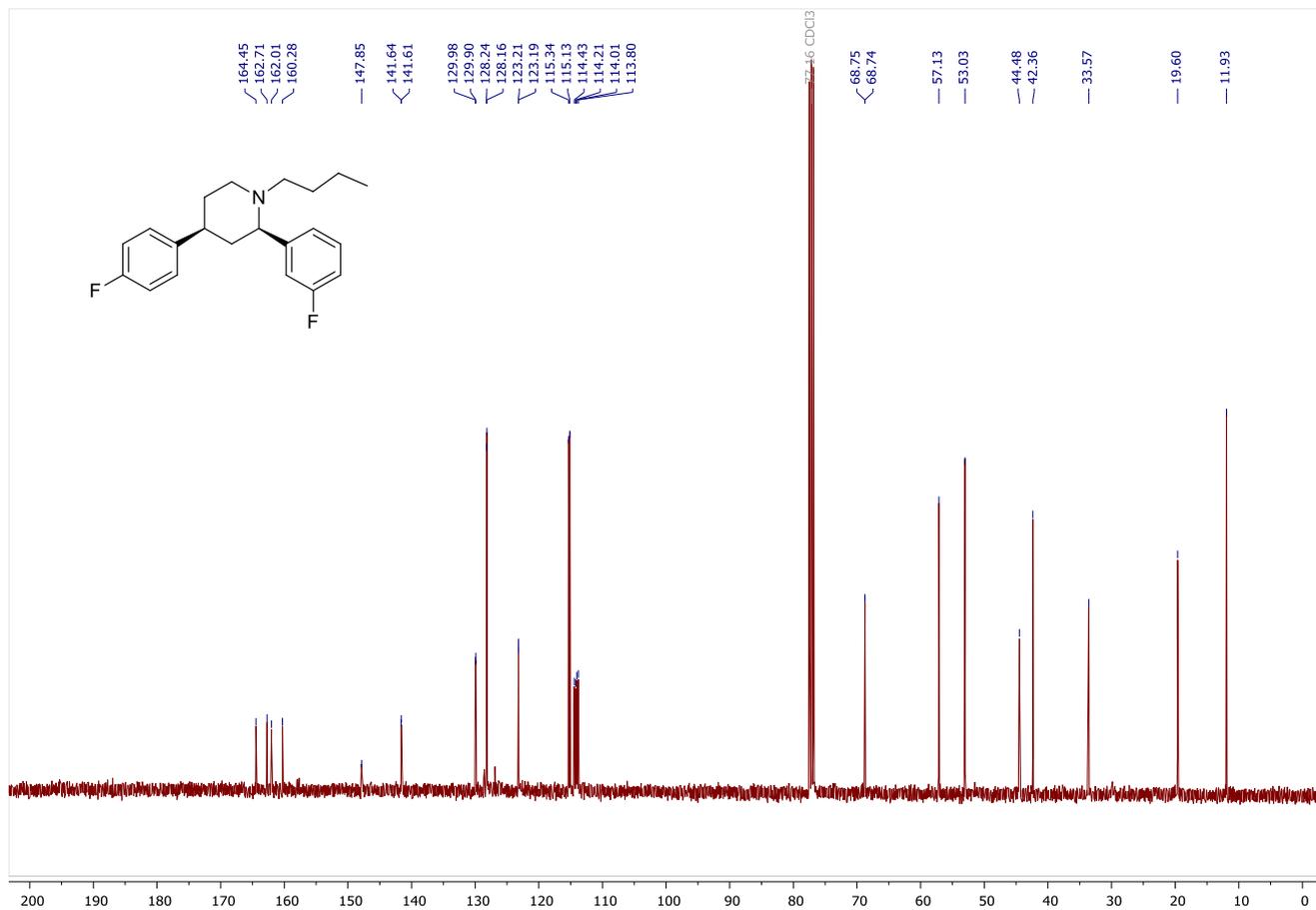
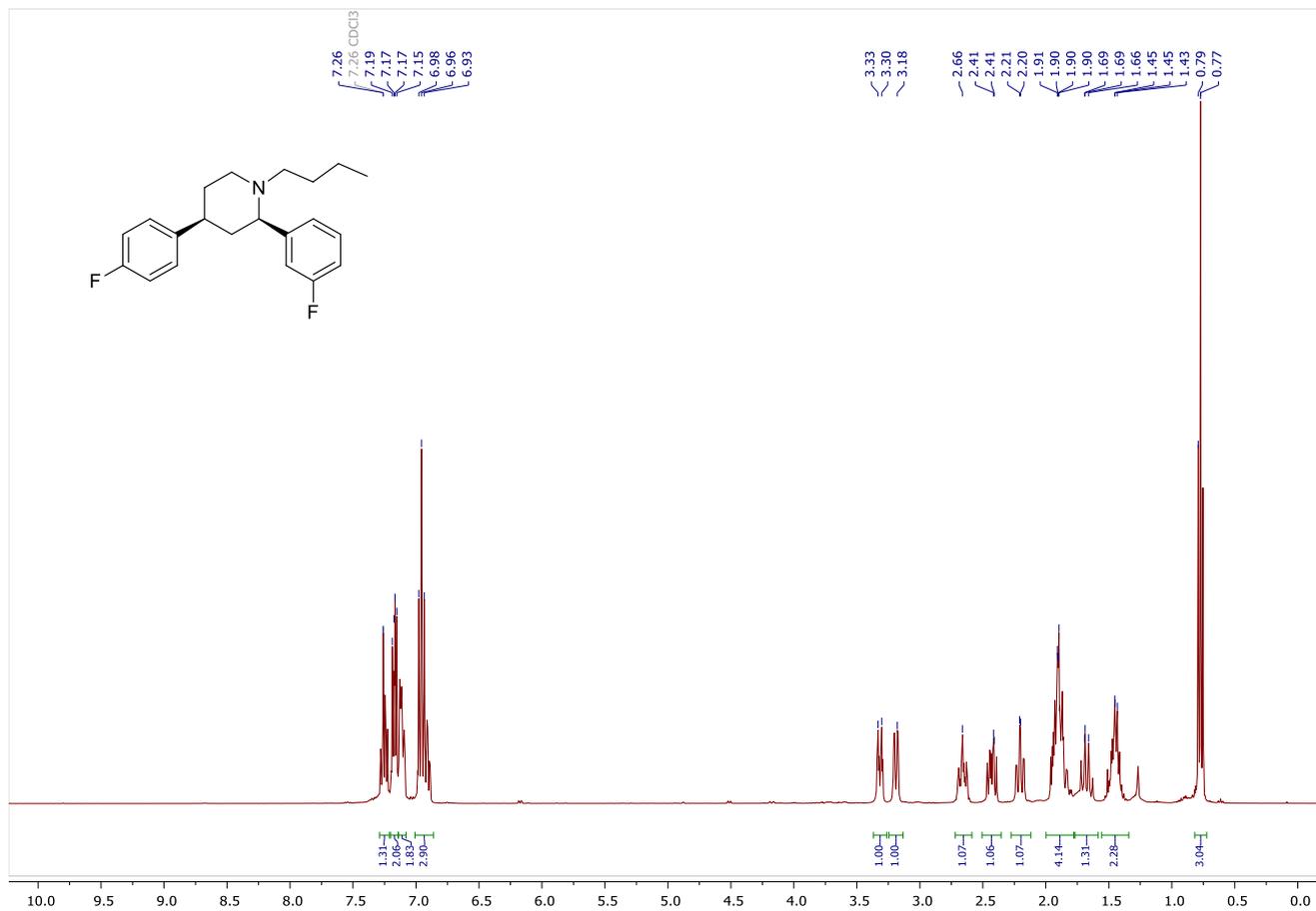
Was prepared from 4-(4-methoxyphenyl)-2*H*-pyran-2,6(3*H*)-dione (137 mg, 0.63 mmol) and *N*-butyl-2-methylpropan-1-imine (84 mg, 0.66 mmol) according to procedure from [S1]. Yield 83% (151 mg); yellow oil. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.39 – 7.29 (m, 2H), 6.95 – 6.83 (m, 2H), 6.08 – 5.98 (m, 1H), 4.01 – 3.94 (m, 1H), 3.94 – 3.85 (m, 1H), 3.82 (s, 3H), 3.33 – 3.27 (m, 2H), 3.04 – 2.94 (m, 1H), 2.28 – 2.16 (m, 1H), 1.58 (s, 2H), 1.41 – 1.28 (m, 2H), 1.04 (d, *J* = 7.0 Hz, 3H), 0.94 (t, *J* = 7.3 Hz, 3H), 0.78 (d, *J* = 6.7 Hz, 3H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 168.3, 159.5, 134.2, 131.0, 126.2, 116.4, 114.0, 63.7, 55.4, 44.7, 35.0, 32.3, 29.5, 20.4, 19.4, 15.4, 14.0. HRMS *m/z* [M+Na]<sup>+</sup> calculated for C<sub>19</sub>H<sub>27</sub>NO<sub>2</sub>Na<sup>+</sup> 324.1934, found 324.1924.

### References

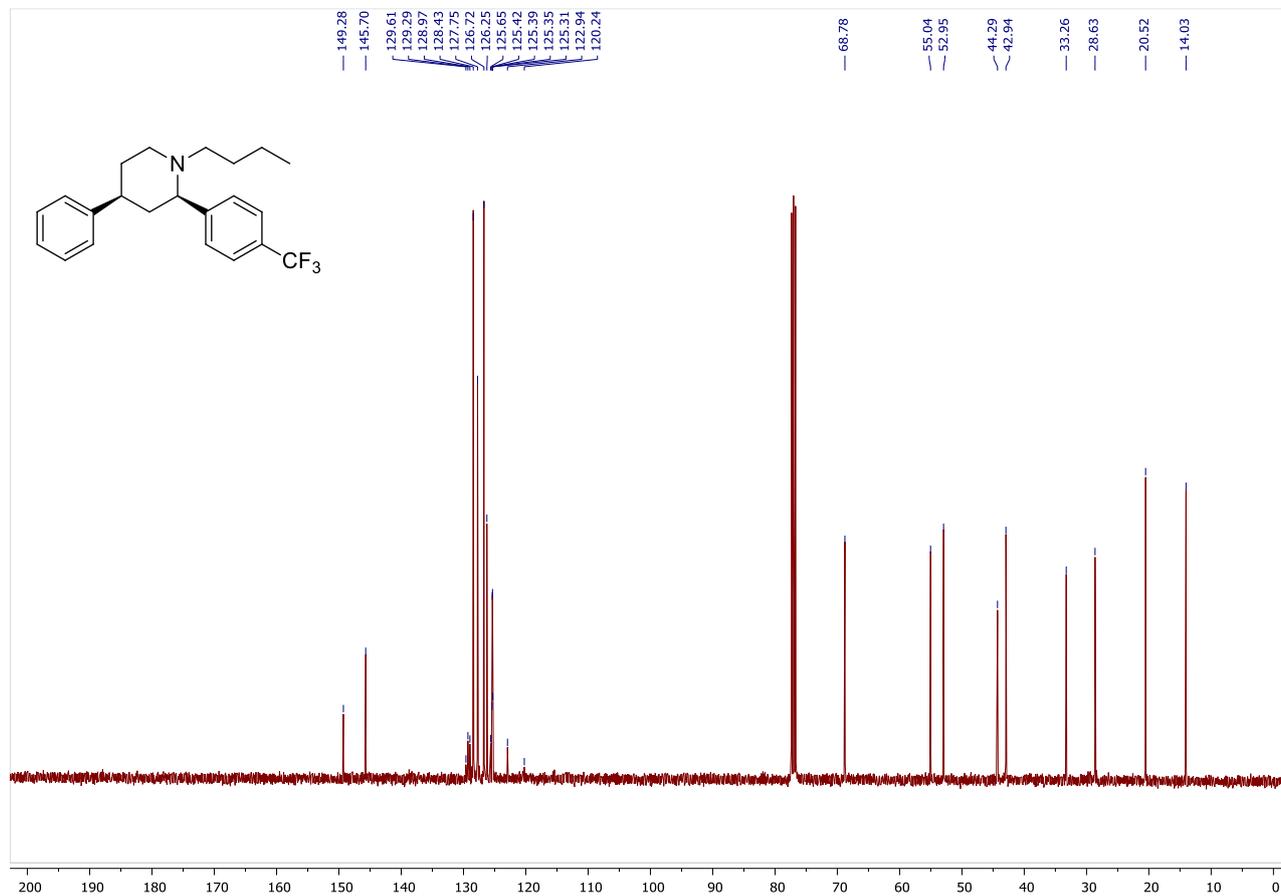
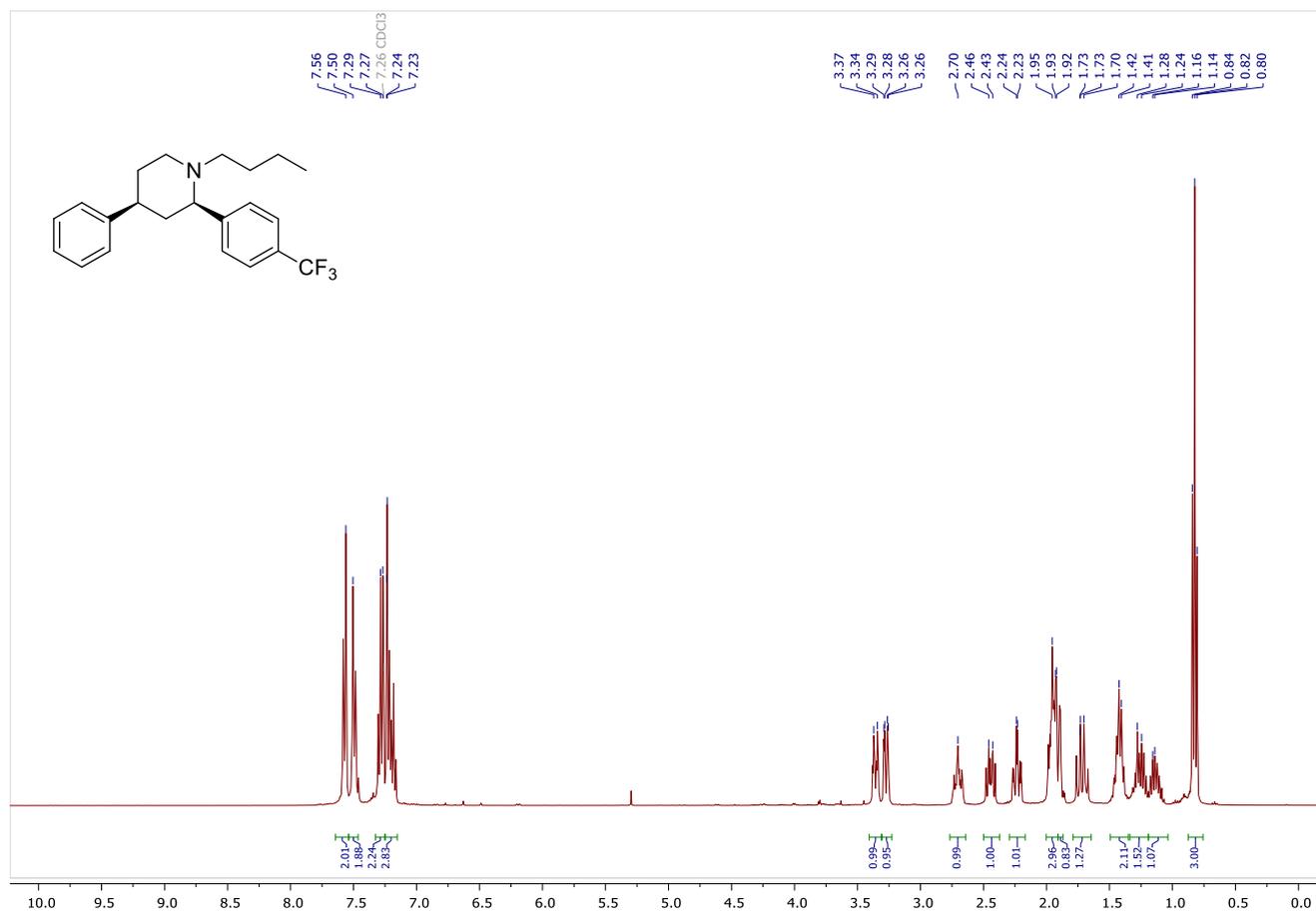
[S1] Firsov, A.; Bakulina, O.; Dar'in, D.; Guranova, N.; Krasavin, M. *J. Org. Chem.* **2020**, *85*, 6822.

