

Supporting Information

Synthesis and evaluation of imidazole-4,5- and pyrazine-2,3-dicarboxamides targeting Dengue and Yellow fever virus

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General Information

Reagents and solvents were purchased from commercial suppliers (Acros, Sigma-Aldrich, Bachem, Novabiochem) and used as provided, unless indicated otherwise. All the solvents were of analytical grade and were stored over 4Å molecular sieves. Reactions were carried out in oven-dried glassware under a nitrogen atmosphere with stirring at 85°C.

¹H and ¹³C NMR spectra of the compounds dissolved in CDCl₃, MeOD or DMSO-d₆ were recorded on a Bruker UltraShield Avance 300 MHz or 500 MHz spectrometer. The chemical shifts are expressed as δ values in parts per million (ppm), using the residual solvent peaks (CDCl₃: ¹H, 7.26 ppm; ¹³C, 77.00 ppm; MeOD: ¹H, 3.31 ppm; ¹³C, 49.00 ppm) as a reference. Coupling constants are given in Hertz (Hz). The peak patterns are indicated by the following abbreviations: bs = broad singlet, d = doublet, m = multiplet, q = quadruplet, s = singlet and t = triplet. High resolution mass spectra were recorded on a quadrupole time-of-flight mass spectrometer (Q-Tof-2, Micromass, Manchester, UK) equipped with a standard ESI interface; samples were infused in 2-propanol/H₂O (1:1) at 3 μL.min⁻¹.

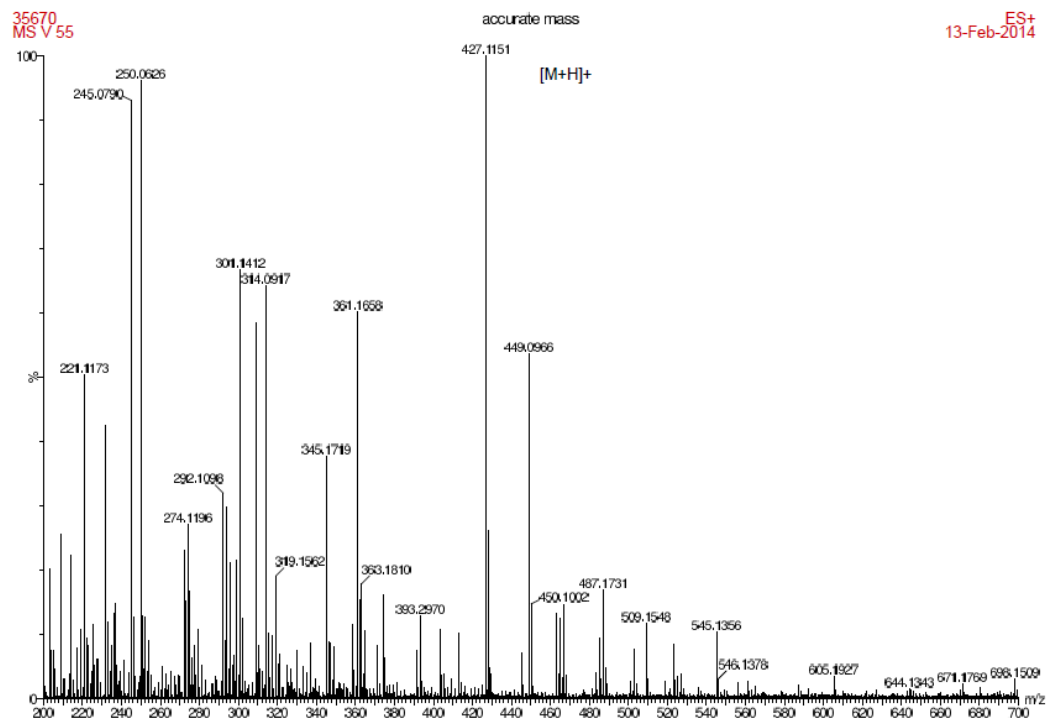
For TLC, precoated aluminium sheets were used (Merck, Silica gel 60 F₂₅₄). The spots were visualized by UV light at 254 nm. Column chromatography was performed on ICN silica gel 60A° 40-60 μM.

This supporting information provides the ¹H and ¹³C NMR and HRMS spectra for all new final compounds with numbering according to the manuscript.

HRMS, ¹H and ¹³C NMR Spectra

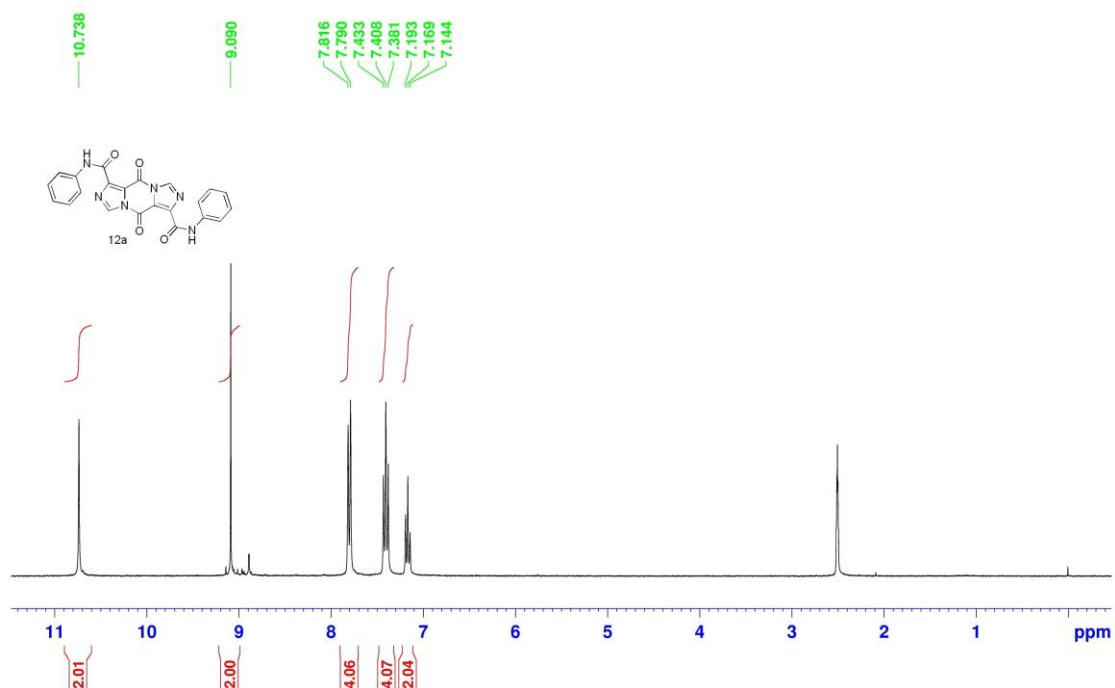
5,10-dioxo-N¹,N⁶-diphenyl-5,10-dihydroimidazo[1,5-*a*:1',5'-*d*]pyrazine-1,6-dicarboxamide (12a)

HRMS (ES+)



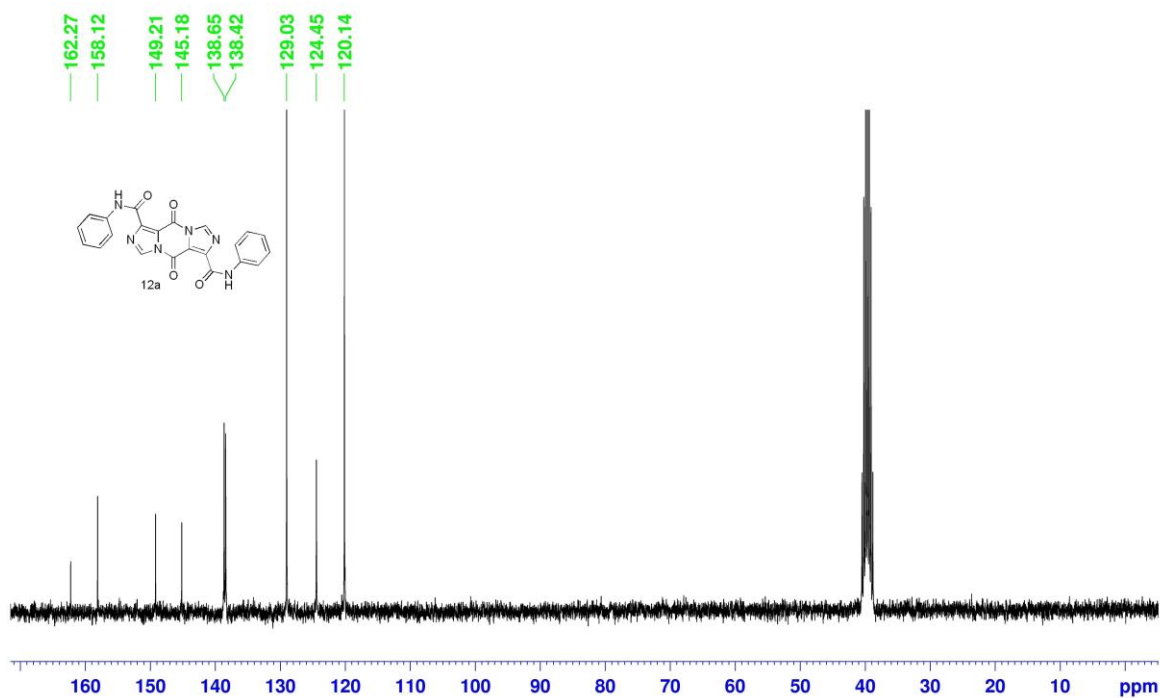
¹H NMR (300 MHz, DMSO)

MS-IV-55 in DMSO
11/02/2014



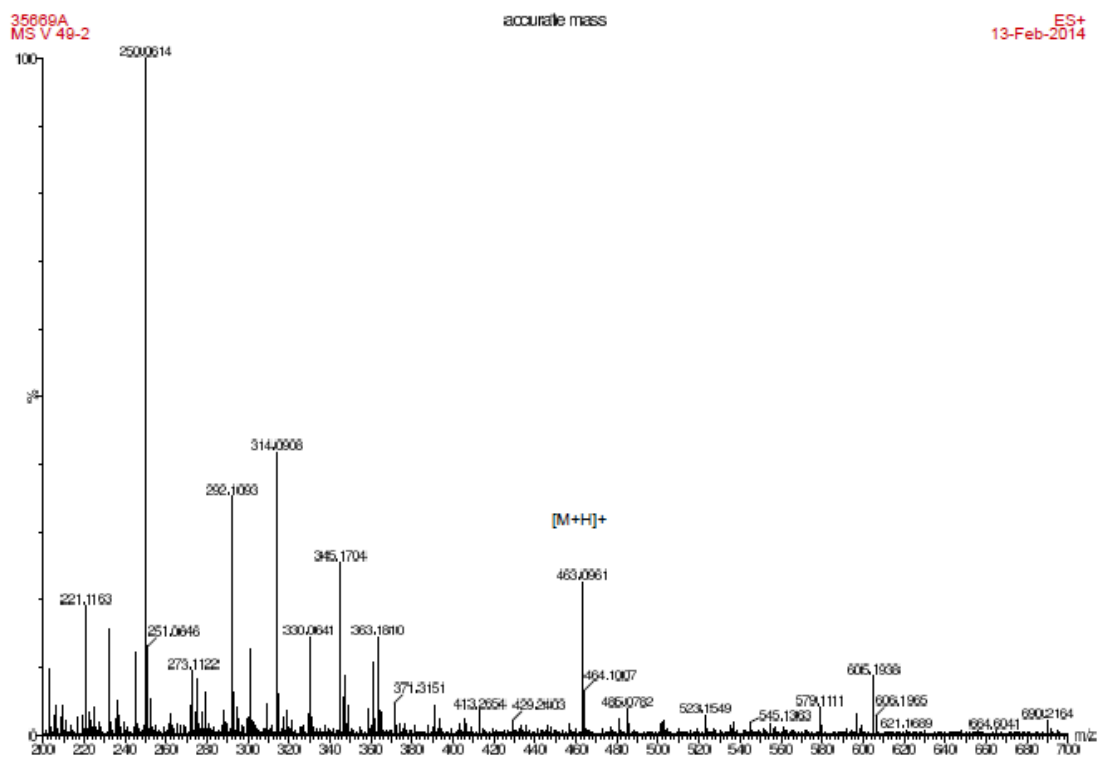
¹³C NMR (75 MHz, DMSO)

MS-IV-55 C13 in DMSO
11/02/2014



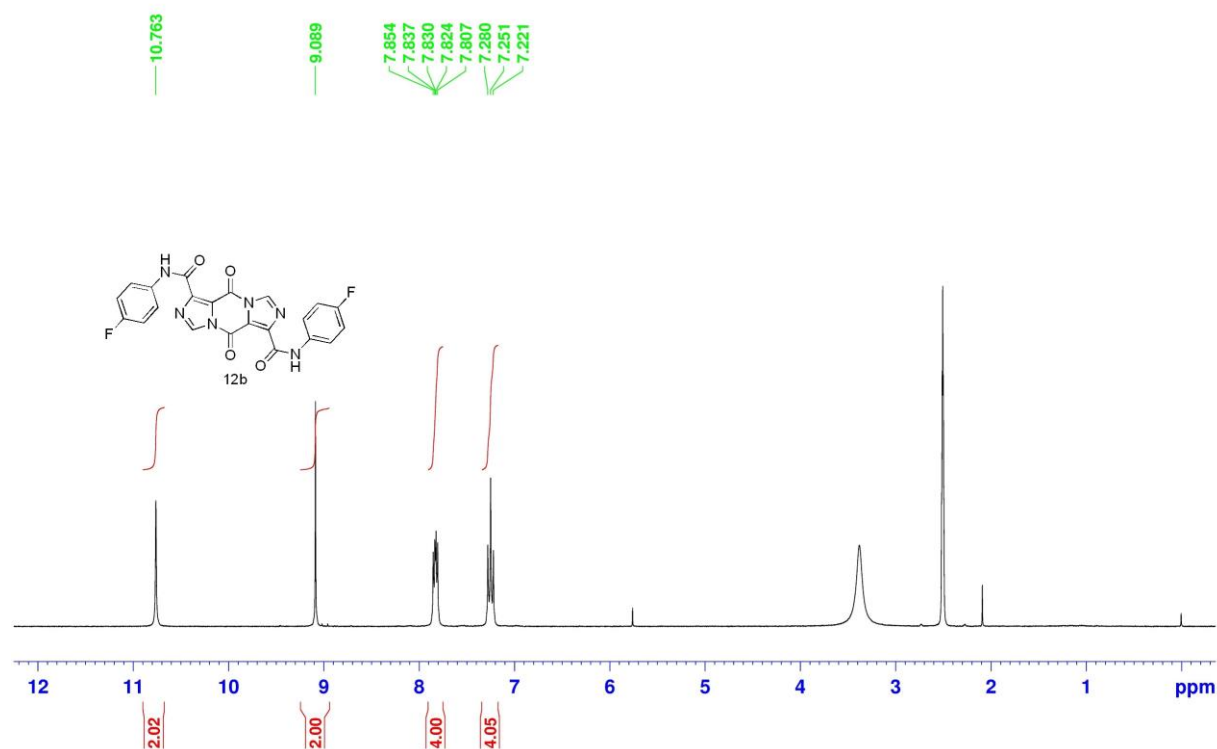
***N*¹,*N*⁶-bis(4-fluorophenyl)-5,10-dioxo-5,10-dihydroimidazo[1,5-*a*:1',5'-*d*]pyrazine-1,6-dicarboxamide (12b)**

HRMS (ES+)



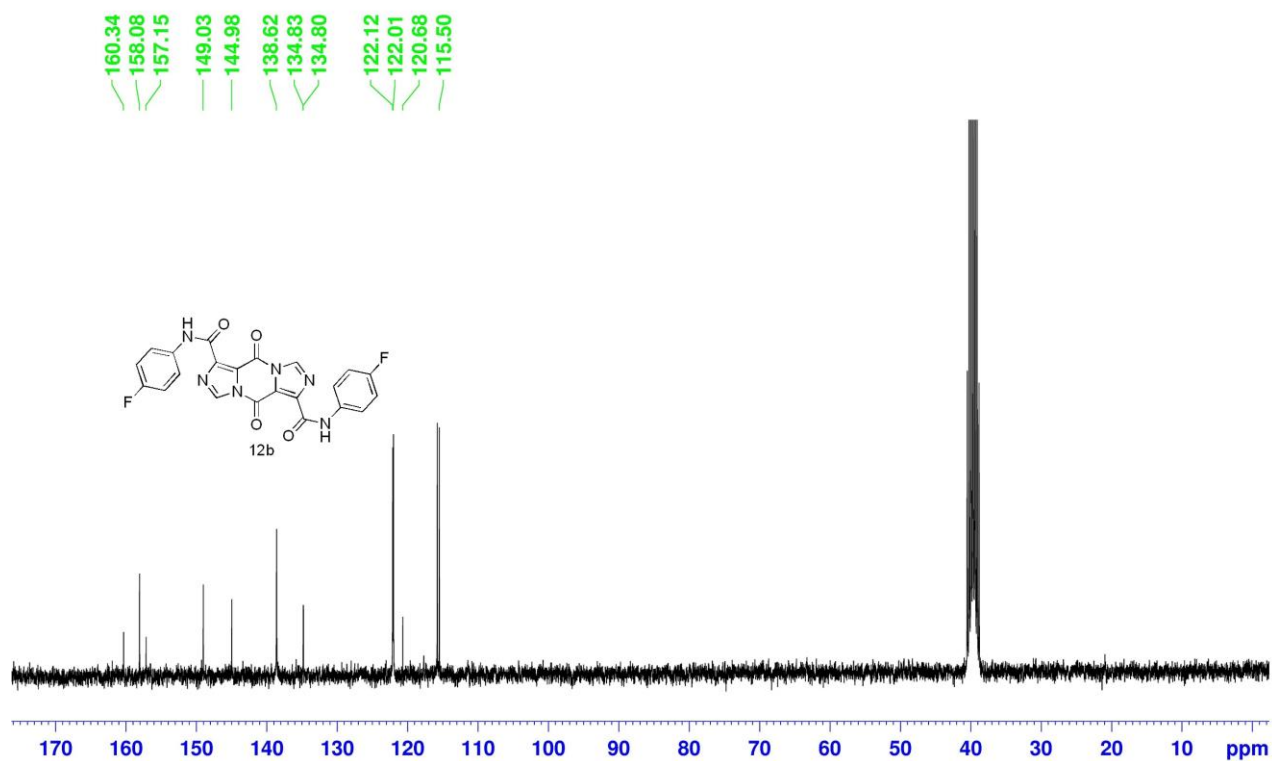
¹H NMR (300 MHz, DMSO)

