Supporting Information

Silver-Catalyzed Direct C-H Oxidative Carbamoylation of Quinolines with Oxamic Acids

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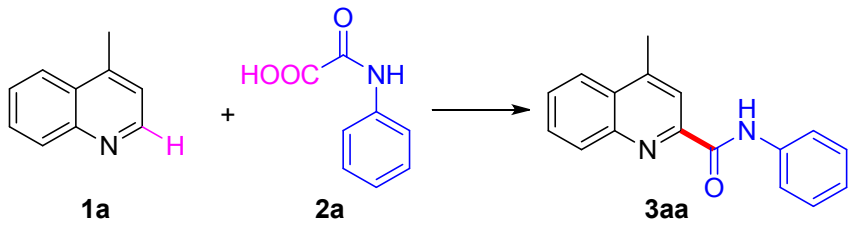
1. Screening the reaction conditions



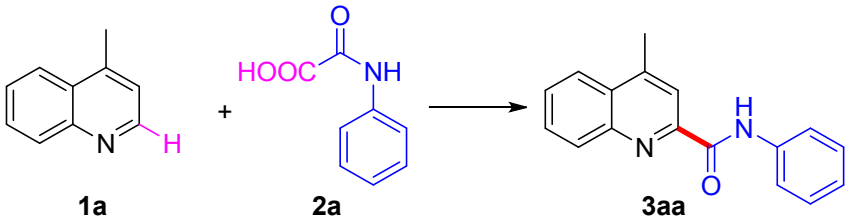
1a **2a** **3aa**

Table S1 Screening the amount of oxidant[a]

Entry	Oxidant (eq.)	Yields (%)[b]
1	1.0	32
2	1.5	48
3	2.0	52
4	2.5	50

[a] Reaction conditions: 4-methylquinoline **1a** (0.2 mmol, 28.6 mg), 2-oxo-2-(phenylamino)acetic acid **2a** (0.3 mmol, 49.5 mg), $(NH_4)_2S_2O_8$ in 2.0 mL DCE-H_2O (1:1, v/v) co-solvent at 90 °C for 4.0 h.

[b] Isolated yield.



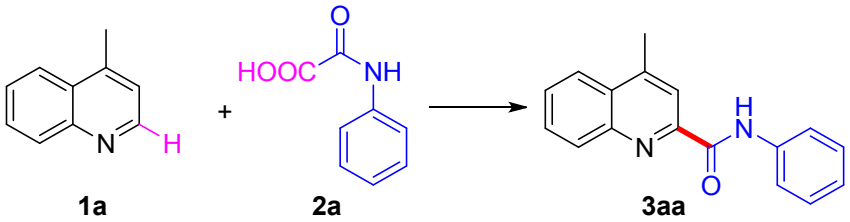
1a **2a** **3aa**

Table S2 Screening the amount of catalyst[a]

Entry	$AgNO_3$ (eq.)	Yields (%)[b]
1	0.05	21
2	0.1	28
3	0.15	35
4	0.2	69

[a] Reaction conditions: 4-methyl quinoline **1a** (0.2 mmol, 28.6 mg), 2-oxo-2-(phenylamino)acetic acid **2a** (0.3 mmol, 49.5 mg), $(NH_4)_2S_2O_8$ (0.4 mmol, 91.2 mg) in 2.0 mL DCE-H_2O (1:1, v/v) co-solvent at 90 °C for 4.0 h.

[b] Isolated yield.



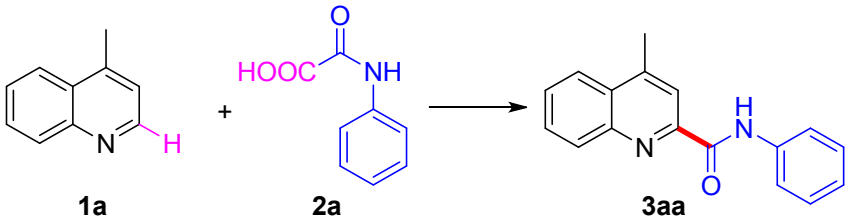
1a **2a** **3aa**

Table S3 Screening the amount of additive[a]

Entry	TFA (eq.)	Yields (%)[b]
1	0.5	70
2	1.0	80
3	1.2	72
4	1.5	68
5	2.0	62

[a] Reaction conditions: 4-methyl quinoline **1a** (0.2 mmol, 28.6 mg), 2-oxo-2-(phenylamino)acetic acid **2a** (0.3 mmol, 49.5 mg), $(NH_4)_2S_2O_8$ (0.4 mmol, 91.2 mg) and $AgNO_3$ (0.04 mmol, 6.8 mg) in 2.0 mL DCE-H_2O (1:1, v/v) co-solvent at 90 °C for 4.0 h.

[b] Isolated yield.



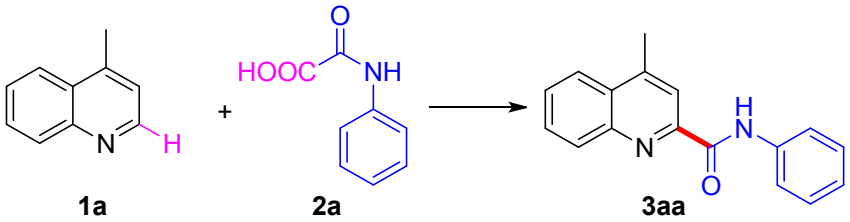
1a **2a** **3aa**

Table S4 Screening the molar ratio of reaction substrates[a]

Entry	The molar ratio of **1a** and **2a**	Yields (%)[b]
1	1:1	63
2	1:1.2	68
3	1:1.5	80
4	1:2	78

[a] Reaction conditions: 4-methyl quinoline **1a** (0.2 mmol, 28.6 mg), 2-oxo-2-(phenylamino)acetic acid **2a**, $(NH_4)_2S_2O_8$ (0.4 mmol, 91.2 mg), $AgNO_3$ (0.04 mmol, 6.8 mg) and TFA (0.2 mmol, 22.8 mg) in 2.0 mL DCE-H_2O (1:1, v/v) co-solvent at 90 °C for 4.0 h.

[b] Isolated yield.



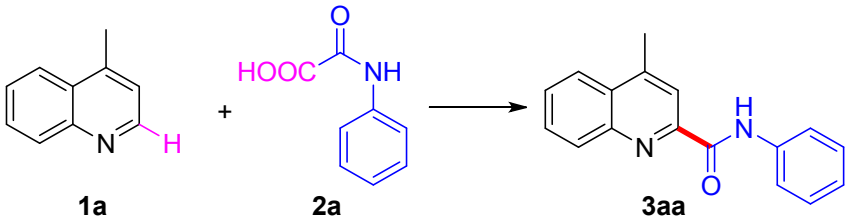
1a **2a** **3aa**

Table S5 Screening the effect of solvents[a]

Entry	Solvents	Yields (%)[b]
1	H_2O	0
2	CH_3CN	0
3	DMF	65
4	DCE	0
5	DMSO	0
6	CH_3CN:H_2O = 1:1	76
7	DMSO:H_2O = 1:1	78
8	DCE:H_2O = 1:1	80

[a] Reaction conditions: 4-methyl quinoline **1a** (0.2 mmol, 28.6 mg), 2-oxo-2-(phenylamino)acetic acid **2a** (0.3 mmol, 49.5 mg), $(NH_4)_2S_2O_8$ (0.4 mmol, 91.2 mg), $AgNO_3$ (0.04 mmol, 6.8 mg) and TFA (0.2 mmol, 22.8 mg) in 2.0 mL solvent at 90 ^oC for 4.0 h.

[b] Isolated yield.



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

Table S6 Screening the reaction time[a]

Entry	Time (h)	Yields (%)[b]
1	1.0	62
2	1.5	73
3	2.0	78
4	3.0	84
5	4.0	84

[a] Reaction conditions: 4-methyl quinoline **1a** (0.2 mmol, 28.6 mg), 2-oxo-2-(phenylamino)acetic acid **2a** (0.3 mmol, 49.5 mg), $(NH_4)_2S_2O_8$ (0.4 mmol, 91.2 mg), $AgNO_3$ (0.04 mmol, 6.8 mg) and TFA (0.2 mmol, 22.8 mg) in 2.0 mL DCE-H_2O (1:1, v/v) co-solvent at 70 °C.

[b] Isolated yield.

