Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Base Catalysed Domino and Self-domino Michael-Aldol Reactions: One-pot Synthesis of Dispirocyclopentaneoxindoles Containing Multiple Chiral Stereocenters

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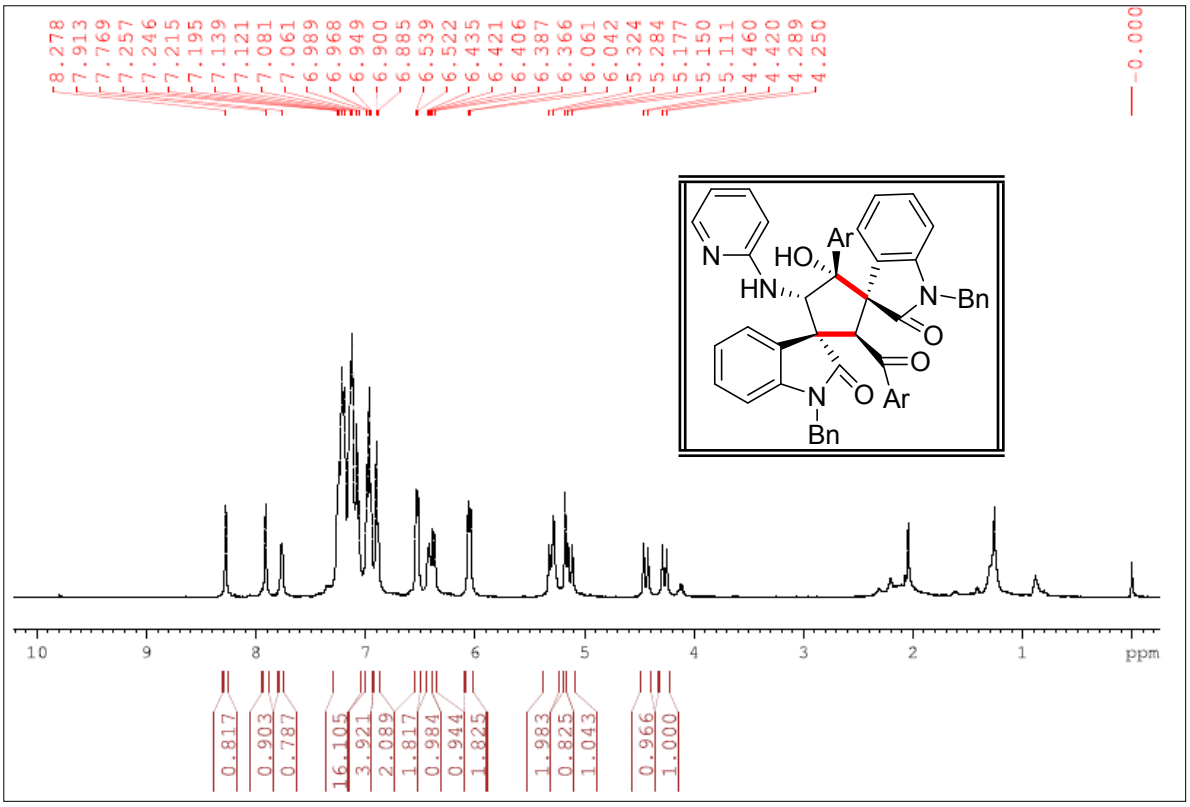


Figure 1. ^{1}H NMR Spectrum of **3a**

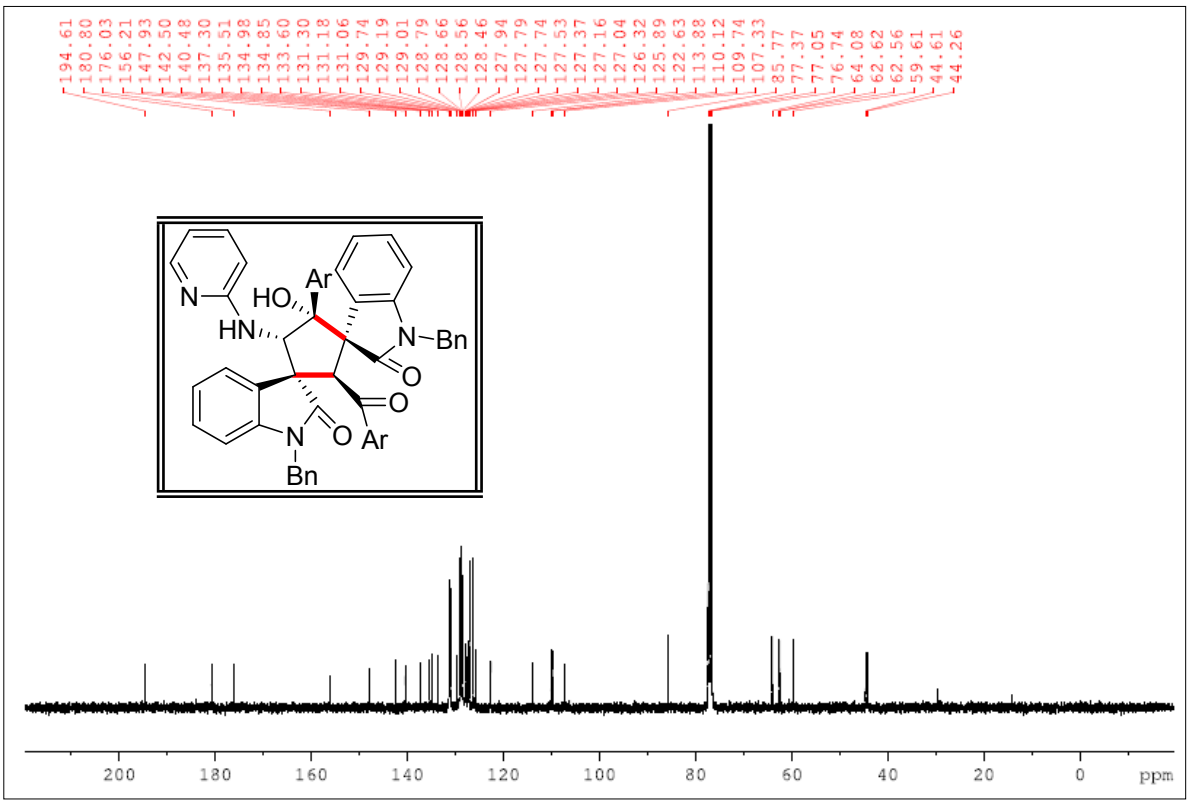
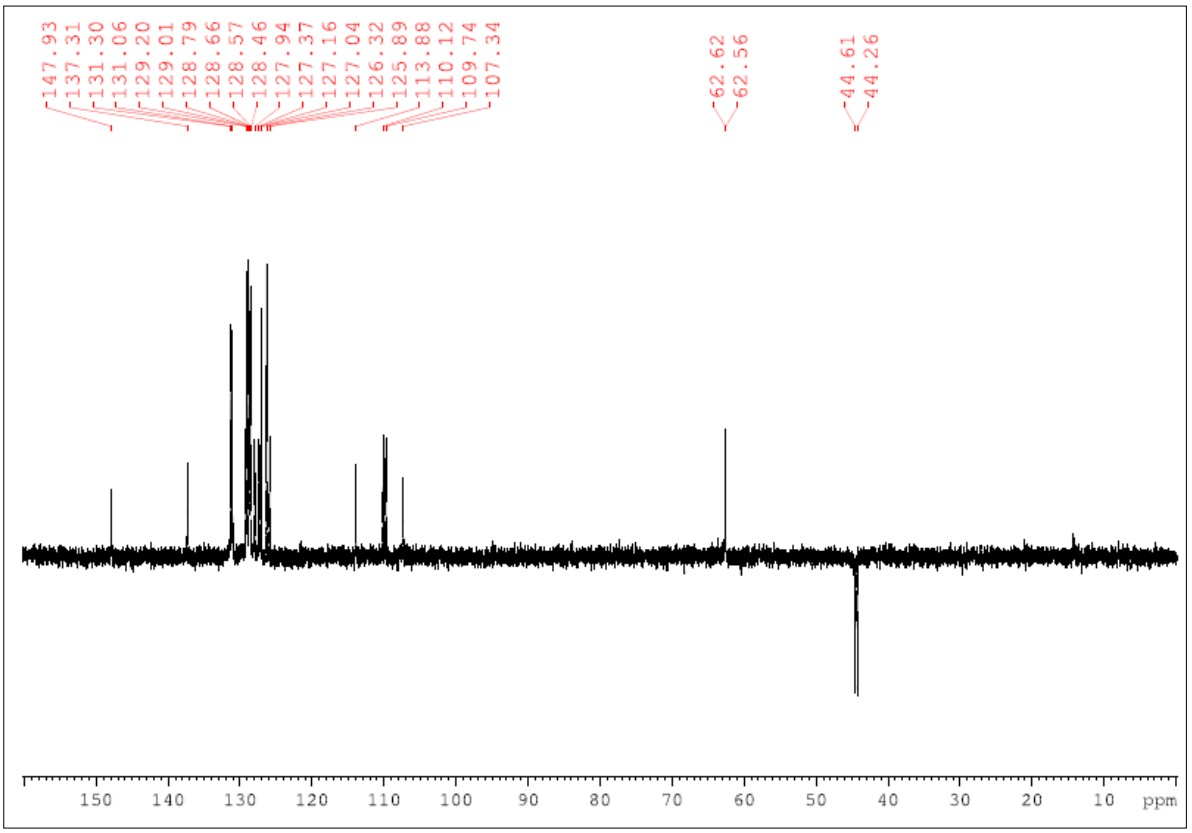


Figure 2. ^{13}C NMR Spectrum of **3a**



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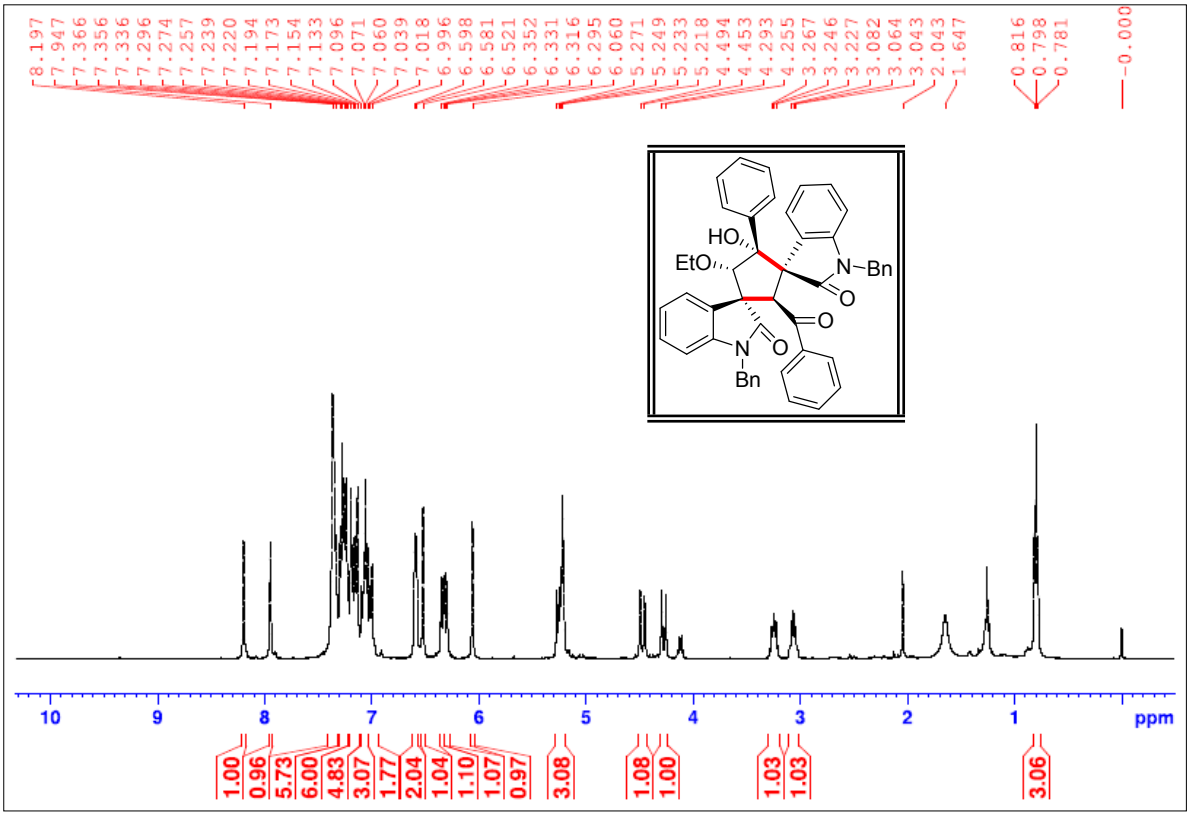
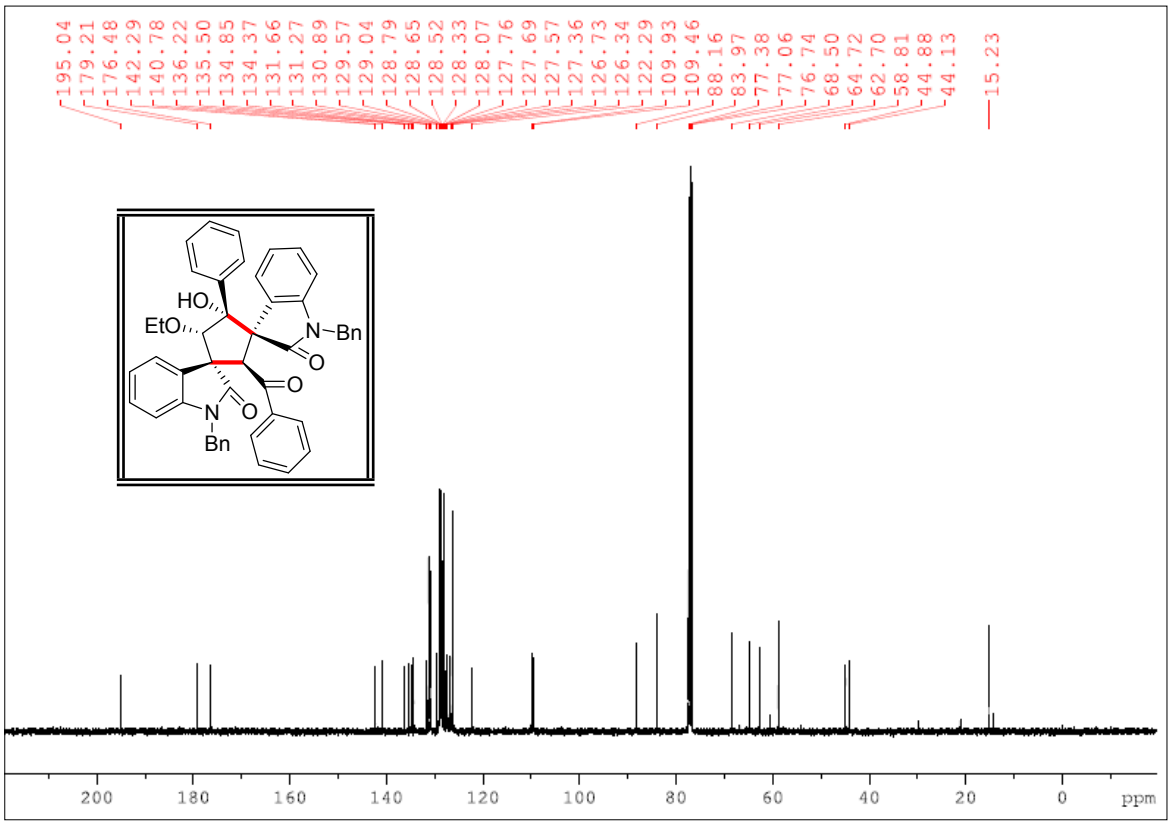


Figure 4. ^{1}H NMR Spectrum of **4a**



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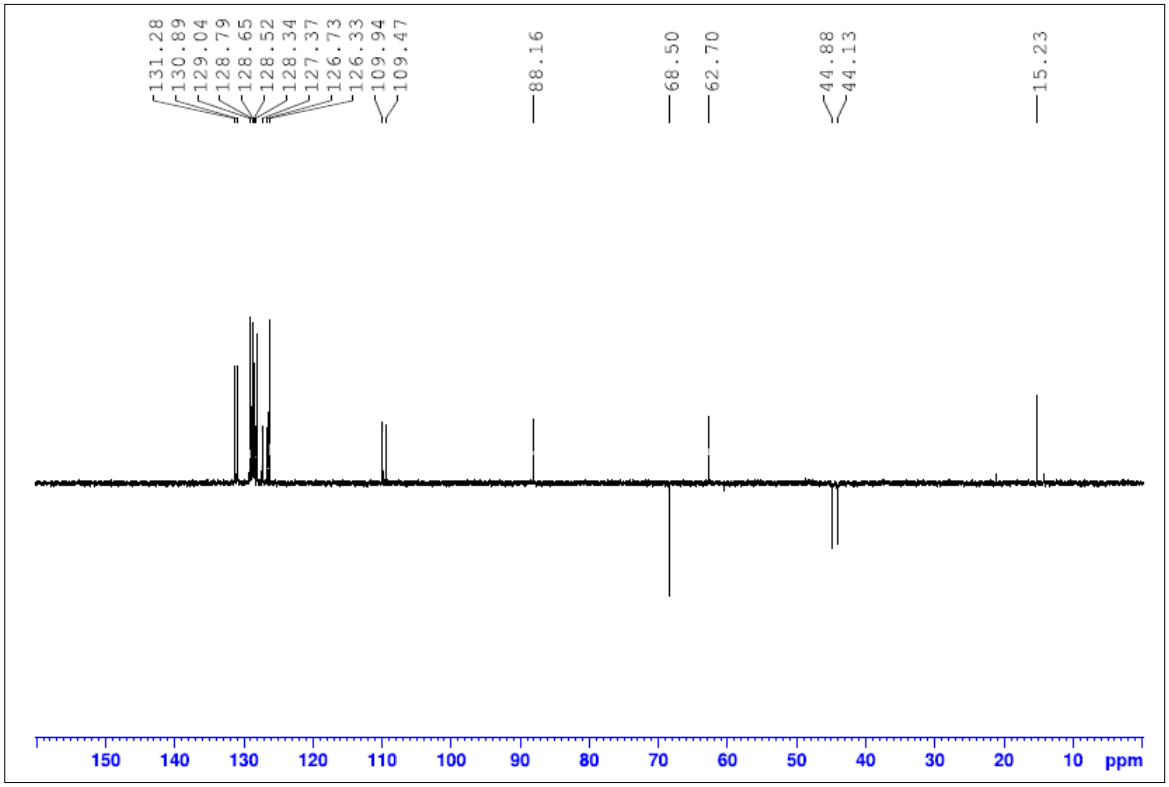

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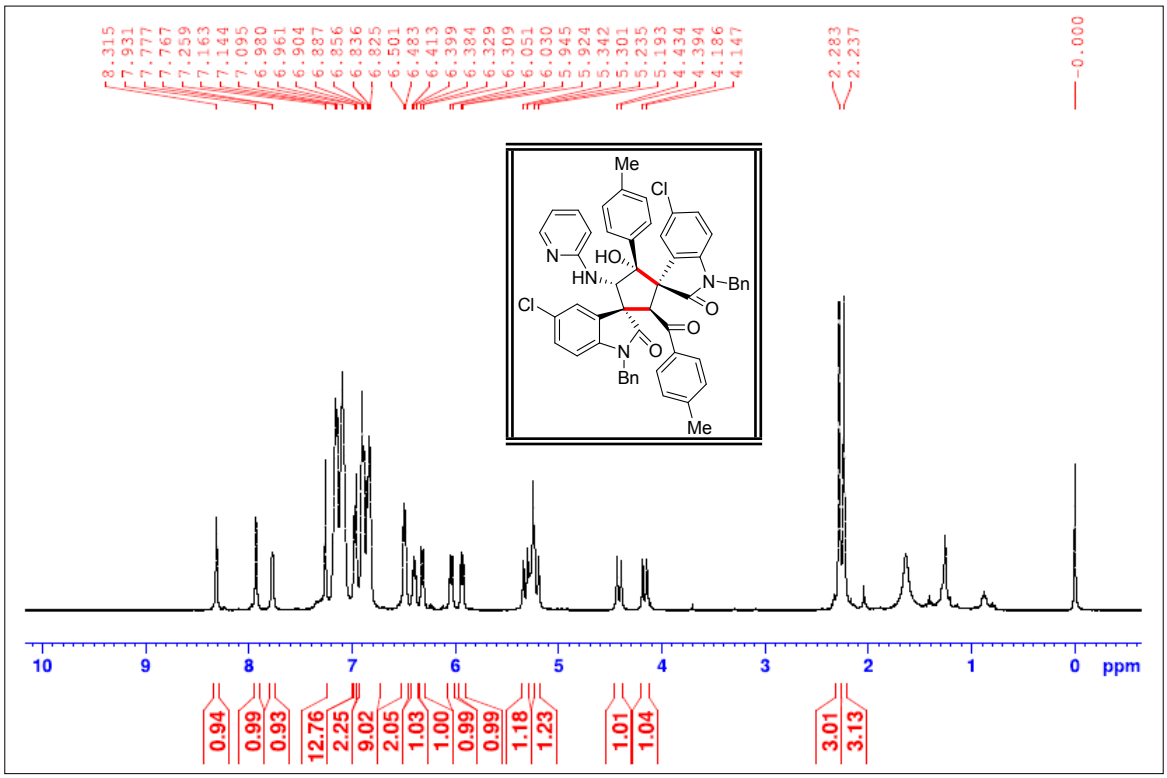

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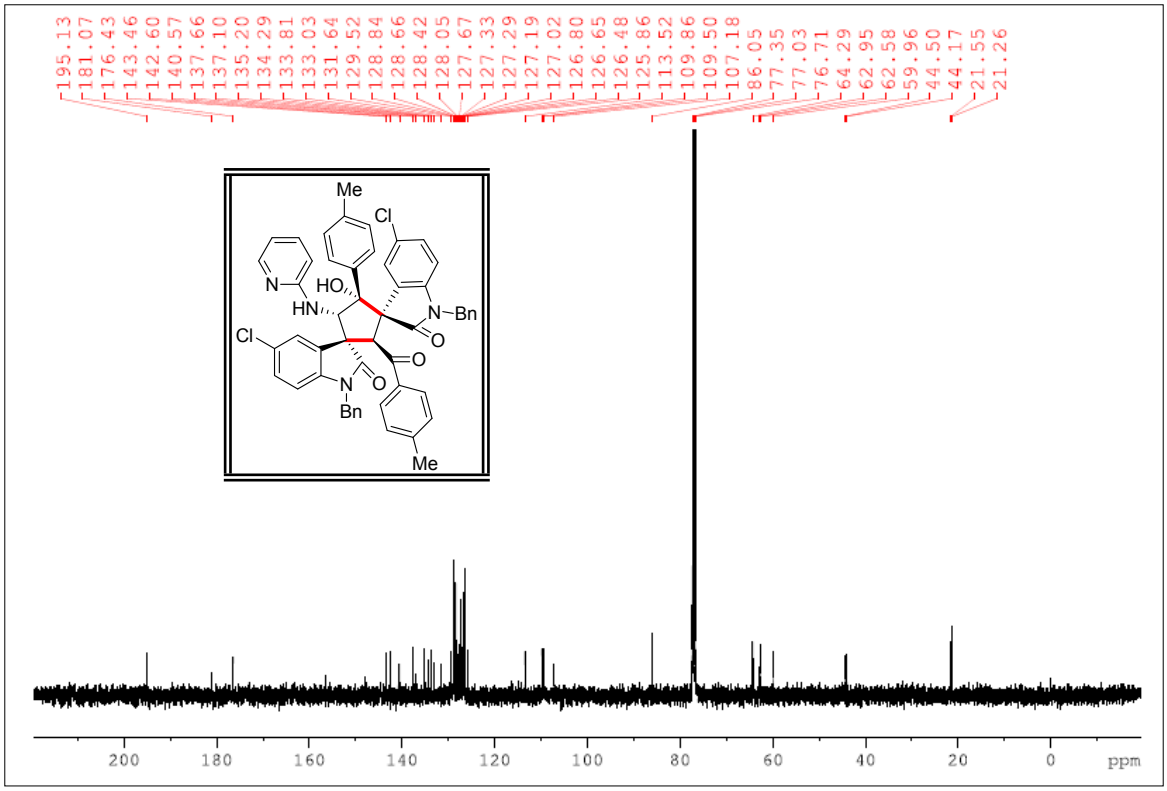

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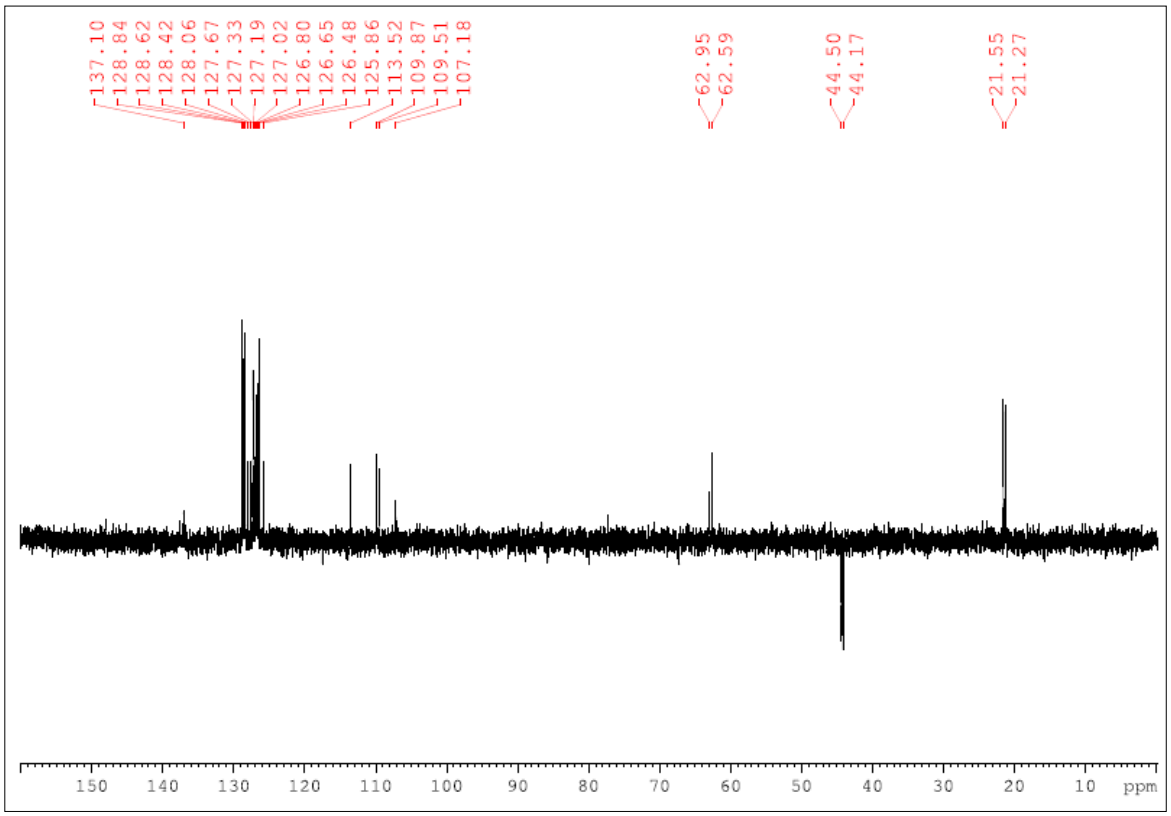

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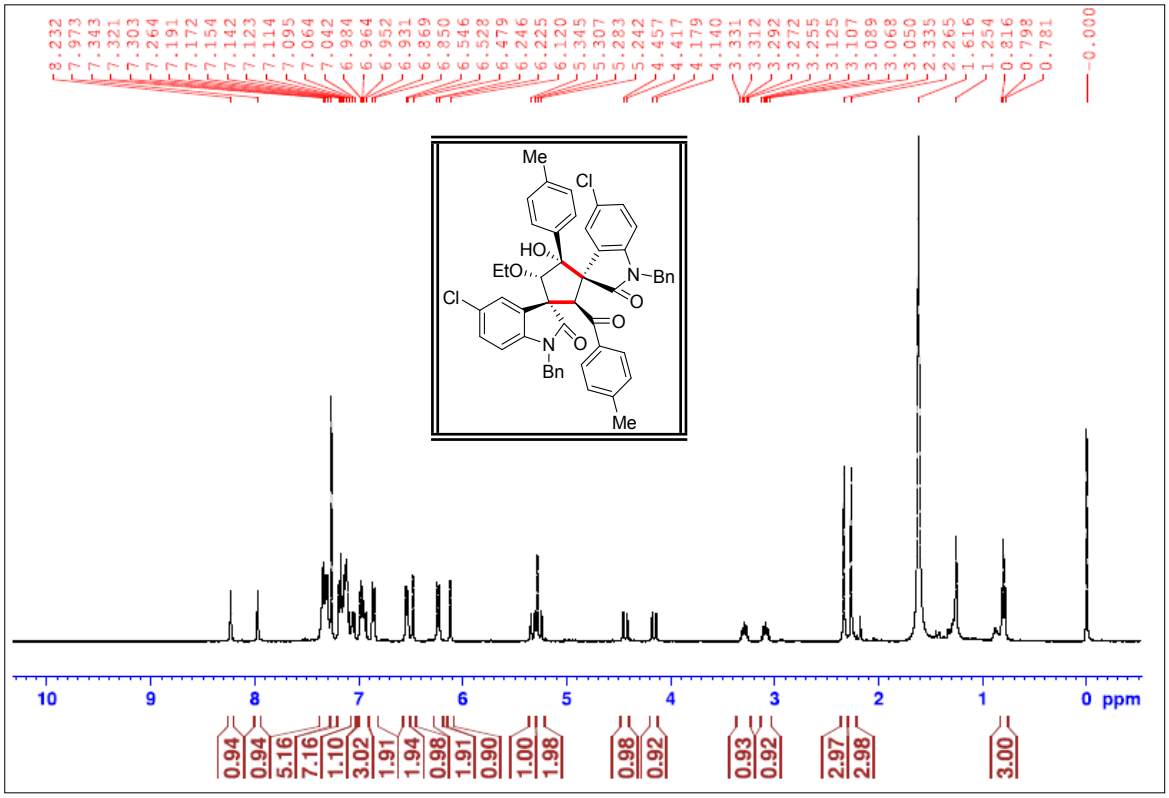

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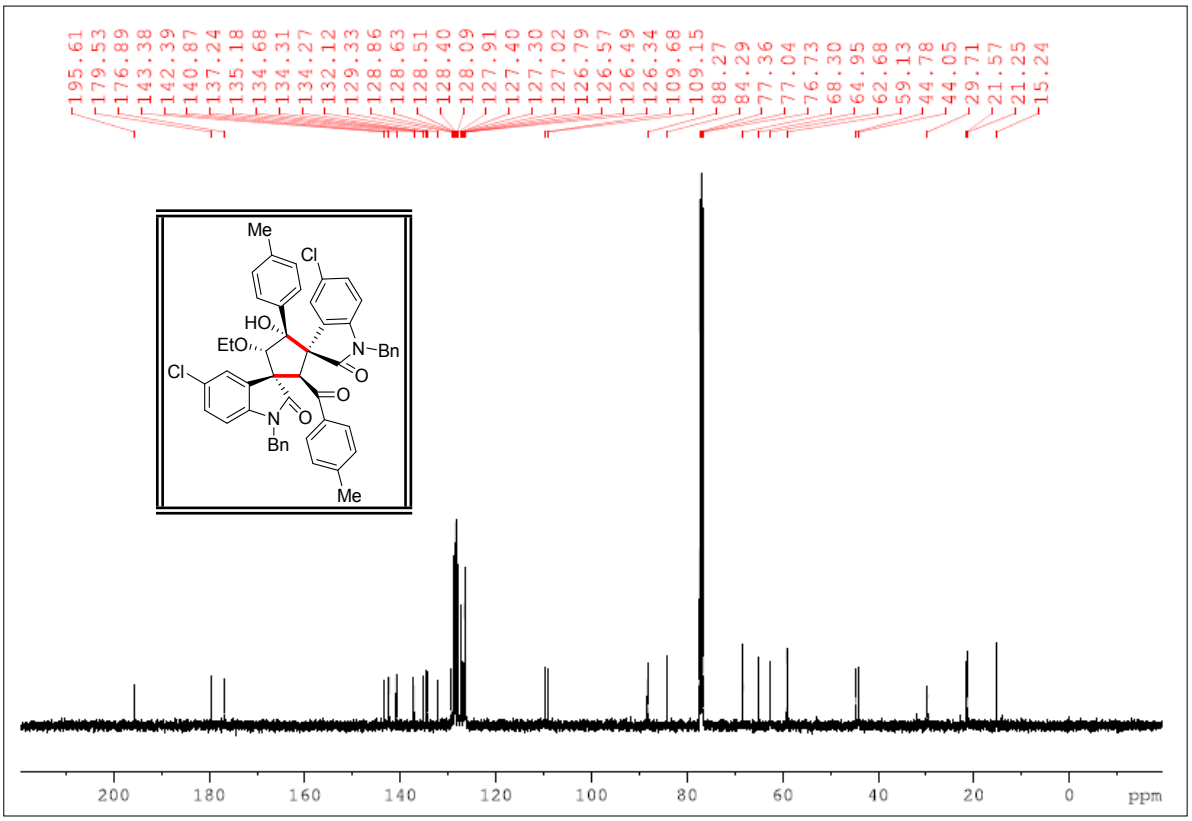

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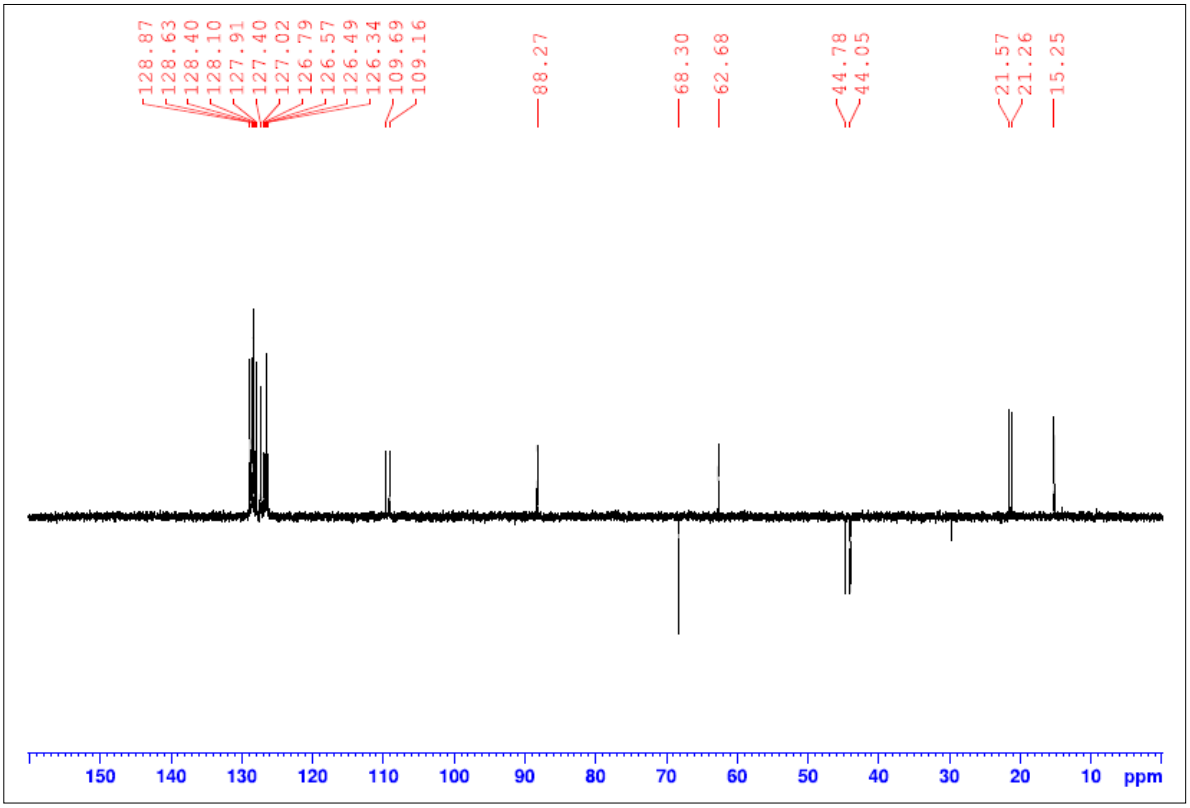

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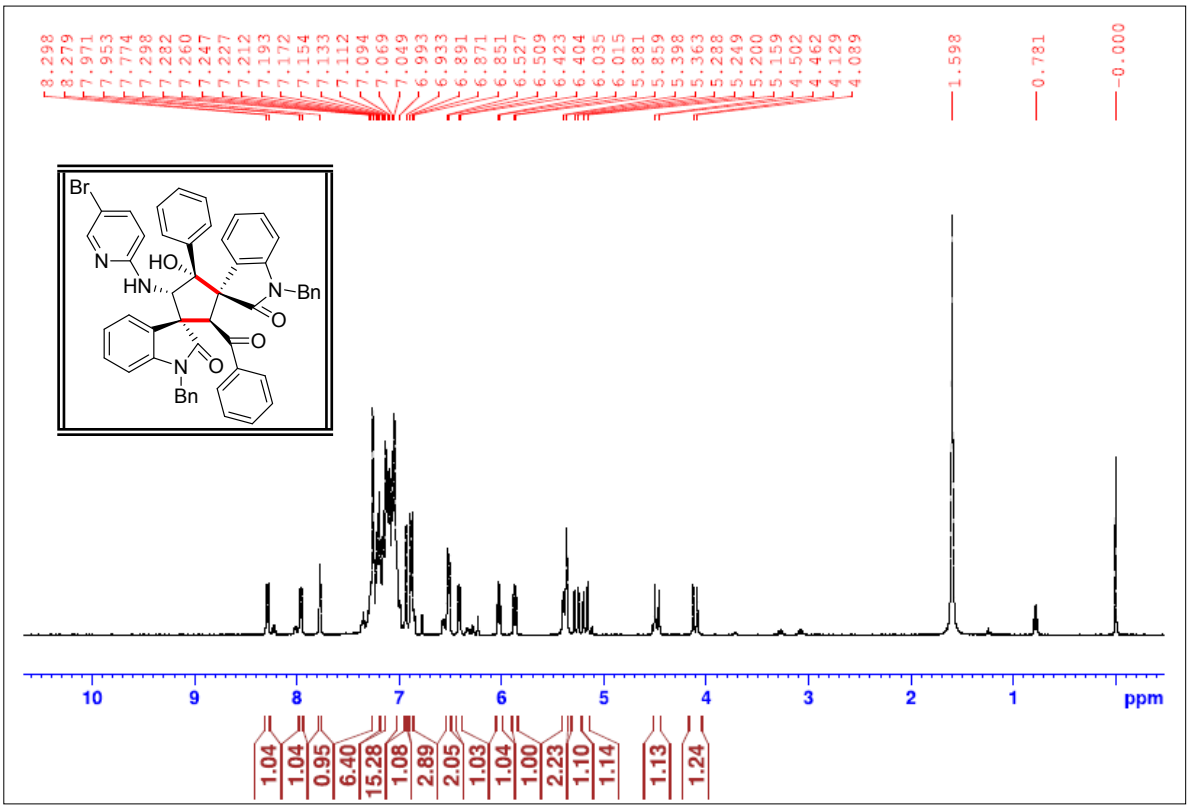

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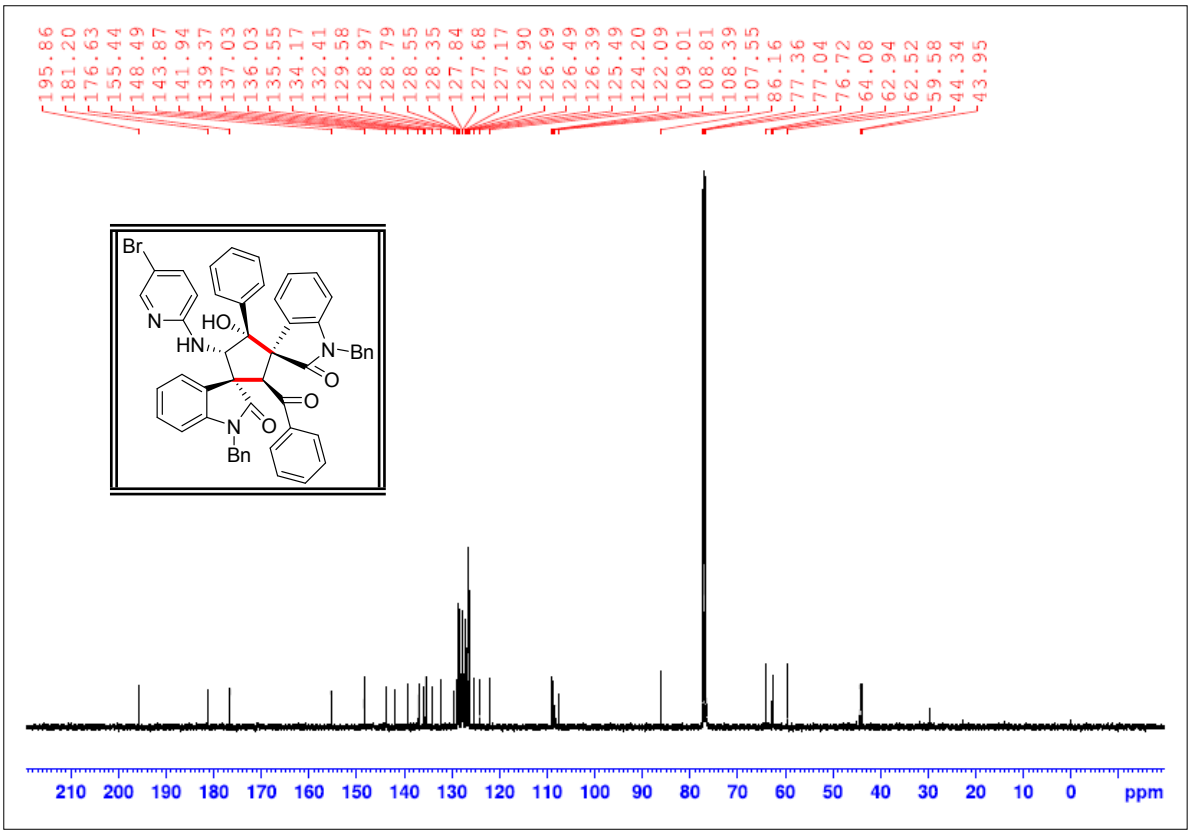

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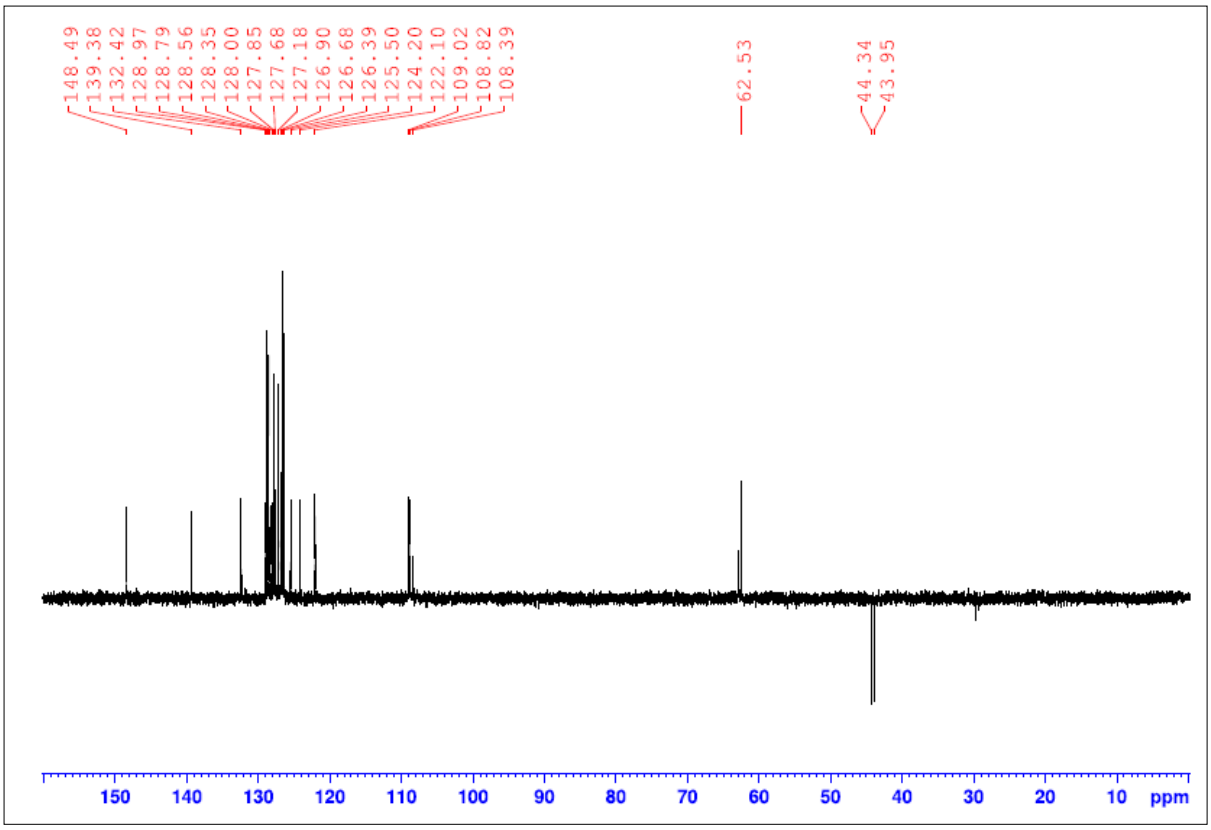

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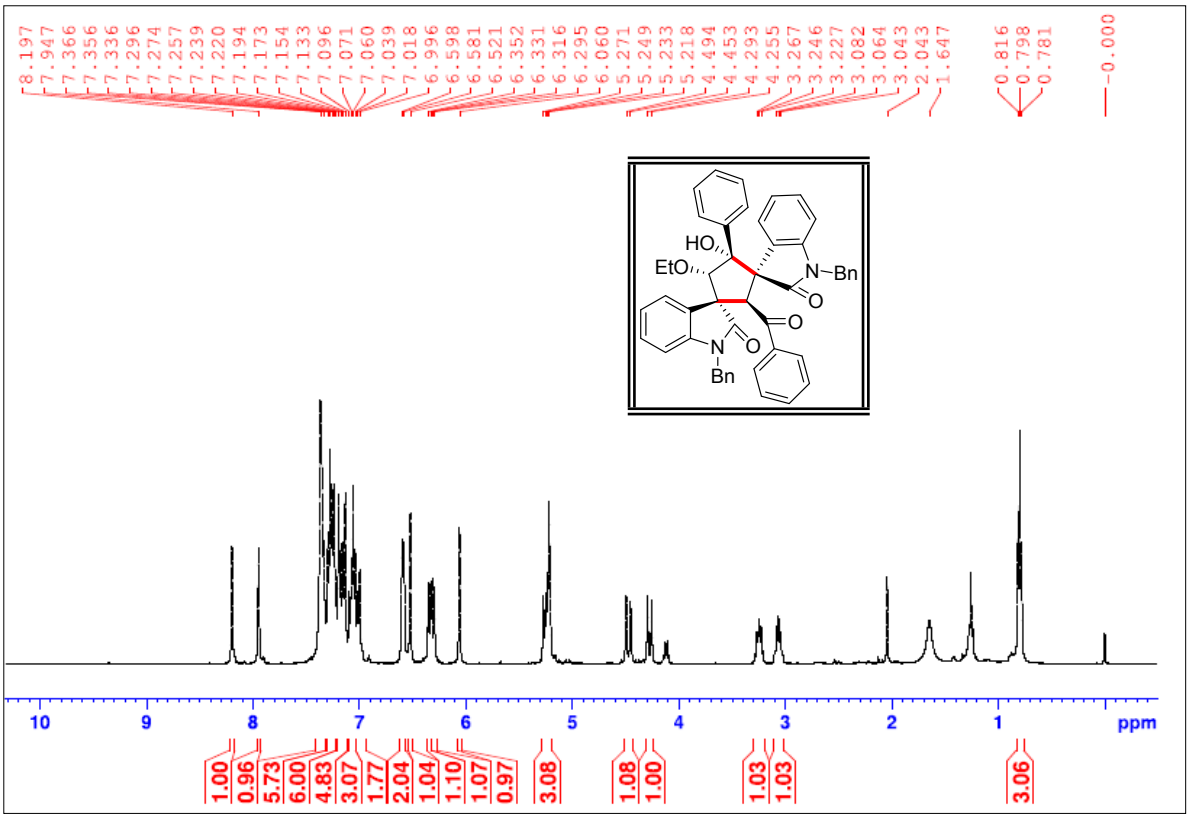

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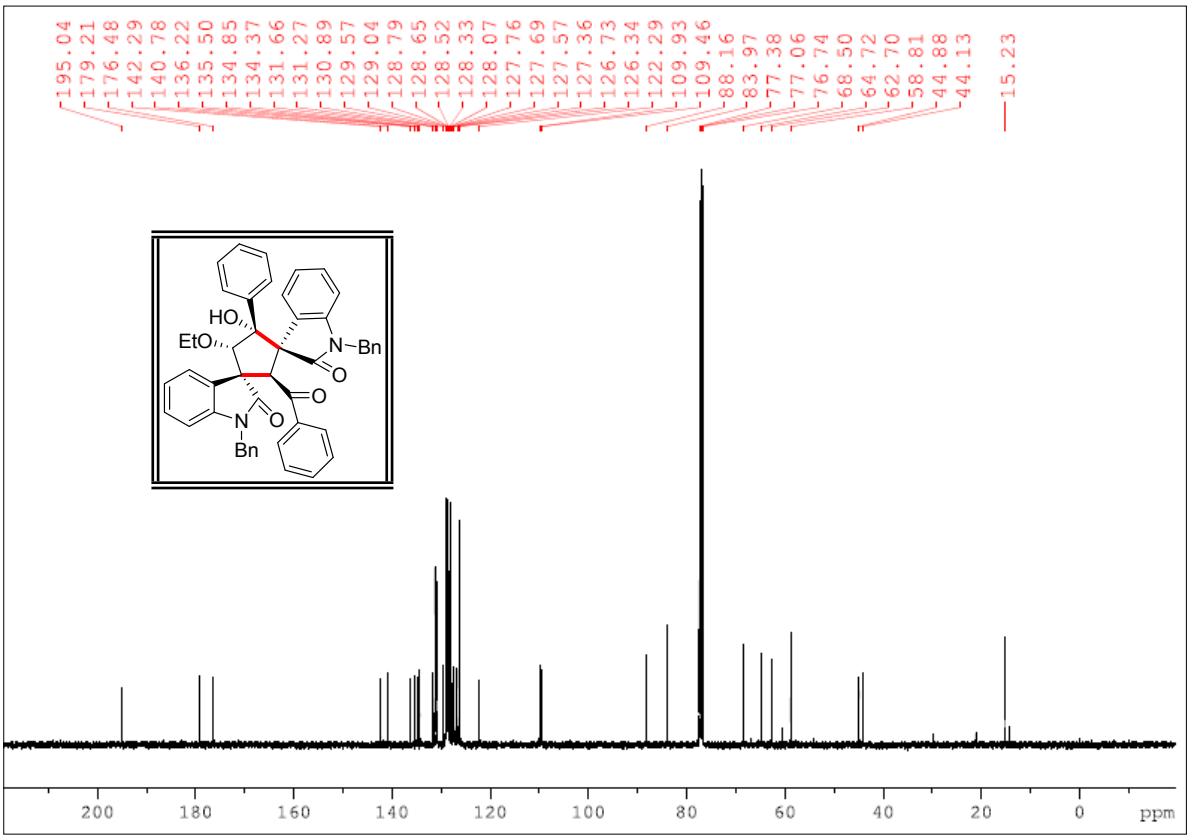

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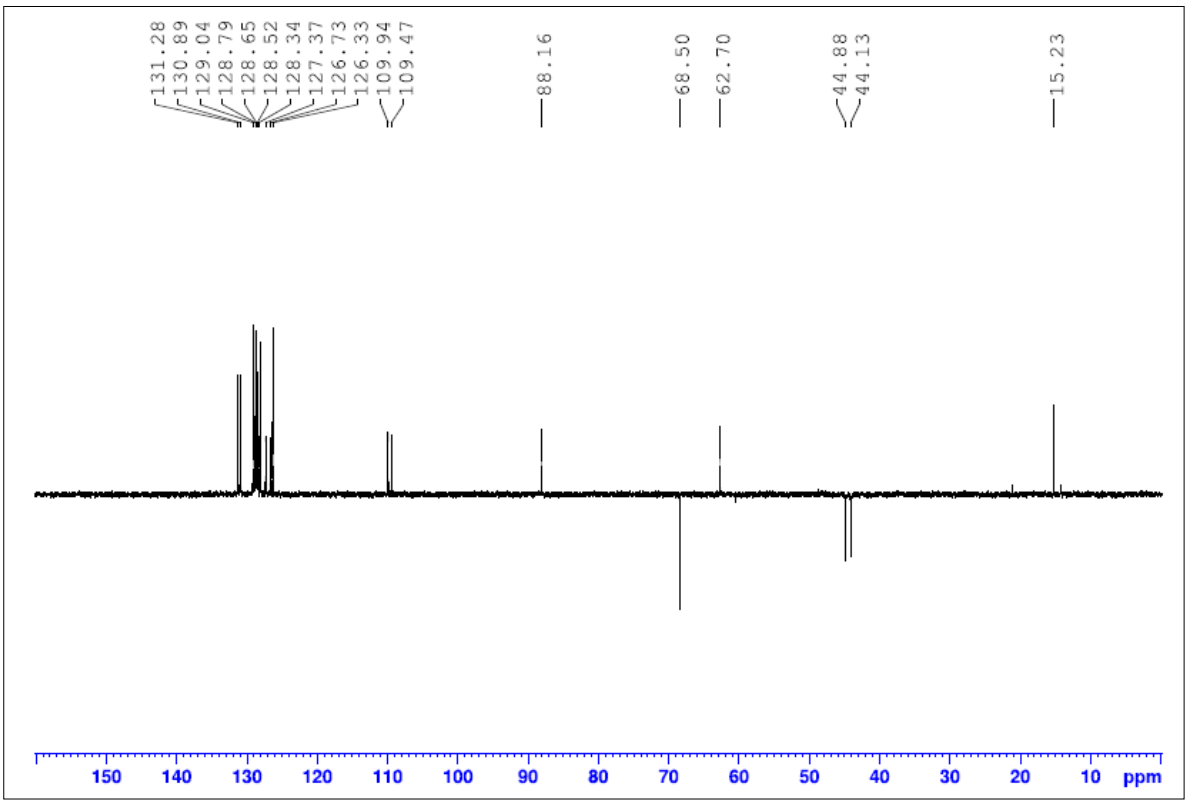

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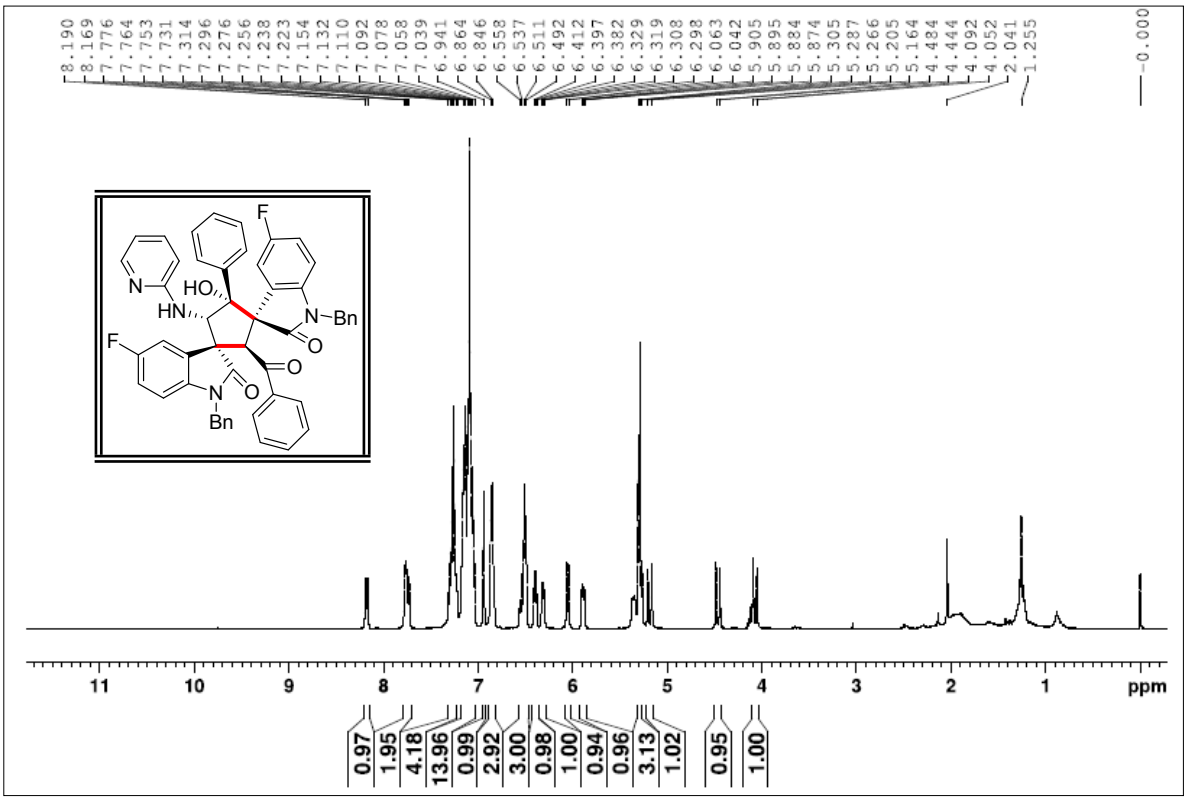

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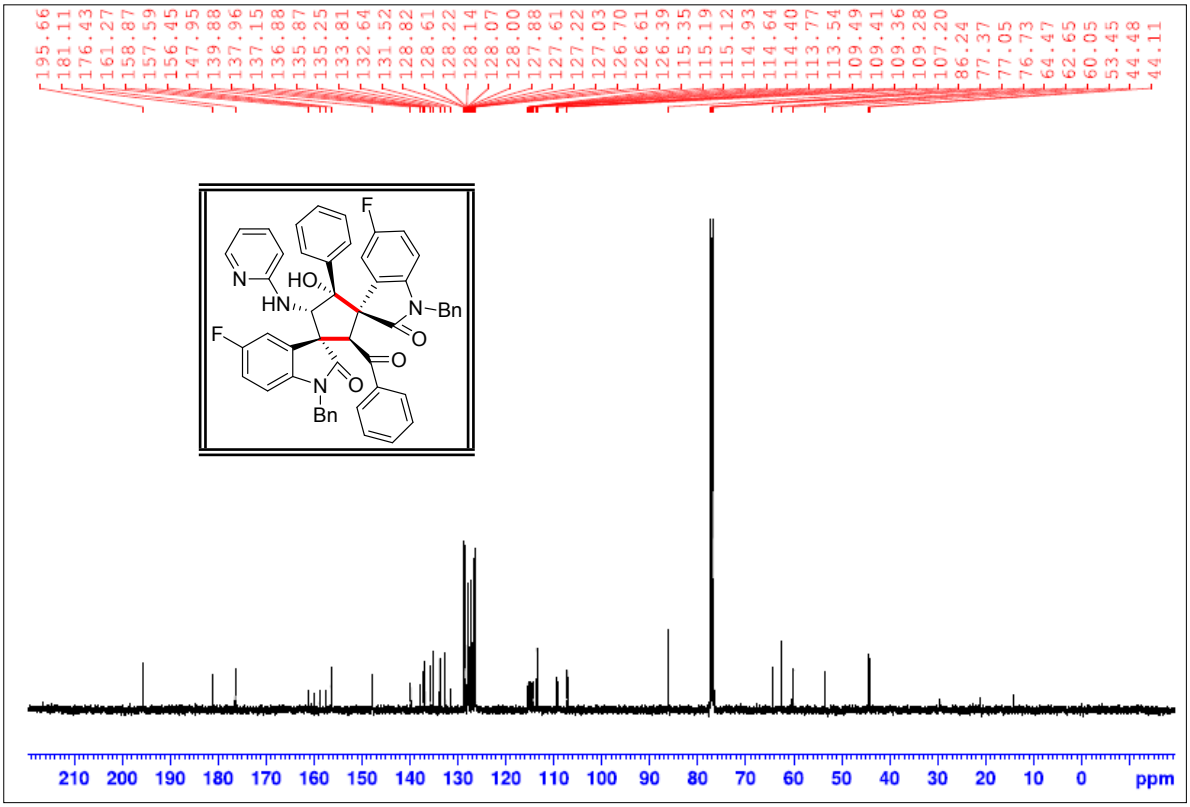

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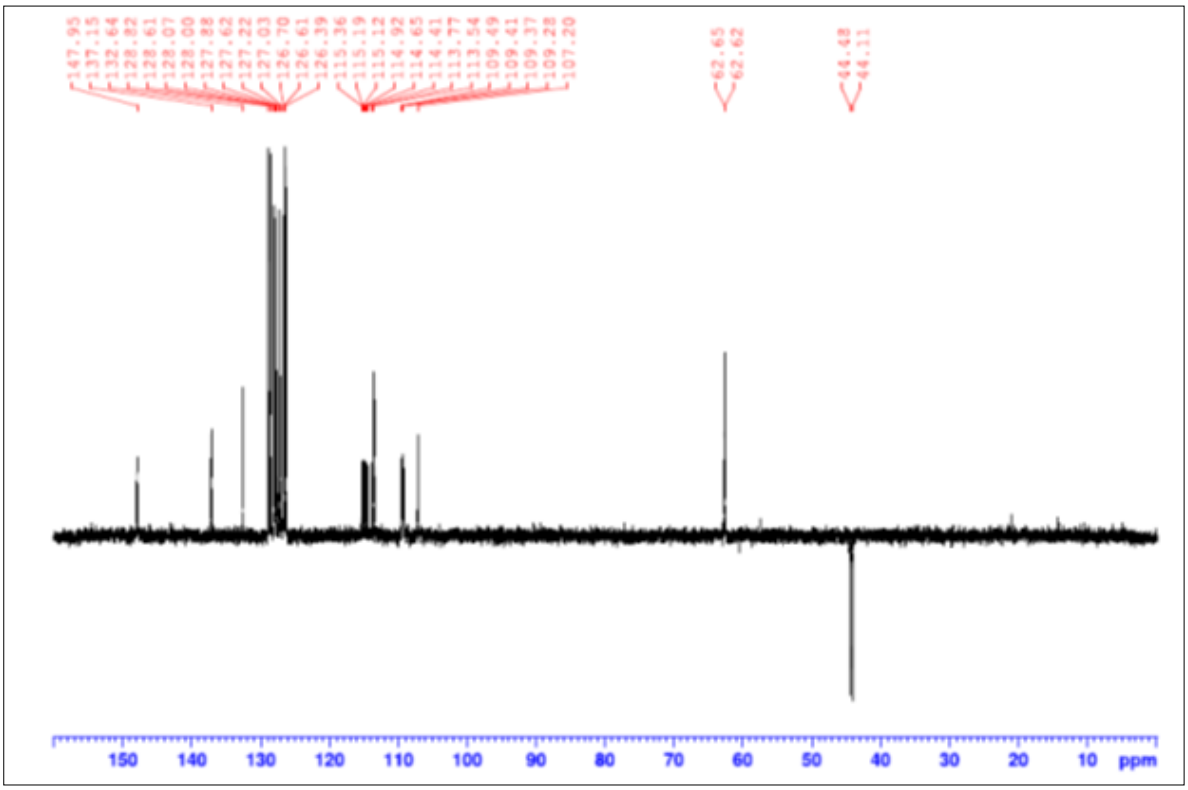