MS-V-49-2 in DMSO
12/02/2014



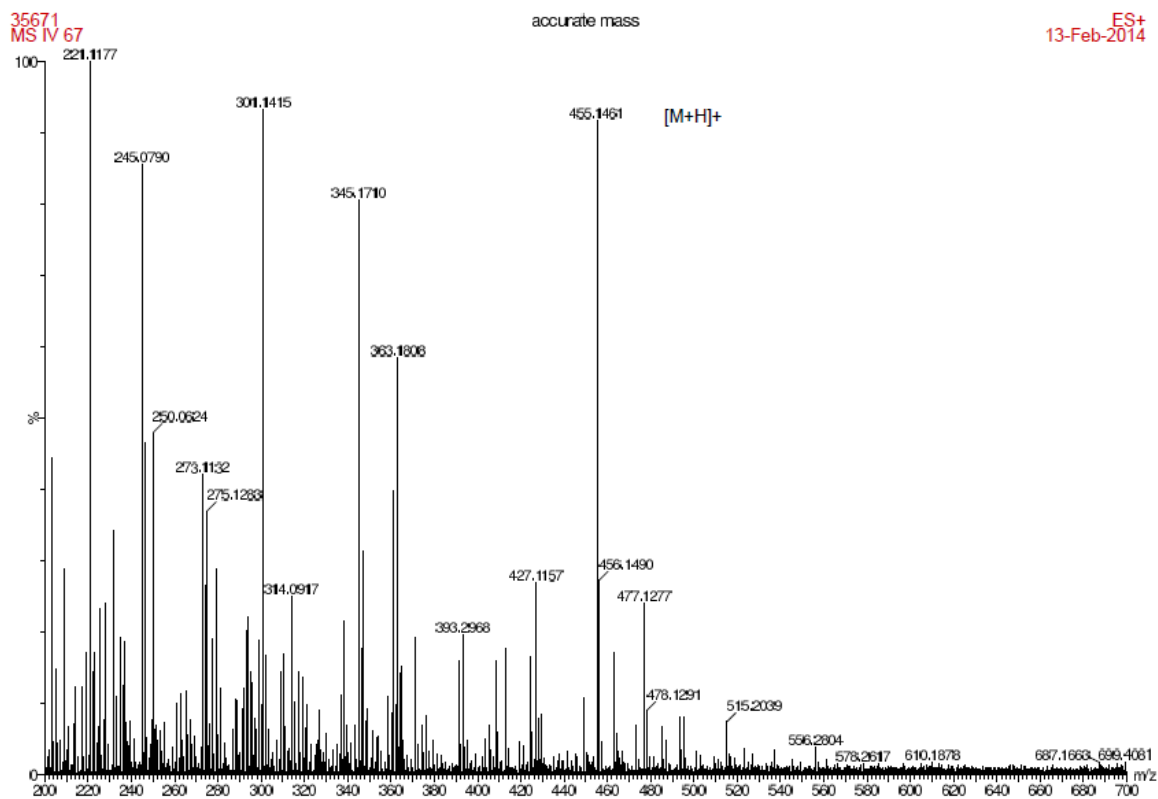
¹³C NMR (75 MHz, DMSO)

MS-V-49-2 C13 in DMSO
12/02/2014



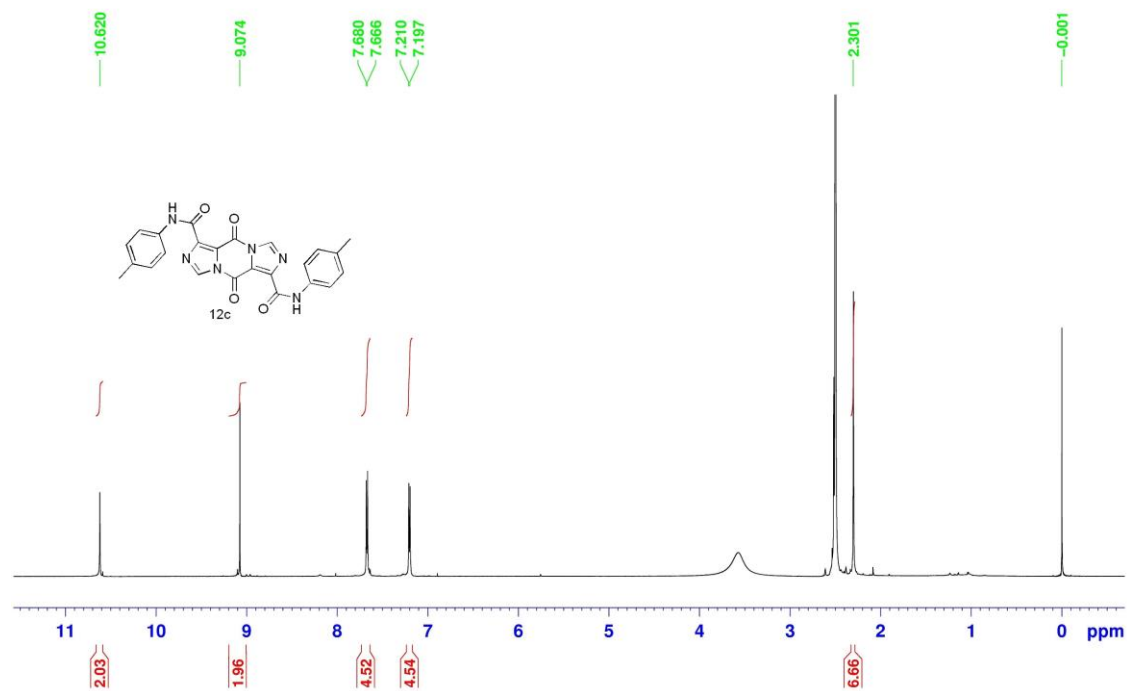
5,10-dioxo-*N*¹,*N*⁶-di-*p*-tolyl-5,10-dihydroimidazo[1,5-*a*:1',5'-*d*]pyrazine-1,6-dicarboxamide (12c)

HRMS (ES+)



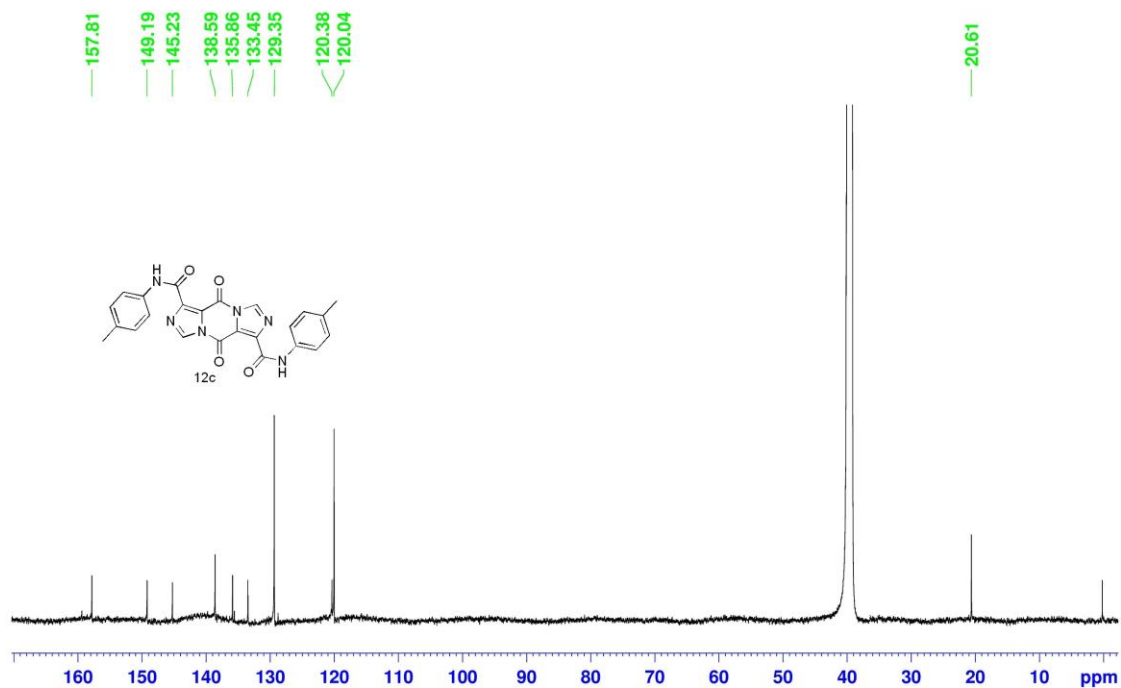
¹H NMR (600 MHz, DMSO)

MS-III-67-600 in DMSO
proton spectrum
temp=25C

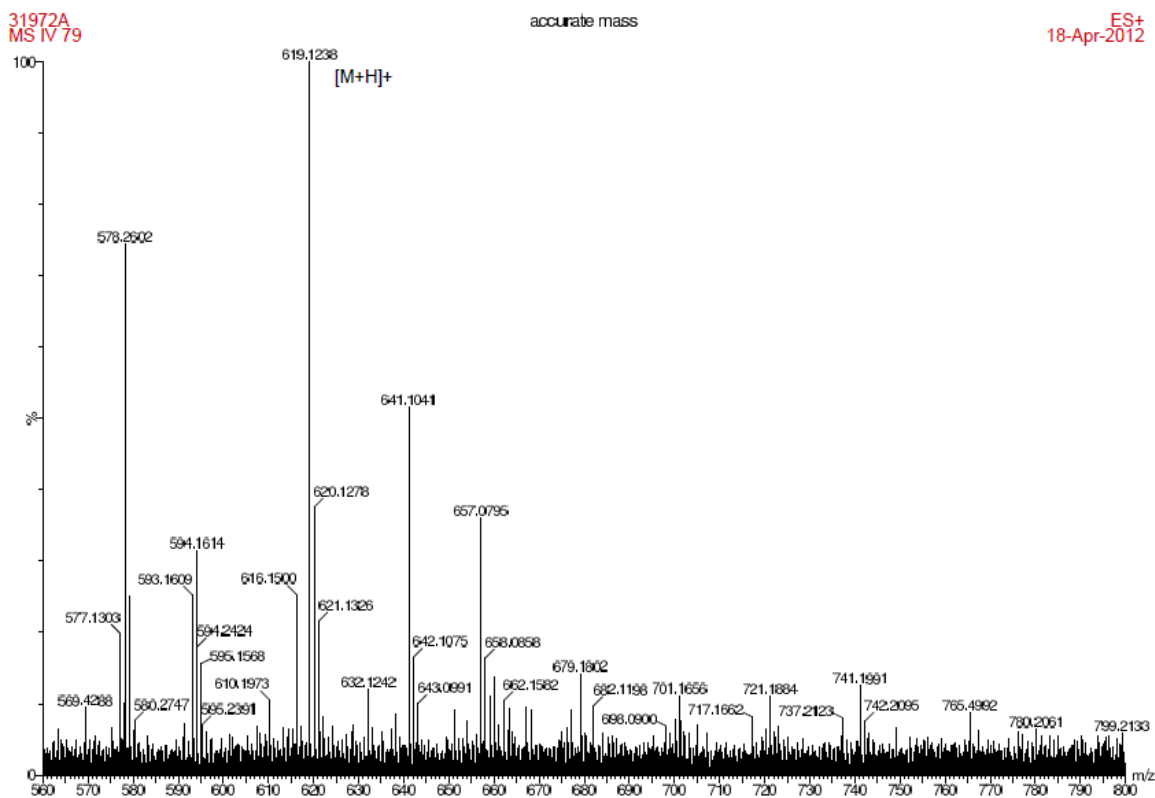


^{13}C NMR (150 MHz, DMSO)

MS-III-67-600 in DMSO
 ^{13}C spectrum



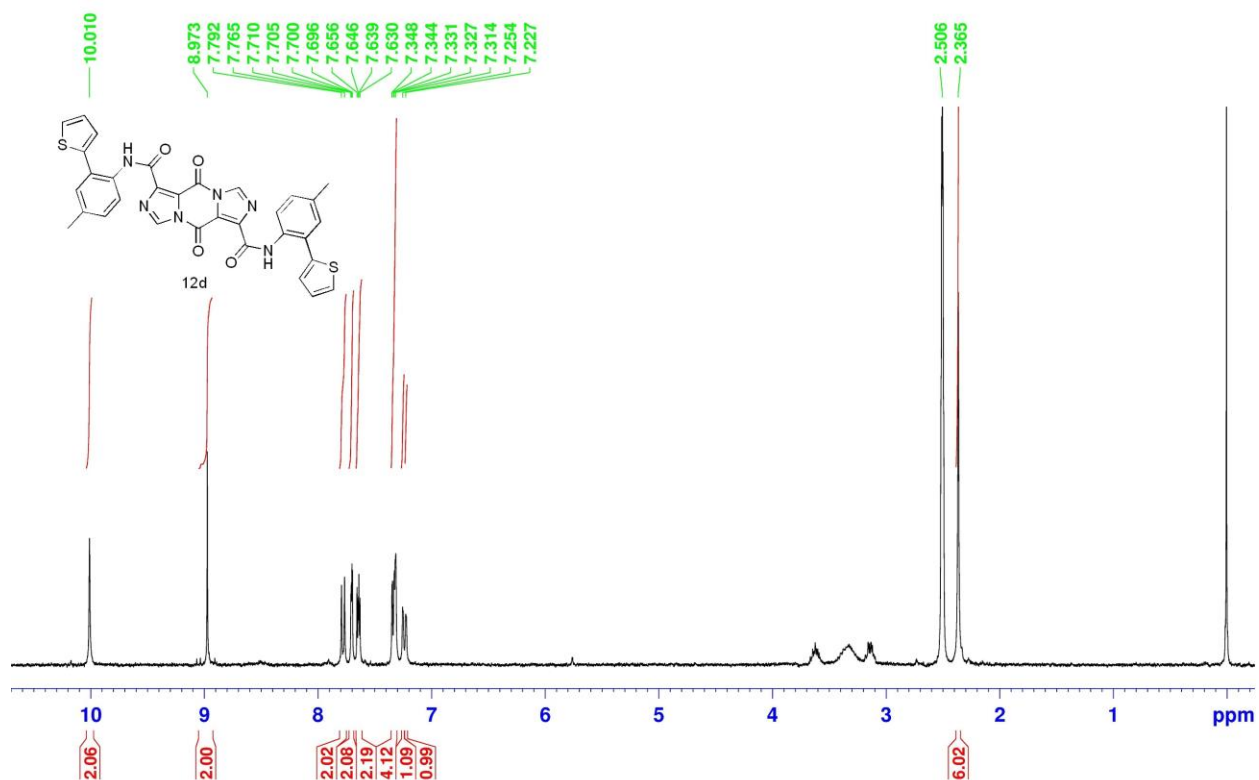
N^1, N^6 -bis(4-methyl-2-(thiophen-2-yl)phenyl)-5,10-dioxo-5,10-dihydroimidazo[1,5-a:1',5'-d]pyrazine-1,6-dicarboxamide (**12d**) HRMS (ES⁺)



^1H NMR (500 MHz, CDCl_3)

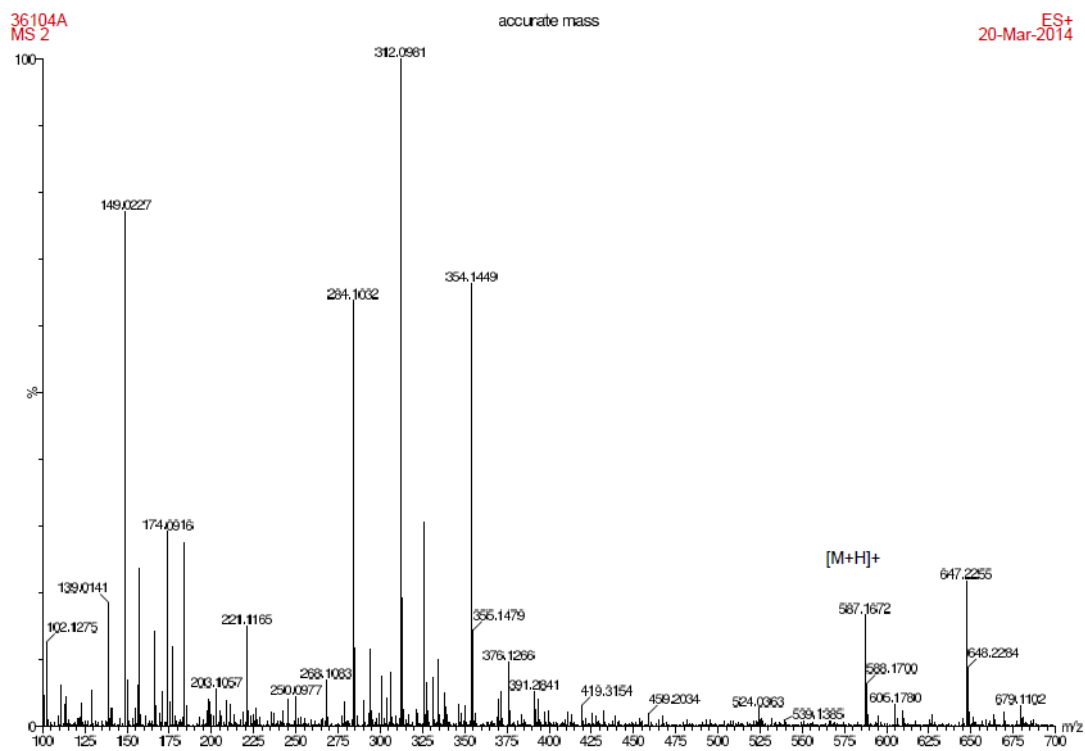
MS-IV-77 in DMSO

19/04/2012



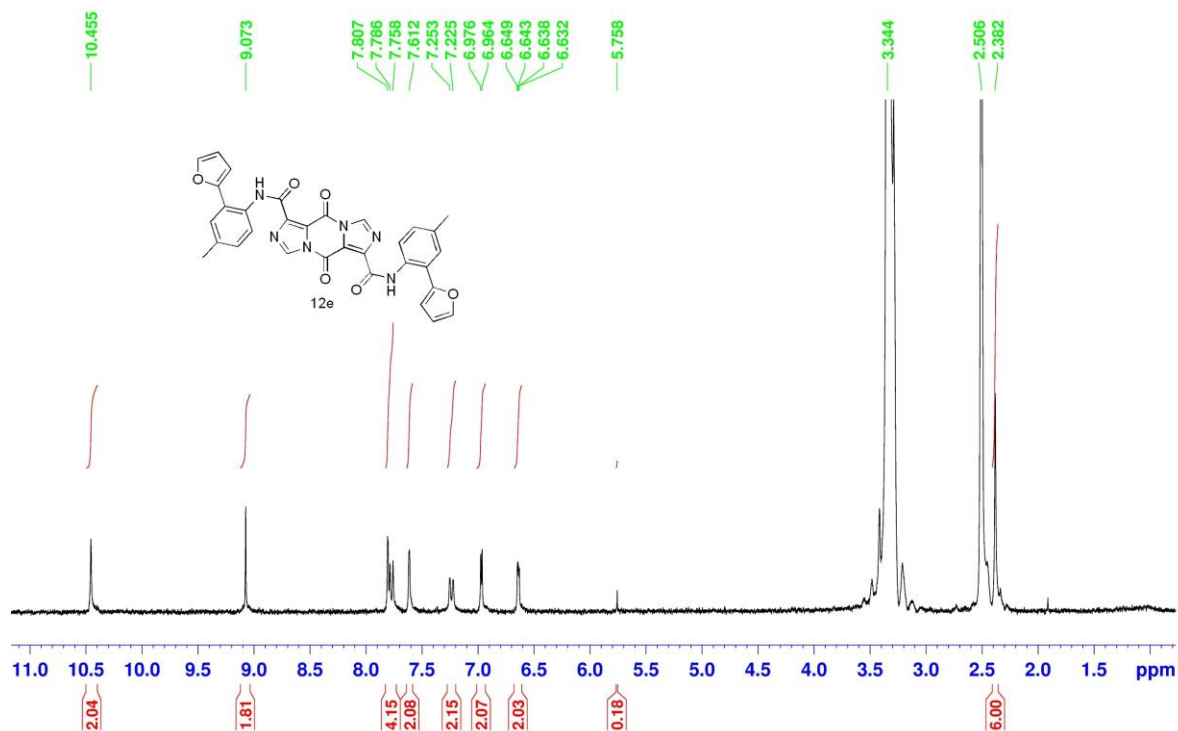
N^1, N^6 -bis(2-(furan-2-yl)-4-methylphenyl)-5,10-dioxo-5,10-dihydroimidazo
[1,5-a:1',5'-d]pyrazine-1,6-dicarboxamide (12e)

HRMS (ES $^+$)



