Supplementary Information

Synthesis of quinolines and isoquinolines *via* site-selective, domino benzannulation of 2-and 3-chloropyridyl ynones with nitromethane

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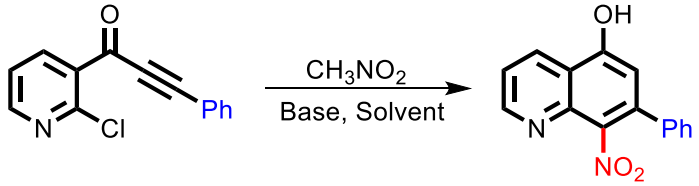
Pages

1. Optimization of reaction conditions S1

2. X-ray structure and data of compounds S3-S7

3. ^{1}H NMR, ^{13}C NMR spectra S8-S66

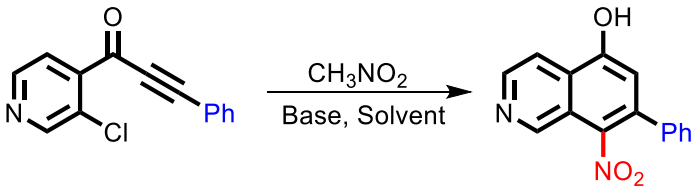
Table S1: Optimization of reaction conditions for quinoline synthesis [a]



S. No.	Base (equiv.)	CH_3NO_2 (equiv.)	Solvent, Temp., time	Yield[b]
1	Cs_2CO_3 (1)	1	DMF, 60 °C , 6h	25%
2	Cs_2CO_3 (1)	1	DMF, 80 °C , 6h	45%
3	Cs_2CO_3 (1)	1	DMF, 100 °C , 6h	40%
4	Cs_2CO_3 (2)	2	DMF, 80 °C , 6h	55%
5	K_2CO_3 (2)	2	DMF, 80 °C , 6h	50%
6	DBU (2)	2	DMF, 80 °C , 6h	trace
7	30% NaOMe/MeOH (2)	2	MeOH, 80 °C , 6h	65%
8	30% NaOMe/MeOH (3)	2	MeOH, 80 °C , 6h	70%
9	**30% NaOMe/MeOH (3)**	**3**	**MeOH, 80 °C , 6h**	**80%**
10	30% NaOMe/MeOH (4)	3	MeOH, 80 °C , 6h	70%
11	30% NaOMe/MeOH (3)	4	MeOH, 80 °C , 6h	77%
12	30% NaOMe/MeOH (3)	3	MeOH, 80 °C , 8h	75%
13	30% NaOMe/MeOH (3)	3	MeOH, 80 °C , 4h	65%
14	30% NaOMe/MeOH (3)	3	MeOH, 100 °C , 6h	70%

[a] Reaction scale 0.2 mmol of ynone. [b] isolated yields.

Table S2: Optimization of reaction conditions for isoquinolones synthesis[a]



S. No.	Base (equiv.)	CH_3NO_2 (equiv.)	Solvent, Temp., time	Yield[b]
1	30% NaOMe/MeOH (3)	3	MeOH, 80 °C, 6h	trace
2	Cs_2CO_3 (3)	3	DMF, 80 °C, 6h	20 %
3	Cs_2CO_3 (3)	3	DMF, 100 °C, 6h	40 %
4	K_2CO_3 (3)	3	DMF, 100 °C, 6h	50 %
5	K_2CO_3 (3)	3	DMSO, 100 °C, 6h	60%
6	K_2CO_3 (3)	3	DMSO, 110 °C, 6h	70%
7	**K_2CO_3 (3)**	**3**	**DMSO, 110 °C, 8h**	**75%**
8	K_2CO_3 (3)	3	DMSO, 110 °C, 10h	70 %
9	K_2CO_3 (3)	3	DMSO, 120 °C, 8h	65%
10	K_2CO_3 (4)	3	DMSO, 110 °C, 8h	65%
11	K_2CO_3 (3)	4	DMSO, 110 °C, 8h	72%
12	K_2CO_3 (3)	2	DMSO, 110 °C, 8h	55%

[a] Reaction scale 0.2 mmol of ynone. [b] isolated yields

X-ray diffraction data and crystal structure determination and refinement.

For compounds **16g**, **24**, **26** and **17a**, single crystal X-ray data was collected on a Bruker D8 Quest CCD diffractometer using Mo-Kα, radiation at 298 K. Data reduction was carried out with CrysAlisproversion 171.33.55 software. Structure solution and refinements were performed with the help of SHELX2014/7program available in the WinGX package.

<u>X-ray data for compound 16g:</u>

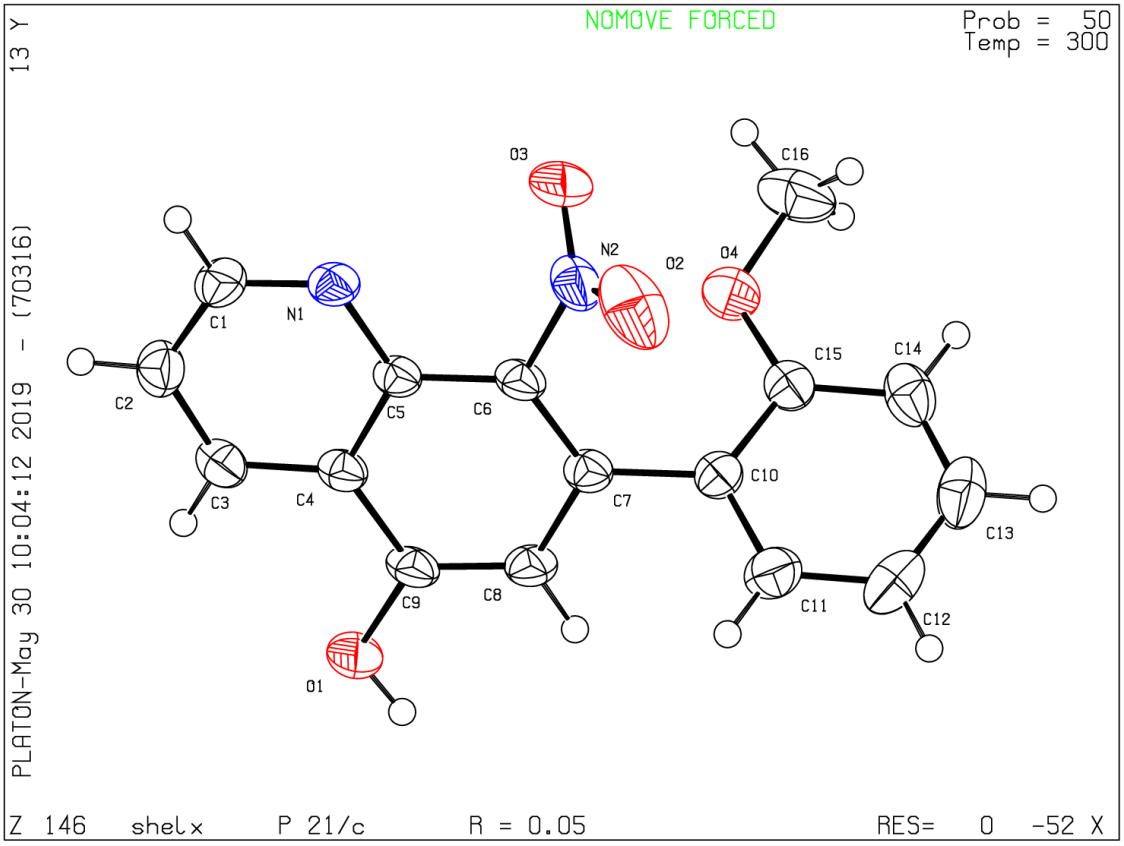


Figure S1. ORTEP diagram of **16g** at 50% ellipsoid probability. Single crystals of **16g** were obtained by slow evaporation of solution of 100 mg of **16g** in 5 mL of MeOH/EtOAc (1:2).

Table S3. Crystal data and structure refinement details for compound **16g**

Compound	**16g**
Empirical formula	$C_{16}H_{12}N_2O_4$
Formula weight	296.28
Crystal system	monoclinic
Space group	*P 21/c*
a (Å)	10.4313(12)
b (Å)	9.4929(10)
c (Å)	14.4559(17)
α	90°
β	106.149(4)°
γ	90°
V (Å^3)	1375.0(3)
Z	4

ρ_{calcd} (g/cm3)	1.431
Reflections measured	91803
Unique reflections	2770
R1	0.0465
wR2	0.1108
CCDC No	1891839

X-ray data for compound 24:

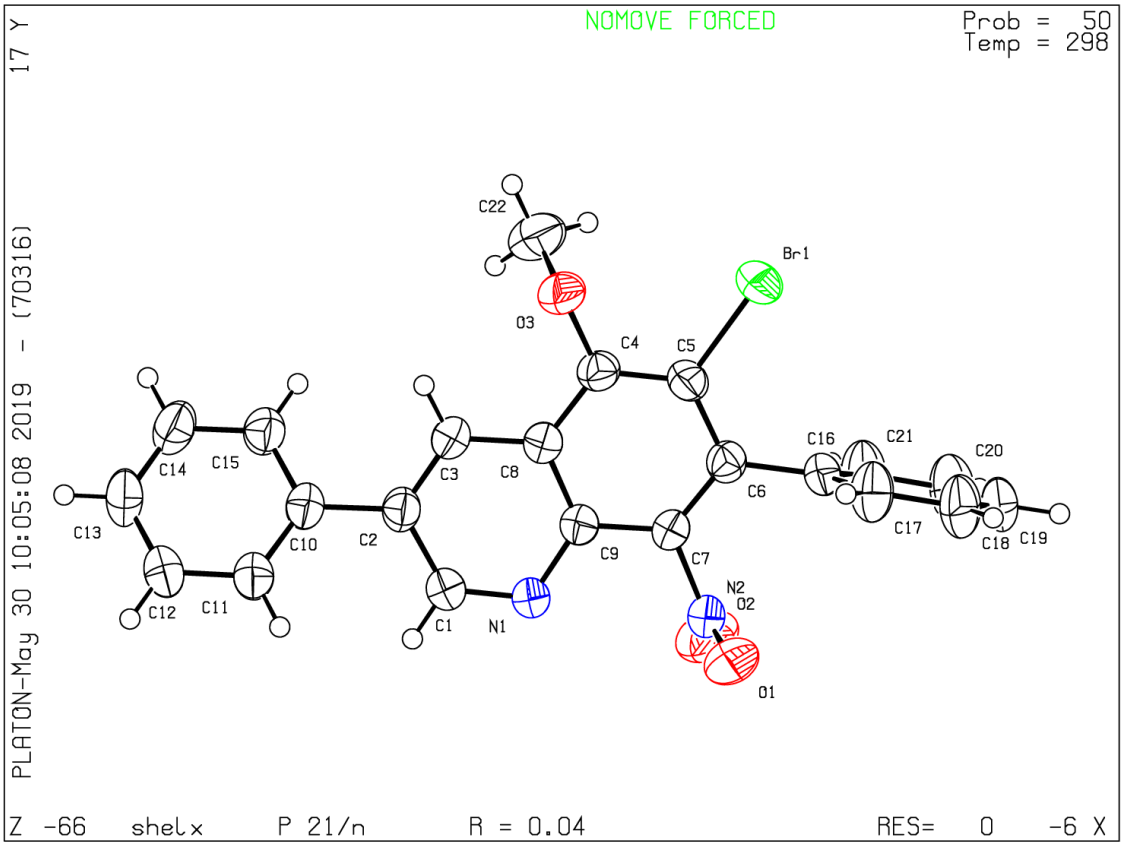


Figure S2. ORTEP diagram of **24** at 50% ellipsoid probability. Single crystals of **24** were obtained by slow evaporation of solution of 100 mg of **24** in 5 mL of DCM/EtOAc (1:1).

Table S4. Crystal data and structure refinement details for compound **24**

Compound	**24**
Empirical formula	$C_{22}H_{15}BrN_2O_3$
Formula weight	435.27
Crystal system	monoclinic
Space group	*P 21/n*
a (Å)	9.1130(3)
b (Å)	12.4570(5)
c (Å)	16.9890(7)
α	90°
β	100.217(2)
γ	90°

V (Å^3)	1898.02(13)
Z	4
ρ_{calcd} (g/cm3)	1.523
Reflections measured	49066
Unique reflections	4368
R1	0.0397
wR2	0.0997
CCDC No	1892026

<u>X-ray data for compound 26</u>:

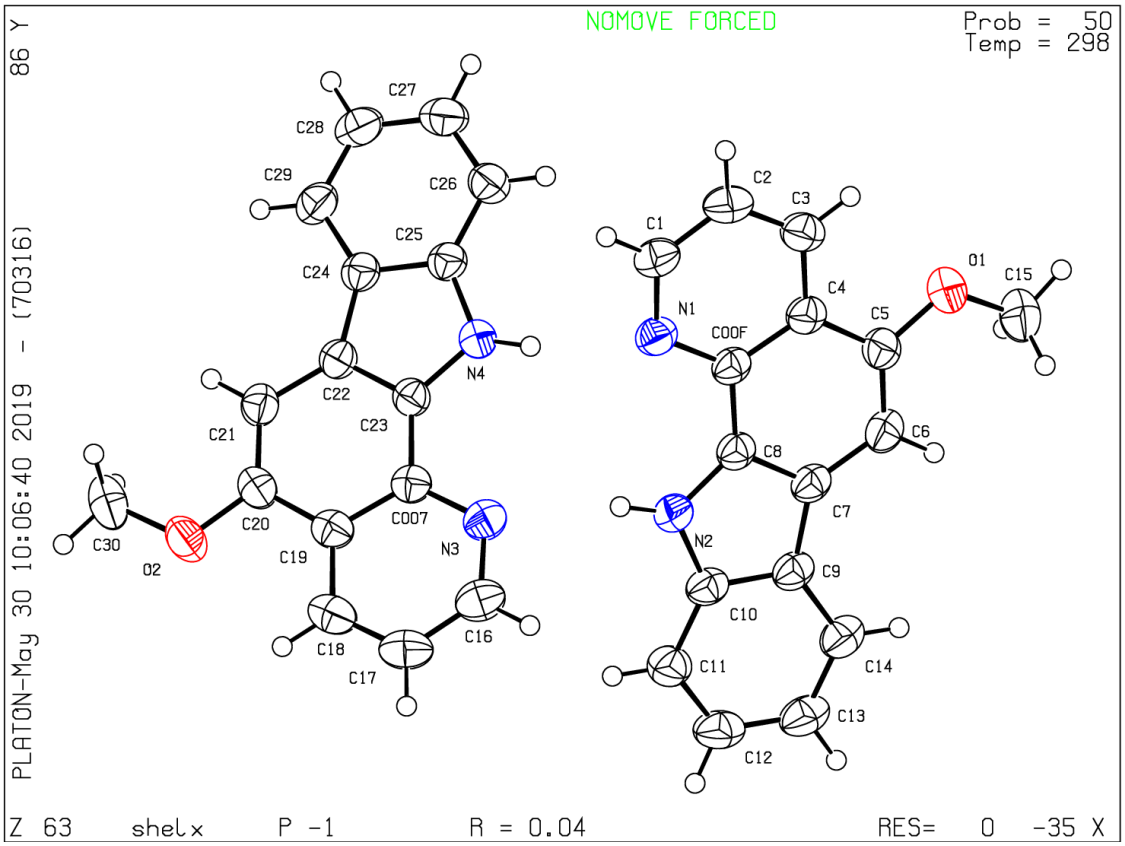


Figure S3. ORTEP diagram of **26** at 50% ellipsoid probability. Single crystals of **26** were obtained by slow evaporation of solution of 100 mg of **26** in 5 mL of DCM/EtOAc (1:1).

Table S5. Crystal data and structure refinement details for compound **26**

Compound	**26**
Empirical formula	$C_{16}H_{12}N_2O$
Formula weight	248.28
Crystal system	triclinic
Space group	*P -1*
a (Å)	7.6613(13)
b (Å)	11.554(2)
c (Å)	15.043(2)

α	111.486(6)°
β	95.884(7)
γ	99.339(7)°
V (Å^3)	1203.4(4)
Z	4
ρ_{calcd} (g/cm3)	1.370
Reflections measured	42420
Unique reflections	5457
R1	0.0446
wR2	0.1202
CCDC No	1892021

X-ray data for compound 17a:

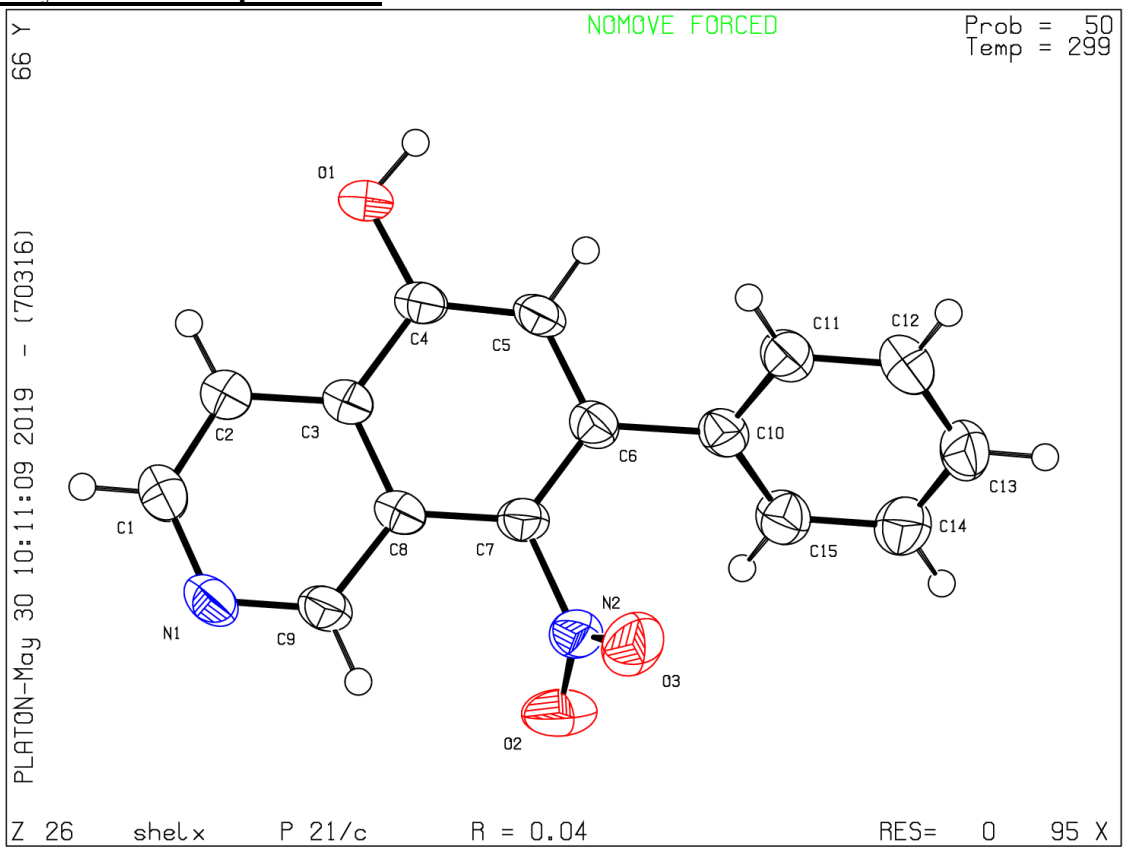


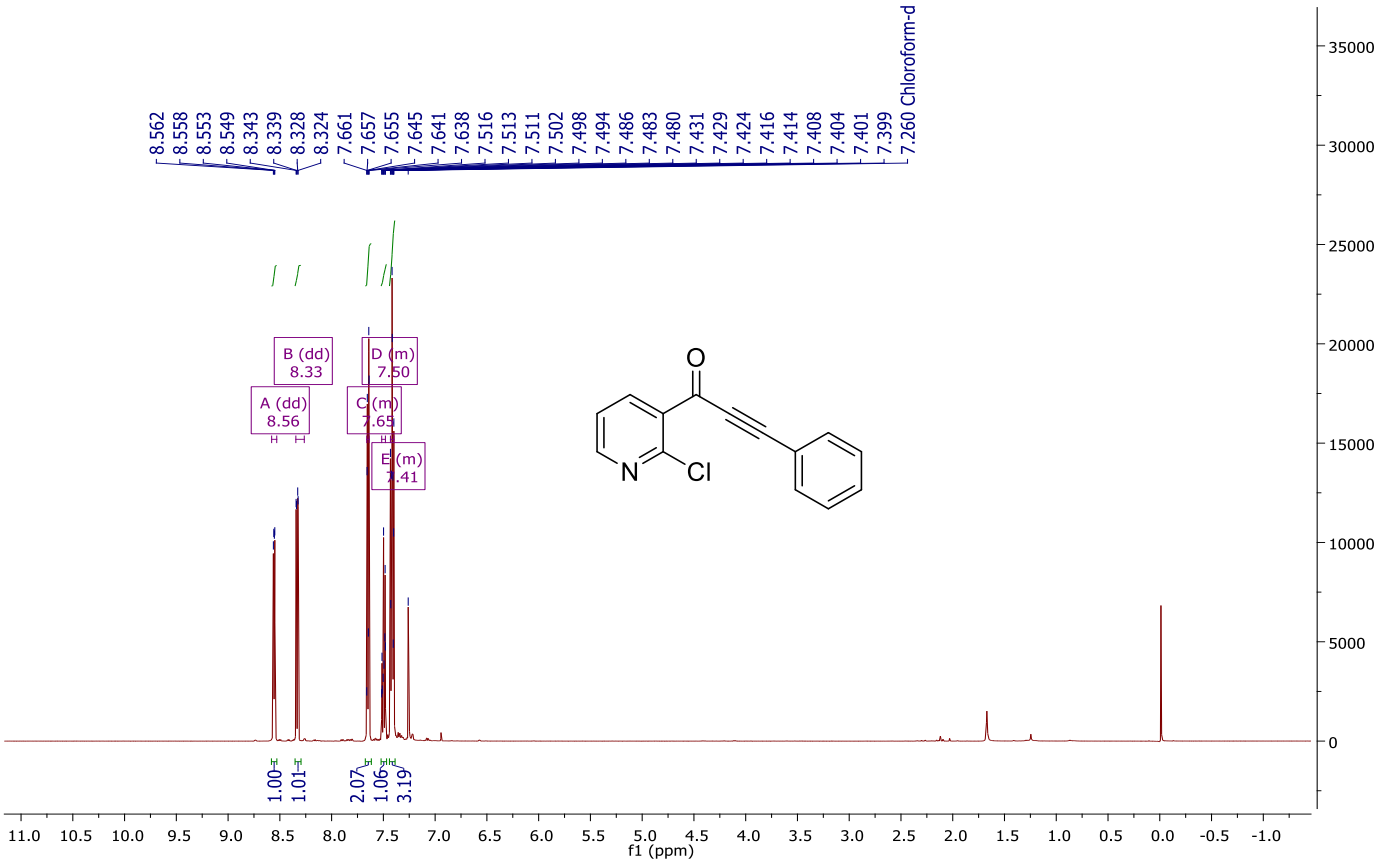
Figure S4. ORTEP diagram of **17a** at 50% ellipsoid probability. Single crystals of **17a** were obtained by slow evaporation of solution of 100 mg of **17a** in 5 mL of MeOH/EtOAc (1:2)

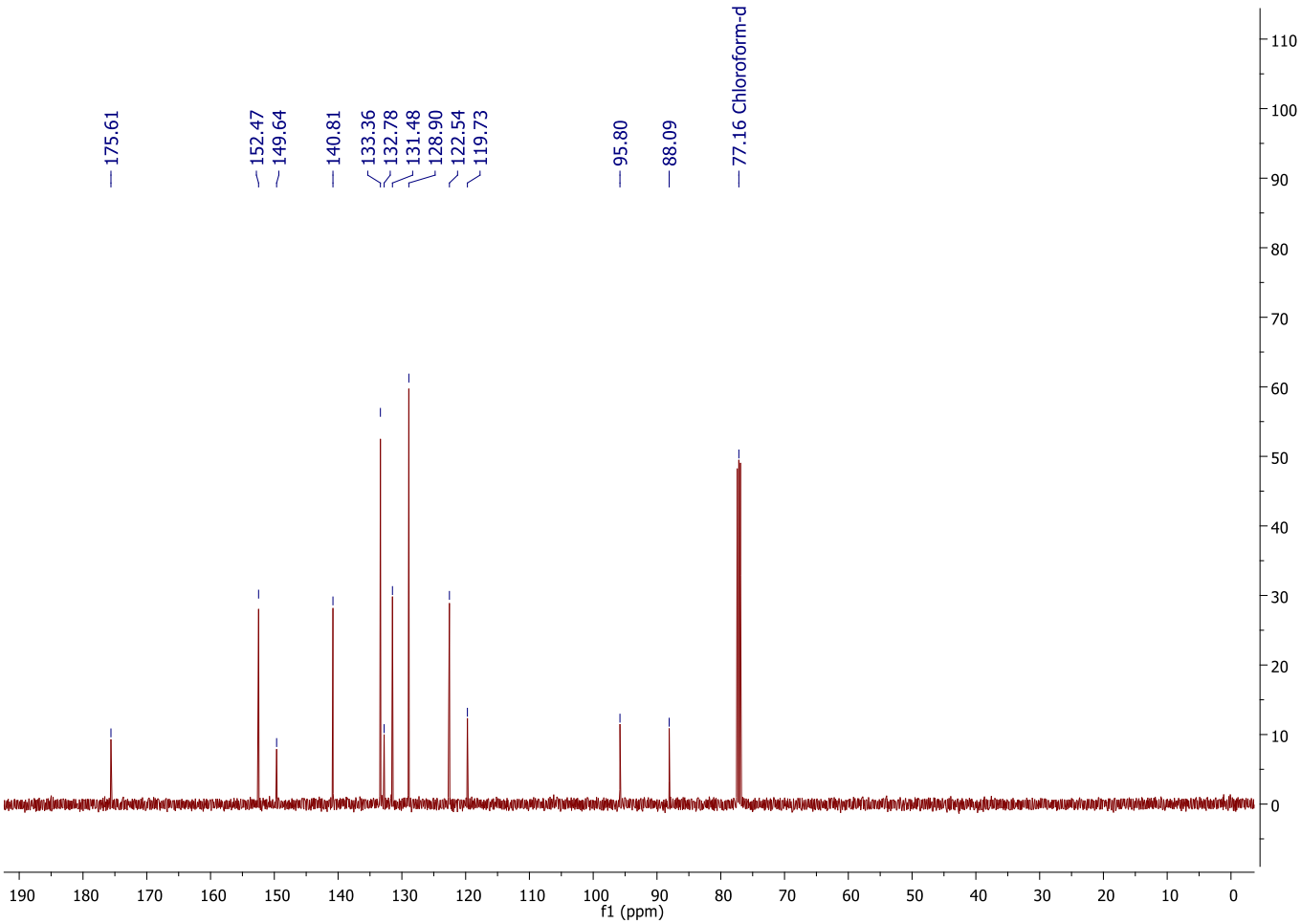
Table S6. Crystal data and structure refinement details for compound **17a**

Compound	**17a**
Empirical formula	$C_{15}H_{10}N_2O_3$
Formula weight	266.25
Crystal system	monoclinic
Space group	*P21/c*
a (Å)	9.2227(7)

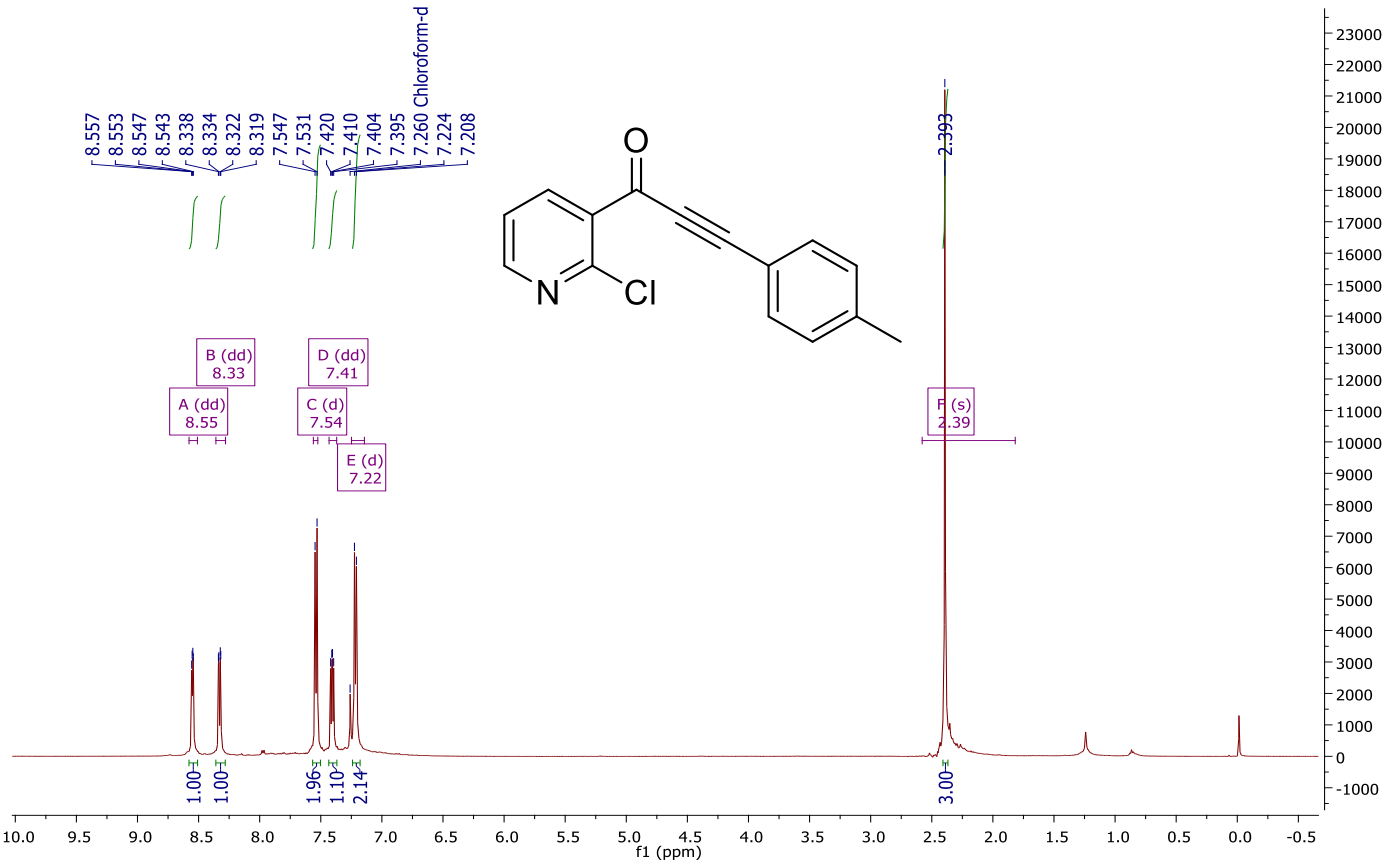
b (Å)	8.7759(7)
c (Å)	15.2553(13)
α	90˚
β	95.299(3)˚
γ	90˚
V (Å^3)	1229.45(17)
Z	4
ρ_{calcd} (g/cm3)	1.438
Reflections measured	19005
Unique reflections	2190
R1	0.0386
wR2	0.0996
CCDC No	1891498

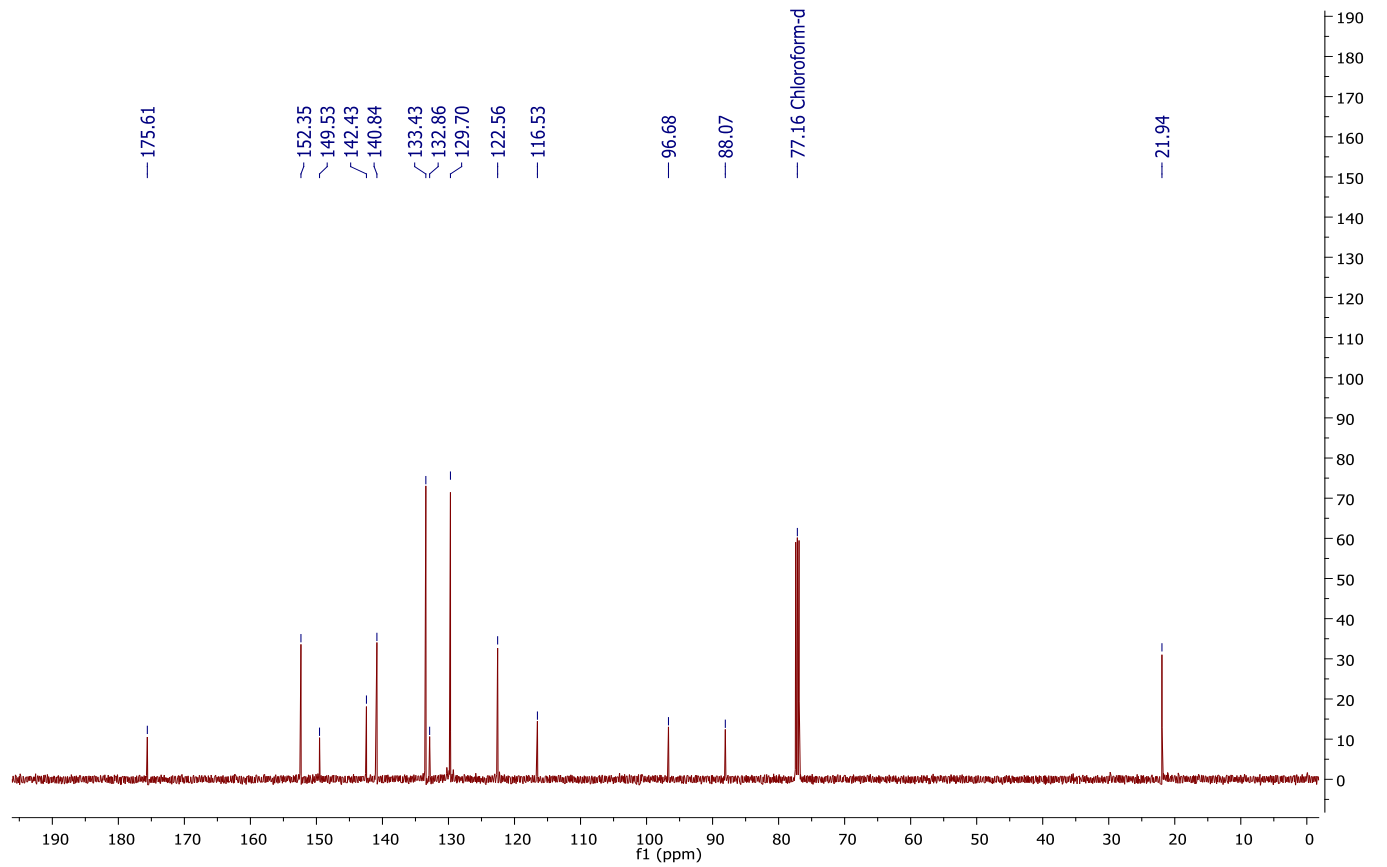
Compound **14a:** ^{1}H and ^{13}C NMR Spectrum



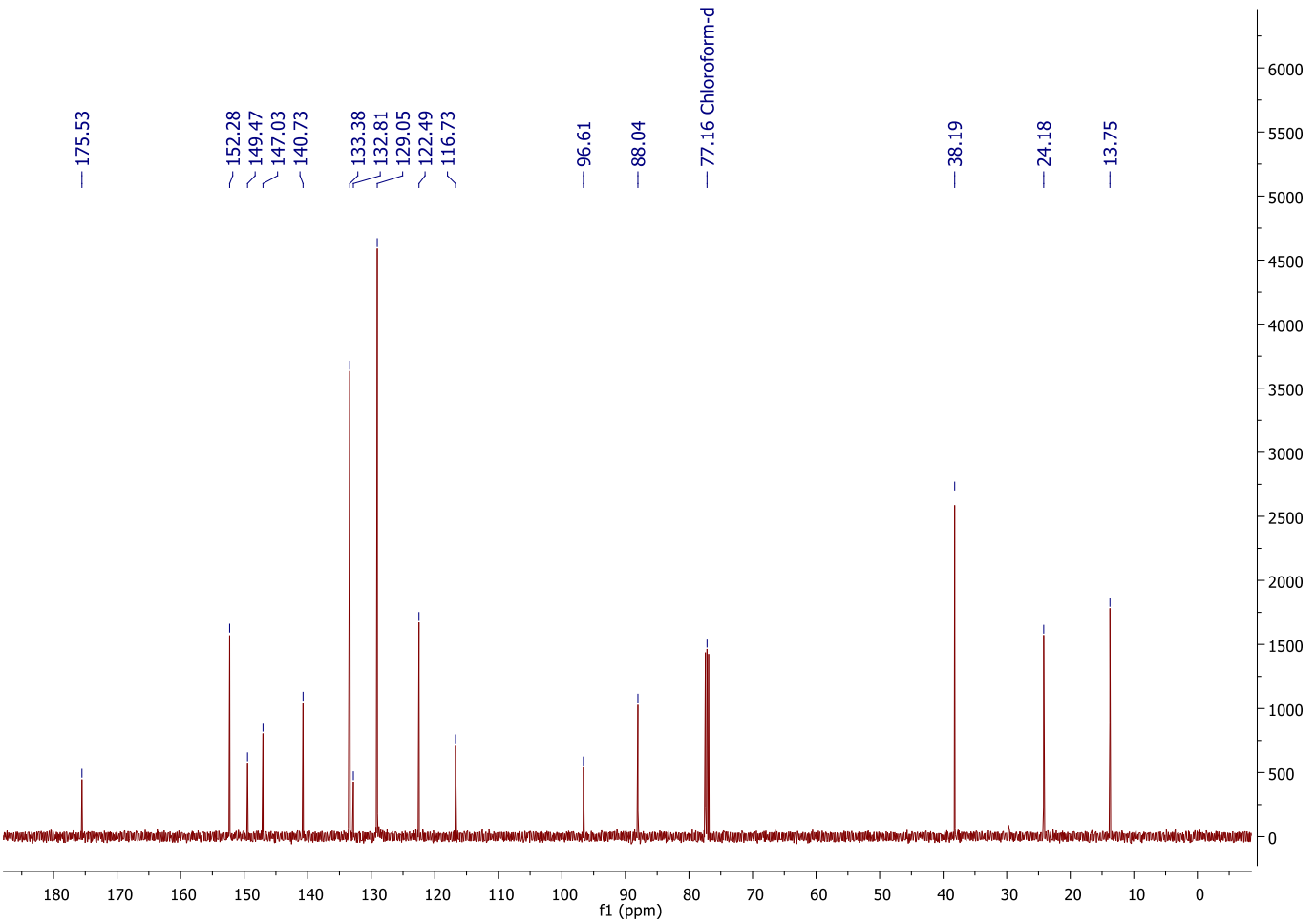


Compound **14b:** ^{1}H and ^{13}C NMR Spectrum

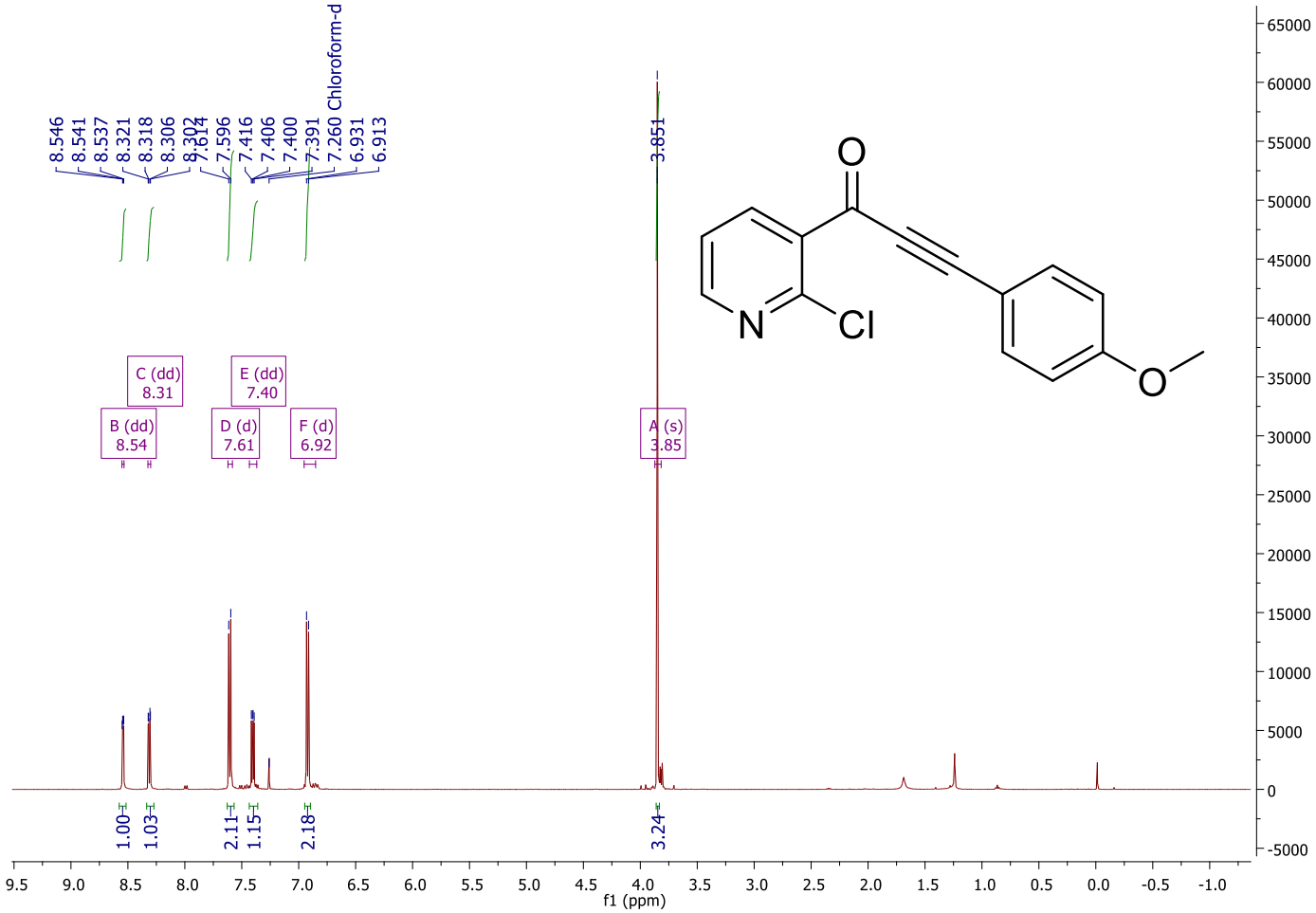


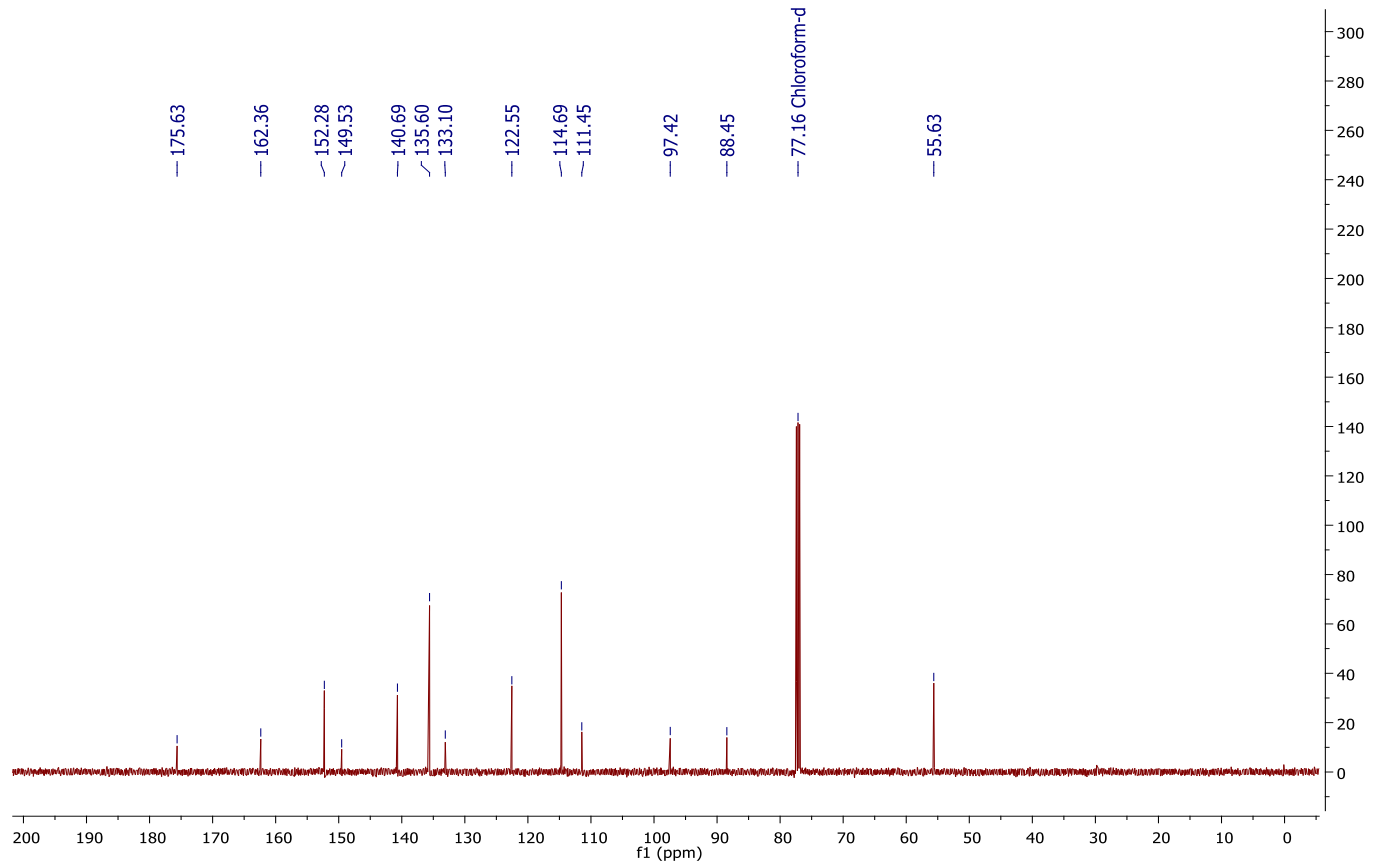


Compound **14c:** ^{1}H and ^{13}C NMR Spectrum

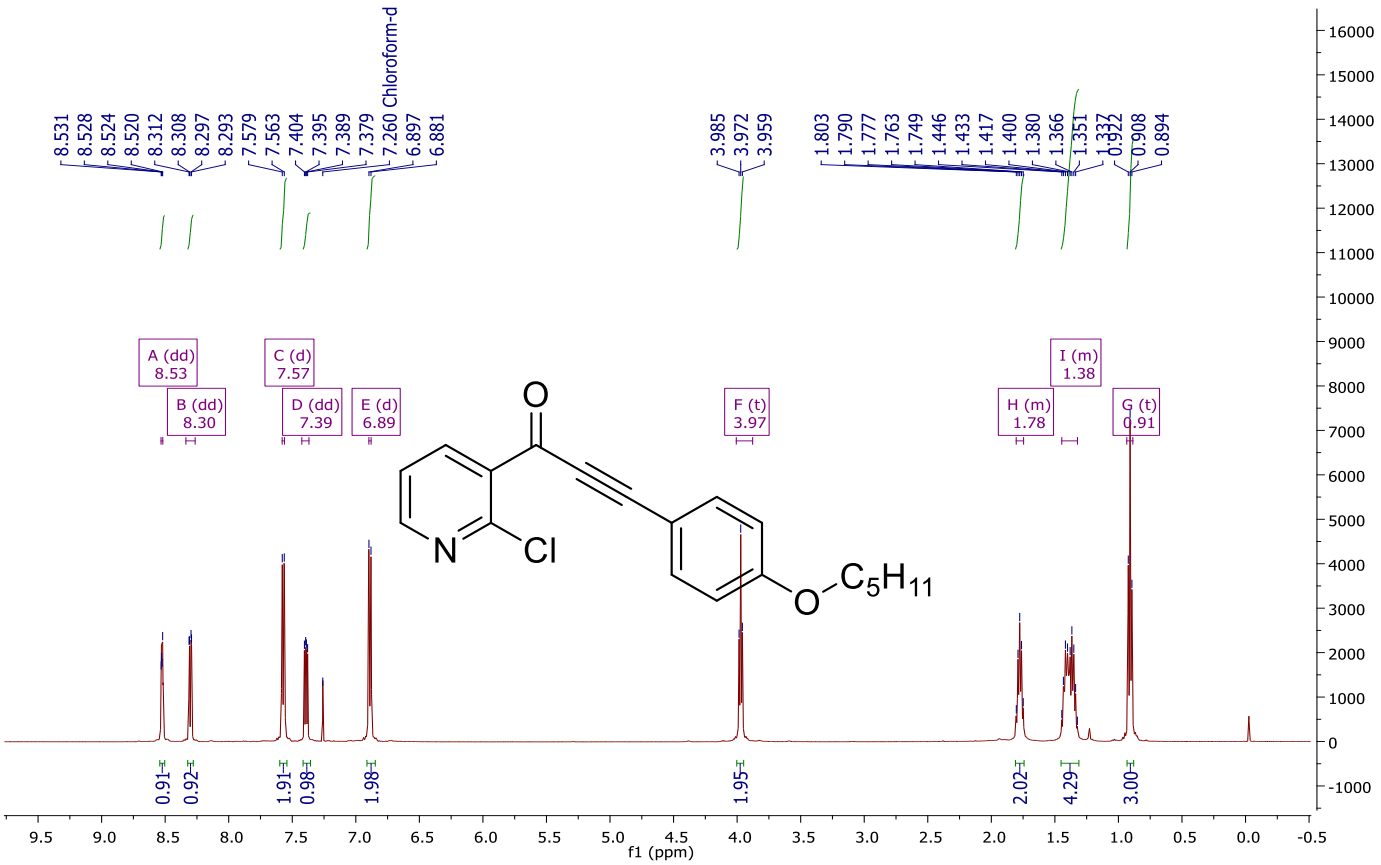


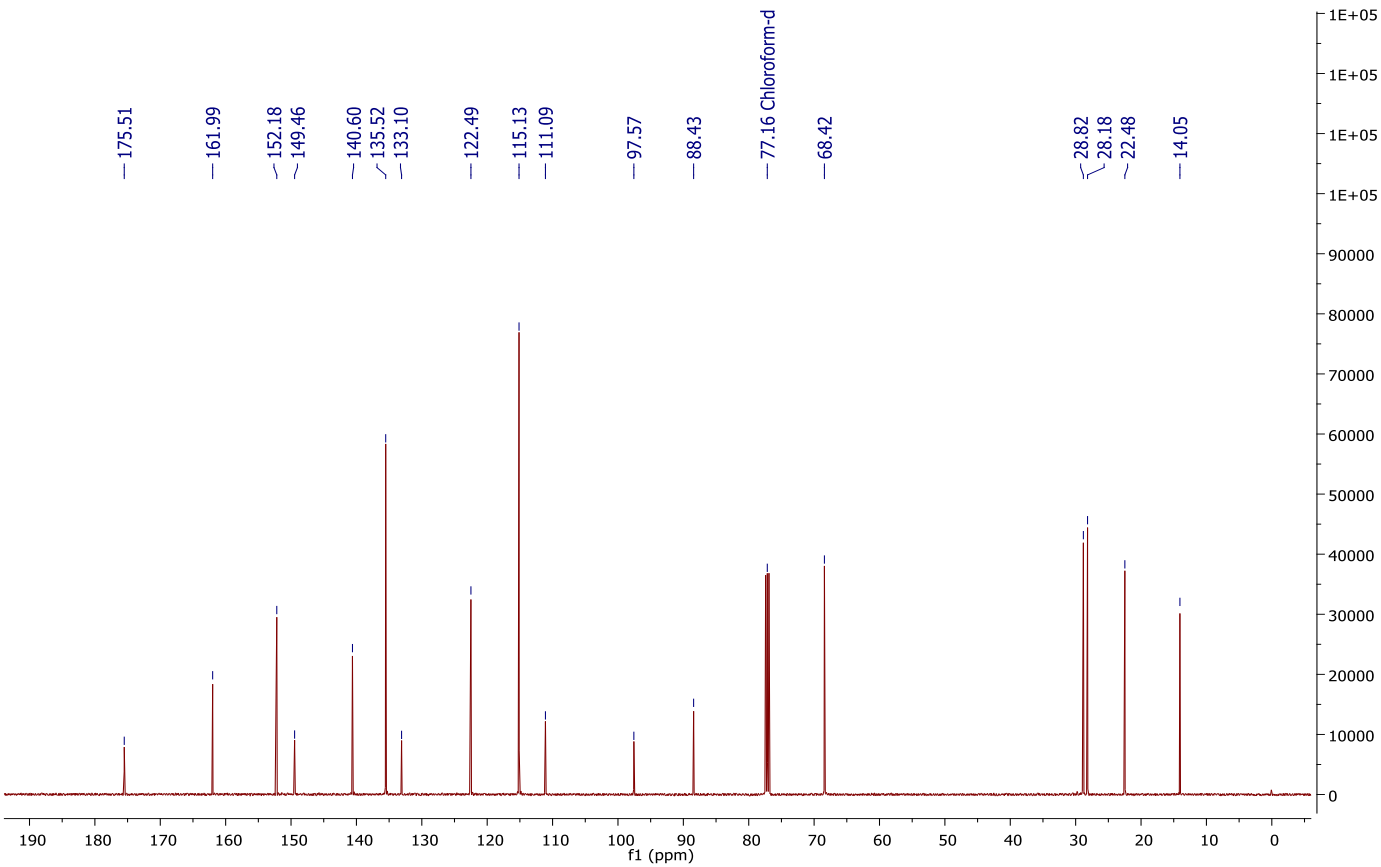
Compound **14d:** ^{1}H and ^{13}C NMR Spectrum



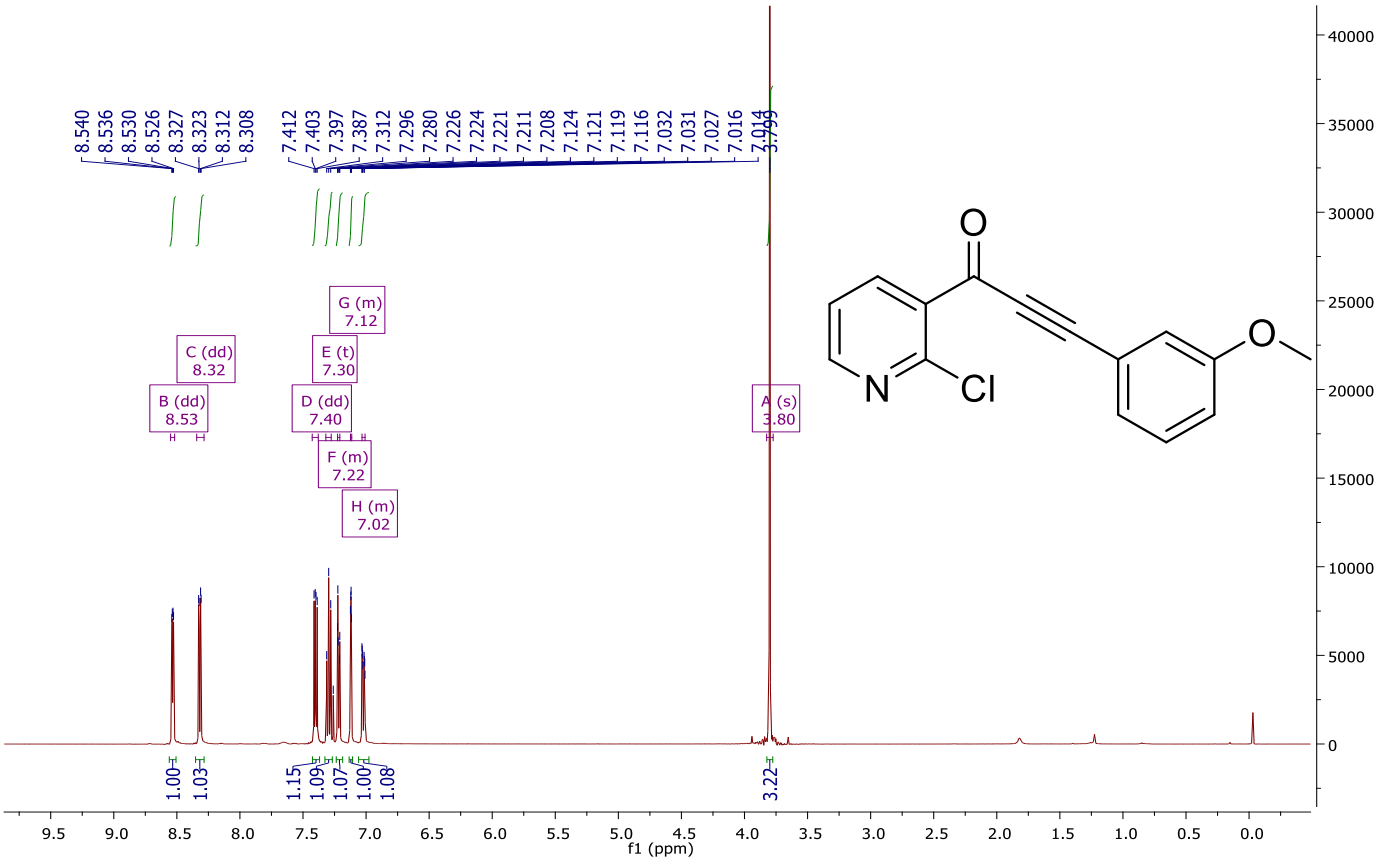


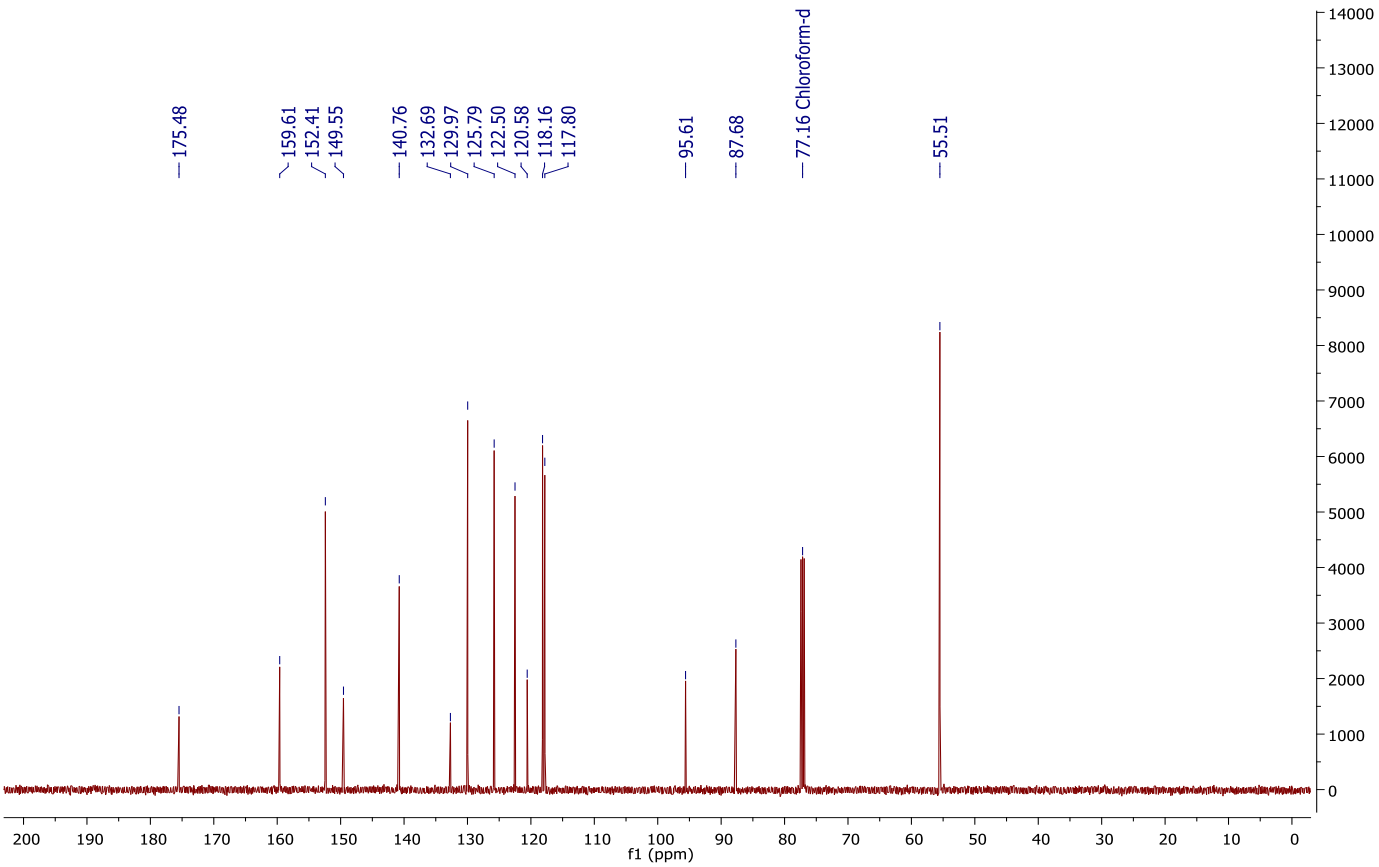
Compound **14e:** ^{1}H and ^{13}C NMR Spectrum



