Synthesis, biological evaluation and docking studies of some novel isatin-3-hydrazonothiazolines

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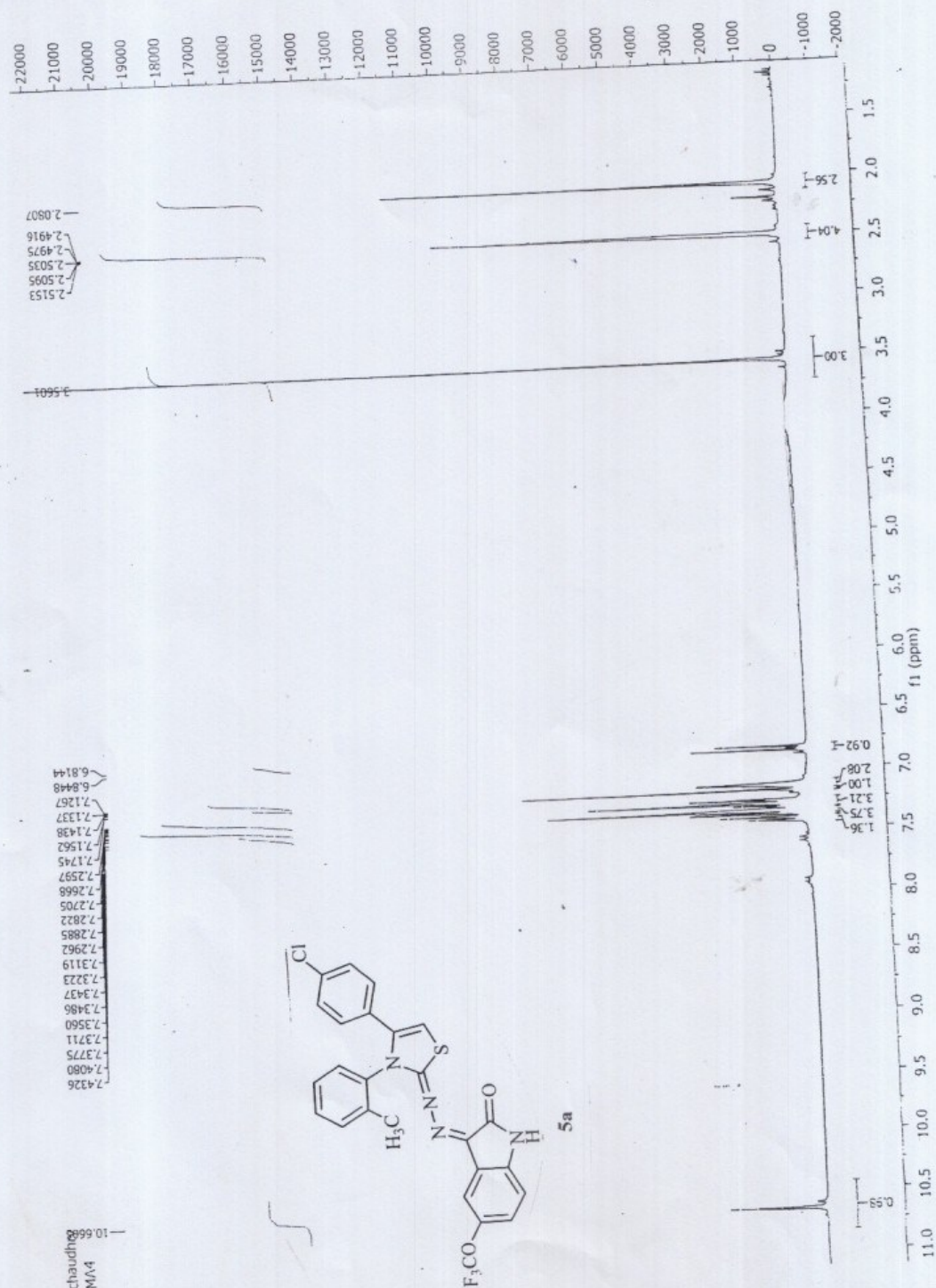
E-mail addresses: pdhpervez@hotmail.com (H. Pervez); drjamshed@ciit.net.pk (J. Iqbal)
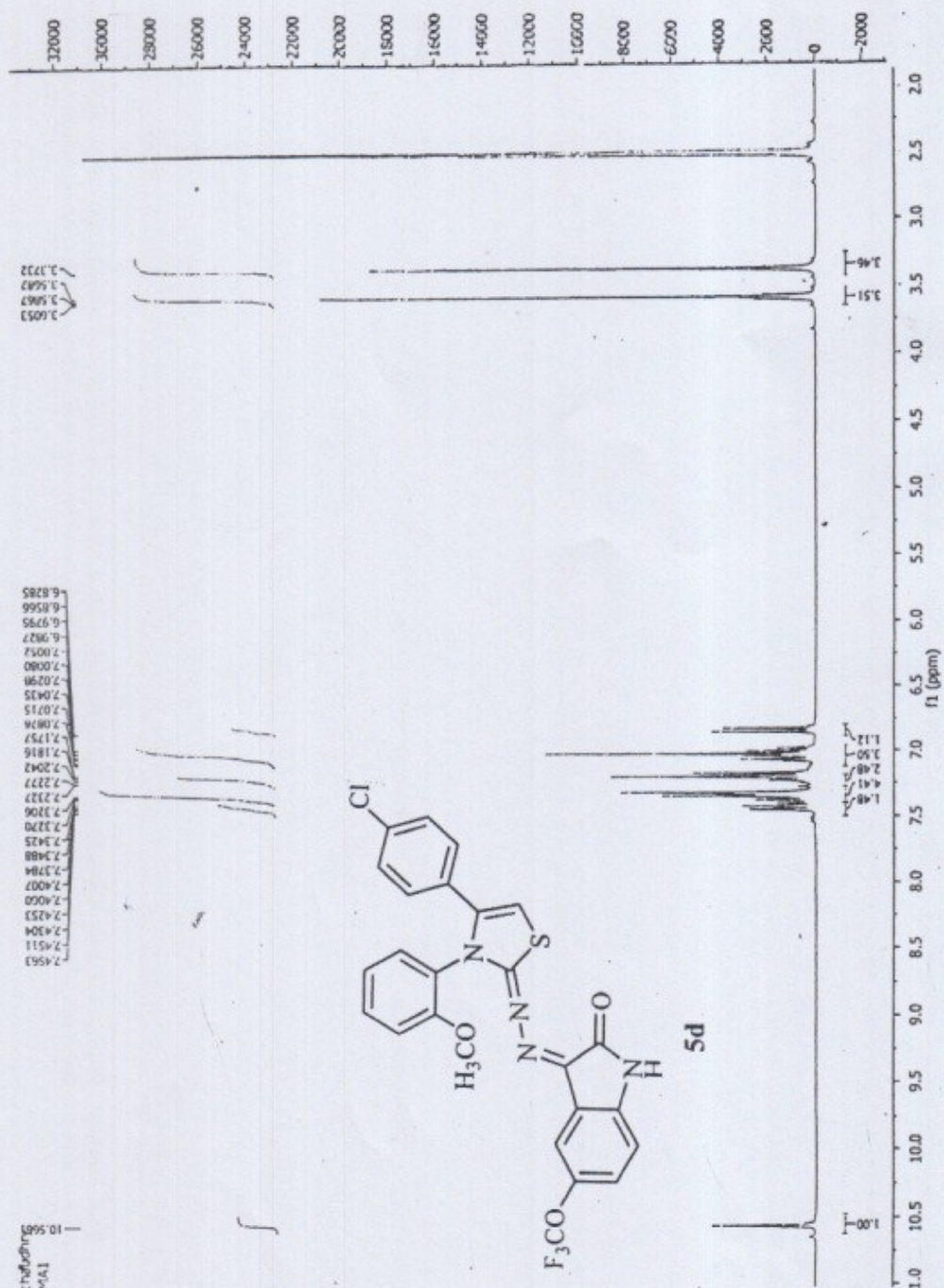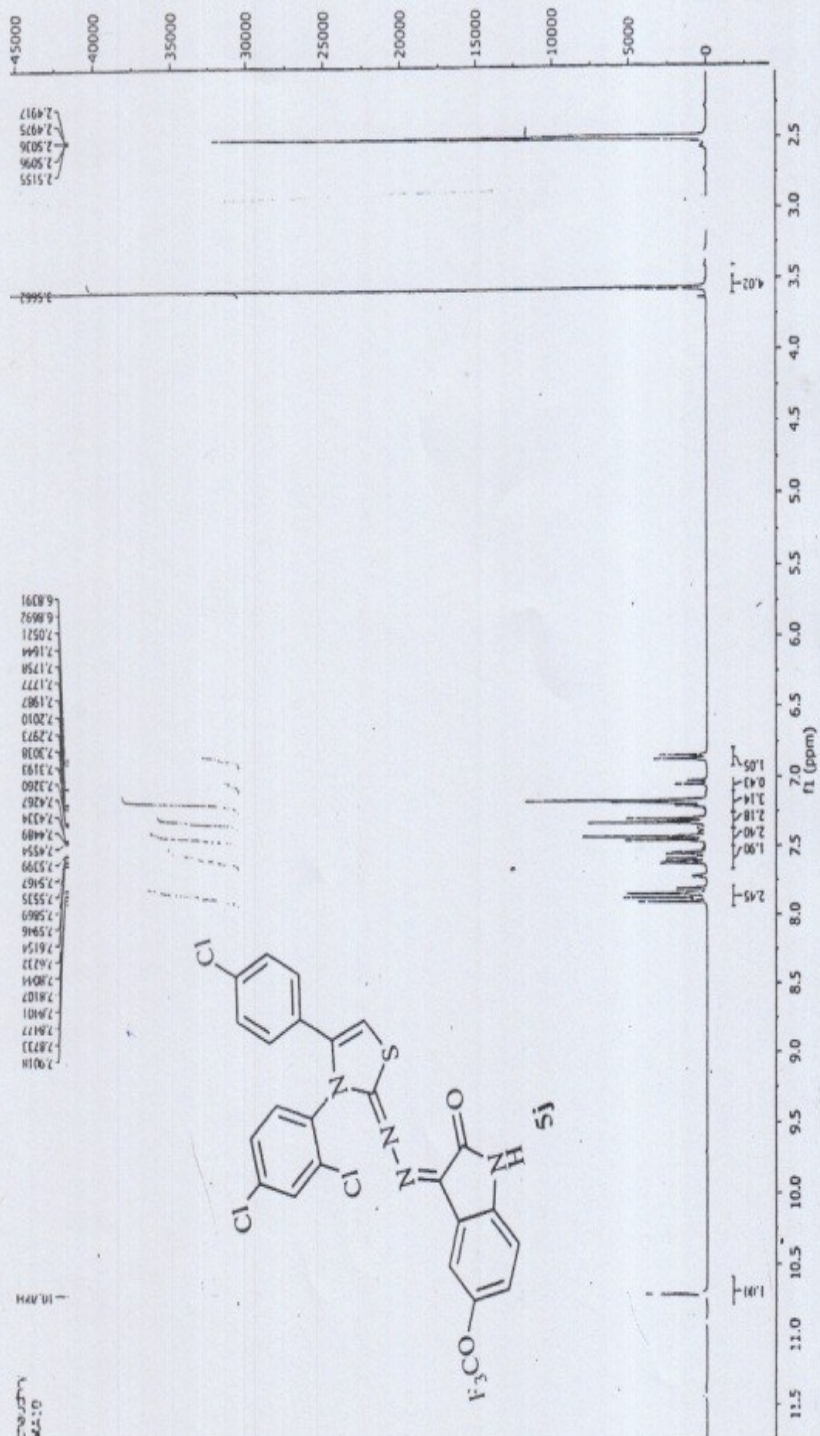
5k

