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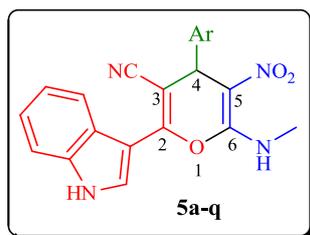
# **A one-pot three-component domino protocol for the synthesis of penta-substituted 4*H*-pyrans**

**Sathiyamoorthi Sivakumar, Selvaraj Kanchithalaivan and Raju Ranjith Kumar\***

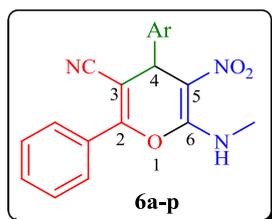
*Department of Organic Chemistry, School of Chemistry, Madurai Kamaraj University,  
Madurai – 625021, Tamil Nadu, India*

Supporting Information

## Table of Contents

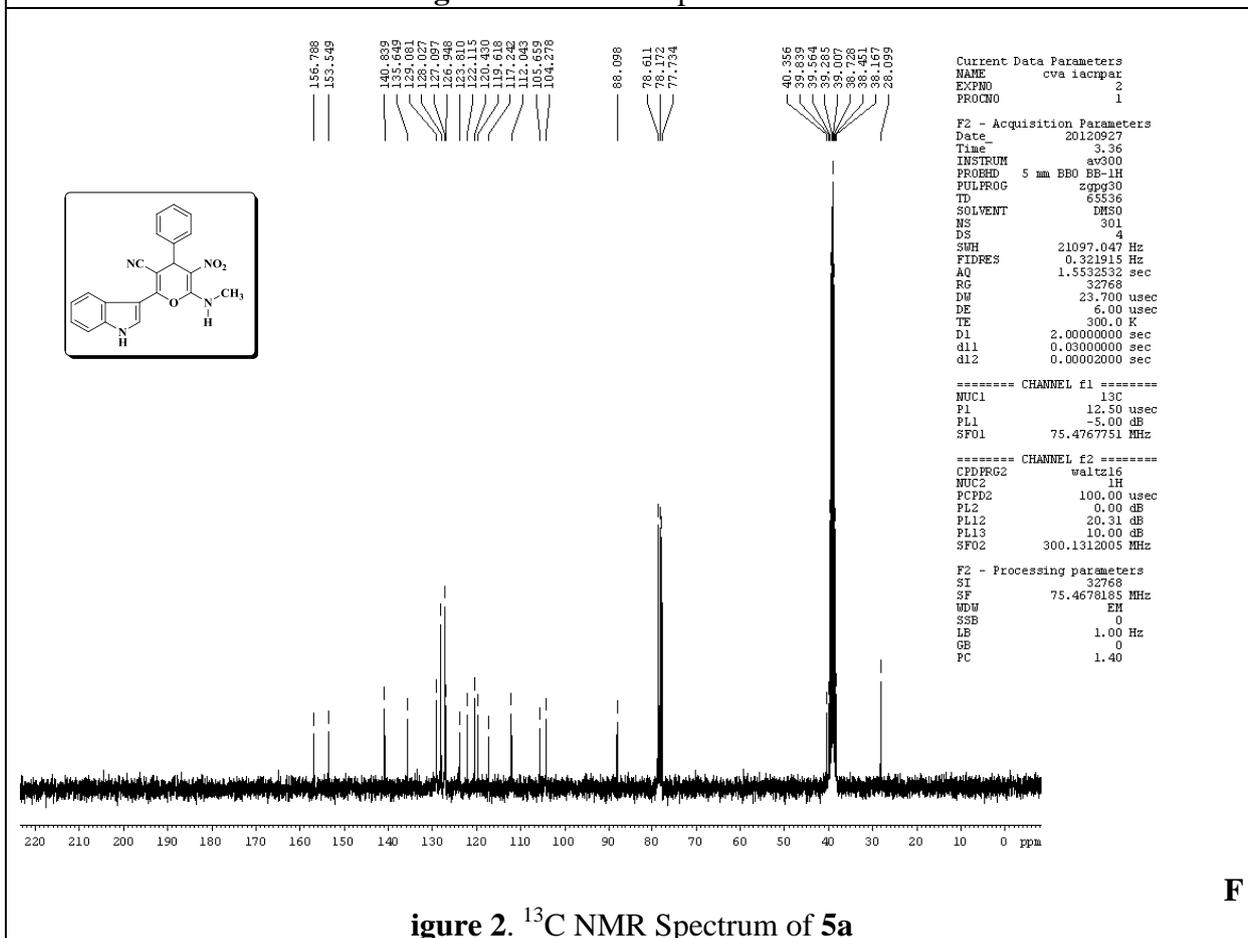
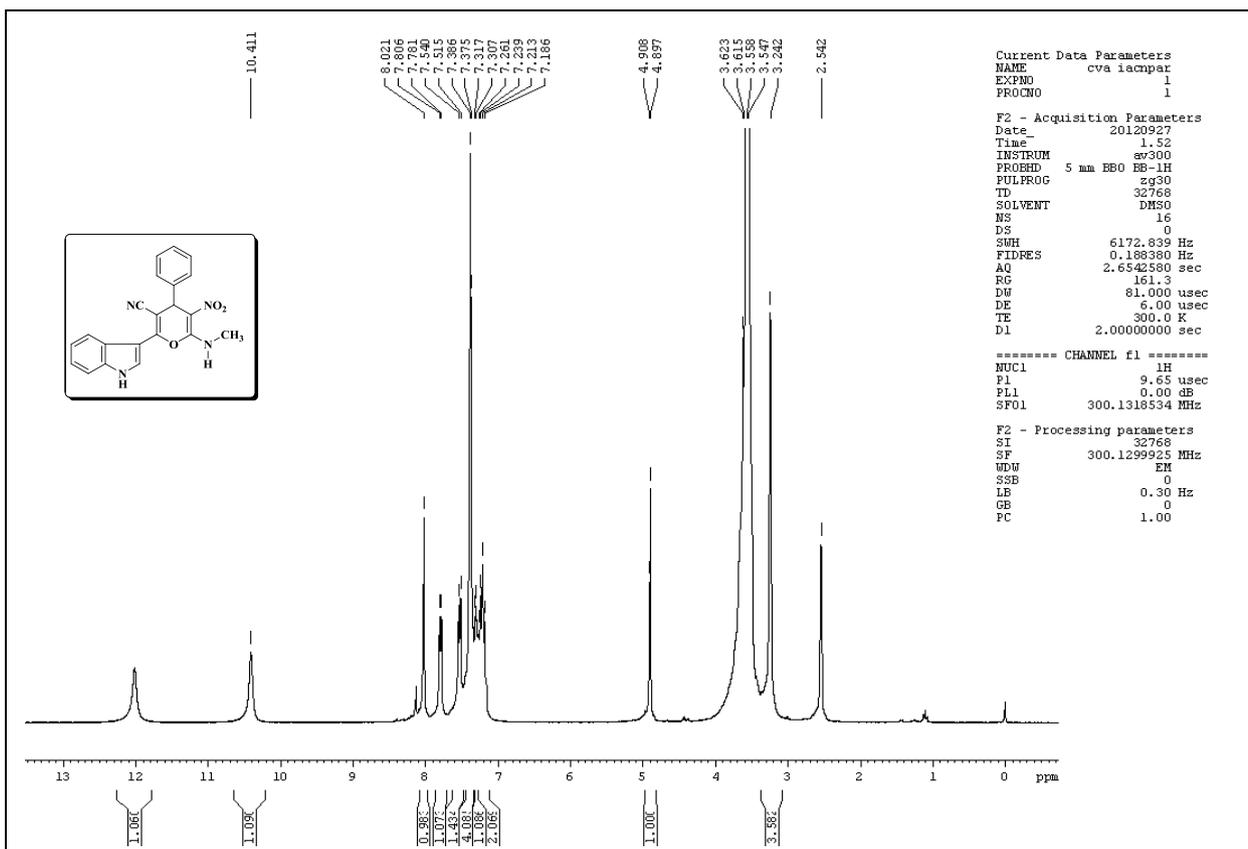


No	List of Figures	Page
1	<sup>1</sup> H NMR Spectrum of <b>5a</b>	4
2	<sup>13</sup> C NMR Spectrum of <b>5a</b>	4
3	<sup>1</sup> H NMR Spectrum of <b>5b</b>	5
4	<sup>13</sup> C NMR Spectrum of <b>5b</b>	5
5	<sup>1</sup> H NMR Spectrum of <b>5c</b>	6
6	<sup>13</sup> C NMR Spectrum of <b>5c</b>	6
7	<sup>1</sup> H NMR Spectrum of <b>5d</b>	7
8	<sup>13</sup> C NMR Spectrum of <b>5d</b>	7
9	<sup>1</sup> H NMR Spectrum of <b>5e</b>	8
10	<sup>13</sup> C NMR Spectrum of <b>5e</b>	8
11	<sup>1</sup> H NMR Spectrum of <b>5f</b>	9
12	<sup>13</sup> C NMR Spectrum of <b>5f</b>	9
13	DEPT 135 NMR Spectrum of <b>5f</b>	10
14	H, H-COSY Spectrum of <b>5f</b>	10
15	C, H-COSY Spectrum of <b>5f</b>	11
16	HMBC Spectrum of <b>5f</b>	11
17	<sup>1</sup> H NMR Spectrum of <b>5g</b>	12
18	<sup>13</sup> C NMR Spectrum of <b>5g</b>	12
19	<sup>1</sup> H NMR Spectrum of <b>5h</b>	13
20	<sup>13</sup> C NMR Spectrum of <b>5h</b>	13
21	<sup>1</sup> H NMR Spectrum of <b>5i</b>	14
22	<sup>13</sup> C NMR Spectrum of <b>5i</b>	14
23	<sup>1</sup> H NMR Spectrum of <b>5j</b>	15
24	<sup>13</sup> C NMR Spectrum of <b>5j</b>	15
25	<sup>1</sup> H NMR Spectrum of <b>5k</b>	16
26	<sup>13</sup> C NMR Spectrum of <b>5k</b>	16
27	<sup>1</sup> H NMR Spectrum of <b>5l</b>	17
28	<sup>13</sup> C NMR Spectrum of <b>5l</b>	17
29	<sup>1</sup> H NMR Spectrum of <b>5m</b>	18
30	<sup>13</sup> C NMR Spectrum of <b>5m</b>	18
31	<sup>1</sup> H NMR Spectrum of <b>5n</b>	19
32	<sup>13</sup> C NMR Spectrum of <b>5n</b>	19
33	<sup>1</sup> H NMR Spectrum of <b>5o</b>	20
34	<sup>13</sup> C NMR Spectrum of <b>5o</b>	20
35	<sup>1</sup> H NMR Spectrum of <b>5p</b>	21
36	<sup>13</sup> C NMR Spectrum of <b>5p</b>	21
37	<sup>1</sup> H NMR Spectrum of <b>5q</b>	22
38	<sup>13</sup> C NMR Spectrum of <b>5q</b>	22



No	List of Figures	Page
39	<sup>1</sup> H NMR Spectrum of <b>6a</b>	23
40	<sup>13</sup> C NMR Spectrum of <b>6a</b>	23
41	<sup>1</sup> H NMR Spectrum of <b>6b</b>	24
42	<sup>13</sup> C NMR Spectrum of <b>6b</b>	24
43	DEPT 135 NMR Spectrum of <b>6b</b>	25
44	H, H-COSY Spectrum of <b>6b</b>	25
45	C, H-COSY Spectrum of <b>6b</b>	26
46	HMBC Spectrum of <b>6b</b>	26
47	<sup>1</sup> H NMR Spectrum of <b>6c</b>	27
48	<sup>13</sup> C NMR Spectrum of <b>6c</b>	27
49	<sup>1</sup> H NMR Spectrum of <b>6d</b>	28
50	<sup>13</sup> C NMR Spectrum of <b>6d</b>	28
51	<sup>1</sup> H NMR Spectrum of <b>6e</b>	29
52	<sup>13</sup> C NMR Spectrum of <b>6e</b>	29
53	<sup>1</sup> H NMR Spectrum of <b>6f</b>	30
54	<sup>13</sup> C NMR Spectrum of <b>6f</b>	30
55	<sup>1</sup> H NMR Spectrum of <b>6g</b>	31
56	<sup>13</sup> C NMR Spectrum of <b>6g</b>	31
57	<sup>1</sup> H NMR Spectrum of <b>6h</b>	32
58	<sup>13</sup> C NMR Spectrum of <b>6h</b>	32
59	<sup>1</sup> H NMR Spectrum of <b>6i</b>	33
60	<sup>13</sup> C NMR Spectrum of <b>6i</b>	33
61	<sup>1</sup> H NMR Spectrum of <b>6j</b>	34
62	<sup>13</sup> C NMR Spectrum of <b>6j</b>	34
63	<sup>1</sup> H NMR Spectrum of <b>6k</b>	35
64	<sup>13</sup> C NMR Spectrum of <b>6k</b>	35
65	<sup>1</sup> H NMR Spectrum of <b>6l</b>	36
66	<sup>13</sup> C NMR Spectrum of <b>6l</b>	36
67	<sup>1</sup> H NMR Spectrum of <b>6m</b>	37
68	<sup>13</sup> C NMR Spectrum of <b>6m</b>	37
69	<sup>1</sup> H NMR Spectrum of <b>6n</b>	38
70	<sup>13</sup> C NMR Spectrum of <b>6n</b>	38
71	<sup>1</sup> H NMR Spectrum of <b>6o</b>	39
72	<sup>13</sup> C NMR Spectrum of <b>6o</b>	39
73	<sup>1</sup> H NMR Spectrum of <b>6p</b>	40
74	<sup>13</sup> C NMR Spectrum of <b>6p</b>	40

No	List of Figures	Page
75	<sup>1</sup> H NMR spectrum of isolated intermediate <b>8 (benzoyl)</b>	41
76	<sup>13</sup> C NMR spectrum of isolated intermediate <b>8 (benzoyl)</b>	42
77	<sup>1</sup> H NMR spectrum of isolated intermediate <b>8 (indolyl)</b>	43
78	<sup>13</sup> C NMR spectrum of isolated intermediate <b>8 (indolyl)</b>	44



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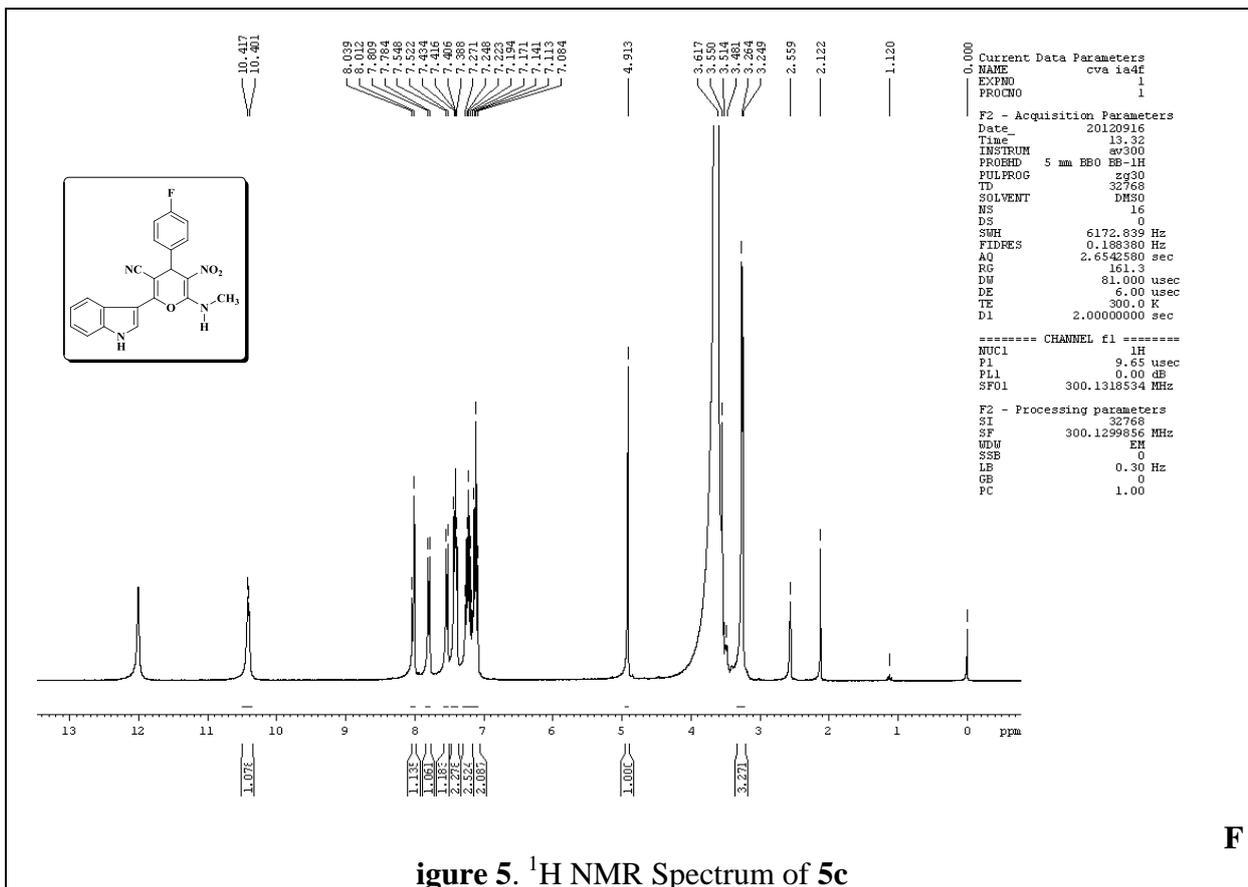


figure 5. <sup>1</sup>H NMR Spectrum of 5c

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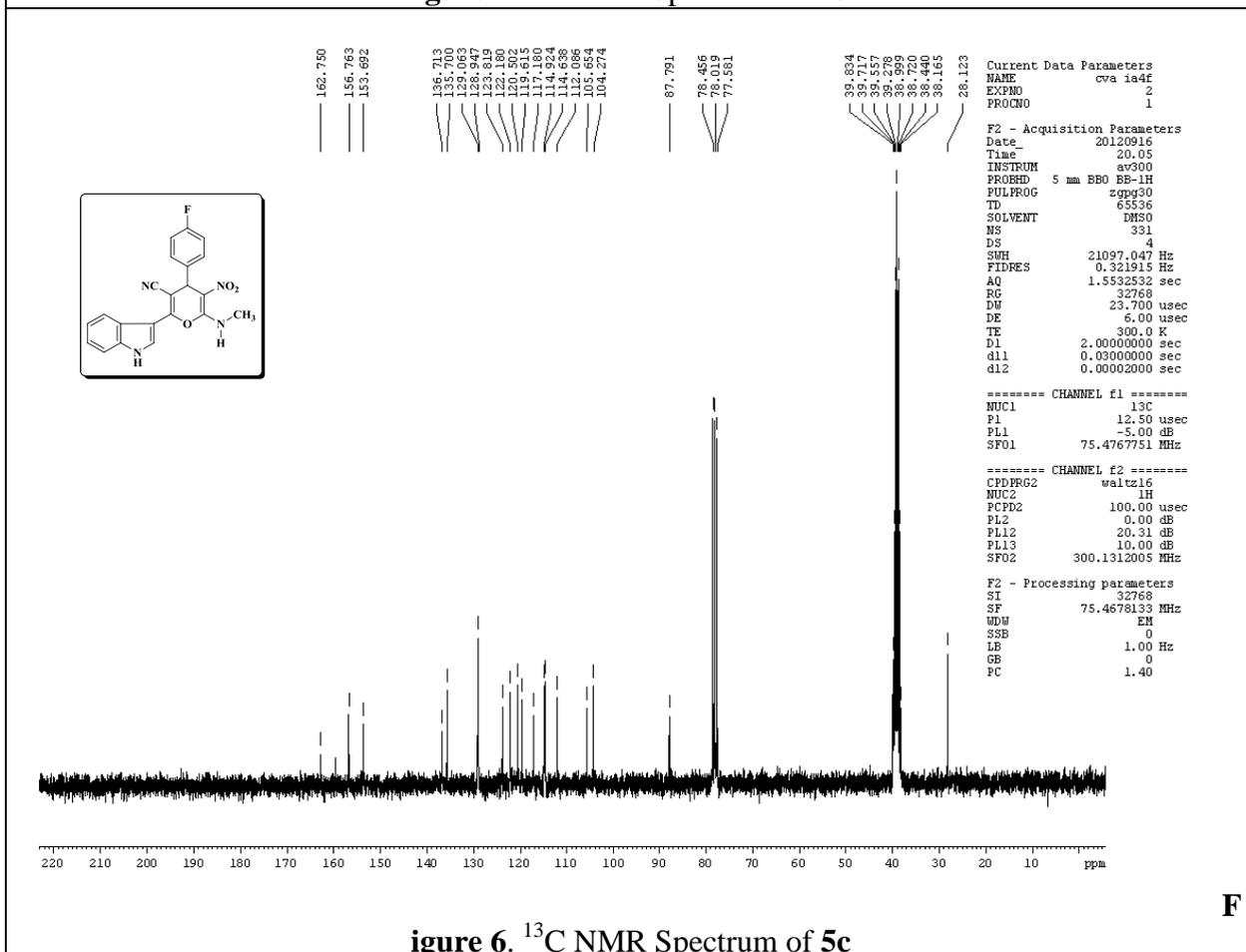


figure 6. <sup>13</sup>C NMR Spectrum of 5c

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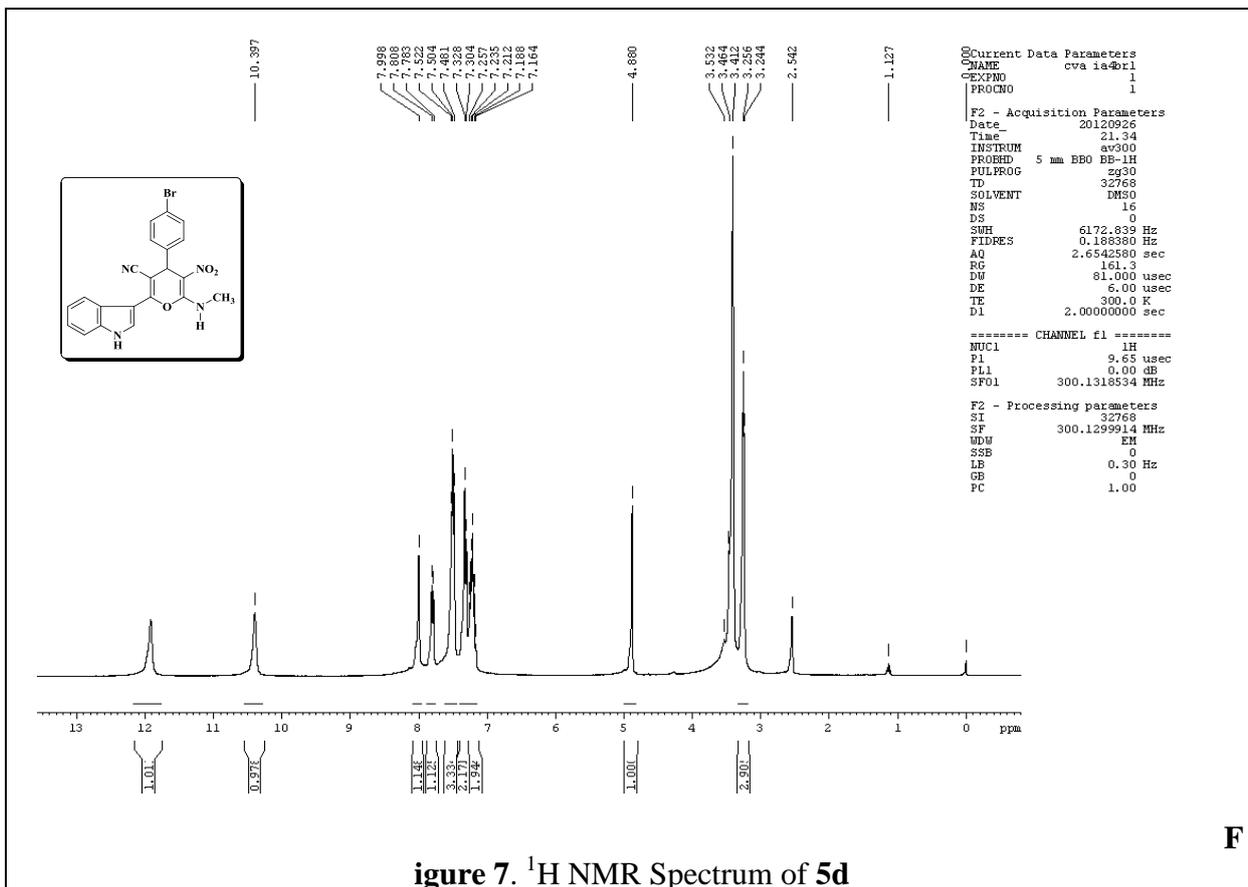


figure 7. <sup>1</sup>H NMR Spectrum of 5d

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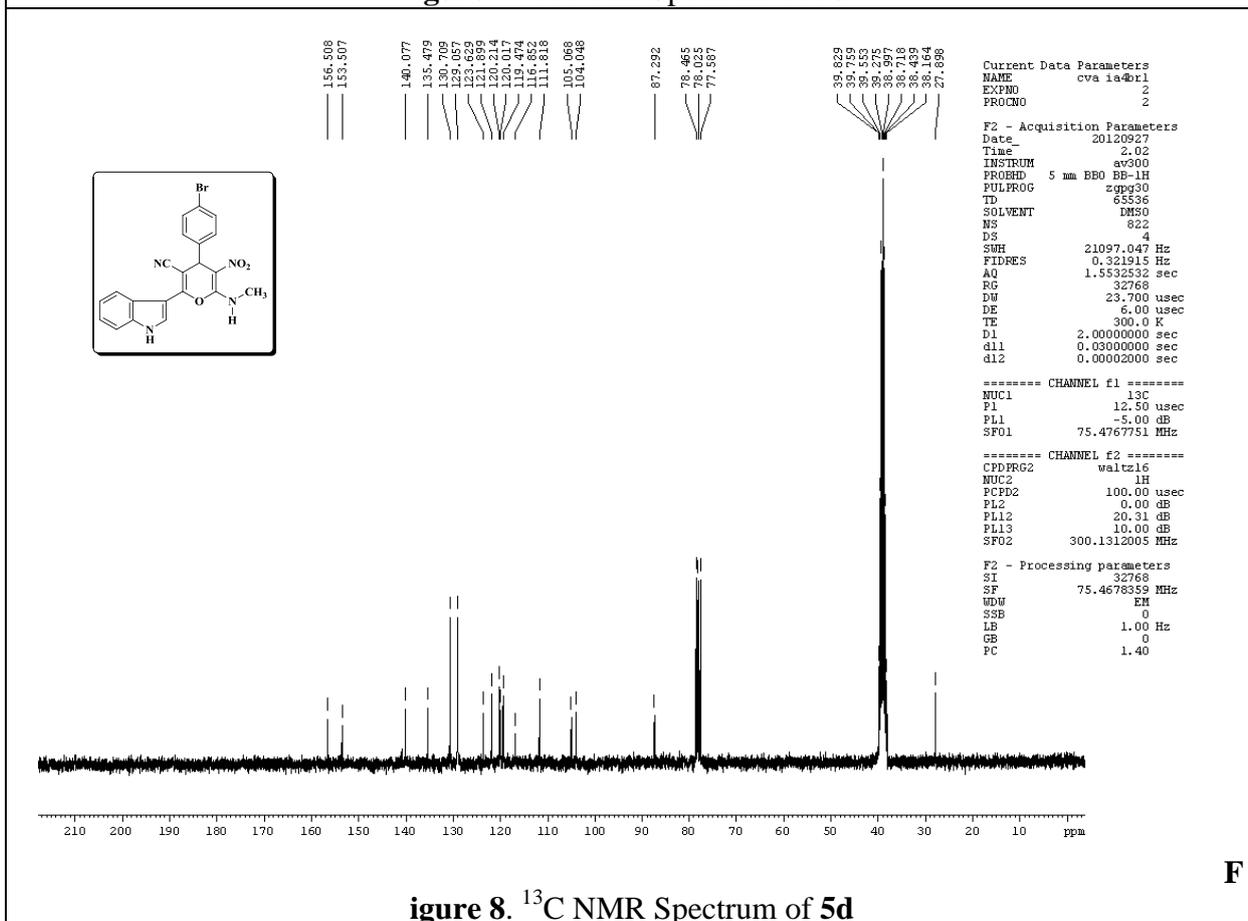


figure 8. <sup>13</sup>C NMR Spectrum of 5d

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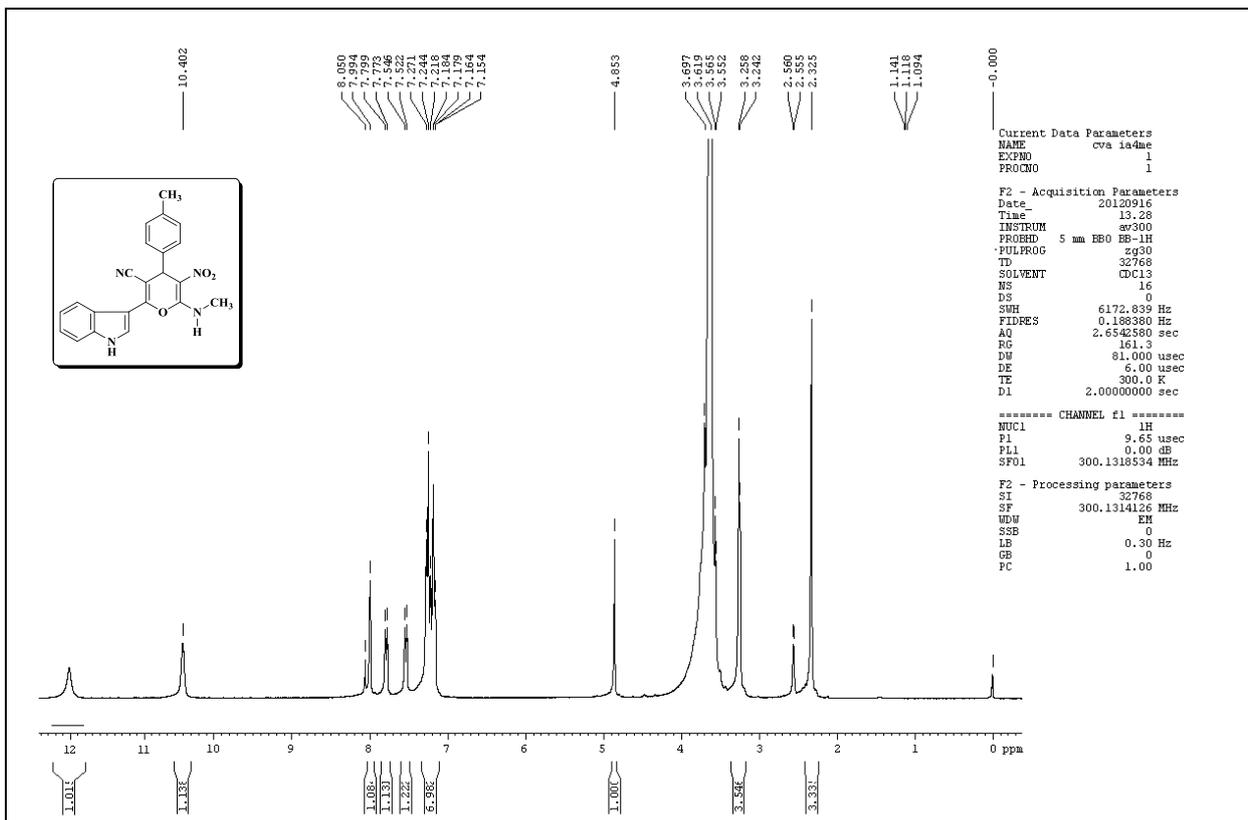