2. Copies of spectra of products

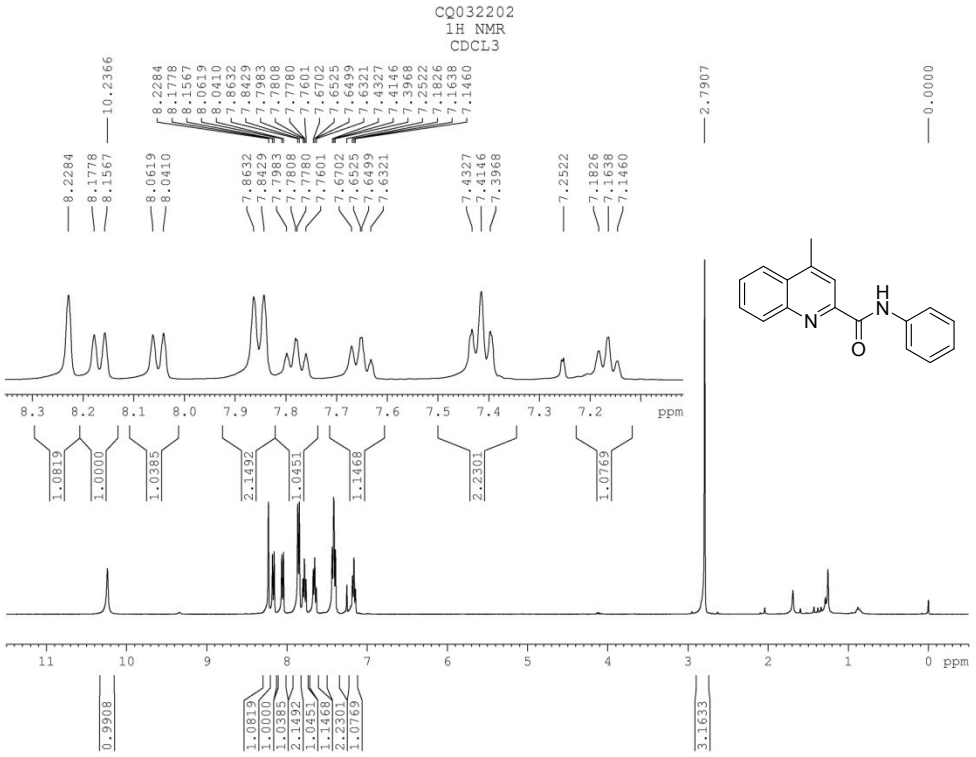


Fig. 1 ^{1}H NMR spectrum of compound **3aa**

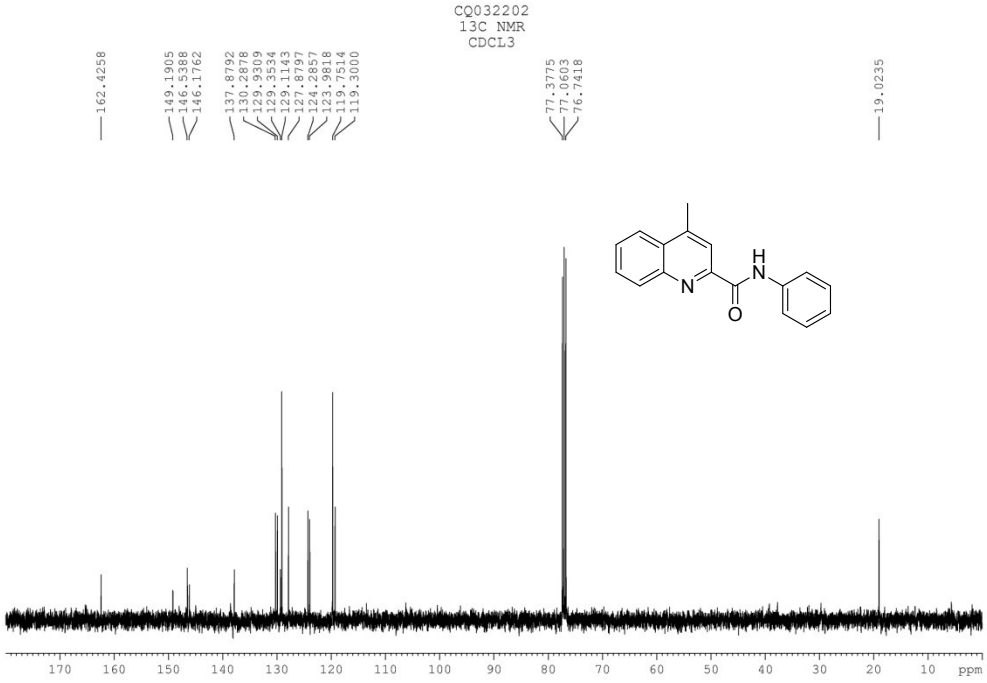


Fig. 2 ^{13}C NMR spectrum of compound **3aa**

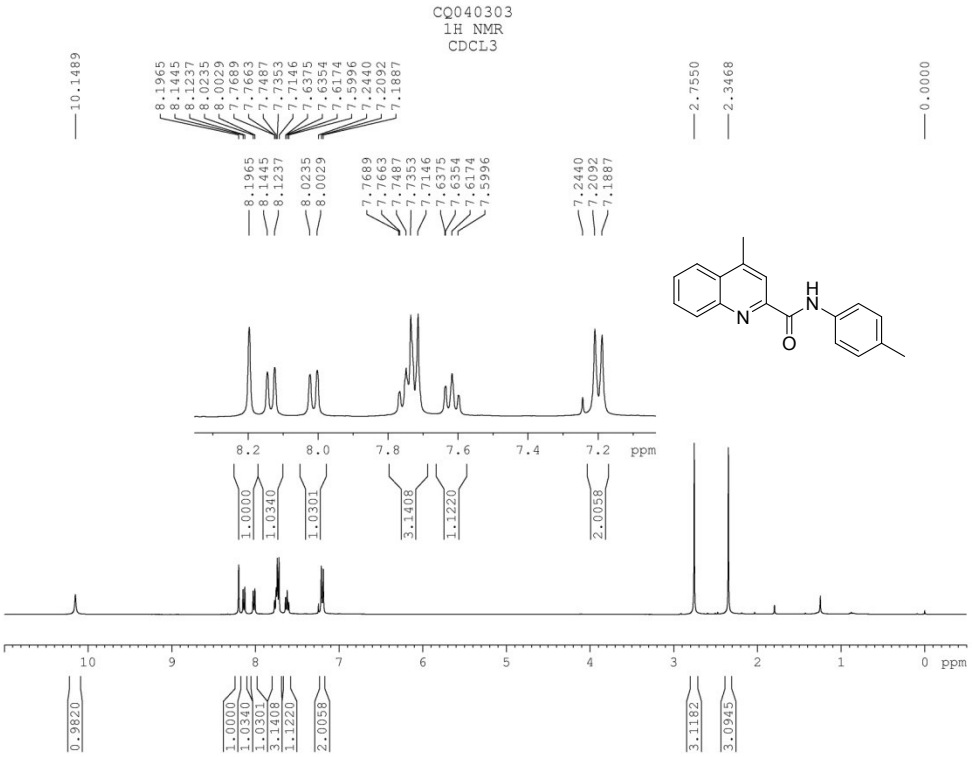


Fig. 3 ^{1}H NMR spectrum of compound **3ab**

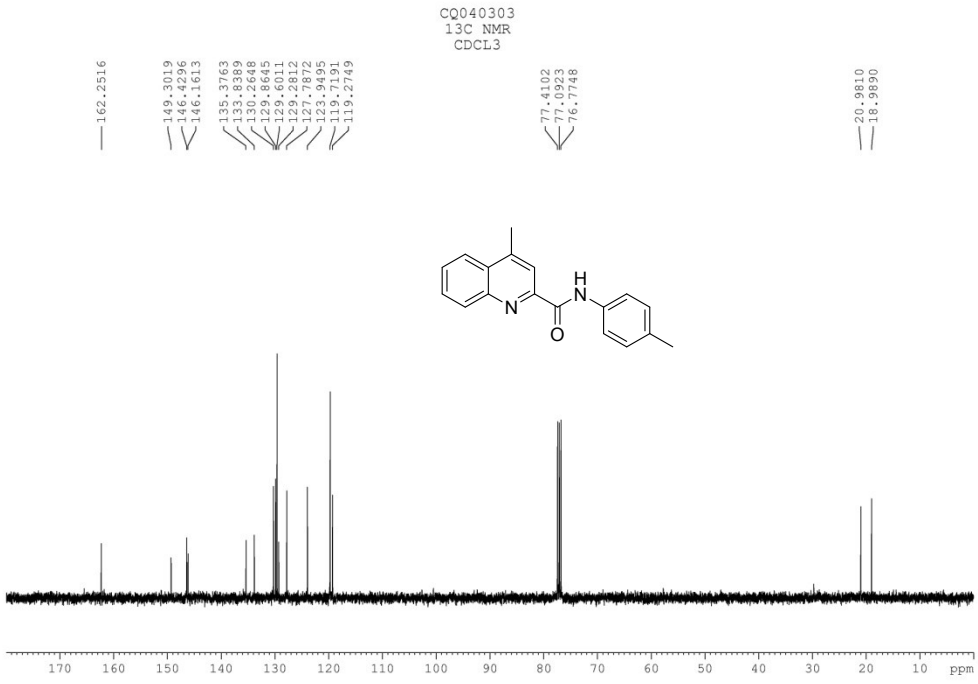


Fig. 4 ^{13}C NMR spectrum of compound **3ab**

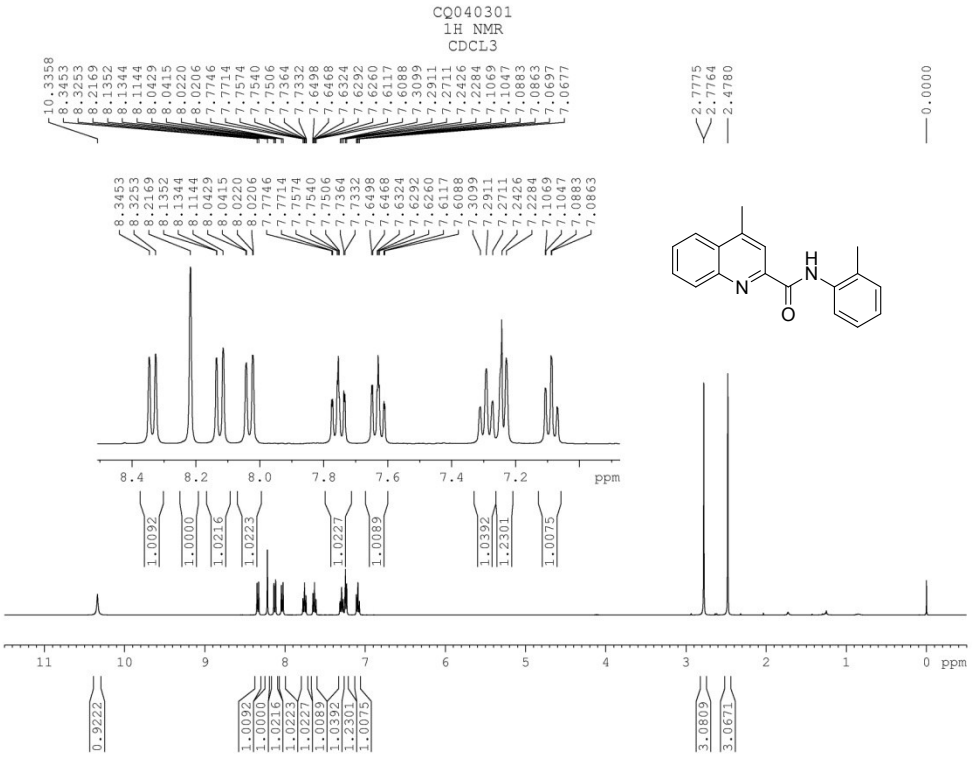


Fig. 5 ^{1}H NMR spectrum of compound **3ac**

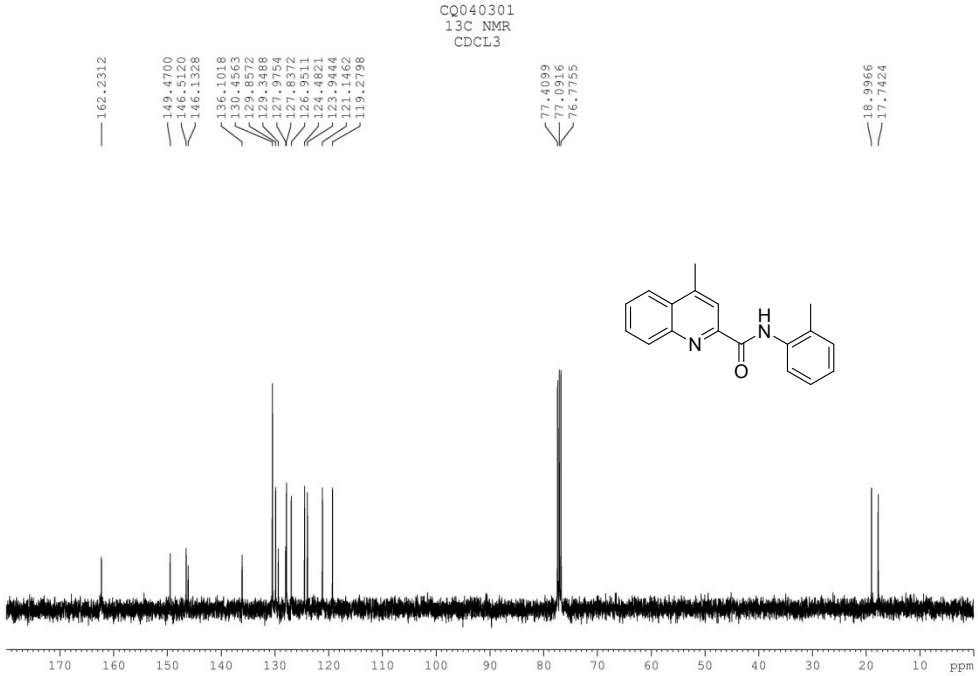


Fig. 6 ^{13}C NMR spectrum of compound **3ac**

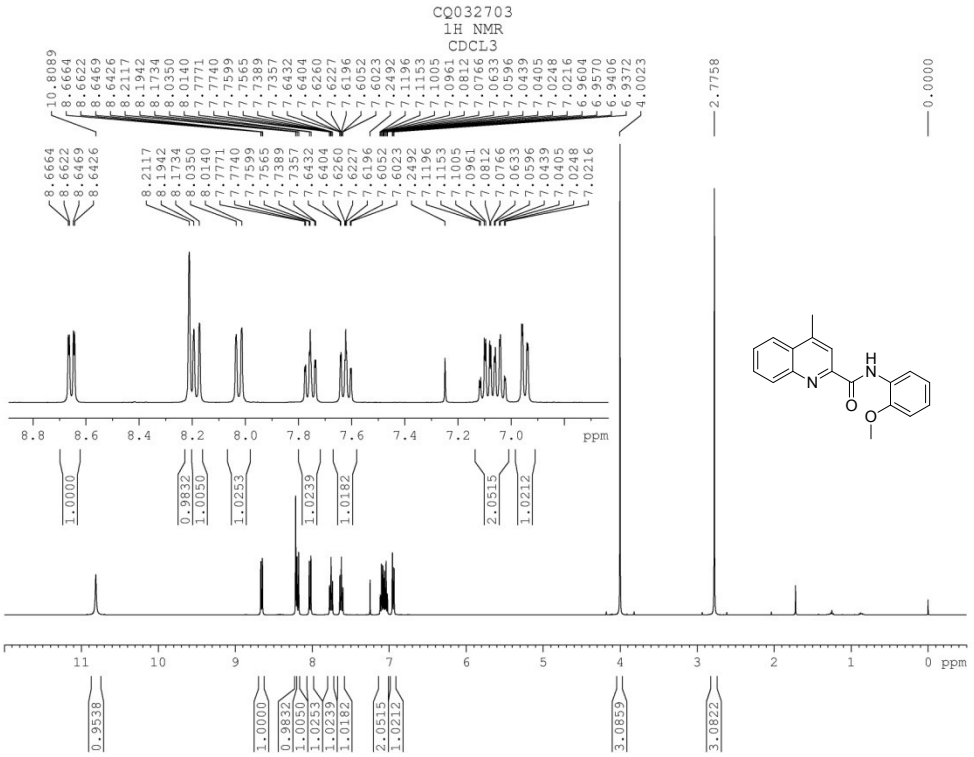


Fig. 7 ^{1}H NMR spectrum of compound **3ad**

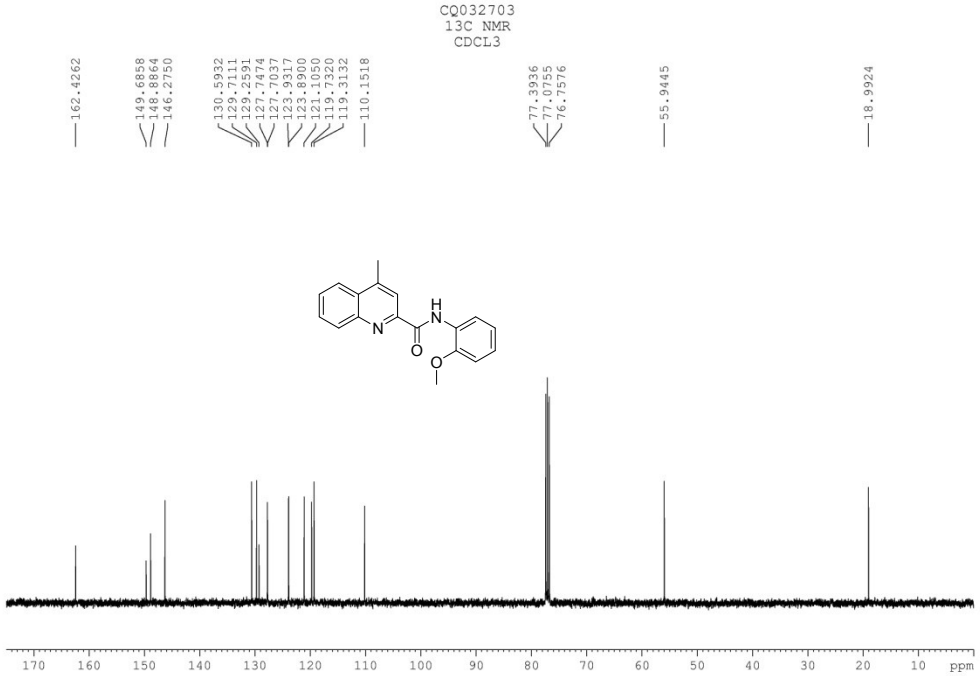


Fig. 8 ^{13}C NMR spectrum of compound **3ad**

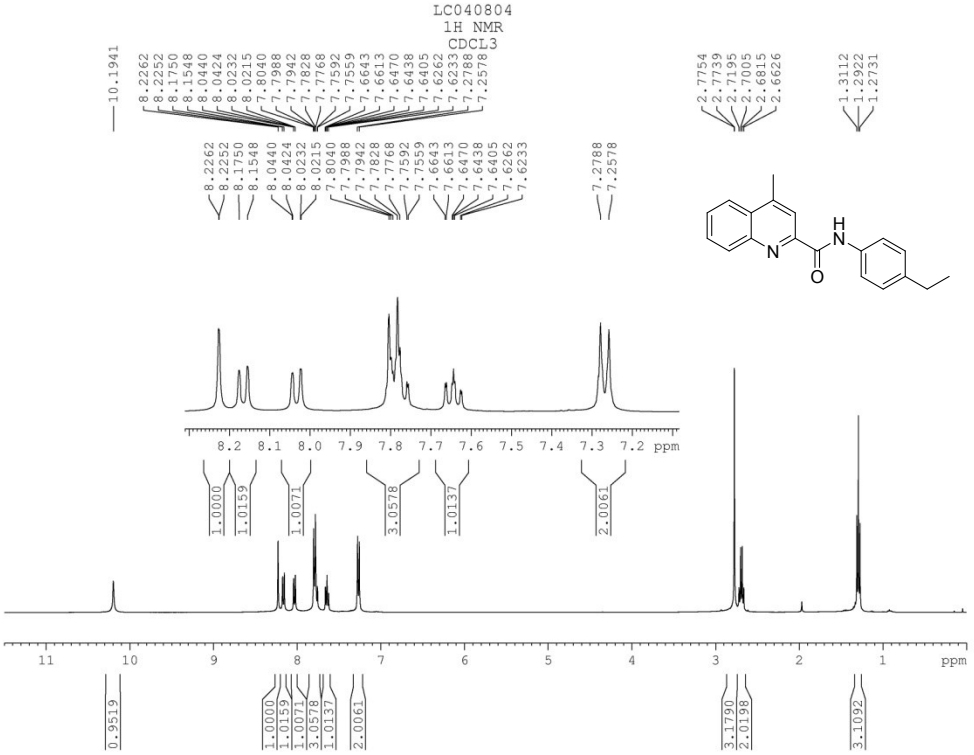