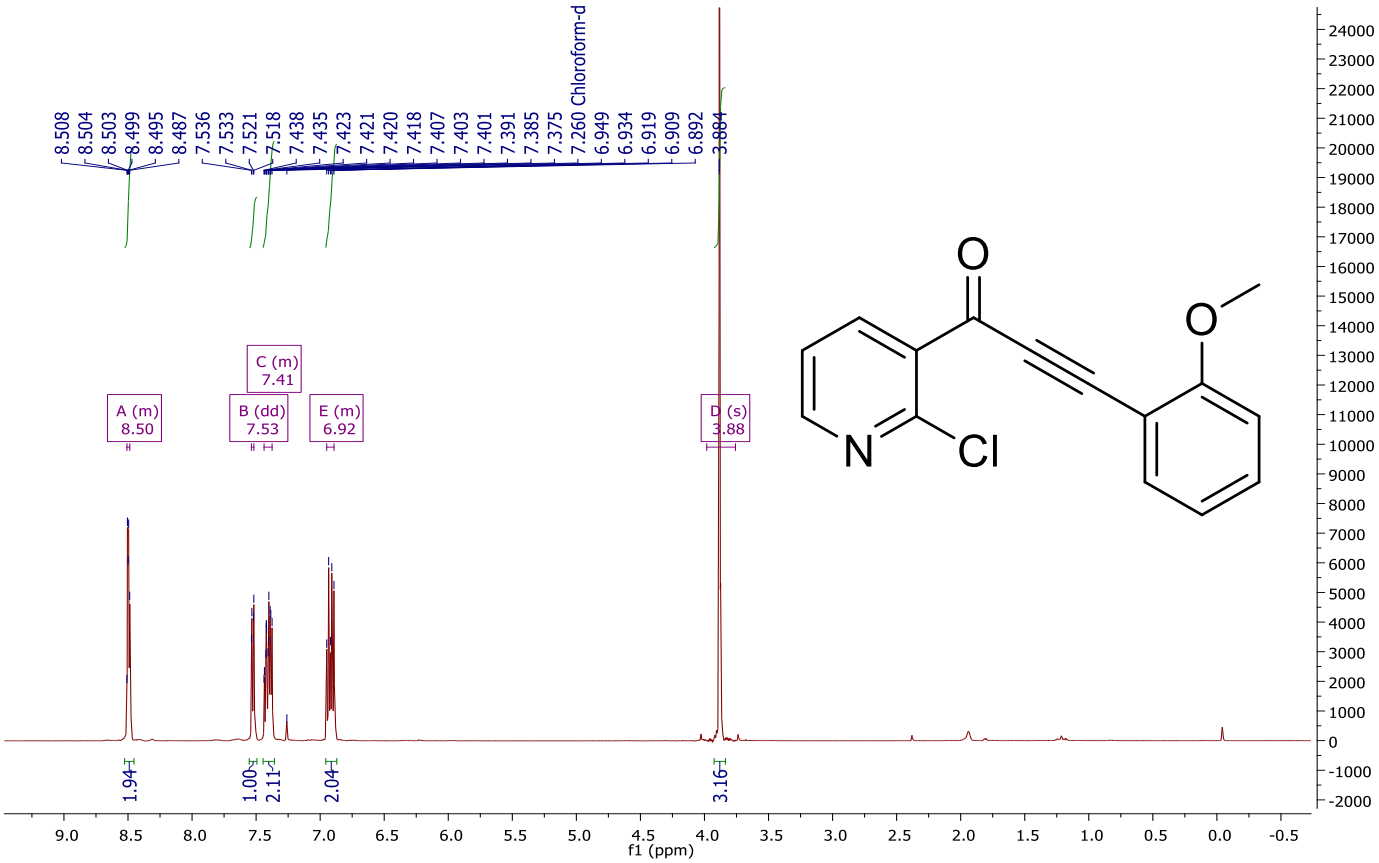


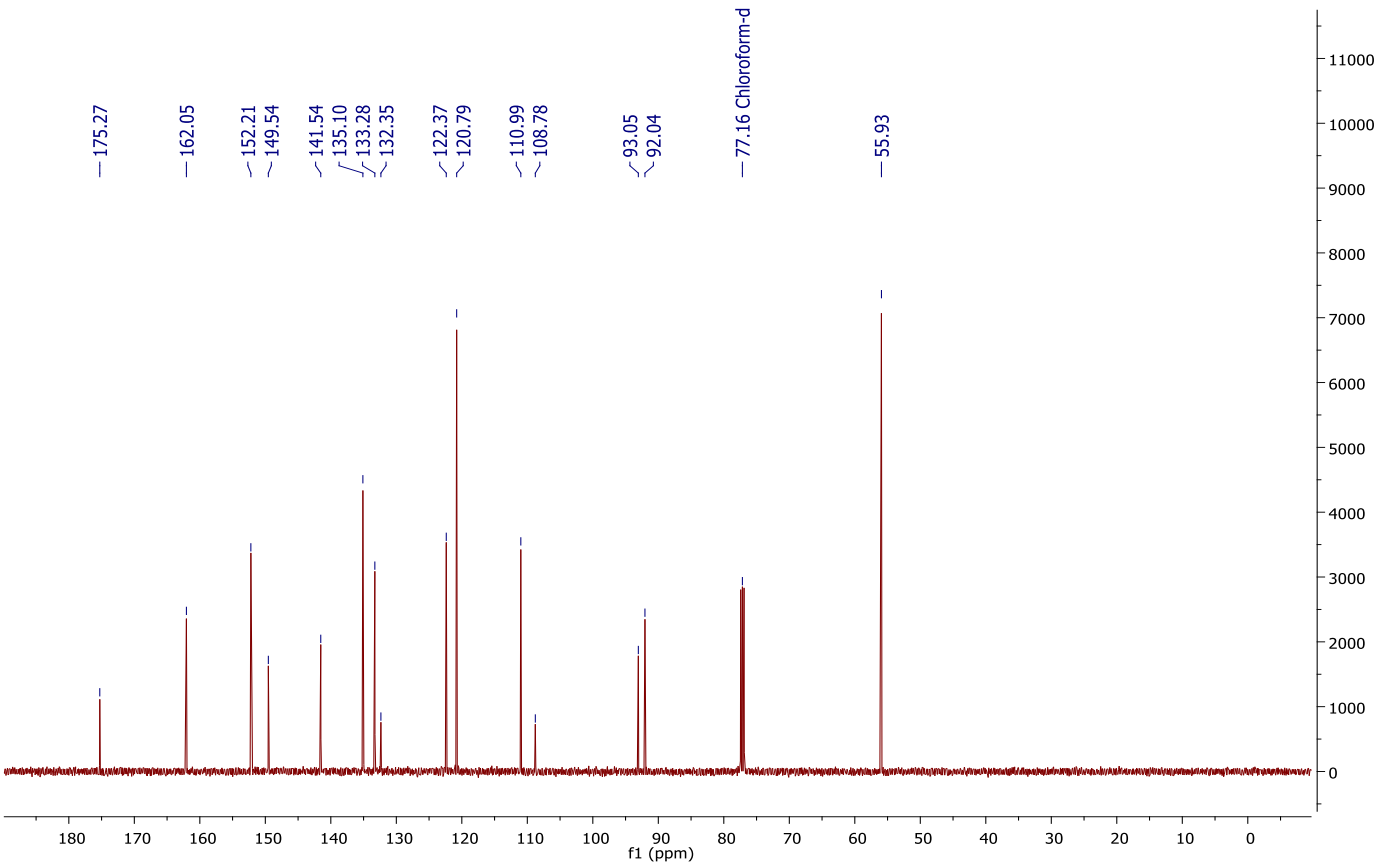
Compound **14f:** ^{1}H and ^{13}C NMR Spectrum



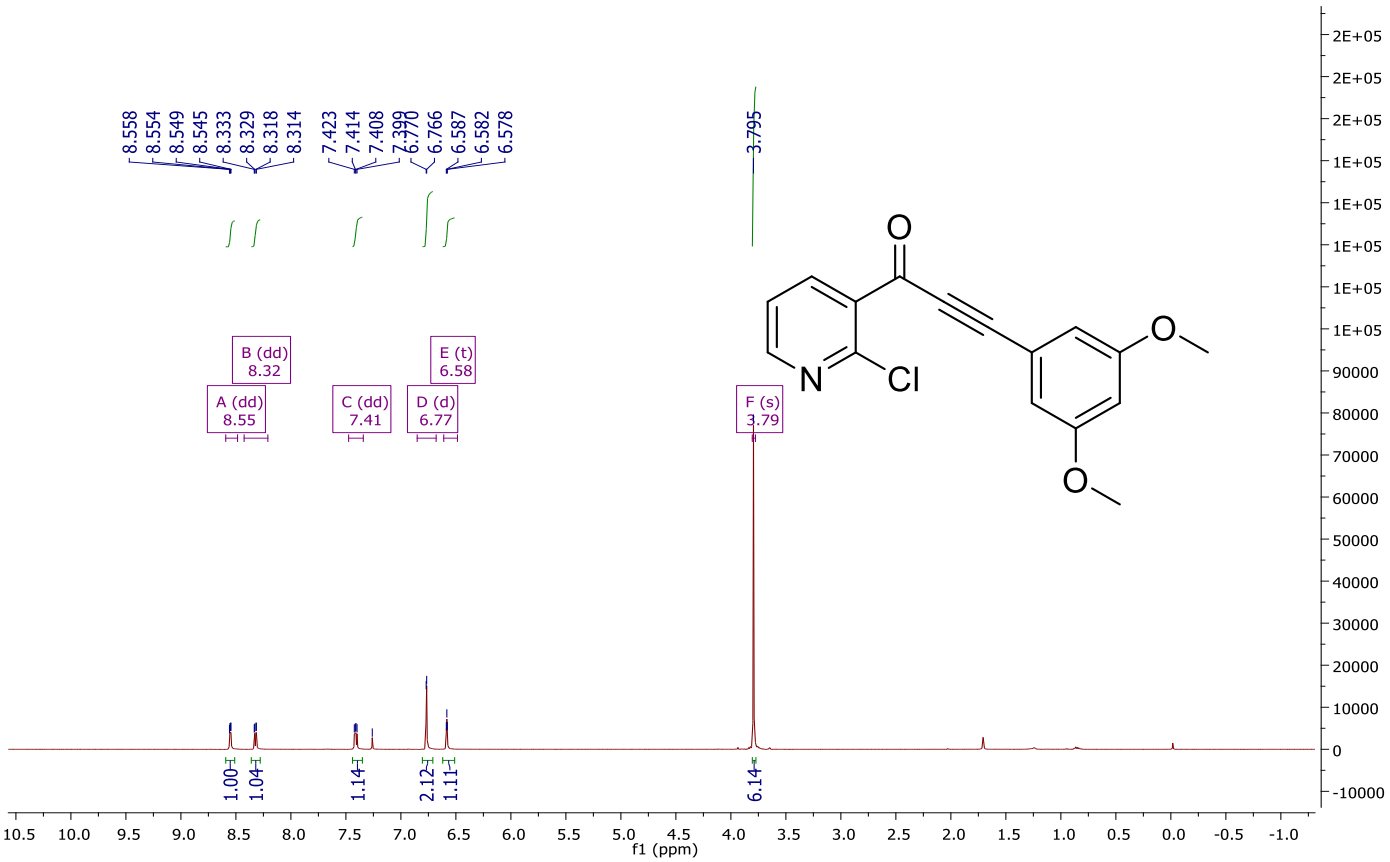


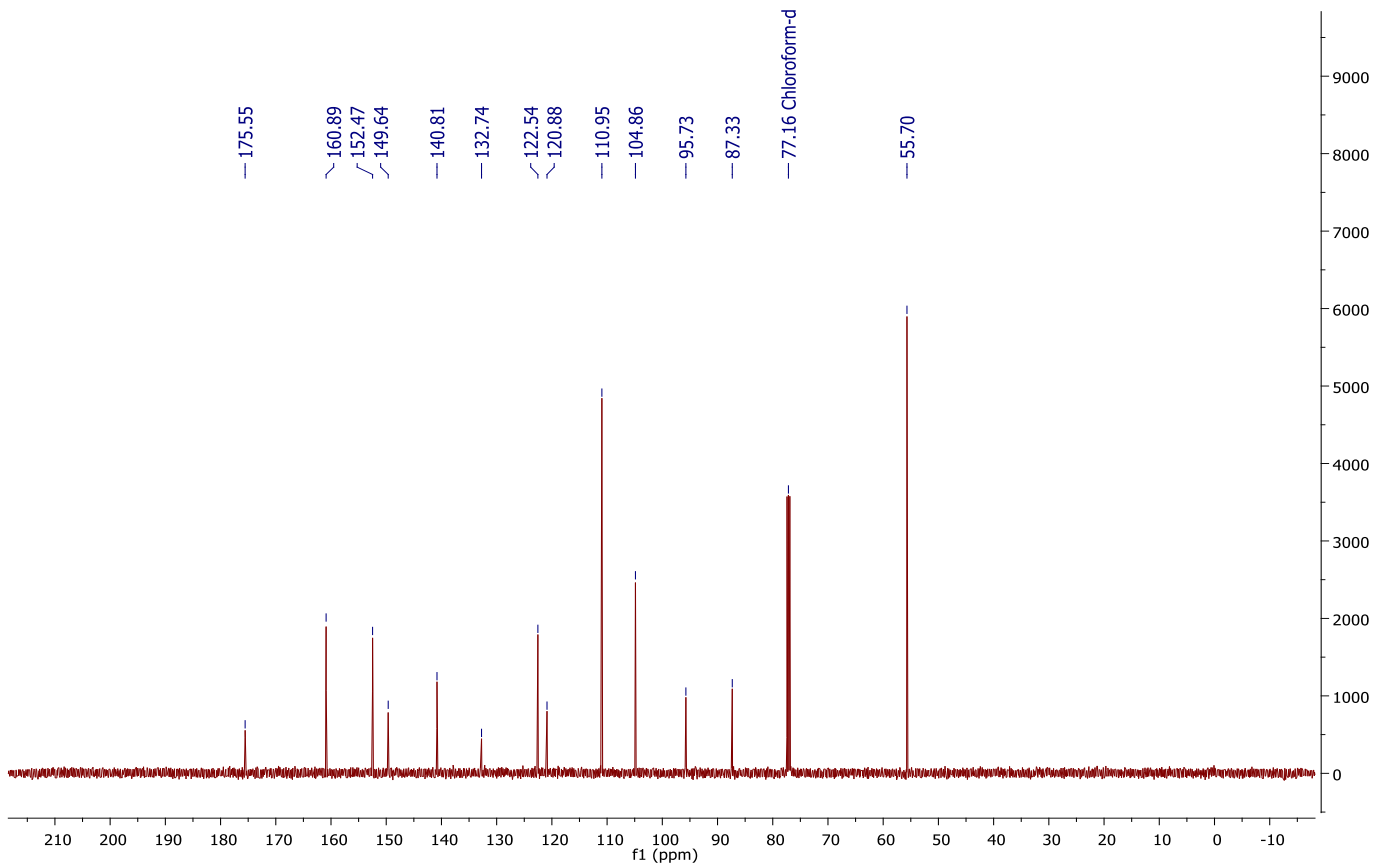
Compound **14g:** ^{1}H and ^{13}C NMR Spectrum



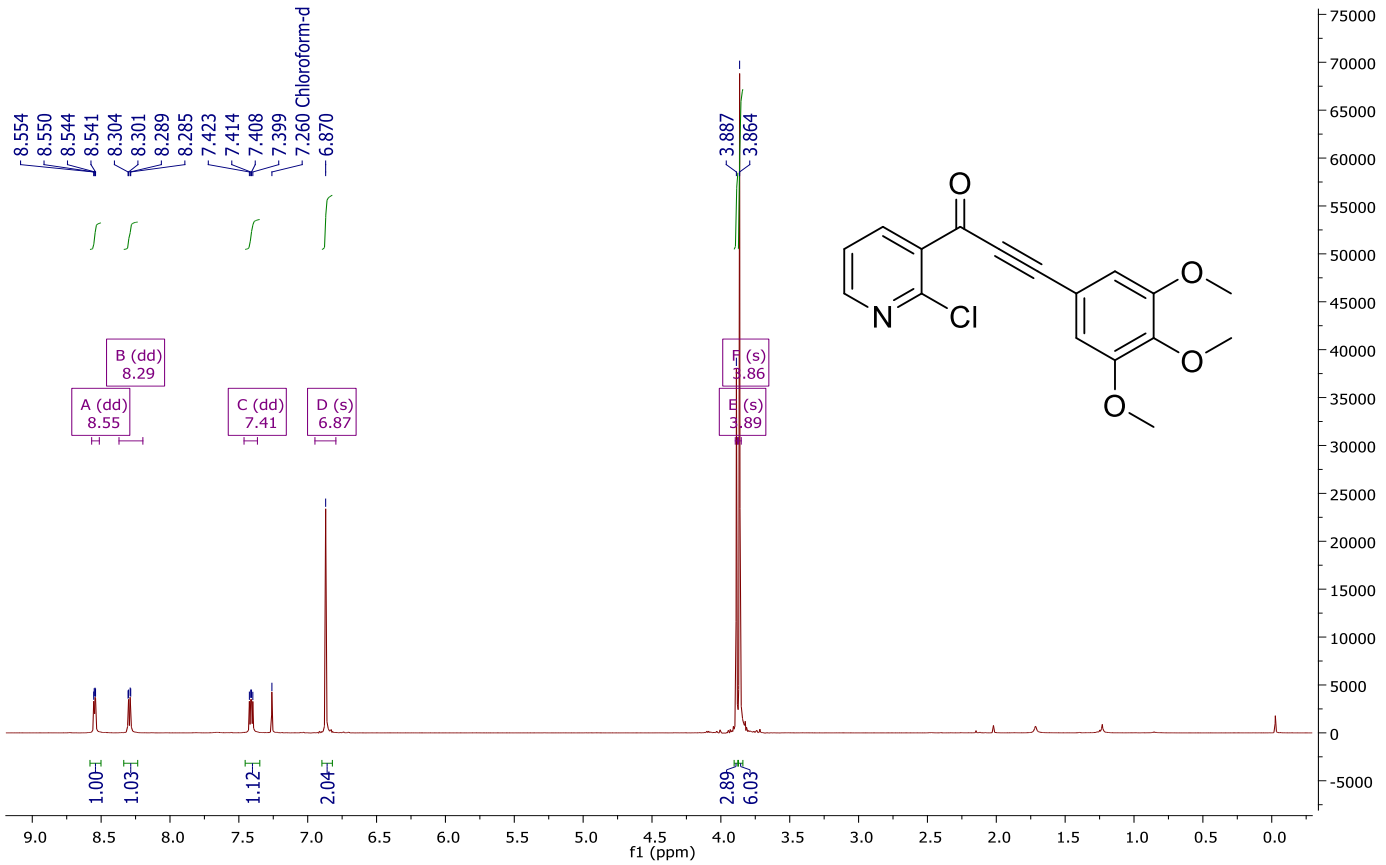


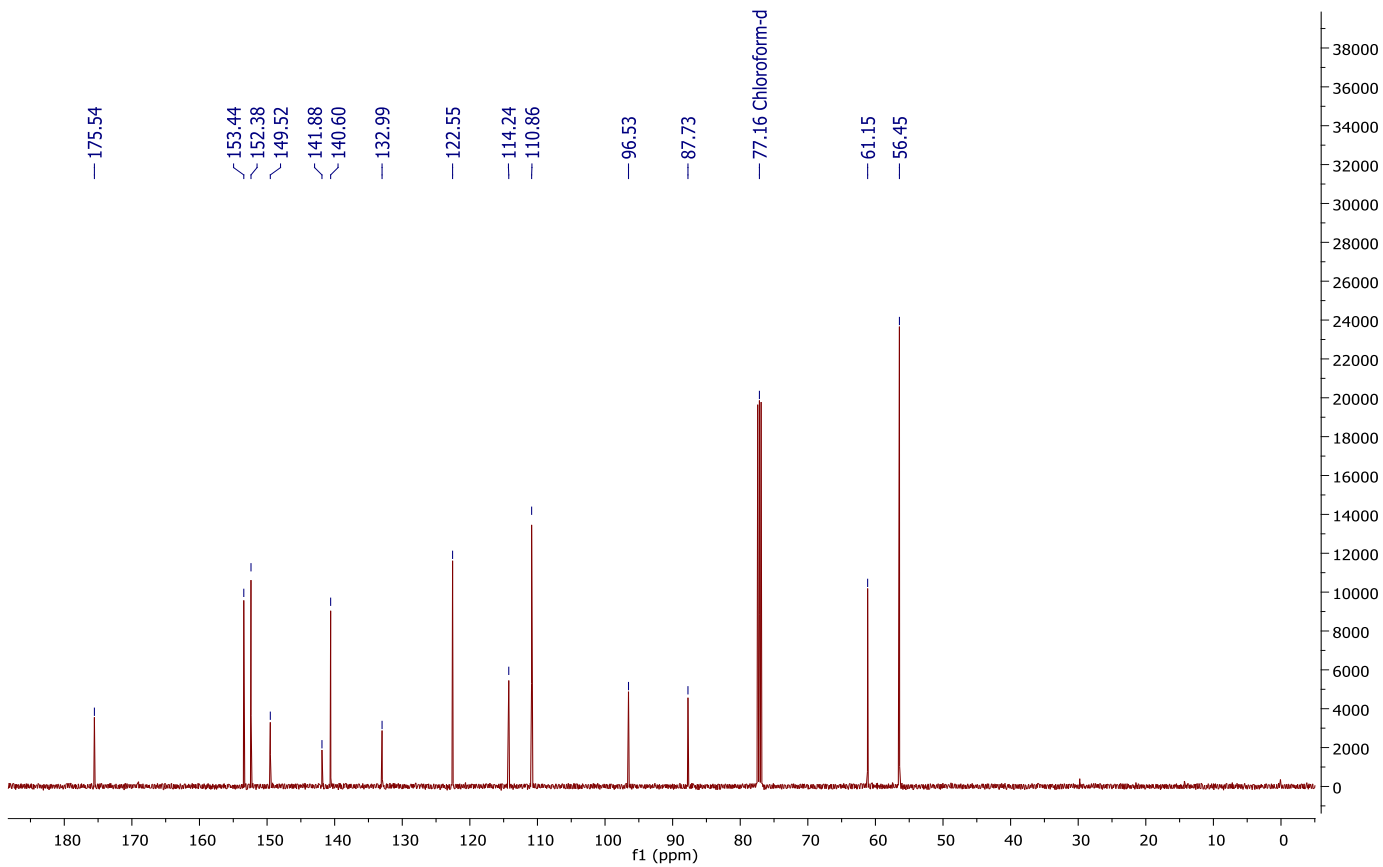
Compound **14h:** ^{1}H and ^{13}C NMR Spectrum



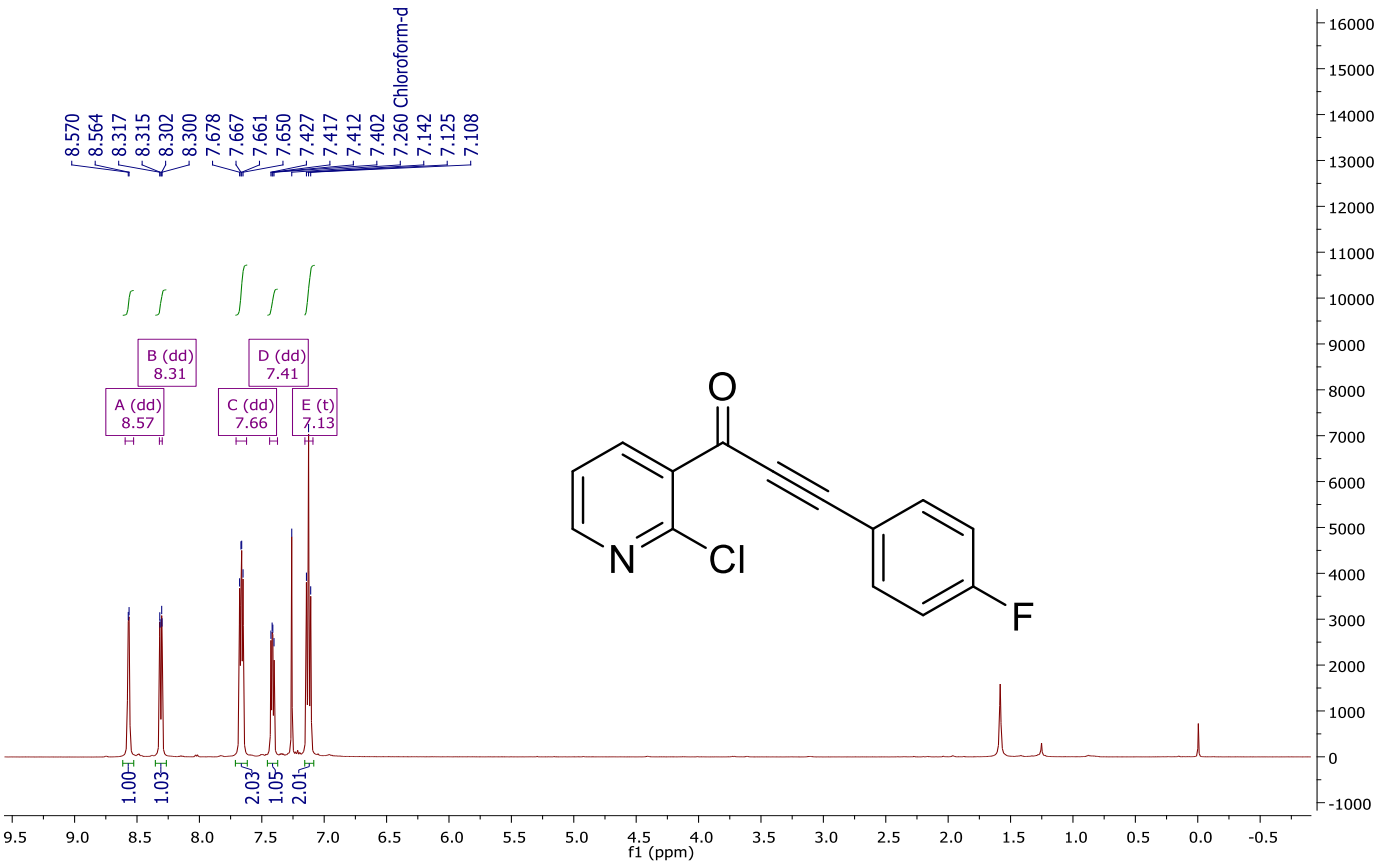


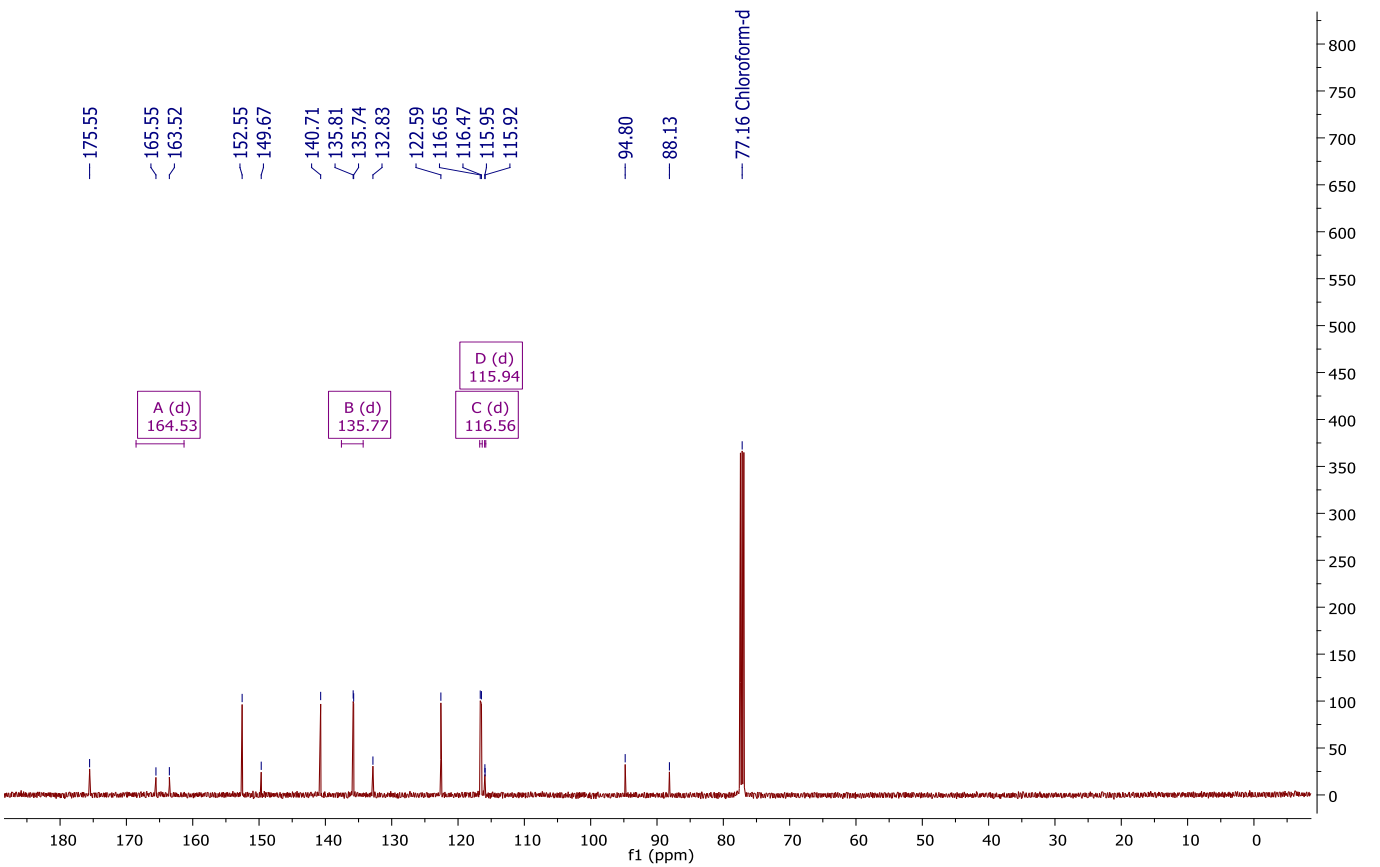
Compound **14i:** ^{1}H and ^{13}C NMR Spectrum



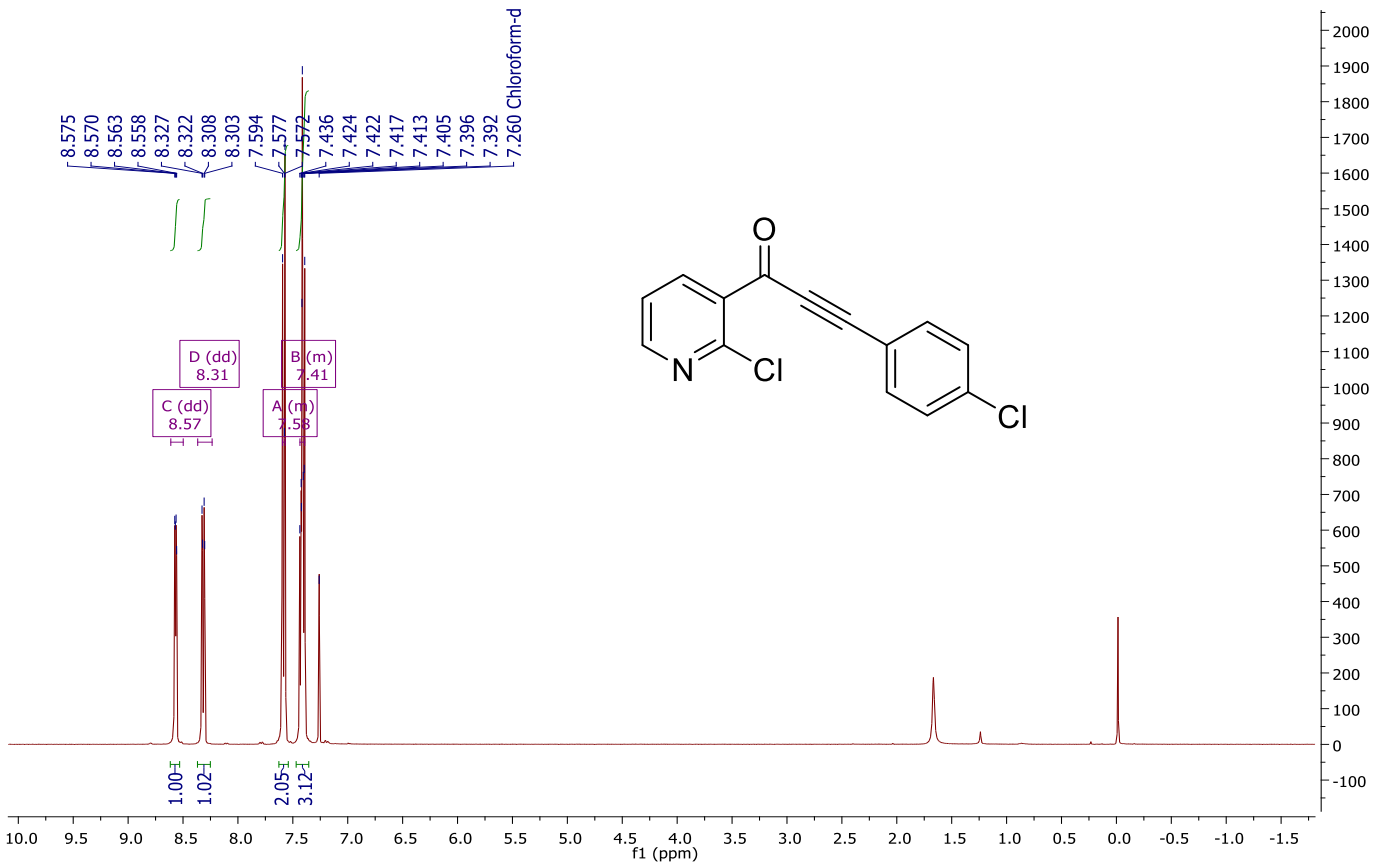


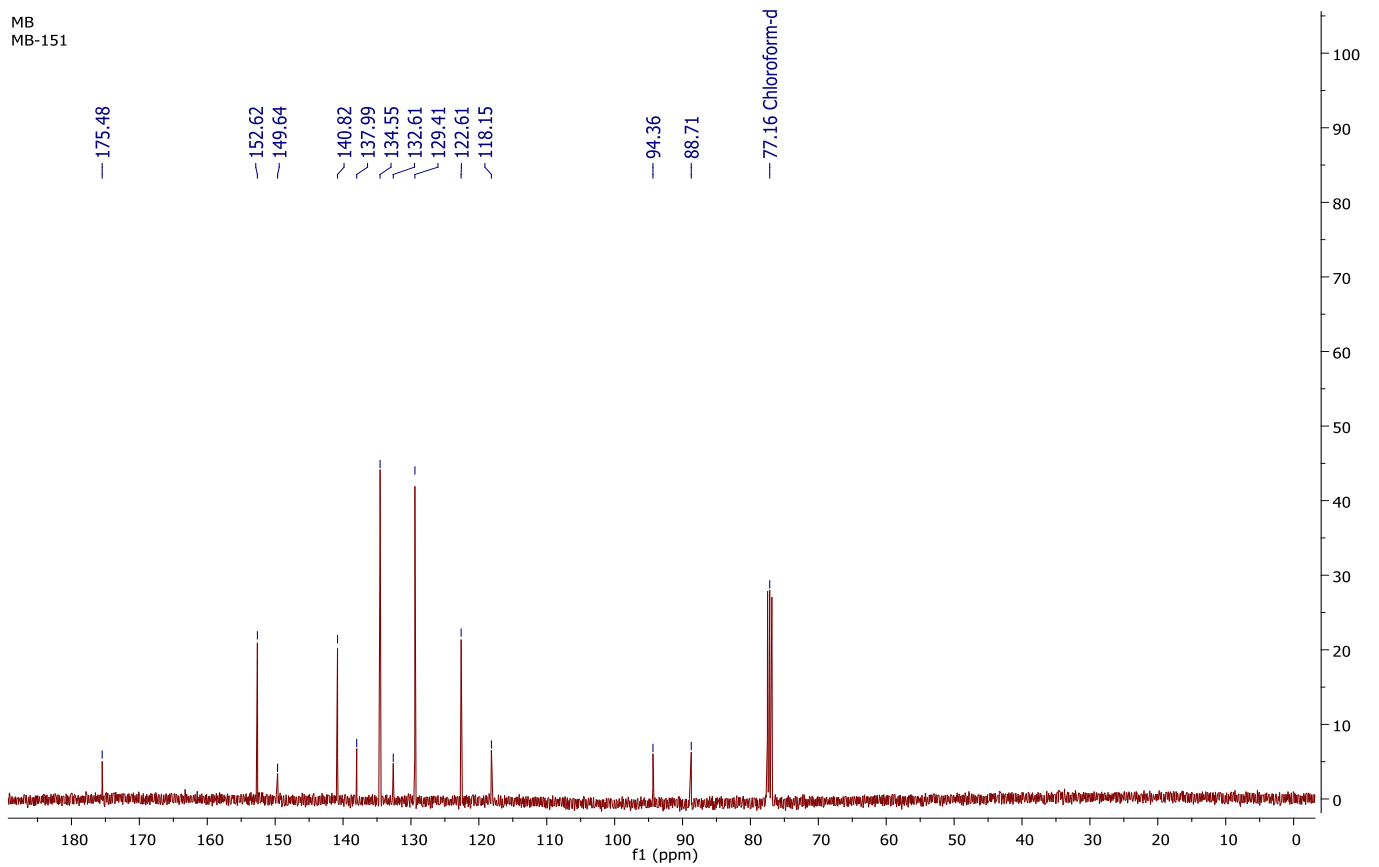
Compound **14j** ^{1}H and ^{13}C NMR Spectrum



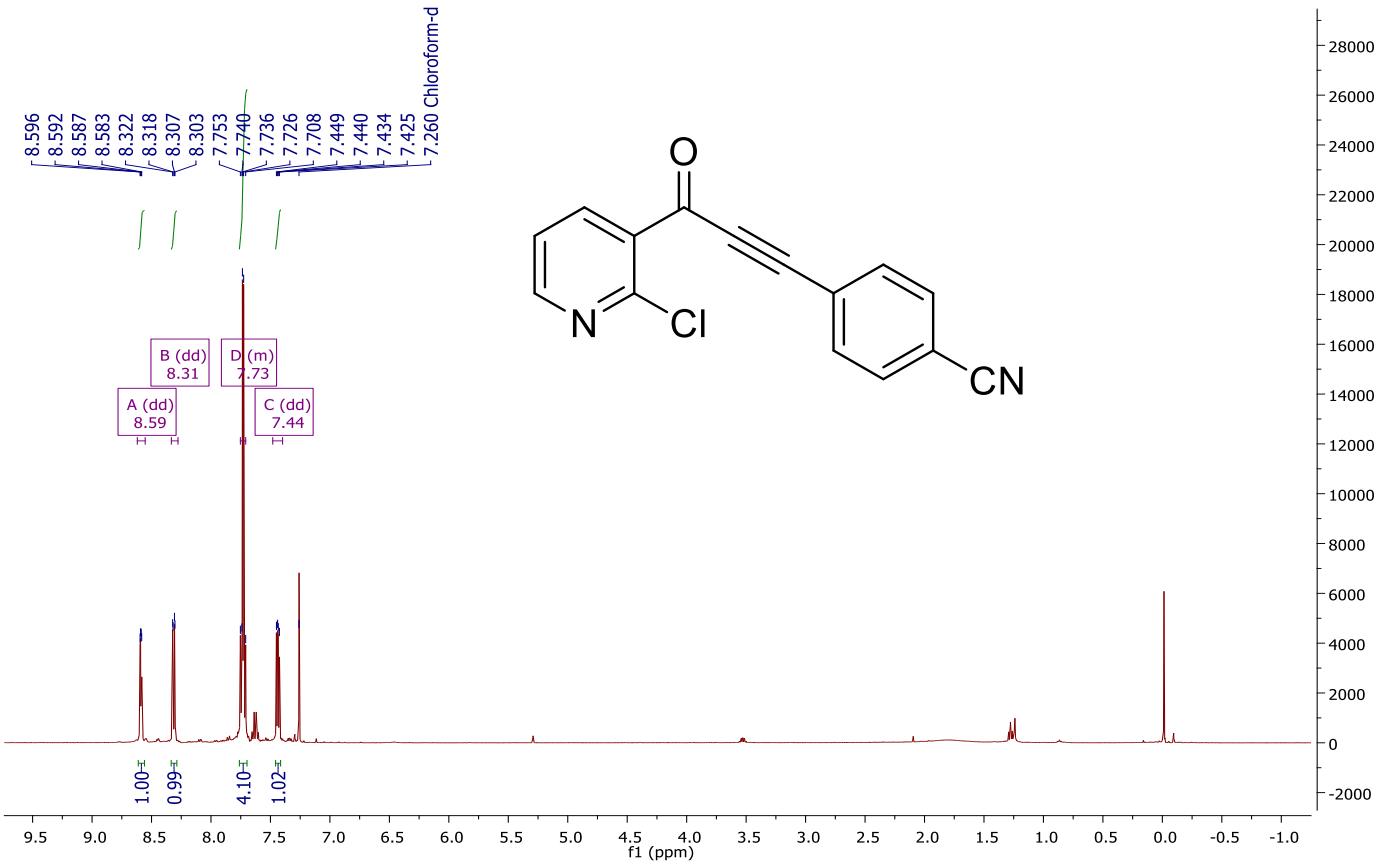


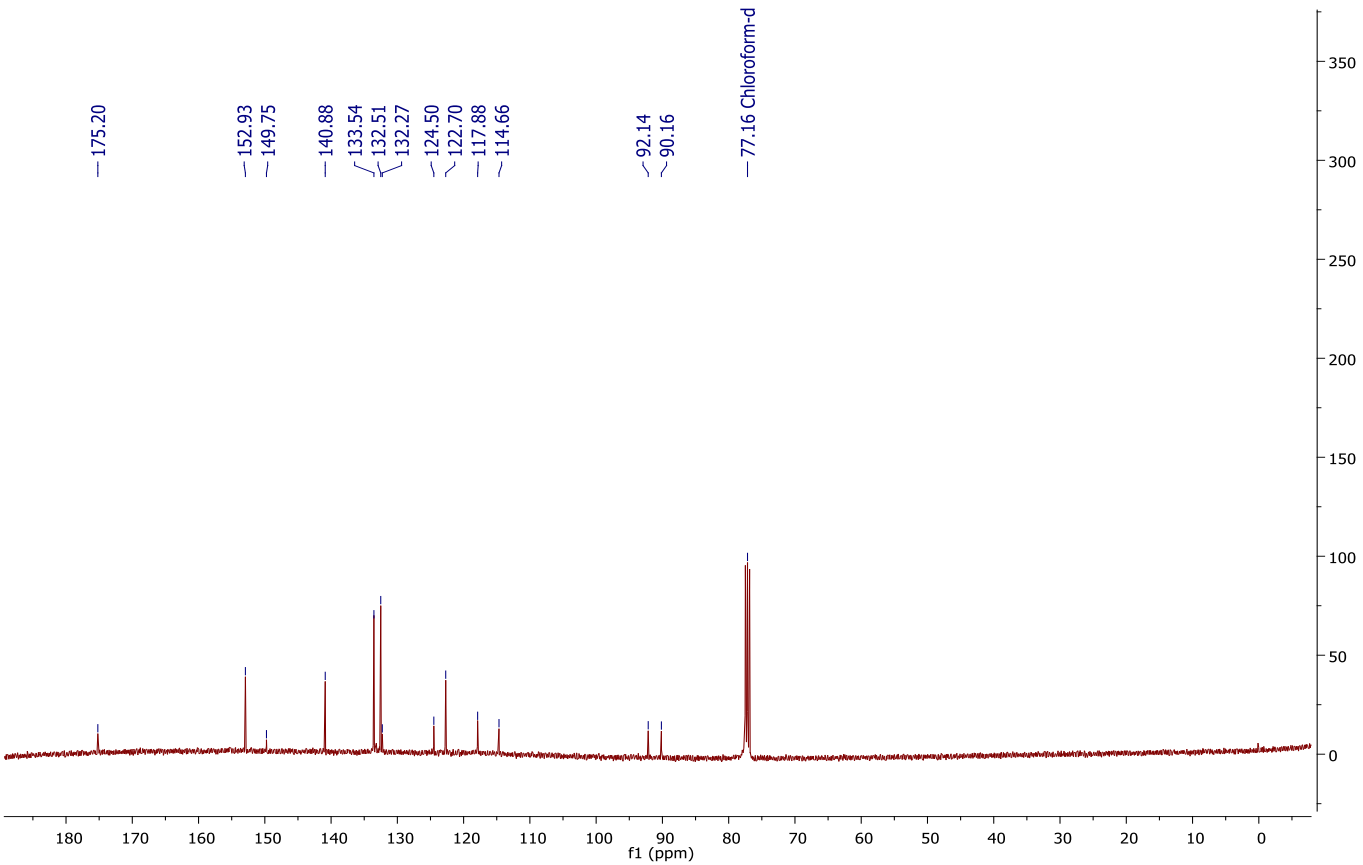
Compound **14k:** ^{1}H and ^{13}C NMR Spectrum



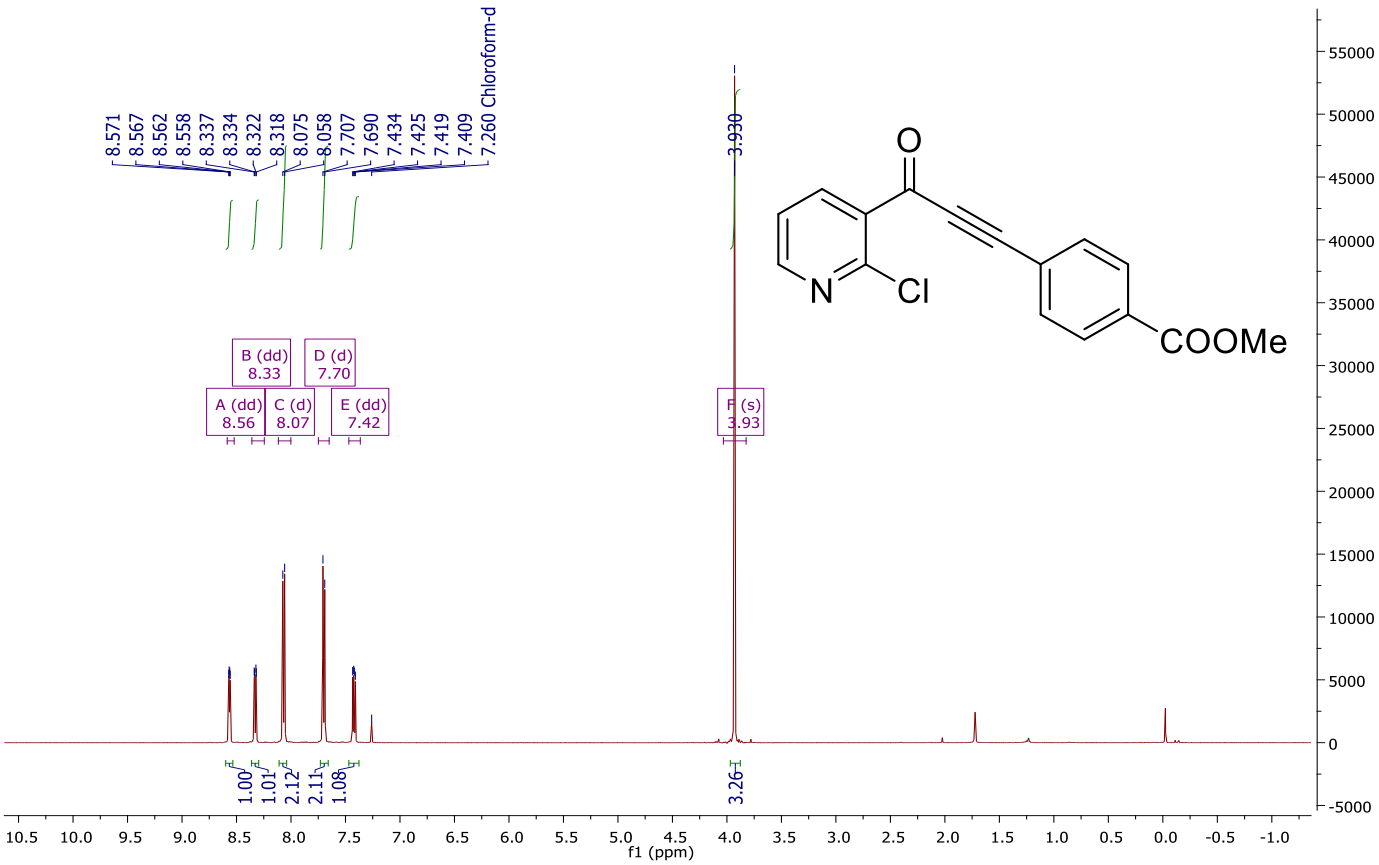


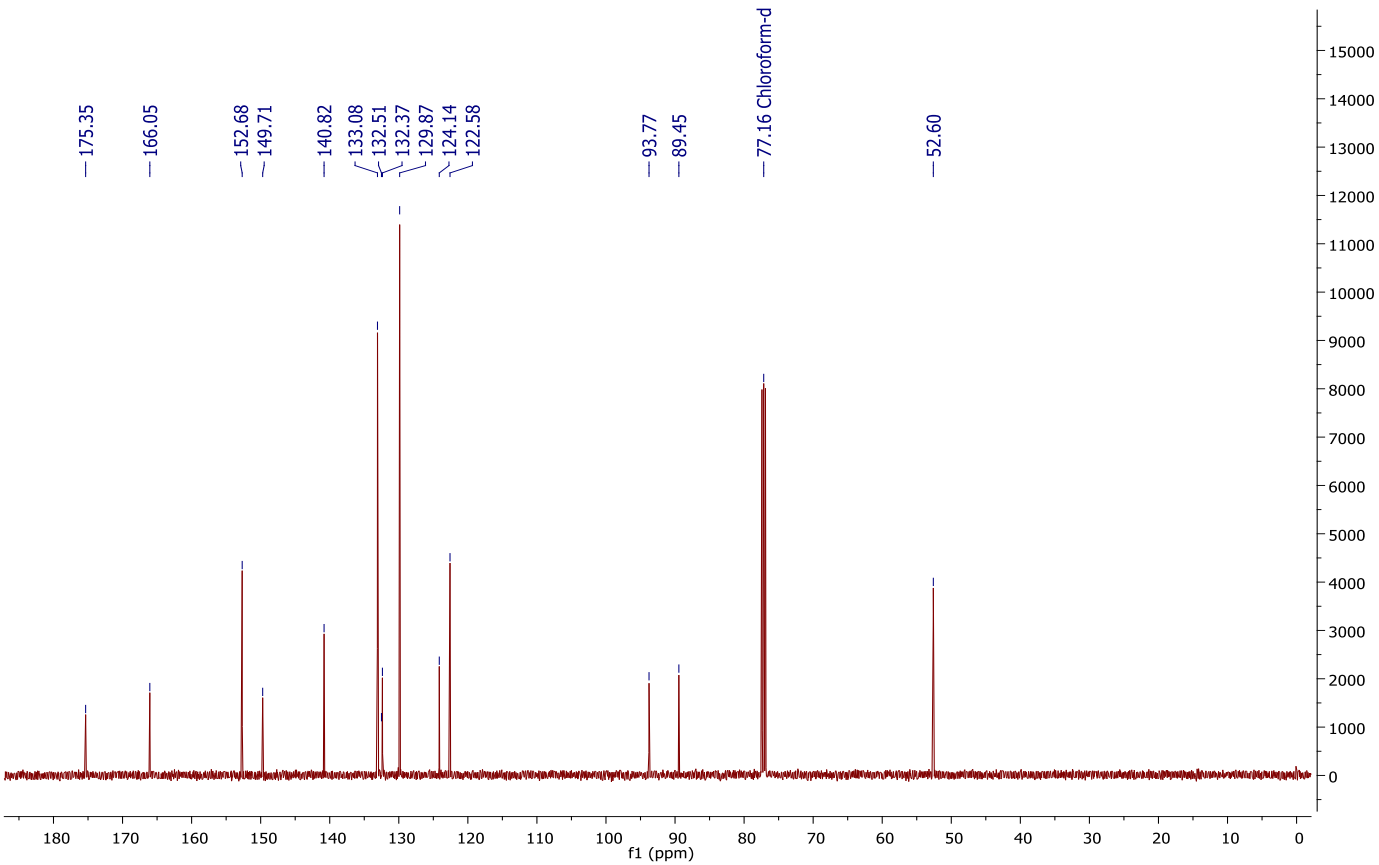
Compound **14l:** ^{1}H and ^{13}C NMR Spectrum