6i
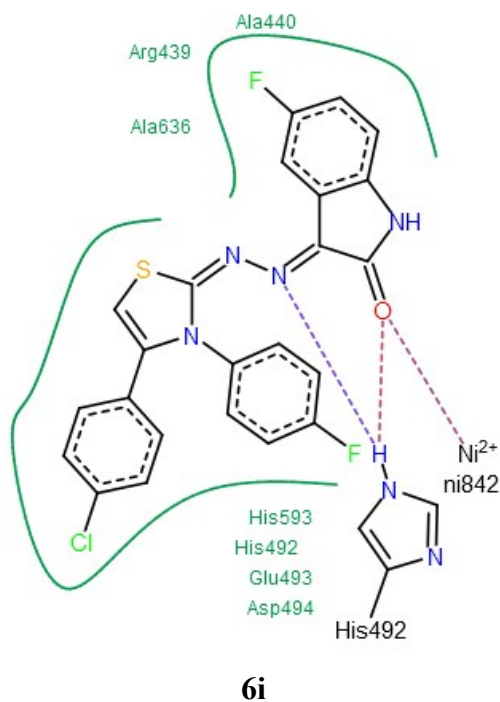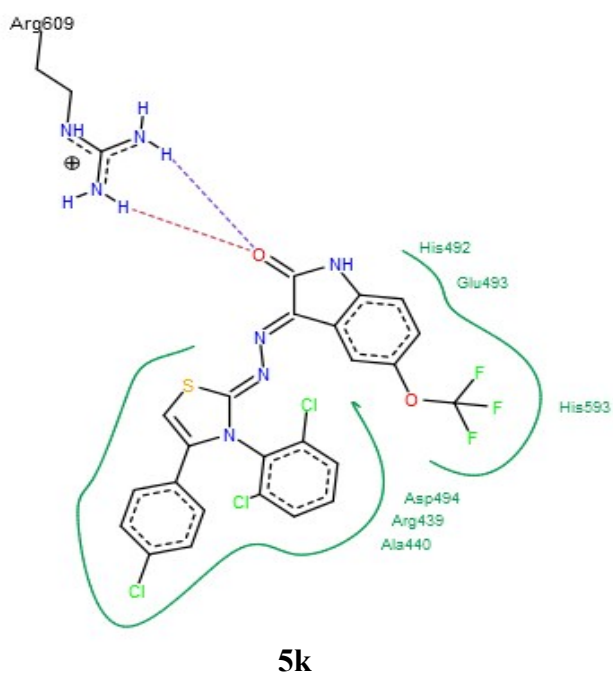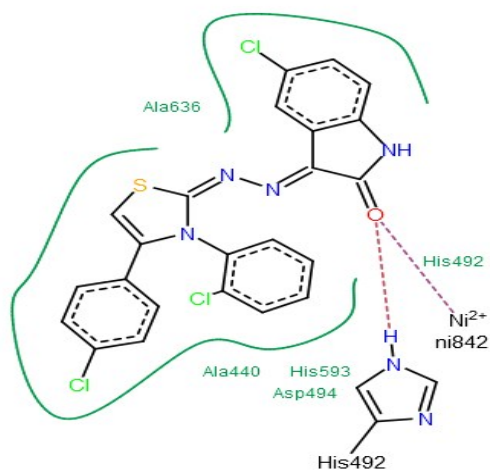
7a

Figure S1. 2D Interaction diagrams of the selected docked conformations for most potent inhibitors. Hydrogen bond interactions are indicated with dotted lines and hydrophobic interactions are shown with green lines. Metal interactions were observed by Nickel ions.

22000
21000
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000

2.0807
2.4916
2.4975
2.5035
2.5095
2.5153

3.5601

6.8144
6.8148
7.1267
7.1337
7.1438
7.1562
7.1745
7.2597
7.2668
7.2705
7.2822
7.2885
7.2962
7.3119
7.3223
7.3437
7.3486
7.3560
7.3711
7.3775
7.4080
7.4326

chaudhrq
MM

10.6669

2.56
4.04
3.00

0.92
2.08
1.00
3.21
3.75
1.36

0.58

1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
f1 (ppm)
7.0
7.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0

Cl

H₃C

N—N

S

N

O

N
H

F₃CO

5a

10.5665

6.8285
6.8566
6.9795
6.9827
7.0052
7.0080
7.0298
7.0435
7.0515
7.0714
7.0834
7.1757
7.1816
7.2042
7.2233
7.2333
7.2906
7.3270
7.3425
7.3488
7.3784
7.4007
7.4060
7.4253
7.4304
7.4511
7.4563

3.3722
3.5682
3.5867
3.6053

32000
30000
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
-2000

2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 1.0

f1 (ppm)

3.46
3.51
1.12
3.50
2.89
4.41
1.48
1.00

5d

H₃CO

Cl

F₃CO

cheuong ng
MA7

10.070 018

6.8308
6.8588
7.1611
7.1639
7.2211
7.2894
7.3137
7.3216
7.3522
7.3982
7.4233
7.5003
7.5204
7.5446
7.5660
7.5692
7.5944
7.7176

2.5022

2.344

Cl

F

N—N

O

N
H

5g

F₃CO

2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0

21000 20000 19000 18000 17000 16000 15000 14000 13000 12000 11000 10000 9000 8000 7000 6000 5000 4000 3000 2000 1000 0 -1000

5j

45000
40000
35000
30000
25000
20000
15000
10000
5000
0

2.4917
2.4975
2.5036
2.5096
2.5155

3.5662

6.8091
6.8692
7.0521
7.1644
7.1758
7.1777
7.1987
7.2010
7.2873
7.3008
7.3193
7.3280
7.4267
7.4334
7.4489
7.4554
7.5399
7.5167
7.5535
7.5669
7.5946
7.6154
7.7233
7.7804
7.8107
7.8101
7.8117
7.8233
7.9014

11.4744

f1 (ppm)
2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5

4.02
1.05
0.43
1.14
2.18
2.40
1.90
2.45
1.01

MAQBOOL /DR.HUMAYUN/ MA-15/DMSO
1H

NAME   july-10-13
EXPNO   3
PROCNO   1
Date_   20130710
Time_   12.54
INSTRUM   spect
PROBHD   5 mm DUL 13C-1
PULPROG   zg30
TD   32768
SOLVENT   DMSO
NS   35
DS   0
SWH   5995.204 Hz
FIDRES   0.182959 Hz
AQ   2.7329011 sec
RG   512
DW   83.400 usec
DE   6.50 usec
TE   298.0 K
D1   1.50000000 sec
TD0   1

