Supporting Information

Synthesis of Chiral α-Hydroxy Acids via Palladium-Catalyzed C(sp^3)–H Alkylation of Lactic Acid

Kai Chen,[†, ‡, §] Xin Li,[†, §] Shuo-Qing Zhang,[†] and Bing-Feng Shi[†, *]

[†]Department of Chemistry, Zhejiang University, Hangzhou 310027, China

[‡]Division of Chemistry and Chemical Engineering, California Institute of Technology, Pasadena, California 91125, US

[*]To whom correspondence should be addressed. Email: bfshi@zju.edu.cn.

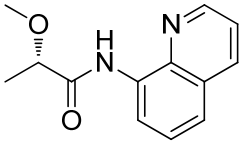
[§]These authors contributed equally to this work

General Information: Unless otherwise noted, all commercial materials were used without further purification. Anhydrous solvents obtained from Aladdin and Adamas were used directly without further purification, and solvents obtained from other commercial suppliers were used after purification as specified in *Purification of Laboratory Chemicals, 6th Ed*. Optical rotations were measured on a Perkin-Elmer 241 polarimeter equipped with a Na-lamp. HPLC analyses were performed on a Shimadzu SPD-20A. Nuclear magnetic resonance (NMR) spectra were recorded with a Bruker AVANCE 400MHz instrument. ^{1}H and ^{13}C chemical shifts are reported in ppm downfield of tetramethylsilane and referenced to residual solvent peak ($CHCl_3$ = 7.26 (^{1}H NMR), DMSO = 2.50 (^{1}H NMR), $CDCl_3$ = 77.16 (^{13}C NMR)) unless otherwise noted. Multiplicities are reported using the following abbreviations: s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, br = broad resonance. High-resolution mass spectra for new compounds were recorded at Mass Spectrometry Facilities, Zhejiang University. X-ray diffraction experiments were performed at X-Ray Facilities, Zhejiang University.

Experimental Procedures:

Preparation of Lactic Acid Substrates

(*S*)-2-Methoxy-*N*-(quinolin-8-yl)propanamide (1a)



To a stirred solution of (*S*)-2-methoxypropanoic acid [1] (10.41 g, 100 mmol) in dry dichloromethane (300 mL), 4-methylmorpholine (NMM, 11.5 mL, 105 mmol) was added slowly at 0 °C. After the solution was stirred for five minutes, *iso*-butyl carbonochloridate (13.3 mL, 105 mmol) was added dropwise slowly at 0 °C. The mixture was then stirred at room temperature for 1.5 h. A solution of 8-aminoquinoline (8.65 g, 60 mmol) in dry dichloromethane (50 mL) was slowly added to the reaction at 0 °C. After the reaction was stirred at room temperature overnight, the resulting mixture was then washed by aqueous HCl (100 mL, 0.1 M), saturated Na_2CO_3 (100 mL), brine (100 mL), and dried over anhydrous $MgSO_4$. Evaporation of organic solvent and purification by silica gel column chromatography in 6:3:1 petroleum ether: dichloromethane: ethyl acetate, afforded the pure 8-aminoquinoline amide **1a** (13.12 g, 95%) as a white solid. $\mathbf{[\alpha]_D^{20}}$ = -66.3 ($CHCl_3$, c=1.0). HPLC Chiralpak® AD-H column, n-hexane/isopropanol = 95: 5, flow rate = 1.00 mL/min, λ = 254 nm, 11.3 (minor), 12.1 (major), 97% ee. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.80 (s, 1H), 8.86 (dd, *J* = 4.0, 1.6 Hz, 1H), 8.80 (dd, *J* = 6.4, 2.4 Hz, 1H), 8.16 (dd, *J* = 8.4, 1.6 Hz, 1H), 7.57 – 7.52 (m, 2H), 7.46 (dd, *J* = 8.4, 4.4 Hz, 1H), 3.99 (q, *J* = 6.8 Hz, 1H), 3.58 (s, 3H), 1.55 (d, *J* = 6.8 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 170.89, 148.63, 138.92, 137.77, 136.20, 133.95, 129.51, 128.38, 128.03, 127.27, 126.60, 122.06, 121.69, 116.63, 84.55, 59.32, 39.58; HRMS (EI) *m/z*: 230.1058(M^+), calc. for $C_{13}H_{14}N_2O_2$: 230.1055.

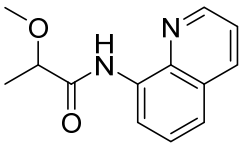
Chiral HPLC Data

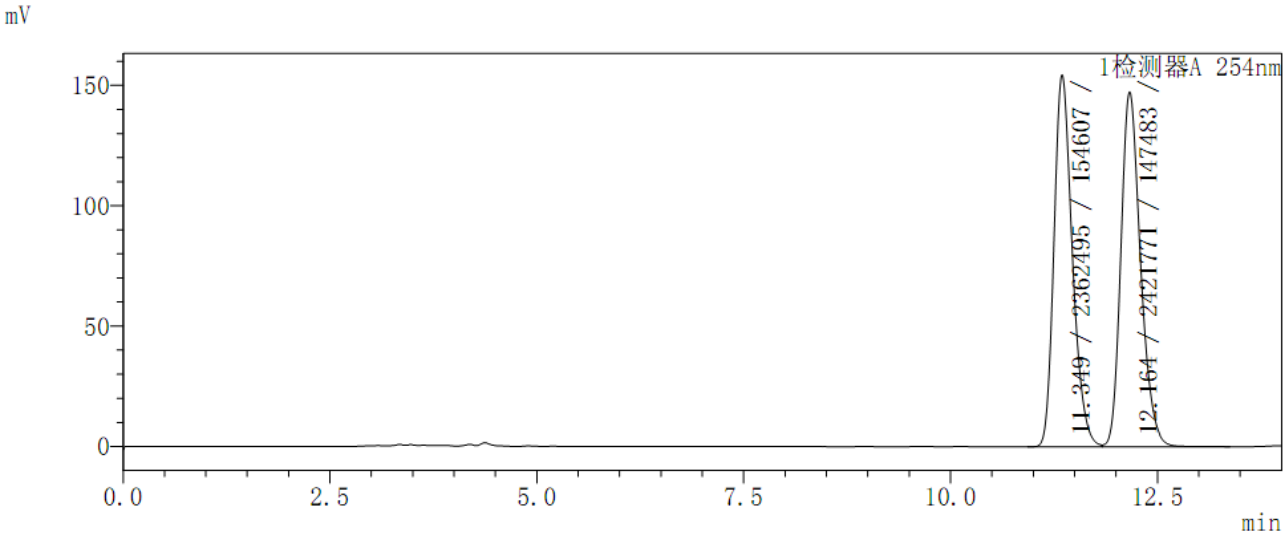
HPLC Conditions

Chiral Stationary phase: Chiralpak® AD-H, n-hexane/isopropanol = 95:5, 1.00 mL/min

Signal: VWD1 A, Wavelength = 254 nm

rac-1a



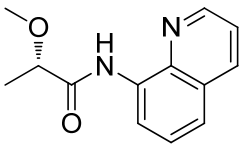


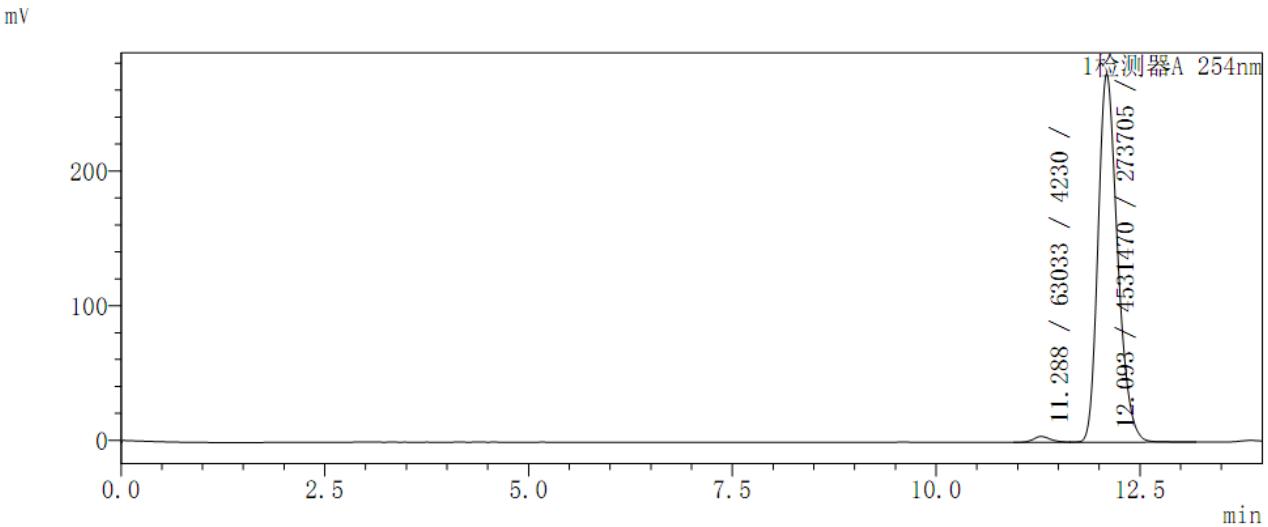
峰表

检测器A 254nm

峰号	保留时间	面积	高度	标记	面积%
1	11.349	2362495	154607		49.381
2	12.164	2421771	147483	V	50.619
总计		4784266	302090		100.000

***L*-1a**



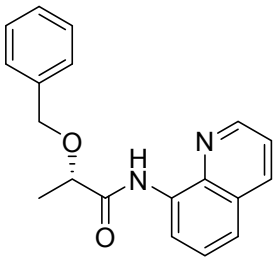


峰表

检测器A 254nm

峰号	保留时间	面积	高度	标记	面积%
1	11.288	63033	4230		1.372
2	12.093	4531470	273705	V	98.628
总计		4594504	277935		100.000

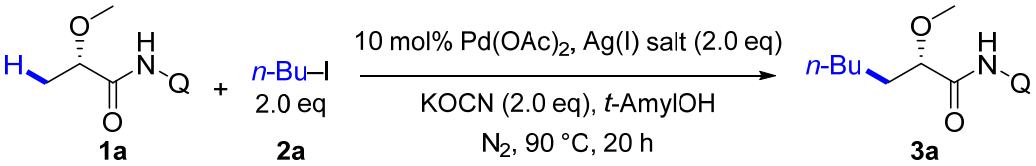
(*S*)-2-Benzyloxy-*N*-(quinolin-8-yl)propanamide (1b)



The preparation of **1b** followed the same procedure of **1a** except using (*S*)-2-benzyloxypropanoic acid instead of (*S*)-2-methoxypropanoic acid. The compound **1b** was obtained as a light yellow solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.09 (s, 1H), 9.16 – 8.69 (m, 2H), 8.15 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.79 – 7.51 (m, 4H), 7.51 – 7.27 (m, 4H), 4.80 (d, *J* = 11.3 Hz, 1H), 4.70 (d, *J* = 11.3 Hz, 1H), 4.22 (qd, *J* = 6.7, 6.7, 0.8 Hz, 1H), 1.62 (d, *J* = 6.6 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.04, 148.47, 138.98, 137.43, 136.23, 134.18, 128.56, 128.16, 128.07, 127.34, 121.93, 121.72, 116.54, 77.13, 72.47, 18.92; HRMS (EI) *m/z*: 306.1369(M^+), calcd. for $C_{19}H_{18}N_2O_2$: 306.1368.

Optimization of Reaction Conditions for Mono-alkylation of 1a

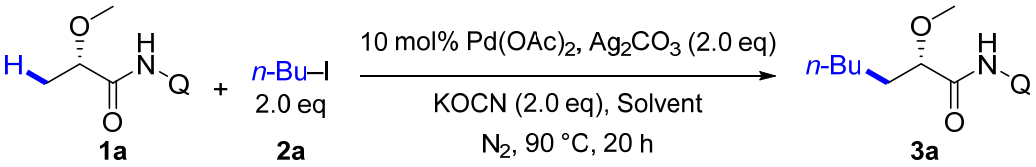
(1) Optimization of Silver Salts (KOCN and *t*-AmylOH used as Base and Solvent)



Entry	Ag(I) salt	Yield **3a**	RSM
1	Ag_2CO_3	34%	59%
2	AgF	<2%	>80%
3	AgOAc	<2%	>80%
4	AgOPiv	~3%	>80%
5	Ag_2O	22%	71%
6	Ag_3PO_4	<2%	>80%
7	AgOCN	~3%	>80%
8	Ag_2SO_4	<1%	>80%
9	AgSCN	<1%	>80%
10	/	0	>90%

Reaction conditions: **1a** (0.20 mmol, 1.0 eq), **2a** (0.40 mmol, 2.0 eq), $Pd(OAc)_2$ (0.02 mmol, 10 mol%), Ag(I) salt (0.40 mmol, 2.0 eq), KOCN (0.40 mmol, 2.0 eq), *t*-AmylOH (2.0 ml), reaction for 20 hours at 90 °C and under N_2 atmosphere.

(2) Optimization of Solvent (KOCN and Ag_2CO_3 used as Base and Silver Salt)

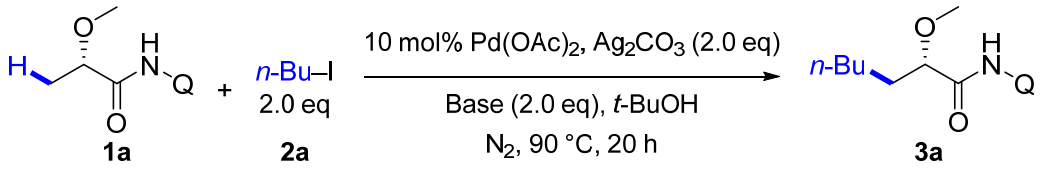


Entry	Solvent	Yield **3a**	RSM
1	^{t}AmylOH	34%	59%
2	^{t}BuOH	49%	33%
3	^{i}PrOH	0	>90%
4	DMF	0	>80%
5	THF	<5%	>80%
6	2-Me-THF	<10%	>70%
7	Acetone	~10%	>70%
8	DME	~10%	>80%
9	AcOEt	22%	72%
10	CF_3CO_2Et	0	>90%
11	HFIP	0	>80%

12	PhMe	~2%	>80%
13	1,4-dioxane	~2%	>80%
14	MeCN	0	>80%
15	^{t}BuCN	0	>80%

Reaction conditions: **1a** (0.20 mmol, 1.0 eq), **2a** (0.40 mmol, 2.0 eq), $Pd(OAc)_2$ (0.02 mmol, 10 mol%), Ag_2CO_3 (0.40 mmol, 2.0 eq), KOCN (0.40 mmol, 2.0 eq), solvent (2.0 ml), reaction for 20 hours at 90 °C and under N_2 atmosphere.

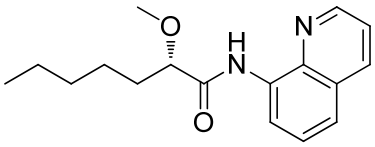
(3) Optimization of Base (*t*-BuOH and Ag_2CO_3 used as Solvent and Silver Salt)



Entry	Base	Yield **3a**	RSM
1	/	~3%	>80%
2	KOCN	49%	33%
3	K_2CO_3	61% (62%)	22%
4	K_3PO_4	58%	27%
5	KF	43%	51%
6	KOAc	50%	44%
7	$MesCO_2K$	49%	43%
8	KTFA	45%	37%
9	Li_2CO_3	~3%	>80%
10	Li_3PO_4	~5%	>80%
11	LiOAc	~2%	>80%
12	Na_2CO_3	33%	55%
13	Na_3PO_4	29%	55%
14	NaOAc	20%	64%
15	Cs_2CO_3	35%	54%
16	CsOAc	45%	46%
17	Rb_2CO_3	61%	24%
18	RbOAc	53%	38%
19	K_2CO_3 (1.0 eq)	61% (62%)	21%
19	K_2CO_3 (0.5 eq)	58%	27%
20	K_2CO_3 (0.2 eq)	53%	33%
21	K_3PO_4 (0.2 eq)	32%	47%
22	KOAc (0.2 eq)	51%	38%
23	Rb_2CO_3 (0.2 eq)	55%	32%
24 [b]	K_2CO_3 (1.0 eq)	63% (64%)	21%

Reaction conditions: **1a** (0.20 mmol, 1.0 eq), **2a** (0.40 mmol, 2.0 eq), $Pd(OAc)_2$ (0.02 mmol, 10 mol%), Ag_2CO_3 (0.40 mmol, 2.0 eq), base (0.40 mmol, 2.0 eq), *t*-BuOH (2.0 ml), reaction for 20 hours at 90 °C and under N_2 atmosphere; [a] 100 °C; [b] Isolated yields indicated in the parentheses.

(***S***)-2-Methoxy-*N*-(quinolin-8-yl)heptanamide (**3a**)



The title compound was prepared under the optimized condition. The crude product was purified by silica gel column chromatography in 12:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3a** as a colorless oil (36.9 mg, 64%) with **1a** (9.9 mg, 21%) recovered. $[\alpha]_D^{20}$ = -50.0 ($CHCl_3$, c=1.0). HPLC Chiralpak® AD-H column, n-hexane/isopropanol = 95: 5, flow rate = 1.00 mL/min, λ = 254 nm, 9.0 (minor), 12.5 (major), 94% ee.^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.81 (dd, *J* = 6.7, 2.1 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.59 – 7.49 (m, 2H), 7.44 (dd, *J* = 8.3, 4.2 Hz, 1H), 3.84 (dd, *J* = 7.3, 4.4 Hz, 1H), 3.57 (s, 3H), 1.99 – 1.78 (m, 2H), 1.57 – 1.45 (m, 2H), 1.38 – 1.29 (m, 4H), 0.88 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.89, 148.70, 139.06, 136.28, 134.18, 128.14, 127.37, 121.94, 121.72, 116.65, 83.70, 58.85, 33.22, 31.79, 24.89, 22.63, 14.14; HRMS (EI) *m/z*: 286.1680 (M^+), calc. for $C_{17}H_{22}N_2O_2$: 286.1681.

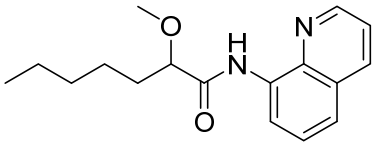
Chiral HPLC Data

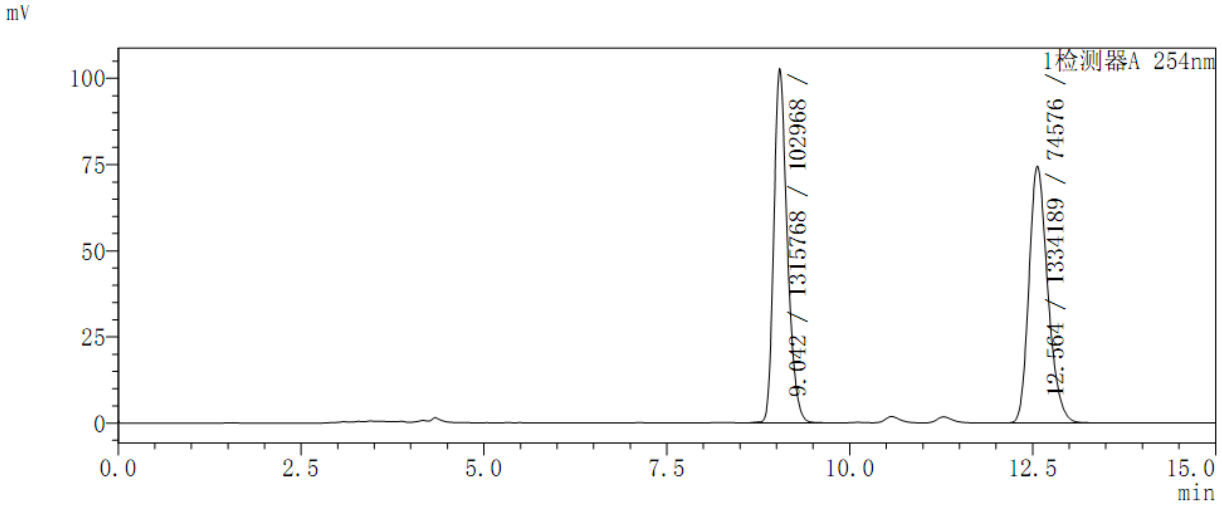
HPLC Conditions

Chiral Stationary phase: Chiralpak® AD-H, n-hexane/isopropanol = 95:5, 1.00 mL/min

Signal: VWD1 A, Wavelength = 254 nm

Rac-3a



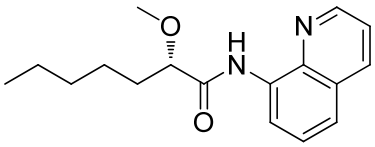


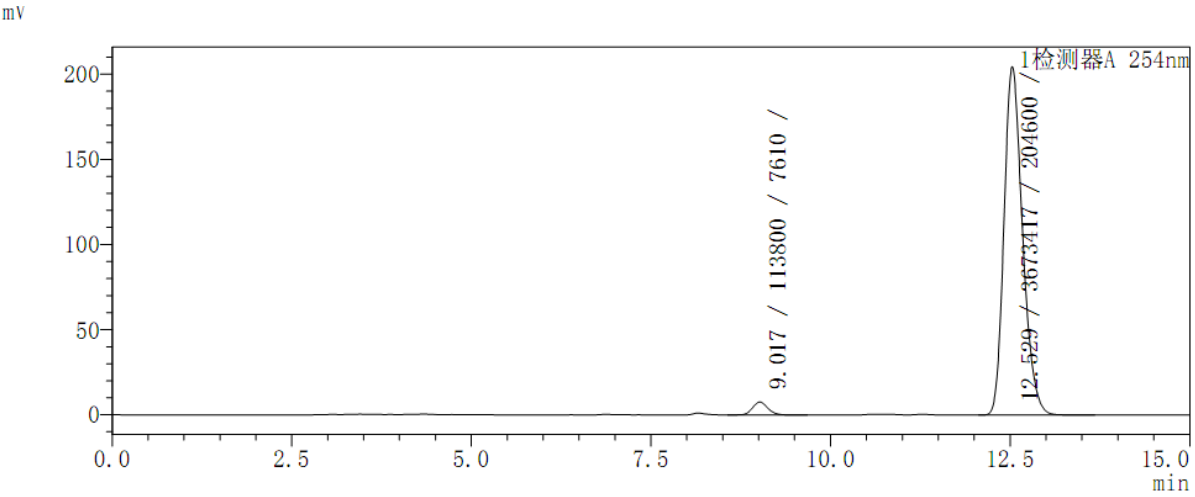
峰表

检测器A 254nm

峰号	保留时间	面积	高度	标记	面积%
1	9.042	1315768	102968		49.652
2	12.564	1334189	74576		50.348
总计		2649956	177544		100.000

***L*-3a**





峰表

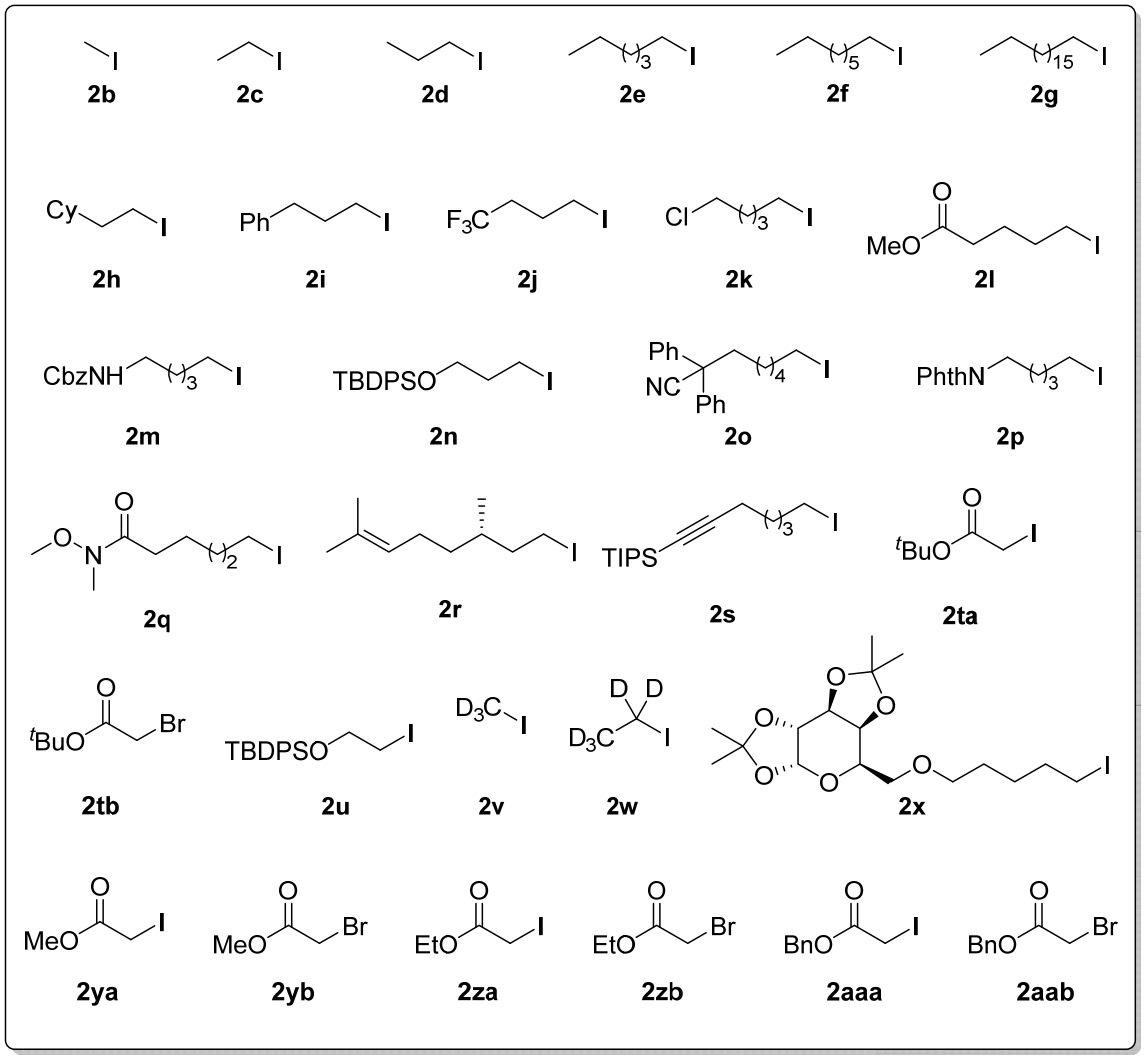
检测器A 254nm

峰号	保留时间	面积	高度	标记	面积%
1	9.017	113800	7610		3.005
2	12.529	3673417	204600		96.995
总计		3787217	212210		100.000

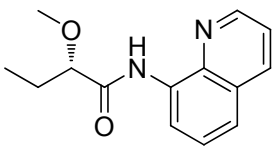
General Procedure (GP) for Mono-alkylation of Lactic Acid Derivative

To a 30-mL resealable Schlenk flask were added **1a** (46.1 mg, 0.2 mmol), $Pd(OAc)_2$ (4.5 mg, 0.02 mmol), alkyl iodide (0.4 mmol), Ag_2CO_3 (110.3 mg, 0.4 mmol), K_2CO_3 (27.6 mg, 0.2 mmol), and *t*-BuOH (2.0 mL). The Schlenk flask was charged with 1 atm of N_2. The mixture was stirred at 100 °C for 20 hours (for deuterated alkyl iodides, the reactions were run at 90 °C). The reaction vessel was allowed to cool to room temperature, and dichloromethane (5 mL) was added. The resulting mixture was filtered through a pad of Celite, which was subsequently washed with additional dichloromethane (20 mL). Evaporation of the organic solvent and purification by silica gel column chromatography gave the corresponding product.

Scope of alkyl iodides:

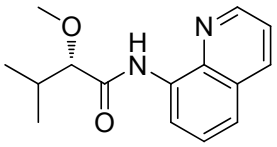


(*S*)-2-Methoxy-*N*-(quinolin-8-yl)butanamide (3b)



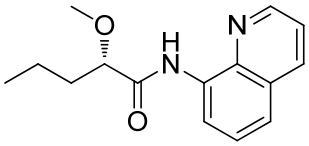
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 12:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3b** as a white solid (33.4 mg, 68%) **$[\alpha]_D^{20}$ = -88.2 ($CHCl_3$, c = 0.75)**, with **3b'** (10.2 mg, 20%) isolated. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.82 (dd, *J* = 6.8, 1.9 Hz, 1H), 8.14 (d, *J* = 8.2 Hz, 1H), 7.64 – 7.48 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.82 (dd, *J* = 6.5, 4.5 Hz, 1H), 3.58 (s, 3H), 2.07 – 1.82 (m, 2H), 1.04 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.60, 148.69, 139.05, 136.27, 134.15, 128.13, 127.35, 121.94, 121.71, 116.64, 84.46, 58.73, 26.07, 9.40; HRMS (EI) *m/z*: 244.1215 (M^+); calc. for $C_{14}H_{16}N_2O_2$: 244.1212.

(*S*)-2-Methoxy-3-methyl-*N*-(quinolin-8-yl)butanamide (3b')



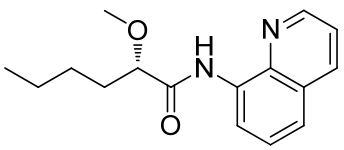
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.75 (s, 1H), 8.86 (d, *J* = 4.1 Hz, 1H), 8.82 (dd, *J* = 6.7, 1.9 Hz, 1H), 8.16 (d, *J* = 8.2 Hz, 1H), 7.60 – 7.48 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.63 (d, *J* = 4.4 Hz, 1H), 3.59 (s, 3H), 2.31 – 2.18 (m, 1H), 1.10 (d, *J* = 6.9 Hz, 3H), 1.02 (d, *J* = 6.8 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.38, 148.74, 139.11, 136.28, 134.13, 128.17, 127.40, 121.92, 121.74, 116.65, 88.67, 59.84, 32.12, 19.20, 17.34; HRMS (EI) *m/z*: 258.1369 (M^+); calc. for $C_{15}H_{18}N_2O_2$: 258.1368.

(*S*)-2-Methoxy-*N*-(quinolin-8-yl)pentanamide (3c)



The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 12:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3c** as a colorless oil (30.3 mg, 59%). **$[\alpha]_D^{20}$** = -104.2 ($CHCl_3$, c = 1.0). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.81 (dd, *J* = 6.8, 1.9 Hz, 1H), 8.14 (dd, *J* = 8.2, 1.4 Hz, 1H), 7.59 – 7.50 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.86 (dd, *J* = 7.1, 4.6 Hz, 1H), 3.57 (s, 3H), 1.98 – 1.78 (m, 2H), 1.53 (dq, *J* = 14.9, 7.4 Hz, 2H), 0.96 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.89, 148.69, 139.04, 136.27, 134.16, 128.13, 127.36, 121.93, 121.72, 116.63, 83.48, 58.85, 35.30, 18.51, 14.01; HRMS (EI) *m/z*: 258.1366 (M^+); calc. for $C_{15}H_{18}N_2O_2$: 258.1368.

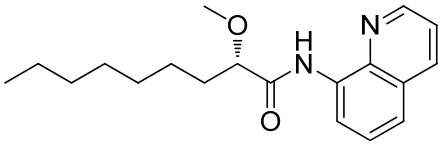
(*S*)-2-Methoxy-*N*-(quinolin-8-yl)hexanamide (3d)



The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 12:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3d** as

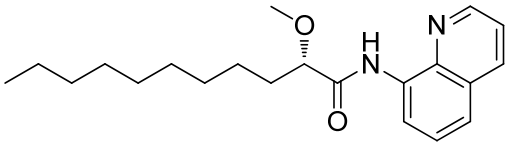
a colorless oil (32.4 mg, 59%).**[α]$_D^{20}$ = -**94.6 ($CHCl_3$, c = 0.5)**.** ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.81 (dd, *J* = 6.8, 1.7 Hz, 1H), 8.14 (d, *J* = 8.2 Hz, 1H), 7.61 – 7.49 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.85 (dd, *J* = 7.1, 4.5 Hz, 1H), 3.57 (s, 3H), 2.00 – 1.78 (m, 2H), 1.48 (dt, *J* = 15.4, 7.5 Hz, 2H), 1.42 – 1.31 (m, 2H), 0.90 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.87, 148.69, 139.05, 136.26, 134.17, 128.13, 127.36, 121.93, 121.71, 116.63, 83.66, 58.83, 32.94, 27.32, 22.68, 14.06; HRMS (EI) *m/z*: 272.1529 (M^+); calc. for $C_{16}H_{20}N_2O_2$: 272.1525.

(*S*)-2-Methoxy-*N*-(quinolin-8-yl)nonanamide (3e)



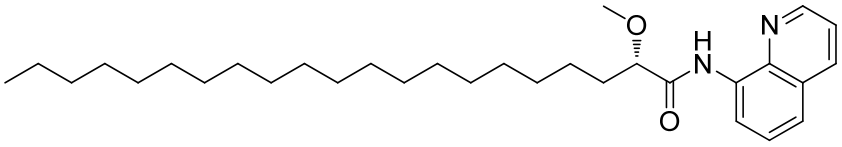
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 14:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3e** as a colorless oil (39.9 mg, 63%).**[α]$_D^{20}$** = -68.0 ($CHCl_3$, c = 1.0). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.0, 1.3 Hz, 1H), 8.82 (dd, *J* = 6.8, 1.7 Hz, 1H), 8.15 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.62 – 7.49 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.85 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.58 (s, 3H), 2.00 – 1.77 (m, 2H), 1.57 – 1.44 (m, 2H), 1.36 – 1.23 (m, 8H), 0.86 (t, *J* = 6.5 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.88, 148.68, 139.05, 136.26, 134.18, 128.13, 127.37, 121.92, 121.71, 116.64, 83.69, 58.84, 33.26, 31.90, 29.56, 29.26, 25.21, 22.73, 14.18; HRMS (EI) *m/z*: 314.1997 (M^+); calc. for $C_{19}H_{26}N_2O_2$: 314.1994.

(*S*)-2-Methoxy-*N*-(quinolin-8-yl)undecanamide (3f)



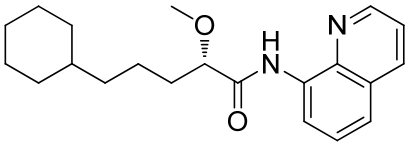
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 15:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3f** as a colorless oil (41.7 mg, 61%). **[α]$_D^{20}$** = -55.0 ($CHCl_3$, c = 1.0). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.0, 1.4 Hz, 1H), 8.81 (dd, *J* = 6.8, 1.9 Hz, 1H), 8.15 (dd, *J* = 8.1, 1.2 Hz, 1H), 7.61 – 7.48 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.84 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.57 (s, 3H), 1.99 – 1.77 (m, 2H), 1.56 – 1.44 (m, 2H), 1.27 (s, 12H), 0.86 (t, *J* = 6.7 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.88, 148.69, 139.06, 136.27, 134.19, 128.14, 127.38, 121.92, 121.72, 116.65, 83.70, 58.85, 33.27, 31.99, 29.65, 29.60, 29.40, 25.21, 22.78, 14.22; HRMS (EI) *m/z*: 342.2306 (M^+); calc. for $C_{21}H_{30}N_2O_2$: 342.2307.

(*S*)-2-Methoxy-*N*-(quinolin-8-yl)henicosanamide (3g)



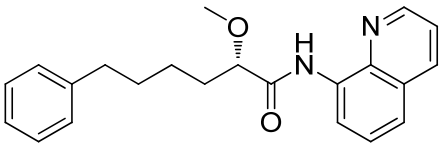
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 20:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3g** as a white solid (58.4 mg, 61%). $[\alpha]_D^{20}$ = -47.4 ($CHCl_3$, c = 1.2). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.0, 1.1 Hz, 1H), 8.82 (dd, *J* = 6.8, 1.6 Hz, 1H), 8.14 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.61 – 7.47 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.85 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.57 (s, 3H), 2.00 – 1.78 (m, 2H), 1.54 – 1.44 (m, 2H), 1.25 (s, 32H), 0.88 (t, *J* = 6.7 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.87, 148.67, 139.06, 136.25, 134.19, 128.13, 127.37, 121.91, 121.70, 116.65, 83.70, 58.83, 33.27, 32.05, 29.83, 29.79, 29.76, 29.72, 29.61, 29.49, 25.22, 22.82, 14.24; HRMS (EI) *m/z*: 482.3876 (M^+); calc. for $C_{31}H_{50}N_2O_2$: 482.3872.

(***S***)-**5-Cyclohexyl-2-methoxy-*N*-(quinolin-8-yl)pentanamide** (**3h**)



The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 15:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3h** as a colorless oil (40.3 mg, 59%). $[\alpha]_D^{20}$ = -68.9 ($CHCl_3$, c = 1.2). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.78 (s, 1H), 8.85 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.81 (dd, *J* = 6.8, 2.0 Hz, 1H), 8.14 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.62 – 7.48 (m, 2H), 7.44 (dd, *J* = 8.3, 4.2 Hz, 1H), 3.84 (dd, *J* = 7.3, 4.4 Hz, 1H), 3.57 (s, 3H), 1.94 – 1.76 (m, 2H), 1.72 – 1.58 (m, 5H), 1.56 – 1.46 (m, 2H), 1.28 – 1.11 (m, 6H), 0.91 – 0.79 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.88, 148.67, 139.05, 136.26, 134.17, 128.12, 127.36, 121.91, 121.70, 116.64, 83.72, 58.87, 37.61, 37.38, 33.58, 33.50, 33.45, 26.81, 26.50, 22.53; HRMS (EI) *m/z*: 340.2151 (M^+); calc. for $C_{21}H_{28}N_2O_2$: 340.2151.

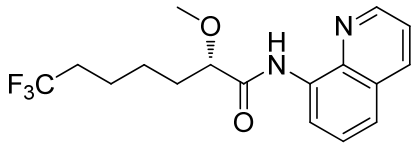
(***S***)-**2-Methoxy-6-phenyl-*N*-(quinolin-8-yl)hexanamide** (**3i**)



The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 10:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3i** as a colorless oil (43.3 mg, 62%). $[\alpha]_D^{20}$ = -65.2 ($CHCl_3$, c = 1.0). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.3, 1.5 Hz, 1H), 8.81 (d, *J* = 6.8 Hz, 1H), 8.14 (d, *J* = 8.3 Hz, 1H), 7.58 – 7.48 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 7.27 – 7.19 (m, 2H), 7.18 – 7.10 (m, 3H), 3.85 (dd, *J* = 6.7, 4.6 Hz, 1H), 3.56 (s, 3H), 2.61 (t, *J* = 7.6 Hz, 2H), 2.02 – 1.83 (m, 2H), 1.71 – 1.62 (m, 2H), 1.60 – 1.51

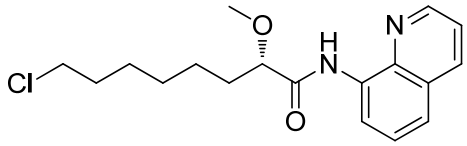
(m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.73, 148.69, 142.62, 139.04, 136.27, 134.12, 128.47, 128.35, 128.12, 127.35, 125.73, 121.96, 121.72, 116.65, 83.54, 58.85, 35.89, 33.03, 31.45, 24.94; HRMS (EI) *m/z*: 348.1835 (M^+); calc. for $C_{22}H_{24}N_2O_2$: 348.1838.

(*S*)-7,7,7-Trifluoro-2-methoxy-*N*-(quinolin-8-yl)heptanamide (3j)



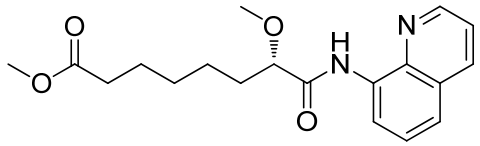
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 12:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3j** as a colorless oil (37.9 mg, 56%). **$[\alpha]_D^{20}$ = -**88.5 ($CHCl_3$, c = 0.5). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.80 (s, 1H), 8.86 (dd, *J* = 4.1, 1.5 Hz, 1H), 8.80 (dd, *J* = 6.1, 2.8 Hz, 1H), 8.16 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.61 – 7.49 (m, 2H), 7.46 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.86 (dd, *J* = 6.8, 4.6 Hz, 1H), 3.59 (s, 3H), 2.16 – 1.99 (m, 2H), 1.99 – 1.82 (m, 2H), 1.66 – 1.52 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.34, 148.76, 139.04, 136.33, 134.02, 131.38, 128.63, 125.88, 123.14 (q, J_{C-F} = 277.4 Hz), 128.16, 127.36, 122.11, 121.78, 116.70, 83.18, 58.90, 34.17, 33.88, 33.60, 33.32 (q, J_{C-F} = 28.6 Hz), 32.59, 24.32, 21.93, 21.90, 21.87, 21.85 (q, J_{C-F} = 2.8 Hz); HRMS (EI) *m/z*: 340.1401 (M^+); calc. for $C_{17}H_{19}F_3N_2O_2$: 340.1399.

(*S*)-8-Chloro-2-methoxy-*N*-(quinolin-8-yl)octanamide (3k)



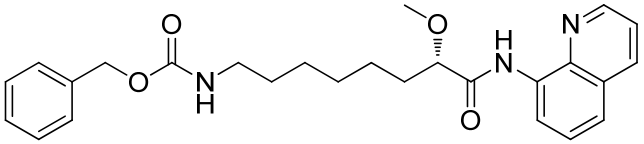
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 12:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3k** as a colorless oil (39.7 mg, 59%). **$[\alpha]_D^{20}$** = -61.1 ($CHCl_3$, c = 1.08). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.80 (dd, *J* = 6.5, 2.3 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.64 – 7.47 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.85 (dd, *J* = 7.1, 4.5 Hz, 1H), 3.57 (s, 3H), 3.50 (t, *J* = 6.7 Hz, 2H), 1.98 – 1.80 (m, 2H), 1.79 – 1.70 (m, 2H), 1.56 – 1.47 (m, 2H), 1.46 – 1.32 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.68, 148.70, 139.02, 136.27, 134.09, 128.12, 127.34, 121.98, 121.73, 116.63, 83.50, 58.84, 45.14, 33.01, 32.61, 28.81, 26.82, 24.96; HRMS (EI) *m/z*: 334.1449 (M^+); calc. for $C_{18}H_{23}ClN_2O_2$: 334.1448.

(*S*)-Methyl 7-methoxy-8-oxo-8-(quinolin-8-ylamino)octanoate (3l)



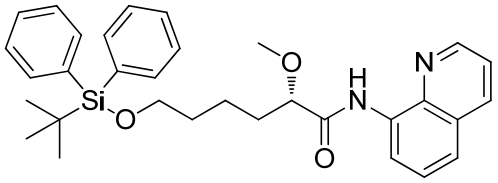
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 6:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3l** as a colorless oil (39.5 mg, 57%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.77 (s, 1H), 8.84 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.79 (dd, *J* = 6.5, 2.4 Hz, 1H), 8.14 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.61 – 7.46 (m, 2H), 7.43 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.83 (dd, *J* = 7.1, 4.5 Hz, 1H), 3.63 (s, 3H), 3.56 (s, 3H), 2.28 (t, *J* = 7.5 Hz, 2H), 1.97 – 1.78 (m, 2H), 1.62 (dt, *J* = 15.1, 7.5 Hz, 2H), 1.55 – 1.45 (m, 2H), 1.41 – 1.31 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.20, 171.63, 148.68, 138.99, 136.25, 134.07, 128.10, 127.31, 121.96, 121.70, 116.61, 83.44, 58.82, 51.51, 34.06, 32.91, 29.03, 24.87, 24.77; HRMS (EI) *m/z*: 344.1740 (M^+); calc. for $C_{19}H_{24}N_2O_4$: 344.1736.

(***S***)-**Benzyl** (**7-methoxy-8-oxo-8-**(**quinolin-8-ylamino**)**octyl**)**carbamate** (**3m**)



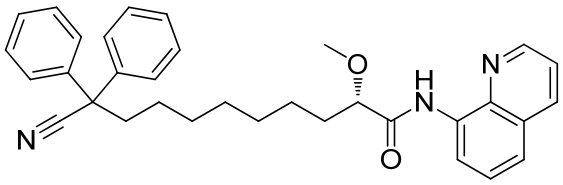
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 5:4:1 petroleum ether: dichloromethane: ethyl acetate, providing **3m** as a white solid (54.1 mg, 60%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 3.9, 1.4 Hz, 1H), 8.80 (dd, *J* = 6.3, 2.4 Hz, 1H), 8.15 (dd, *J* = 8.2, 1.4 Hz, 1H), 7.58 – 7.50 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 7.40 – 7.26 (m, 5H), 5.08 (s, 2H), 4.78 (s, 1H), 3.84 (dd, *J* = 6.9, 4.5 Hz, 1H), 3.57 (s, 3H), 3.16 (q, *J* = 6.3 Hz, 2H), 1.96 – 1.80 (m, 2H), 1.56 – 1.43 (m, 4H), 1.39 – 1.28 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.73, 156.48, 148.70, 139.02, 136.80, 136.27, 134.09, 128.59, 128.18, 128.13, 127.34, 121.97, 121.72, 116.63, 83.50, 66.63, 58.82, 41.13, 33.00, 29.95, 29.16, 26.64, 25.00; HRMS (ESI) *m/z*: 449.2309 (M^+); calc. for $C_{26}H_{31}N_3O_4$: 449.2315.

(***S***)-**6-**((***tert***-**Butyldiphenylsilyl**)**oxy**)-**2-methoxy-*N*-**(**quinolin-8-yl**)**hexanamide** (**3n**)



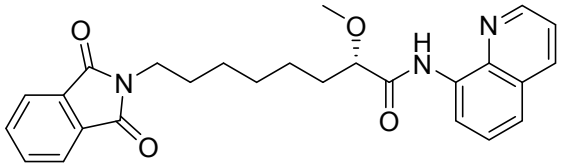
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 15:2:1 petroleum ether: dichloromethane: ethyl acetate, providing **3n** as a colorless oil (67.2 mg, 64%). $[\alpha]_D^{20}$ = -49.0 ($CHCl_3$, c = 0.9). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.83 (s, 1H), 9.10 – 8.63 (m, 2H), 8.15 (dd, *J* = 8.4, 1.3 Hz, 1H), 7.79 – 7.63 (m, 4H), 7.59 – 7.51 (m, 2H), 7.49 – 7.31 (m, 7H), 3.87 (dd, *J* = 6.2, 4.6 Hz, 1H), 3.69 (t, *J* = 5.8 Hz, 2H), 3.59 (s, 3H), 2.01 – 1.81 (m, 2H), 1.74 – 1.54 (m, 4H), 1.04 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.72, 148.66, 139.02, 136.23, 135.66, 134.15, 134.12, 129.58, 128.10, 127.68, 127.34, 121.92, 121.69, 116.64, 83.55, 63.82, 58.82, 32.98, 32.50, 26.95, 21.56, 19.28; HRMS (ESI) *m/z*: 526.2653 (M^+); calc. for $C_{32}H_{38}N_2O_3Si$: 526.2652.

