Step economic, efficient, ZnS nanoparticle catalyzed synthesis of spirooxindole derivatives in aqueous medium via Knoevenagel condensation followed by Michael addition

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Supporting Information

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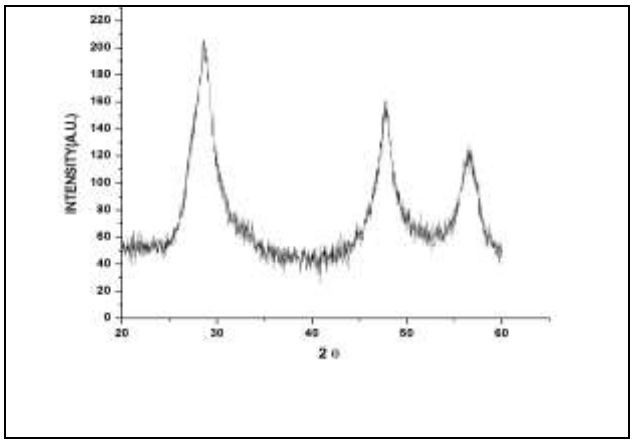


Fig.2: XRD patterns of ZnS nanoparticles

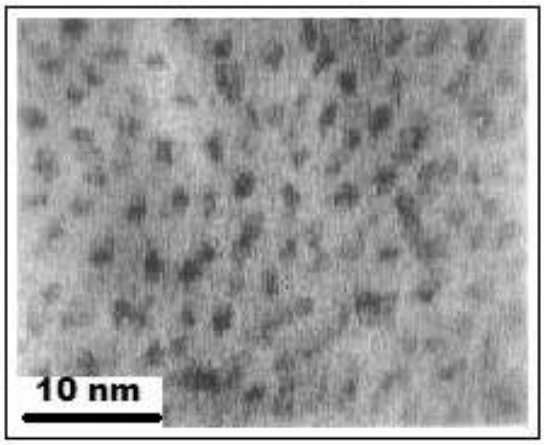


Fig.3a: TEM image of ZnS nanoparticles

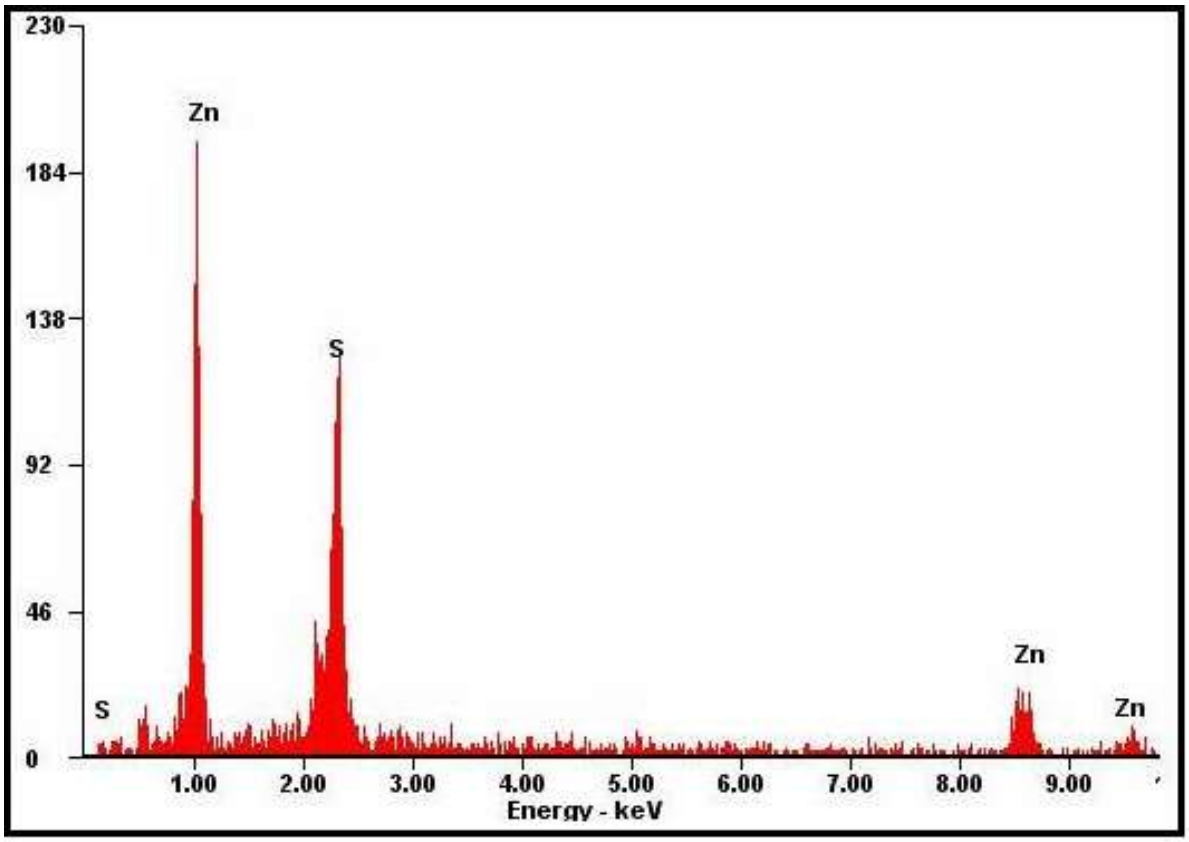
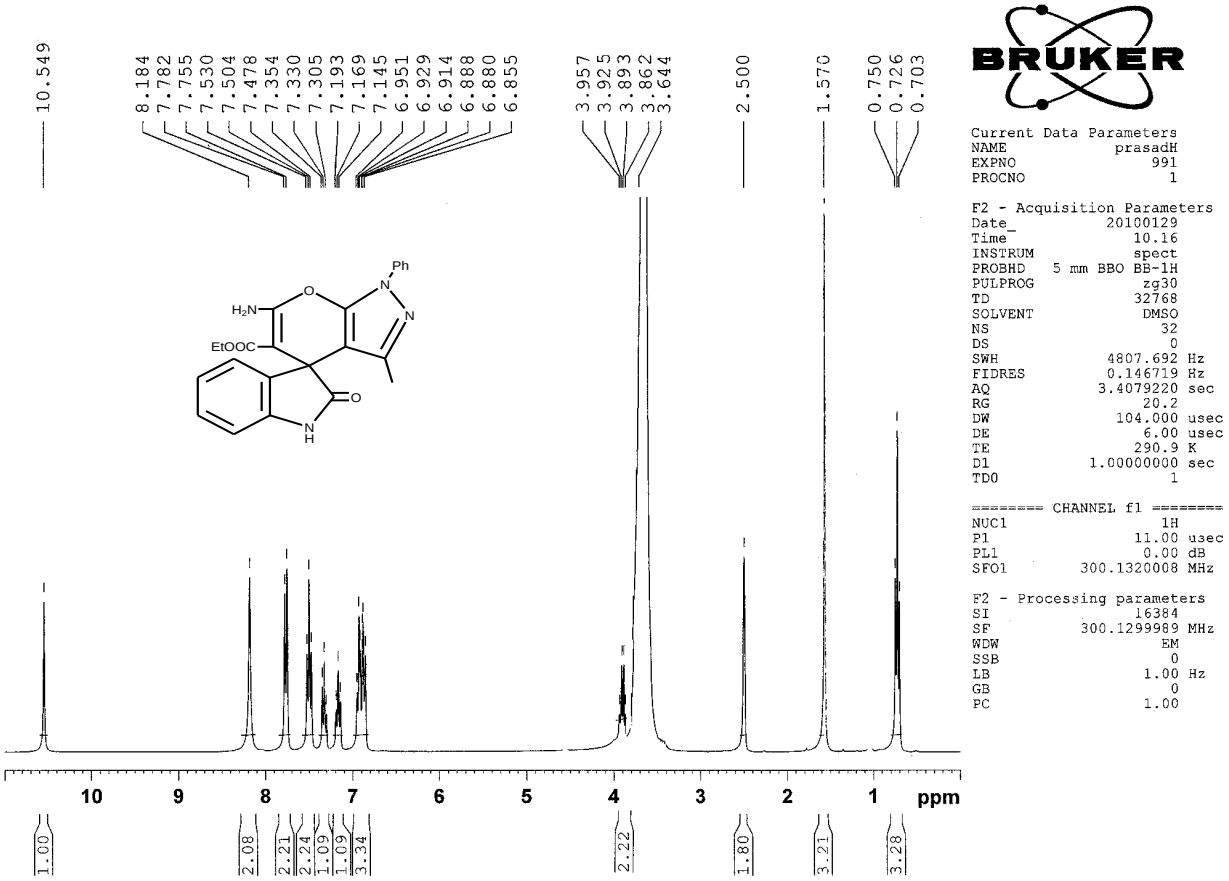
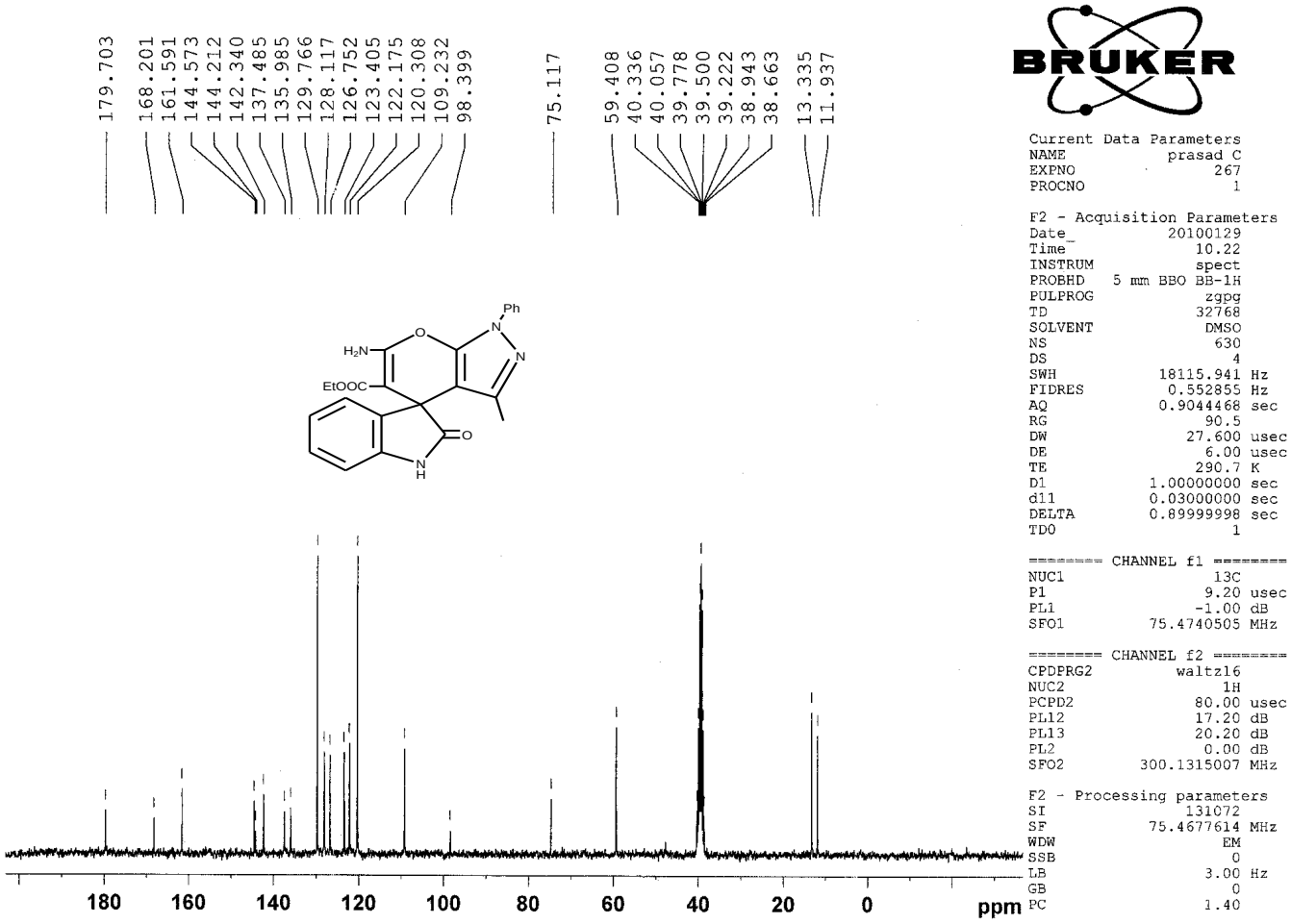