Fig. 9 ^{1}H NMR spectrum of compound **3ae**

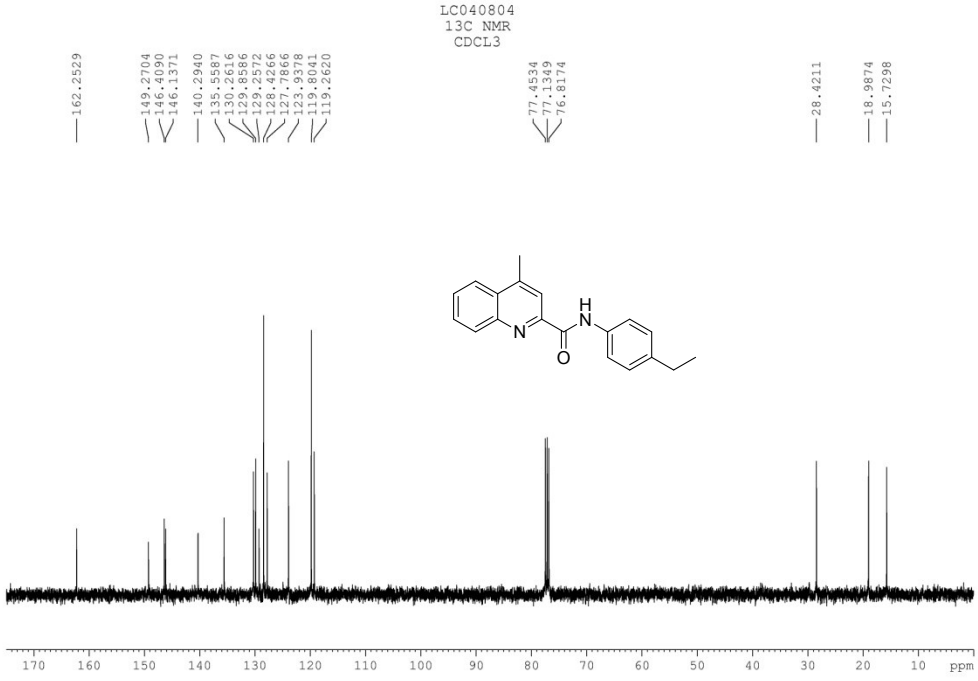


Fig. 10 ^{13}C NMR spectrum of compound **3ae**

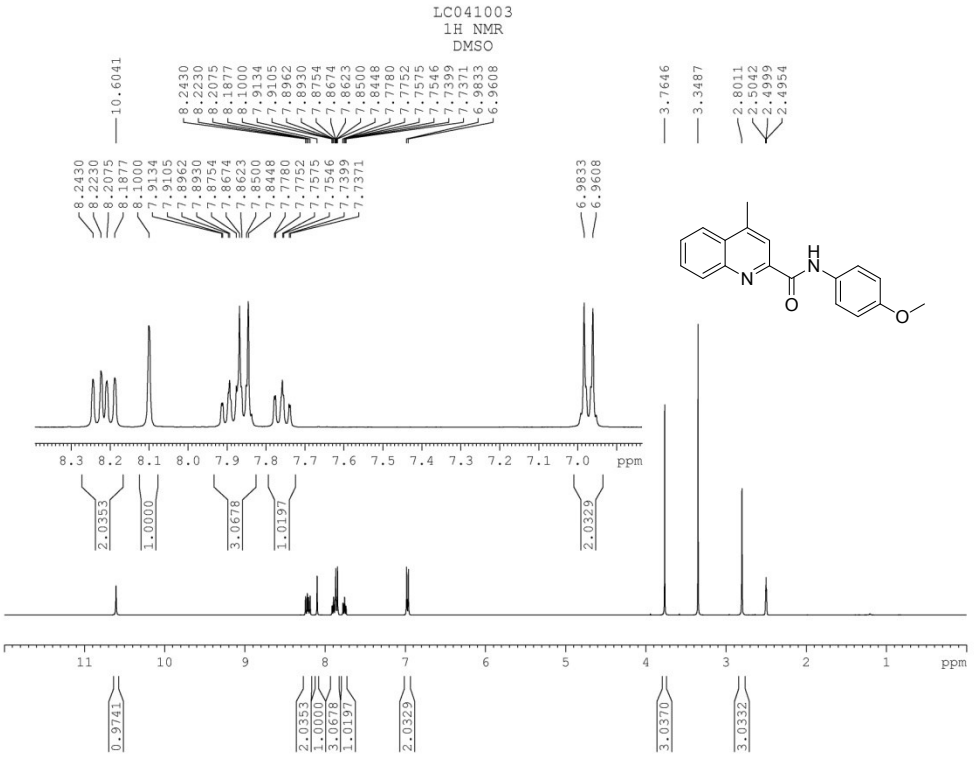


Fig. 11 ^{1}H NMR spectrum of compound **3af**

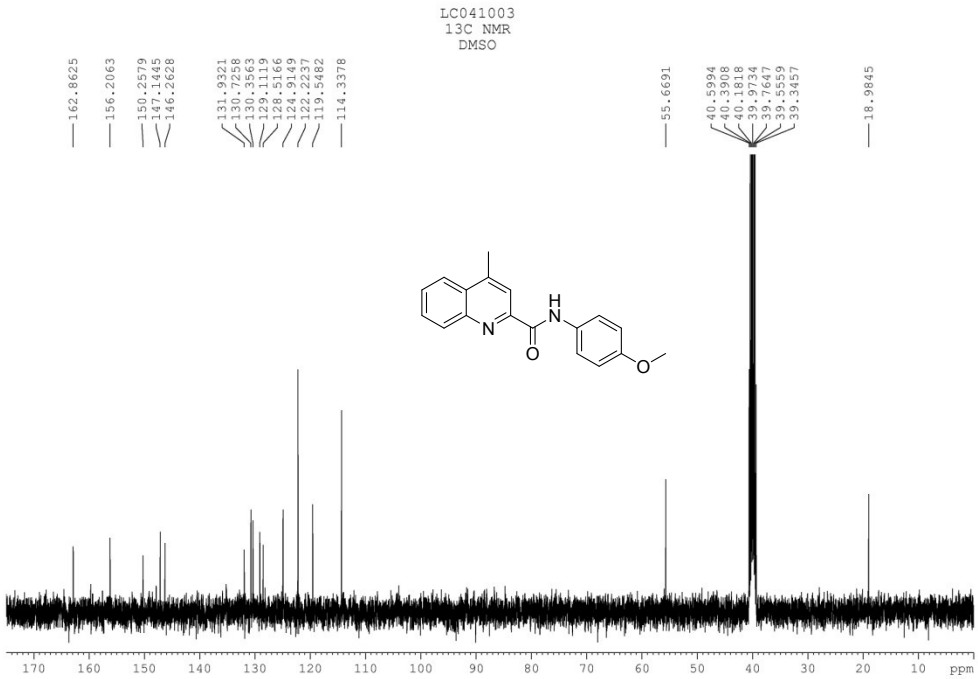


Fig. 12 ^{13}C NMR spectrum of compound **3af**

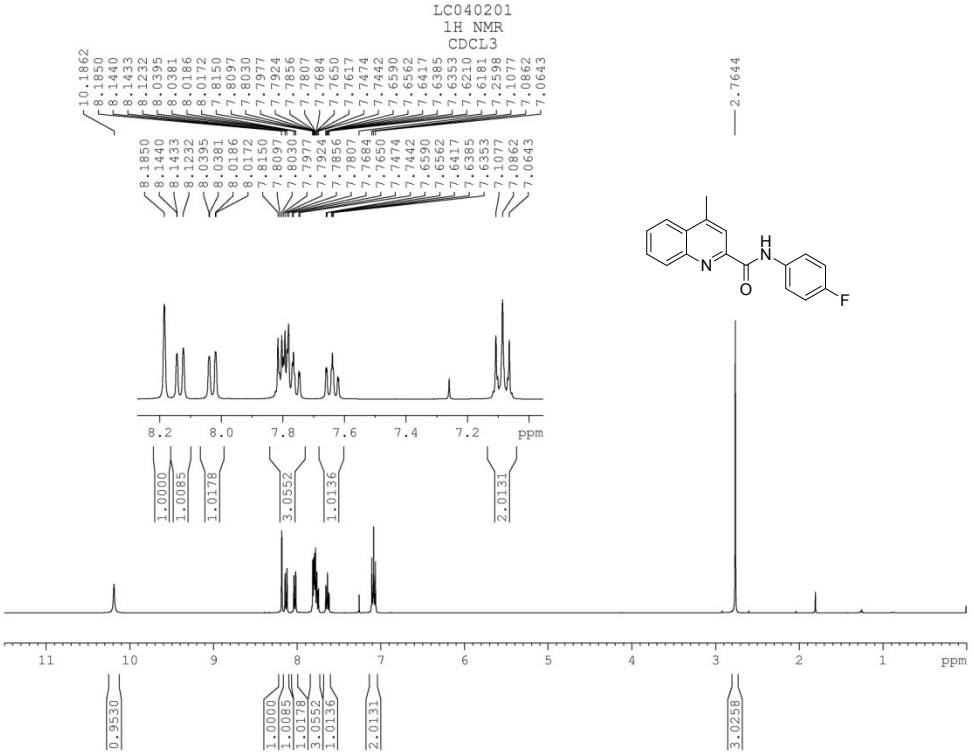


Fig. 13 ^{1}H NMR spectrum of compound **3ag**

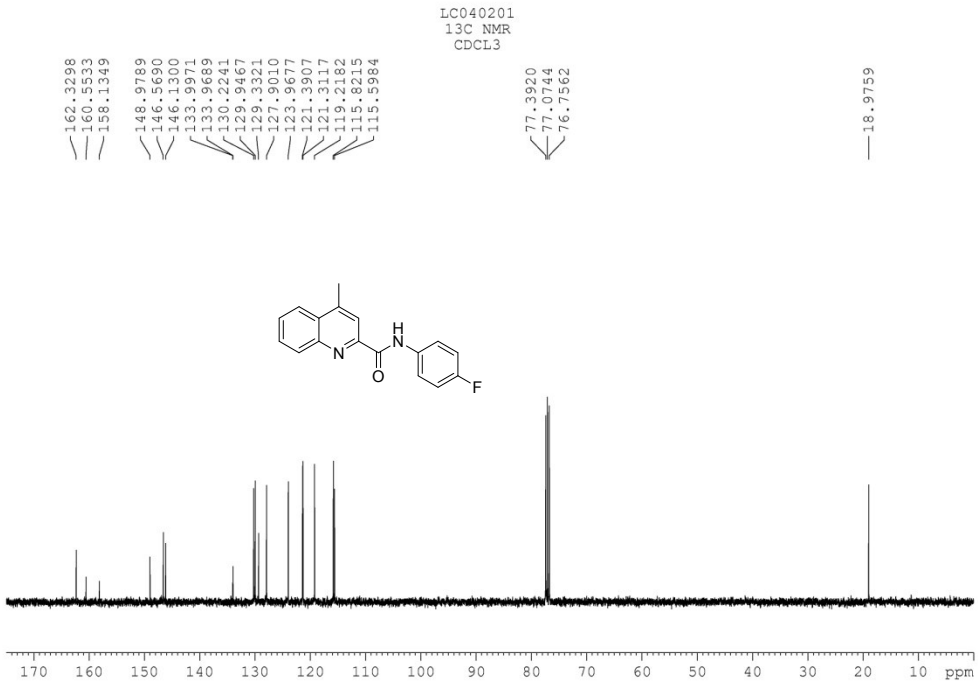


Fig. 14 ^{13}C NMR spectrum of compound **3ag**

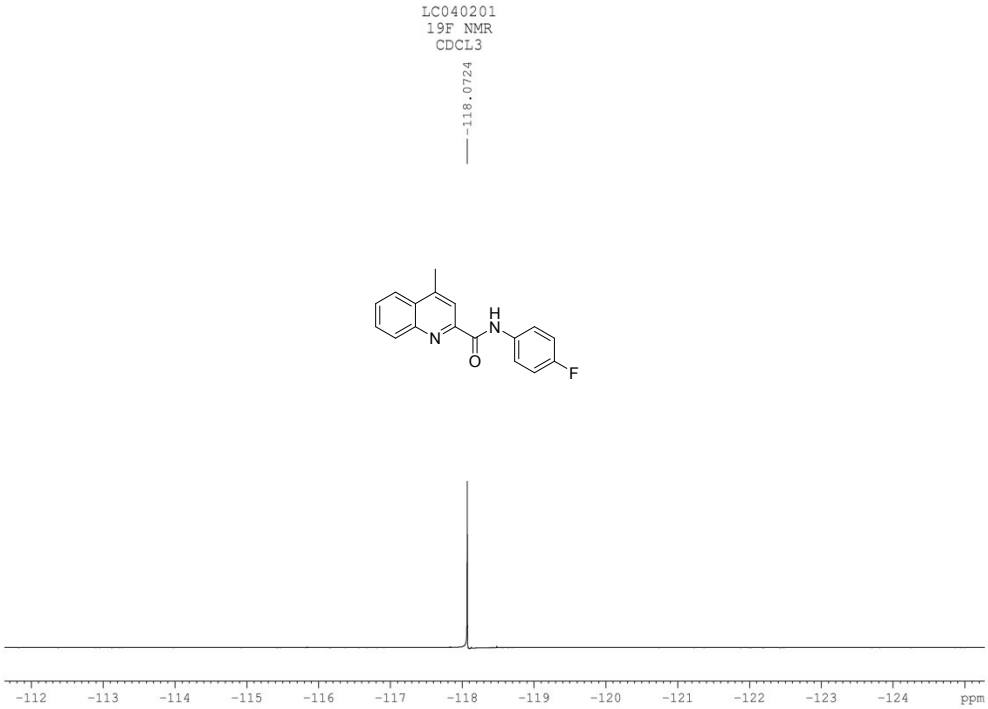


Fig. 15 ^{19}F NMR spectrum of compound **3ag**

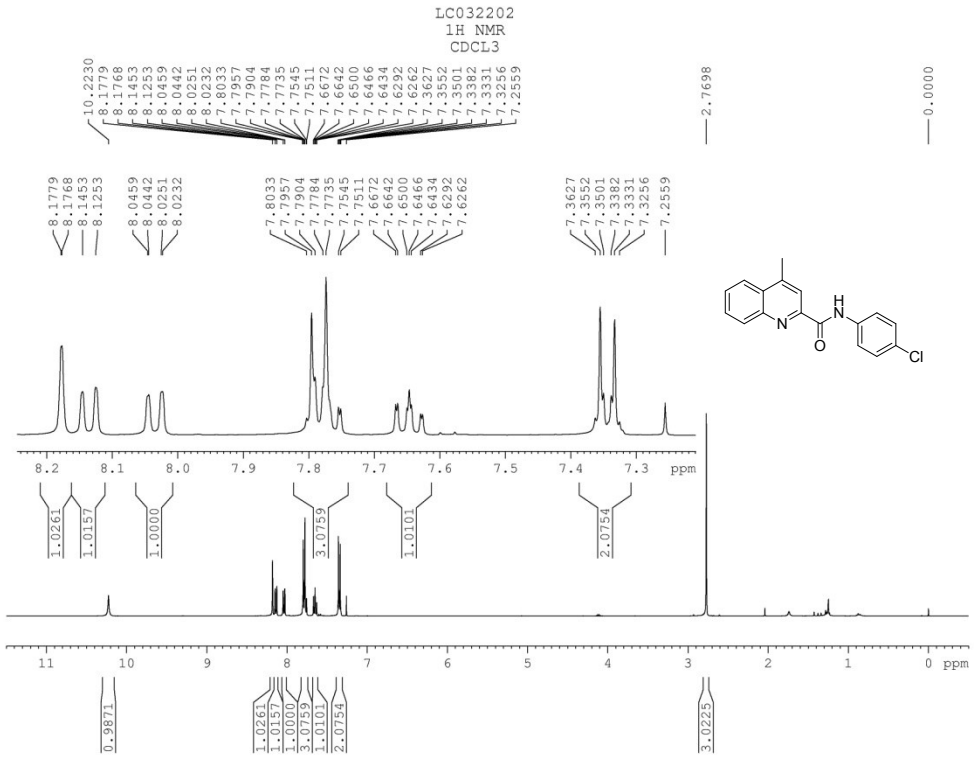


Fig. 16 ^{1}H NMR spectrum of compound **3ah**

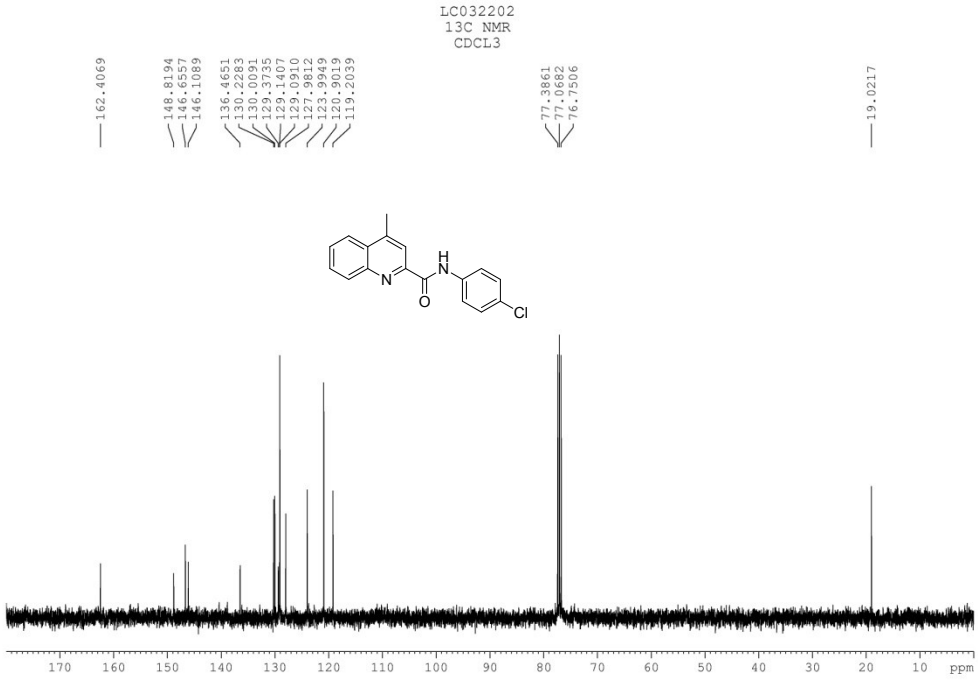


Fig. 17 ^{13}C NMR spectrum of compound **3ah**

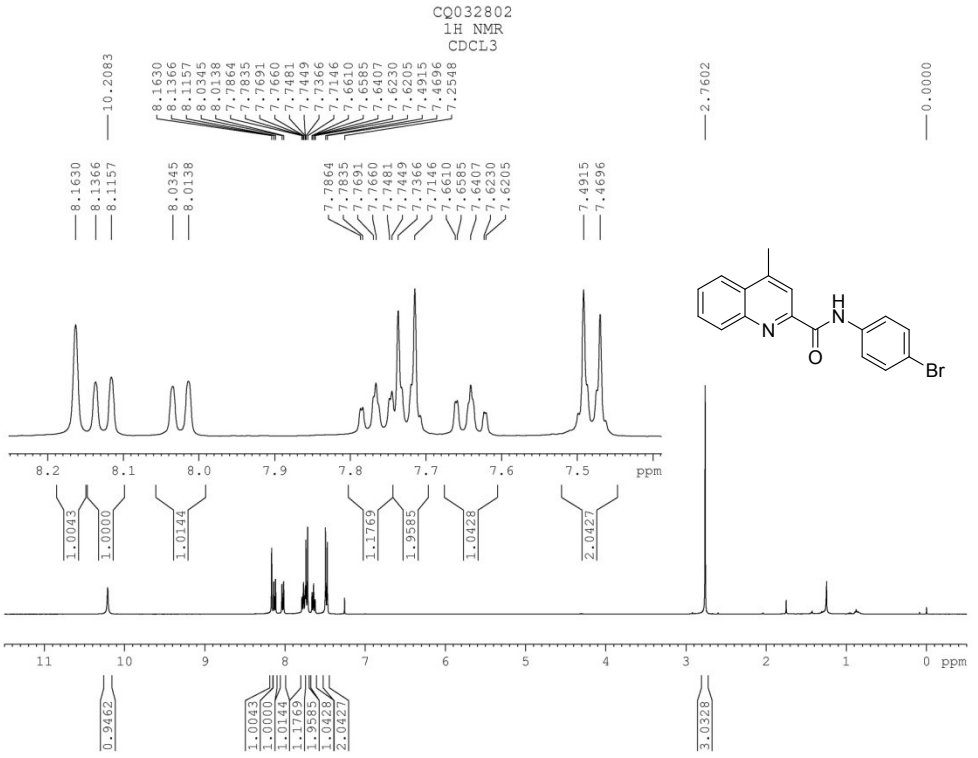