(***S***)-**10-Cyano-2-methoxy-10**,**10-diphenyl-*N*-**(**quinolin-8-yl**)**decanamide** (**3o**)



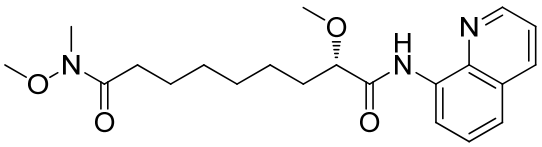
The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 20:3:1 petroleum ether: dichloromethane: acetone, providing **3o** as a colorless oil (35.5 mg, 35%). $[\alpha]_D^{20}$ = -51.3 ($CHCl_3$, c = 1.08). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.78 (s, 1H), 8.85 (dd, *J* = 4.1, 1.5 Hz, 1H), 8.81 (dd, *J* = 6.5, 2.2 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.59 – 7.50 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 7.40 – 7.26 (m, 10H), 3.83 (dd, *J* = 7.0, 4.5 Hz, 1H), 3.57 (s, 3H), 2.41 – 2.27 (m, 2H), 1.95 – 1.76 (m, 2H), 1.50 – 1.38 (m, 4H), 1.36 – 1.27 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.79, 148.71, 140.50, 139.04, 136.28, 134.14, 128.93, 128.13, 127.87, 127.36, 126.98, 122.59, 121.96, 121.74, 116.64, 83.58, 58.84, 51.90, 39.74, 33.11, 29.49, 29.43, 29.20, 25.69, 25.04; HRMS (ESI) *m/z*: 505.2734 (M^+); calc. for $C_{33}H_{35}N_3O_2$: 505.2729.

(*S*)-8-(1,3-Dioxoisoindolin-2-yl)-2-methoxy-*N*-(quinolin-8-yl)octanamide (3p)



The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 5:4:1 petroleum ether: dichloromethane: ethyl acetate, providing **3p** as a white solid (53.6 mg, 60%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.76 (s, 1H), 8.83 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.78 (dd, *J* = 6.5, 2.4 Hz, 1H), 8.12 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.80 (dd, *J* = 5.4, 3.0 Hz, 2H), 7.66 (dd, *J* = 5.4, 3.0 Hz, 2H), 7.56 – 7.46 (m, 2H), 7.42 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.82 (dd, *J* = 7.1, 4.5 Hz, 1H), 3.64 (t, *J* = 7.2 Hz, 2H), 3.55 (s, 3H), 1.94 – 1.77 (m, 2H), 1.70 – 1.59 (m, 2H), 1.54 – 1.43 (m, 2H), 1.41 – 1.29 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.70, 168.48, 148.66, 138.98, 136.21, 134.08, 133.88, 132.23, 128.07, 127.30, 123.20, 121.91, 121.68, 116.60, 83.48, 58.80, 38.04, 33.05, 29.13, 28.61, 26.82, 25.04; HRMS (EI) *m/z*: 445.2004 (M^+); calc. for $C_{26}H_{27}N_3O_4$: 445.2002.

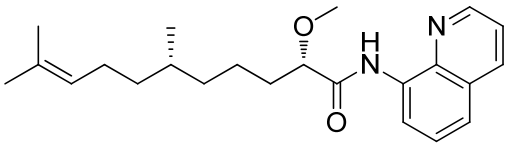
(*S*)-*N*^{9},2-Dimethoxy-*N*^{9}-methyl-*N*^{1}-(quinolin-8-yl)nonanediamide (3q)



The title compound was prepared according to the **GP**. The crude product was purified by silica gel column chromatography in 3:1 petroleum ether: acetone, providing **3q** as a colorless oil (41.5 mg, 53%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.77 (s, 1H), 8.85 (dd, *J* = 4.1, 1.5 Hz, 1H), 8.79 (dd, *J* = 6.4, 2.4 Hz, 1H), 8.14 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.59 – 7.48 (m, 2H), 7.44 (dd, *J* = 8.3, 4.2 Hz, 1H), 3.83 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.65 (s, 3H), 3.56 (s, 3H), 3.15 (s, 3H), 2.38 (t, *J* = 7.4 Hz, 2H), 1.96 – 1.78 (m, 2H), 1.68 – 1.56 (m, 2H), 1.50 (dt, *J* = 14.6, 7.3 Hz, 2H), 1.40 – 1.29 (m, 4H); ^{13}C NMR

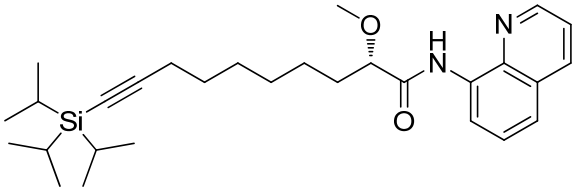
(101 MHz, $CDCl_3$) δ 174.68, 171.69, 148.59, 138.93, 136.15, 134.03, 128.01, 127.23, 121.83, 121.61, 116.51, 83.47, 61.18, 58.73, 33.03, 32.20, 31.83, 29.26, 29.22, 24.93, 24.56; HRMS (EI) *m/z*: 387.2158 (M^+); calc. for $C_{21}H_{29}N_3O_4$: 387.2158.

(2*S*,6*R*)-2-Methoxy-6,10-dimethyl-*N*-(quinolin-8-yl)undec-9-enamide (3r)



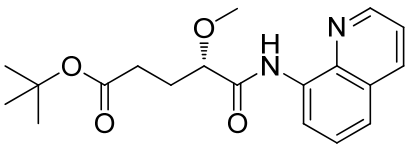
The compound **3r** was prepared according to the **GP** and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 15:2:1. **3r** was obtained as a colorless oil (30.5 mg, 41%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.78 (s, 1H), 8.85 (dd, *J* = 4.1, 1.5 Hz, 1H), 8.81 (dd, *J* = 6.7, 2.0 Hz, 1H), 8.15 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.60 – 7.47 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 5.07 (t, *J* = 6.3 Hz, 1H), 3.84 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.58 (s, 3H), 2.06 – 1.74 (m, 4H), 1.66 (s, 3H), 1.58 (s, 3H), 1.54 – 1.47 (m, 1H), 1.46 – 1.37 (m, 2H), 1.36 – 1.28 (m, 2H), 1.20 – 1.08 (m, 2H), 0.86 (d, *J* = 6.4 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.88, 148.70, 139.06, 136.28, 134.18, 131.10, 128.14, 127.38, 125.11, 121.94, 121.72, 116.67, 83.74, 58.88, 37.17, 36.90, 33.61, 32.45, 25.83, 25.66, 22.76, 19.67, 17.74; HRMS (EI) *m/z*: 368.2466 (M^+); calc. for $C_{23}H_{32}N_2O_2$: 368.2464.

(*S*)-2-Methoxy-*N*-(quinolin-8-yl)-10-(triisopropylsilyl)dec-9-ynamide (3s)



The compound **3s** was prepared according to the **GP** and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 15:2:1. **3s** was obtained as a colorless oil (43.0 mg, 45%). $[\alpha]_D^{20}$ = -39.7($CHCl_3$, c = 0.95). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.78 (s, 1H), 8.85 (dd, *J* = 4.1, 1.5 Hz, 1H), 8.81 (dd, *J* = 6.7, 2.0 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.62 – 7.49 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.84 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.57 (s, 3H), 2.22 (t, *J* = 6.7 Hz, 2H), 1.98 – 1.78 (m, 2H), 1.58 – 1.46 (m, 4H), 1.46 – 1.33 (m, 4H), 1.11 – 0.92 (m, 21H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.79, 148.68, 139.05, 136.26, 134.16, 128.13, 127.37, 121.93, 121.71, 116.65, 109.32, 83.65, 80.14, 58.84, 33.20, 29.04, 28.88, 28.65, 25.12, 19.90, 18.74, 11.41; HRMS (EI) *m/z*: 480.3171 (M^+); calc. for $C_{29}H_{44}N_2O_2Si$: 480.3172.

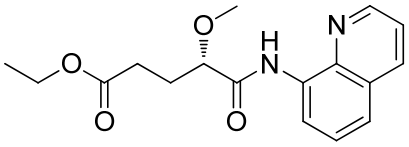
(*S*)-*tert*-Butyl 4-methoxy-5-oxo-5-(quinolin-8-ylamino)pentanoate (3t)



The compound **3t** was prepared according to the **GP** and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 6:3:1. **3t** was obtained as a colorless oil (49.1 mg,

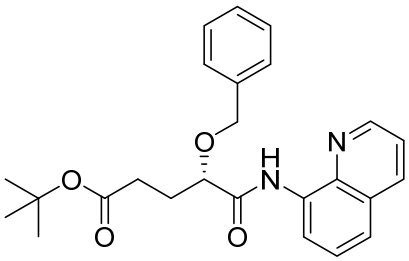
71% using **2ta** as alkylating reagent; 47.2 mg, 68% using **2tb** as alkylating reagent). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.80 (s, 1H), 8.84 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.80 (dd, *J* = 5.9, 2.9 Hz, 1H), 8.14 (dd, *J* = 8.2, 1.4 Hz, 1H), 7.61 – 7.47 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.91 (dd, *J* = 6.8, 4.7 Hz, 1H), 3.57 (s, 3H), 2.51 – 2.35 (m, 2H), 2.30 – 2.21 (m, 1H), 2.19 – 2.08 (m, 1H), 1.43 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.38, 170.89, 148.69, 139.00, 136.27, 134.01, 128.10, 127.31, 122.06, 121.73, 116.68, 82.29, 80.40, 58.80, 31.16, 28.17, 28.11; HRMS (EI) *m/z*: 344.1729 (M^+); calc. for $C_{19}H_{24}N_2O_4$: 344.1736.

(*S*)-Ethyl 4-methoxy-5-oxo-5-(quinolin-8-ylamino)pentanoate (3u)



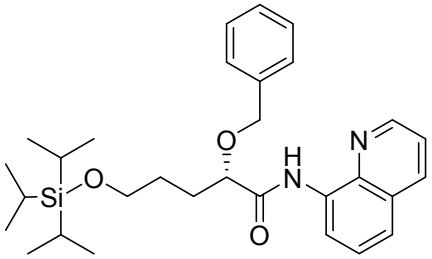
The compound **3u** was prepared according to the **GP** and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 5:4:1. **3u** was obtained as a colorless oil (32.4 mg, 51% using **2za** as alkylating reagent; 16.0 mg, 25% using **2zb** as alkylating reagent). $[\alpha]_D^{20}$ = -58.5 ($CHCl_3$, c = 1.0). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.80 (s, 1H), 8.84 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.79 (dd, *J* = 5.6, 3.3 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.62 – 7.48 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 4.12 (qd, *J* = 7.1, 2.2 Hz, 2H), 3.92 (dd, *J* = 6.9, 4.7 Hz, 1H), 3.58 (s, 3H), 2.64 – 2.39 (m, 2H), 2.29 (dtd, *J* = 12.0, 7.5, 4.8 Hz, 1H), 2.19 (ddd, *J* = 14.3, 8.5, 6.8 Hz, 1H), 1.23 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.12, 170.77, 148.71, 138.98, 136.29, 133.94, 128.10, 127.31, 122.12, 121.75, 116.70, 82.18, 60.53, 58.85, 29.97, 28.00, 14.29; HRMS (EI) *m/z*: 316.1421 (M^+); calc. for $C_{17}H_{20}N_2O_4$: 316.1423.

(*S*)-*tert*-Butyl 4-benzyloxy-5-oxo-5-(quinolin-8-ylamino)pentanoate (3v)



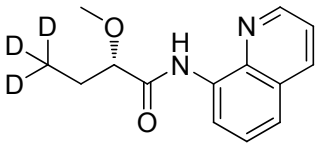
The compound **3v** was prepared according to the **GP** (using **1b** and **2tb** as substrate) and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 6:3:1. **3v** was obtained as a colorless oil (54.0 mg, 64%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.06 (s, 1H), 9.02 – 8.62 (m, 2H), 8.16 (d, *J* = 8.2 Hz, 1H), 7.76 – 7.51 (m, 4H), 7.46 (dd, *J* = 8.2, 4.2 Hz, 1H), 7.44 – 7.27 (m, 3H), 4.81 (d, *J* = 11.2 Hz, 1H), 4.65 (d, *J* = 11.2 Hz, 1H), 4.15 (dd, *J* = 6.6, 4.8 Hz, 1H), 2.47 (t, *J* = 7.7 Hz, 2H), 2.38 – 2.27 (m, 1H), 2.27 – 2.12 (m, 1H), 1.42 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.32, 170.91, 148.50, 138.95, 137.15, 136.27, 134.03, 128.57, 128.47, 128.21, 128.08, 127.34, 122.05, 121.77, 116.61, 80.43, 79.93, 73.22, 31.23, 28.40, 28.16; HRMS (EI) *m/z*: 420.2049 (M^+); calc. for $C_{25}H_{28}N_2O_4$: 420.2046.

(***S***)-**2**-(**Benzyloxy**)-***N***-(**quinolin-8-yl**)-**5**-((**triisopropylsilyl**)**oxy**)**pentanamide** (**3w**)



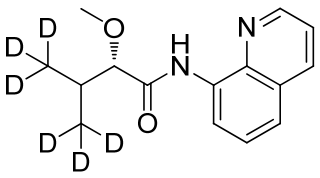
The compound **3w** was prepared according to the **GP** (using **1b** and **2u** as substrate) and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 15:2:1. **3w** was obtained as a colorless oil (46.8 mg, 46%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.05 (s, 1H), 9.02 – 8.63 (m, 2H), 8.16 (dd, *J* = 8.2, 1.1 Hz, 1H), 7.69 – 7.50 (m, 4H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 7.44 – 7.27 (m, 3H), 4.82 (d, *J* = 11.2 Hz, 1H), 4.64 (d, *J* = 11.2 Hz, 1H), 4.13 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.91 – 3.60 (m, 2H), 2.18 – 2.06 (m, 1H), 1.98 (dt, *J* = 14.0, 7.3 Hz, 1H), 1.86 – 1.75 (m, 2H), 1.22 – 0.97 (m, 21H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.66, 148.50, 139.03, 137.43, 136.25, 134.21, 128.55, 128.44, 128.13, 127.39, 121.93, 121.75, 116.62, 81.12, 73.11, 63.17, 29.79, 28.75, 18.15, 12.09; HRMS (EI) *m/z*: 506.2965 (M^+); calc. for $C_{30}H_{42}N_2O_3Si$: 506.2966.

(***S***)-**2-Methoxy-*N*-3-(methyl-*d*$_3$)-(quinolin-8-yl)propanamide** (**3x**)



The compound **3x** was prepared according to the **GP** and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 12:2:1. **3x** was obtained as a white solid (30.0 mg, 60%) with **3x**' (15.8 mg, 30%) isolated. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.1, 1.4 Hz, 1H), 8.81 (dd, *J* = 6.8, 1.9 Hz, 1H), 8.14 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.61 – 7.47 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.82 (dd, *J* = 6.6, 4.7 Hz, 1H), 3.58 (s, 3H), 1.96 (dd, *J* = 13.9, 3.6 Hz, 1H), 1.87 (dd, *J* = 14.1, 6.6 Hz, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.63, 148.69, 139.04, 136.27, 134.14, 128.13, 127.35, 121.94, 121.71, 116.64, 84.43, 58.72, 25.83; HRMS (EI) *m/z*: 247.1403 (M^+); calc. for $C_{14}H_{13}D_3N_2O_2$: 247.1400.

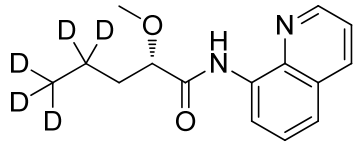
(***S***)-**2-Methoxy-*N*-3,3-di(methyl-*d*$_3$)-(quinolin-8-yl)propanamide** (**3x**')



^{1}H NMR (400 MHz, $CDCl_3$) δ 10.75 (s, 1H), 8.85 (dd, *J* = 4.1, 1.5 Hz, 1H), 8.82 (dd, *J* = 6.8, 2.0 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.61 – 7.49 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.63 (d, *J* = 4.5 Hz, 1H), 3.59 (s, 3H), 2.21 (d, *J* = 4.5 Hz 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.40, 148.73, 139.09,

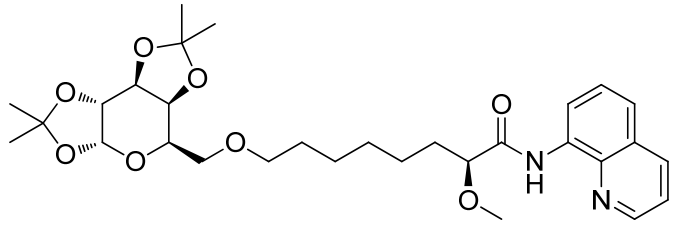
136.27, 134.12, 128.16, 127.39, 121.91, 121.73, 116.63, 88.62, 59.81, 31.66; HRMS (EI) *m/z*: 264.1746 (M^+); calc. for $C_{15}H_{12}D_6N_2O_2$: 264.1745.

(*S*)-2-Methoxy-*N*-3-(ethyl-*d*$_5$)-(quinolin-8-yl)propanamide (3y)



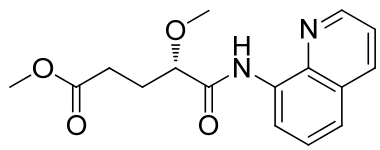
The compound **3y** was prepared according to the **GP** and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 12:2:1. **3y** was obtained as a colorless oil (35.5 mg, 67%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.81 (dd, *J* = 6.8, 1.9 Hz, 1H), 8.14 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.62 – 7.48 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.86 (dd, *J* = 7.2, 4.6 Hz, 1H), 3.58 (s, 3H), 1.85 (qd, *J* = 14.0, 5.7 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.89, 148.68, 139.02, 136.26, 134.15, 128.11, 127.34, 121.92, 121.70, 116.61, 83.46, 58.82, 35.02; HRMS (EI) *m/z*: 263.1681 (M^+); calc. for $C_{15}H_{13}D_5N_2O_2$: 263.1682.

(*S*)-2-Methoxy-*N*-(quinolin-8-yl)-8-(((3a*R*,5*R*,5a*S*,8a*S*,8b*R*)-2,2,7,7-tetramethyltetrahydro-3a*H*-bis([1,3]dioxolo)[4,5-*b*:4',5'-*d*]pyran-5-yl)methoxy)octanamide (3z)



The compound **3z** was prepared according to the **GP** and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 5:4:1. **3z** was obtained as a white solid (69.5 mg, 62%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.77 (s, 1H), 8.85 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.80 (dd, *J* = 6.5, 2.3 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.59 – 7.47 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 5.52 (d, *J* = 5.0 Hz, 1H), 4.58 (dd, *J* = 7.9, 2.2 Hz, 1H), 4.28 (dd, *J* = 5.0, 2.3 Hz, 1H), 4.24 (dd, *J* = 7.9, 1.7 Hz, 1H), 3.93 (dd, *J* = 8.5, 3.7 Hz, 1H), 3.83 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.65 – 3.50 (m, 5H), 3.49 – 3.39 (m, 2H), 1.98 – 1.78 (m, 2H), 1.62 – 1.45 (m, 7H), 1.43 (s, 3H), 1.37 – 1.28 (m, 10H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.83, 148.71, 139.06, 136.28, 134.17, 128.14, 127.38, 121.94, 121.73, 116.65, 109.29, 108.62, 96.50, 83.64, 71.61, 71.32, 70.77, 69.42, 66.83, 58.85, 33.19, 29.65, 29.42, 26.22, 26.11, 26.05, 25.17, 25.06, 24.56; HRMS (EI) *m/z*: 558.2943 (M^+); calc. for $C_{30}H_{42}N_2O_8$: 558.2941.

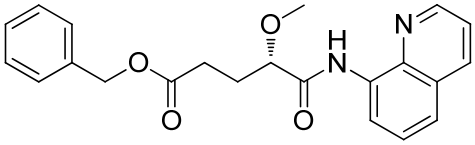
(*S*)-Methyl 4-methoxy-5-oxo-5-(quinolin-8-ylamino)pentanoate (3aa)



The compound **3aa** was prepared according to the **GP** and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 5:4:1. **3aa** was obtained as a colorless oil (27.0 mg,

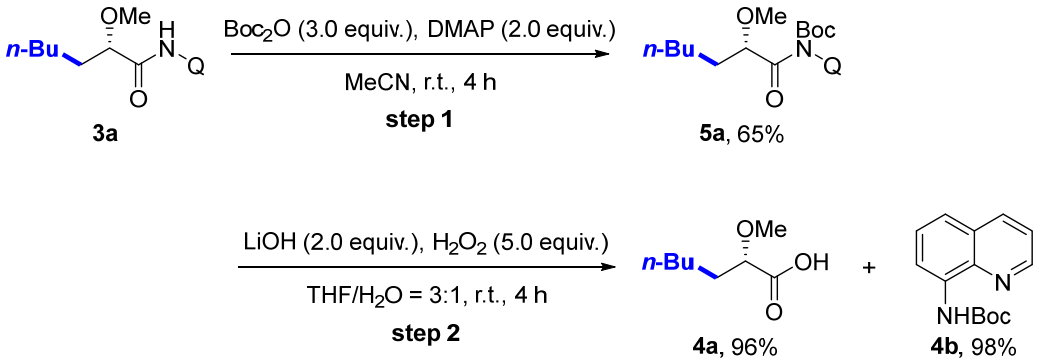
45% using **2ya** as alkylating reagent; 12.2 mg, 20% using **2yb** as alkylating reagent). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.0, 1.4 Hz, 1H), 8.79 (dd, *J* = 5.1, 3.5 Hz, 1H), 8.16 (dd, *J* = 8.2, 1.5 Hz, 1H), 7.60 – 7.49 (m, 2H), 7.46 (dd, *J* = 8.1, 4.1 Hz, 1H), 3.92 (dd, *J* = 6.6, 4.8 Hz, 1H), 3.67 (s, 3H), 3.58 (s, 3H), 2.62 – 2.44 (m, 2H), 2.36 – 2.14 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.58, 170.73, 148.73, 138.99, 136.30, 133.94, 128.11, 127.32, 122.14, 121.76, 116.72, 82.14, 58.87, 51.76, 29.72, 28.00; HRMS (EI) *m/z*: 302.1266 (M^+); calc. for $C_{16}H_{18}N_2O_4$: 302.1267.

(*S*)-Benzyl 4-methoxy-5-oxo-5-(quinolin-8-ylamino)pentanoate (3ab)

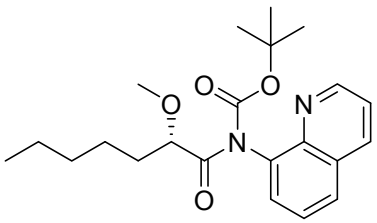


The compound **3ab** was prepared according to the **GP** and purified by column chromatography in petroleum ether: dichloromethane: ethyl acetate = 5:4:1. **3ab** was obtained as a colorless oil (21.4 mg, 28% using **2aaa** as alkylating reagent; 11.5 mg, 15% using **2aab** as alkylating reagent). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.81 (s, 1H), 8.84 (dd, *J* = 4.2, 1.5 Hz, 1H), 8.80 (dd, *J* = 5.3, 3.6 Hz, 1H), 8.16 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.61 – 7.48 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 7.41 – 7.25 (m, 5H), 5.25 – 4.97 (m, 2H), 3.93 (dd, *J* = 6.8, 4.8 Hz, 1H), 3.55 (s, 3H), 2.71 – 2.44 (m, 2H), 2.33 (dt, *J* = 12.0, 7.5 Hz, 1H), 2.23 (dt, *J* = 14.3, 6.8 Hz, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.96, 170.72, 148.74, 139.00, 136.31, 136.06, 133.95, 128.64, 128.33, 128.29, 128.12, 127.34, 122.16, 121.77, 116.74, 82.14, 66.43, 58.86, 29.97, 27.94; HRMS (EI) *m/z*: 378.1584 (M^+); calc. for $C_{22}H_{22}N_2O_4$: 378.1580.

Removal of 8-AQ Auxiliary

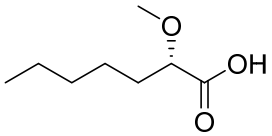


***tert*-Butyl (*S*)-(2-methoxyheptanoyl)(quinolin-8-yl)carbamate (5a)**



To a solution of **3a** (114.6 mg, 0.4 mmol) in dry MeCN (4 mL) were added di-*tert*-butyl dicarbonate (Boc_2O, 261.9 mg, 1.2 mmol) and *N*,*N*-dimethylpyridin-4-amine (DMAP, 97.7 mg, 0.8 mmol). The mixture was stirred at room temperature for 4 hours. Then the reaction was diluted with dichloromethane (15 mL), washed by water (15 mL), brine (20 mL), and dried over anhydrous $MgSO_4$. Evaporation of organic solvent and purification by column chromatography in petroleum ether: ethyl acetate = 2:1 gave the product **5a** as a yellow solid (101.1 mg, 65%). ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.86 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.16 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.81 (dd, *J* = 8.0, 1.3 Hz, 1H), 7.55 (t, *J* = 7.7 Hz, 1H), 7.50 (dd, *J* = 7.3, 1.4 Hz, 1H), 7.40 (dd, *J* = 8.3, 4.2 Hz, 1H), 5.05 (dd, *J* = 8.0, 3.3 Hz, 1H), 3.45 (s, 3H), 2.02 (dq, *J* = 10.1, 3.3, 2.9 Hz, 1H), 1.87 – 1.77 (m, 1H), 1.62 – 1.51 (m, 2H), 1.40 – 1.32 (m, 4H), 1.23 (s, 9H), 0.91 (t, *J* = 6.8 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 176.35, 152.79, 150.29, 144.16, 136.68, 135.91, 128.88, 128.07, 126.04, 121.50, 82.77, 81.52, 77.35, 77.03, 76.71, 57.96, 33.15, 31.73, 27.59, 25.33, 22.56, 14.09.

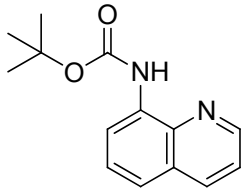
(*S*)-2-Methoxyheptanoic acid (4a)



To a solution of **5a** (38.7 mg, 0.1 mmol) in THF/H_2O (3:1, 0.5 mL) were added LiOH (4.8 mg, 0.2 mmol) and H_2O_2 (30%, 50 μL, 0.5 mmol). The mixture was stirred at room temperature for 4 hours. Then the reaction was acidified by HCl (0.5 M, 12 mL), diluted with ethyl acetate (15 mL), washed by water (15 mL), brine (20 mL), and dried over anhydrous $MgSO_4$. Evaporation of organic solvent and purification by column chromatography in petroleum ether: ethyl acetate = 1:1 gave the product **4a** as a light yellow oil (15.4 mg, 96%) with **4b** (24.0 mg, 98%) isolated. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 3.80 (dd, *J* = 6.7, 5.1 Hz, 1H), 3.44 (s, 3H), 1.89 – 1.68 (m, 2H), 1.42 (p, *J* = 7.4 Hz,

2H), 1.35 – 1.27 (m, 4H), 0.89 (t, J = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 176.47, 80.23, 77.33, 77.02, 76.70, 58.29, 32.20, 31.46, 24.49, 22.43, 13.96.

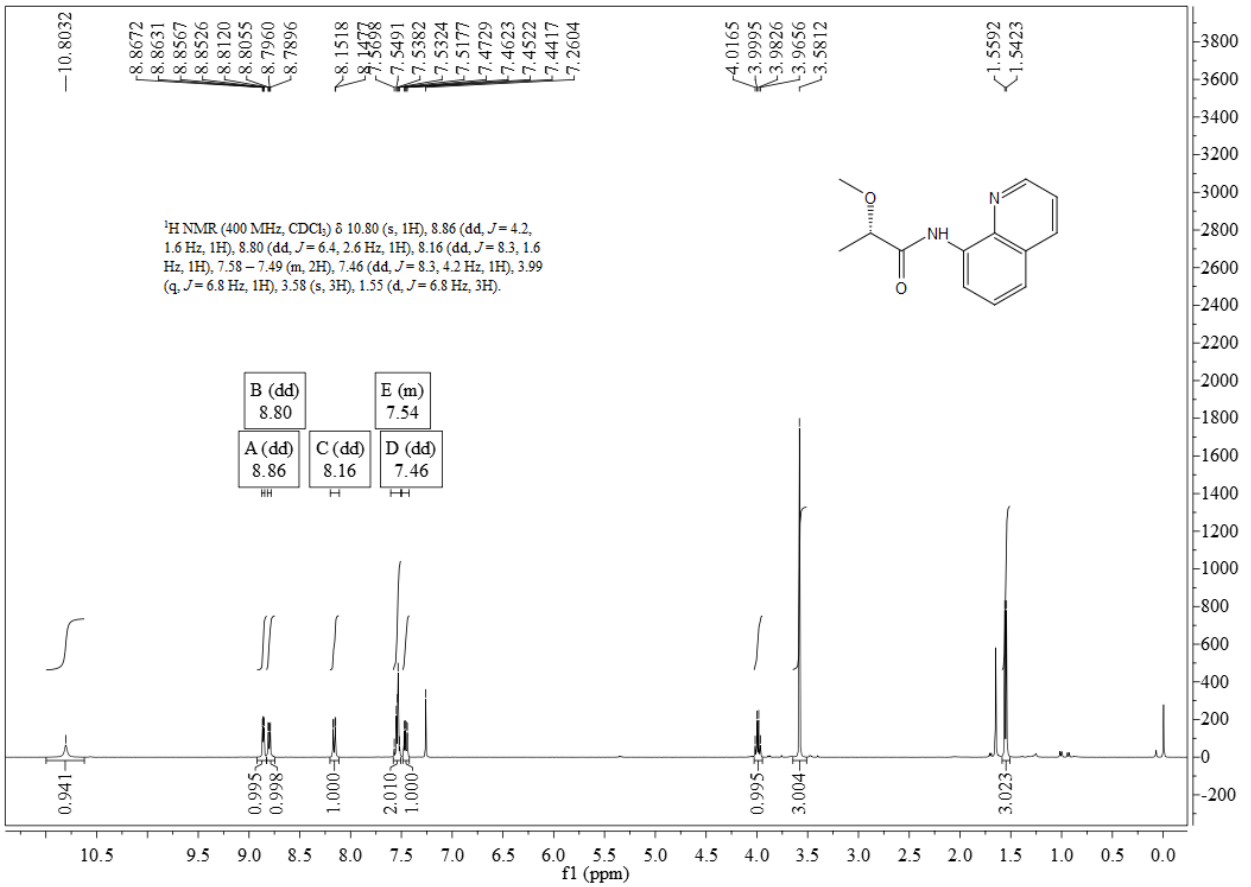
***tert*-Butyl quinolin-8-ylcarbamate (4b)**



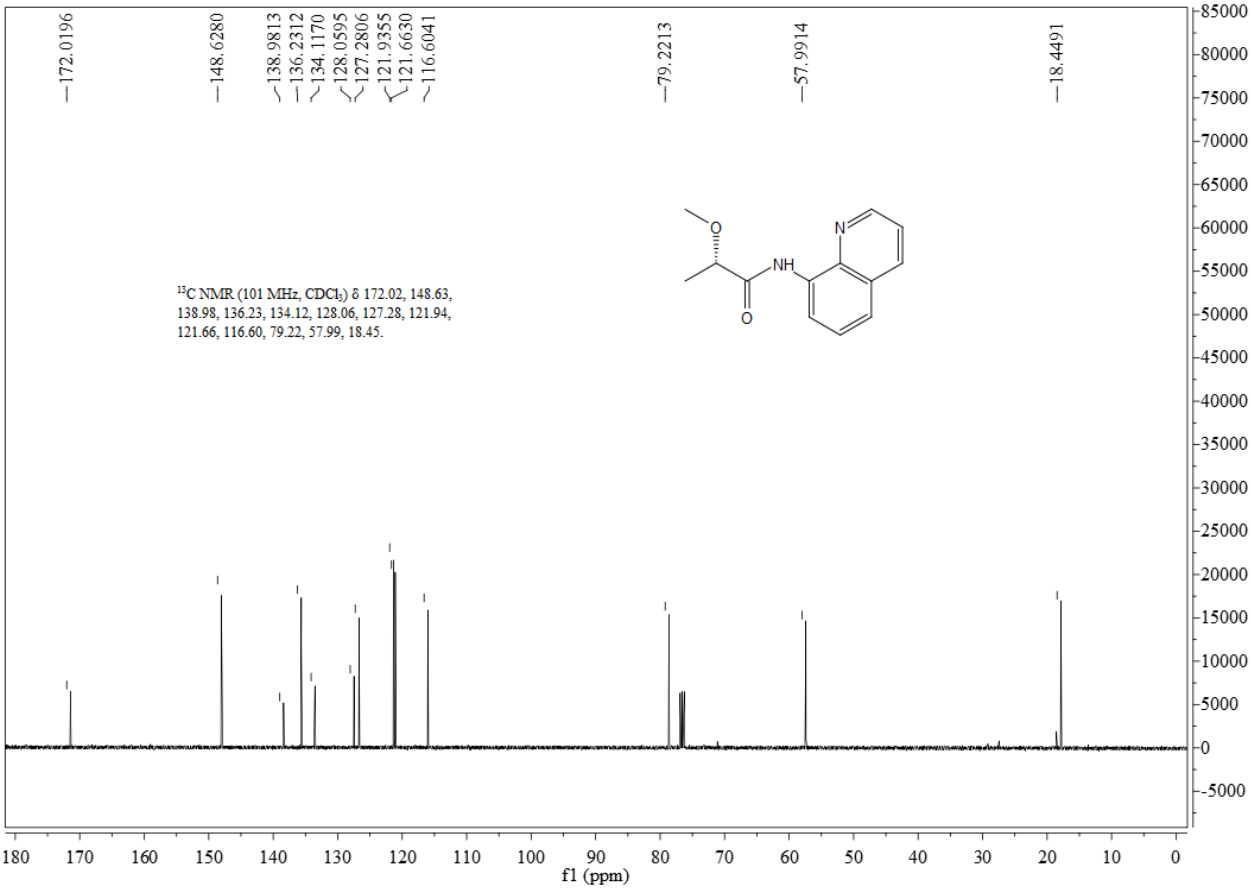
^{1}H NMR (400 MHz, $CDCl_3$) δ 9.02 (s, 1H), 8.79 (dd, J = 4.1, 1.5 Hz, 1H), 8.42 (d, J = 7.4 Hz, 1H), 8.13 (dd, J = 8.2, 1.4 Hz, 1H), 7.51 (t, J = 8.0 Hz, 1H), 7.46 – 7.35 (m, 2H), 1.58 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 153.05, 148.09, 138.41, 136.37, 135.35, 128.21, 127.49, 121.63, 120.28, 114.59, 80.54, 28.55; HRMS (EI) *m/z*: 244.1210 (M^+); calc. for $C_{14}H_{16}N_2O_2$: 244.1212.

References

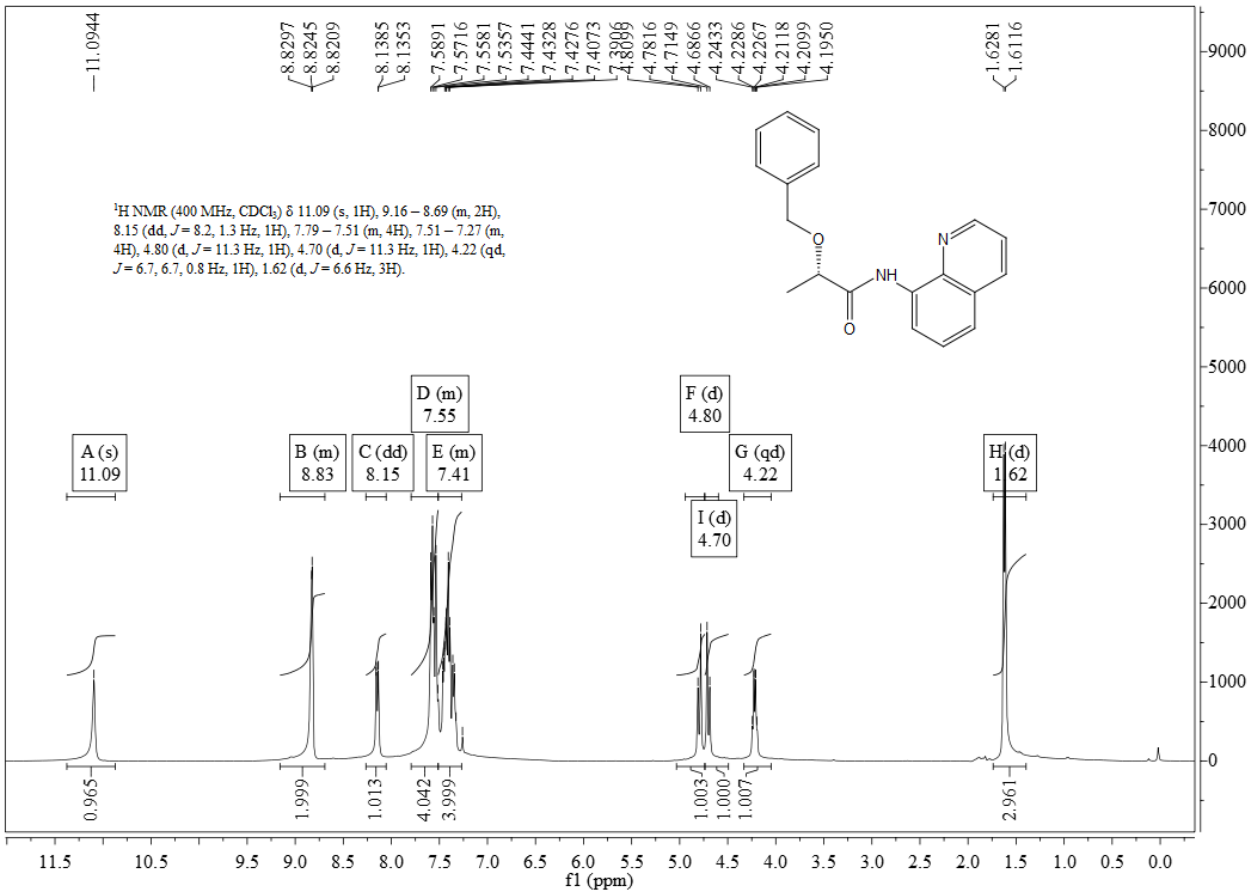
1. Barrett, A. G. M.; Braddock, D. C.; Christian, P. W. N.; Pilipauskas, D.; White, A. J. P.; Williams, D. J. *Journal of Organic Chemistry*, **1998**, *63*, 5818 – 5823.

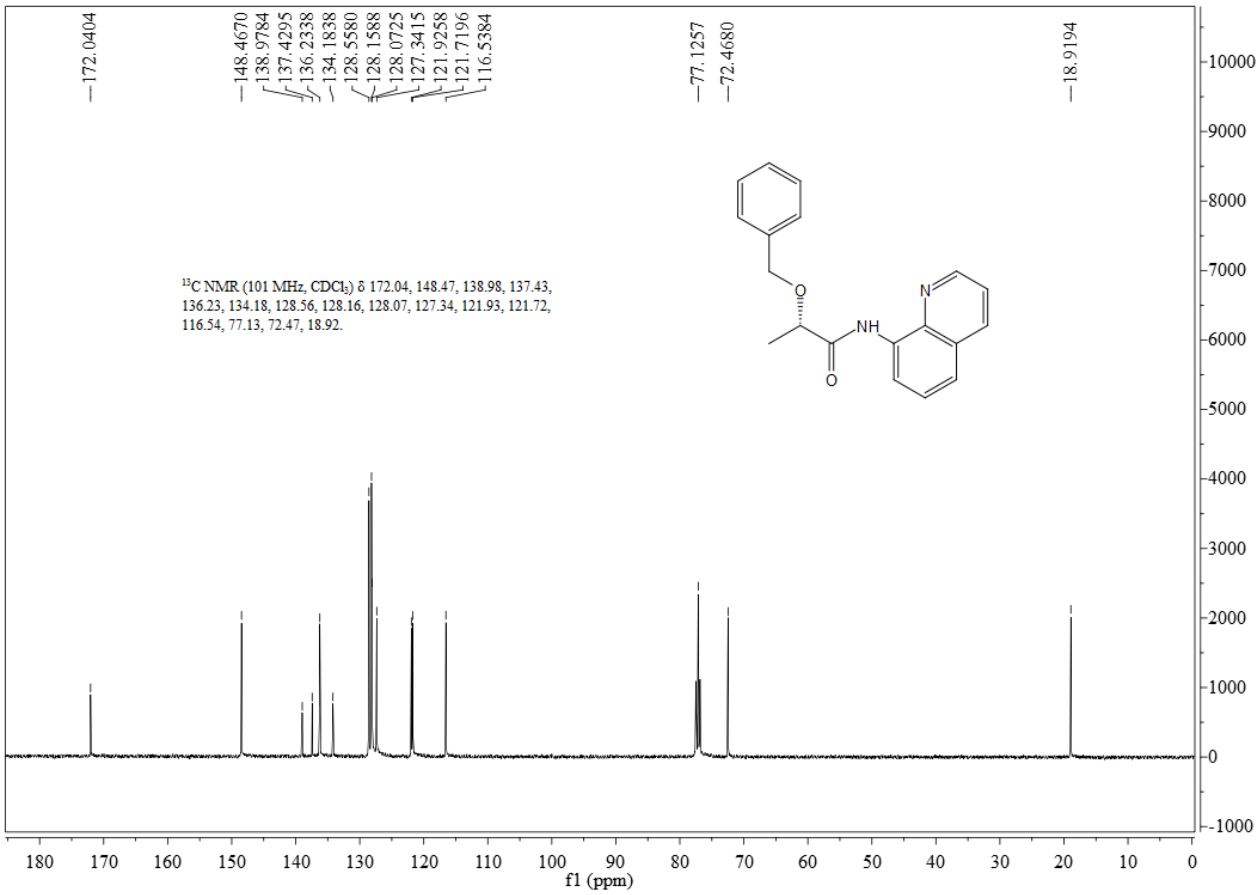


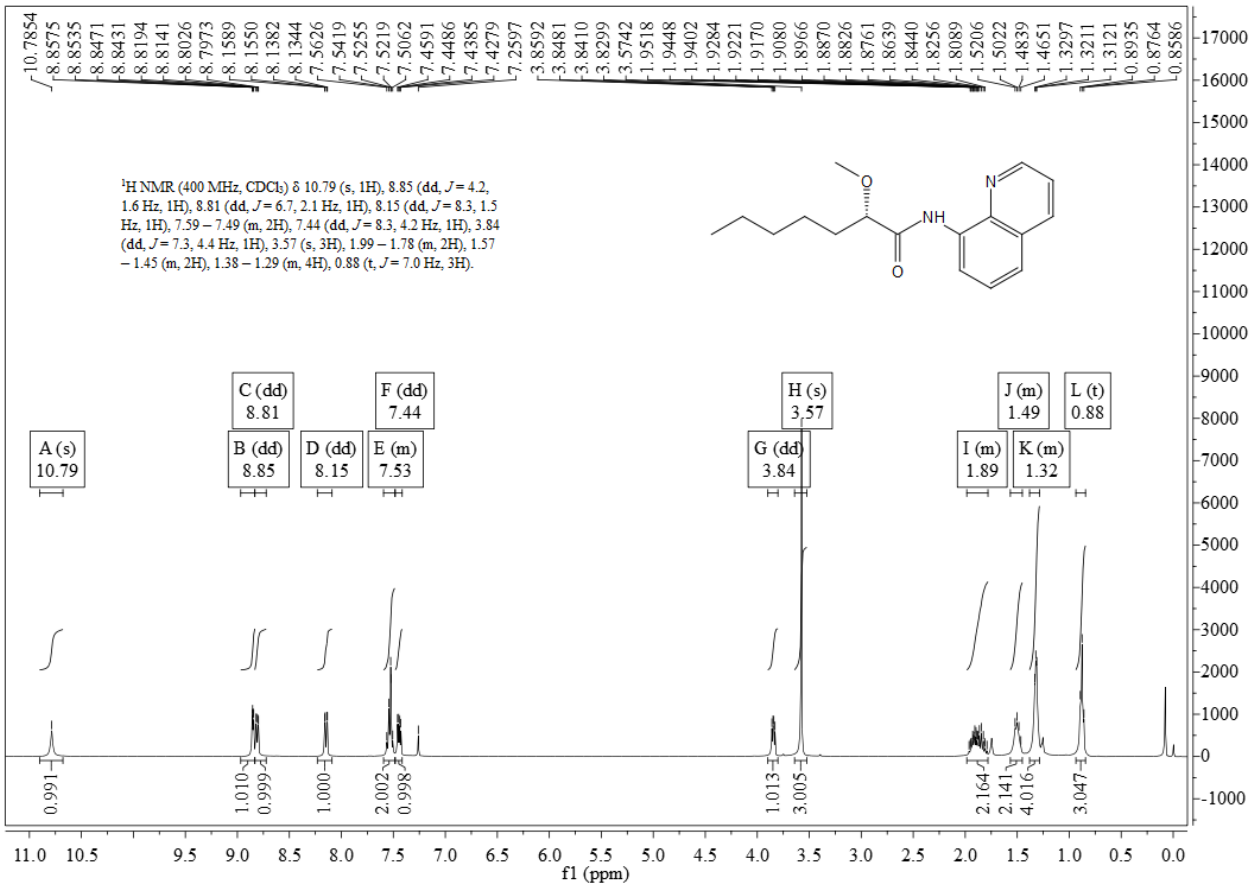
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.80 (s, 1H), 8.86 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.80 (dd, *J* = 6.4, 2.6 Hz, 1H), 8.16 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.58 – 7.49 (m, 2H), 7.46 (dd, *J* = 8.3, 4.2 Hz, 1H), 3.99 (q, *J* = 6.8 Hz, 1H), 3.58 (s, 3H), 1.55 (d, *J* = 6.8 Hz, 3H).

