Electronic Supplementary Material (ESI) for ChemComm.

Cu-catalyzed Selective Cascade *sp*^{3} C-H Bonds Oxidative Functionlization towards Isoxazoline Derivatives

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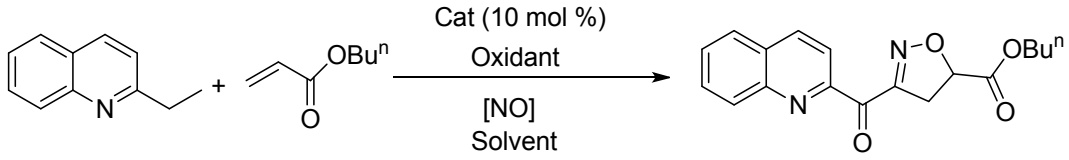
1. General information

^{1}H and ^{13}C NMR spectra were recorded on a Bruker advance Ⅲ 400 spectrometer in $CDCl_3$ with TMS as internal standard. ^{19}F NMR was recorded on the same instrument. Data are reported as follows: Chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet), Coupling constants, *J*, are reported in hertz. IR spectra were recorded on a Nexus 670 FT-IR spectrometer and only major peaks are reported in cm^{-1}. Mass spectra were mearsured using Bruker microTOF-Q II. The starting materials were purchased from Aldrich, Acros Organics, J&K Chemicals or TCI and used without further purification. Solvents were dried and purified according to the procedure from "Purification of Laboratory Chemicals book". Column chromatography was carried out on silica gel (particle size 200-400 mesh ASTM).

2. Reaction conditions screening[a]



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

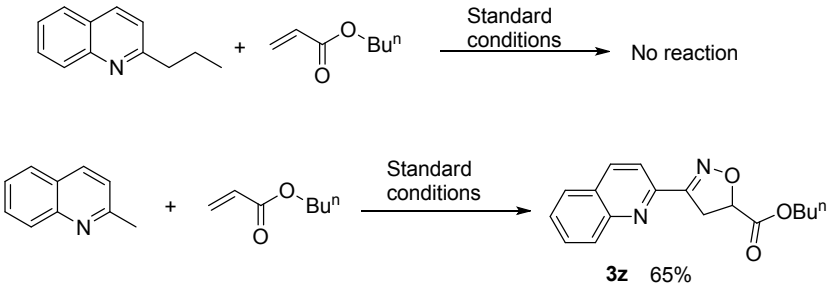
Entry	Cat.	Oxidant	[NO]	Solvent	Yield of **3a** [%][b,c]
1	$CuCl_2$	$PhI(OAc)_2$	KNO_3	DMF	0
2	$CuCl_2$	BQ	KNO_3	DMF	0
3	$CuCl_2$	TBHP	KNO_3	DMF	0
4	$CuCl_2$	Select-F	KNO_3	DMF	21
5	$CuCl_2$	$K_2S_2O_8$	KNO_3	DMF	63
6	CuCl	$K_2S_2O_8$	KNO_3	DMF	65
7	CuBr	$K_2S_2O_8$	KNO_3	DMF	71
8	$Sc(OTf)_3$	$K_2S_2O_8$	KNO_3	DMF	0
9	$AlCl_3$	$K_2S_2O_8$	KNO_3	DMF	0
10	$Zn(OTf)_2$	$K_2S_2O_8$	KNO_3	DMF	0
11	$Fe(acac)_2$	$K_2S_2O_8$	KNO_3	DMF	24
12	CuBr	$K_2S_2O_8$	KNO_3	DMF	72[d]
13	CuBr	$K_2S_2O_8$	KNO_3	DMF	76
14	CuBr	$K_2S_2O_8$	KNO_2	DMF	0
15	CuBr	$K_2S_2O_8$	$NaNO_3$	DMF	74
16	CuBr	$K_2S_2O_8$	NH_4NO_3	DMF	37
17	CuBr	$K_2S_2O_8$	$AgNO_3$	DMF	0
18	CuBr	$K_2S_2O_8$	KNO_3	DMSO	42
19	CuBr	$K_2S_2O_8$	KNO_3	THF	0
20	CuBr	$K_2S_2O_8$	KNO_3	DCE	0
21	CuBr	$K_2S_2O_8$	KNO_3	Toluene	0
22	CuBr	$K_2S_2O_8$	KNO_3	CH_3CN	43
23	CuBr	$K_2S_2O_8$	KNO_3	$DMF/CH_3CN=10:1$	82[e]
24	---	$K_2S_2O_8$	KNO_3	DMF	0

[a] Reaction was carried out with Cu (10 mol %), oxidant (2.5 equiv), [NO] (6.0 equiv), 2-ethylquinoline **1a** (0.2mmol), butyl acrylate **2a** (0.6 mmol) in solvent (2.0 ml) at 80 °C for 24 h. [b] Isolated yield. [c] Entries 1-9 were preformed in a closed tube under air and entries 11-20 were preformed in an open tube. [d] Reaction wwas preformed under O_2. [e] $DMF/CH_3CN=2ml/0.2ml$.

3. General procedures:

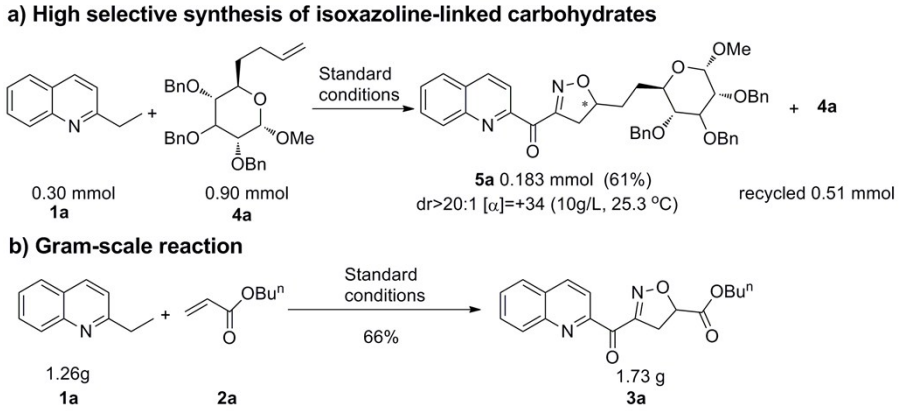
In a schlenk tube, 2-ethylquinpline **1a** (0.30 mmol), butyl acrylate **2a** (0.9 mmol), CuBr (0.03 mmol), $K_2S_2O_8$ (0.75 mmol), KNO_3 (1.80 mmol) were added. Then, anhydrous DMF (3 mL) and acetonitrile (0.3mL) were added. The mixture was allowed to stir at 80°C for 24 hr with the tube open to air. After substrate was consumed (monitored by TLC), the reaction was cooled to room temperature, and then the mixture is extracted by EtOAc (4*10 mL) and H_2O. The organic layers were combined, dried with $MgSO_4$. The residue was purified by column chromatography (EtOAc /petroleum ether=10/1) to give the product **3a**.

4. Other 2-substituted quinolines scope



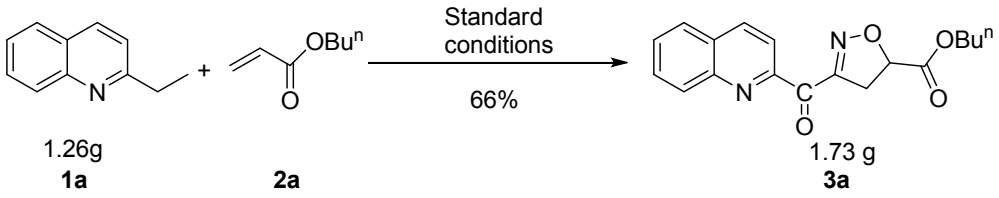
5. Synthetic application

5.1 High selective synthesis of isoxazoline-linked carbohydrates



In a schlenk tube, 2-ethylquinpline **1a** (0.30 mmol), carbohydrates **4a** (0.9 mmol), CuBr (0.03 mmol), $K_2S_2O_8$ (0.75 mmol), KNO_3 (1.80 mmol) were added. Then, anhydrous DMF (3 mL) and acetonitrile (0.3mL) were added. After the mixture was stir at 80°C for 20 hours with the tube open to air, the reaction was cooled to room temperature, and then the mixture is extracted by EtOAc (5*10 mL) and H_2O. Organic layers were combined, dried with $MgSO_4$. The residue was purified by column chromatography (petroleum ether/EtOAc=10/1) to give the product **5a**, and the big part of excess carbohydrates **4a** was recycled (0.51 mmol).

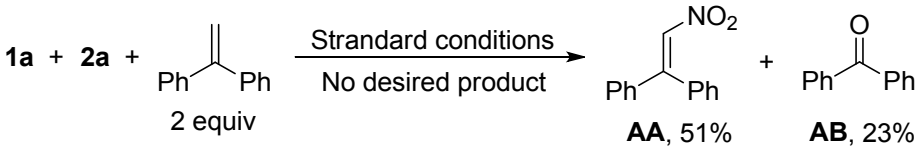
5.2 Gram-scale reaction



In a 100 ml round-bottom flask, 2-ethylquinpline **1a** (8.0 mmol, 1.26g), butyl acrylate 2**a** (2.4 mmol, 3.07g), CuBr (0.8 mmol), $K_2S_2O_8$ (20 mmol), KNO_3 (48 mmol) were added. Then, anhydrous DMF (60 mL) and acetonitrile (6 mL) were added. After the mixture was stir at 80°C for 24 hours with the tube open to air, the reaction was cooled to room temperature, and then the mixture is extracted by EtOAc (2*150 mL) and H_2O (150 mL). Organic layers were combined, dried with $MgSO_4$. The residue was purified by column chromatography (petroleum ether/EtOAc=10/1) to give the product **3a** (5.28 mmol, 1.73g, 66 %).

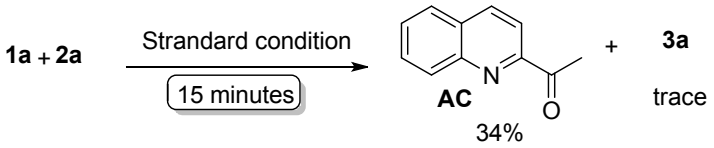
6. Mechanism experiments

6.1. Radical trapping experiments

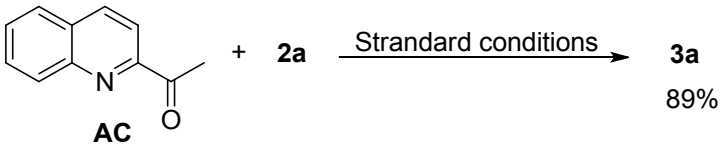


In a schlenk tube, 2-ethylquinpline **1a** (0.30 mmol), butyl acrylate **2a** (0.9 mmol), CuBr (0.03 mmol), $K_2S_2O_8$ (0.75 mmol), KNO_3 (1.80 mmol) were added, anhydrous DMF (3 mL) and acetonitrile (0.3mL) were added, then 1, 1-Diphenylethylene (0.60 mmol) was added to the system. After stir at 80°C for 4 hours, the reaction was completed (TLC). Then it was cooled to room temperature, extracted by EtOAc (3*10 mL) and H_2O. The organic layers were combined, dried with $MgSO_4$. The residue was purified by column chromatography (petroleum ether/EtOAc=50/1) to give the (2-nitroethene-1, 1-diyl)dibenzene **AA** (51%) and benzophenone **BB** (23%)**.** No desire product was formed under this condition.

6.2. Control experiments

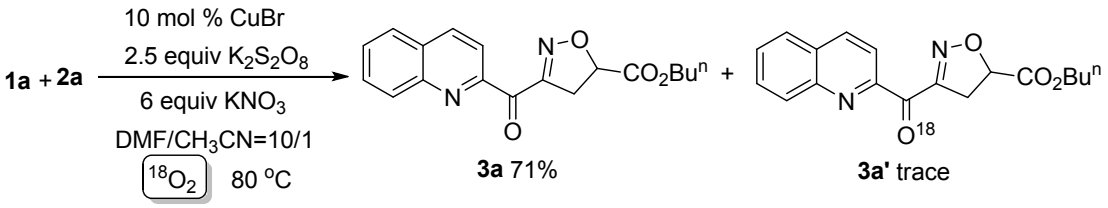


In a schlenk tube, 2-ethylquinpline **1a** (0.30 mmol), butyl acrylate **2a** (0.9 mmol), CuBr (0.03 mmol), $K_2S_2O_8$ (0.75 mmol), KNO_3 (1.80 mmol) were added. Then, anhydrous DMF (3 mL) and acetonitrile (0.3mL) were added. The mixture was allowed to stir at 80°C for 15 mintues with the tube open to air. Then the reaction was cooled to room temperature, and then the mixture is extracted by EtOAc (3*10 mL) and H_2O. Organic layers were combined, dried with $MgSO_4$. The residue was purified by column chromatography (EtOAc/petroleum ether=20/1) to give the product **AC** in 34 % yield combined with trace amount of **3a**.



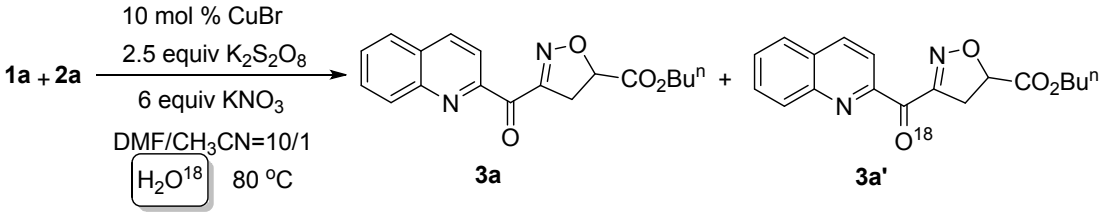
In a schlenk tube, 1-(quinolin-2-yl)ethanone **AC** (0.30 mmol), butyl acrylate **2a** (0.9 mmol), CuBr (0.03 mmol), $K_2S_2O_8$ (0.75 mmol), KNO_3 (1.80 mmol) were added. Then, anhydrous DMF (3 mL) and acetonitrile (0.3mL) were added. The mixture was allowed to stir at 80°C for 24 hr with the tube open to air. Then the reaction was cooled to room temperature, and the mixture is extracted by EtOAc (3*10 mL) and H_2O. Organic layers were combined, dried with $MgSO_4$. The residue was purified by column chromatography (EtOAc /petroleum ether=101/1) to give the product **3a** in 89 % yield.

6.3. $^{18}O_2$ labeling experiment



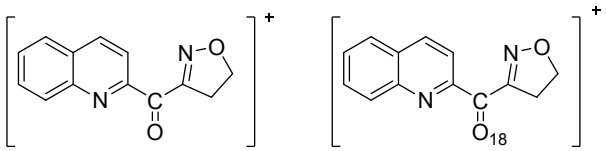
In a schlenk tube, 2-ethylquinpline **1a** (0.30 mmol), butyl acrylate **2a** (0.9 mmol), CuBr (0.03 mmol), $K_2S_2O_8$ (0.75 mmol), KNO_3 (1.80 mmol) were added, anhydrous DMF (3 mL) and acetonitrile (0.3mL) were added, the tube was degassed and charged with ^{18}O (three times). The mixture was allowed to stir at 80°C for 24 hours, then the reaction was cooled to room temperature and extracted by EtOAc (3*10 mL) and H_2O. The organic were combined, dried with $MgSO_4$. The residue was purified by column chromatography (petroleum ether/EtOAc=10/1) to give the product, and product was analyzed by chromatography-mass spectrometry to indentify the percentage of **3a'**. This result indicated that molecular oxygen was not the oxygen source of the carbonyl group

6.4. H_2O^{18} labeling experiment



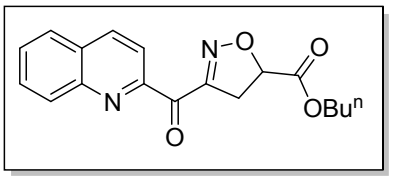
Equivalent of H_2O^{18} (equiv)	0	1	2	3	4	5	7	9
Total yield (3a+3a')	81.4%	81.9%	76.6%	69.0%	57.8%	54.5%	33.1%	29.9%
Precentage of 3a' [3a'/(3a+3a')]	0%	7.7%	11.1%	13.4%	15.4%	18.3%	24.5%	28.7%

In eight different schlenk tubes, 2-ethylquinpline **1a** (0.30 mmol), butyl acrylate **2a** (0.9 mmol), CuBr (0.03 mmol), $K_2S_2O_8$ (0.75 mmol), KNO_3 (1.80 mmol), anhydrous DMF (3 mL) and acetonitrile (0.3mL) were added to every tube, then different equivalents of H_2O^{18} (0, 1, 2, 3, 4, 5, 7, 9,) were added to the different tubes and allowed to stir at 80°C for 24 hours, then every reactions were extracted by EtOAc (3*10 mL) and H_2O. The organic were combined, dried with $MgSO_4$. The every residue was purified by column chromatography (petroleum ether/EtOAc=10/1) to give the corresponding products, and products were analyzed by chromatography-mass spectrometry to indentify the percentage of **3a'** (We used the debris samples of **CC** and **CC'** as the standard to set up the ration). This result indicated that that H_2O might serve as a small part of the oxygen source for the carbonyl group.

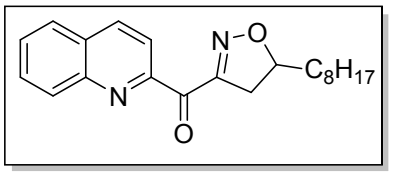


CC CC'

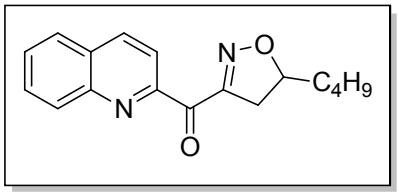
7. Characterization of the Products



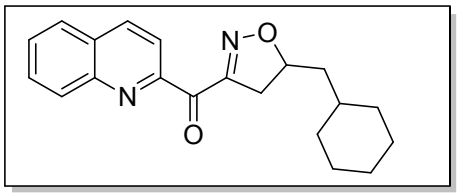
butyl 3-(quinoline-2-carbonyl)-4,5-dihydroisoxazole-5-carboxylate 3a : Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.32 (d, *J* = 8.4 Hz, 1H), 8.23 (d, *J* = 8.4 Hz, 1H), 8.11 (d, *J* = 8.8 Hz, 1H), 7.88 (d, *J* = 8.4 Hz, 1H), 7.79 (t, *J* = 7.6 Hz, 1H), 7.66 (t, *J* = 7.6 Hz, 1H), 5.28 (t, *J* = 9.6 Hz, 1H), 4.24 (t, *J* = 9.6 Hz, 2H), 3.86 (d, *J* = 9.6 Hz, 2H), 1.69 (m, 2H), 1.40 (m, 2H), 0.94 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 185.66, 169.13, 156.48, 152.54, 147.18, 137.09, 130.71, 130.33, 129.36, 128.98, 127.57, 120.08, 79.62, 65.96, 38.72, 30.38, 19.02, 18.93, 13.57. HRMS calc. for $C_{18}H_{18}N_2O_4$ $(M+H)^+$, 327.1339; found, 327.1335.



