

**Design, Synthesis, *In vitro*, and *In vivo* Biological Evaluation of Triazolopyrimidines Hybrids as Multitarget Directed Anticancer Agents**

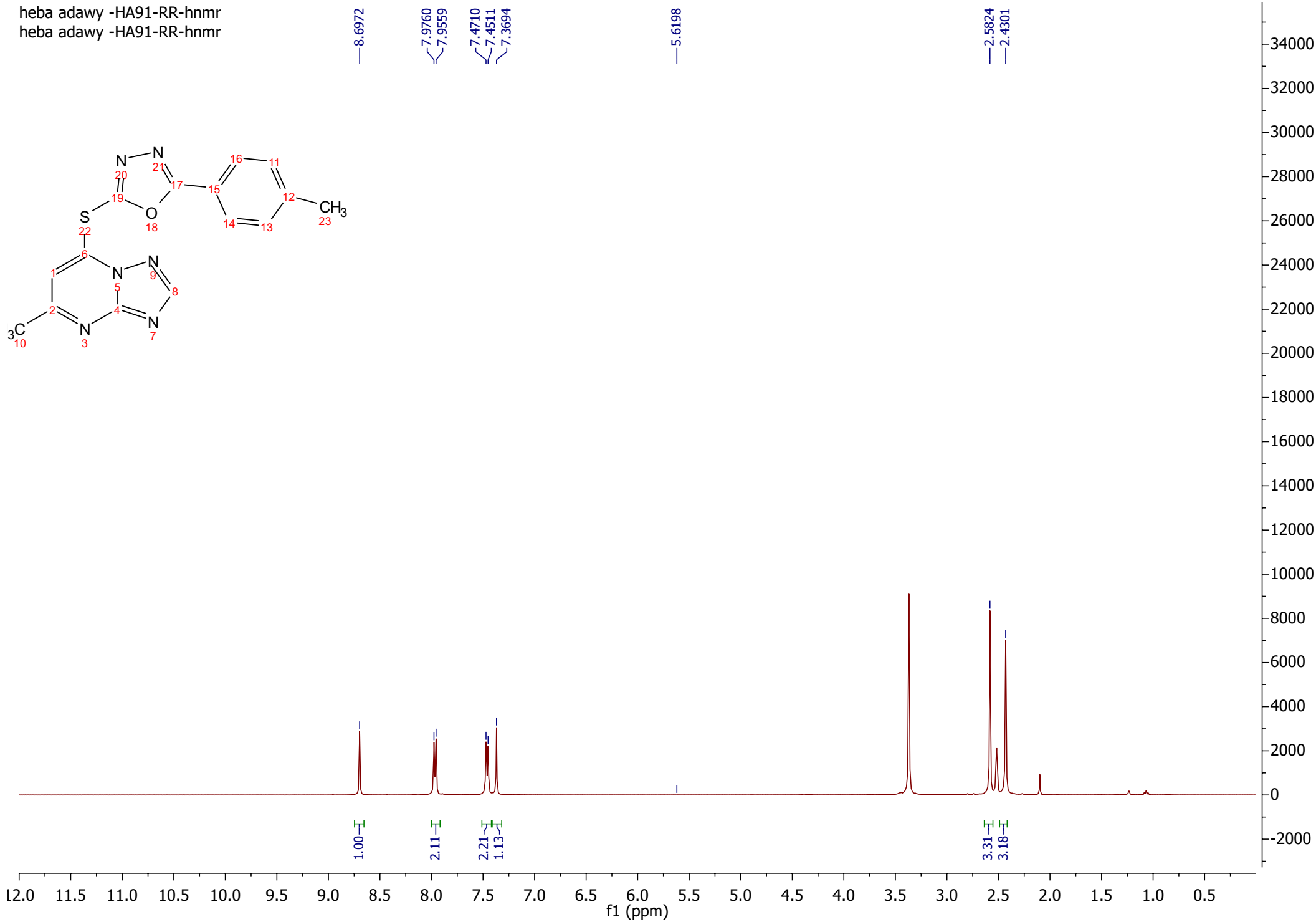
Heba A. Adawy<sup>1</sup>, Samar S. Tawfik<sup>1†</sup>, Abdullah A. Elgazar<sup>2</sup>, Khalid B. Selim<sup>1</sup>, Fatma E. Goda<sup>1</sup>

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<sup>2</sup>*Department of Pharmacognosy, Faculty of Pharmacy, Kafr El Sheikh University, Kafr El Sheikh, Egypt*

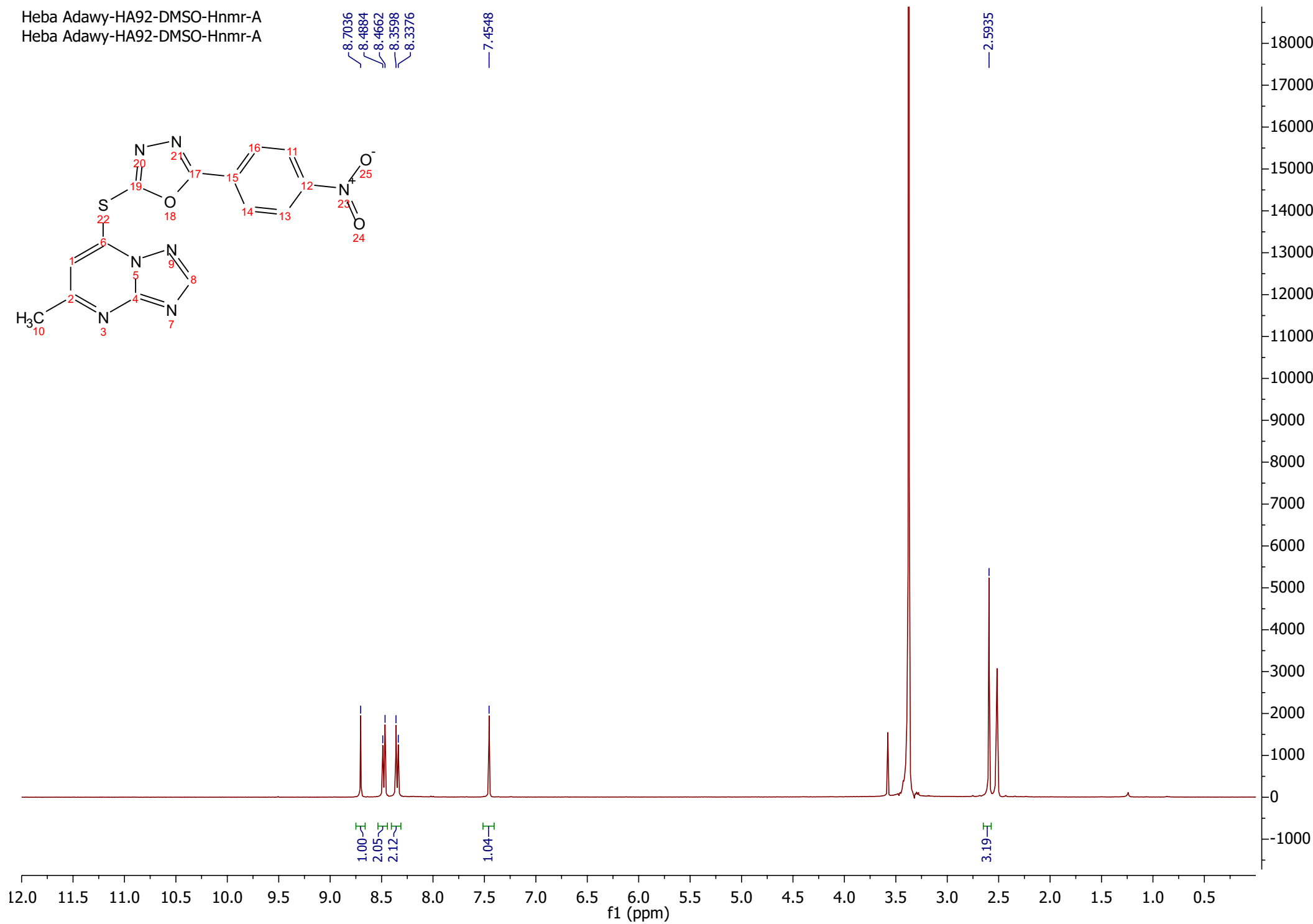
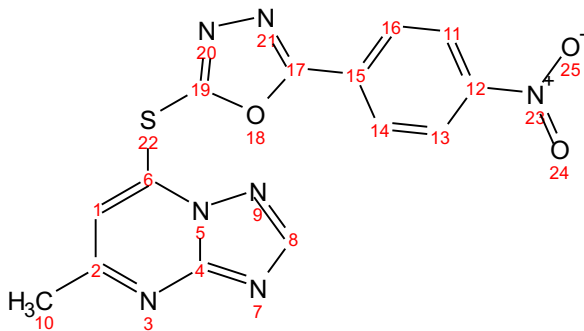
†*Corresponding author: Samar S. Tawfik (e-mail: drsamarelmasry@mans.edu.eg)*

heba adawy -HA91-RR-hnmr  
heba adawy -HA91-RR-hnmr

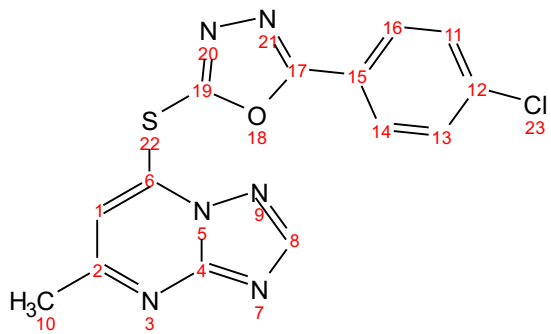


Heba Adawy-HA92-DMSO-Hnmr-A  
Heba Adawy-HA92-DMSO-Hnmr-A

8.7036  
8.4884  
8.4662  
8.3598  
8.3376  
7.4548



Heba Saad - HA93 - Hnmr - T  
Heba Saad - HA93 - Hnmr - T



— 8.6988

— 8.1060

— 8.0846

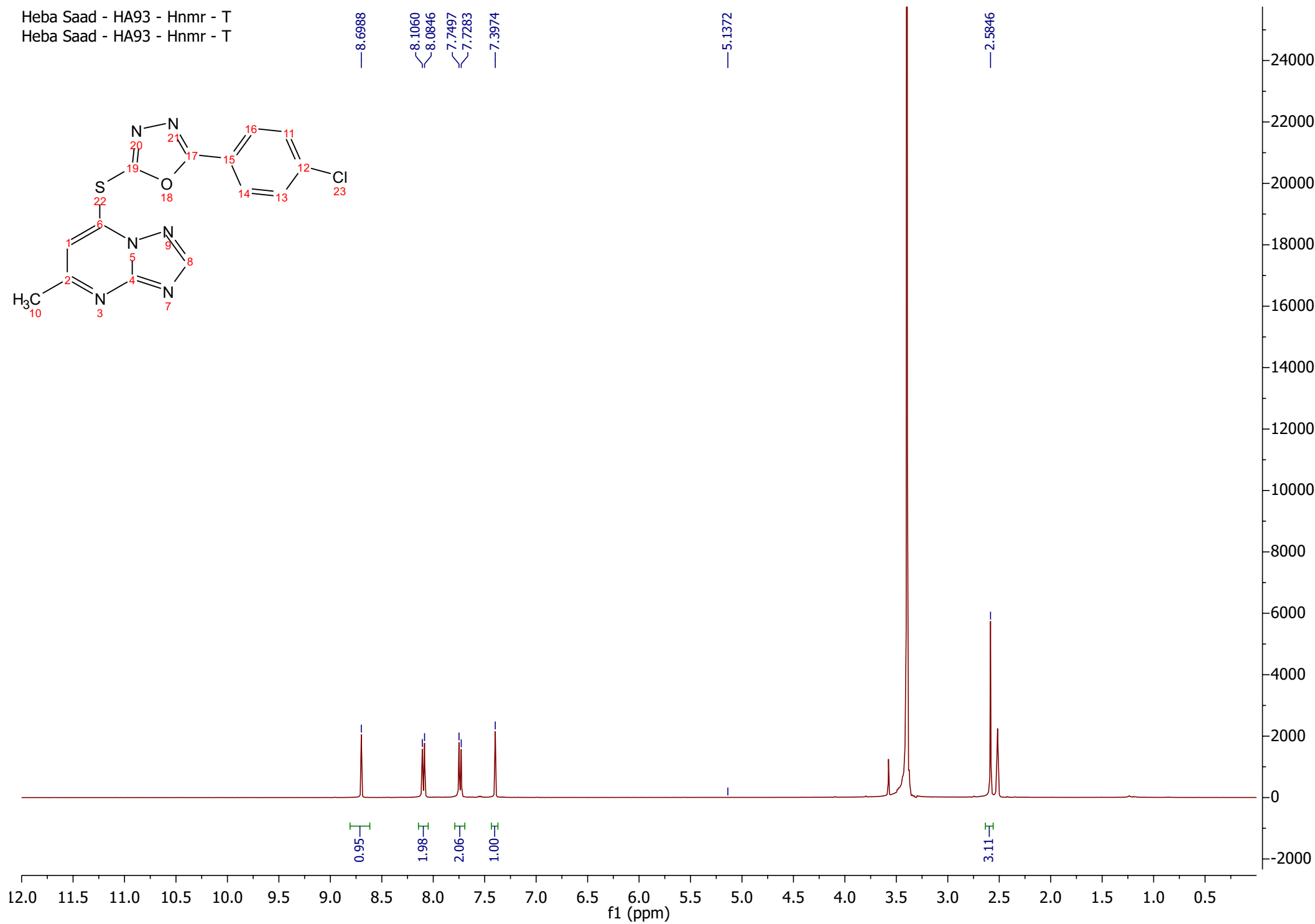
— 7.7497

— 7.7283

— 7.3974

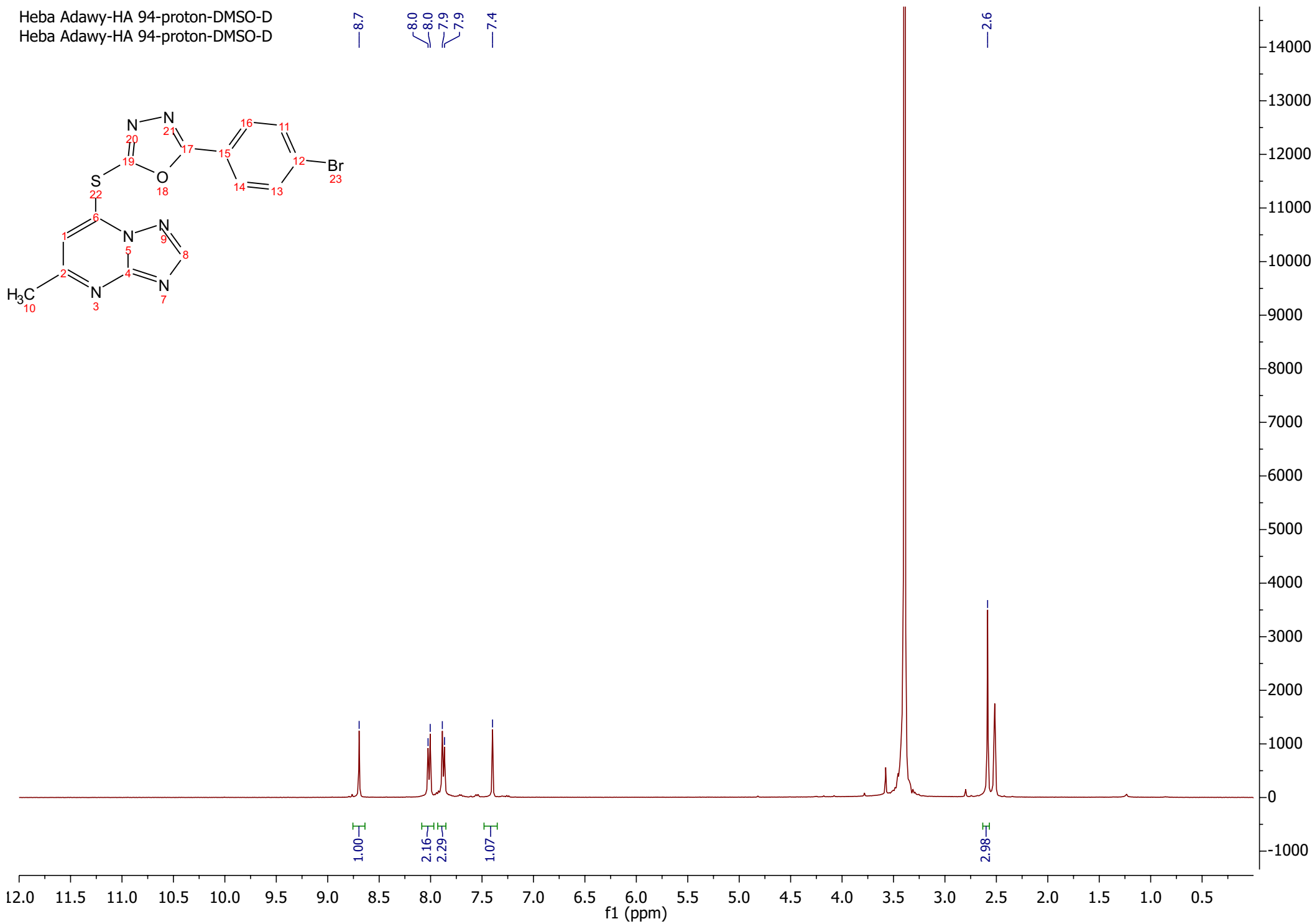
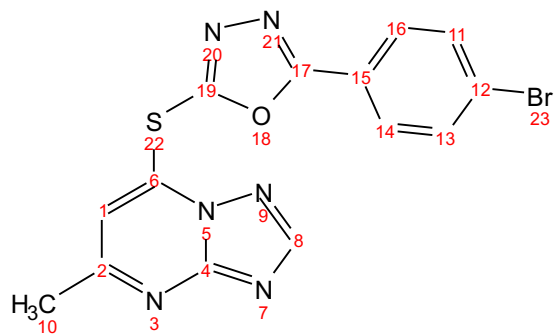
— 5.1372