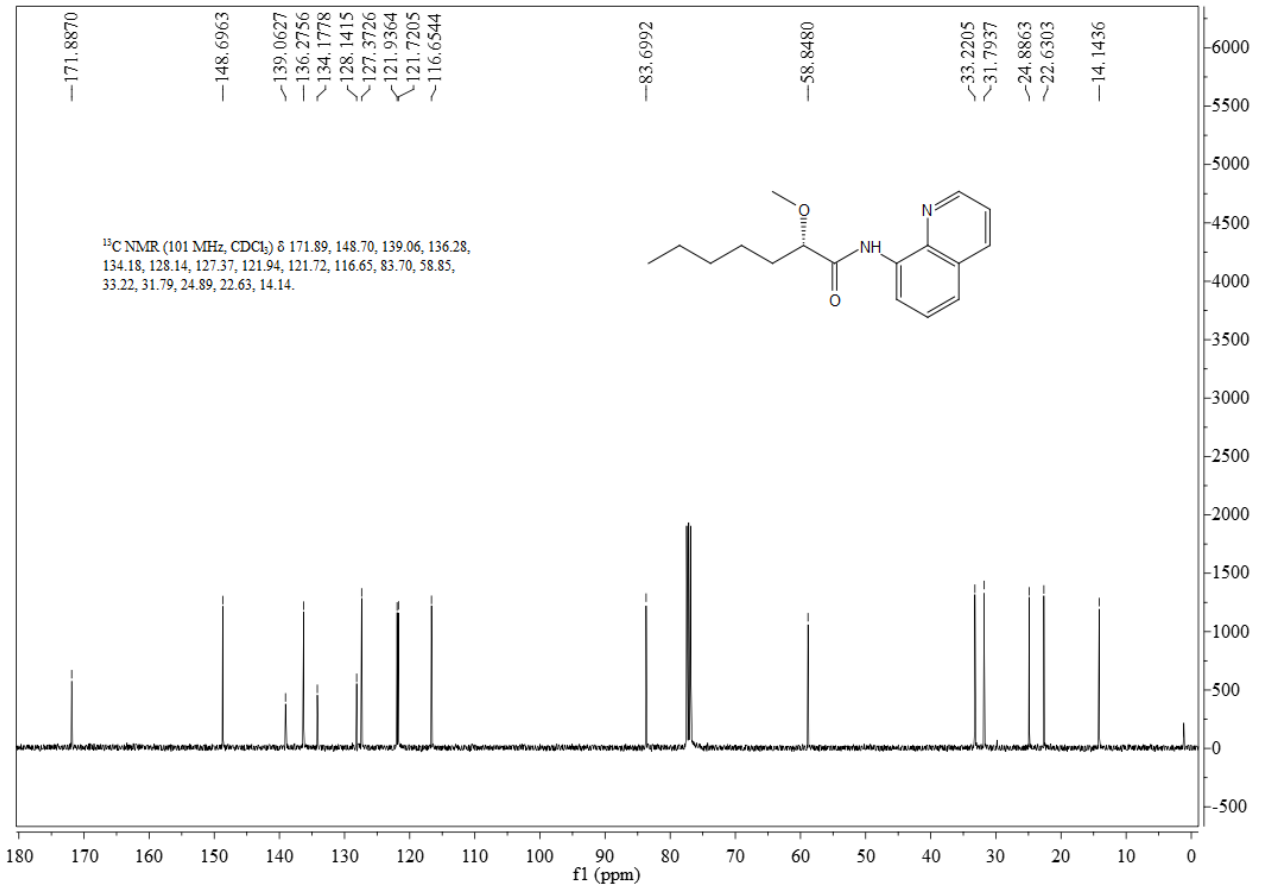


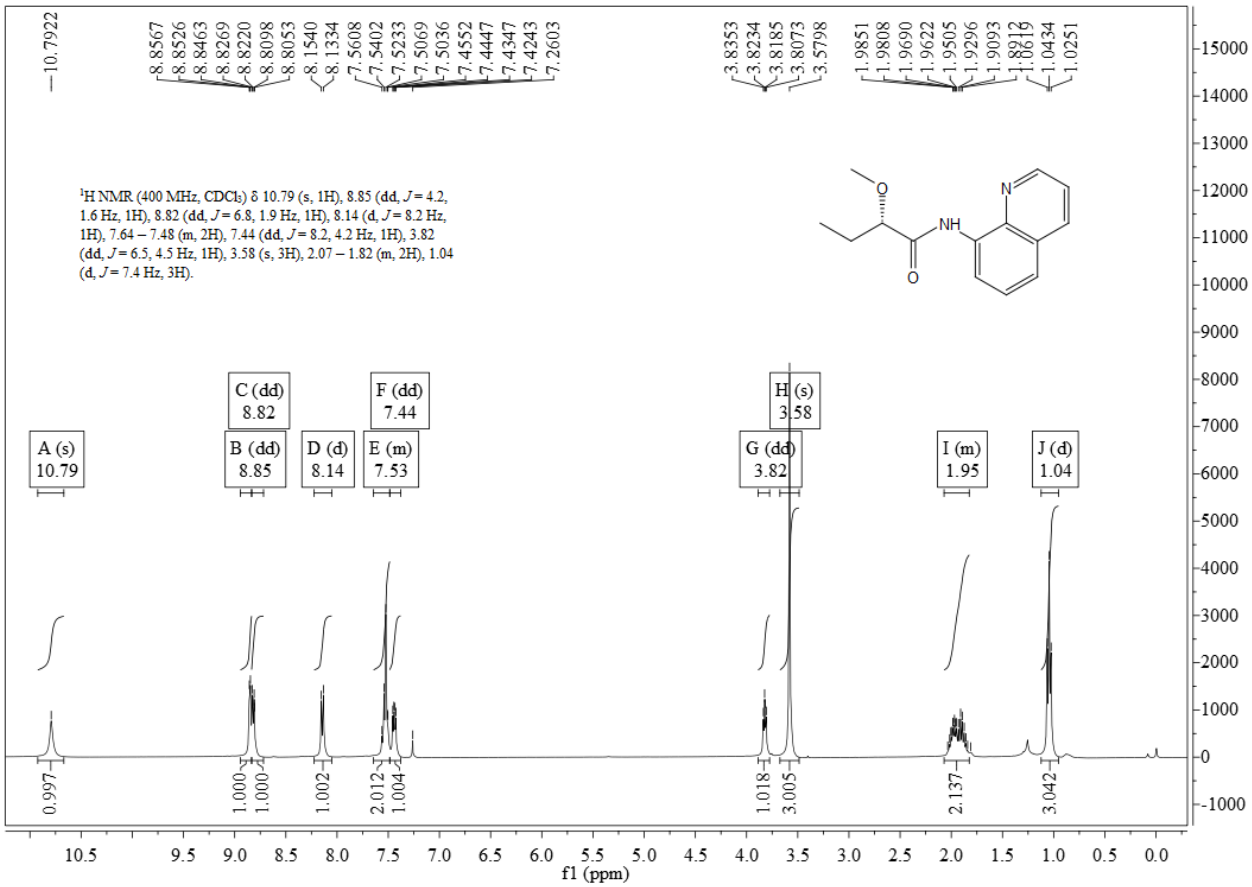
^{13}C NMR (101 MHz, $CDCl_3$) δ 172.02, 148.63, 138.98, 136.23, 134.12, 128.06, 127.28, 121.94, 121.66, 116.60, 79.22, 57.99, 18.45.

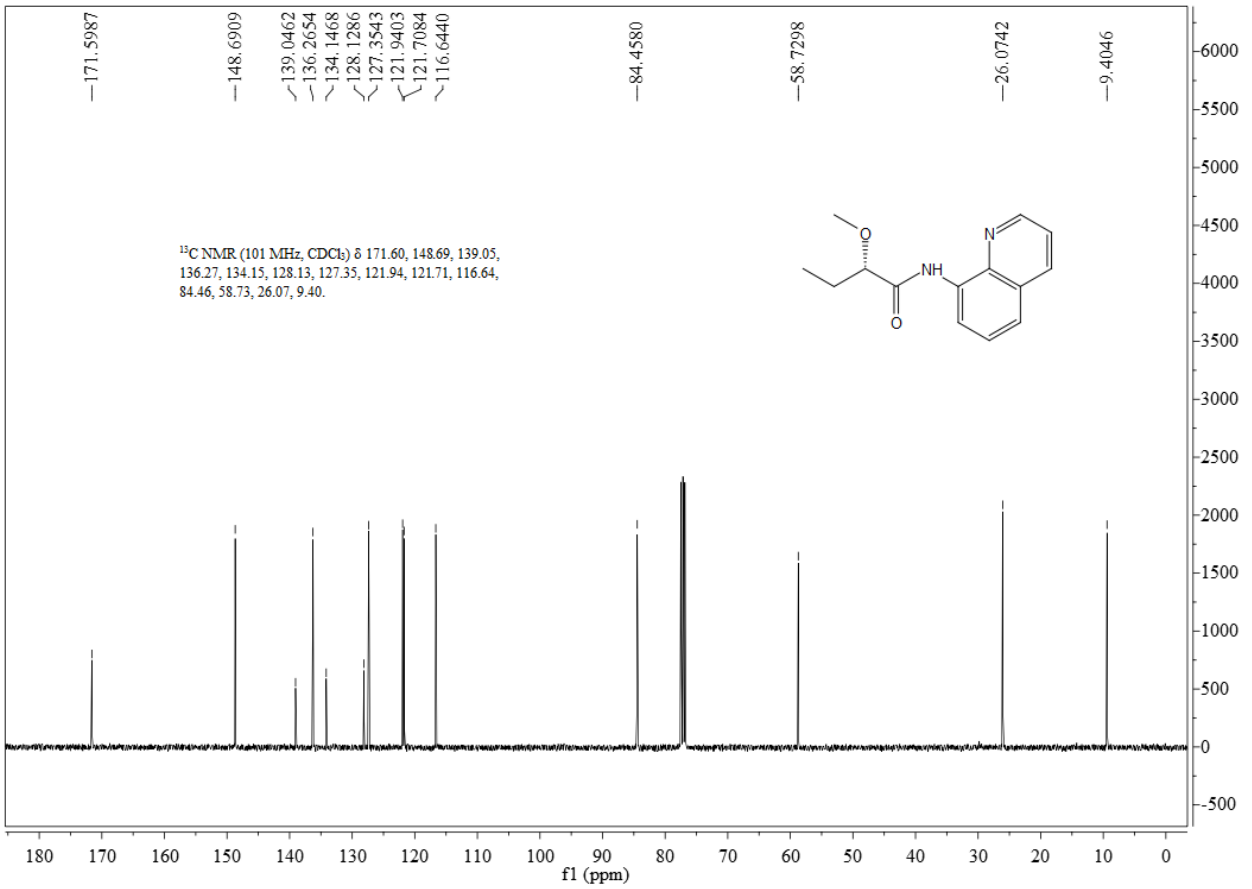

11.0944
8.8297
8.8245
8.8209
8.1385
8.1353
7.5891
7.5716
7.5581
7.5357
7.4441
7.4328
7.4276
7.4073
7.3806
7.3699
4.7816
4.7149
4.6866
4.2433
4.2286
4.2267
4.2118
4.2099
4.1950
1.6281
1.6116
1H NMR (400 MHz, CDCl3) δ 11.09 (s, 1H), 9.16 – 8.69 (m, 2H), 8.15 (dd, J = 8.2, 1.3 Hz, 1H), 7.79 – 7.51 (m, 4H), 7.51 – 7.27 (m, 4H), 4.80 (d, J = 11.3 Hz, 1H), 4.70 (d, J = 11.3 Hz, 1H), 4.22 (qd, J = 6.7, 6.7, 0.8 Hz, 1H), 1.62 (d, J = 6.6 Hz, 3H).
A (s) 11.09
B (m) 8.83
C (dd) 8.15
D (m) 7.55
E (m) 7.41
F (d) 4.80
G (qd) 4.22
H (d) 1.62
I (d) 4.70
0.965
1.999
1.013
4.042
3.999
1.003
1.000
1.007
2.961
f1 (ppm)

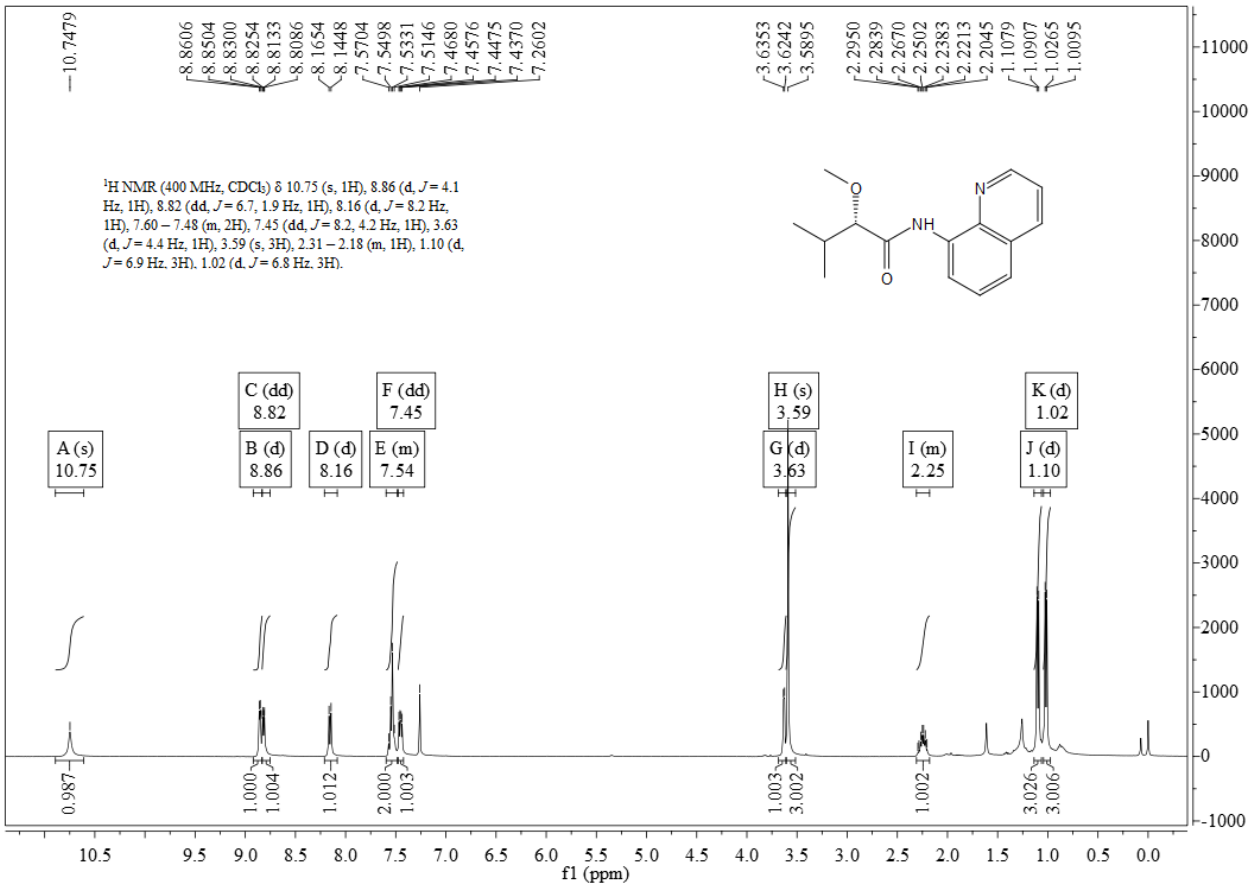

172.0404
148.4670
138.9784
137.4295
136.2338
134.1838
128.5580
128.1588
128.0725
127.3415
121.9258
121.7196
116.5384
77.1257
72.4680
18.9194
13C NMR (101 MHz, CDCl3) δ 172.04, 148.47, 138.98, 137.43, 136.23, 134.18, 128.56, 128.16, 128.07, 127.34, 121.93, 121.72, 116.54, 77.13, 72.47, 18.92.
f1 (ppm)

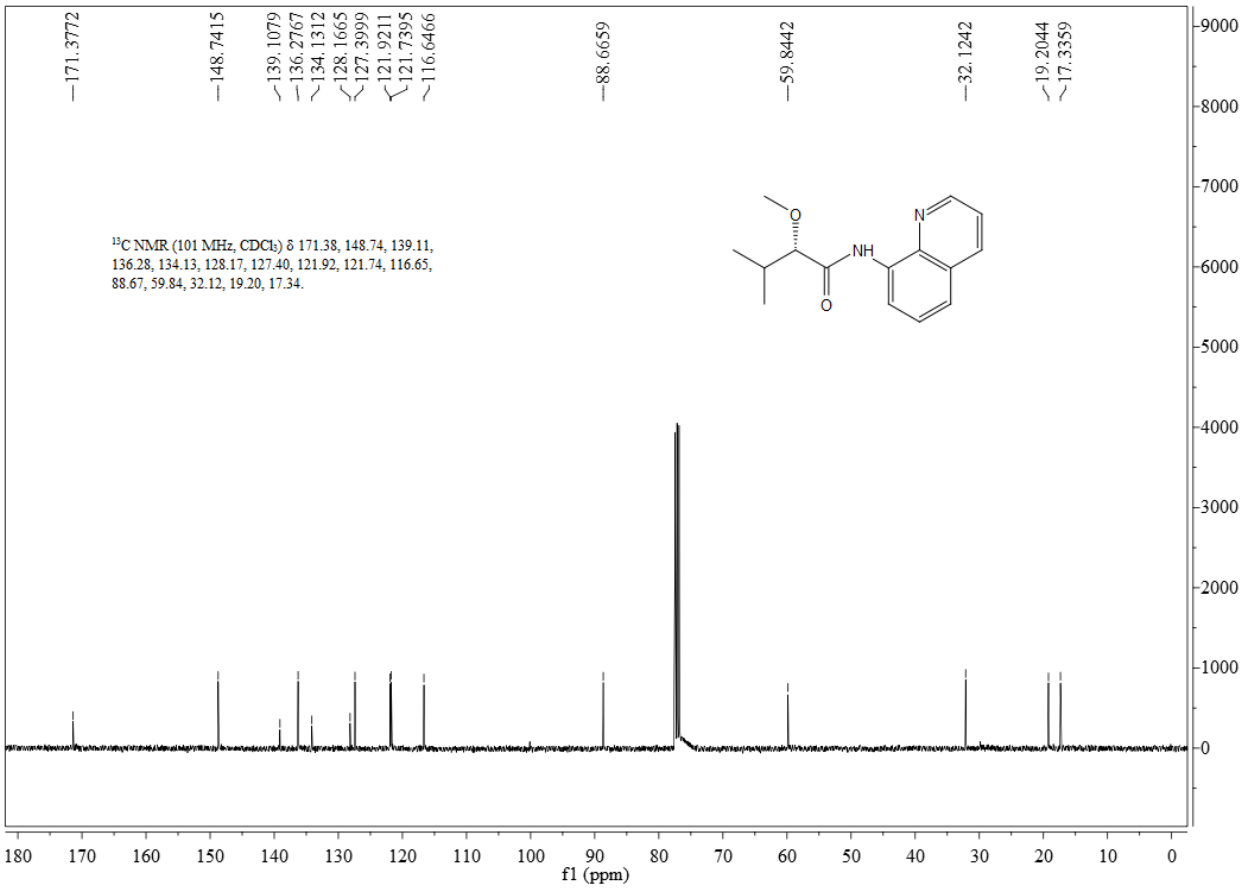

10.7854
8.8575
8.8535
8.8471
8.8431
8.8194
8.8141
8.8026
8.7973
8.1589
8.1550
8.1382
8.1344
7.5626
7.5419
7.5255
7.5219
7.5062
7.4591
7.4486
7.4385
7.4279
7.2597
3.8592
3.8481
3.8410
3.8299
3.5742
1.9518
1.9448
1.9402
1.9284
1.9221
1.9170
1.9080
1.8966
1.8870
1.8826
1.8761
1.8639
1.8440
1.8256
1.8089
1.5206
1.5022
1.4839
1.4651
1.3297
1.3211
1.3121
0.8935
0.8764
0.8586
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.79 (s, 1H), 8.85 (dd, J = 4.2, 1.6 Hz, 1H), 8.81 (dd, J = 6.7, 2.1 Hz, 1H), 8.15 (dd, J = 8.3, 1.5 Hz, 1H), 7.59 – 7.49 (m, 2H), 7.44 (dd, J = 8.3, 4.2 Hz, 1H), 3.84 (dd, J = 7.3, 4.4 Hz, 1H), 3.57 (s, 3H), 1.99 – 1.78 (m, 2H), 1.57 – 1.45 (m, 2H), 1.38 – 1.29 (m, 4H), 0.88 (t, J = 7.0 Hz, 3H).
O
NH
N
O
A (s) 10.79
B (dd) 8.85
C (dd) 8.81
D (dd) 8.15
E (m) 7.53
F (dd) 7.44
G (dd) 3.84
H (s) 3.57
I (m) 1.89
J (m) 1.49
K (m) 1.32
L (t) 0.88
0.991
1.010
0.999
1.000
2.002
0.998
1.013
3.005
2.164
2.141
4.016
3.047
f1 (ppm)

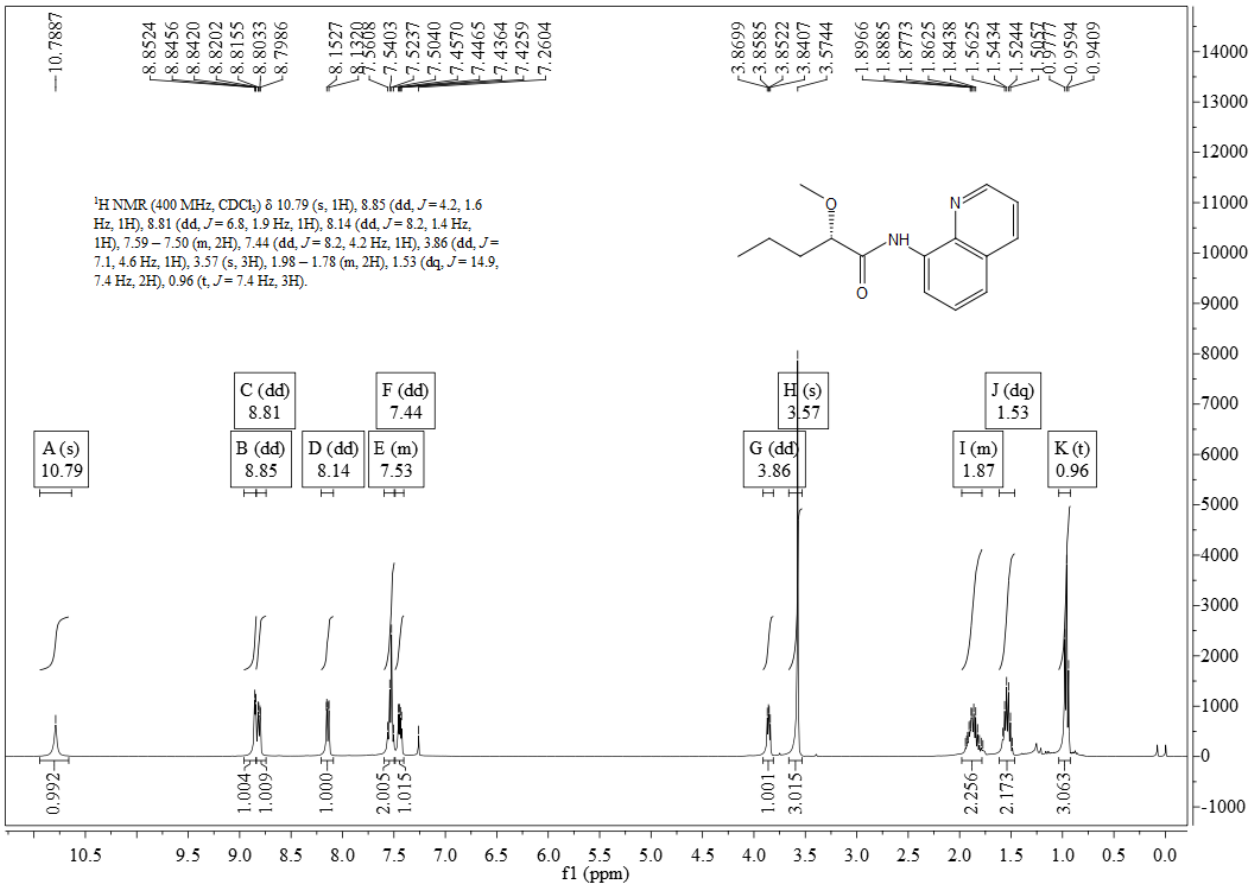

171.8870
148.6963
139.0627
136.2756
134.1778
128.1415
127.3726
121.9364
121.7205
116.6544
83.6992
58.8480
33.2205
31.7937
24.8863
22.6303
14.1436
^{13}C NMR (101 MHz, CDCl$_3$) δ 171.89, 148.70, 139.06, 136.28, 134.18, 128.14, 127.37, 121.94, 121.72, 116.65, 83.70, 58.85, 33.22, 31.79, 24.89, 22.63, 14.14.
O
NH
N
O
f1 (ppm)

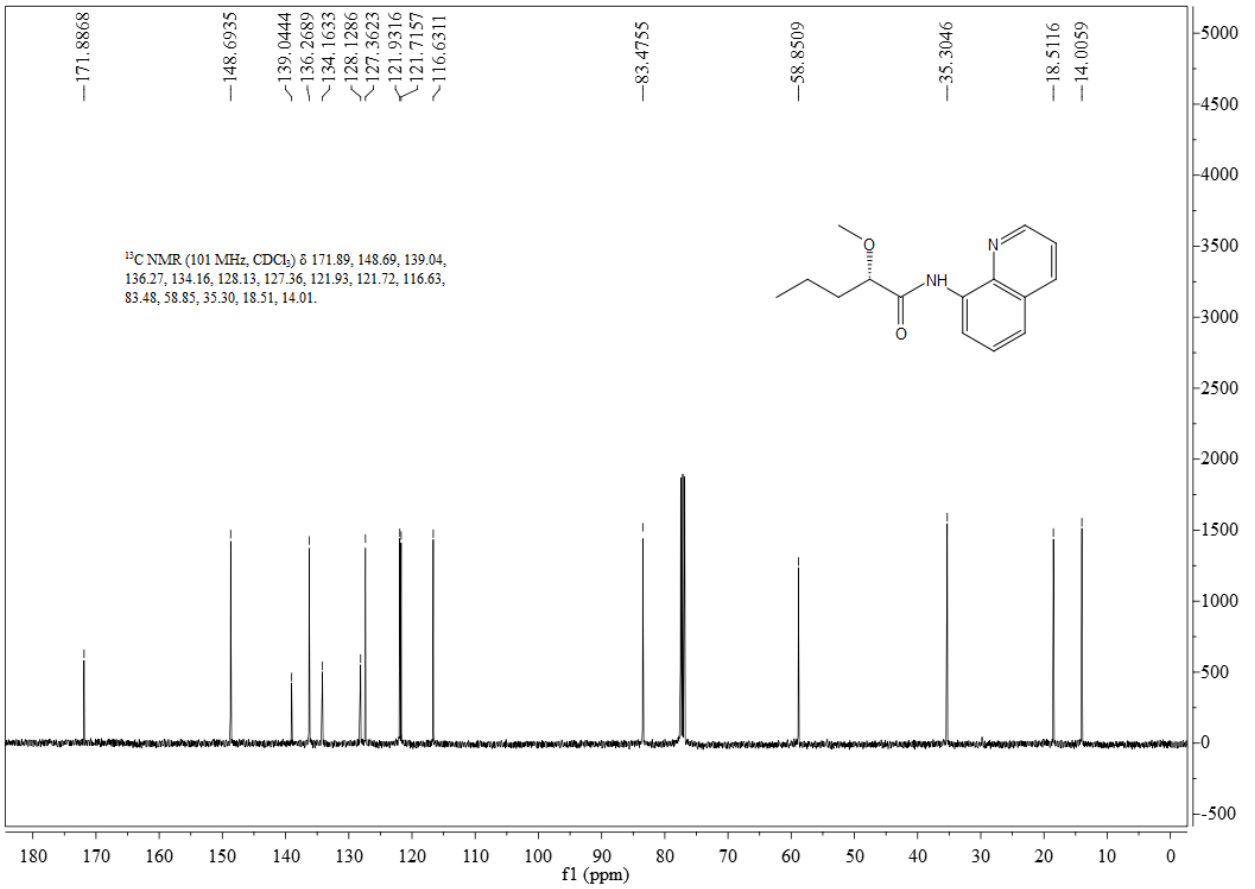

10.7922
8.8567
8.8526
8.8463
8.8269
8.8220
8.8098
8.8053
8.1540
8.1334
7.5608
7.5402
7.5233
7.5069
7.5036
7.4552
7.4447
7.4347
7.4243
7.2603
3.8353
3.8234
3.8185
3.8073
3.5798
1.9851
1.9808
1.9690
1.9622
1.9505
1.9296
1.9093
1.8812
1.8619
1.0434
1.0251
1H NMR (400 MHz, CDCl3) δ 10.79 (s, 1H), 8.85 (dd, J = 4.2, 1.6 Hz, 1H), 8.82 (dd, J = 6.8, 1.9 Hz, 1H), 8.14 (d, J = 8.2 Hz, 1H), 7.64 – 7.48 (m, 2H), 7.44 (dd, J = 8.2, 4.2 Hz, 1H), 3.82 (dd, J = 6.5, 4.5 Hz, 1H), 3.58 (s, 3H), 2.07 – 1.82 (m, 2H), 1.04 (d, J = 7.4 Hz, 3H).
O
N
NH
O
A (s) 10.79
B (dd) 8.85
C (dd) 8.82
D (d) 8.14
E (m) 7.53
F (dd) 7.44
G (dd) 3.82
H (s) 3.58
I (m) 1.95
J (d) 1.04
0.997
1.000
1.000
1.002
2.012
1.004
1.018
3.005
2.137
3.042
f1 (ppm)

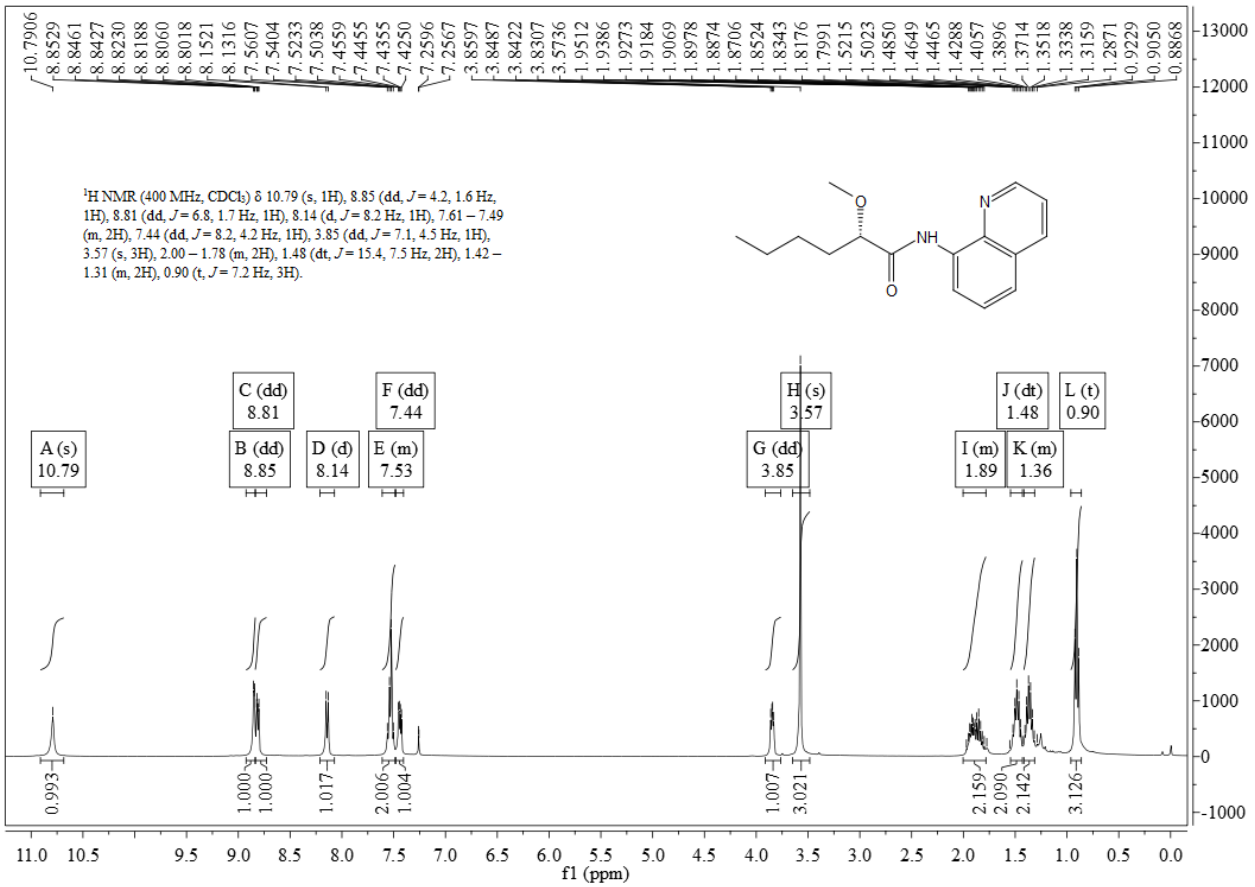

171.5987
148.6909
139.0462
136.2654
134.1468
128.1286
127.3543
121.9403
121.7084
116.6440
84.4580
58.7298
26.0742
9.4046
13C NMR (101 MHz, CDCl3) δ 171.60, 148.69, 139.05, 136.27, 134.15, 128.13, 127.35, 121.94, 121.71, 116.64, 84.46, 58.73, 26.07, 9.40.
O
N
NH
O
f1 (ppm)

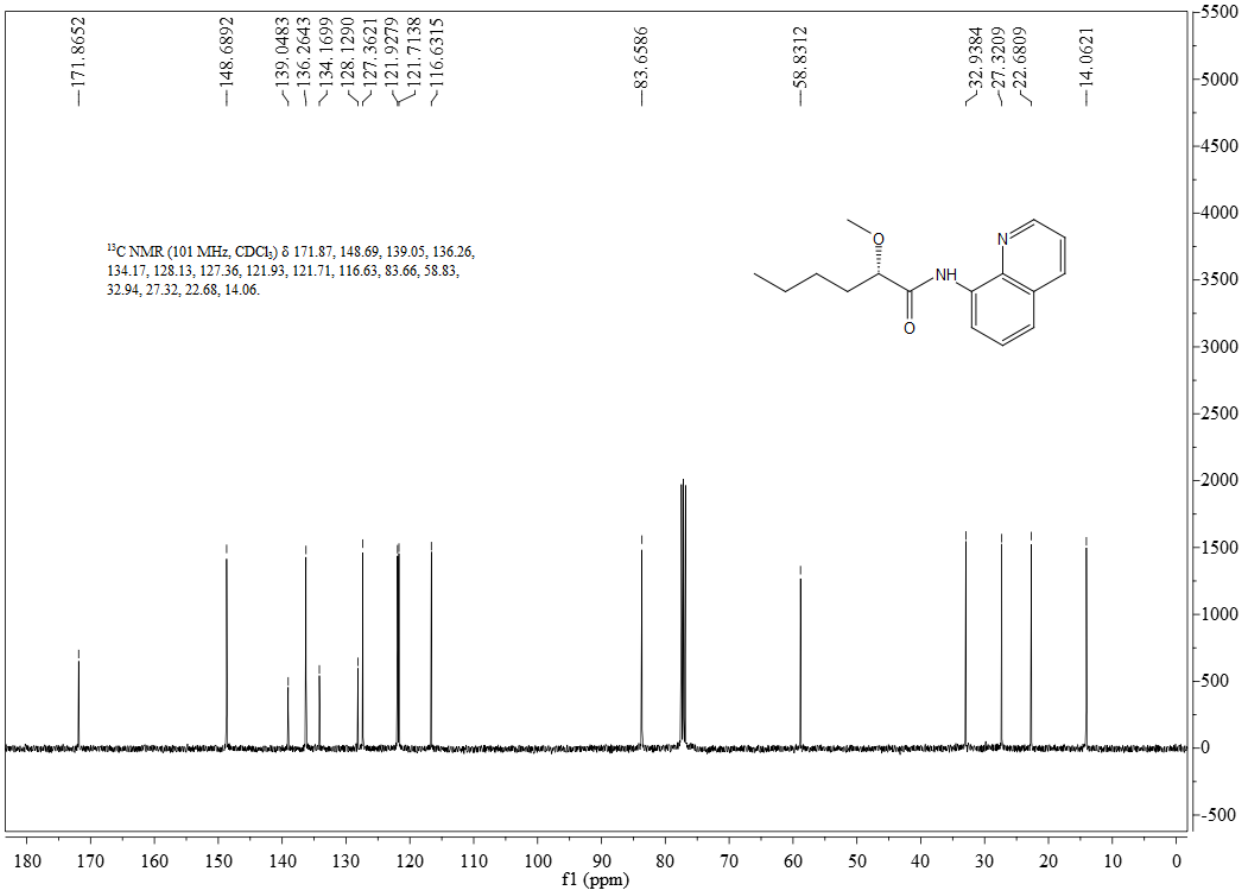

10.7479
8.8606
8.8504
8.8300
8.8254
8.8133
8.8086
8.1654
8.1448
7.5704
7.5498
7.5331
7.5146
7.4680
7.4576
7.4475
7.4370
7.2602
3.6353
3.6242
3.5895
2.2950
2.2839
2.2670
2.2502
2.2383
2.2213
2.2045
1.1079
1.0907
1.0265
1.0095
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.75 (s, 1H), 8.86 (d, J = 4.1 Hz, 1H), 8.82 (dd, J = 6.7, 1.9 Hz, 1H), 8.16 (d, J = 8.2 Hz, 1H), 7.60 – 7.48 (m, 2H), 7.45 (dd, J = 8.2, 4.2 Hz, 1H), 3.63 (d, J = 4.4 Hz, 1H), 3.59 (s, 3H), 2.31 – 2.18 (m, 1H), 1.10 (d, J = 6.9 Hz, 3H), 1.02 (d, J = 6.8 Hz, 3H).
A (s) 10.75
C (dd) 8.82
B (d) 8.86
D (d) 8.16
F (dd) 7.45
E (m) 7.54
H (s) 3.59
G (d) 3.63
I (m) 2.25
K (d) 1.02
J (d) 1.10
0.987
1.000
1.004
1.012
2.000
1.003
1.003
3.002
1.002
3.026
3.006
f1 (ppm)

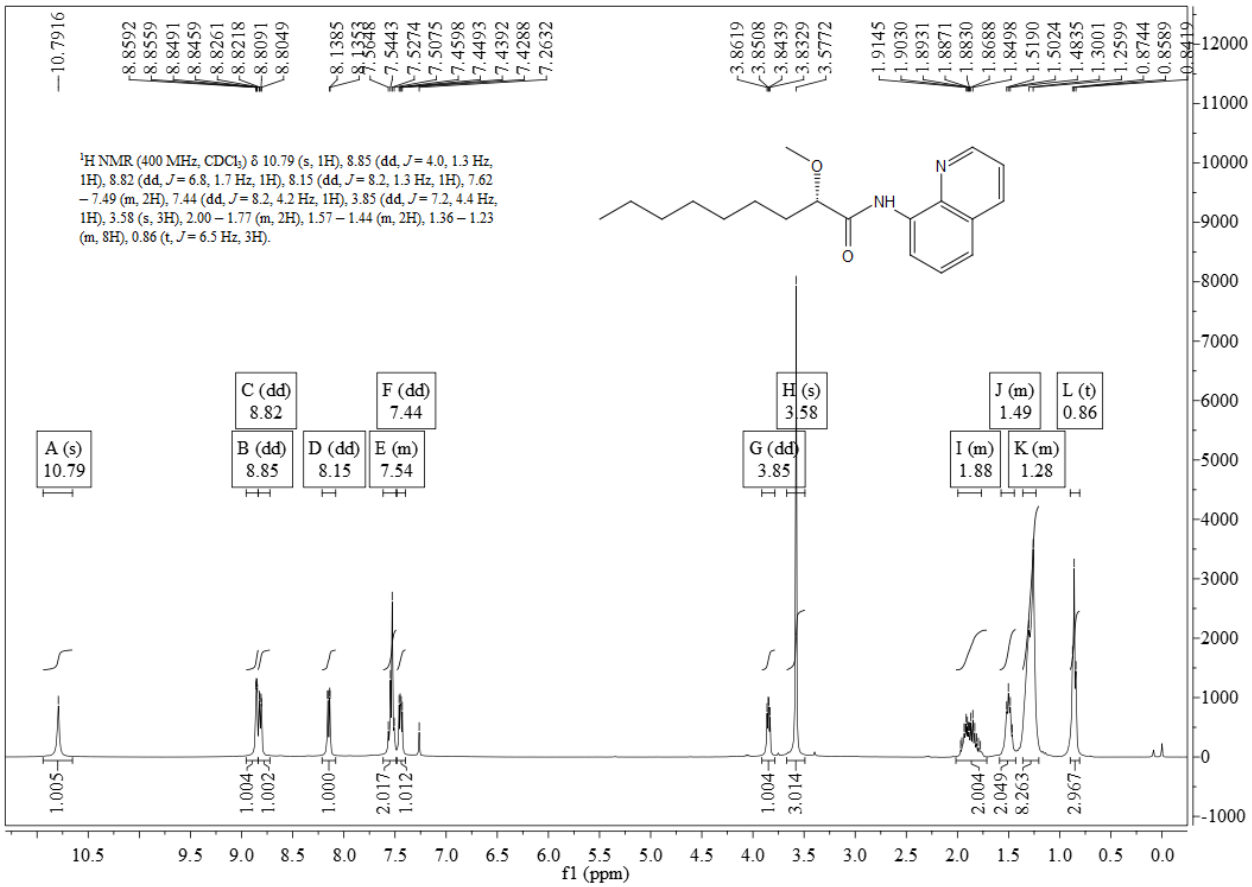

171.3772
148.7415
139.1079
136.2767
134.1312
128.1665
127.3999
121.9211
121.7395
116.6466
88.6659
59.8442
32.1242
19.2044
17.3359
^{13}C NMR (101 MHz, CDCl$_3$) δ 171.38, 148.74, 139.11, 136.28, 134.13, 128.17, 127.40, 121.92, 121.74, 116.65, 88.67, 59.84, 32.12, 19.20, 17.34.
f1 (ppm)

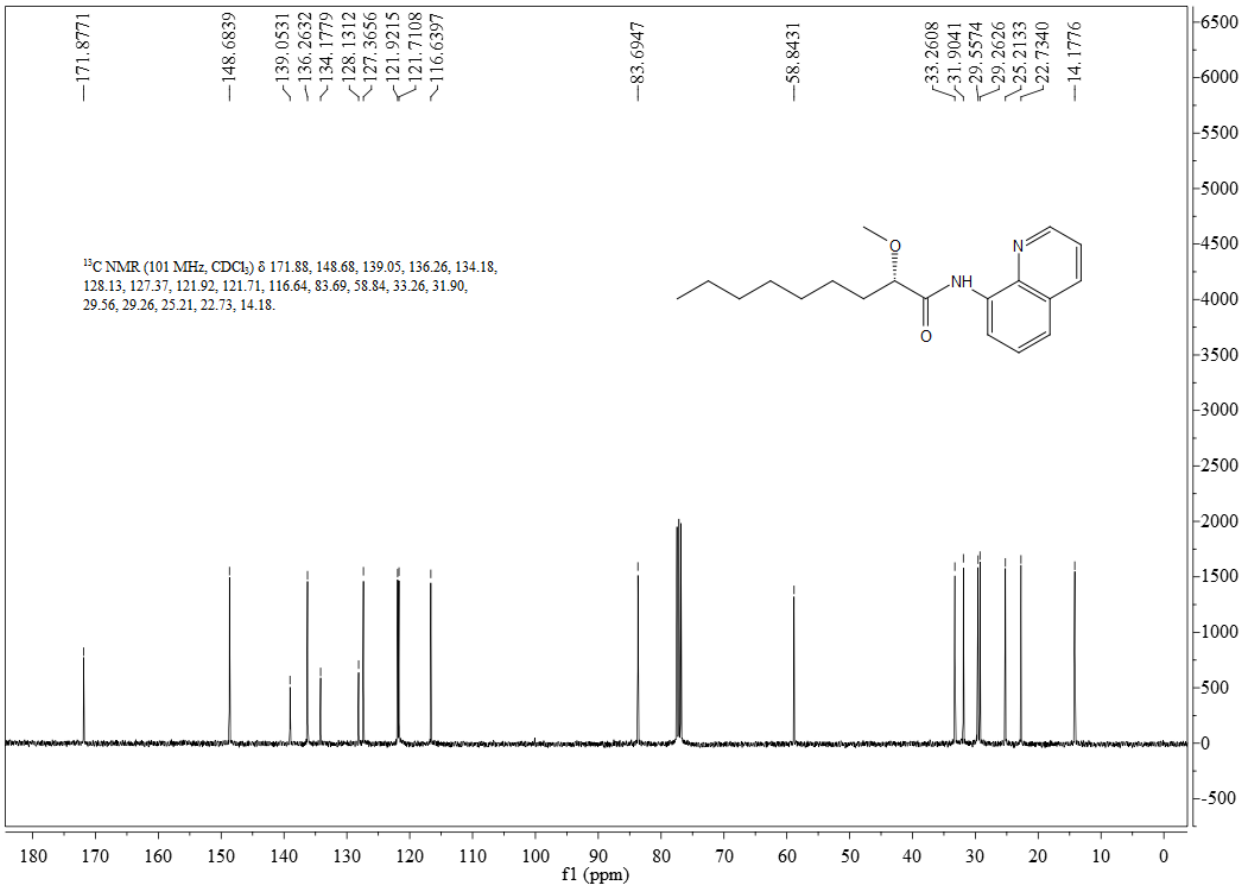

10.7887
8.8524
8.8456
8.8420
8.8202
8.8155
8.8033
8.7986
8.1527
8.1380
7.5608
7.5403
7.5237
7.5040
7.4570
7.4465
7.4364
7.4259
7.2604
3.8699
3.8585
3.8522
3.8407
3.5744
1.8966
1.8885
1.8773
1.8625
1.8438
1.5625
1.5434
1.5244
1.5057
0.9777
0.9594
0.9409
1H NMR (400 MHz, CDCl3) δ 10.79 (s, 1H), 8.85 (dd, J = 4.2, 1.6 Hz, 1H), 8.81 (dd, J = 6.8, 1.9 Hz, 1H), 8.14 (dd, J = 8.2, 1.4 Hz, 1H), 7.59 – 7.50 (m, 2H), 7.44 (dd, J = 8.2, 4.2 Hz, 1H), 3.86 (dd, J = 7.1, 4.6 Hz, 1H), 3.57 (s, 3H), 1.98 – 1.78 (m, 2H), 1.53 (dq, J = 14.9, 7.4 Hz, 2H), 0.96 (t, J = 7.4 Hz, 3H).
A (s) 10.79
B (dd) 8.85
C (dd) 8.81
D (dd) 8.14
E (m) 7.53
F (dd) 7.44
G (dd) 3.86
H (s) 3.57
I (m) 1.87
J (dq) 1.53
K (t) 0.96
0.992
1.004
1.009
1.000
2.005
1.015
1.001
3.015
2.256
2.173
3.063
f1 (ppm)

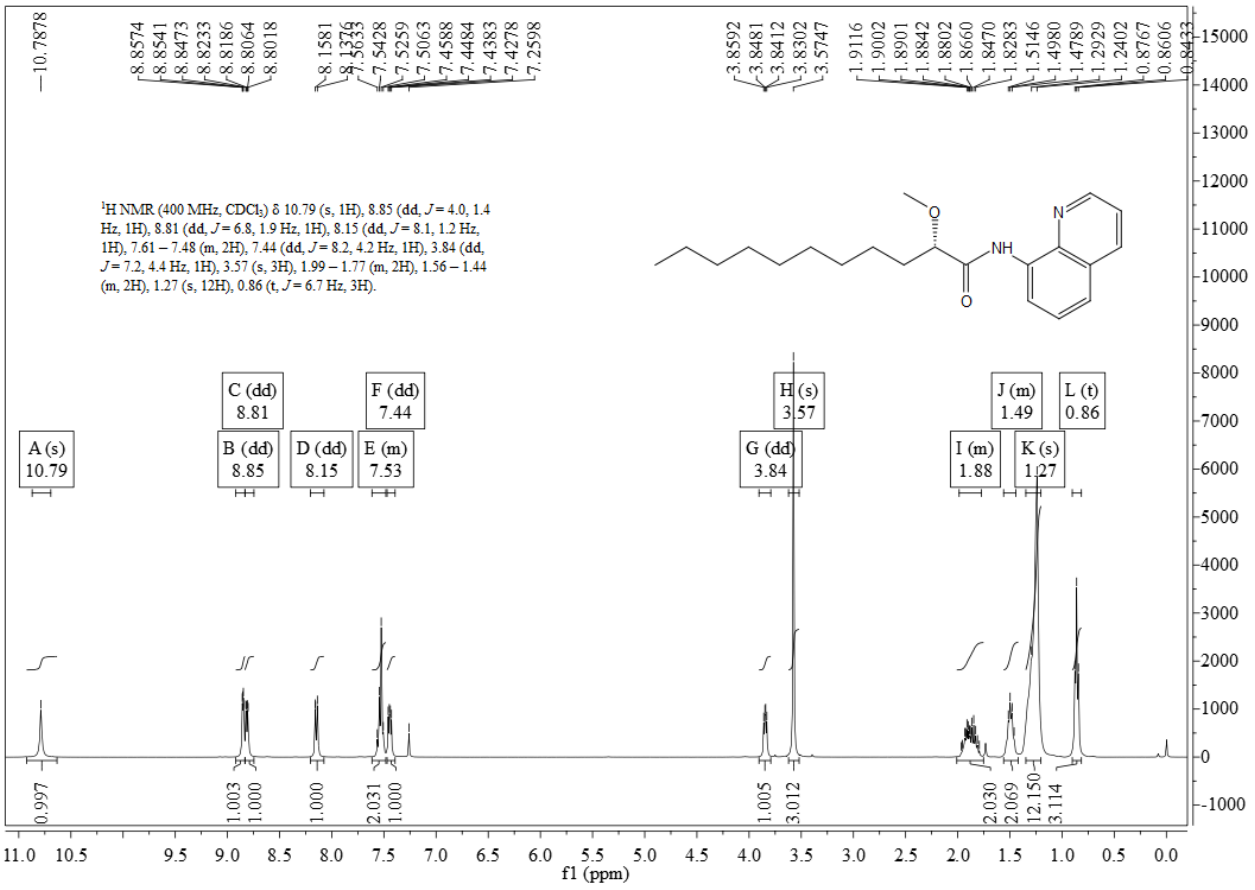

171.8868
148.6935
139.0444
136.2689
134.1633
128.1286
127.3623
121.9316
121.7157
116.6311
83.4755
58.8509
35.3046
18.5116
14.0059
13C NMR (101 MHz, CDCl3) δ 171.89, 148.69, 139.04, 136.27, 134.16, 128.13, 127.36, 121.93, 121.72, 116.63, 83.48, 58.85, 35.30, 18.51, 14.01.
f1 (ppm)


