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Supporting Information

Palladium-Catalyzed Cascade Carboesterification of Norbornene with Alkynes

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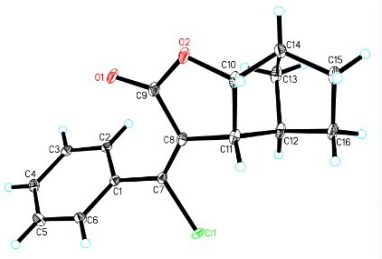
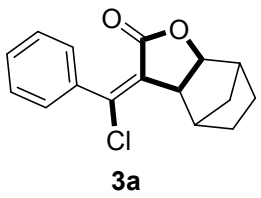
Table of Contents

X-ray Crystallographic Analysis for Product 3a

The CCDC number of compound **3a** is 1814490.





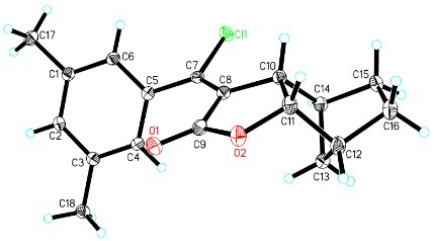
3a

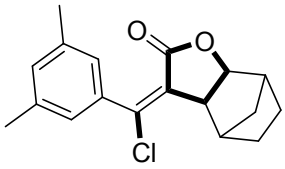
Crystal Data and Structure Refinement for Product **3a**

Empirical formula	$C_{16}H_{15}ClO_2$
Formula weight	274.73
Temperature	100.00(10) K
Wavelength	1.54184 Å
Crystal system	monoclinic
Space group	P 1 21/c 1
Unit cell dimensions	a= 6.07129(17) Å, α= 90.00°
	b= 18.3833(5) Å, β= 101.880(3) °
	c= 12.0370(3) Å, γ= 90.00°
Density (calculated)	1.388 Mg/m^3
Absorption coefficient	2524 mm^{-1}
F (000)	576.0
Crystal size	0.21 × 0.16 × 0.15 mm
Theta range for data collection	8.916 to 146.522 deg.
Index ranges	$-6 \le h \le 7$, $-15 \le k \le 22$, $-14 \le l \le 13$
Reflections collected	4776
Independent reflections	2576
Completeness to theta = 29.55°	99.88%
Absorption correction	multi-scan
Refinement method	Full-matrix least-squares on F^2
Data/restraints/parameters	2576 /0 / 173
Goodness-of-fit on F^2	1.034
Final R indices [I>2sigma(I)]	R1 = 0.0815, wR2 = 0.2215
R indices (all data)	R1 = 0.0825, wR2 = 0.2230

X-ray Crystallographic Analysis for Product 7a

The CCDC number of compound **7a** is 1838810.





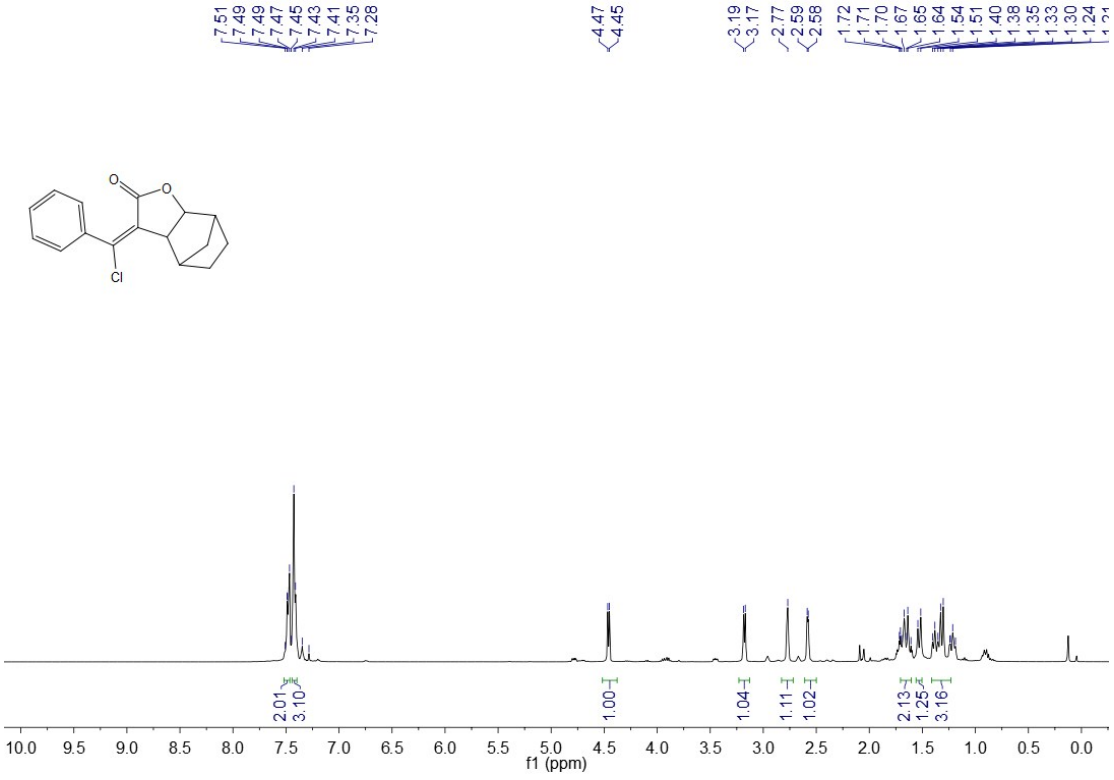
7a

Crystal Data and Structure Refinement for Product **3a**

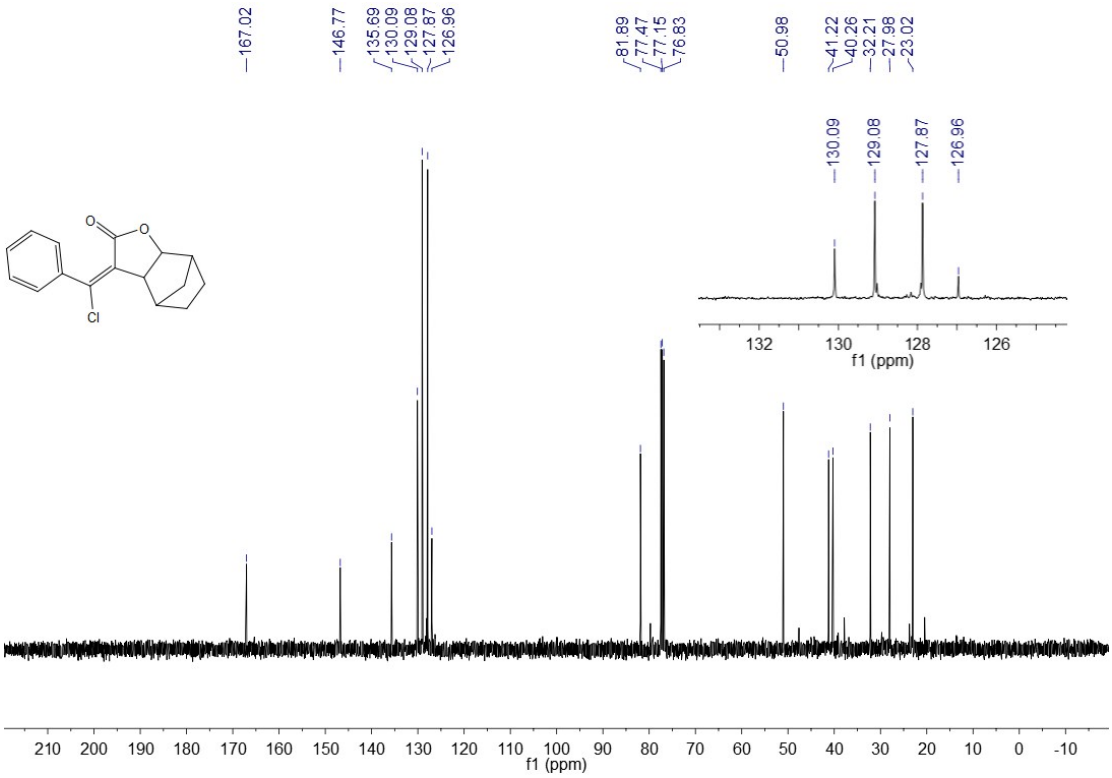
Empirical formula	$C_{18}H_{19}ClO_2$
Formula weight	302.78
Temperature	100.01(10) K
Wavelength	1.54184 Å
Crystal system	monoclinic
Space group	$P2_1/n$
Unit cell dimensions	a= 10.9261(3) Å, α= 90.00°
	b= 10.6284(3) Å, β= 90.813(3) °
	c= 12.9254(4) Å, γ= 90.00°
Density (calculated)	1.340 Mg/m^3
Absorption coefficient	2260 mm^{-1}
F(000)	640.0
Crystal size	0.13 × 0.12 × 0.11 mm
Theta range for data collection	10.528 to 148.364 deg.
Index ranges	$-12 \le h \le 13$, $-10 \le k \le 13$, $-10 \le l \le 16$
Reflections collected	6356
Independent reflections	2939
Completeness to theta = 29.55°	99.88%
Absorption correction	multi-scan
Refinement method	Full-matrix least-squares on F^2
Data/restraints/parameters	2939 /0 / 192
Goodness-of-fit on F^2	1.042
Final R indices [I>2sigma(I)]	R1 = 0.0561, wR2 = 0.1542
R indices (all data)	R1 = 0.0590, wR2 = 0.1588

NMR Spectra for All the Products

^{1}H NMR of Compound **3a**



^{13}C NMR of Compound **3a**



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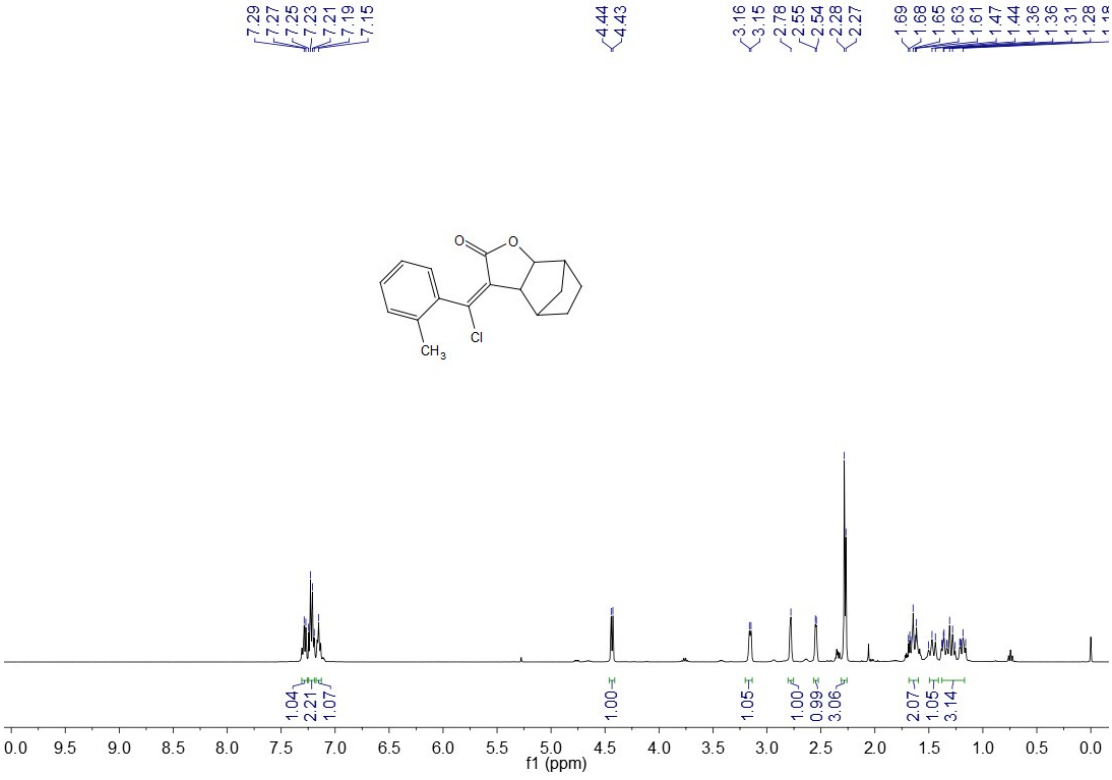
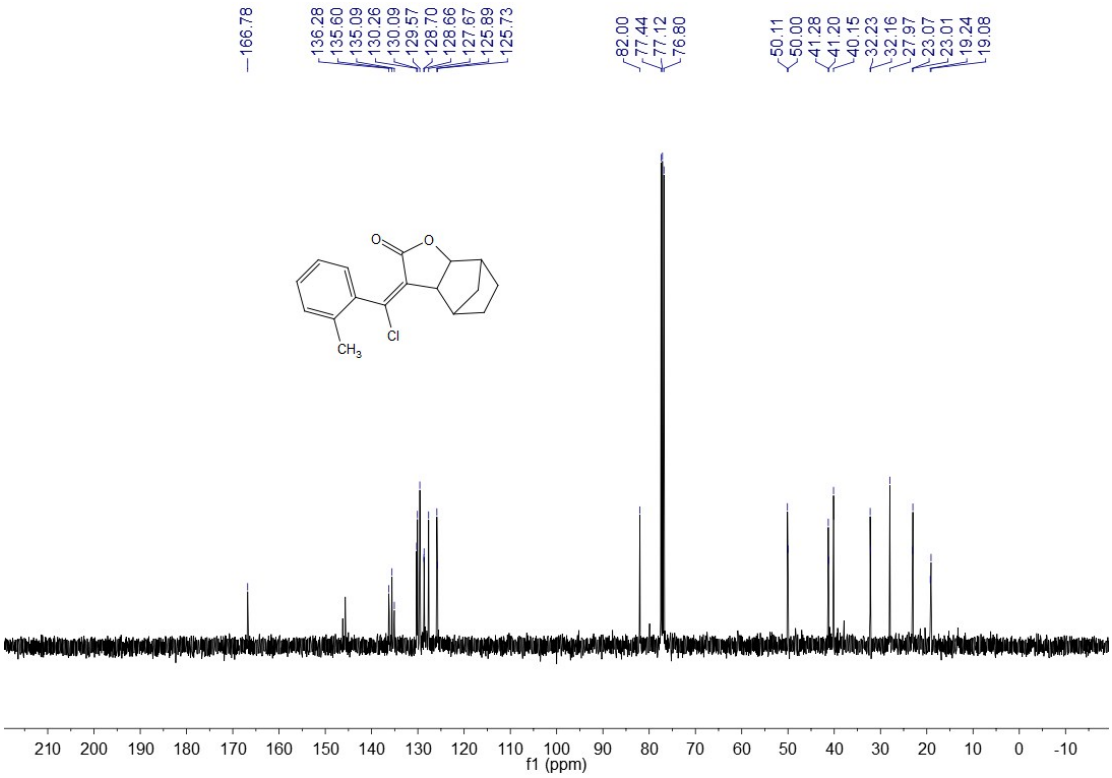
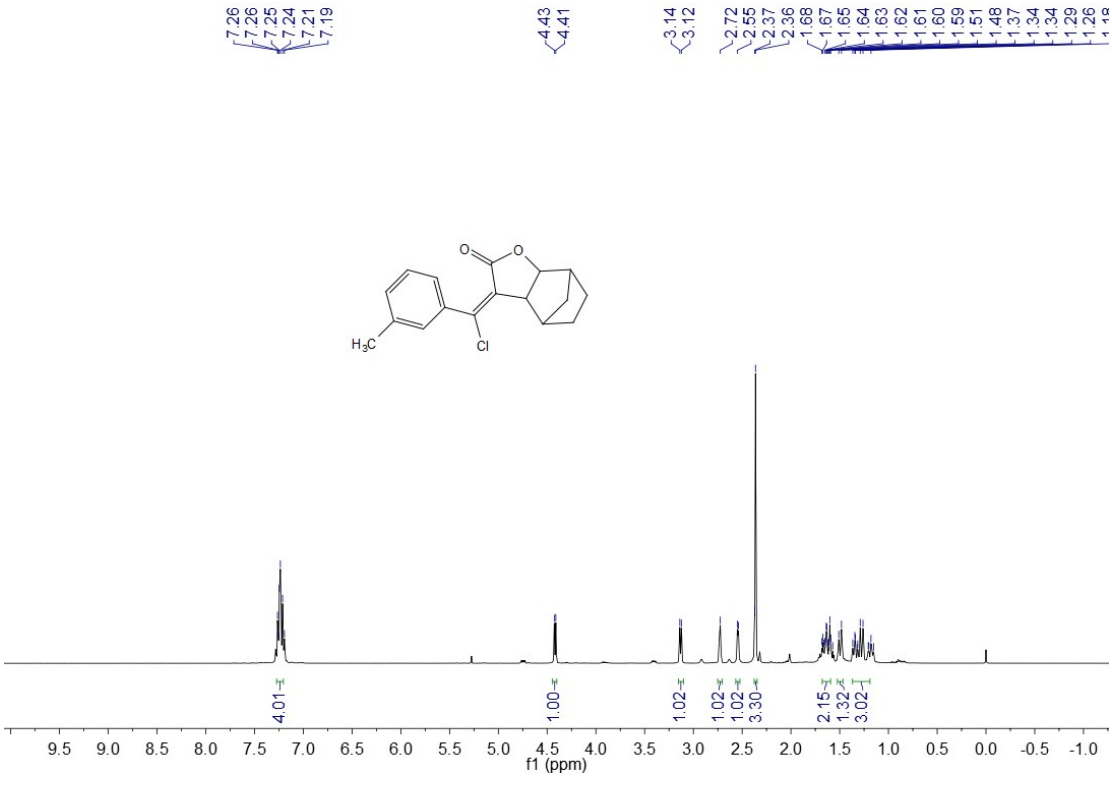