[S2] Firsov, A.; Chupakhin, E.; Dar'in, D.; Bakulina, O.; Krasavin, M. *Org. Lett.* **2019**, *21*, 1637.

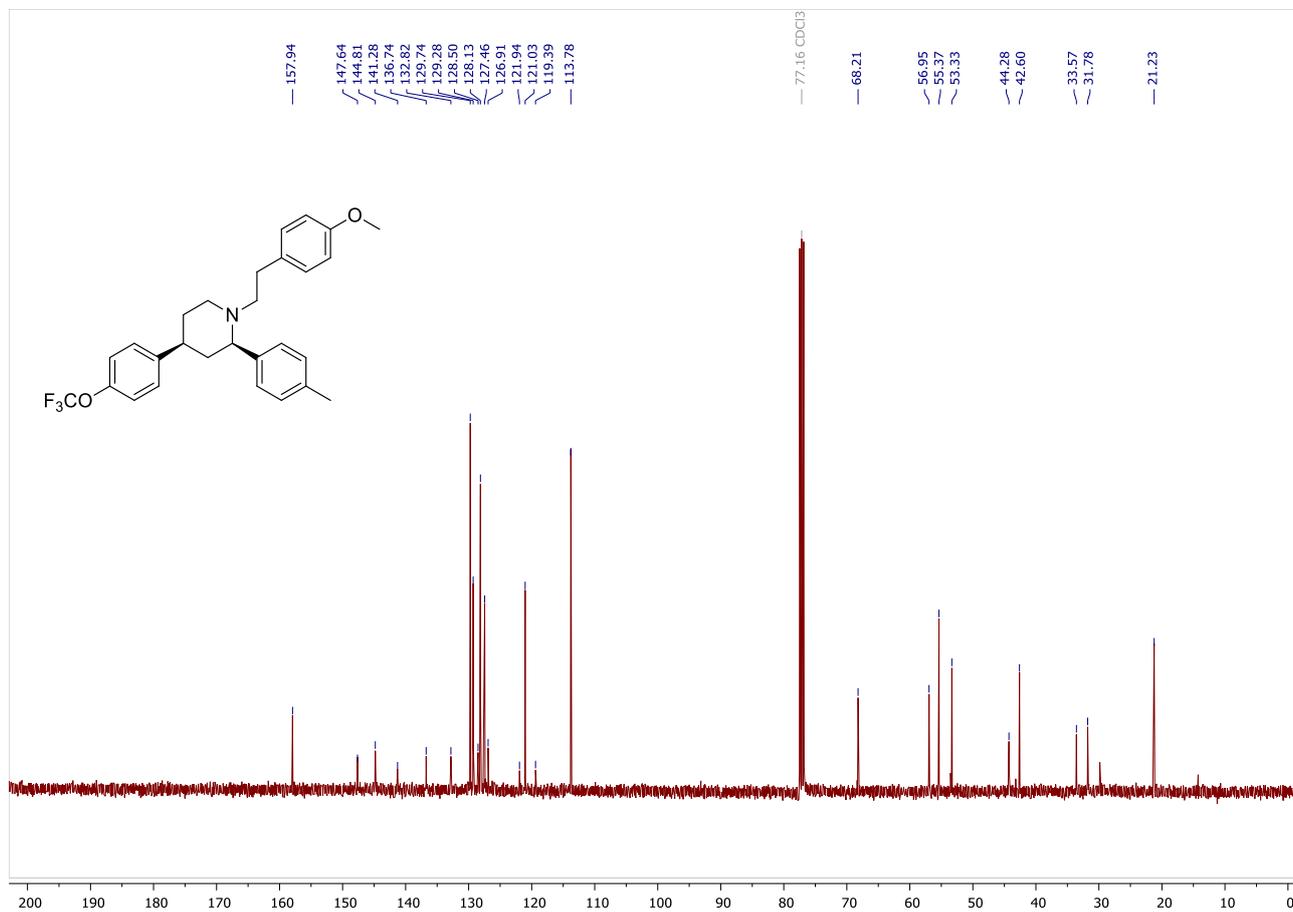
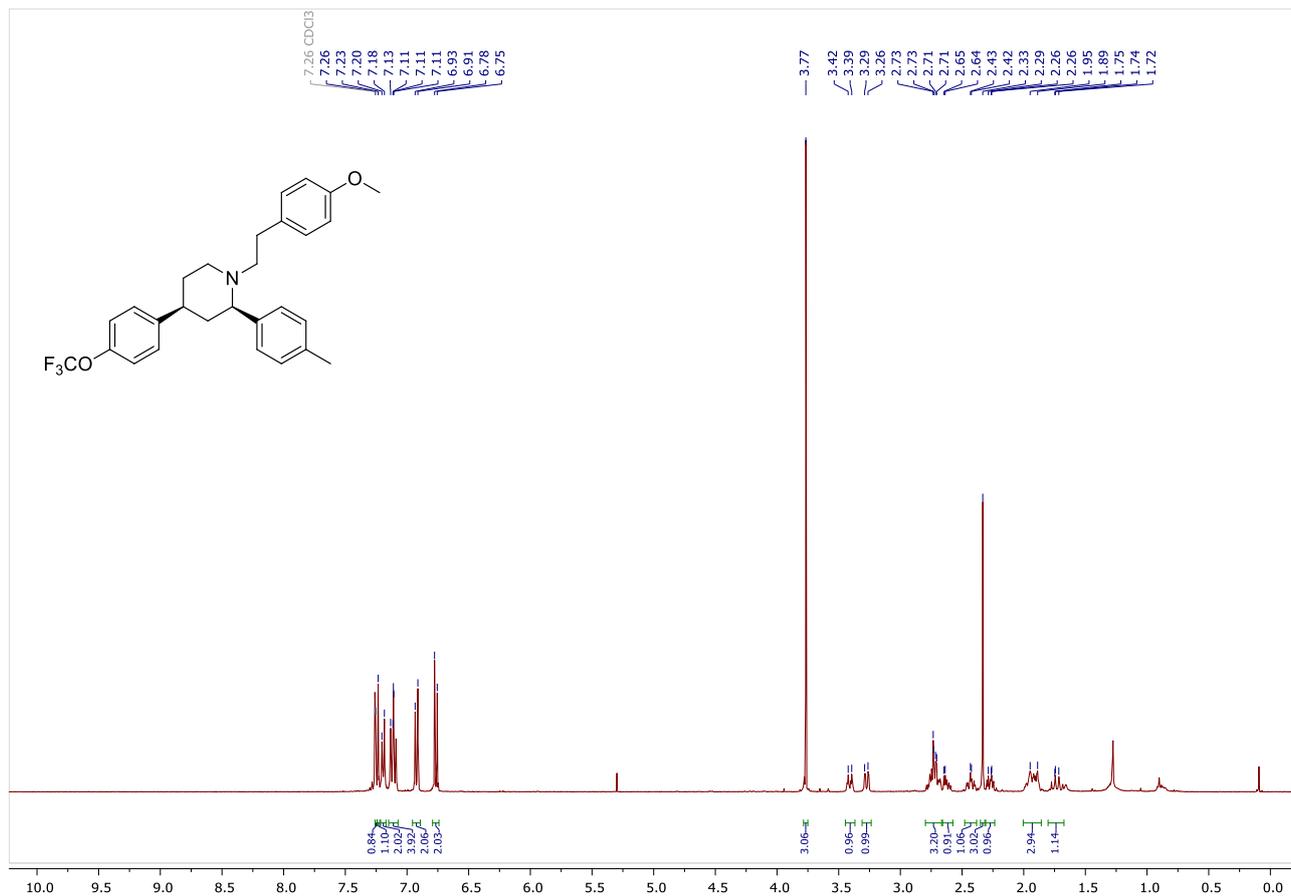
**$^1\text{H}$  and  $^{13}\text{C}$  spectra of compound 2a**