— 2.5846

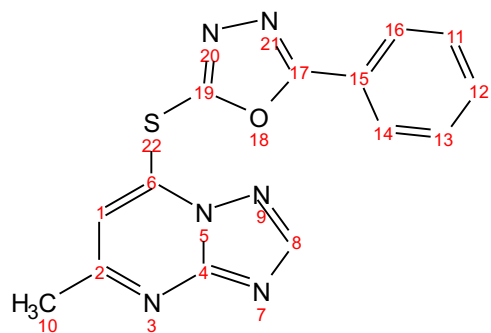


Heba Adawy-HA 94-proton-DMSO-D  
Heba Adawy-HA 94-proton-DMSO-D

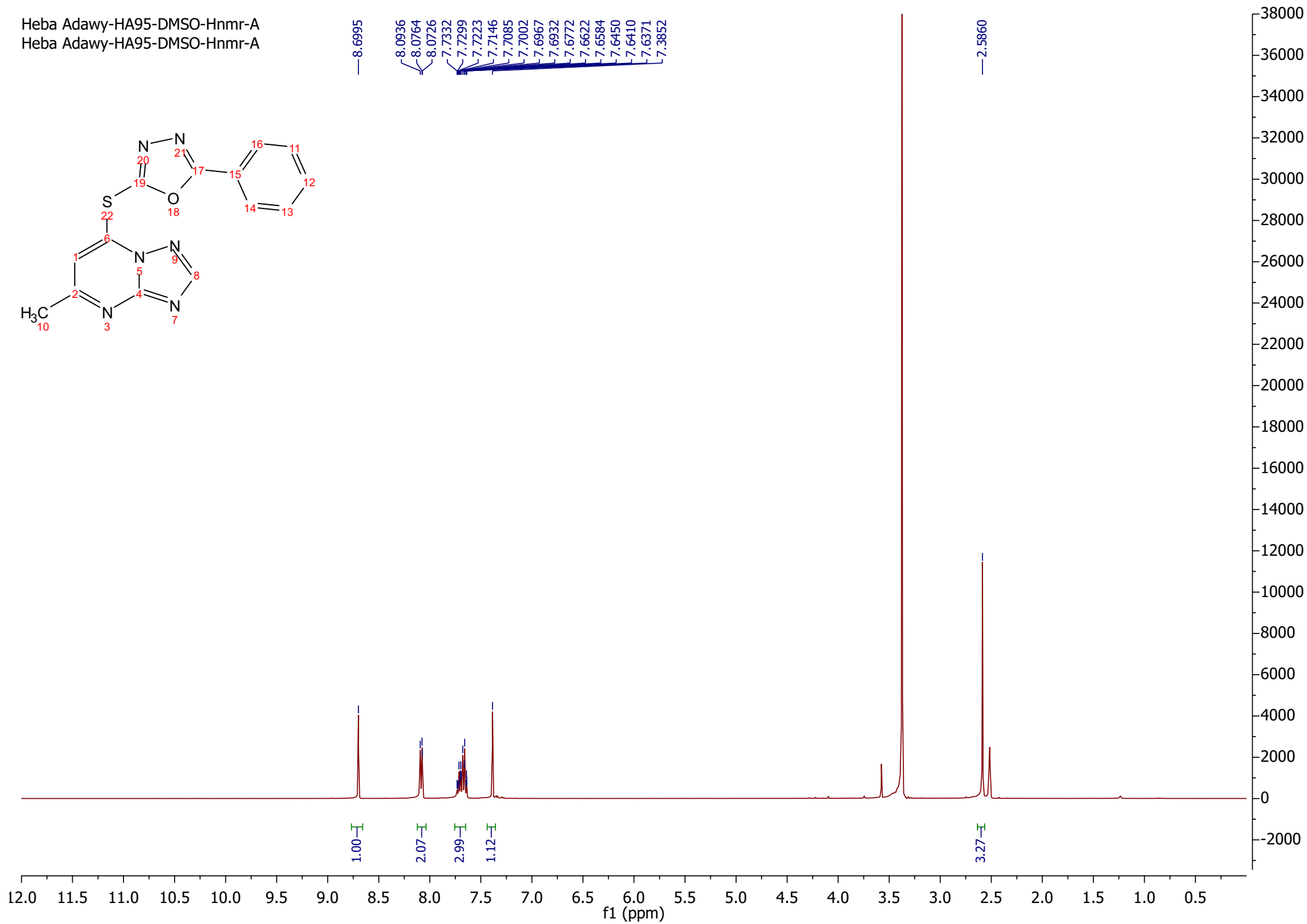
—8.7  
8.0  
8.0  
7.9  
7.9  
—7.4



Heba Adawy-HA95-DMSO-Hnmr-A  
Heba Adawy-HA95-DMSO-Hnmr-A



8.6995  
8.0936  
8.0764  
8.0726  
7.7332  
7.7299  
7.7223  
7.7146  
7.7085  
7.7002  
7.6967  
7.6932  
7.6772  
7.6622  
7.6584  
7.6450  
7.6410  
7.6371  
7.3852



heba adawy -HA81-RR-hnmr  
heba adawy -HA81-RR-hnmr

8.5998

8.0470

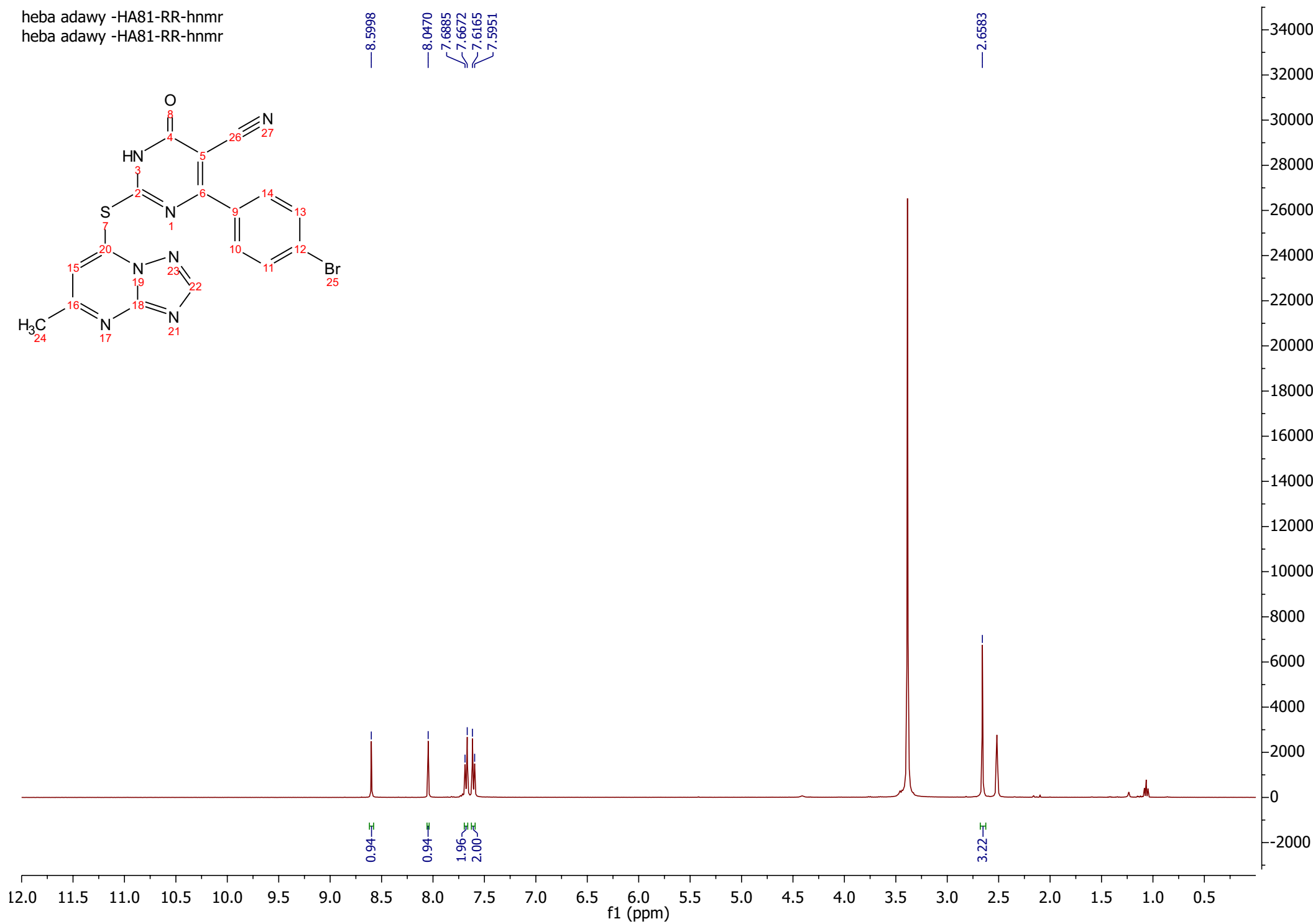
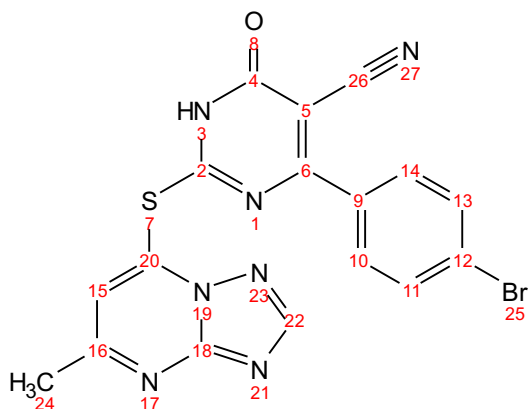
7.6685

7.6672

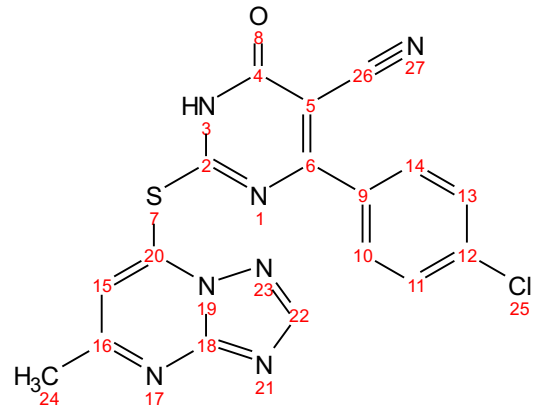
7.6165

7.5951

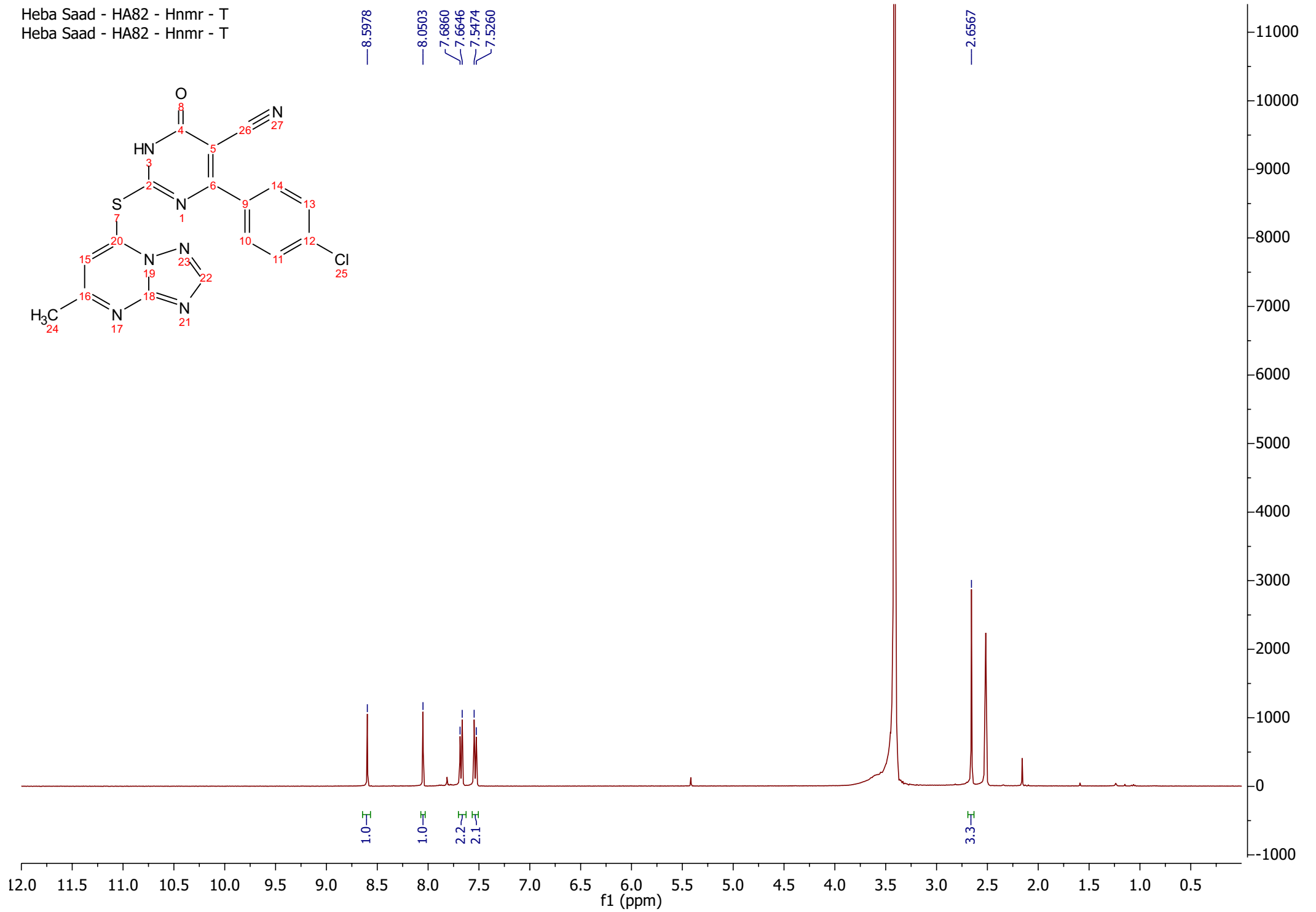
2.6583



Heba Saad - HA82 - Hnmr - T  
Heba Saad - HA82 - Hnmr - T

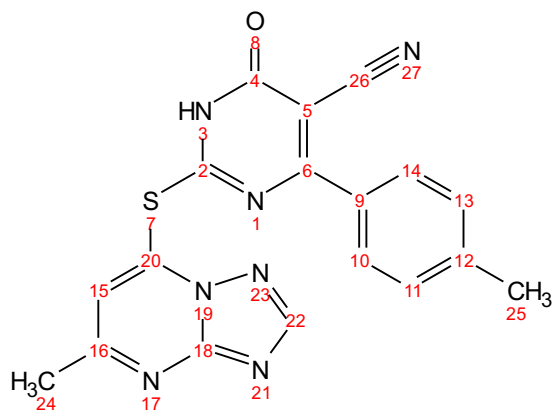


— 8.5978  
— 8.0503  
7.6860  
7.6646  
7.5474  
7.5260





Heba Saad - HA83 - Hnmr - T  
Heba Saad - HA83 - Hnmr - T



— 8.5989

— 8.0788

7.5486

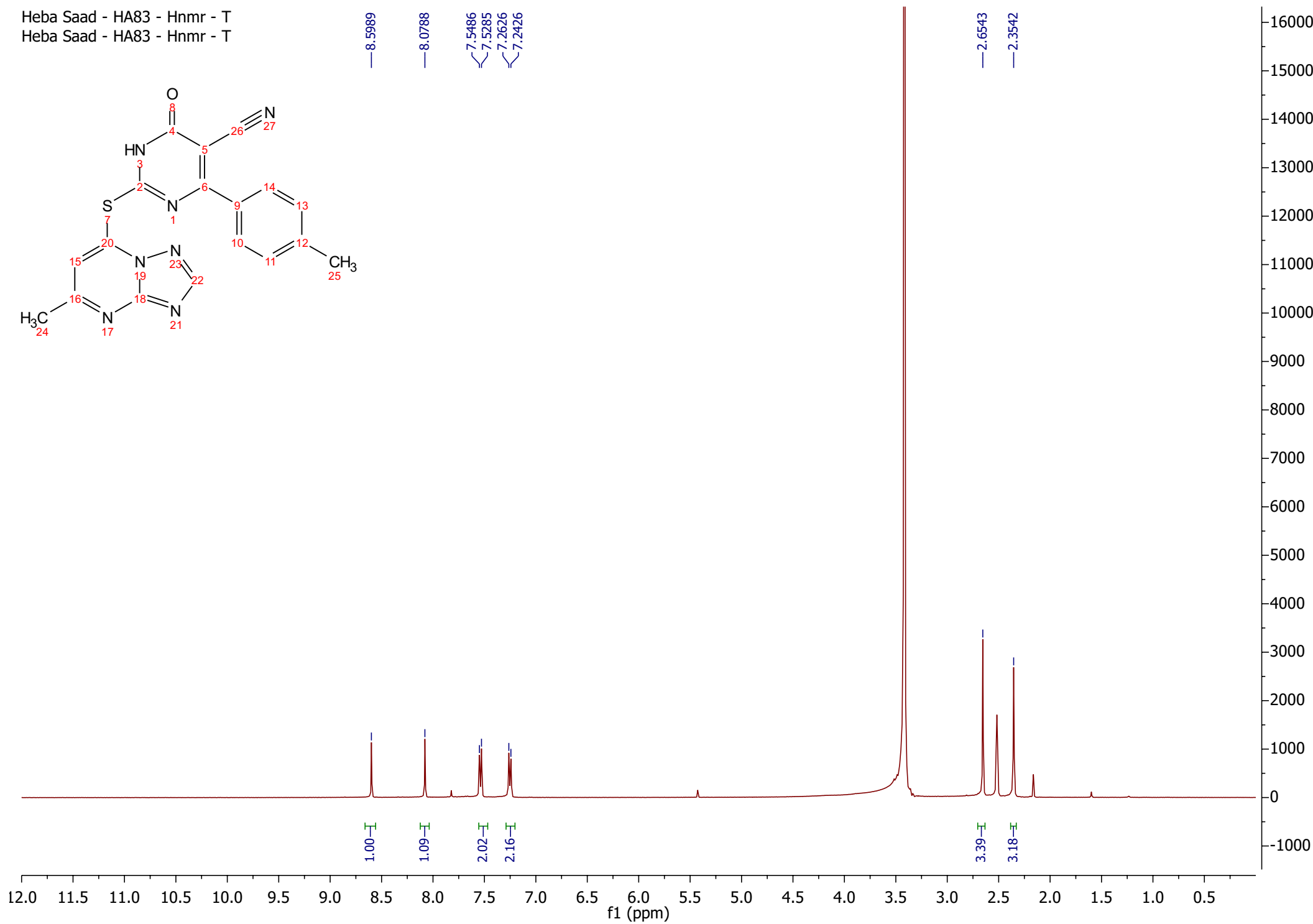
7.5285

7.2626

7.2426

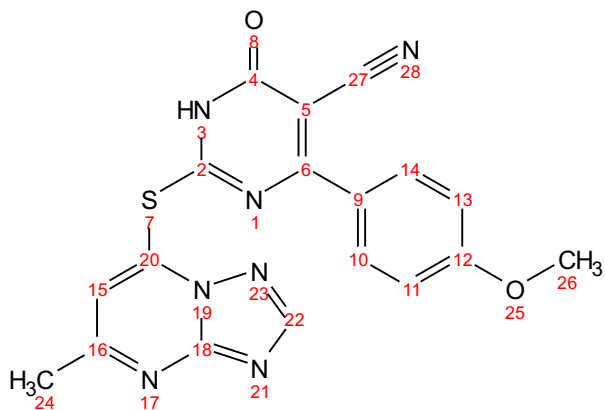
— 2.6543

— 2.3542



f1 (ppm)

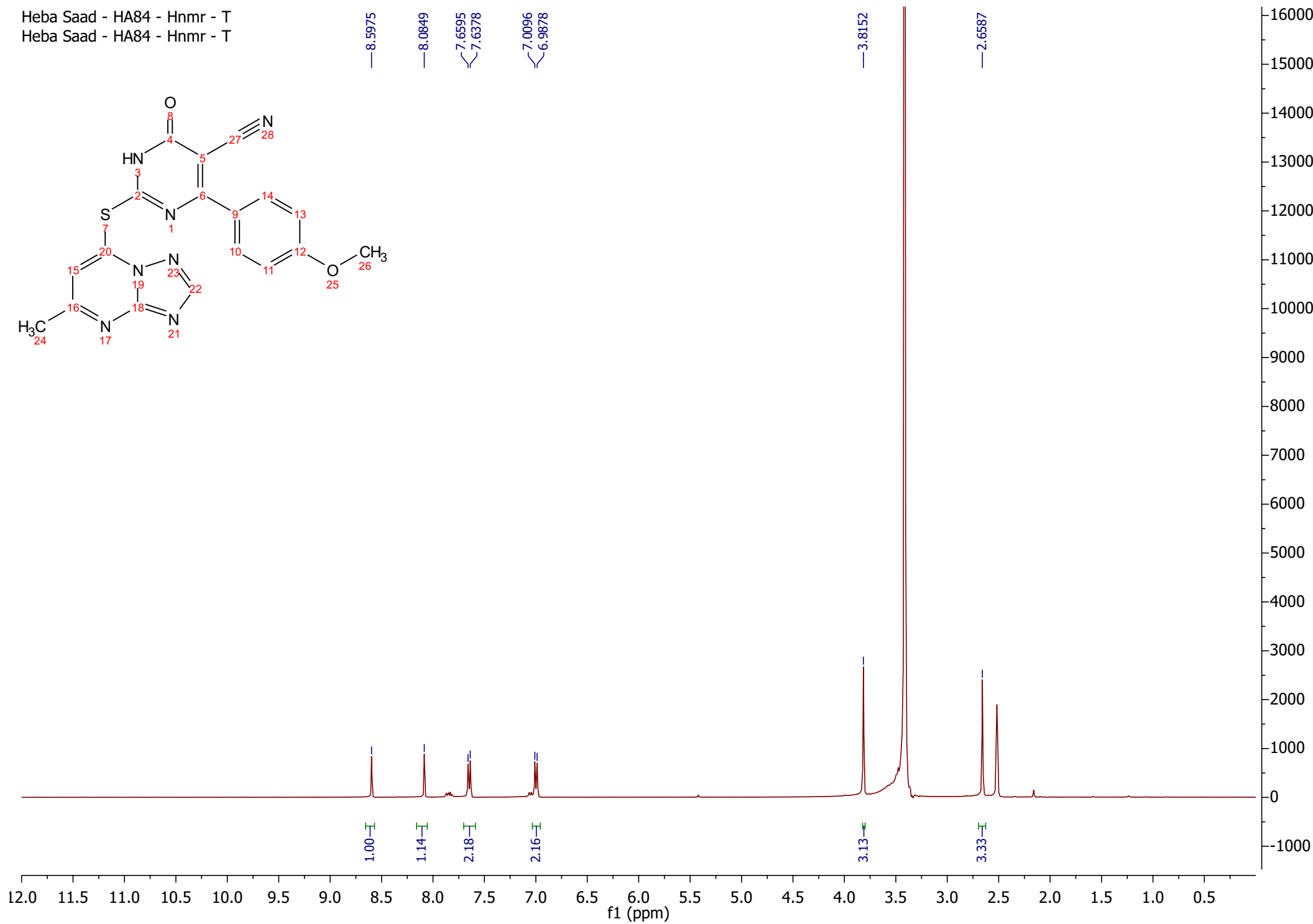
Heba Saad - HA84 - Hnmr - T  
Heba Saad - HA84 - Hnmr - T