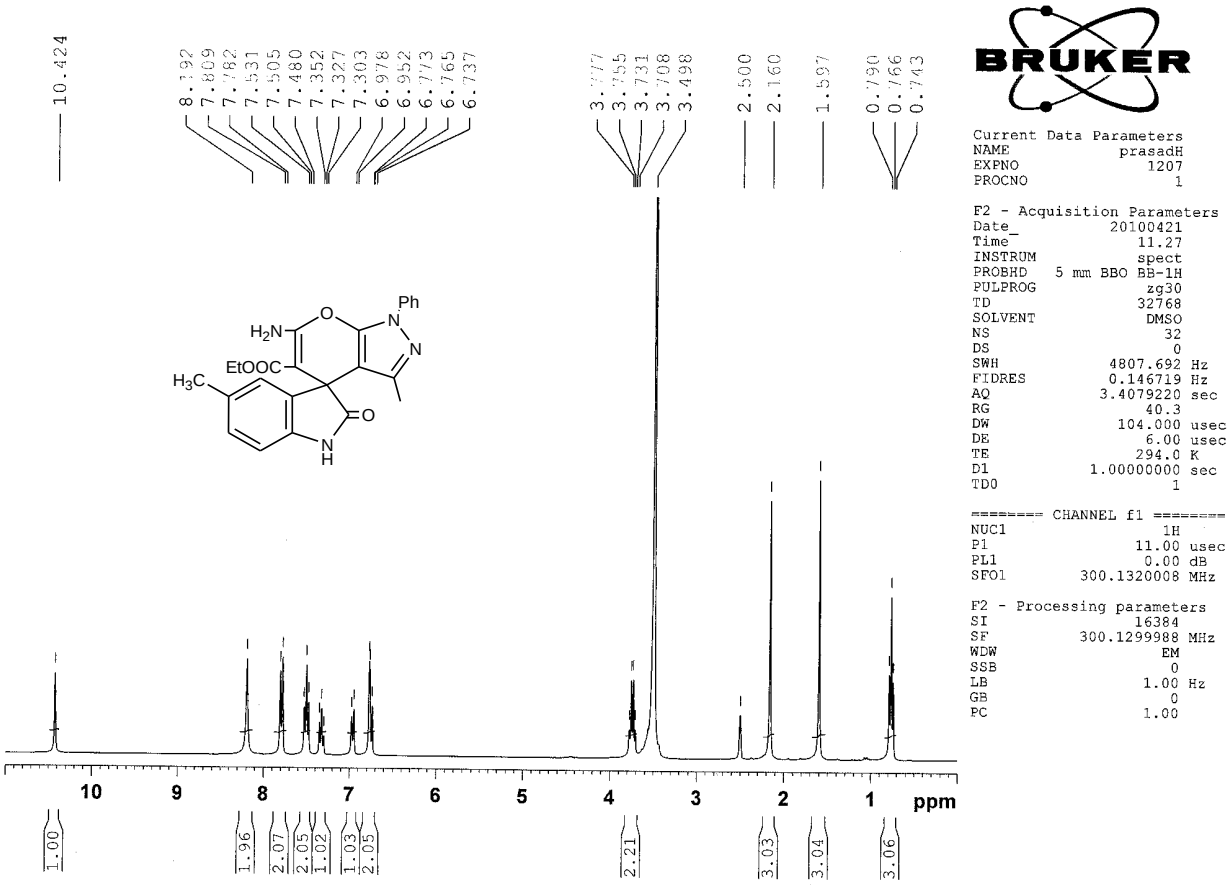
Fig. 5: EDAX pattern of ZnS nanoparticles