Figure 9. <sup>1</sup>H NMR Spectrum of 5e

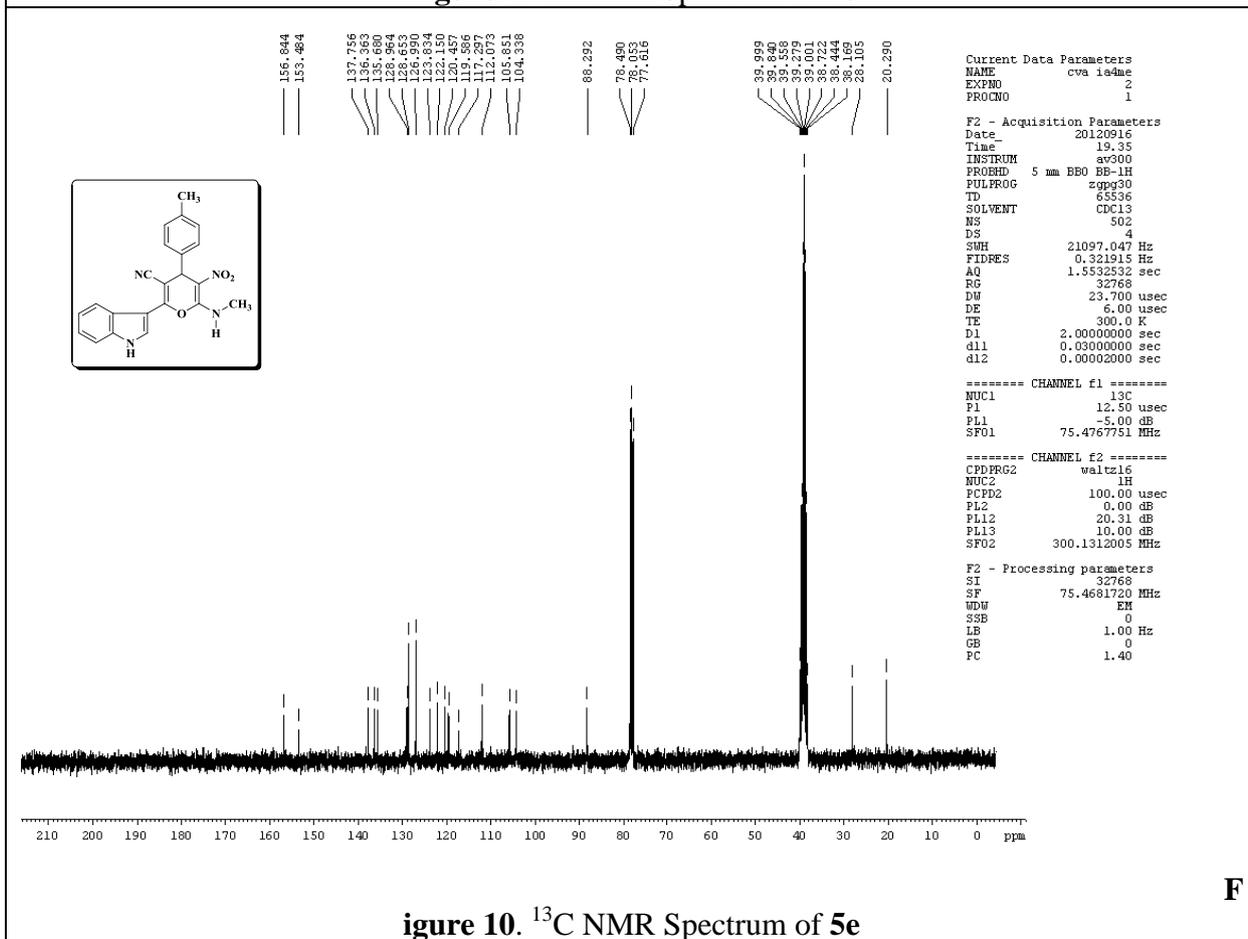
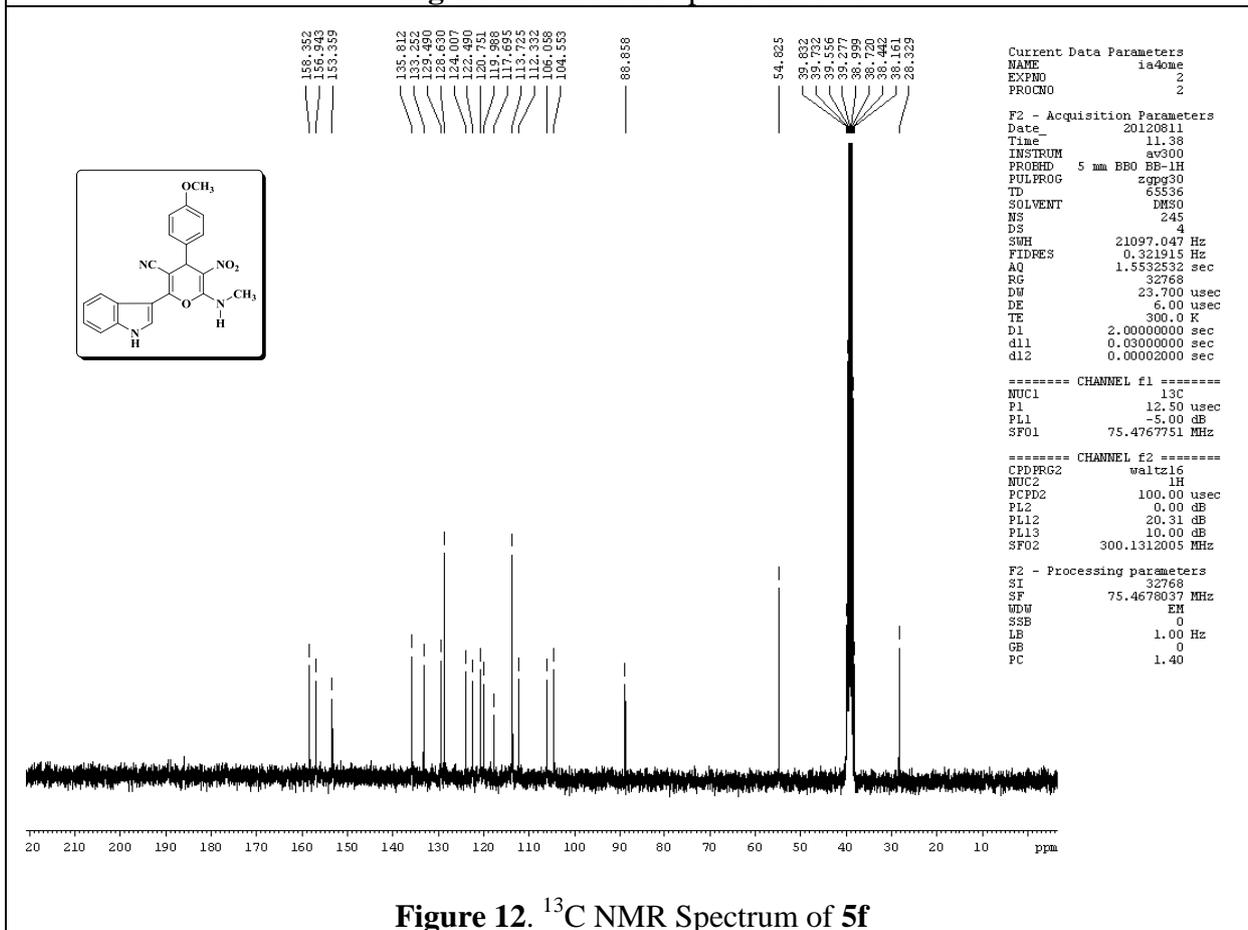
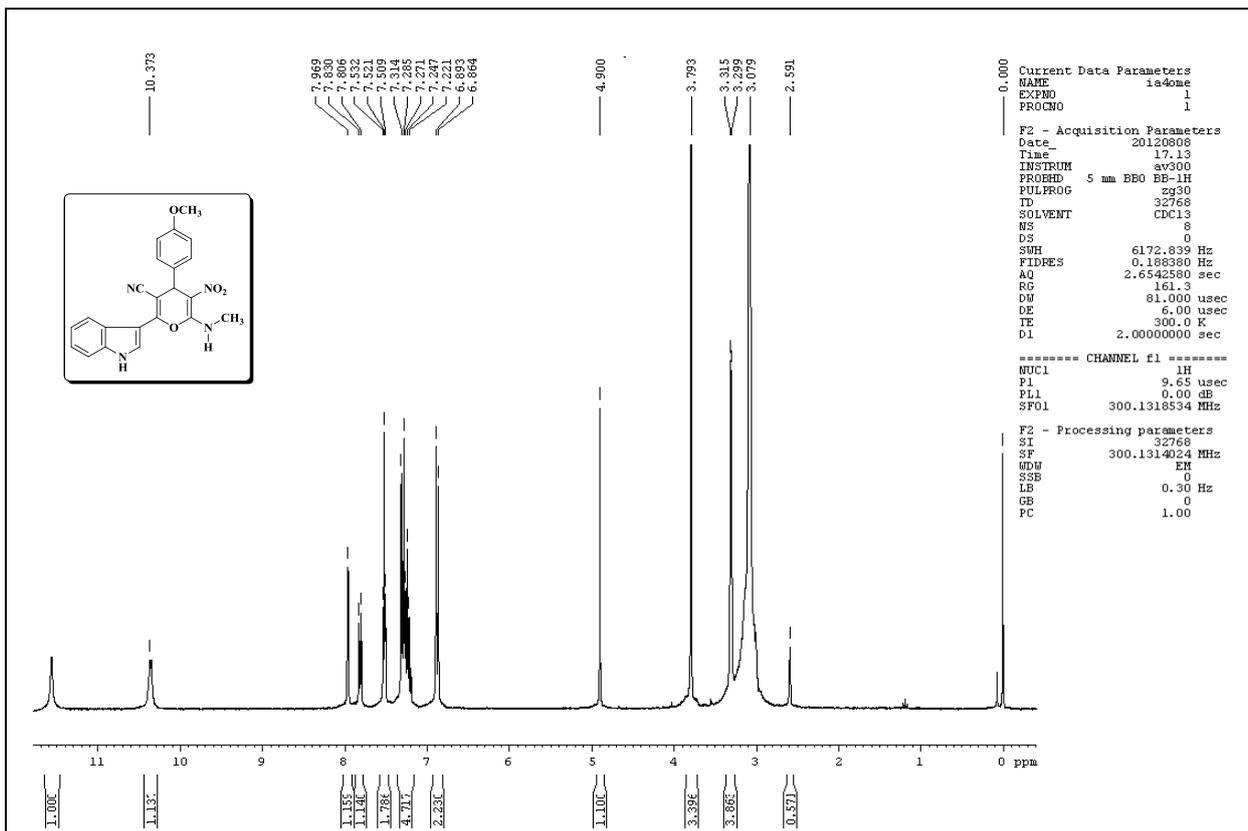