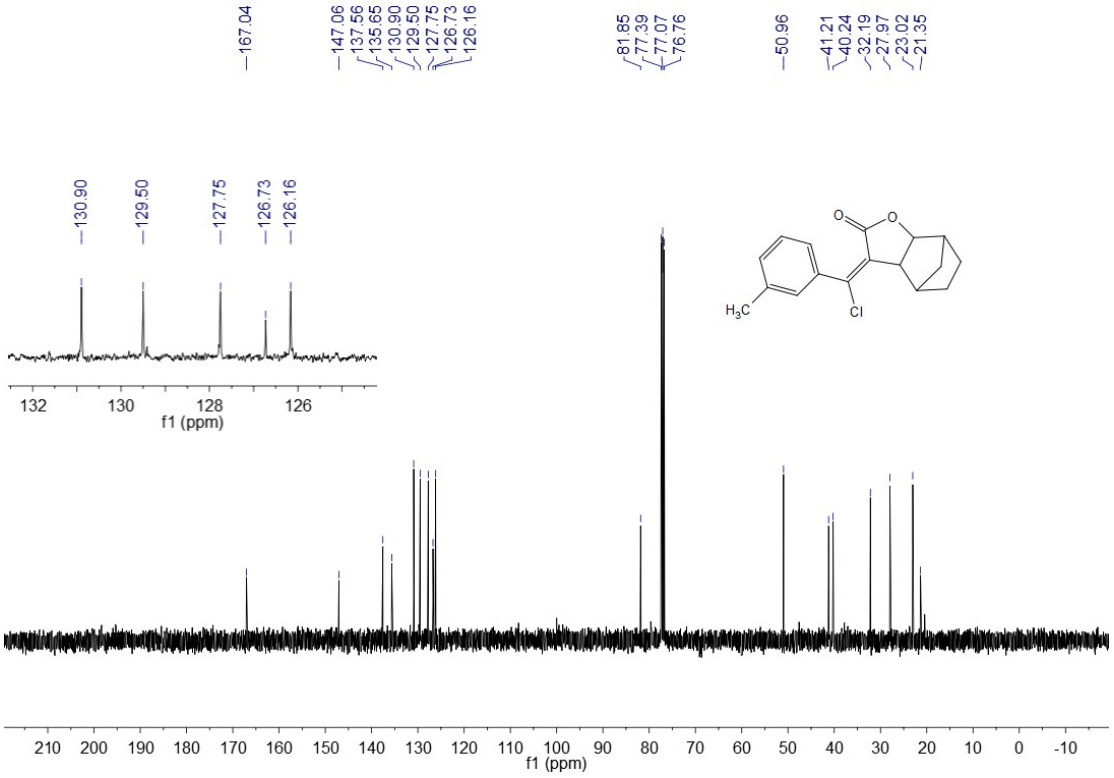
^{13}C NMR of Compound **3b**



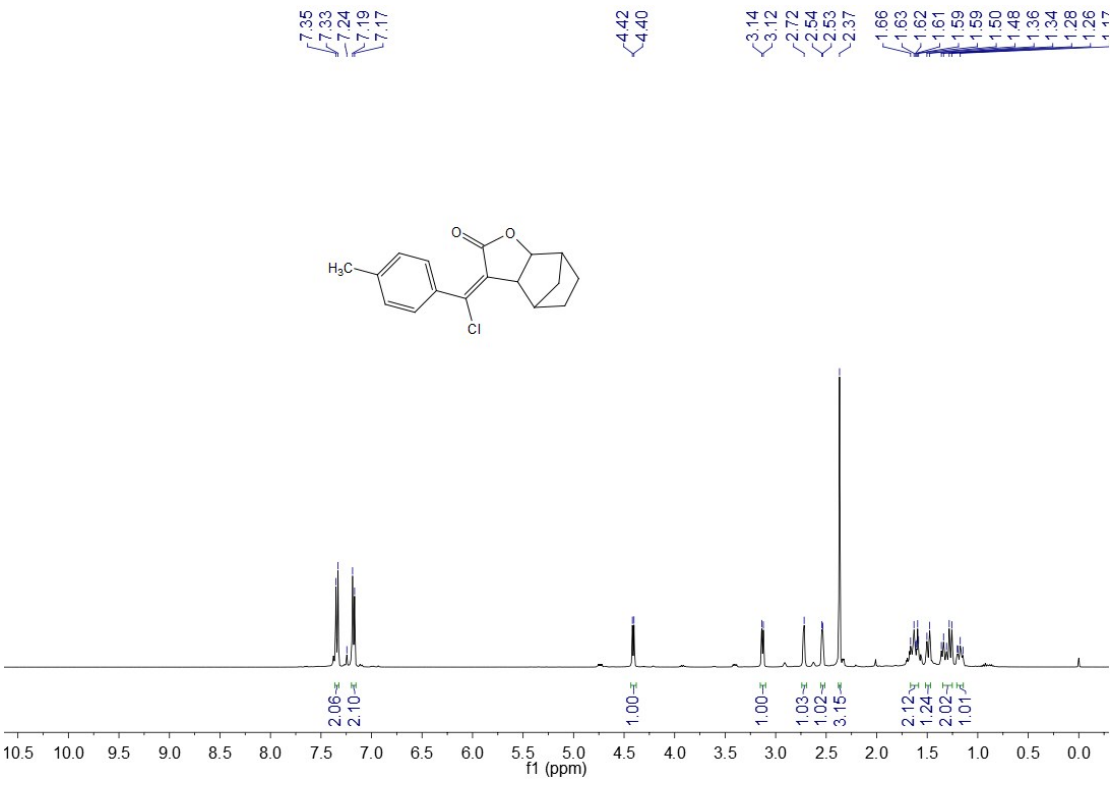
^{1}H NMR of Compound **3c**



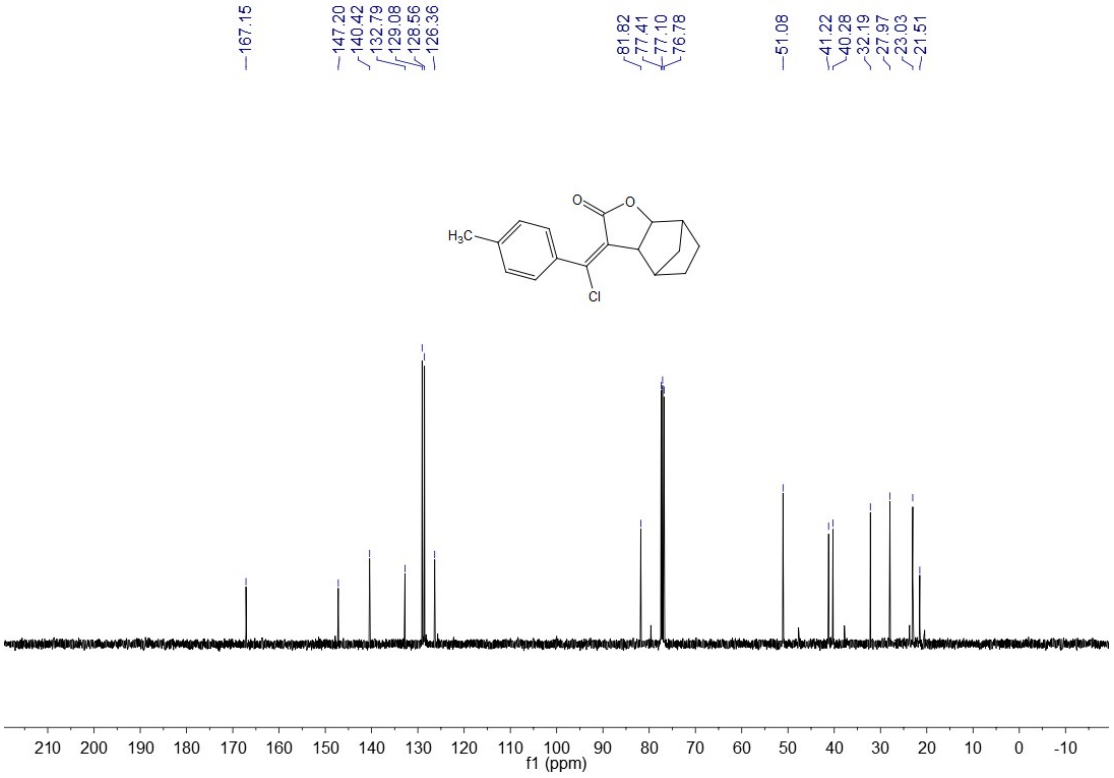
^{13}C NMR of Compound **3c**



^{1}H NMR of Compound **3d**



^{13}C NMR of Compound **3d**



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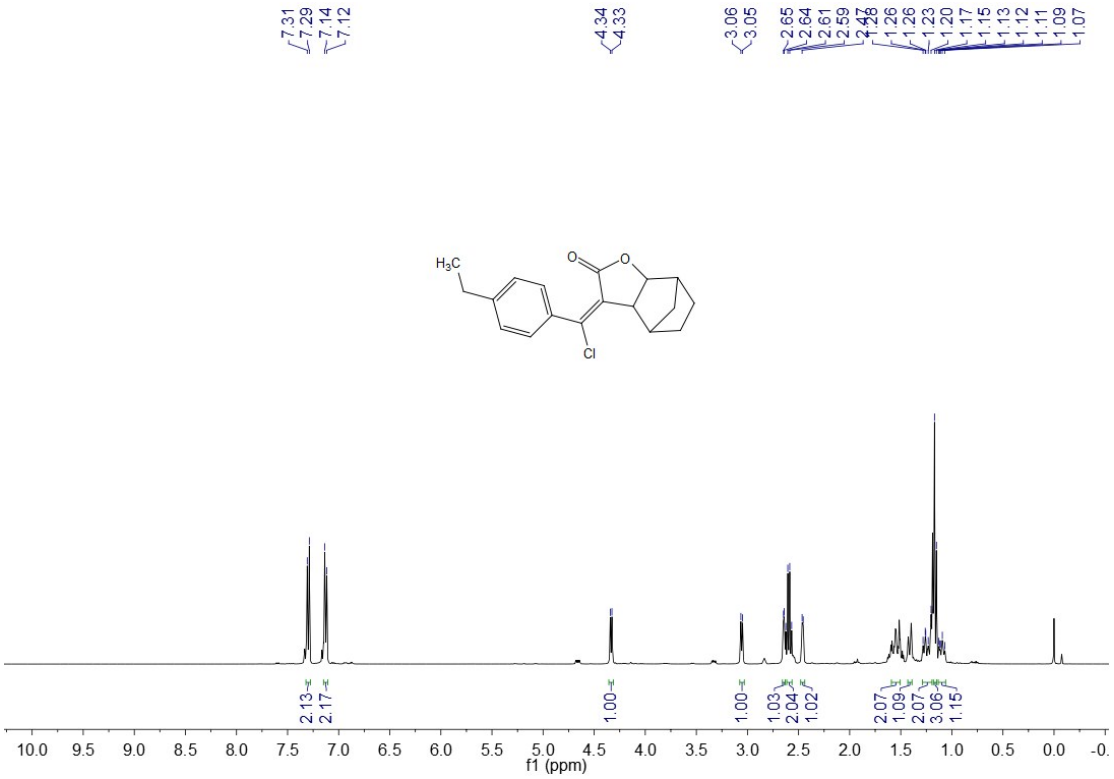

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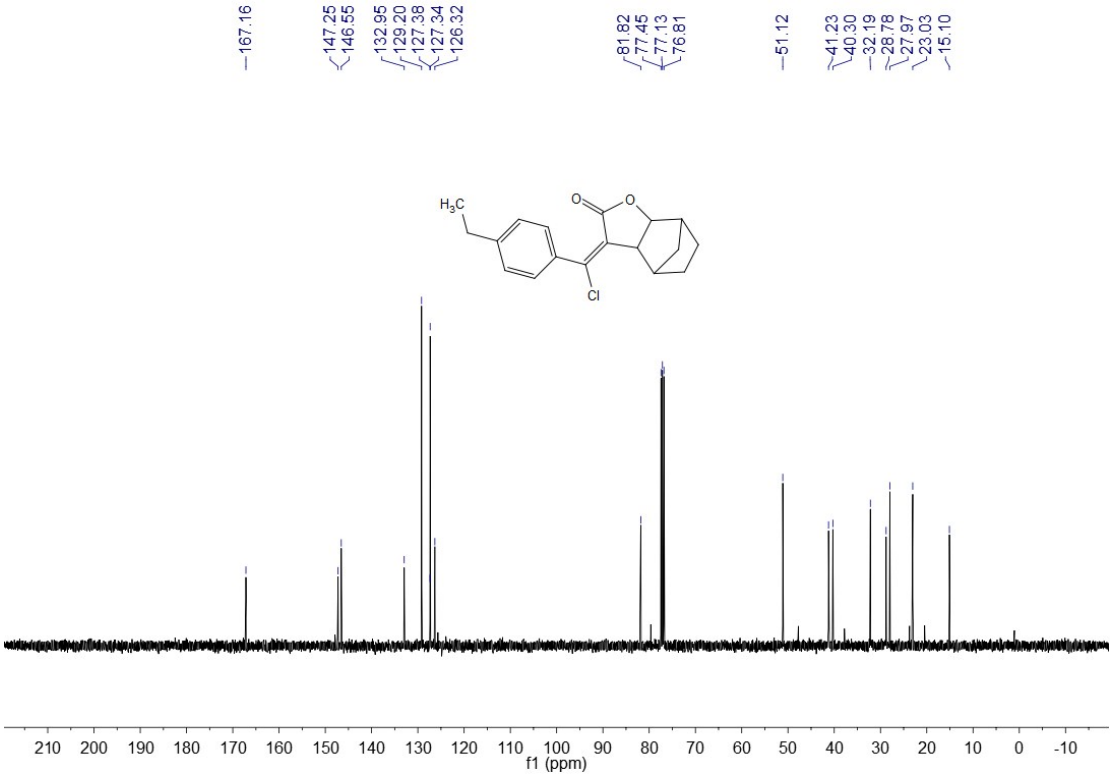

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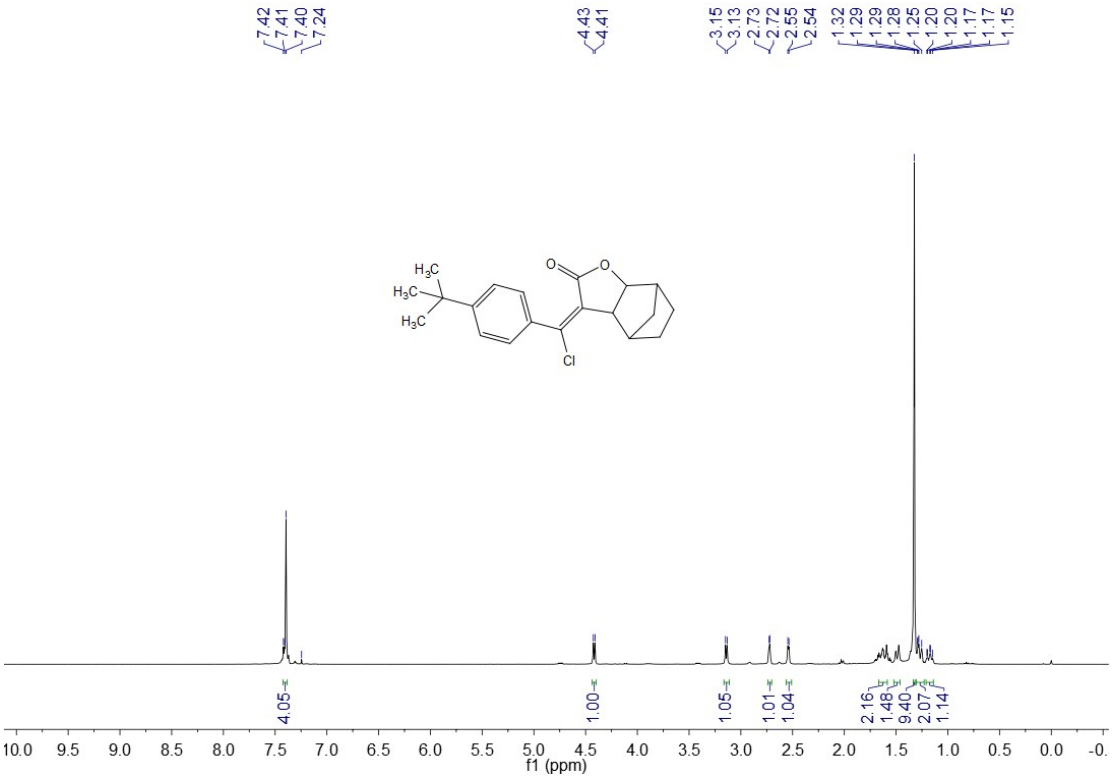
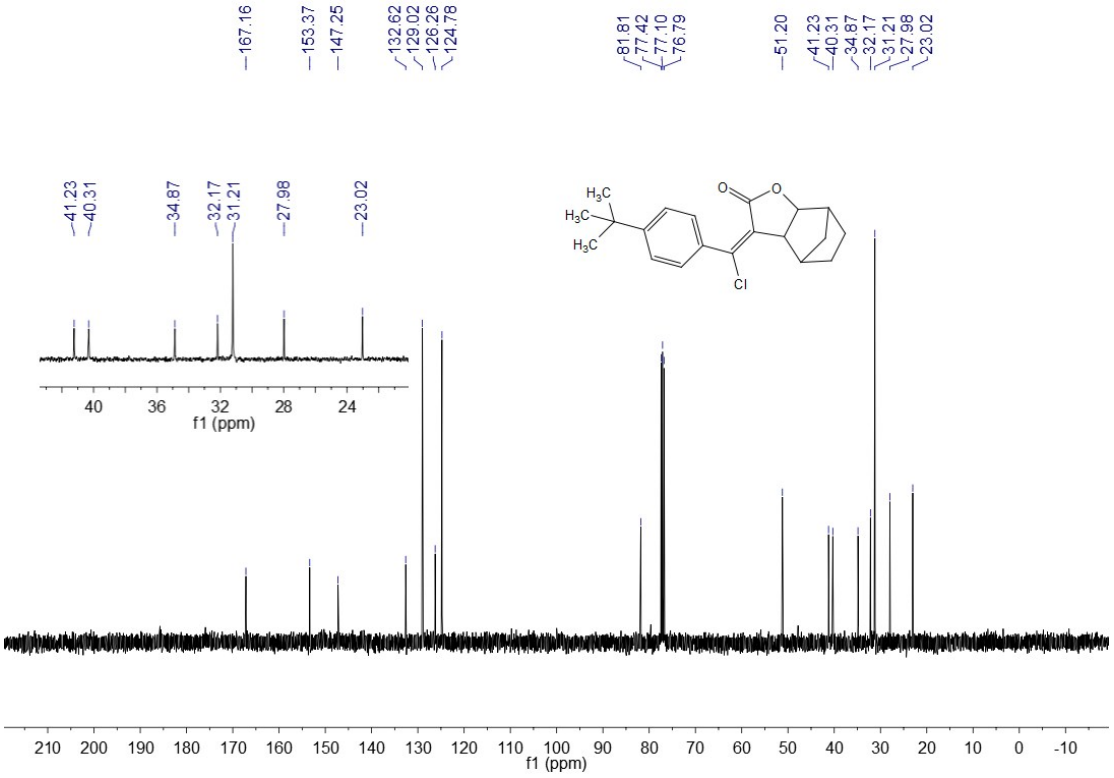


^{13}C NMR of Compound **3f**



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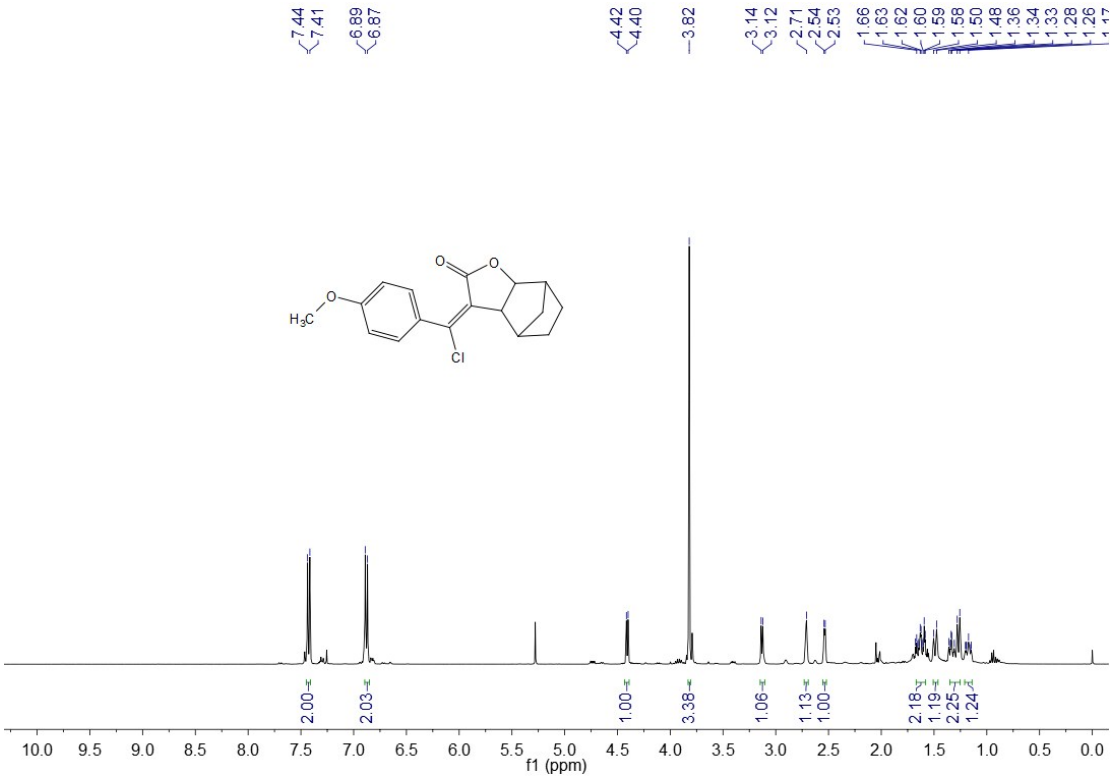

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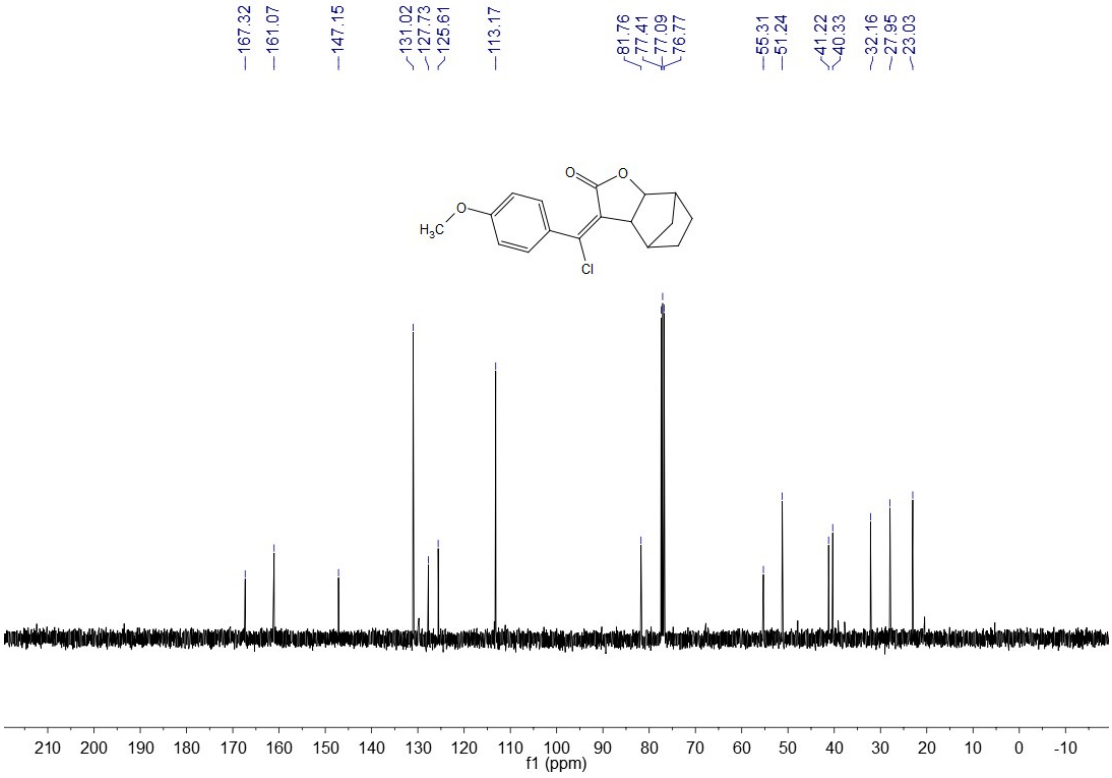

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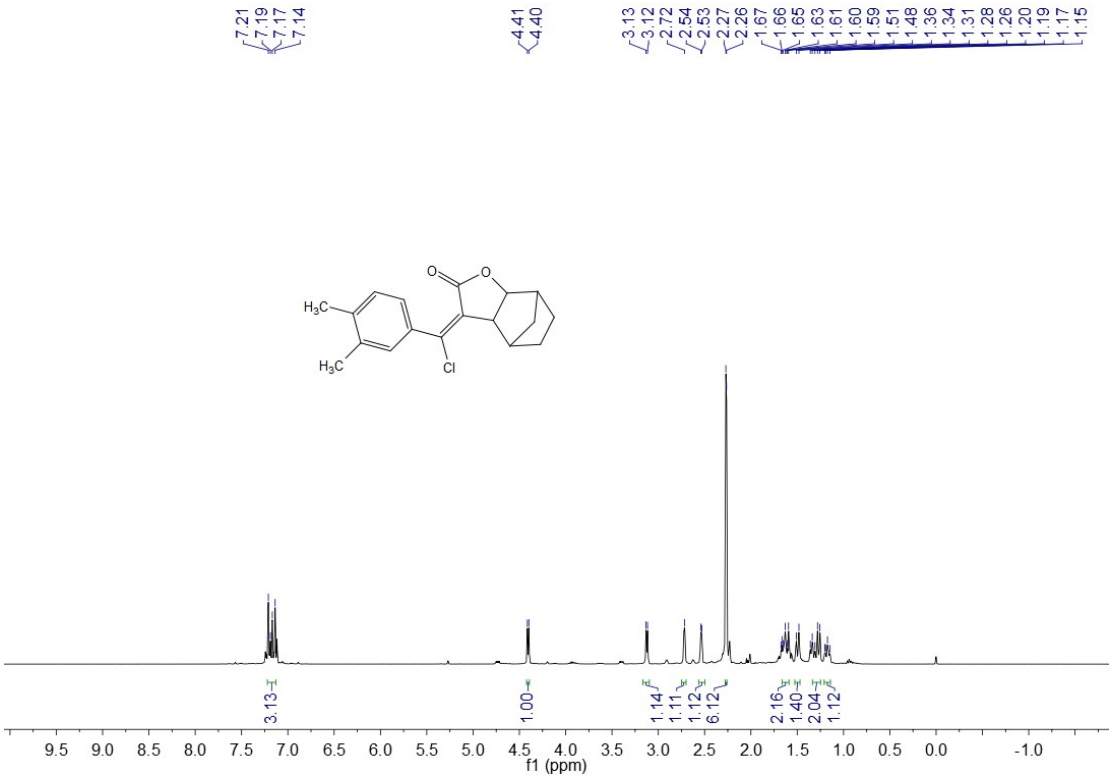

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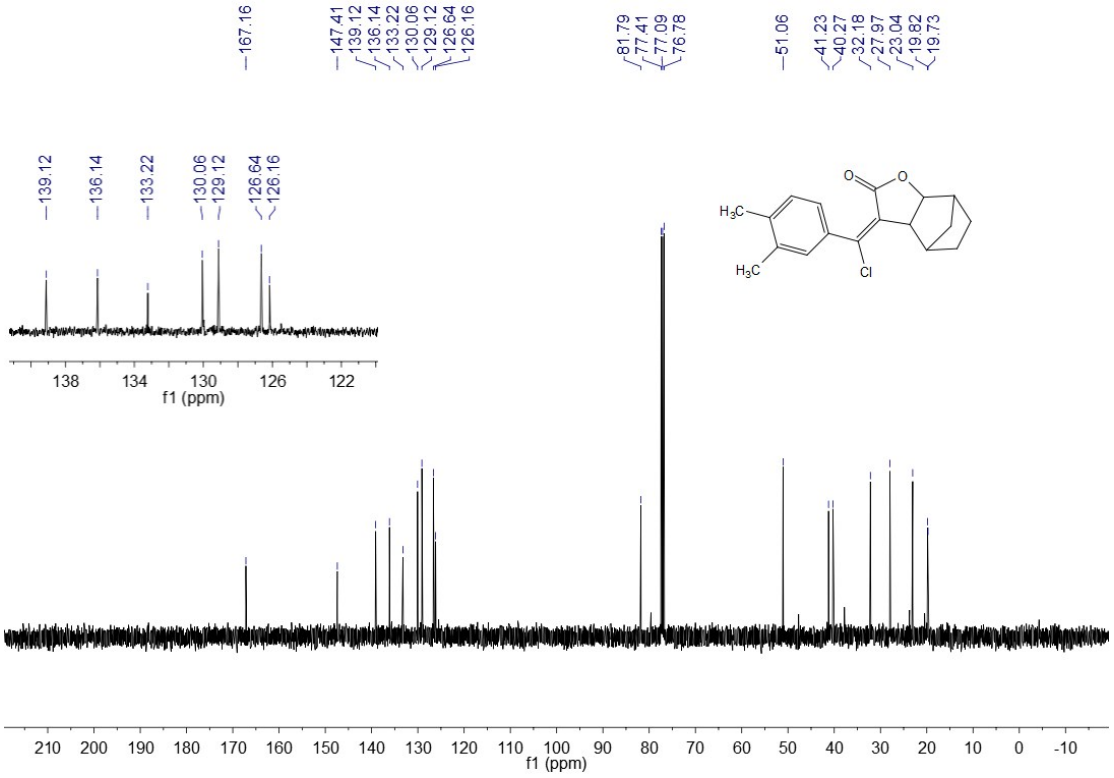