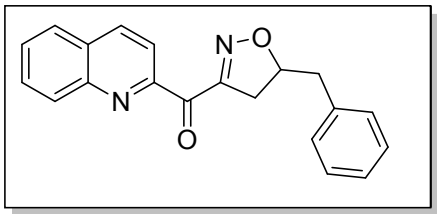
(5-octyl-4,5-dihydroisoxazol-3-yl)(quinolin-2-yl)methanone 3b : Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.30 (d, *J* = 8.4 Hz, 1H), 8.25 (d, *J* = 8.4 Hz, 1H), 8.09 (d, *J* = 8.4 Hz, 1H), 7.87 (d, *J* = 8.4 Hz, 1H), 7.80-7.76 (m, 1H), 7.65 (t, *J* = 7.6 Hz, 1H), 4.91-4.83 (m, 1H), 3.54 (dd, *J* = 10.8 Hz, *J* = 17.2 Hz, 1H), 3.15 (dd, *J* = 8.8 Hz, *J* = 17.6 Hz, 1H), 1.90-1.81 (m, 1H), 1.74-1.62 (m, 1H), 1.54-1.39 (m, 12H), 0.88 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.96, 157.50, 153.27, 147.31, 136.93, 130.77, 130.22, 129.26, 128.70, 127.55, 120.39, 84.23, 38.95, 35.14, 31.79, 29.40, 29.33, 29.15, 25.25, 22.61, 14.05. HRMS calc. for $C_{21}H_{26}N_2O_2$ $(M+H)^+$, 339.2067; found, 339.2063.



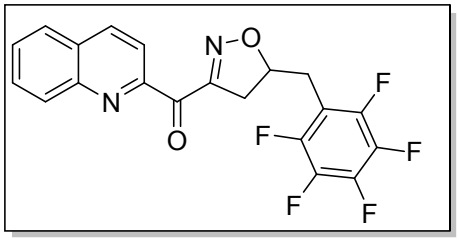
(5-butyl-4,5-dihydroisoxazol-3-yl)(quinolin-2-yl)methanone 3c : Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.31 (d, *J* = 8.4 Hz, 1H), 8.25 (d, *J* = 8.4 Hz, 1H), 8.09 (d, *J* = 8.8 Hz, 1H), 7.88 (d, *J* = 8.0 Hz, 1H), 7.81-7.77 (m, 1H), 7.68-7.64 (m, 1H), 4.92-4.84 (m, 1H), 3.54 (dd, *J* = 10.8 Hz, *J* = 17.2 Hz, 1H), 3.16 (dd, *J* = 8.8 Hz, *J* = 17.2 Hz, 1H), 1.91-1.82 (m, 1H), 1.73-1.65 (m, 1H), 1.55-1.35 (m, 4H), 0.94 (t, *J* = 6.8 Hz, 1H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.91, 157.46, 153.18, 147.23, 136.91, 130.69, 130.20, 129.19, 128.68, 127.52, 120.37, 84.19, 38.87, 34.78, 27.31, 22.39, 13.89. HRMS calc. for $C_{17}H_{18}N_2O_2$ $(M+H)^+$, 283.1441; found, 283.1438.



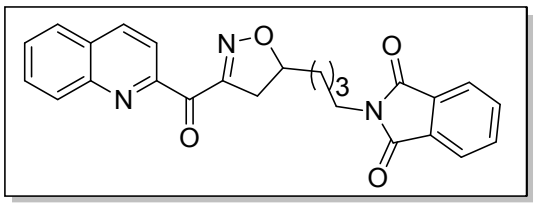
(5-(cyclohexylmethyl)-4,5-dihydroisoxazol-3-yl)(quinolin-2-yl)methanone 3d : Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.30 (d, *J* = 8.8 Hz, 1H), 8.25 (d, *J* = 8.8 Hz, 1H), 8.08 (d, *J* = 8.4 Hz, 1H), 7.87 (d, *J* = 8.4 Hz, 1H), 7.80-7.76 (m, 1H), 7.67-7.63 (m, 1H), 5.00-4.94 (m, 1H), 3.56 (dd, *J* = 10.4 Hz, *J* = 17.2 Hz, 1H), 3.12 (dd, *J* = 8.8 Hz, *J* = 17.2 Hz, 1H), 1.86-1.54 (m, 6H), 1.53-1.49 (m, 2H), 1.33-1.15 (m, 3H), 1.04-0.94 (m, 2H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.87, 157.52, 153.18, 147.22, 136.88, 130.88, 130.27, 129.17, 128.64, 127.80, 120.35, 82.37, 42.93, 38.52, 34.55, 33.38, 32.87, 26.30, 26.05, 26.03. HRMS calc. for $C_{20}H_{22}N_2O_2$ $(M+H)^+$, 323.1754; found, 323.1758.



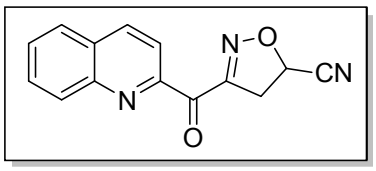
(5-benzyl-4,5-dihydroisoxazol-3-yl)(quinolin-2-yl)methanone 3e : Yellow solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.29 (d, *J* = 9.6 Hz, 1H), 8.23 (d, *J* = 8.4 Hz, 1H), 8.04 (d, *J* = 7.6 Hz, 1H), 7.87 (d, *J* = 8.0 Hz, 1H), 7.78 (m, 1H), 7.65 (m, 1H), 7.28 (m, 5H), 5.13 (m, 1H), 3.49 (dd, *J* = 10.8 Hz, *J* = 17.6 Hz, 1H), 3.27 (dd, *J* = 8.4 Hz, *J* = 17.6 Hz, 1H), 3.19 (dd, *J* = 6.0 Hz, *J* = 14.0 Hz, 1H), 2.99 (dd, *J* = 6.4 Hz, *J* = 14.0 Hz, 1H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.71, 157.42, 153.06, 147.23, 136.97, 136.10, 130.69, 130.26, 129.40, 129.31, 129.25, 128.75, 128.65, 127.54, 126.91, 120.34. HRMS calc. for $C_{20}H_{16}N_2O_2$ $(M+H)^+$, 317.1286; found, 317.1282.



(5-((perfluorophenyl)methyl)-4,5-dihydroisoxazol-3-yl)(quinolin-2-yl)methanone 3f : White solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.33 (d, *J* = 8.8 Hz, 1H), 8.23 (d, *J* = 8.8 Hz, 1H), 8.10 (d, *J* = 8.8 Hz, 1H), 7.89 (d, *J* = 8.4 Hz, 1H), 7.83-7.78 (m, 1H), 7.70-7.66 (m, 1H), 5.15-5.07 (m, 1H), 3.65 (dd, *J* = 10.8 Hz, *J* = 17.6 Hz, 1H), 3.37 (dd, *J* = 7.2 Hz, *J* = 17.6 Hz, 1H), 3.23 (dd, *J* = 7.6 Hz, *J* = 14.0 Hz, 1H), 3.10 (dd, *J* = 6.0 Hz, *J* = 14.4 Hz, 1H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.36, 157.12, 152.75, 147.20, 145.44 (dm, *J* = 246.0 Hz), 140.35 (dm, *J* = 251.0 Hz), 137.52 (dm, *J* = 244.0 Hz), 137.12, 130.69, 130.37, 129.37, 128.97, 127.60, 120.10, 109.98-109.57 (m), 81.11, 39.46, 27.90. ^{19}F NMR (367 MHz, CDCl3) δ: -142.0 (m, 2F), -155.3 (t, *J* = 18.5 Hz 1F), -161.8 (m, 2F). HRMS calc. for $C_{20}H_{11}F_5N_2O_2$ $(M+H)^+$, 407.0813; found, 407.0808.

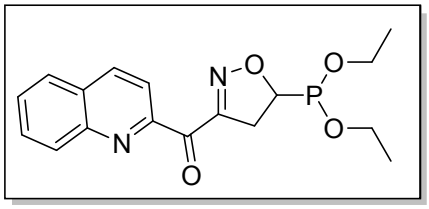

mixed with trace amount of impurities.

2-(2-(3-(quinoline-2-carbonyl)-4,5-dihydroisoxazol-5-yl)ethyl)isoindoline-1,3-dione 3h : Yellow oil. Selected ^{1}H NMR (400 MHz, CDCl3) δ: 8.30 (d, *J* = 8.8 Hz, 1H), 8.24 (d, *J* = 8.4 Hz, 1H), 8.08 (d, *J* = 8.8 Hz, 1H), 7.88-7.76 (m, 4H), 7.71-7.63 (m, 3H), 4.91-4.83 (m, 1H), 3.74-3.71 (m, 2H), 3.56 (dd, *J* = 10.8 Hz, *J* = 17.2 Hz, 1H), 3.16 (dd, *J* = 8.4 Hz, *J* = 17.2 Hz, 1H), 1.95-1.86 (m, 1H), 1.84-1.73 (m, 3H), 1.64-1.55 (m, 1H), 1.53-1.43 (m, 1H). Selected ^{13}C NMR (400 MHz, CDCl3) δ: 186.76, 168.33, 157.41, 153.10, 147.18, 136.92, 133.85, 131.97, 130.67, 130.20, 129.19, 128.68, 127.50, 123.13, 120.32, 83.70, 39.00, 37.52, 34.58, 28.23, 22.56. HRMS calc. for $C_{25}H_{21}N_3O_4$ $(M+H)^+$, 428.1605; found, 428.1606.

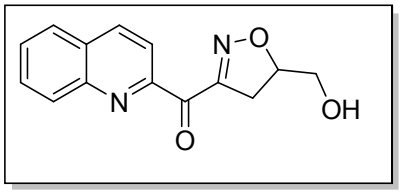


3-(quinoline-2-carbonyl)-4,5-dihydroisoxazole-5-carbonitrile 3i : Red oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.36 (d, *J* = 8.4 Hz, 1H), 8.23 (d, *J* = 8.4 Hz, 1H), 8.14 (d, *J* = 8.4 Hz, 1H), 7.92 (d, *J* = 8.0 Hz, 1H), 7.85-7.81 (m, 1H), 7.71 (t, *J* = 7.6 Hz, 1H), 5.48 (dd, *J* = 7.6 Hz, *J* = 10.4 Hz, 1H), 4.11-3.99 (m, 2H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 184.69, 156.30, 151.87, 147.12, 137.51,

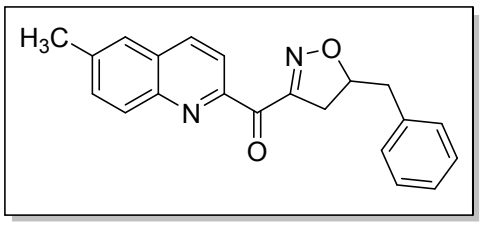
130.69, 129.67, 129.51, 127.73, 119.69, 116.20, 67.64, 41.61. HRMS calc. for $C_{14}H_9N_3O_2$ $(M+H)^+$, 252.0768; found, 252.0765.



diethyl (3-(quinoline-2-carbonyl)-4,5-dihydroisoxazol-5-yl)phosphonite 3j : Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.32 (d, *J* = 8.4 Hz, 1H), 8.22 (d, *J* = 8.8 Hz, 1H), 8.11 (d, *J* = 8.4 Hz, 1H), 7.89 (d, *J* = 8.4 Hz, 1H), 7.82-7.77 (m, 1H), 7.69-7.65 (m, 1H), 5.04-4.98 (m, 1H), 4.34-4.24 (m, 4H), 3.89 (dd, *J* = 11.2 Hz, *J* = 23.6 Hz, 2H), 1.41-1.37 (m, 6H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 185.67, 156.83, 156.77, 152.49, 147.13, 137.05, 130.65, 130.29, 129.32, 128.96, 127.54, 119.95, 77.76, 76.08, 63.62, 63.56, 63.39, 63.32, 37.46, 16.43, 16.37. ^{31}P NMR (162 MHz, CDCl3) : 17.11. HRMS calc. for $C_{17}H_{19}N_2O_5P$ $(M+H)^+$, 363.1104; found, 363.1100.

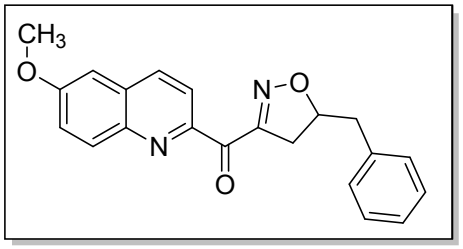


(5-(hydroxymethyl)-4,5-dihydroisoxazol-3-yl)(quinolin-2-yl)methanone 3k : Red oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.31 (d, *J* = 8.8 Hz, 1H), 8.24 (d, *J* = 8.8 Hz, 1H), 8.08 (d, *J* = 8.4 Hz, 1H), 7.87 (d, *J* = 8.4 Hz, 1H), 7.81-7.77 (m, 1H), 7.68-7.64 (m, 1H), 5.04-4.97 (m, 1H), 3.95 (dd, *J* = 2.8 Hz, *J* = 12.4 Hz, 1H), 3.75 (dd, *J* = 4.8 Hz, *J* = 12.4 Hz, 1H), 3.57 (dd, *J* = 11.2 Hz, *J* = 17.2 Hz, 1H), 3.46 (dd, *J* = 8.4 Hz, *J* = 17.2 Hz, 1H), 2,61 (br, 1H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 188.45, 157.81, 152.33, 147.13, 137.15, 130.58, 130.39, 129.22, 128.89, 127.60, 120.11, 83.76, 63.44, 35.64. HRMS calc. for $C_{14}H_{12}N_2O_3$ $(M+H)^+$, 257.0921; found, 257.0919.

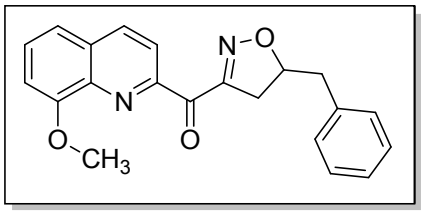


(5-benzyl-4,5-dihydroisoxazol-3-yl)(6-methylquinolin-2-yl)methanone 3l: Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.18 (d, *J* = 8.8 Hz, 1H), 8.12 (d, *J* = 8.4 Hz, 1H), 8.02 (d, *J* = 8.4 Hz, 1H), 7.61-7.59 (m, 2H), 7.28-7.24 (m, 5H), 5.15-5.07 (m, 1H), 3.48 (dd, *J* = 11.2 Hz, *J* = 17.6 Hz, 1H), 3.27 (dd, *J* = 8.4 Hz, *J* = 17.6 Hz, 1H), 3.18 (dd, *J* = 6.4 Hz, *J* = 14.0 Hz, 1H), 2.97 (dd, *J* = 7.2 Hz, *J* = 14.0 Hz, 1H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.59, 157.43, 152.14, 145.84, 139.18, 136.13,

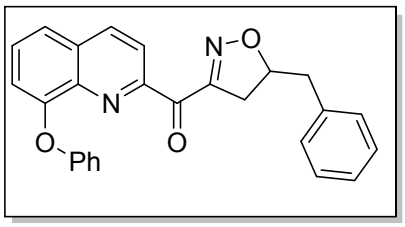
132.65, 130.32, 129.39, 129.36, 128.62, 126.87, 126.32, 120.47, 84.12, 40.83, 38.63, 21.77. HRMS calc. for $C_{21}H_{18}N_2O_2$ $(M+H)^+$, 331.1441; found, 331.1437.



(5-benzyl-4,5-dihydroisoxazol-3-yl)(6-methoxyquinolin-2-yl)methanone 3m : Yellow solid. ^1H NMR (400 MHz, $CDCl_3$) δ: 8.15-8.10 (m, 2H), 8.05 (d, *J* = 8.4 Hz, 1H), 7.41 (dd, *J* = 2.8 Hz, *J* = 9.2 Hz, 1H), 7.33-7.24 (m, 5H), 7.08 (d, *J* = 2.8 Hz, 1H), 5.15-5.07 (m, 1H), 3.95 (s, 3H), 3.49 (dd, *J* = 10.8 Hz, *J* = 17.6 Hz, 1H), 3.28 (dd, *J* = 8.0 Hz, *J* = 17.6 Hz, 1H), 3.18 (dd, *J* = 6.0 Hz, *J* = 13.6 Hz, 1H), 2.98 (dd, *J* = 6.8 Hz, *J* = 14.0 Hz, 1H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.28, 159.61, 157.44, 150.56, 143.40, 136.17, 135.27, 132.25, 130.84, 129.39, 128.62, 126.86, 123.47, 120.98, 104.61, 84.00, 55.61, 40.83, 38.82. HRMS calc. for $C_{21}H_{18}N_2O_2(M+H)^+$, 347.1390; found, 347.1386.



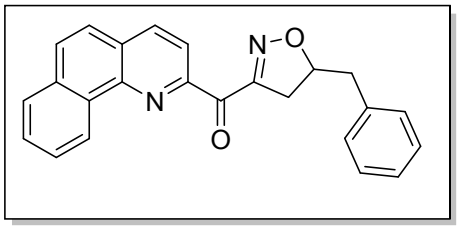
(5-benzyl-4,5-dihydroisoxazol-3-yl)(8-methoxyquinolin-2-yl)methanone 3n : Yellow solid. ^1H NMR (400 MHz, $CDCl_3$) δ: 8.24 (d, *J* = 8.8 Hz, 1H), 8.05 (d, *J* = 8.4 Hz, 1H), 7.56 (t, *J* = 8.0 Hz, 1H), 7.41 (d, *J* = 8.4 Hz, 1H), 7.34-7.23 (m, 5H), 7.07 (d, *J* = 7.6 Hz, 1H), 5.14-5.06 (m, 1H), 4.05 (s, 3H), 3.49 (dd, *J* = 10.8 Hz, *J* = 17.6 Hz, 1H), 3.30 (dd, *J* = 8.4 Hz, *J* = 17.6 Hz, 1H), 3.20 (dd, *J* = 6.0 Hz, *J* = 13.6 Hz, 1H), 2.97 (dd, *J* = 7.2 Hz, *J* = 14.0 Hz, 1H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.31, 157.47, 156.16, 151.70, 139.15, 136.72, 136.19, 130.38, 129.31, 129.28, 128.54, 126.77, 120.68 , 119.09, 108.28, 84.19, 56.04, 40.80, 38.65. HRMS calc. for $C_{21}H_{18}N_2O_3$ $(M+H)^+$, 347.1390; found, 347.1386.



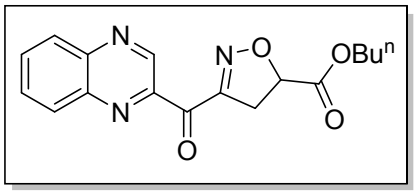
mixed with trace amount of impurities.

(5-benzyl-4,5-dihydroisoxazol-3-yl)(8-phenoxyquinolin-2-yl)methanone 3o : Yellow oil. Selected ^1H NMR (400 MHz, $CDCl_3$) δ: 8.33 (d, *J* = 8.8 Hz, 1H), 8.12 (d, *J* = 8.4 Hz, 1H), 7.62 (d,

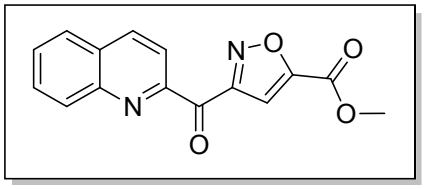
J = 8.4 Hz, 1H), 7.61-7.54 (m, 1H), 7.35-7.31 (m, 2H), 7.29-7.20 (m, 6H), 7.13-7.06 (m, 1H), 7.04 (d, *J* = 7.6 Hz, 2H), 5.01-4.93 (m, 1H), 3.40 (dd, *J* = 10.4 Hz, *J* = 17.6 Hz, 1H), 3.24 (dd, *J* = 8.4 Hz, *J* = 17.6 Hz, 1H), 3.09 (dd, *J* = 8.4 Hz, *J* = 14.0 Hz, 1H), 2.85 (dd, *J* = 6.8 Hz, *J* = 14.0 Hz, 1H). Selected ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.07, 157.29, 154.19, 152.44, 139.90, 137.16, 136.33, 130.85, 129.74, 129.34, 129.24, 128.56, 126.76, 123.61, 122.46, 120.51, 119.09, 117.34, 84.50, 40.85, 39.38. HRMS calc. for $C_{26}H_{20}N_2O_3$ $(M+H)^+$, 409.1547; found, 409.15443.