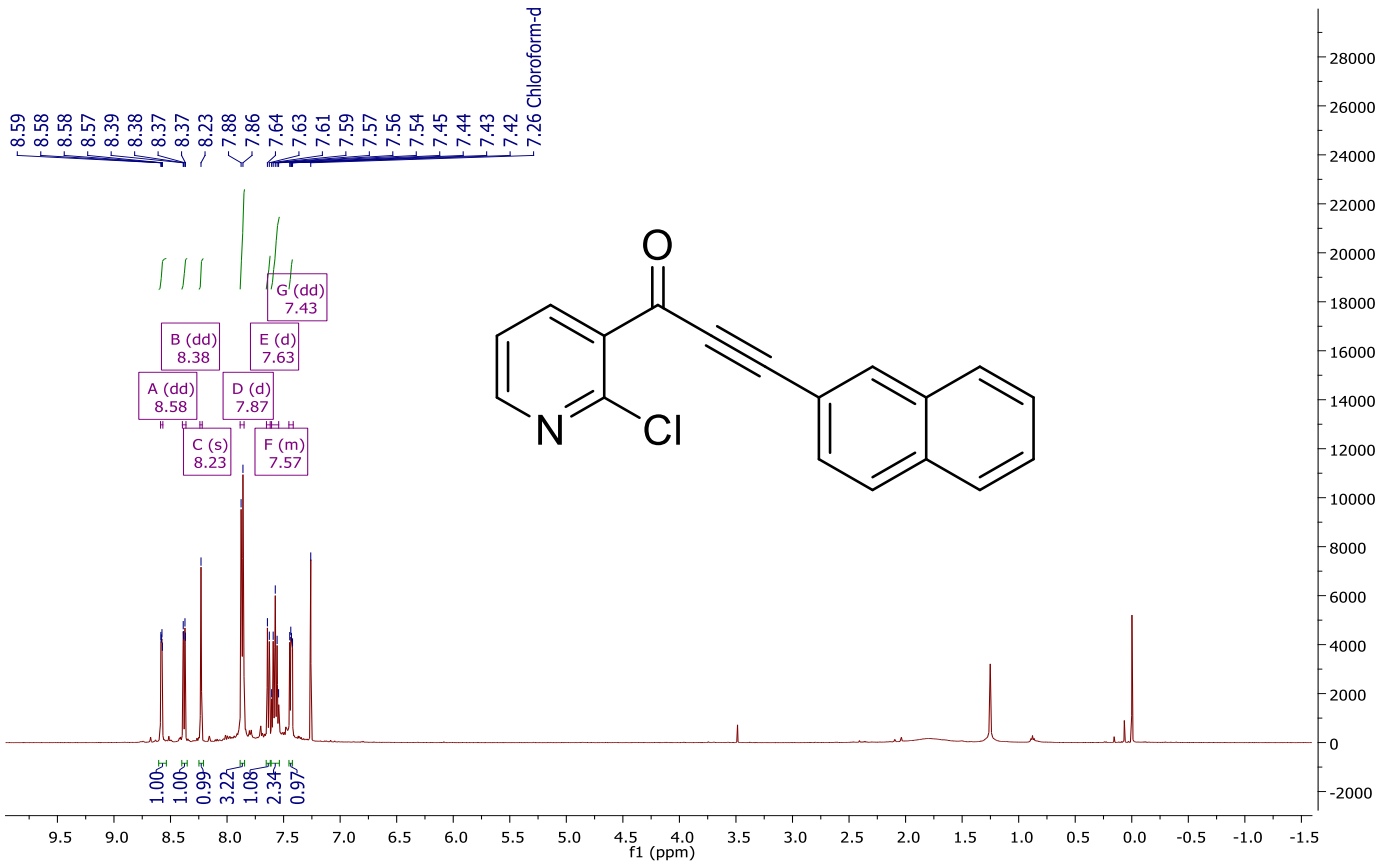


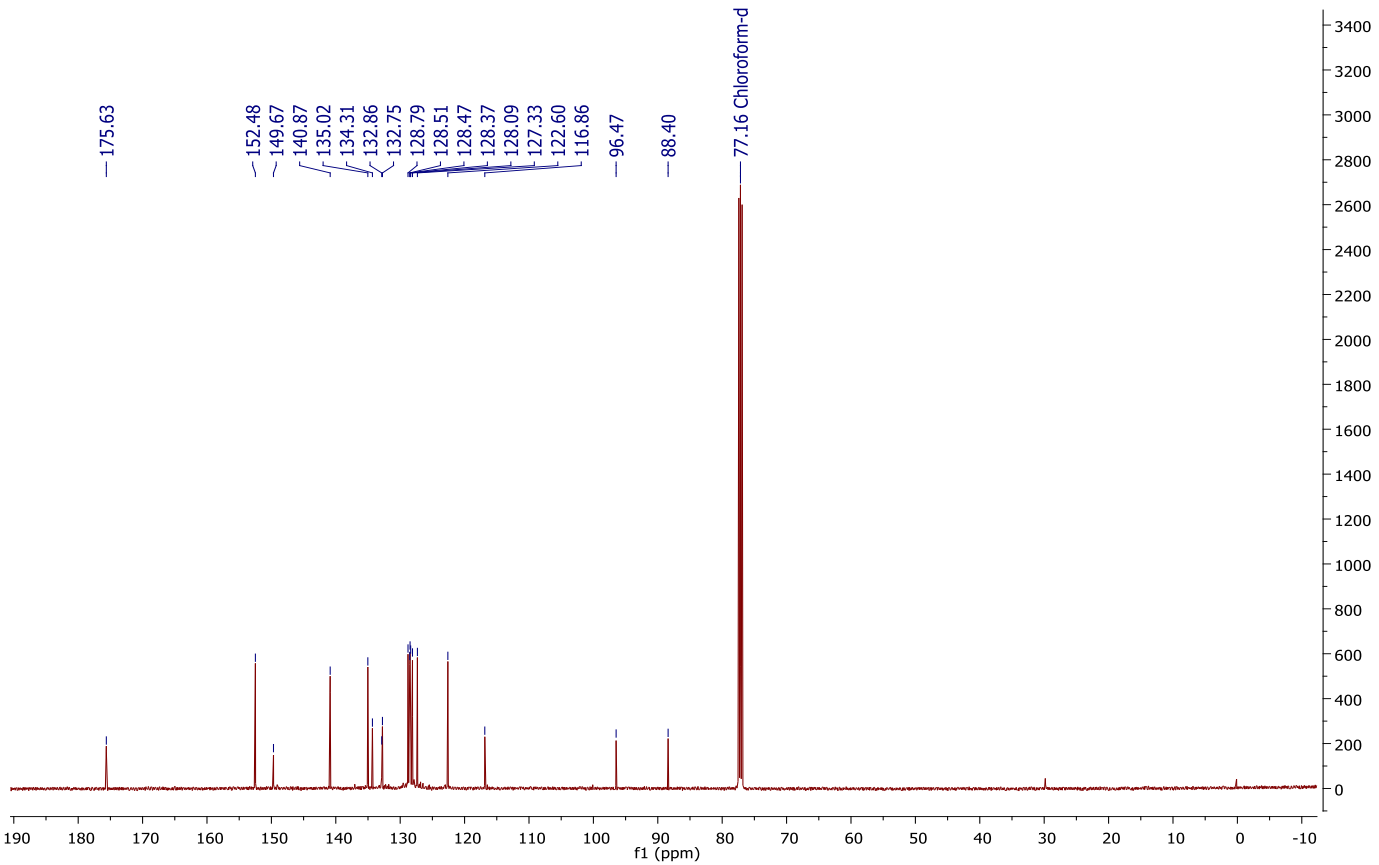
Compound **14m:** ^{1}H and ^{13}C NMR Spectrum



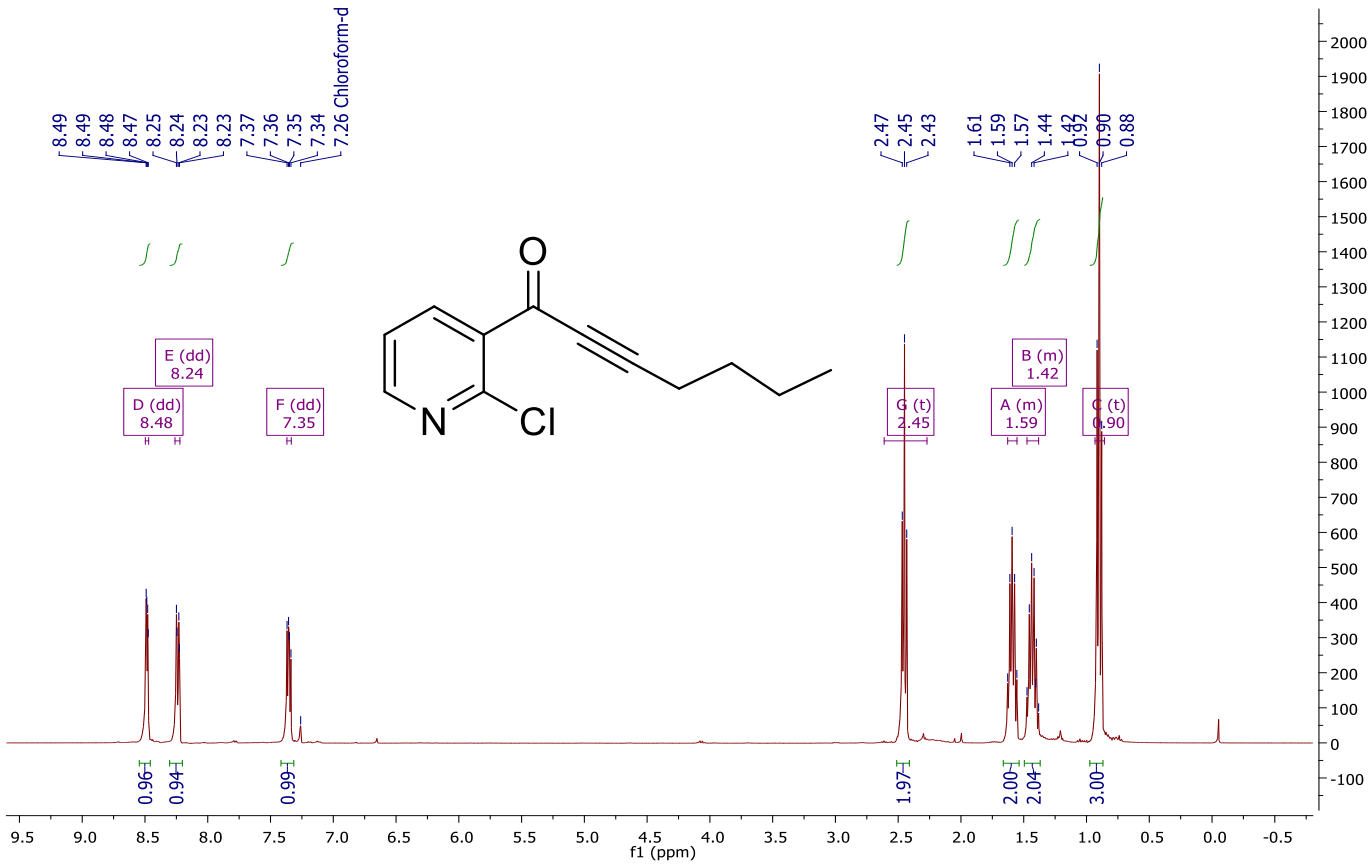


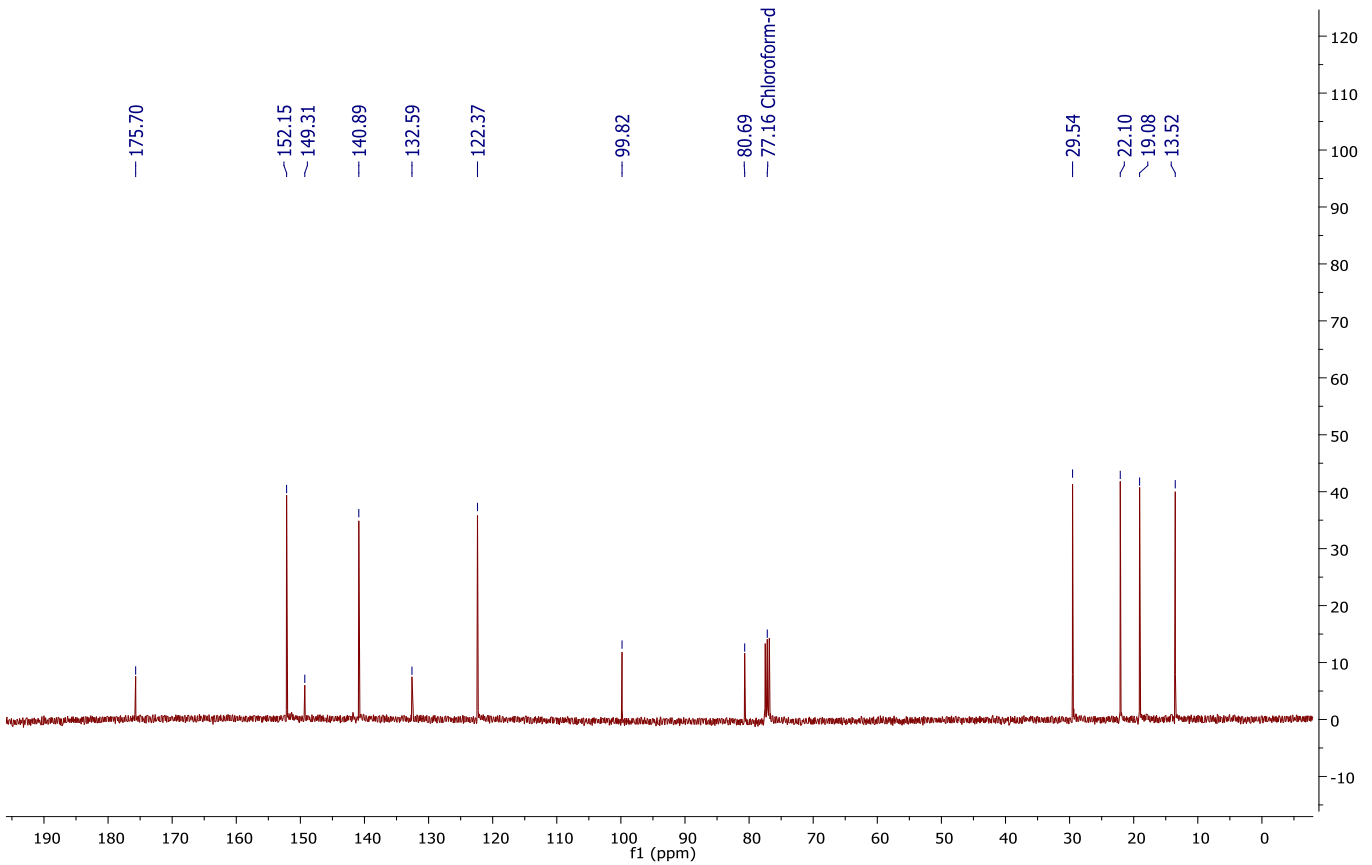
Compound **14n:** ^{1}H and ^{13}C NMR Spectrum



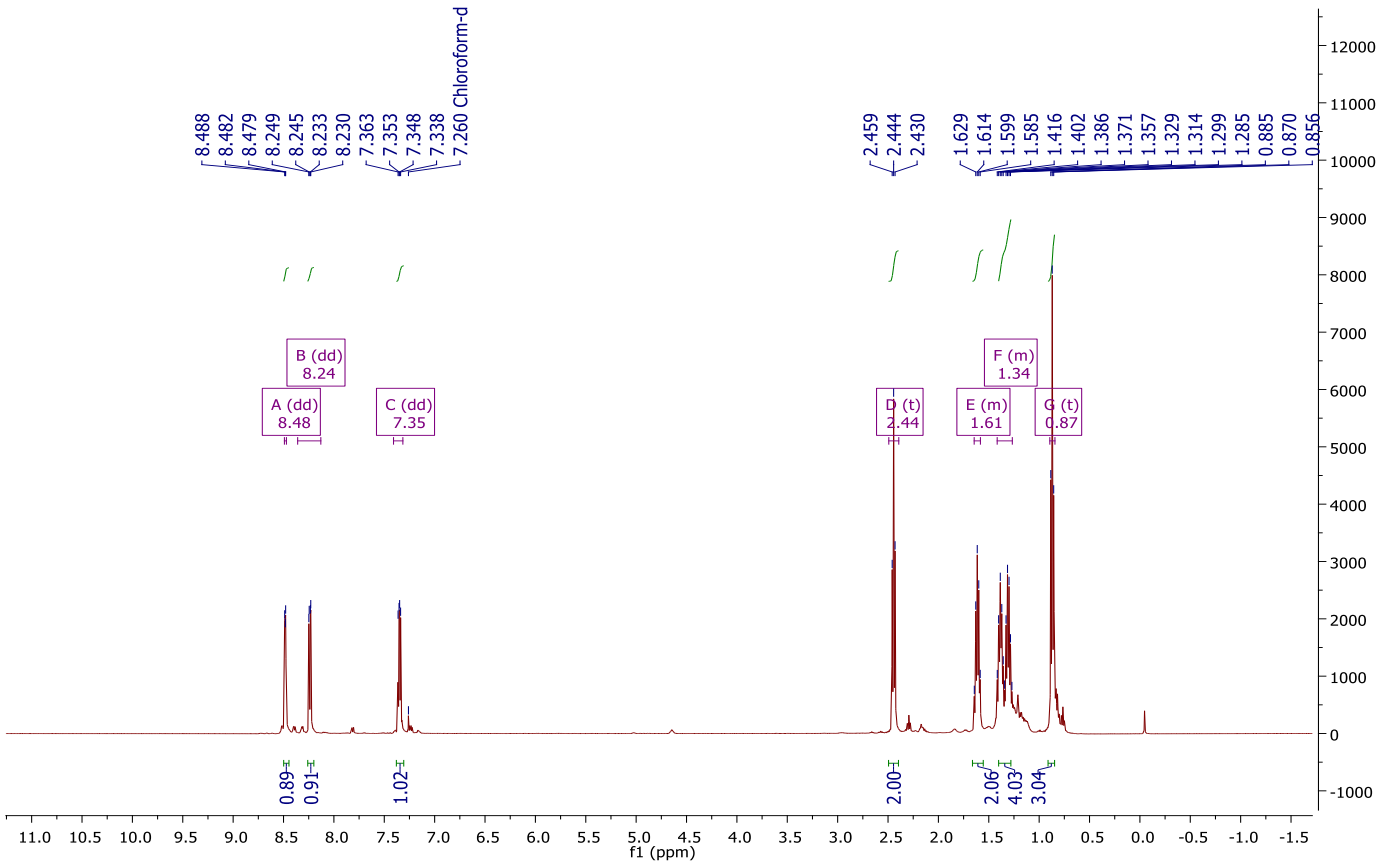


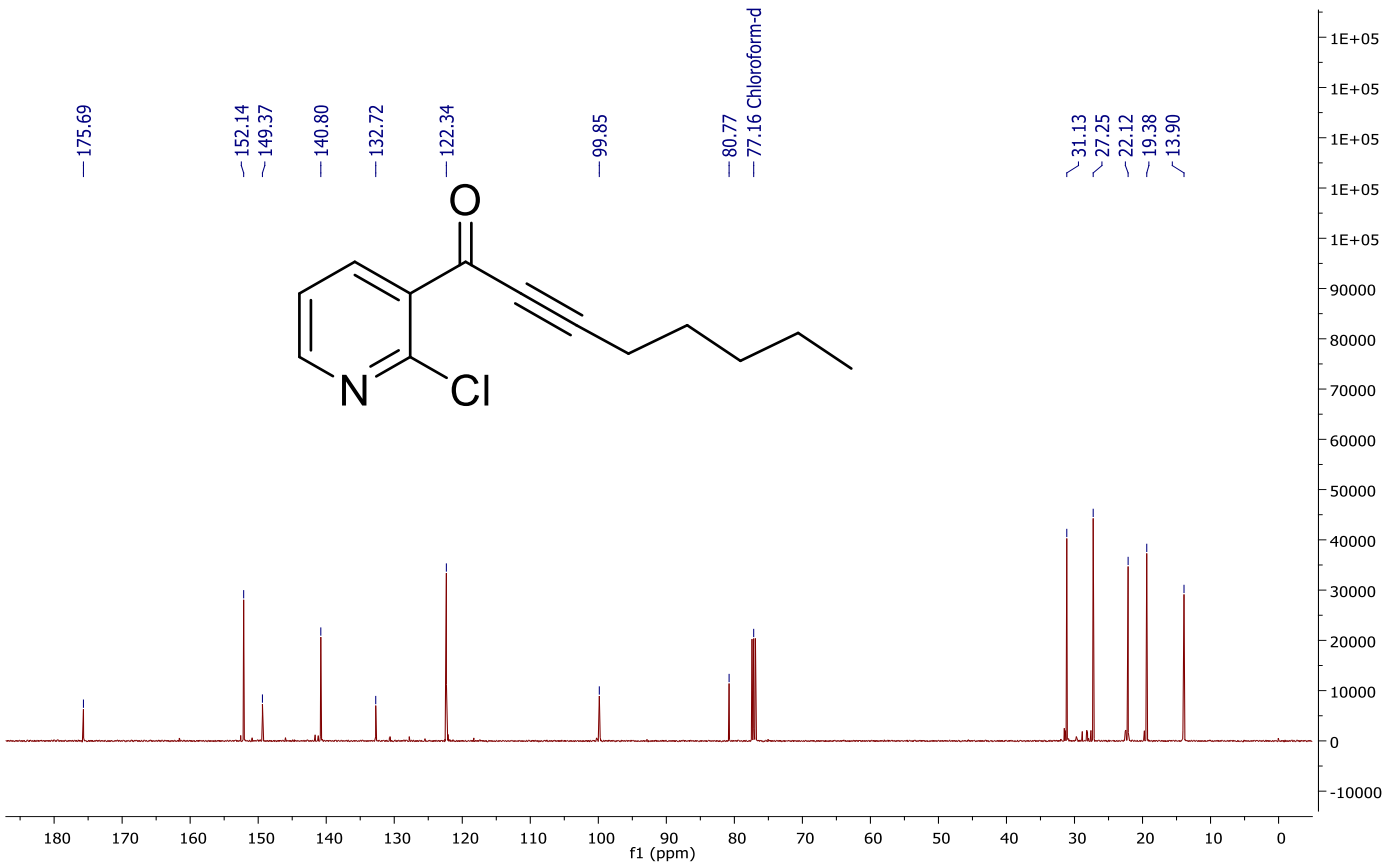
Compound **14o:** ^{1}H and ^{13}C NMR Spectrum



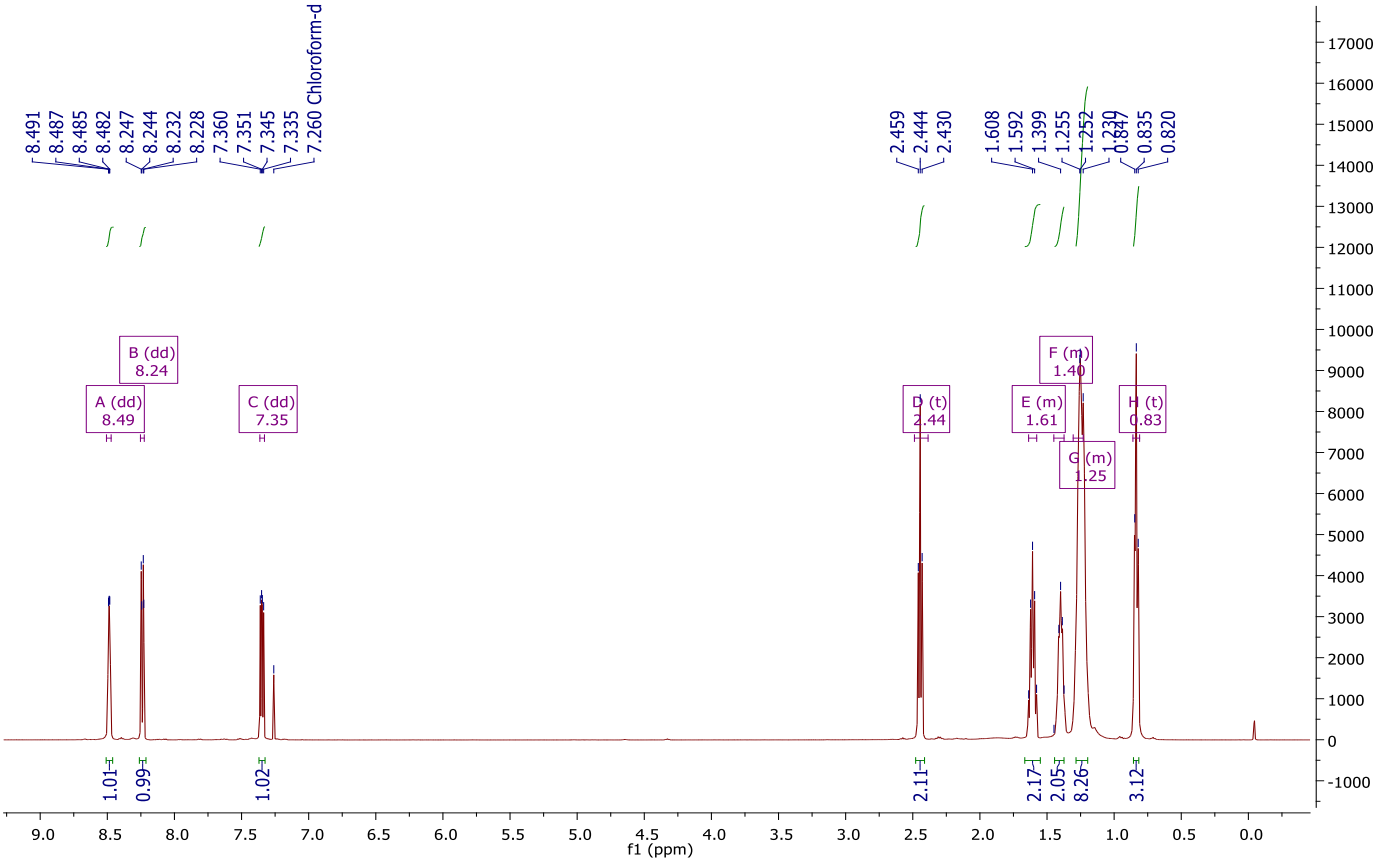


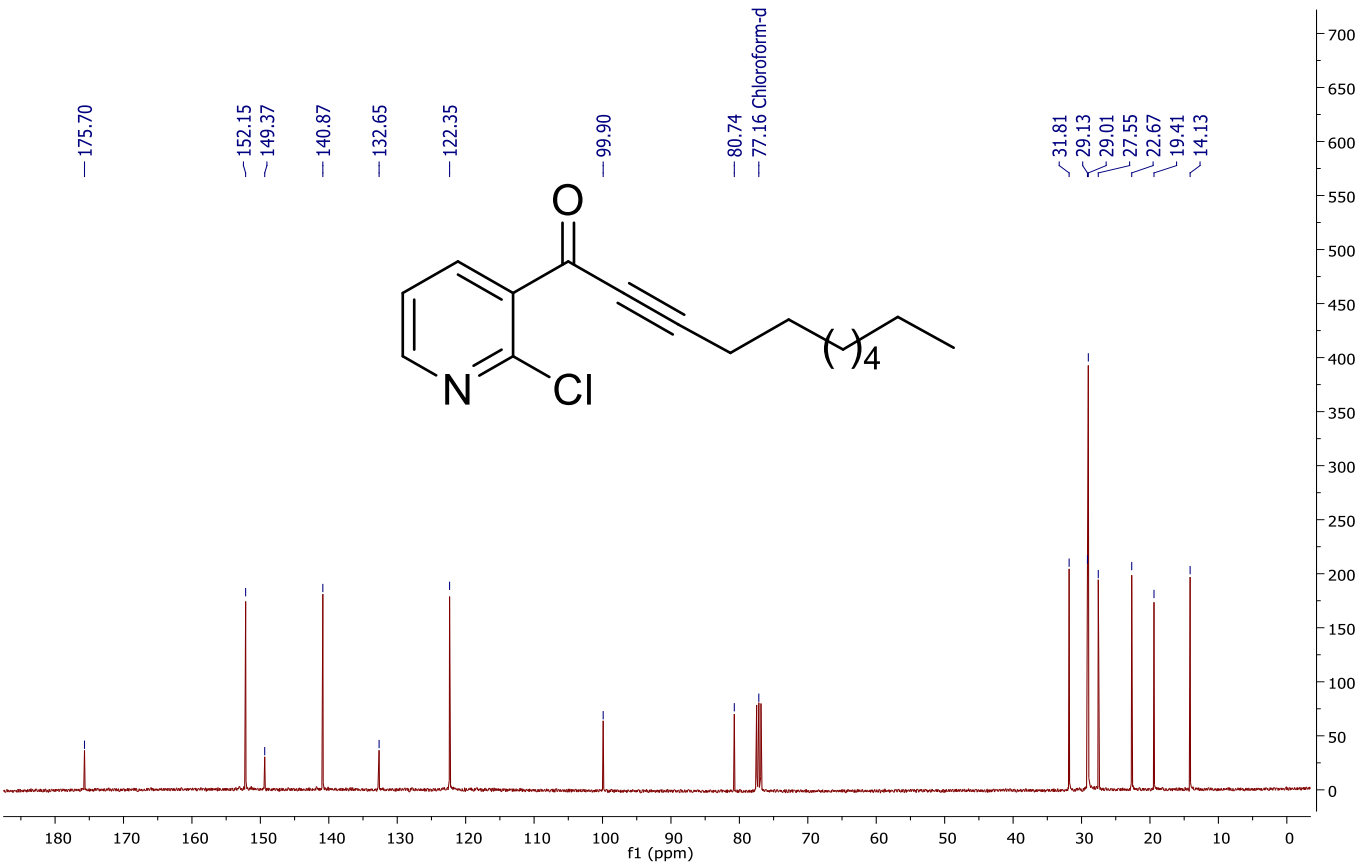
Compound **14p:** ^{1}H and ^{13}C NMR Spectrum



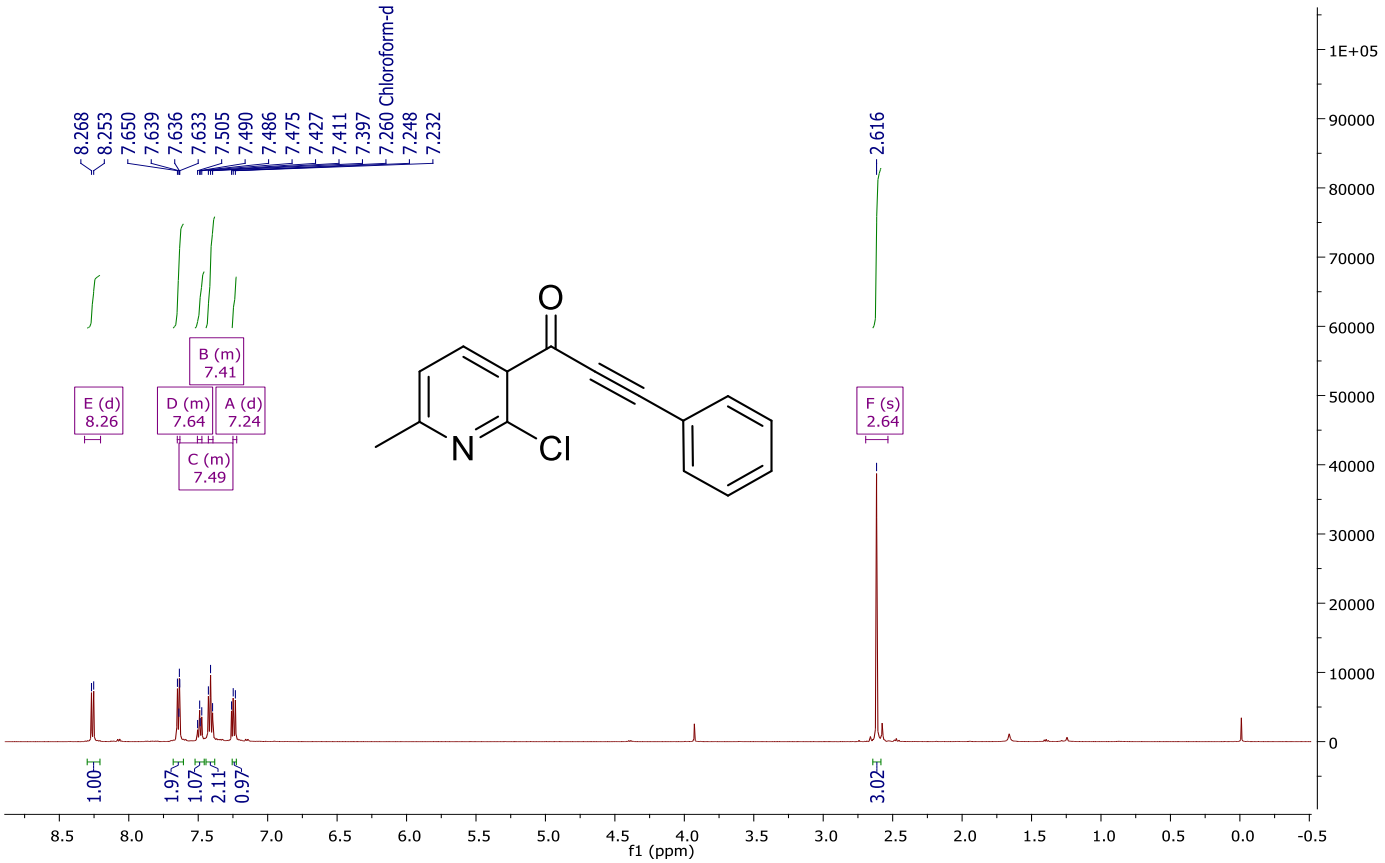


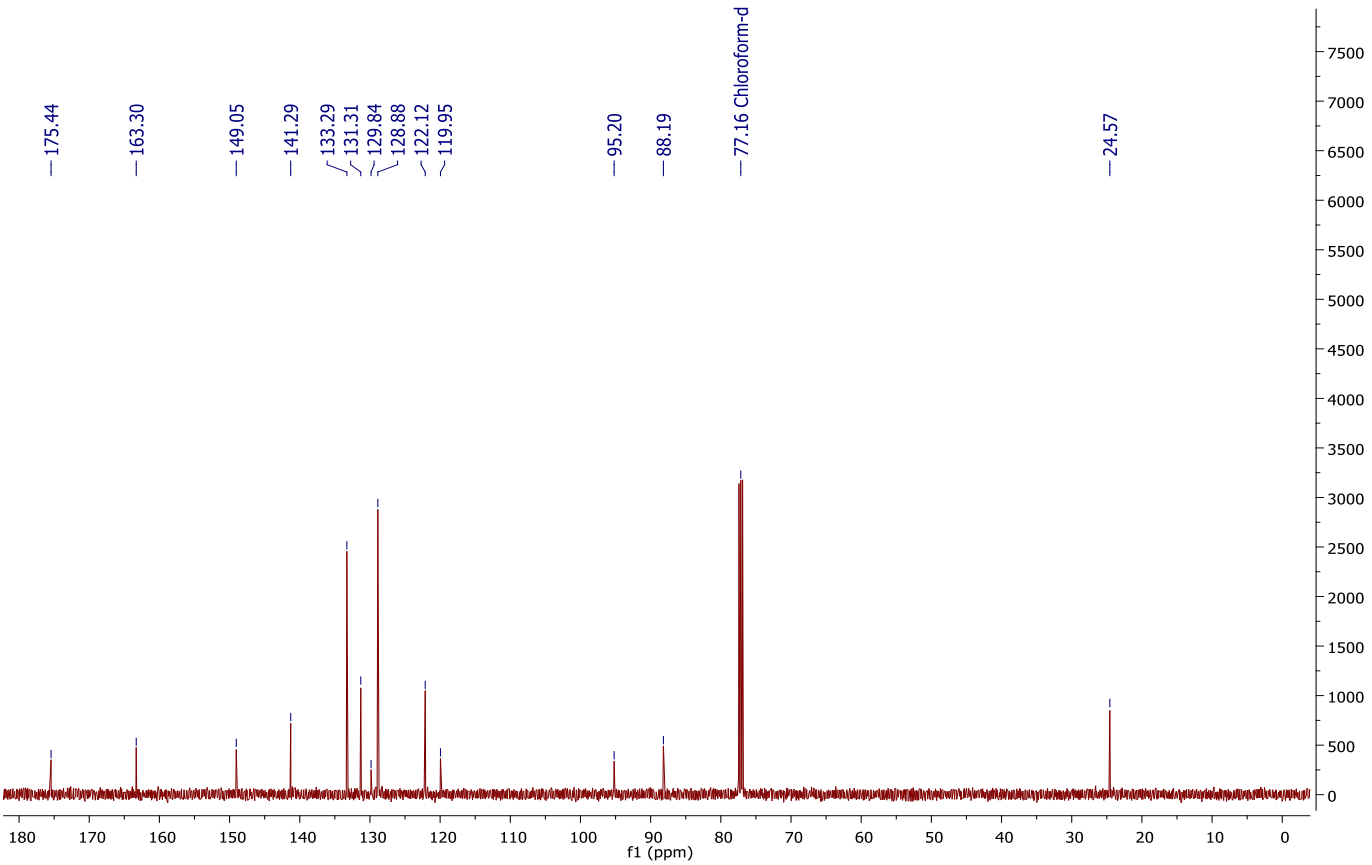
Compound **14q:** ^{1}H and ^{13}C NMR Spectrum



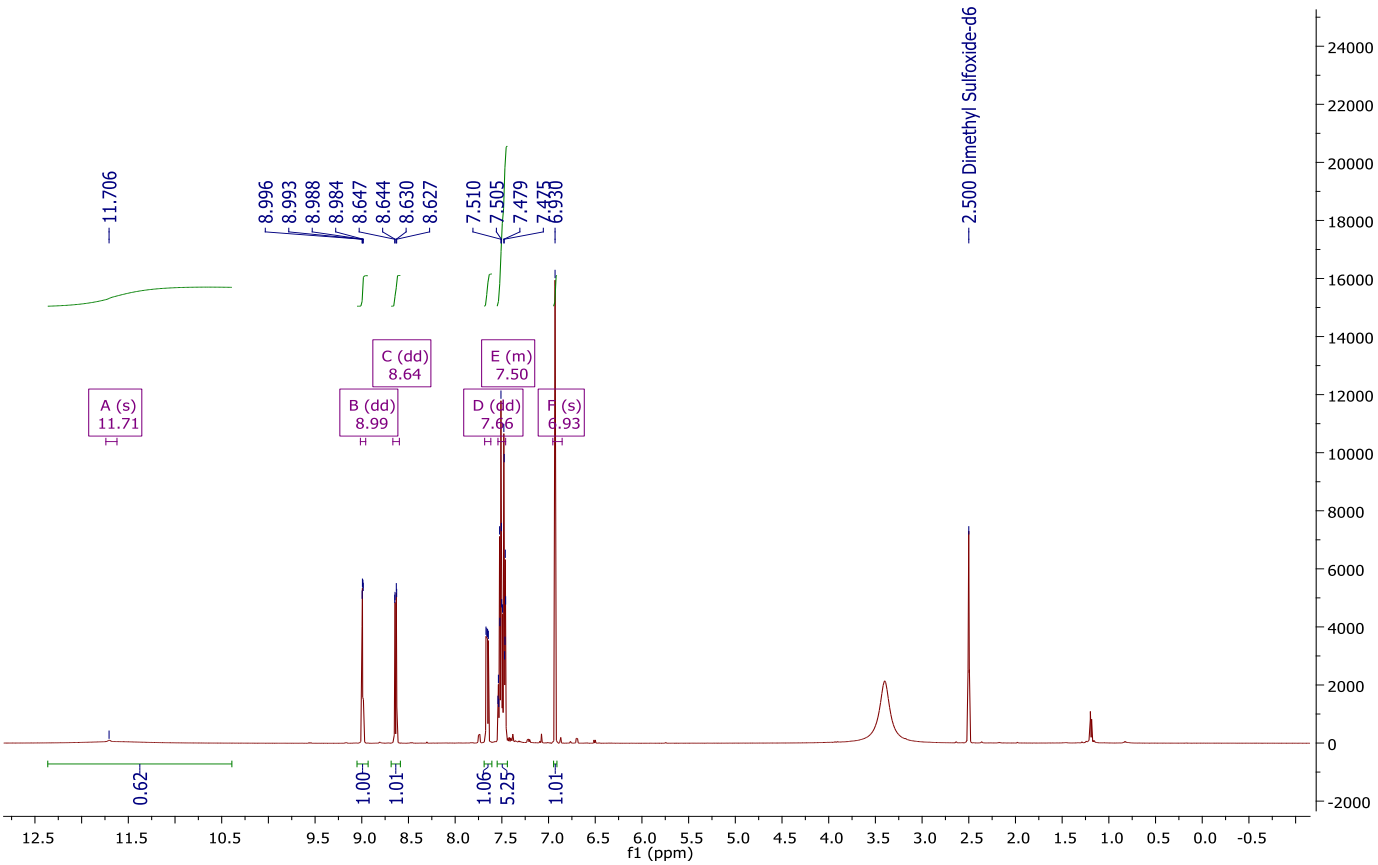


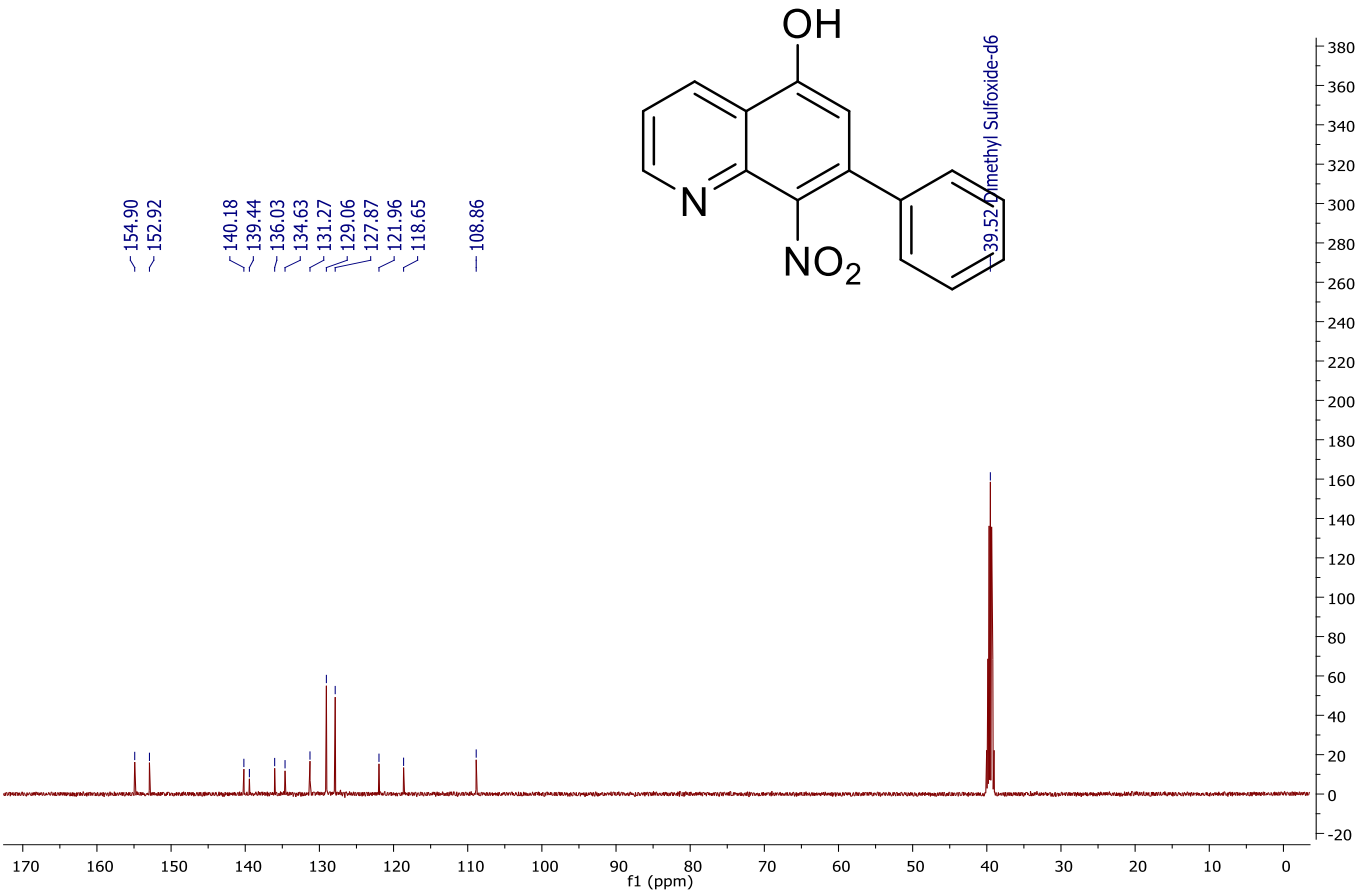
Compound **14r:** ^{1}H and ^{13}C NMR Spectrum



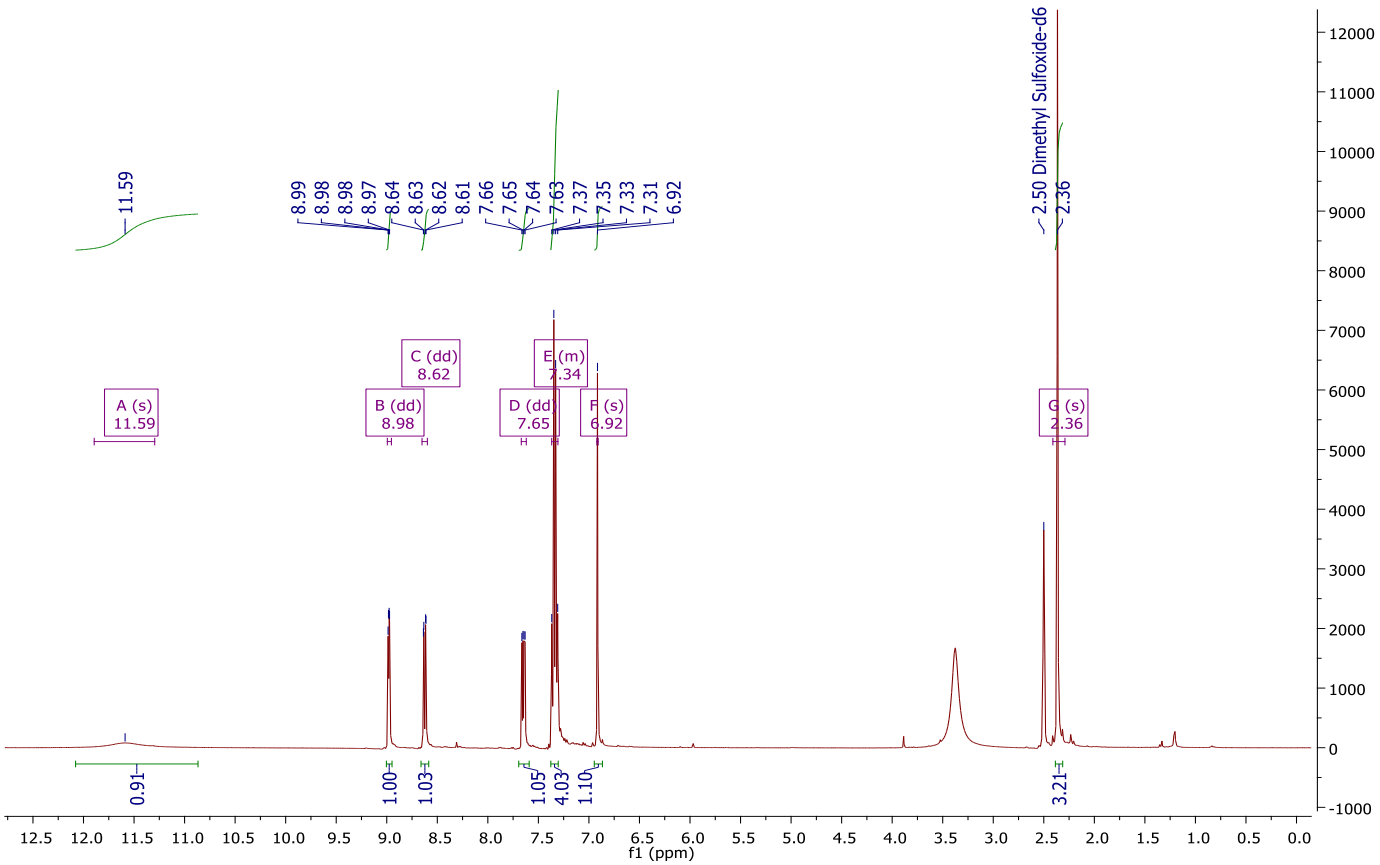


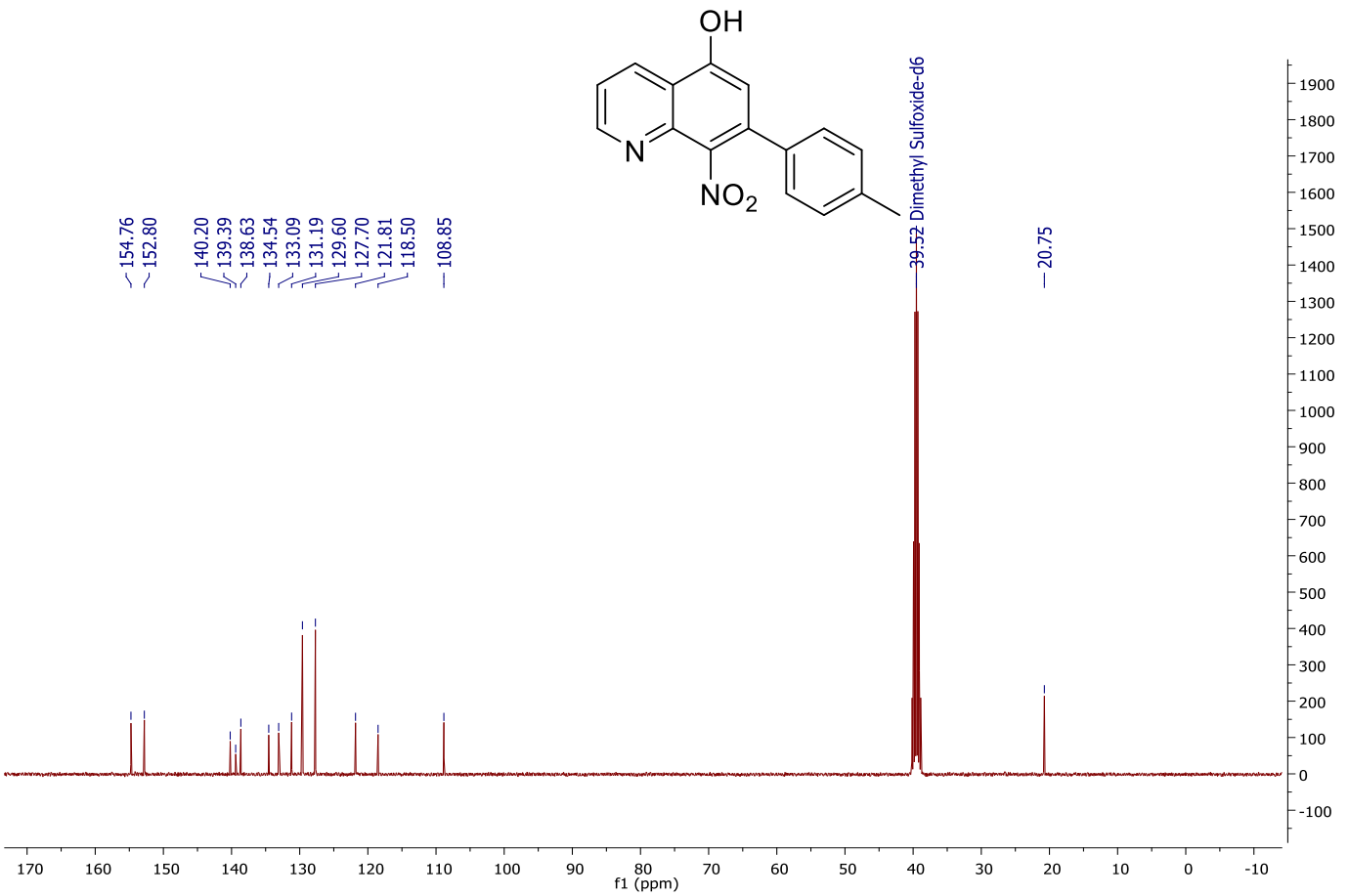
Compound **16a:** ^{1}H and ^{13}C NMR Spectrum



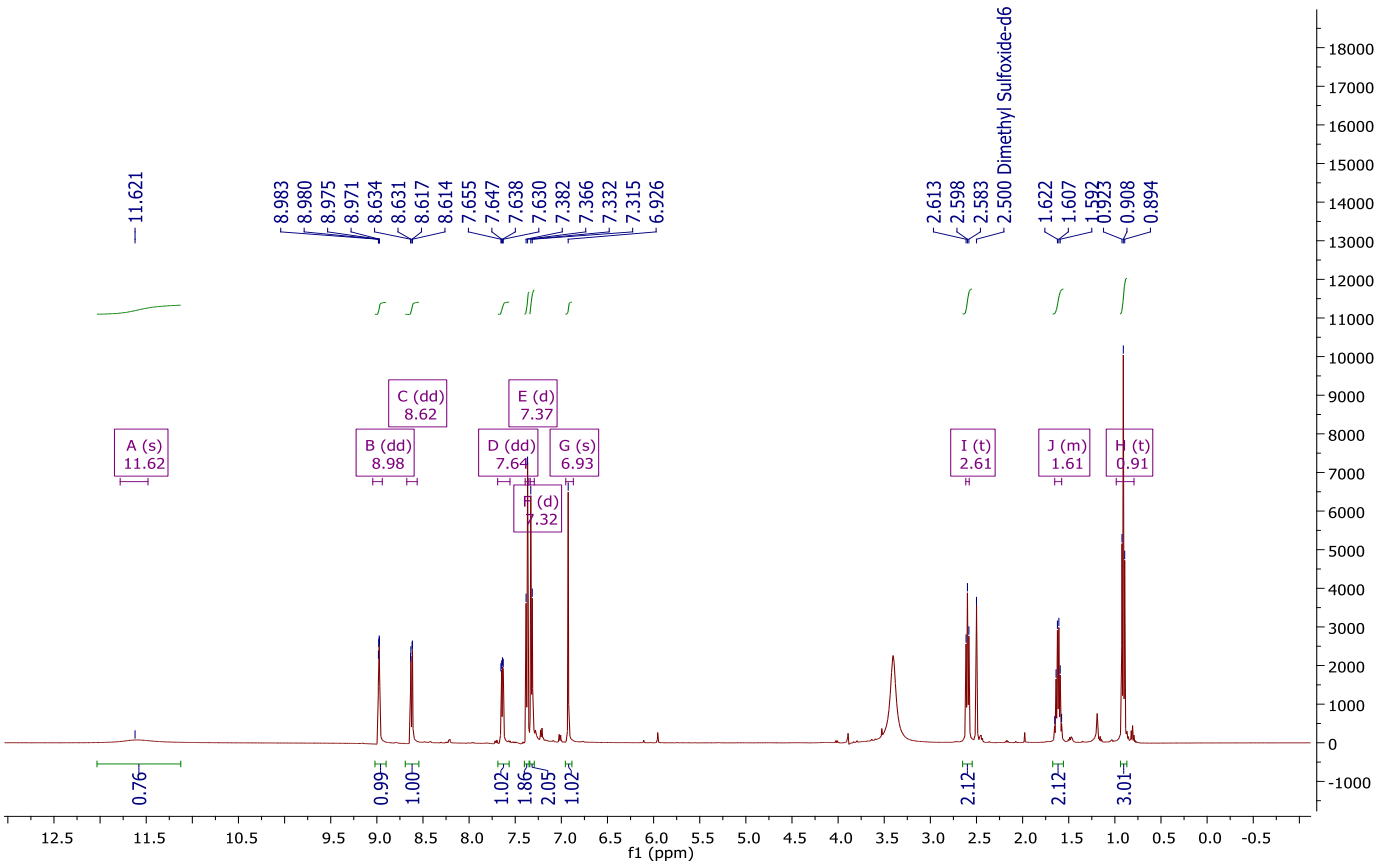


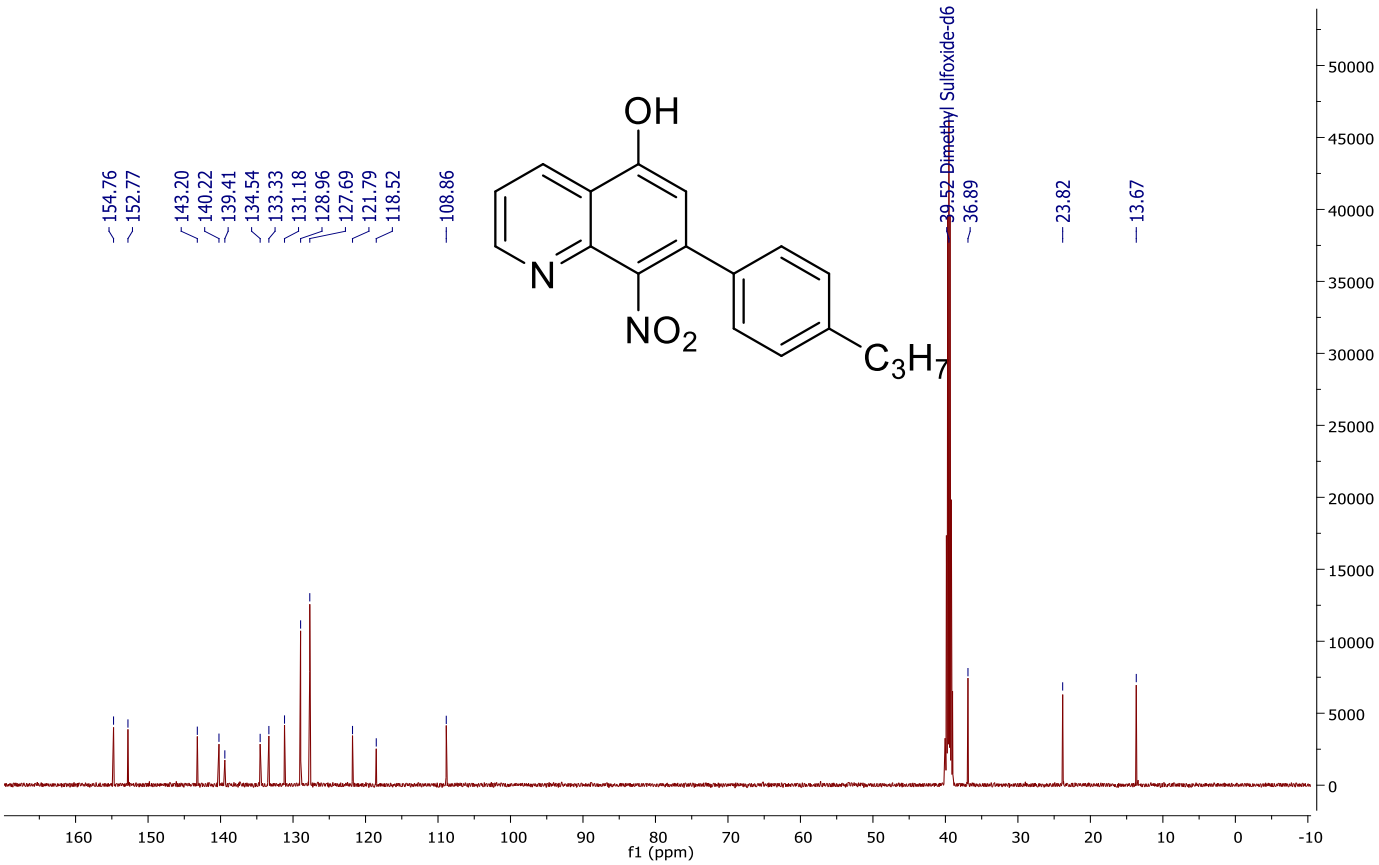
Compound **16b:** ^{1}H and ^{13}C NMR Spectrum



