Supporting Information

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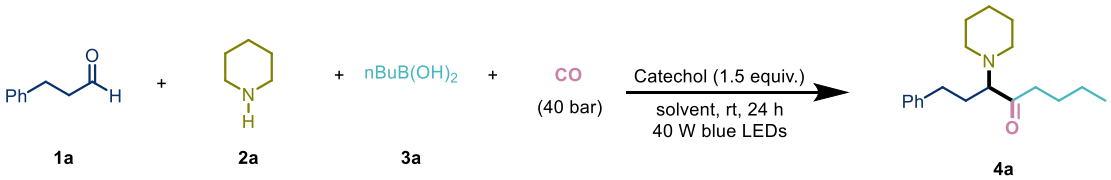
1. General Information.

Unless otherwise noted, all reactions were carried out under carbon monoxide or nitrogen atmosphere. All reagents were from commercial sources (Sigma-Aldrich, Bidepharm, EnergyChemical) and used as received without further purification. All solvents were dried by standard techniques and distilled prior to use. Column chromatography was performed on silica gel (200-300 meshes) using petroleum ether (bp. 60~90 °C), dichloromethane and ethyl acetate as eluent. All NMR spectra were recorded at ambient temperature using Bruker Avance III 400 MHz NMR (^{1}H, 400 MHz; ^{13}C {^{1}H}, 101 MHz, ^{19}F 376 MHz). ^{1}H NMR chemical shifts are reported relative to TMS and were referenced via residual proton resonances of the corresponding deuterated solvent ($CDCl_3$: 7.26 ppm) whereas ^{13}C{1H} NMR spectra are reported relative to TMS via the carbon signals of the deuterated solvent ($CDCl_3$: 77.0 ppm. Data for ^{1}H are reported as follows: chemical shift (δ ppm), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, dd (doublet of doublets), dt (doublet of triplets), qd (quartet of doublets), quint = quintet, m = multiplet, br = broad), coupling constant (Hz), and integration. All ^{13}C NMR spectra were broad-band ^{1}H decoupled. All reactions were monitored by GC-FID or NMR analysis. HRMS data was obtained with Micromass HPLC-Q-TOF mass spectrometer (ESI-TOF) or Agilent 6540 Accurate-MS spectrometer (Q-TOF). FT-ICR MS was obtained with Solarix FT-ICR MS (15 T, Bruker Daltonics GmbH, Bremen, Germany). Because of the high toxicity of carbon monoxide, all the reactions should be performed in an autoclave. The laboratory should be well-equipped with a CO detector and alarm system.

2. Optimization of the Reaction Conditions.

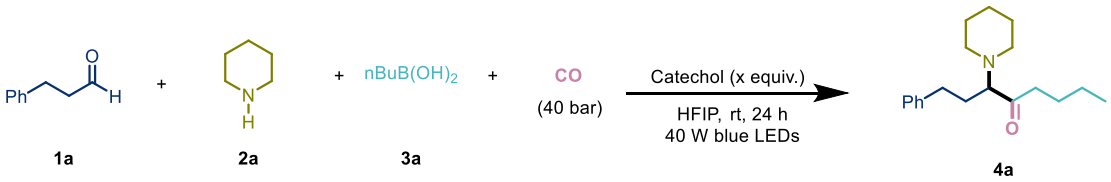
Table 1. Optimization of solvent.



Entry	Solvent	Yield (%)
1	DCM	0
2	DMF	0
3	EA	0
4	MeCN	0
5	HFIP	68

Reaction conditions: **1a** (0.1 mmol), **2a** (0.15 mmol), **3a** (0.15 mmol), Catechol (1.5 equiv.), CO (40 bar), HFIP (1 mL), rt, 24 h, 40W blue LEDs. The yields were determined by GC using dodecane as the internal standard.

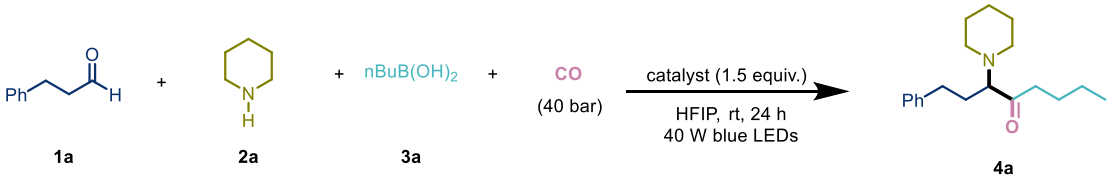
Table 2. Optimization of the equivalent ratio.

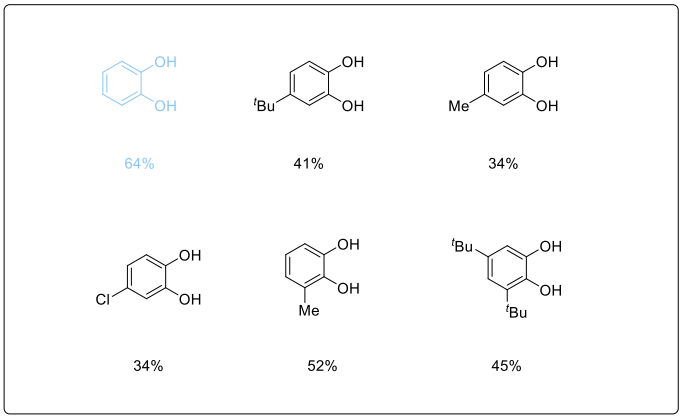


Entry	**1a**:**2a**:**3a** (mmol)	Yield (%)
1	0.1:0.1:0.15	75
2	0.1:0.15:0.15	70
3	0.15:0.1:0.15	57
4[a]	0.2:0.1:0.2	54

Reaction conditions: Catechol (1.5 equiv.), CO (40 bar), HFIP (1 mL), rt, 24 h, 40W blue LEDs. The yields were determined by GC using dodecane as the internal standard. a: Catechol (2.0 equiv.).

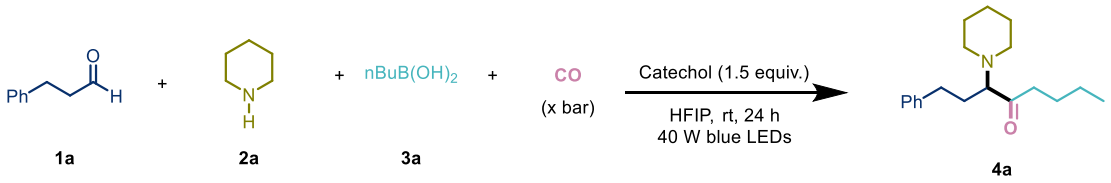
Table 3. Optimization of the Catechol.





Reaction conditions: **1a** (0.1 mmol), **2a** (0.15 mmol), **3a** (0.15 mmol), Catechol (1.5 equiv.), CO (40 bar), HFIP (1 mL), rt, 24 h, 40W blue LEDs. The yields were determined by GC using dodecane as the internal standard.

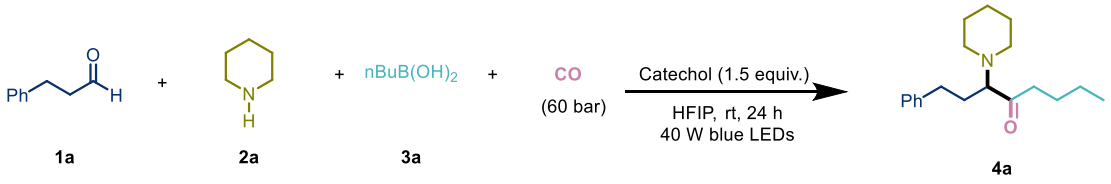
Table 4. Optimization of pressure.



Entry	CO	Yield (%)
1	20 bar	48
2	40 bar	64
3	60 bar	74

Reaction conditions: **1a** (0.1 mmol), **2a** (0.15 mmol), **3a** (0.15 mmol), Catechol (1.5 equiv.), HFIP (1 mL), rt, 24 h, 40W blue LEDs. The yields were determined by GC using dodecane as the internal standard.

Table 5. Optimization of solvent quantity.

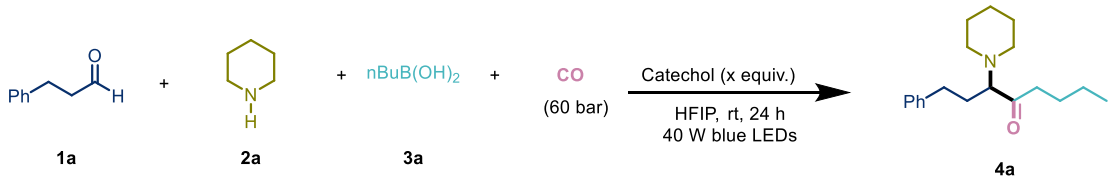


Entry	HFIP (mL)	Yield (%)

1	0.5	34
2	1.0	51
3	1.5	73
4	2.0	92

Reaction conditions: **1a** (0.1 mmol), **2a** (0.15 mmol), **3a** (0.15 mmol), Catechol (1.5 equiv.), rt, 24 h, 40W blue LEDs. The yields were determined by GC using dodecane as the internal standard.

Table 6. Optimization of the amount of catalyst.

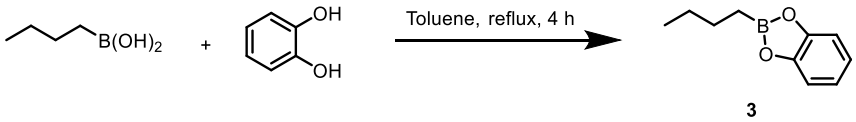


Entry	Catechol (x equiv.)	Yield (%)
1	0.2	29
2	0.3	92
3	0.5	99
4	1.5	92

Reaction conditions: **1a** (0.1 mmol), **2a** (0.15 mmol), **3a** (0.15 mmol), HFIP (2 mL), rt, 24 h, 40W blue LEDs. The yields were determined by GC using dodecane as the internal standard.

3. Mechanistic investigations.

3.1 Synthesis of nBuBCat.

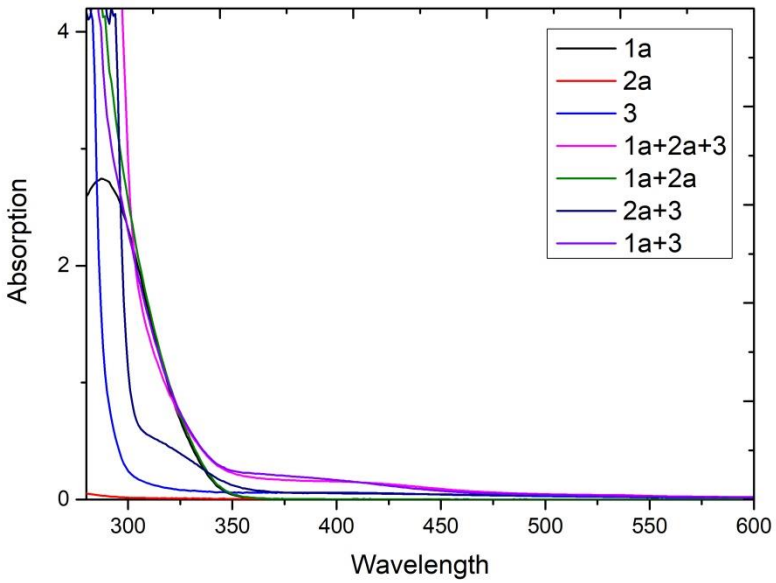


3

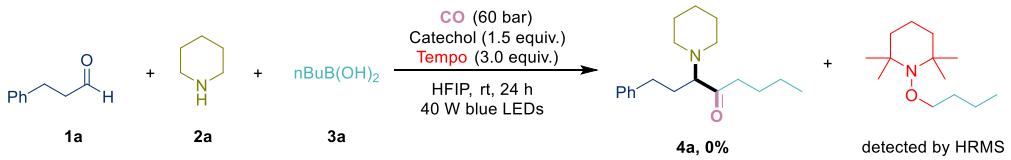
Add toluene (8 mL), catechol (324 mg, 2.94 mmol) and n-butylboronic acid (300 mg, 2.94 mmol) to a flame dried 25 mL round-bottom flask and attach a Dean-Stark apparatus. Reflux the solution for 4 hours. A separate water layer in the Dean-Stark trap would be observed .Then concentrate the solution in vacuo to obtain n-butylcatecholboronate ester **3** as yellow oil.

3.2 UV-Vis Absorbance Experiment.

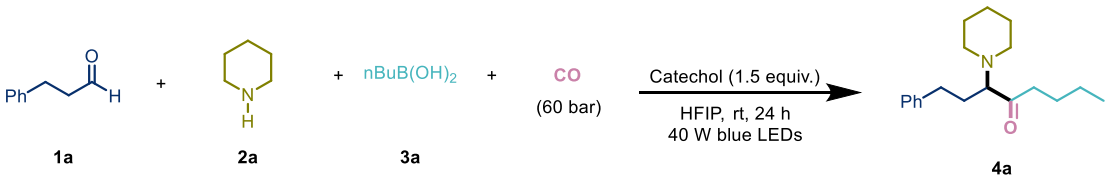
A solution of **4a** (0.1 M, in HFIP), **4b** (0.1 M, in HFIP), n-butylcatecholboronate ester **3** (0.1 M, in HFIP) was prepared in 3 mL glass bottles. Then placed in a quartz dish in order to measure the absorbance of the solution alone or in a mixture from 280 to 500 nm, a new UV absorption was observed for mixtures of **1a**, **2a** and **3**.



3.3 Radical Trapping Experiment.

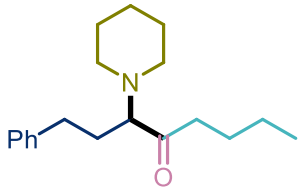


4. General Experimental Procedure and Characterization Data.



A 4 mL screw-cap vial was charged with **3a** n-butyl boric acid (15 mg, 1.5 equiv) and catechol (17mg, 1.5 equiv) an oven-dried stirring bar. After replacing nitrogen in the bottle three times, HFIP (2 mL) was added, then add **1a** phenylpropanal (14μL, 1.0 equiv.), **2a** piperidine (10μL, 1.0 equiv) with a microinJector. the vial was moved to an alloy plate and put into an autoclave which are euphotic under argon atmosphere. At room temperature, the autoclave was charged with 60 atm of CO. The autoclave was placed on an environment equipped with a magnetic stirrer and two Kesill light (450 nm, 40W). The reaction mixture was stirred for 24 h. After the reaction was complete, the pressure in autoclave was released carefully. The reaction mixture was purified by column chromatography on silica gel using petroleum ether and ethyl acetate (30:1) to afford the product **4a**.

Tips: the products are all colorless liquids.



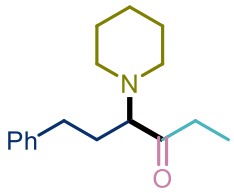
1-phenyl-3-(piperidin-1-yl) octan-4-one (4a): 26 mg, 90%. R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31 – 7.24 (m, 2H), 7.18 (t, *J* = 6.1 Hz, 3H), 3.04 (dd, *J* = 8.7, 5.0 Hz, 1H), 2.61 – 2.55 (m, 2H), 2.50 – 2.41 m, 6H), 2.01 – 1.89 (m, 1H), 1.88 – 1.79 (m, 1H), 1.59 – 1.48 (m, 6H), 1.41 (dd, *J* = 11.0, 6.4 Hz, 2H), 1.31 (dd, *J* = 15.0, 7.4 Hz, 2H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 212.1, 142.0, 128.4, 128.4, 125.9, 72.8, 51.0, 41.1,

33.0, 26.9, 26.6, 25.9, 24.5, 22.5, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{19}H_{30}NO^+$ 288.2322, found: 288.2325.

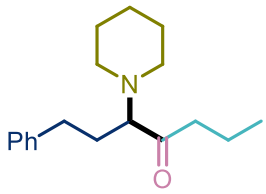


6-phenyl-4-(piperidin-1-yl) hexan-3-one (4b): 23 mg, 88%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32 – 7.22 (m, 2H), 7.18 (t, *J* = 6.4 Hz, 3H), 3.05 (dd, *J* = 8.7, 5.1 Hz, 1H), 2.67 – 2.54 (m, 2H), 2.53 – 2.39 (m, 6H), 2.03 – 1.91 (m, 1H), 1.89 – 1.80 (m, 1H), 1.53 (dt, *J* = 10.9, 5.4 Hz, 4H), 1.41 (dd, *J* = 11.2, 6.1 Hz, 2H), 1.04 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 212.8, 142.0, 128.4, 128.4, 125.9, 72.7, 51.0, 34.6, 33.0, 27.2, 26.6, 24.5, 7.8.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{17}H_{26}NO^+$ 260.2009, found: 260.2010.

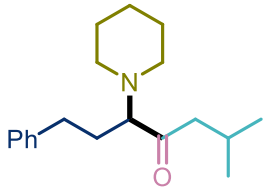


1-phenyl-3-(piperidin-1-yl) heptan-4-one (4c): 26 mg, 58%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32 – 7.23 (m, 2H), 7.18 (t, *J* = 6.4 Hz, 3H), 3.03 (dd, *J* = 8.7, 5.0 Hz, 1H), 2.65 – 2.35 (m, 8H), 2.02 – 1.90 (m, 1H), 1.89 – 1.78 (m, 1H), 1.64 – 1.49 (m, 6H), 1.41 (dd, *J* = 11.2, 6.1 Hz, 2H), 0.92 (t, *J* = 7.4 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 212.0, 142.0, 128.4, 128.4, 125.9, 72.8, 51.0, 43.3, 33.0, 26.9, 26.6, 24.5, 17.2, 13.9.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{28}NO^+$ 274.2165, found: 274.2169.



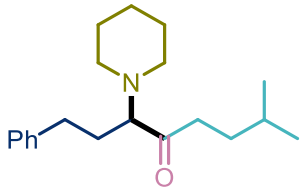
6-methyl-1-phenyl-3-(piperidin-1-yl) heptan-4-one (4d): 27 mg, 96%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 – 7.23 (m, 2H), 7.17 (d, *J* = 7.7 Hz, 3H), 3.01

(dd, *J* = 8.7, 4.9 Hz, 1H), 2.67 – 2.56 (m, 1H), 2.52 – 2.36 (m, 7H), 2.16 (dt, *J* = 13.4, 6.7 Hz, 1H), 2.03 – 1.90 (m, 1H), 1.86 –1.77 (m, 1H), 1.52 (dd, *J* = 10.8, 5.3 Hz, 4H), 1.46 – 1.35 (m, 2H), 0.98 – 0.83 (m, 6H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 211.3, 142.0, 128.4, 128.4, 125.9, 72.8, 51.0, 50.4, 33.0, 26.6, 26.5, 24.5, 24.2, 22.8, 22.6.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{19}H_{30}NO^+$ 288.2322, found: 288.2325.

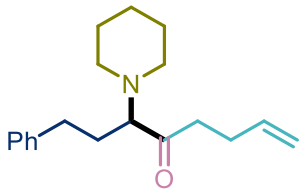


7-methyl-1-phenyl-3-(piperidin-1-yl) octan-4-one (4e): 14 mg, 48%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31 – 7.24 (m, 2H), 7.18 (t, *J* = 6.1 Hz, 3H), 3.04 (dd, *J* = 8.7, 4.9 Hz, 1H), 2.66 – 2.53 (m, 2H), 2.50 – 2.39 (m, 6H), 2.00 – 1.91 (m, 1H), 1.87 – 1.79 (m, 1H), 1.57 – 1.49 (m, 5H), 1.48 – 1.37 (m, 4H), 0.89 (d, *J* = 6.4 Hz, 6H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 212.2, 142.0, 128.4, 128.4, 125.9, 72.8, 51.0, 39.3, 33.0, 32.7, 27.7, 26.8, 26.6, 24.6, 22.5, 22.4.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{20}H_{32}NO^+$ 302.2478, found: 302.2477.

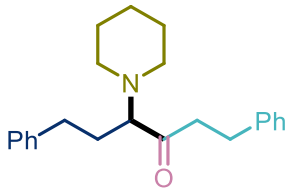


1-(4-methoxyphenyl)-3-oxopentan-1-aminium chloride (4f): 15 mg, 54%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 – 7.24 (m, 2H), 7.18 (t, *J* = 6.5 Hz, 3H), 5.86 – 5.76 (m, 1H), 5.11 – 4.92 (m, 2H), 3.03 (dd, *J* = 8.8, 4.9 Hz, 1H), 2.73 – 2.51 (m, 3H), 2.50 – 2.39 (m, 5H), 2.32 (q, *J* = 7.2 Hz, 2H), 2.01 – 1.91 (m, 1H), 1.88 – 1.79 (m, 1H), 1.53 (dt, *J* = 10.7, 5.3 Hz, 4H), 1.41 (dd, *J* = 11.2, 6.1 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 211.1, 142.0, 137.6, 128.4, 128.4, 125.9, 115.1, 72.9, 51.0, 40.3, 32.99, 27.8, 26.7, 26.6, 24.5.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{19}H_{28}NO^+$ 286.2165, found: 286.2165.

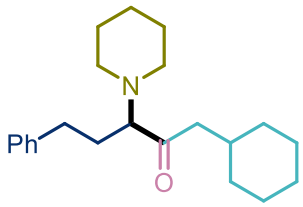


1,6-diphenyl-4-(piperidin-1-yl) hexan-3-one (4g): 19.4 mg, 58%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 – 7.23 (m, 4H), 7.20 – 7.17 (m, 4H), 7.12 (d, *J* = 7.2 Hz, 2H), 3.03 – 2.85 (m, 4H), 2.81 – 2.71 (m, 1H), 2.62 – 2.51 (m, 1H),2.45 – 2.34 (m, 5H), 2.00 – 1.88 (m, 1H), 1.87 – 1.76 (m, 1H), 1.49 (d, *J* = 4.9 Hz, 4H), 1.39 (dd, *J* = 11.1, 5.6 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.9, 134.8, 134.2, 129.3, 128.7, 50.3, 44.5, 36.0, 6.8.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{23}H_{30}NO^+$ 336.2322, found: 336.2323.

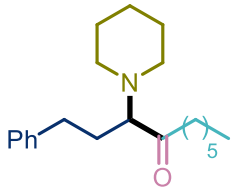


1-cyclohexyl-5-phenyl-3-(piperidin-1-yl) pentan-2-one (4h): 17.3 mg, 53%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31 – 7.24 (m, 2H), 7.18 (t, *J* = 6.1 Hz, 3H), 2.99 (dd, *J* = 8.7, 4.9 Hz, 1H), 2.67 – 2.56 (m, 1H), 2.51 – 2.31 (m, 7H), 2.00 – 1.90 (m, 1H), 1.89 – 1.76 (m, 2H), 1.67 (d, *J* = 9.3 Hz, 5H), 1.52 (dd, *J* = 10.8, 5.4 Hz, 4H), 1.44 – 1.36 (m, 2H), 1.35 – 1.21 (m, 2H), 1.20 – 1.09 (m, 1H), 0.99 – 0.84 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 211.3, 142.1, 128.4, 128.4, 125.9, 72.9, 51.0, 49.0, 33.5, 33.4, 33.3, 33.0, 26.6, 26.5, 26.3, 26.2, 26.2, 24.6.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{22}H_{34}NO^+$ 328.2635, found: 328.2635.



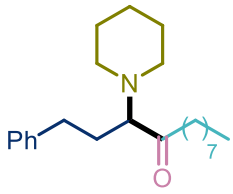
1-phenyl-3-(piperidin-1-yl) decan-4-one (4i): 20.4 mg, 65%, R_f = 0.5 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 – 7.24 (m, 2H), 7.18 (t, *J* = 6.1 Hz, 3H), 3.03 (dd, *J* = 8.7, 5.0 Hz, 1H), 2.66 – 2.53 (m, 2H), 2.52 – 2.40 (m, 6H), 2.03 – 1.90 (m, 1H),

1.87 – 1.79 (m, 1H), 1.53 (dd, *J* = 11.3, 5.5 Hz, 6H), 1.41 (dd, *J* = 11.0, 5.9 Hz, 2H), 1.34 – 1.23 (m, 6H), 0.88 (t, *J* = 6.7 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 212.1, 142.0, 128.4, 128.4, 125.9, 72.8, 51.0, 41.3, 33.0, 31.7, 29.0, 26.9, 26.6, 24.6, 23.7, 22.5, 14.1.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{21}H_{34}NO^+$ 316.2635, found: 316.2633.

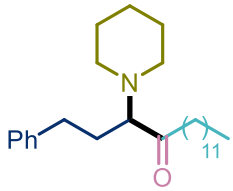


1-phenyl-3-(piperidin-1-yl) dodecan-4-one (4j): 20.5 mg, 60%, R_f = 0.5 (PE: EA = 20:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.27 (dd, *J* = 10.3, 4.7 Hz, 2H), 7.18 (t, *J* = 6.2 Hz, 3H), 3.05 (dd, *J* = 8.8, 5.0 Hz, 1H), 2.66 – 2.36 (m, 8H), 2.00 – 1.91 (m, 1H), 1.90 – 1.77 (m, 1H), 1.54 (dt, *J* = 10.8, 5.4 Hz, 6H), 1.41 (dd, *J* = 10.6, 6.7 Hz, 2H), 1.27 (d, *J* = 6.6 Hz, 10H), 0.92 – 0.84 (m, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 212.1, 142.0, 128.4, 128.4, 125.9, 72.7, 51.0, 41.4, 33.0, 31.9, 29.4, 29.3, 29.2, 26.9, 26.5, 24.5, 23.7, 22.7, 14.1.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{23}H_{38}NO^+$ 344.2948, found: 344.2951.

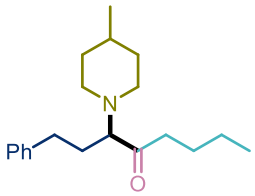


1-phenyl-3-(piperidin-1-yl) hexadecan-4-one (4k): 21.9 mg, 57%, R_f = 0.5 (PE: EA = 20:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.27 (dd, *J* = 10.2, 4.8 Hz, 2H), 7.18 (dd, *J* = 7.1, 5.2 Hz, 3H), 3.03 (dd, *J* = 8.8, 5.0 Hz, 1H), 2.65 – 2.38 (m, 8H), 2.00 – 1.90 (m, 1H), 1.90 – 1.76 (m, 1H), 1.59 – 1.48 (m, 6H), 1.41 (dd, *J* = 11.1, 6.0 Hz, 2H), 1.26 (s, 18H), 0.88 (t, *J* = 6.8 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 212.1, 142.0, 128.4, 128.4, 125.9, 72.8, 51.0, 41.3, 33.0, 31.9, 29.7, 29.7, 29.5, 29.5, 29.4, 29.4, 26.9, 26.6, 24.6, 23.8, 22.7, 14.1.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{27}H_{46}NO^+$ 400.3574, found: 400.3575.

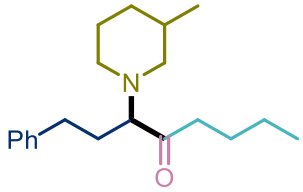


3-(4-methylpiperidin-1-yl)-1-phenyloctan-4-one (5a): 22.5 mg, 75%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 – 7.23 (m, 2H), 7.18 (t, *J* = 6.3 Hz, 3H), 3.05 (dd, *J* = 8.7, 5.0 Hz, 1H), 2.70 (d, *J* = 10.7 Hz, 1H), 2.66 – 2.40 (m, 5H), 2.33 (td, *J* = 11.3, 2.0 Hz, 1H), 2.18 (td, *J* = 11.4, 2.2 Hz, 1H), 2.01 – 1.91 (m, 1H), 1.87 – 1.79 (m, 1H), 1.60 – 1.49 (m, 4H), 1.31 (dq, *J* = 14.7, 7.2 Hz, 3H), 1.20 – 1.12 (m, 2H), 0.91 (t, *J* = 7.3 Hz, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.1, 142.0, 128.4, 128.4, 125.9, 72.5, 51.1, 49.6, 41.0, 35.0, 34.9, 33.0, 30.9, 27.0, 25.9, 22.5, 22.0, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{20}H_{32}NO^+$ 302.2478, found: 302.2480.

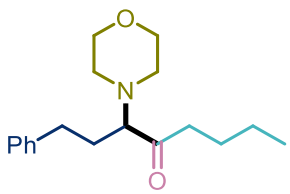


3-(3-methylpiperidin-1-yl)-1-phenyloctan-4-one (5b): 21.9 mg, 73%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32 – 7.24 (m, 2H), 7.18 (dd, *J* = 7.1, 4.2 Hz, 3H), 3.13 – 2.97 (m, 1H), 2.71 – 2.36 (m, 3H), 2.28 (td, *J* = 11.1, 2.6 Hz, 1H), 2.12 (td, *J* = 11.1, 2.8 Hz, 1H), 2.04 – 1.75 (m, 1H), 1.72 – 1.41 (m, 3H), 1.31 (dq, *J* = 14.6, 7.3 Hz, 1H), 0.91 (t, *J* = 7.3 Hz, 1H), 0.83 (dd, *J* = 8.1, 6.6 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.0, 142.1, 128.4, 128.4, 125.9, 72.6, 72.5, 59.0, 57.6, 51.1, 49.8, 41.1, 41.0, 33.1, 33.1, 33.0, 31.8, 31.6, 26.8, 26.8, 26.1, 26.0, 25.9, 25.9, 22.5, 19.6, 19.6, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{20}H_{32}NO^+$ 302.2478, found: 302.2480.



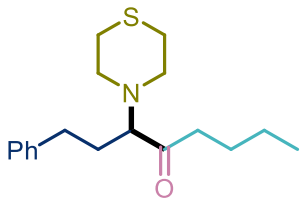
3-morpholino-1-phenyloctan-4-one (5c): 21.0 mg, 73%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 – 7.25 (m, 2H), 7.18 (dd, *J* = 13.8, 7.1 Hz, 3H),

3.67 (t, *J* = 4.6 Hz, 4H), 3.06 (dd, *J* = 8.7, 5.1 Hz, 1H), 2.66 – 2.41 (m, 8H), 2.03 – 1.93 (m, 1H), 1.92 – 1.80 (m, 1H), 1.60 – 1.48 (m, 2H), 1.31 (tt, *J* = 12.2, 6.1 Hz, 2H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 211.1, 141.6, 128.5, 128.4, 126.0, 72.3, 67.4, 50.2, 41.1, 32.6, 26.9, 25.8, 22.4, 13.9.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{28}NO_2^+$ 274.2165, found: 274.2167.

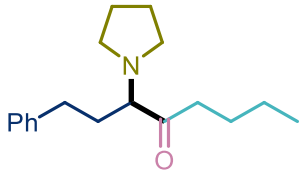


1-phenyl-3-thiomorpholinooctan-4-one (5d): 26.8 mg, 88%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.28 (t, *J* = 7.4 Hz, 2H), 7.22 – 7.11 (m, 3H), 3.04 (dd, *J* = 8.5, 5.3 Hz, 1H), 2.85 – 2.73 (m, 4H), 2.67 – 2.59 (m, 5H), 2.58 – 2.36 (m, 3H), 2.04 – 1.94 (m, 1H), 1.86 – 1.75 (m, 1H), 1.60 – 1.48 (m, 2H), 1.35 – 1.22 (m, 2H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 210.9, 141.7, 128.4, 128.4, 126.0, 72.9, 52.1, 41.2, 32.9, 28.7, 26.2, 25.9, 22.3, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{28}NOS^+$ 306.1886, found: 306.1886.