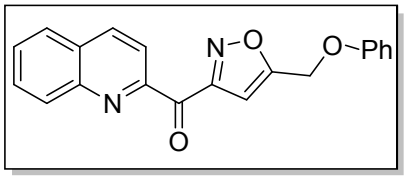
benzo[h]quinolin-2-yl(5-benzyl-4,5-dihydroisoxazol-3-yl)methanone 3p : Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 9.02 (d, *J* = 8.4 Hz, 1H), 8.62 (t, *J* = 2.4 Hz, 1H), 8.24 (d, *J* = 8.8 Hz, 1H), 8.06-7.99 (m, 3H), 7.93 (d, *J* = 6.8 Hz, 1H), 7.72-7.67 (m, 2H), 7.35-7.24 (m, 5H), 5.17-5.05 (m, 1H), 3.51 (dd, *J* = 10.8 Hz, *J* = 17.6 Hz, 1H), 3.28 (dd, *J* = 8.0 Hz, *J* = 17.6 Hz, 1H), 3.19 (dd, *J* = 6.0 Hz, *J* = 14.0 Hz, 1H), 2.99 (dd, *J* = 6.8 Hz, *J* = 14.0 Hz, 1H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.30, 157.52, 152.17, 147.50, 136.09, 132.43, 131.79, 131.41, 129.41, 128.93, 128.78, 128.65, 128.45, 128.39, 127.42, 127.31, 126.91, 123.29, 121.39, 84.19, 40.84, 38.54. HRMS calc. for $C_{24}H_{18}N_2O_2$ $(M+H)^+$, 367.1441; found, 367.1437.



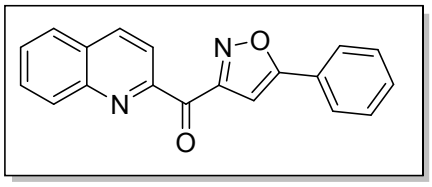
butyl 3-(quinoxaline-2-carbonyl)-4,5-dihydroisoxazole-5-carboxylate 3r : Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 9.46 (s, 1H), 8.27-8.25 (m, 1H), 8.20-8.18 (m, 1H), 7.95-7.86 (m, 2H), 5.30 (dd, *J* = 9.2 Hz, *J* = 10.8 Hz, 1H), 4.25 (t, *J* = 6.4 Hz, 2H), 3.82-3.73 (m, 2H), 1.73-1.66 (m, 2H), 1.46-1.37 (m, 2H), 0.95 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 184.68, 168.80, 156.35, 147.01, 144.23, 143.61, 141.15, 132.65, 131.05, 130.75, 129.33, 79.97, 66.14, 37.76, 30.40, 18.96, 13.60. HRMS calc. for $C_{17}H_{17}N_3O_4$ $(M+H)^+$, 328.1292; found, 328.1296.



methyl 3-(quinoline-2-carbonyl)isoxazole-5-carboxylate 3u : Yellow solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.38 (d, *J* = 8.8 Hz, 1H), 8.29-8.23 (m, 2H), 7.92 (d, *J* = 7.6 Hz, 1H), 7.86 (s, 1H), 7.85-7.81 (m, 1H), 7.31-7.69 (m, 1H), 4.04 (s, 3H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 184.04, 160.92, 160.47, 156.89, 152.07, 147.10, 137.46, 130.77, 130.53, 129.65, 129.49, 127.72, 119.66, 111.87, 53.06. HRMS calc. for $C_{15}H_{10}N_2O_4$ $(M+H)^+$, 283.0713; found, 283.0710.

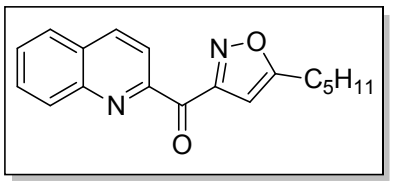


(5-(phenoxymethyl)isoxazol-3-yl)(quinolin-2-yl)methanone 3v: Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.35 (d, *J* = 8.4 Hz, 1H), 8.25-8.21 (m, 2H), 7.90 (d, *J* = 8.0 Hz, 1H), 7.82-7.78 (m, 1H), 7.70-7.66 (m, 1H), 7.35-7.35 (m, 2H), 7.22 (s, 1H), 7.05-7.00 (m, 3H), 5.28 (d, *J* = 0.4 Hz, 2H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 185.13, 168.64, 160.75, 157.60, 152.49, 147.14, 137.28, 130.78, 130.37, 129.67, 129.52, 129.21, 127.66, 121.95, 119.93, 114.78, 105.64, 61.09. HRMS calc. for $C_{20}H_{14}N_2O_3$ $(M+H)^+$, 331.1077; found, 331.1076.



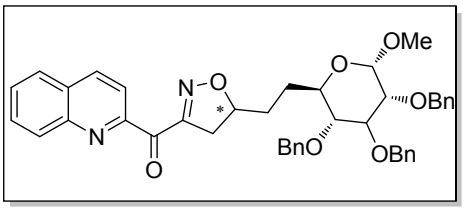
mixed with small amount of impurities.

(5-phenylisoxazol-3-yl)(quinolin-2-yl)methanone 3w : Yellow oil. Selected ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.38 (d, *J* = 8.4 Hz, 1H), 8.30 (dd, *J* = 2.0 Hz, *J* = 8.4 Hz, 2H), 7.93-7.88 (m, 3H), 7.84-7.80 (m, 1H), 7.72-7.68 (m, 1H), 7.54-7.47 (m, 3H), 7.38 (s, 1H). Selected ^{13}C NMR (400 MHz, $CDCl_3$) δ: 185.57, 170.71, 161.38, 152.76, 147.27, 137.28, 130.89, 130.59, 130.38, 129.56, 129.17, 129.10, 127.69, 126.00, 120.15, 101,46. HRMS calc. for $C_{19}H_{12}N_2O_2$ $(M+H)^+$, 301.0972; found, 301.0969.



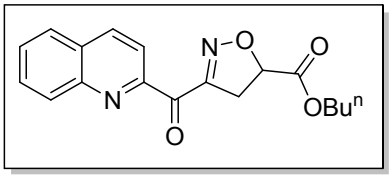
(5-pentylisoxazol-3-yl)(quinolin-2-yl)methanone 3x : Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.35 (d, *J* = 8.8 Hz, 1H), 8.26 (t, *J* = 8.8 Hz, 2H), 7.91 (d, *J* = 8.0 Hz, 1H), 7.83-7.79 (m, 1H), 7.70-7.66 (m, 1H), 6.83 (s, 1H), 2.88 (t, *J* = 7.6 Hz, 2H), 1.83-1.76 (m, 2H), 1.46-1.34 (m, 4H),

0.93 (t, J = 7.2 Hz, 3H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 185.91, 174.64, 160.84, 152.94, 147.27, 137.19, 130.86, 130.29, 129.50, 129.04, 127.65, 120.19, 102.74, 31.18, 27.14, 26.67, 22.25, 13.88. MS (ESI) $(M+H)^+$: 294.9. HRMS calc. for $C_{18}H_{18}N_2O_2$ $(M+H)^+$, 295.1441; found, 295.1438.

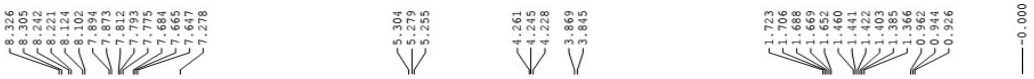


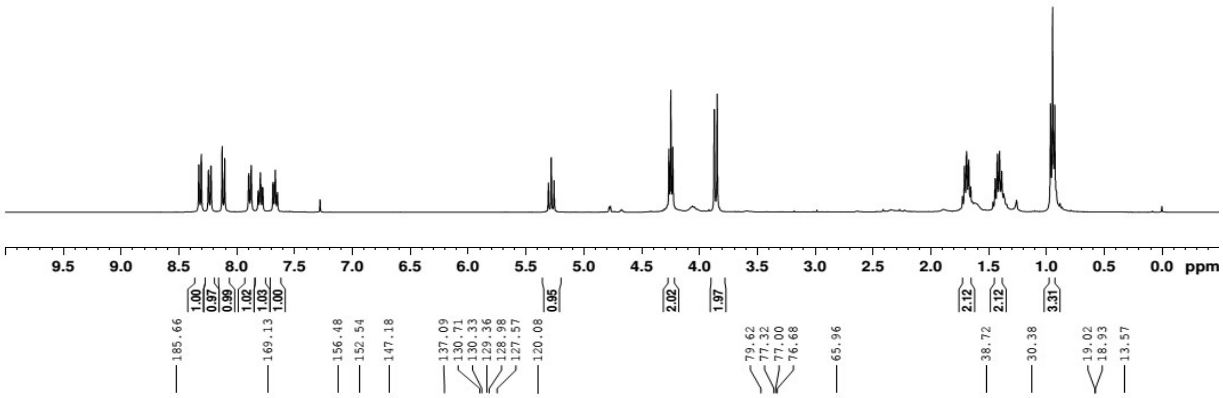
quinolin-2-yl(5-(((3,4,5-tris(benzyloxy)-6-methoxytetrahydro-2H- pyran-2- yl)methoxy)methyl)-4,5-dihydroisoxazol-3-yl)methanone 5a : Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.29-8.21 (m, 2H), 8.07 (dd, J = 2.4 Hz, J = 8.4 Hz, 1H), 7.85 (d, J = 8.0 Hz, 1H), 7.78-7.73 (m, 1H), 7.65-7.61 (m, 1H), 7.36-7.30 (m, 6H), 7.28-7.24 (m, 9H), 5.00 (d, J = 10.8 Hz, 1H), 4.91 (d, J = 10.8 Hz, 1H), 4.82 (t, J = 12.0 Hz, 3H), 4.68-4.61 (m, 2H), 4.54 (d, J = 3.2 Hz, 1H), 3.98 (t, J = 9.2 Hz, 1H), 3.62 (t, J = 8.8 Hz, 1H), 3.53-3.34 (m, 2H), 3.33 (s, 3H), 3.21 (t, J = 9.2 Hz, 1H), 3.14-3.05 (m, 1H), 2.01-1.92 (m, 1H), 1.89-1.80 (m, 1H), 1.69-1.40 (m, 2H). ^{13}C NMR (400 MHz, $CDCl_3$) δ: 186.76, 157.31, 153.06, 147.17, 138.57, 138.00, 137.98, 136.89, 130.65, 130.64, 130.17, 129.15, 128.66, 128.36, 128.31, 128.01, 127.98, 127.91, 127.82, 127.73, 127.54, 127.48, 120.27, 120.25, 97.73, 97.70, 83.84, 83.74, 81.93, 81.41, 80.00, 75.66, 75.15, 75.12, 73.22, 69.64, 69.59, 55.02, 38.92, 38.85, 31.02, 30.95, 27.26, 27.00. HRMS calc. for $C_{42}H_{41}N_2O_7$ $(M+Na)^+$, 709.2891; found, 709.2884.