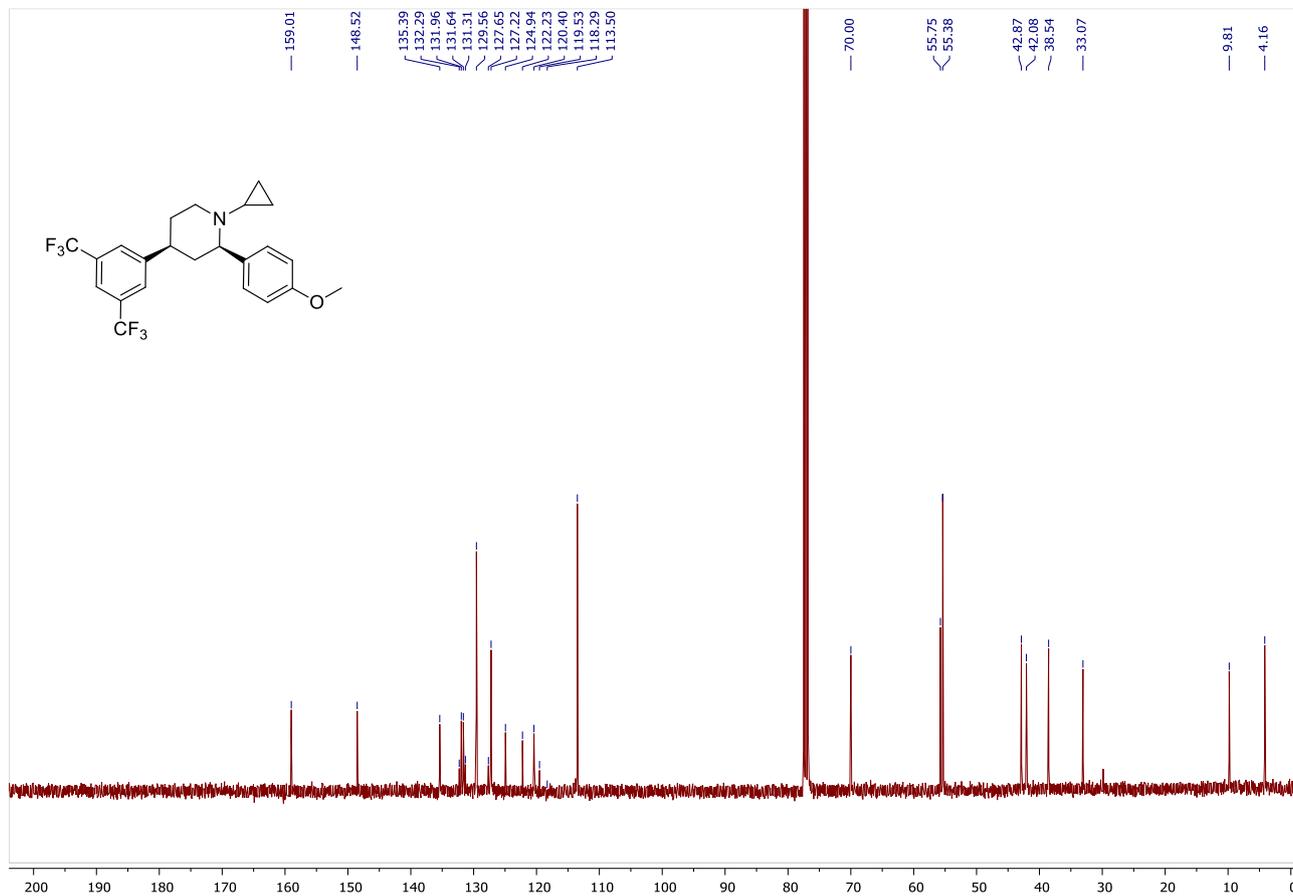
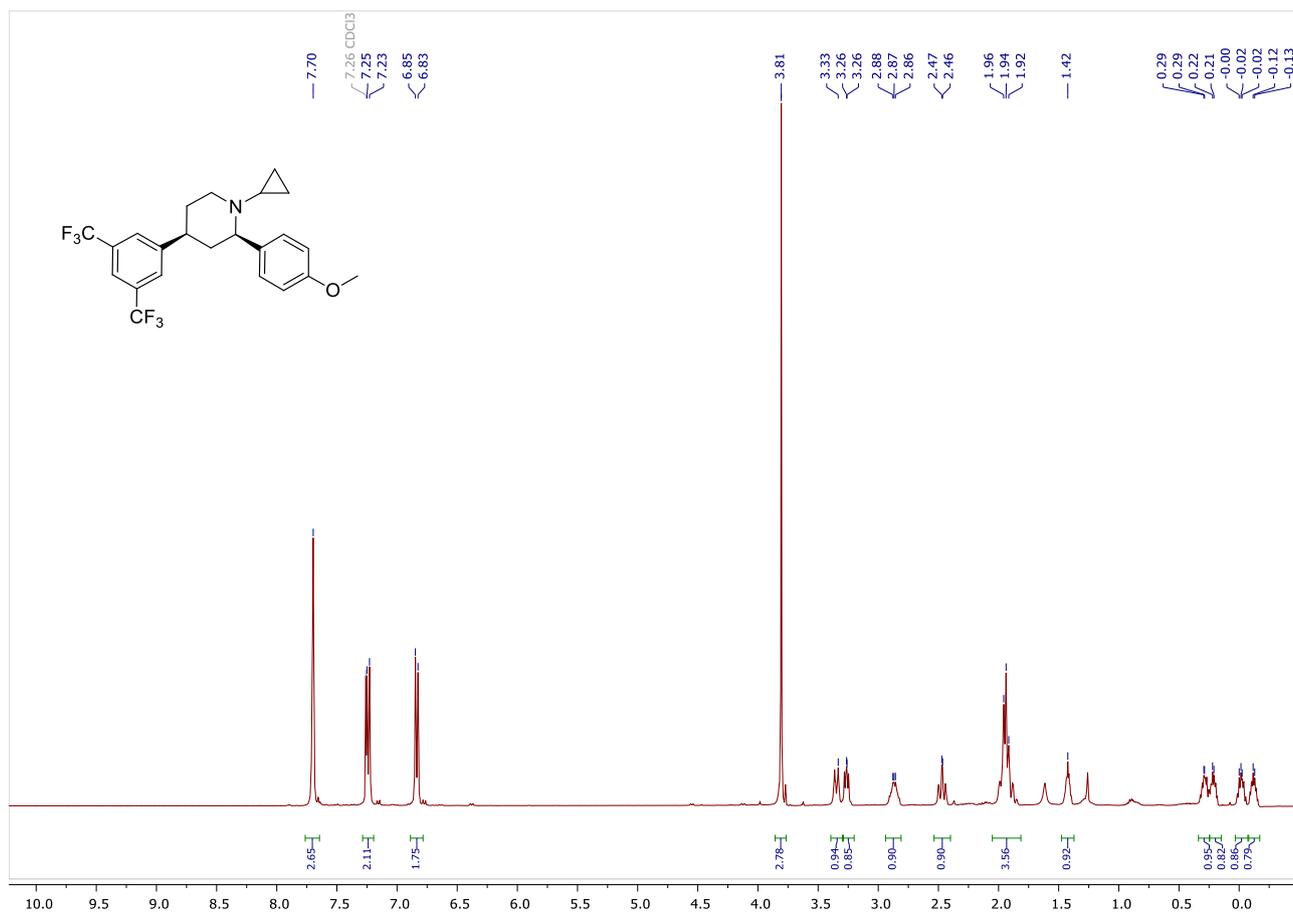
# <sup>1</sup>H and <sup>13</sup>C spectra of compound 2b



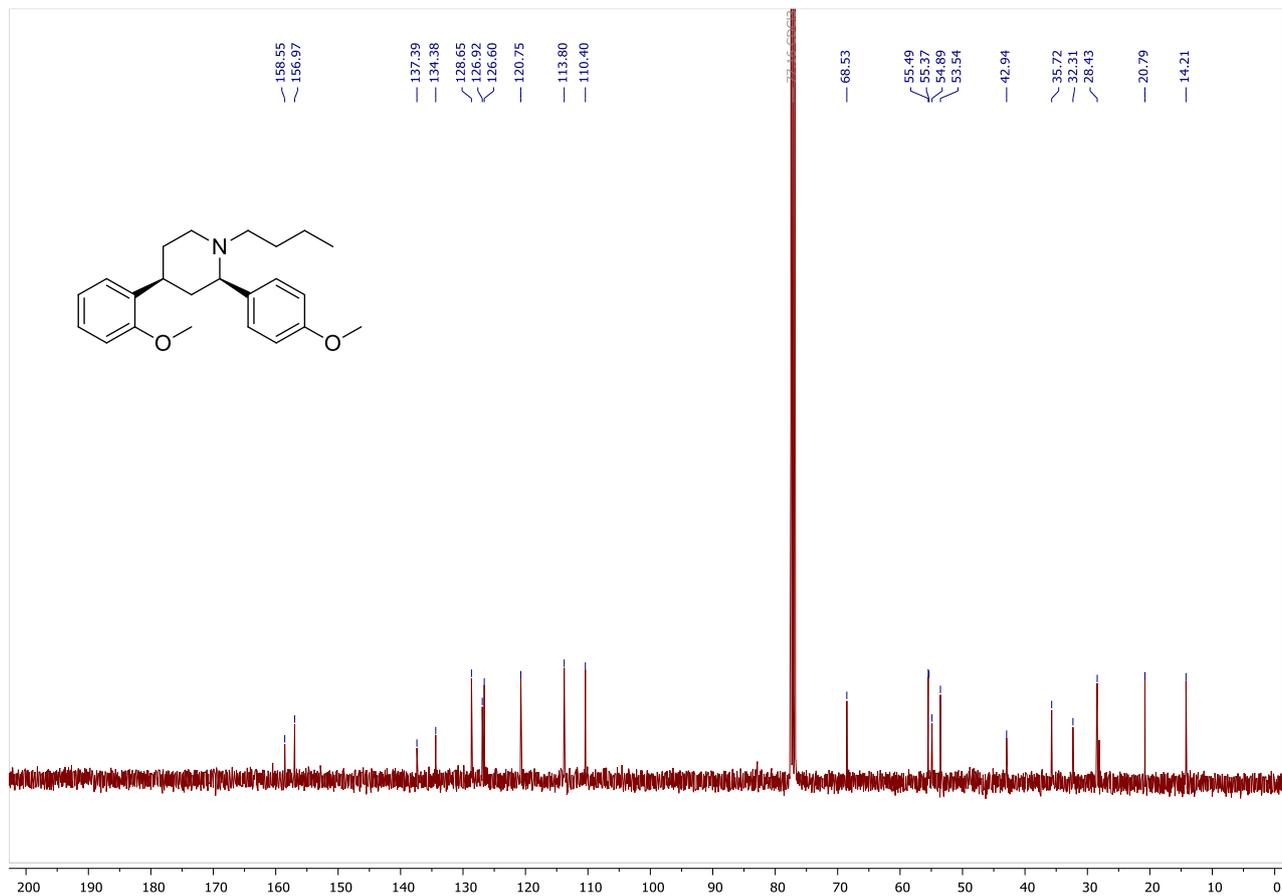
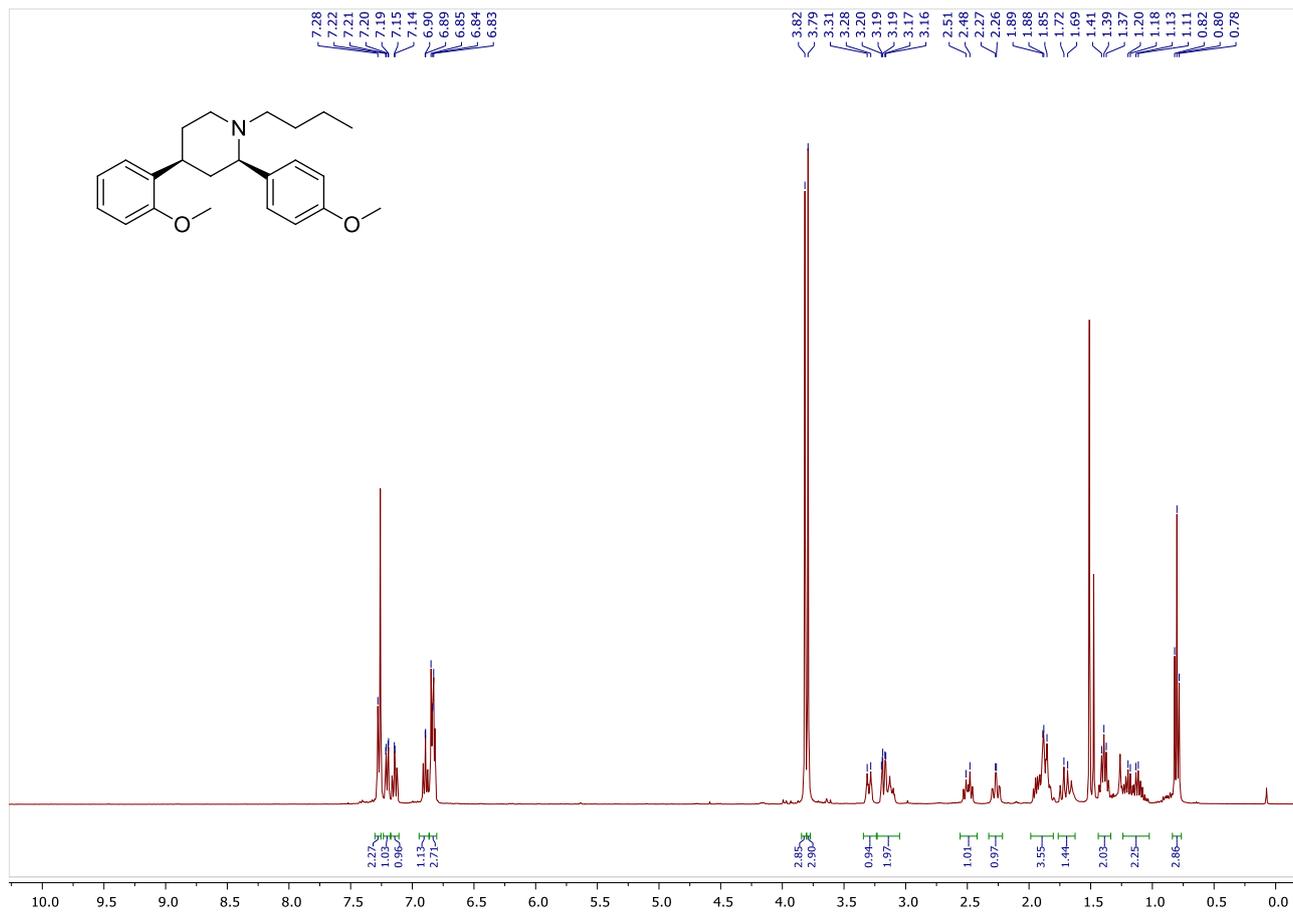
# <sup>1</sup>H and <sup>13</sup>C spectra of compound 2c