======== CHANNEL f1 ========
NUC1   1H
P1   12.30 usec
PL1   4.00 dB
SFO1   300.1321009 MHz
SI   32768
SF   300.1300045 MHz
WDW   EM
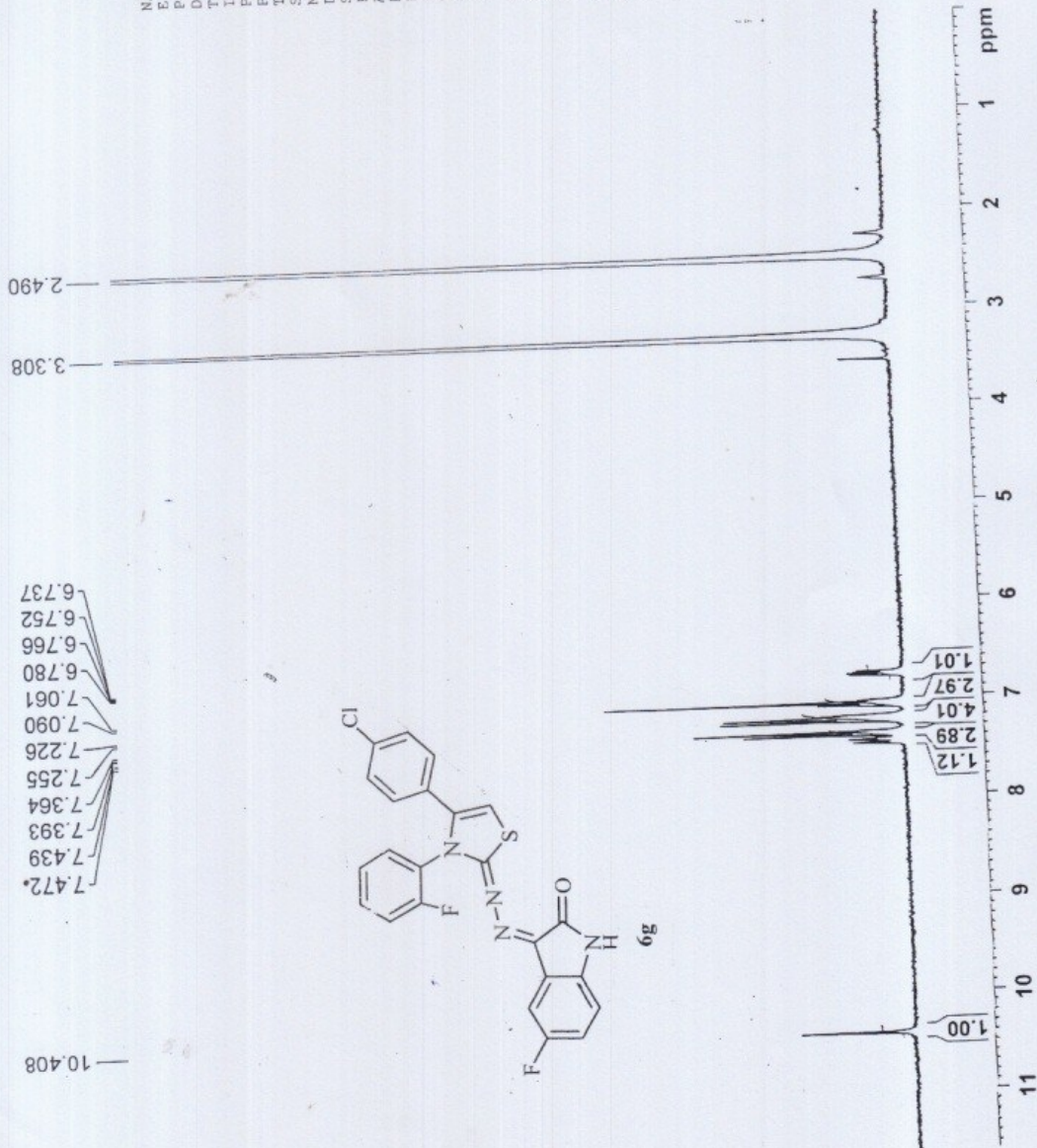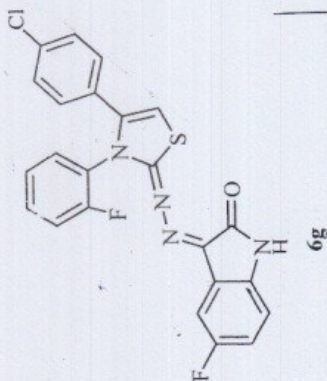SSB   0
LB   0.30 Hz
GB   0
PC   1.00

2.078
2.490
3.306

6.696
6.710
6.724
6.739
6.886
6.894
6.925
6.957
6.986
6.995
7.153
7.269
7.298
7.332
7.356
7.385
7.432
7.457

10.448

2.93
1.00
1.97
1.04
7.99
0.94

6a

ppm
1 2 3 4 5 6 7 8 9 10 11
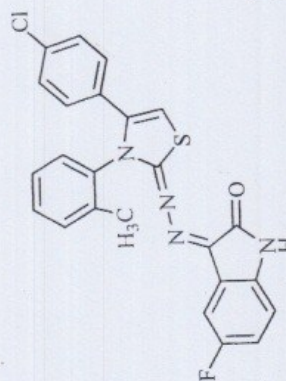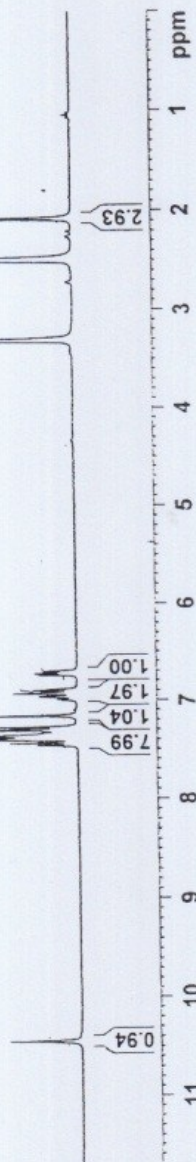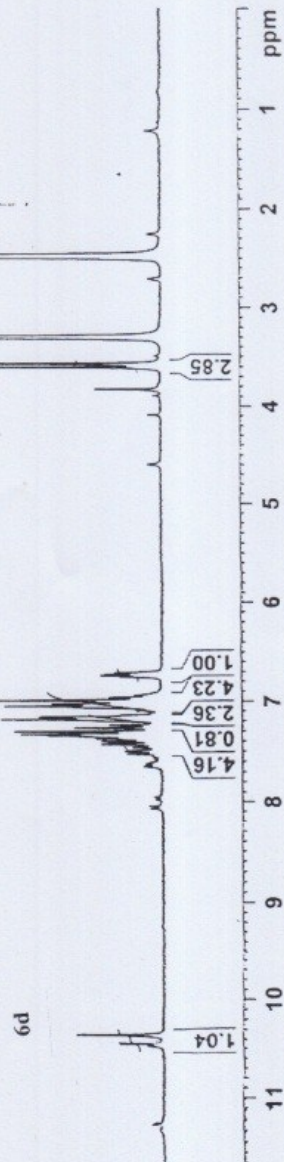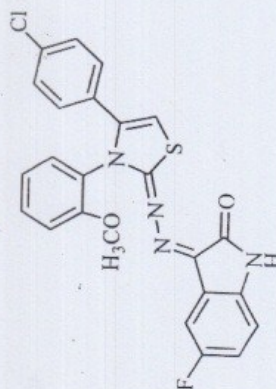
AVANCE AV-300
LAB NO: 108

NAME   july-10-13
EXPNO   4
PROCNO   1
Date_   20130710
Time   12.58
INSTRUM   spect
PROBHD   5 mm DUL 13C-1
PULPROG   zg30
TD   32768
SOLVENT   DMSO
NS   41
DS
SWH   5995.204 Hz
FIDRES   0.182959 Hz
AQ   2.7329011 sec
RG   645.1
DW   83.400 usec
DE   6.50 usec
TE   298.0 K
D1   1.50000000 sec
TD0   1

======= CHANNEL f1 =======
NUC1   1H
P1   12.30 usec
PL1   4.00 dB
SFO1   300.1321009 MHz
SI   32768
SF   300.1300045 MHz
WDW   EM
SSB   0
LB   0.30 Hz
GB   0.00
PC   1.00

2.490
3.305
3.578
3.612
6.714
6.728
6.742
6.755
6.945
6.967
6.998
7.013
7.033
7.043
7.055
7.072
7.146
7.162
7.168
7.189
7.245
7.274
7.309
7.338
7.350
7.378
7.404
7.432
7.464
7.497
7.523
10.351
10.443

6d

2.85
1.00
4.23
2.36
0.81
4.16
1.04

ppm 1 2 3 4 5 6 7 8 9 10 11

AVANCE AV-300
LAB NO: 108

NAME   july-10-13
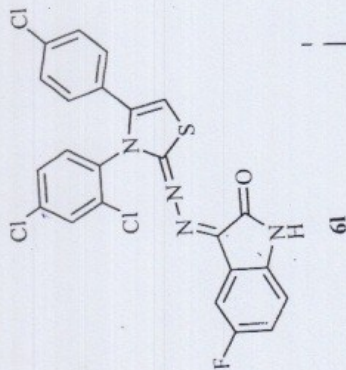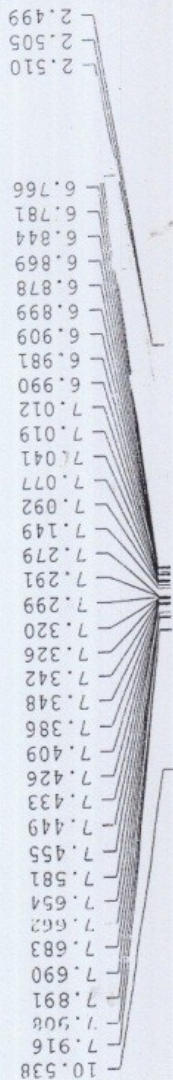EXPNO   1
PROCNO   1
Date_   20130710
Time   12.44
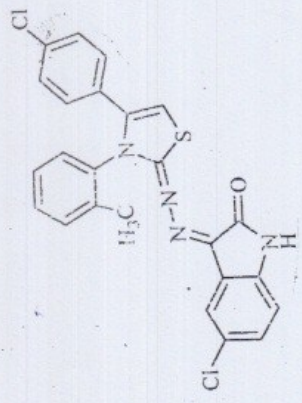INSTRUM   spect
PROBHD   5 mm DUL 13C-1
PULPROG   zg30
TD   32768
SOLVENT   DMSO
NS   32
DS   0
SWH   5995.204 Hz
FIDRES   0.182959 Hz
AQ   2.7329011 sec
RG   512
DW   83.400 usec
DE   6.50 usec
TE   298.0 K
D1   1.50000000 sec
TD0   1