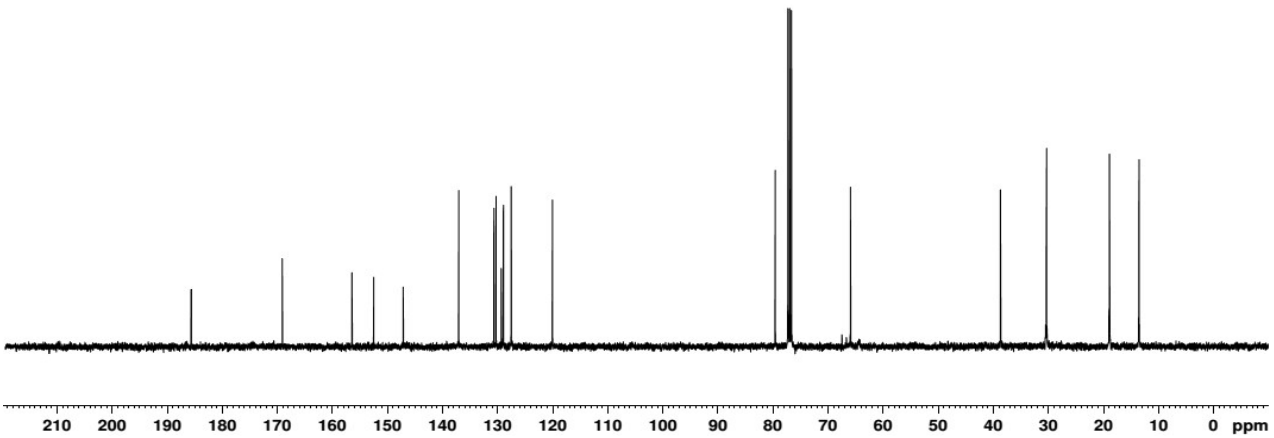
8. Charts of products

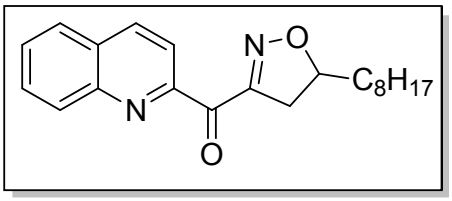


3a

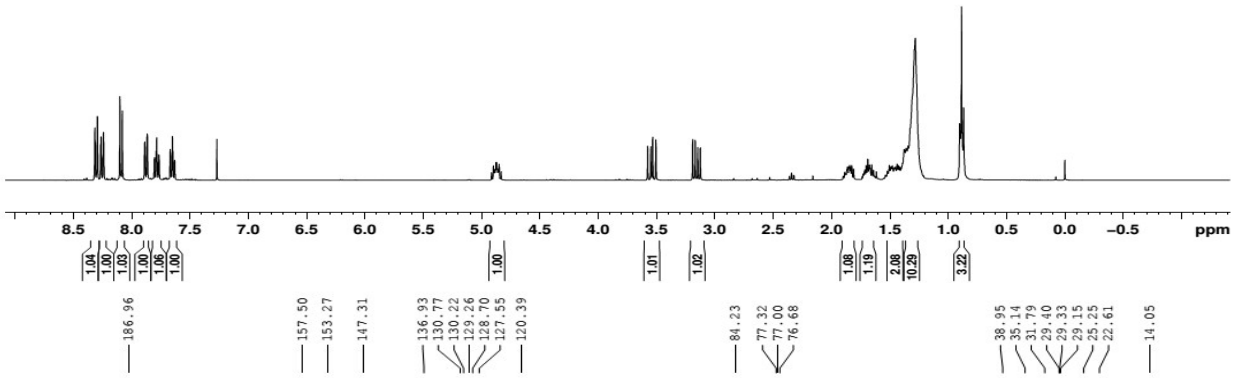


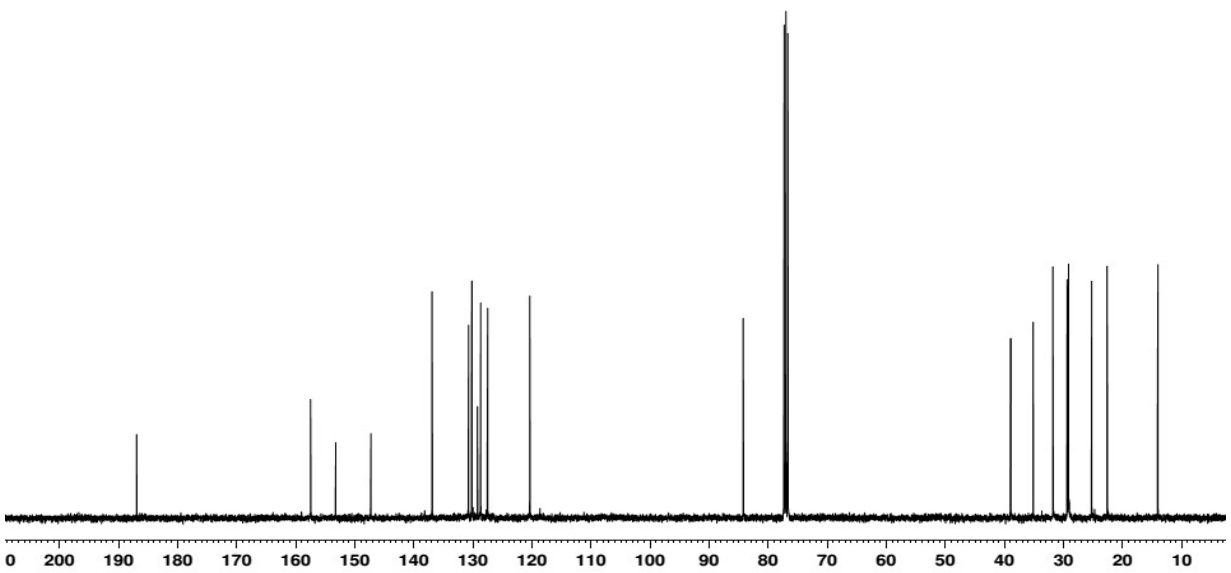


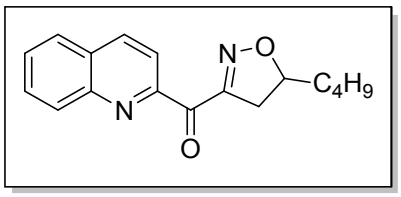



N
O
N
O
C_8H_{17}

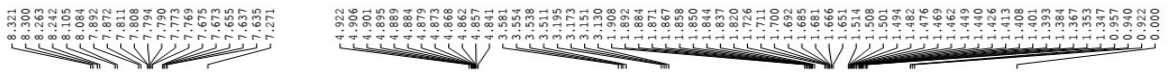
3b

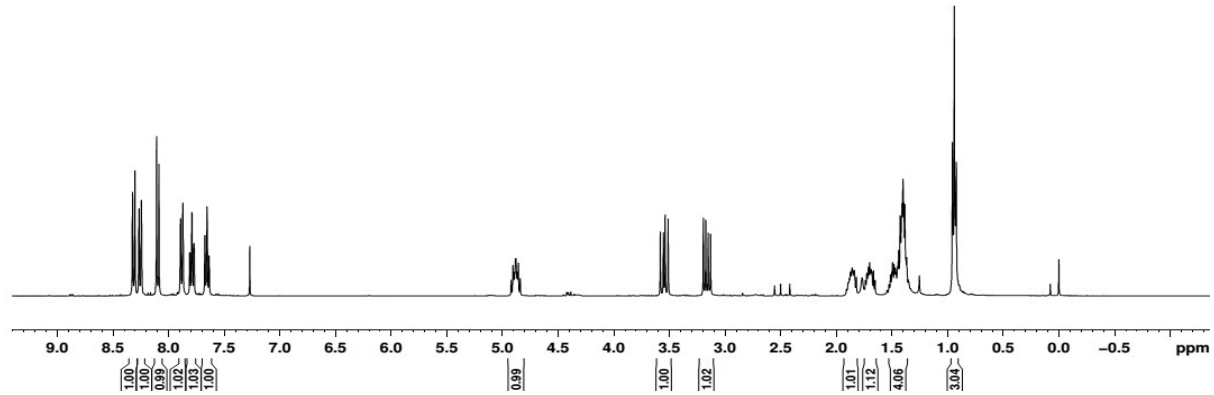

8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
−0.5
ppm

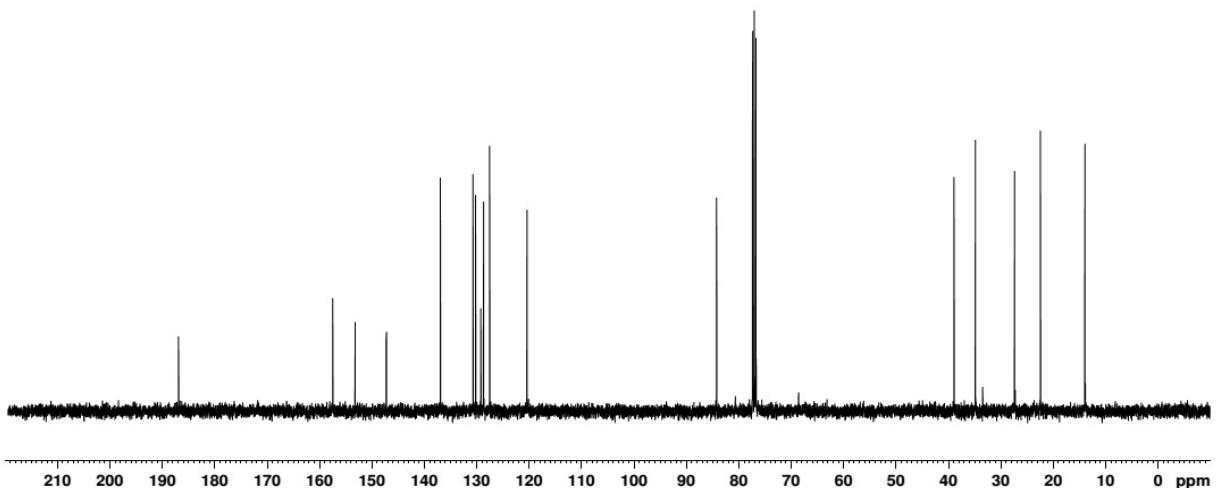

0
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10

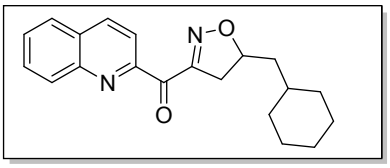

N
O
N
O
C_4H_9

3c

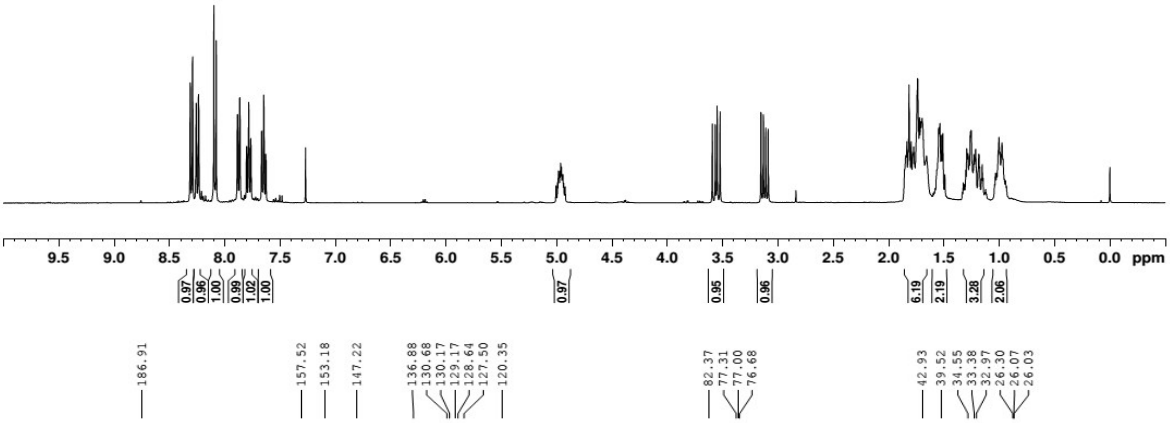


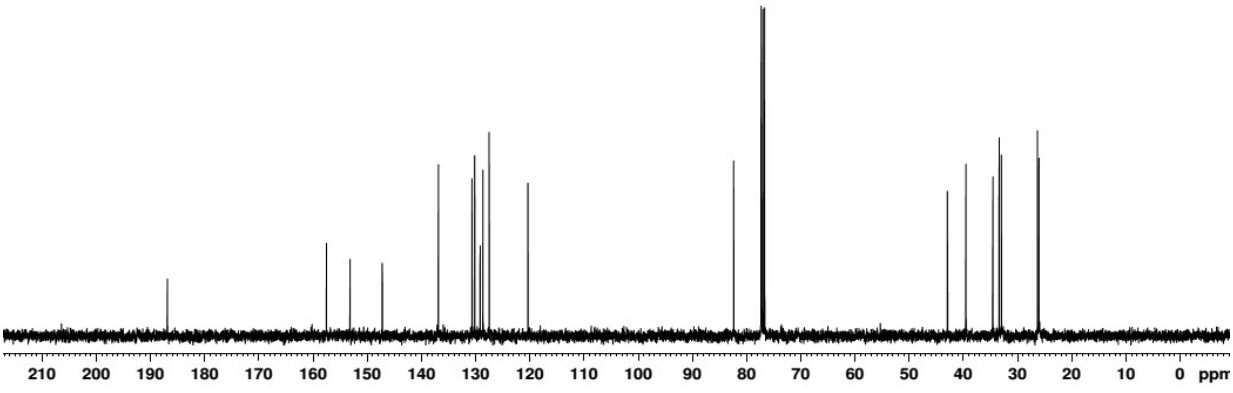

9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 −0.5 ppm
1.00 1.00 0.99 1.02 1.03 1.00
0.99
1.00
1.02
1.01 1.12 4.06
3.04

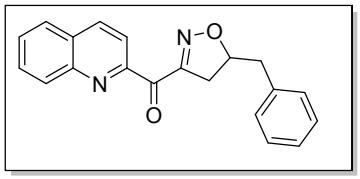

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm



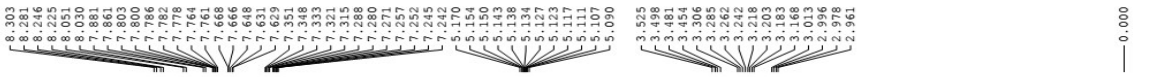
3d

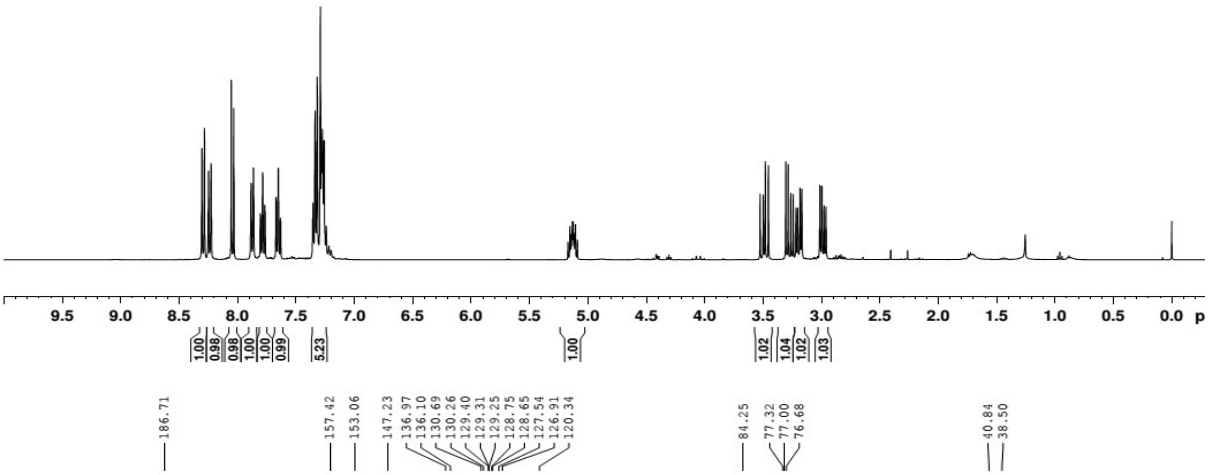




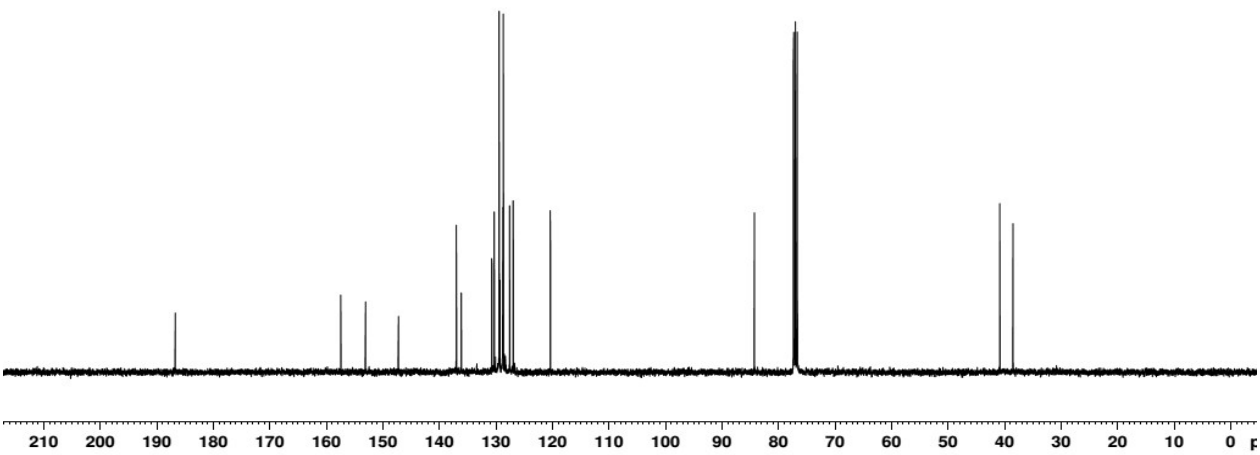


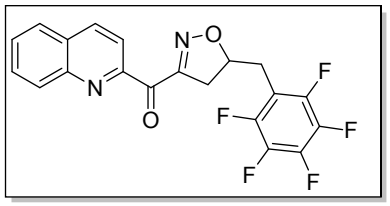
3e


8.303
8.281
8.246
8.225
8.051
8.030
7.881
7.861
7.803
7.800
7.786
7.782
7.778
7.764
7.761
7.668
7.666
7.648
7.631
7.629
7.351
7.348
7.333
7.321
7.315
7.288
7.280
7.271
7.257
7.252
7.245
7.242
5.170
5.154
5.150
5.143
5.138
5.134
5.127
5.123
5.117
5.111
5.107
5.090
3.525
3.498
3.481
3.454
3.306
3.285
3.262
3.242
3.218
3.203
3.183
3.168
3.013
2.996
2.978
2.961
0.000

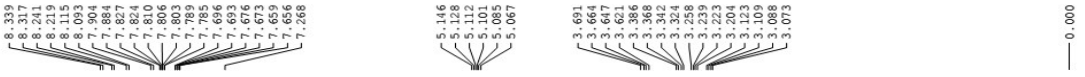

9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 p
1.00
0.98
0.98
1.00
1.00
0.99
5.23
1.00
1.02
1.04
1.02
1.03

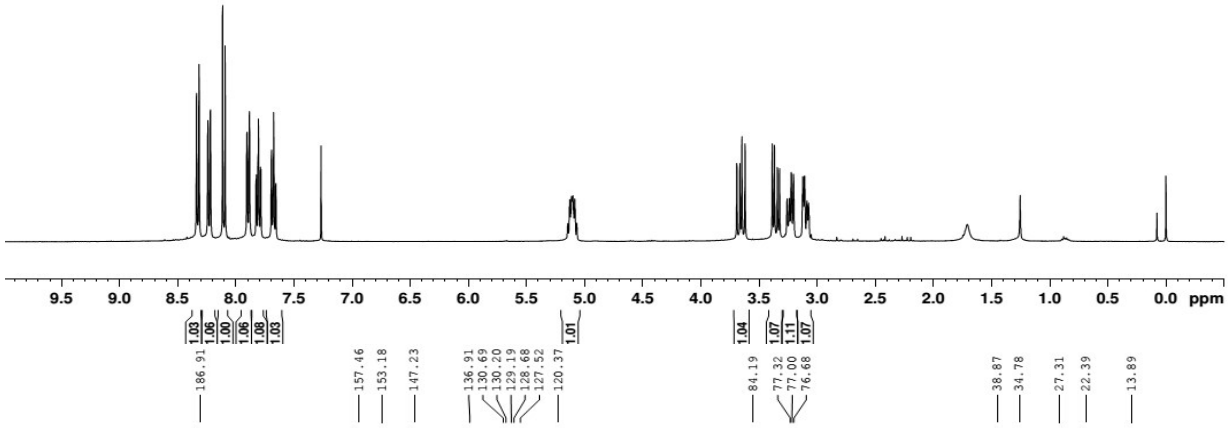
186.71
157.42
153.06
147.23
136.97
136.10
130.69
130.26
129.40
129.31
129.25
128.75
128.65
127.54
126.91
120.34
84.25
77.32
77.00
76.68
40.84
38.50

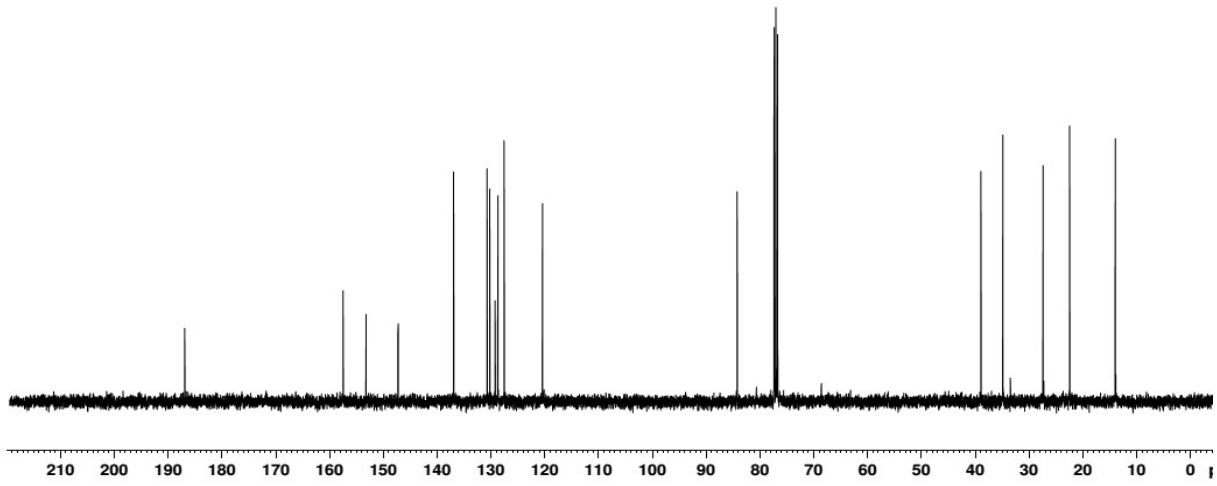

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 p

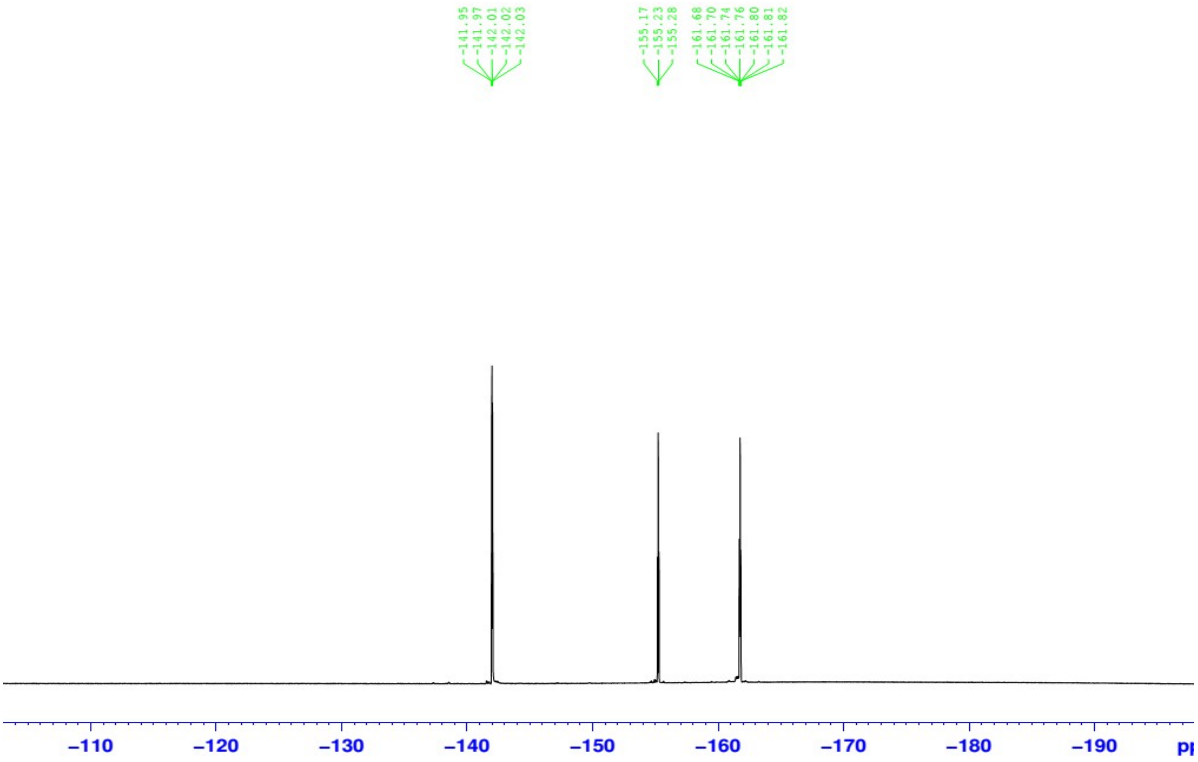

N
O
N
O
F
F
F
F
F

3f

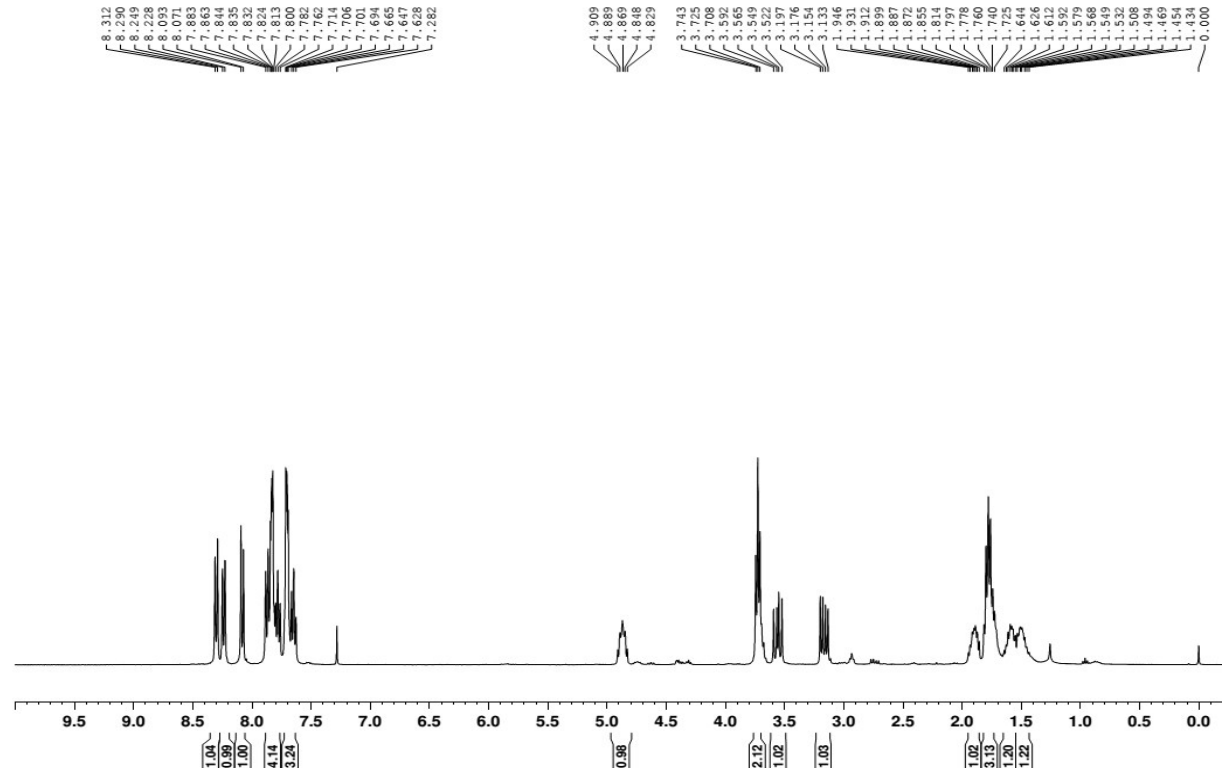

8.339
8.317
8.241
8.219
8.115
8.093
7.904
7.884
7.827
7.824
7.810
7.806
7.803
7.789
7.785
7.696
7.693
7.676
7.673
7.659
7.656
7.268
5.146
5.128
5.112
5.101
5.085
5.067
3.691
3.664
3.647
3.621
3.386
3.368
3.342
3.324
3.258
3.239
3.223
3.204
3.123
3.109
3.088
3.073
0.000