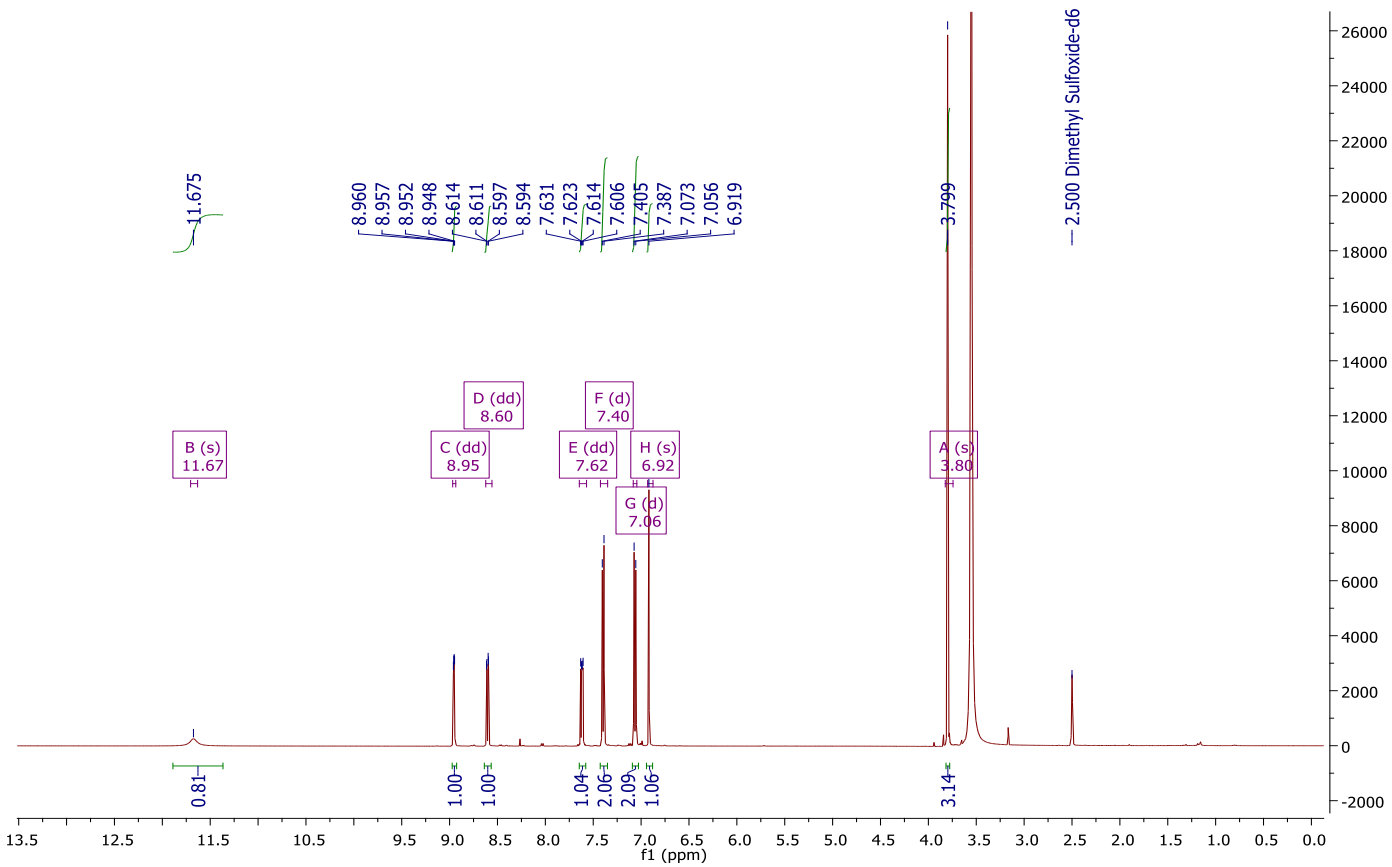


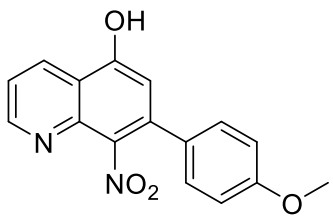
Compound **16c:** ^{1}H and ^{13}C NMR Spectrum

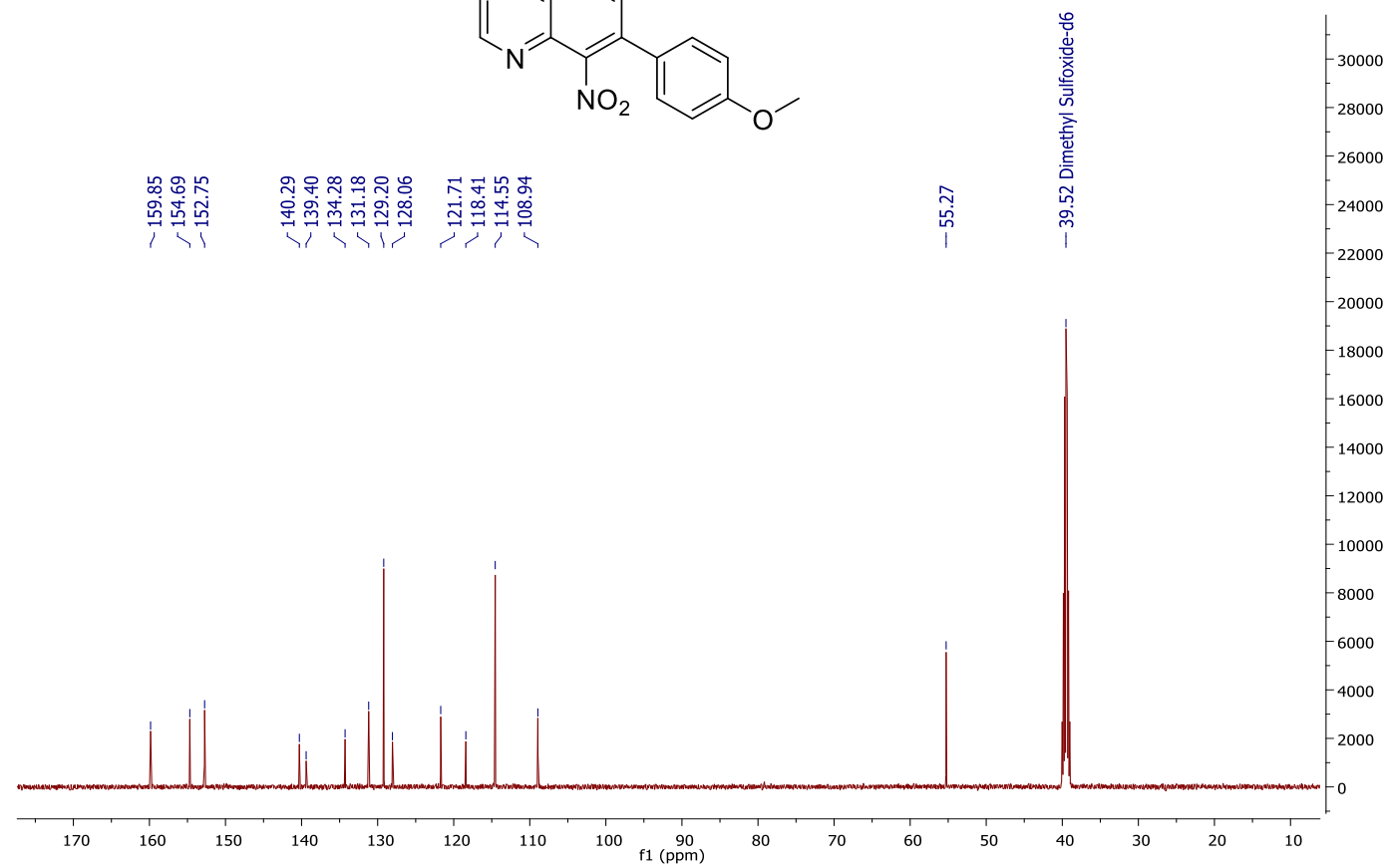




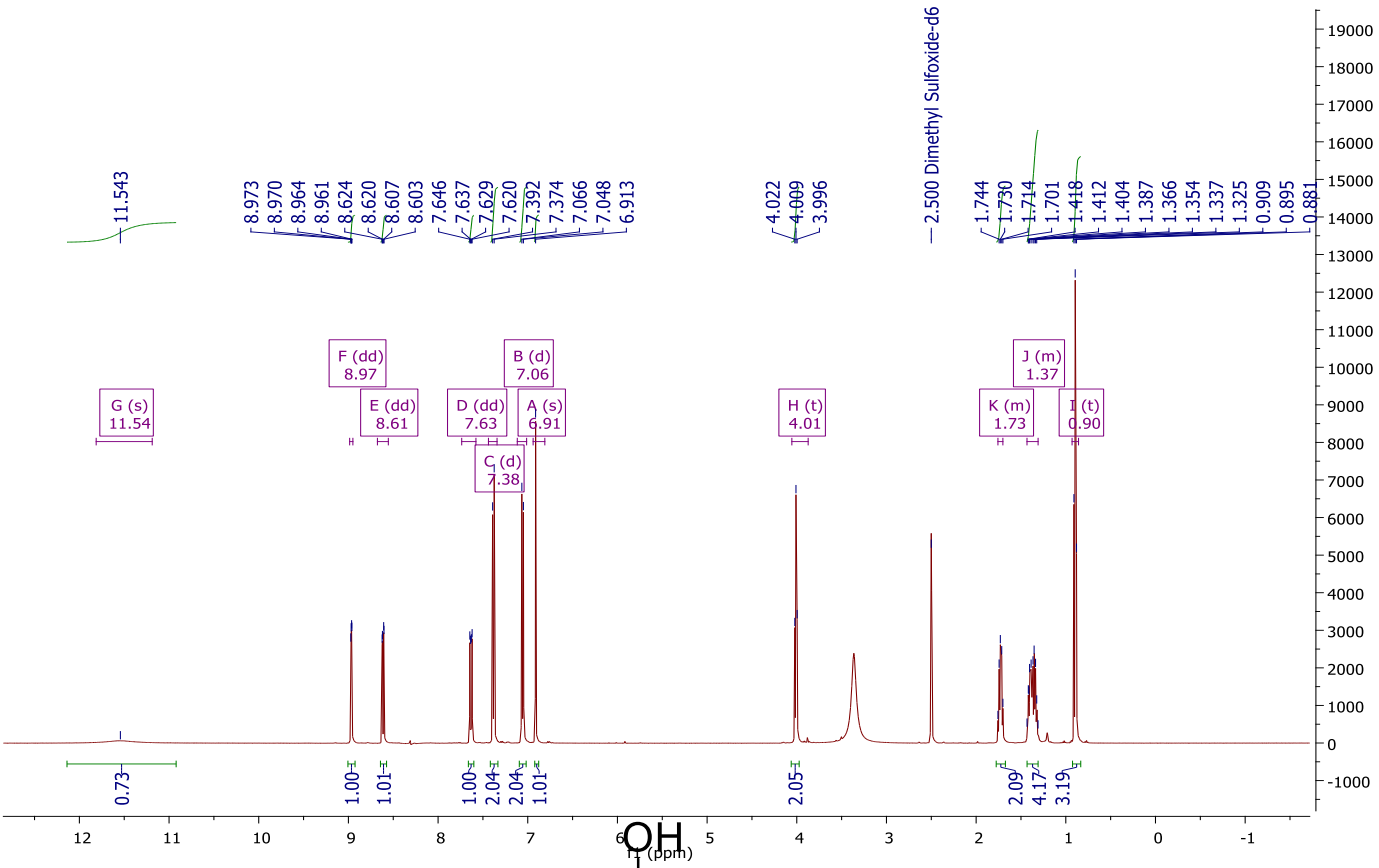
Compound **16d:** ^{1}H and ^{13}C NMR Spectrum

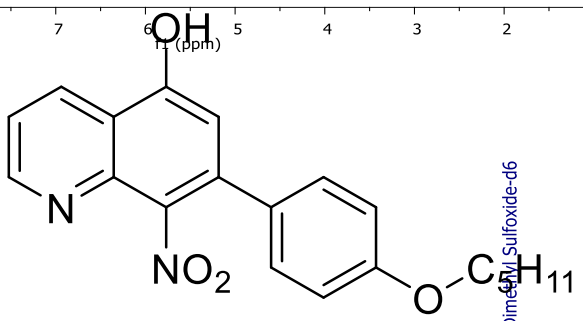


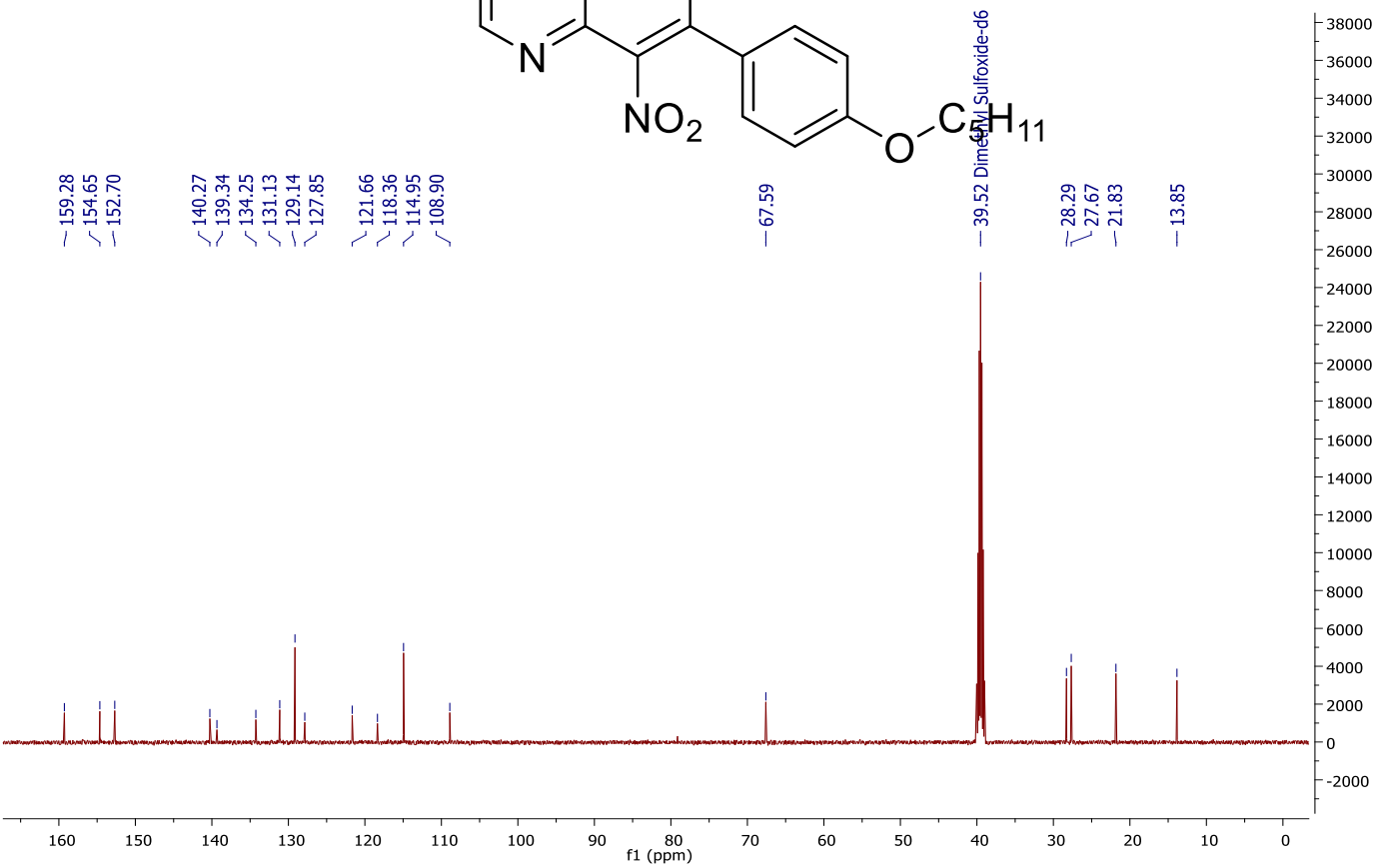




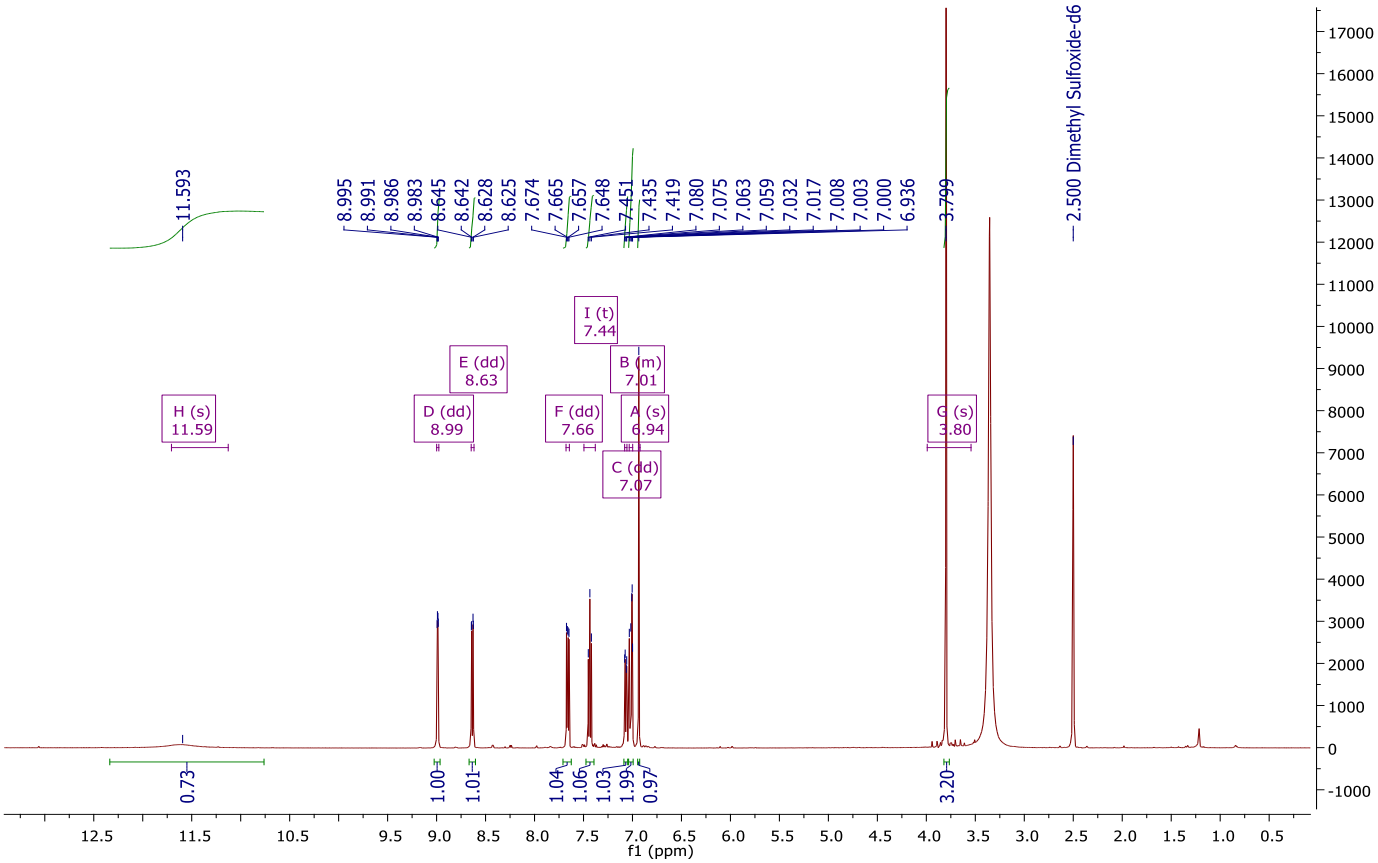
Compound **16e:** ^{1}H and ^{13}C NMR Spectrum

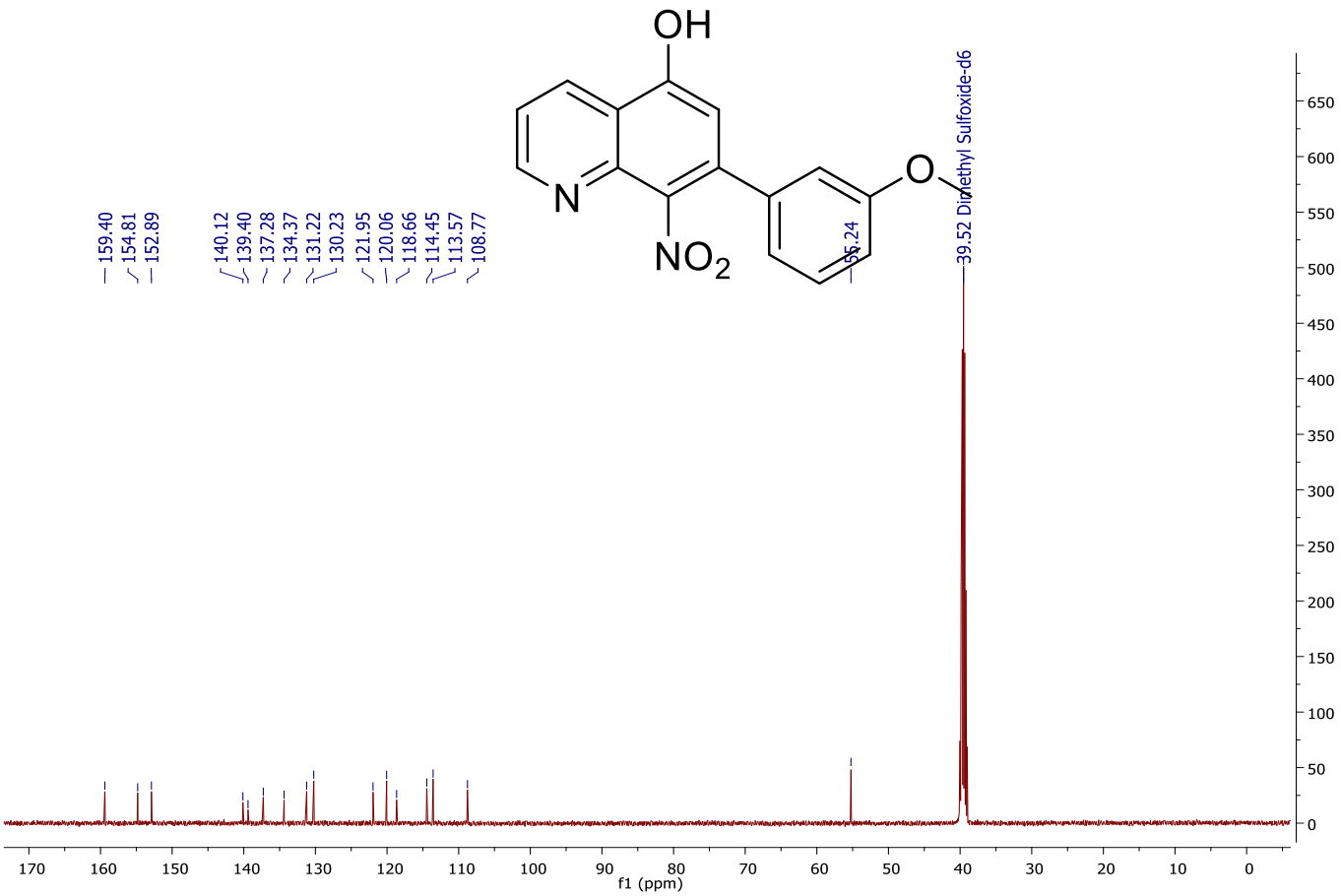




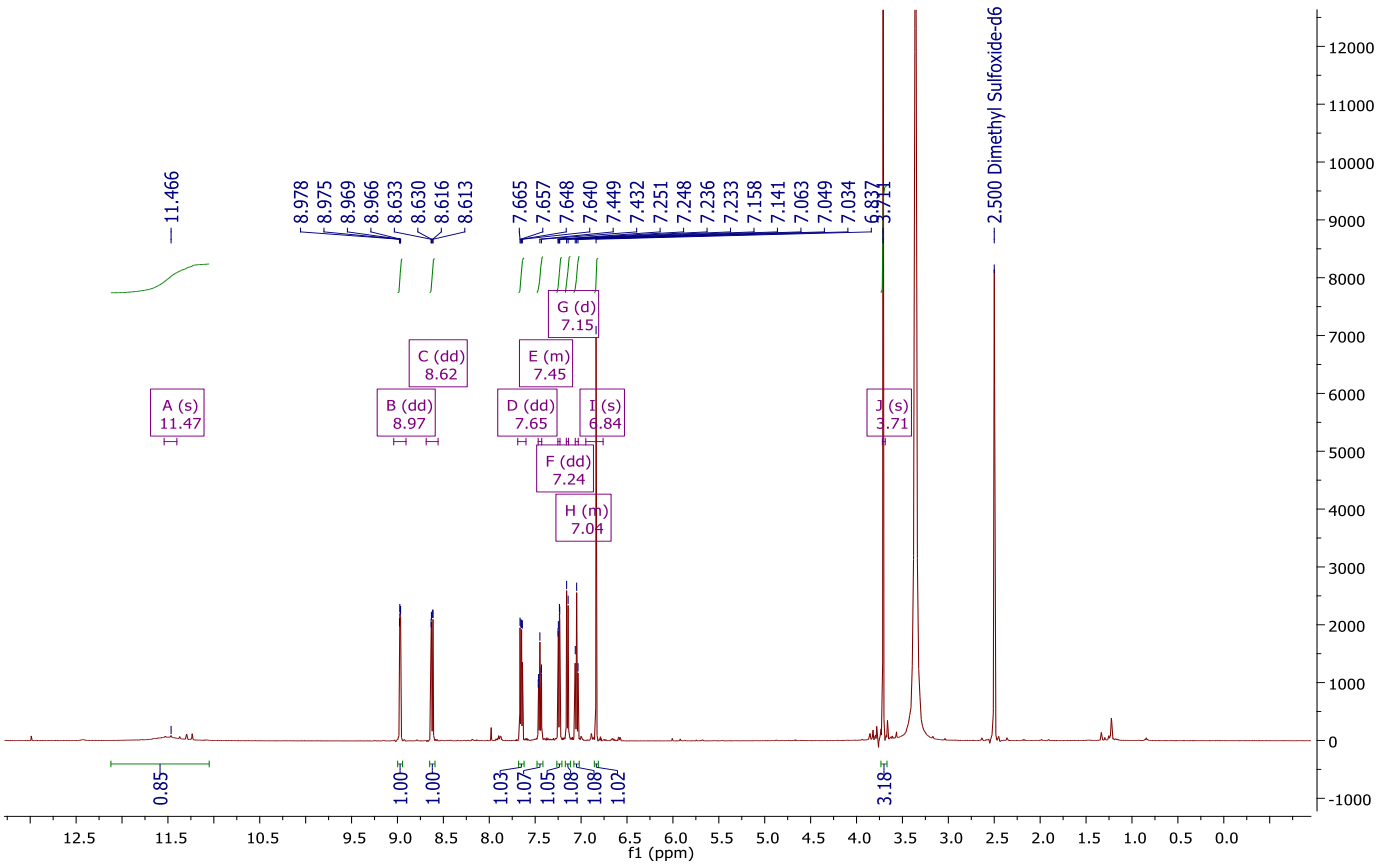


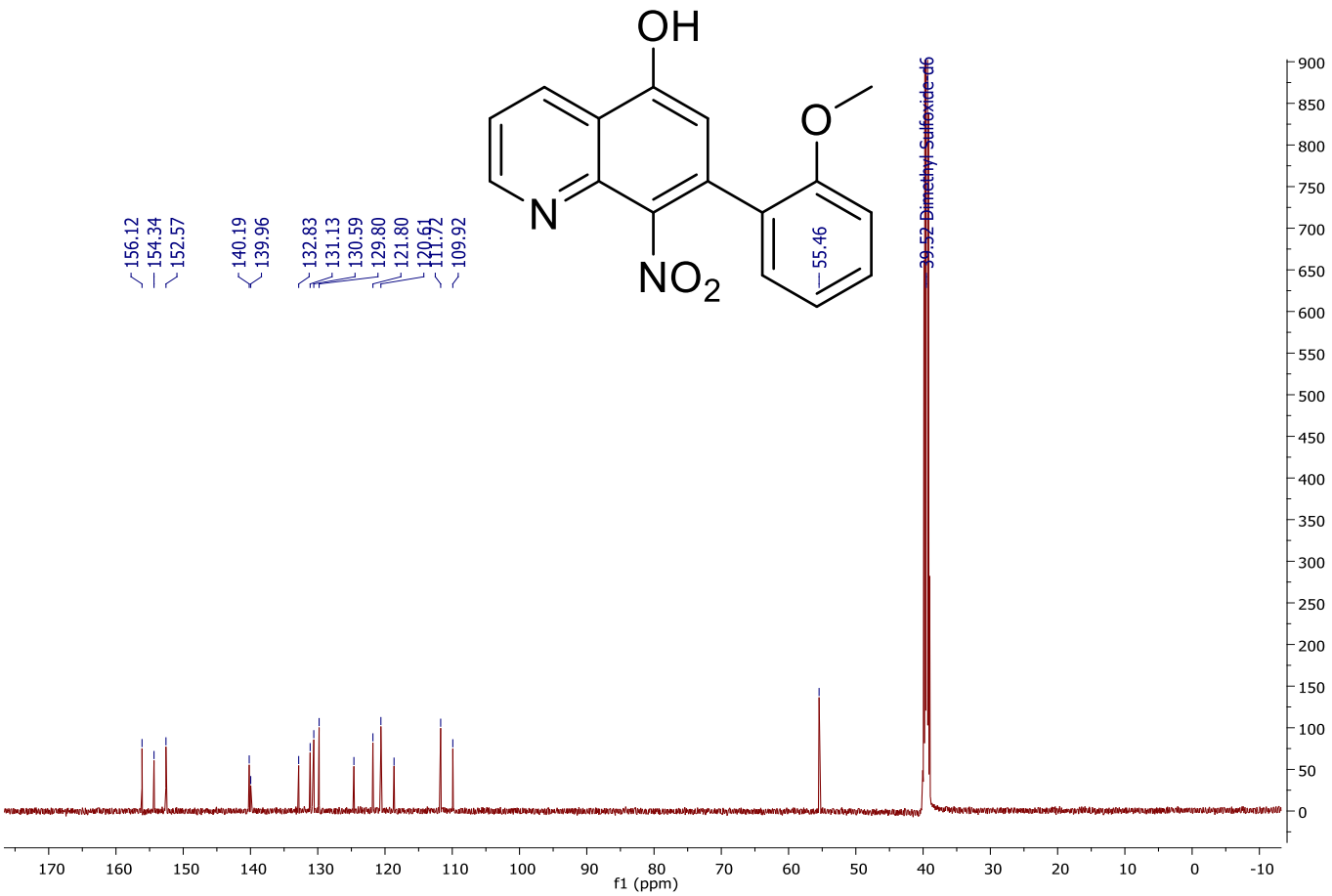
Compound **16f:** ^{1}H and ^{13}C NMR Spectrum



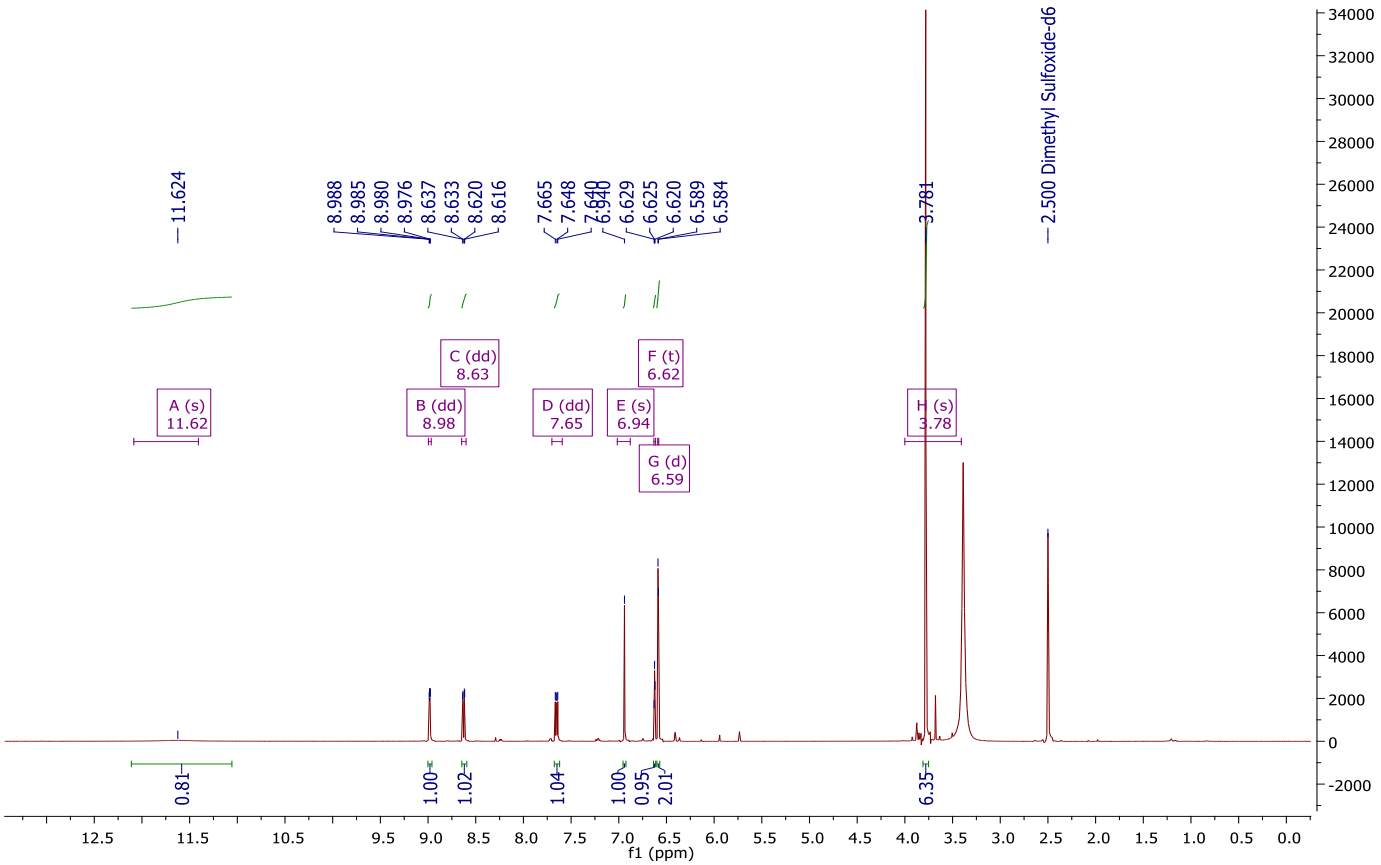


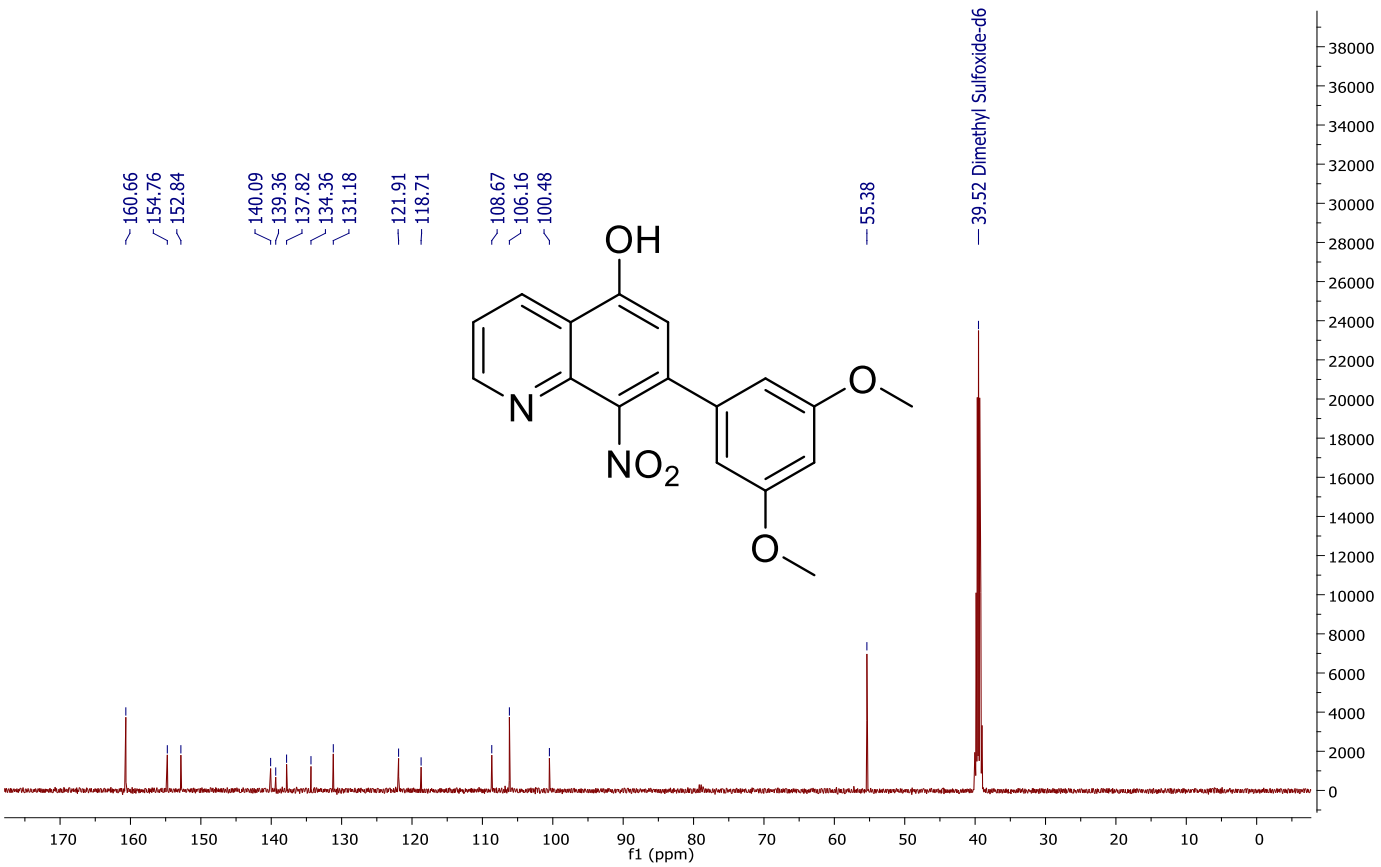
Compound **16g:** ^{1}H and ^{13}C NMR Spectrum



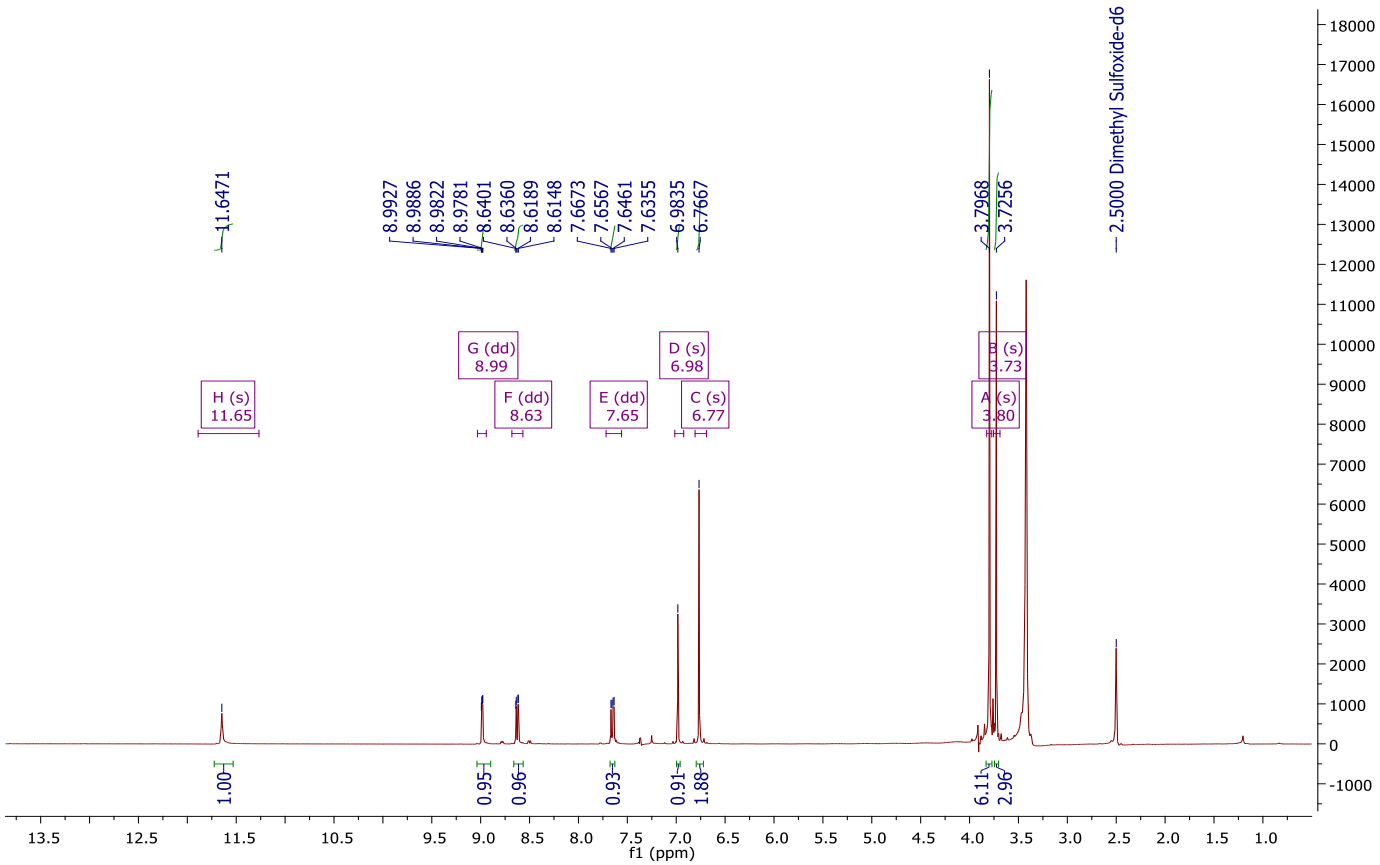


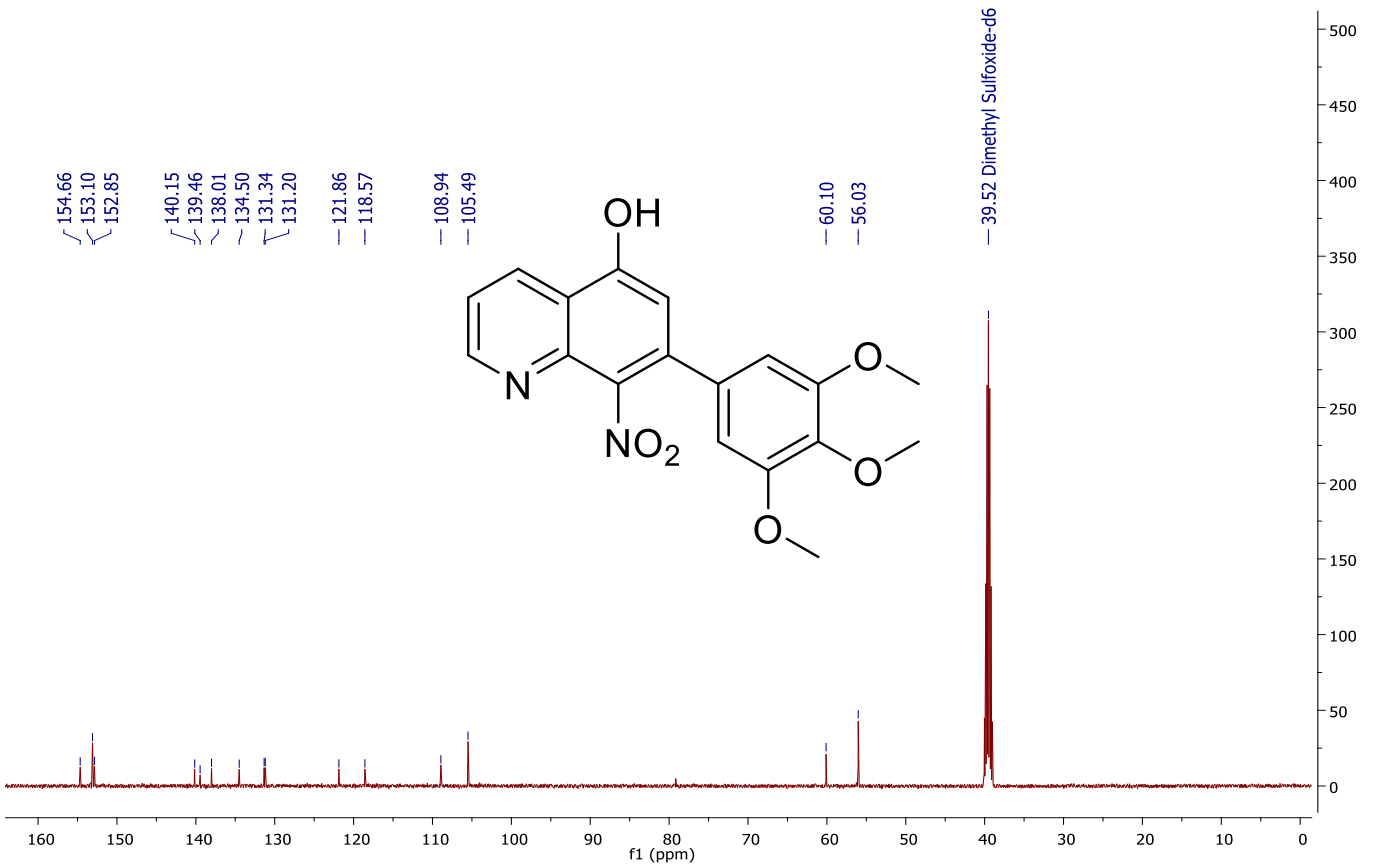
Compound **16h:** ^{1}H and ^{13}C NMR Spectrum



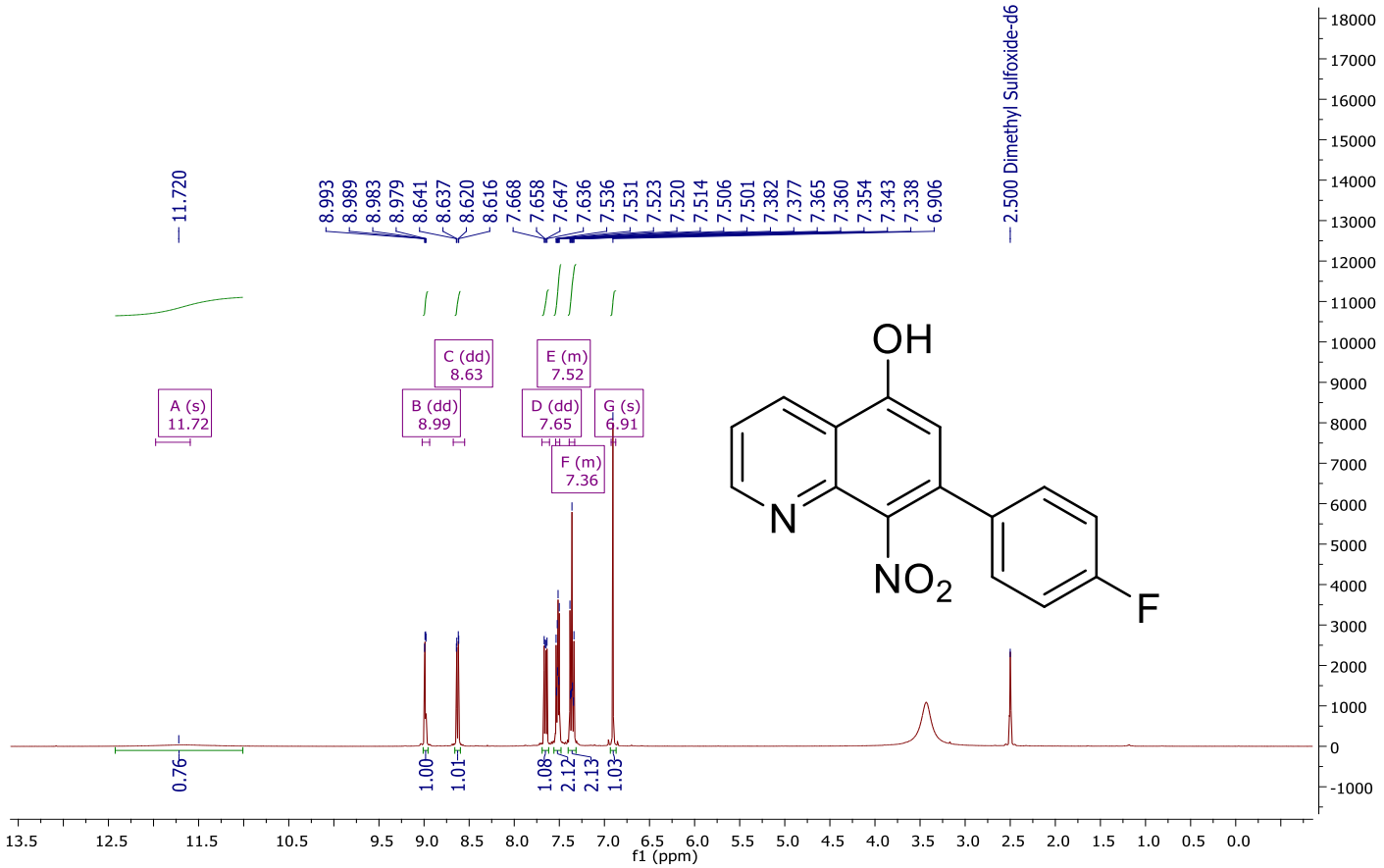


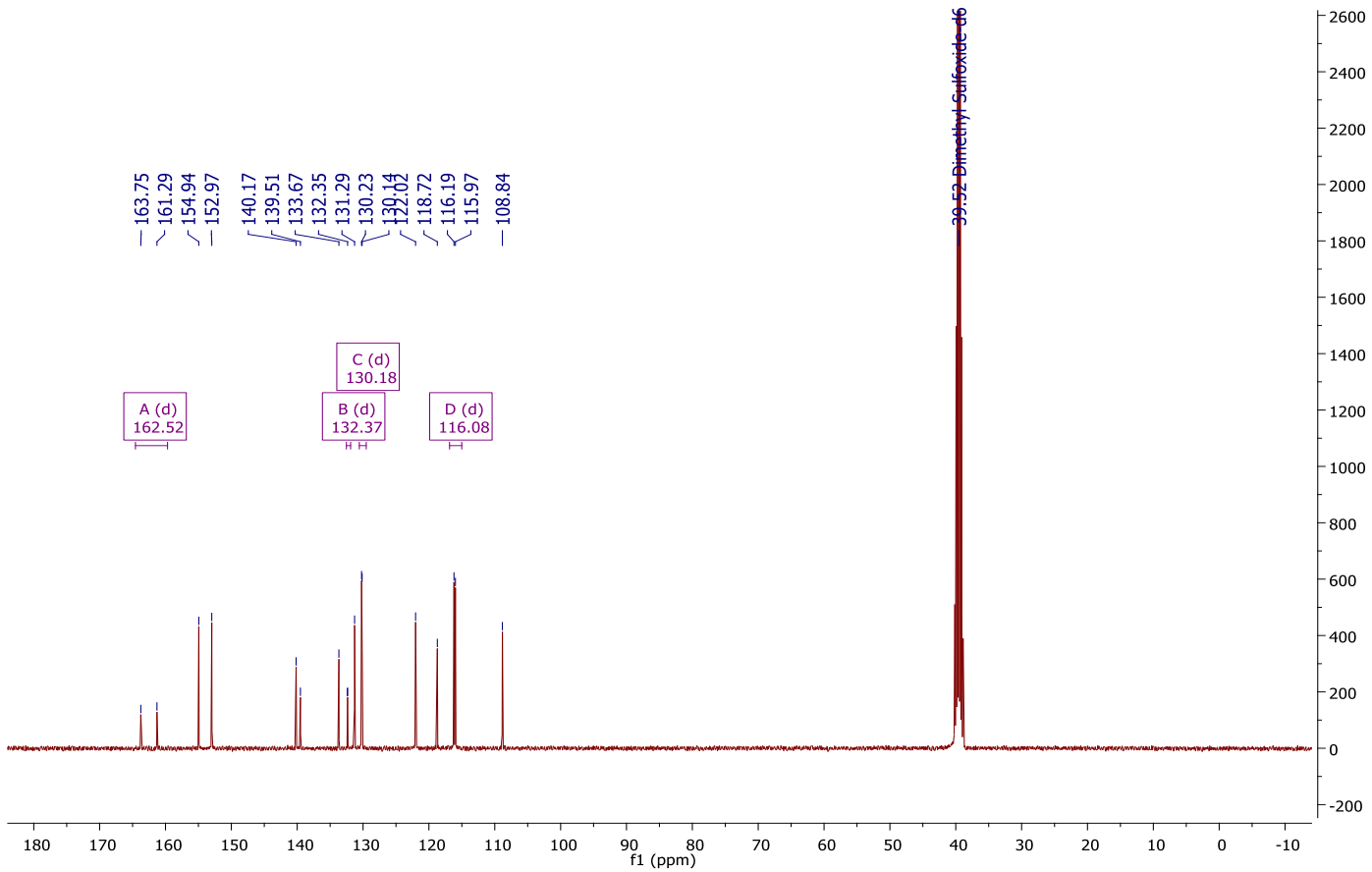
Compound **16i:** ^{1}H and ^{13}C NMR Spectrum