10.7906
8.8529
8.8461
8.8427
8.8230
8.8188
8.8060
8.8018
8.1521
8.1316
7.5607
7.5404
7.5233
7.5038
7.4559
7.4455
7.4355
7.4250
7.2596
7.2567
3.8597
3.8487
3.8422
3.8307
3.5736
1.9512
1.9386
1.9273
1.9184
1.9069
1.8978
1.8874
1.8706
1.8524
1.8343
1.8176
1.7991
1.5215
1.5023
1.4850
1.4649
1.4465
1.4288
1.4057
1.3896
1.3714
1.3518
1.3338
1.3159
1.2871
0.9229
0.9050
0.8868
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.79 (s, 1H), 8.85 (dd, J = 4.2, 1.6 Hz, 1H), 8.81 (dd, J = 6.8, 1.7 Hz, 1H), 8.14 (d, J = 8.2 Hz, 1H), 7.61 – 7.49 (m, 2H), 7.44 (dd, J = 8.2, 4.2 Hz, 1H), 3.85 (dd, J = 7.1, 4.5 Hz, 1H), 3.57 (s, 3H), 2.00 – 1.78 (m, 2H), 1.48 (dt, J = 15.4, 7.5 Hz, 2H), 1.42 – 1.31 (m, 2H), 0.90 (t, J = 7.2 Hz, 3H).
O
N
NH
O
A (s) 10.79
C (dd) 8.81
B (dd) 8.85
D (d) 8.14
F (dd) 7.44
E (m) 7.53
H (s) 3.57
G (dd) 3.85
J (dt) 1.48
L (t) 0.90
I (m) 1.89
K (m) 1.36
0.993
1.000
1.000
1.017
2.006
1.004
1.007
3.021
2.159
2.090
2.142
3.126
f1 (ppm)

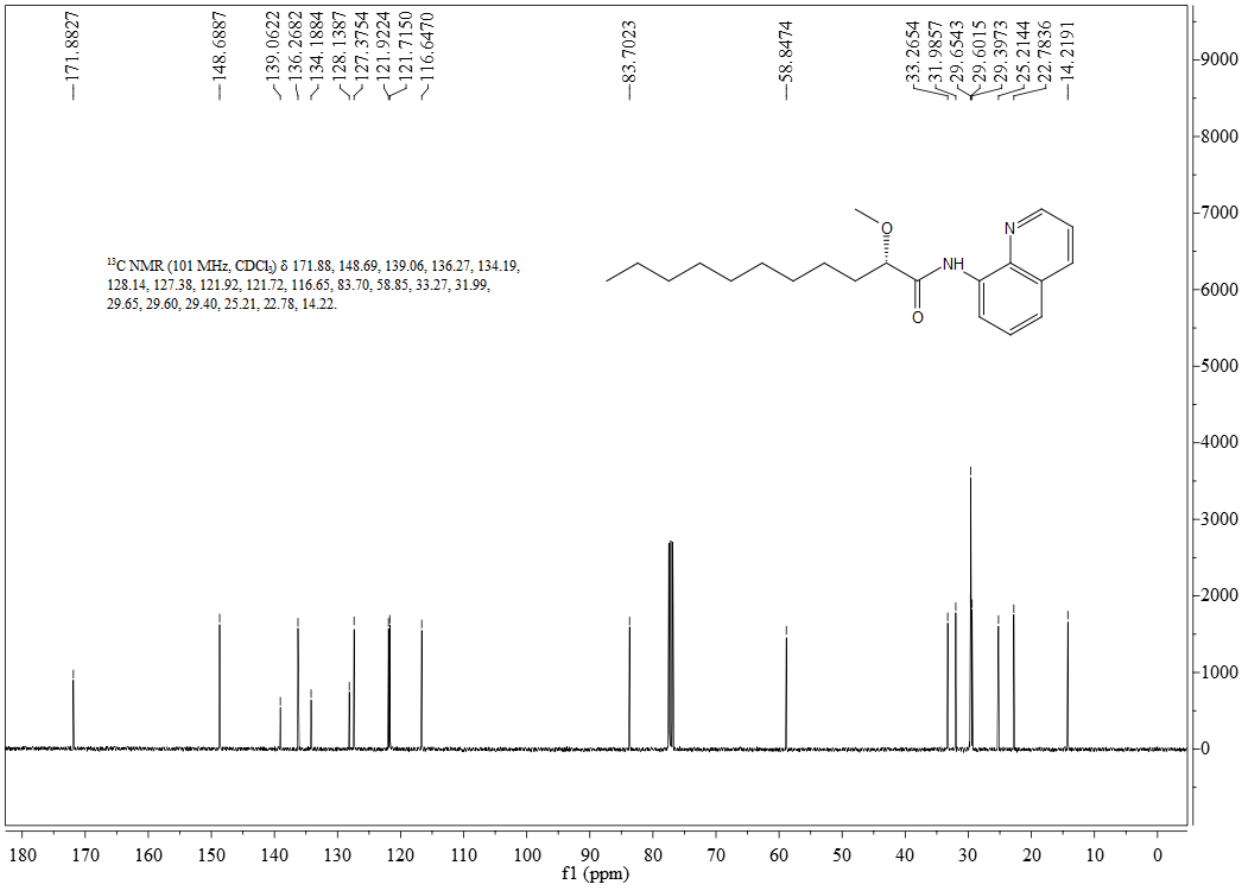

171.8652
148.6892
139.0483
136.2643
134.1699
128.1290
127.3621
121.9279
121.7138
116.6315
83.6586
58.8312
32.9384
27.3209
22.6809
14.0621
^{13}C NMR (101 MHz, CDCl$_3$) δ 171.87, 148.69, 139.05, 136.26, 134.17, 128.13, 127.36, 121.93, 121.71, 116.63, 83.66, 58.83, 32.94, 27.32, 22.68, 14.06.
O
N
NH
O
f1 (ppm)


10.7916
8.8592
8.8559
8.8491
8.8459
8.8261
8.8218
8.8091
8.8049
8.1385
8.1353
7.5648
7.5443
7.5274
7.5075
7.4598
7.4493
7.4392
7.4288
7.2632
3.8619
3.8508
3.8439
3.8329
3.5772
1.9145
1.9030
1.8931
1.8871
1.8830
1.8688
1.8498
1.5190
1.5024
1.4835
1.3001
1.2599
0.8744
0.8589
0.8419
1H NMR (400 MHz, CDCl3) δ 10.79 (s, 1H), 8.85 (dd, J = 4.0, 1.3 Hz, 1H), 8.82 (dd, J = 6.8, 1.7 Hz, 1H), 8.15 (dd, J = 8.2, 1.3 Hz, 1H), 7.62 – 7.49 (m, 2H), 7.44 (dd, J = 8.2, 4.2 Hz, 1H), 3.85 (dd, J = 7.2, 4.4 Hz, 1H), 3.58 (s, 3H), 2.00 – 1.77 (m, 2H), 1.57 – 1.44 (m, 2H), 1.36 – 1.23 (m, 8H), 0.86 (t, J = 6.5 Hz, 3H).
O
NH
N
O
A (s) 10.79
B (dd) 8.85
C (dd) 8.82
D (dd) 8.15
E (m) 7.54
F (dd) 7.44
G (dd) 3.85
H (s) 3.58
I (m) 1.88
J (m) 1.49
K (m) 1.28
L (t) 0.86
1.005
1.004
1.002
1.000
2.017
1.012
1.004
3.014
2.004
2.049
8.263
2.967
f1 (ppm)

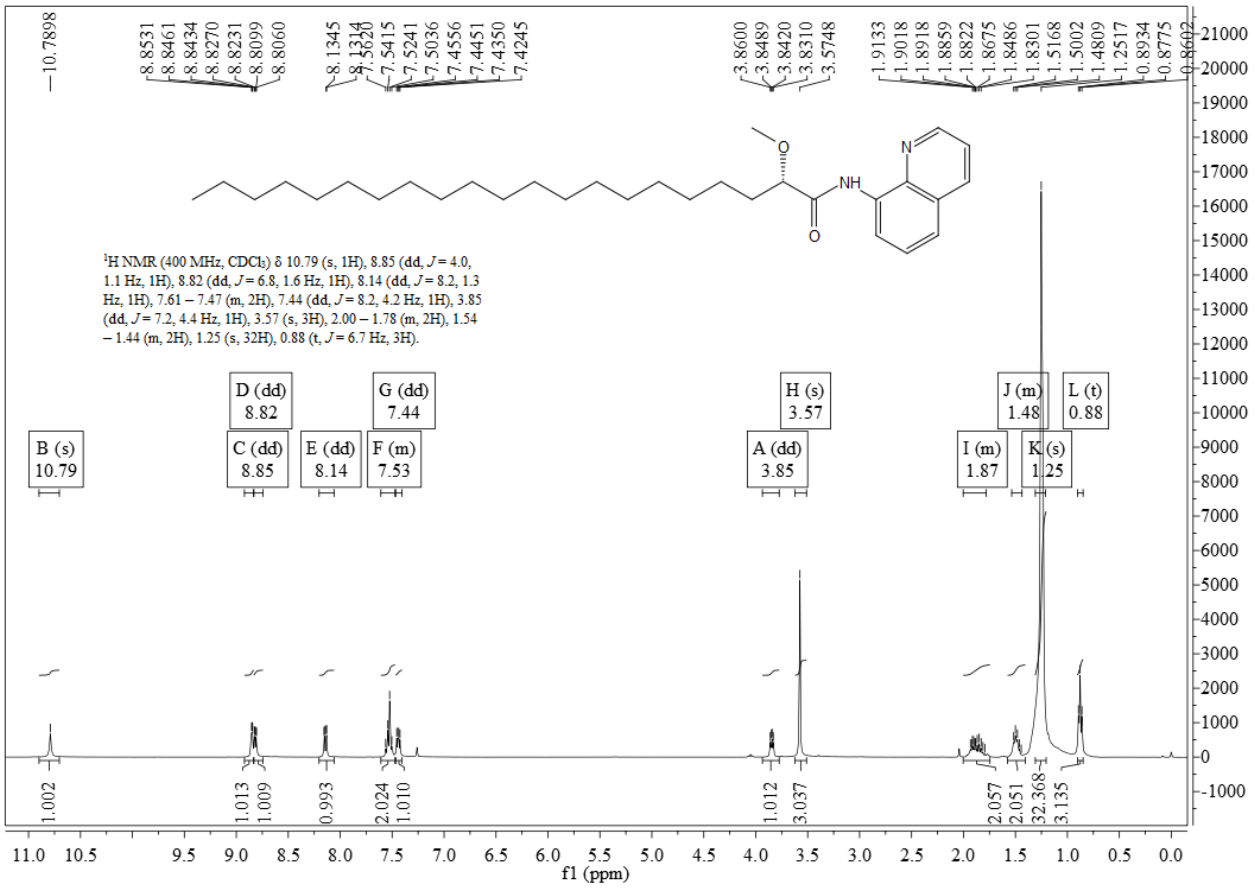

171.8771
148.6839
139.0531
136.2632
134.1779
128.1312
127.3656
121.9215
121.7108
116.6397
83.6947
58.8431
33.2608
31.9041
29.5574
29.2626
25.2133
22.7340
14.1776
13C NMR (101 MHz, CDCl3) δ 171.88, 148.68, 139.05, 136.26, 134.18, 128.13, 127.37, 121.92, 121.71, 116.64, 83.69, 58.84, 33.26, 31.90, 29.56, 29.26, 25.21, 22.73, 14.18.
O
NH
N
O
f1 (ppm)

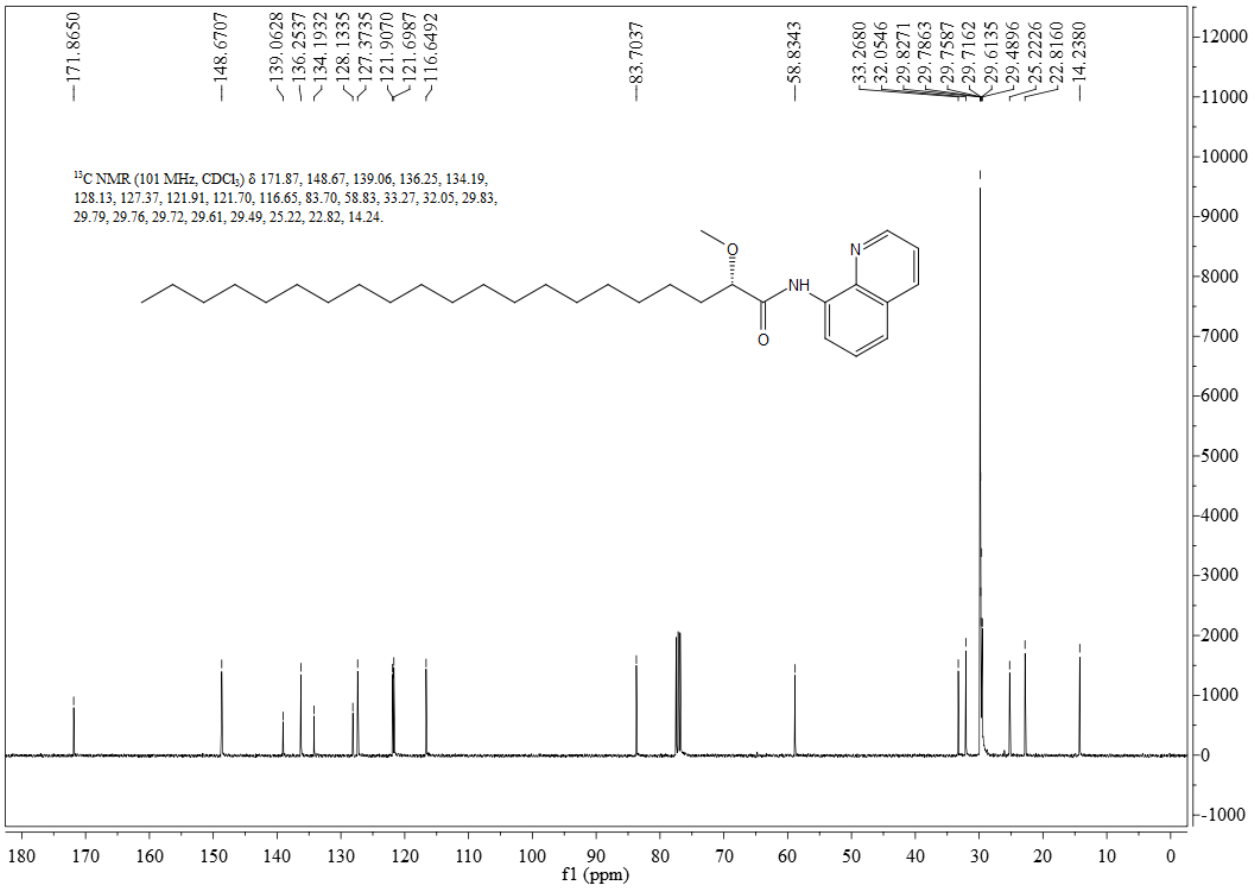


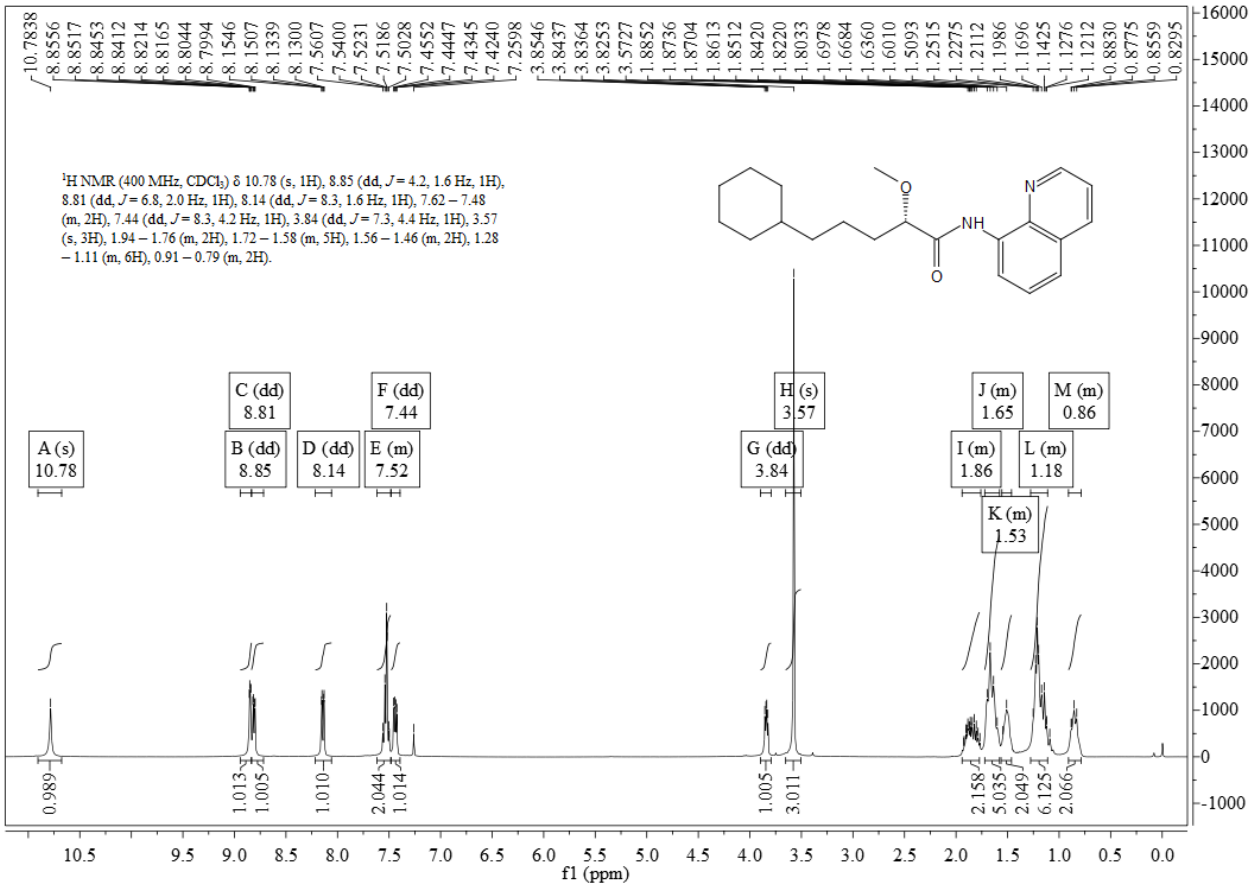
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.0, 1.4 Hz, 1H), 8.81 (dd, *J* = 6.8, 1.9 Hz, 1H), 8.15 (dd, *J* = 8.1, 1.2 Hz, 1H), 7.61 – 7.48 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.84 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.57 (s, 3H), 1.99 – 1.77 (m, 2H), 1.56 – 1.44 (m, 2H), 1.27 (s, 12H), 0.86 (t, *J* = 6.7 Hz, 3H).

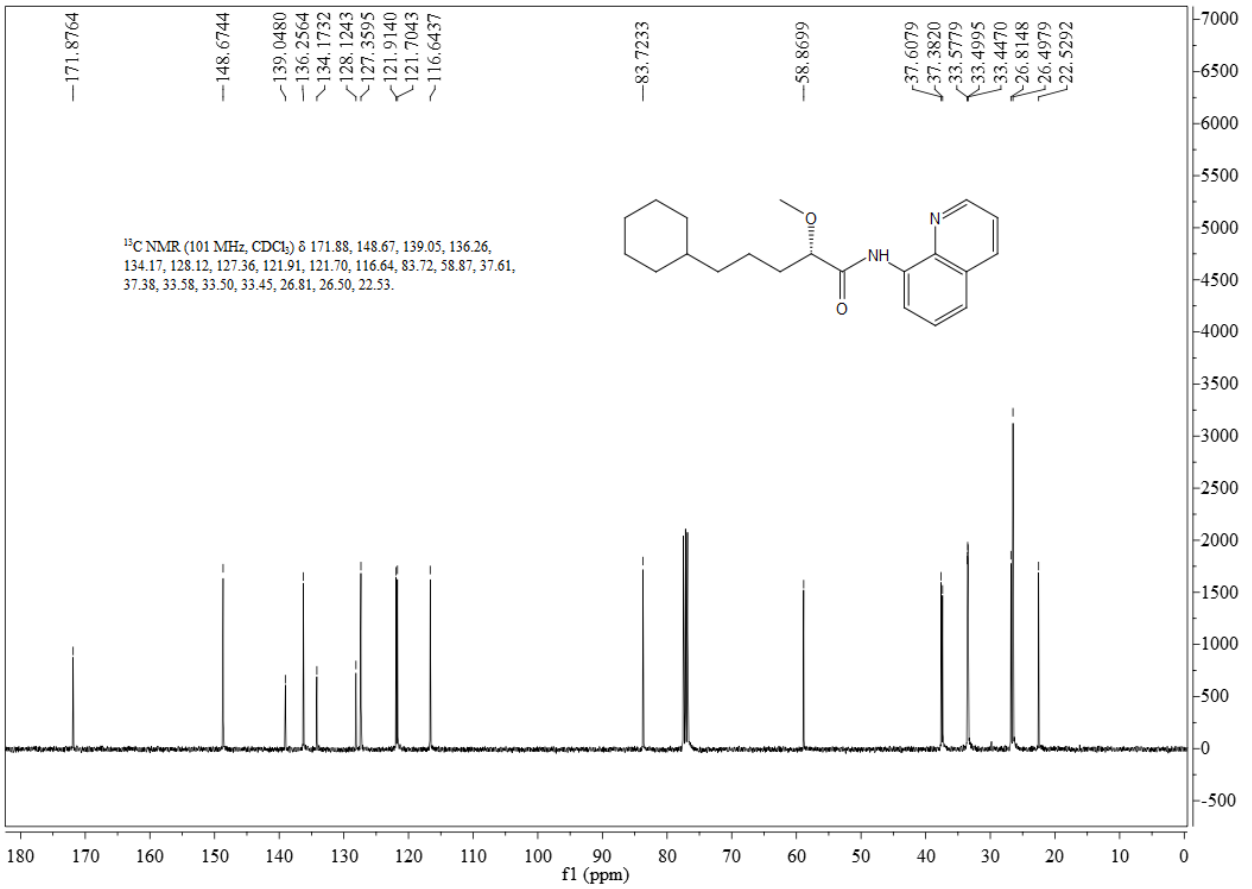


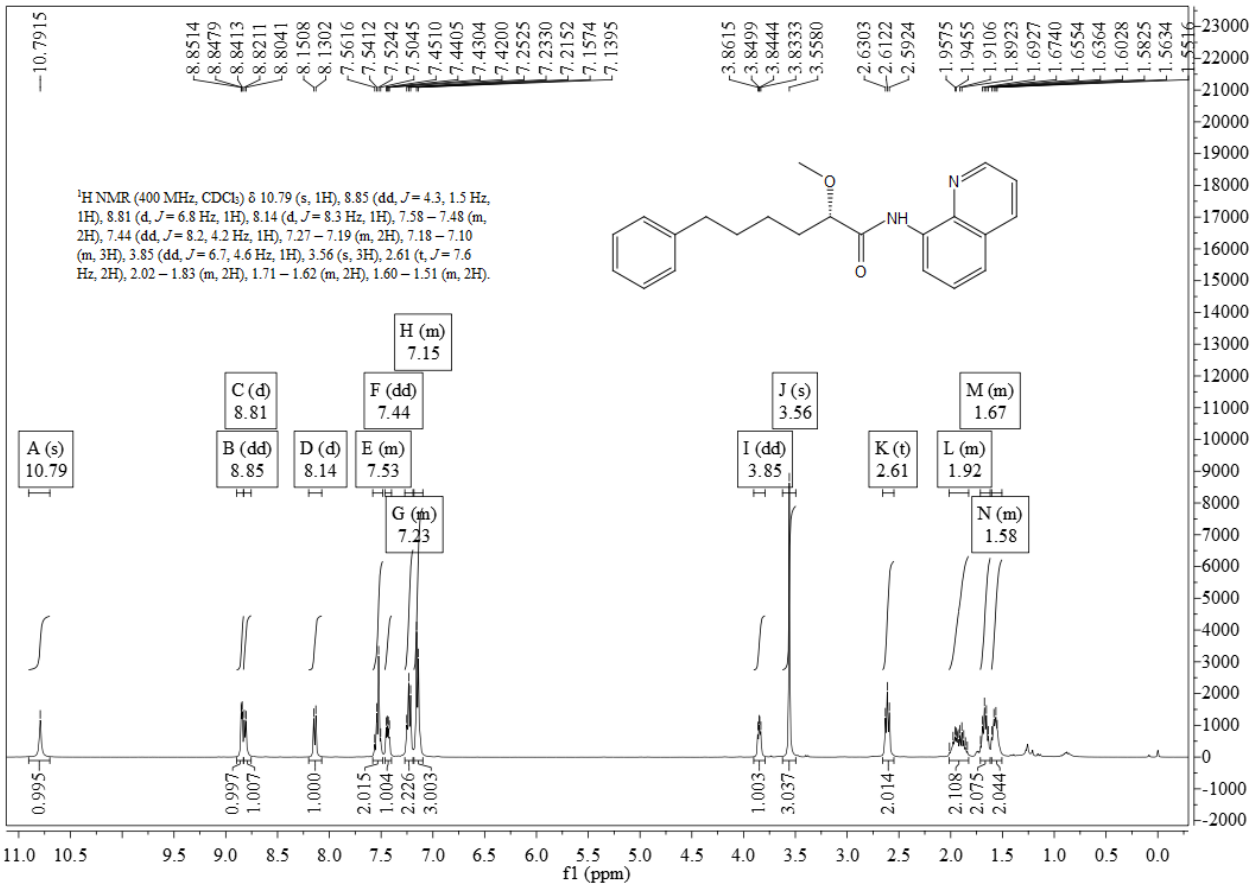
^{13}C NMR (101 MHz, $CDCl_3$) δ 171.88, 148.69, 139.06, 136.27, 134.19, 128.14, 127.38, 121.92, 121.72, 116.65, 83.70, 58.85, 33.27, 31.99, 29.65, 29.60, 29.40, 25.21, 22.78, 14.22.

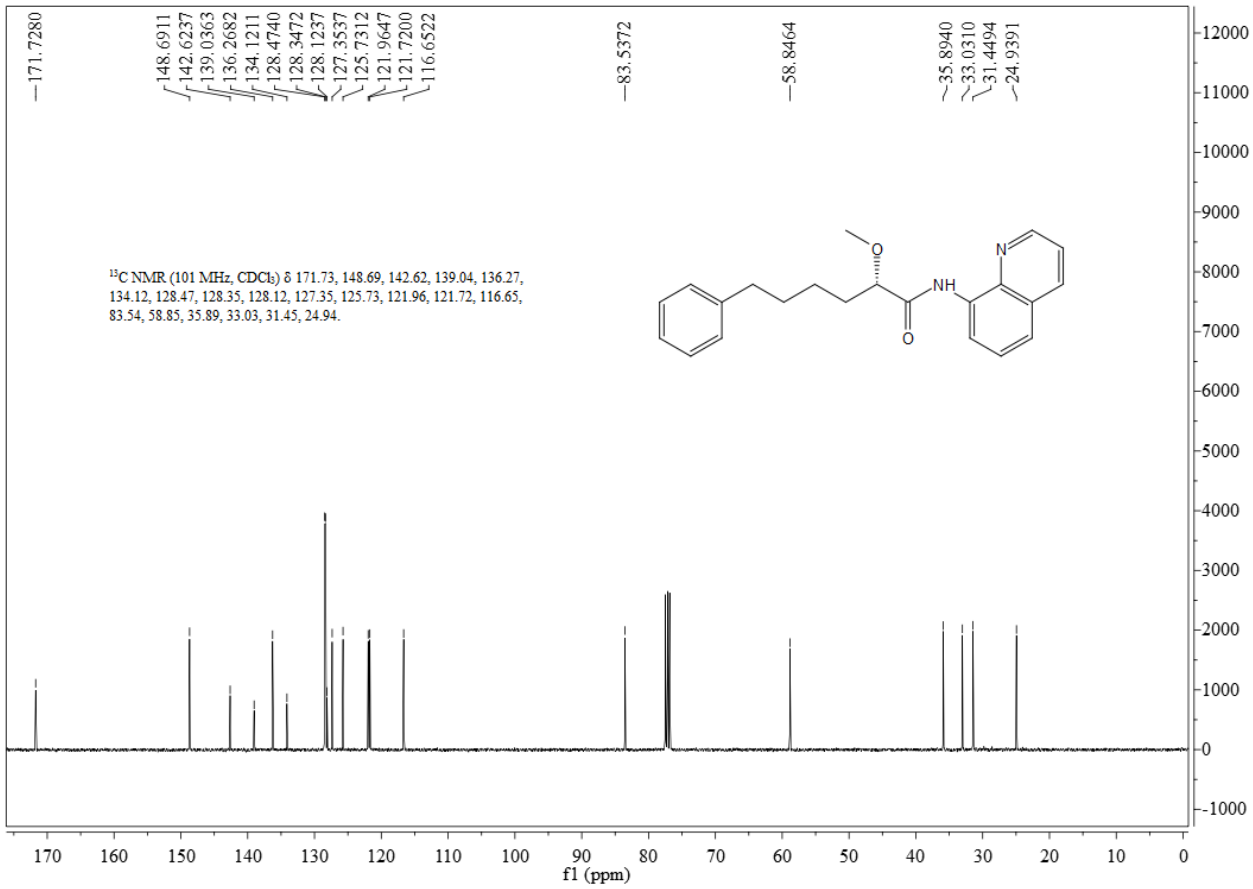

10.7898
8.8531
8.8461
8.8434
8.8270
8.8231
8.8099
8.8060
8.1345
8.1314
7.5620
7.5415
7.5241
7.5036
7.4556
7.4451
7.4350
7.4245
3.8600
3.8489
3.8420
3.8310
3.5748
1.9133
1.9018
1.8918
1.8859
1.8822
1.8675
1.8486
1.8301
1.5168
1.5002
1.4809
1.2517
0.8934
0.8775
0.8602
O
N
NH
O
1H NMR (400 MHz, CDCl3) δ 10.79 (s, 1H), 8.85 (dd, J = 4.0, 1.1 Hz, 1H), 8.82 (dd, J = 6.8, 1.6 Hz, 1H), 8.14 (dd, J = 8.2, 1.3 Hz, 1H), 7.61 – 7.47 (m, 2H), 7.44 (dd, J = 8.2, 4.2 Hz, 1H), 3.85 (dd, J = 7.2, 4.4 Hz, 1H), 3.57 (s, 3H), 2.00 – 1.78 (m, 2H), 1.54 – 1.44 (m, 2H), 1.25 (s, 32H), 0.88 (t, J = 6.7 Hz, 3H).
B (s) 10.79
D (dd) 8.82
C (dd) 8.85
E (dd) 8.14
G (dd) 7.44
F (m) 7.53
H (s) 3.57
A (dd) 3.85
J (m) 1.48
I (m) 1.87
K (s) 1.25
L (t) 0.88
1.002
1.013
1.009
0.993
2.024
1.010
1.012
3.037
2.057
2.051
32.368
3.135
f1 (ppm)

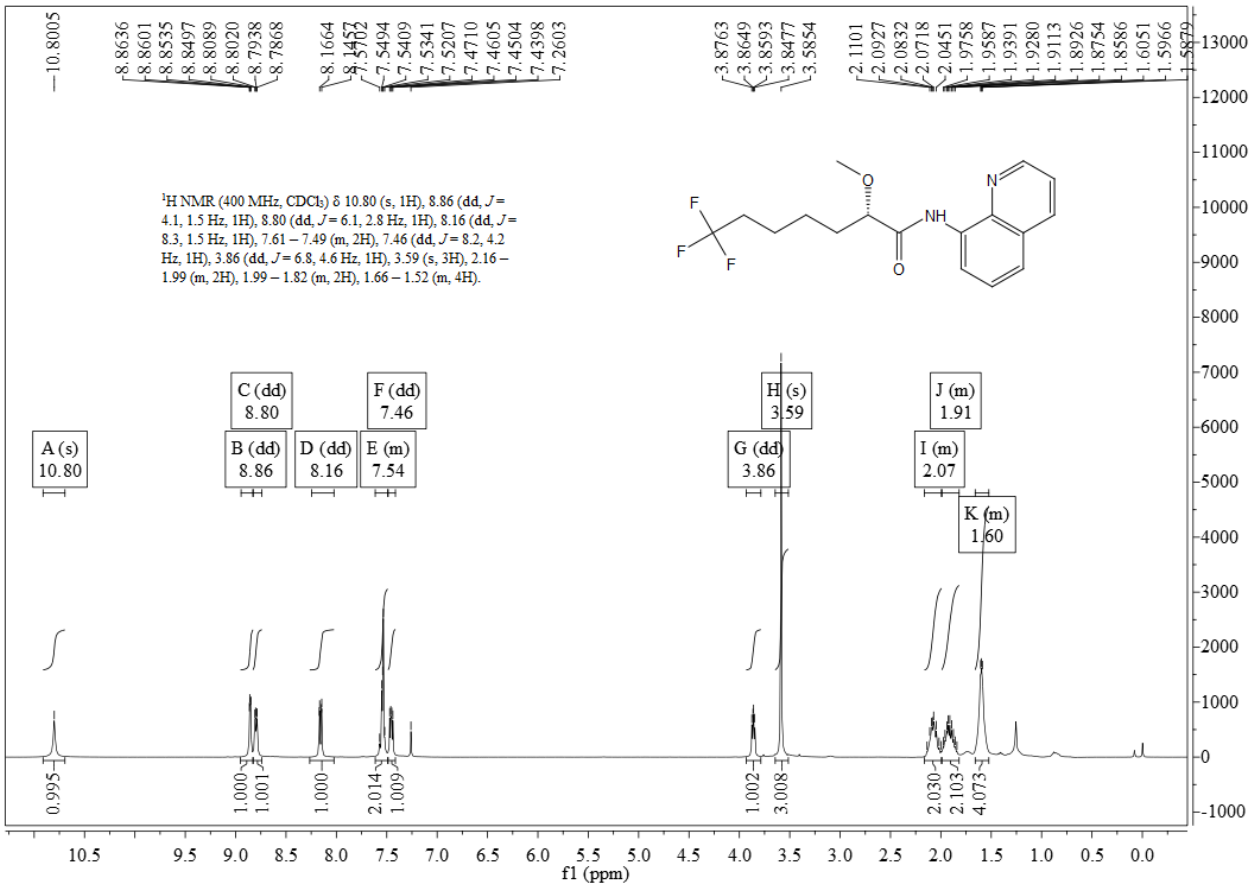

171.8650
148.6707
139.0628
136.2537
134.1932
128.1335
127.3735
121.9070
121.6987
116.6492
83.7037
58.8343
33.2680
32.0546
29.8271
29.7863
29.7587
29.7162
29.6135
29.4896
25.2226
22.8160
14.2380
13C NMR (101 MHz, CDCl3) δ 171.87, 148.67, 139.06, 136.25, 134.19, 128.13, 127.37, 121.91, 121.70, 116.65, 83.70, 58.83, 33.27, 32.05, 29.83, 29.79, 29.76, 29.72, 29.61, 29.49, 25.22, 22.82, 14.24.
O
N
NH
O
f1 (ppm)


10.7838
8.8556
8.8517
8.8453
8.8412
8.8214
8.8165
8.8044
8.7994
8.1546
8.1507
8.1339
8.1300
7.5607
7.5400
7.5231
7.5186
7.5028
7.4552
7.4447
7.4345
7.4240
7.2598
3.8546
3.8437
3.8364
3.8253
3.5727
1.8852
1.8736
1.8704
1.8613
1.8512
1.8420
1.8220
1.8033
1.6978
1.6684
1.6360
1.6010
1.5093
1.2515
1.2275
1.2112
1.1986
1.1696
1.1425
1.1276
1.1212
0.8830
0.8775
0.8559
0.8295
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.78 (s, 1H), 8.85 (dd, J = 4.2, 1.6 Hz, 1H), 8.81 (dd, J = 6.8, 2.0 Hz, 1H), 8.14 (dd, J = 8.3, 1.6 Hz, 1H), 7.62 – 7.48 (m, 2H), 7.44 (dd, J = 8.3, 4.2 Hz, 1H), 3.84 (dd, J = 7.3, 4.4 Hz, 1H), 3.57 (s, 3H), 1.94 – 1.76 (m, 2H), 1.72 – 1.58 (m, 5H), 1.56 – 1.46 (m, 2H), 1.28 – 1.11 (m, 6H), 0.91 – 0.79 (m, 2H).
O
NH
N
O
A (s) 10.78
B (dd) 8.85
C (dd) 8.81
D (dd) 8.14
E (m) 7.52
F (dd) 7.44
G (dd) 3.84
H (s) 3.57
I (m) 1.86
J (m) 1.65
K (m) 1.53
L (m) 1.18
M (m) 0.86
0.989
1.013
1.005
1.010
2.044
1.014
1.005
3.011
2.158
5.035
2.049
6.125
2.066
f1 (ppm)

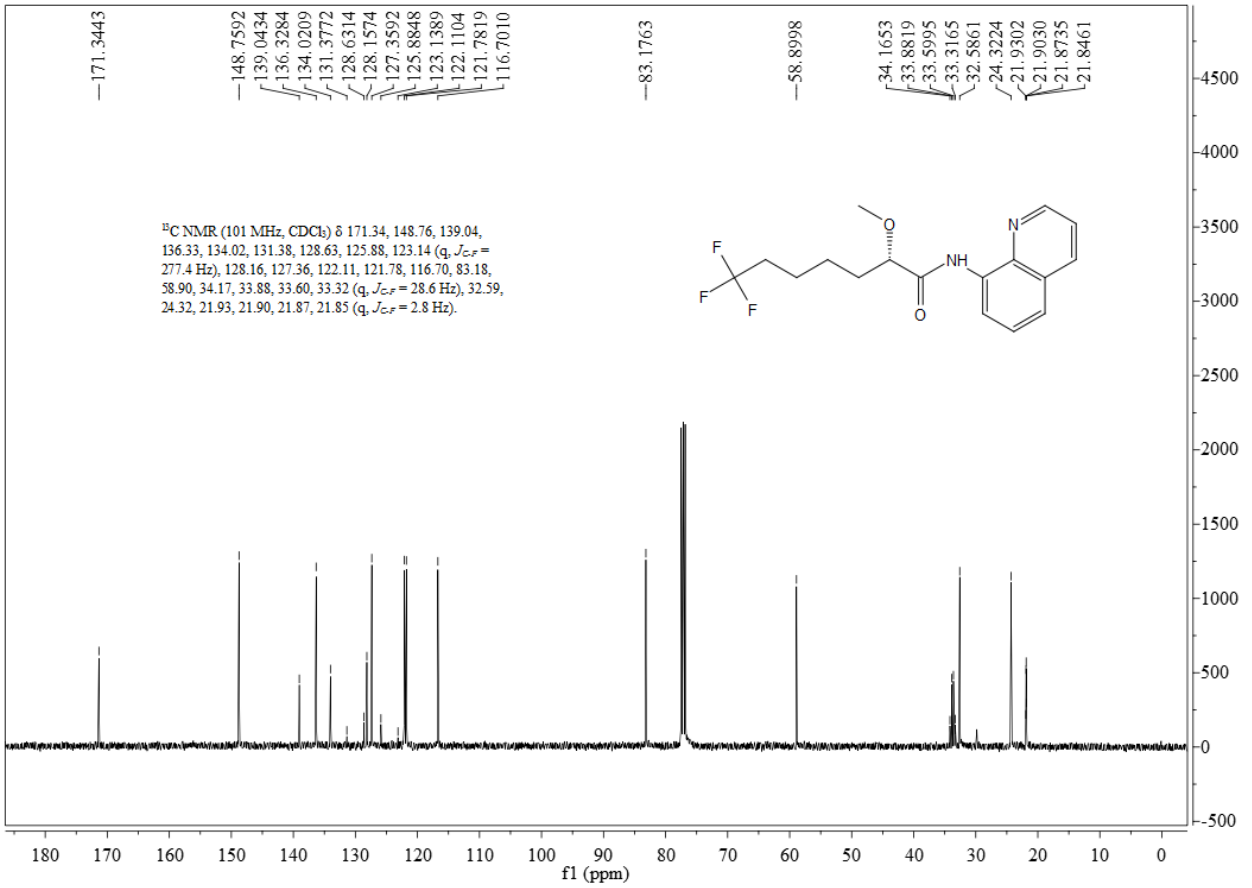

171.8764
148.6744
139.0480
136.2564
134.1732
128.1243
127.3595
121.9140
121.7043
116.6437
83.7233
58.8699
37.6079
37.3820
33.5779
33.4995
33.4470
26.8148
26.4979
22.5292
^{13}C NMR (101 MHz, CDCl$_3$) δ 171.88, 148.67, 139.05, 136.26, 134.17, 128.12, 127.36, 121.91, 121.70, 116.64, 83.72, 58.87, 37.61, 37.38, 33.58, 33.50, 33.45, 26.81, 26.50, 22.53.
O
NH
N
O
f1 (ppm)


10.7915
8.8514
8.8479
8.8413
8.8211
8.8041
8.1508
8.1302
7.5616
7.5412
7.5242
7.5045
7.4510
7.4405
7.4304
7.4200
7.2525
7.2330
7.2152
7.1574
7.1395
3.8615
3.8499
3.8444
3.8333
3.5580
2.6303
2.6122
2.5924
1.9575
1.9455
1.9106
1.8923
1.6927
1.6740
1.6554
1.6364
1.6028
1.5825
1.5634
1.5516
1H NMR (400 MHz, CDCl3) δ 10.79 (s, 1H), 8.85 (dd, J = 4.3, 1.5 Hz, 1H), 8.81 (d, J = 6.8 Hz, 1H), 8.14 (d, J = 8.3 Hz, 1H), 7.58 – 7.48 (m, 2H), 7.44 (dd, J = 8.2, 4.2 Hz, 1H), 7.27 – 7.19 (m, 2H), 7.18 – 7.10 (m, 3H), 3.85 (dd, J = 6.7, 4.6 Hz, 1H), 3.56 (s, 3H), 2.61 (t, J = 7.6 Hz, 2H), 2.02 – 1.83 (m, 2H), 1.71 – 1.62 (m, 2H), 1.60 – 1.51 (m, 2H).
O
N
NH
O
A (s) 10.79
B (dd) 8.85
C (d) 8.81
D (d) 8.14
E (m) 7.53
F (dd) 7.44
G (m) 7.23
H (m) 7.15
I (dd) 3.85
J (s) 3.56
K (t) 2.61
L (m) 1.92
M (m) 1.67
N (m) 1.58
0.995
0.997
1.007
1.000
2.015
1.004
2.226
3.003
1.003
3.037
2.014
2.108
2.075
2.044
f1 (ppm)

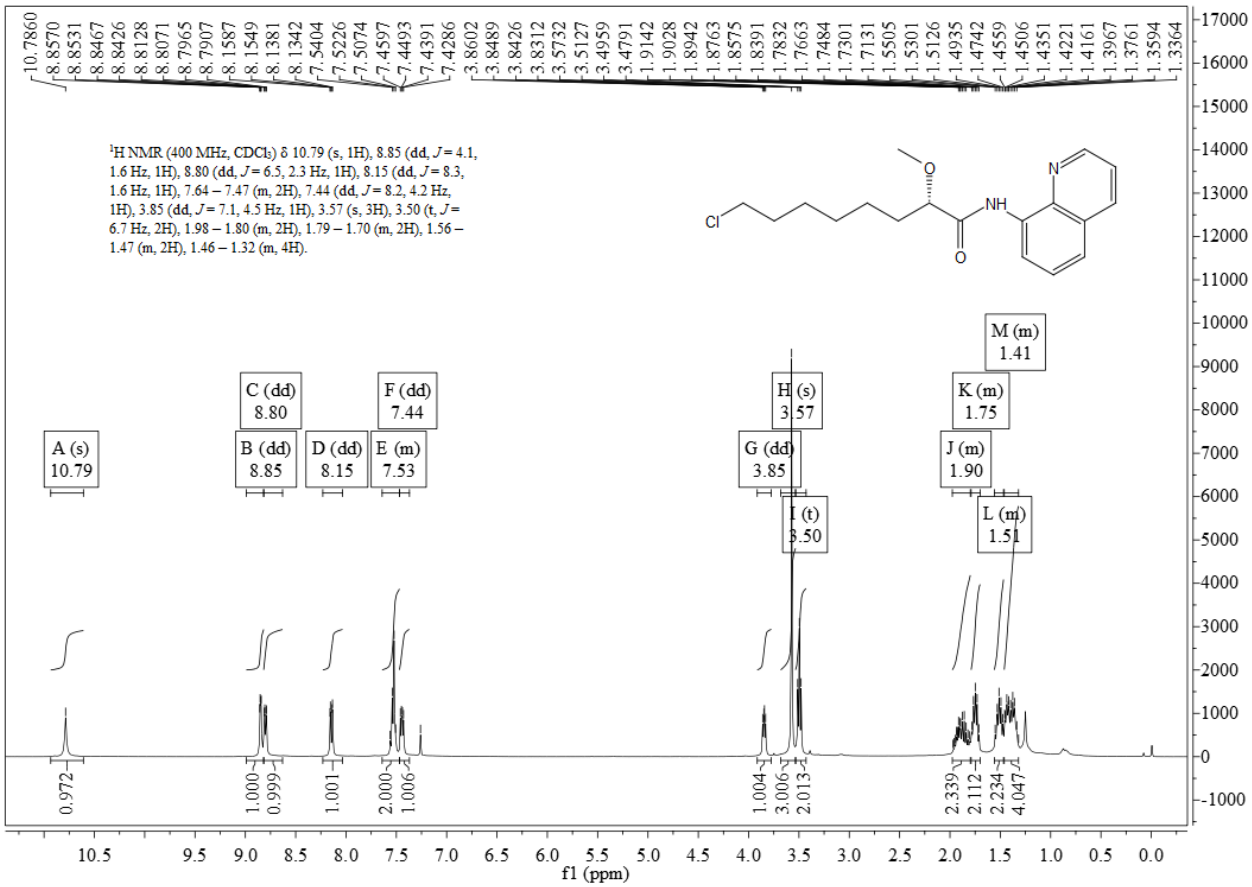

171.7280
148.6911
142.6237
139.0363
136.2682
134.1211
128.4740
128.3472
128.1237
127.3537
125.7312
121.9647
121.7200
116.6522
83.5372
58.8464
35.8940
33.0310
31.4494
24.9391
13C NMR (101 MHz, CDCl3) δ 171.73, 148.69, 142.62, 139.04, 136.27, 134.12, 128.47, 128.35, 128.12, 127.35, 125.73, 121.96, 121.72, 116.65, 83.54, 58.85, 35.89, 33.03, 31.45, 24.94.
O
N
NH
O
f1 (ppm)



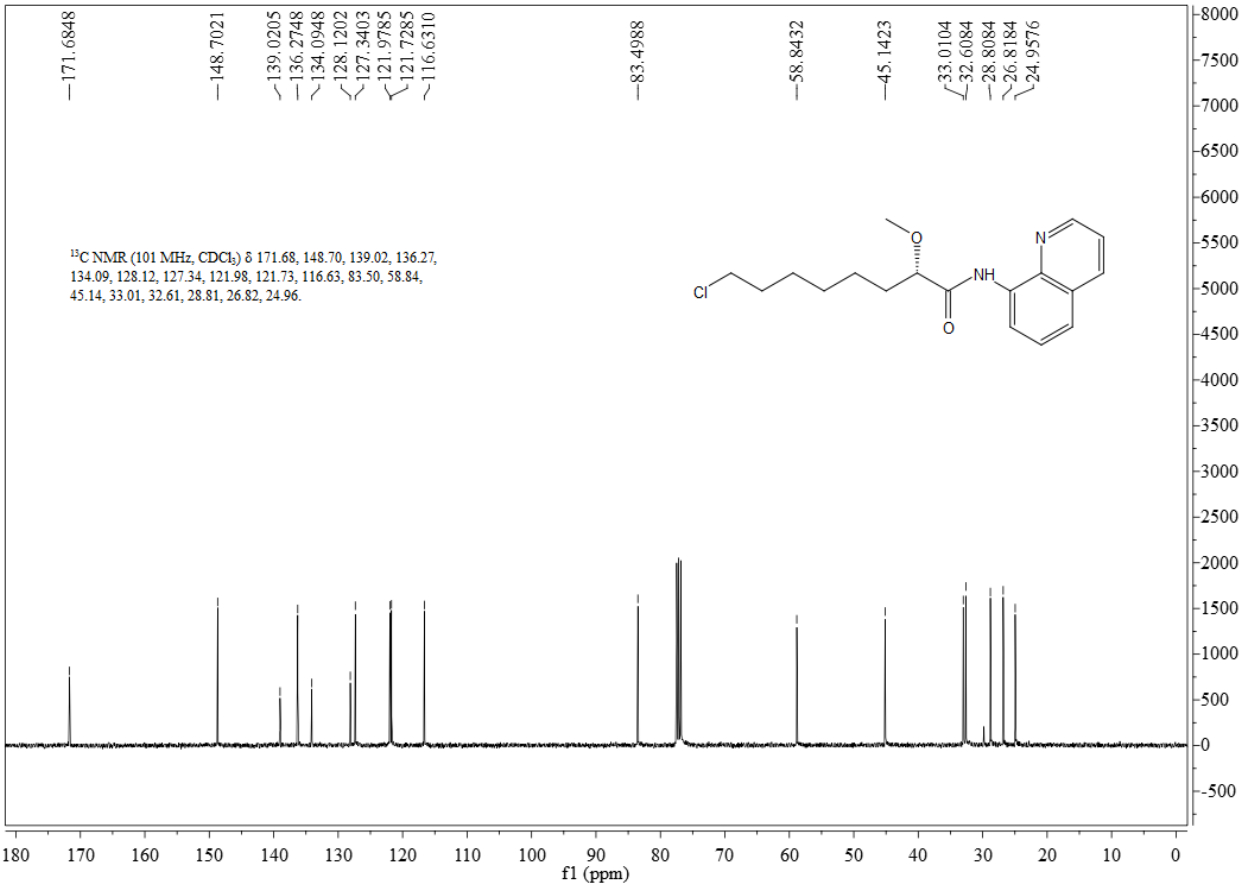
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.80 (s, 1H), 8.86 (dd, J = 4.1, 1.5 Hz, 1H), 8.80 (dd, J = 6.1, 2.8 Hz, 1H), 8.16 (dd, J = 8.3, 1.5 Hz, 1H), 7.61 – 7.49 (m, 2H), 7.46 (dd, J = 8.2, 4.2 Hz, 1H), 3.86 (dd, J = 6.8, 4.6 Hz, 1H), 3.59 (s, 3H), 2.16 – 1.99 (m, 2H), 1.99 – 1.82 (m, 2H), 1.66 – 1.52 (m, 4H).