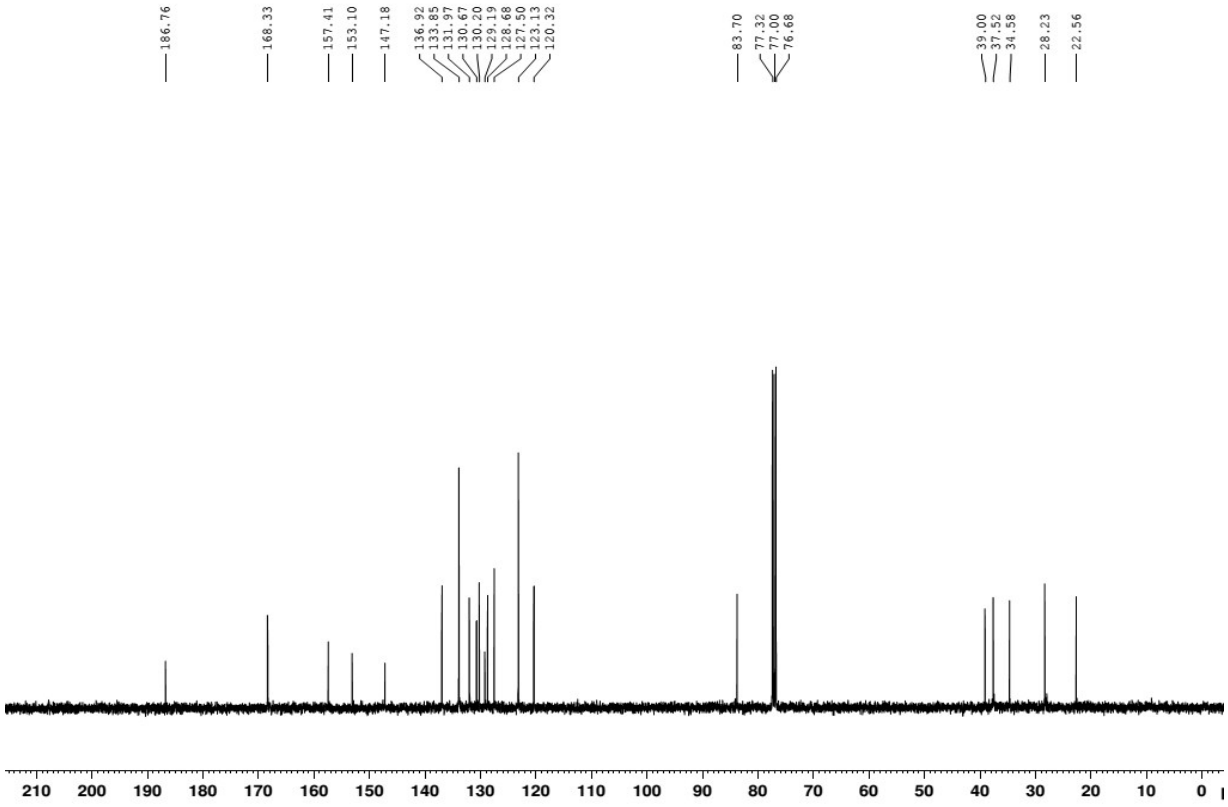

9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
ppm
1.03
1.06
1.00
1.06
1.08
1.03
1.01
1.04
1.07
1.11
1.07
186.91
157.46
153.18
147.23
136.91
130.69
130.20
129.19
128.68
127.52
120.37
84.19
77.32
77.00
76.68
38.87
34.78
27.31
22.39
13.89

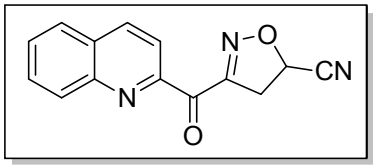

210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0



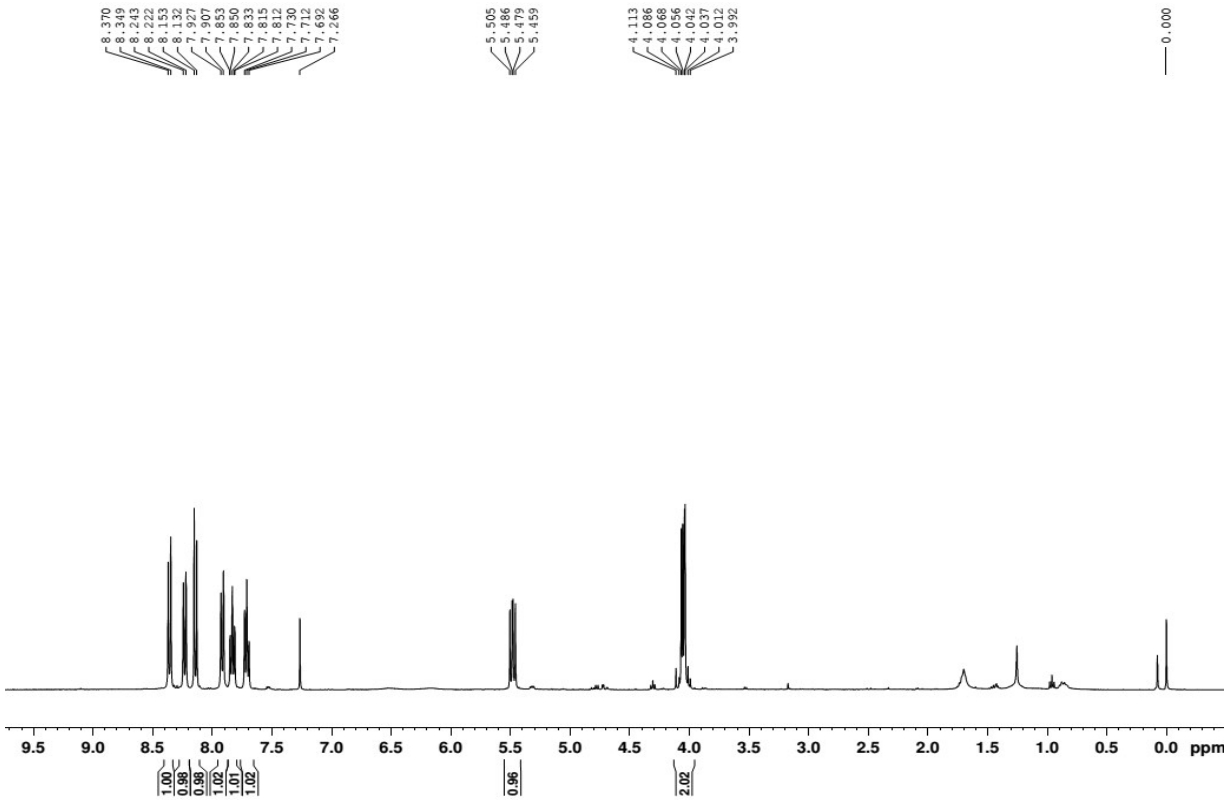
3h mixed with a small amount of impurities.

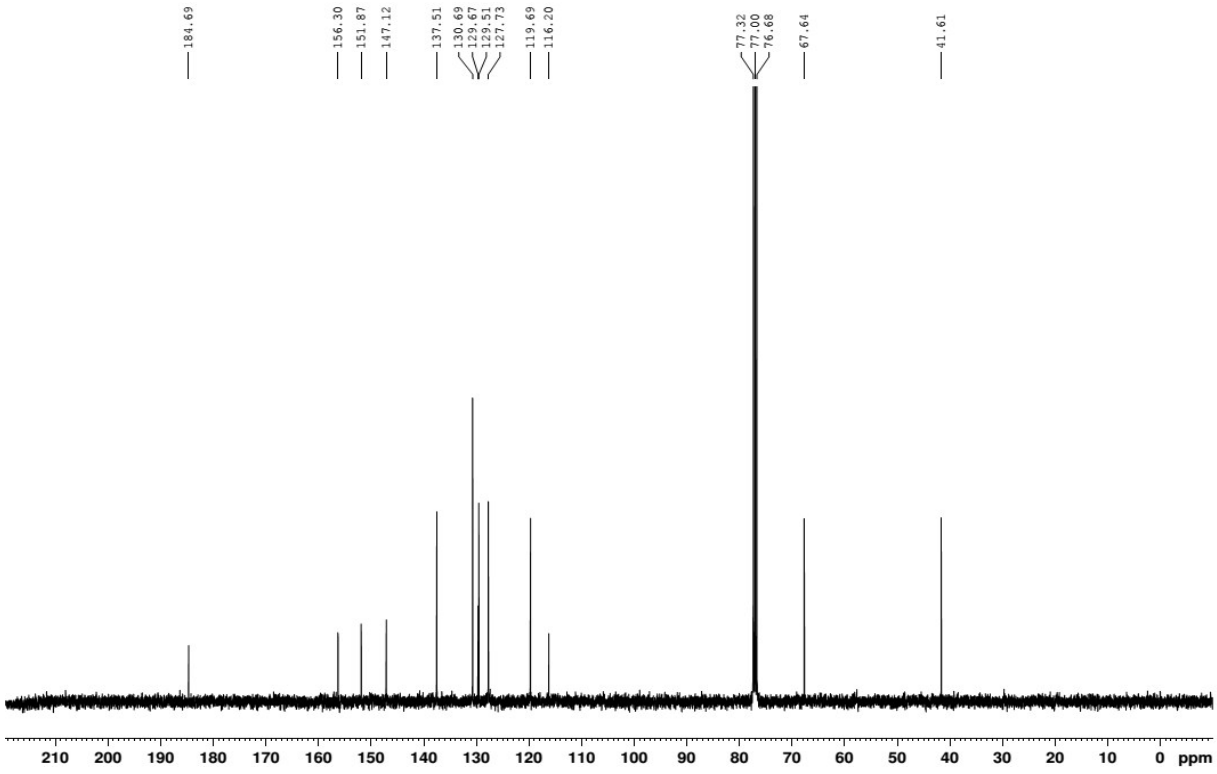


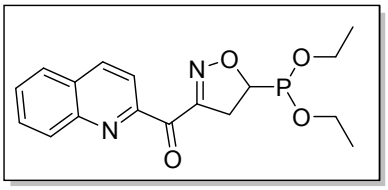

186.76
168.33
157.41
153.10
147.18
136.92
133.85
131.97
130.67
130.20
129.19
128.68
127.50
123.13
120.32
83.70
77.32
77.00
76.68
39.00
37.52
34.58
28.23
22.56
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0


N
O
CN
N
O

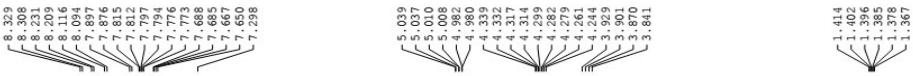
3i

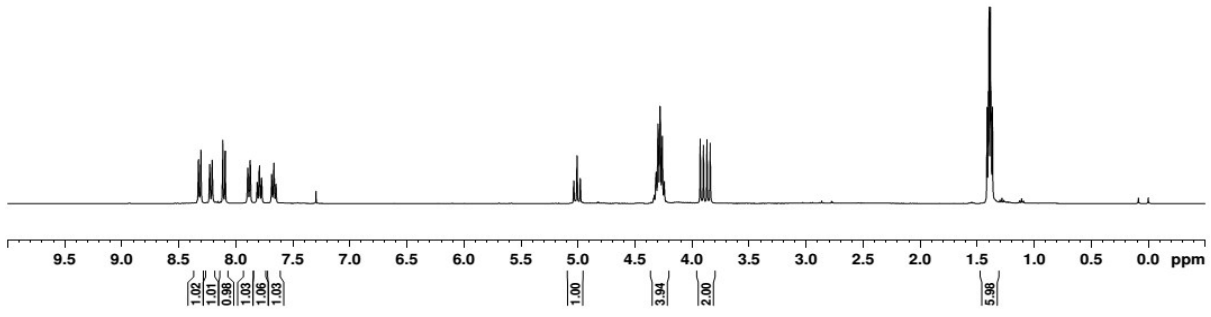

8.370
8.349
8.243
8.222
8.153
8.132
7.927
7.907
7.853
7.850
7.833
7.815
7.812
7.730
7.712
7.692
7.266
5.505
5.486
5.479
5.459
4.113
4.086
4.068
4.056
4.042
4.037
4.012
3.992
0.000
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 ppm
1.00
0.98
0.98
1.02
1.01
1.02
0.96
2.02

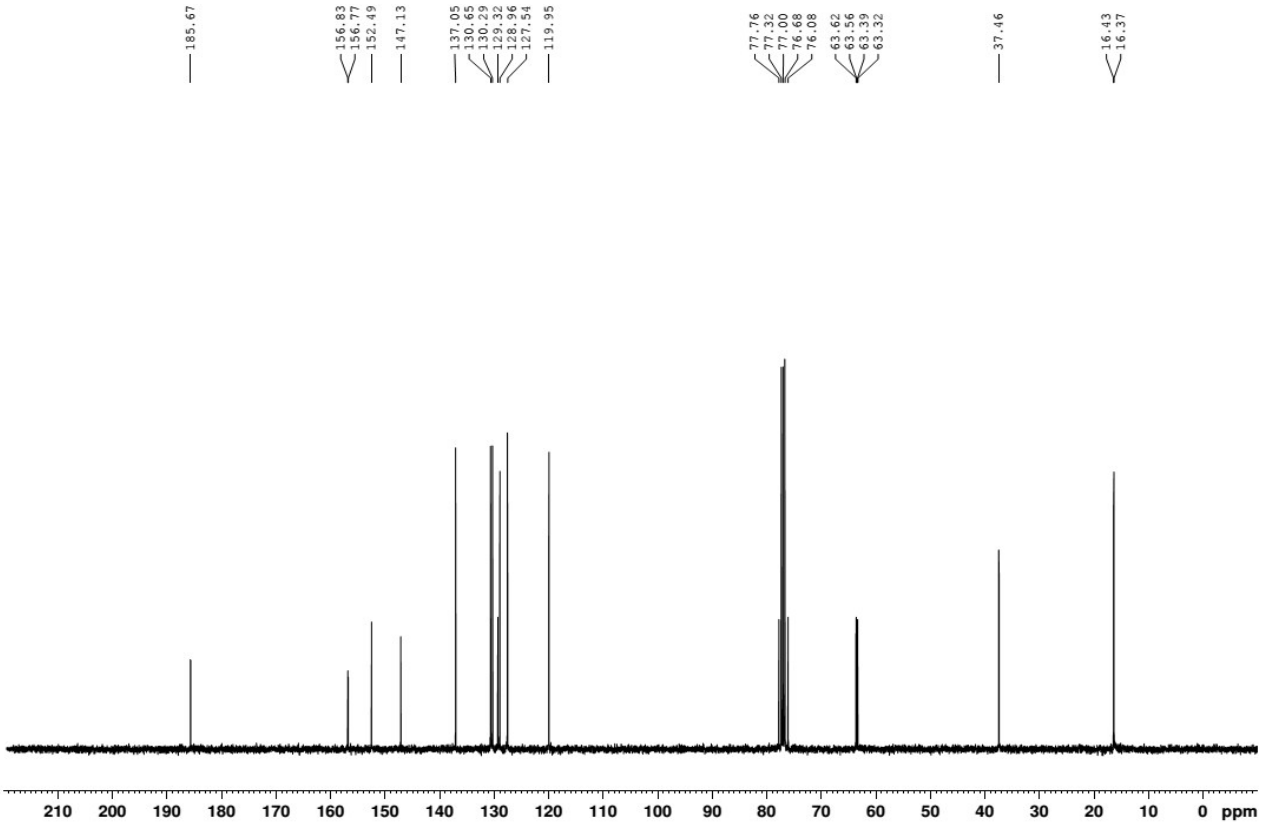

184.69
156.30
151.87
147.12
137.51
130.69
129.67
129.51
127.73
119.69
116.20
77.32
77.00
76.68
67.64
41.61
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

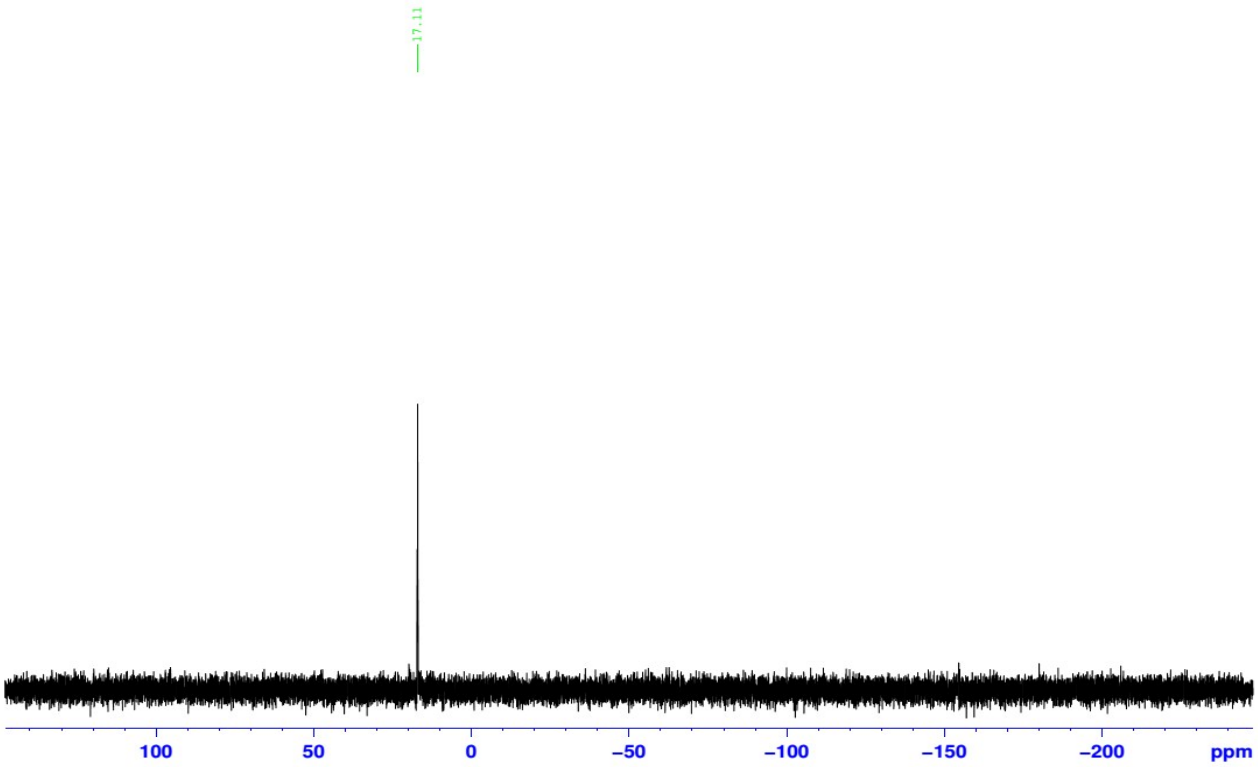

N
O
P
O
O
N
O

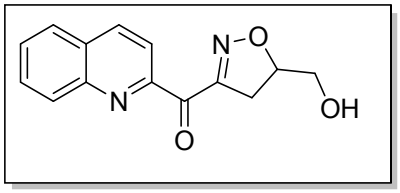
3j


8.329
8.308
8.231
8.209
8.116
8.094
7.897
7.876
7.815
7.812
7.797
7.794
7.776
7.773
7.688
7.685
7.667
7.650
7.298
5.039
5.037
5.010
5.008
4.982
4.980
4.339
4.332
4.317
4.314
4.299
4.282
4.279
4.261
4.244
3.929
3.901
3.870
3.841
1.414
1.402
1.396
1.385
1.378
1.367