======== CHANNEL f1 ========
NUC1   1H
P1   12.30 usec
PL1   4.00 dB
SFO1   300.1321009 MHz
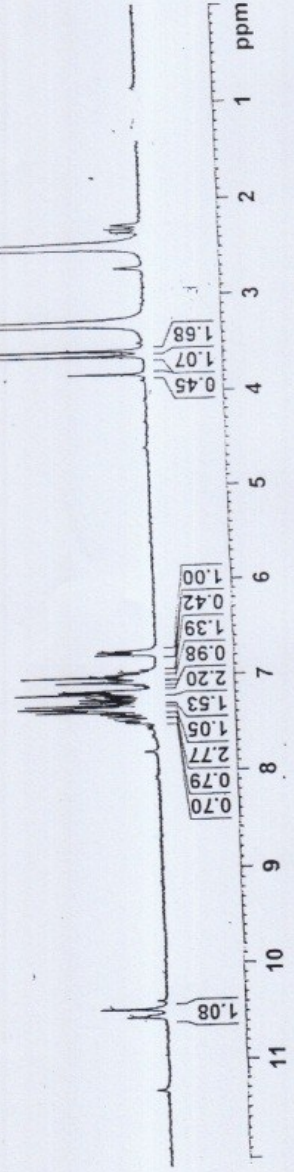SI   32768
SF   300.1300045 MHz
WDW   EM
SSB   0
LB   0.30 Hz
GB   0
PC   1.00

6.737
6.752
6.766
6.780
7.061
7.090
7.226
7.255
7.364
7.393
7.439
7.472

10.408

2.490
3.308

6g

1.01
2.97
4.01
2.89
1.12

1.00

ppm

11 10 9 8 7 6 5 4 3 2 1

MA-26_1HNMR_DMSO

Current Data Parameters
NAME   MA-26_1HNMR_DMSO
EXPNO   1
PROCNO   1

F2 - Acquisition Parameters
Date_   20130426
Time   17.26
INSTRUM   spect
PROBHD   5 mm BBO BB-1H
PULPROG   zg30
TD   65536
SOLVENT   DMSO
NS   4
DS   0
SWH   6172.839 Hz
FIDRES   0.094190 Hz
AQ   5.3084660 sec
RG   362
DW   81.000 usec
DE   6.00 usec
TE   673.2 K
D1   1.00000000 sec
TD0   1

======== CHANNEL f1 ========
NUC1   1H
P1   9.00 usec
PL1   2.00 dB
SFO1   300.1318534 MHz

F2 - Processing parameters
SI   32768
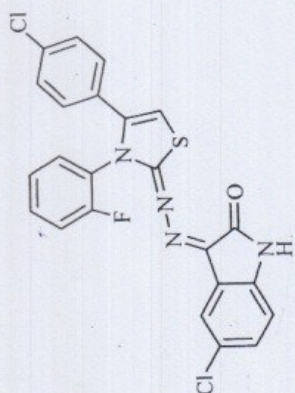SF   300.1300000 MHz
WDW   EM
SSB   0
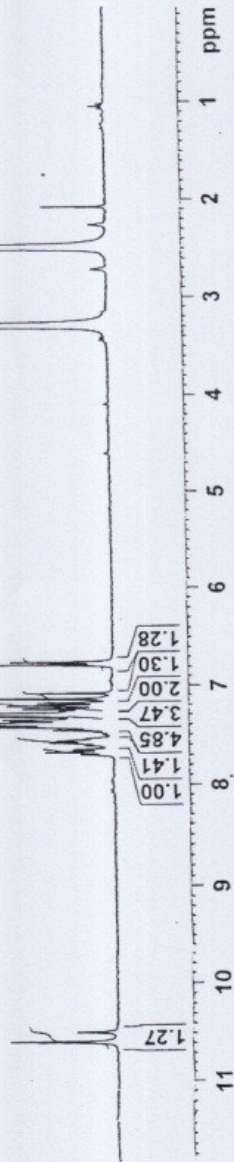LB   0.30 Hz
GB   0
PC   1.00

2.499
2.505
2.510

6.766
6.781
6.844
6.869
6.878
6.899
6.909
6.981
6.990
7.012
7.019
7.041
7.077
7.092
7.149
7.279
7.291
7.299
7.320
7.326
7.342
7.348
7.386
7.409
7.426
7.433
7.449
7.455
7.581
7.654
7.662
7.683
7.690
7.891
7.908
7.916
10.538

61

MAQBOOL /DR.HUMAYUN/ MA-30/DMSO
1H

2.301
2.337
2.490
3.298
3.580
3.632
3.823
6.737
6.750
6.764
6.778
6.936
6.965
6.992
7.011
7.032
7.067
7.165
7.193
7.221
7.228
7.249
7.277
7.311
7.340
7.353
7.382
7.405
7.435
7.474
7.500
10.462
10.541

7a

Current Data Parameters
NAME   MA-33_1HNMR_DMSO
EXPNO   1
PROCNO   1

F2 - Acquisition Parameters
Date_   20130506
Time   17.58
INSTRUM   spect
PROBHD   5 mm BBO BB-1H
PULPROG   zg30
TD   65536
SOLVENT   CDCl3
NS   8
DS   0
SWH   6172.839 Hz
FIDRES   0.094190 Hz
AQ   5.3084660 sec
RG   161.3
DW   81.000 usec
DE   6.00 usec
TE   673.2 K
D1   1.00000000 sec
TD0   1

======= CHANNEL f1 =======
NUC1   1H
P1   9.00 usec
PL1   2.00 dB
SFO1   300.1318534 MHz

F2 - Processing parameters
SI   32768
SF   300.1300000 MHz
WDW   EM
SSB   0
LB   0.30 Hz
GB   0
PC   1.00

DR. HUMAYUN PERVEZ/MAQBOOL AHMAD/MA-33_1HNMR_DMSO

2.504
3.604
3.627
6.760
6.775
6.788
6.814
6.842
7.003
7.029
7.054
7.073
7.090
7.118
7.160
7.185
7.210
7.247
7.274
7.308
7.327
7.355
7.392
7.422
7.444
7.471
7.498
10.594
10.729

7d

1.24

1.00
0.97
0.90
1.68
0.97

0.41

ppm
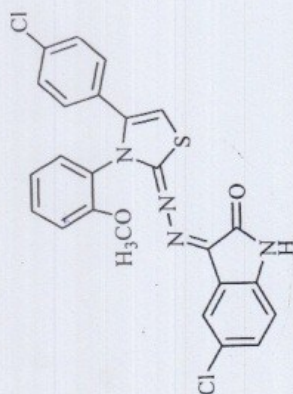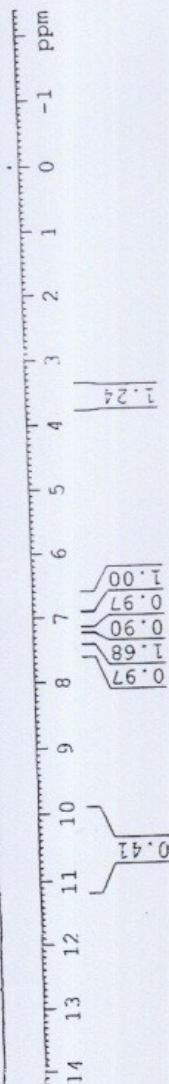
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LAB NO: 108