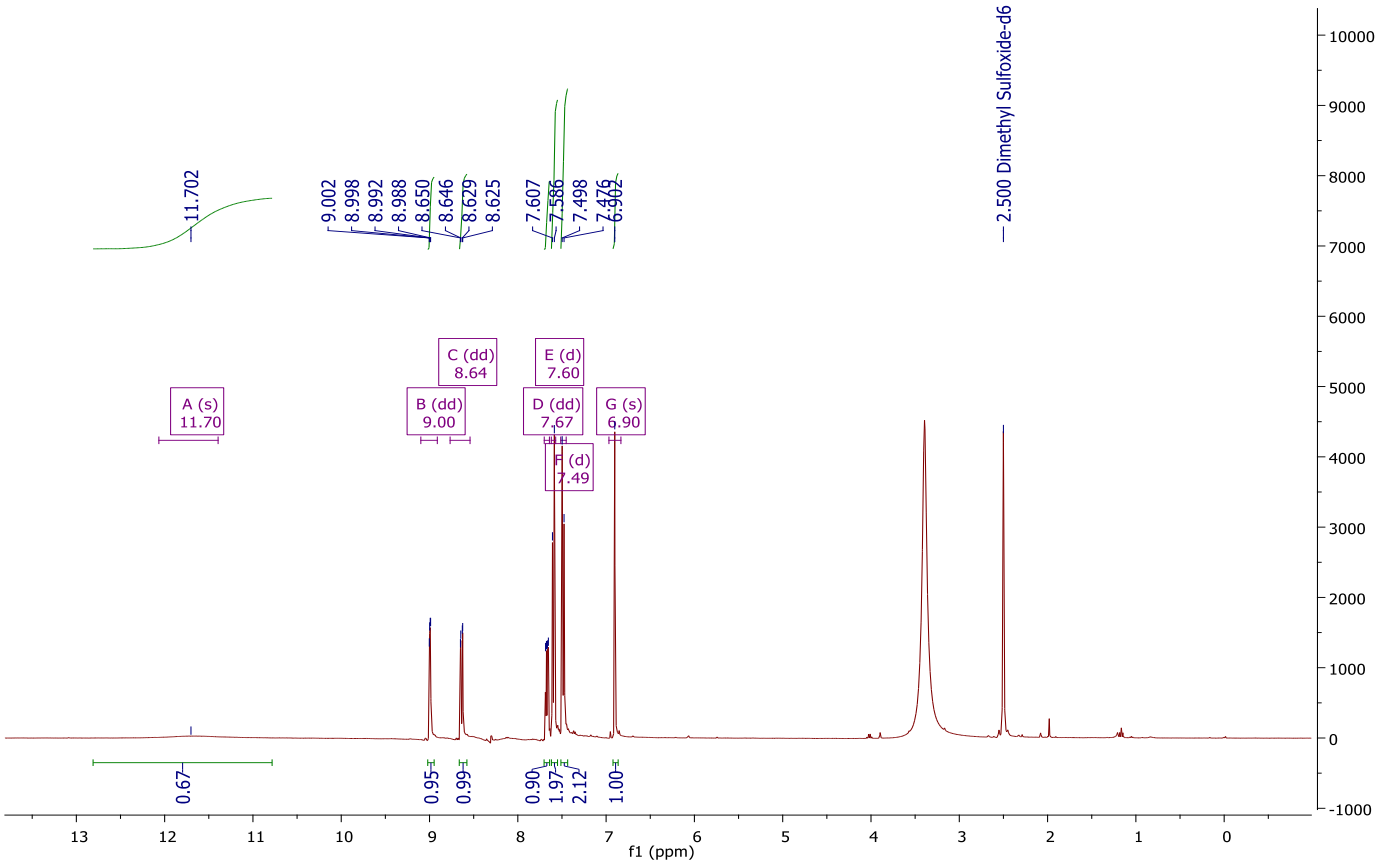


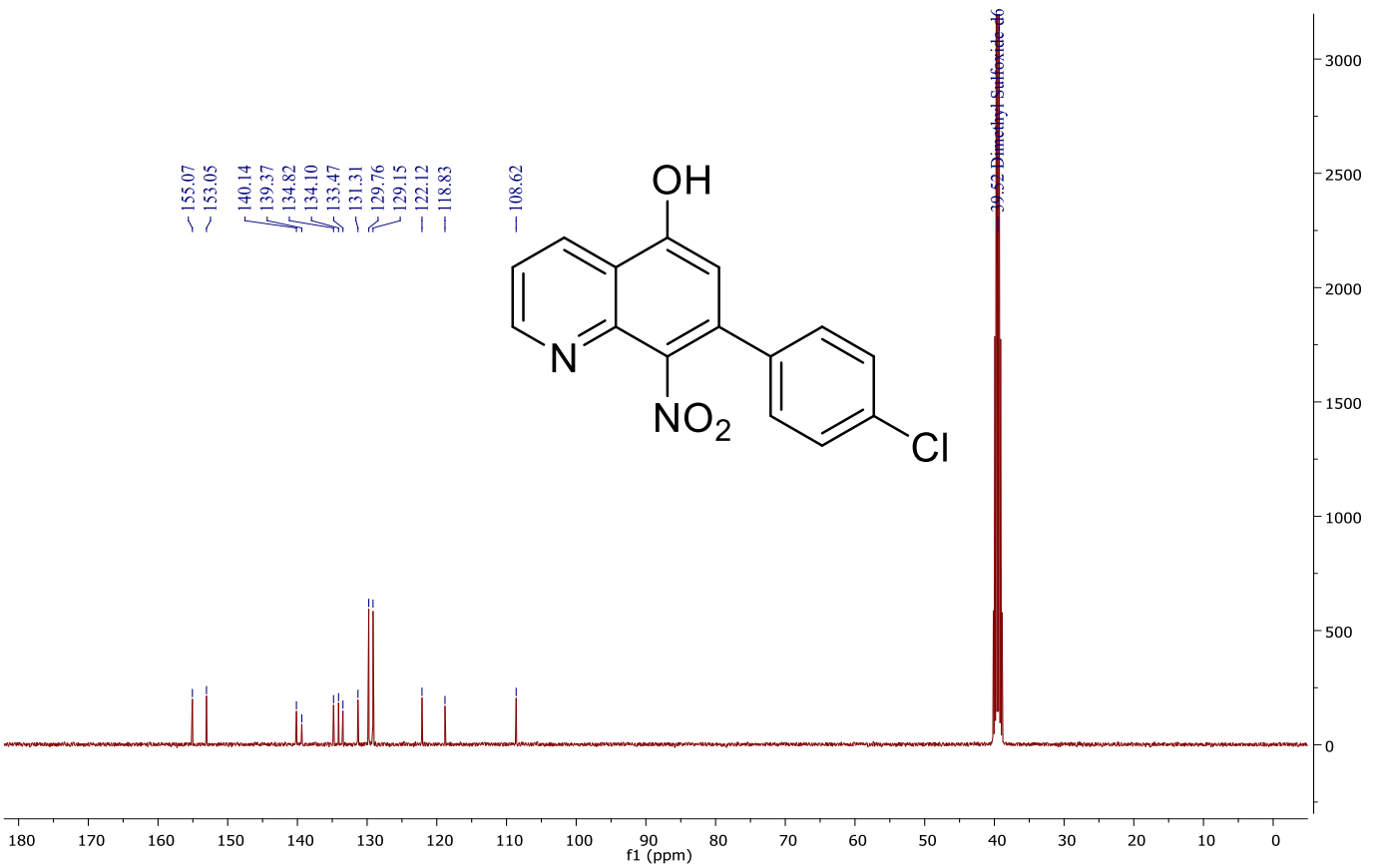
Compound **16j:** ^{1}H and ^{13}C NMR Spectrum



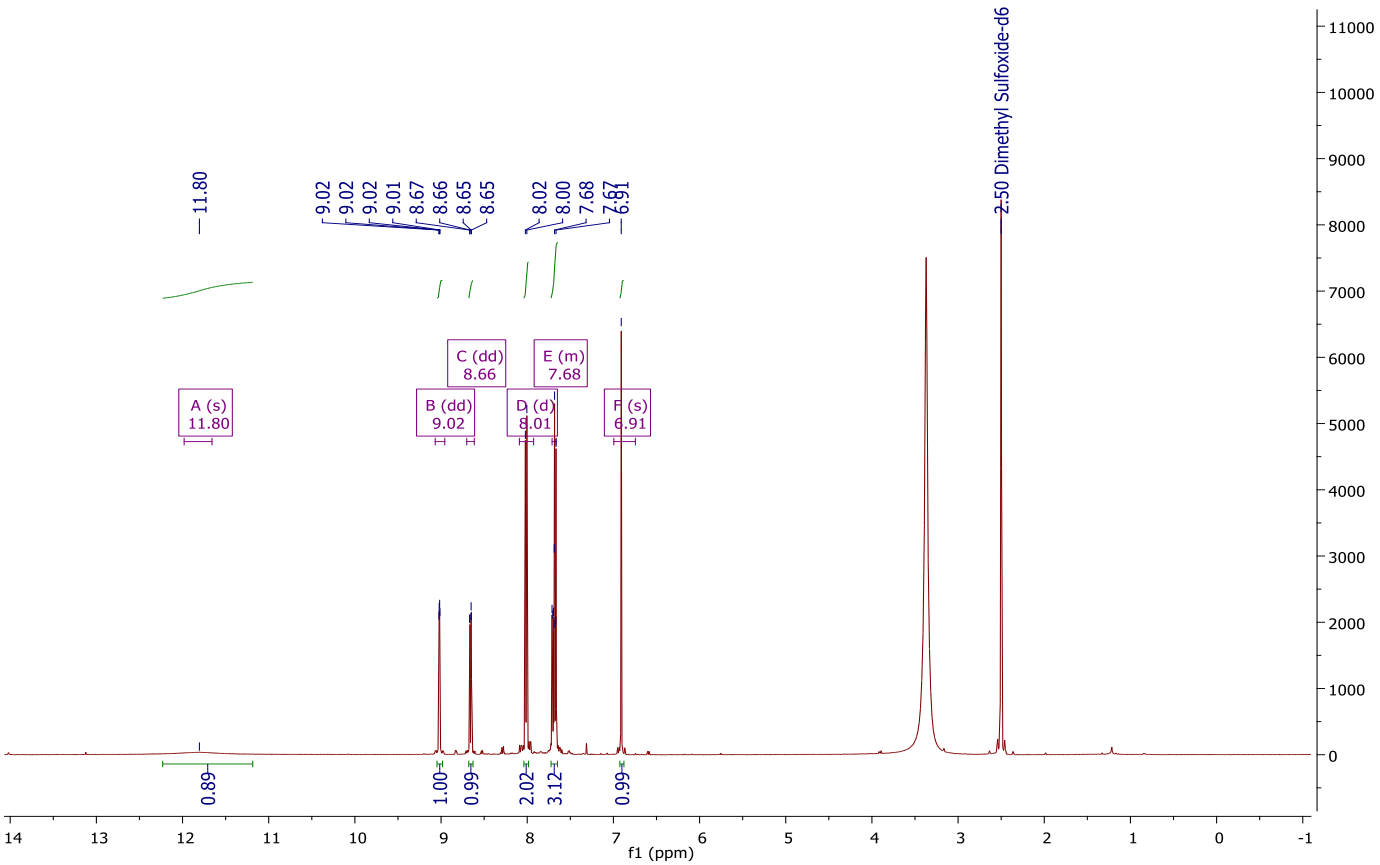


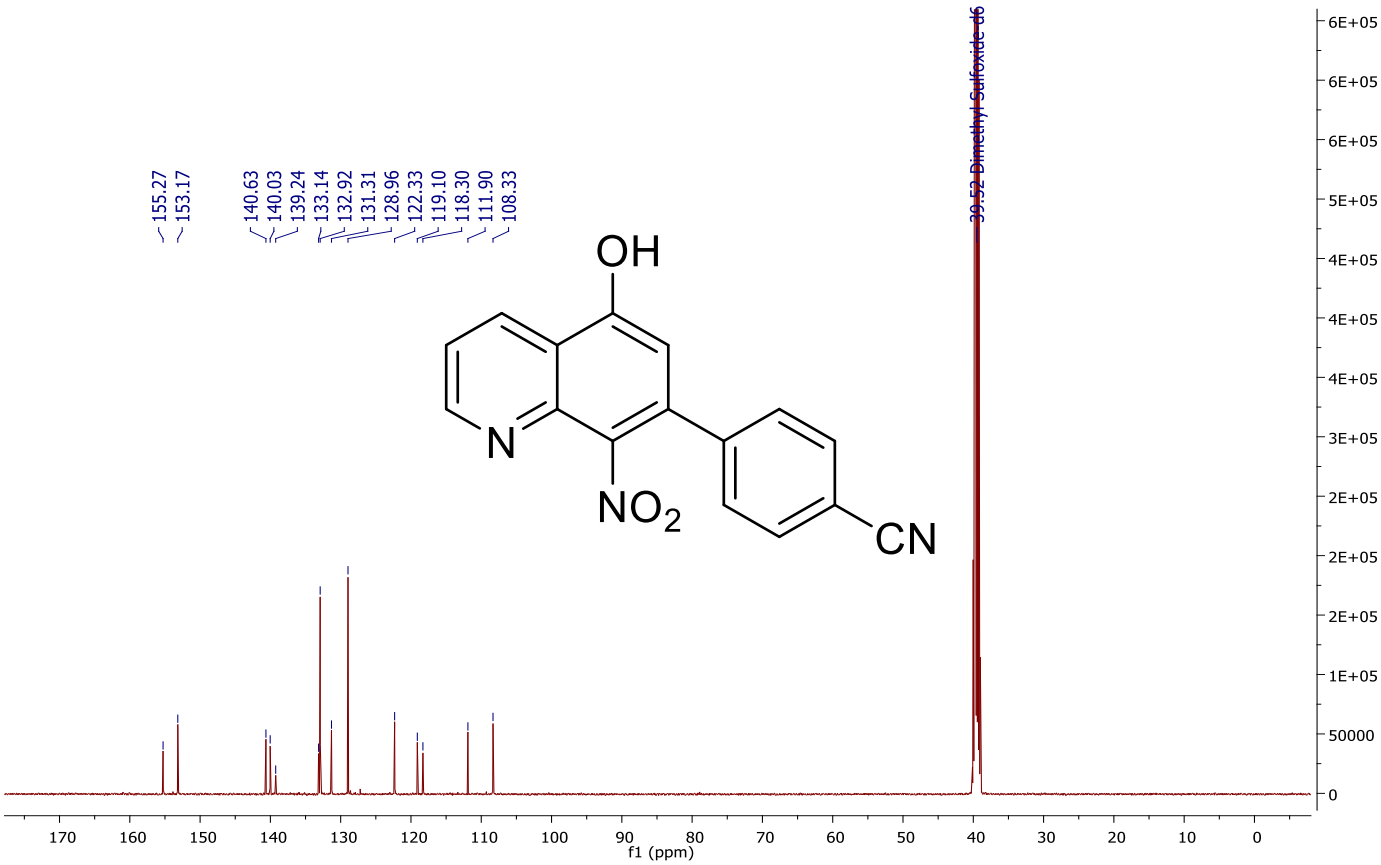
Compound 16**k:** ^{1}H and ^{13}C NMR Spectrum



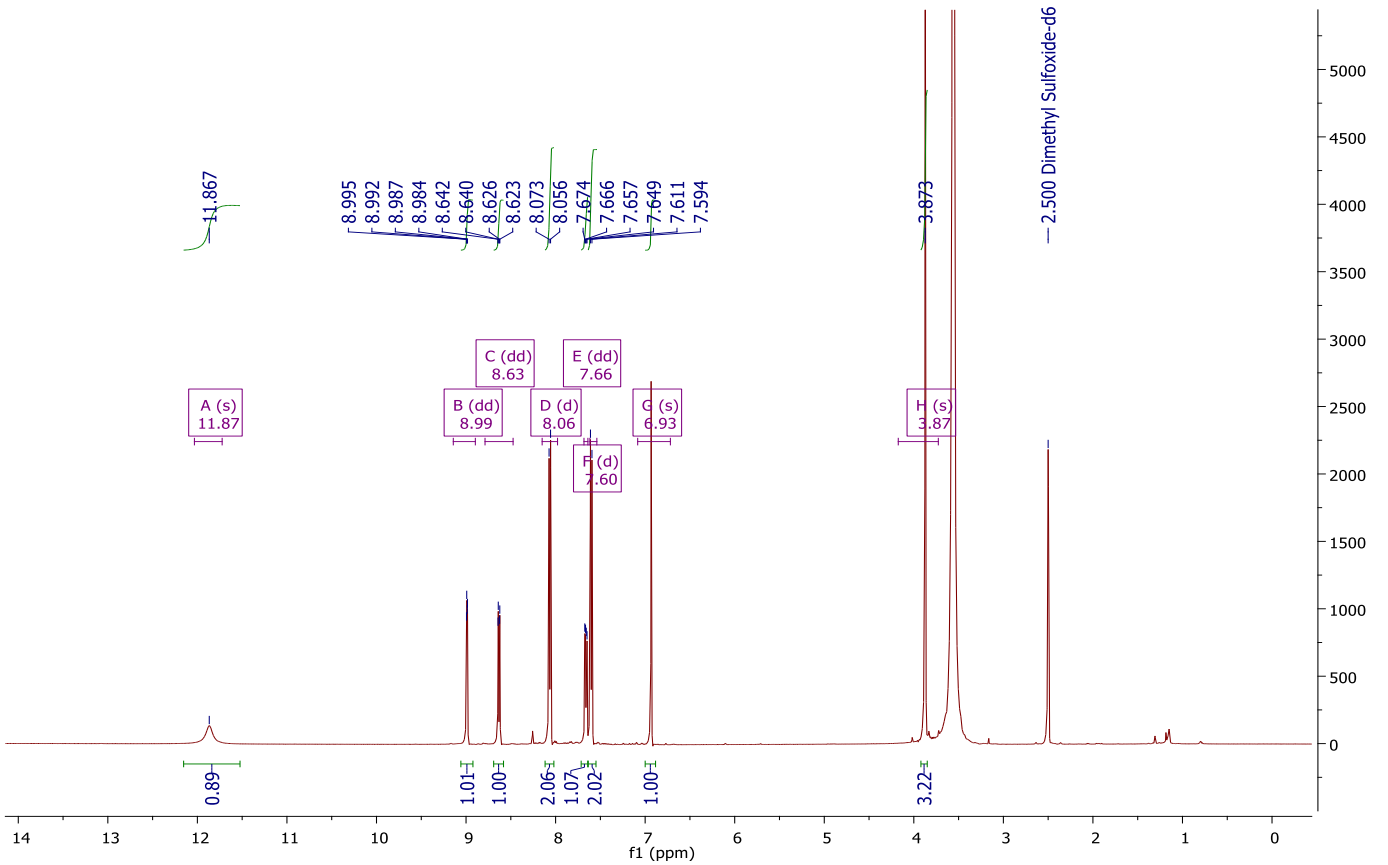


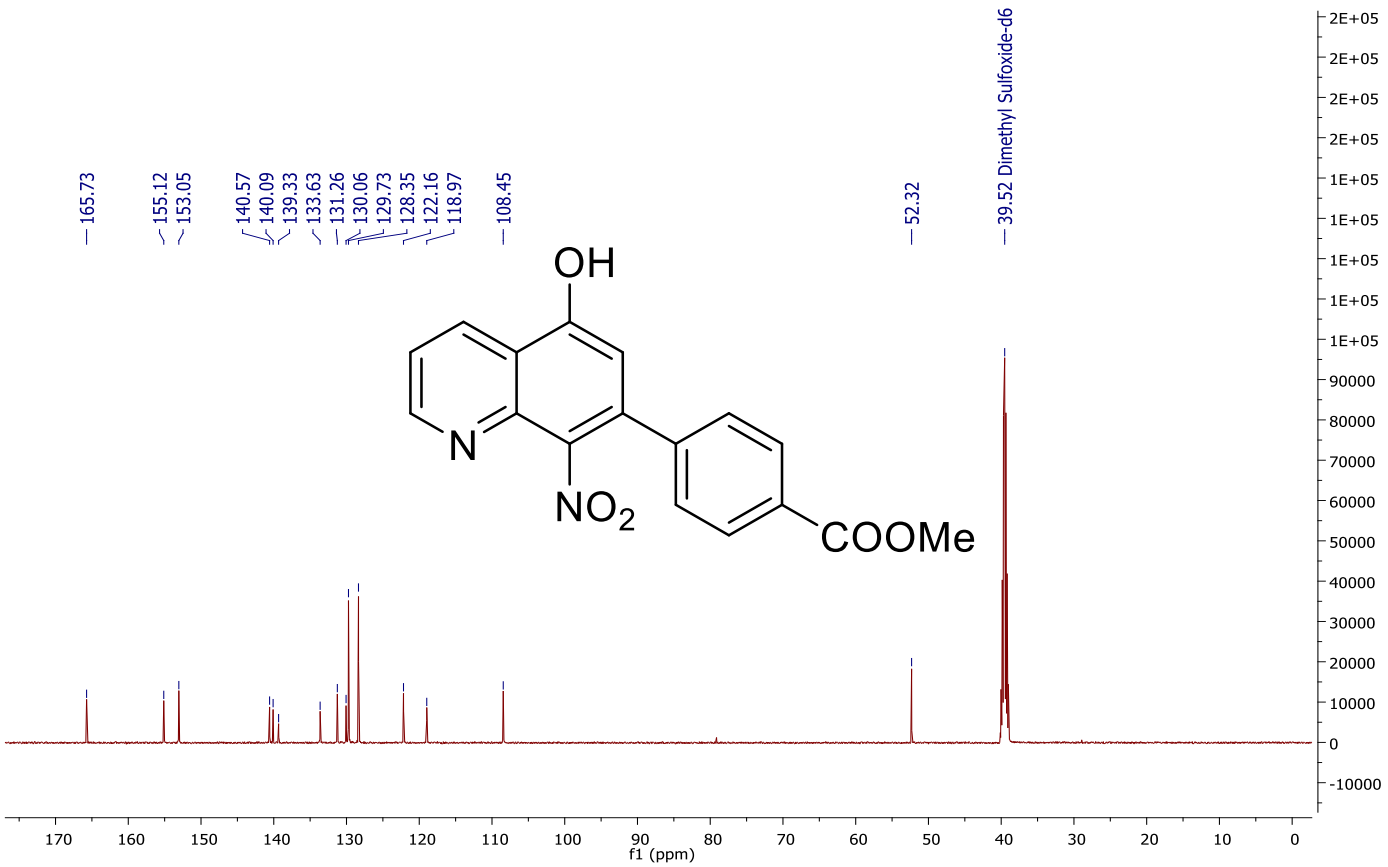
Compound **16l:** ^{1}H and ^{13}C NMR Spectrum



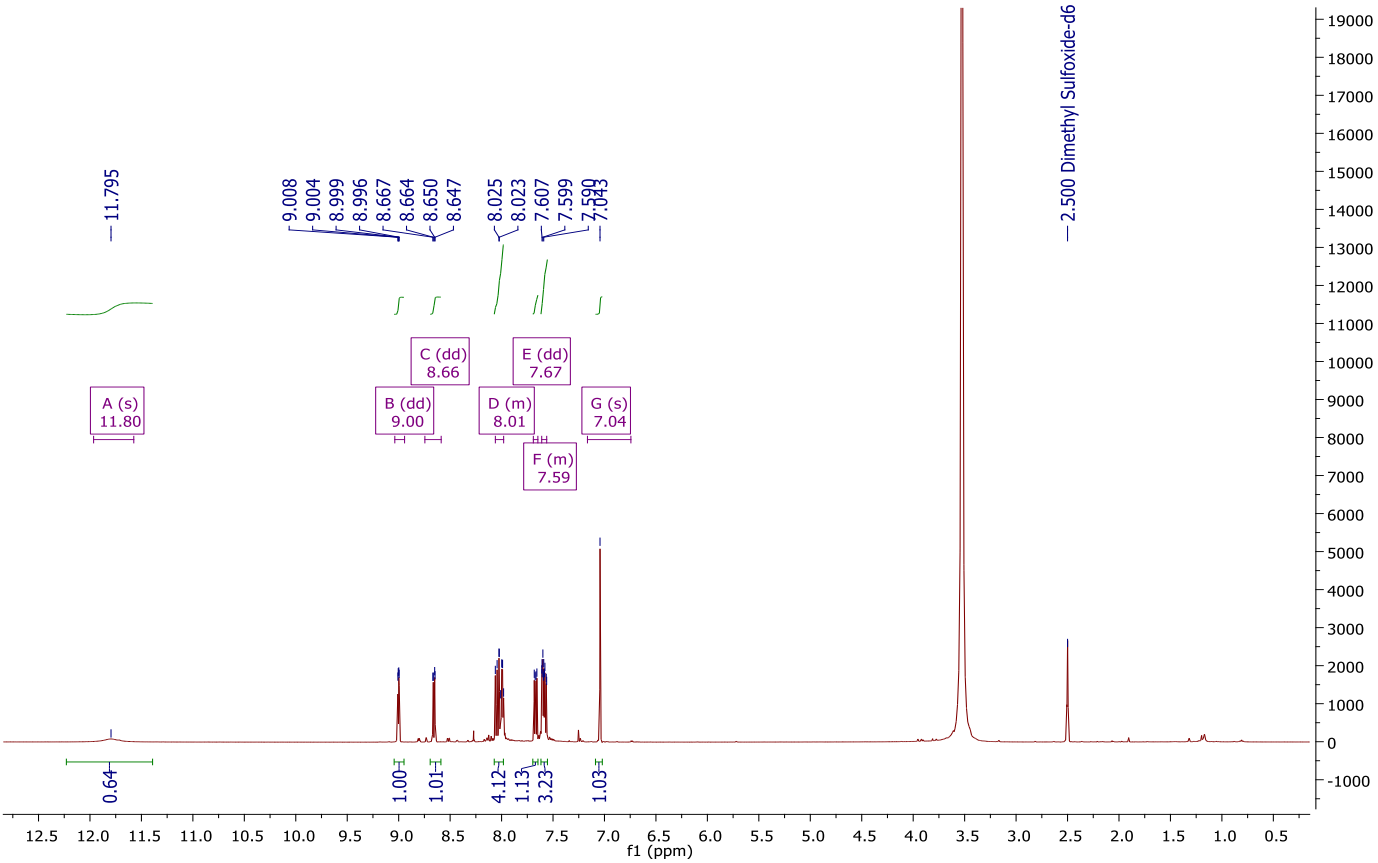


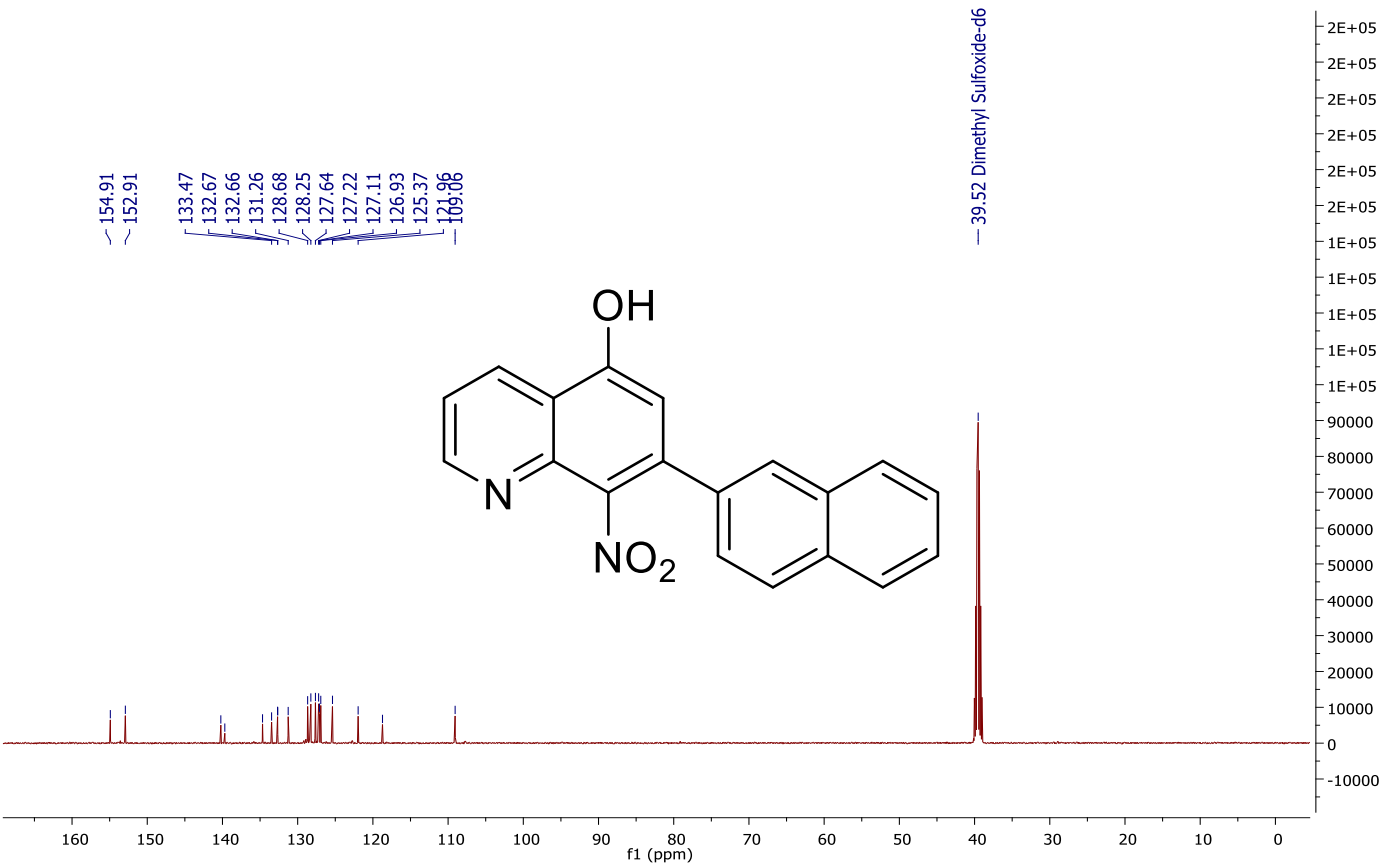
Compound **16m:** ^{1}H and ^{13}C NMR Spectrum



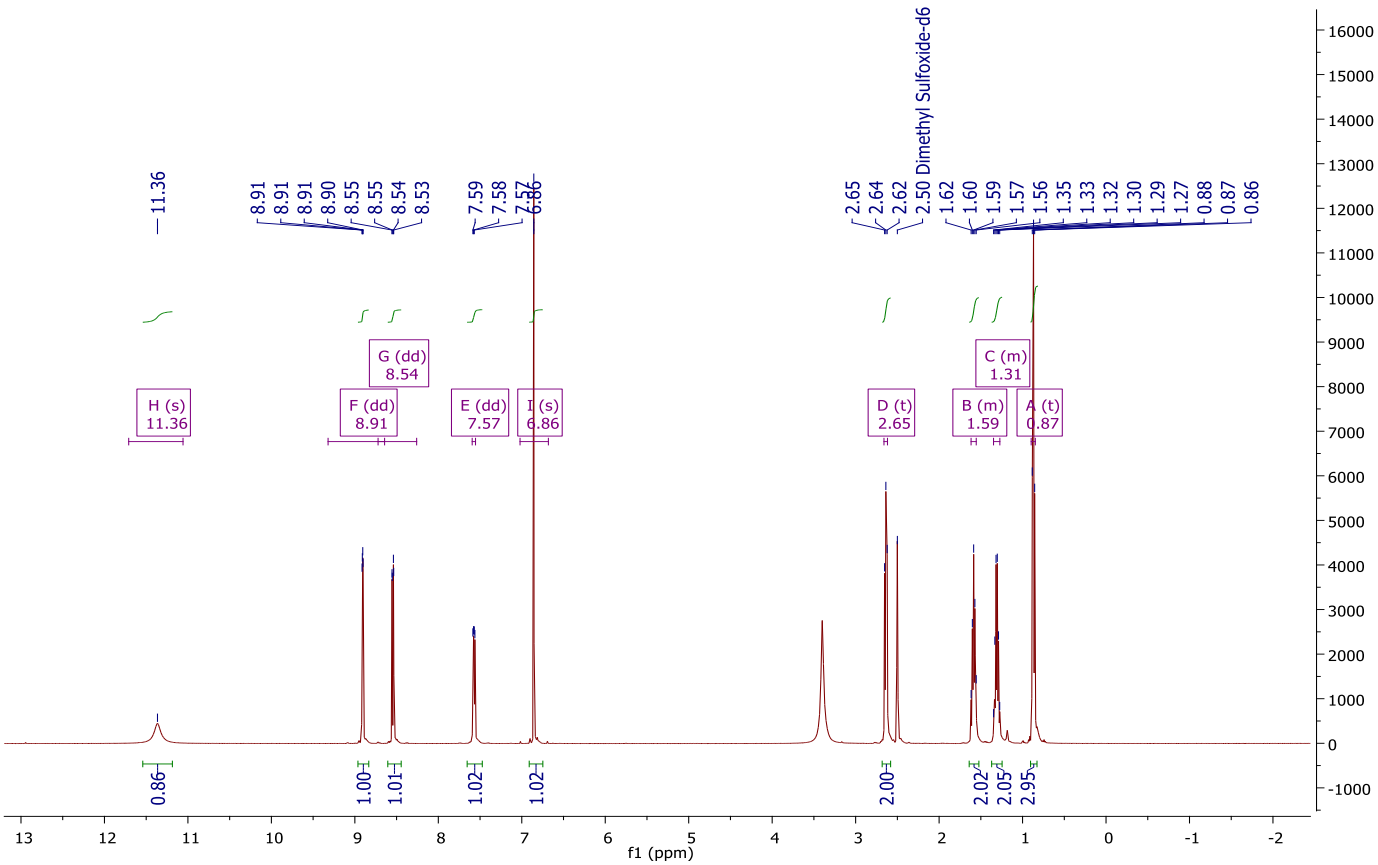


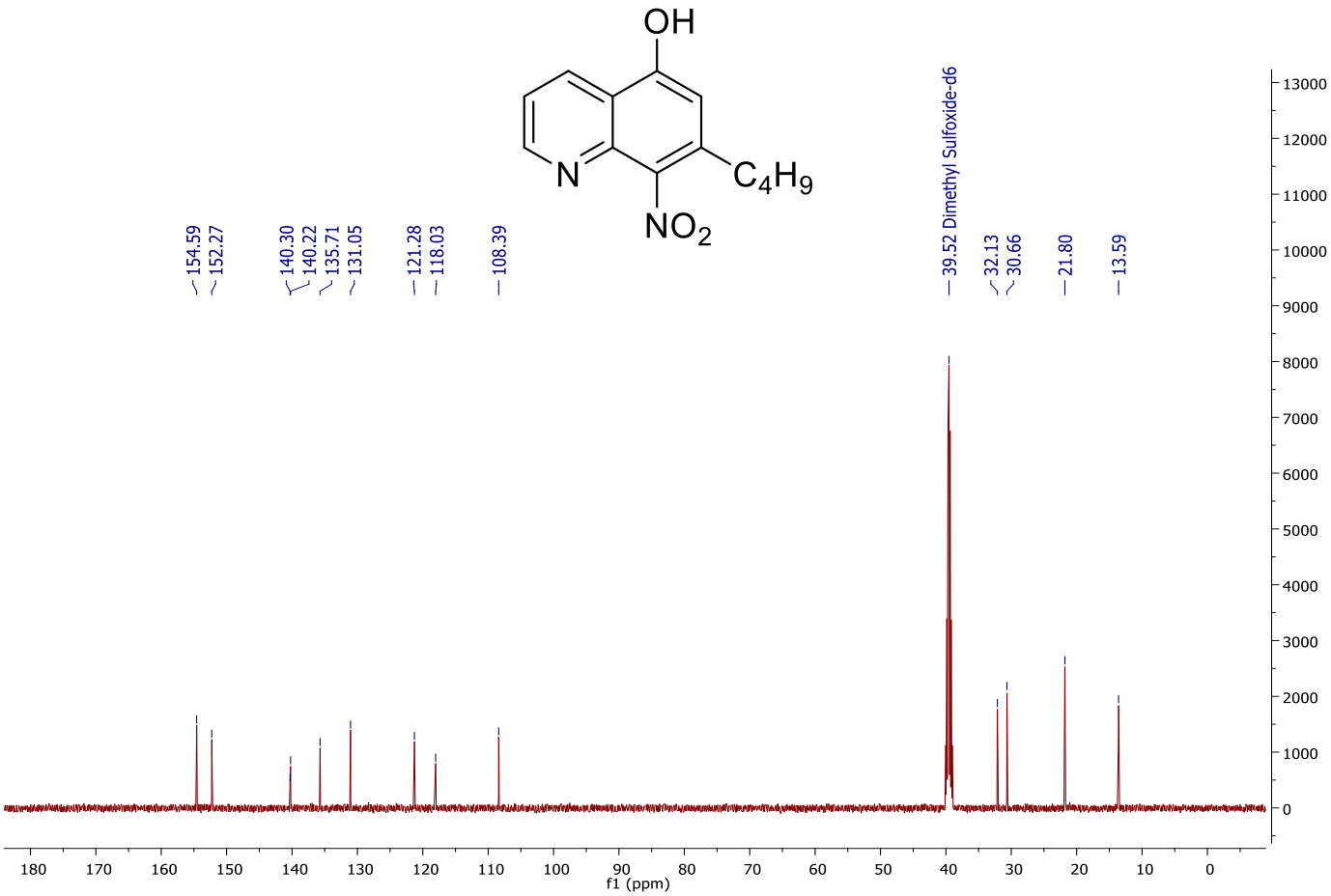
Compound **16n:** ^{1}H and ^{13}C NMR Spectrum



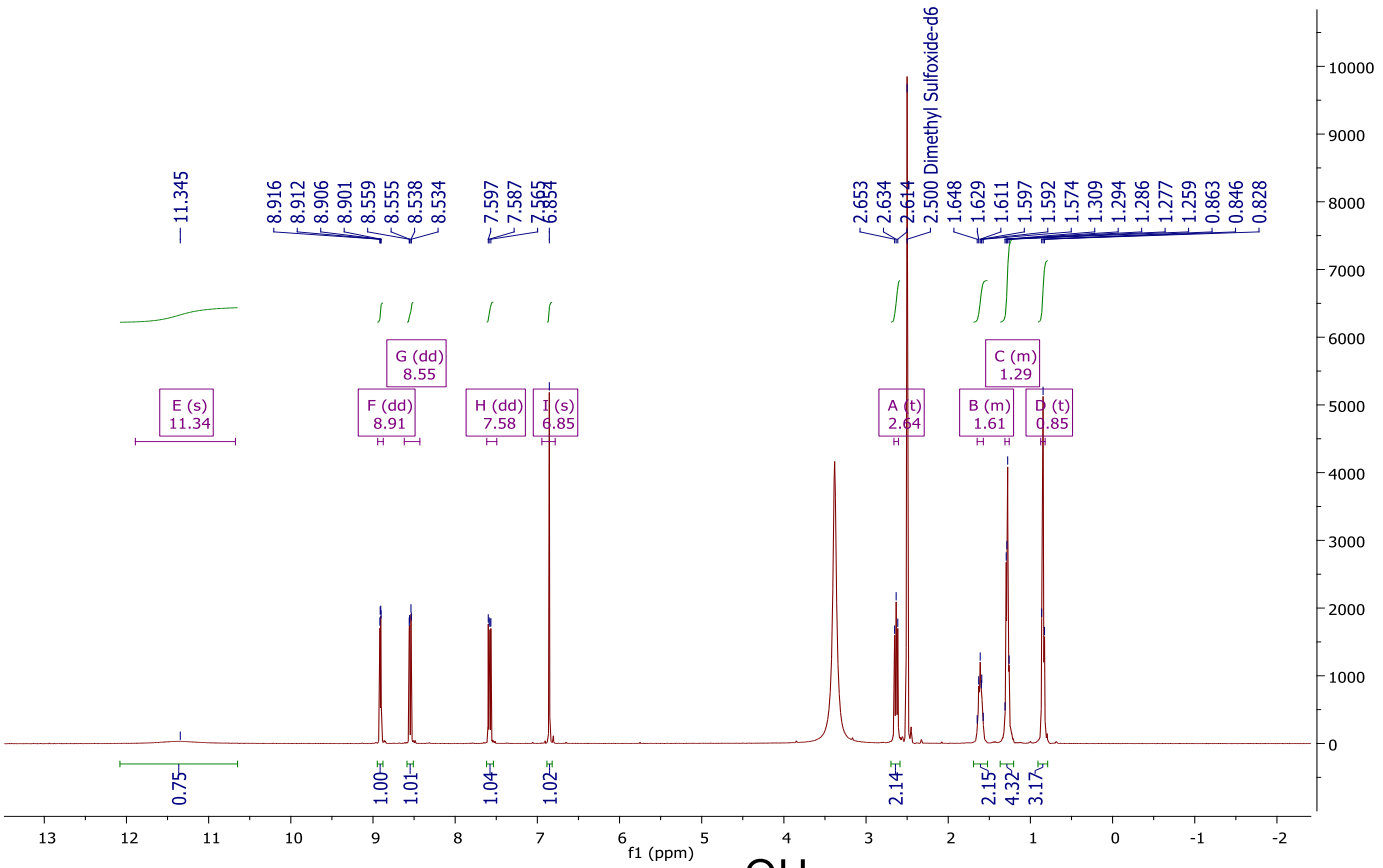


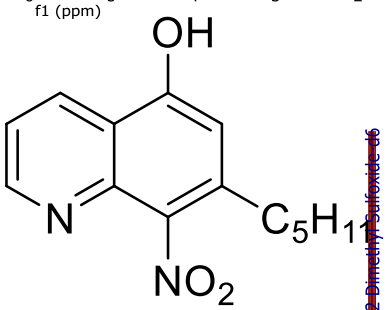
Compound **16o:** ^{1}H and ^{13}C NMR Spectrum

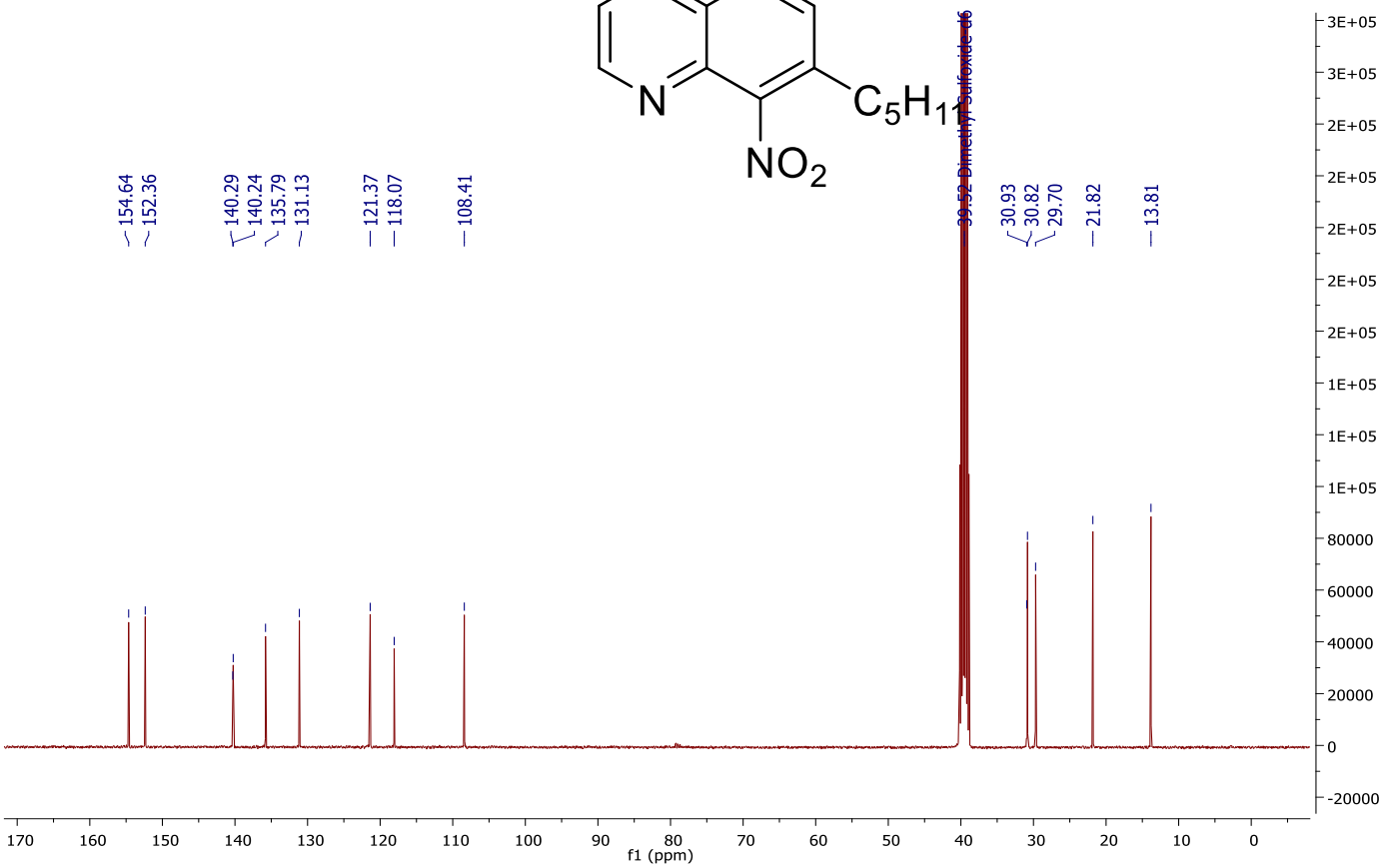




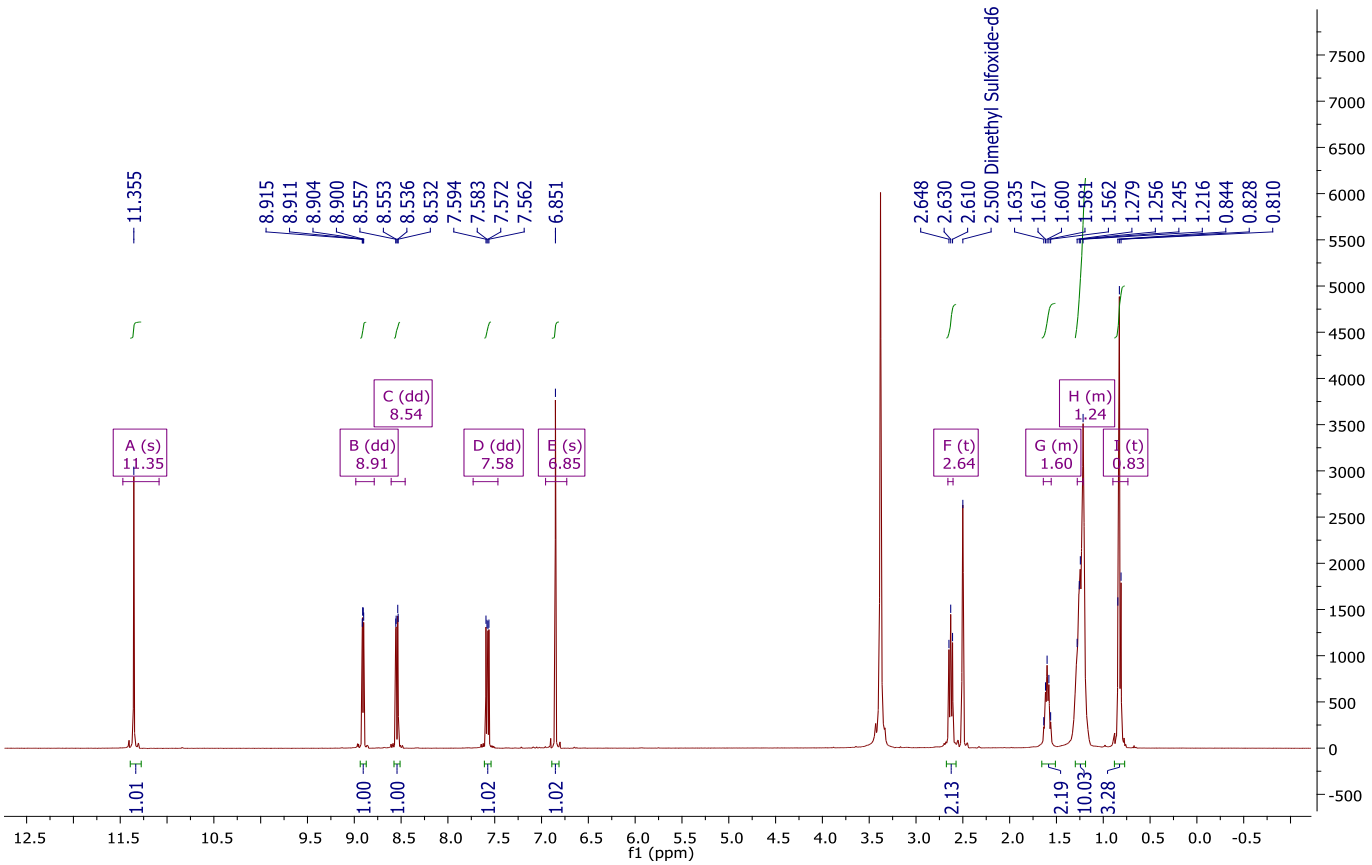
Compound **16p:** ^{1}H and ^{13}C NMR Spectrum

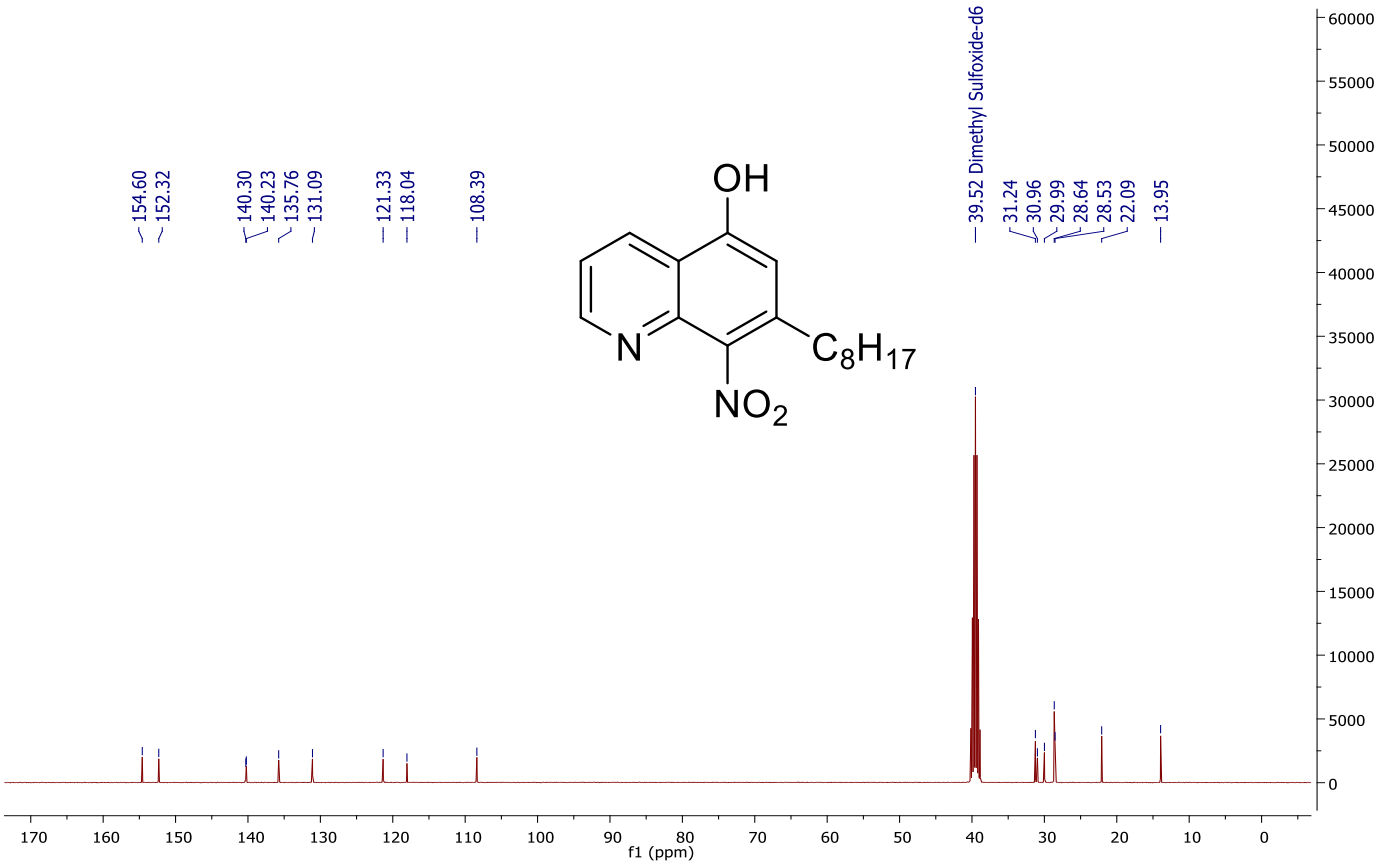




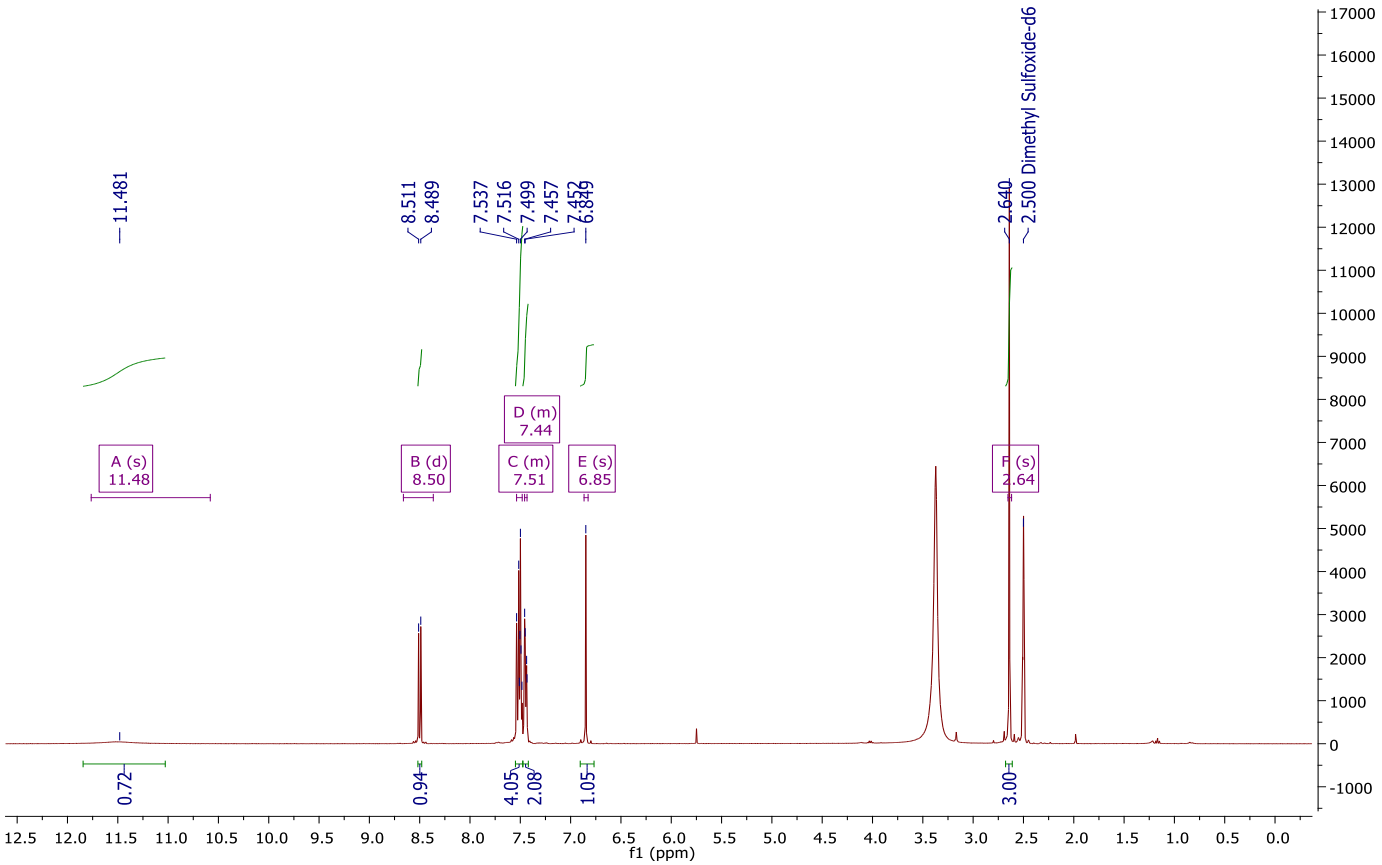


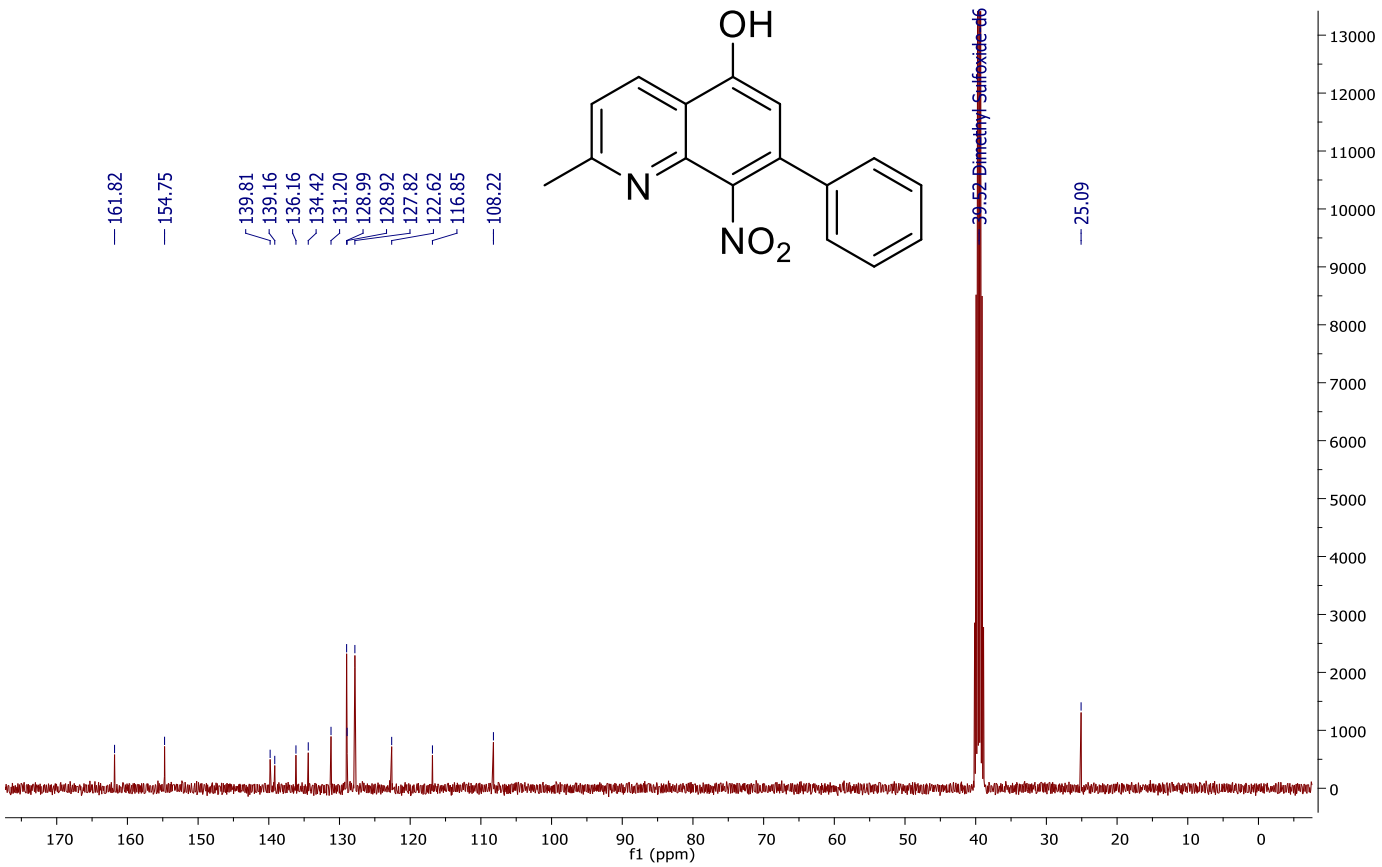
Compound **16q:** ^{1}H and ^{13}C NMR Spectrum