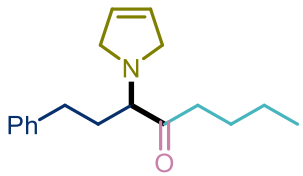


1-phenyl-3-(pyrrolidin-1-yl) octan-4-one (5e): 26.7 mg, 98%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.31 – 7.24 (m, 2H), 7.18 (dd, *J* = 13.7, 7.2 Hz, 3H), 3.00 (dd, *J* = 8.2, 5.2 Hz, 1H), 2.63 – 2.40 (m, 8H), 2.11 – 1.91 (m, 2H), 1.77 (t, *J* = 2.8 Hz, 4H), 1.57 (dt, *J* = 15.1, 7.3 Hz, 2H), 1.37 – 1.28 (m, 2H), 0.92 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 212.4, 141.6, 128.5, 128.3, 126.0, 73.3, 51.3, 39.4, 32.0, 31.6, 25.7, 23.4, 22.5, 14.0.

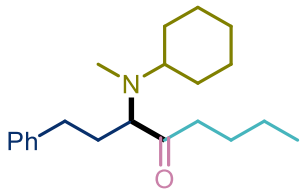
HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{28}NO^+$ 274.2165, found: 274.2165.



3-(2,5-dihydro-1H-pyrrol-1-yl)-1-phenyloctan-4-one (5f): 16.2 mg, 60%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.29 (t, *J* = 7.4 Hz, 2H), 7.19 (t, *J* = 7.7 Hz, 3H), 5.78 (s, 2H), 3.58 (s, 4H), 3.30 (dd, *J* = 7.5, 6.1 Hz, 1H), 2.67 – 2.53(m, 2H), 2.49 (t, *J* = 7.4 Hz, 2H), 2.17 – 1.99 (m, 1H), 1.96 – 1.87 (m, 1H), 1.63 – 1.50 (m, 2H), 1.36 – 1.29 (m, 2H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 212.4, 141.6, 128.5, 128.4, 127.3, 126.0, 71.0, 56.9, 39.6, 32.2, 31.2, 25.8, 22.5, 14.0.

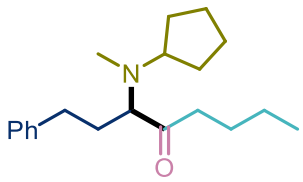


3-(cyclohexyl(methyl)amino)-1-phenyloctan-4-one (5g): 25.8 mg, 82%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.23 – 7.17 (m, 2H), 7.11 (t, *J* = 6.2 Hz, 3H), 3.20 (dd, *J* = 9.5, 3.8 Hz, 1H), 2.62 – 2.47 (m, 2H), 2.44 – 2.23 (m, 3H), 2.11 (s, 3H), 2.07 – 1.93 (m, 1H), 1.68 – 1.60 (m, 5H), 1.48 (dt, *J* = 15.2, 7.5 Hz, 3H), 1.23 (dt, *J* = 14.8, 7.4 Hz, 2H), 1.16 – 1.10 (m, 4H), 1.07 – 0.95 (m, 1H), 0.84 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 212.1, 142.2, 128.5, 128.4, 125.9, 67.5, 61.3, 39.9, 33.3, 33.2, 30.9, 30.6, 27.6, 26.2, 26.1, 25.8, 25.8, 22.5, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{21}H_{34}NO^+$ 316.2635, found: 316.2635.

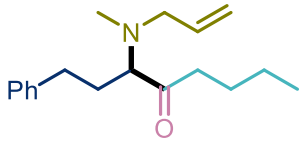


3-(cyclopentyl(methyl)amino)-1-phenyloctan-4-one (5h): 16.8 mg, 56%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.32 – 7.24 (m, 2H), 7.18 (t, *J* = 5.8 Hz, 3H), 3.29 (dd, *J* = 9.3, 3.6 Hz, 1H), 2.91 – 2.76 (m, 1H), 2.72 – 2.58 (m, 2H), 2.50 – 2.34 (m, 2H), 2.11 (s, 3H), 2.08 – 2.00 (m, 1H), 1.85 – 1.69 (m, 2H), 1.65 – 1.63 (m, 2H), 1.61 – 1.46 (m, 5H), 1.41 – 1.28 (m, 4H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.1, 142.2, 128.5, 128.4, 125.9, 68.6, 64.3, 40.6, 35.1, 33.3, 31.4, 31.3, 26.1, 24.8, 23.7, 23.7, 22.5, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{20}H_{32}NO^+$ 302.2478, found: 302.2478.

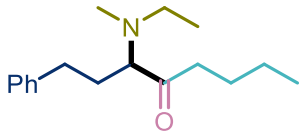


3-(allyl(methyl)amino)-1-phenyloctan-4-one (5i): 21.8 mg, 80%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28 (t, *J* = 7.5 Hz, 2H), 7.18 (t, *J* = 6.9 Hz, 3H), 5.83 – 5.73(m, 1H), 5.19 – 4.96 (m, 2H), 3.19 (dd, *J* = 8.7, 4.9 Hz, 1H), 3.08 (d, *J* = 6.3 Hz, 2H), 2.68 – 2.52 (m, 2H), 2.52 – 2.37 (m, 2H), 2.21 (s, 3H), 2.07 – 1.94 (m, 1H), 1.83 – 1.71 (m, 1H), 1.61 – 1.48 (m, 2H), 1.31 (dq, *J* = 14.7, 7.3 Hz, 2H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 211.9, 141.9, 136.2, 128.5, 128.4, 125.9, 117.2, 69.7, 57.7, 40.8, 38.00, 32.9, 26.1, 25.9, 22.5, 13.9.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{28}NO^+$ 274.2165, found: 274.2167.

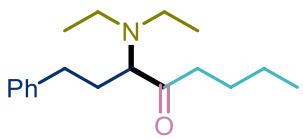


3-(ethyl(methyl)amino)-1-phenyloctan-4-one (5j): 15.9 mg, 61%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31 – 7.25 (m, 2H), 7.18 (t, *J* = 6.5 Hz, 3H), 3.14 (dd, *J* = 8.9, 4.6 Hz, 1H), 2.68 – 2.53 (m, 2H), 2.52 – 2.39 (m, 4H), 2.21 (s, 3H), 2.04 – 1.95 (m, 1H), 1.79 – 1.72 (m, 1H), 1.62 – 1.48 (m, 2H), 1.35 – 1.26 (m, 2H), 1.01 (t, *J* = 7.1 Hz, 3H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.1, 142.0, 128.4, 128.4, 125.9, 70.4, 48.5, 40.7, 37.7, 33.0, 26.2, 25.9, 22.5, 14.0, 13.4.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{17}H_{28}NO^+$ 262.2165, found: 262.2161.



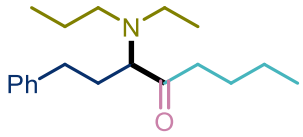
3-(diethylamino)-1-phenyloctan-4-one (5k): 21.4 mg, 78%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31 – 7.24 (m, 2H), 7.18 (t, *J* = 5.6 Hz, 3H), 3.21 (dd,

J = 9.1, 4.1 Hz, 1H), 2.69 – 2.60 (m, 2H), 2.57 – 2.38 (m, 6H), 2.09 – 1.96 (m, 1H), 1.76 – 1.65 (m, 1H), 1.60 – 1.49 (m, 2H), 1.35 – 1.26 (m, 2H), 0.96 (t, *J* = 7.1 Hz, 6H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 212.5, 142.2, 128.4, 128.4, 125.9, 67.3, 44.5, 40.2, 33.3, 26.2, 25.7, 22.5, 14.1, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{30}NO^+$ 276.2322, found: 276.2321.

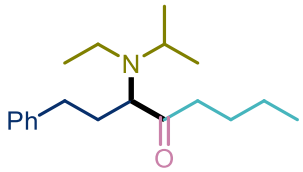


3-(ethyl(propyl)amino)-1-phenyloctan-4-one (5l): 21.1 mg, 73%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.23 – 7.17 (m, 2H), 7.11 (dd, *J* = 7.1, 4.4 Hz, 3H), 3.12 (dd, *J* = 9.1, 4.0 Hz, 1H), 2.61 – 2.53 (m, 2H), 2.44 – 2.26 (m, 6H), 2.06 – 1.90 (m, 1H), 1.70 – 1.56 (m, 1H), 1.54 – 1.40 (m, 2H), 1.30 – 1.21 (m, 4H), 0.86 (dt, *J* = 17.7, 7.2 Hz, 6H), 0.76 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 212.3, 142.2, 128.4, 128.4, 125.9, 67.5, 52.7, 44.9, 40.3, 33.4, 26.1, 25.5, 22.5, 21.9, 14.2, 14.0, 11.7.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{19}H_{32}NO^+$ 290.2478, found: 290.2477.

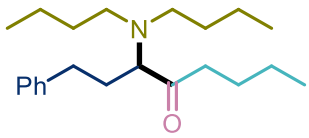


3-(ethyl(isopropyl)amino)-1-phenyloctan-4-one (5m): 17.6 mg, 61%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.30 – 7.24 (m, 2H), 7.18 (t, *J* = 6.3 Hz, 3H), 3.25 (dd, *J* = 9.5, 3.6 Hz, 1H), 2.95 (dt, *J* = 13.2, 6.6 Hz, 1H), 2.76 – 2.50 (m, 4H), 2.48 – 2.34 (m, 2H), 2.22 – 2.05 (m, 1H), 1.75 – 1.62 (m, 1H), 1.61 – 1.49 (m, 2H), 1.39 – 1.28 (m, 2H), 0.99 (d, *J* = 6.6 Hz, 3H), 0.97 – 0.85 (m, 9H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 212.1, 142.2, 128.5, 128.4, 125.8, 64.8, 49.5, 39.9, 39.6, 33.6, 28.2, 26.3, 22.5, 22.1, 19.8, 15.6, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{19}H_{32}NO^+$ 290.2478, found: 290.2479.

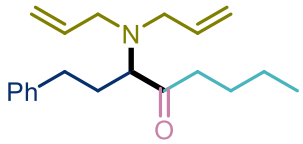


3-(dibutylamino)-1-phenyloctan-4-one (5n): 31.4 mg, 95%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 – 7.24 (m, 2H), 7.17 (t, *J* = 6.2 Hz, 3H), 3.18 (dd, *J* = 9.2, 3.8 Hz, 1H), 2.71 – 2.59 (m, 2H), 2.49 – 2.31 (m, 6H), 2.14 – 1.97 (m, 1H), 1.72 – 1.64 (m, 1H), 1.58 – 1.49 (m, 2H), 1.37 – 1.20 (m, 10H), 0.96 – 0.82 (m, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.2, 142.2, 128.5, 128.4, 125.8, 67.5, 50.9, 40.4, 33.4, 31.1, 26.1, 25.2, 22.5, 20.4, 14.1, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{22}H_{38}NO^+$ 332.2948, found: 332.2948.

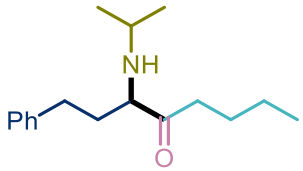


3-(diallylamino)-1-phenyloctan-4-one (5o): 26.9 mg, 90%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27 (t, *J* = 7.7 Hz, 2H), 7.18 (t, *J* = 8.3 Hz, 3H), 5.81 – 5.67 (m, 2H), 5.07 (dd, *J* = 11.1, 6.2 Hz, 4H), 3.33 (dd, *J* = 8.8, 4.5 Hz, 1H), 3.15 (dd, *J* = 14.3, 5.4 Hz, 2H), 2.99 (dd, *J* = 14.3, 7.2 Hz, 2H), 2.68 – 2.56 (m, 2H), 2.51 – 2.35 (m, 2H), 2.11 – 1.96 (m, 1H), 1.74 –1.66 (m, 1H), 1.60 – 1.46 (m, 2H), 1.30 (td, *J* = 14.6, 7.1 Hz, 2H), 0.90 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.3, 142.0, 136.6, 128.5, 128.4, 125.9, 117.2, 66.1, 53.5, 40.5, 33.2, 26.0, 25.7, 22.4, 13.9.

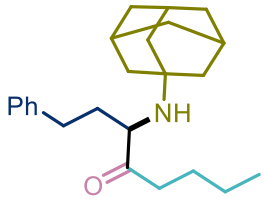
HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{20}H_{30}NO^+$ 300.2322, found: 300.2322.



3-(isopropylamino)-1-phenyloctan-4-one (5p): 14.8 mg, 57%, R_f = 0.5 (PE: EA = 5:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28 (dd, *J* = 12.2, 5.0 Hz, 2H), 7.19 (t, *J* = 6.2 Hz, 3H), 3.33 (dd, *J* = 7.7, 4.6 Hz, 1H), 2.79 – 2.55 (m, 3H), 2.53 – 2.42 (m, 1H), 2.36 (dt, *J* = 16.8, 7.3 Hz, 1H), 1.95 – 1.86 (m, 1H), 1.76 (s, 1H), 1.72 – 1.59 (m, 1H), 1.60 – 1.47 (m, 2H), 1.37 – 1.21 (m, 2H), 1.01 (dd, *J* = 15.2, 6.2 Hz, 6H), 0.90 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 214.5, 141.6, 128.5, 128.4, 126.0, 64.4, 47.3, 39.8, 34.5, 32.1, 25.8, 23.9, 22.7, 22.4, 13.9.

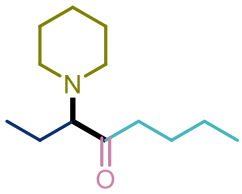


3-(adamantan-1-ylamino)-1-phenyloctan-4-one (5q): 21.8 mg, 62%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32 – 7.24 (m, 2H), 7.19 (d, *J* = 6.6 Hz, 3H), 3.41 (dd, *J* = 8.3, 3.9 Hz, 1H), 2.84 – 2.73 (m, 1H), 2.69 – 2.49 (m, 2H), 2.45 – 2.37 (m, 1H), 2.02 (s, 3H), 1.85 – 1.77 (m, 2H), 1.68 – 1.50 (m, 12H), 1.45 (d, *J* = 11.5 Hz, 3H), 1.30 (td, *J* = 14.9, 7.4 Hz, 2H), 0.90 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 215.0, 141.9, 128.5, 128.4, 125.9, 59.3, 50.6, 43.6, 39.1, 36.6, 36.0, 32.5, 29.6, 25.9, 22.5, 13.9.

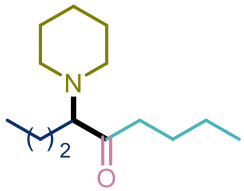
HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{24}H_{36}NO^+$ 354.2791, found: 354.2795.



3-(piperidin-1-yl) octan-4-one (6a): 11 mg, 52%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 2.89 (dd, *J* = 8.8, 5.1 Hz, 1H), 2.59 – 2.44 (m, 4H), 2.40 (dt, *J* = 10.9, 5.3 Hz, 2H), 1.71 – 1.57 (m, 2H), 1.58 – 1.48 (m, 6H), 1.46 – 1.37 (m, 2H), 1.32 (dq, *J* = 14.6, 7.3 Hz, 2H), 0.91 (t, *J* = 7.3 Hz, 3H), 0.83 (t, *J* = 7.4 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.5, 75.8, 51.3, 40.7, 26.5, 25.8, 24.6, 22.5, 18.9, 14.0, 11.3.

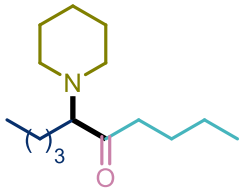


4-(piperidin-1-yl) nonan-5-one (6b): 15.1 mg, 67%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 2.97 (dd, *J* = 9.0, 4.8 Hz, 1H), 2.60 – 2.36 (m, 6H), 1.65 – 1.58 (m, 1H), 1.57 – 1.46 (m, 7H), 1.47 – 1.37 (m, 2H), 1.32 (dt, *J* = 15.0, 7.4 Hz, 2H), 1.27 – 1.13 (m, 2H), 0.91 (td, *J* = 7.3, 3.7 Hz, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.6, 73.9, 51.3, 40.7, 28.0, 26.5, 25.8, 24.6, 22.4, 20.2, 14.3, 13.9.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{14}H_{28}NO^+$ 226.2165, found: 226.2164.

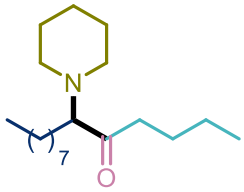


6-(piperidin-1-yl) decan-5-one (6c): 16.2 mg, 68%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 2.96 (dd, *J* = 8.9, 4.8 Hz, 1H), 2.64 – 2.32 (m, 6H), 1.70 – 1.58 (m, 1H), 1.59 – 1.48 (m, 7H), 1.46 – 1.37 (m, 2H), 1.37 – 1.22 (m, 4H), 1.22 – 1.10 (m, 2H), 0.90 (dt, *J* = 12.5, 7.3 Hz, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.6, 74.1, 51.3, 40.7, 29.1, 26.5, 25.8, 25.5, 24.6, 22.9, 22.4, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{15}H_{30}NO^+$ 240.2322, found: 240.2321.

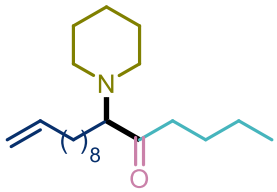


6-(piperidin-1-yl) tetradecan-5-one (6d): 16.2 mg, 55%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 2.96 (dd, *J* = 8.9, 4.8 Hz, 1H), 2.61 – 2.45 (m, 4H), 2.46 – 2.34 (m, 3H), 1.67 – 1.48 (m, 8H), 1.46 – 1.37 (m, 2H), 1.37 – 1.21 (m, 14H), 0.97 – 0.82 (m, 7H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.6, 74.2, 51.3, 40.7, 31.9, 29.9, 29.4, 29.3, 26.9, 26.5, 25.8, 24.6, 22.7, 22.4, 14.1, 13.9.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{19}H_{38}NO^+$ 296.2948, found: 296.2947.

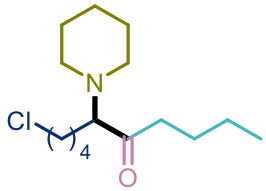


6-(piperidin-1-yl) hexadec-15-en-5-one (6e): 24.4 mg, 76%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 5.81 (ddt, *J* = 16.9, 10.2, 6.7 Hz, 1H), 5.09 – 4.75 (m, 2H), 2.95 (dd, *J* = 9.0, 4.8 Hz, 1H), 2.64 – 2.31 (m, 6H), 2.03 (dd, *J* = 14.3, 6.9 Hz, 2H), 1.70 – 1.47 (m, 8H), 1.44 – 1.21 (m, 16H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.6, 139.2, 114.1, 74.2, 51.3, 40.7, 33.8, 29.8, 29.4, 29.1, 28.9, 26.9, 26.5, 25.8, 25.8, 24.6, 22.4, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{21}H_{40}NO^+$ 322.3104, found: 322.3103.

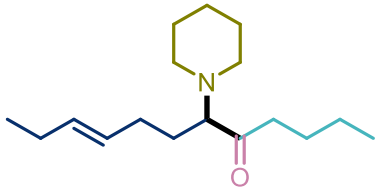


10-chloro-6-(piperidin-1-yl) decan-5-one (6f): 20.0 mg, 73%, R_f = 0.4 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 3.62 – 3.43 (m, 2H), 2.99 (dd, *J* = 8.9, 4.8 Hz, 1H), 2.57 (dt, *J* = 16.9, 7.5 Hz, 1H), 2.51 – 2.39 (m, 5H), 1.83 – 1.73 (m, 2H), 1.71 – 1.60 (m, 1H), 1.59 – 1.49 (m, 7H), 1.42 (dd, *J* = 11.2, 5.9 Hz, 2H), 1.38 – 1.27 (m, 4H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.1, 73.7, 51.2, 44.8, 40.9, 32.7, 26.5, 25.9, 24.5, 24.3, 22.4, 13.9.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{15}H_{29}ClNO^+$ 274.1932, found: 274.1932.

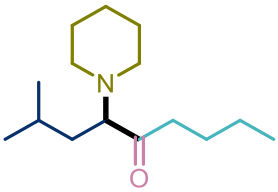


6-(piperidin-1-yl) dodec-9-en-5-one (6g): 19.1 mg, 72%, R_f = 0.4 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 5.51 – 5.22 (m, 2H), 3.01 (dd, *J* = 8.8, 4.7 Hz, 1H), 2.63 – 2.35 (m, 6H), 2.07 – 1.90 (m, 3H), 1.89 – 1.77 (m, 1H), 1.76 – 1.64 (m, 1H), 1.62 – 1.47 (m, 7H), 1.46 – 1.36 (m, 2H), 1.31 (dt, *J* = 14.9, 7.4 Hz, 2H), 1.00 – 0.83 (m, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.2, 132.7, 132.4, 128.4, 128.3, 73.0, 73.0, 51.1, 51.1, 41.0, 29.8, 26.6, 25.9, 25.6, 25.2, 25.1, 24.6, 24.3, 22.4, 20.5, 14.4, 13.9, 13.9.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{17}H_{32}NO^+$ 266.2478, found: 266.2483.

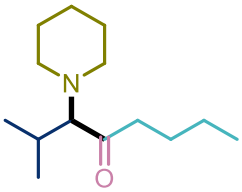


2-methyl-4-(piperidin-1-yl) nonan-5-one (6h): 15.3 mg, 64%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 3.07 (dd, *J* = 8.8, 4.9 Hz, 1H), 2.63 – 2.36 (m, 6H), 1.61 – 1.47 (m, 7H), 1.47 – 1.36 (m, 3H), 1.36 – 1.26 (m, 3H), 0.99 – 0.74 (m, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 212.4, 71.8, 51.1, 40.7, 34.2, 26.6, 25.9, 25.6, 24.6, 23.3, 22.4, 22.3, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{15}H_{30}NO^+$ 240.2322, found: 240.2321.

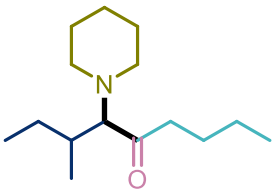


2-methyl-3-(piperidin-1-yl) octan-4-one (6i): 10.3 mg, 45%, R_f = 0.4 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 2.74 (d, *J* = 10.2 Hz, 1H), 2.61 – 2.51 (m, 2H), 2.51 – 2.41 (m, 2H), 2.35 (td, *J* = 7.2, 3.3 Hz, 2H), 2.12 – 1.99 (m, 1H), 1.61 – 1.45 (m, 6H), 1.41 (dd, *J* = 10.8, 5.2 Hz, 2H), 1.31 (dd, *J* = 15.1, 7.4 Hz, 2H), 0.99 – 0.87 (m, 6H), 0.78 (d, *J* = 6.6 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 211.5, 79.1, 51.1, 45.5, 26.9, 26.3, 25.2, 24.9, 22.5, 19.9, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{14}H_{28}NO^+$ 226.2165, found: 226.2168.



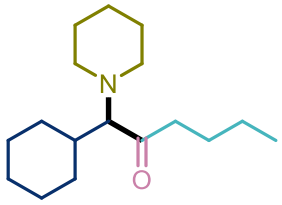
3-methyl-4-(piperidin-1-yl) nonan-5-one (6j): 15.1 mg, 63%, R_f = 0.5 (PE: EA = 10:1), dr = 3:1.

^{1}H NMR (400 MHz, $CDCl_3$) δ 2.83 (dd, *J* = 12.2, 10.4 Hz, 1H), 2.60 – 2.49 (m, 2H), 2.49 – 2.38 (m, 2H), 2.34 (t, *J* = 7.4 Hz, 2H), 1.97 – 1.79 (m, 1H), 1.72 – 1.36 (m, 9H), 1.35 – 1.26 (m, 2H), 0.96 – 0.82 (m, 8H), 0.74 (d, *J* = 6.6 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 211.46, 211.37, 77.85, 51.13, 51.06, 45.54, 45.43,

32.92, 32.04, 26.90, 26.44, 25.40, 25.18, 24.88, 22.47, 15.88, 15.63, 13.96, 11.49, 10.49.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{15}H_{30}NO^+$ 240.2322, found: 240.2324.

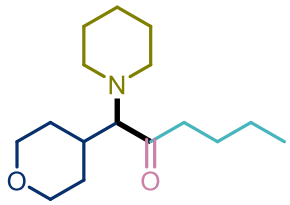


1-cyclohexyl-1-(piperidin-1-yl) hexan-2-one (6k): 20.7 mg, 88%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 2.87 (d, *J* = 10.1 Hz, 1H), 2.61 – 2.51 (m, 2H), 2.50 – 2.41 (m, 2H), 2.41 – 2.25 (m, 2H), 1.90 (d, *J* = 13.3 Hz, 1H), 1.84 – 1.68 (m, 2H), 1.68 – 1.59 (m, 2H), 1.59 – 1.36 (m, 9H), 1.37 – 1.27 (m, 2H), 1.26 – 1.10 (m, 3H), 0.96 – 0.81 (m, 5H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 211.7, 77.8, 51.0, 45.8, 35.9, 30.5, 30.2, 26.9, 26.8, 26.0, 26.0, 25.1, 24.9, 22.5, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{17}H_{32}NO^+$ 266.2478, found: 266.2483.

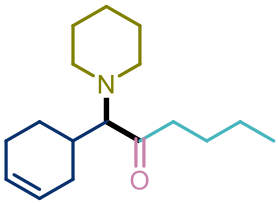


1-(piperidin-1-yl)-1-(tetrahydro-2H-pyran-4-yl) hexan-2-one (6l): 23.4 mg, 88%, R_f = 0.3 (PE: EA = 5:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 3.98 (dd, *J* = 11.3, 3.2 Hz, 1H), 3.89 (dd, *J* = 11.4, 2.7 Hz, 1H), 3.37 (td, *J* = 13.6, 1.9 Hz, 2H), 2.93 (d, *J* = 10.3 Hz, 1H), 2.68 – 2.53 (m, 2H), 2.51 – 2.43 (m, 2H), 2.41 – 2.27 (m, 2H), 2.12 – 1.99 (m, 1H), 1.79 (d, *J* = 13.6 Hz, 1H), 1.59 – 1.38 (m, 8H), 1.36 – 1.15 (m, 5H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 210.5, 68.0, 67.5, 51.1, 46.0, 33.2, 30.5, 30.3, 26.9, 25.2, 24.8, 22.4, 13.9.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{16}H_{30}NO_2^+$ 268.2271, found: 268.2268.

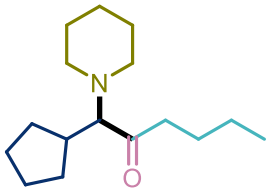


1-(cyclohex-3-en-1-yl)-1-(piperidin-1-yl) hexan-2-one (6m): 18.3 mg, 70%, R_f = 0.5 (PE: EA = 20:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 5.73 – 5.53 (m, 2H), 2.98 (dd, *J* = 26.4, 10.3 Hz, 1H), 2.69 – 2.55 (m, 2H), 2.54 – 2.42 (m, 2H), 2.44 – 2.25 (m, 2H), 2.24 – 1.72 (m, 5H), 1.64 – 1.38 (m, 9H), 1.38 – 1.21 (m, 3H), 0.91 (td, *J* = 7.3, 1.4 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 211.1, 211.0, 127.4, 126.7, 126.5, 125.5, 76.1, 51.1, 51.1, 45.8, 45.7, 31.9, 31.4, 29.1, 28.8, 27.0, 26.9, 26.2, 25.2, 25.2, 25.1, 24.9, 24.9, 24.3, 22.5, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{17}H_{30}NO^+$ 264.2322, found: 264.2323.

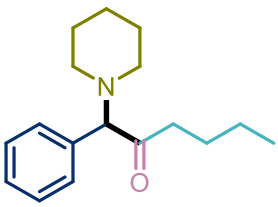


1-cyclopentyl-1-(piperidin-1-yl) hexan-2-one (6n): 15.1 mg, 63%, R_f = 0.4 (PE: EA = 20:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 2.85 (d, *J* = 10.6 Hz, 1H), 2.65 – 2.50 (m, 4H), 2.49 – 2.32 (m, 2H), 2.33 – 2.19 (m, 1H), 1.84 – 1.73 (m, 1H), 1.67 – 1.45 (m, 12H), 1.41 (dd, *J* = 10.9, 5.2 Hz, 2H), 1.32 (dt, *J* = 15.0, 7.3 Hz, 3H), 0.91 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, CDCl$_3$) δ 211.5, 78.0, 51.2, 43.9, 38.1, 30.6, 30.3, 27.0, 25.5, 25.2, 25.1, 24.9, 22.5, 14.0.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{16}H_{30}NO^+$ 252.2322, found: 252.2321.

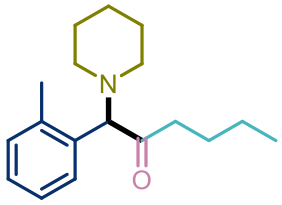


1-phenyl-1-(piperidin-1-yl) hexan-2-one (6o): 14.5 mg, 52%, R_f = 0.4 (PE: EA = 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ 7.38 (d, *J* = 6.8 Hz, 2H), 7.35 – 7.26 (m, 3H), 3.88 (s, 1H), 2.56 – 2.45 (m, 1H), 2.44 – 2.31 (m, 3H), 2.24 (d, *J* = 4.2 Hz, 2H), 1.65 – 1.55 (m, 4H), 1.48 – 1.36 (m, 4H), 1.24 – 1.10 (m, 2H), 0.80 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 209.9, 135.8, 129.1, 128.6, 128.1, 82.5, 53.0, 38.4, 26.0, 25.9, 24.5, 22.2, 13.8.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{17}H_{26}NO^+$ 260.2009, found: 260.2005.

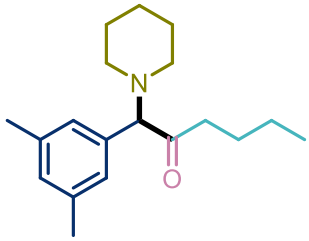


1-(piperidin-1-yl)-1-(o-tolyl) hexan-2-one (6p): 14.4 mg, 53%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54 (d, *J* = 7.0 Hz, 1H), 7.23 – 7.12 (m, 3H), 4.12 (s, 1H), 2.54 – 2.30 (m, 7H), 2.29 (d, *J* = 23.0, 5.6 Hz, 2H), 1.59 (dt, *J* = 10.8, 5.4 Hz, 4H), 1.52 – 1.41 (m, 2H), 1.41 – 1.30 (m, 2H), 1.24 – 1.08 (m, 2H), 0.79 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 209.8, 137.8, 134.2, 130.8, 128.7, 127.6, 126.2, 78.0, 52.8, 26.1, 26.0, 24.6, 22.2, 19.9, 13.8.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{28}NO^+$ 274.2165, found: 274.2167.

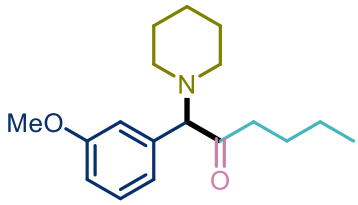


1-(3,5-dimethylphenyl)-1-(piperidin-1-yl) hexan-2-one (6q): 14.6 mg, 51%, R_f = 0.4 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 6.97 (s, 2H), 6.91 (s, 1H), 3.80 (s, 1H), 2.52 – 2.38 (m, 2H), 2.36 – 2.18 (m, 10H), 1.67 – 1.52 (m, 4H), 1.49 – 1.36 (m, 4H), 1.27 – 1.10 (m, 2H), 0.81 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 209.9, 138.1, 135.6, 129.7, 126.9, 82.5, 53.1, 38.7, 26.0, 25.8, 24.5, 22.2, 21.3, 13.8.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{19}H_{30}NO^+$ 288.2322, found: 288.2323.