Figure 10. <sup>13</sup>C NMR Spectrum of 5e

F



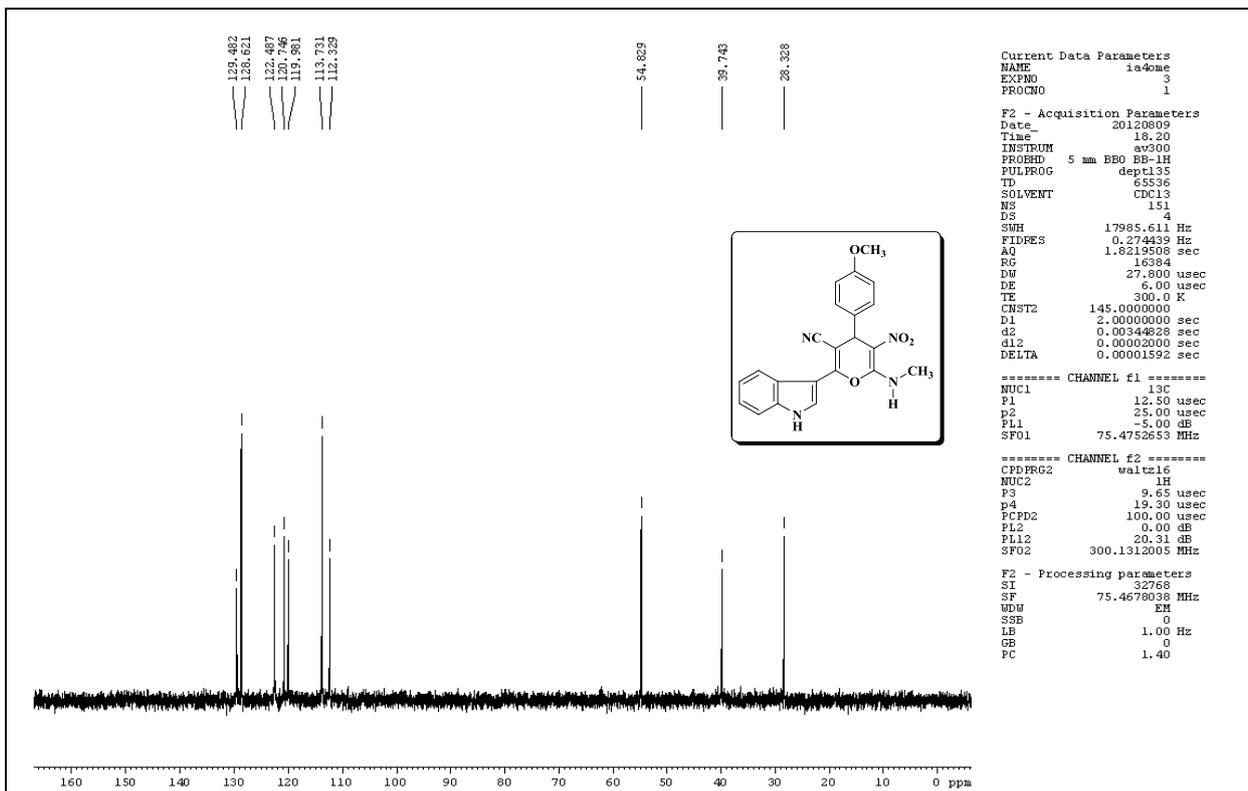


Figure 13. DEPT 135 NMR spectrum of **5f**

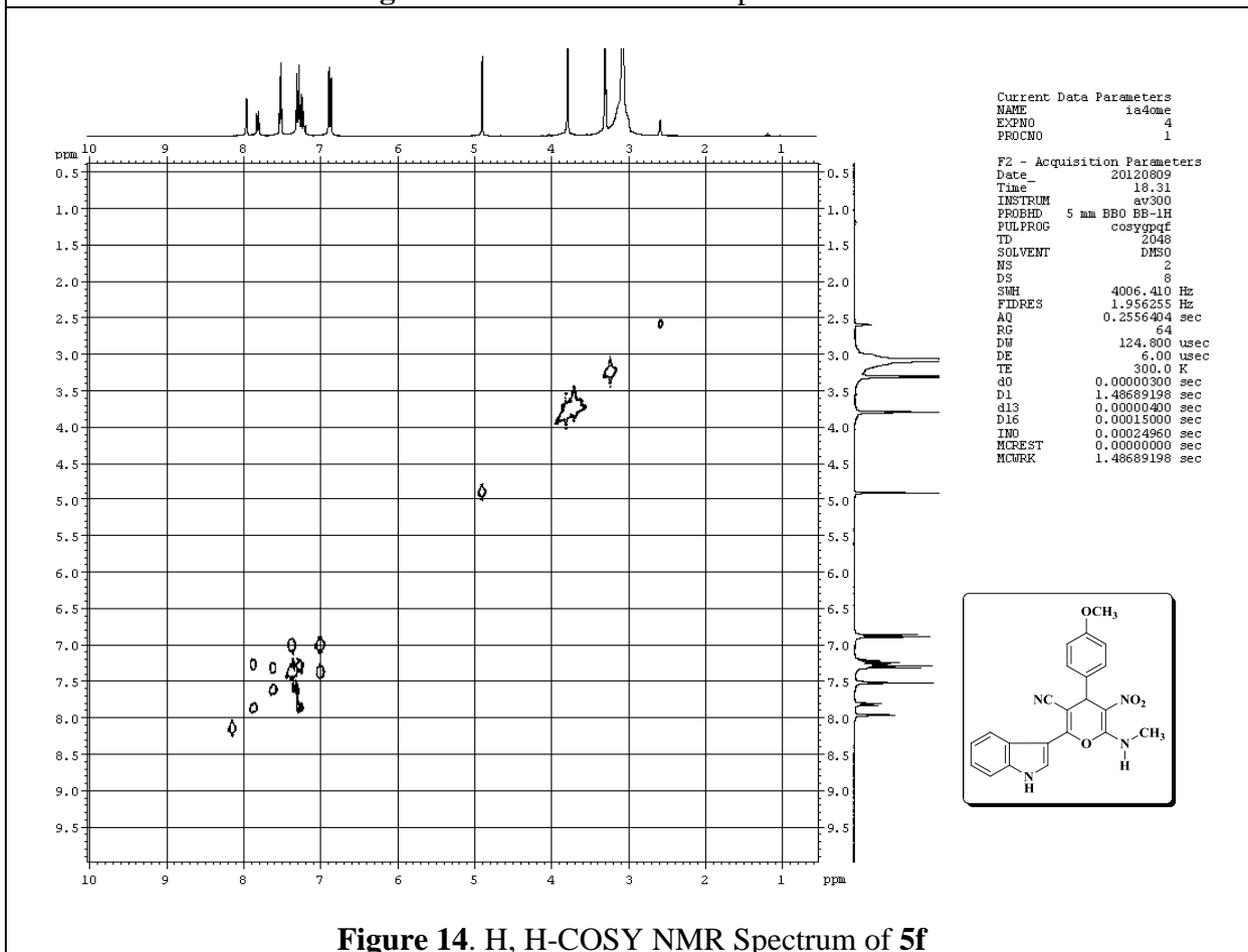


Figure 14. H, H-COSY NMR Spectrum of **5f**

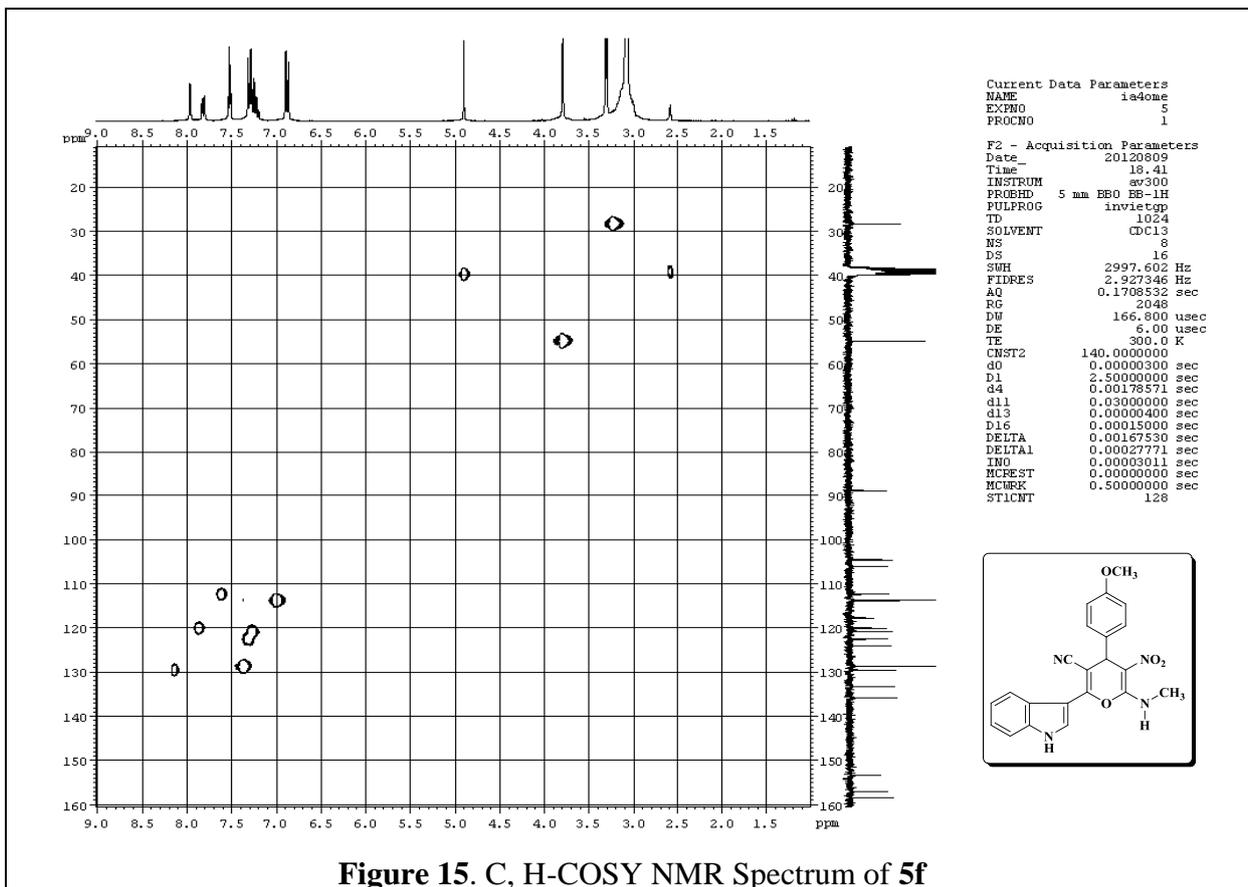


Figure 15. C, H-COSY NMR Spectrum of 5f

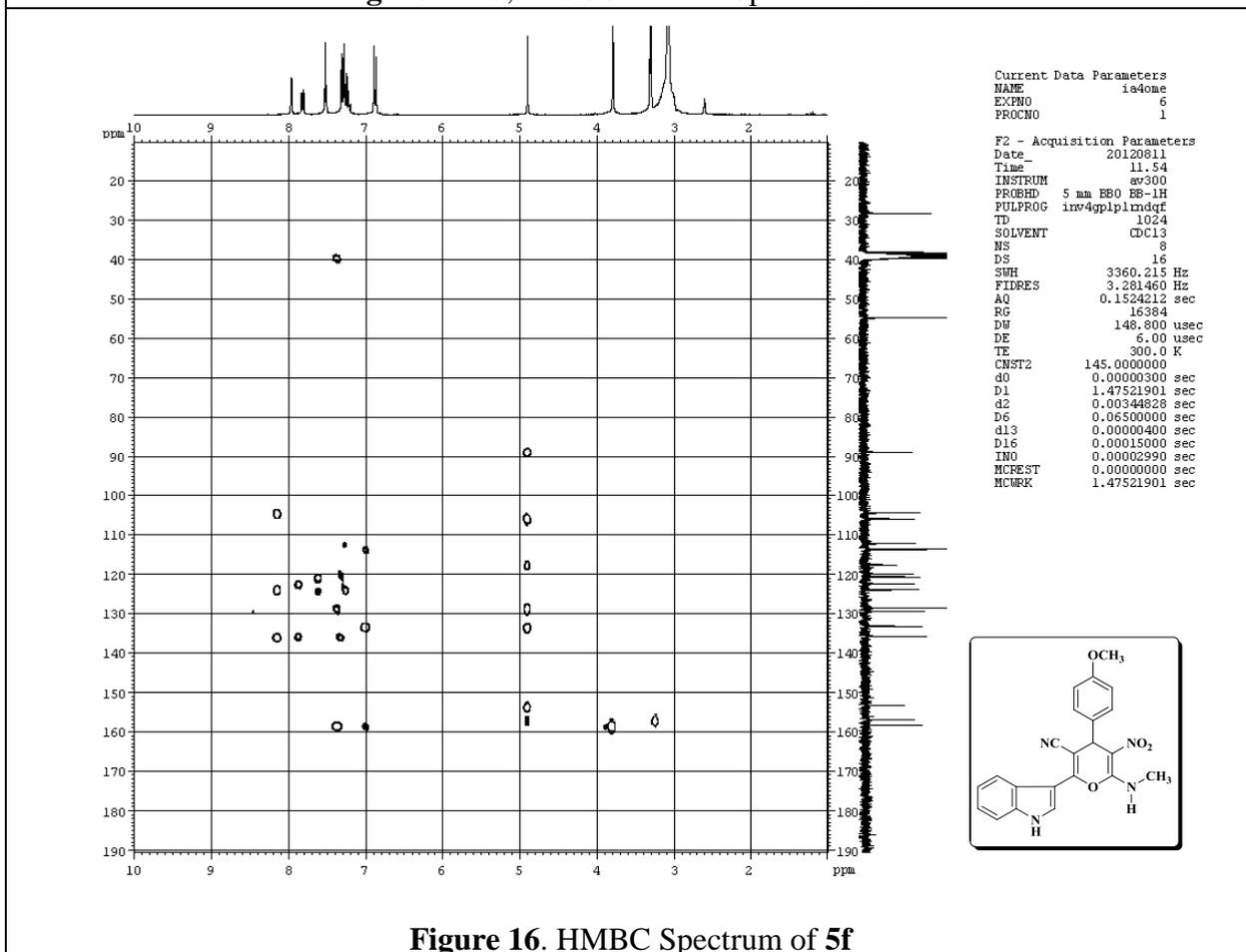


Figure 16. HMBC Spectrum of 5f

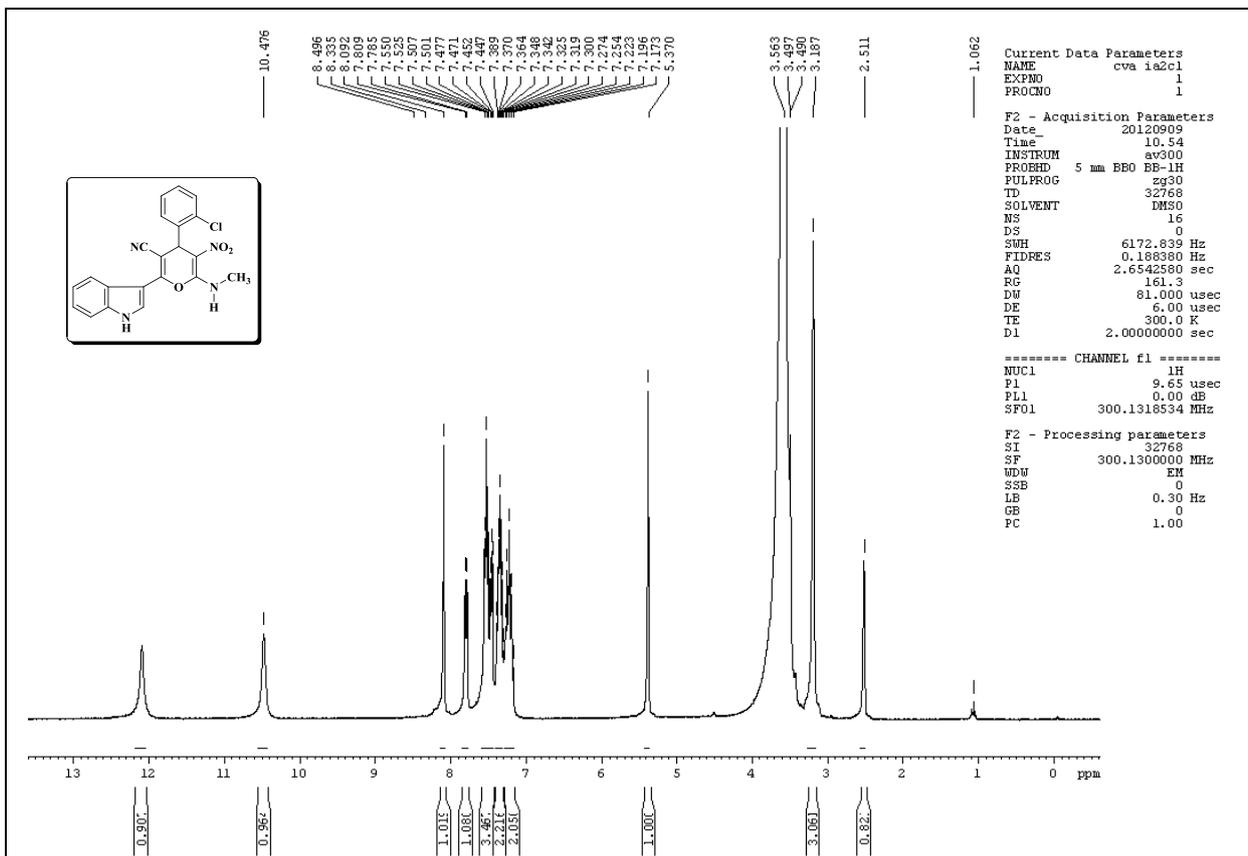


Figure 17. <sup>1</sup>H NMR Spectrum of 5g

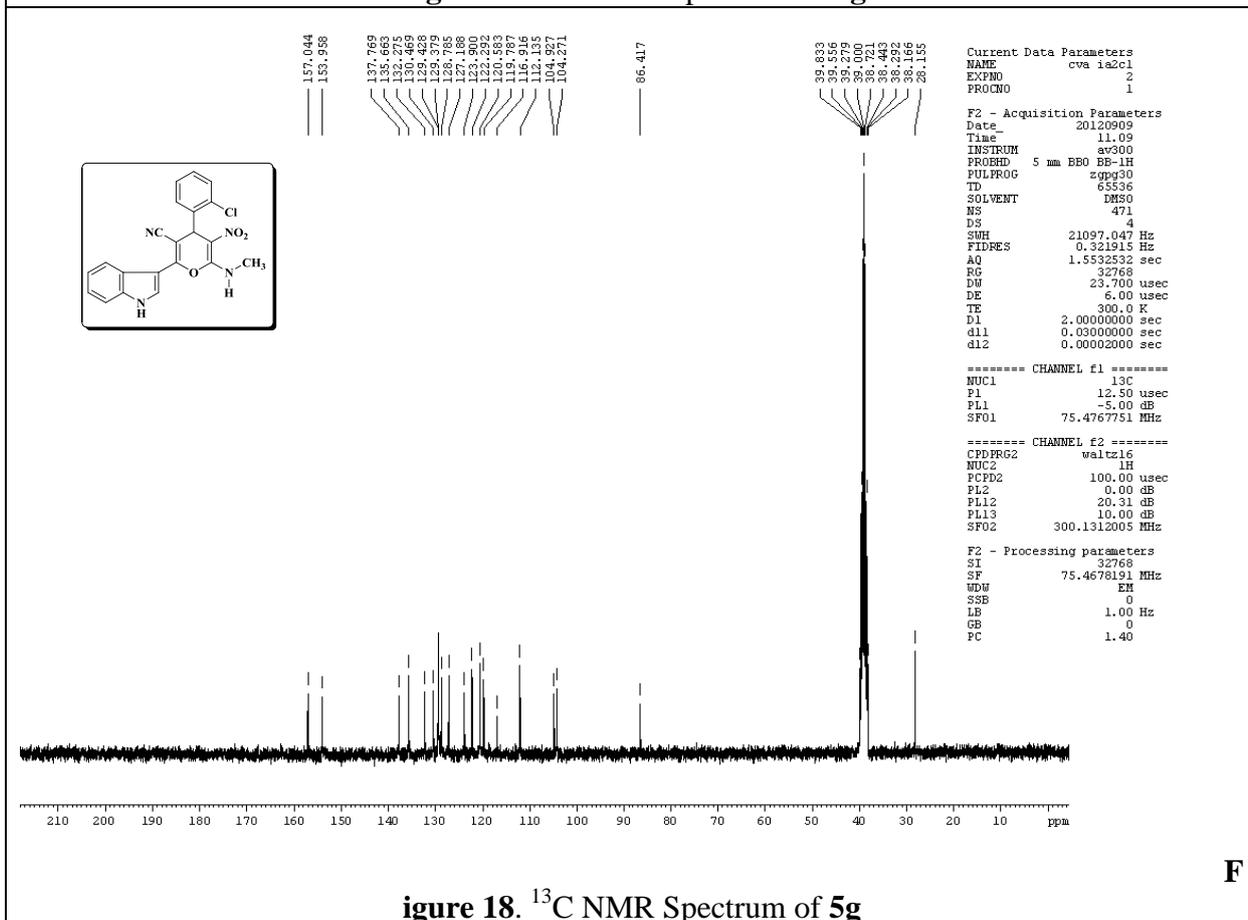


Figure 18. <sup>13</sup>C NMR Spectrum of 5g

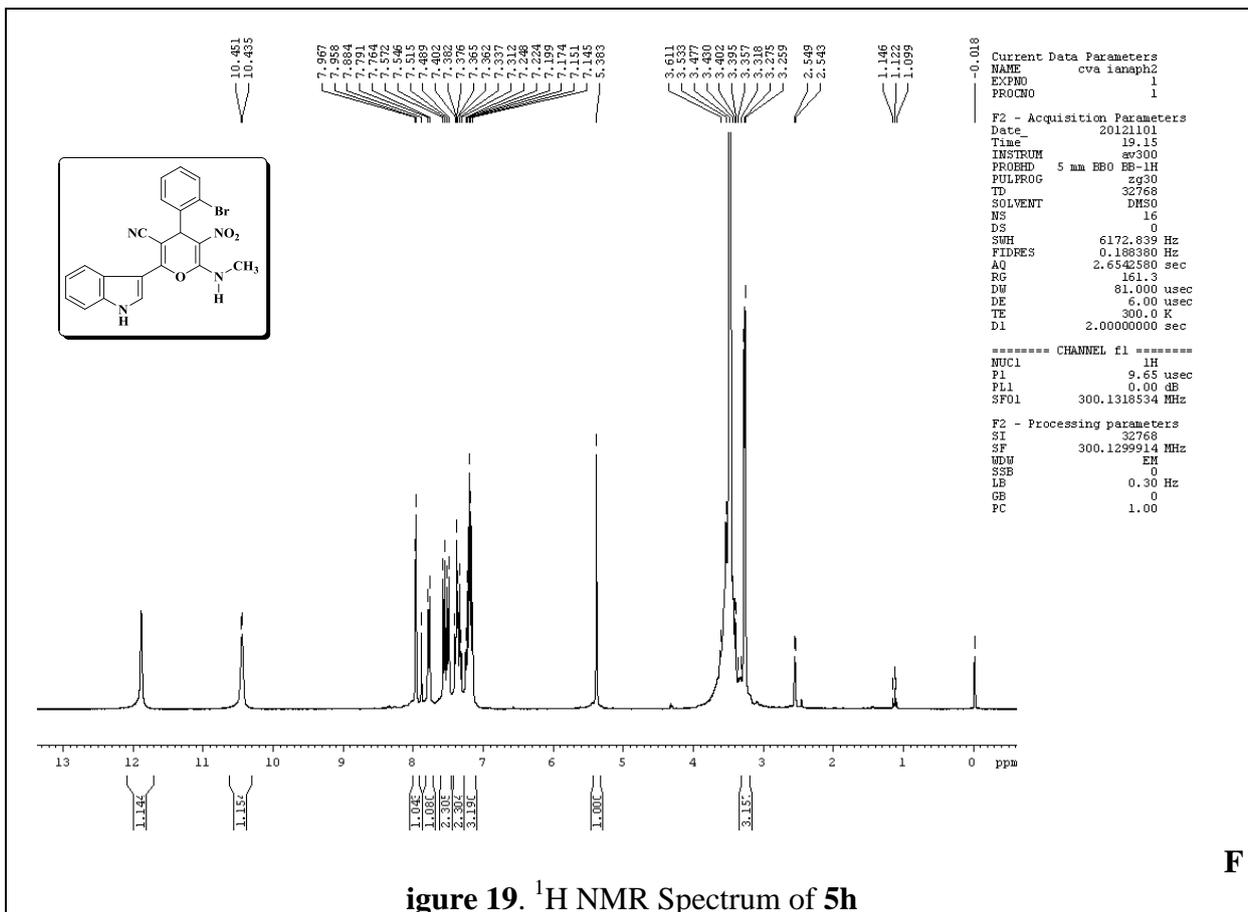


Figure 19. <sup>1</sup>H NMR Spectrum of 5h

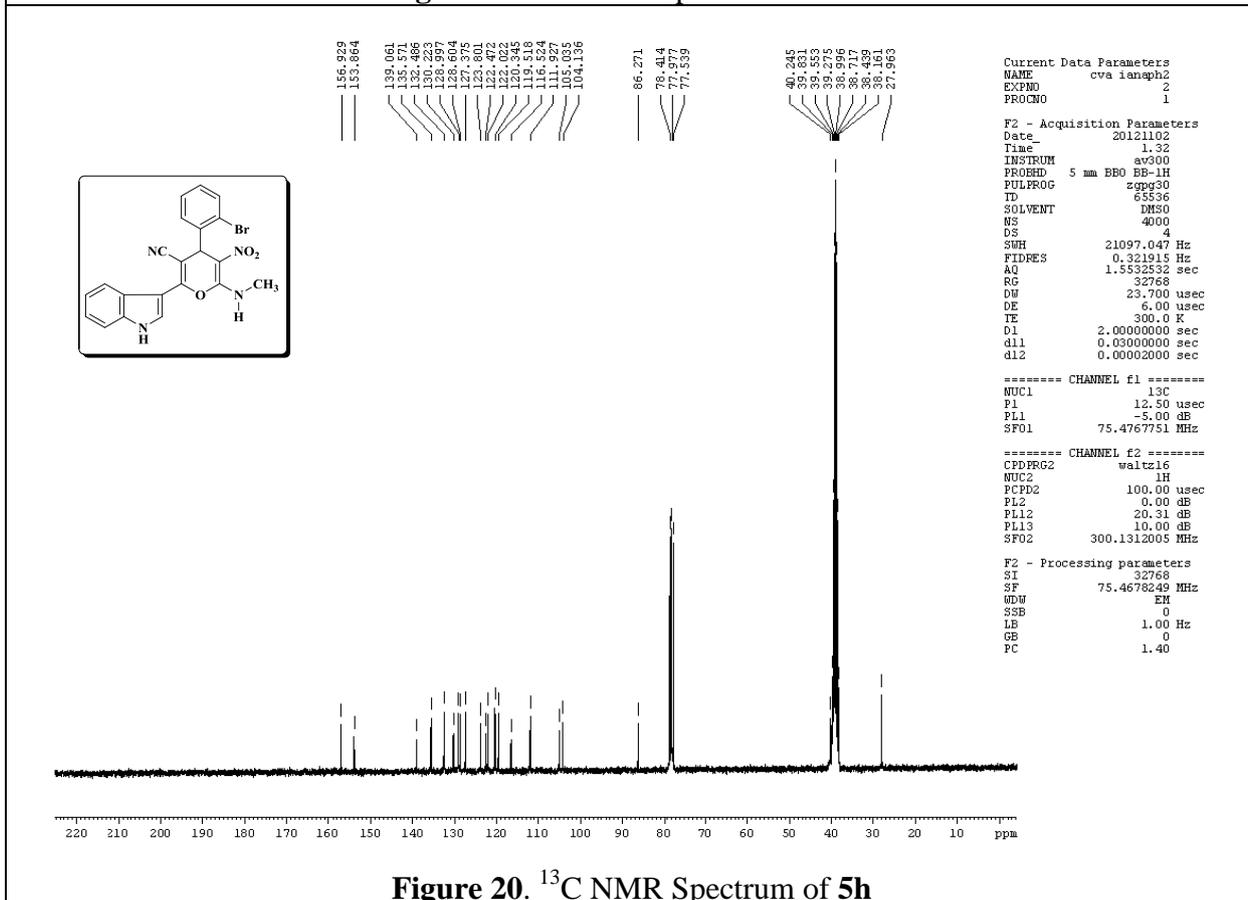


Figure 20. <sup>13</sup>C NMR Spectrum of 5h

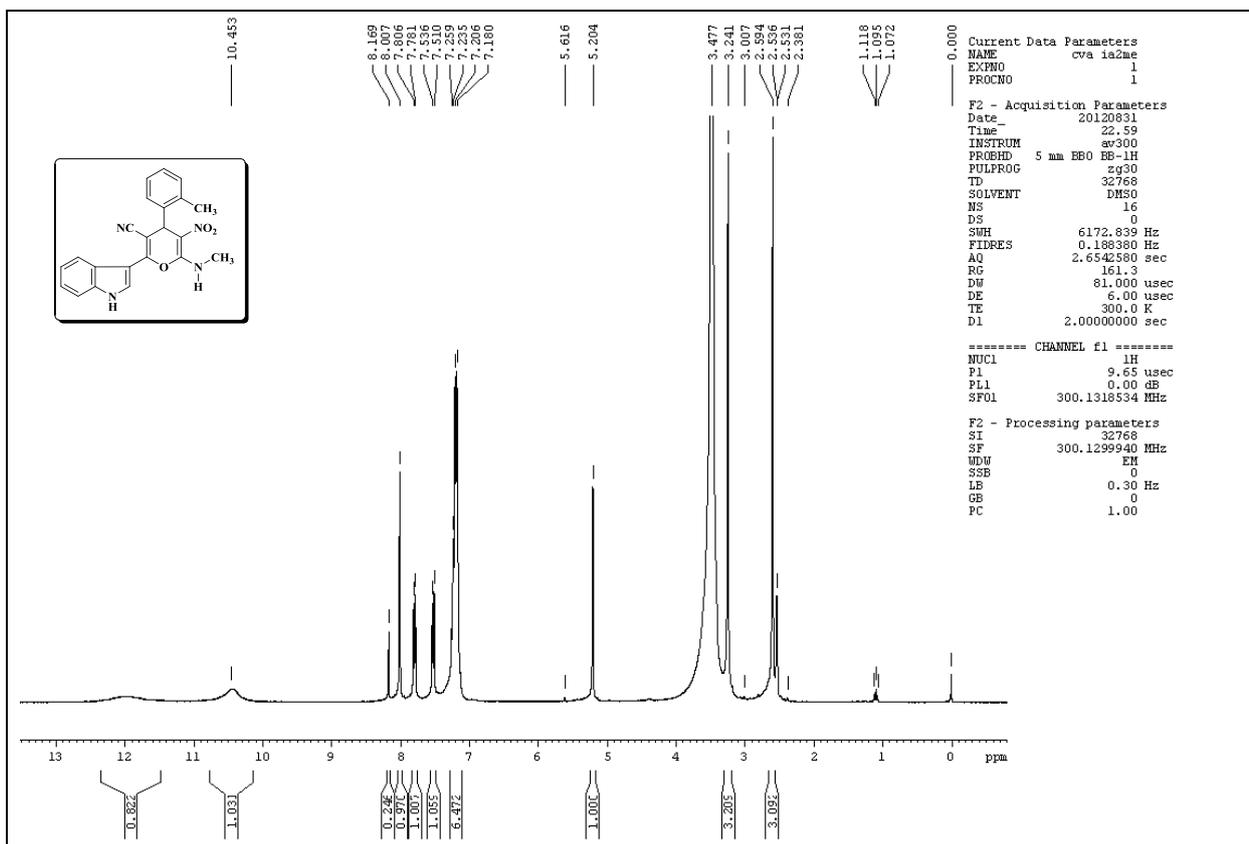


figure 21. <sup>1</sup>H NMR Spectrum of 5i

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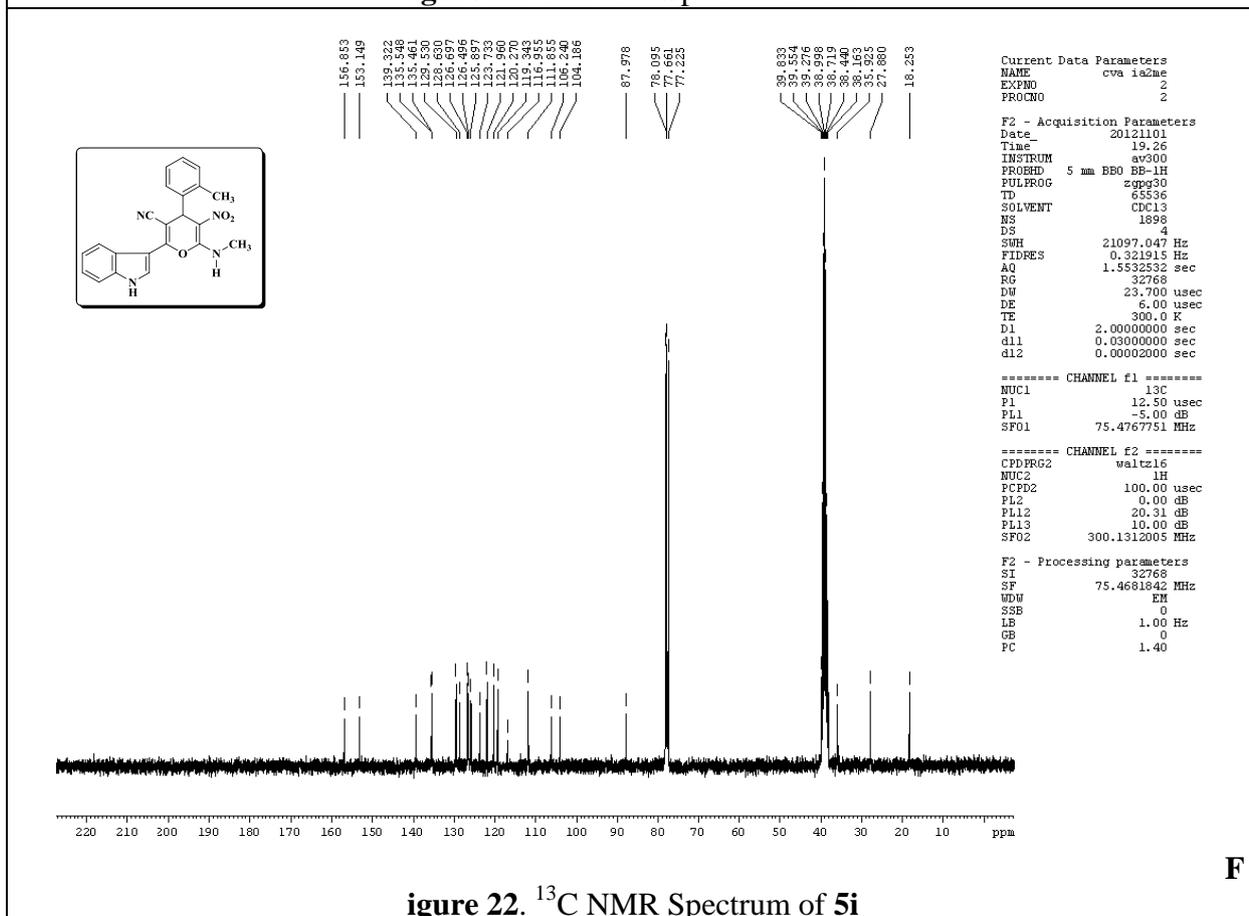
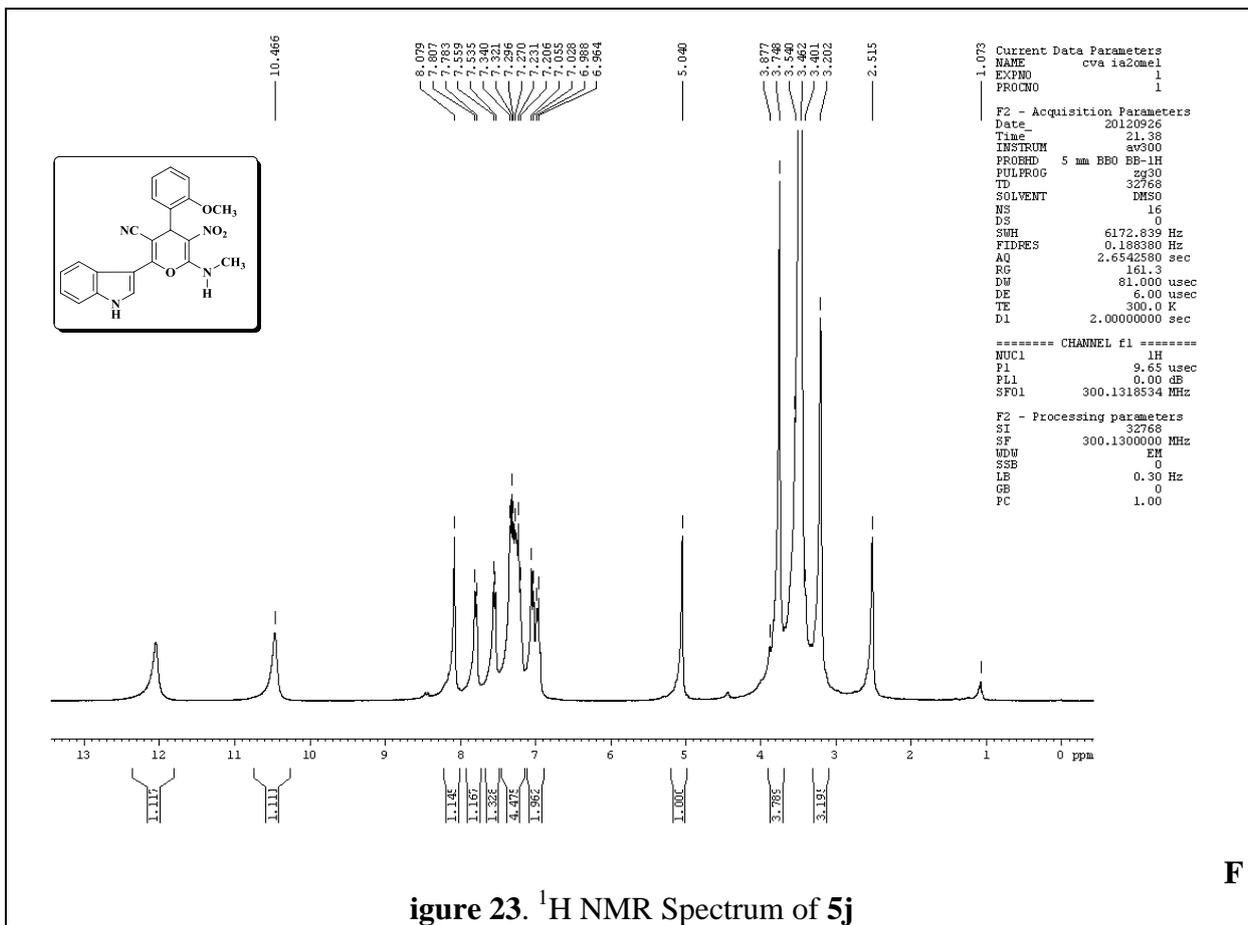


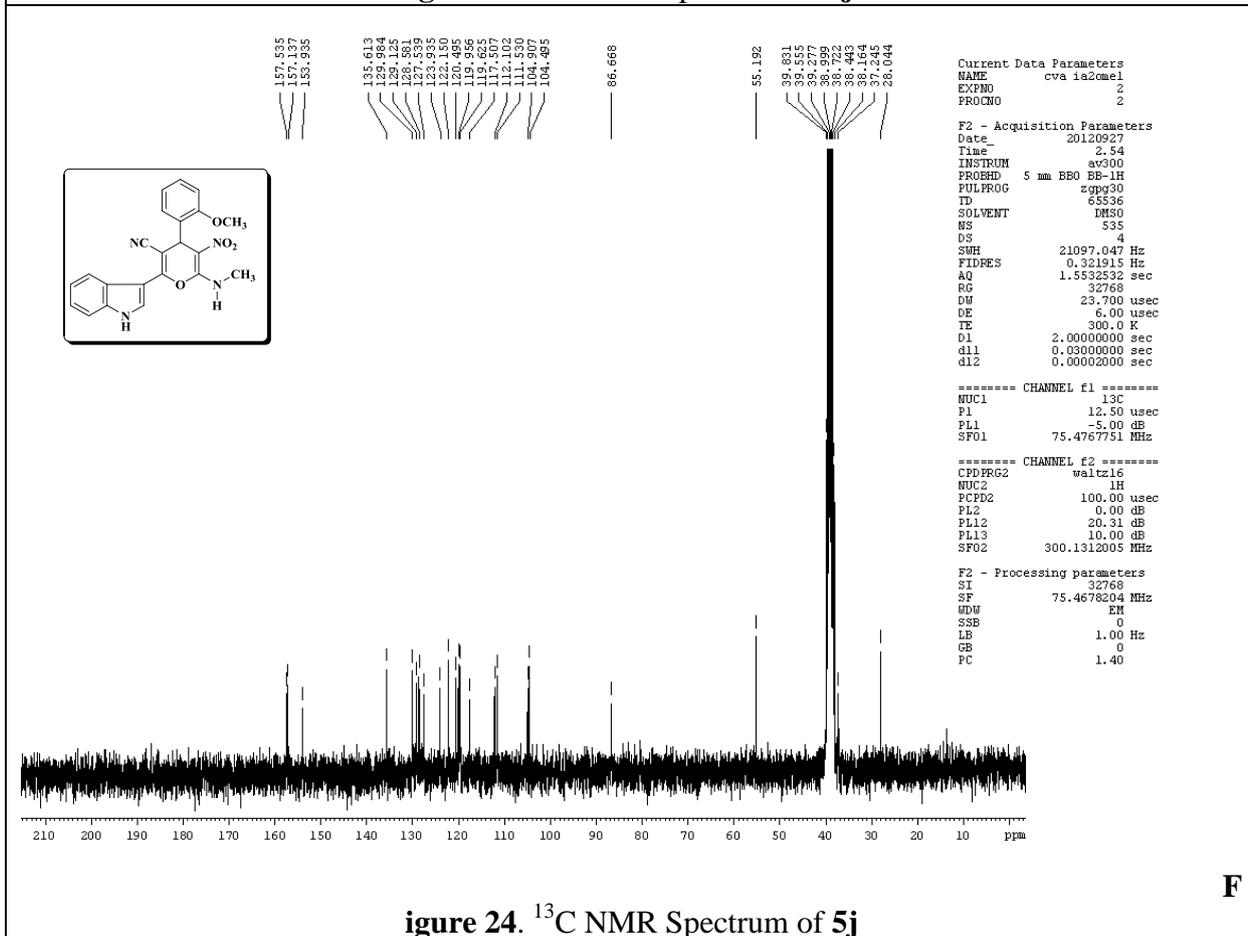
figure 22. <sup>13</sup>C NMR Spectrum of 5i

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figure 23. <sup>1</sup>H NMR Spectrum of 5j



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figure 24. <sup>13</sup>C NMR Spectrum of 5j

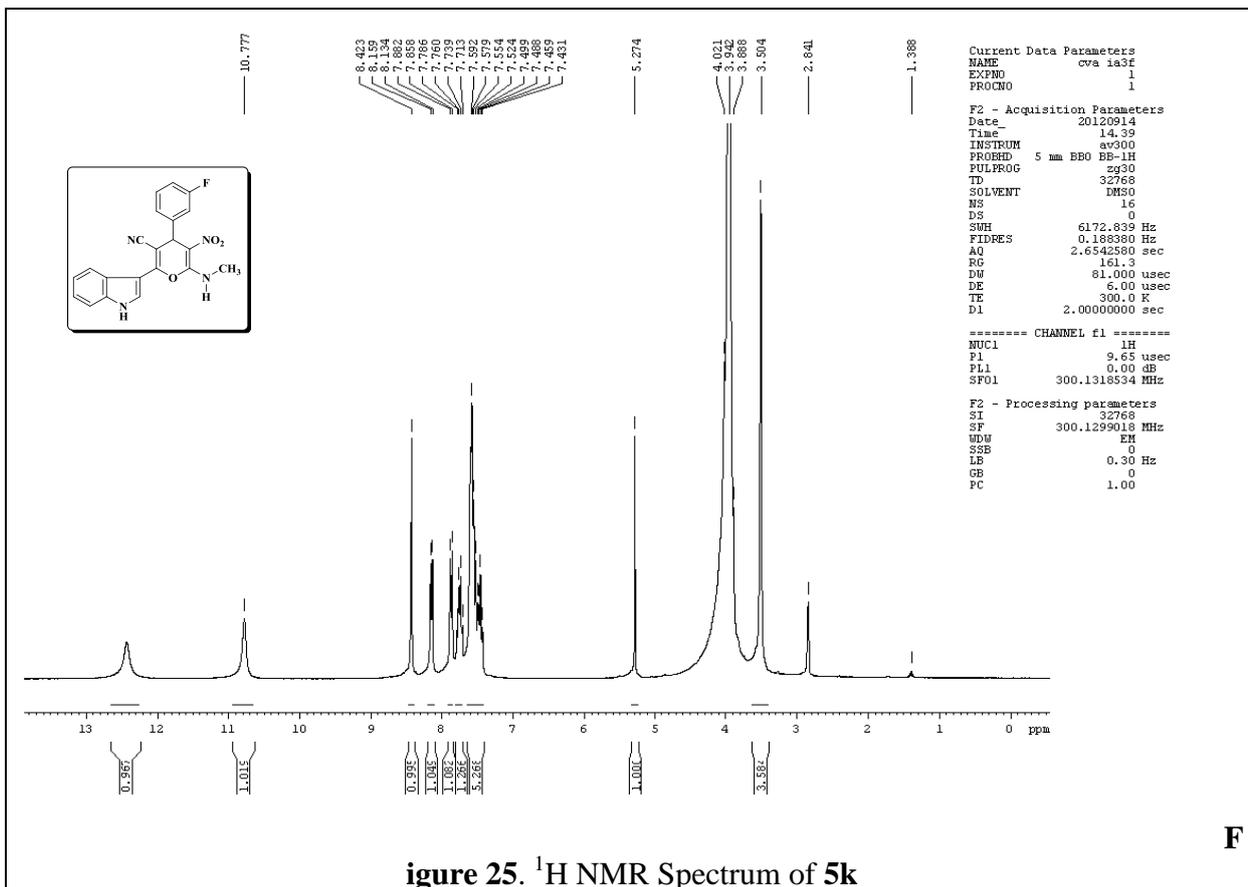


figure 25. <sup>1</sup>H NMR Spectrum of 5k

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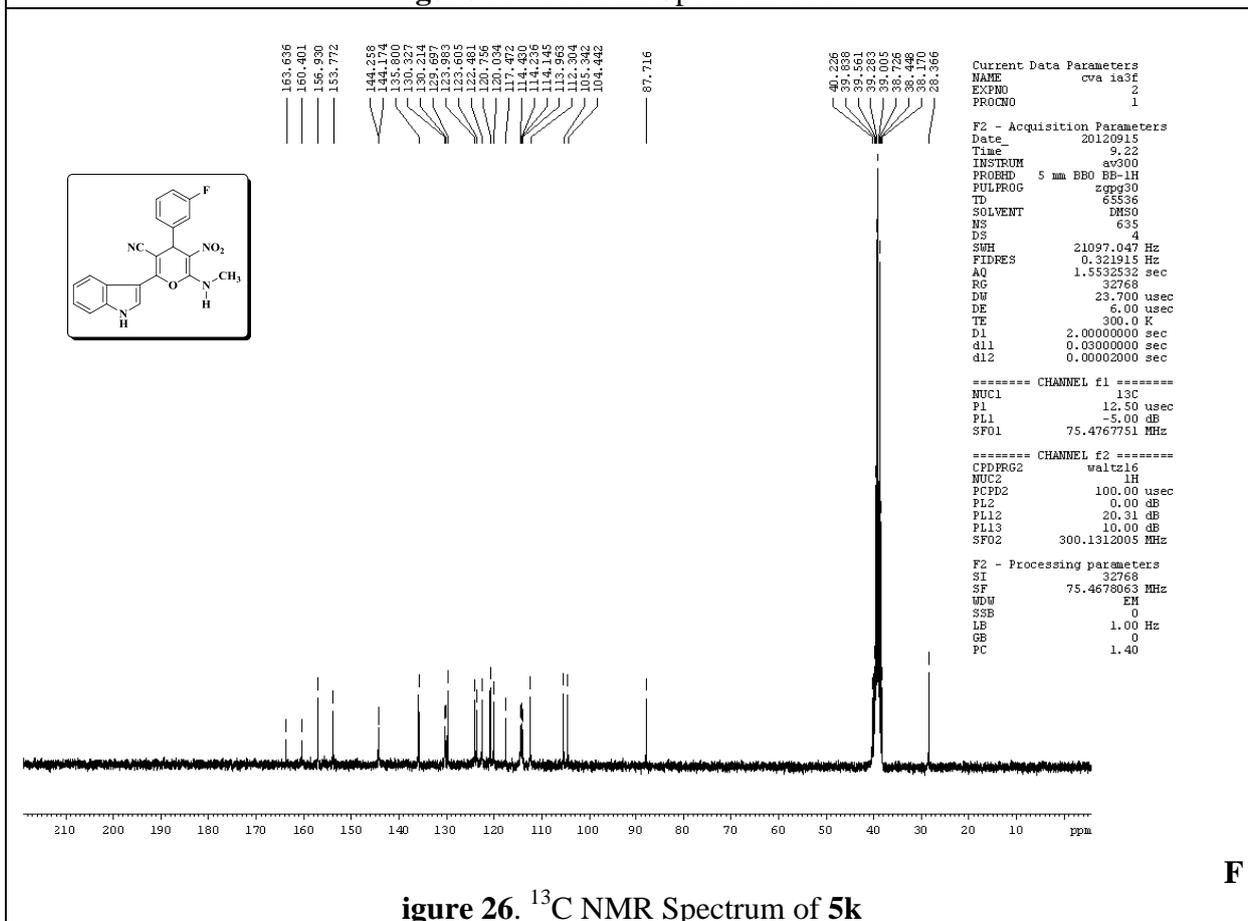
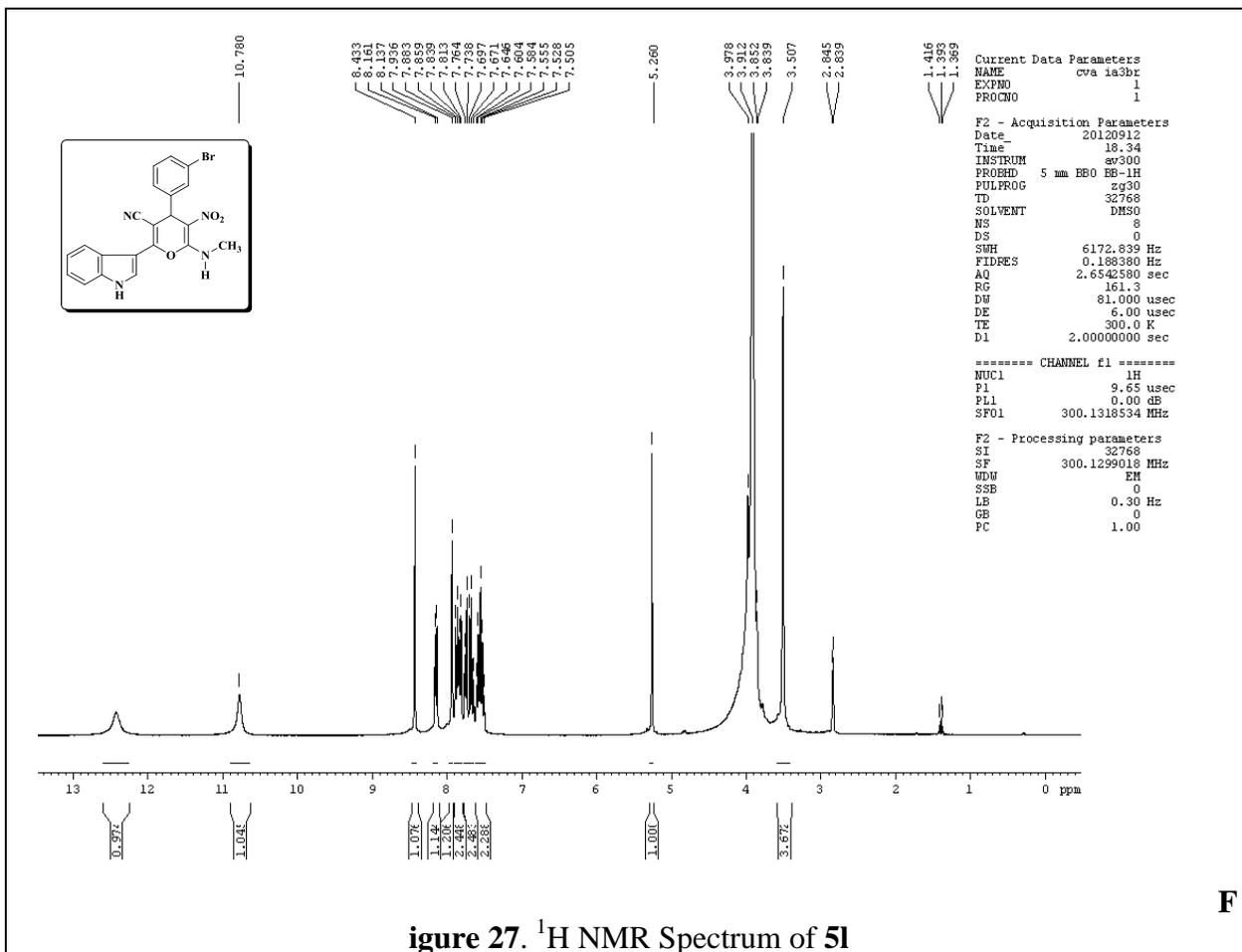
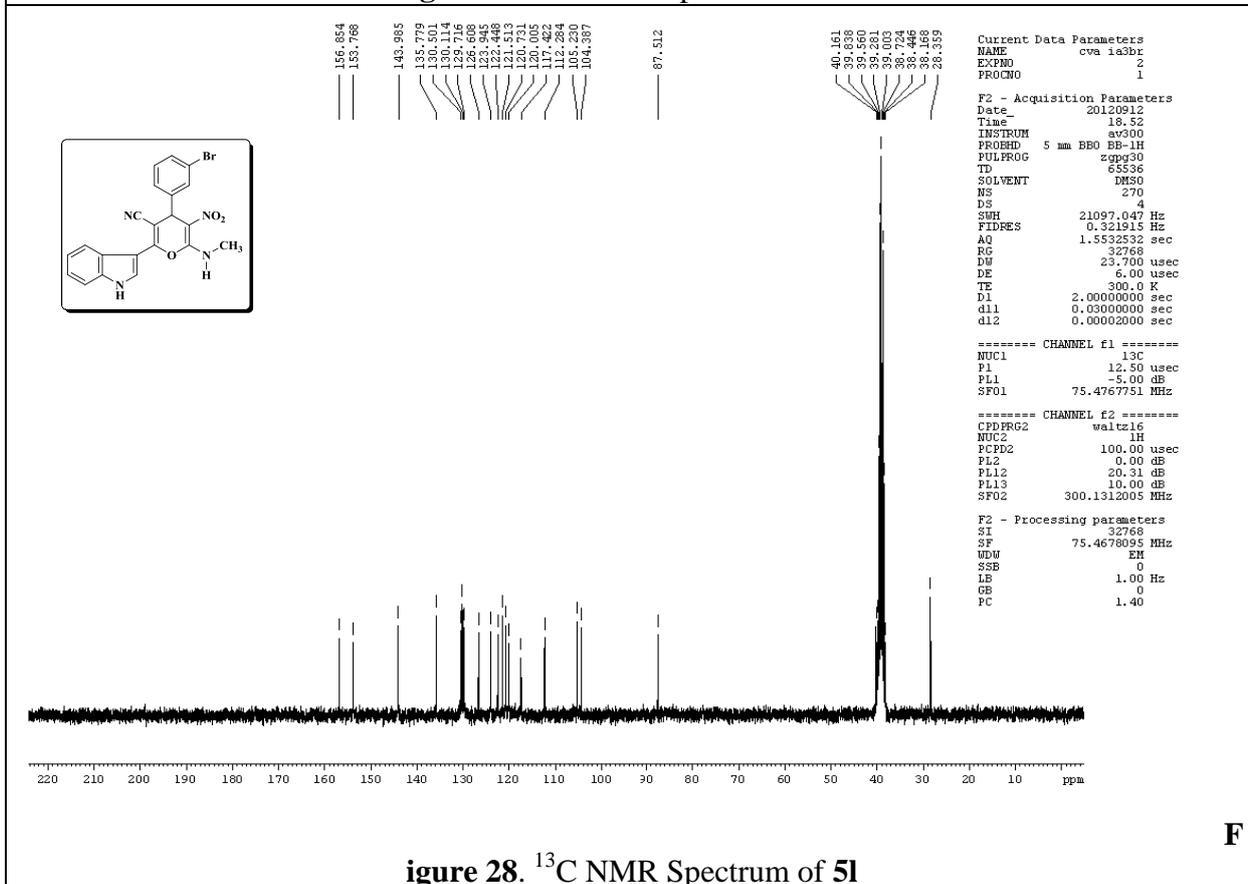


