Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry.

Supporting Information

Photoredox Radical Cascade Reaction of *o*-Vinylaryl Isocyanides with Acyl Chlorides to Access 2,4-Disubstituted Quinolines

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List of Contents

1. **General Information** **S1**
2. **Experimental Section** **S1-S11**
   2.1 General Procedure for the Synthesis of Substrates **S1-S1**
   2.2 Details of Visible-Light Source **S1-S2**
   2.3 Control Experiments **S2-S11**
   2.4 The Light on/off Experiments **S11-S12**
3. **Reference** **S12**
4. **Spectra** **S13-S87**

1. General Information

Unless otherwise stated, all commercial reagents were used as received. Propiophenone, aldehydes (Innochem, >98%), *o*-Phenylenediamine and Phenylhydrazine hydrochloride were used without further treatment. All reagents and solvents were commercially available and used without any further purification unless specified. All solvents were dried and distilled according to standard procedures. Flash column chromatography was performed using silica gel (0.25mm, 300-400 mesh). Analytical thin-layer chromatography was performed using glass plates pre-coated with 0.25mm 300-400 mesh silica gel impregnated with a fluorescent indicator (254 nm). All reactions were carried out with magnetic stirring and in dried glassware. Nuclear magnetic resonance (NMR) spectra are recorded in parts per million from internal tetramethylsilane on the δ scale. ^{1}H NMR, ^{19}F NMR and ^{13}C NMR spectra were recorded in $CDCl_3$ on a Bruker DRX-400 spectrometer operating at 400 MHz, 282 MHz and 100 MHz, respectively. All chemical shift values are quoted in ppm and coupling constants quated in Hz. The solvent peak was used as a reference value, for ^{1}H NMR: TMS = 0.00 ppm, for ^{13}C NMR: $CDCl_3$ = 77.00 ppm. The following abbreviations were used to explain multiplicities: s = singlet, d = doublet, dd = doublet of doublet, t = triplet, td = triplet of doublet, q = quartet, m = multiplet, and br = broad. High-resolution mass spectra (HRMS) were obtained on an Agilent mass spectrometer using ESI-TOF (electrospray ionization-time of flight).

2. Experiment Section

2.1 General Procedure for the Synthesis of Substrates

1-Isocyano-2-(1-phenylvinyl)benzene **1** was synthesized according to the known methods[1].

2.2 Details of Visible-Light Source

The light source bought from SANYI (https://item.taobao.com/item.htm?spm=a1z09.2.0.0.42672e8dv2Chsz&id=35497290577&_u=j35sh1qt9325), 5 W blue LED light bulb (E27). The wavelength was about

460-470 nm and the wavelength of peak intensity was about 467.5 nm. The picture of the experimental facility was shown as follow:

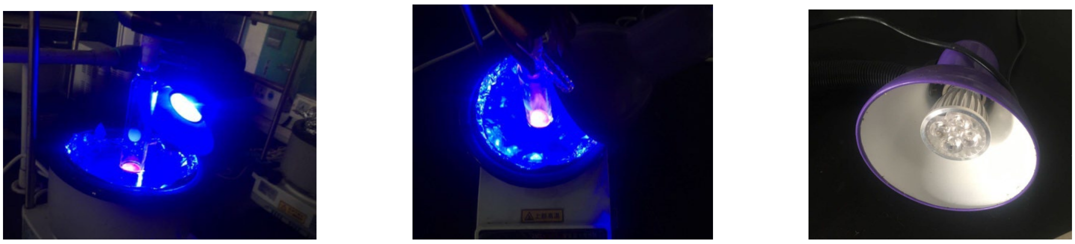
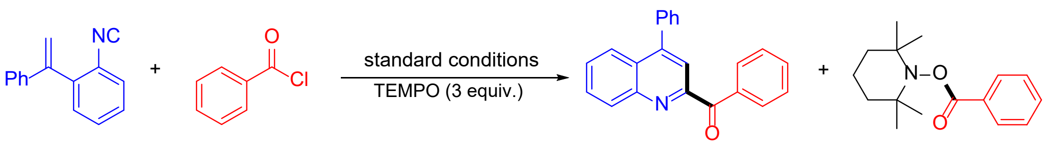


Figure S1. Pictures of Visible-Light Source. Reproduced from [Liu, Y.; Wang, Q.-L.; Chen, Z.; Zhou, Q.; Li, H.; Zhou, C.-S.; Xiong, B.-Q.; Zhang, P.-L.; and Tang, K.-W.; Visible-Light-Catalyzed C−C Bond Difunctionalization of Methylenecyclopropanes with Sulfonyl Chlorides for the Synthesis of 3-Sulfonyl-1,2-dihydronaphthalenes, *J. Org. Chem.* **2019**, *84*, 2829-2839]. Copyright [2019] American Chemical Society

2.3 Control Experiments

2.3.1 GC-MS Analysis of Raw Reaction Mixture by Using TEMPO as Radical Inhibitor



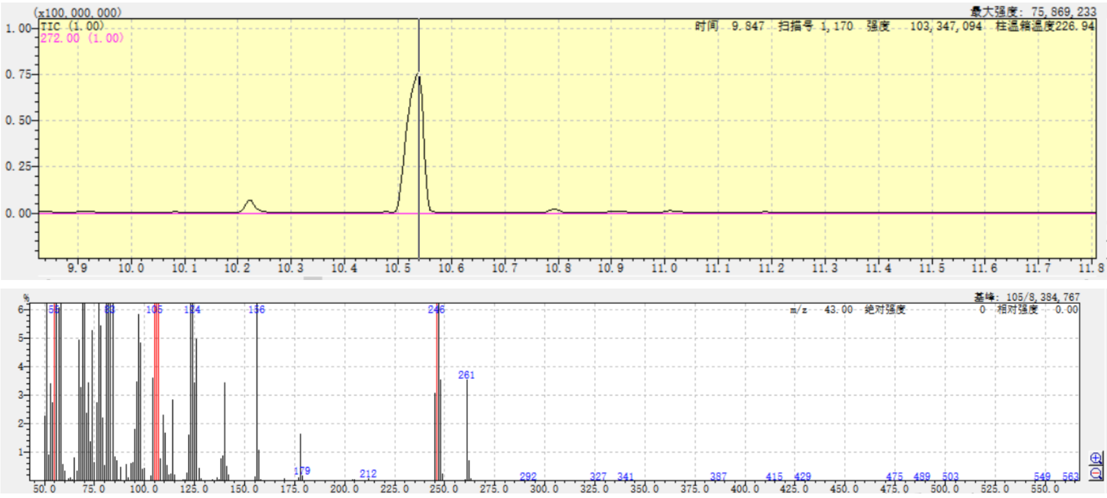
1a **2a** **3aa,** trace **4**, detected by GC-MS

To a Schlenk tube were added 1-isocyano-2-(1-phenylvinyl)benzene **1a** (0.2 mmol), benzoyl chloride **2a** (6 mmol, 3 equiv), Ir(ppy)$_3$ (1 mol%),2,6-lutidine (0.8 mmol, 4 equiv.), TEMPO (3 equiv), CH_3CN (2 mL) at room temperature and 5 W blue LED irradiation for 12 h. The GC-MS analysis of raw reaction mixture showed that only trace amounts of the target product **3aa** was detected. The acyl radical trapping product **4**, which generated from TEMPO capturing the acyl radical, could be detected by GC-Ms analysis.

The GC-MS analysis results of raw reaction mixture

The GC spectra of raw reaction mixture

The MS spectra of the peak at 10.53 min



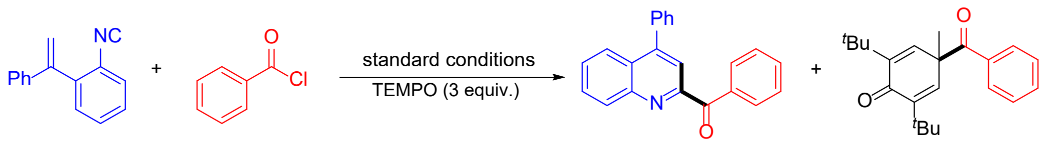
[MS Spectrum]
# of Peaks546
Raw Spectrum 10.540 (scan : 1309)
Background No
Background Spectrum
Base Peakm/z 104.95 (Inten : 8,384,767)
Event# 1
m/z Absolute Intensity Relative Intensity

50.00	193502	2.31
50.95	998132	11.90
52.05	78758	0.94
53.00	286834	3.42
54.05	231648	2.76
55.00	7926265	94.53
56.00	3159524	37.68
57.05	512937	6.12
58.00	1073834	12.81
59.00	49290	0.59
60.00	31847	0.38
61.00	26870.03	
62.00	72790.09	
62.95	11286	0.13
64.05	64100.08	
65.00	69833	0.83
66.05	30959	0.37
67.00	416017	4.96
68.05	276471	3.30
69.00	3041140	36.27
70.05	852154	10.16
71.05	201337	2.40
72.05	291571	3.48
73.05	117525	1.40
74.00	445073	5.31
75.00	56151	0.67
76.05	231665	2.76
77.00	6289020	75.01
78.00	457689	5.46
79.00	188367	2.25
80.05	48237	0.58
81.05	944251	11.26
82.10	802929	9.58
83.05	6841848	81.60
84.05	901507	10.75
85.05	72256	0.86
86.05	62159	0.74
87.05	63400.08	
88.05	40669	0.49
89.05	35860.04	
90.05	17420.02	
91.05	50049	0.60
92.05	12378	0.15
93.05	53806	0.64
94.05	56033	0.67
95.05	152555	1.82
96.05	293878	3.50
97.05	490760	5.85
98.10	409622	4.89
99.10	36799	0.44
100.05	39560	0.47
100.90	28920.03	

101.95	2827	0.03
102.95	17651	0.21
103.95	303938	3.62
104.95	8384767	100.00
105.90	8382526	99.97
106.85	1648731	19.66
108.10	65708	0.78
109.10	195321	2.33
110.10	141446	1.69
111.10	46406	0.55
112.10	18025	0.21
113.15	20893	0.25
114.10	239329	2.85
115.10	19610	0.23
116.05	2991	0.04
117.05	3824	0.05
118.10	2369	0.03
119.05	4098	0.05
120.05	5770	0.07
121.15	25819	0.31
122.05	137207	1.64
123.10	1123894	13.40
124.10	1390618	16.59
125.10	289447	3.45
126.10	420102	5.01
127.10	39167	0.47
128.10	7297	0.09
129.05	1976	0.02
130.00	1471	0.02
131.05	2094	0.02
131.95	1376	0.02
133.05	1657	0.02
134.05	5412	0.06
135.05	3516	0.04
136.10	12070	0.14
137.15	6115	0.07
138.05	66730	0.80
139.10	75186	0.90
140.10	290004	3.46
141.10	45326	0.54
142.05	20412	0.24
143.10	2348	0.03
144.00	871	0.01
145.00	2202	0.03
146.05	1200	0.01
147.05	2591	0.03
148.00	999	0.01
149.00	460	0.01
150.05	1047	0.01
151.00	978	0.01
152.00	1566	0.02
153.00	818	0.01
154.05	2960	0.04
155.15	12528	0.15
156.10	878561	10.48
157.05	92699	1.11
158.05	6561	0.08
159.05	3628	0.04
159.95	1334	0.02
160.95	780	0.01
162.00	1670	0.02
163.05	656	0.01
164.00	300	0.00
165.00	999	0.01
166.00	377	0.00
167.00	273	0.00
167.95	1267	0.02
169.05	812	0.01
170.00	7478	0.09
171.05	2367	0.03
172.00	3140	0.04
173.05	1088	0.01
174.00	574	0.01
175.05	371	0.00
176.05	1674	0.02
177.05	9842	0.12
178.00	140374	1.67
179.00	16908	0.20
179.95	2592	0.03
180.95	476	0.01
181.95	590	0.01
182.90	177	0.00
183.90	294	0.00
184.90	223	0.00
186.00	564	0.01
187.05	712	0.01
188.00	2302	0.03
188.95	789	0.01
190.00	1126	0.01
190.95	512	0.01
191.90	542	0.01
192.95	1051	0.01
194.00	726	0.01
194.95	315	0.00
196.00	417	0.00
197.00	582	0.01
197.95	395	0.00
198.90	442	0.01
200.00	886	0.01
200.95	556	0.01
202.00	548	0.01
203.00	1162	0.01
204.00	6135	0.07
204.95	5610	0.07
206.00	1638	0.02
206.95	2894	0.03
207.95	545	0.01
208.95	392	0.00
209.90	225	0.00
211.00	228	0.00
212.00	7257	0.09
213.00	1407	0.02
214.00	1038	0.01
215.05	569	0.01
216.00	231	0.00
216.95	586	0.01
218.00	2578	0.03
219.00	1370	0.02
219.90	662	0.01
220.90	431	0.01
221.90	250	0.00
222.90	132	0.00
223.90	111	0.00
224.90	134	0.00
225.90	302	0.00
227.00	175	0.00
227.95	1344	0.02
229.00	462	0.01
230.00	3876	0.05
230.95	613	0.01
231.90	566	0.01
232.90	241	0.00

233.90	82	0.00	246.05	8377313	99.91	258.00	162	0.00
234.90	178	0.00	247.05	2906641	34.67	259.00	58	0.00
235.90	377	0.00	248.00	299668	3.57	**260.15**	**4090**	**0.05**
236.90	164	0.00	249.00	23406	0.28	**261.05**	**298960**	**3.57**
237.90	100	0.00	249.95	1754	0.02	**262.05**	**62278**	**0.74**
238.90	90	0.00	251.00	375	0.00	263.00	7746	0.09
239.90	70	0.00	252.00	191	0.00	264.05	1058	0.01
240.90	129	0.00	253.00	241	0.00	265.00	334	0.00
242.05	512	0.01	254.00	137	0.00	266.00	116	0.00
243.05	302	0.00	255.00	97	0.00	266.95	558	0.01
244.15	2293	0.03	256.00	1681	0.02	267.90	177	0.00
245.15	260429	3.11	257.00	346	0.00	268.90	226	0.00

2.3.2 GC-MS Analysis of Raw Reaction Mixture by Using BHT as Radical Inhibitor

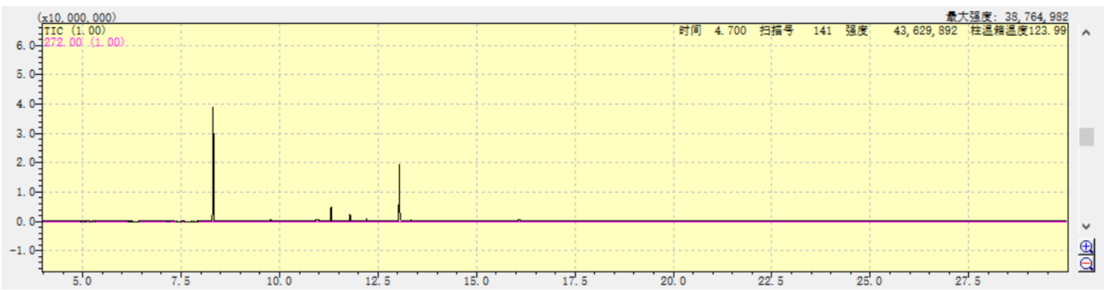


1a **2a** **3aa**, trace **5**, detected by GC-MS

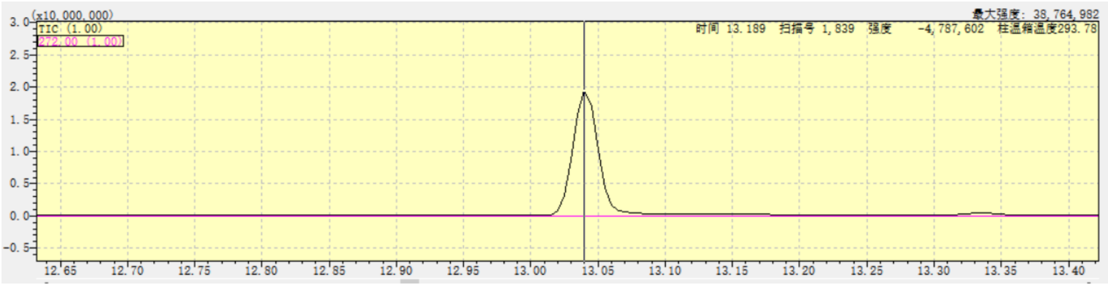
To a Schlenk tube were added 1-isocyano-2-(1-phenylvinyl)benzene **1a** (0.2 mmol), benzoyl chloride **2a** (6 mmol, 3 equiv), Ir(ppy)$_3$ (1 mol%),2,6-lutidine (0.8 mmol, 4 equiv.), BHT (3 equiv), CH_3CN (2 mL) at room temperature and 5 W blue LED irradiation for 12 h. The GC-MS analysis of raw reaction mixture showed that only trace amounts of the target product **3aa** was detected. The acyl radical trapping product 5, which generated from BHT capturing the acyl radical, could be detected by GC-Ms analysis.

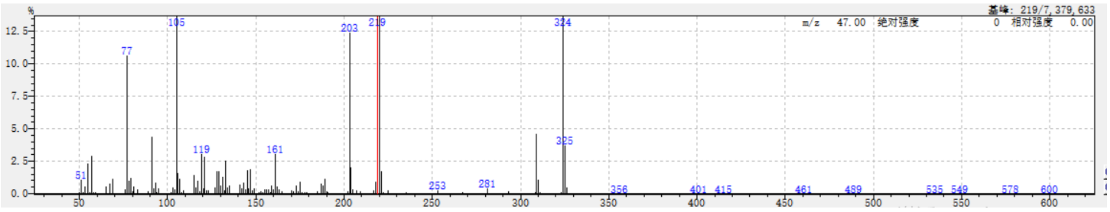
The GC-MS analysis results of raw reaction mixture

The GC spectra of raw reaction mixture



The MS spectra of the peak at 13.04 min





[MS Spectrum]

# of Peaks539

Raw Spectrum 13.040 (scan : 1809)

Background No

Background Spectrum

Base Peak m/z 219.10 (Inten : 7,379,633)

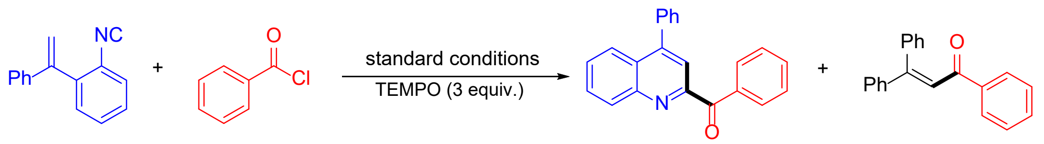
Event# 1

m/z	Absolute Intensity	Relative Intensity
50.00	11537	0.16
51.00	84015	1.14
52.00	10804	0.15
53.00	44962	0.61
54.05	4768	0.06
55.00	176780	2.40
56.05	13536	0.18
57.00	216455	2.93
58.00	11246	0.15
59.00	10884	0.15
60.05	599	0.01
61.05	309	0.00
61.95	1045	0.01
63.00	7497	0.10
64.05	4479	0.06
65.00	43562	0.59
66.00	6548	0.09
67.00	59321	0.80
68.05	4003	0.05
69.00	86988	1.18
70.00	5356	0.07
70.95	3102	0.04
72.05	1399	0.02
72.95	6287	0.09
73.95	2678	0.04
75.05	5609	0.08
76.05	25759	0.35
77.00	791783	10.73
78.00	74266	1.01
79.05	90303	1.22
80.00	17868	0.24
81.05	43333	0.59
82.05	4959	0.07
83.00	26233	0.36
84.00	2026	0.03
85.10	1310	0.02
85.95	757	0.01
87.05	1721	0.02
88.05	2109	0.03
89.00	13862	0.19
90.05	5996	0.08
91.00	325230	4.41
92.05	31772	0.43
93.05	65262	0.88
94.05	11387	0.15
95.05	30685	0.42
96.05	5229	0.07
97.05	6896	0.09
98.00	705	0.01
99.00	454	0.01
100.05	555	0.01
101.00	4258	0.06
102.00	9246	0.13
103.05	39503	0.54
104.05	27761	0.38
105.00	1433650	19.43
106.00	120100	1.63
107.05	88718	1.20
108.05	10840	0.15
109.05	21635	0.29
110.10	2591	0.04
111.05	2312	0.03
112.05	541	0.01
113.00	1166	0.02
114.05	2110	0.03
115.05	106839	1.45
116.05	37959	0.51
117.05	76011	1.03
118.15	16738	0.23
119.05	225869	3.06
120.10	33698	0.46
121.05	212005	2.87
122.05	21553	0.29
123.05	22868	0.31
124.10	2556	0.03
125.05	1172	0.02
126.05	2865	0.04
127.05	35968	0.49
128.05	130389	1.77
129.05	133212	1.81
130.05	47160	0.64
131.05	98909	1.34
132.10	23439	0.32
133.05	188145	2.55
134.05	37000	0.50

135.10	47825	0.65	179.00	10823	0.15	223.00	7236	0.10
136.05	6061	0.08	180.05	3107	0.04	224.05	1738	0.02
137.10	2260	0.03	181.00	6986	0.09	225.00	22553	0.31
138.05	442	0.01	181.95	1993	0.03	226.00	4124	0.06
139.05	4412	0.06	183.00	3871	0.05	227.00	948	0.01
140.05	2111	0.03	184.00	1217	0.02	228.00	1127	0.02
141.05	52684	0.71	185.05	16282	0.22	229.00	2473	0.03
142.05	32458	0.44	186.05	3539	0.05	230.05	1167	0.02
143.05	65399	0.89	187.05	60280	0.82	231.00	4553	0.06
144.05	26600	0.36	188.05	47455	0.64	232.05	2301	0.03
145.05	135211	1.83	189.05	85991	1.17	233.00	4281	0.06
146.05	34667	0.47	190.05	15502	0.21	234.00	4007	0.05
147.05	142974	1.94	191.00	11015	0.15	235.05	13015	0.18
148.05	22857	0.31	192.00	5308	0.07	236.05	3027	0.04
149.05	33134	0.45	193.00	5386	0.07	237.05	4868	0.07
150.05	4070	0.06	194.00	3428	0.05	238.05	889	0.01
151.05	3078	0.04	194.95	4817	0.07	239.05	2492	0.03
152.05	11177	0.15	196.00	964	0.01	239.95	676	0.01
153.05	17161	0.23	197.00	5428	0.07	240.95	867	0.01
154.00	10311	0.14	198.00	1329	0.02	242.05	457	0.01
155.05	26523	0.36	199.00	3225	0.04	243.05	1563	0.02
156.05	24986	0.34	200.05	1892	0.03	244.00	980	0.01
157.05	27508	0.37	201.05	4289	0.06	245.00	1161	0.02
158.05	11483	0.16	202.15	18283	0.25	246.00	663	0.01
159.05	47630	0.65	203.05	922112	12.50	247.05	998	0.01
160.05	28475	0.39	204.05	153855	2.08	248.05	1013	0.01
161.05	228527	3.10	205.00	25302	0.34	249.00	4745	0.06
162.05	42925	0.58	206.05	5482	0.07	250.05	2103	0.03
163.05	28856	0.39	206.95	21916	0.30	251.00	3903	0.05
164.05	4493	0.06	208.00	5674	0.08	252.05	1417	0.02
165.05	15258	0.21	208.95	14804	0.20	253.05	20404	0.28
166.00	6465	0.09	210.00	3494	0.05	254.00	3855	0.05
167.05	5616	0.08	210.95	3171	0.04	254.95	672	0.01
168.05	1874	0.03	212.05	894	0.01	255.90	98	0.00
169.05	5274	0.07	213.00	4650	0.06	257.05	426	0.01
170.05	24020	0.33	213.95	852	0.01	258.10	823	0.01
171.05	17574	0.24	215.00	6454	0.09	258.95	446	0.01
172.05	6350	0.09	216.00	3610	0.05	259.95	584	0.01
173.05	47940	0.65	217.05	22865	0.31	261.10	455	0.01
174.05	15807	0.21	218.15	71128	0.96	262.05	379	0.01
175.05	72316	0.98	219.10	7379633	100.00	263.05	1399	0.02
176.05	13521	0.18	220.10	1300937	17.63	264.05	669	0.01
177.00	4761	0.06	221.05	129937	1.76	265.00	7316	0.10
178.00	12202	0.17	222.05	10466	0.14	266.05	4780	0.06

267.05	10349	0.14	289.00	370	0.01	311.10	10316	0.14
268.00	4140	0.06	290.10	110	0.00	312.05	832	0.01
269.00	1841	0.02	291.10	2132	0.03	313.10	158	0.00
270.00	254	0.00	292.15	719	0.01	314.10	65	0.00
271.00	134	0.00	293.10	14258	0.19	315.10	34	0.00
272.00	138	0.00	294.10	3462	0.05	316.10	60	0.00
273.00	135	0.00	295.10	2086	0.03	317.10	42	0.00
274.00	79	0.00	296.15	515	0.01	318.10	27	0.00
275.00	398	0.01	297.20	103	0.00	319.10	31	0.00
276.00	218	0.00	298.20	110	0.00	320.10	86	0.00
277.05	542	0.01	299.20	84	0.00	321.10	266	0.00
278.10	186	0.00	300.20	31	0.00	322.10	2150	0.03
279.05	1415	0.02	301.20	21	0.00	323.15	8964	0.12
280.05	862	0.01	302.20	49	0.00	**324.10**	**1120295**	**15.18**
281.05	30839	0.42	303.20	121	0.00	**325.10**	**276106**	**3.74**
282.05	6818	0.09	304.20	130	0.00	326.10	37550	0.51
283.00	1866	0.03	305.20	97	0.00	327.00	4212	0.06
284.00	303	0.00	306.10	239	0.00	327.95	675	0.01
285.00	130	0.00	307.10	2977	0.04	329.00	140	0.00
286.00	54	0.00	308.15	8387	0.11	330.00	81	0.00
287.00	90	0.00	309.10	343746	4.66			
288.00	66	0.00	310.10	81161	1.10			

2.3.3 GC-MS Analysis of Raw Reaction Mixture by Using 1,1-diphenylethen as Radical Inhibitor

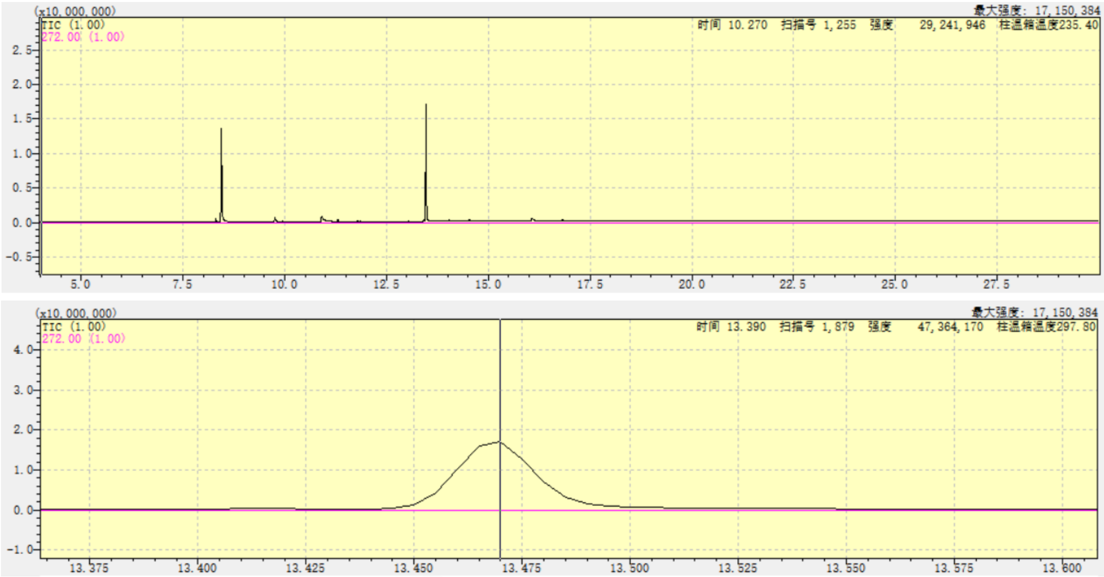


1a **2a** **3aa**, trace **6**, 40% isolated yield

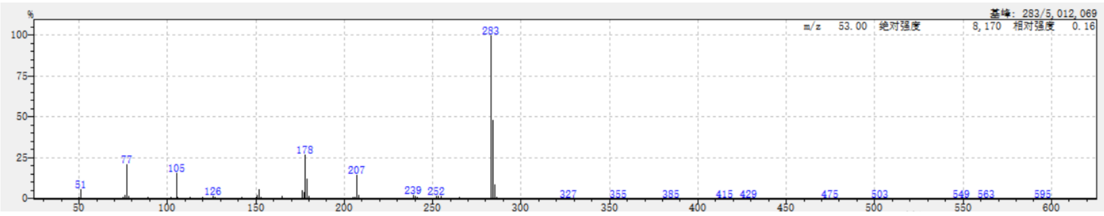
To a Schlenk tube were added 1-isocyano-2-(1-phenylvinyl)benzene **1a** (0.2 mmol), benzoyl chloride **2a** (6 mmol, 3 equiv), Ir(ppy)$_3$ (1 mol%),2,6-lutidine (0.8 mmol, 4 equiv.), 1,1-diphenylethene (3 equiv), CH_3CN (2 mL) at room temperature and 6 W blue LED irradiation for 12 h. The GC-MS analysis of raw reaction mixture showed that only trace amounts of the target product **3aa** was detected. The acyl radical trapping product 6, which generated from 1,1-diphenylethene capturing the acyl radical, could be detected by GC-Ms analysis.

The GC-MS analysis results of raw reaction mixture

The GC spectra of raw reaction mixture



The MS spectra of the peak at 13.47 min

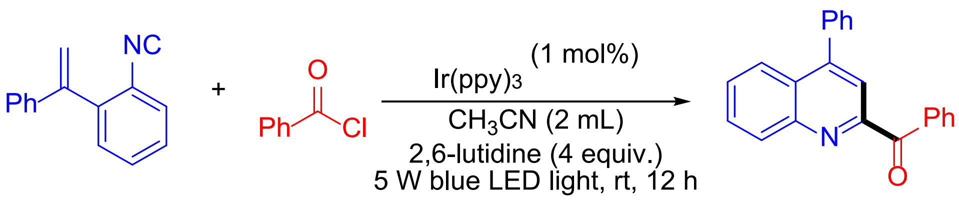


[MS Spectrum]
# of Peaks548
Raw Spectrum 13.465 (scan : 1894)
Background No
Background Spectrum
Base Peakm/z 283.05 (Inten : 4,881,985)
Event# 1
m/z Absolute Intensity Relative Intensity
50.00 41241 0.84
51.00 261439 5.36
52.00 27970 0.57
53.00 67350.14
54.00 362 0.01
55.00 19670.04
55.95 744 0.02
57.05 926 0.02
58.00 217 0.00
59.00 575 0.01
60.00 182 0.00
60.95 10360.02
62.00 92040.19
63.00 37654 0.77
63.95 44530.09
65.00 10623 0.22
66.00 11260.02
67.00 506 0.01
68.00 398 0.01
69.00 926 0.02
69.95 380 0.01
71.05 660 0.01
72.05 310 0.01
73.05 64160.13
74.00 23222 0.48
75.00 47231 0.97
76.05 96551 1.98
77.00 921450 18.87
78.00 70839 1.45
79.05 40070.08
79.95 422 0.01
81.20 21400.04
82.15 14200.03
83.05 10980.02
84.00 15020.03
84.95 14730.03
85.95 74180.15
87.00 17185 0.35
88.05 20781 0.43
89.00 39569 0.81
89.95 39650.08
91.00 17742 0.36
92.00 20020.04
93.55 46480.10
94.50 81480.17
96.00 28700.06
97.05 10420.02
97.95 69890.14
99.00 79030.16
100.05 10771 0.22
101.05 34539 0.71
102.00 63919 1.31
103.00 28119 0.58
104.05 82420.17
105.00 707974 14.50

106.00	59428	1.22	150.00	43596	0.89	193.95	813	0.02
107.40	14650	0.30	151.00	117575	2.41	194.90	378	0.01
108.35	3343	0.07	152.00	262798	5.38	195.90	158	0.00
109.00	1153	0.02	153.00	49727	1.02	196.90	170	0.00
110.00	2222	0.05	154.00	8238	0.17	198.05	882	0.02
111.05	3896	0.08	155.05	956	0.02	199.00	1223	0.03
112.05	8529	0.17	156.00	98	0.00	199.95	5069	0.10
113.05	50630	1.04	157.00	121	0.00	200.95	4479	0.09
114.00	29902	0.61	158.00	156	0.00	202.00	13033	0.27
115.00	25804	0.53	159.00	217	0.00	203.00	4145	0.08
116.00	3762	0.08	160.00	36	0.00	204.05	2428	0.05
116.60	1172	0.02	161.00	1302	0.03	205.00	67231	1.38
117.65	1759	0.04	162.00	4042	0.08	206.05	50354	1.03
118.65	12493	0.26	163.00	18378	0.38	207.00	710806	14.56
119.65	57577	1.18	164.00	12934	0.26	208.00	114274	2.34
120.55	17877	0.37	165.00	72337	1.48	208.95	12585	0.26
122.05	25688	0.53	166.00	11102	0.23	210.00	1135	0.02
122.95	3267	0.07	167.00	3510	0.07	210.95	2255	0.05
124.05	2791	0.06	168.00	759	0.02	211.95	957	0.02
125.05	23620	0.48	169.00	150	0.00	213.00	7935	0.16
126.05	85601	1.75	170.00	50	0.00	214.05	2959	0.06
127.00	43162	0.88	171.00	79	0.00	215.00	25495	0.52
128.00	25183	0.52	172.00	108	0.00	216.00	6150	0.13
129.00	14359	0.29	173.05	621	0.01	216.95	1093	0.02
130.45	2957	0.06	174.00	6964	0.14	218.00	986	0.02
131.45	23772	0.49	175.05	17182	0.35	218.90	524	0.01
132.35	30975	0.63	176.00	240271	4.92	219.90	169	0.00
133.35	11923	0.24	177.05	202355	4.14	220.90	1393	0.03
134.15	15453	0.32	178.00	1230174	25.20	221.95	856	0.02
135.15	3987	0.08	179.00	563822	11.55	223.00	1026	0.02
136.05	381	0.01	180.00	73338	1.50	224.00	5761	0.12
137.00	5292	0.11	181.00	16476	0.34	224.95	4760	0.10
138.00	4362	0.09	182.00	1870	0.04	225.95	26437	0.54
139.05	29705	0.61	183.00	265	0.01	227.00	13438	0.28
140.05	9808	0.20	184.00	68	0.00	228.00	22042	0.45
141.05	33317	0.68	184.95	428	0.01	229.00	11092	0.23
142.05	43672	0.89	186.05	792	0.02	230.00	1878	0.04
142.95	4379	0.09	187.00	5354	0.11	231.00	930	0.02
144.00	242	0.00	188.00	4575	0.09	232.00	241	0.00
144.95	405	0.01	189.00	24620	0.50	233.00	170	0.00
146.00	242	0.00	190.05	8297	0.17	233.90	174	0.00
147.00	1390	0.03	191.00	34575	0.71	234.90	898	0.02
148.05	462	0.01	192.00	5838	0.12	236.00	742	0.02
149.05	5585	0.11	192.95	4115	0.08	236.95	4813	0.10

238.05	3785	0.08
239.00	107818	2.21
240.00	70938	1.45
241.00	64513	1.32
242.00	13153	0.27
243.00	2361	0.05
243.95	848	0.02
244.90	284	0.01
245.90	132	0.00
247.00	199	0.00
248.00	1796	0.04
248.95	2593	0.05
250.00	19766	0.40
251.05	9147	0.19
252.00	89367	1.83
253.00	83564	1.71
254.00	39302	0.81
255.00	77166	1.58
256.00	37142	0.76
257.00	9396	0.19
257.95	1149	0.02
258.90	254	0.01
260.00	281	0.01
261.00	1406	0.03
262.05	877	0.02
263.00	12967	0.27
264.00	5178	0.11
265.00	48985	1.00
266.00	15177	0.31
267.05	13878	0.28
268.00	11591	0.24
269.00	4295	0.09
270.05	925	0.02
271.00	162	0.00
272.00	78	0.00
273.00	132	0.00
274.00	87	0.00
275.00	170	0.00
276.00	153	0.00
277.00	194	0.00
278.05	296	0.01
279.00	1433	0.03
280.05	1520	0.03
281.00	25447	0.52
282.05	31295	0.64
283.05	**4881985**	**100.00**
284.05	**2393937**	**49.04**
285.00	**432991**	**8.87**
286.00	48350	0.99
287.05	3339	0.07
288.00	412	0.01
289.00	138	0.00
290.00	73	0.00
291.00	92	0.00
292.00	70	0.00
293.00	241	0.00
294.00	122	0.00
295.00	494	0.01
296.00	345	0.01
297.00	215	0.00
298.00	39	0.00

2.4 The Light on/off Experiments



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

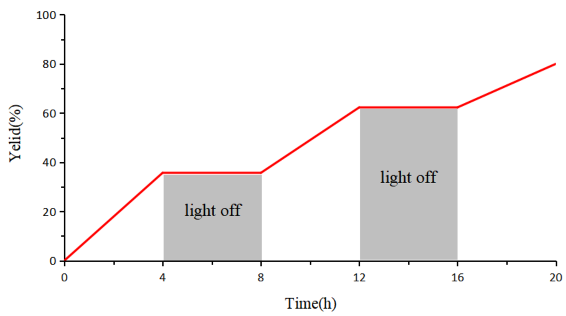


Figure S2 The Light on/off Experiments

Time/h	0	4 (blue)	8 (dark)	12 (blue)	16 (dark)	20 (blue)
Yield/%	0	35.7	35.7	62.3	62.3	80.0

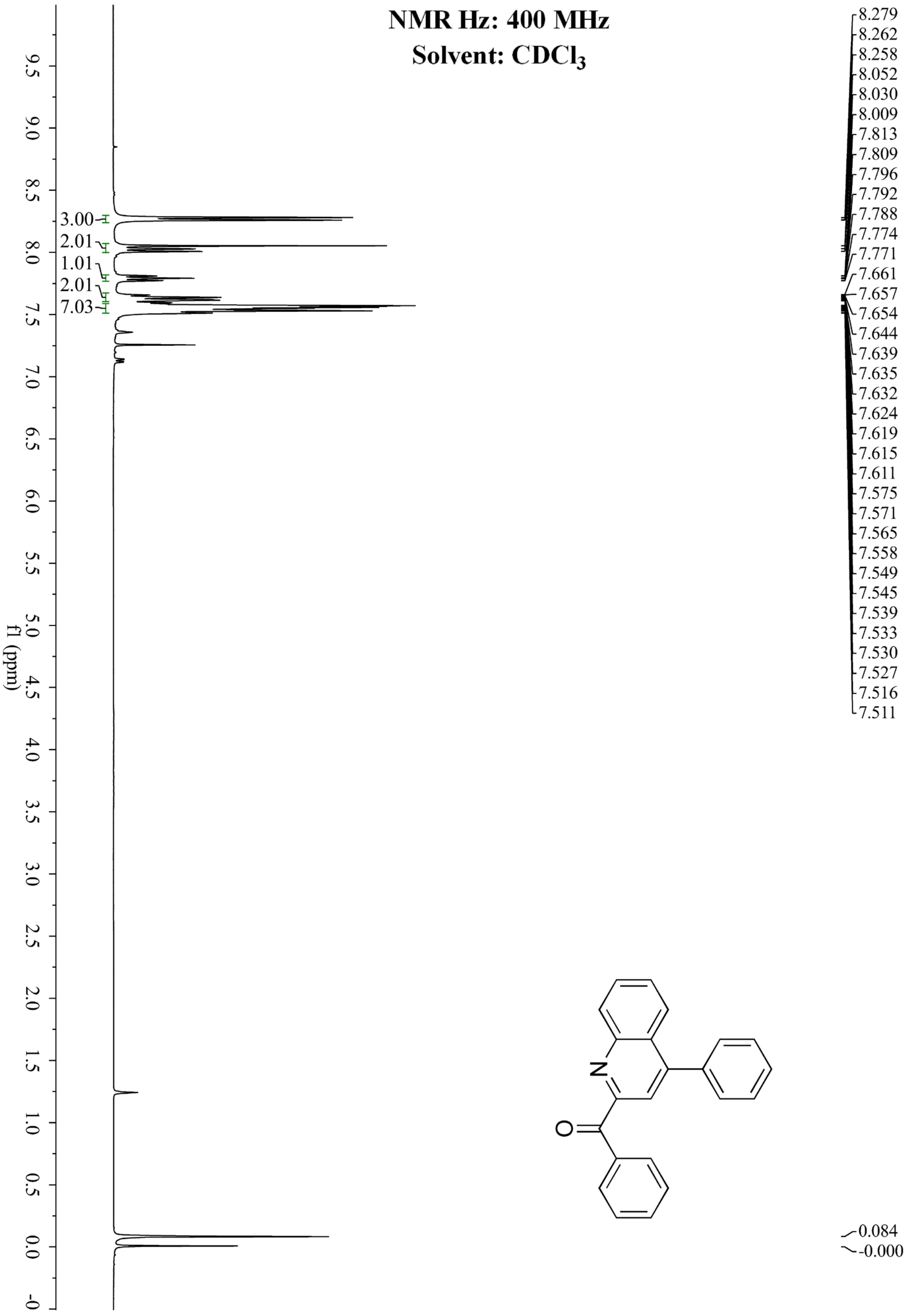
The above depicted reaction was performed according to the general protocol established. The reaction was irradiated with 5 W blue LEDs for 4 hour and then stirred in the dark for 4 hour. This procedure was repeated for 20 hours, and the yield of the product was determined by ^{1}H NMR with dibromomethane as an internal standard at each point the light was turned off or on. The results are shown in the graph above. This result shows that constant light irradiation is needed to progress the reaction.