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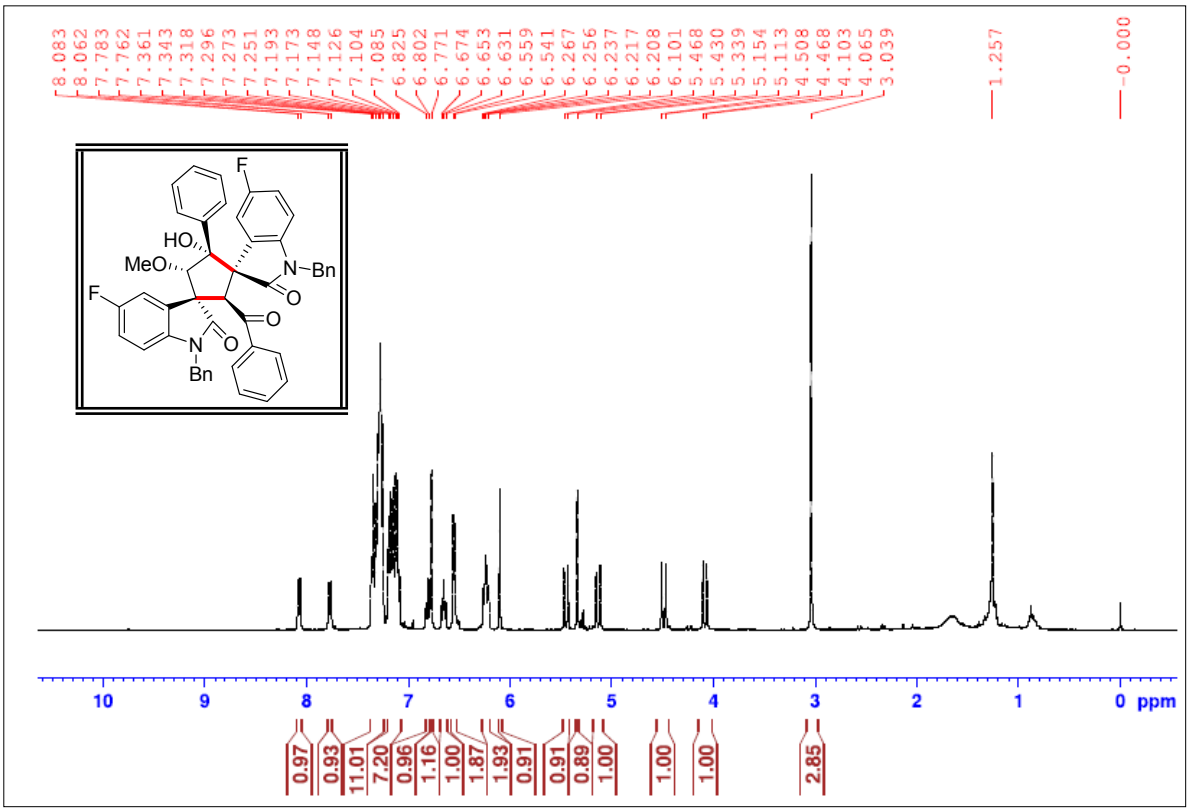

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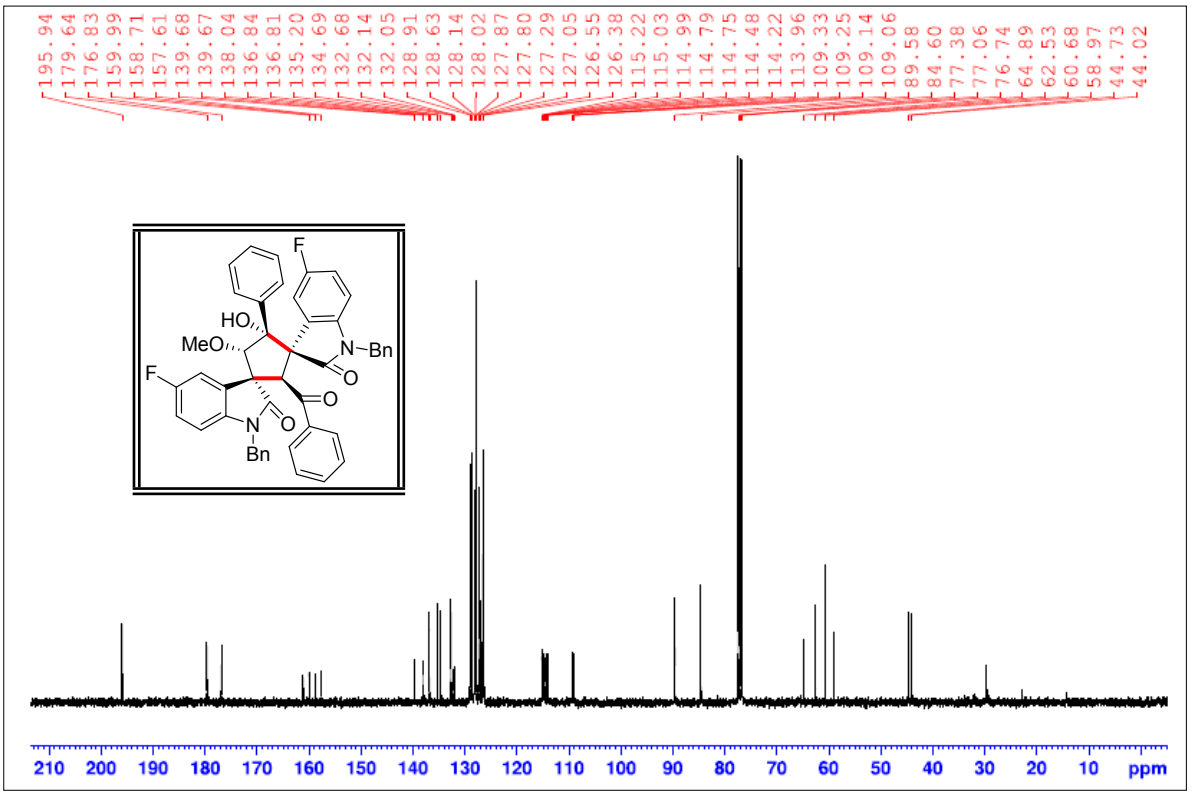

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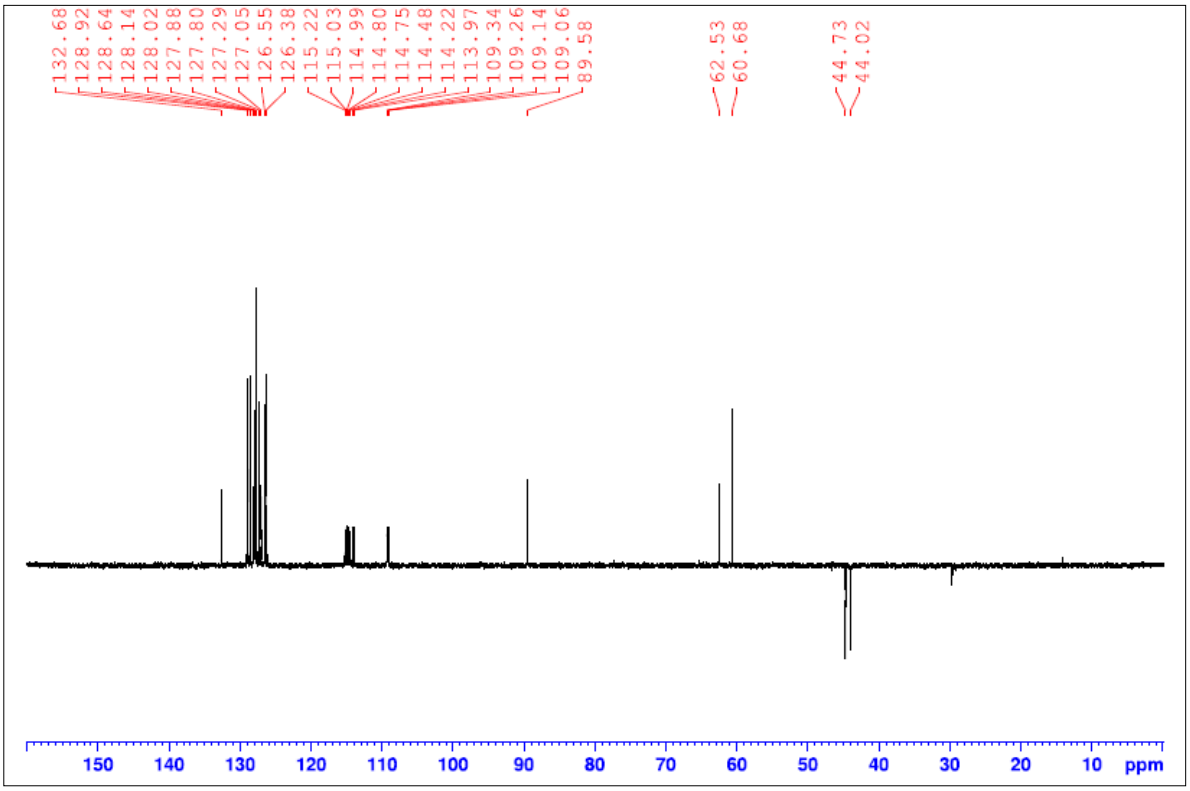

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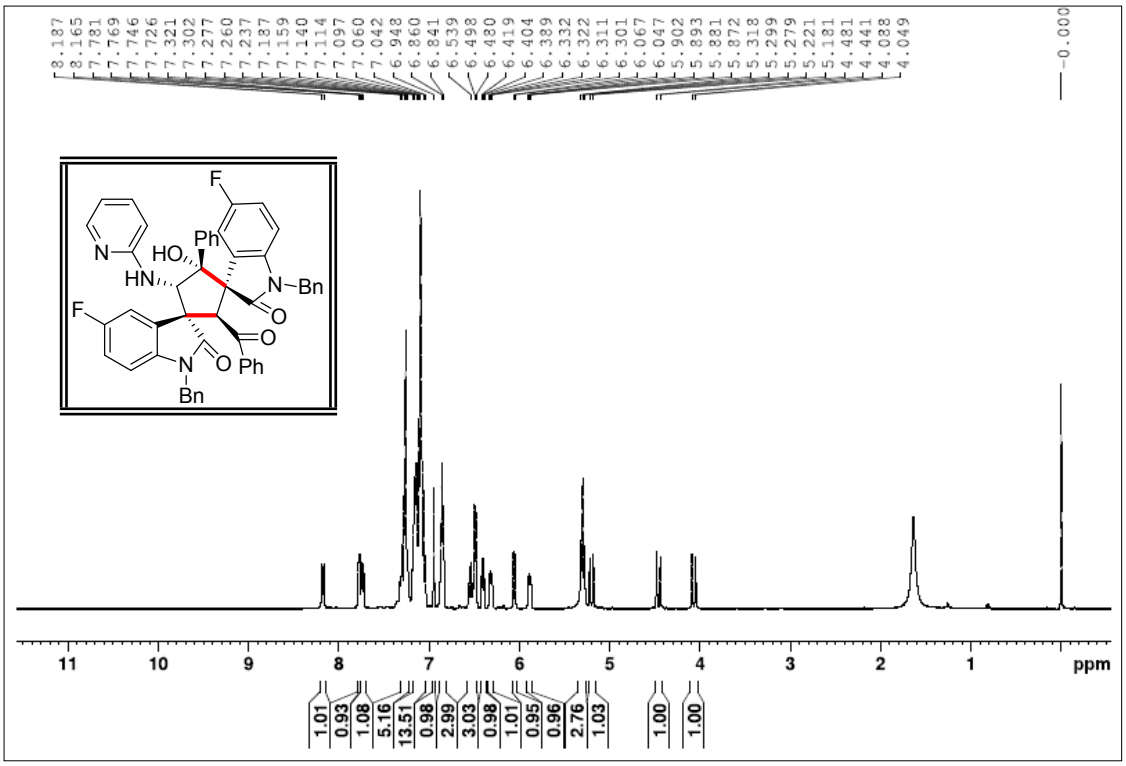

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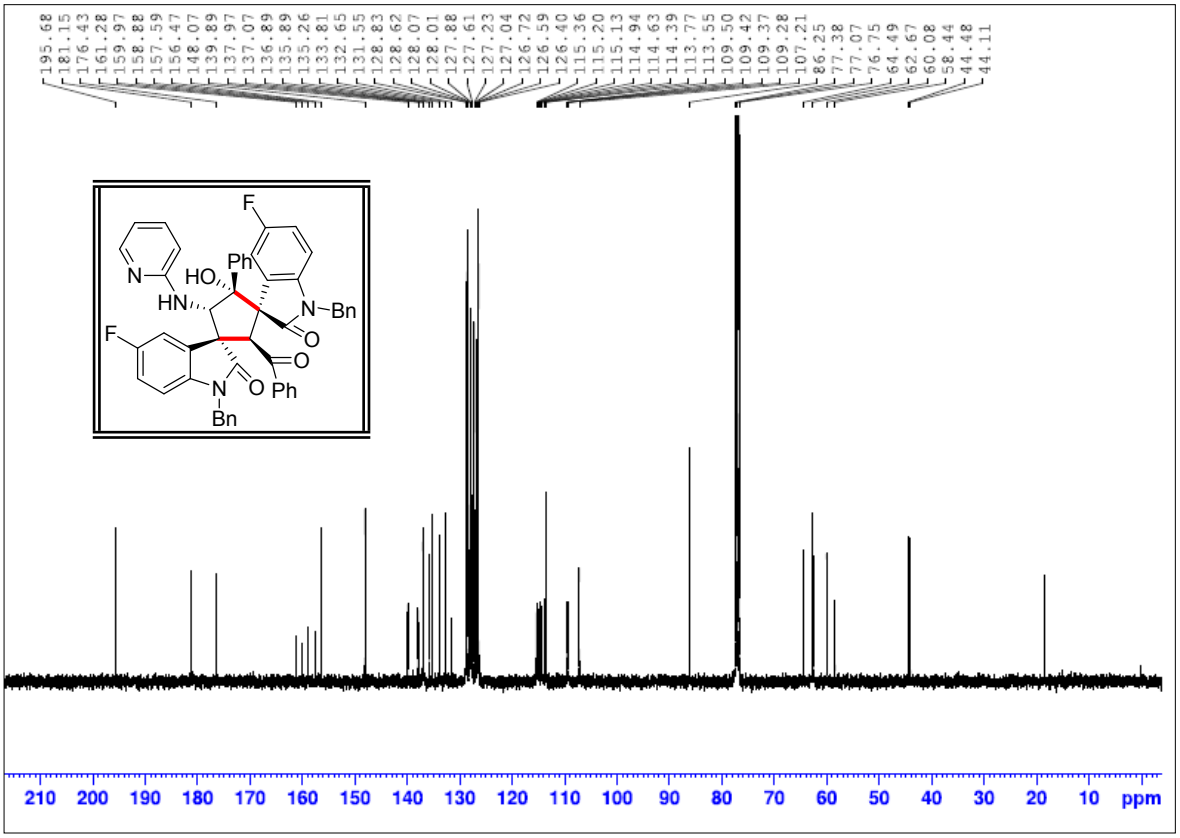

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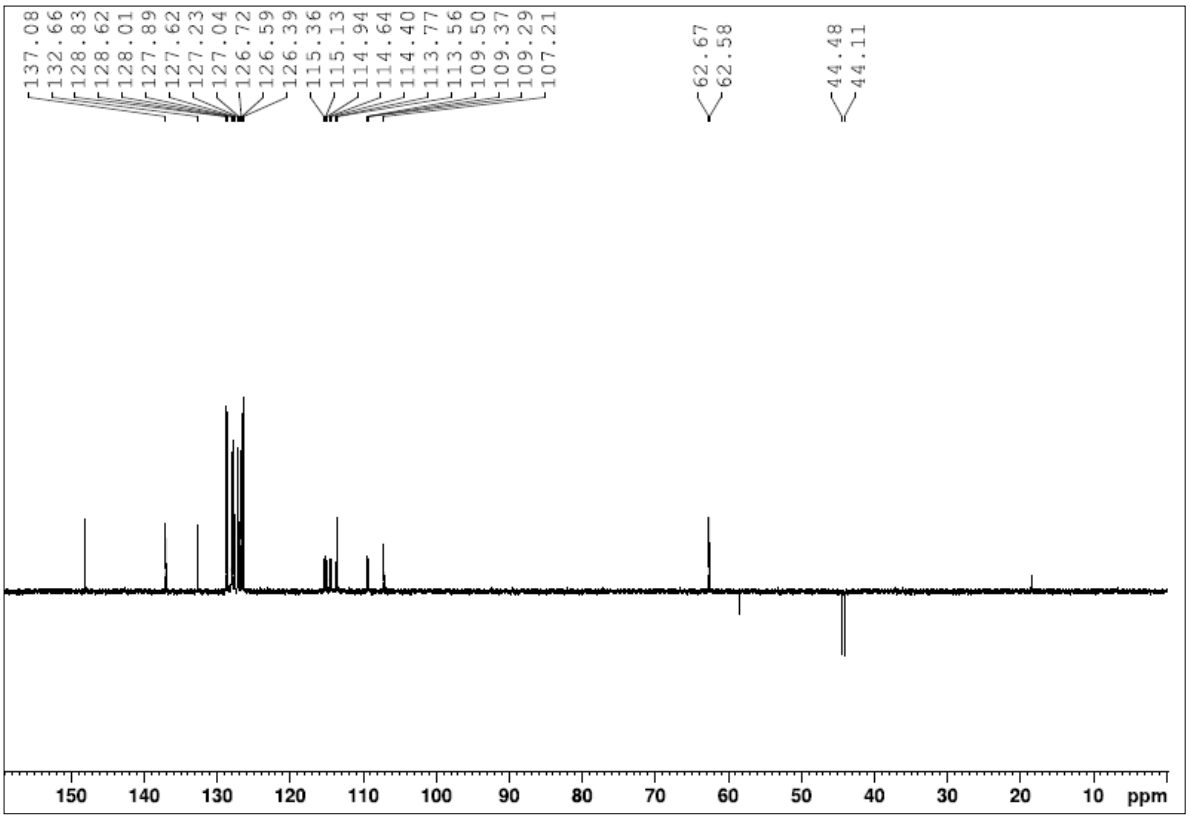

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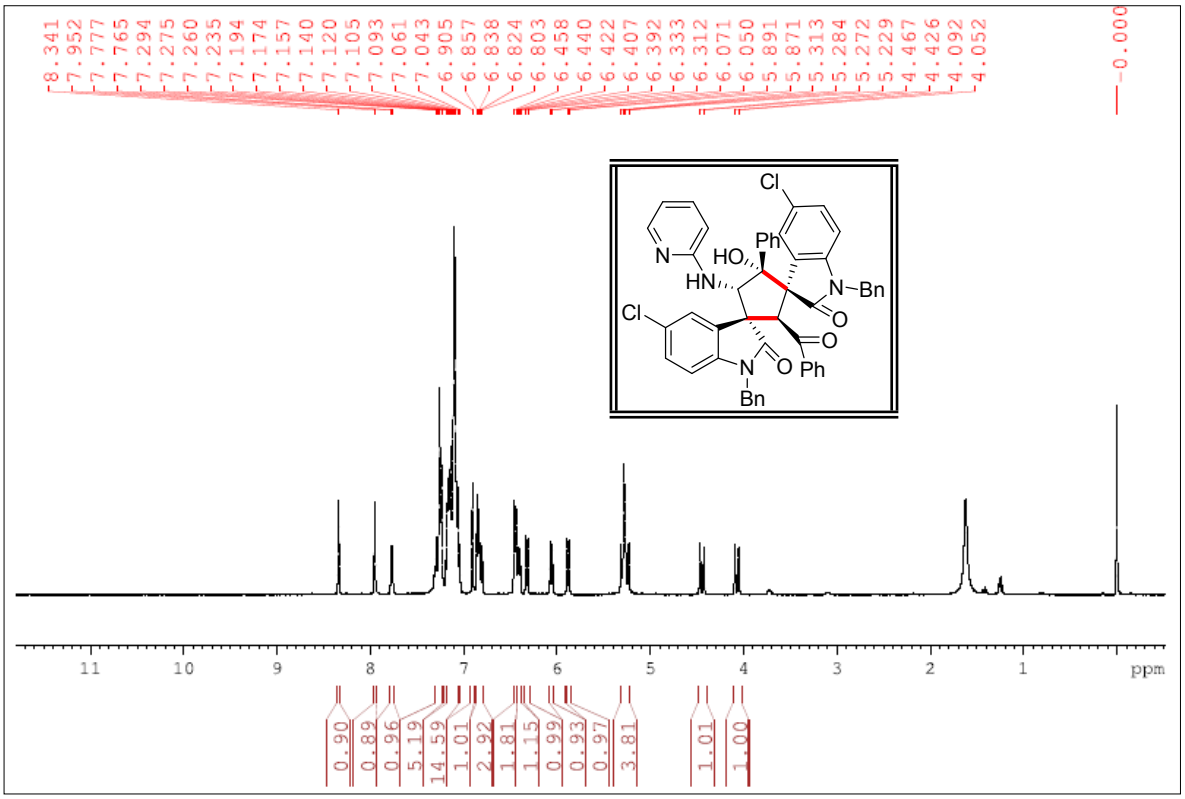

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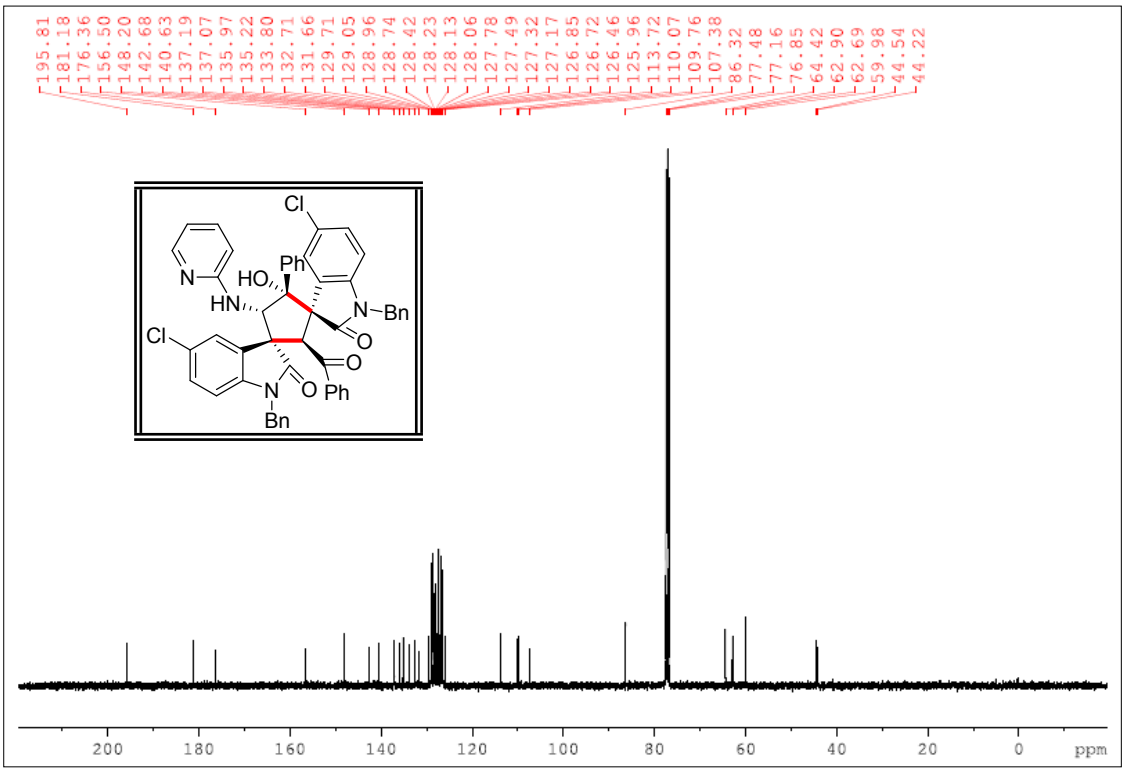

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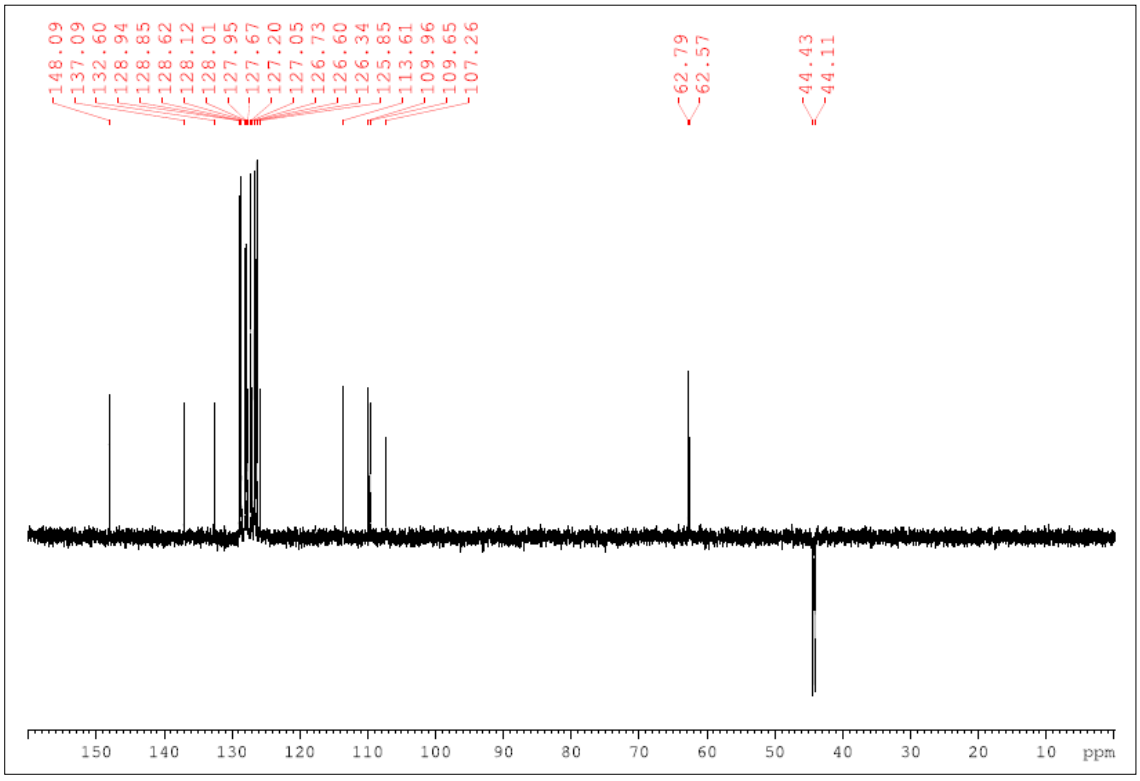

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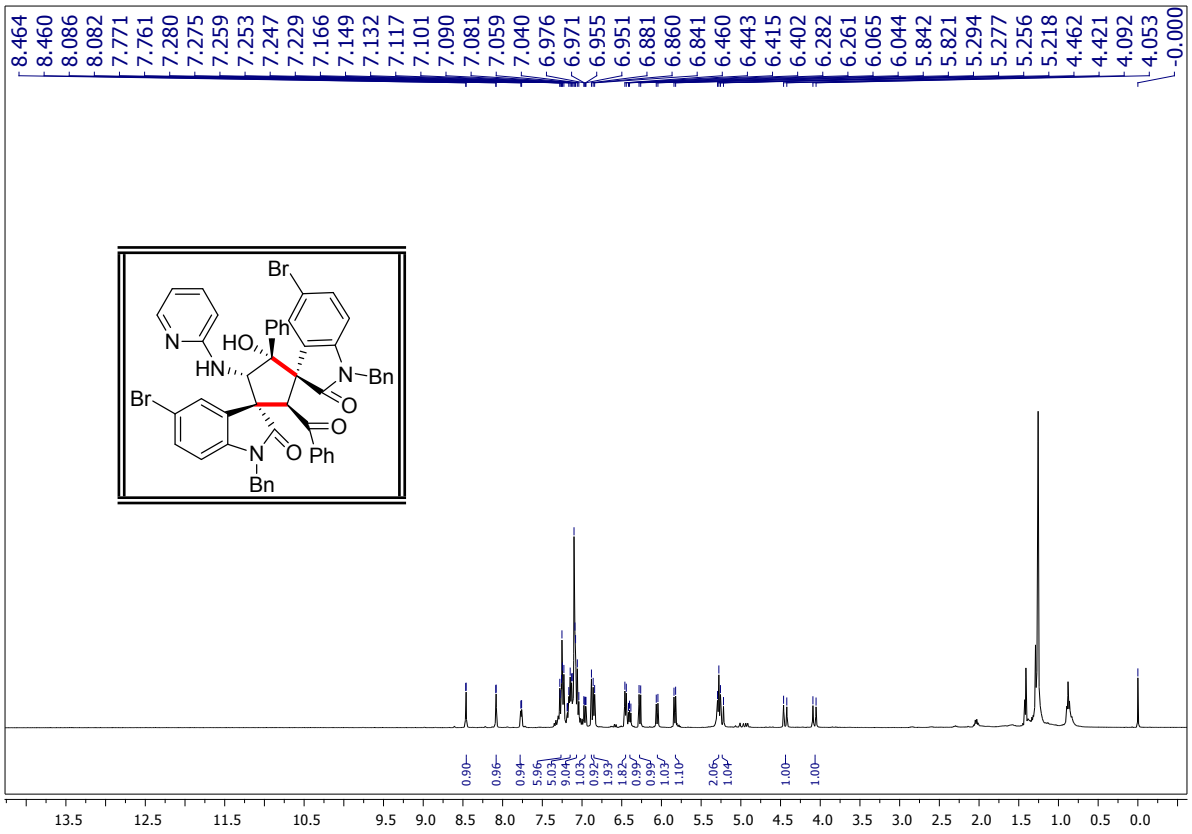

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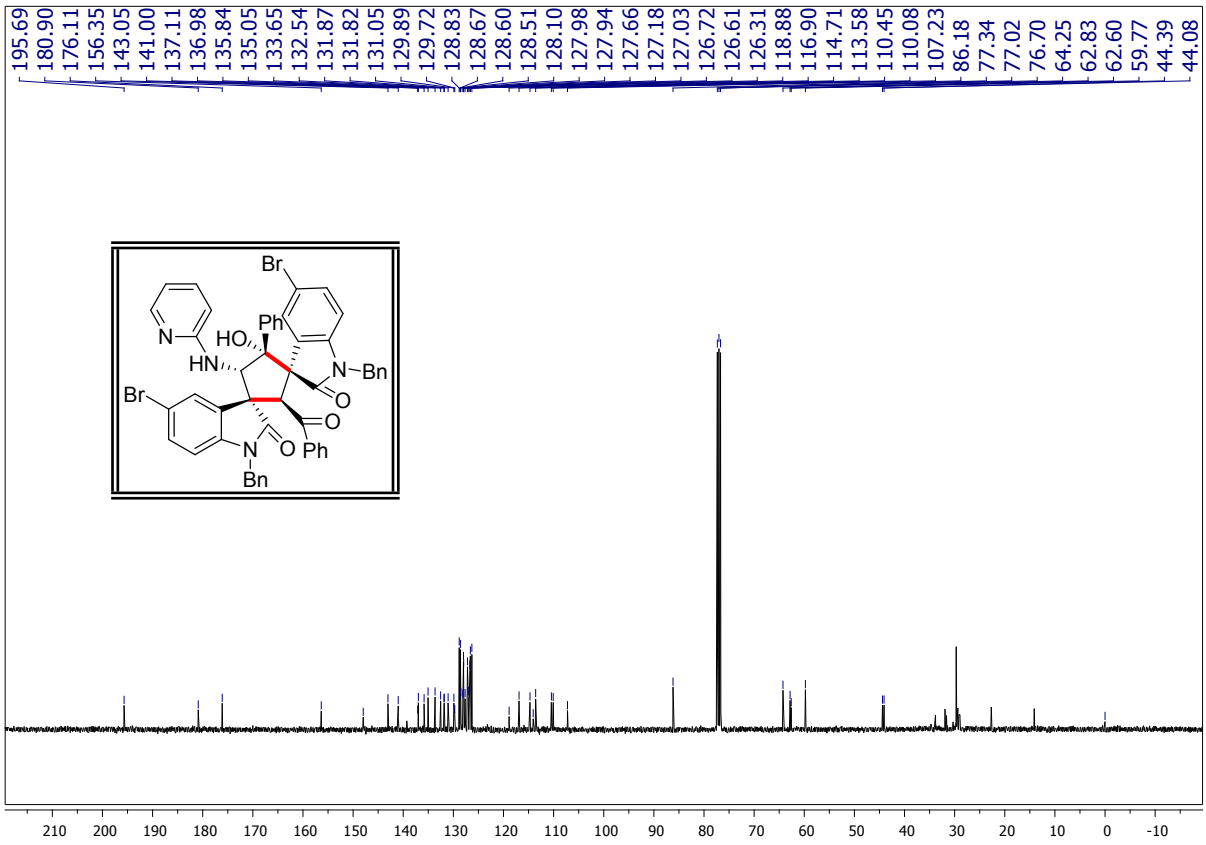

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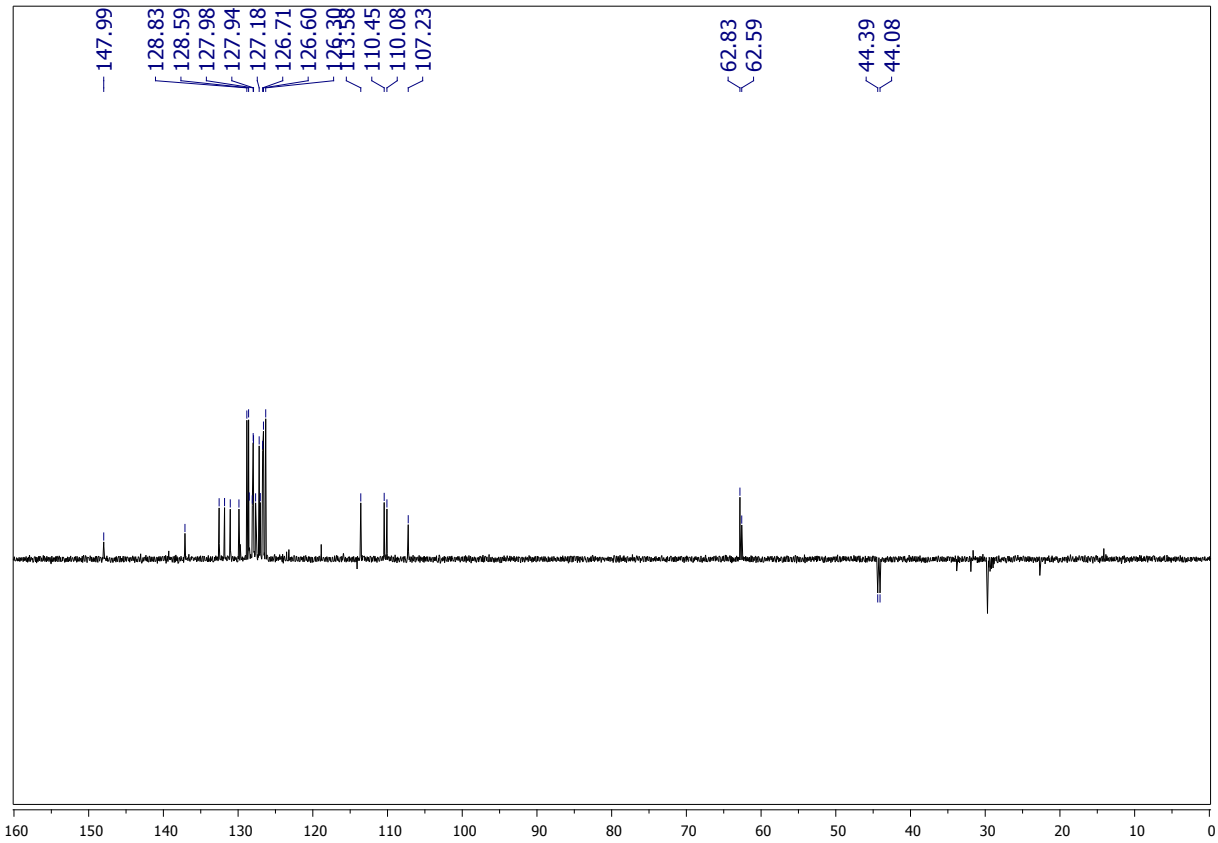

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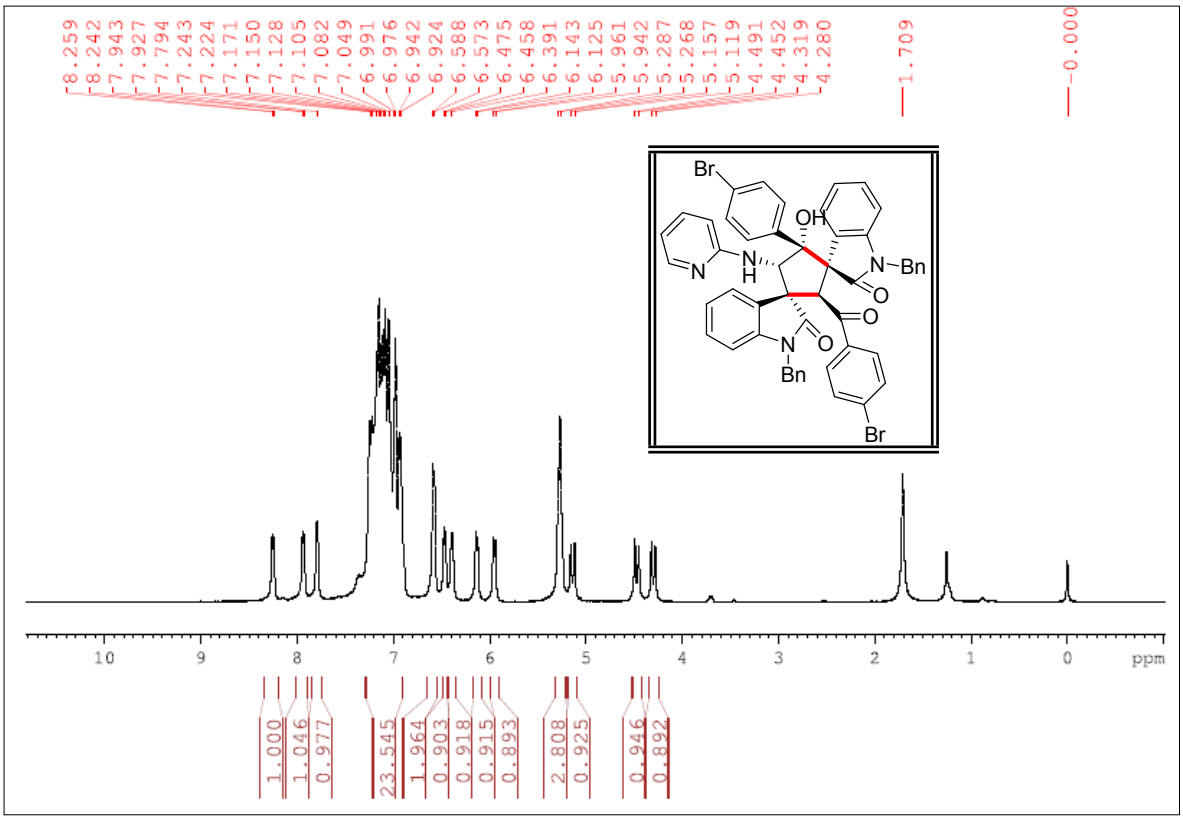

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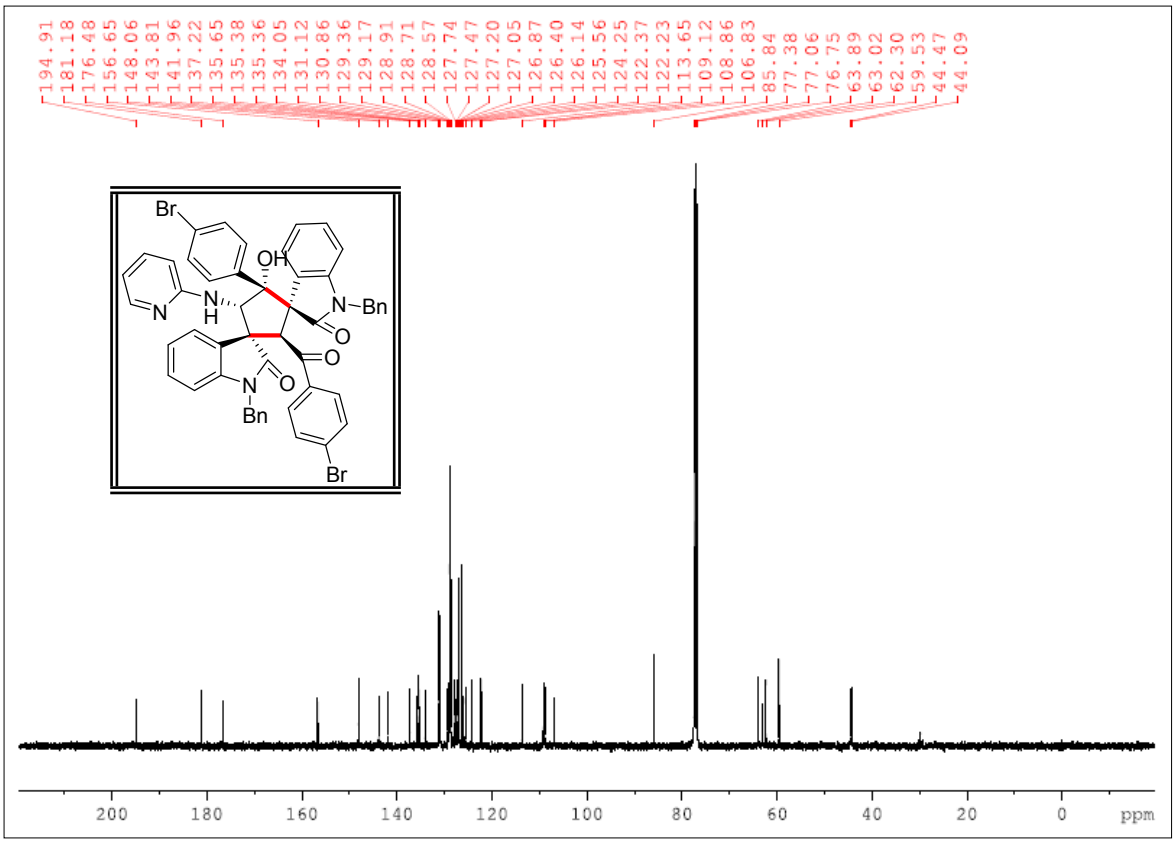
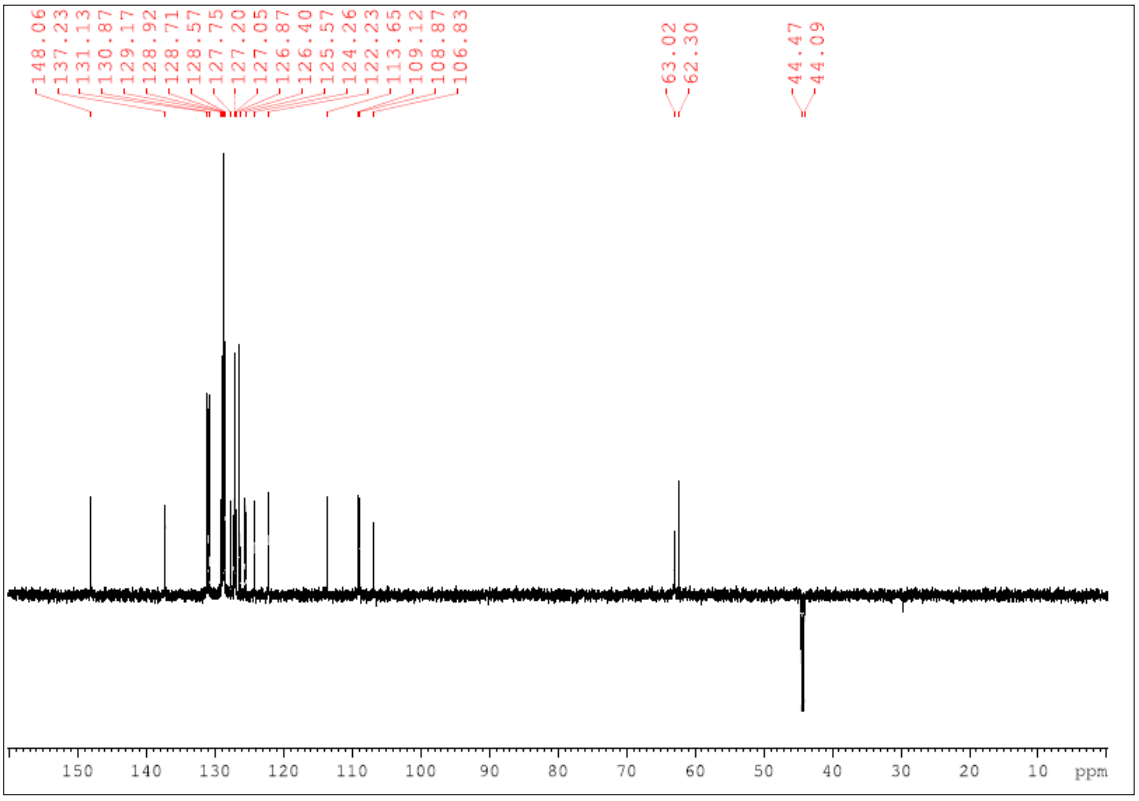


Figure 35. ^{13}C NMR Spectrum of **3d'**



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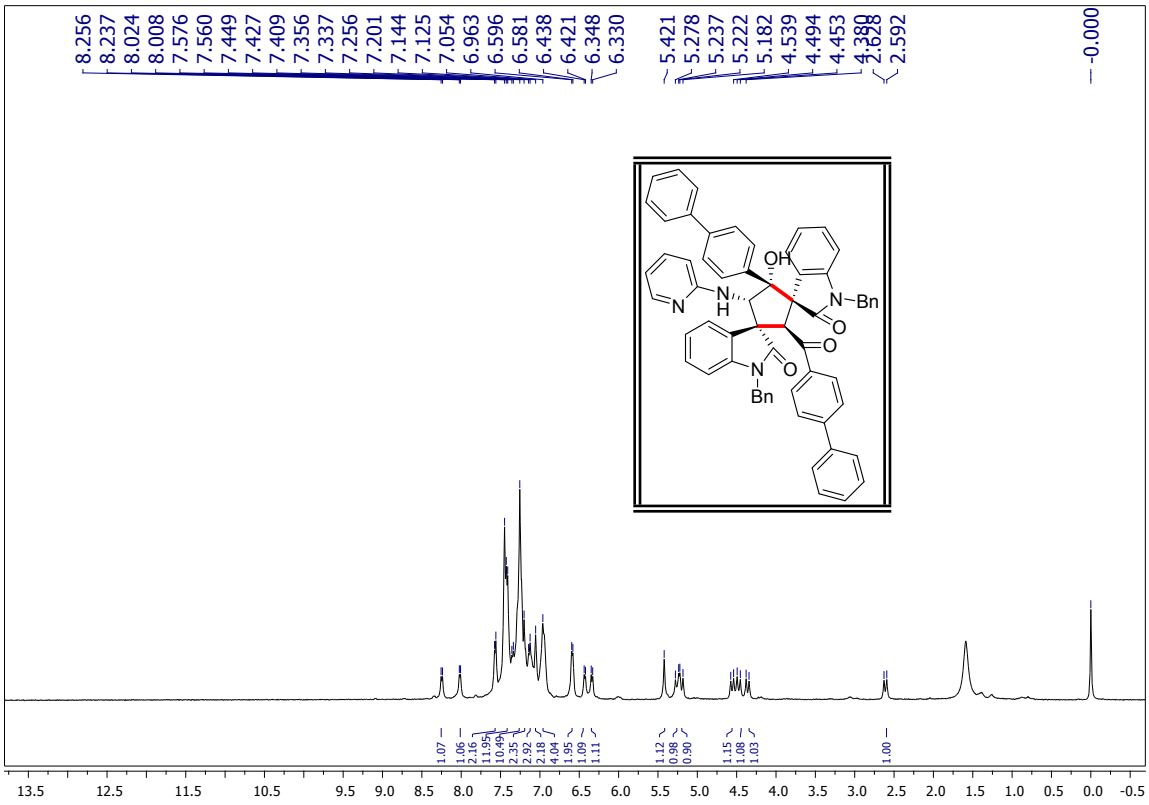


Figure 37. ^{1}H NMR Spectrum of **3e'**

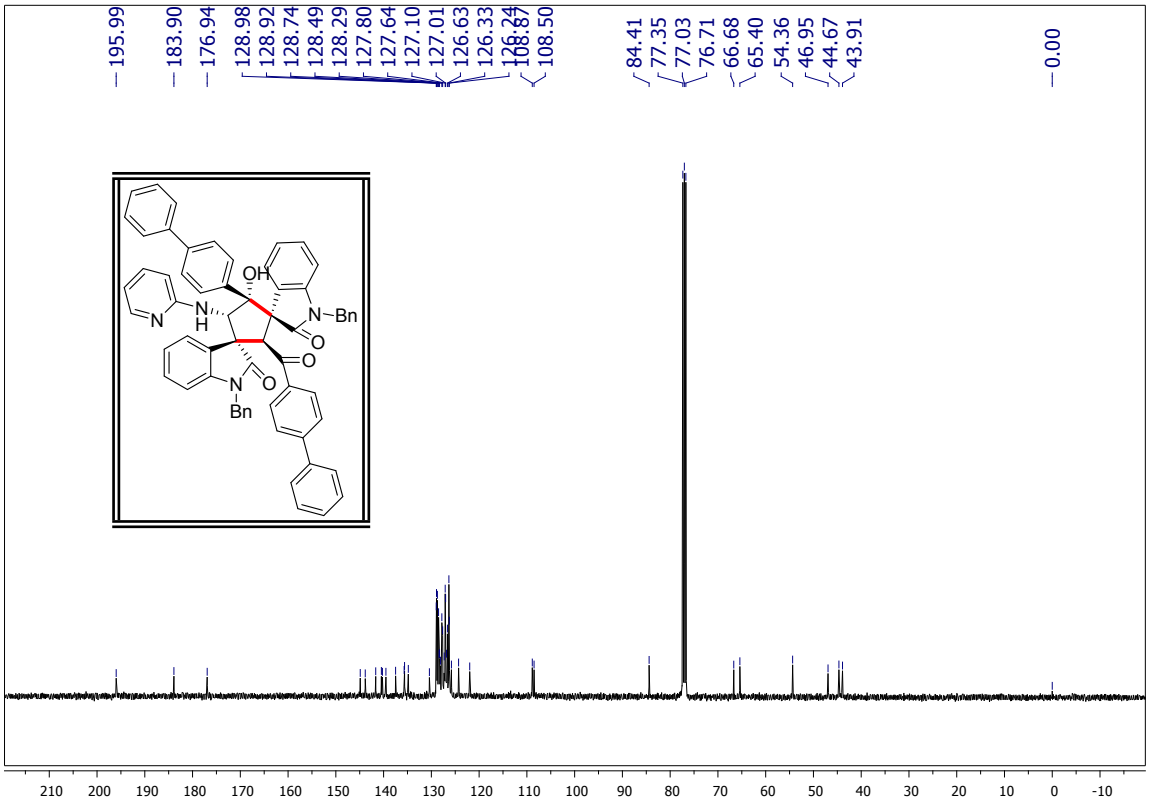


Figure 38. ^{13}C NMR Spectrum of **3e'**

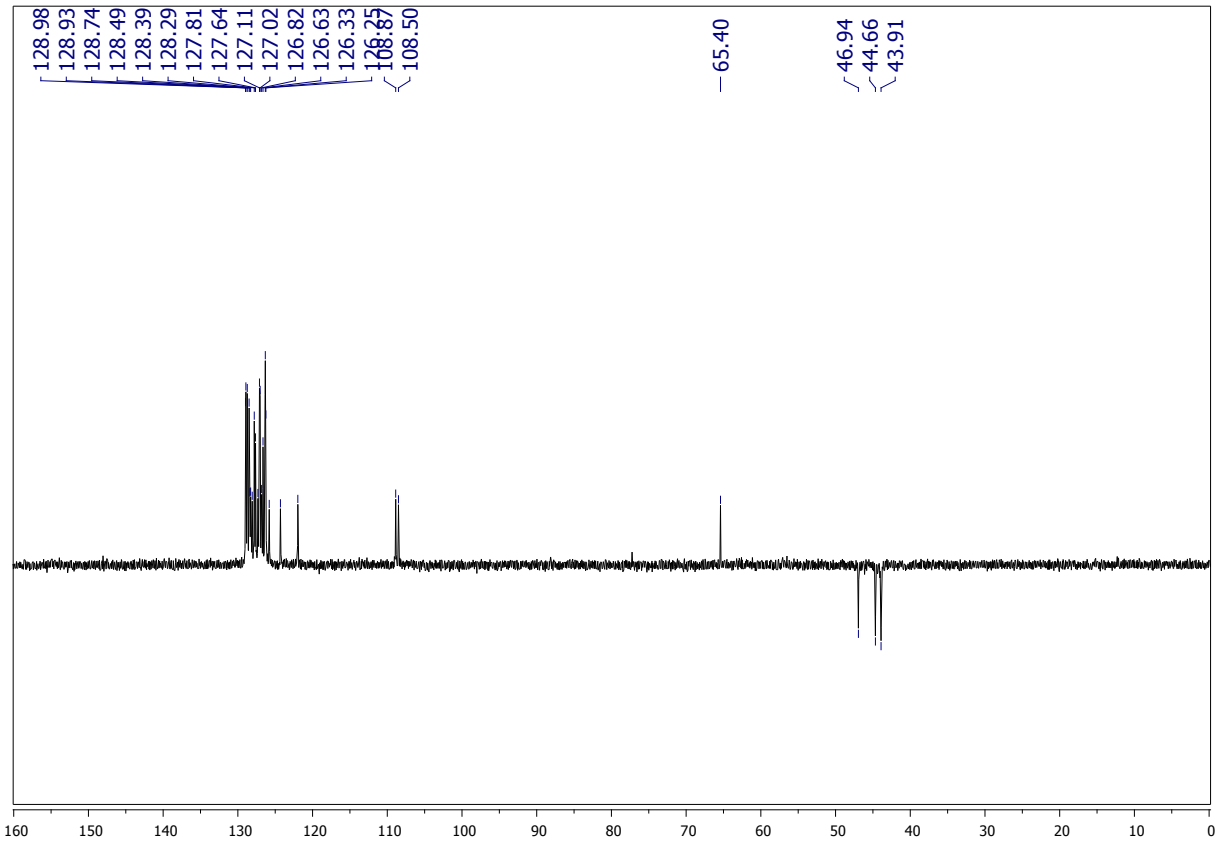
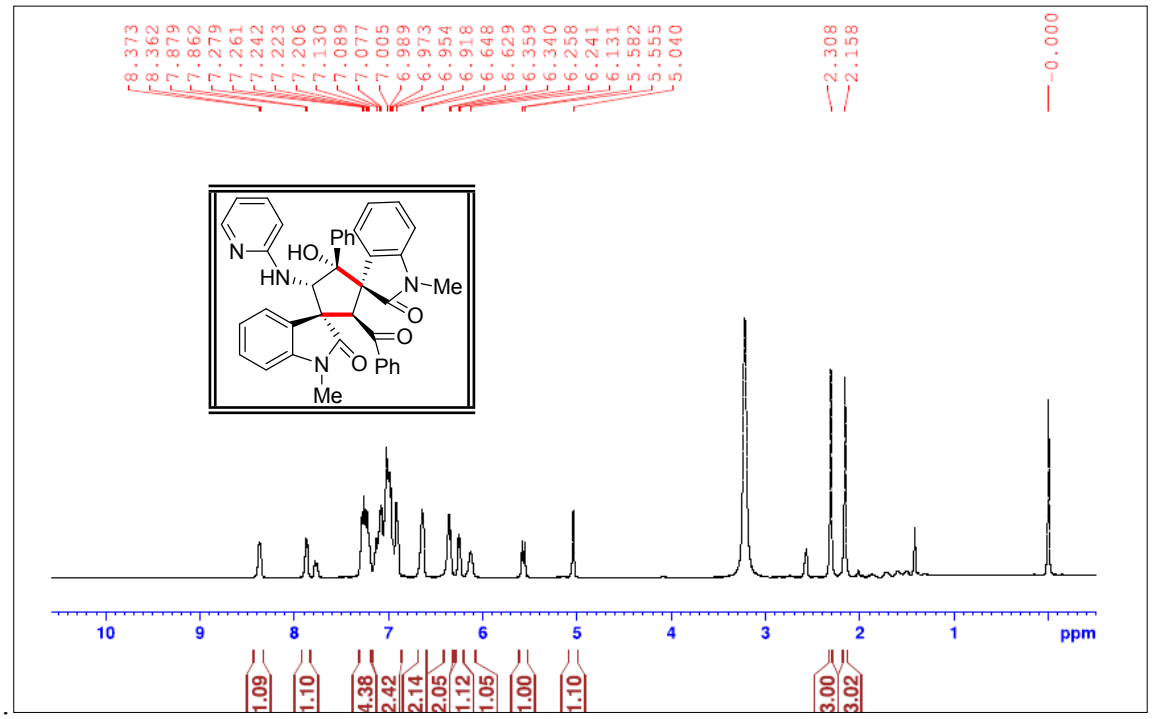


Figure 39. DEPT-135 Spectrum of **3e'**



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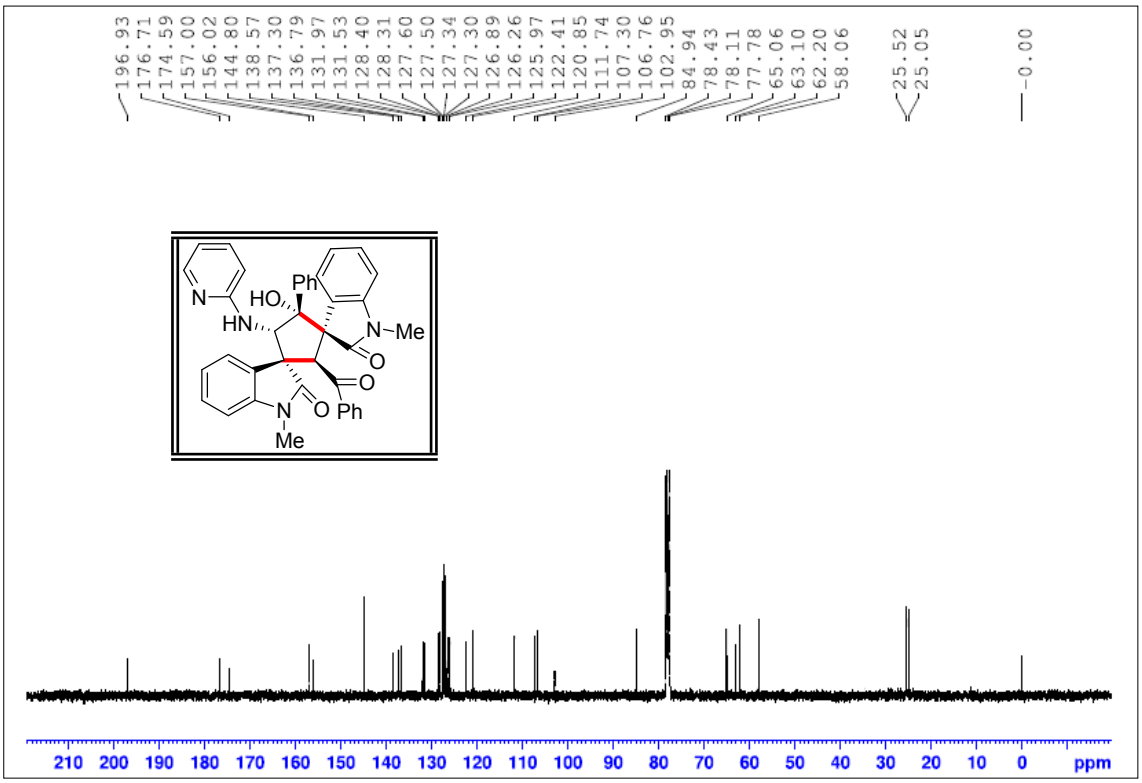

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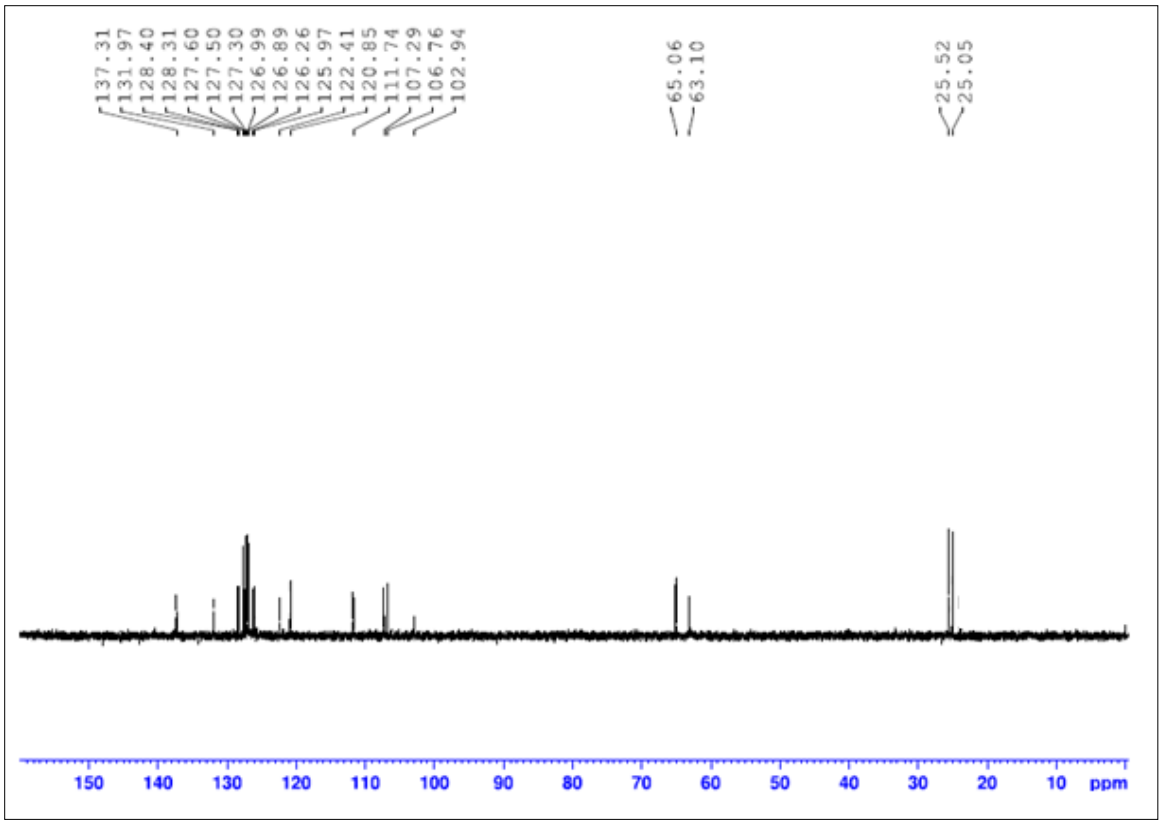