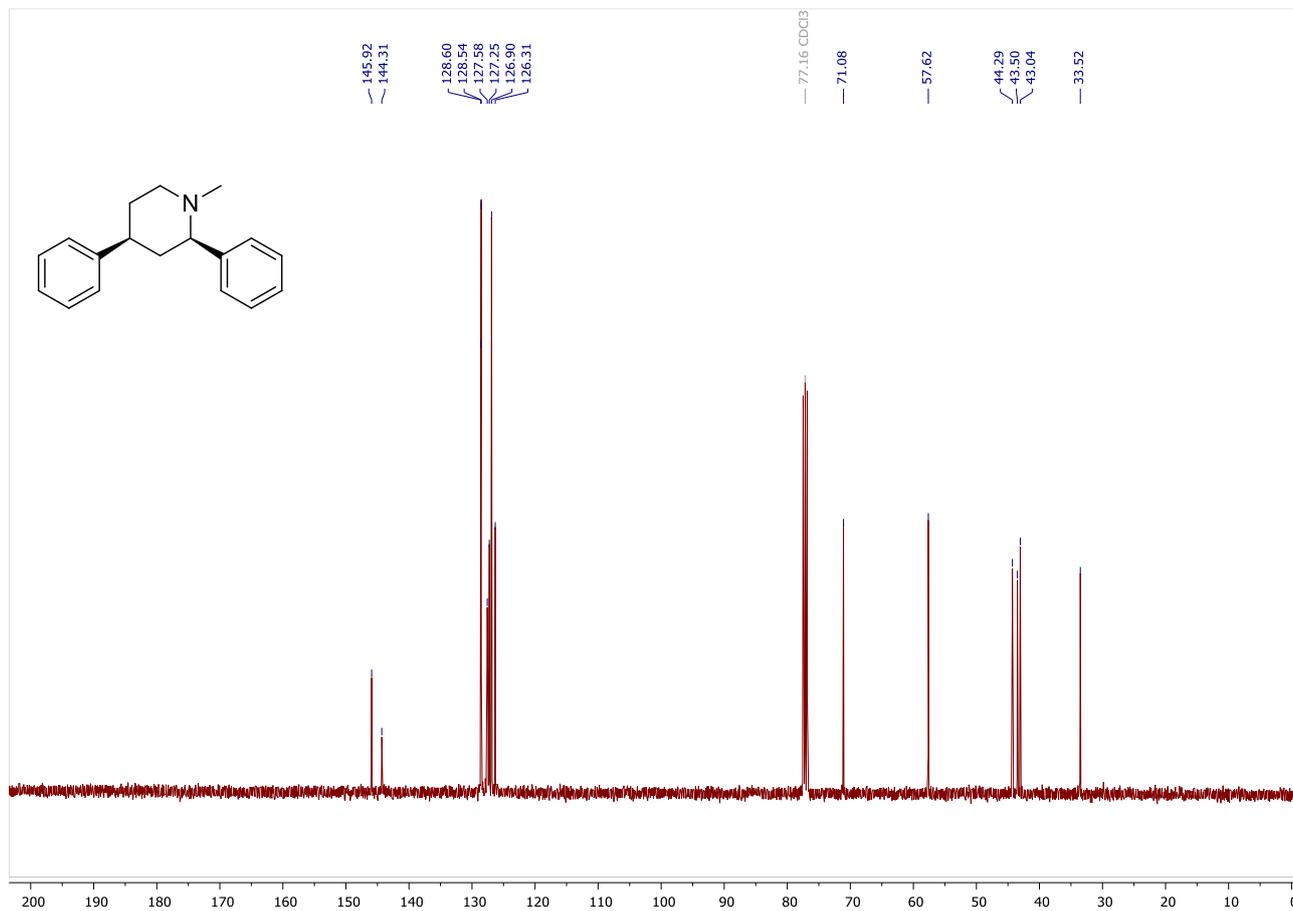
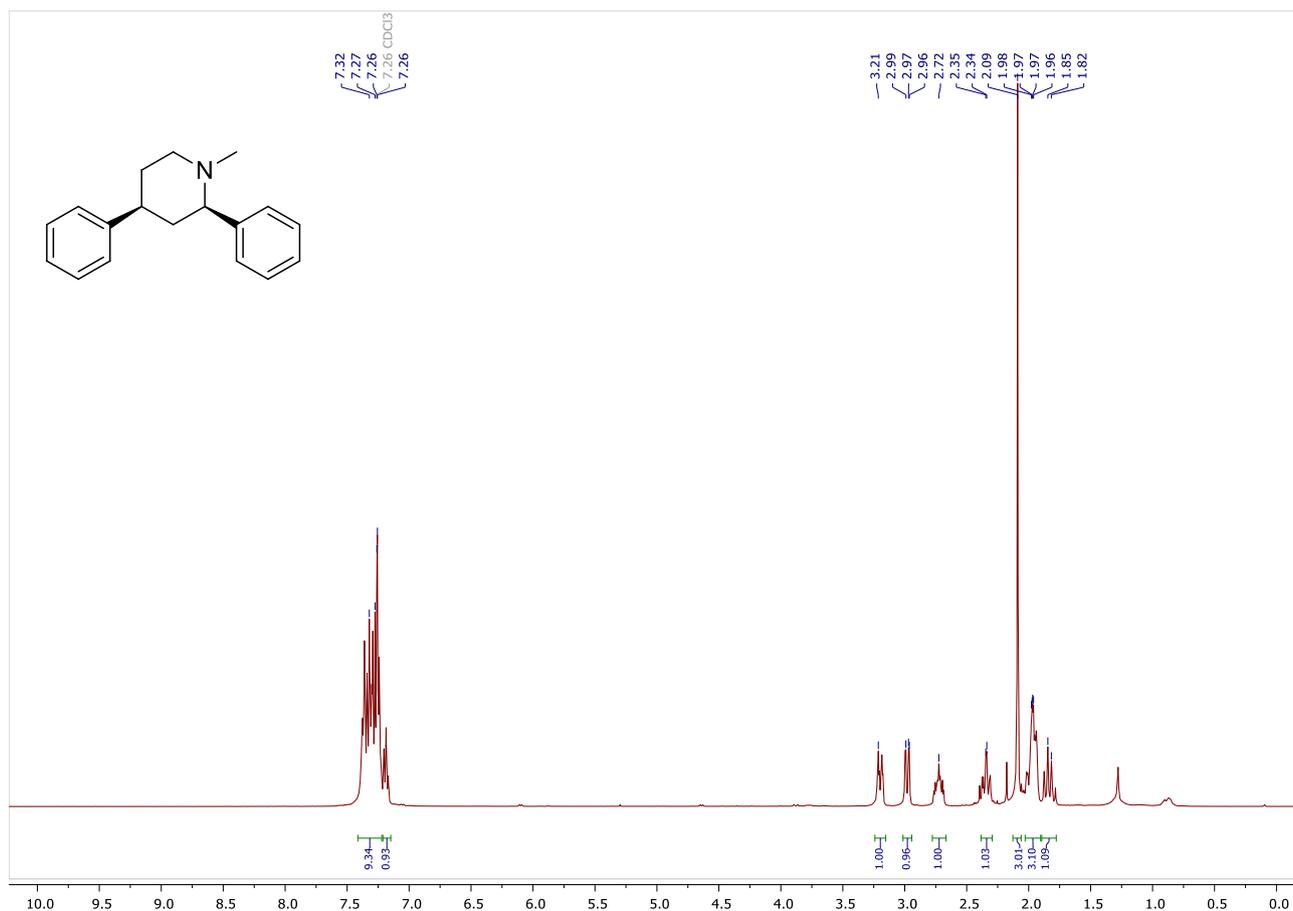
# $^1\text{H}$ and $^{13}\text{C}$ spectra of compound 2d



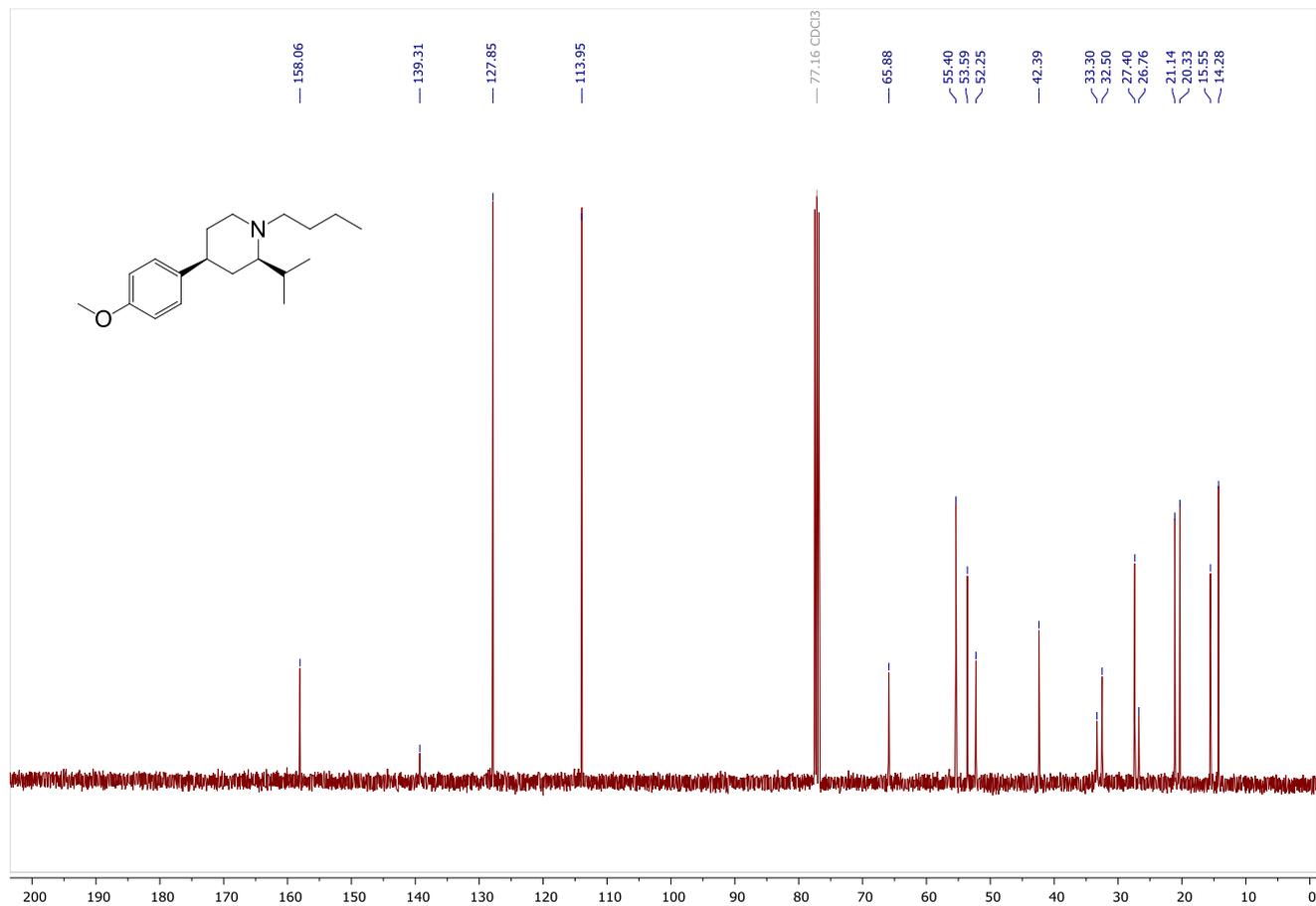
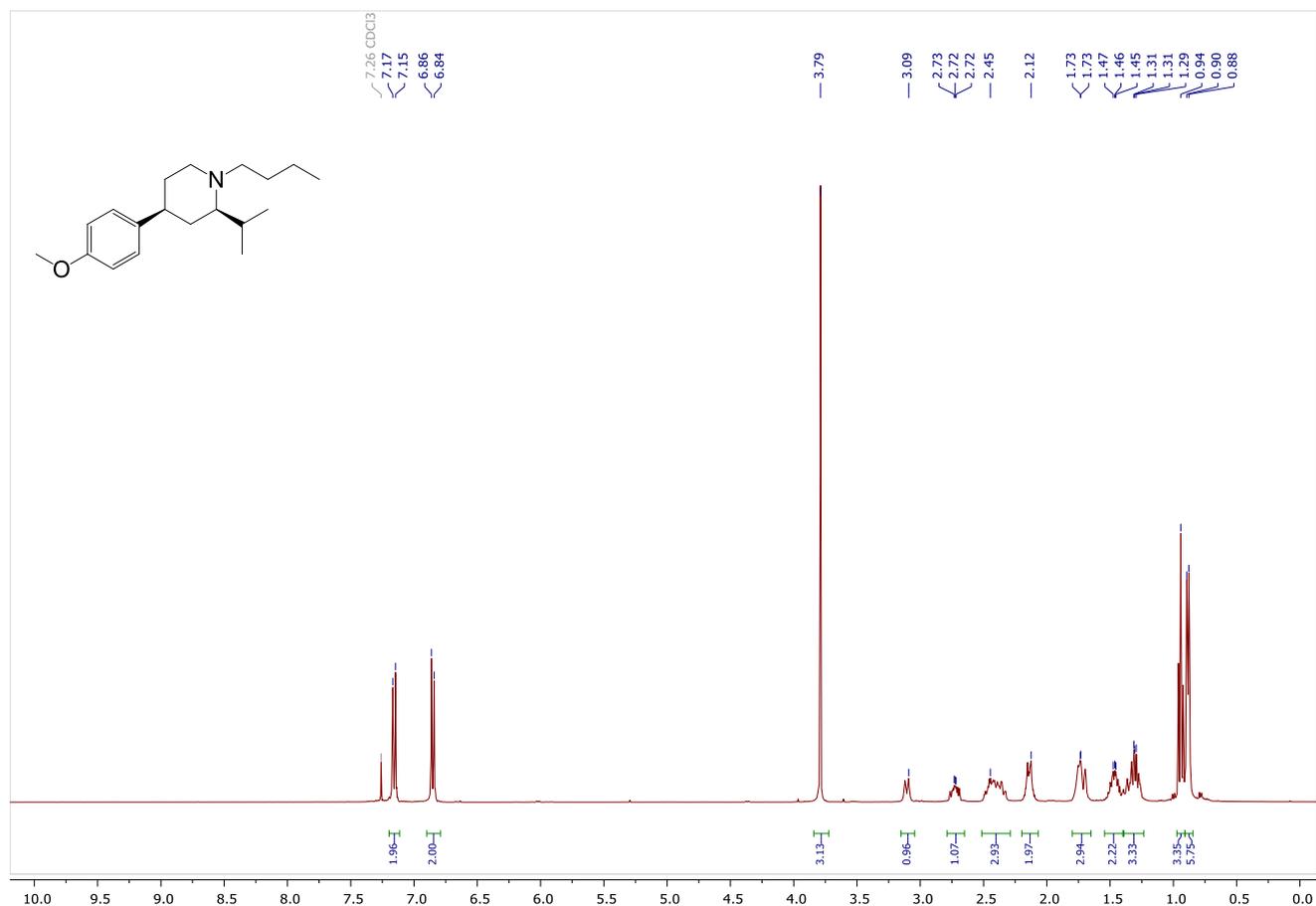
**$^1\text{H}$  and  $^{13}\text{C}$  spectra of compound 2e**