3. References

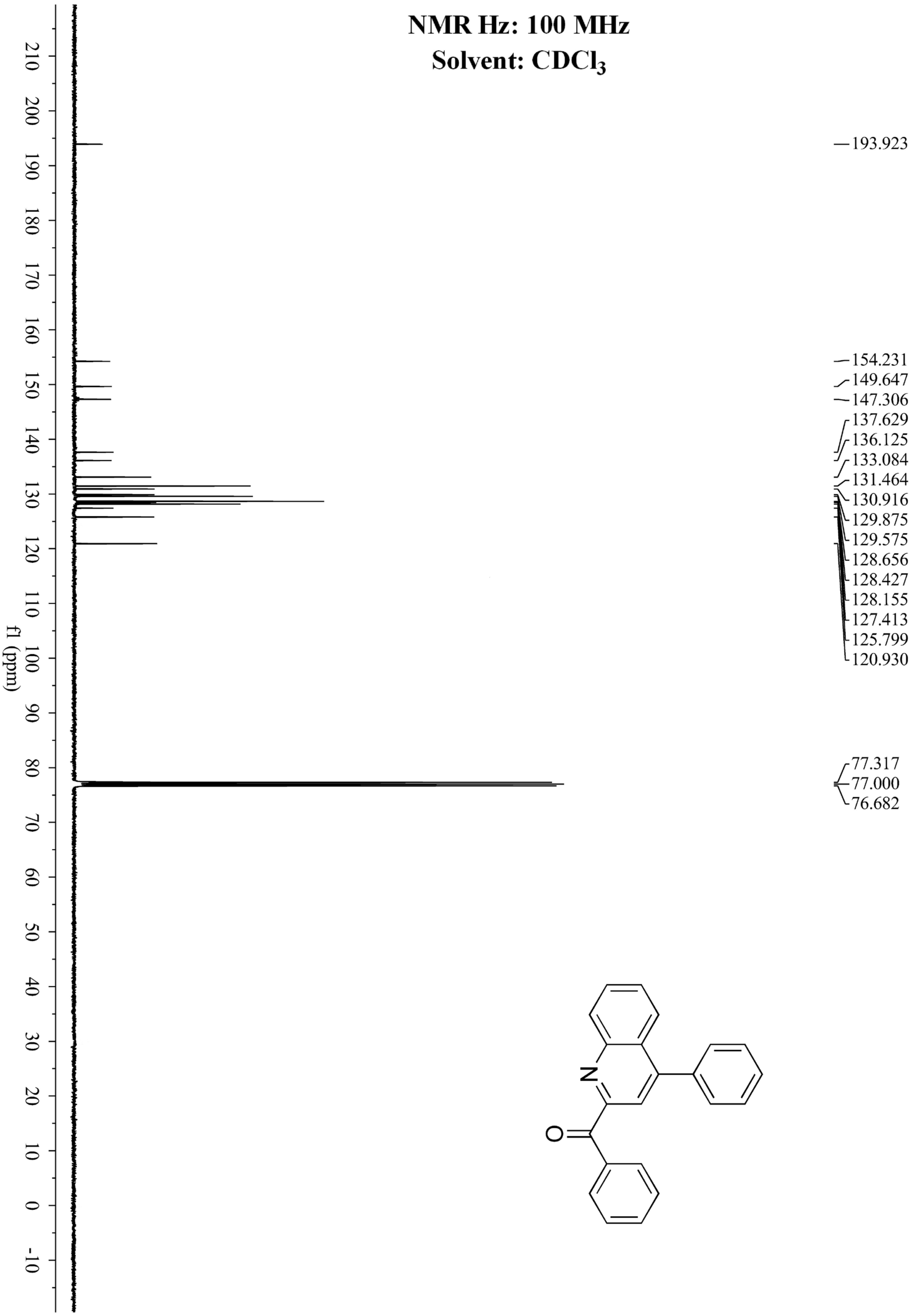
[1] J. Wang, H. Liu, Y. Liu, W. Hao, Y. Yang, Y. Sun and X. Xu, *Org. Chem. Front.*, 2022, **9**, 6484-6489.

4. Spectra

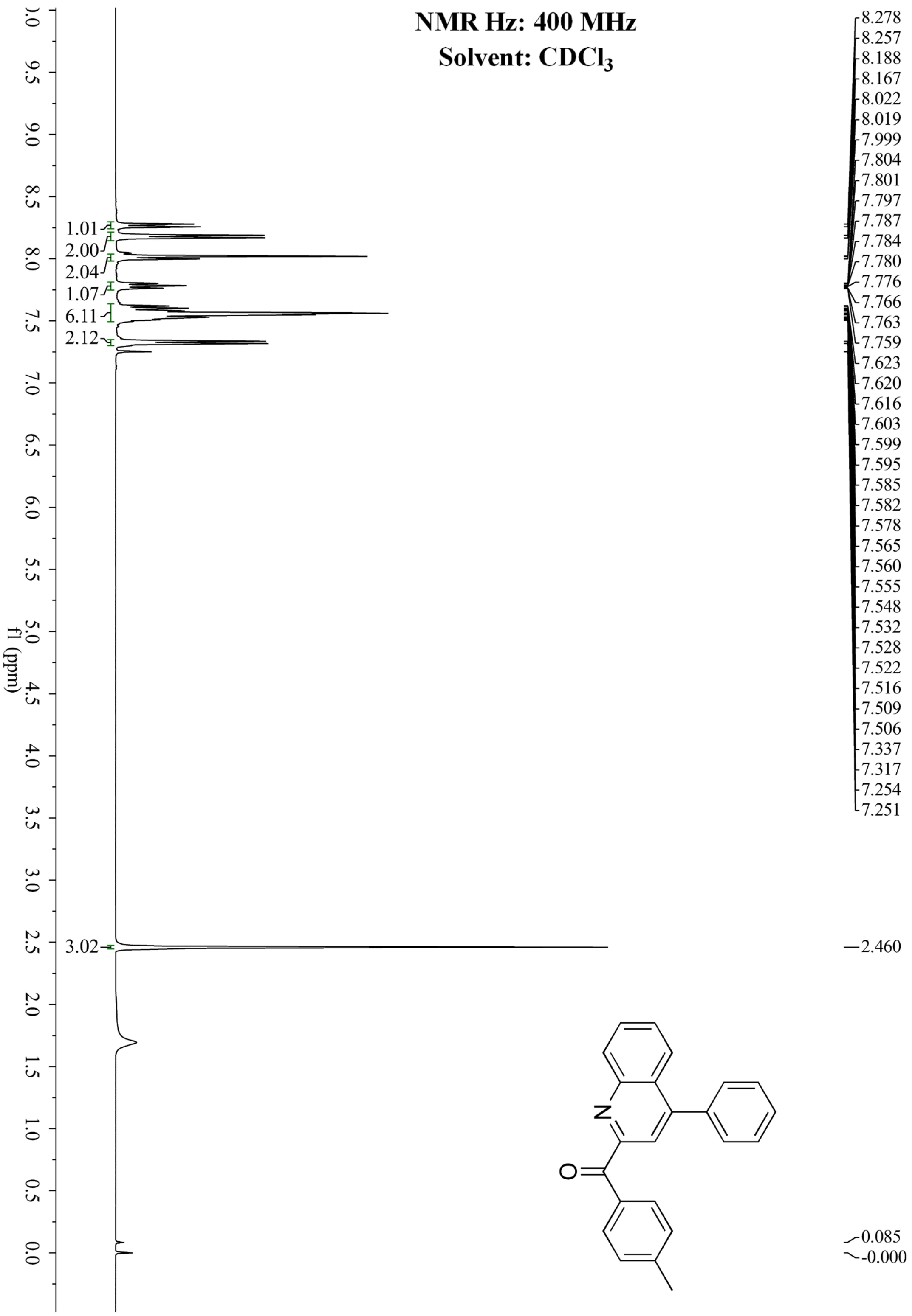
Phenyl(4-phenylquinolin-2-yl)methanone(3aa)

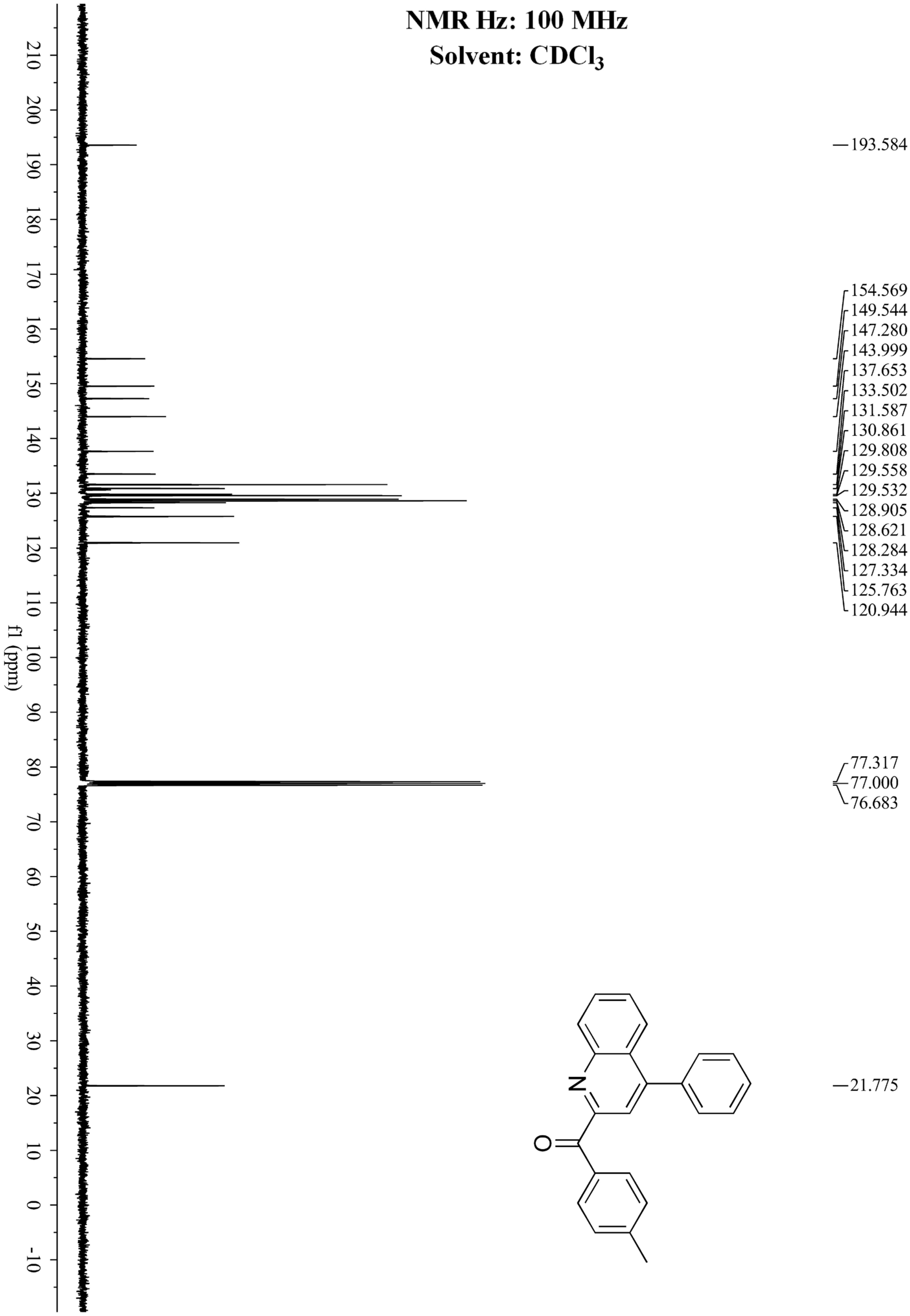


NMR Hz: 100 MHz
Solvent: $CDCl_3$

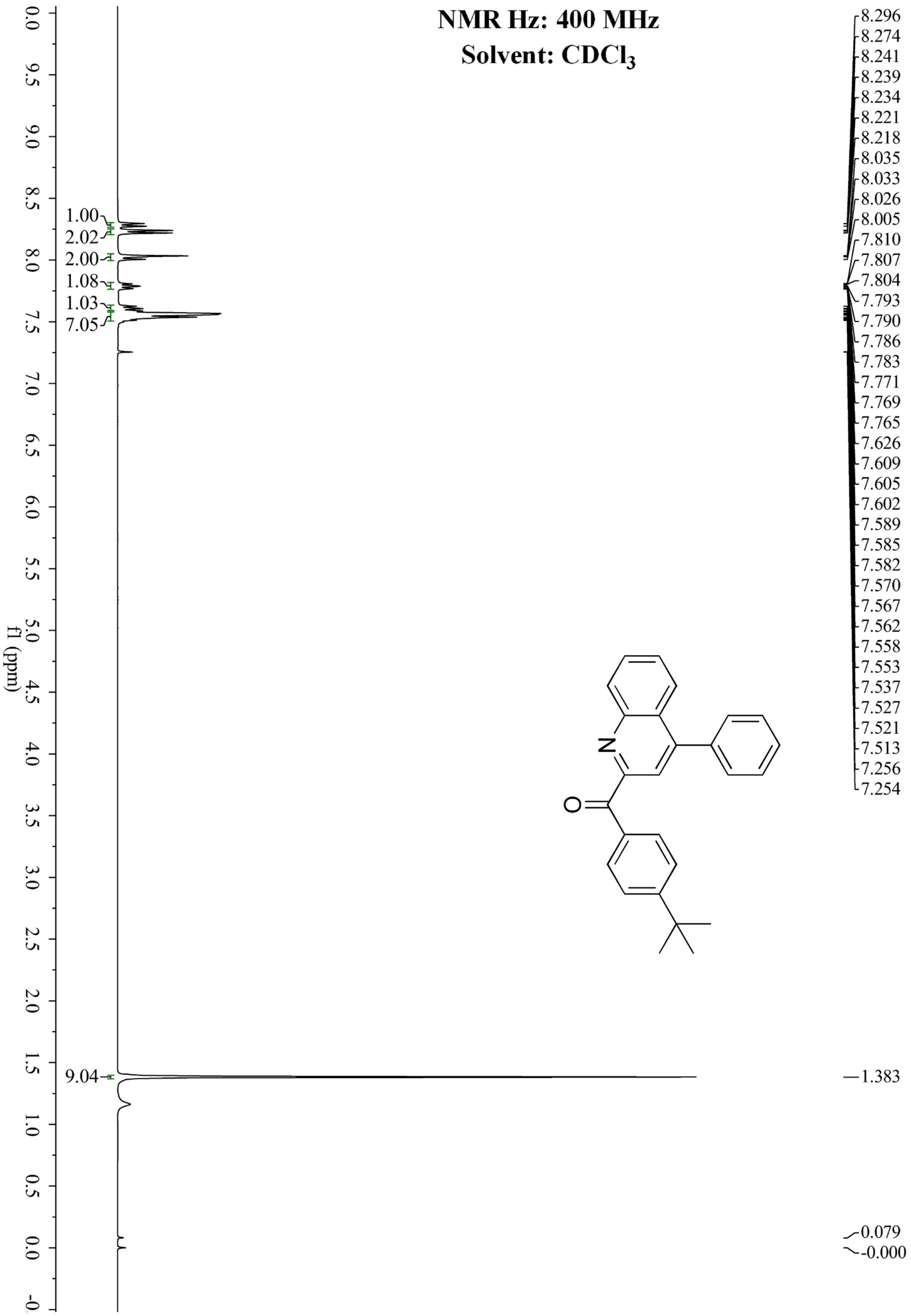


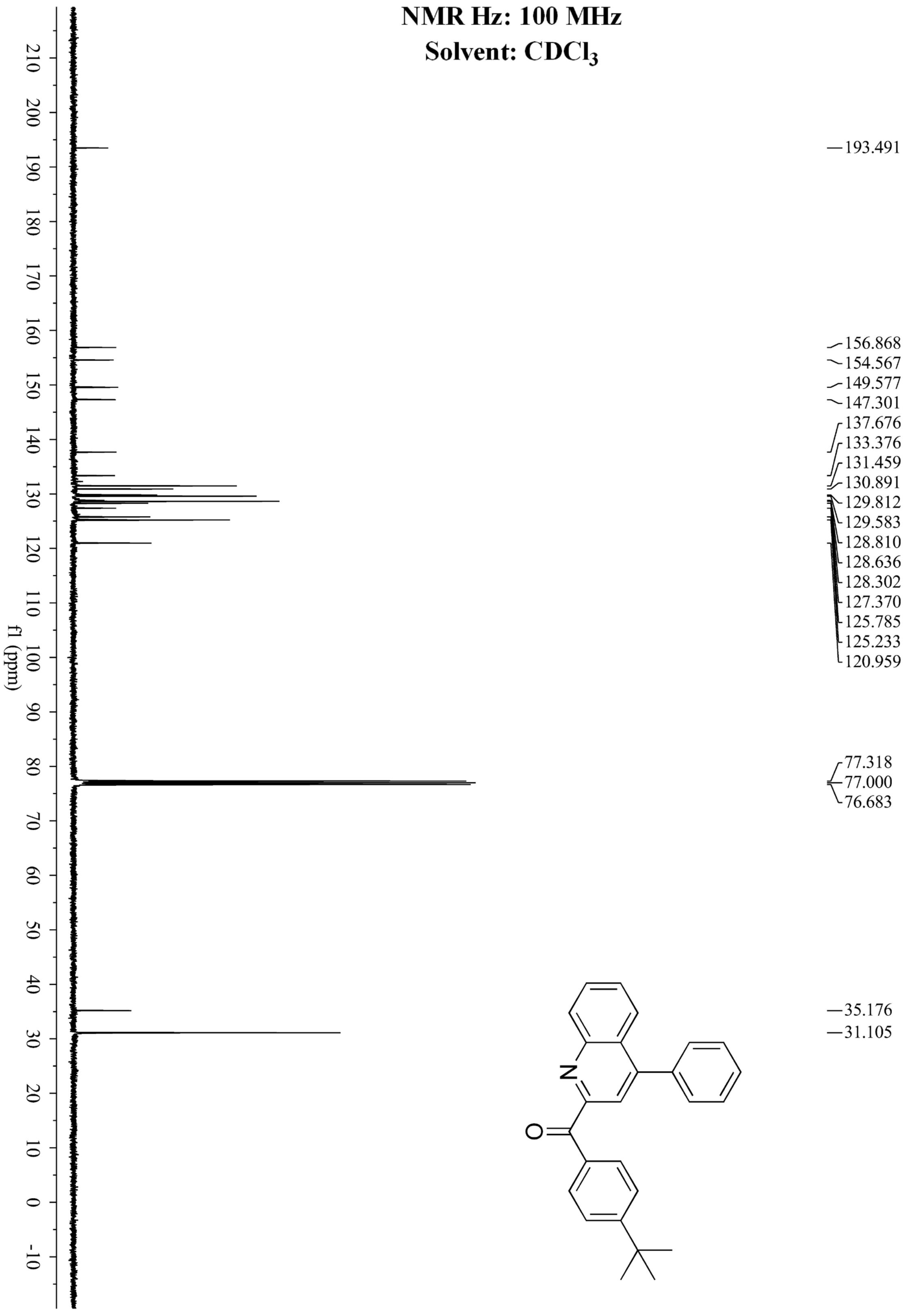
(4-Phenylquinolin-2-yl)(p-tolyl)methanone(3ab)



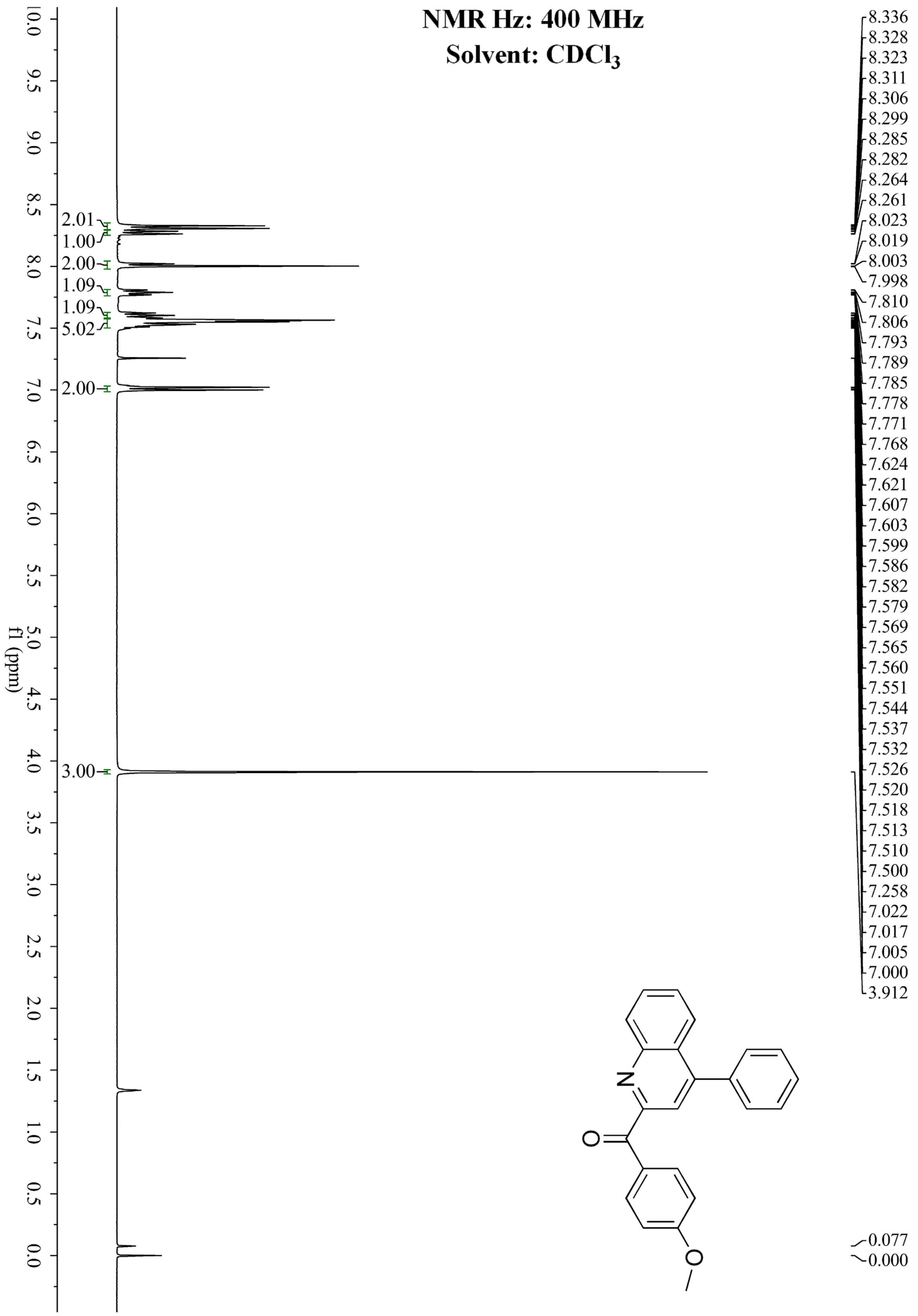

NMR Hz: 100 MHz
Solvent: $CDCl_3$
193.584
154.569
149.544
147.280
143.999
137.653
133.502
131.587
130.861
129.808
129.558
129.532
128.905
128.621
128.284
127.334
125.763
120.944
77.317
77.000
76.683
21.775
fl (ppm)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
N
O

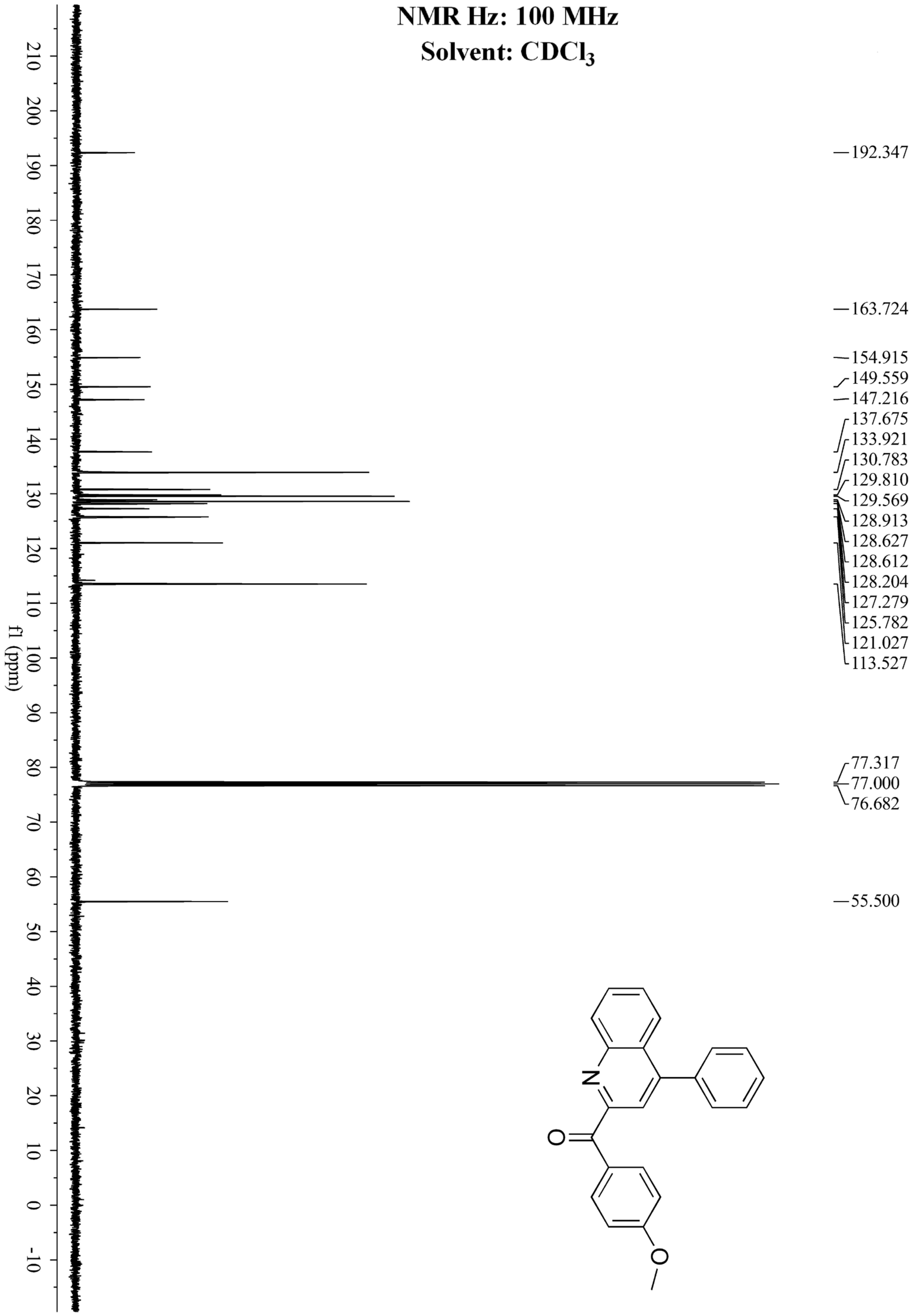
(4-(Tert-butyl)phenyl)(4-phenylquinolin-2-yl)methanone(3ac)



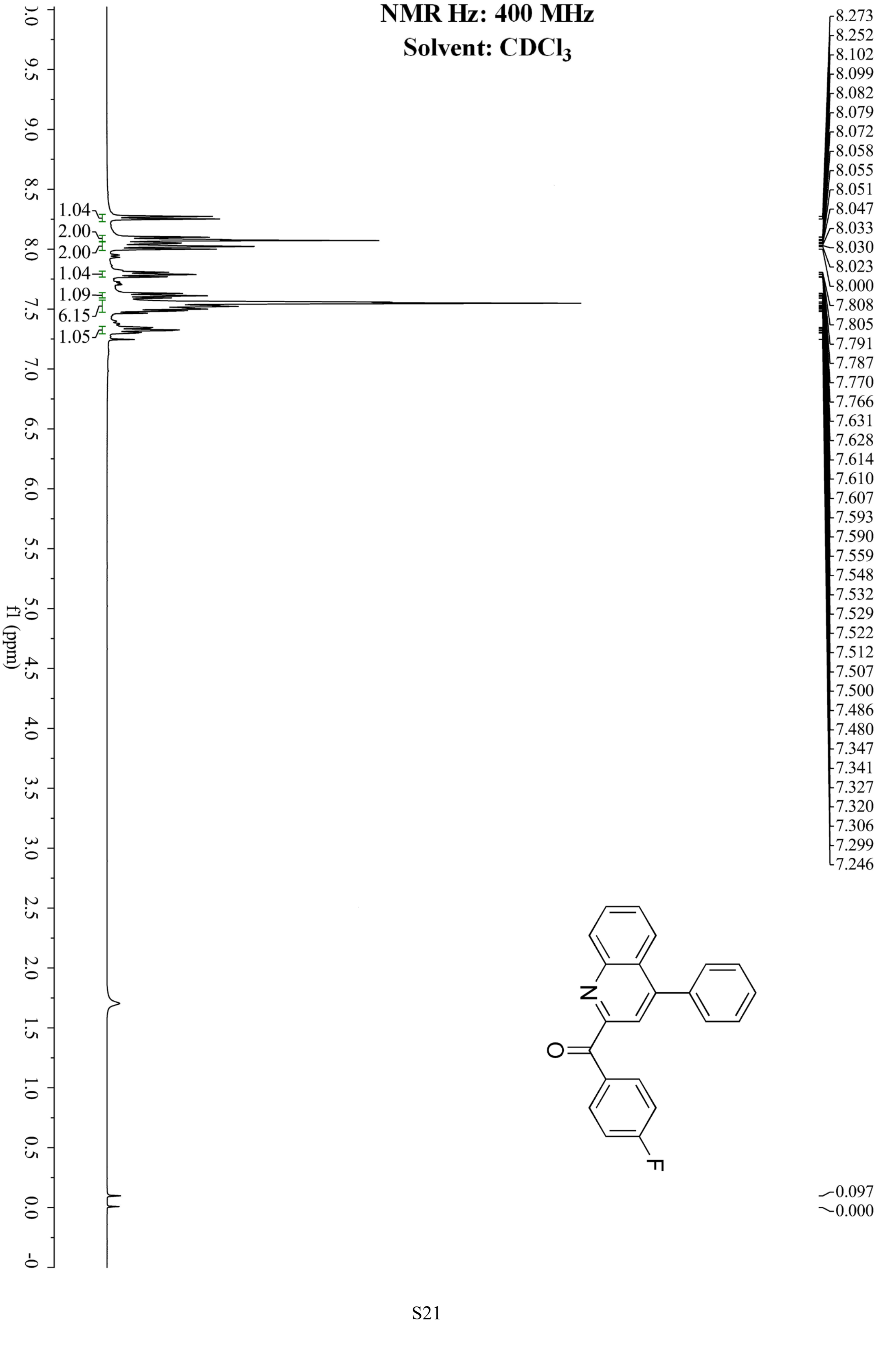

NMR Hz: 100 MHz
Solvent: $CDCl_3$
193.491
156.868
154.567
149.577
147.301
137.676
133.376
131.459
130.891
129.812
129.583
128.810
128.636
128.302
127.370
125.785
125.233
120.959
77.318
77.000
76.683
35.176
31.105
f1 (ppm)
N
O

(4-Methoxyphenyl)(4-phenylquinolin-2-yl)methanone(3ad)

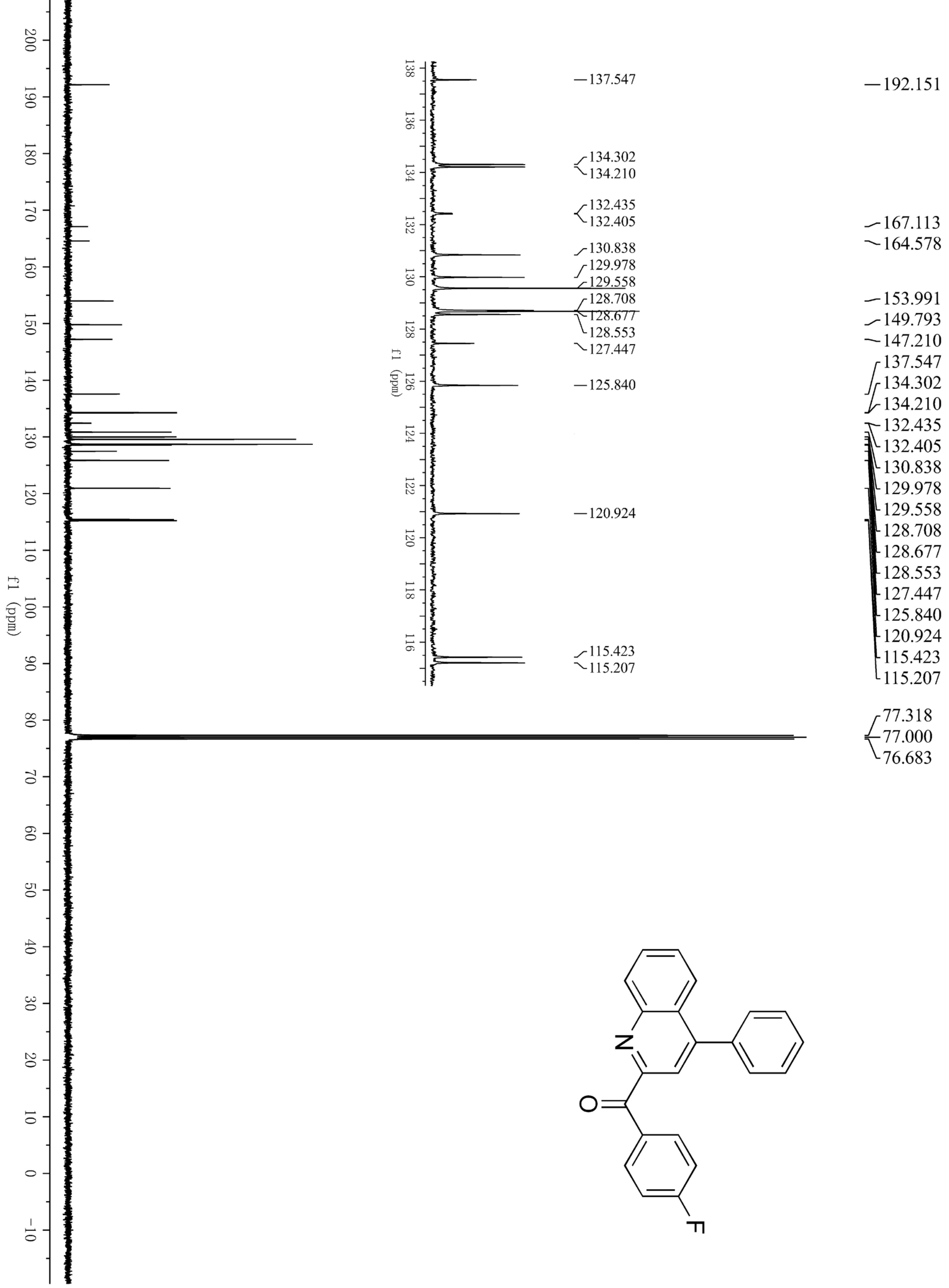


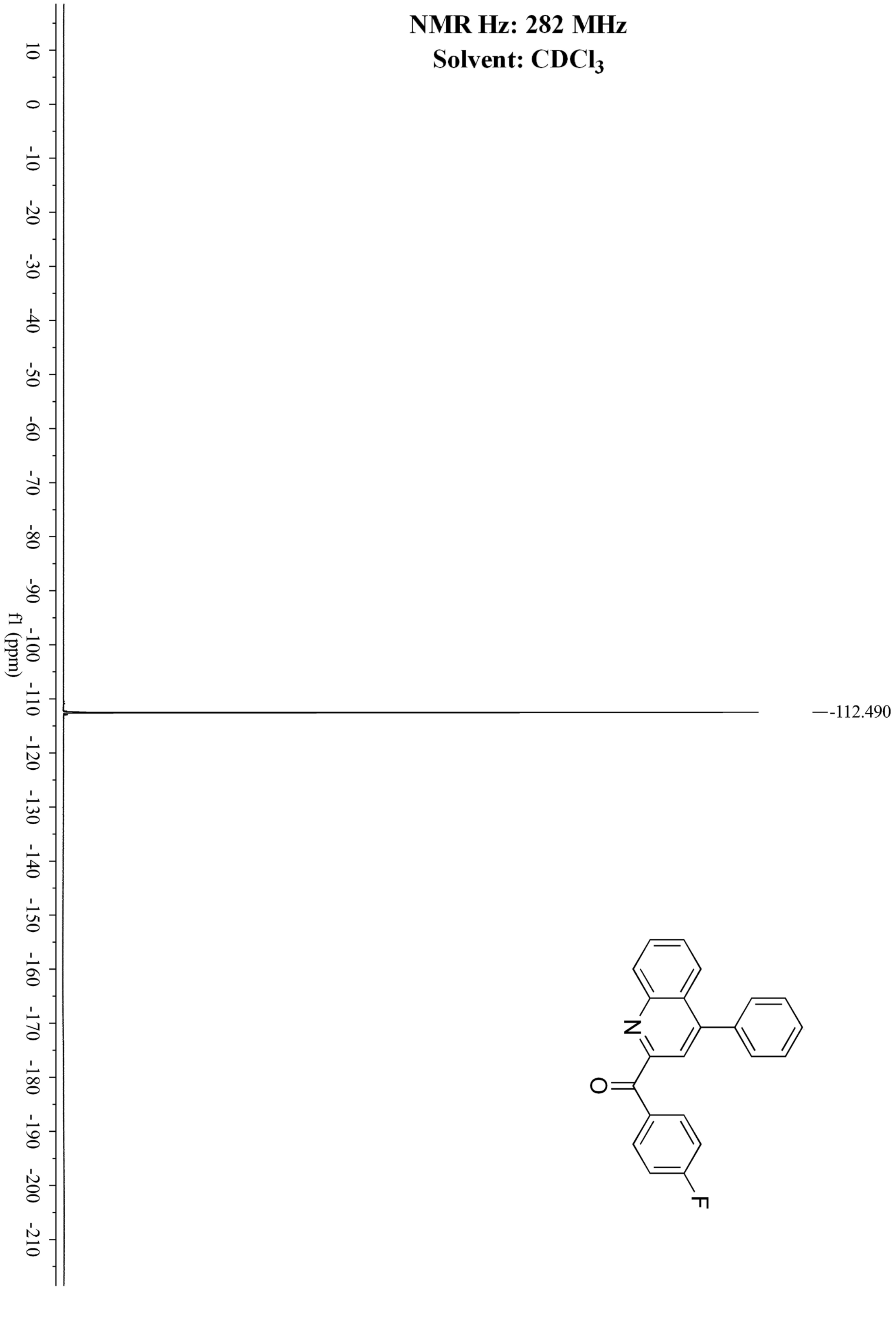

NMR Hz: 100 MHz
Solvent: $CDCl_3$
192.347
163.724
154.915
149.559
147.216
137.675
133.921
130.783
129.810
129.569
128.913
128.627
128.612
128.204
127.279
125.782
121.027
113.527
77.317
77.000
76.682
55.500
f1 (ppm)
N
O

(4-Fluorophenyl)(4-phenylquinolin-2-yl)methanone (3ae))