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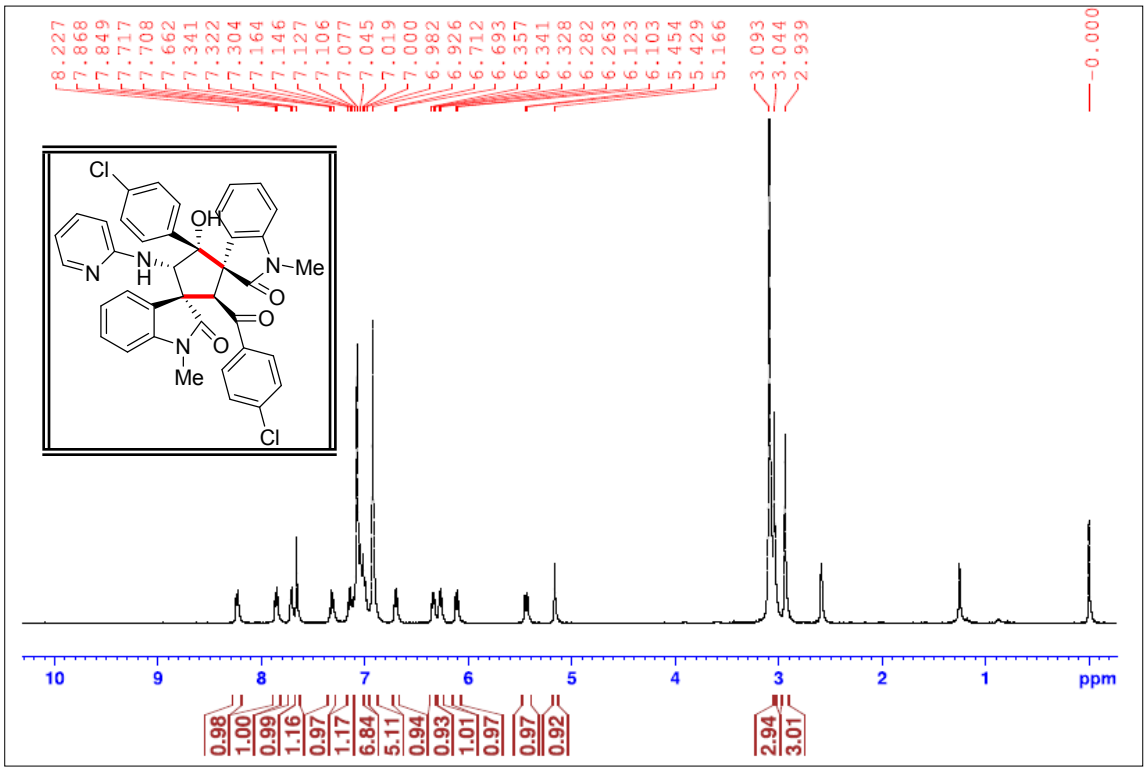

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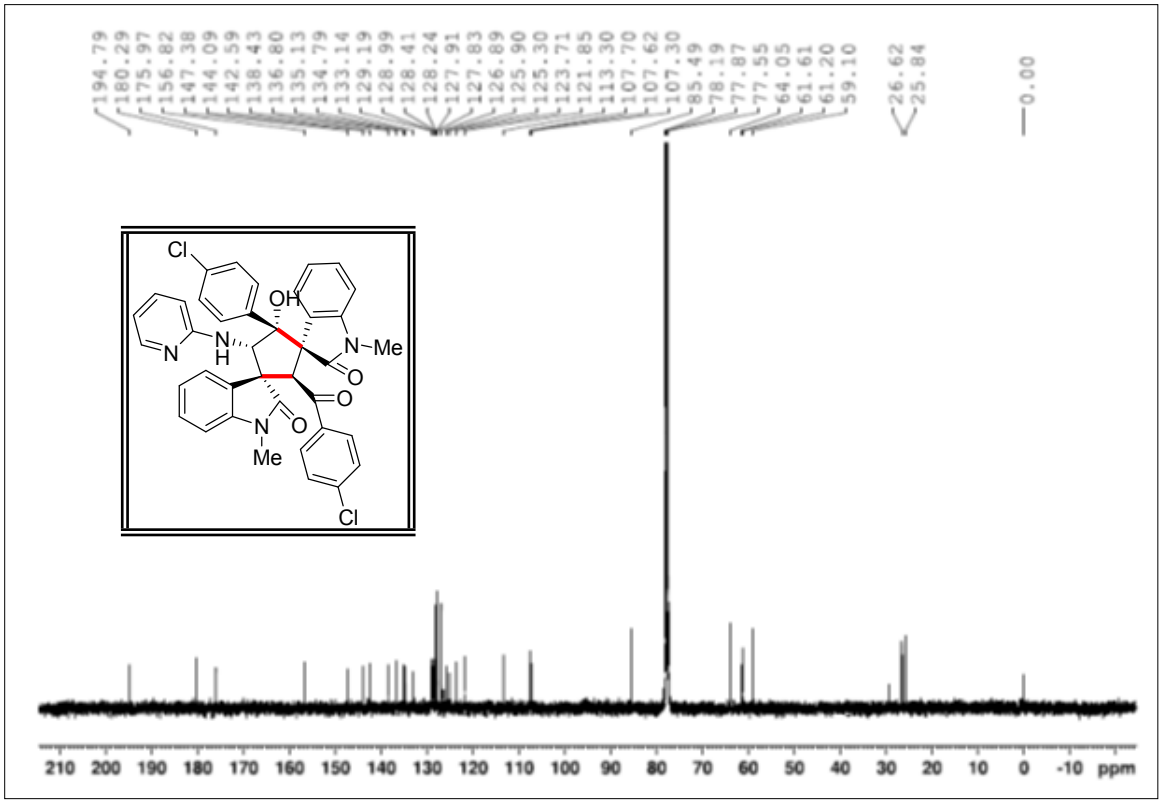

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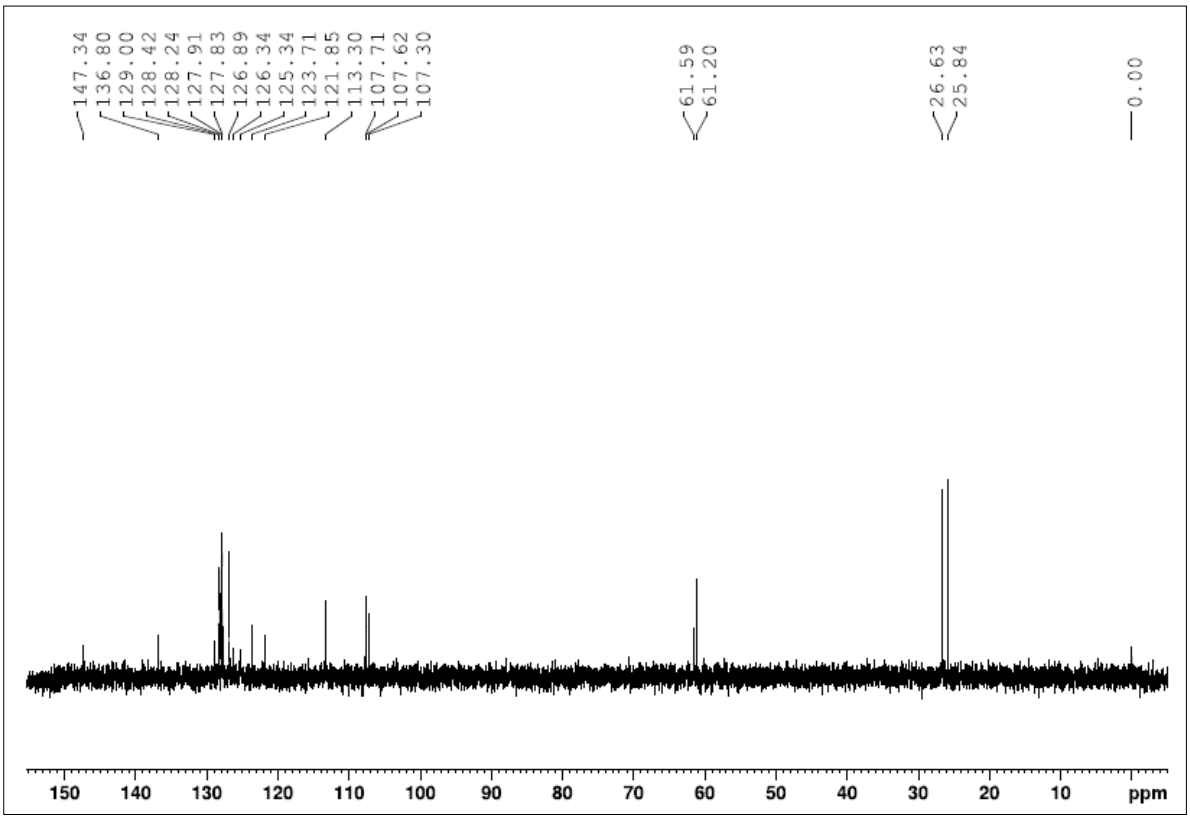

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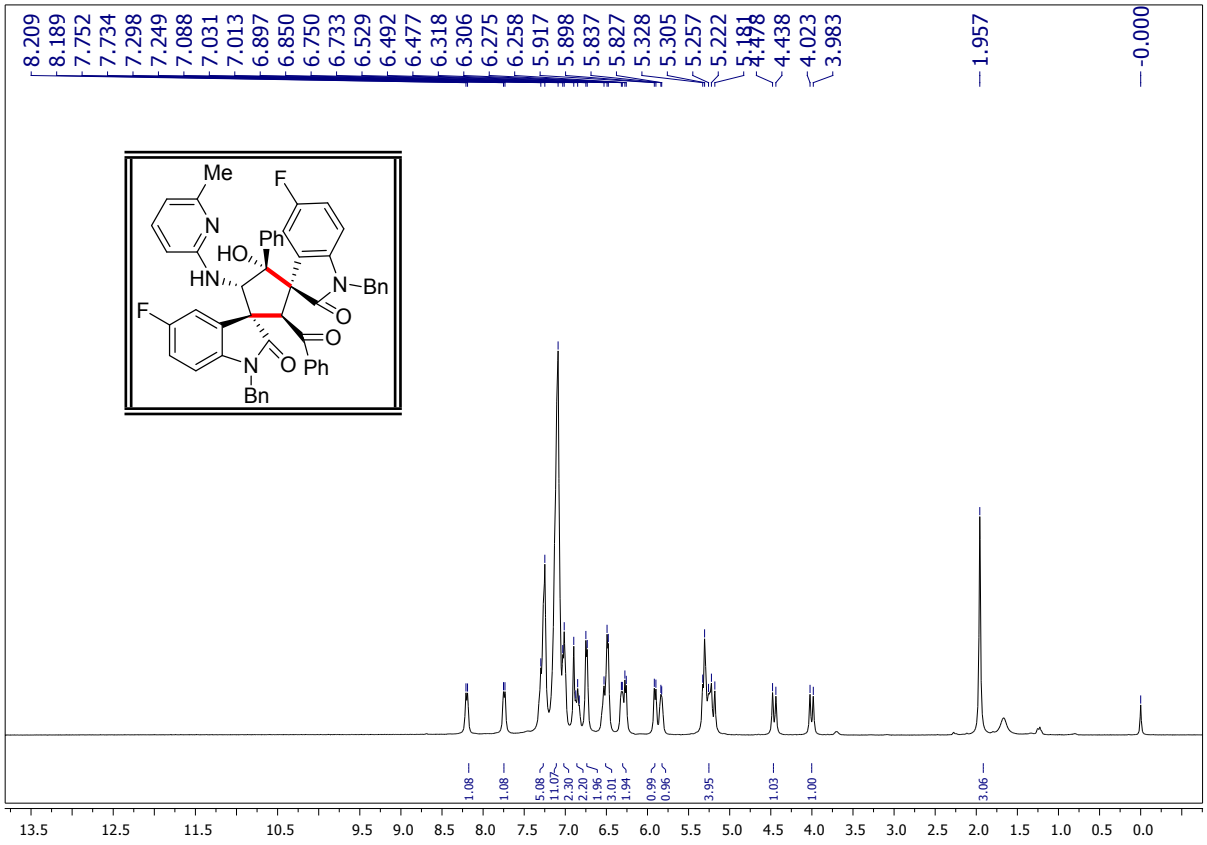


Figure 46. ^{1}H NMR Spectrum of **3h'**

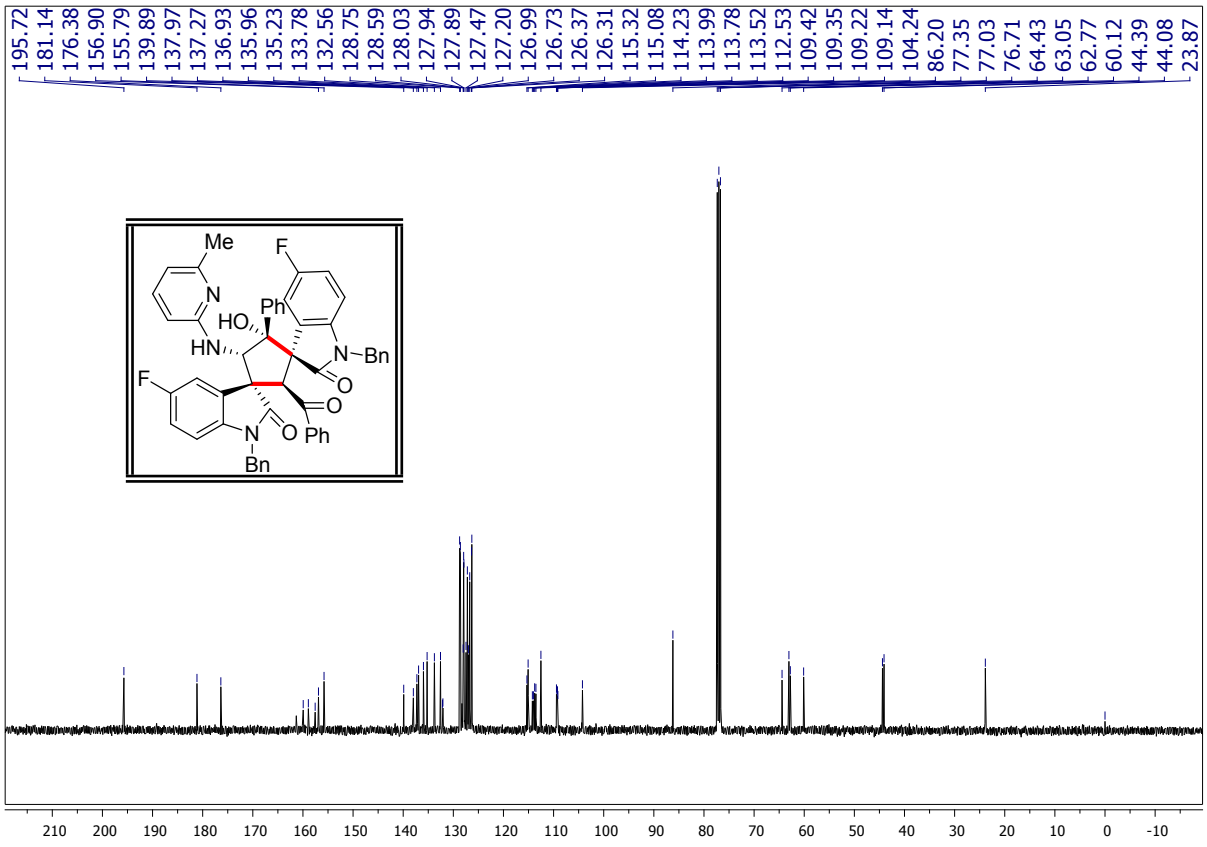


Figure **47**. ^{13}C NMR Spectrum of **3h'**

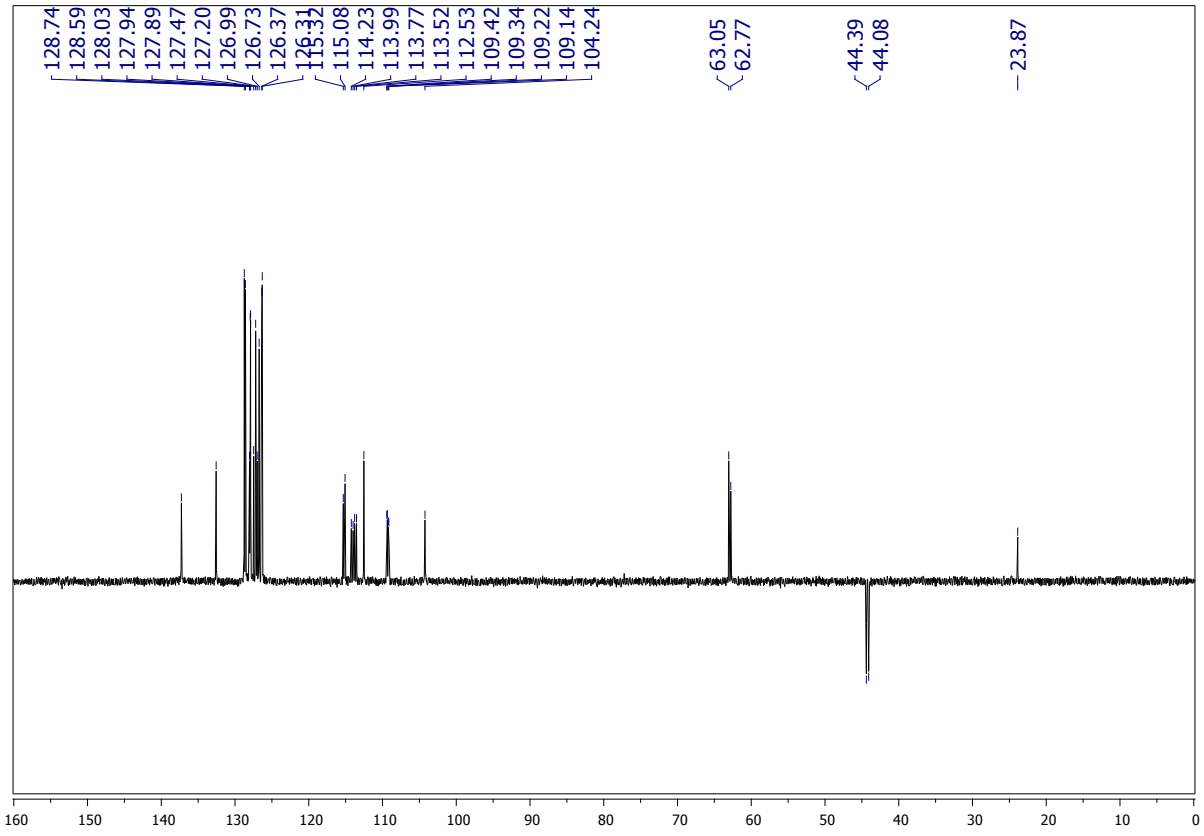
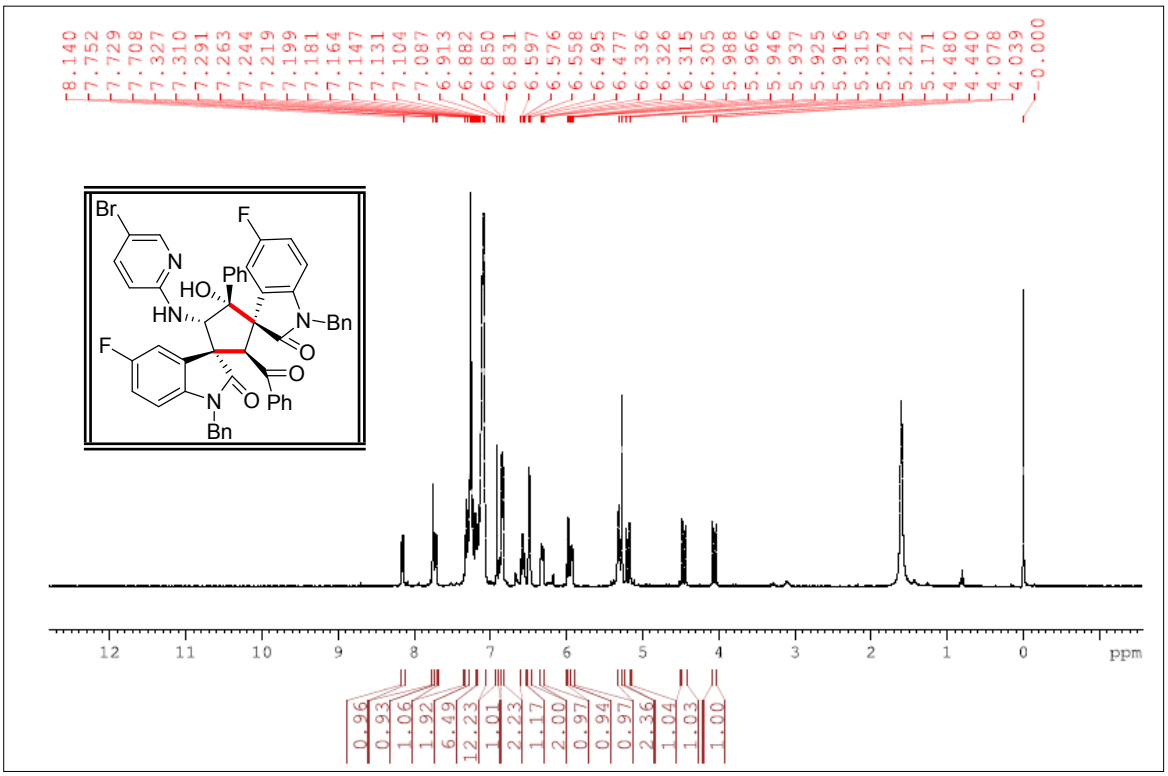


Figure **48**. DEPT-135 Spectrum of **3h'**



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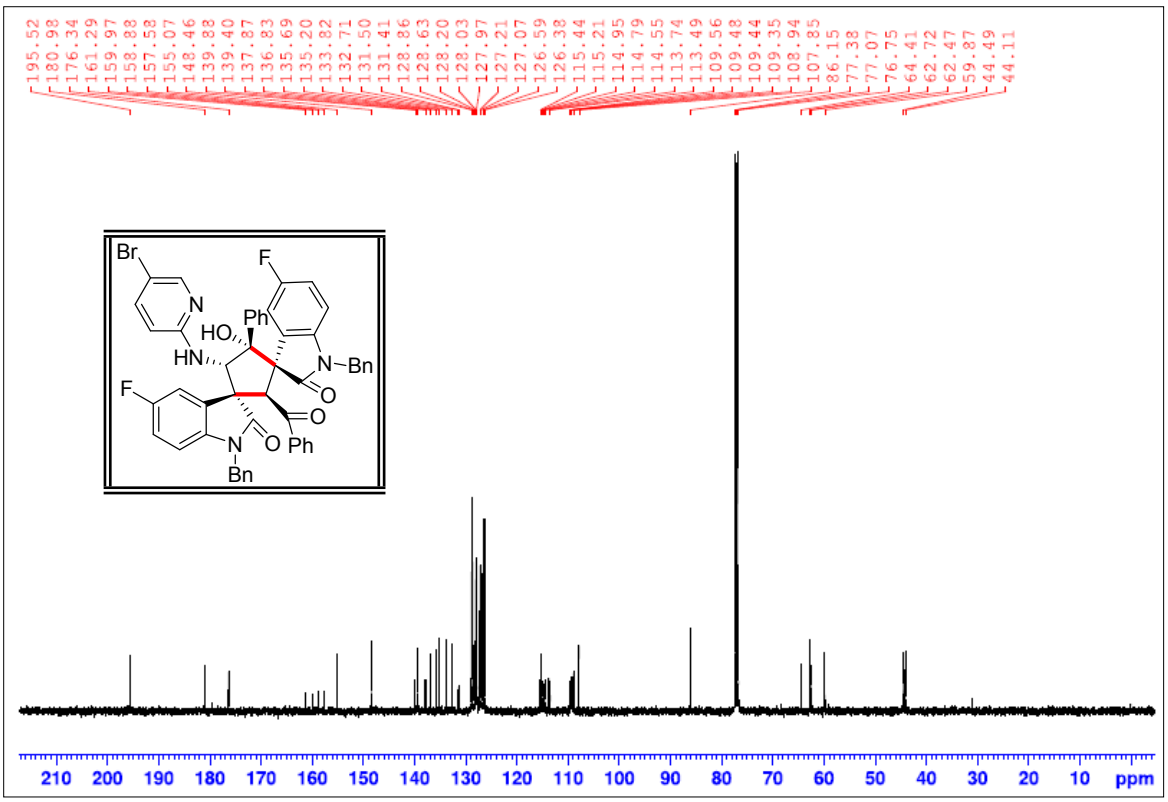

