Supporting Information

Electrochemical C-H Functionalization to Synthesize 3-hydroxyalkylquinoxalin-2(1*H*)-ones via quinoxalin-2(1*H*)-ones and Aldehydes

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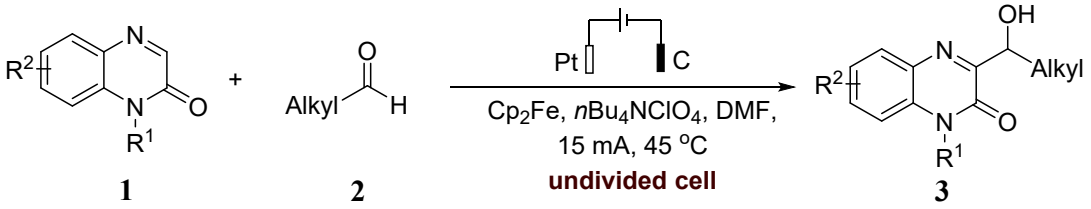
1.General Information

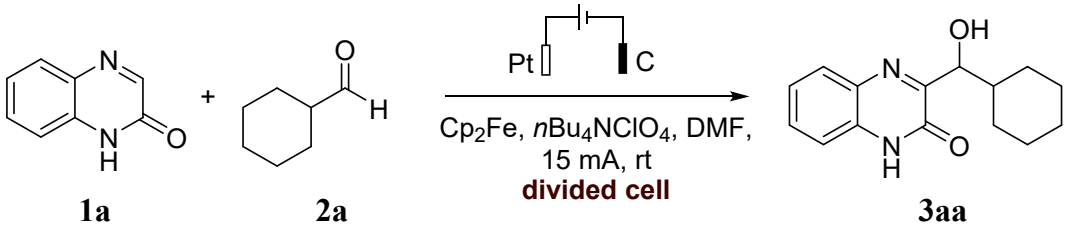
Without special instructions, all reagents and solvents were commercially available and were not further purified. Column chromatography was carried out using silica gel (300-400 mesh). NMR spectroscopy was performed on Bruker AV-400 or Bruker AV-600 instruments. Chemical shifts for ^{1}H NMR spectra are reported as δ in units of parts per million (ppm) downfield from TMS (δ 0.00) and relative to the signal of Dimethyl Sulfoxide-d6 (δ 2.50). The abbreviations used to explain the multiplicities were as follows: s, singlet; d, doublet; t, triplet; m, multiplet; brs, broad singlet and J, coupling constant in Hz. ^{13}C NMR spectra are reported as δ in units of parts per million (ppm) downfield from TMS (δ 0.00) and relative to the signal of Dimethyl Sulfoxide-d6 (δ 39.52). The HRMS spectrum was measured by micromass QTOF2 Quadrupole/Time of Flight Tandem mass spectrometer with electron spray ionization. Cyclic voltammograms were recorded on a CHI 660E potentiostat.

2.Procedures for the Electrolysis



A 10 ml three-necked round-bottomed flask was charged with derivatives of quinoxalin-2(1*H*)-ones **1** (0.4 mmol, 1.0 equiv.), aliphatic aldehydes **2** (2.4 mmol, 6.0 equiv.), nBu$_4$NClO$_4$ (0.6 mmol, 1.5 equiv.) Cp$_2$Fe (0.08 mmol, 20 mol %). The flask was equipped with a platinum plate (1 cm x 1 cm) anode and a graphite rod (Φ 6 mm) cathode, the distance between the two electrodes was 1.6 cm. DMF (6.0 mL) was added. Electrolysis was carried out at 45 ℃, which using a constant current of 15 mA until the substrate was completely consumed (monitored by TLC, about 5 hours). After the reaction was completed, the solvent was extracted with ethyl acetate and water. The aqueous phase was extracted with ethyl acetate (3 x 30.0 mL). The combined organic solution was washed with brine, dried over Na$_2$SO$_4$ and concentrated under reduced pressure. Purification with silica gel column chromatography using ethyl acetate/petroleum ether to afford the desired products **3**. The pictures of reaction set-up were shown in Figure S1.

Figure S1. Electrolysis setup. (undivided cell)

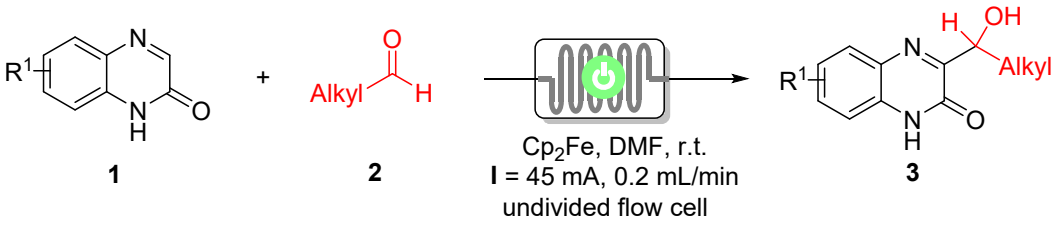


1a **2a** **3aa**

A 10 ml three-necked round-bottomed flask was charged with quinoxalin-2(1*H*)-one **1a** (0.4 mmol, 1.0 equiv.), cyclohexanecarboxaldehyde **2a** (2.4 mmol, 6.0 equiv.), nBu$_4$NClO$_4$ (0.6 mmol, 1.5 equiv.), Cp$_2$Fe (0.08 mmol, 20 mol %). The flask was equipped with a platinum plate (1 cm x 1 cm) anode and a graphite rod (Φ 6 mm) cathode, the distance between the two electrodes was 5.2 cm. DMF (6.0 mL) was added. Electrolysis was carried out in the divided cell at room temperature, which using a constant current of 15 mA until the substrate was completely consumed (monitored by TLC, about 5 hours). The picture of reaction set-up was shown in Figure S2.

Figure S2. Electrolysis setup. (divided cell)

3. Procedures for the Flow Electrolysis

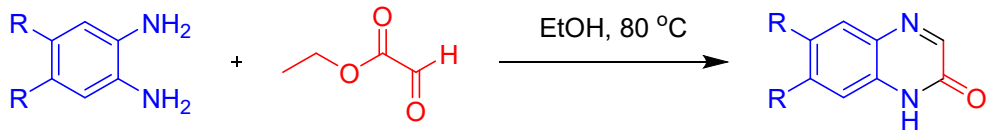


The electrolysis was conducted with a constant current of 45 mA using a flow electrolytic cell equipped with a Pt plate anode and a graphite cathode with the electrode surface of 8 cm × 6 cm. **1** (10.0 mmol, 1.0 equiv.), **2** (60.0 mmol, 6.0 equiv.), Cp_2Fe (2.0 mmol, 20 mol %), nBu$_4$NClO$_4$ (15.0 mmol, 1.5 equiv.), in DMF (150 mL) at room temperature were pushed via peristatic pump to pass through the flow electrolytic cell with a flow rate of 0.2 mL/min. After 12.5 h, the solvent was extracted with ethyl acetate and water. The aqueous phase was extracted with ethyl acetate (3 x 200 mL). The combined organic solution was washed with brine, dried over Na_2SO_4 and concentrated under reduced pressure. Purification with silica gel column chromatography using ethyl acetate/petroleum ether to afford the desired products **3**. The picture of reaction set-up was shown in Figure S3.

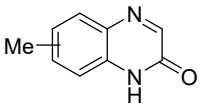
Figure S3. Flow electrolysis setup. (undivided flow cell)

4. General procedure for the synthesis of starting materials

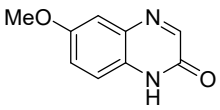
(**1**)



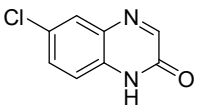
The substituted quinoxalin-2(1*H*)-ones were prepared according to literature procedure[1]. To ethanol (8.0 ml) suspension solution of *o*-arylenediamine (2.0 mmol) was added ethyl 2-oxoacetate (2.4 equiv., 50% toluene solution). The reaction system was stirred and heated to refluxing at 80 °C for 1 h, Then the reaction was cooled. The precipitate was filtered and washed with ethanol, and finally dried to give quinoxalin-2(1*H*)-ones (**1b-1e**).



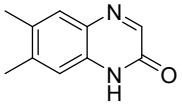
1b



1c

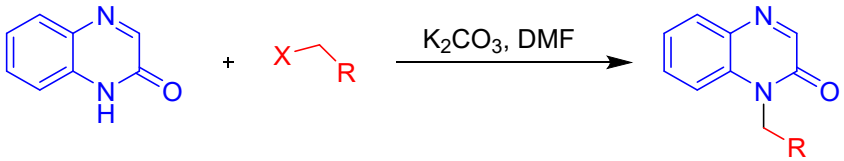


1d

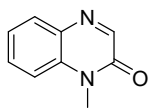


1e

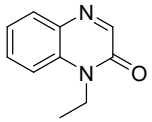
(**2**)



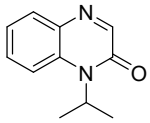
A typical procedure[1]: To a stirred solution of quinoxalin-2(1*H*)-ones (3.0 mmol) in DMF (10.0 mL) was added the corresponding halide (1.6 equiv.) and potassium carbonate (1.2 equiv.) at room temperature overnight. Then the resulting mixture was added with water, and extracted with et hyl acetate for three times. The combined organic layers were dried over Na_2SO_4, filtered and evaporated under reduced pressure. The residue was purified by column chromatography on silica gel to obtain the desired products (**1f-1k**).



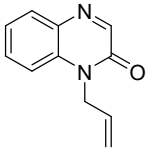
1f



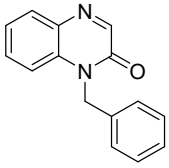
1g`



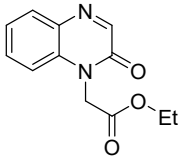
1h



1i



1j



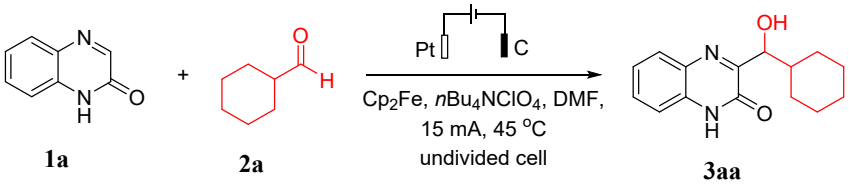
1k

REFERENCES

[1] H. Ni; X. Shi; Y. Li; X. Zhang; J. Zhao and F. Zhao, Metal-free C3-H acylation of quinoxalin-2(1*H*)-ones with alpha-oxo-carboxylic acids, *Org. Biomol. Chem.,* 2020, **18**, 6558-6563.

5. Additional Optimization of Reaction Conditions

Table S1. Optimization of the reaction conditions[a]



1a **2a** **3aa**

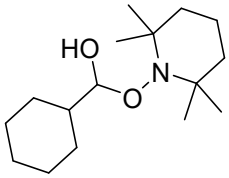
Entry	Variation from standard conditions	Yield[b] (%)
1	graphite rod as anode, graphite rod as cathode	52
2	RVC as anode, graphite rod as cathode	49
3	Mg as anode, graphite rod as cathode	trace
4	Pt plate as anode, Pt plate as cathode	45
5	Pt plate as anode, RVC as cathode	66
6	DMSO as solvent	trace
7	EtOH as solvent	trace
8	MeCN as solvent	trace
9	MeOH as solvent	trace
10	DMA as solvent	60
11	HFIP as solvent	trace
12	without nBu$_4$NClO$_4$	NR
13	nBu$_4$NPF$_4$ as electrolyte	55
14	nBu$_4$NPF$_6$ as electrolyte	58
15	nBu$_4$NHSO$_4$ as electrolyte	46
16	nBu$_4$NCl as electrolyte	62
17	Et$_4$NOTs as electrolyte	42
18	reaction at 0 °C	trace
19	reaction at 25 °C	55
20	reaction at 60 °C	62
21	reaction at 80 °C	58
22	reaction at 100 °C	46
23	5 mA	55
24	20 mA	65
25	30 mA	64

26	Cp_2Fe (15 mol %)	69
27	Cp_2Fe (30 mol %)	65
28	reaction under Ar	61

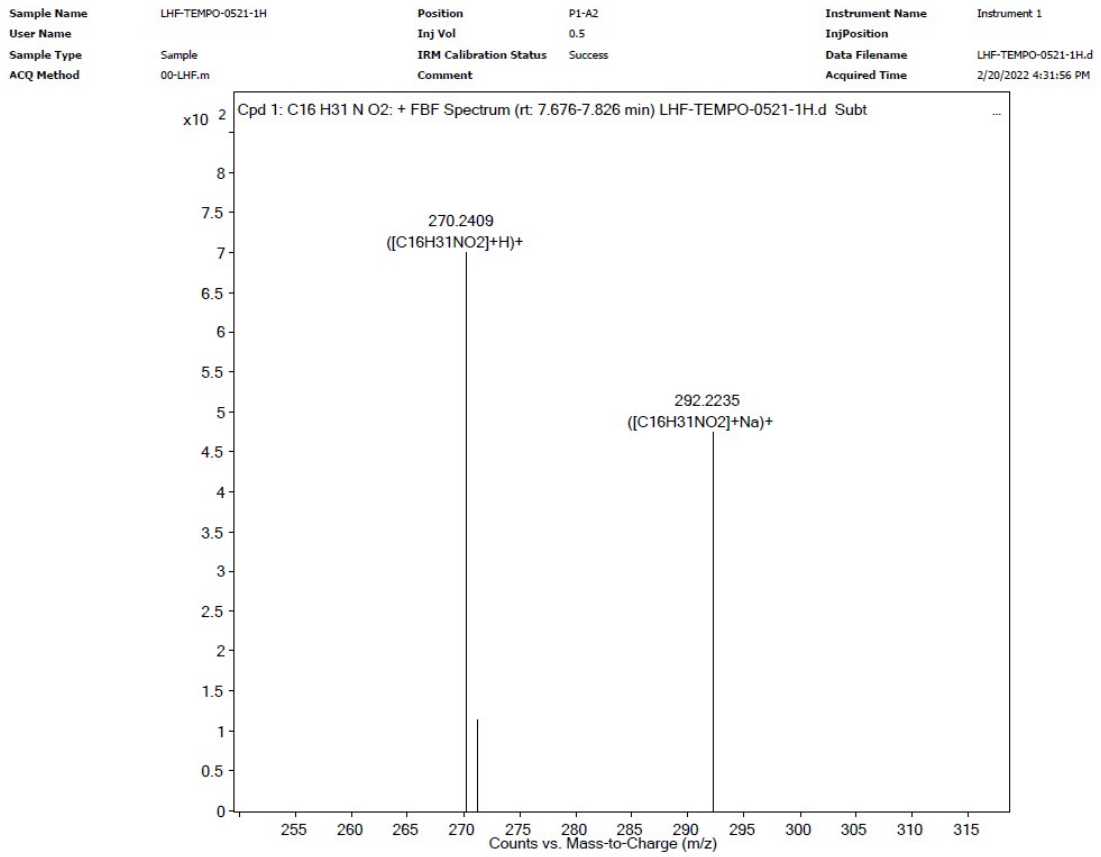
[a]Reaction conditions: A platinum plate (1 cm x 1 cm) anode and a graphite rod (Φ 6 mm) cathode, undivided cell, **1a** (0.4 mmol, 1.0 equiv.), **2a** (2.4 mmol, 6.0 equiv.), catalyst (20 mol %), electrolyte (1.5 equiv.), DMF (6.0 mL), 45 ℃, 15 mA, 5 h (7.0 F/mol). [b]Isolated yields. NR = no reaction.

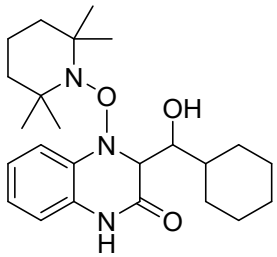
6. The Control experiments

6.1 The HRMS spectra of compounds 4, 5, 6, 7 and 8



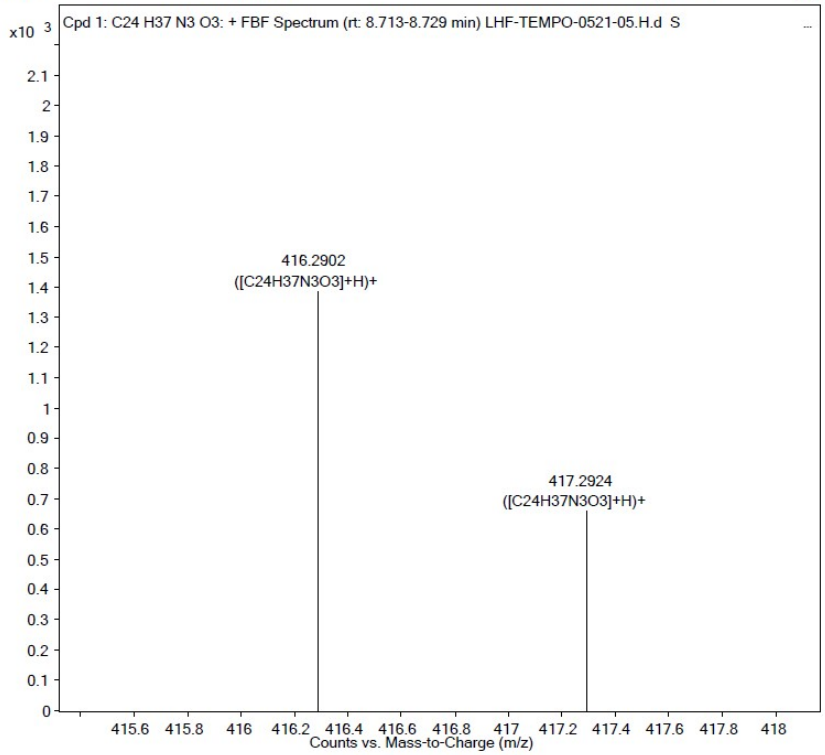
Compound **4**：**HRMS**(m/z) [ESI]: calculated for $C_{16}H_{32}NO_2^+$[M+H]$^+$: 270.2428, found 270.2409.

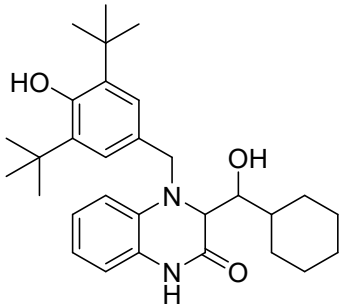




Compound **5**：**HRMS**(m/z) [ESI]: calculated for $C_{24}H_{38}N_3O_3^+[M+H]^+$: 416.2908, found 416.2902.

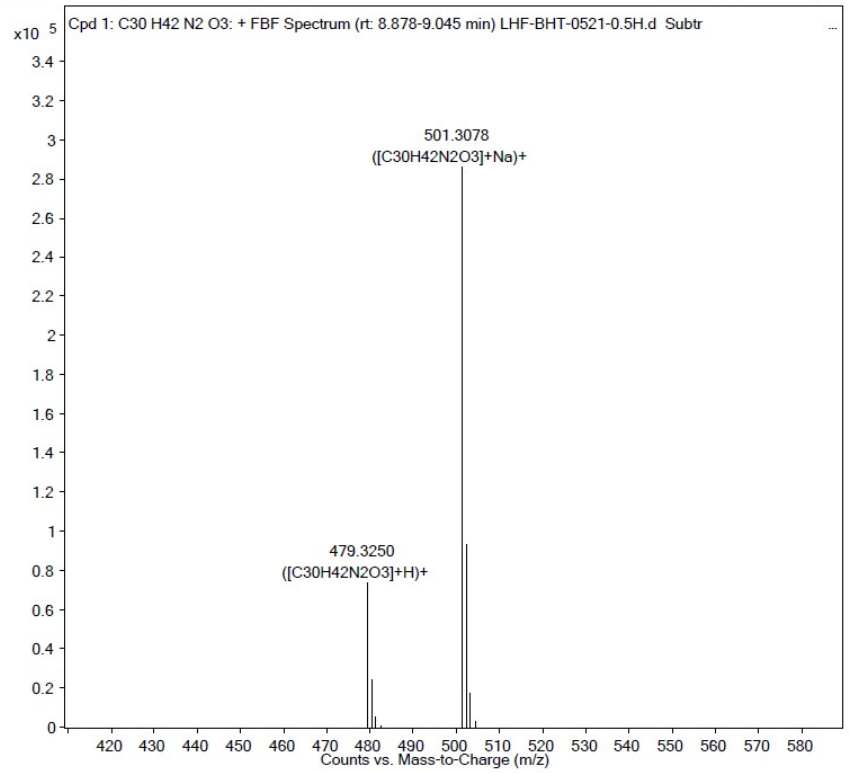
Sample Name	LHF-TEMPO-0521-05.H	**Position**	P1-A1	**Instrument Name**	Instrument 1
User Name		**Inj Vol**	0.5	**InjPosition**	
Sample Type	Sample	**IRM Calibration Status**	Success	**Data Filename**	LHF-TEMPO-0521-05.H.d
ACQ Method	00-LHF.m	**Comment**		**Acquired Time**	2/20/2022 4:18:12 PM

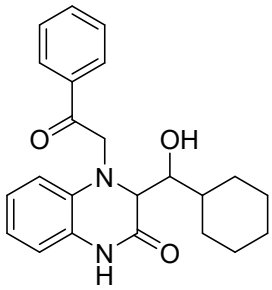




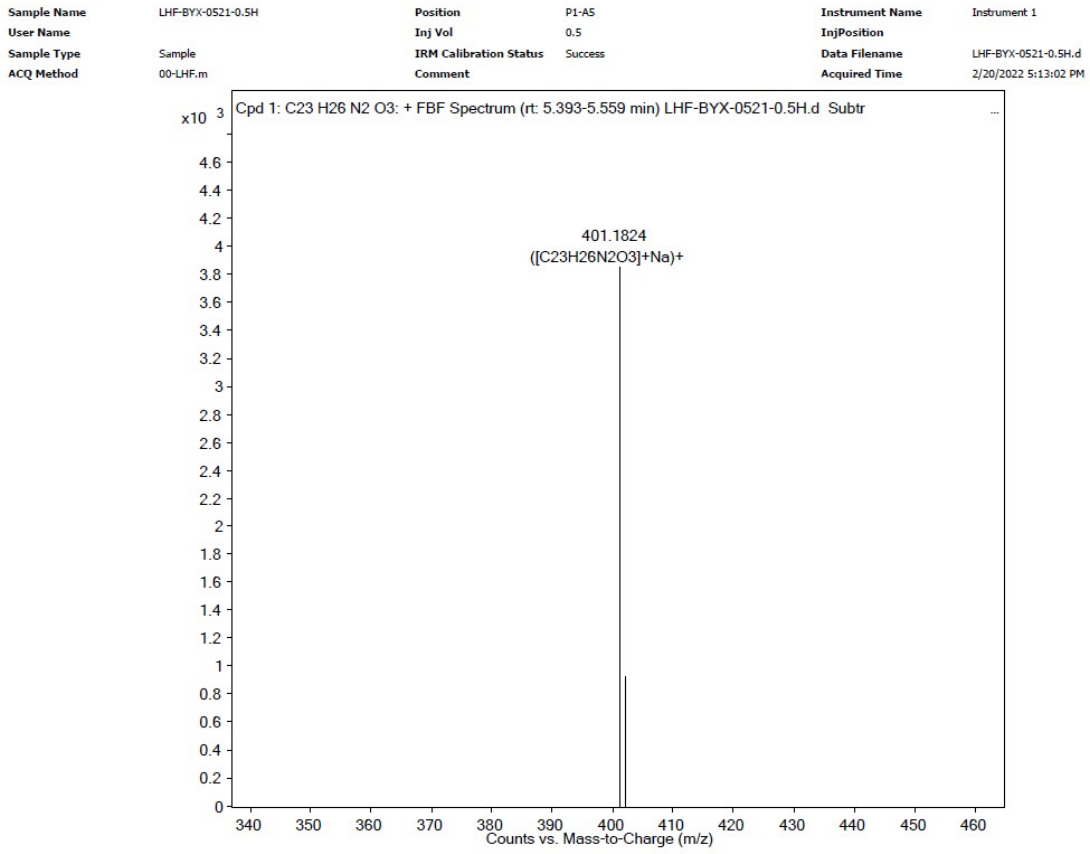
Compound **6**：**HRMS**(m/z) [ESI]: calculated for $C_{30}H_{42}N_2O_3$+Na^+ $[M+Na]^+$: 501.3088, found 381.2266.