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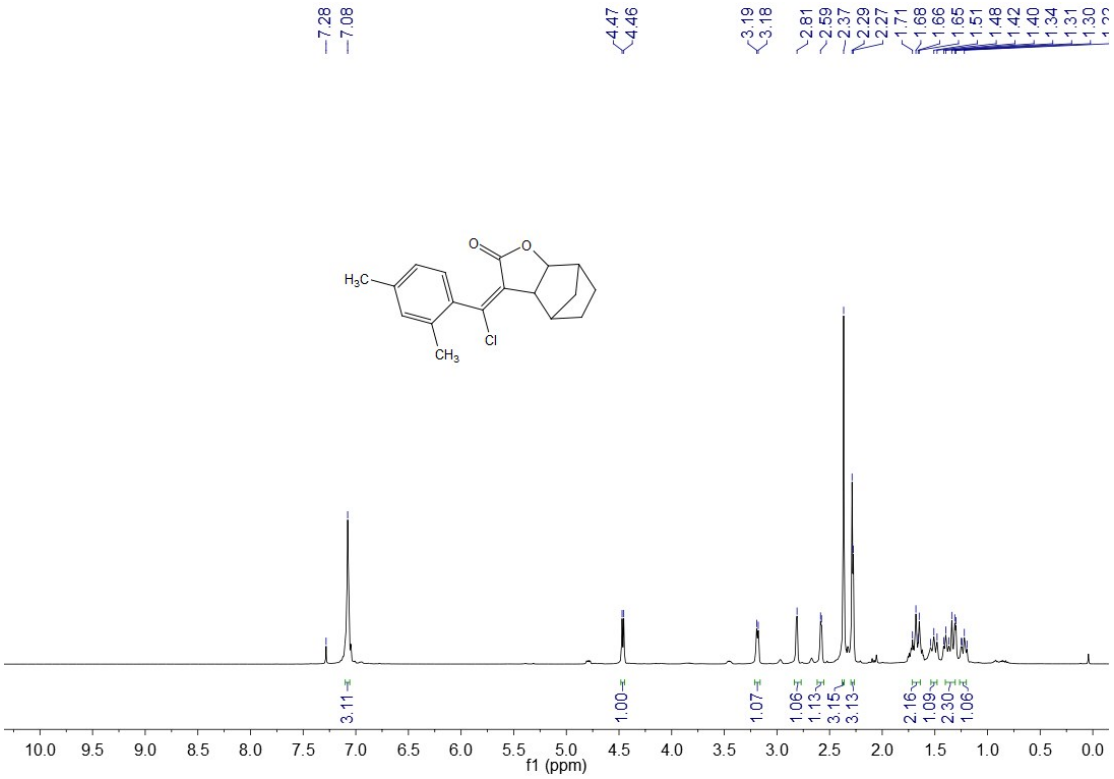
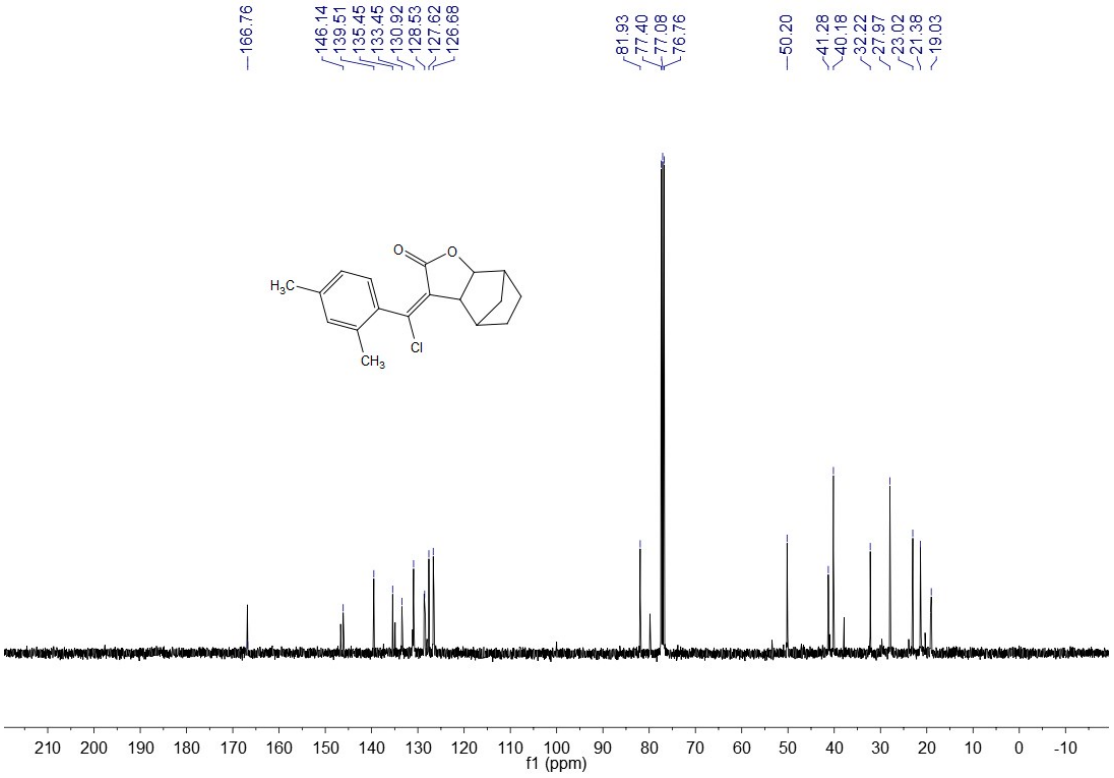


^{13}C NMR of Compound **3i**



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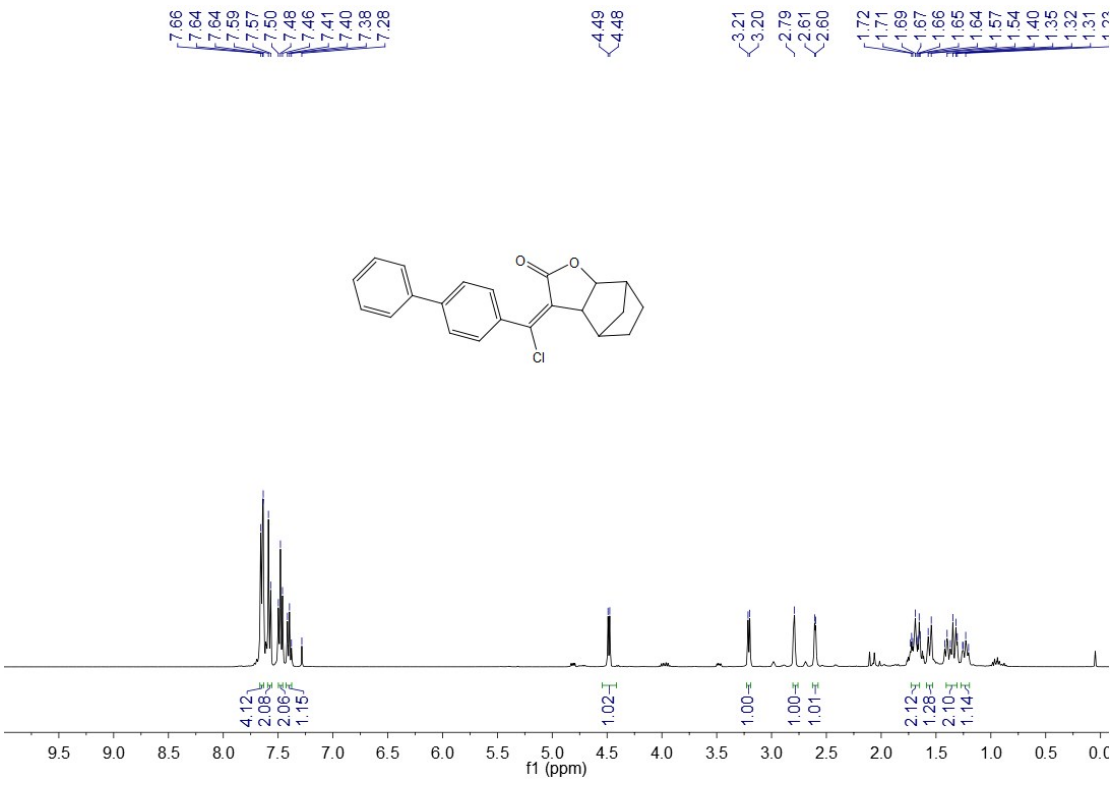

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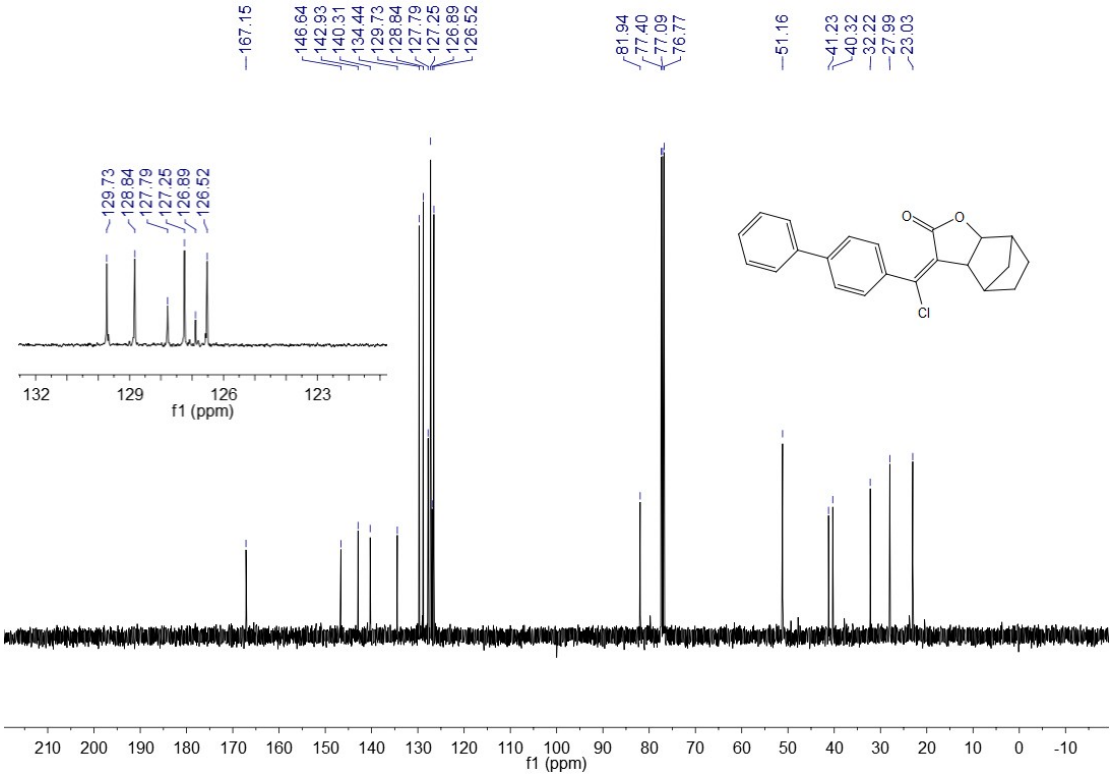
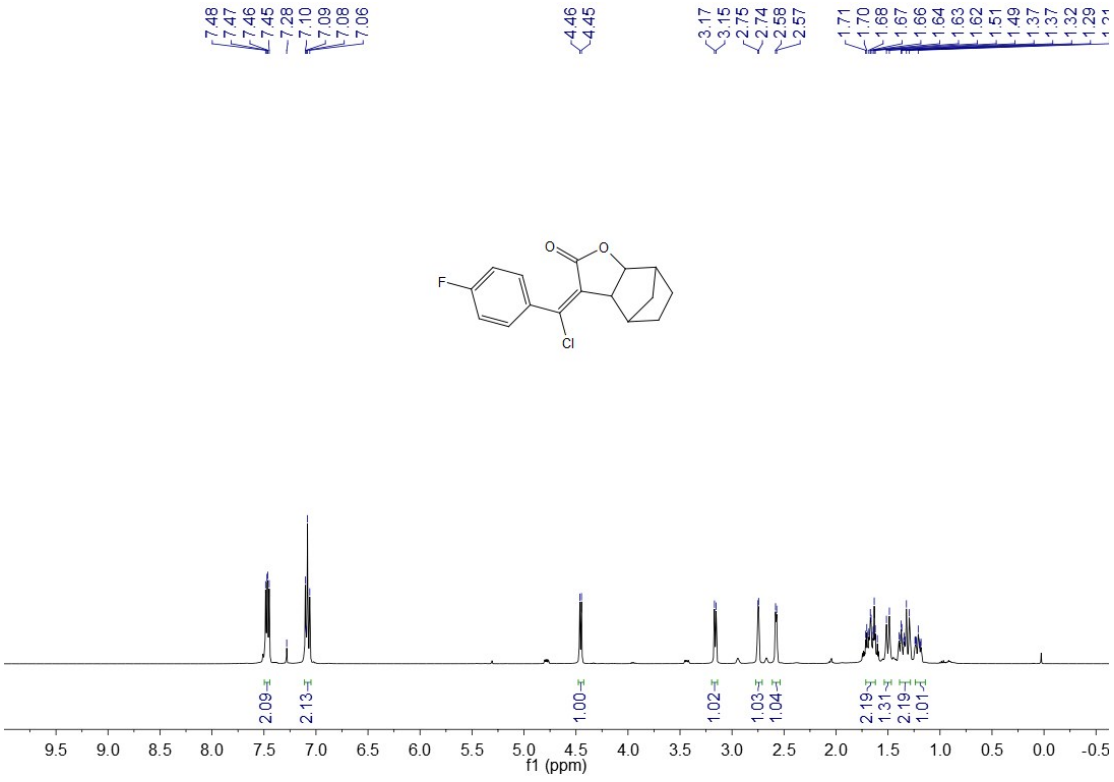


^{1}H NMR of Compound **3k**



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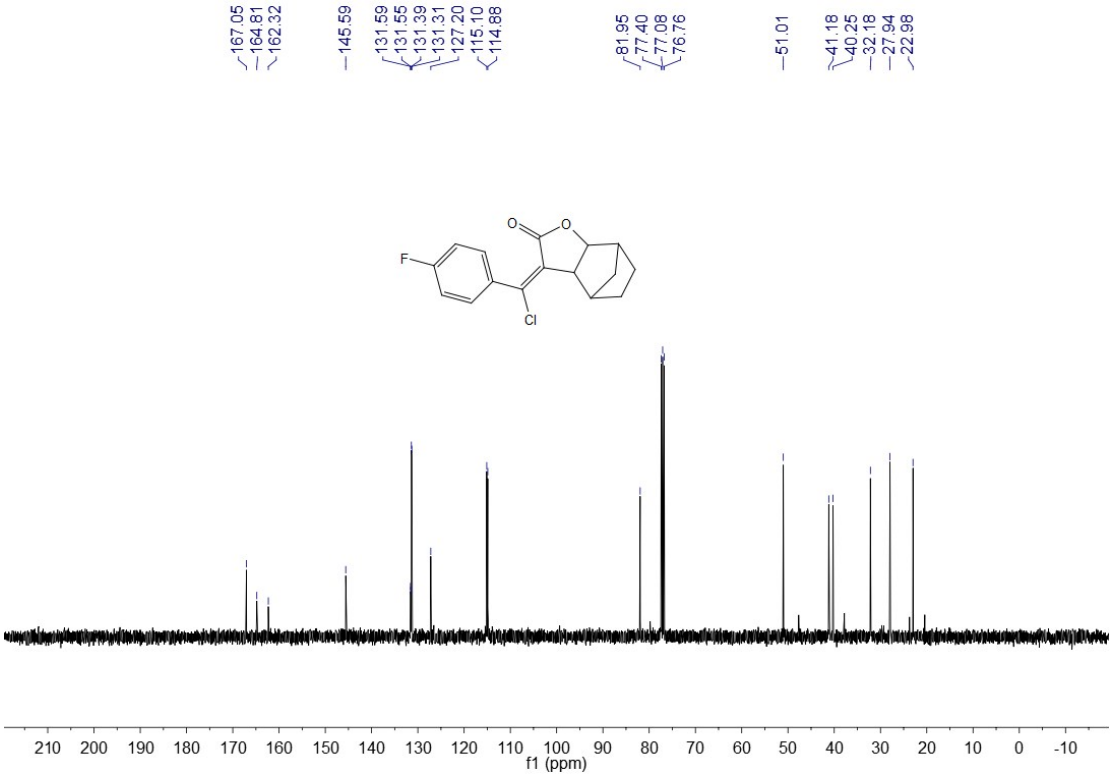
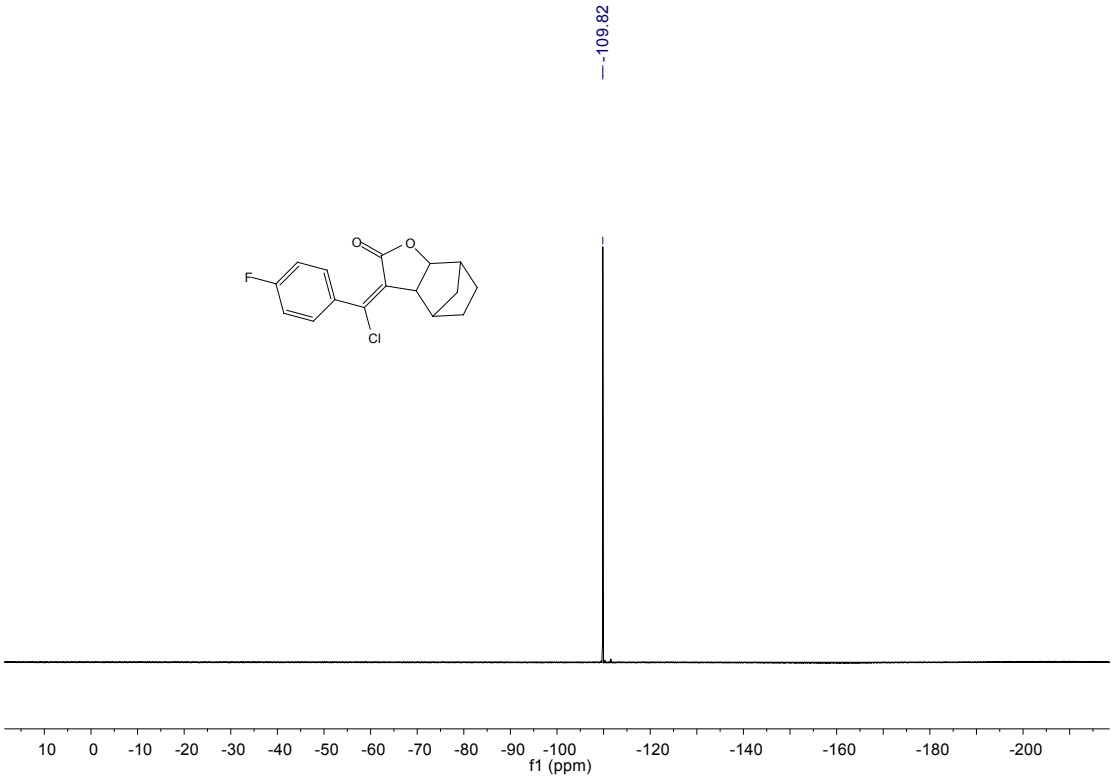


^{19}F NMR of Compound **3k**



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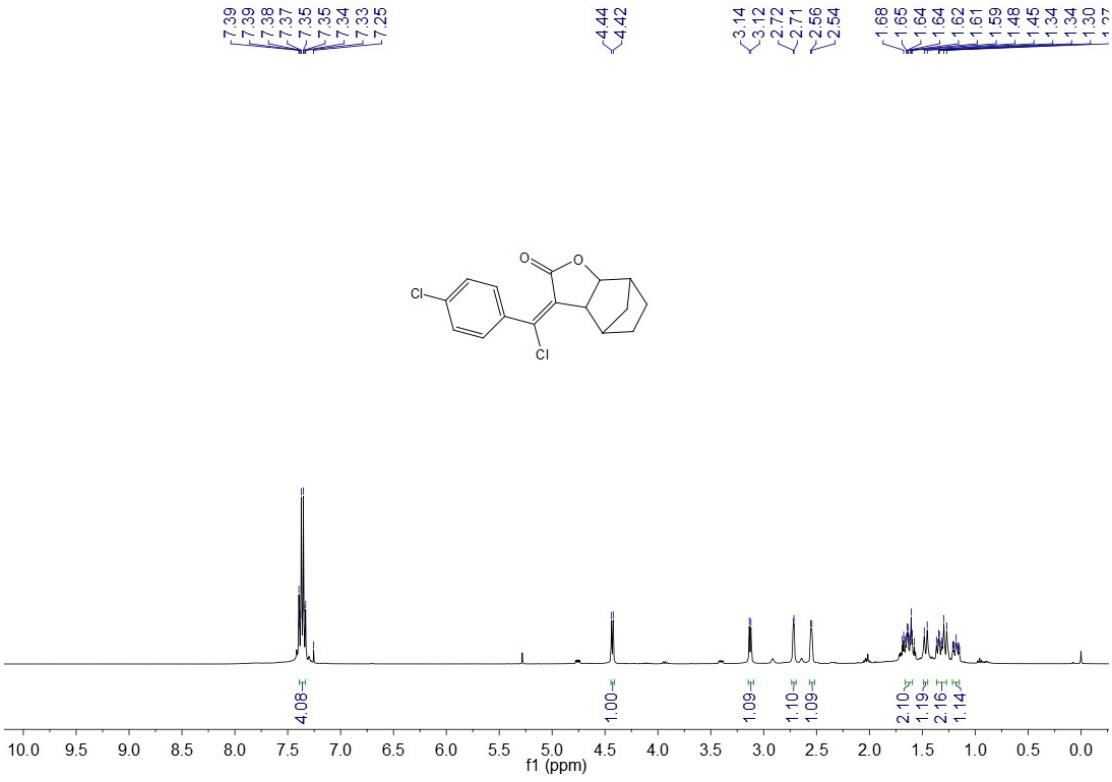

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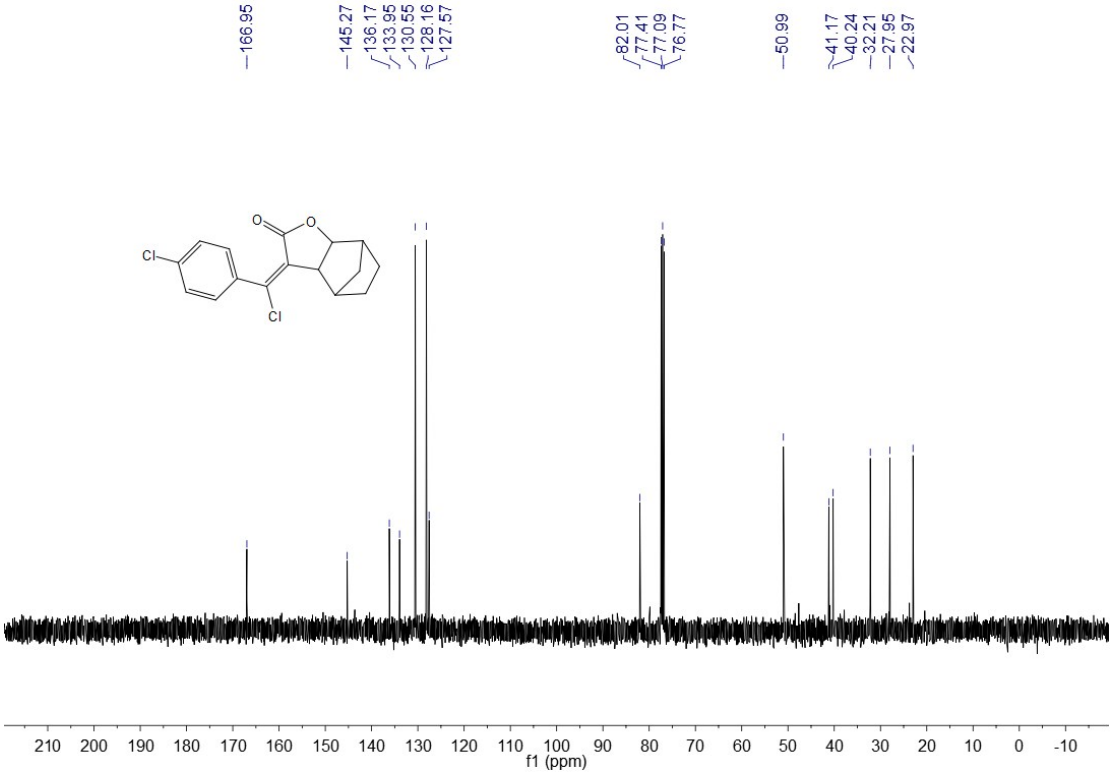