Figure 50. ^{13}C NMR Spectrum of **3i'**

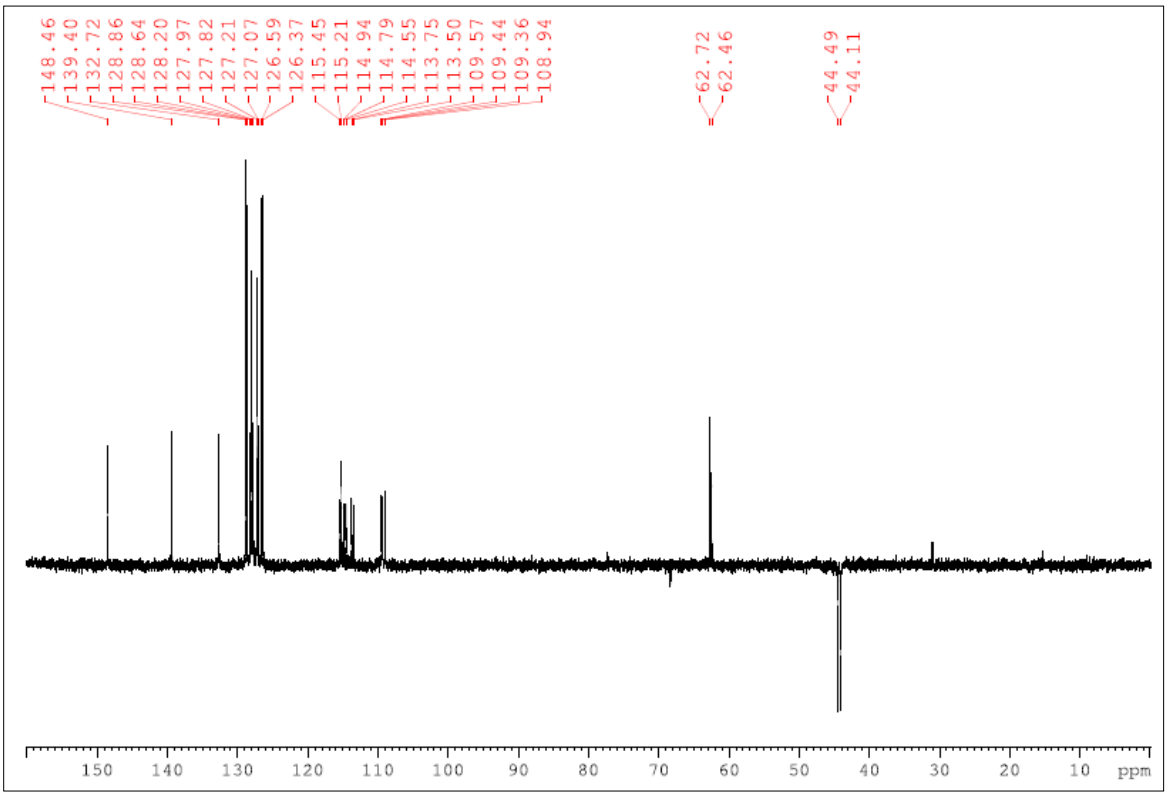

Figure 51. DEPT-135 Spectrum of **3i'**

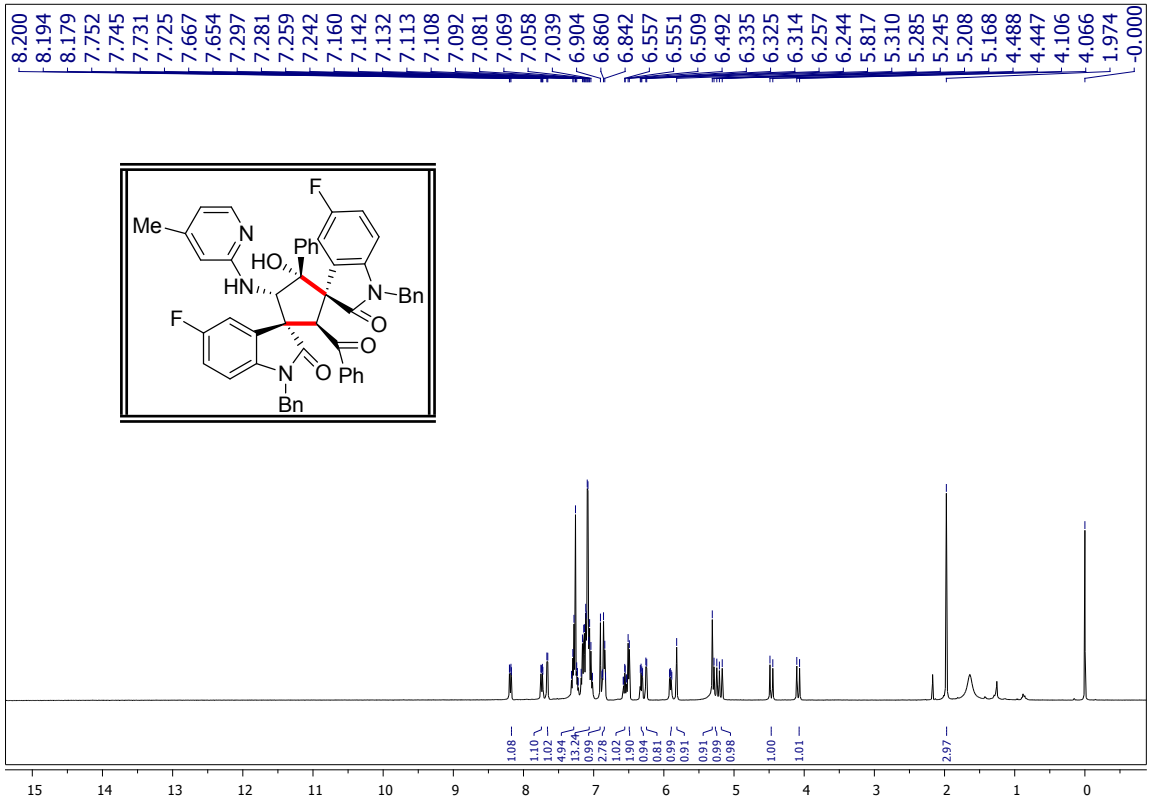

Figure 52. ^{1}H NMR Spectrum of **3j'**

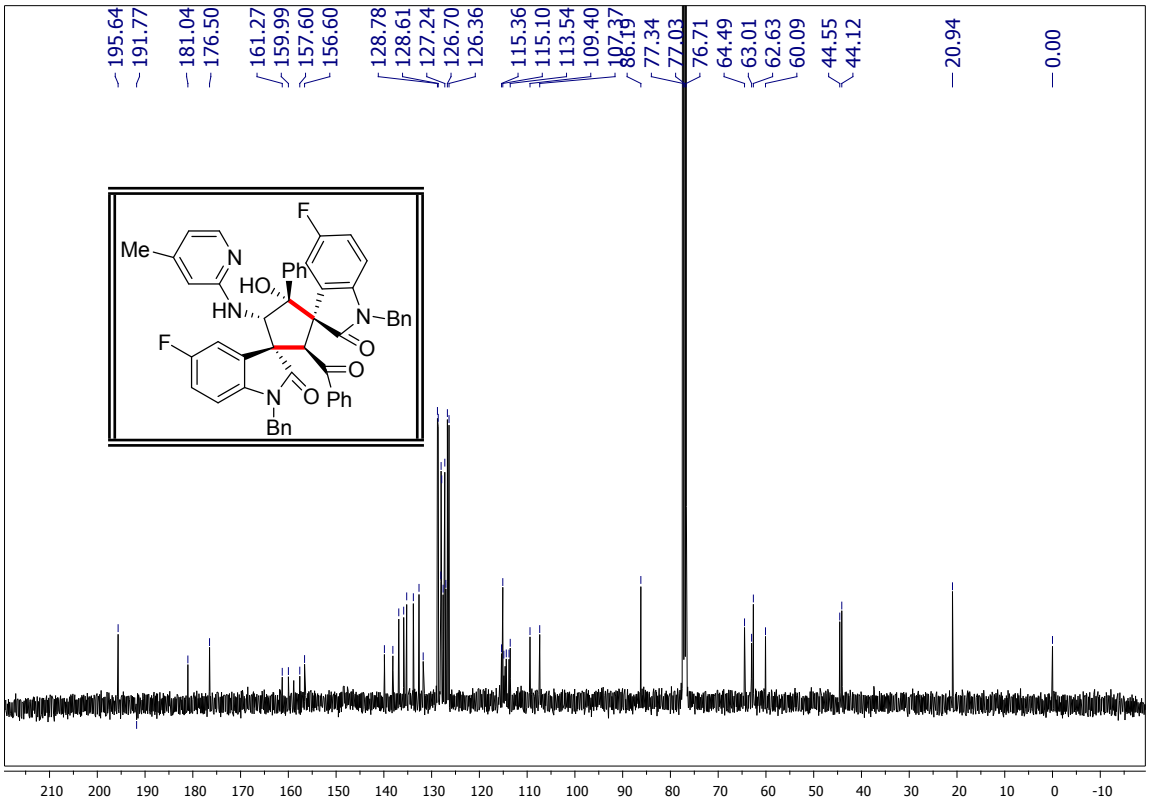

Figure 53. ^{13}C NMR Spectrum of **3j'**

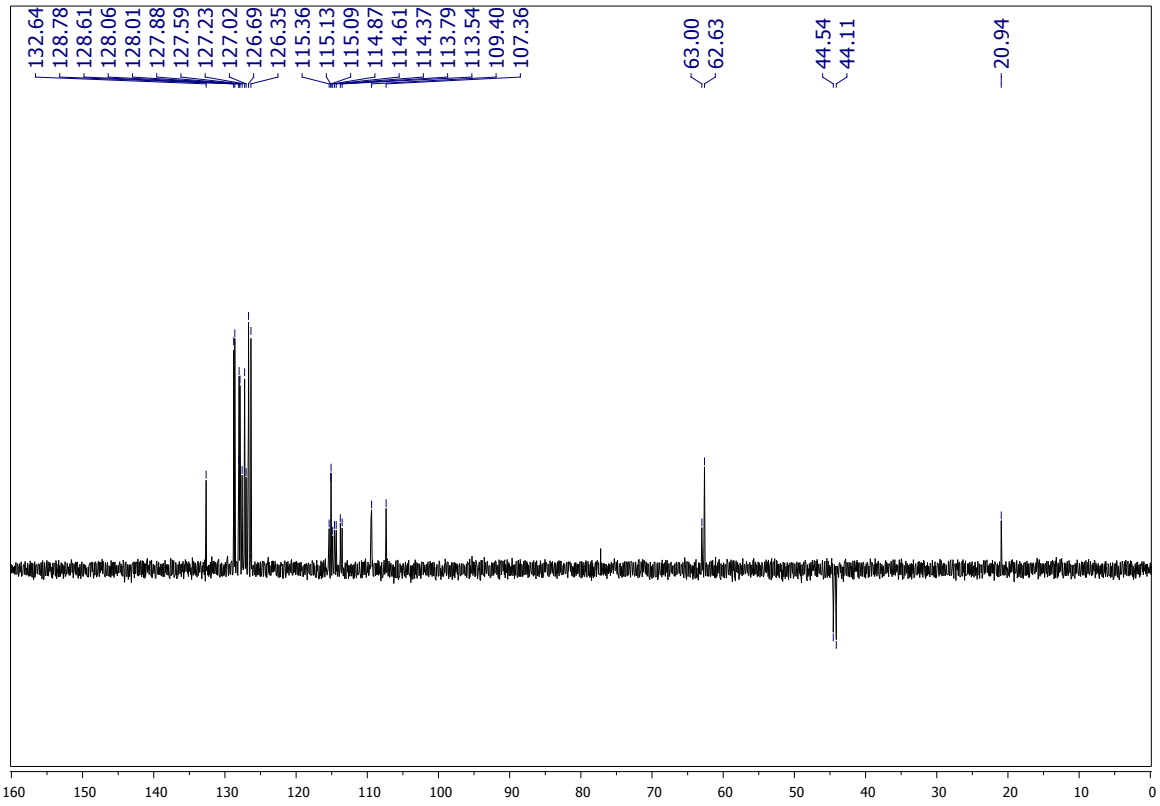

Figure 54. DEPT-135 Spectrum of **3j'**

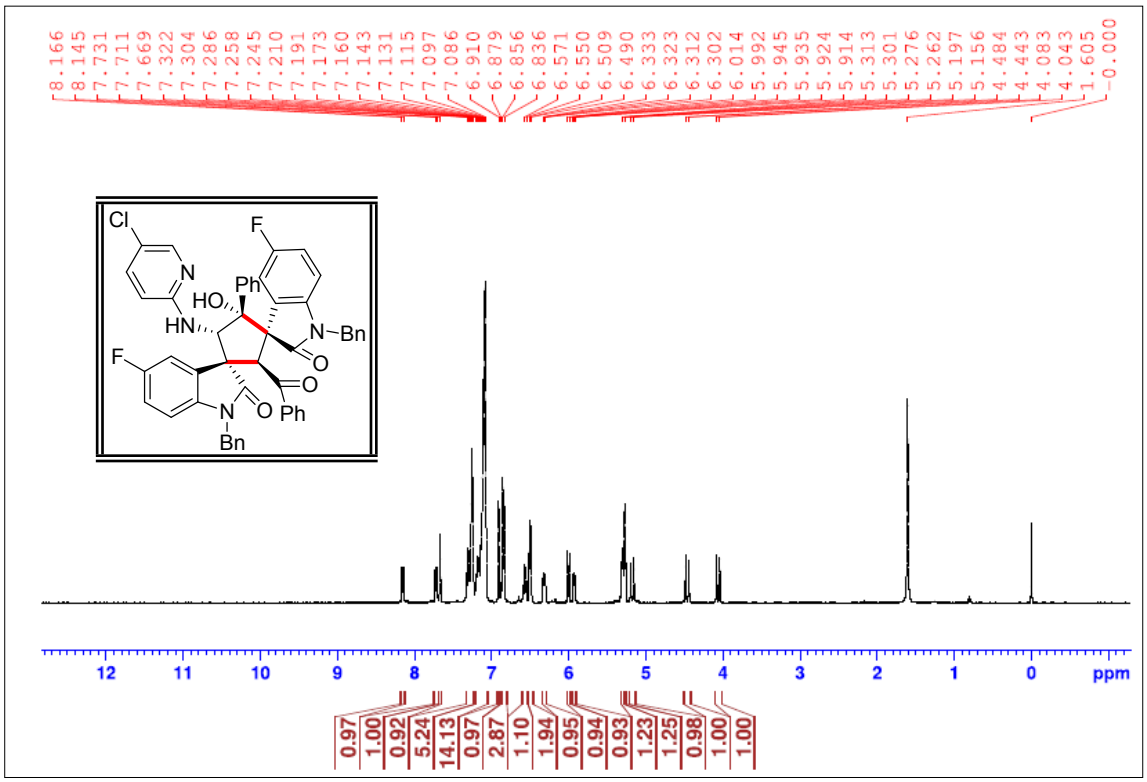

Figure 55. ^{1}H NMR Spectrum of **3k'**

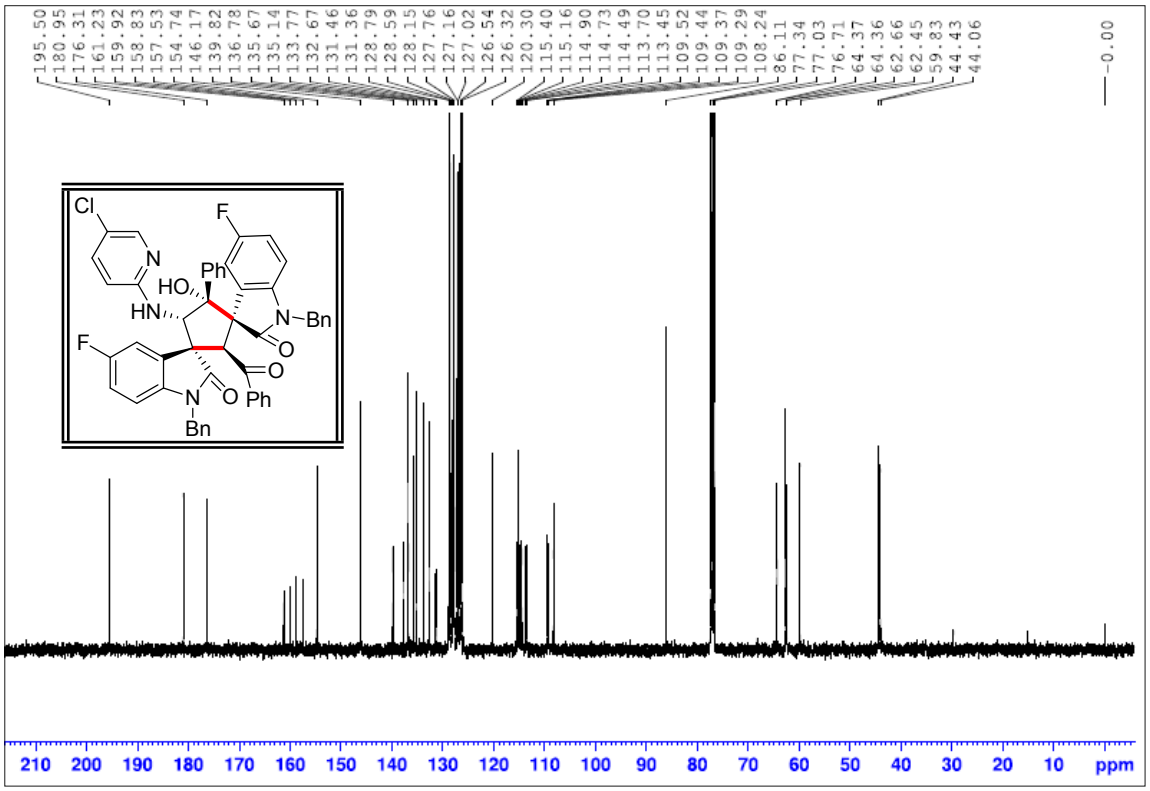

Figure 56. ^{13}C NMR Spectrum of **3k'**

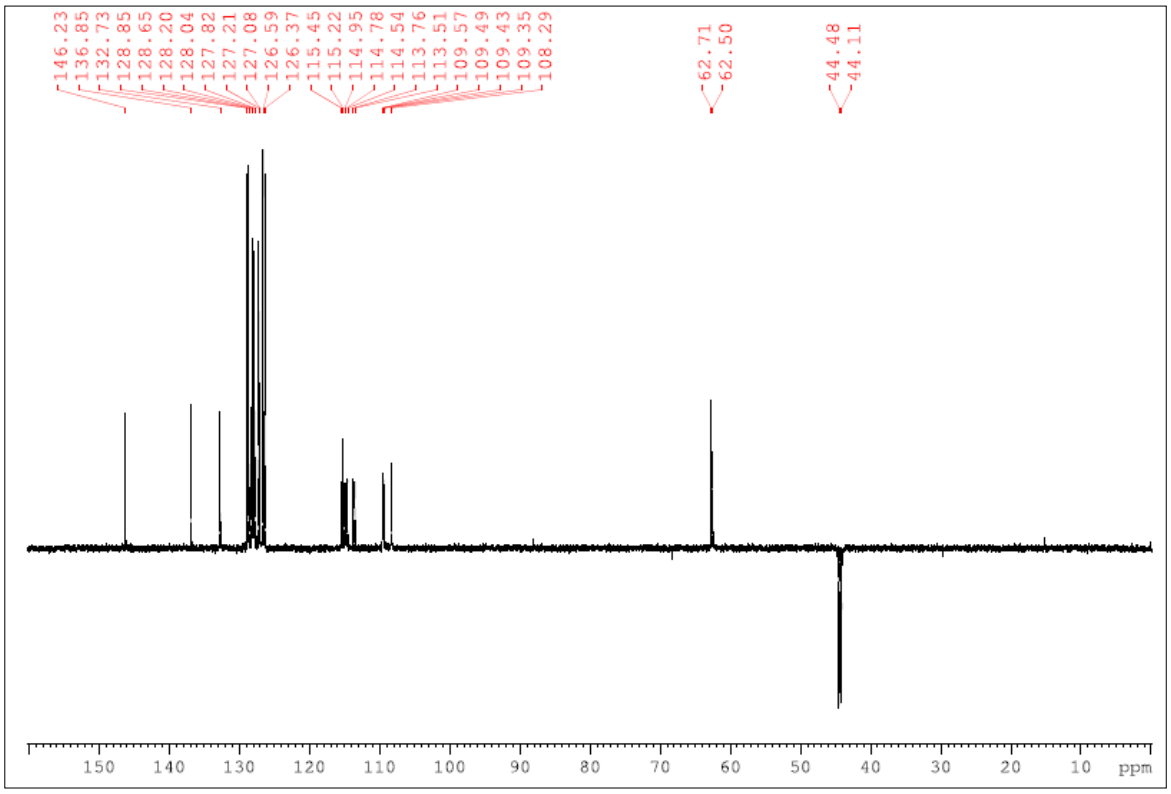

Figure 57. DEPT-135 Spectrum of **3k'**

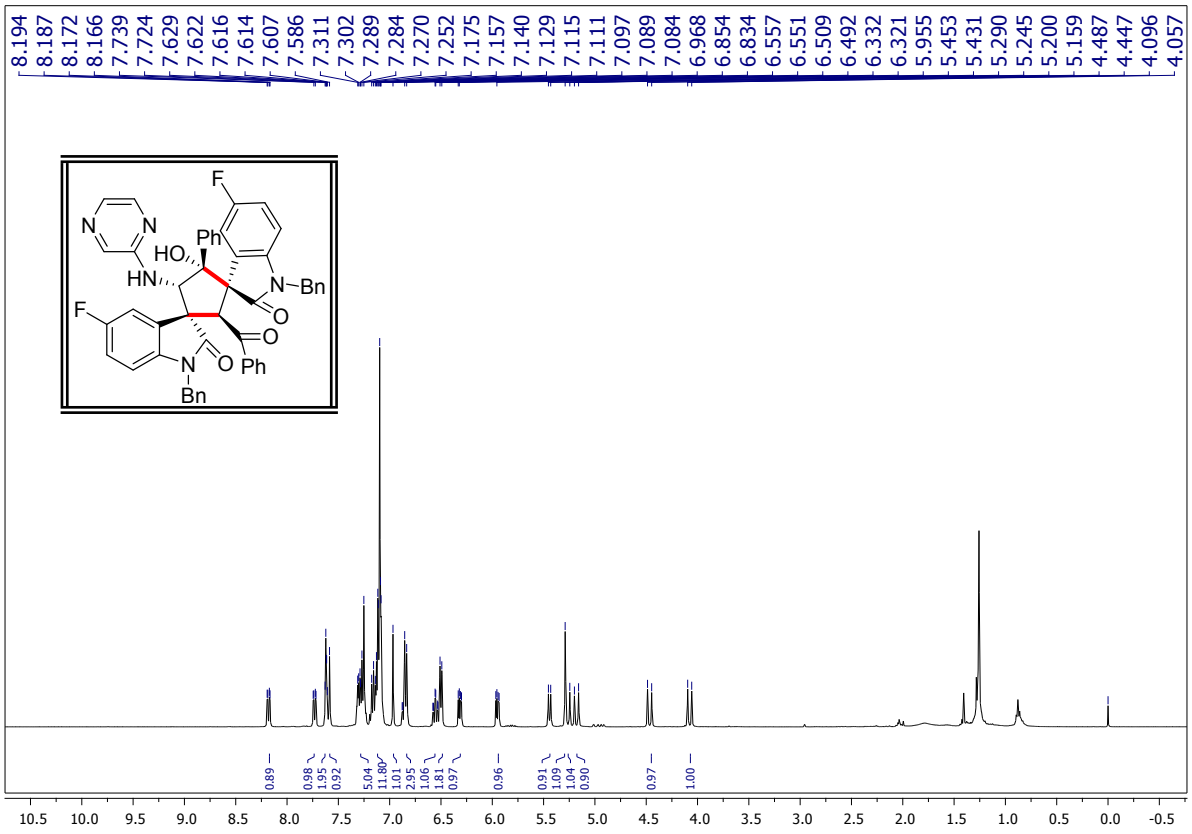

Figure 58. ^{1}H NMR Spectrum of **3l'**

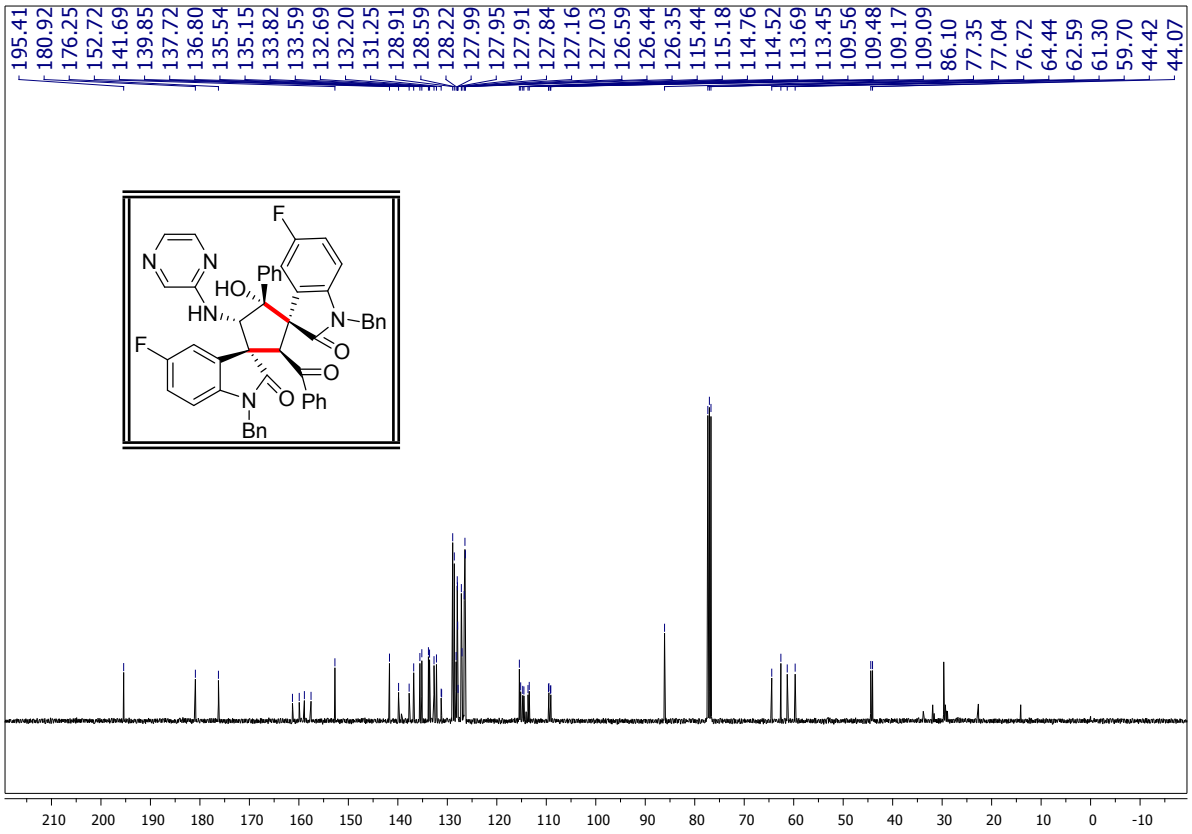

Figure 59. ^{13}C NMR Spectrum of **3l'**

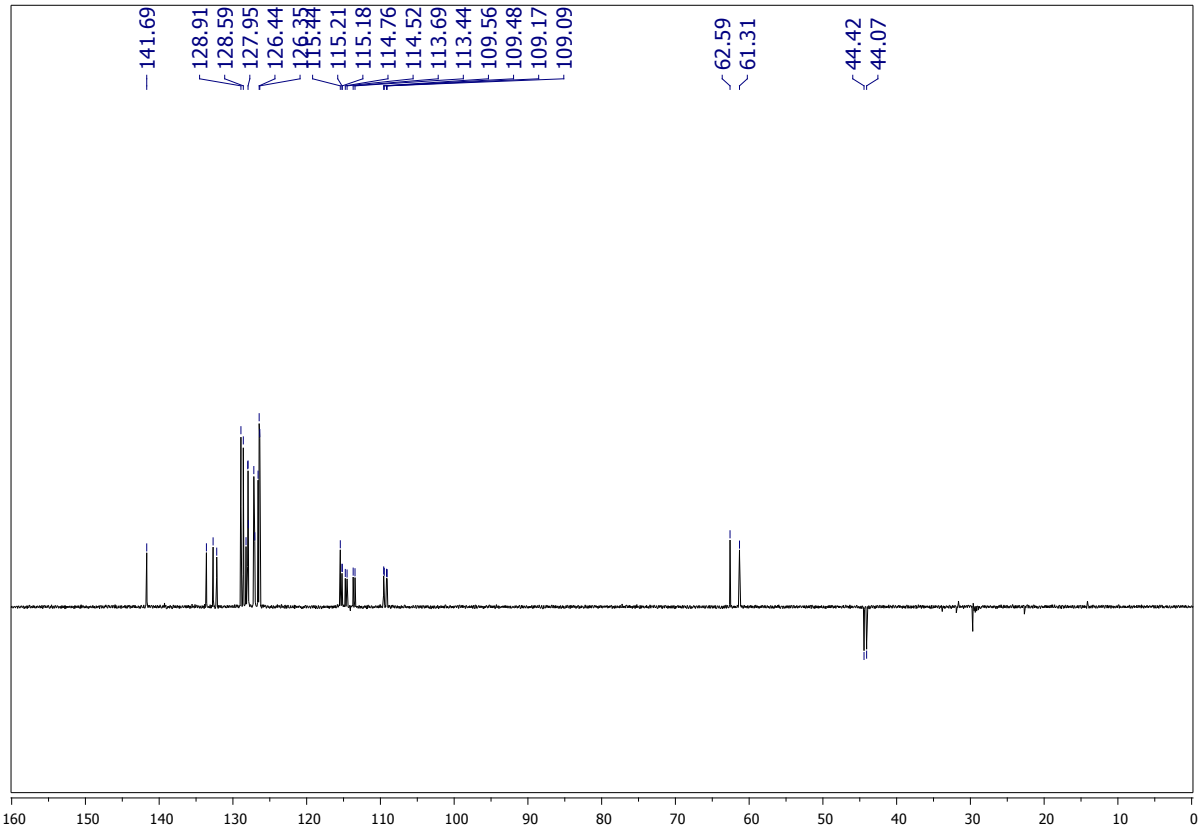

Figure 60. DEPT-135 Spectrum of **3l'**

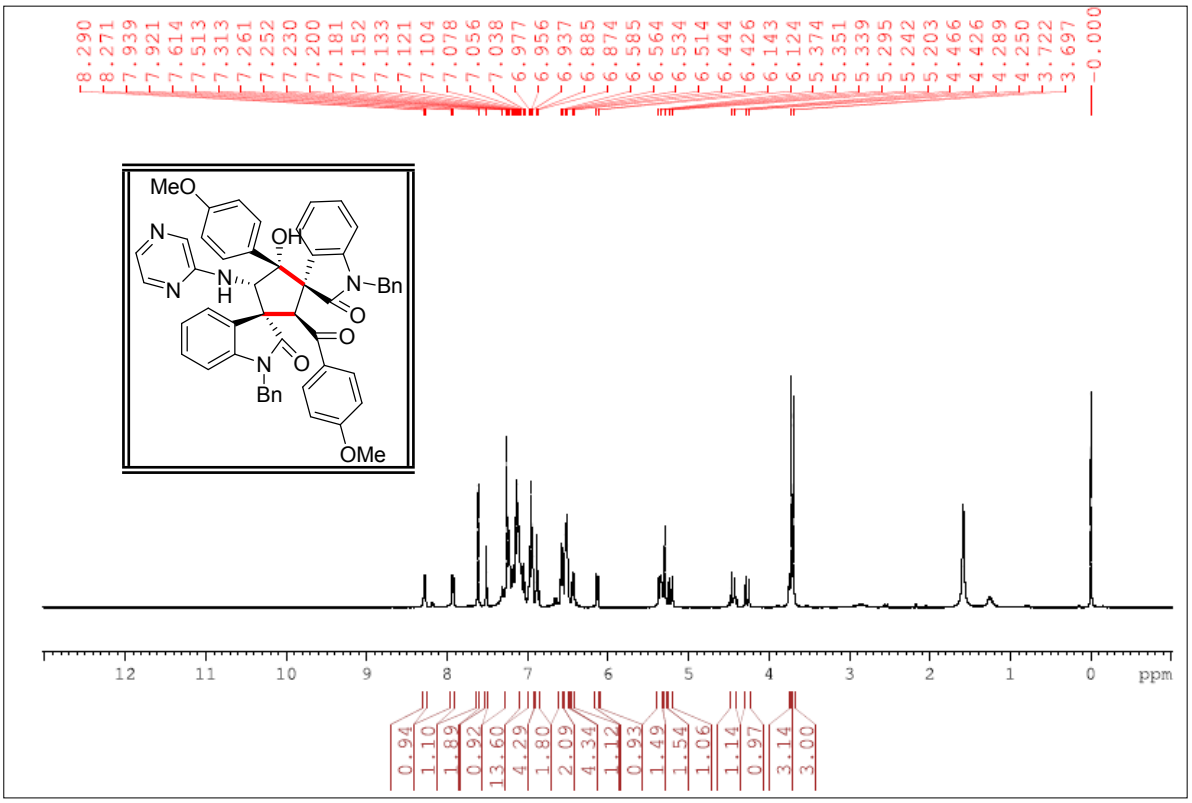

Figure 61. ^{1}H NMR Spectrum of **3m'**

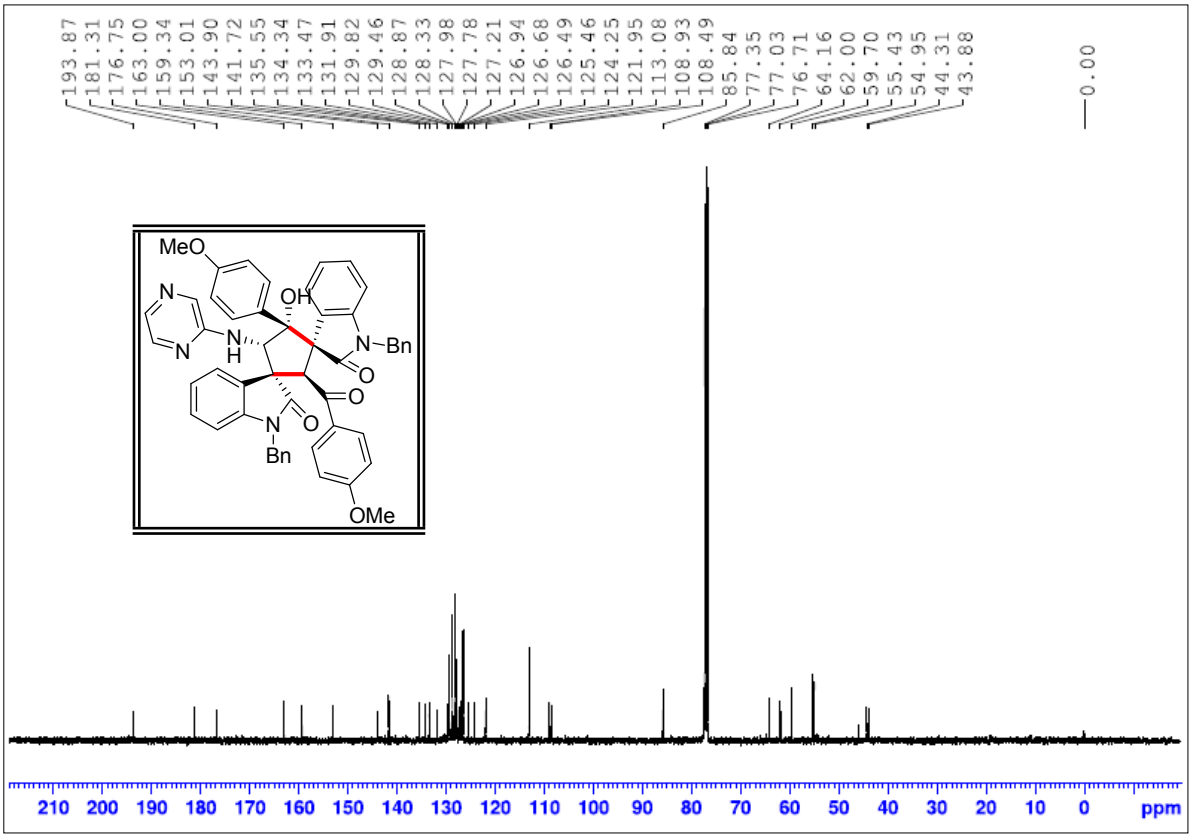

Figure 62. ^{13}C NMR Spectrum of **3m'**

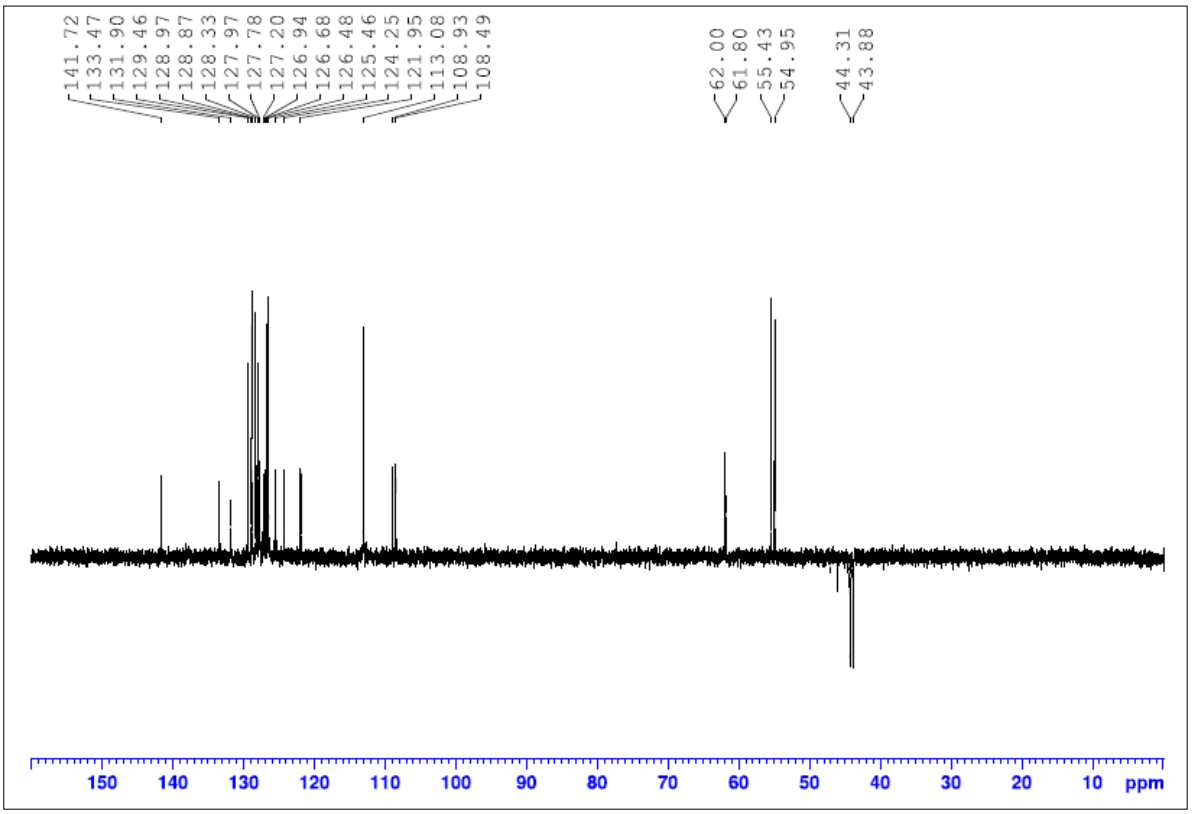

Figure 63. DEPT-135 Spectrum of **3m'**

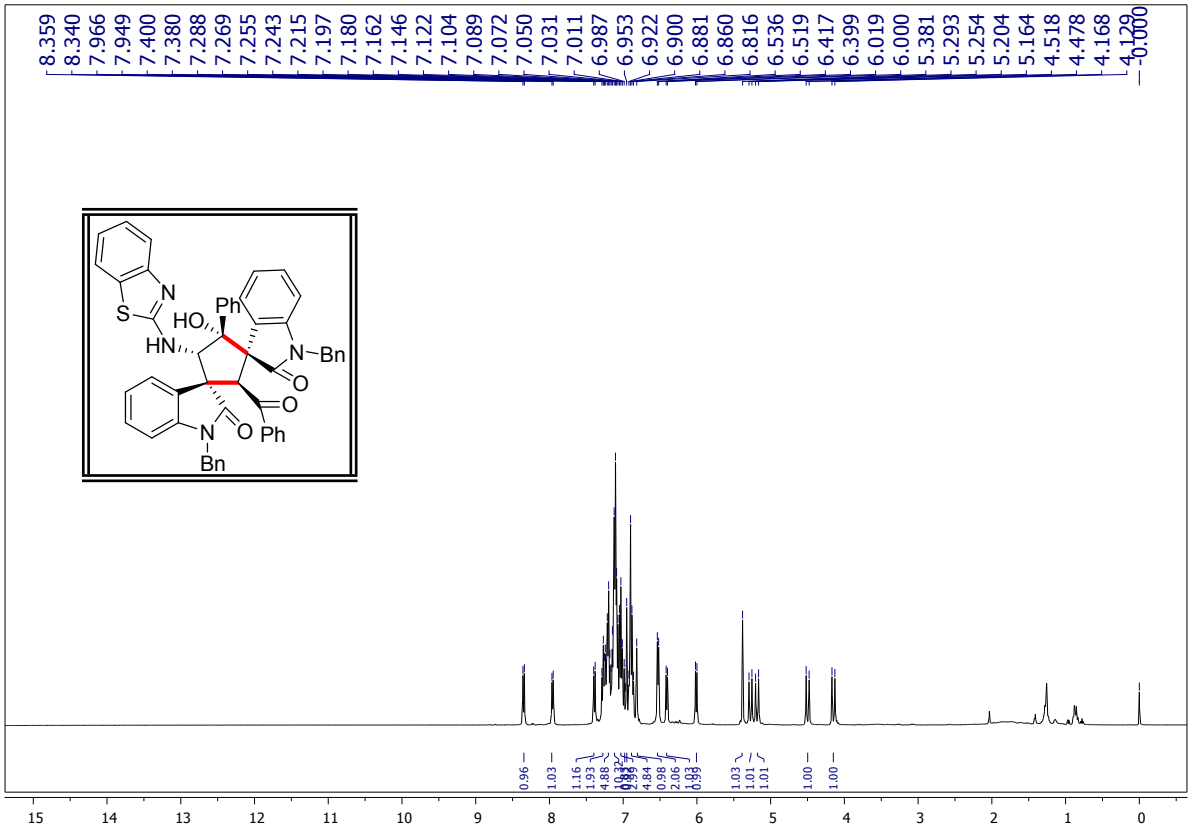

Figure 64. [1]H NMR Spectrum of **3n'**

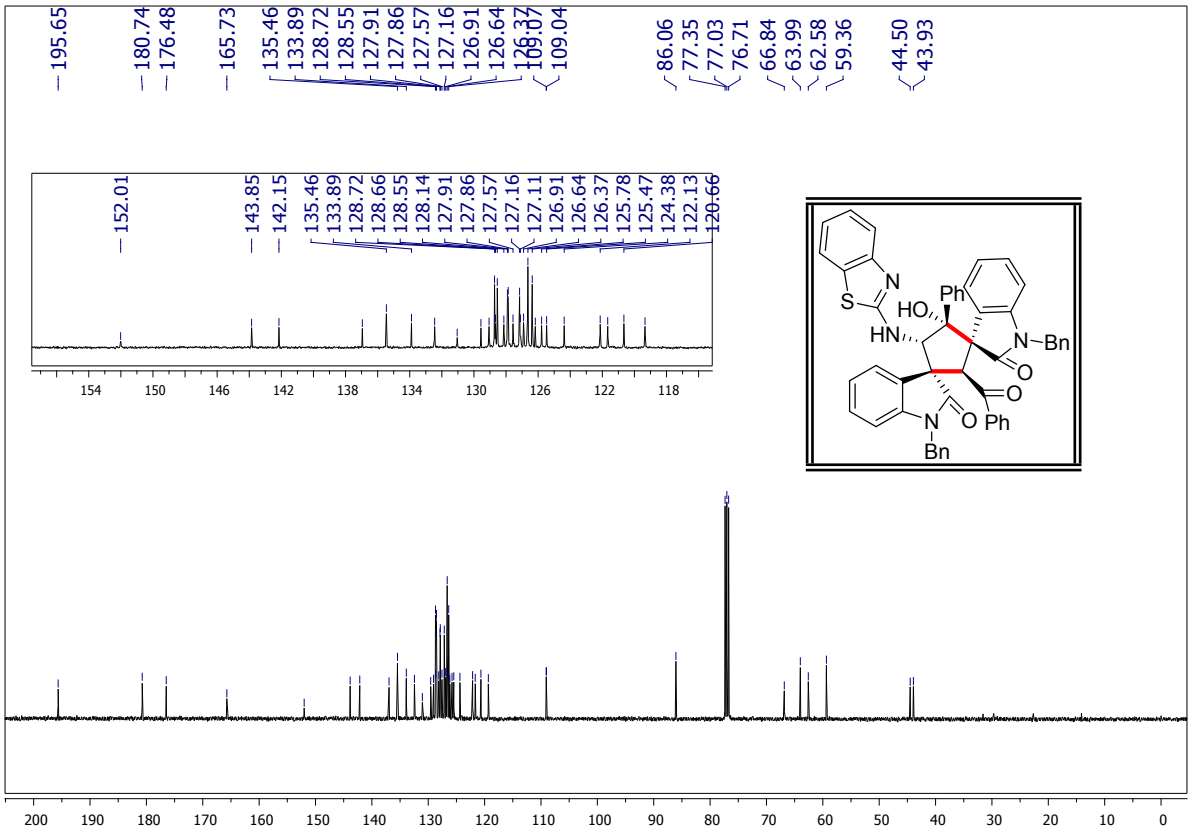

Figure 65. ^{13}C NMR Spectrum of **3n'**

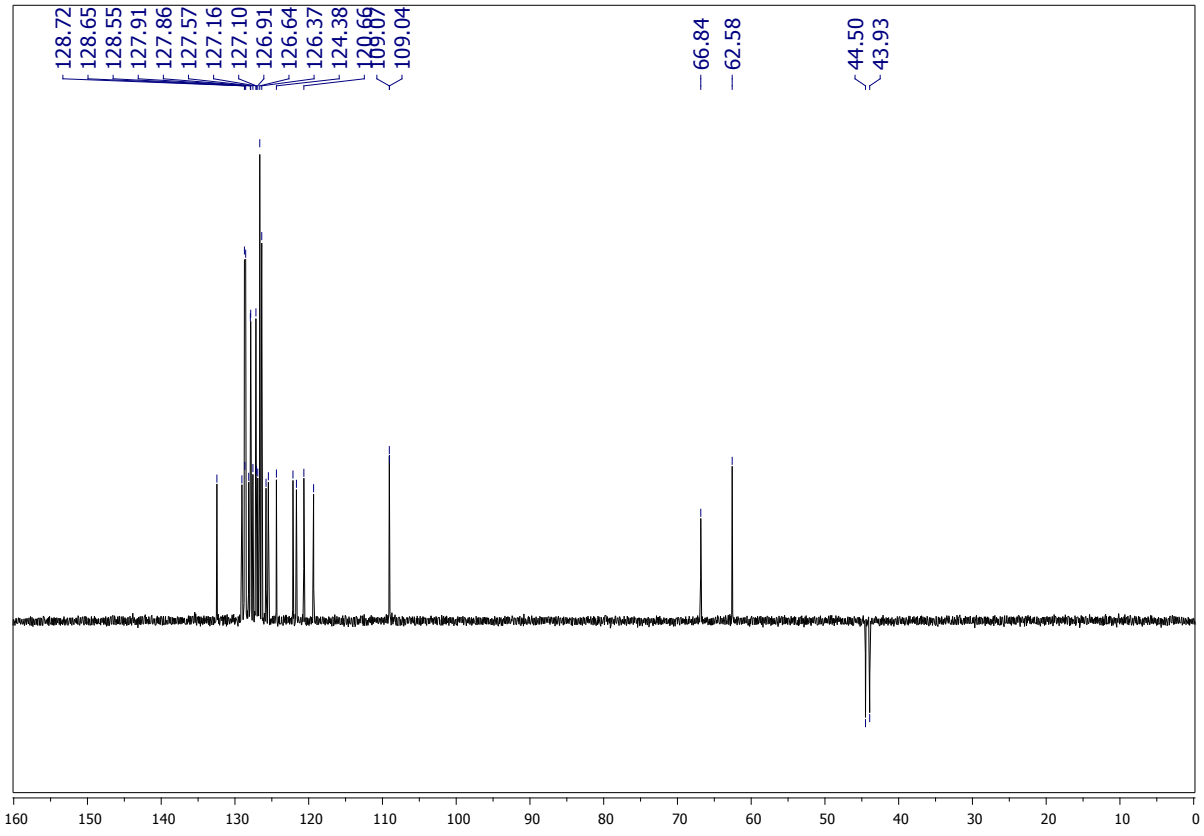

Figure 66. DEPT-135 Spectrum of **3n'**

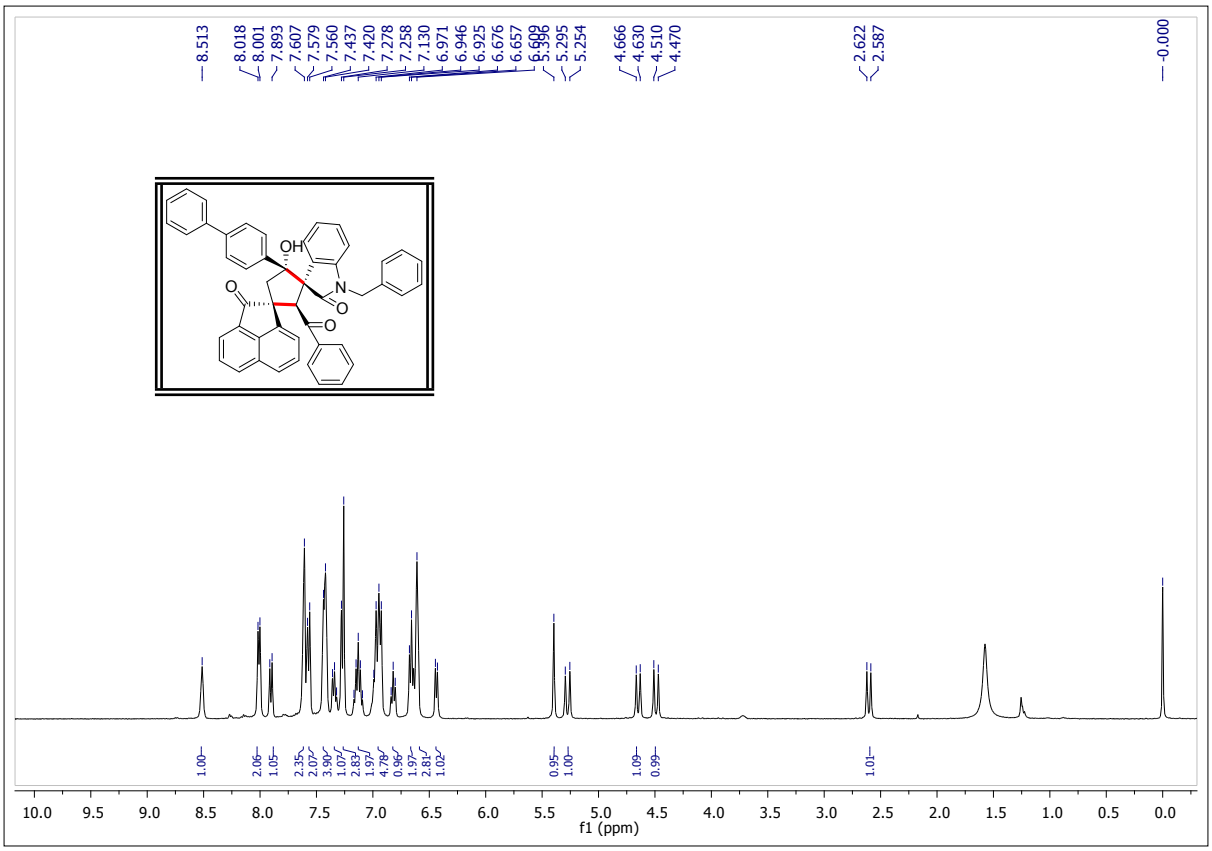

Figure 67. ^{1}H NMR Spectrum of **5a**

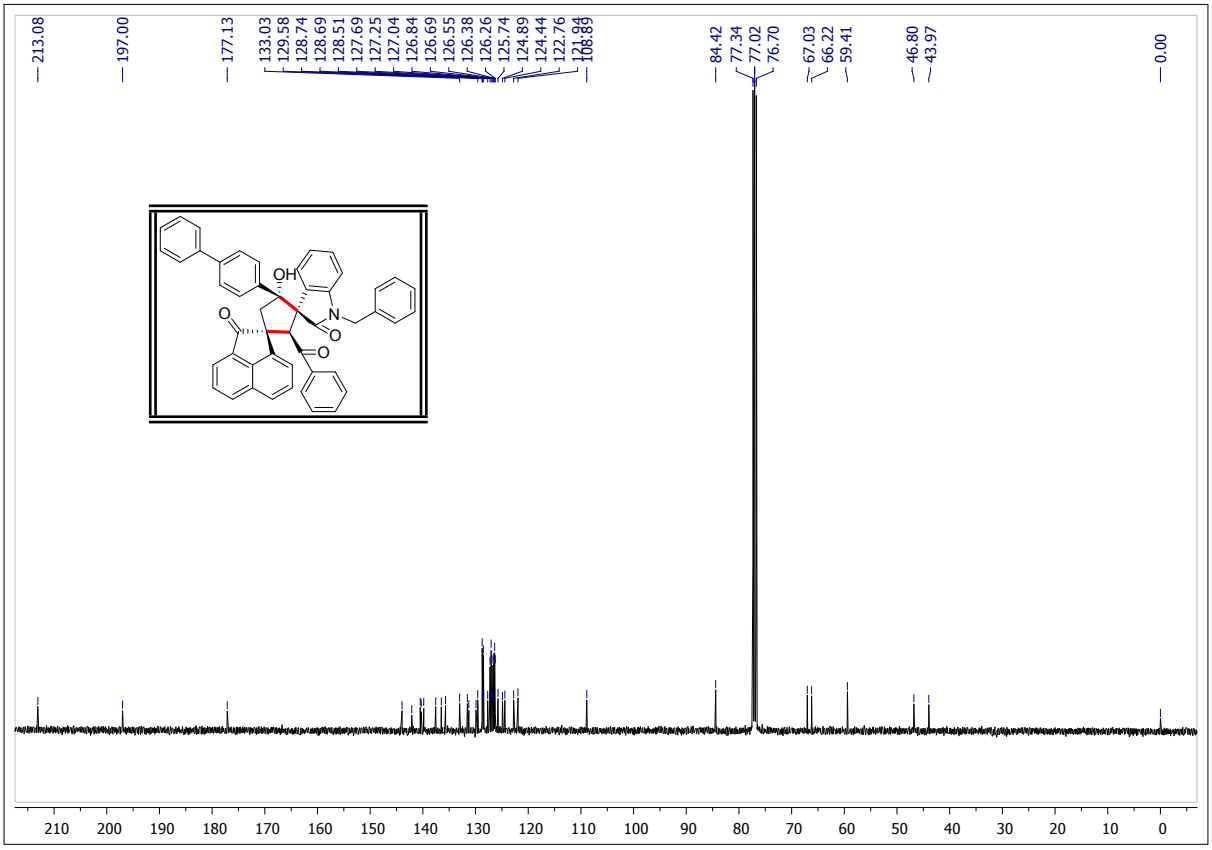

Figure 68. ^{13}C NMR Spectrum of **5a**

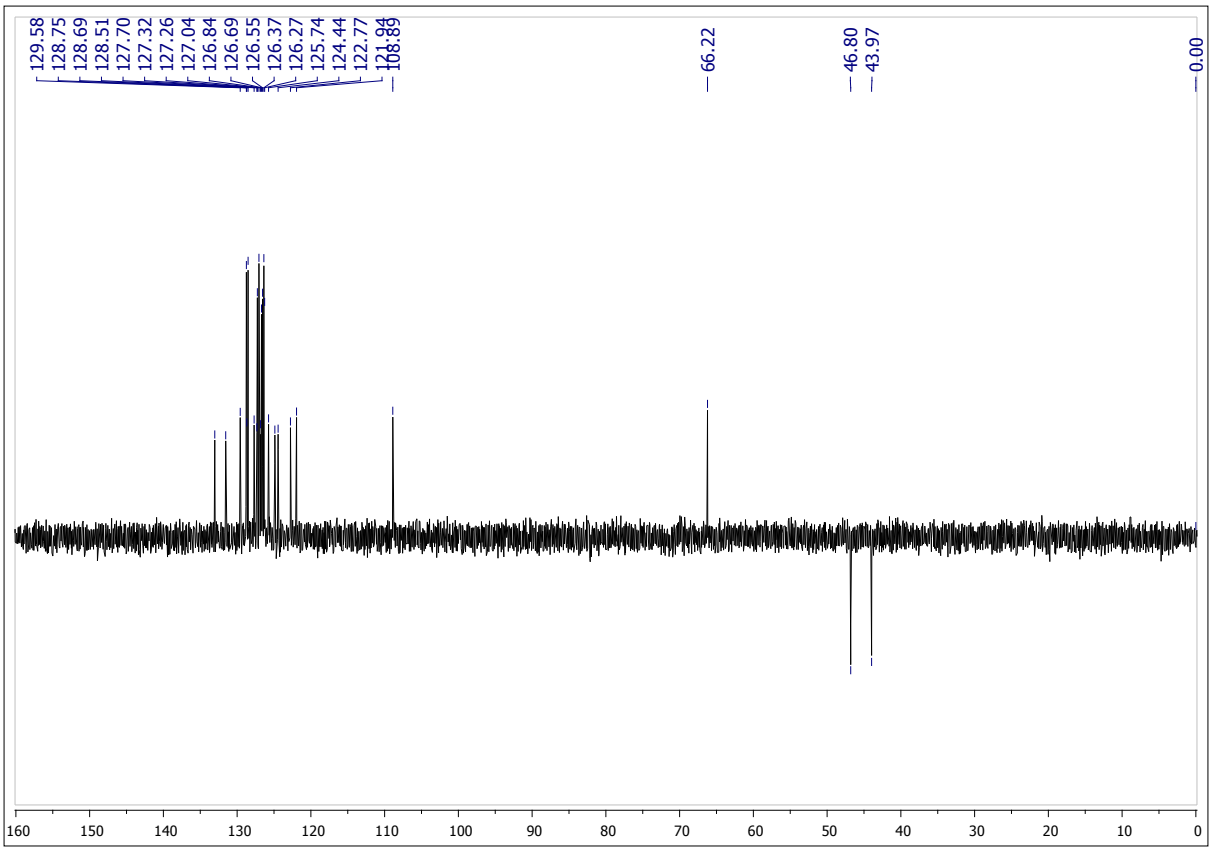

Figure 69. DEPT-135 Spectrum of **5a**

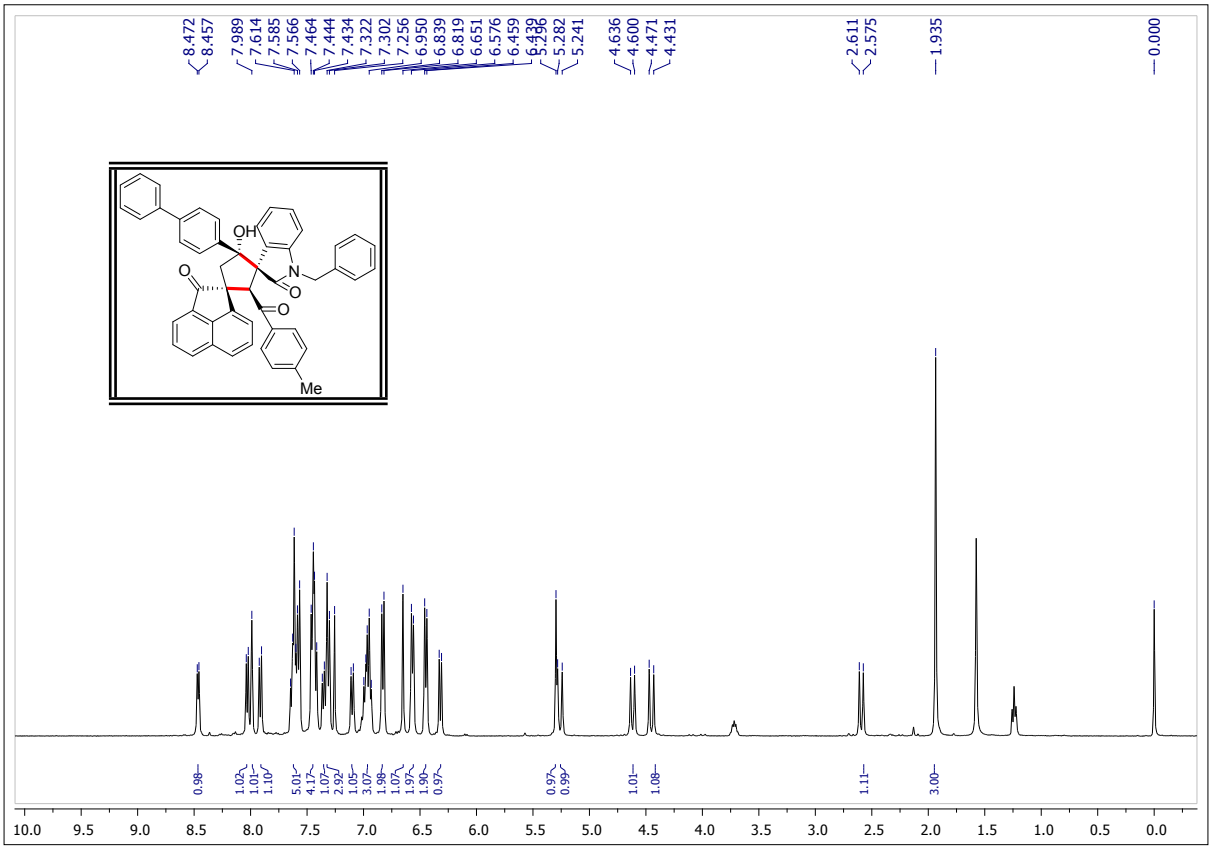

Figure 70. ^{1}H NMR Spectrum of **5b**

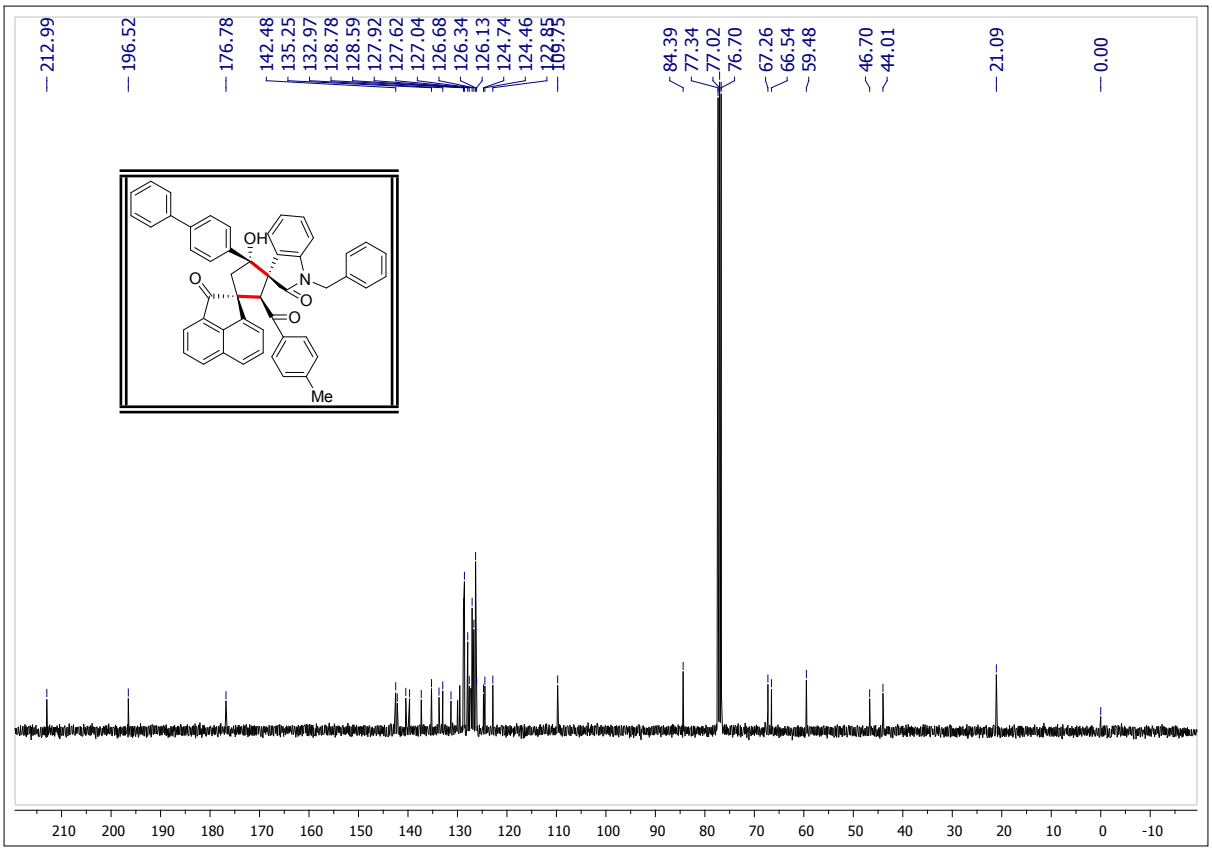

Figure 71. ^{13}C NMR Spectrum of **5b**

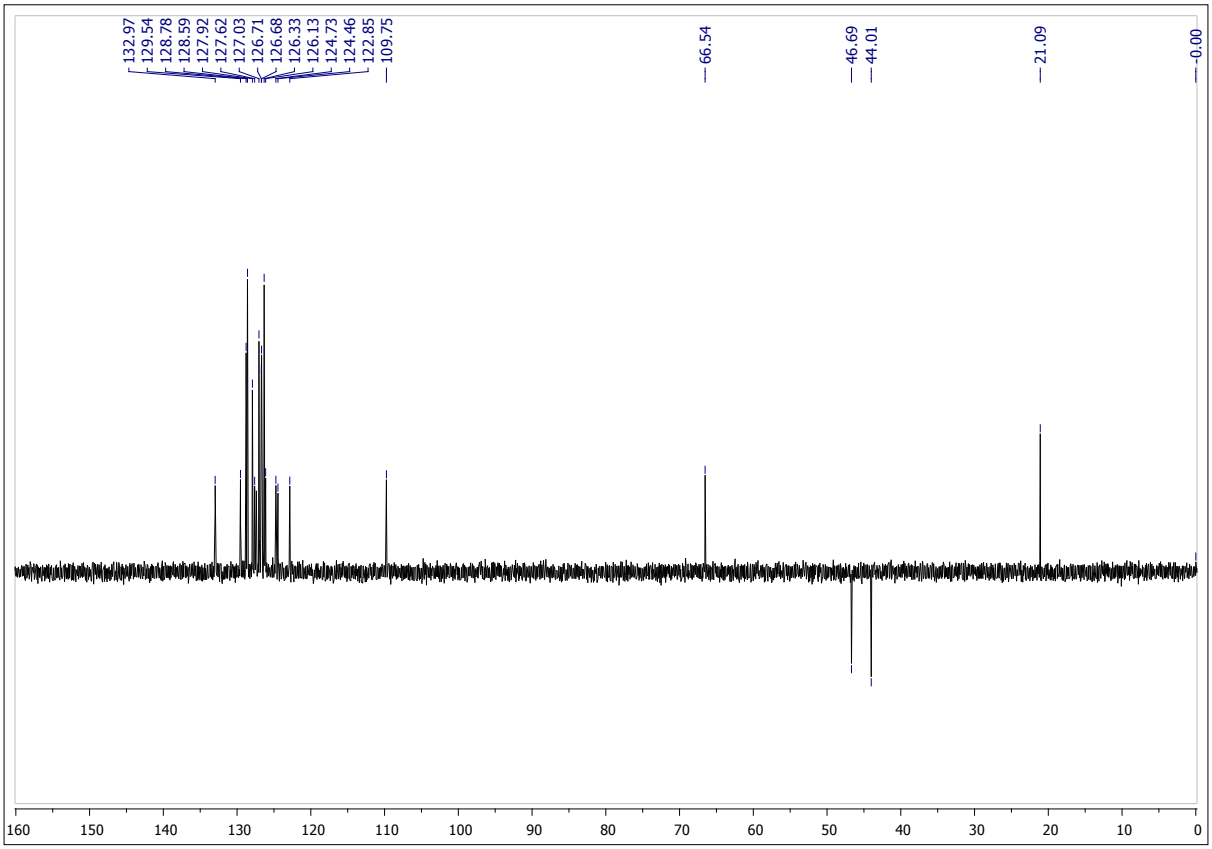

Figure 72. DEPT-135 Spectrum of **5b**

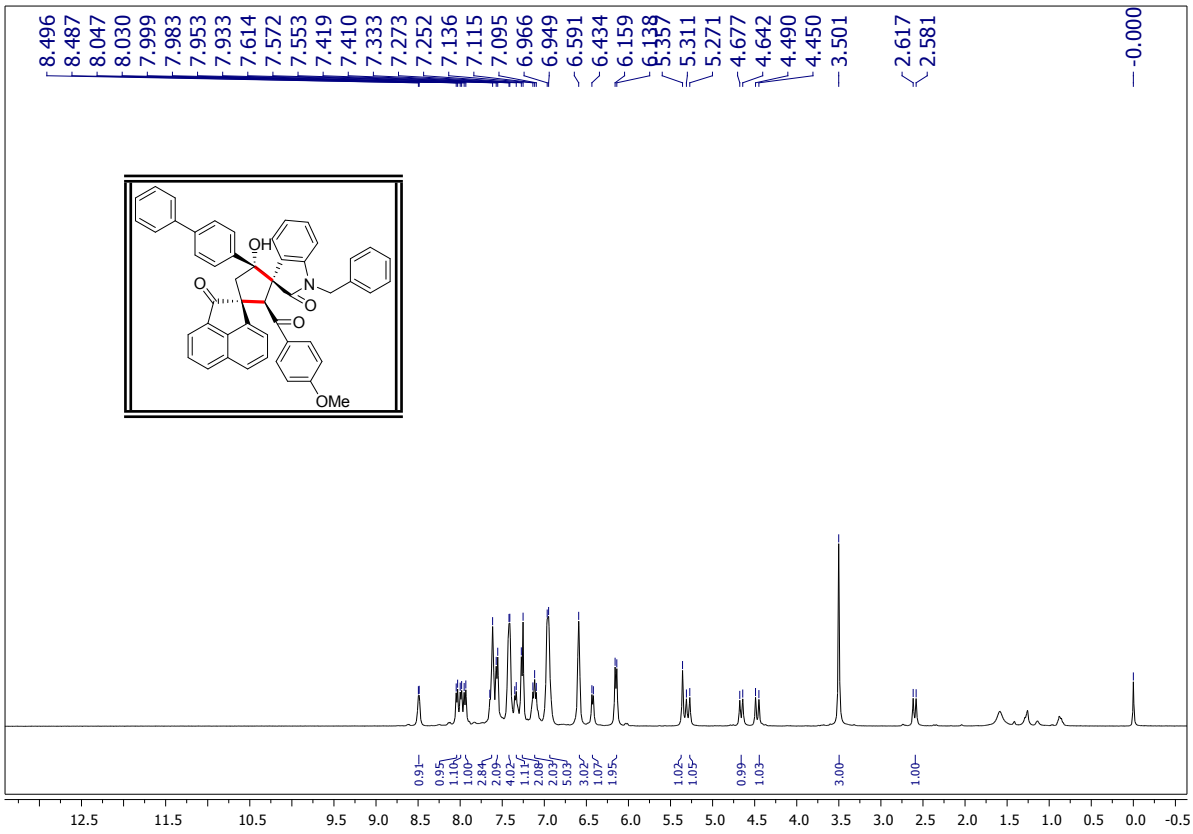

Figure 73. ^{1}H NMR Spectrum of **5c**

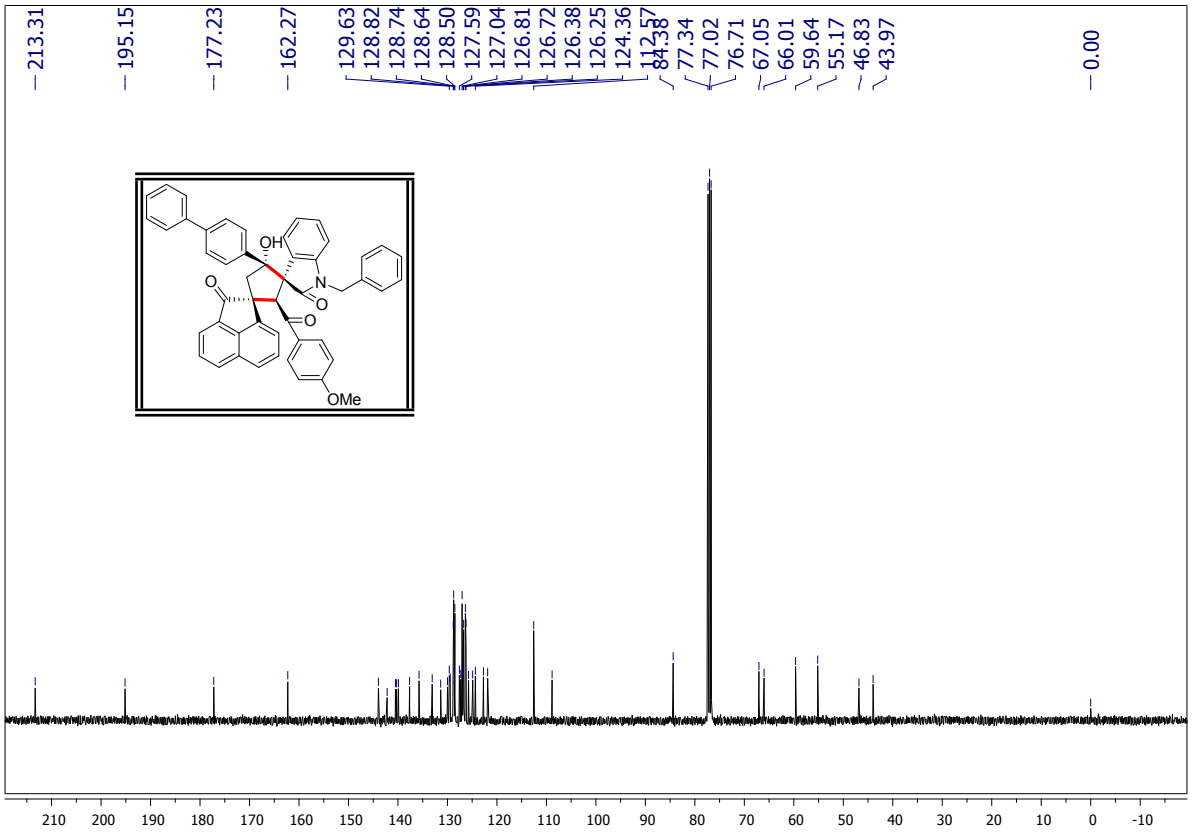

Figure 74. ^{13}C NMR Spectrum of **5c**

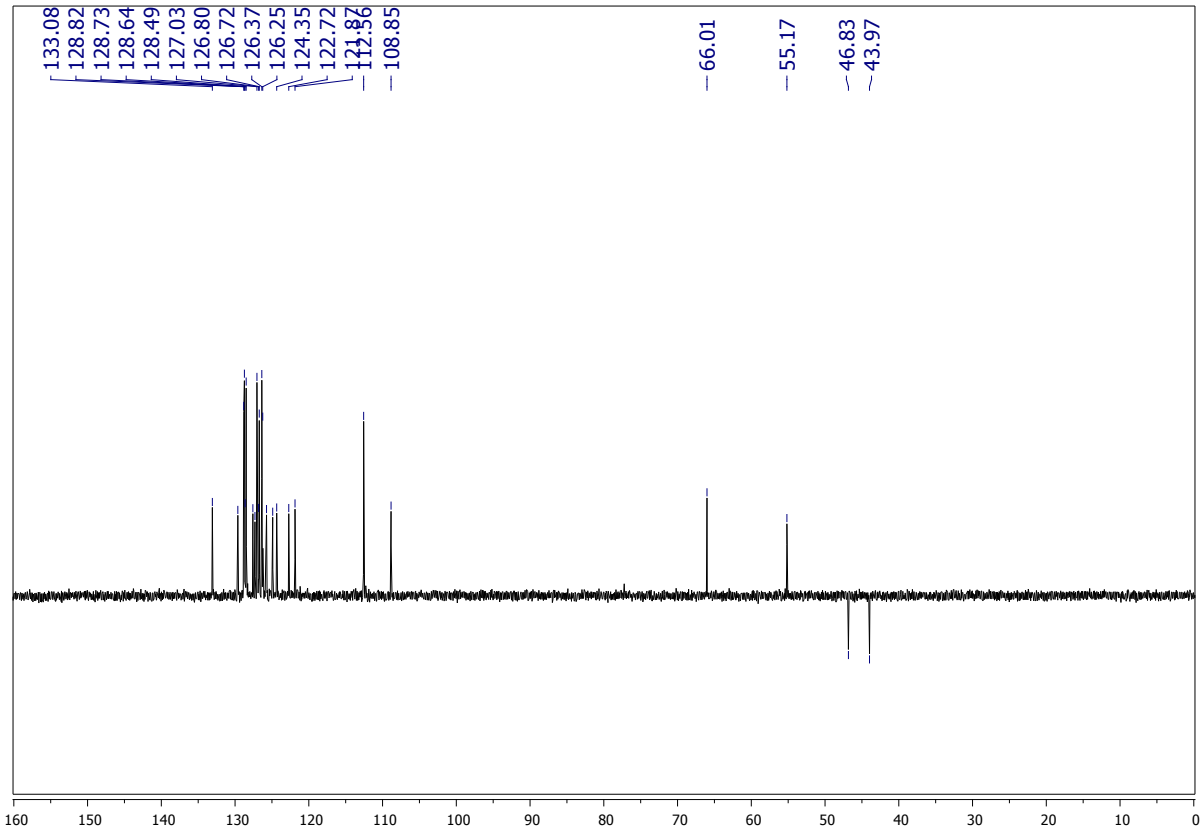

Figure 75. DEPT-135 Spectrum of **5c**

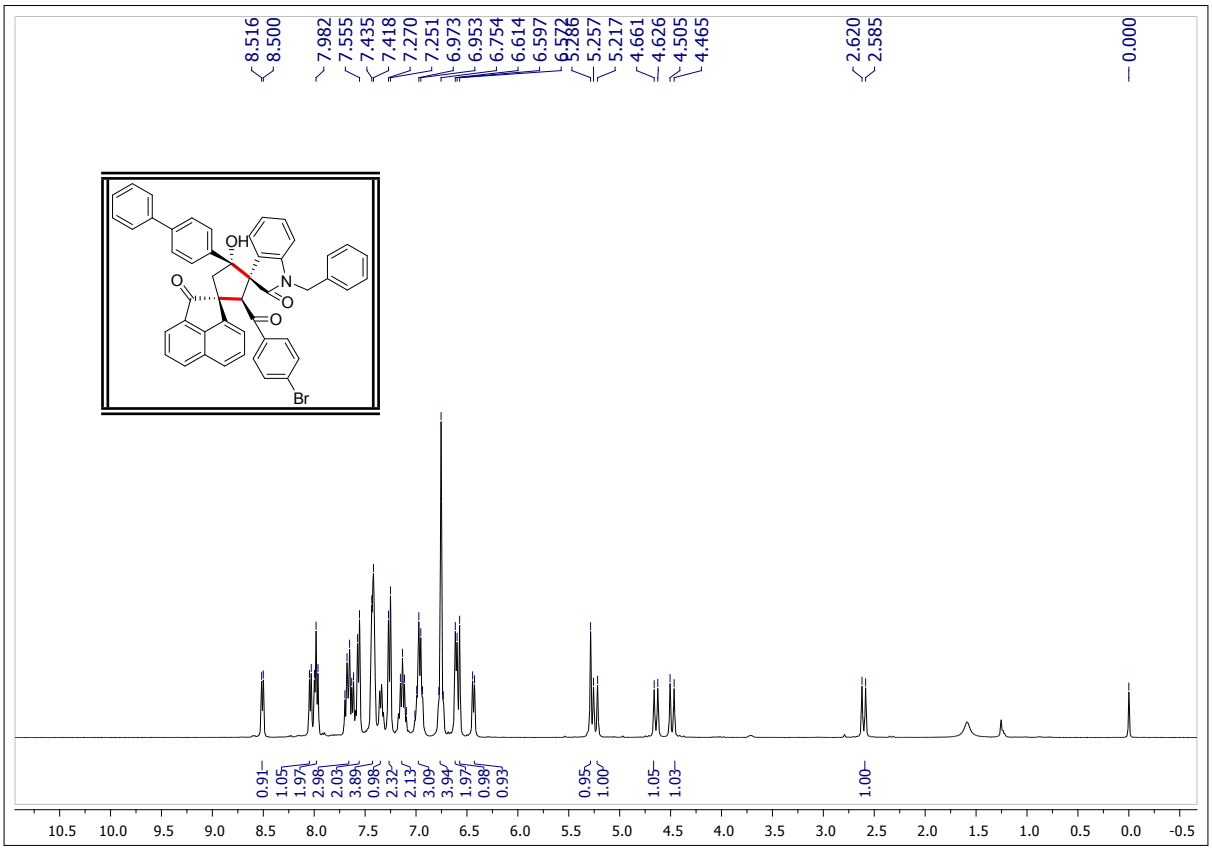

Figure 76. ^{1}H NMR Spectrum of **5d**

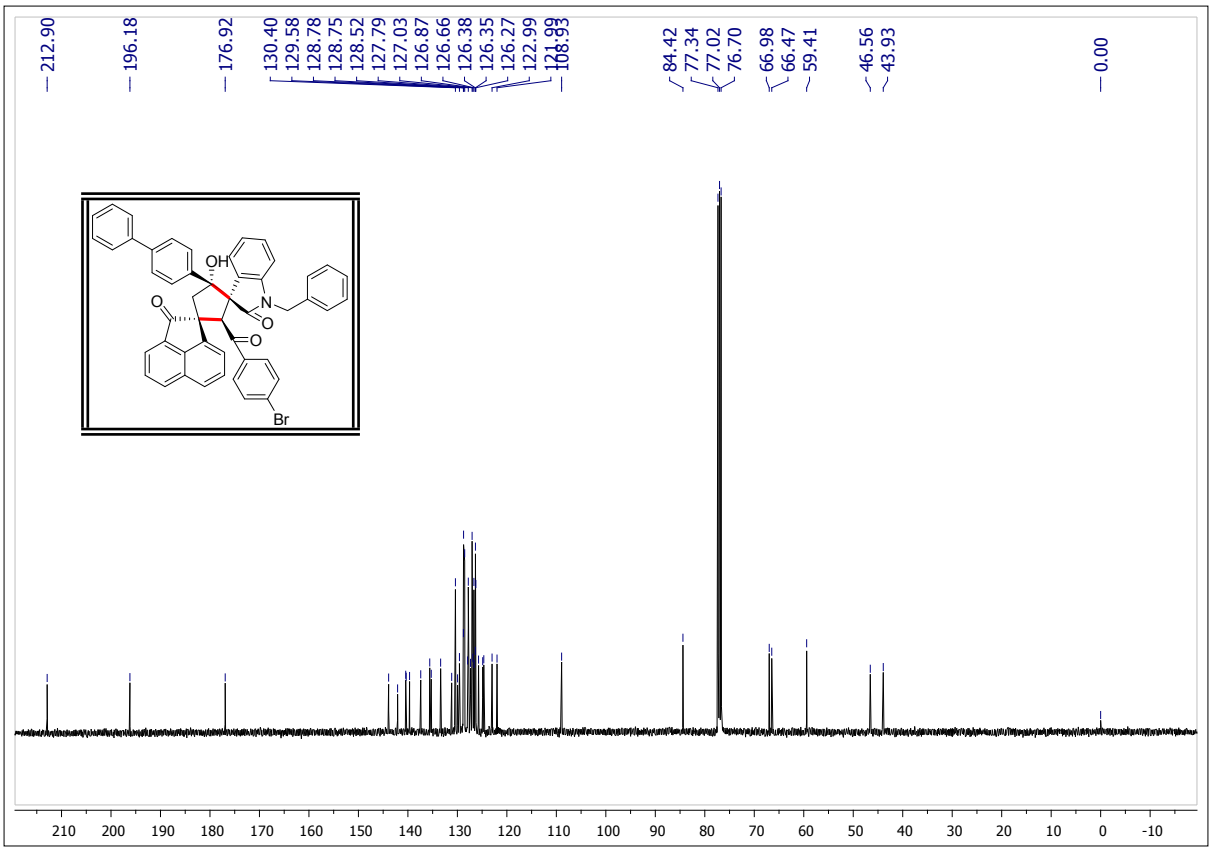

Figure 77. ^{13}C NMR Spectrum of **5d**

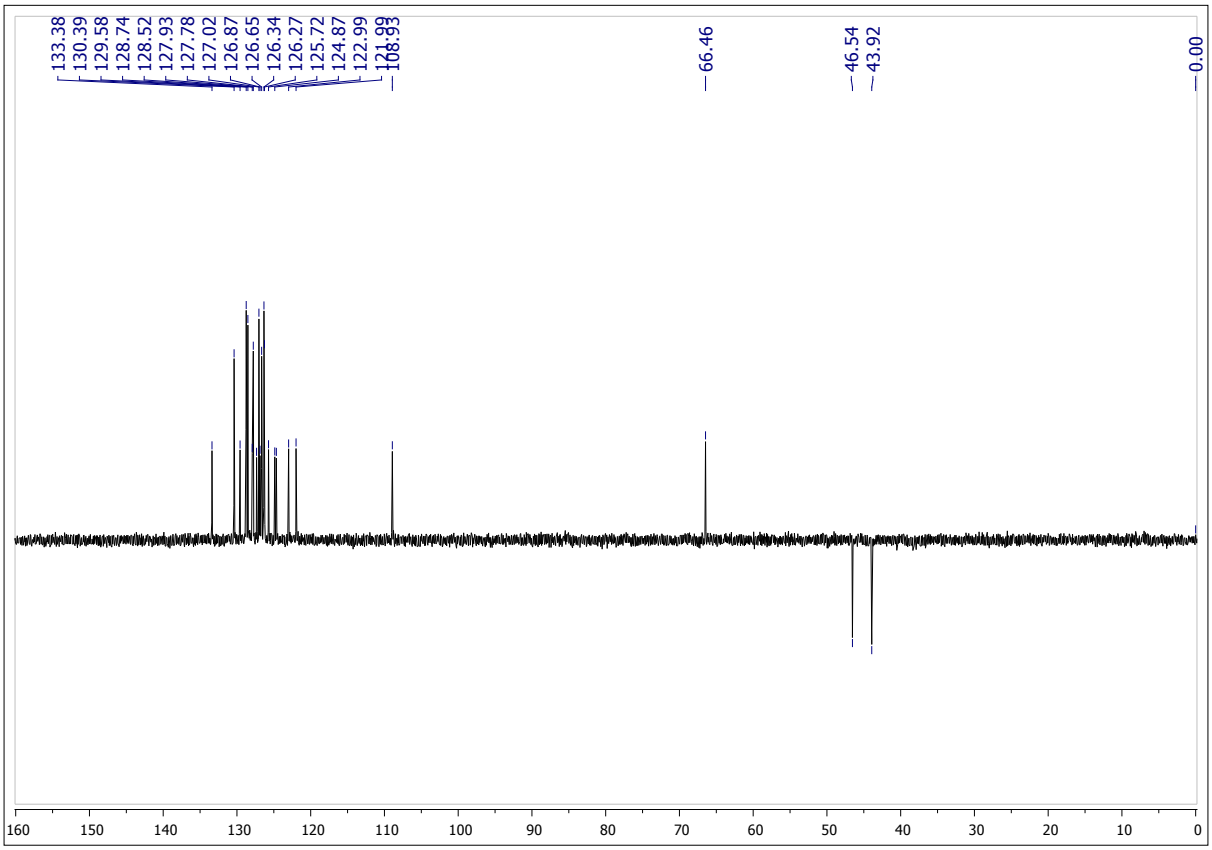

Figure 78. DEPT-135 Spectrum of **5d**