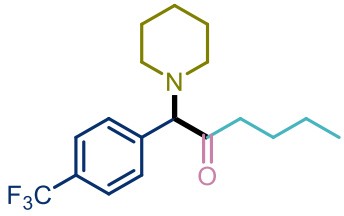


1-(3-methoxyphenyl)-1-(piperidin-1-yl) hexan-2-one (6r): 14.5 mg, 50%, R_f = 0.3 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.23 (t, *J* = 7.9 Hz, 1H), 6.95 (dd, *J* = 11.9, 4.9 Hz, 2H), 6.82 (dd, *J* = 7.9, 2.3 Hz, 1H), 3.84 (s, 1H), 3.80 (s, 3H), 2.55 – 2.44 (m, 1H), 2.44 – 2.31 (m, 3H), 2.24 (d, *J* = 3.5 Hz, 2H), 1.59 (dt, *J* = 10.9, 5.5 Hz, 4H), 1.49 – 1.36 (m, 4H), 1.27 – 1.11 (m, 2H), 0.81 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 209.8, 159.8, 137.5, 129.5, 121.6, 114.3, 113.7, 82.5, 55.3, 53.0, 38.4, 26.0, 25.8, 24.5, 22.2, 13.8.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{28}NO_2^+$ 274.2165, found: 274.2163.



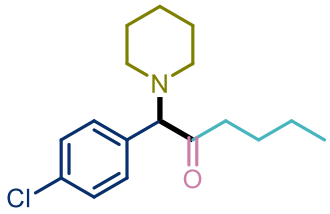
1-(piperidin-1-yl)-1-(4-(trifluoromethyl) phenyl) hexan-2-one (6s): 17.1 mg, 60%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60 (d, *J* = 8.2 Hz, 2H), 7.53 (d, *J* = 8.2 Hz, 2H), 3.96 (s, 1H), 2.55 (dt, *J* = 17.1, 7.6 Hz, 1H), 2.46 – 2.30 (m, 3H), 2.25 (m, 2H), 1.66 – 1.56 (m, 4H), 1.50 – 1.39 (m, 4H), 1.25 – 1.12 (m, 2H), 0.82 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 209.4, 140.2, 130.4 (q, $J_{C\text{-}F}$ = 32.3 Hz), 129.5, 125.7 (q, $J_{C\text{-}F}$ = 3.8 Hz), 124.2 (q, $J_{C\text{-}F}$ = 272.1 Hz), 82.2, 53.0, 38.6, 26.0, 25.9, 24.4, 22.3, 13.9.

^{19}F NMR (376 MHz, $CDCl_3$) δ -62.6.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{25}F_3NO^+$ 328.1883, found: 328.1882.

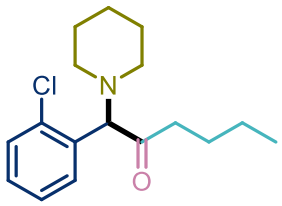


1-(4-chlorophenyl)-1-(piperidin-1-yl) hexan-2-one (6t): 15.3 mg, 51%, R_f = 0.4 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41 – 7.27 (m, 1H), 3.87 (s, 1H), 2.50 (dt, *J* = 17.0, 7.6 Hz, 1H), 2.43 – 2.29 (m, 1H), 2.23 (d, *J* = 4.7 Hz, 1H), 1.59 (dt, *J* = 10.9, 5.6 Hz, 1H), 1.50 – 1.37 (m, 1H), 1.24 – 1.11 (m, 1H), 0.82 (t, *J* = 7.3 Hz, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 209.5, 134.3, 134.0, 130.4, 128.8, 81.6, 52.8, 38.4, 25.9, 25.8, 24.4, 22.2, 13.8.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{17}H_{25}ClNO^+$ 294.1619, found: 294.1616.

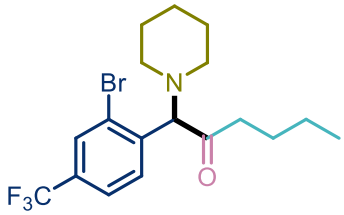


1-(2-chlorophenyl)-1-(piperidin-1-yl) hexan-2-one (6u): 20.1 mg, 67%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54 (dd, *J* = 7.6, 1.9 Hz, 1H), 7.39 (dd, *J* = 7.7, 1.5 Hz, 1H), 7.31 – 7.16 (m, 2H), 4.65 (s, 1H), 2.49 – 2.26 (m, 6H), 1.63 – 1.54 (m, 4H), 1.53 – 1.38 (m, 4H), 1.24 – 1.13 (m, 2H), 0.81 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 208.2, 135.1, 133.3, 130.6, 129.8, 129.1, 127.1, 75.7, 52.5, 40.4, 25.9, 25.9, 24.4, 22.2, 13.8.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{17}H_{25}ClNO^+$ 294.1619, found: 294.1622.



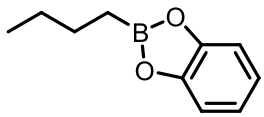
1-(2-bromo-4-(trifluoromethyl) phenyl)-1-(piperidin-1-yl) hexan-2-one (6v): 27.1 mg, 67%, R_f = 0.5 (PE: EA = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (s, 1H), 7.73 (d, *J* = 8.2 Hz, 1H), 7.57 (d, *J* = 8.1 Hz, 1H), 4.66 (s, 1H), 2.54 – 2.36 (m, 4H), 2.35 – 2.24 (m, 2H), 1.64 – 1.53 (m, 4H), 1.53 – 1.39 (m, 4H), 1.32 – 1.12 (m, 2H), 0.83 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 207.6, 139.7, 131.5 (q, $J_{C\text{-}F}$ = 33.2 Hz), 131.4, 130.10 (q, $J_{C\text{-}F}$ = 3.9 Hz), 125.7, 124.6 (q, $J_{C\text{-}F}$ = 3.6 Hz), 123.2 (q, $J_{C\text{-}F}$ = 272.7 Hz), 78.1, 52.6, 41.1, 26.0, 25.8, 24.4, 22.3, 13.9.

^{19}F NMR (376 MHz, $CDCl_3$) δ -62.8.

HRMS(ESI-TOF) m/z: calcd for [M+]H+ $C_{18}H_{24}BrF_3NO^+$ 406.0988, found: 406.0996.

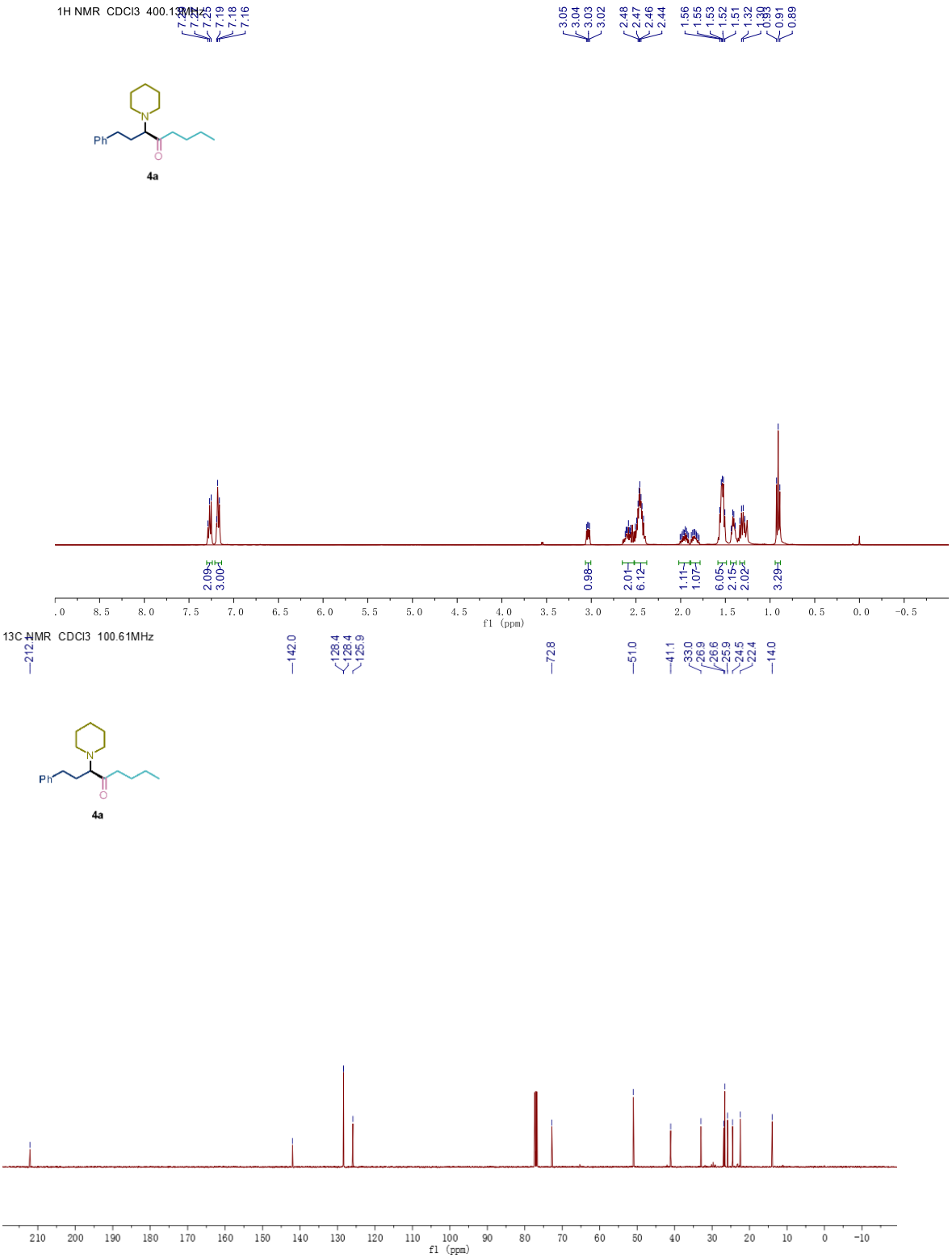


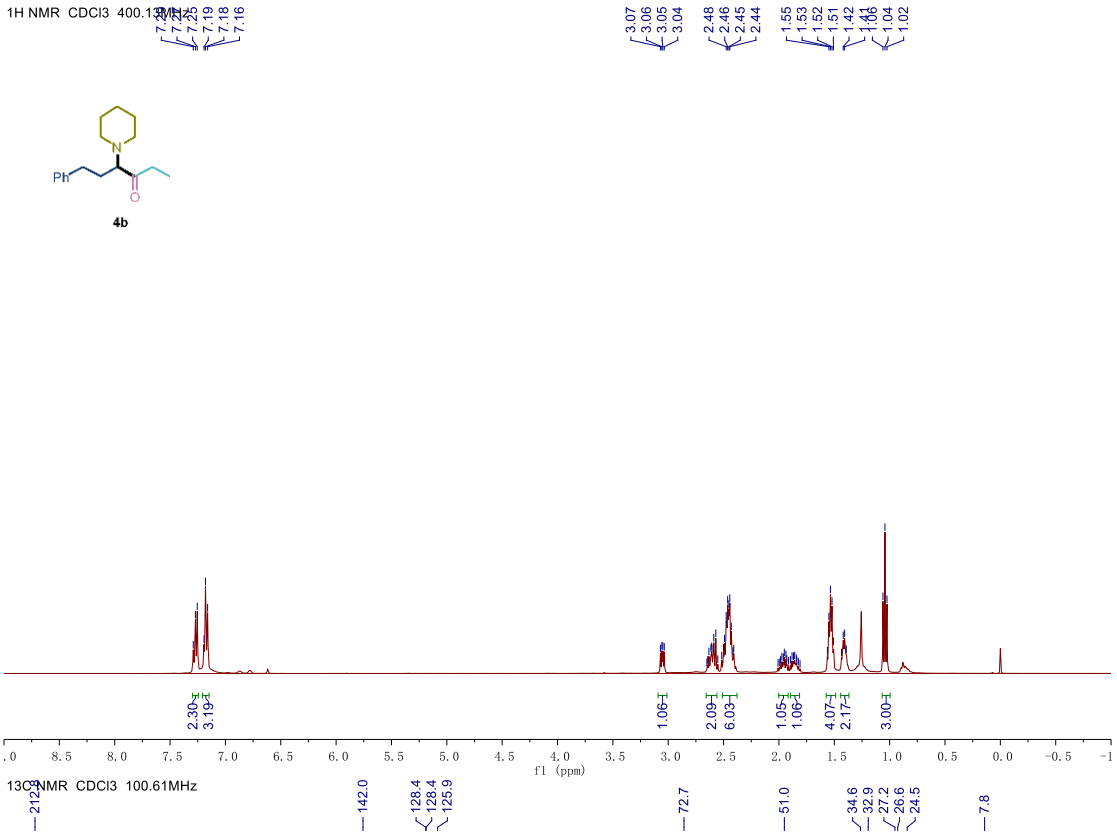
2-butylbenzo[*d*] [1,3,2] dioxaborole

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24 – 7.14 (m, 2H), 7.10 – 6.98 (m, 2H), 1.70 – 1.54 (m, 2H), 1.48 – 1.35 (m, 2H), 1.29 (t, *J* = 7.8 Hz, 2H), 0.94 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 148.3, 122.5, 112.2, 25.9, 25.3, 13.9.

5. Copies of ^{1}H, ^{13}C and ^{19}F Spectra.

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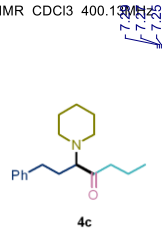
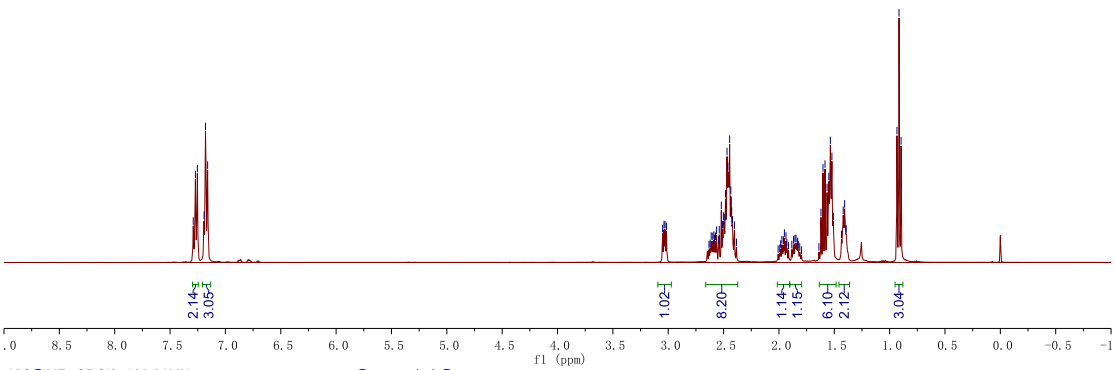
7.25
7.19
7.18
7.16
3.07
3.06
3.05
3.04
2.48
2.46
2.45
2.44
1.55
1.53
1.52
1.51
1.42
1.41
1.06
1.04
1.02
Ph
N
O
4b
2.30
3.19
1.06
2.09
6.03
1.05
1.06
4.07
2.17
3.00
f1 (ppm)
13C NMR CDCl3 100.61MHz
212.3
142.0
128.4
128.4
125.9
72.7
51.0
34.6
32.9
27.2
26.6
24.5
7.8
Ph
N
O
4b
f1 (ppm)

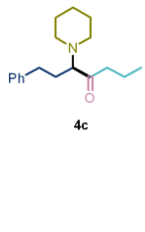
1H NMR CDCl3 400.13MHz



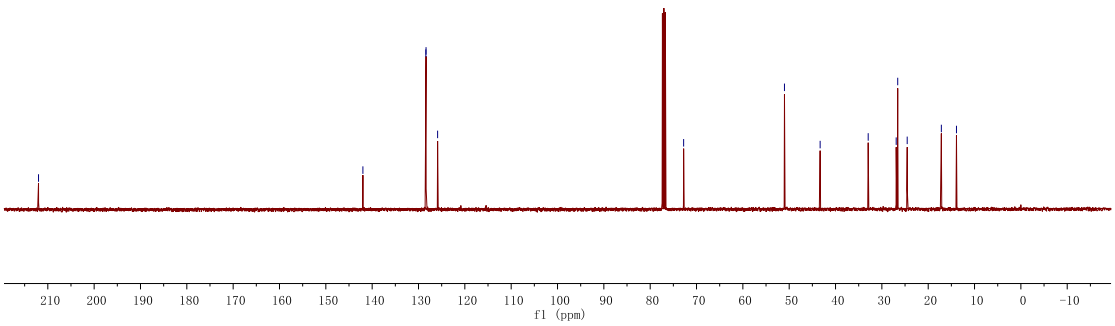
4c



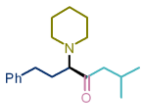
13C NMR CDCl3 100.61MHz



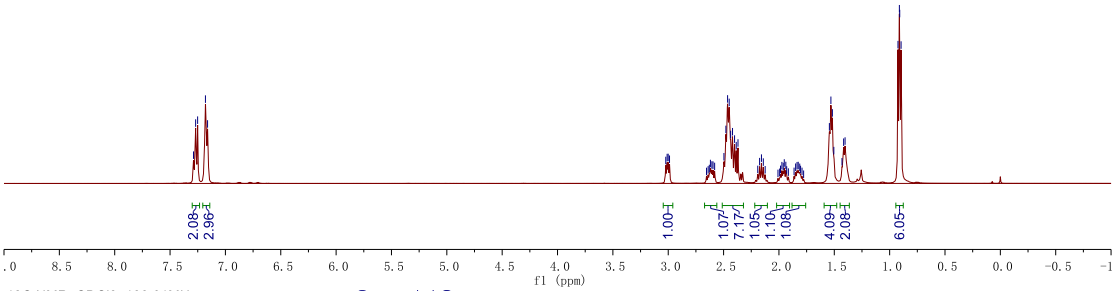
4c



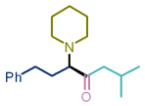
1H NMR CDCl3 400.13MHz



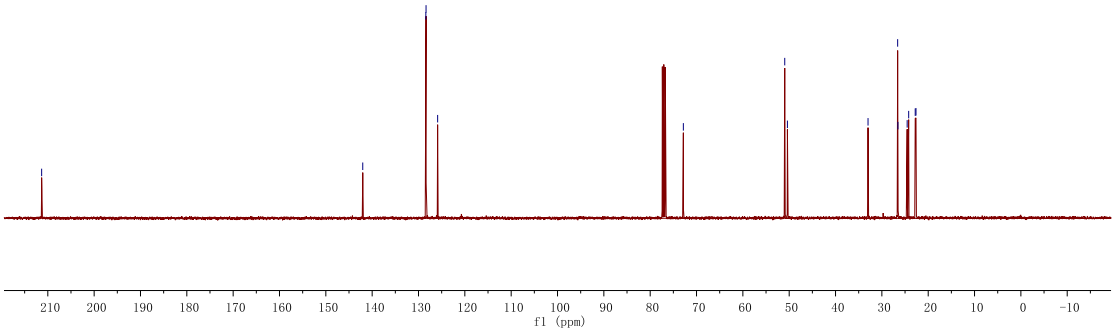
4d

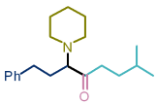


13C NMR CDCl3 100.61MHz

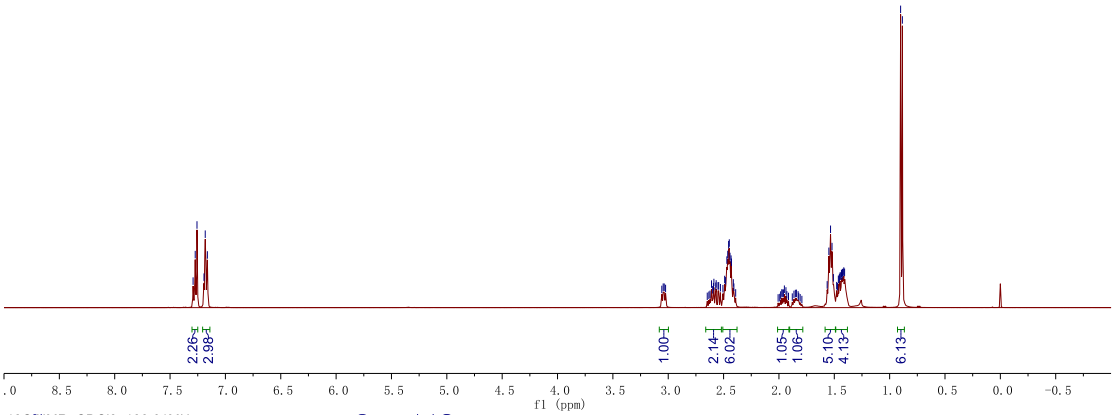


4d




Ph
N
O

4e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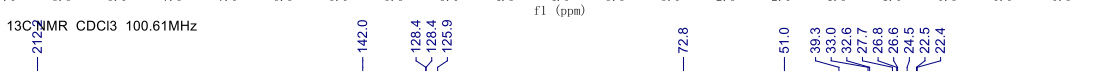
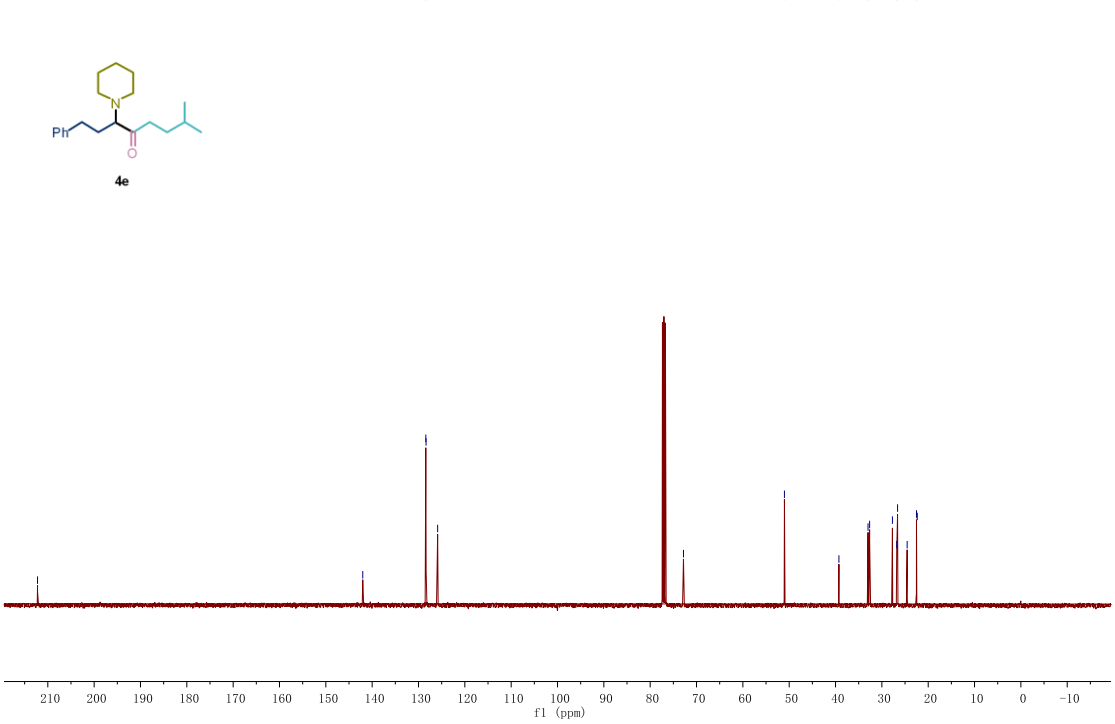
1.05
1.06
5.10
4.13
6.13
f1 (ppm)


13CNMR CDCl3 100.61MHz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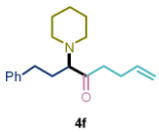
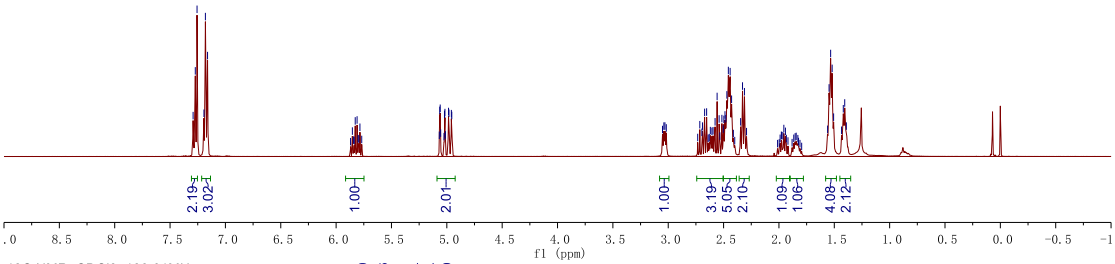
128.4
128.4
125.9
72.8
51.0
39.3
33.0
32.6
27.7
26.8
26.6
24.5
22.5
22.4
f1 (ppm)

Ph
N
O

4e


Ph
N
O

4f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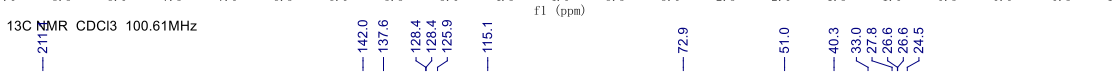
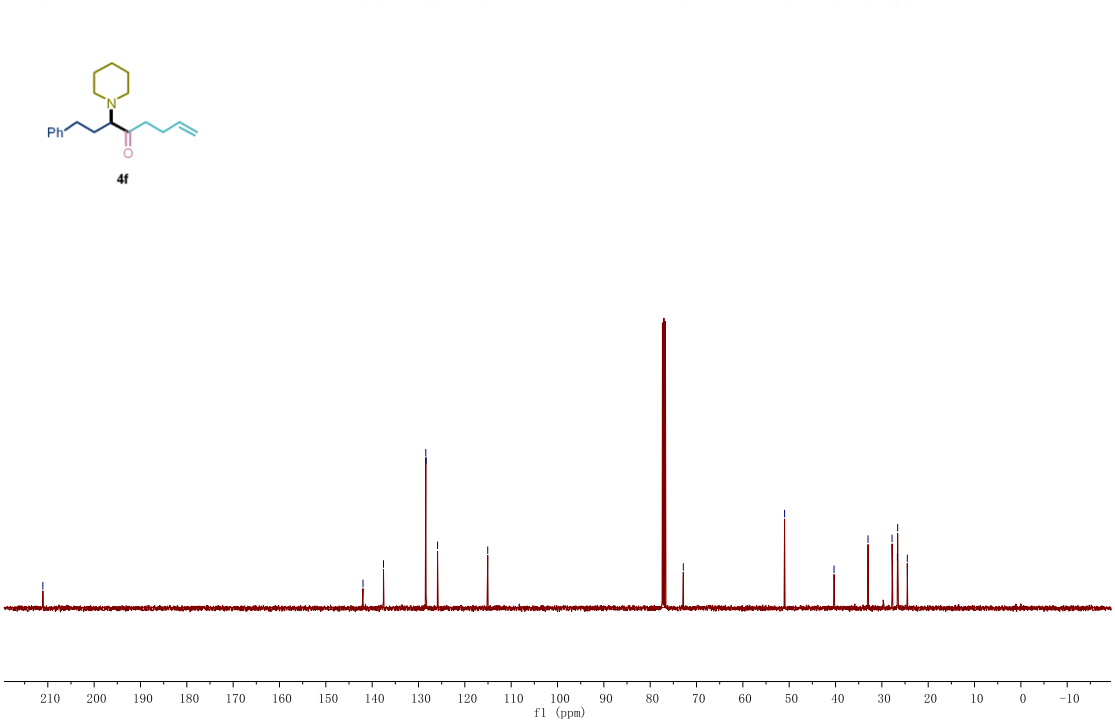
5.05
2.10
1.09
1.06
4.08
2.12
f1 (ppm)


13C NMR CDCl3 100.61MHz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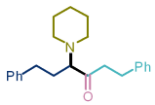
142.0
137.6
128.4
128.4
125.9
115.1
72.9
51.0
40.3
33.0
27.8
26.6
26.6
24.5
f1 (ppm)

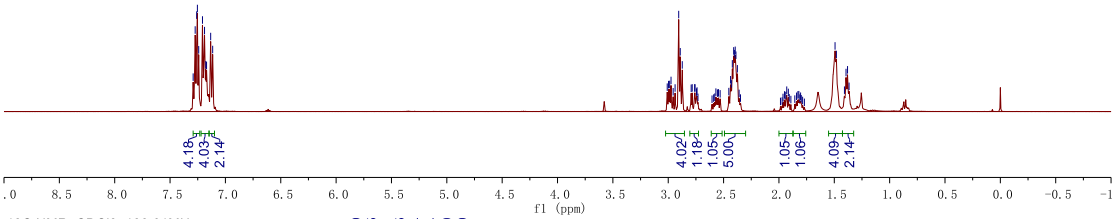
Ph
N
O

4f


1H NMR CDCl3 400.13MHz


Ph
N
Ph
O

4g


4.18
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1.05
5.00
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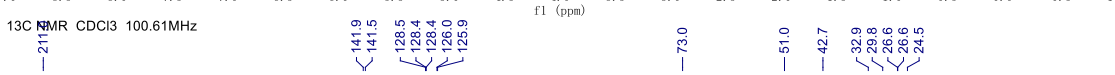
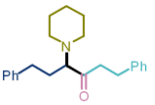
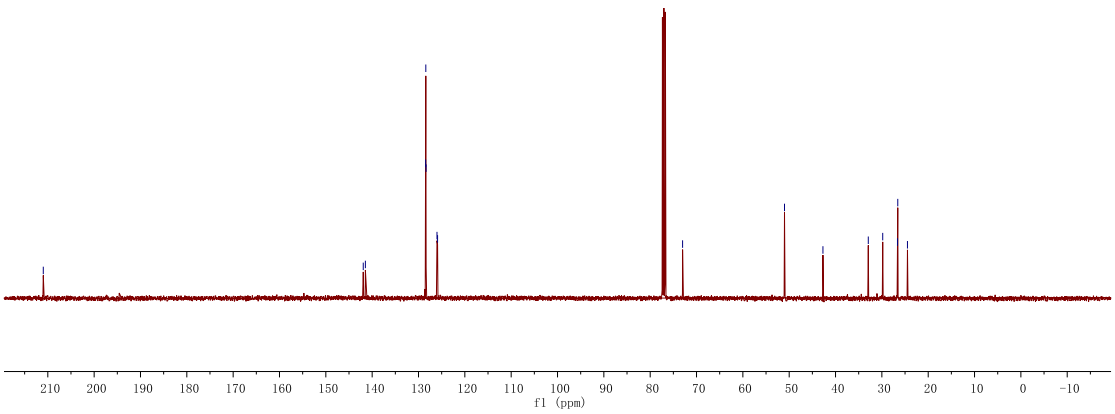
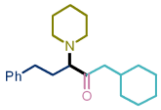
4.09
2.14
f1 (ppm)


13C NMR CDCl3 100.61MHz
211.1
141.9
141.5
128.5
128.4
128.4
126.0
125.9
73.0
51.0
42.7
32.9
29.8
26.6
26.6
24.5

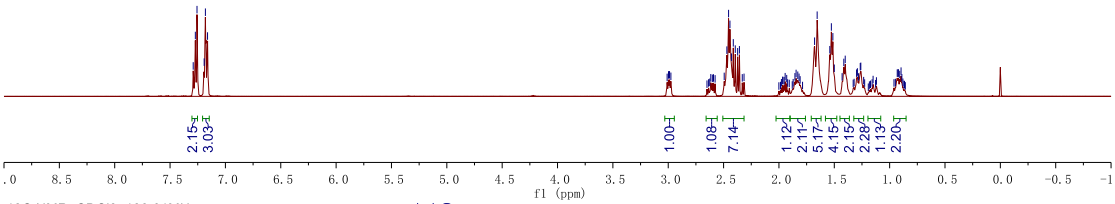

Ph
N
Ph
O

4g


f1 (ppm)