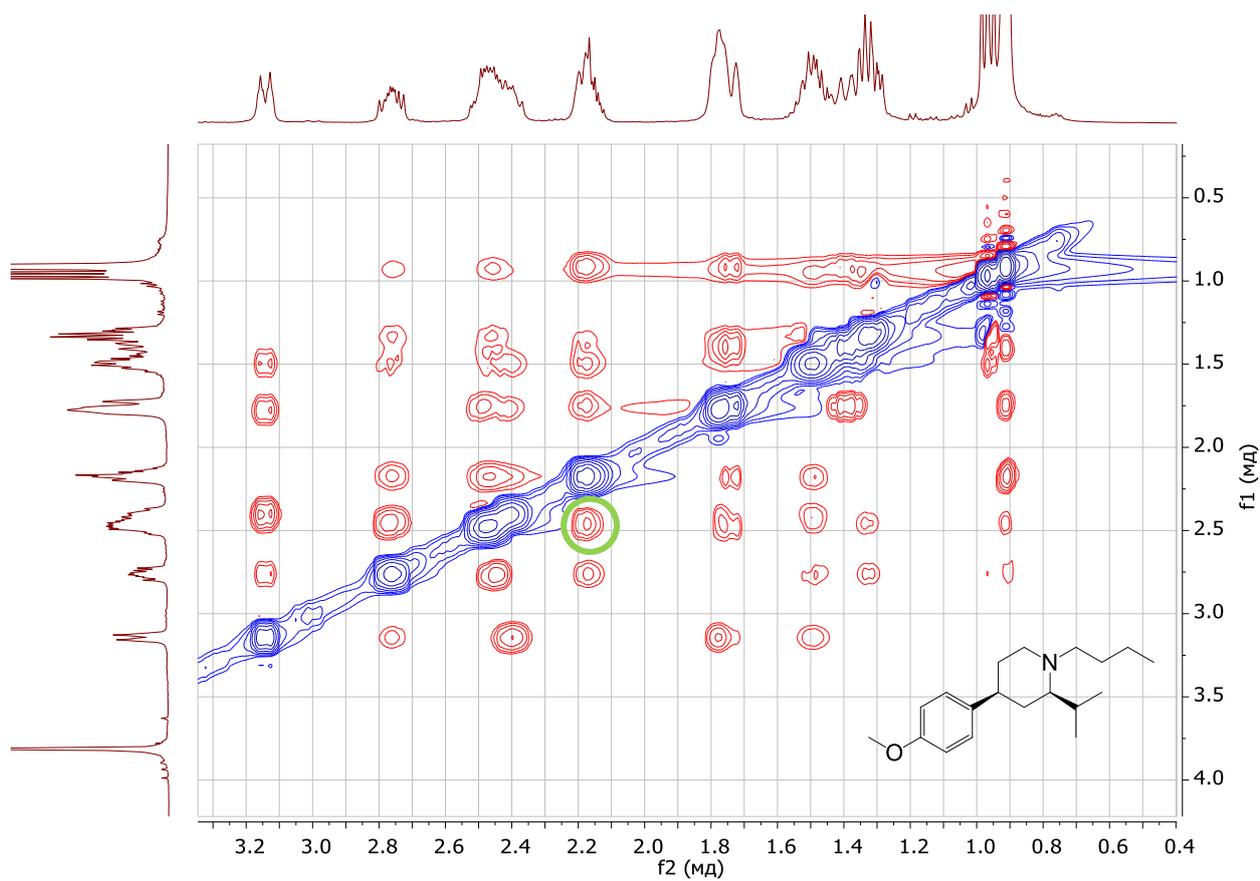
# $^1\text{H}$ and $^{13}\text{C}$ spectra of compound 2f



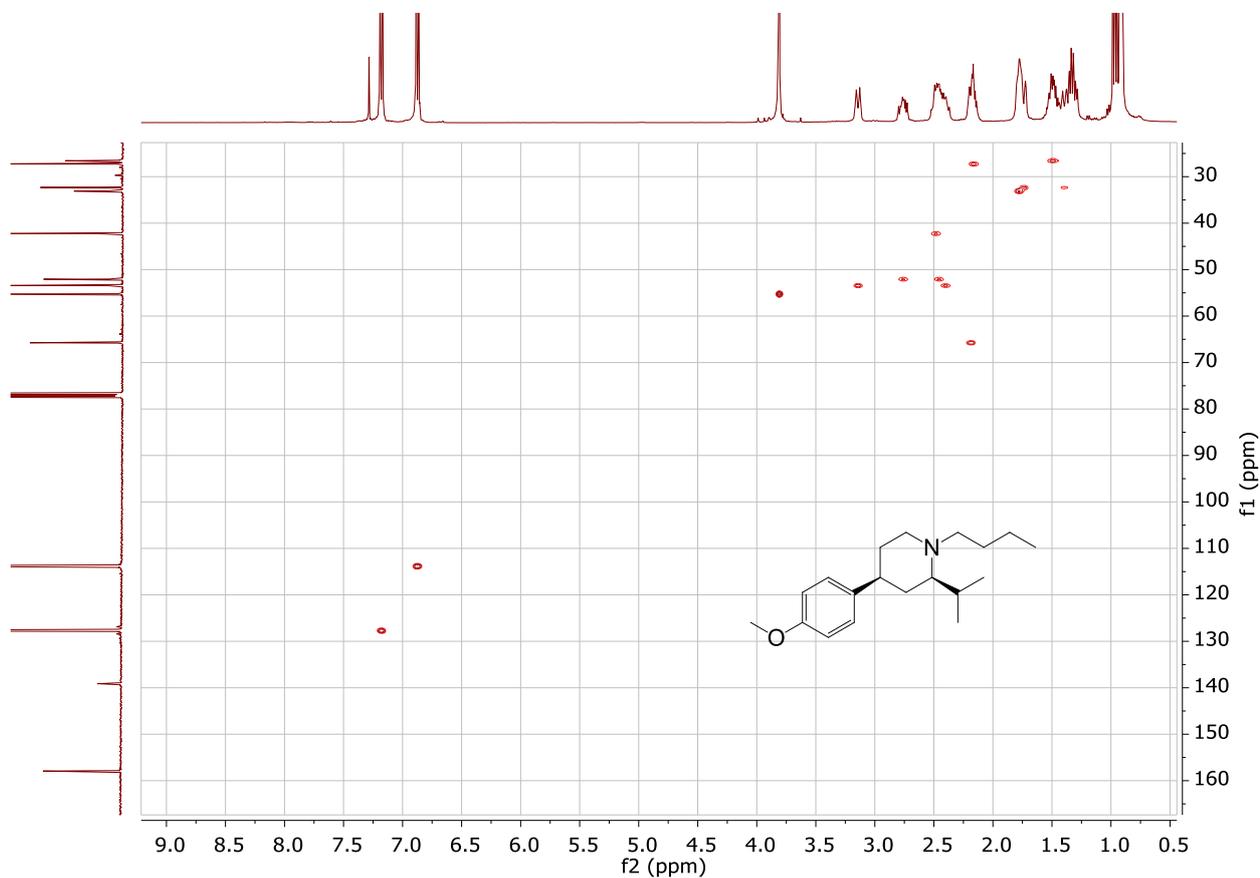
# $^1\text{H}$ and $^{13}\text{C}$ spectra of compound 2g



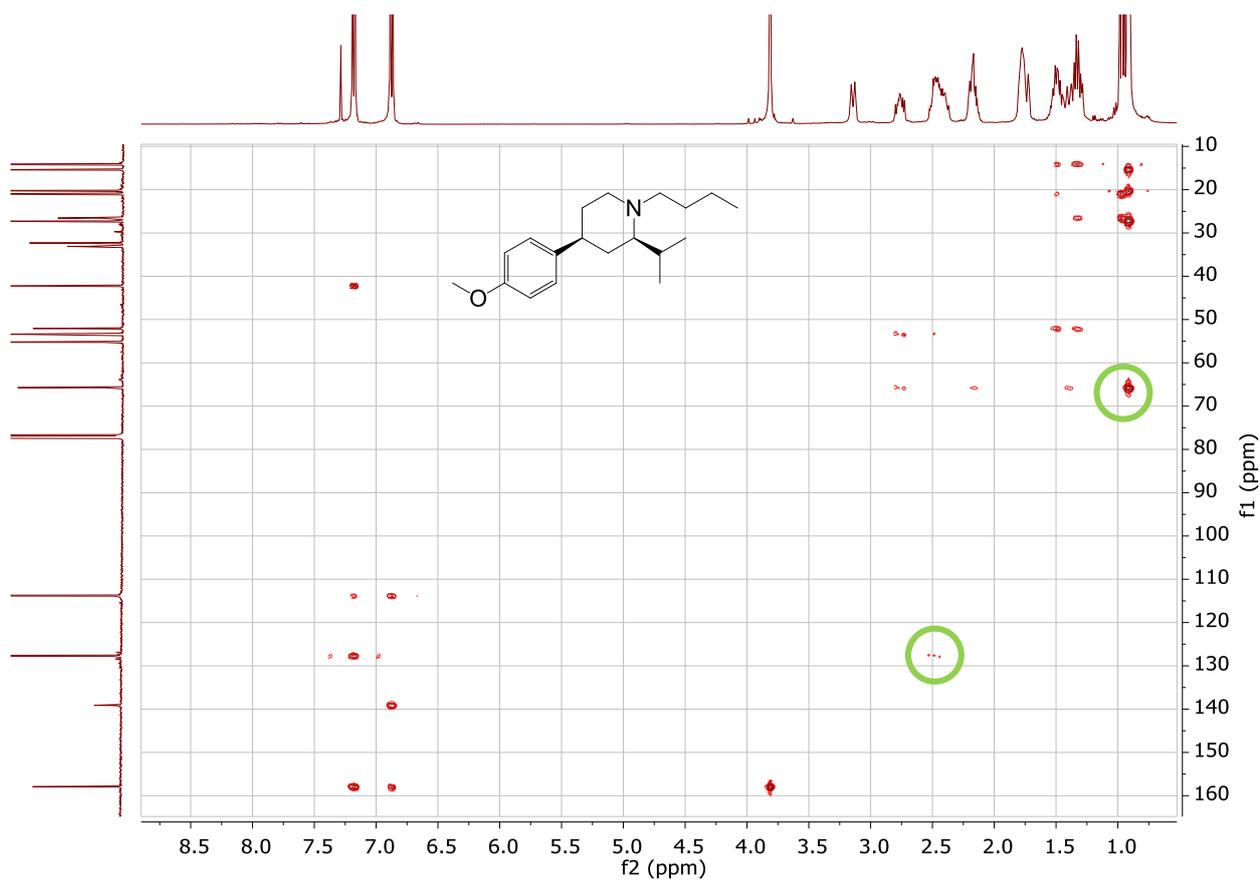
### Partial $^1\text{H}$ - $^1\text{H}$ NOESY spectrum of compound 2g