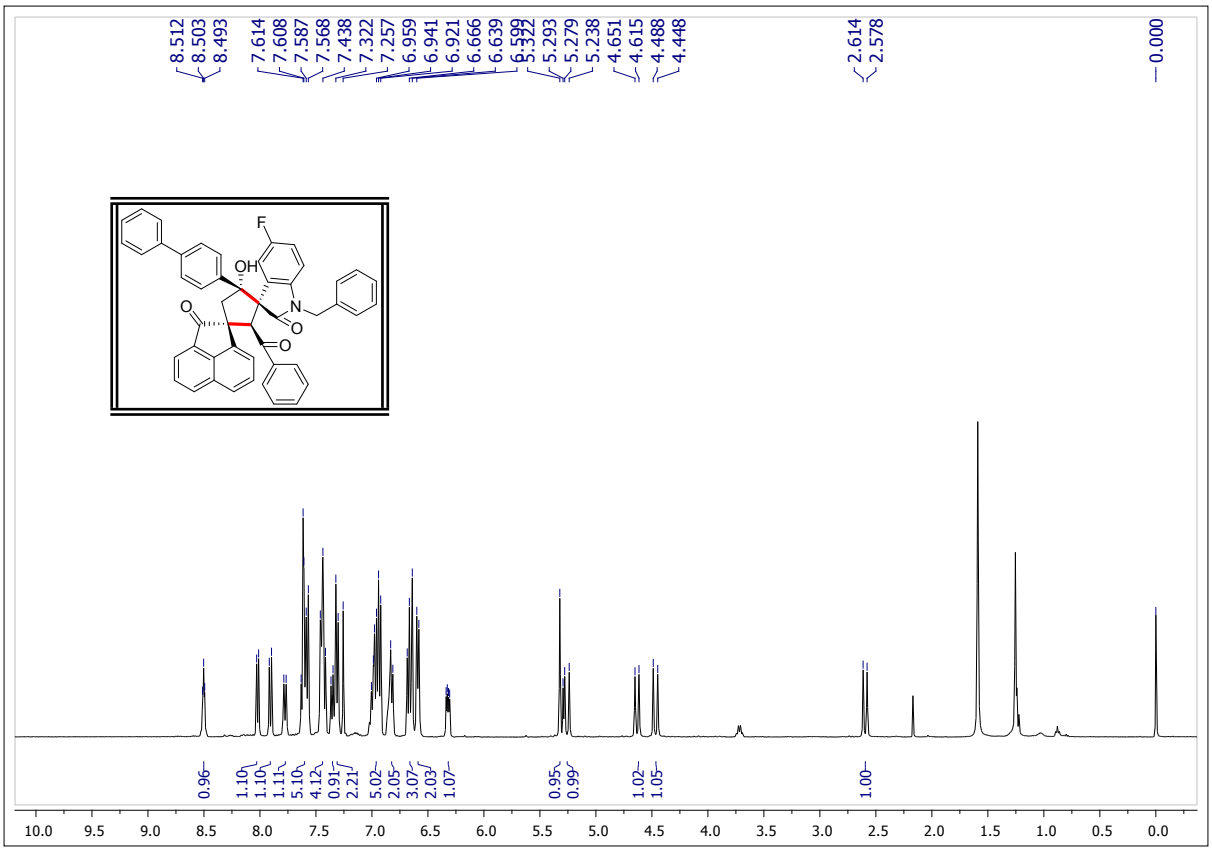

Figure 79. ^{1}H NMR Spectrum of **5e**

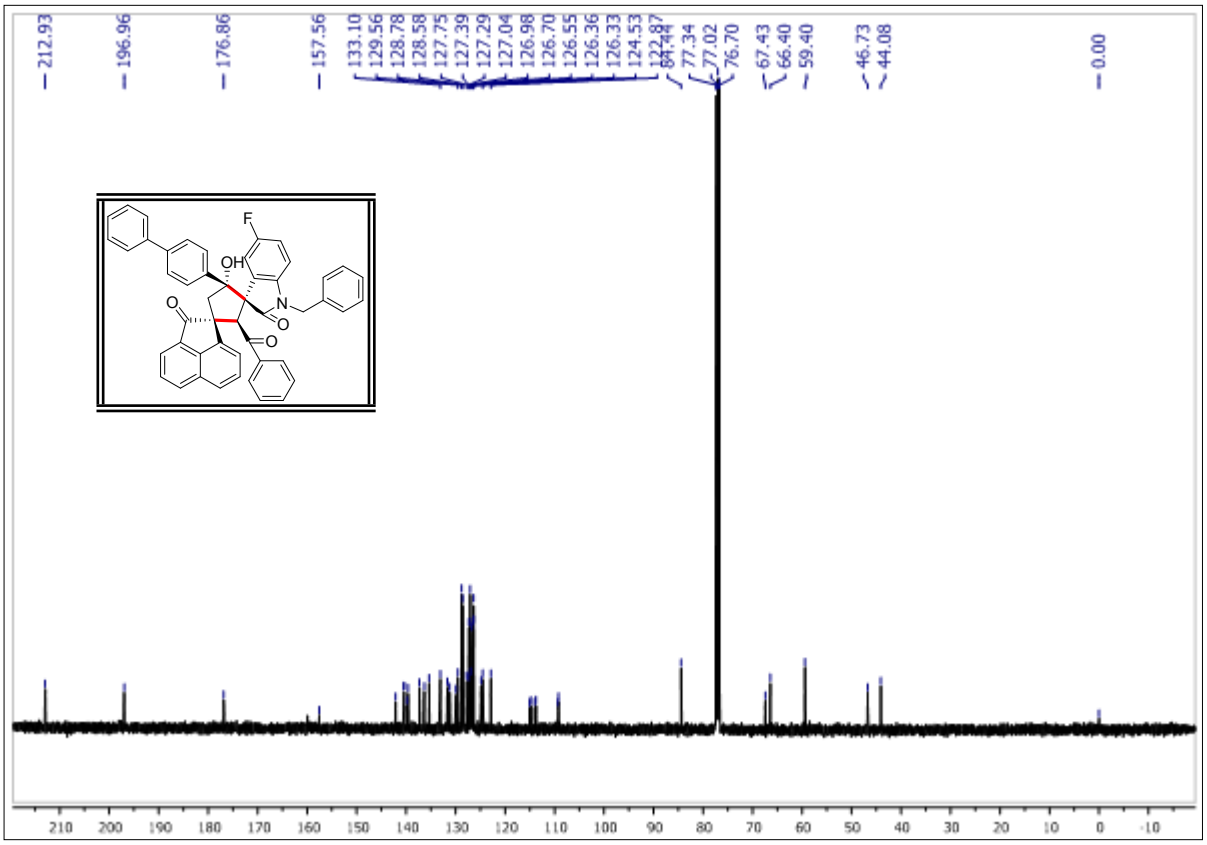

Figure 80. ^{13}C NMR Spectrum of **5e**

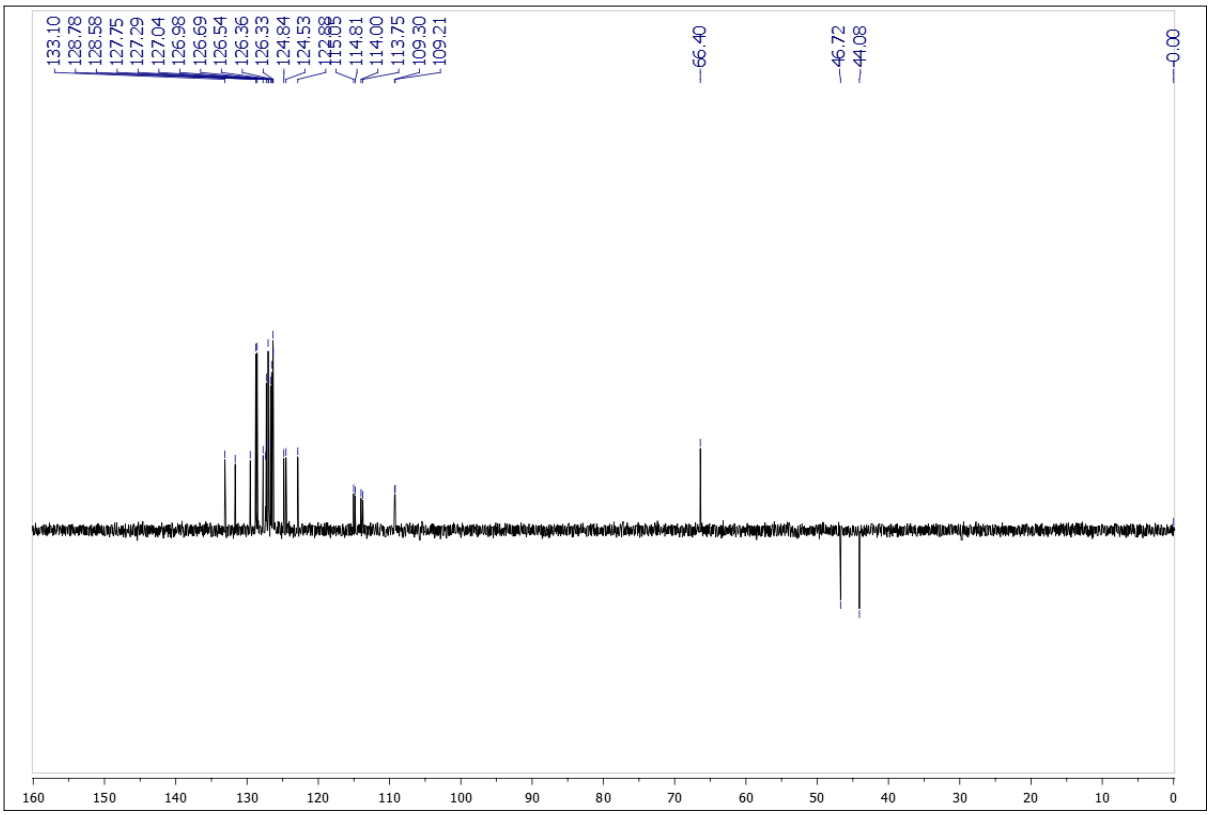

Figure 81. DEPT-135 Spectrum of **5e**

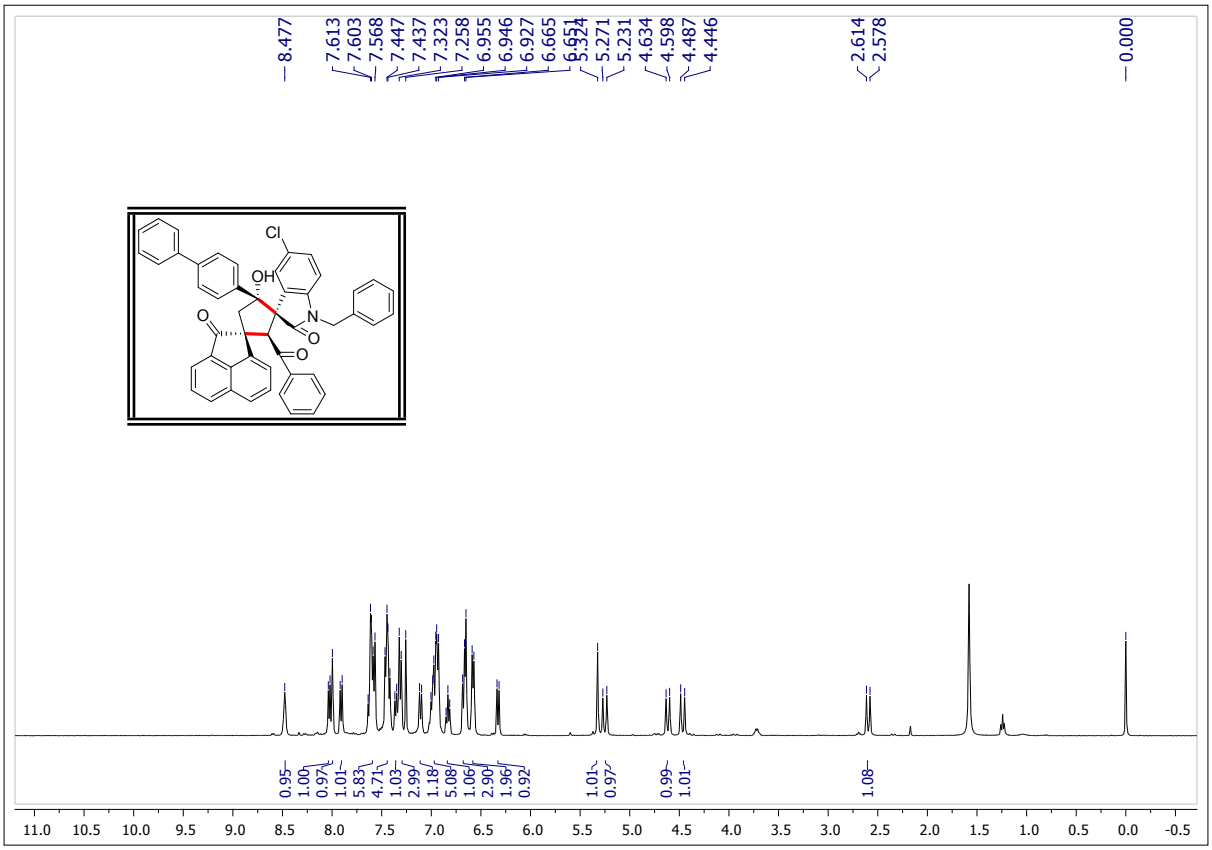

Figure 82. ^{1}H NMR Spectrum of **5f**

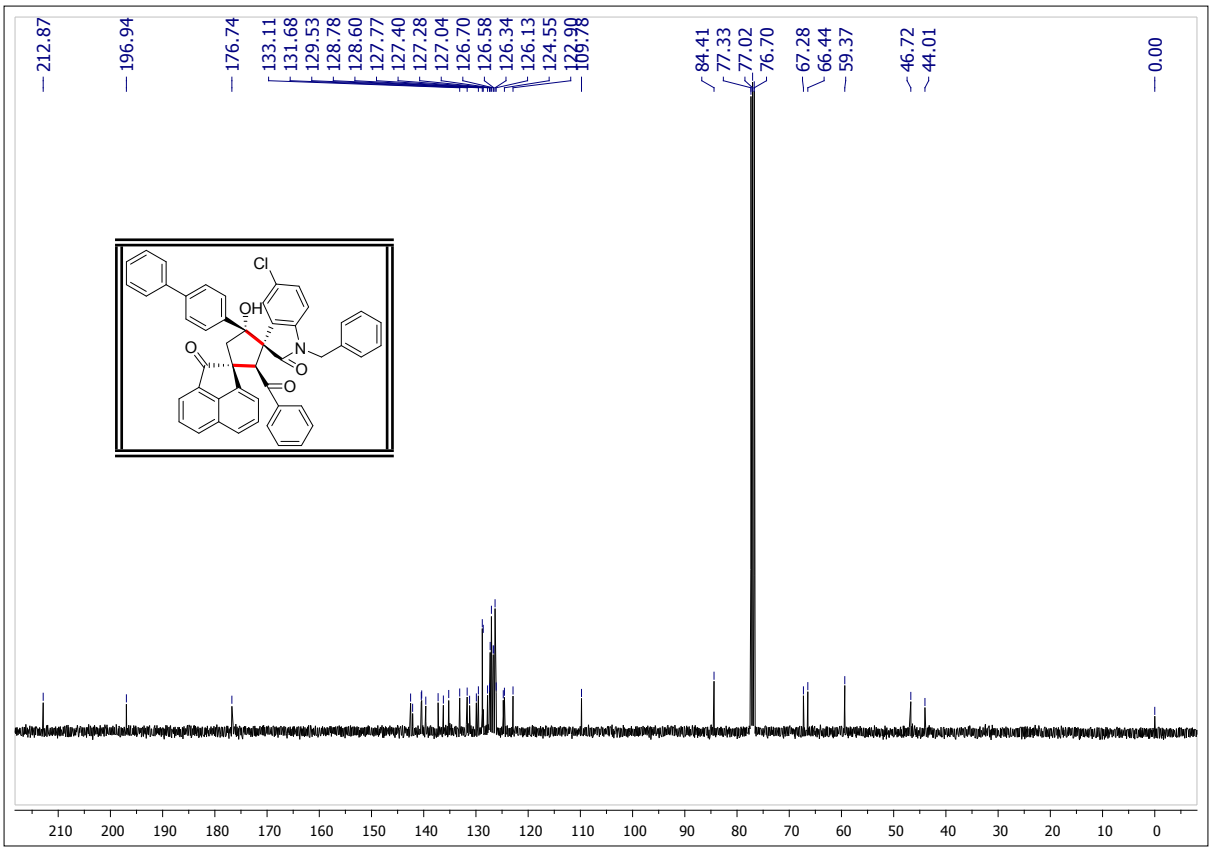

Figure 83. ^{13}C NMR Spectrum of **5f**

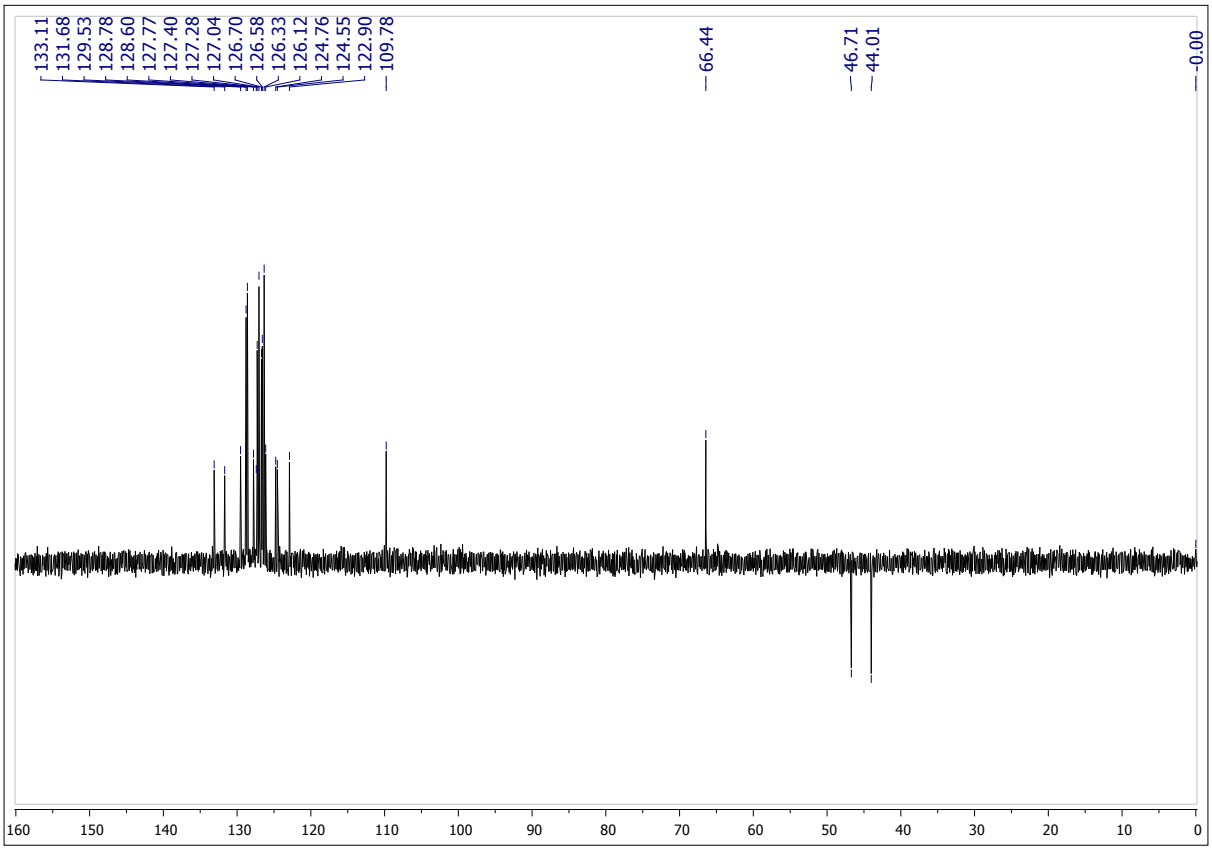

Figure 84. DEPT-135 Spectrum of **5f**

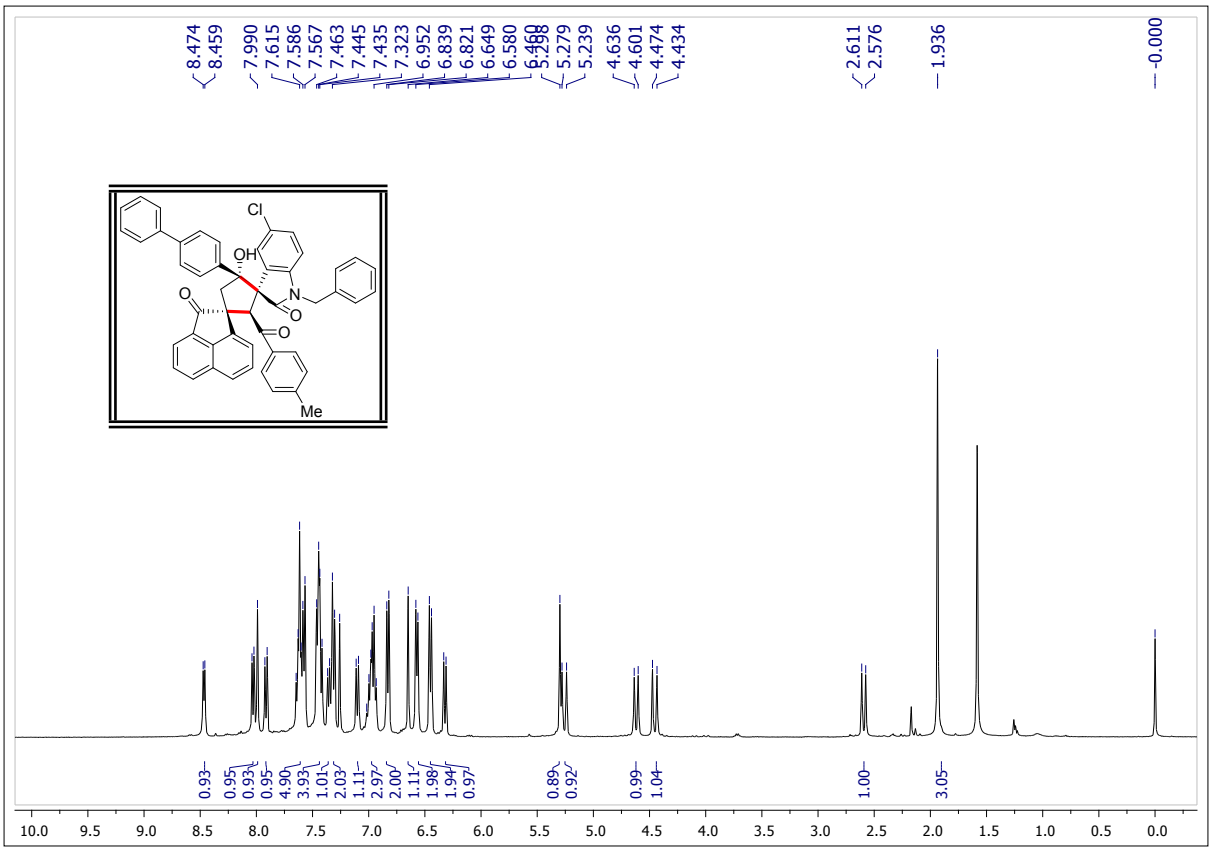

Figure 85. ^{1}H NMR Spectrum of **5g**

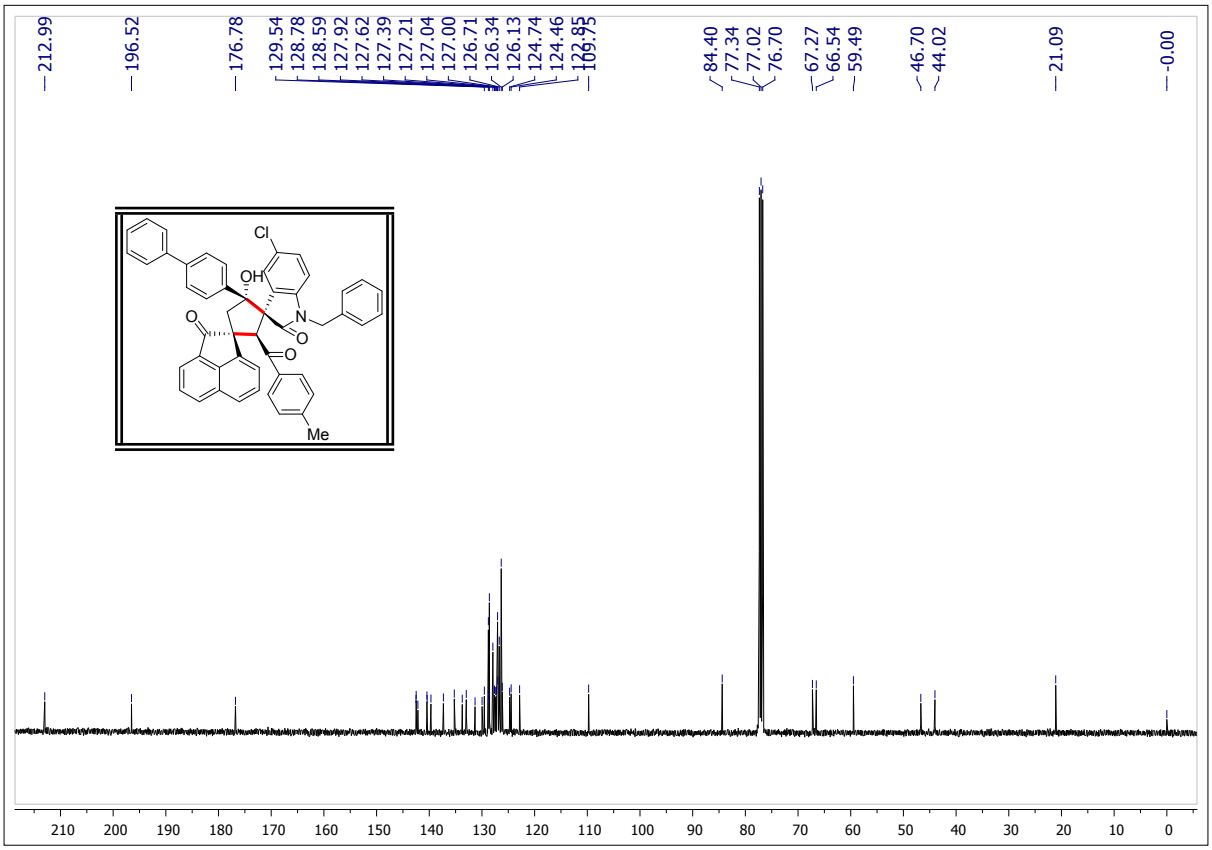

Figure 86. ^{13}C NMR Spectrum of **5g**

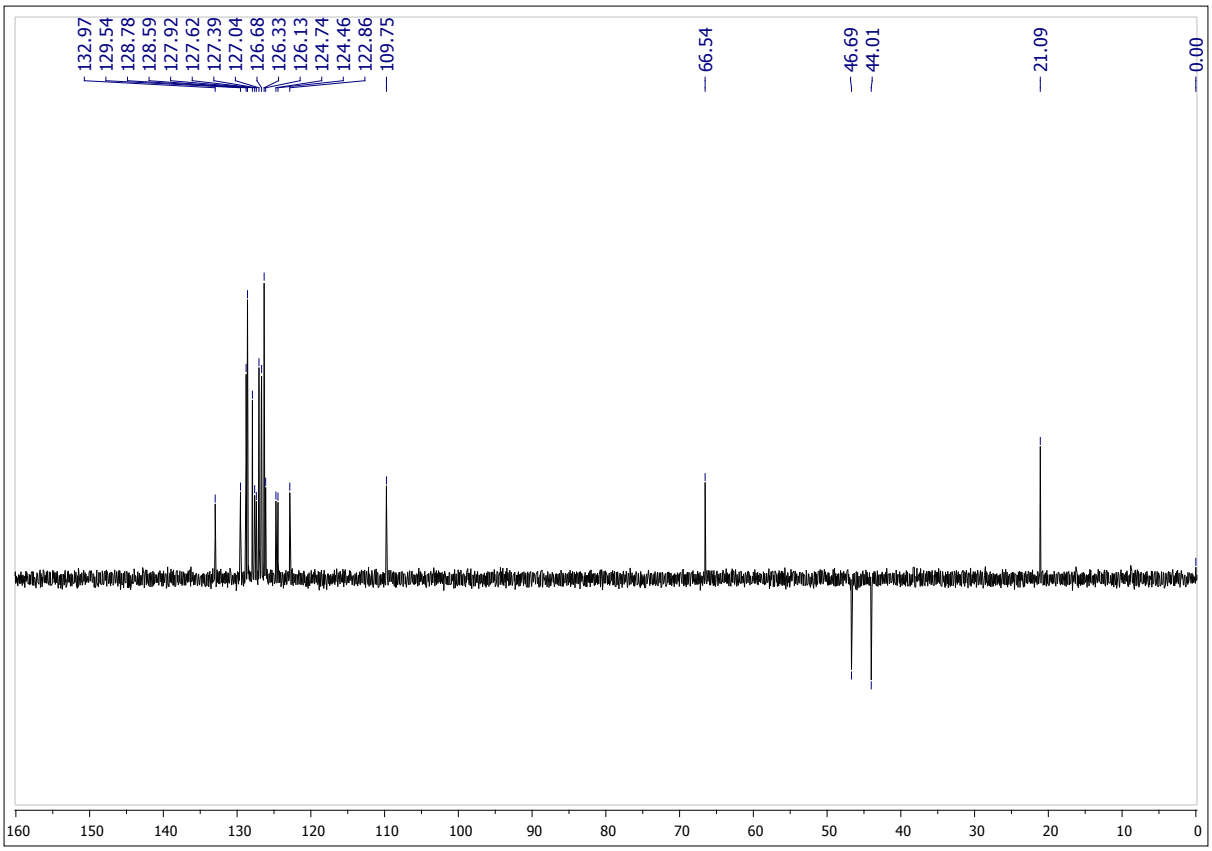

Figure 87. DEPT-135 Spectrum of **5g**

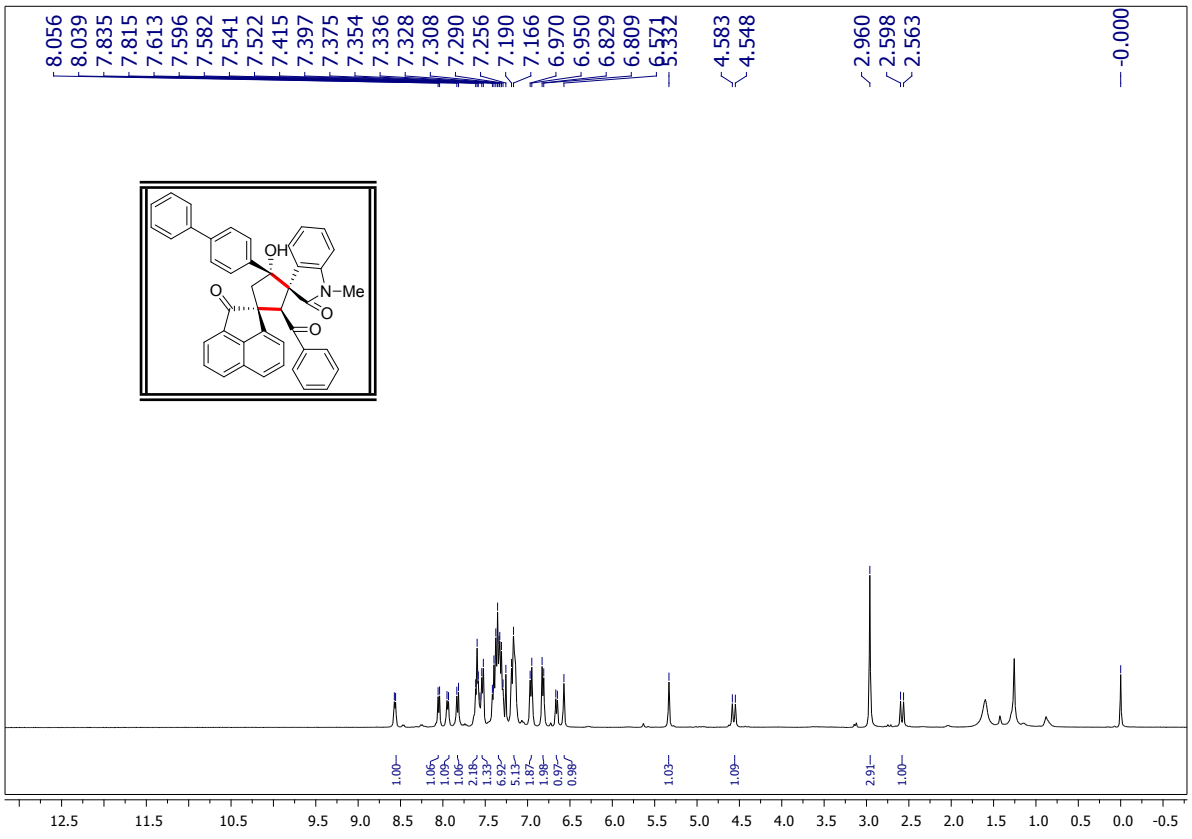

Figure 88. ^{1}H NMR Spectrum of **5h**

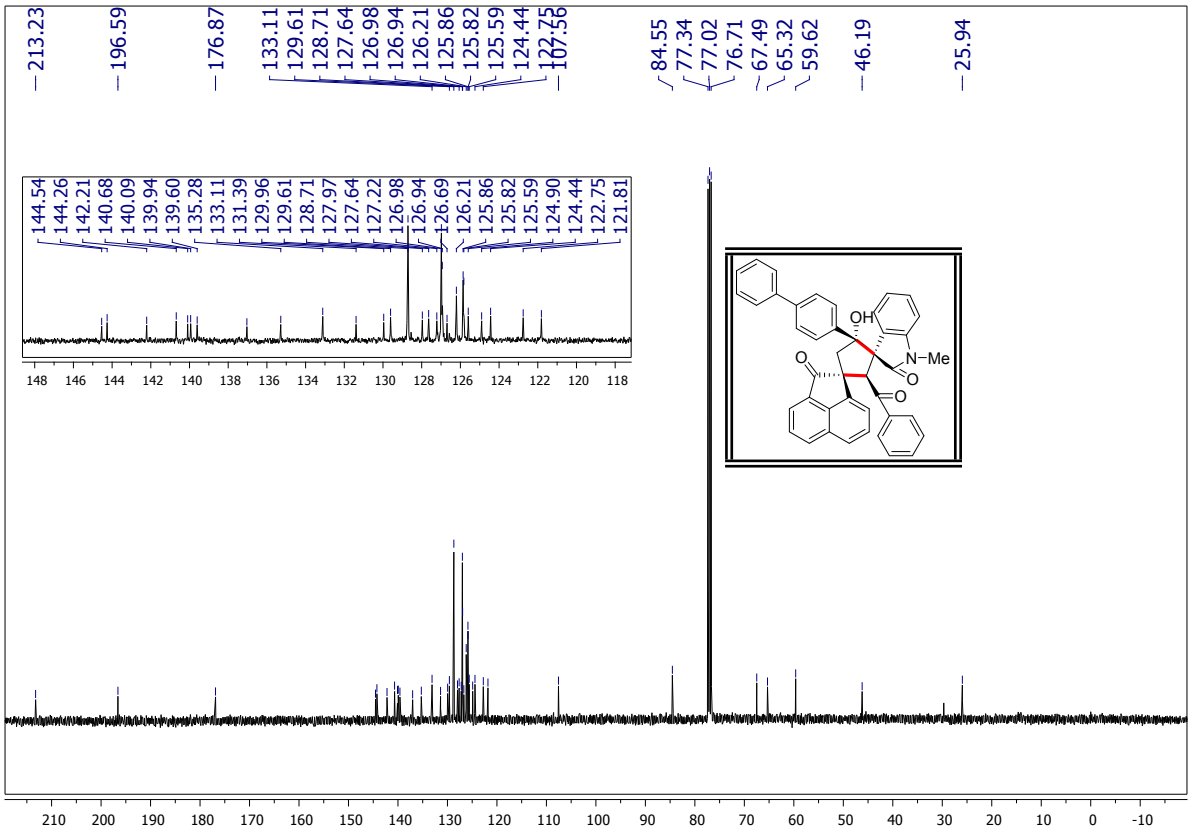

Figure 89. ^{13}C NMR Spectrum of **5h**

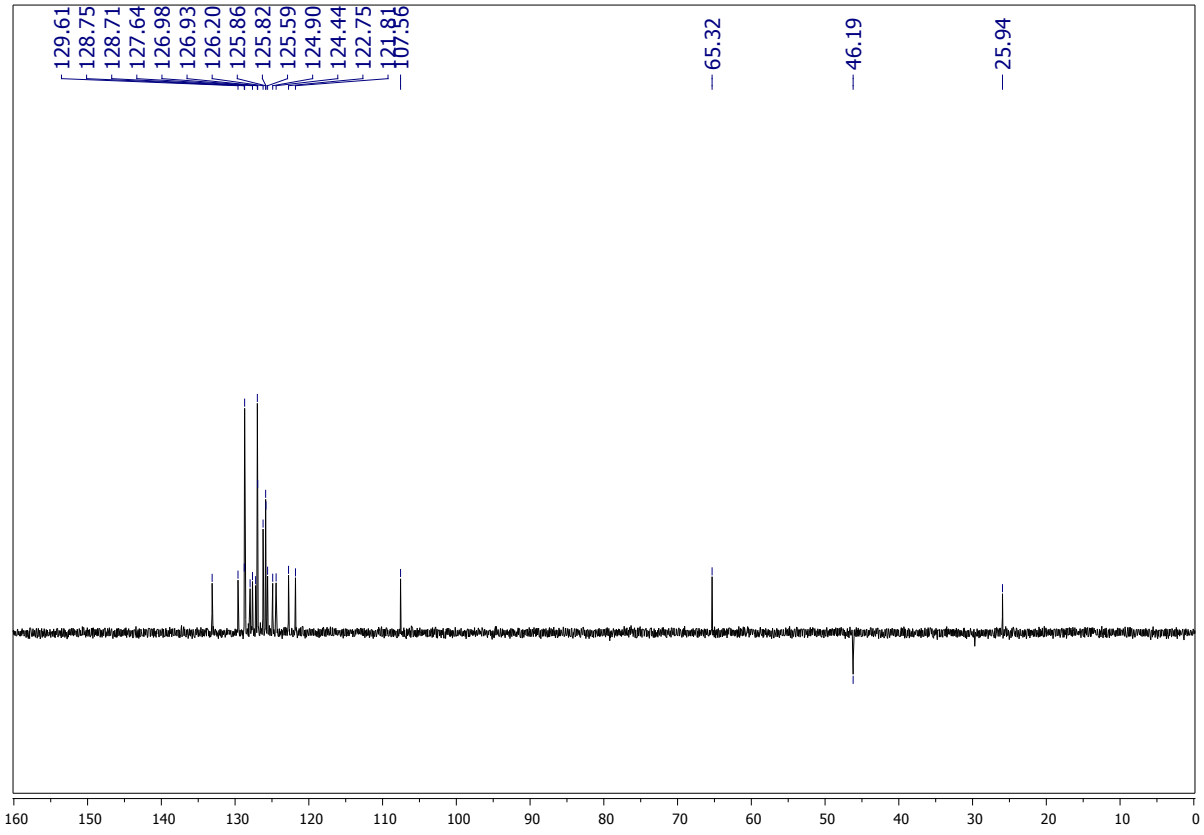

Figure 90. DEPT-135 Spectrum of **5h**

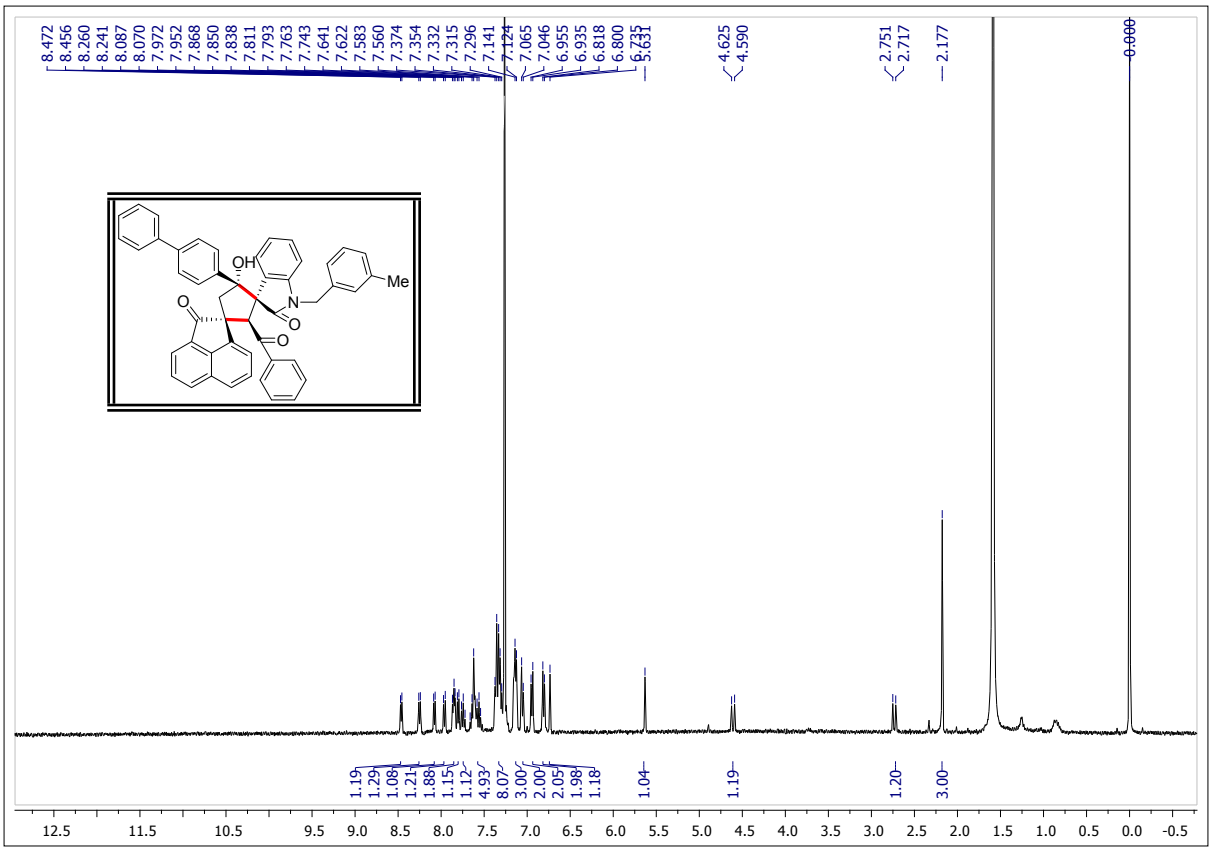

Figure 91. ^{1}H NMR Spectrum of **5i**

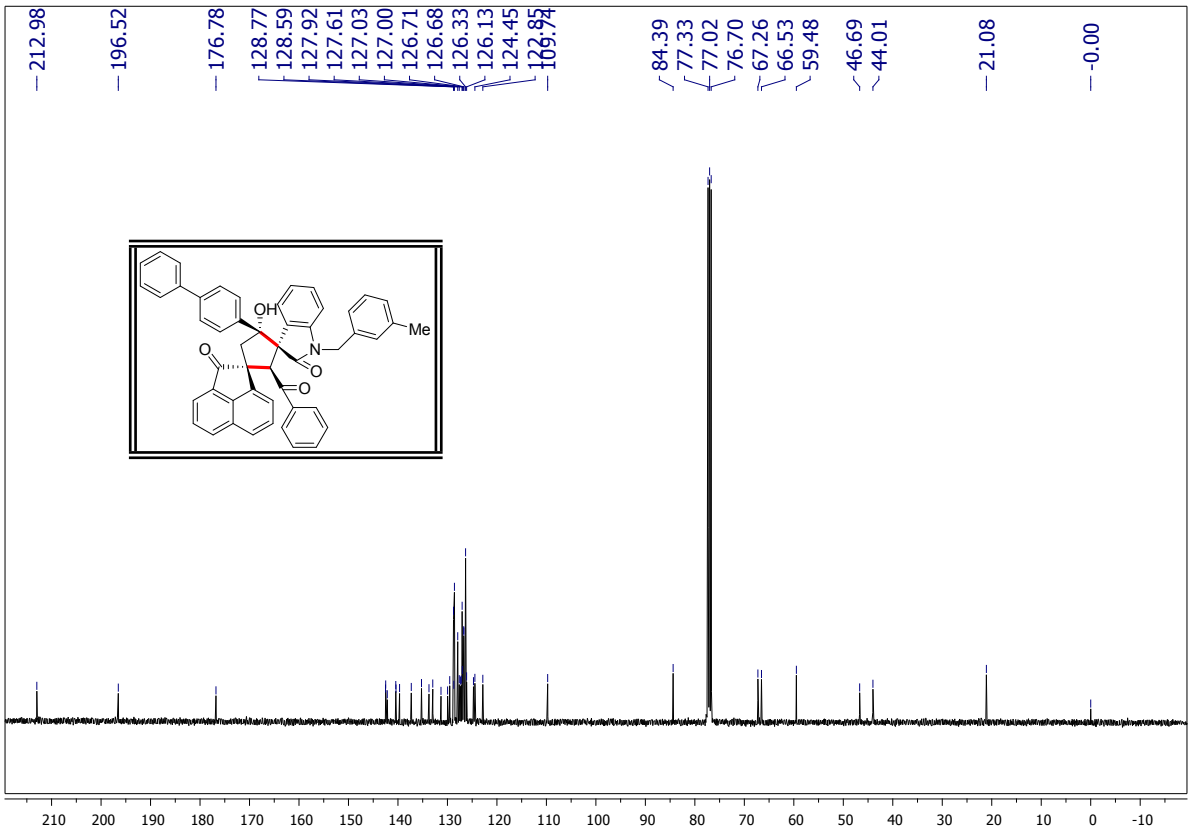

Figure 92. ^{13}C NMR Spectrum of **5i**

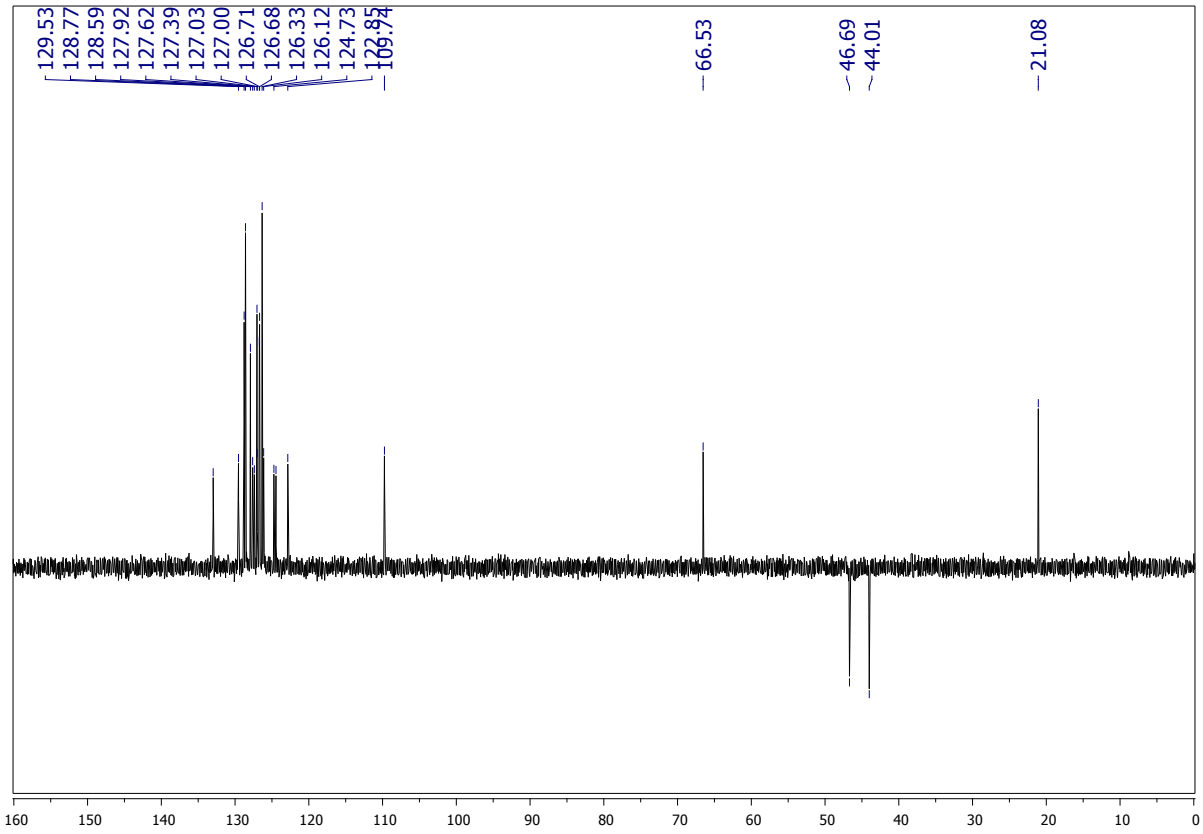

Figure 93. DEPT-135 Spectrum of **5i**

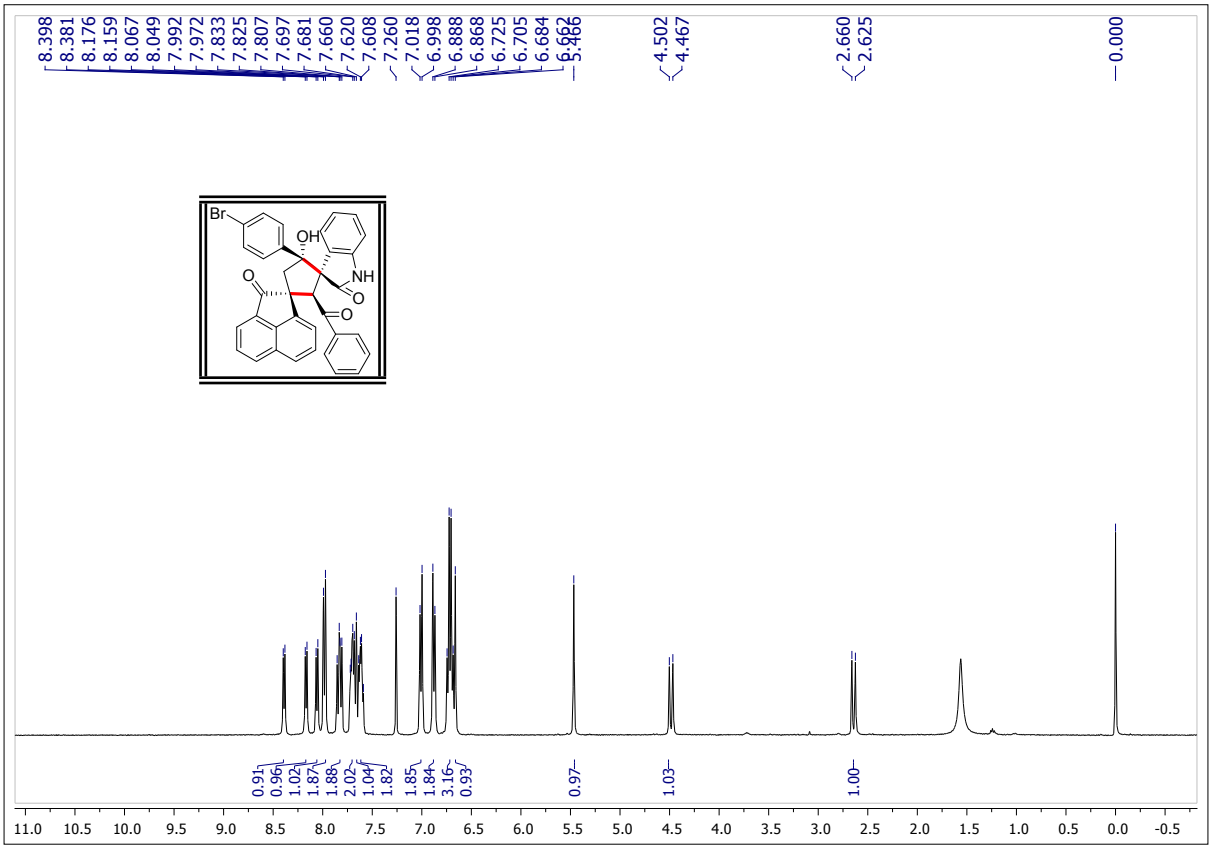

Figure 94. ^{1}H NMR Spectrum of **5j**

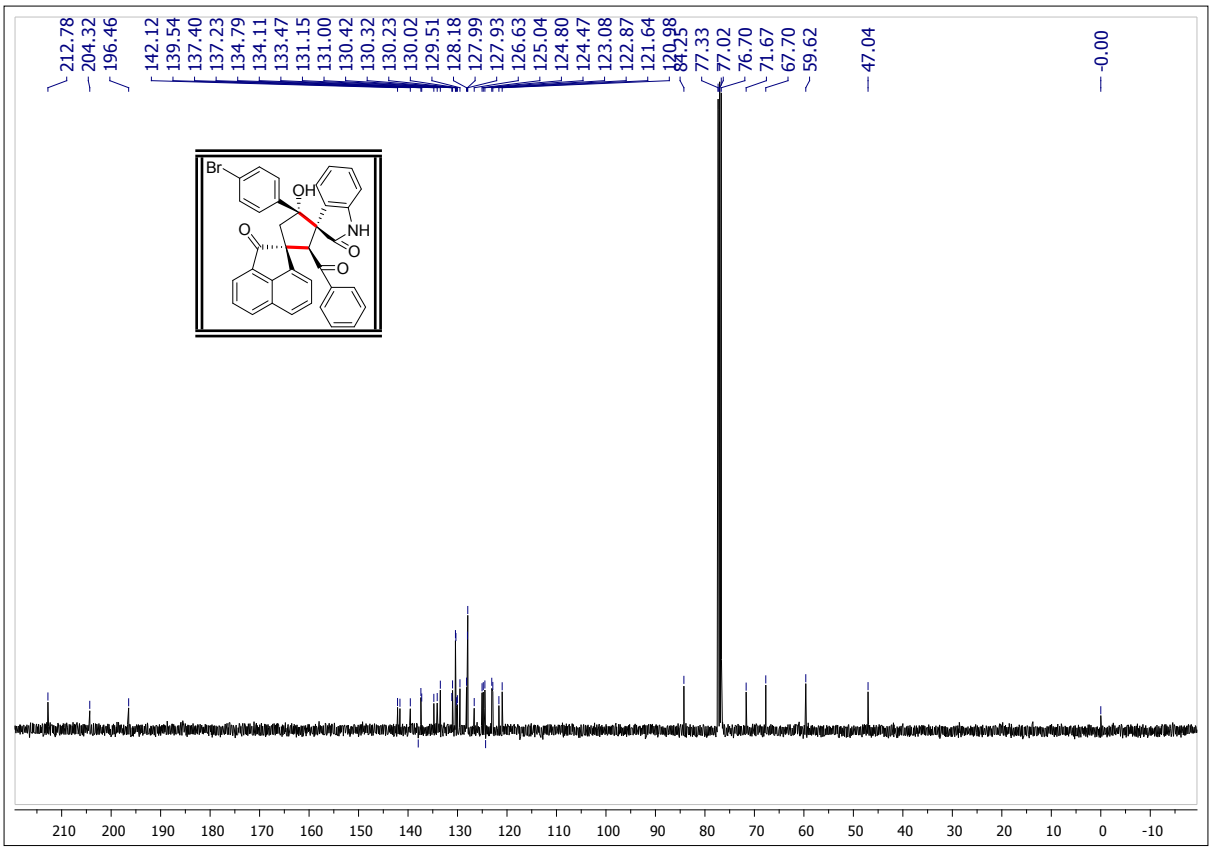

Figure 95. ^{13}C NMR Spectrum of **5j**

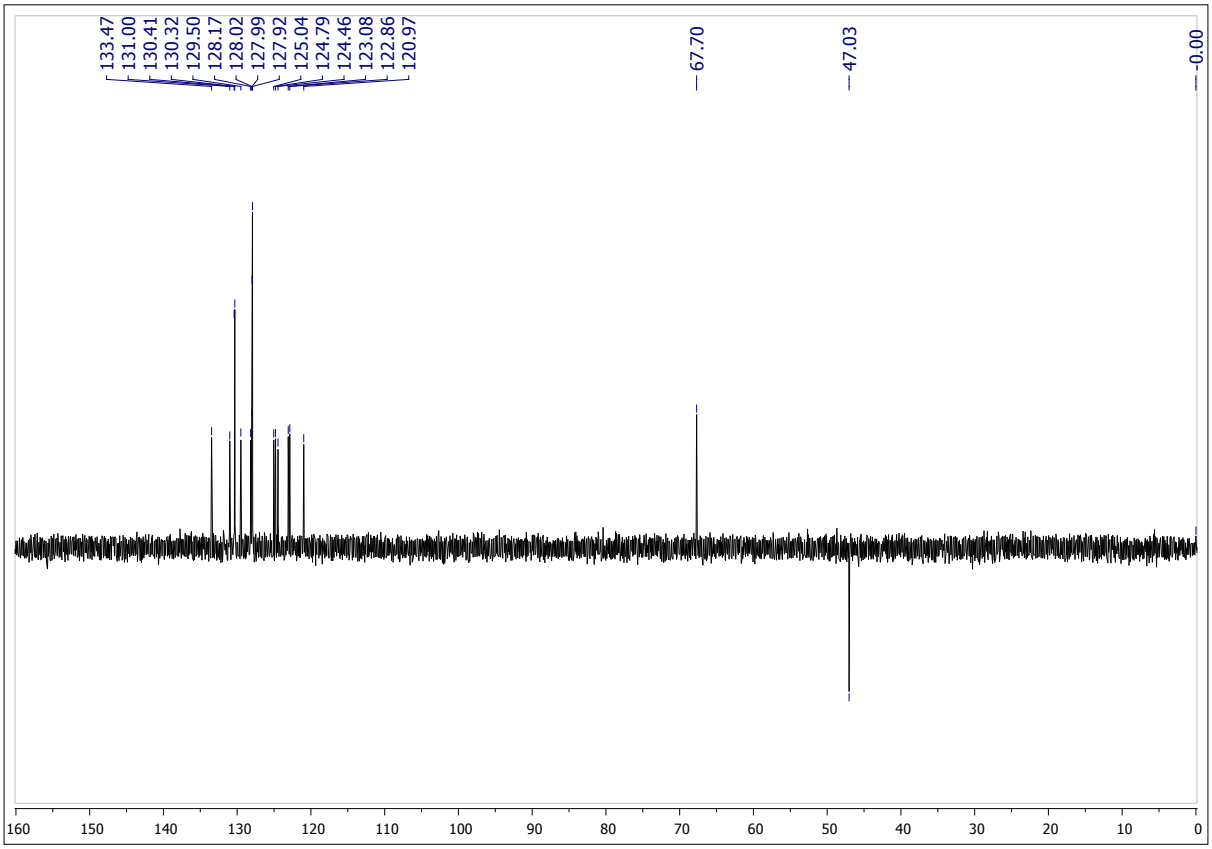

Figure 96. DEPT-135 Spectrum of **5j**

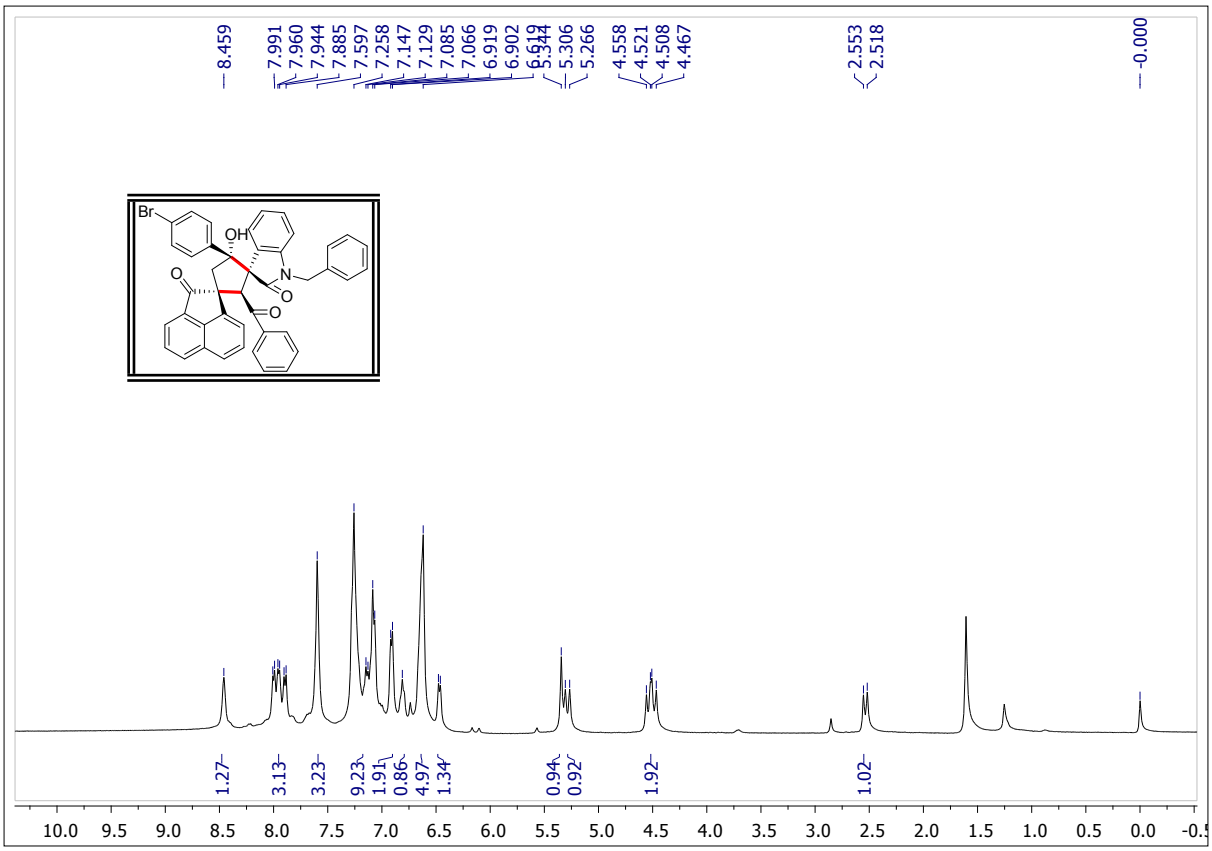

Figure 97. ^{1}H NMR Spectrum of **5k**

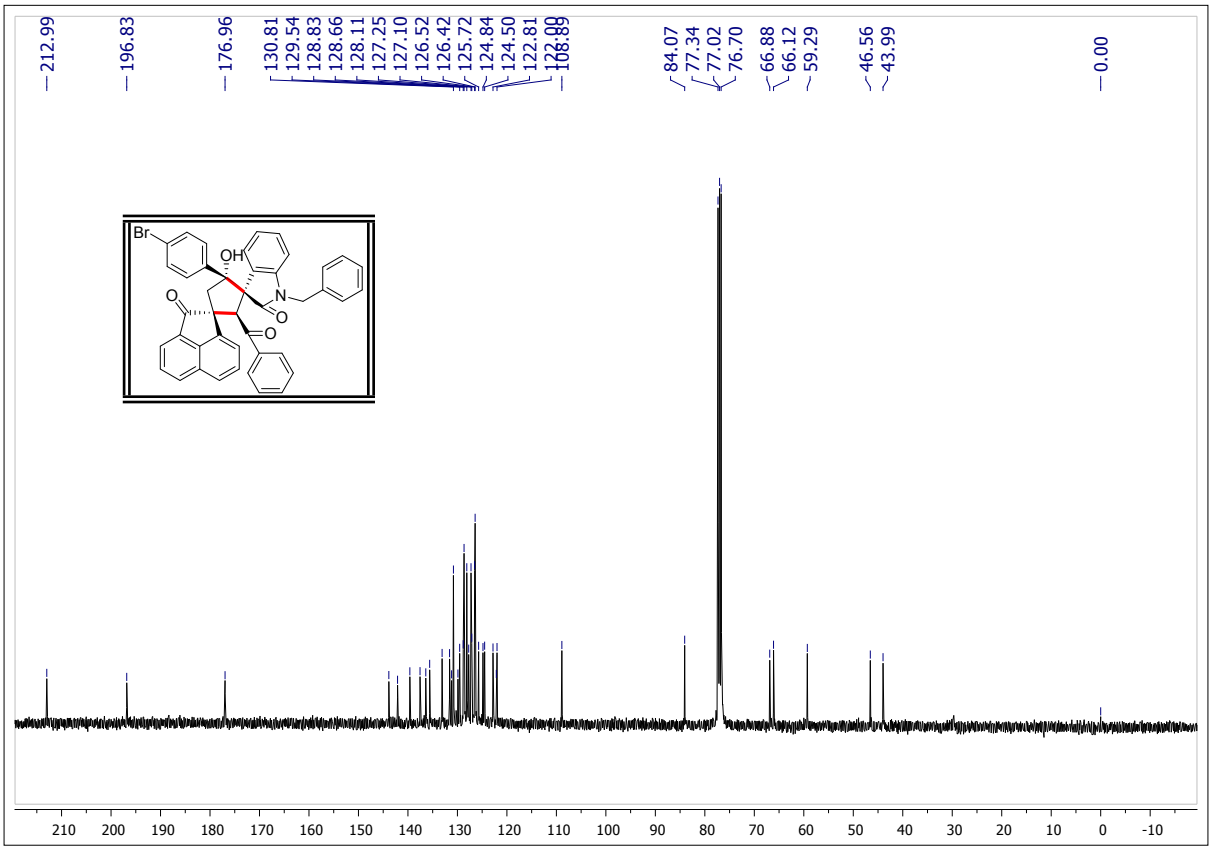

Figure 98. ^{13}C NMR Spectrum of **5k**

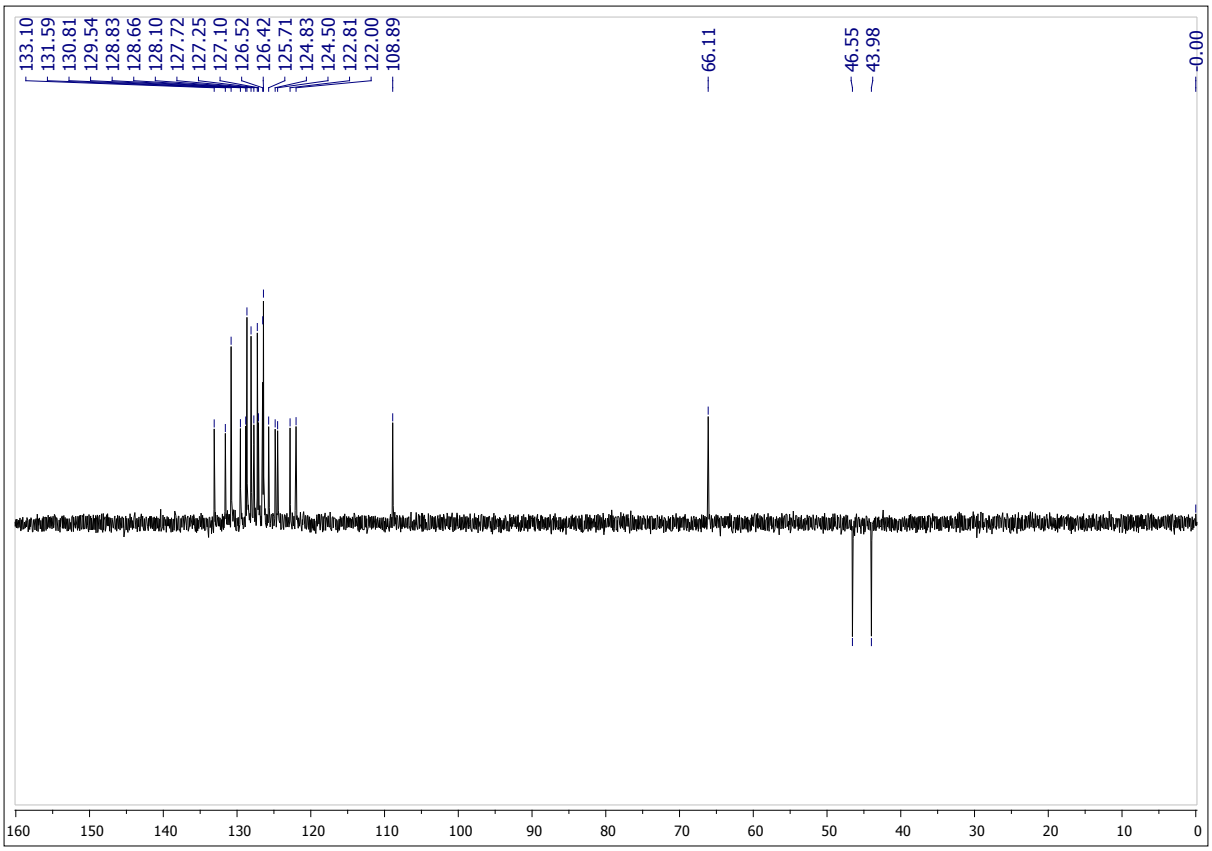

Figure 99. DEPT-135 Spectrum of **5k**

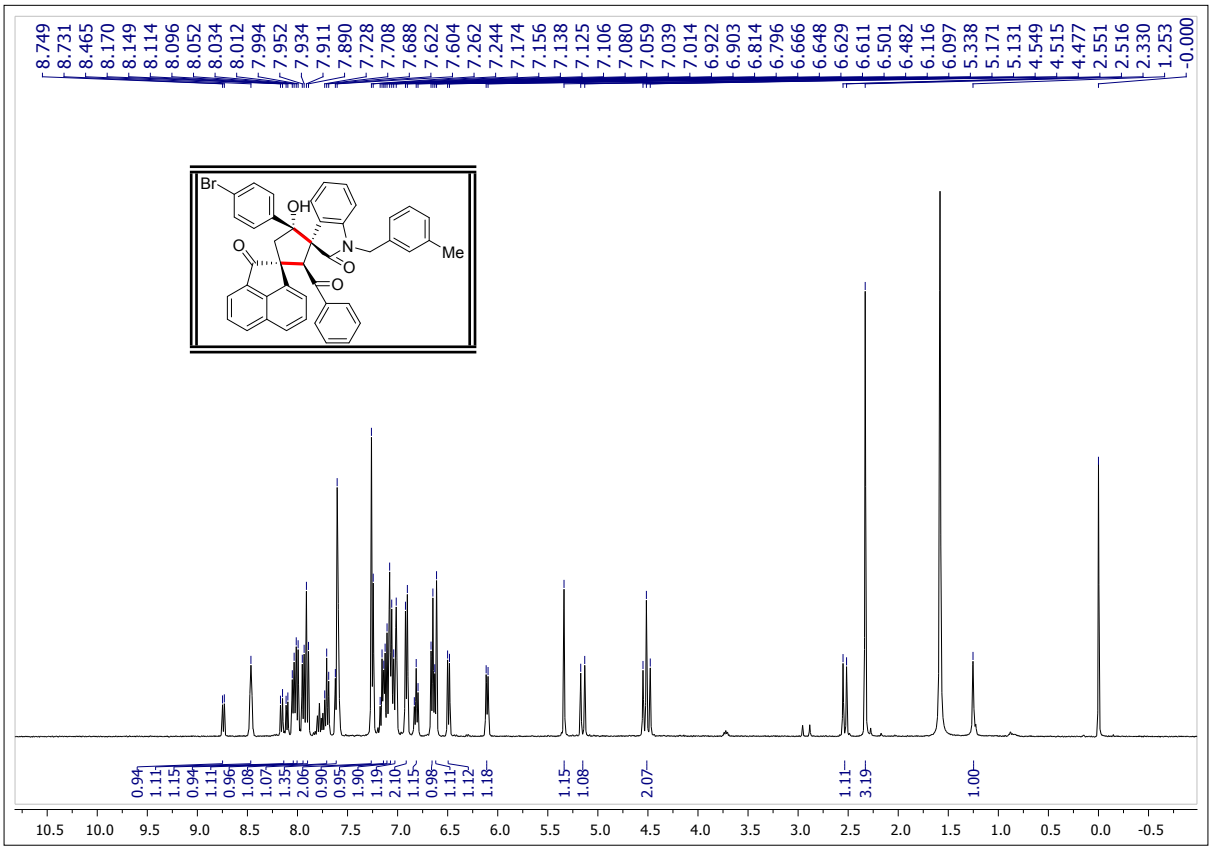

Figure 100. ^{1}H NMR Spectrum of **5l**

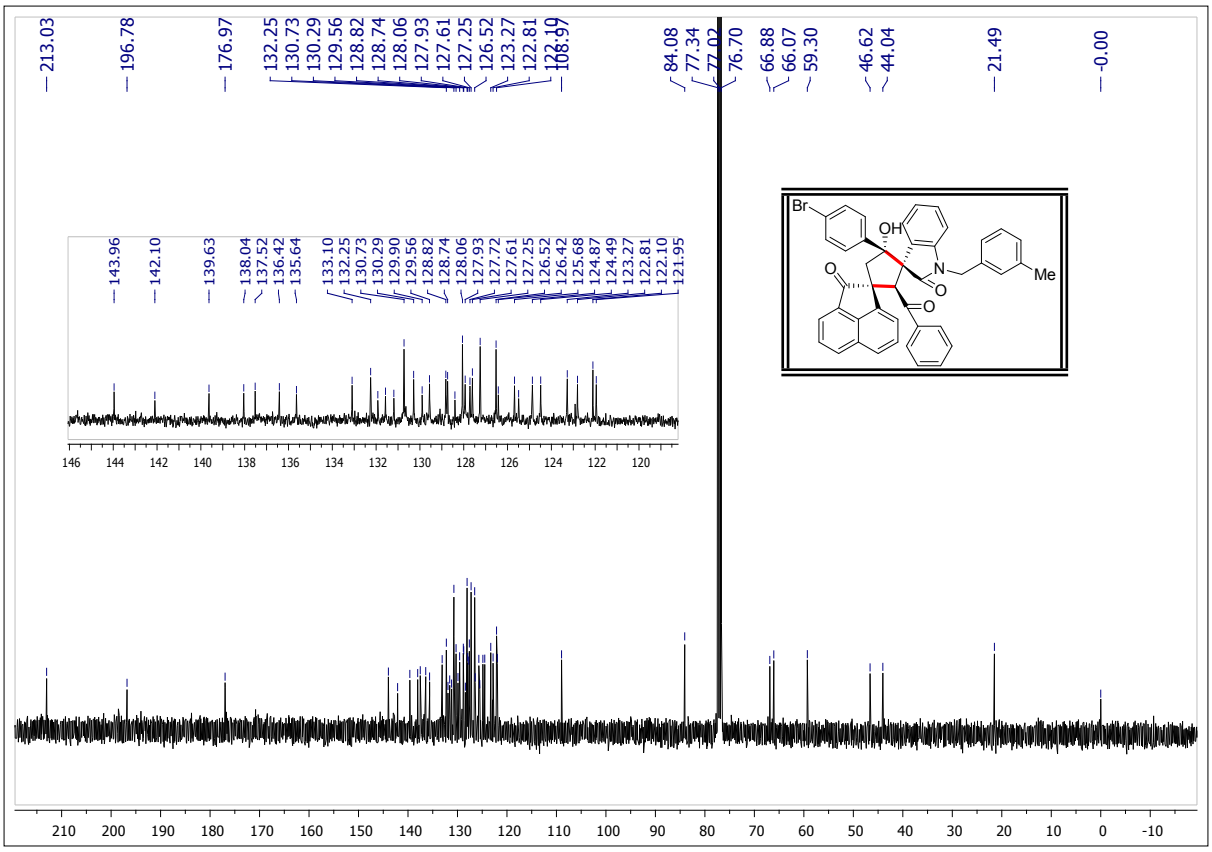

Figure 101. ^{13}C NMR Spectrum of **5l**

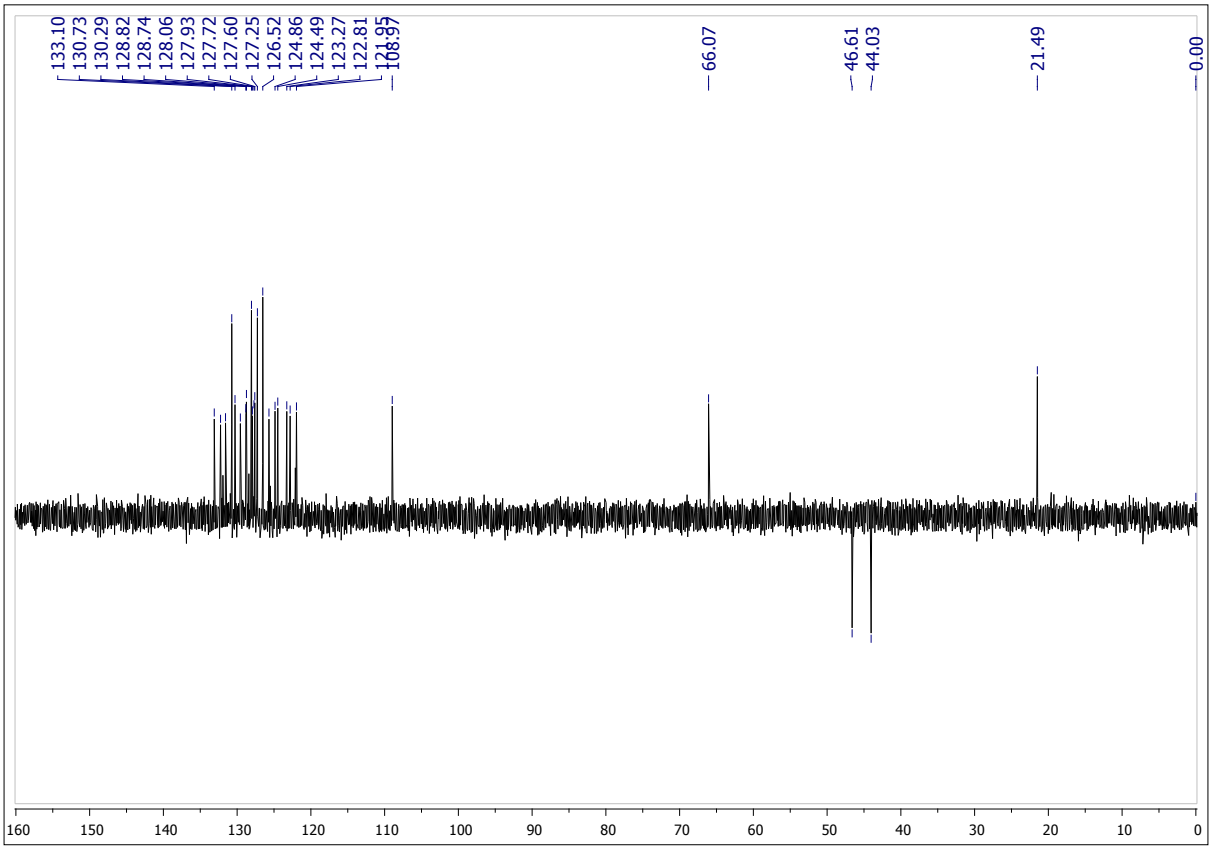

Figure 102. DEPT-135 Spectrum of **5l**

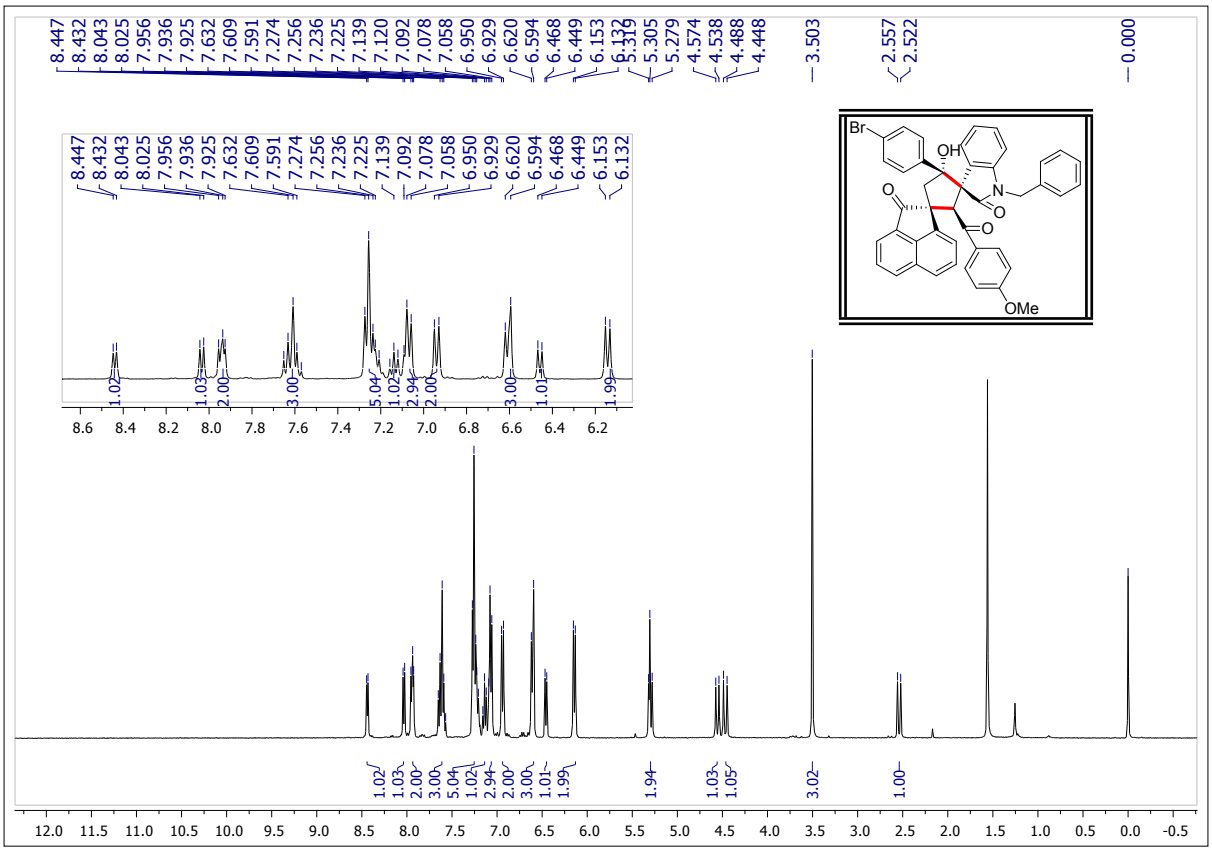

Figure 103. [1]H NMR Spectrum of **5m**

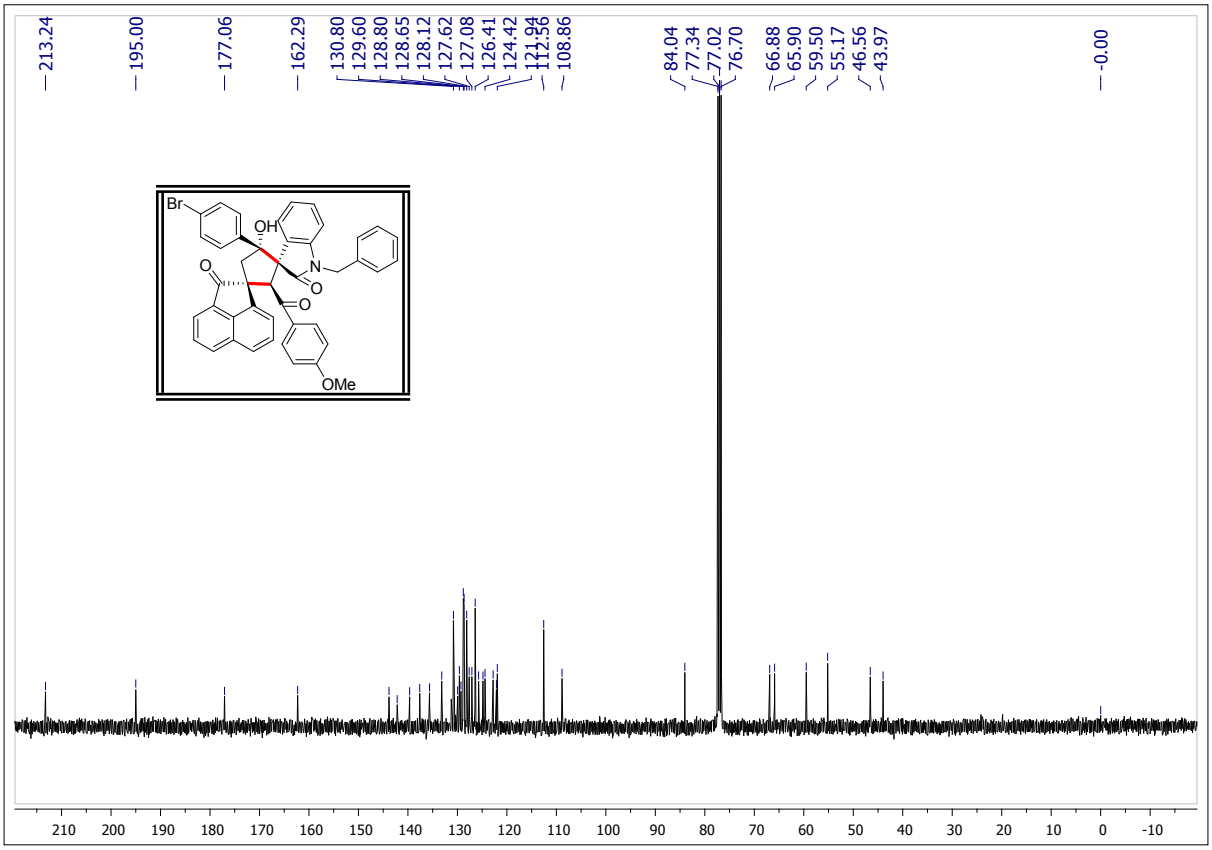

Figure 104. [13]C NMR Spectrum of **5m**

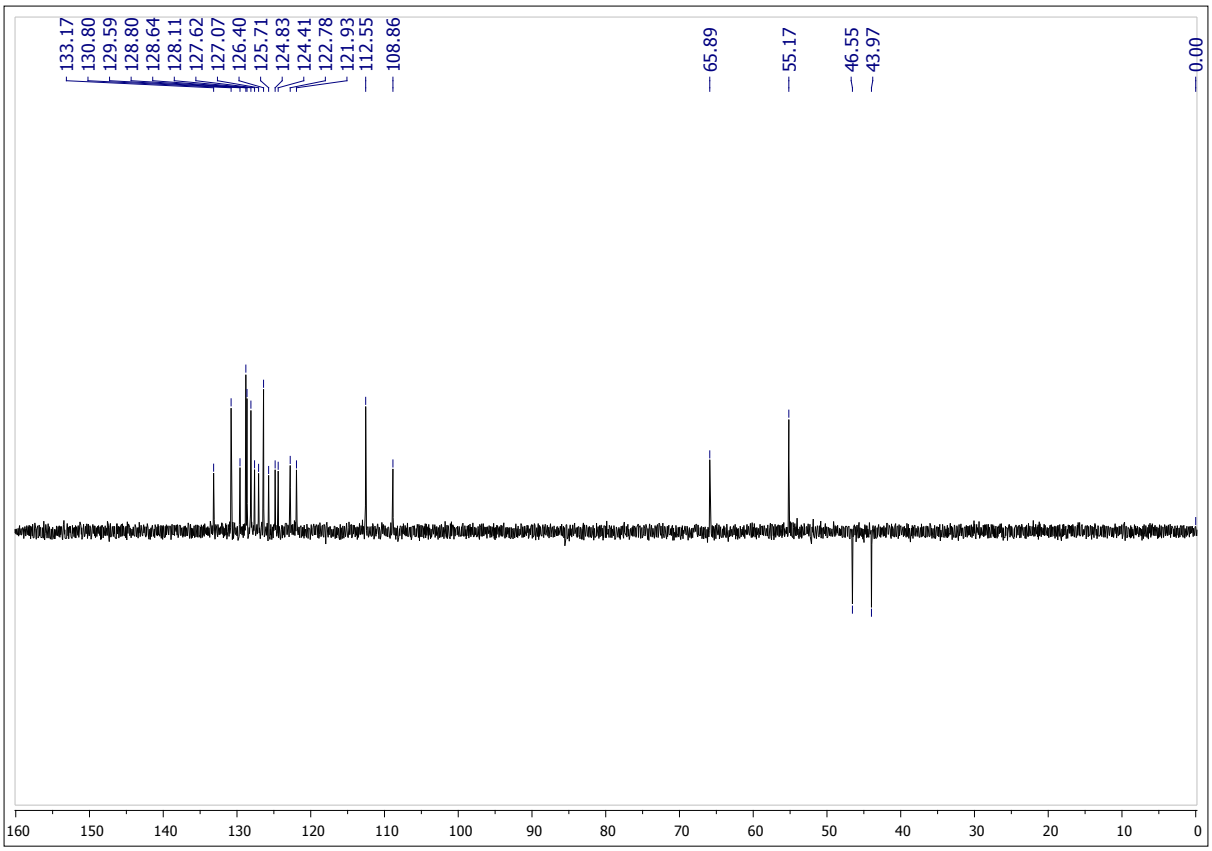

Figure 105. DEPT-135 Spectrum of **5m**

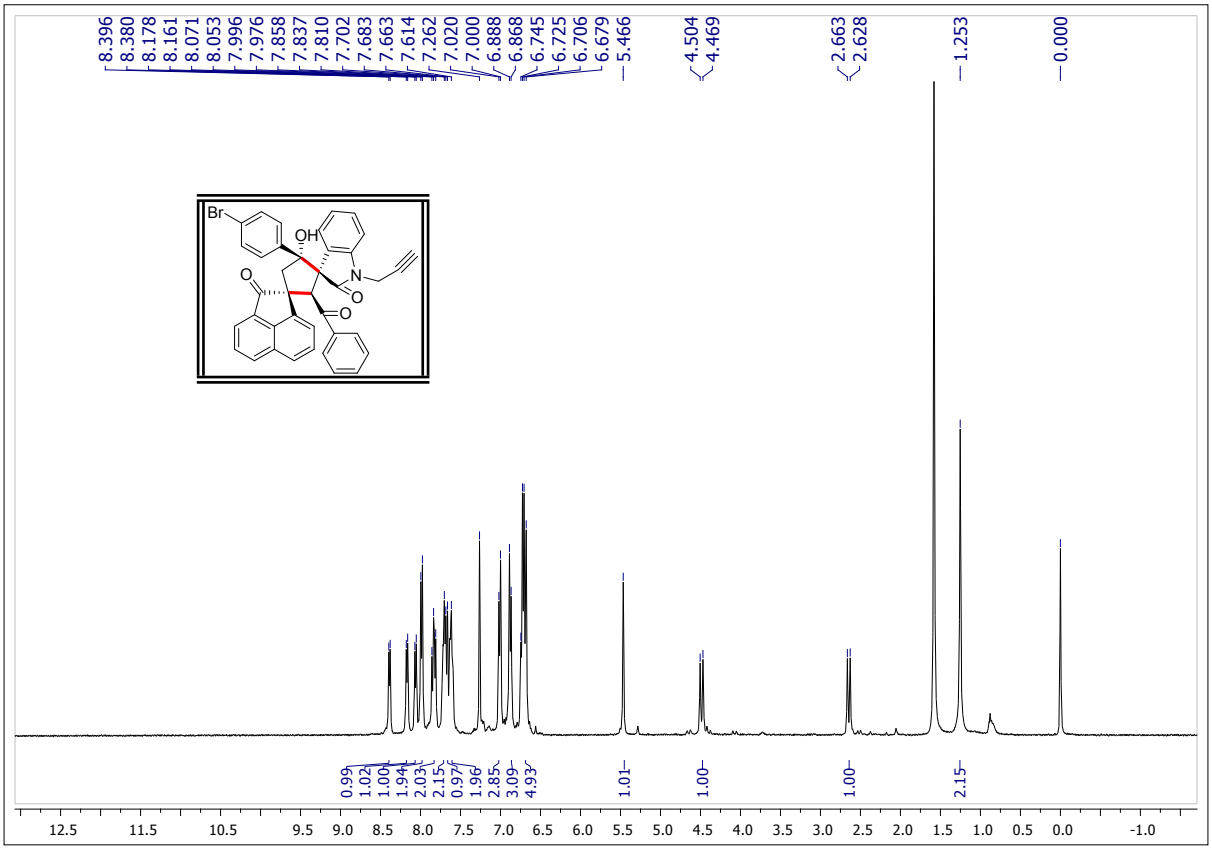

Figure 106. ^{1}H NMR Spectrum of **5n**

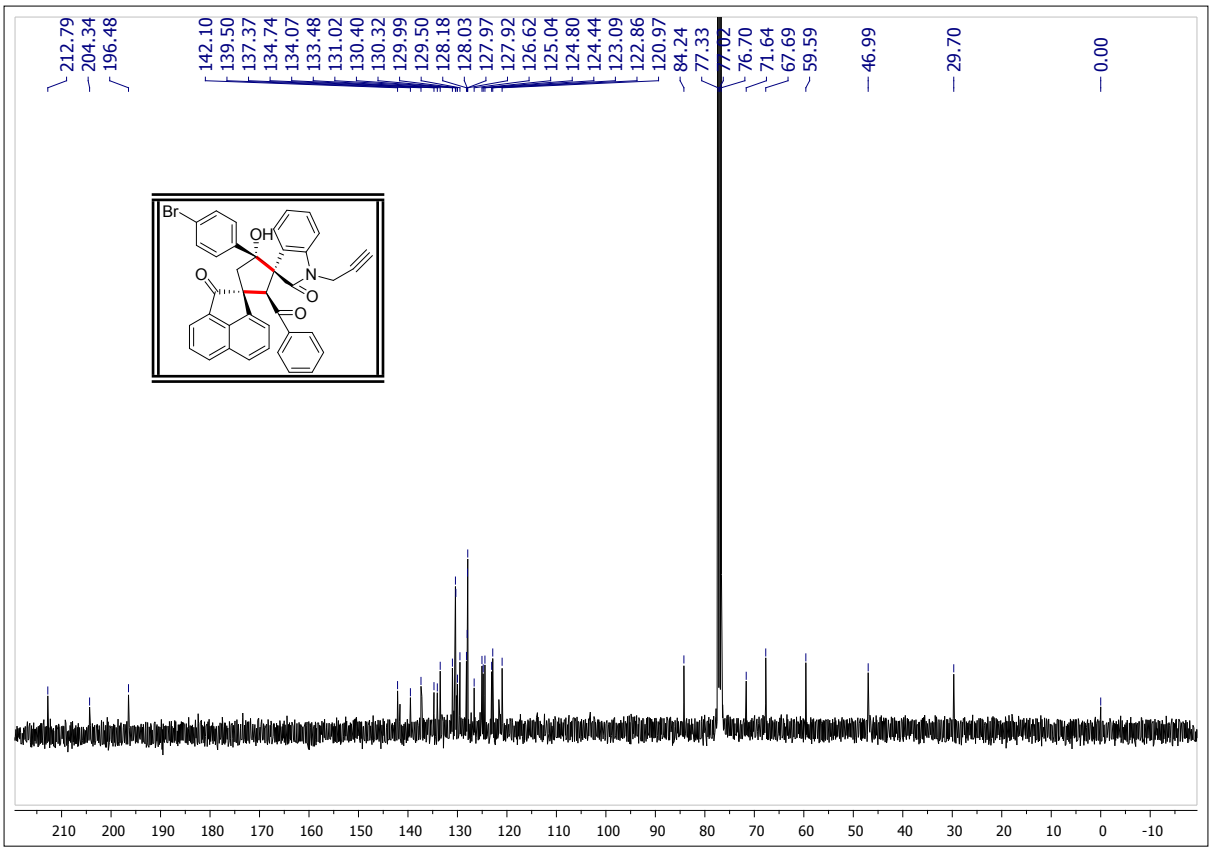