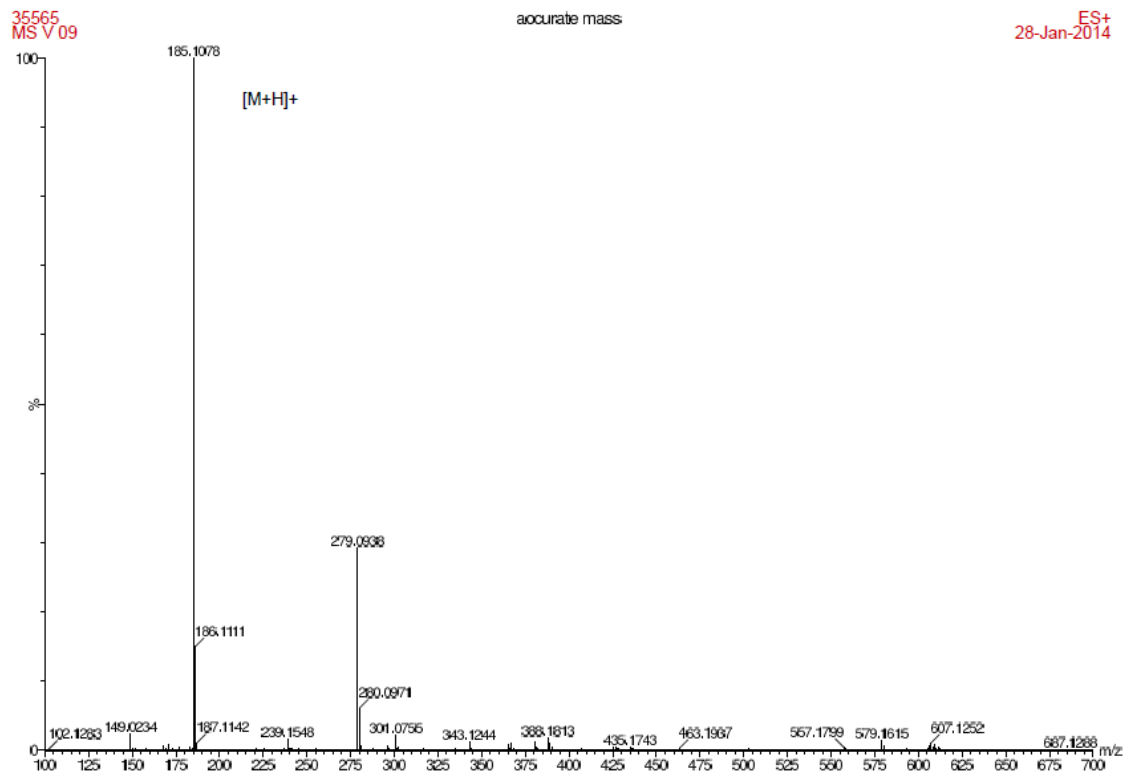
¹H NMR (500 MHz, CDCl₃)

MS-IV-04 in DMSO
20/09/2011



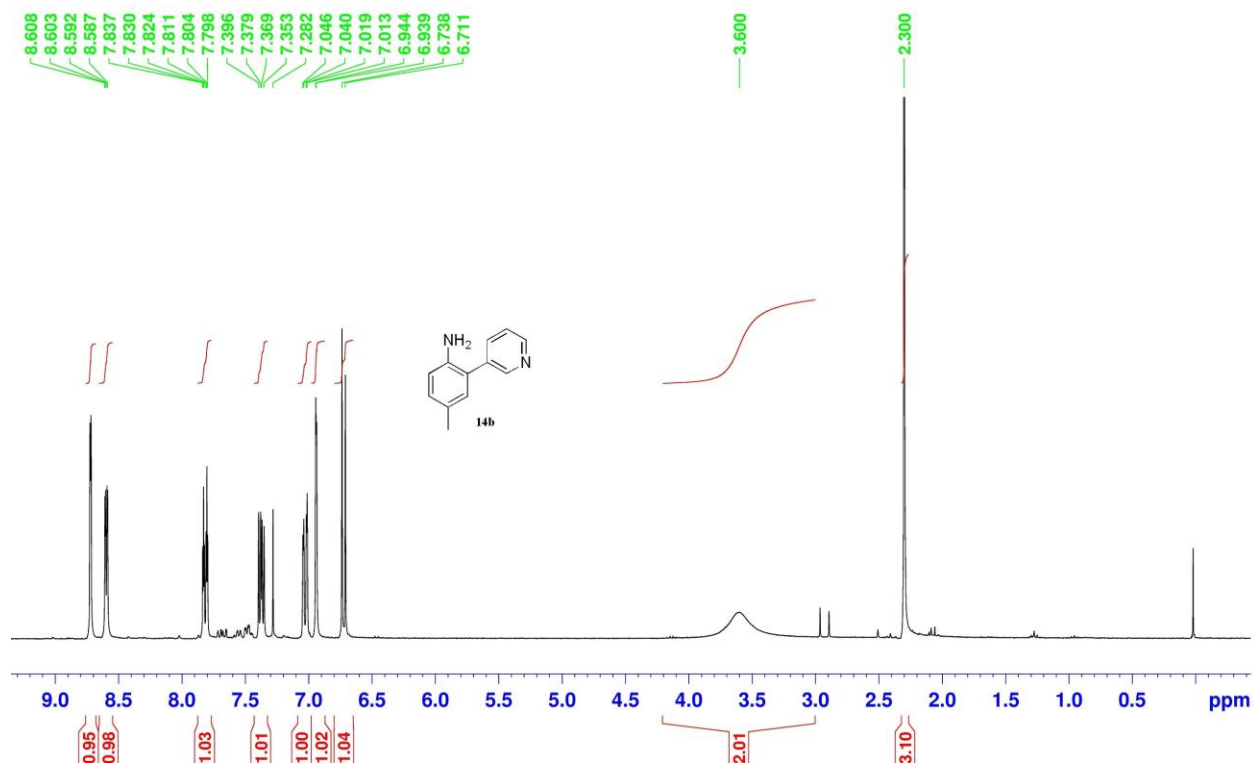
4-methyl-2-(pyridin-3-yl) aniline (14b)

HRMS (ES+)



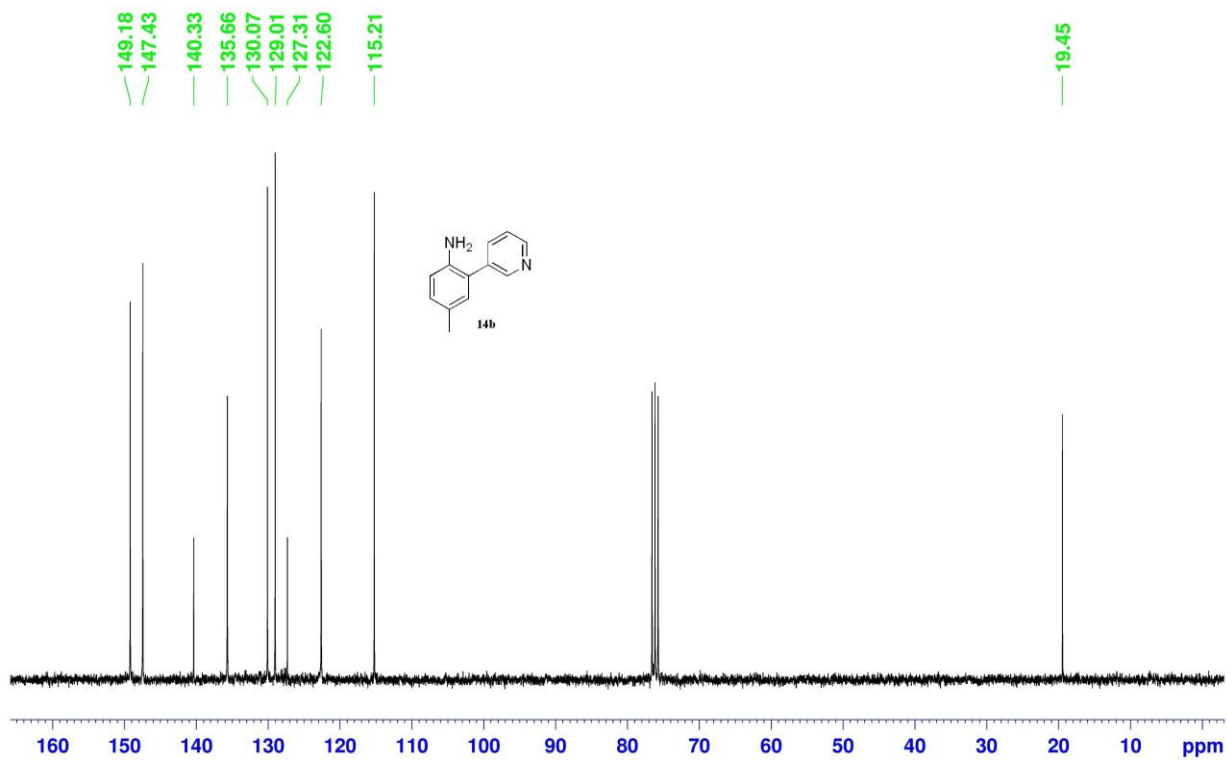
¹H NMR (300 MHz, CDCl₃)

MS-V-09 in CDCl₃ 300 mhz
25/01/2014



¹³C NMR (75 MHz, CDCl₃)

MS-V-09 C13 in CDCl₃ 300 mhz
25/01/2014



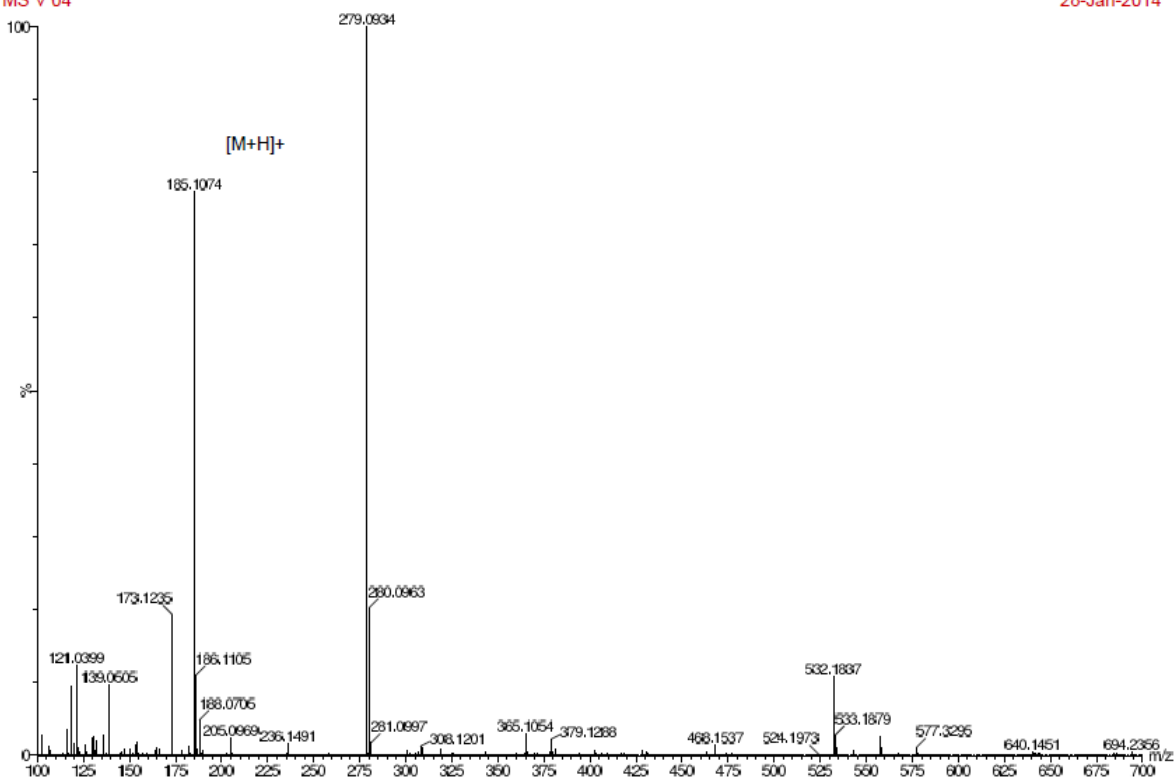
4-methyl-2-(pyridin-4-yl)aniline (14c)

HRMS (ES+)

35549
MS V 04

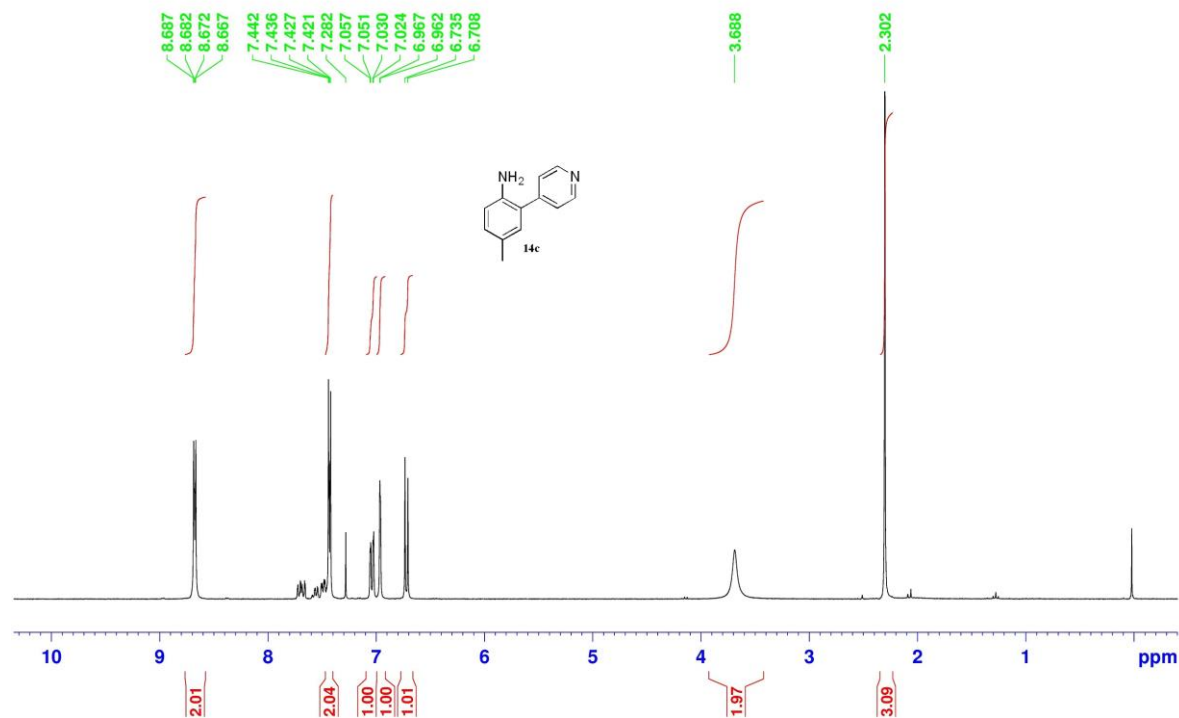
accurate mass

ES+
28-Jan-2014



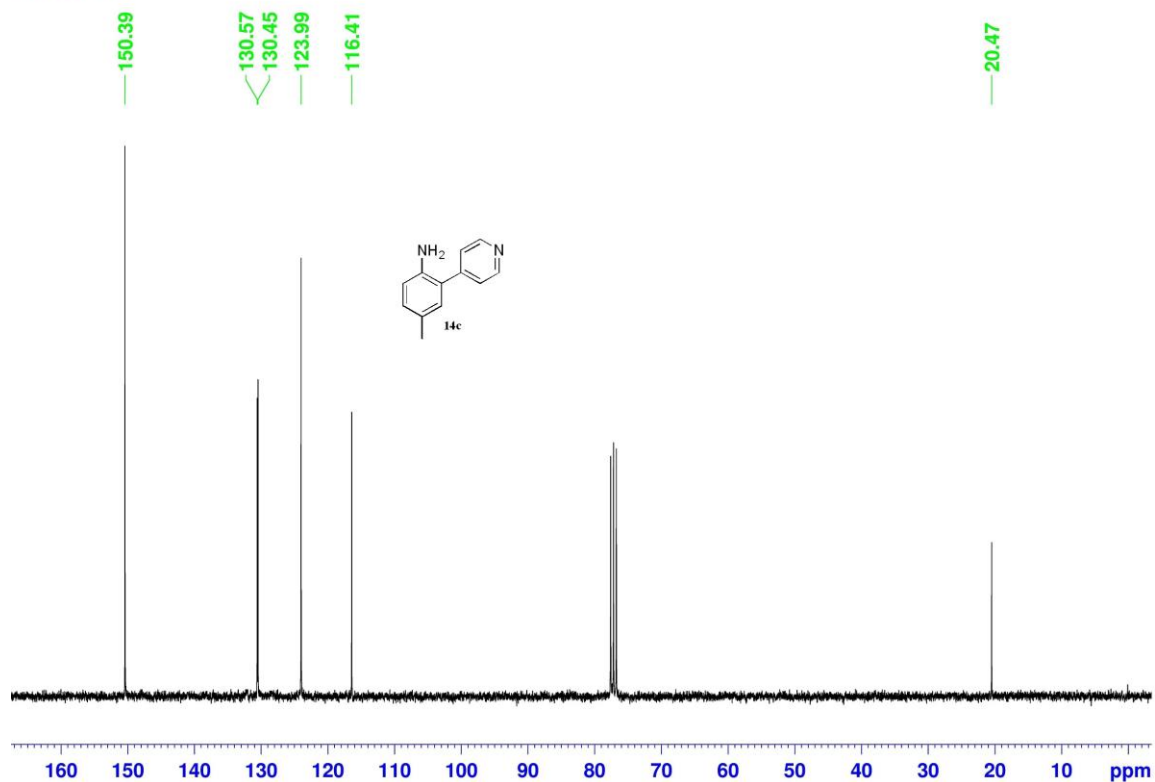
¹H NMR (300 MHz, CDCl₃)

MS-V-04 in CDCl₃ 300 mhz
25/01/2014



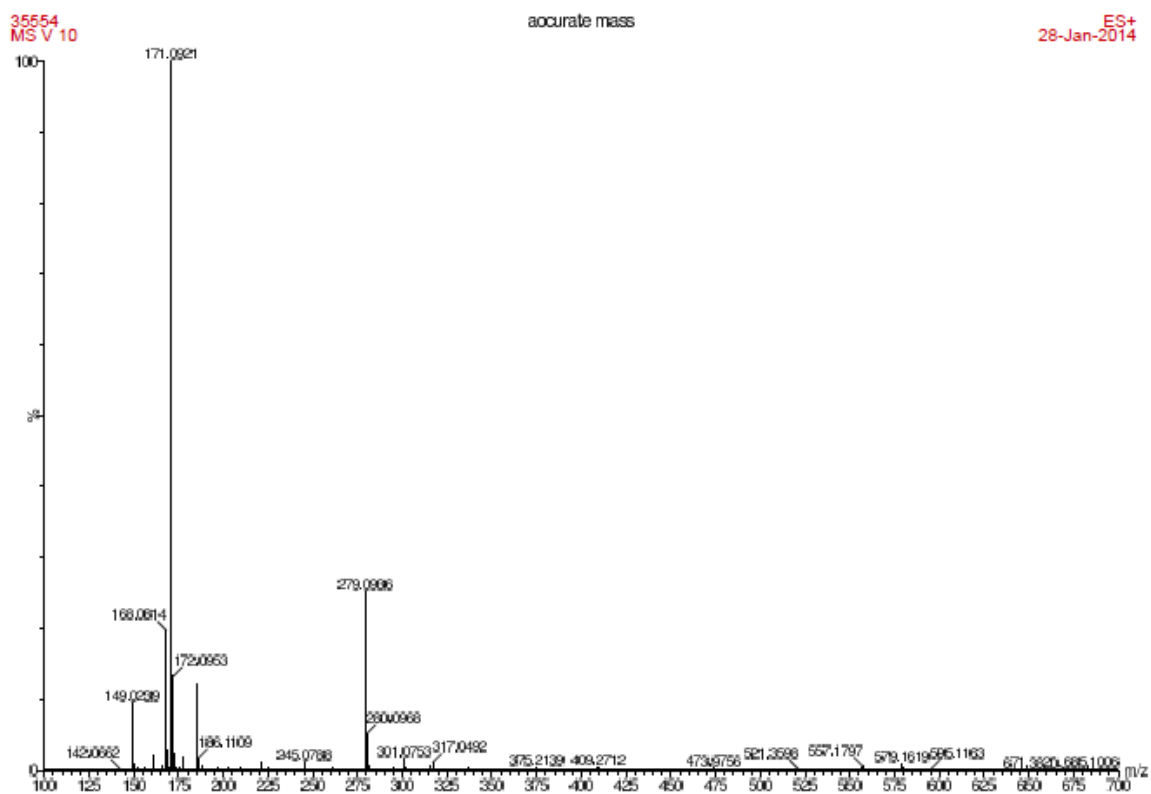
¹³C NMR (75 MHz, CDCl₃)