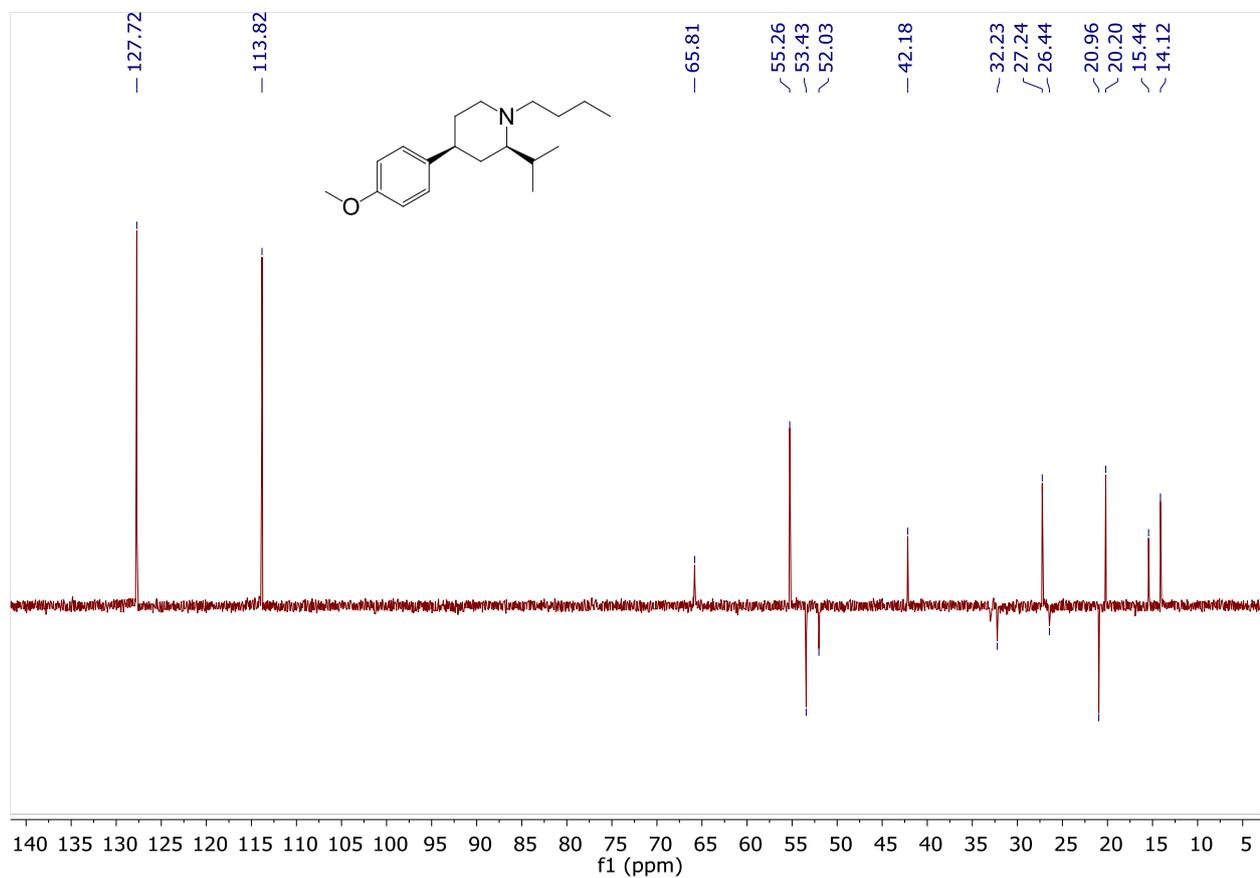
### $^1\text{H}$ - $^{13}\text{C}$ HSQC spectrum of compound 2g



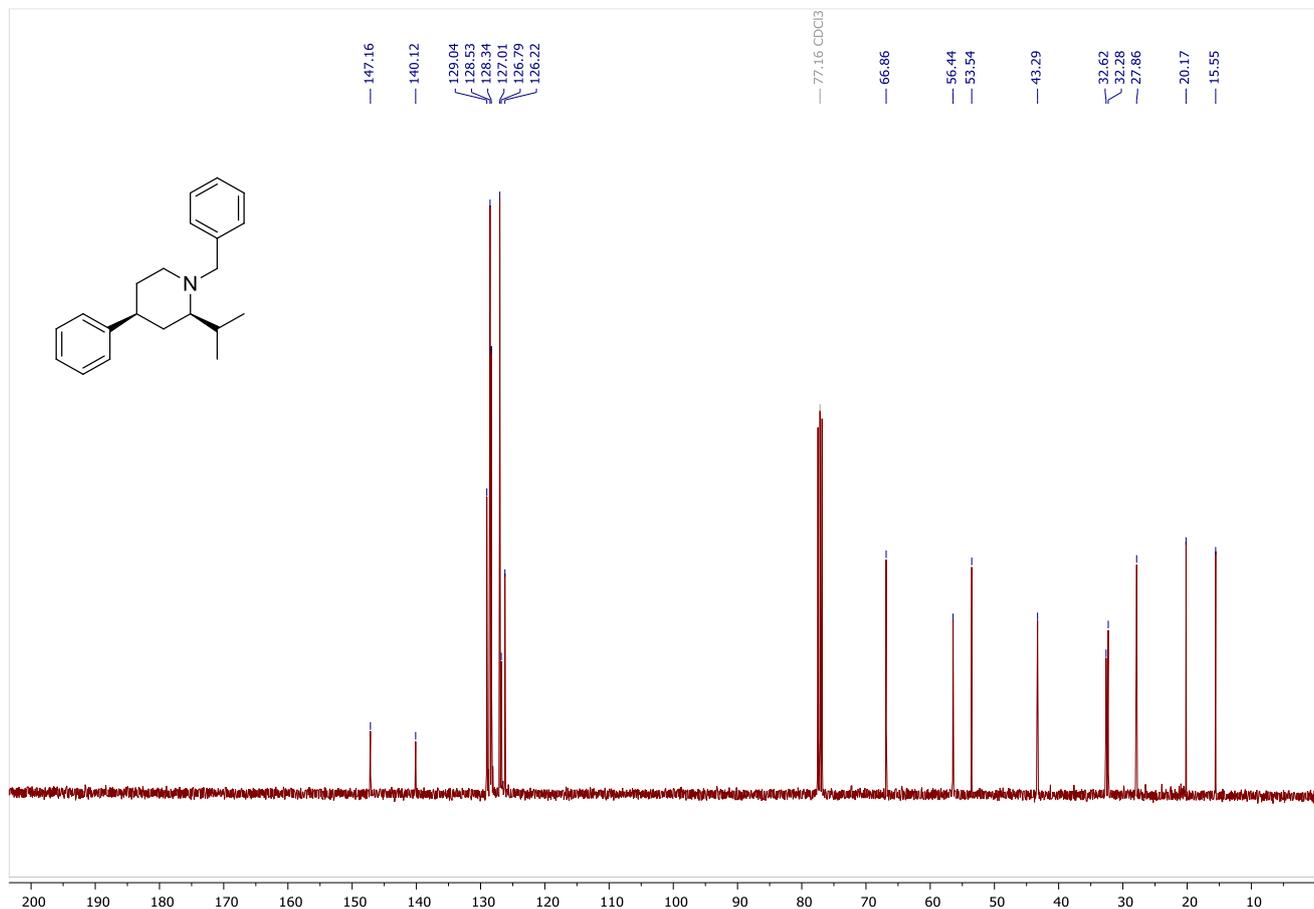
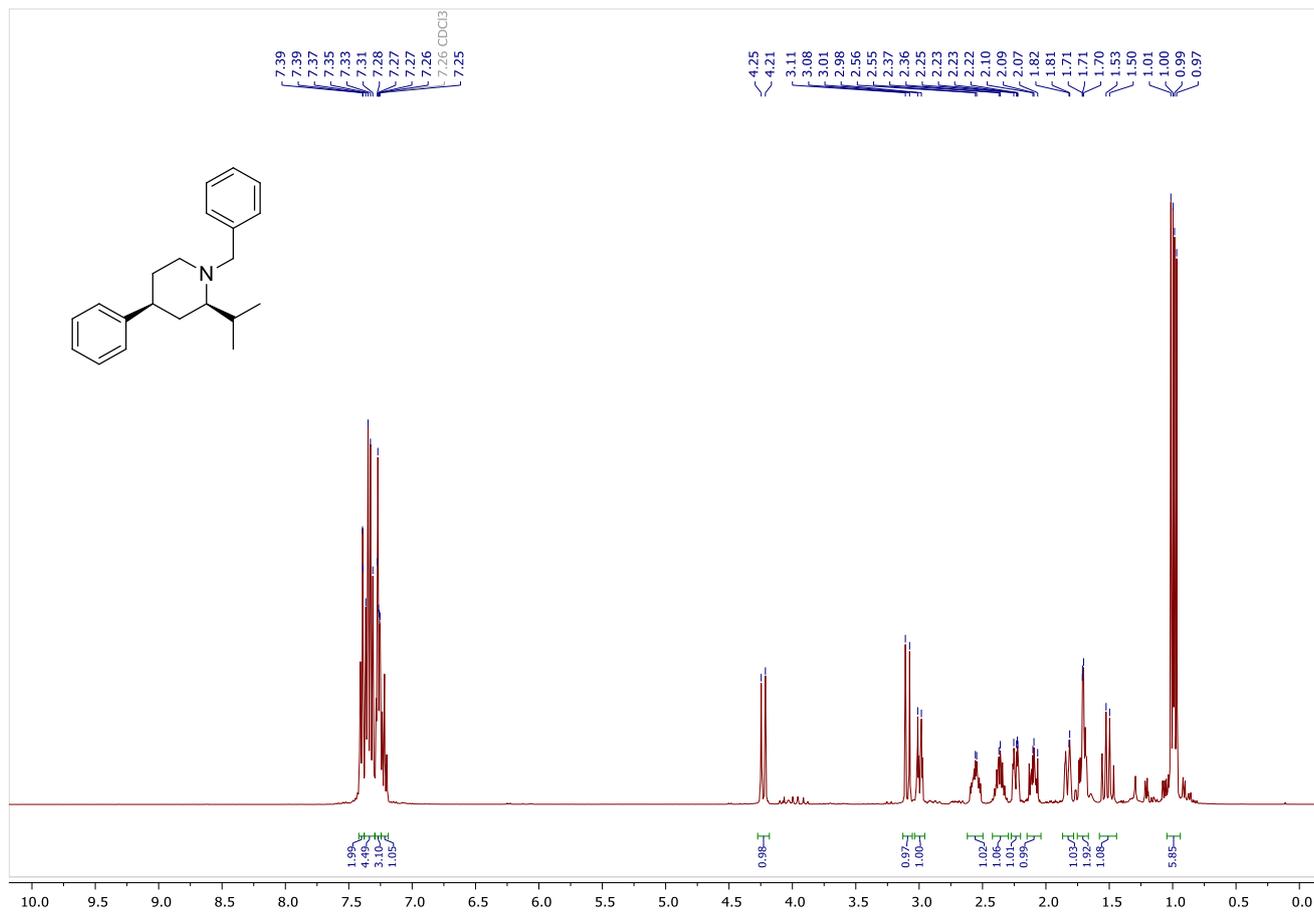
### $^1\text{H}$ - $^{13}\text{C}$ HMBC spectrum of compound 2g