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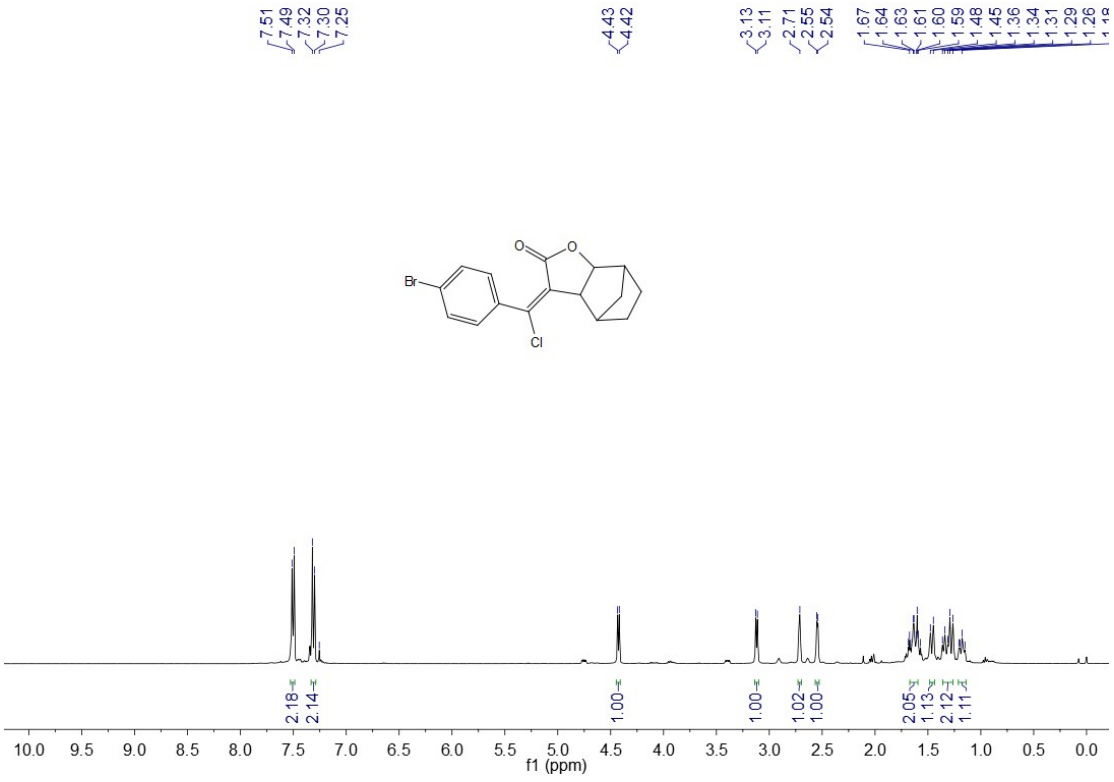

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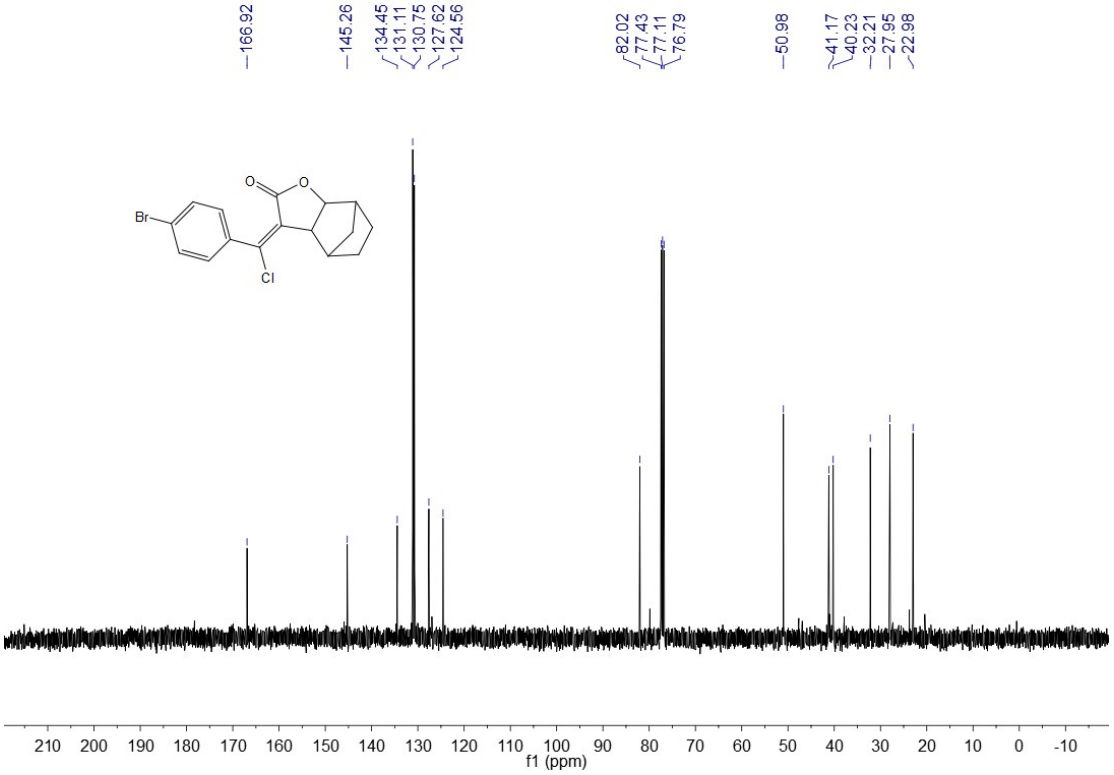

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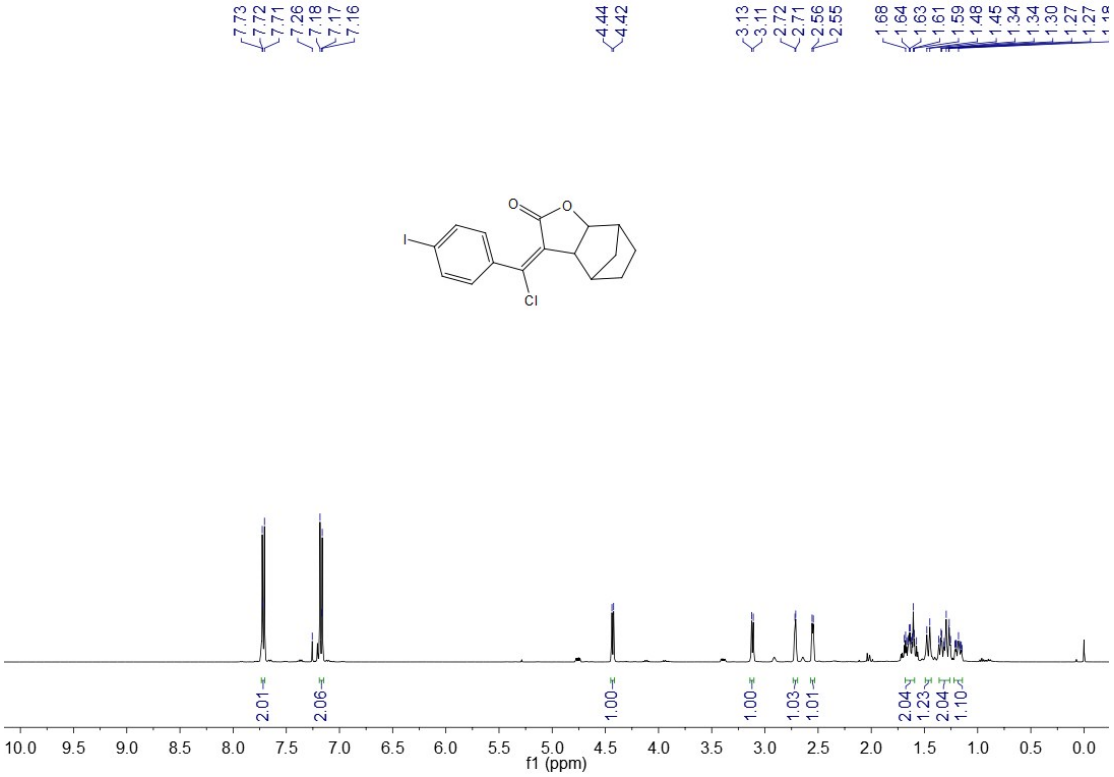

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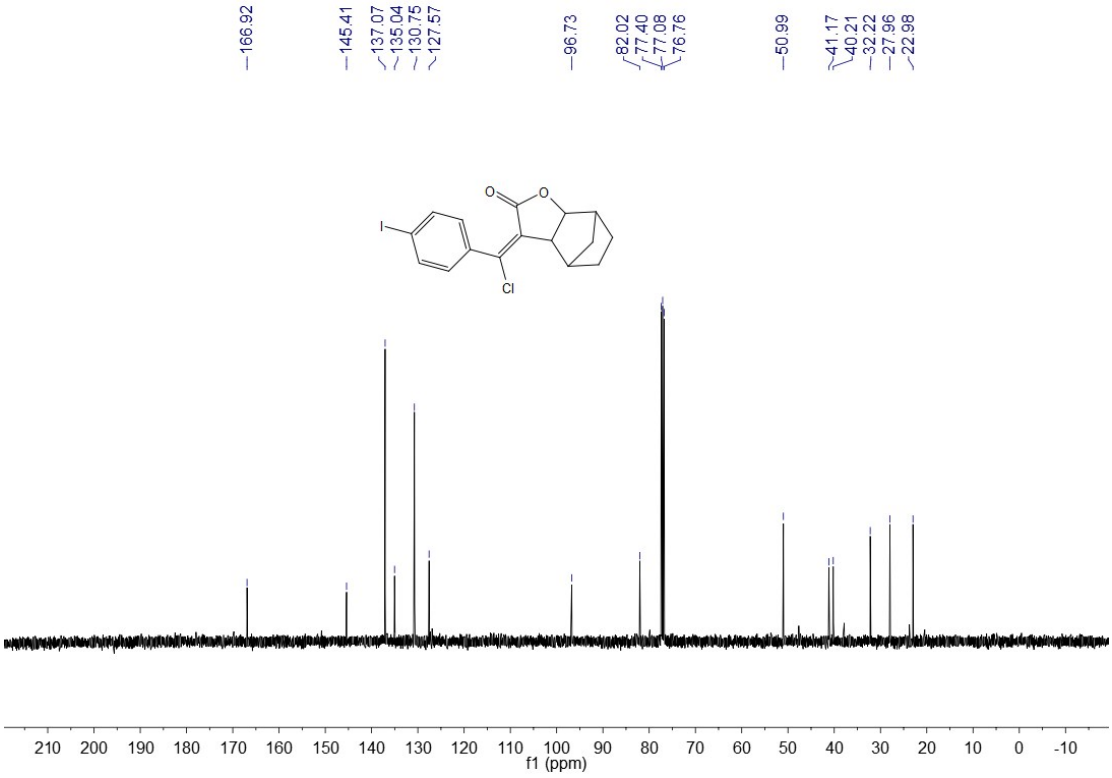

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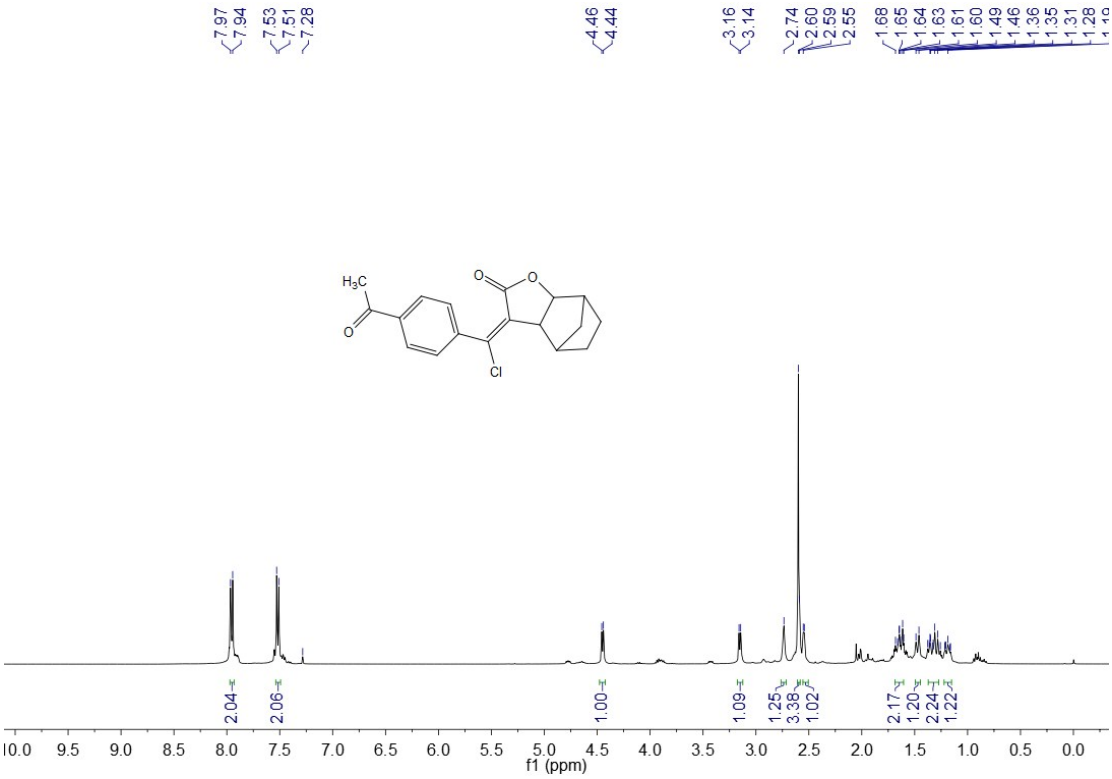

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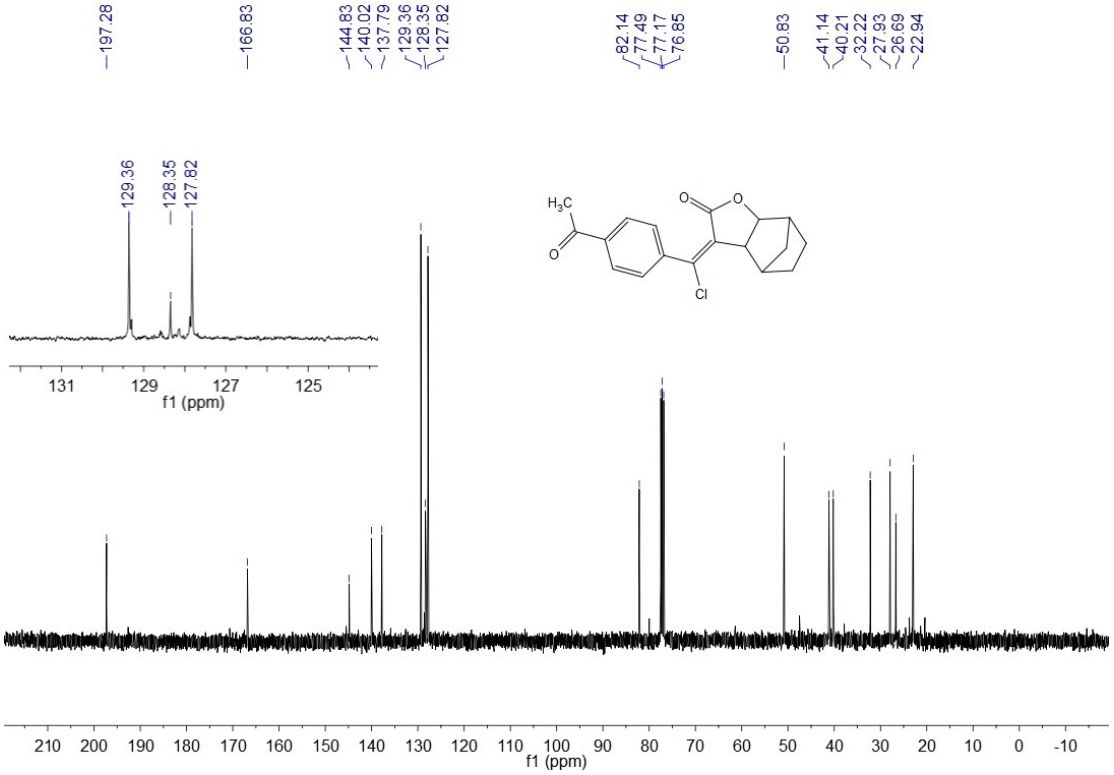

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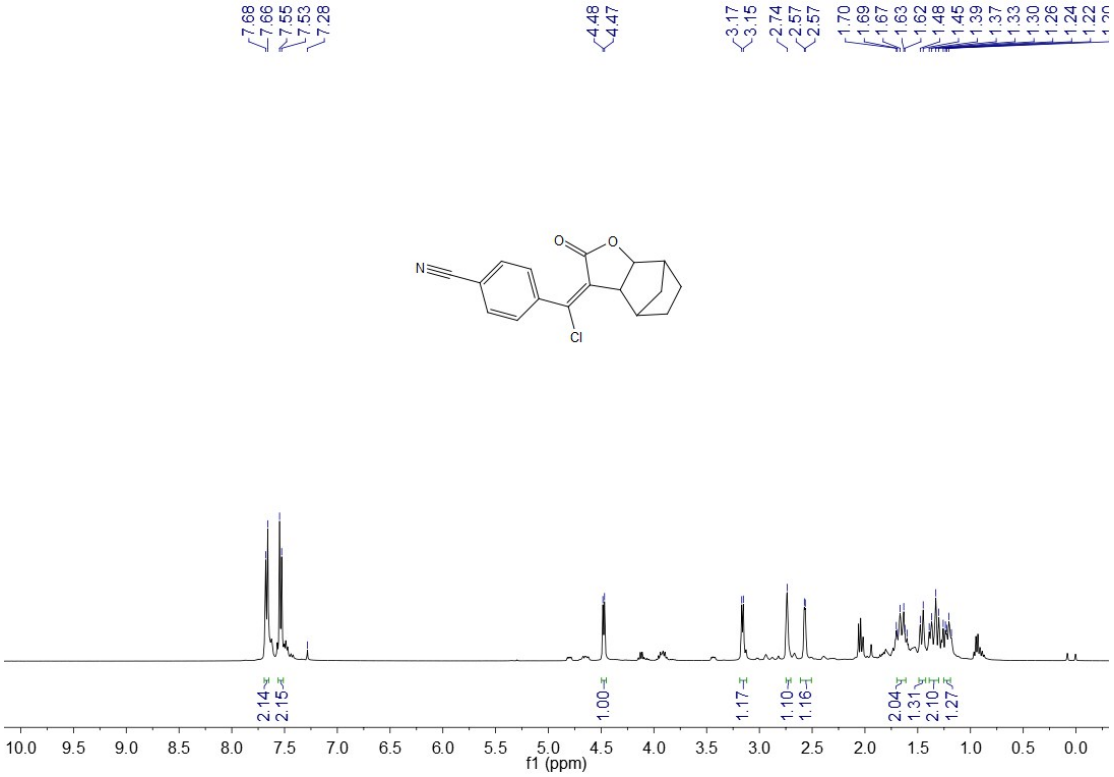

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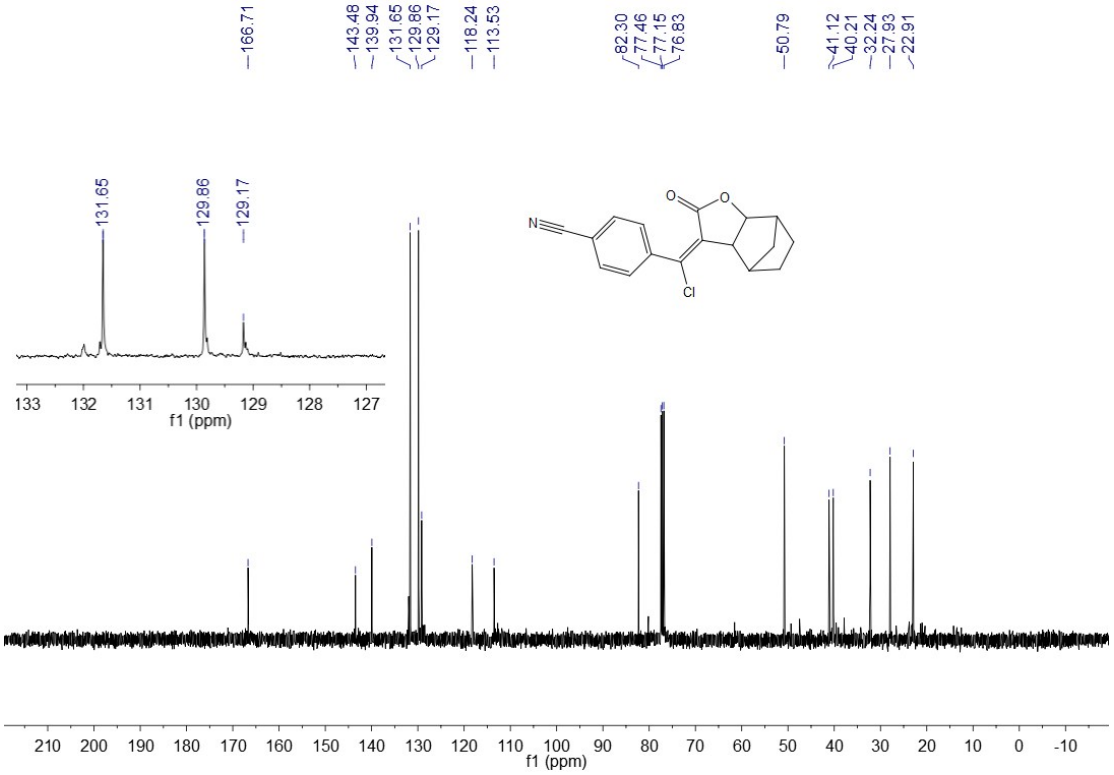
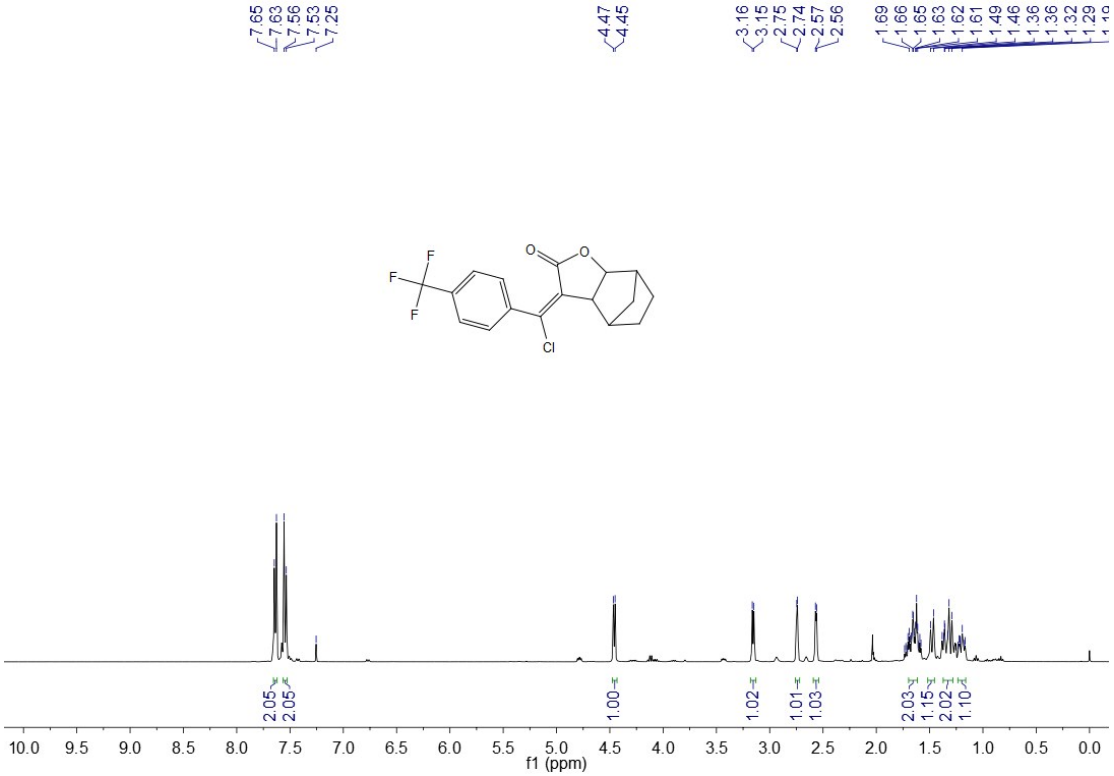