MS-V-04 in CDCl₃ C13 300 mhz
25/01/2014



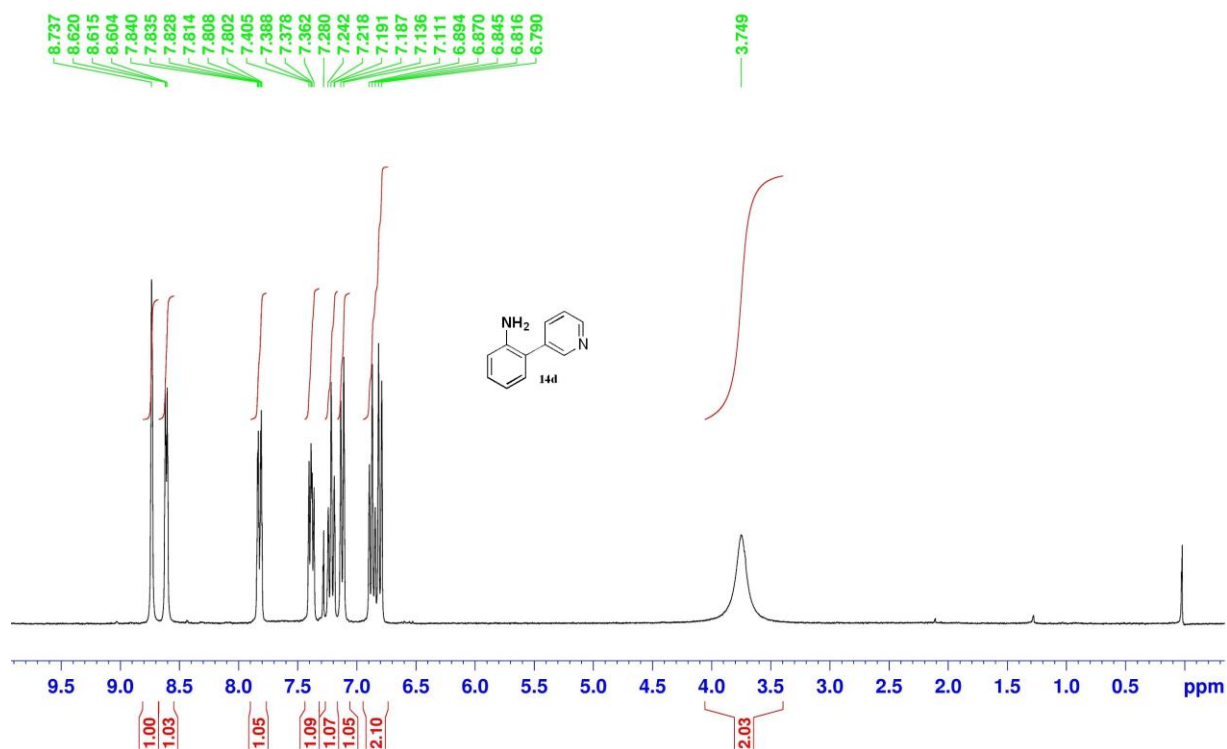
2-(pyridin-3-yl)aniline (14d)

HRMS (ES+)



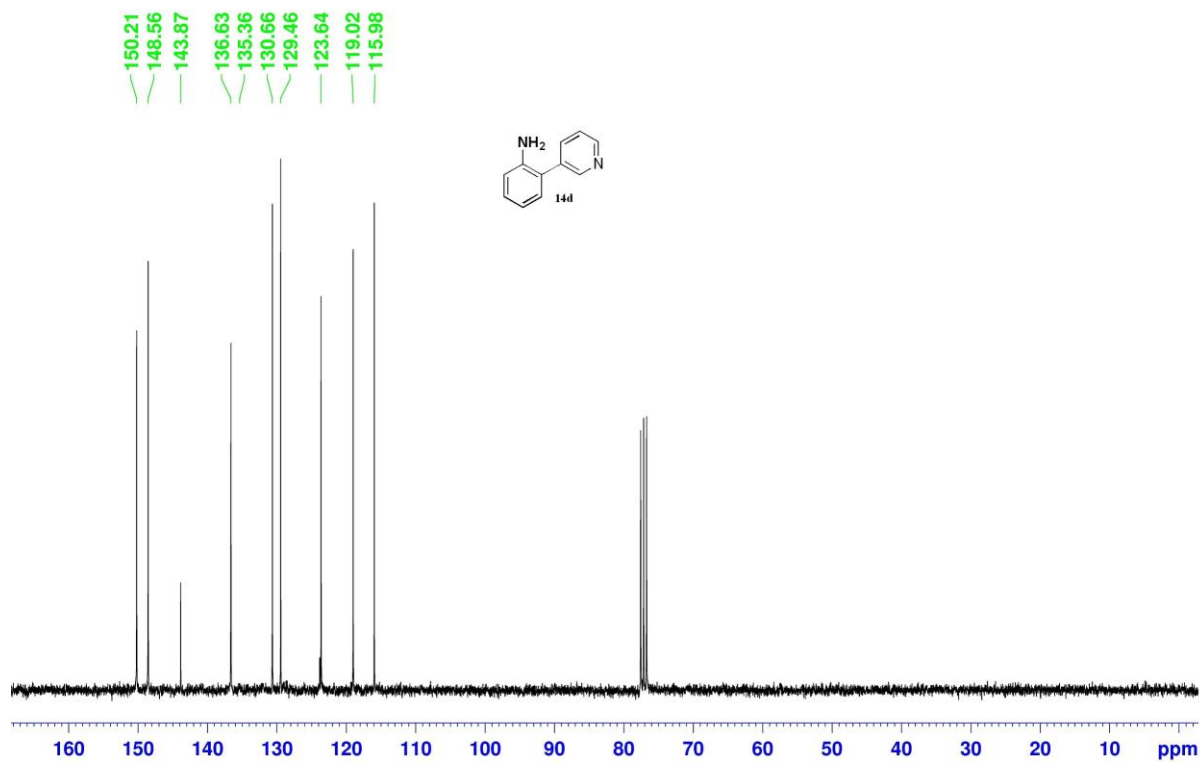
¹H NMR (300 MHz, CDCl₃)

MS-V-10 in CDCl₃ 300 mhz
25/01/2014



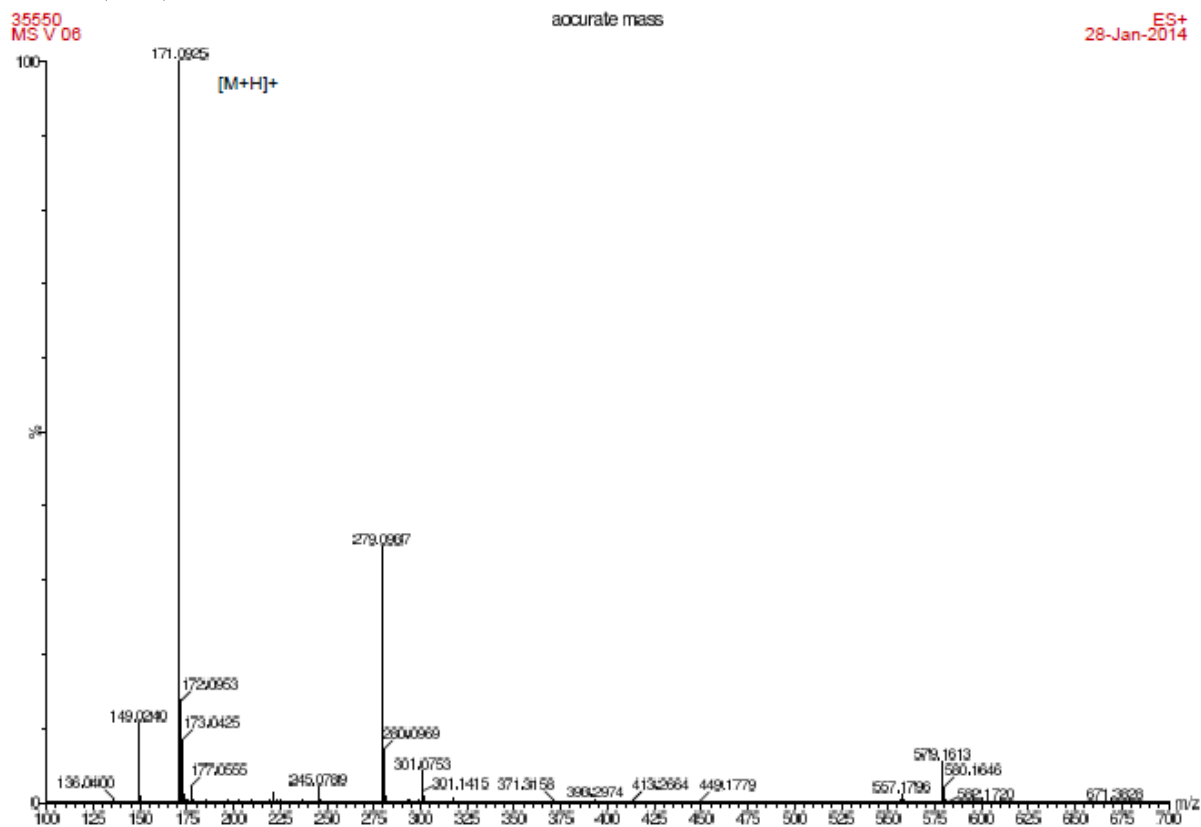
¹³C NMR (75 MHz, CDCl₃)

MS-V-10 C13 in CDCl₃ 300 mhz
25/01/2014



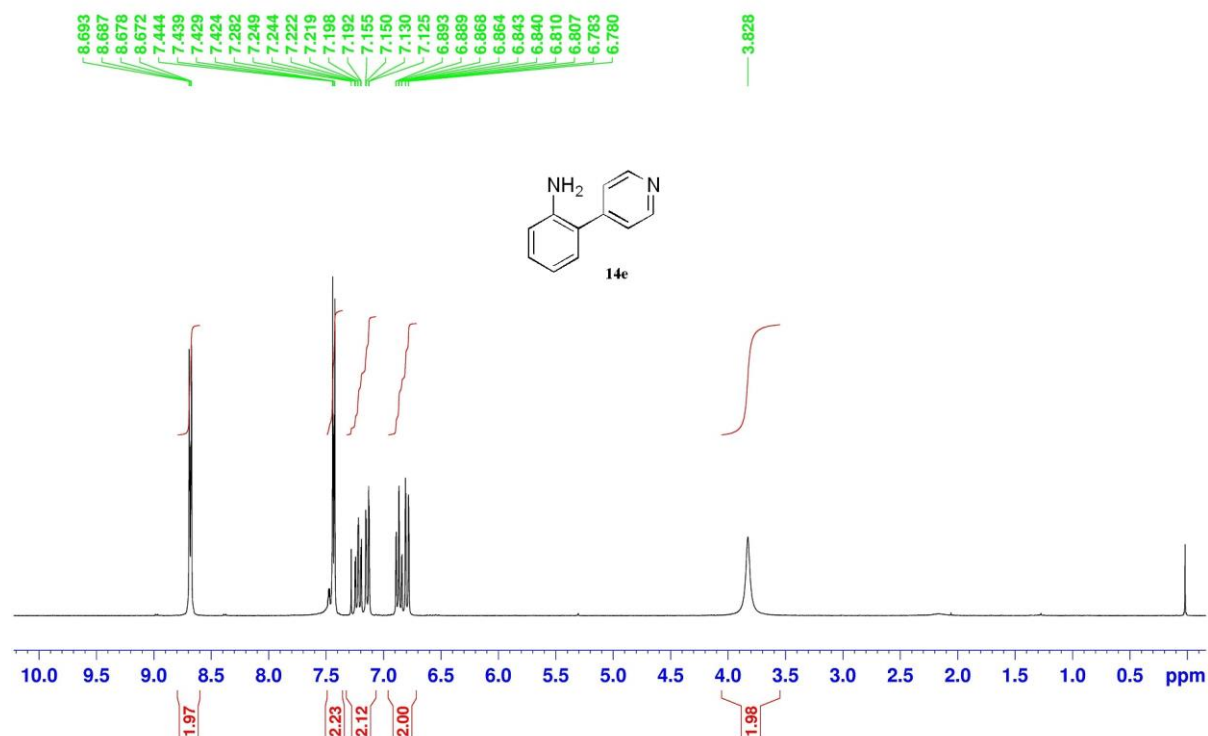
2-(pyridin-4-yl)aniline (14e)

HRMS (ES+)



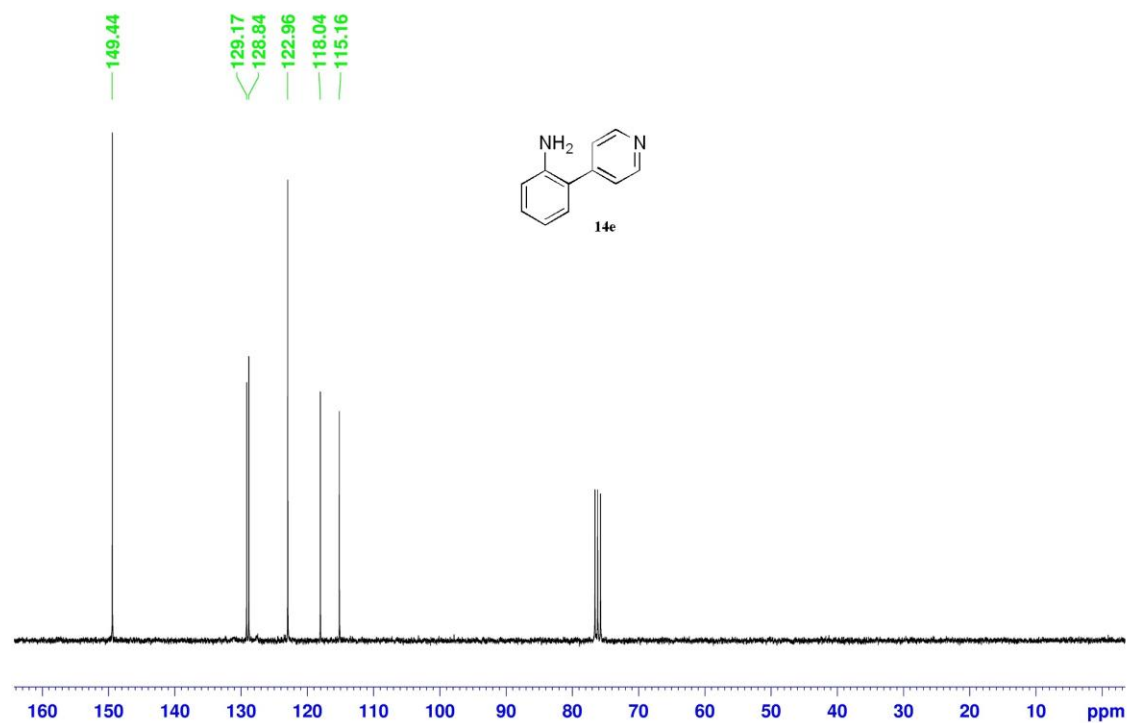
^1H NMR (300 MHz, CDCl_3)

MS-V-06 in CDCl_3 300 mhz
25/01/2014



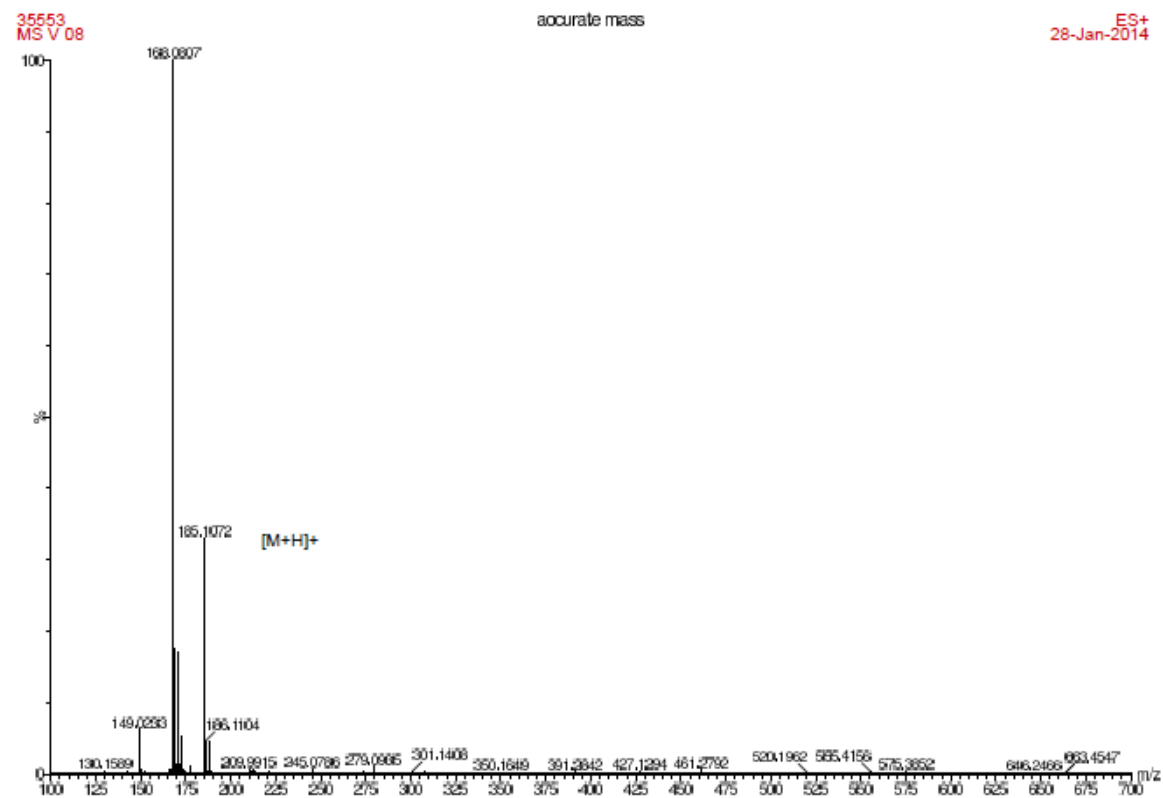
¹³C NMR (75 MHz, CDCl₃)