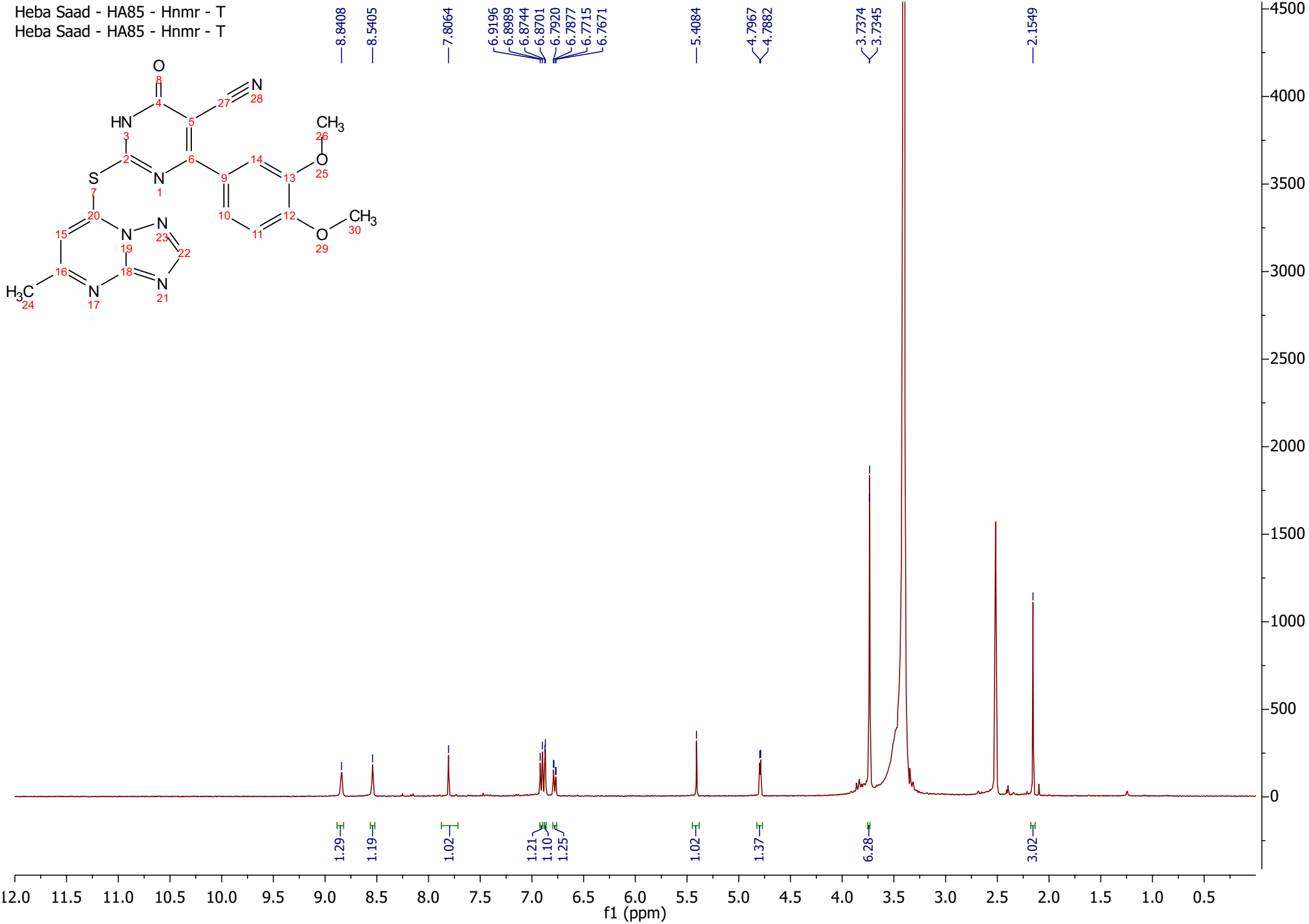
— 8.5975  
— 8.0849  
∩ 7.6595  
∩ 7.6378  
— 7.0096  
— 6.9878

— 3.8152

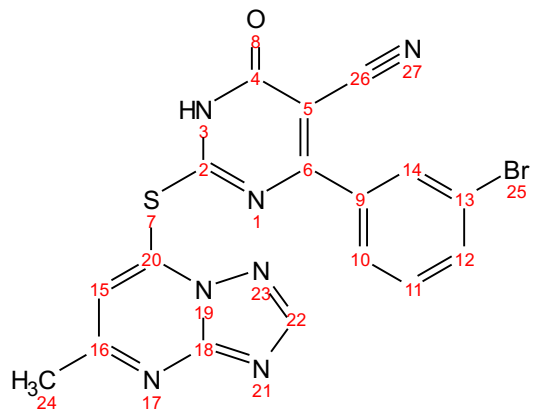
— 2.6587



Heba Saad - HA85 - Hnmr - T  
Heba Saad - HA85 - Hnmr - T

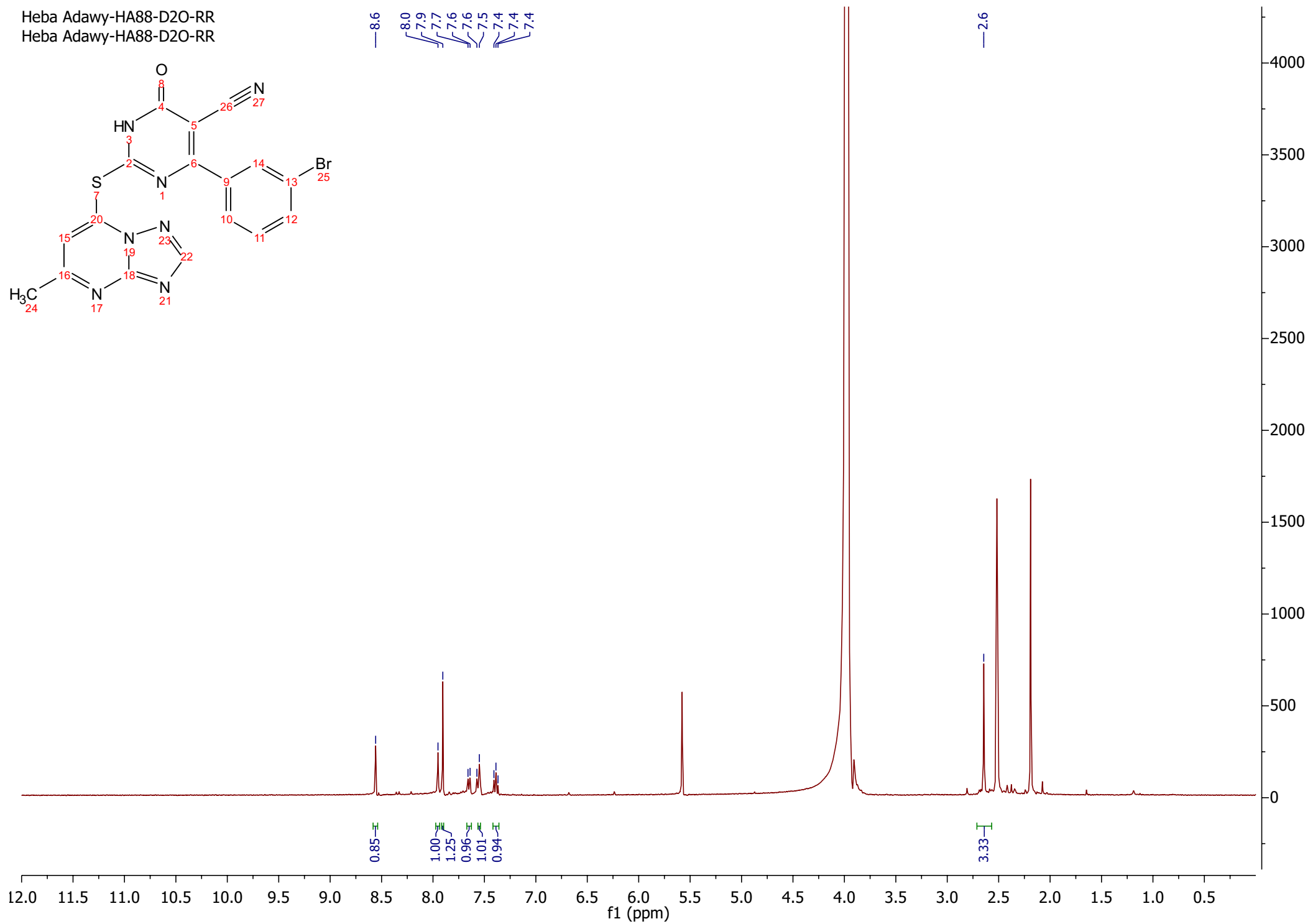


Heba Adawy-HA88-D2O-RR  
Heba Adawy-HA88-D2O-RR

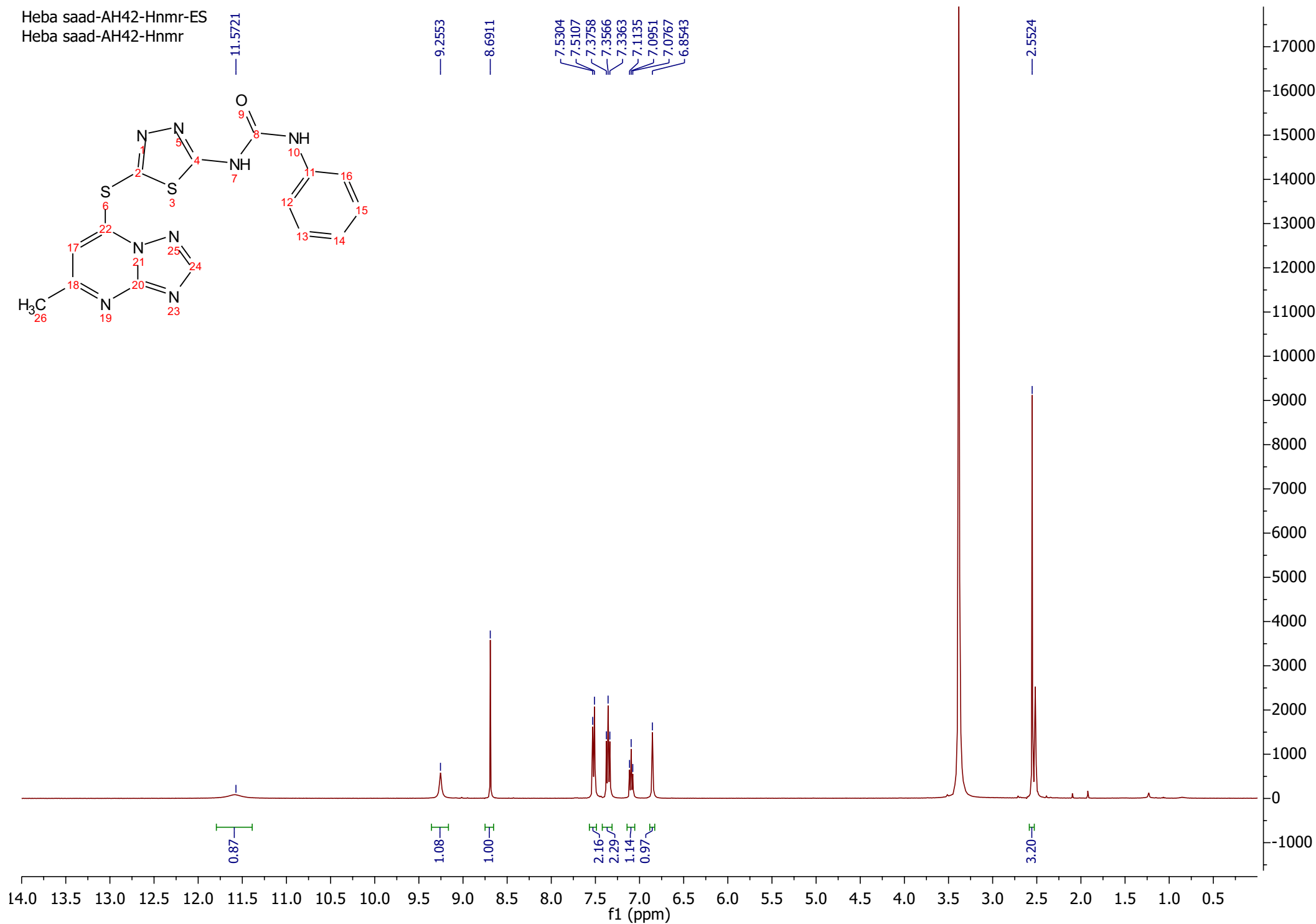
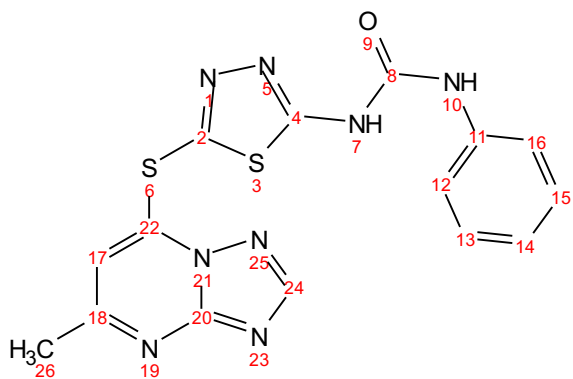


8.6  
8.0  
7.9  
7.7  
7.7  
7.6  
7.6  
7.5  
7.4  
7.4  
7.4

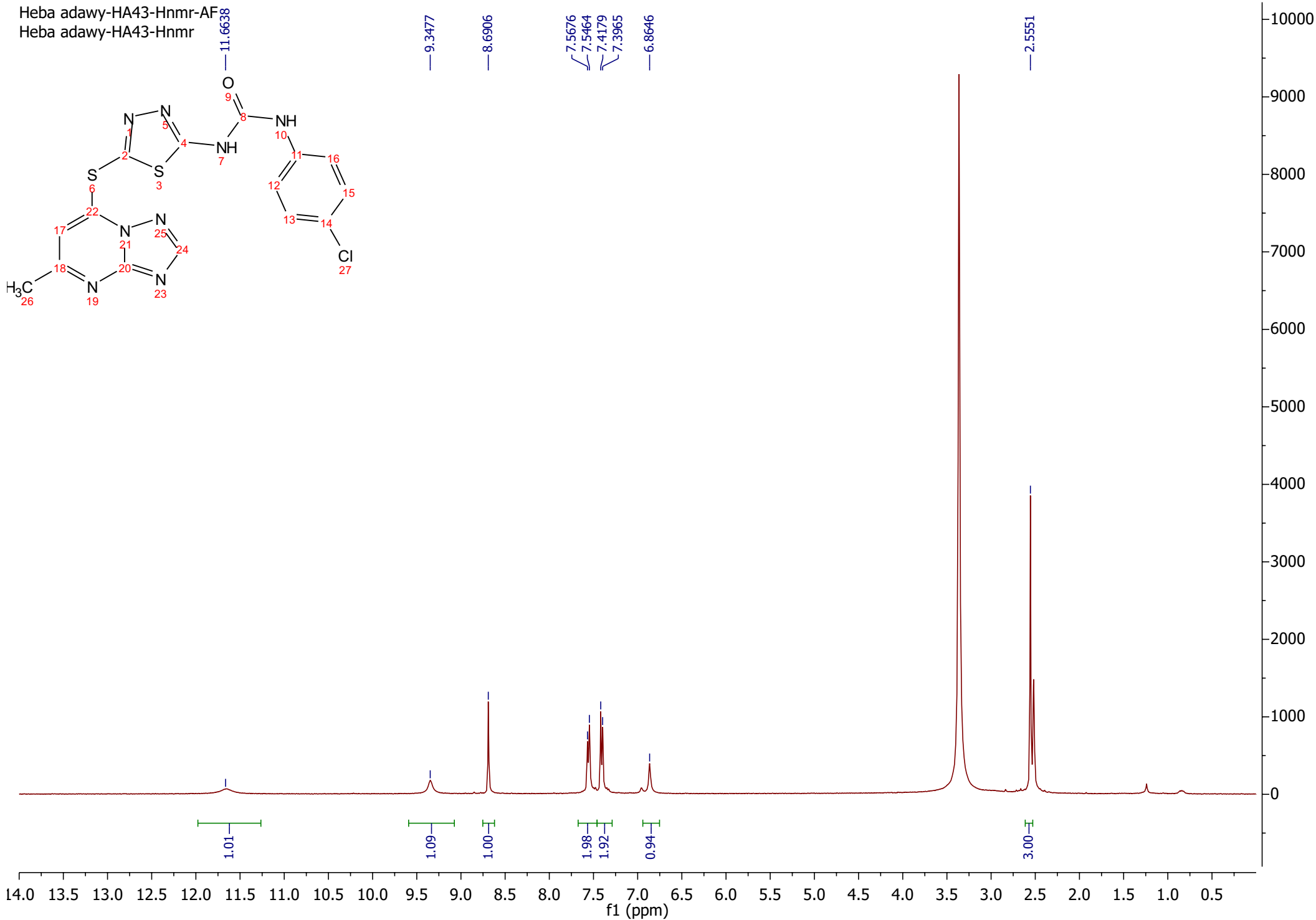
2.6



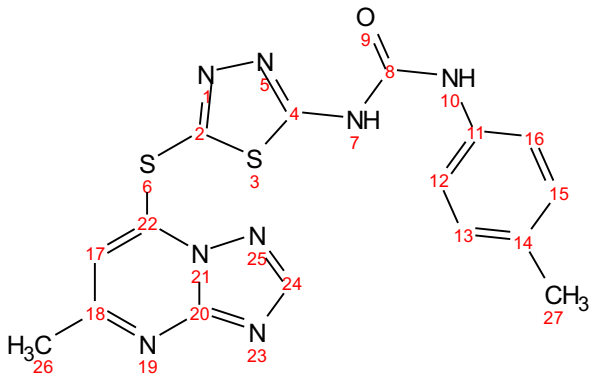
Heba saad-AH42-Hnmr-ES  
Heba saad-AH42-Hnmr