^{1}H NMR of Compound **3q**



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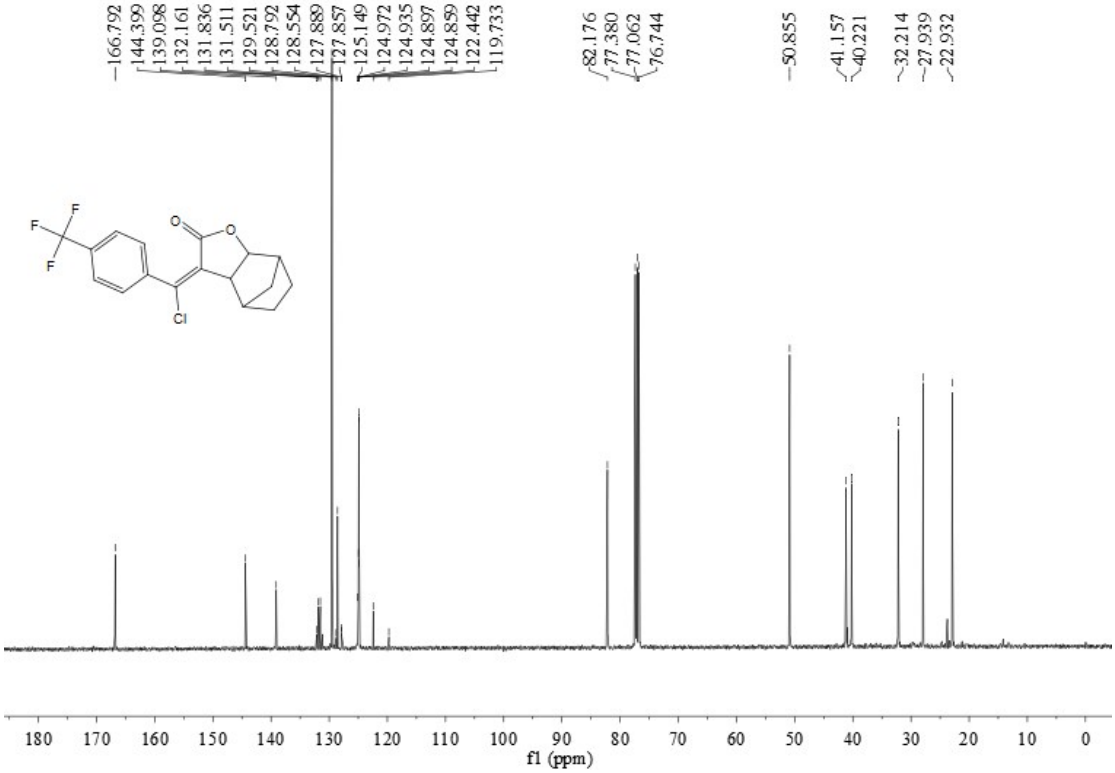

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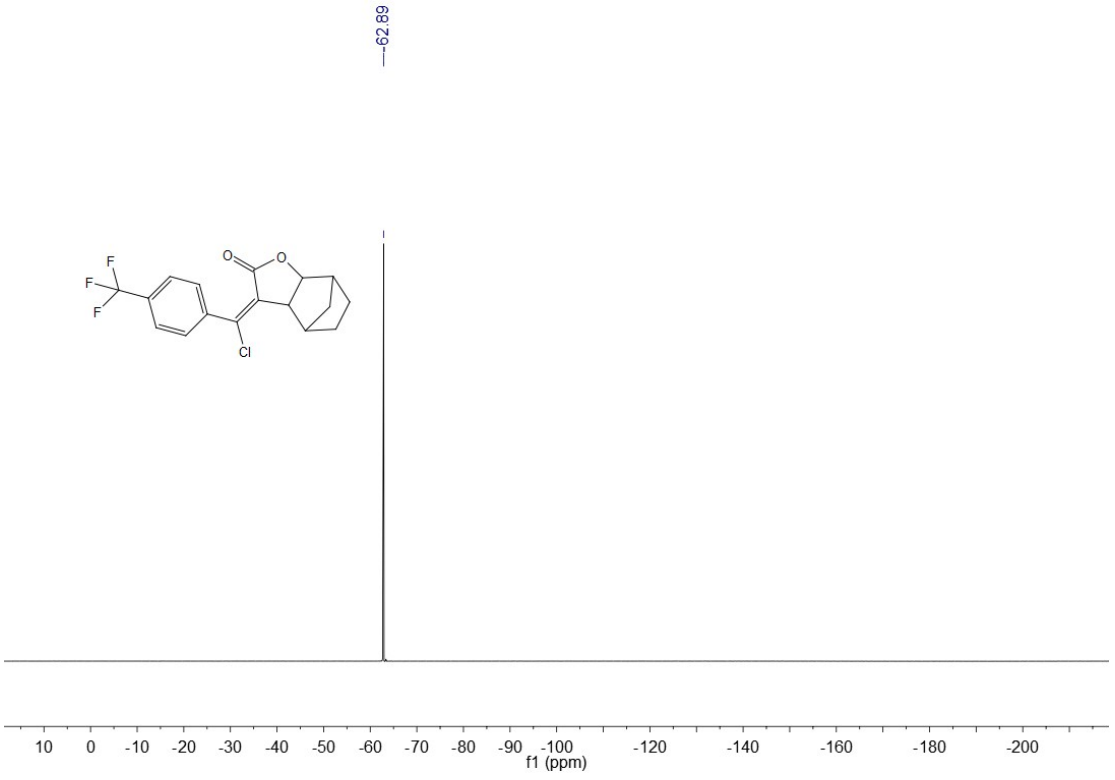
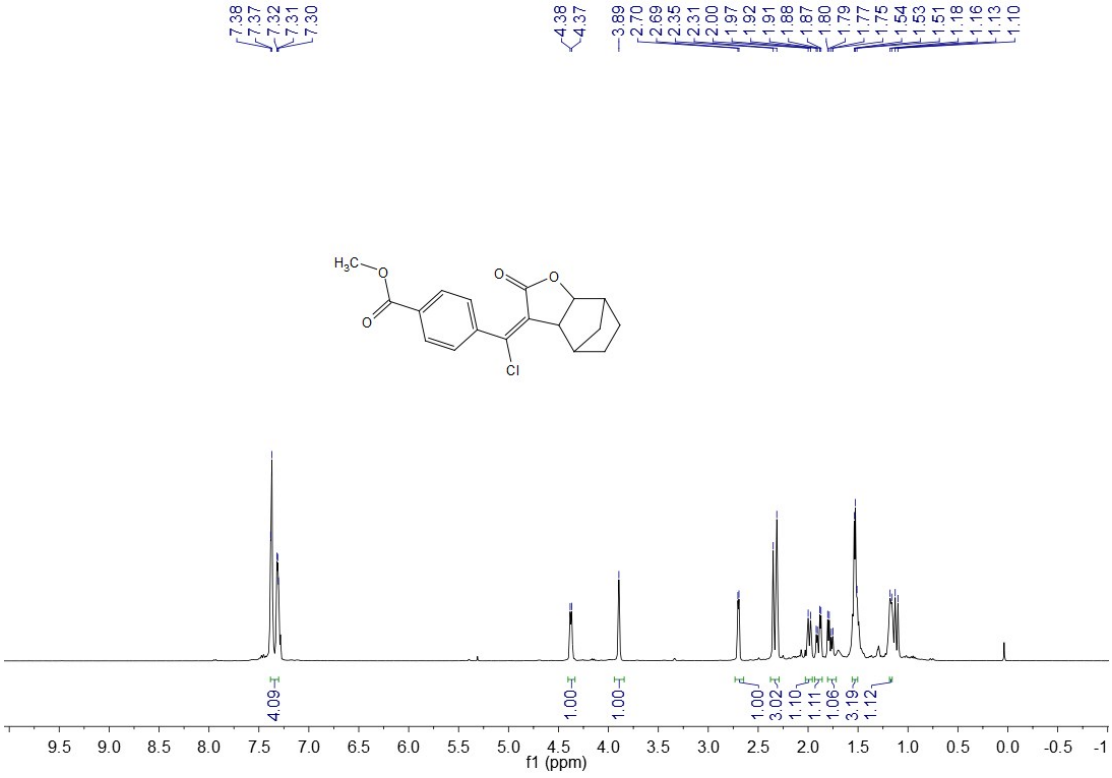


^{1}H NMR of Compound **3r**



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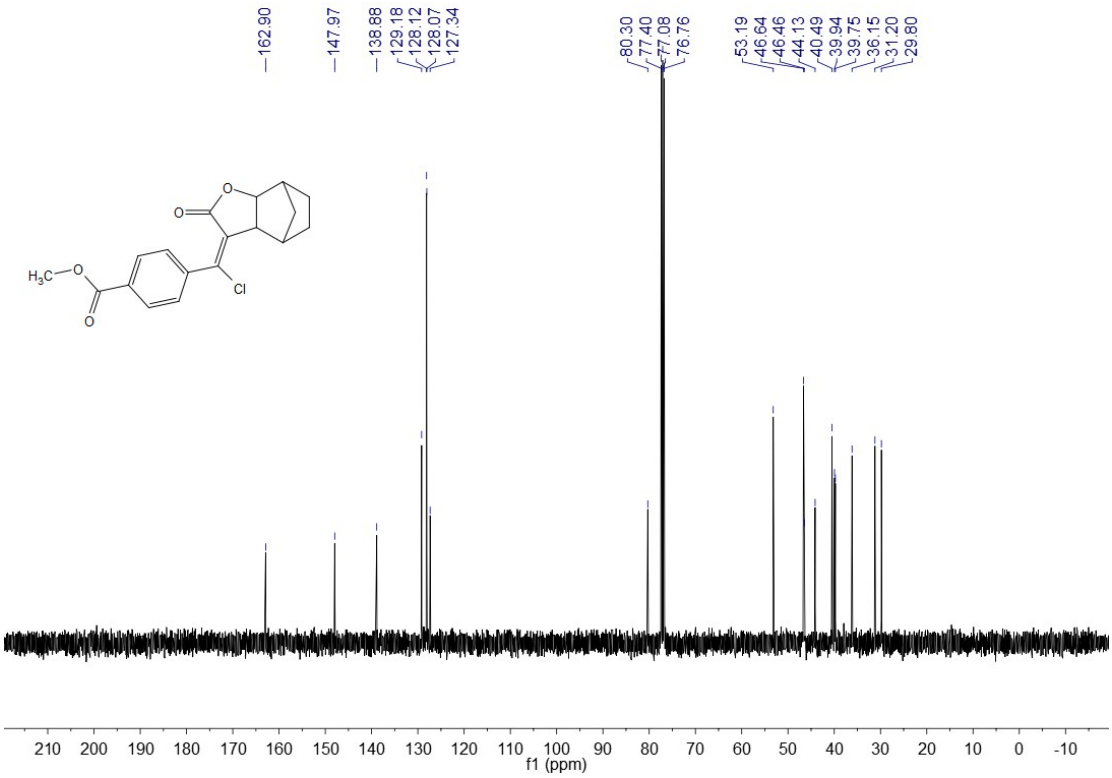
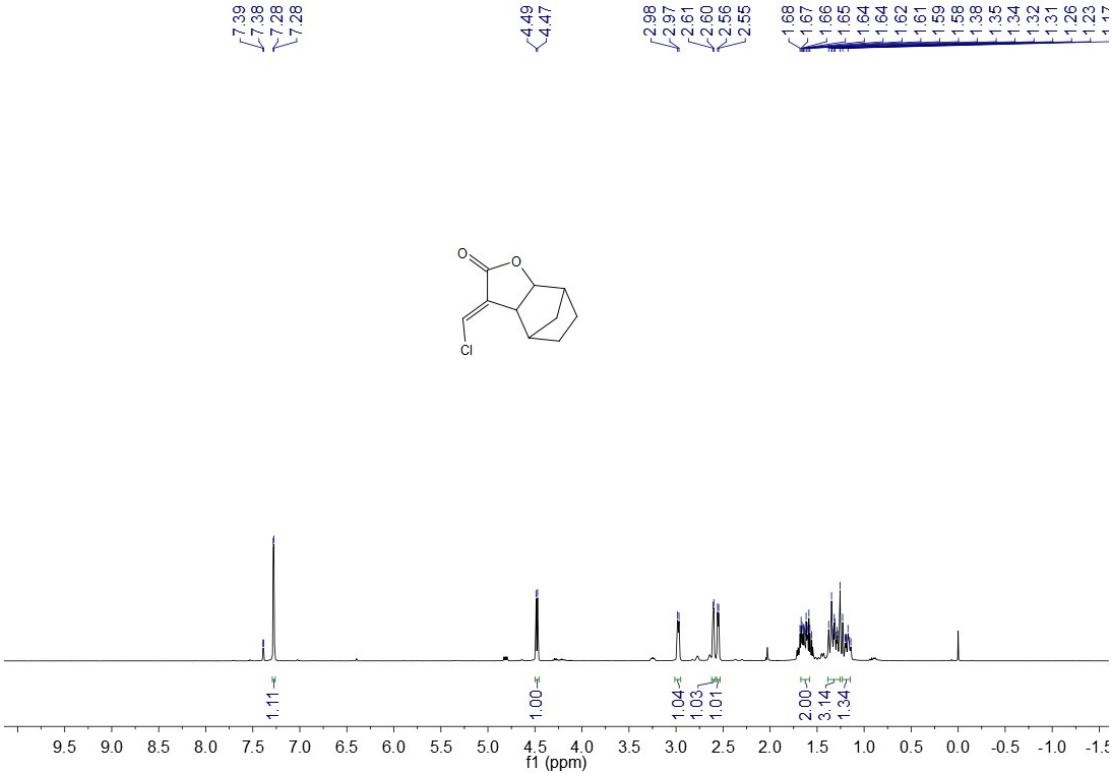
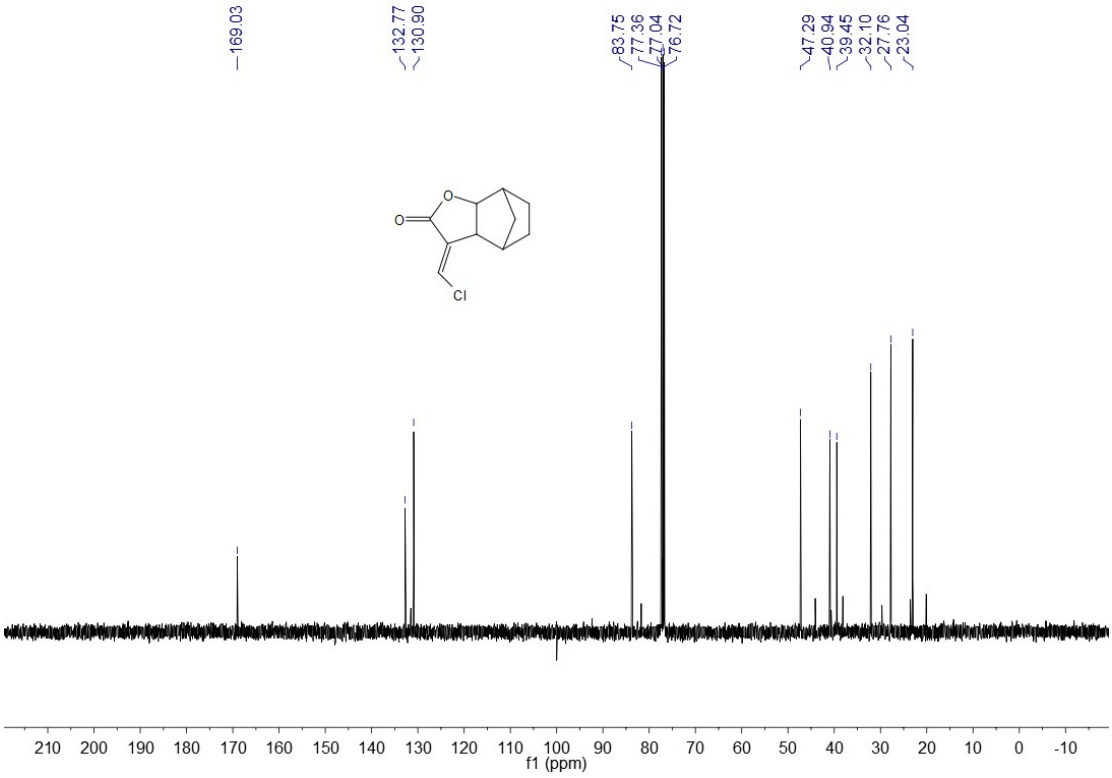