Fig. 18 ^{1}H NMR spectrum of compound **3ai**

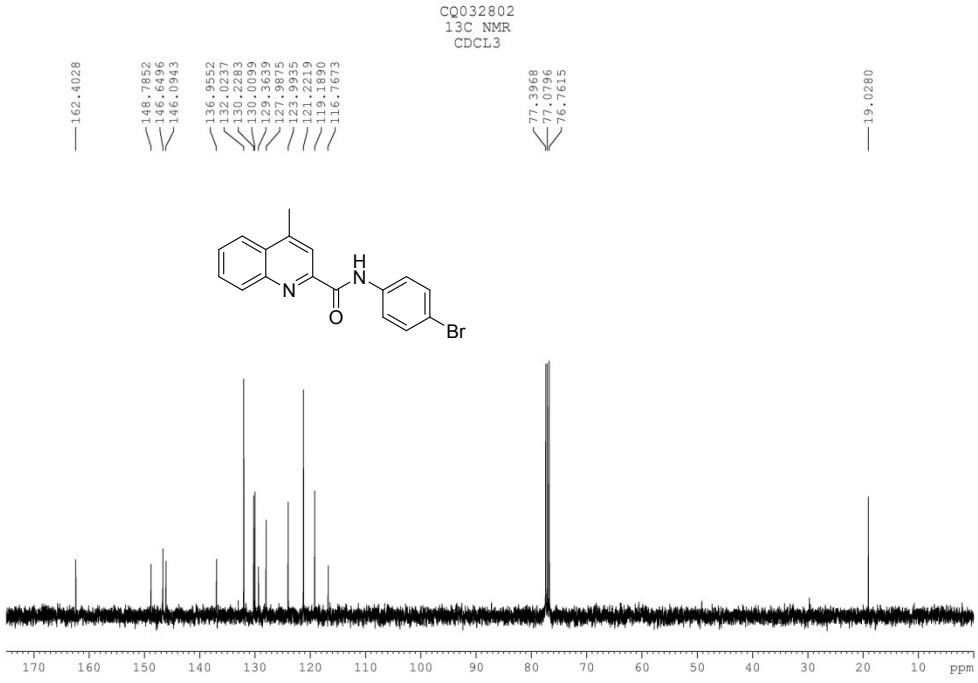


Fig. 19 ^{13}C NMR spectrum of compound **3ai**

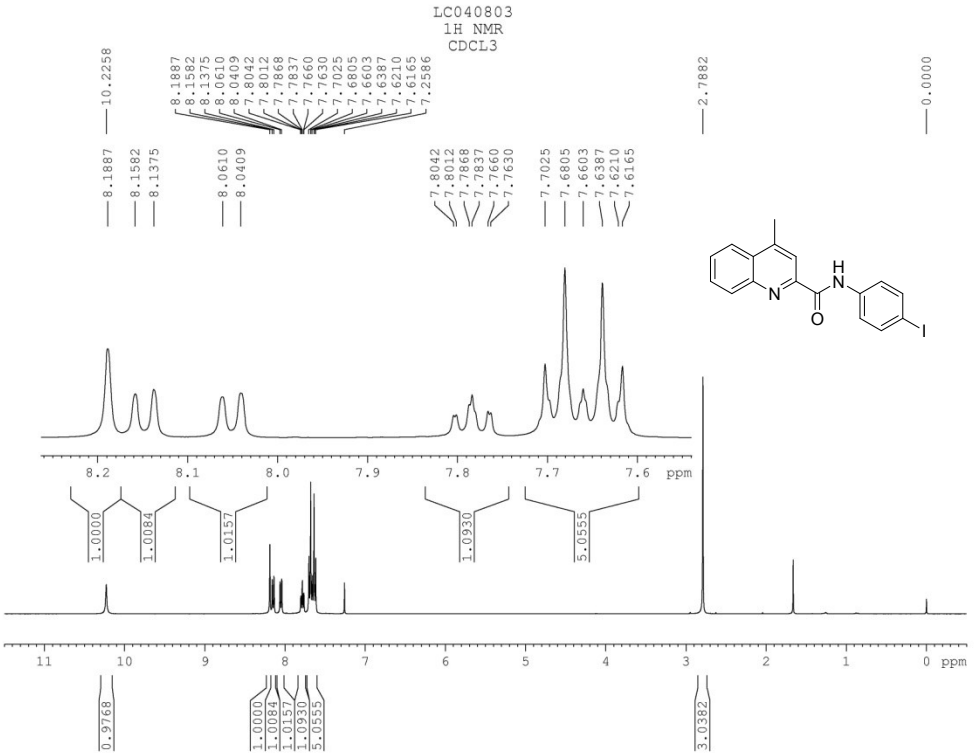


Fig. 20 ^{1}H NMR spectrum of compound **3aj**

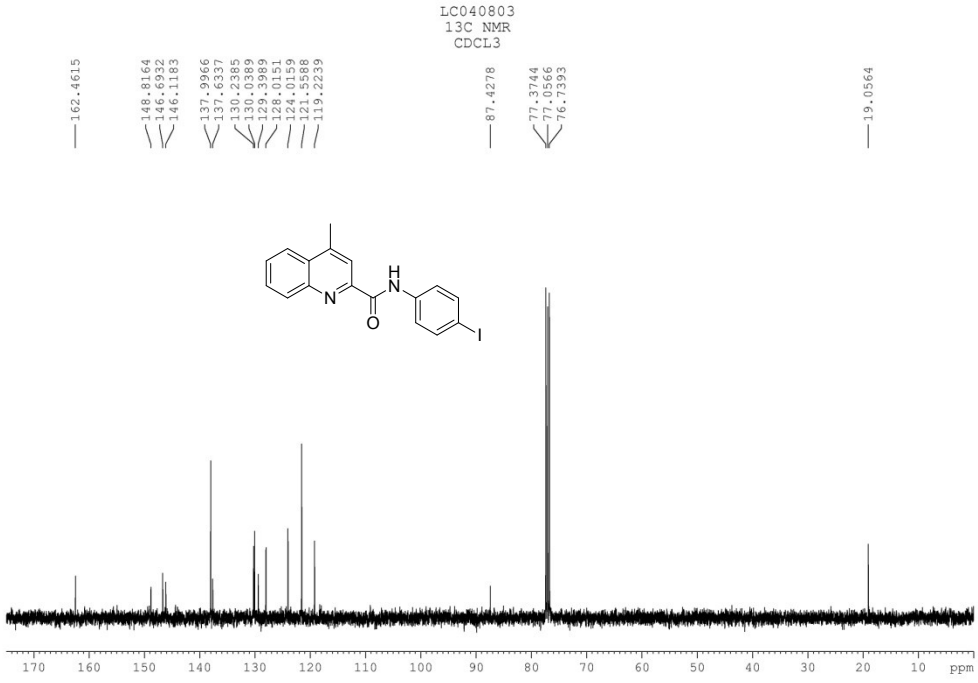


Fig. 21 ^{13}C NMR spectrum of compound **3aj**

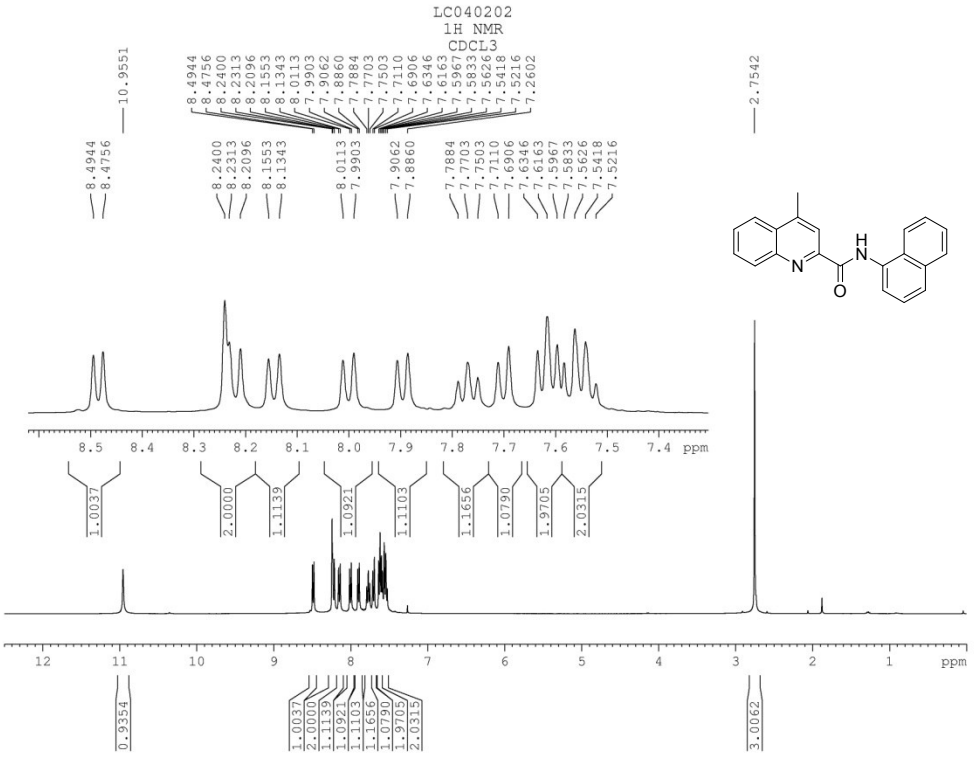


Fig. 22 ^{1}H NMR spectrum of compound **3ak**

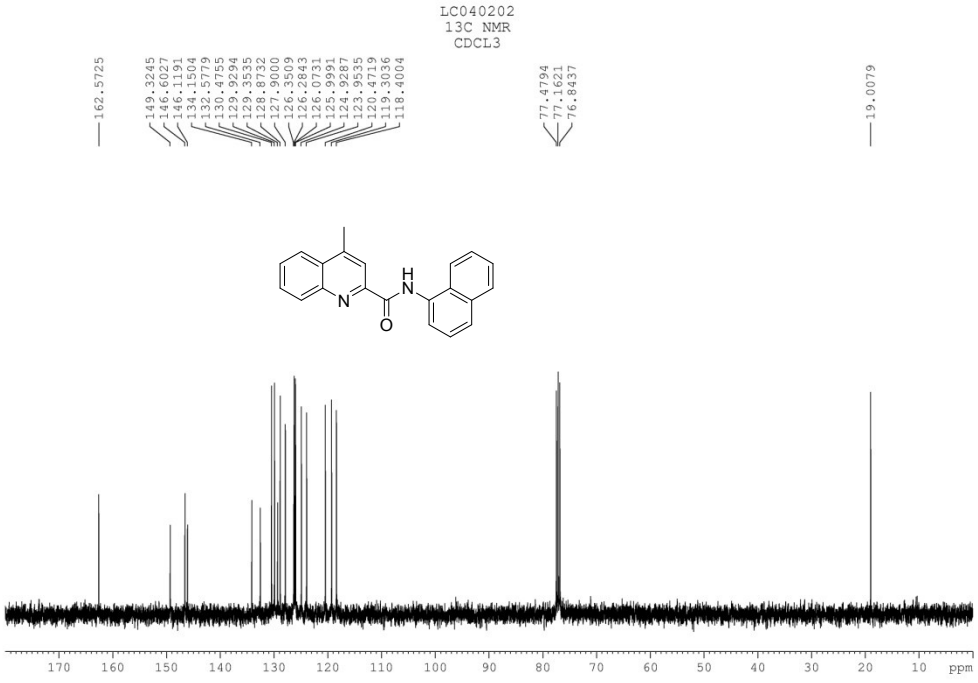


Fig. 23 ^{13}C NMR spectrum of compound **3ak**

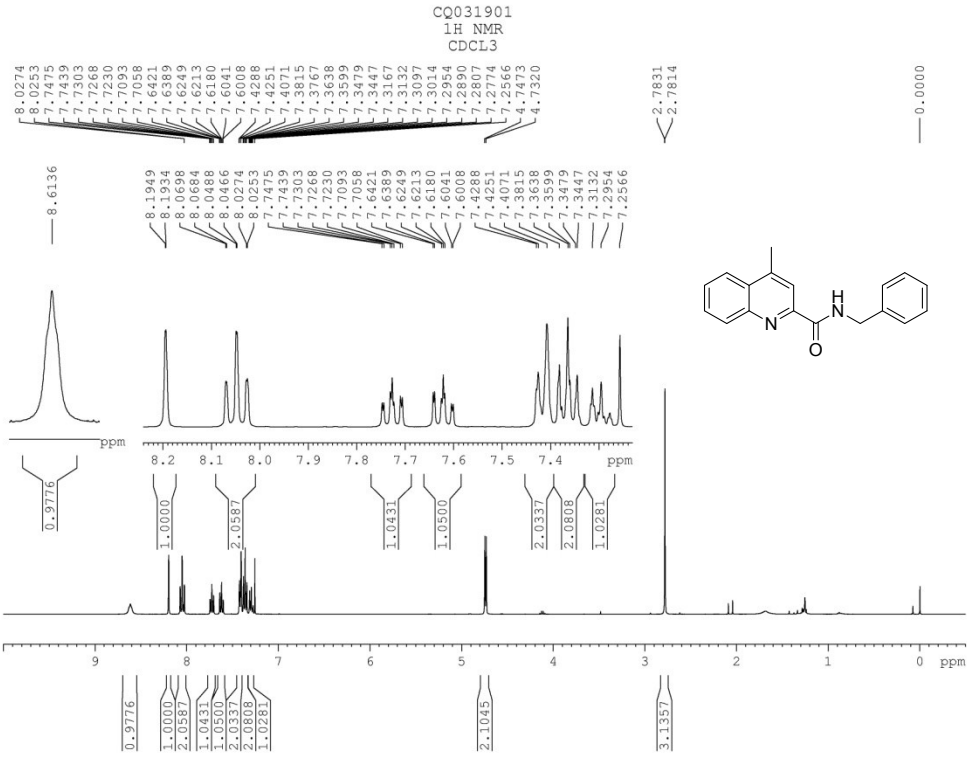


Fig. 24 ^{1}H NMR spectrum of compound **3al**

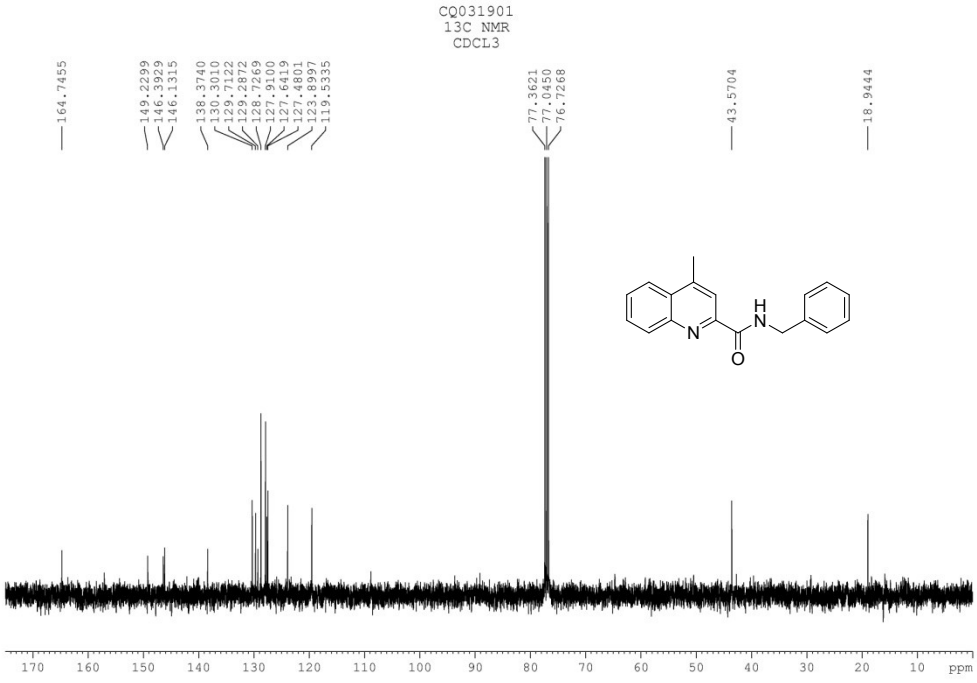


Fig. 25 ^{13}C NMR spectrum of compound **3al**

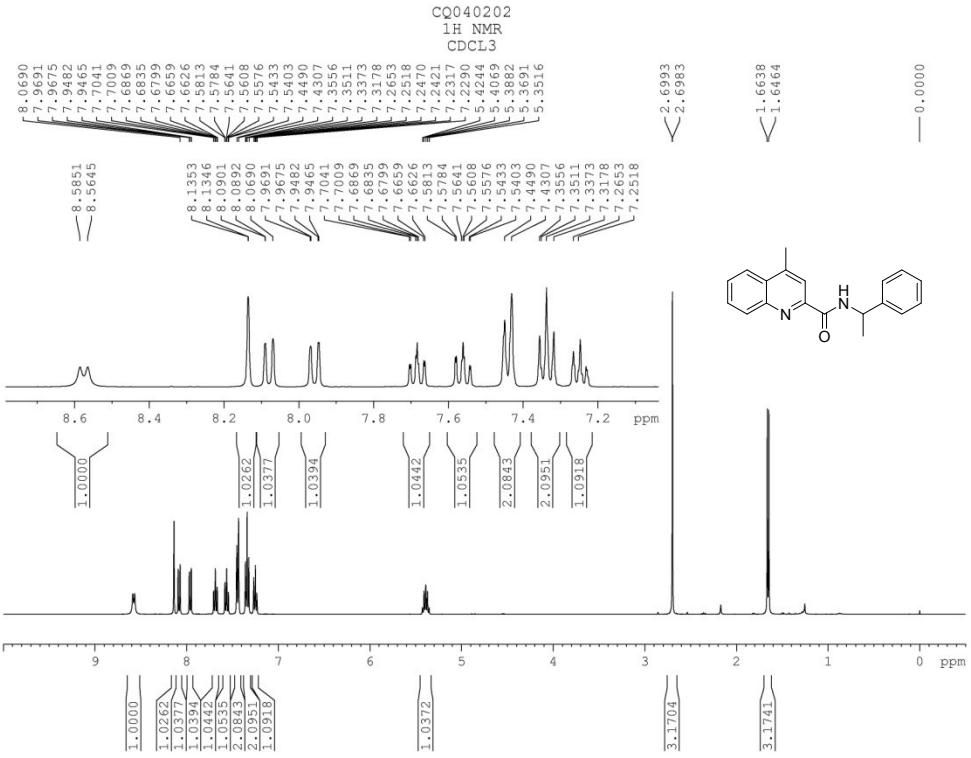


Fig. 26 ^{1}H NMR spectrum of compound **3am**

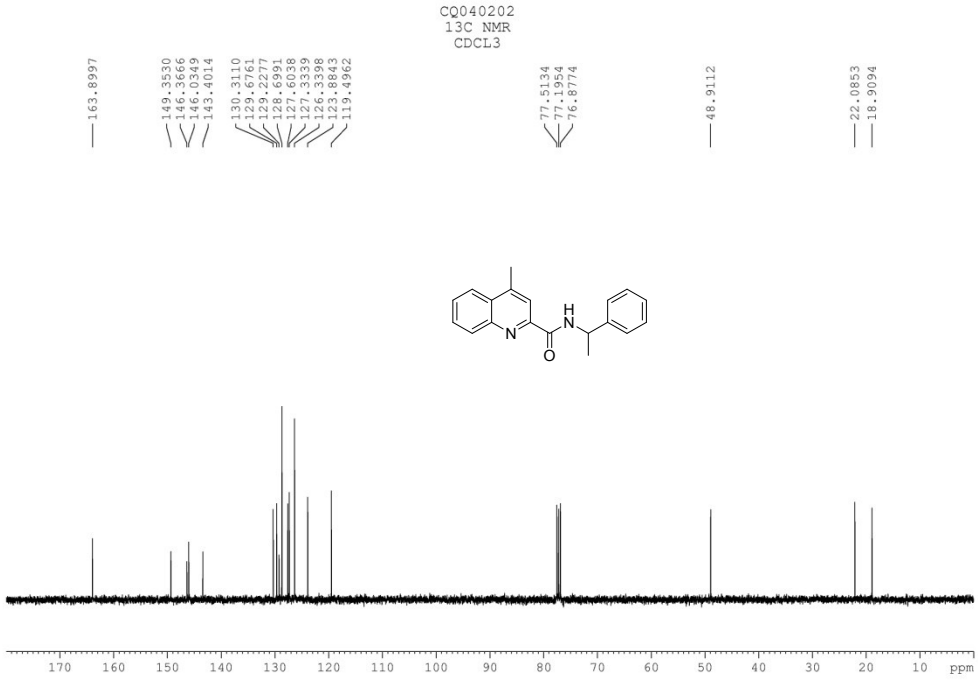