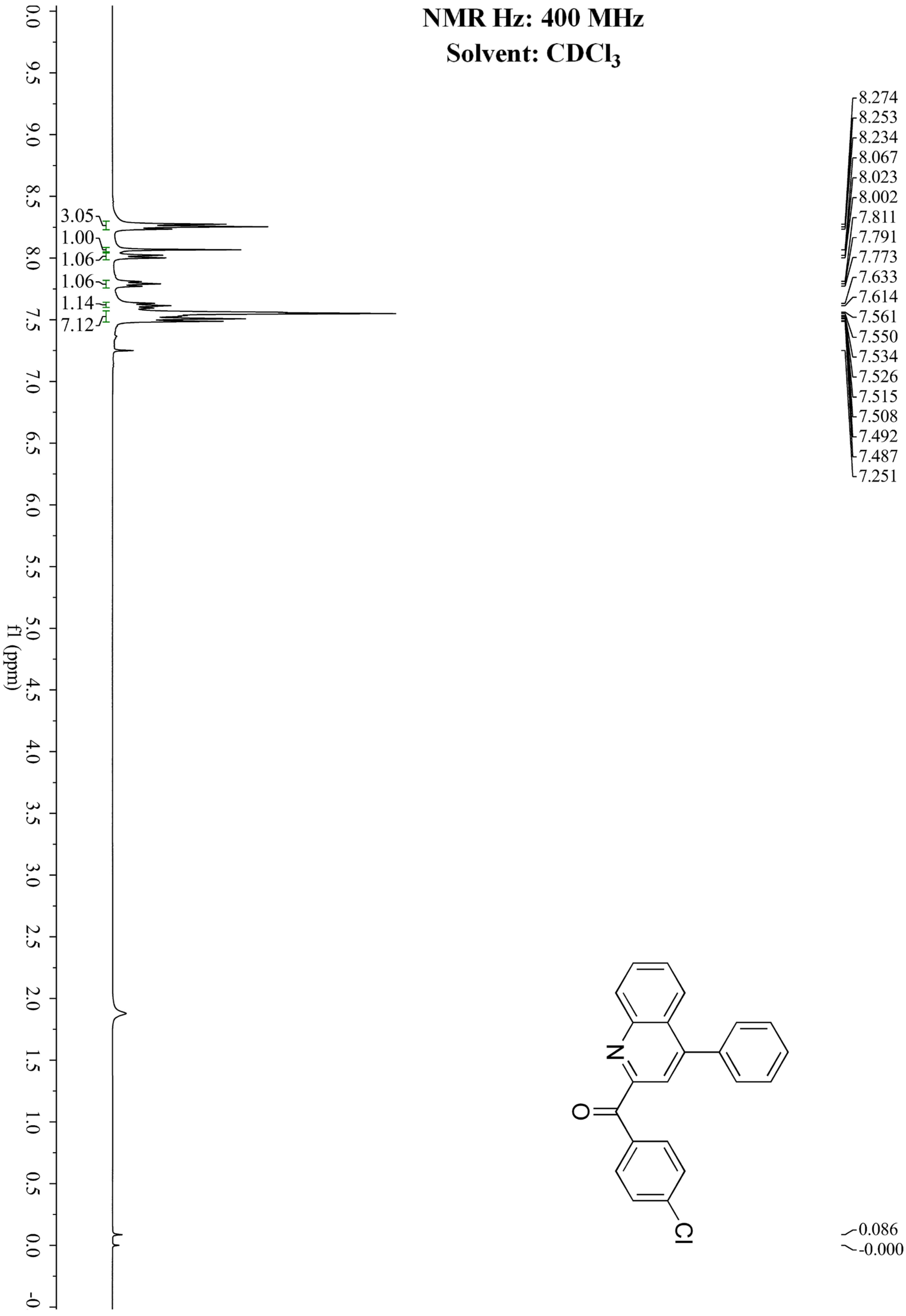


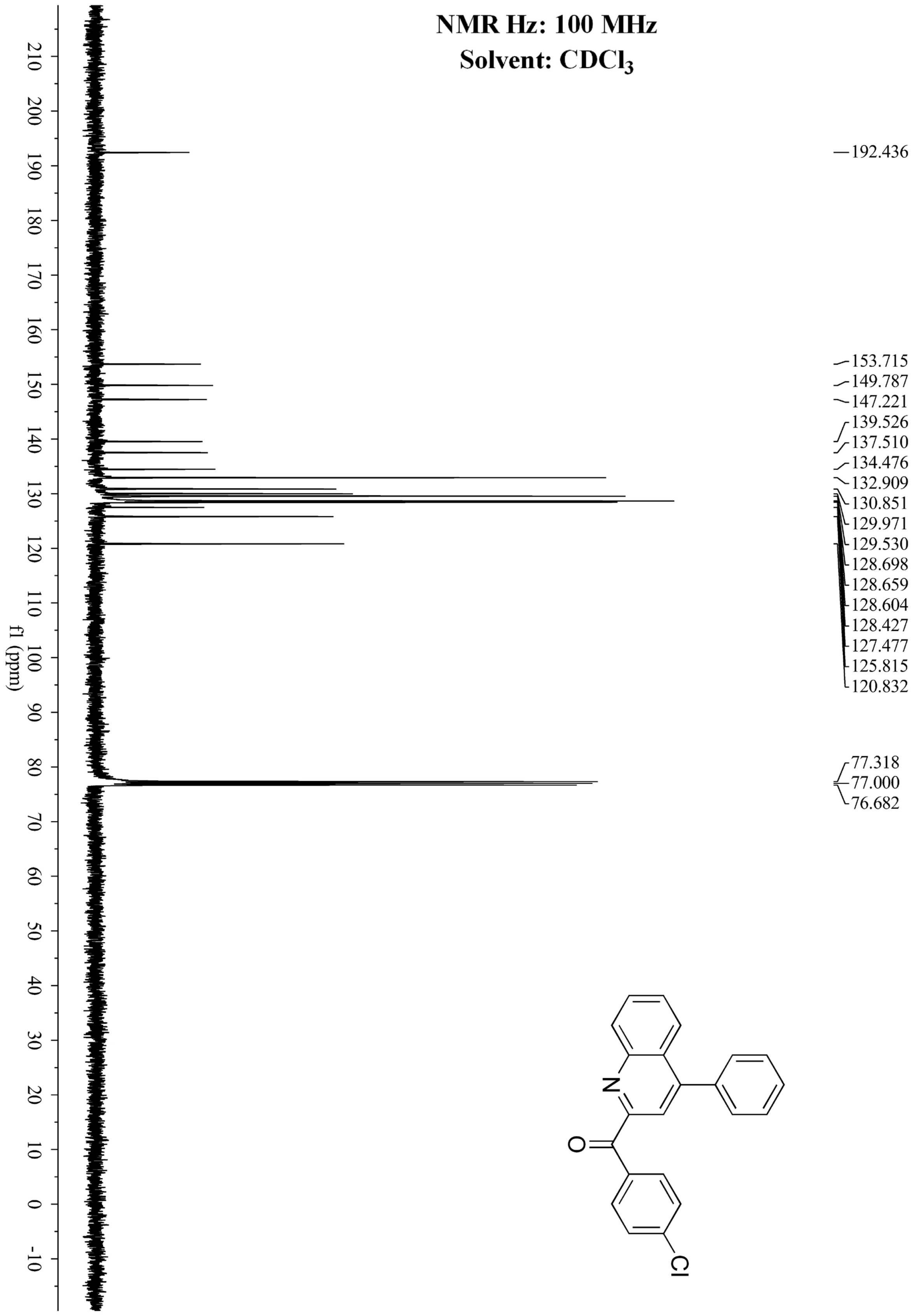
NMR Hz: 100 MHz
Solvent: $CDCl_3$



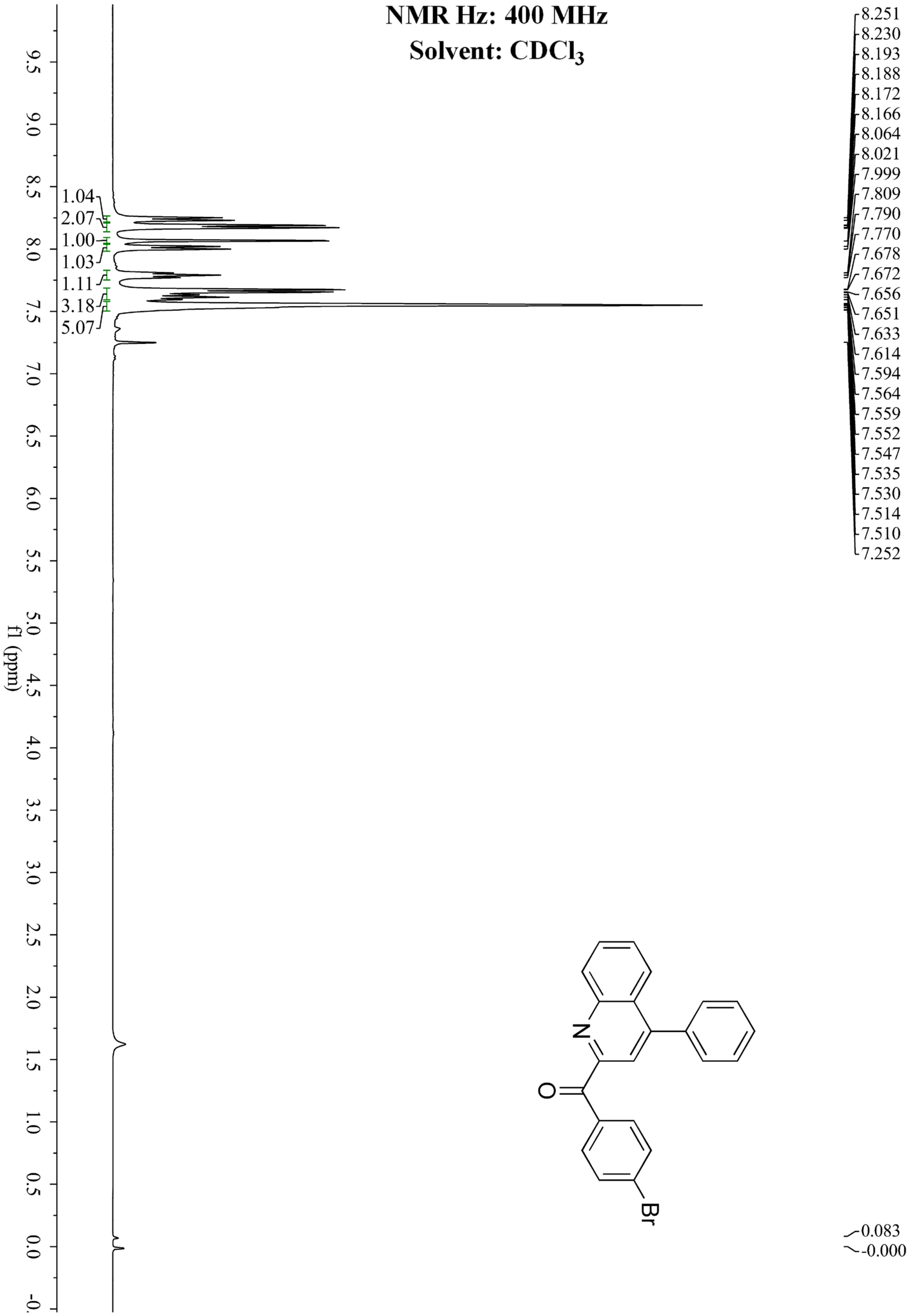

NMR Hz: 282 MHz
Solvent: $CDCl_3$
-112.490
f1 (ppm)
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
N
O
F

(4-Chlorophenyl)(4-phenylquinolin-2-yl)methanone (3af)

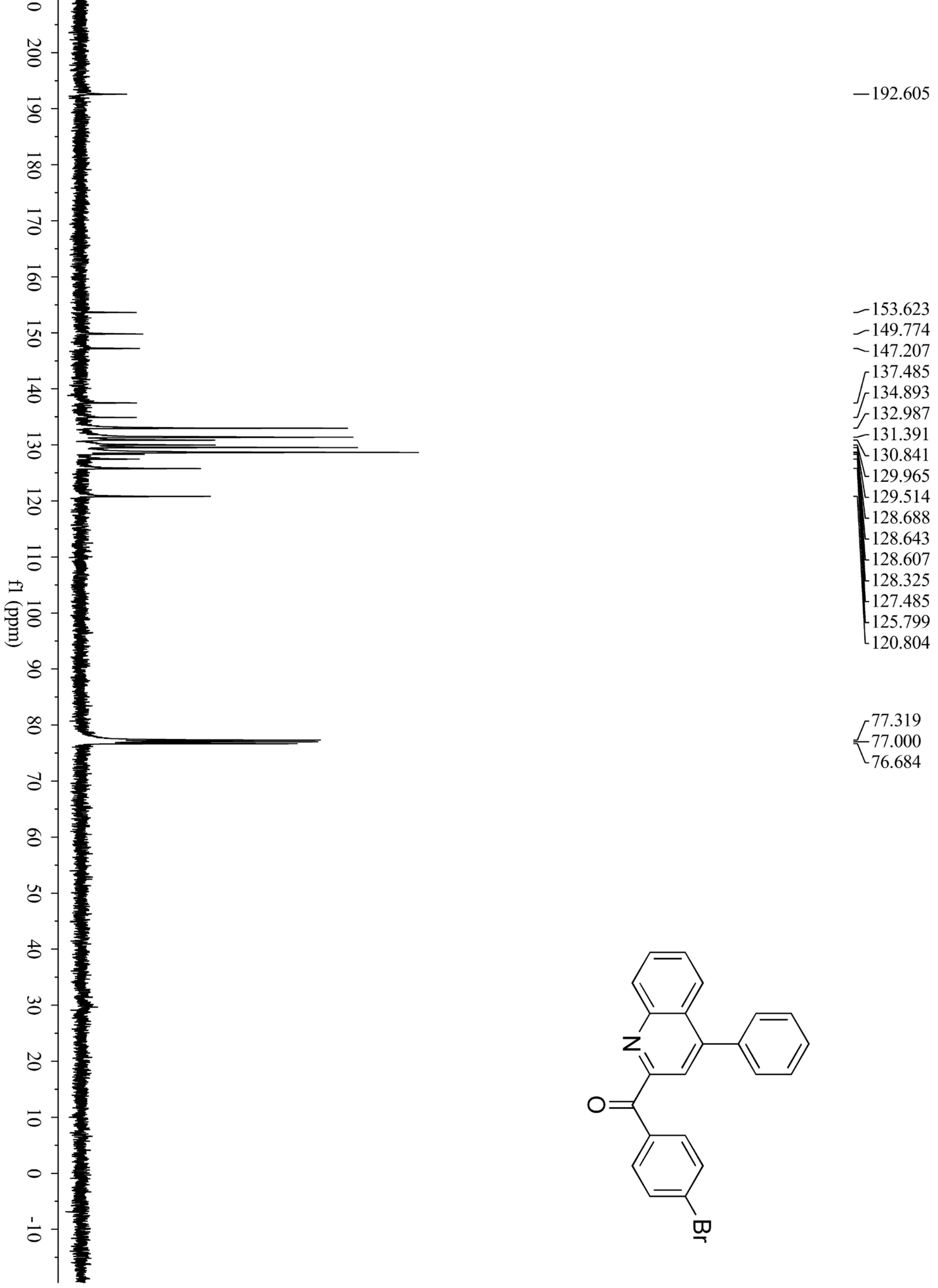



NMR Hz: 100 MHz
Solvent: $CDCl_3$
192.436
153.715
149.787
147.221
139.526
137.510
134.476
132.909
130.851
129.971
129.530
128.698
128.659
128.604
128.427
127.477
125.815
120.832
77.318
77.000
76.682
f1 (ppm)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
N
O
Cl

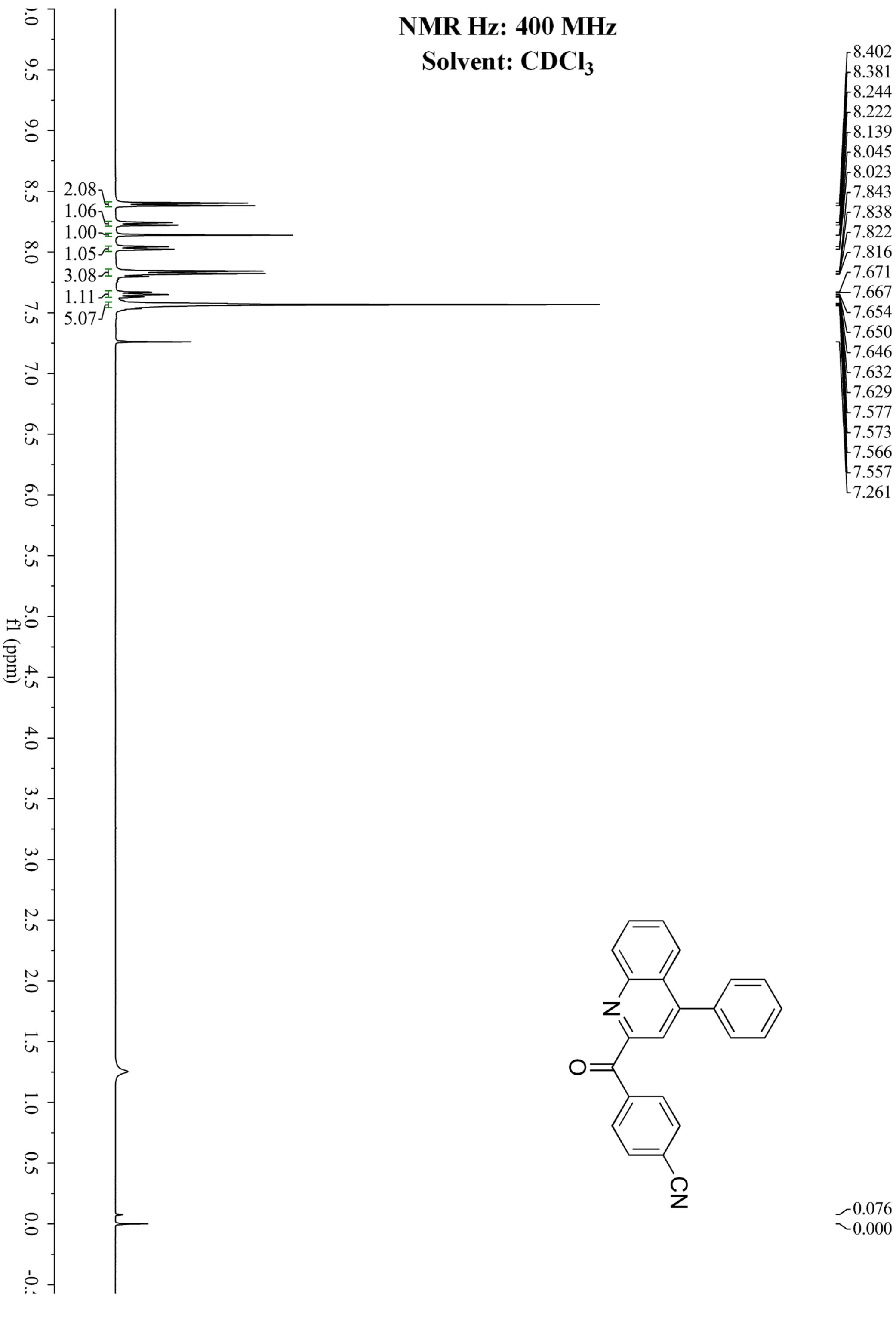
(4-Bromophenyl)(4-phenylquinolin-2-yl)methanone (3ag)

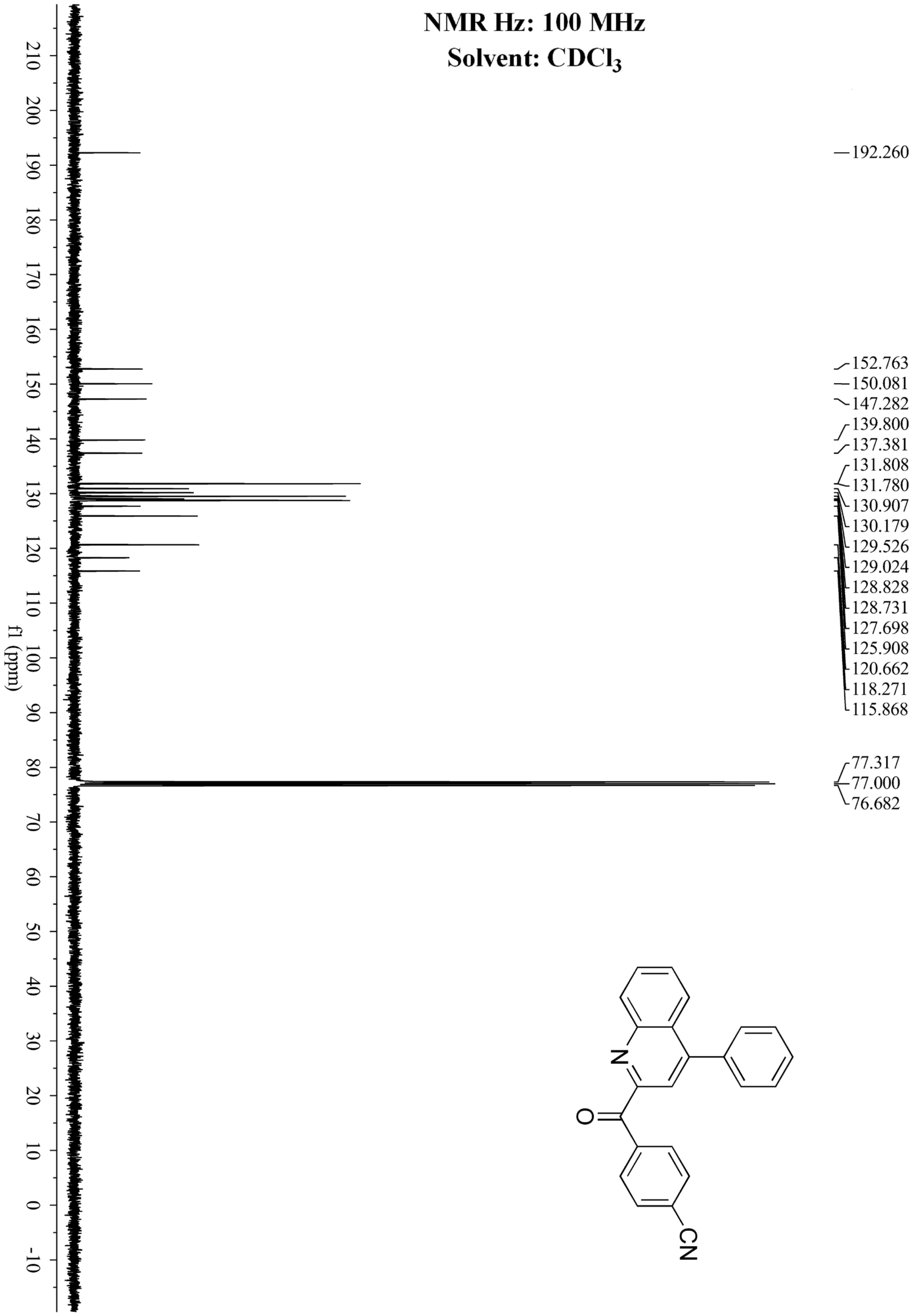


NMR Hz: 100 MHz
Solvent: $CDCl_3$

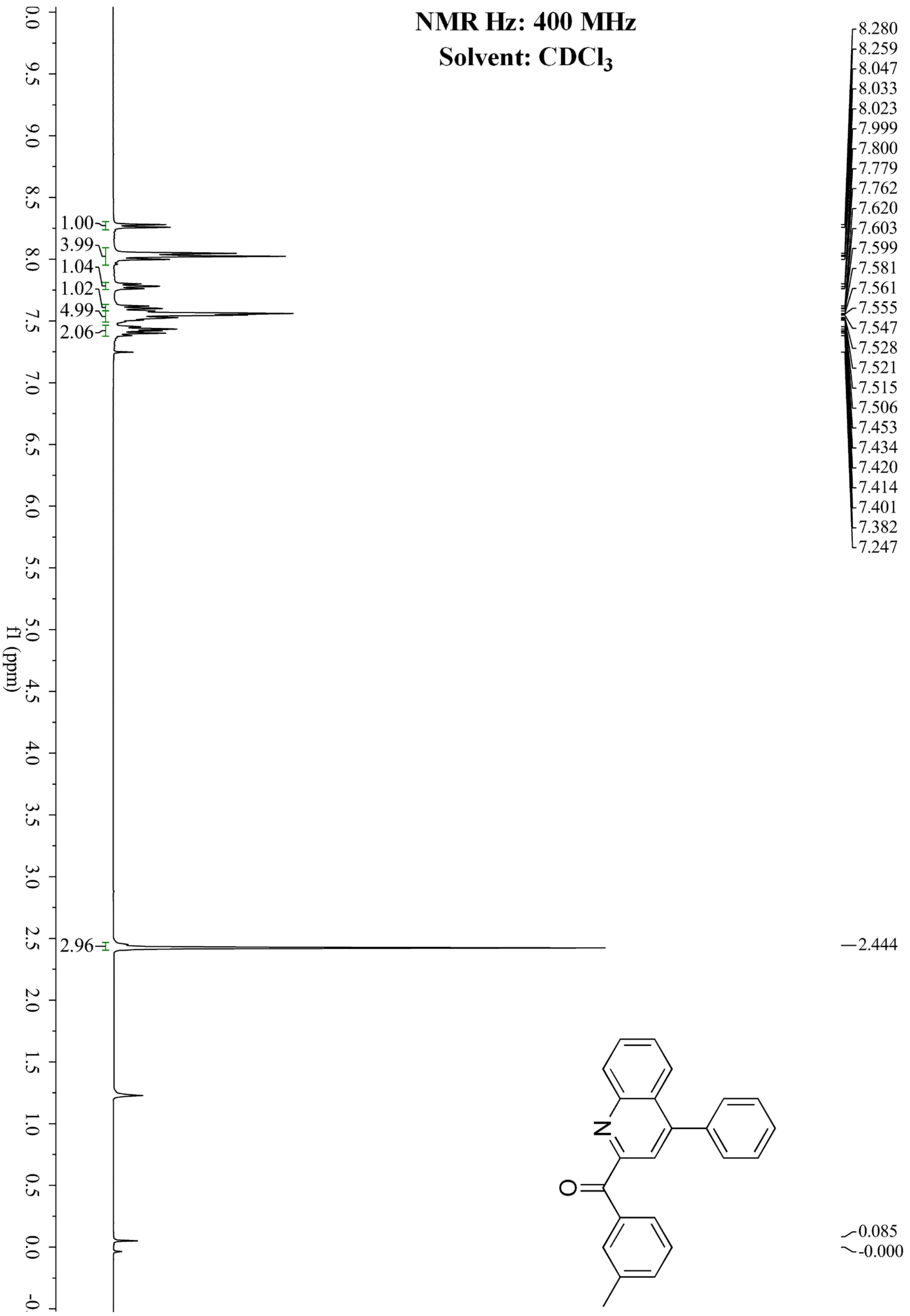


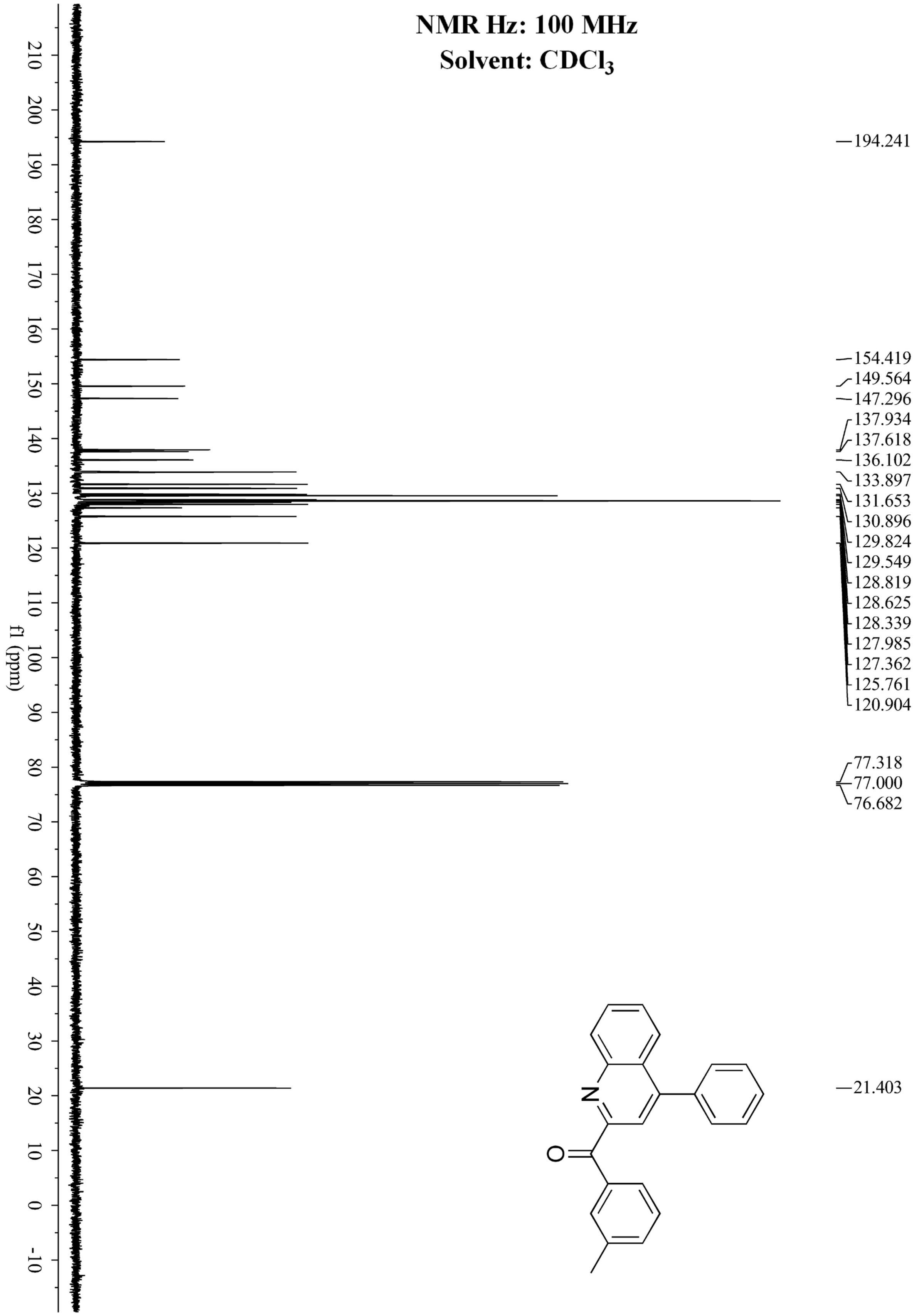
4-(4-Phenylquinoline-2-carbonyl)benzonitrile (3ah)



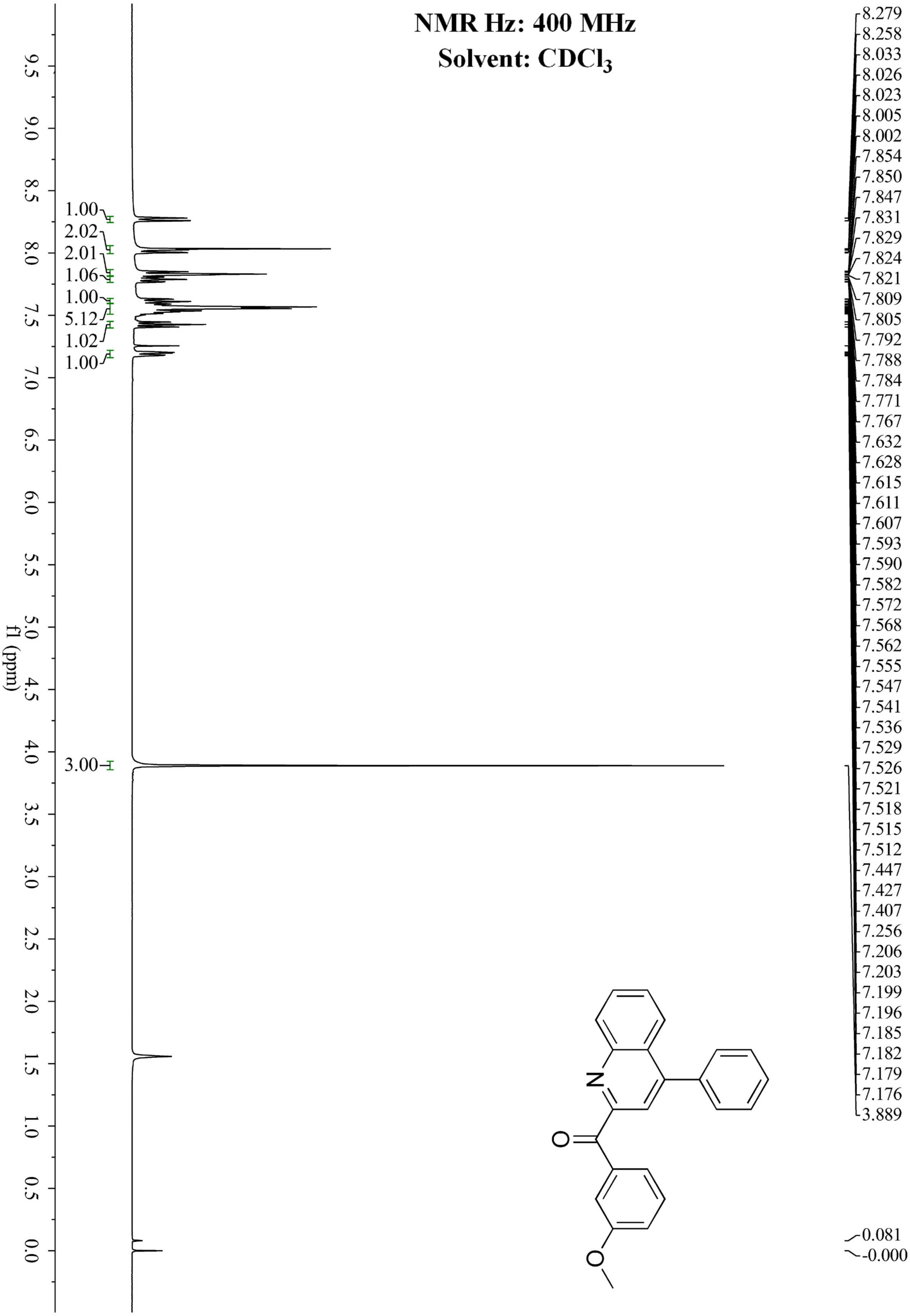

NMR Hz: 100 MHz
Solvent: $CDCl_3$
192.260
152.763
150.081
147.282
139.800
137.381
131.808
131.780
130.907
130.179
129.526
129.024
128.828
128.731
127.698
125.908
120.662
118.271
115.868
77.317
77.000
76.682
f1 (ppm)
N
O
CN

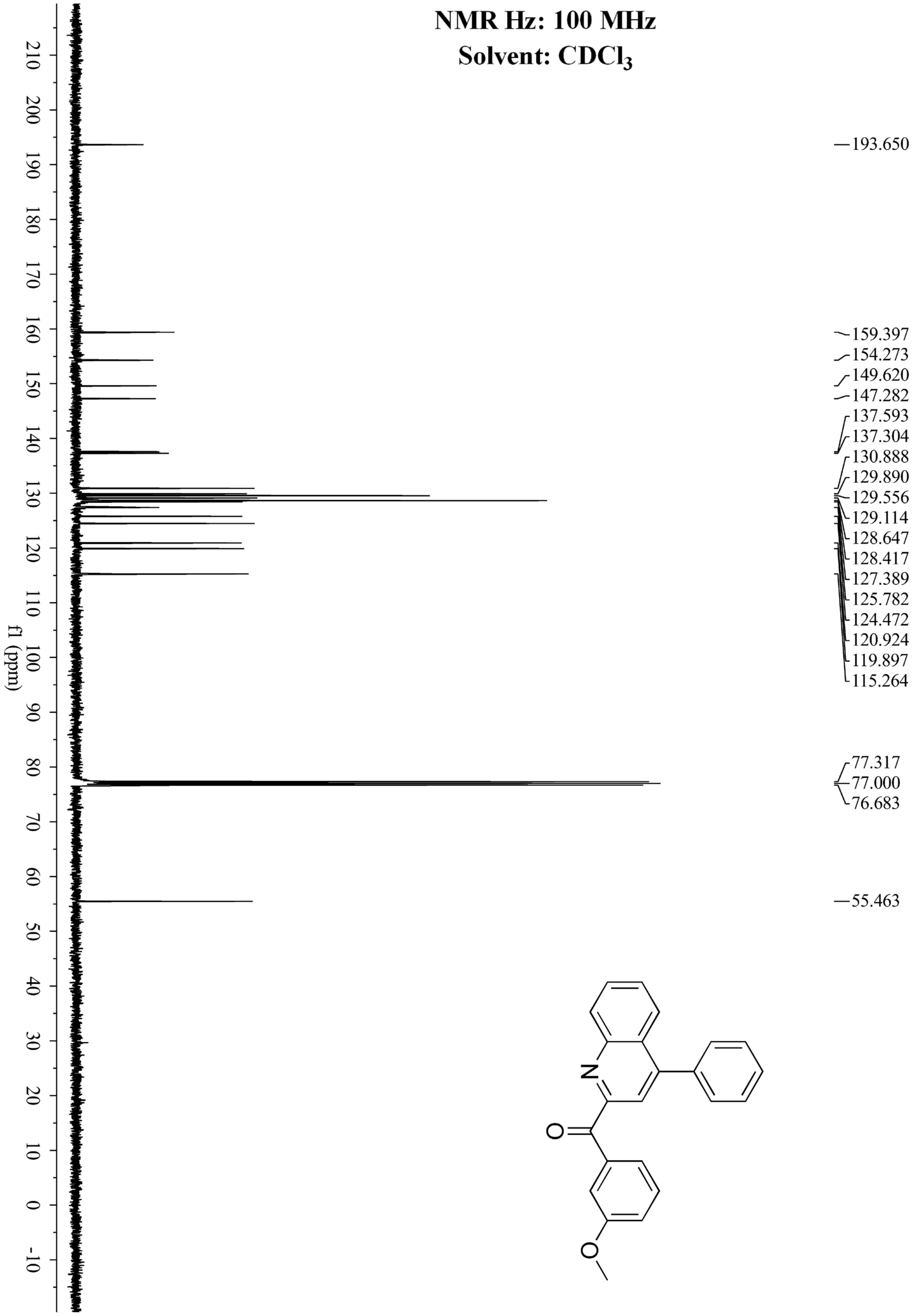
(4-Phenylquinolin-2-yl)(p-tolyl)methanone (3ai)



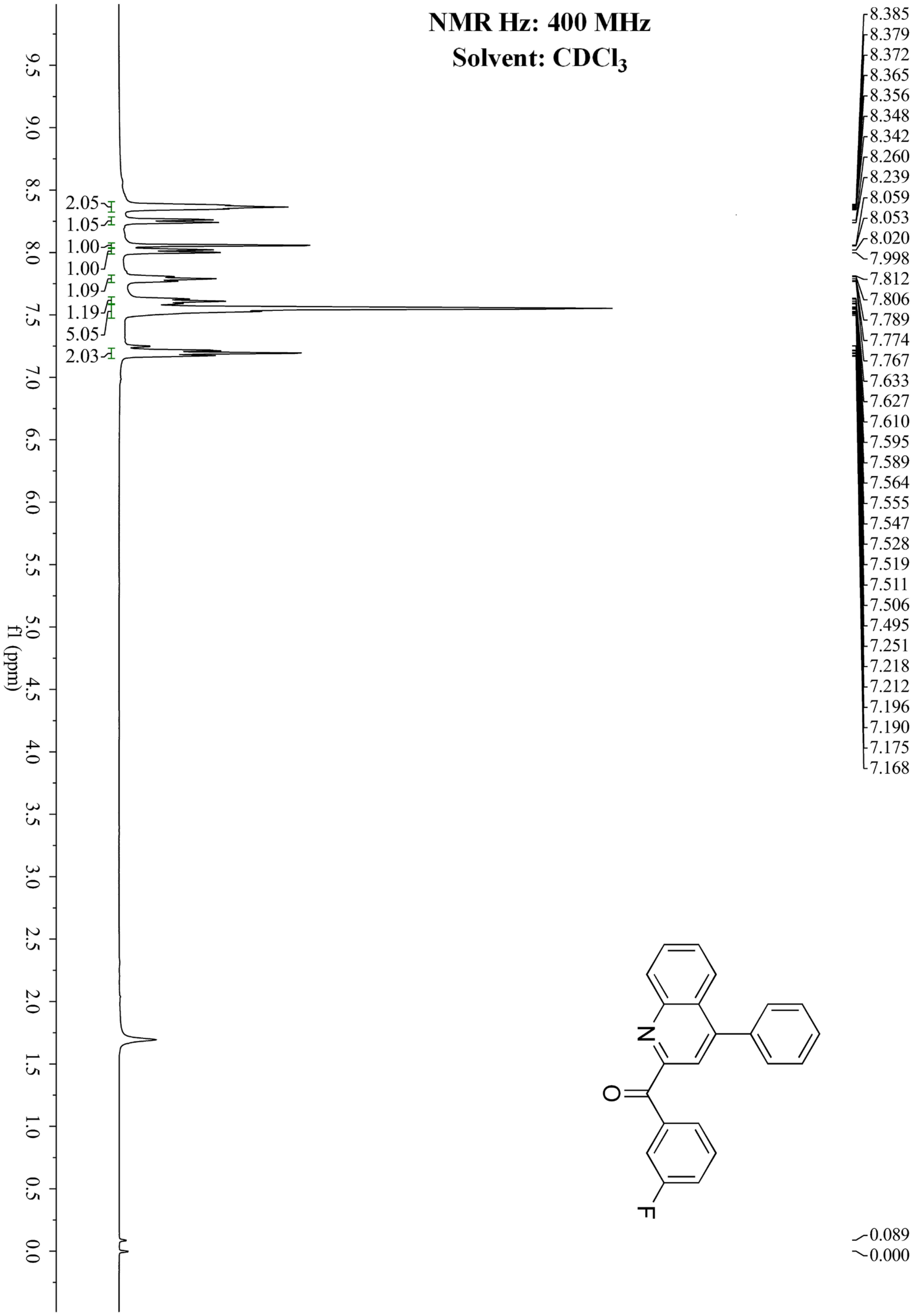

NMR Hz: 100 MHz
Solvent: $CDCl_3$
194.241
154.419
149.564
147.296
137.934
137.618
136.102
133.897
131.653
130.896
129.824
129.549
128.819
128.625
128.339
127.985
127.362
125.761
120.904
77.318
77.000
76.682
21.403
f1 (ppm)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
N
O