Figure 107. ^{13}C NMR Spectrum of **5n**

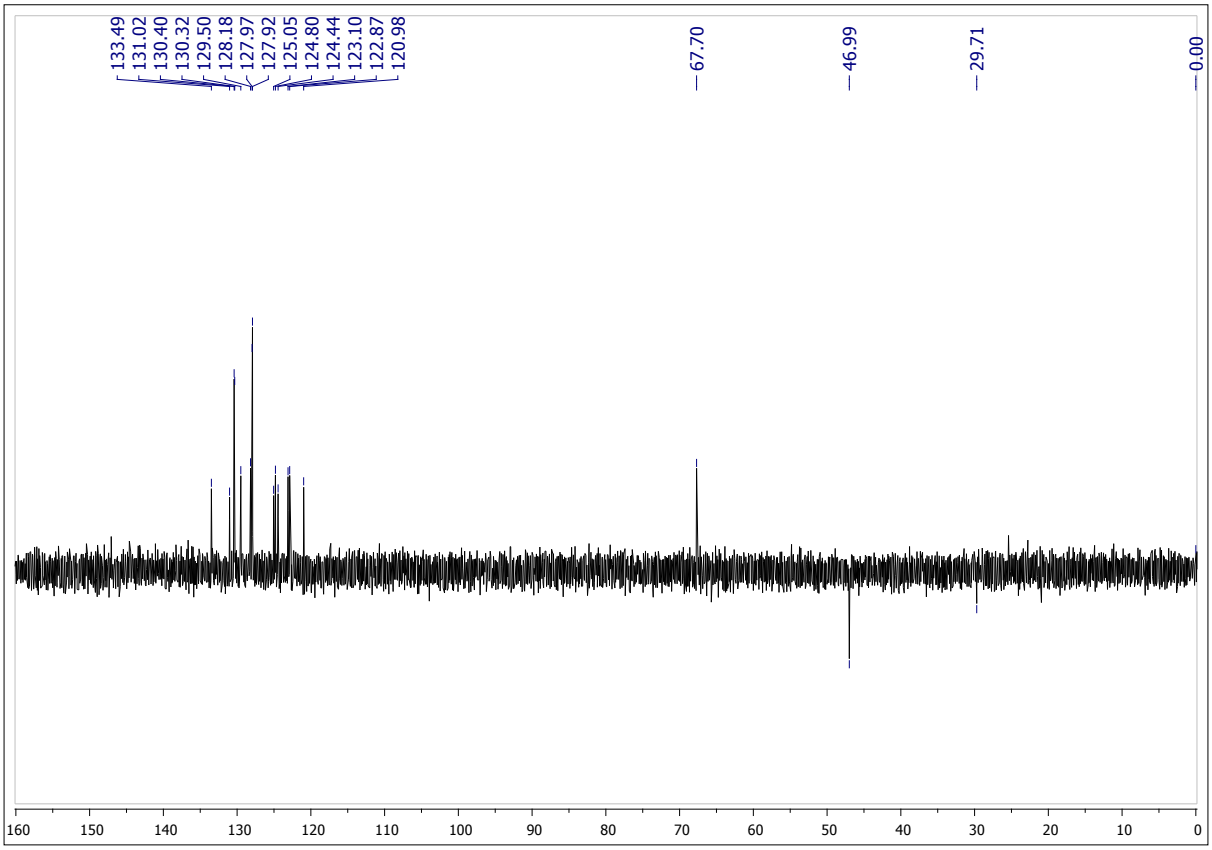

Figure 108. DEPT-135 Spectrum of **5n**

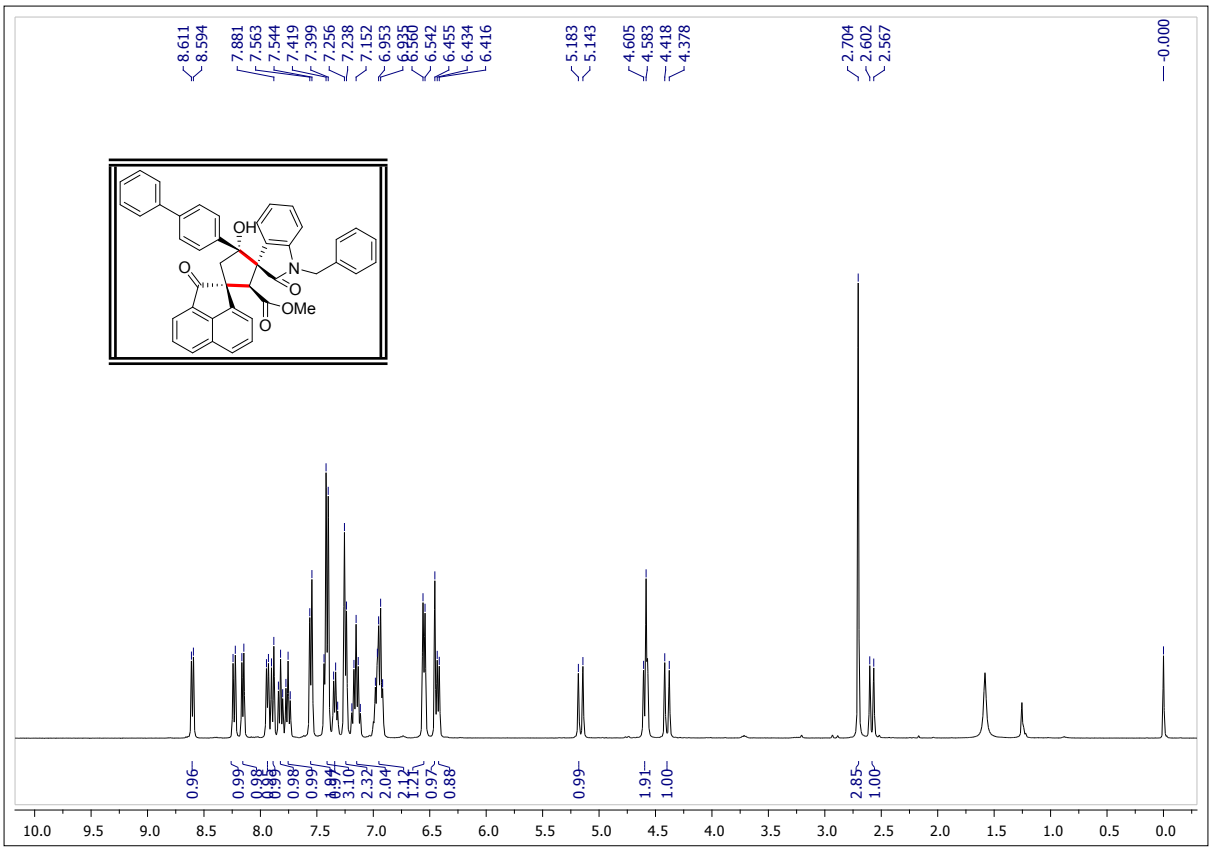

Figure 109. ^{1}H NMR Spectrum of **5o**

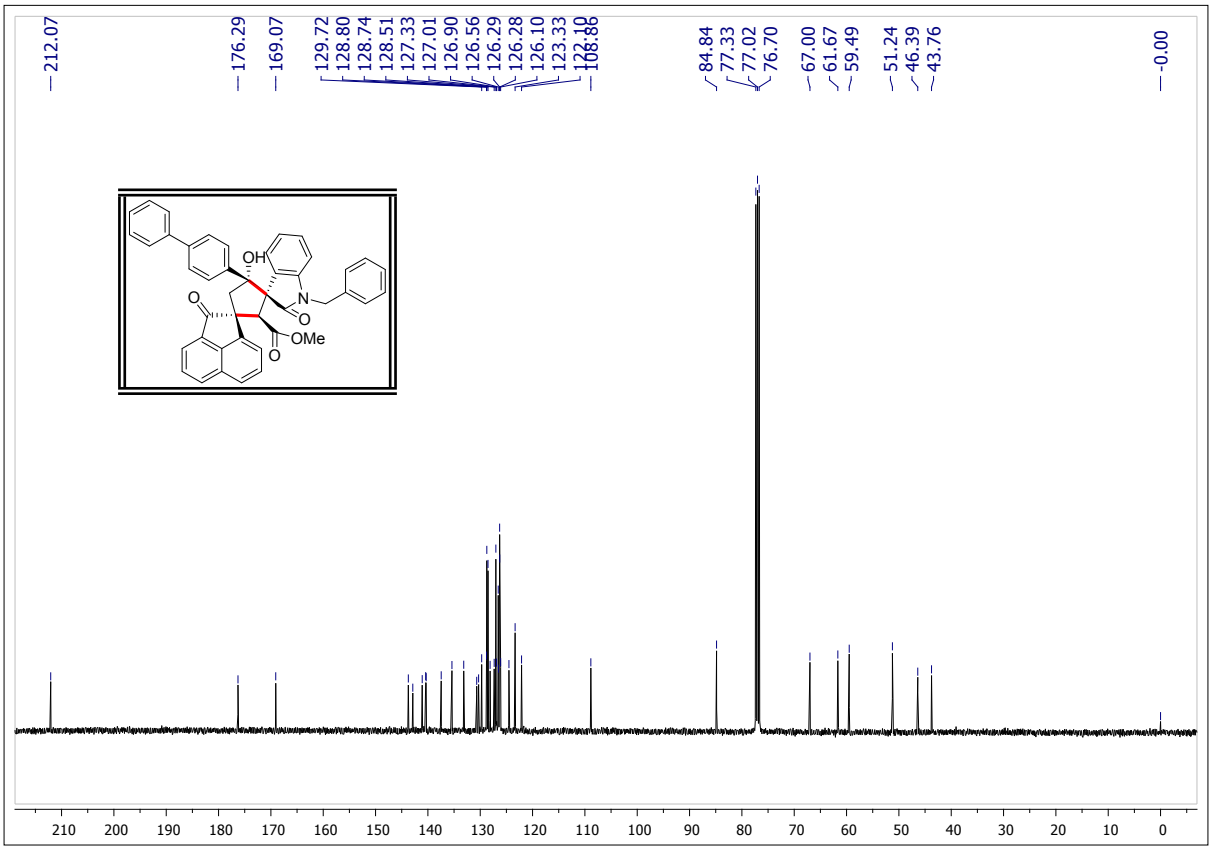

Figure 110. ^{13}C NMR Spectrum of **5o**

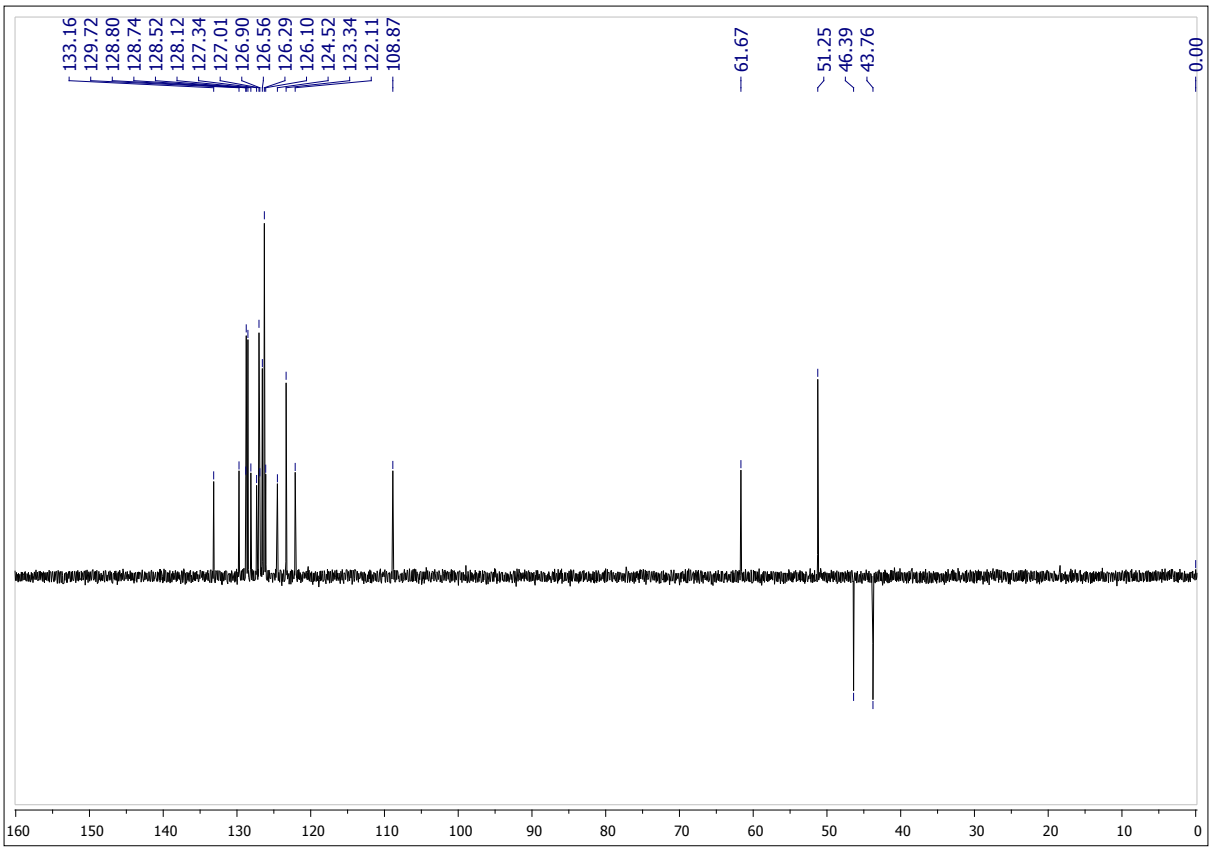

Figure 111. DEPT-135 Spectrum of **5o**

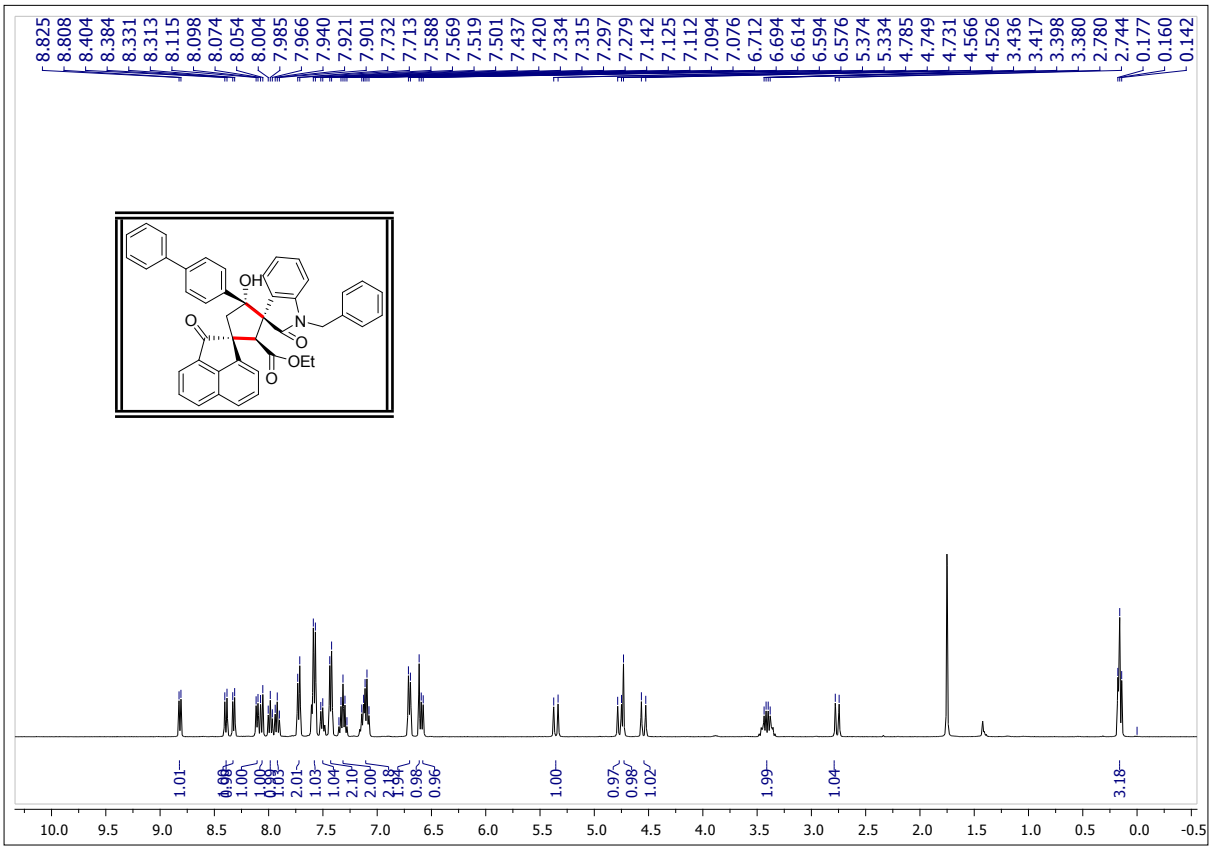

Figure 112. ^{1}H NMR Spectrum of **5p**

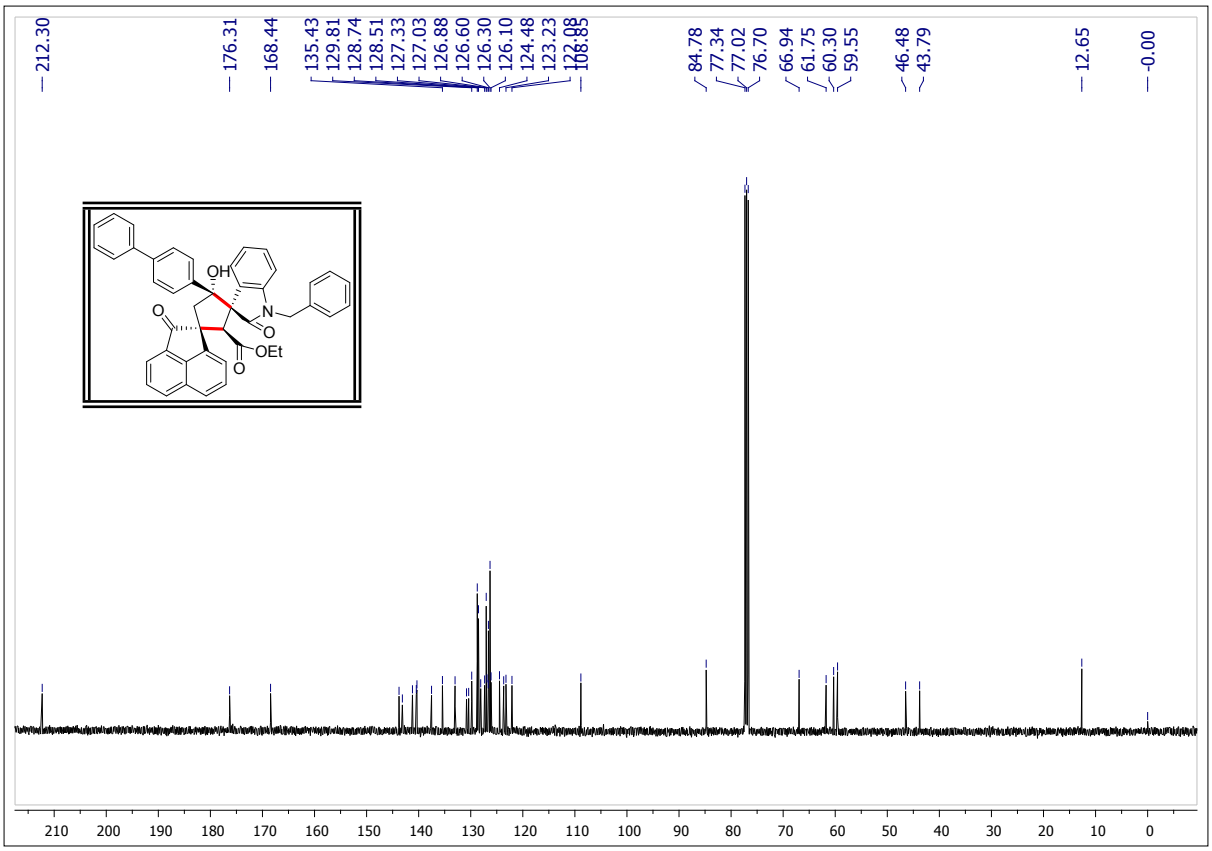

Figure 113. ^{13}C NMR Spectrum of **5p**

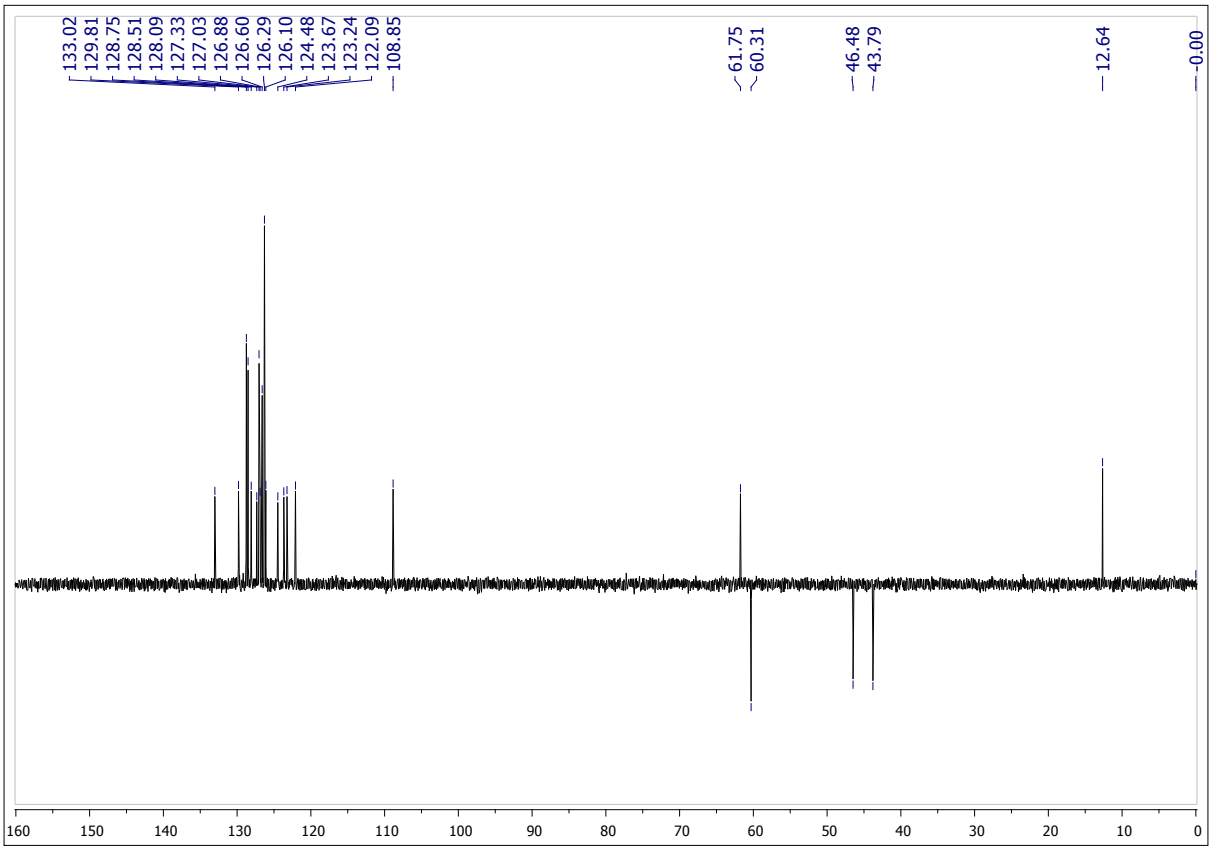

Figure 114. DEPT-135 Spectrum of **5p**

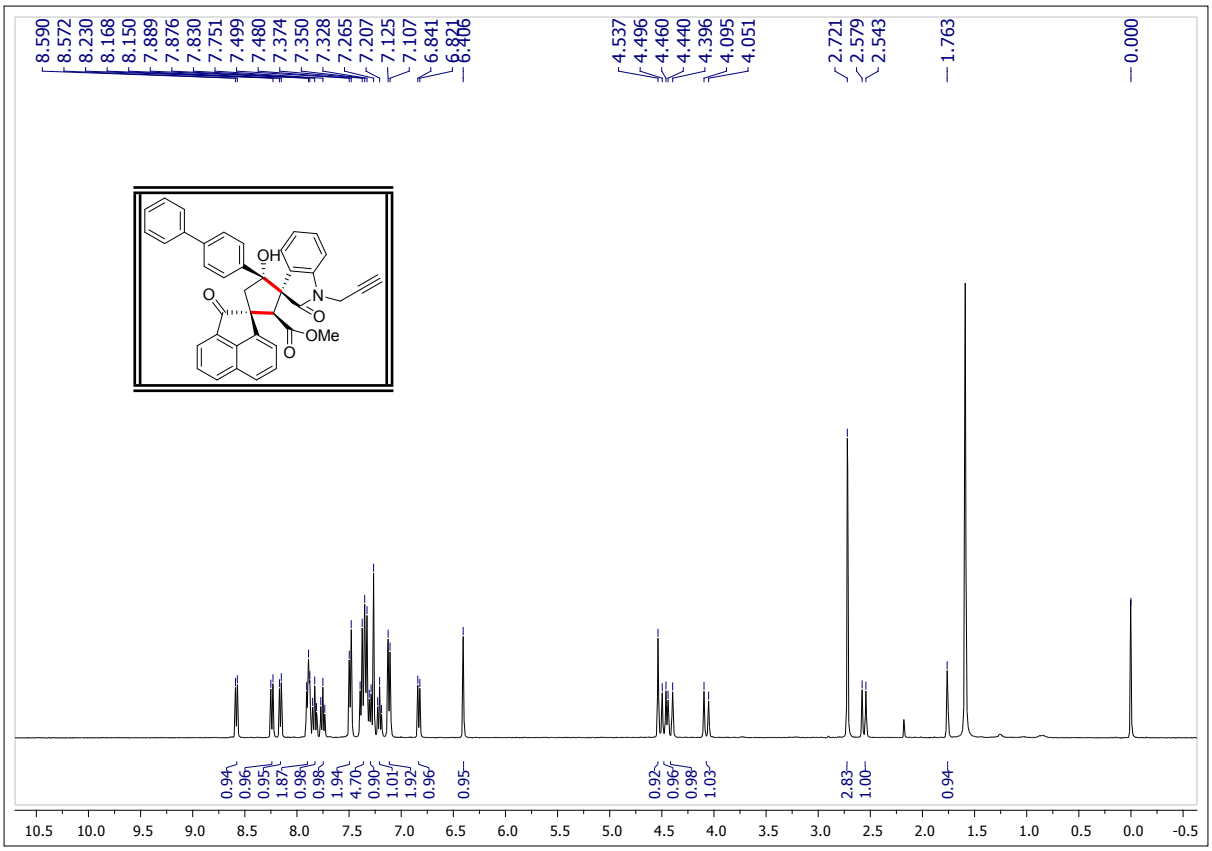

Figure 115. ^{1}H NMR Spectrum of **5q**

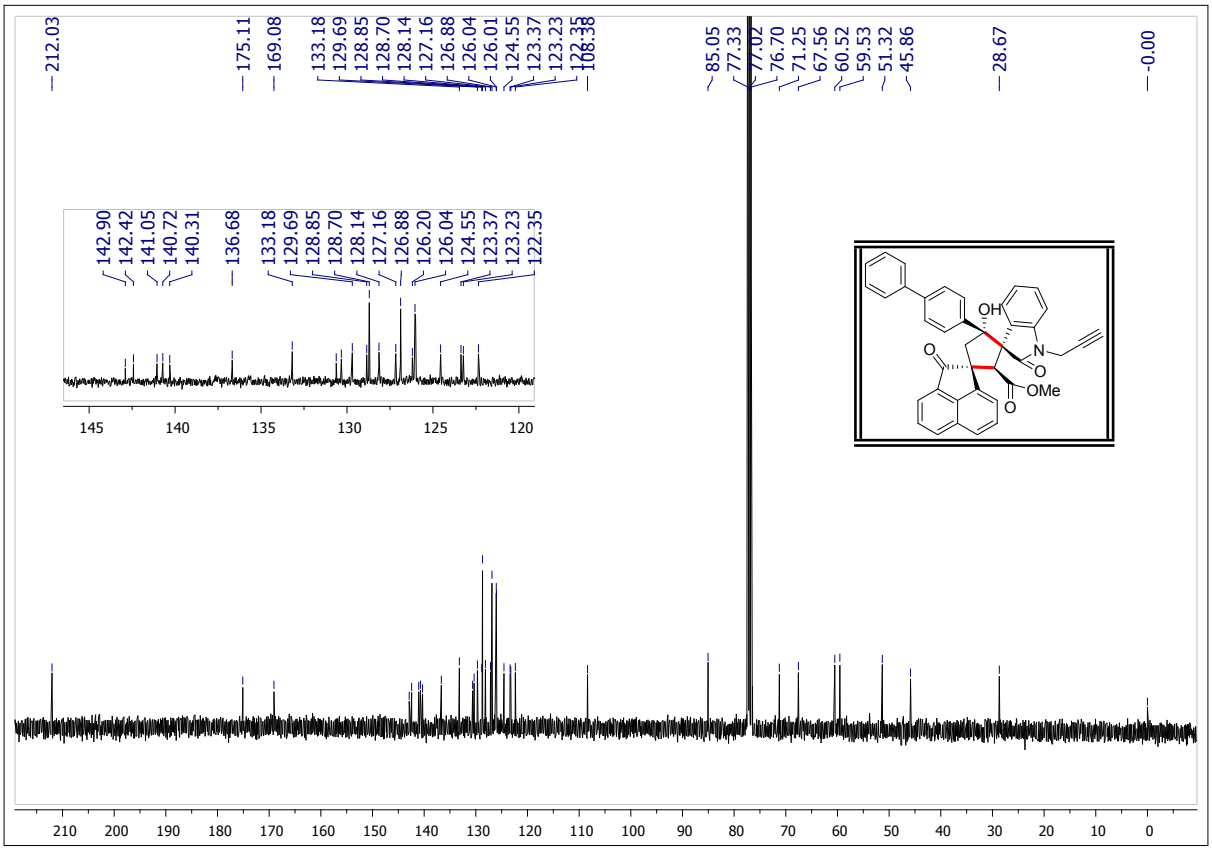

Figure 116. ^{13}C NMR Spectrum of **5q**

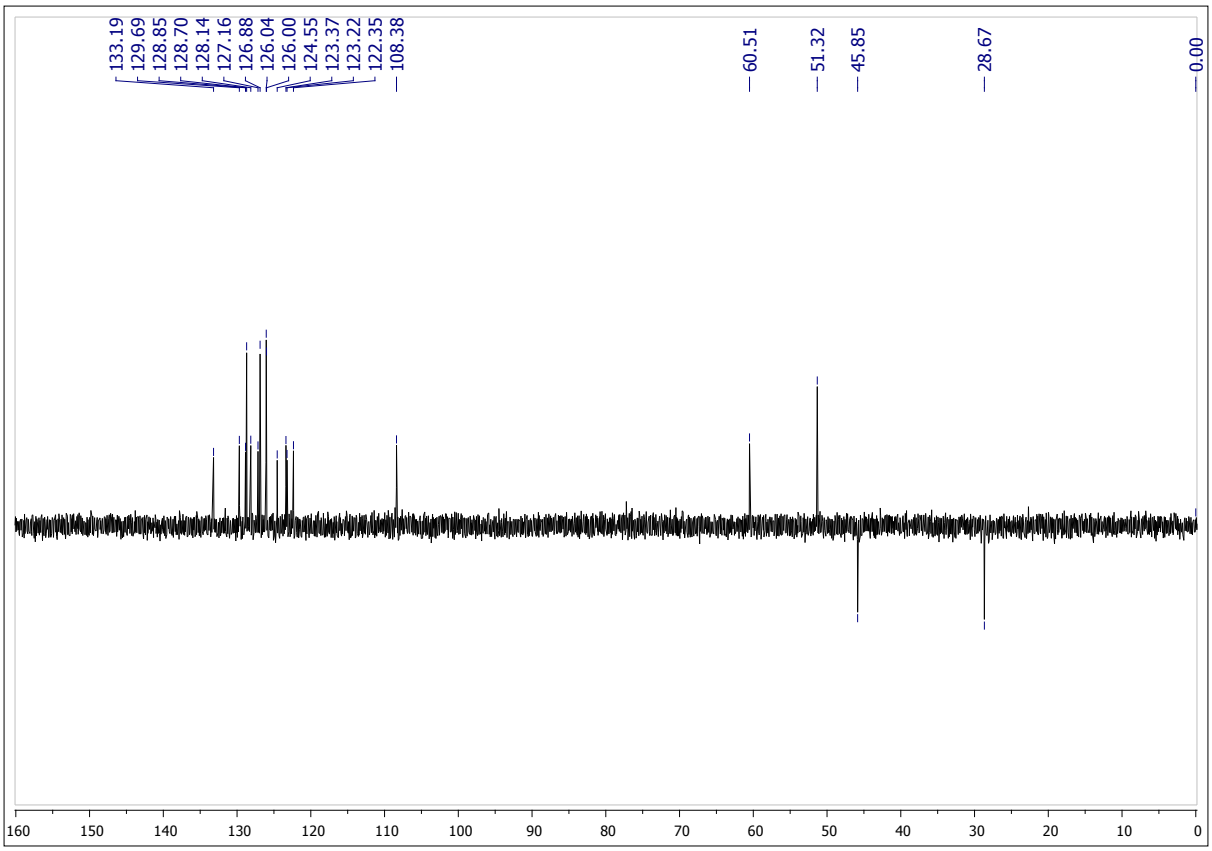

Figure 117. DEPT-135 Spectrum of **5q**

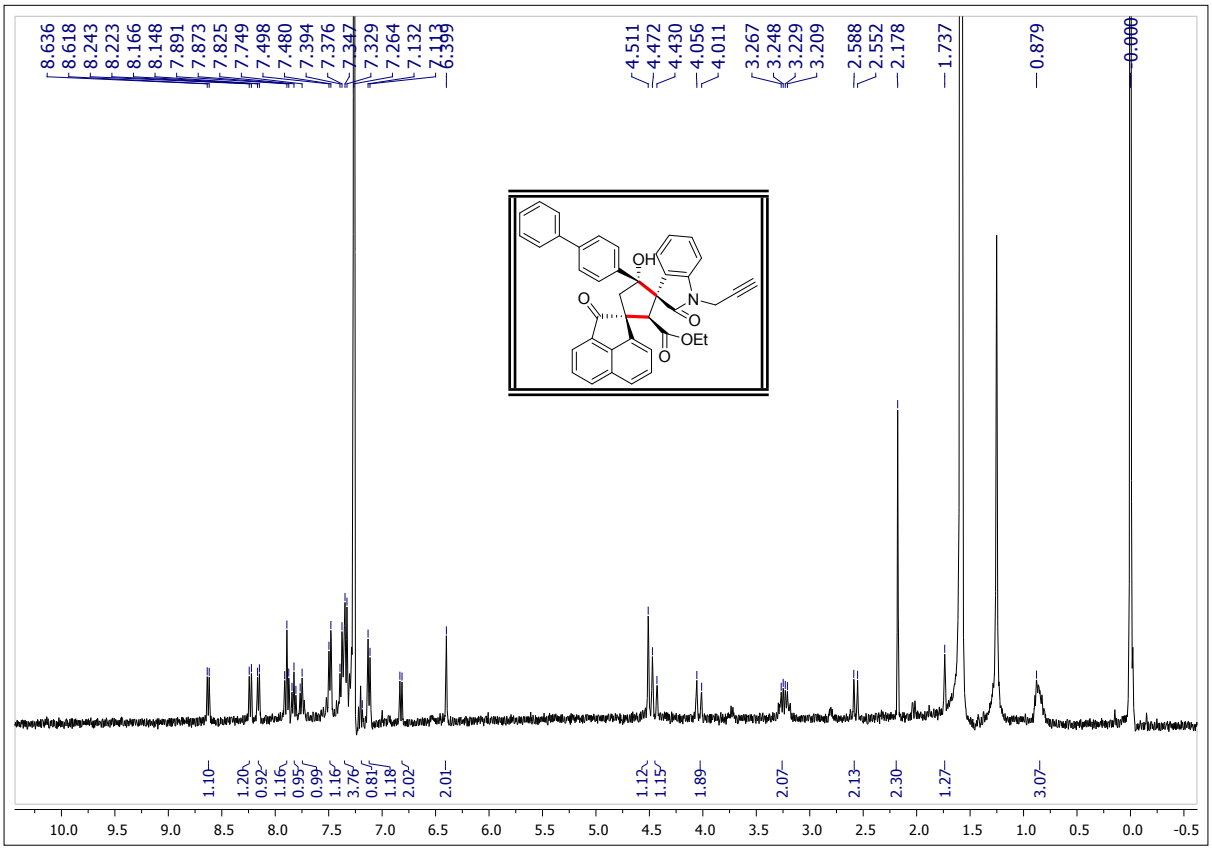

Figure 118. ^{1}H NMR Spectrum of **5r**

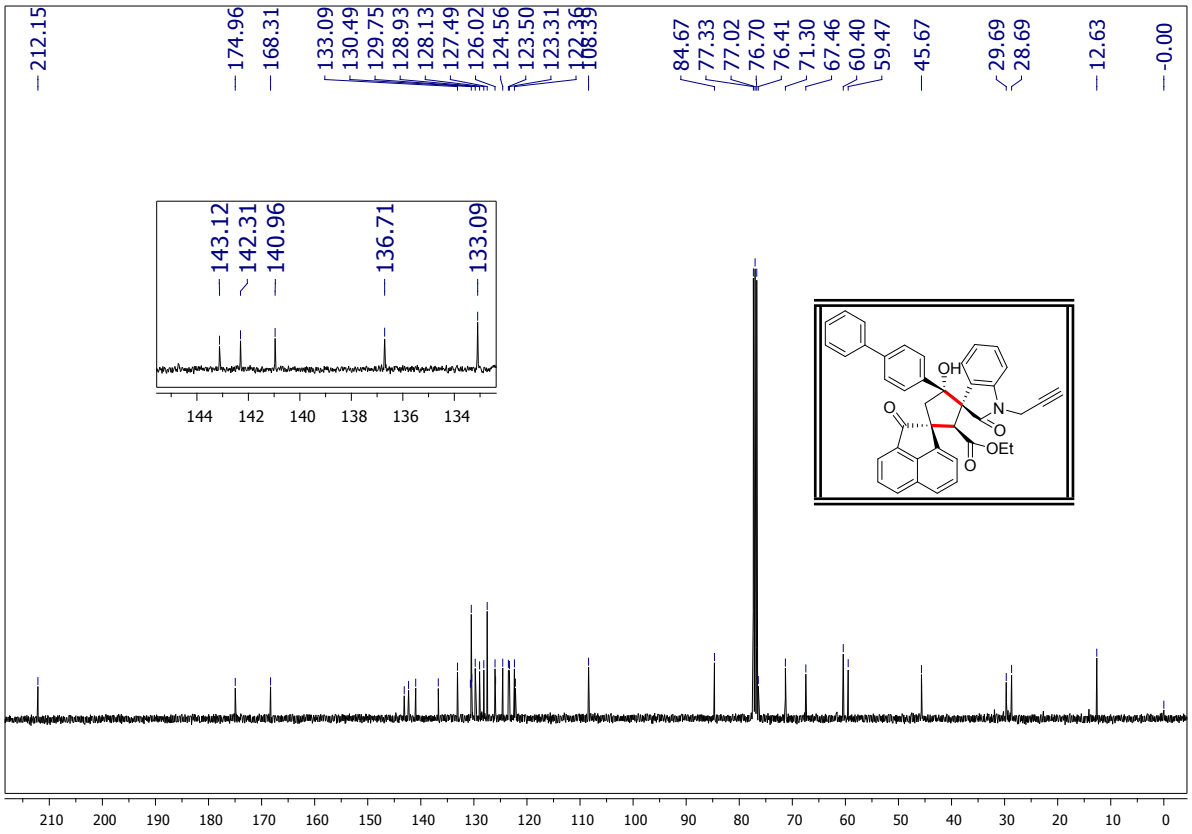

Figure 119. ^{13}C NMR Spectrum of **5r**

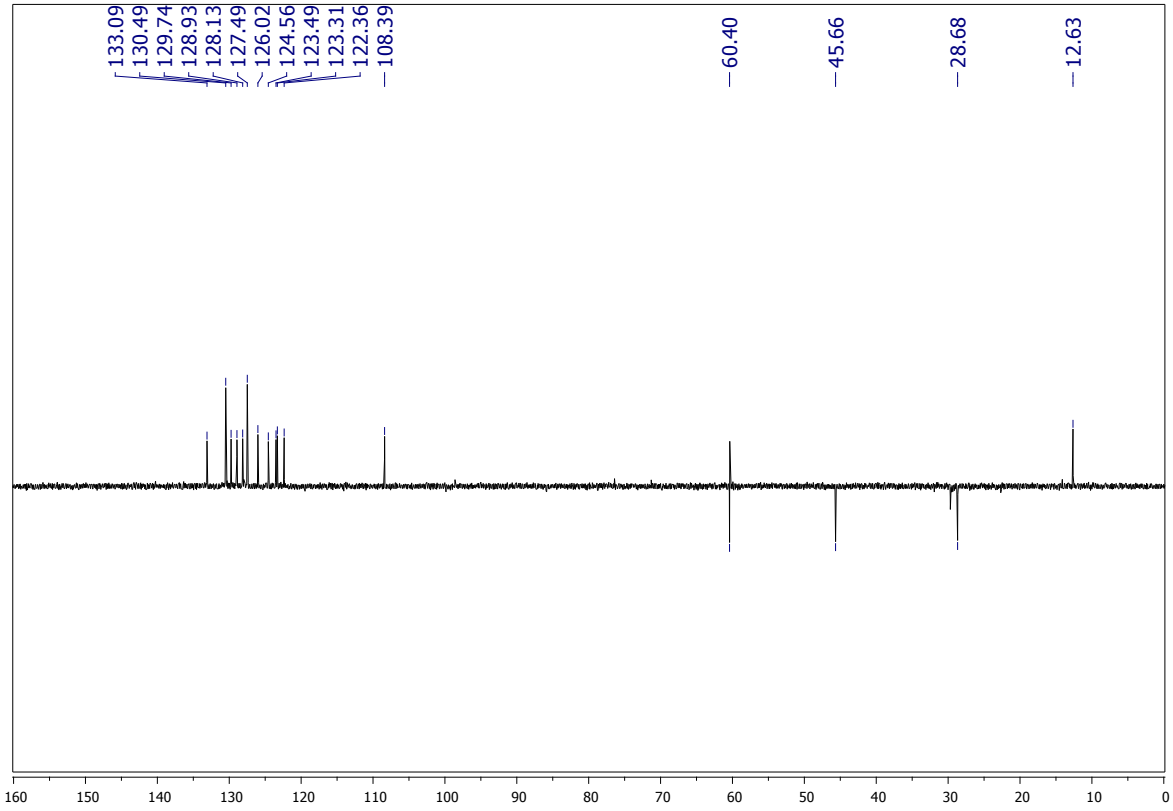

Figure 120. DEPT-135 Spectrum of **5r**

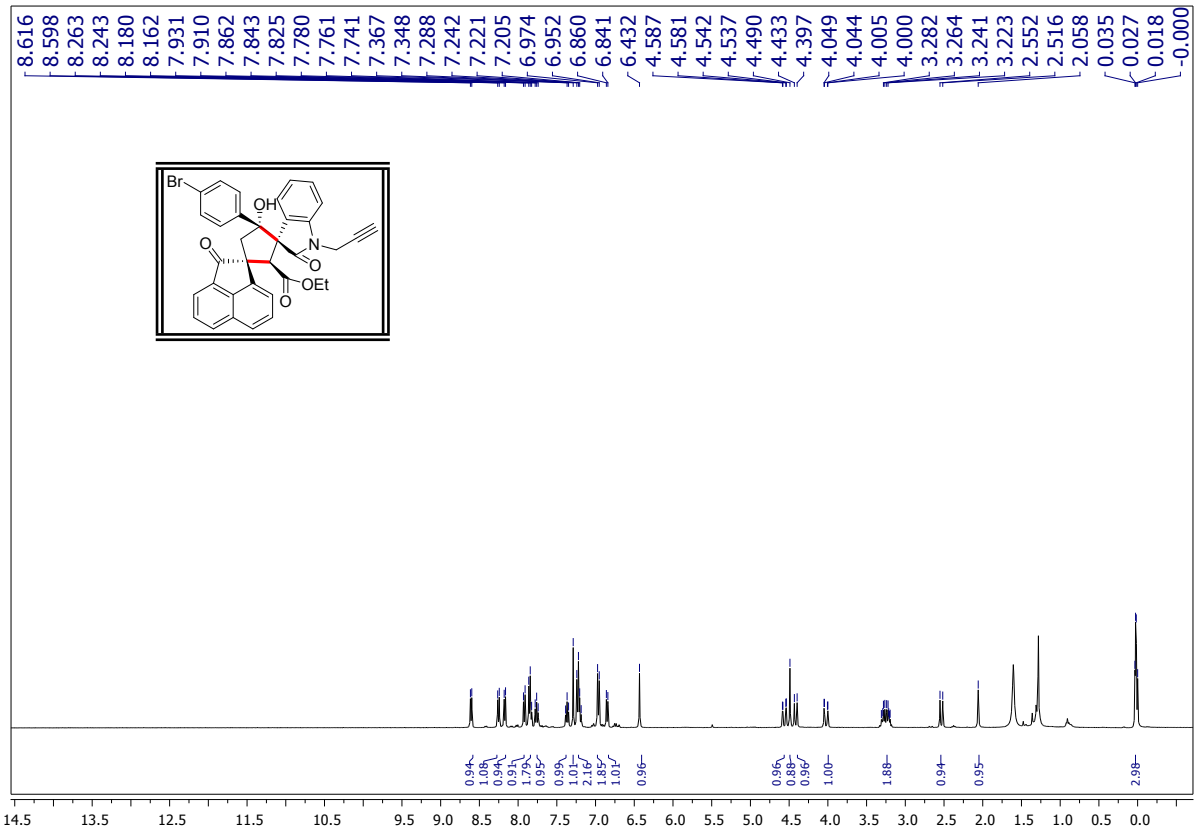

Figure 121. ^{1}H NMR Spectrum of **5s**

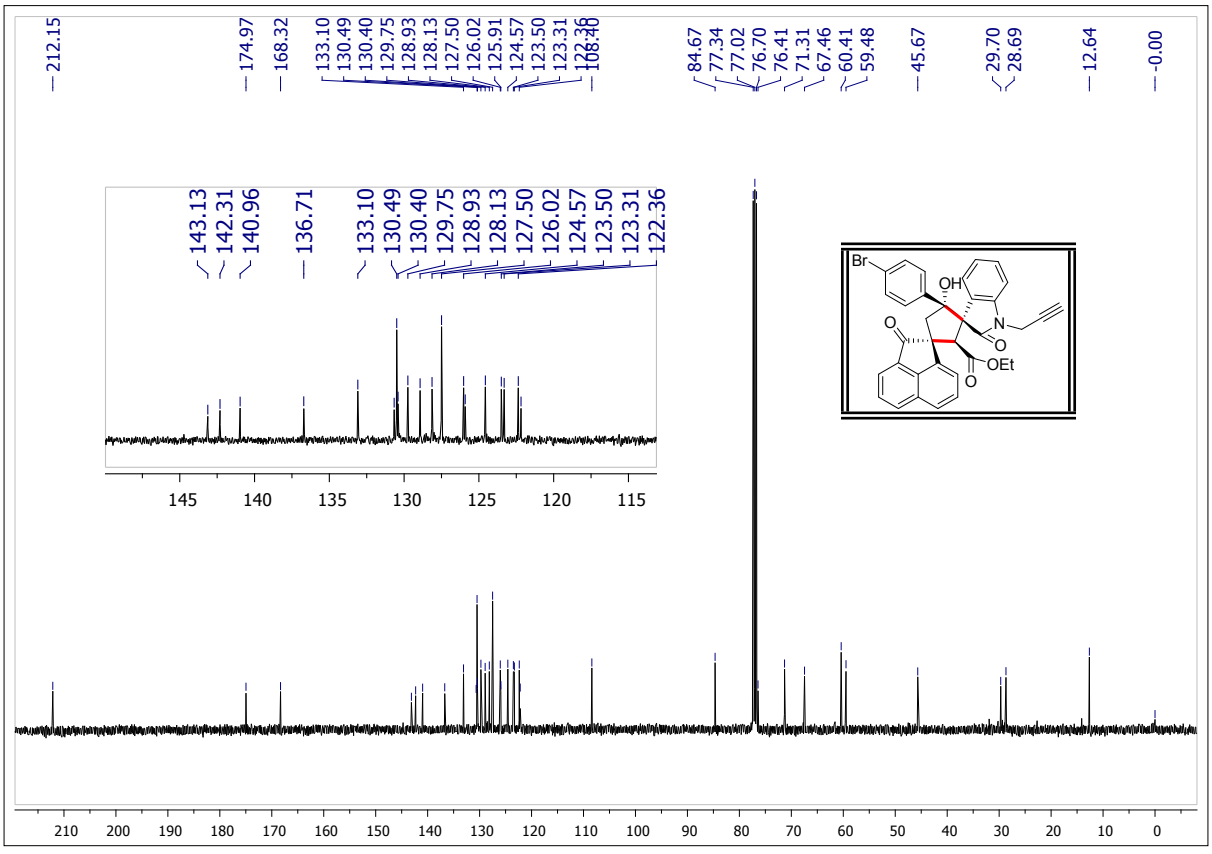

Figure 122. ^{13}C NMR Spectrum of **5s**

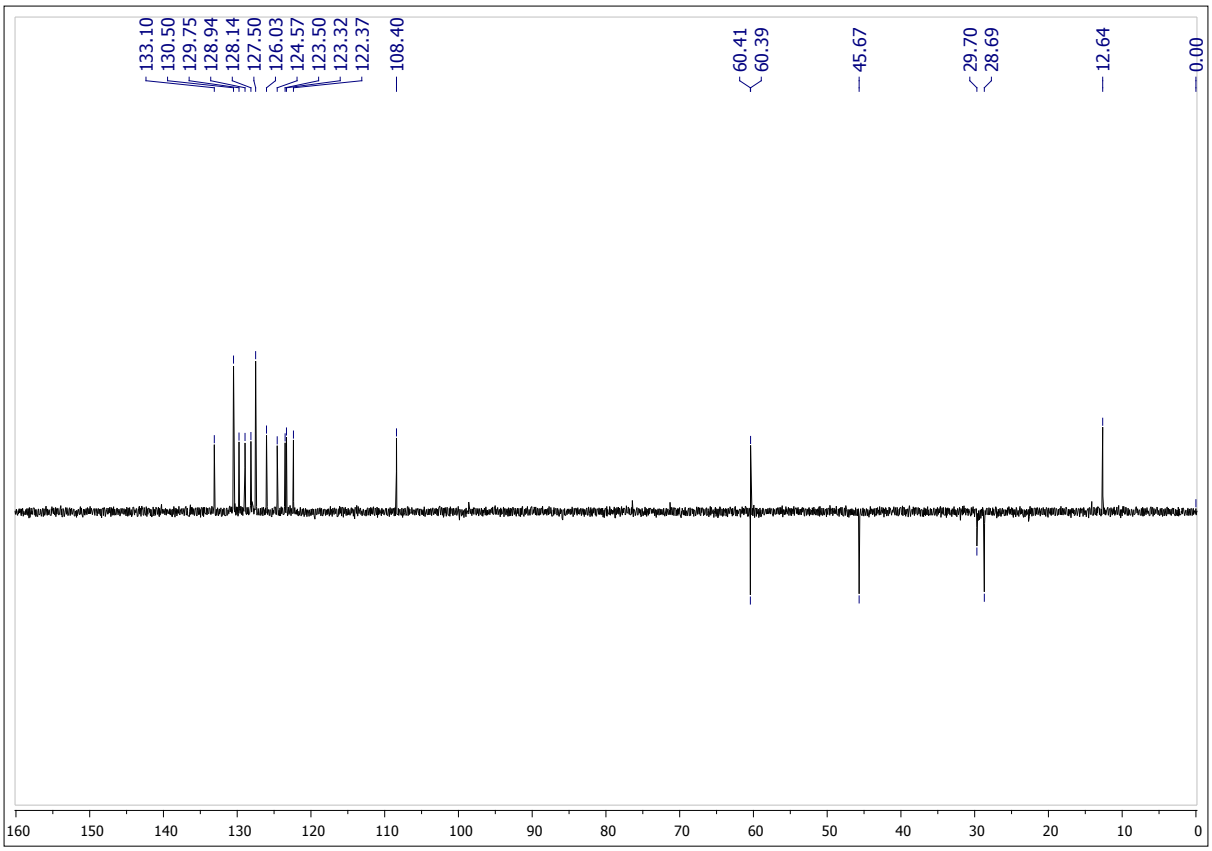

Figure 123. DEPT-135 Spectrum of **5s**

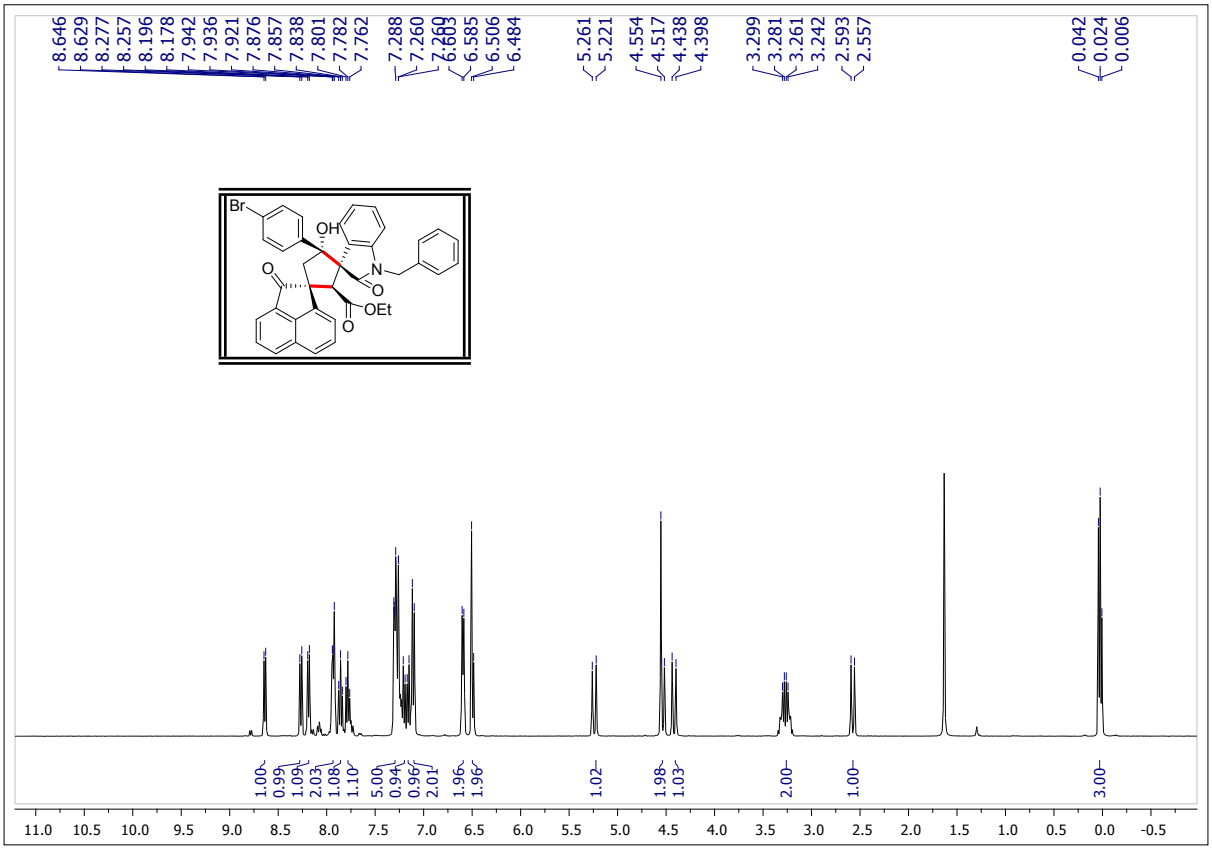

Figure 124. ^{1}H NMR Spectrum of **5t**

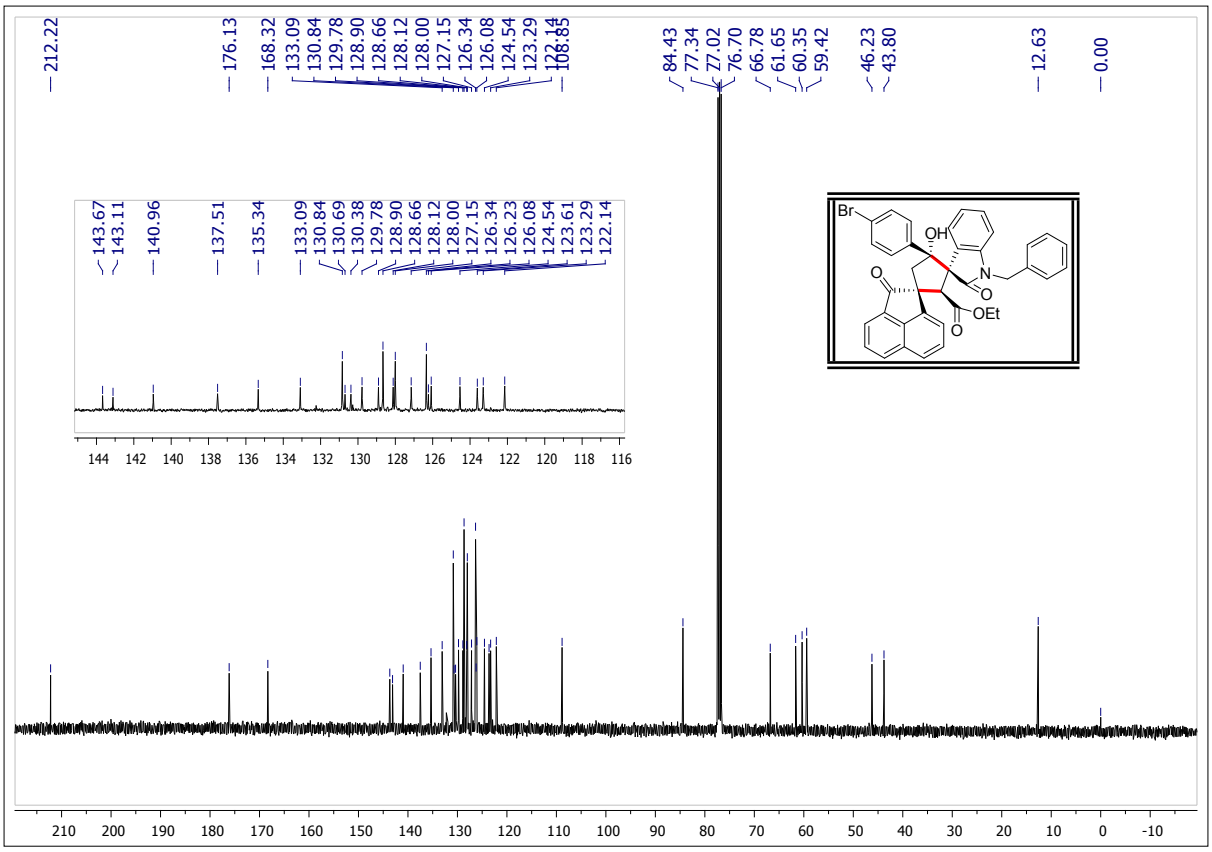

Figure 125. ^{13}C NMR Spectrum of **5t**

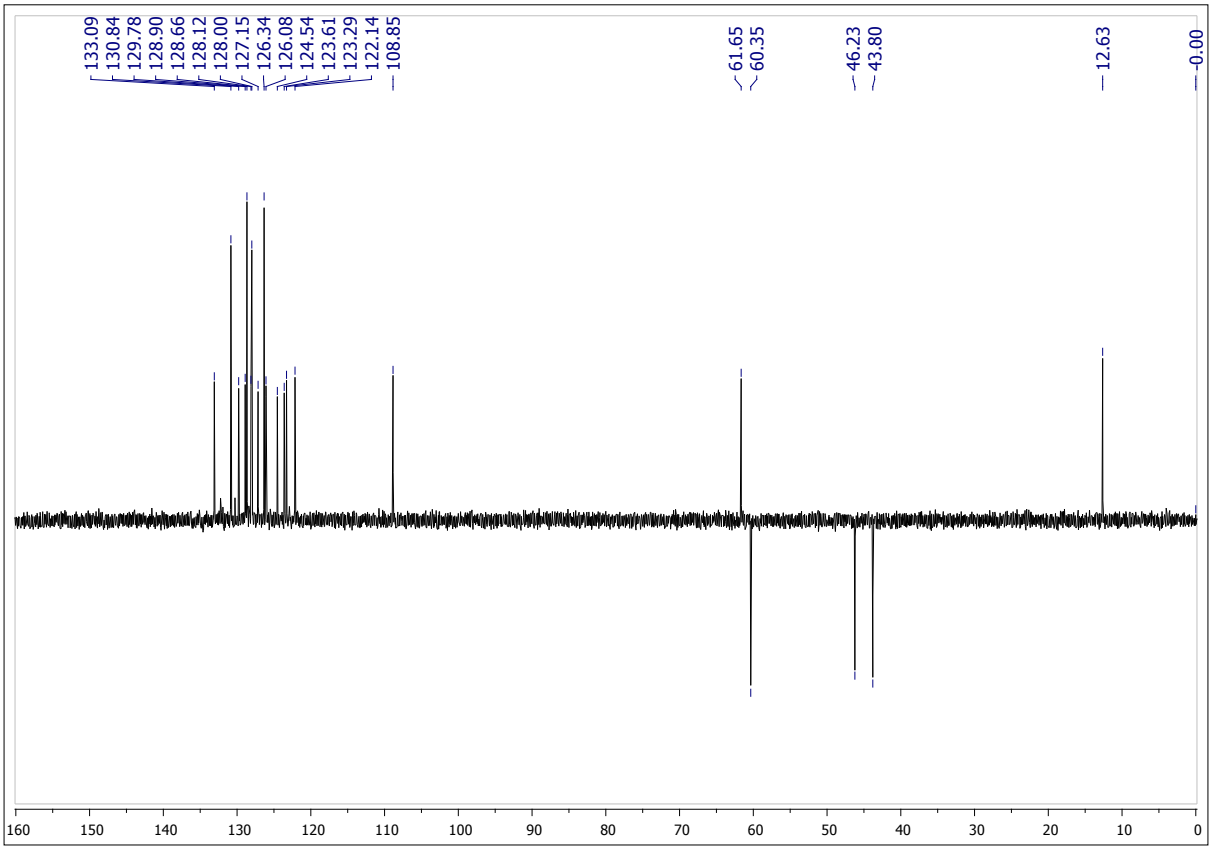

Figure 126. DEPT-135 Spectrum of **5t**

2. HRMS (EI) Spectra of Compounds

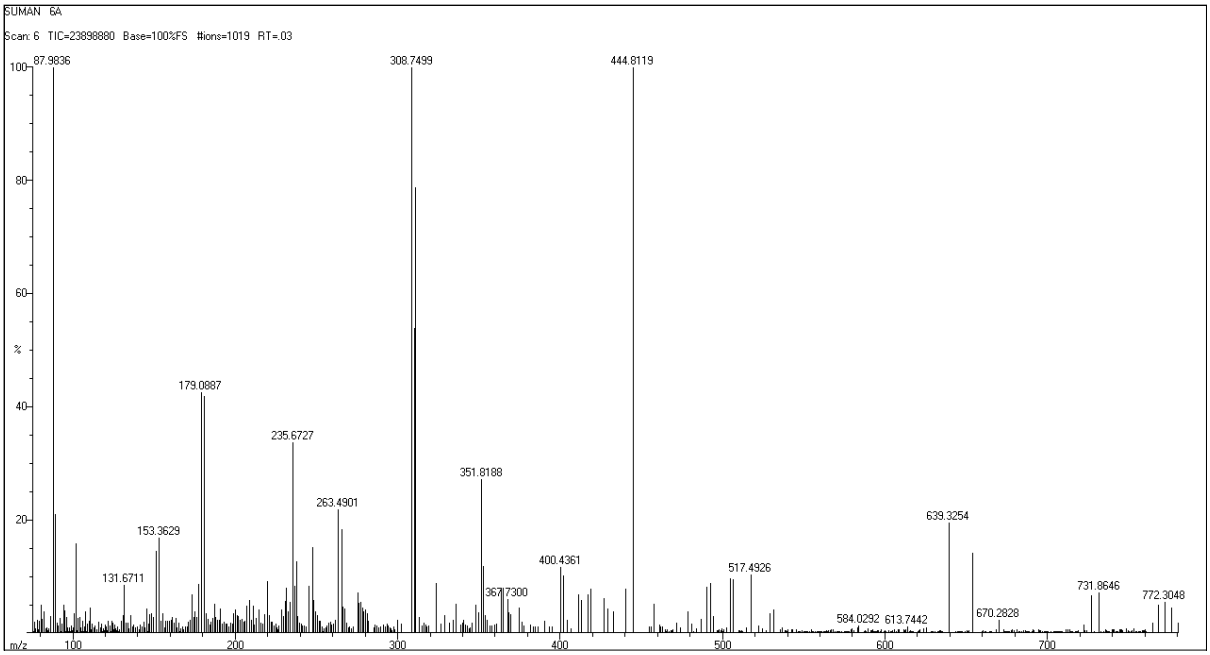

Figure 127. Mass spectrum of **3a**

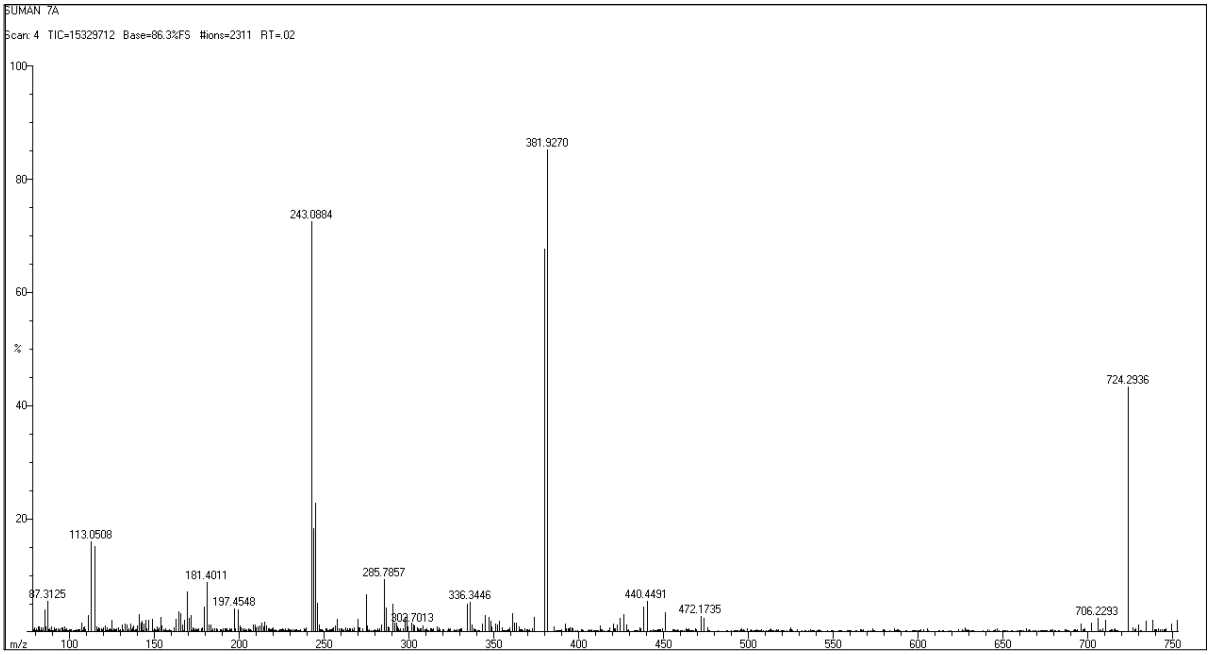

Figure 128. Mass spectrum of **4a**

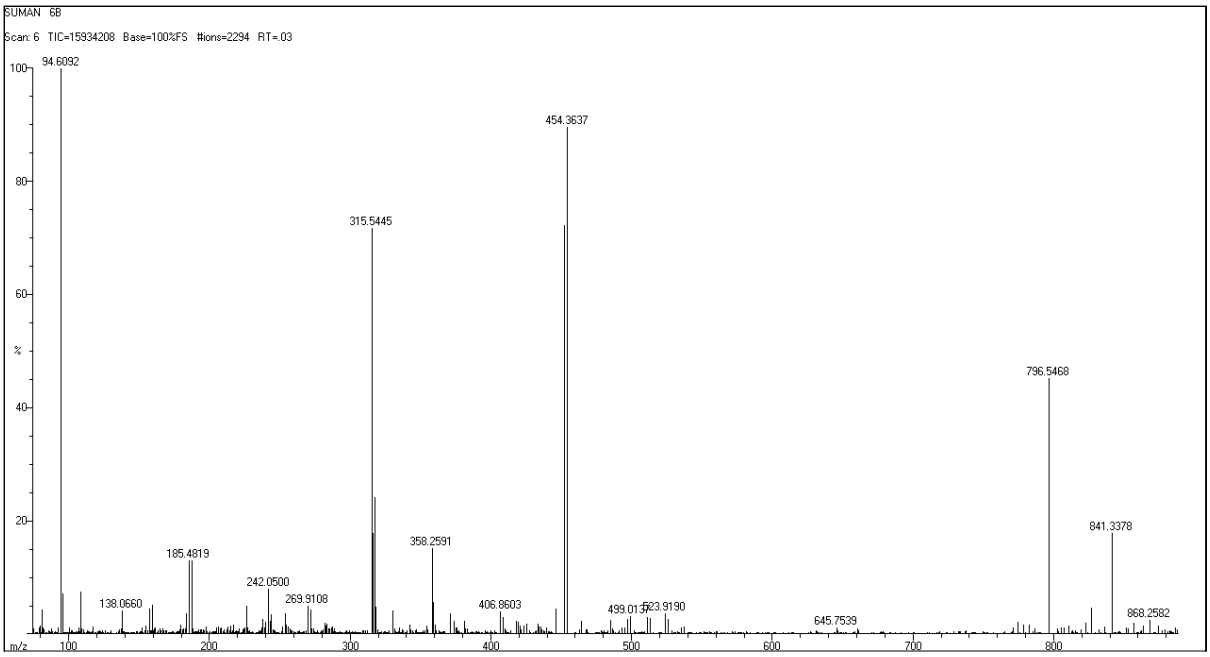

Figure 129. Mass spectrum of **3b**

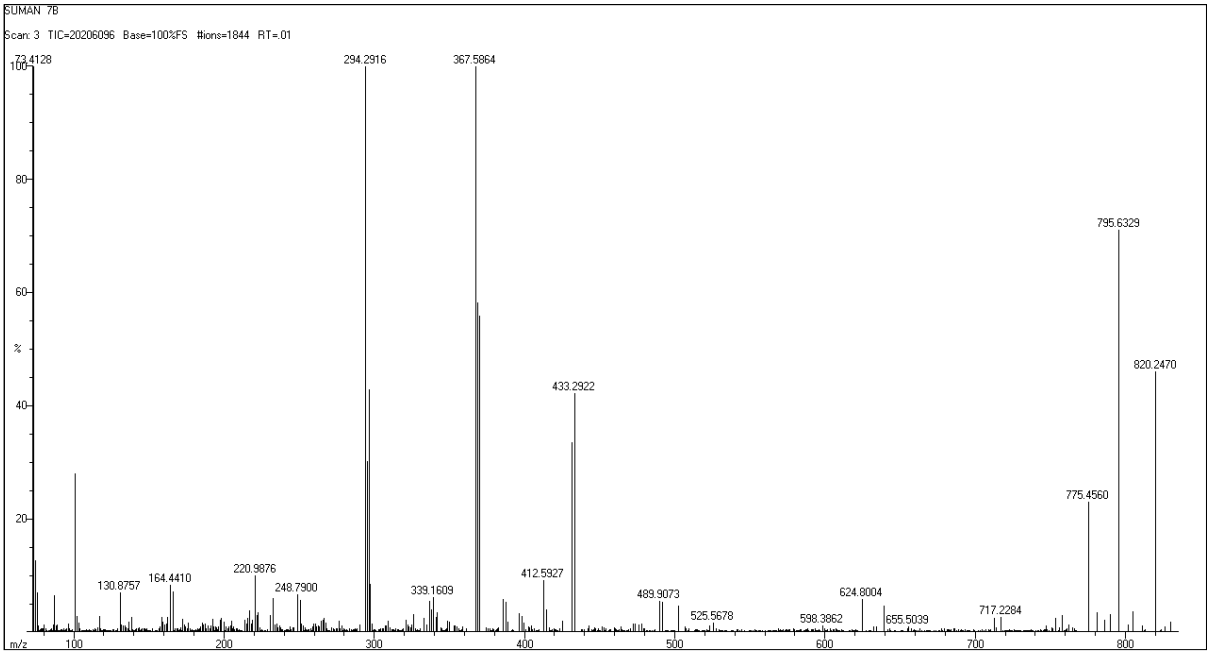

Figure 130. Mass spectrum of **4b**

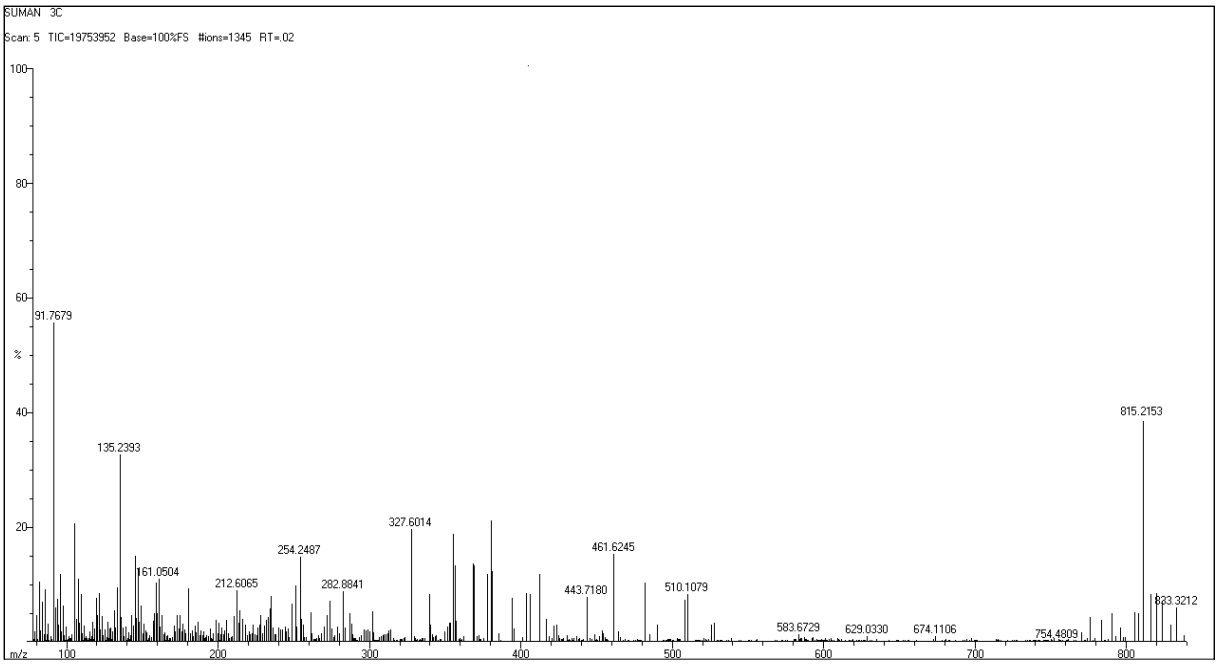

Figure 131. Mass spectrum of **3c**

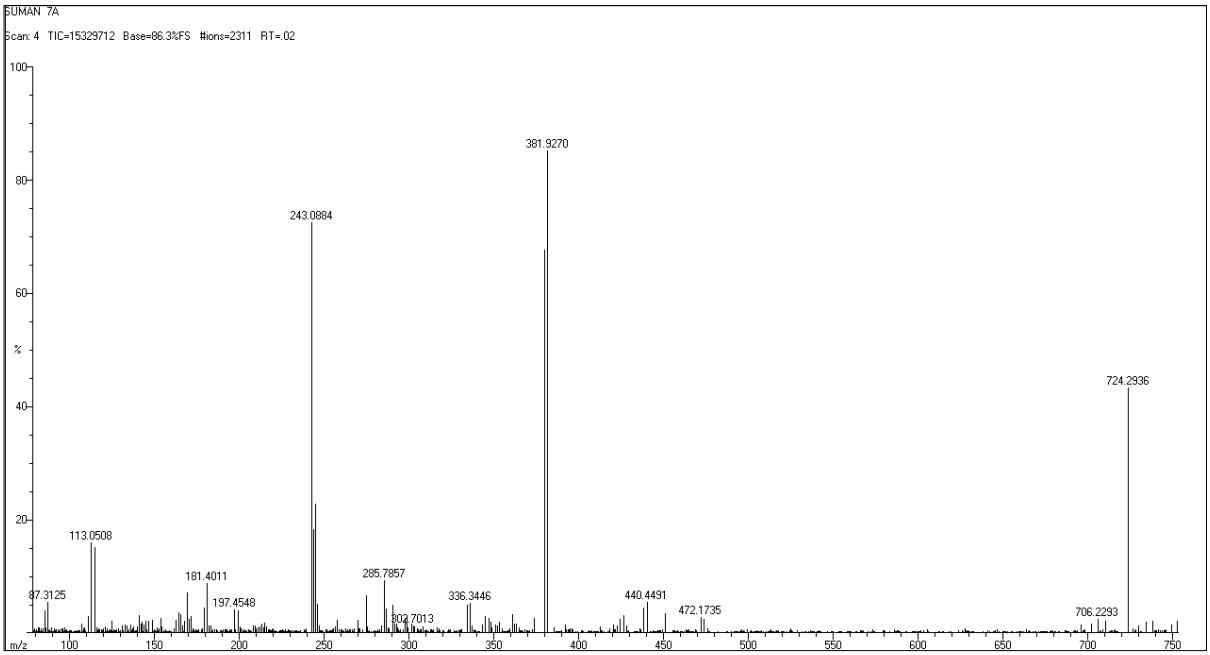

Figure 132. Mass spectrum of **4c**

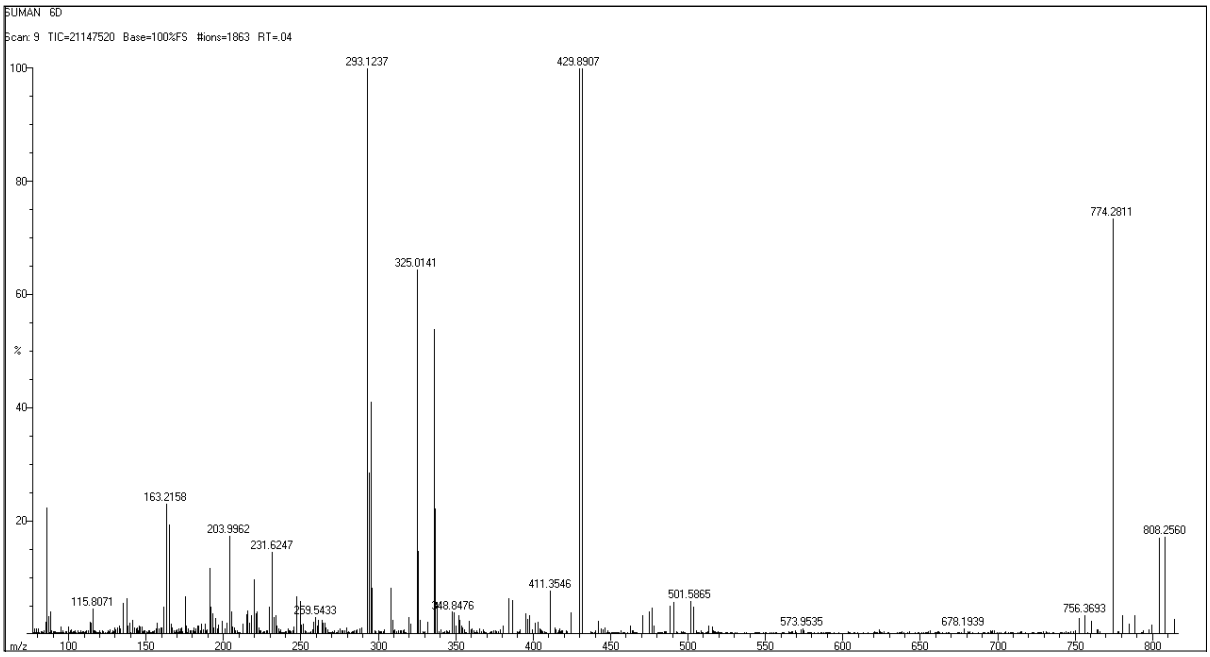

Figure 133. Mass spectrum of **3d**

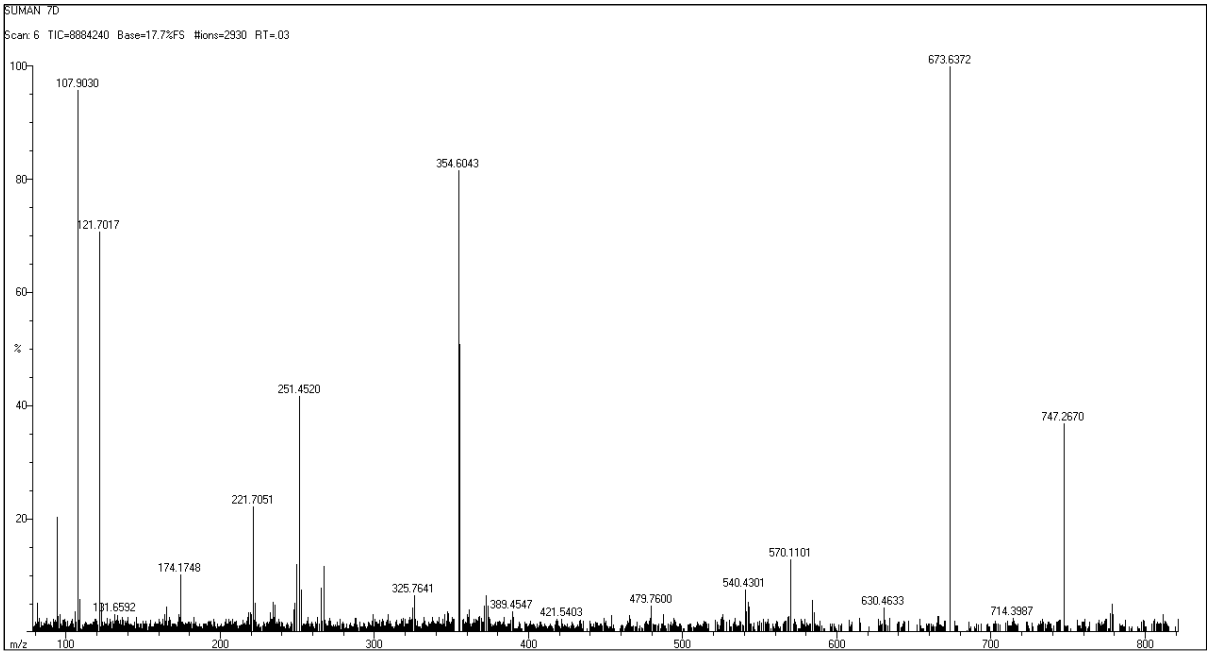

Figure 134. Mass spectrum of **4d**

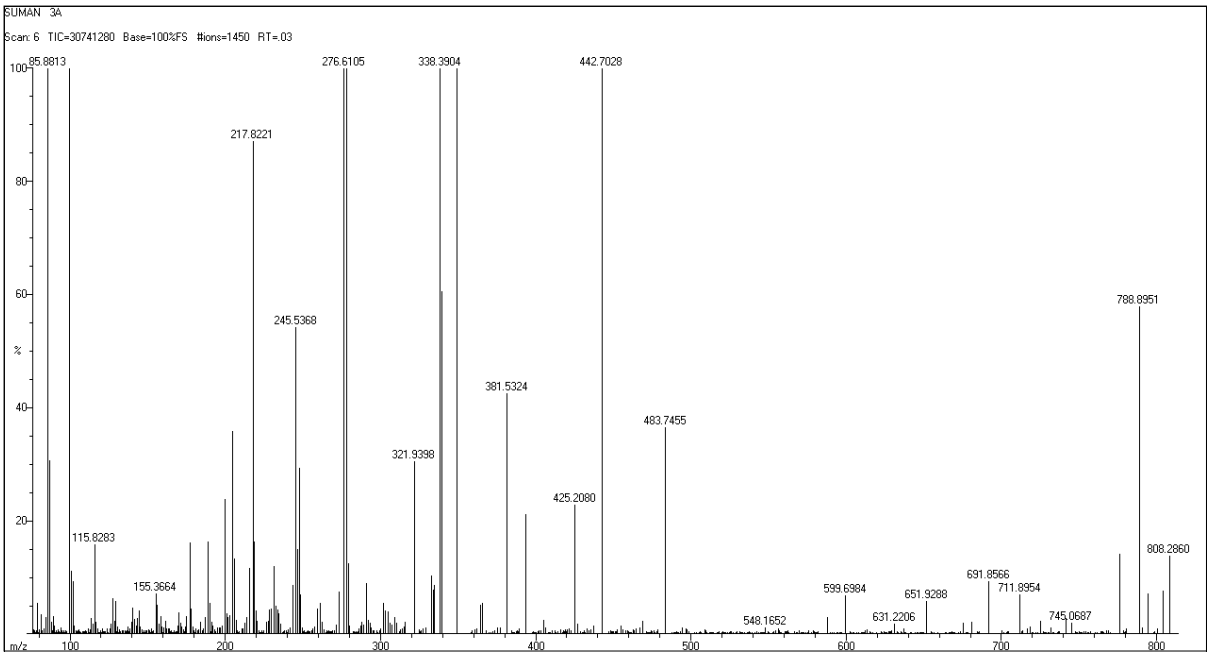

Figure 135. Mass spectrum of **3a'**