Fig. 27 ^{13}C NMR spectrum of compound **3am**

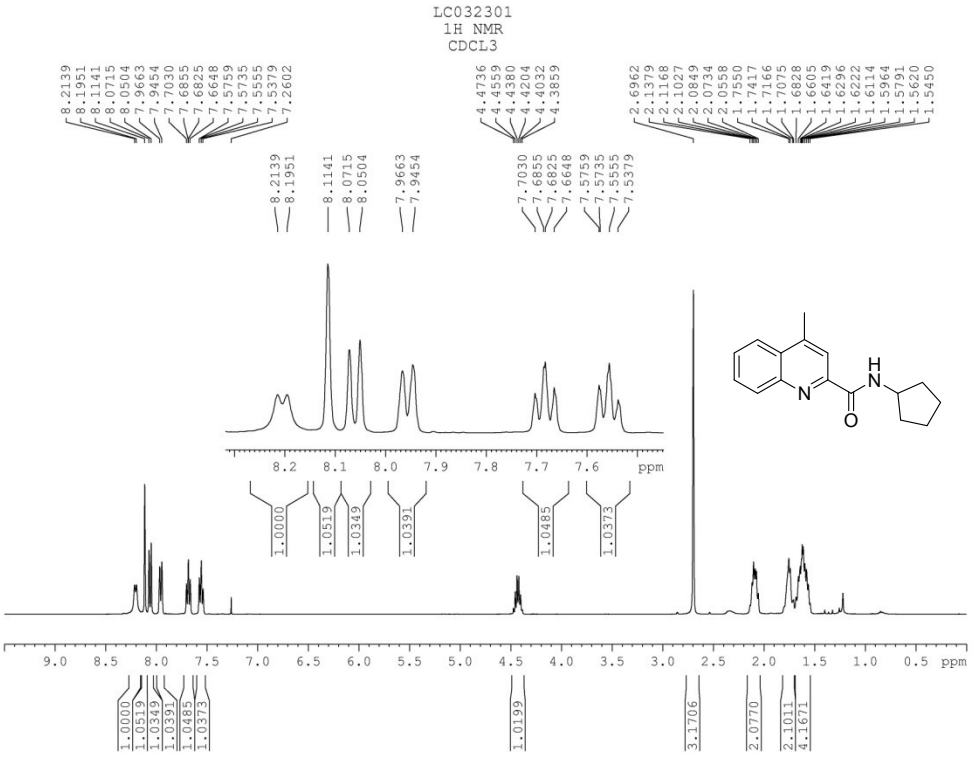


Fig. 28 ^{1}H NMR spectrum of compound **3an**

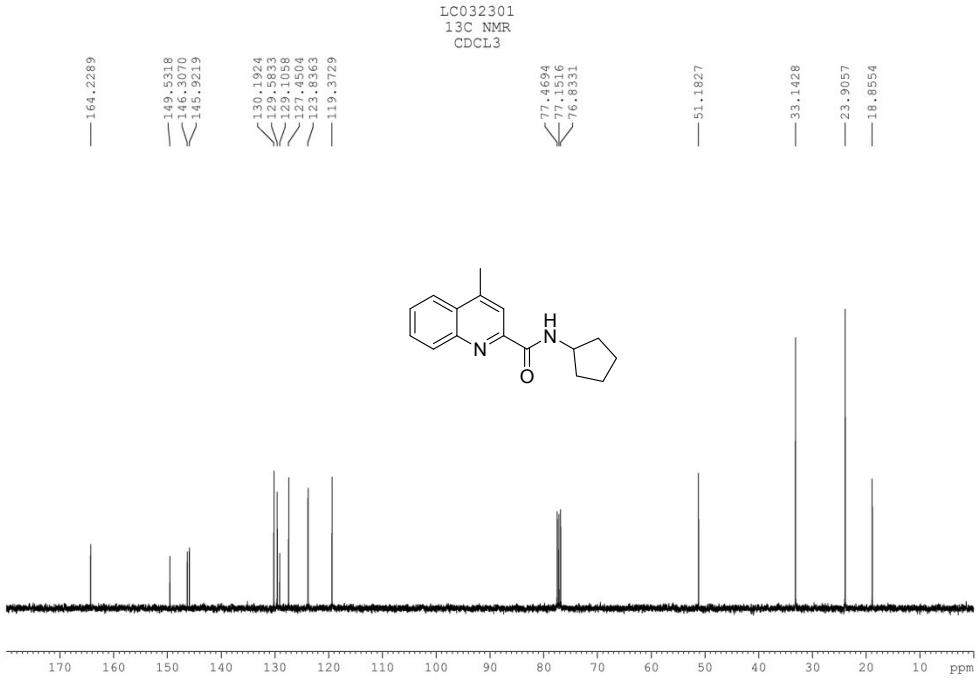


Fig. 29 ^{13}C NMR spectrum of compound **3an**

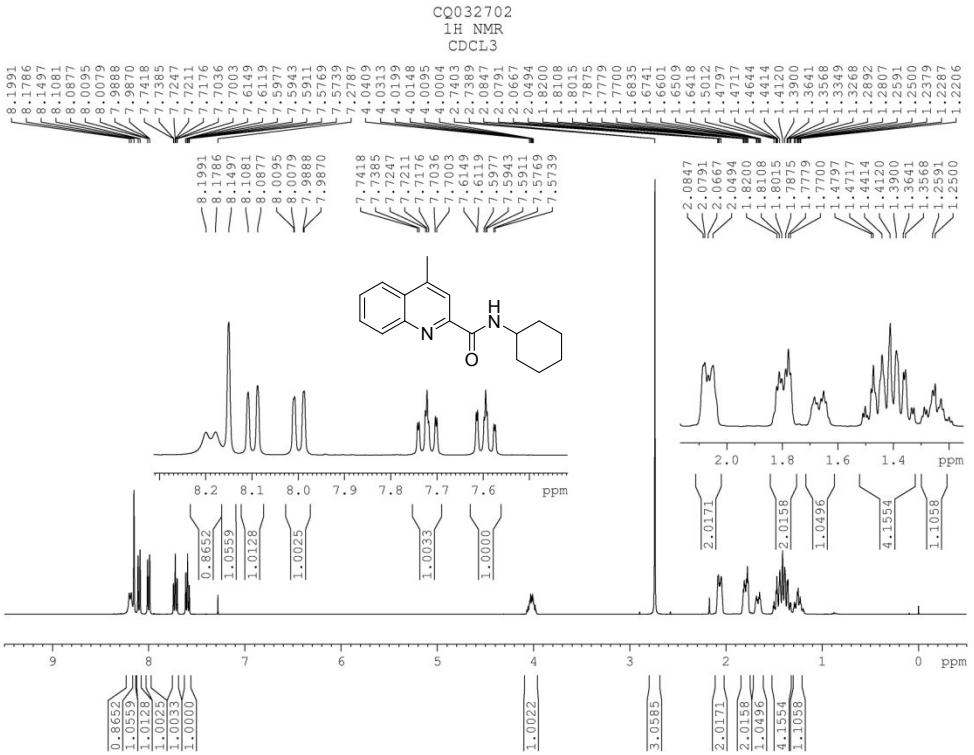


Fig. 30 ^{1}H NMR spectrum of compound **3ao**

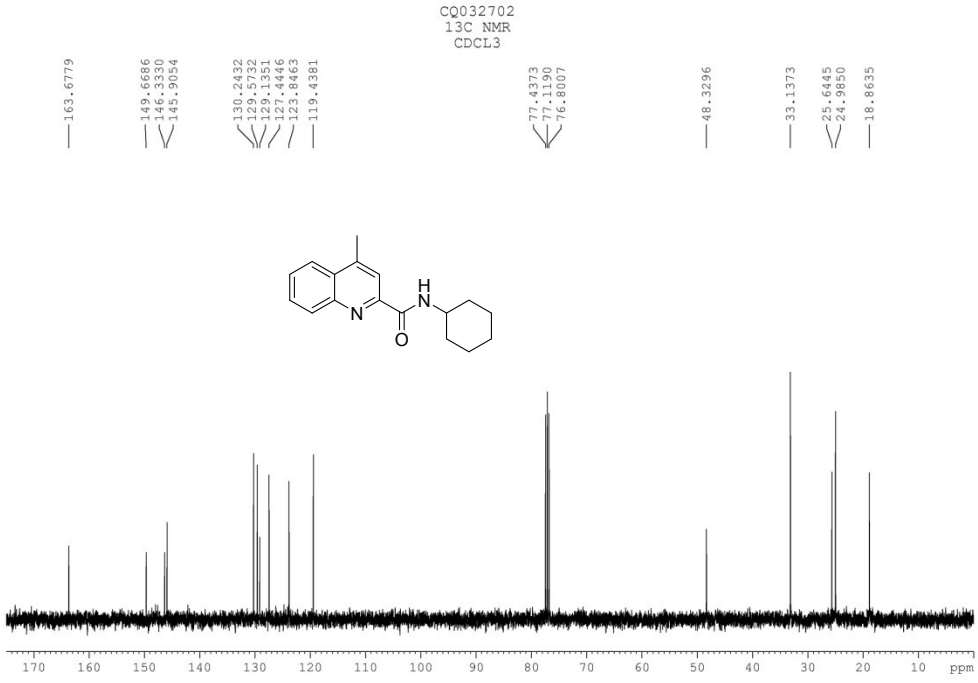


Fig. 31 ^{13}C NMR spectrum of compound **3ao**

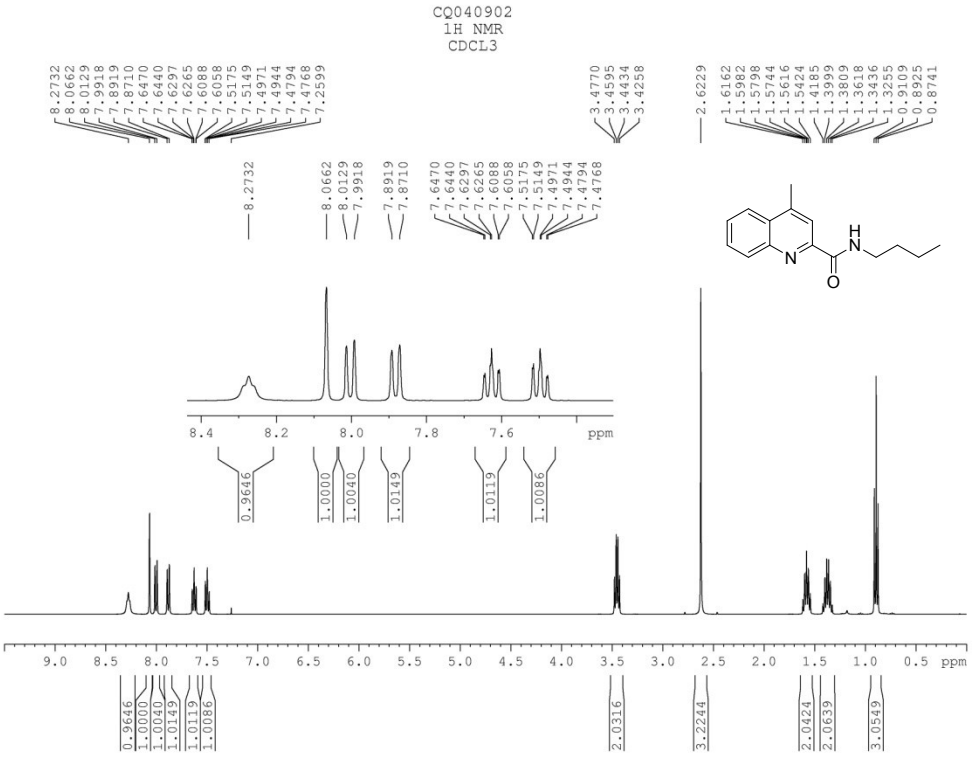


Fig. 32 ^{1}H NMR spectrum of compound **3ap**

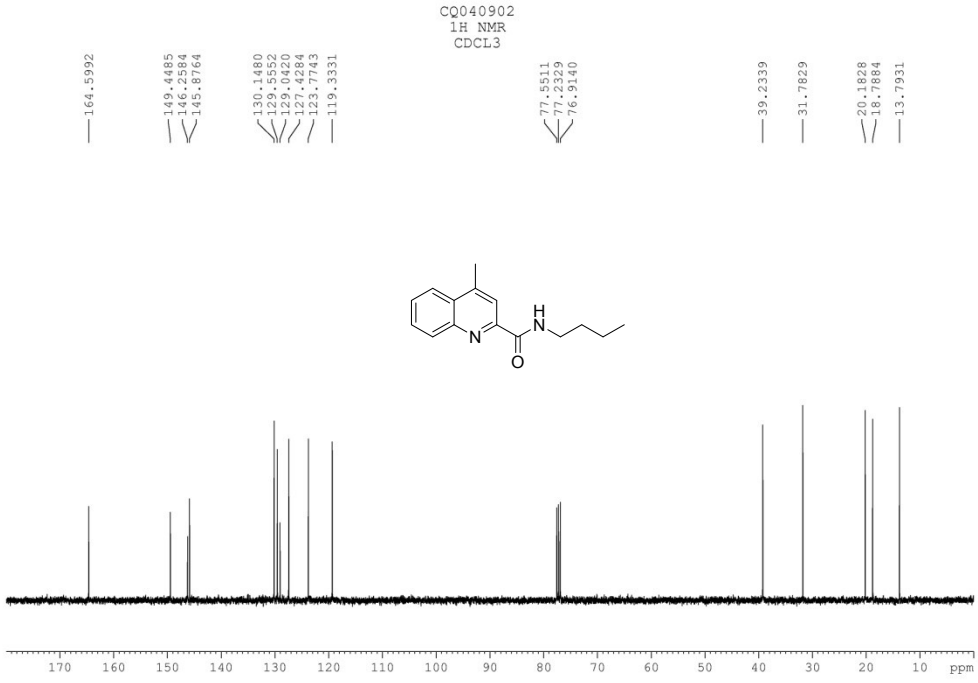


Fig. 33 ^{13}C NMR spectrum of compound **3ap**

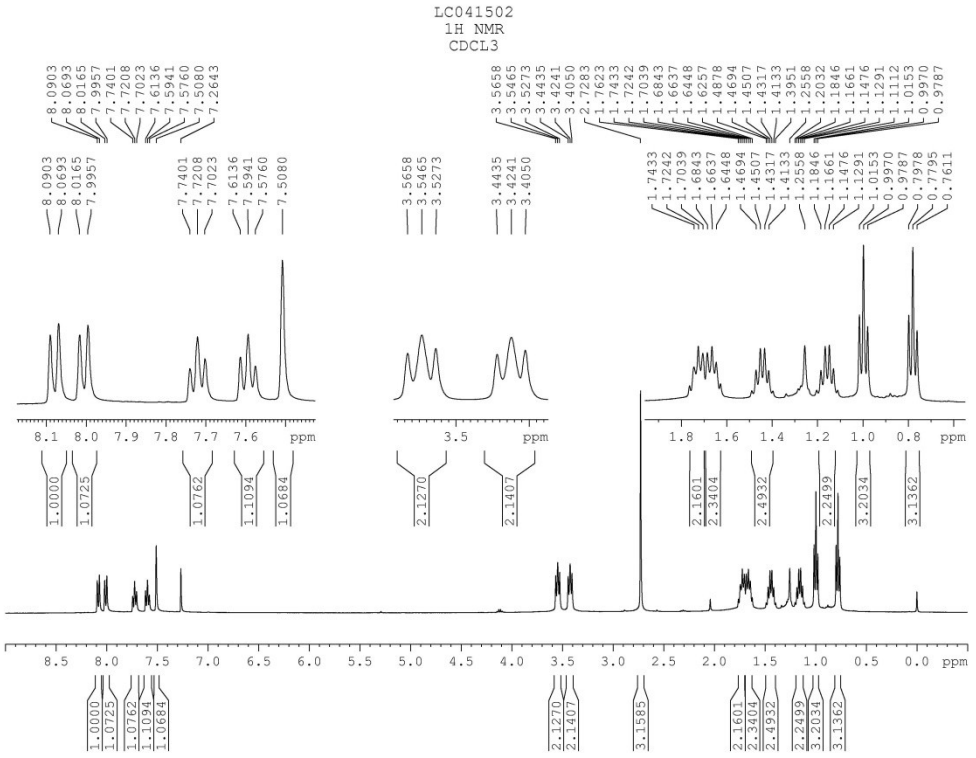


Fig. 34 ^{1}H NMR spectrum of compound **3aq**

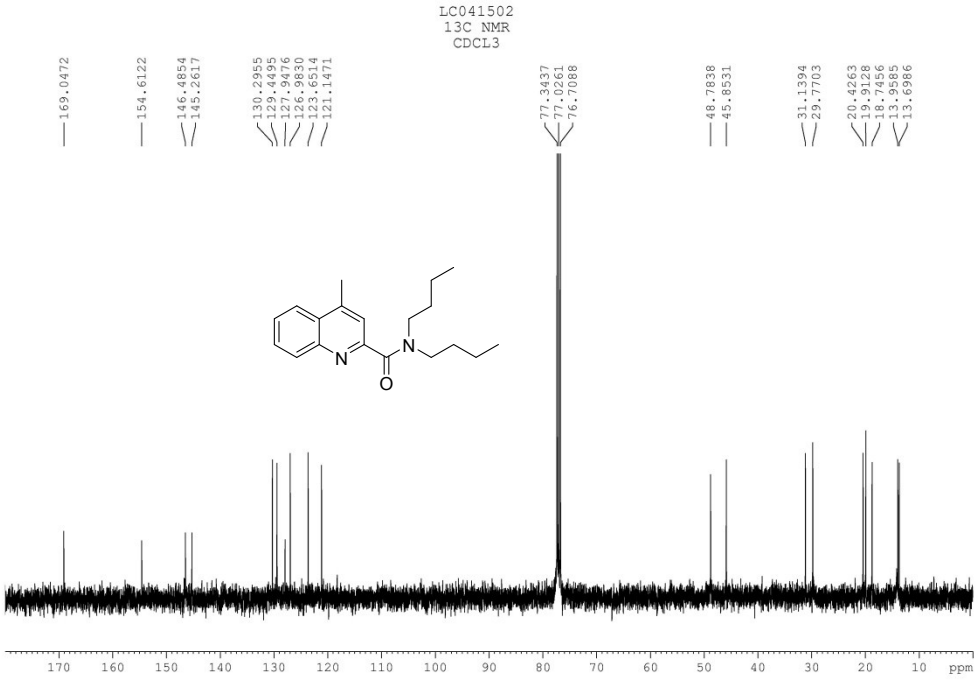


Fig. 35 ^{13}C NMR spectrum of compound **3aq**

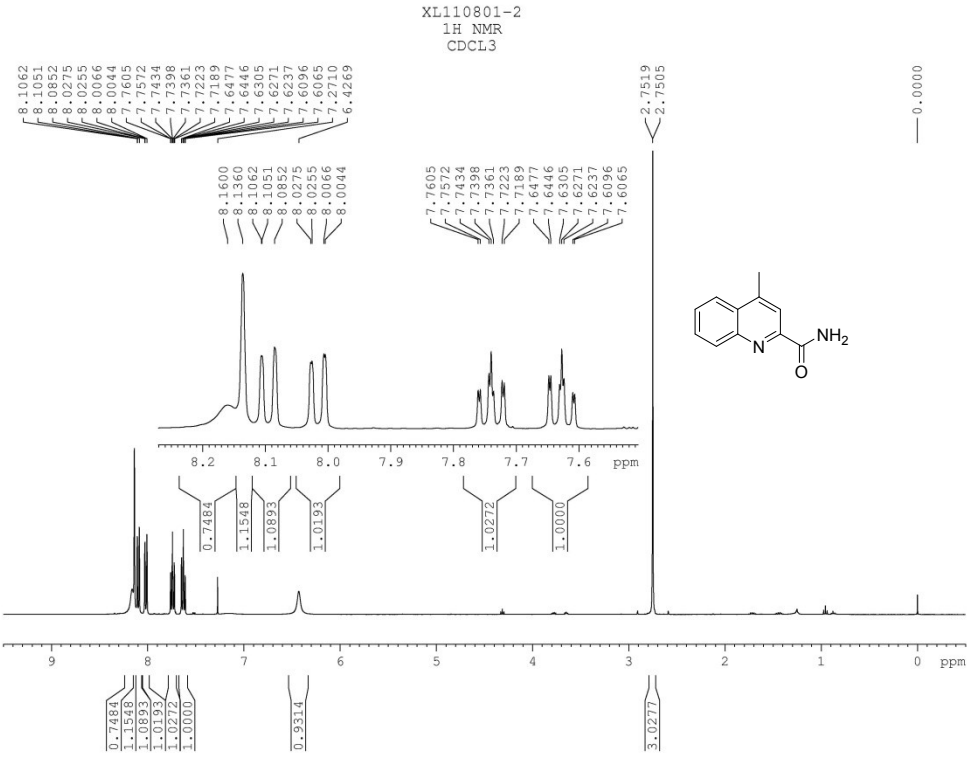