(3-Methoxyphenyl)(4-phenylquinolin-2-yl)methanone(3aj)

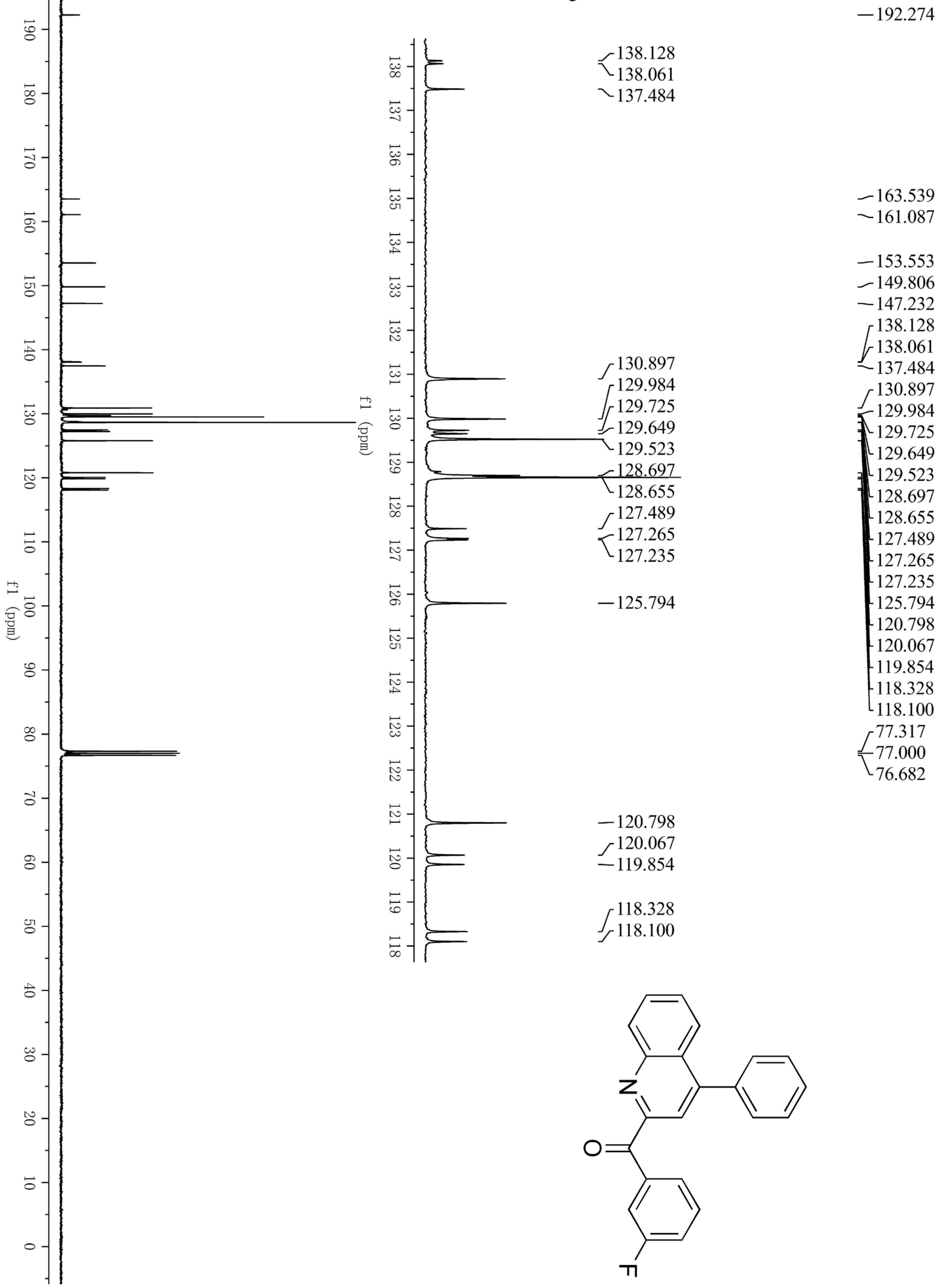



NMR Hz: 100 MHz
Solvent: $CDCl_3$
193.650
159.397
154.273
149.620
147.282
137.593
137.304
130.888
129.890
129.556
129.114
128.647
128.417
127.389
125.782
124.472
120.924
119.897
115.264
77.317
77.000
76.683
55.463
f1 (ppm)
N
O

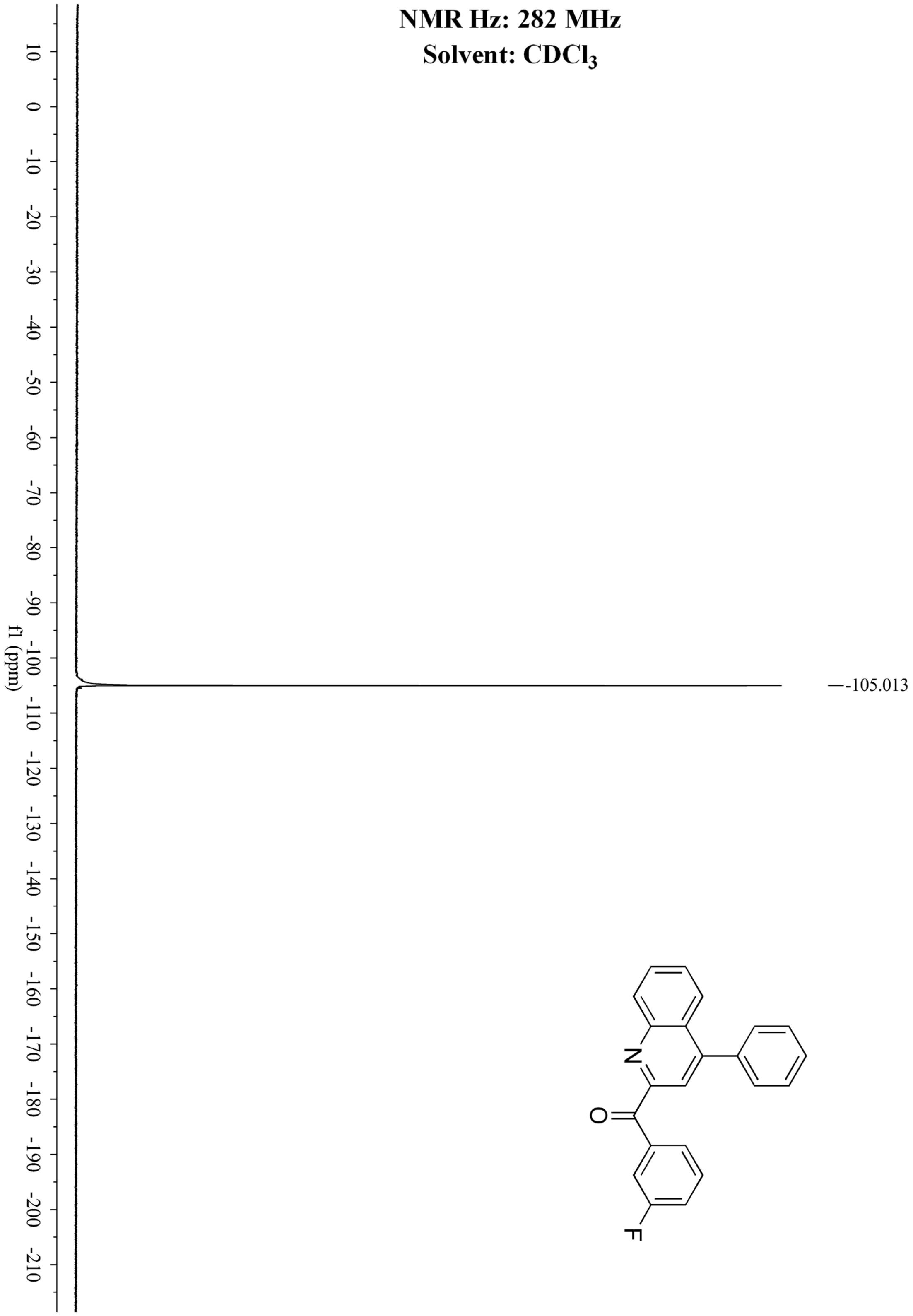
(3-Fluorophenyl)(4-phenylquinolin-2-yl)methanone (3ak)



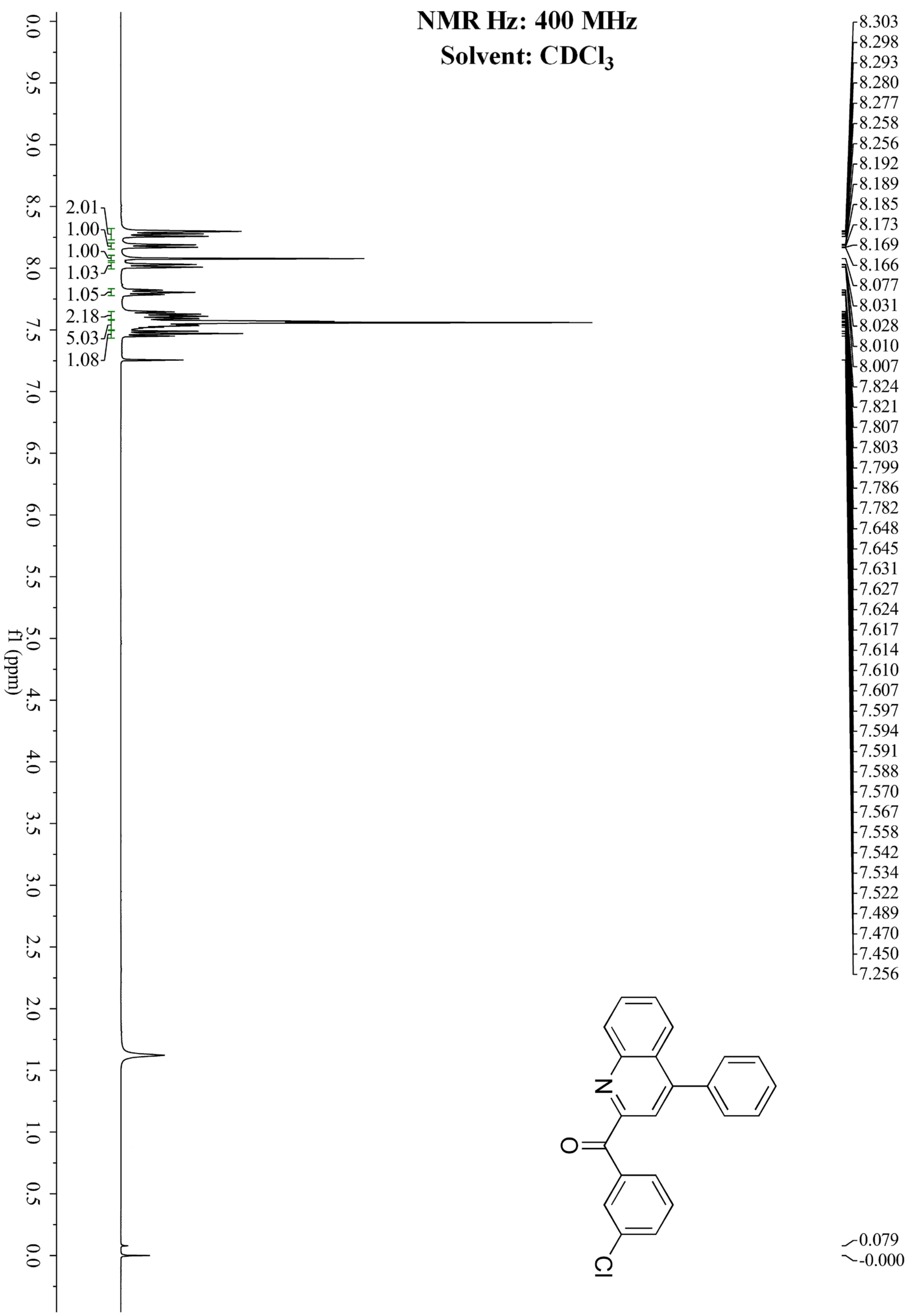
NMR Hz: 100 MHz
Solvent: $CDCl_3$



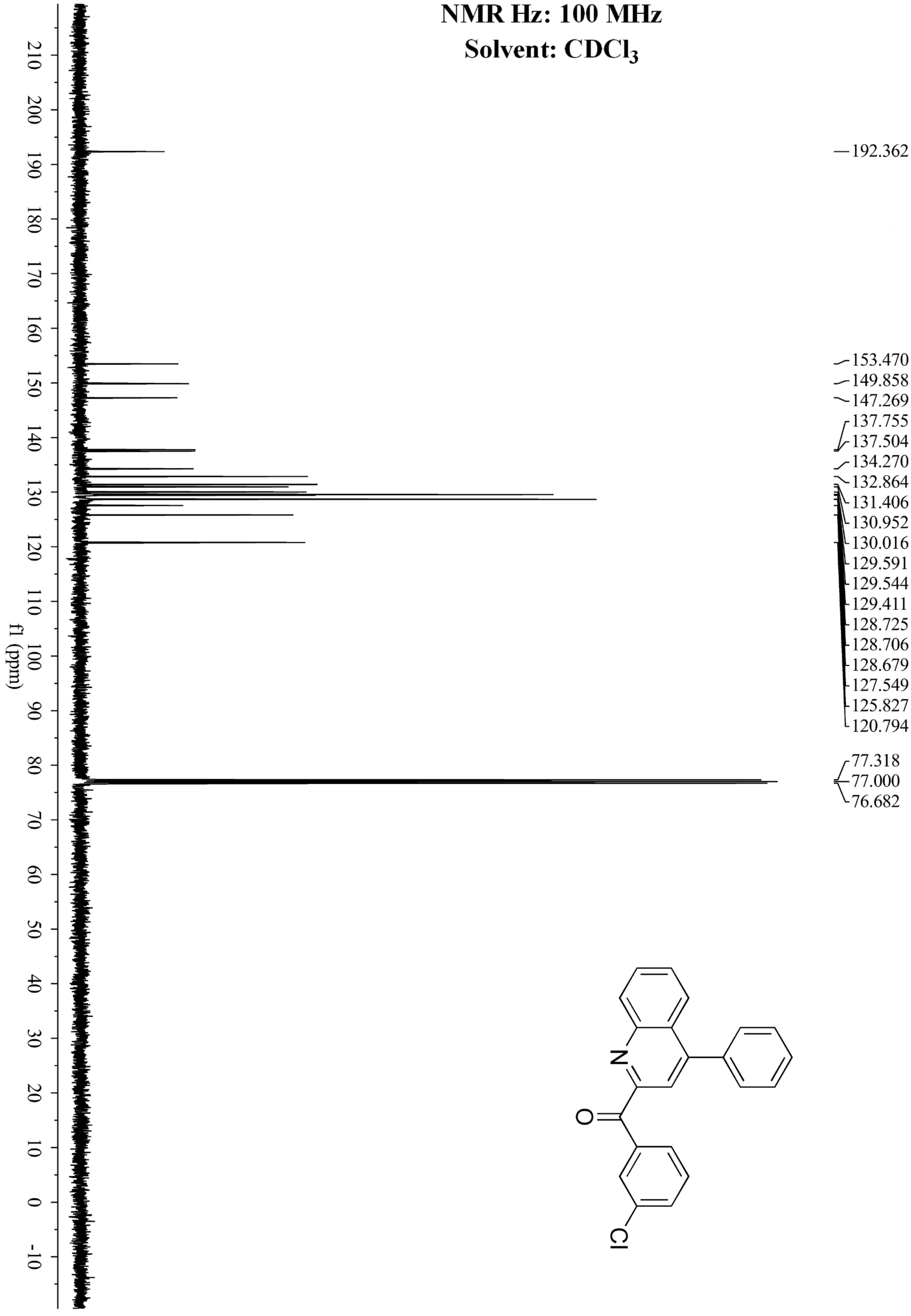
NMR Hz: 282 MHz
Solvent: $CDCl_3$



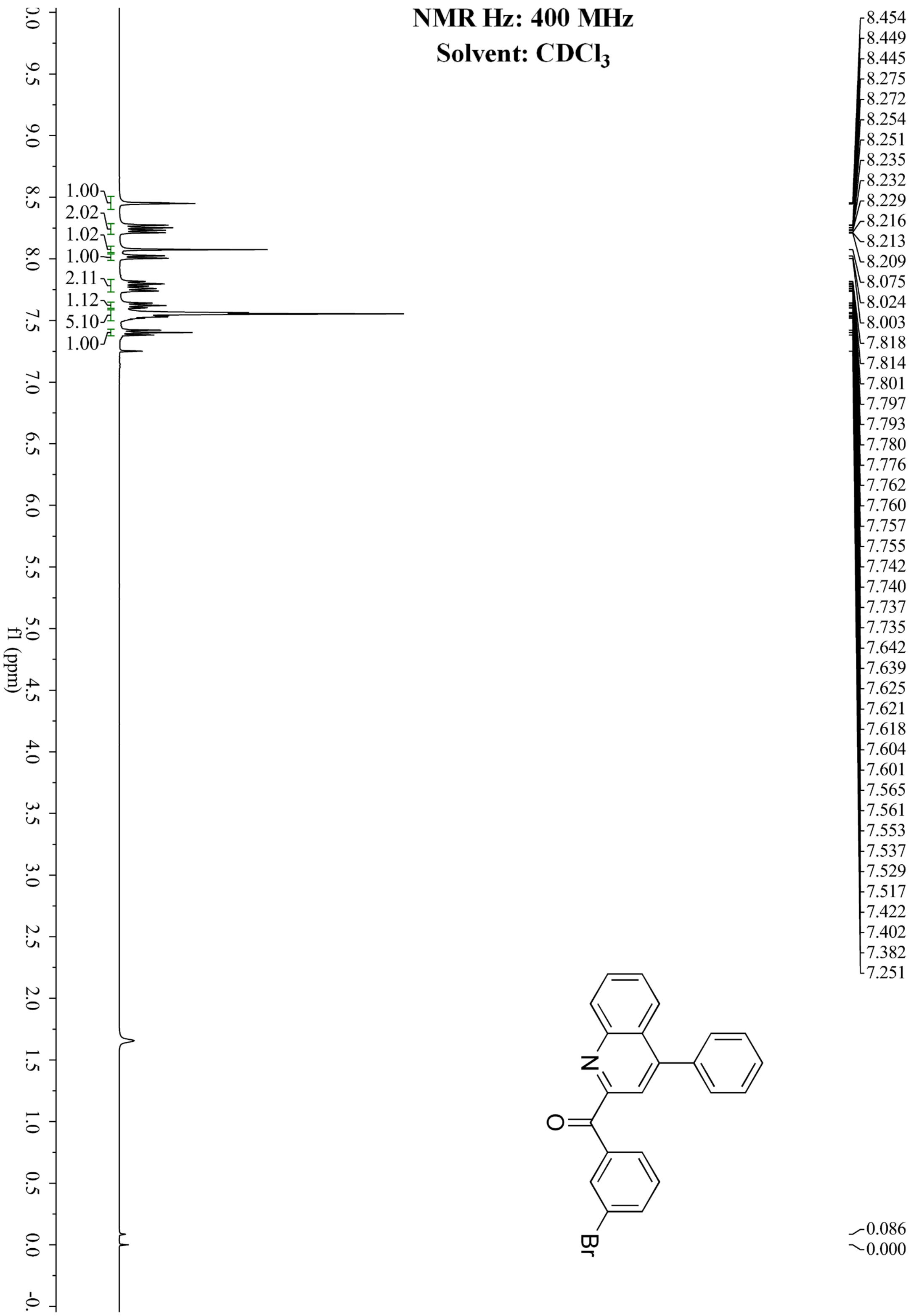
(3-Chlorophenyl)(4-phenylquinolin-2-yl)methanone (3al)



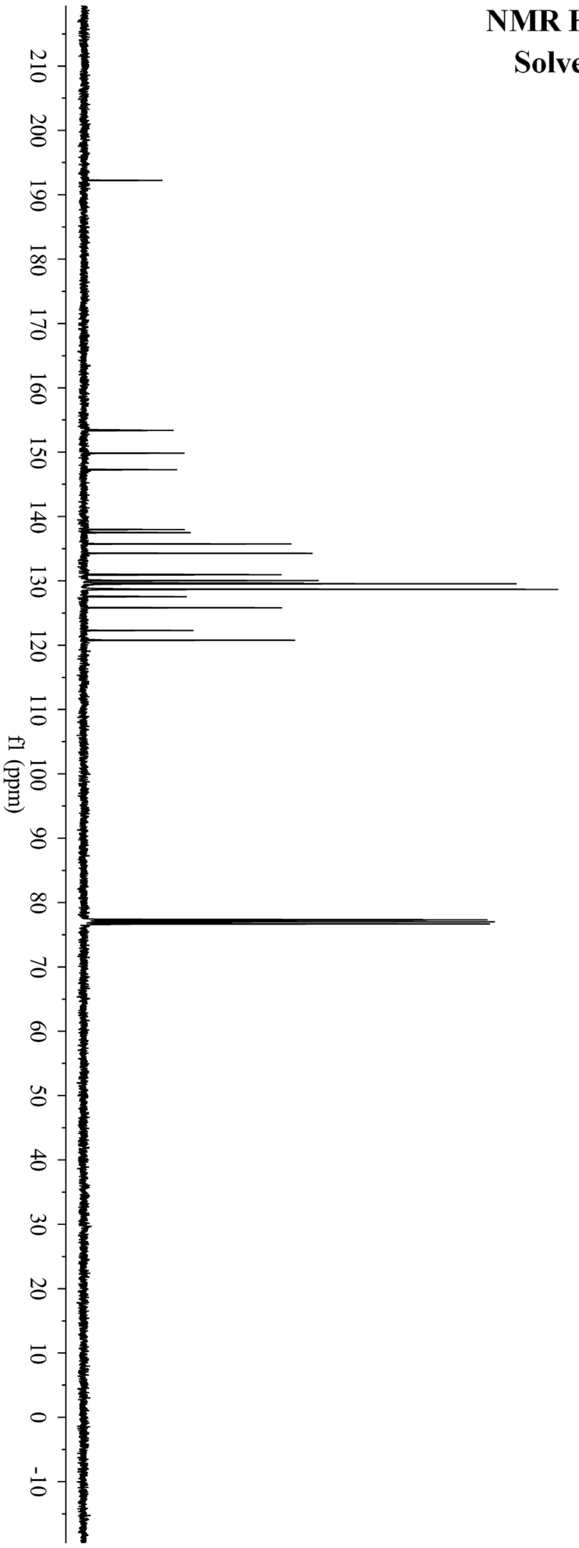
NMR Hz: 100 MHz
Solvent: $CDCl_3$

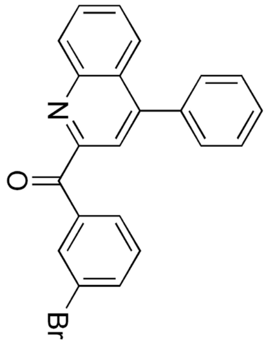


(3-Bromophenyl)(4-phenylquinolin-2-yl)methanone (3am)

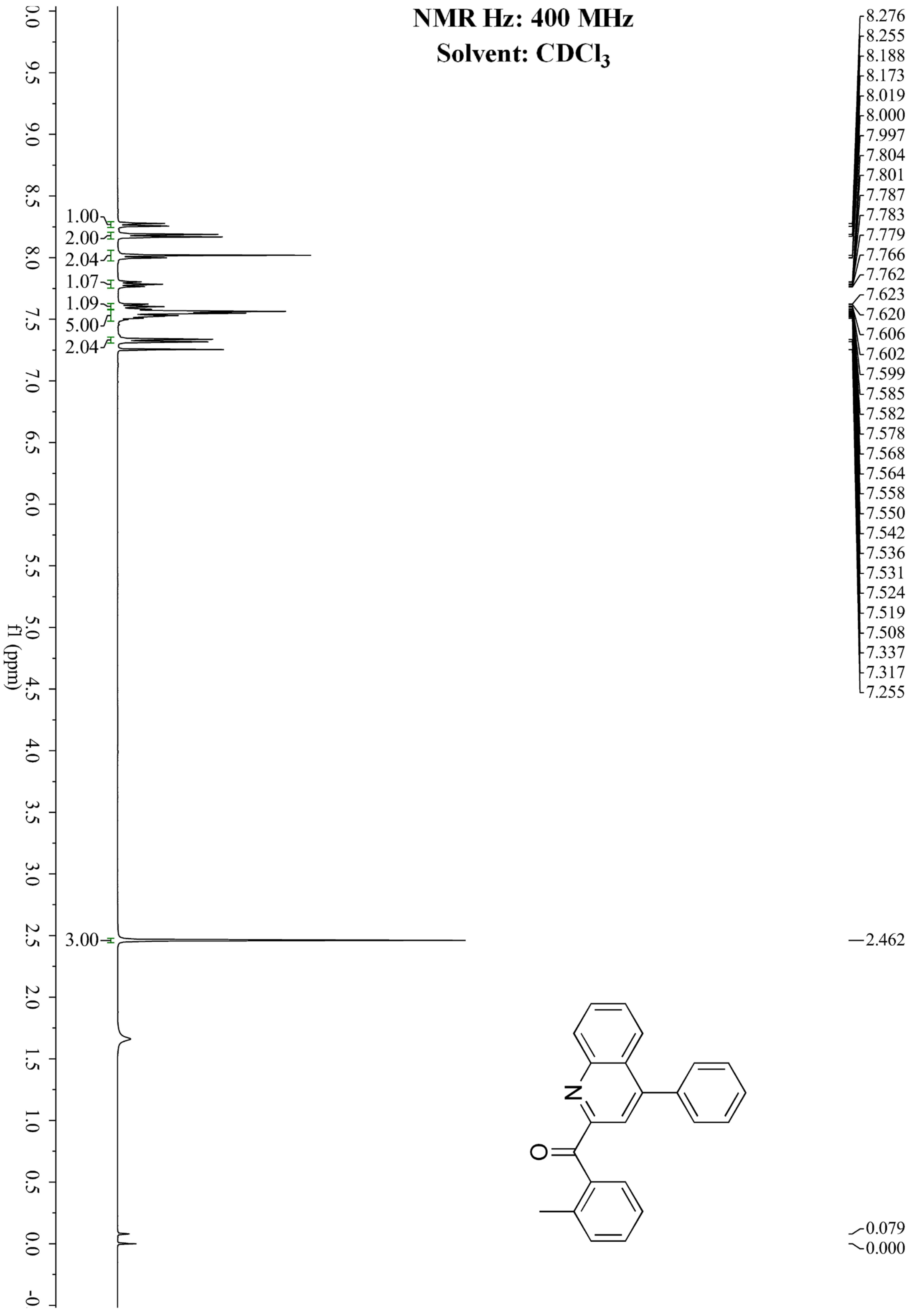


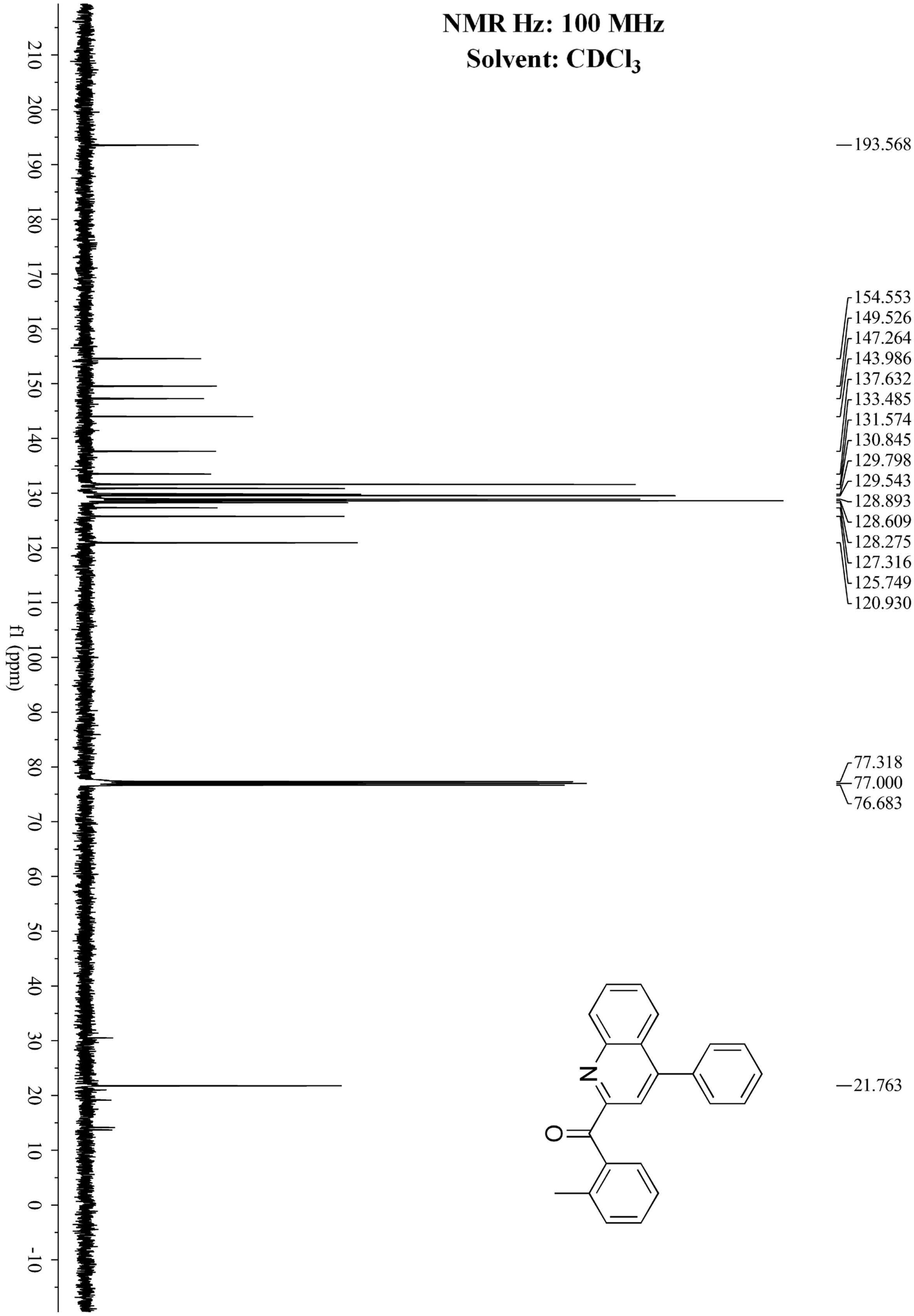
NMR Hz: 100 MHz
Solvent: $CDCl_3$



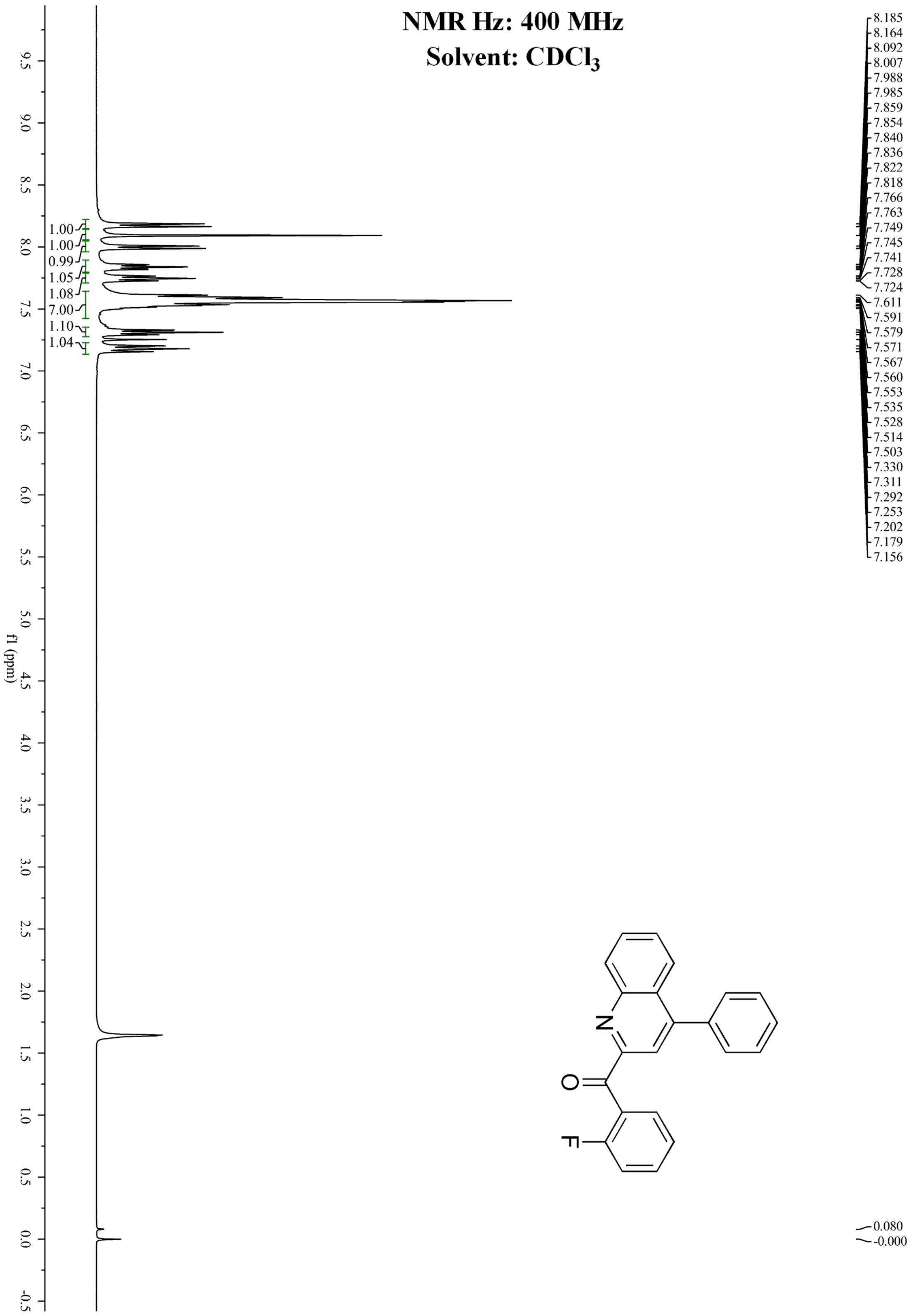


(4-Phenylquinolin-2-yl)(o-tolyl)methanone(3an)

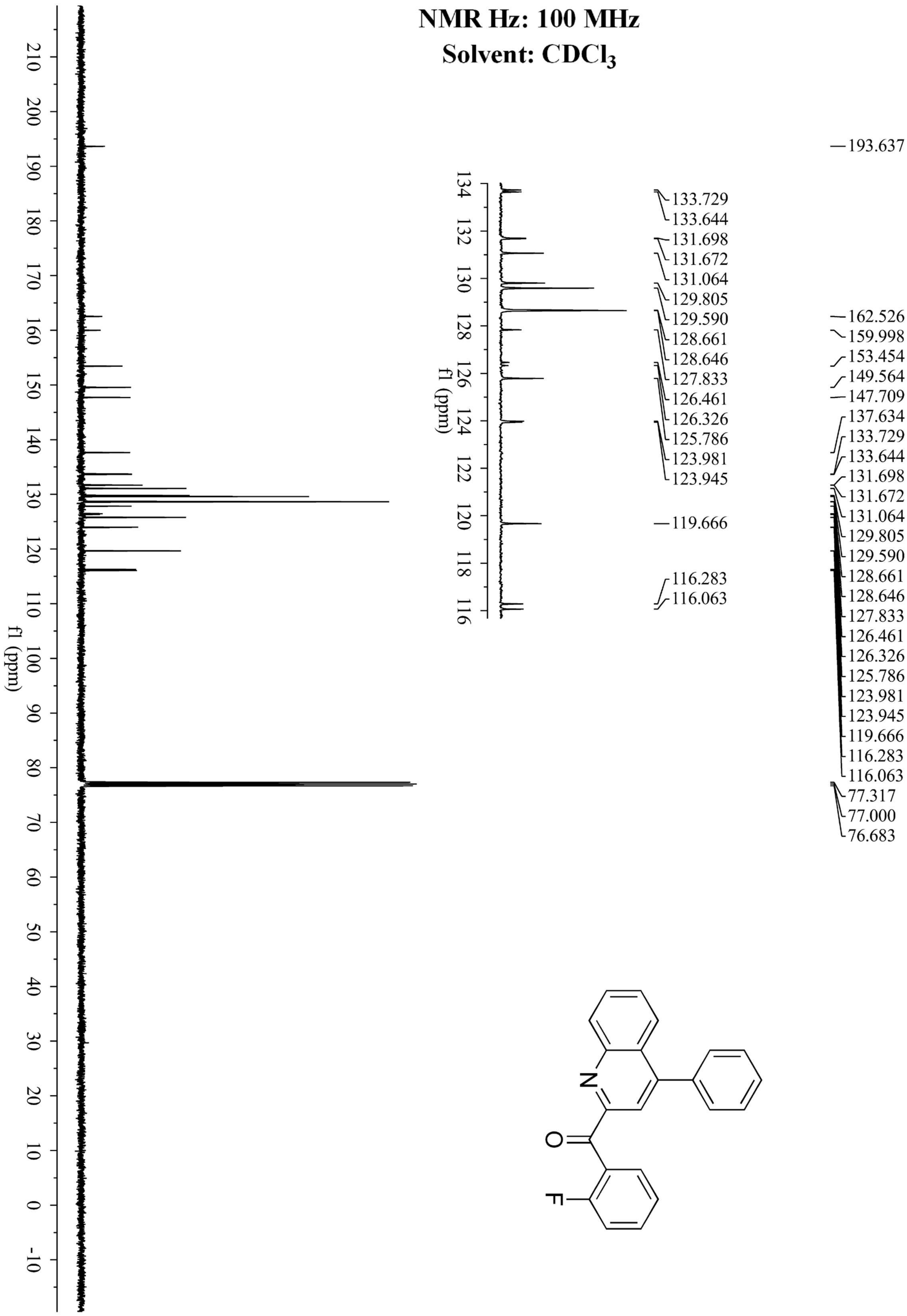


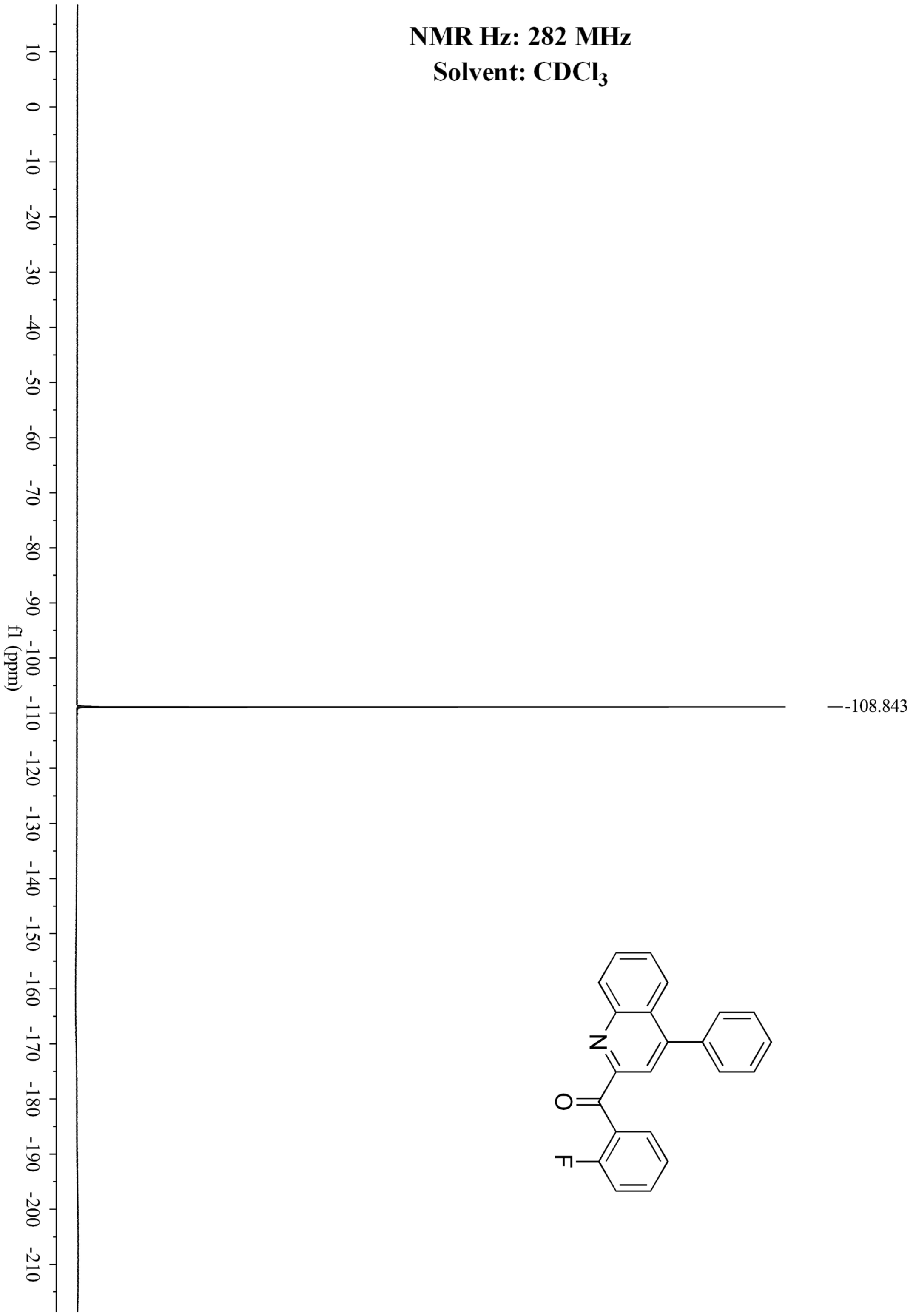

NMR Hz: 100 MHz
Solvent: CDCl3
193.568
154.553
149.526
147.264
143.986
137.632
133.485
131.574
130.845
129.798
129.543
128.893
128.609
128.275
127.316
125.749
120.930
77.318
77.000
76.683
21.763
f1 (ppm)
N
O