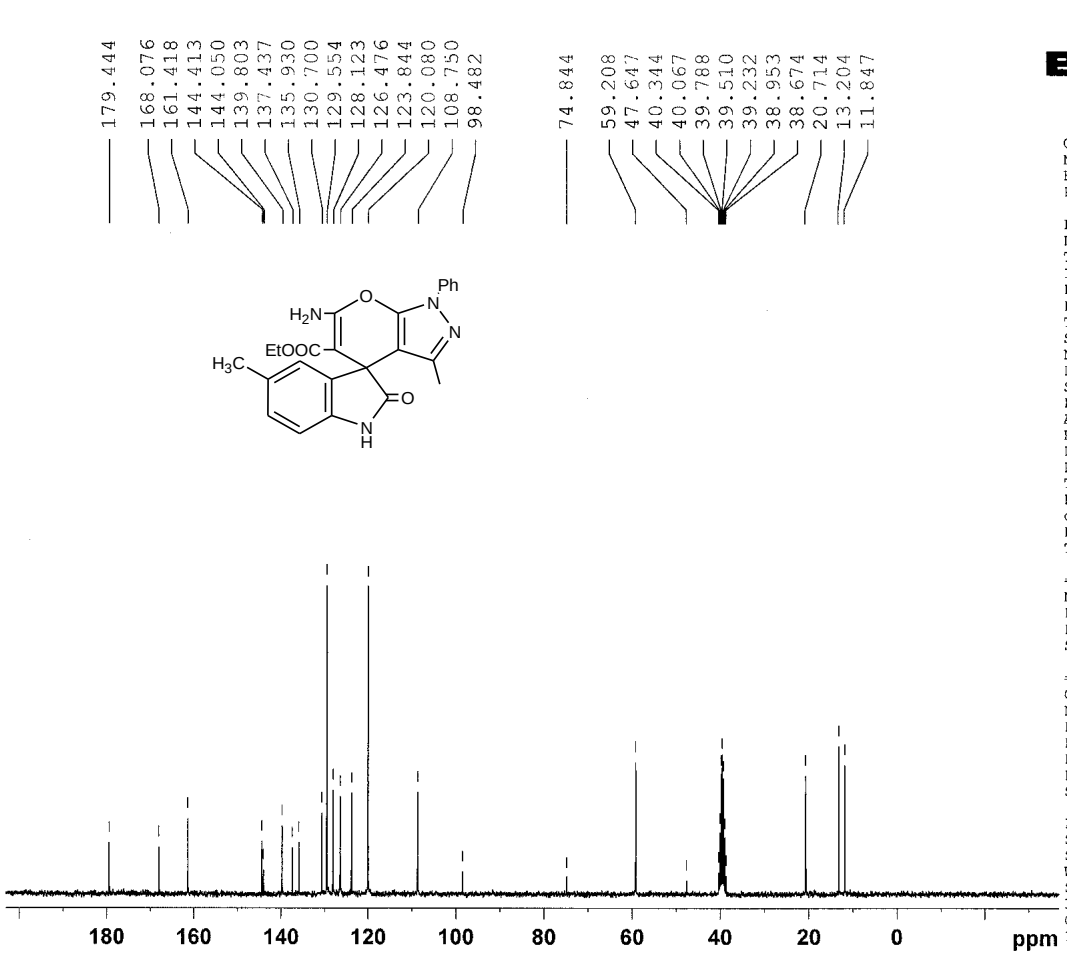
^{1}H NMR Spectrum of compound **5a**



^{13}C NMR Spectrum of compound **5a**



^{1}H NMR Spectrum of compound **5b**



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PROCNO                       1

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DE                     6.00 usec
TE                     294.2 K
D1                 1.00000000 sec
d11                0.03000000 sec
DELTA              0.89999998 sec
TD0                          1

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P1                        9.20 usec
PL1                      -1.00 dB
SFO1               75.4740505 MHz

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NUC2                        1H
PCPD2                    80.00 usec
PL12                     17.20 dB
PL13                     20.20 dB
PL2                       0.00 dB
SFO2              300.1315007 MHz

F2 - Processing parameters
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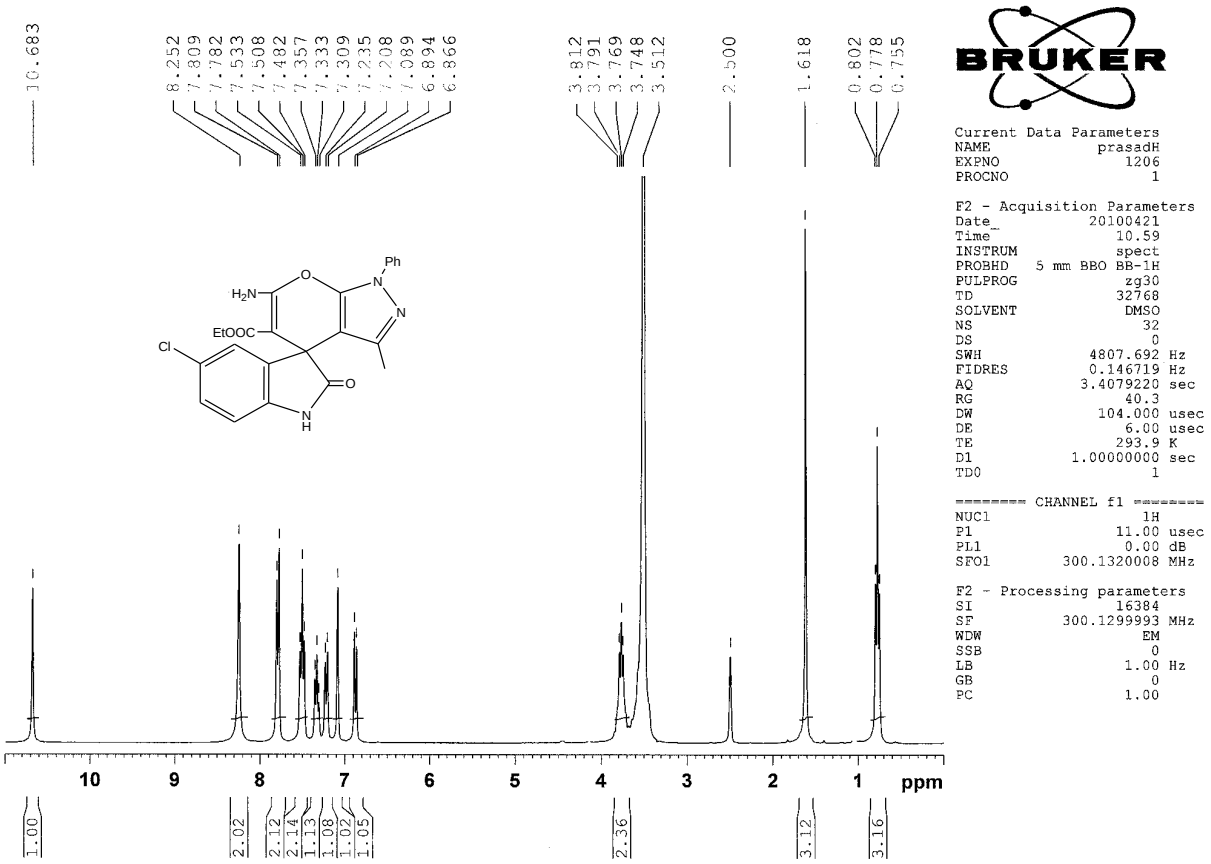