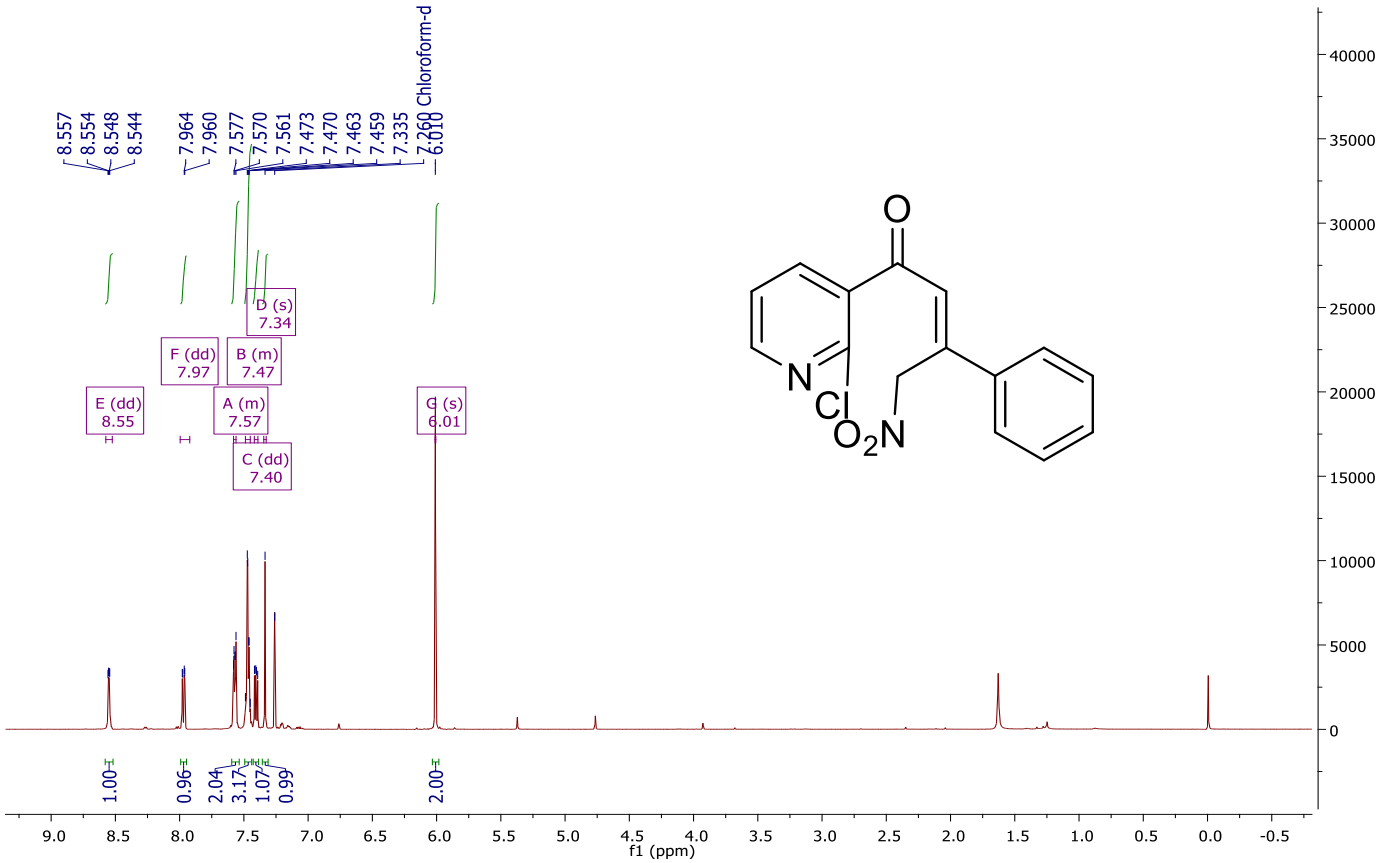


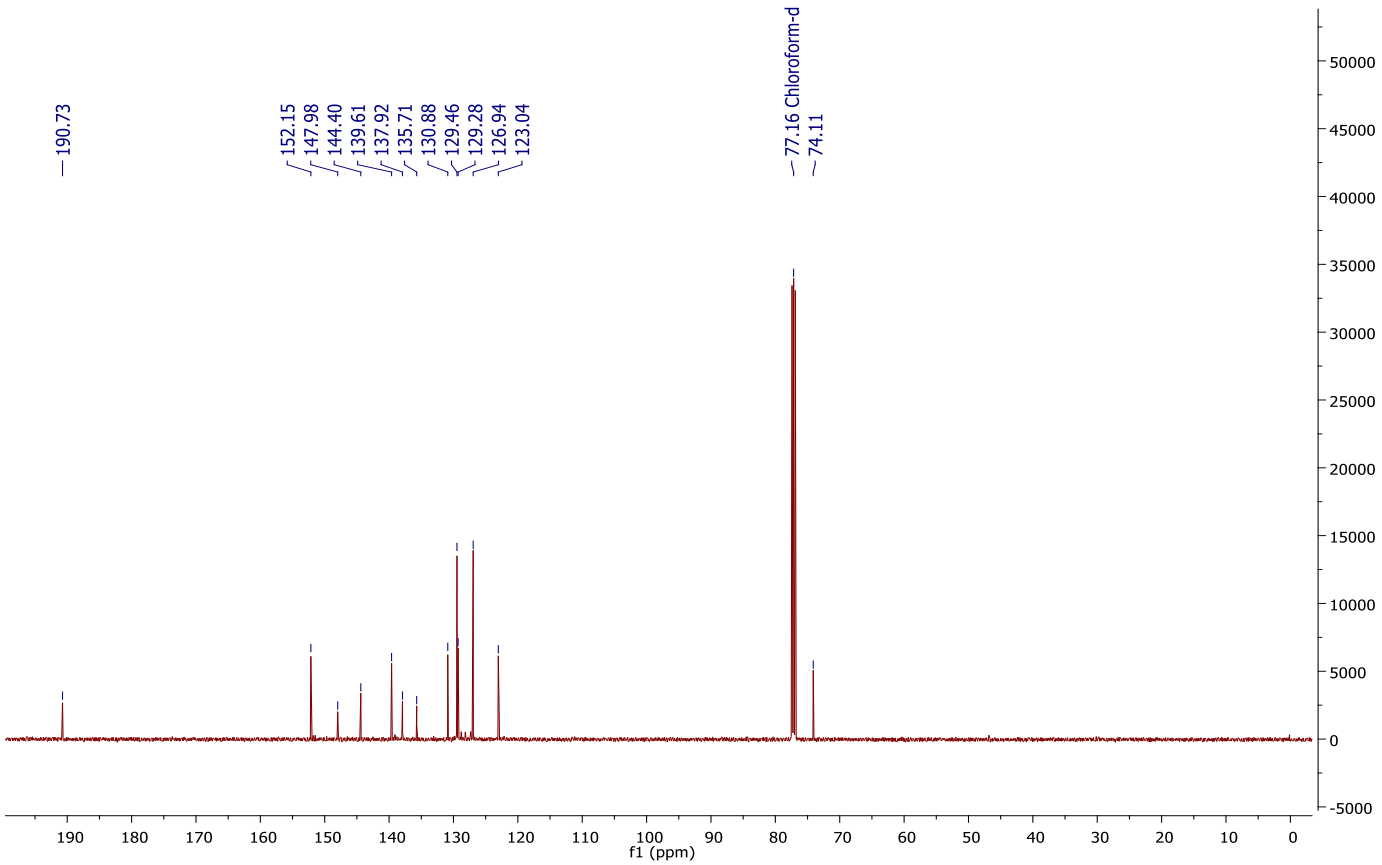
Compound **16r:** ^{1}H and ^{13}C NMR Spectrum



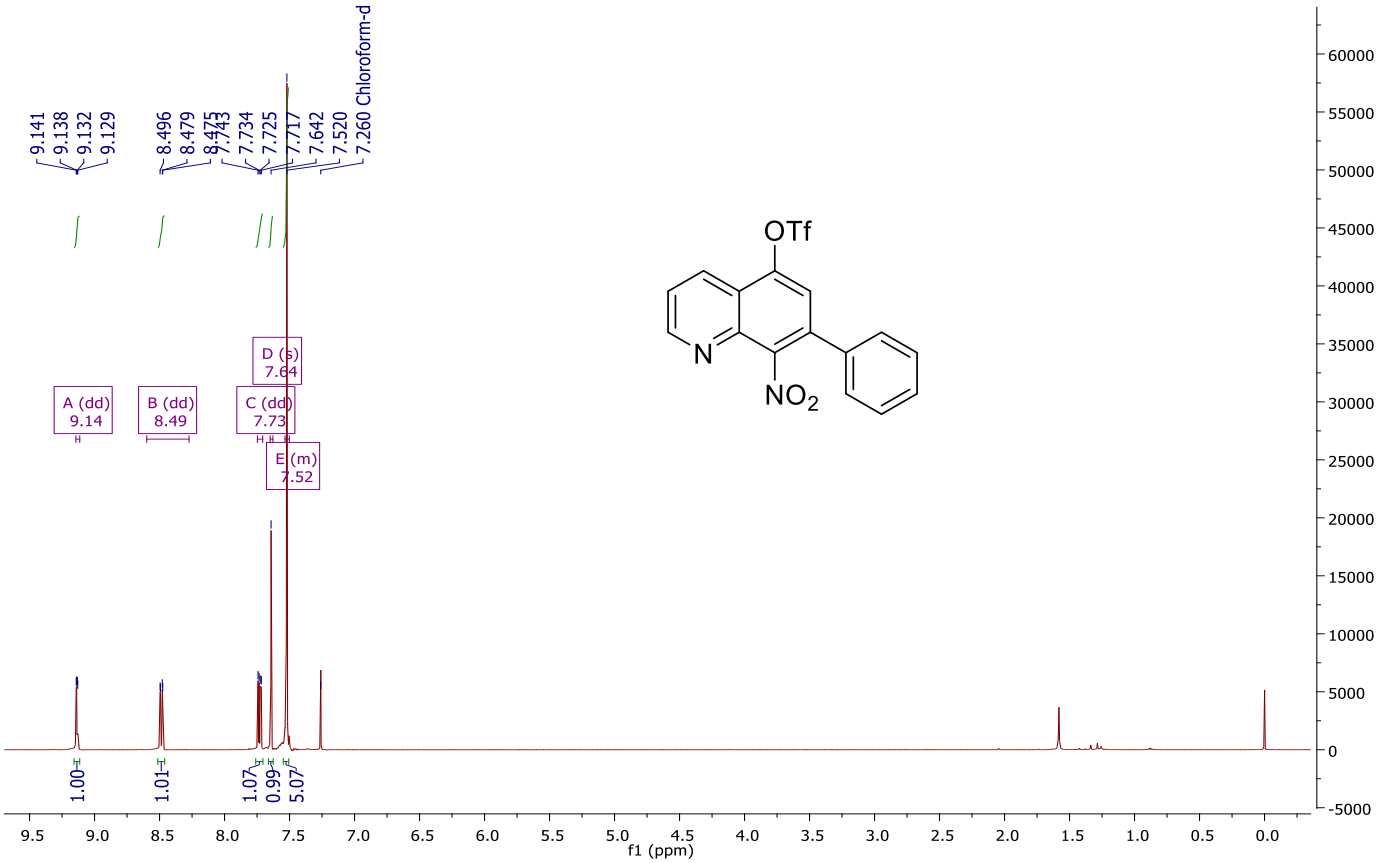


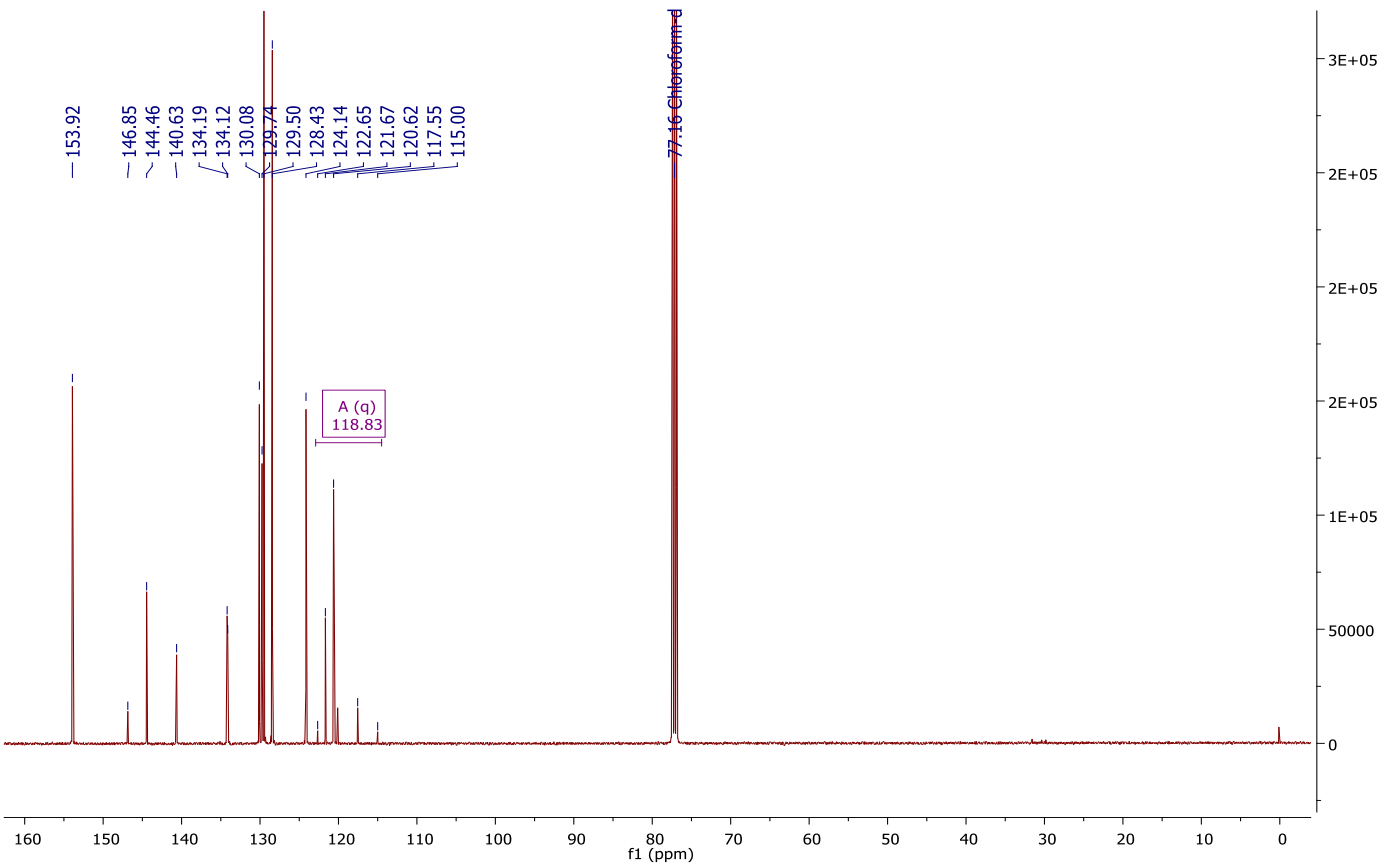
Compound **18:** ^{1}H and ^{13}C NMR Spectrum



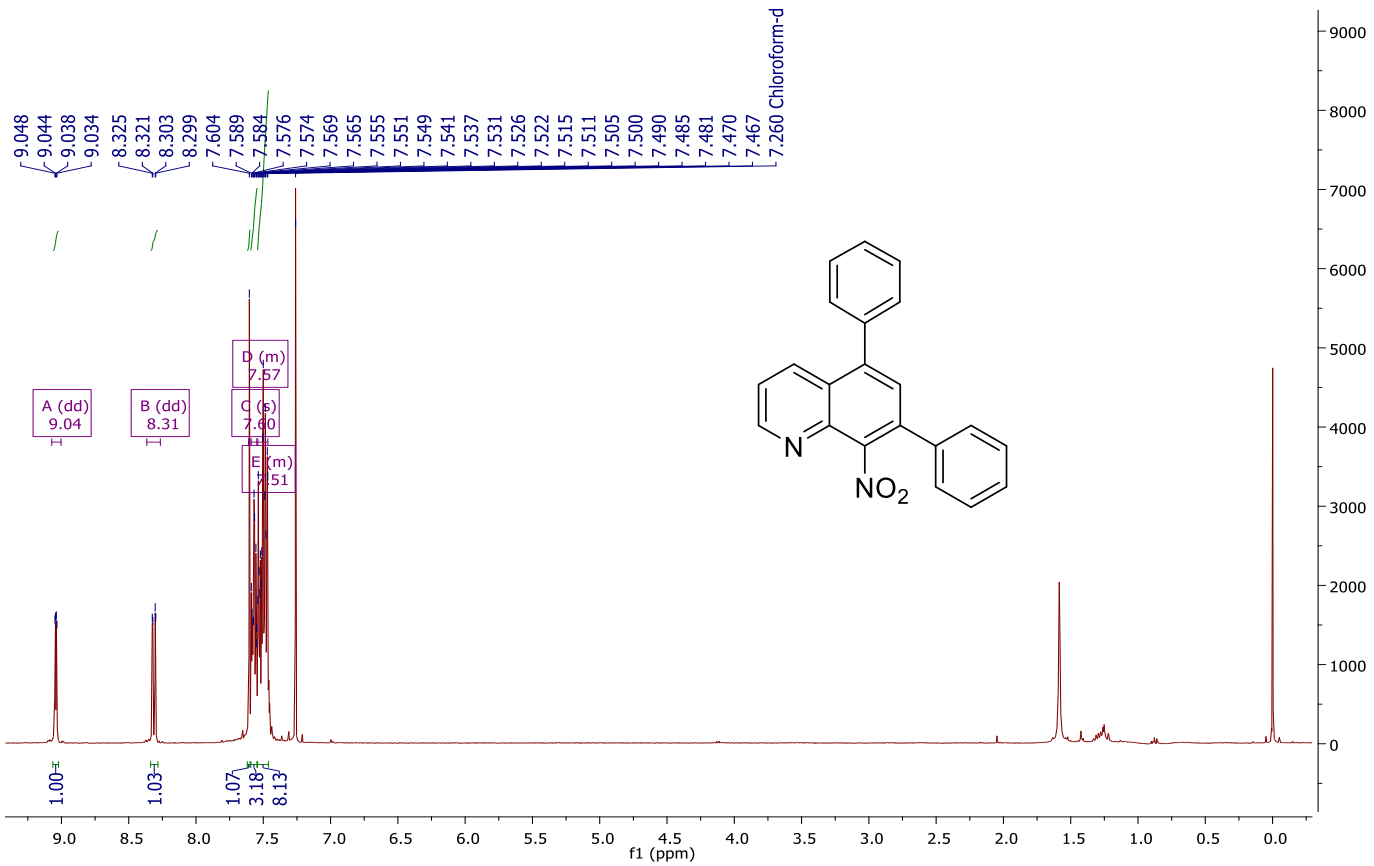


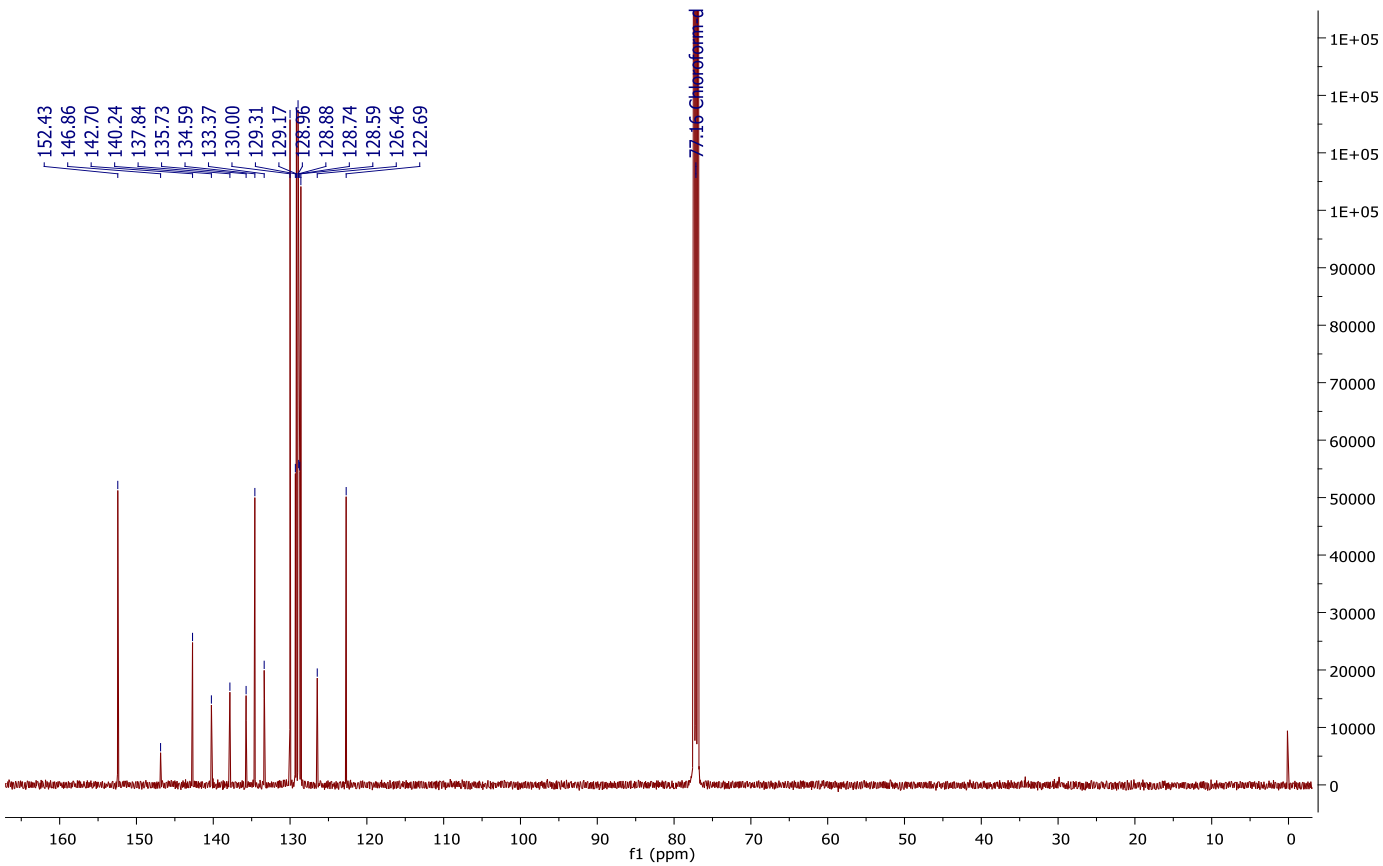
Compound **19:** ^{1}H and ^{13}C NMR Spectrum



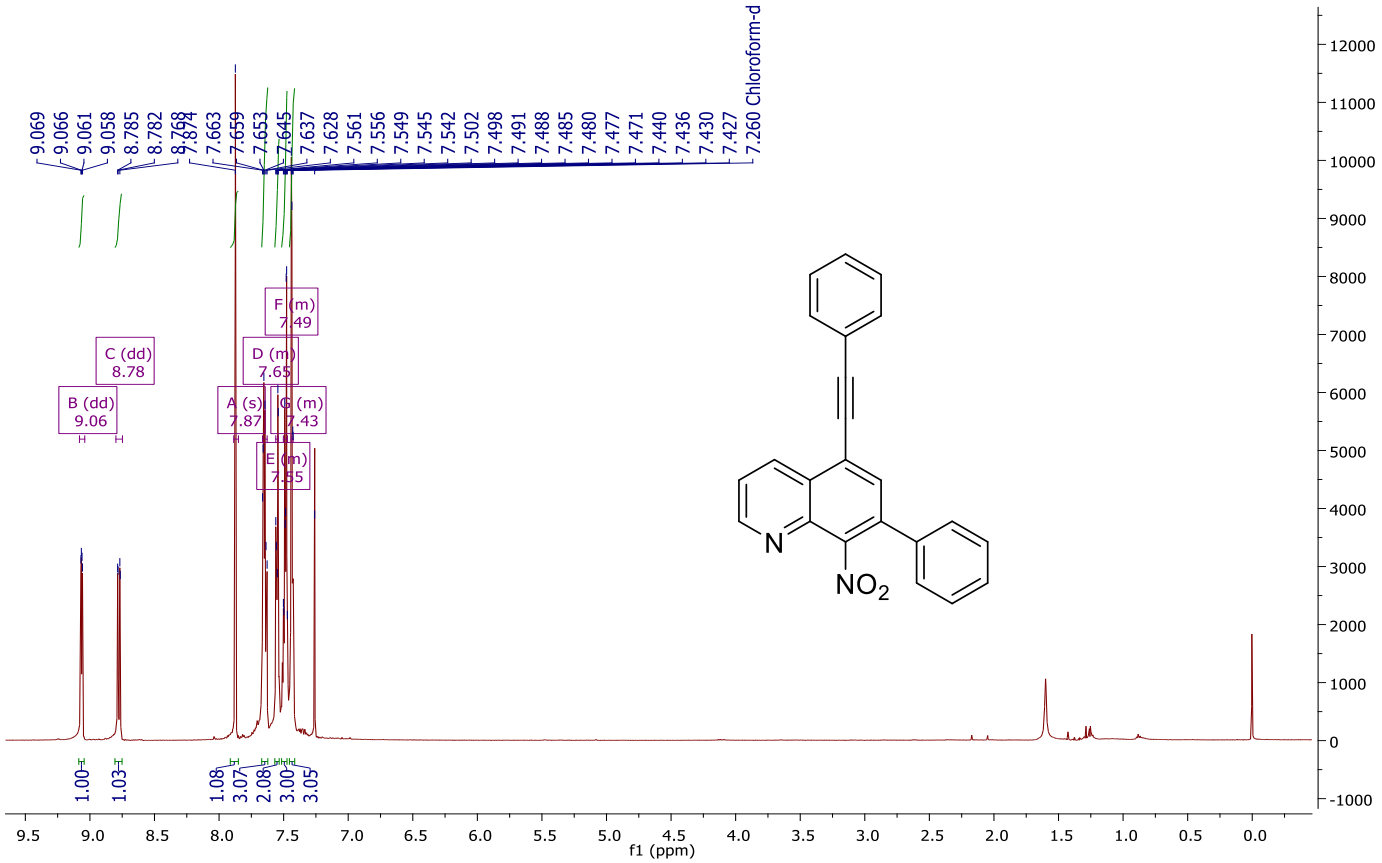


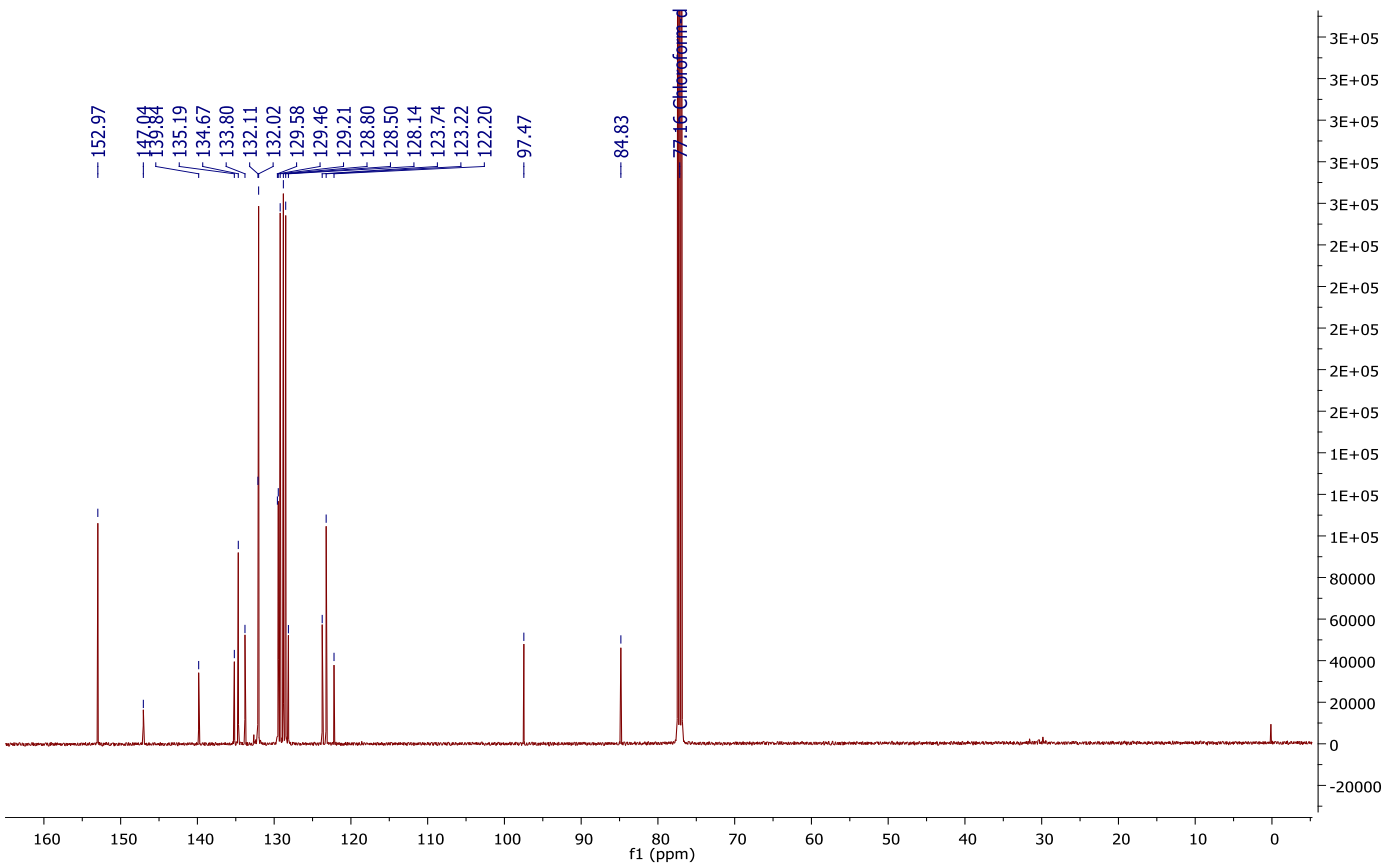
Compound **20:** ^{1}H and ^{13}C NMR Spectrum



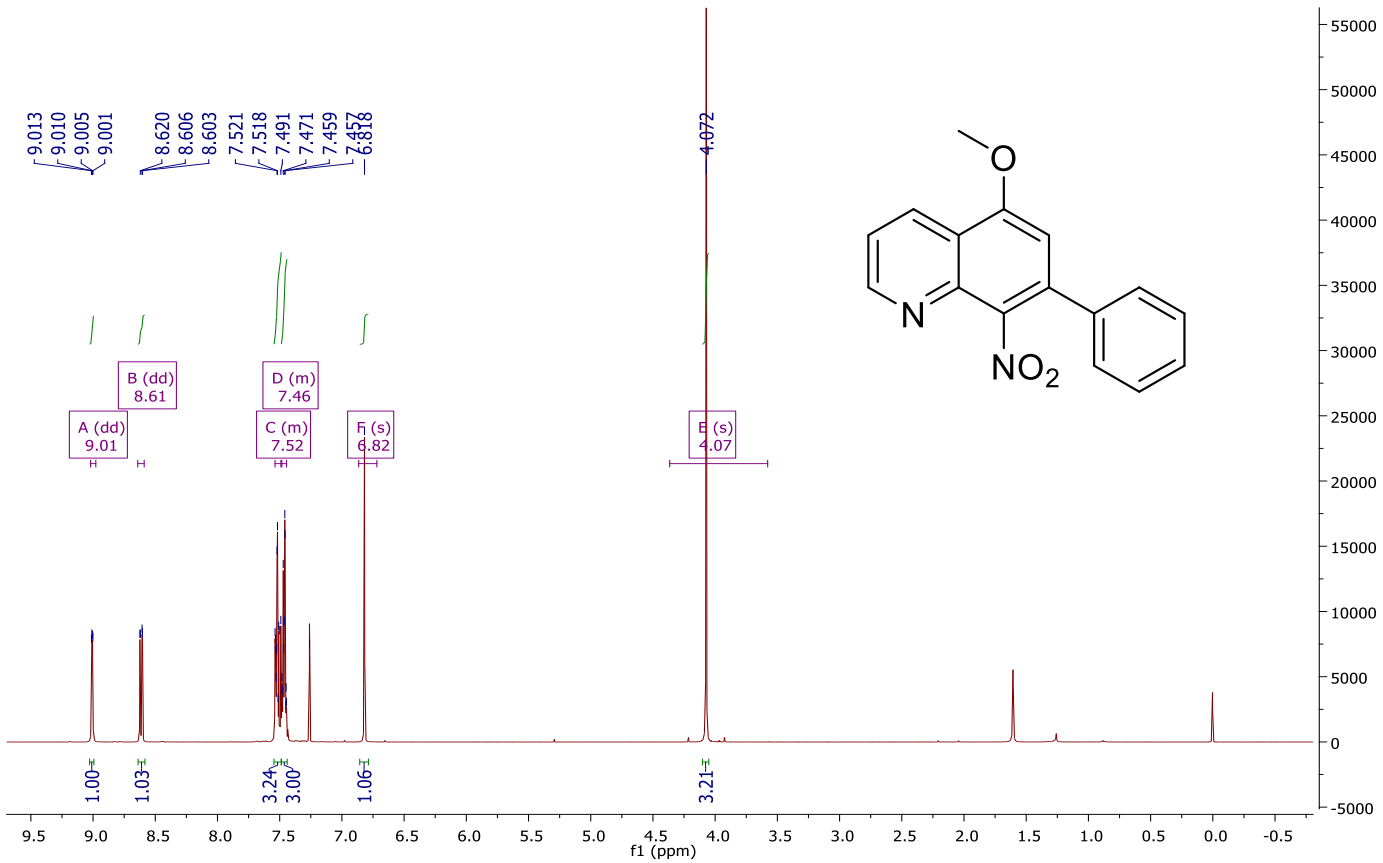


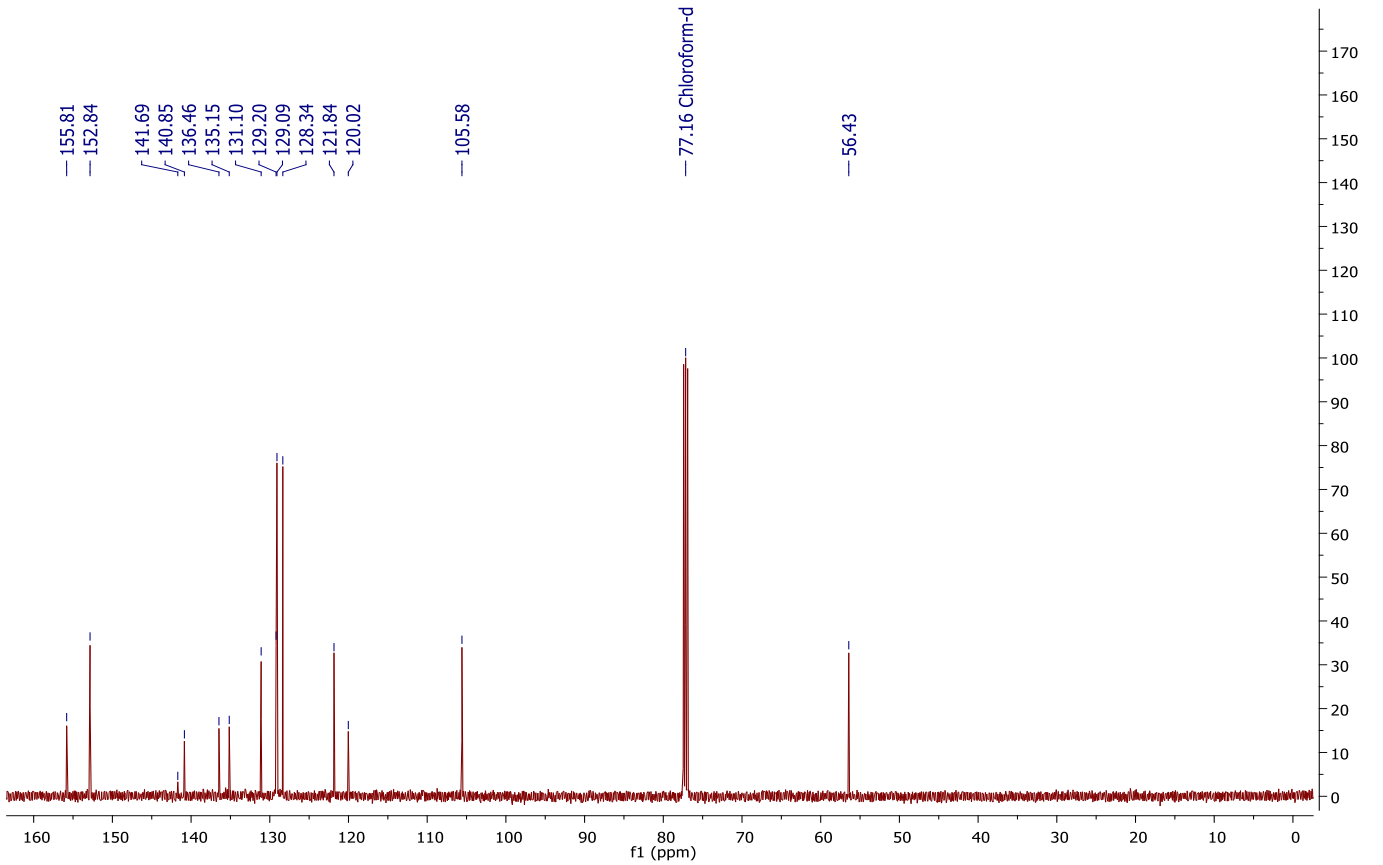
Compound **21:** ^{1}H and ^{13}C NMR Spectrum



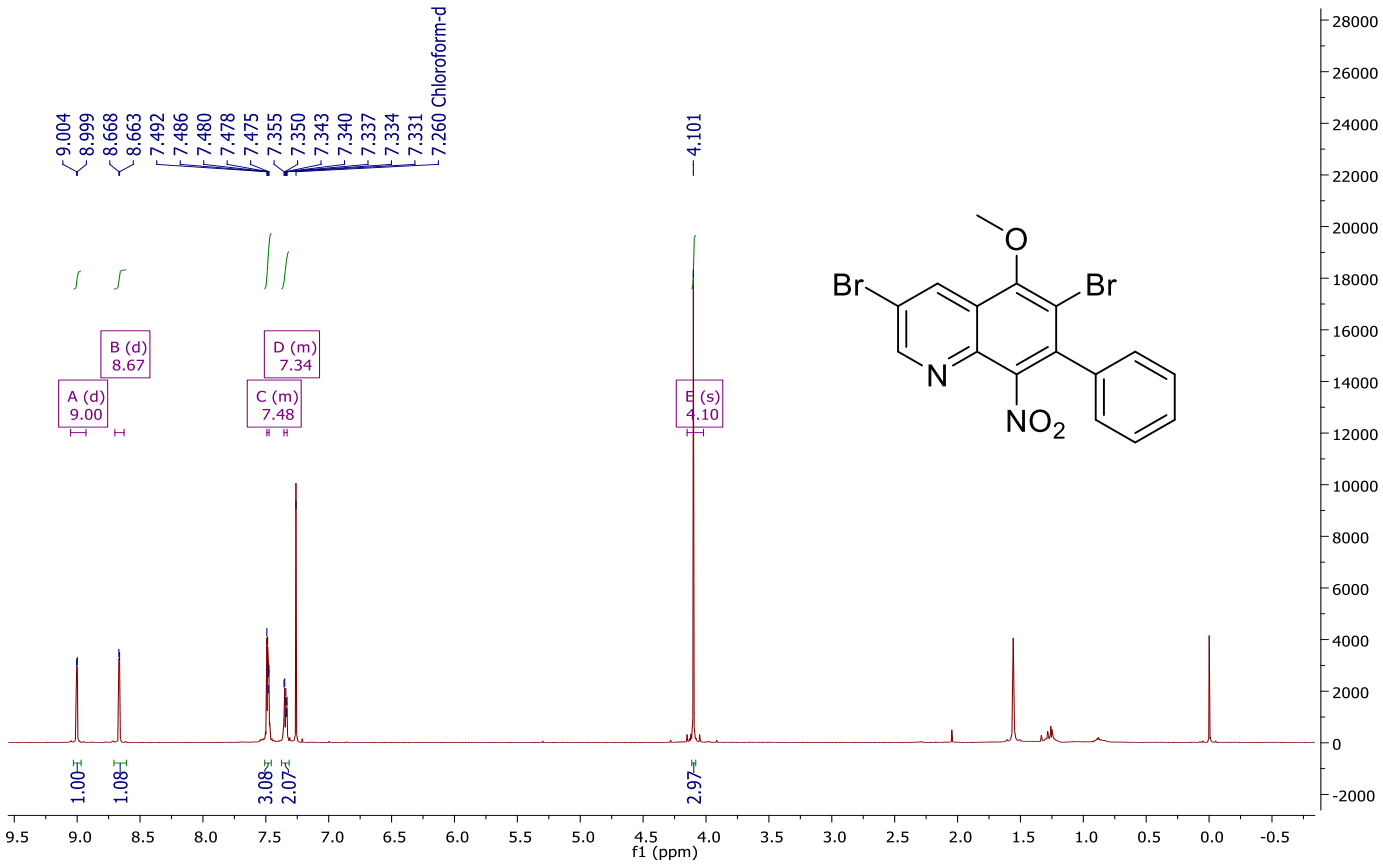


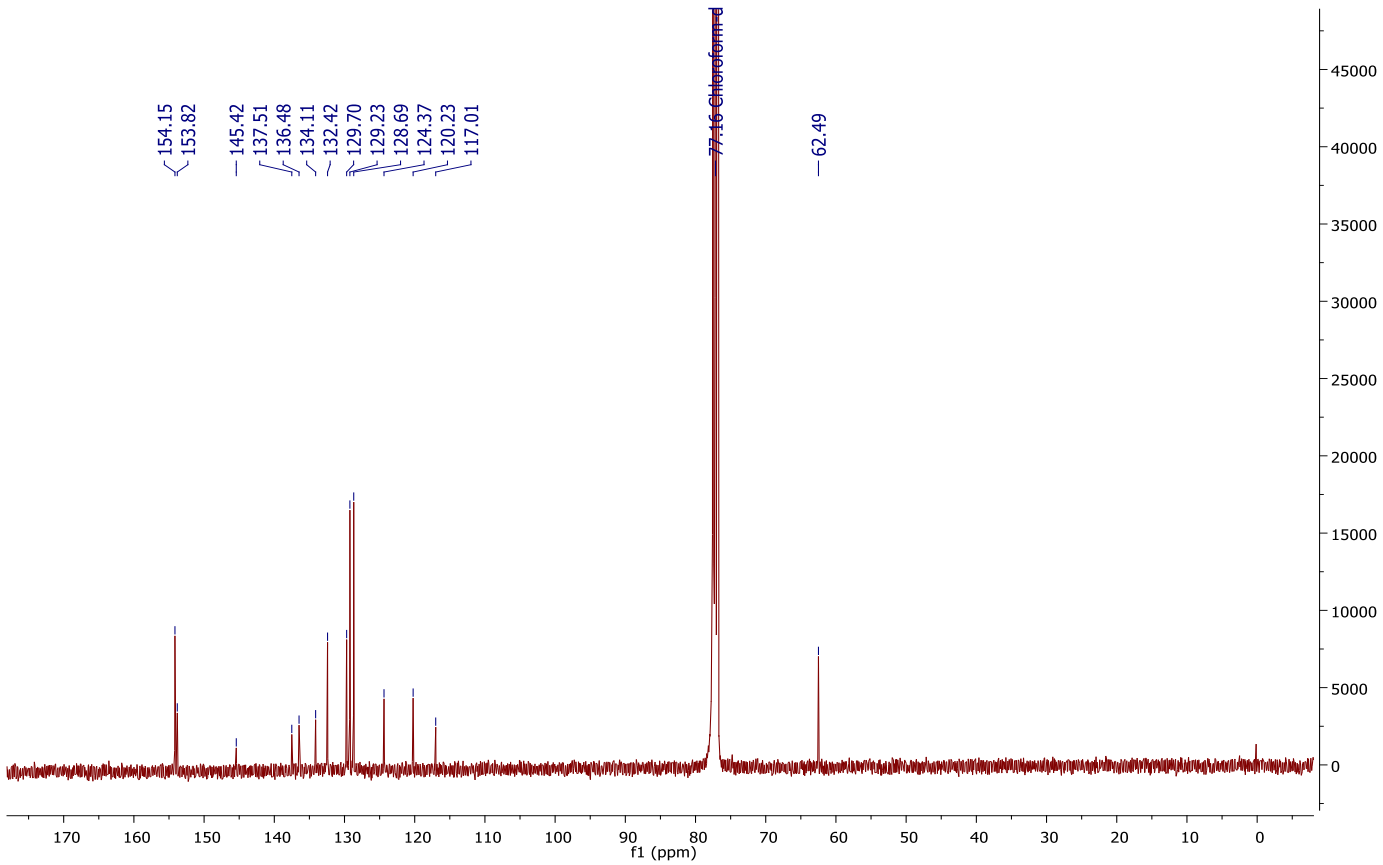
Compound **22:** ^{1}H and ^{13}C NMR Spectrum



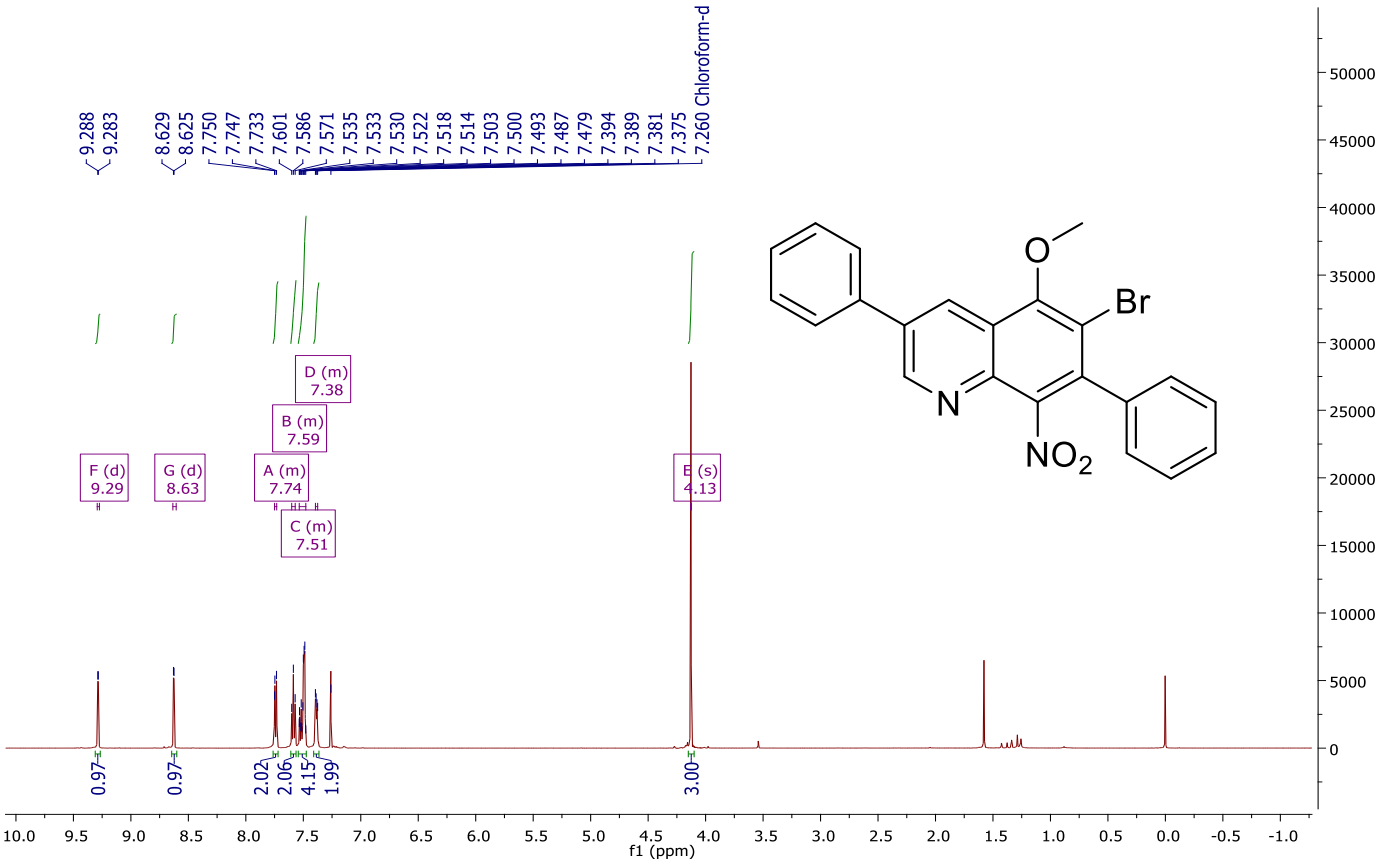


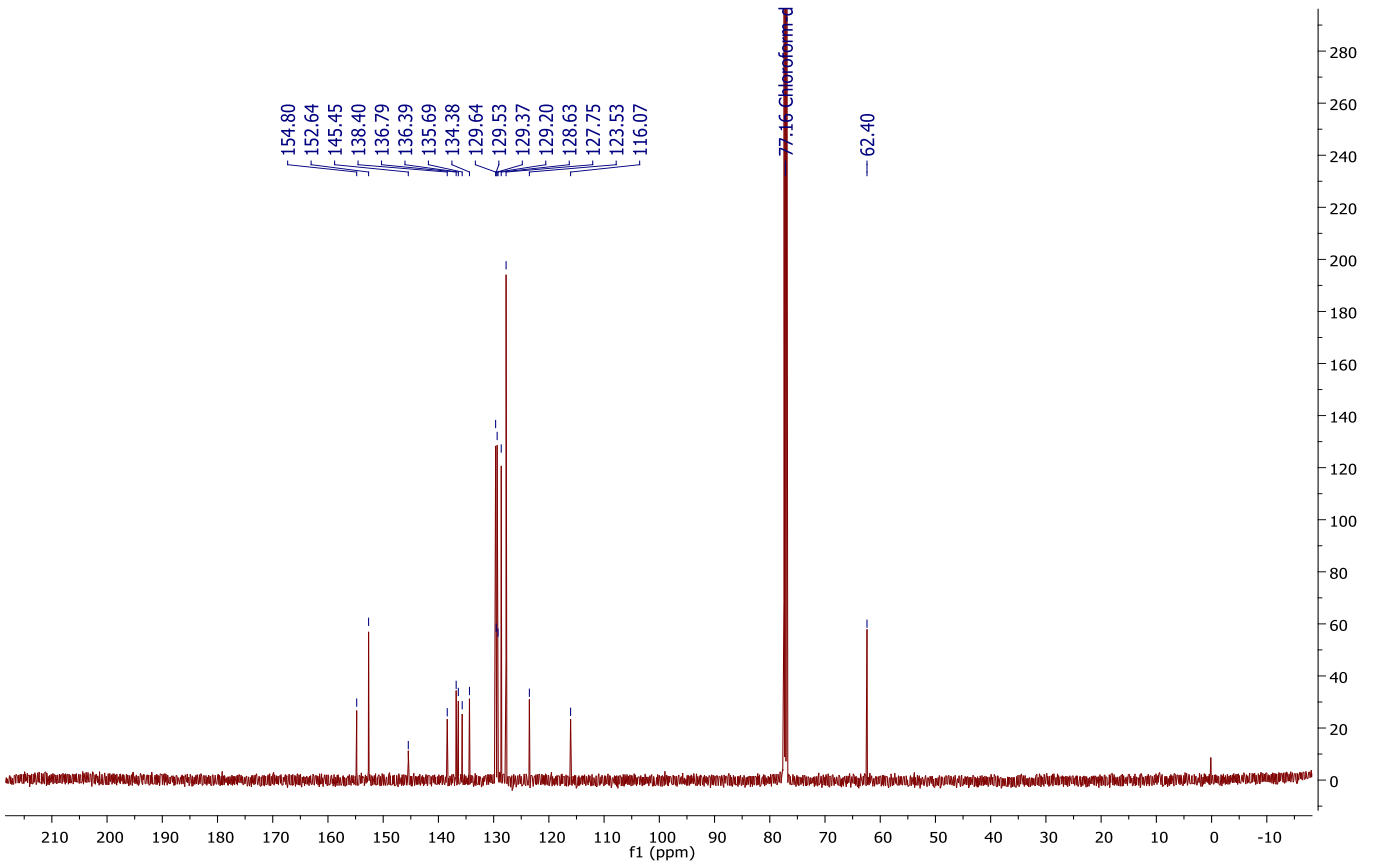
Compound **23:** ^{1}H and ^{13}C NMR Spectrum



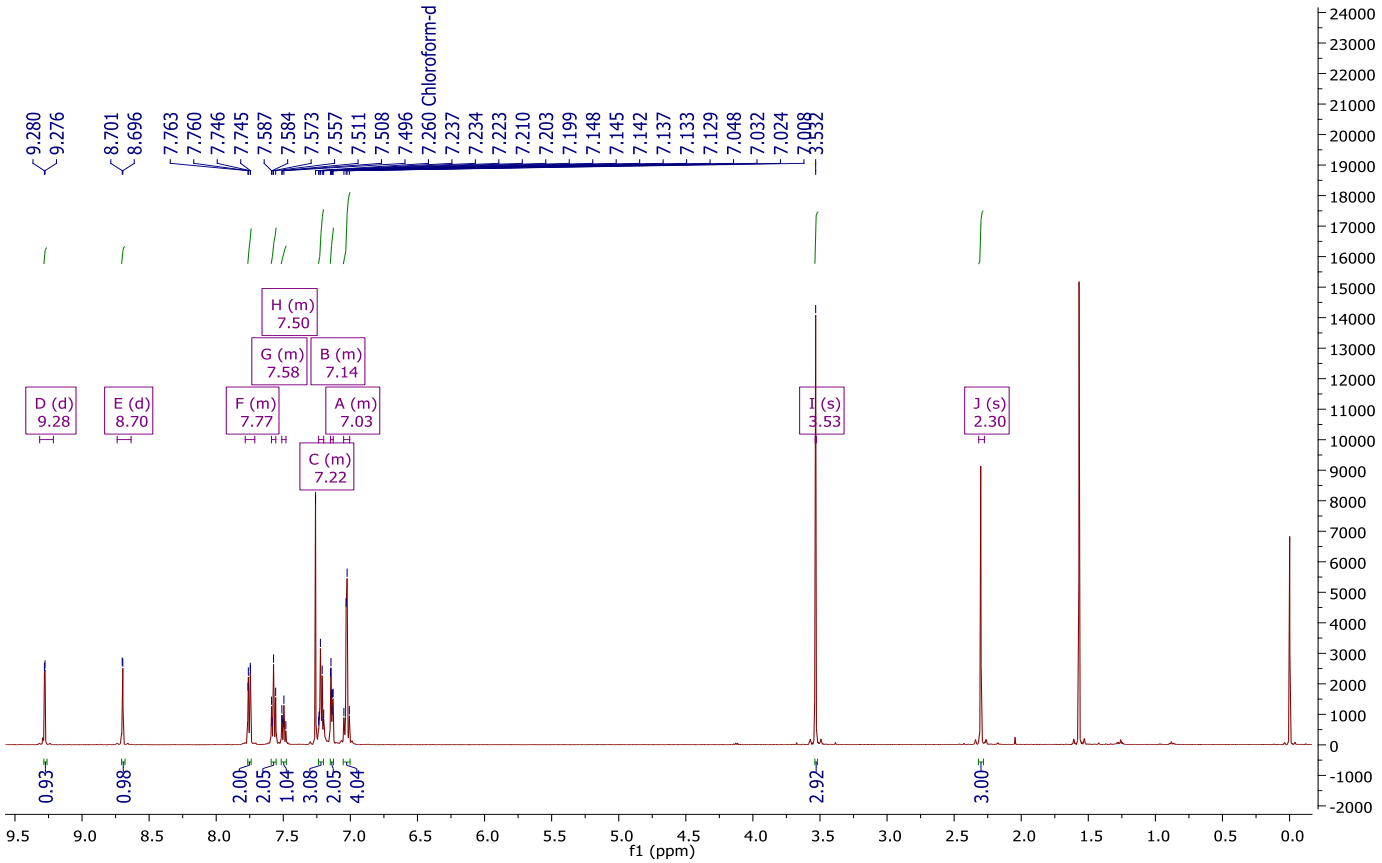


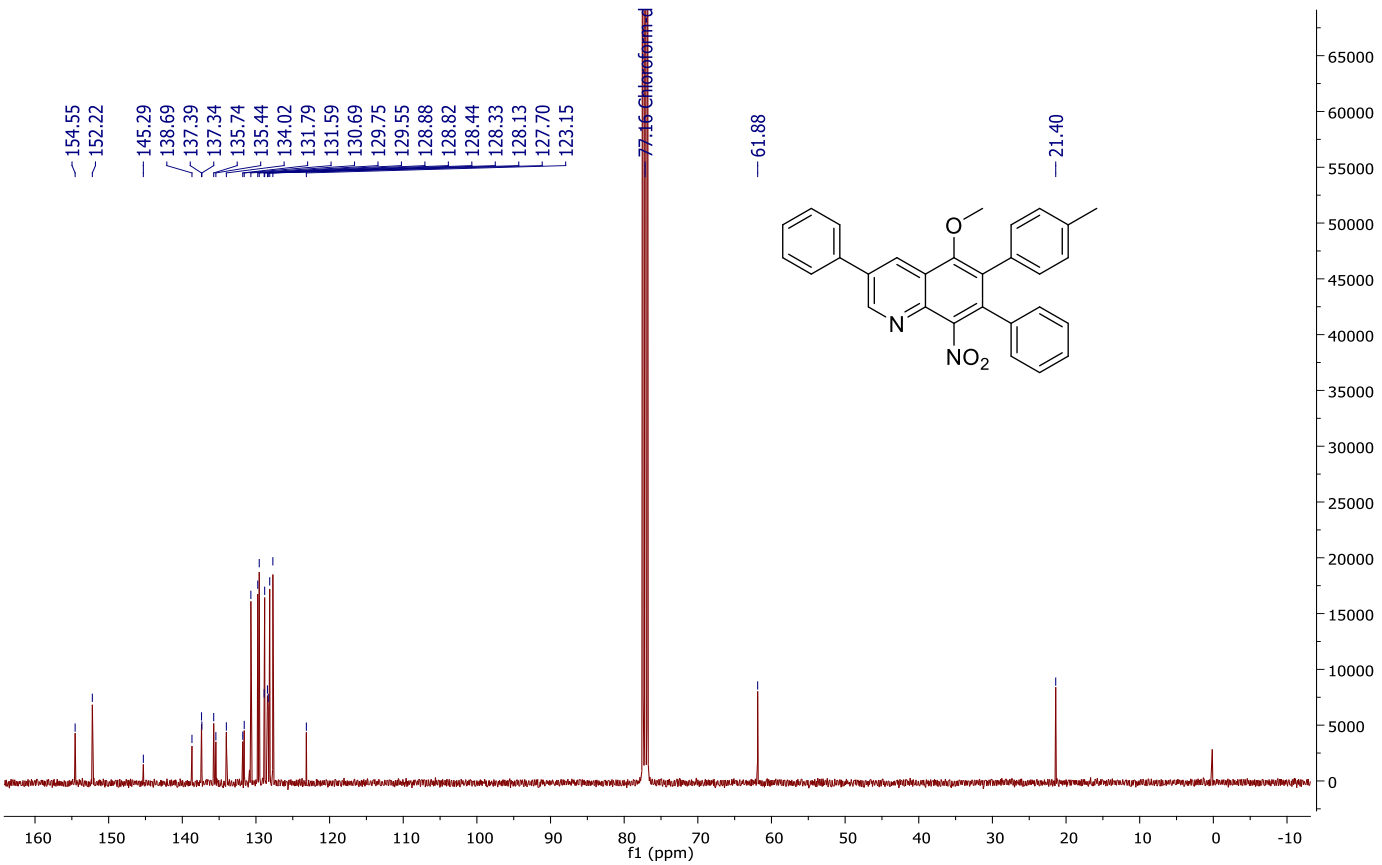
Compound **24:** ^{1}H and ^{13}C NMR Spectrum