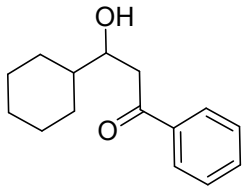
Sample Name	LHF-BHT-0521-0.5H	**Position**	P1-A3	**Instrument Name**	Instrument 1
User Name		**Inj Vol**	0.5	**InjPosition**	
Sample Type	Sample	**IRM Calibration Status**	Success	**Data Filename**	LHF-BHT-0521-0.5H.d
ACQ Method	00-LHF.m	**Comment**		**Acquired Time**	2/20/2022 4:45:37 PM



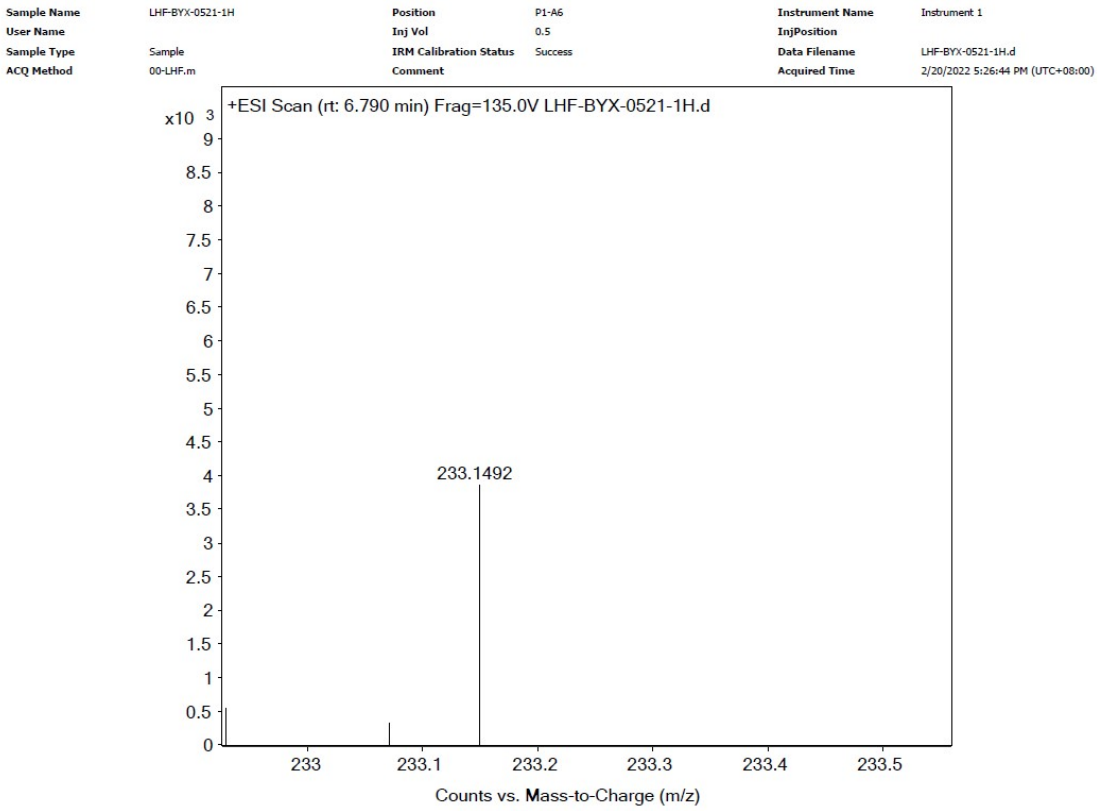


Compound **7**：**HRMS**(m/z) [ESI]: calculated for $C_{23}H_{26}N_2O_3$+Na^+ $[M+Na]^+$: 401.1836, found 401.1824.



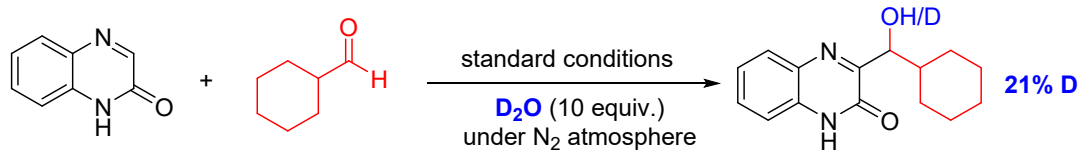


Compound **8**：**HRMS**(m/z) [ESI]: calculated for $C_{15}H_{21}O_2^+[M+H]^+$: 233.1536, found 233.1492.



6.2 Deuterium-labeling experiments

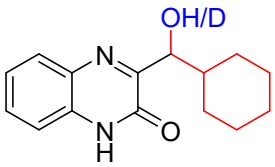
(1)



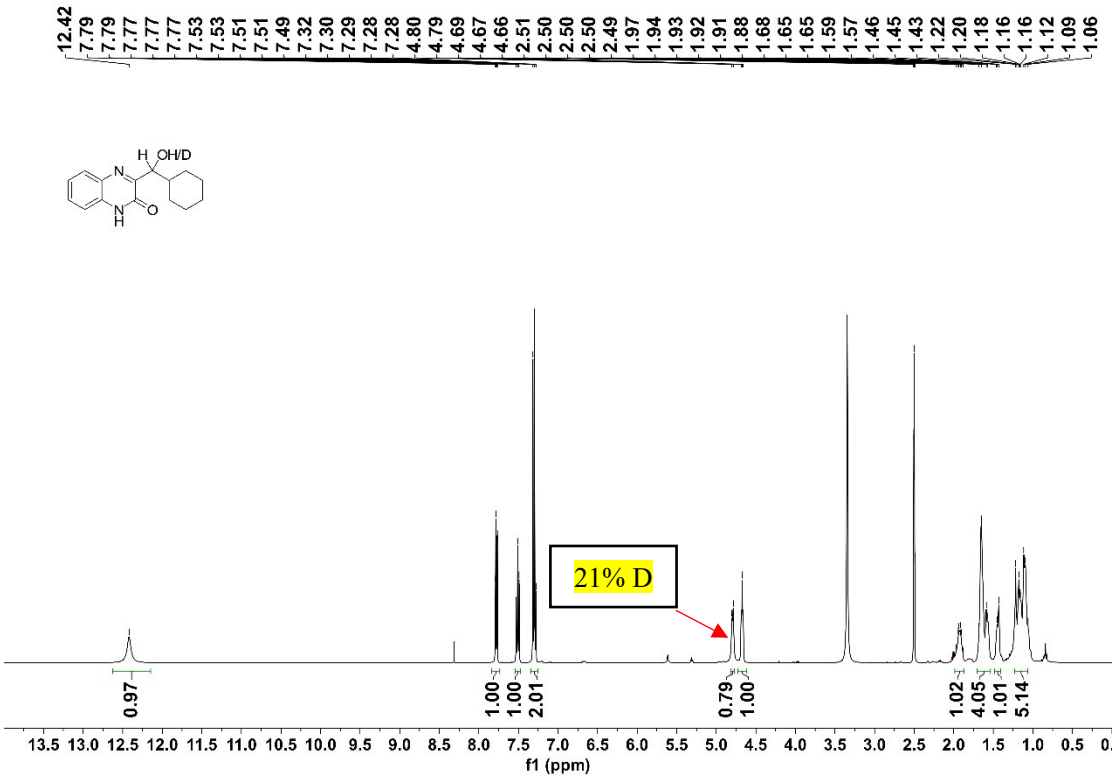
1a **2a** **3aa & 3aa-*d***

A 10 ml three-necked round-bottomed flask was charged with quinoxalin-2(1*H*)-one **1a** (0.4 mmol, 1.0 equiv.), cyclohexanecarboxaldehyde **2a** (2.4 mmol, 6.0 equiv.), nBu$_4$NClO$_4$ (0.6 mmol, 1.5 equiv.) Cp$_2$Fe (0.08 mmol, 20 mol %) and **deuterium oxide** (10 equiv.). The flask was equipped with a platinum plate (1 cm x 1 cm) anode and a graphite rod (Φ 6 mm) cathode, the distance between the two electrodes was 1.6 cm. Dry DMF (6.0 mL) was added. Electrolysis was carried out at 45 °C, under N_2 atmosphere, which using a constant current of 15 mA until the substrate was completely consumed (monitored by TLC, about 5 hours). After the reaction was completed, the solvent was extracted with ethyl acetate and water. The aqueous phase was extracted with ethyl acetate (3 x 30.0 mL). The combined organic solution was washed with brine, dried over Na_2SO_4 and concentrated under reduced pressure. Purification with silica gel column chromatography using ethyl acetate/petroleum ether to afford the desired products **3aa** and **3aa-*d*** (**3aa**: **3aa-*d*** = 79:21), yield 73%.

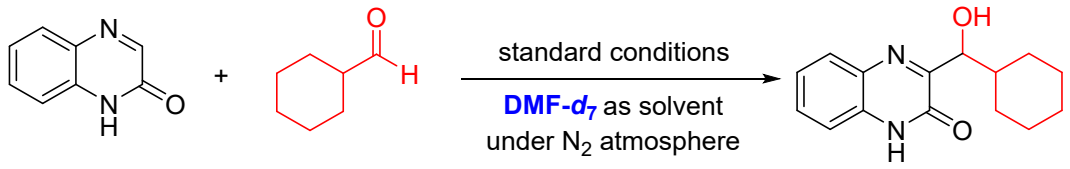
^{1}H NMR spectra of Compounds 3aa & 3aa-*d*



3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3aa & 3aa-*d*). white solid (75.4 mg, 73%). mp: 144 - 145 °C. **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.42 (s, 1H), 7.79 - 7.77 (m, 1H), 7.53- 7.49 (m, 1H), 7.32 - 7.28 (m, 2H), 4.79 (d, J=6.7, 0.79H), 4.67 (t, J=5.6, 1H), 1.97 - 1.88 (m, 1H), 1.68 - 1.57 (m, 4H), 1.46-1.43 (m, 1H), 1.22 - 1.06 (m, 5H).

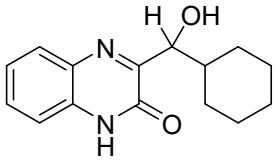


(2)

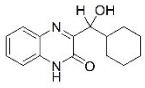


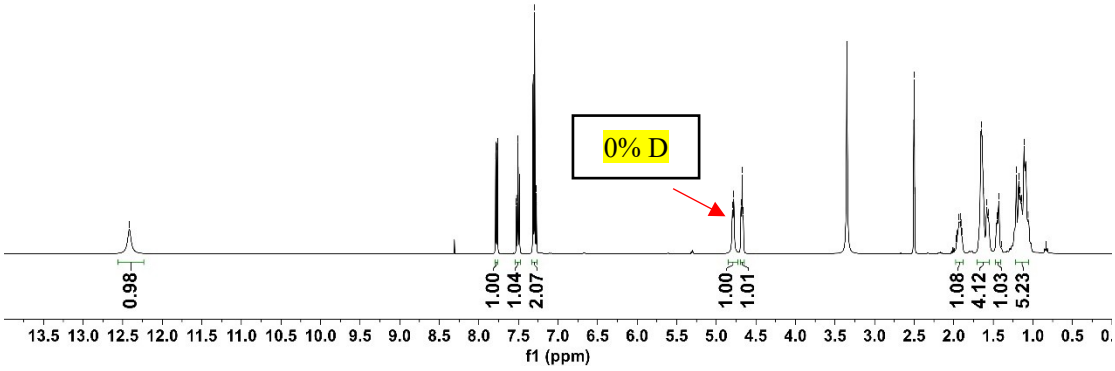
1a **2a** **3aa**

A 10 ml three-necked round-bottomed flask was charged with quinoxalin-2(1*H*)-one **1a** (0.4 mmol, 1.0 equiv.), cyclohexanecarboxaldehyde **2a** (2.4 mmol, 6.0 equiv.), nBu$_4$NClO$_4$ (0.6 mmol, 1.5 equiv.) Cp_2Fe (0.08 mmol, 20 mol %). The flask was equipped with a platinum plate (1 cm x 1 cm) anode and a graphite rod (Φ 6 mm) cathode, the distance between the two electrodes was 1.6 cm. **DMF-d_7** (6.0 mL) was added. Electrolysis was carried out at 45 ℃, under N_2 atmosphere, which using a constant current of 15 mA until the substrate was completely consumed (monitored by TLC, about 5 hours). After the reaction was completed, the solvent was extracted with ethyl acetate and water. The aqueous phase was extracted with ethyl acetate (3 x 30.0 mL). The combined organic solution was washed with brine, dried over Na_2SO_4 and concentrated under reduced pressure. Purification with silica gel column chromatography using ethyl acetate/petroleum ether to afford the desired products **3aa** in 71% yield.



3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3aa). white solid (73.4 mg, 71%). mp: 144 - 145 °C. **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.42 (s, 1H), 7.78 (dd, *J*=8.0, 1.4, 1H), 7.53-7.48 (m, 1H), 7.32 - 7.27 (m, 2H), 4.79 (d, *J*=6.8, 1H), 4.67 (t, *J*=5.8, 1H), 1.97 - 1.90 (m, 1H), 1.65 - 1.56 (m, 4H), 1.46-1.39 (m, 1H), 1.21-1.04 (m, 5H). **HRMS** (m/z) [ESI]: calculated for $C_{15}H_{19}N_2O_2^+$ m/z $[M+H]^+$: 259.1441, found 259.1443.





7. Cyclic Voltammetry Studies

The cyclic voltammograms were recorded in an electrolyte solution of nBu$_4$NClO$_4$ (0.1 M) in DMF using a glassy carbon disk working electrode (diameter, 3 mm), a Pt wire auxiliary electrode and an Ag/AgCl reference electrode. The scan rate was 100 mV/s.

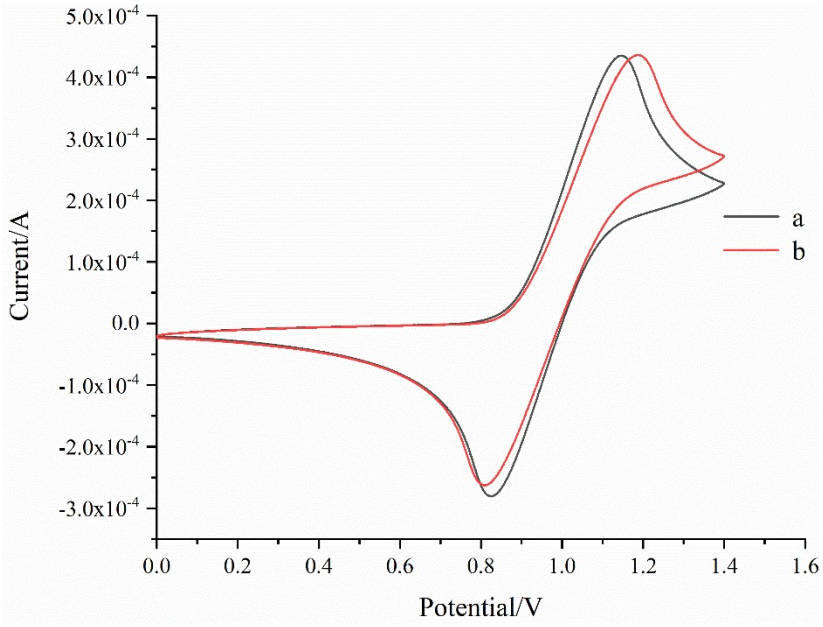


Figure S4-1. Cyclic voltammograms. (a) A1 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 1.148 V, $i_{p,c}$ = 0.435 mA. (b) **1a** (0.3 mM) + **2a** (1.8 mM) + A1 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 1.186 V, $i_{p,c}$ = 0.436 mA.

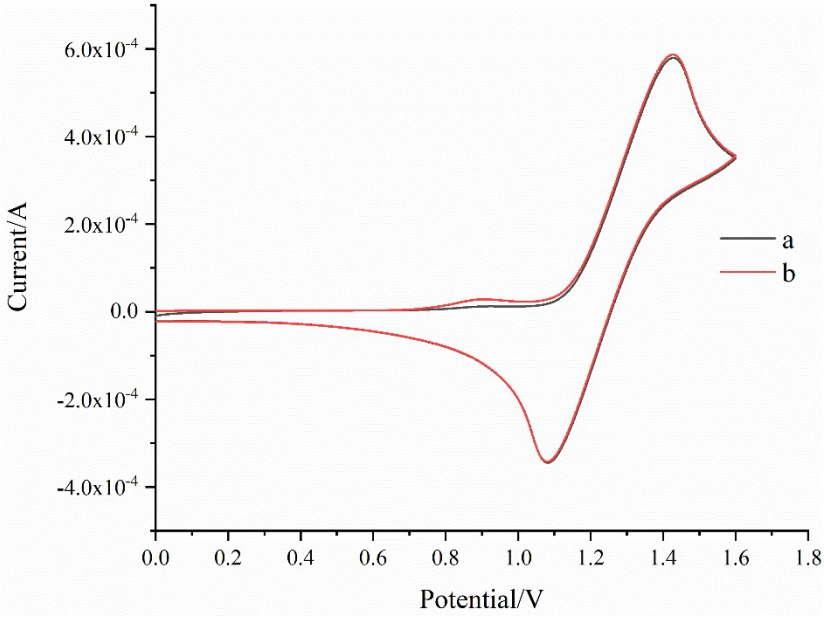


Figure S4-2. Cyclic voltammograms. (a) A2 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 1.427 V, $i_{p,c}$ = 0.577 mA. (b) **1a** (0.3 mM) + **2a** (1.8 mM) + A2 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 1.429 V, $i_{p,c}$ = 0.578 mA.

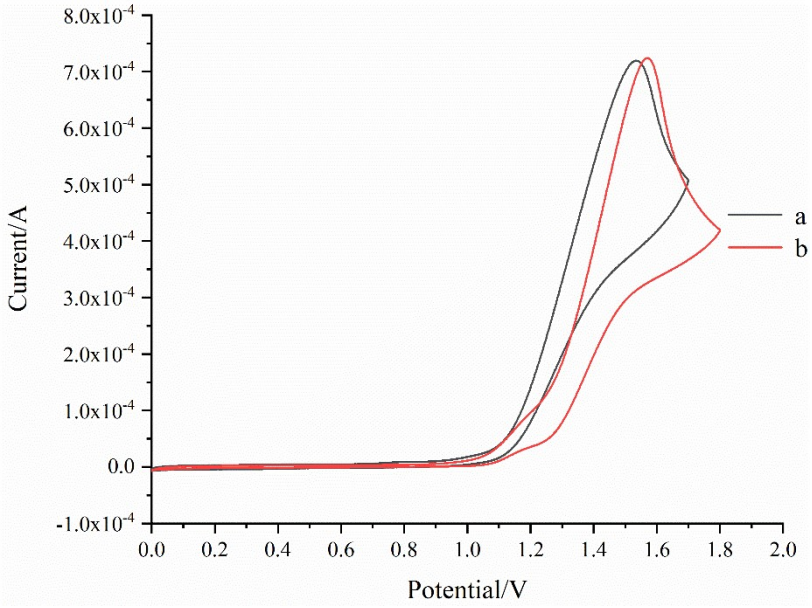


Figure S4-3. Cyclic voltammograms. (a) A3 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 1.534 V, $i_{p,c}$ = 0.720 mA. (b) **1a** (0.3 mM) + **2a** (1.8 mM) + A3 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 1.523 V, $i_{p,c}$ = 0.722 mA.

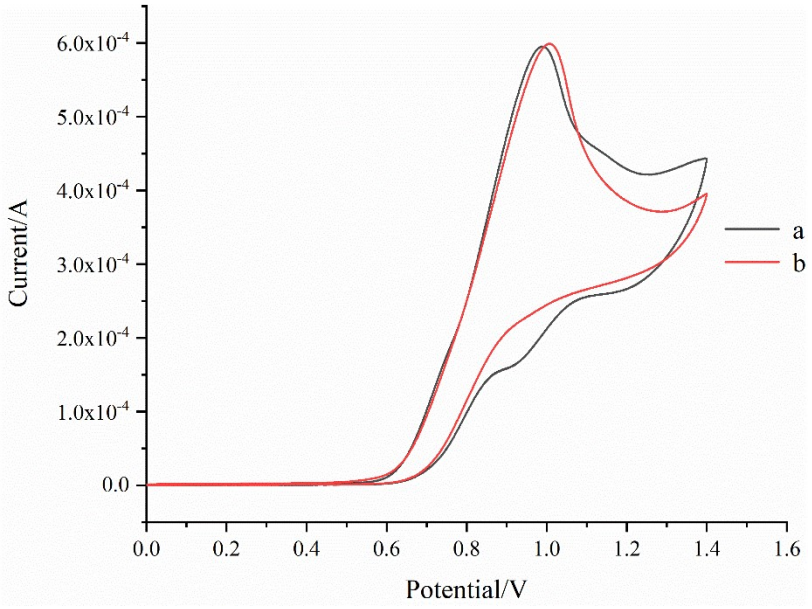


Figure S4-4. Cyclic voltammograms. (a) A4 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 0.988 V, $i_{p,c}$ = 0.593 mA. (b) **1a** (0.3 mM) + **2a** (1.8 mM) + A4 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 1.008 V, $i_{p,c}$ = 0.594 mA.

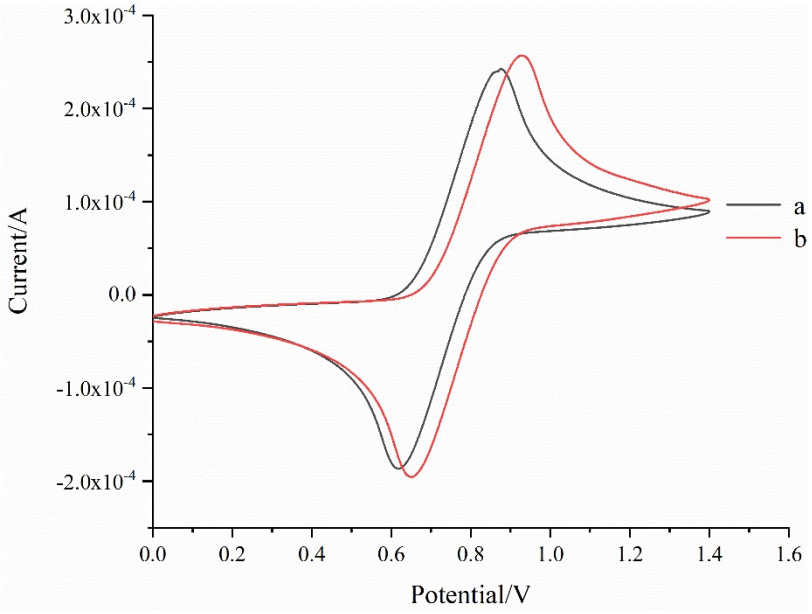
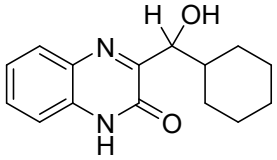
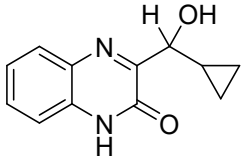


Figure S4-5. Cyclic voltammograms. (a) A5 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 0.973 V, $i_{p,\,c}$ = 0.548 mA. (b) **1a** (0.3 mM) + **2a** (1.8 mM) + A5 (0.15 mM) + nBu$_4$NClO$_4$ (0.1 M), $E_{p/2}$ = 1.008 V, $i_{p,\,c}$ = 0.558 mA.