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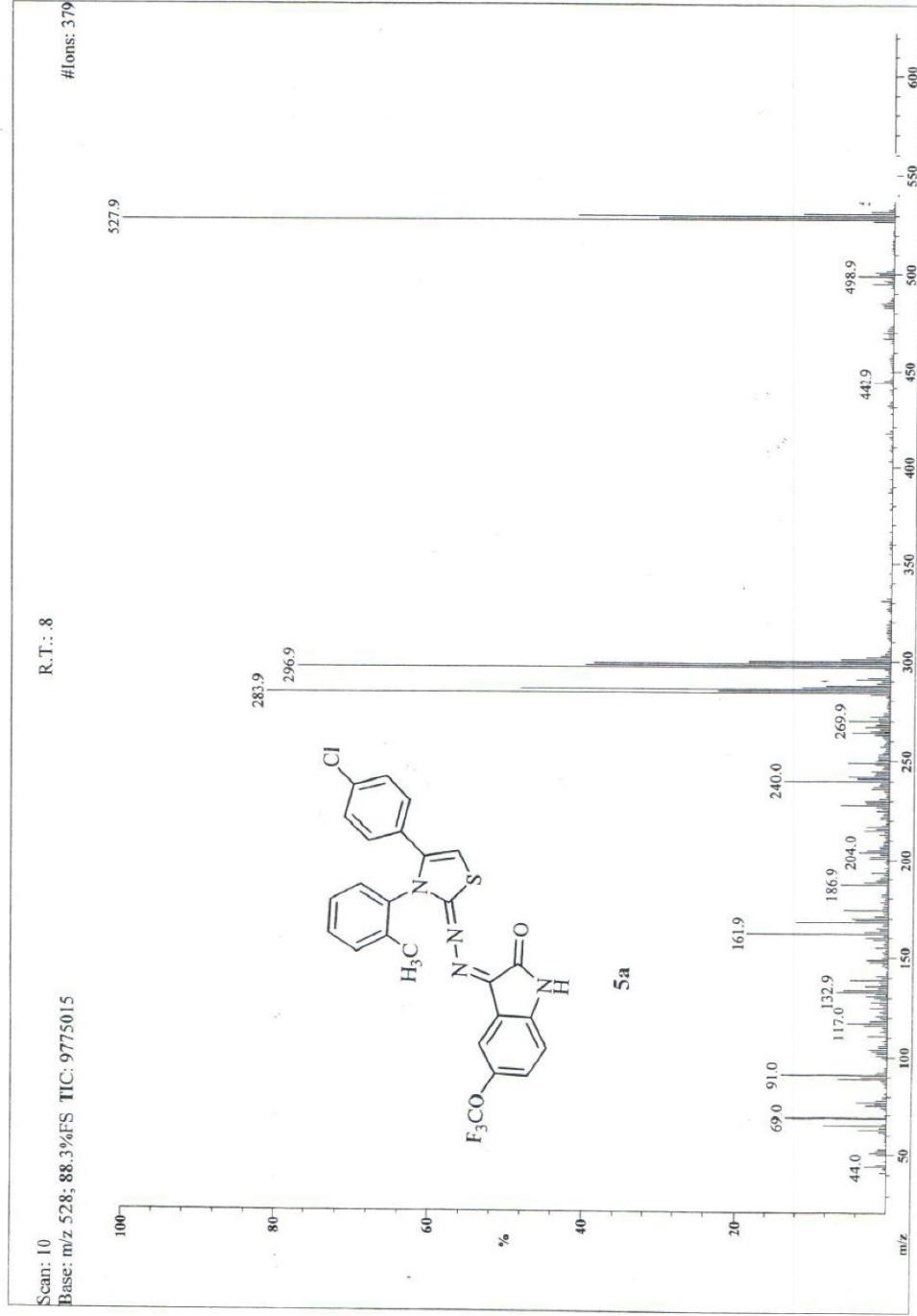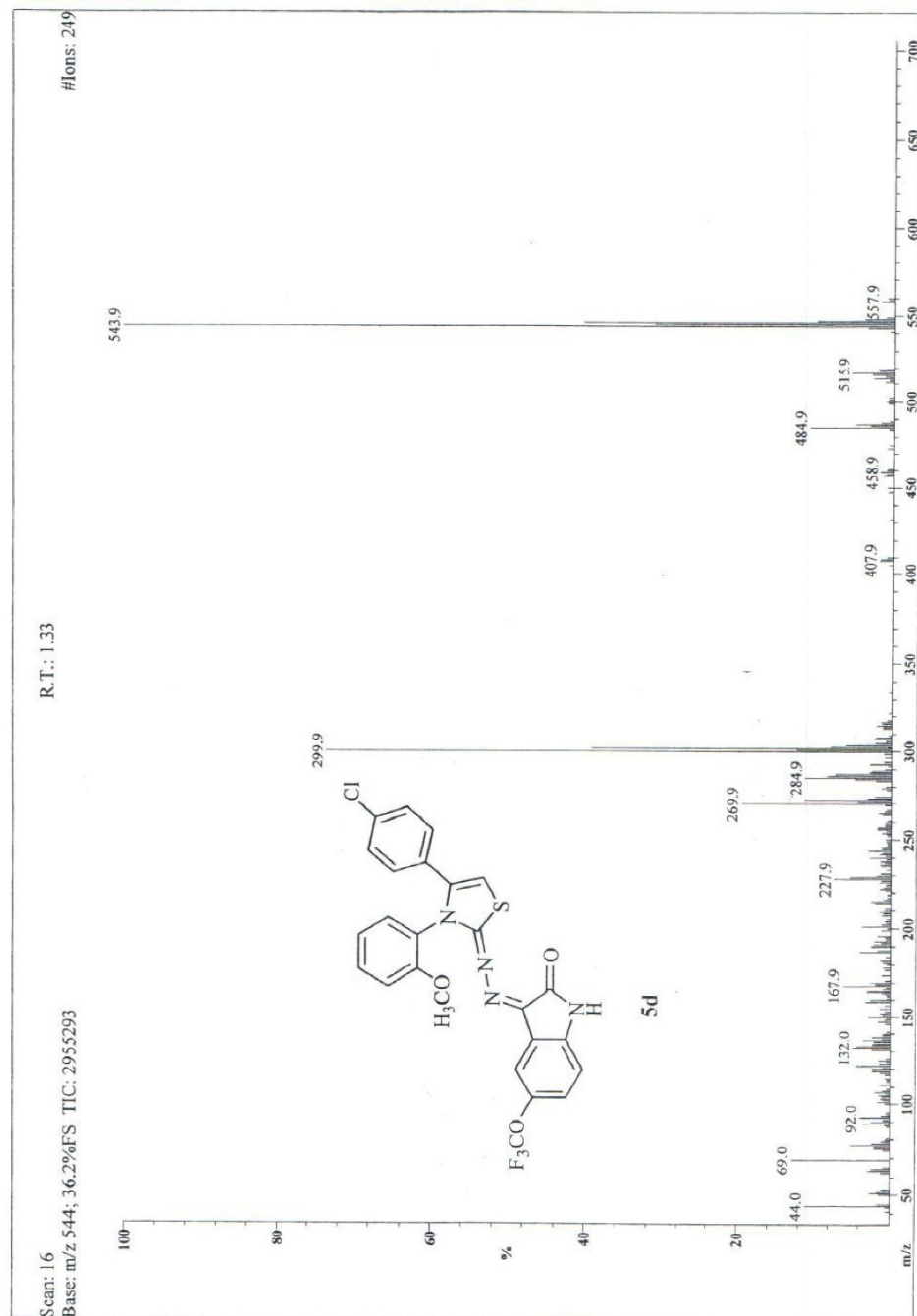PROCNO   1
Date   20130712
Time   12.15
INSTRUM   spect
PROBHD   5 mm DUL 13C-1
PULPROG   zg30
TD   32768
SOLVENT   DMSO
NS   70
DS   0
SWH   5995.204 Hz
FIDRES   0.182959 Hz
AQ   2.7329011 sec
RG   812.7
DW   83.400 usec
DE   6.50 usec
TE   301.5 K
D1   1.50000000 sec
TD0   1

====== CHANNEL f1 ======
NUC1   1H
P1   12.30 usec
PL1   4.00 dB
SFO1   300.1321009 MHz
SI   32768
SF   300.1300043 MHz
WDW   EM
SSB   0
LB   0.30 Hz
GB   0
PC   1.00

7g

2.490
3.292
6.750
6.759
6.778
7.079
7.138
7.176
7.183
7.204
7.212
7.242
7.264
7.287
7.297
7.305
7.315
7.340
7.354
7.362
7.392
7.421
7.455
7.539
7.558
7.582
7.605
7.648
7.671
7.696
10.488
10.587
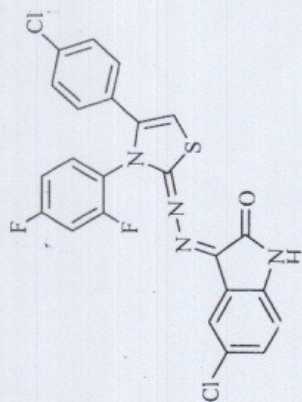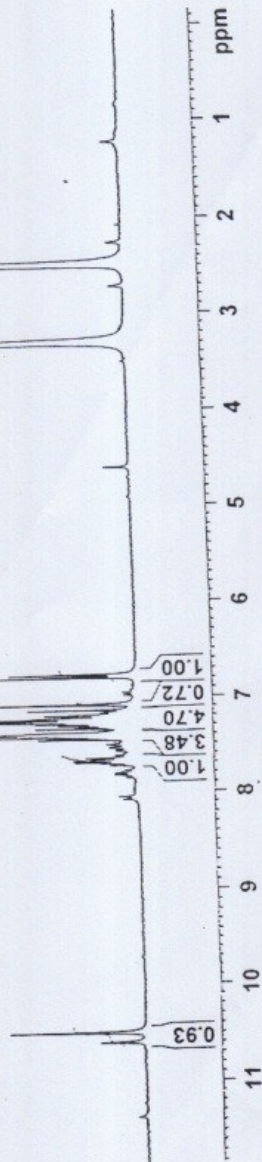
AVANCE AV-300
LAB NO: 108

NAME   july-12-13
EXPNO   2
PROCNO   1
Date_   20130712
Time   11.42
INSTRUM   spect
PROBHD   5 mm DUL 13C-1
PULPROG   zg30
TD   32768
SOLVENT   DMSO
NS   55
DS   0
SWH   5995.204 Hz
FIDRES   0.182959 Hz
AQ   2.7329011 sec
RG   812.7
DW   83.400 usec
DE   6.50 usec
TE   301.5 K
D1   1.50000000 sec
TD0   1

===== CHANNEL f1 =======
NUC1   1H
P1   12.30 usec
PL1   4.00 dB
SFO1   300.1321009 MHz
SI   32768
SF   300.1300044 MHz
WDW   EM
SSB   0
LB   0.30 Hz
GB   0
PC   1.00

2.484
2.490
2.495

3.301

6.766
6.793
7.077
7.134
7.193
7.229
7.250
7.257
7.276
7.284
7.304
7.332
7.387
7.399
7.407
7.415
7.422
7.451
7.619
7.646
7.667
7.676
7.696
7.704
7.725
10.500
10.600

1.00
0.72
4.70
3.48
1.00

0.93

7j

ppm
1   2   3   4   5   6   7   8   9   10   11

ICCBS-HEJ[LAB-104]
7/4/2013

File: MA#4
Sample: MAQBOOL AHMED /DR HUMAYUN PERVEZ/INS OF CHEMICAL SC/BZU MULTAN
Instrument: JEOL JMS 600-H
Inlet: My Inlet

Date Run: 07-04-2013 (Time Run: 09:55:14)

Ionization mode: EI+

R.T.: 8

Scan: 10
Base: m/z 528; 88.3%FS TIC: 9775015

#Ions: 379

5a

5d

ICCBS-HEJ[LAB-104]
7/4/2013

File: MA#7
Date Run: 07-04-2013 (Time Run: 10:13:19)
Sample: MAQBOOL AHMED /DR HUMAYUN PERVEZ /INS OF CHEMICAL SC/BZU MULTAN
Instrument: JEOL JMS 600-H
Inlet: My Inlet