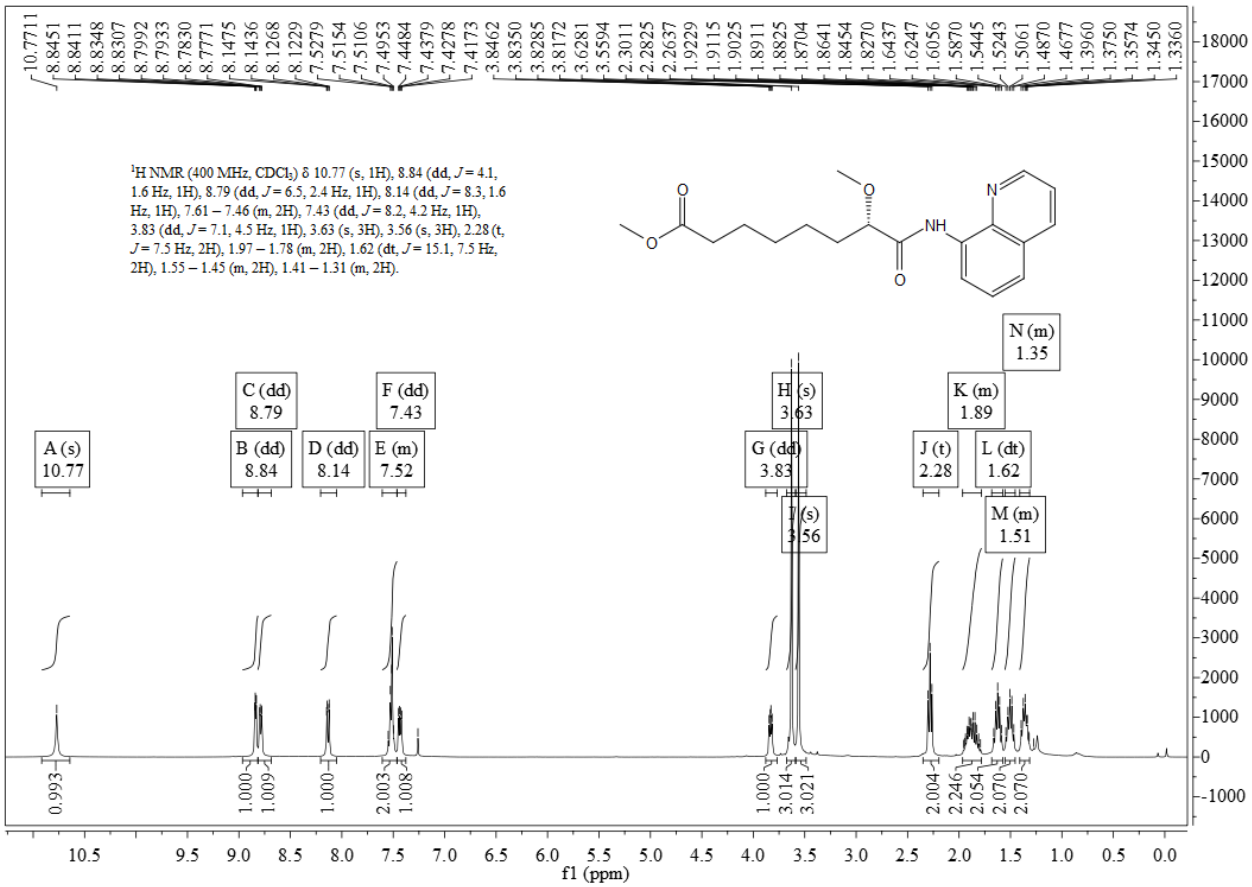
^{13}C NMR (101 MHz, $CDCl_3$) δ 171.34, 148.76, 139.04, 136.33, 134.02, 131.38, 128.63, 125.88, 123.14 (q, $J_{C,F}$ = 277.4 Hz), 128.16, 127.36, 122.11, 121.78, 116.70, 83.18, 58.90, 34.17, 33.88, 33.60, 33.32 (q, $J_{C,F}$ = 28.6 Hz), 32.59, 24.32, 21.93, 21.90, 21.87, 21.85 (q, $J_{C,F}$ = 2.8 Hz).

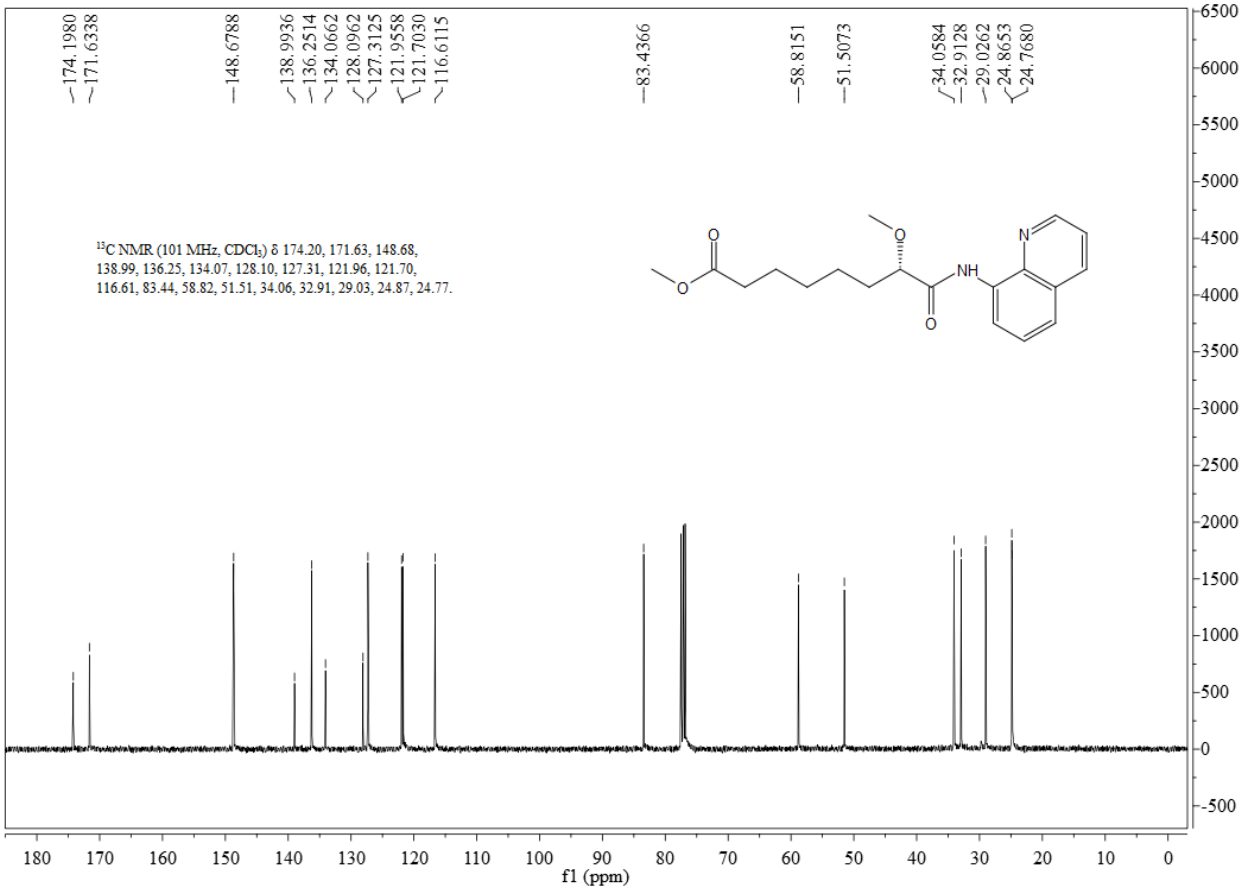


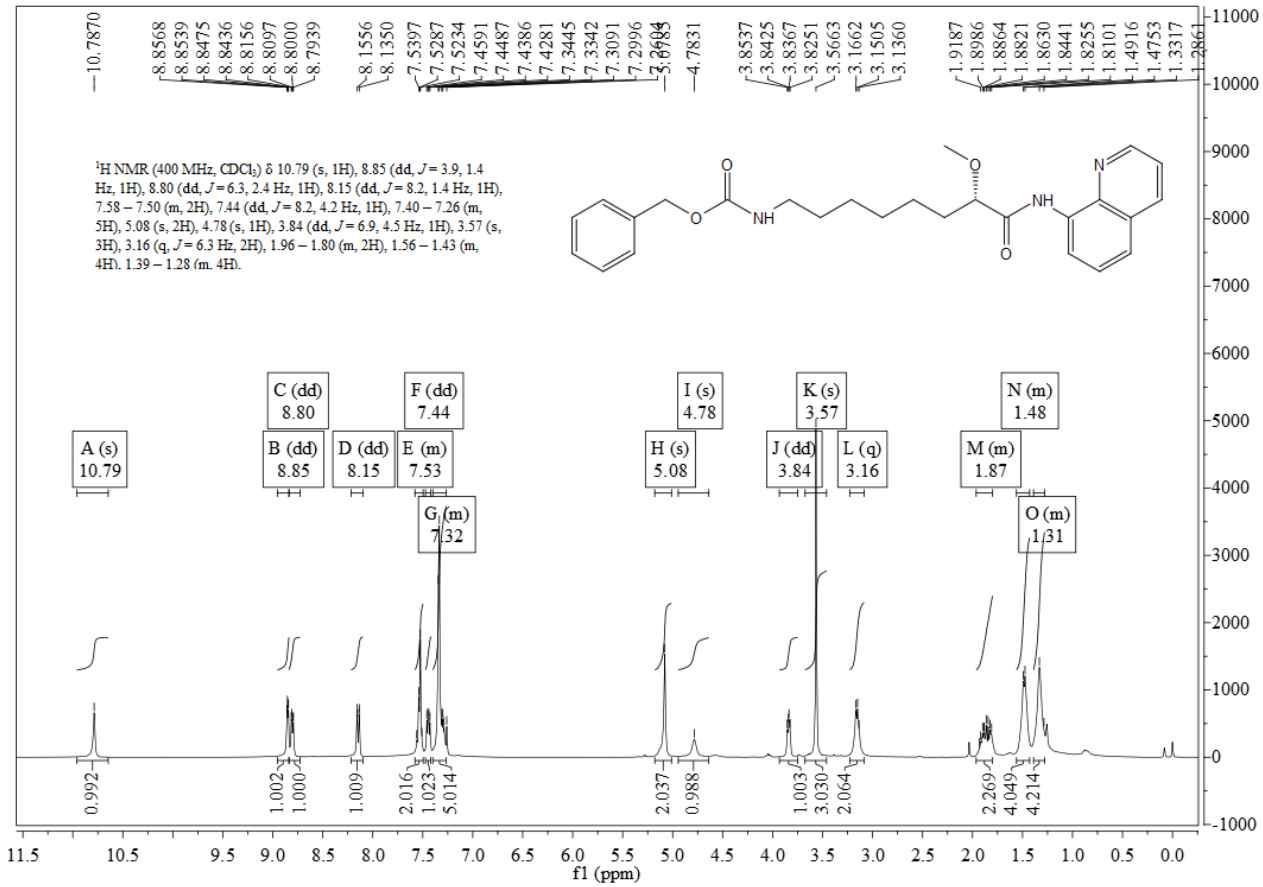
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.80 (dd, *J* = 6.5, 2.3 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.64 – 7.47 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.85 (dd, *J* = 7.1, 4.5 Hz, 1H), 3.57 (s, 3H), 3.50 (t, *J* = 6.7 Hz, 2H), 1.98 – 1.80 (m, 2H), 1.79 – 1.70 (m, 2H), 1.56 – 1.47 (m, 2H), 1.46 – 1.32 (m, 4H).

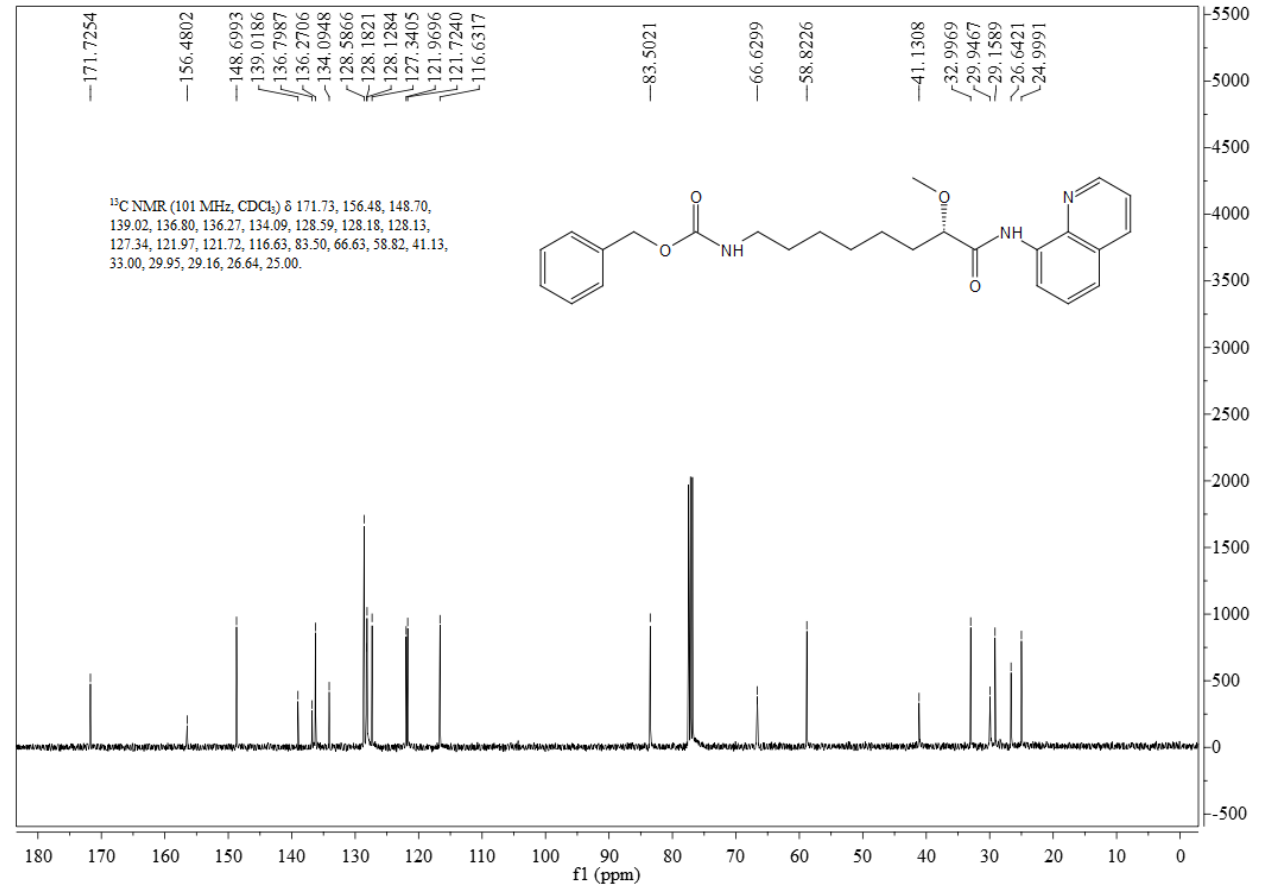


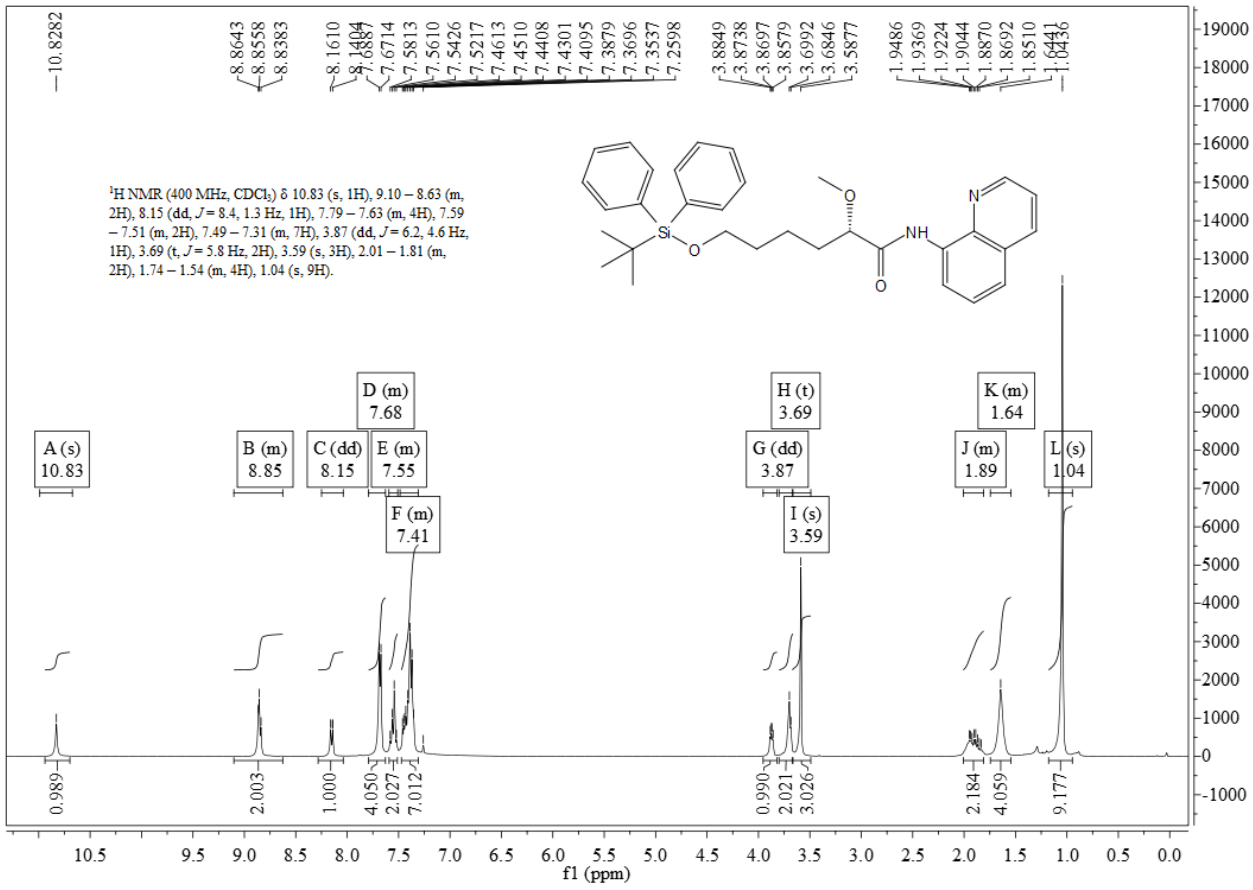
^{13}C NMR (101 MHz, $CDCl_3$) δ 171.68, 148.70, 139.02, 136.27, 134.09, 128.12, 127.34, 121.98, 121.73, 116.63, 83.50, 58.84, 45.14, 33.01, 32.61, 28.81, 26.82, 24.96.

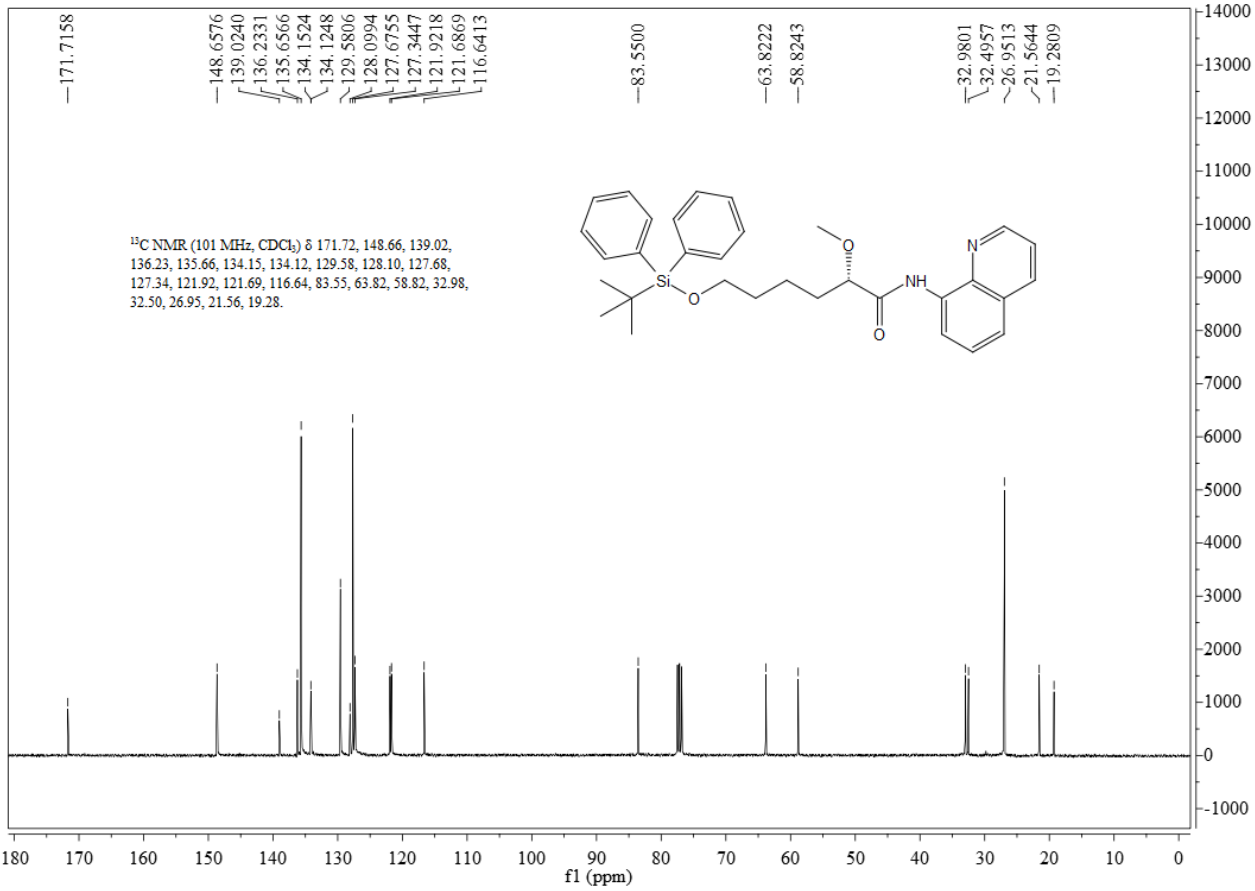

10.7711
8.8451
8.8411
8.8348
8.8307
8.7992
8.7933
8.7830
8.7771
8.1475
8.1436
8.1268
8.1229
7.5279
7.5154
7.5106
7.4953
7.4484
7.4379
7.4278
7.4173
3.8462
3.8350
3.8285
3.8172
3.6281
3.5594
3.3011
2.2825
2.2637
1.9229
1.9115
1.9025
1.8911
1.8825
1.8704
1.8641
1.8454
1.8270
1.6437
1.6247
1.6056
1.5870
1.5445
1.5243
1.5061
1.4870
1.4677
1.3960
1.3750
1.3574
1.3450
1.3360
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.77 (s, 1H), 8.84 (dd, J = 4.1, 1.6 Hz, 1H), 8.79 (dd, J = 6.5, 2.4 Hz, 1H), 8.14 (dd, J = 8.3, 1.6 Hz, 1H), 7.61 – 7.46 (m, 2H), 7.43 (dd, J = 8.2, 4.2 Hz, 1H), 3.83 (dd, J = 7.1, 4.5 Hz, 1H), 3.63 (s, 3H), 3.56 (s, 3H), 2.28 (t, J = 7.5 Hz, 2H), 1.97 – 1.78 (m, 2H), 1.62 (dt, J = 15.1, 7.5 Hz, 2H), 1.55 – 1.45 (m, 2H), 1.41 – 1.31 (m, 2H).
O
O
O
NH
N
A (s) 10.77
B (dd) 8.84
C (dd) 8.79
D (dd) 8.14
E (m) 7.52
F (dd) 7.43
G (dd) 3.83
H (s) 3.63
I (s) 3.56
J (t) 2.28
K (m) 1.89
L (dt) 1.62
M (m) 1.51
N (m) 1.35
0.993
1.000
1.009
1.000
2.003
1.008
1.000
3.014
3.021
2.004
2.246
2.054
2.070
2.070
f1 (ppm)

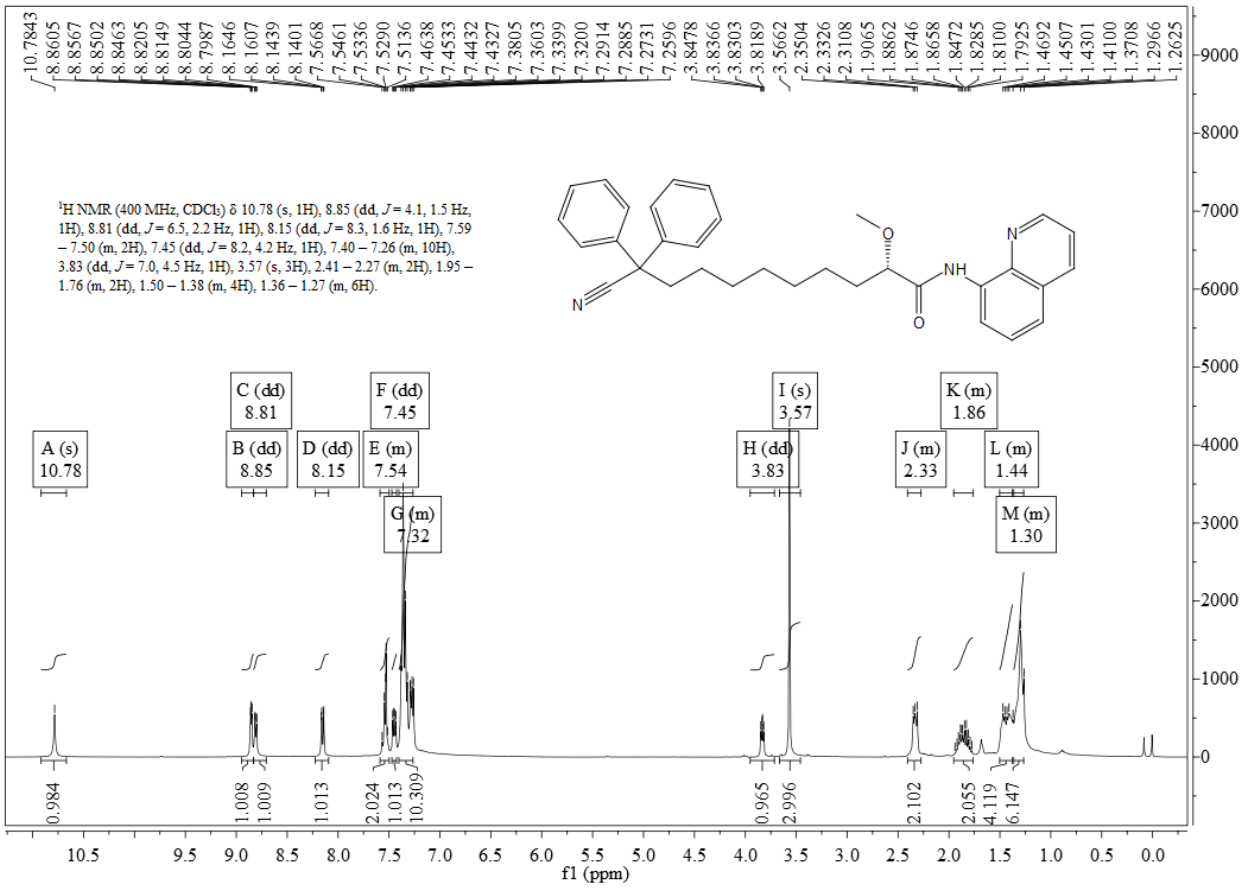

174.1980
171.6338
148.6788
138.9936
136.2514
134.0662
128.0962
127.3125
121.9558
121.7030
116.6115
83.4366
58.8151
51.5073
34.0584
32.9128
29.0262
24.8653
24.7680
^{13}C NMR (101 MHz, CDCl$_3$) δ 174.20, 171.63, 148.68, 138.99, 136.25, 134.07, 128.10, 127.31, 121.96, 121.70, 116.61, 83.44, 58.82, 51.51, 34.06, 32.91, 29.03, 24.87, 24.77.
O
O
O
NH
N
f1 (ppm)

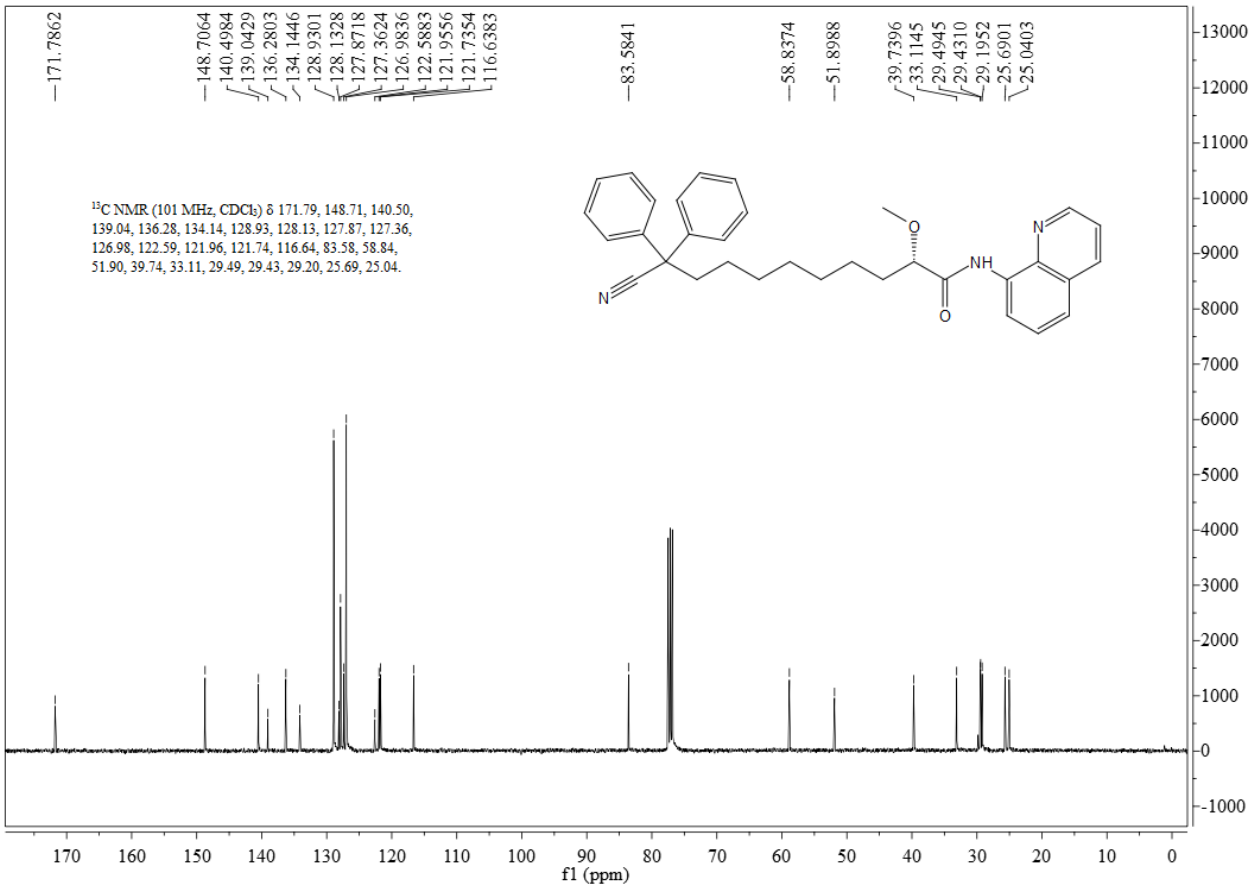

10.7870
8.8568
8.8539
8.8475
8.8436
8.8156
8.8097
8.8000
8.7939
8.1556
8.1350
7.5397
7.5287
7.5234
7.4591
7.4487
7.4386
7.4281
7.3445
7.3342
7.3091
7.2996
4.7831
3.8537
3.8425
3.8367
3.8251
3.5663
3.1662
3.1505
3.1360
1.9187
1.8986
1.8864
1.8821
1.8630
1.8441
1.8255
1.8101
1.4916
1.4753
1.3317
1.2861
1H NMR (400 MHz, CDCl3) δ 10.79 (s, 1H), 8.85 (dd, J = 3.9, 1.4 Hz, 1H), 8.80 (dd, J = 6.3, 2.4 Hz, 1H), 8.15 (dd, J = 8.2, 1.4 Hz, 1H), 7.58 – 7.50 (m, 2H), 7.44 (dd, J = 8.2, 4.2 Hz, 1H), 7.40 – 7.26 (m, 5H), 5.08 (s, 2H), 4.78 (s, 1H), 3.84 (dd, J = 6.9, 4.5 Hz, 1H), 3.57 (s, 3H), 3.16 (q, J = 6.3 Hz, 2H), 1.96 – 1.80 (m, 2H), 1.56 – 1.43 (m, 4H), 1.39 – 1.28 (m, 4H).
A (s) 10.79
B (dd) 8.85
C (dd) 8.80
D (dd) 8.15
E (m) 7.53
F (dd) 7.44
G (m) 7.32
H (s) 5.08
I (s) 4.78
J (dd) 3.84
K (s) 3.57
L (q) 3.16
M (m) 1.87
N (m) 1.48
O (m) 1.31
0.992
1.002
1.000
1.009
2.016
1.023
5.014
2.037
0.988
1.003
3.030
2.064
2.269
4.049
4.214
f1 (ppm)

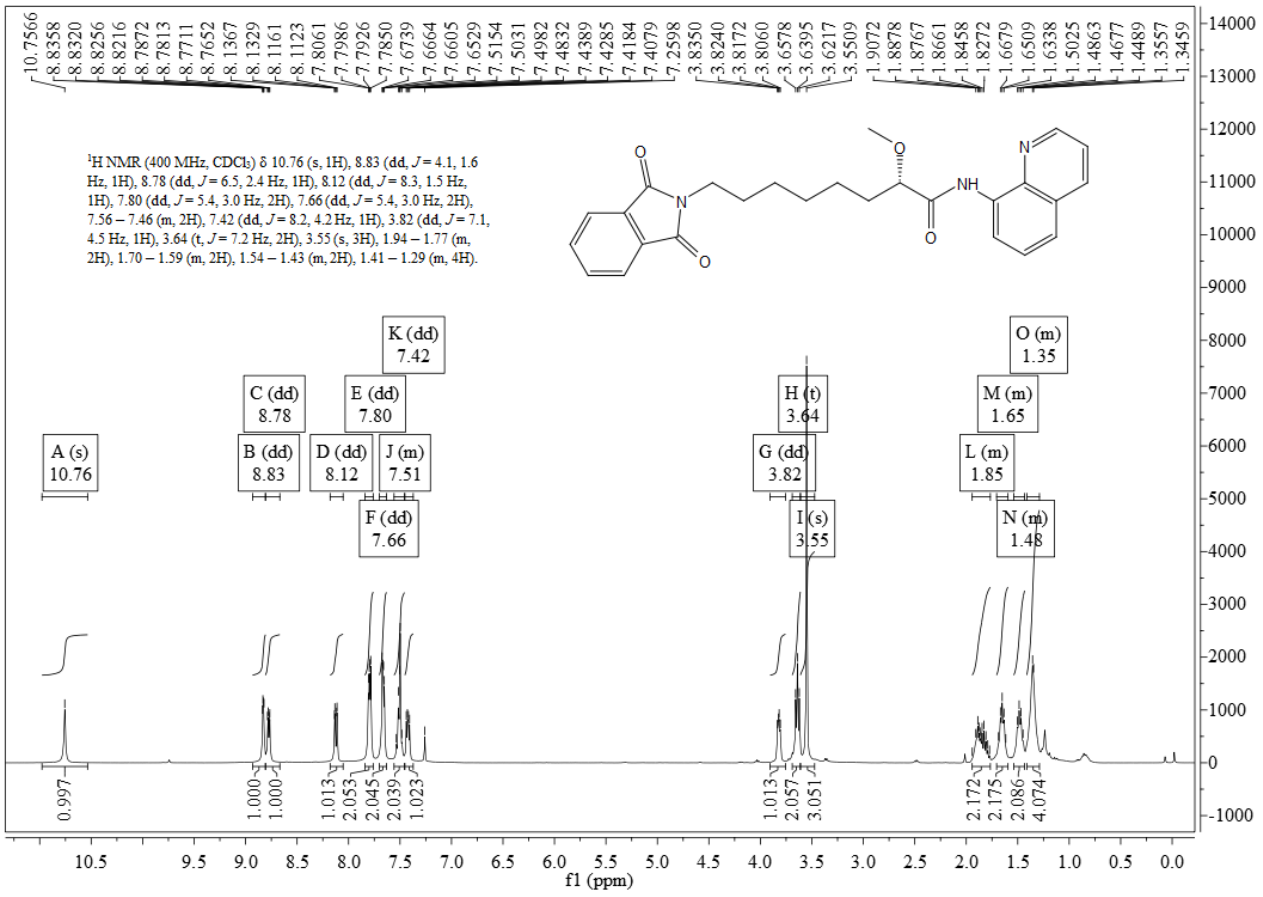

171.7254
156.4802
148.6993
139.0186
136.7987
136.2706
134.0948
128.5866
128.1821
128.1284
127.3405
121.9696
121.7240
116.6317
83.5021
66.6299
58.8226
41.1308
32.9969
29.9467
29.1589
26.6421
24.9991
13C NMR (101 MHz, CDCl3) δ 171.73, 156.48, 148.70, 139.02, 136.80, 136.27, 134.09, 128.59, 128.18, 128.13, 127.34, 121.97, 121.72, 116.63, 83.50, 66.63, 58.82, 41.13, 33.00, 29.95, 29.16, 26.64, 25.00.
f1 (ppm)


10.8282
8.8643
8.8558
8.8383
8.1610
8.1404
7.6887
7.6714
7.5813
7.5610
7.5426
7.5217
7.4613
7.4510
7.4408
7.4301
7.4095
7.3879
7.3696
7.3537
7.2598
3.8849
3.8738
3.8697
3.8579
3.6992
3.6846
3.5877
1.9486
1.9369
1.9224
1.9044
1.8870
1.8692
1.8510
1.6441
1.0436
[1]H NMR (400 MHz, CDCl3) δ 10.83 (s, 1H), 9.10 – 8.63 (m, 2H), 8.15 (dd, J = 8.4, 1.3 Hz, 1H), 7.79 – 7.63 (m, 4H), 7.59 – 7.51 (m, 2H), 7.49 – 7.31 (m, 7H), 3.87 (dd, J = 6.2, 4.6 Hz, 1H), 3.69 (t, J = 5.8 Hz, 2H), 3.59 (s, 3H), 2.01 – 1.81 (m, 2H), 1.74 – 1.54 (m, 4H), 1.04 (s, 9H).
A (s) 10.83
B (m) 8.85
C (dd) 8.15
D (m) 7.68
E (m) 7.55
F (m) 7.41
G (dd) 3.87
H (t) 3.69
I (s) 3.59
J (m) 1.89
K (m) 1.64
L (s) 1.04
0.989
2.003
1.000
4.050
2.027
7.012
0.990
2.021
3.026
2.184
4.059
9.177
f1 (ppm)

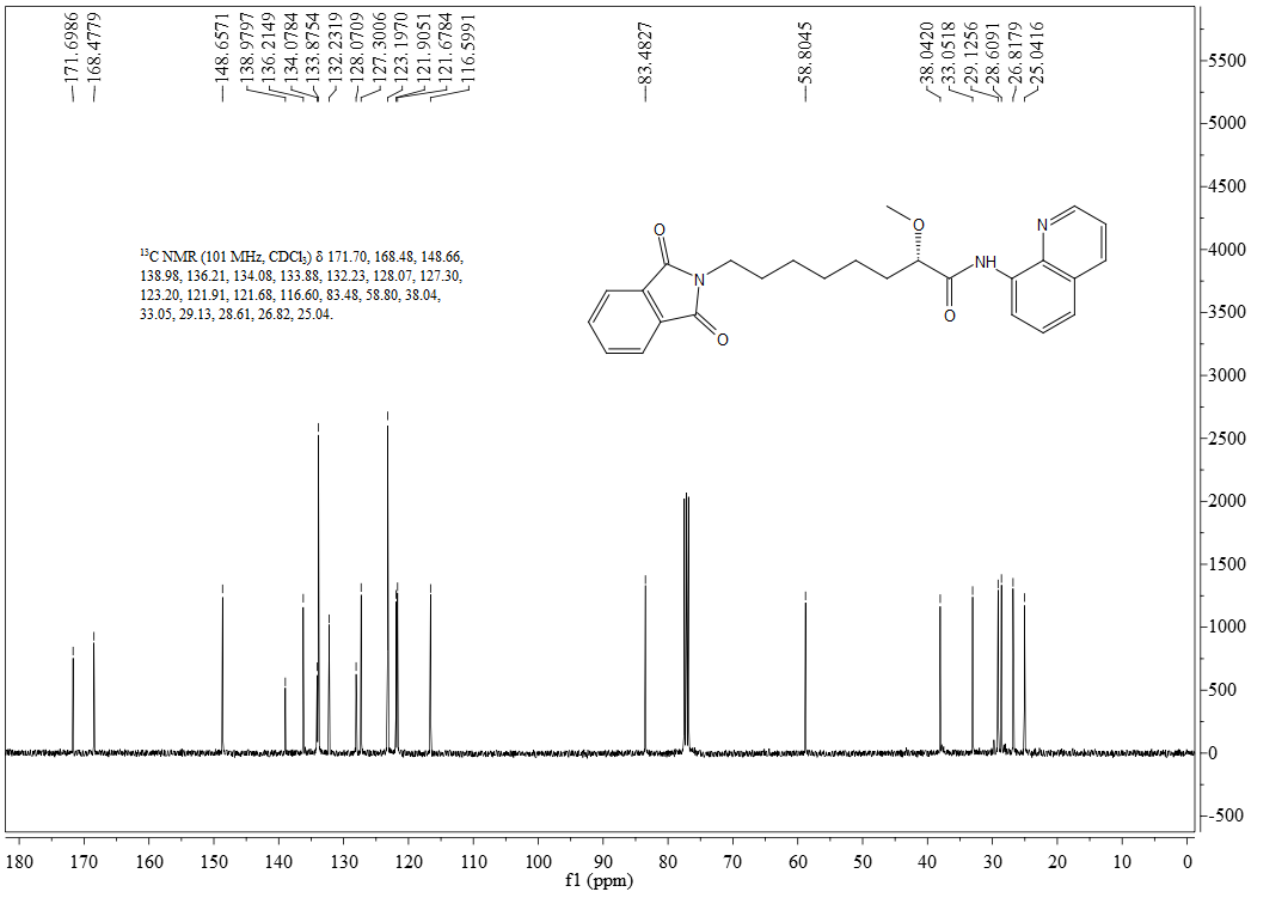

171.7158
148.6576
139.0240
136.2331
135.6566
134.1524
134.1248
129.5806
128.0994
127.6755
127.3447
121.9218
121.6869
116.6413
83.5500
63.8222
58.8243
32.9801
32.4957
26.9513
21.5644
19.2809
[13]C NMR (101 MHz, CDCl3) δ 171.72, 148.66, 139.02, 136.23, 135.66, 134.15, 134.12, 129.58, 128.10, 127.68, 127.34, 121.92, 121.69, 116.64, 83.55, 63.82, 58.82, 32.98, 32.50, 26.95, 21.56, 19.28.
f1 (ppm)