MS-V-06 C13 in CDCl3 300 mhz
25/01/2014



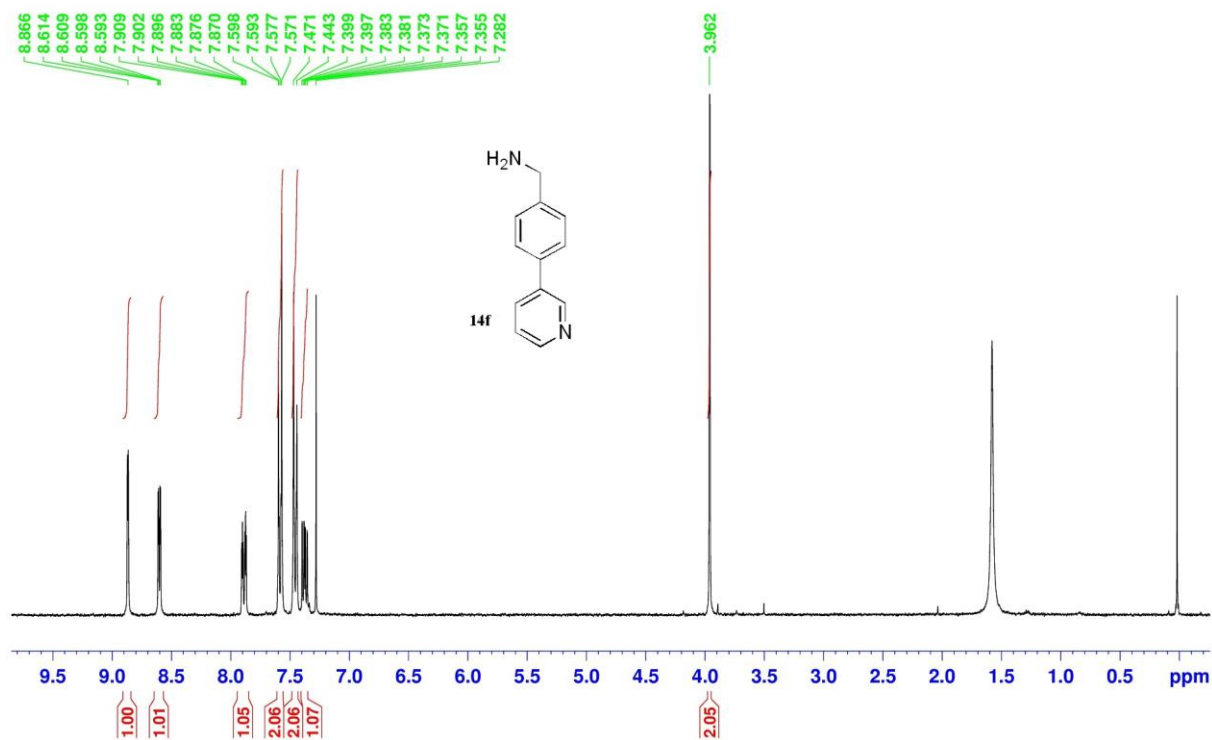
(4-(pyridin-3-yl)phenyl)methanamine (14f)

HRMS (ES+)



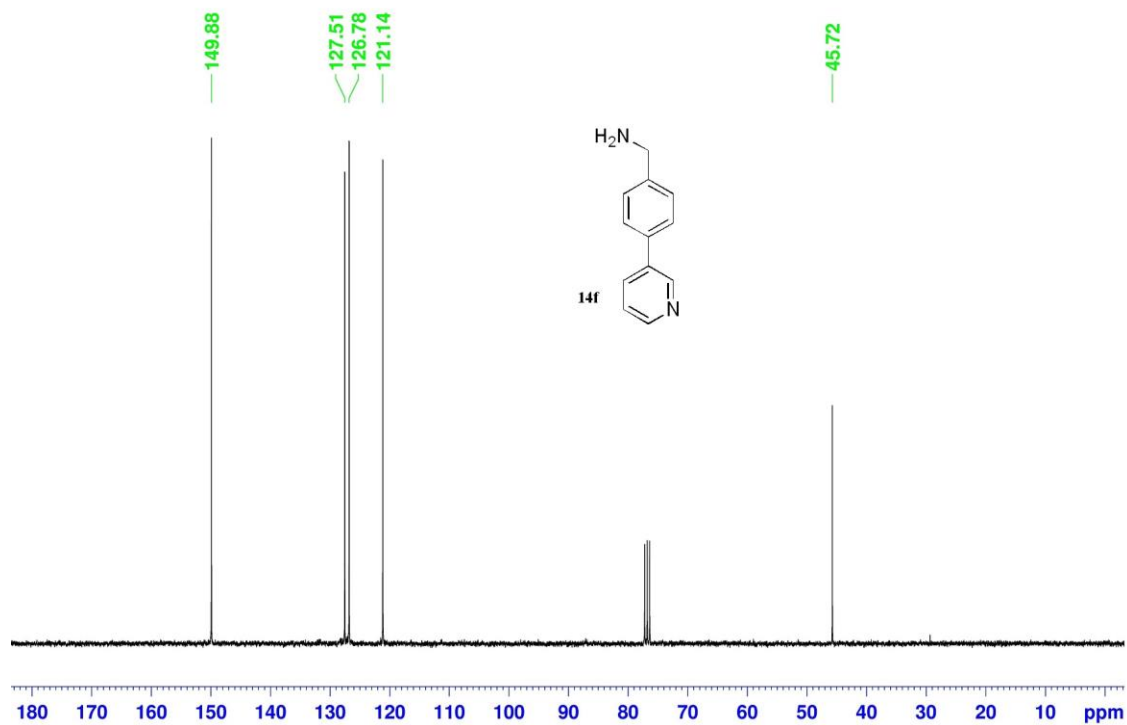
^1H NMR (300 MHz, CDCl_3)

MS-V-08 in CDCl_3
28/05/2012



^{13}C NMR (75 MHz, CDCl_3)

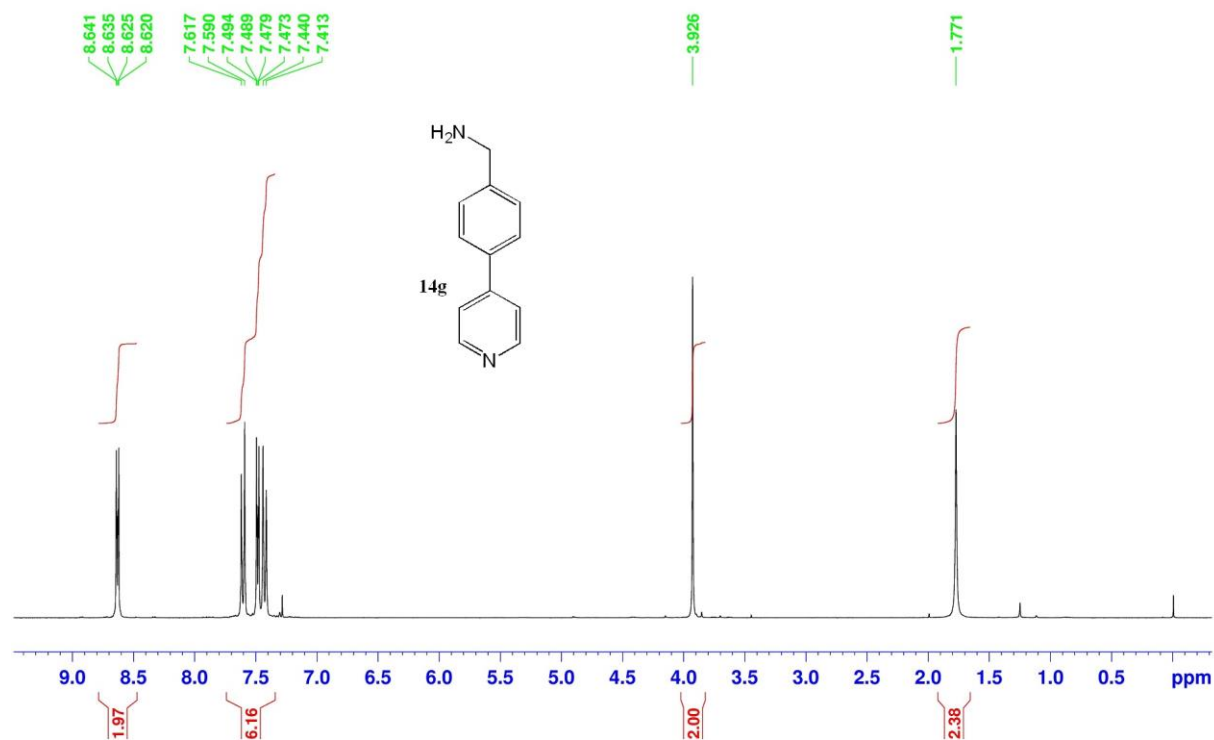
MS-V-08 C13 in CDCl_3 300 mhz
25/01/2014



(4-(pyridin-4-yl)phenyl)methanamine (14g)

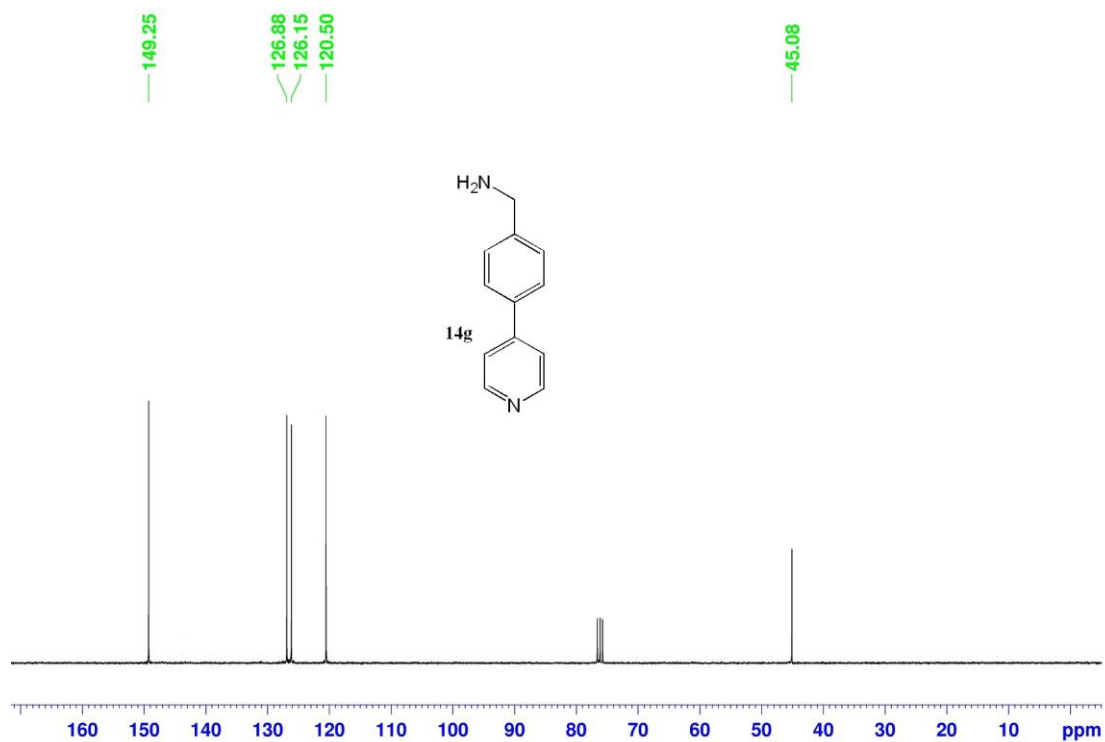
¹H NMR (500 MHz, CDCl₃)

MS-V-07 in CDCl₃ 300 mhz
25/01/2014



¹³C NMR (75 MHz, CDCl₃)

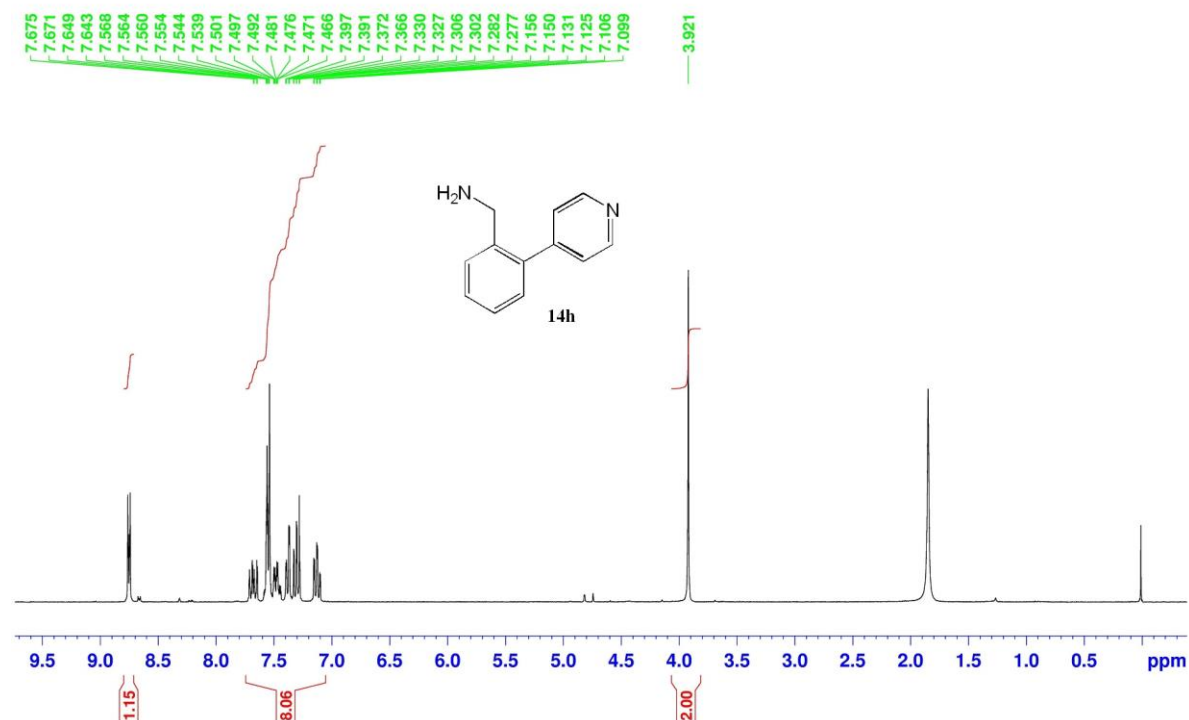
MS-V-07 C13 in CDCl₃ 300 mhz
25/01/2014



(2-(pyridin-4-yl)phenyl)methanamine (14h)

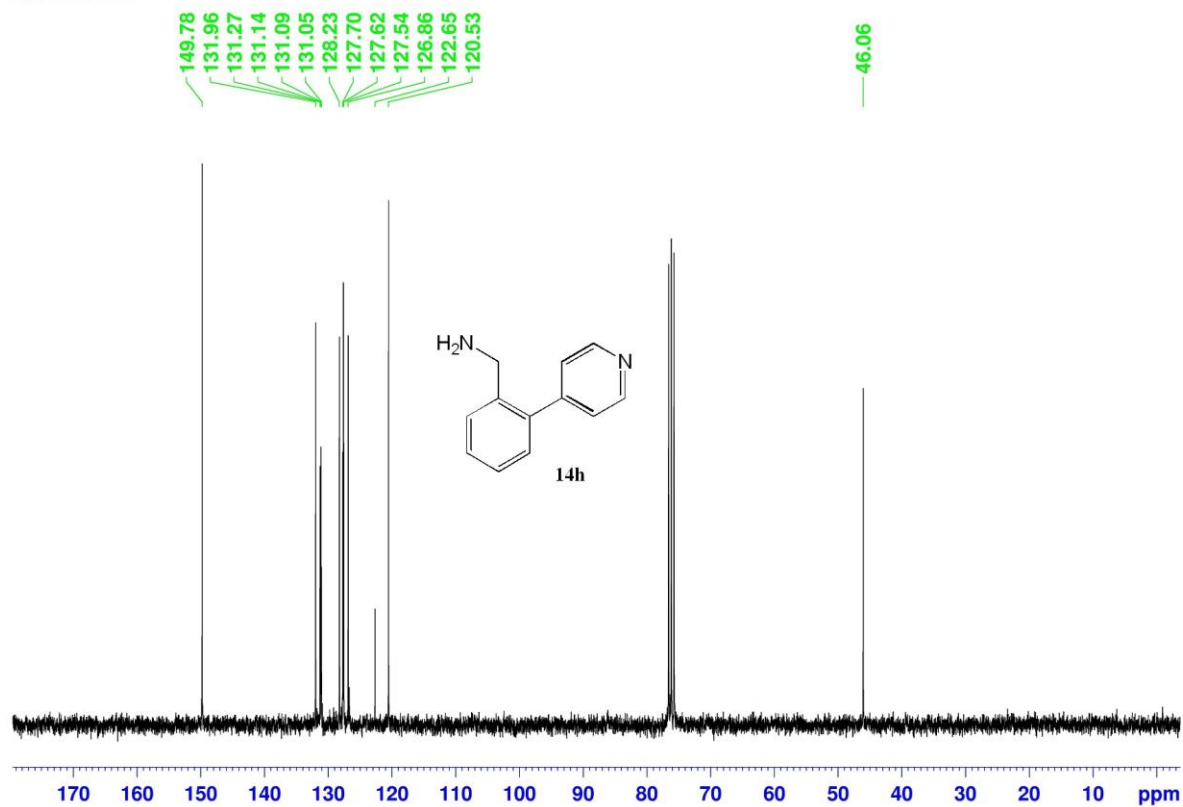
^1H NMR (300 MHz, CDCl_3)

MS-V-05 in CDCl_3 300 mhz
25/01/2014



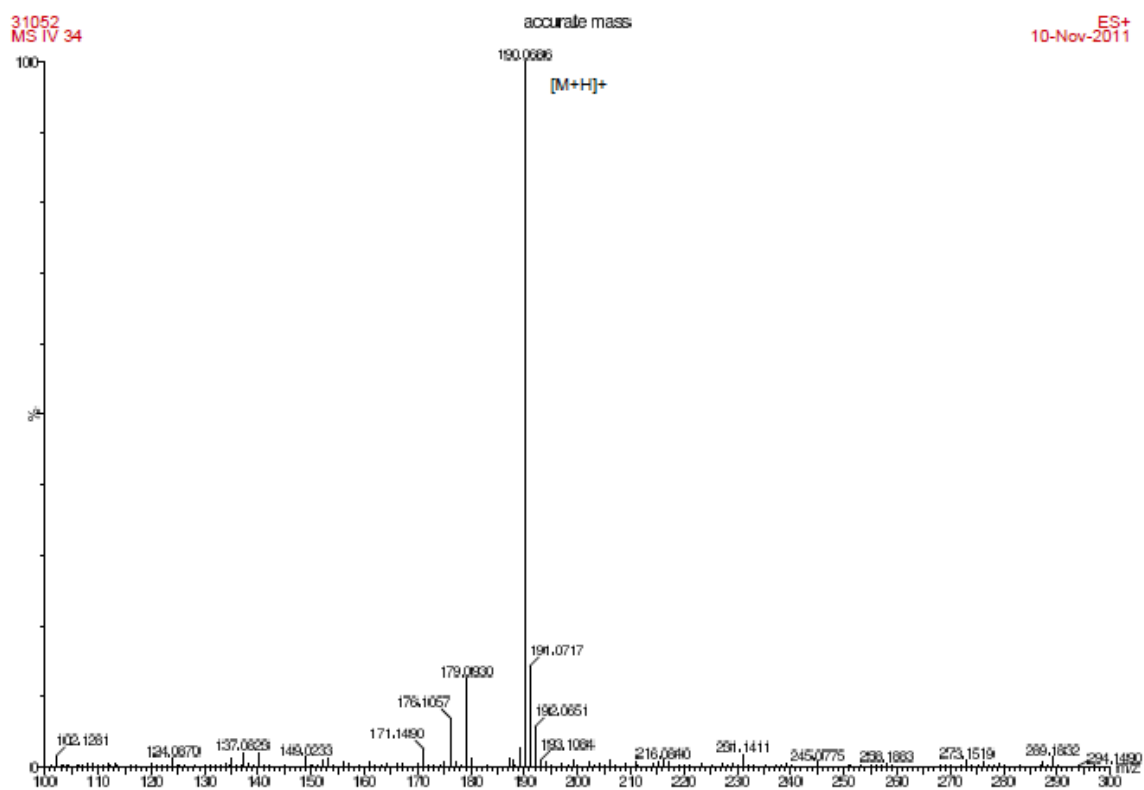
^{13}C NMR (75 MHz, CDCl_3)