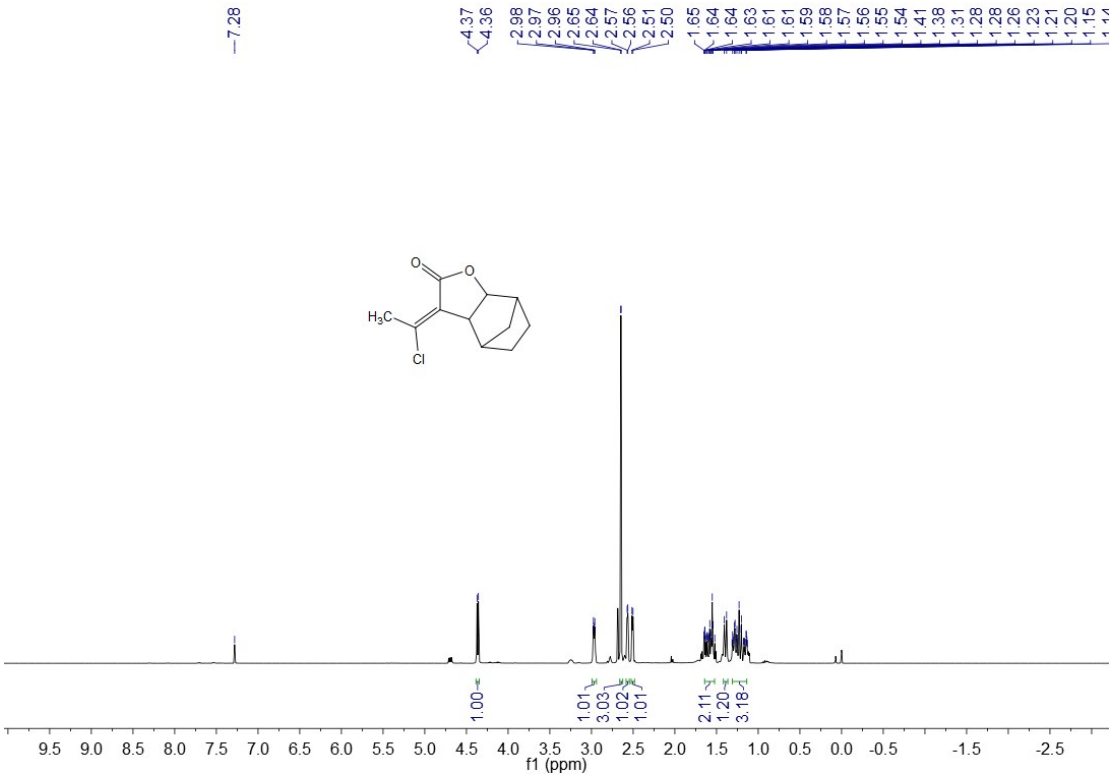
^{1}H NMR of Compound **3s**



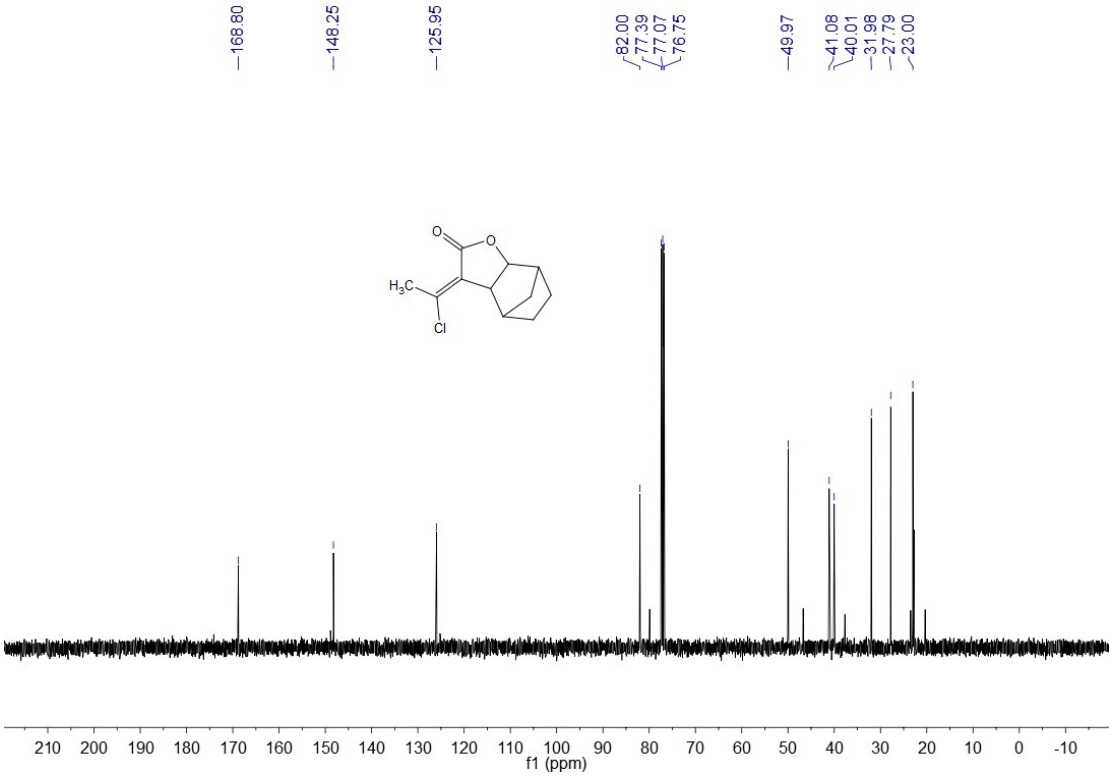
^{13}C NMR of Compound **3s**



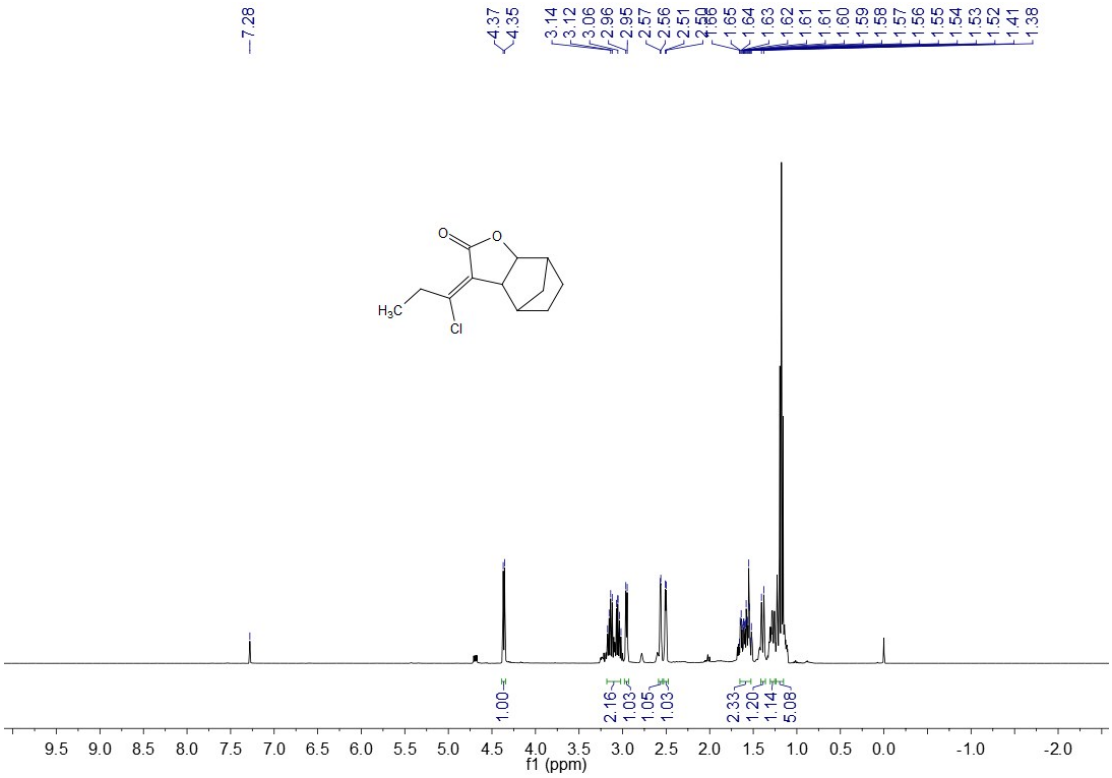
^{1}H NMR of Compound **3t**



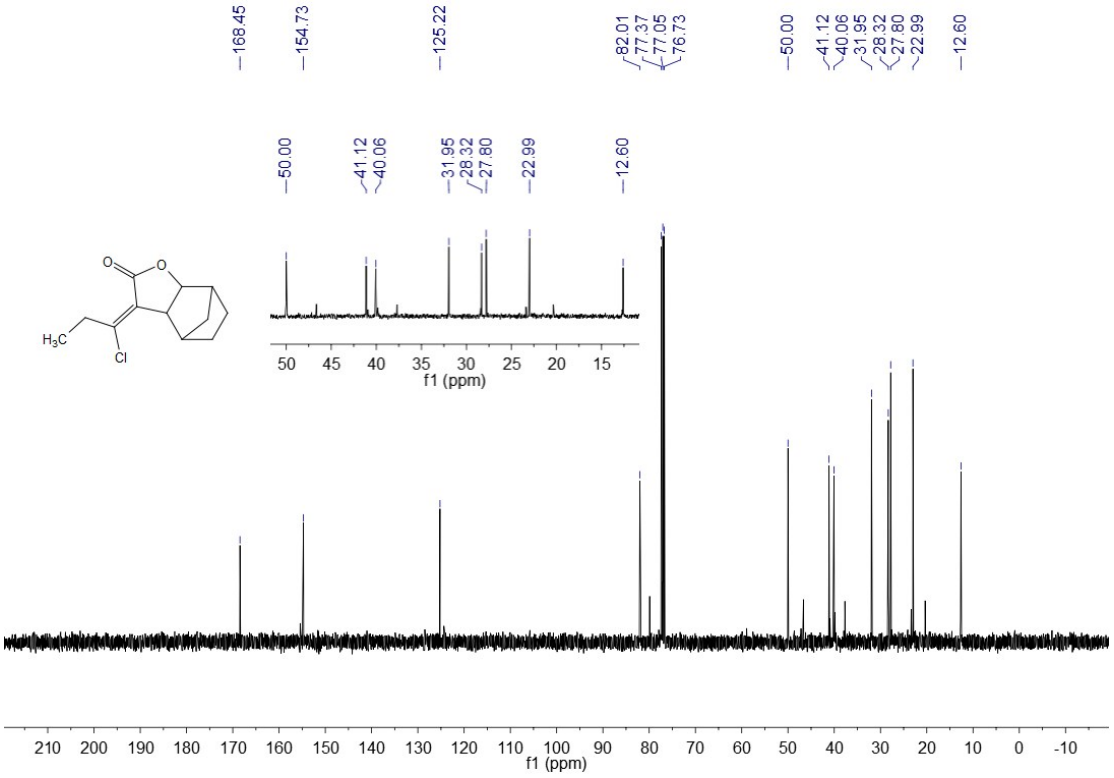
^{13}C NMR of Compound **3t**



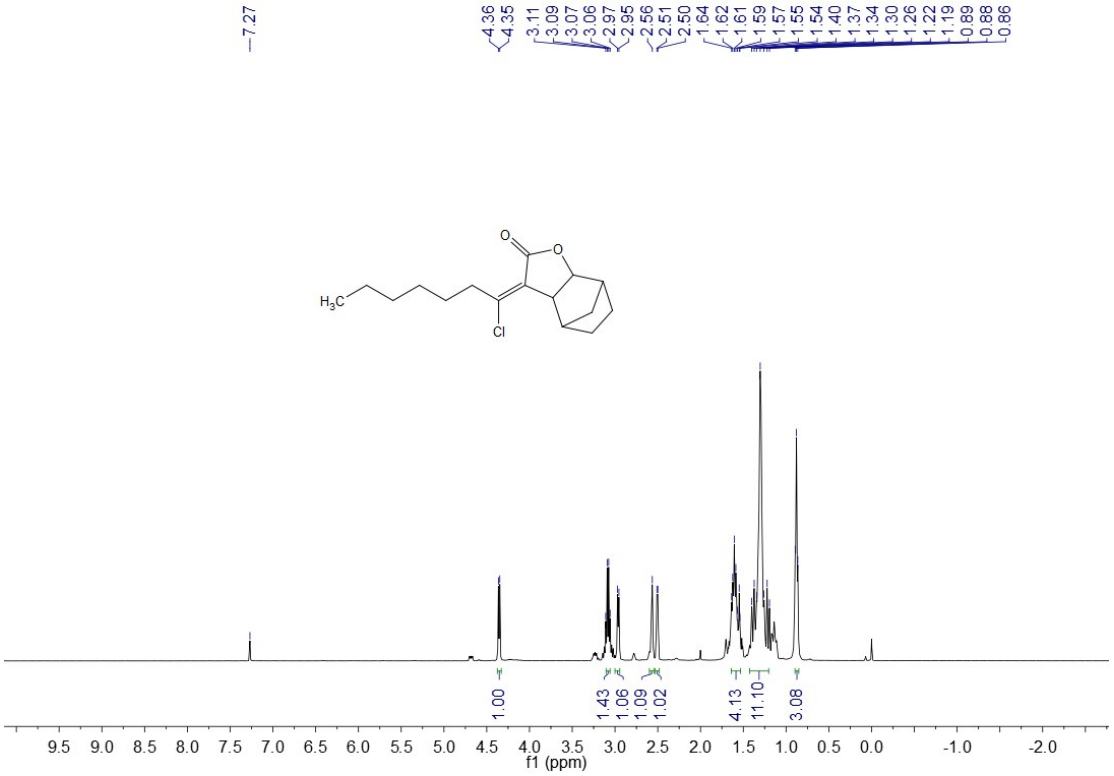
^{1}H NMR of Compound **3u**



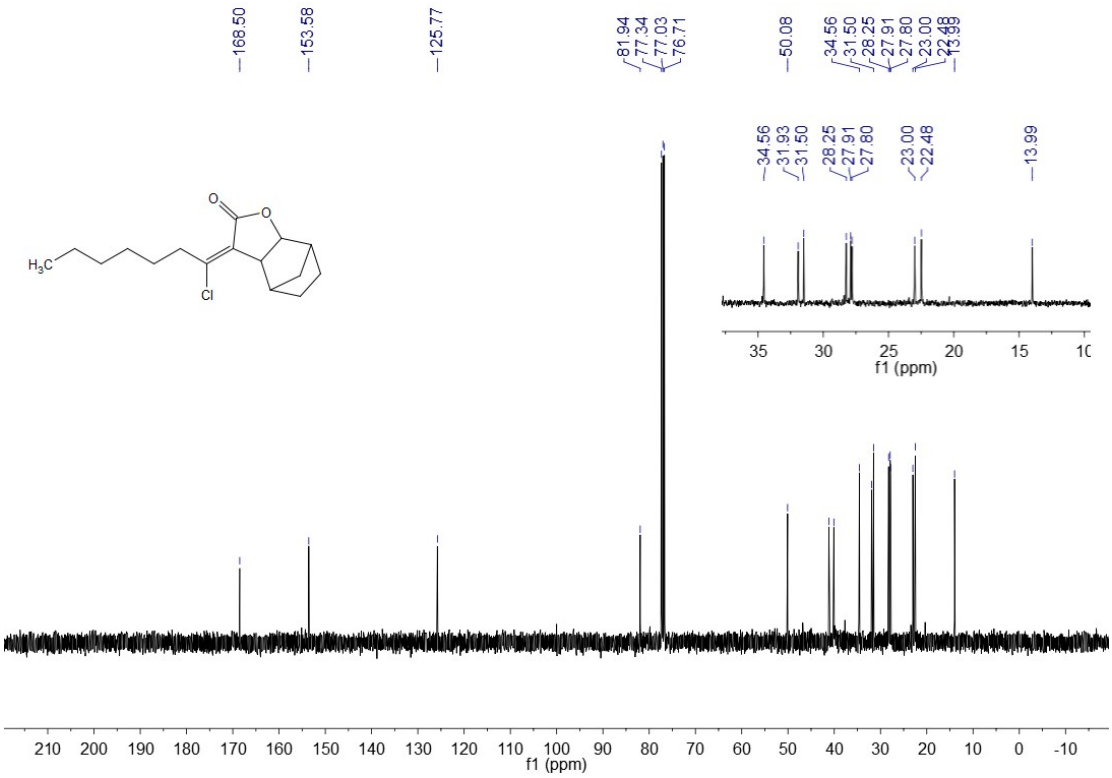
^{13}C NMR of Compound **3u**



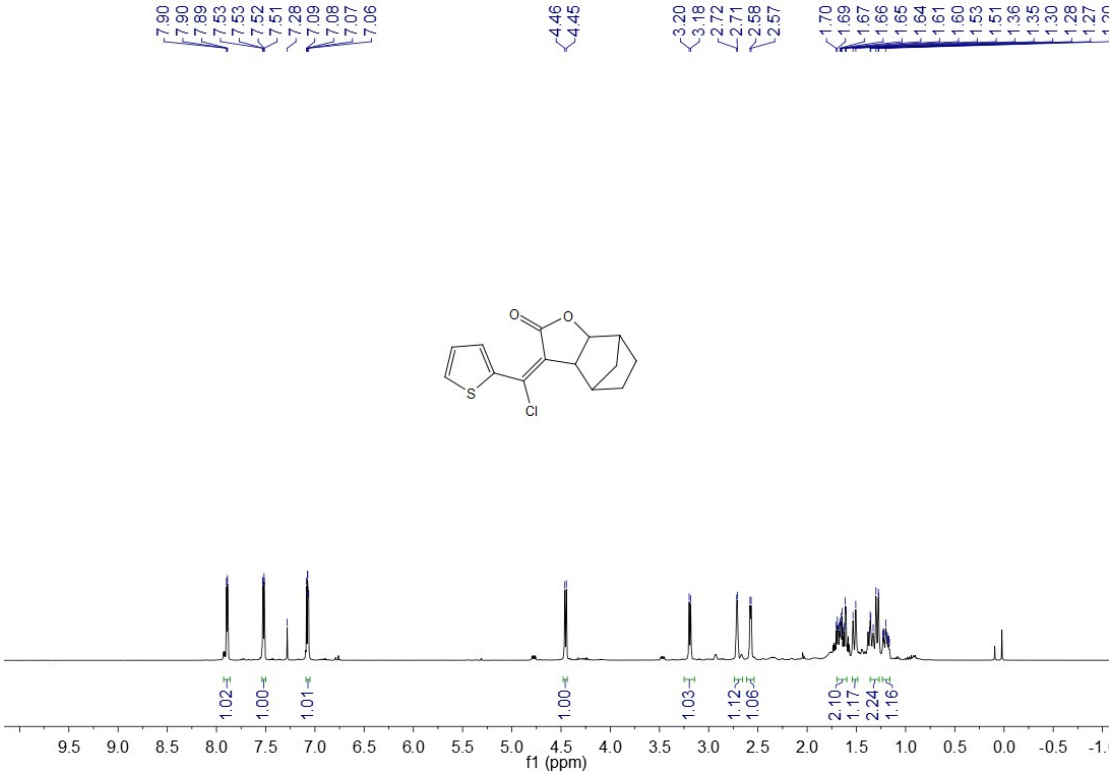
^{1}H NMR of Compound **3v**



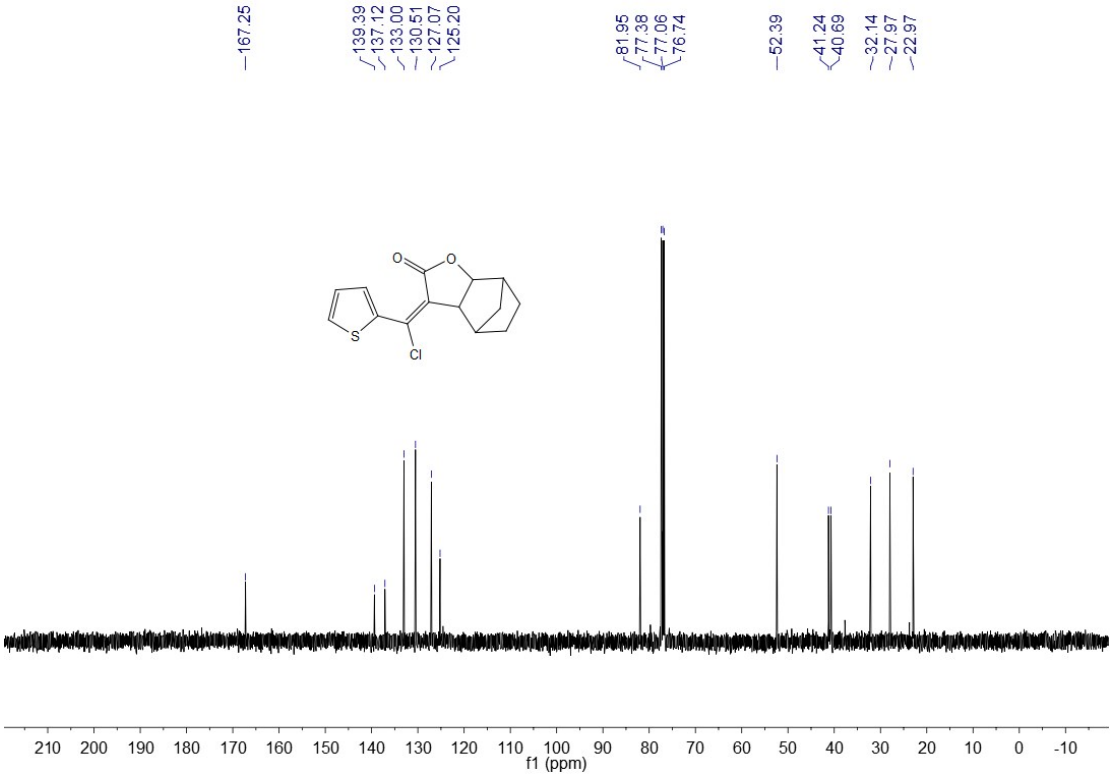
^{13}C NMR of Compound **3v**



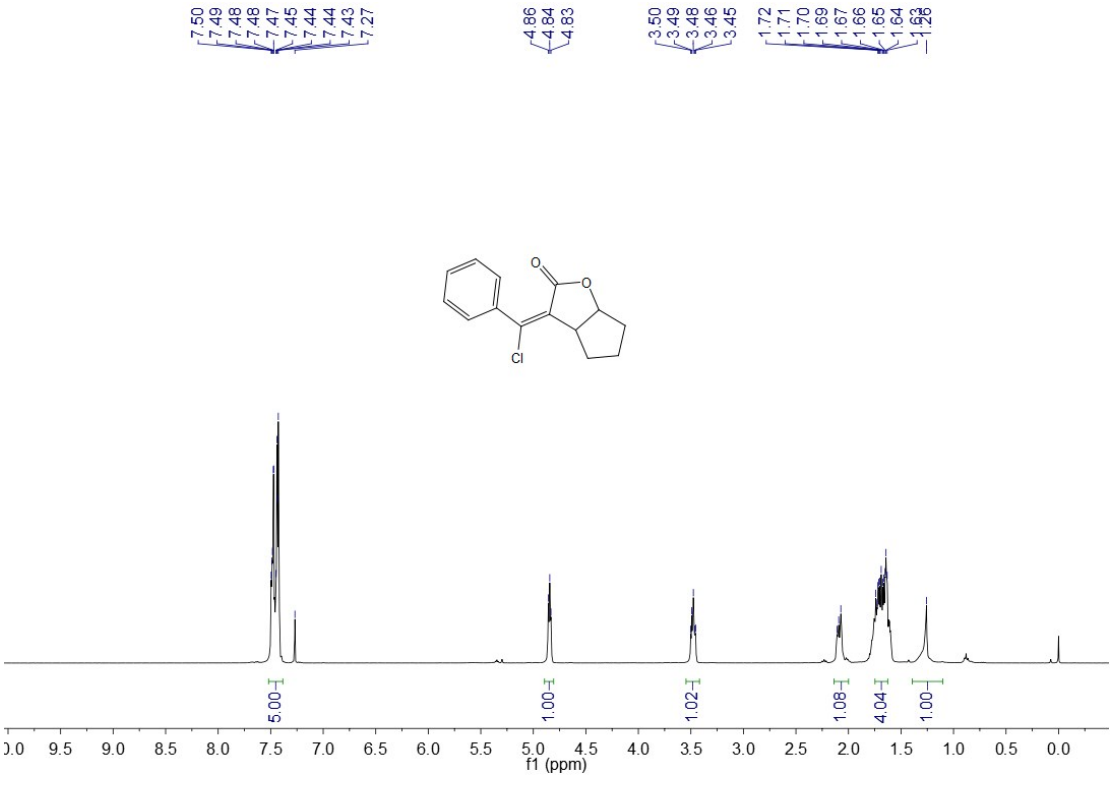
^{1}H NMR of Compound **3w**



^{13}C NMR of Compound **3w**



^{1}H NMR of Compound **3x**



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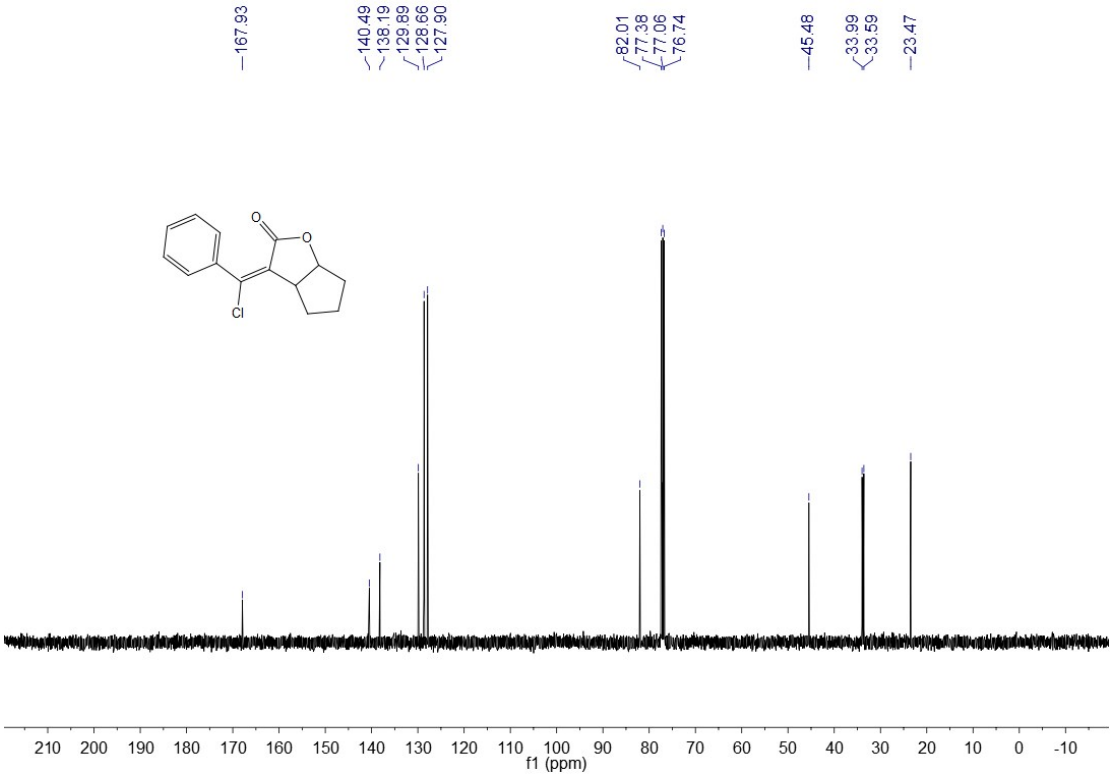
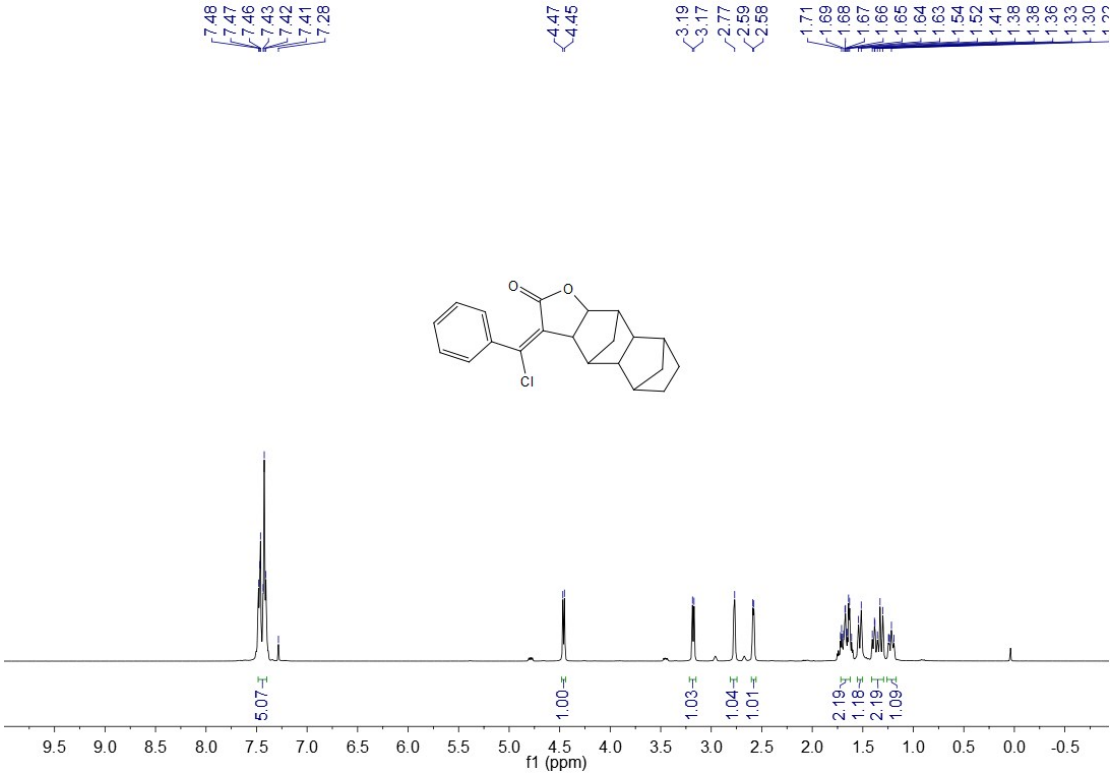
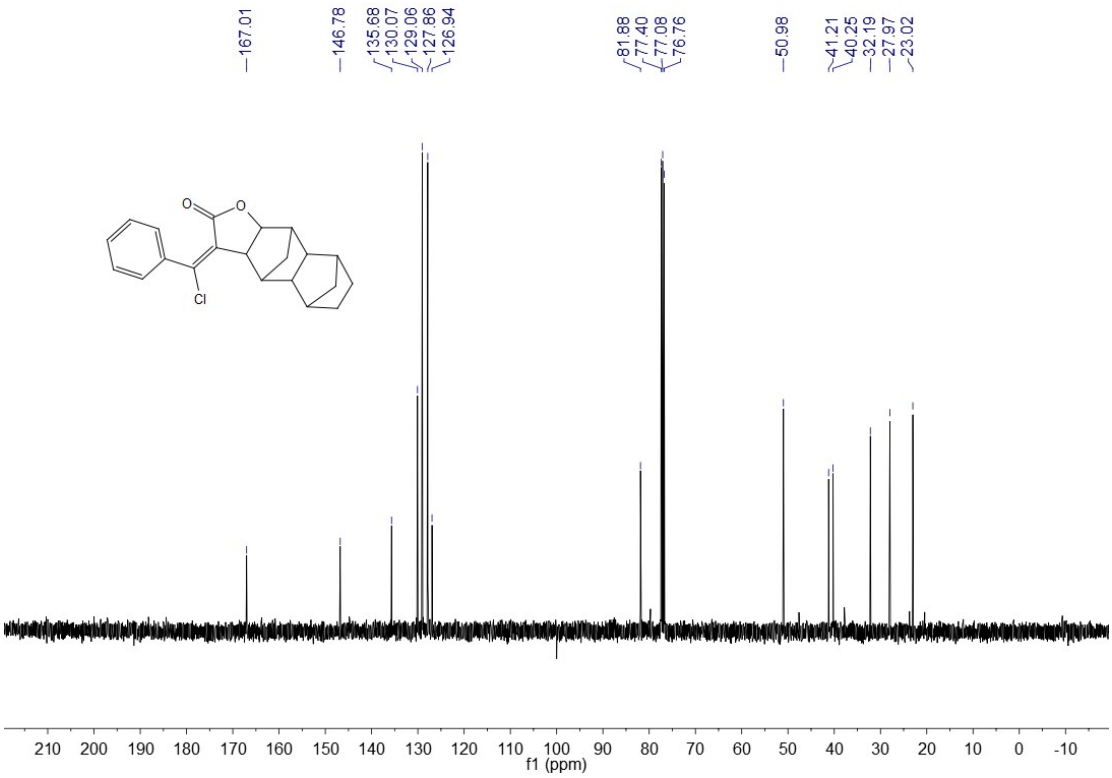