figure 26. <sup>13</sup>C NMR Spectrum of 5k

F



F



F

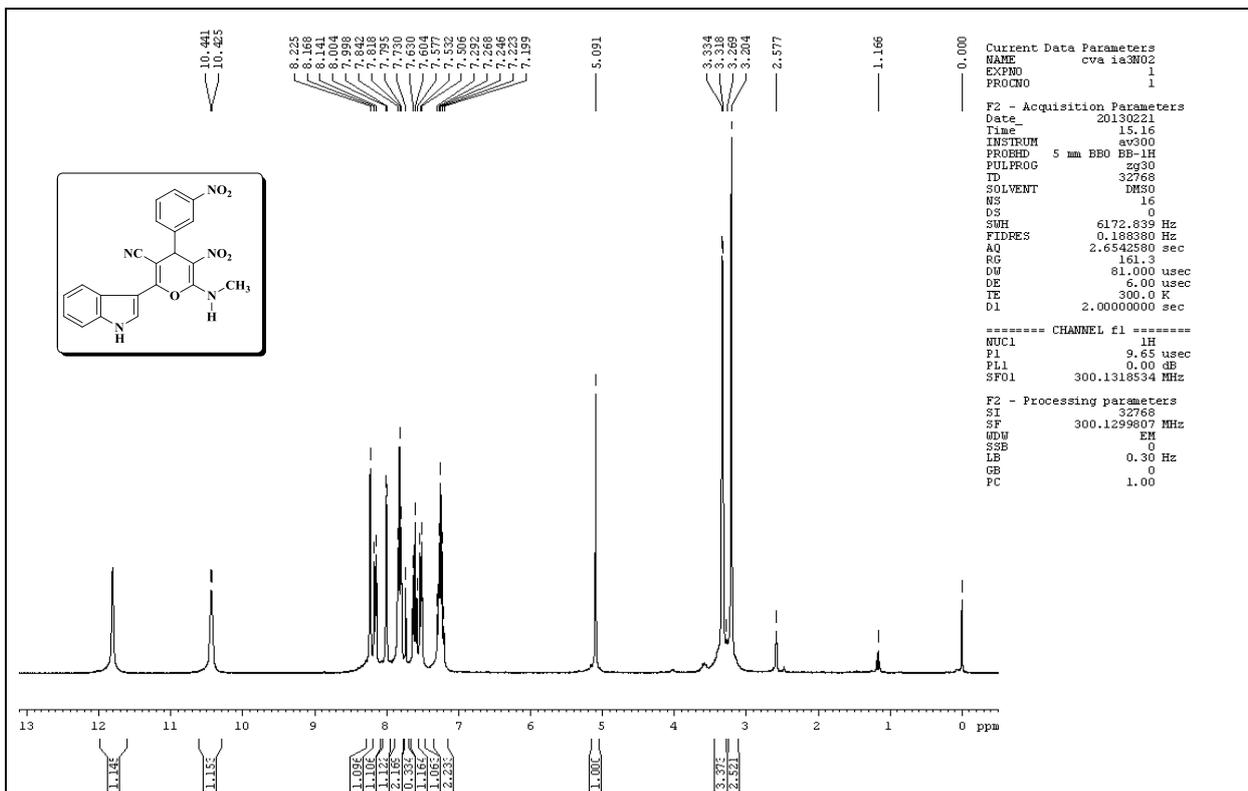


figure 29. <sup>1</sup>H NMR Spectrum of 5m

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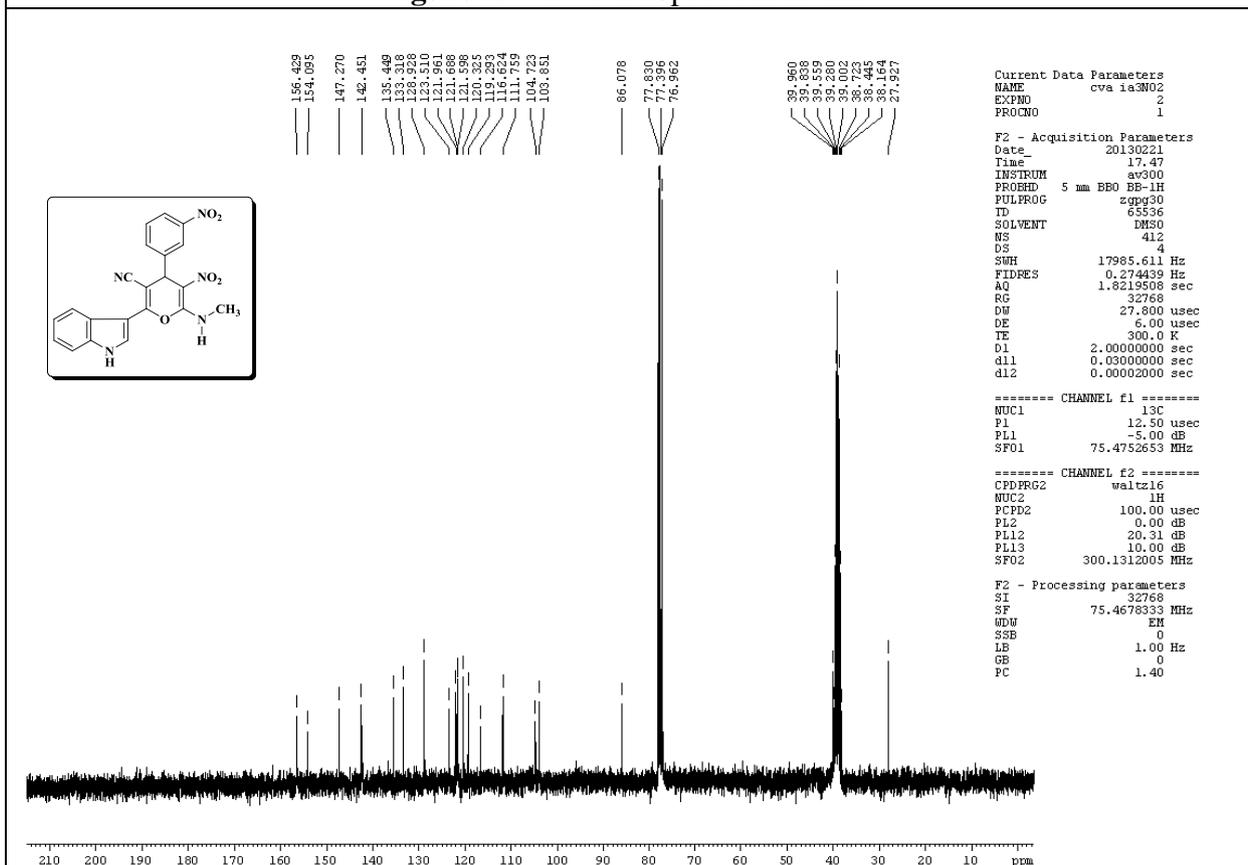


figure 30. <sup>13</sup>C NMR Spectrum of 5m

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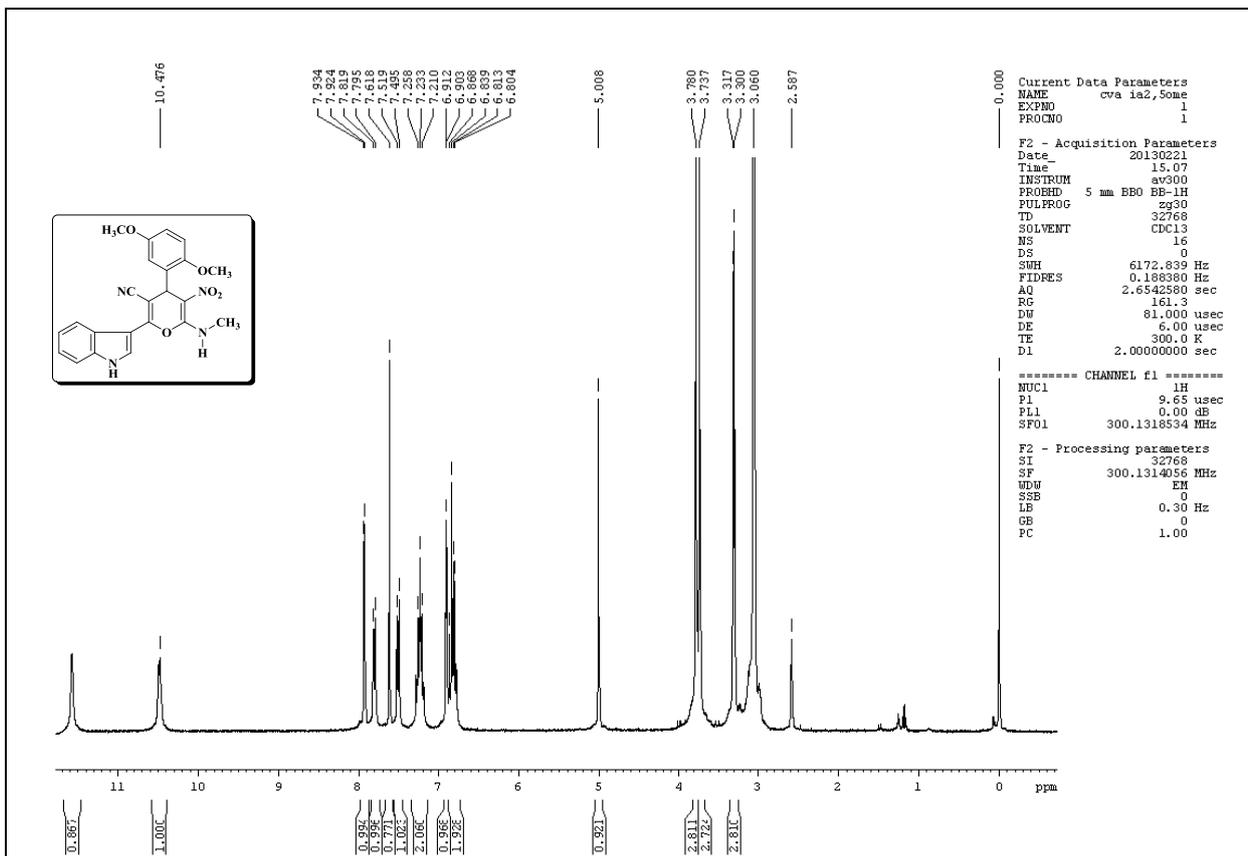


Figure 31.  $^1\text{H}$  NMR Spectrum of 5n

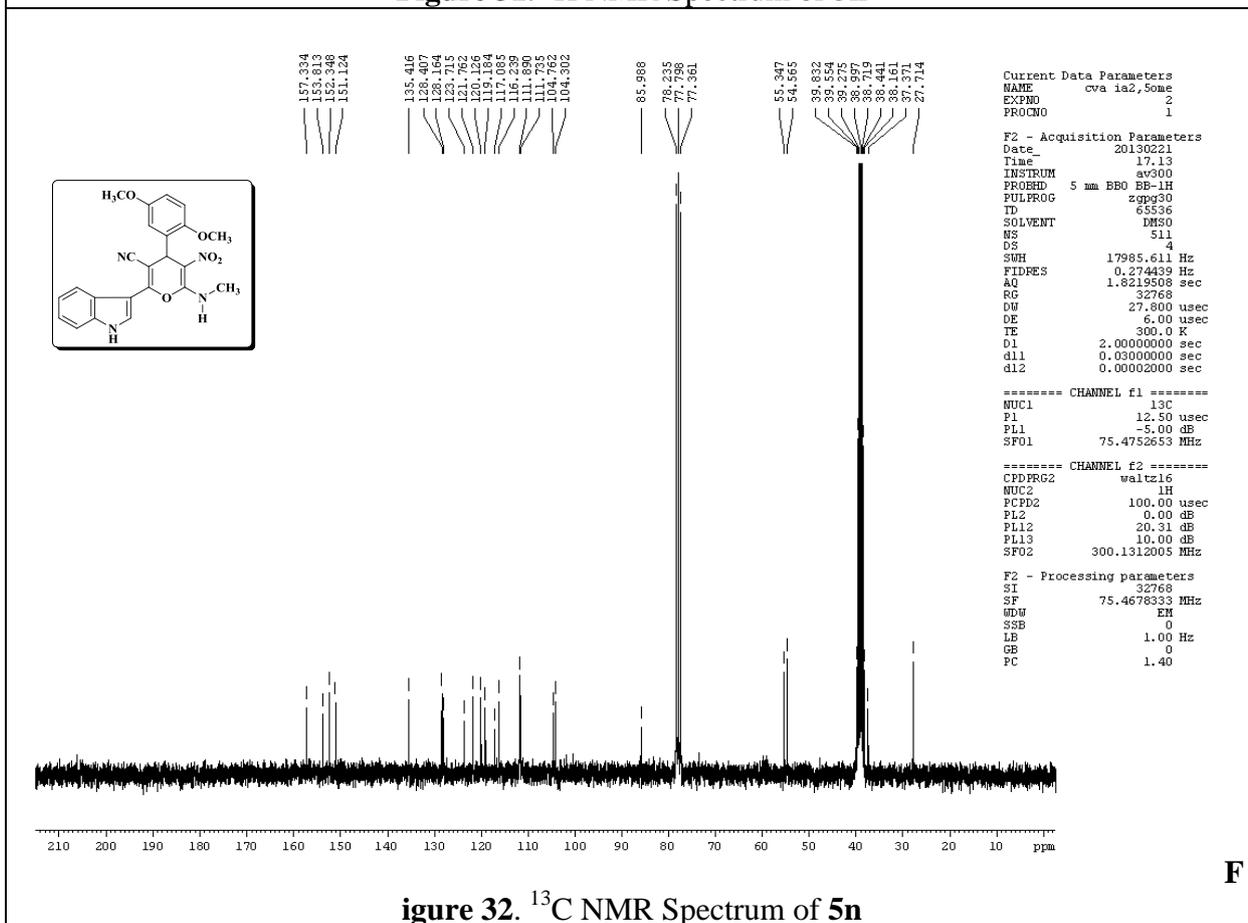


Figure 32.  $^{13}\text{C}$  NMR Spectrum of 5n

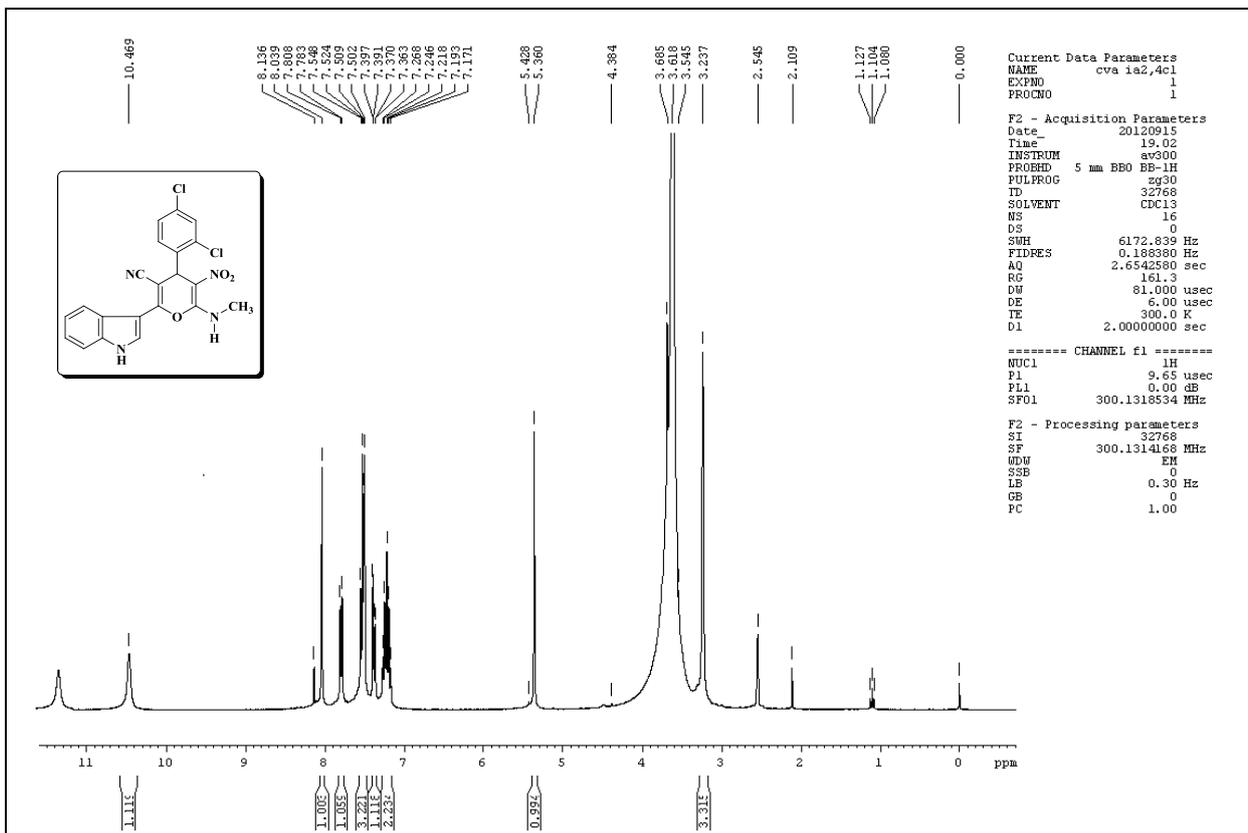


Figure 33. <sup>1</sup>H NMR Spectrum of 5o

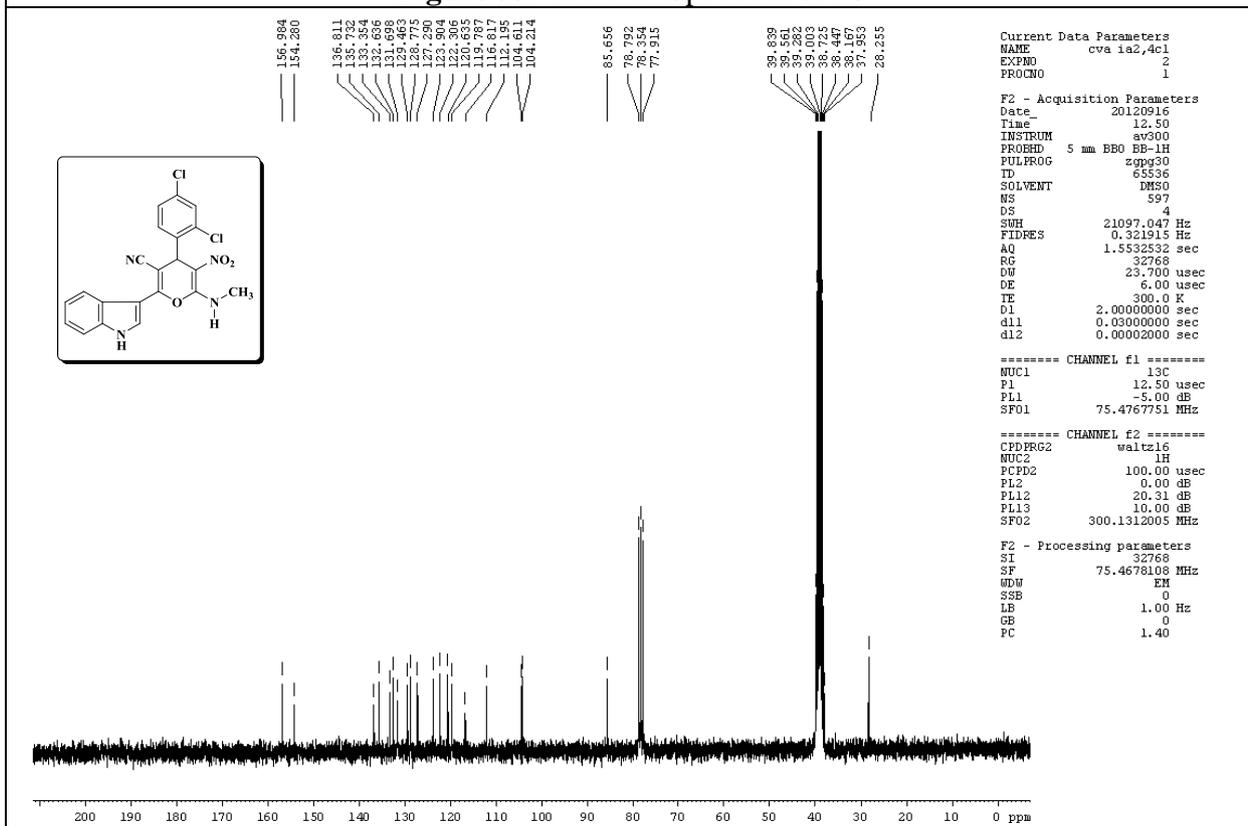
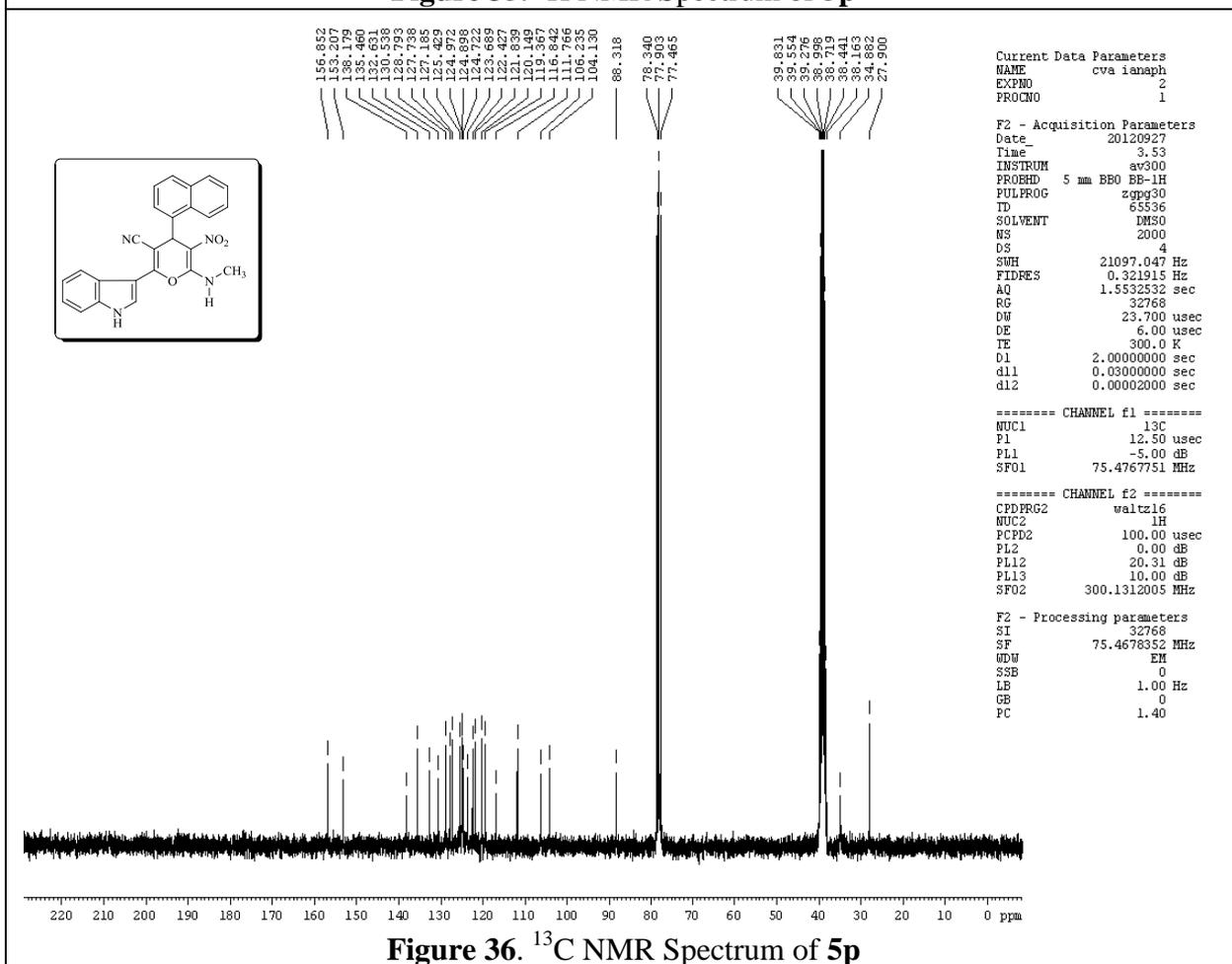
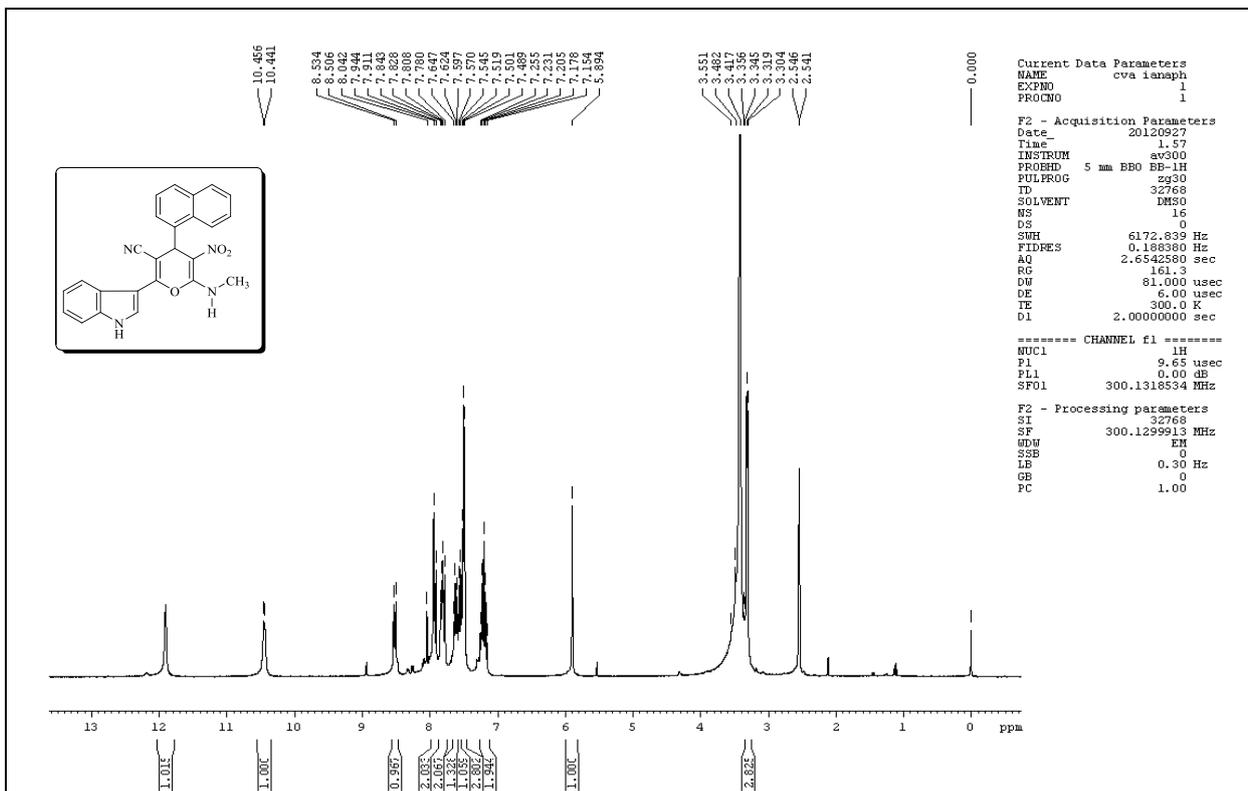


Figure 34. <sup>13</sup>C NMR Spectrum of 5o

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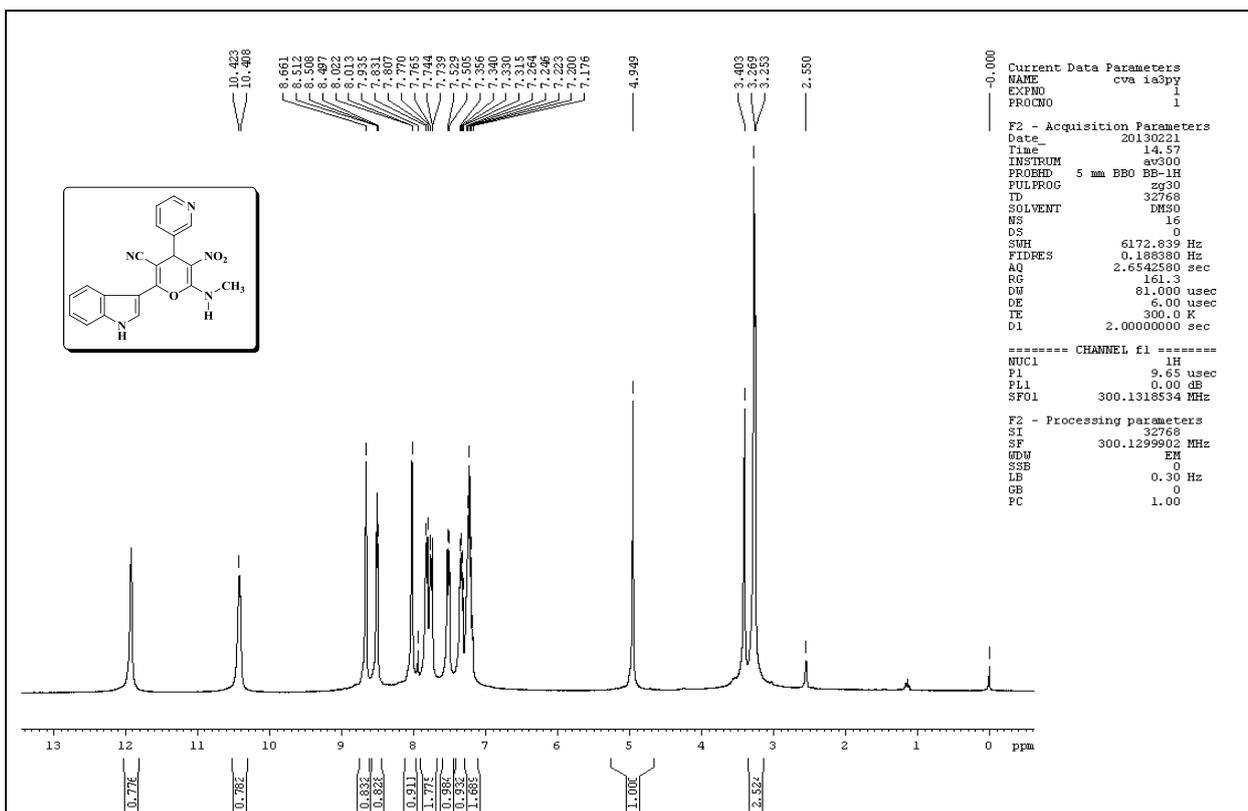


figure 37. <sup>1</sup>H NMR Spectrum of 5q

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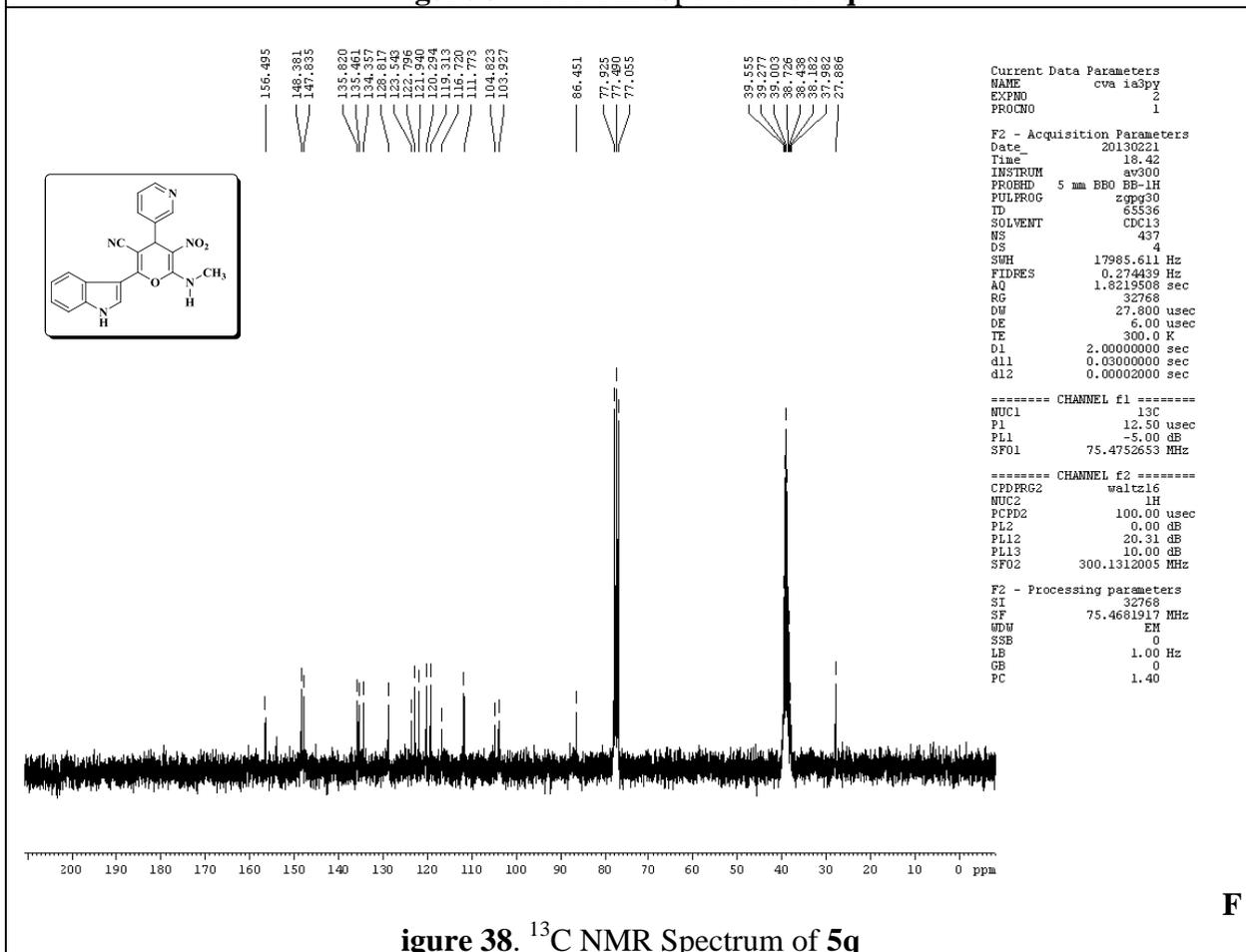