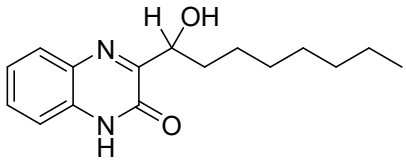
8. Characterization Data for the Electrolysis Products



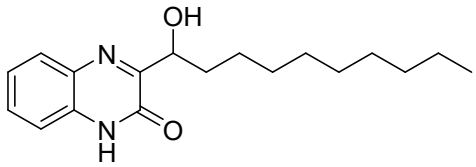
3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3aa). white solid (78.5 mg, 76%). mp: 144 - 145 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.43 (s, 1H), 7.77 (dd, J = 8.1, 1.3 Hz, 1H), 7.52 - 7.49 (m, 1H), 7.30 - 7.28 (m, 2H), 4.81 (d, J = 6.8 Hz, 1H), 4.67 (t, J = 6.2 Hz, 1H), 1.96 - 1.87 (m, 1H), 1.66 - 1.55 (m, 4H), 1.4 - 1.42 (m, 1H), 1.20 - 1.05 (m, 5H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 161.93, 154.24, 131.80, 131.28, 130.05, 128.39, 123.37, 115.40. **HRMS** (m/z) [ESI]: calculated for $C_{15}H_{19}N_2O_2^+$ m/z $[M+H]^+$: 259.1441, found 259.1443.



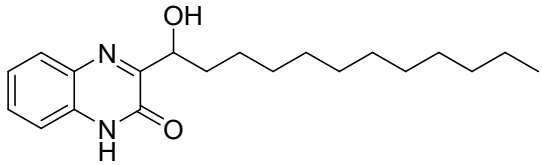
3-(cyclopropyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3ab). yellow solid (58.0 mg, 67%). mp: 146 - 147 °C. **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.45 (s, 1H), 7.79 - 7.77 (m, 1H), 7.54-7.50 (m, 1H), 7.32 - 7.28 (m, 2H), 5.00 (d, J = 6.5 Hz, 1H), 4.44 (t, J = 6.8 Hz, 1H), 1.38 - 1.31 (m, 1H), 0.42 - 0.35 (m, 4H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 161.81, 154.21, 131.87, 131.29, 130.06, 128.39, 123.34, 115.35, 71.02, 15.31, 2.39, 1.67. **HRMS** (m/z) [ESI]: calculated for $C_{12}H_{13}N_2O_2^+$ m/z $[M+H]^+$: 217.0972, found 217.0983.



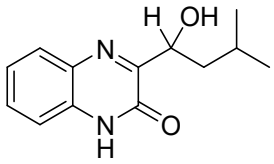
3-(1-hydroxyoctyl)quinoxalin-2(1*H*)-one (3ac). white solid (75.7 mg, 69%). mp: 135 - 136 °C. **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.42 (s, 1H), 7.78 - 7.76 (m, 1H), 7.53 - 7.48 (m, 1H), 7.31 - 7.27 (m, 2H), 4.92 - 4.85 (m, 2H), 1.86 - 1.78 (m, 1H), 1.65 - 1.56 (m, 1H), 1.40 - 1.21 (m, 10H), 0.85 - 0.81 (m, 3H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 162.35, 154.04, 131.86, 131.26, 129.93, 128.31, 123.28, 115.33, 68.54, 34.58, 31.26, 28.94, 28.66, 25.28, 22.09, 13.95. **HRMS** (m/z) [ESI]: calculated for $C_{16}H_{23}N_2O_2^+$ m/z $[M+H]^+$: 275.1754, found 275.1757.



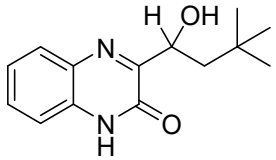
3-(1-hydroxydecyl)quinoxalin-2(1*H*)-one (3ad). white solid (79.8 mg, 66%). mp: 151 - 152 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.43 (s, 1H), 7.78 - 7.76 (m, 1H), 7.51 (td, *J* = 7.6, 1.4 Hz, 1H), 7.31 - 7.28 (m, 2H), 4.92 (s, 1H), 4.87 (dd, *J*= 8.2, 4.3 Hz, 1H), 1.84 - 1.79 (m, 1H), 1.63 - 1.57 (m,1H), 1.44 - 1.39 (m, 1H), 1.36 - 1.32 (m, 1H), 1.26 - 1.19 (m, 12H), 0.83 (t, *J*=6.9 Hz, 3H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 162.37, 154.06, 131.89, 131.27, 129.94, 128.32, 123.28, 115.35, 68.52, 34.57, 31.31, 29.00, 28.97, 28.71, 25.27, 22.12, 13.98. **HRMS** (m/z) [ESI]: calculated for $C_{18}H_{27}N_2O_2^+$ m/z $[M+H]^+$: 303.2067, found 303.2066.



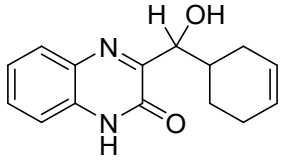
3-(1-hydroxydodecyl)quinoxalin-2(1*H*)-one (3ae). white solid (84.6 mg, 64%). mp: 145 - 146 °C. **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.42 (s, 1H), 7.76 (dt, *J* = 7.8, 1.3 Hz, 1H), 7.52-7.48 (m, 1H), 7.31-7.27 (m, 2H), 4.92 - 4.85 (m, 2H), 1.86 - 1.77 (m, 1H), 1.64 - 1.56 (m, 1H), 1.35-1.20 (m, 18H), 0.85 - 0.81 (m, 3H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 162.33, 154.04, 131.87, 131.26, 129.92, 128.31, 123.27, 115.33, 68.55, 34.58, 31.32, 29.06, 29.03, 29.01, 29.00, 28.98, 28.73, 25.26, 22.12, 13.96. **HRMS** (m/z) [ESI]: calculated for $C_{20}H_{31}N_2O_2^+$ m/z $[M+H]^+$: 331.2380, found 331.2388.



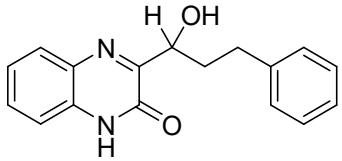
3-(1-hydroxy-3-methylbutyl)quinoxalin-2(1*H*)-one (3af). white solid (53.9 mg, 58%). mp: 150 - 151 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.43 (s, 1H), 7.76 (d, *J* = 8.0 Hz, 1H), 7.51 - 7.48 (m, 1H), 7.31 - 7.27 (m, 2H), 4.97 (dd, *J* = 9.1 Hz, 4.0, 1H), 4.91 (s, 1H), 1.88 - 1.81 (m, 1H), 1.61 - 1.52 (m, 2H), 0.94 (d, *J* = 6.6 Hz, 3H), 0.90 (d, *J* = 6.7 Hz, 3H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 162.68, 154.04, 131.90, 131.33, 129.92, 128.31, 123.28, 115.36, 66.91, 43.73, 24.37, 23.55, 21.70. **HRMS** (m/z) [ESI]: calculated for $C_{13}H_{17}N_2O_2^+$ m/z $[M+H]^+$: 233.1285, found 233.1287.



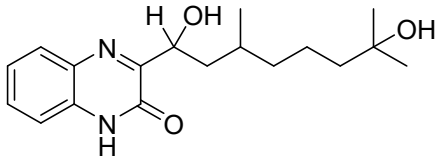
3-(1-hydroxy-3,3-dimethylbutyl)quinoxalin-2(1*H*)-one (3ag). yellow (64.0 mg, 65%). mp: 169-170 °C. dr 1:1.1, as an inseparable diastereomeric mixture. **^{1}H NMR** (600 MHz, DMSO-d_6) δ = 7.76 (dd, *J* = 8.1, 1.4 Hz, 1H), 7.51 - 7.48 (m, 1H), 7.32 - 7.27 (m, 2H), 5.07 (d, *J* = 3.4 Hz, 0.48H), 4.83 (s, 1H), 5.06 (d, *J* = 3.4 Hz, 0.52H) 1.75 (dd, *J* = 14.0, 3.4 Hz, 1H), 1.49 (dd, *J* = 14.0, 8.4 Hz, 1H), 0.96 (s, 9H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 162.97, 154.02, 131.99, 131.30, 129.88, 128.28, 123.26, 115.40, 66.59, 47.89, 30.40, 30.17. **HRMS** (m/z) [ESI]: calculated for $C_{14}H_{19}N_2O_2^+$ m/z $[M+H]^+$: 247.1441, found 247.1442.



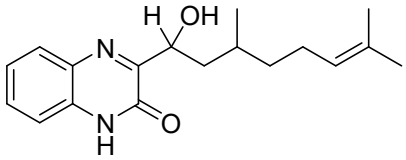
3-(cyclohex-3-en-1-yl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3ah). white solid (68.7 mg, 67%). mp: 134 - 135 °C. dr 1:1, as an inseparable diastereomeric mixture. **^{1}H NMR** (600 MHz, DMSO-d_6) δ = 12.45 (d, *J*=7.8, 1H), 7.79 (dd, *J* = 8.1, 3.1 Hz, 1H), 7.52 (t, *J* = 7.7 Hz, 1H), 7.32-7.29 (m, 2H), 5.64- 5.57 (m, 2H), 4.95 (d, *J* = 30.6 Hz, 1H), 4.80 (d, *J* = 5.9 Hz, 0.5H), 4.73 (d, *J* = 6.6 Hz, 0.5H) 2.28 - 2.15 (m, 1H), 2.04 - 1.80 (m, 5H), 1.45.1.27 (m, 1H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 161.56, 161.54, 154.30, 154.20, 131.84, 131.32, 131.24, 130.11, 130.09, 128.43, 128.41, 126.93, 126.51, 126.34, 123.36, 72.31, 71.90, 37.33, 36.97, 27.98, 25.93, 25.60, 24.81, 24.62, 23.36. **HRMS** (m/z) [ESI]: calculated for $C_{15}H_{17}N_2O_2^+$ m/z $[M+H]^+$: 257.1285, found 257.1282.



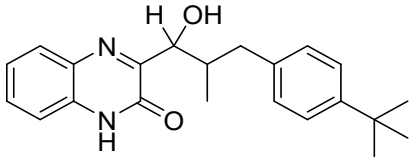
3-(1-hydroxy-3-phenylpropyl)quinoxalin-2(1*H*)-one (3ai). white solid (80.7 mg, 72%). mp: 158 - 159 °C. **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.41 (s, 1H), 7.78 (dd, *J* = 8.5, 1.3 Hz, 1H), 7.51 (td, *J* = 7.5, 1.4 Hz, 1H), 7.32 - 7.12 (m, 9H), 5.12 (d, *J* = 6.4 Hz, 1H), 4.94 - 4.89 (m, 1H), 2.82 - 2.69 (m, 2H), 2.19 - 2.10 (m, 1H), 2.00 - 1.90 (m, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 161.94, 154.05, 141.97, 131.94, 131.29, 129.99, 128.38, 128.30, 128.24, 125.63, 123.28, 115.34, 68.07, 36.20, 31.42. **HRMS** (m/z) [ESI]: calculated for $C_{17}H_{17}N_2O_2^+$ m/z $[M+H]^+$: 281.1285, found 281.1294.



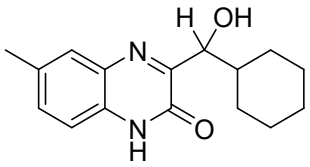
3-(1,7-dihydroxy-3,7-dimethyloctyl)quinoxalin-2(1*H*)-one (3aj). white solid (93.0 mg, 73%). mp: 136 - 137 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.42 (s, 1H), 7.77 (dd, J = 8.0, 1.4 Hz, 1H), 7.51-7.48 (m, 1H), 7.31 - 7.28 (m, 2H), 4.99 (dd, J = 9.6, 3.3 Hz, 1H), 4.89 (s, 1H), 4.05 (s, 1H), 1.80-1.74 (m, 1H), 1.63-1.58 (m, 1H), 1.52 -1.48 (m, 1H), 1.31 - 1.25 (m, 4H), 1.21 - 1.20 (m, 1H), 1.16 - 1.12 (m, 1H), 1.03 (d, J = 1.5 Hz, 6H), 0.94 (d, J = 6.6 Hz, 3H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 162.87, 154.12, 154.01, 131.91, 131.33, 129.89, 128.29, 123.29, 115.37, 68.80, 66.66, 43.97, 41.92, 38.19, 29.35, 29.32, 28.90, 21.30, 19.02. **HRMS** (m/z) [ESI]: calculated for $C_{18}H_{27}N_2O_3^+$ m/z $[M+H]^+$: 319.2016, found 319.2015.



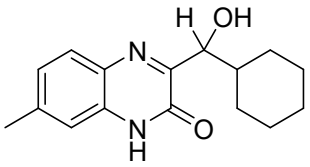
3-(1-hydroxy-3,7-dimethyloct-6-en-1-yl)quinoxalin-2(1*H*)-one (3ak). white solid (88.9 mg, 74%). mp: 151 - 152 °C. dr 1.1:1, as an inseparable diastereomeric mixture. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.42 (s, 1H), 7.76 (dd, J = 7.4, 2.8 Hz, 1H), 7.50 (t, J = 7.7 Hz, 1H), 7.31 - 7.28 (m, 2H), 5.08 - 5.0 (m, 1H), 5.00 (d, J = 4.3 Hz, 0.52H), 4.98 (d, J = 4.4 Hz, 0.48H), 2.03 - 1.90z (m, 2H), 1.81 - 1.74 (m, 1H), 1.68-1.64 (m, 1H), 1.60 (d, J = 4.3 Hz, 3H), 1.54 (d, J = 5.4 Hz, 3H), 1.46 - 1.44 (m, 1H), 1.27 - 1.12 (m, 2H), 0.94 (d, J = 6.6 Hz, 1H), 0.90 (d, J = 6.7 Hz, 2H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 162.75, 162.62, 154.14, 154.06, 131.98, 131.95, 131.36, 131.33, 130.42, 130.37, 129.92, 129.88, 128.31, 128.28, 124.79, 124.71, 123.25, 115.39, 66.91, 66.70, 42.09, 41.86, 37.51, 35.89, 28.84, 28.57, 25.52, 25.51, 25.06, 24.71, 20.43, 18.88, 17.52. **HRMS** (m/z) [ESI]: calculated for $C_{18}H_{25}N_2O_2^+$ m/z $[M+H]^+$: 301.1911, found 301.1914.



3-(3-(4-(tert-butyl)phenyl)-1-hydroxy-2-methylpropyl)quinoxalin-2(1*H*)-one (3al). white solid (99.5 mg, 71%). mp: 165 - 166 °C. **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.34 (s, 1H), 7.77 (dd, J = 8.1, 1.2 Hz, 1H), 7.52 - 7.48 (m, 1H), 7.31 - 7.25 (m, 2H), 7.15 - 7.13 (m, 2H), 7.00 - 6.98 (m, 2H), 5.09 (d, J = 6.4 Hz, 1H), 4.72 (t, J = 6.3 Hz, 1H), 2.87 (dd, J = 13.3, 4.6 Hz, 1H), 2.31 (dd, J = 13.4, 8.8 Hz, 1H), 1.22 (s, 1H), 1.19 (s, 9H), 0.79 (d, J = 6.8 Hz, 3H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 161.57, 154.14, 147.60, 137.55, 131.83, 131.22, 129.95, 128.84, 128.30, 124.61, 123.24, 115.30, 72.65, 38.39, 36.64, 33.94, 31.19, 16.68. **HRMS** (m/z) [ESI]: calculated for $C_{22}H_{27}N_2O_2^+$ m/z $[M+H]^+$: 351.2067, found 351.2066.

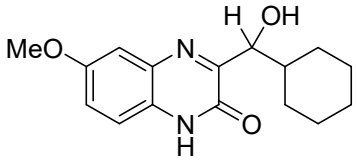


3ba

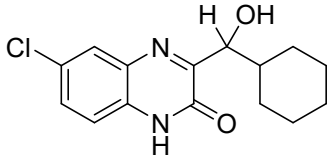


3ba'

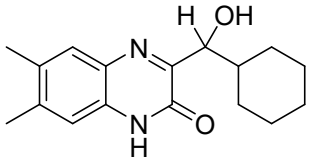
3-(cyclohexyl(hydroxy)methyl)-6-methylquinoxalin-2(1*H*)-one (3ba) /3-(cyclohexyl(hydroxy)methyl)-7-methylquinoxalin-2(1*H*)-one (3ba'). white solid (85.0 mg, 78%). mp: 142-143 °C. ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.36 (s, 1H), 7.66 (d, J = 8.2 Hz, 0.37H), 7.58 (d, J = 2.1 Hz, 0.65H), 7.34 (dd, J = 1.9,8.3 Hz, 0.65H), 7.21 (d, J = 8.3 Hz, 0.65H), 7.12 (dd, J = 1.9, 8.3 Hz, 0.39H), 7.08 (s, 0.37H), 4.77 (d, J = 6.9 Hz, 1H), 4.66 (d, J = 6.6 Hz, 0.56H), 4.46 (d, J = 6.4 Hz, 0.44H), 2.39 (s, 1H), 2.37 (s, 2H), 1.94 - 1.88 (m, 1H), 1.66 - 1.56 (m, 4H), 1.44 - 1.41 (m, 1H), 1.21 - 1.07 (m, 5H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 161.67, 160.61, 154.39, 154.16, 140.24, 132.67, 131.73, 131.20, 129.69, 129.53, 129.52, 128.13, 128.02, 124.72, 115.12, 114.98, 72.90, 72.87, 41.40, 41.37, 29.54, 27.38, 27.31, 26.10, 25.90, 25.60, 21.29, 20.44. **HRMS** (m/z) [ESI]: calculated for $C_{16}H_{20}N_2NaO_2^+$ m/z $[M+Na]^+$: 295.1417, found 295.1422.



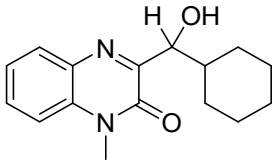
3-(cyclohexyl(hydroxy)methyl)-6-methoxyquinoxalin-2(1*H*)-one (3ca). white solid (93.4 mg, 81%). mp: 136 - 137 °C. **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.40 (s, 1H), 7.30 (d, J = 2.8 Hz, 1H), 7.24 (d, J = 8.9 Hz, 1H), 7.16 (dd, J = 8.9, 2.8 Hz, 1H), 5.29 - 4.78 (m, 1H), 4.67 (d, J = 5.9 Hz, 1H), 3.81 (s, 3H), 1.95 - 1.89 (m, 1H), 1.66 - 1.57 (m, 4H), 1.46 - 1.43 (m, 1H), 1.21 - 1.05 (m, 5H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 162.15, 155.41, 153.87, 131.93, 125.93, 119.34, 116.30, 109.88, 72.98, 55.60, 41.39, 29.56, 27.29, 26.08, 25.89, 25.59. **HRMS** (m/z) [ESI]: calculated for $C_{16}H_{20}N_2NaO_3^+$ m/z $[M+Na]^+$: 311.1366, found 311.1365.



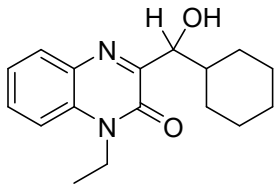
6-chloro-3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3da). yellow solid (78.5 mg, 67%). mp: 159 - 160 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.49 (s, 1H), 7.78 (d, J = 8.5 Hz, 1H), 7.33 - 7.30 (m, 2H), 4.85 (d, J = 6.6 Hz, 1H), 4.66 (d, J = 4.2 Hz, 1H), 1.93-1.87 (m, 1H), 1.67 - 1.57 (m, 4H), 1.46 - 1.40 (m, 1H), 1.22 - 1.07 (m, 5H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 162.48, 153.99, 134.02, 132.92, 130.07, 129.68, 123.41, 114.65, 72.75, 41.33, 29.47, 27.35, 26.06, 25.86, 25.57. **HRMS** (m/z) [ESI]: calculated for $C_{15}H_{18}ClN_2O_2^+$ m/z $[M+H]^+$: 293.1051, found 293.1051.



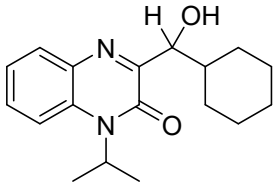
3-(cyclohexyl(hydroxy)methyl)-6,7-dimethylquinoxalin-2(1*H*)-one (3ea). white solid (90.5 mg, 79%). mp: 133 - 134 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.30 (s, 1H), 7.55 (s, 1H), 7.06 (s, 1H), 4.75 (d, J = 6.8 Hz, 1H), 4.63 (t, J = 6.4 Hz, 1H), 2.30 (s, 3H), 2.28 (s, 3H), 1.92-1.87 (m, 1H), 1.67 - 1.57 (m, 3H), 1.43-1.41 (m, 1H), 1.18 - 1.04 (m, 5H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 160.43, 154.34, 139.59, 132.08, 129.80, 129.78, 128.29, 115.40, 72.91, 41.40, 29.55, 27.37, 26.13, 25.92, 25.63, 19.83, 19.00. **HRMS** (m/z) [ESI]: calculated for $C_{17}H_{22}KN_2O_2^+$ m/z $[M+K]^+$: 325.1313, found 325.1309.



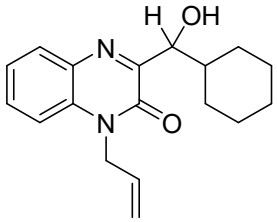
3-(cyclohexyl(hydroxy)methyl)-1-methylquinoxalin-2(1*H*)-one (3fa). white solid (81.7 mg, 75%). mp: 118 - 119 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 7.83 (dd, J = 7.9, 1.5 Hz, 1H), 7.64 - 7.61 (m, 1H), 7.56 (dd, J = 8.4, 1.3 Hz, 1H), 7.40 - 7.37 (m, 1H), 4.82 (d, J= 6.7 Hz, 1H), 4.71 (t, J = 6.0 Hz, 1H), 3.63 (s, 3H), 1.95 - 1.90 (m, 1H), 1.60-1.56 (m, 4H), 1.45 - 1.43 (m, 1H), 1.21 - 1.06 (m, 5H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 160.40, 153.56, 133.00, 131.54, 130.29, 129.11, 123.53, 114.81, 73.27, 41.33, 29.57, 28.91, 27.27, 26.06, 25.88, 25.57. **HRMS** (m/z) [ESI]: calculated for $C_{16}H_{21}N_2O_2^+$ m/z $[M+H]^+$: 273.1598, found 273.1560.



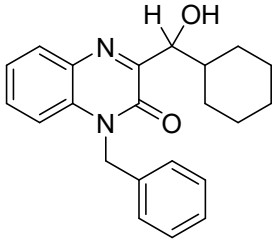
3-(cyclohexyl(hydroxy)methyl)-1-ethylquinoxalin-2(1*H*)-one (3ga). white solid (83.6 mg, 73%). mp: 144 - 145 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 7.85 - 7.84 (m, 1H), 7.63-7.62 (m, 2H), 7.39 - 7.37 (m, 1H), 4.83 (d, J = 6.8 Hz, 1H), 4.72 (t, J = 6.5 Hz, 1H), 4.32 - 4.22 (m, 2H), 1.93 - 1.88 (m, 1H), 1.67 - 1.56 (m, 4H), 1.43 - 1.41 (m, 1H), 1.23 (t, J = 7.1 Hz, 3H), 1.18 - 1.04 (m, 5H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 160.46, 153.10, 131.86, 131.77, 130.41, 129.46, 123.44, 114.49, 73.01, 41.40, 36.73, 29.49, 27.38, 26.06, 25.84, 25.56, 12.38. **HRMS** (m/z) [ESI]: calculated for $C_{17}H_{23}N_2O_2^+$ m/z $[M+H]^+$: 287.1754, found 287.1753.