10.7843
8.8605
8.8567
8.8502
8.8463
8.8205
8.8149
8.8044
8.7987
8.1646
8.1607
8.1439
8.1401
7.5668
7.5461
7.5336
7.5290
7.5136
7.4638
7.4533
7.4432
7.4327
7.3805
7.3603
7.3399
7.3200
7.2914
7.2885
7.2731
7.2596
3.8478
3.8366
3.8303
3.8189
3.5662
2.3504
2.3326
2.3108
1.9065
1.8862
1.8746
1.8658
1.8472
1.8285
1.8100
1.7925
1.4692
1.4507
1.4301
1.4100
1.3708
1.2966
1.2625
¹H NMR (400 MHz, CDCl₃) δ 10.78 (s, 1H), 8.85 (dd, J = 4.1, 1.5 Hz, 1H), 8.81 (dd, J = 6.5, 2.2 Hz, 1H), 8.15 (dd, J = 8.3, 1.6 Hz, 1H), 7.59 – 7.50 (m, 2H), 7.45 (dd, J = 8.2, 4.2 Hz, 1H), 7.40 – 7.26 (m, 10H), 3.83 (dd, J = 7.0, 4.5 Hz, 1H), 3.57 (s, 3H), 2.41 – 2.27 (m, 2H), 1.95 – 1.76 (m, 2H), 1.50 – 1.38 (m, 4H), 1.36 – 1.27 (m, 6H).
A (s) 10.78
B (dd) 8.85
C (dd) 8.81
D (dd) 8.15
E (m) 7.54
F (dd) 7.45
G (m) 7.32
H (dd) 3.83
I (s) 3.57
J (m) 2.33
K (m) 1.86
L (m) 1.44
M (m) 1.30
0.984
1.008
1.009
1.013
2.024
1.013
10.309
0.965
2.996
2.102
2.055
4.119
6.147
f1 (ppm)

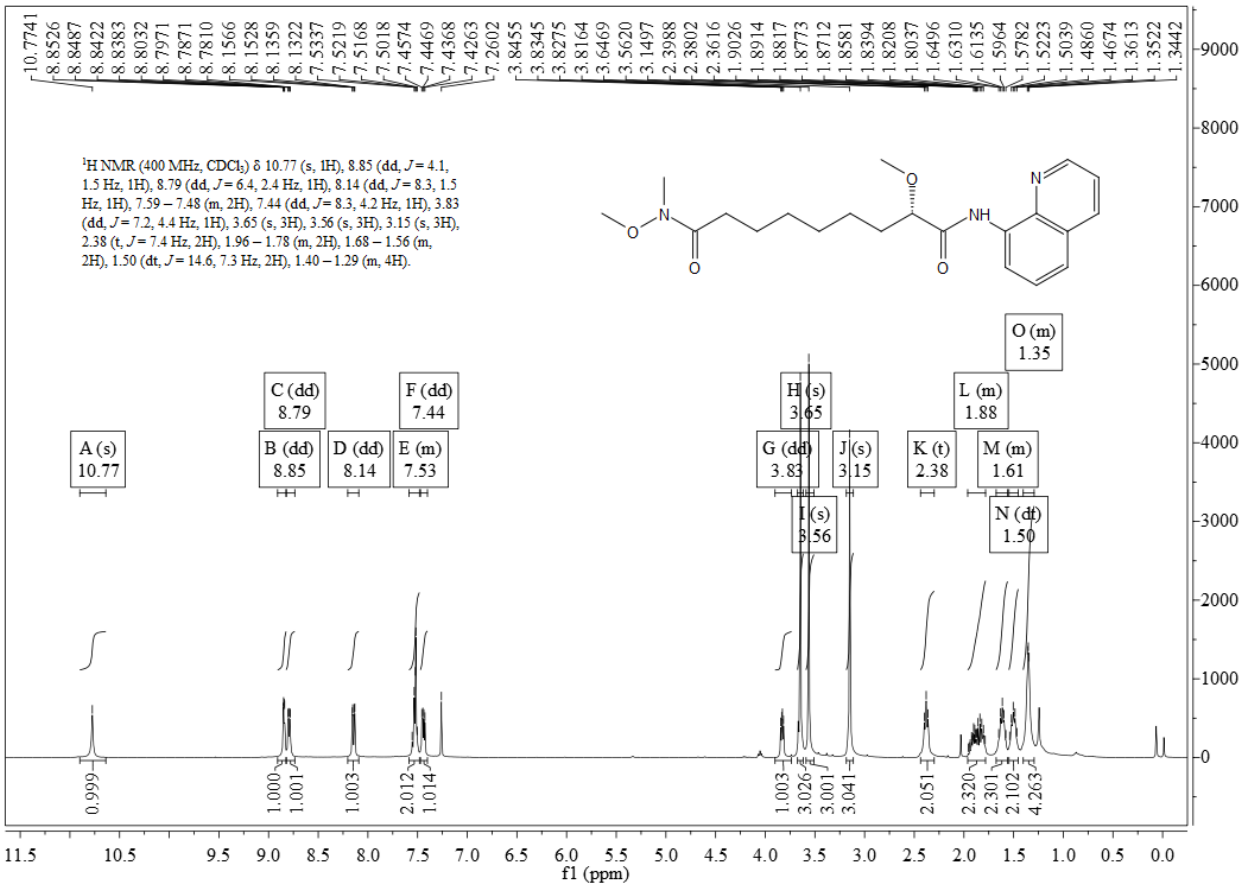

171.7862
148.7064
140.4984
139.0429
136.2803
134.1446
128.9301
128.1328
127.8718
127.3624
126.9836
122.5883
121.9556
121.7354
116.6383
83.5841
58.8374
51.8988
39.7396
33.1145
29.4945
29.4310
29.1952
25.6901
25.0403
¹³C NMR (101 MHz, CDCl₃) δ 171.79, 148.71, 140.50, 139.04, 136.28, 134.14, 128.93, 128.13, 127.87, 127.36, 126.98, 122.59, 121.96, 121.74, 116.64, 83.58, 58.84, 51.90, 39.74, 33.11, 29.49, 29.43, 29.20, 25.69, 25.04.
f1 (ppm)

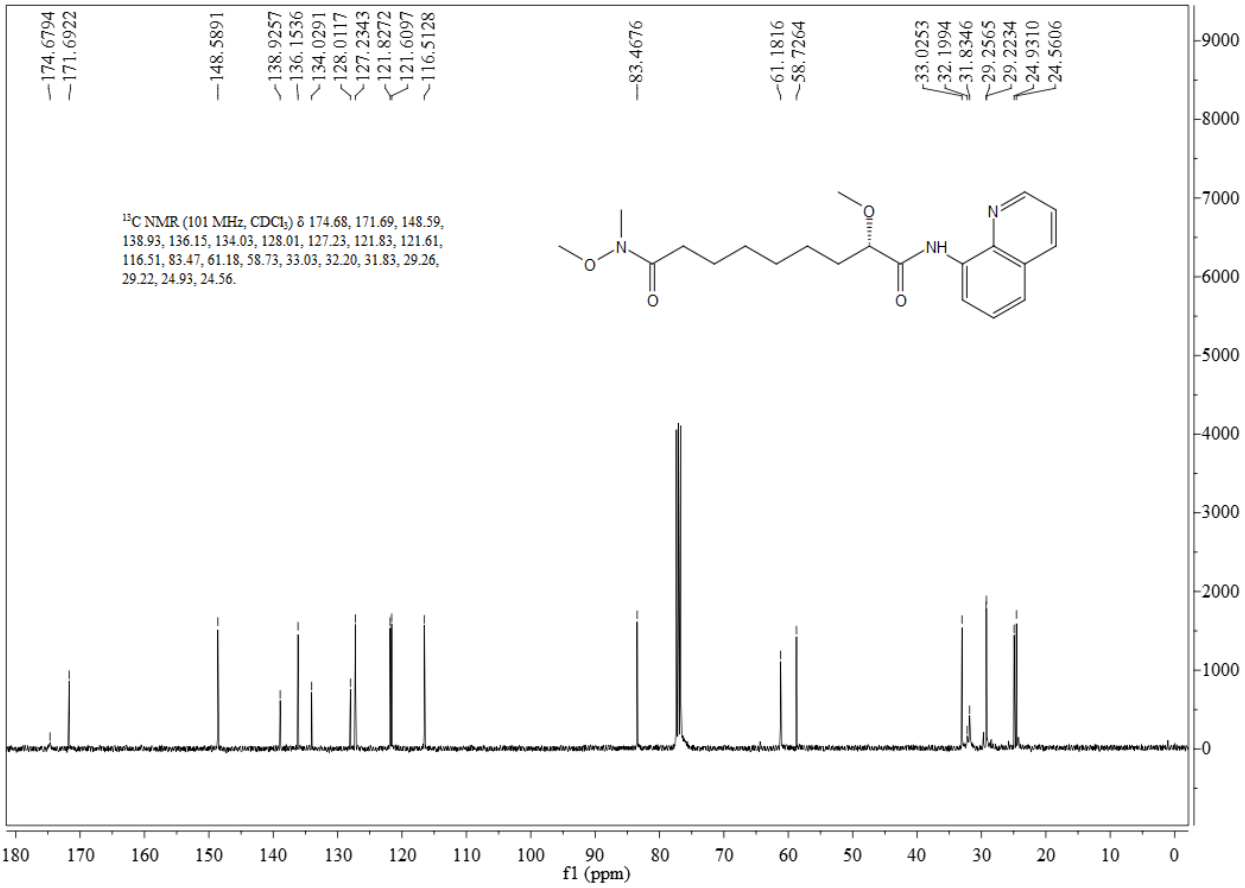


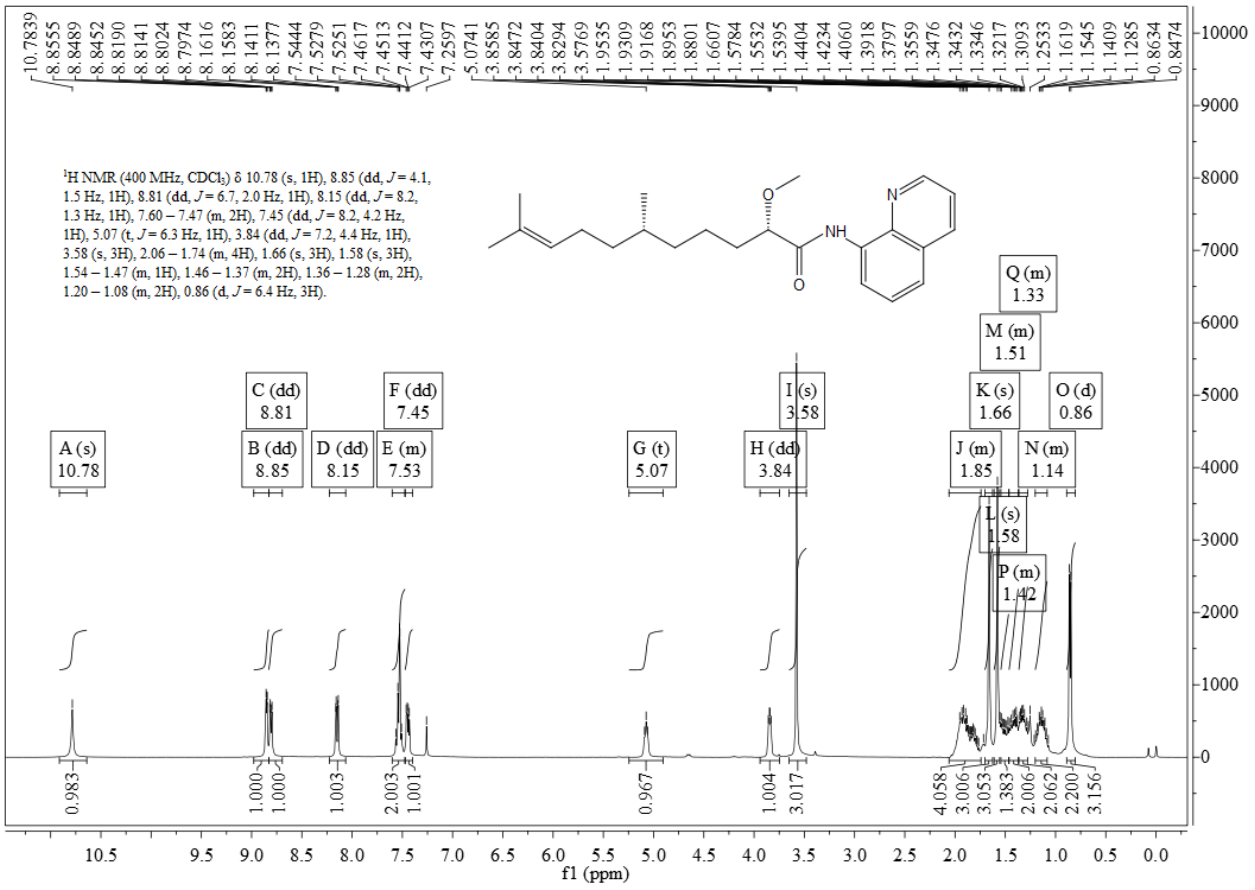
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.76 (s, 1H), 8.83 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.78 (dd, *J* = 6.5, 2.4 Hz, 1H), 8.12 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.80 (dd, *J* = 5.4, 3.0 Hz, 2H), 7.66 (dd, *J* = 5.4, 3.0 Hz, 2H), 7.56 – 7.46 (m, 2H), 7.42 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.82 (dd, *J* = 7.1, 4.5 Hz, 1H), 3.64 (t, *J* = 7.2 Hz, 2H), 3.55 (s, 3H), 1.94 – 1.77 (m, 2H), 1.70 – 1.59 (m, 2H), 1.54 – 1.43 (m, 2H), 1.41 – 1.29 (m, 4H).

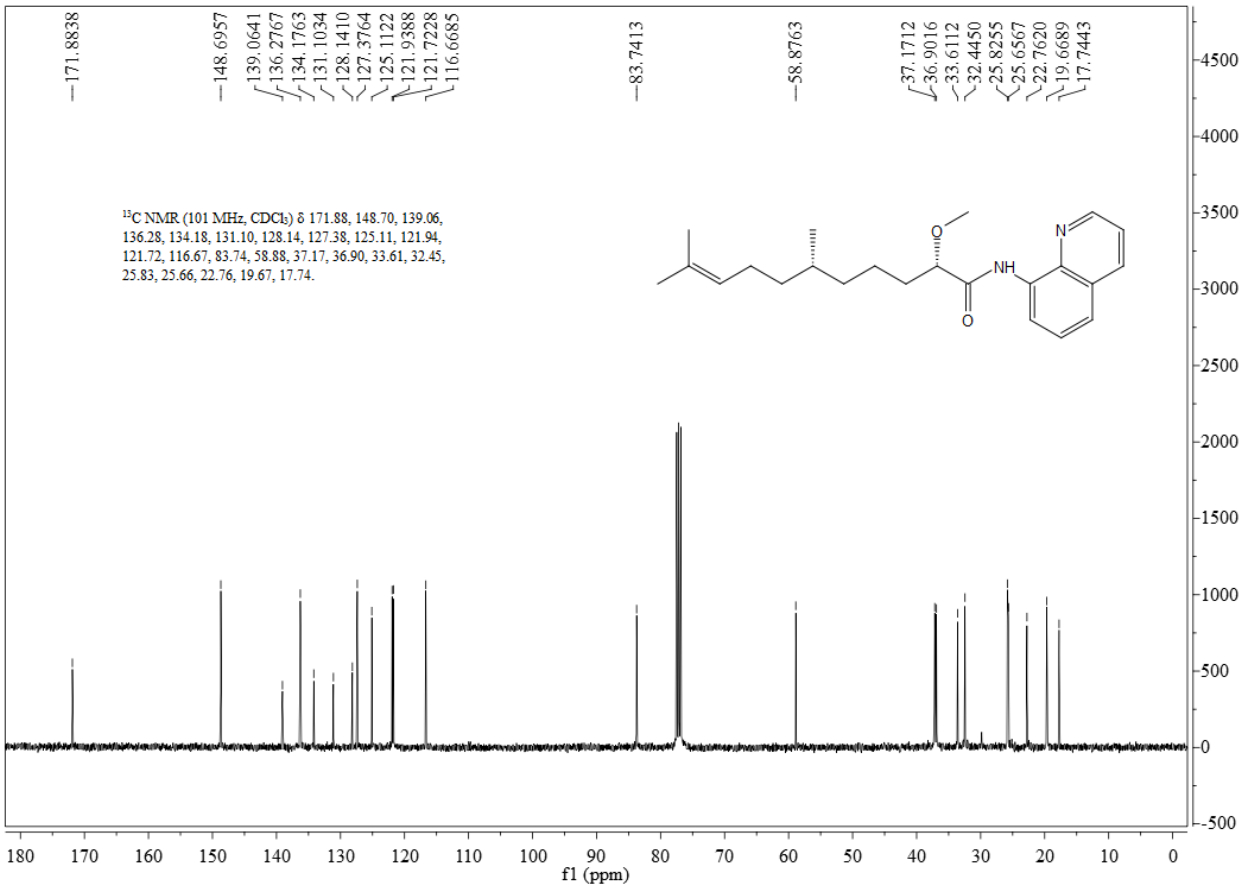


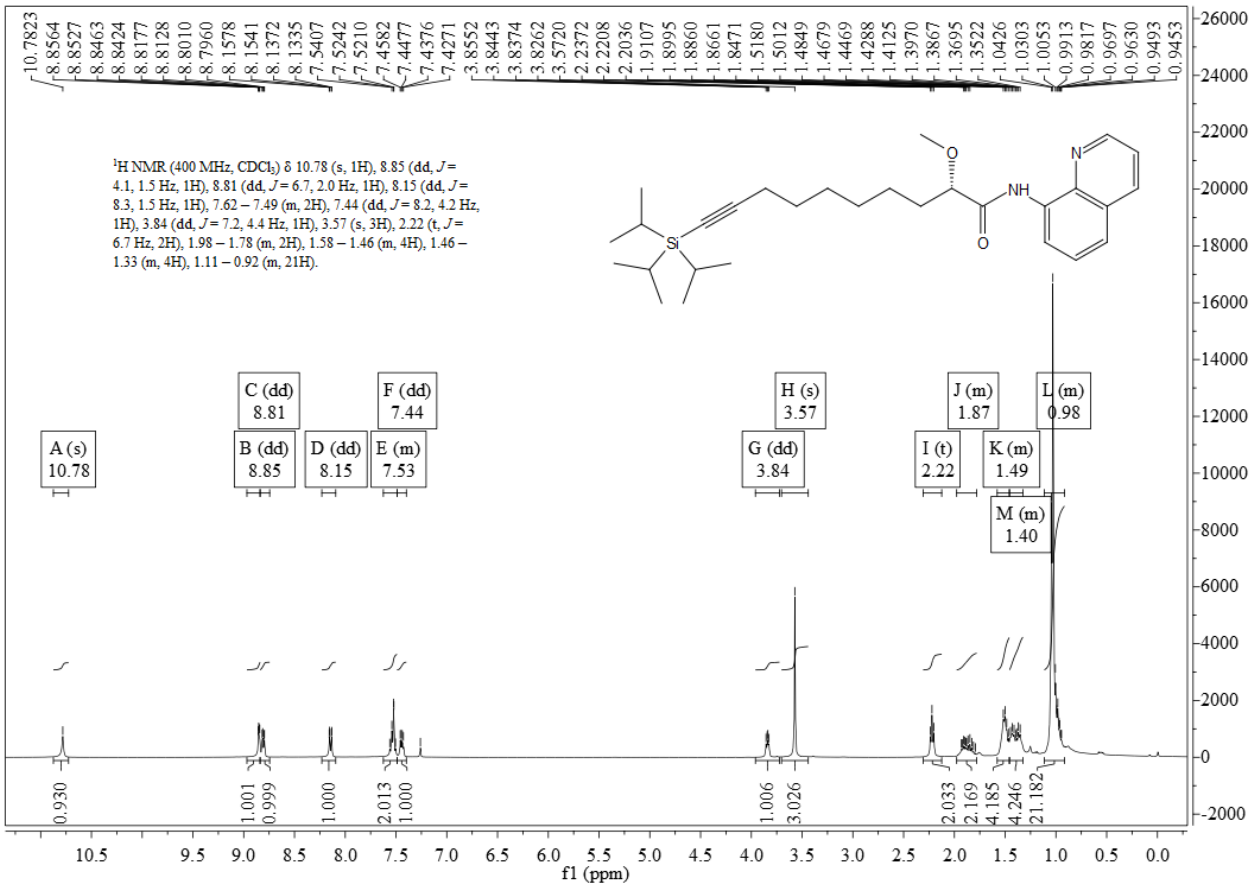
^{13}C NMR (101 MHz, $CDCl_3$) δ 171.70, 168.48, 148.66, 138.98, 136.21, 134.08, 133.88, 132.23, 128.07, 127.30, 123.20, 121.91, 121.68, 116.60, 83.48, 58.80, 38.04, 33.05, 29.13, 28.61, 26.82, 25.04.

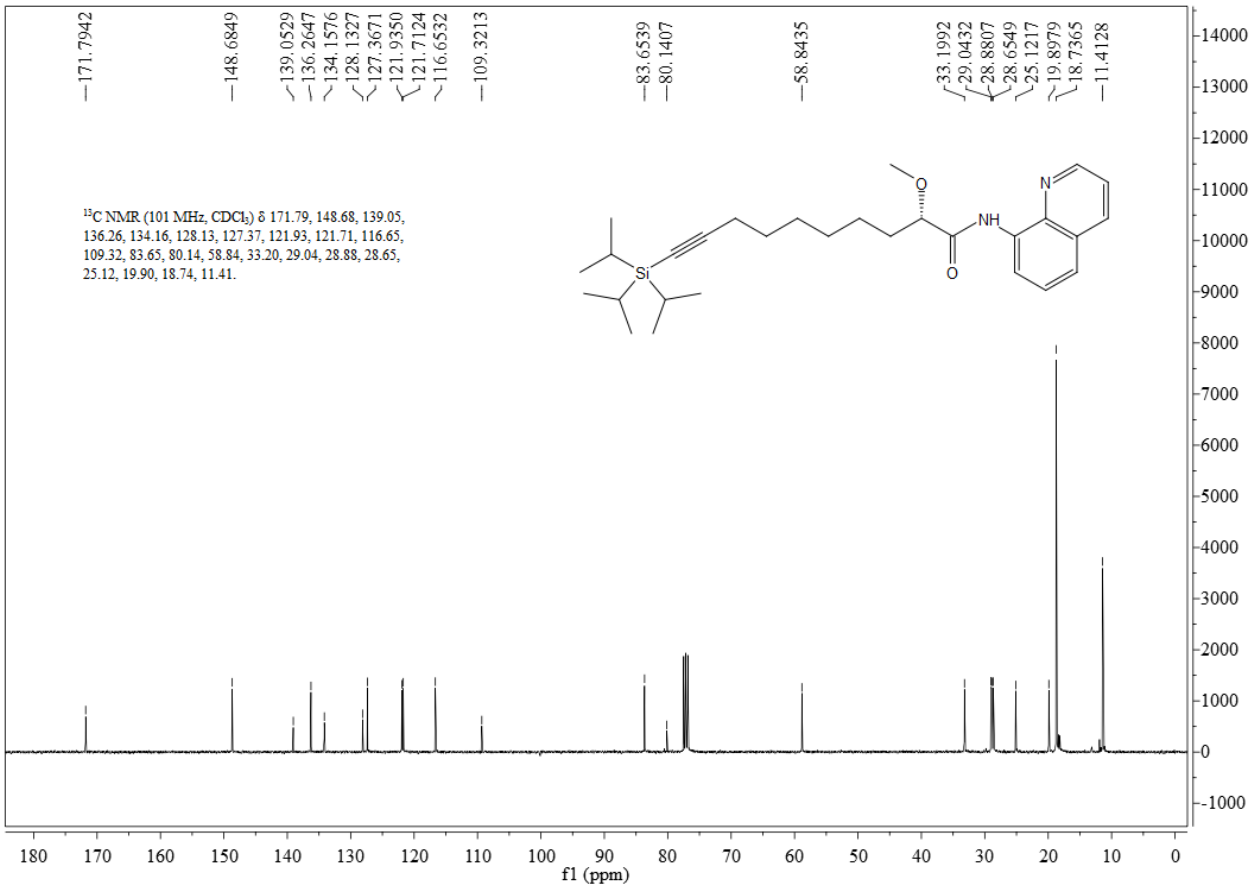

10.7741
8.8526
8.8487
8.8422
8.8383
8.8032
8.7971
8.7871
8.7810
8.1566
8.1528
8.1359
8.1322
7.5337
7.5219
7.5168
7.5018
7.4574
7.4469
7.4368
7.4263
7.2602
3.8455
3.8345
3.8275
3.8164
3.6469
3.5620
3.1497
2.3988
2.3802
2.3616
1.9026
1.8914
1.8817
1.8773
1.8712
1.8581
1.8394
1.8208
1.8037
1.6496
1.6310
1.6135
1.5964
1.5782
1.5223
1.5039
1.4860
1.4674
1.3613
1.3522
1.3442
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.77 (s, 1H), 8.85 (dd, J = 4.1, 1.5 Hz, 1H), 8.79 (dd, J = 6.4, 2.4 Hz, 1H), 8.14 (dd, J = 8.3, 1.5 Hz, 1H), 7.59 – 7.48 (m, 2H), 7.44 (dd, J = 8.3, 4.2 Hz, 1H), 3.83 (dd, J = 7.2, 4.4 Hz, 1H), 3.65 (s, 3H), 3.56 (s, 3H), 3.15 (s, 3H), 2.38 (t, J = 7.4 Hz, 2H), 1.96 – 1.78 (m, 2H), 1.68 – 1.56 (m, 2H), 1.50 (dt, J = 14.6, 7.3 Hz, 2H), 1.40 – 1.29 (m, 4H).
A (s) 10.77
B (dd) 8.85
C (dd) 8.79
D (dd) 8.14
E (m) 7.53
F (dd) 7.44
G (dd) 3.83
H (s) 3.65
I (s) 3.56
J (s) 3.15
K (t) 2.38
L (m) 1.88
M (m) 1.61
N (dt) 1.50
O (m) 1.35
0.999
1.000
1.001
1.003
2.012
1.014
1.003
3.026
3.001
3.041
2.051
2.320
2.301
2.102
4.263
f1 (ppm)

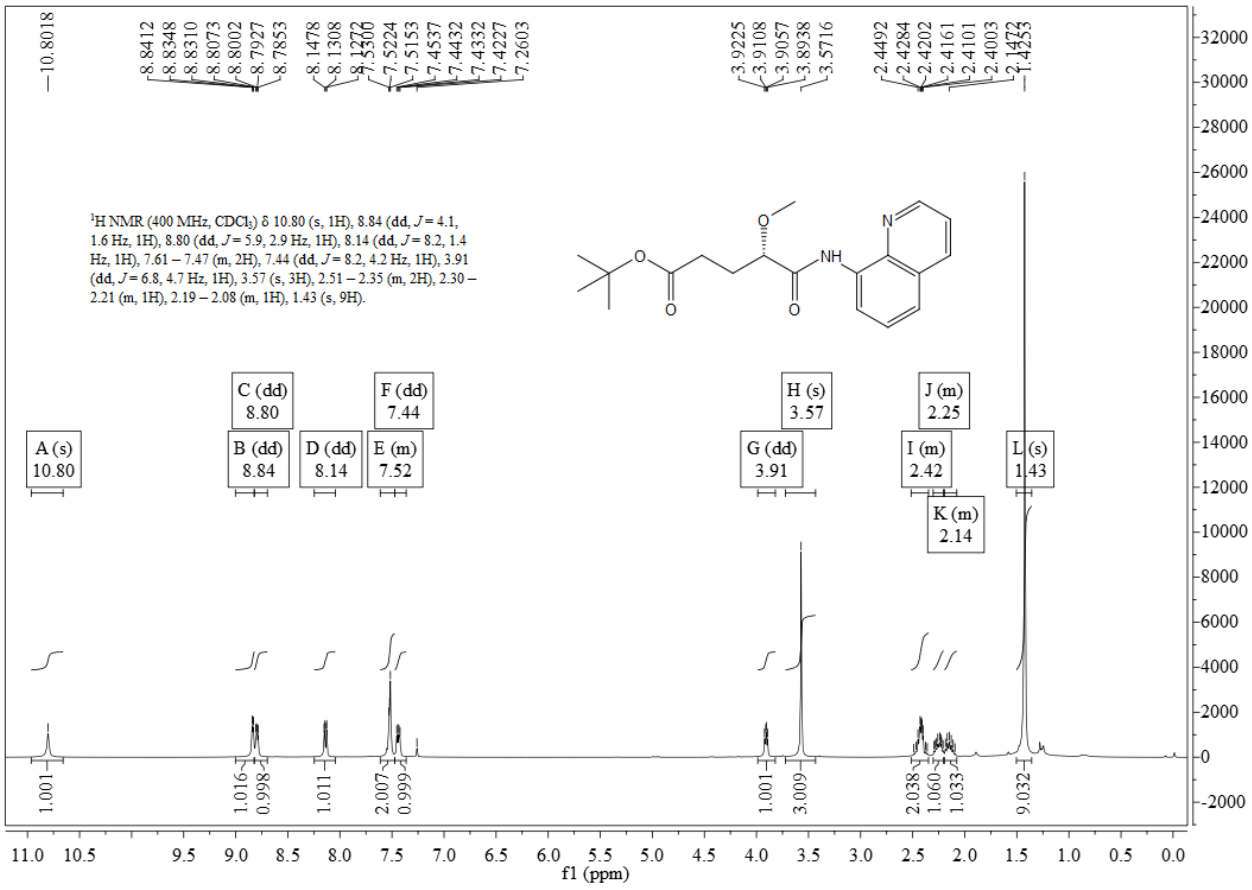

174.6794
171.6922
148.5891
138.9257
136.1536
134.0291
128.0117
127.2343
121.8272
121.6097
116.5128
83.4676
61.1816
58.7264
33.0253
32.1994
31.8346
29.2565
29.2234
24.9310
24.5606
^{13}C NMR (101 MHz, CDCl$_3$) δ 174.68, 171.69, 148.59, 138.93, 136.15, 134.03, 128.01, 127.23, 121.83, 121.61, 116.51, 83.47, 61.18, 58.73, 33.03, 32.20, 31.83, 29.26, 29.22, 24.93, 24.56.
f1 (ppm)


10.7839
8.8555
8.8489
8.8452
8.8190
8.8141
8.8024
8.7974
8.1616
8.1583
8.1411
8.1377
7.5444
7.5279
7.5251
7.4617
7.4513
7.4412
7.4307
7.2597
5.0741
3.8585
3.8472
3.8404
3.8294
3.5769
1.9535
1.9309
1.9168
1.8953
1.8801
1.6607
1.5784
1.5532
1.5395
1.4404
1.4234
1.4060
1.3918
1.3797
1.3559
1.3476
1.3432
1.3346
1.3217
1.3093
1.2533
1.1619
1.1545
1.1409
1.1285
0.8634
0.8474
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.78 (s, 1H), 8.85 (dd, J = 4.1, 1.5 Hz, 1H), 8.81 (dd, J = 6.7, 2.0 Hz, 1H), 8.15 (dd, J = 8.2, 1.3 Hz, 1H), 7.60 – 7.47 (m, 2H), 7.45 (dd, J = 8.2, 4.2 Hz, 1H), 5.07 (t, J = 6.3 Hz, 1H), 3.84 (dd, J = 7.2, 4.4 Hz, 1H), 3.58 (s, 3H), 2.06 – 1.74 (m, 4H), 1.66 (s, 3H), 1.58 (s, 3H), 1.54 – 1.47 (m, 1H), 1.46 – 1.37 (m, 2H), 1.36 – 1.28 (m, 2H), 1.20 – 1.08 (m, 2H), 0.86 (d, J = 6.4 Hz, 3H).
O
NH
N
O
A (s) 10.78
B (dd) 8.85
C (dd) 8.81
D (dd) 8.15
E (m) 7.53
F (dd) 7.45
G (t) 5.07
H (dd) 3.84
I (s) 3.58
J (m) 1.85
K (s) 1.66
L (s) 1.58
M (m) 1.51
N (m) 1.14
O (d) 0.86
P (m) 1.42
Q (m) 1.33
0.983
1.000
1.000
1.003
2.003
1.001
0.967
1.004
3.017
4.058
3.006
3.053
1.383
2.006
2.062
2.200
3.156
f1 (ppm)

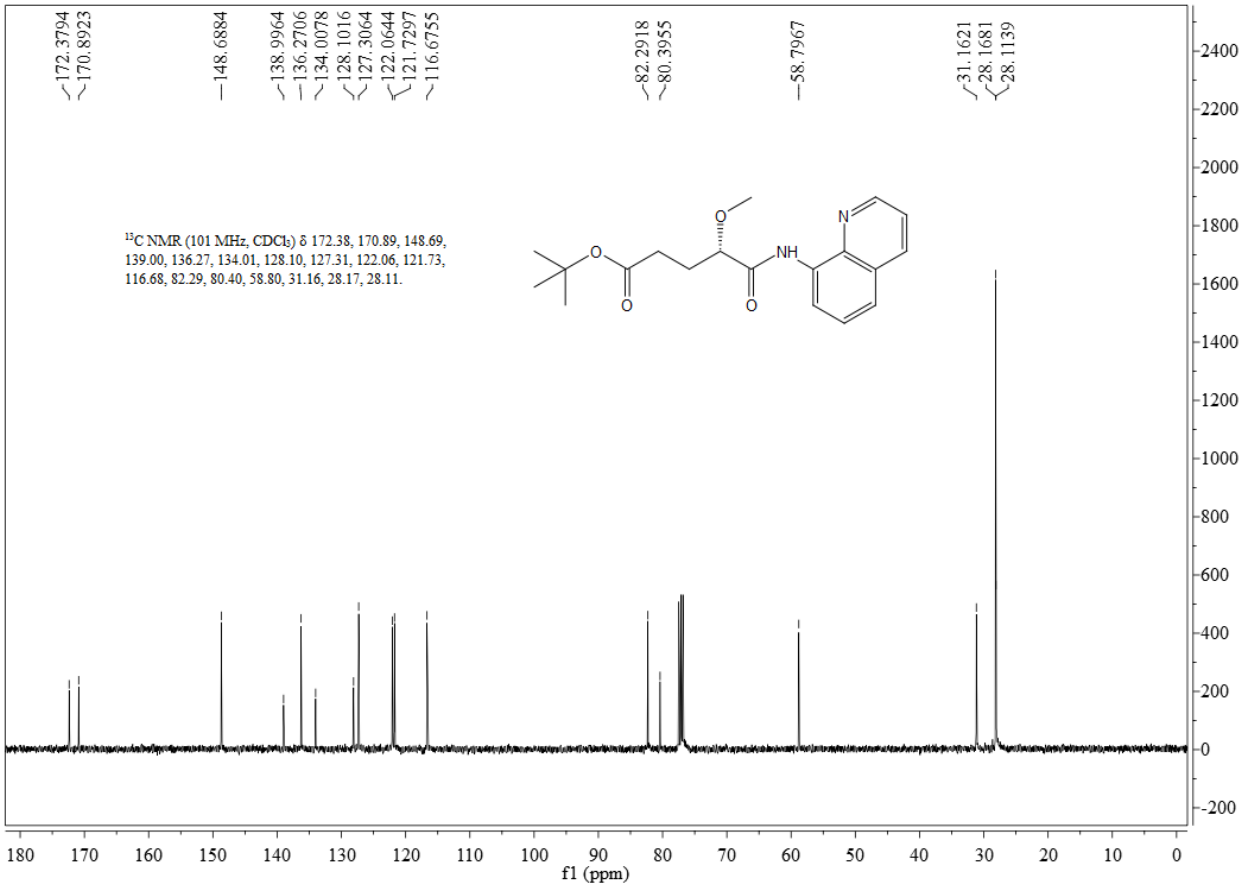

171.8838
148.6957
139.0641
136.2767
134.1763
131.1034
128.1410
127.3764
125.1122
121.9388
121.7228
116.6685
83.7413
58.8763
37.1712
36.9016
33.6112
32.4450
25.8255
25.6567
22.7620
19.6689
17.7443
^{13}C NMR (101 MHz, CDCl$_3$) δ 171.88, 148.70, 139.06, 136.28, 134.18, 131.10, 128.14, 127.38, 125.11, 121.94, 121.72, 116.67, 83.74, 58.88, 37.17, 36.90, 33.61, 32.45, 25.83, 25.66, 22.76, 19.67, 17.74.
O
NH
N
O
f1 (ppm)


10.7823
8.8564
8.8527
8.8463
8.8424
8.8177
8.8128
8.8010
8.7960
8.1578
8.1541
8.1372
8.1335
7.5407
7.5242
7.5210
7.4582
7.4477
7.4376
7.4271
3.8552
3.8443
3.8374
3.8262
3.5720
2.2372
2.2208
2.2036
1.9107
1.8995
1.8860
1.8661
1.8471
1.5180
1.5012
1.4849
1.4679
1.4469
1.4288
1.4125
1.3970
1.3867
1.3695
1.3522
1.0426
1.0303
1.0053
0.9913
0.9817
0.9697
0.9630
0.9493
0.9453
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.78 (s, 1H), 8.85 (dd, J = 4.1, 1.5 Hz, 1H), 8.81 (dd, J = 6.7, 2.0 Hz, 1H), 8.15 (dd, J = 8.3, 1.5 Hz, 1H), 7.62 – 7.49 (m, 2H), 7.44 (dd, J = 8.2, 4.2 Hz, 1H), 3.84 (dd, J = 7.2, 4.4 Hz, 1H), 3.57 (s, 3H), 2.22 (t, J = 6.7 Hz, 2H), 1.98 – 1.78 (m, 2H), 1.58 – 1.46 (m, 4H), 1.46 – 1.33 (m, 4H), 1.11 – 0.92 (m, 21H).
A (s) 10.78
B (dd) 8.85
C (dd) 8.81
D (dd) 8.15
E (m) 7.53
F (dd) 7.44
G (dd) 3.84
H (s) 3.57
I (t) 2.22
J (m) 1.87
K (m) 1.49
L (m) 0.98
M (m) 1.40
0.930
1.001
0.999
1.000
2.013
1.000
1.006
3.026
2.033
2.169
4.185
4.246
21.182
f1 (ppm)

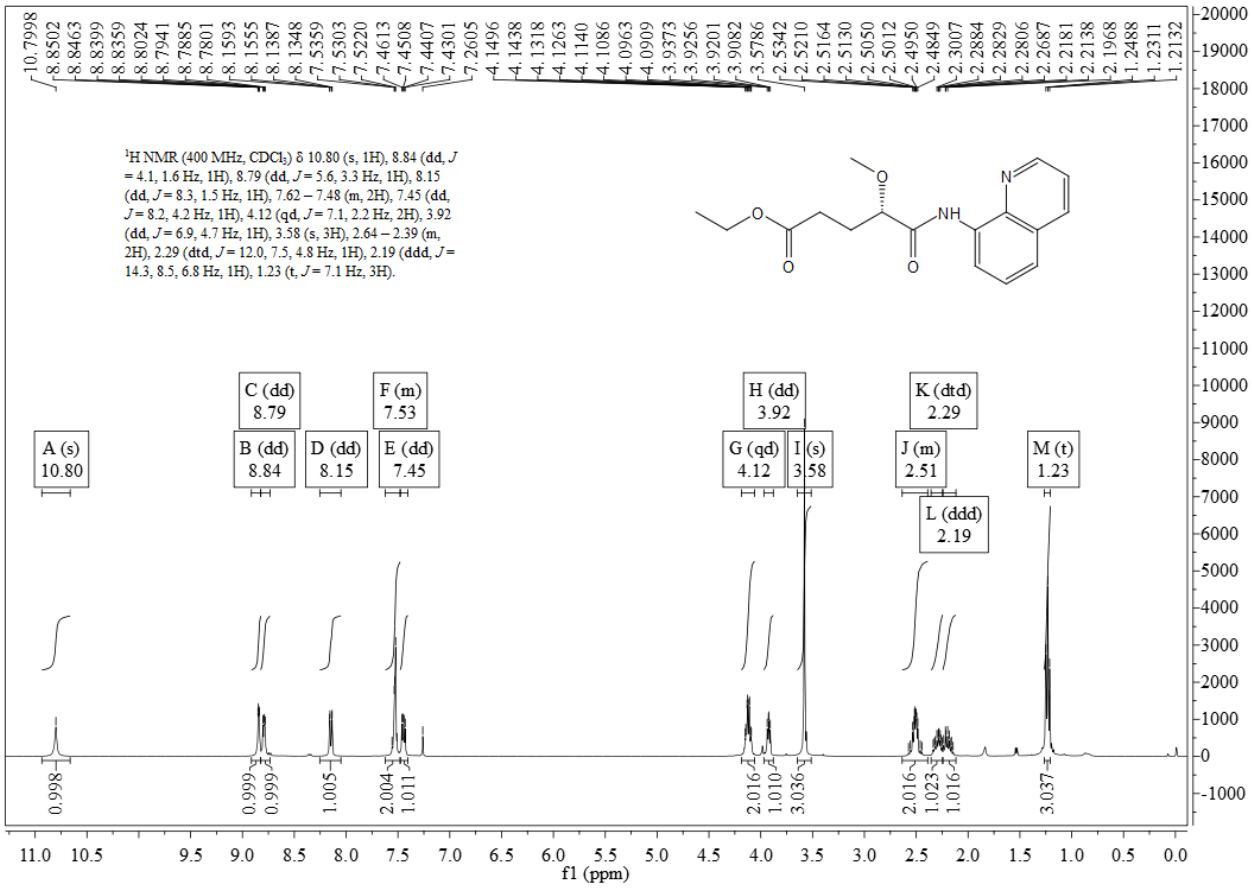

171.7942
148.6849
139.0529
136.2647
134.1576
128.1327
127.3671
121.9350
121.7124
116.6532
109.3213
83.6539
80.1407
58.8435
33.1992
29.0432
28.8807
28.6549
25.1217
19.8979
18.7365
11.4128
^{13}C NMR (101 MHz, CDCl$_3$) δ 171.79, 148.68, 139.05, 136.26, 134.16, 128.13, 127.37, 121.93, 121.71, 116.65, 109.32, 83.65, 80.14, 58.84, 33.20, 29.04, 28.88, 28.65, 25.12, 19.90, 18.74, 11.41.
f1 (ppm)

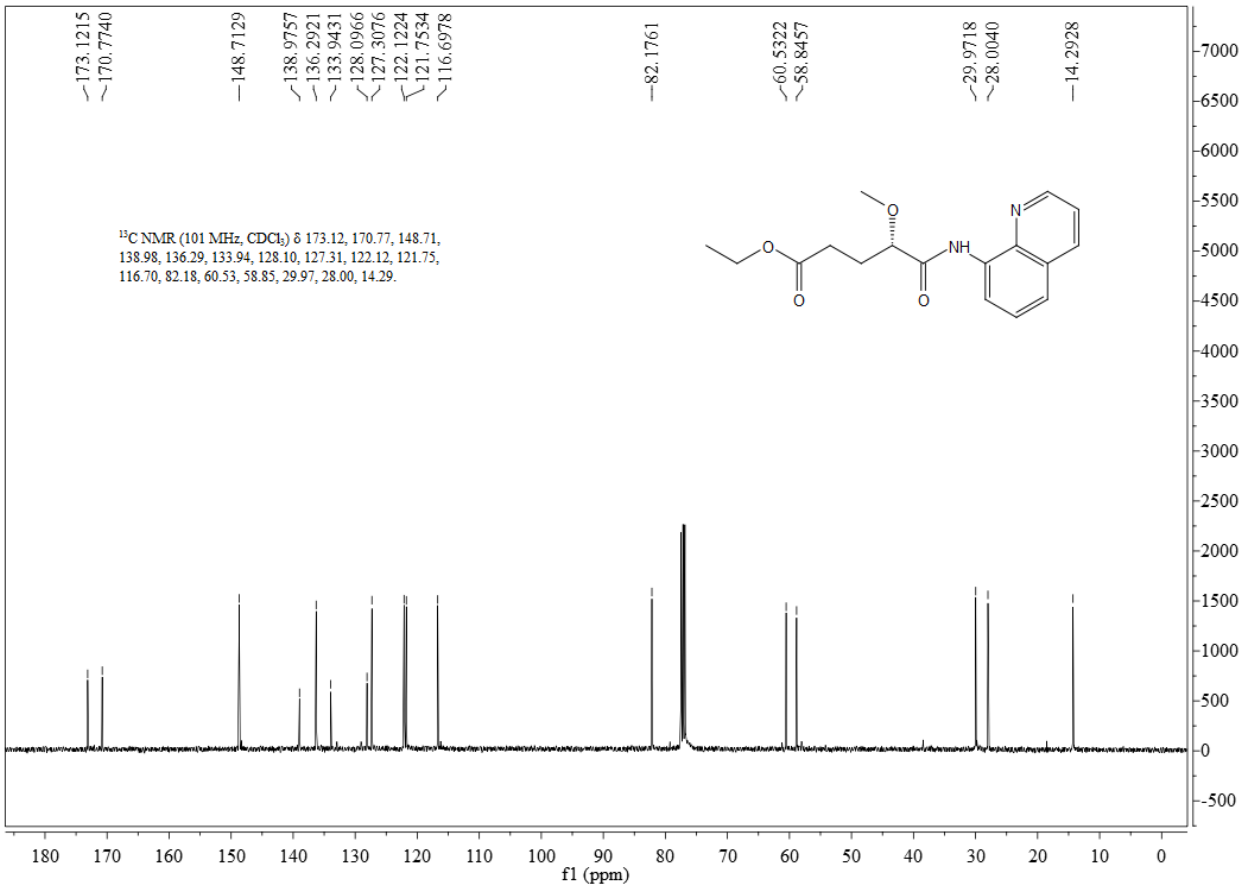


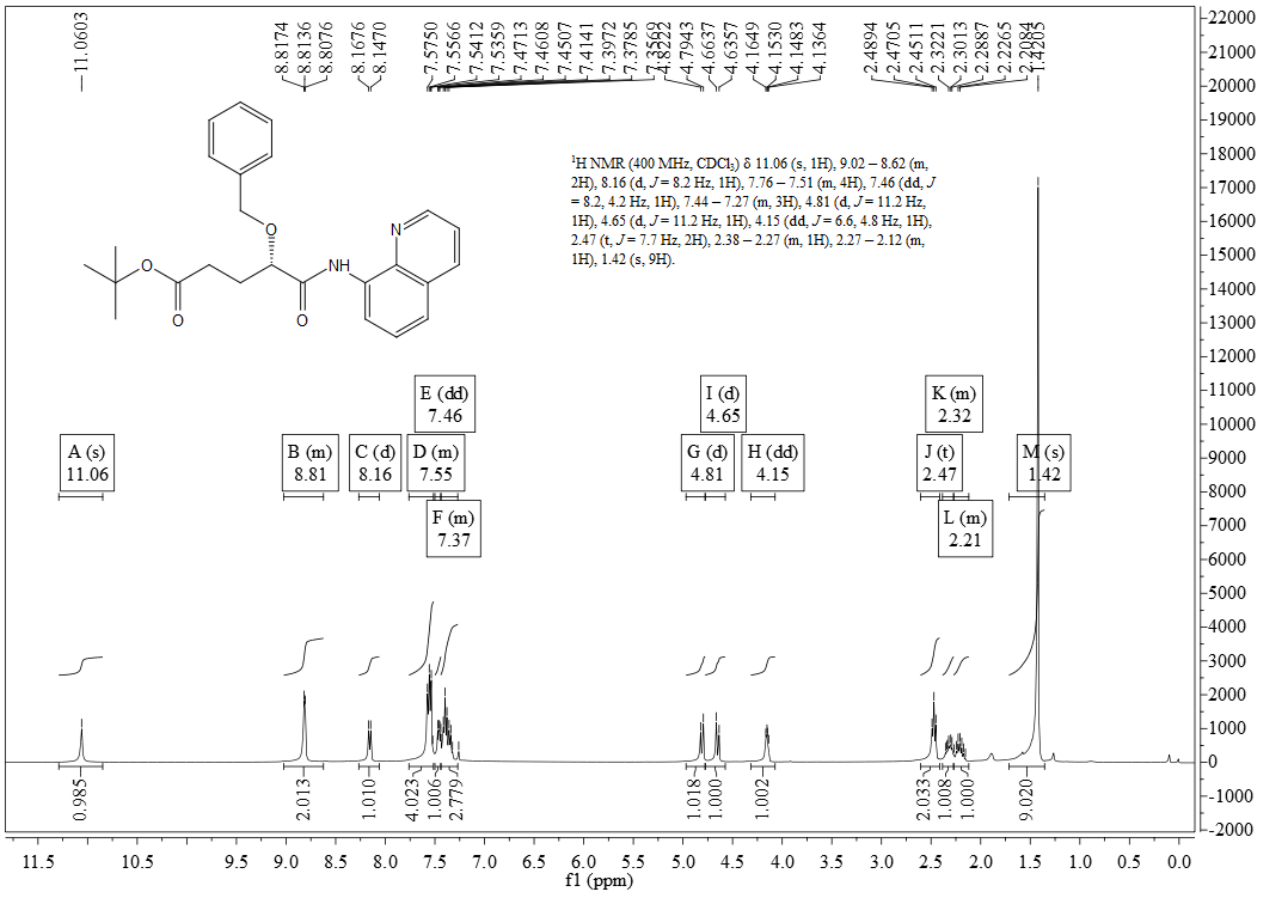
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.80 (s, 1H), 8.84 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.80 (dd, *J* = 5.9, 2.9 Hz, 1H), 8.14 (dd, *J* = 8.2, 1.4 Hz, 1H), 7.61 – 7.47 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.91 (dd, *J* = 6.8, 4.7 Hz, 1H), 3.57 (s, 3H), 2.51 – 2.35 (m, 2H), 2.30 – 2.21 (m, 1H), 2.19 – 2.08 (m, 1H), 1.43 (s, 9H).