(2-Fluorophenyl)(4-phenylquinolin-2-yl)methanone (3ao)

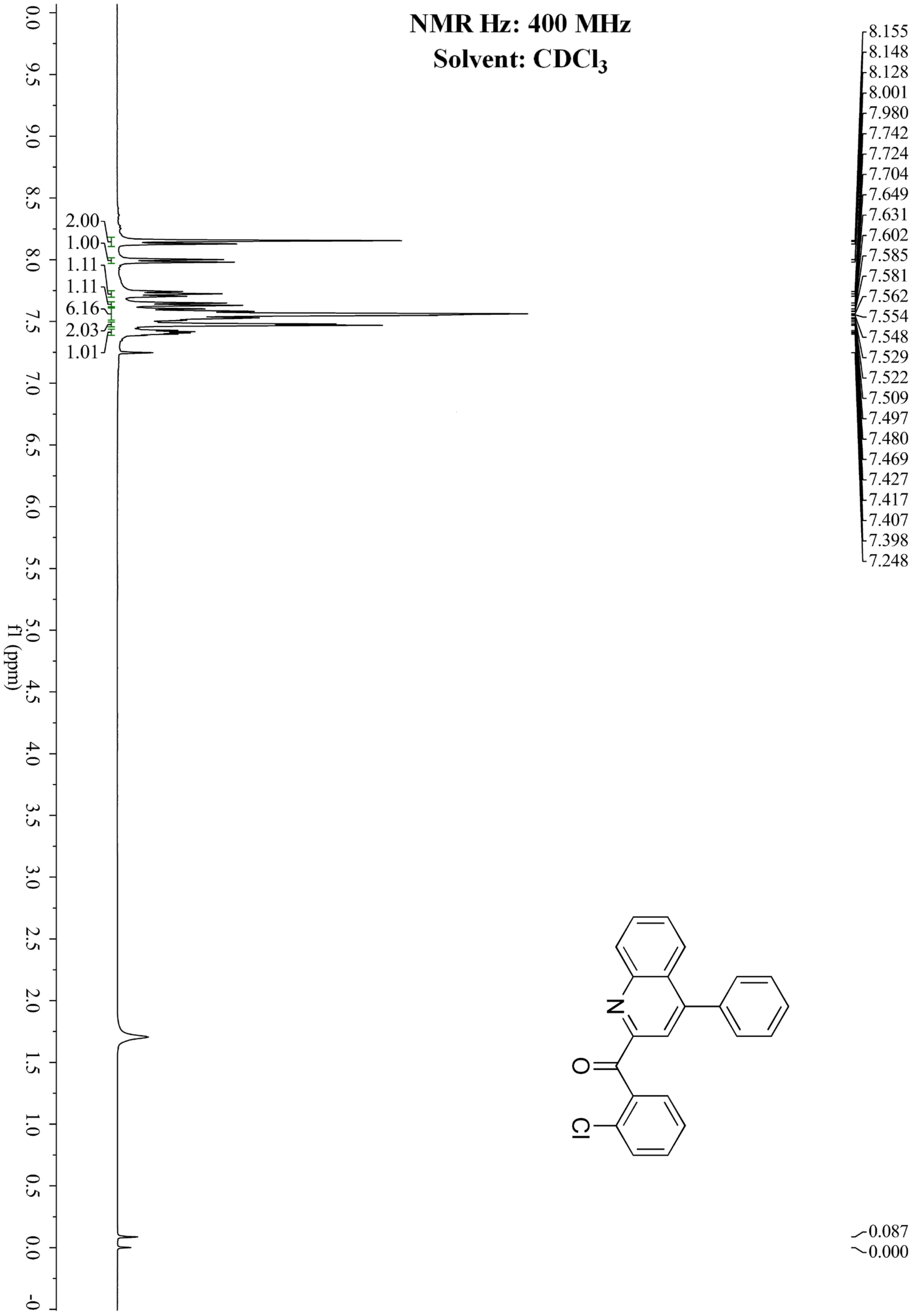


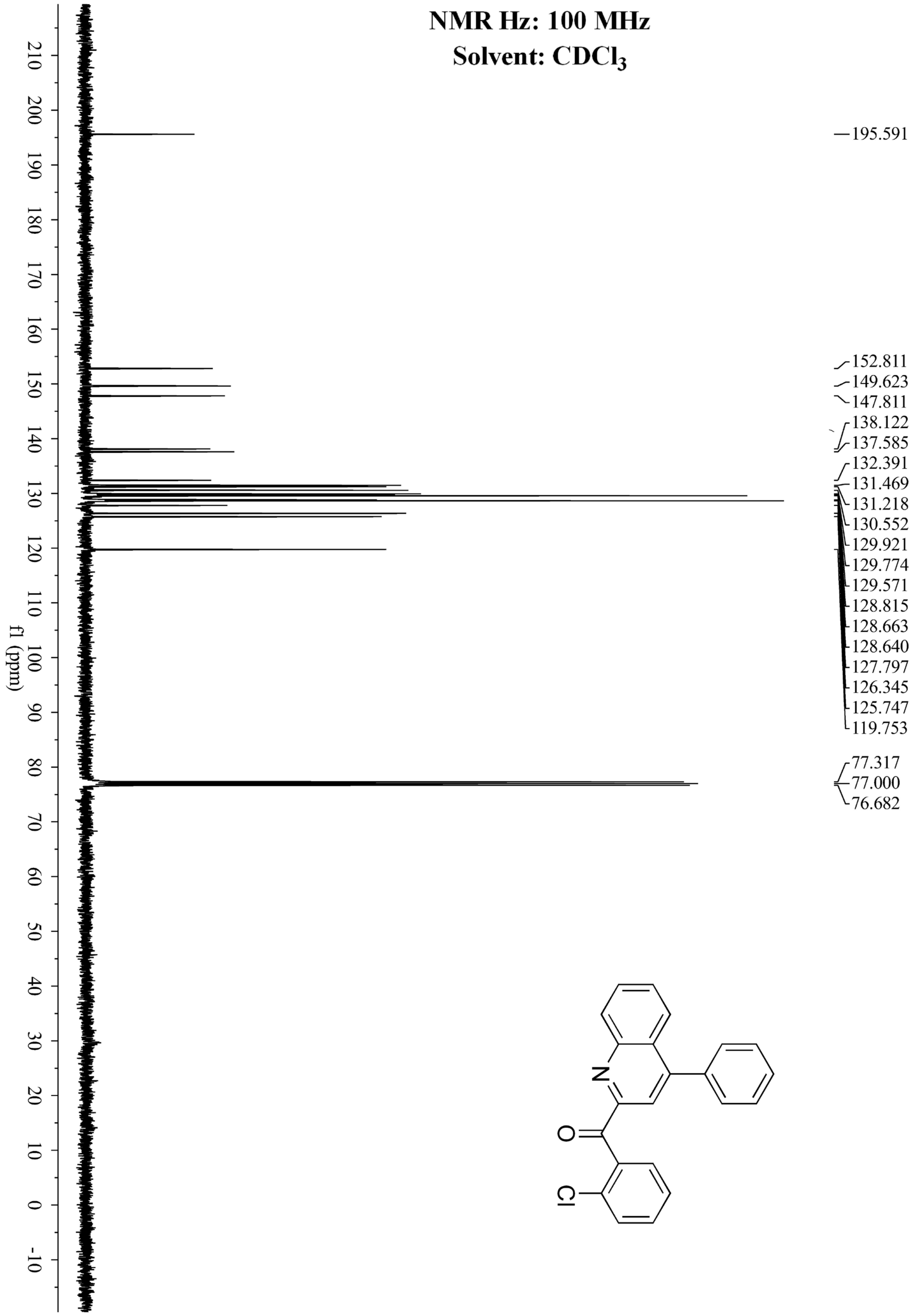
NMR Hz: 100 MHz
Solvent: $CDCl_3$



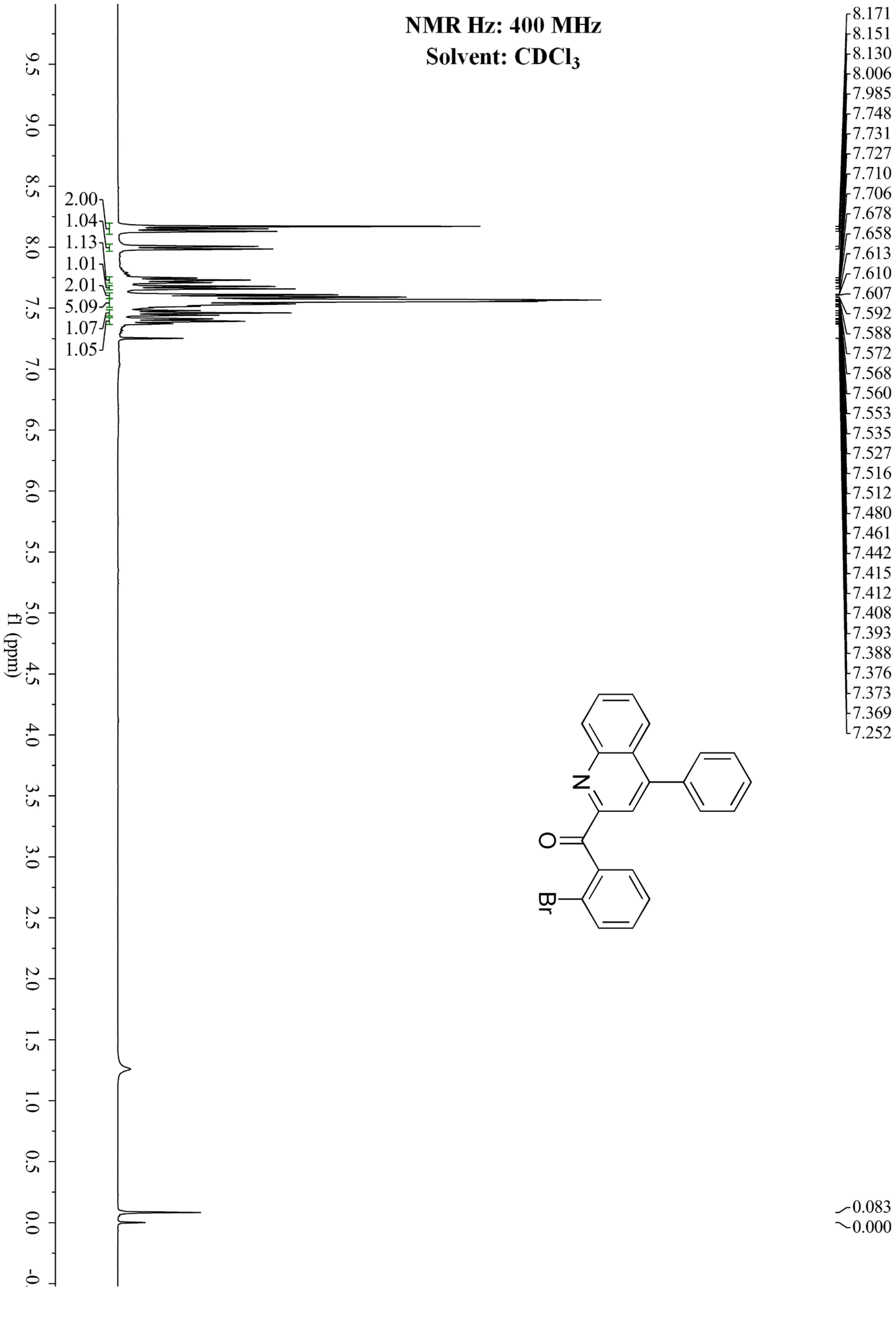

NMR Hz: 282 MHz
Solvent: $CDCl_3$
-108.843
f1 (ppm)
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
N
O
F

(2-Chlorophenyl)(4-phenylquinolin-2-yl)methanone (3ap)

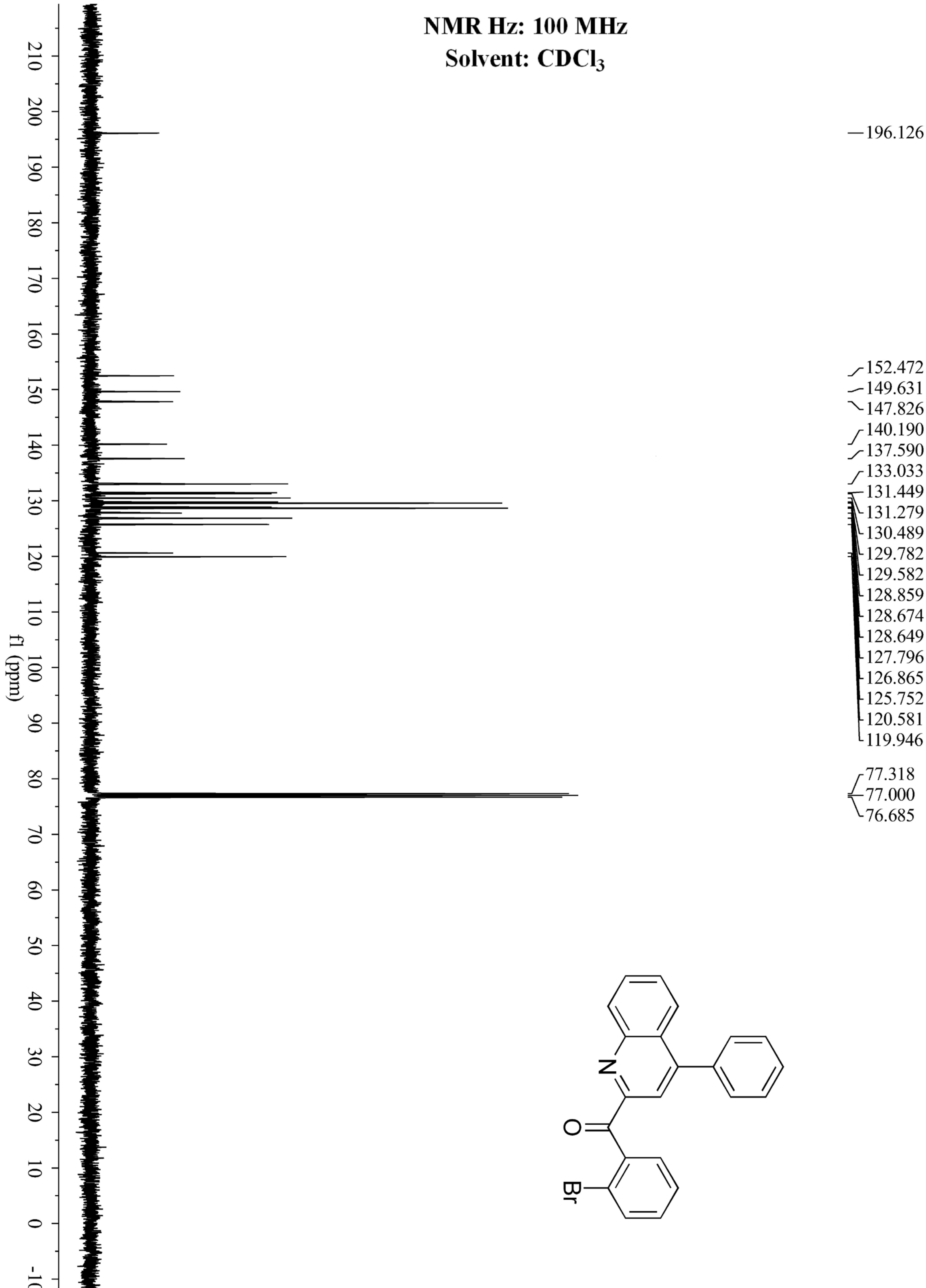



NMR Hz: 100 MHz
Solvent: $CDCl_3$
195.591
152.811
149.623
147.811
138.122
137.585
132.391
131.469
131.218
130.552
129.921
129.774
129.571
128.815
128.663
128.640
127.797
126.345
125.747
119.753
77.317
77.000
76.682
f1 (ppm)
N
O
Cl

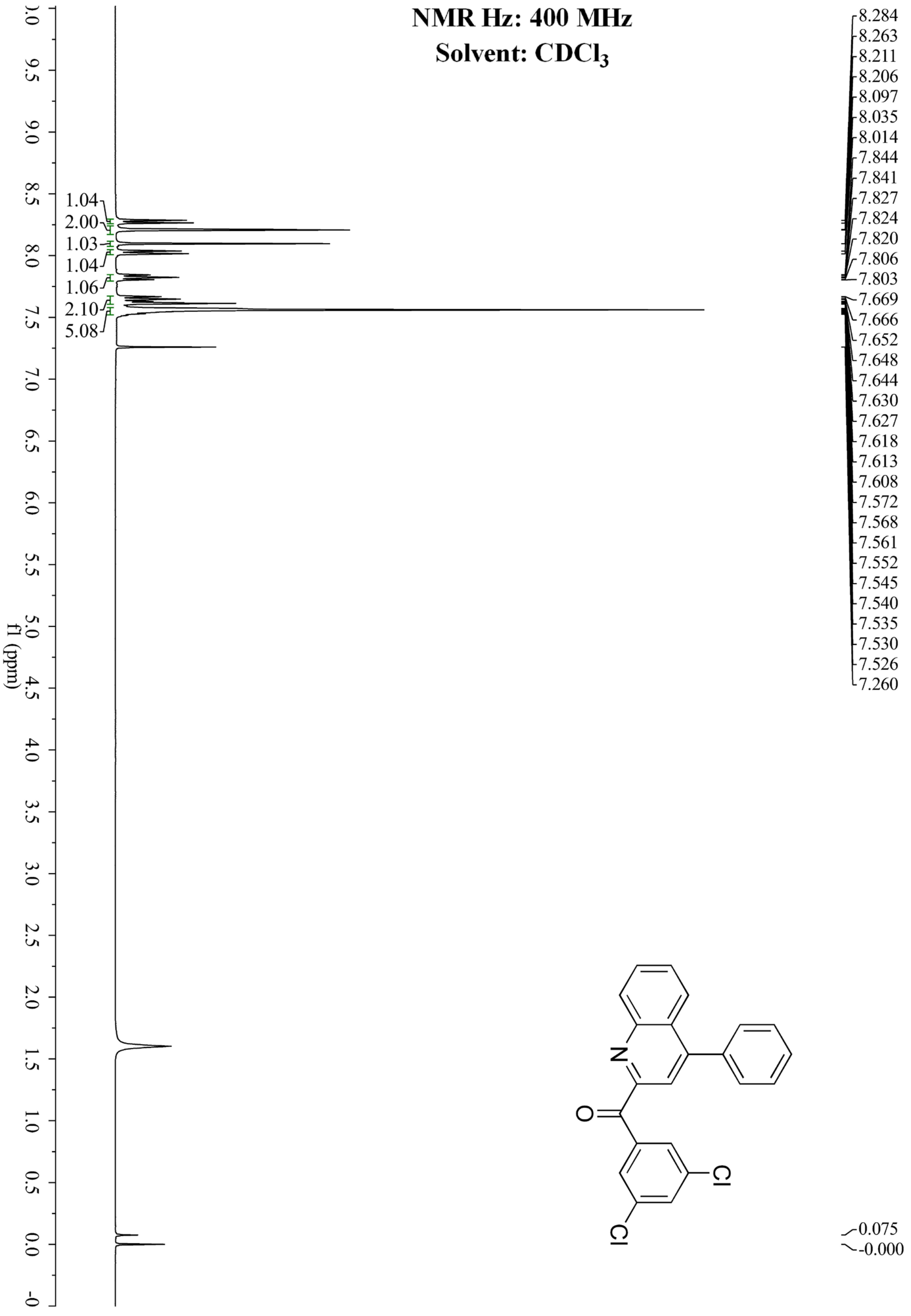
(2-Bromophenyl)(4-phenylquinolin-2-yl)methanone(3aq)

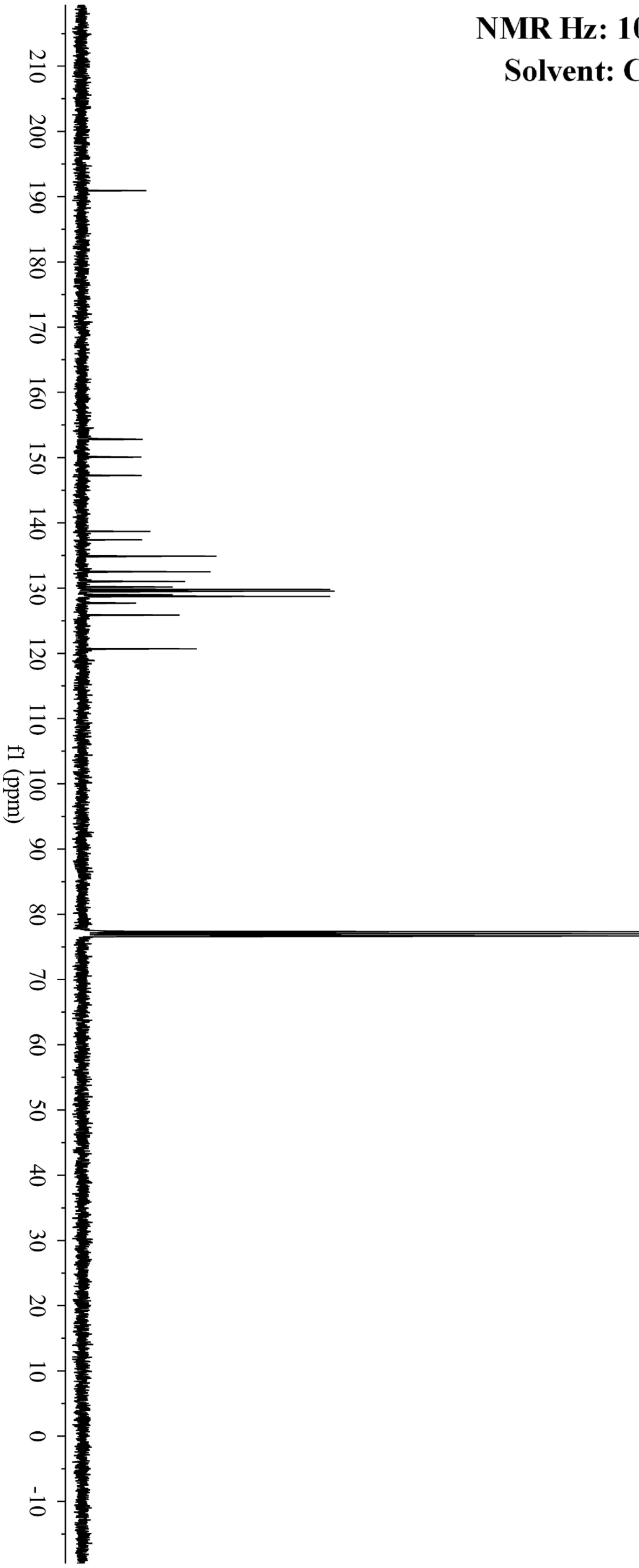


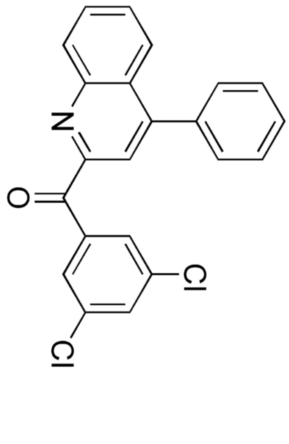
NMR Hz: 100 MHz
Solvent: $CDCl_3$



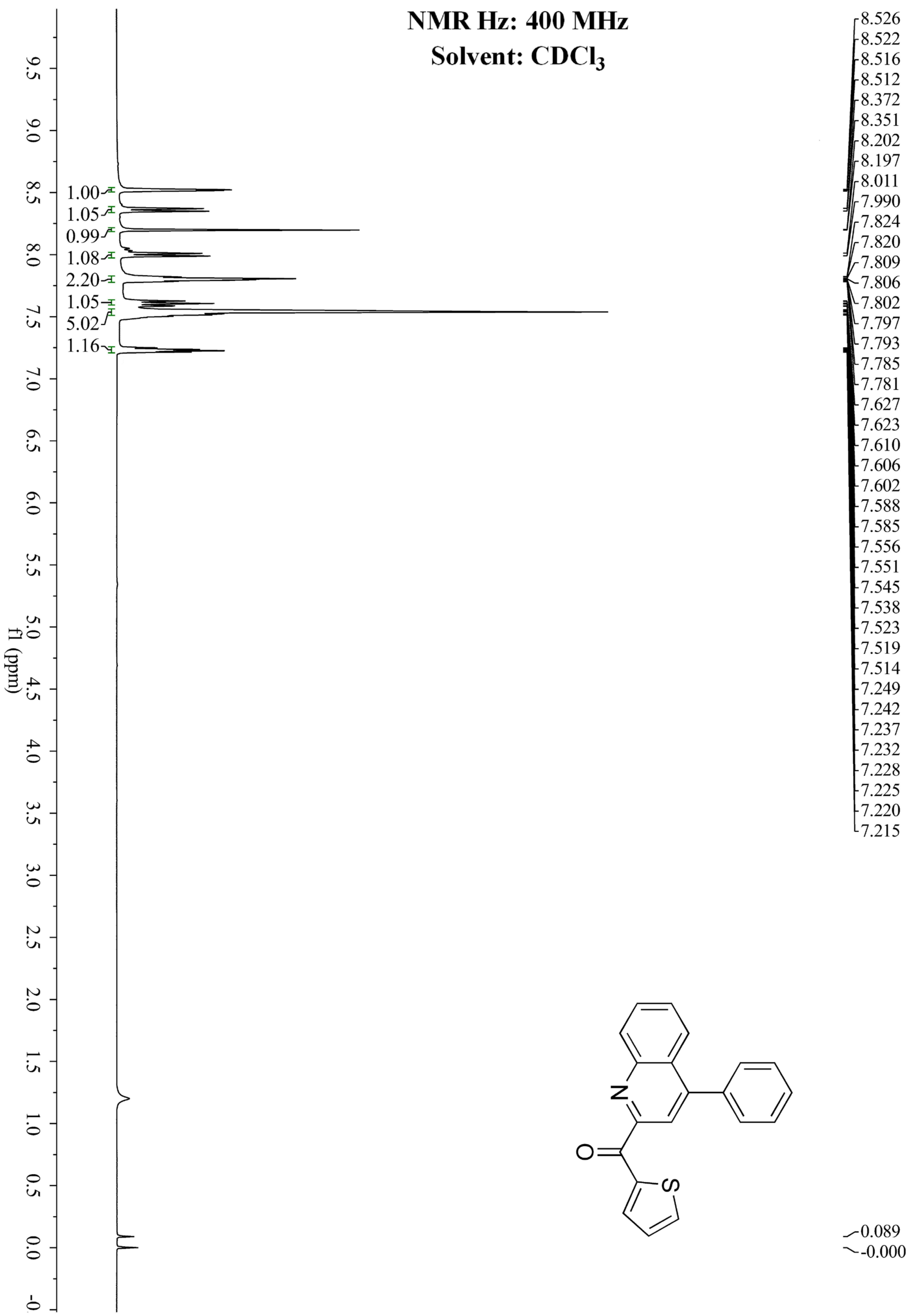
(3,5-Dichlorophenyl)(4-phenylquinolin-2-yl)methanone(3ar)



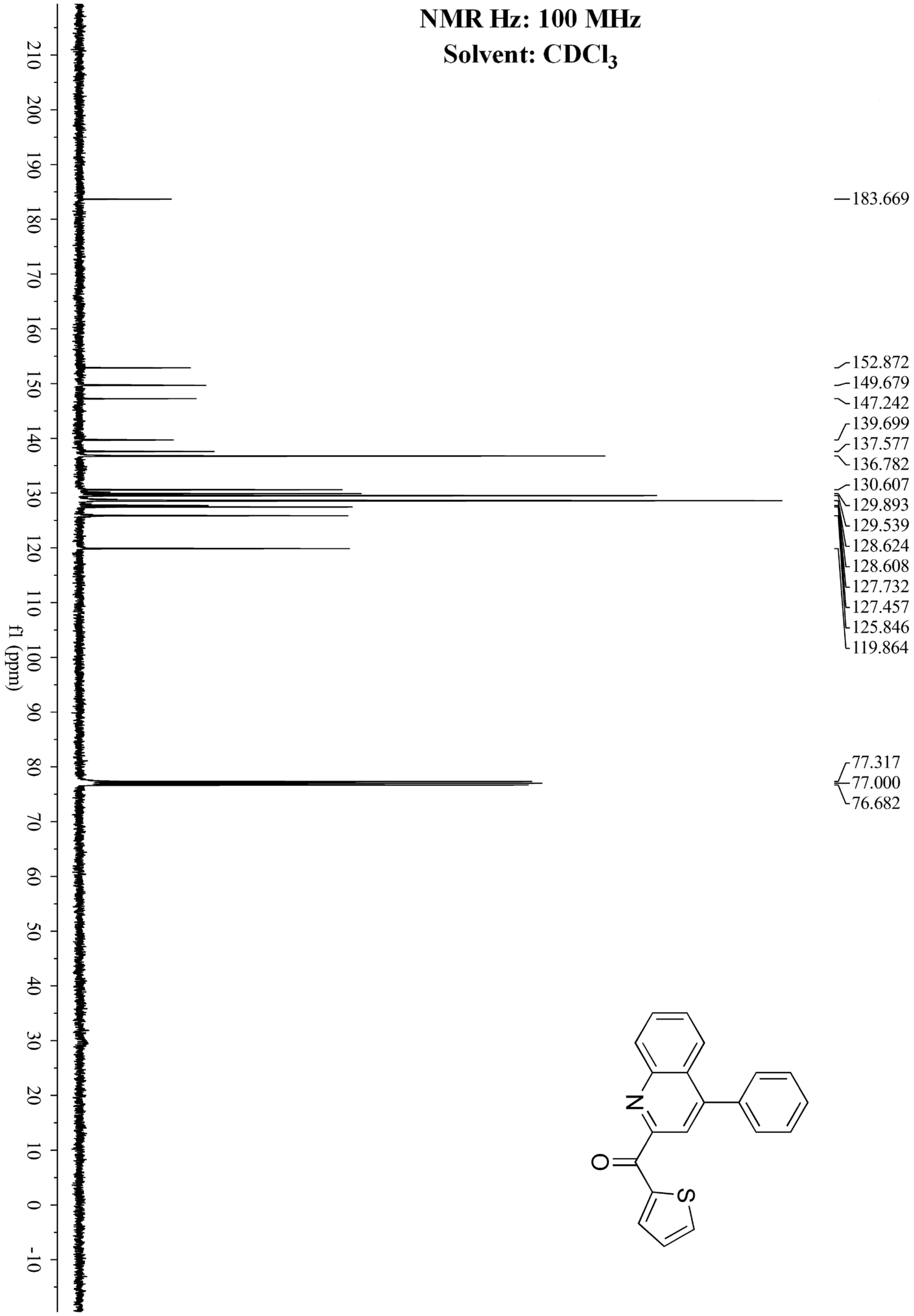

NMR Hz: 100 MHz
Solvent: $CDCl_3$
190.915
152.824
150.063
147.268
138.704
137.409
134.905
132.486
131.021
130.168
129.797
129.537
128.978
128.803
128.719
127.695
125.873
120.701
77.319
77.000
76.683
fl (ppm)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


N
O
Cl
Cl

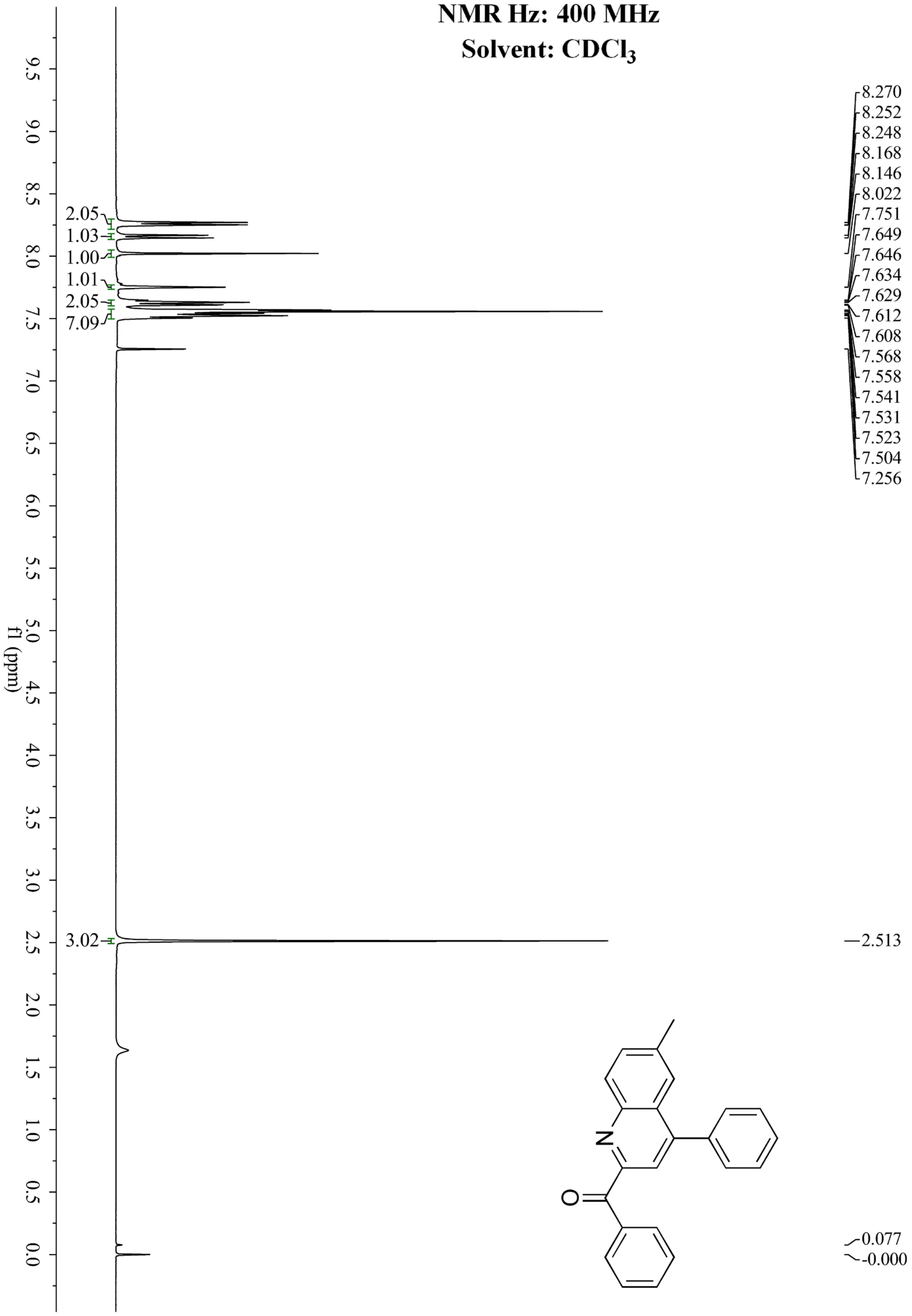
(4-Phenylquinolin-2-yl)(thiophen-2-yl)methanone(3as)



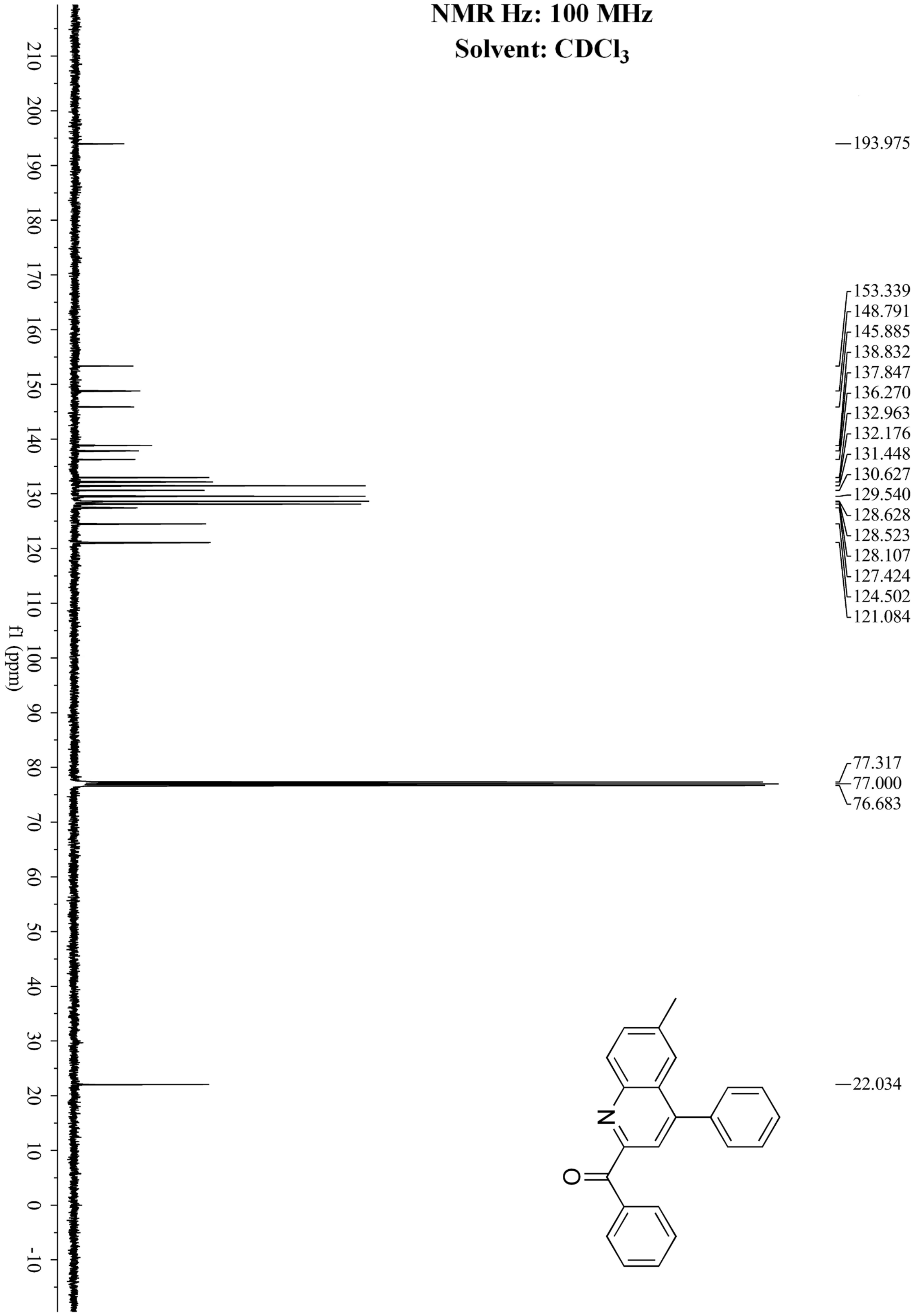
NMR Hz: 100 MHz
Solvent: $CDCl_3$



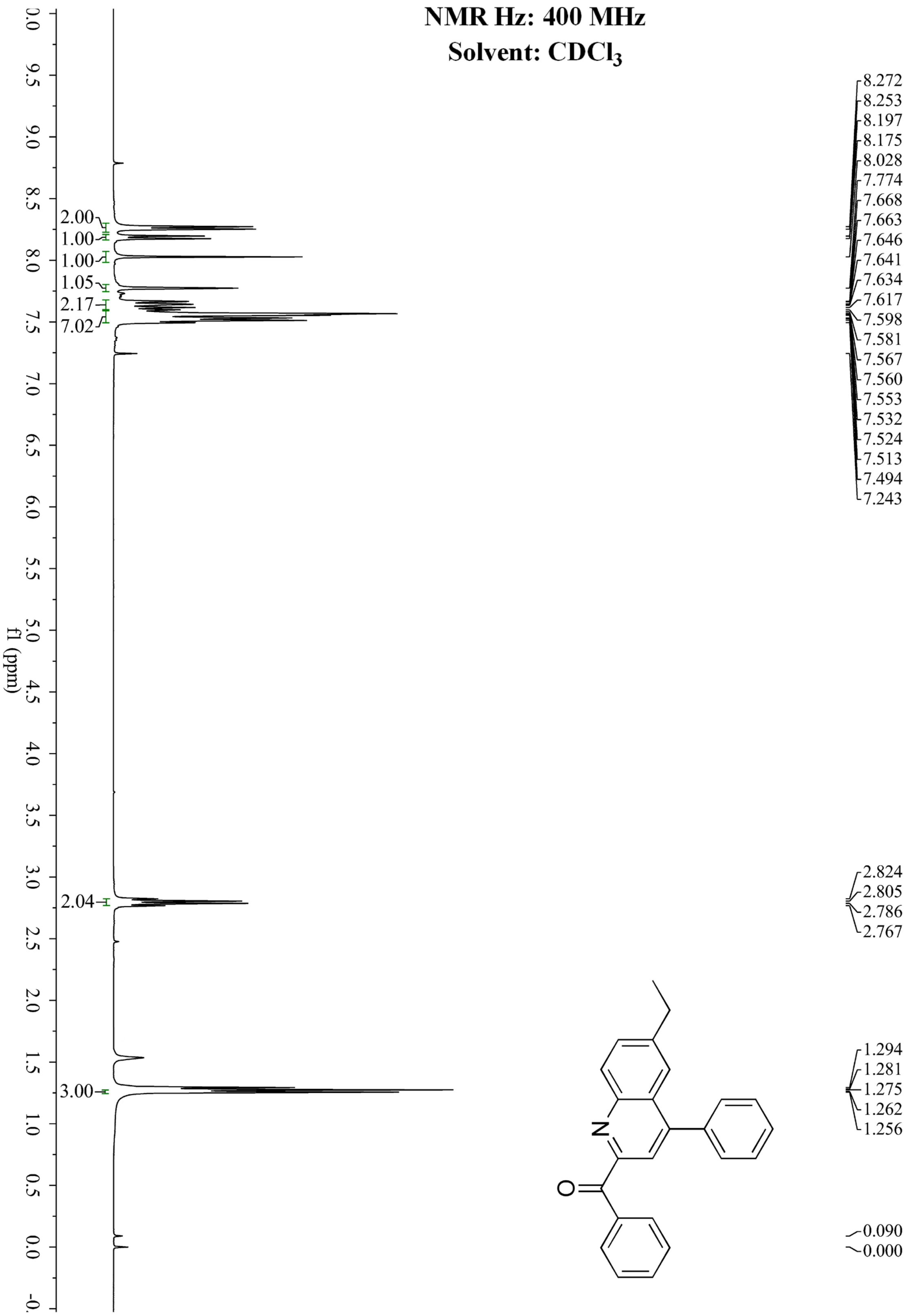
(6-Methyl-4-phenylquinolin-2-yl)(phenyl)methanone (3ba)