Heba adawy-HA43-Hnmr-AF  
Heba adawy-HA43-Hnmr



Heba adawy-HA44-Hnmr-AF  
Heba adawy-HA44-Hnmr



11.5125

9.0826

8.6859

7.4005

7.3803

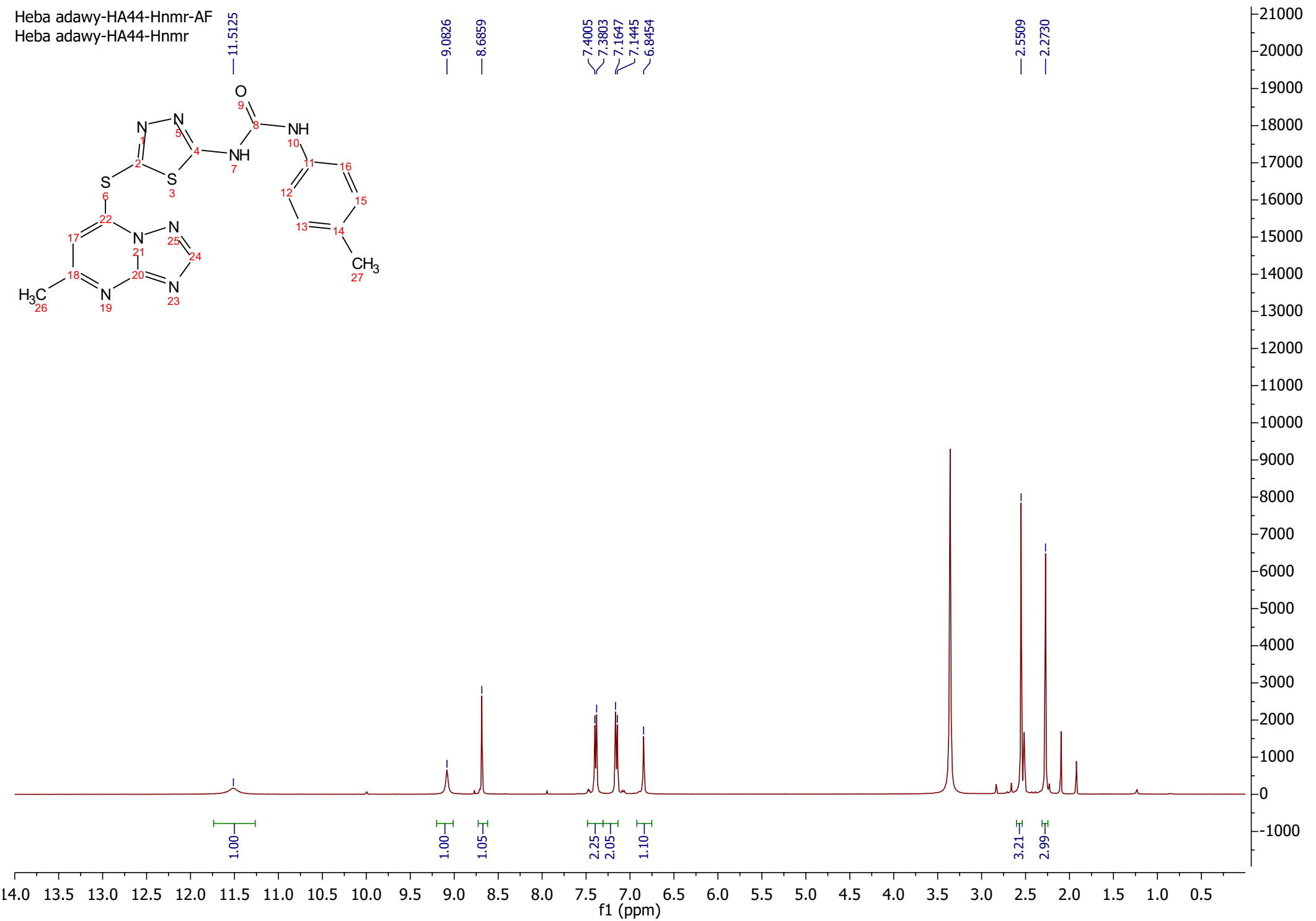
7.1647

7.1445

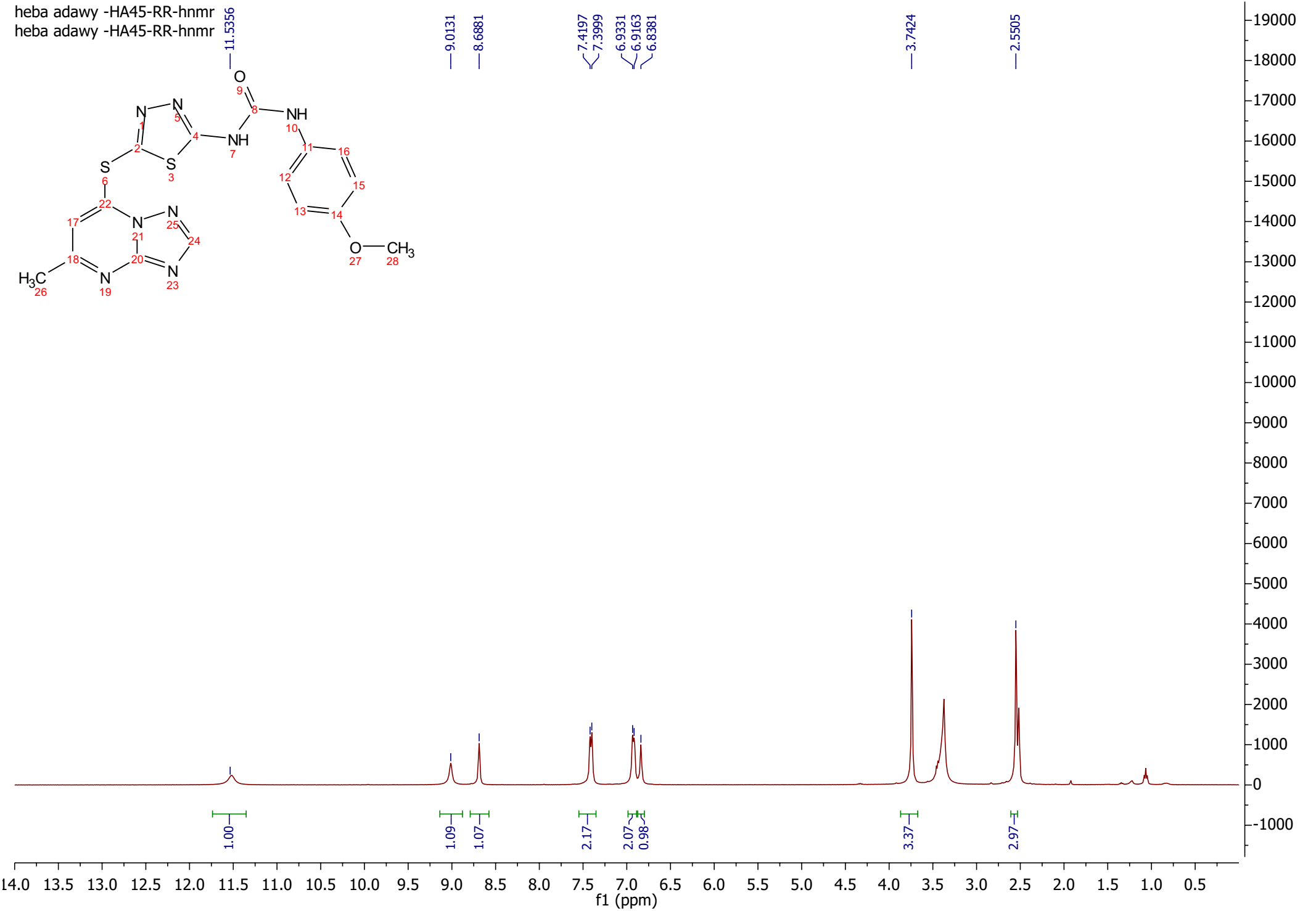
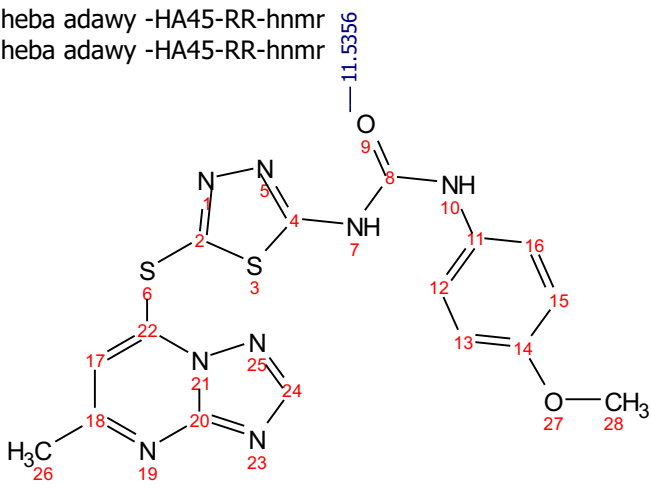
6.8454

2.5509

2.2730

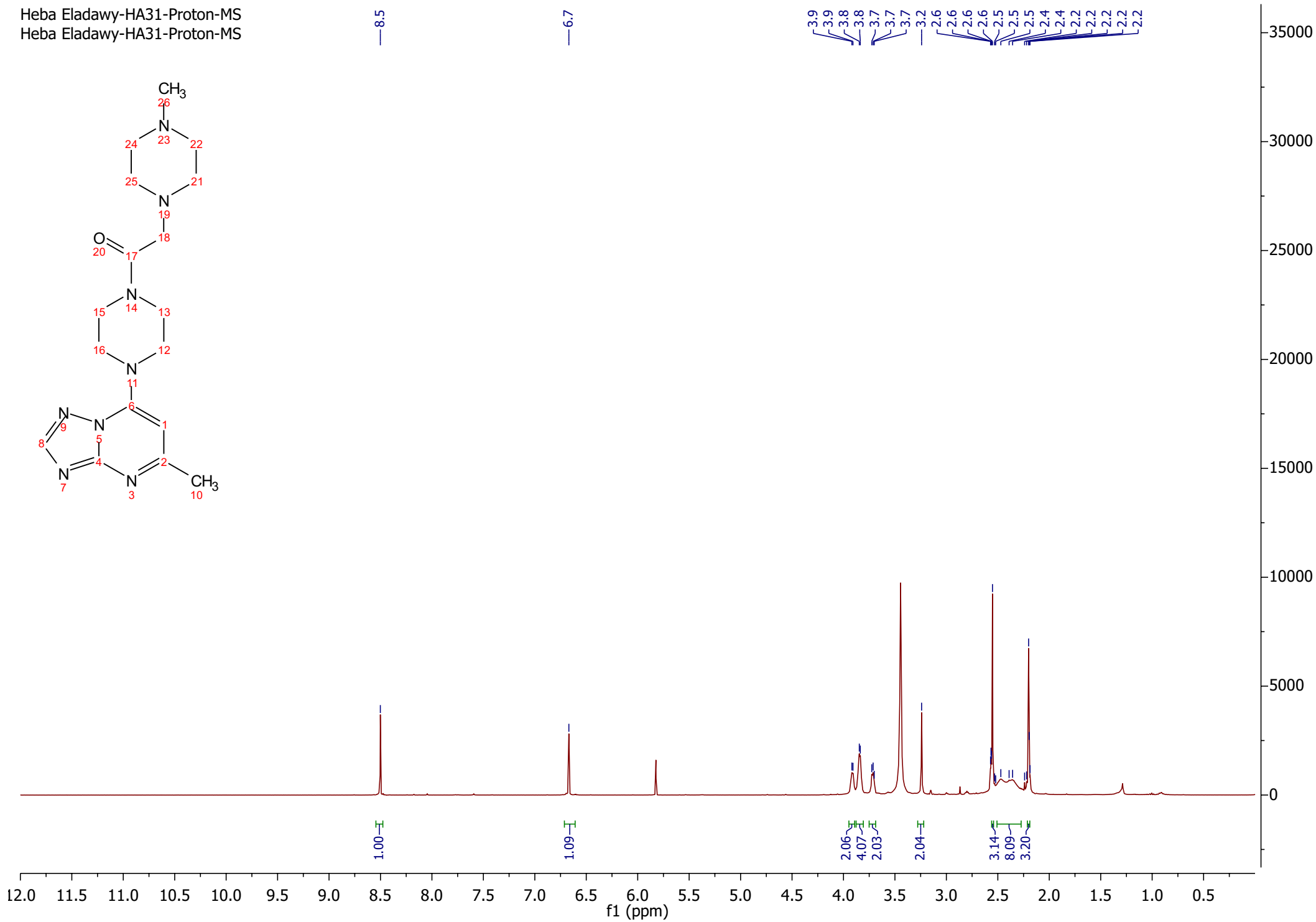
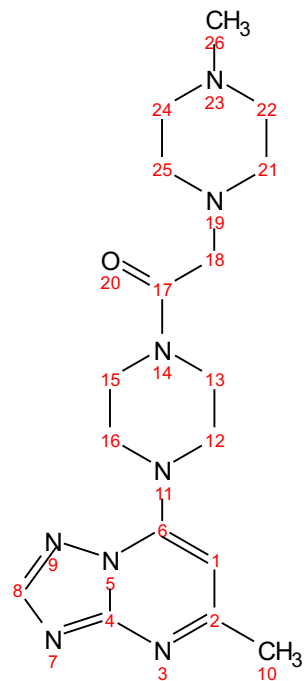


heba adawy -HA45-RR-hnmr  
heba adawy -HA45-RR-hnmr

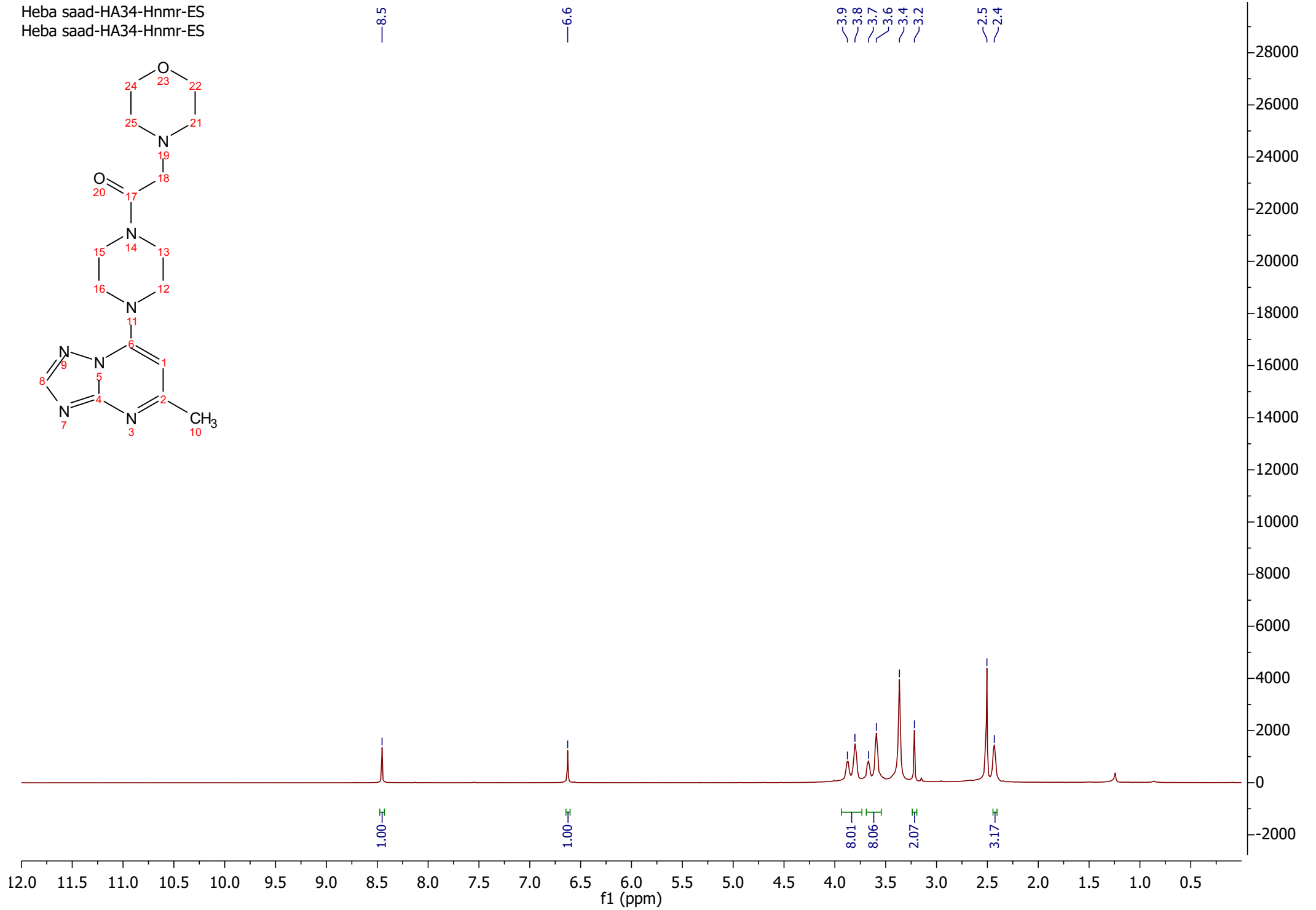
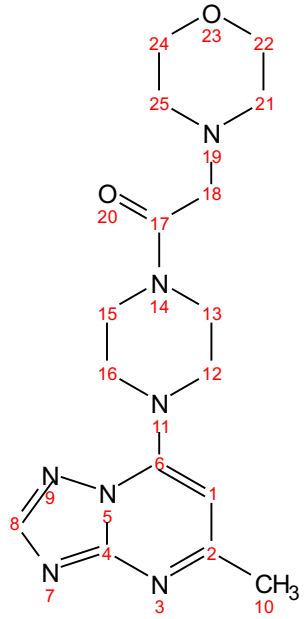




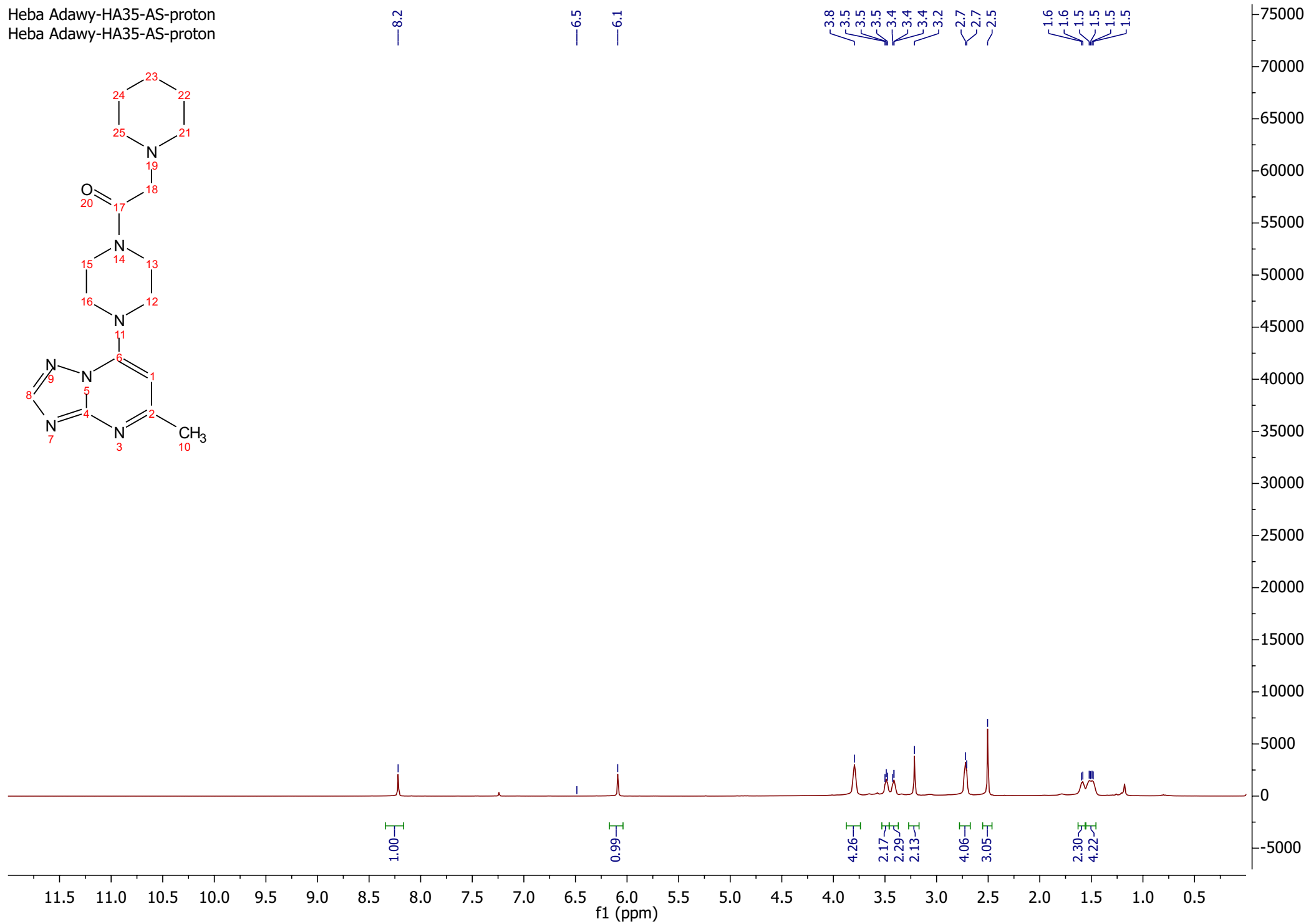
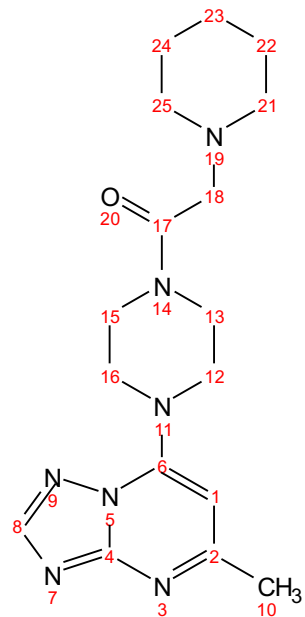
Heba Eladawy-HA31-Proton-MS  
Heba Eladawy-HA31-Proton-MS