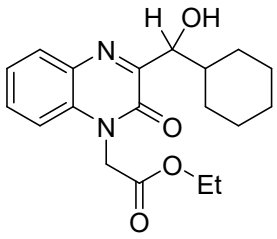
3-(cyclohexyl(hydroxy)methyl)-1-isopropylquinoxalin-2(1*H*)-one (3ha). yellow liquid (96.1 mg, 80%). **^{1}H NMR** (600 MHz, DMSO-d_6) δ 7.96 (dd, J = 8.2, 1.4 Hz, 1H), 7.78 (dd, J = 8.3, 1.4 Hz, 1H), 7.67 (ddd, J = 8.3, 7.0, 1.5 Hz, 1H), 7.58 (ddd, J = 8.3, 6.9, 1.4 Hz, 1H), 5.49-5.43 (m, 1H), 5.01 (d, J = 6.6 Hz, 1H), 4.71 (t, J = 6.8 Hz, 1H), 1.94 - 1.89 (m, 1H), 1.79 - 1.75 (m,1H), 1.66 - 1.55 (m, 3H), 1.37 (t, J = 5.8, 6H), 1.28 - 1.25 (m, 1H), 1.13 - 1.05 (m, 5H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 154.49, 152.06, 139.34, 137.45, 129.62, 128.20, 126.54, 126.46, 72.73, 68.89, 42.44, 29.18, 28.09, 26.04, 25.81, 25.56, 21.58, 21.51. **HRMS** (m/z) [ESI]: calculated for $C_{18}H_{25}N_2O_2^+$ m/z $[M+H]^+$: 301.1911, found 301.1911.



1-allyl-3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3ia). white solid (82.3 mg, 69%). mp: 128 - 129 °C. **^{1}H NMR** (400 MHz, DMSO-d_6) δ 7.85 (dd, J = 8.0, 1.4 Hz, 1H), 7.61-7.57 (m, 1H), 7.50 - 7.48 (m, 1H), 7.39 - 7.35 (m, 1H), 5.98- 5.89 (m, 1H), 5.19 - 5.16 (m, 1H), 5.03 - 4.99 (m, 1H), 4.95 - 4.8 (m, 2H), 4.86 (d, J = 6.8 Hz, 1H), 4.72 (d, J = 6.5 Hz, 1H), 1.97 - 1.85 (m, 1H), 1.68 - 1.56 (m, 4H), 1.44 - 1.42 (m, 1H), 1.21 - 1.07 (m, 5H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 160.58, 153.19, 133.14, 132.02, 131.75, 131.56, 130.23, 129.30, 123.56, 116.99, 115.07, 73.08, 43.64, 41.44, 29.46, 27.41, 26.05, 25.83, 25.56. **HRMS** (m/z) [ESI]: calculated for $C_{18}H_{23}N_2O_2^+$ m/z $[M+H]^+$: 299.1754, found299.1751.



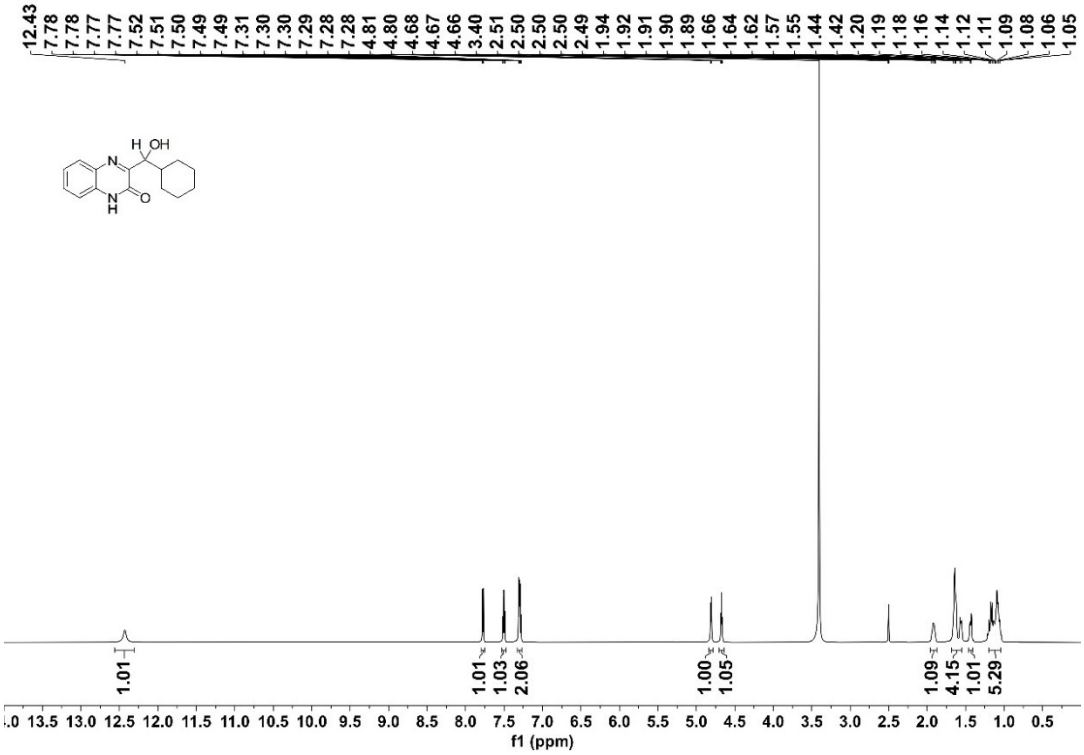
1-benzyl-3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3ja). white solid (100.4 mg, 72%). mp: 123 - 124 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 7.86 (dd, J = 8.0, 1.5 Hz, 1H), 7.53-7.50 (m, 1H), 7.45 (dd, J = 8.6, 1.2 Hz, 1H), 7.36 - 7.33 (m, 1H), 7.31 (t, J = 7.5 Hz, 2H), 7.24 (t, J = 8.1 Hz, 3H), 5.57 - 5.46 (m, 2H), 4.94 (d, J = 6.7 Hz, 1H), 4.79 (t, J = 6.4 Hz, 1H), 1.96 (dd, J = 14.8, 7.1 Hz, 1H), 1.72 - 1.57 (m, 4H), 1.46 (d, J = 11.2 Hz, 1H), 1.22 - 1.10 (m, 5H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 160.88, 153.84, 135.92, 132.12, 131.96, 130.39, 129.50, 128.83, 127.48, 126.83, 123.80, 115.17, 73.20, 44.76, 41.58, 29.56, 27.57, 26.13, 25.91, 25.64. **HRMS** (m/z) [ESI]: calculated for $C_{22}H_{25}N_2O_2^+$ m/z $[M+H]^+$: 349.1911, found 349.1914.

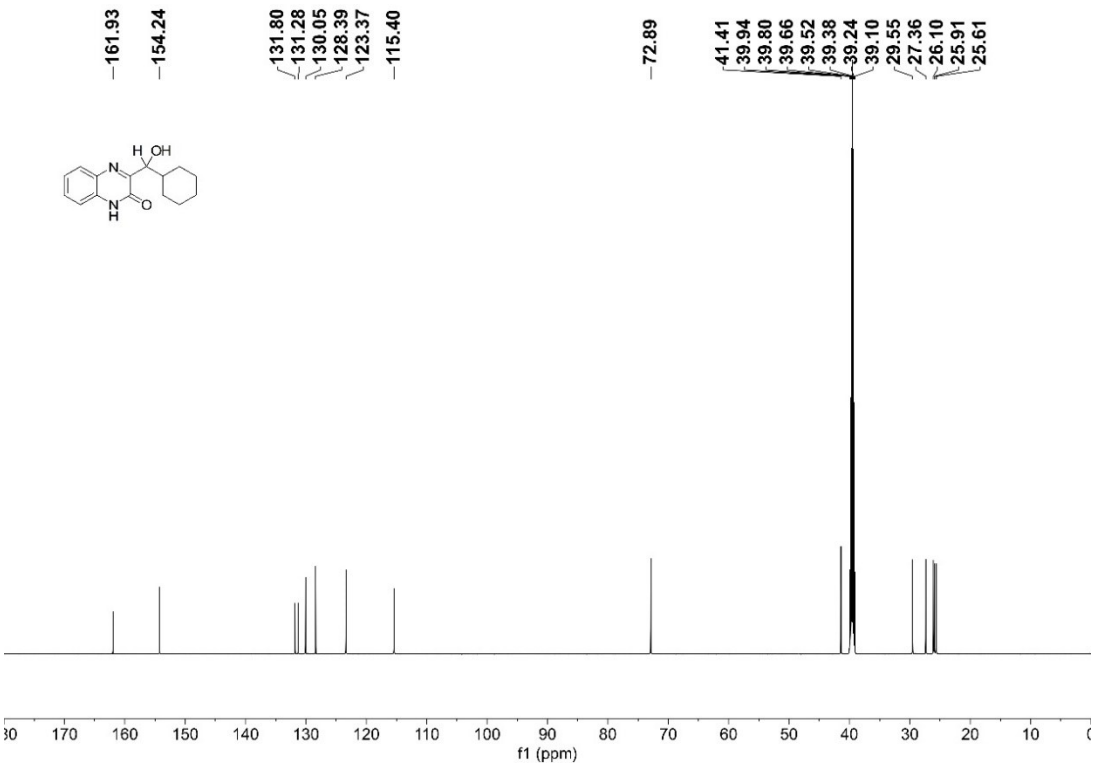


ethyl 2-(3-(cyclohexyl(hydroxy)methyl)-2-oxoquinoxalin-1(2*H*)-yl)acetate (3ka). Yellow liquid (106.1 mg, 77%). **^{1}H NMR** (600 MHz, DMSO-d_6) δ 7.87 (dd, J = 8.0, 1.5 Hz, 1H), 7.62-7.59 (m, 1H), 7.52 (dd, J = 8.5, 1.2 Hz, 1H), 7.42 - 7.39 (m, 1H), 5.15 - 5.08 (m, 2H), 4.95 (d, J = 6.8 Hz, 1H), 4.71 (t, J = 6.5 Hz, 1H), 4.20 - 4.12 (m, 2H), 1.92 - 1.87 (m, 1H), 1.71 - 1.57 (m, 4H), 1.42-1.41 (m, 1H), 1.20 (t, J = 7.1 Hz, 3H), 1.17 - 1.07 (m, 5H). **^{13}C NMR** (150 MHz, DMSO-d_6) δ 167.50, 160.49, 153.42, 132.30, 131.68, 130.50, 129.46, 123.89, 114.61, 61.41, 43.60, 41.57, 29.41, 27.55, 26.07, 25.84, 25.58, 14.02. **HRMS** (m/z) [ESI]: calculated for $C_{19}H_{25}N_2O_4^+$ m/z $[M+H]^+$: 345.1809, found 345.1808.

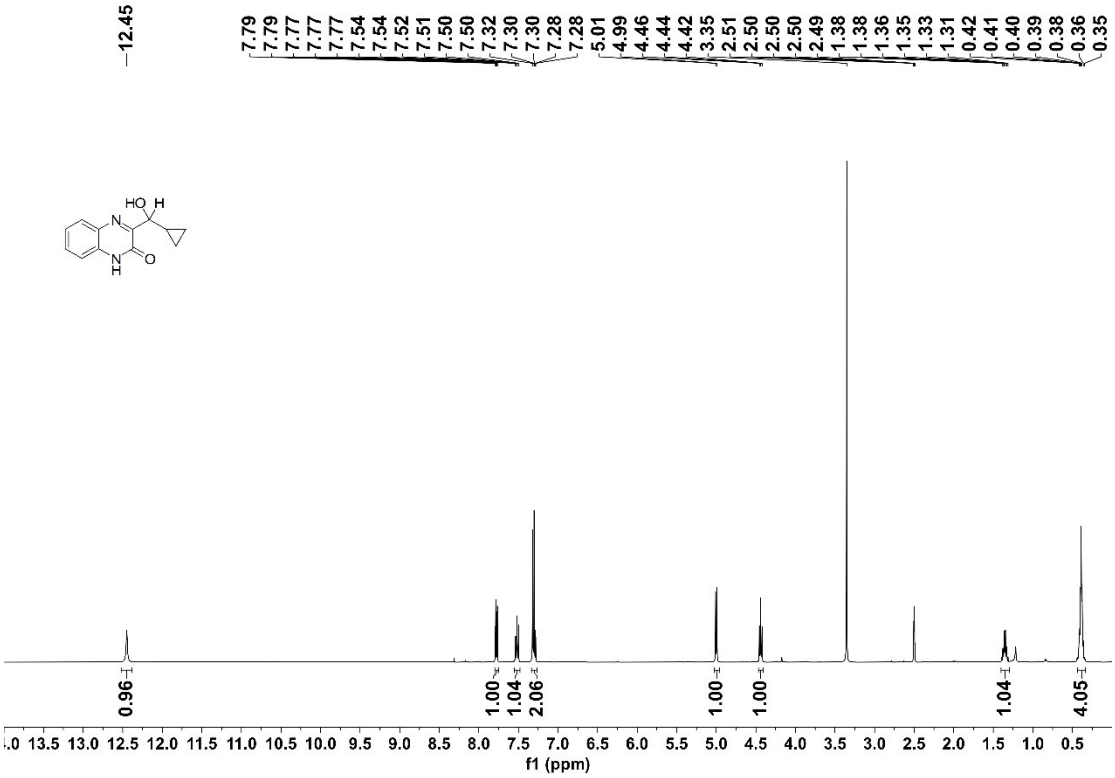
9. Copies of ^{1}H NMR and ^{13}C NMR for the Products

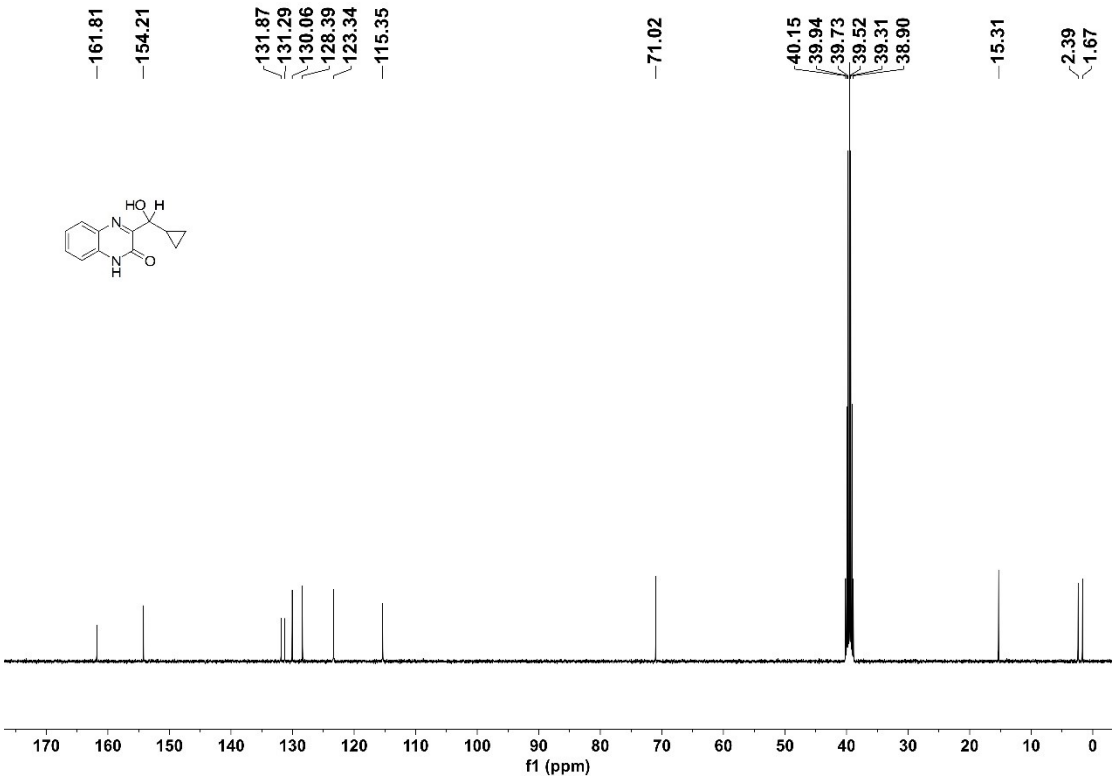
3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3aa)



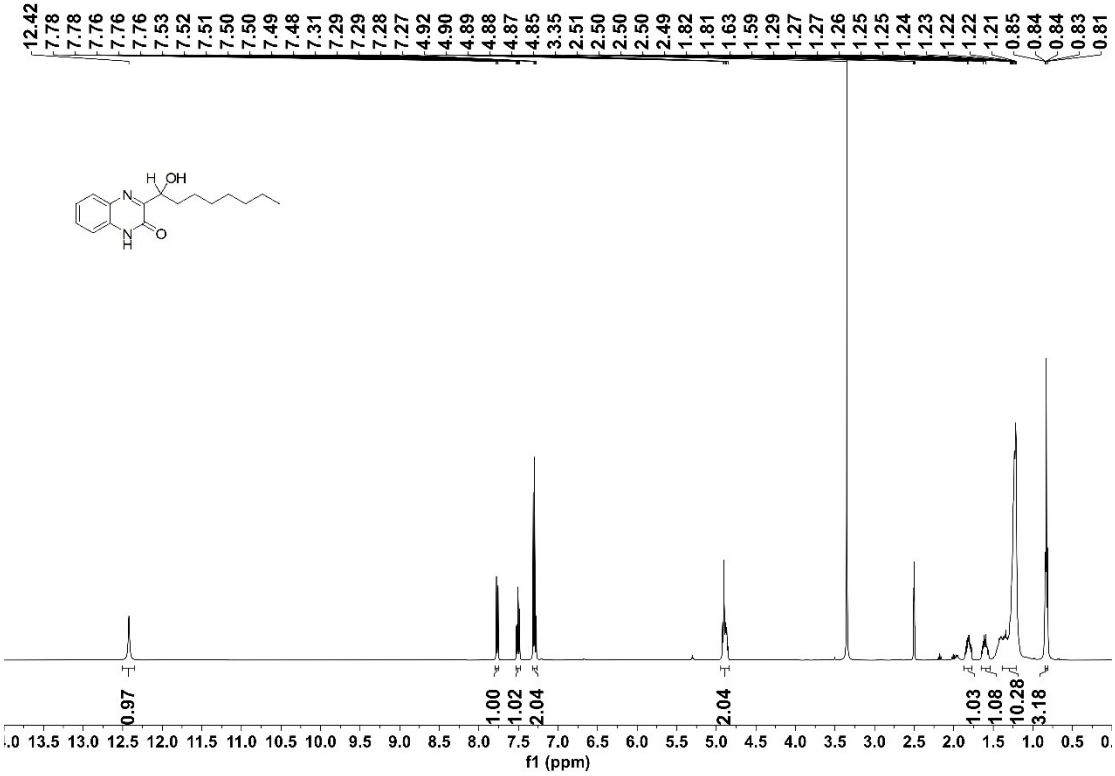


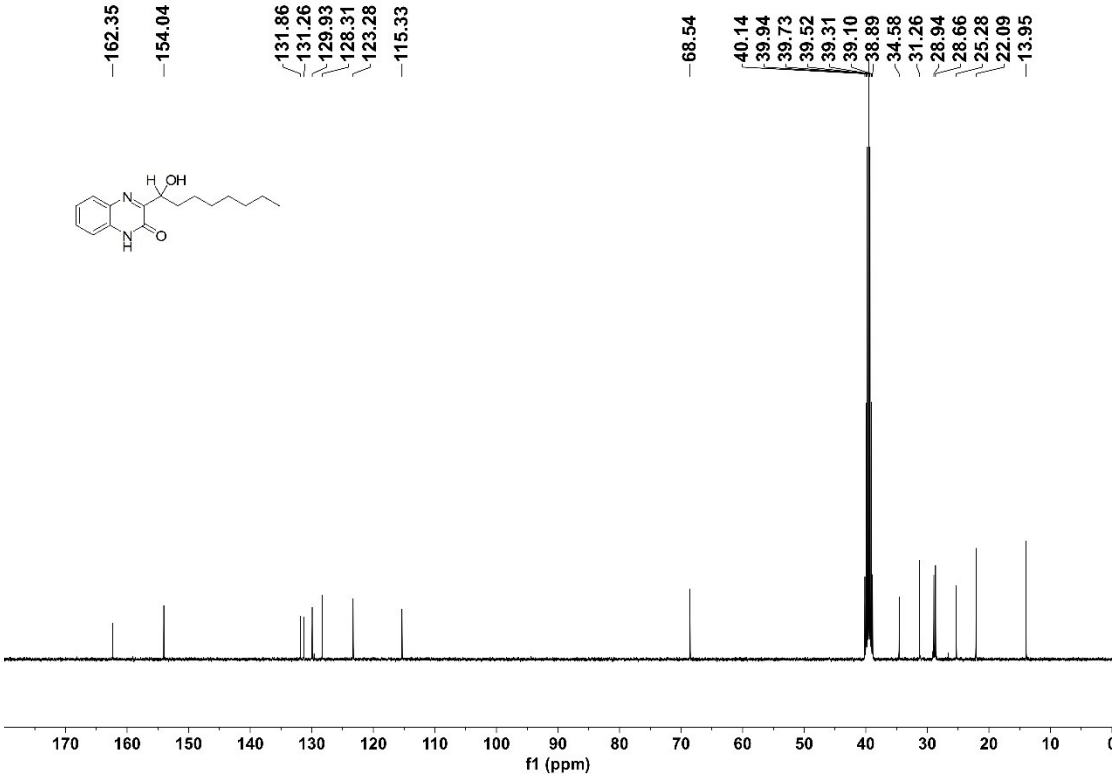
3-(cyclopropyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3ab)