Fig. 36 ^{1}H NMR spectrum of compound **3ar**

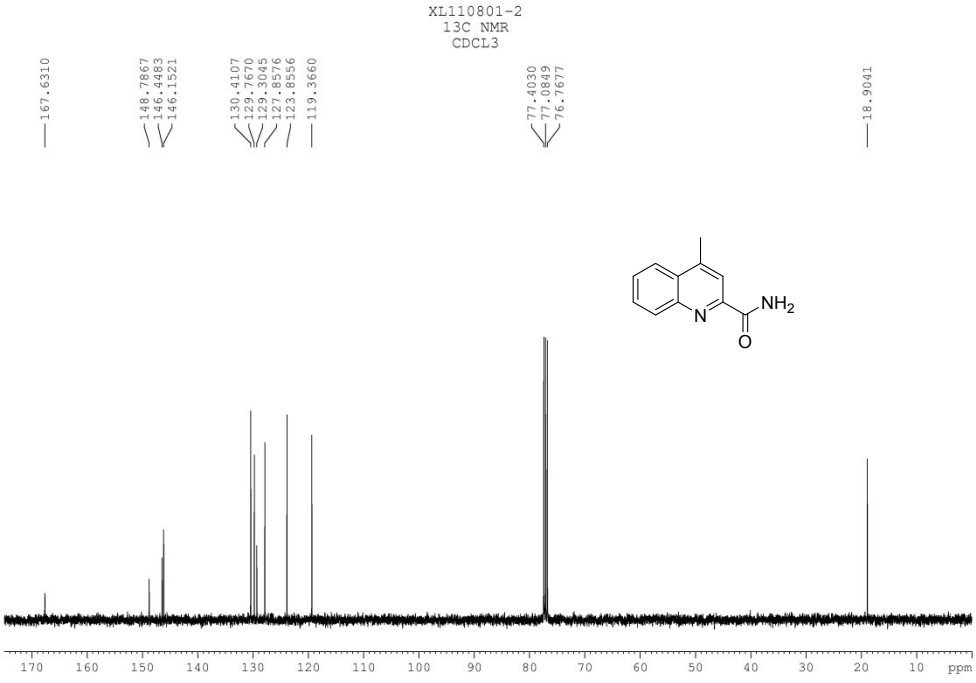


Fig. 37 ^{13}C NMR spectrum of compound **3ar**

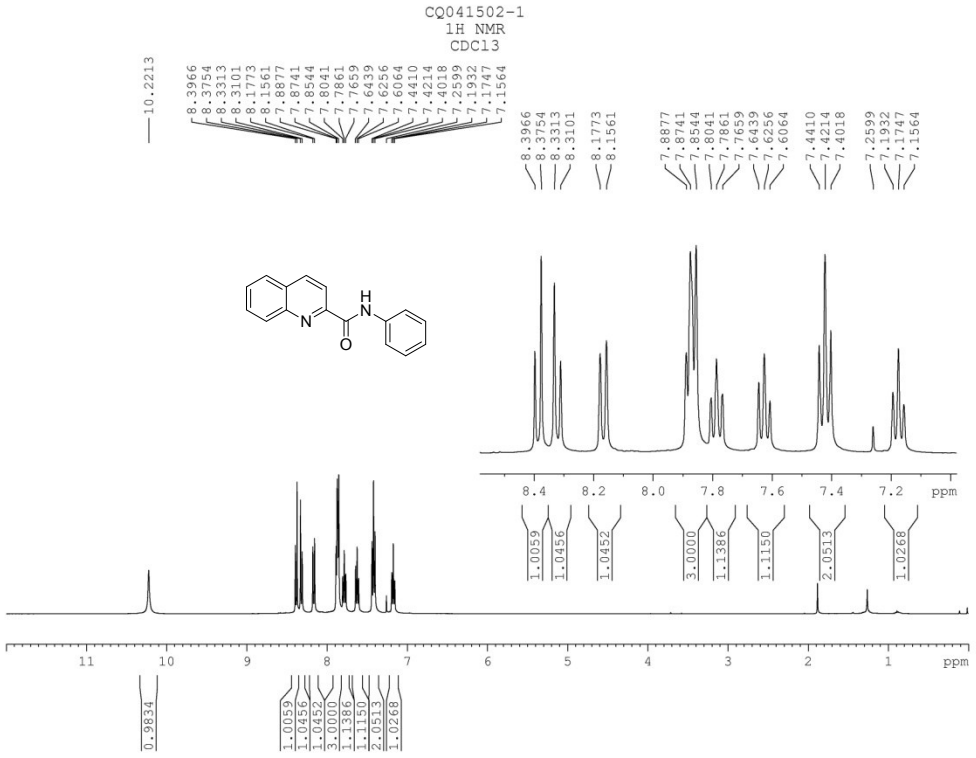


Fig. 38 ^{1}H NMR spectrum of compound **3ba**

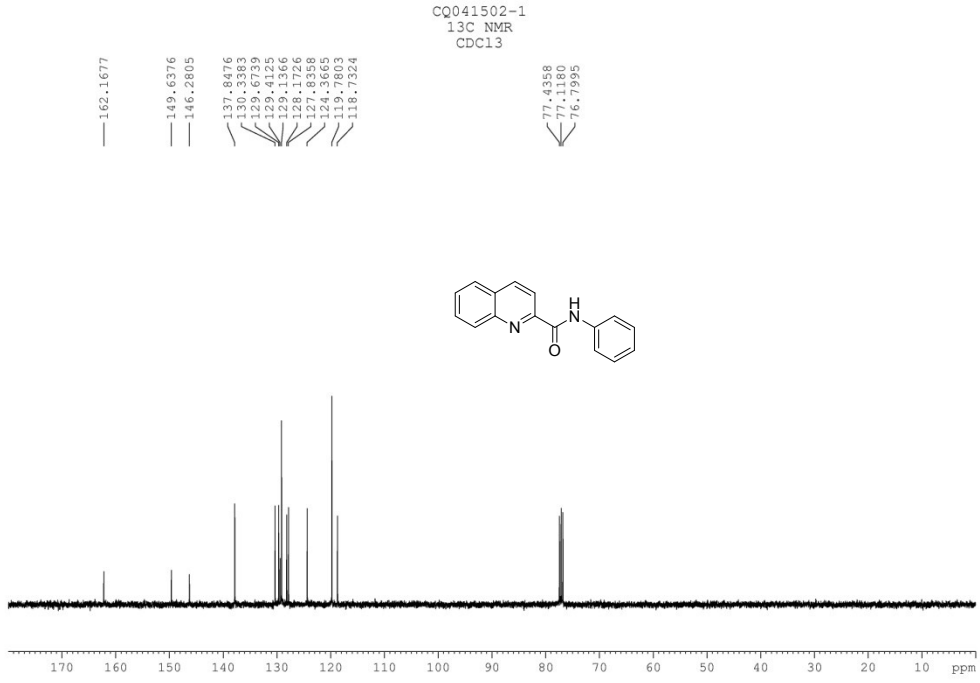


Fig. 39 ^{13}C NMR spectrum of compound **3ba**

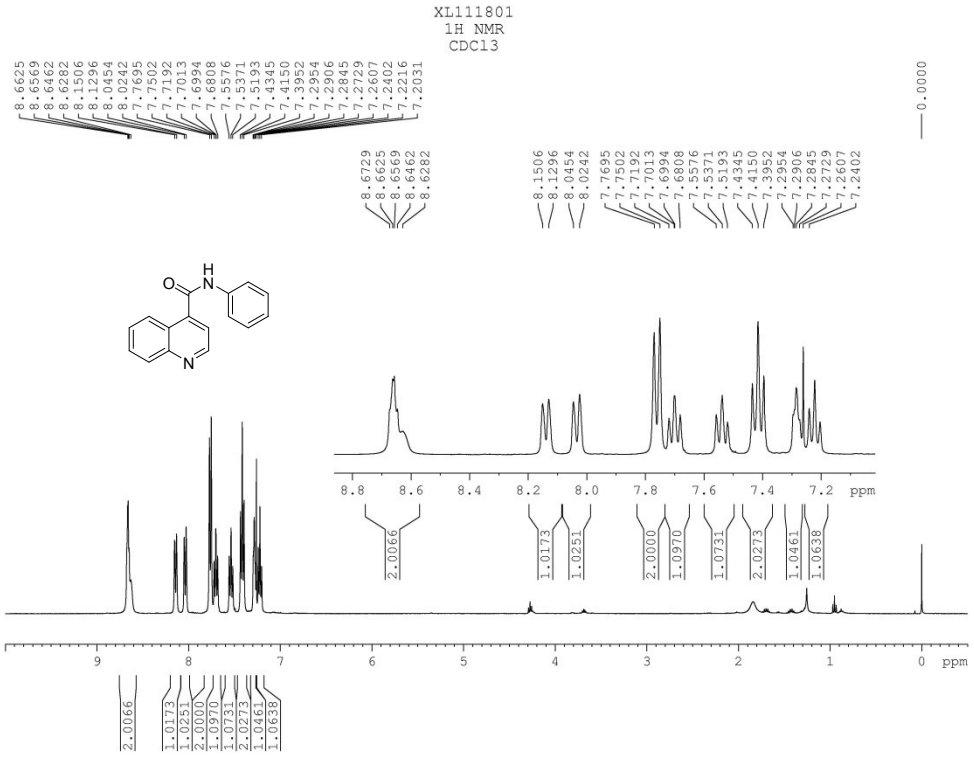


Fig. 40 ^{1}H NMR spectrum of compound **3ba'**

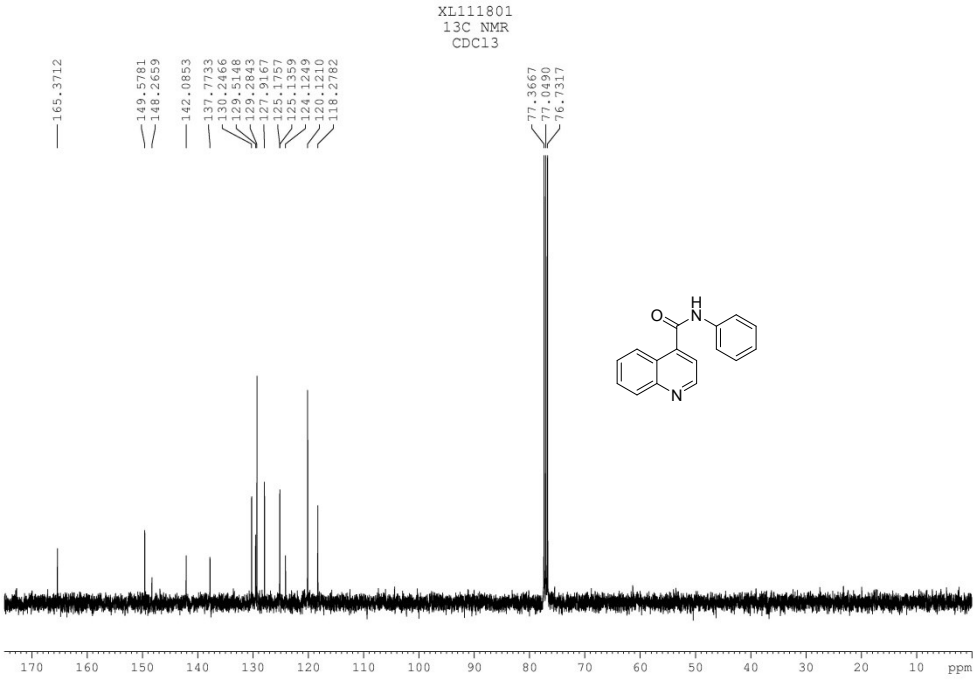


Fig. 41 ^{13}C NMR spectrum of compound **3ba'**

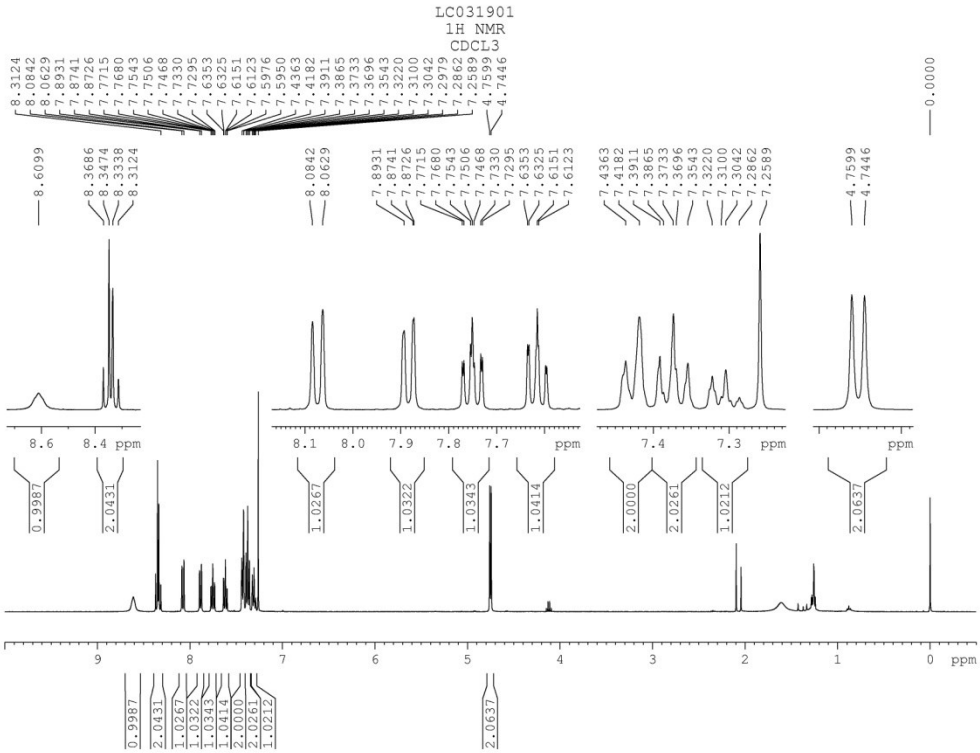


Fig. 42 ^{1}H NMR spectrum of compound **3bl**

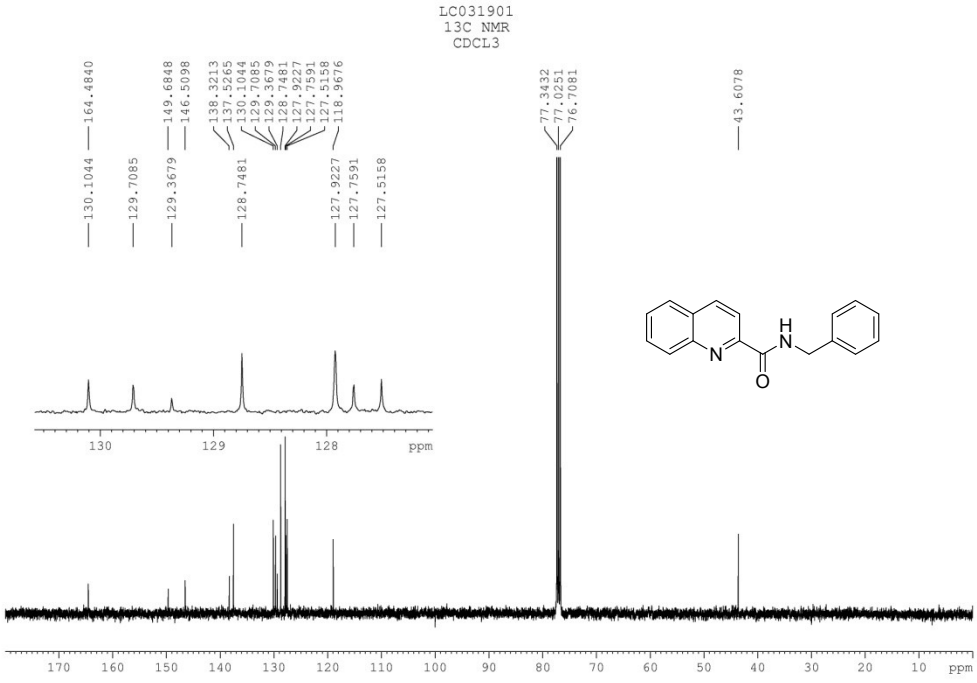


Fig. 43 ^{13}C NMR spectrum of compound **3bl**

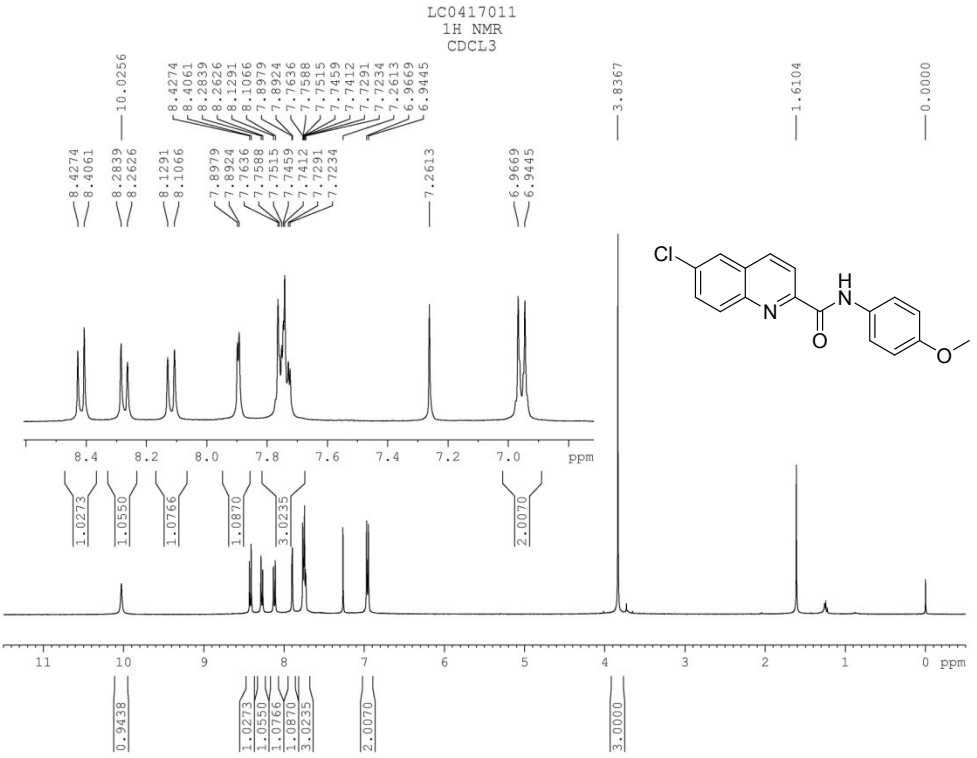


Fig. 44 ^{1}H NMR spectrum of compound **3cf**

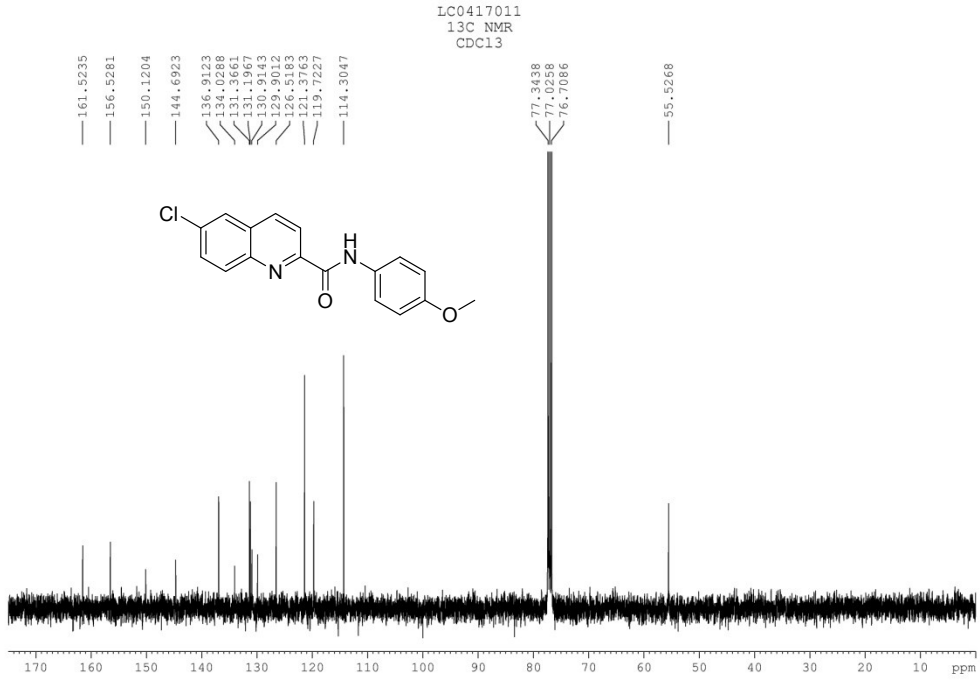