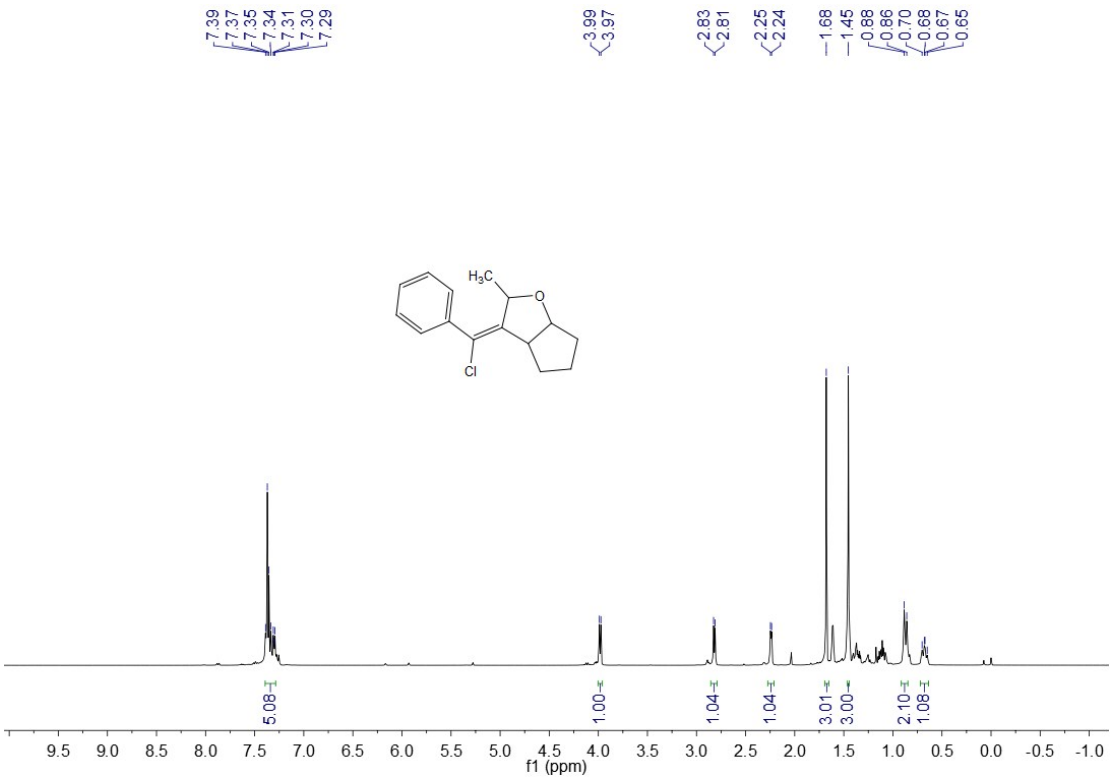
^{1}H NMR of Compound **3y**



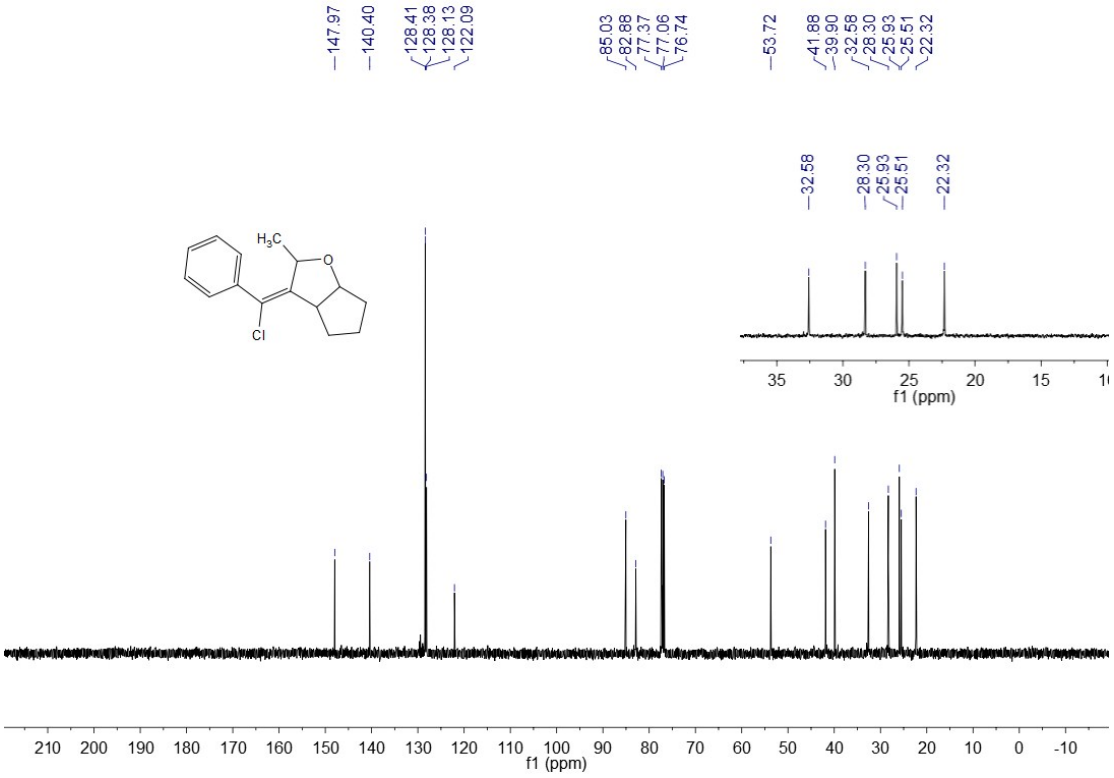
^{13}C NMR of Compound **3y**



^{1}H NMR of Compound **5a**



^{13}C NMR of Compound **5a**



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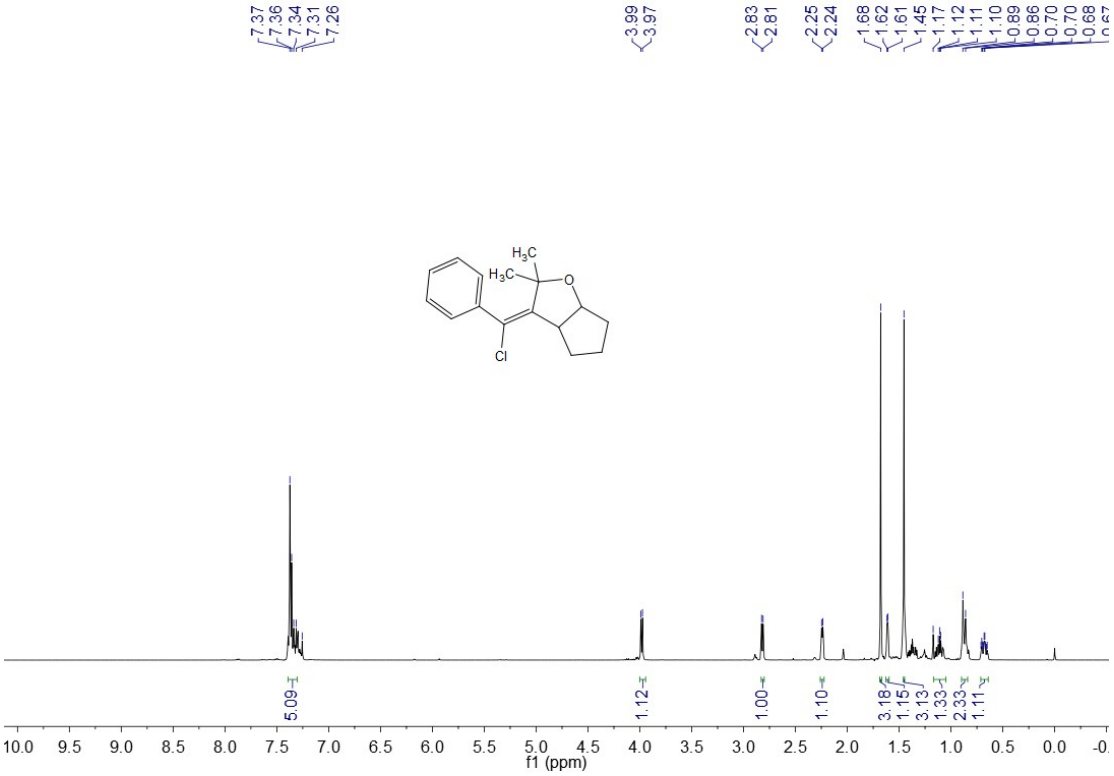
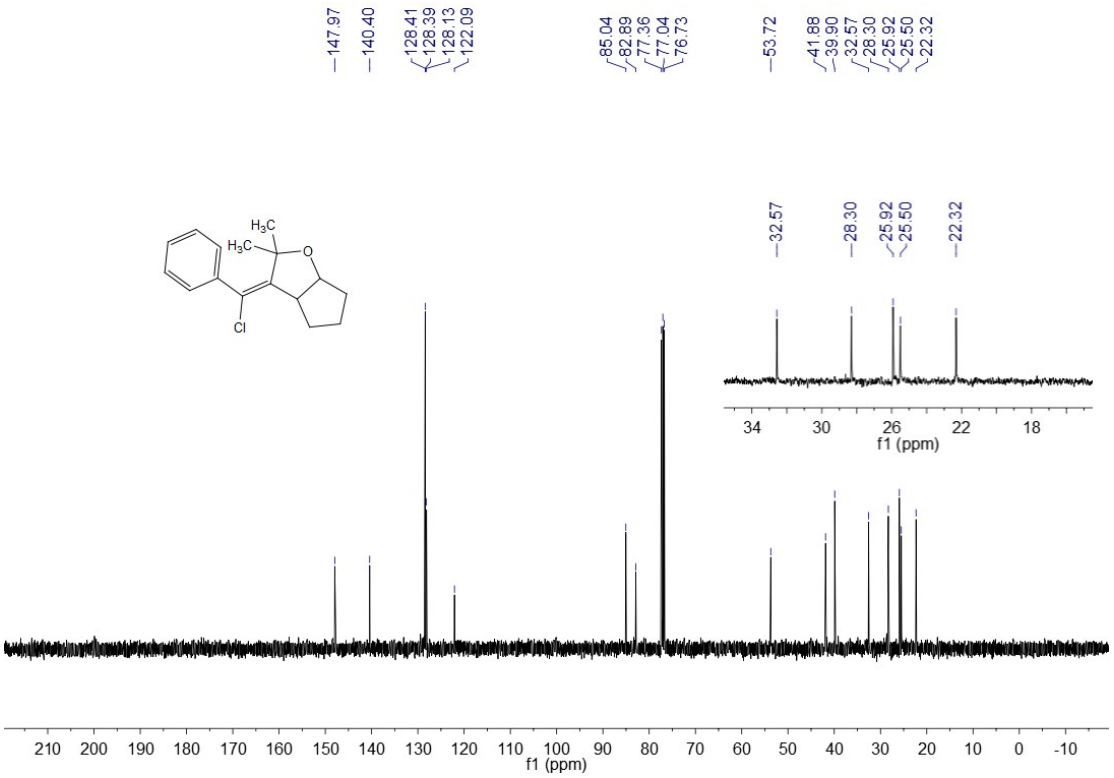


^{13}C NMR of Compound **5b**



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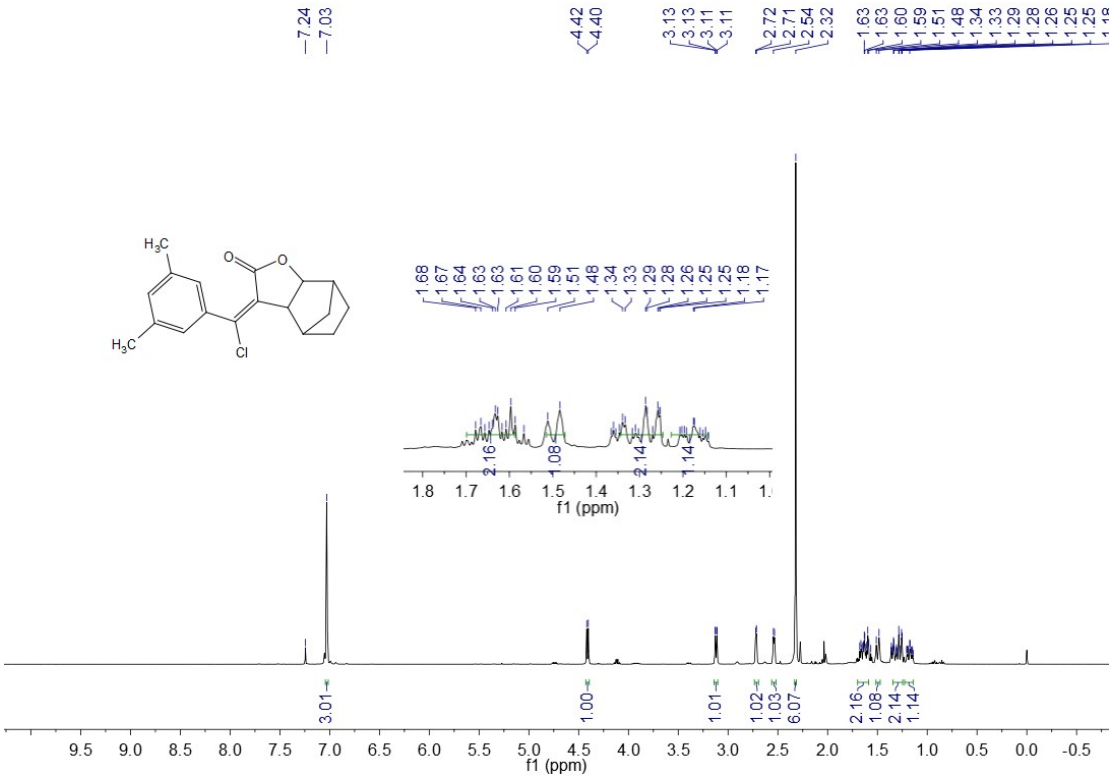
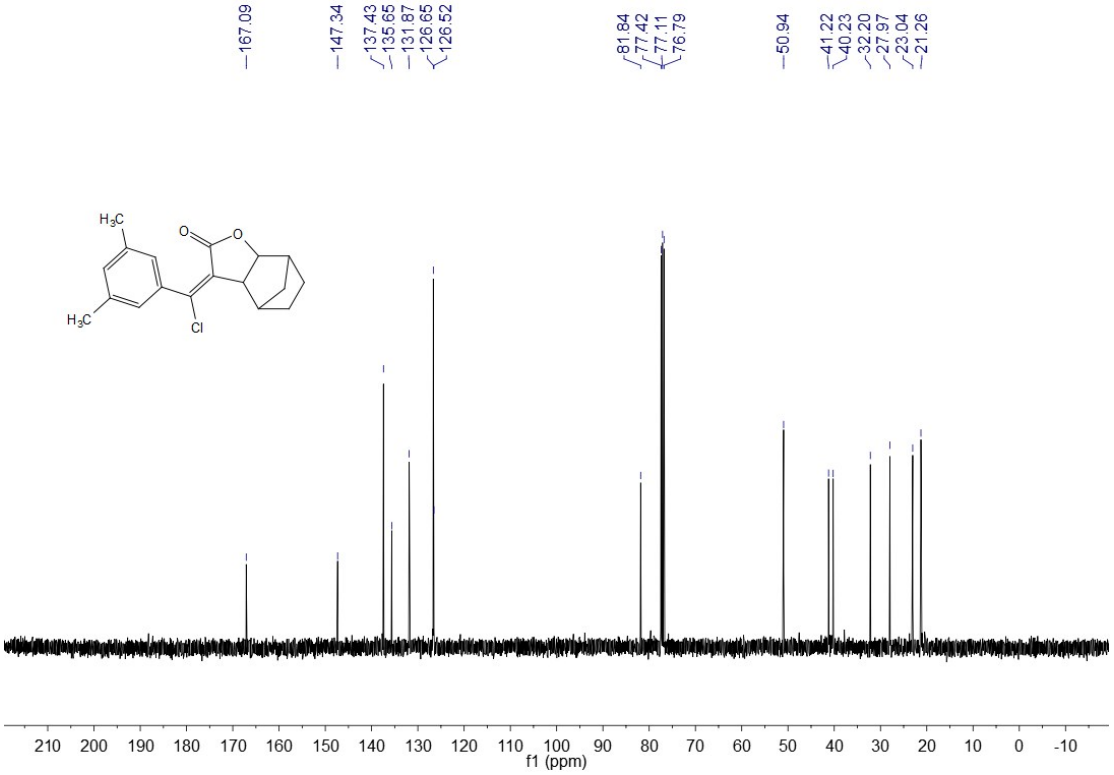


^{13}C NMR of Compound **7a**



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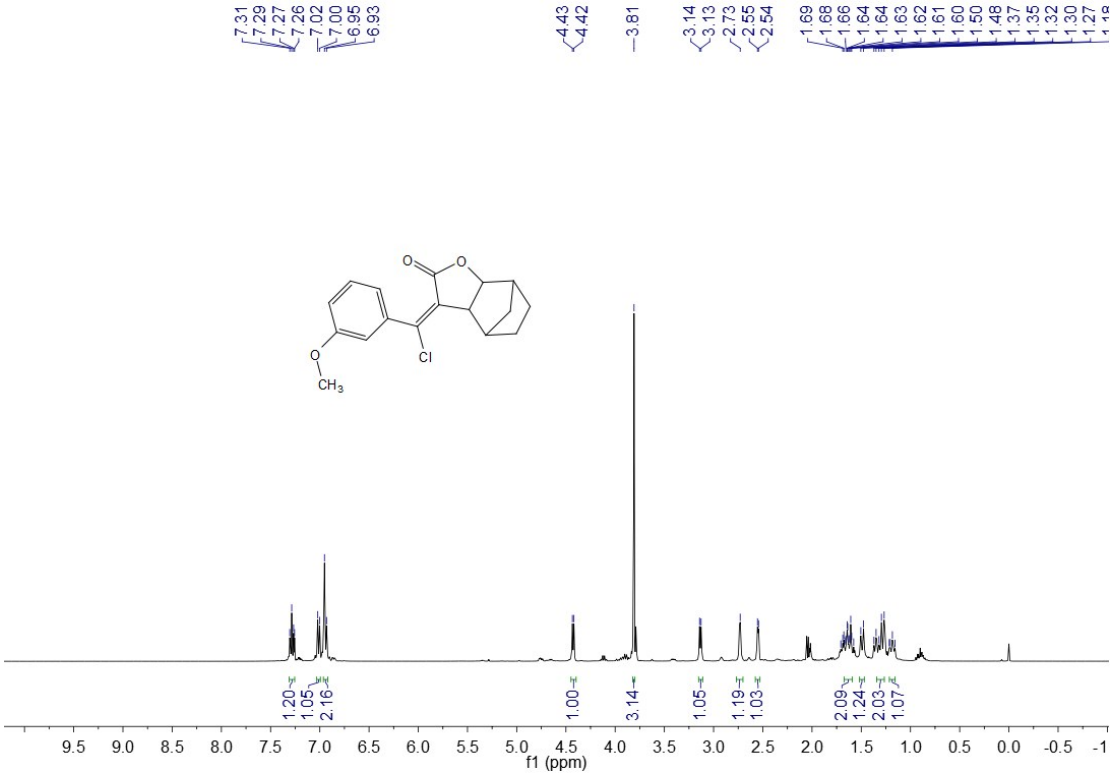