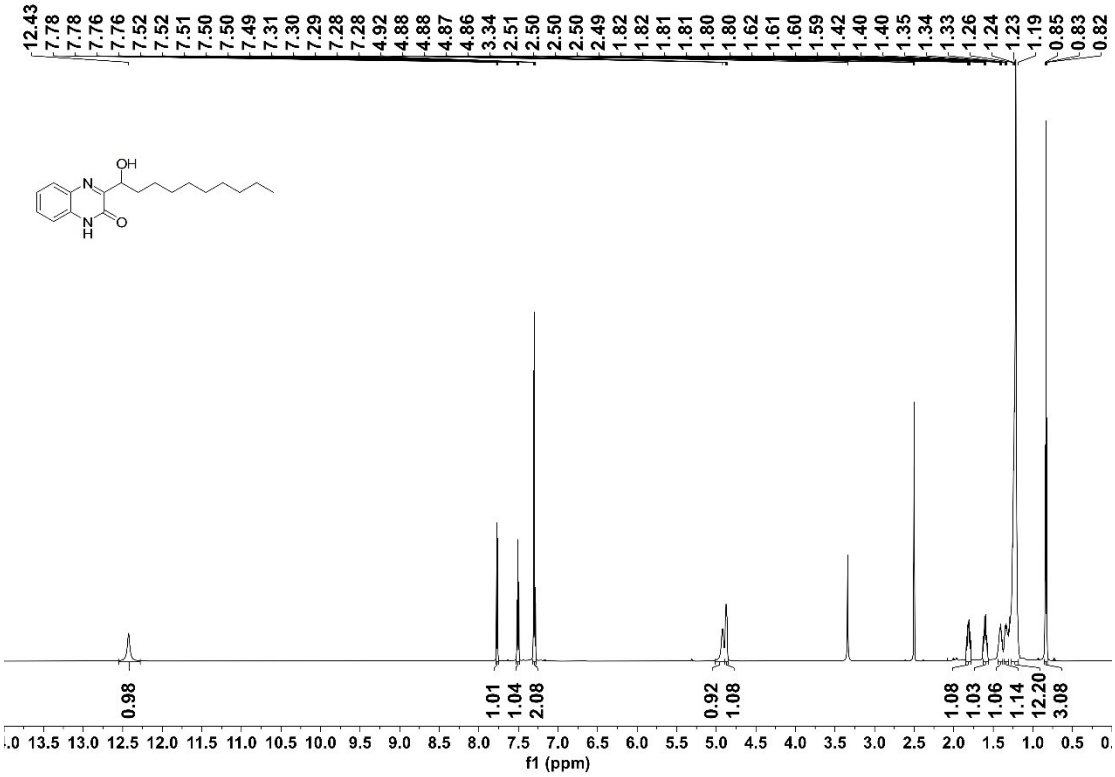


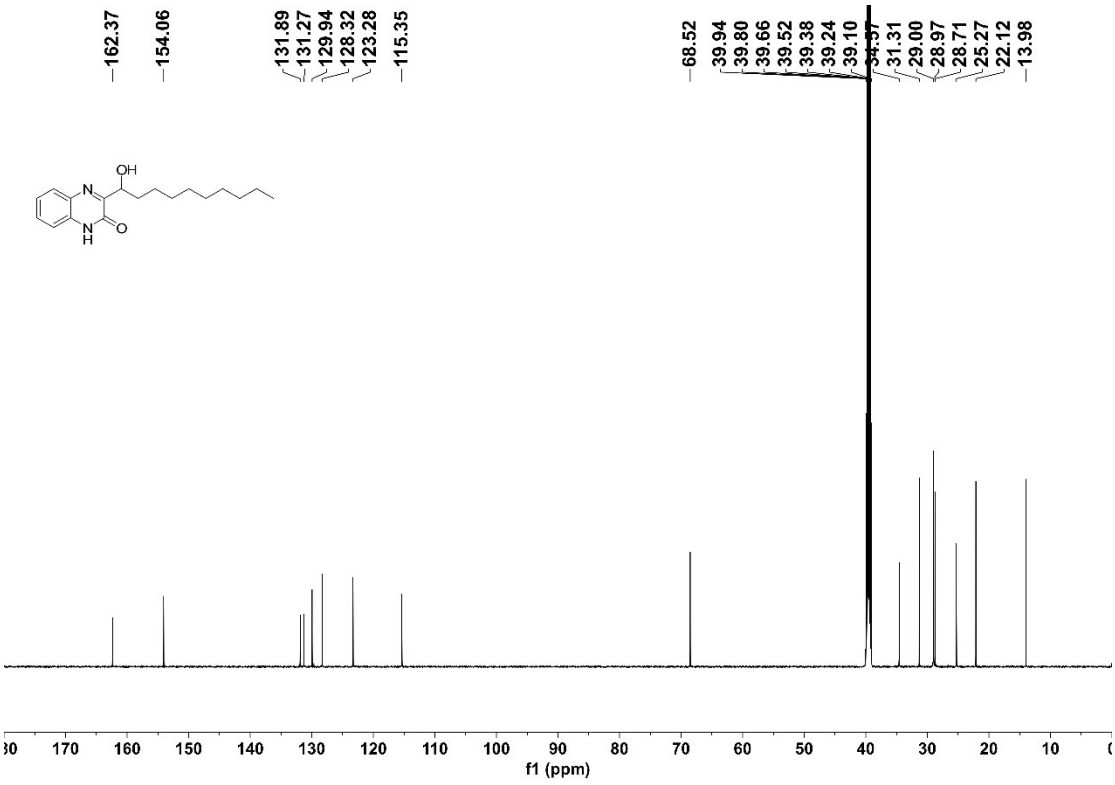
3-(1-hydroxyoctyl)quinoxalin-2(1*H*)-one (3ac).



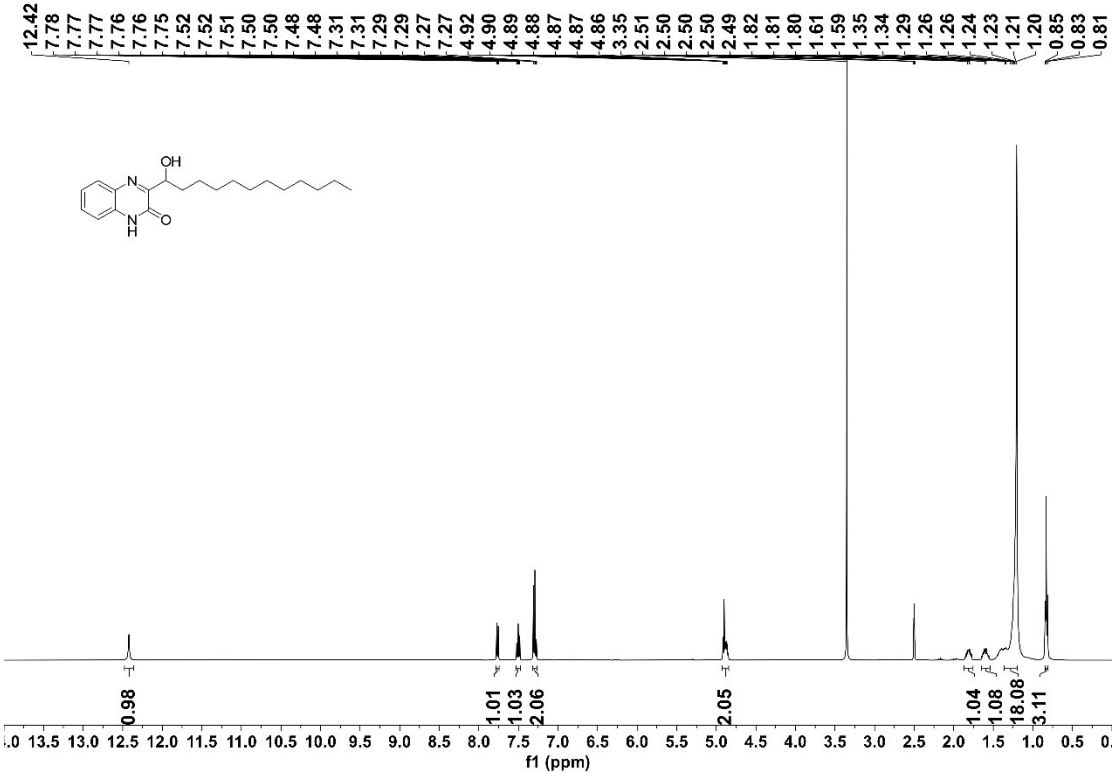


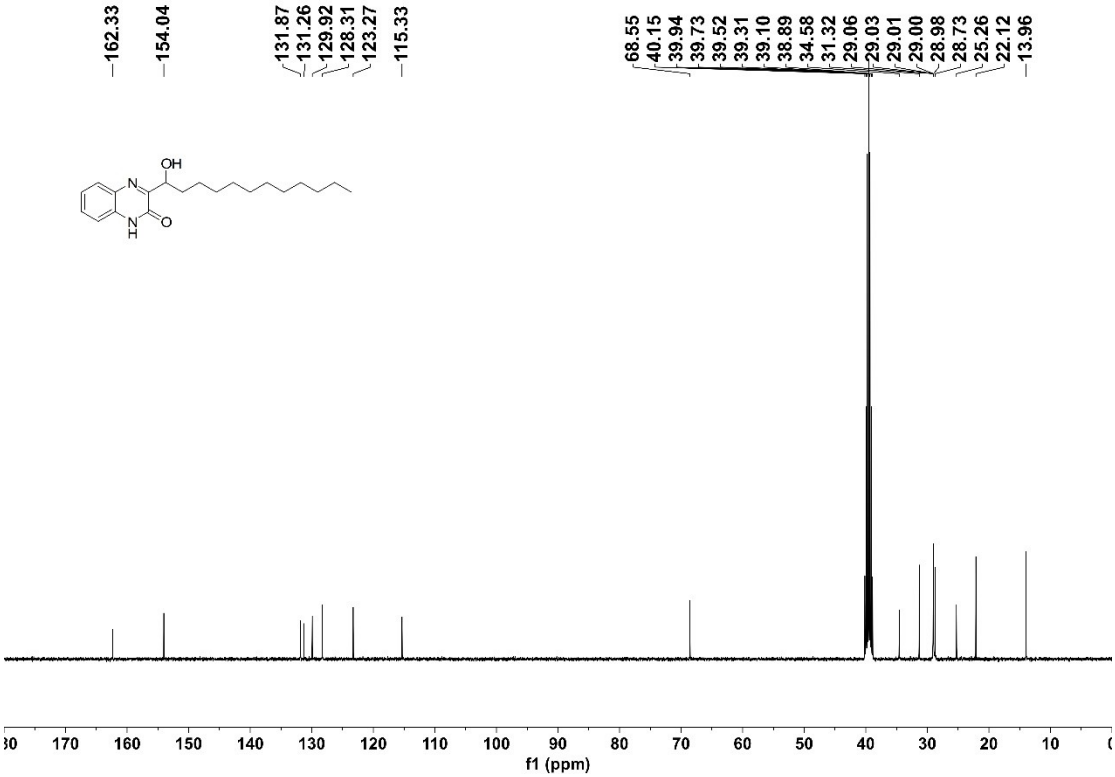
3-(1-hydroxydecyl)quinoxalin-2(1*H*)-one (3ad)



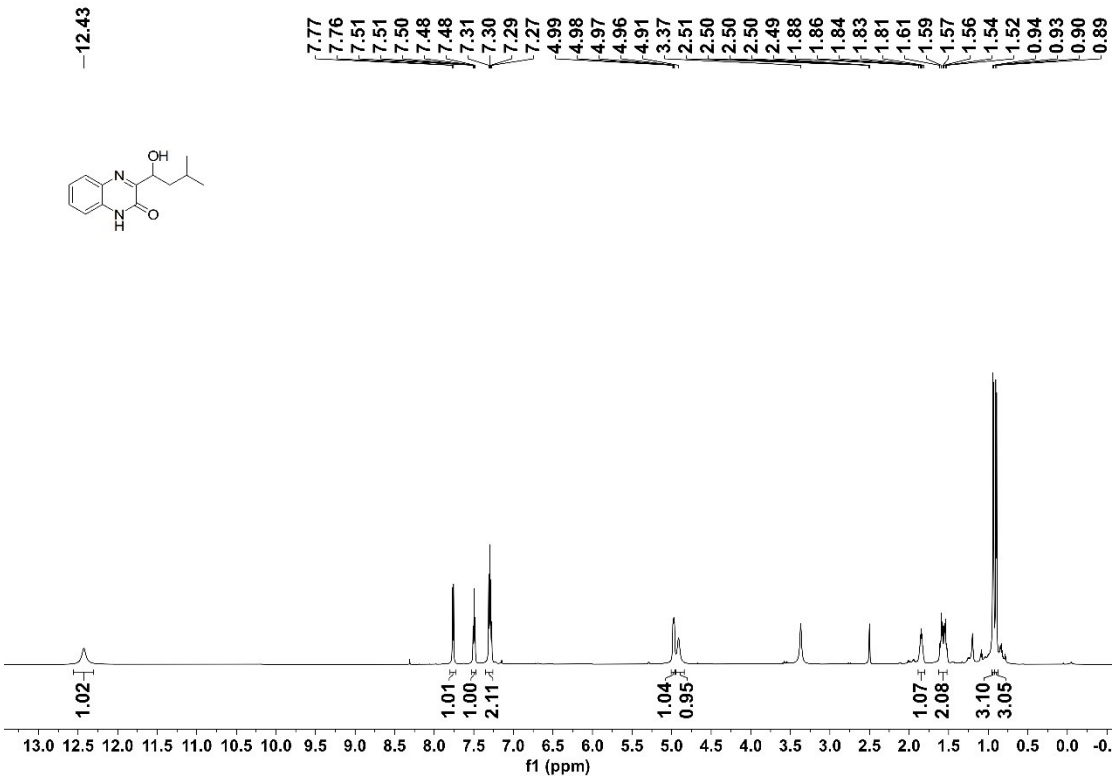


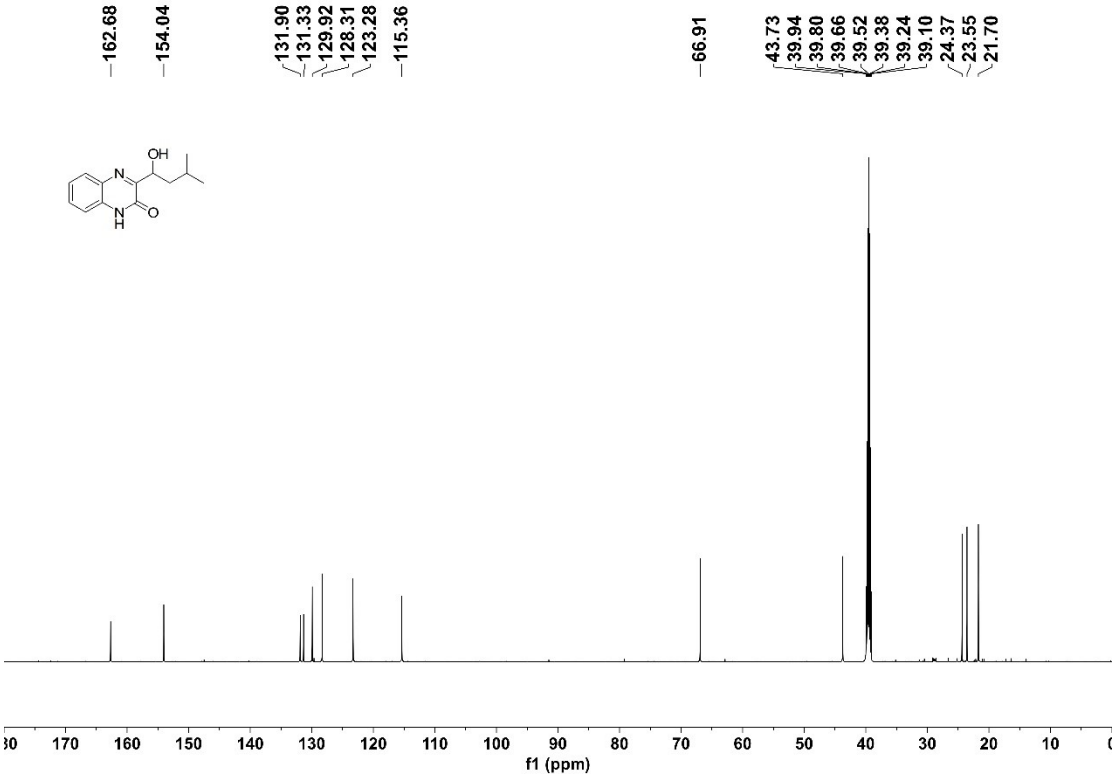
3-(1-hydroxydodecyl)quinoxalin-2(1*H*)-one (3ae)



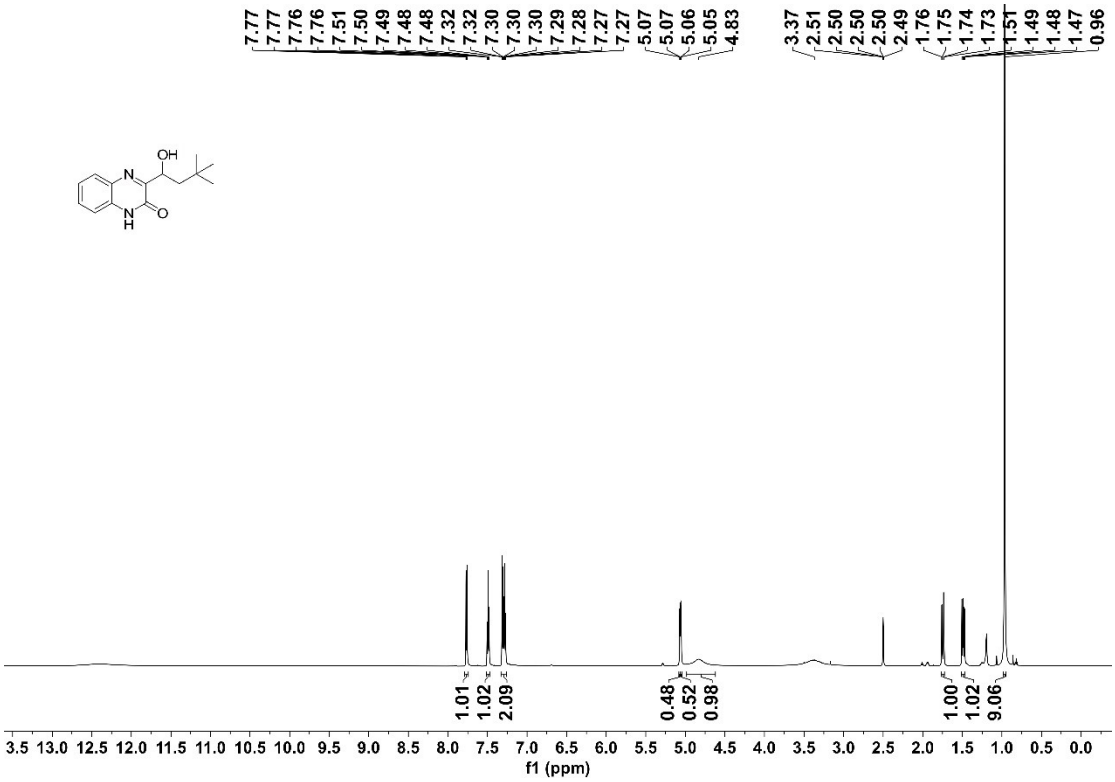


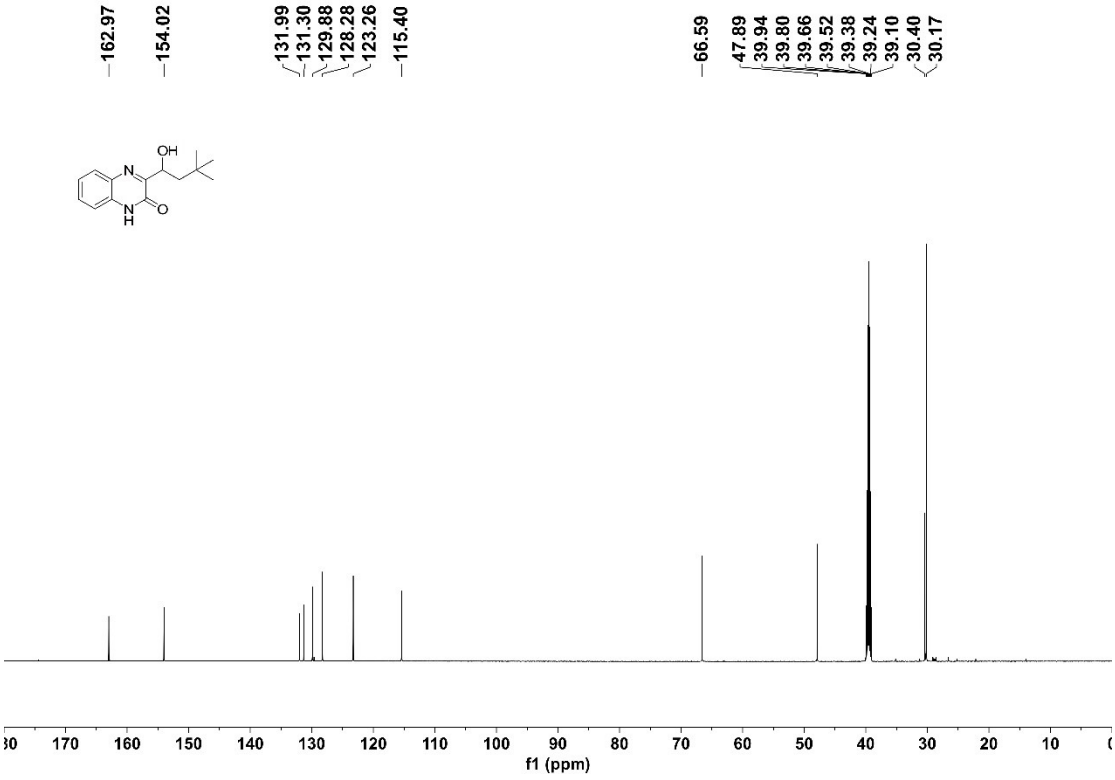
3-(1-hydroxy-3-methylbutyl)quinoxalin-2(1*H*)-one (3af).