figure 38. <sup>13</sup>C NMR Spectrum of 5q

F

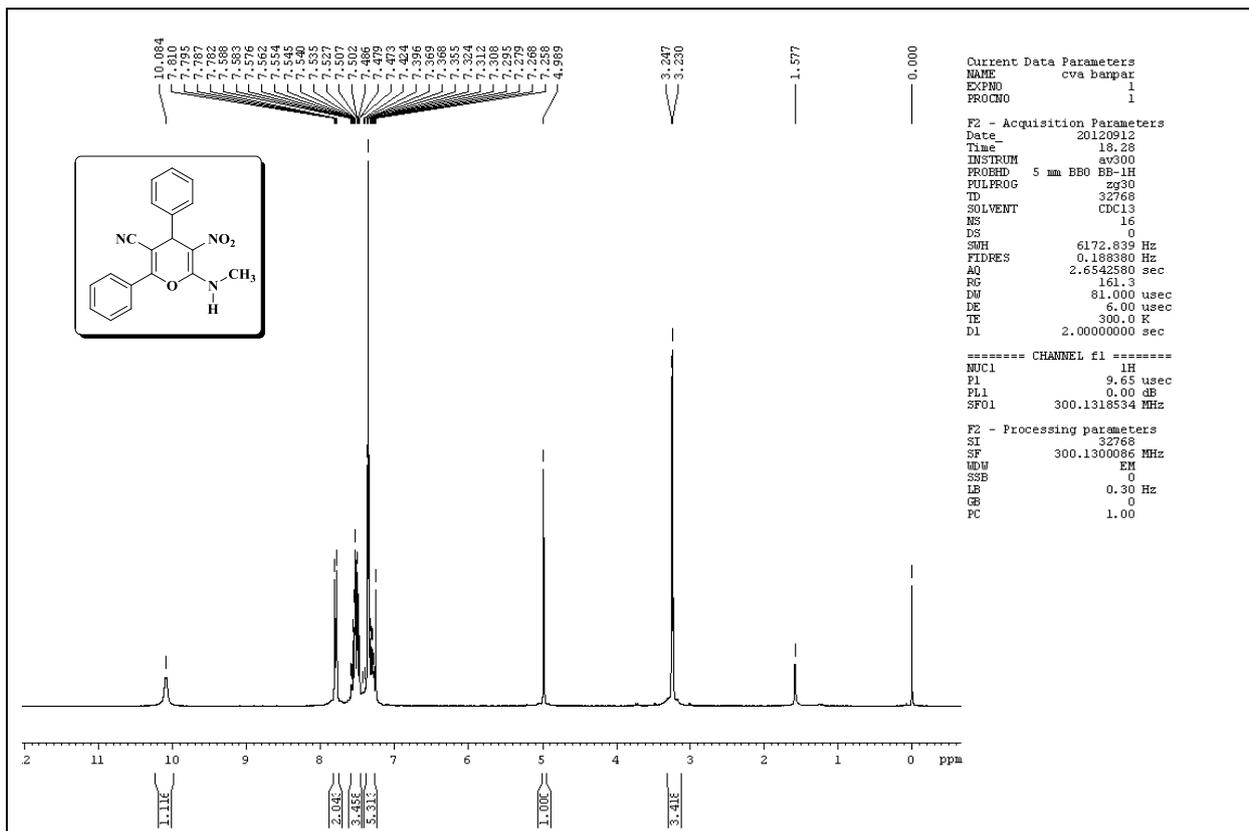


Figure 39. <sup>1</sup>H NMR Spectrum of 6a

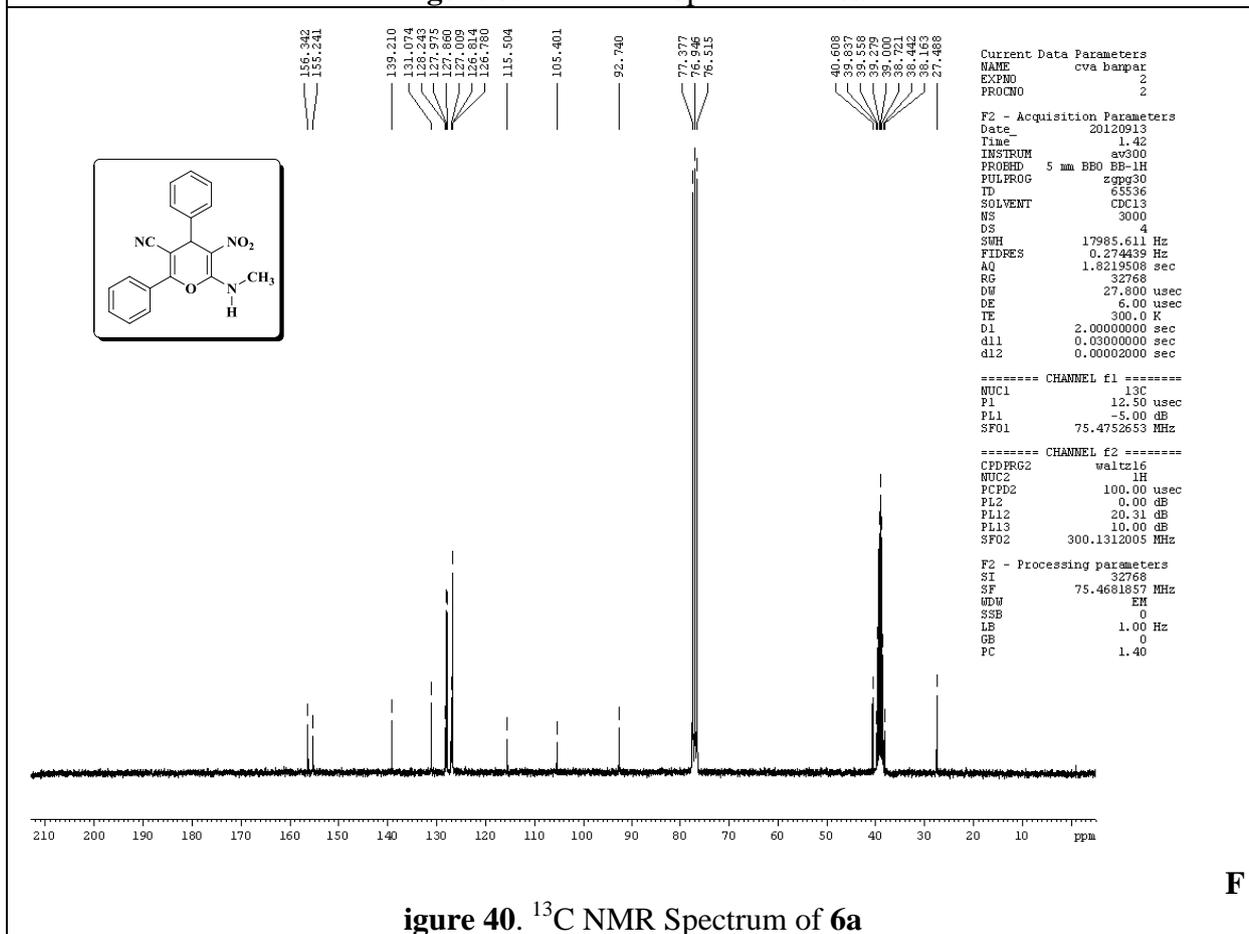


Figure 40. <sup>13</sup>C NMR Spectrum of 6a

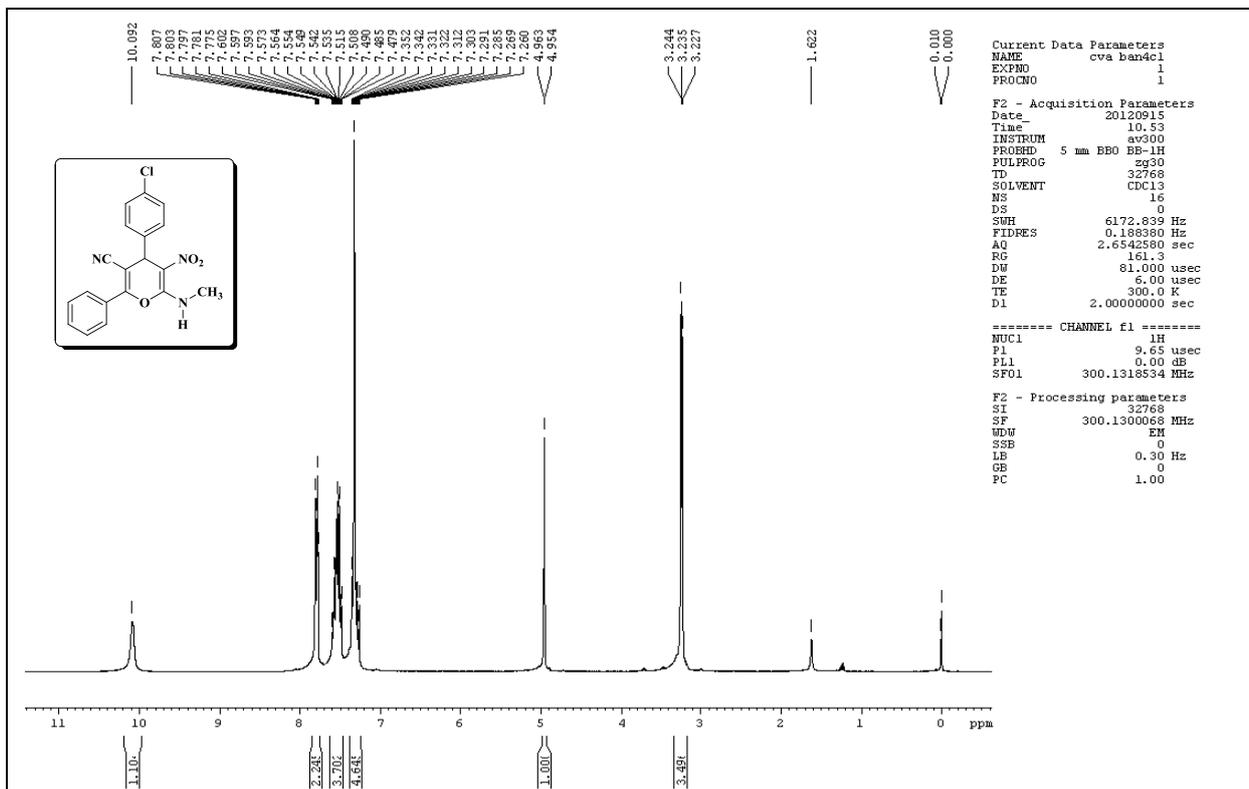


Figure 41. <sup>1</sup>H NMR Spectrum of 6b

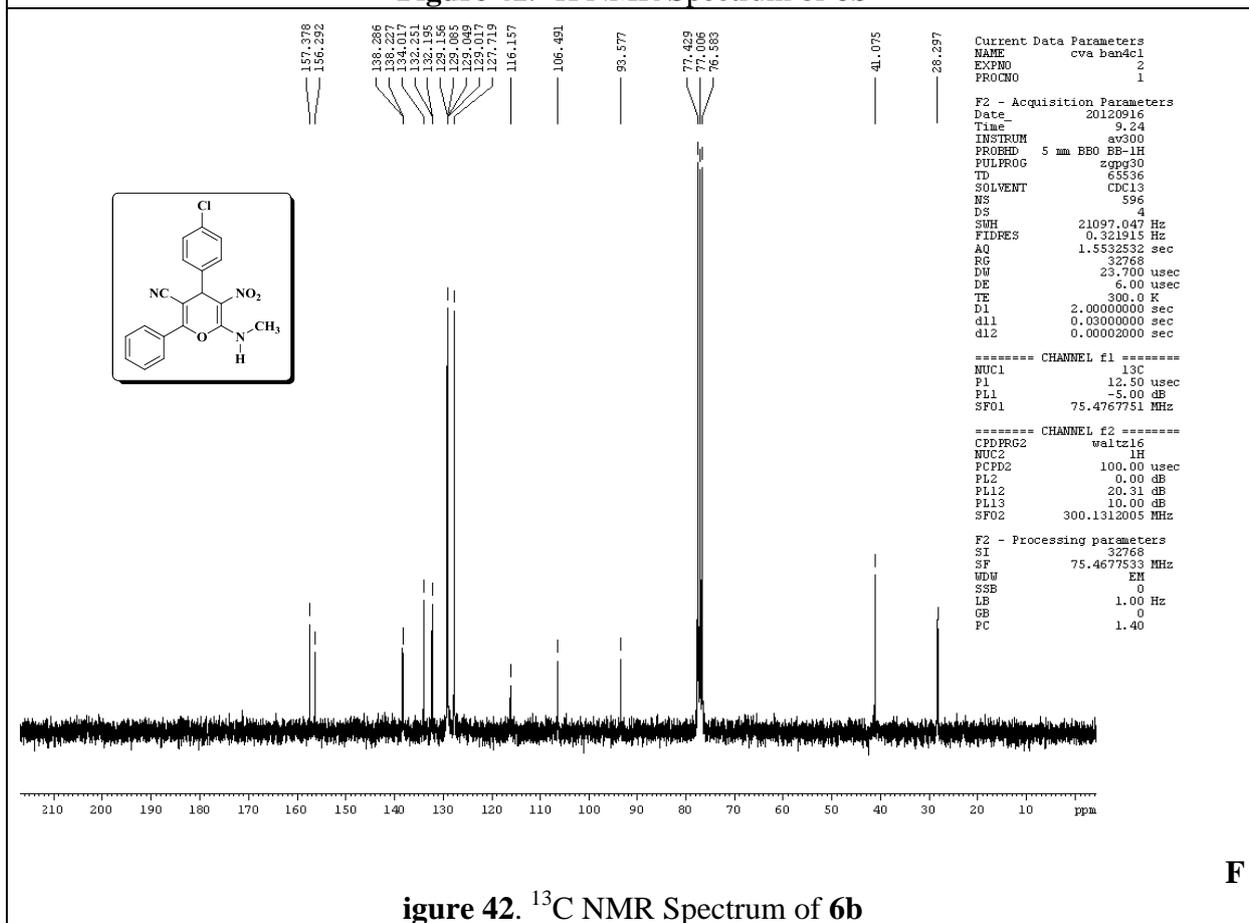


Figure 42. <sup>13</sup>C NMR Spectrum of 6b

F

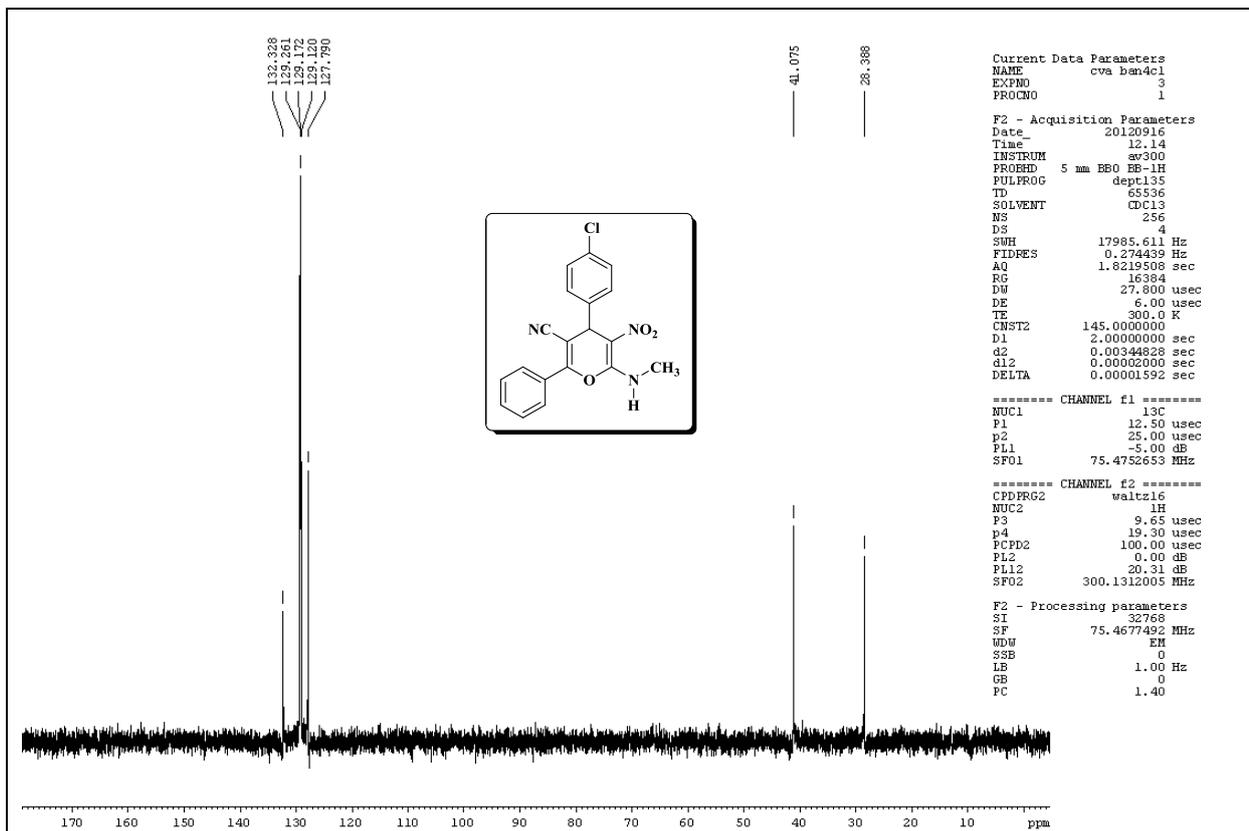


Figure 43. DEPT 135 NMR spectrum of **6b**

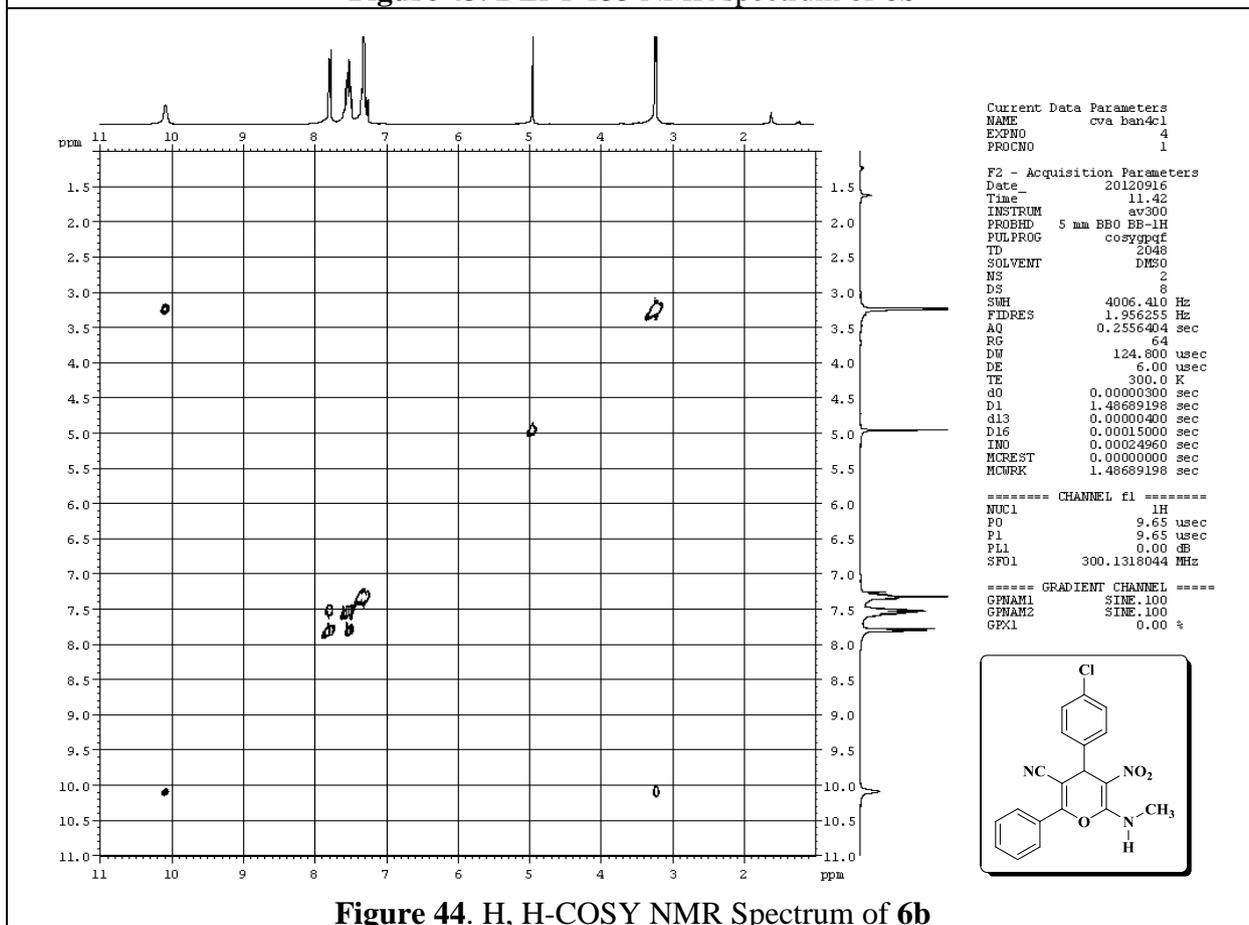


Figure 44. H, H-COSY NMR Spectrum of **6b**

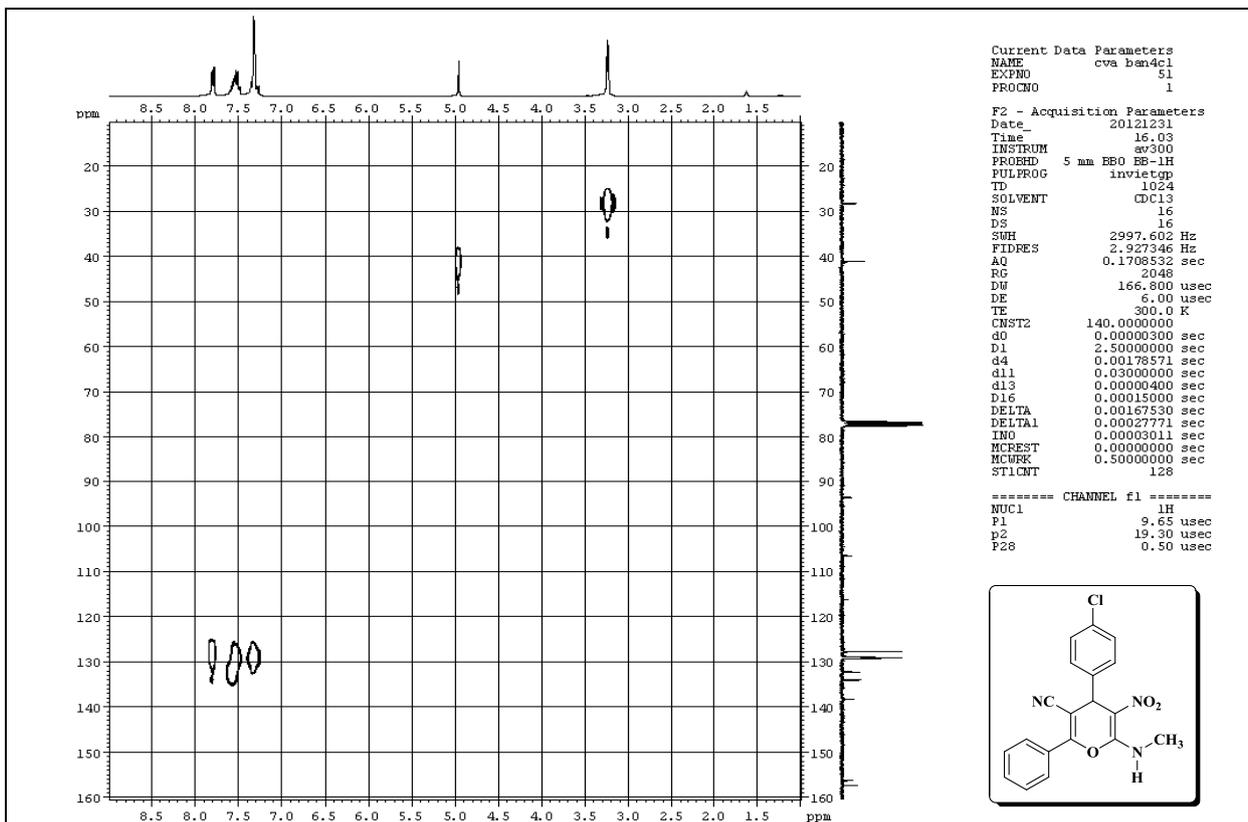


Figure 45. C, H-COSY NMR Spectrum of **6b**

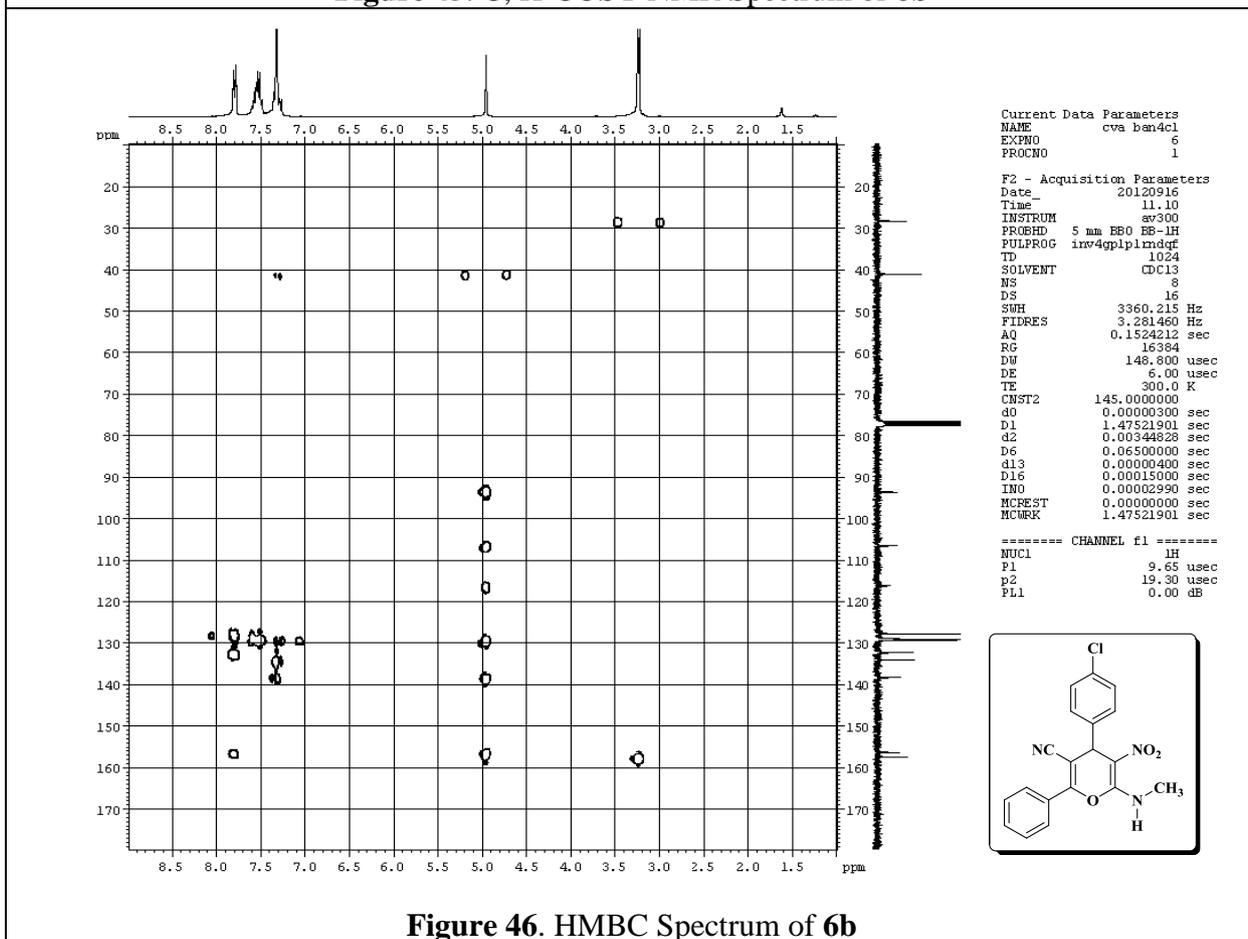
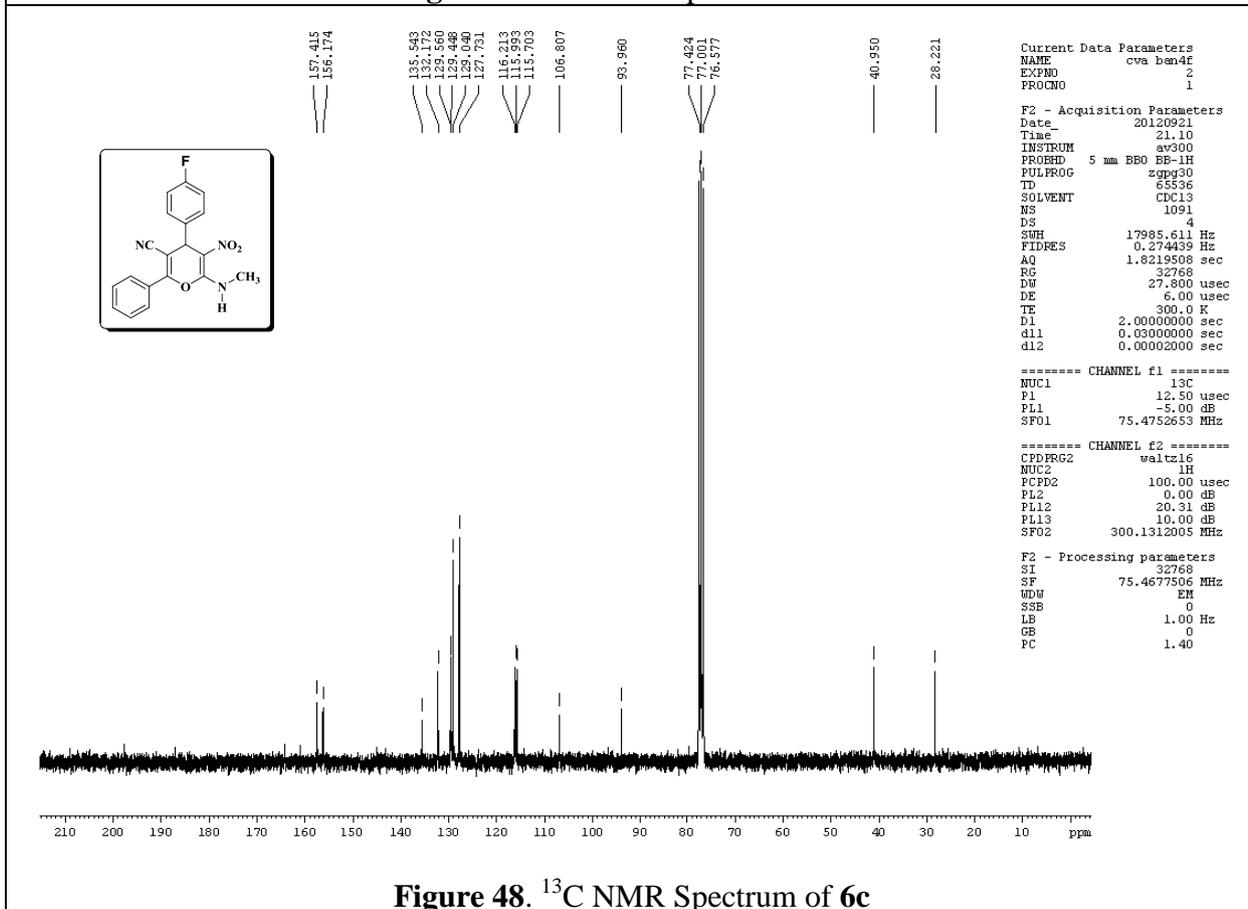
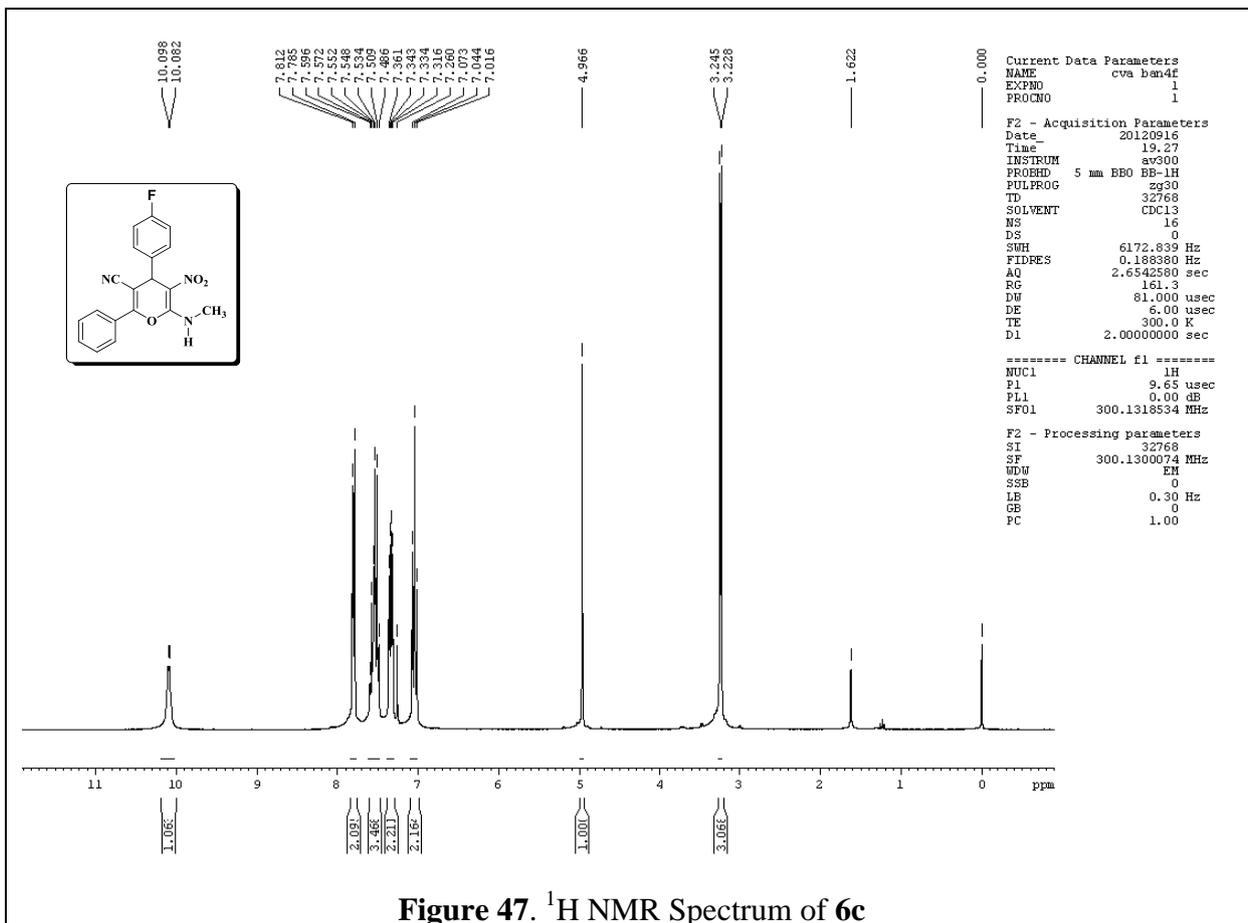
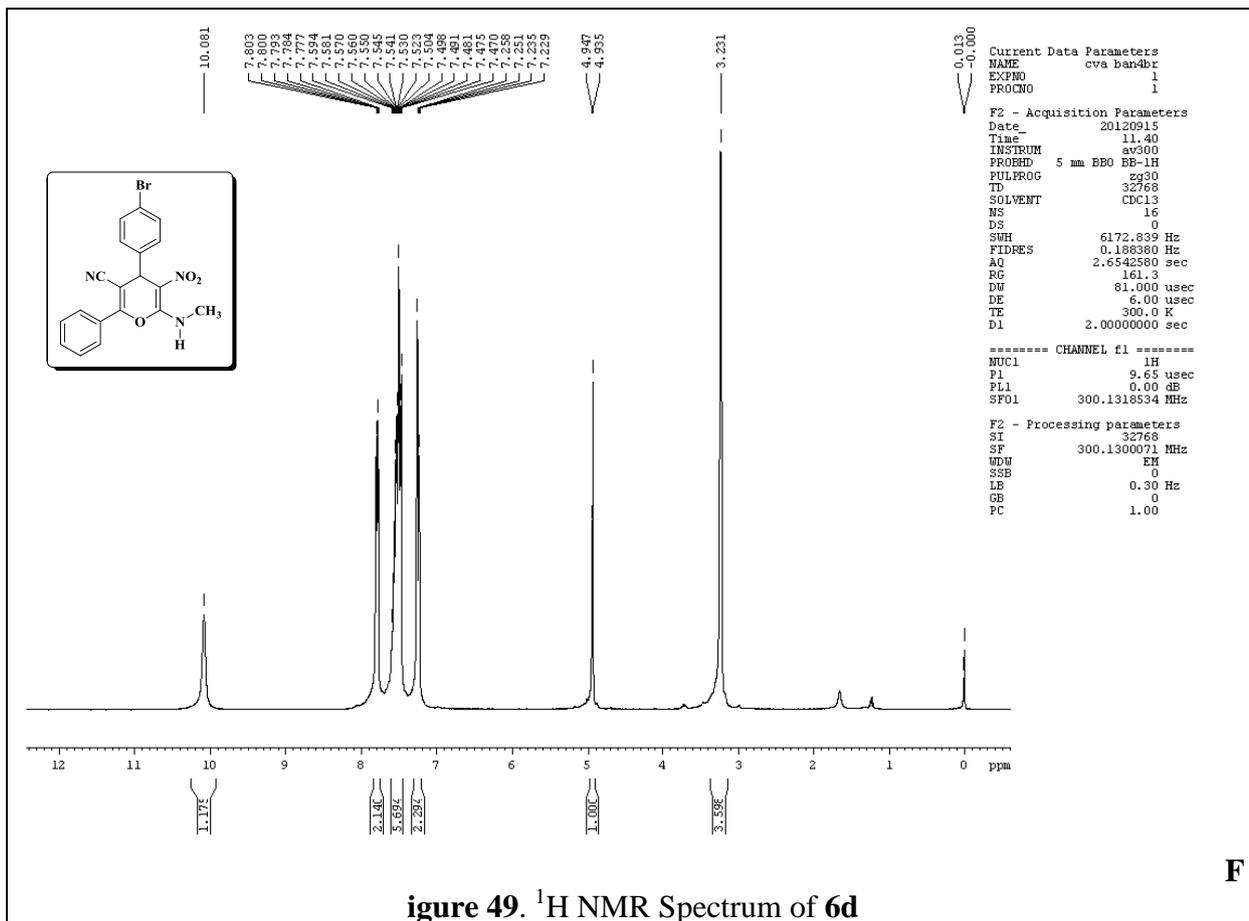