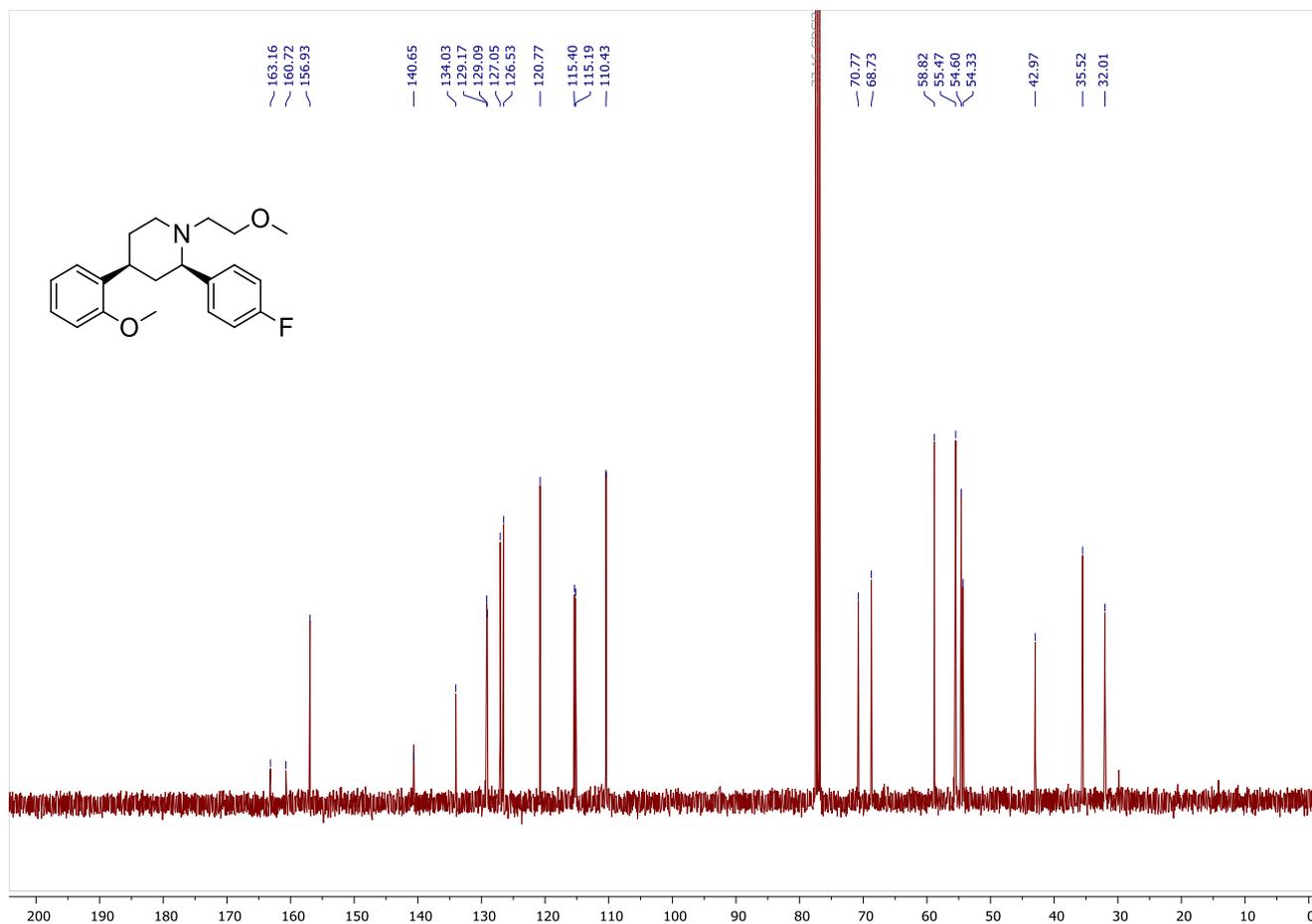
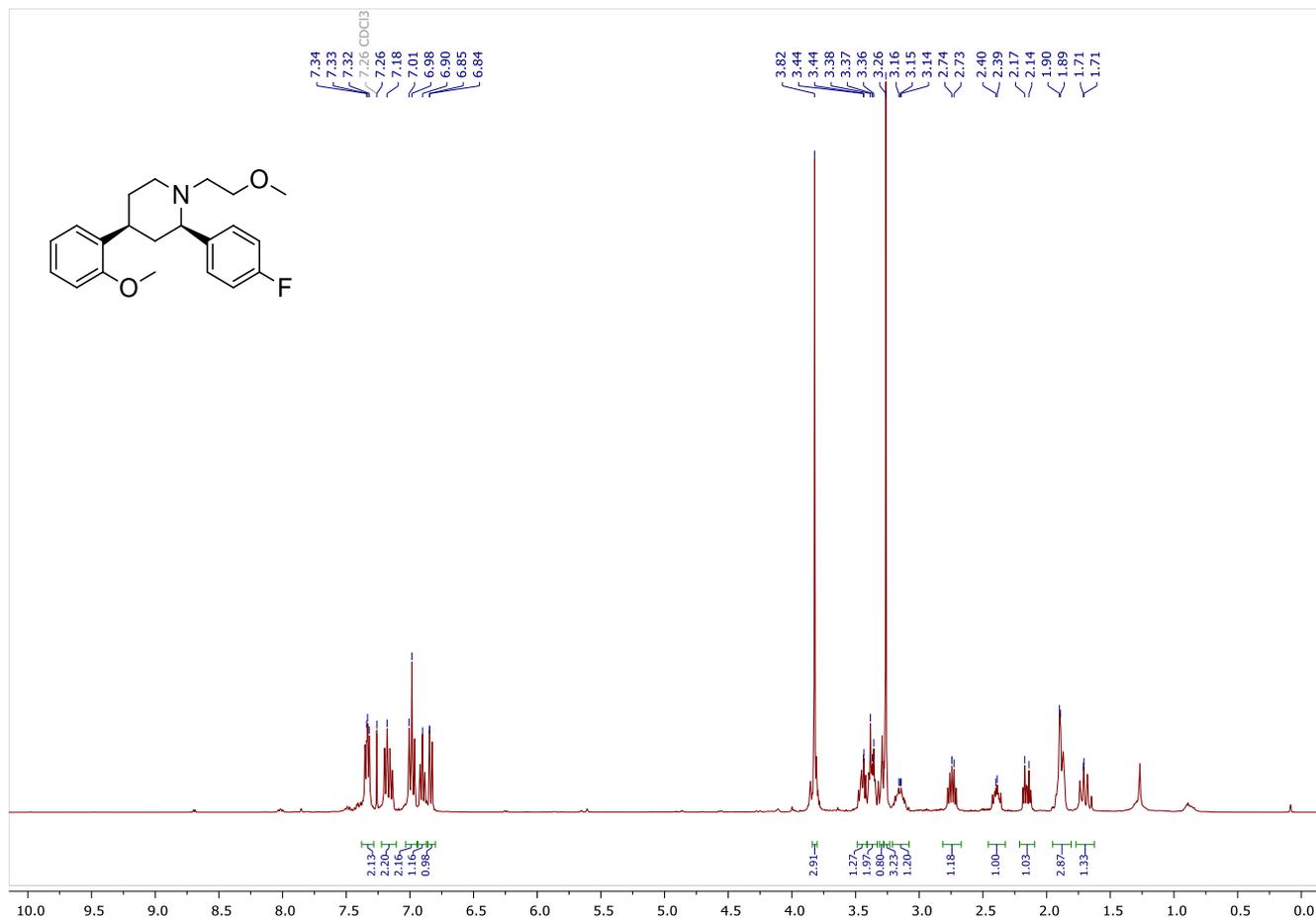
### $^{13}\text{C}$ DEPT spectrum of compound 2g



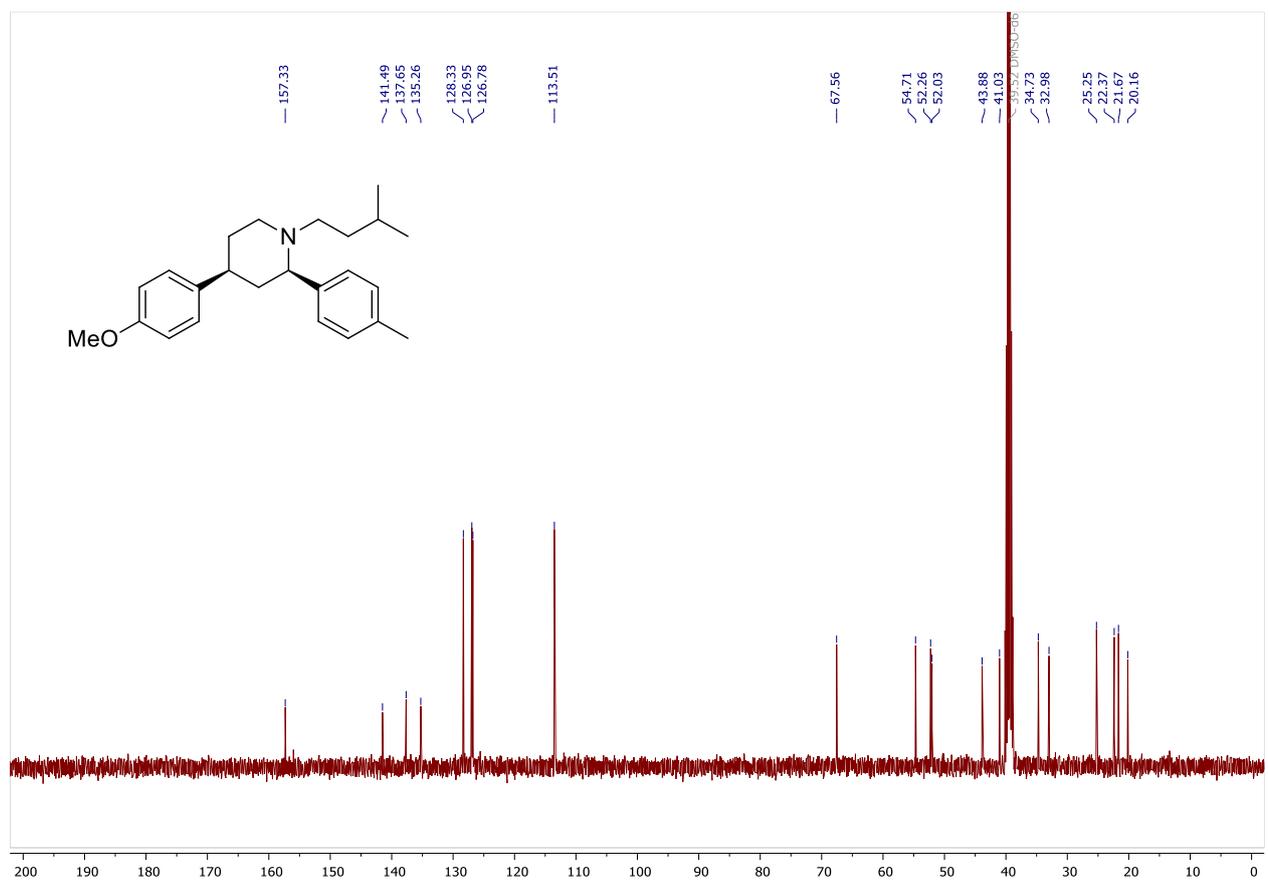
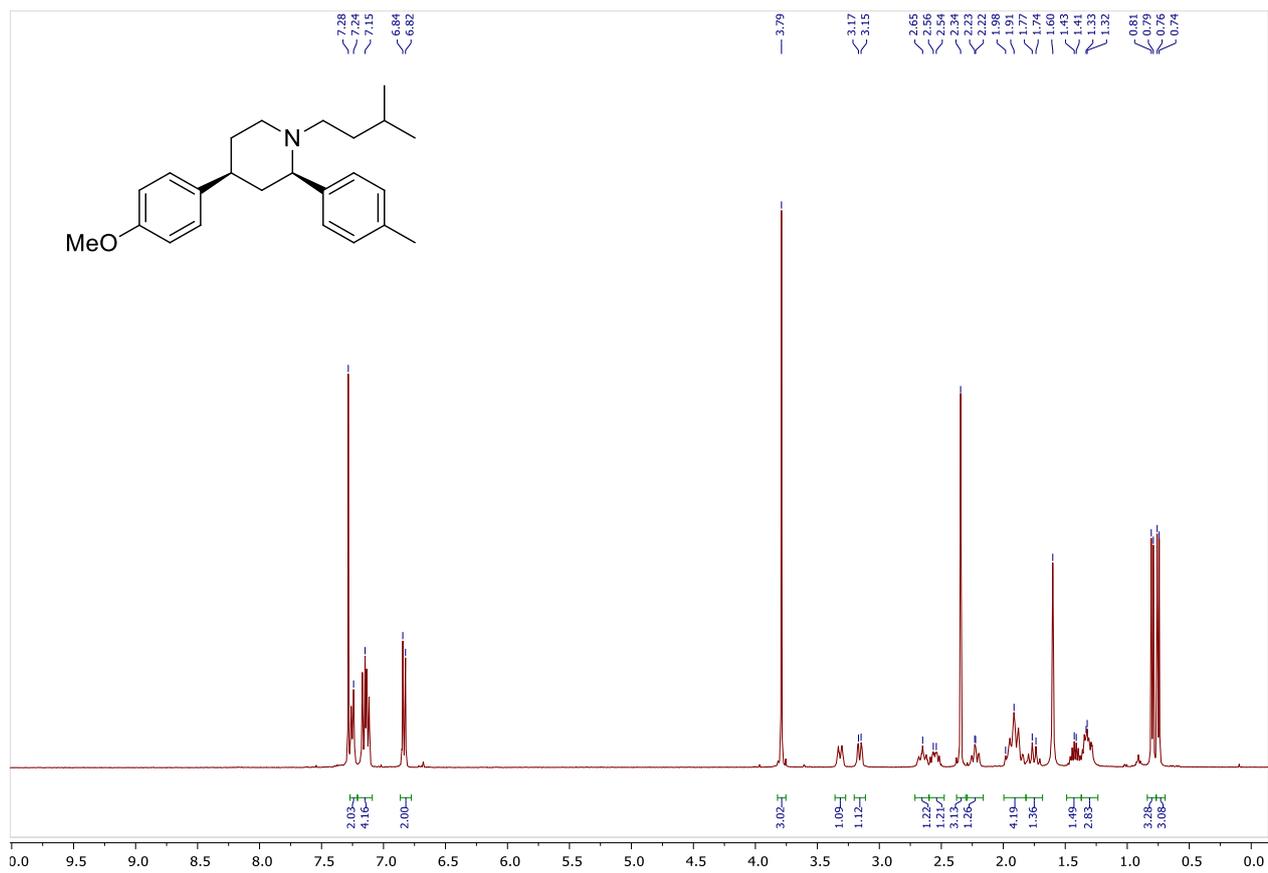
# $^1\text{H}$ and $^{13}\text{C}$ spectra of compound 2h