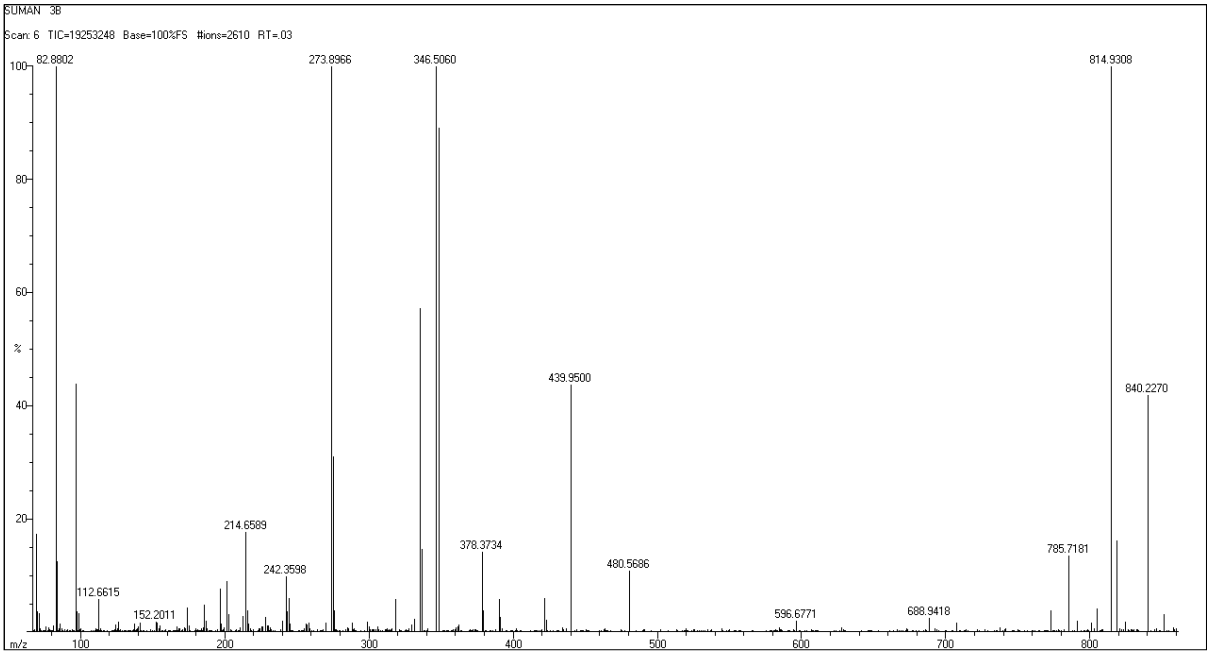

Figure 136. Mass spectrum of **3b'**

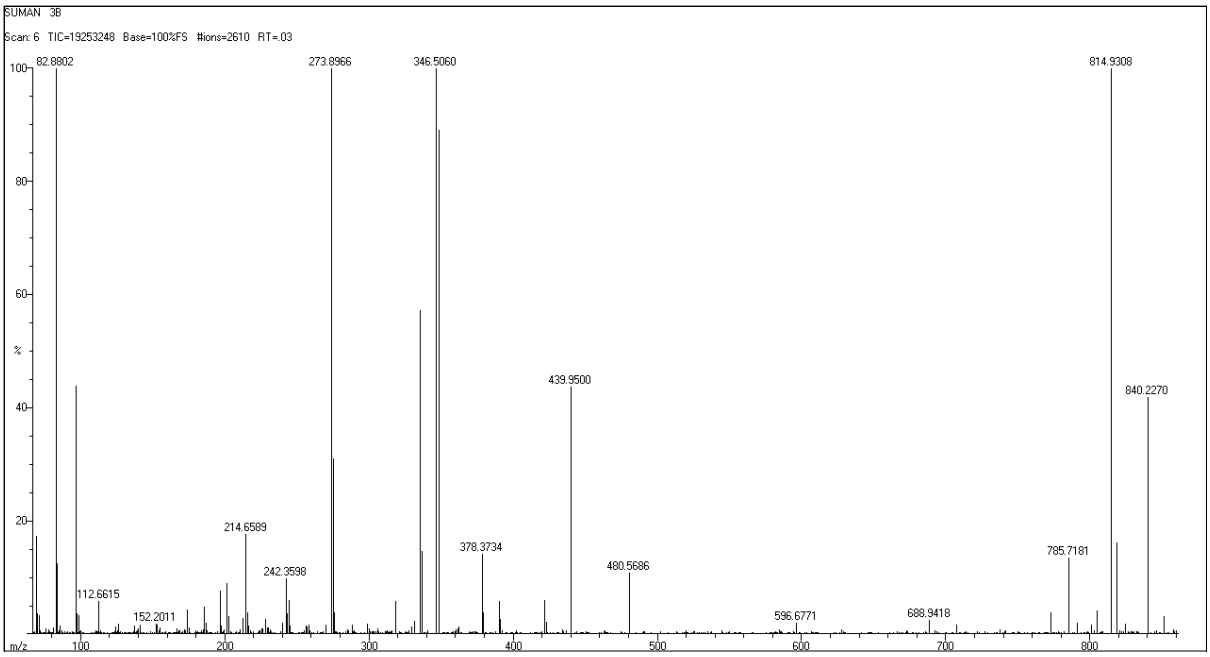

Figure 137. Mass spectrum of **3c'**

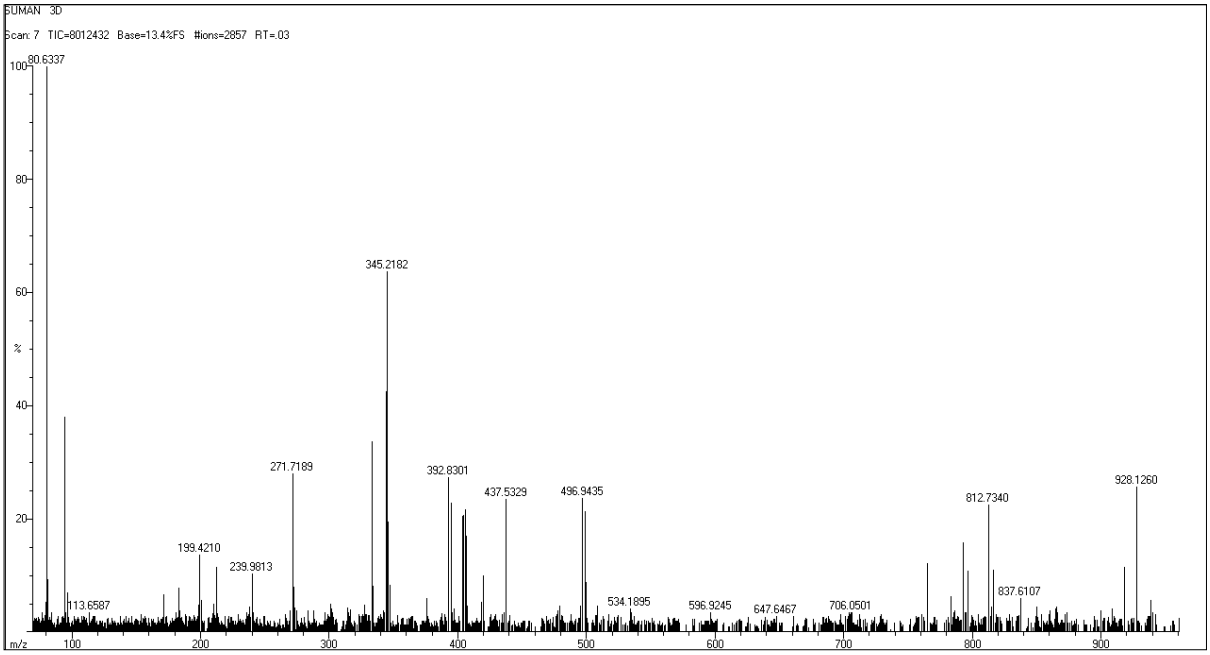

Figure 138. Mass spectrum of **3d'**

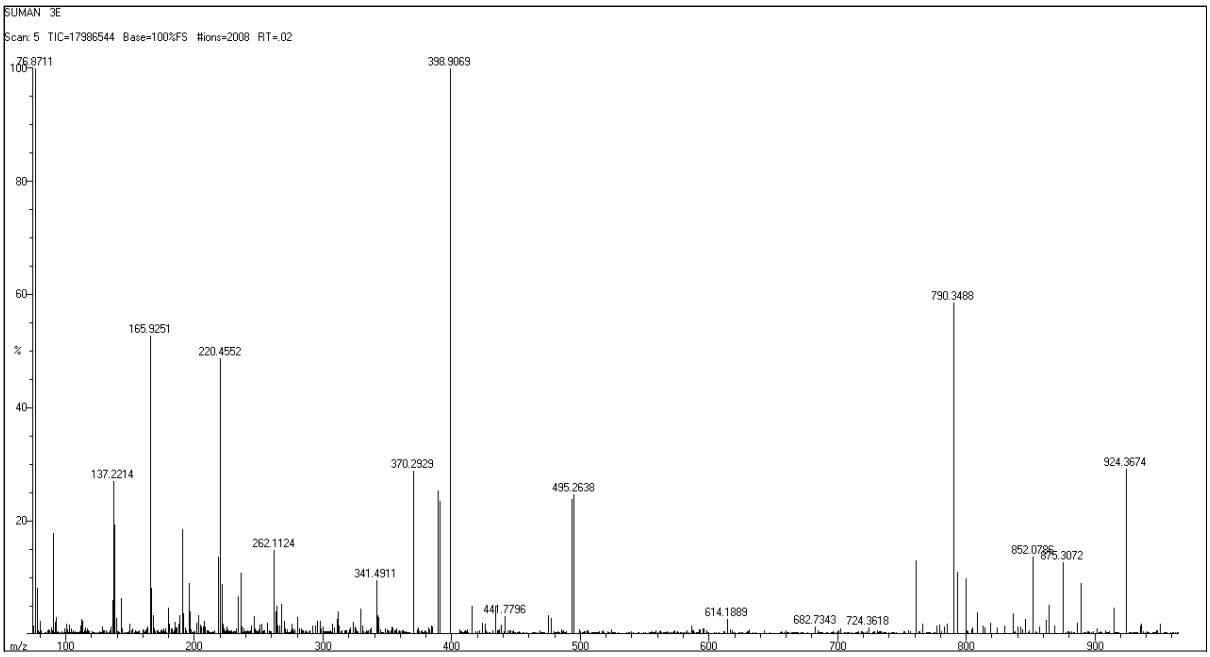

Figure 139. Mass spectrum of **3e'**

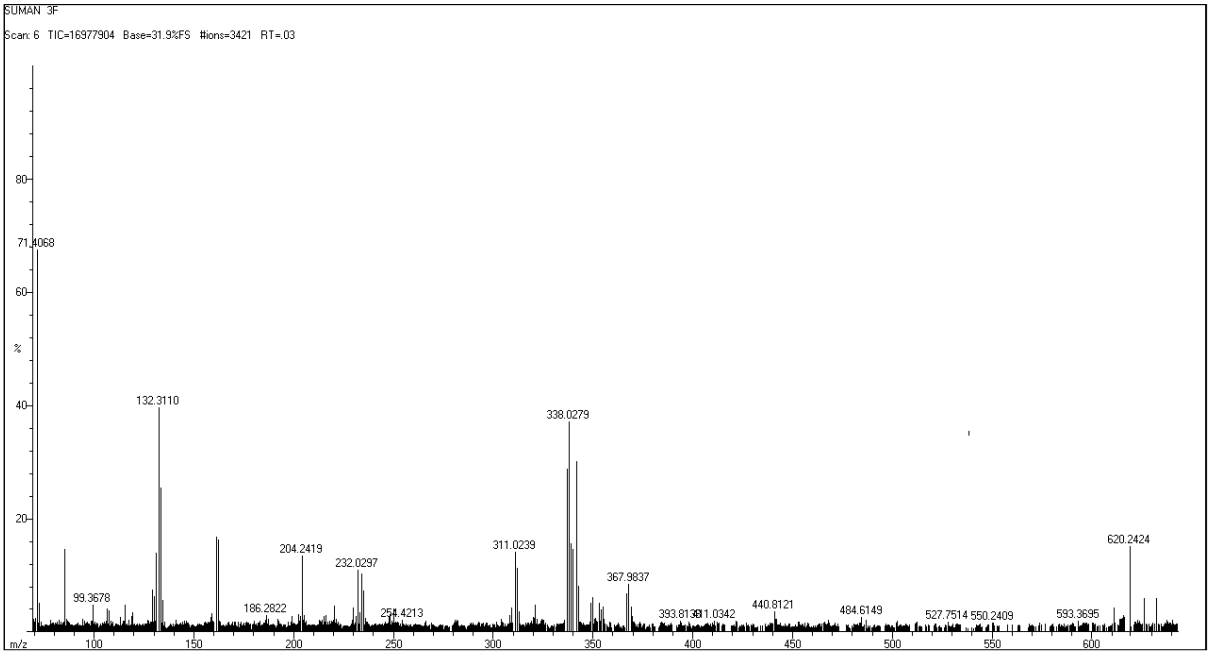

Figure 140. Mass spectrum of **3f'**

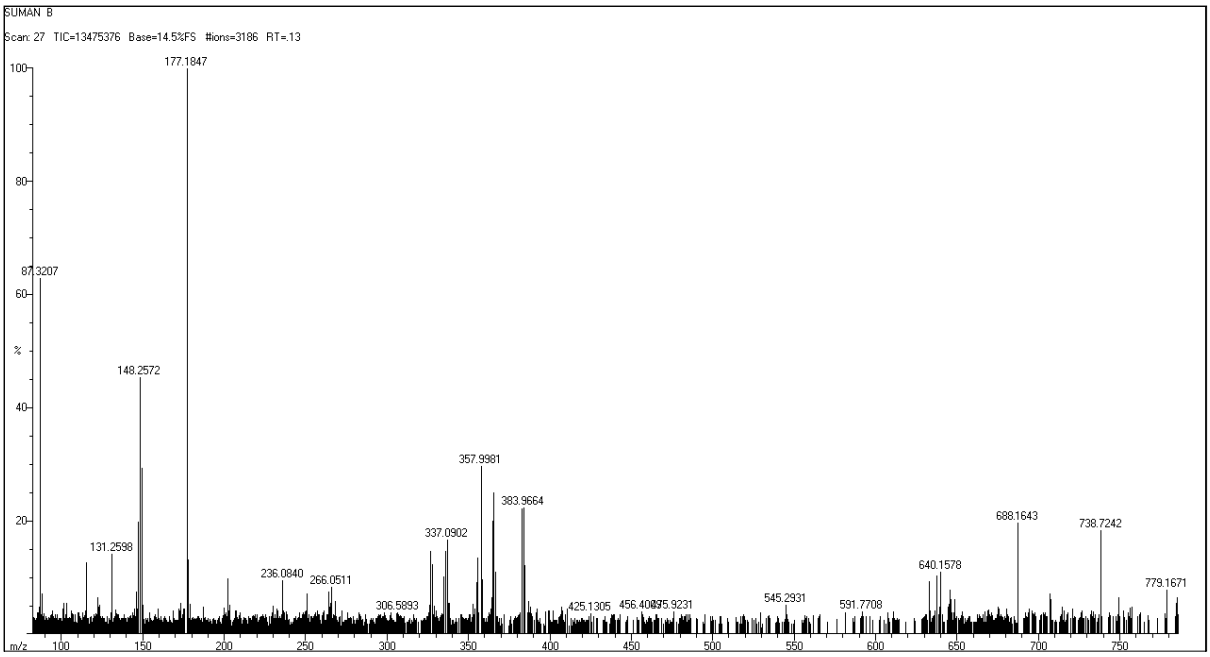

Figure 141. Mass spectrum of **3g'**

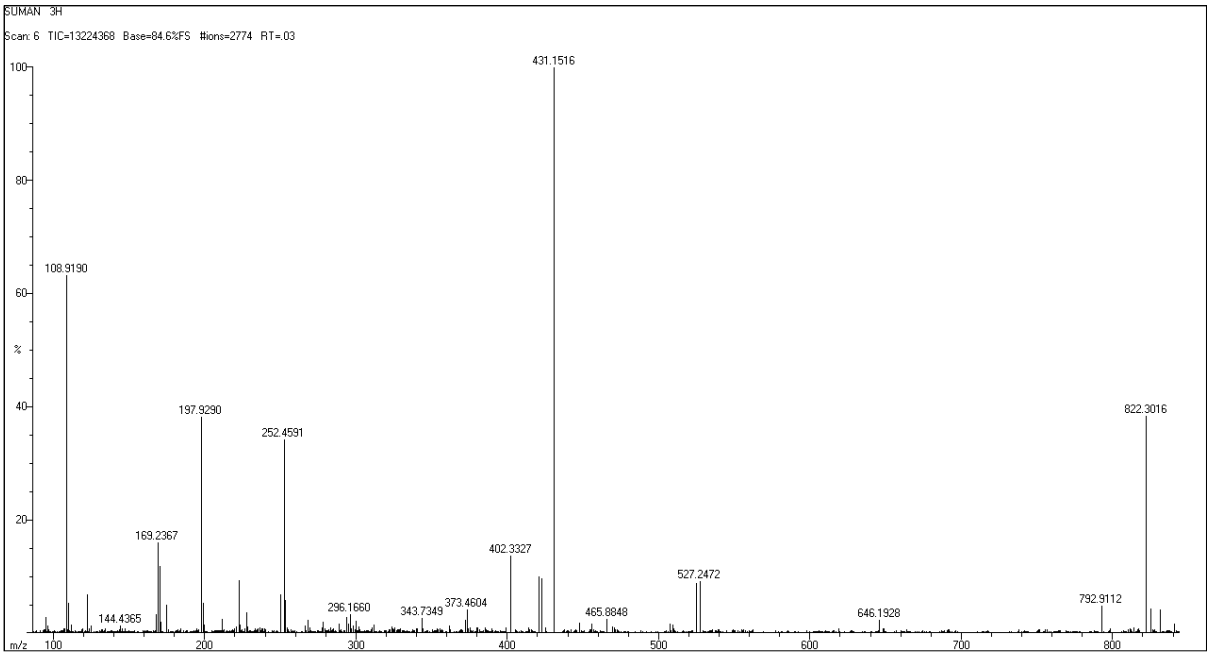

Figure 142. Mass spectrum of **3h'**

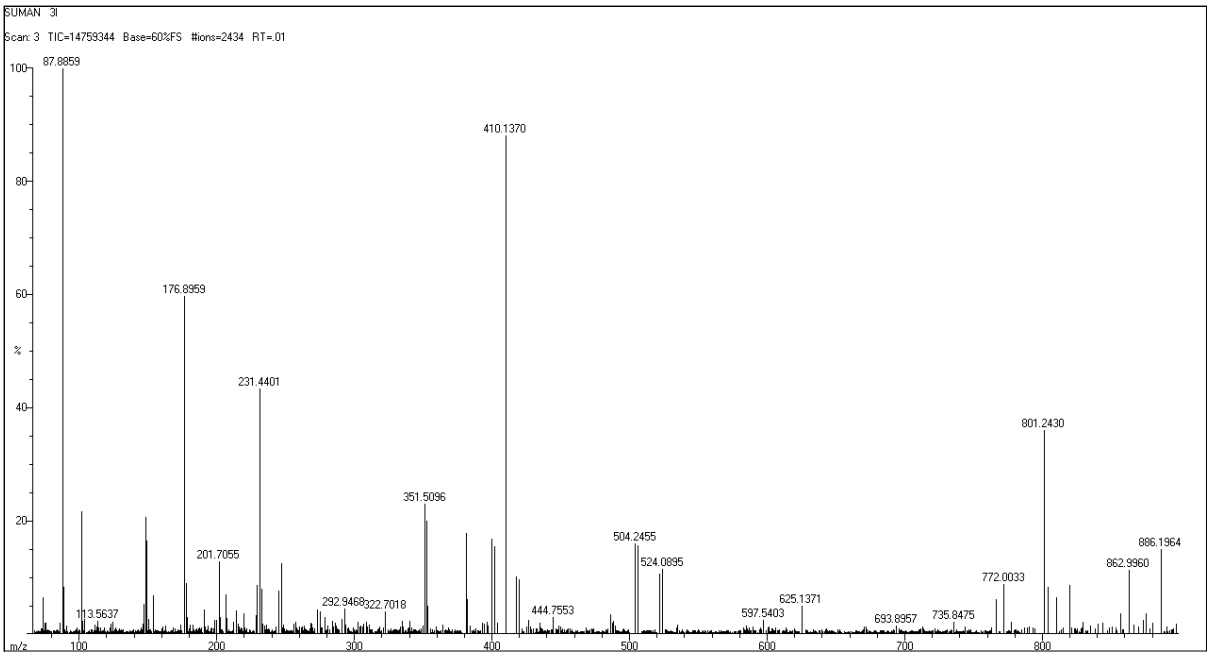

Figure 143. Mass spectrum of **3i'**

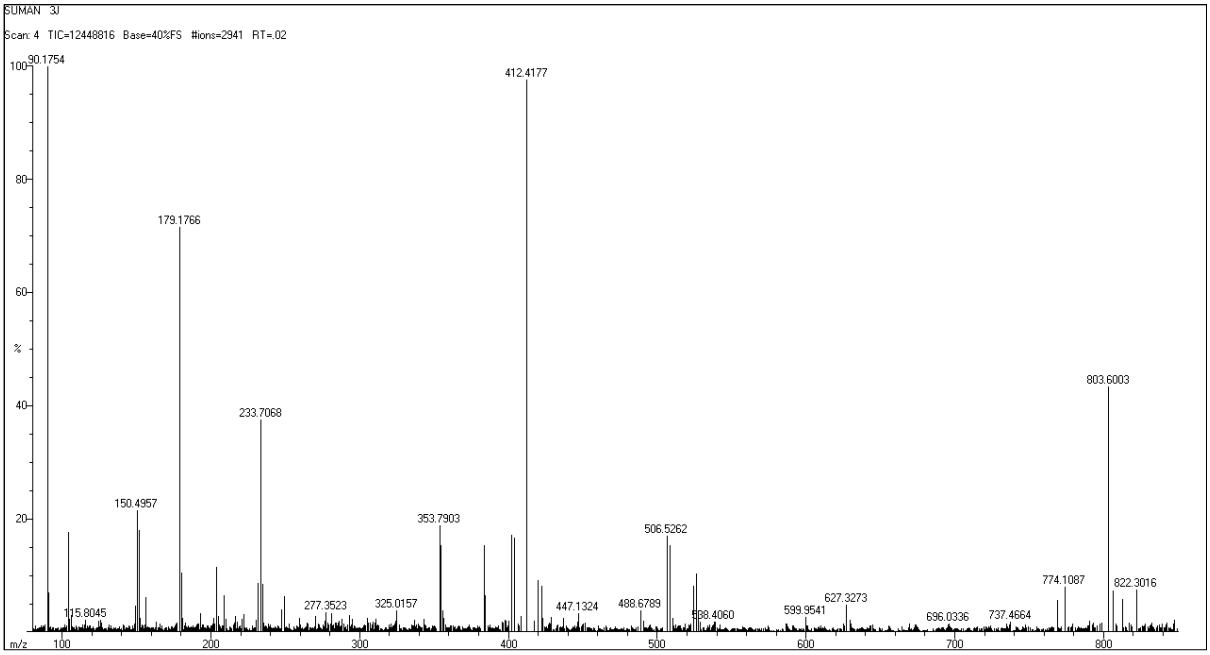

Figure 144. Mass spectrum of **3j'**

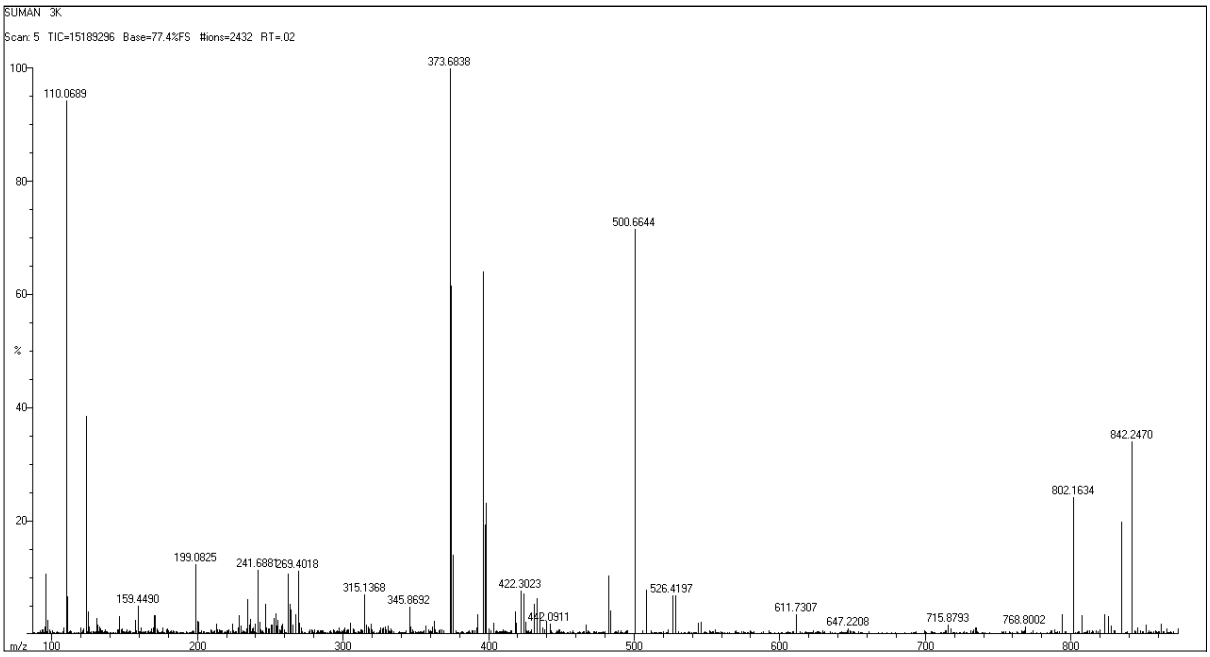

Figure 145. Mass spectrum of **3k'**

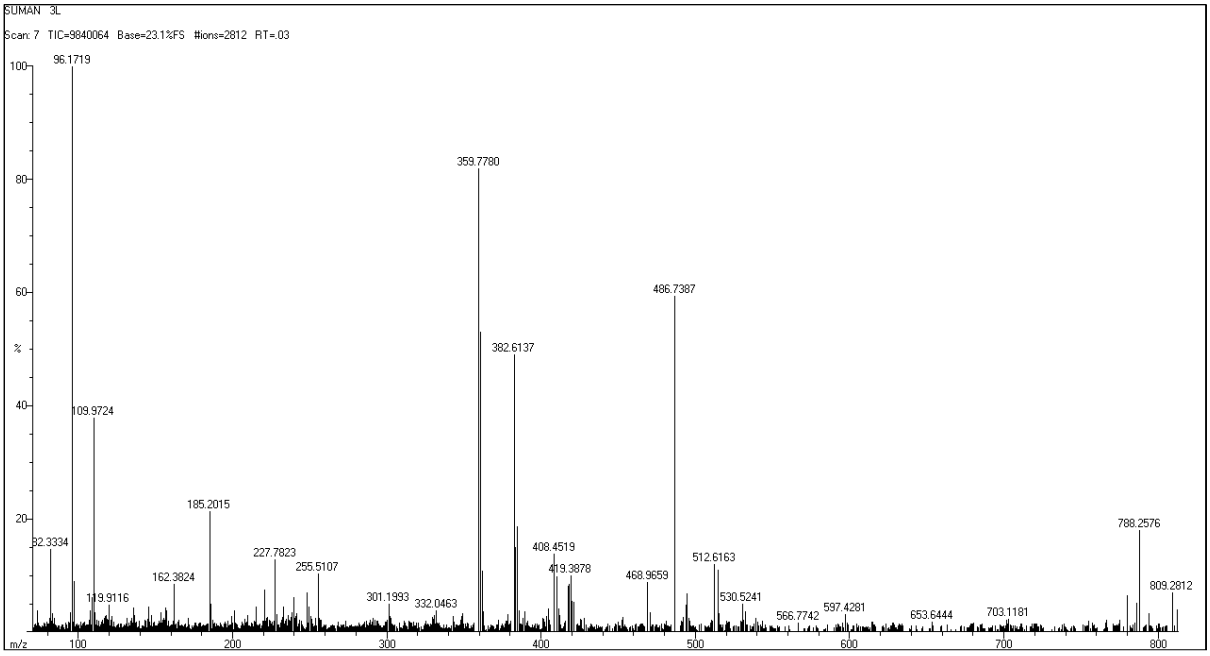

Figure 146. Mass spectrum of **3l'**

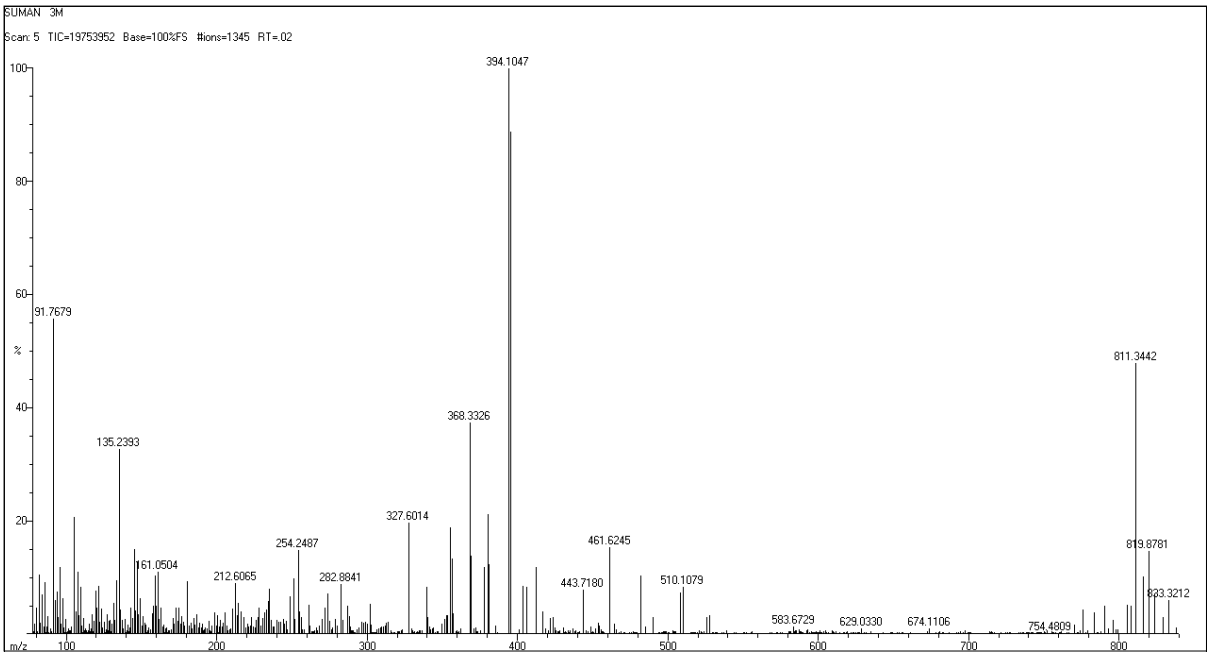

Figure 147. Mass spectrum of **3m'**

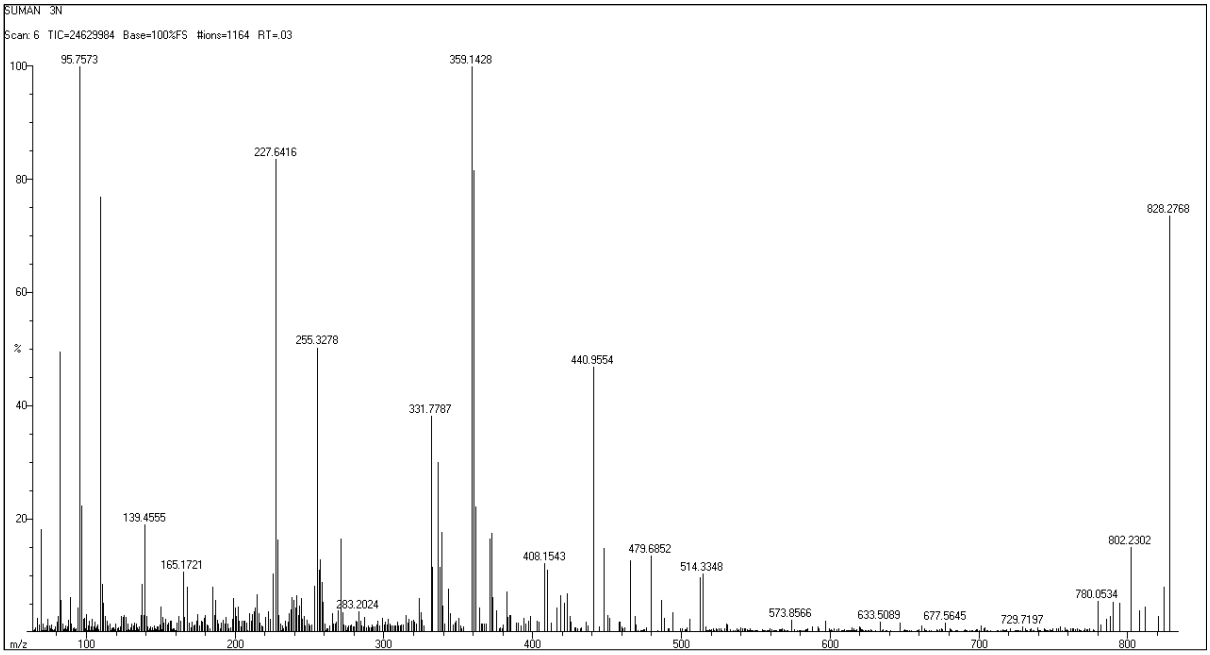

Figure 148. Mass spectrum of **3n'**

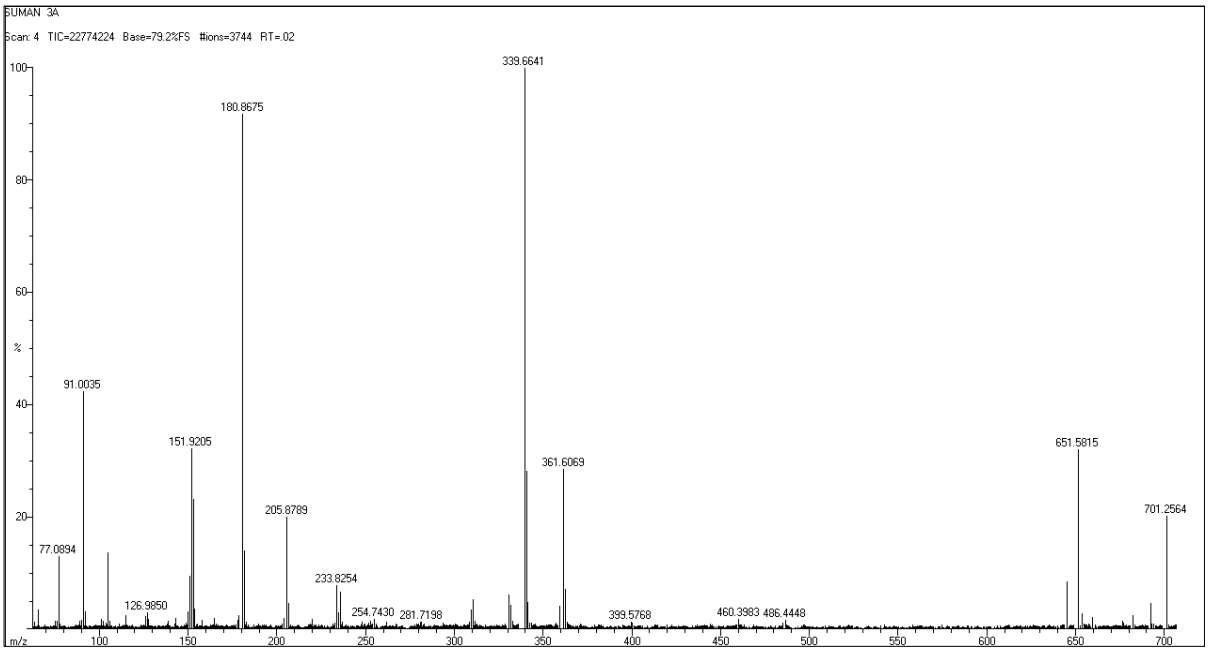

Figure 149. Mass spectrum of **5a**

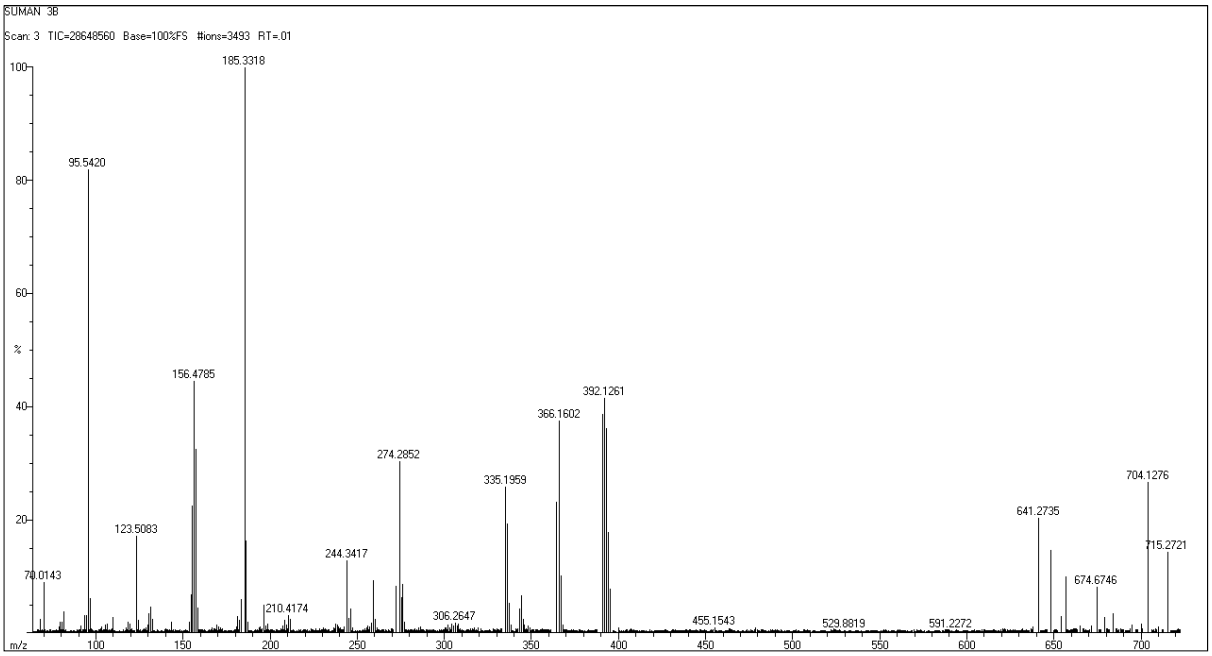

Figure 150. Mass spectrum of **5b**

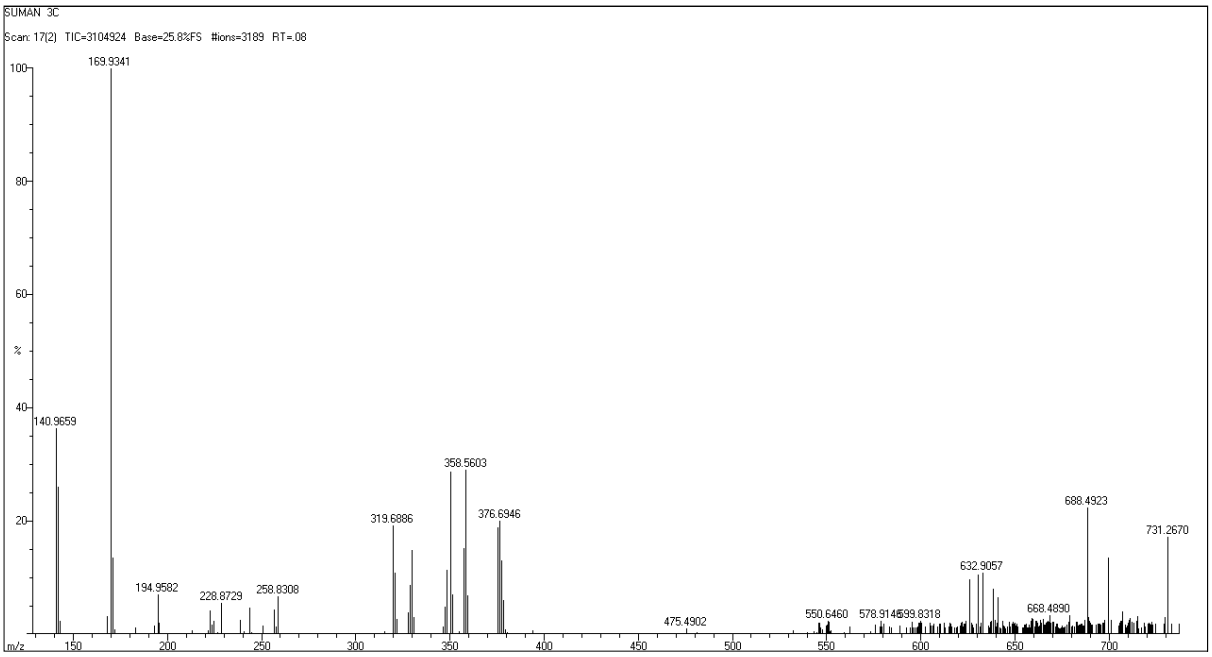

Figure 151. Mass spectrum of **5c**

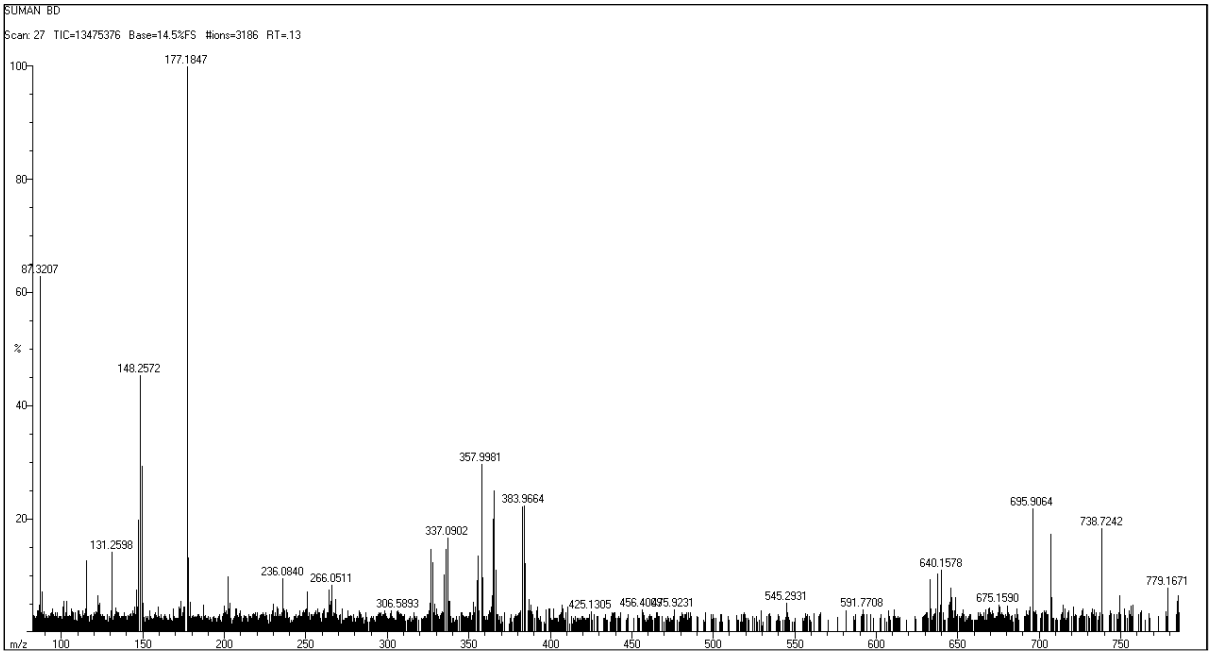

Figure 152. Mass spectrum of **5d**

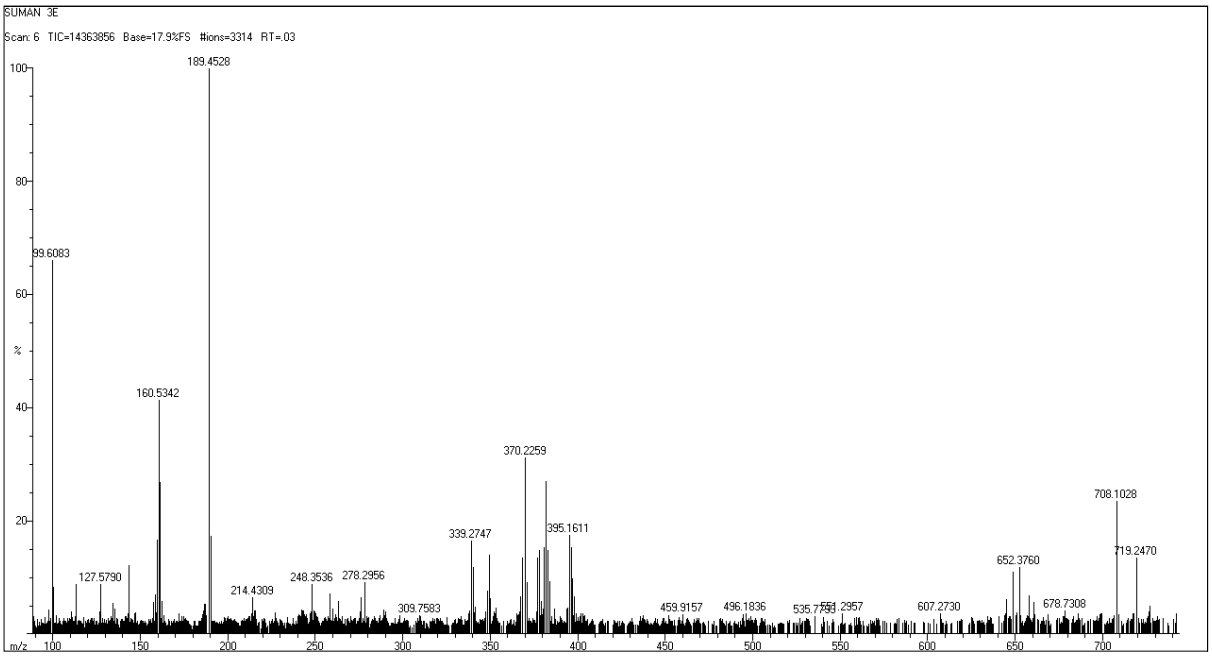

Figure 153. Mass spectrum of **5e**

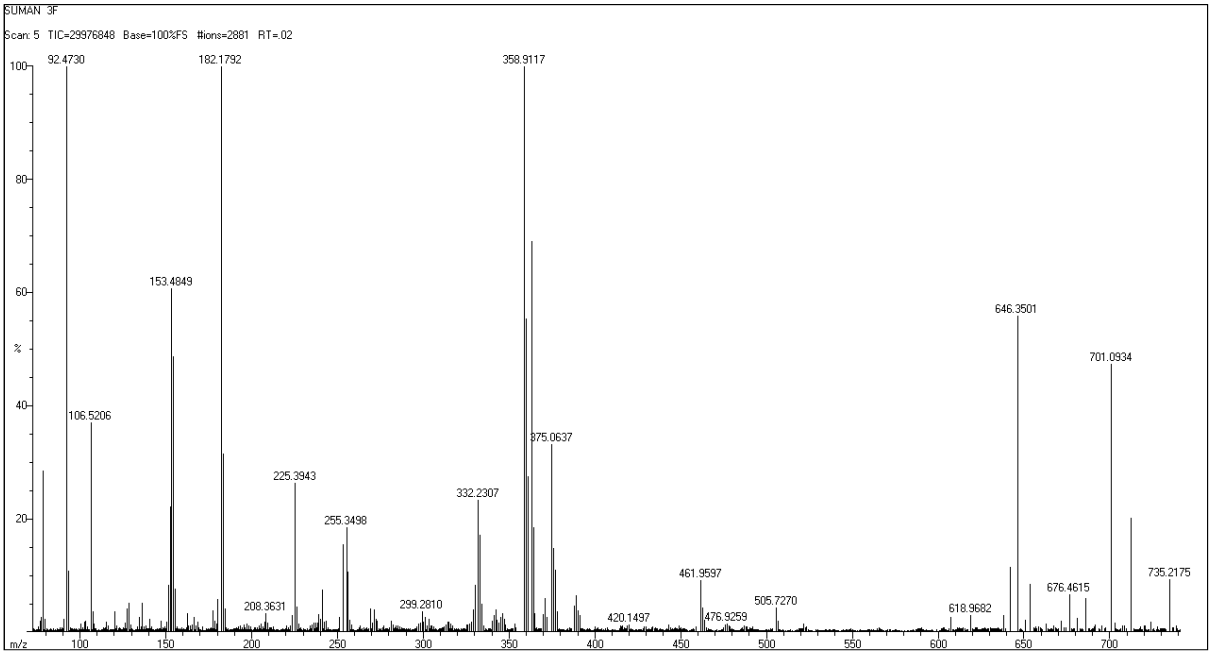

Figure 153. Mass spectrum of **5f**

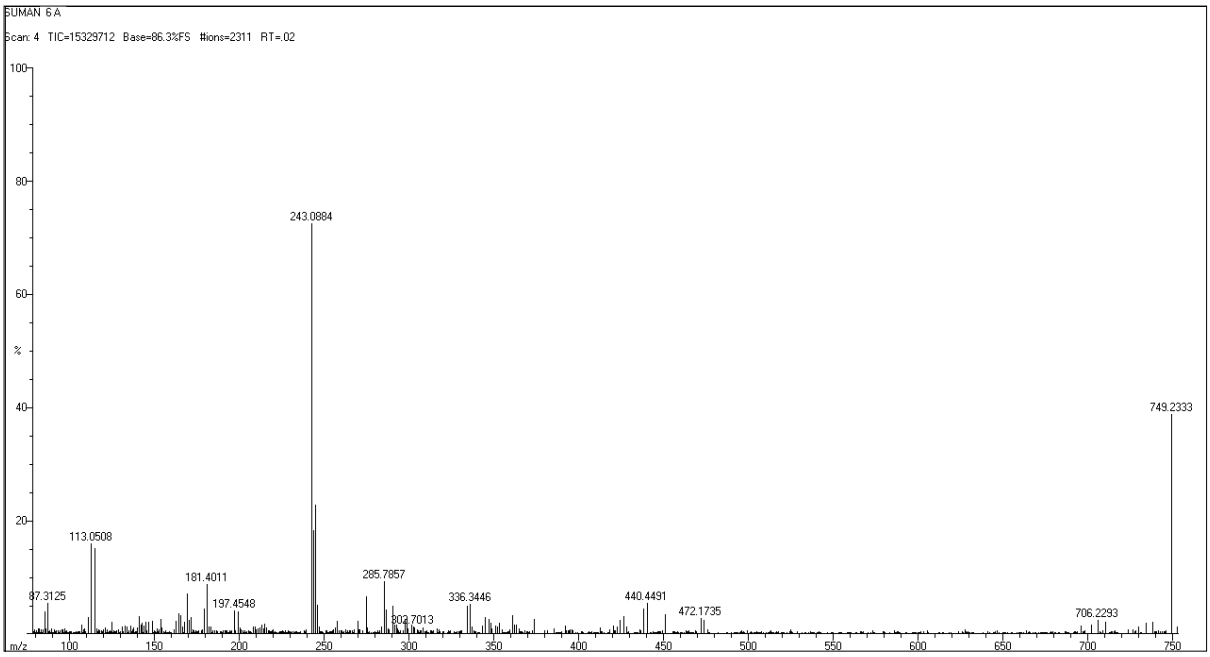

Figure 154. Mass spectrum of **5g**

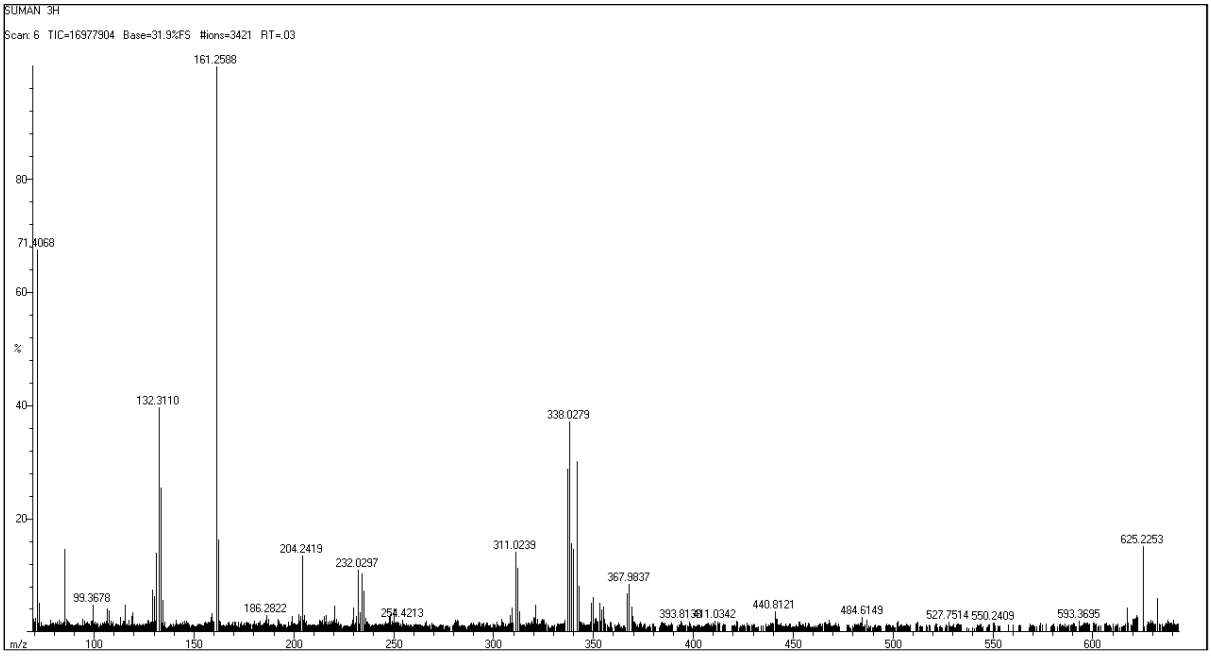

Figure 155. Mass spectrum of **5h**

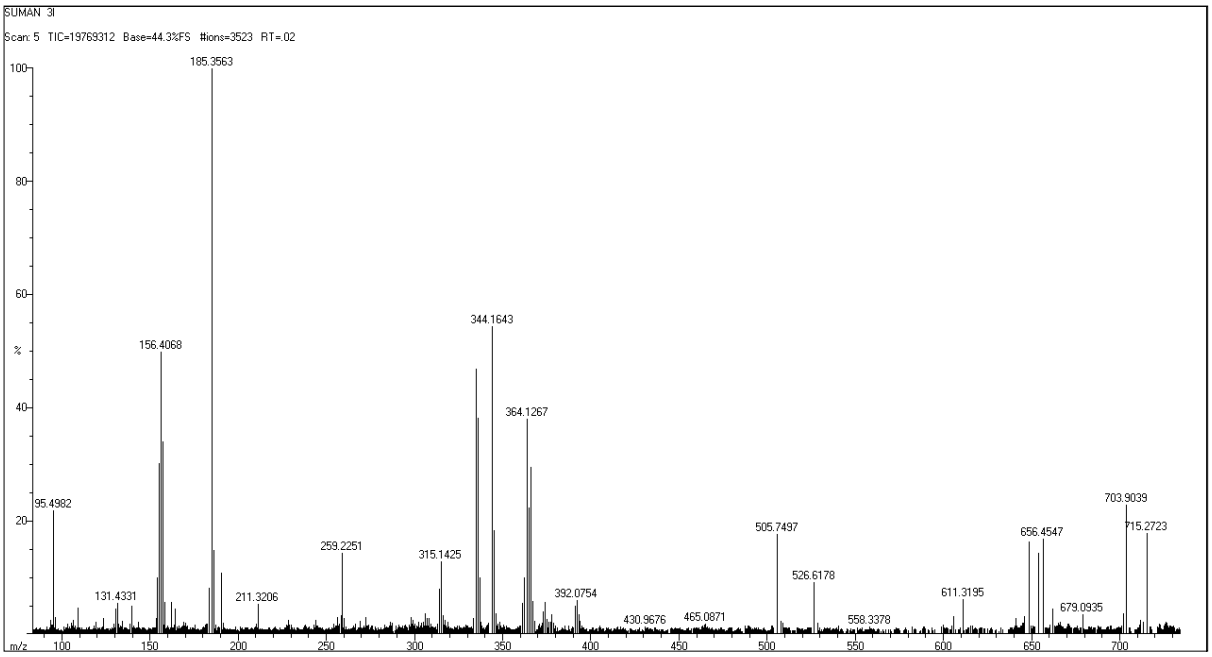

Figure 156. Mass spectrum of **5i**

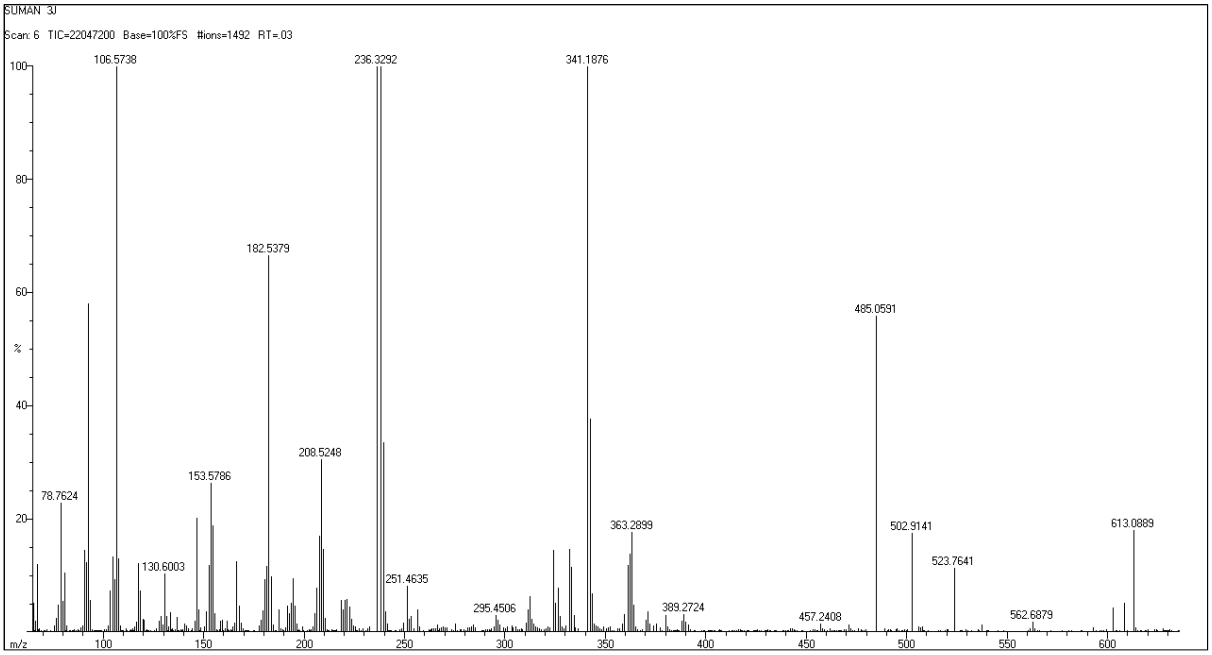

Figure 157. Mass spectrum of **5j**

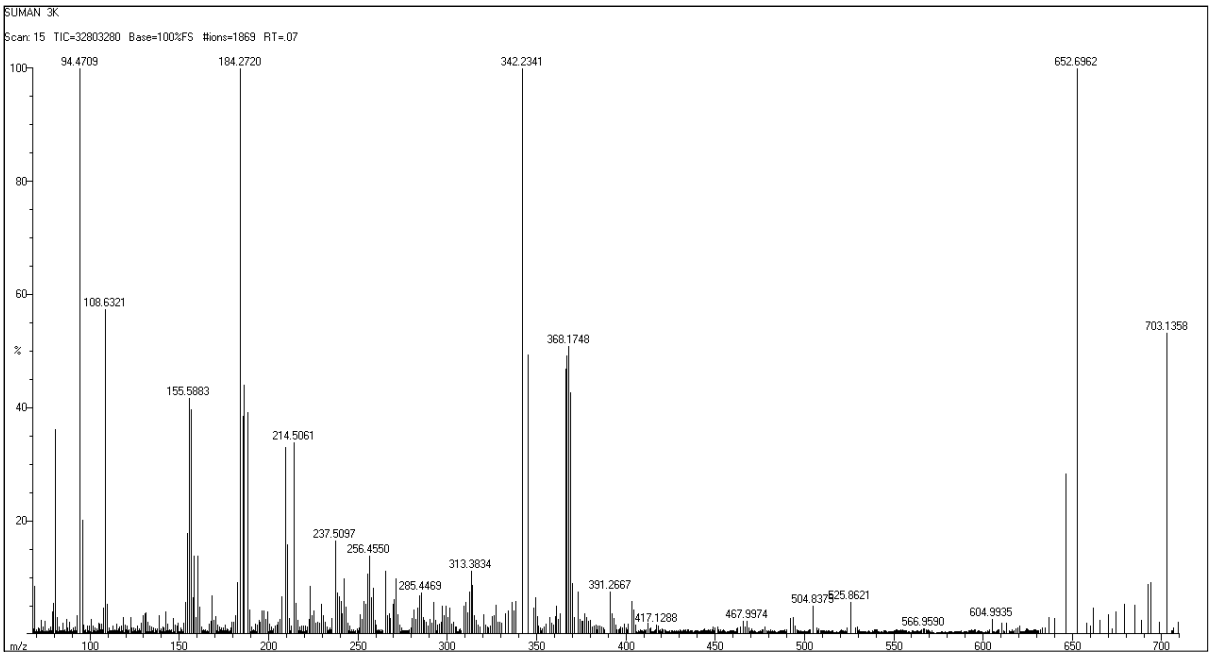

Figure 158. Mass spectrum of **5k**

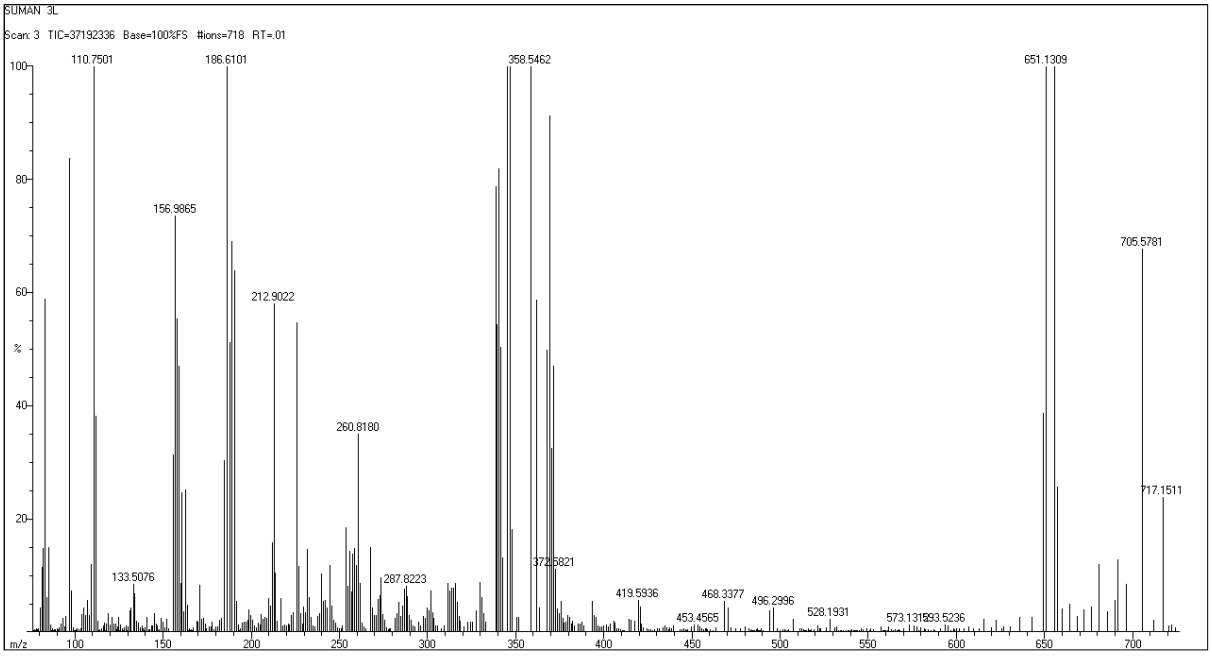

Figure 159. Mass spectrum of **5l**

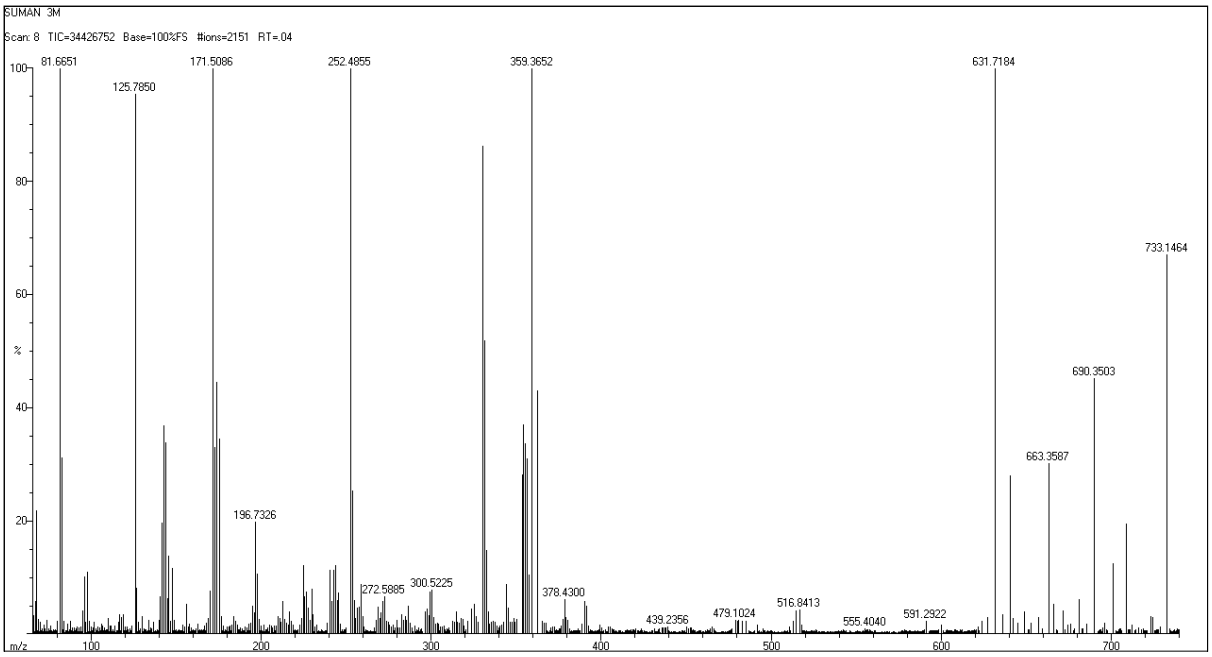

Figure 160. Mass spectrum of **5m**

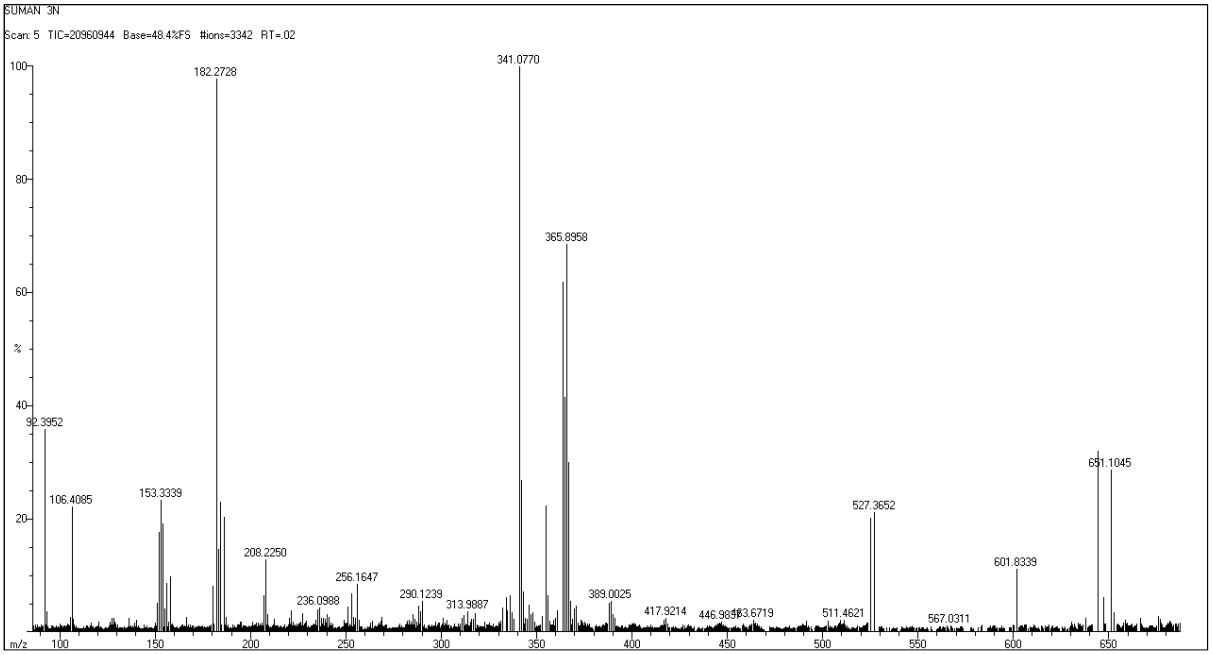

Figure 161. Mass spectrum of **5n**

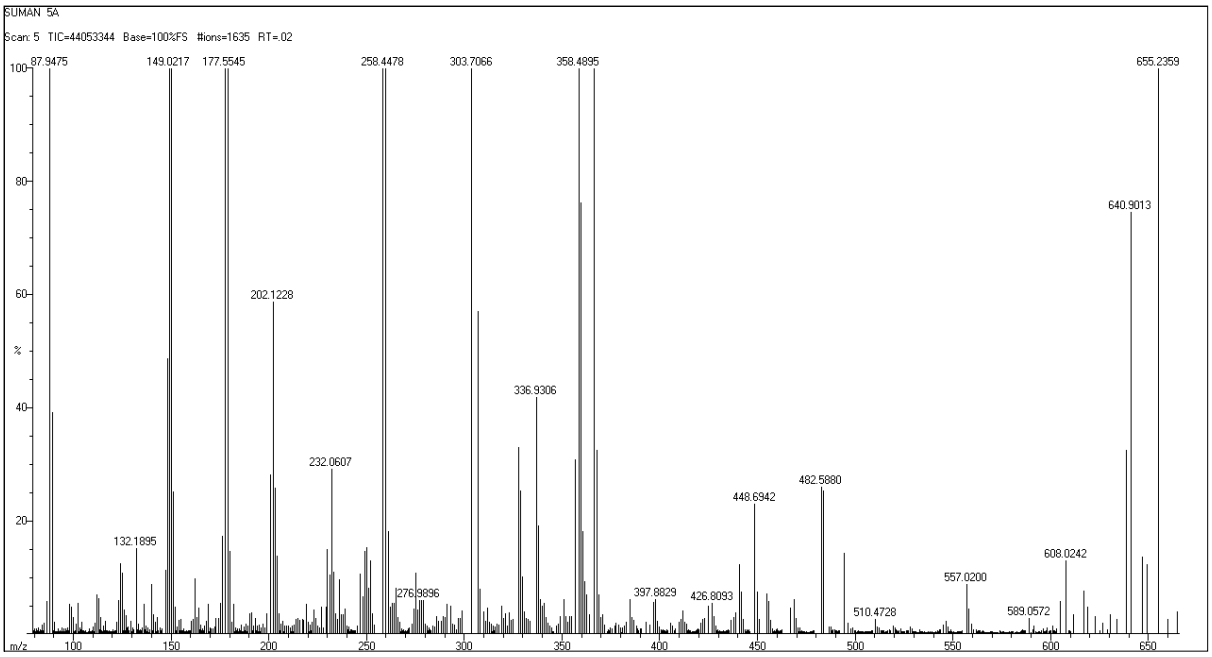

Figure 162. Mass spectrum of **5o**

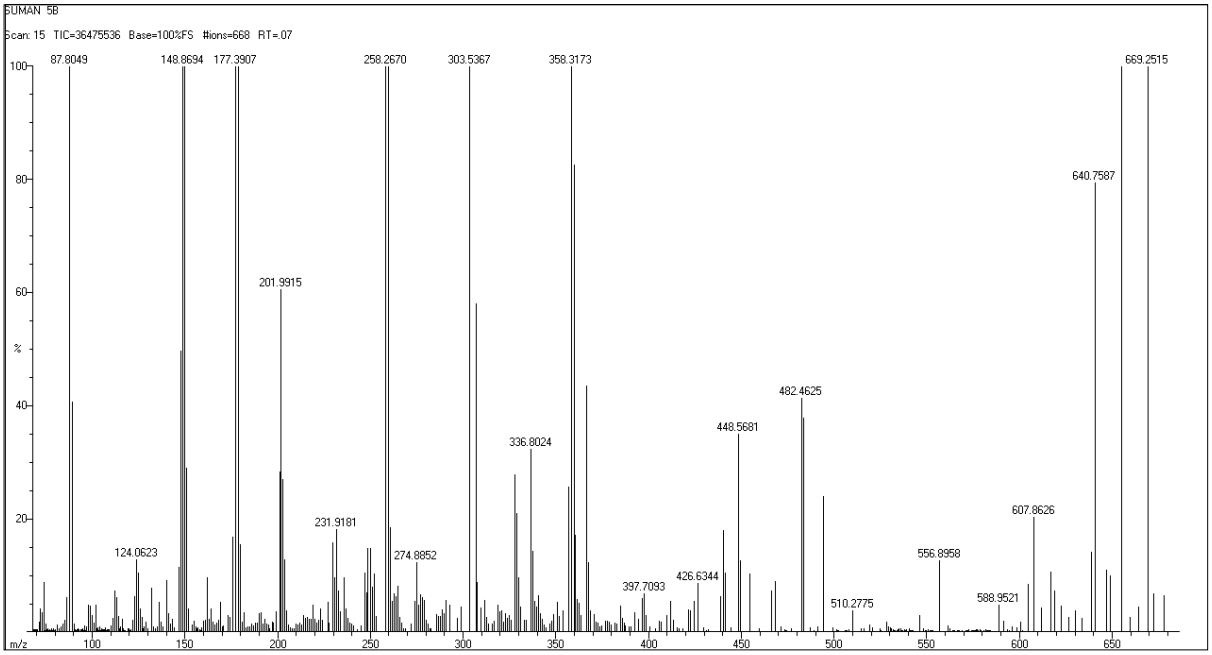

Figure 163. Mass spectrum of **5p**

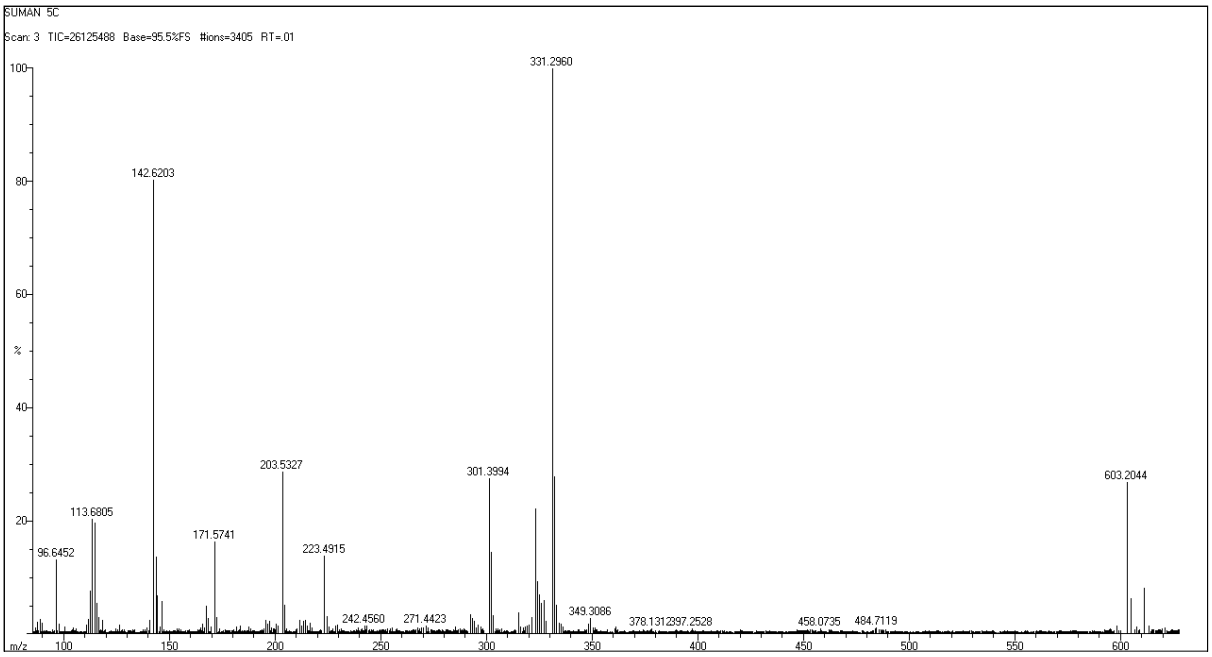

Figure 164. Mass spectrum of **5q**