MS-V-05 C13 in CDCl_3 300 mhz
25/01/2014



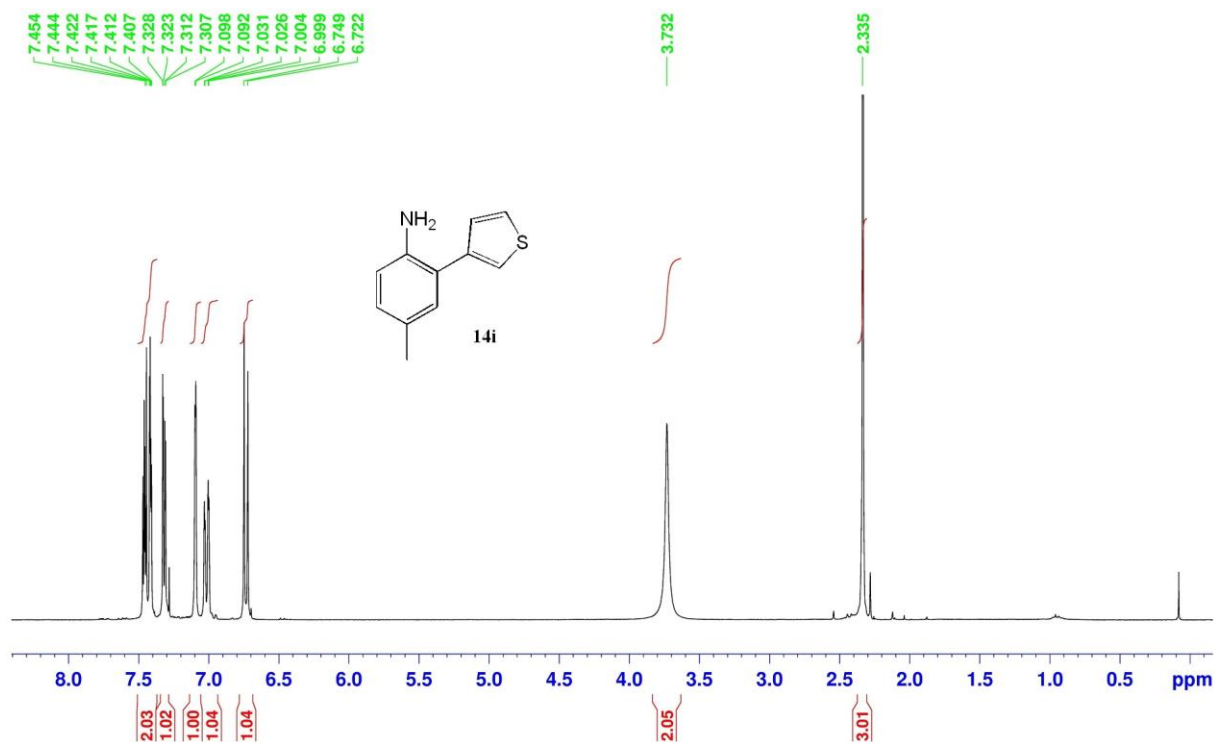
4-methyl-2-(thiophen-3-yl)aniline (14i)

HRMS (ES+)



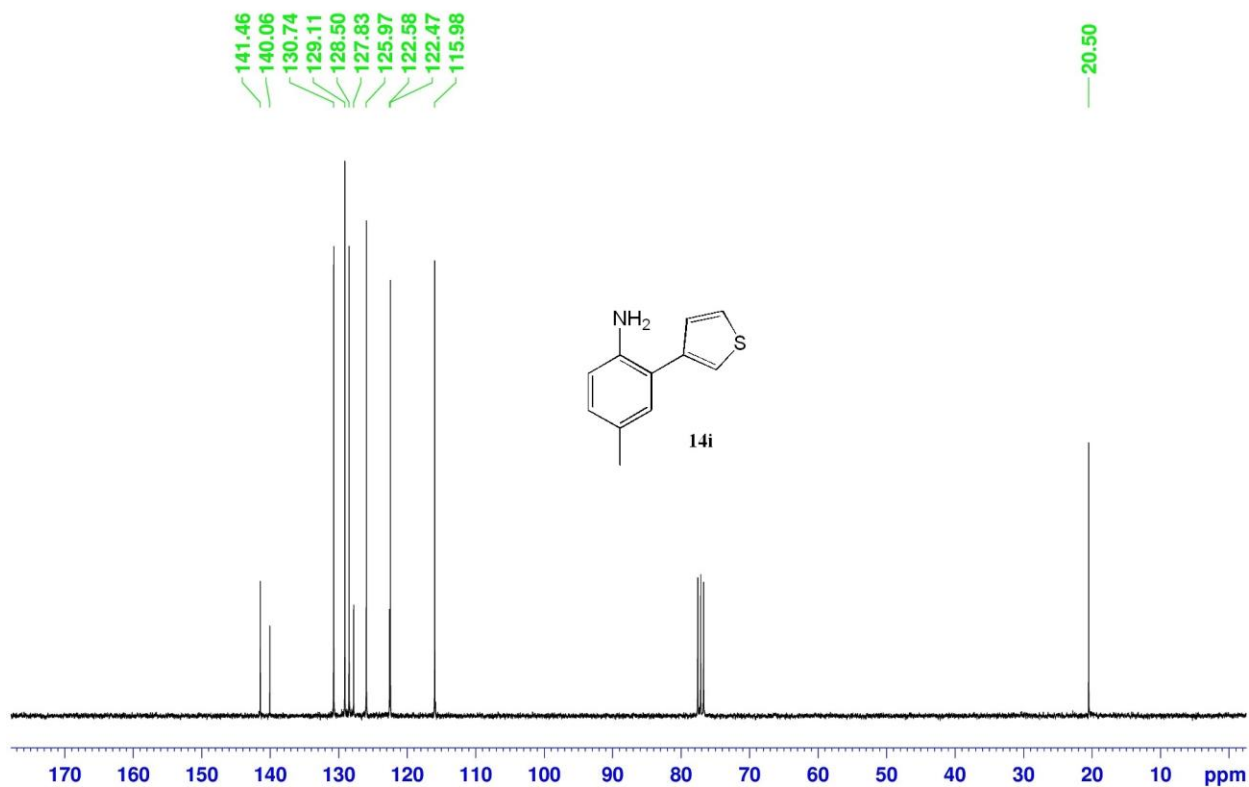
¹H NMR (300 MHz, CDCl₃)

MS-IV-34 in CDCl₃ 300 mhz
25/01/2014



^{13}C NMR (75 MHz, CDCl_3)

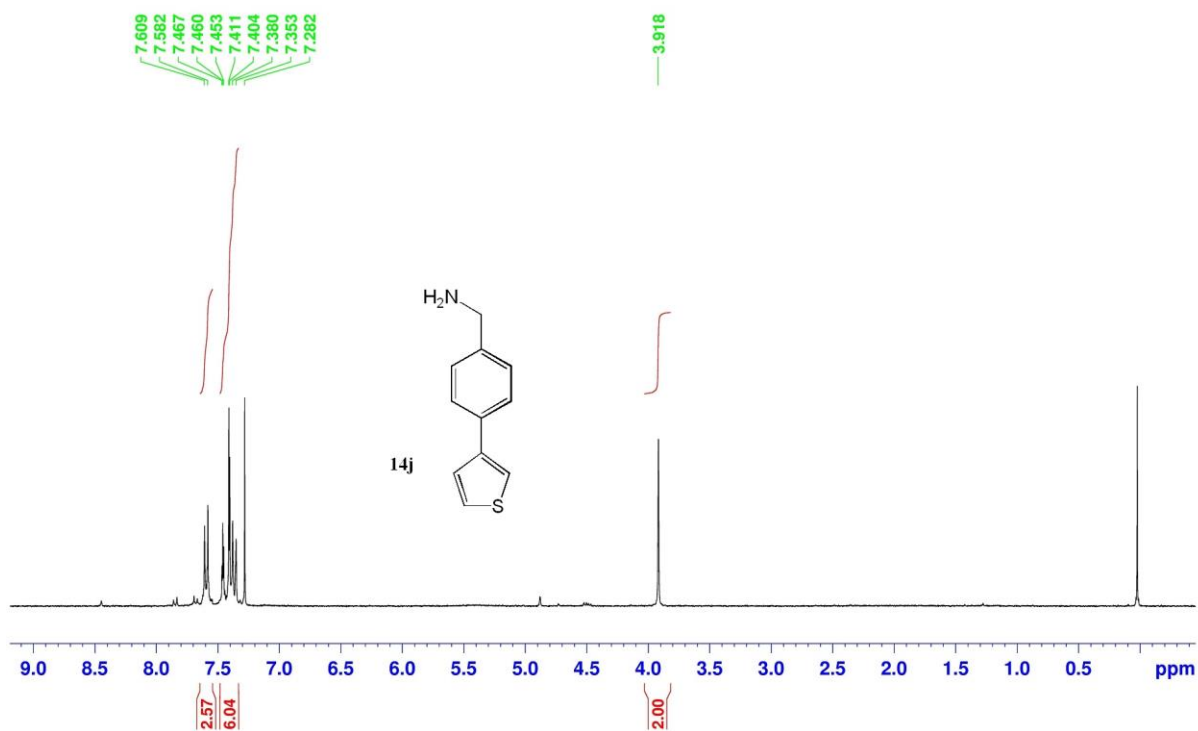
MS-IV-34 C13 in CDCl_3 300 mhz
25/01/2014



(4-(thiophen-3-yl)phenyl)methanamine (14j)

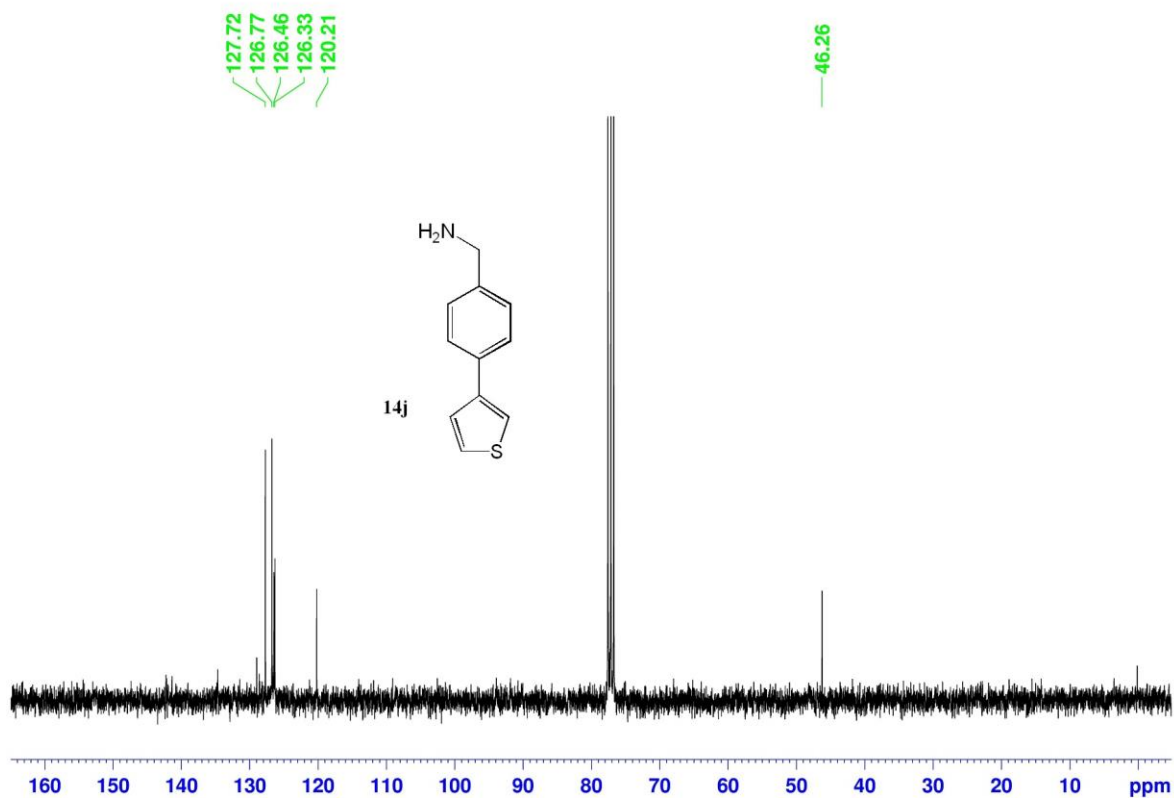
^1H NMR (300 MHz, CDCl_3)

MS-IV-82 in CDCl_3 300 mhz
25/01/2014



¹³C NMR (75 MHz, CDCl₃)

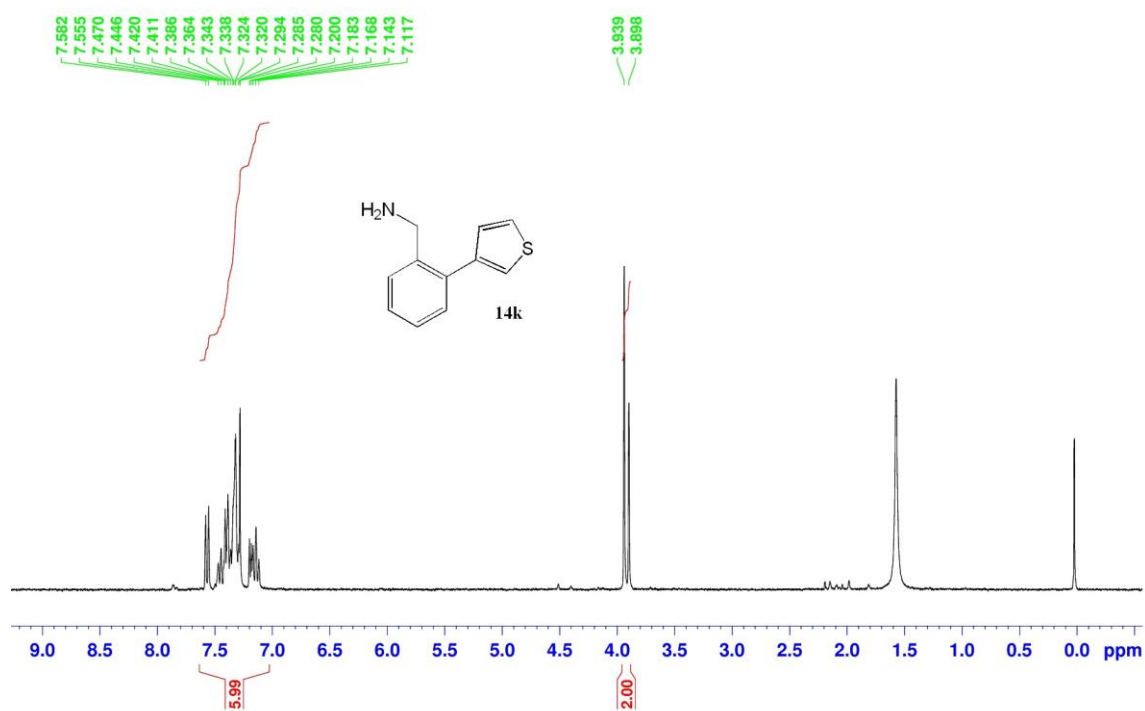
MS-IV-82 C13 in CDCl₃ 300 mhz
25/01/2014



2-(thiophen-3-yl)phenylmethanamine (4.14k)

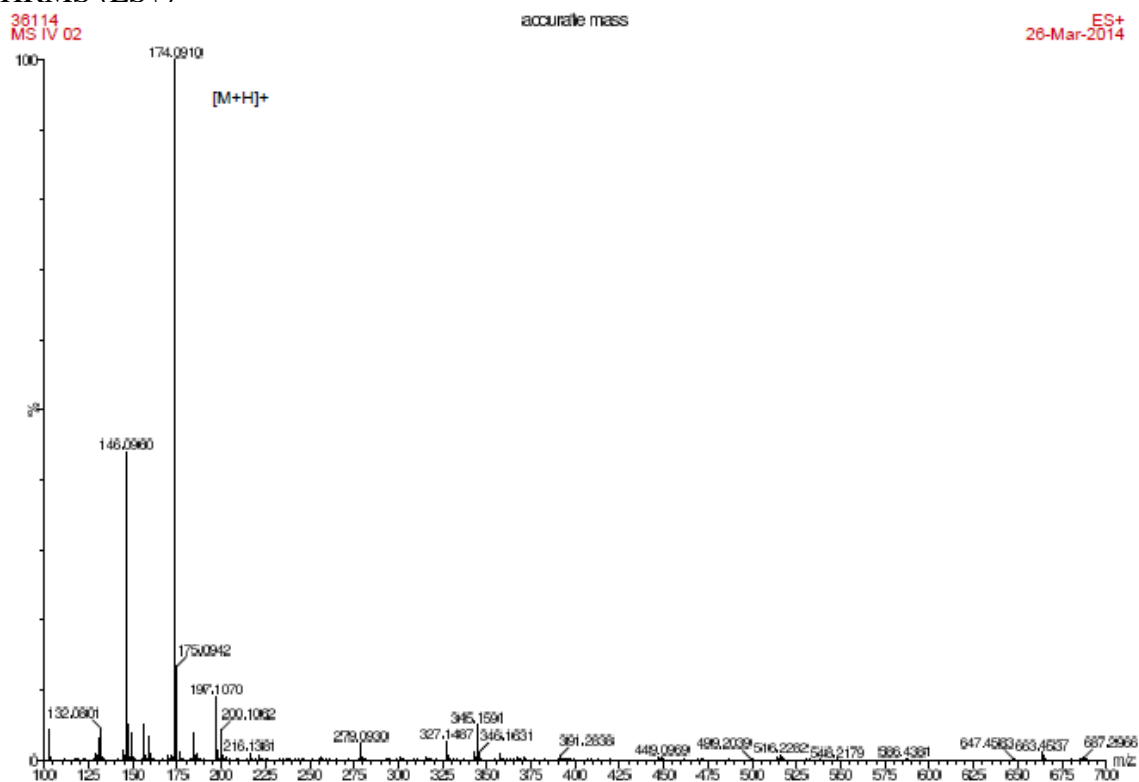
¹H NMR (300 MHz, CDCl₃)

MS-IV-87 in CDCl₃
25/04/2012



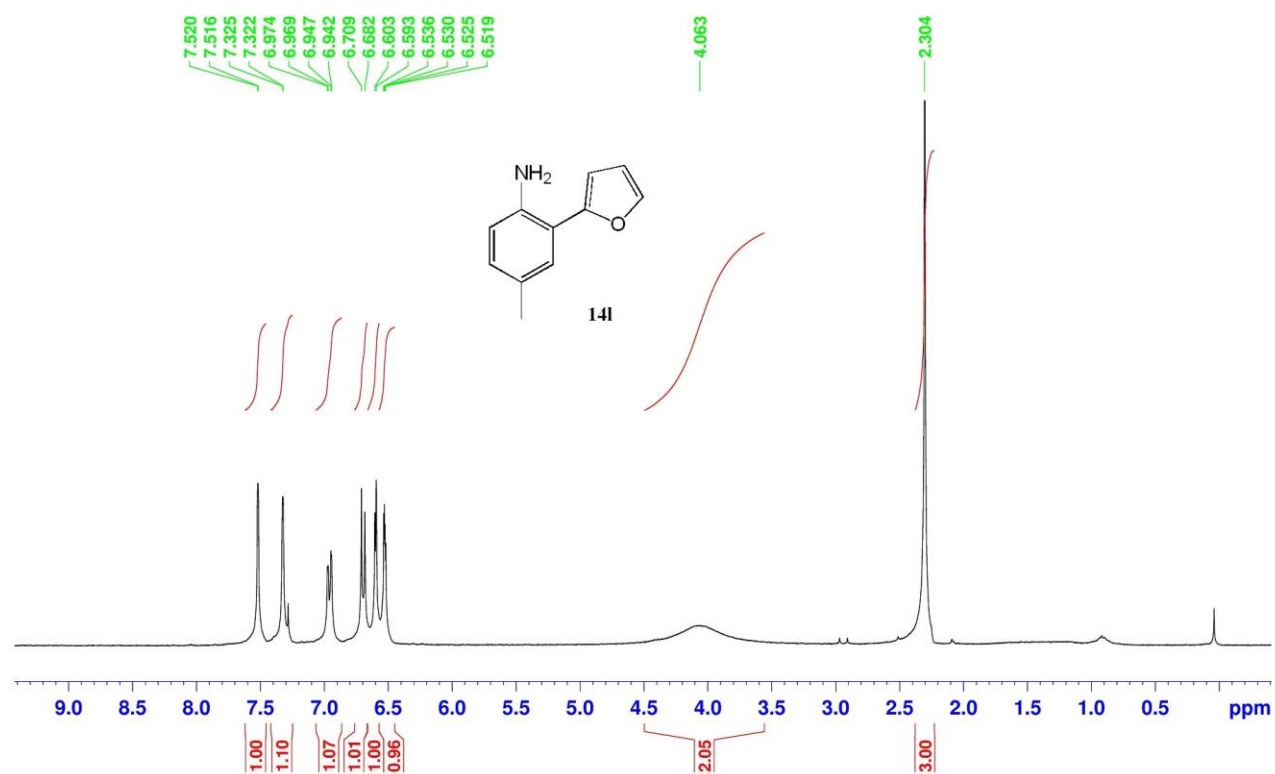
2-(furan-2-yl)-4-methylaniline (14l)