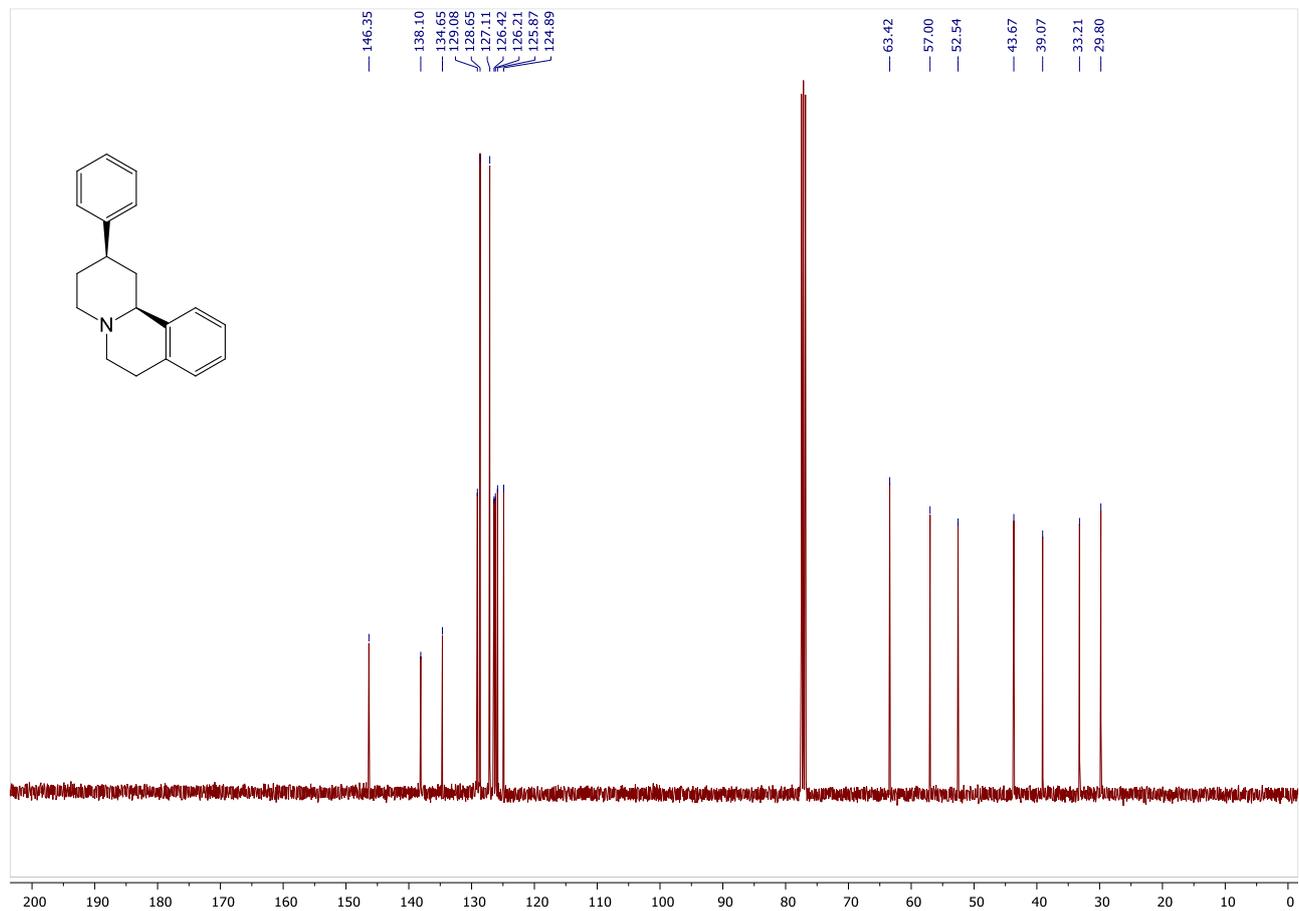
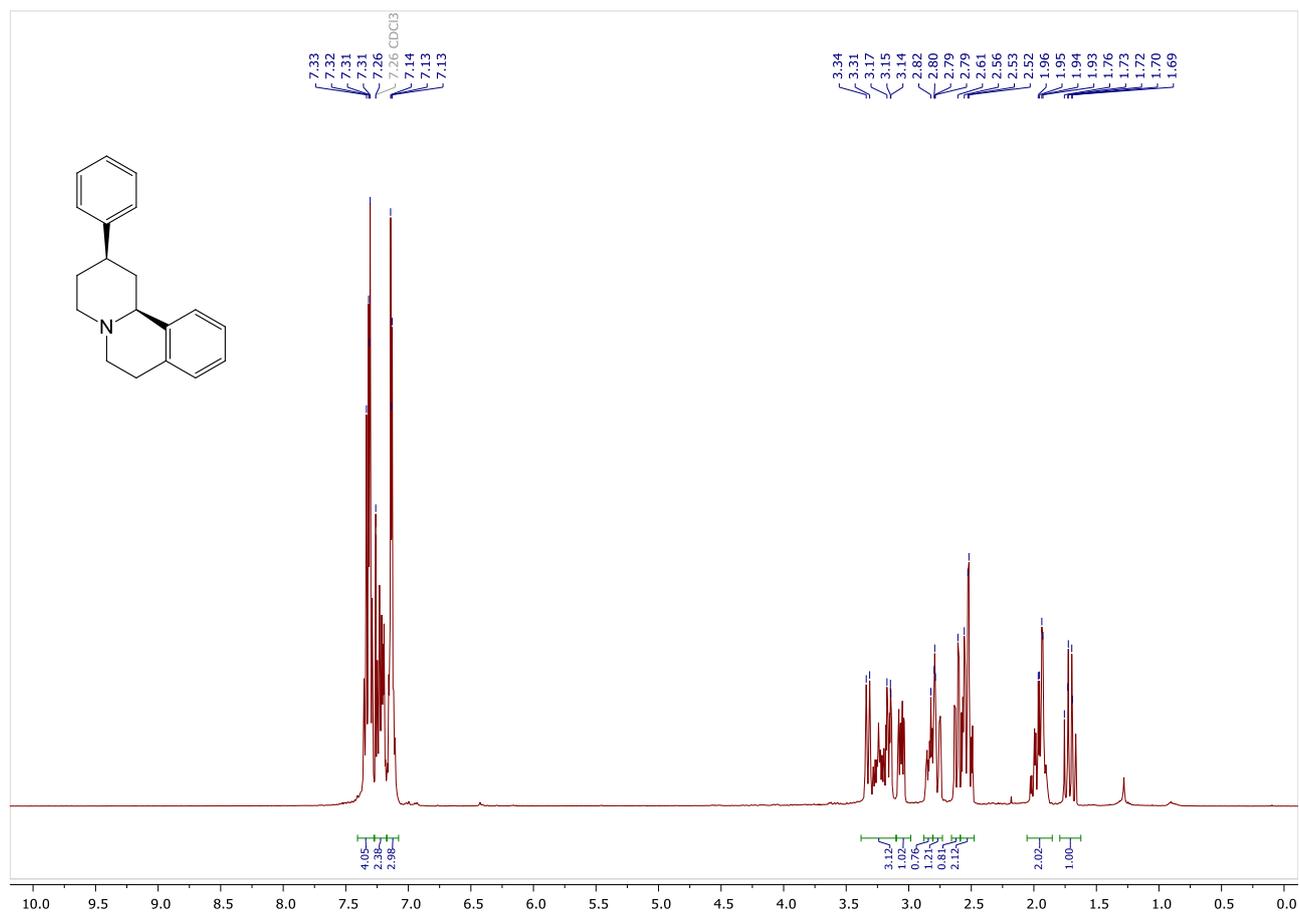
# <sup>1</sup>H and <sup>13</sup>C spectra of compound 2i



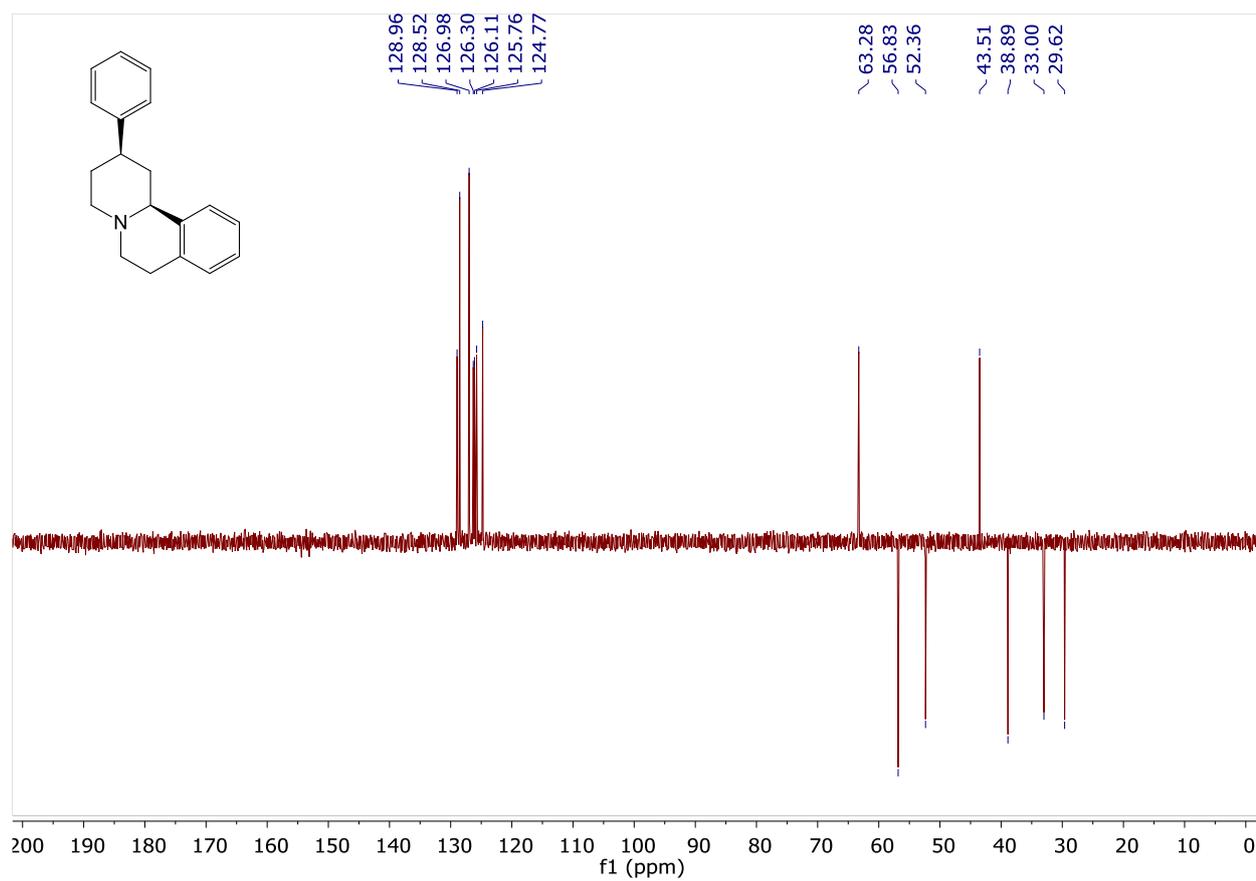
**$^1\text{H}$  and  $^{13}\text{C}$  spectra of compound 2j**



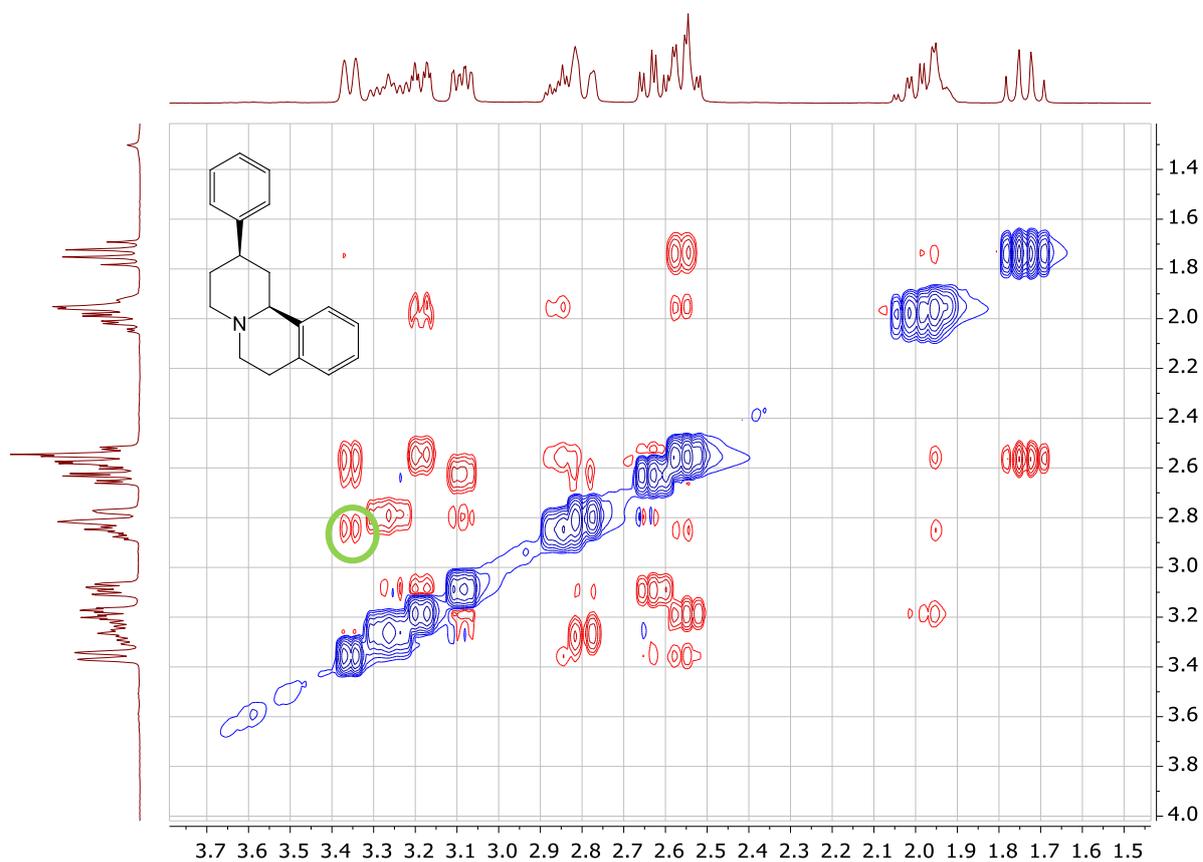
# $^1\text{H}$ and $^{13}\text{C}$ spectra of compound 2k



### $^{13}\text{C}$ DEPT spectrum of compound 2k



### Partial $^1\text{H}$ - $^1\text{H}$ NOESY spectrum of compound 2k



Partial  $^1\text{H}$ - $^{13}\text{C}$  HSQC spectrum of compound 2k



# $^1\text{H}$ and $^{13}\text{C}$ spectra of compound 1g