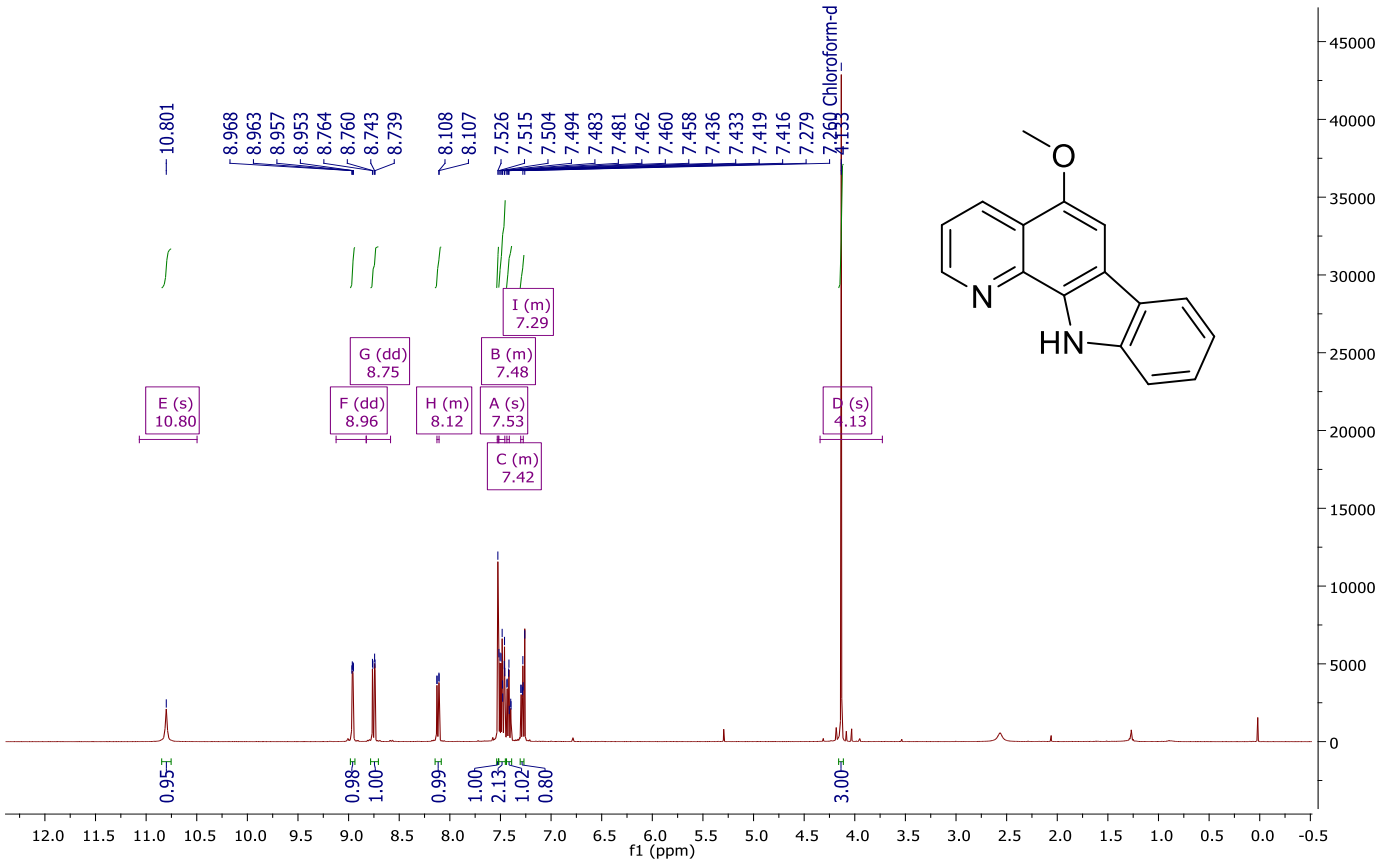


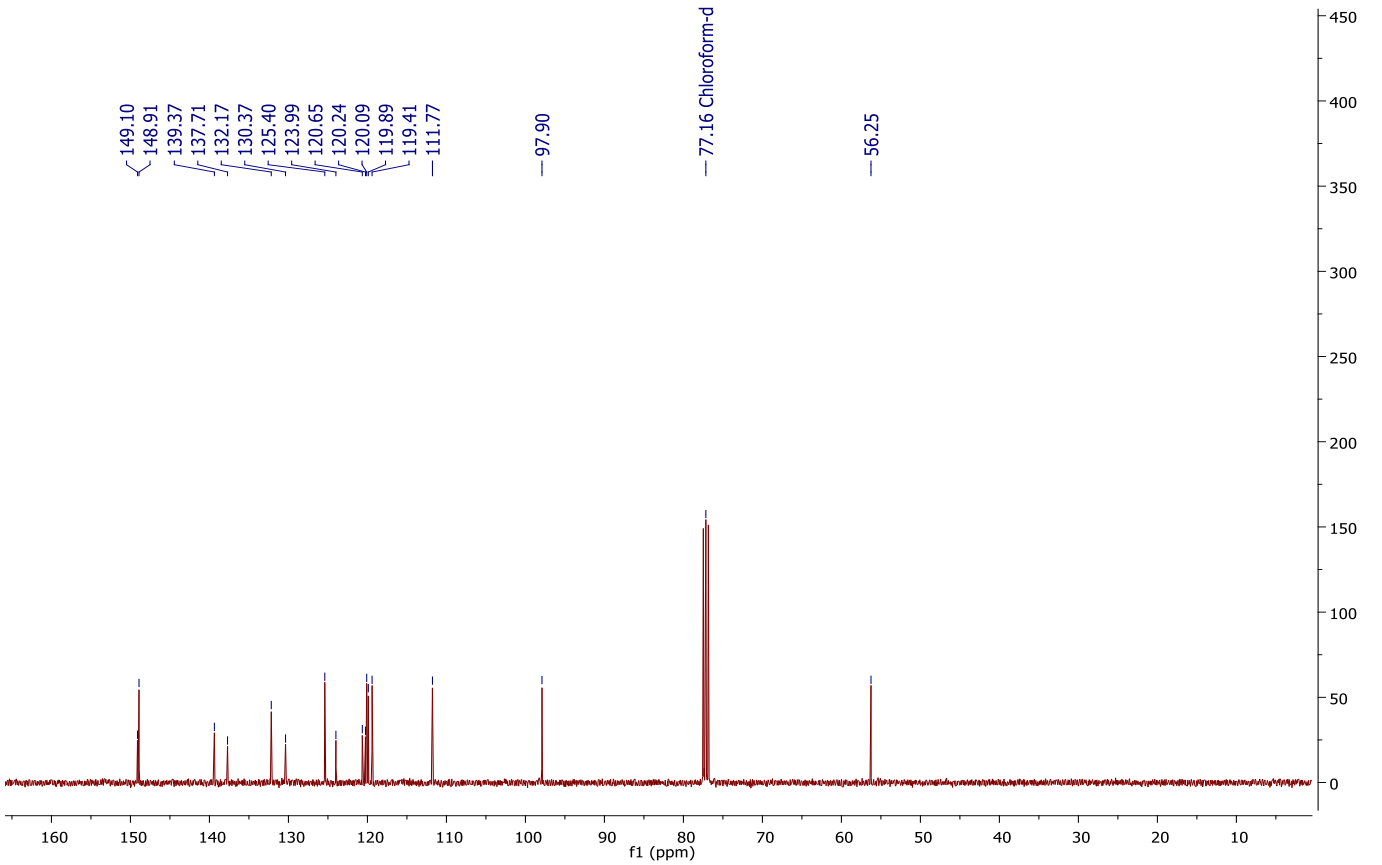
Compound **25:** ^{1}H and ^{13}C NMR Spectrum



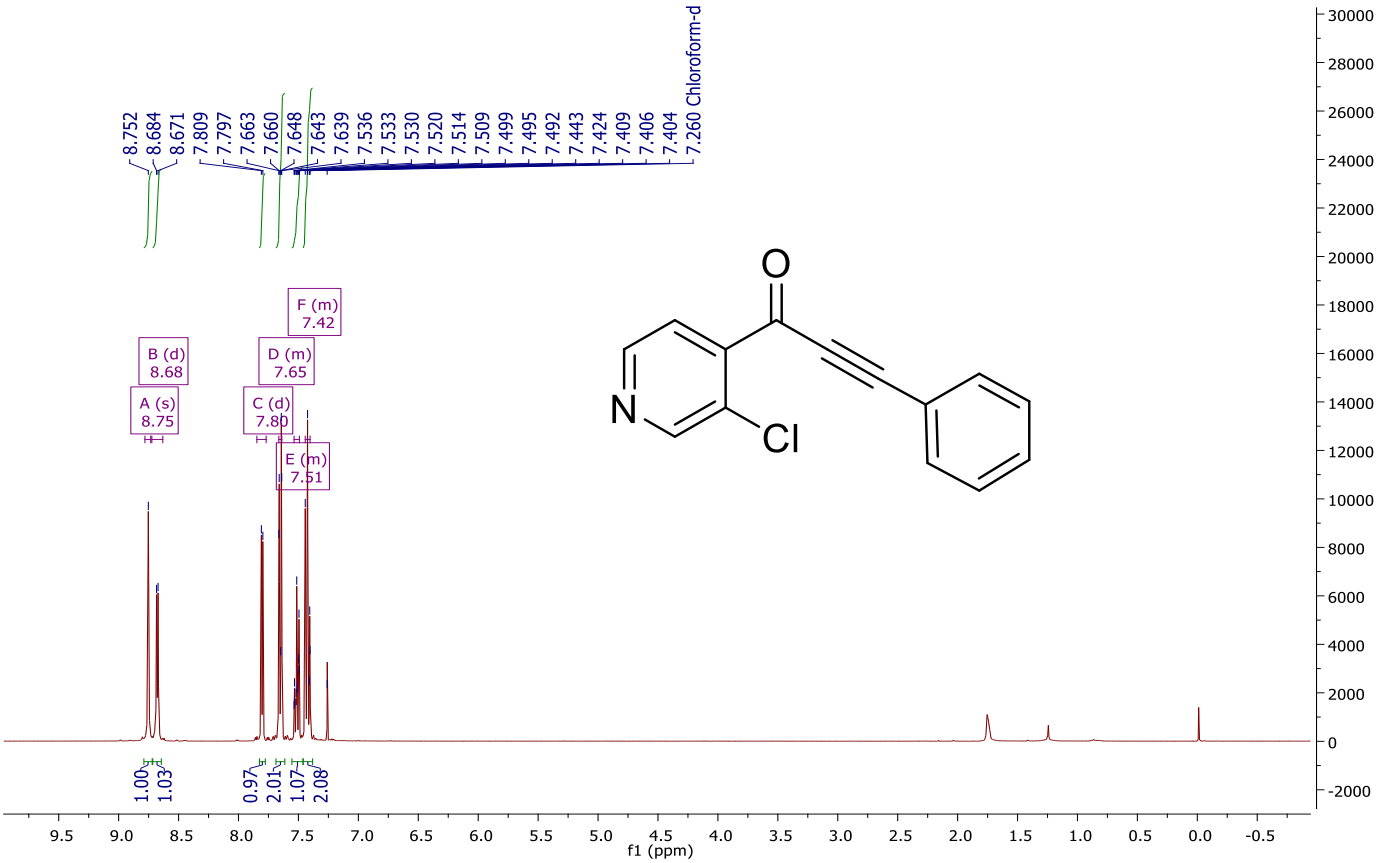


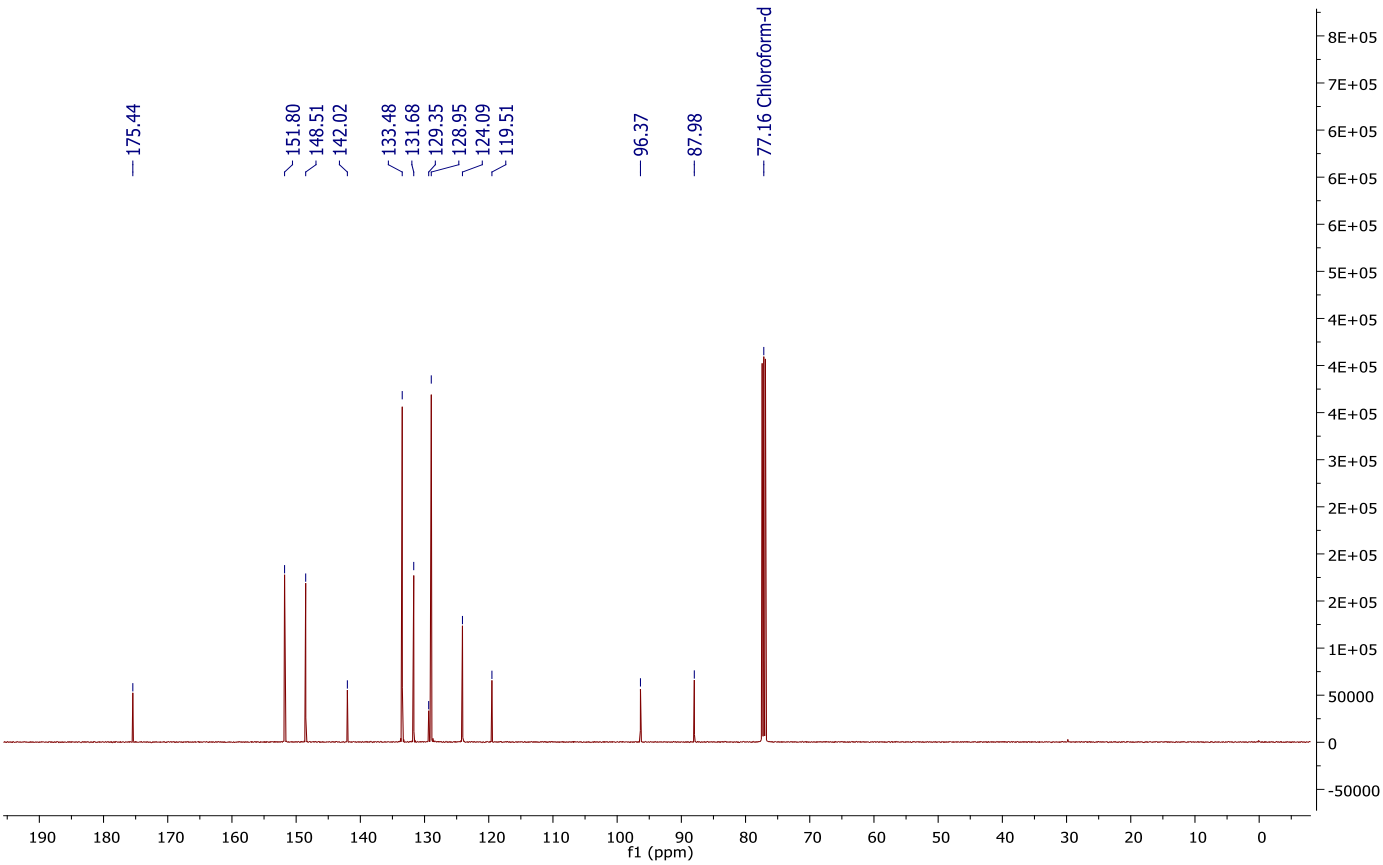
Compound **26:** ^{1}H and ^{13}C NMR Spectrum



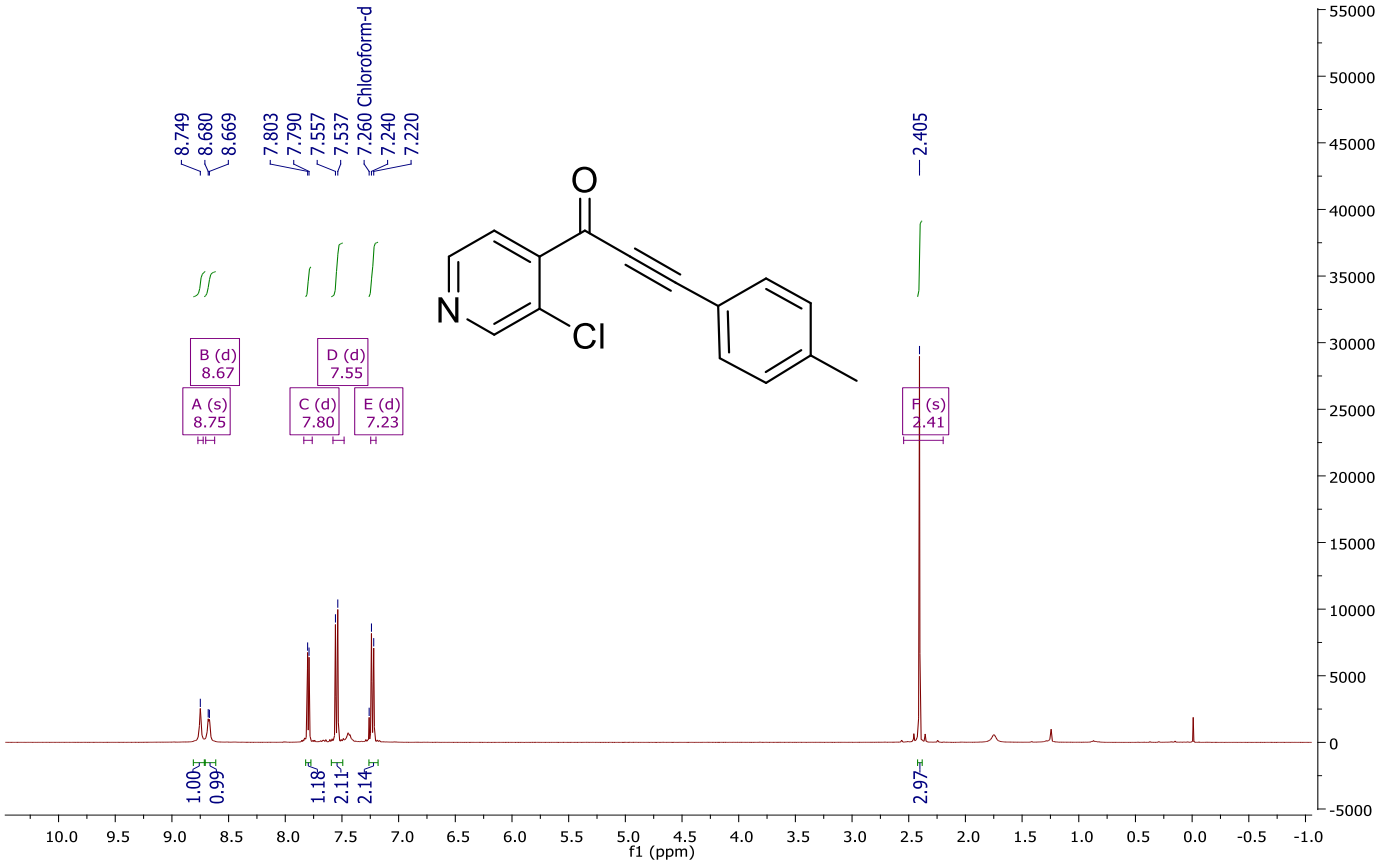


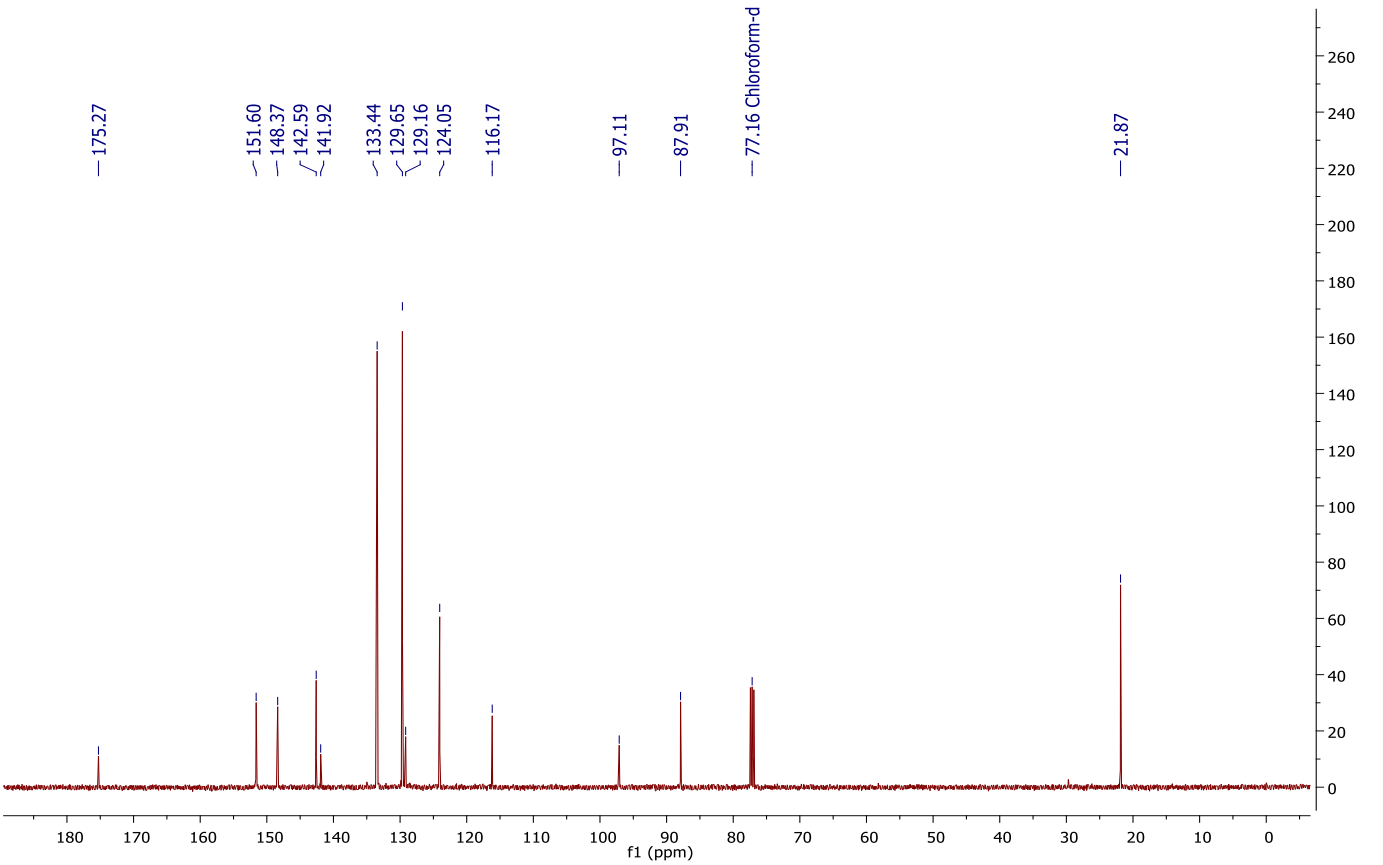
Compound **15a:** ^{1}H and ^{13}C NMR Spectrum



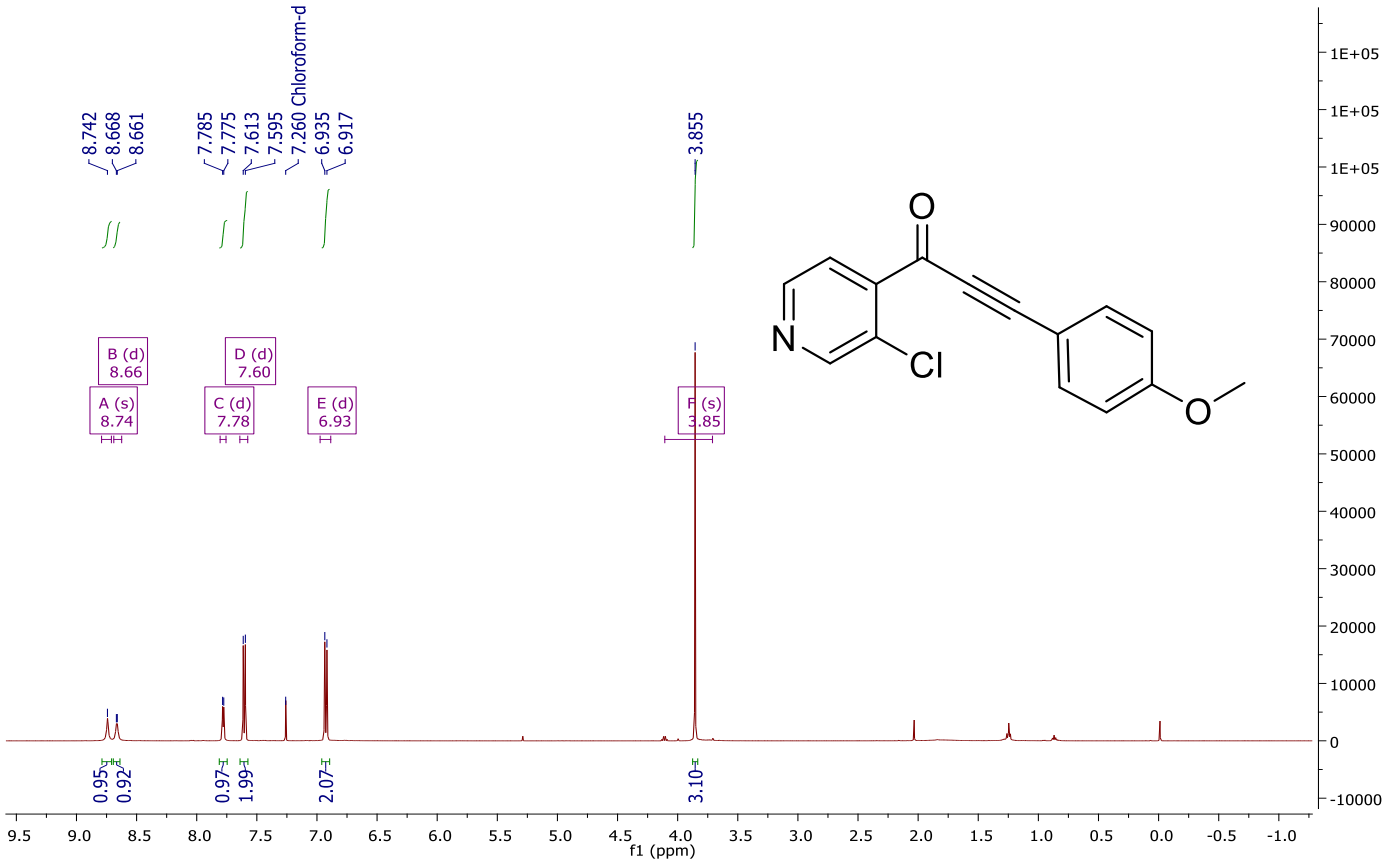


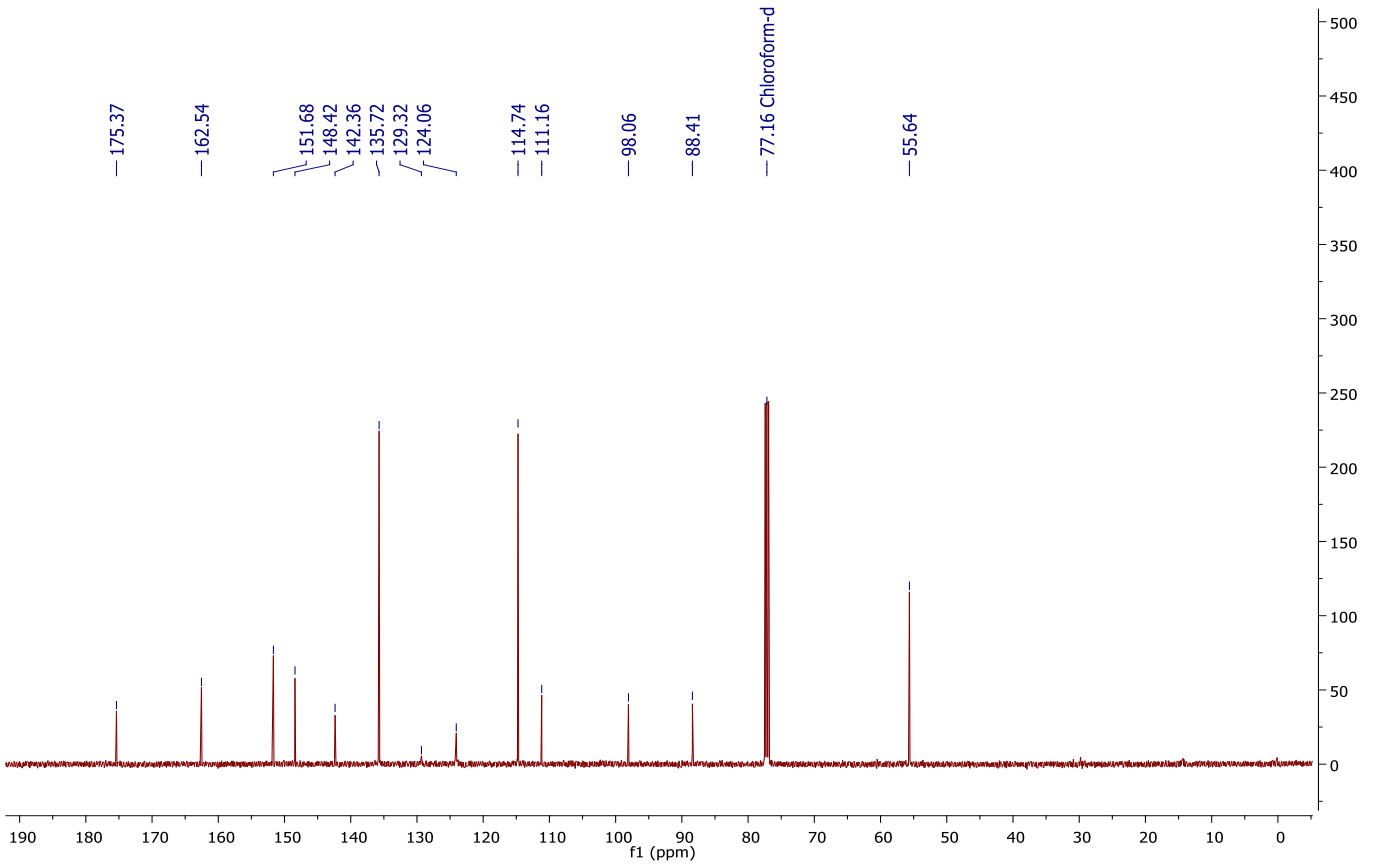
Compound **15b:** ^{1}H and ^{13}C NMR Spectrum



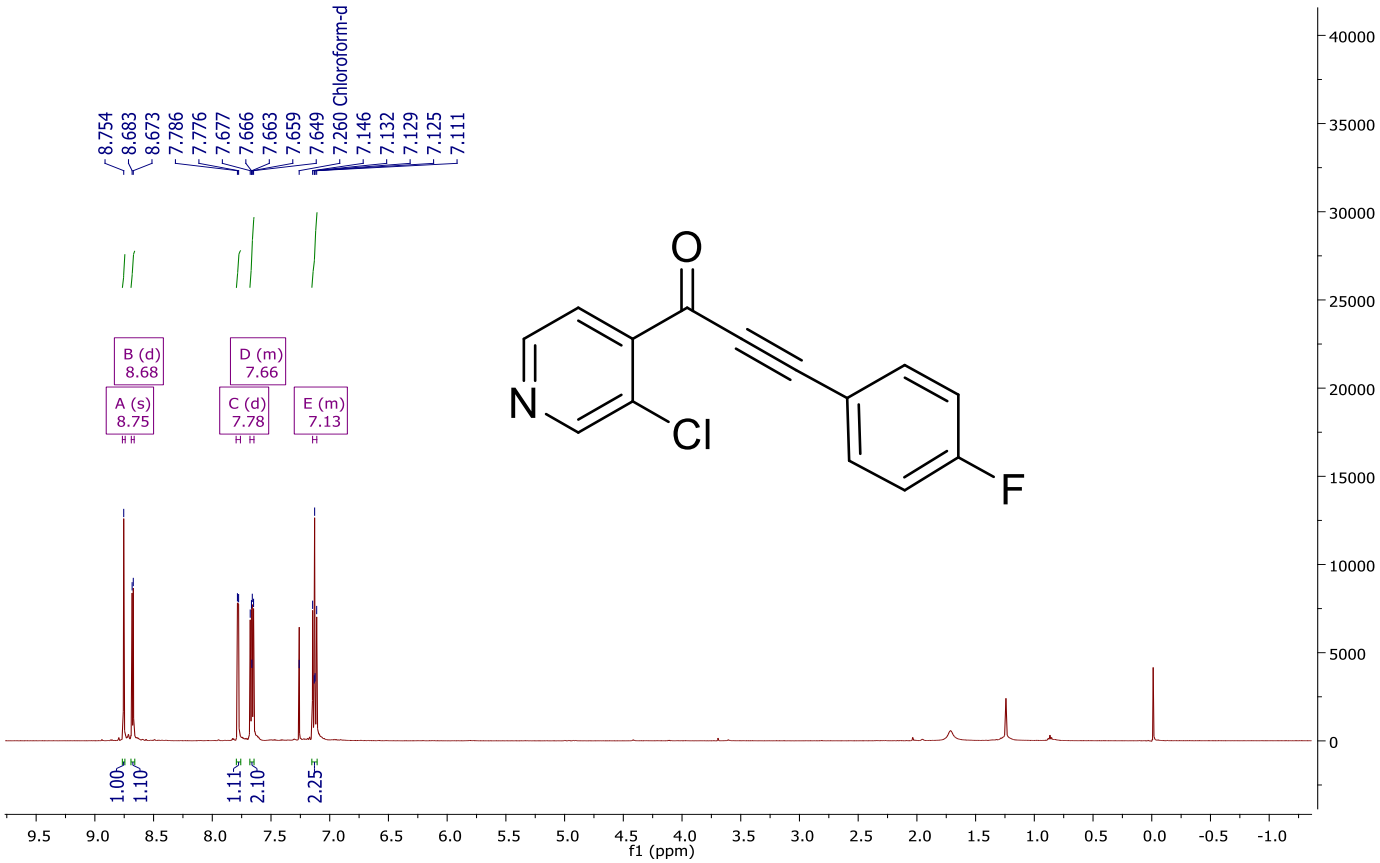


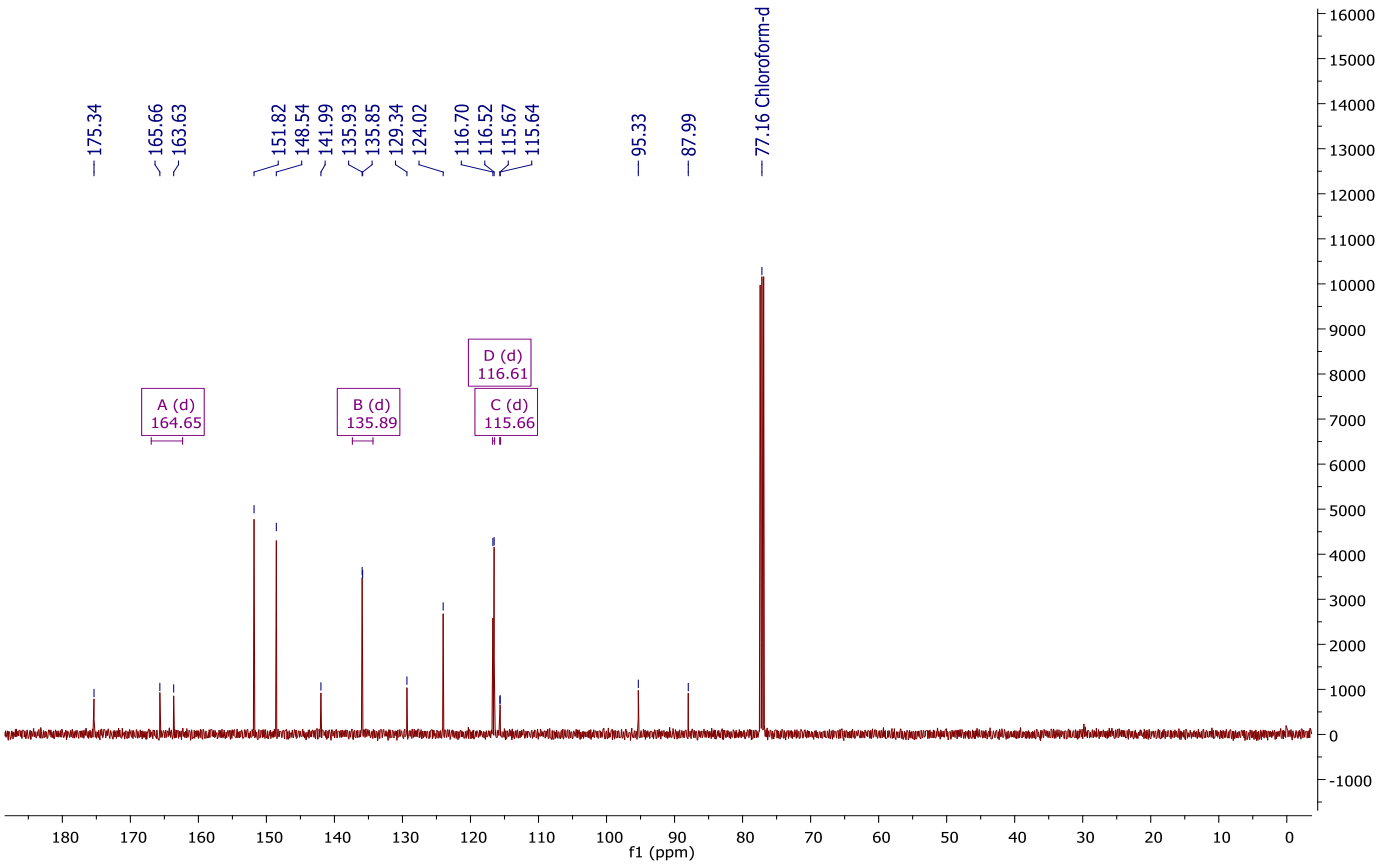
Compound **15c:** ^{1}H and ^{13}C NMR Spectrum



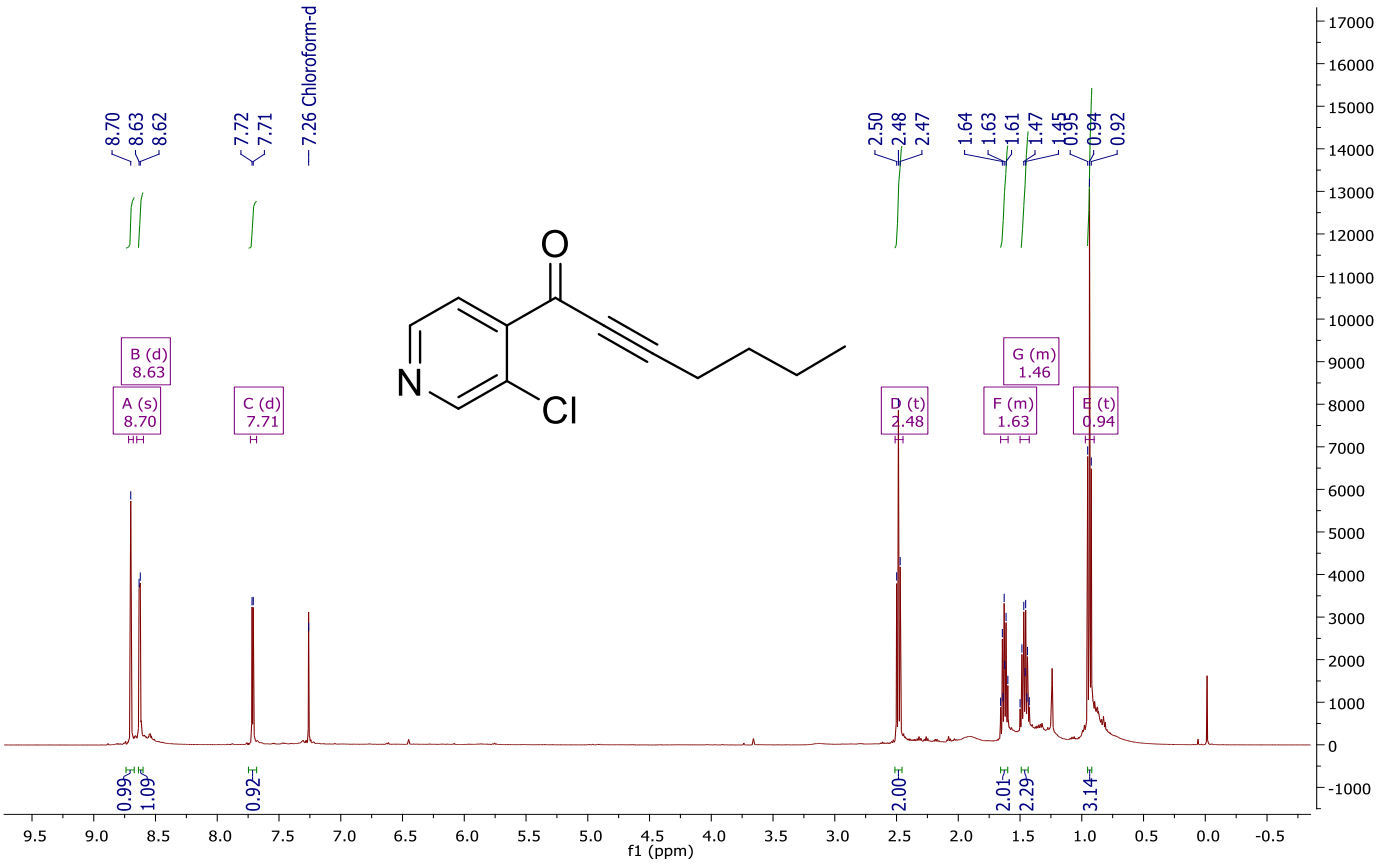


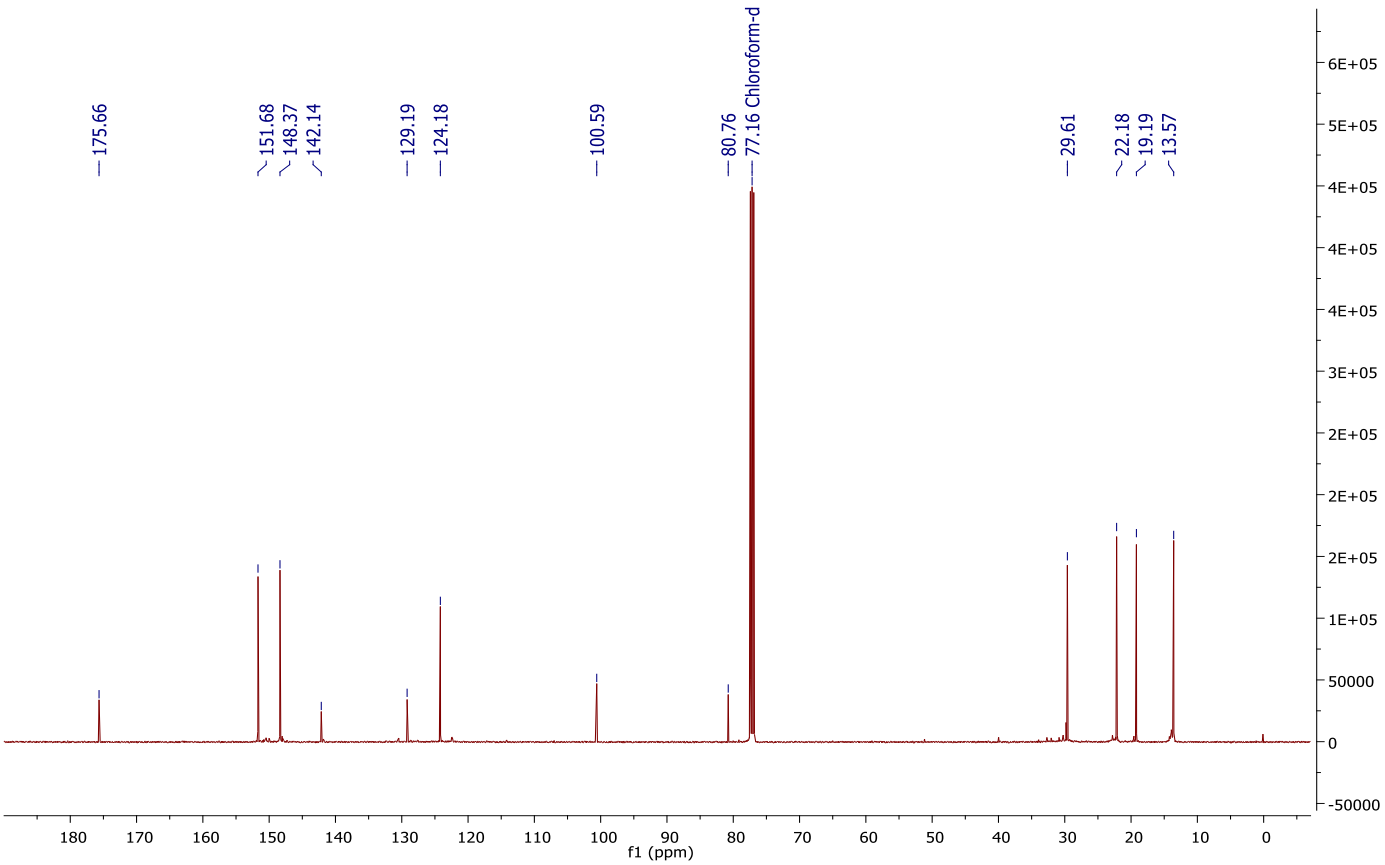
Compound **15d:** ^{1}H and ^{13}C NMR Spectrum



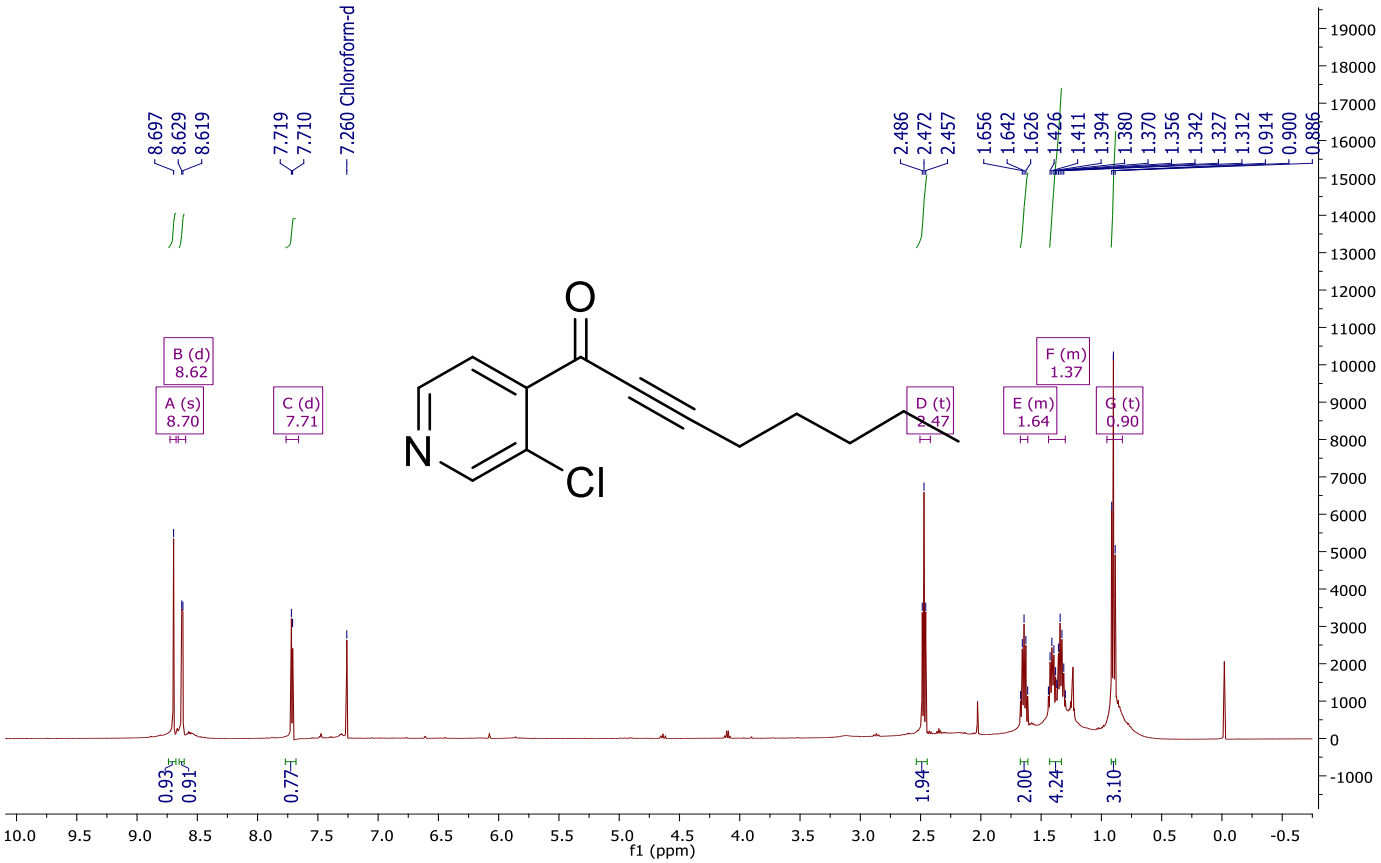


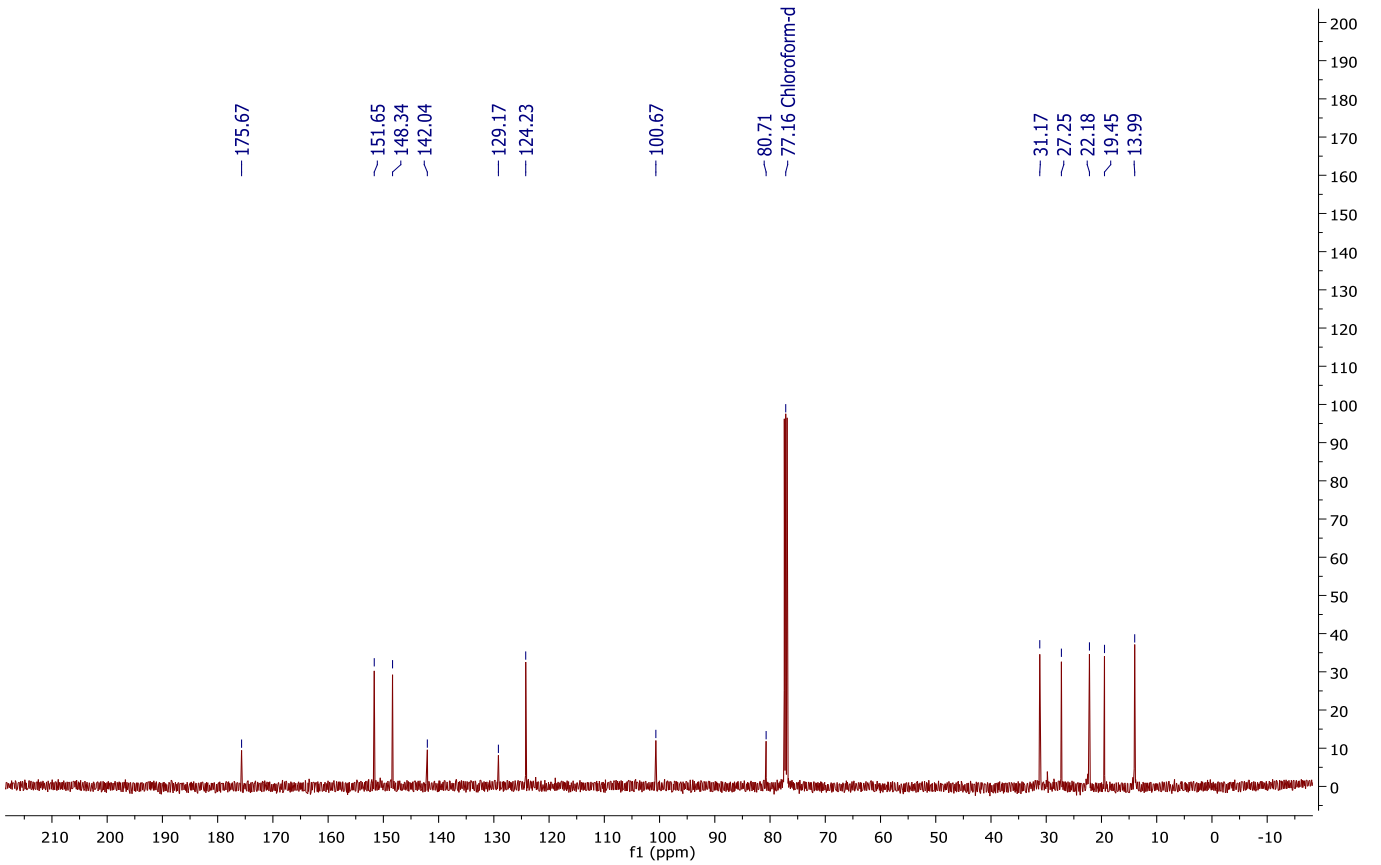
Compound **15e:** ^{1}H and ^{13}C NMR Spectrum