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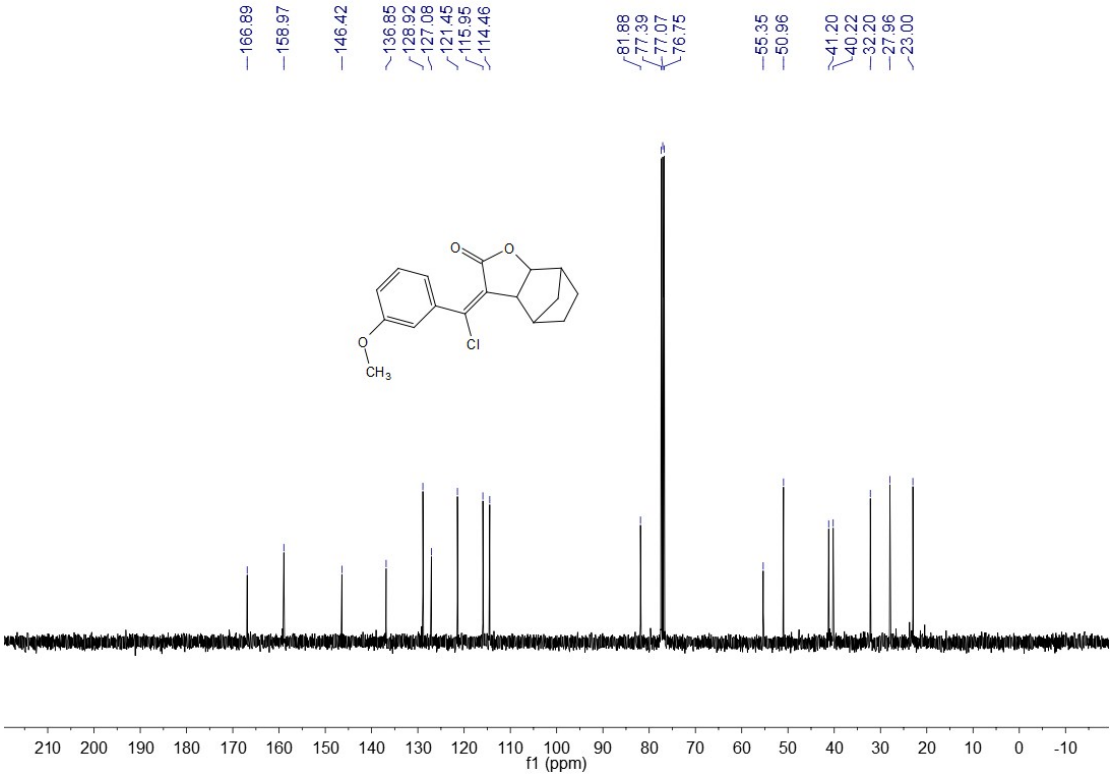

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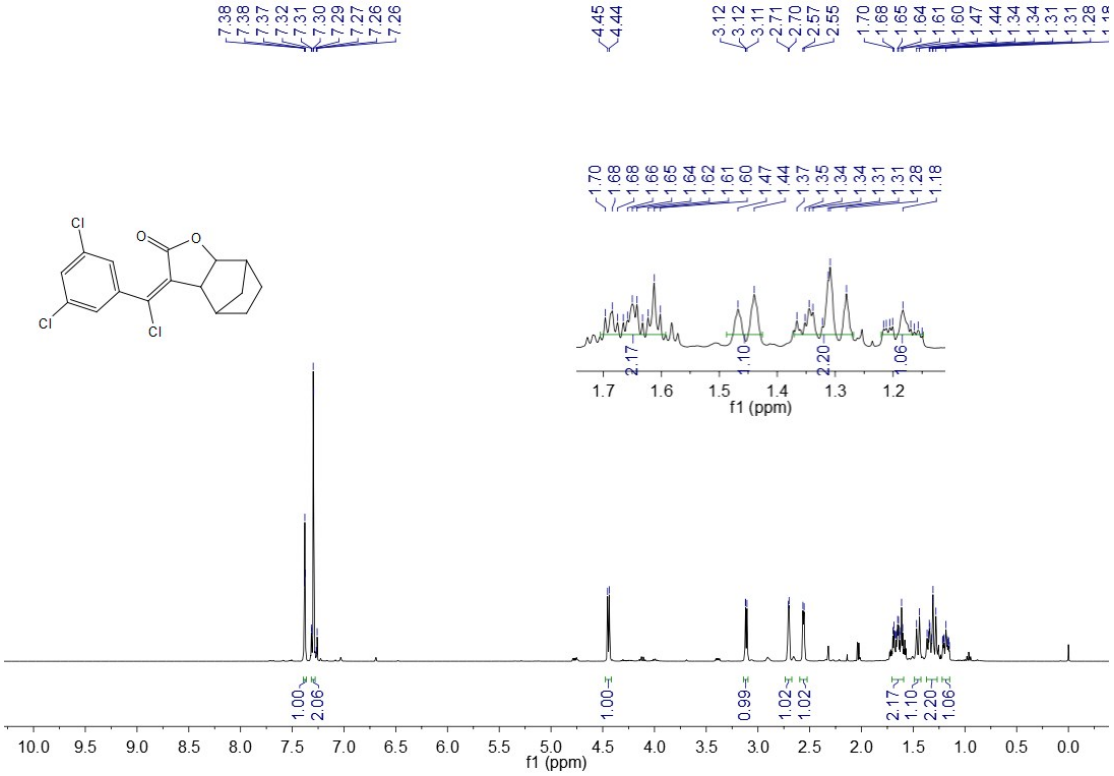

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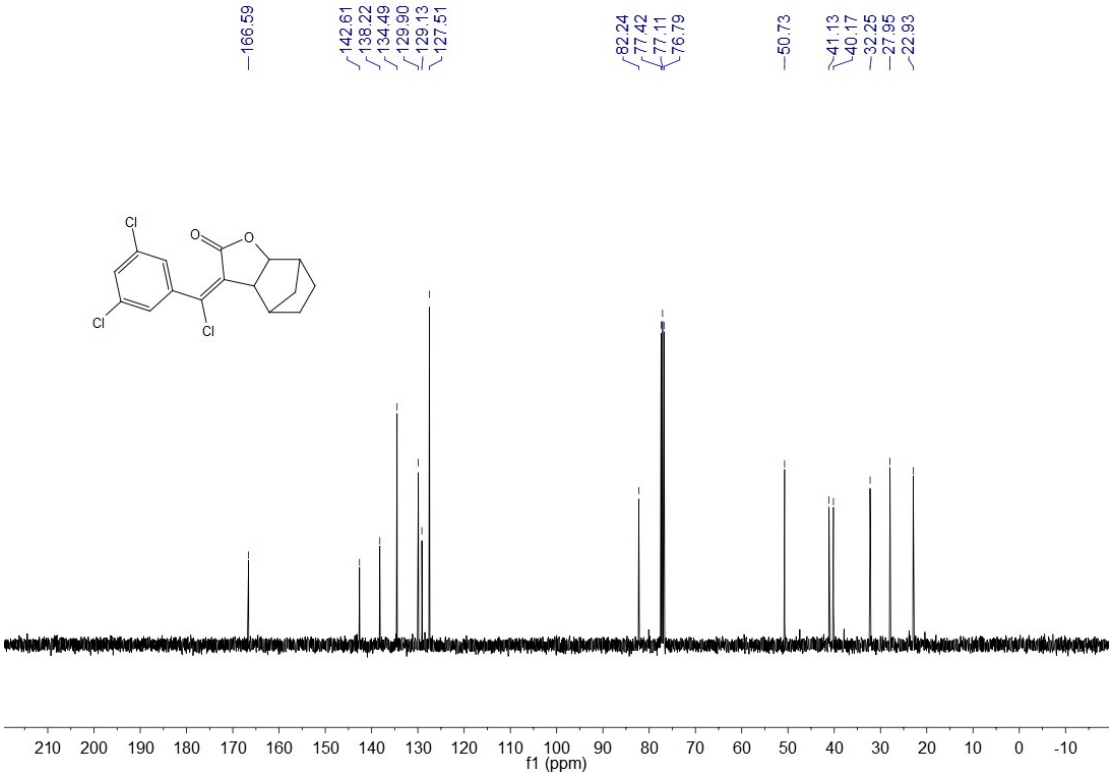

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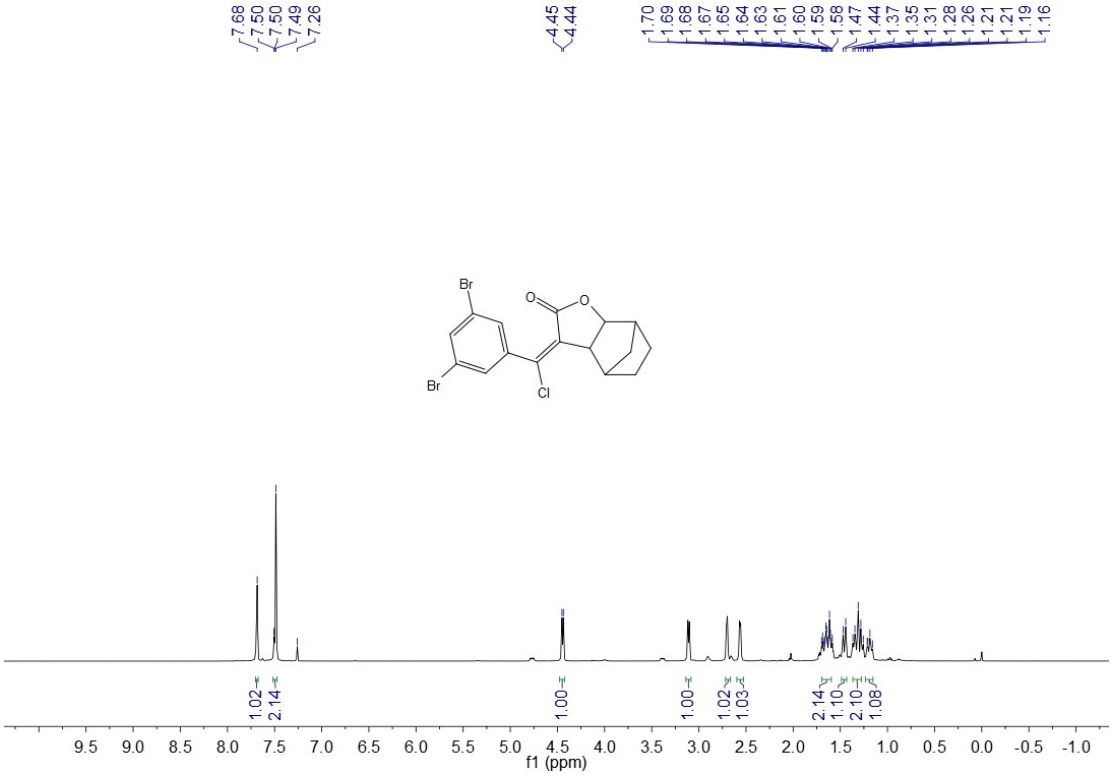

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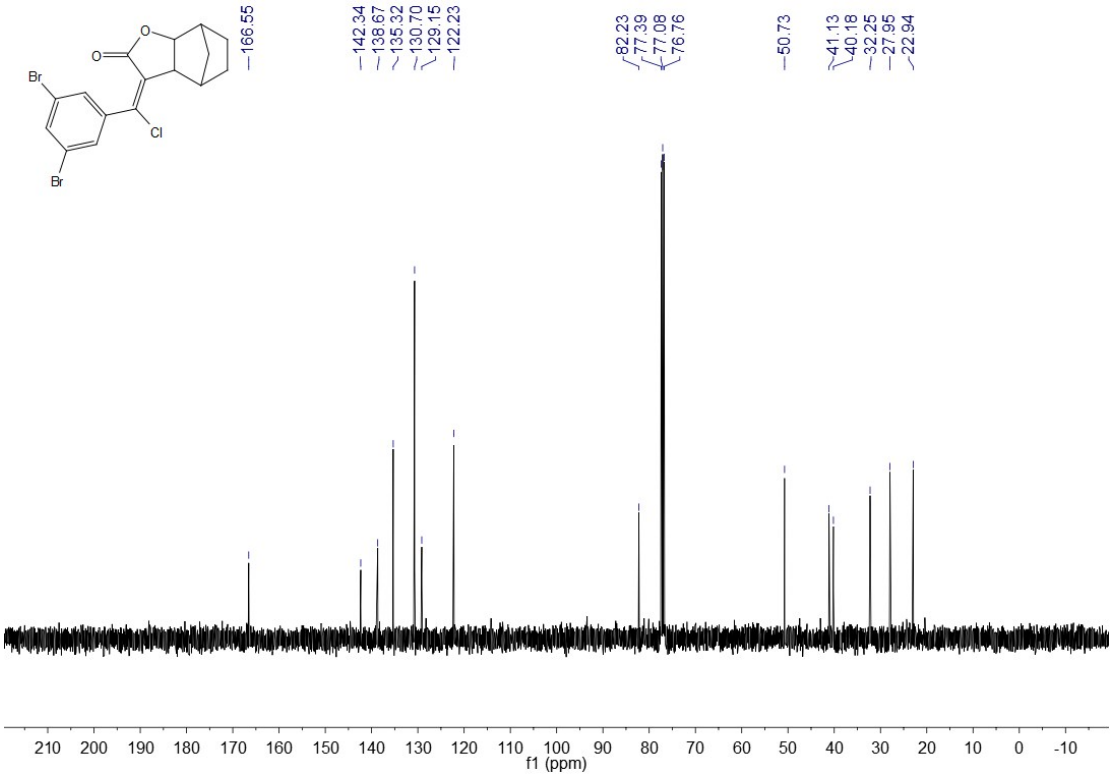
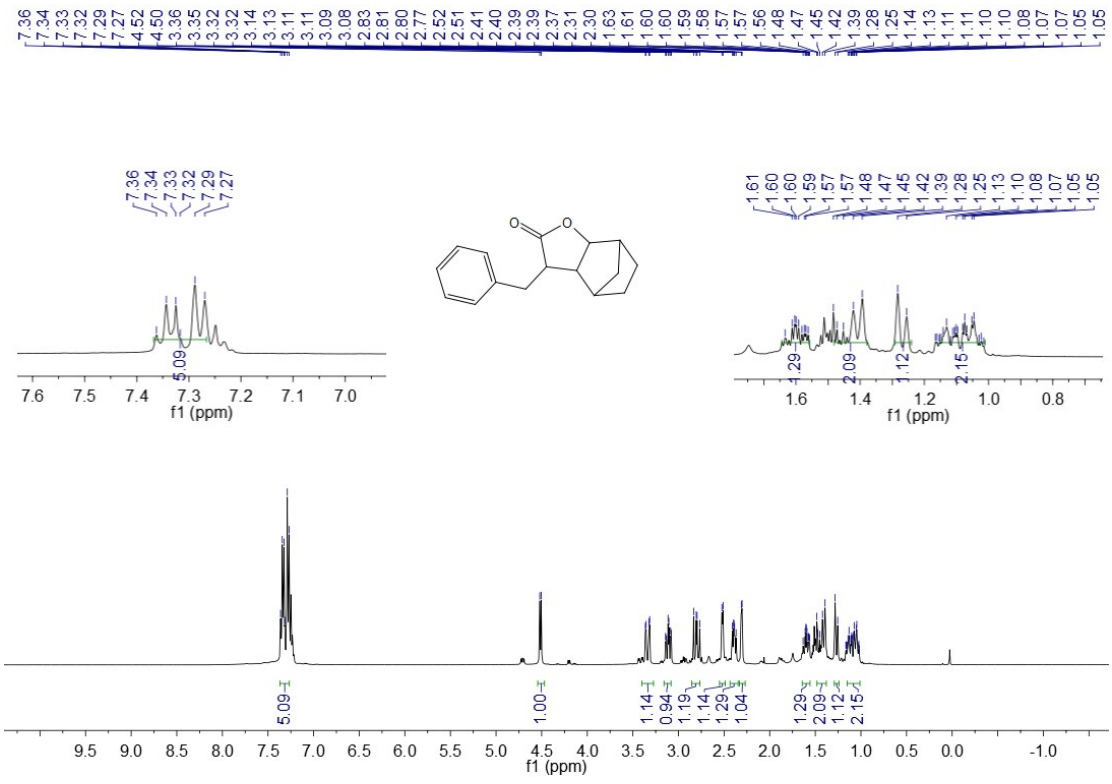


^{1}H NMR of Compound **8**



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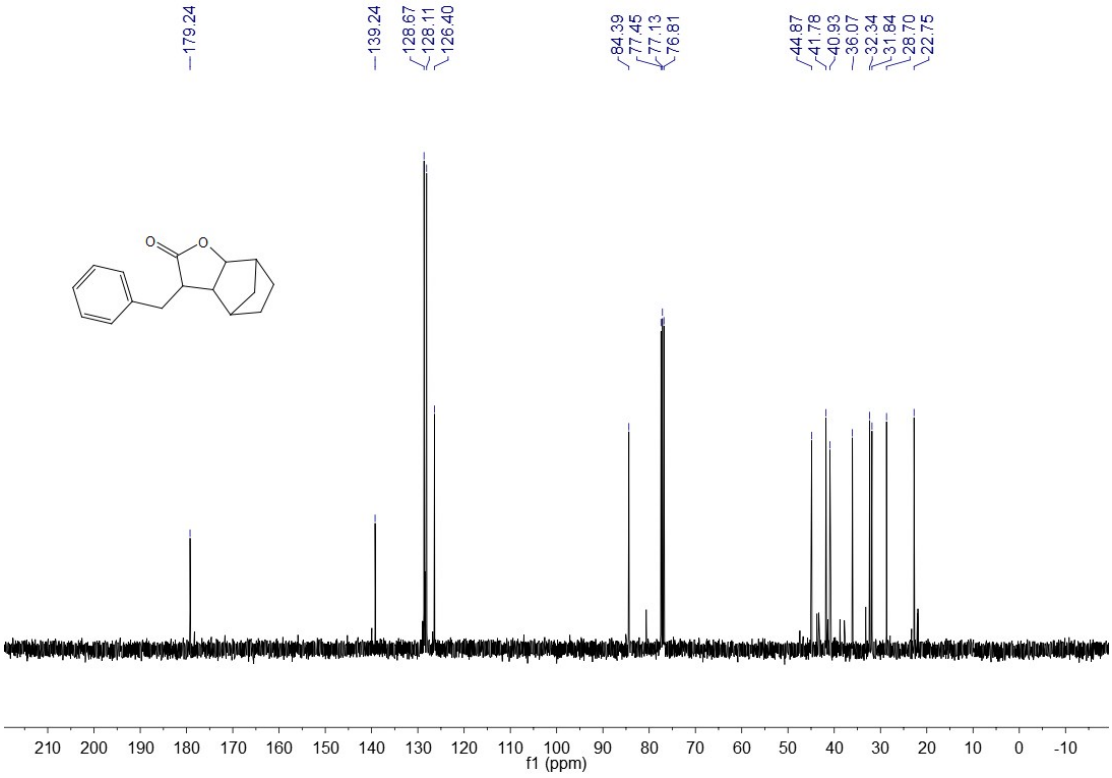
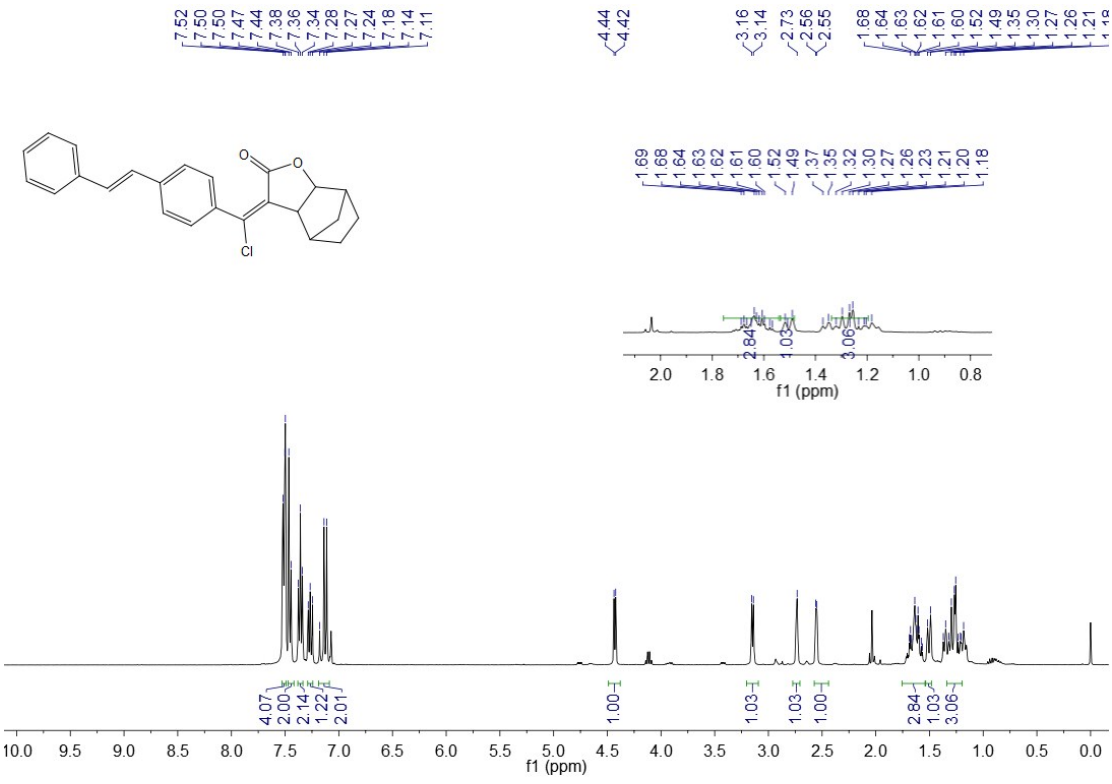


^{1}H NMR of Compound **9**



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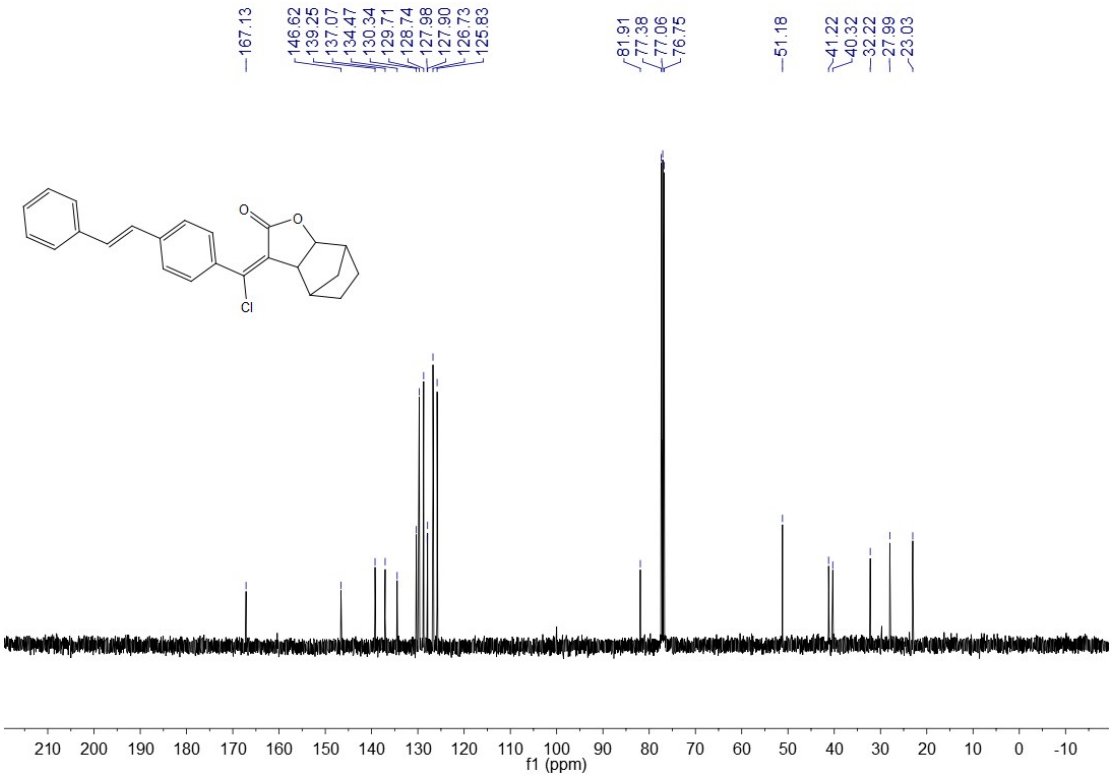
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76.75
51.18
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O
O
Cl
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f1 (ppm)