Figure 46. HMBC Spectrum of **6b**





F

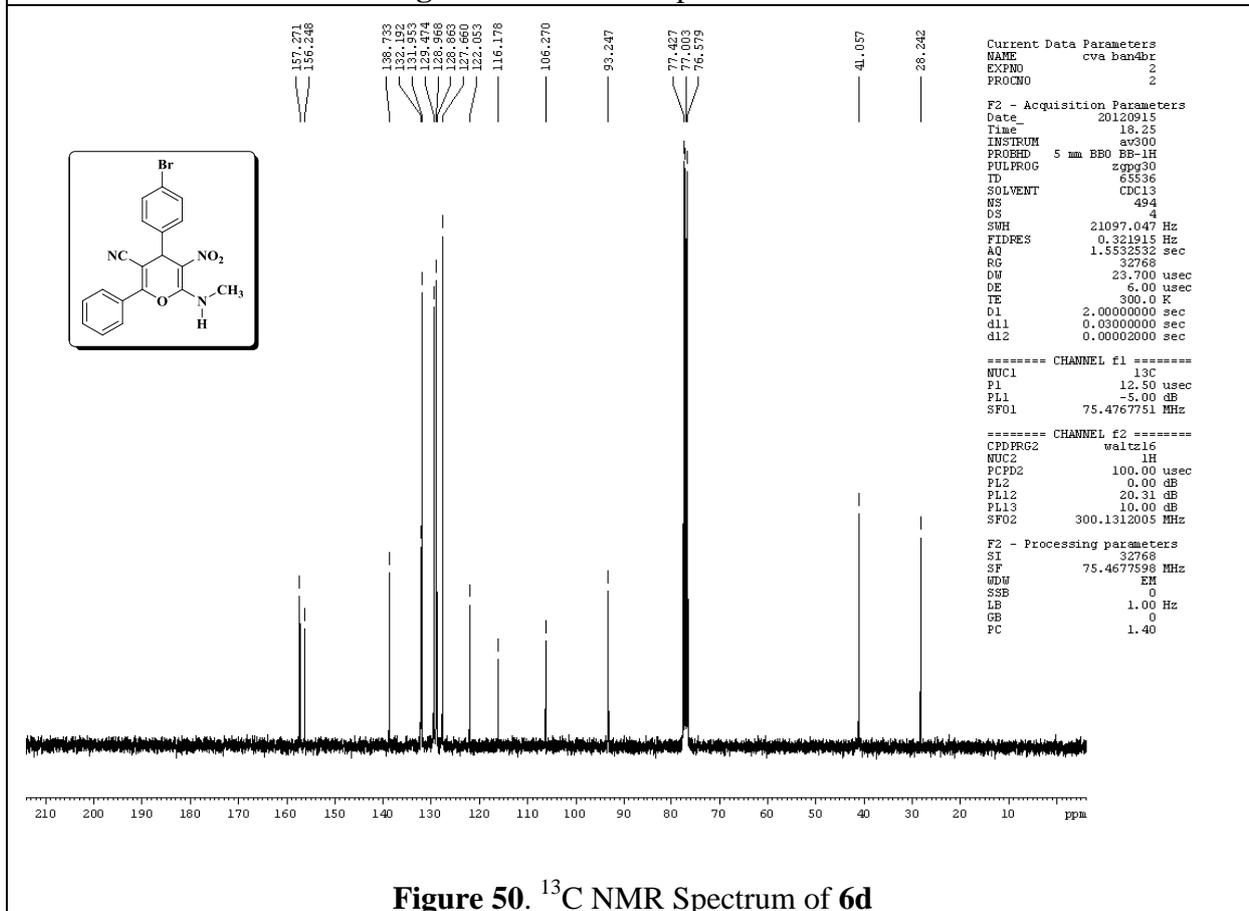


Figure 50. <sup>13</sup>C NMR Spectrum of 6d

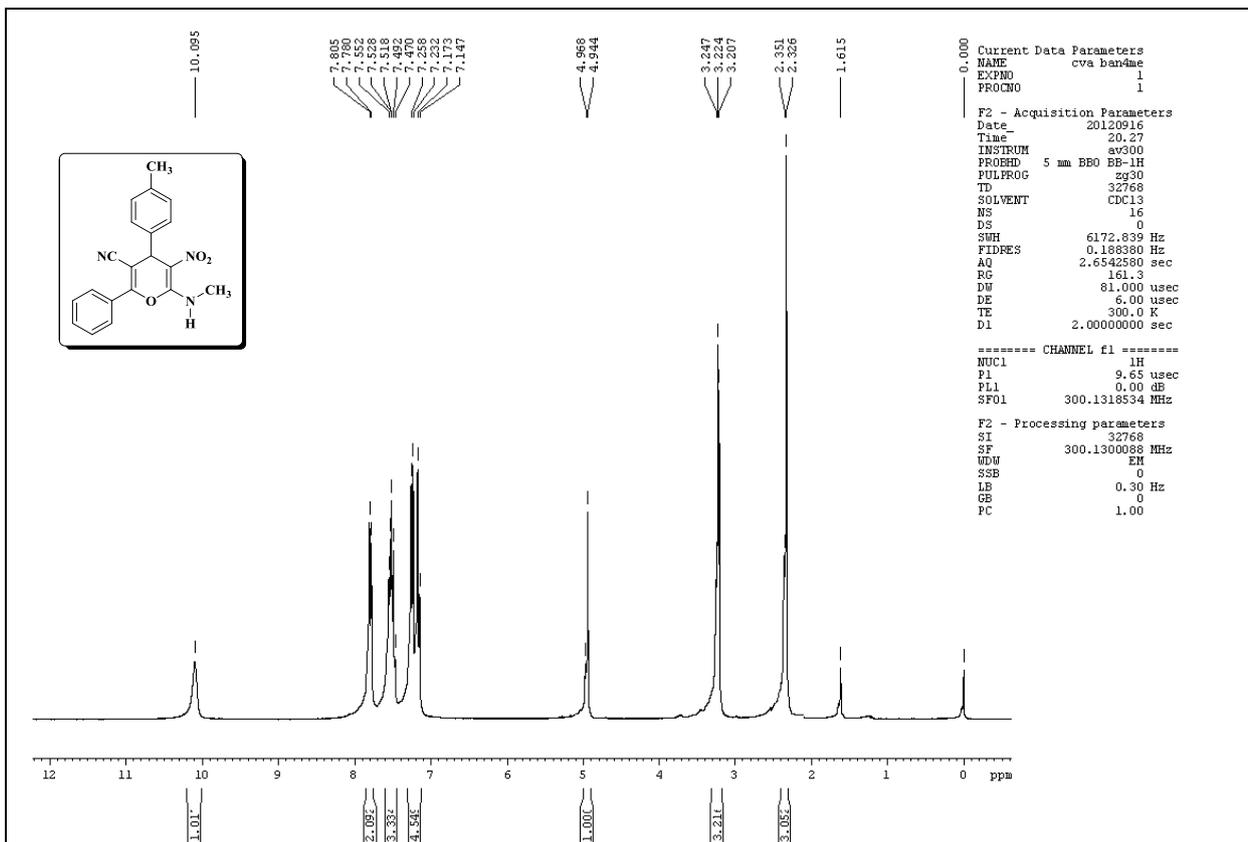


Figure 51. <sup>1</sup>H NMR Spectrum of 6e

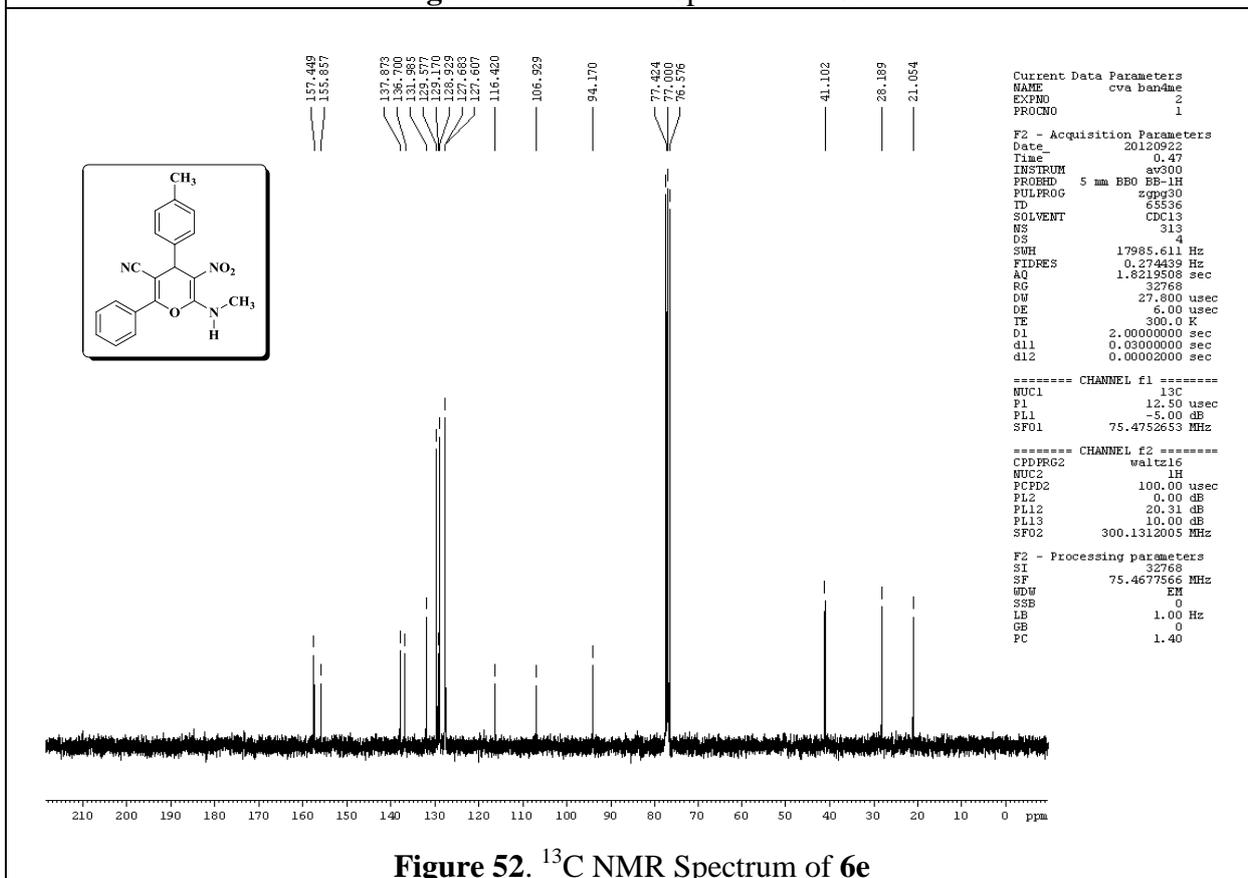


Figure 52. <sup>13</sup>C NMR Spectrum of 6e

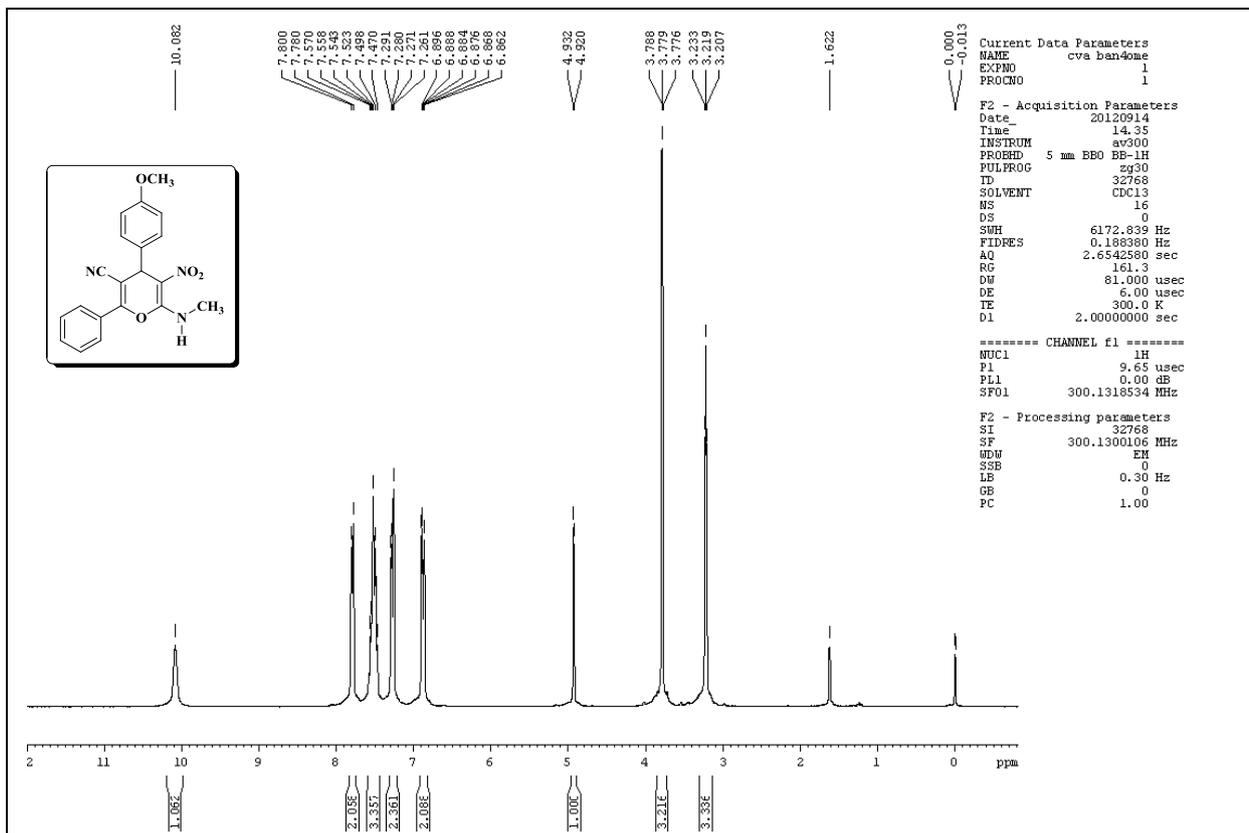


Figure 53. <sup>1</sup>H NMR Spectrum of 6f

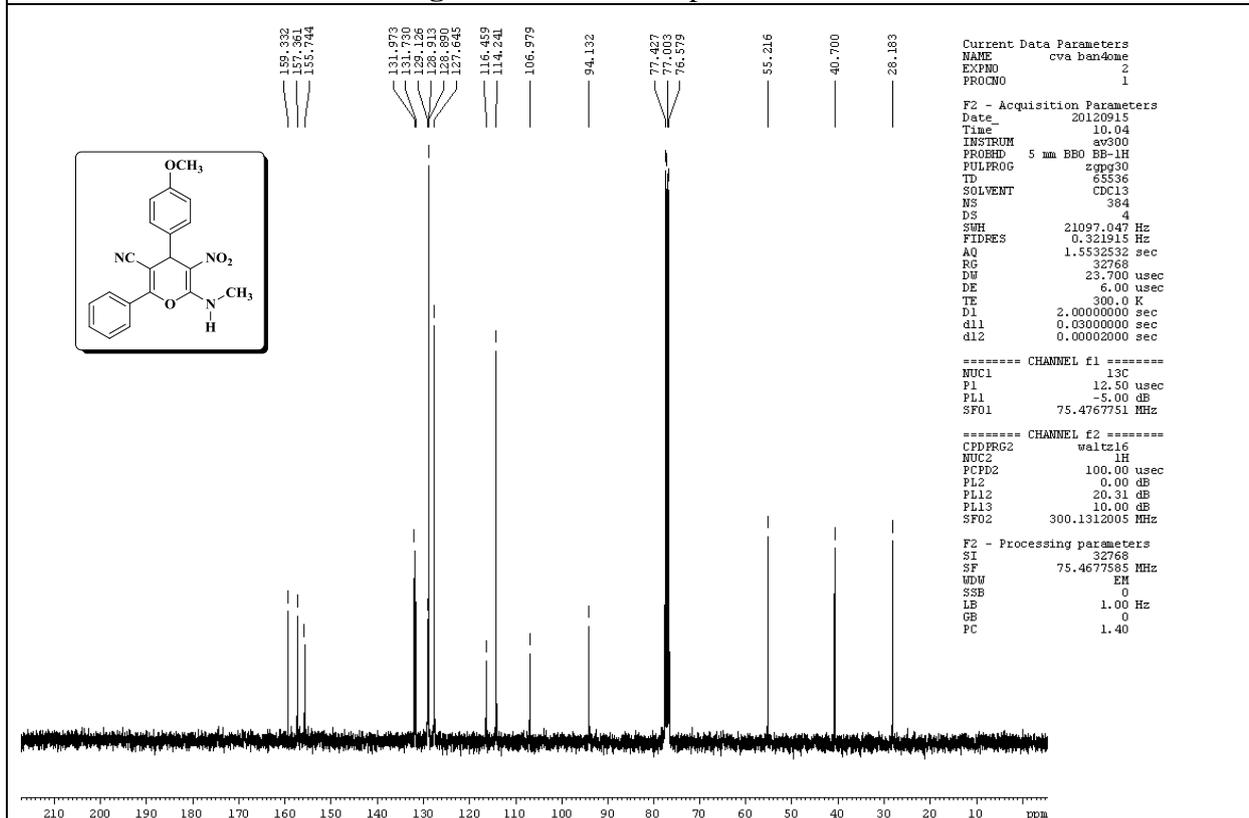
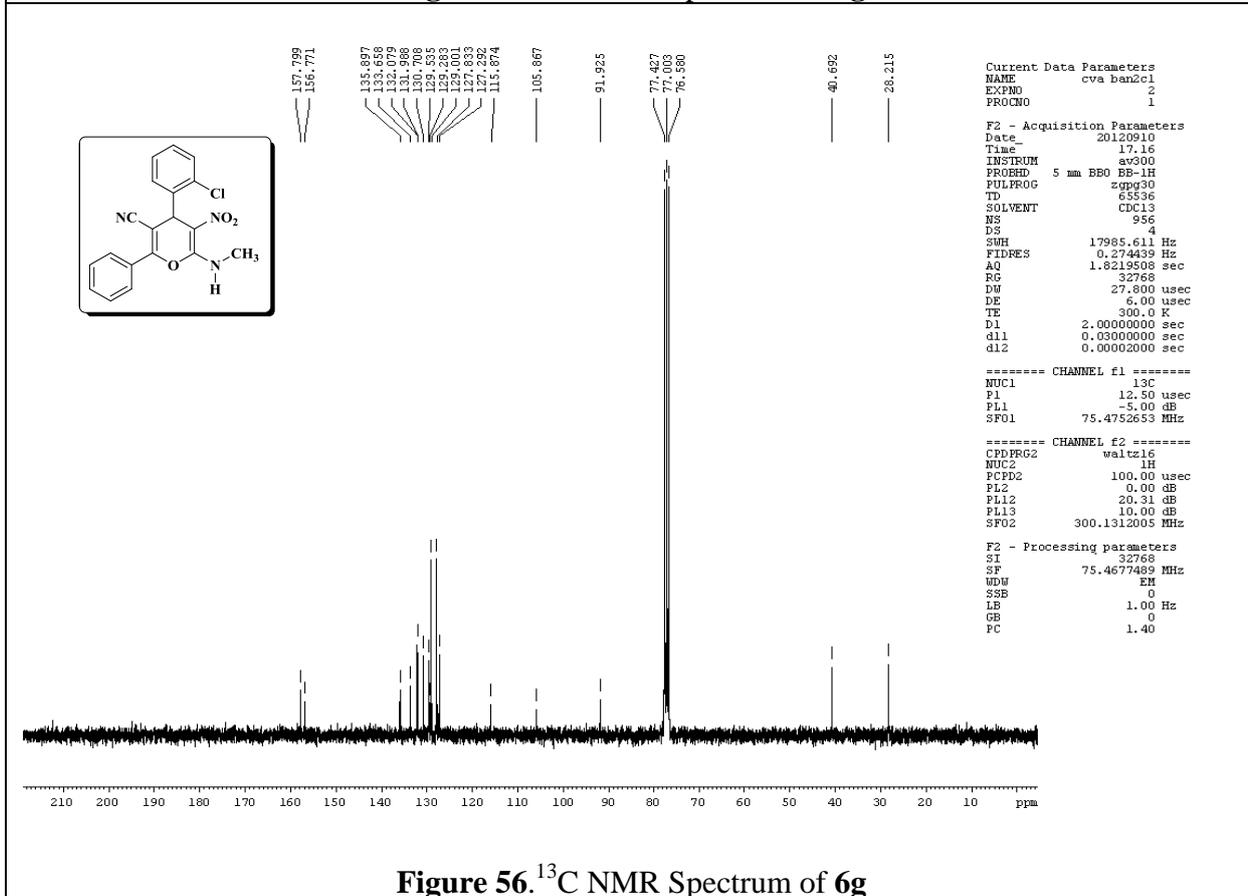
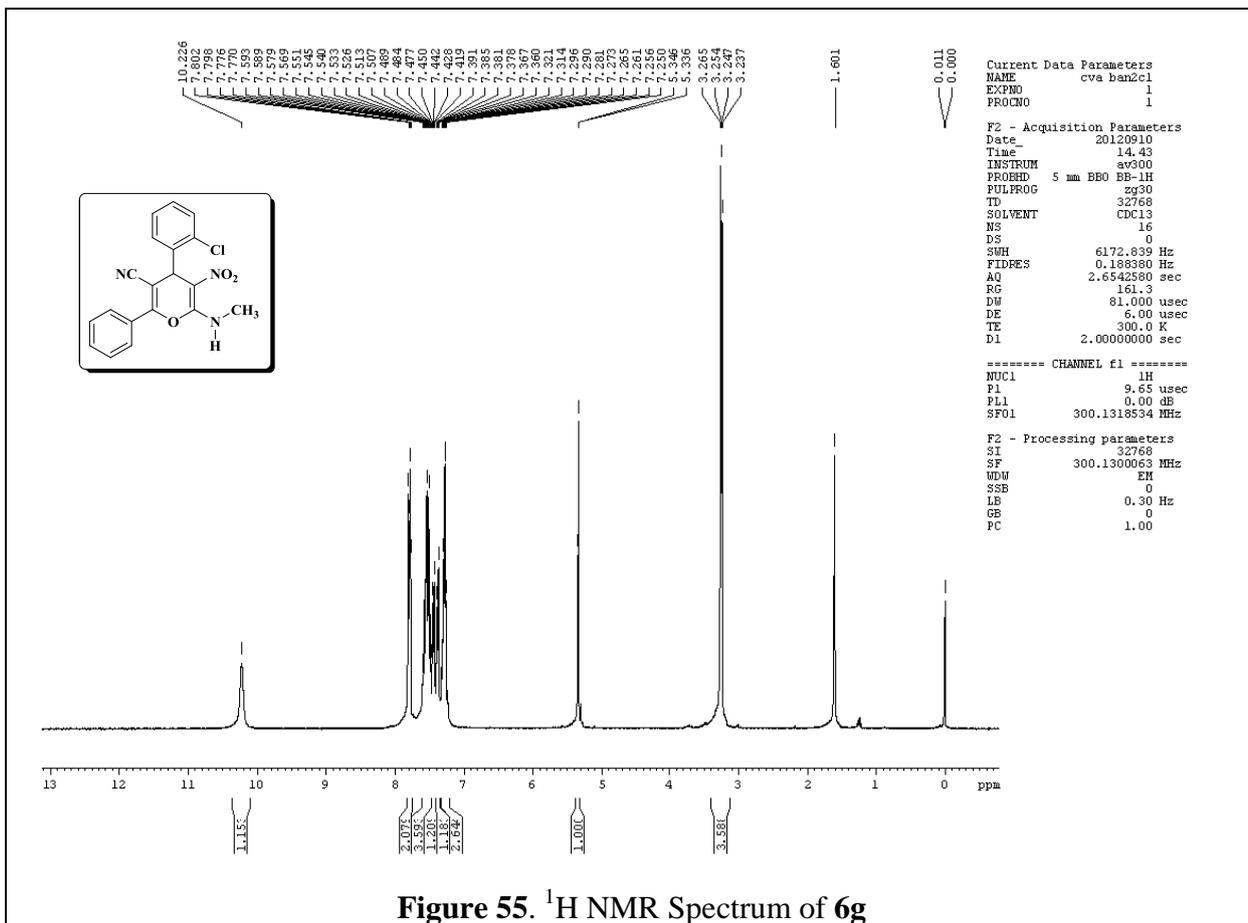