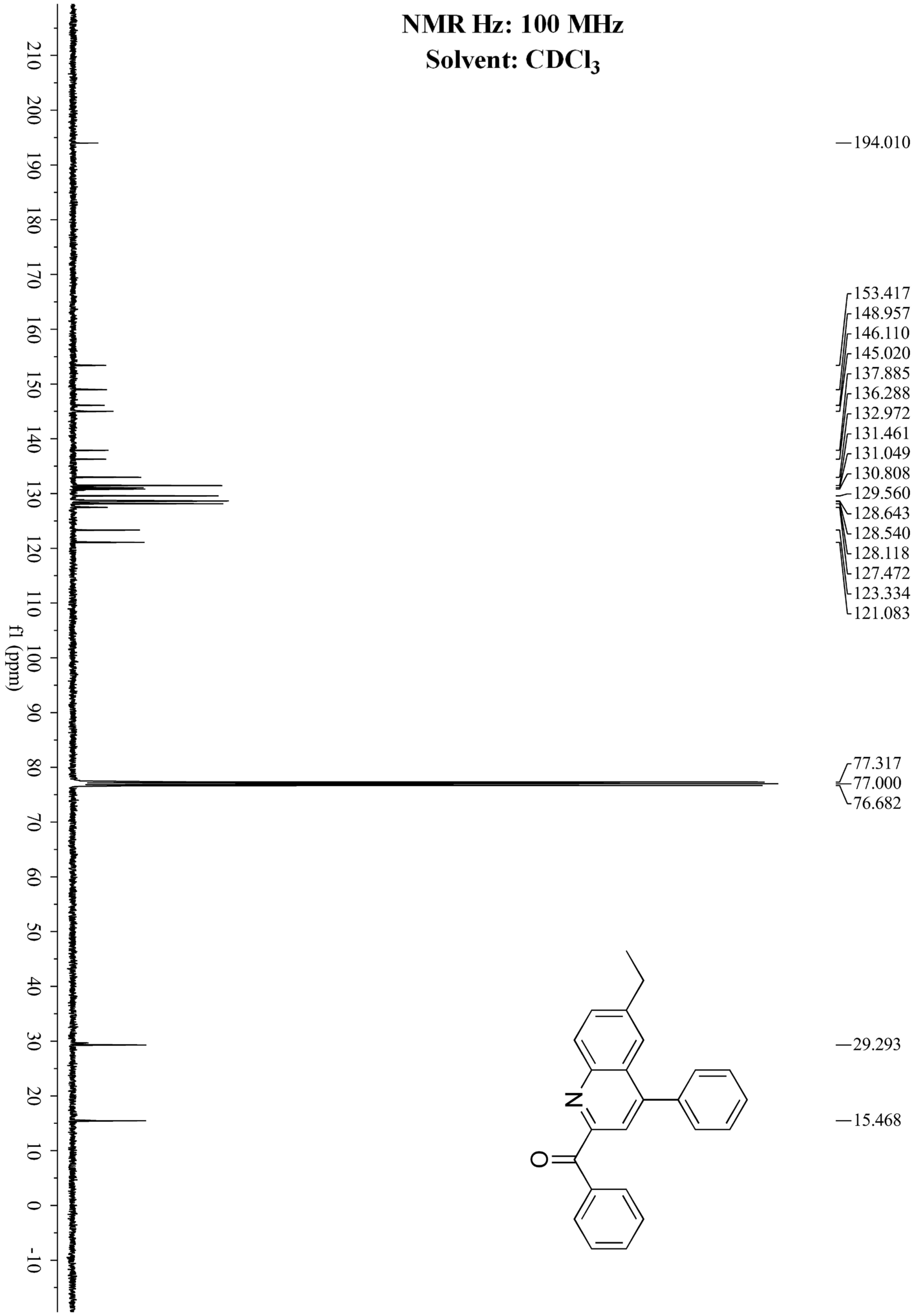


NMR Hz: 100 MHz
Solvent: $CDCl_3$

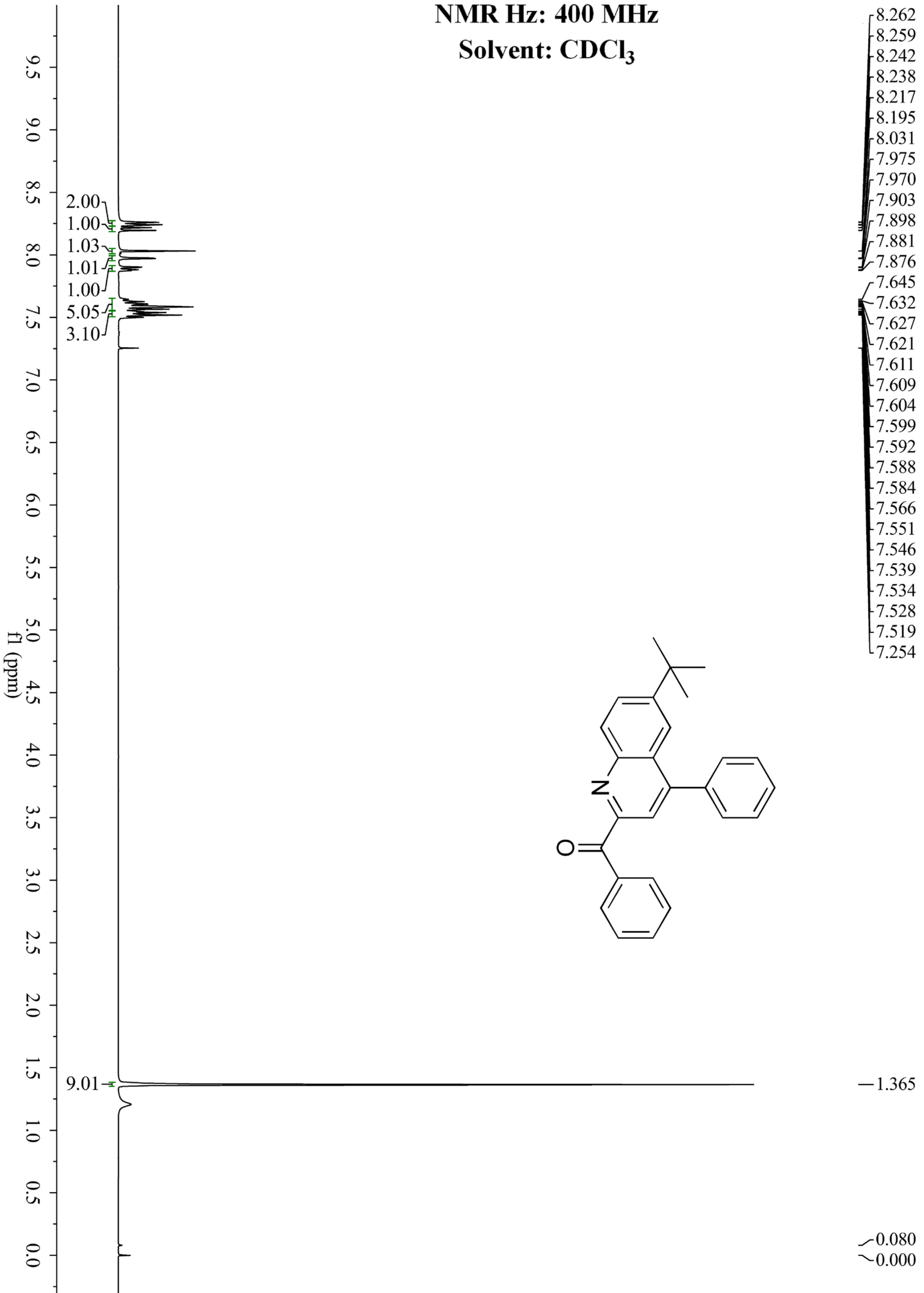


(6-Ethyl-4-phenylquinolin-2-yl)(phenyl)methanone (3ca)

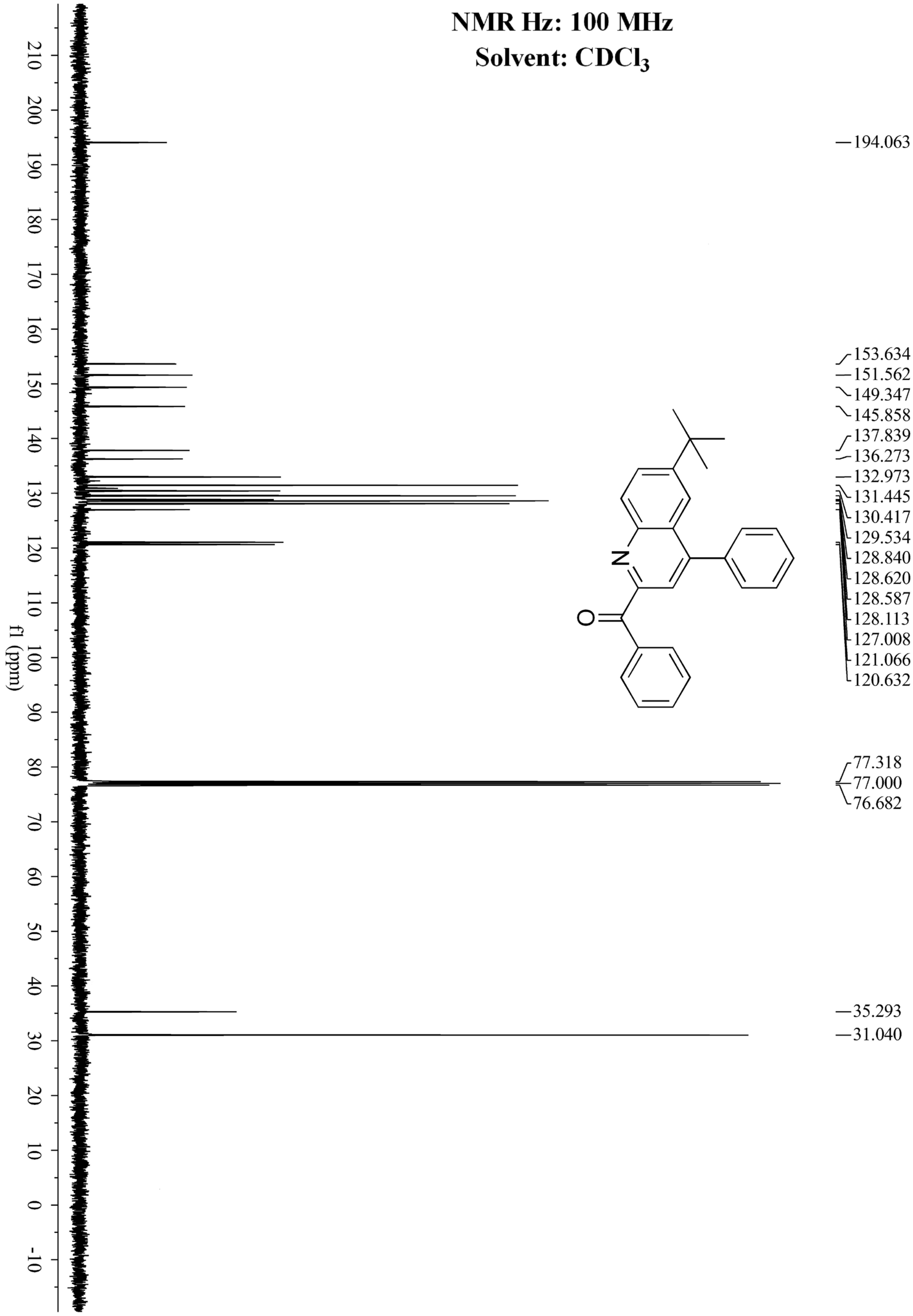



NMR Hz: 100 MHz
Solvent: $CDCl_3$
194.010
153.417
148.957
146.110
145.020
137.885
136.288
132.972
131.461
131.049
130.808
129.560
128.643
128.540
128.118
127.472
123.334
121.083
77.317
77.000
76.682
29.293
15.468
fl (ppm)
N
O

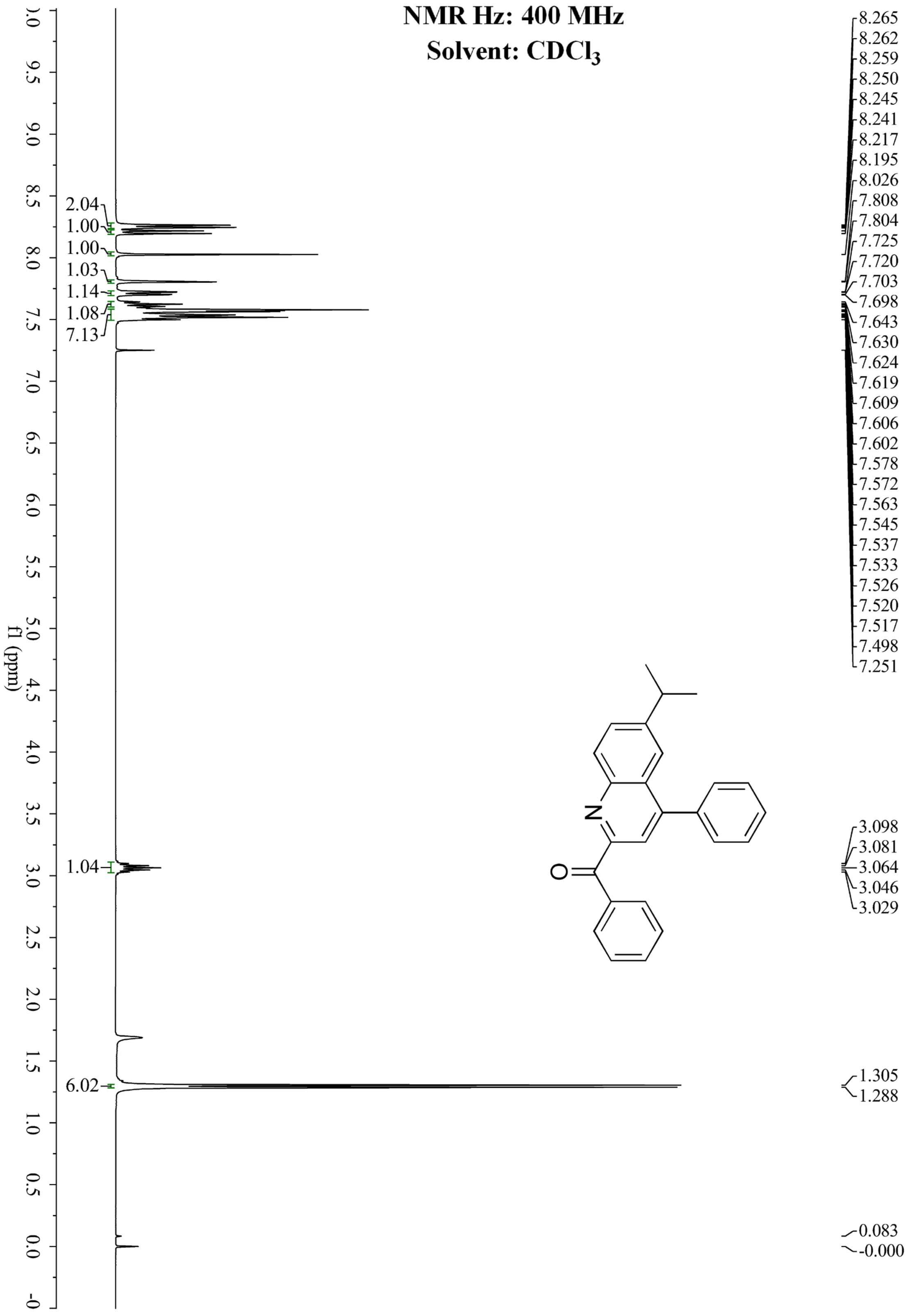
(6-(Tert-butyl)-4-phenylquinolin-2-yl)(phenyl)methanone(3da)

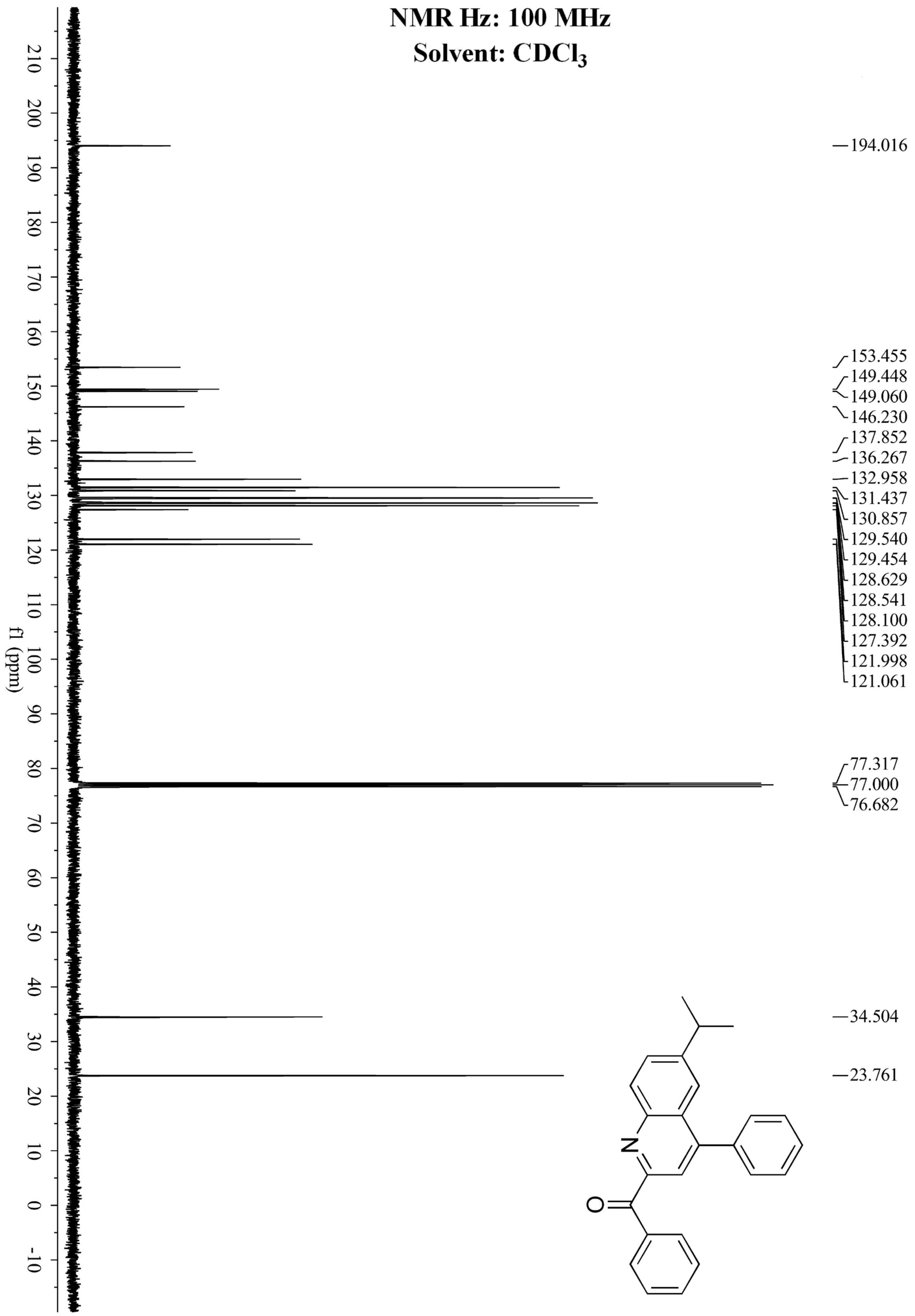


NMR Hz: 100 MHz
Solvent: $CDCl_3$

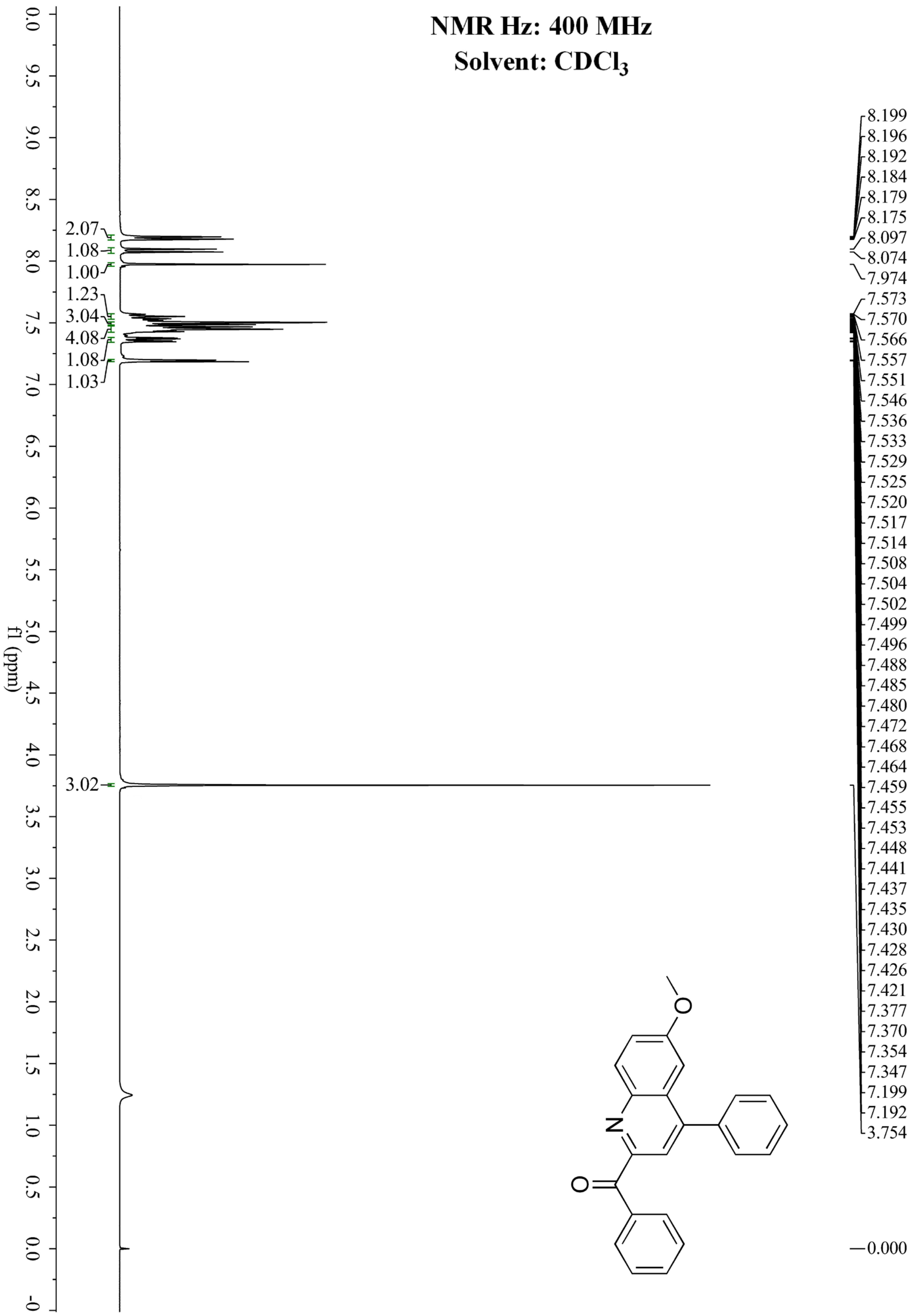


(6-Isopropyl-4-phenylquinolin-2-yl)(phenyl)methanone(3ea)

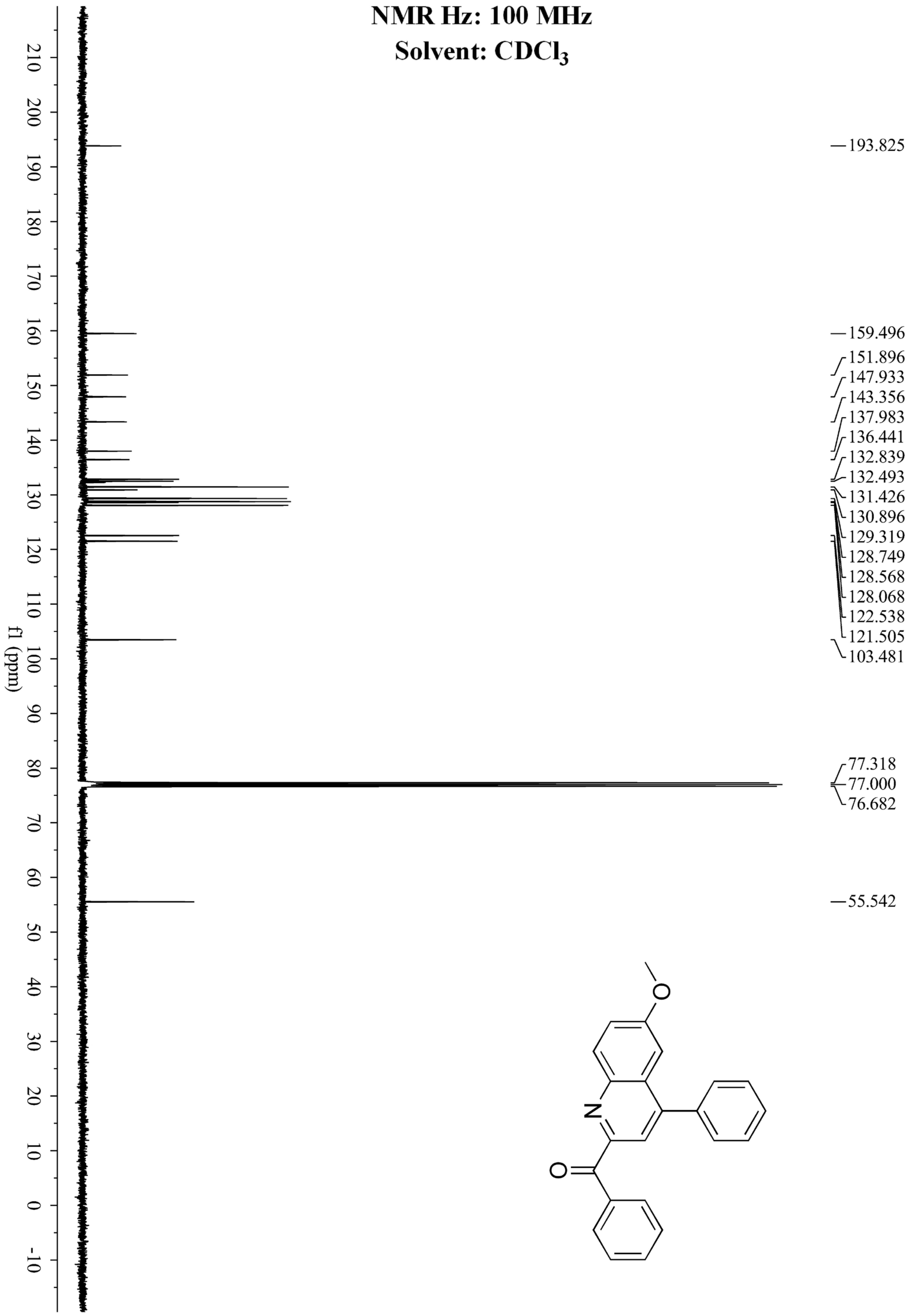



NMR Hz: 100 MHz
Solvent: $CDCl_3$
194.016
153.455
149.448
149.060
146.230
137.852
136.267
132.958
131.437
130.857
129.540
129.454
128.629
128.541
128.100
127.392
121.998
121.061
77.317
77.000
76.682
34.504
23.761
f1 (ppm)
N
O

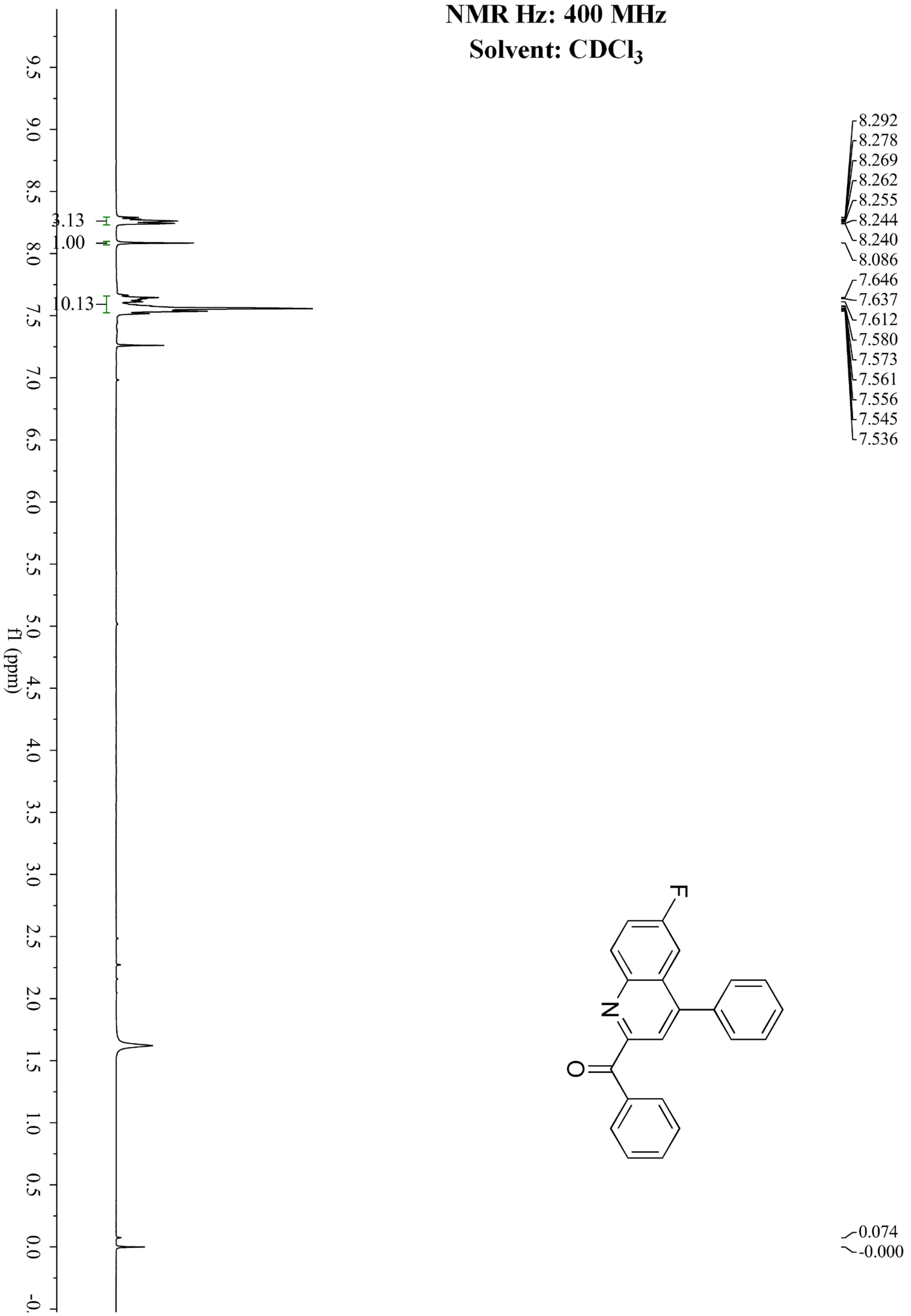
(6-Methoxy-4-phenylquinolin-2-yl)(phenyl)methanone(3fa)

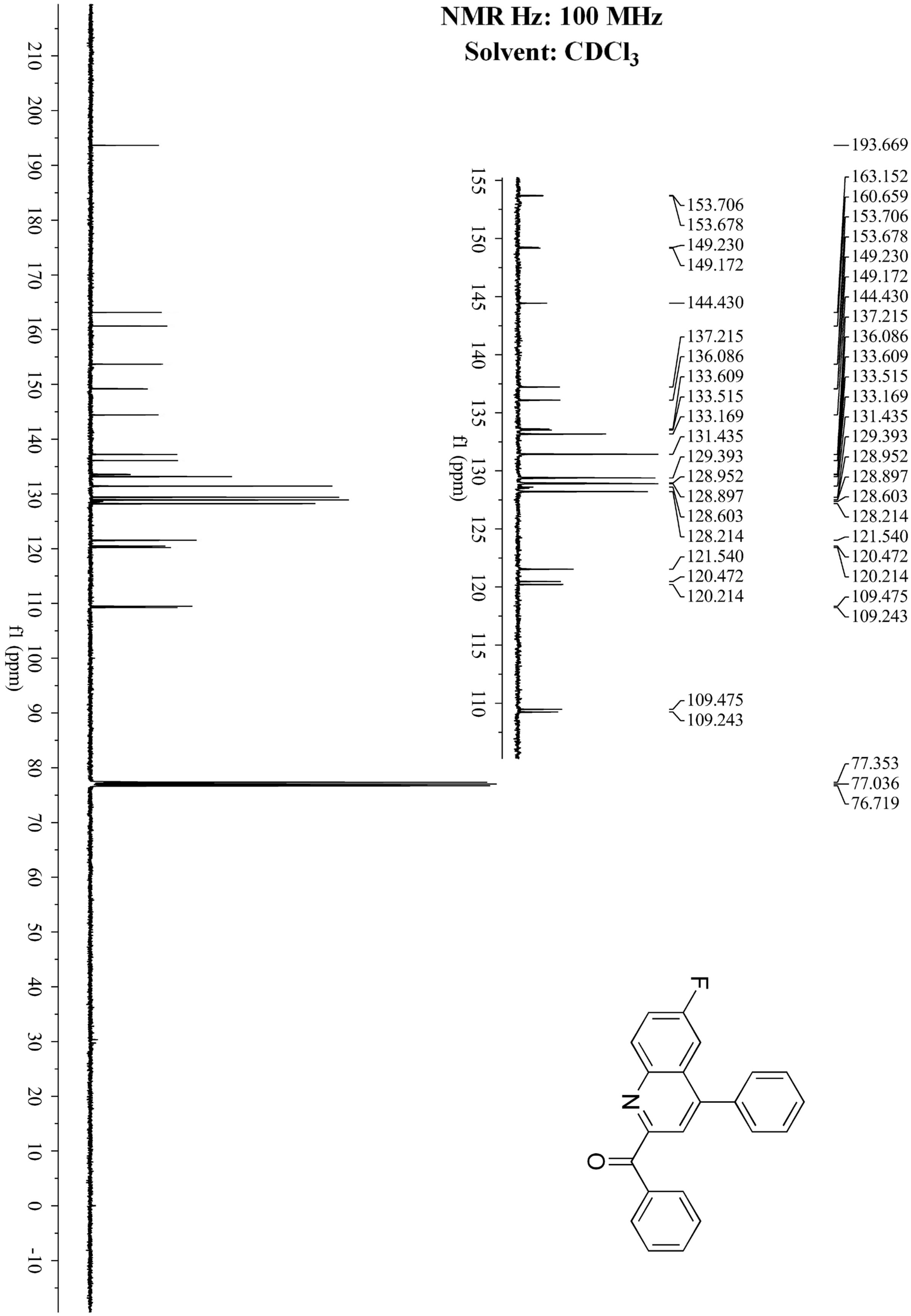


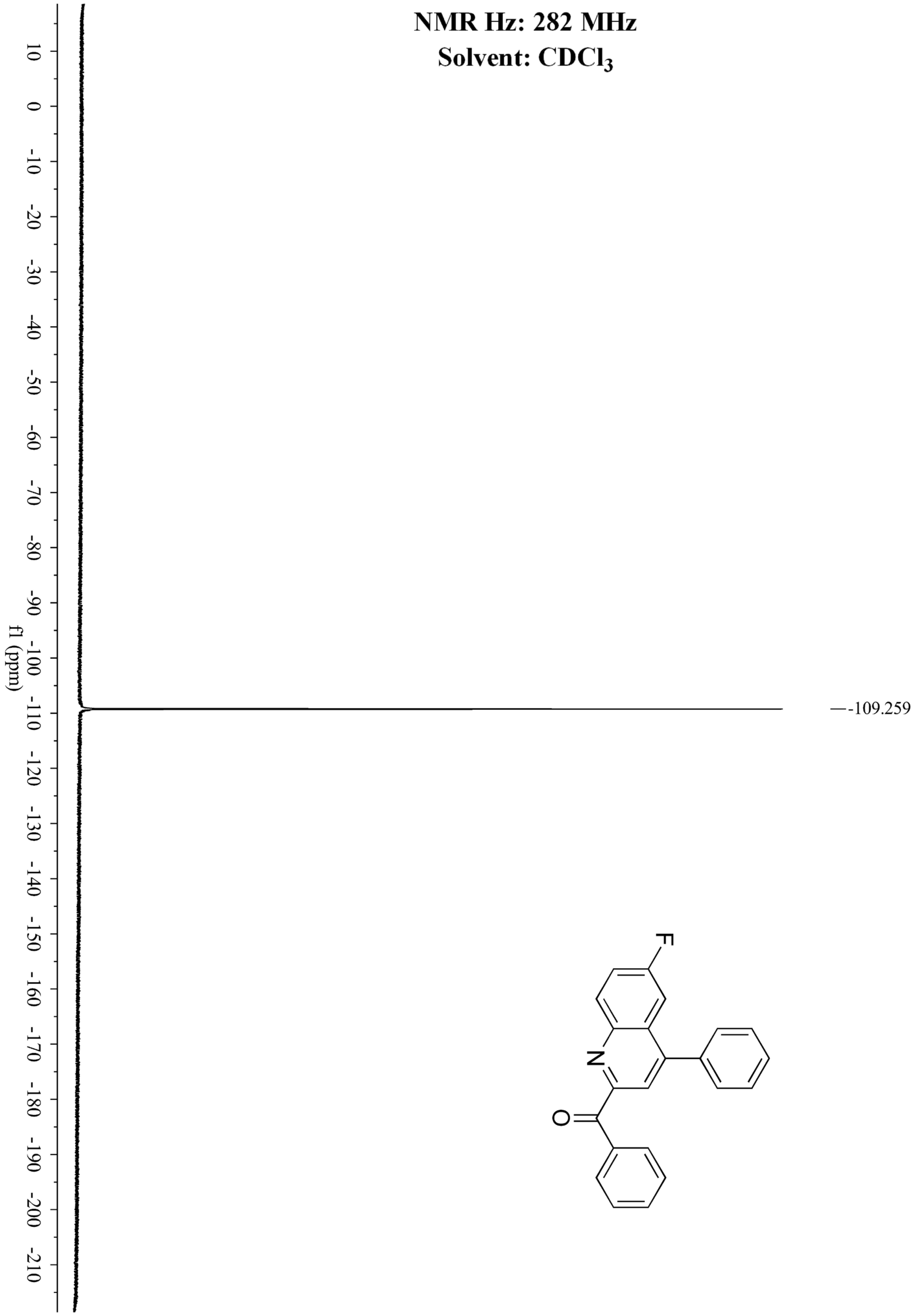
NMR Hz: 100 MHz
Solvent: $CDCl_3$



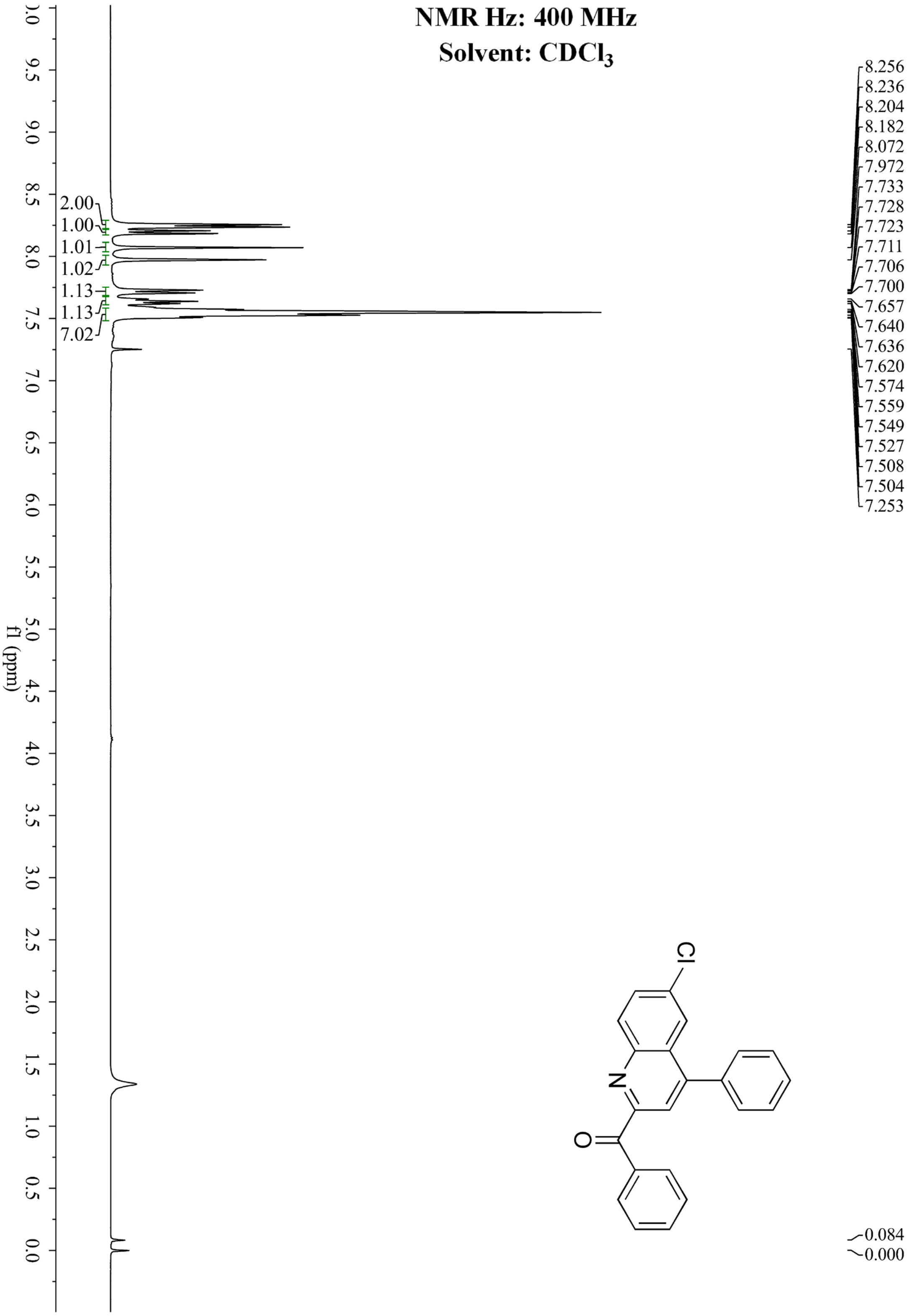
(6-Fluoro-4-phenylquinolin-2-yl)(phenyl)methanone (3ga)