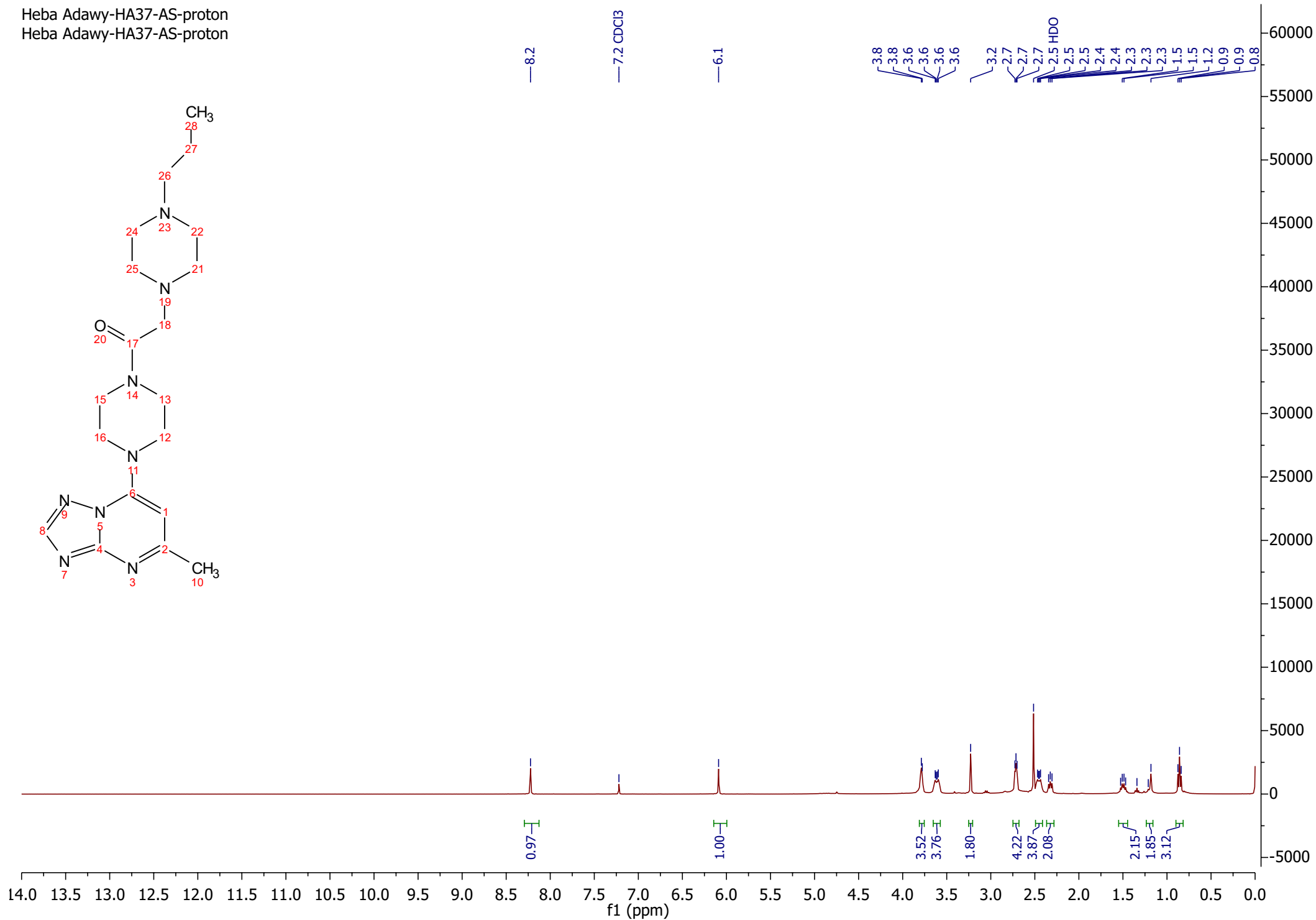
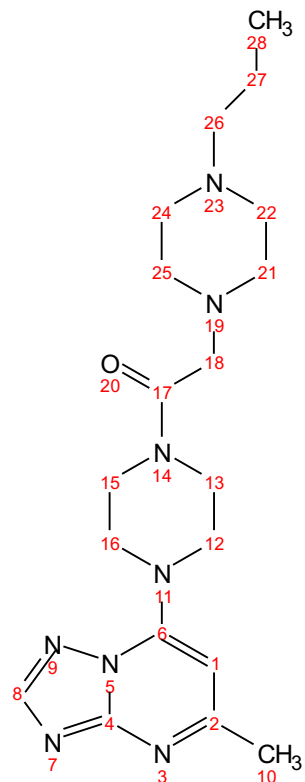
Heba saad-HA34-Hnmr-ES  
Heba saad-HA34-Hnmr-ES



Heba Adawy-HA35-AS-proton  
Heba Adawy-HA35-AS-proton



Heba Adawy-HA37-AS-proton  
Heba Adawy-HA37-AS-proton



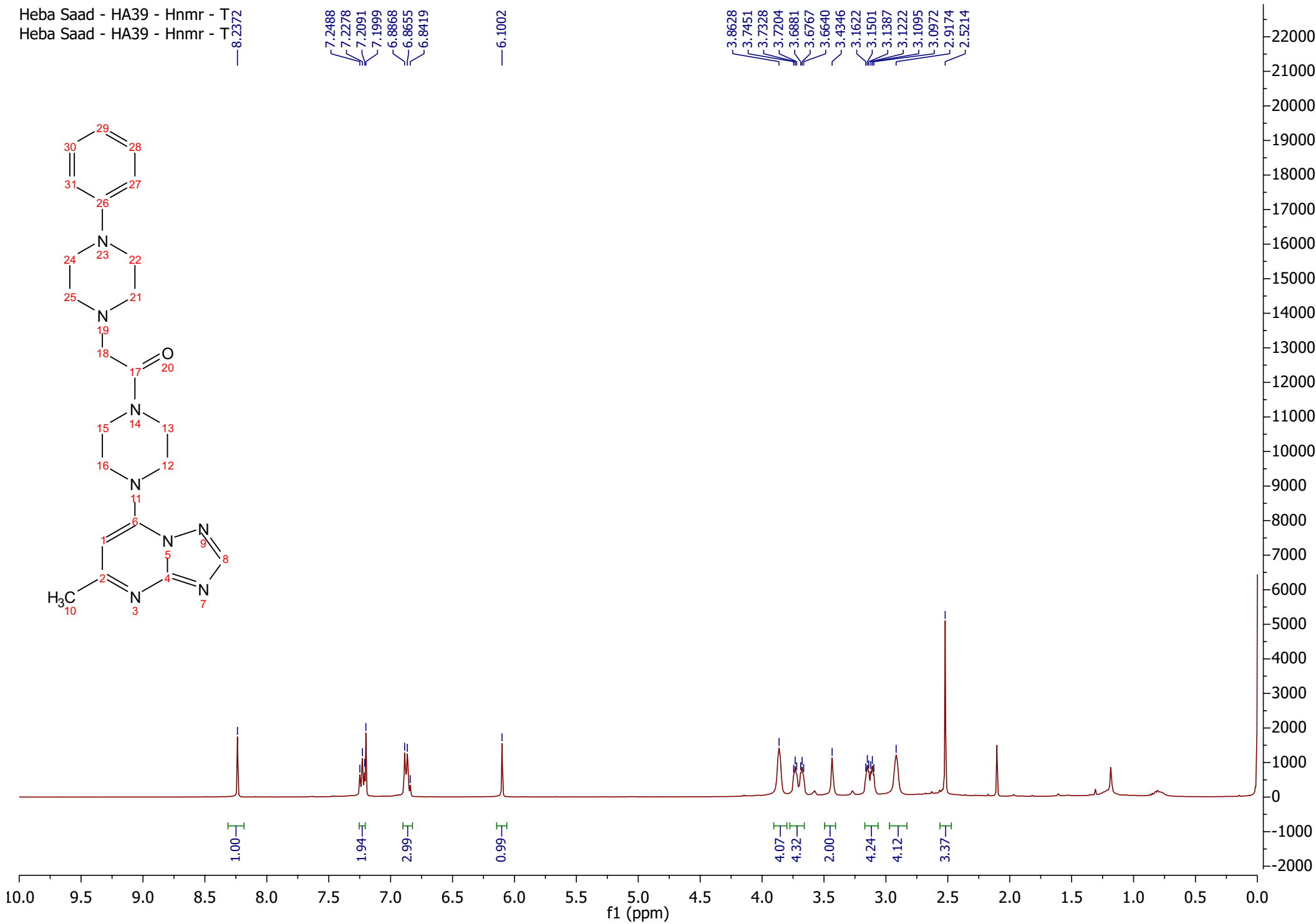
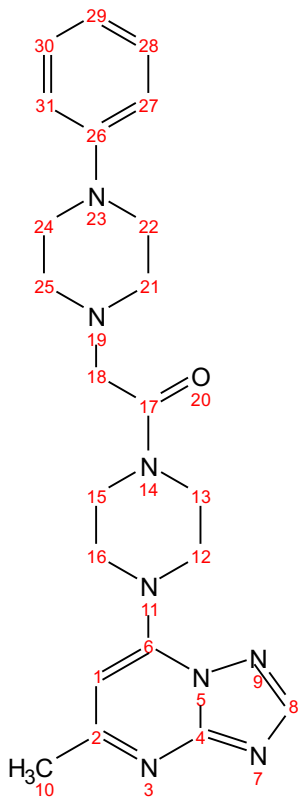
Heba Saad - HA39 - Hnmr - T  
Heba Saad - HA39 - Hnmr - T

8.2372

7.2488  
7.2278  
7.2091  
7.1999  
6.8868  
6.8655  
6.8419

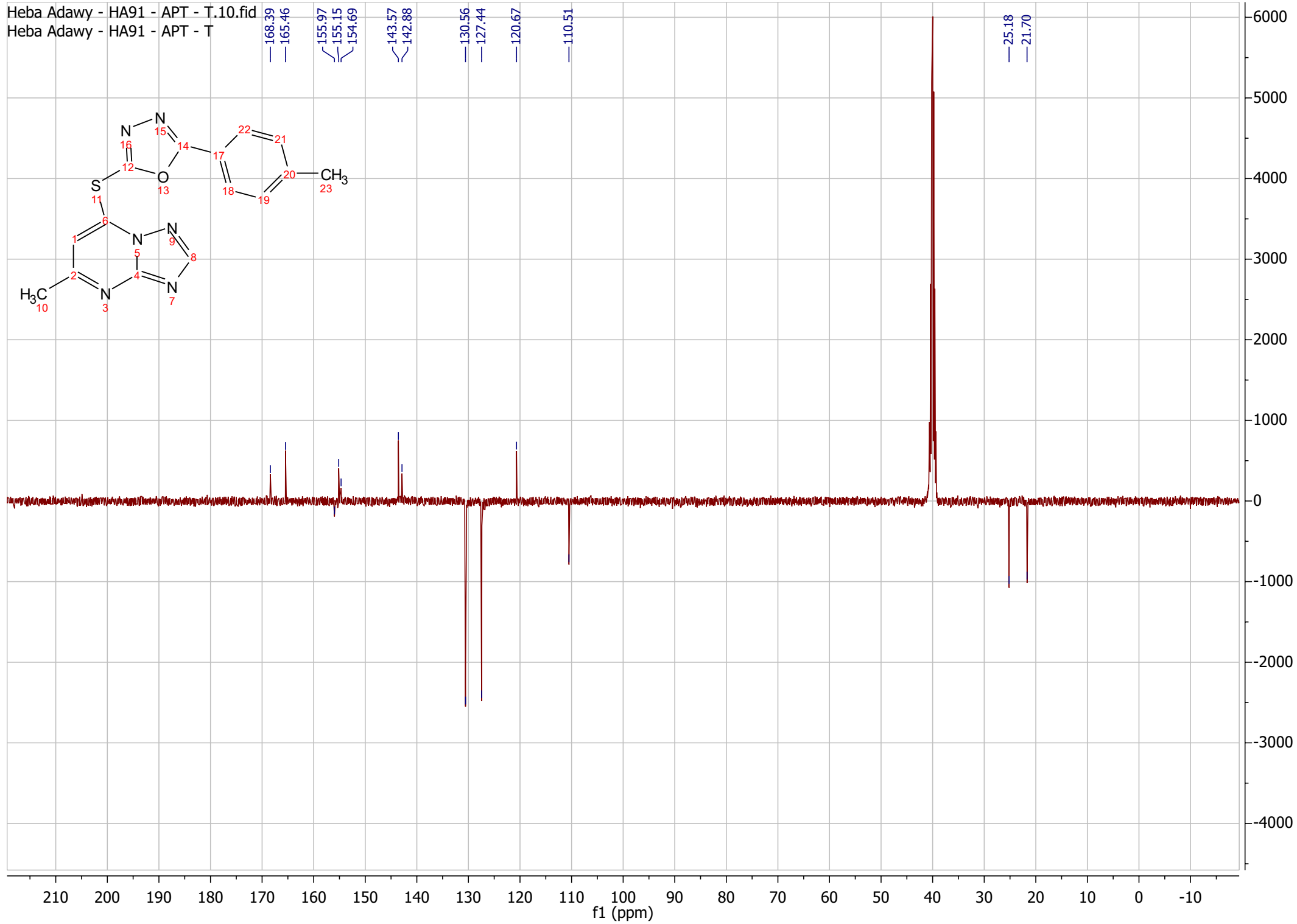
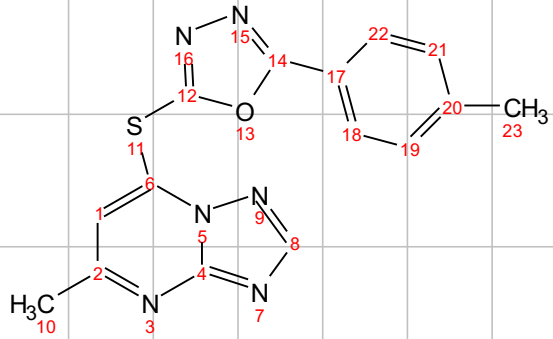
6.1002

3.8628  
3.7451  
3.7328  
3.7204  
3.6881  
3.6767  
3.6640  
3.4346  
3.1622  
3.1501  
3.1387  
3.1222  
3.1095  
3.0972  
2.9174  
2.5214

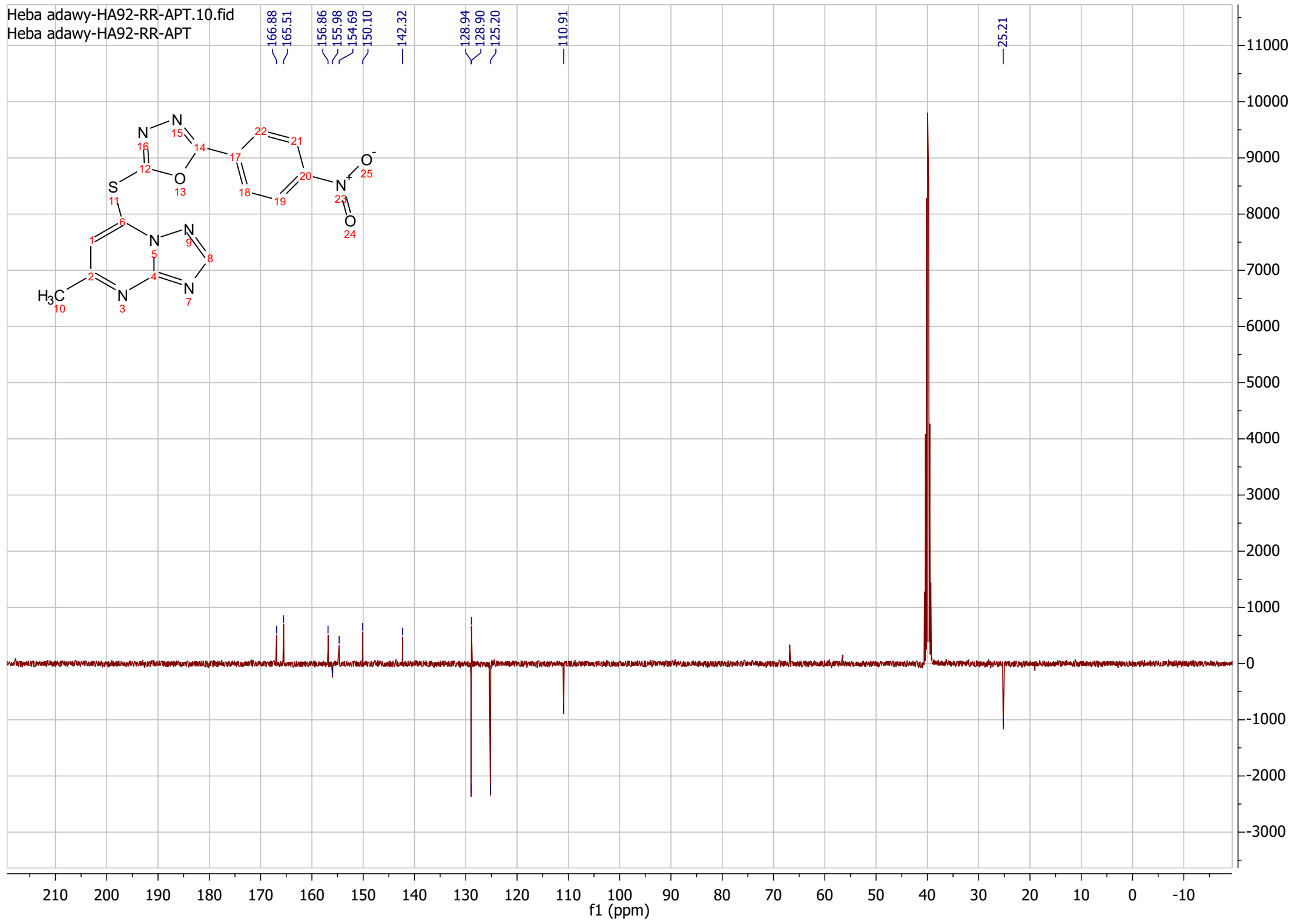
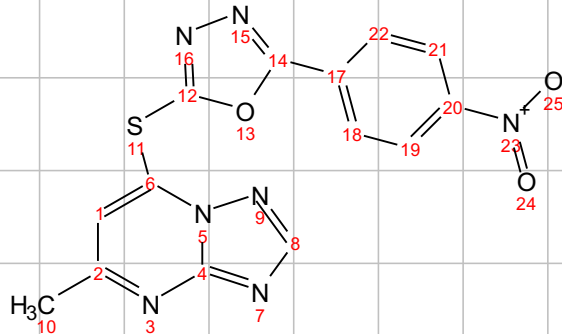