N
Ph
O

4h


2.15
3.03
1.00
1.08
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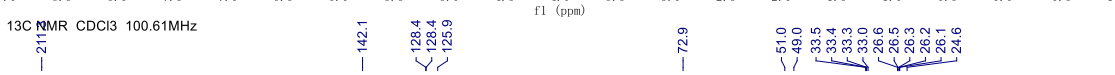
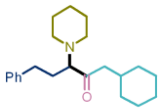
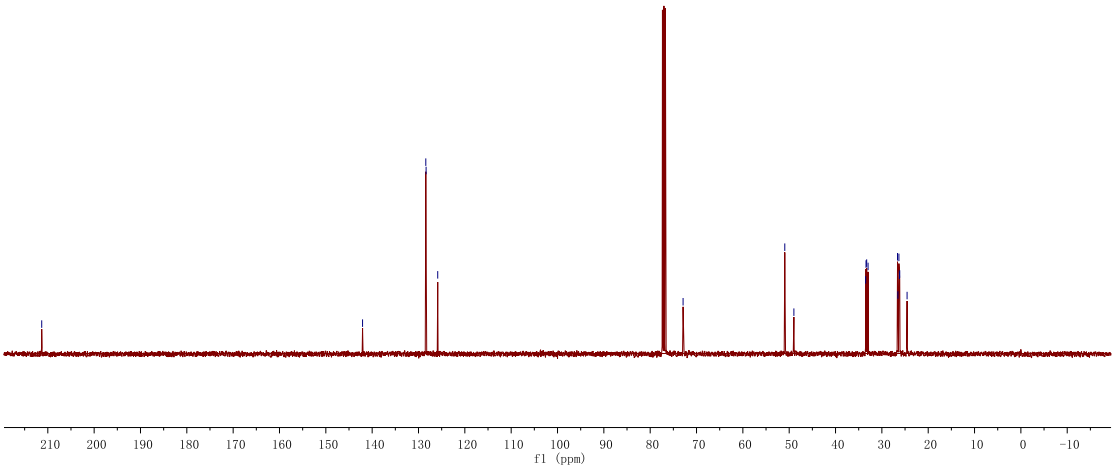
1.12
2.11
5.17
4.15
2.15
2.28
1.13
2.20
f1 (ppm)


13C NMR CDCl3 100.61MHz

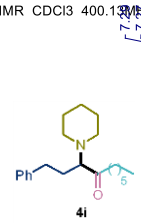
211
142.1
128.4
128.4
125.9
72.9
51.0
49.0
33.5
33.4
33.3
33.0
26.6
26.5
26.3
26.2
26.1
24.6


N
Ph
O

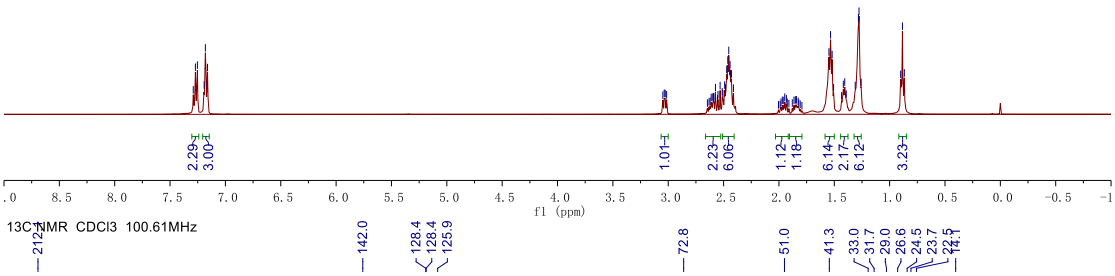
4h


f1 (ppm)

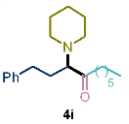
1H NMR CDCl3 400.13MHz



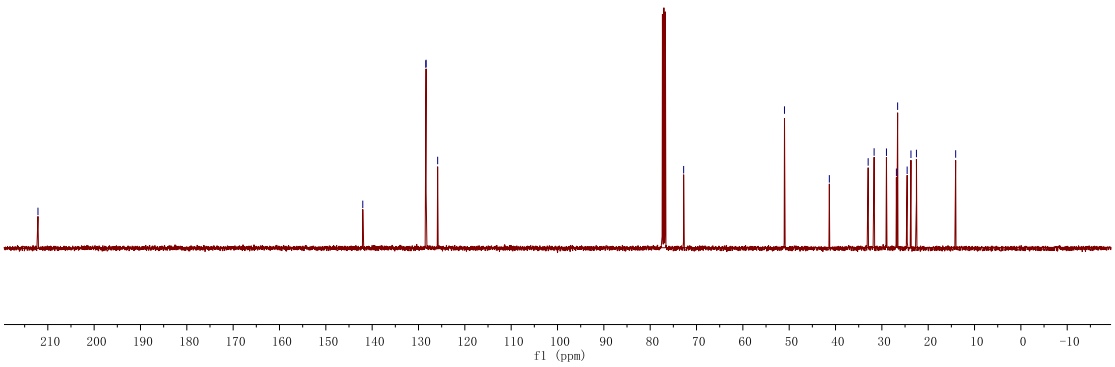
4i

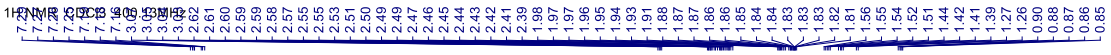


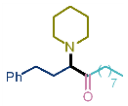
13C NMR CDCl3 100.61MHz



4i







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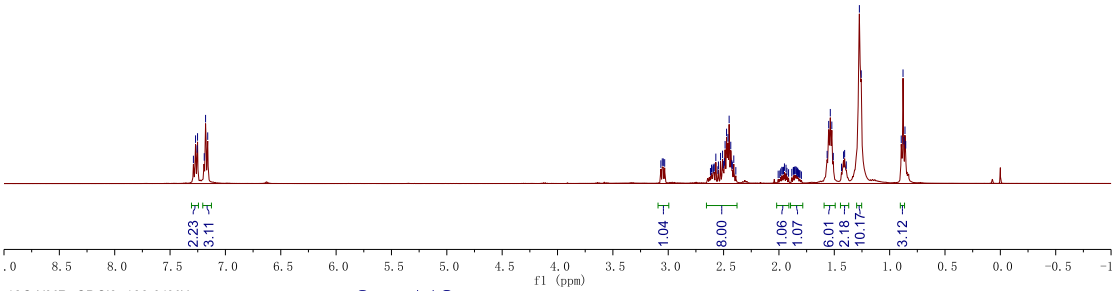

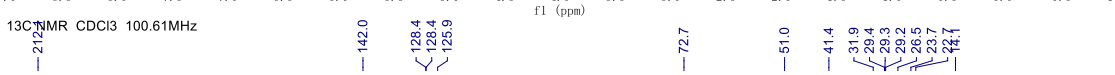

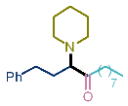

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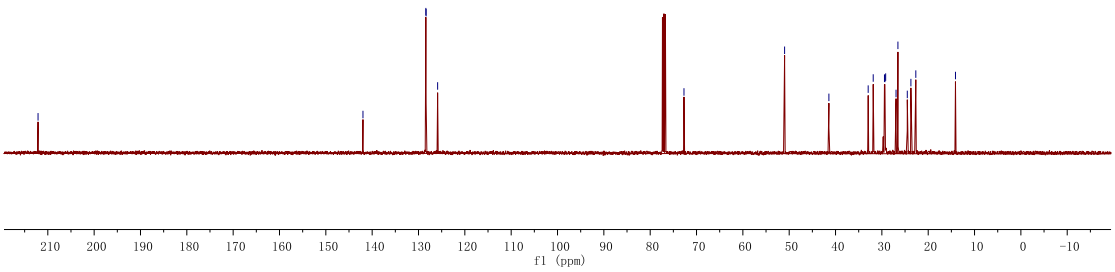
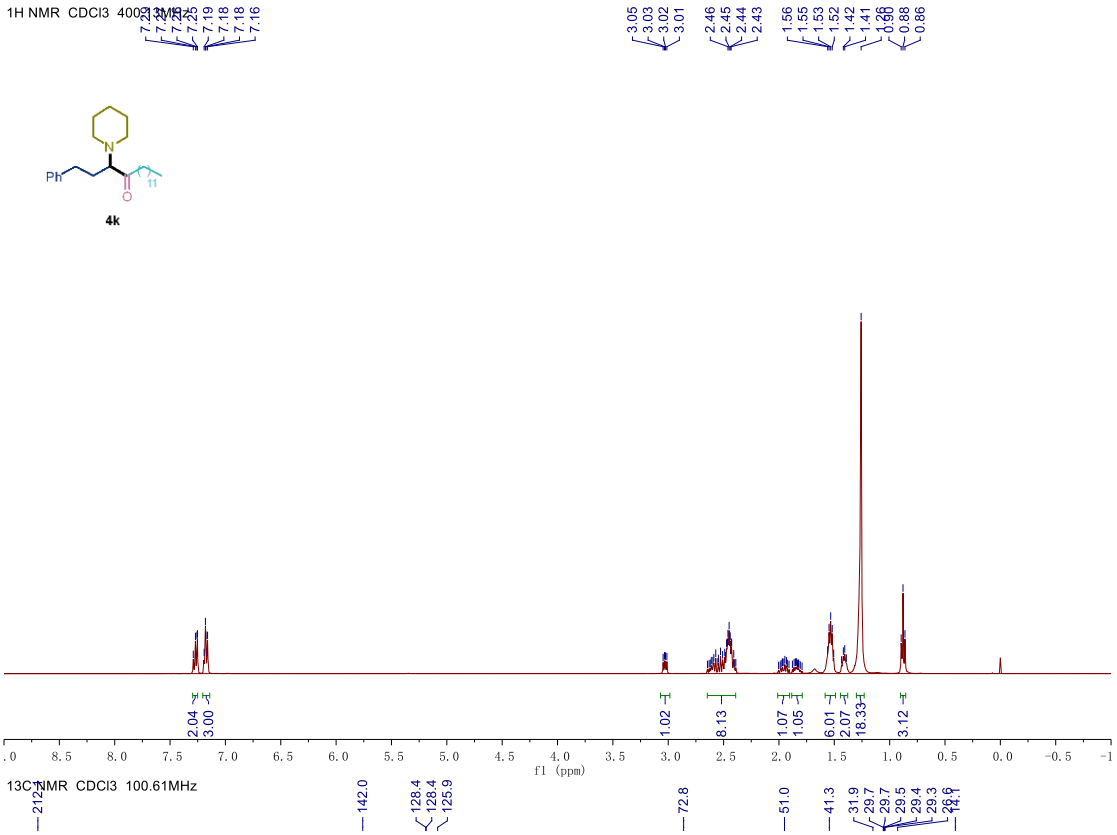
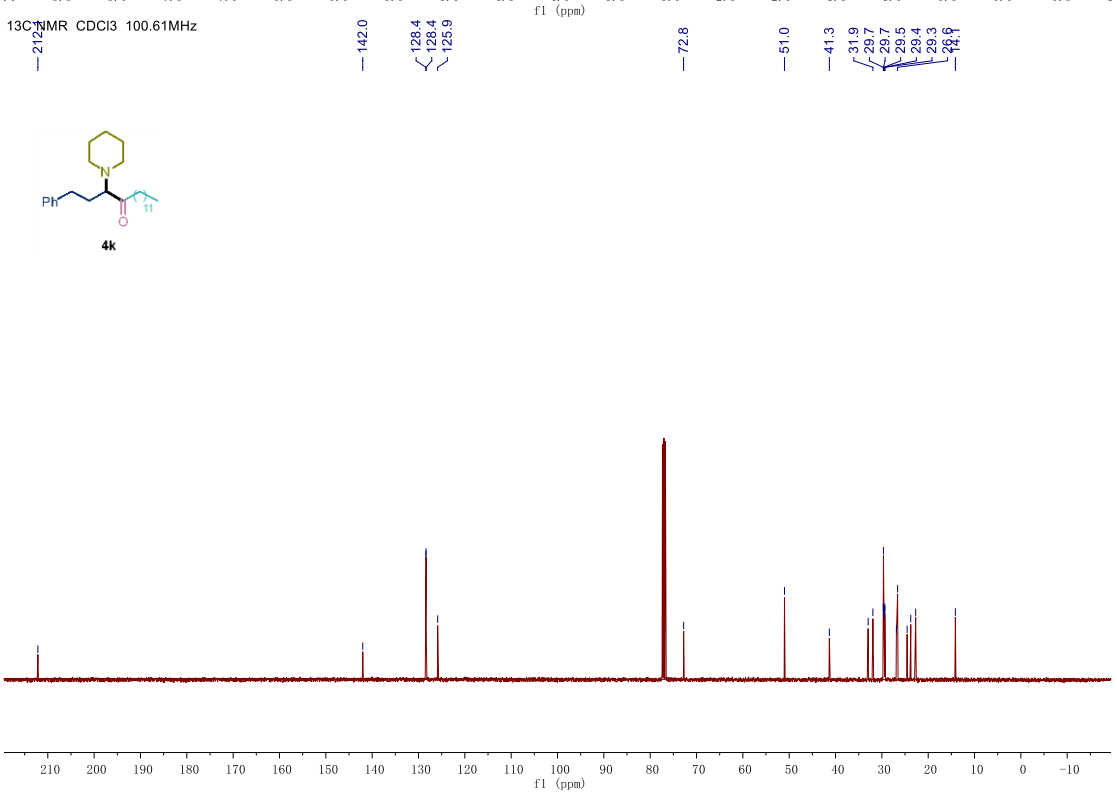
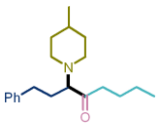
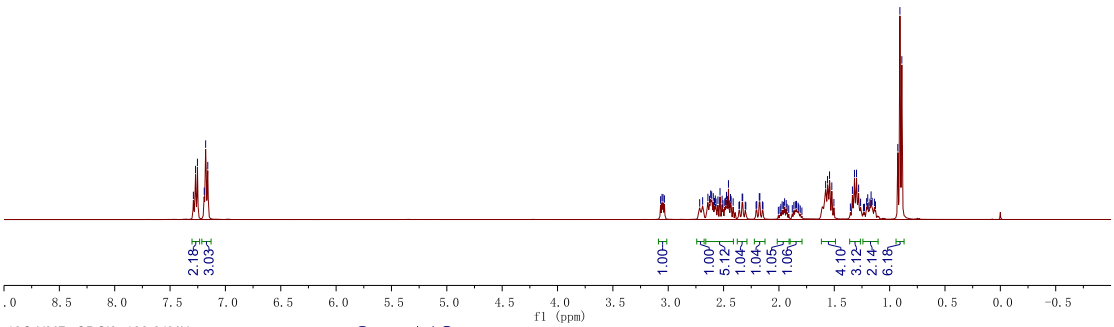



1H NMR CDCl3 400.13MHz
7.24
7.23
7.22
7.21
7.19
7.18
7.18
7.16
3.05
3.03
3.02
3.01
2.46
2.45
2.44
2.43
1.56
1.55
1.53
1.52
1.42
1.41
1.26
0.90
0.88
0.86
Ph
11
O
4k
2.04
3.00
1.02
8.13
1.07
1.05
6.01
2.07
18.33
3.12
f1 (ppm)


13C NMR CDCl3 100.61MHz
212.1
142.0
128.4
128.4
125.9
72.8
51.0
41.3
31.9
29.7
29.7
29.5
29.4
29.3
26.6
14.1
Ph
11
O
4k
f1 (ppm)


Ph
N
O

5a


2.18
3.03
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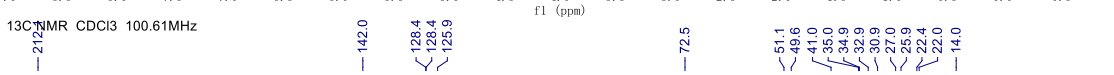
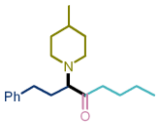
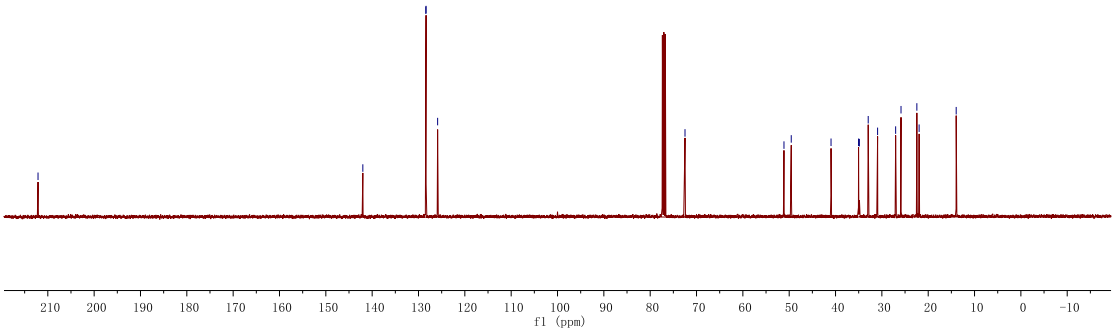
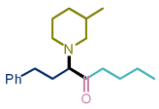
1.00
5.12
1.04
1.04
1.05
1.06
4.10
3.12
2.14
6.18
f1 (ppm)


13C NMR CDCl3 100.61MHz
212
142.0
128.4
128.4
125.9
72.5
51.1
49.6
41.0
35.0
34.9
32.9
30.9
27.0
25.9
22.4
22.0
14.0

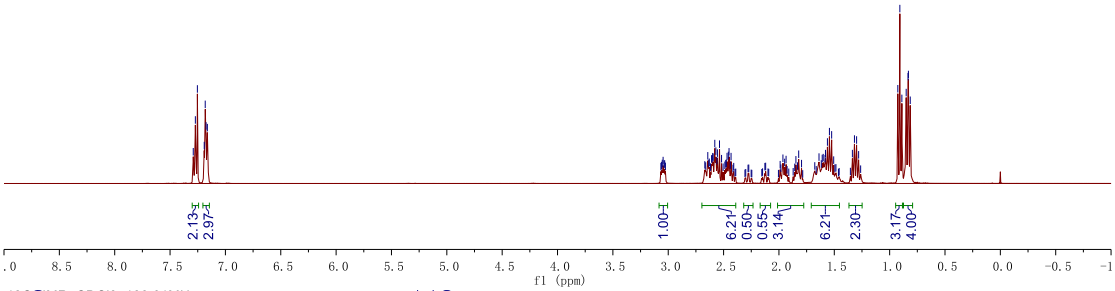

Ph
N
O

5a

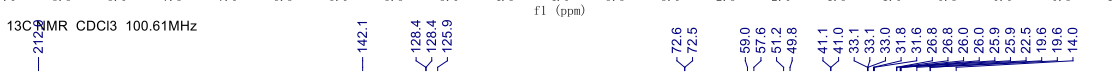

f1 (ppm)

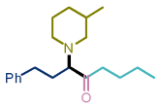


5b

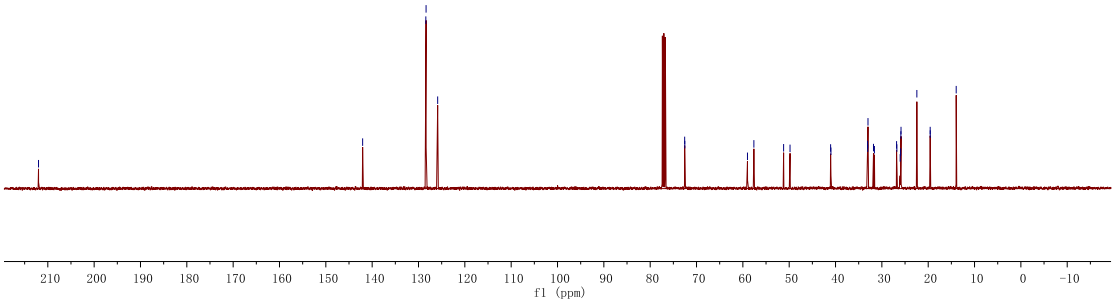


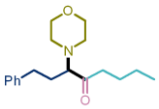
13C NMR CDCl3 100.61MHz





5b





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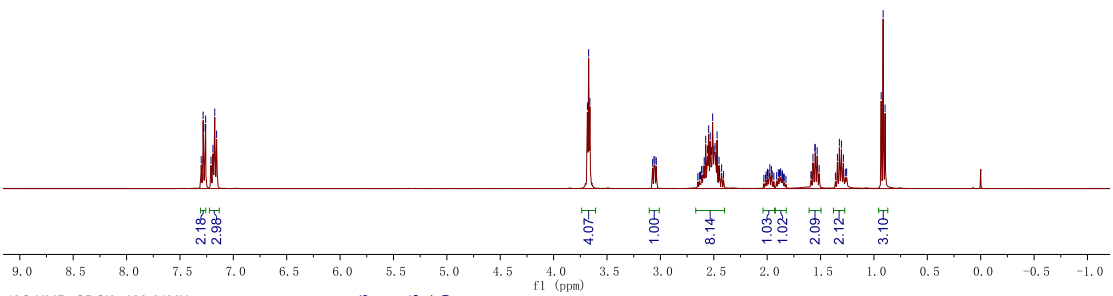

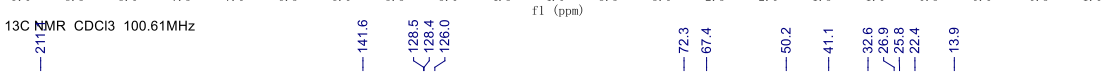

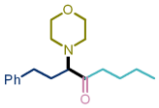

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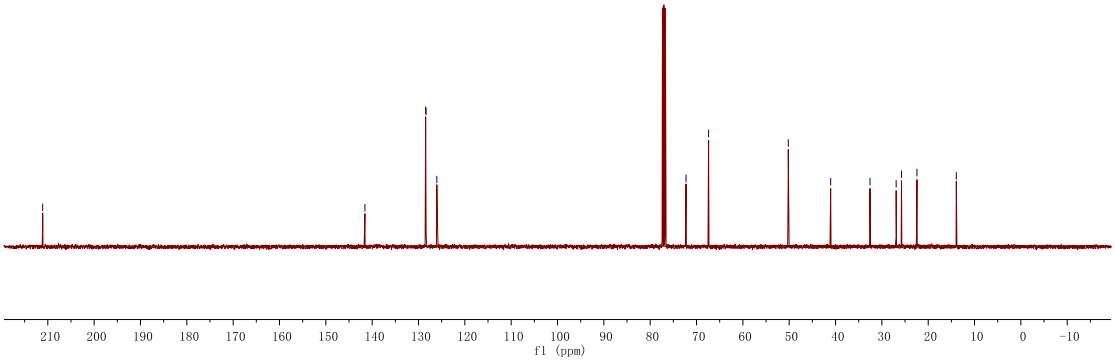
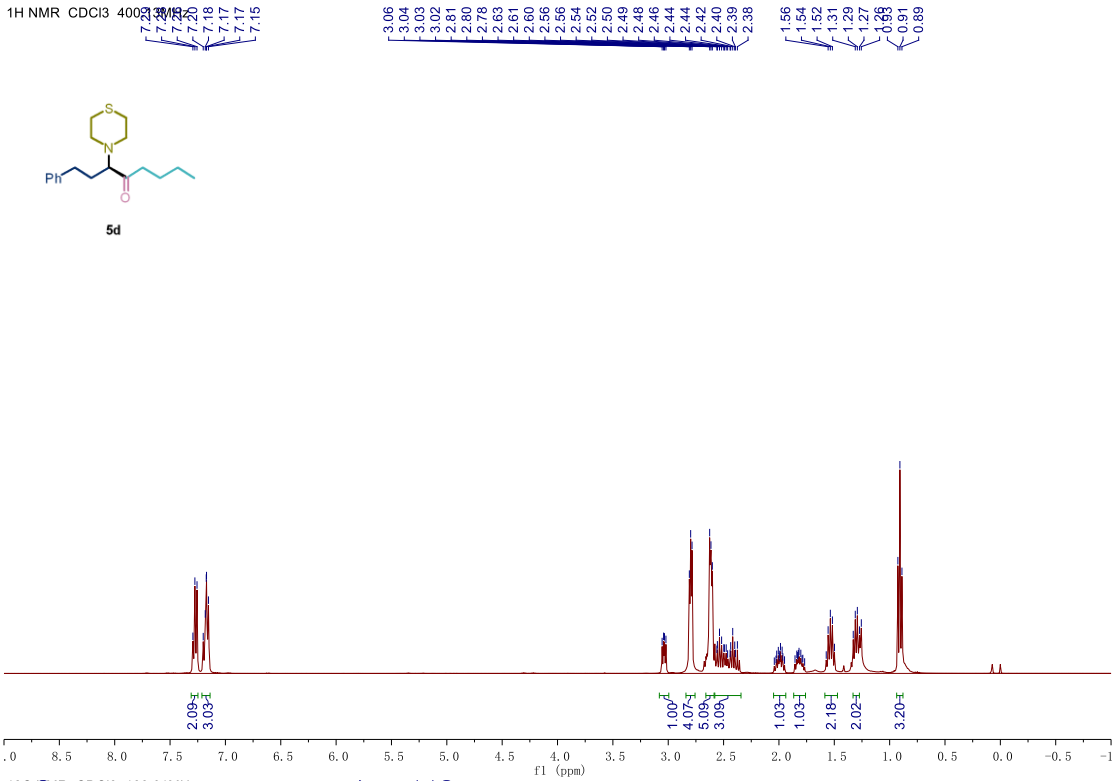
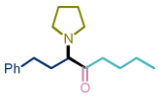
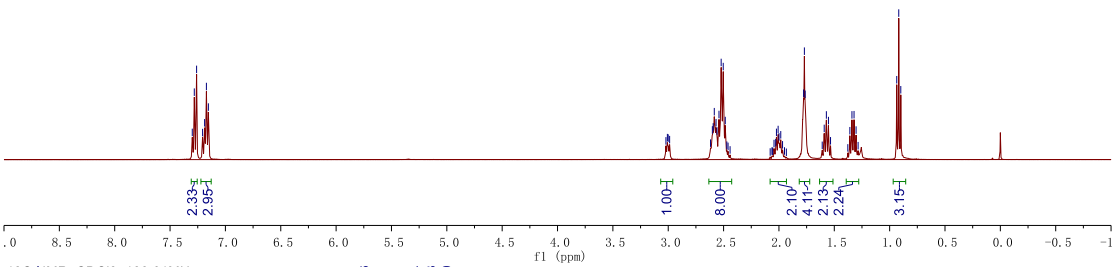



1H NMR CDCl3 400.13MHz
7.24
7.22
7.20
7.18
7.17
7.17
7.15
3.06
3.04
3.03
3.02
2.81
2.80
2.78
2.63
2.61
2.60
2.56
2.56
2.54
2.52
2.50
2.49
2.48
2.46
2.44
2.44
2.42
2.40
2.39
2.38
1.56
1.54
1.52
1.31
1.29
1.27
1.26
0.93
0.91
0.89
S
N
Ph
O
5d
2.09
3.03
1.00
4.07
5.09
3.09
1.03
1.03
2.18
2.02
3.20
f1 (ppm)
13C NMR CDCl3 100.61MHz
210.1
141.7
128.4
128.4
126.0
72.9
52.1
41.2
32.9
28.7
26.2
25.9
22.4
14.0
S
N
Ph
O
5d
f1 (ppm)