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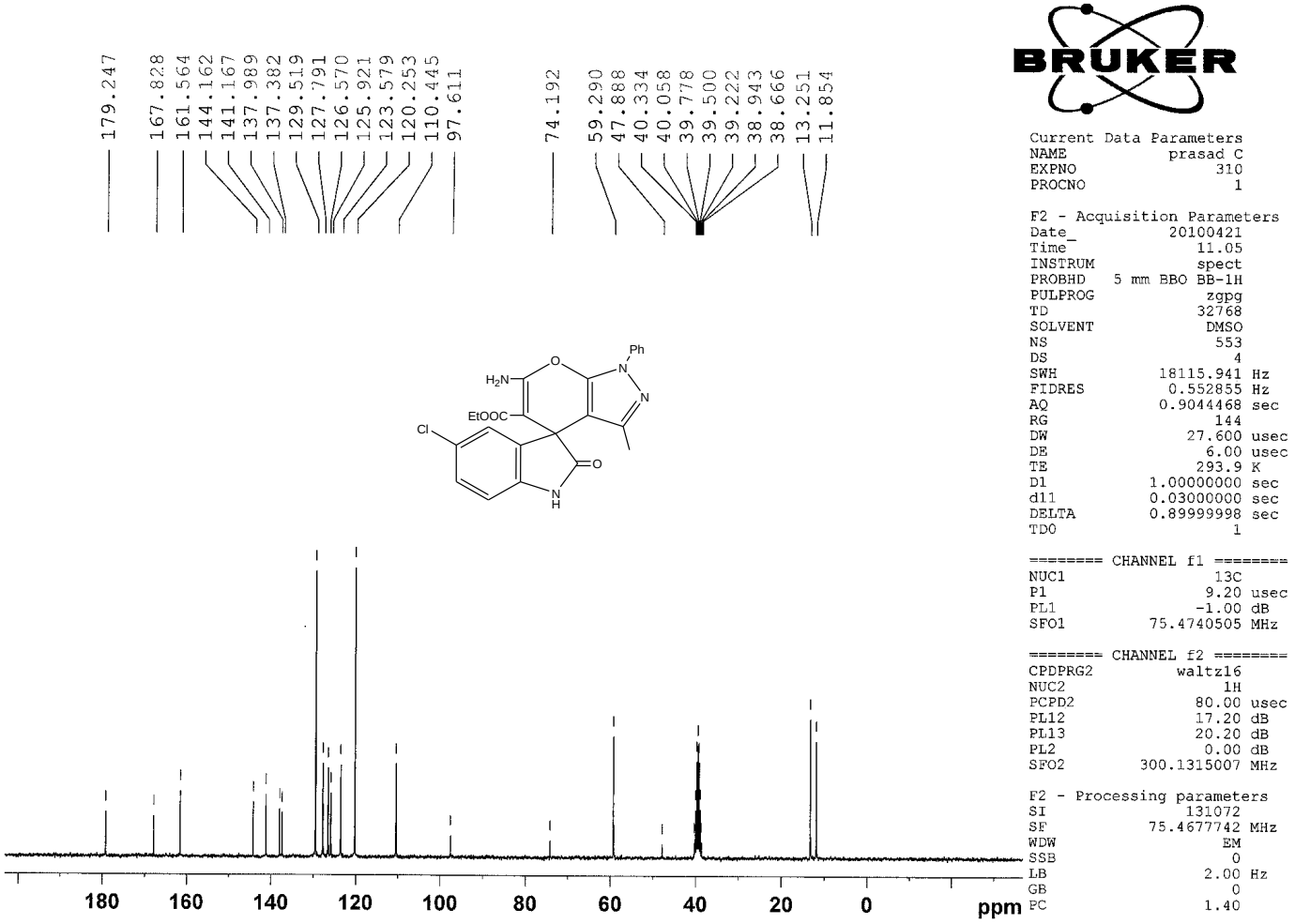
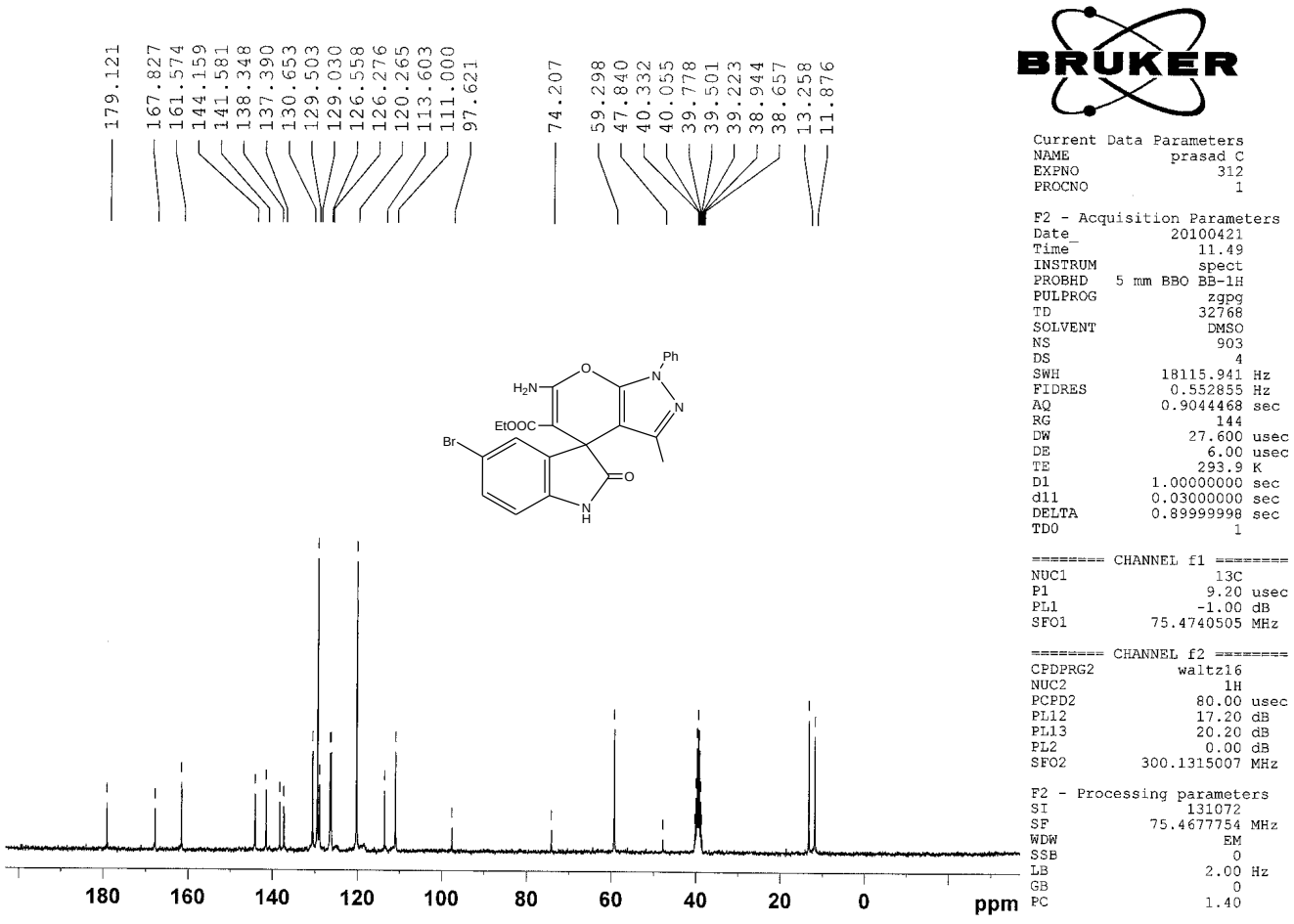