Figure 54. <sup>13</sup>C NMR Spectrum of 6f

F



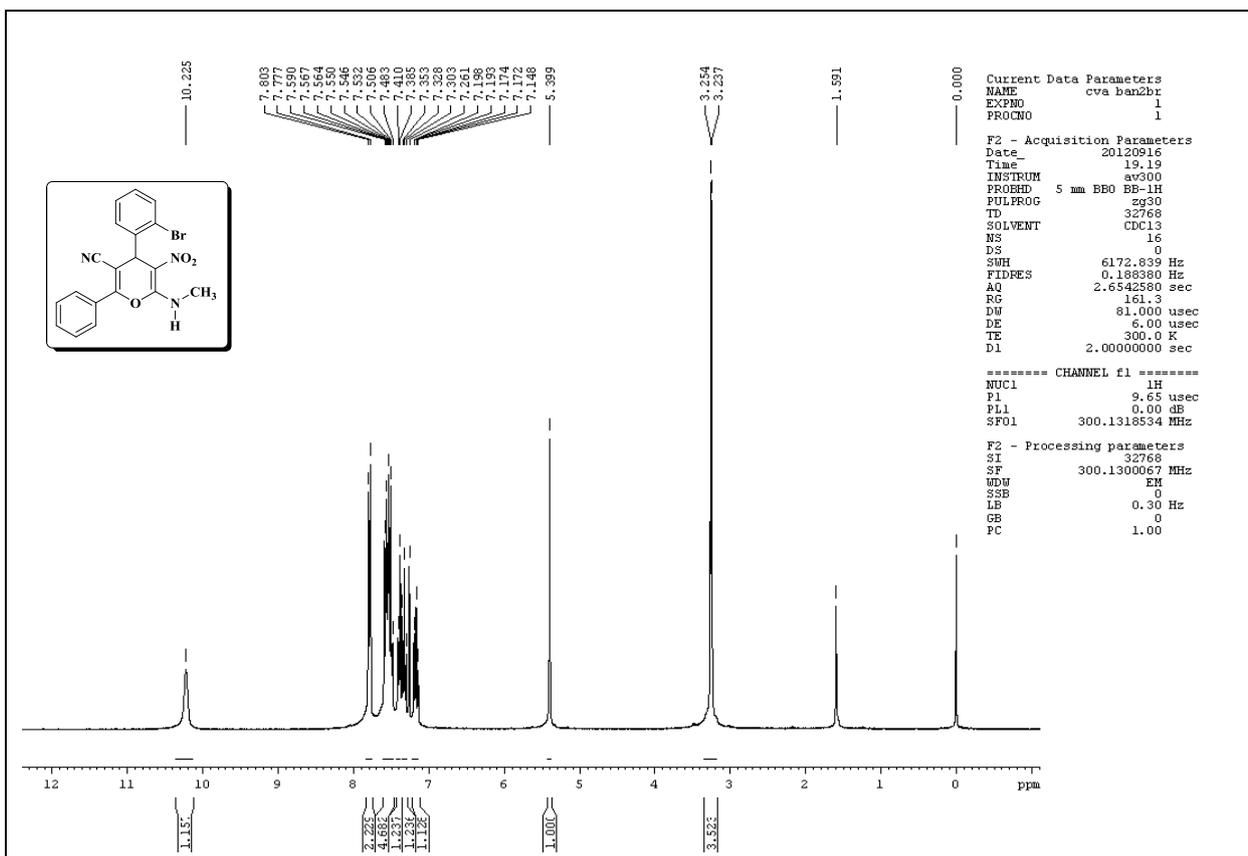


Figure 57. <sup>1</sup>H NMR Spectrum of **6h**

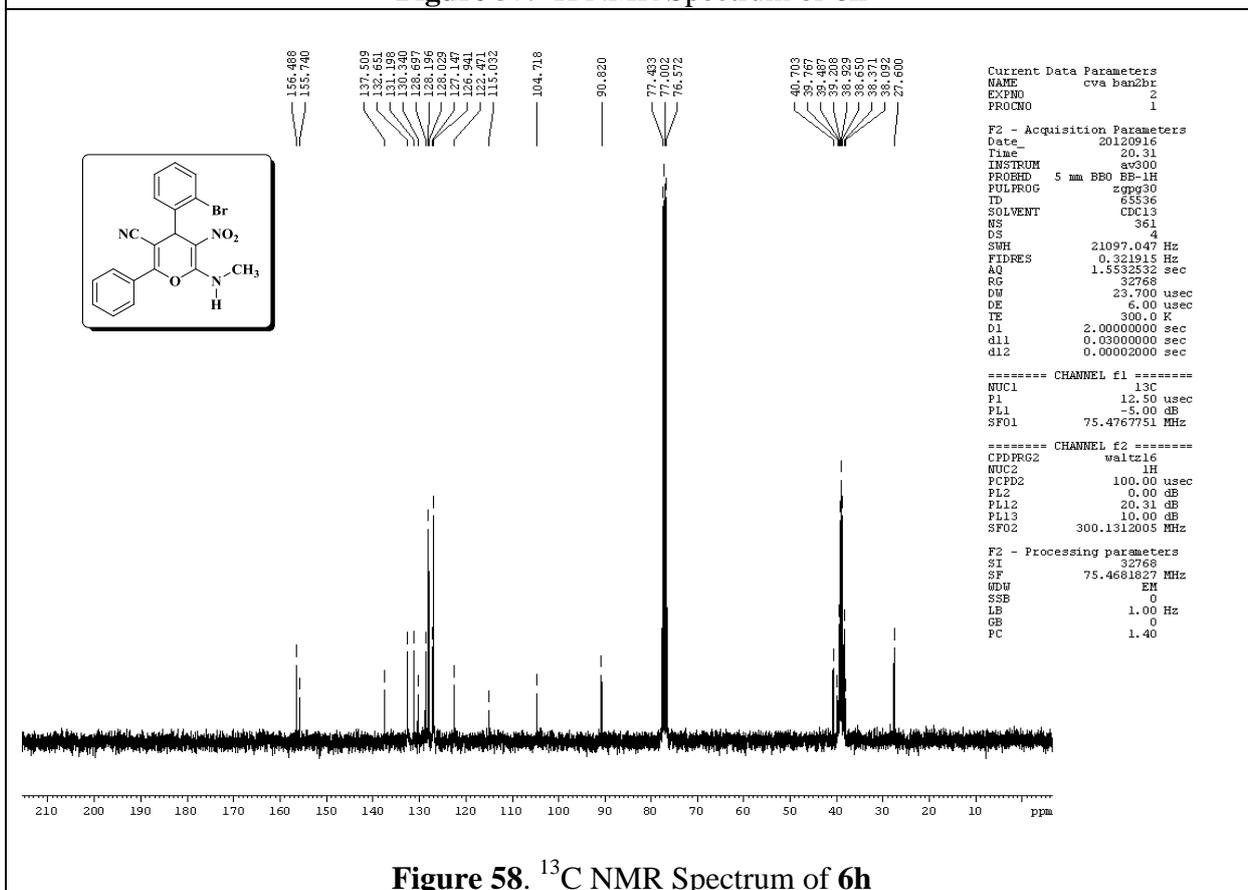
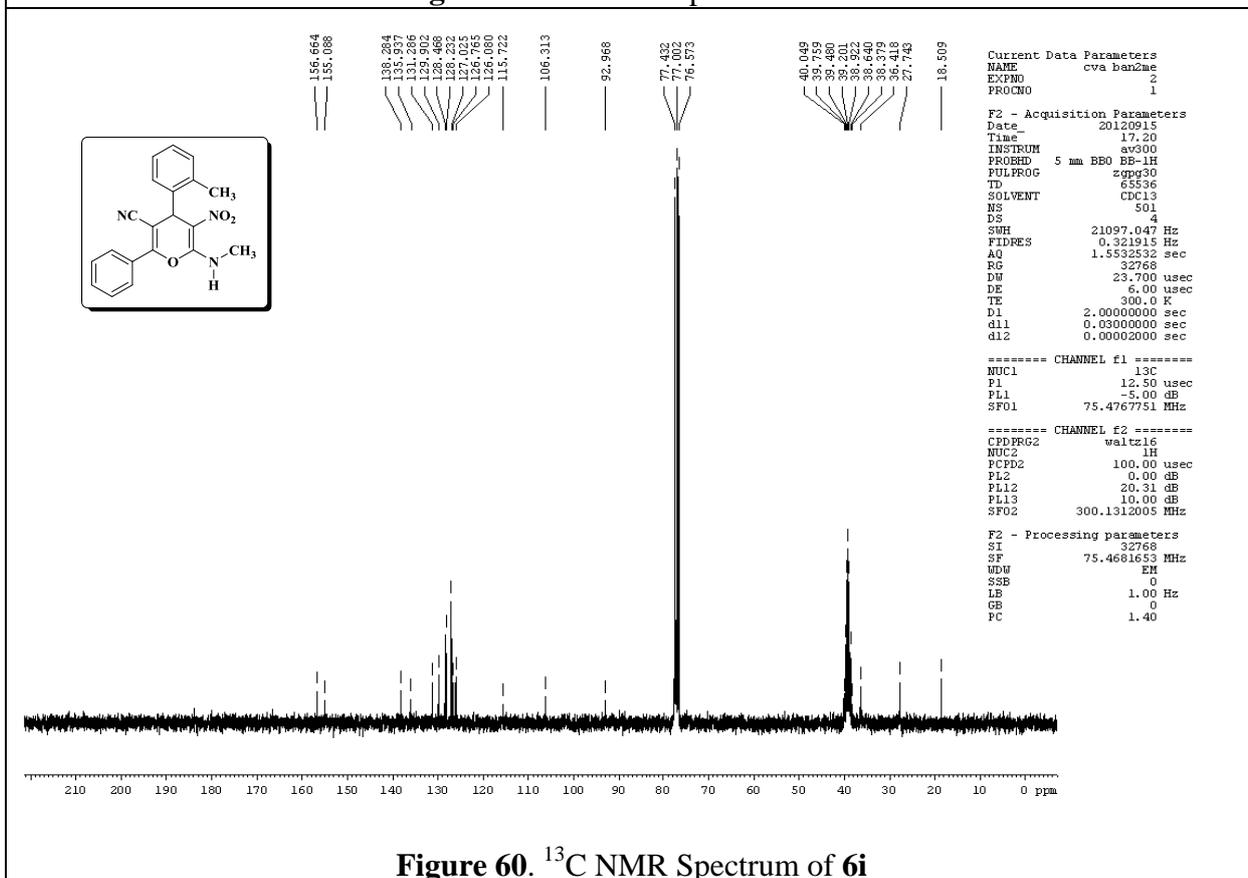
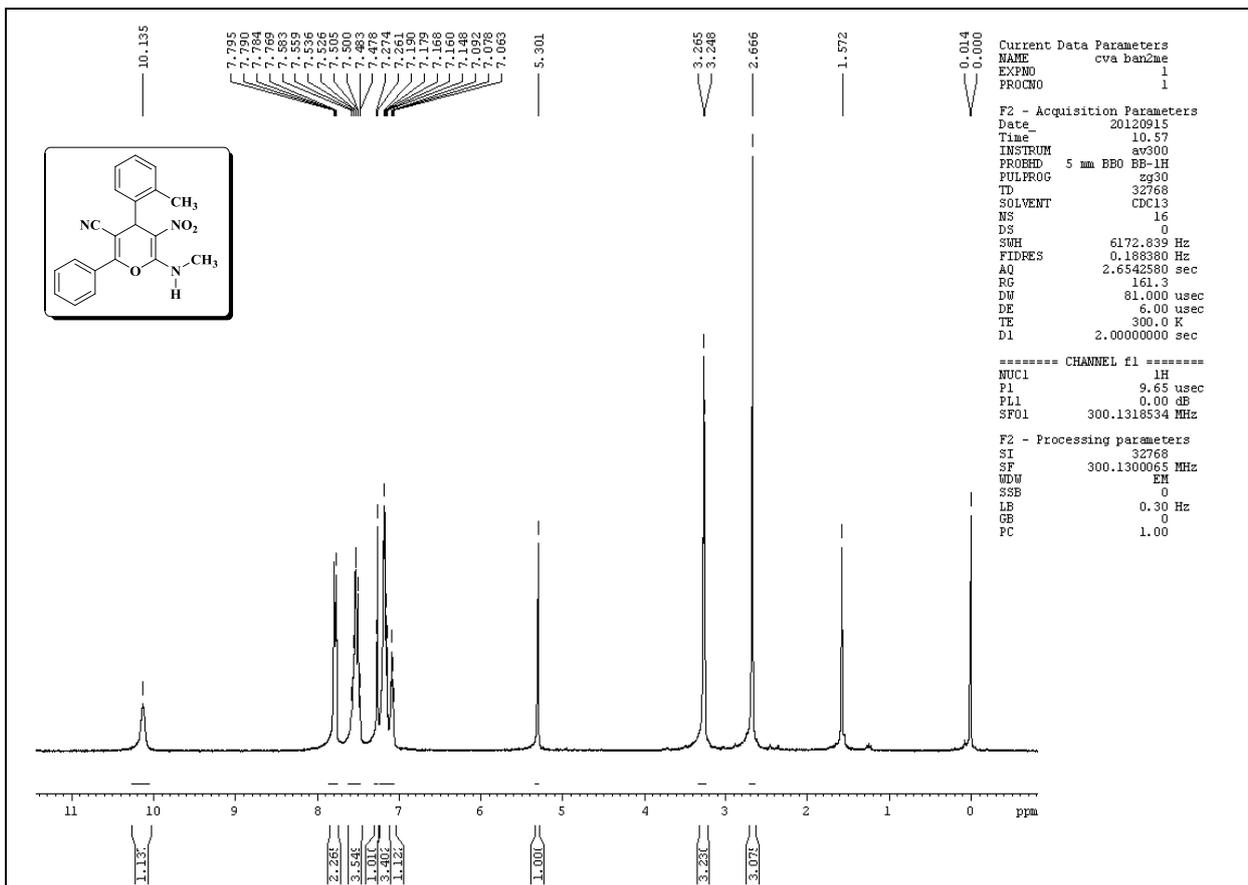
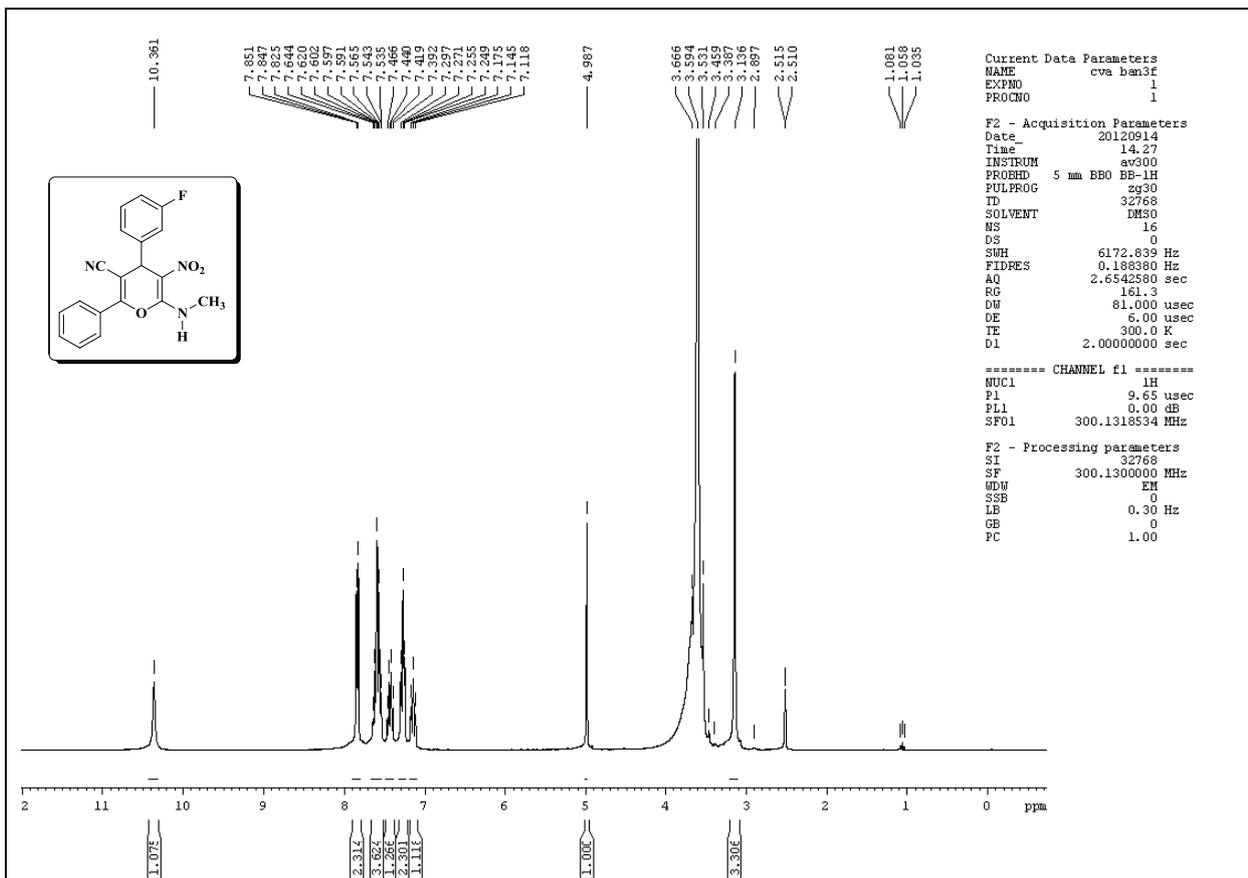


Figure 58. <sup>13</sup>C NMR Spectrum of **6h**







F

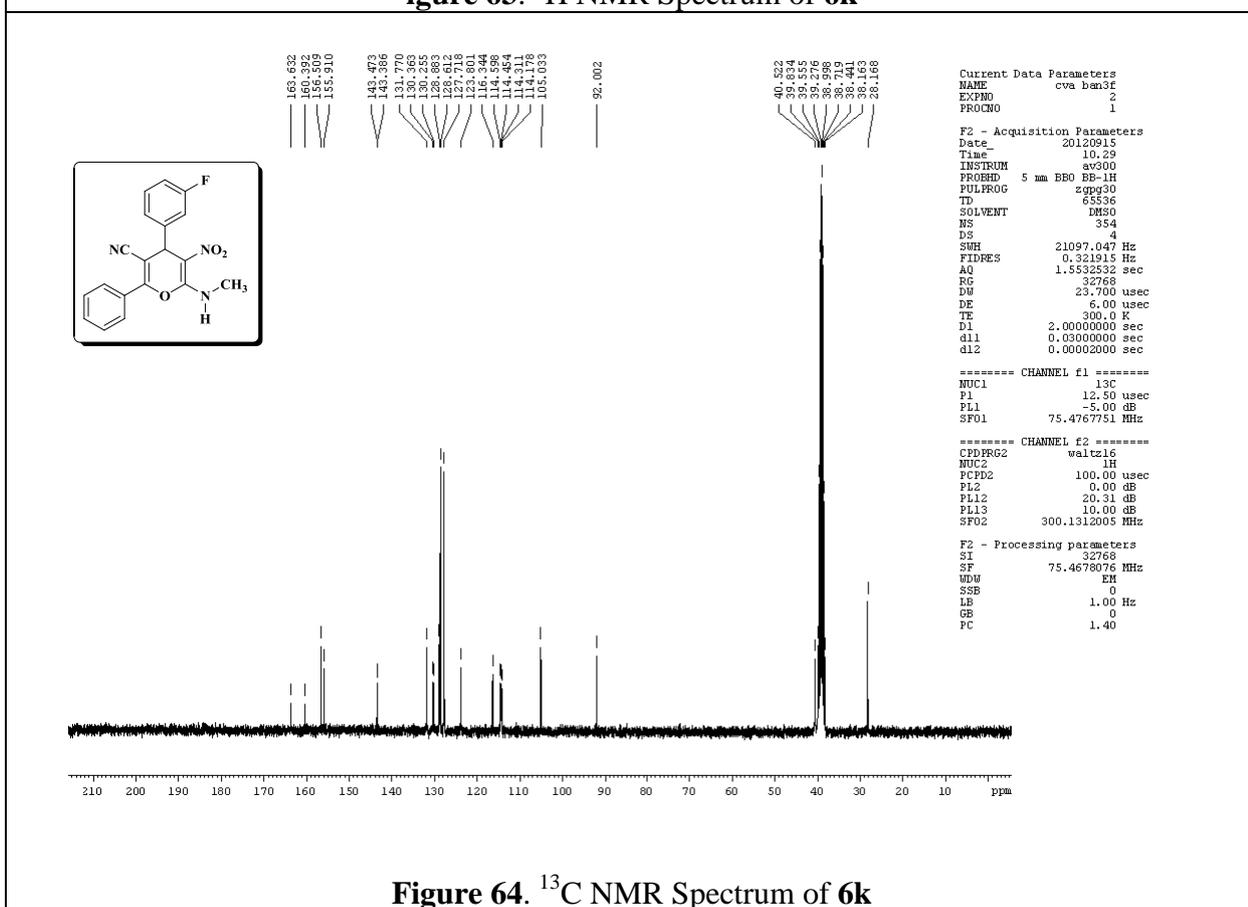
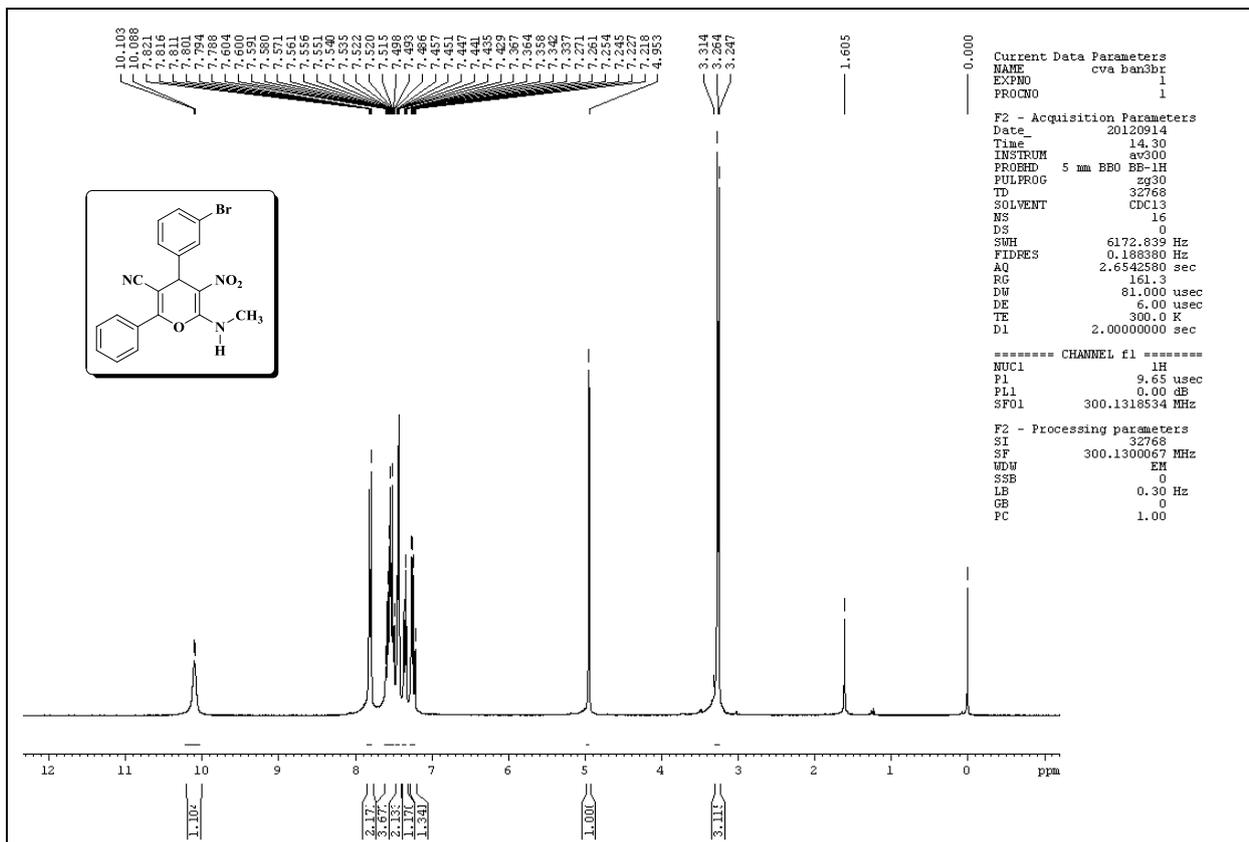
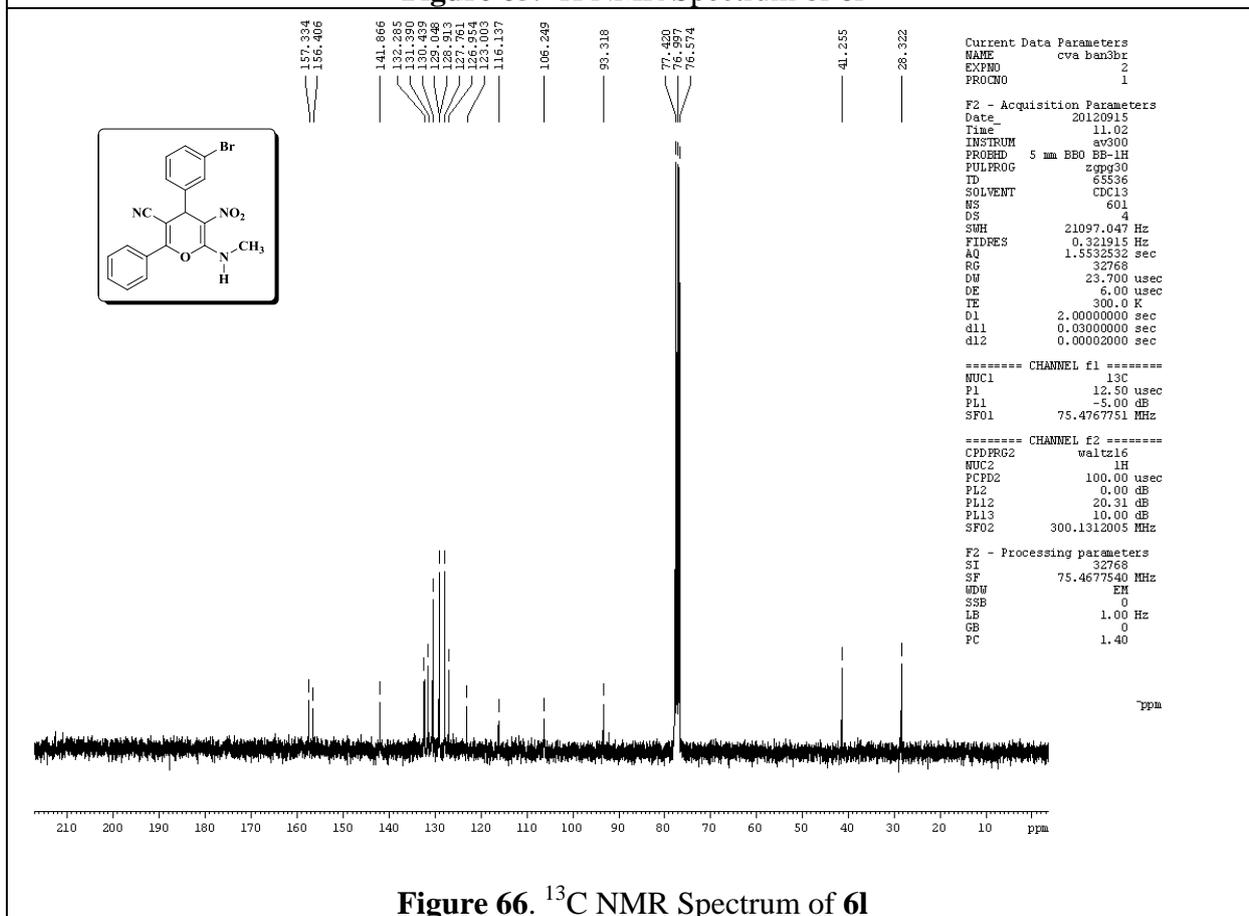