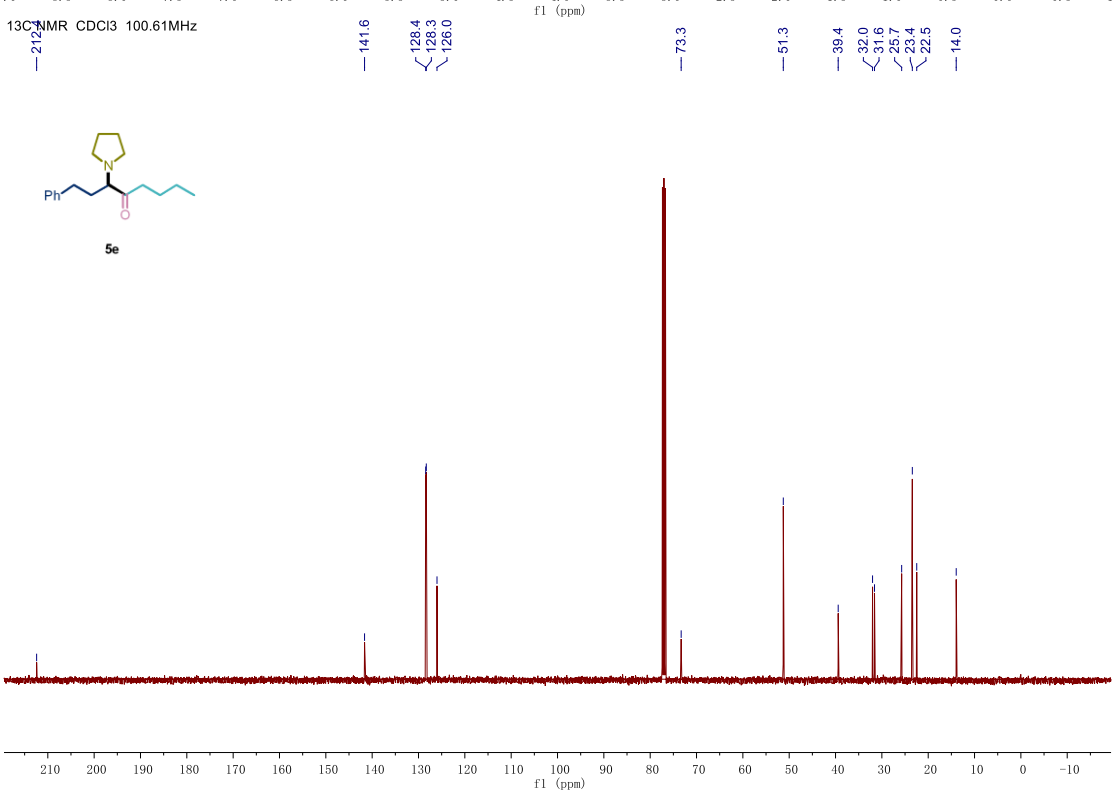
1H NMR CDCl3 400.13MHz



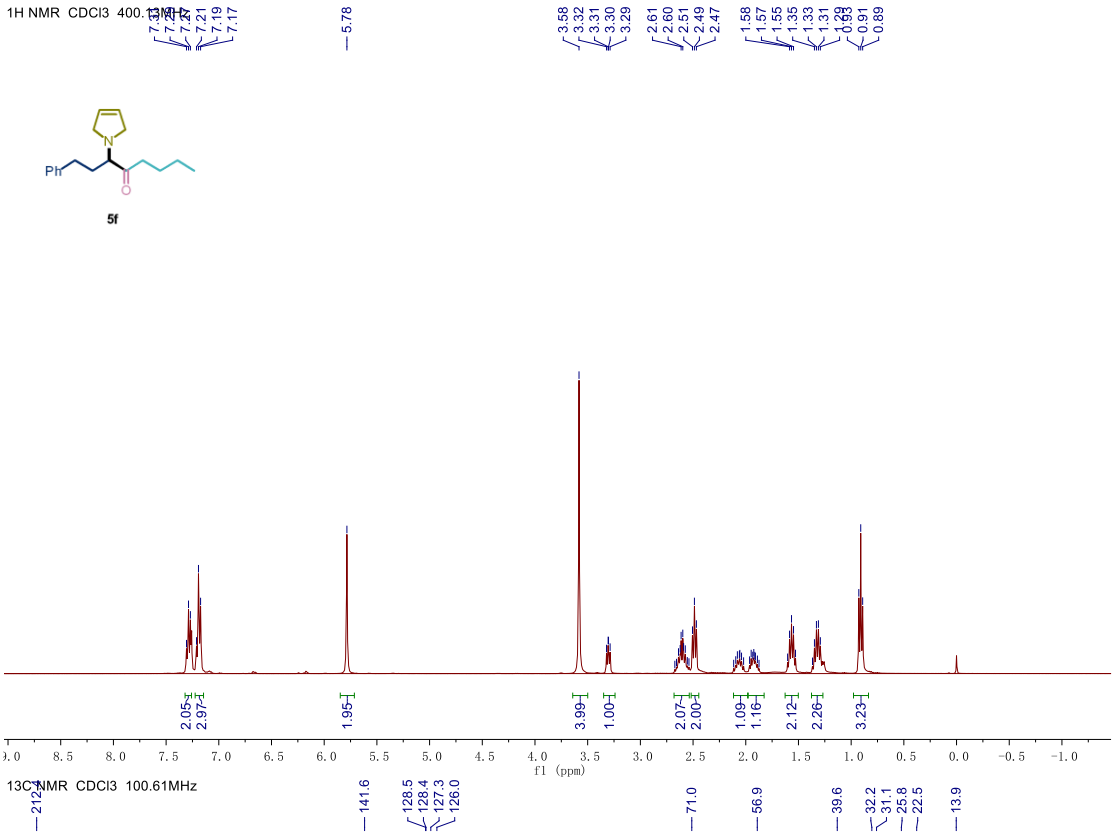
5e

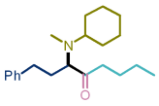


13C NMR CDCl3 100.61MHz

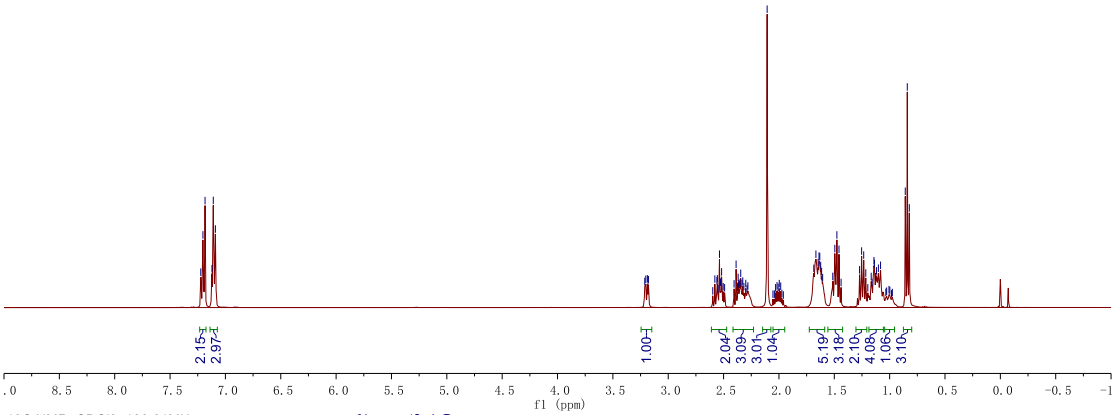


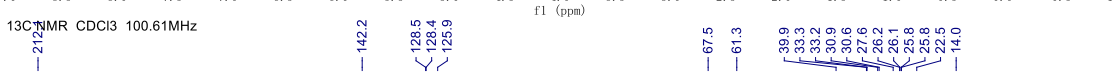
5e

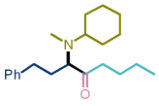

1H NMR CDCl3 400.13MHz
7.34
7.32
7.23
7.21
7.19
7.17
5.78
3.58
3.32
3.31
3.30
3.29
2.61
2.60
2.51
2.49
2.47
1.58
1.57
1.55
1.35
1.33
1.31
1.29
0.93
0.91
0.89
Ph
N
O
5f
2.05
2.97
1.95
3.99
1.00
2.07
2.00
1.09
1.16
2.12
2.26
3.23
f1 (ppm)
13C NMR CDCl3 100.61MHz
212.4
141.6
128.5
128.4
127.3
126.0
71.0
56.9
39.6
32.2
31.1
25.8
22.5
13.9
Ph
N
O
5f
f1 (ppm)



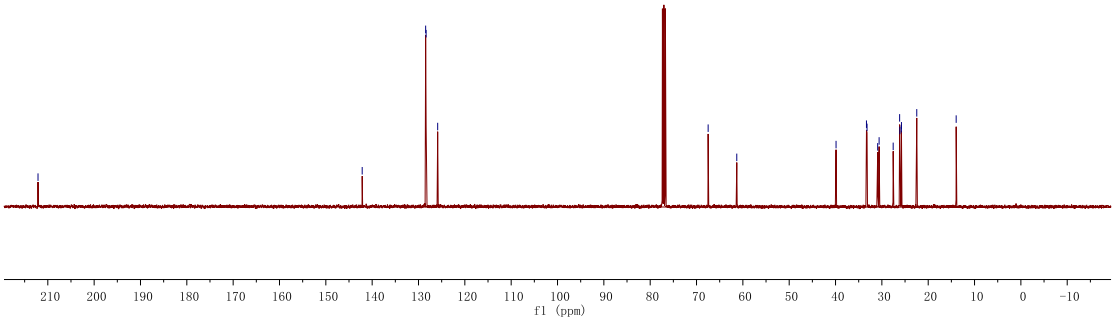
5g

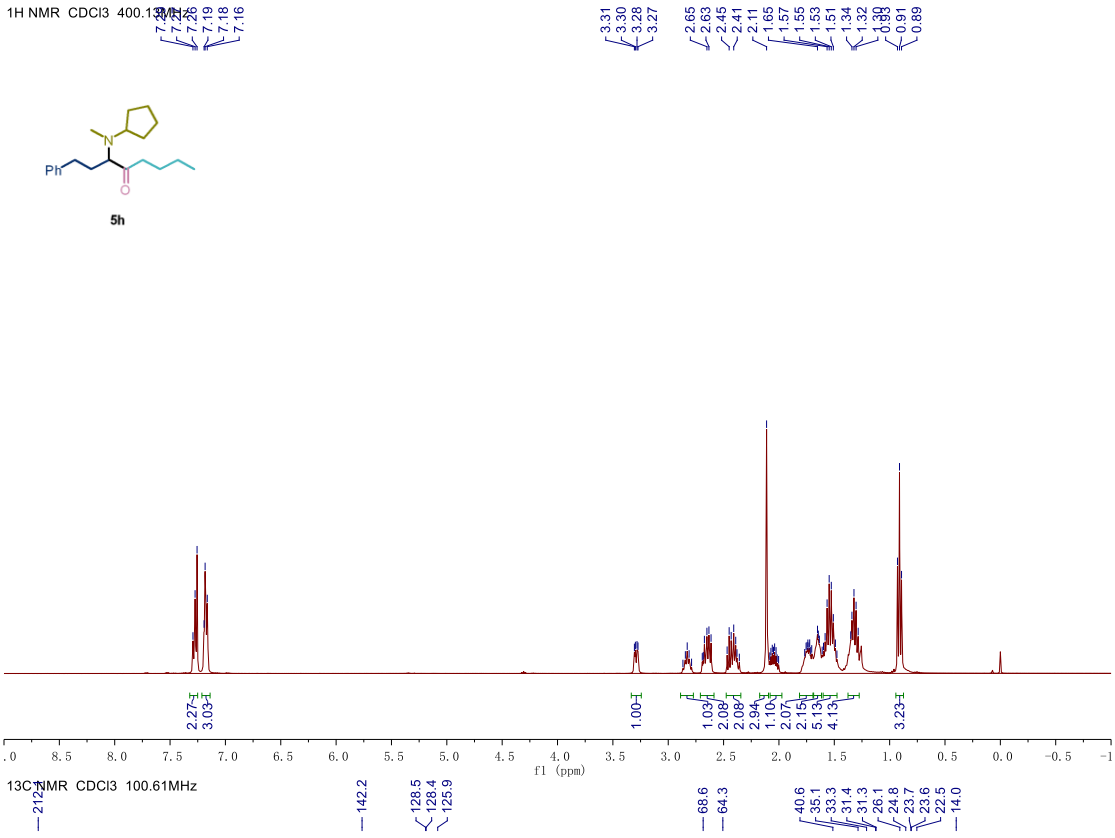






5g




1H NMR CDCl3 400.13MHz
7.28
7.26
7.19
7.18
7.16
3.31
3.30
3.28
3.27
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2.63
2.45
2.41
2.11
1.65
1.57
1.55
1.53
1.51
1.34
1.32
0.93
0.91
0.89
Ph
N
O
5h
2.27
3.03
1.00
1.03
2.08
2.08
2.94
1.10
2.07
2.15
5.13
4.13
3.23
f1 (ppm)
13C NMR CDCl3 100.61MHz
212.1
142.2
128.5
128.4
125.9
68.6
64.3
40.6
35.1
33.3
31.4
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26.1
24.8
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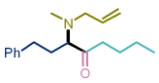
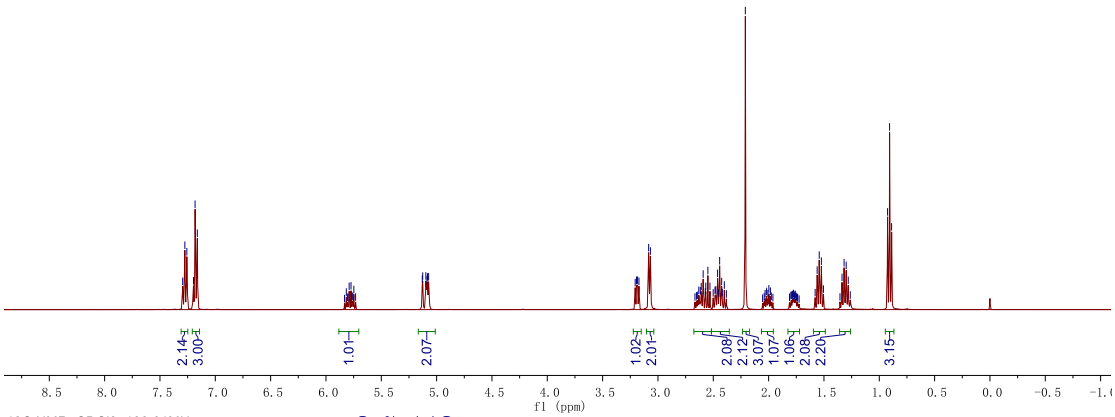
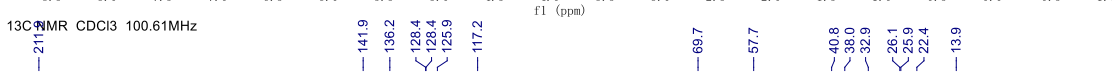
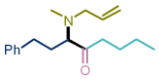
23.6
22.5
14.0
Ph
N
O
5h
f1 (ppm)



5i







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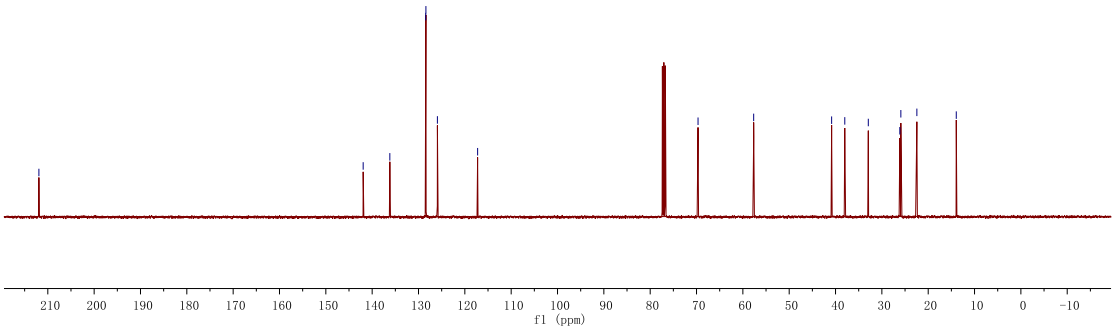

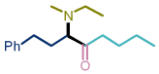

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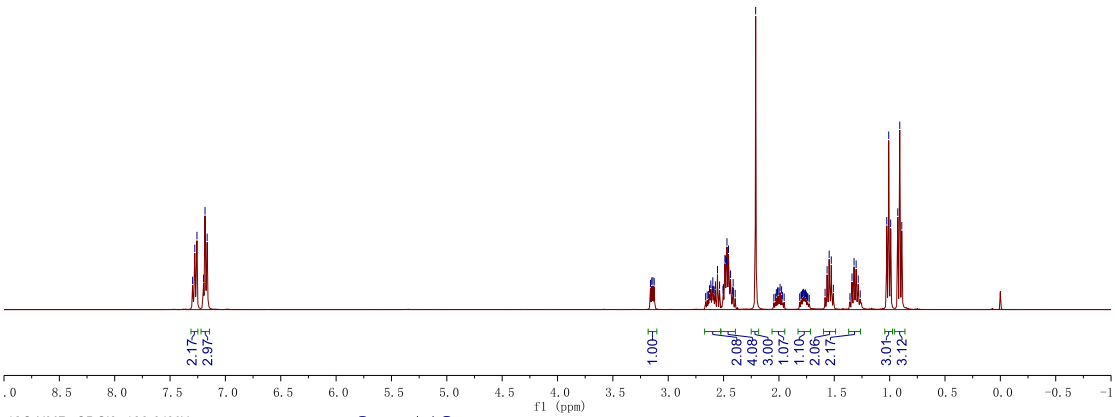

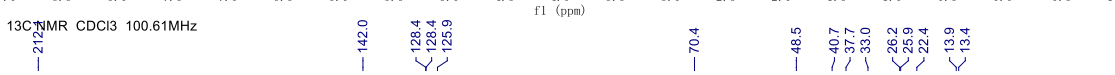

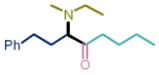

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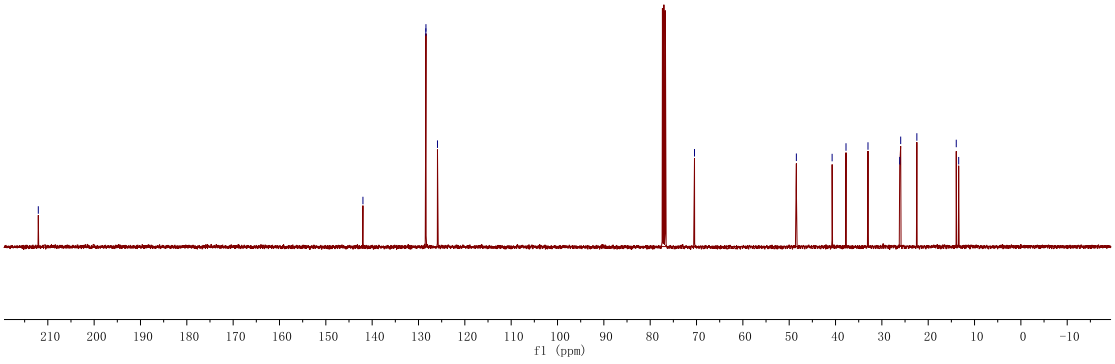

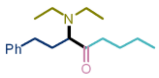

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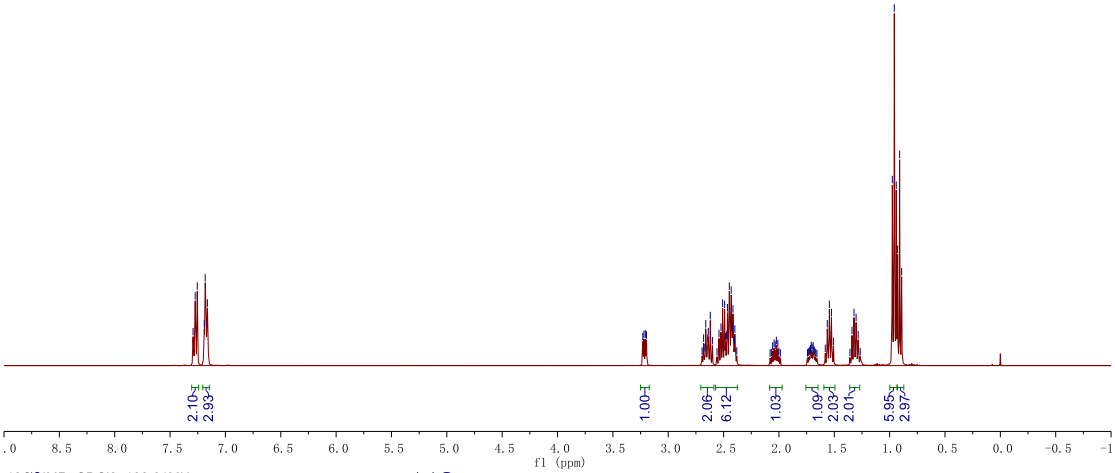

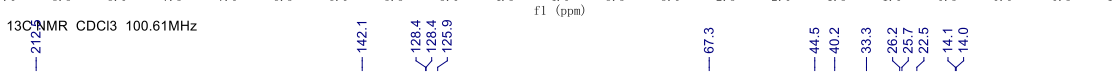

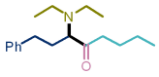

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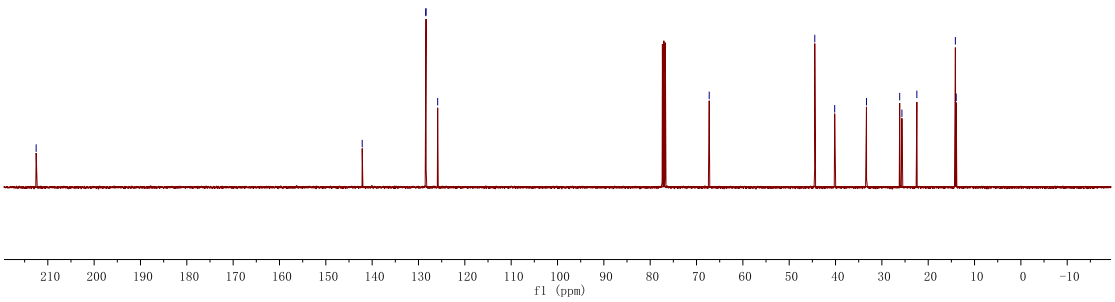

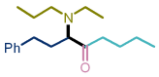

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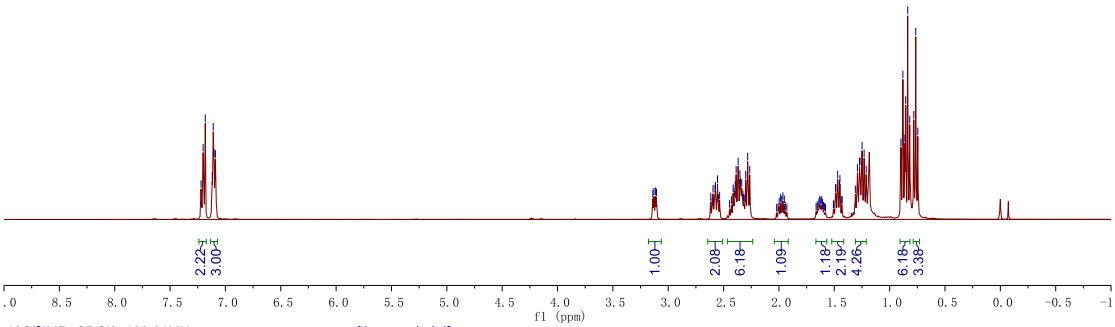

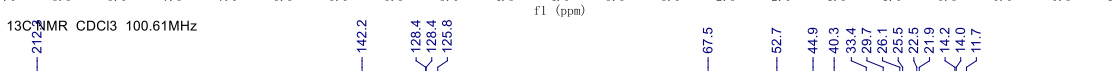

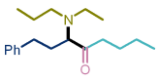

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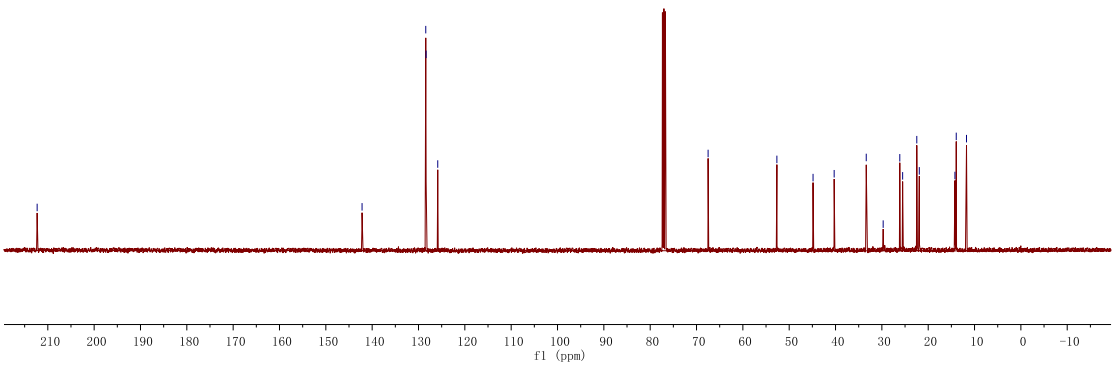

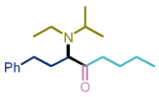

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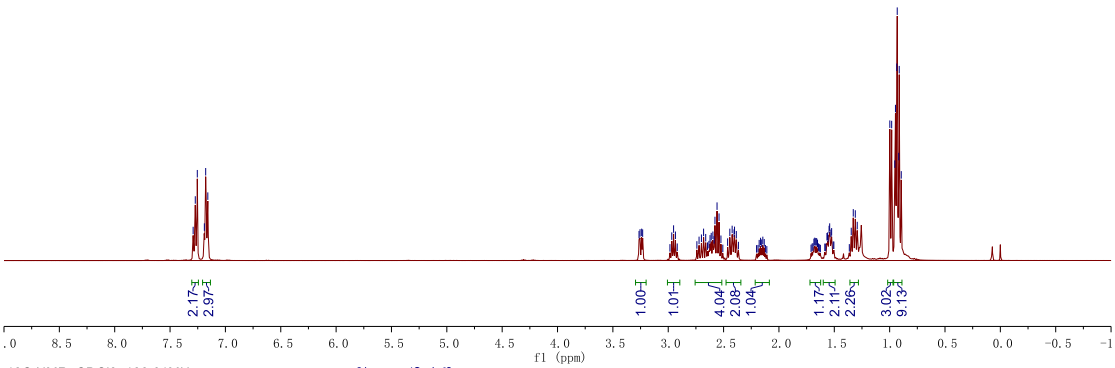

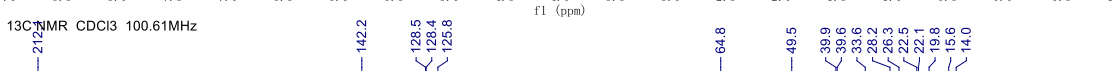

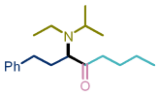

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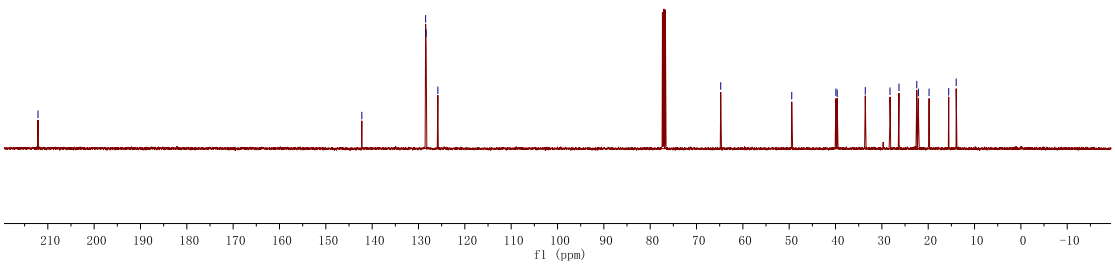

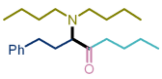

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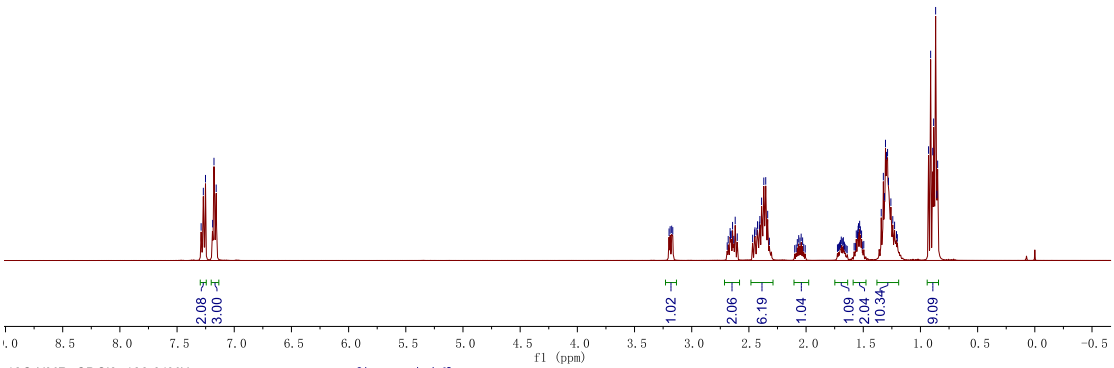
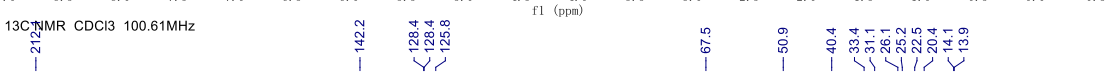
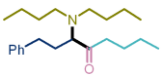


13C NMR CDCl3 100.61MHz





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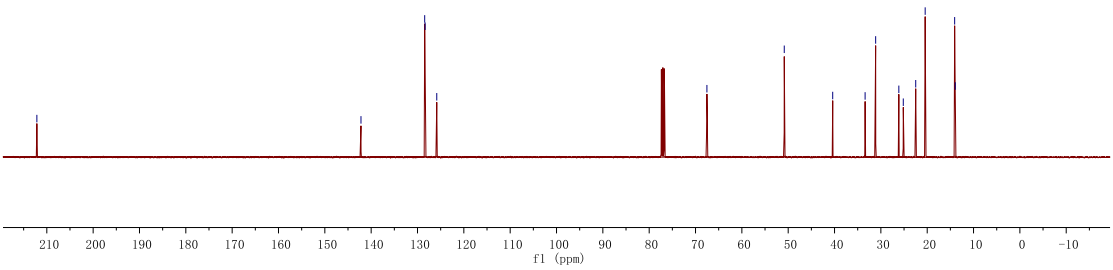

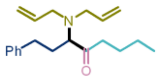

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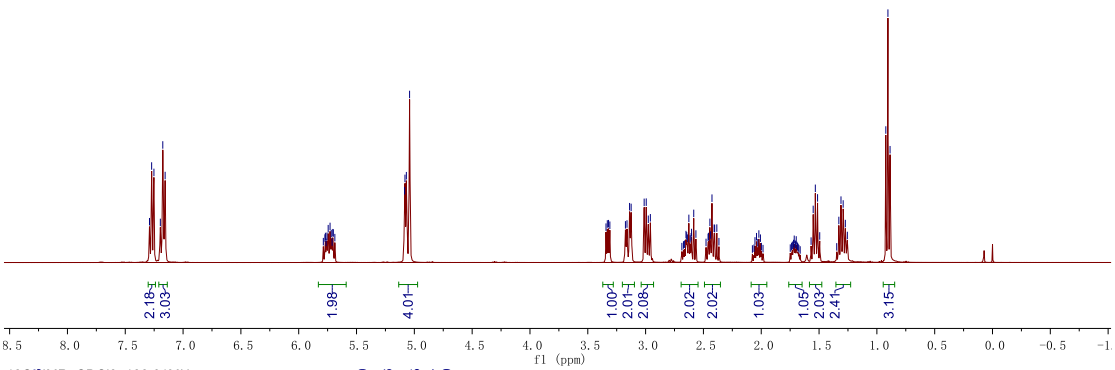
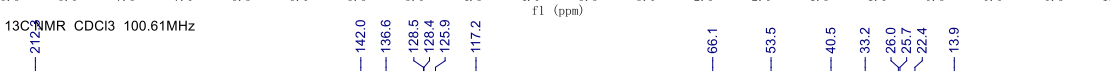
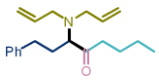


13C NMR CDCl3 100.61MHz





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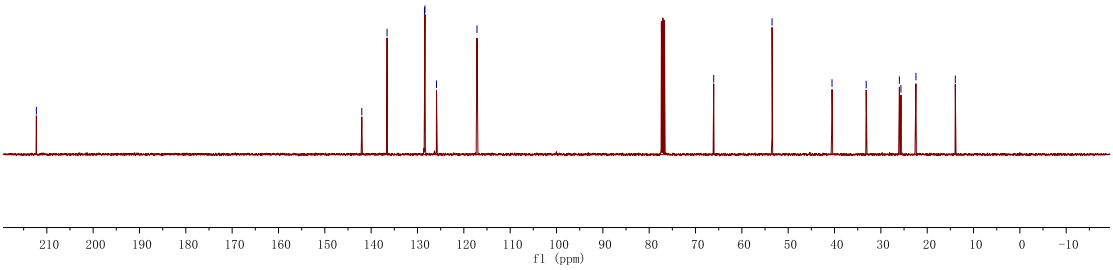
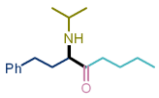
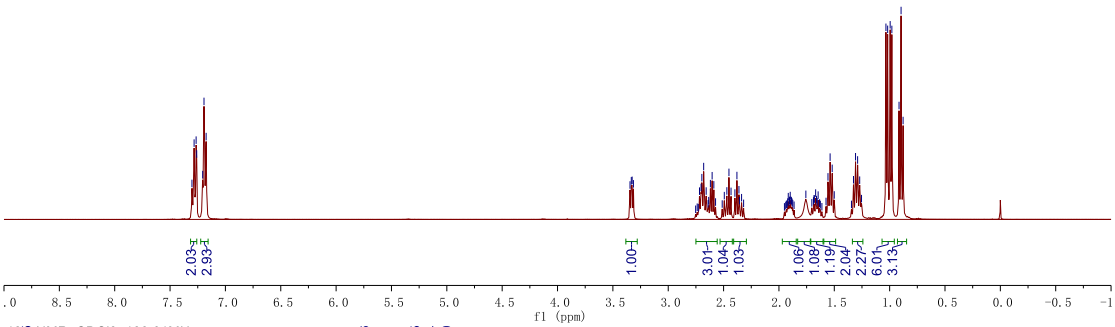
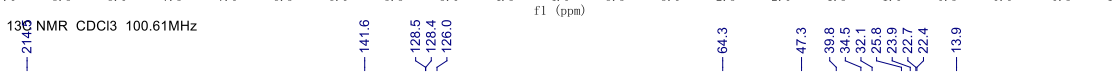
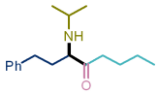