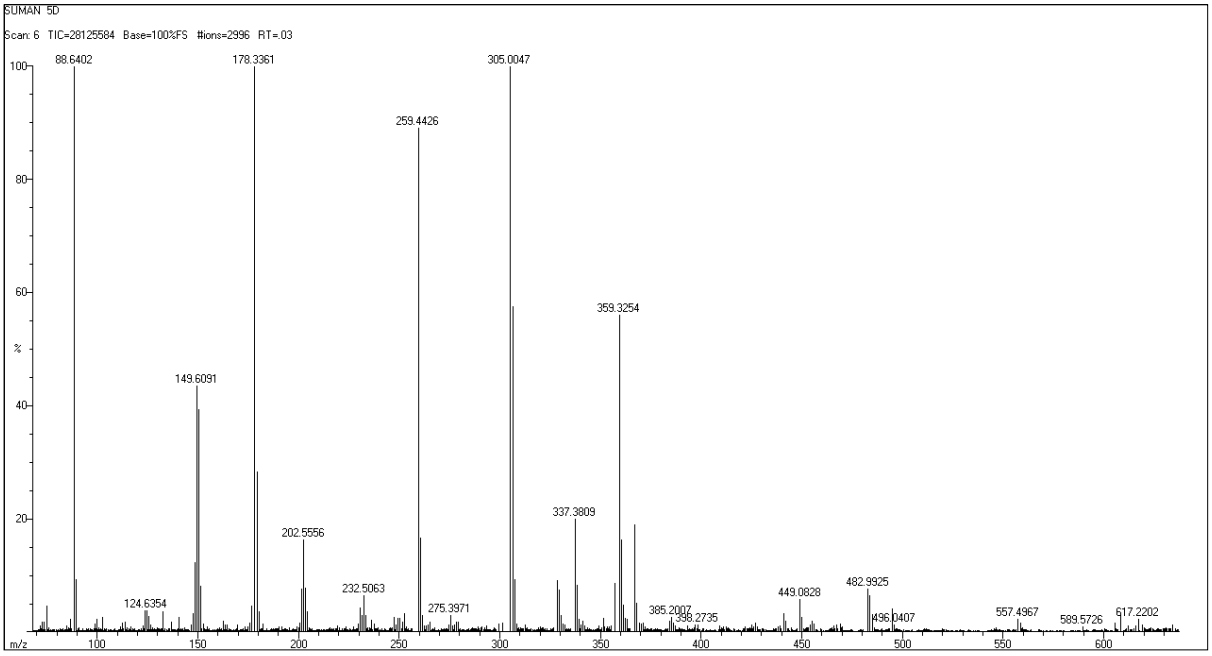

Figure 165. Mass spectrum of **5r**

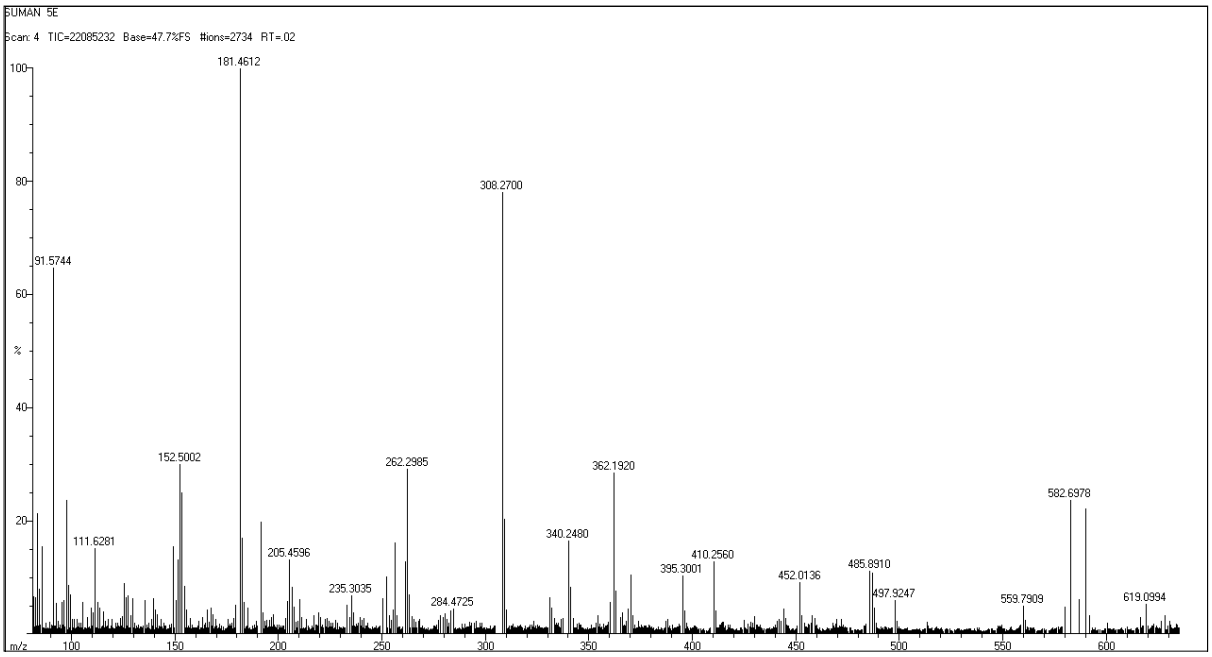

Figure 166. Mass spectrum of **5s**

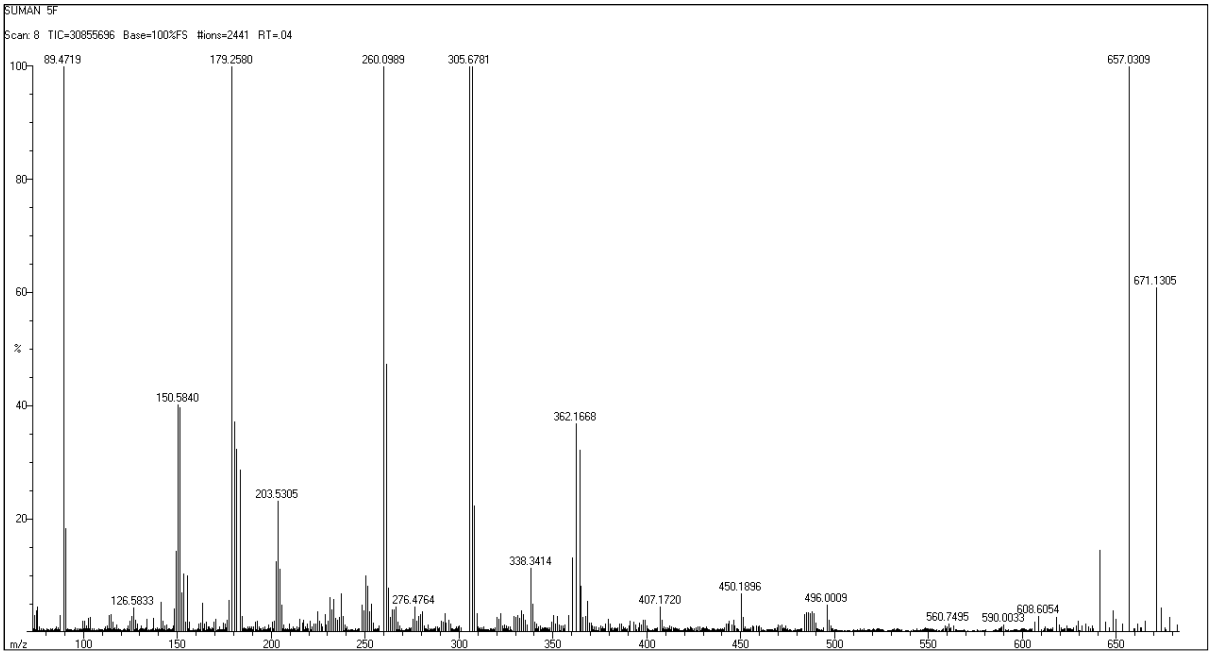

Figure 167. Mass spectrum of **5t**

3. Crystal data and structure refinement

Compound 3a':

Table 1. Crystal data and structure refinement for ksd3.

Identification code	ksd3
Empirical formula	C51 H38 F2 N4 O4
Formula weight	808.85
Temperature	296(2) K
Wavelength	0.71073 A
Crystal system, space group	Monoclinic, P 21/c
Unit cell dimensions	
a = 11.9700(5) A	alpha = 90 deg.
b = 15.5516(8) A	beta = 103.1855(19) deg.
c = 23.1725(11) A	gamma = 90 deg.
Volume	4199.9(3) A^3
Z, Calculated density	4, 1.279 Mg/m^3
Absorption coefficient	0.088 mm^-1
F(000)	1688
Crystal size	0.350 x 0.220 x 0.150 mm
Theta range for data collection	1.590 to 21.936 deg.
Limiting indices	-12<=h<=11, -16<=k<=14, -22<=l<=24
Reflections collected / unique	18978 / 5092 [R(int) = 0.0289]
Completeness to theta	= 25.242 66.9 %
Absorption correction	None
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	5092 / 0 / 558
Goodness-of-fit on F^2	1.076
Final R indices [I>2sigma(I)]	R1 = 0.0470, wR2 = 0.1222
R indices (all data)	R1 = 0.0629, wR2 = 0.1361
Extinction coefficient	n/a
Largest diff. peak and hole	0.704 and -0.186 e.A^-3

Compound 5f:

Table 2. Crystal data and structure refinement for fin .

Identification code	fin
Empirical formula	C49 H34 Cl N O4
Formula weight	736.22
Temperature	293(2) K
Wavelength	0.71073 A
Crystal system, space group	Triclinic, P -1
Unit cell dimensions	
	a = 8.890(5) A alpha = 91.701(5) deg.
	b = 10.257(5) A beta = 90.533(5) deg.
	c = 20.323(5) A gamma = 98.252(5) deg.
Volume	1833.0(14) A^3
Z, Calculated density	2, 1.334 Mg/m^3
Absorption coefficient	0.154 mm^-1
F(000)	768
Crystal size	0.20 x 0.15 x 0.10 mm
Theta range for data collection	2.01 to 26.61 deg.
Limiting indices	-10<=h<=11, -12<=k<=12, -25<=l<=25
Reflections collected / unique	27769 / 7610 [R(int) = 0.0233]
Completeness to theta = 26.61	98.9 %
Absorption correction	Semi-empirical from equivalents
Max. and min. transmission	0.9848 and 0.9698
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	7610 / 0 / 497
Goodness-of-fit on F^2	1.013
Final R indices [I>2sigma(I)]	R1 = 0.0395, wR2 = 0.1103
R indices (all data)	R1 = 0.0506, wR2 = 0.1189
Largest diff. peak and hole	0.261 and -0.251 e.A^-3