^{13}C NMR Spectrum of compound **5c**



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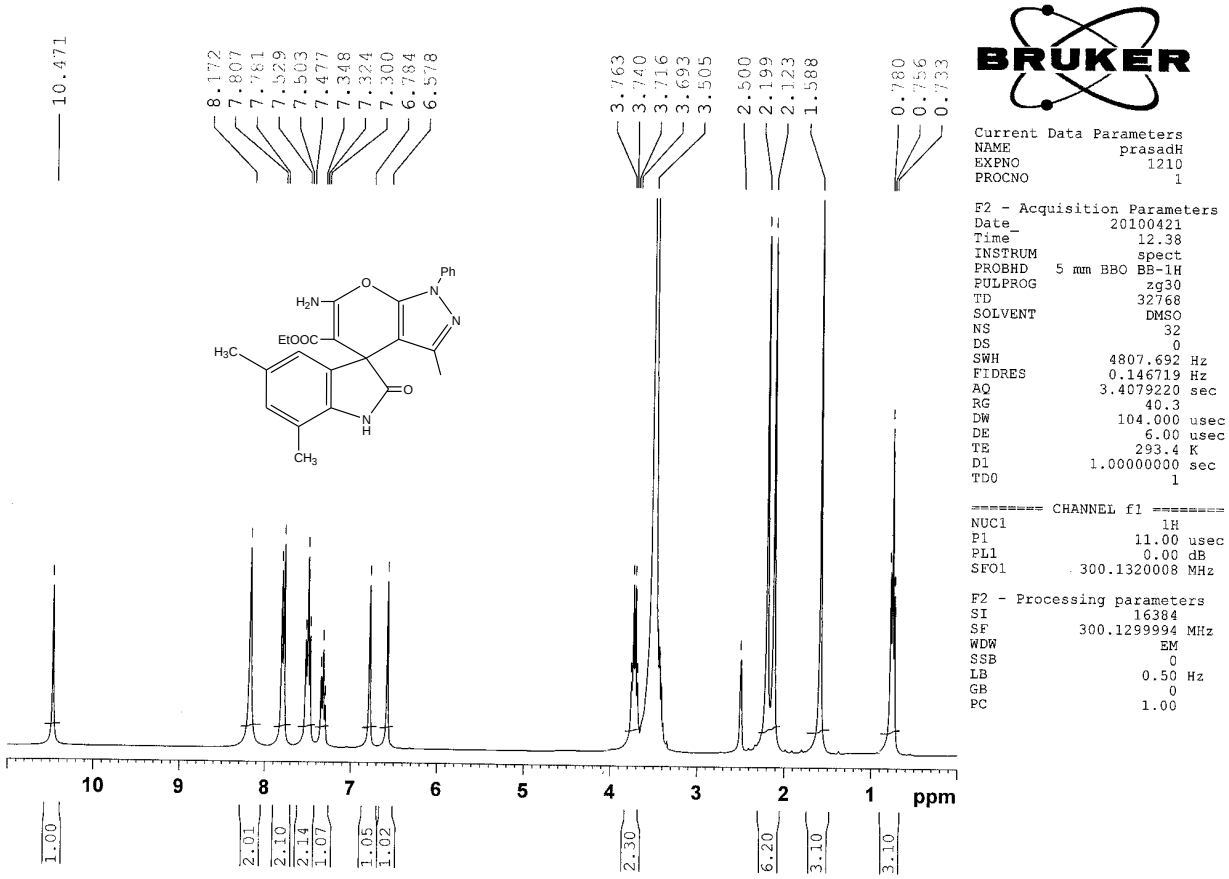
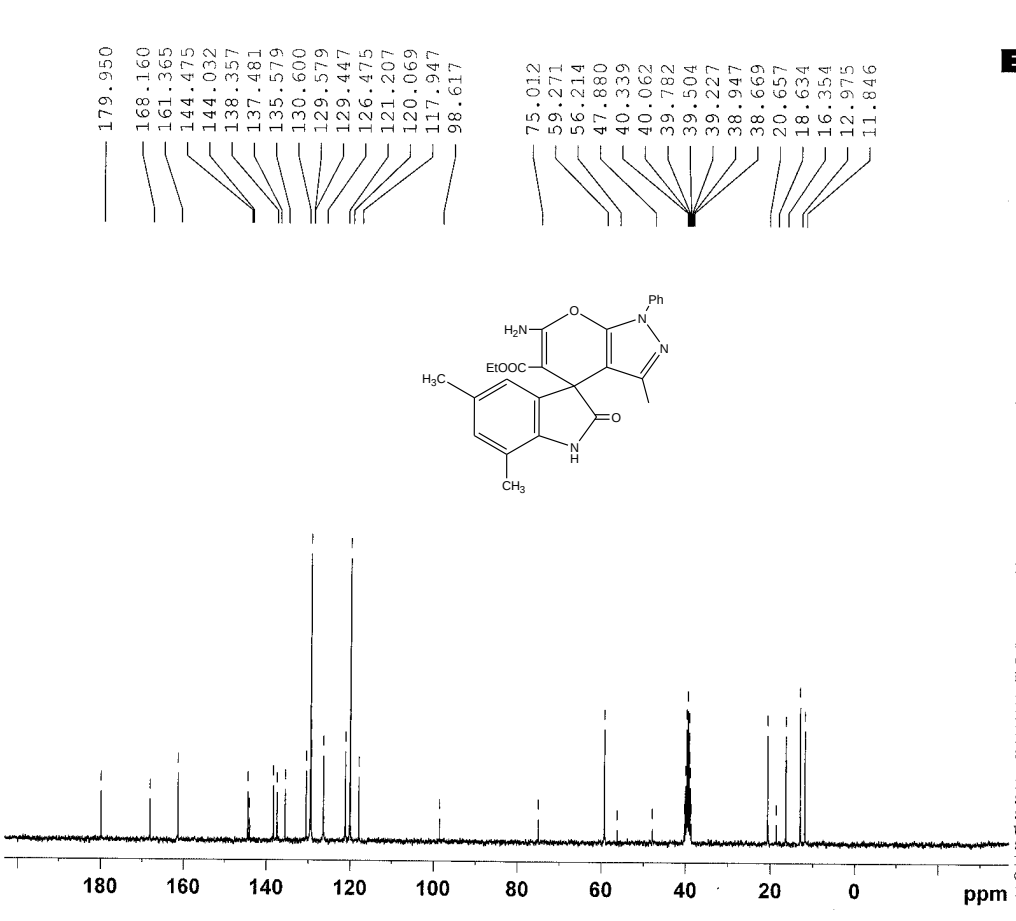