Ionization mode: EI+

R.T.: 81

#Ions: 497

Scan: 9-11
Base: m/z 532; 99.5%FS TIC: 10122690

5g

ICCBS-HEJ[LAB-104]
7/4/2013
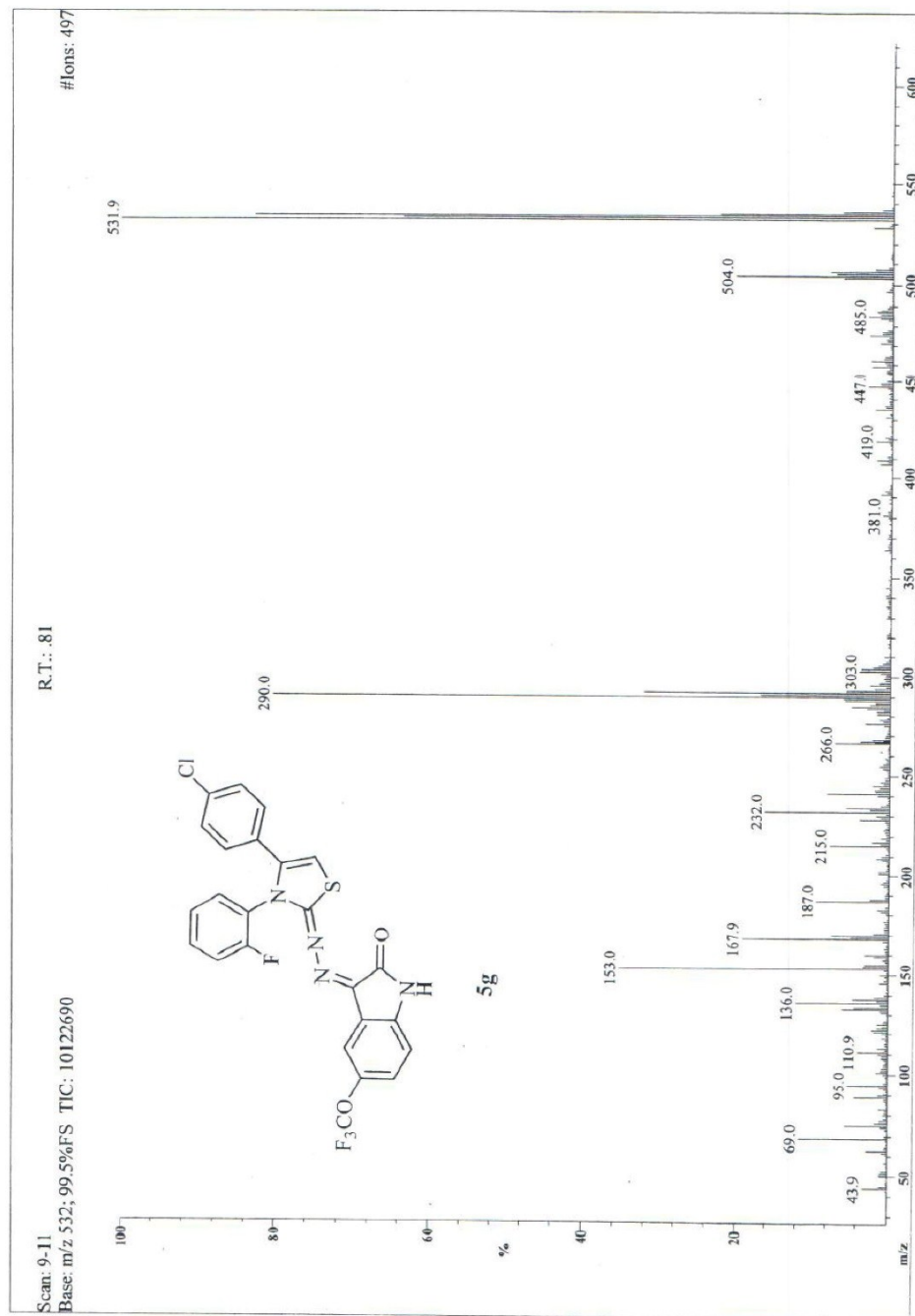
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Sample: MAQBOOL AHMED /DR HUMAYUN PERVEZ /INS OF CHEMICAL SC/BZU MULTAN
Instrument: JEOL JMS 600-H
Inlet: My Inlet

Ionization mode: EI+

R.T.:.98

#Ions: 519

Scan: 12
Base: m/z 582; 82.1%FS TIC: 12303395

5j

ICCBS-HEJ[LAB-104]
7/4/2013
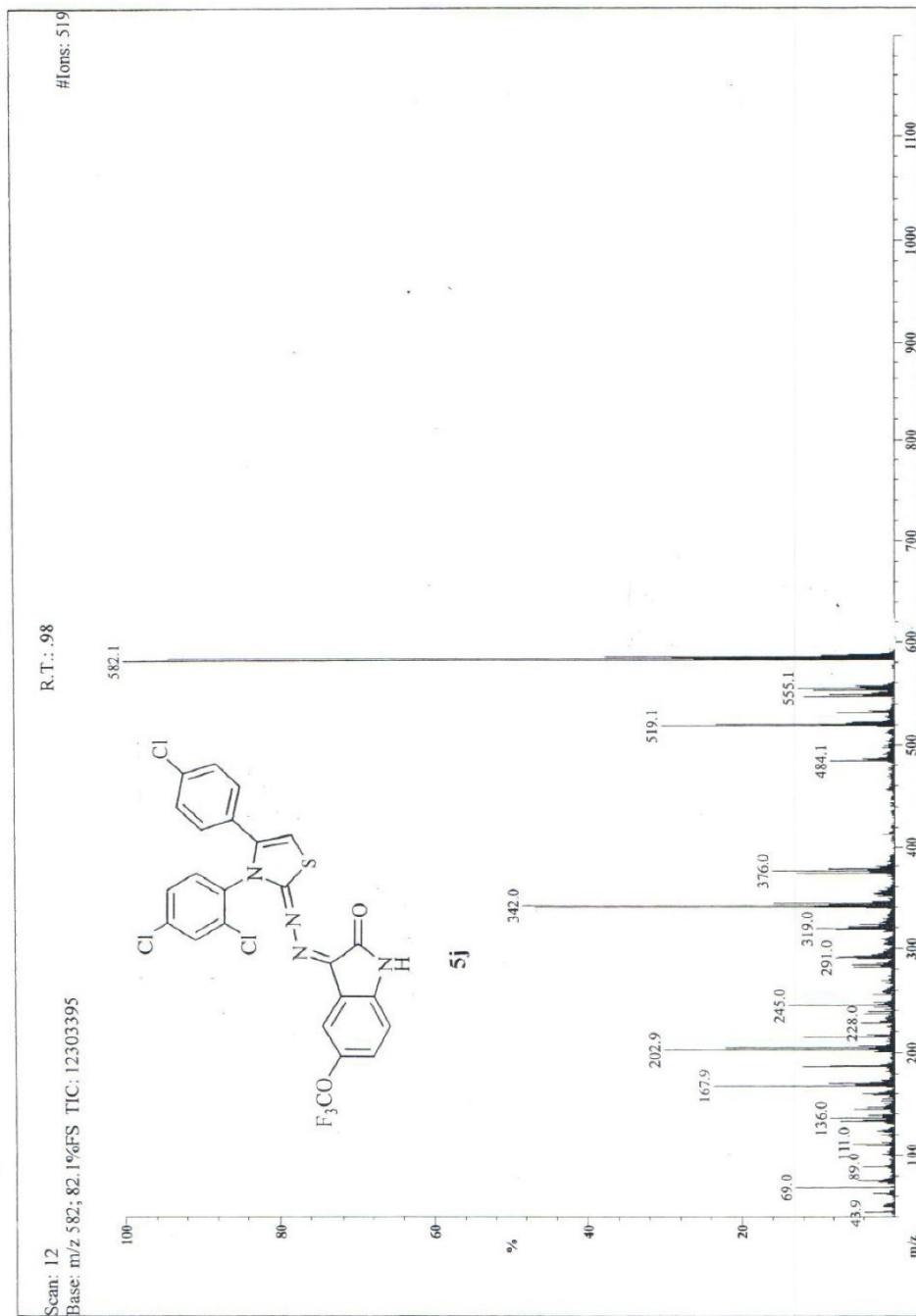
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Instrument: JEOL JMS 600-H
Inlet: **My Inlet**   Ionization mode: EI+