Fig. 45 ^{13}C NMR spectrum of compound **3cf**

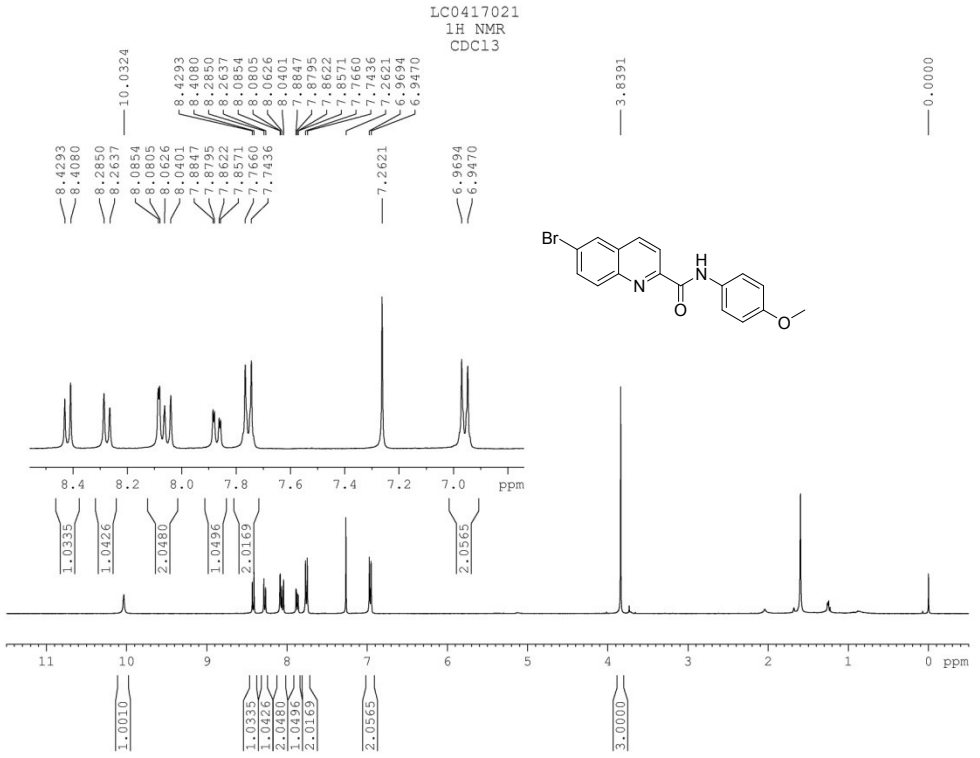


Fig. 46 ^{1}H NMR spectrum of compound **3df**

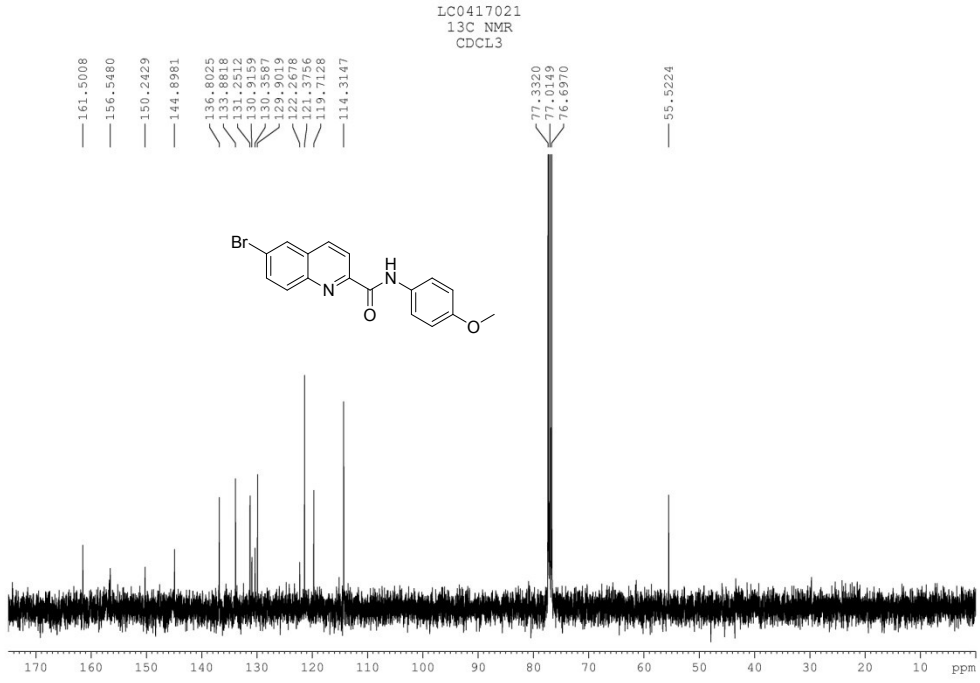


Fig. 47 ^{13}C NMR spectrum of compound **3df**

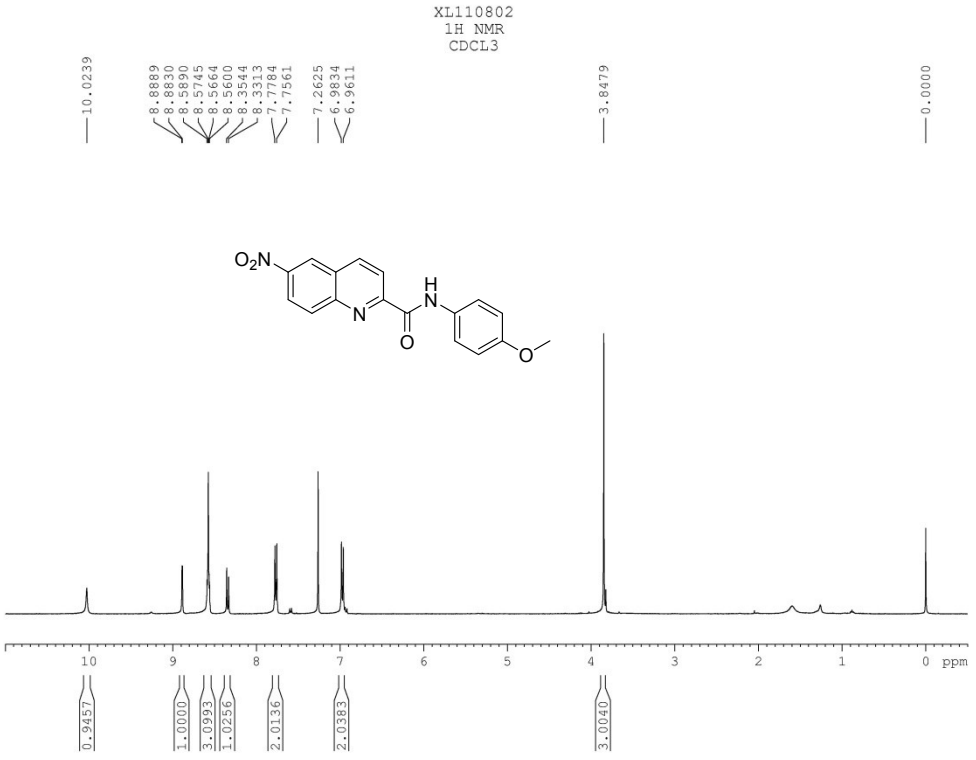


Fig. 48 ^{1}H NMR spectrum of compound **3ef**

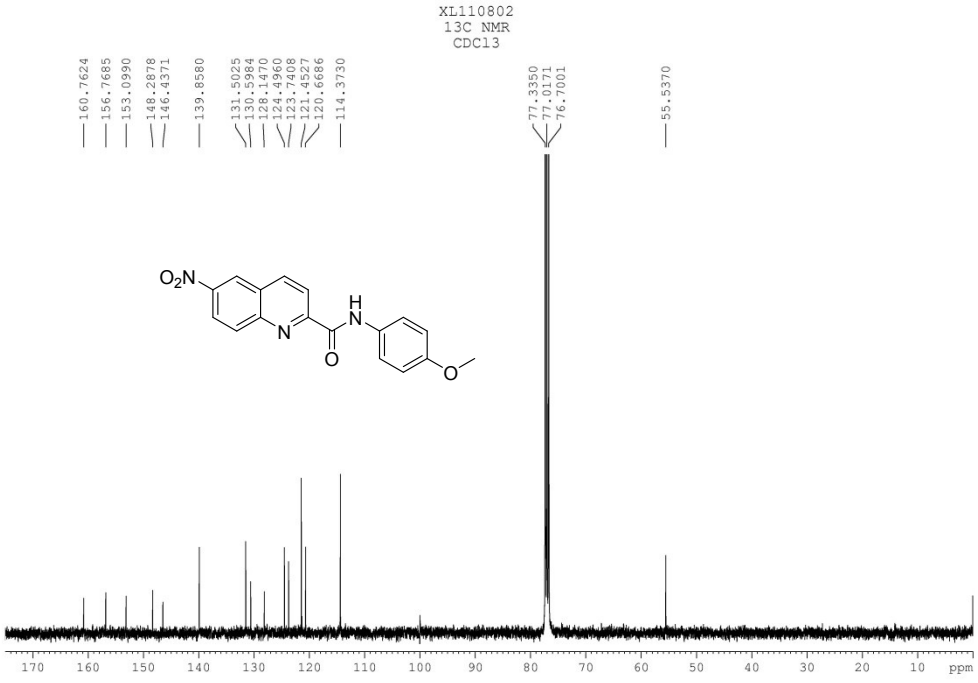


Fig. 49 ^{13}C NMR spectrum of compound **3ef**

Fig. 50 ^{1}H NMR spectrum of compound **3ff**

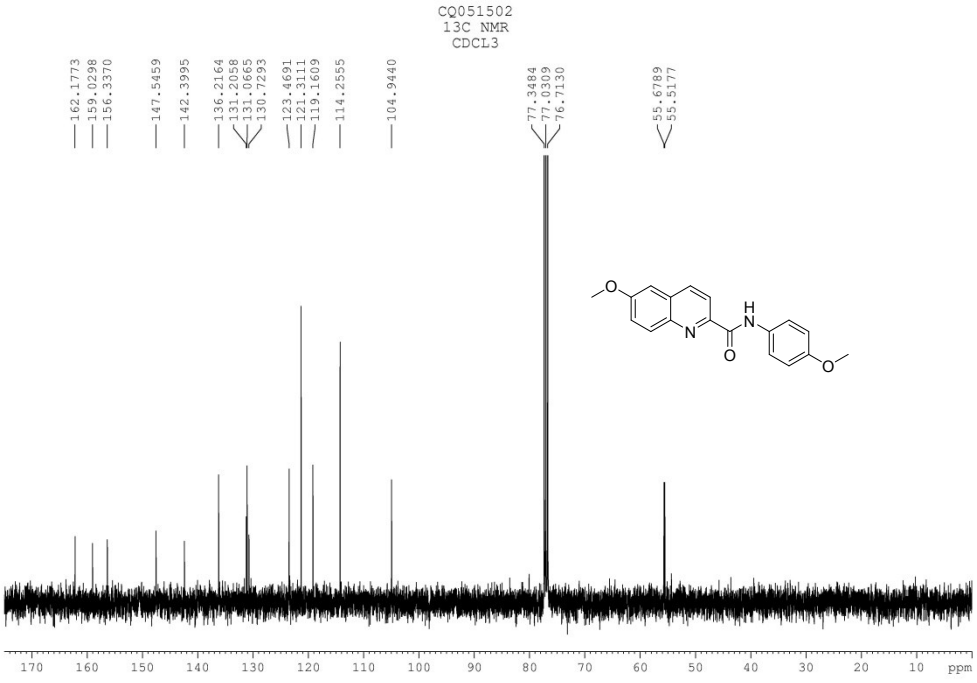


Fig. 51 ^{13}C NMR spectrum of compound **3ff**

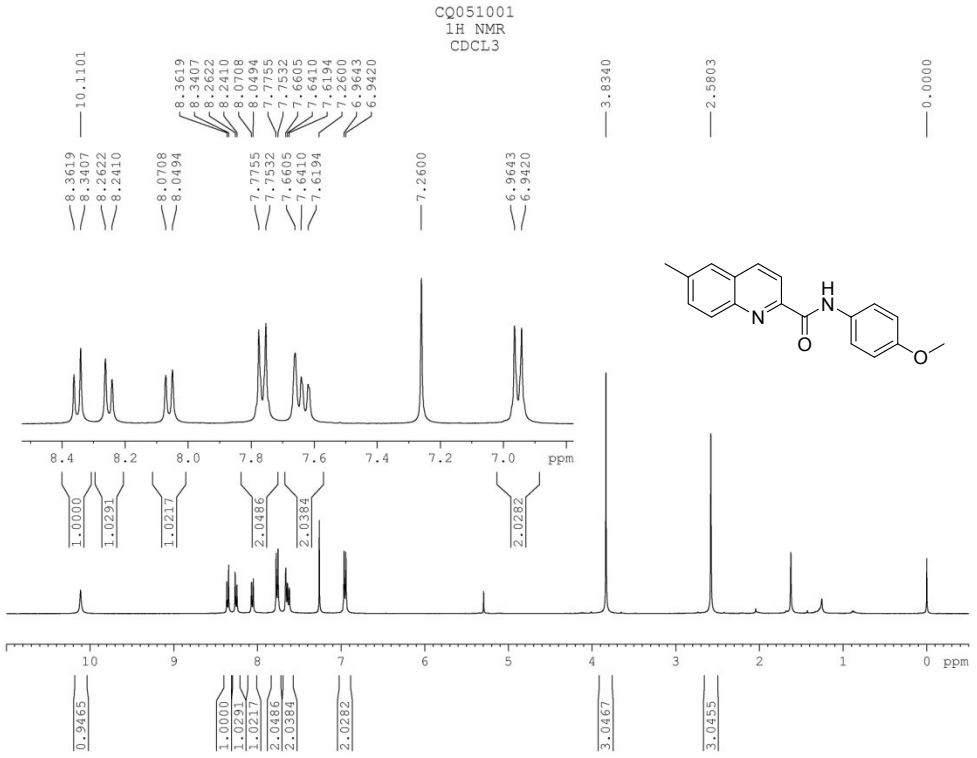


Fig. 52 ^{1}H NMR spectrum of compound **3gf**

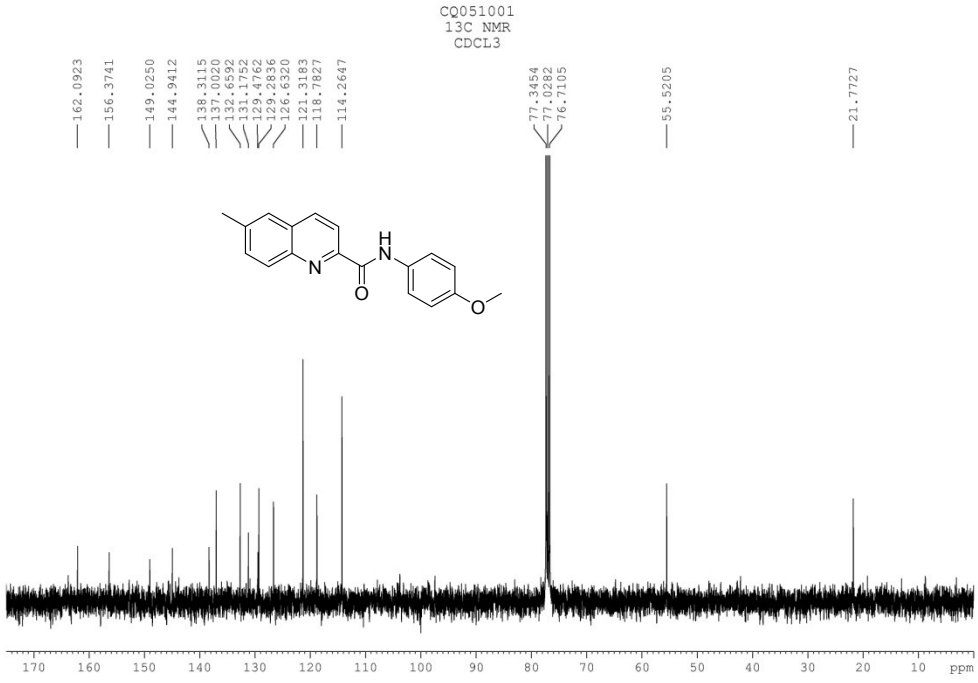


Fig. 53 ^{13}C NMR spectrum of compound **3gf**

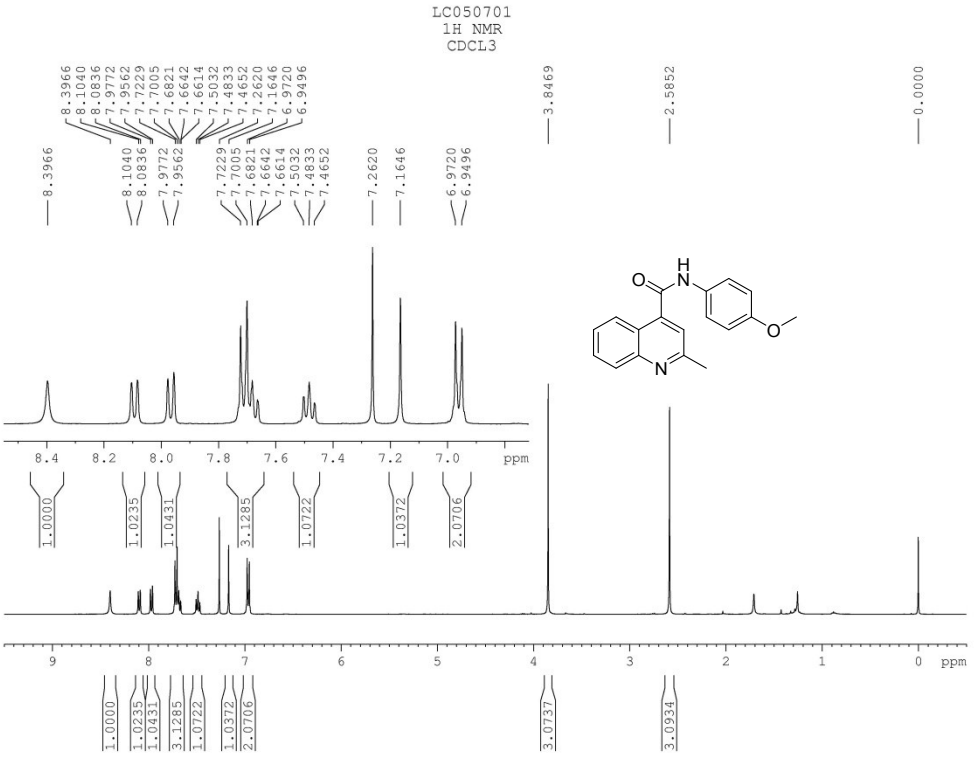


Fig. 54 ^{1}H NMR spectrum of compound **3hf**