^{1}H NMR Spectrum of compound **5f**



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PROCNO	1

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DW	27.600 usec
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NUC1	13C
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PL1	-1.00 dB
SFO1	75.4740505 MHz

======== CHANNEL f2 ========

CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL12	17.20 dB
PL13	20.20 dB
PL2	0.00 dB
SFO2	300.1315007 MHz

F2 - Processing parameters

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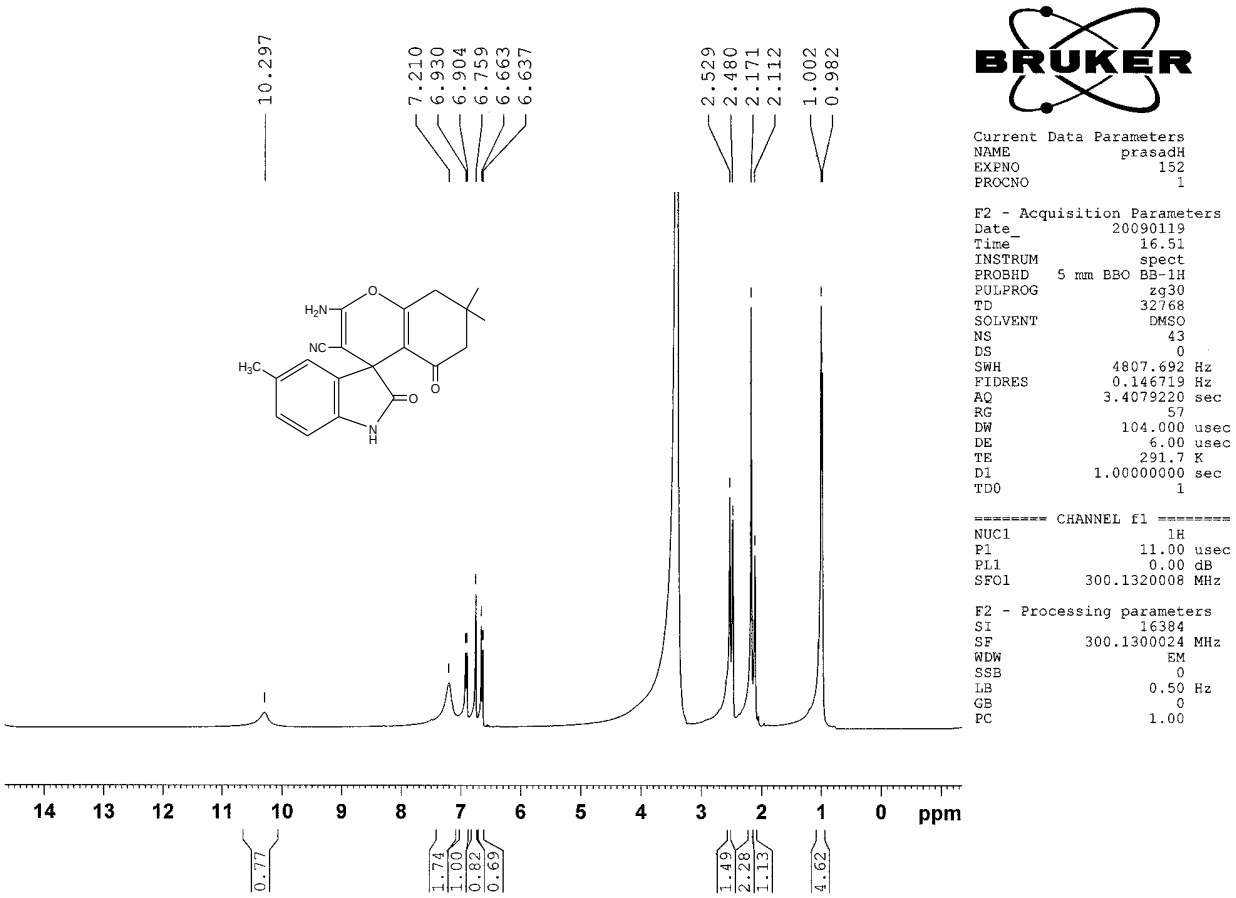
^{13}C NMR Spectrum of compound **5f**



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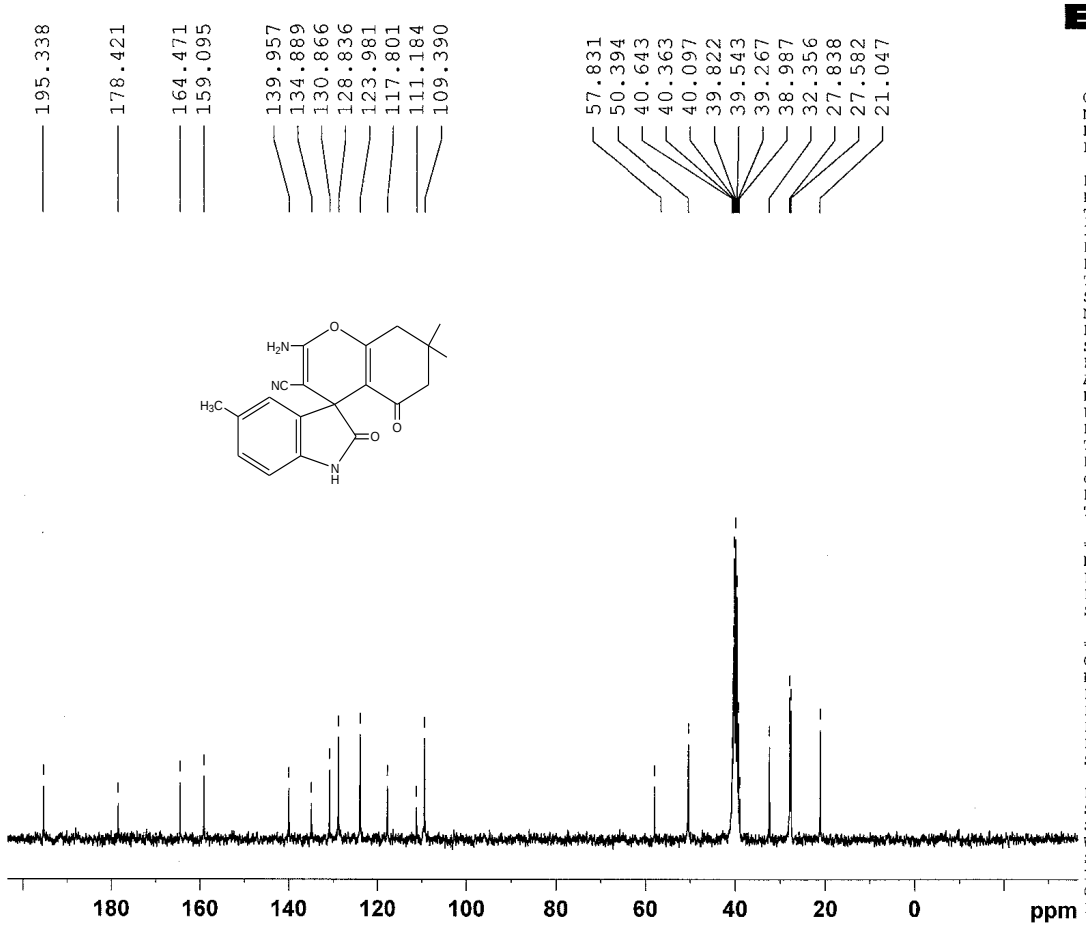