R.T.: 2.48

#Ions: 210

Scan: 29
Base: m/z 284; 17.9%FS TIC: 2376778

6a

ICCBS-HEJ[LAB-104]
7/4/2013
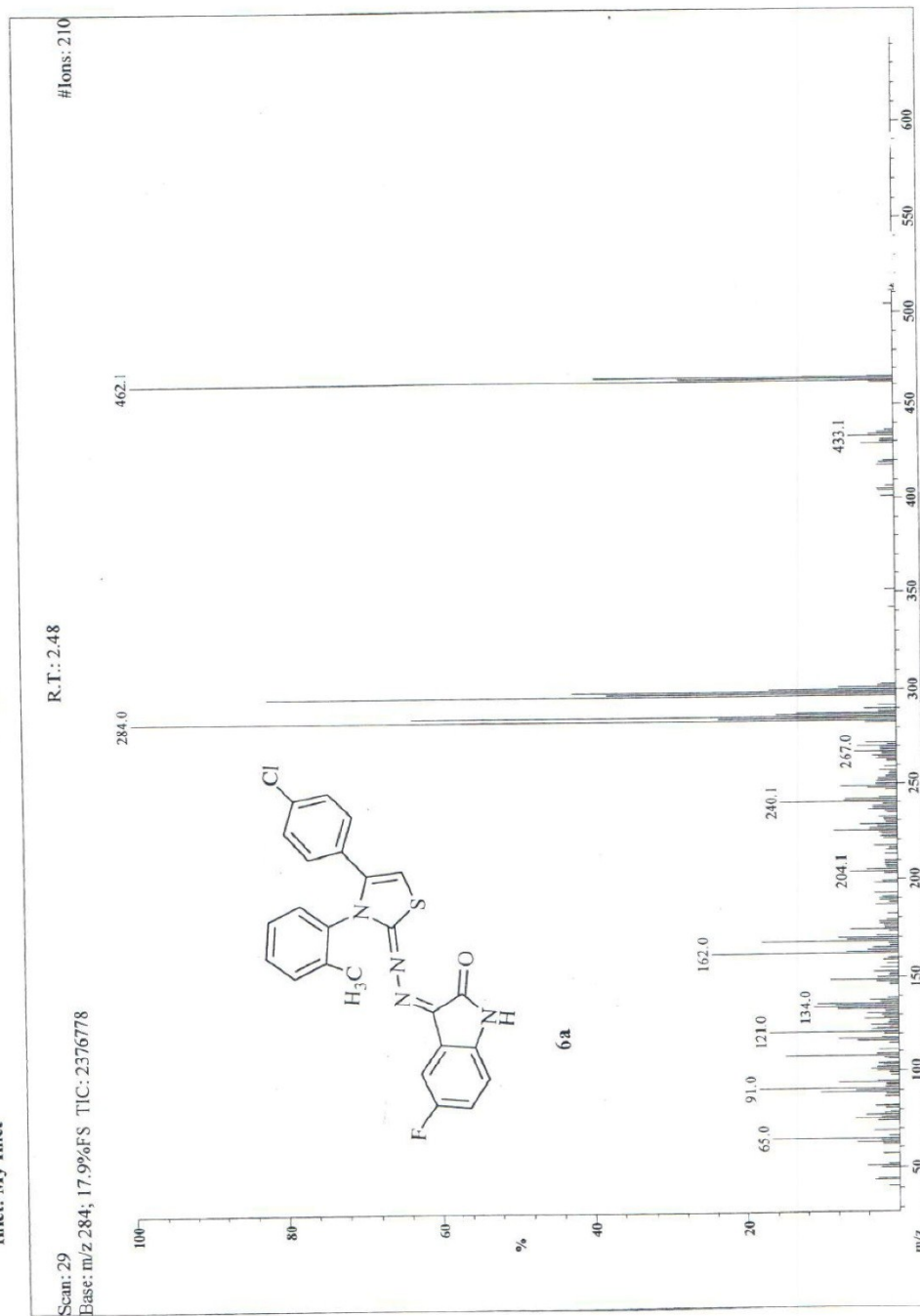
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Sample: MAQBOOL AHMED /DR HUMAYUN PERVEZ /INS OF CHEMICAL SC/BZU MULTAN
Instrument: JEOL JMS 600-H
Inlet: My Inlet

Date Run: 07-04-2013 (Time Run: 11:22:21)

Ionization mode: EI+
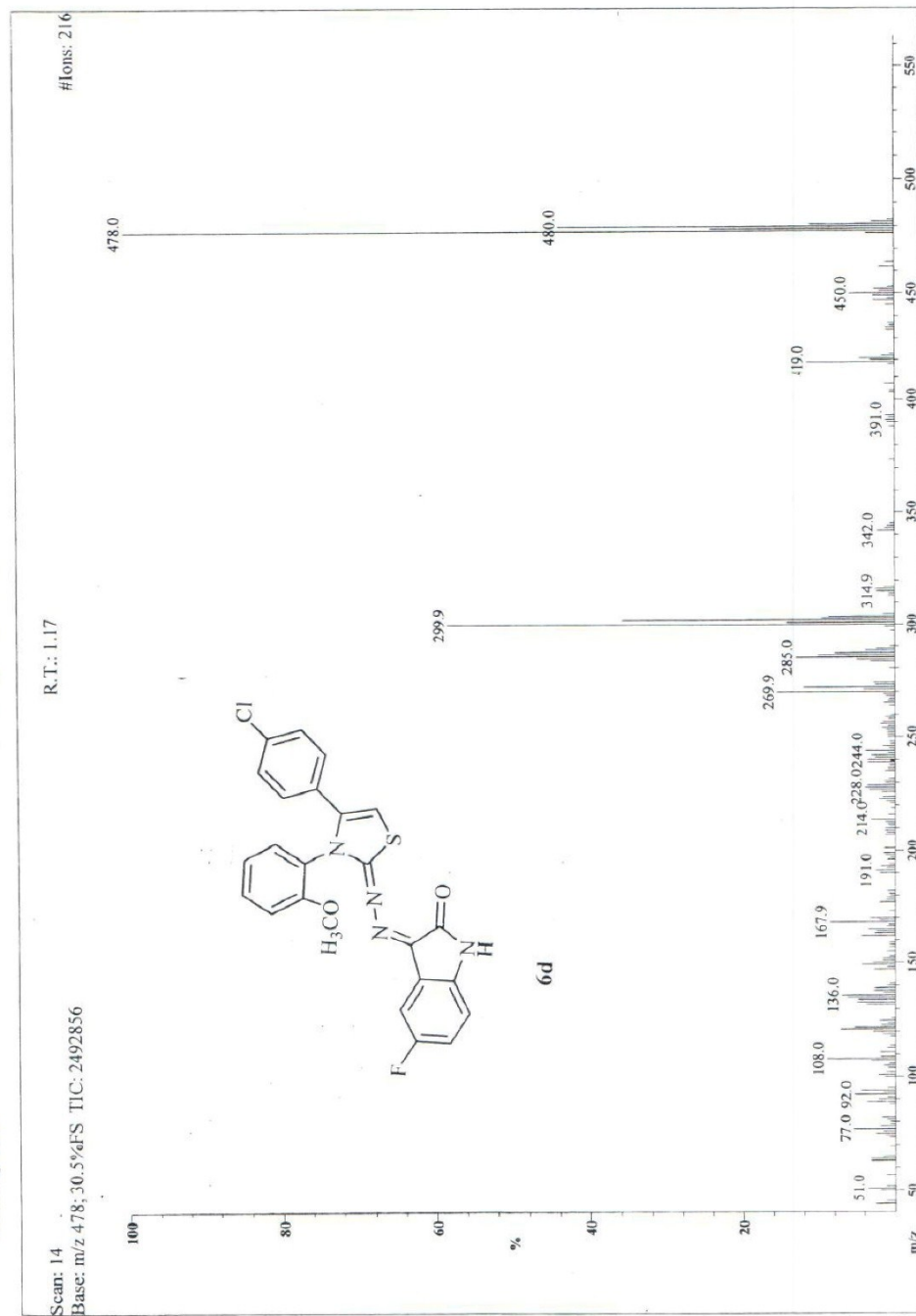
R.T.: 1.17

#Ions: 216

Scan: 14
Base: m/z 478; 30.5%dFS   TIC: 2492856

6d

ICCBS-HEJ[LAB-104]
7/4/2013

File: MA#21
Sample: MAQBOOL AHMED /DR HUMAYUN PERVEZ /INS OF CHEMICAL SC/BZU MULTAN
Instrument: JEOL JMS 600-H
Inlet: My Inlet

Date Run: 07-04-2013 (Time Run: 11:31:07)

Ionization mode: EI+

R.T.: 1.17

Scan: 14
Base: m/z 466; 9.9%FS TIC: 750587

#Ions: 79

6g

SCAN GRAPH. Flagging=M/z.
Scan 14-7.04 Entries=136. 100% Int.=4211.
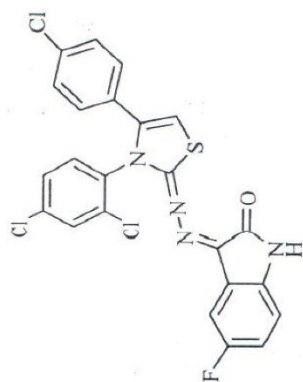
%age