HRMS (ES+)



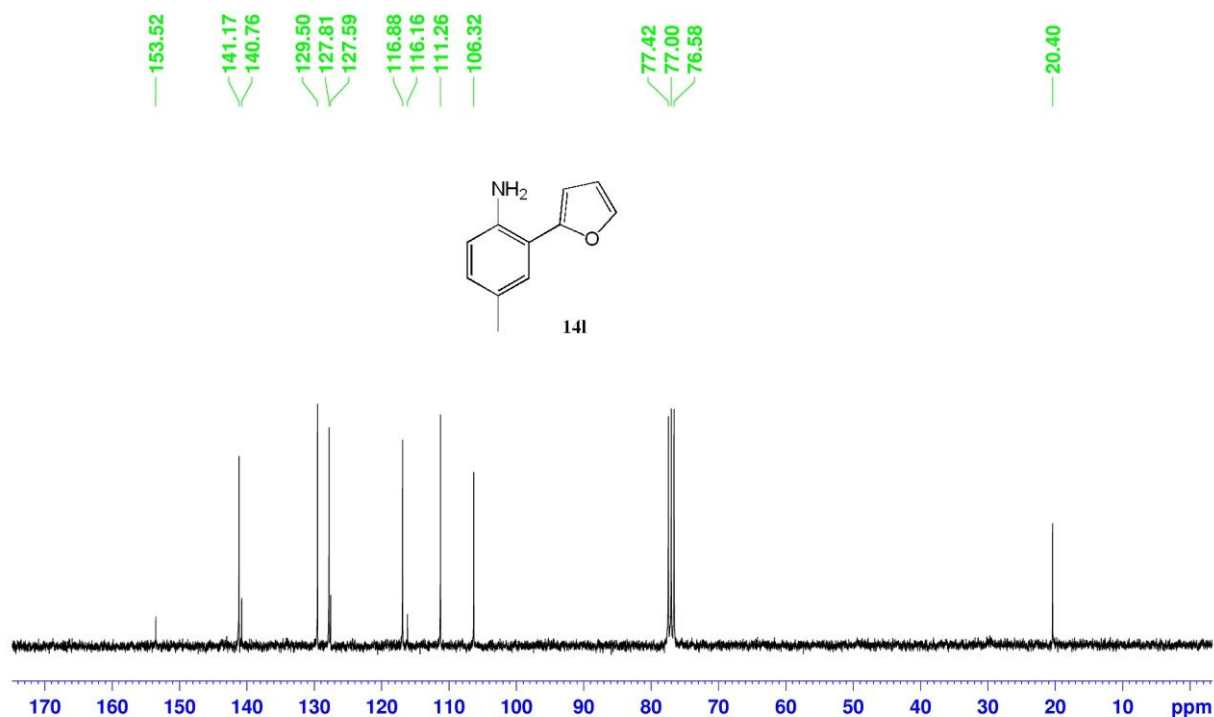
$^1\text{H NMR}$ (300 MHz, CDCl_3)

MS-III-62 in CDCl_3
11/06/2011



^{13}C NMR (75 MHz, CDCl_3)

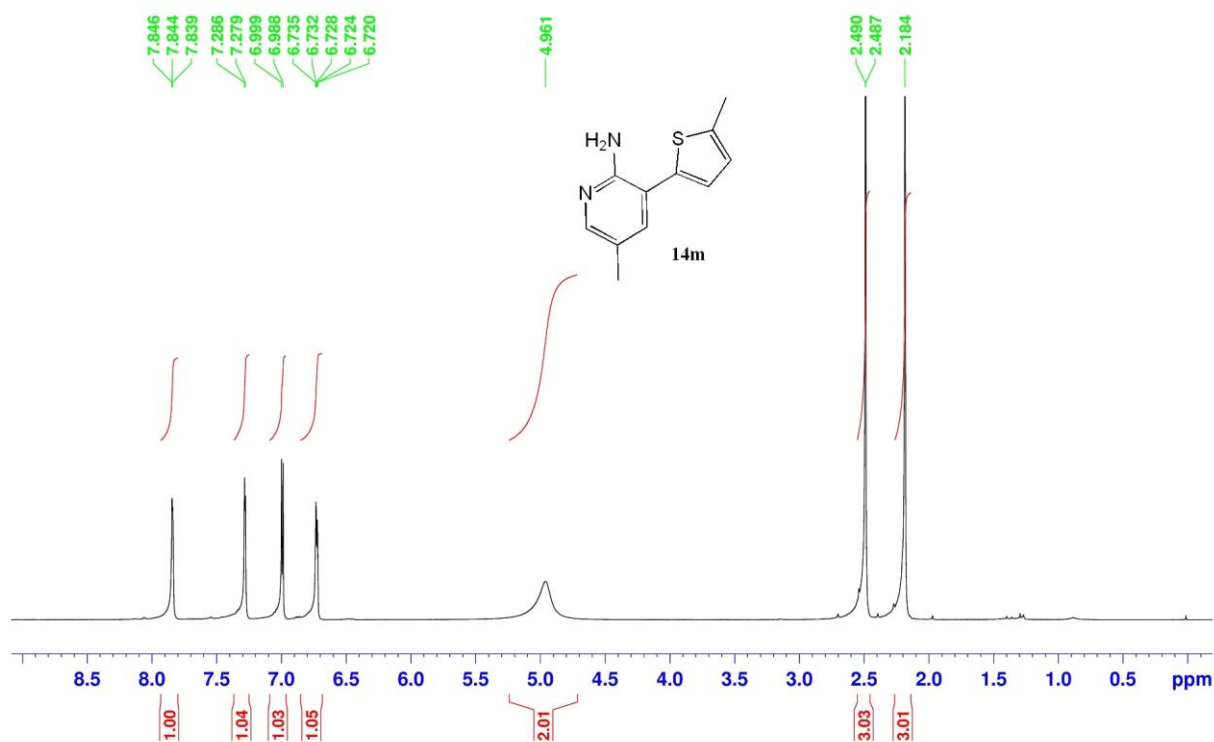
MS-III-62C13 in CDCl_3
11/06/2011



5-methyl-3-(5-methylthiophen-2-yl)pyridin-2-amine (14m)

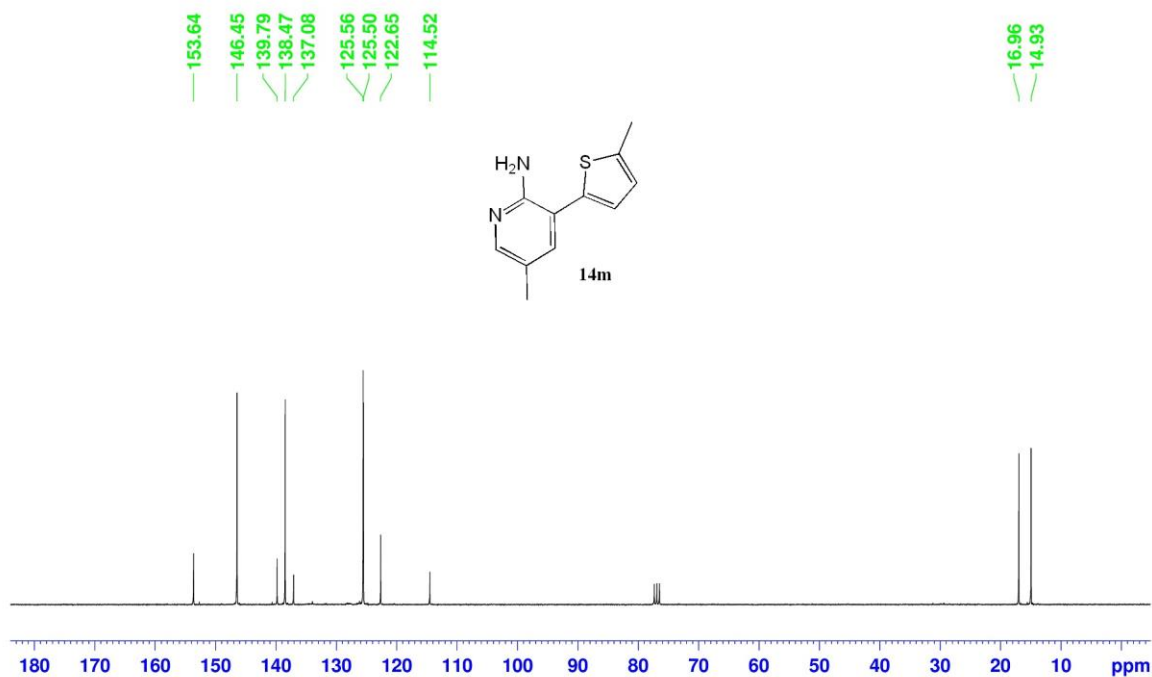
^1H NMR (300 MHz, CDCl_3)

MS-V-82 in CDCl_3
13/12/2012



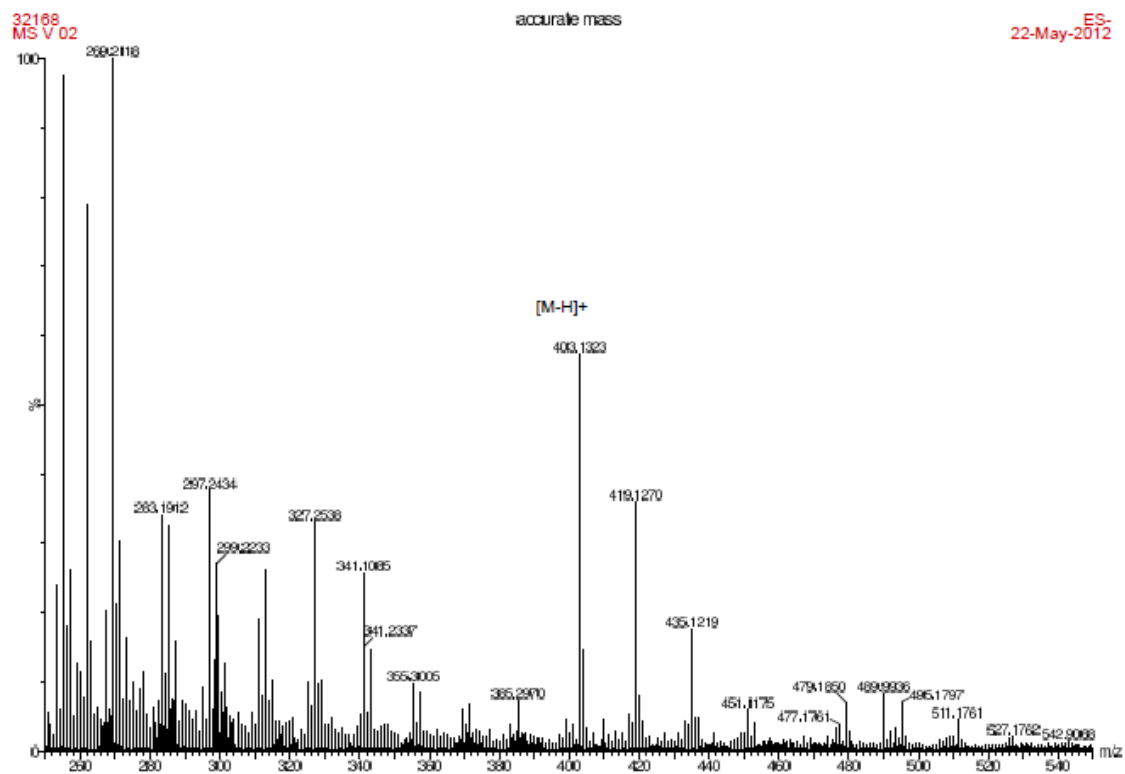
^{13}C NMR (75 MHz, CDCl_3)

MS-V-82 C13 in CDCl_3
13/12/2012



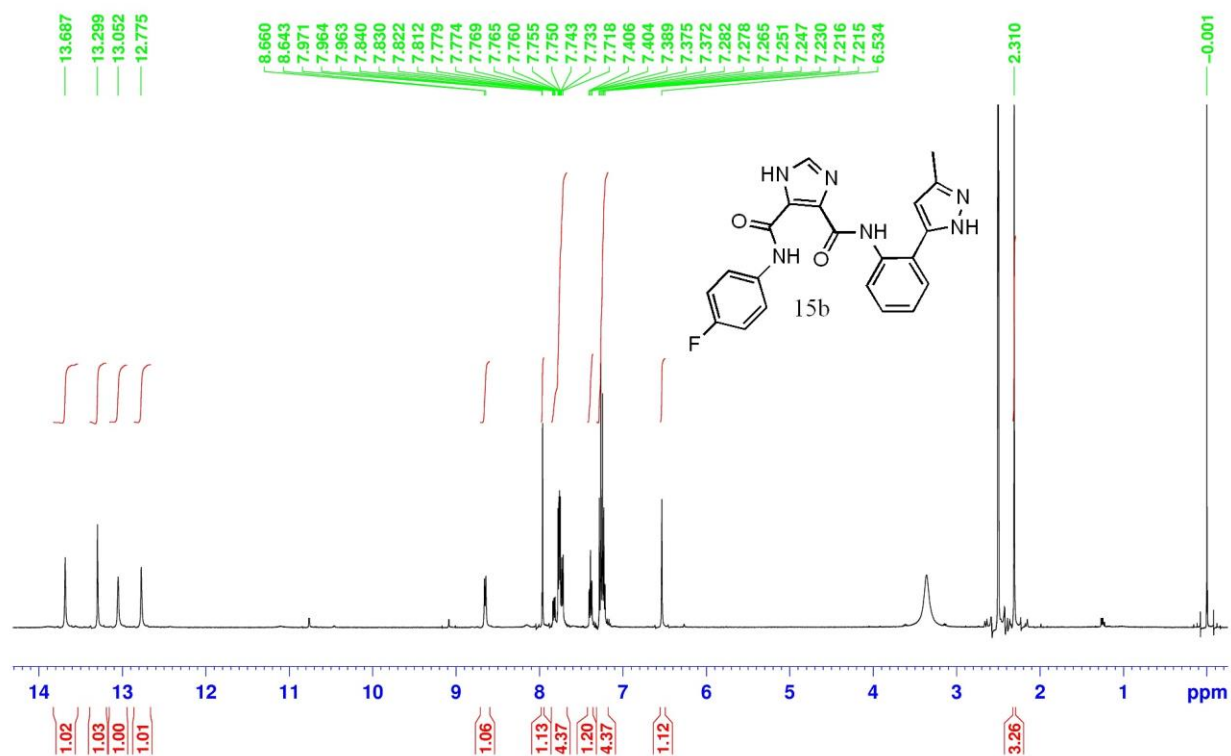
N^5 -(4-fluorophenyl)- N^4 -(2-(3-methyl-1H-pyrazol-5-yl)phenyl)-1H-imidazole-4,5-dicarboxamide (15b)

HRMS (ES+)



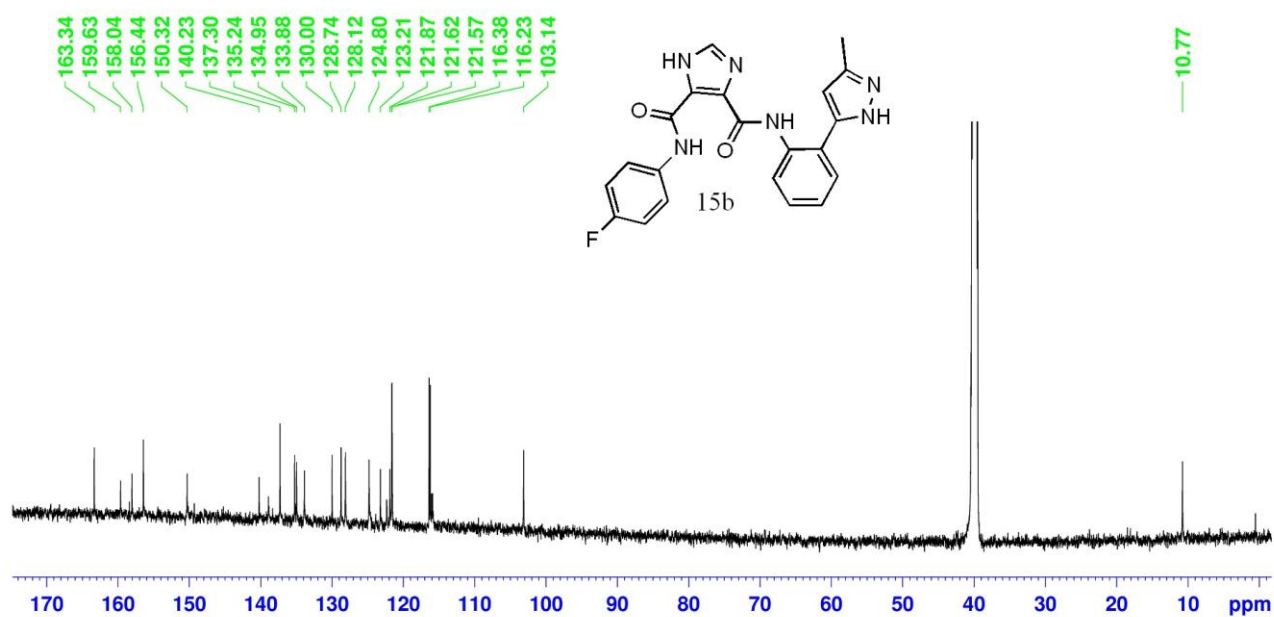
¹H NMR (300 MHz, DMSO)