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TE                     292.6 K
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d11                0.03000000 sec
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======== CHANNEL f1 ========
NUC1                       13C
P1                        9.20 usec
PL1                      -1.00 dB
SFO1               75.4740505 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                    80.00 usec
PL12                     17.20 dB
PL13                     20.20 dB
PL2                       0.00 dB
SFO2              300.1315007 MHz

F2 - Processing parameters
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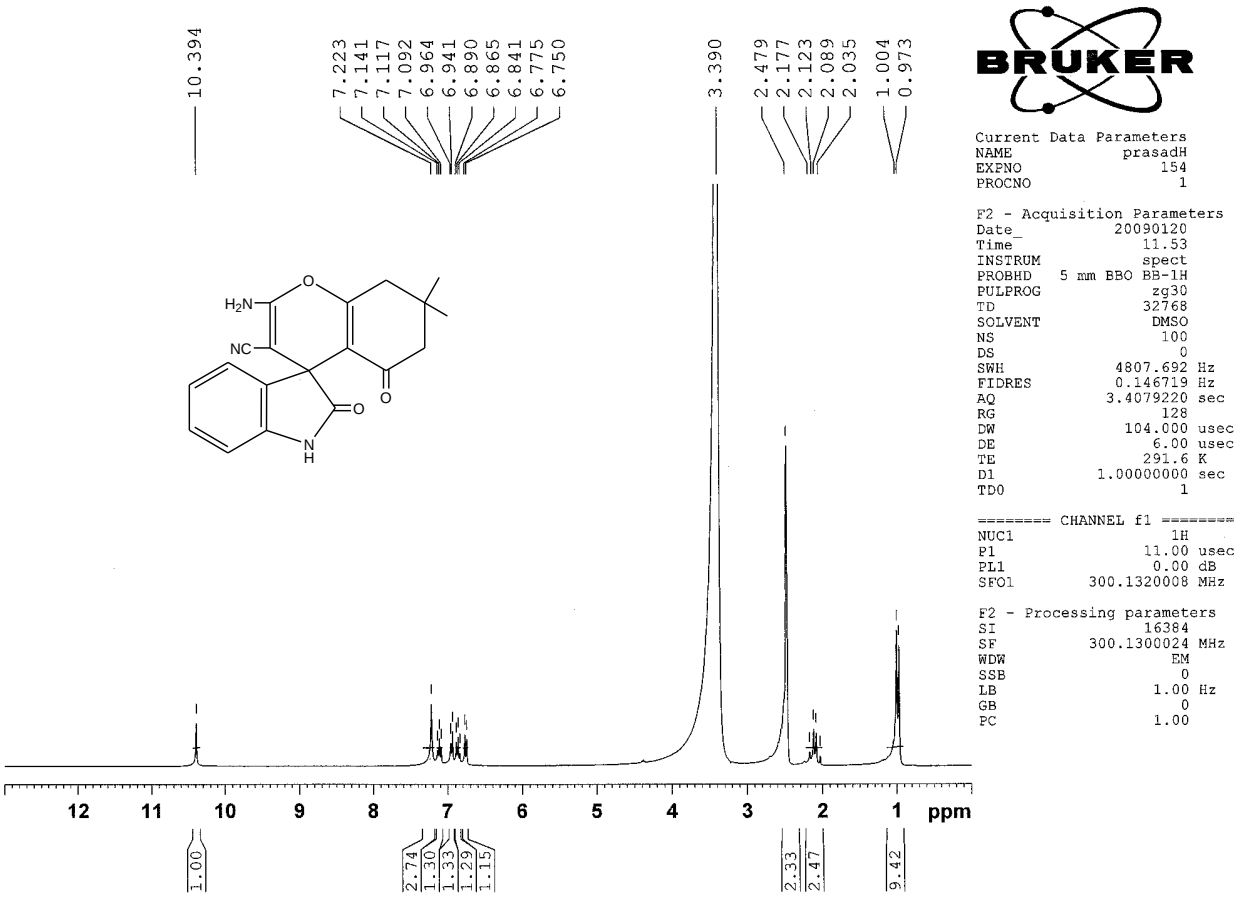
^{13}C NMR Spectrum of compound **7h**



BRUKER

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PROCNO 1

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PULPROG zg30
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DS 0
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FIDRES 0.146719 Hz
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RG 128
DW 104.000 usec
DE 6.00 usec
TE 291.6 K
D1 1.00000000 sec
TD0 1

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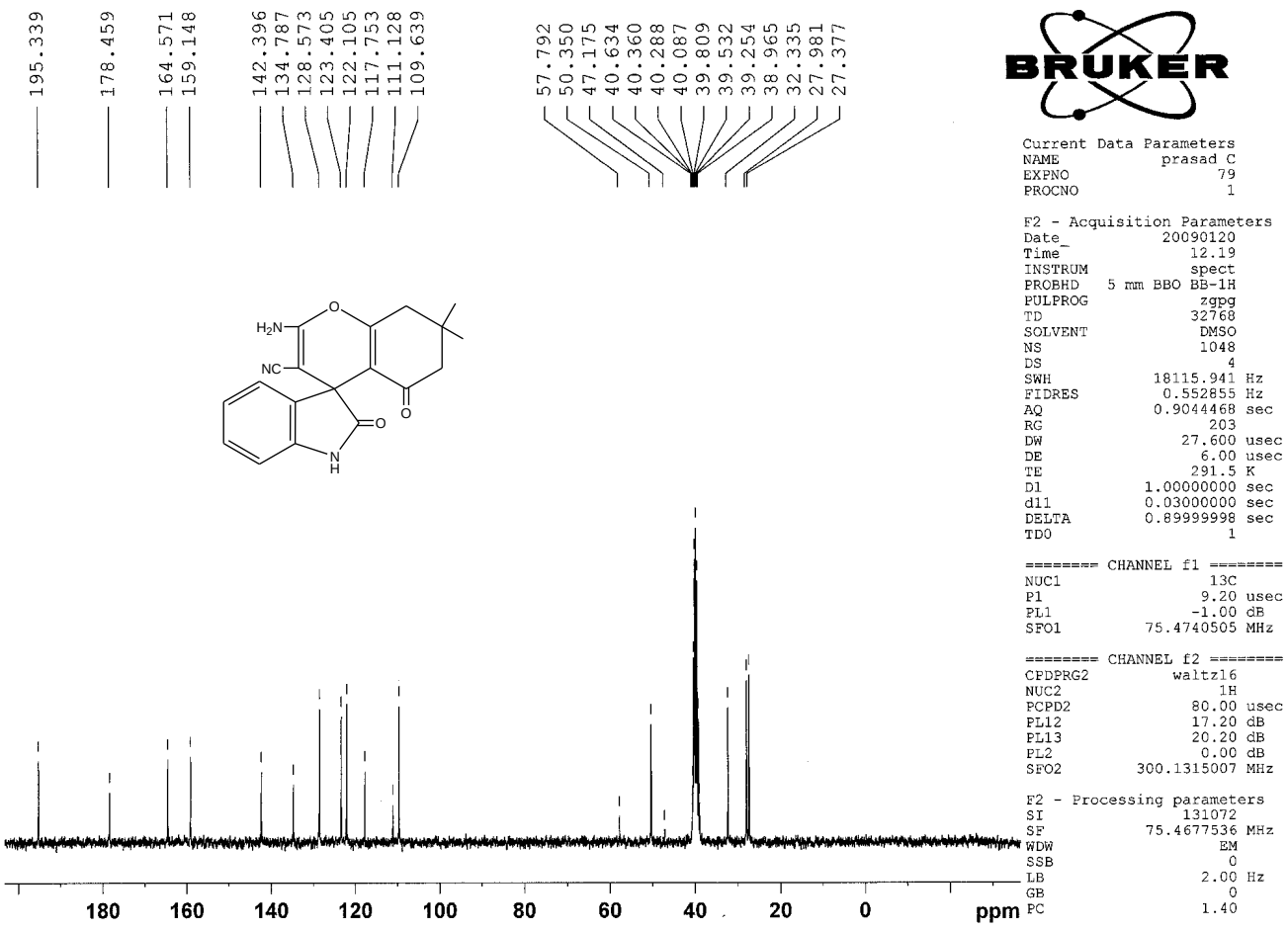
^{1}H NMR Spectrum of compound **7g**