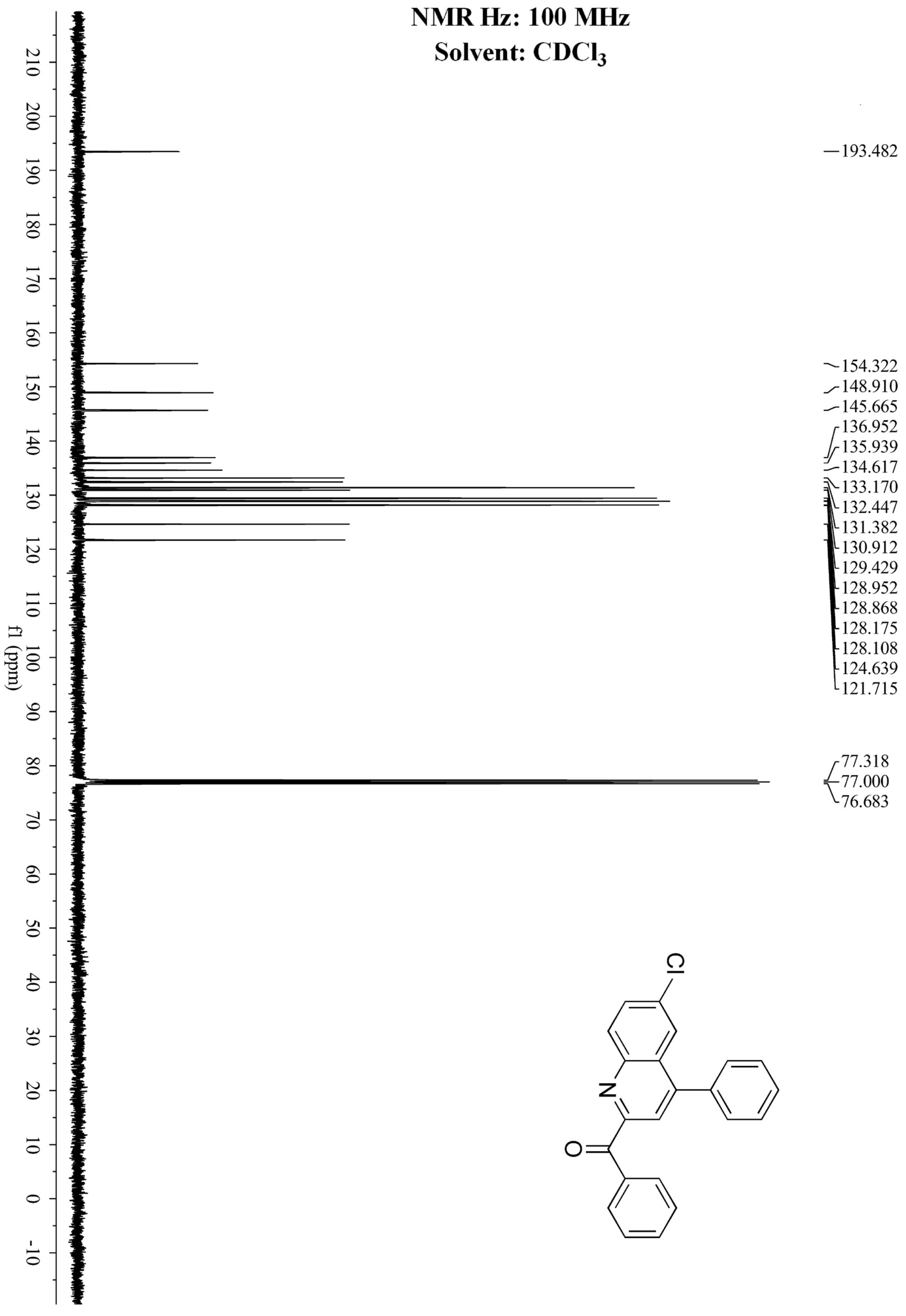



NMR Hz: 100 MHz
Solvent: $CDCl_3$
193.669
163.152
160.659
153.706
153.678
149.230
149.172
144.430
137.215
136.086
133.609
133.515
133.169
131.435
129.393
128.952
128.897
128.603
128.214
121.540
120.472
120.214
109.475
109.243
77.353
77.036
76.719
f1 (ppm)
F
N
O

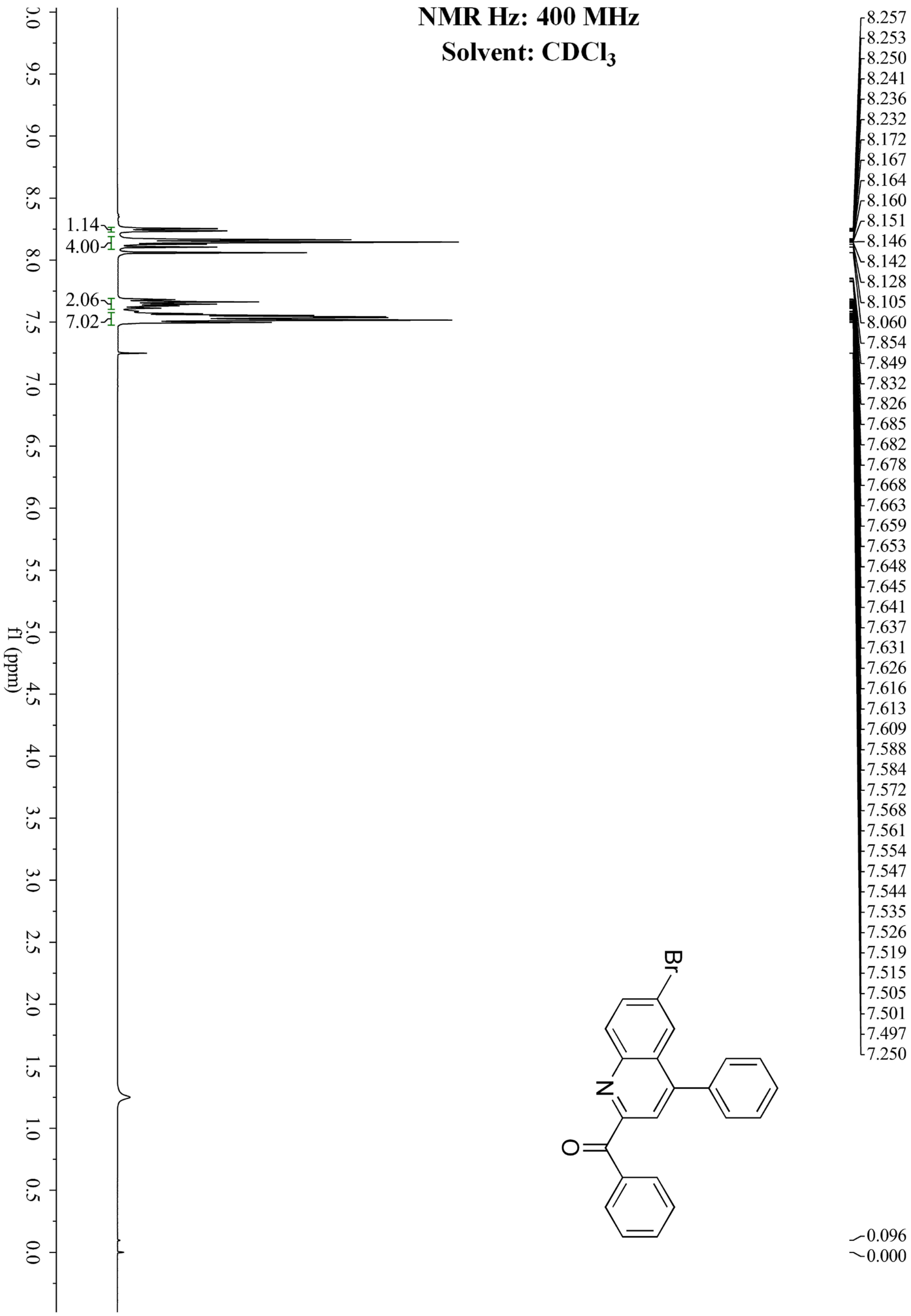

NMR Hz: 282 MHz
Solvent: $CDCl_3$
-109.259
f1 (ppm)
F
N
O

(6-Chloro-4-phenylquinolin-2-yl)(phenyl)methanone (3ha)

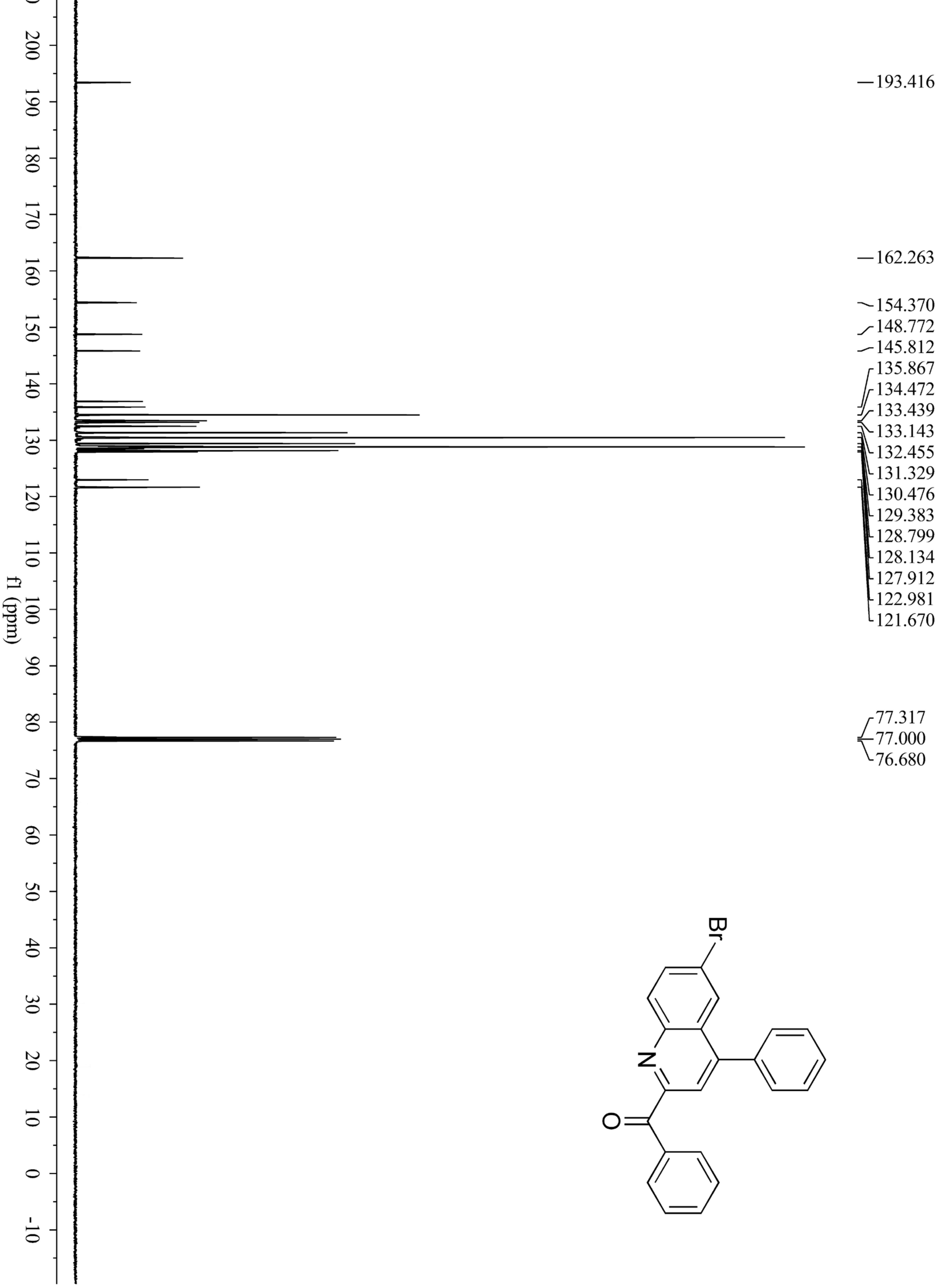



NMR Hz: 100 MHz
Solvent: $CDCl_3$
193.482
154.322
148.910
145.665
136.952
135.939
134.617
133.170
132.447
131.382
130.912
129.429
128.952
128.868
128.175
128.108
124.639
121.715
77.318
77.000
76.683
f1 (ppm)
Cl
N
O

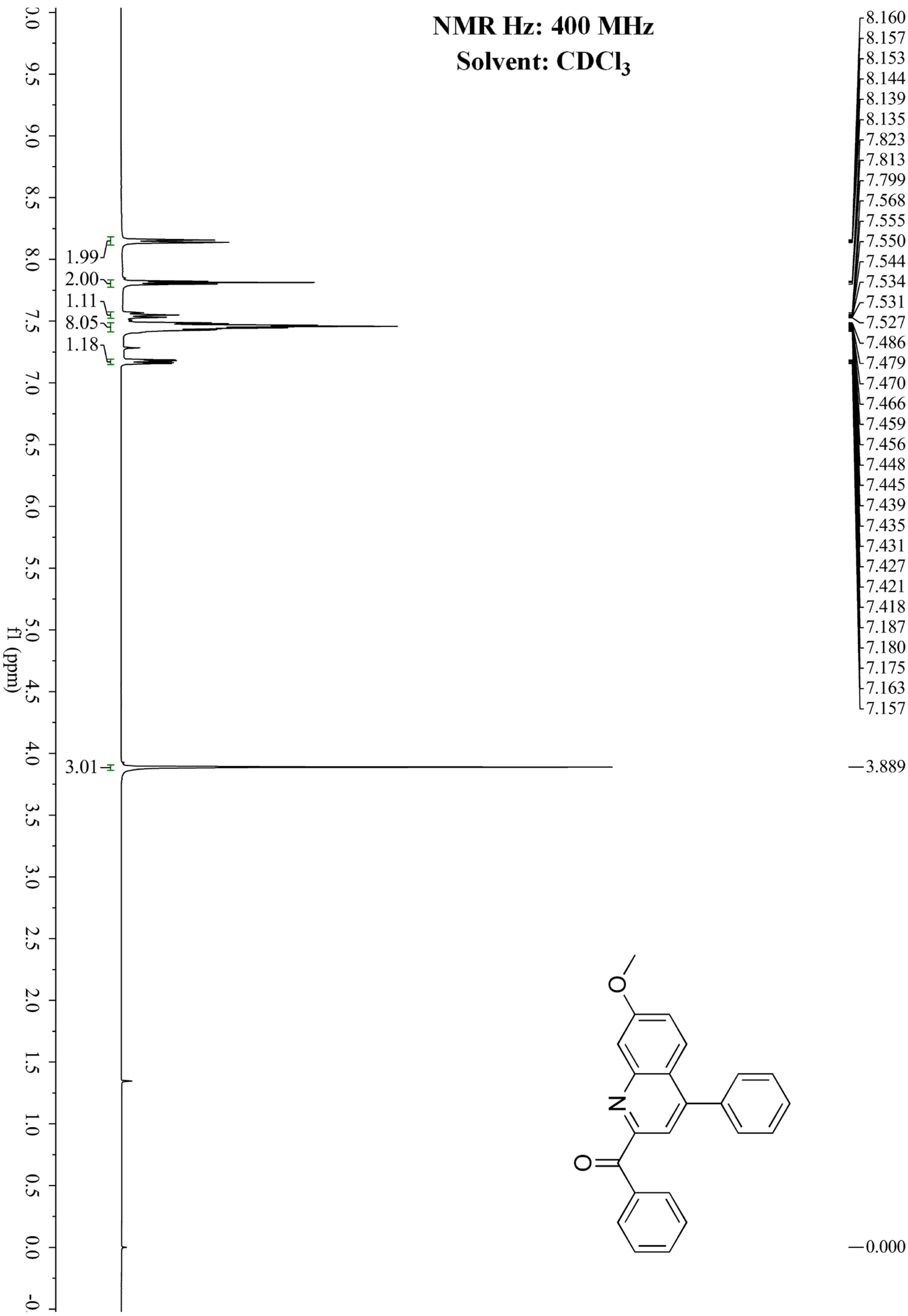
(6-Bromo-4-phenylquinolin-2-yl)(phenyl)methanone (3ia)

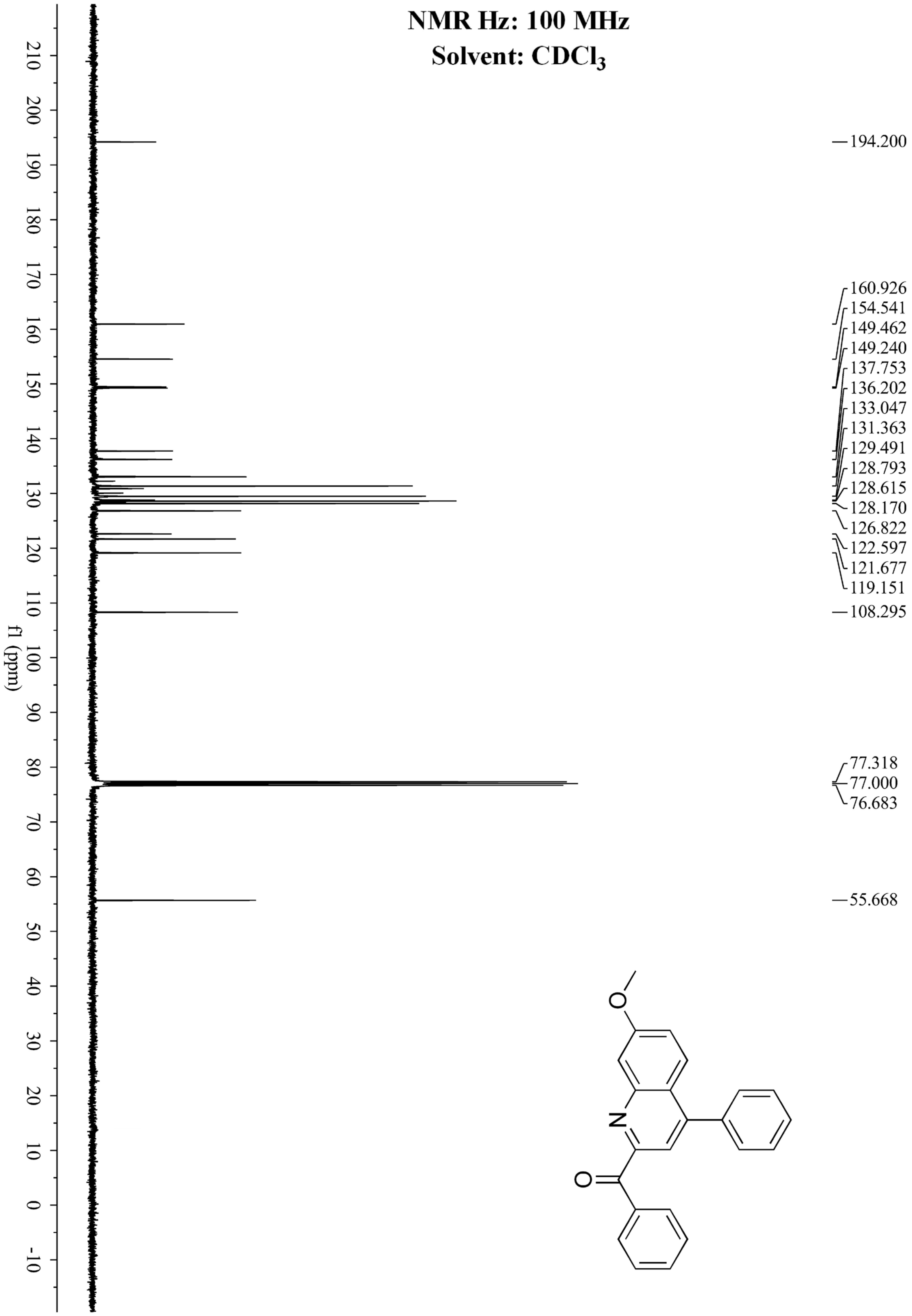


NMR Hz: 100 MHz
Solvent: $CDCl_3$

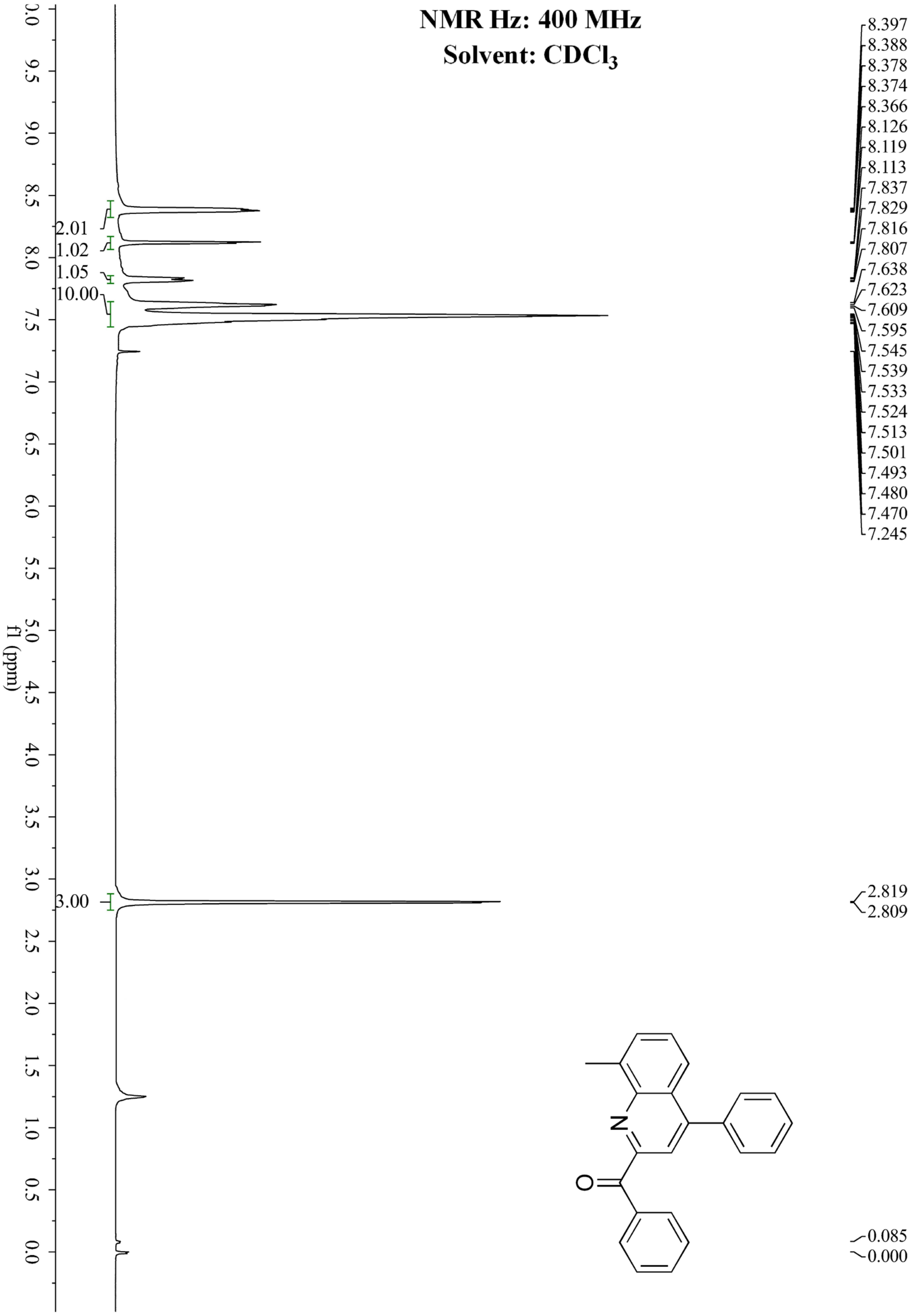


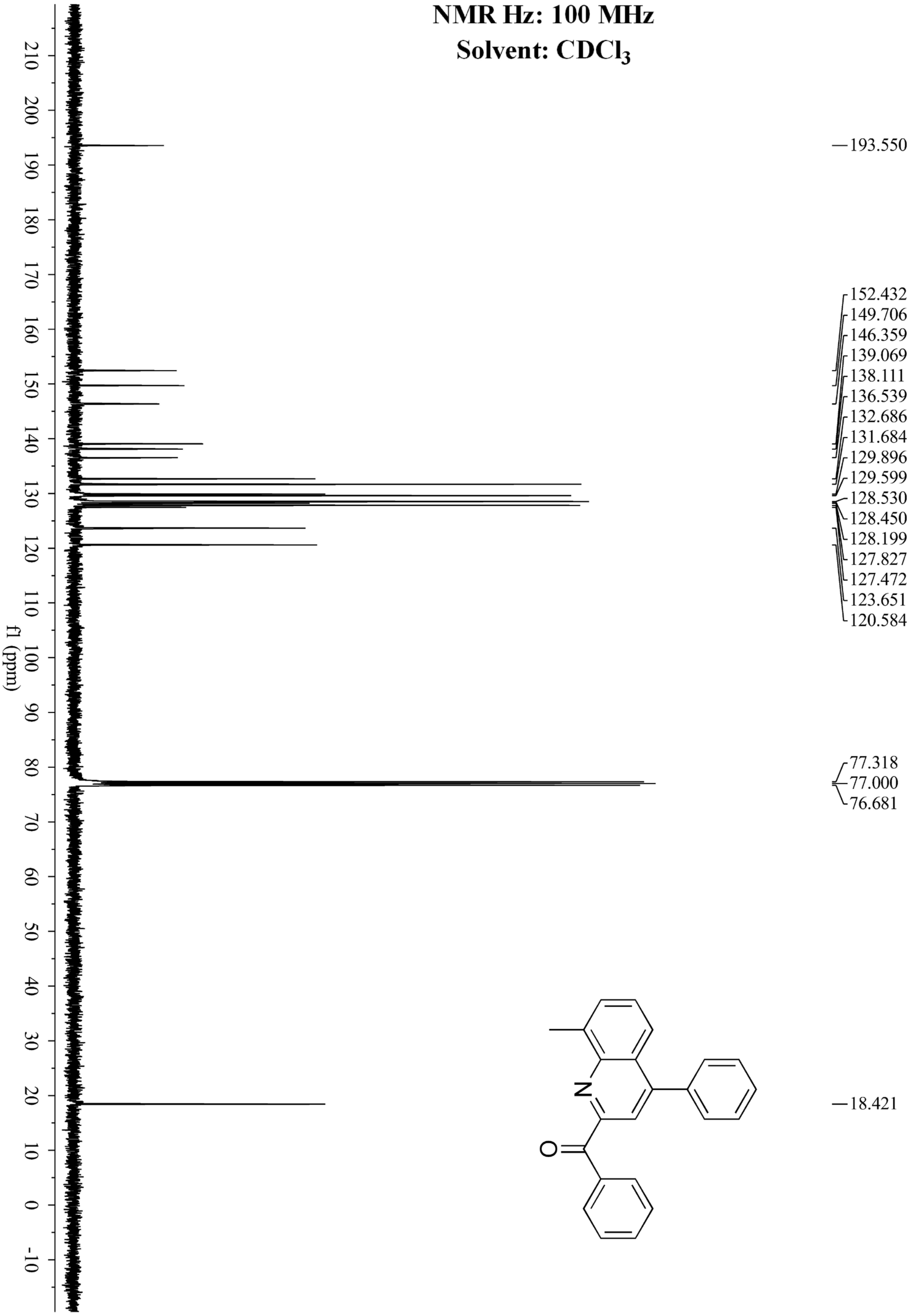
(7-Methoxy-4-phenylquinolin-2-yl)(phenyl)methanone(3ja)



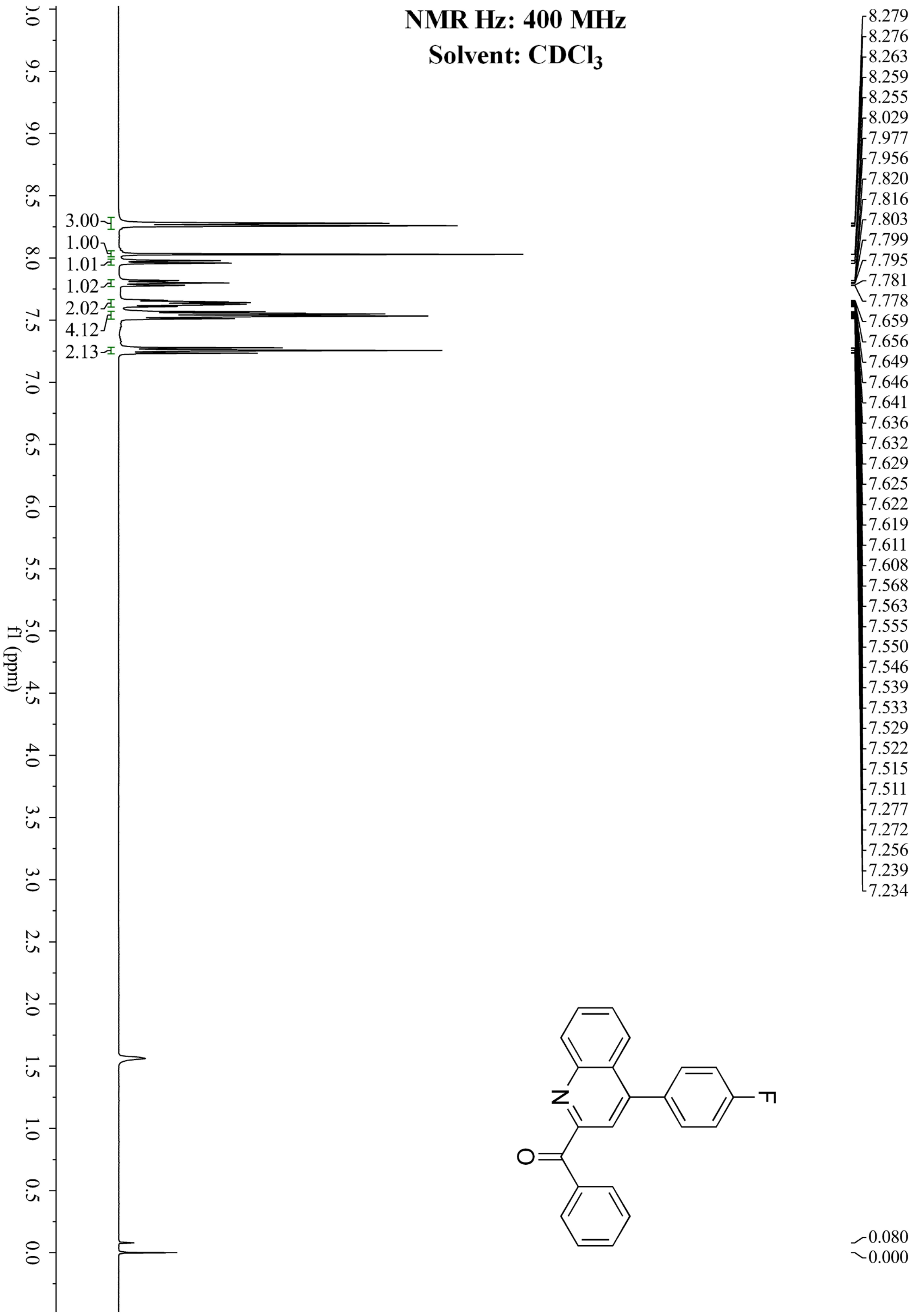

NMR Hz: 100 MHz
Solvent: CDCl$_3$
194.200
160.926
154.541
149.462
149.240
137.753
136.202
133.047
131.363
129.491
128.793
128.615
128.170
126.822
122.597
121.677
119.151
108.295
77.318
77.000
76.683
55.668
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)
O
N
O

(8-Methyl-4-phenylquinolin-2-yl)(phenyl)methanone (3ka)

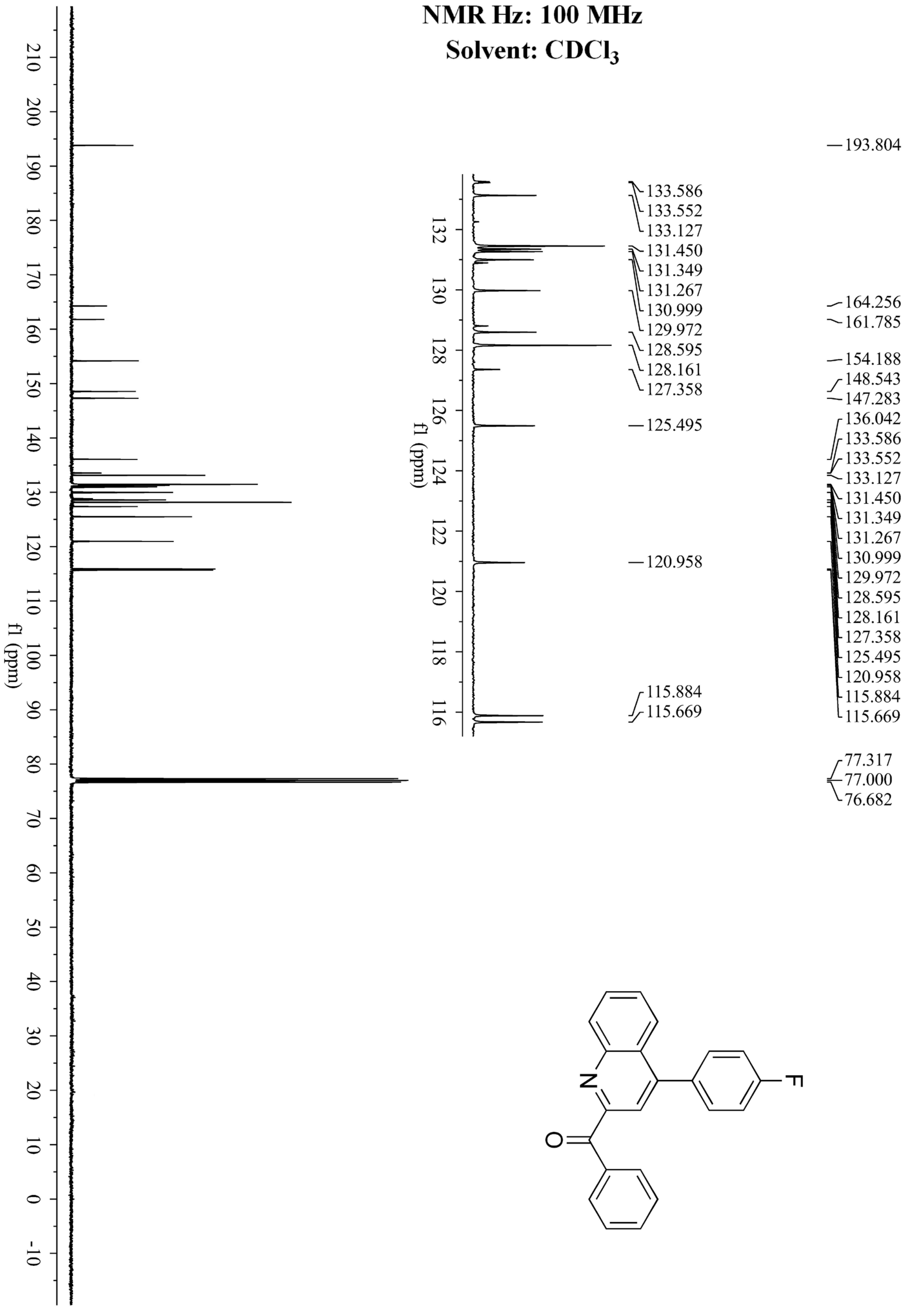


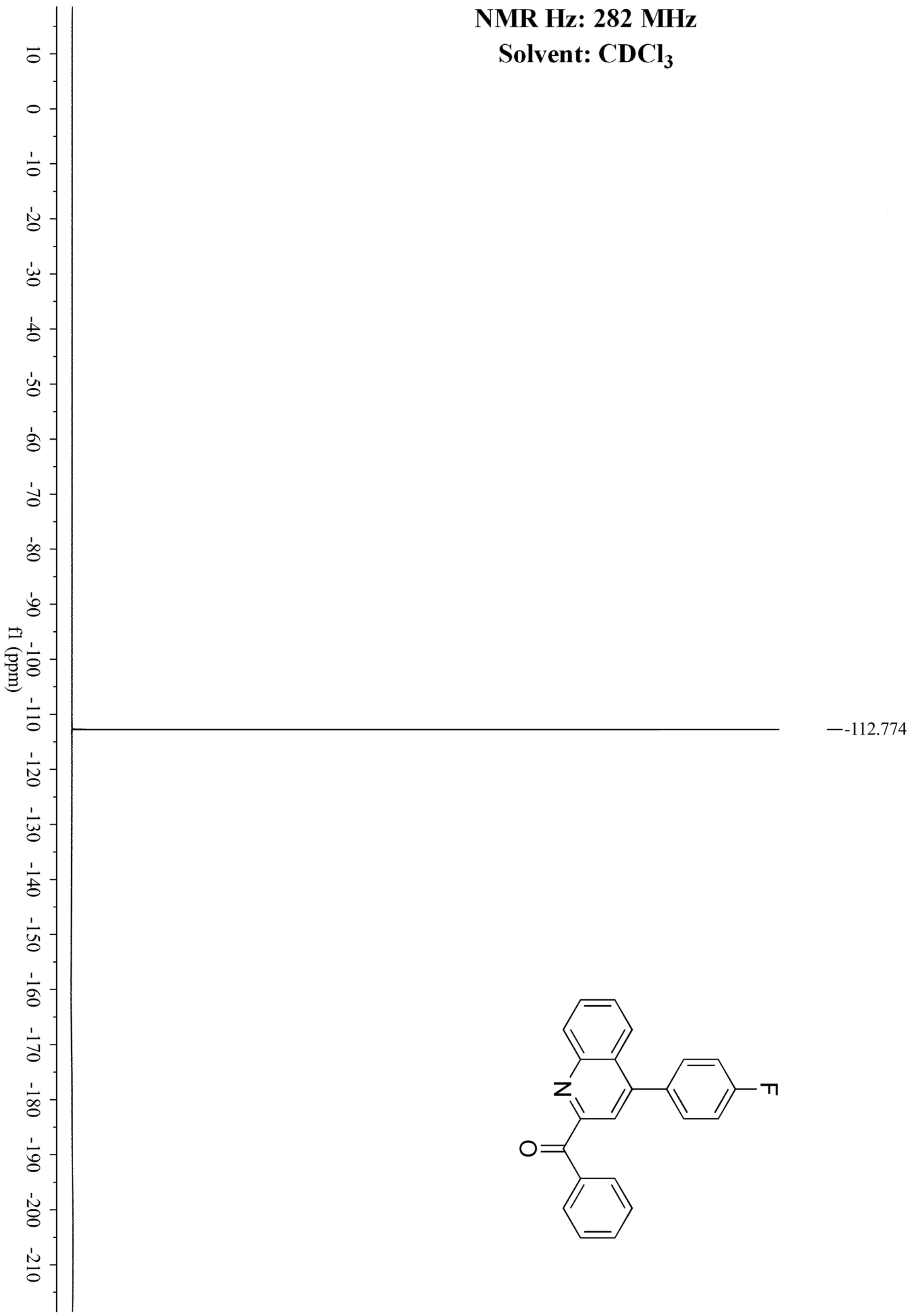

NMR Hz: 100 MHz
Solvent: CDCl3
193.550
152.432
149.706
146.359
139.069
138.111
136.539
132.686
131.684
129.896
129.599
128.530
128.450
128.199
127.827
127.472
123.651
120.584
77.318
77.000
76.681
18.421
N
O
f1 (ppm)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10