SCAN GRAPH. Flagging=M/z.
Scan 13-6:33. Entries=223. 100% Int.=7099.
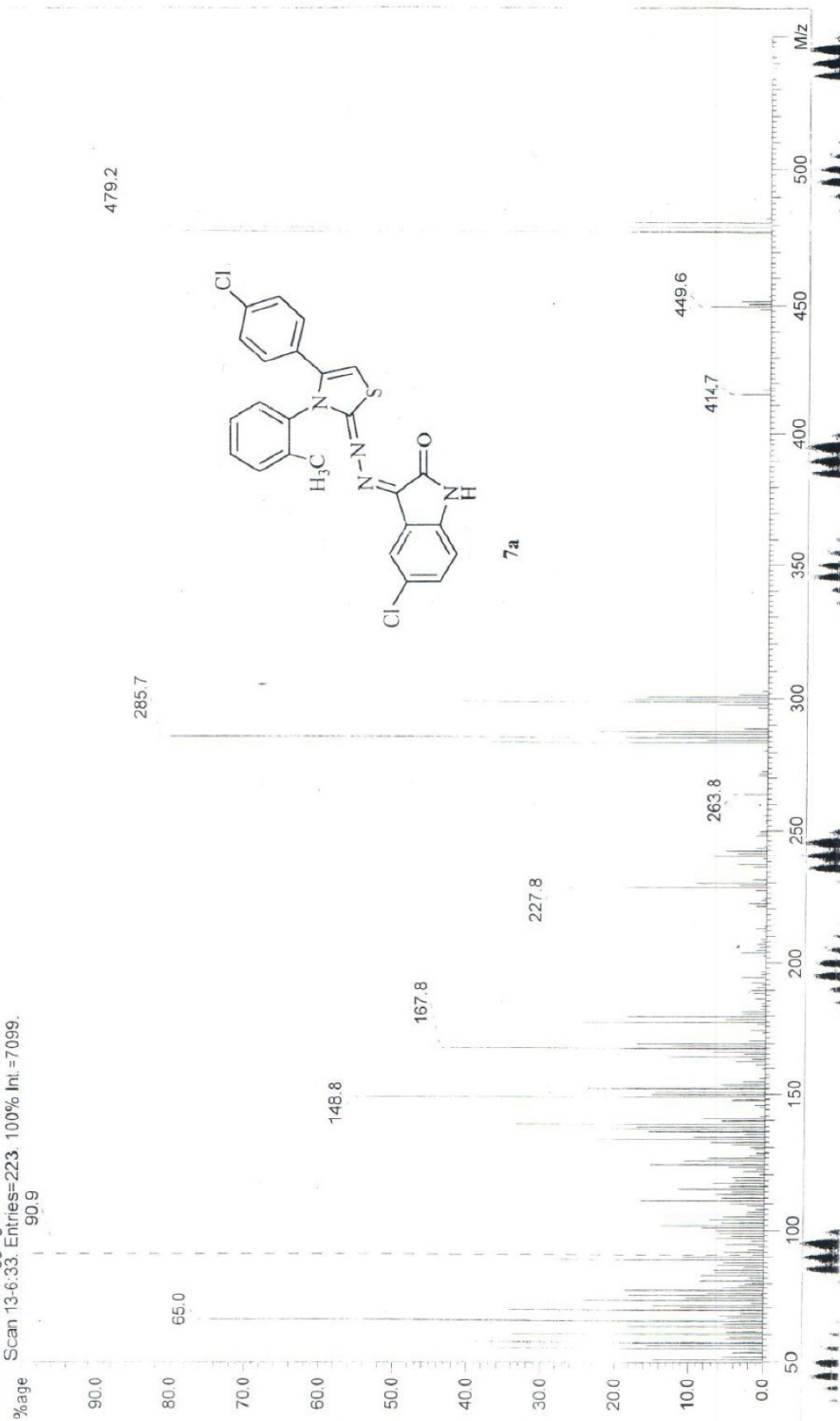
SCAN GRAPH. Flagging=M/z.
Scan 9-4:40. Entries=220. 100% Int.=17050.
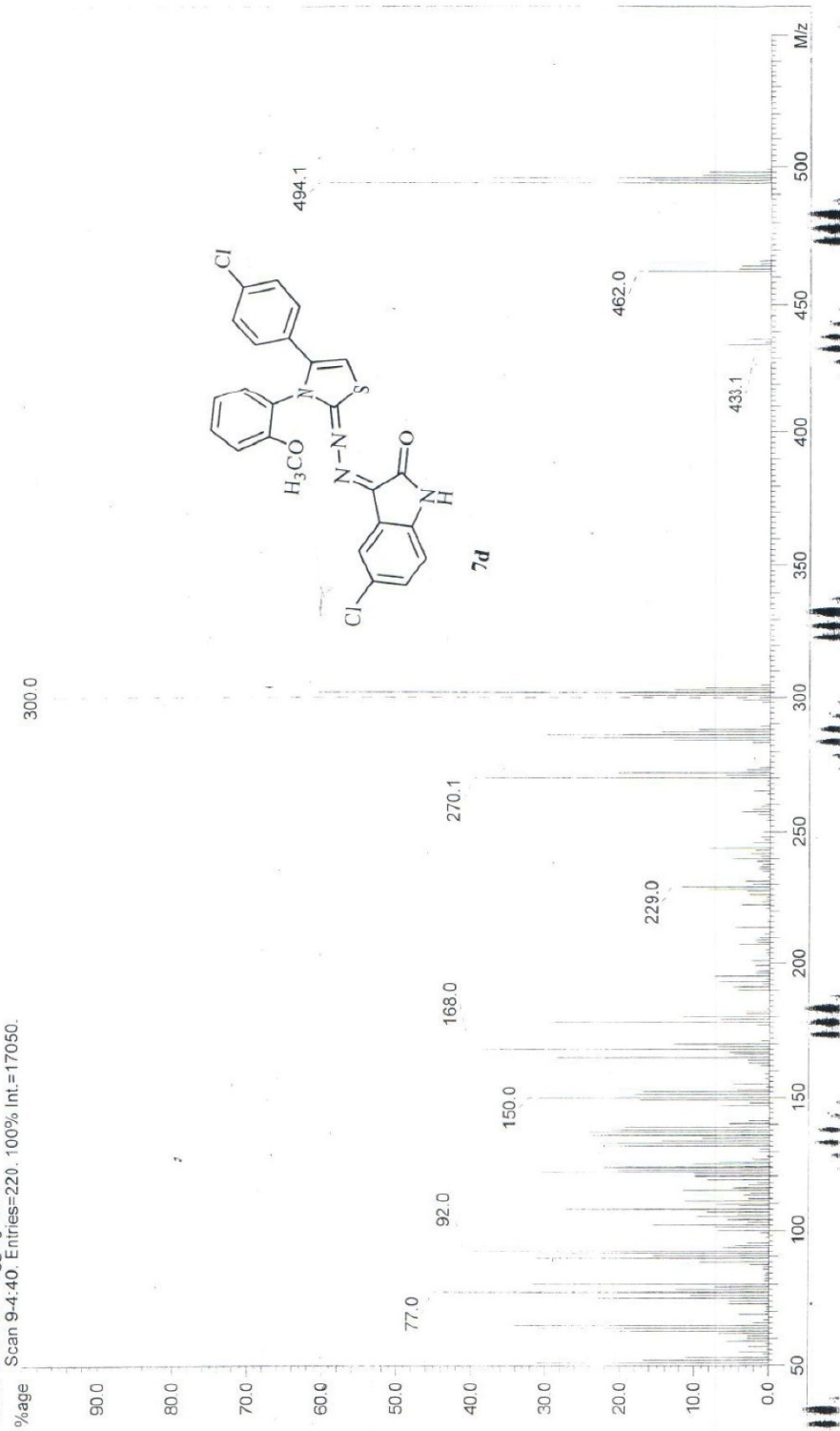
SCAN GRAPH. Flagging=M/z
%age   Scan 8-4.09. Entries=216. 100% Int.=12124.
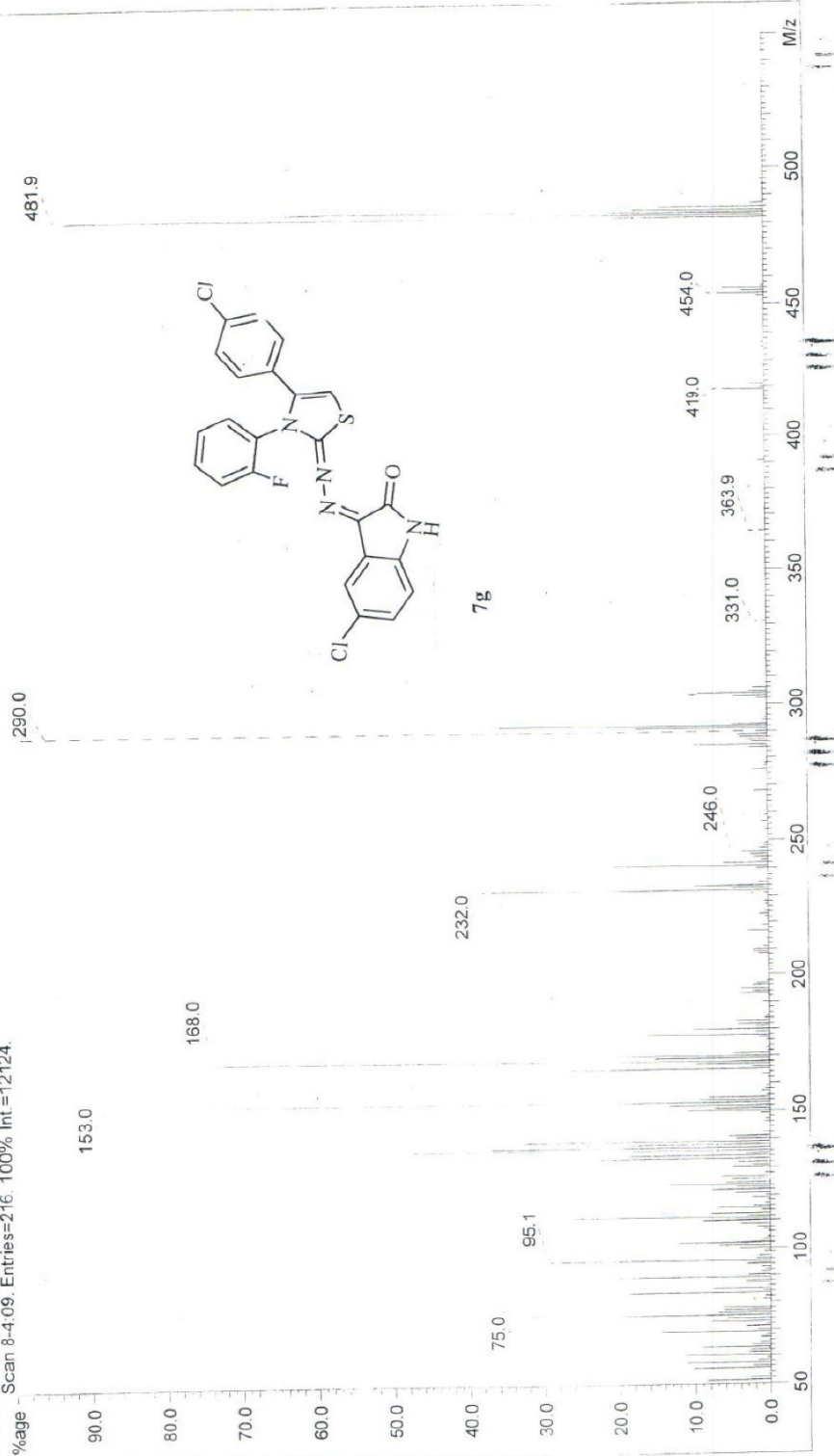
7g

M/z

SCAN GRAPH Flagging=M/z.
Scan 10-5:28. Entries=123. 100% Int.=5973.

%age

90.0

80.0

70.0

60.0

50.0

40.0

30.0

20.0

10.0

0.0

75.1

111.0

137.0

171.0

231.1

250.1

308.1

322.1

472.0

500.0

M/z

7j