Figure 64. <sup>13</sup>C NMR Spectrum of 6k



**Figure 65. <sup>1</sup>H NMR Spectrum of 6l**



**Figure 66. <sup>13</sup>C NMR Spectrum of 6l**

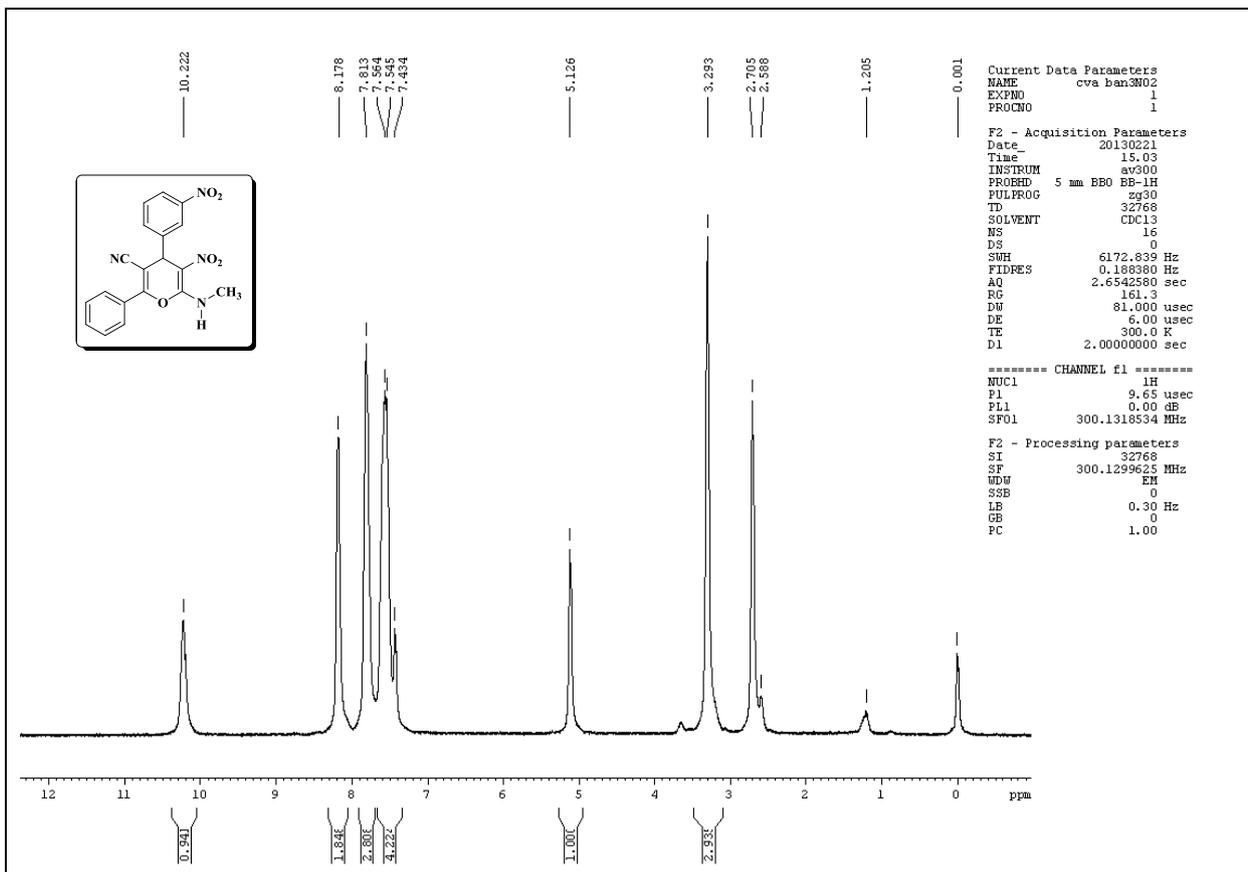


figure 67. <sup>1</sup>H NMR Spectrum of 6m

F

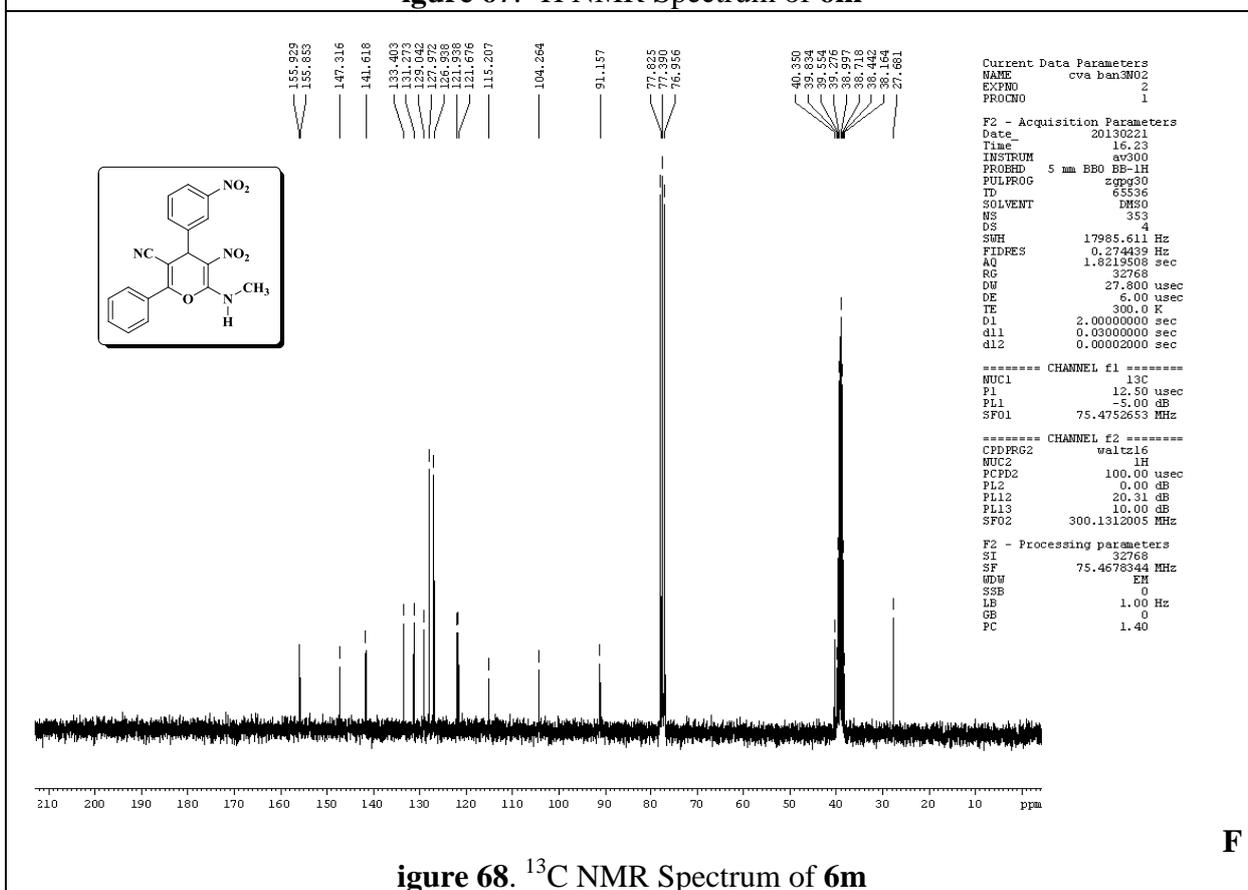


figure 68. <sup>13</sup>C NMR Spectrum of 6m

F

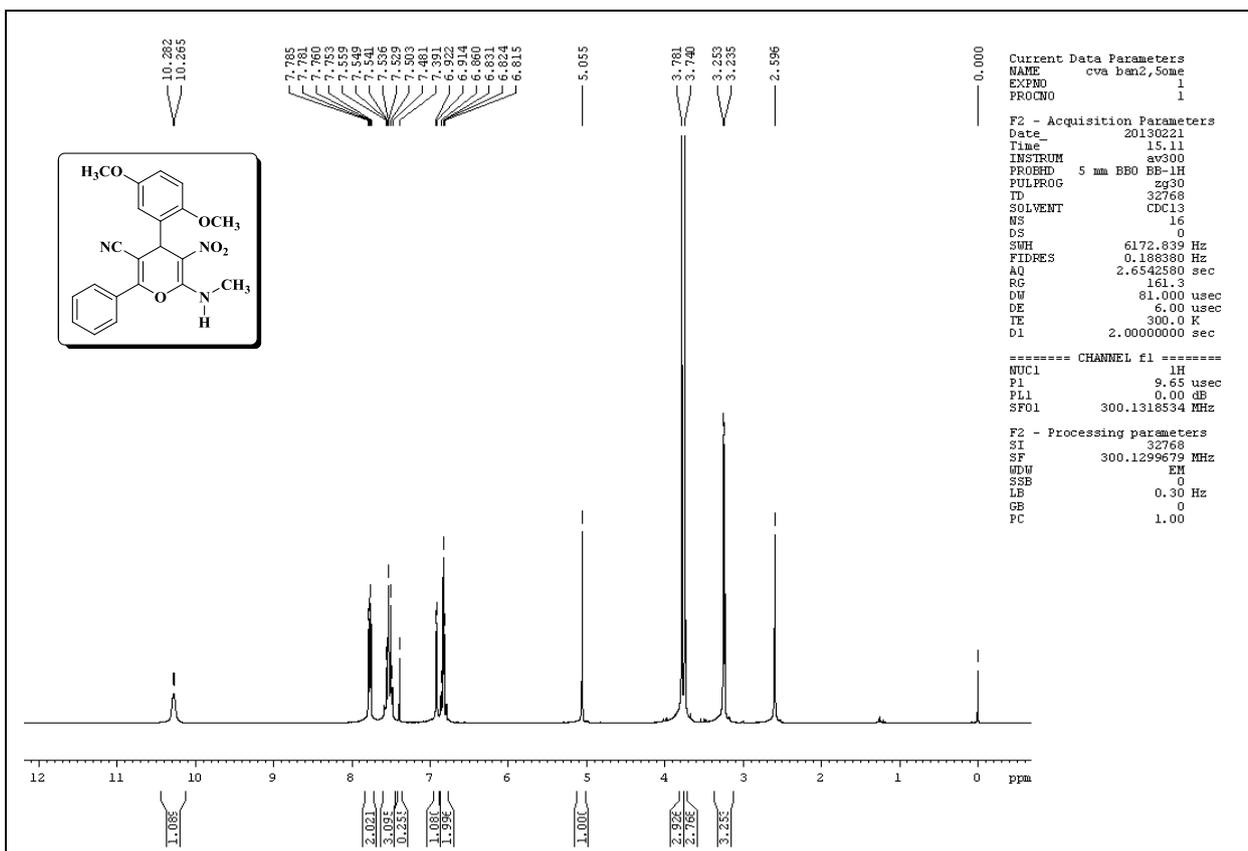


Figure 69. <sup>1</sup>H NMR Spectrum of 6n

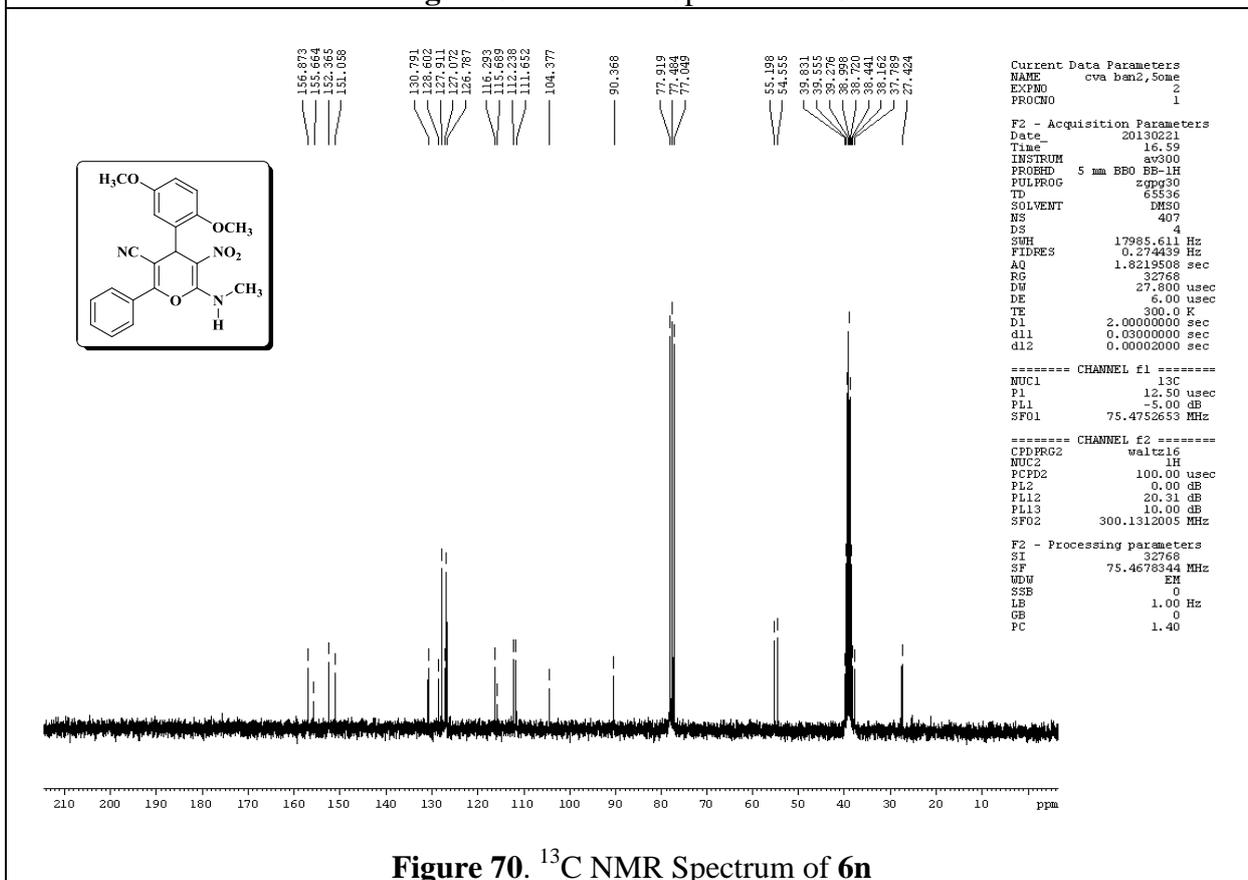


Figure 70. <sup>13</sup>C NMR Spectrum of 6n

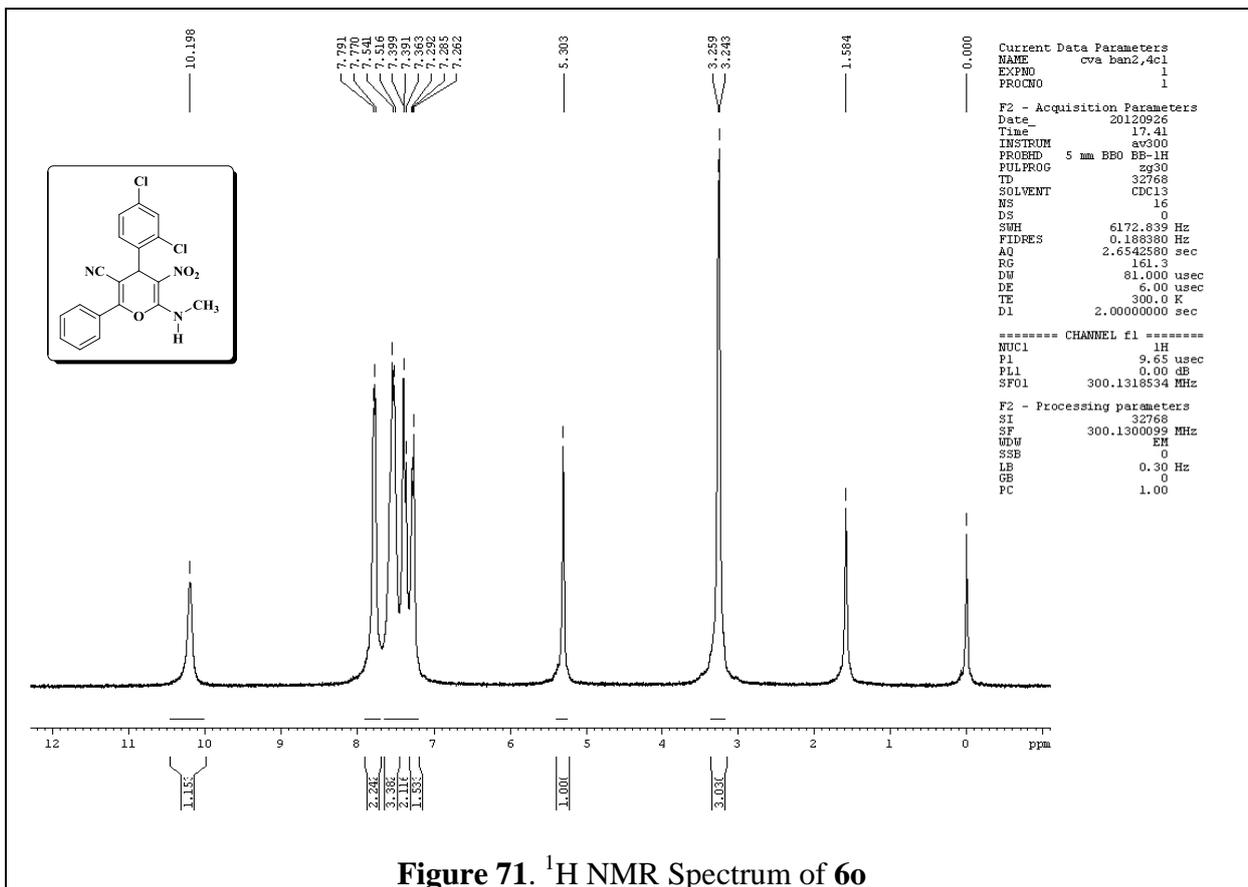


Figure 71. <sup>1</sup>H NMR Spectrum of 60

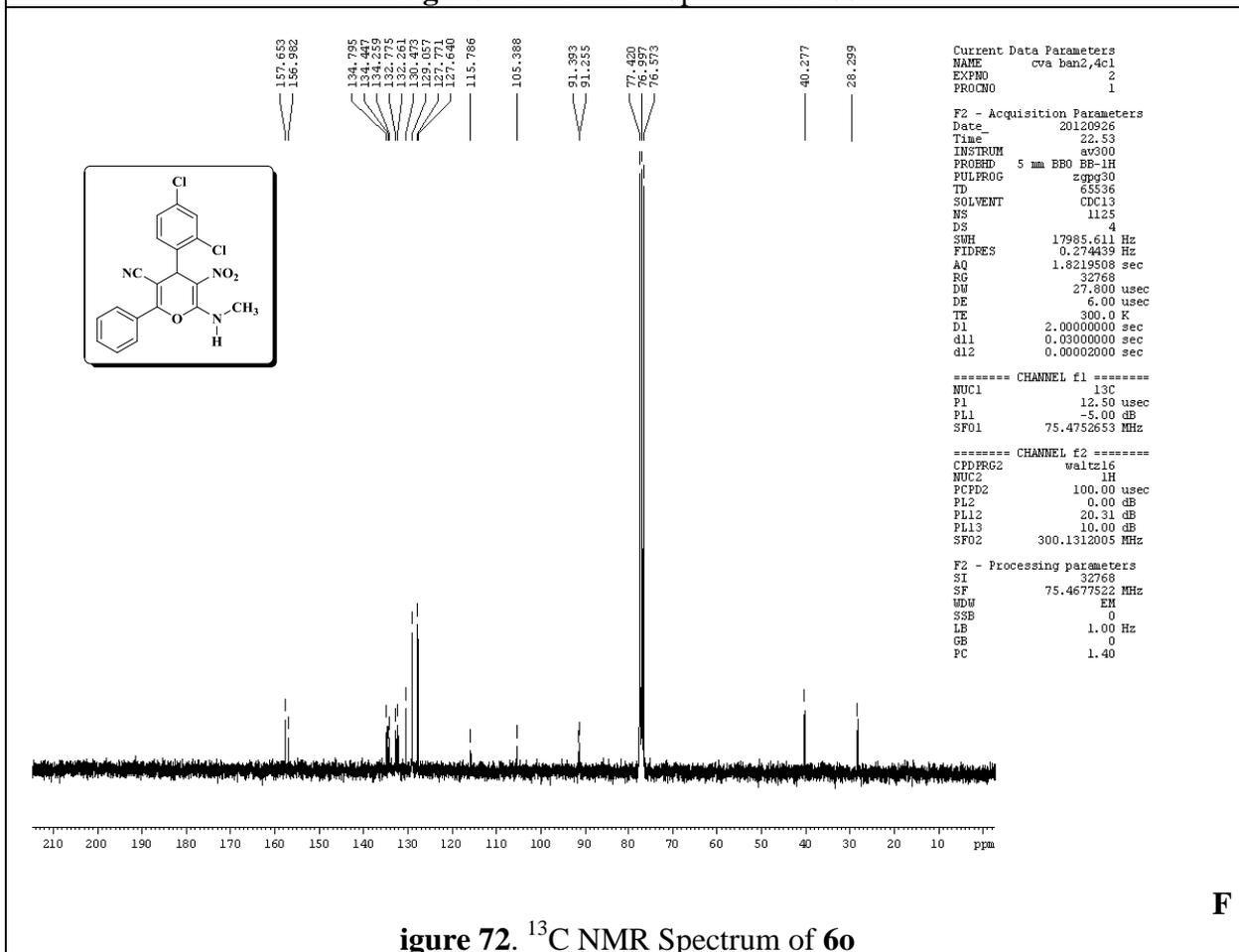
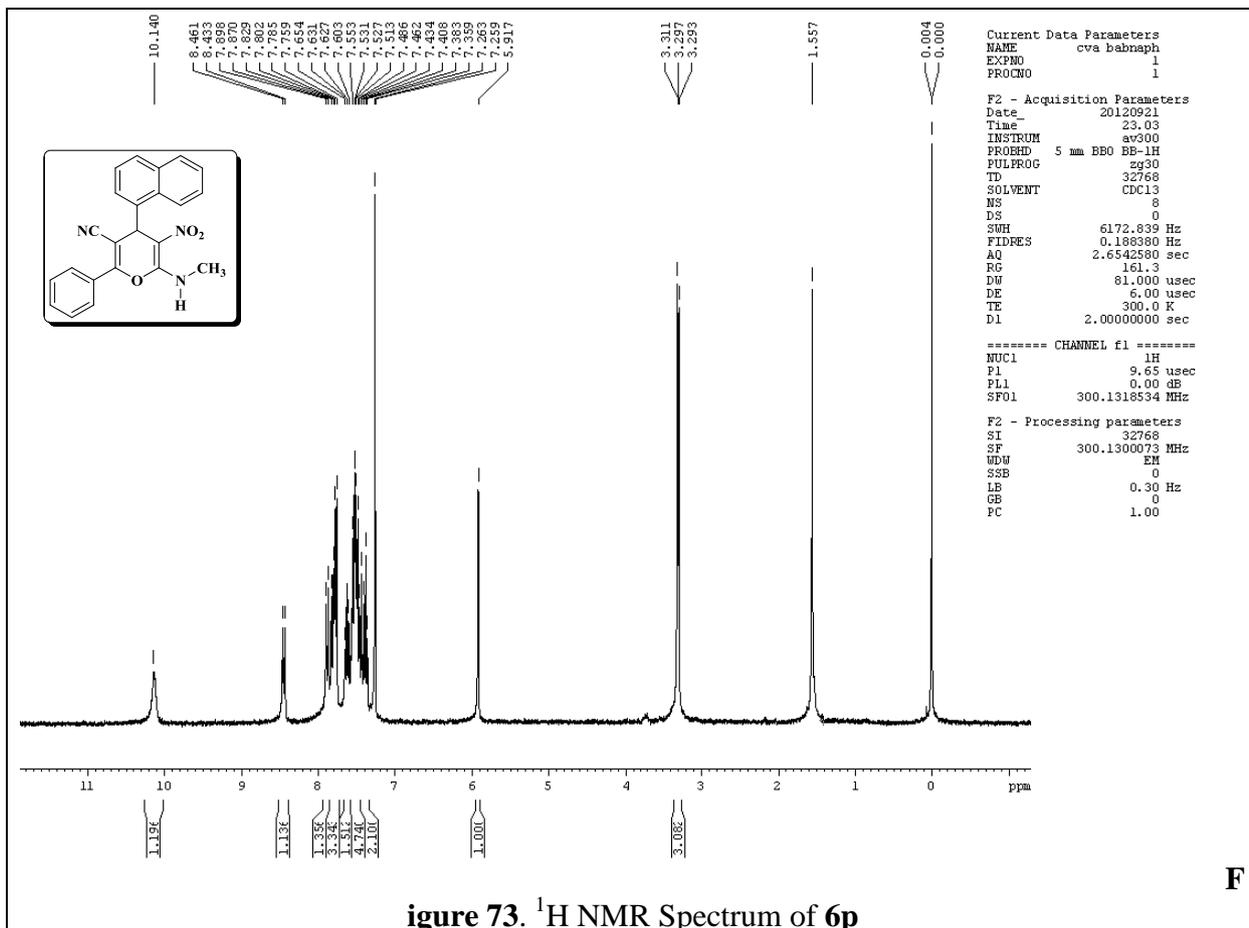


Figure 72. <sup>13</sup>C NMR Spectrum of 60

F



F

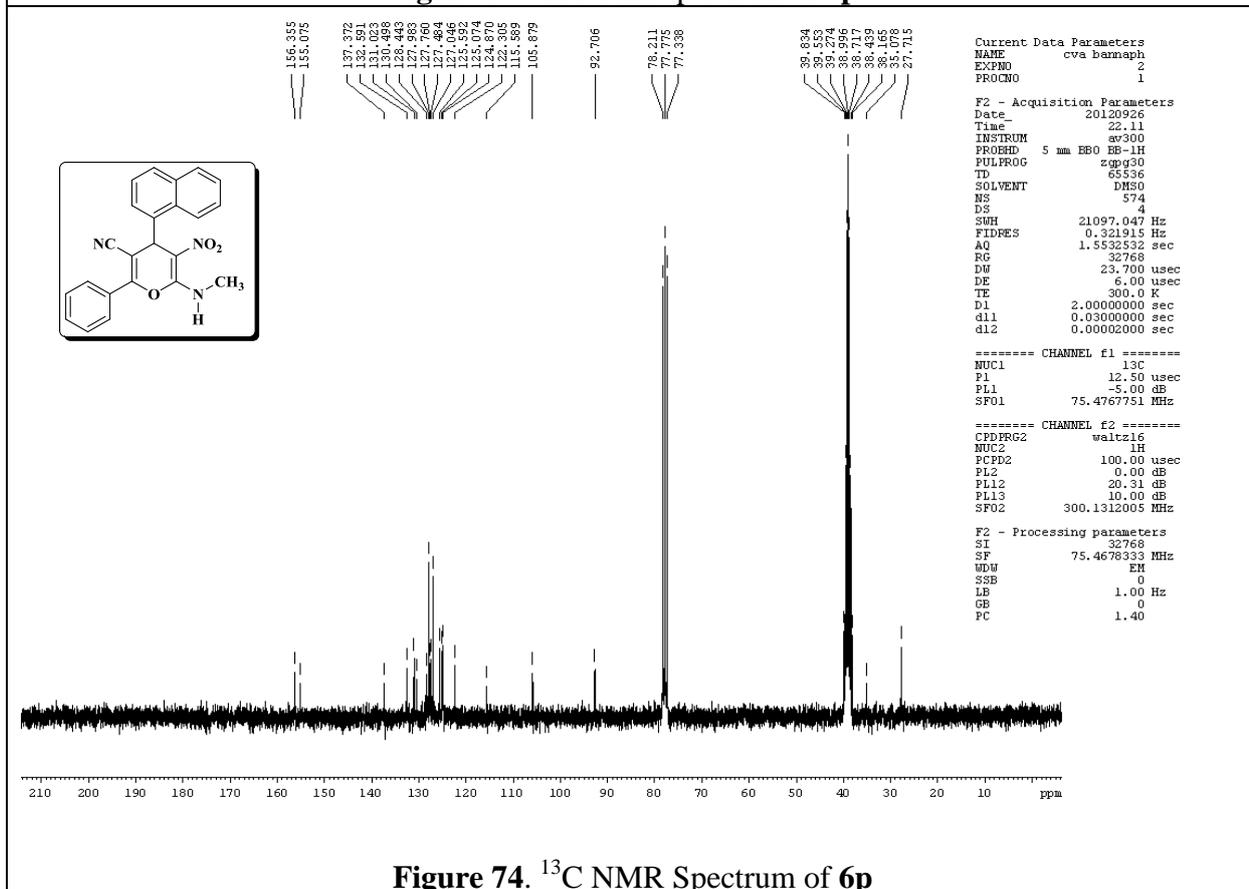


Figure 74. <sup>13</sup>C NMR Spectrum of 6p

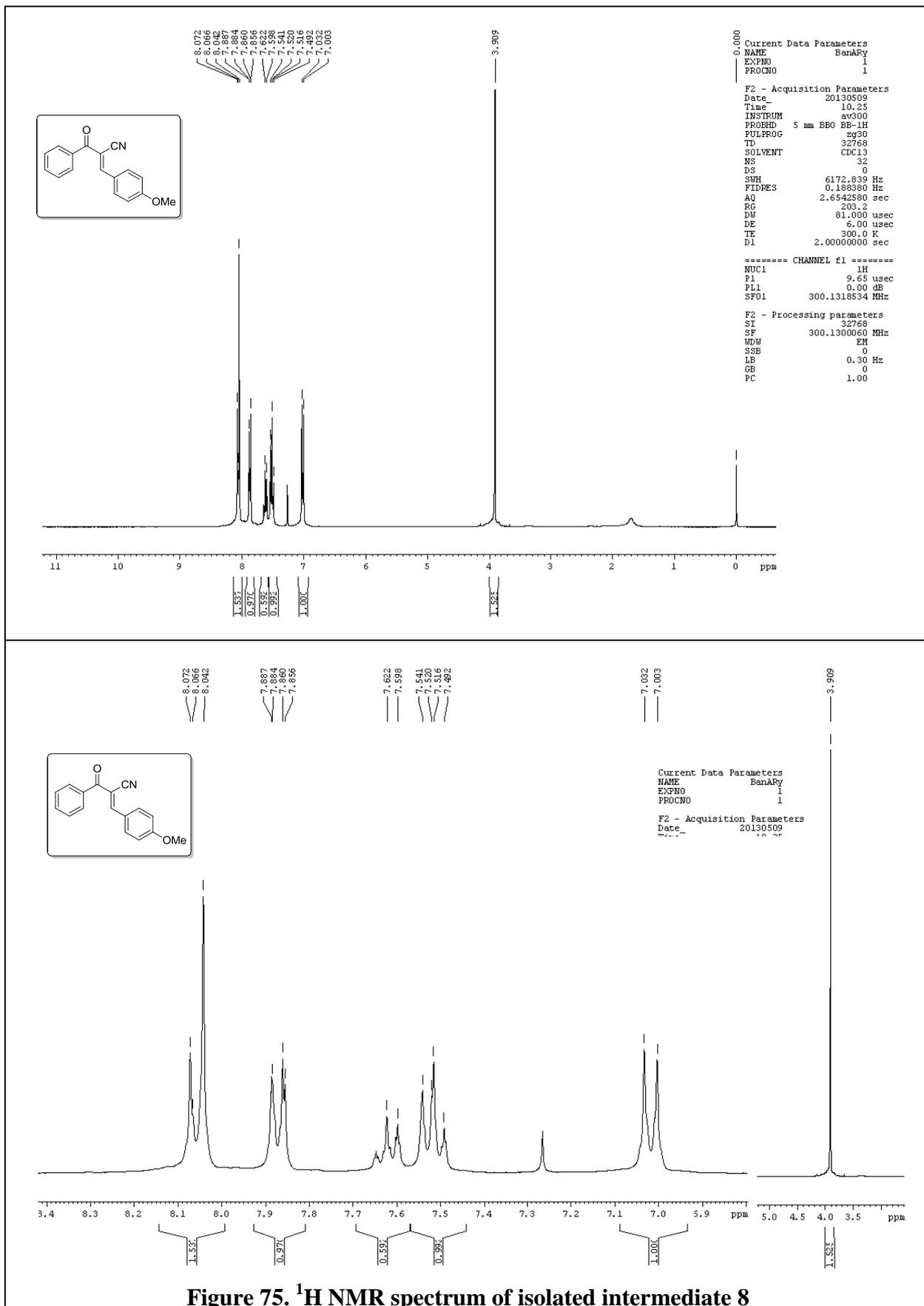


Figure 75. <sup>1</sup>H NMR spectrum of isolated intermediate 8

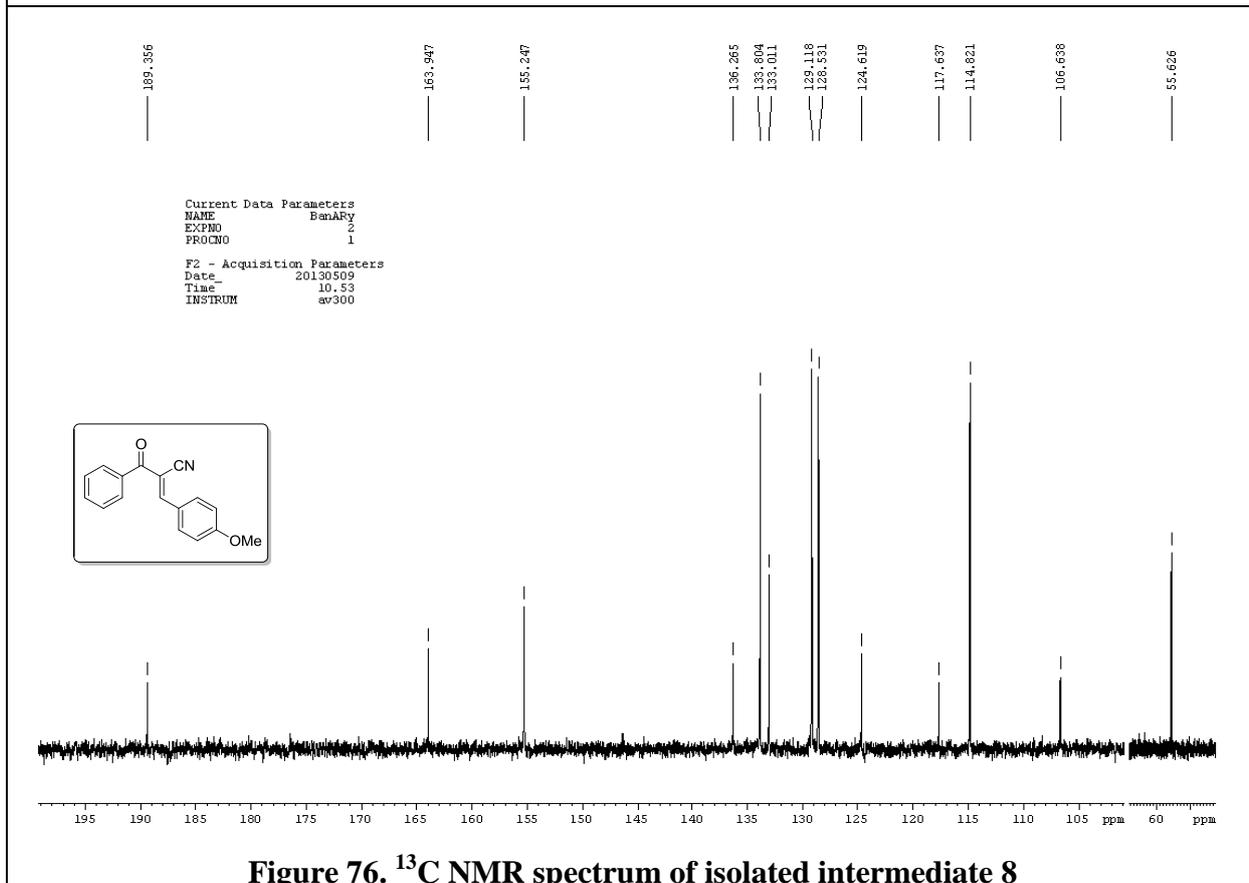
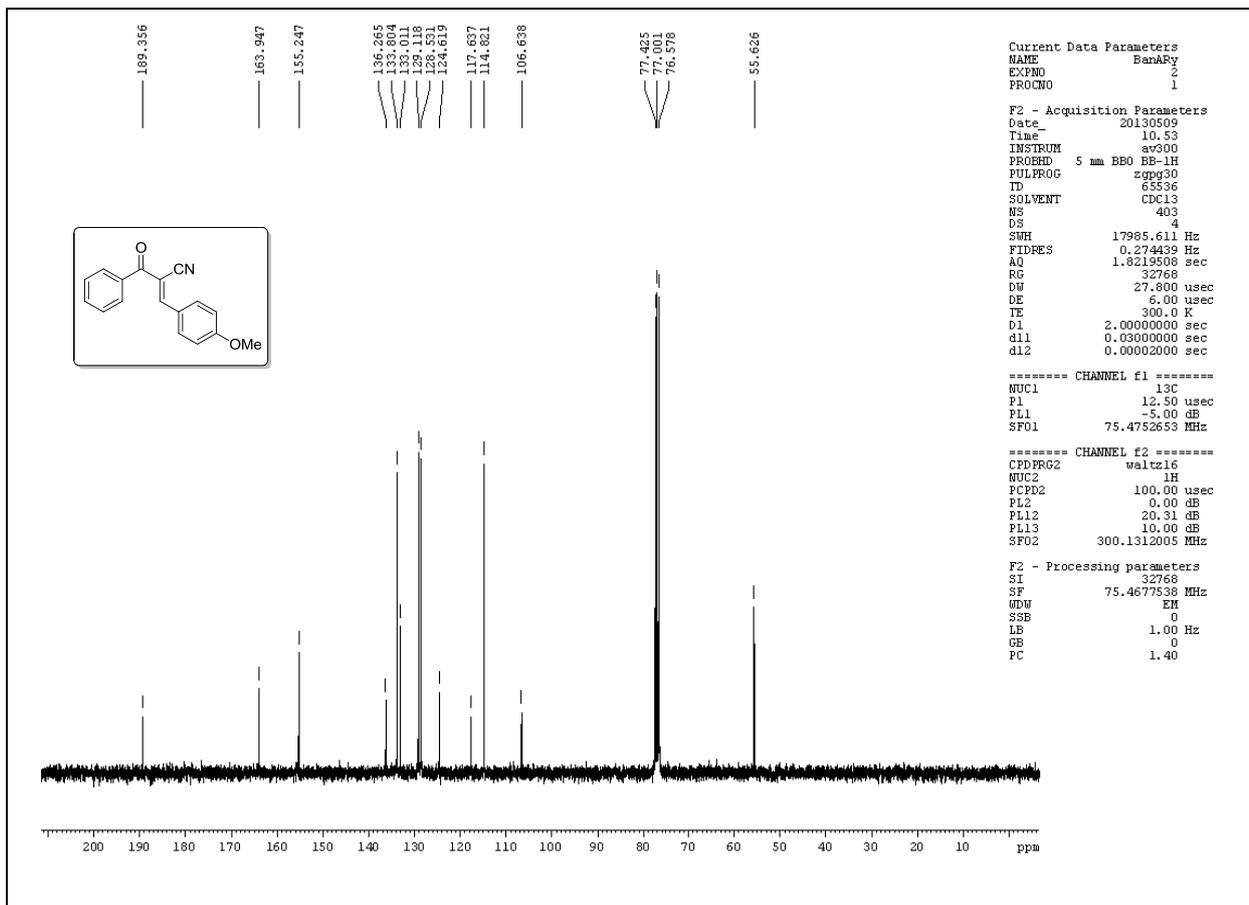


Figure 76. <sup>13</sup>C NMR spectrum of isolated intermediate 8

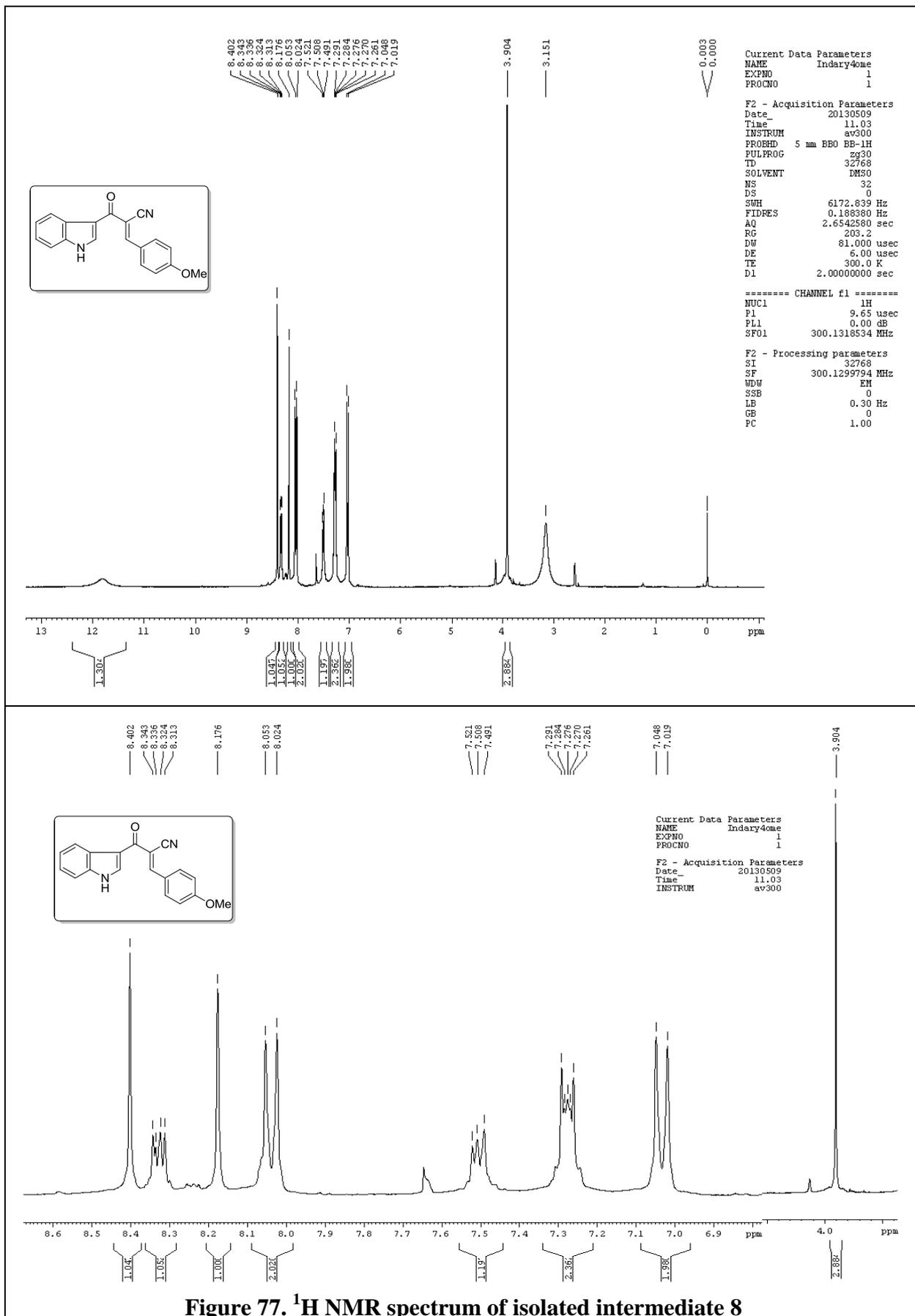


Figure 77. <sup>1</sup>H NMR spectrum of isolated intermediate 8

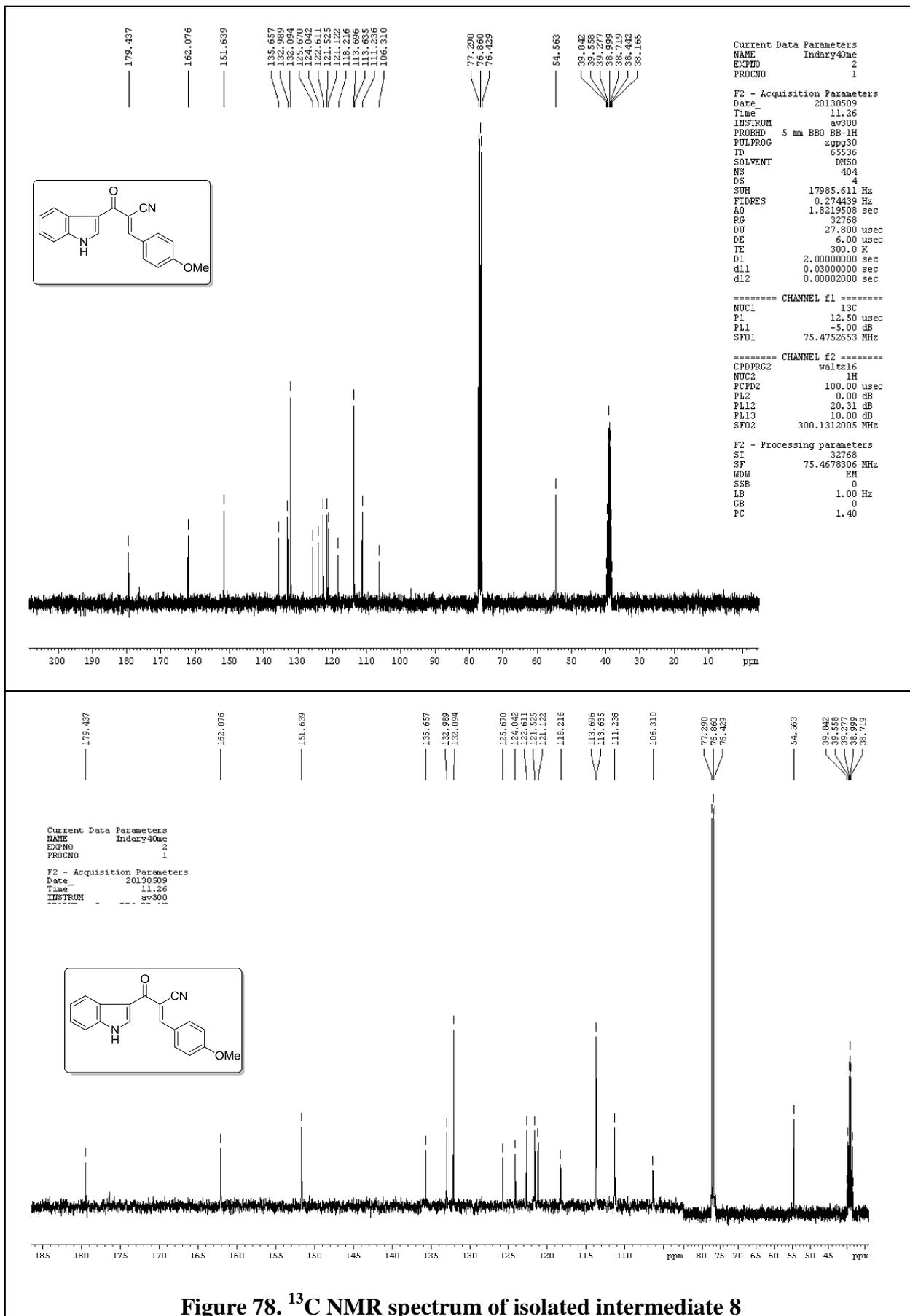


Figure 78. <sup>13</sup>C NMR spectrum of isolated intermediate 8