(4-(4-Fluorophenyl)quinolin-2-yl)(phenyl)methanone (3la)

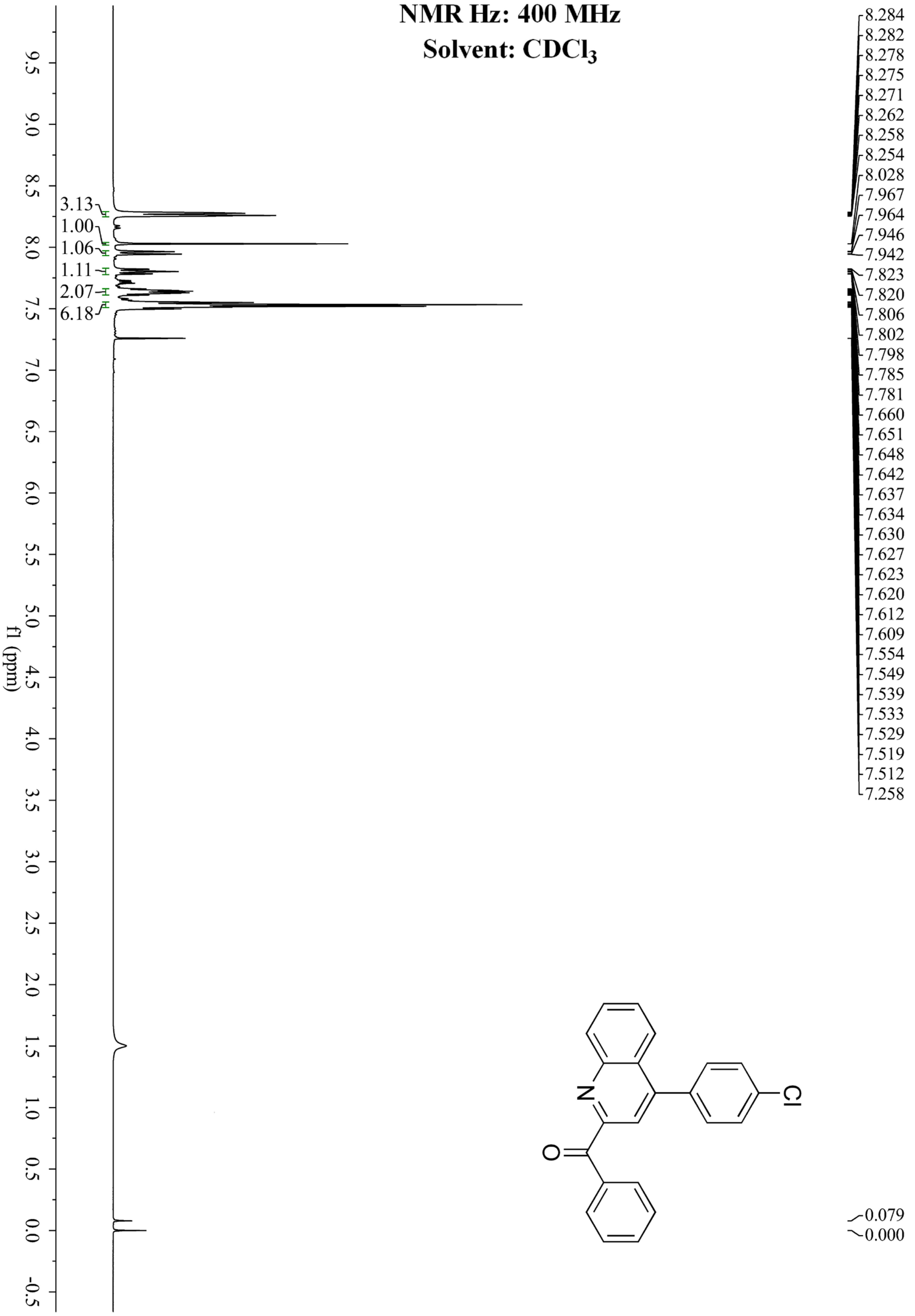


NMR Hz: 100 MHz
Solvent: $CDCl_3$



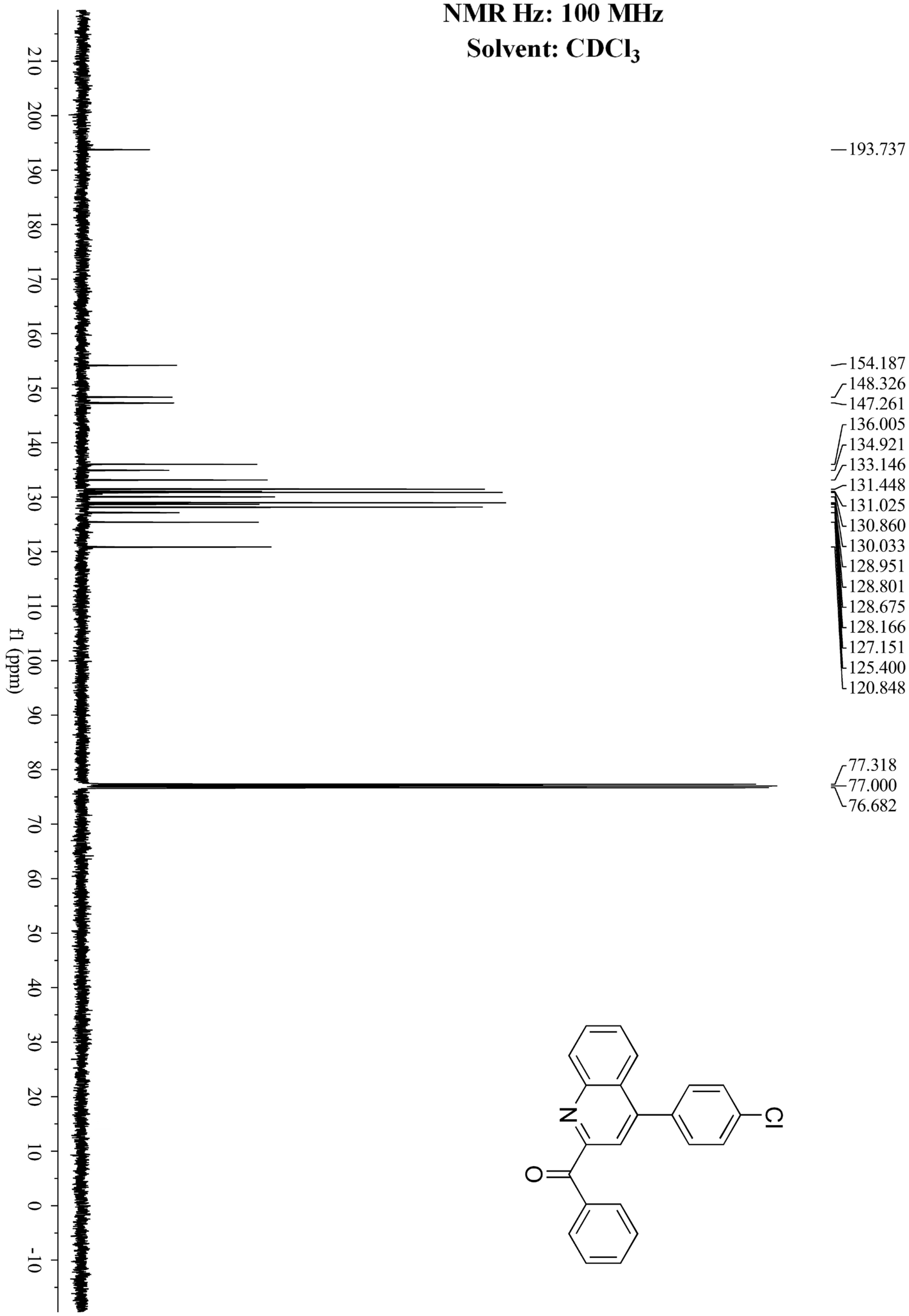

NMR Hz: 282 MHz
Solvent: CDCl3
-112.774
f1 (ppm)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
N
O
F

(4-(4-Chlorophenyl)quinolin-2-yl)(phenyl)methanone (3ma)

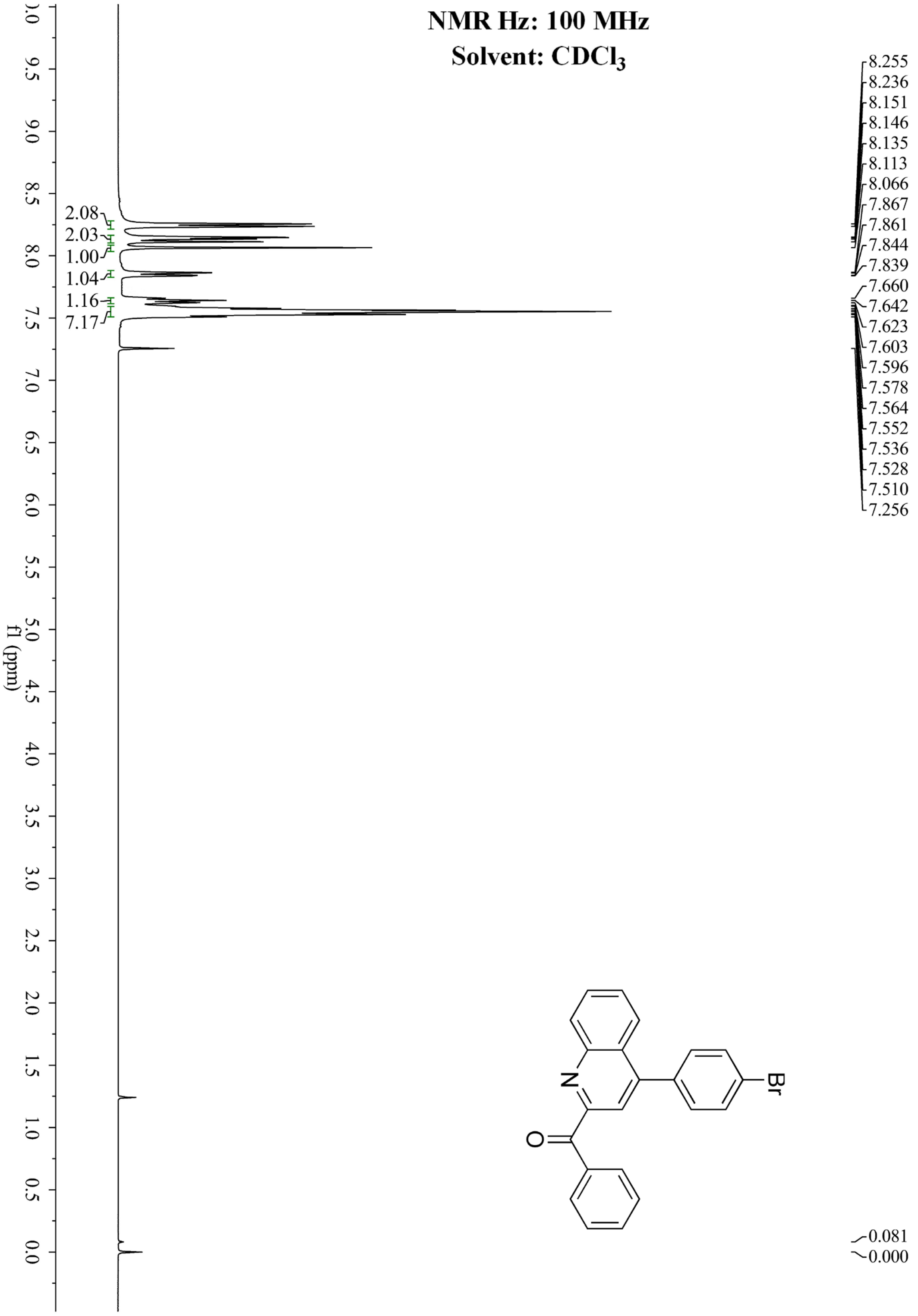


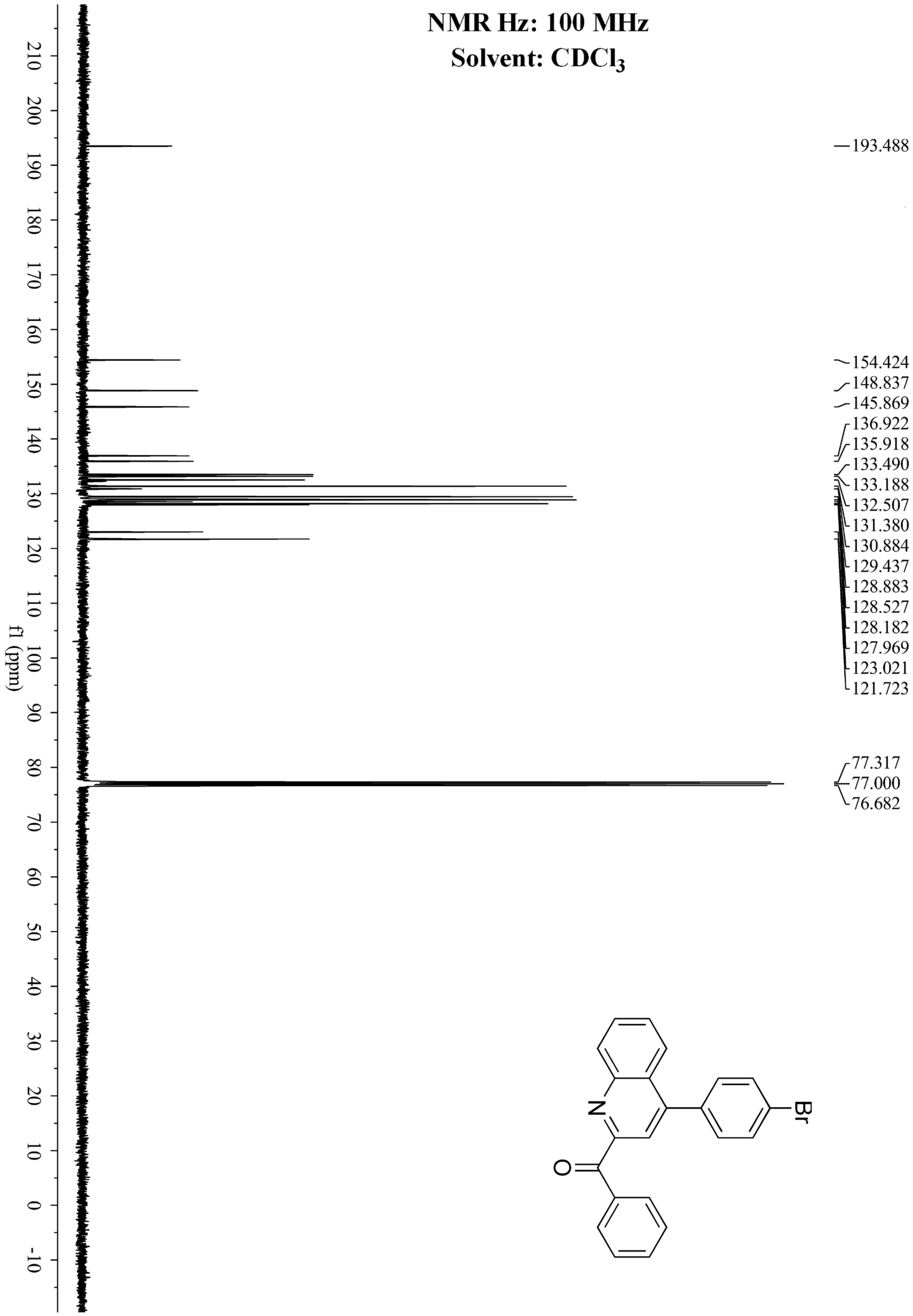
NMR Hz: 100 MHz

Solvent: $CDCl_3$

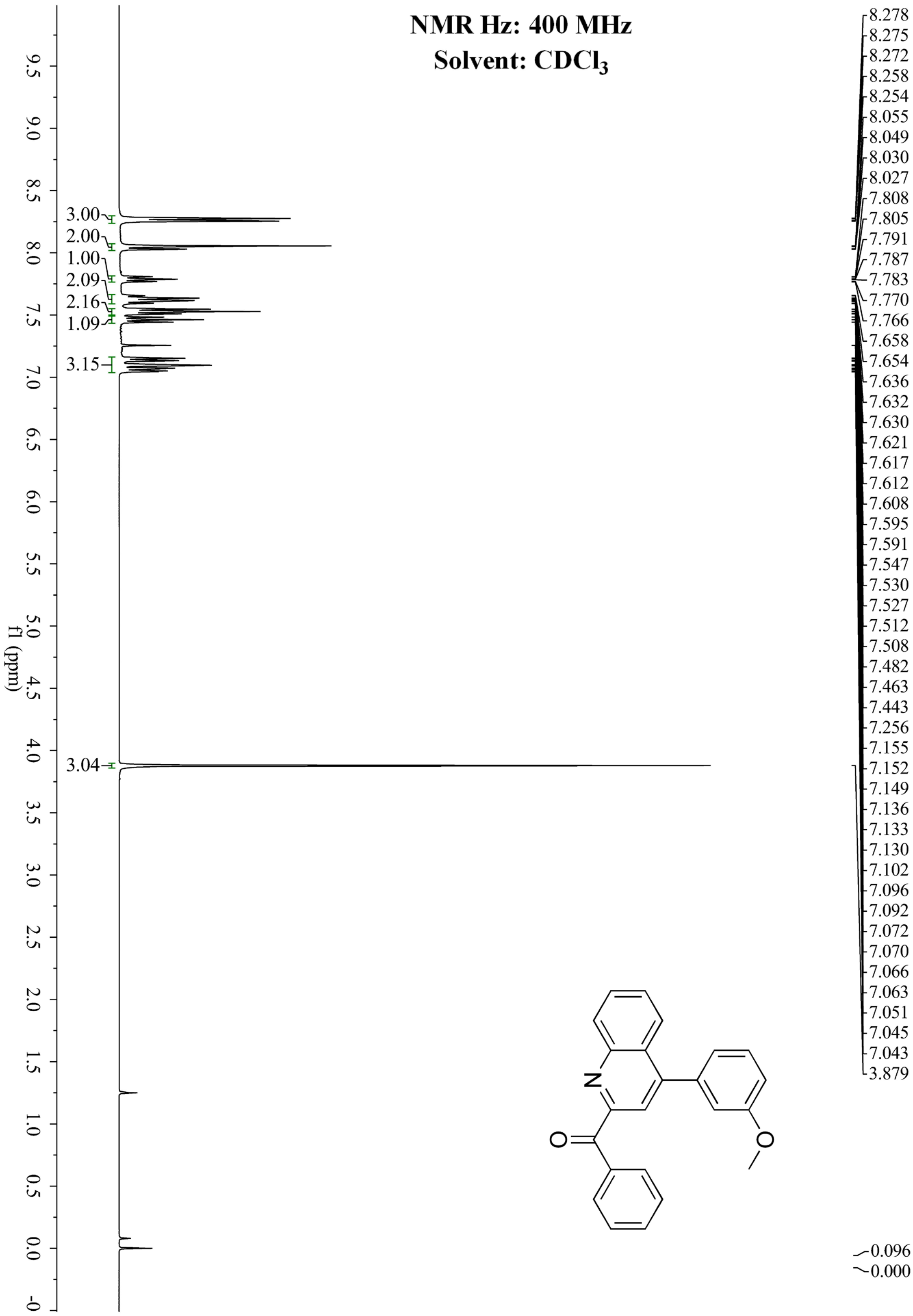


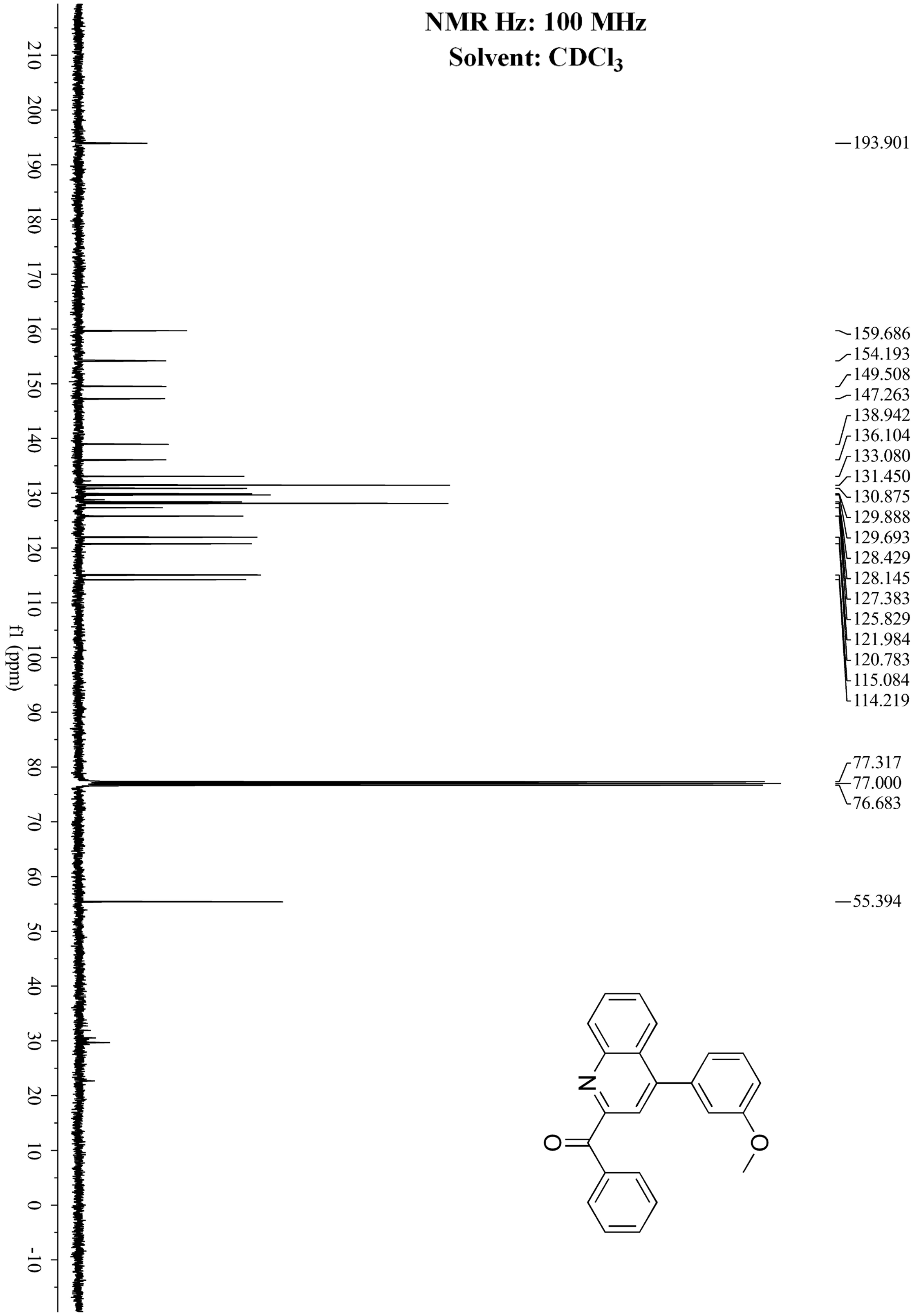
(4-(4-Bromophenyl)quinolin-2-yl)(phenyl)methanone (3na)




NMR Hz: 100 MHz
Solvent: $CDCl_3$
193.488
154.424
148.837
145.869
136.922
135.918
133.490
133.188
132.507
131.380
130.884
129.437
128.883
128.527
128.182
127.969
123.021
121.723
77.317
77.000
76.682
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)
N
O
Br

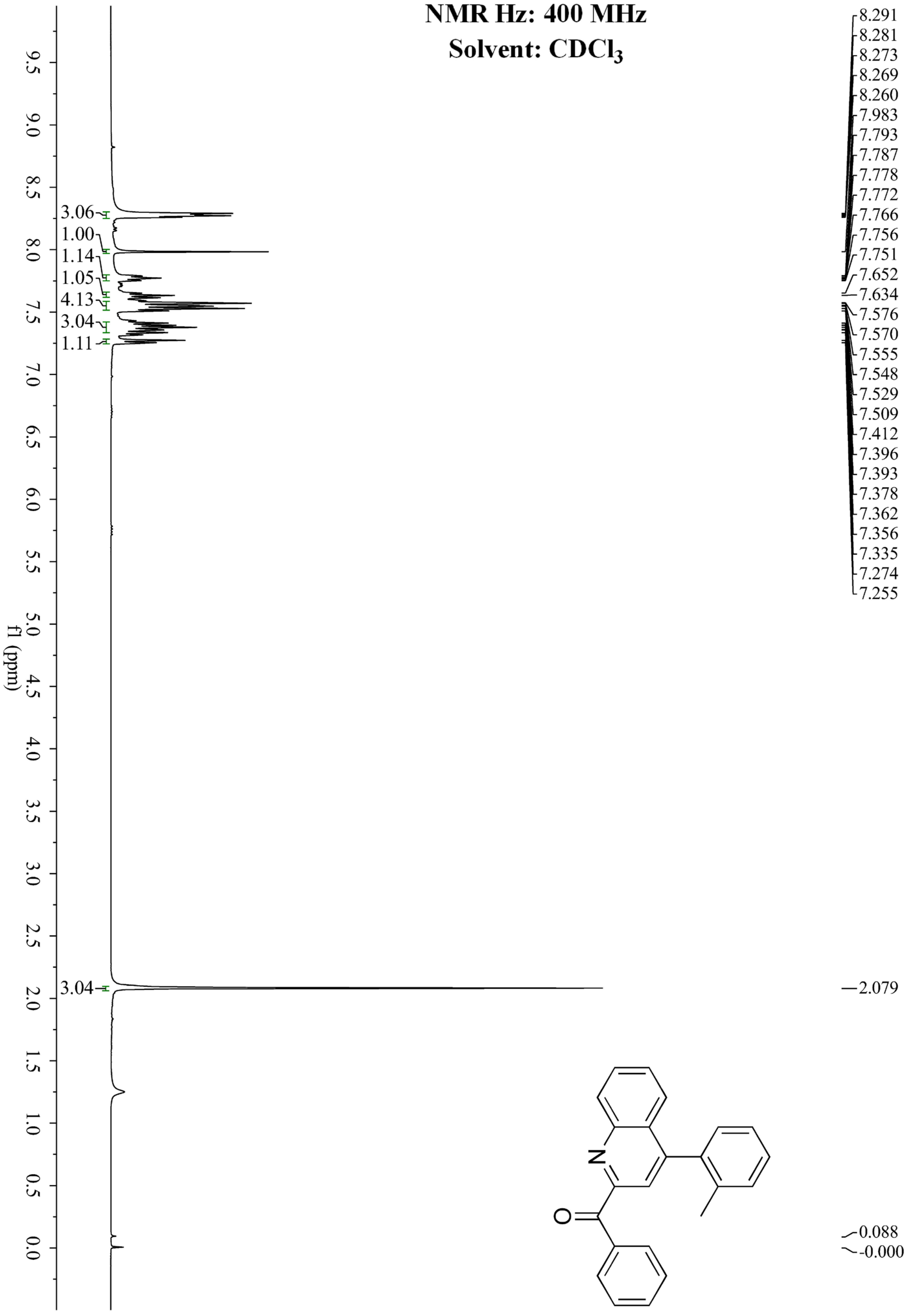
(4-(3-Methoxyphenyl)quinolin-2-yl)(phenyl)methanone(3oa)



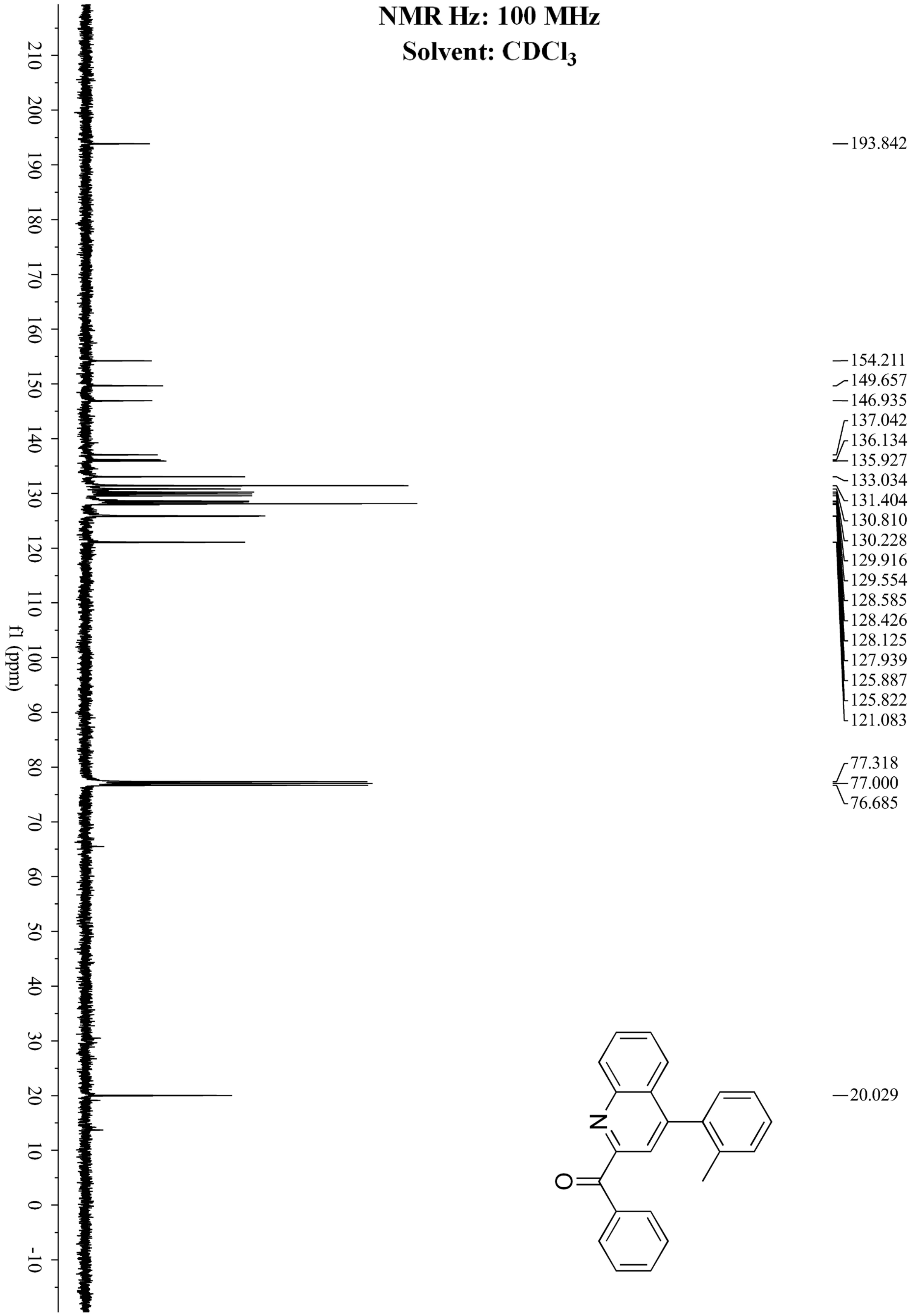


NMR Hz: 100 MHz
Solvent: $CDCl_3$
193.901
159.686
154.193
149.508
147.263
138.942
136.104
133.080
131.450
130.875
129.888
129.693
128.429
128.145
127.383
125.829
121.984
120.783
115.084
114.219
77.317
77.000
76.683
55.394
f1 (ppm)
N
O

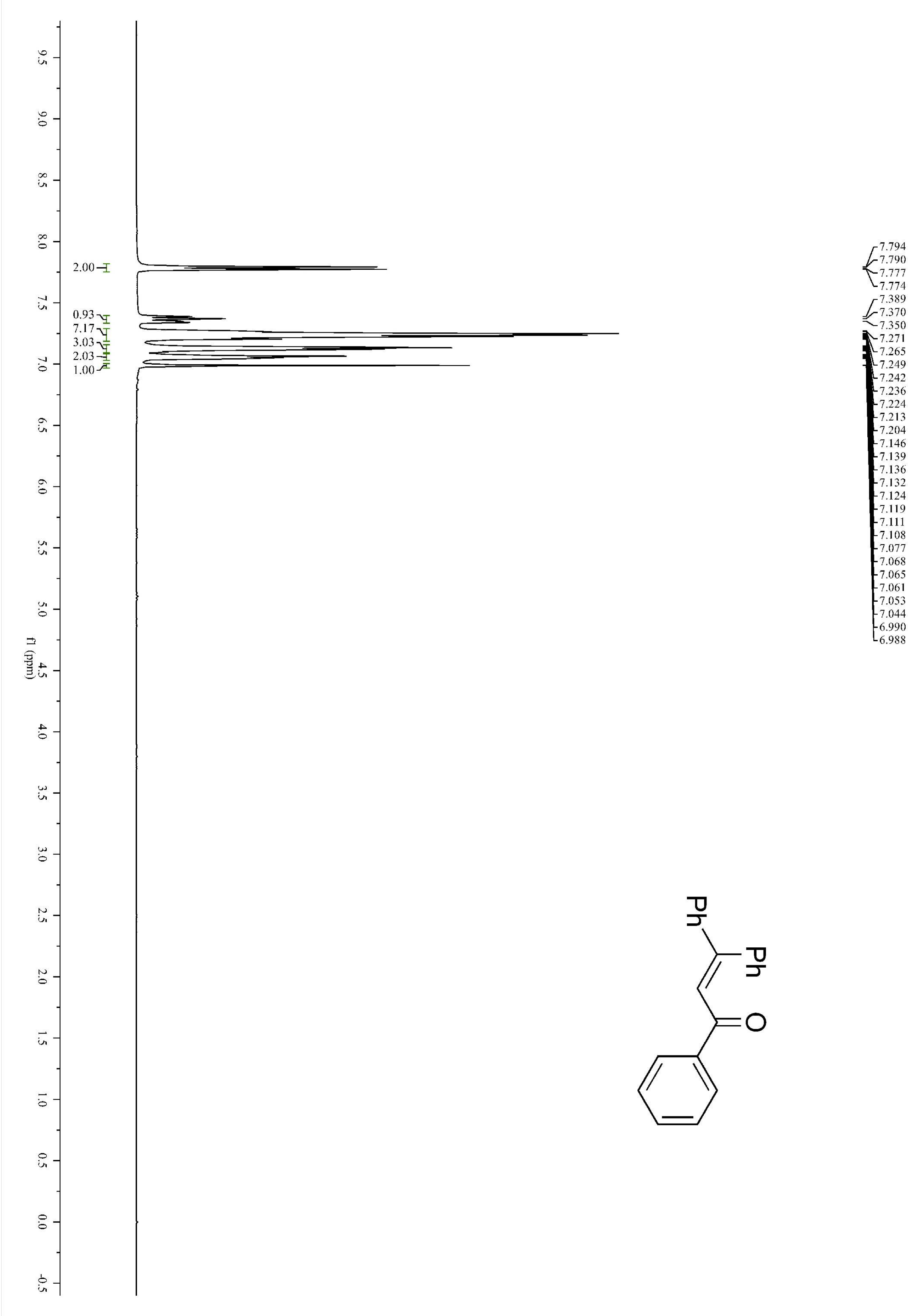
Phenyl(4-(o-tolyl)quinolin-2-yl)methanone (3pa)

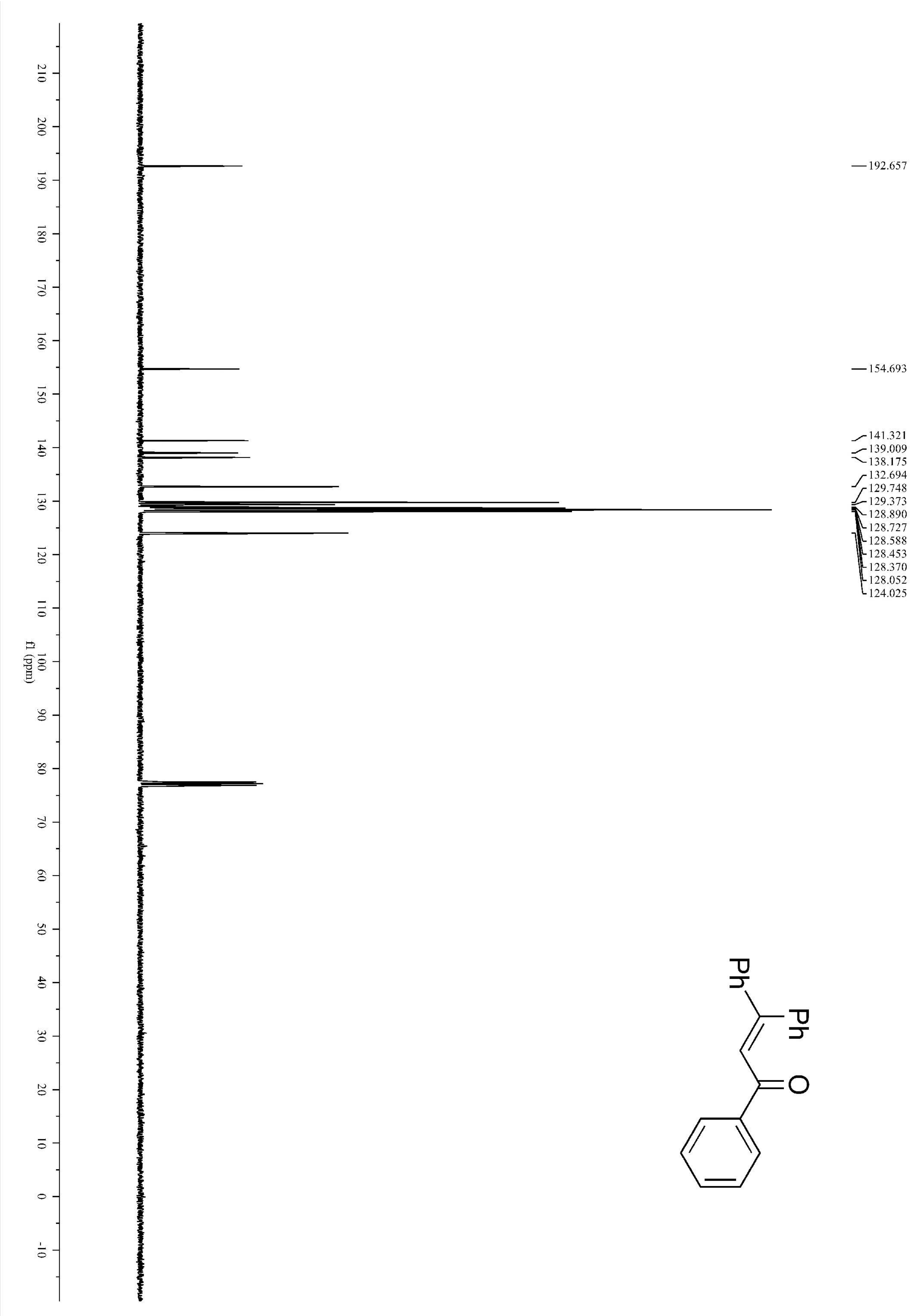


NMR Hz: 100 MHz
Solvent: $CDCl_3$



1,3,3-Triphenylprop-2-en-1-one (6)





192.657
154.693
141.321
139.009
138.175
132.694
129.748
129.373
128.890
128.727
128.588
128.453
128.370
128.052
124.025
f1 (ppm)
Ph
Ph
O