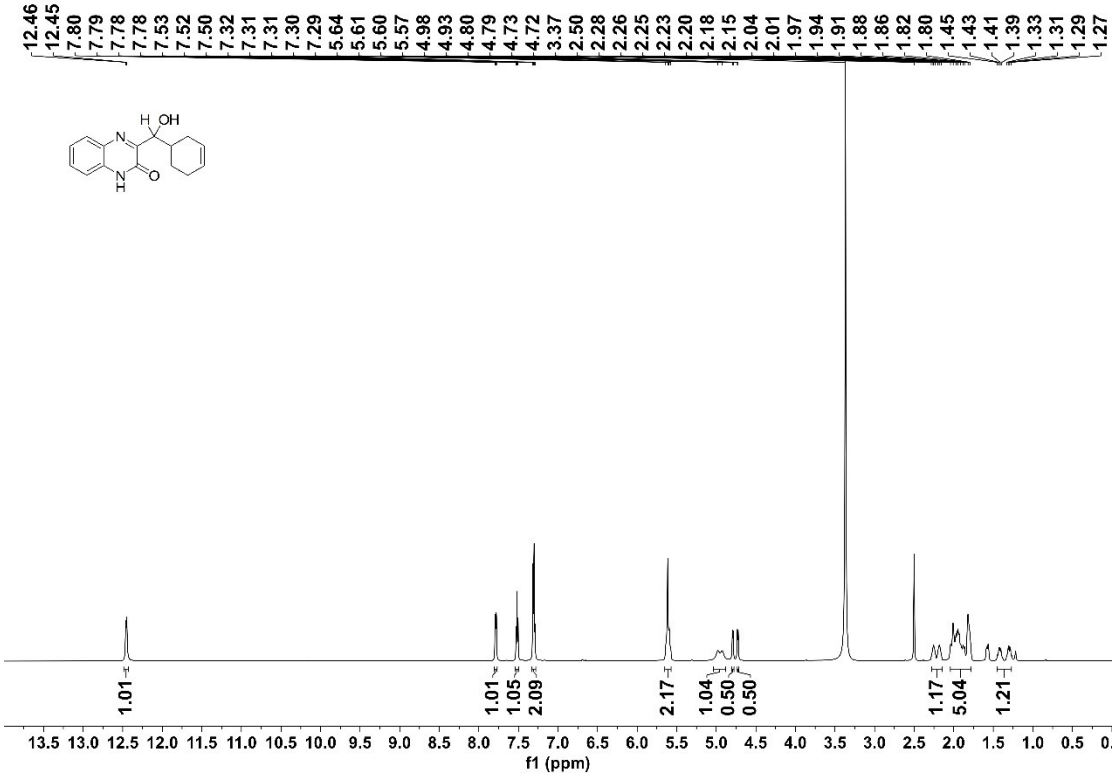


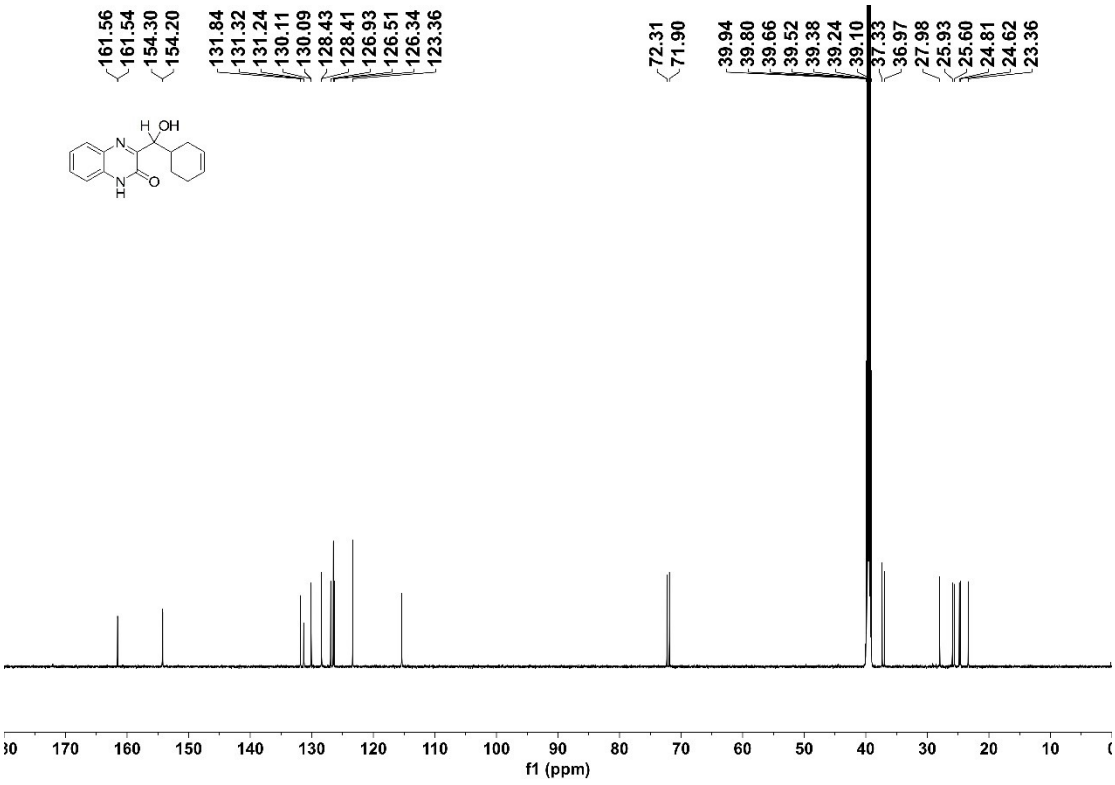
3-(1-hydroxy-3,3-dimethylbutyl)quinoxalin-2(1*H*)-one (3ag)



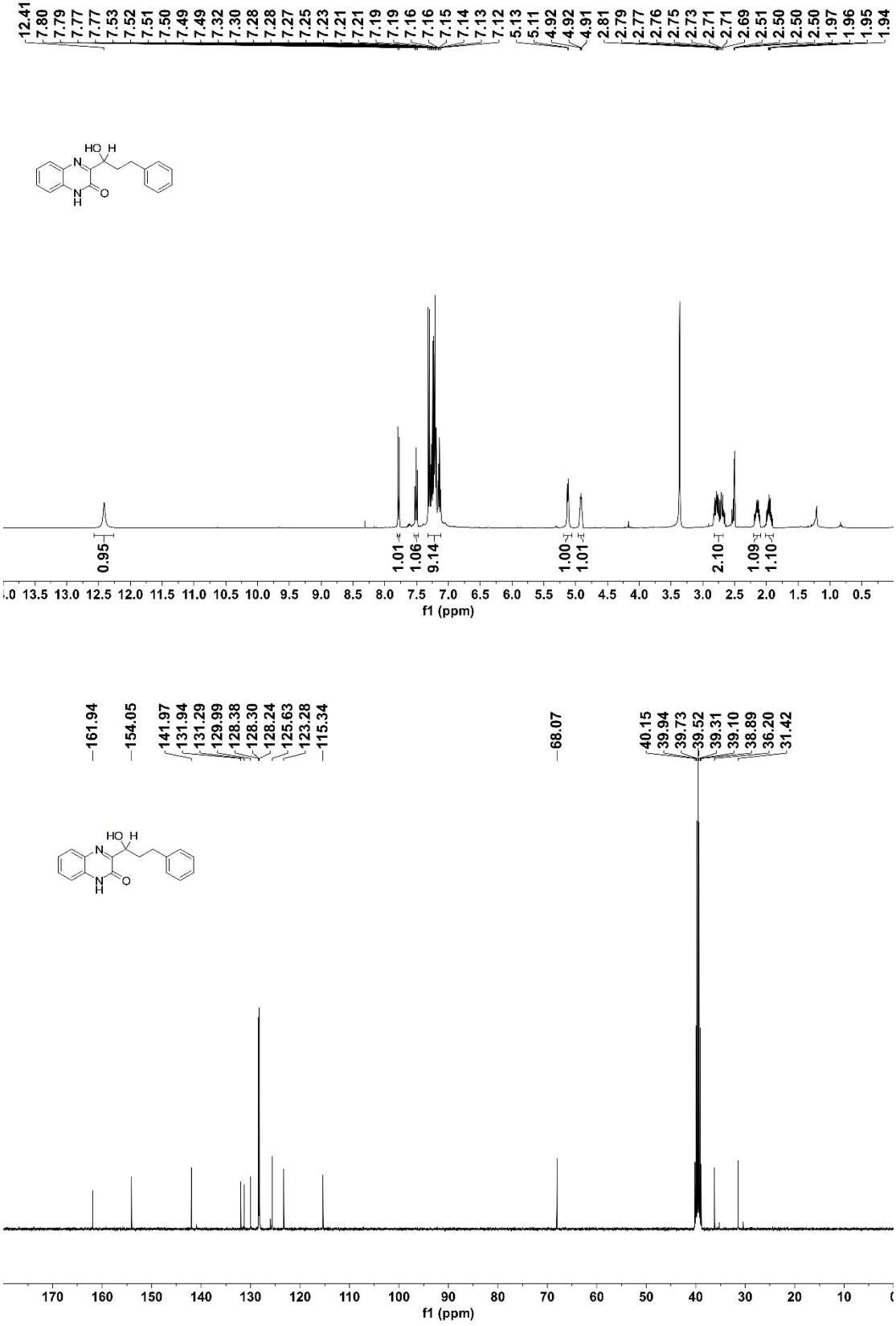


3-(cyclohex-3-en-1-yl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3ah)

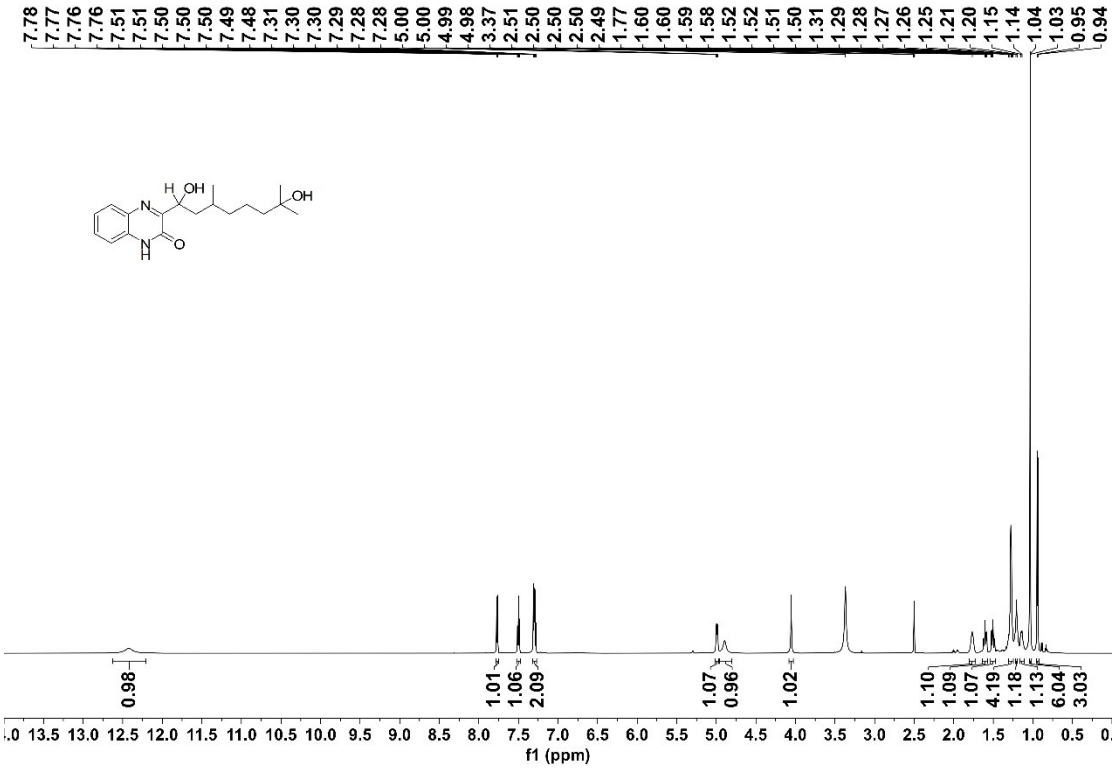


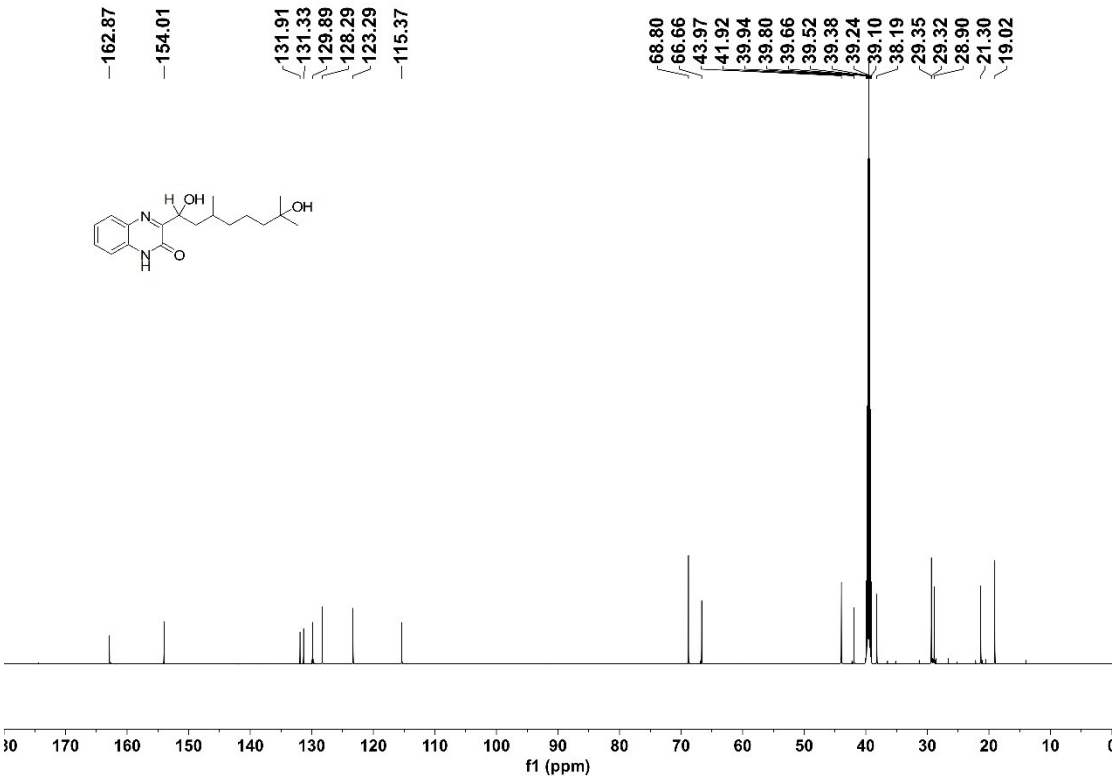


3-(1-hydroxy-3-phenylpropyl)quinoxalin-2(1*H*)-one (3ai)

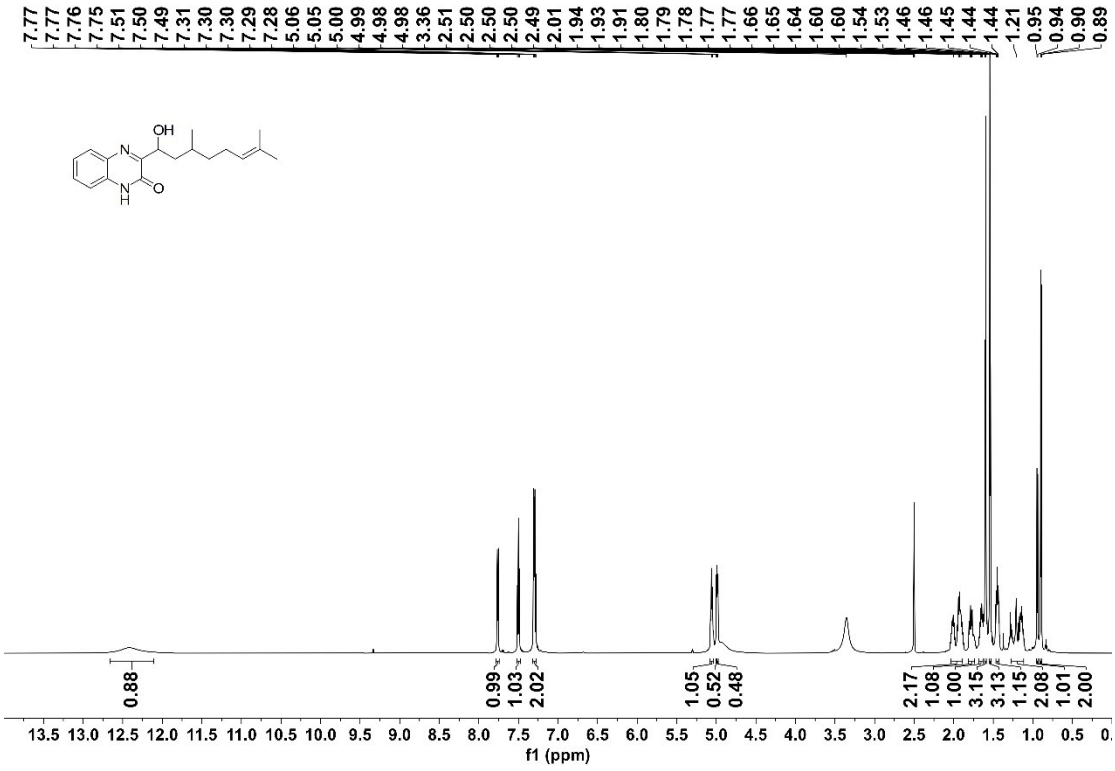


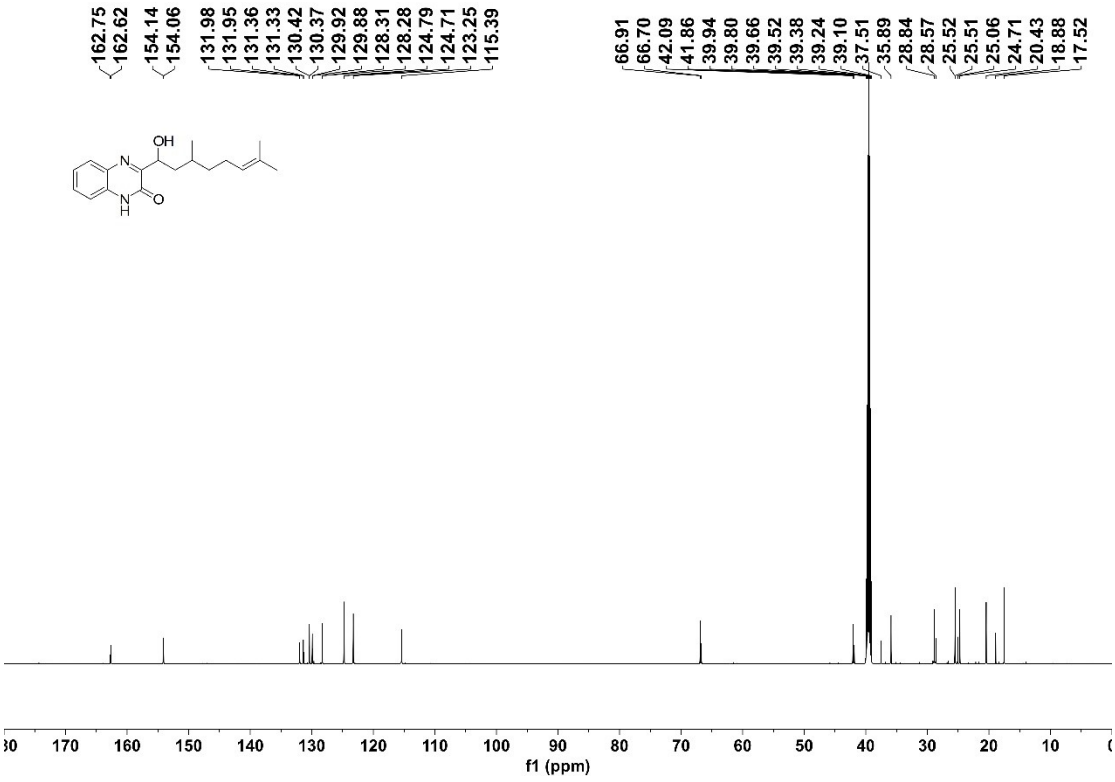
3-(1,7-dihydroxy-3,7-dimethyloctyl)quinoxalin-2(1*H*)-one (3aj).



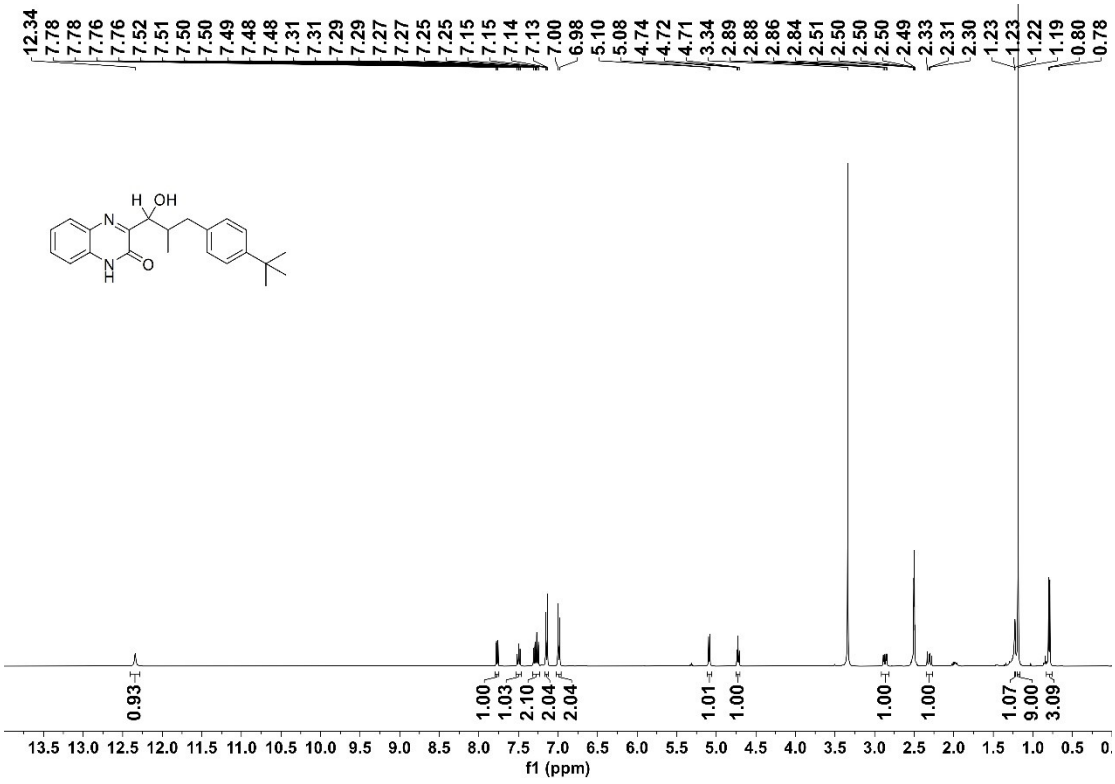


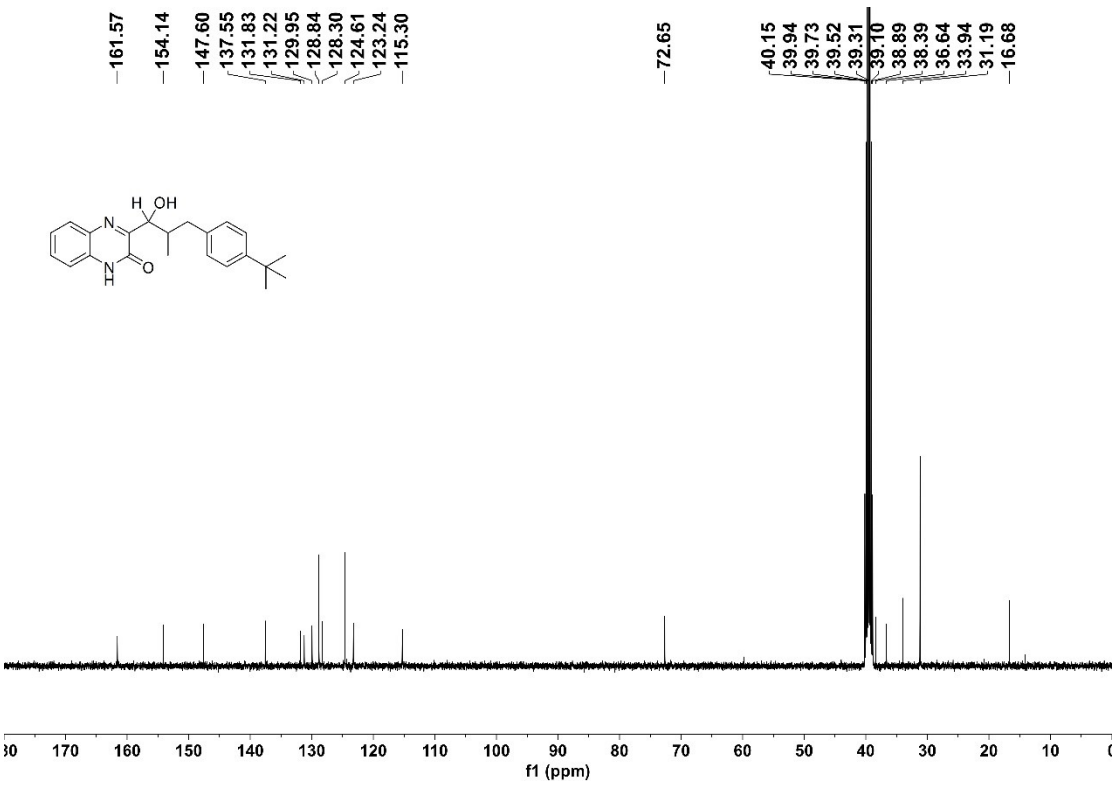
3-(1-hydroxy-3,7-dimethyloct-6-en-1-yl)quinoxalin-2(1*H*)-one (3ak)