Heba Adawy - HA91 - APT - T.10.fid  
Heba Adawy - HA91 - APT - T

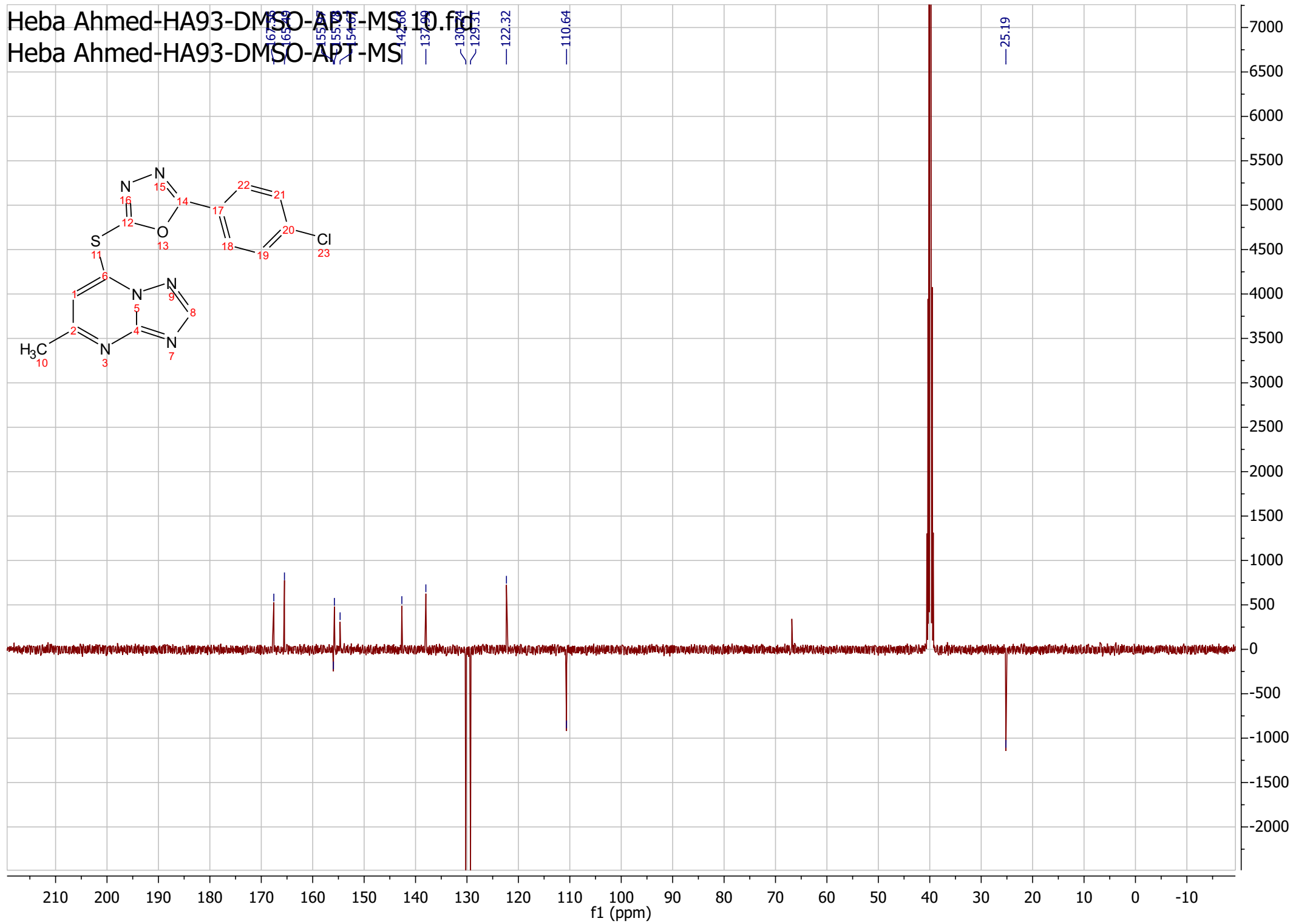
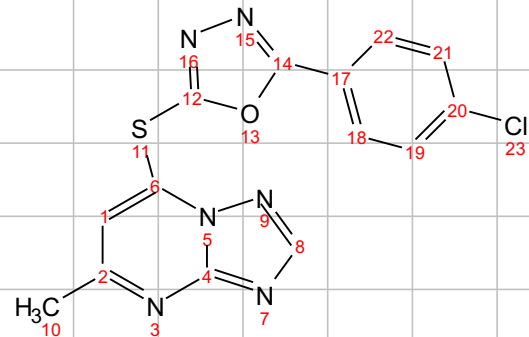
168.39  
165.46  
155.97  
155.15  
154.69  
143.57  
142.88  
130.56  
127.44  
120.67  
110.51  
25.18  
21.70



Heba adawy-HA92-RR-APT.10.fid  
Heba adawy-HA92-RR-APT

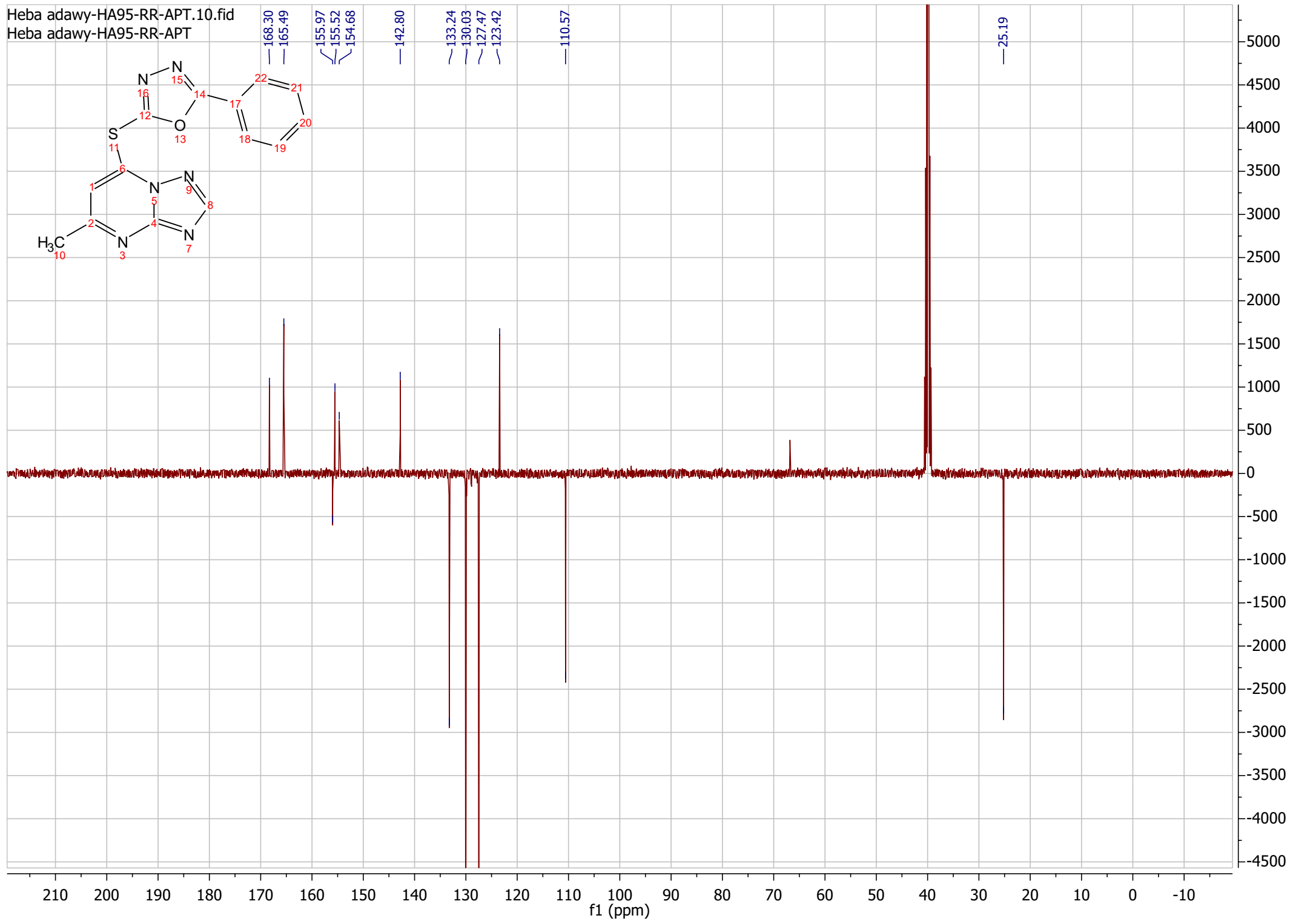
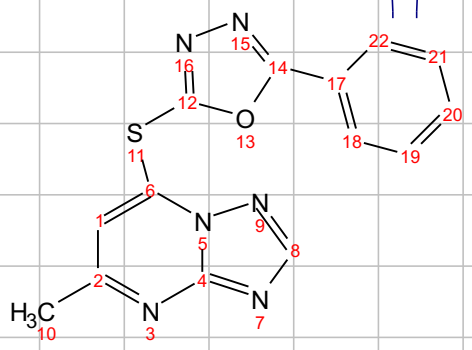


Heba Ahmed-HA93-DMSO-APT-MS-10.fid  
Heba Ahmed-HA93-DMSO-APT-MS

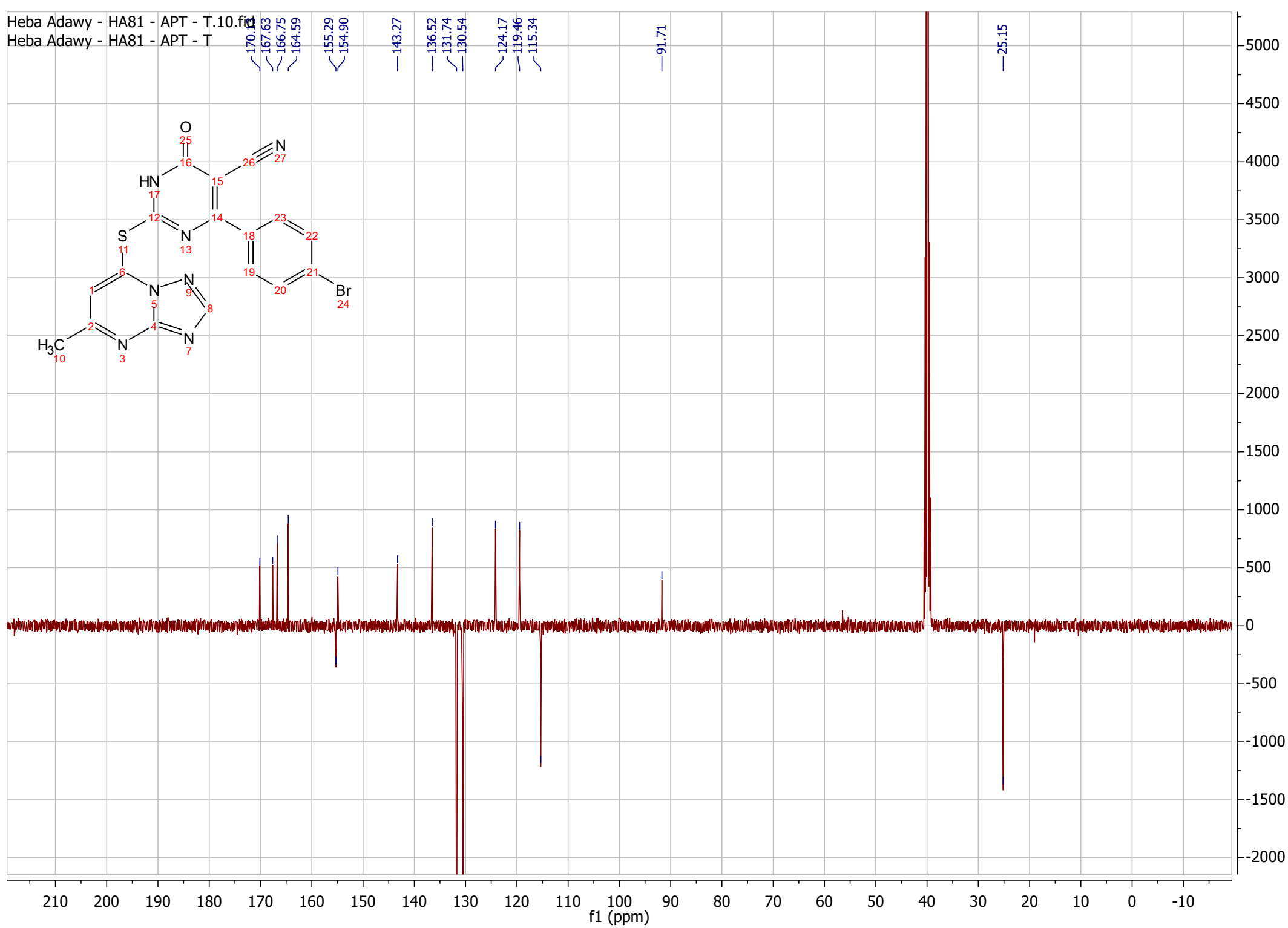




Heba adawy-HA95-RR-APT.10.fid  
Heba adawy-HA95-RR-APT



Heba Adawy - HA81 - APT - T.10.f1  
Heba Adawy - HA81 - APT - T



Heba Saad - HA82 - APT - T.10.fid  
Heba Saad - HA82 - APT - T

170.13  
167.61  
166.66  
164.58

155.29  
154.90

143.28

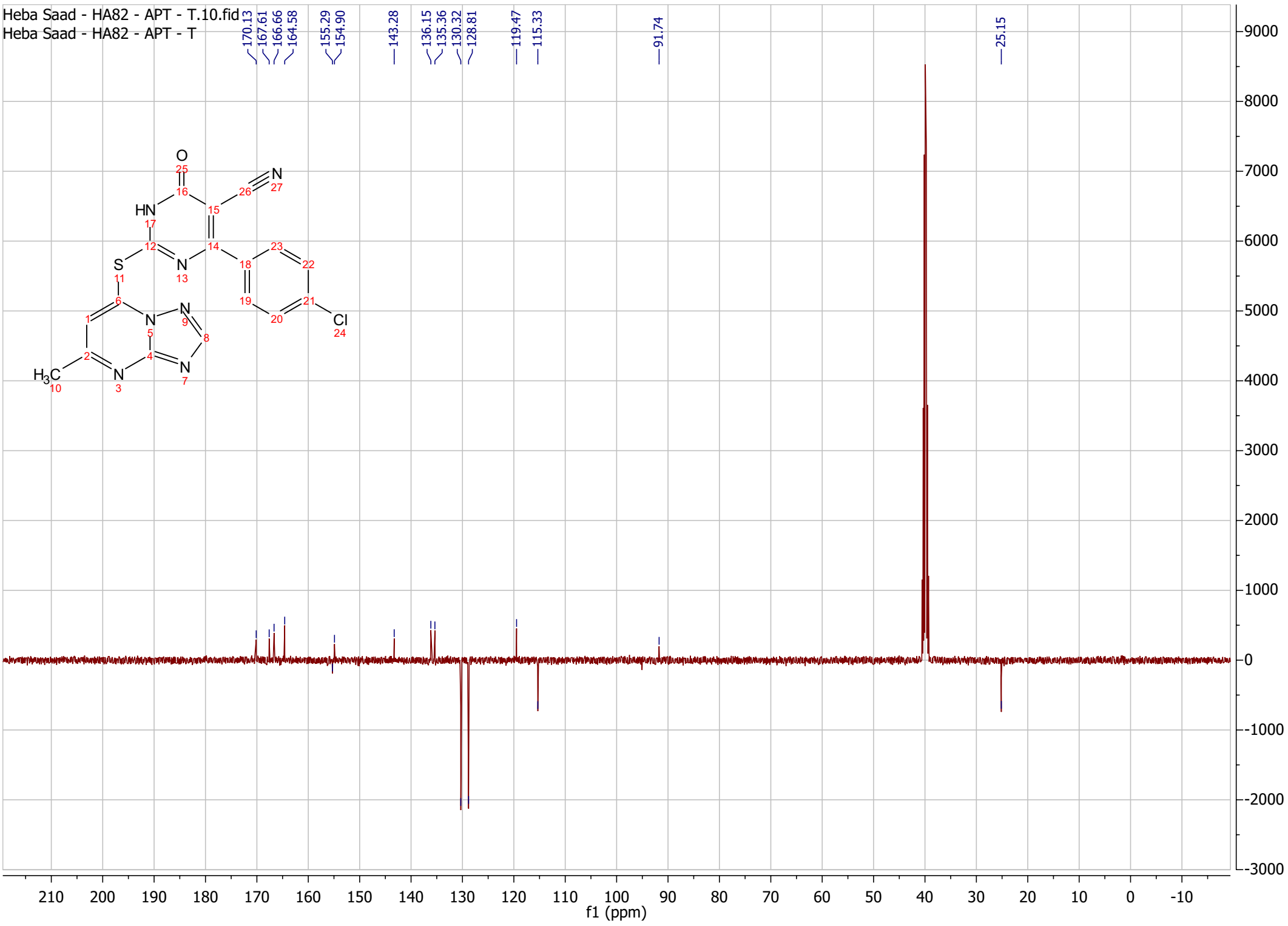
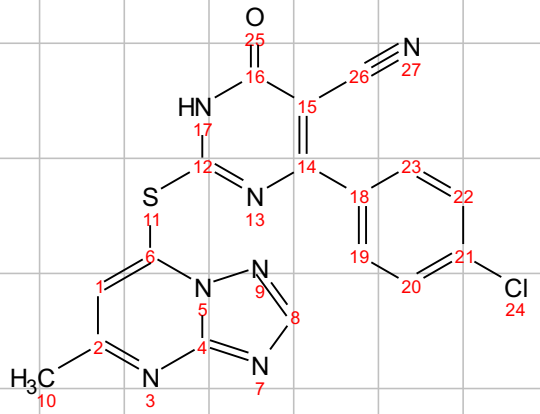
136.15  
135.36  
130.32  
128.81