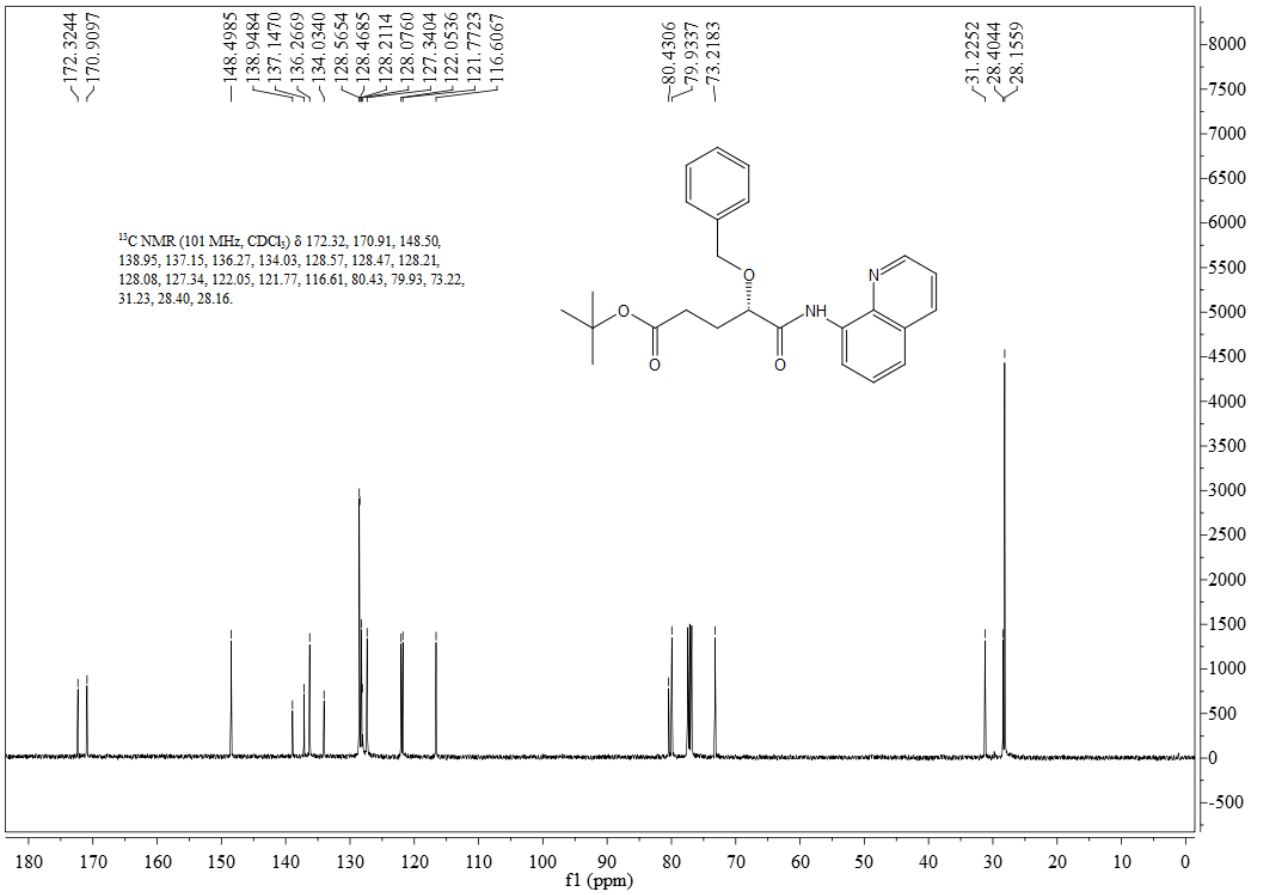


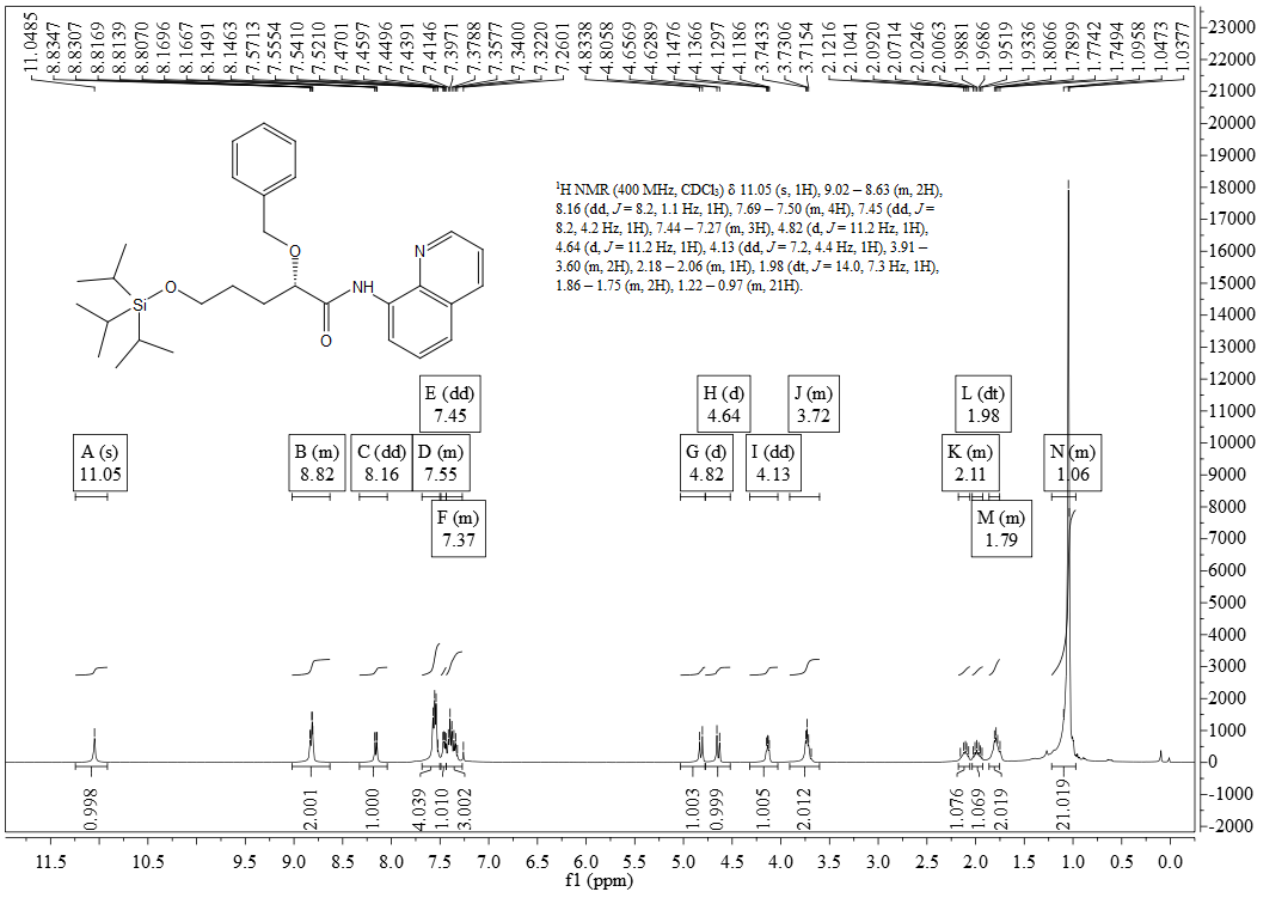
^{13}C NMR (101 MHz, $CDCl_3$) δ 172.38, 170.89, 148.69, 139.00, 136.27, 134.01, 128.10, 127.31, 122.06, 121.73, 116.68, 82.29, 80.40, 58.80, 31.16, 28.17, 28.11.

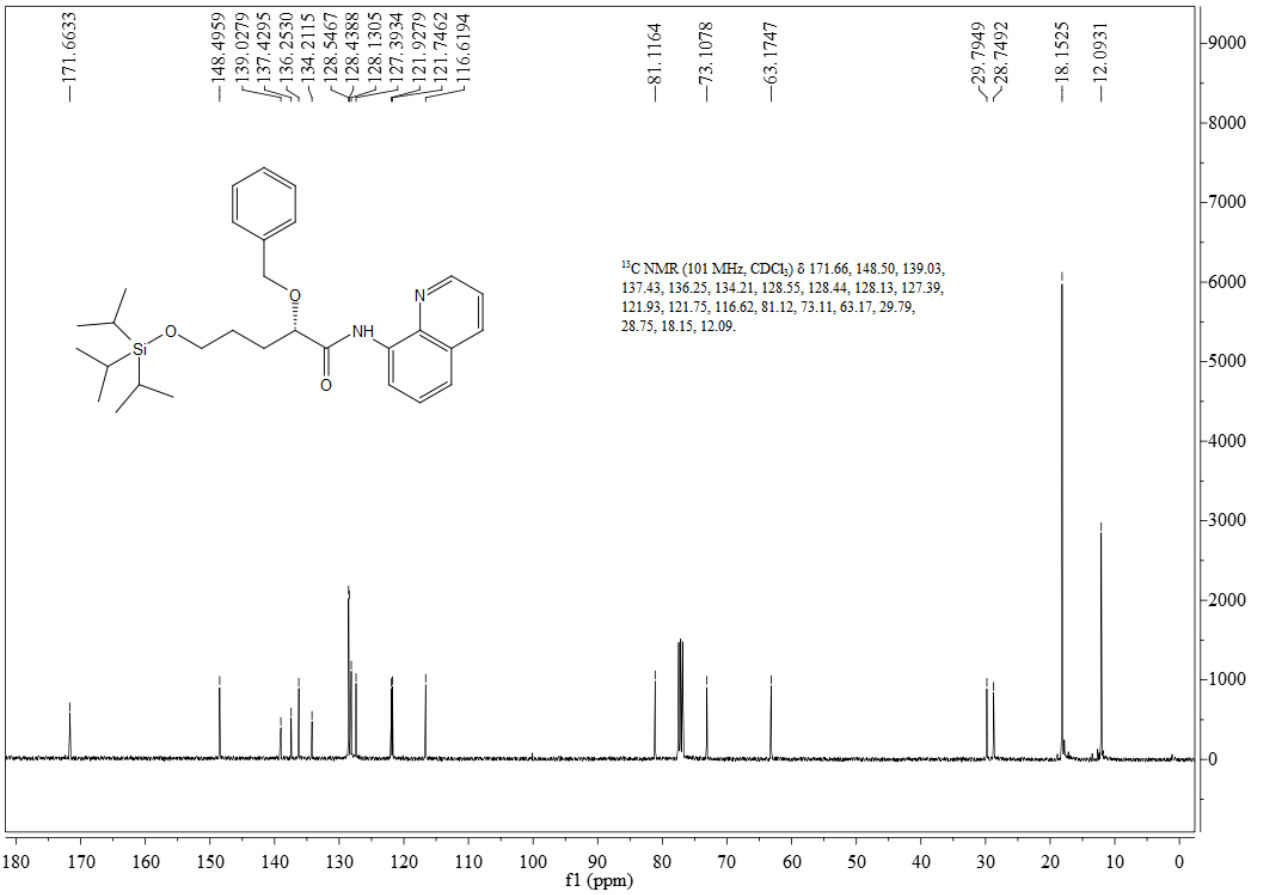

10.7998
8.8502
8.8463
8.8399
8.8359
8.8024
8.7941
8.7885
8.7801
8.1593
8.1555
8.1387
8.1348
7.5359
7.5303
7.5220
7.4613
7.4508
7.4407
7.4301
7.2605
4.1496
4.1438
4.1318
4.1263
4.1140
4.1086
4.0963
4.0909
3.9373
3.9256
3.9201
3.9082
3.5786
2.5342
2.5210
2.5164
2.5130
2.5050
2.5012
2.4950
2.4849
2.3007
2.2884
2.2829
2.2806
2.2687
2.2181
2.2138
2.1968
1.2488
1.2311
1.2132
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.80 (s, 1H), 8.84 (dd, J = 4.1, 1.6 Hz, 1H), 8.79 (dd, J = 5.6, 3.3 Hz, 1H), 8.15 (dd, J = 8.3, 1.5 Hz, 1H), 7.62 – 7.48 (m, 2H), 7.45 (dd, J = 8.2, 4.2 Hz, 1H), 4.12 (qd, J = 7.1, 2.2 Hz, 2H), 3.92 (dd, J = 6.9, 4.7 Hz, 1H), 3.58 (s, 3H), 2.64 – 2.39 (m, 2H), 2.29 (dtd, J = 12.0, 7.5, 4.8 Hz, 1H), 2.19 (ddd, J = 14.3, 8.5, 6.8 Hz, 1H), 1.23 (t, J = 7.1 Hz, 3H).
A (s) 10.80
B (dd) 8.84
C (dd) 8.79
D (dd) 8.15
E (dd) 7.45
F (m) 7.53
G (qd) 4.12
H (dd) 3.92
I (s) 3.58
J (m) 2.51
K (dtd) 2.29
L (ddd) 2.19
M (t) 1.23
0.998
0.999
0.999
1.005
2.004
1.011
2.016
1.010
3.036
2.016
1.023
1.016
3.037
f1 (ppm)

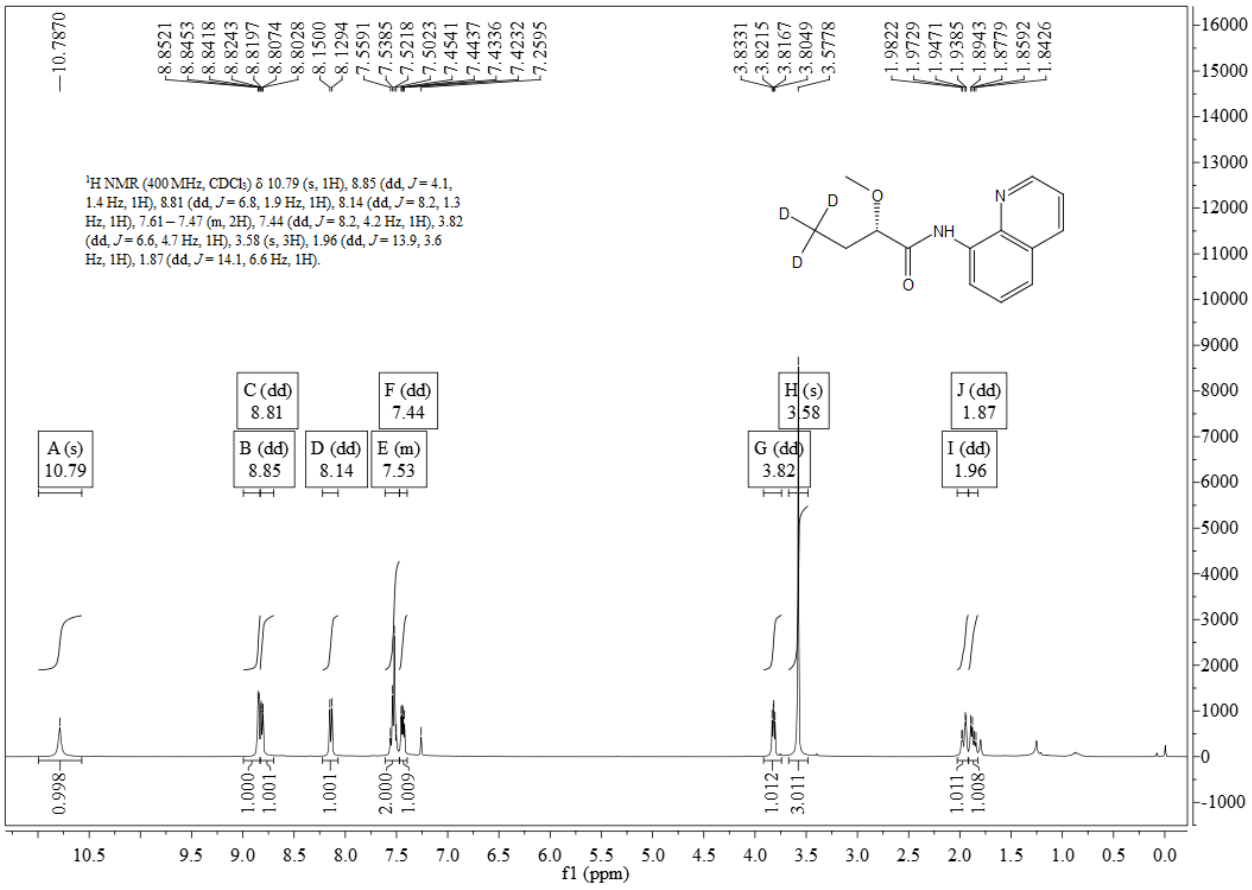

173.1215
170.7740
148.7129
138.9757
136.2921
133.9431
128.0966
127.3076
122.1224
121.7534
116.6978
82.1761
60.5322
58.8457
29.9718
28.0040
14.2928
^{13}C NMR (101 MHz, CDCl$_3$) δ 173.12, 170.77, 148.71, 138.98, 136.29, 133.94, 128.10, 127.31, 122.12, 121.75, 116.70, 82.18, 60.53, 58.85, 29.97, 28.00, 14.29.
f1 (ppm)


11.0603
8.8174
8.8136
8.8076
8.1676
8.1470
7.5750
7.5566
7.5412
7.5359
7.4713
7.4608
7.4507
7.4141
7.3972
7.3785
4.8222
4.7943
4.6637
4.6357
4.1649
4.1530
4.1483
4.1364
2.4894
2.4705
2.4511
2.3221
2.3013
2.2887
2.2265
1.4205
O
O
O
NH
N
^{1}H NMR (400 MHz, CDCl$_3$) δ 11.06 (s, 1H), 9.02 – 8.62 (m, 2H), 8.16 (d, J = 8.2 Hz, 1H), 7.76 – 7.51 (m, 4H), 7.46 (dd, J = 8.2, 4.2 Hz, 1H), 7.44 – 7.27 (m, 3H), 4.81 (d, J = 11.2 Hz, 1H), 4.65 (d, J = 11.2 Hz, 1H), 4.15 (dd, J = 6.6, 4.8 Hz, 1H), 2.47 (t, J = 7.7 Hz, 2H), 2.38 – 2.27 (m, 1H), 2.27 – 2.12 (m, 1H), 1.42 (s, 9H).
A (s) 11.06
B (m) 8.81
C (d) 8.16
D (m) 7.55
E (dd) 7.46
F (m) 7.37
G (d) 4.81
H (dd) 4.15
I (d) 4.65
J (t) 2.47
K (m) 2.32
L (m) 2.21
M (s) 1.42
0.985
2.013
1.010
4.023
1.006
2.779
1.018
1.000
1.002
2.033
1.008
1.000
9.020
f1 (ppm)

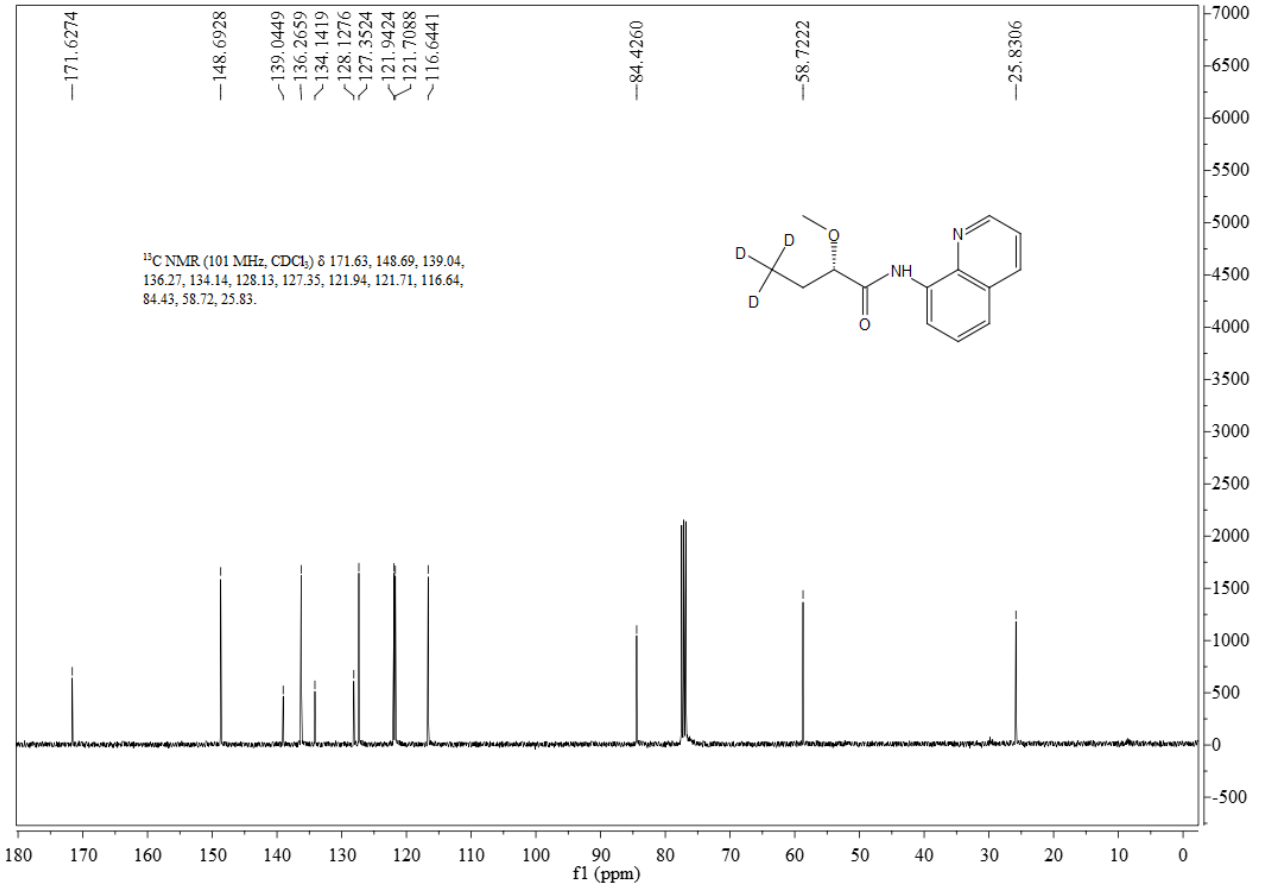

172.3244
170.9097
148.4985
138.9484
137.1470
136.2669
134.0340
128.5654
128.4685
128.2114
128.0760
127.3404
122.0536
121.7723
116.6067
80.4306
79.9337
73.2183
31.2252
28.4044
28.1559
O
O
O
NH
N
^{13}C NMR (101 MHz, CDCl$_3$) δ 172.32, 170.91, 148.50, 138.95, 137.15, 136.27, 134.03, 128.57, 128.47, 128.21, 128.08, 127.34, 122.05, 121.77, 116.61, 80.43, 79.93, 73.22, 31.23, 28.40, 28.16.
f1 (ppm)


11.0485
8.8347
8.8307
8.8169
8.8139
8.8070
8.1696
8.1667
8.1491
8.1463
7.5713
7.5554
7.5410
7.5210
7.4701
7.4597
7.4496
7.4391
7.4146
7.3971
7.3788
7.3577
7.3400
7.3220
7.2601
4.8338
4.8058
4.6569
4.6289
4.1476
4.1366
4.1297
4.1186
3.7433
3.7306
3.7154
2.1216
2.1041
2.0920
2.0714
2.0246
2.0063
1.9881
1.9686
1.9519
1.9336
1.8066
1.7899
1.7742
1.7494
1.0958
1.0473
1.0377
1H NMR (400 MHz, CDCl3) δ 11.05 (s, 1H), 9.02 – 8.63 (m, 2H), 8.16 (dd, J = 8.2, 1.1 Hz, 1H), 7.69 – 7.50 (m, 4H), 7.45 (dd, J = 8.2, 4.2 Hz, 1H), 7.44 – 7.27 (m, 3H), 4.82 (d, J = 11.2 Hz, 1H), 4.64 (d, J = 11.2 Hz, 1H), 4.13 (dd, J = 7.2, 4.4 Hz, 1H), 3.91 – 3.60 (m, 2H), 2.18 – 2.06 (m, 1H), 1.98 (dt, J = 14.0, 7.3 Hz, 1H), 1.86 – 1.75 (m, 2H), 1.22 – 0.97 (m, 21H).
A (s) 11.05
B (m) 8.82
C (dd) 8.16
D (m) 7.55
E (dd) 7.45
F (m) 7.37
G (d) 4.82
H (d) 4.64
I (dd) 4.13
J (m) 3.72
K (m) 2.11
L (dt) 1.98
M (m) 1.79
N (m) 1.06
0.998
2.001
1.000
4.039
1.010
3.002
1.003
0.999
1.005
2.012
1.076
1.069
2.019
21.019
f1 (ppm)

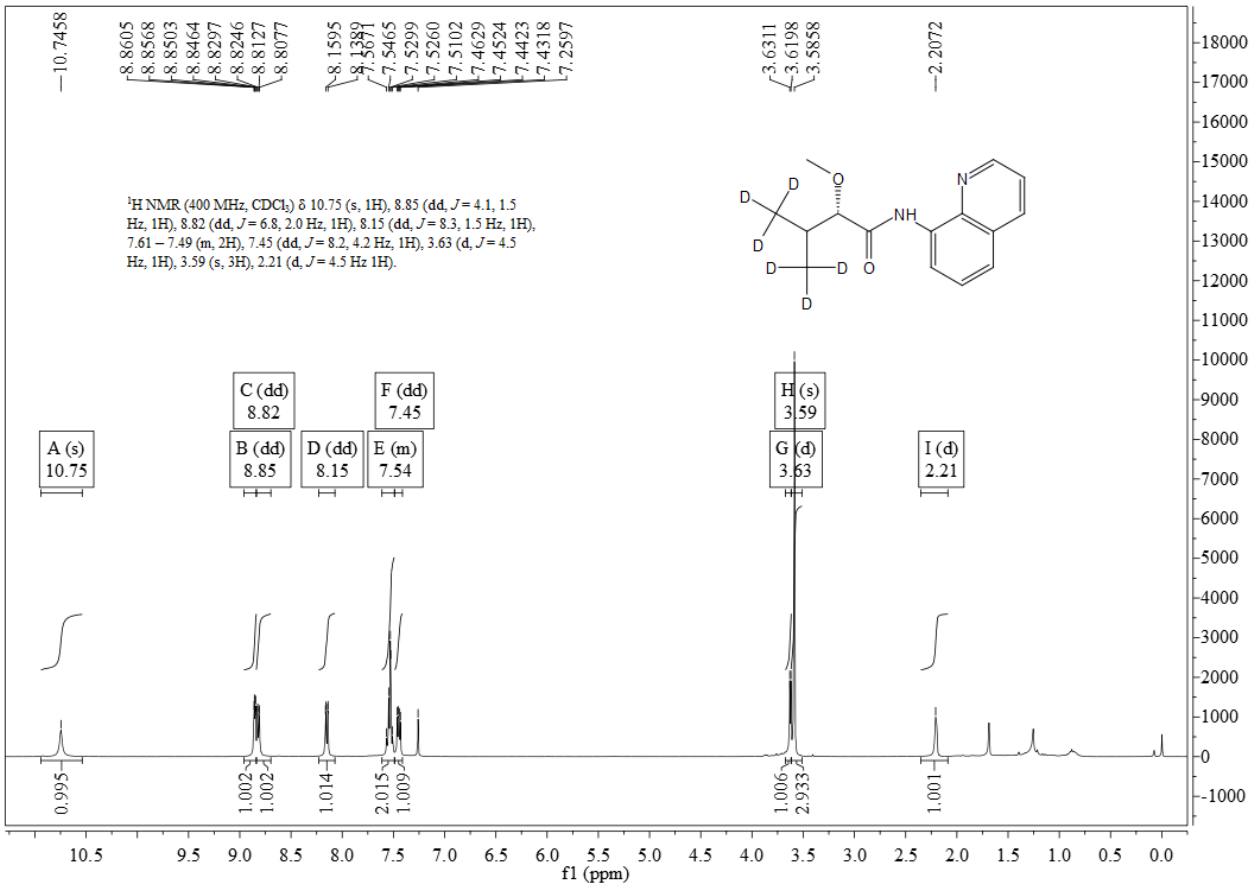

171.6633
148.4959
139.0279
137.4295
136.2530
134.2115
128.5467
128.4388
128.1305
127.3934
121.9279
121.7462
116.6194
81.1164
73.1078
63.1747
29.7949
28.7492
18.1525
12.0931
13C NMR (101 MHz, CDCl3) δ 171.66, 148.50, 139.03, 137.43, 136.25, 134.21, 128.55, 128.44, 128.13, 127.39, 121.93, 121.75, 116.62, 81.12, 73.11, 63.17, 29.79, 28.75, 18.15, 12.09.
f1 (ppm)



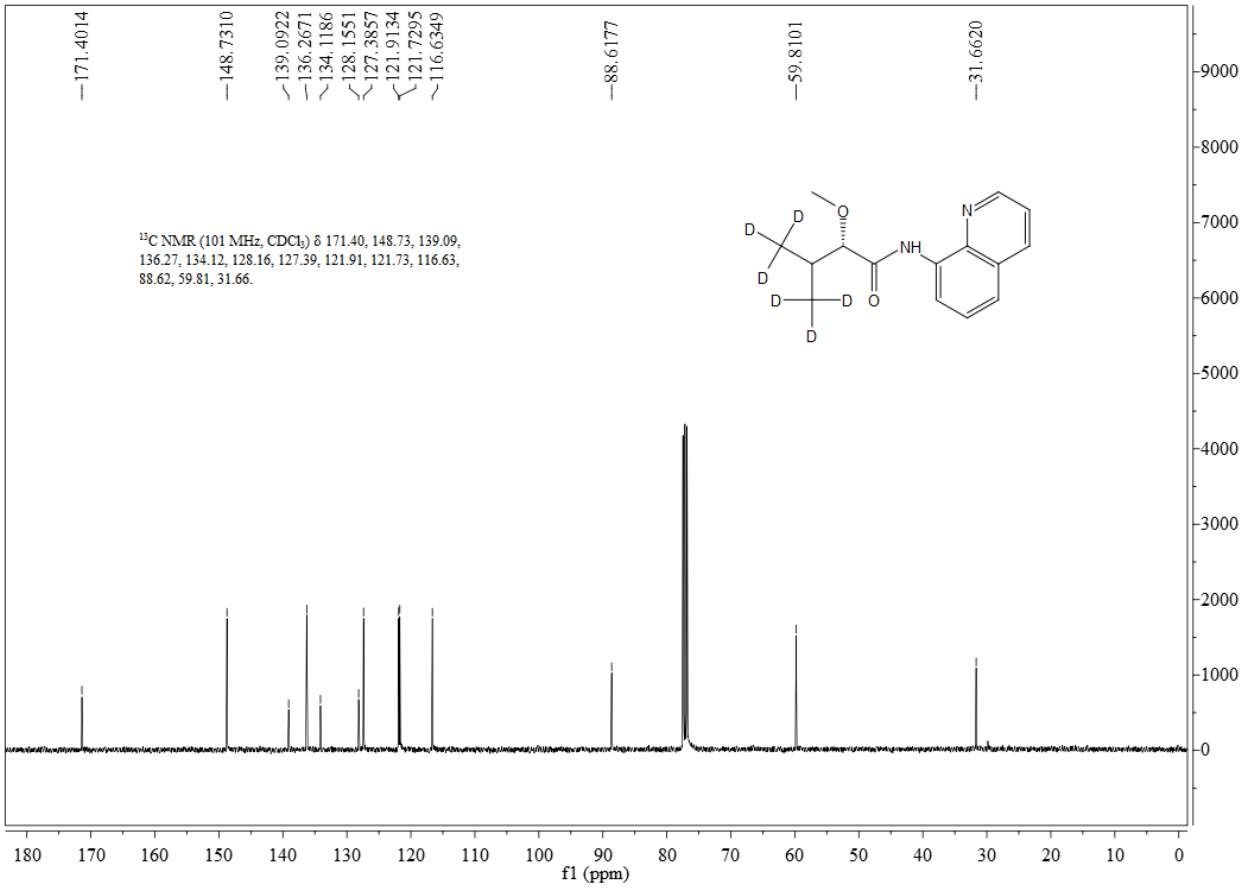
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.1, 1.4 Hz, 1H), 8.81 (dd, *J* = 6.8, 1.9 Hz, 1H), 8.14 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.61 – 7.47 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.82 (dd, *J* = 6.6, 4.7 Hz, 1H), 3.58 (s, 3H), 1.96 (dd, *J* = 13.9, 3.6 Hz, 1H), 1.87 (dd, *J* = 14.1, 6.6 Hz, 1H).



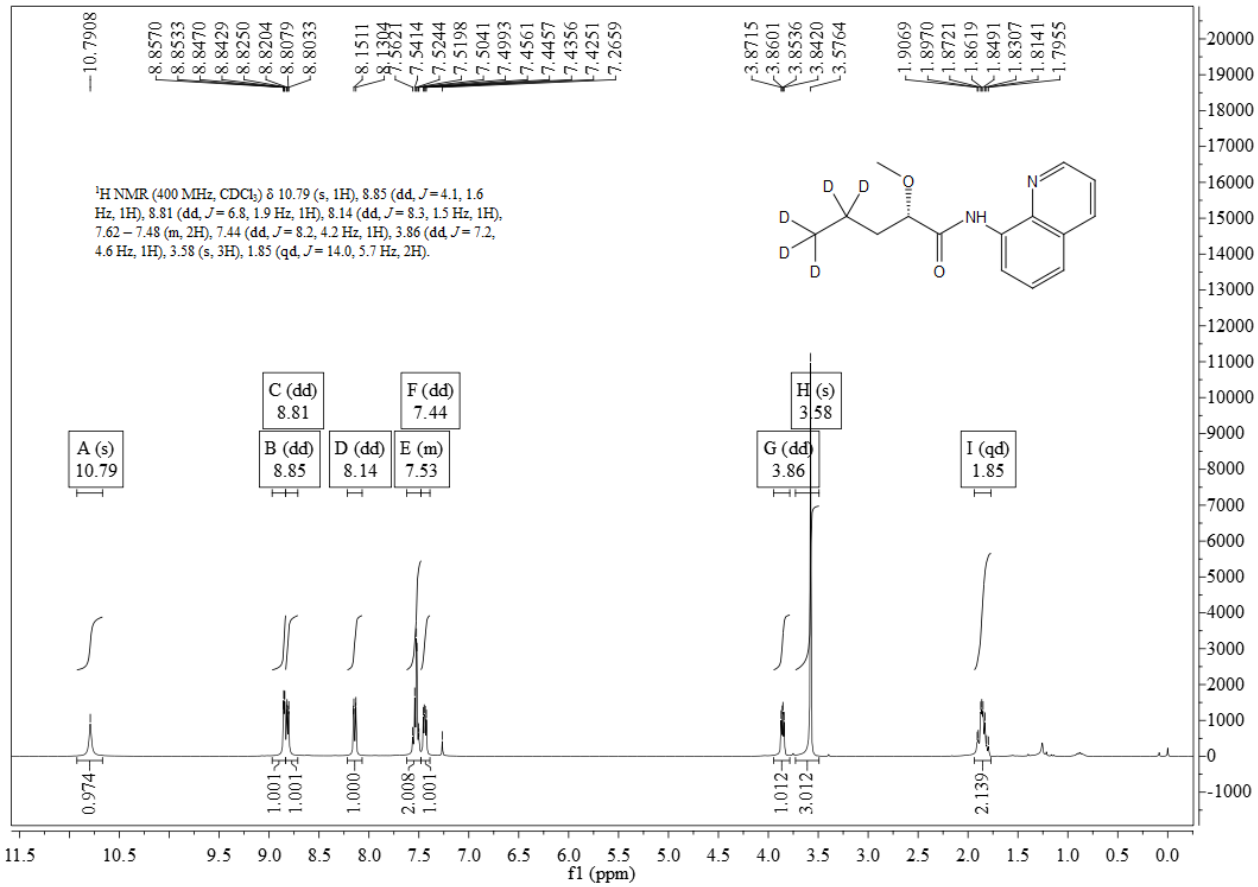
^{13}C NMR (101 MHz, $CDCl_3$) δ 171.63, 148.69, 139.04, 136.27, 134.14, 128.13, 127.35, 121.94, 121.71, 116.64, 84.43, 58.72, 25.83.



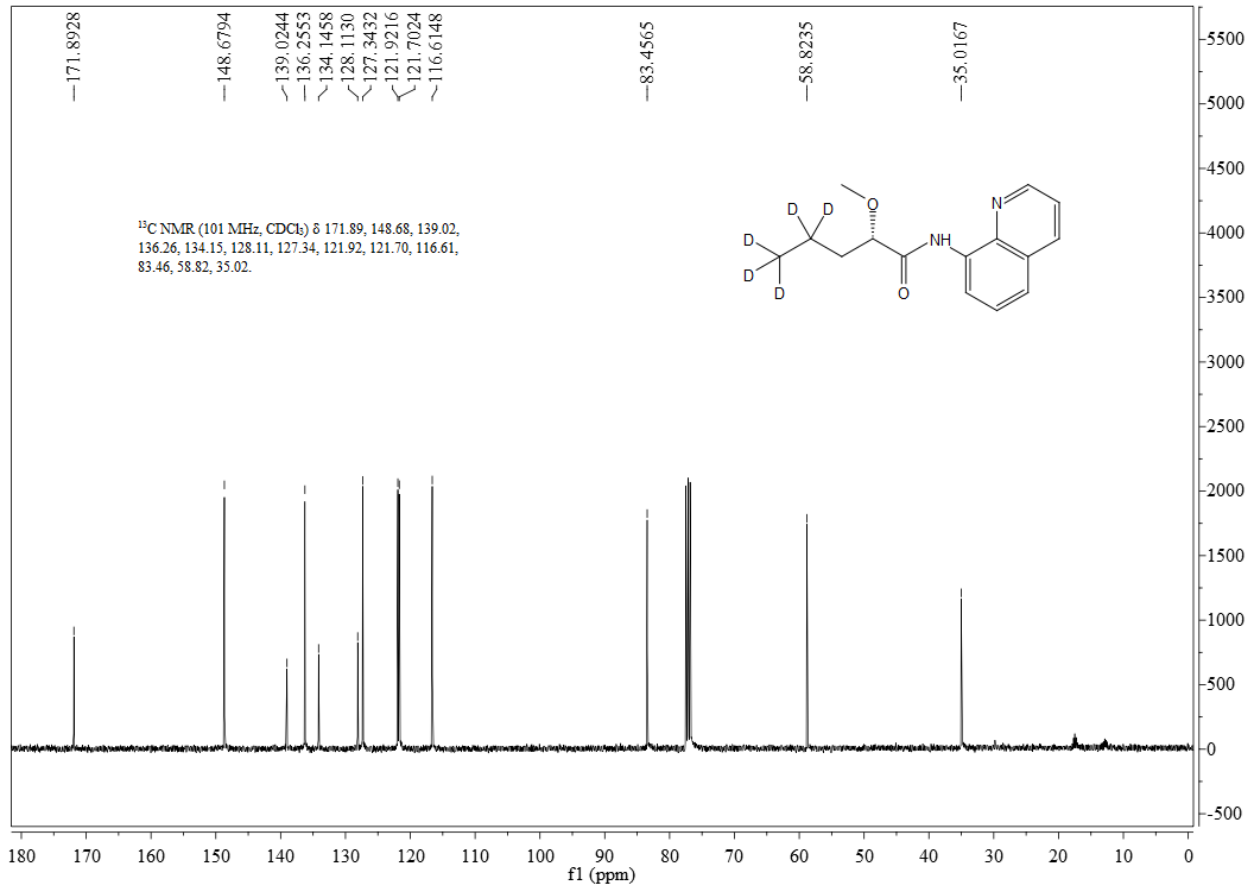
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.75 (s, 1H), 8.85 (dd, *J* = 4.1, 1.5 Hz, 1H), 8.82 (dd, *J* = 6.8, 2.0 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.61 – 7.49 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.63 (d, *J* = 4.5 Hz, 1H), 3.59 (s, 3H), 2.21 (d, *J* = 4.5 Hz 1H).



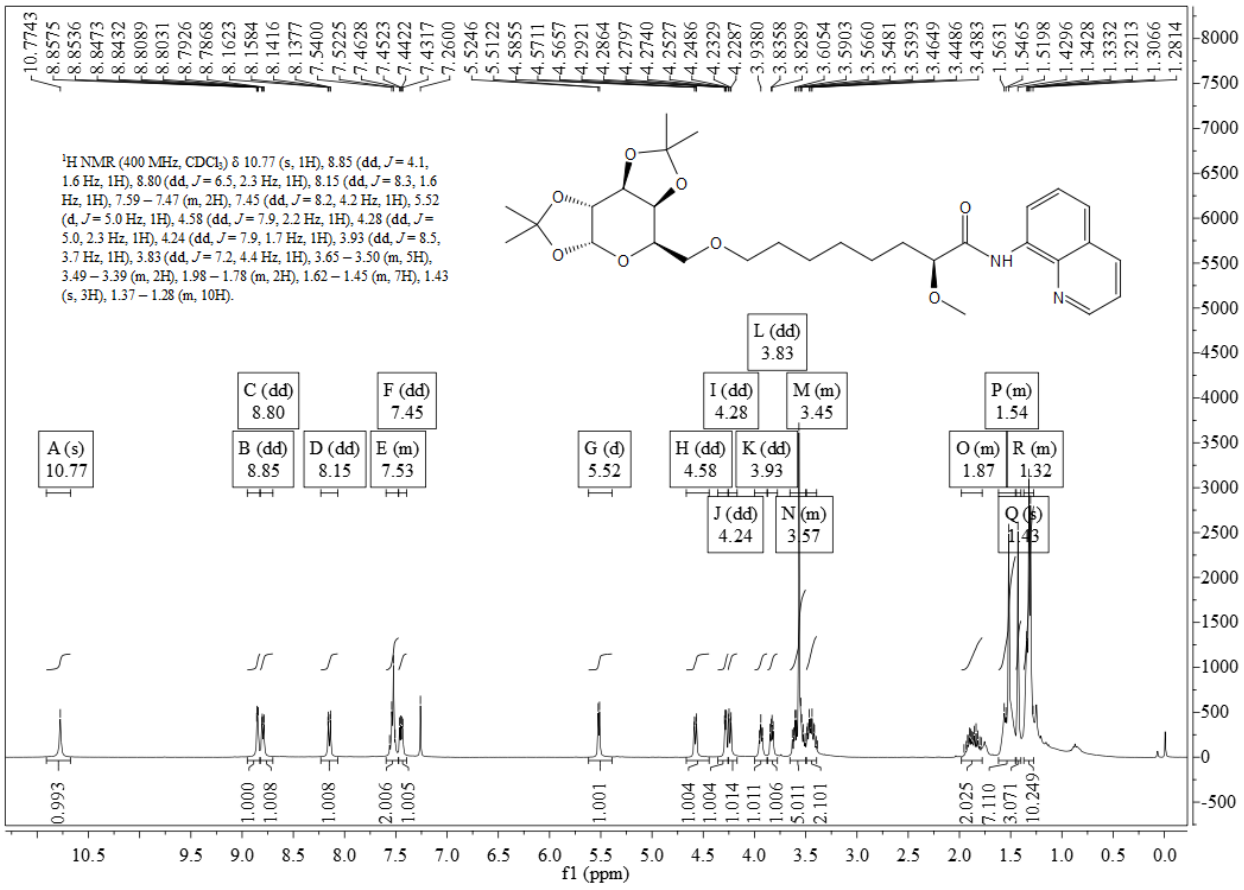
^{13}C NMR (101 MHz, $CDCl_3$) δ 171.40, 148.73, 139.09, 136.27, 134.12, 128.16, 127.39, 121.91, 121.73, 116.63, 88.62, 59.81, 31.66.