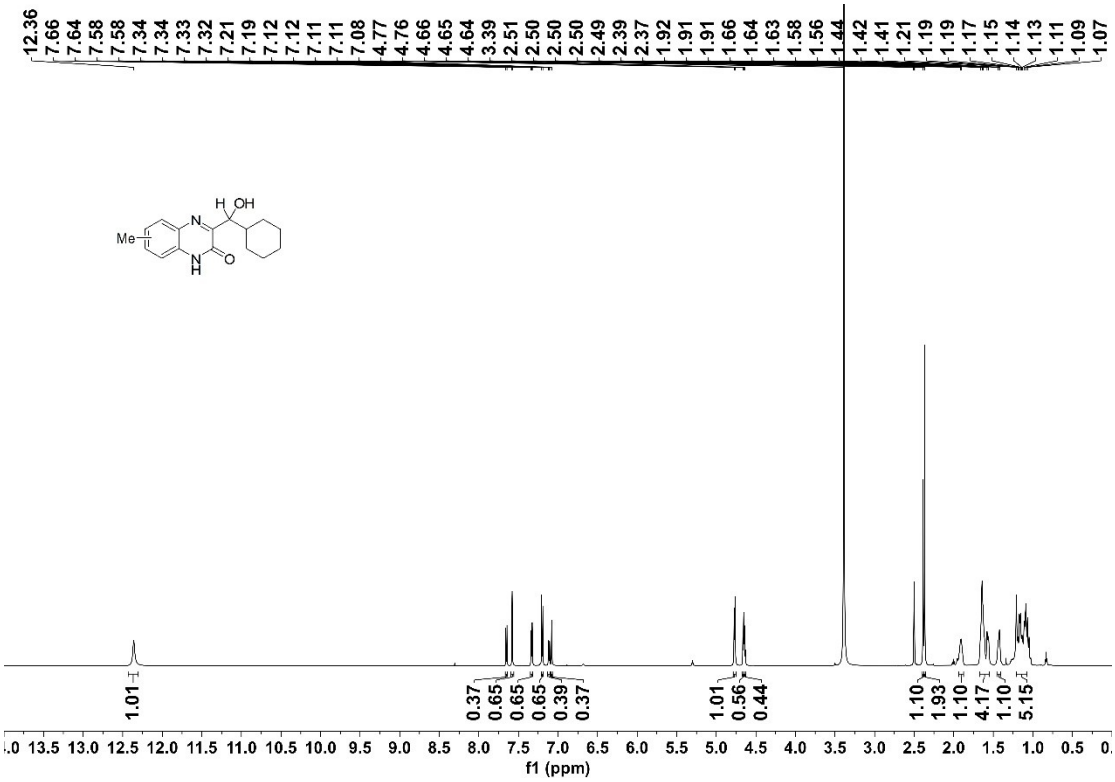


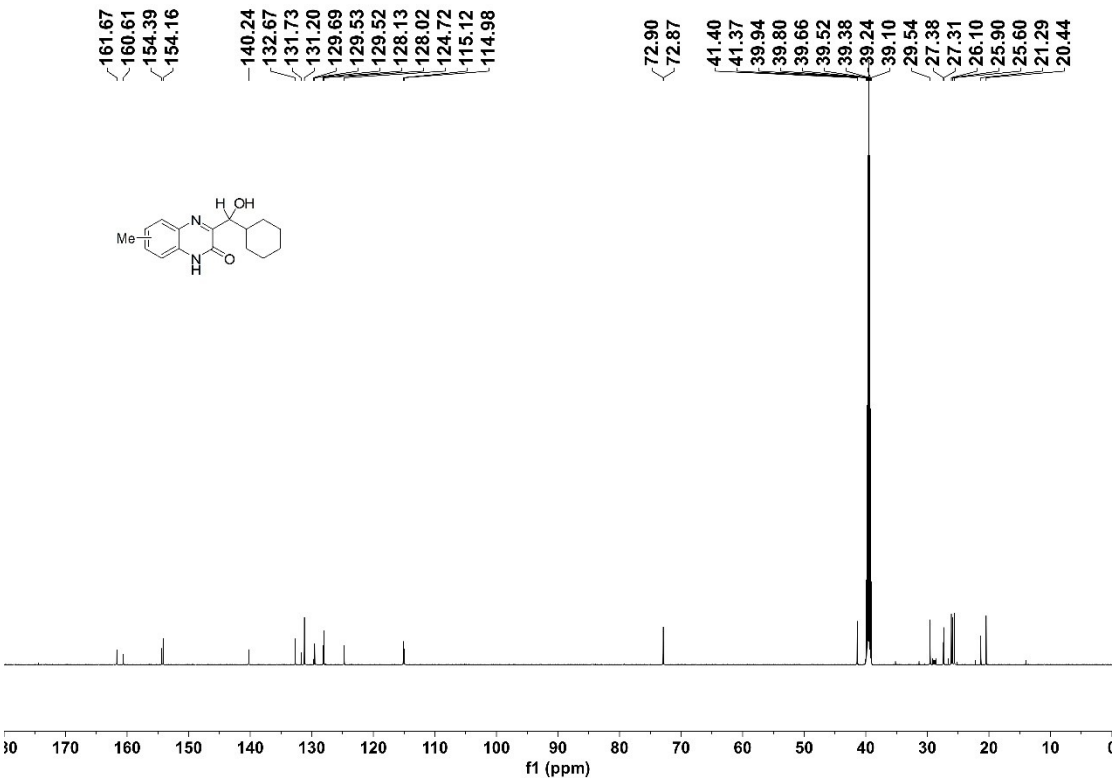
3-(3-(4-(tert-butyl)phenyl)-1-hydroxy-2-methylpropyl)quinoxalin-2(1*H*)-one (3al)



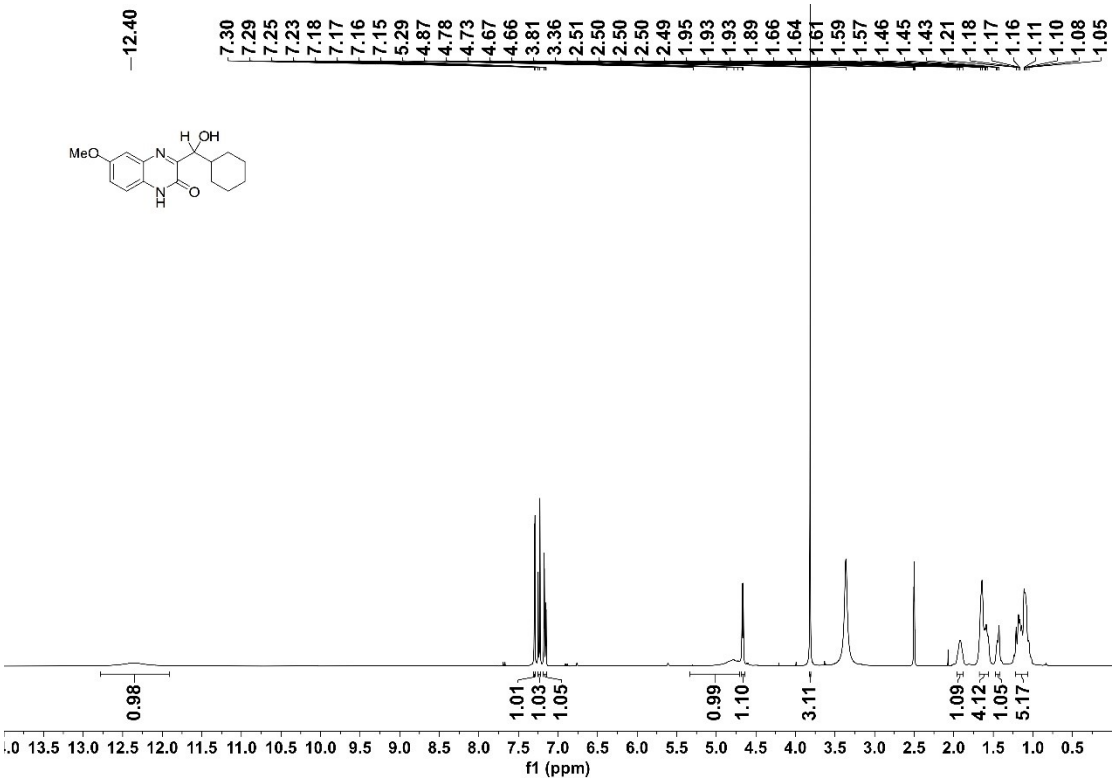


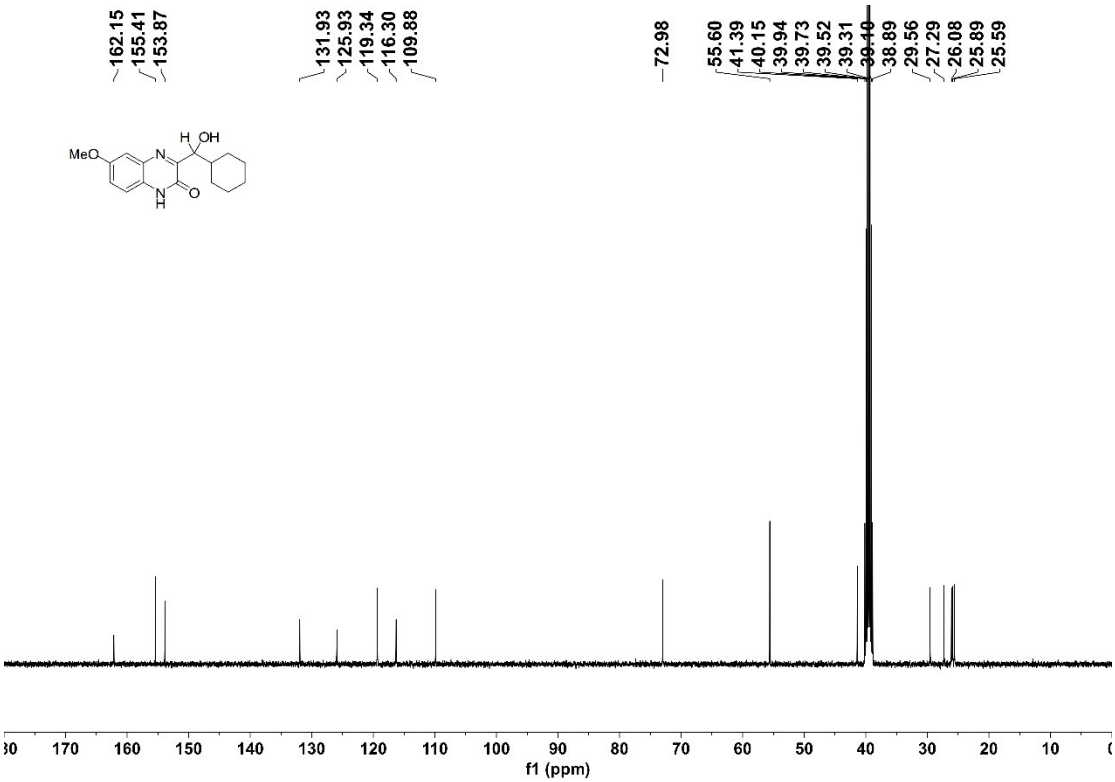
3-(cyclohexyl(hydroxy)methyl)-6-methylquinoxalin-2(1*H*)-one (3ba) /3-(cyclohexyl(hydroxy)methyl)-7-methylquinoxalin-2(1*H*)-one (3ba').



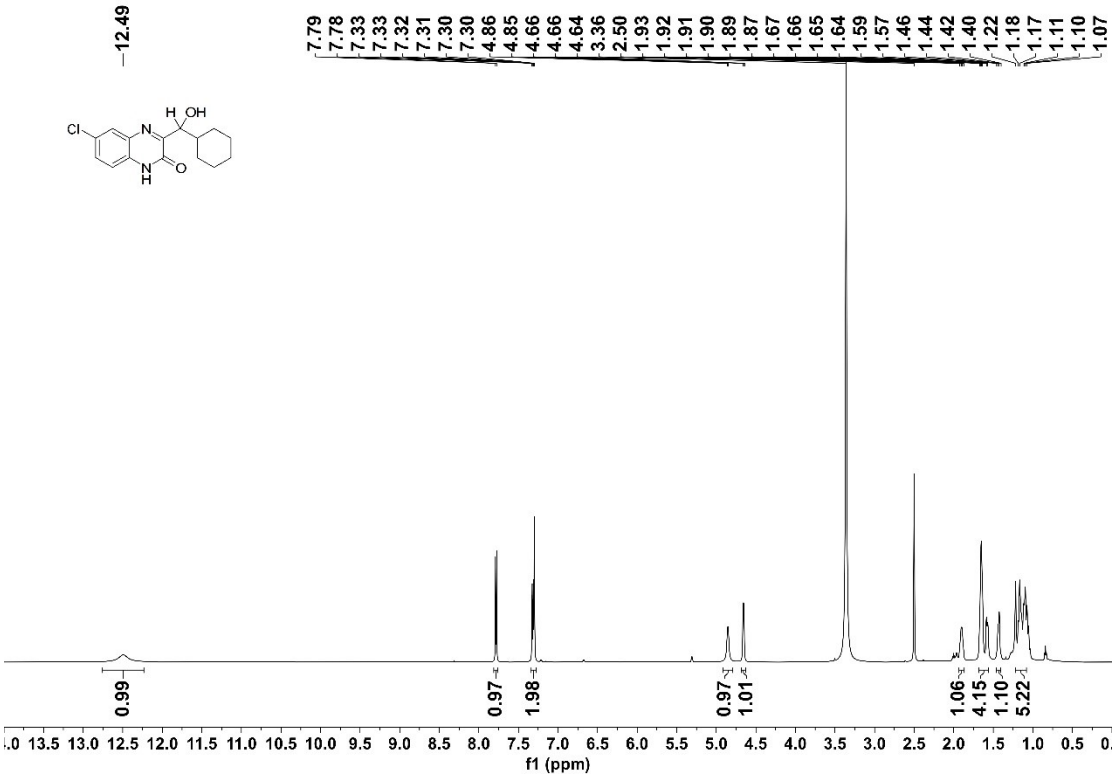


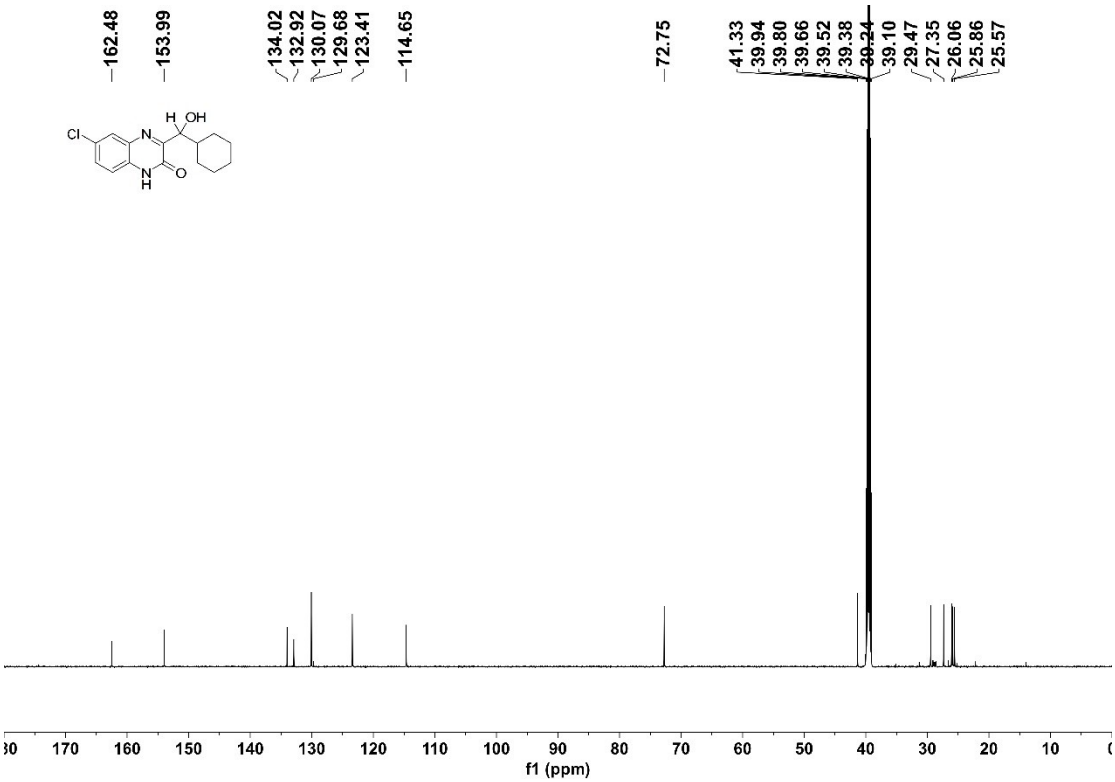
3-(cyclohexyl(hydroxy)methyl)-6-methoxyquinoxalin-2(1*H*)-one (3ca)



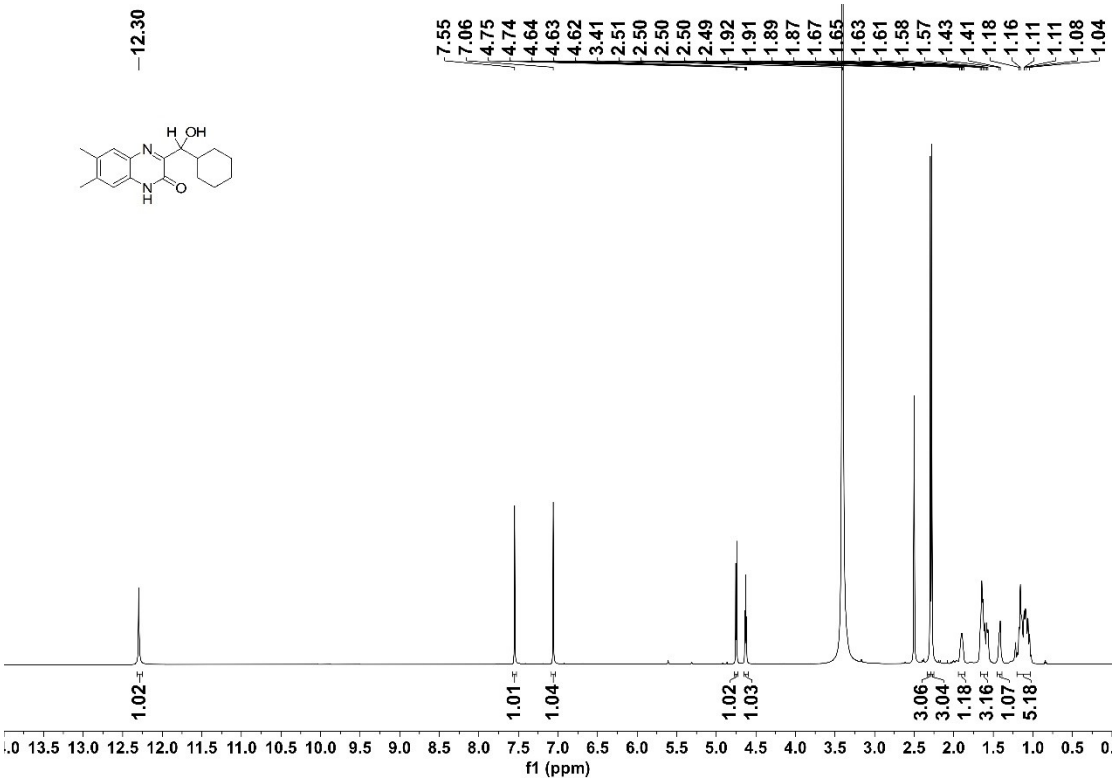


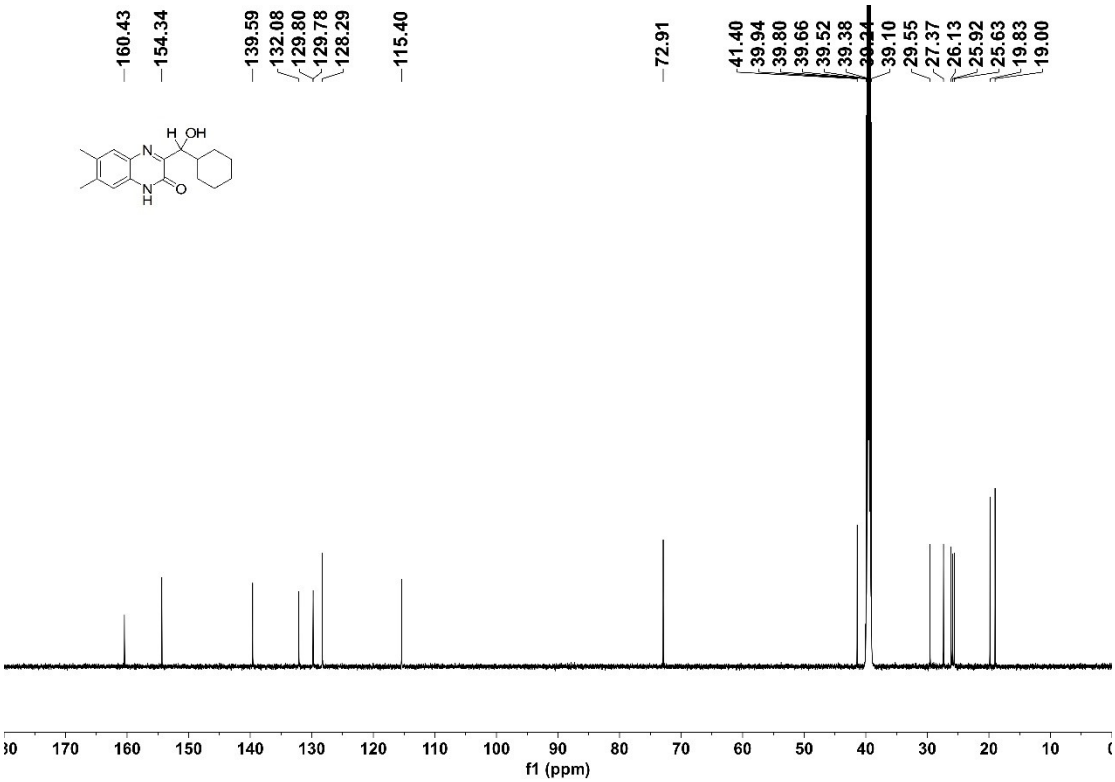
6-chloro-3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3da).