119.47

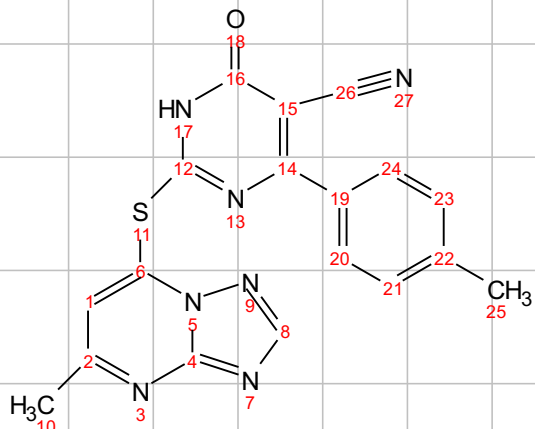
115.33

91.74

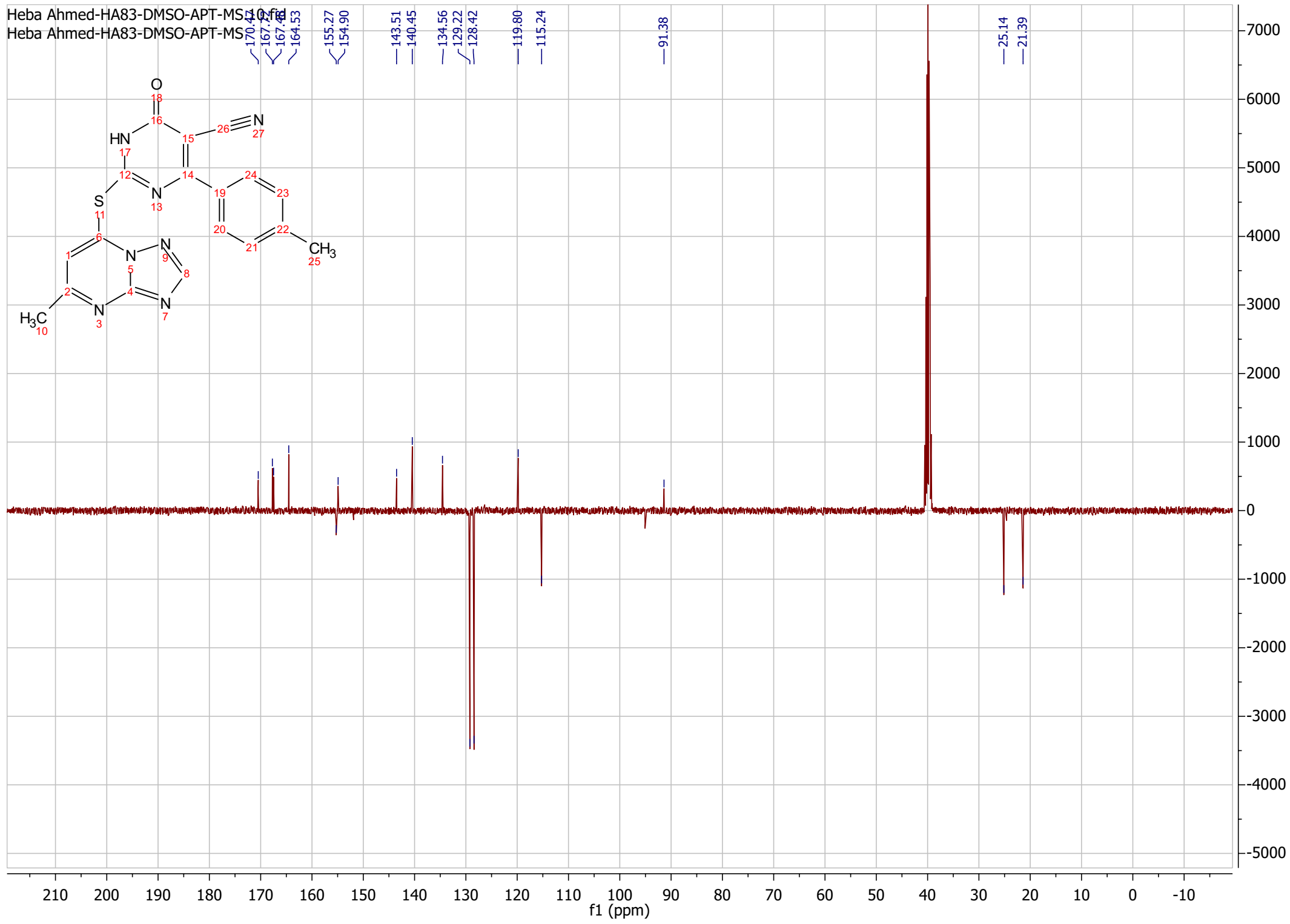
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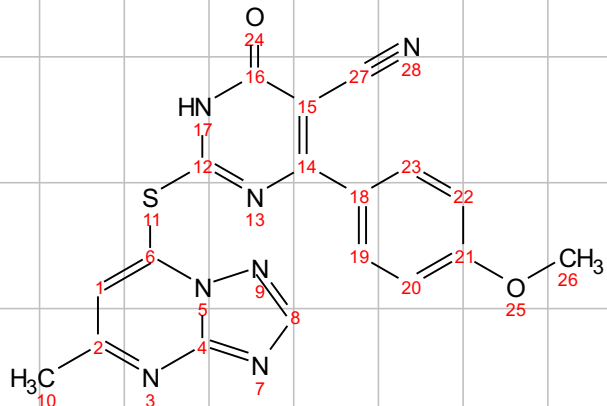


Heba Ahmed-HA83-DMSO-APT-MS  
Heba Ahmed-HA83-DMSO-APT-MS



- 170.44
- 167.96
- 167.46
- 164.53
- 155.27
- 154.90
- 143.51
- 140.45
- 134.56
- 129.22
- 128.42
- 119.80
- 115.24
- 91.38





170.63  
167.37  
167.15  
164.54  
161.27  
155.26  
154.89

143.62

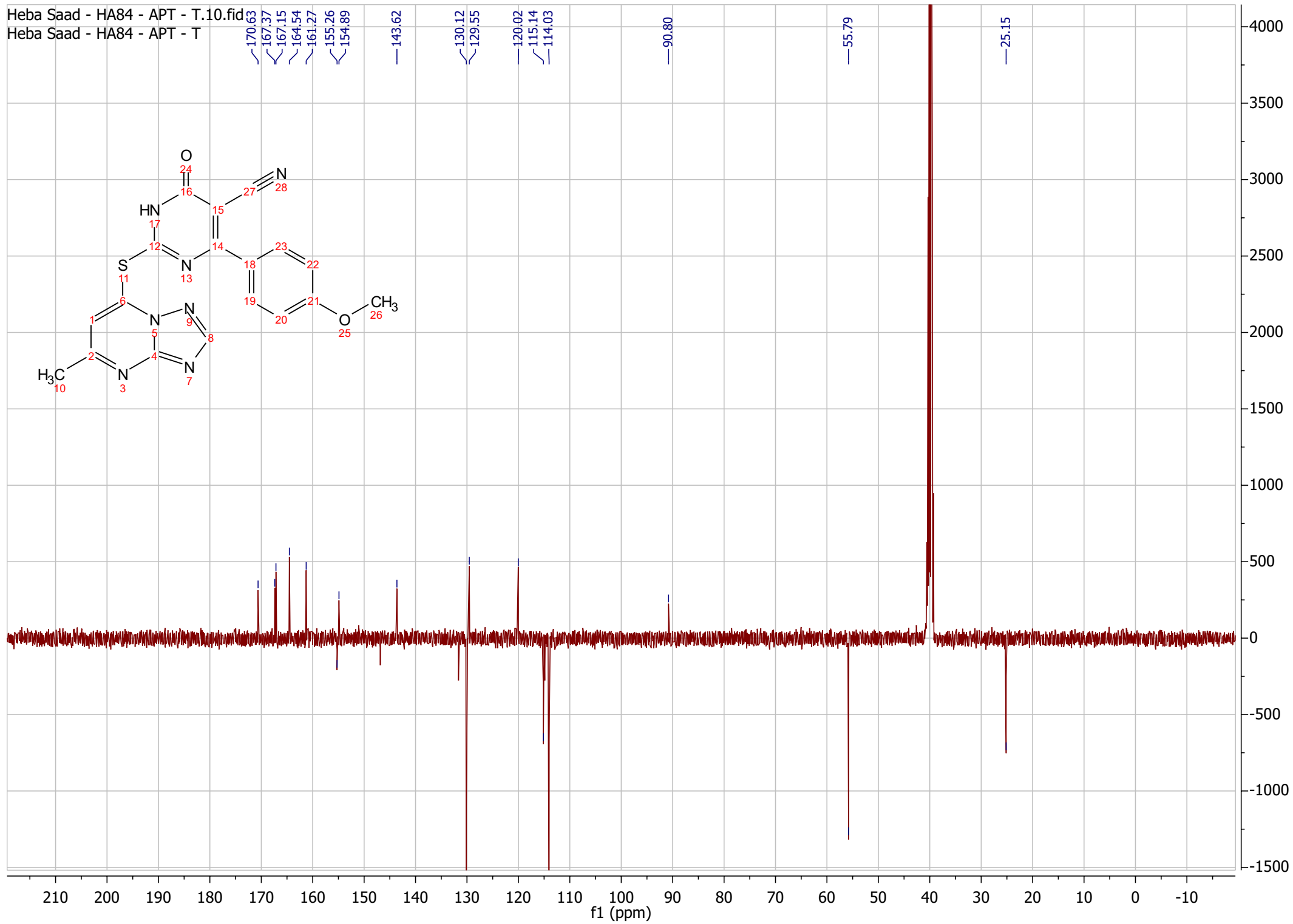
130.12  
129.55

120.02  
115.14  
114.03

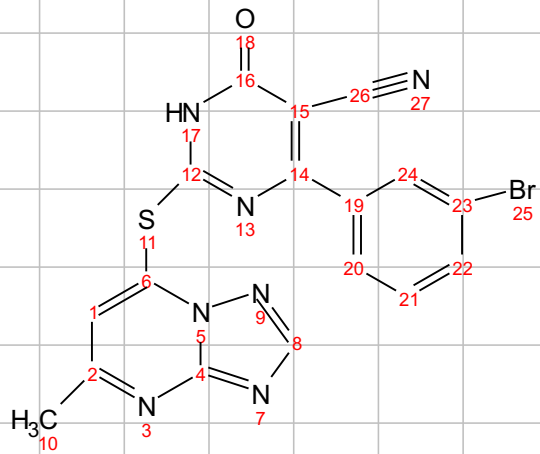
90.80

55.79

25.15



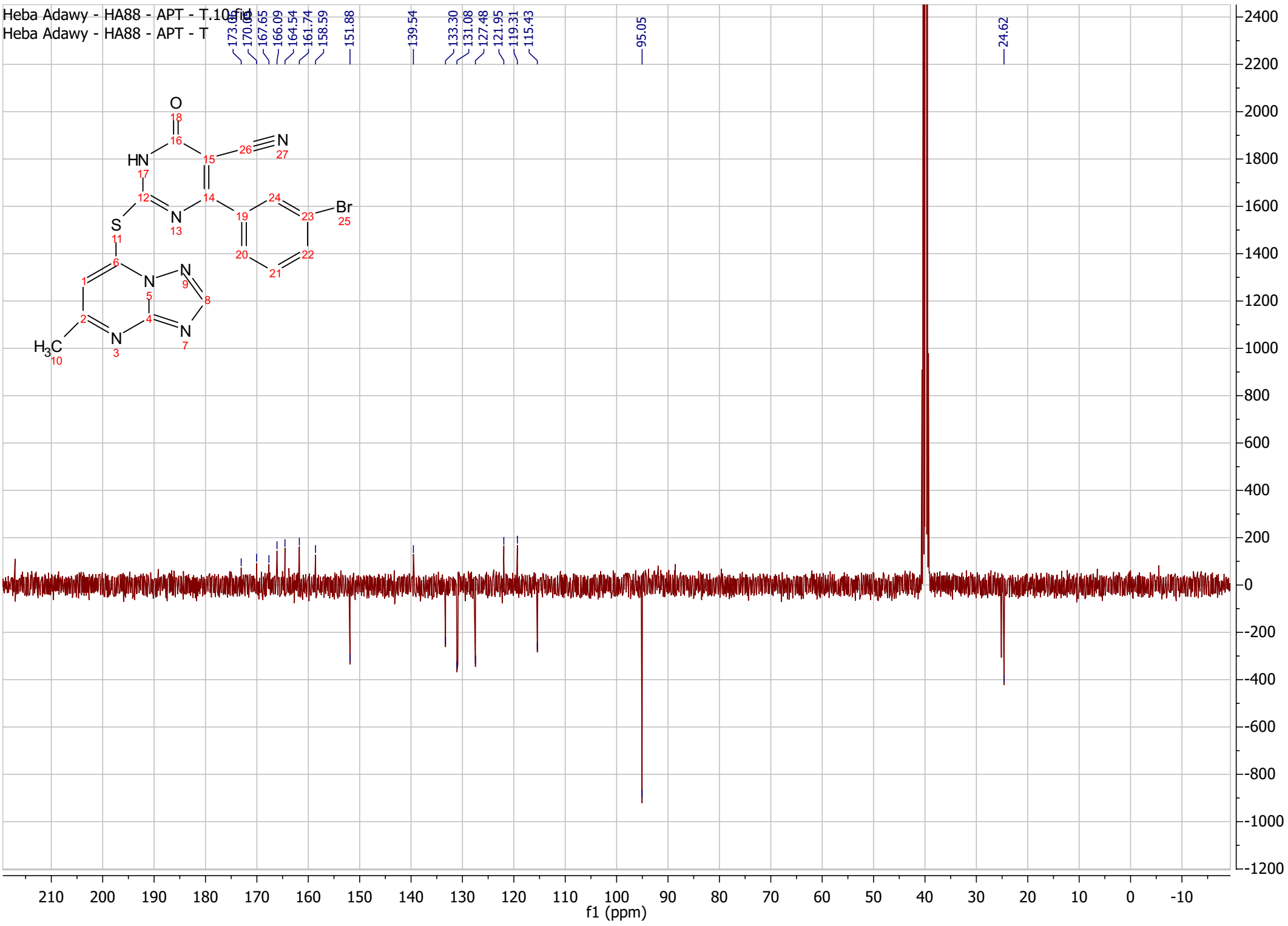
Heba Adawy - HA88 - APT - T.10  
Heba Adawy - HA88 - APT - T



173.61  
170.06  
167.65  
166.09  
164.54  
161.74  
158.59  
151.88  
139.54  
133.30  
131.08  
127.48  
121.95  
119.31  
115.43