NH
Ph
O

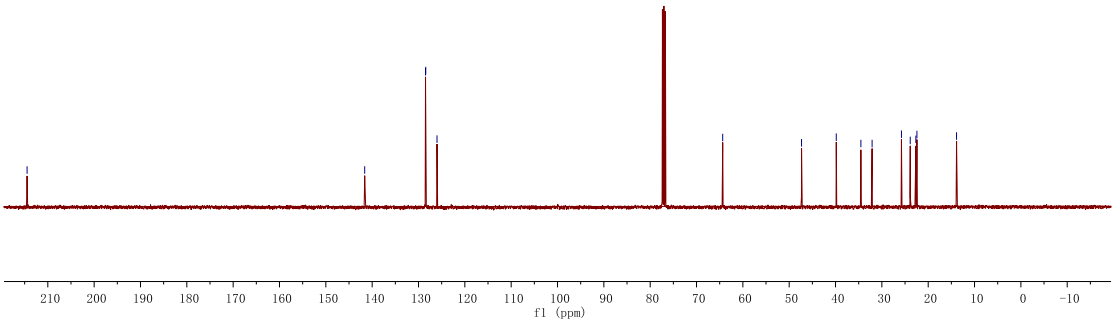
5p


2.03
2.93
1.00
3.01
1.04
1.03
1.06
1.08
1.19
2.04
2.27
6.01
3.13
f1 (ppm)

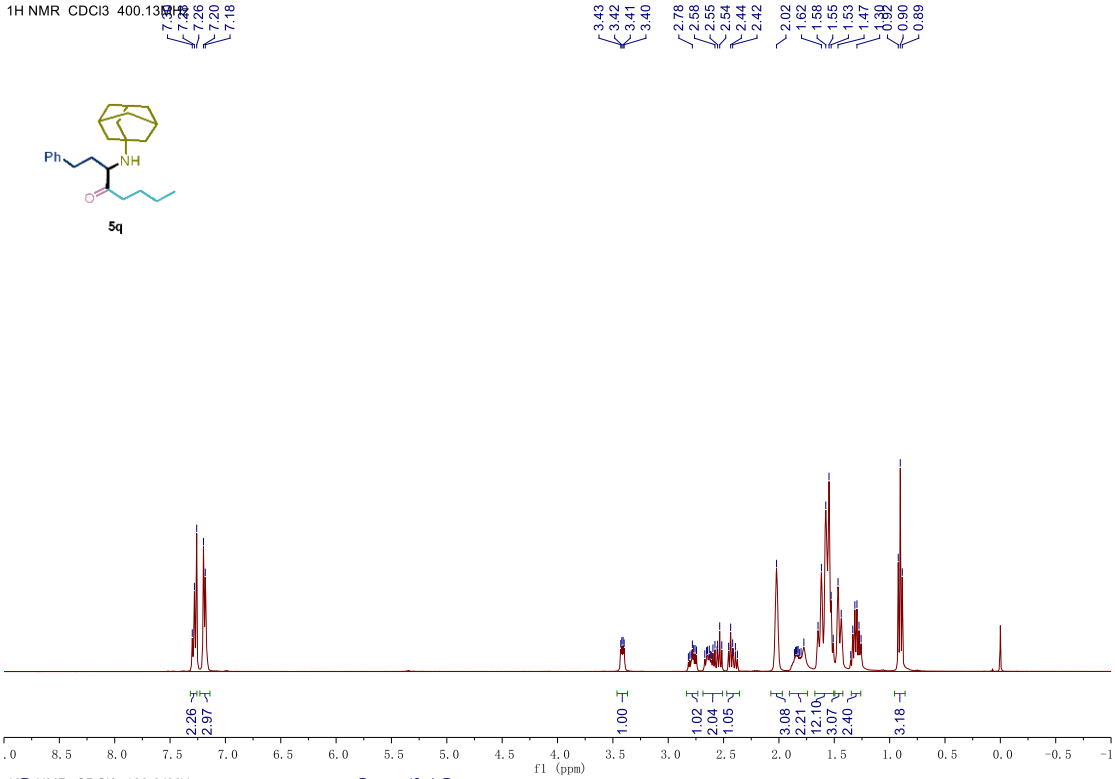

13C NMR CDCl3 100.61MHz
214.0
141.6
128.5
128.4
126.0
64.3
47.3
39.8
34.5
32.1
25.8
23.9
22.7
22.4
13.9


NH
Ph
O

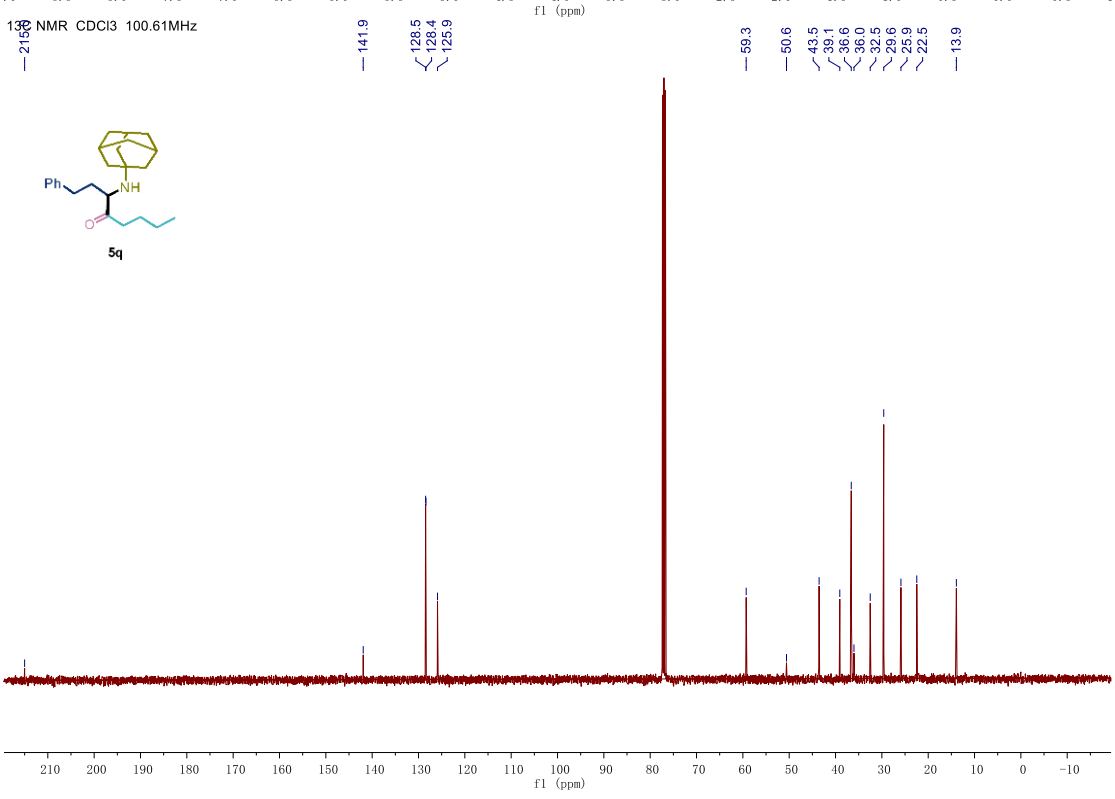
5p


f1 (ppm)

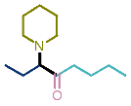
1H NMR CDCl3 400.13MHz



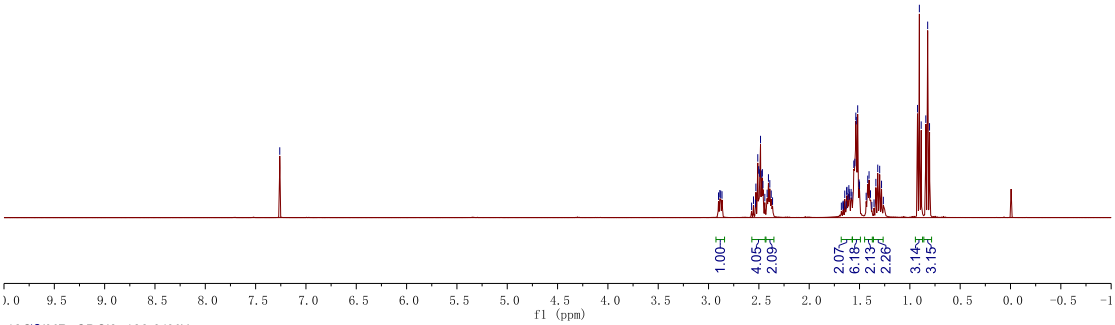
13C NMR CDCl3 100.61MHz



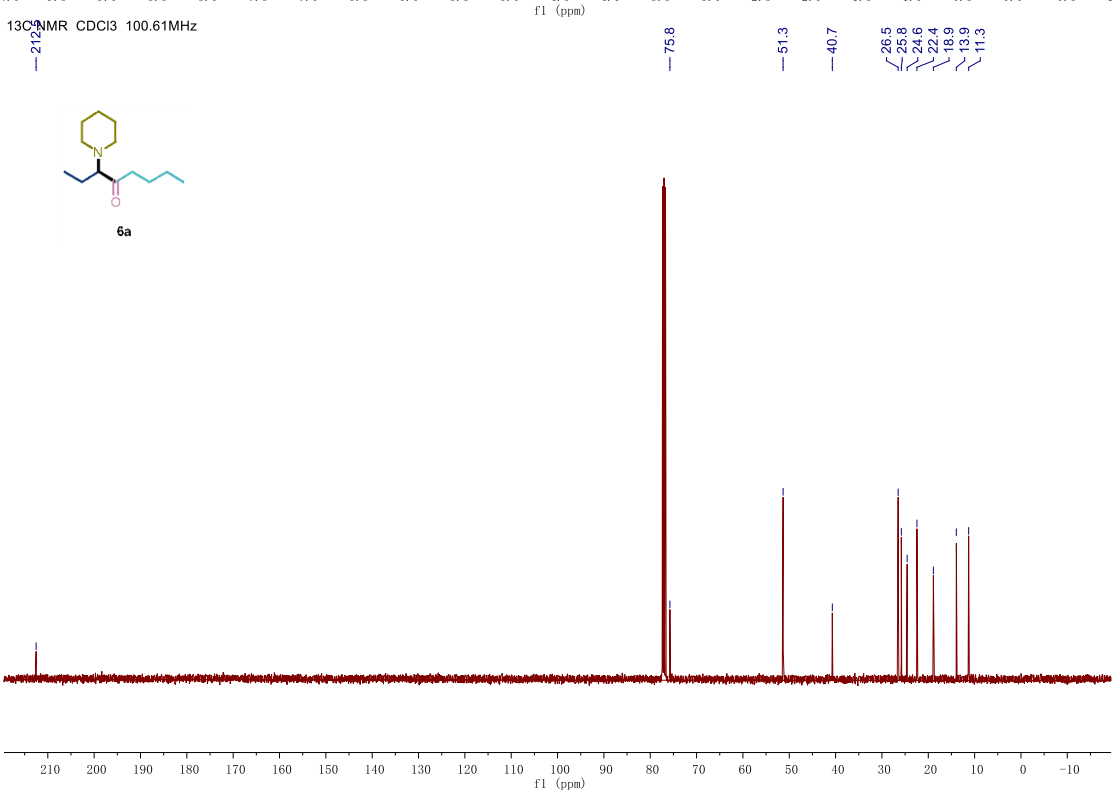
1H NMR CDCl3 400.13MHz



6a

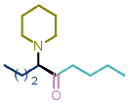


13C NMR CDCl3 100.61MHz

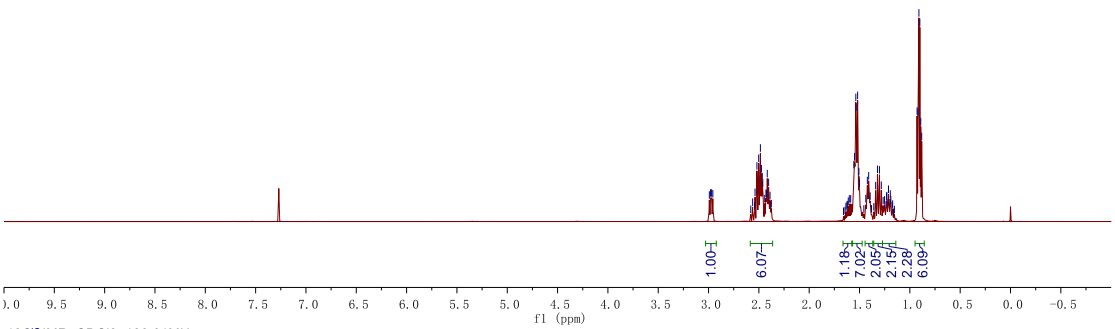


6a

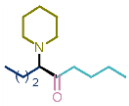
1H NMR CDCl3 400.13MHz



6b



13C NMR CDCl3 100.61MHz



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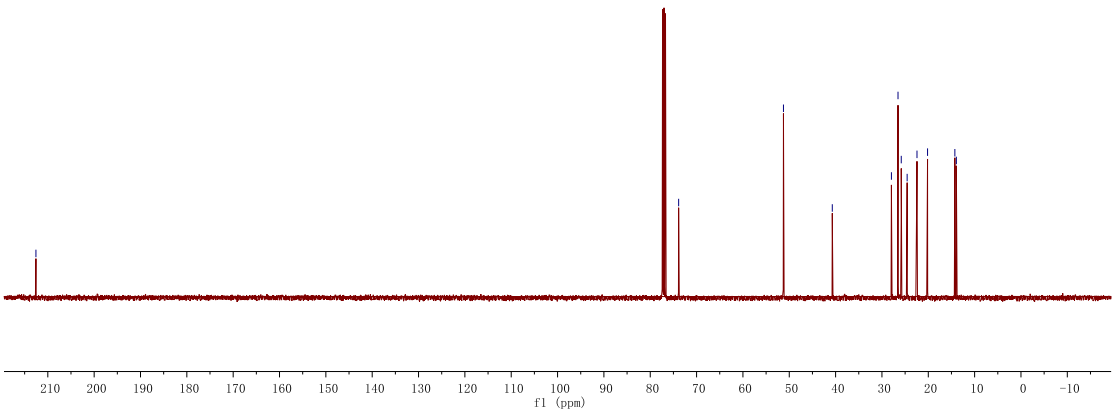
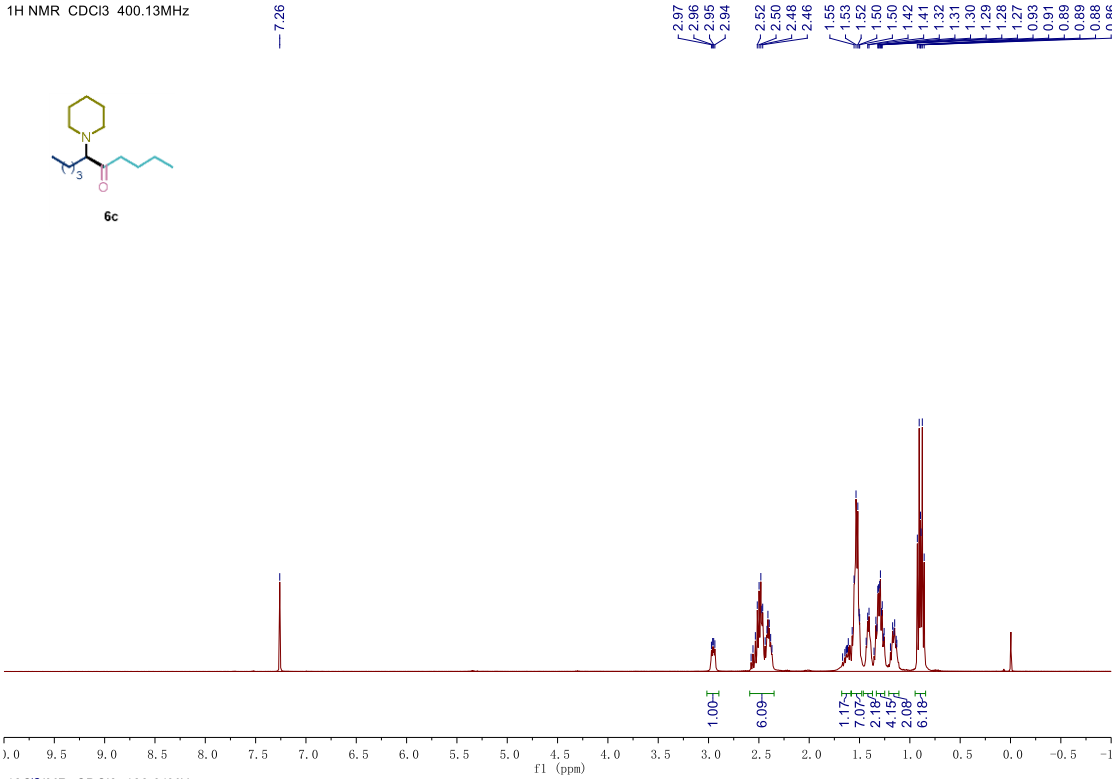
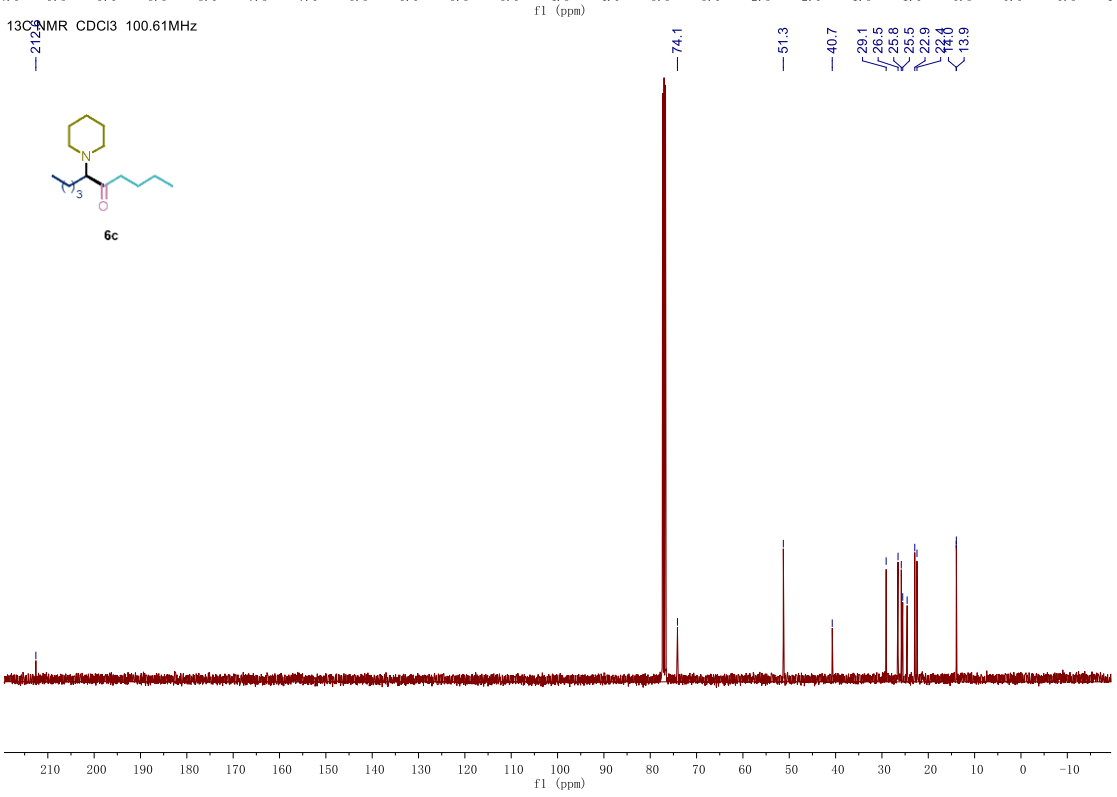


1H NMR CDCl3 400.13MHz



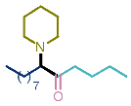
6c

13C NMR CDCl3 100.61MHz



6c

1H NMR CDCl3 400.13MHz



6d

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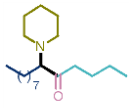
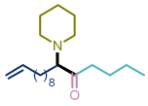


6d



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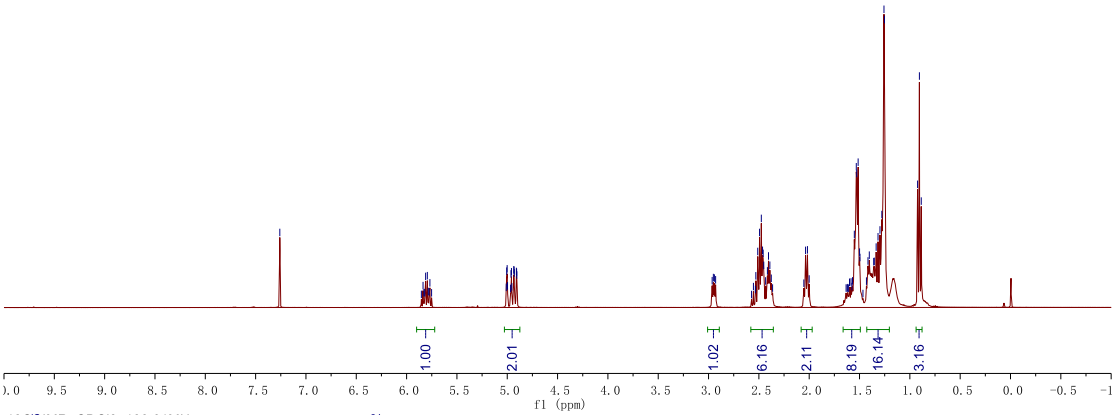

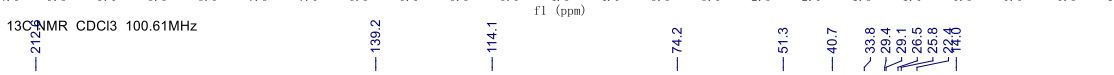

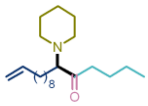

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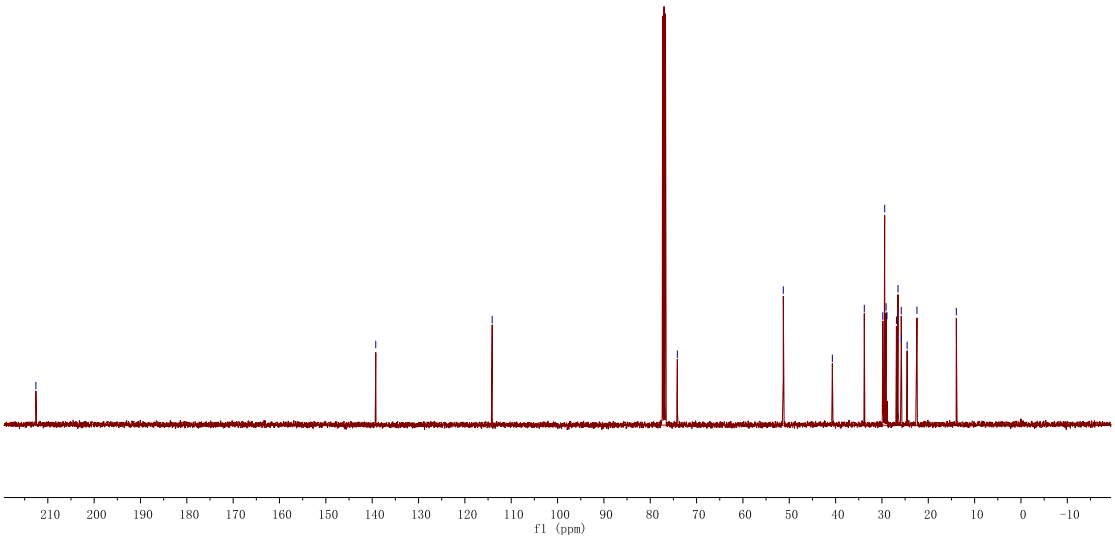
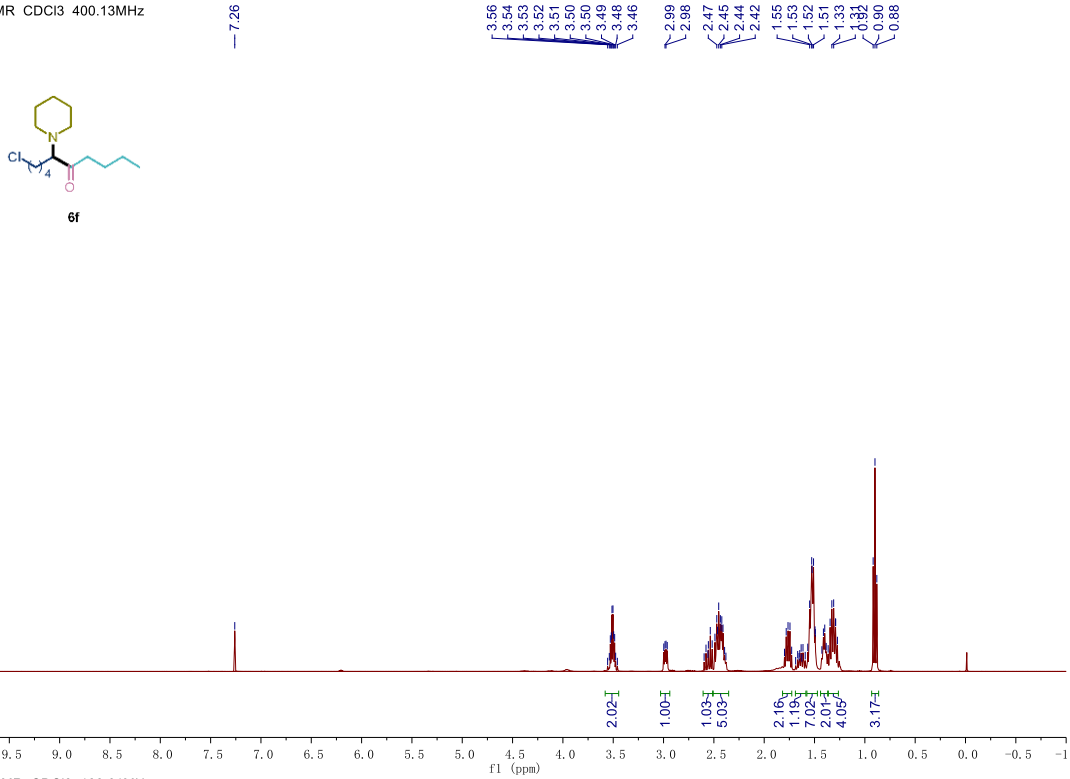
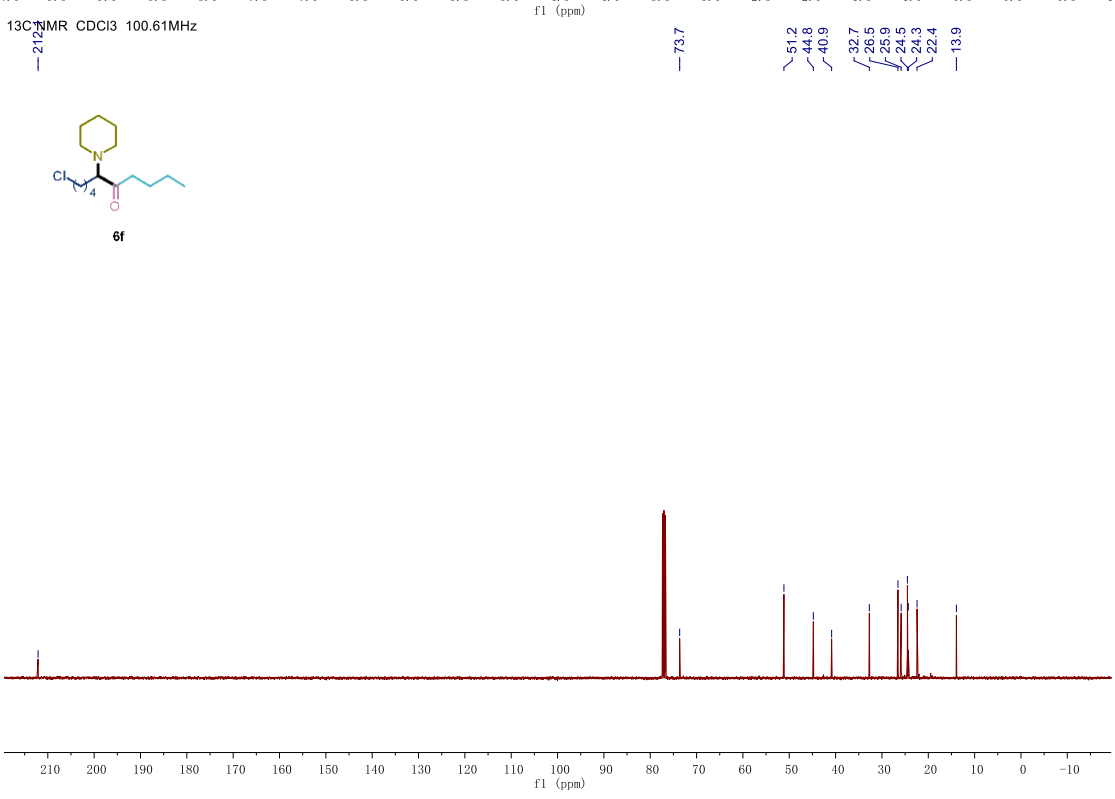


1H NMR CDCl3 400.13MHz



6f

13C NMR CDCl3 100.61MHz



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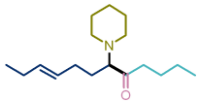

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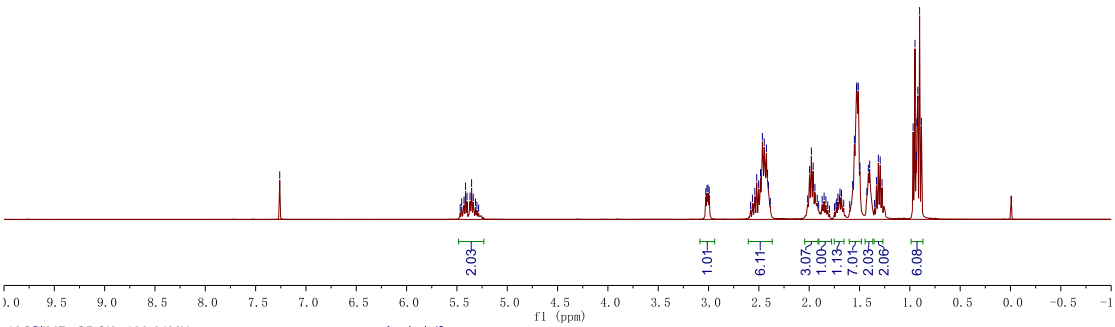