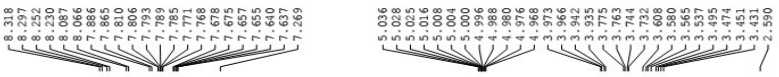

9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 ppm
1.02
1.01
0.98
1.03
1.06
1.03
1.00
3.94
2.00
5.98

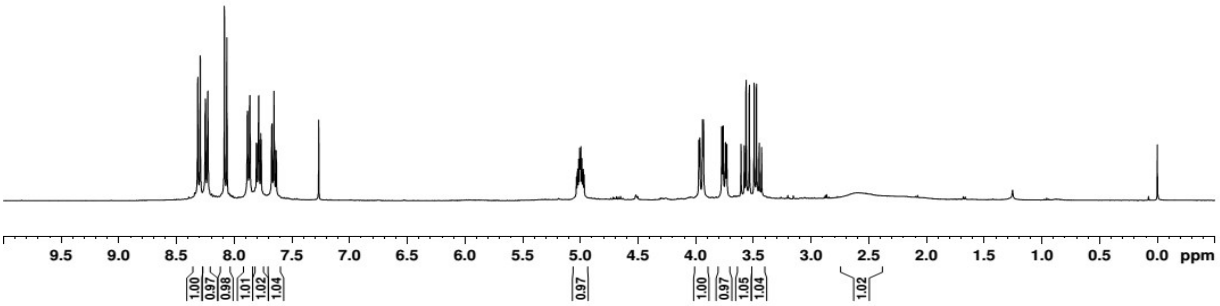

185.67
156.83
156.77
152.49
147.13
137.05
130.65
130.29
129.32
128.96
127.54
119.95
77.76
77.32
77.00
76.68
76.08
63.62
63.56
63.39
63.32
37.46
16.43
16.37
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

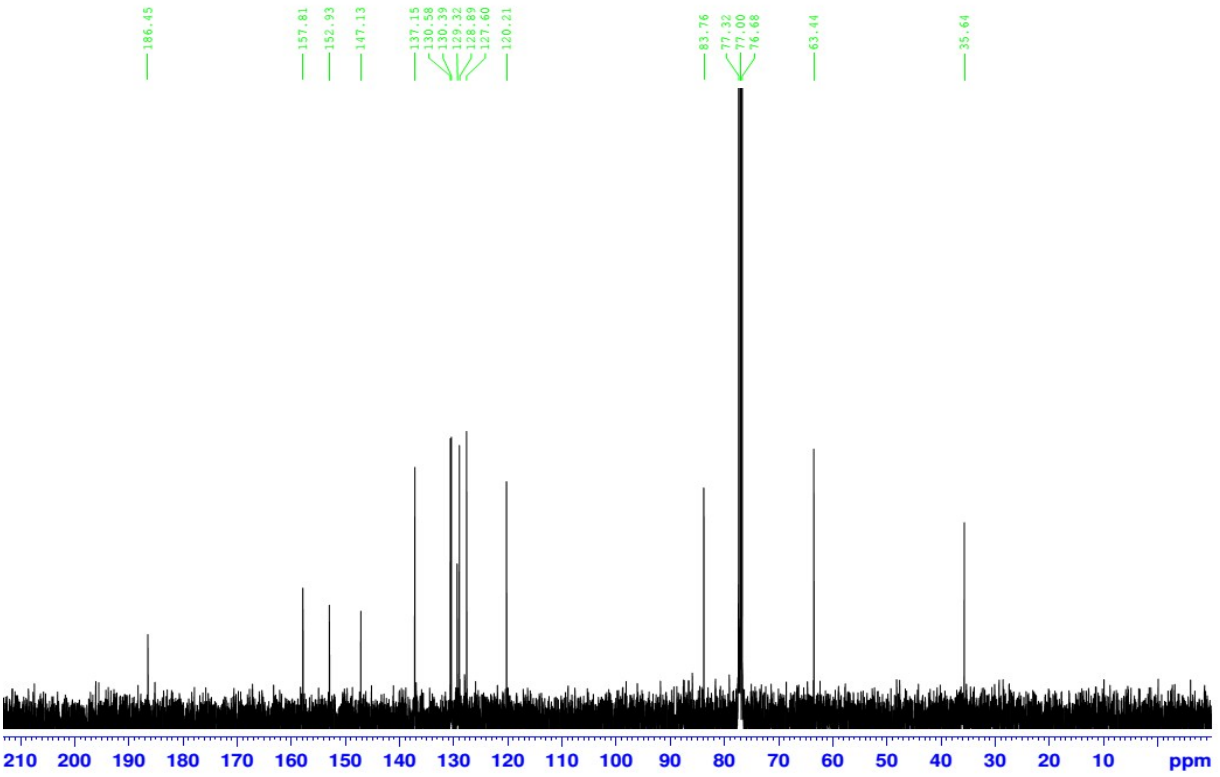

17.11
100 50 0 −50 −100 −150 −200 ppm

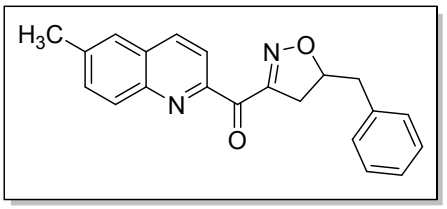

N
O
N
O
OH

3k

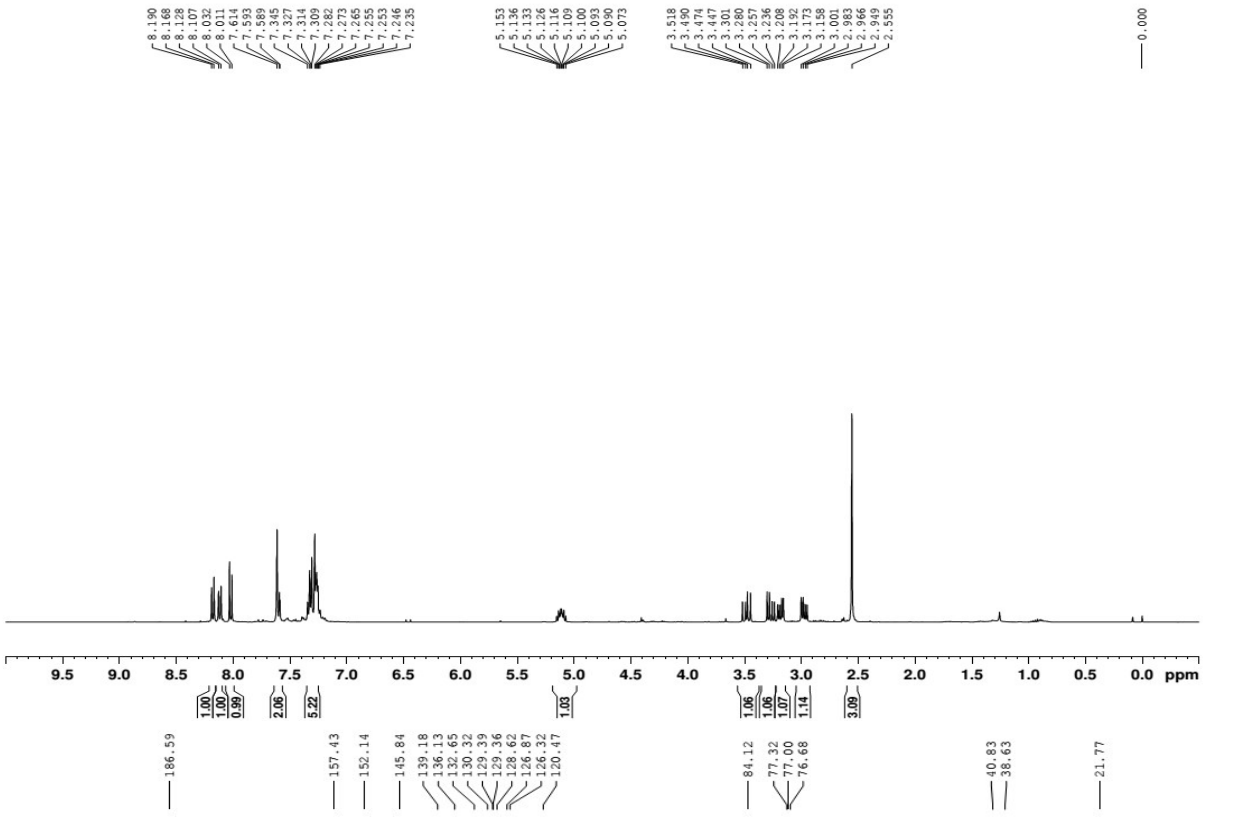

8.318
8.297
8.252
8.230
8.087
8.066
7.886
7.865
7.810
7.806
7.793
7.789
7.785
7.771
7.768
7.678
7.675
7.657
7.655
7.640
7.637
7.269
5.036
5.028
5.025
5.016
5.008
5.004
5.000
4.996
4.988
4.980
4.976
4.968
3.973
3.966
3.942
3.935
3.775
3.763
3.744
3.732
3.608
3.580
3.565
3.537
3.495
3.474
3.451
3.431
2.590
0.000


9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
ppm
1.00
0.97
0.98
1.01
1.02
1.04
0.97
1.00
0.97
1.05
1.04
1.02


186.45
157.81
152.93
147.13
137.15
130.58
130.39
129.32
128.89
127.60
120.21
83.76
77.32
77.00
76.68
63.44
35.64
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm


H3C
N
O
N
O

3l


8.190
8.188
8.128
8.107
8.032
8.011
7.614
7.593
7.589
7.345
7.327
7.314
7.309
7.282
7.273
7.265
7.255
7.253
7.246
7.235
5.153
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3.236
3.208
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3.173
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2.949
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1.00
1.00
0.99
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1.03
1.06
1.06
1.07
1.14
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126.32
120.47
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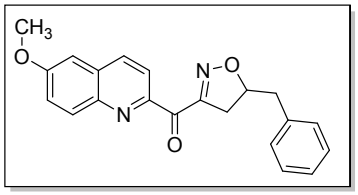
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O
N
O

3m


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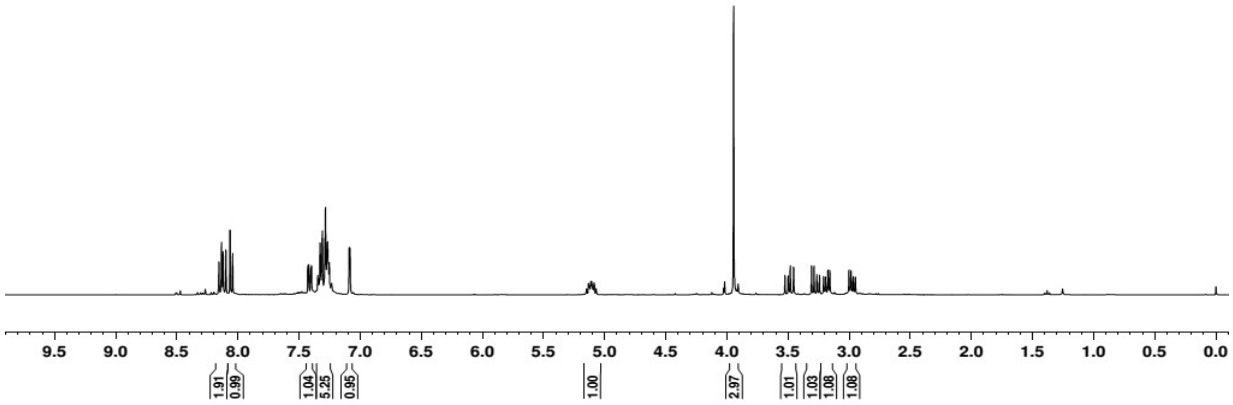
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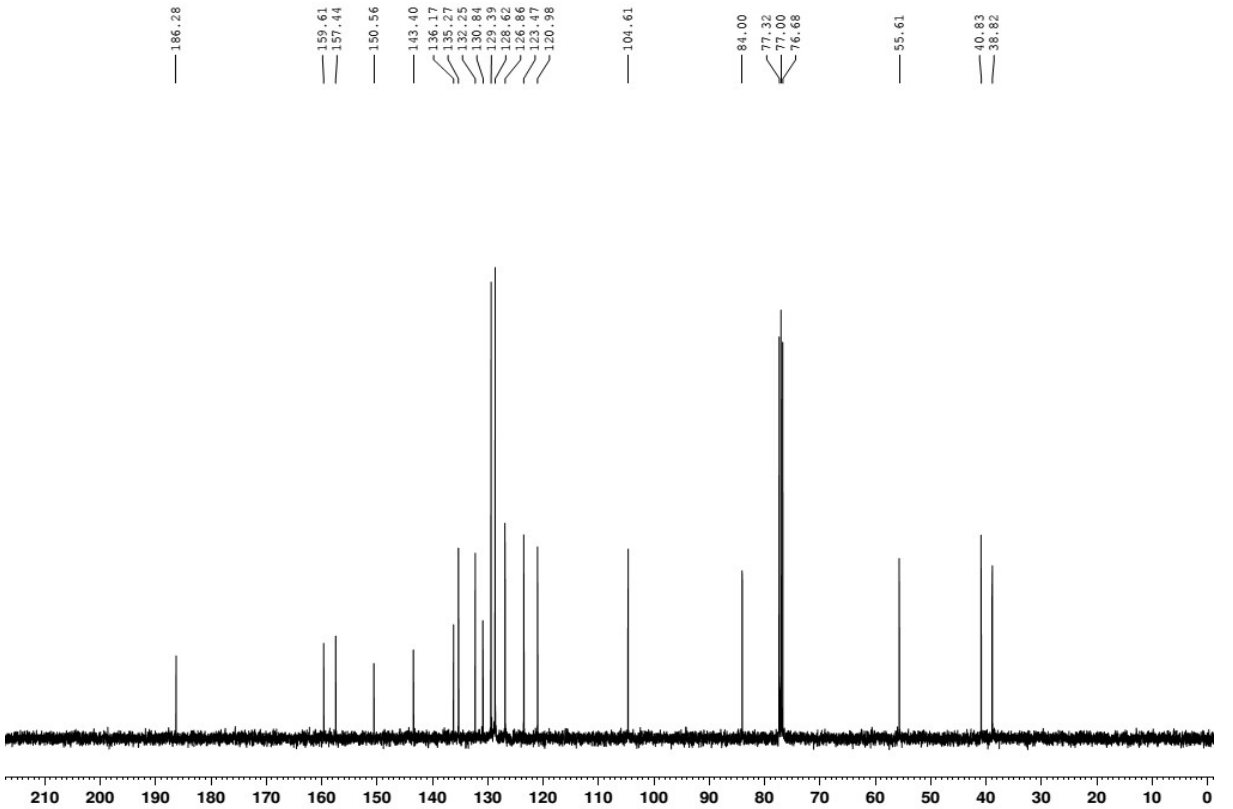
1.08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77.00
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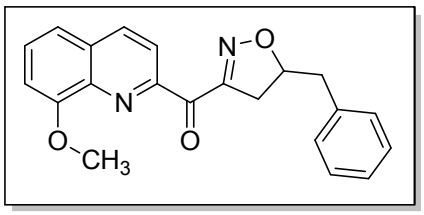
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CH3

3n


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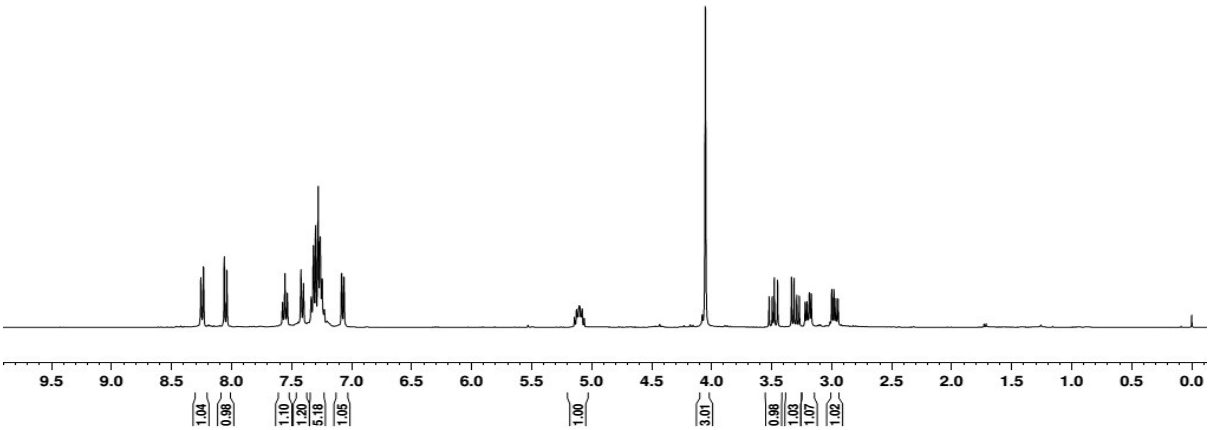
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1.05
1.00
3.01
0.98
1.03
1.07
1.02