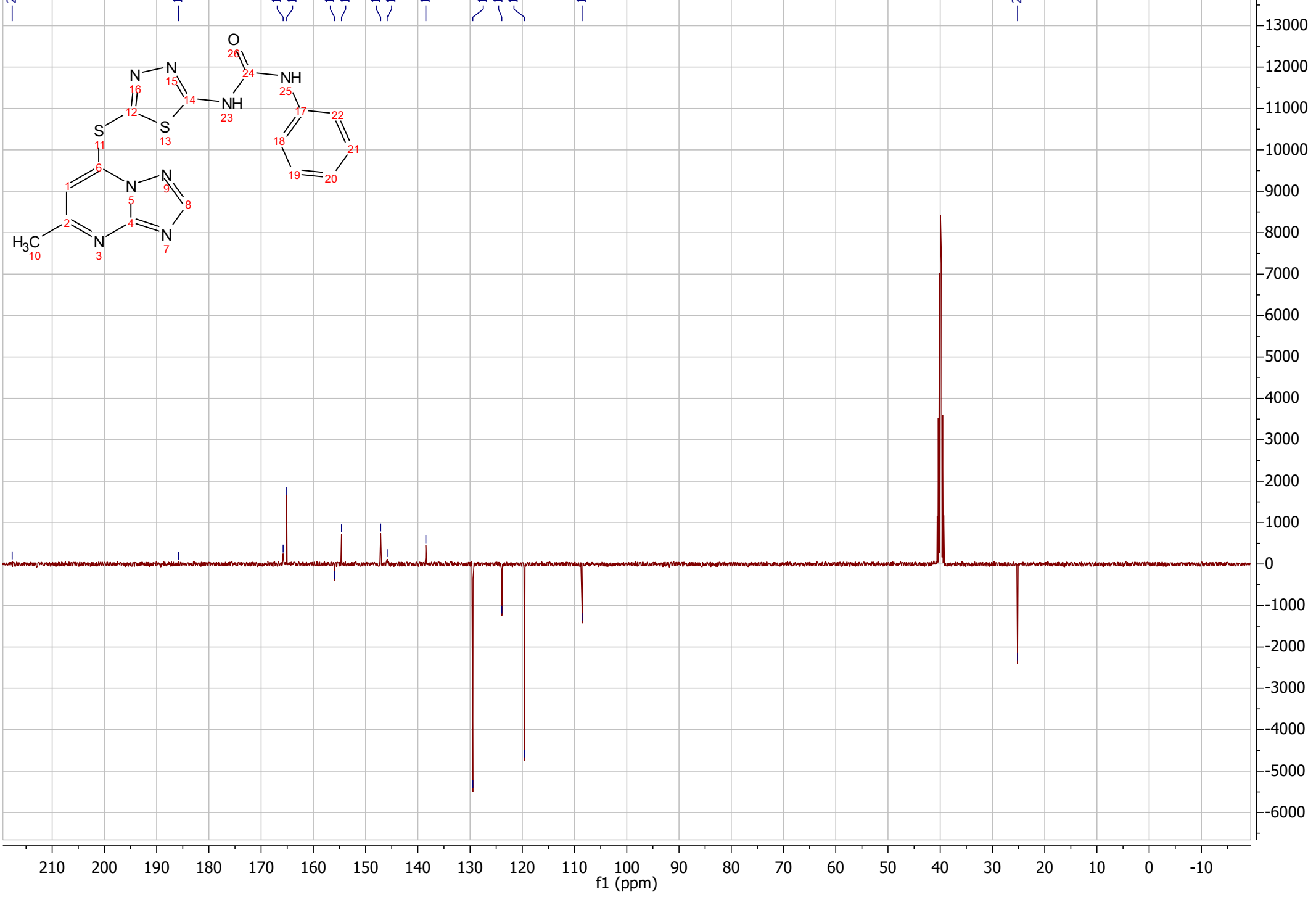
95.05

24.62



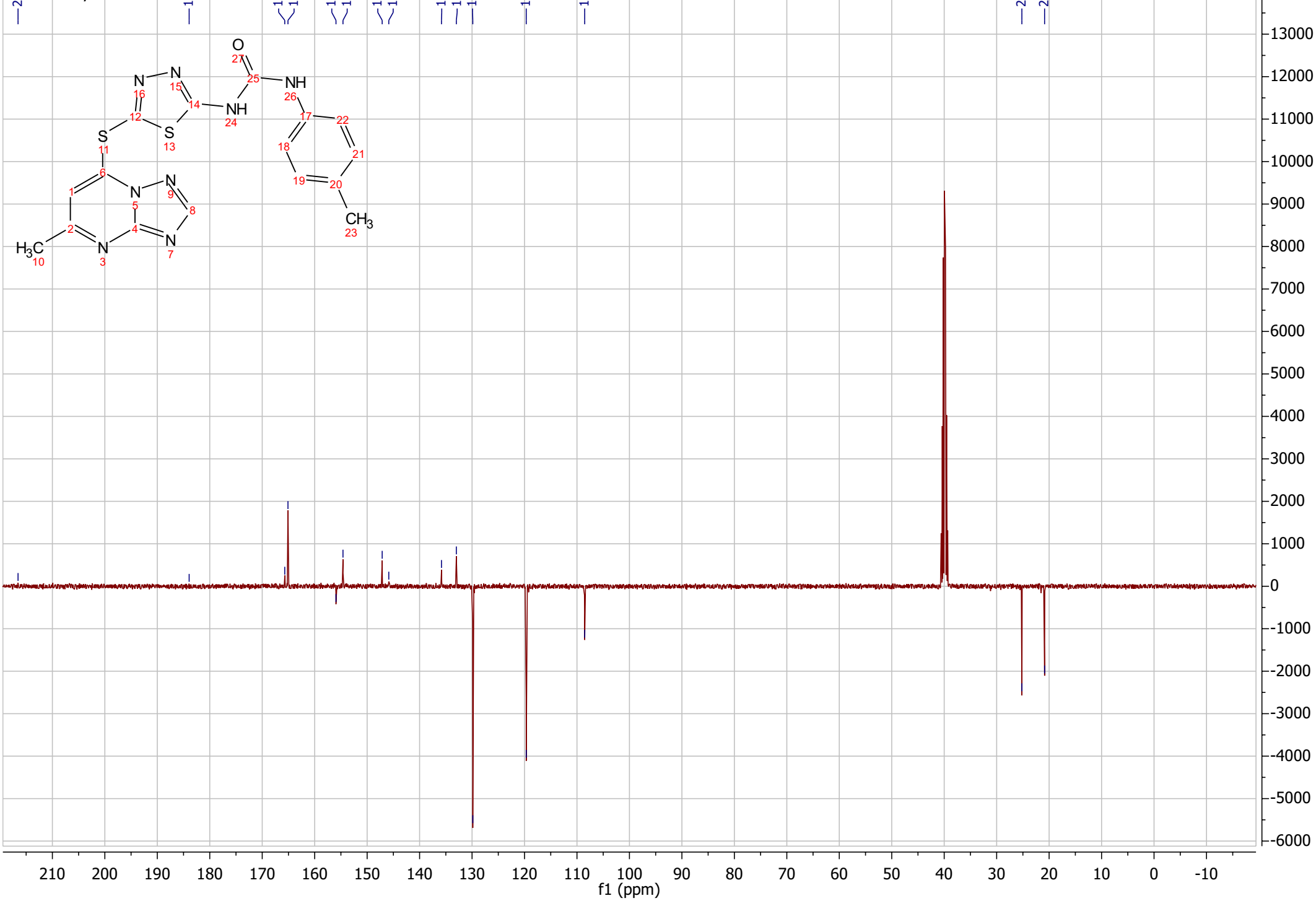
Heba Adawy-HA42-APT-4F.20.fid

Heba Adawy-HA42-APT-4F

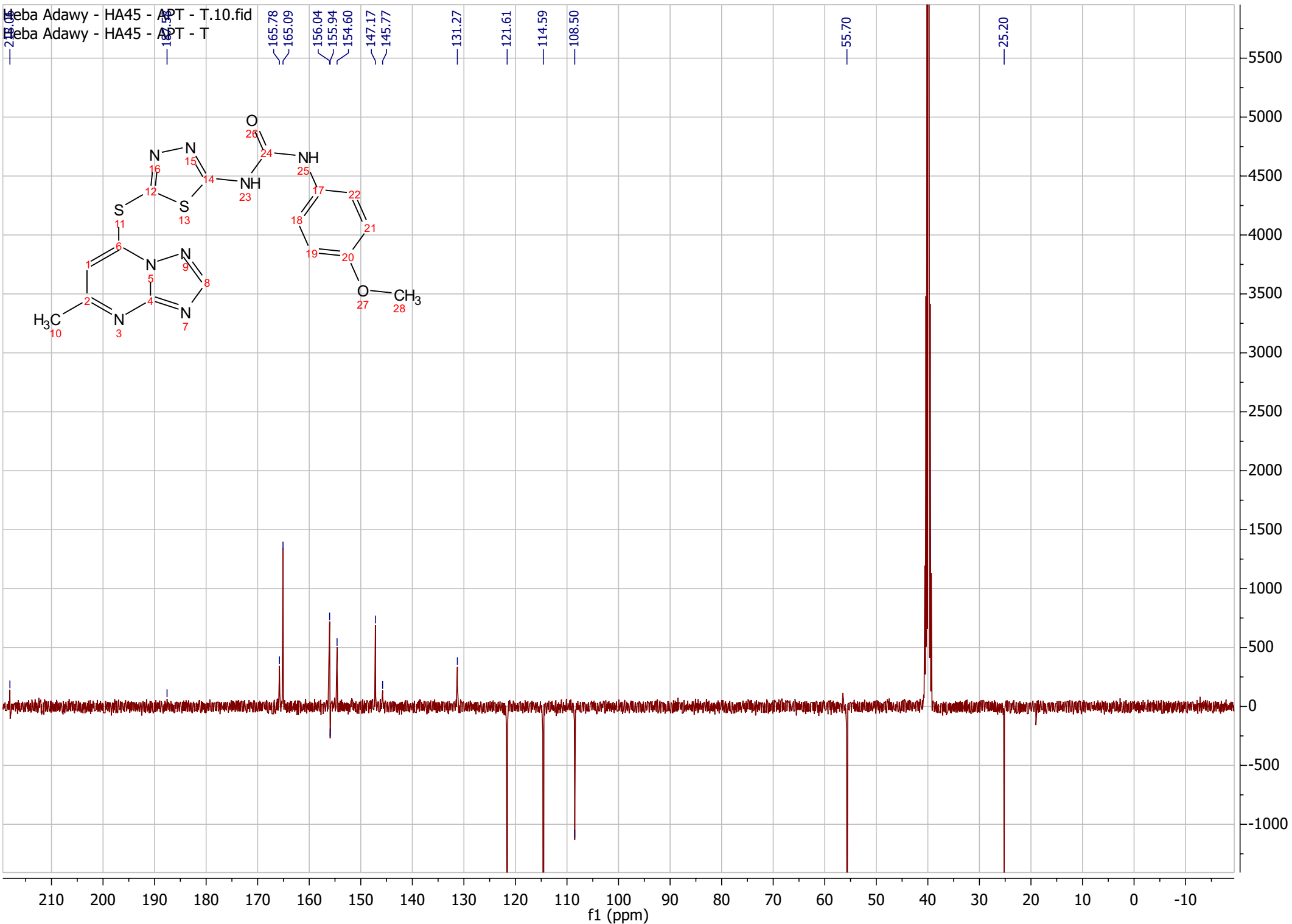


Hiba Adawy-HA44-APT-09.10.fid

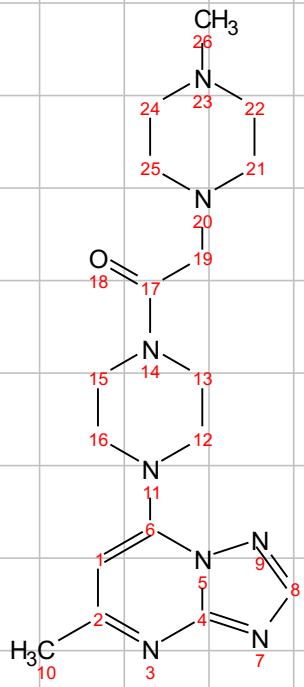
Hiba Adawy-HA44-APT







Heba Adawy HA31 -M apt.10.fid  
Heba Adawy HA31 -M apt



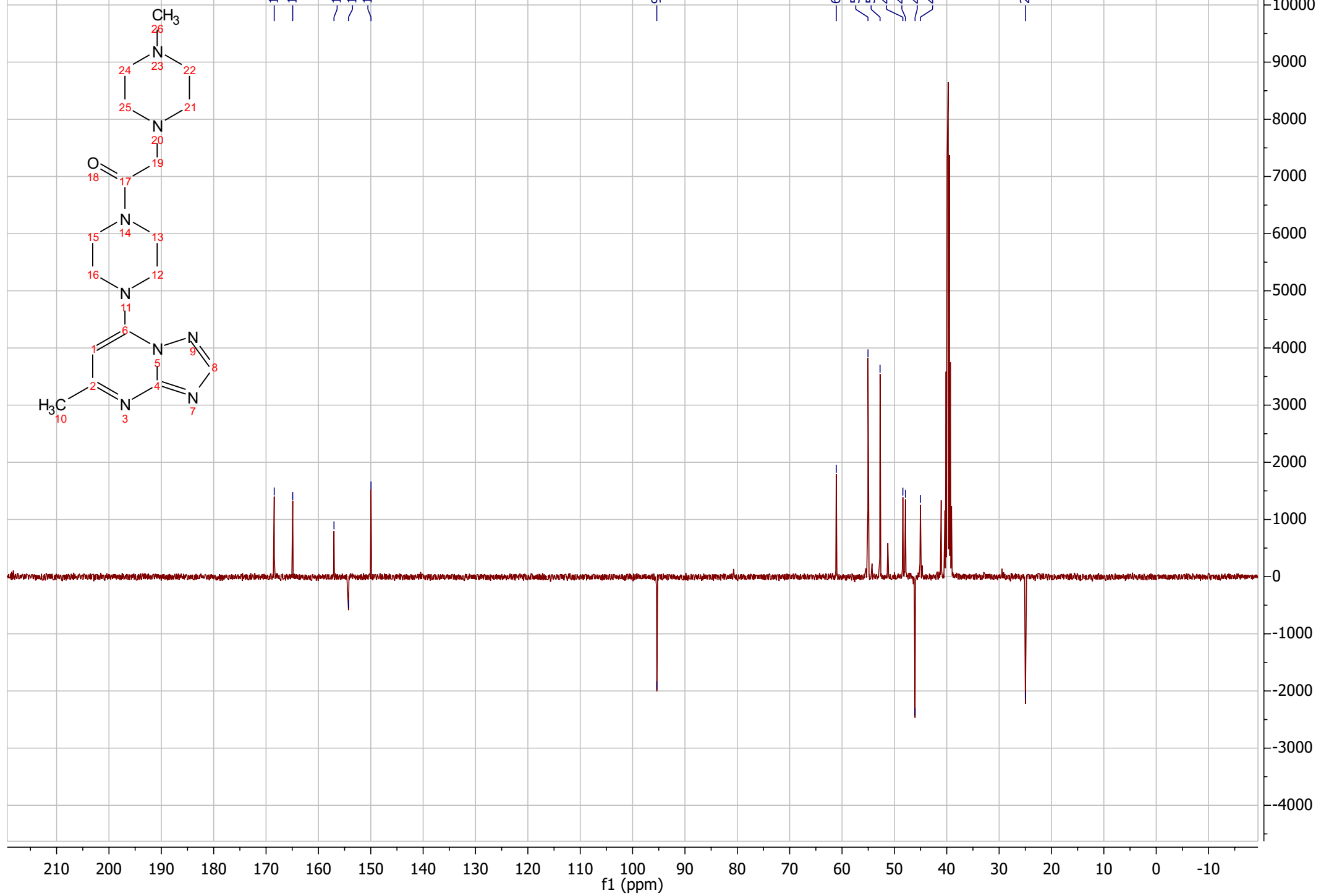
168.44  
164.91

157.03  
154.26  
149.95

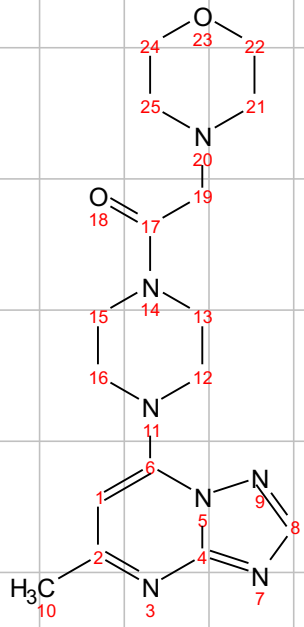
95.37

61.11  
55.04  
52.74  
48.39  
47.90  
46.05  
45.04

24.99



heba adawy -HA34-RR-C13 APT.10.fid  
heba adawy -HA34-RR-C13 APT



—167.89  
—164.72

—157.13  
—154.38  
—149.98

—95.37

—66.62

—61.32

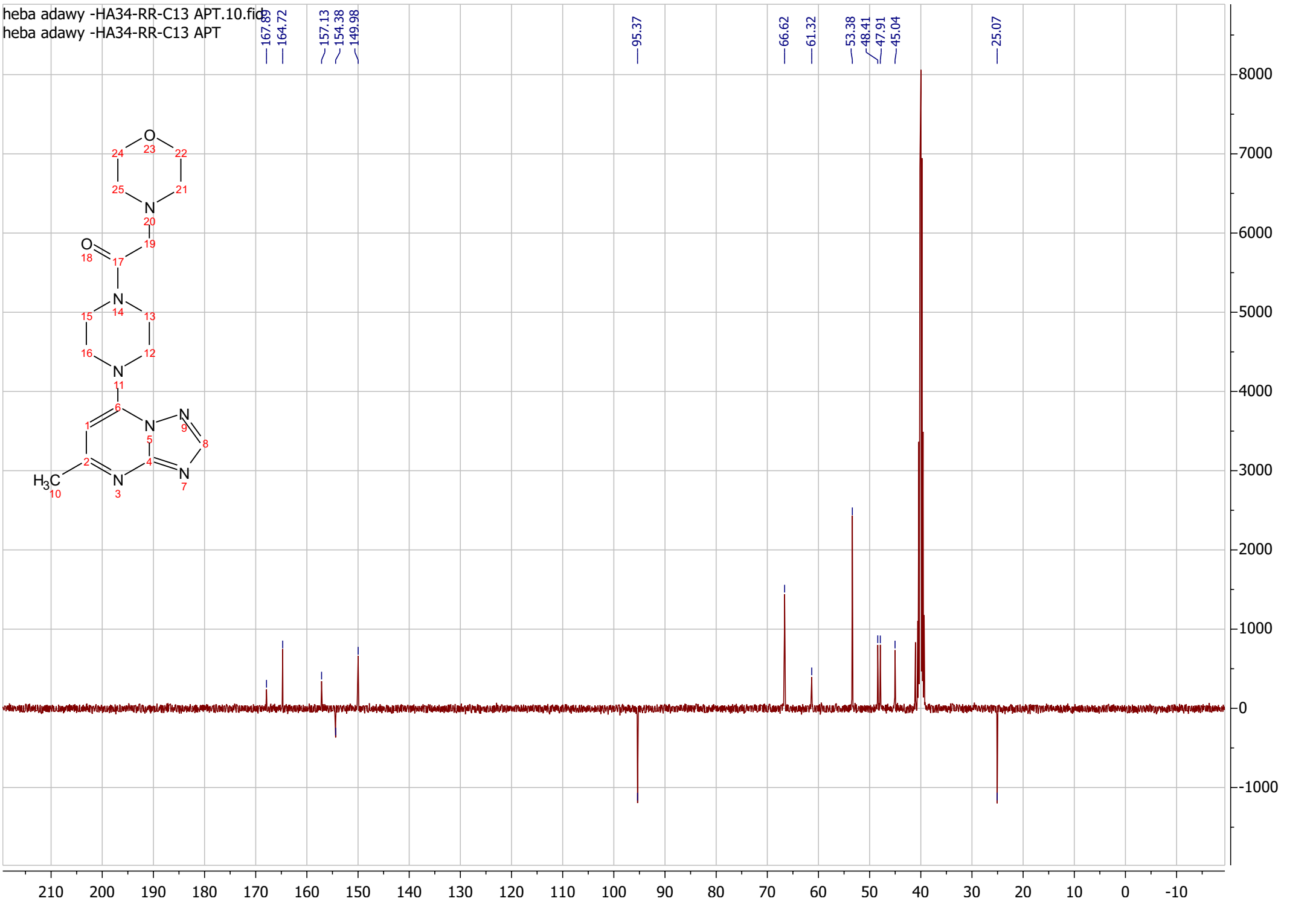
—53.38

—48.41

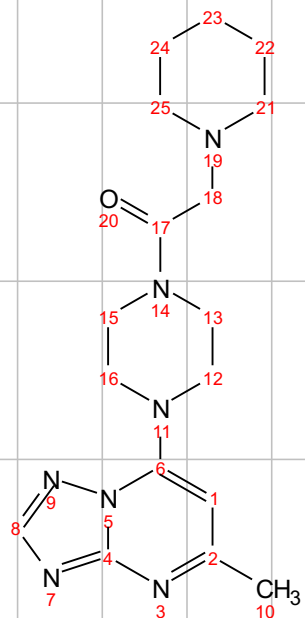
—47.91

—45.04

—25.07



Heba Adawy-HA35-APT-RR.10.fid  
Heba Adawy-HA35-APT-RR



167.01  
164.83

157.17  
154.09  
150.16

94.60

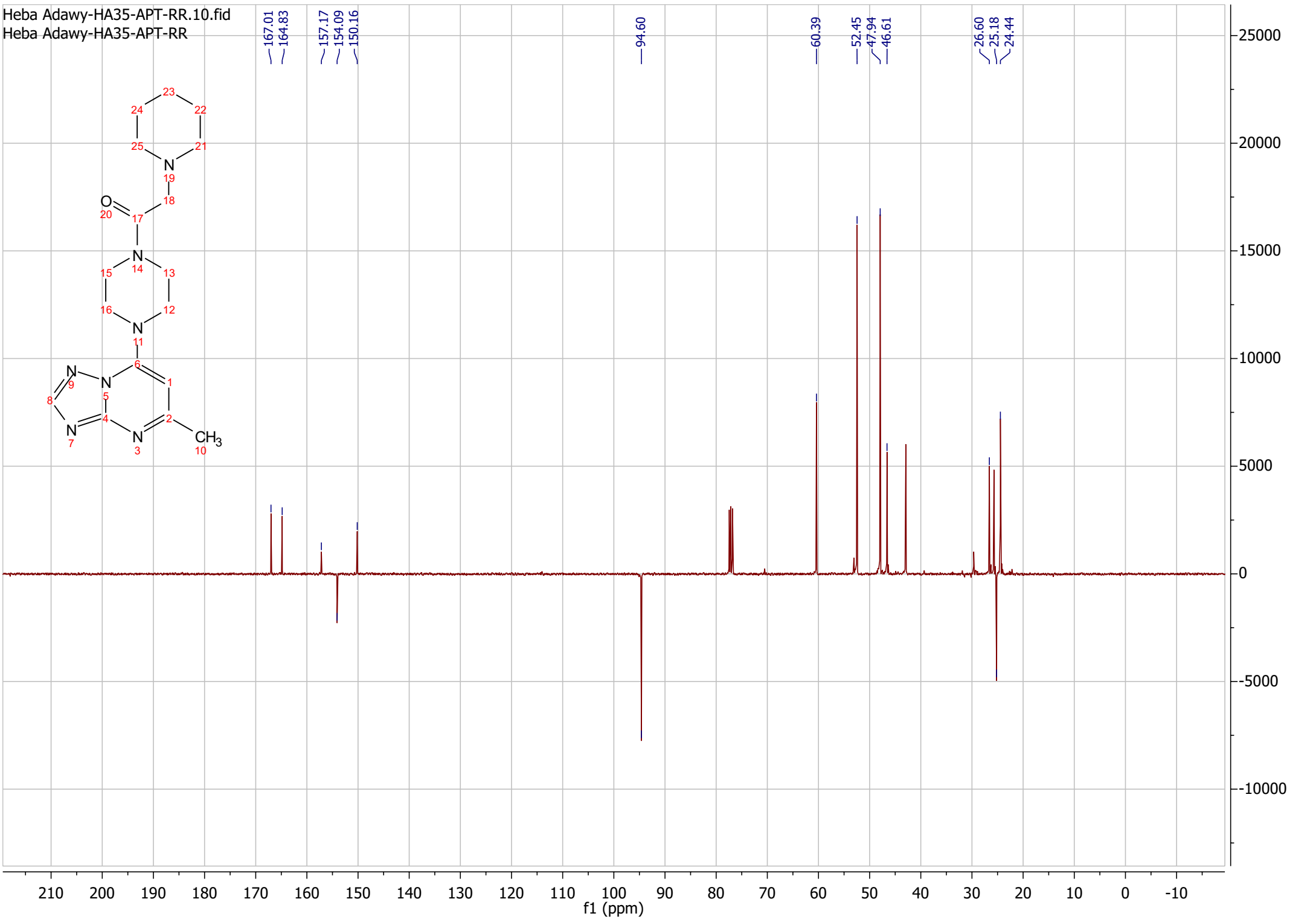
60.39

52.45  
47.94  
46.61

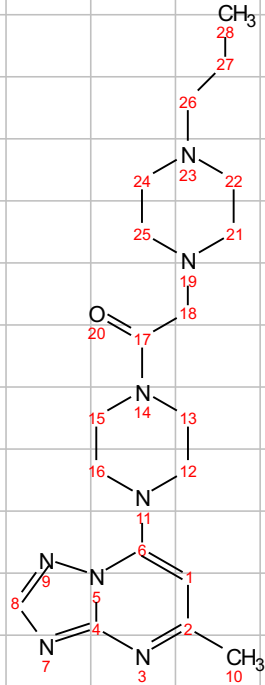
26.60  
25.18  
24.44

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10  
f1 (ppm)

25000  
20000  
15000  
10000  
5000  
0  
-5000  
-10000



Heba Adawy-HA37-APT-RR.10.fid  
Heba Adawy-HA37-APT-RR



166.25  
163.88

156.17  
153.15  
149.14

93.64

59.43  
59.24

52.30  
51.41  
46.89  
43.95

24.20

18.44

10.73

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20  
f1 (ppm)

16000  
15000  
14000  
13000  
12000  
11000  
10000  
9000  
8000  
7000  
6000  
5000  
4000  
3000  
2000  
1000  
0  
-1000  
-2000  
-3000  
-4000  
-5000  
-6000

Heba Ahmed-HA39-CDCL3-APT-MS.10.f1  
Heba Ahmed-HA39-CDCL3-APT-MS