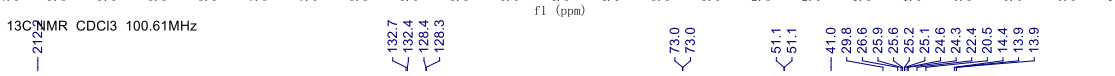

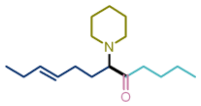

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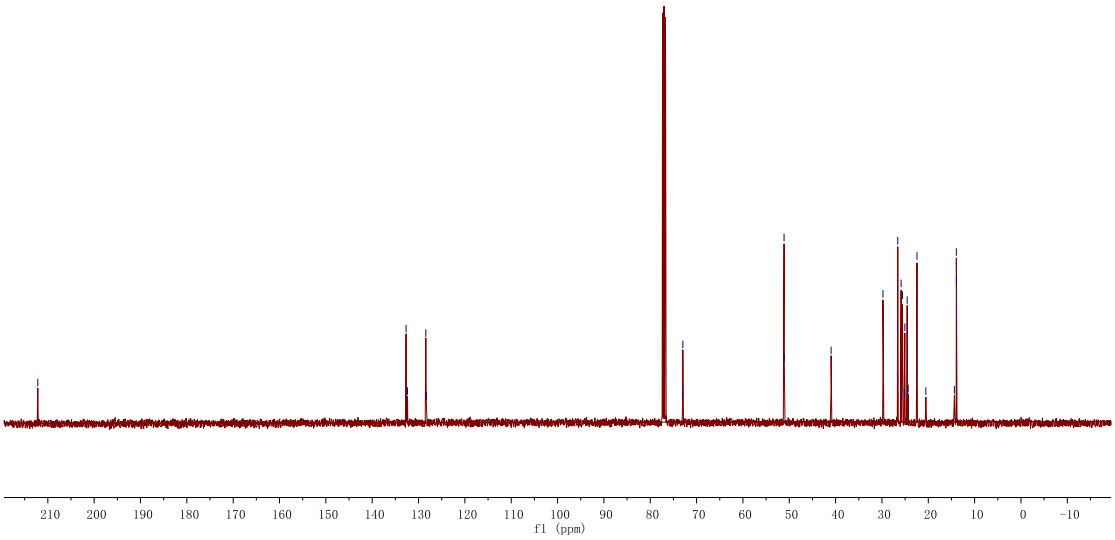
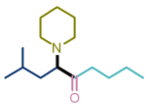


1H NMR CDCl3 400.13MHz



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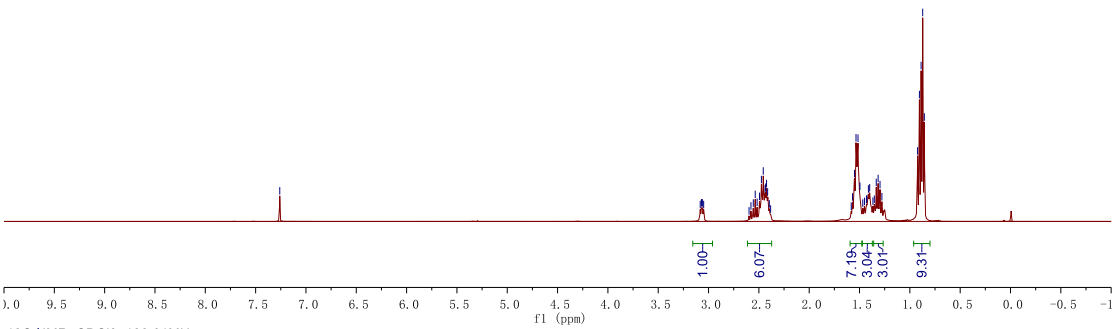
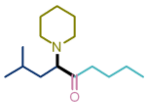


13C NMR CDCl3 100.61MHz



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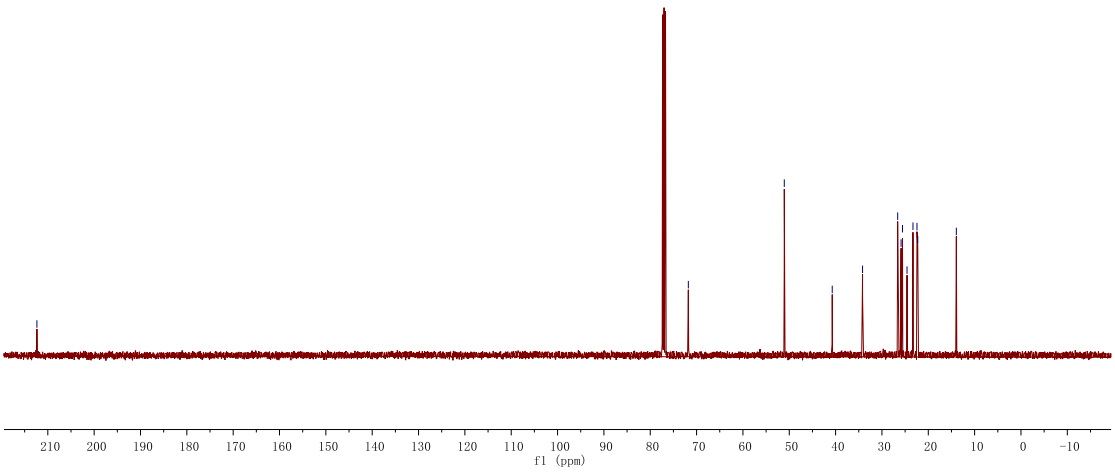

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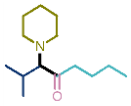

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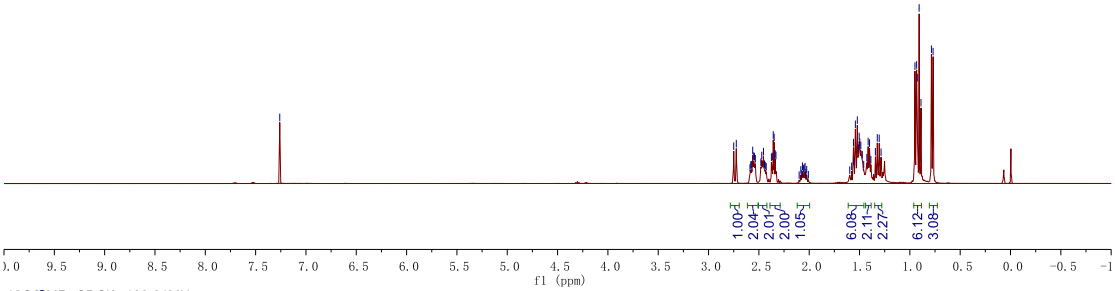
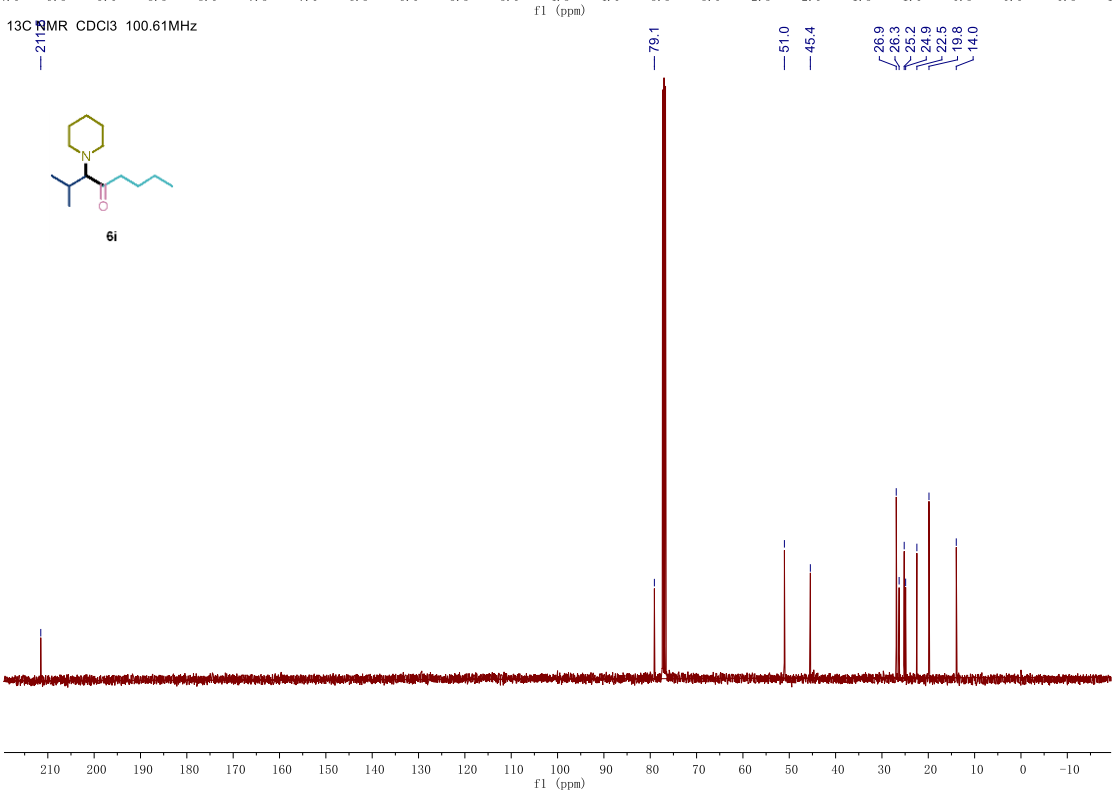


13C NMR CDCl3 100.61MHz



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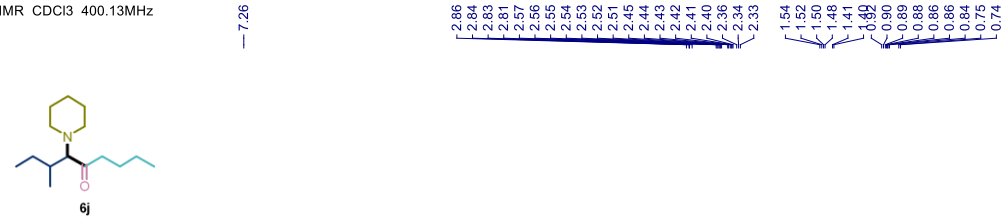

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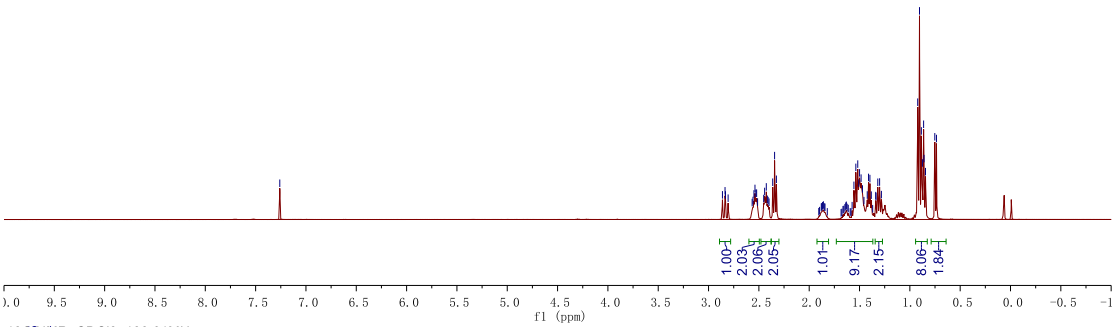

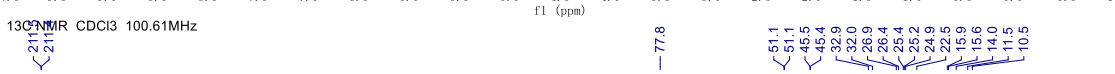

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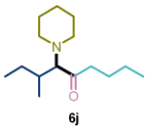

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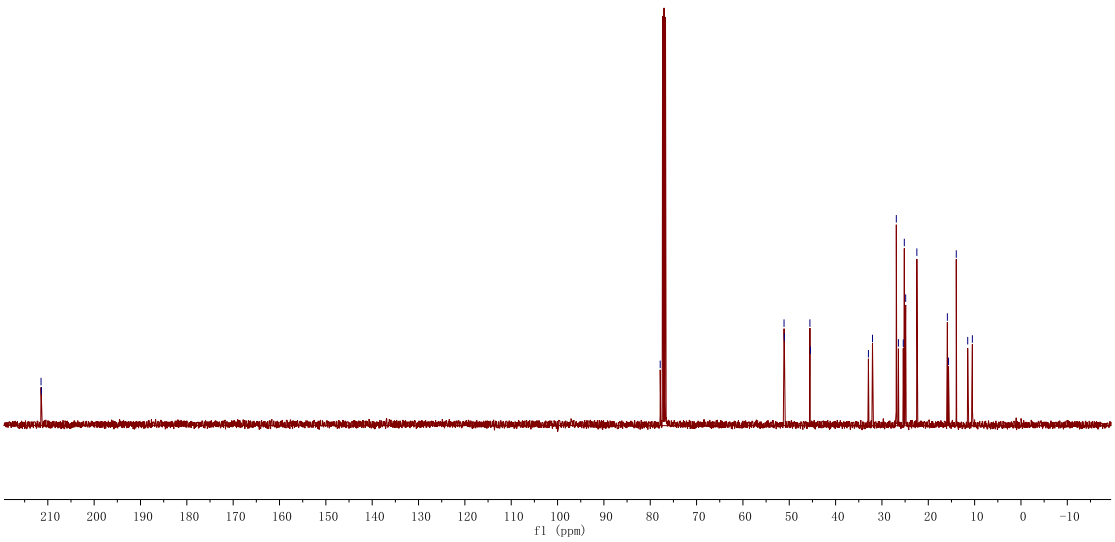

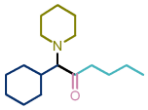

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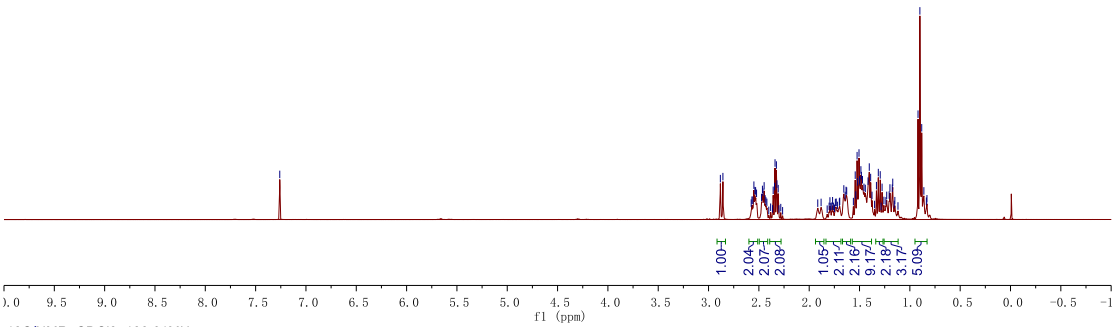

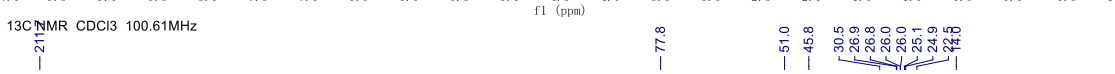

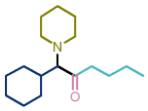

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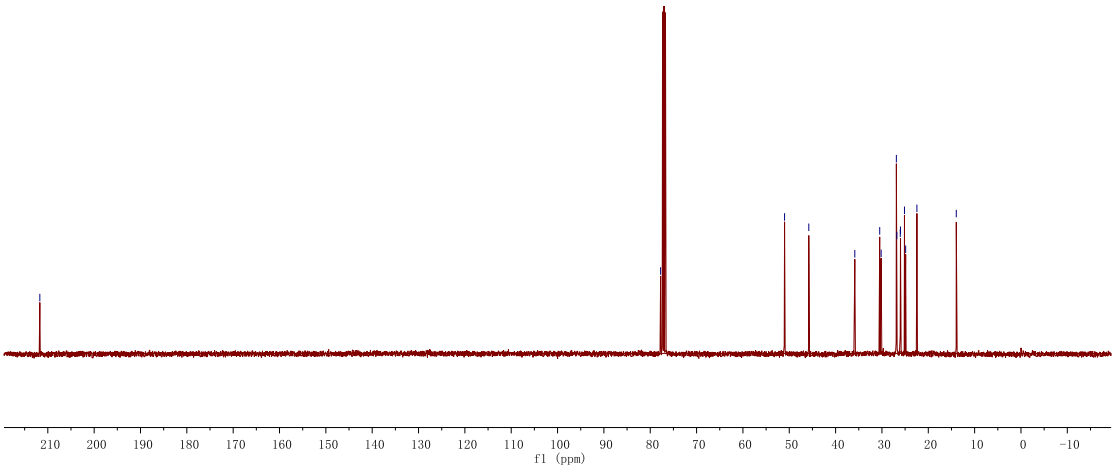

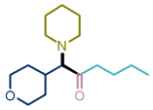

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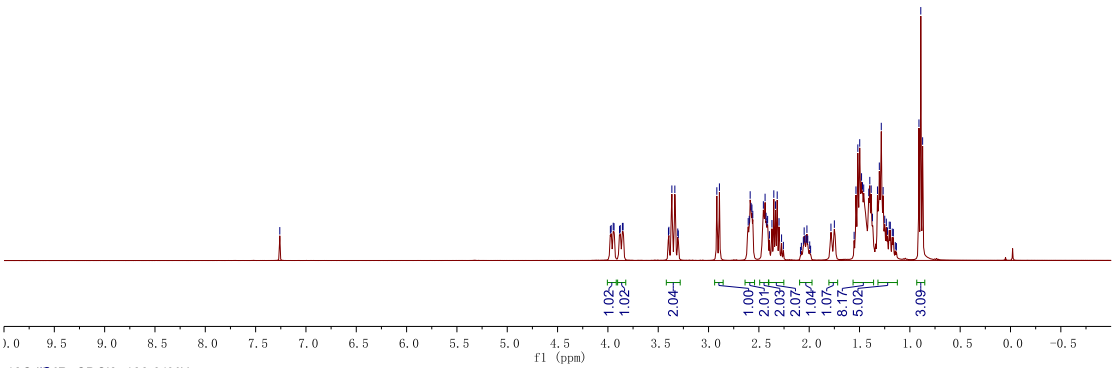

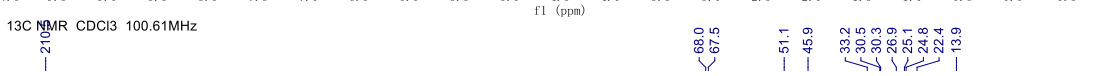

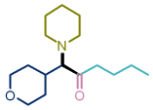

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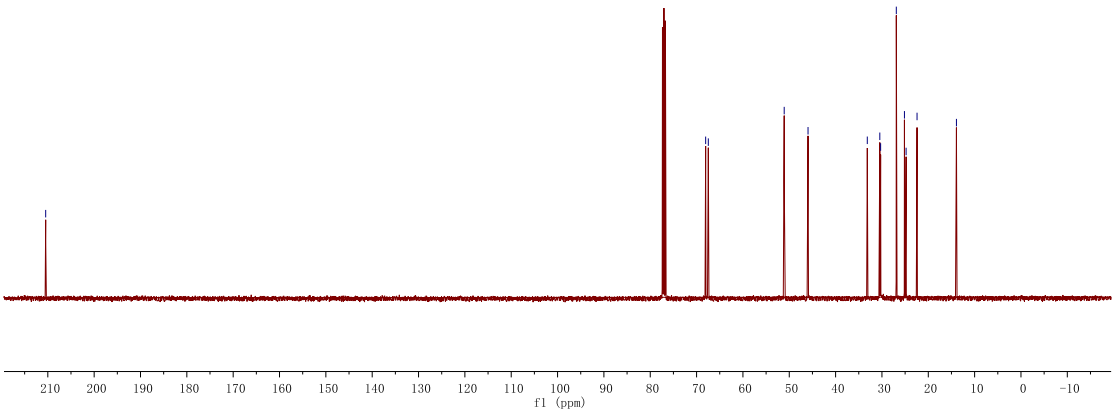

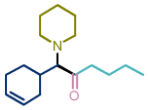

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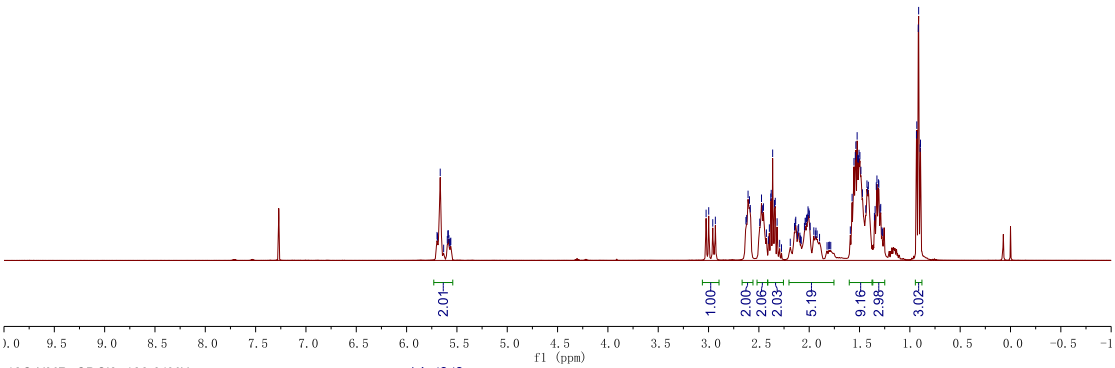
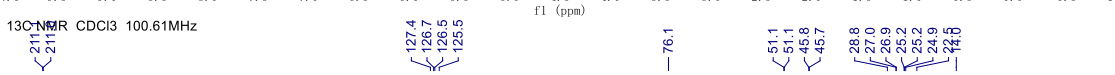
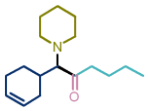


13C NMR CDCl3 100.61MHz





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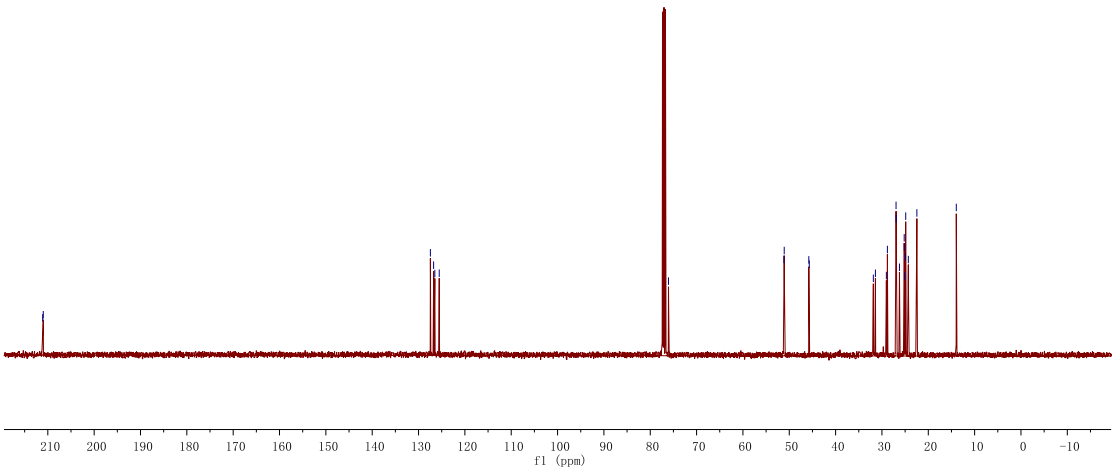
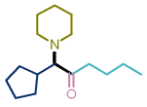


1H NMR CDCl3 400.13MHz



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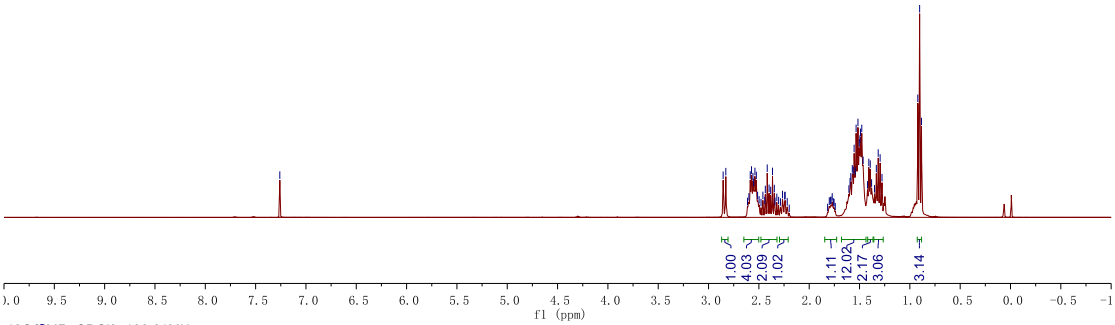
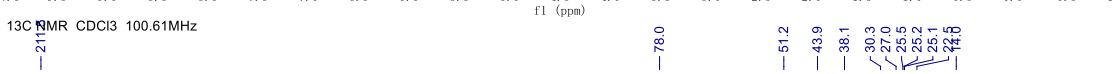
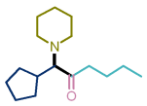


13C NMR CDCl3 100.61MHz





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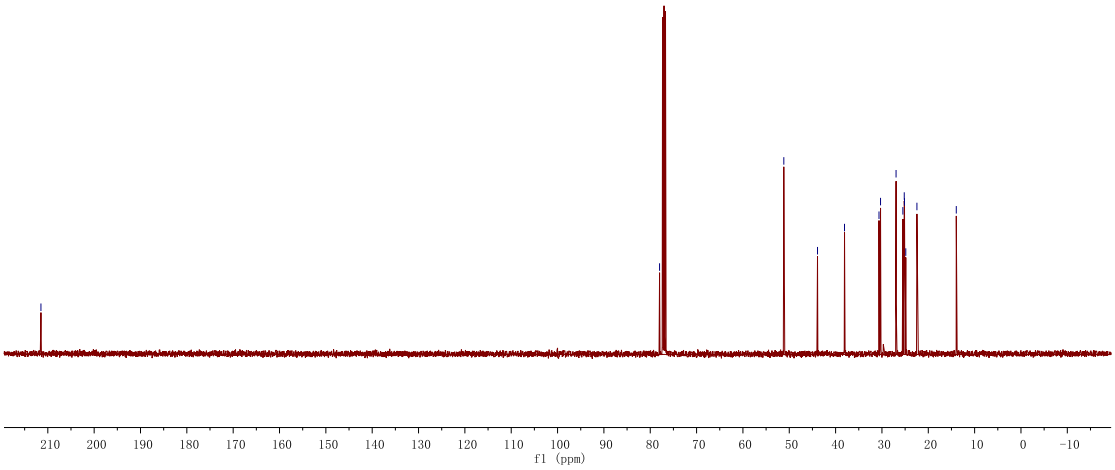
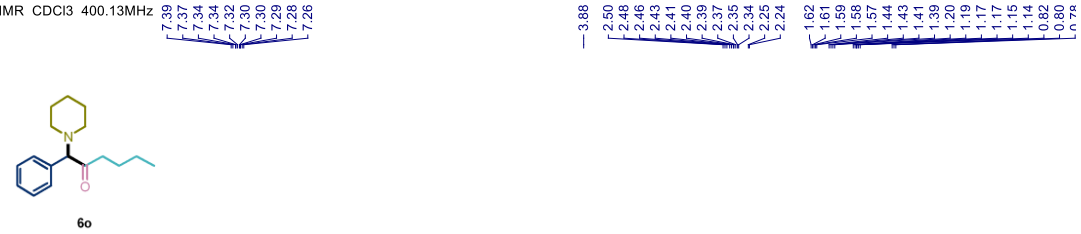
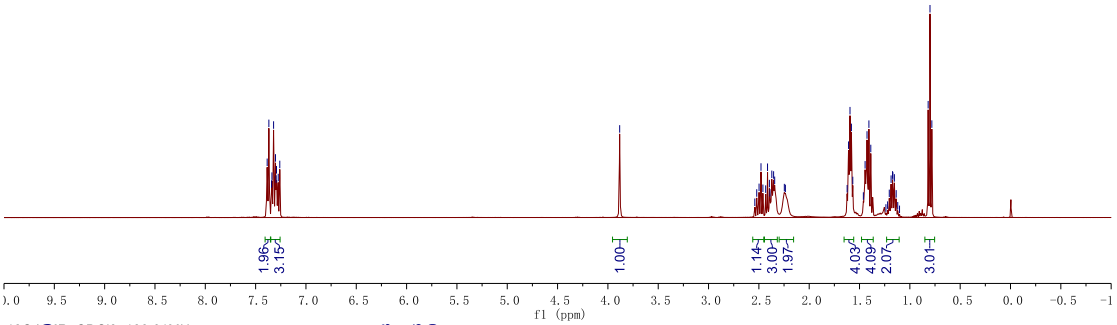