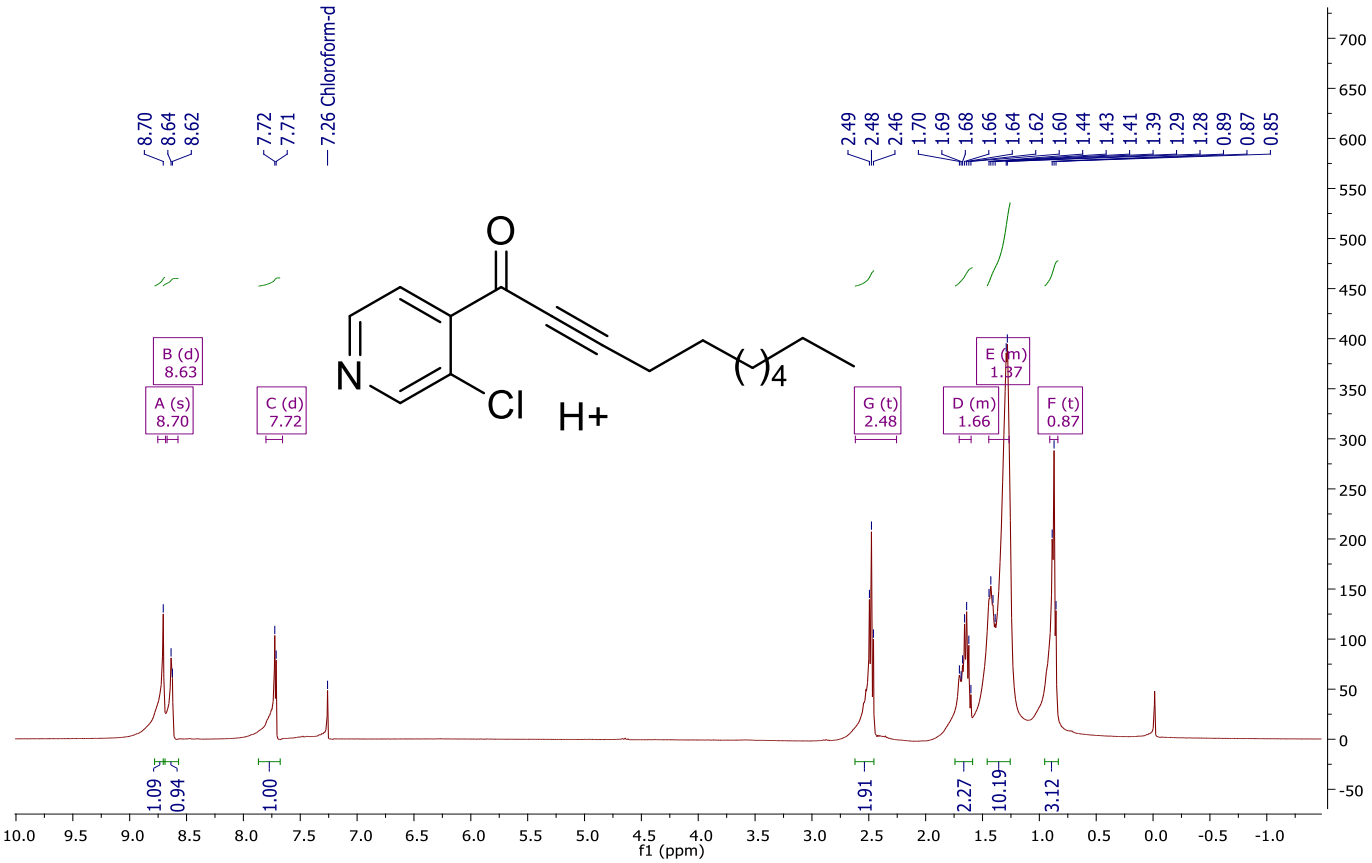


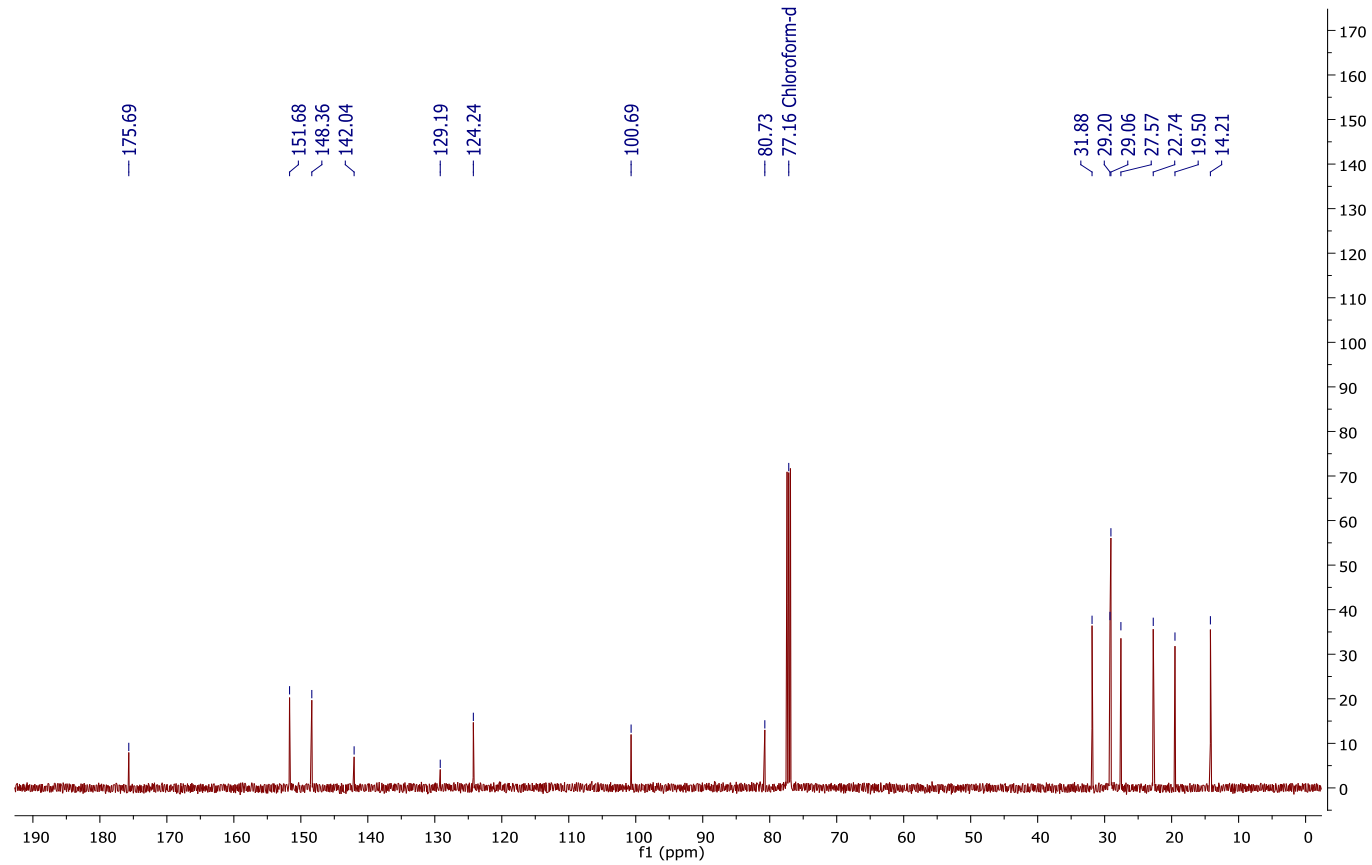
Compound **15f:** ^{1}H and ^{13}C NMR Spectrum



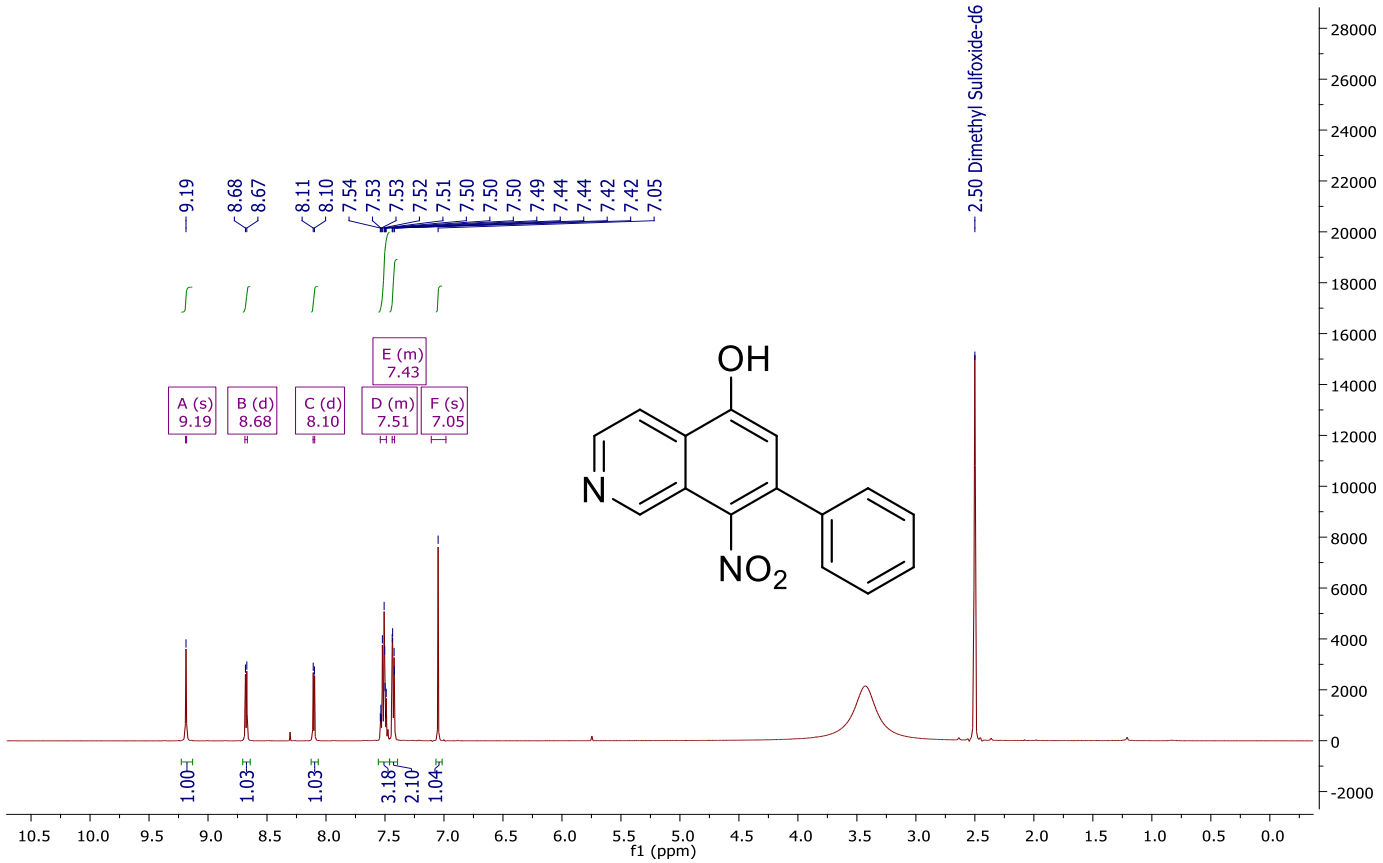


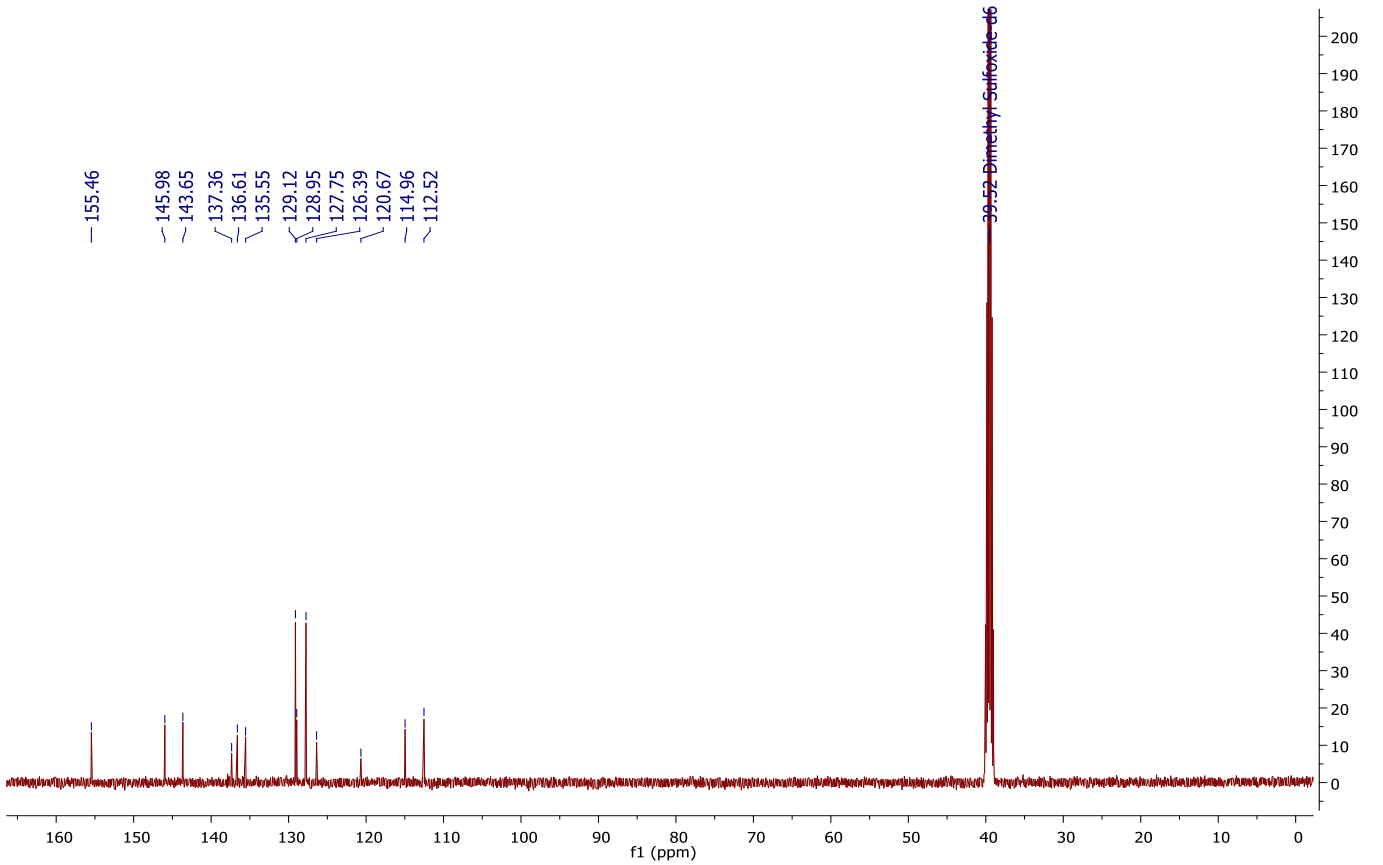
Compound **15g:** ^{1}H and ^{13}C NMR Spectrum



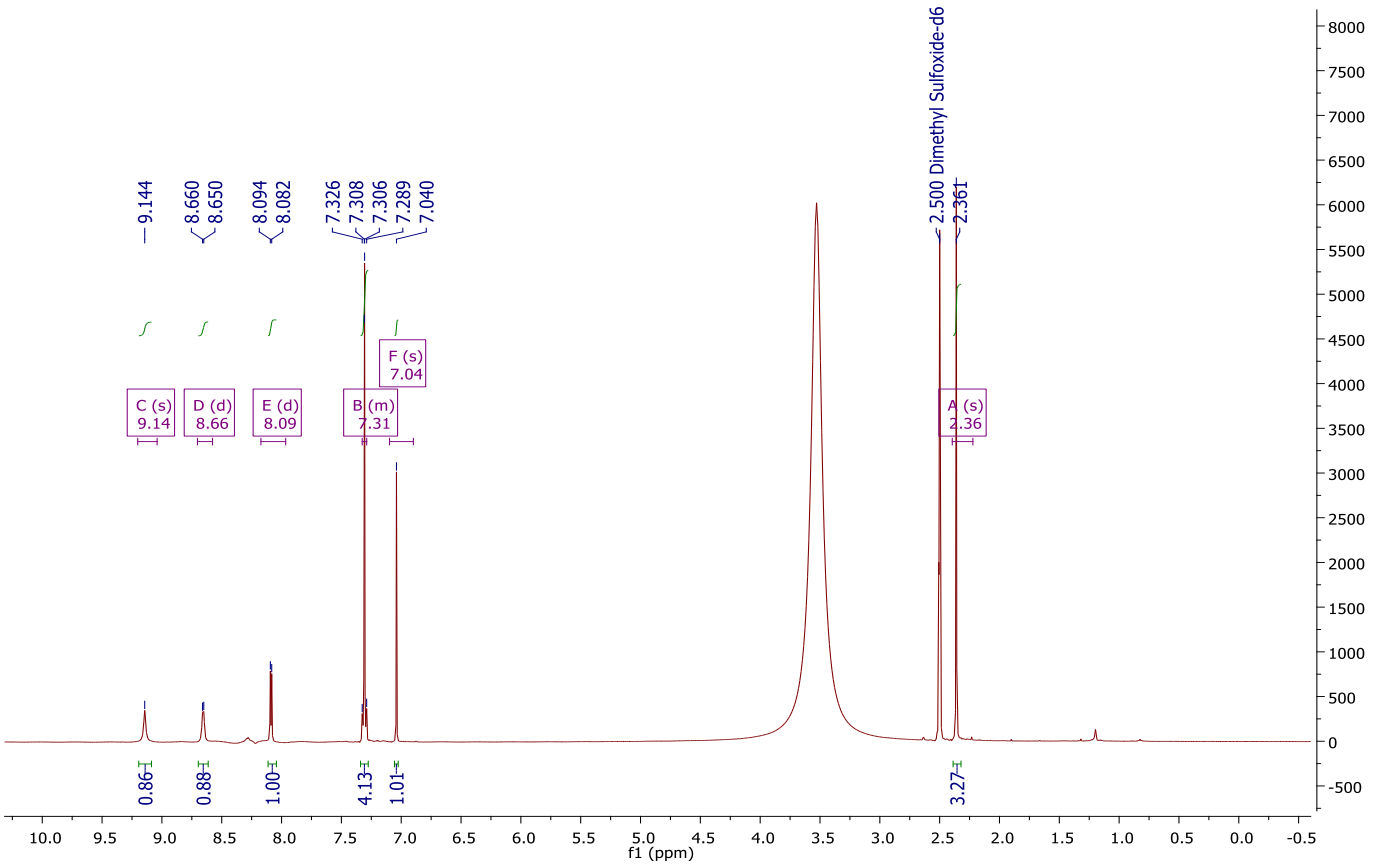


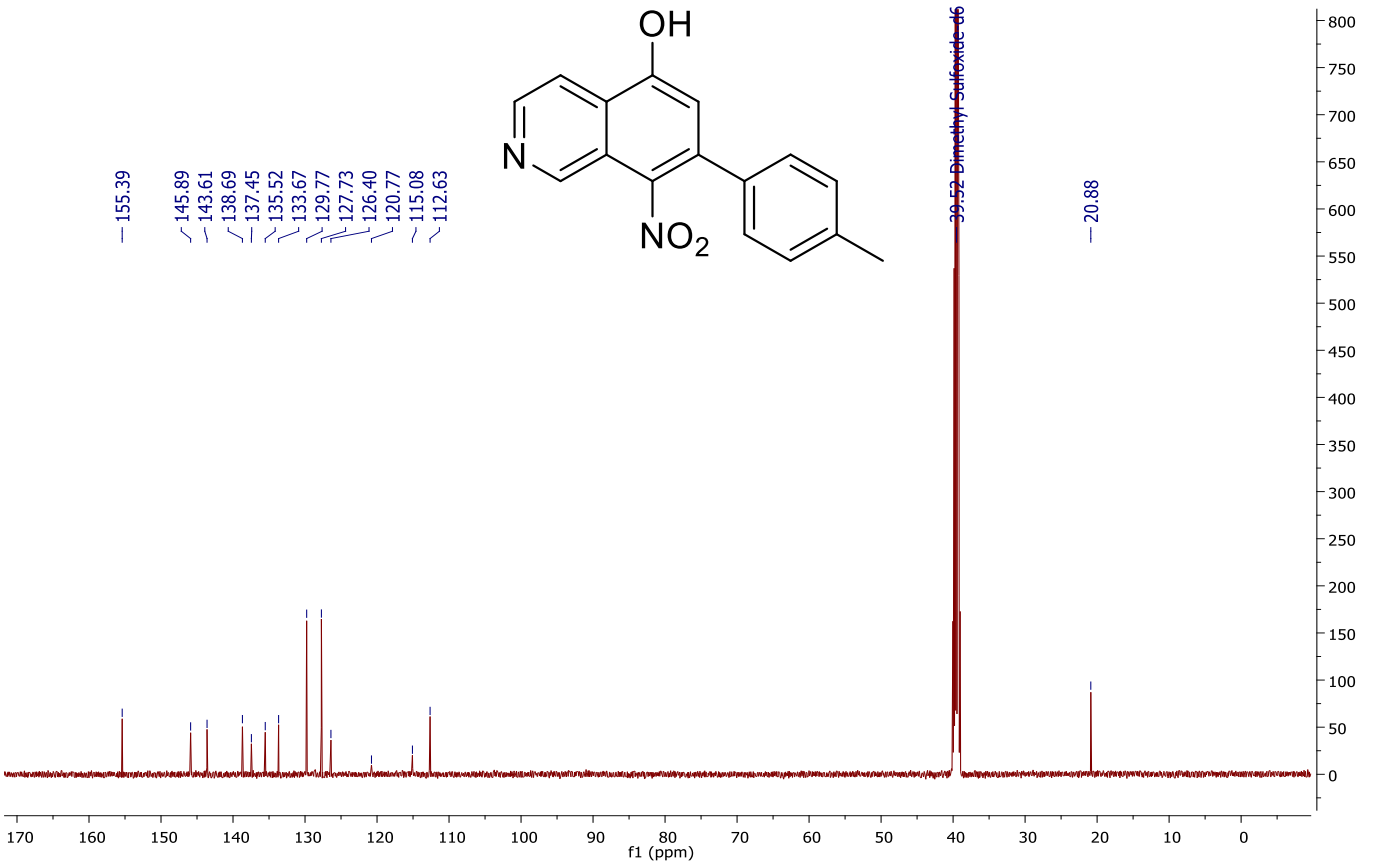
Compound **17a:** ^{1}H and ^{13}C NMR Spectrum



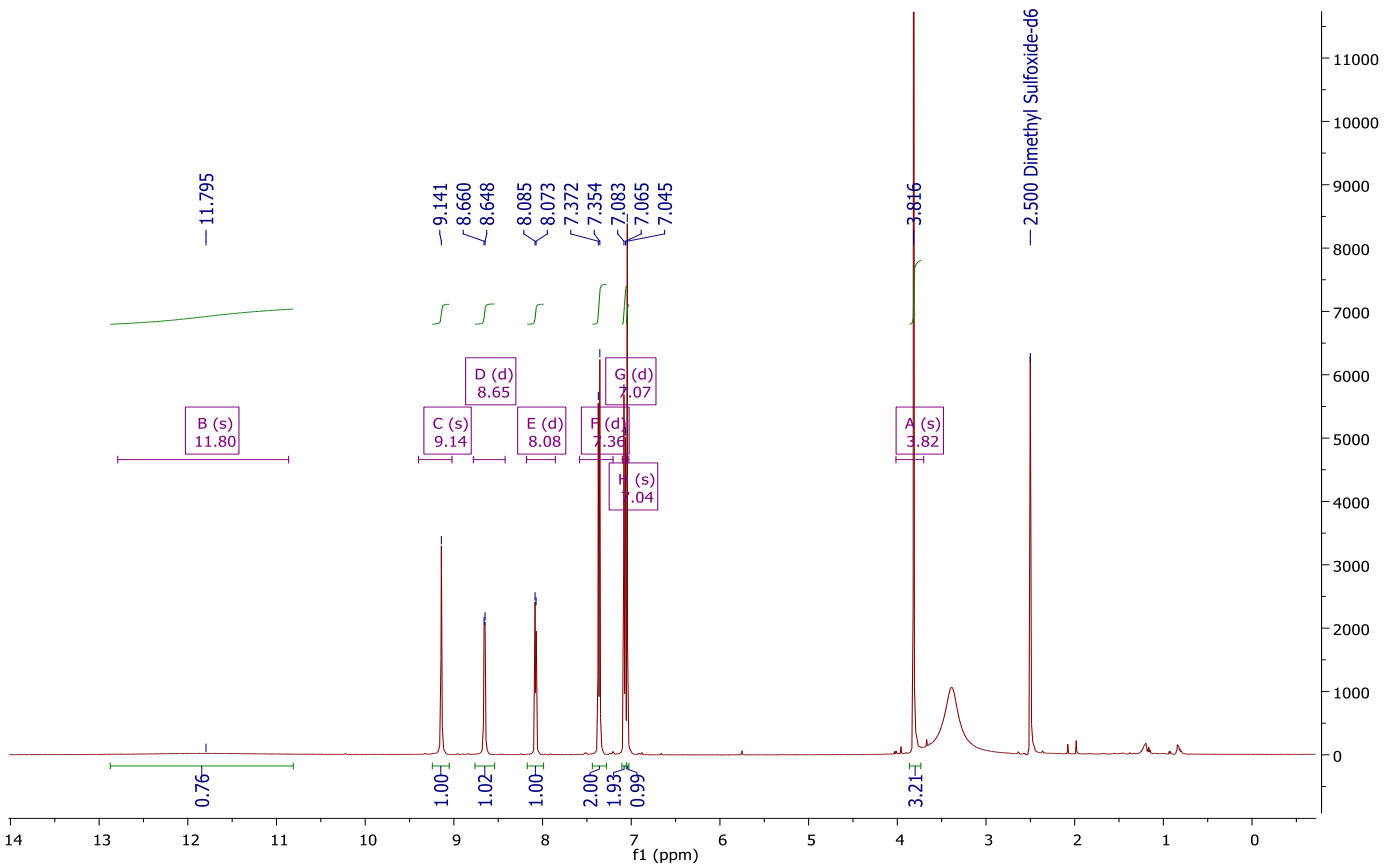


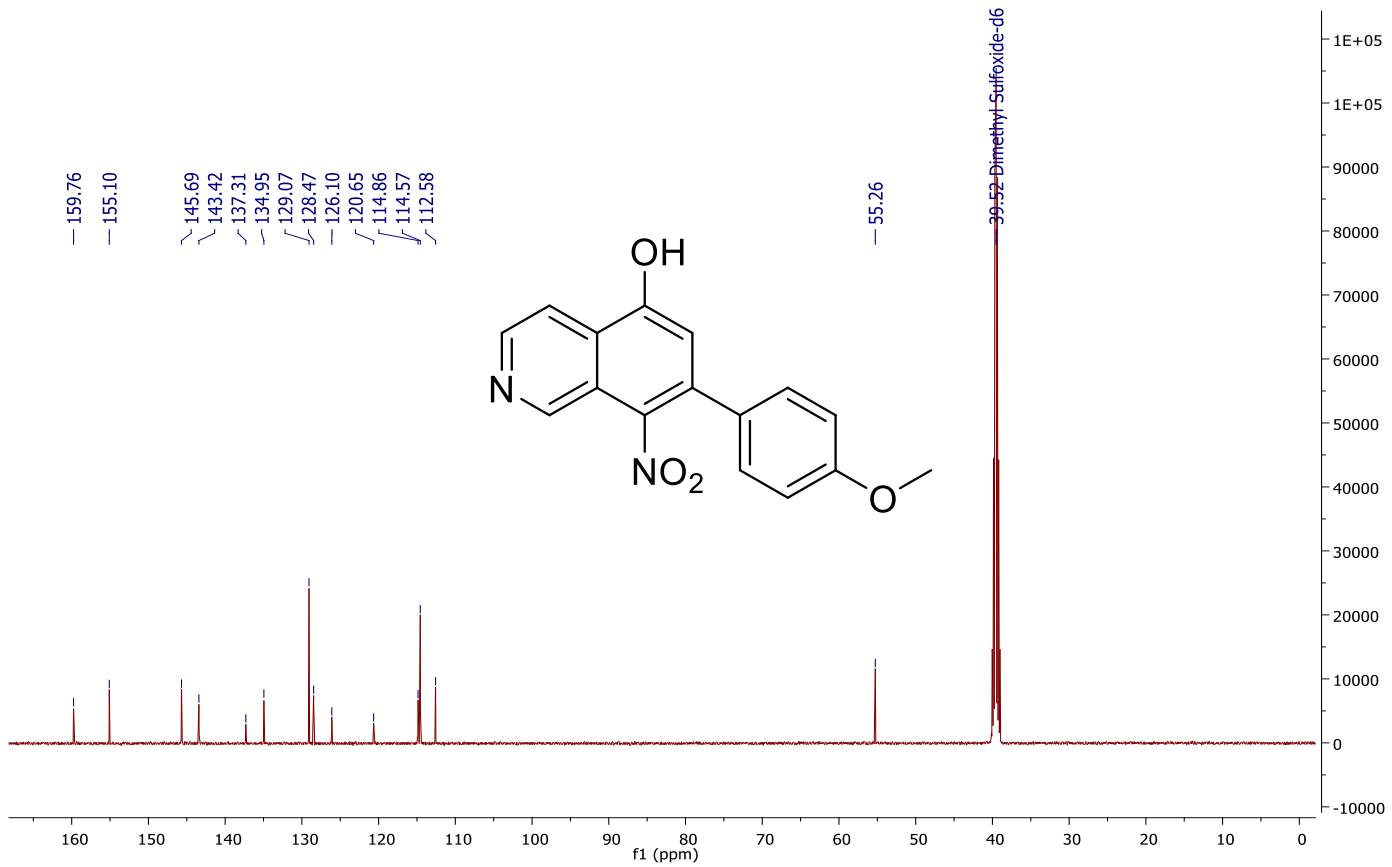
Compound **17b:** ^{1}H and ^{13}C NMR Spectrum



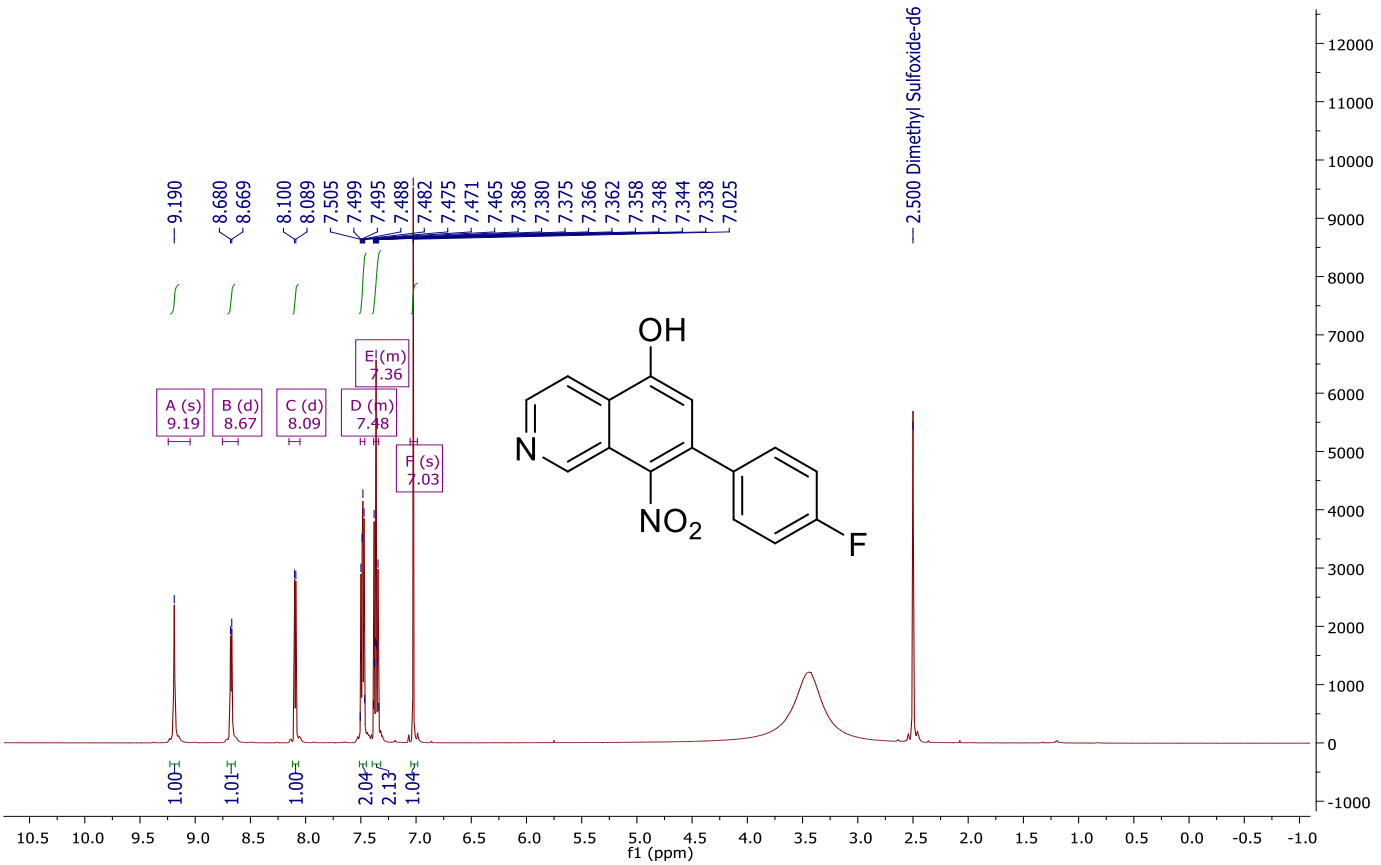


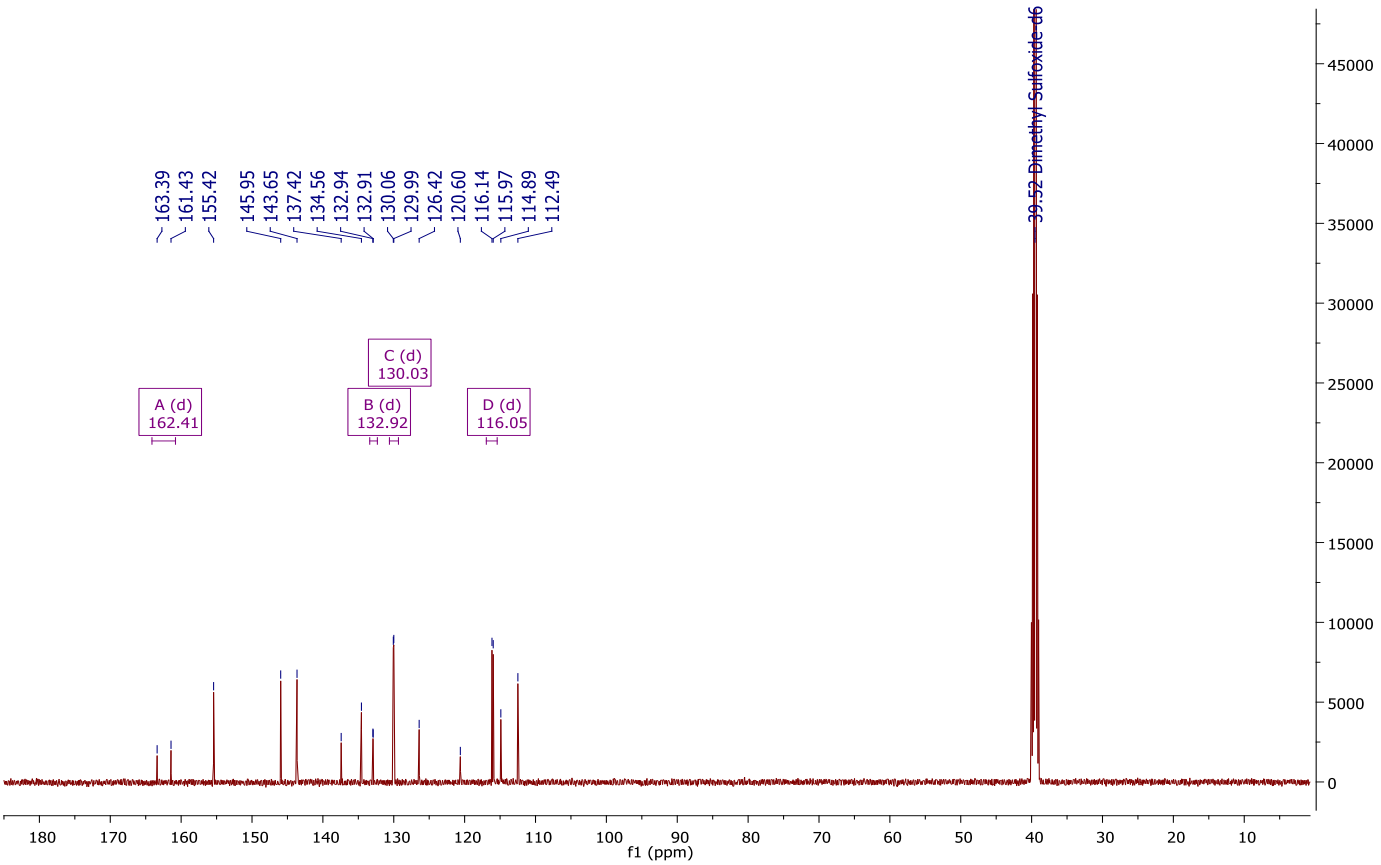
Compound **17c:** ^{1}H and ^{13}C NMR Spectrum



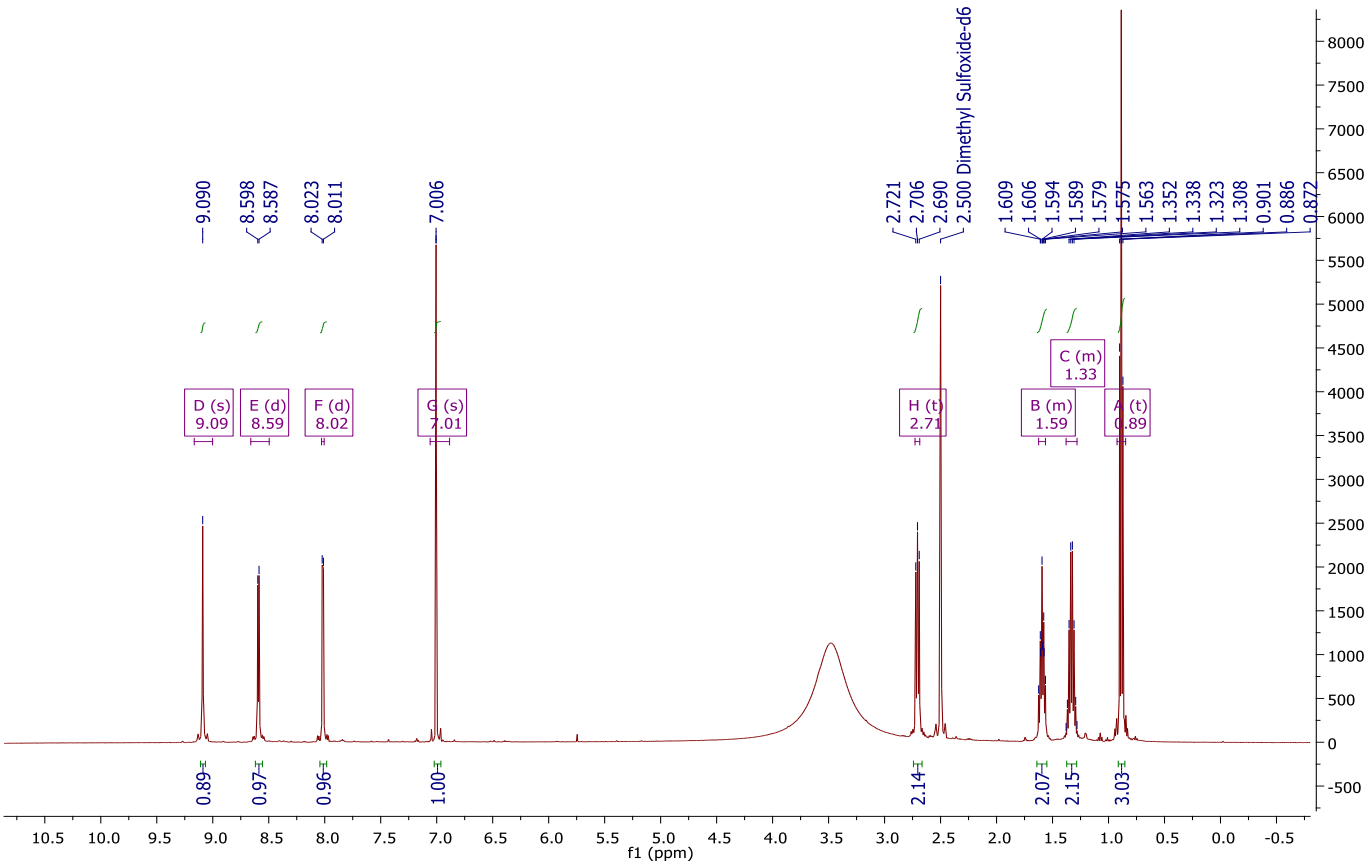


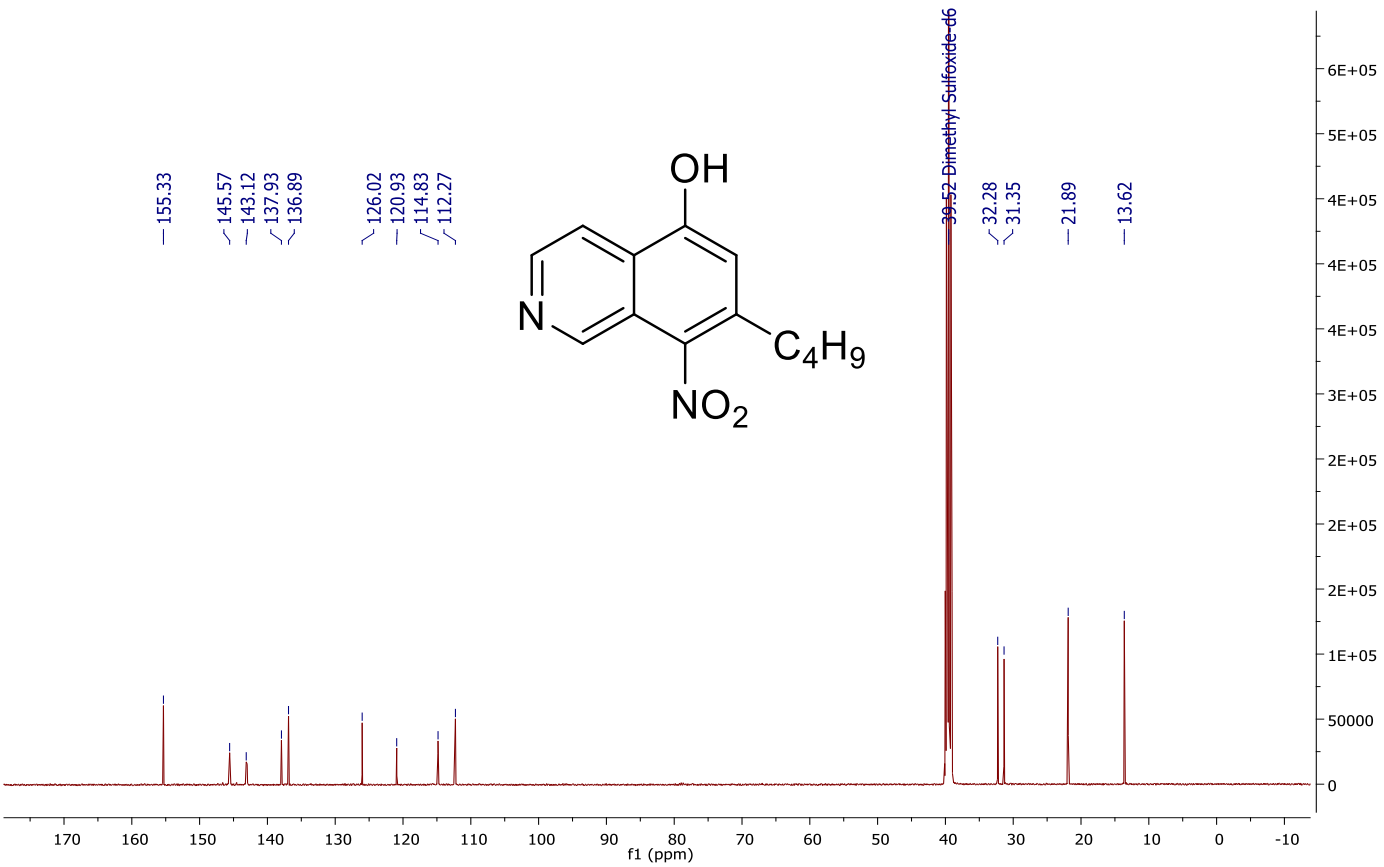
Compound **17d:** ^{1}H and ^{13}C NMR Spectrum



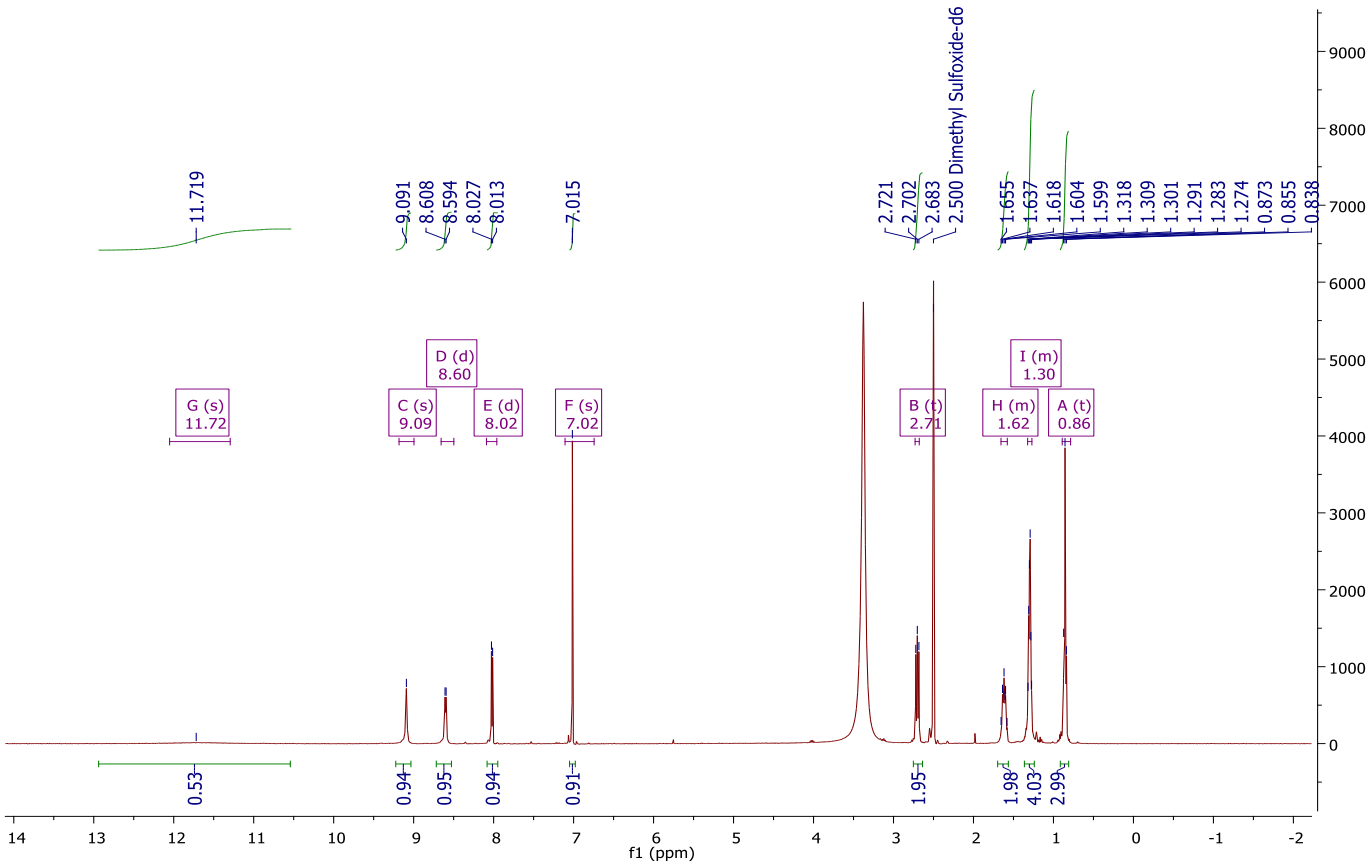


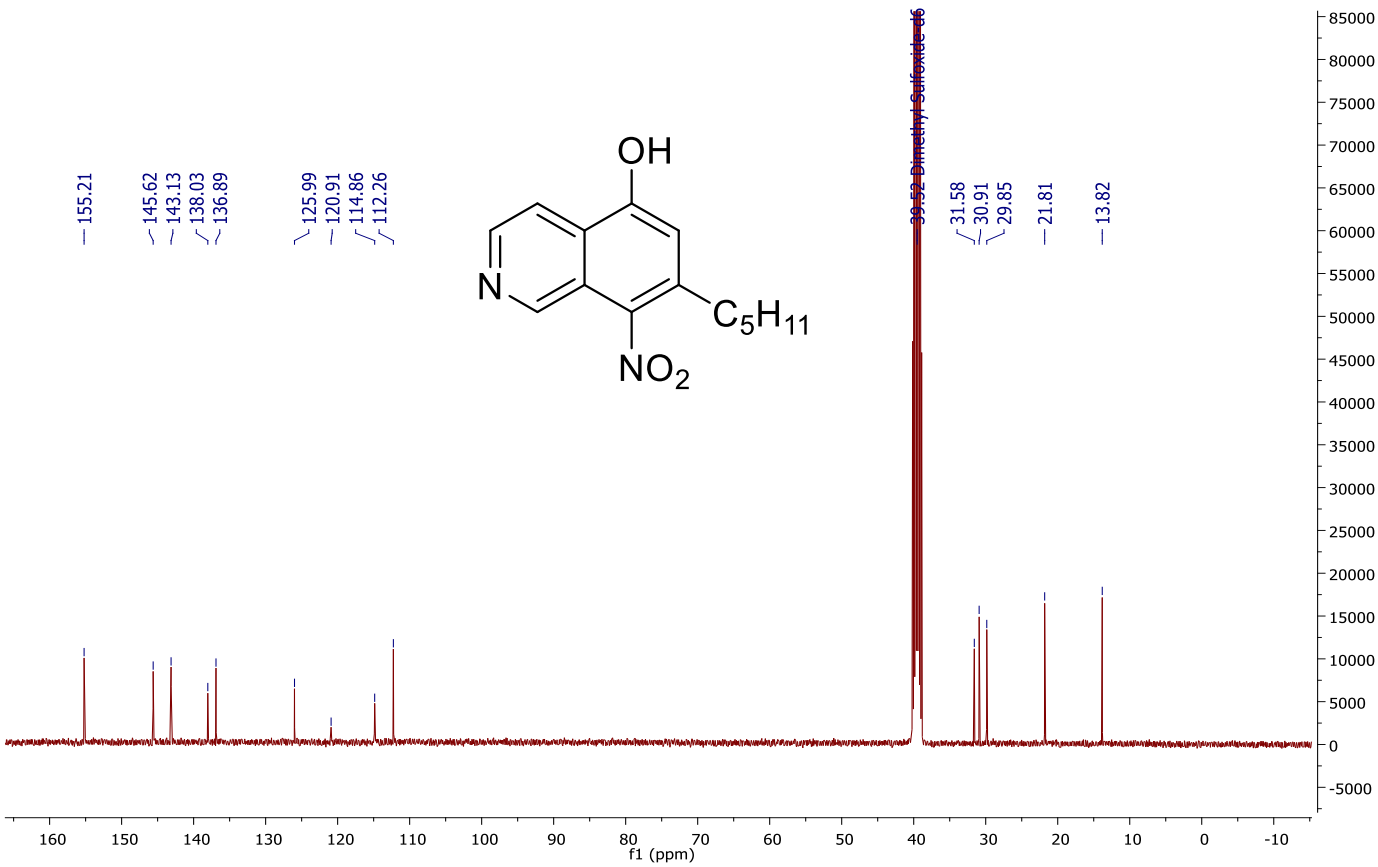
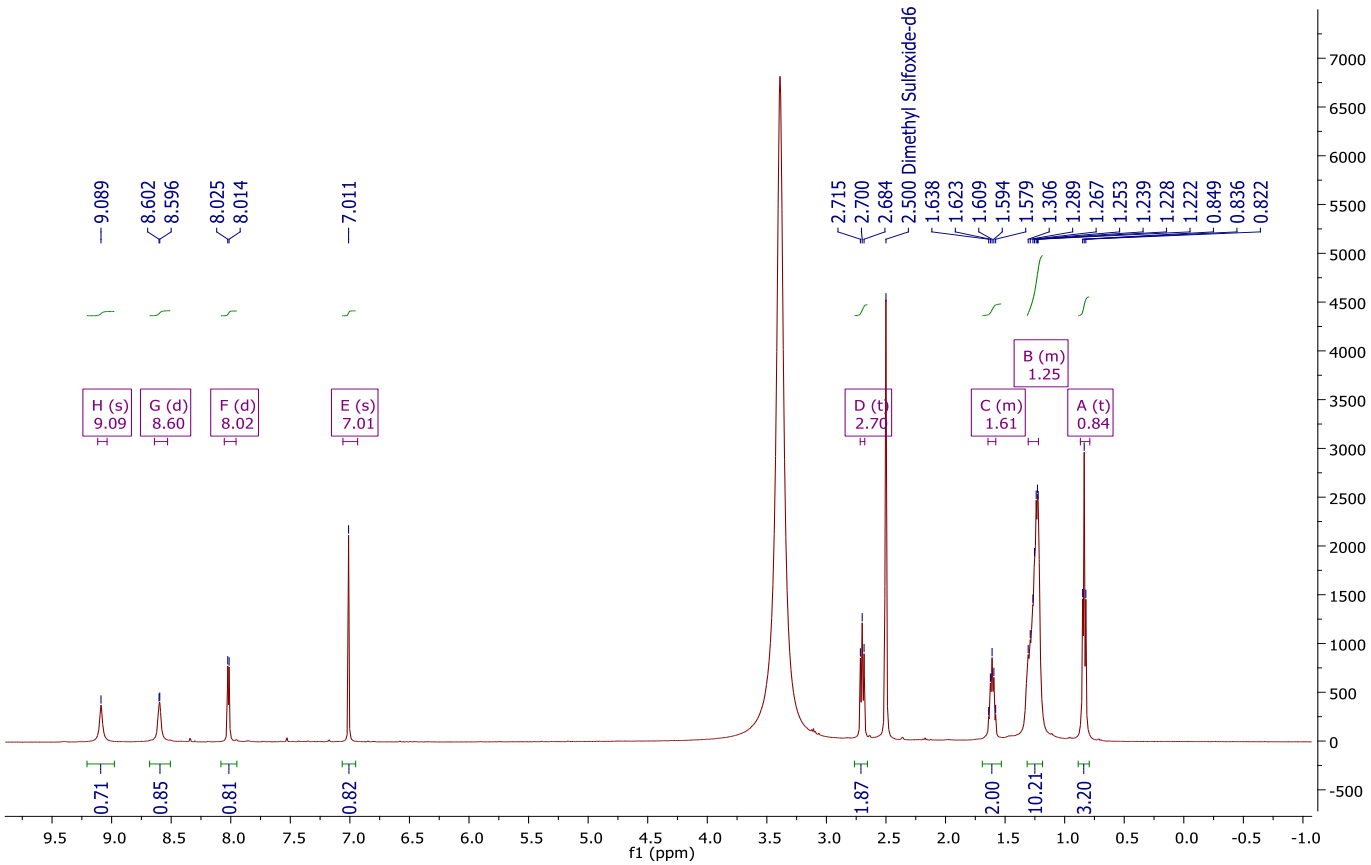
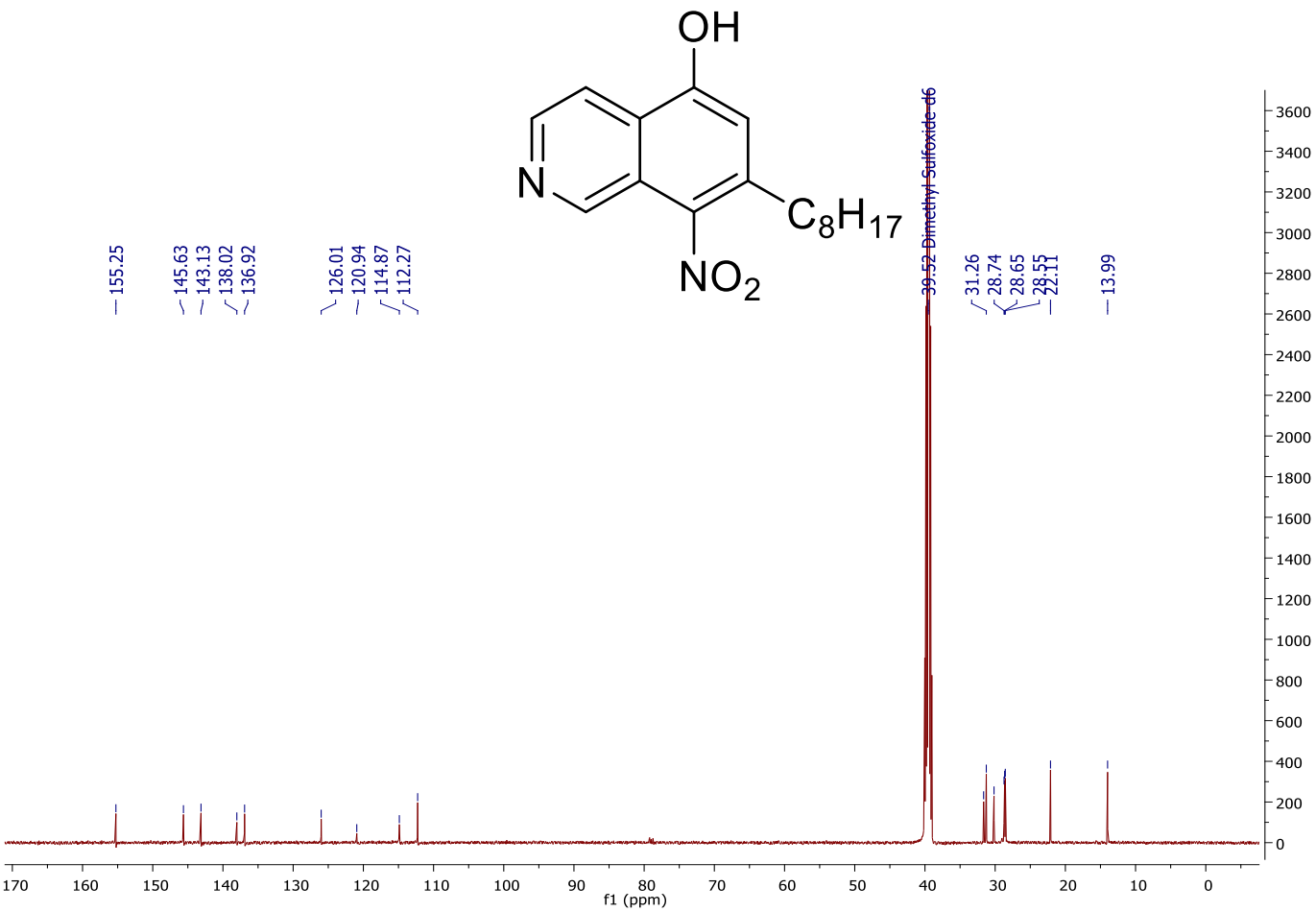
Compound **17e:** ^{1}H and ^{13}C NMR Spectrum





Compound **17f:** ^{1}H and ^{13}C NMR Spectrum





Compound 17**g:** ^{1}H and ^{13}C NMR Spectrum