BRUKER

Current Data Parameters
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======== CHANNEL f1 ========
NUC1 13C
P1 9.20 usec
PL1 -1.00 dB
SFO1 75.4740505 MHz

======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL12 17.20 dB
PL13 20.20 dB
PL2 0.00 dB
SFO2 300.1315007 MHz

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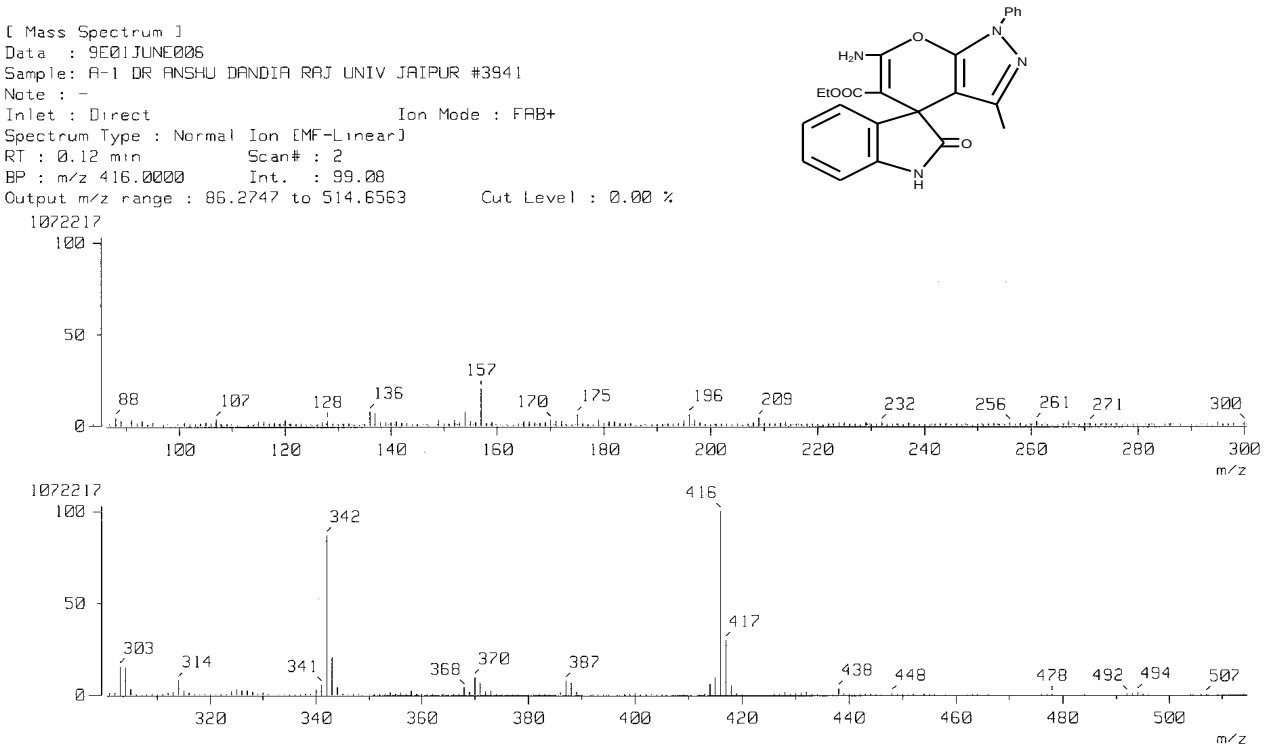
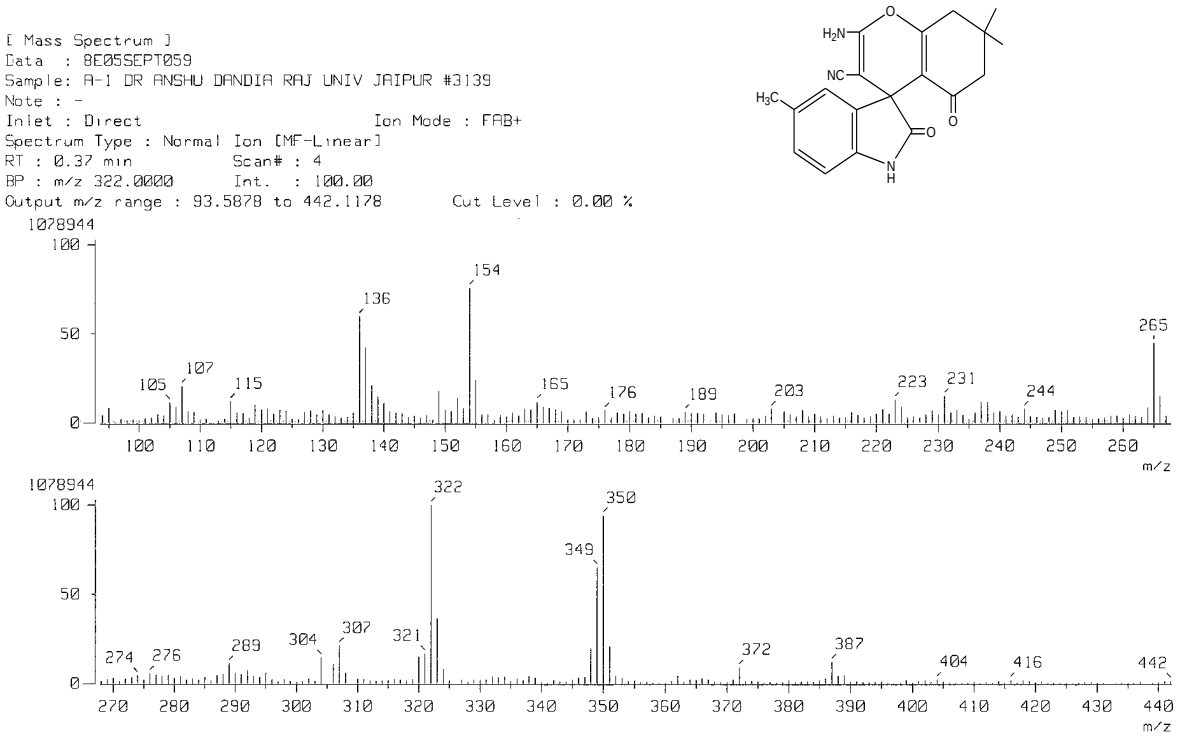
^{13}C NMR Spectrum of compound **7g**



Mass spectrum of compound **5a**



Mass spectrum of compound **7h**