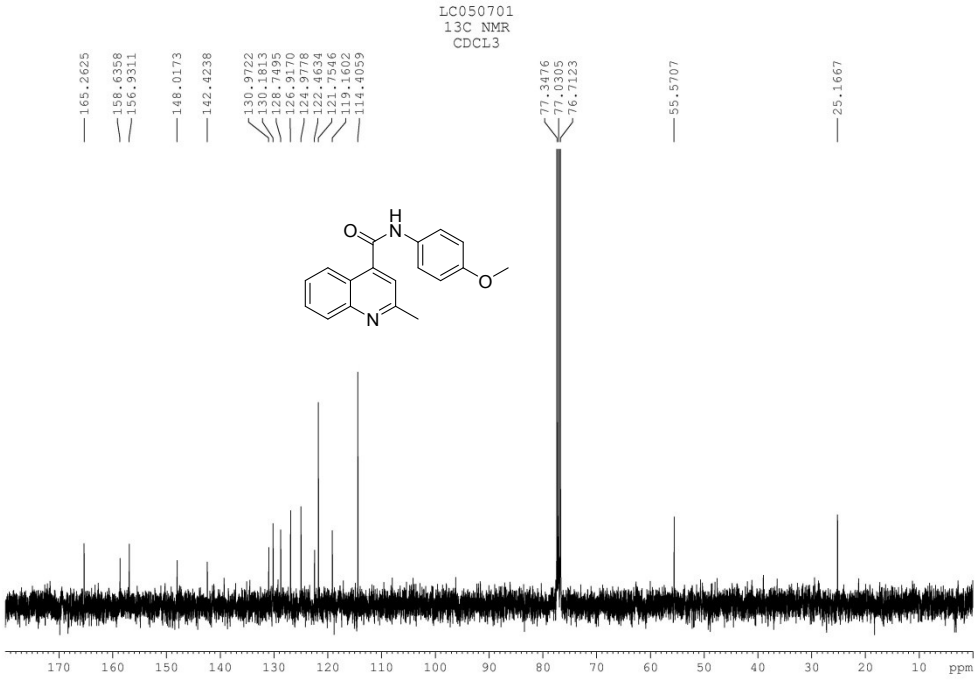


Fig. 55 ^{13}C NMR spectrum of compound **3hf**

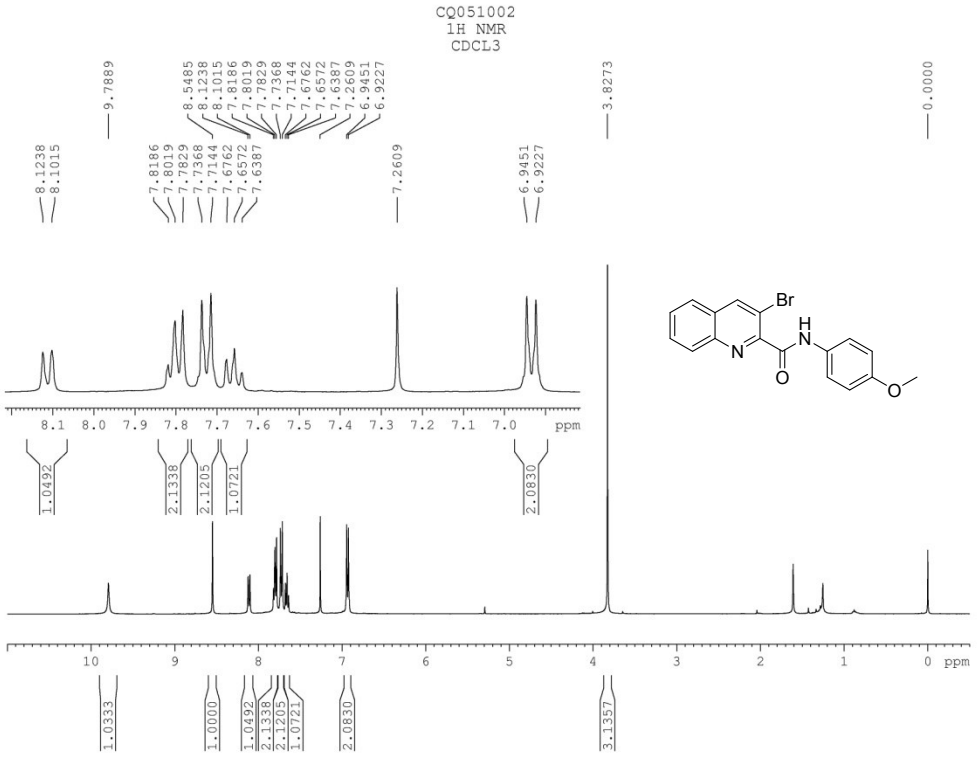


Fig. 56 ^{1}H NMR spectrum of compound **3if**

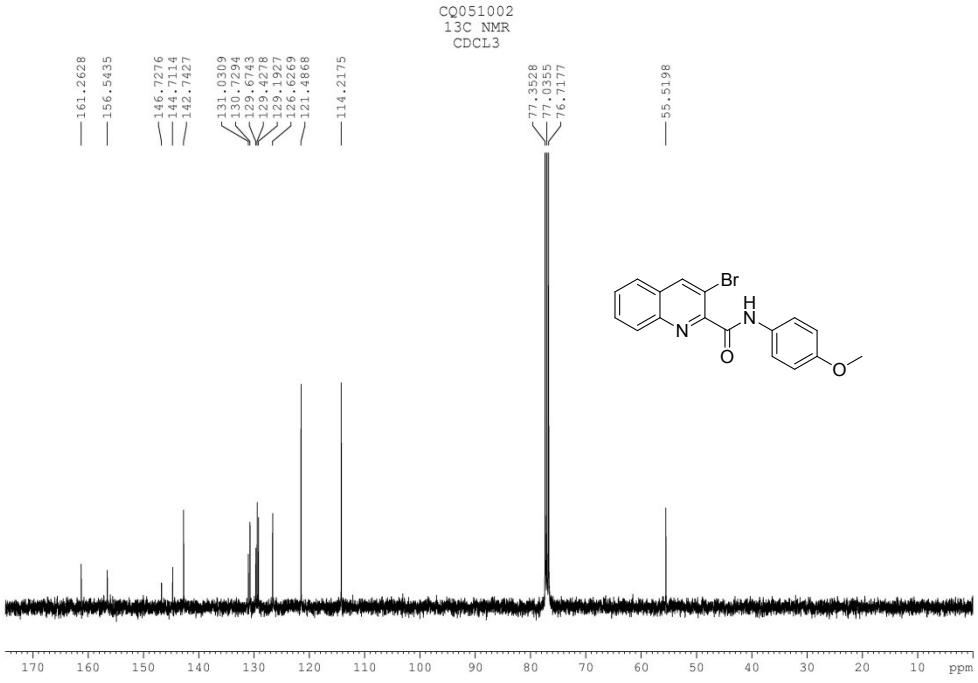


Fig. 57 ^{13}C NMR spectrum of compound **3if**

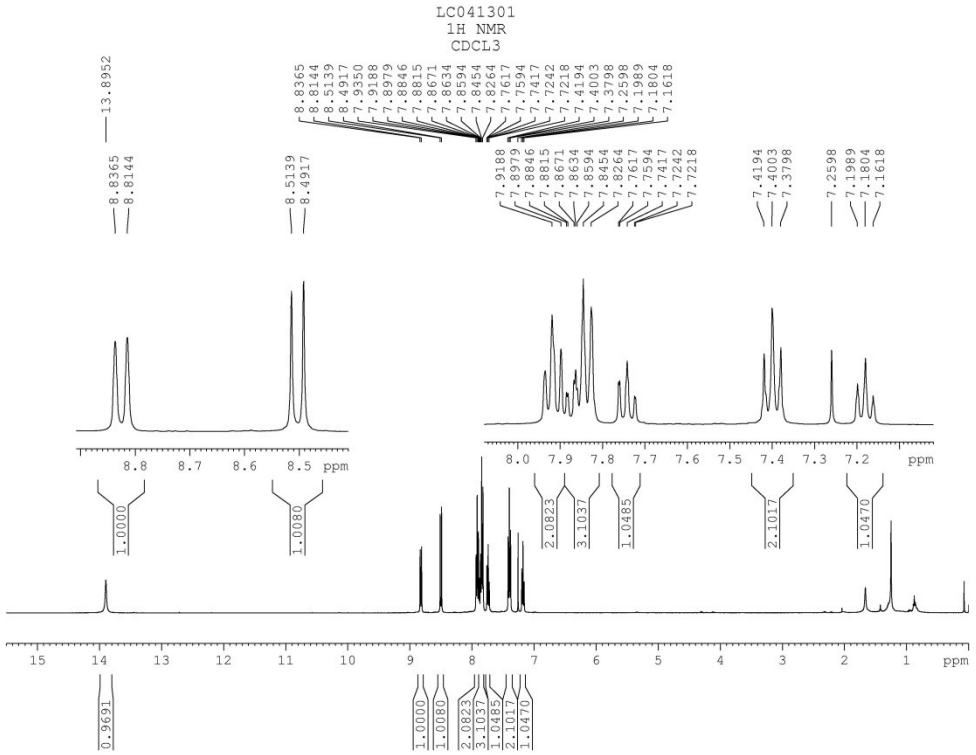


Fig. 58 ^{1}H NMR spectrum of compound **5a**

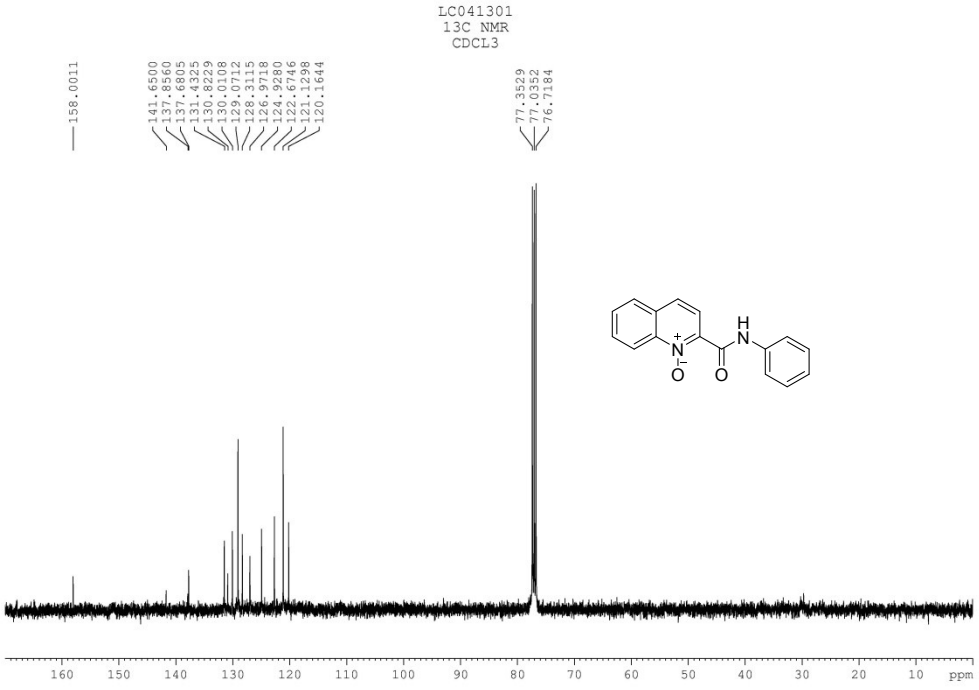


Fig. 59 ^{13}C NMR spectrum of compound **5a**

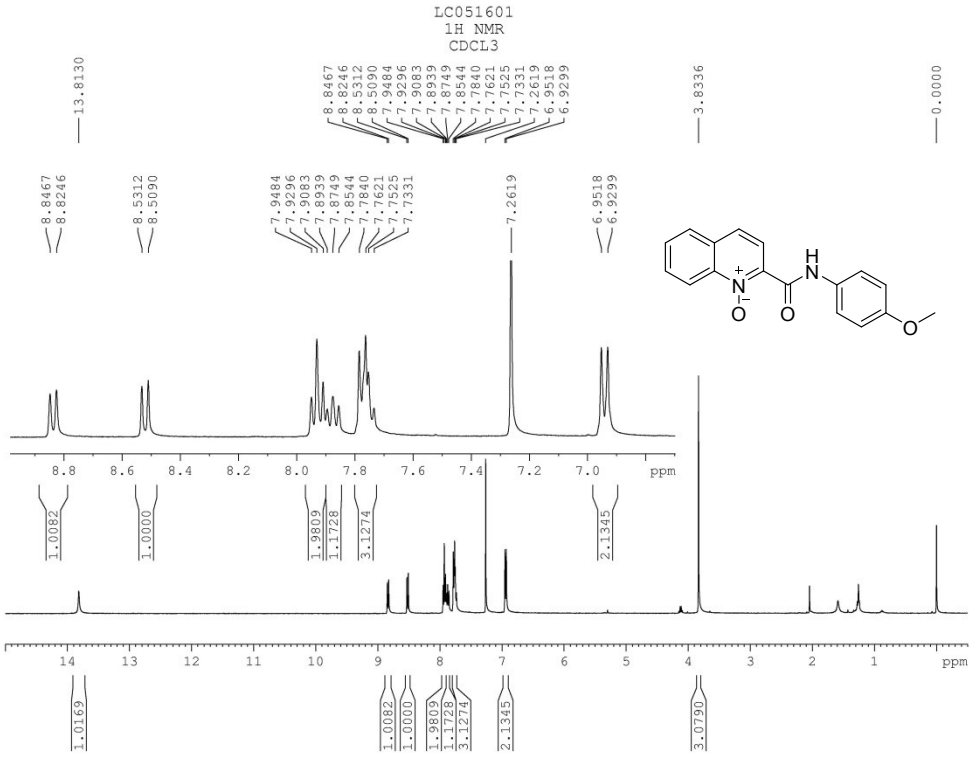


Fig. 60 ^{1}H NMR spectrum of compound **5b**

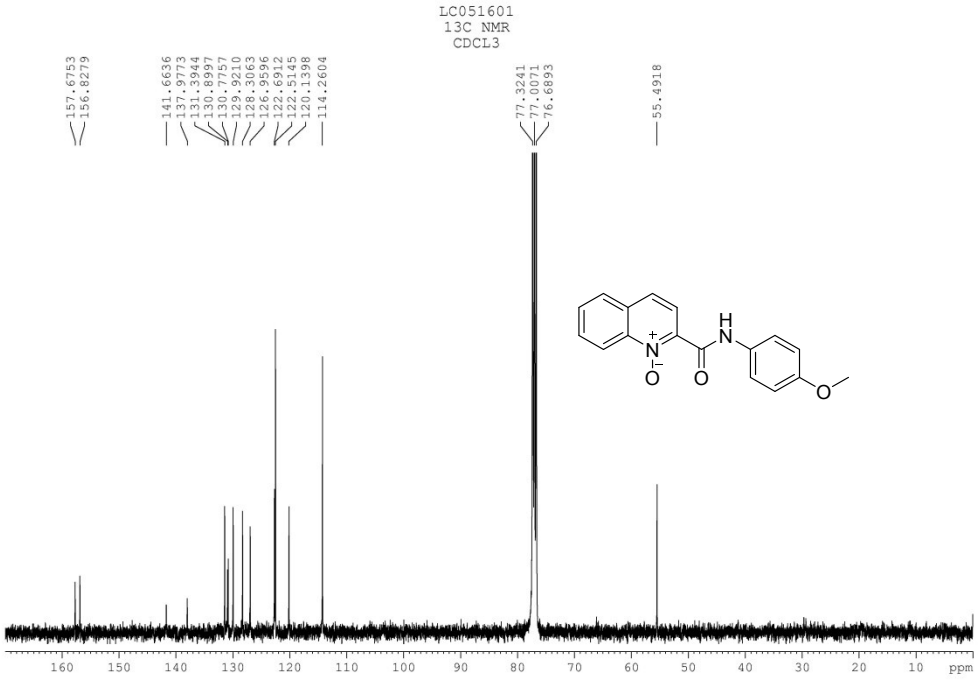


Fig. 61 ^{13}C NMR spectrum of compound **5b**

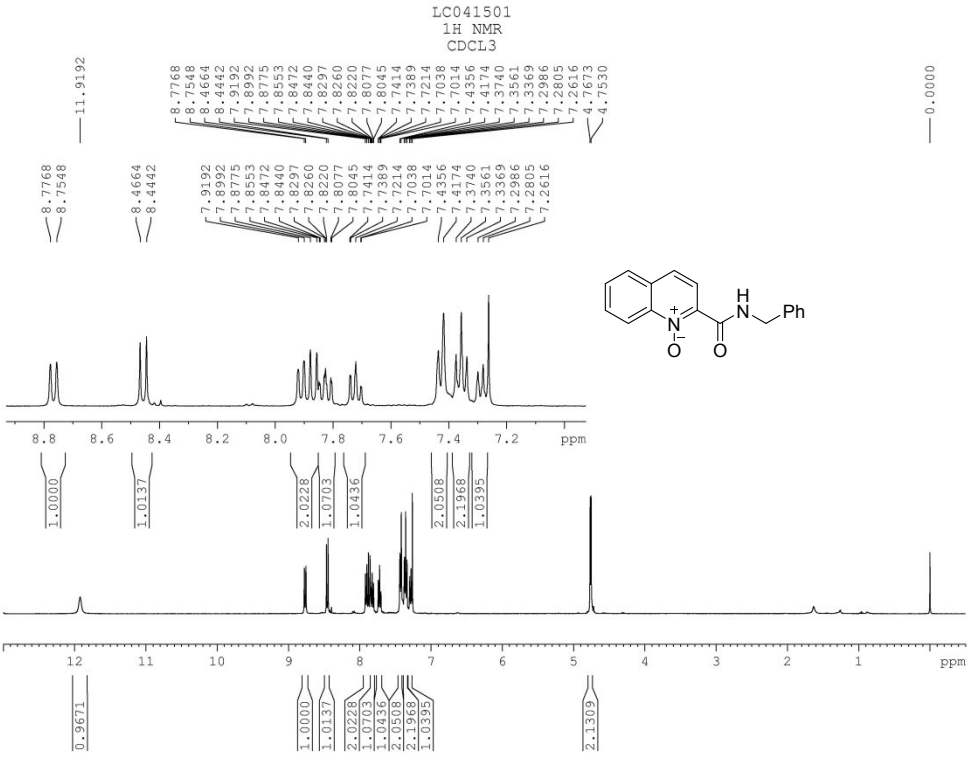


Fig. 62 ^{1}H NMR spectrum of compound **5c**

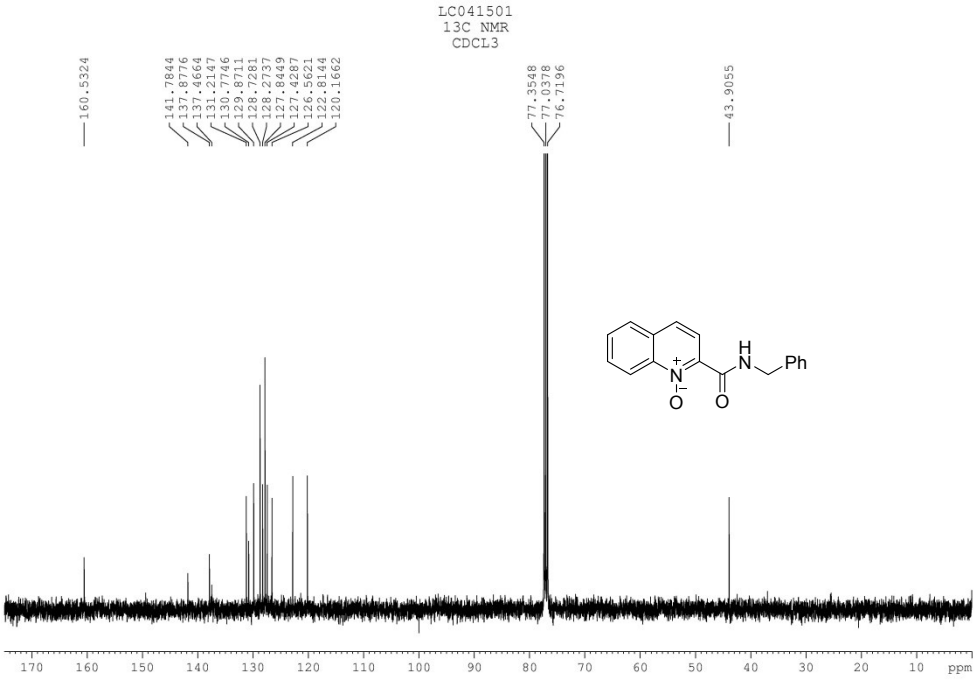


Fig. 63 ^{13}C NMR spectrum of compound **5c**