186.31
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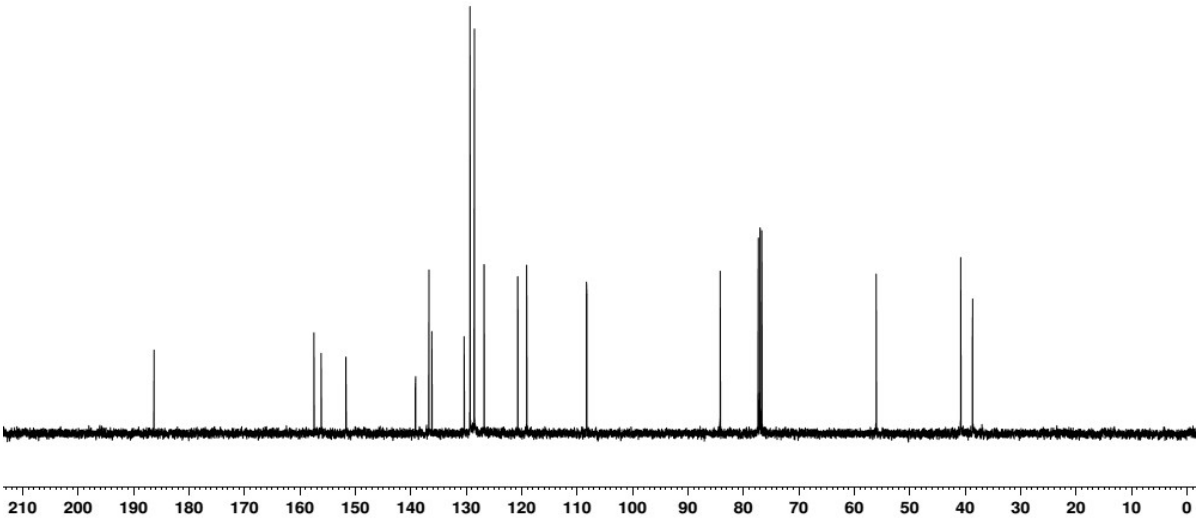
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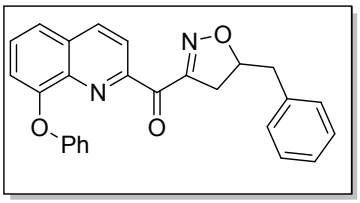
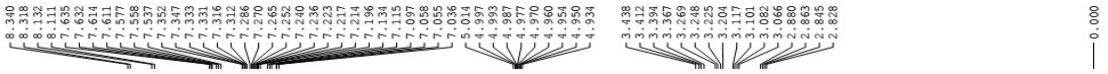
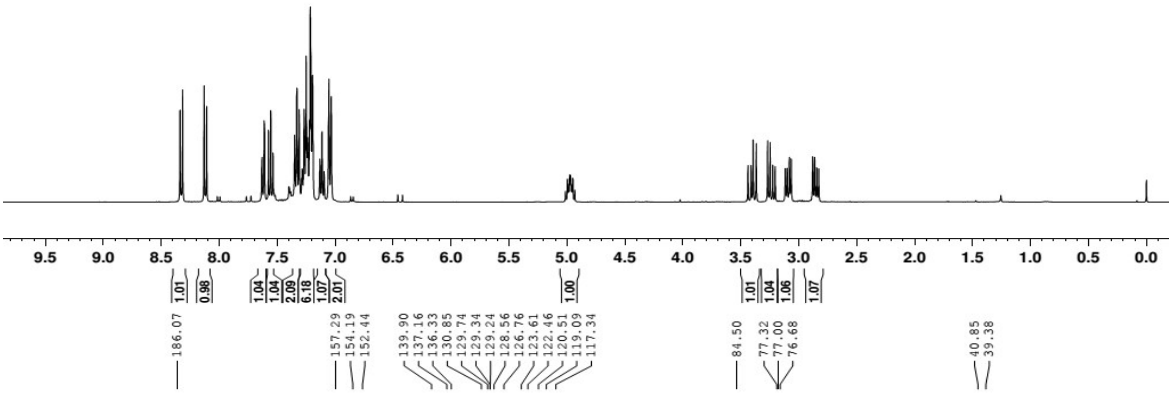
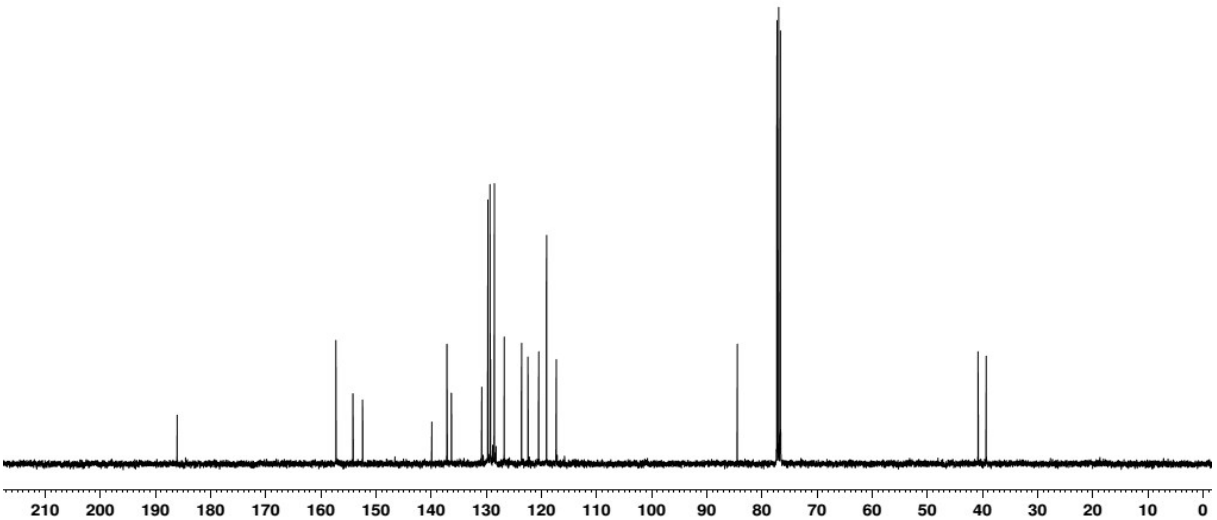
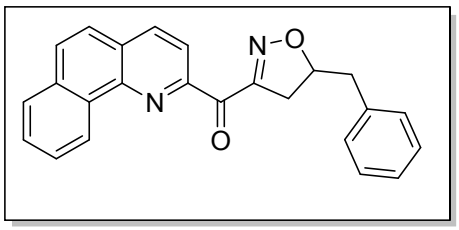


3o mixed with trace amount of impurities.









3p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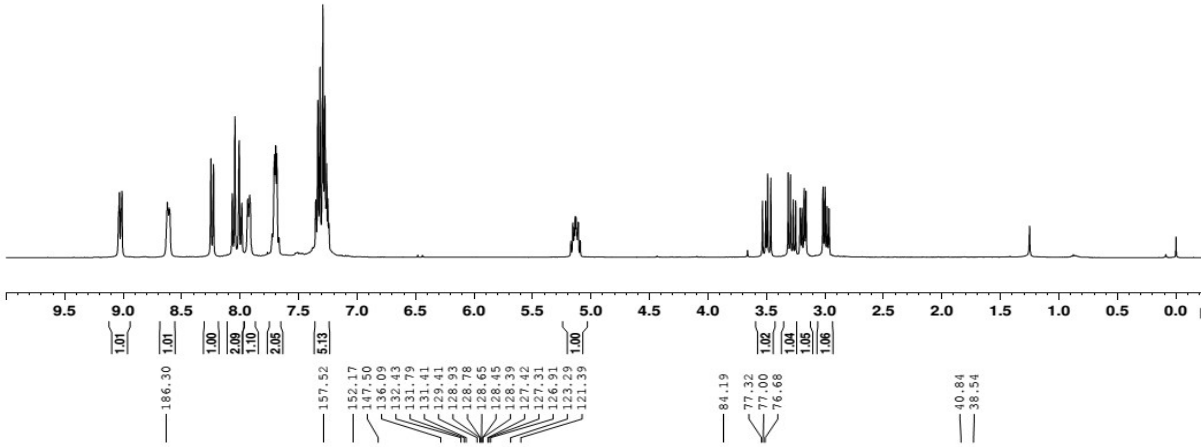
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1.01
1.00
2.09
1.10
2.05
5.13
1.00
1.02
1.04
1.05
1.06
186.30
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152.17
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136.09
132.43
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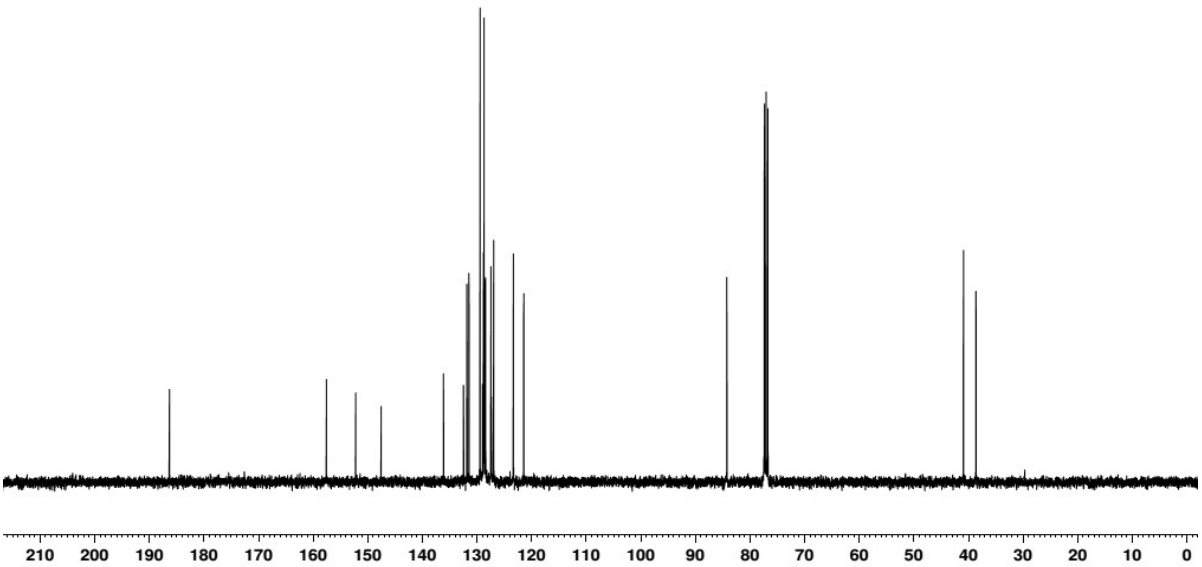
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10
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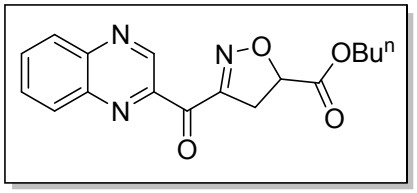
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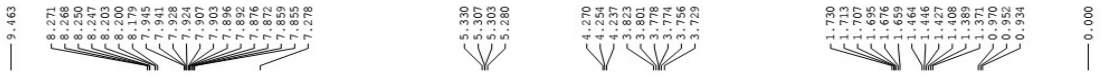
OBu^n
O
O

3r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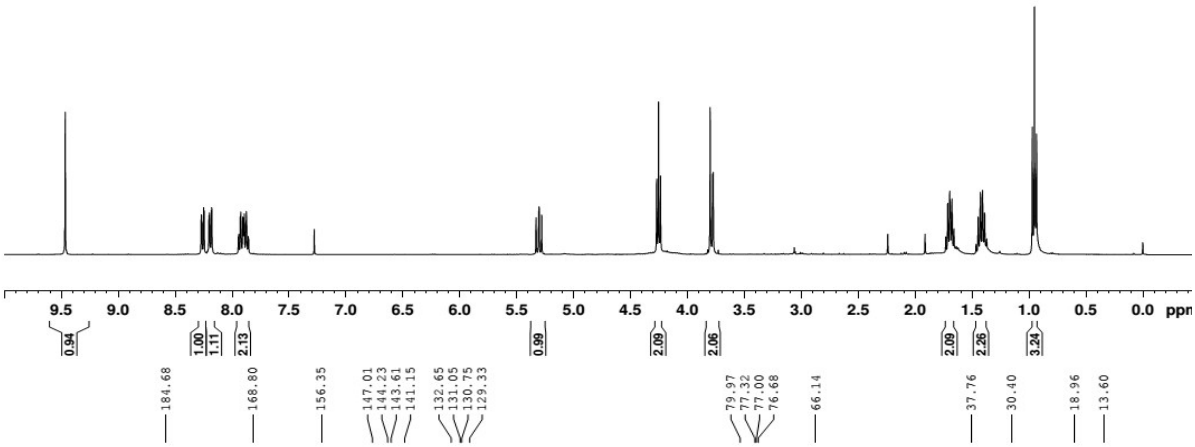
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1.0
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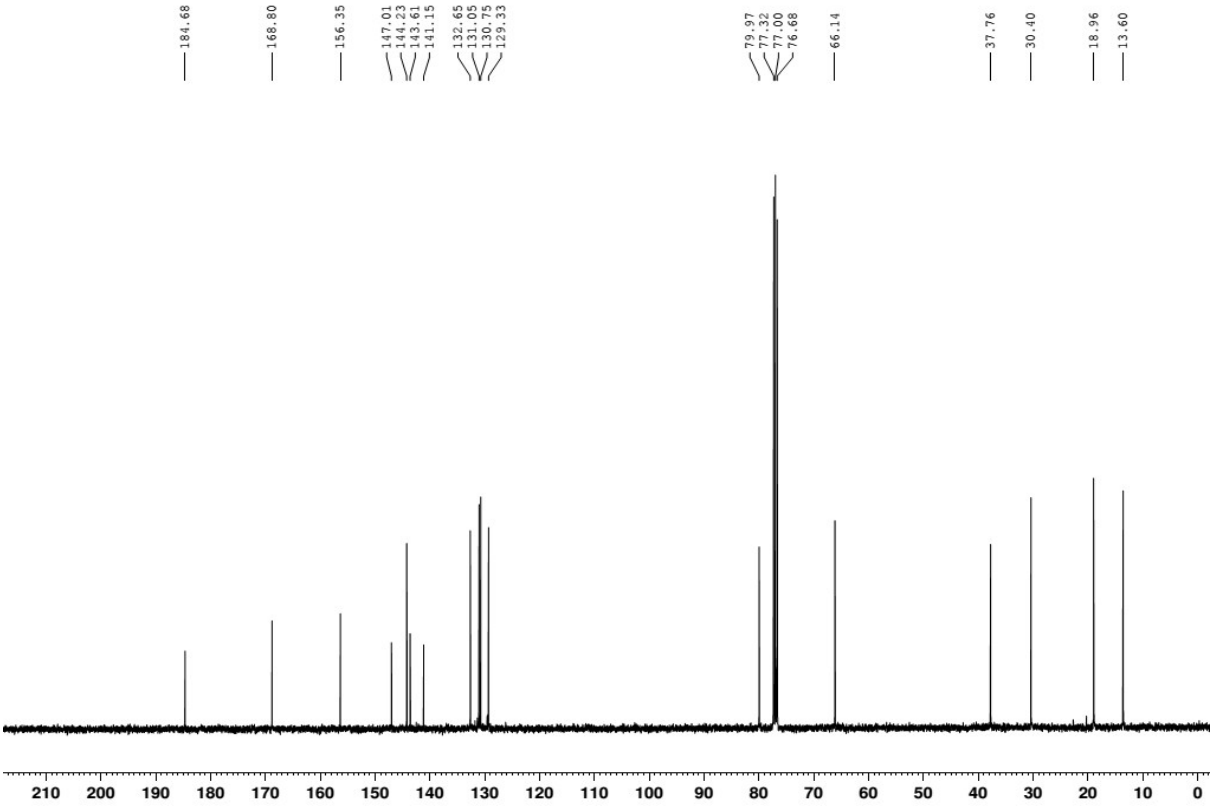
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77.00
76.68
66.14
37.76
30.40
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13.60
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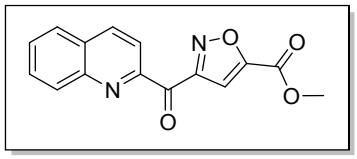

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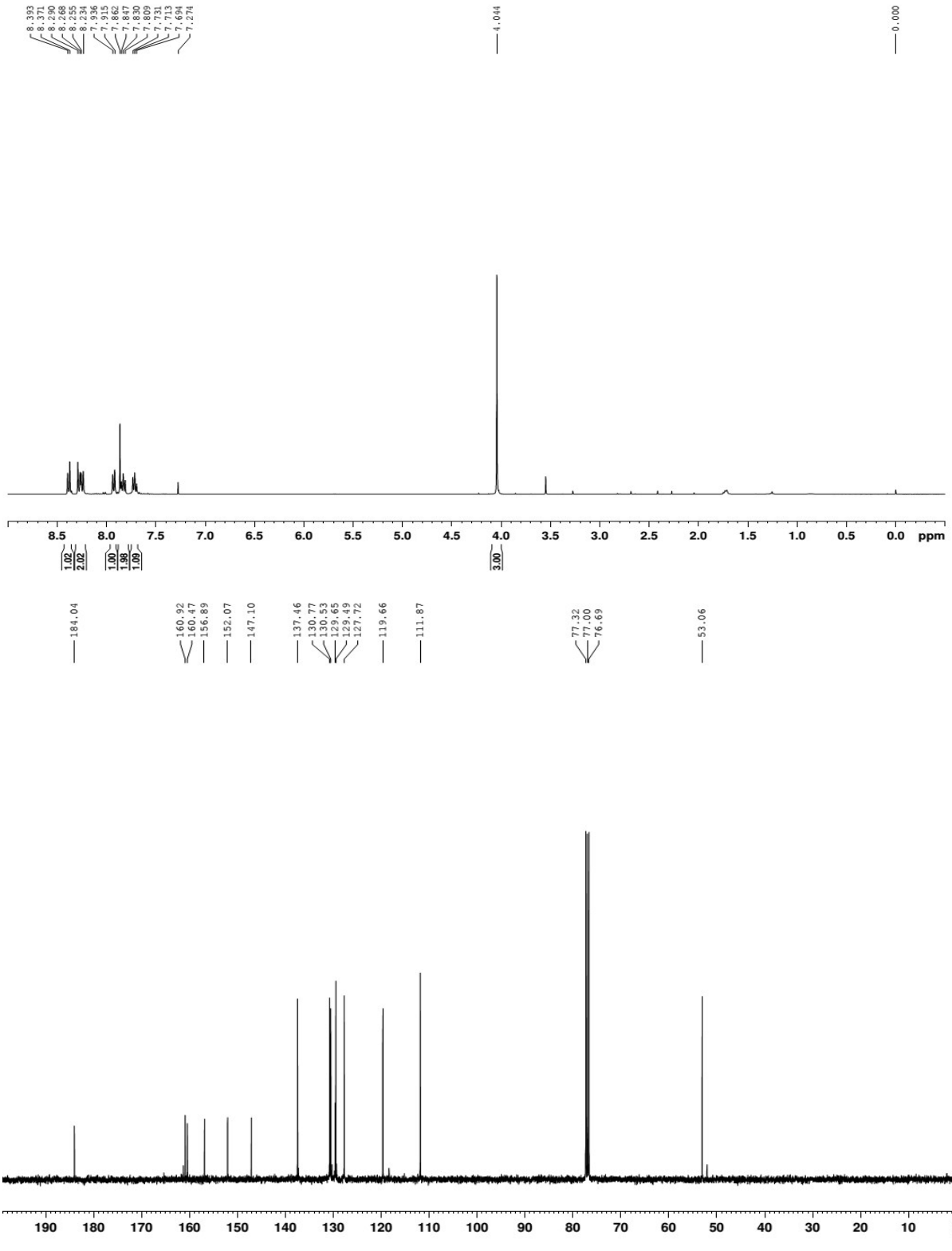
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7.713
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2.02
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3.00
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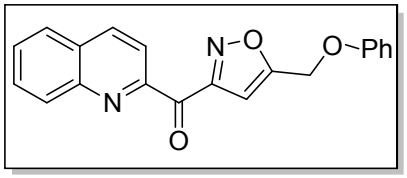
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Ph
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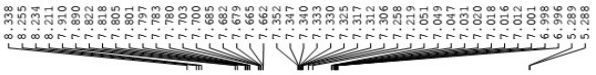
O