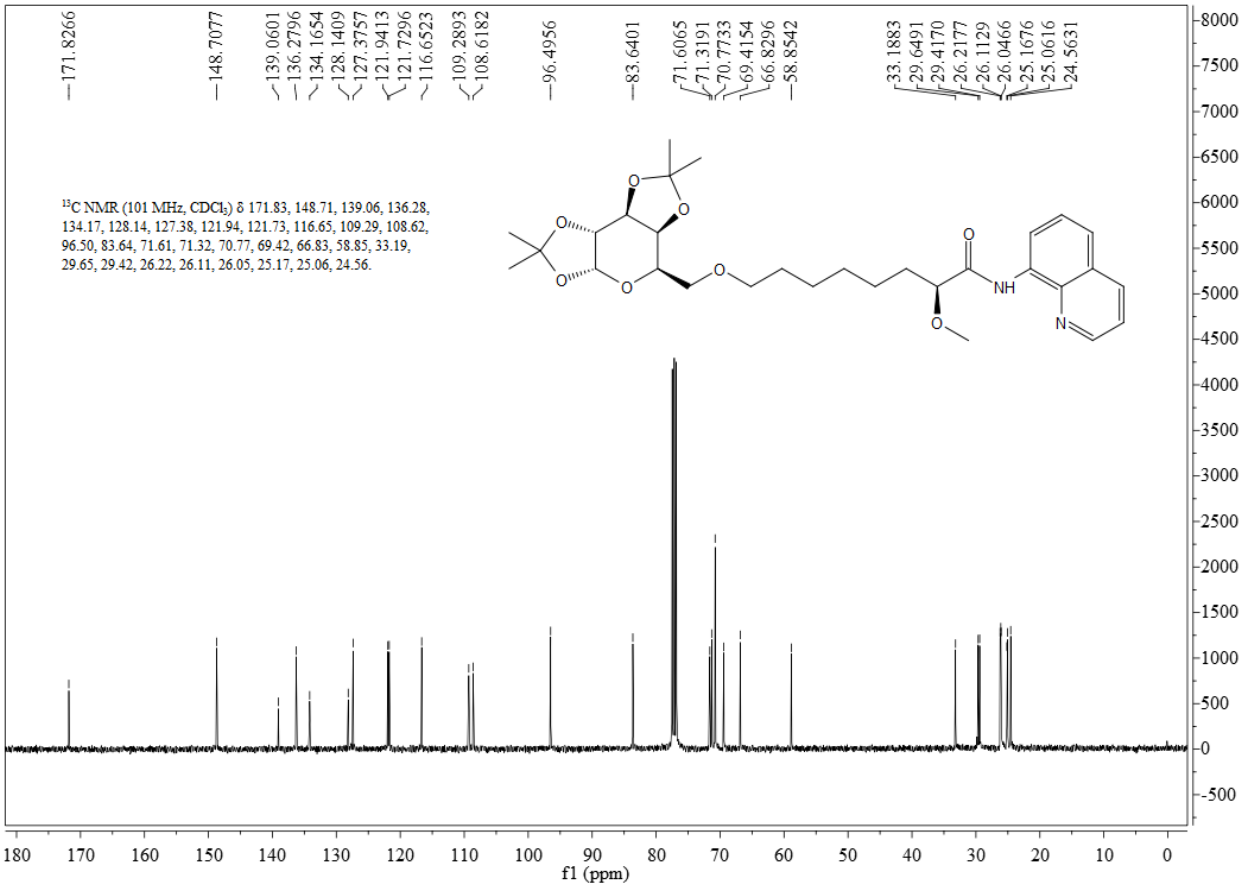
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.79 (s, 1H), 8.85 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.81 (dd, *J* = 6.8, 1.9 Hz, 1H), 8.14 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.62 – 7.48 (m, 2H), 7.44 (dd, *J* = 8.2, 4.2 Hz, 1H), 3.86 (dd, *J* = 7.2, 4.6 Hz, 1H), 3.58 (s, 3H), 1.85 (qd, *J* = 14.0, 5.7 Hz, 2H).



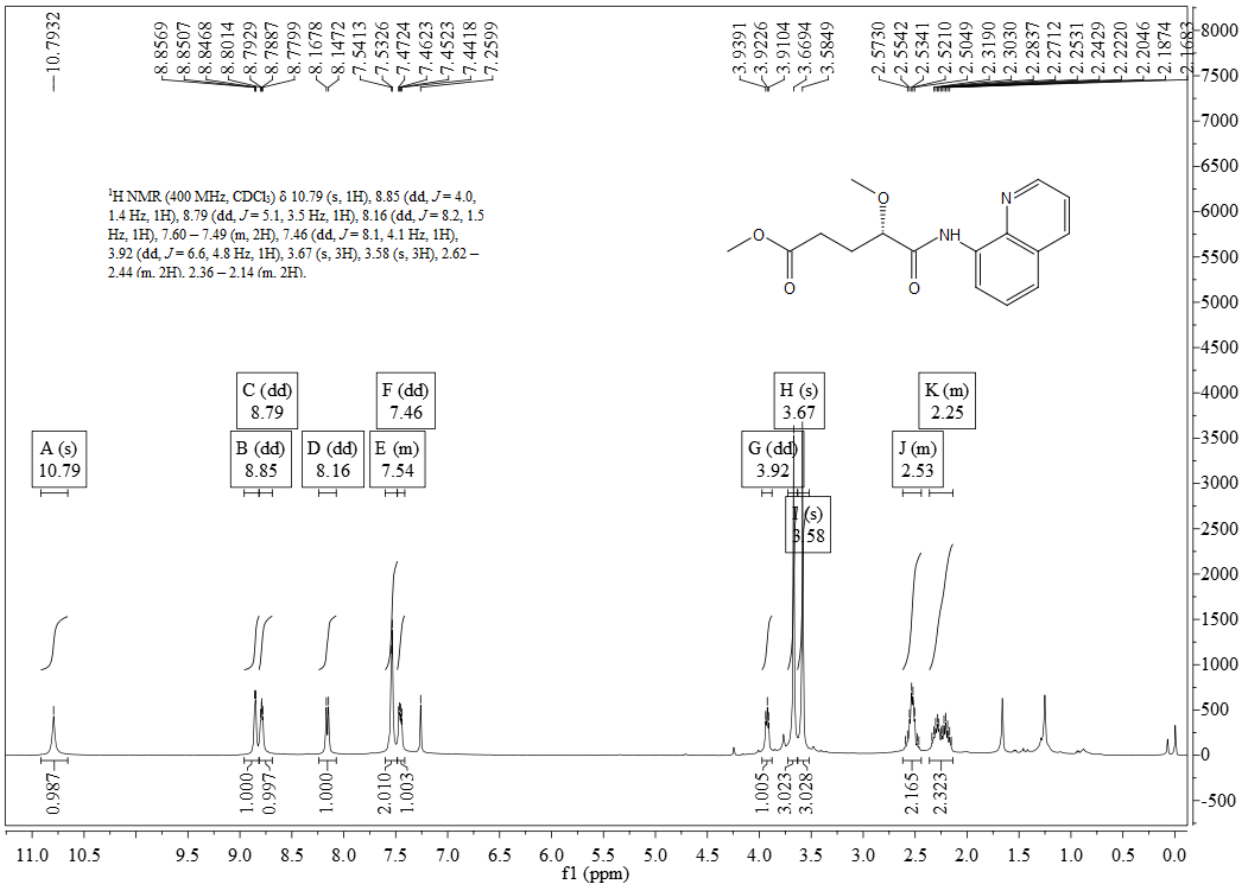
^{13}C NMR (101 MHz, $CDCl_3$) δ 171.89, 148.68, 139.02, 136.26, 134.15, 128.11, 127.34, 121.92, 121.70, 116.61, 83.46, 58.82, 35.02.

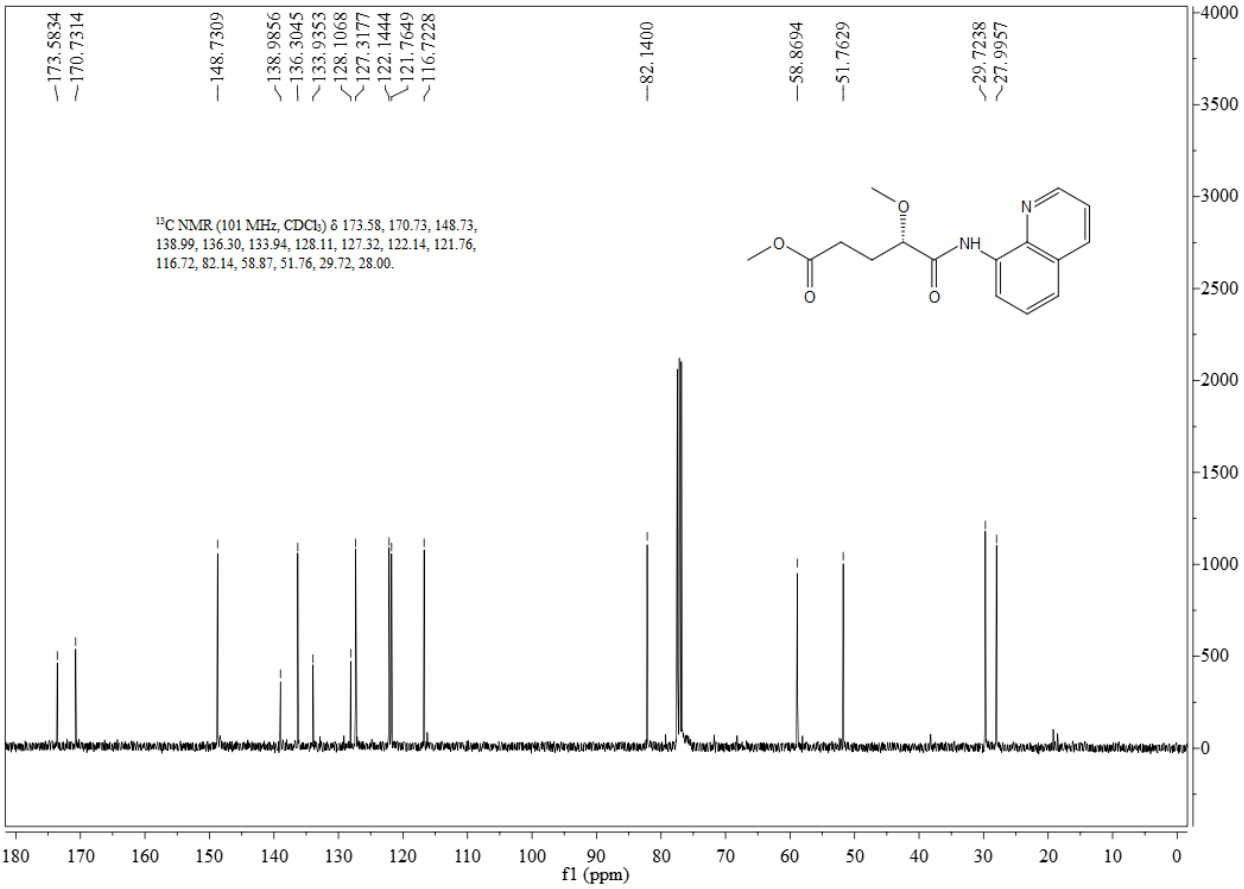


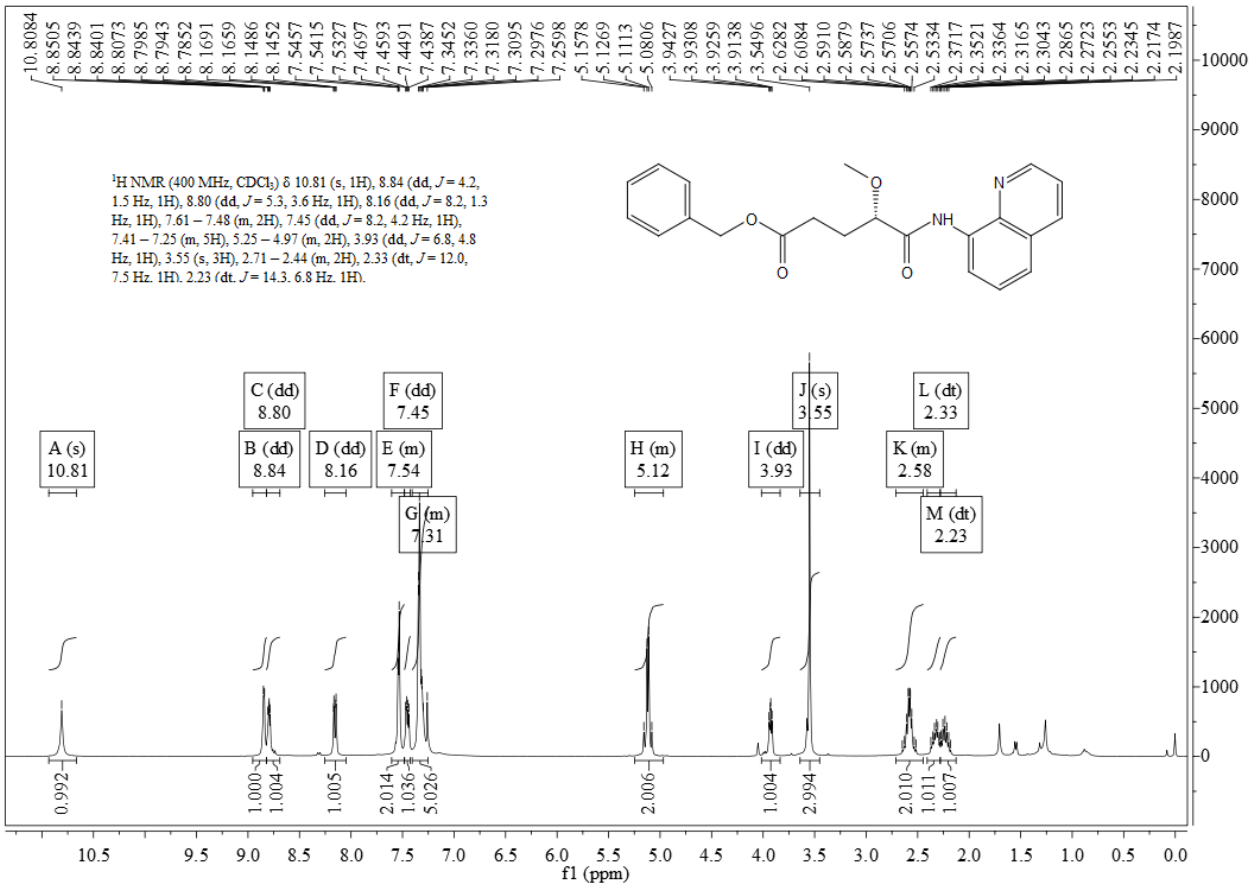
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.77 (s, 1H), 8.85 (dd, *J* = 4.1, 1.6 Hz, 1H), 8.80 (dd, *J* = 6.5, 2.3 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.59 – 7.47 (m, 2H), 7.45 (dd, *J* = 8.2, 4.2 Hz, 1H), 5.52 (d, *J* = 5.0 Hz, 1H), 4.58 (dd, *J* = 7.9, 2.2 Hz, 1H), 4.28 (dd, *J* = 5.0, 2.3 Hz, 1H), 4.24 (dd, *J* = 7.9, 1.7 Hz, 1H), 3.93 (dd, *J* = 8.5, 3.7 Hz, 1H), 3.83 (dd, *J* = 7.2, 4.4 Hz, 1H), 3.65 – 3.50 (m, 5H), 3.49 – 3.39 (m, 2H), 1.98 – 1.78 (m, 2H), 1.62 – 1.45 (m, 7H), 1.43 (s, 3H), 1.37 – 1.28 (m, 10H).

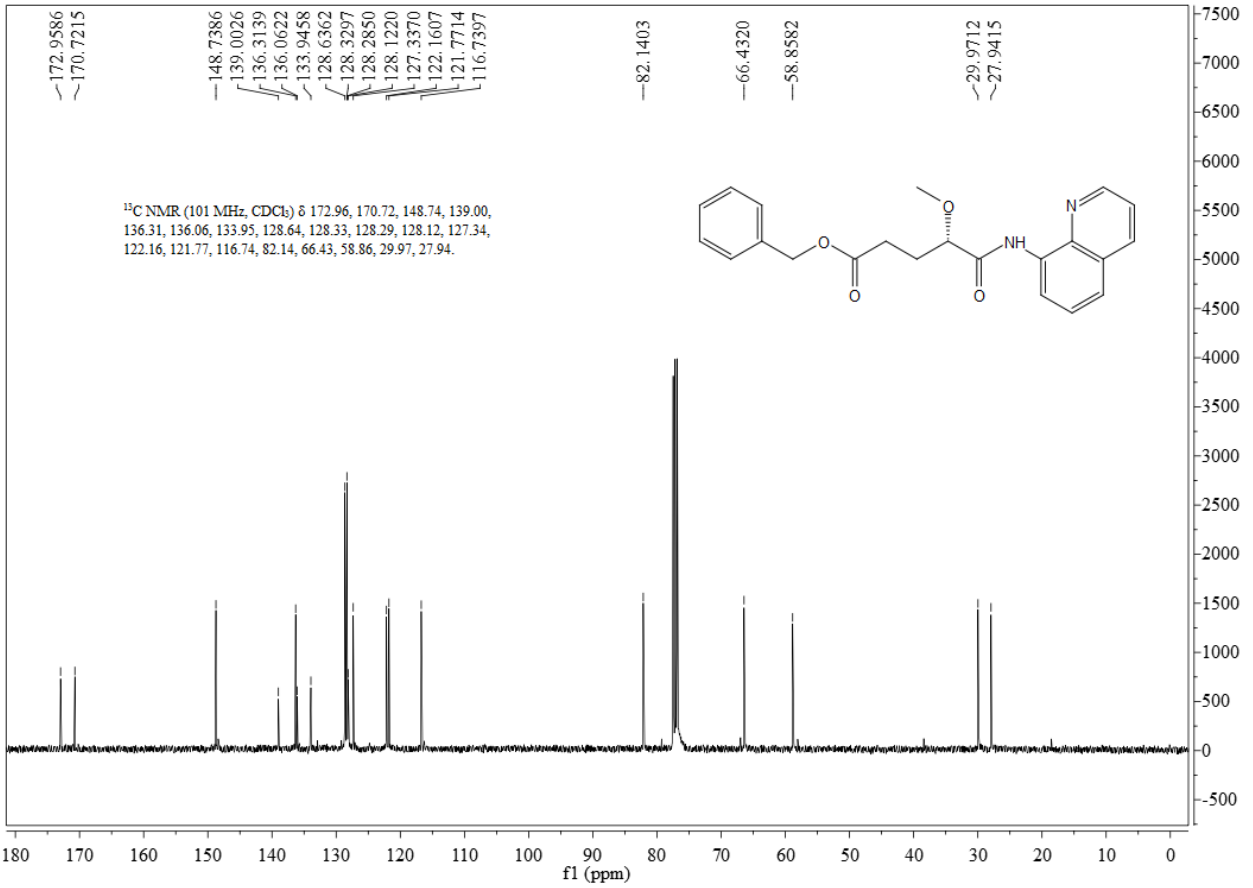


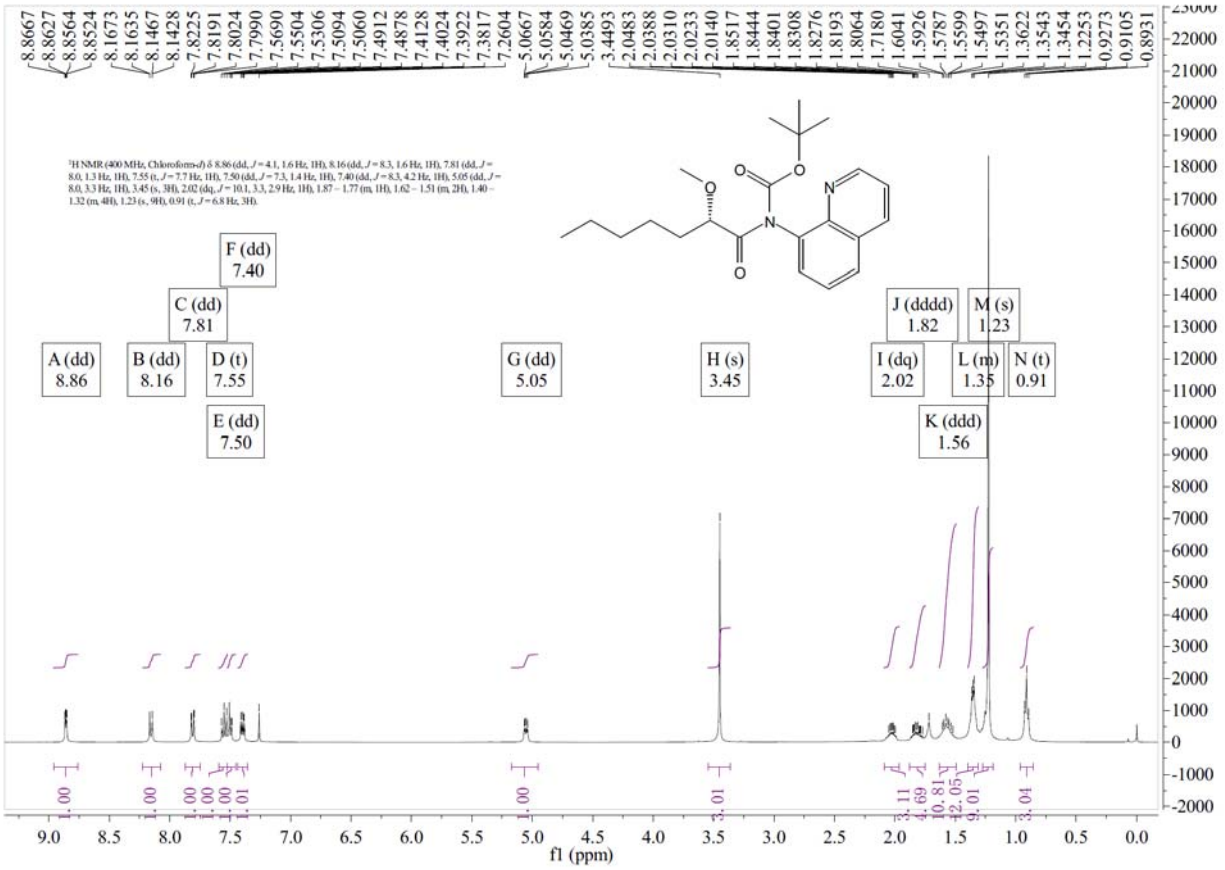
^{13}C NMR (101 MHz, $CDCl_3$) δ 171.83, 148.71, 139.06, 136.28, 134.17, 128.14, 127.38, 121.94, 121.73, 116.65, 109.29, 108.62, 96.50, 83.64, 71.61, 71.32, 70.77, 69.42, 66.83, 58.85, 33.19, 29.65, 29.42, 26.22, 26.11, 26.05, 25.17, 25.06, 24.56.

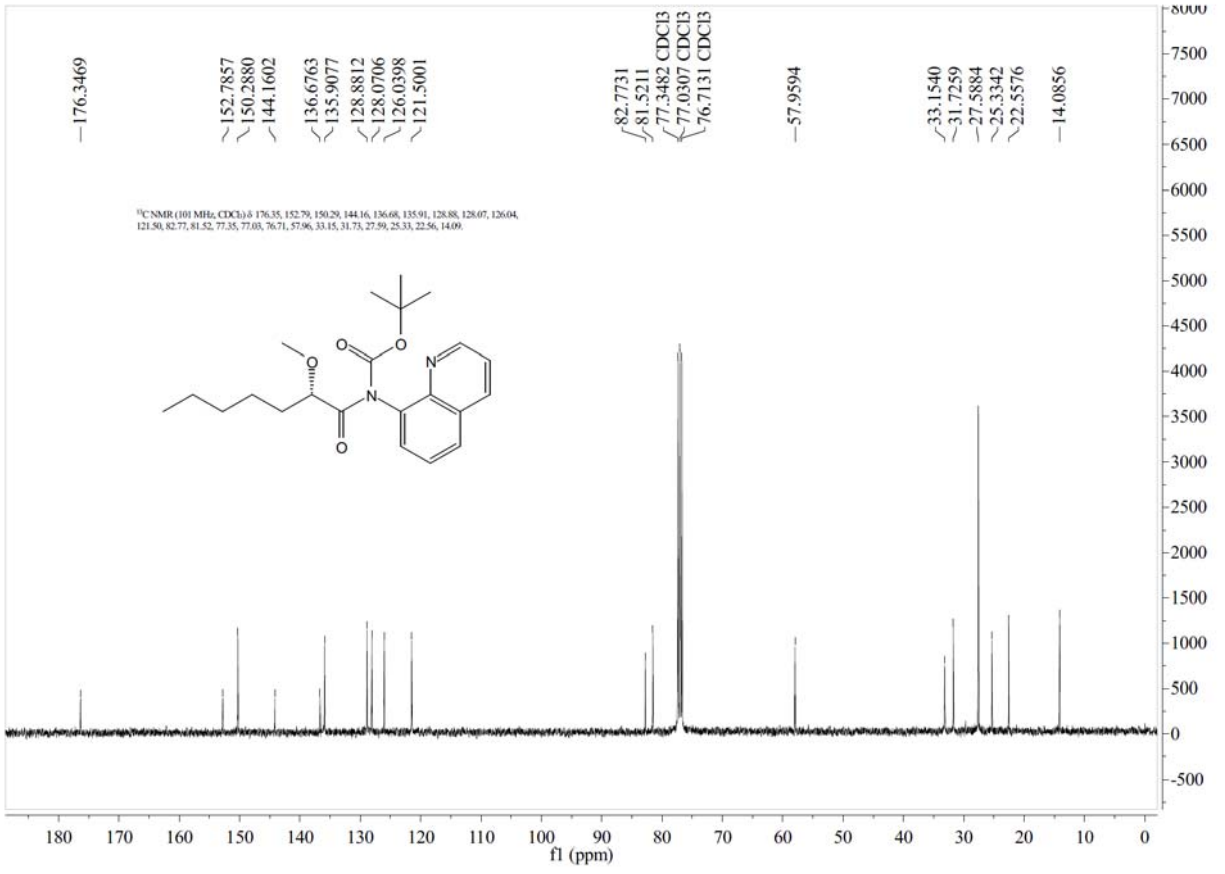

10.7932
8.8569
8.8507
8.8468
8.8014
8.7929
8.7887
8.7799
8.1678
8.1472
7.5413
7.5326
7.4724
7.4623
7.4523
7.4418
7.2599
3.9391
3.9226
3.9104
3.6694
3.5849
2.5730
2.5542
2.5341
2.5210
2.5049
2.3190
2.3030
2.2837
2.2712
2.2531
2.2429
2.2220
2.2046
2.1874
2.1683
1H NMR (400 MHz, CDCl3) δ 10.79 (s, 1H), 8.85 (dd, J = 4.0, 1.4 Hz, 1H), 8.79 (dd, J = 5.1, 3.5 Hz, 1H), 8.16 (dd, J = 8.2, 1.5 Hz, 1H), 7.60 – 7.49 (m, 2H), 7.46 (dd, J = 8.1, 4.1 Hz, 1H), 3.92 (dd, J = 6.6, 4.8 Hz, 1H), 3.67 (s, 3H), 3.58 (s, 3H), 2.62 – 2.44 (m, 2H), 2.36 – 2.14 (m, 2H).
A (s) 10.79
B (dd) 8.85
C (dd) 8.79
D (dd) 8.16
E (m) 7.54
F (dd) 7.46
G (dd) 3.92
H (s) 3.67
I (s) 3.58
J (m) 2.53
K (m) 2.25
0.987
1.000
0.997
1.000
2.010
1.003
1.005
3.023
3.028
2.165
2.323
f1 (ppm)

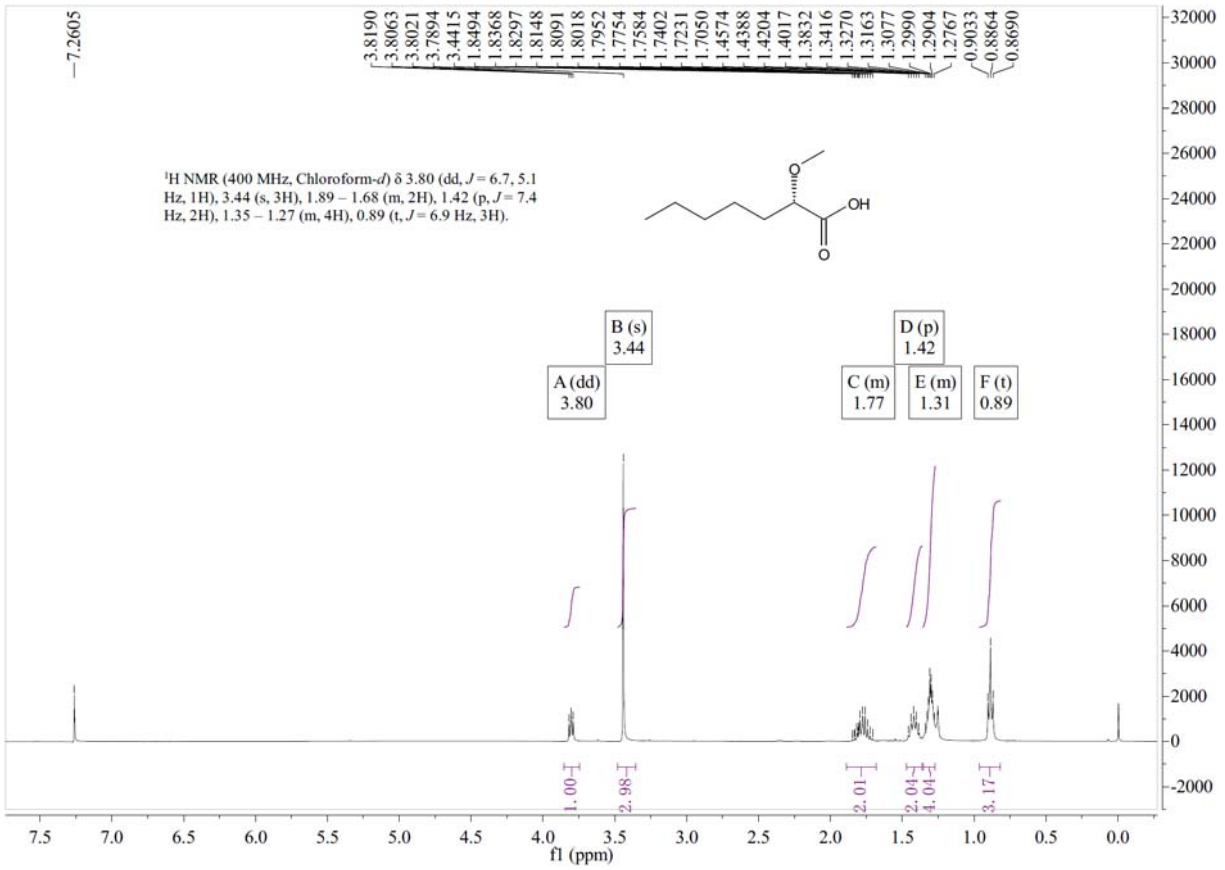

173.5834
170.7314
148.7309
138.9856
136.3045
133.9353
128.1068
127.3177
122.1444
121.7649
116.7228
82.1400
58.8694
51.7629
29.7238
27.9957
13C NMR (101 MHz, CDCl3) δ 173.58, 170.73, 148.73, 138.99, 136.30, 133.94, 128.11, 127.32, 122.14, 121.76, 116.72, 82.14, 58.87, 51.76, 29.72, 28.00.
f1 (ppm)

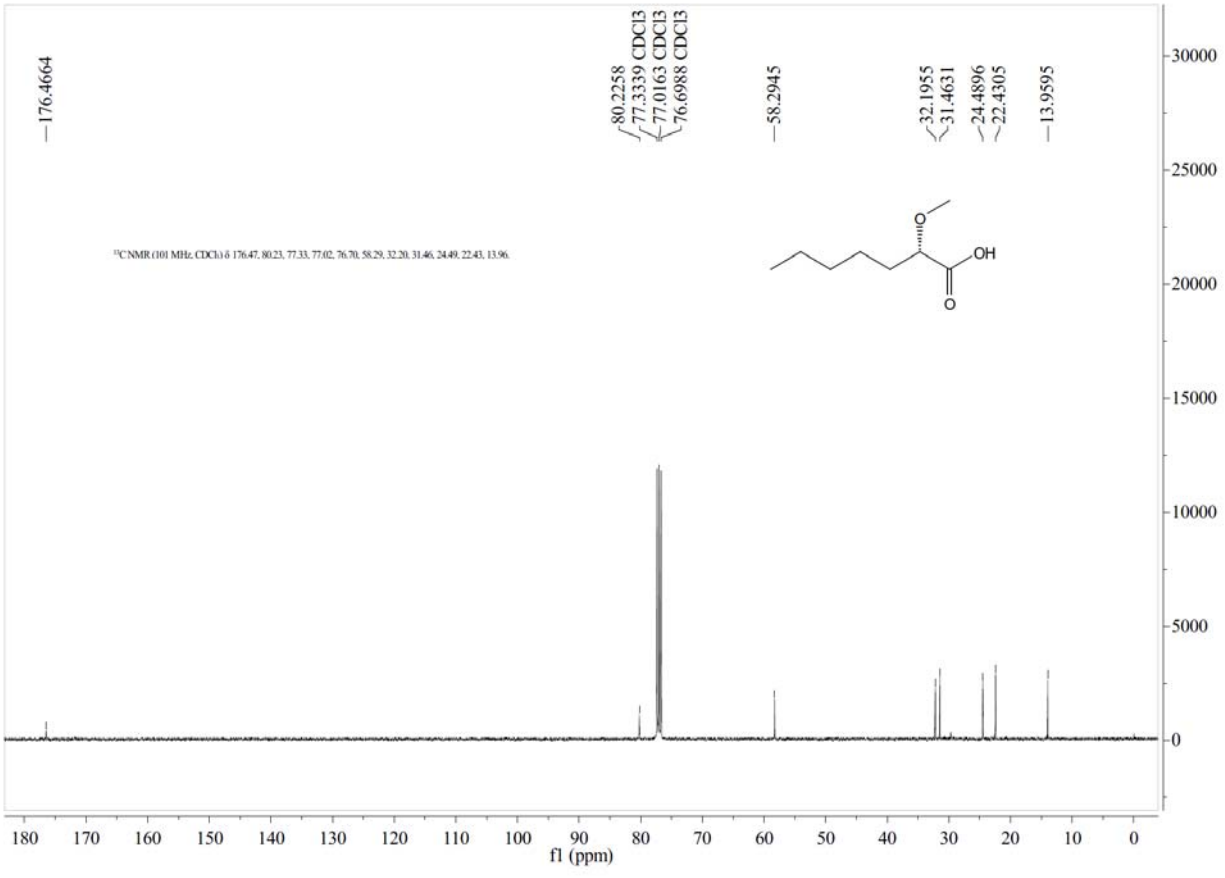

10.8084
8.8505
8.8439
8.8401
8.8073
8.7985
8.7943
8.7852
8.1691
8.1659
8.1486
8.1452
7.5457
7.5415
7.5327
7.4697
7.4593
7.4491
7.4387
7.3452
7.3360
7.3180
7.3095
7.2976
7.2598
5.1578
5.1269
5.1113
5.0806
3.9427
3.9308
3.9259
3.9138
3.5496
2.6282
2.6084
2.5910
2.5879
2.5737
2.5706
2.5574
2.5334
2.3717
2.3521
2.3364
2.3165
2.3043
2.2865
2.2723
2.2553
2.2345
2.2174
2.1987
^{1}H NMR (400 MHz, CDCl$_3$) δ 10.81 (s, 1H), 8.84 (dd, J = 4.2, 1.5 Hz, 1H), 8.80 (dd, J = 5.3, 3.6 Hz, 1H), 8.16 (dd, J = 8.2, 1.3 Hz, 1H), 7.61 – 7.48 (m, 2H), 7.45 (dd, J = 8.2, 4.2 Hz, 1H), 7.41 – 7.25 (m, 5H), 5.25 – 4.97 (m, 2H), 3.93 (dd, J = 6.8, 4.8 Hz, 1H), 3.55 (s, 3H), 2.71 – 2.44 (m, 2H), 2.33 (dt, J = 12.0, 7.5 Hz, 1H), 2.23 (dt, J = 14.3, 6.8 Hz, 1H).
A (s) 10.81
B (dd) 8.84
C (dd) 8.80
D (dd) 8.16
E (m) 7.54
F (dd) 7.45
G (m) 7.31
H (m) 5.12
I (dd) 3.93
J (s) 3.55
K (m) 2.58
L (dt) 2.33
M (dt) 2.23
0.992
1.000
1.004
1.005
2.014
1.036
5.026
2.006
1.004
2.994
2.010
1.011
1.007
O
O
O
NH
N
f1 (ppm)

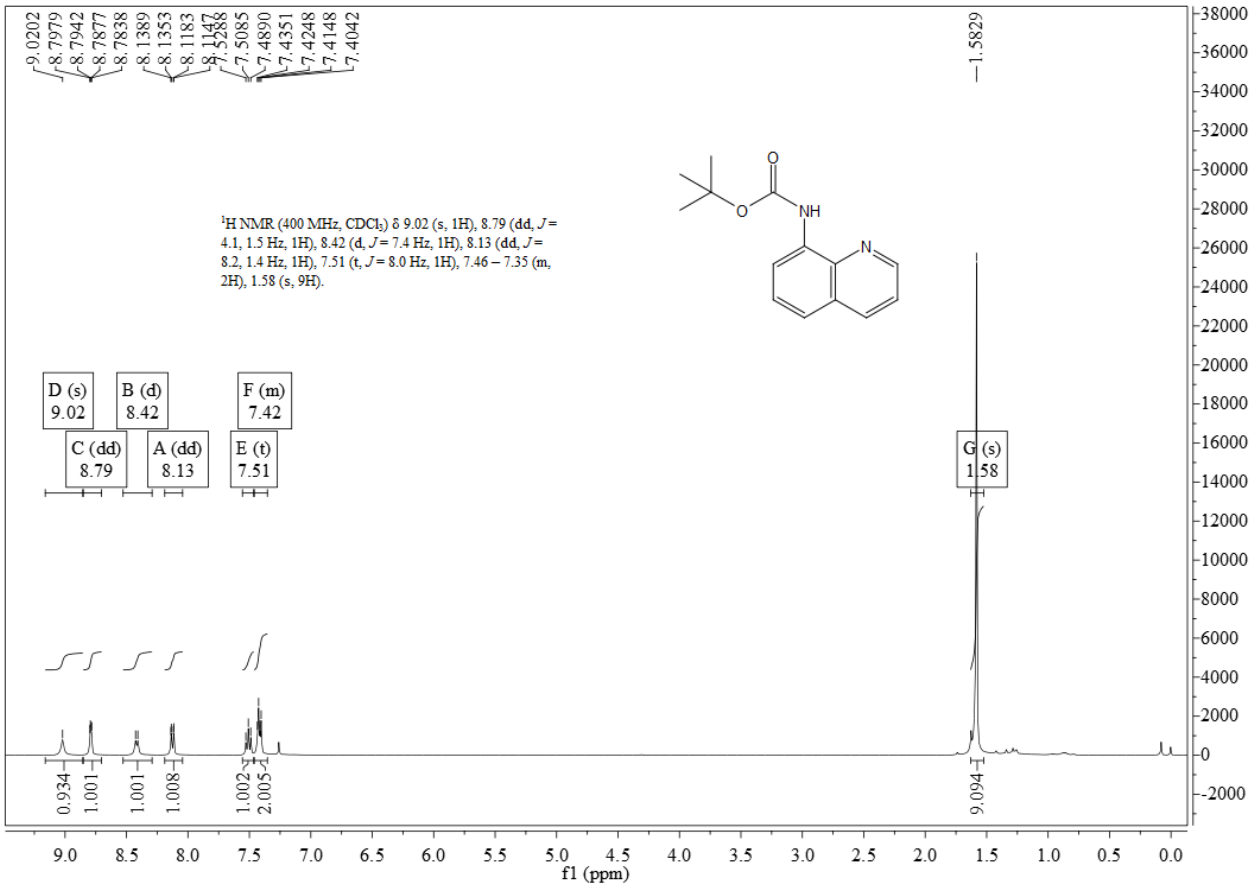

172.9586
170.7215
148.7386
139.0026
136.3139
136.0622
133.9458
128.6362
128.3297
128.2850
128.1220
127.3370
122.1607
121.7714
116.7397
82.1403
66.4320
58.8582
29.9712
27.9415
^{13}C NMR (101 MHz, CDCl$_3$) δ 172.96, 170.72, 148.74, 139.00, 136.31, 136.06, 133.95, 128.64, 128.33, 128.29, 128.12, 127.34, 122.16, 121.77, 116.74, 82.14, 66.43, 58.86, 29.97, 27.94.
O
O
O
NH
N
f1 (ppm)

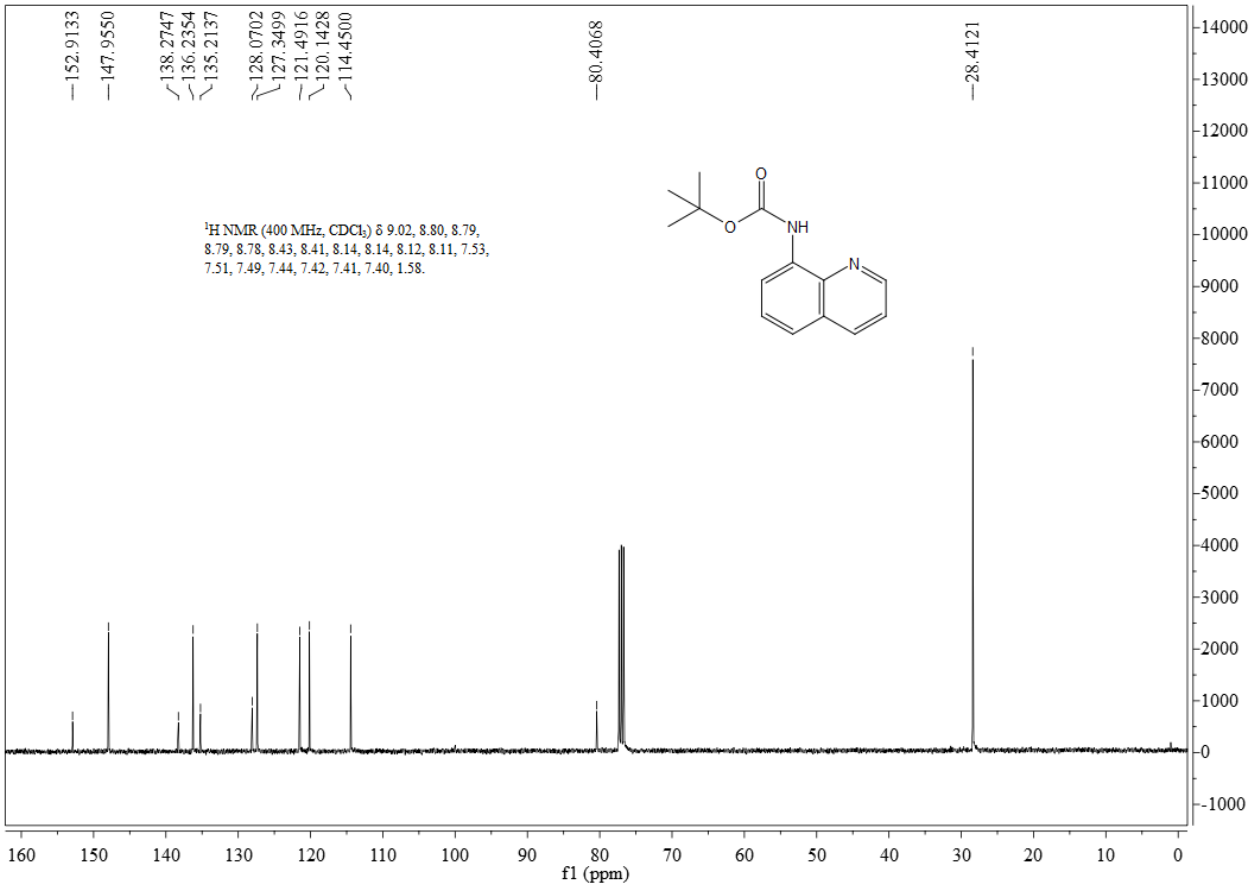

A (dd) 8.86
B (dd) 8.16
C (dd) 7.81
D (t) 7.55
E (dd) 7.50
F (dd) 7.40
G (dd) 5.05
H (s) 3.45
I (dq) 2.02
J (dddd) 1.82
K (ddd) 1.56
L (m) 1.35
M (s) 1.23
N (t) 0.91
f1 (ppm)


176.3469
152.7857
150.2880
144.1602
136.6763
135.9077
128.8812
128.0706
126.0398
121.5001
82.7731
81.5211
77.3482 CDCl3
77.0307 CDCl3
76.7131 CDCl3
57.9594
33.1540
31.7259
27.5884
25.3342
22.5576
14.0856
f1 (ppm)


7.2605
3.8190
3.8063
3.8021
3.7894
3.4415
1.8494
1.8368
1.8297
1.8148
1.8091
1.8018
1.7952
1.7754
1.7584
1.7402
1.7231
1.7050
1.4574
1.4388
1.4204
1.4017
1.3832
1.3416
1.3270
1.3163
1.3077
1.2990
1.2904
1.2767
0.9033
0.8864
0.8690
¹H NMR (400 MHz, Chloroform-d) δ 3.80 (dd, J = 6.7, 5.1 Hz, 1H), 3.44 (s, 3H), 1.89 – 1.68 (m, 2H), 1.42 (p, J = 7.4 Hz, 2H), 1.35 – 1.27 (m, 4H), 0.89 (t, J = 6.9 Hz, 3H).
OH
O
A (dd) 3.80
B (s) 3.44
C (m) 1.77
D (p) 1.42
E (m) 1.31
F (t) 0.89
1.00
2.98
2.01
2.04
4.04
3.17
f1 (ppm)


176.4664
80.2258
77.3339 CDCl3
77.0163 CDCl3
76.6988 CDCl3
58.2945
32.1955
31.4631
24.4896
22.4305
13.9595
¹³C NMR (101 MHz, CDCl3) δ 176.47, 80.23, 77.33, 77.02, 76.70, 58.29, 32.20, 31.46, 24.49, 22.43, 13.96.
OH
O
f1 (ppm)


9.0202
8.7979
8.7942
8.7877
8.7838
8.1389
8.1353
8.1183
8.1147
7.5288
7.5085
7.4890
7.4351
7.4248
7.4148
7.4042
1.5829
^{1}H NMR (400 MHz, CDCl$_3$) δ 9.02 (s, 1H), 8.79 (dd, J = 4.1, 1.5 Hz, 1H), 8.42 (d, J = 7.4 Hz, 1H), 8.13 (dd, J = 8.2, 1.4 Hz, 1H), 7.51 (t, J = 8.0 Hz, 1H), 7.46 – 7.35 (m, 2H), 1.58 (s, 9H).
D (s) 9.02
B (d) 8.42
F (m) 7.42
C (dd) 8.79
A (dd) 8.13
E (t) 7.51
G (s) 1.58
0.934
1.001
1.001
1.008
1.002
2.005
9.094
f1 (ppm)


152.9133
147.9550
138.2747
136.2354
135.2137
128.0702
127.3499
121.4916
120.1428
114.4500
80.4068
28.4121
^{1}H NMR (400 MHz, CDCl$_3$) δ 9.02, 8.80, 8.79, 8.79, 8.78, 8.43, 8.41, 8.14, 8.14, 8.12, 8.11, 7.53, 7.51, 7.49, 7.44, 7.42, 7.41, 7.40, 1.58.
f1 (ppm)