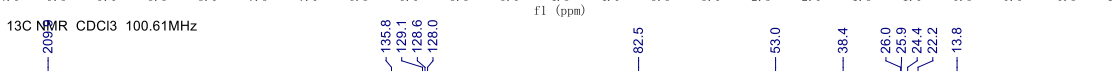
1H NMR CDCl3 400.13MHz

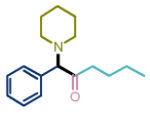


6o



13C NMR CDCl3 100.61MHz





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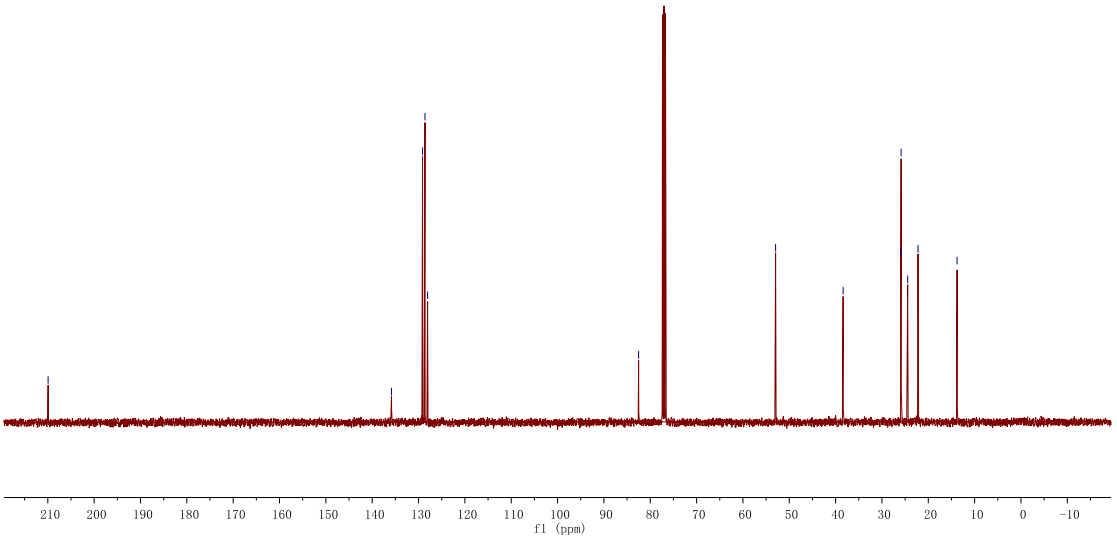
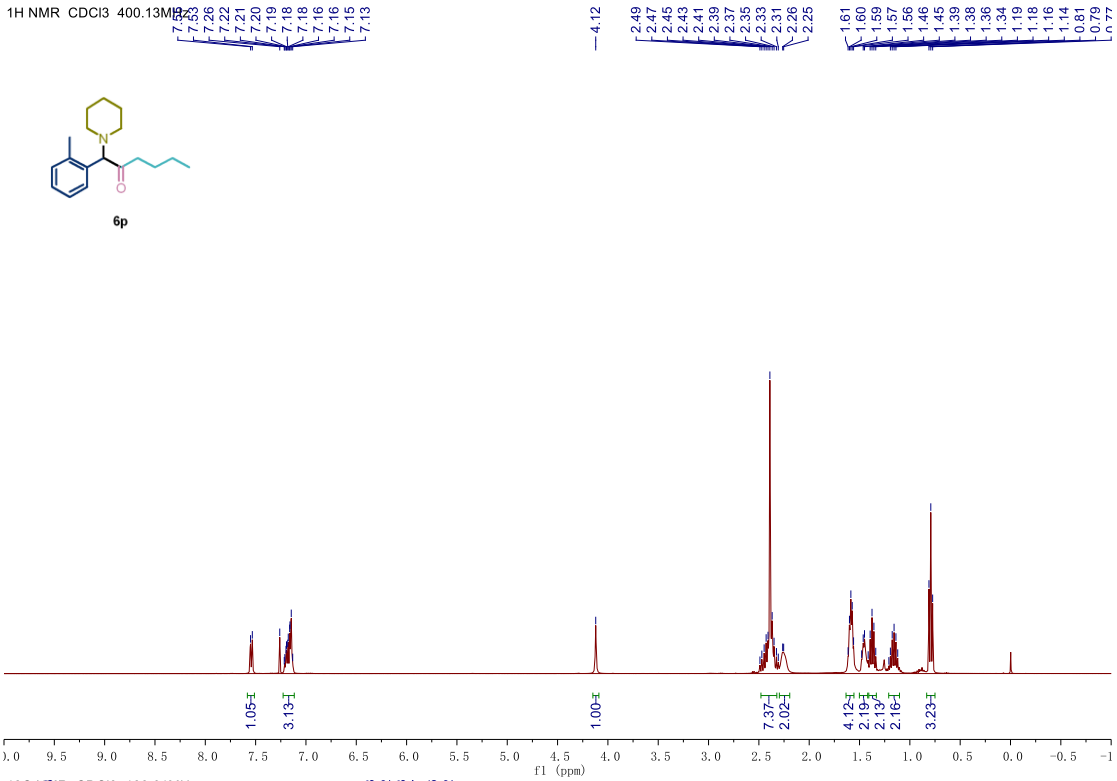
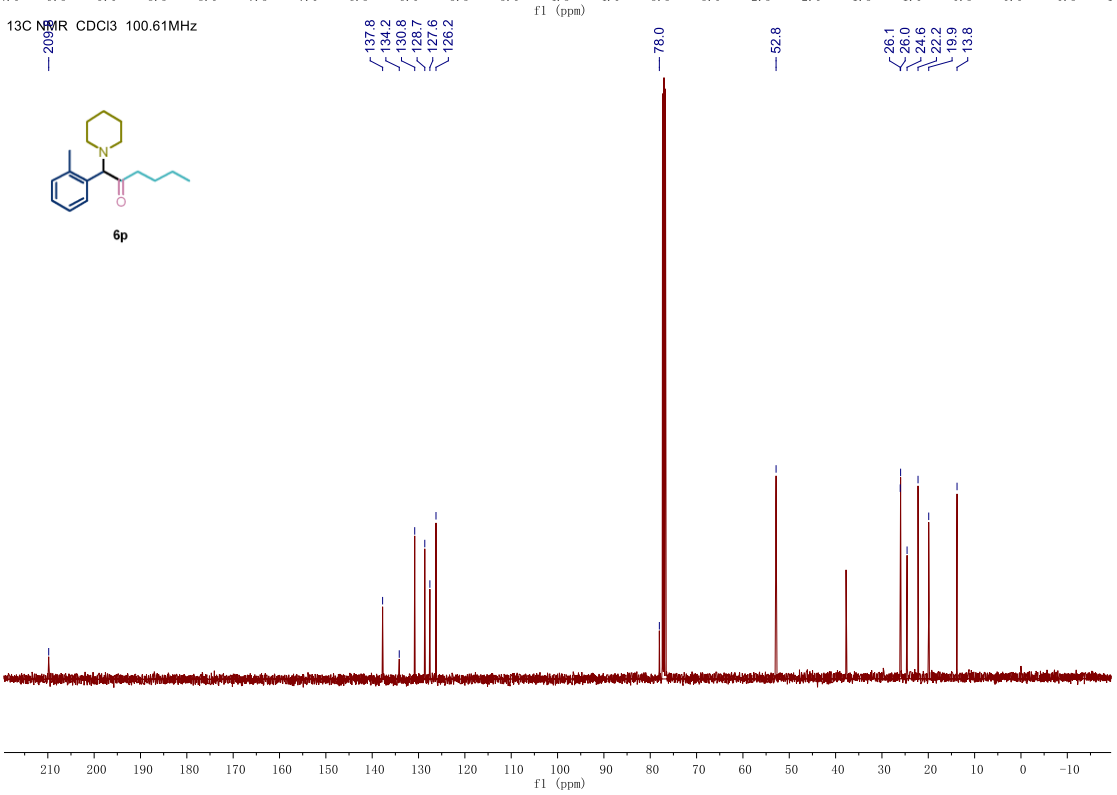
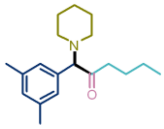


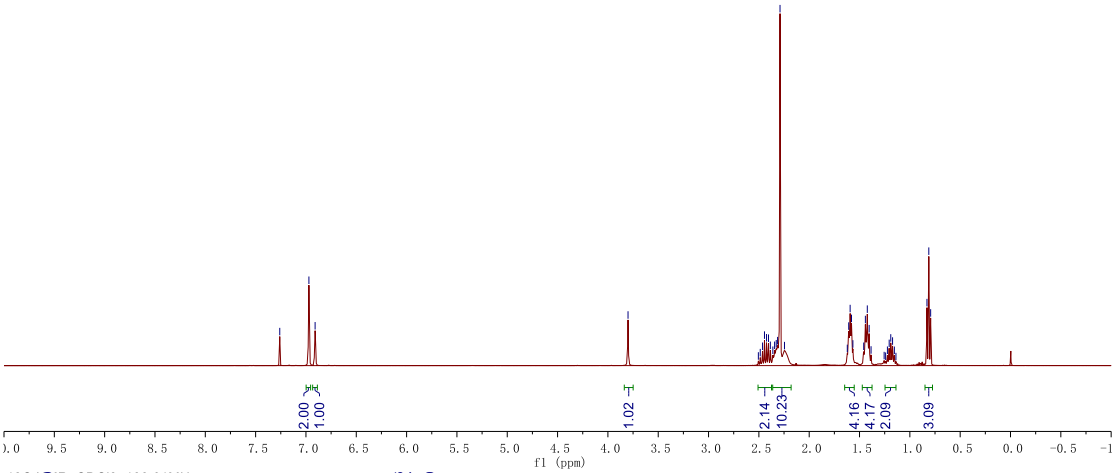

1H NMR CDCl3 400.13MHz
7.53
7.33
7.26
7.22
7.21
7.20
7.19
7.18
7.18
7.16
7.16
7.15
7.13
4.12
2.49
2.47
2.45
2.43
2.41
2.39
2.37
2.35
2.33
2.31
2.26
2.25
1.61
1.60
1.59
1.57
1.56
1.46
1.45
1.39
1.38
1.36
1.34
1.19
1.18
1.16
1.14
0.81
0.79
6p
1.05
3.13
1.00
7.37
2.02
4.12
2.19
2.13
2.16
3.23
f1 (ppm)


13C NMR CDCl3 100.61MHz
209
137.8
134.2
130.8
128.7
127.6
126.2
78.0
52.8
26.1
26.0
24.6
22.2
19.9
13.8
6p
f1 (ppm)

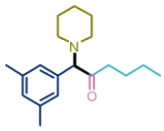
1H NMR CDCl3 400.13MHz



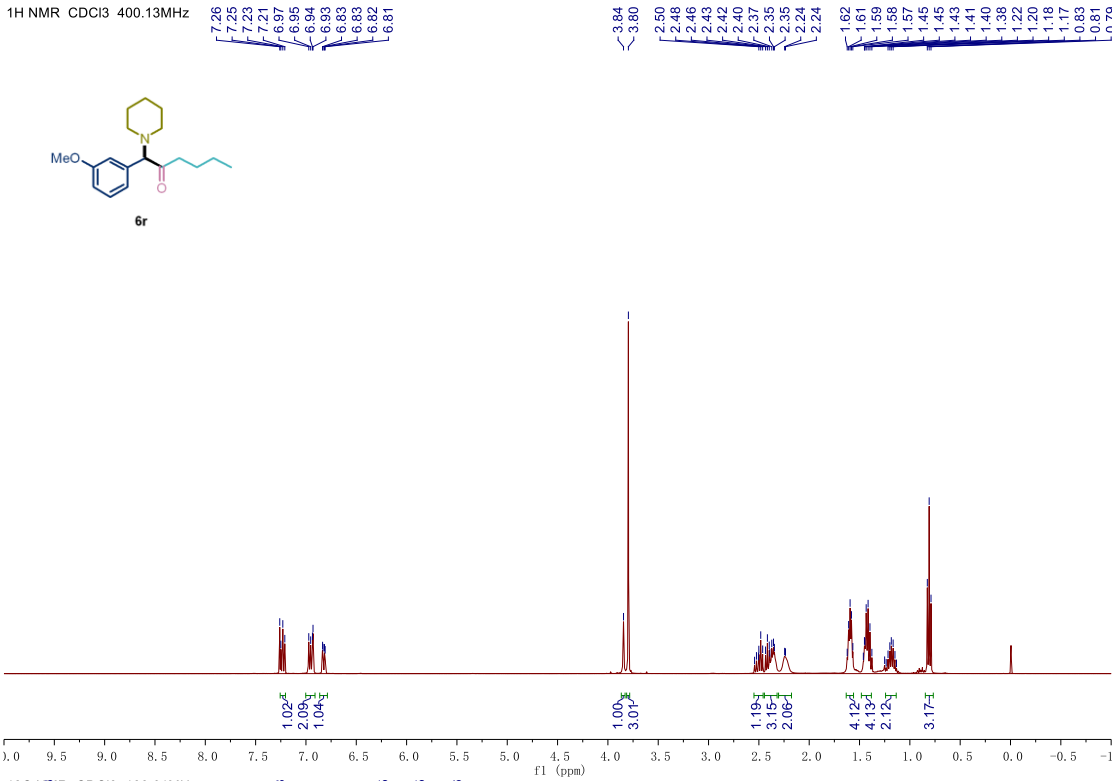
6q

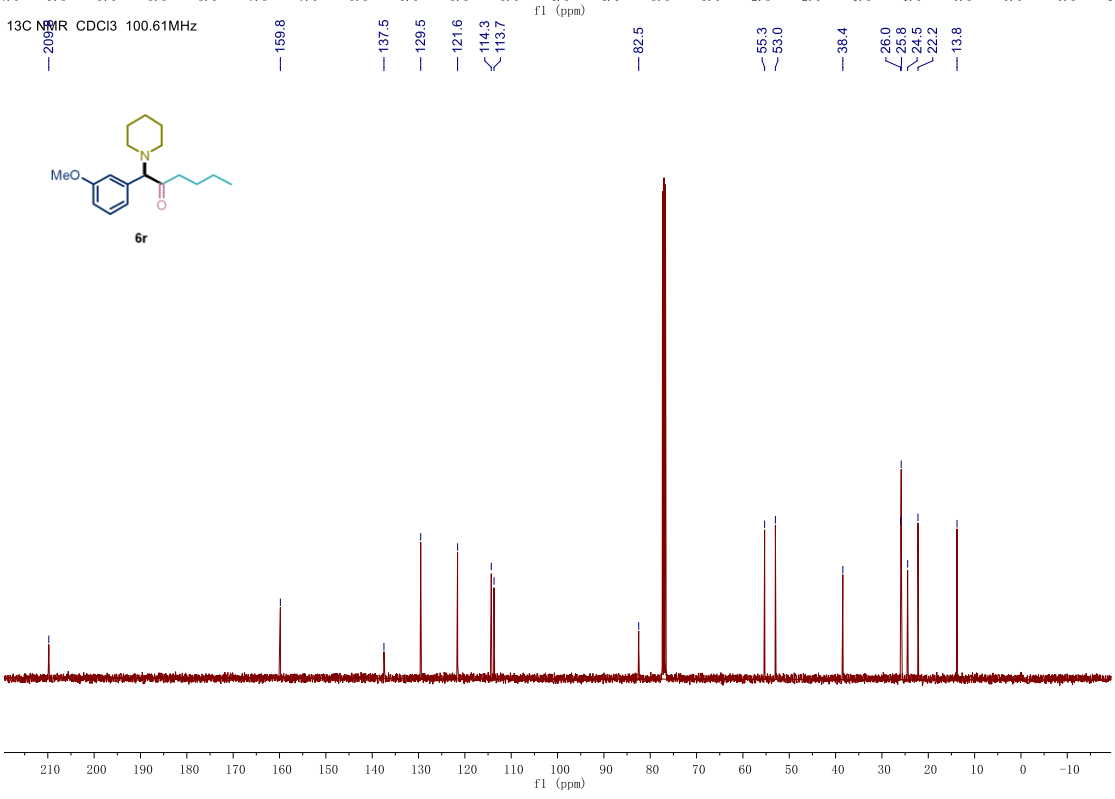


13C NMR CDCl3 100.61MHz

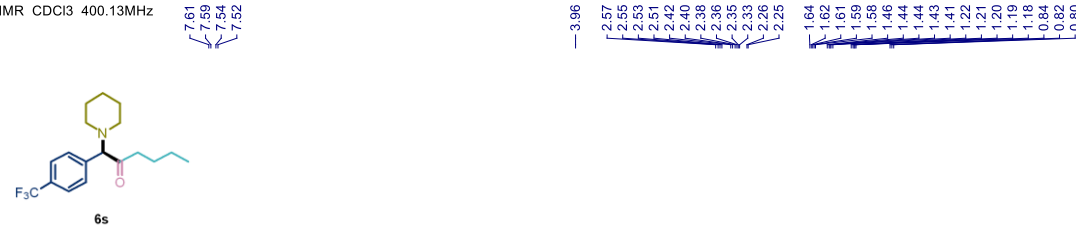


6q

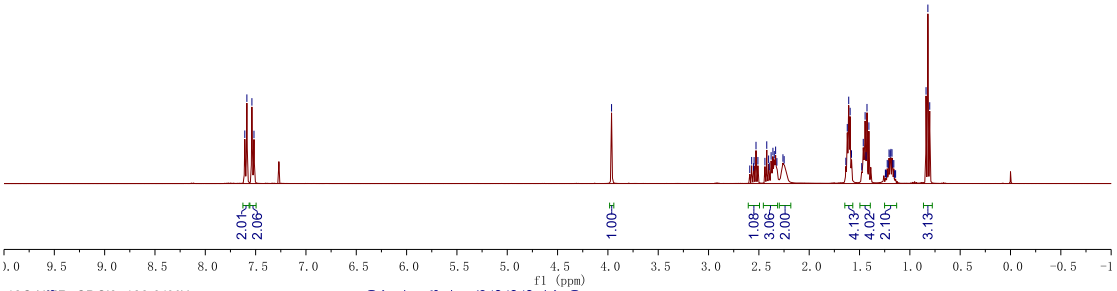

1H NMR CDCl3 400.13MHz
7.26
7.25
7.23
7.21
6.97
6.95
6.94
6.93
6.83
6.83
6.82
6.81
3.84
3.80
2.50
2.48
2.46
2.43
2.42
2.40
2.37
2.35
2.35
2.24
2.24
1.62
1.61
1.59
1.58
1.57
1.45
1.45
1.43
1.41
1.40
1.38
1.22
1.20
1.18
1.17
0.83
0.81
MeO
N
O
6r
1.02
2.09
1.04
1.00
3.01
1.19
3.15
2.06
4.12
4.13
2.12
3.17
f1 (ppm)


13C NMR CDCl3 100.61MHz
209.1
159.8
137.5
129.5
121.6
114.3
113.7
82.5
55.3
53.0
38.4
26.0
25.8
24.5
22.2
13.8
MeO
N
O
6r
f1 (ppm)

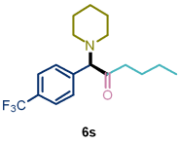
1H NMR CDCl3 400.13MHz



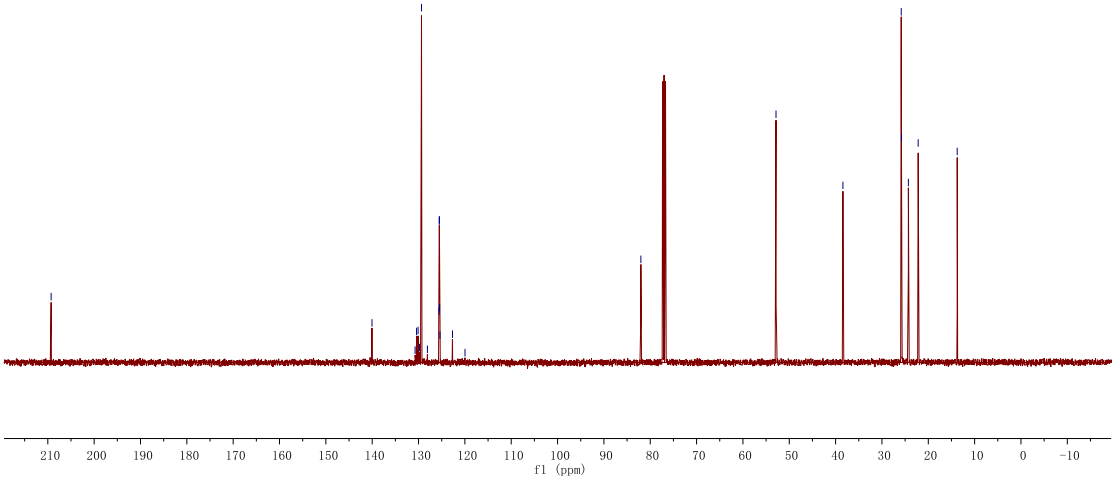
6s



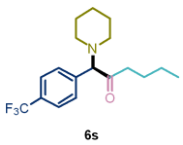
13C NMR CDCl3 100.61MHz



6s



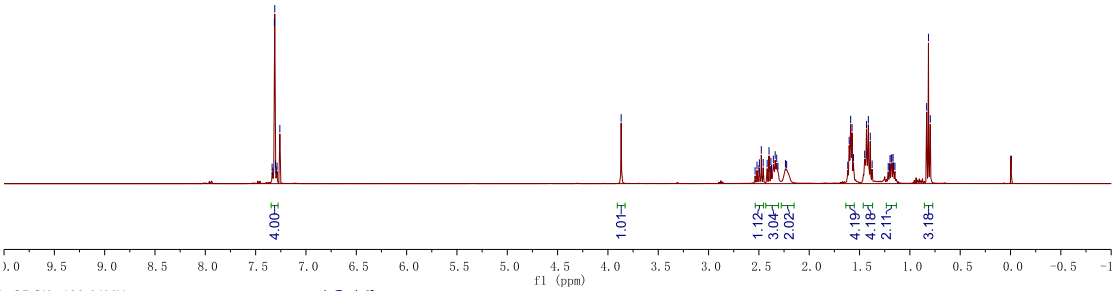
19F NMR CDCl3 376.50MHz



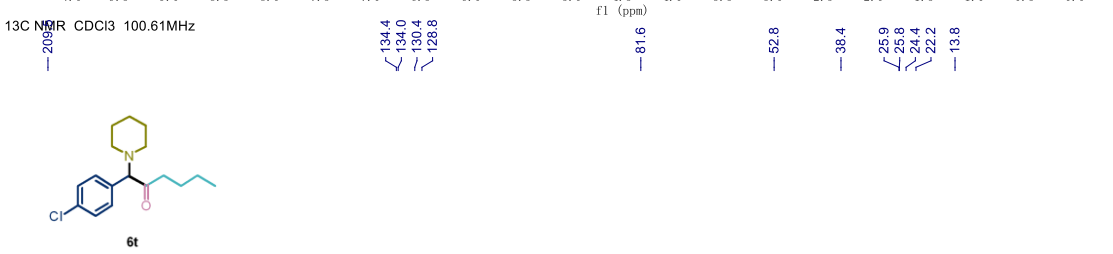
6s

1H NMR CDCl3 400.13MHz

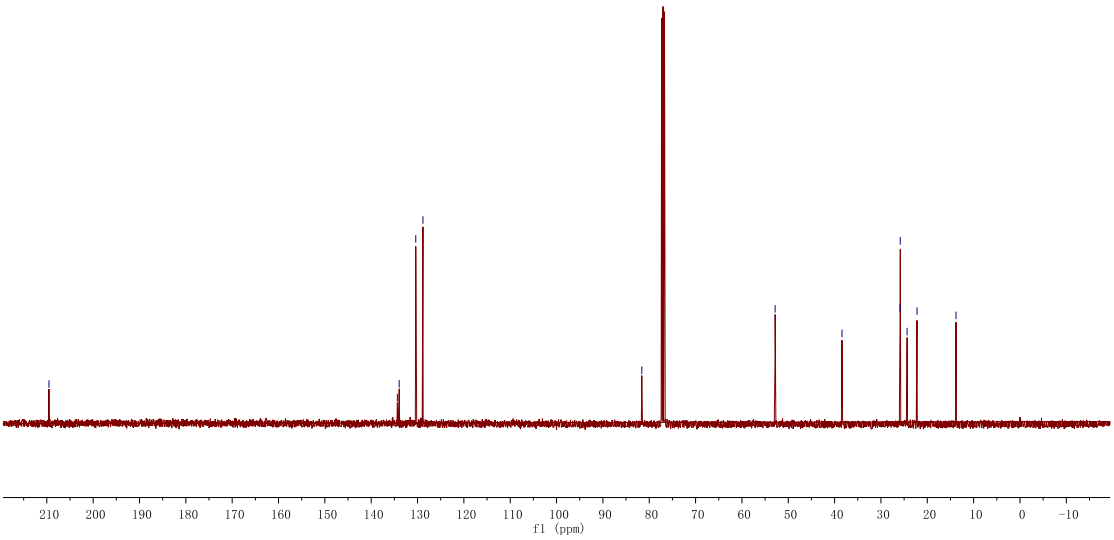
6t



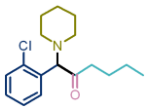
13C NMR CDCl3 100.61MHz



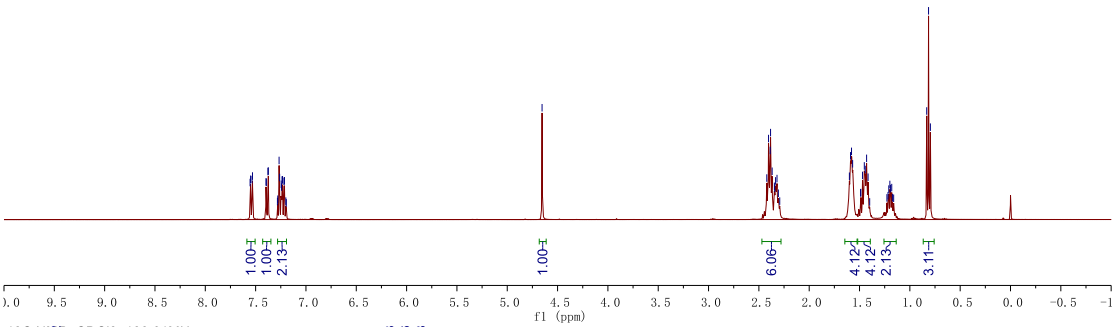
6t

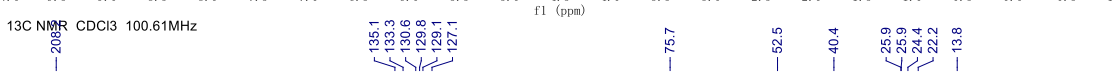


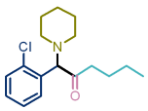

1H NMR CDCl3 400.13MHz
7.45
7.44
7.43
7.42
7.39
7.38
7.37
7.28
7.28
7.27
7.26
7.25
7.24
7.24
7.23
7.22
7.21
7.20
7.20
4.65
2.42
2.40
2.39
2.38
2.37
2.35
2.34
2.33
2.32
2.31
2.29
1.59
1.58
1.57
1.45
1.44
1.43
0.83
0.81
0.80


Cl
N
O

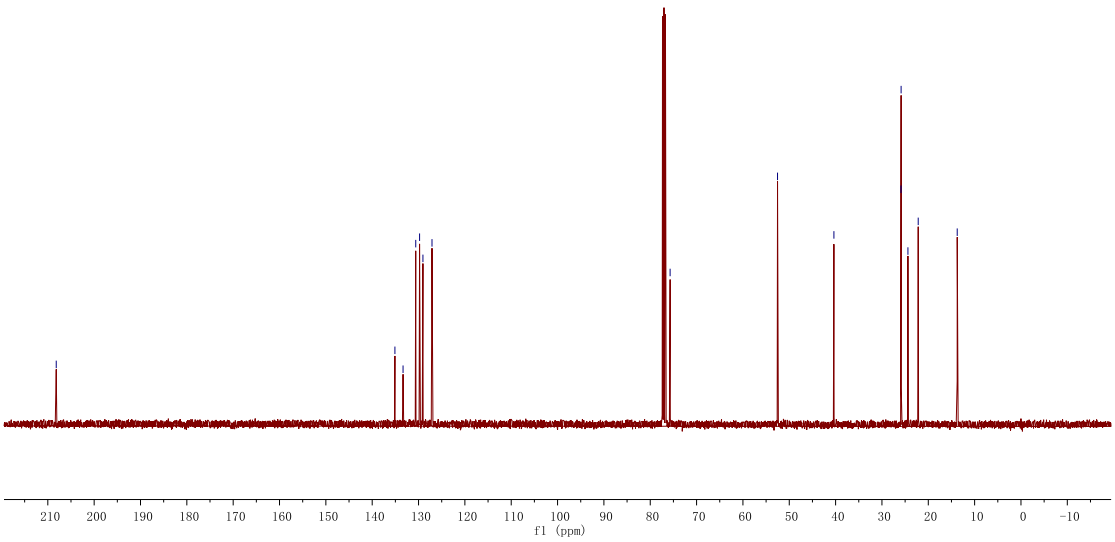
6u


1.00
1.00
2.13
1.00
6.06
4.12
4.12
2.13
3.11
f1 (ppm)

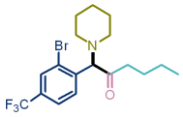

13C NMR CDCl3 100.61MHz
208.7
135.1
133.3
130.6
129.8
129.1
127.1
75.7
52.5
40.4
25.9
25.9
24.4
22.2
13.8


Cl
N
O

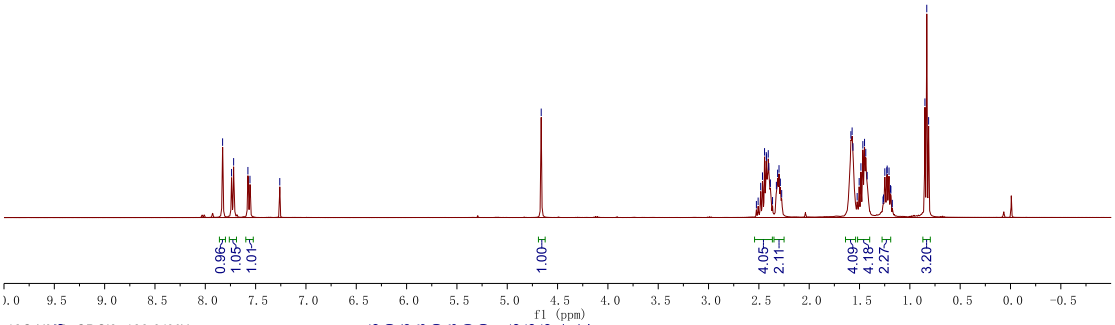
6u


f1 (ppm)

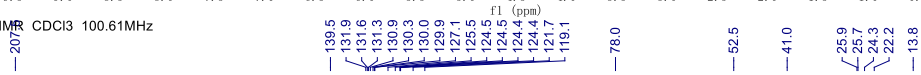
1H NMR CDCl3 400.13MHz

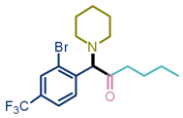


6v

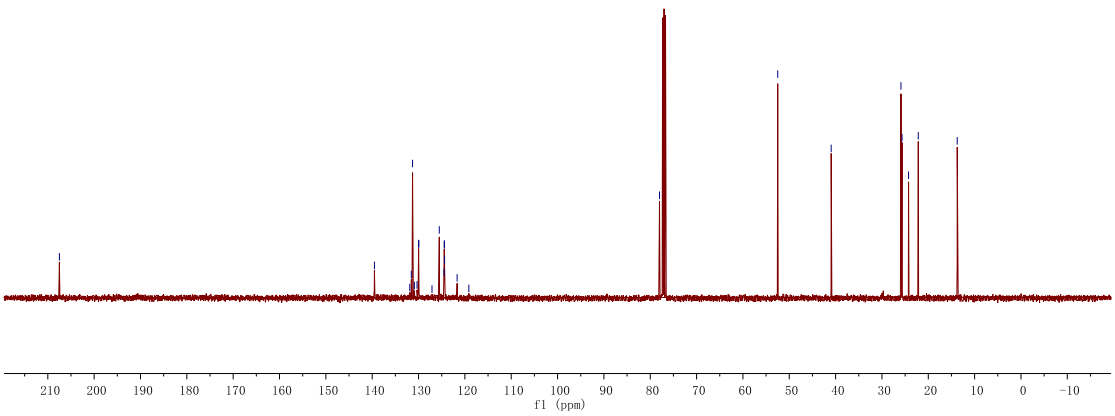


13C NMR CDCl3 100.61MHz

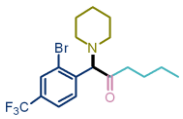




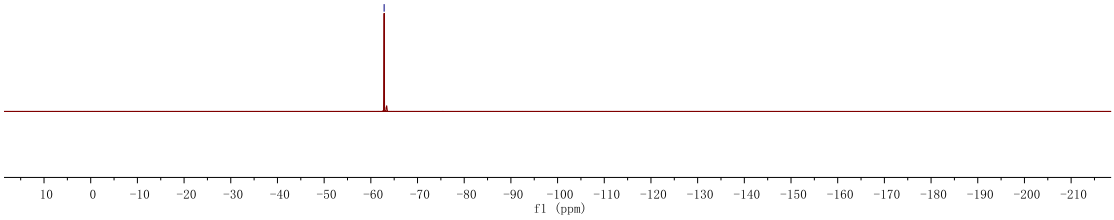
6v



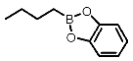
19F NMR CDCl3 376.50MHz

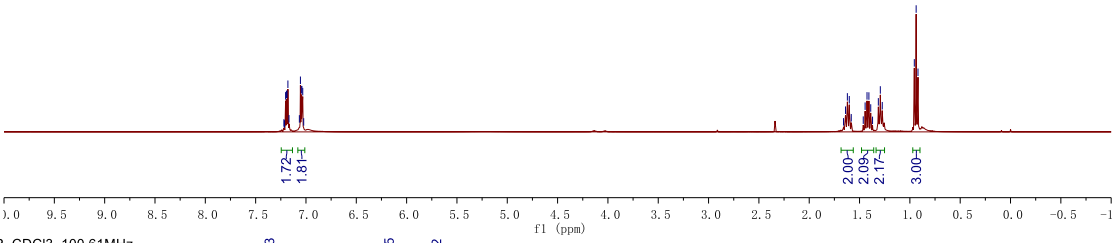


6v



1H NMR CDCl3 400.13MHz





13C NMR CDCl3 100.61MHz