3v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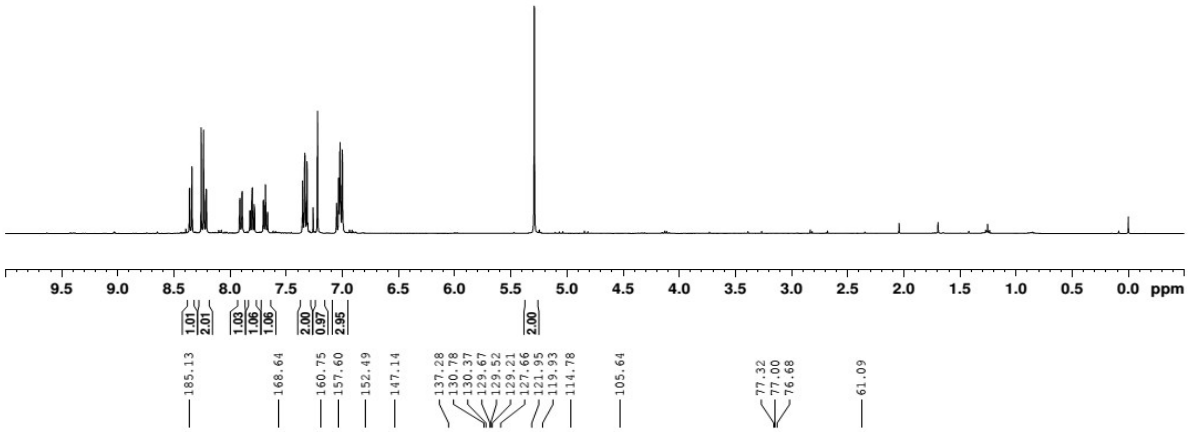
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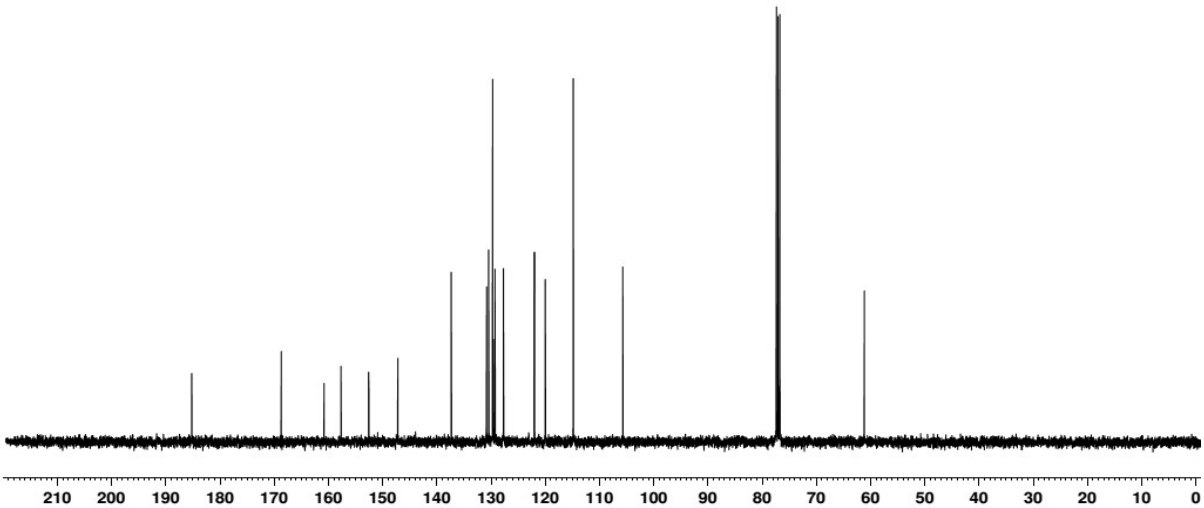
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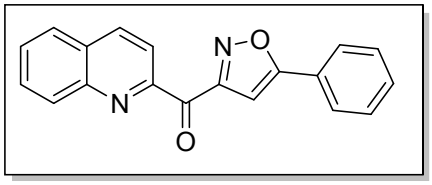
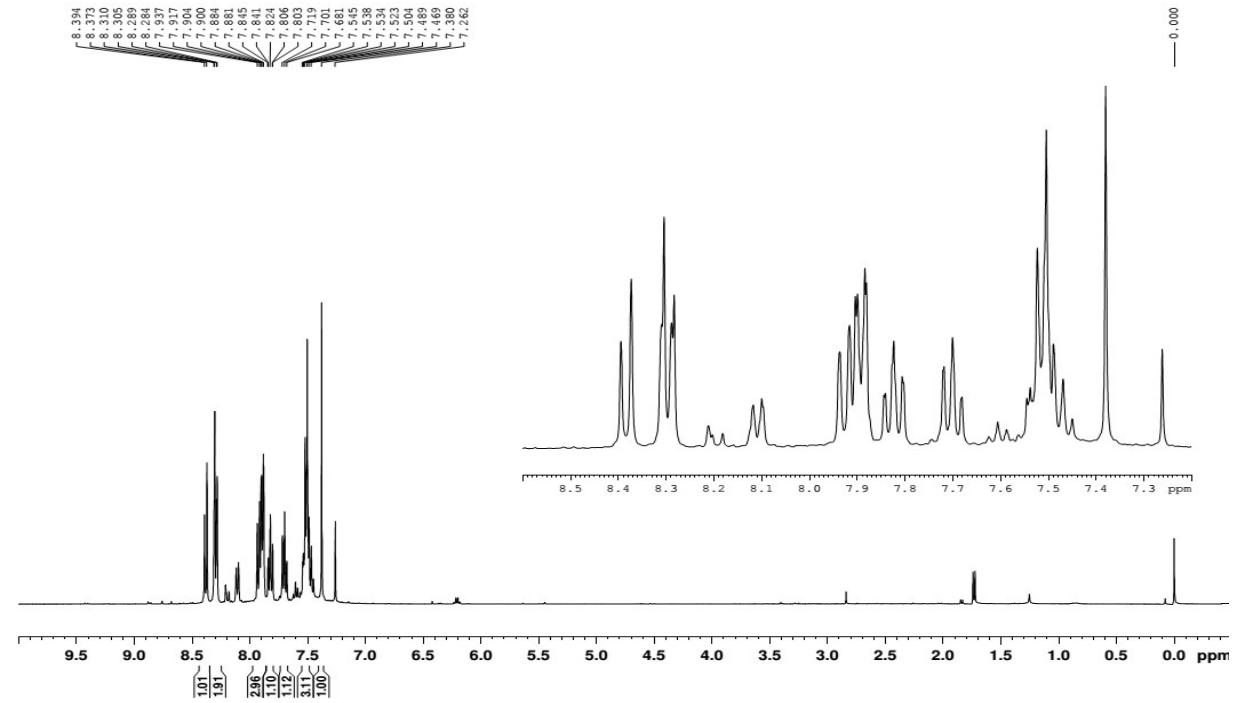
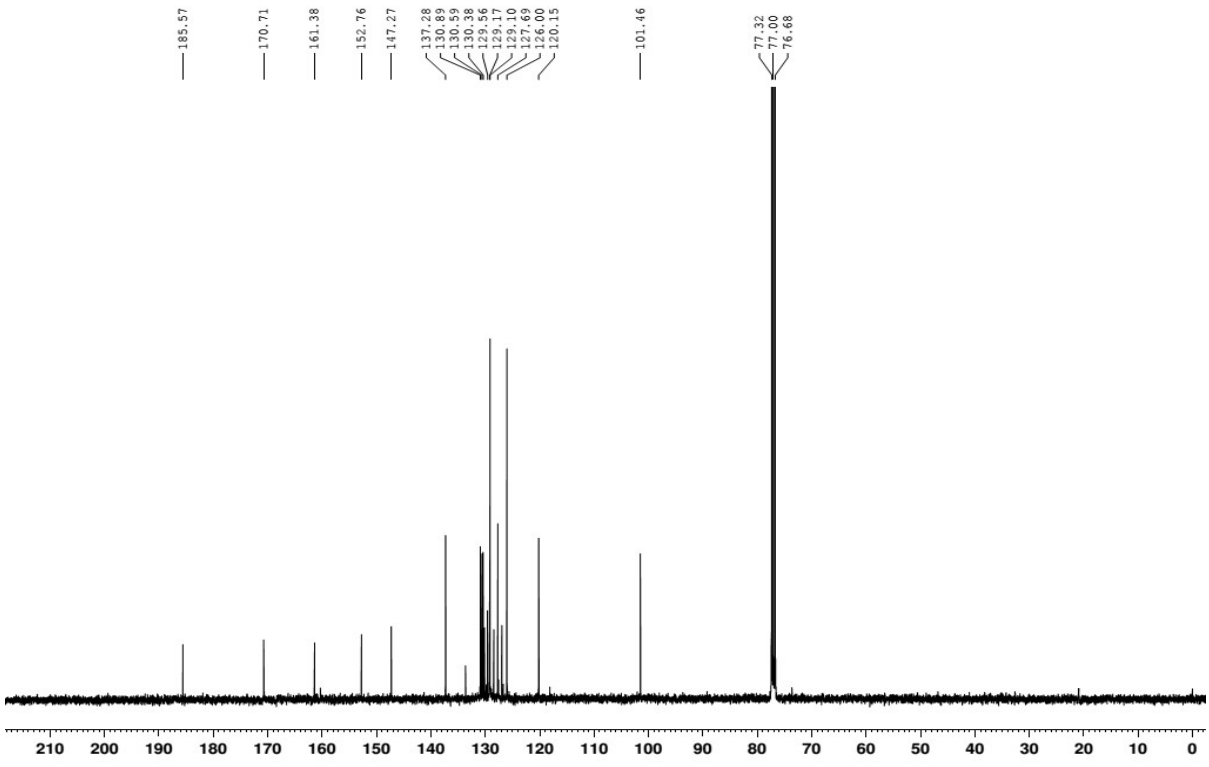
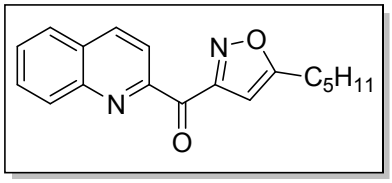


3w mixed with a small amount of impurities.



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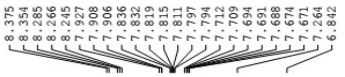
N
O
C_5H_{11}

3x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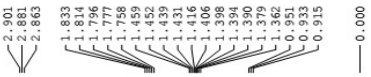
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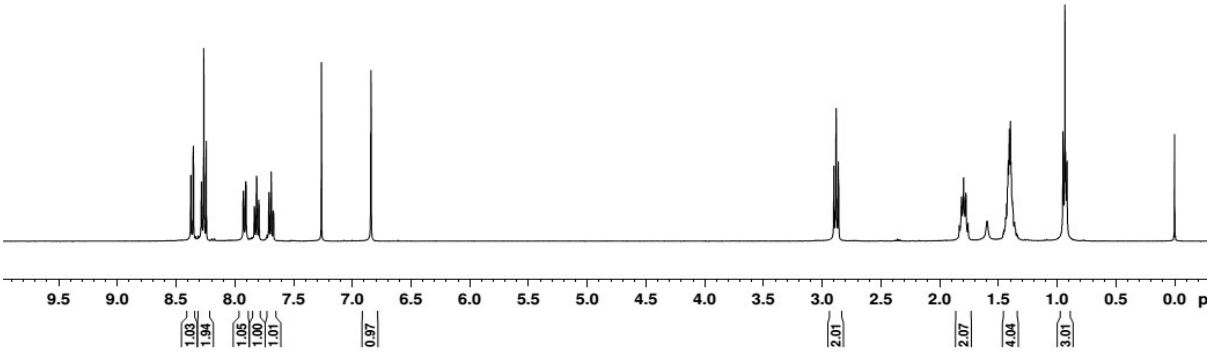
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1.01
0.97
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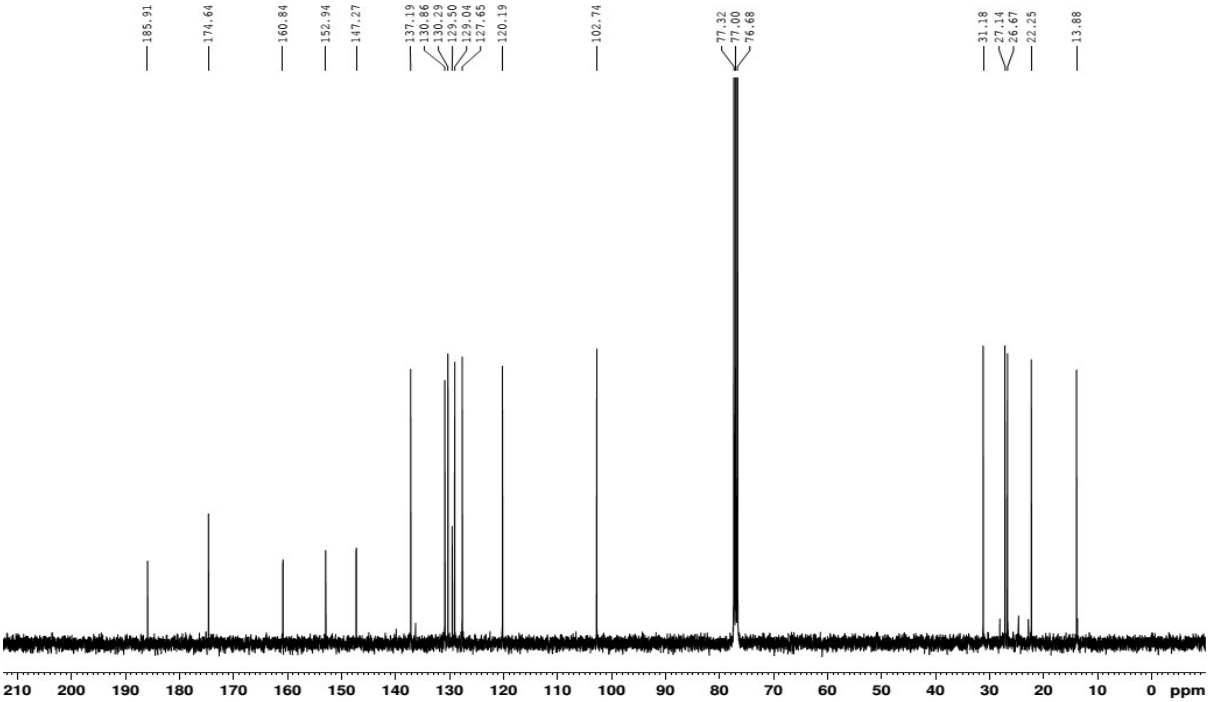
2.07
4.04
3.01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77.00
76.68
31.18
27.14
26.67
22.25
13.88
210
200
190
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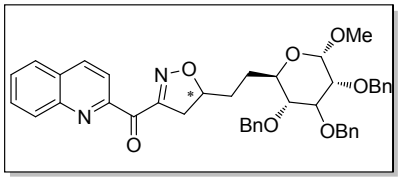
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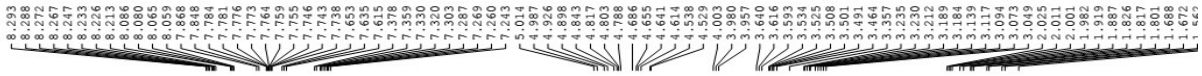

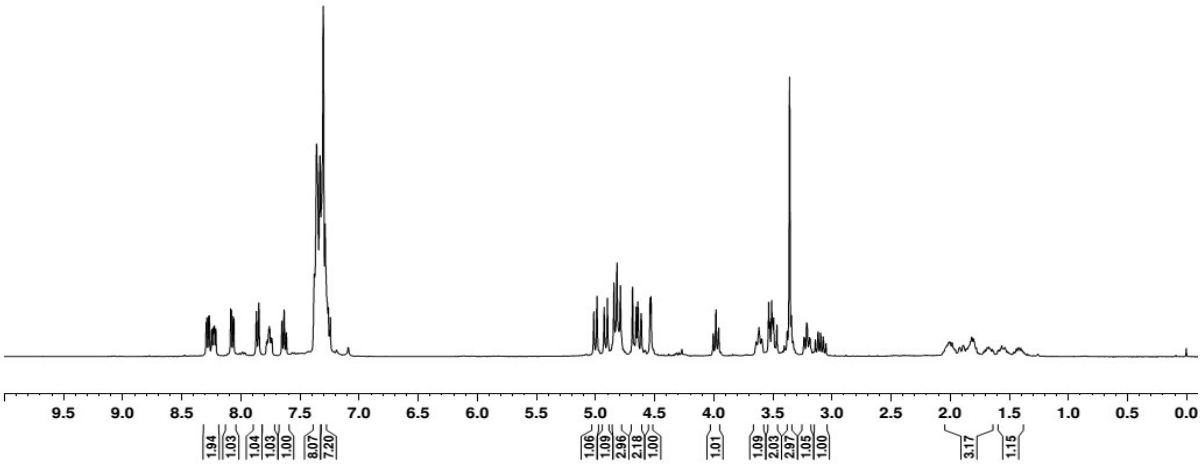
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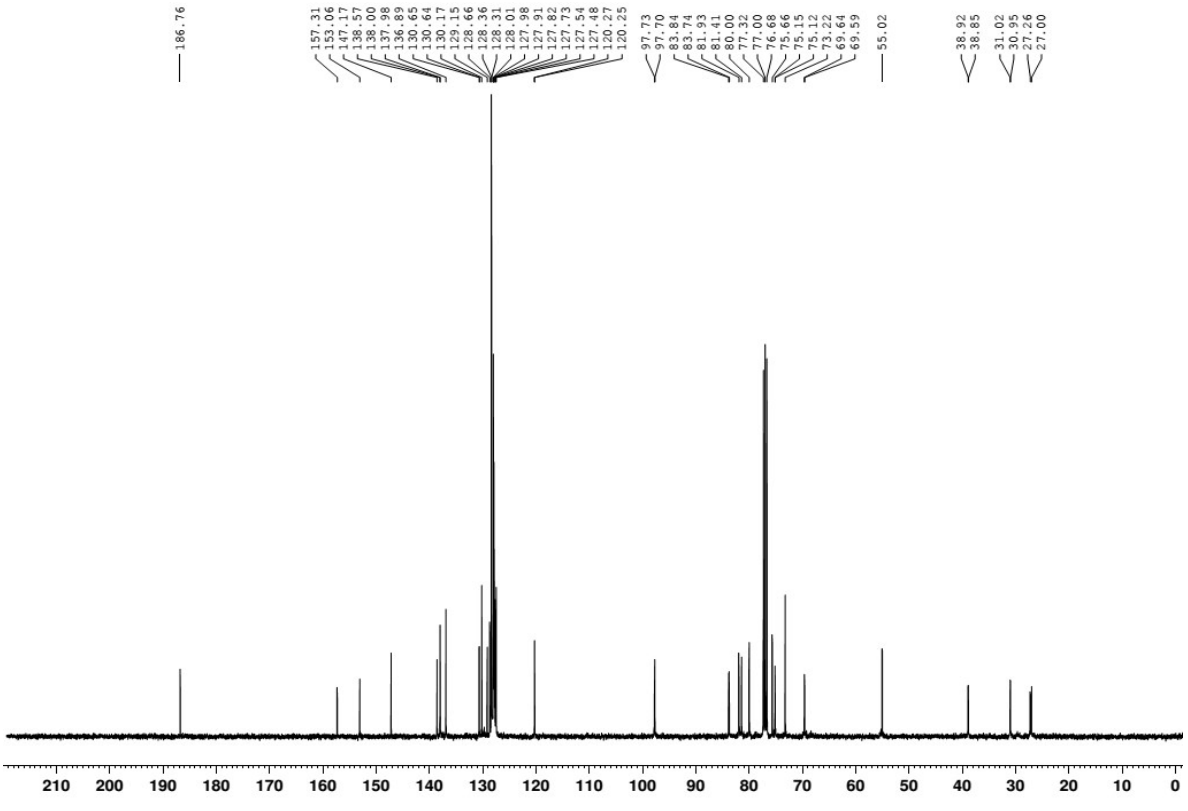
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55.02
38.92 38.85 31.02 30.95 27.26 27.00
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0