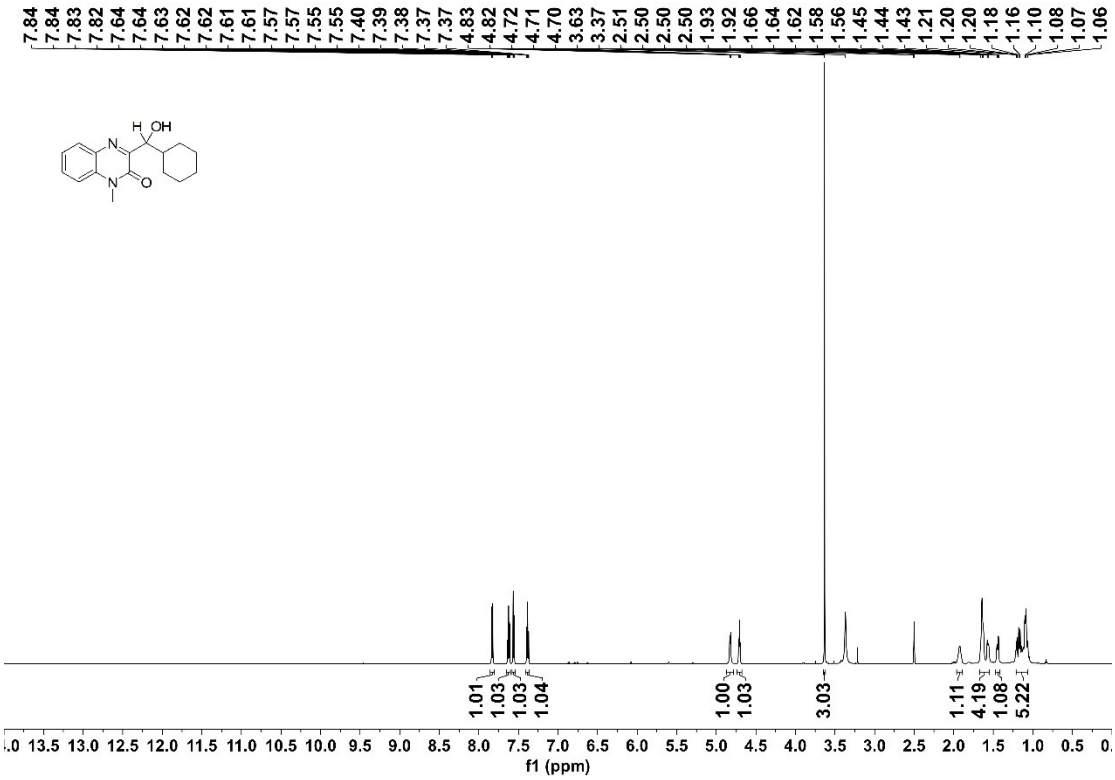


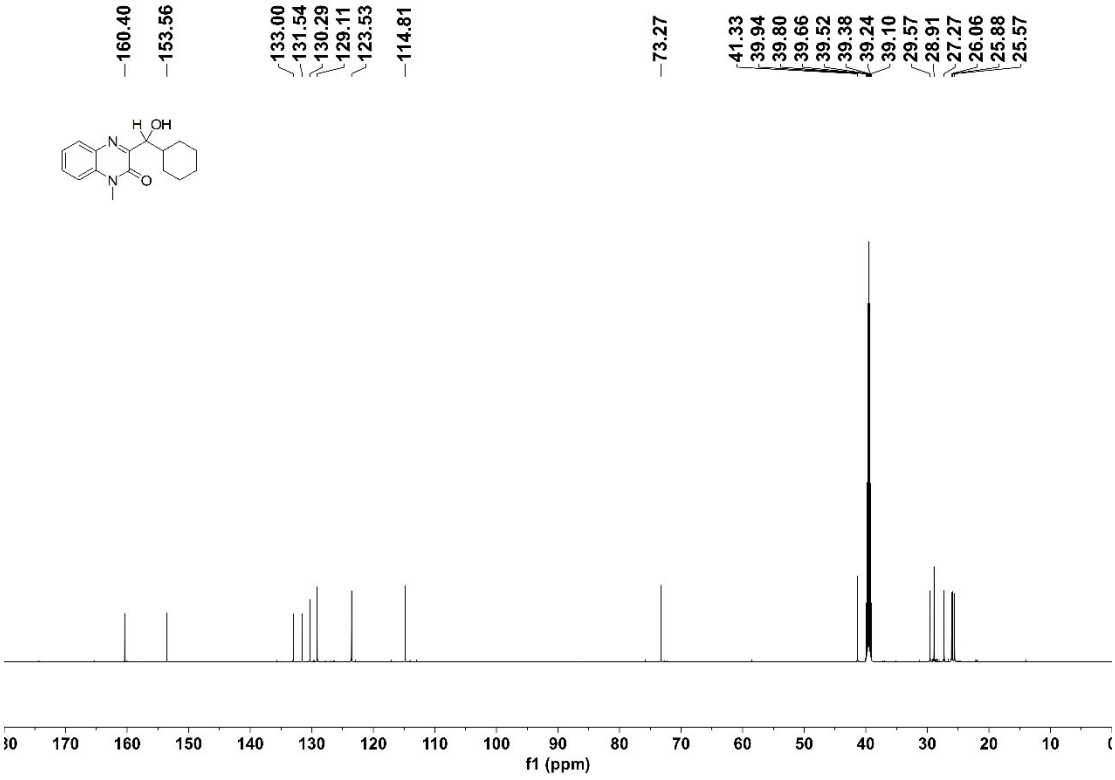
3-(cyclohexyl(hydroxy)methyl)-6,7-dimethylquinoxalin-2(1*H*)-one (3ea)



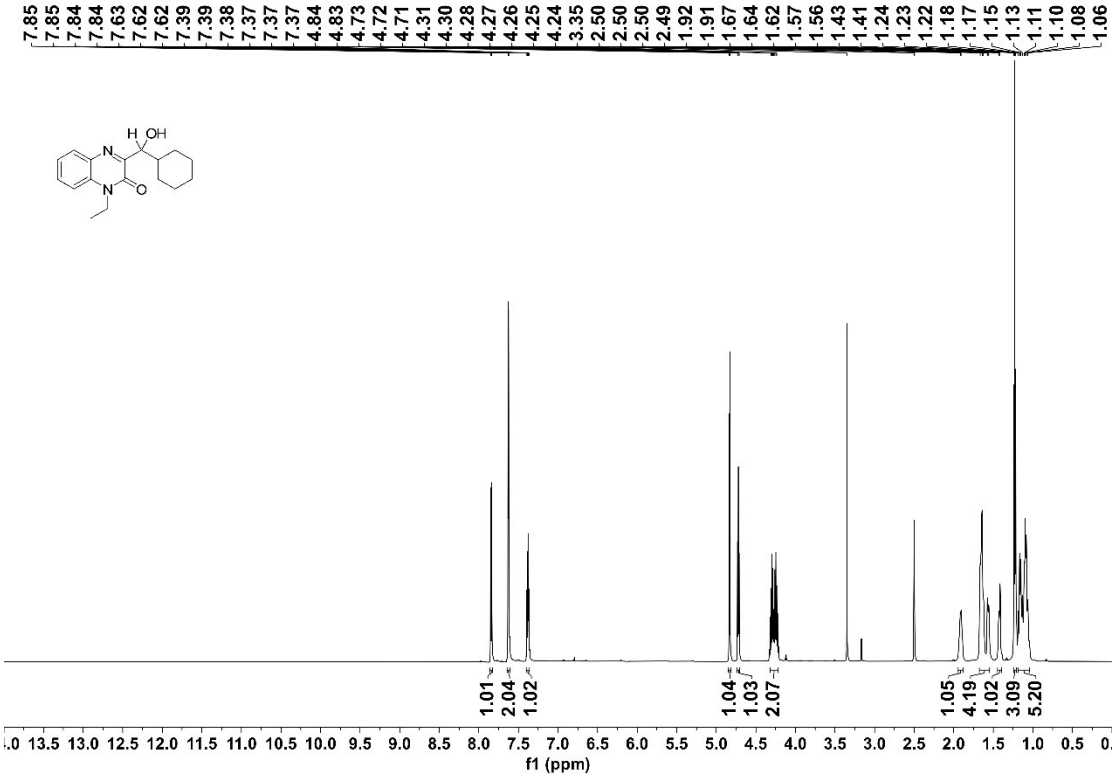


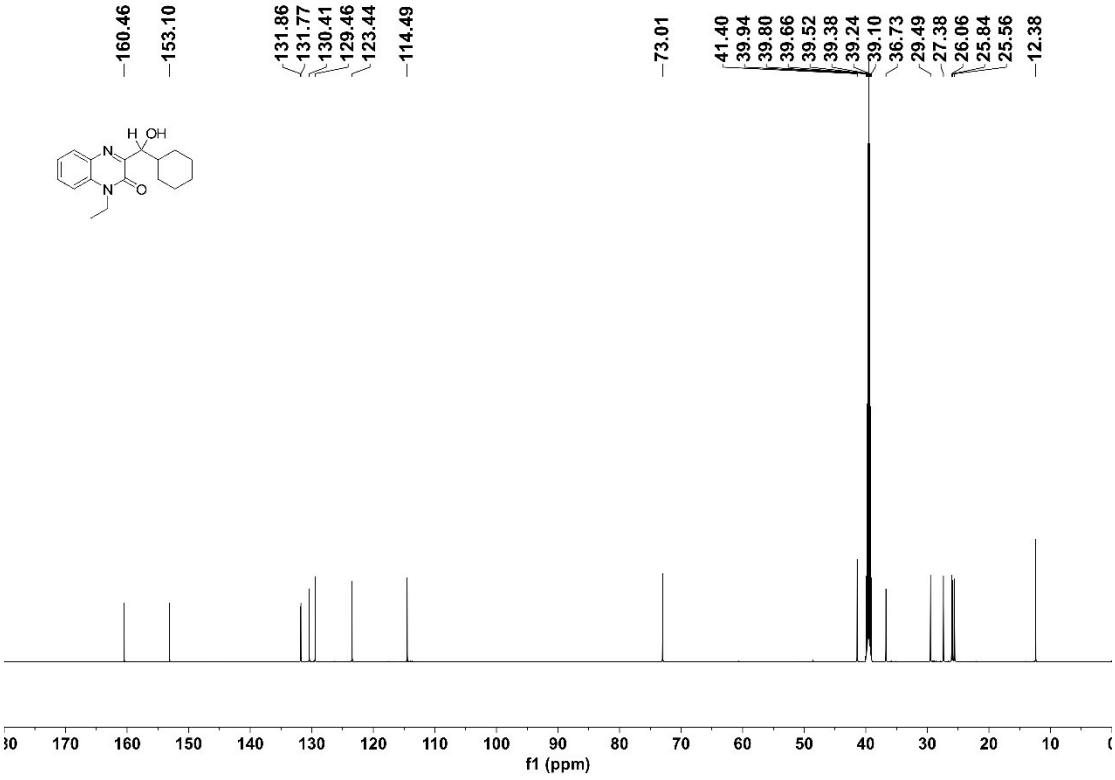
3-(cyclohexyl(hydroxy)methyl)-1-methylquinoxalin-2(1*H*)-one (3fa)



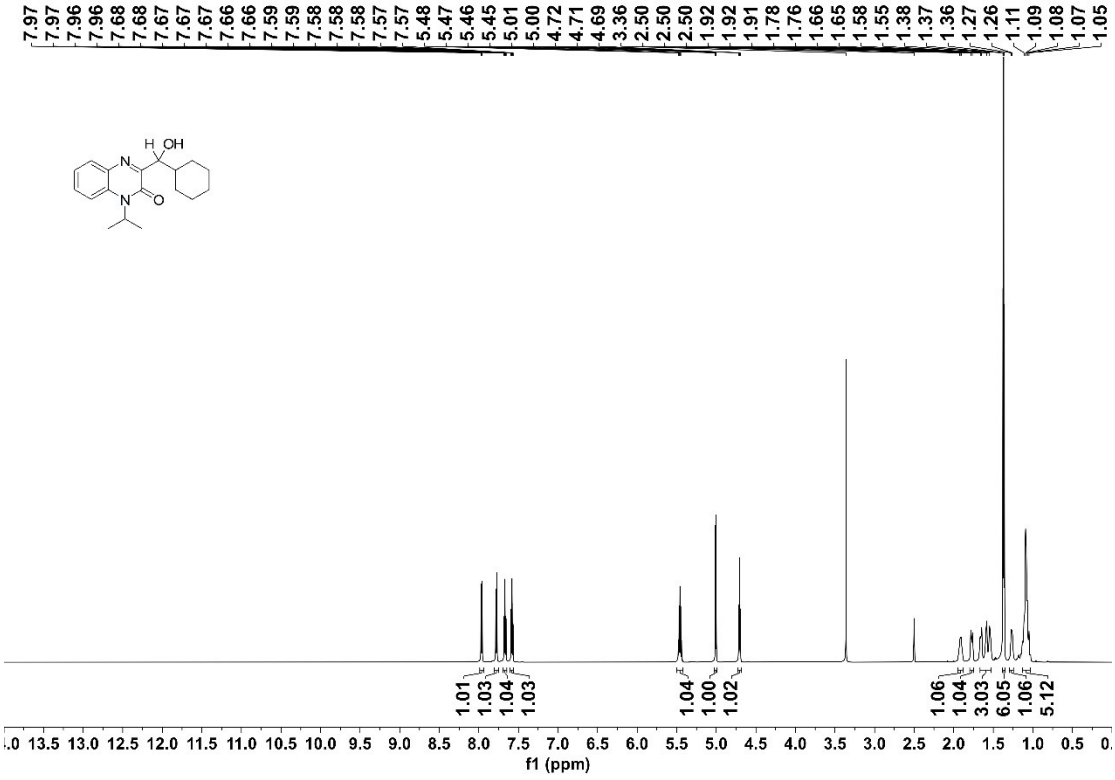


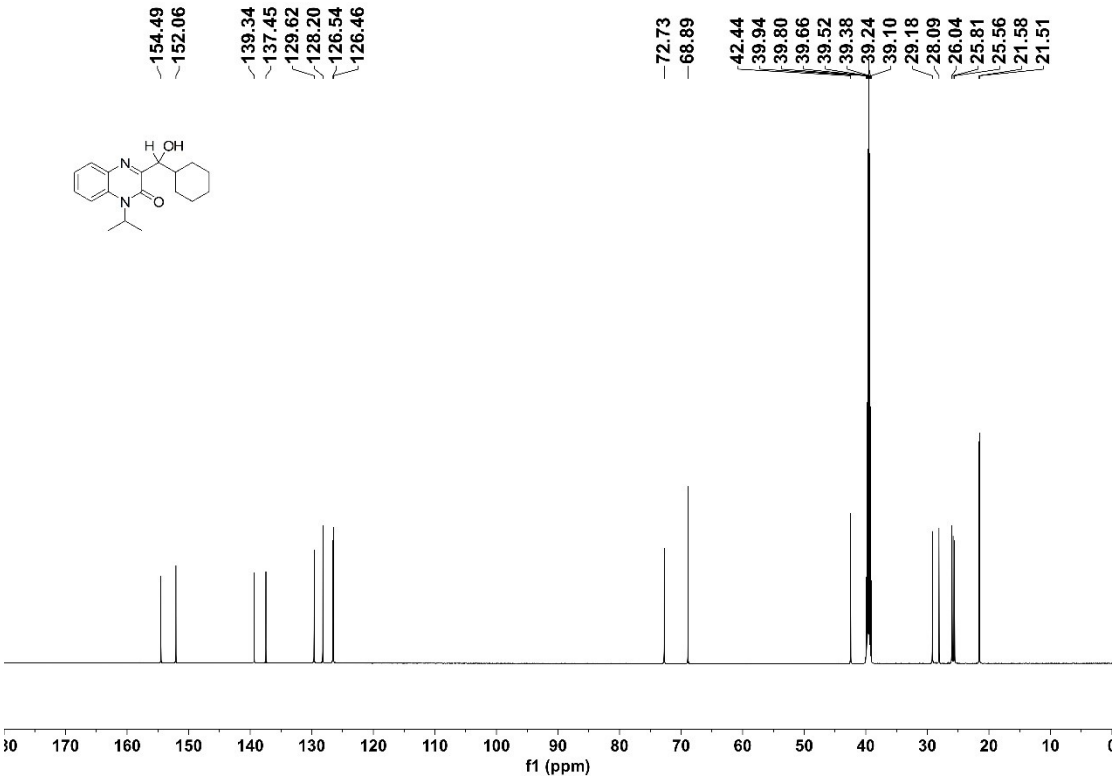
3-(cyclohexyl(hydroxy)methyl)-1-ethylquinoxalin-2(1*H*)-one (3ga)



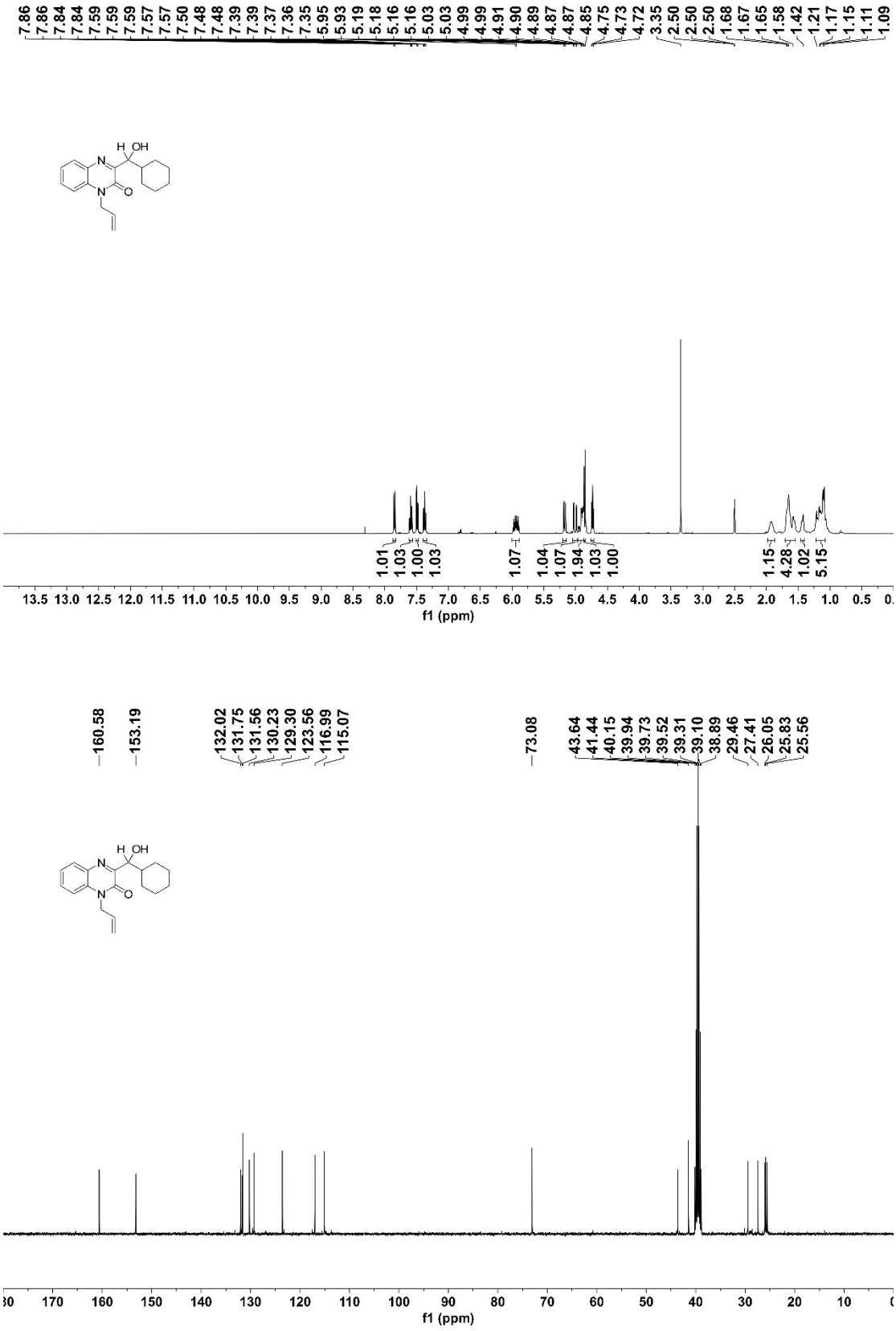


3-(cyclohexyl(hydroxy)methyl)-1-isopropylquinoxalin-2(1*H*)-one (3ha)

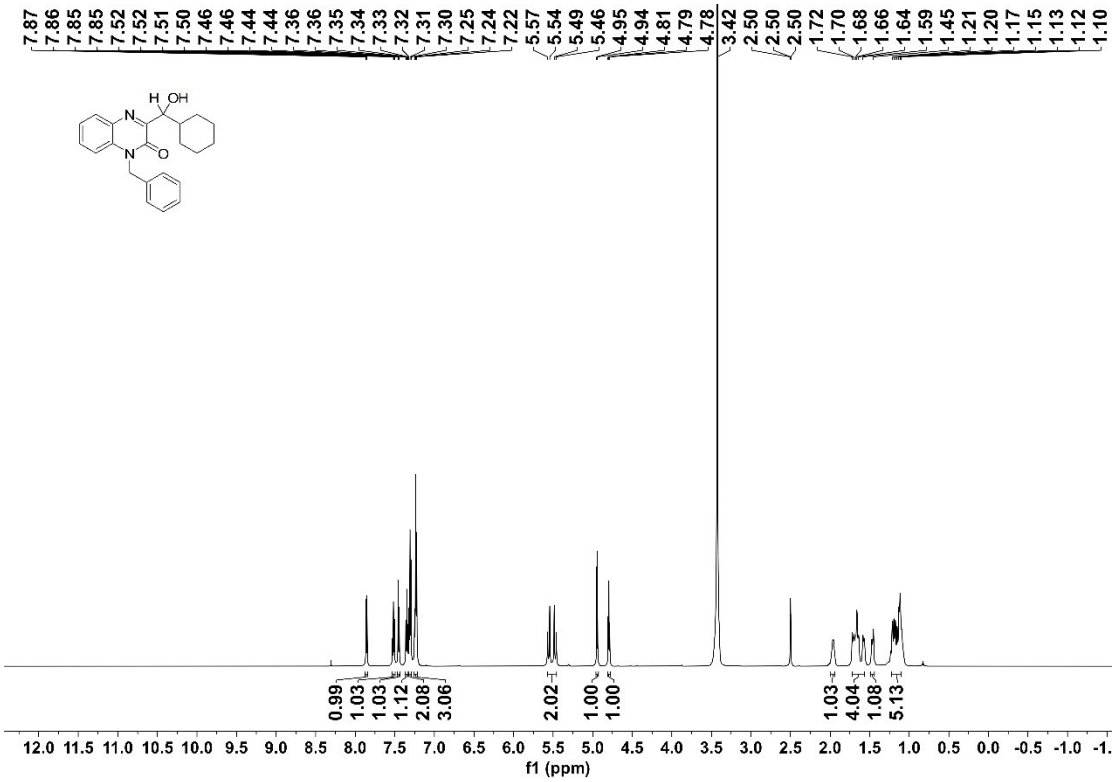


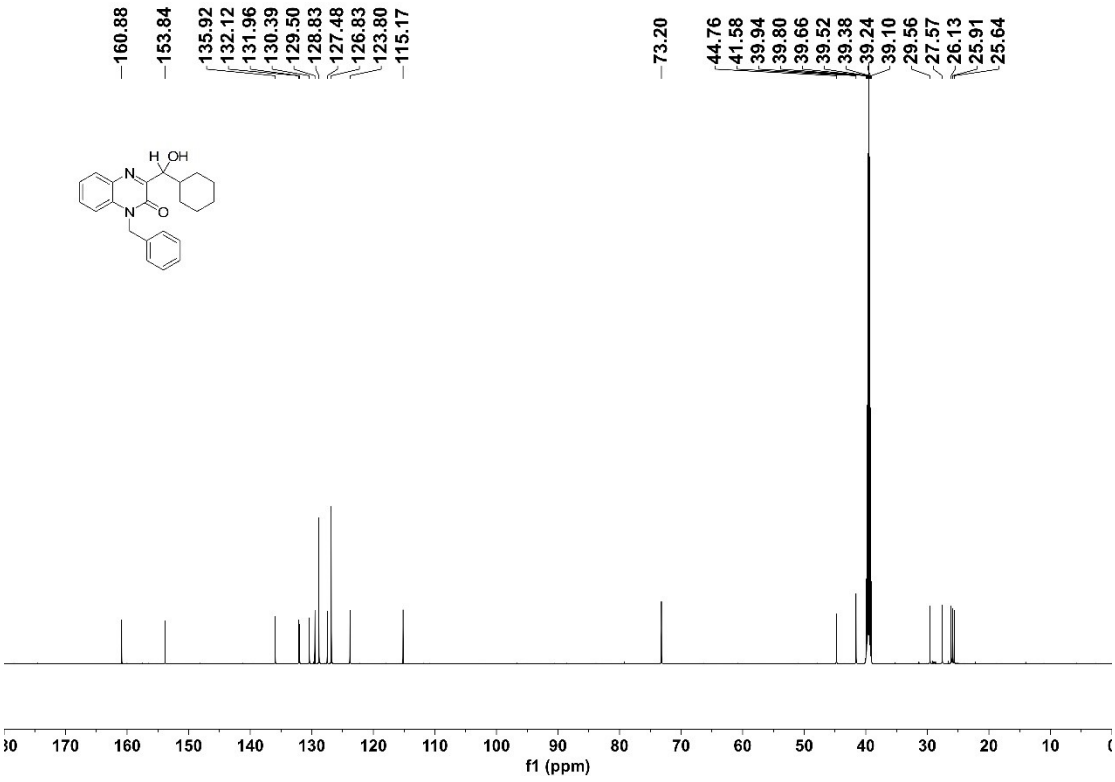


1-allyl-3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3ia)



1-benzyl-3-(cyclohexyl(hydroxy)methyl)quinoxalin-2(1*H*)-one (3ja).





ethyl 2-(3-(cyclohexyl(hydroxy)methyl)-2-oxoquinoxalin-1(2*H*)-yl)acetate (3ka).