MS-V-02 in DMSO
proton spectrum



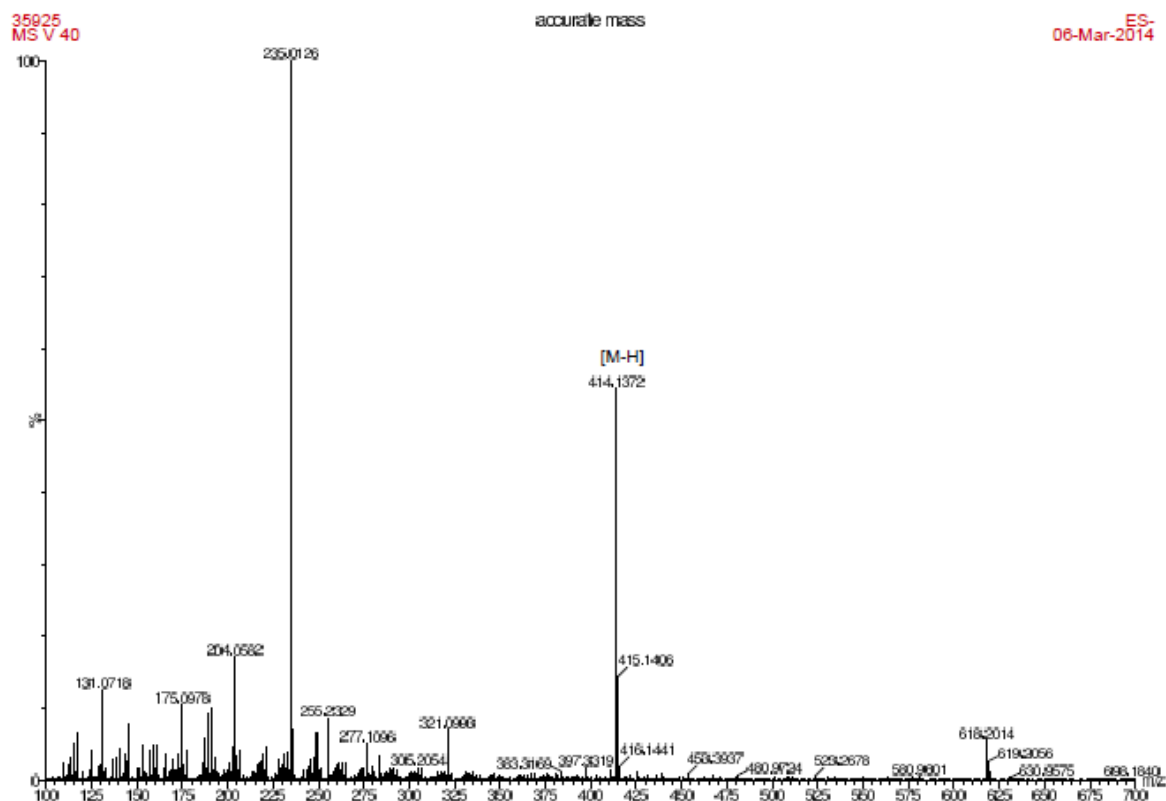
¹³C NMR (75 MHz, DMSO)

MS-V-02 in DMSO
temp = 25C
13C
1H decoupled



***N*⁵-(4-fluorophenyl)-*N*⁴-(2-(pyridin-4-yl)benzyl)-1*H*-imidazole-4,5-dicarboxamide (15c)**

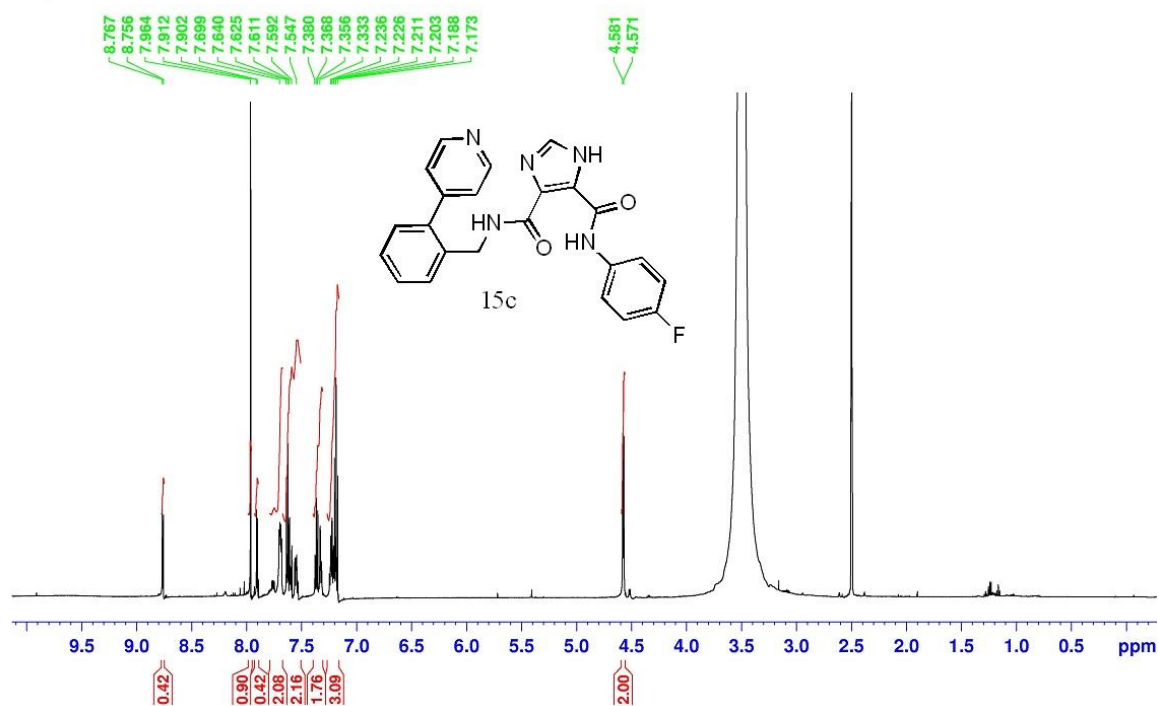
HRMS (ES+)



¹H NMR (300 MHz, DMSO)

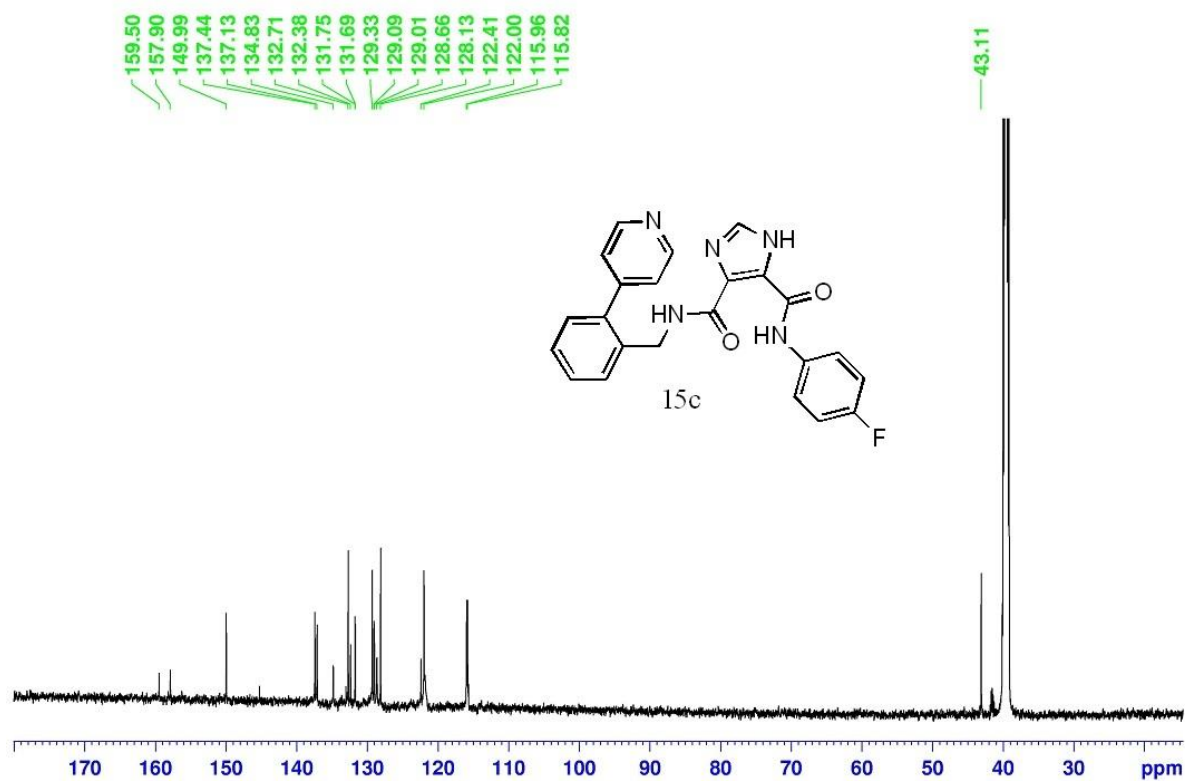
MS-V-40-600 in DMSO
proton spectrum

temp=25C



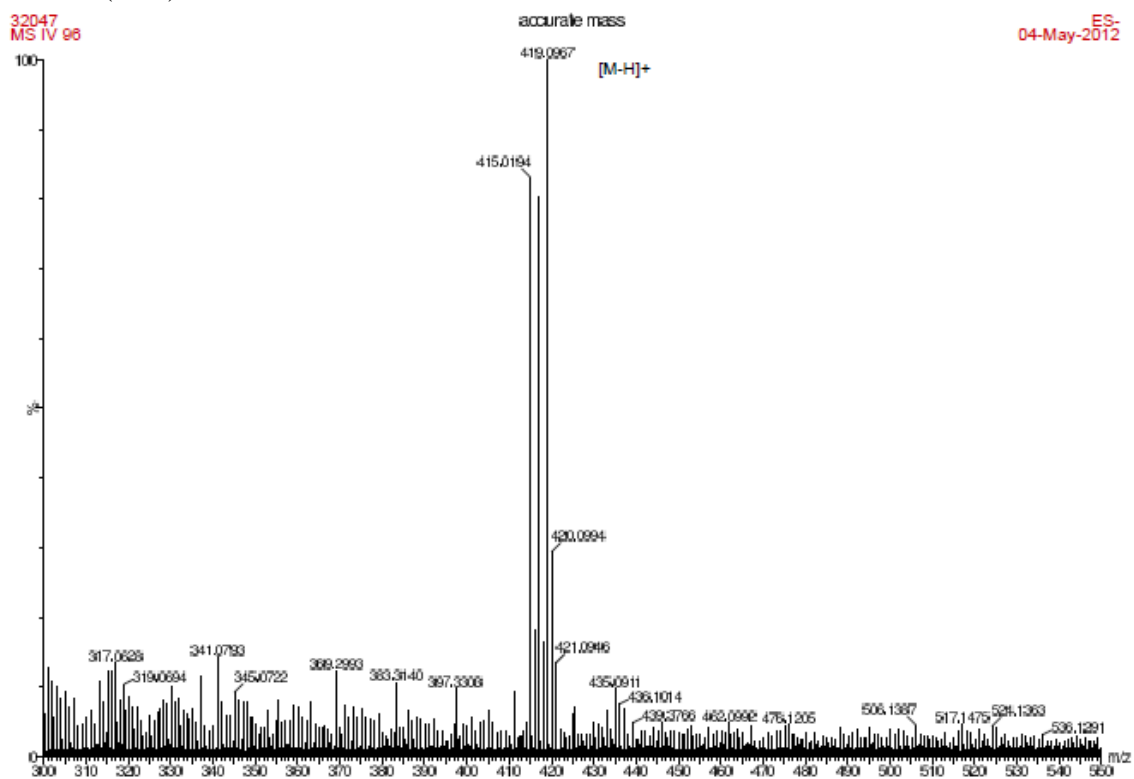
^{13}C NMR (75 MHz, DMSO)

MS-V-40-600 in DMSO
 ^{13}C



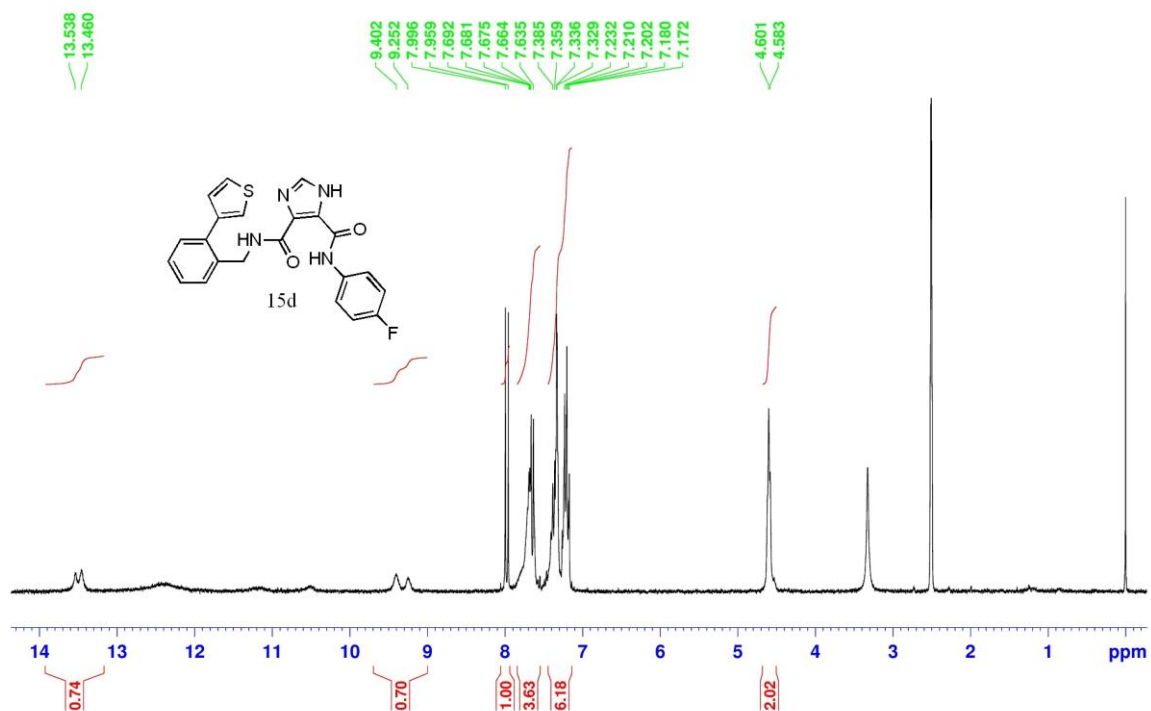
N^5 -(4-fluorophenyl)- N^4 -(2-(thiophen-3-yl)benzyl)-1H-imidazole-4,5-dicarboxamide (15d)

HRMS (ES+)



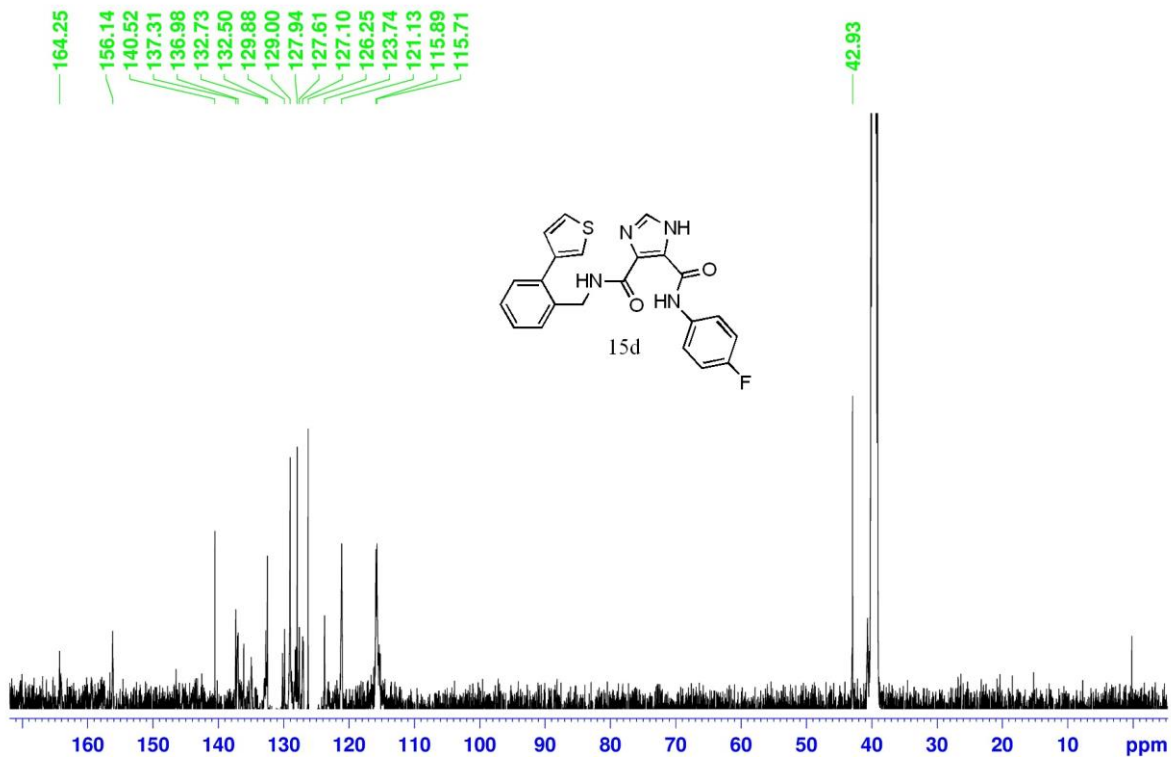
¹H NMR (300 MHz, DMSO)

MS-IV-96 in DMSO
01/05/2012



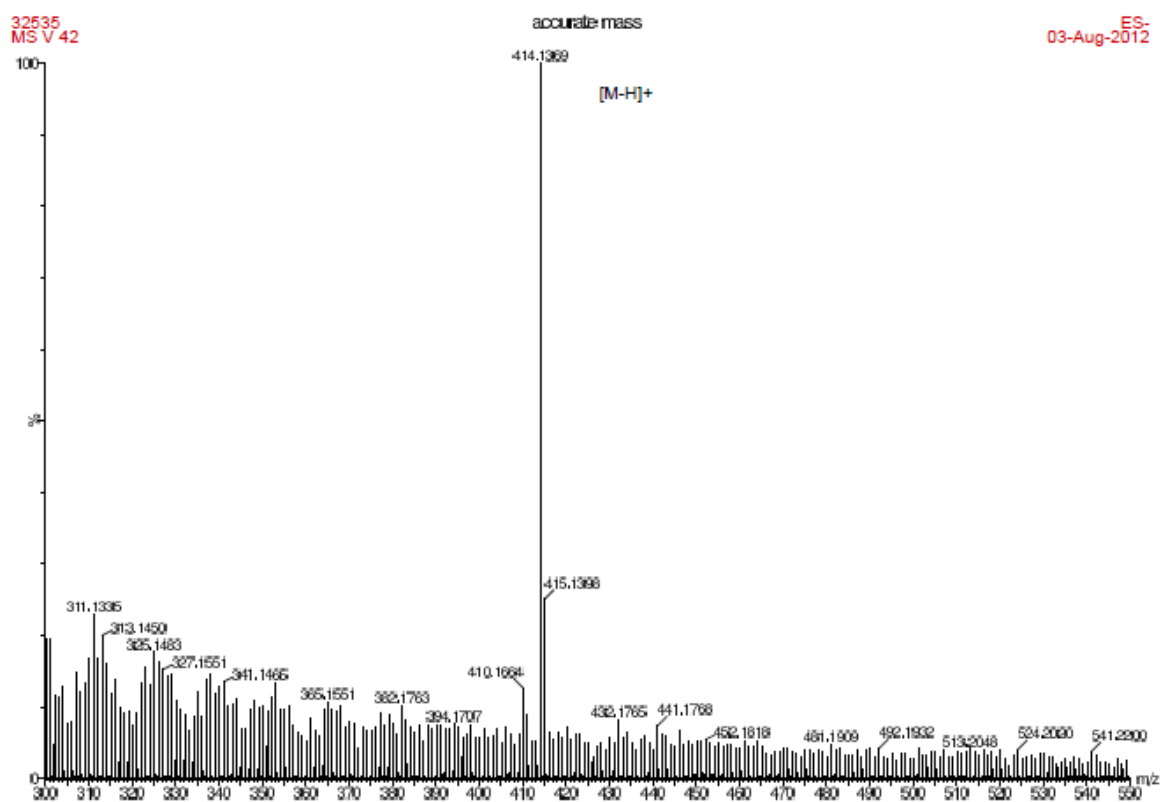
¹³C NMR (75 MHz, DMSO)

MS-IV-96 in DMSO
carbon spectrum



***N*⁵-(4-fluorophenyl)-*N*⁴-(4-(pyridin-3-yl)benzyl)-1*H*-imidazole-4,5-dicarboxamide (15e)**

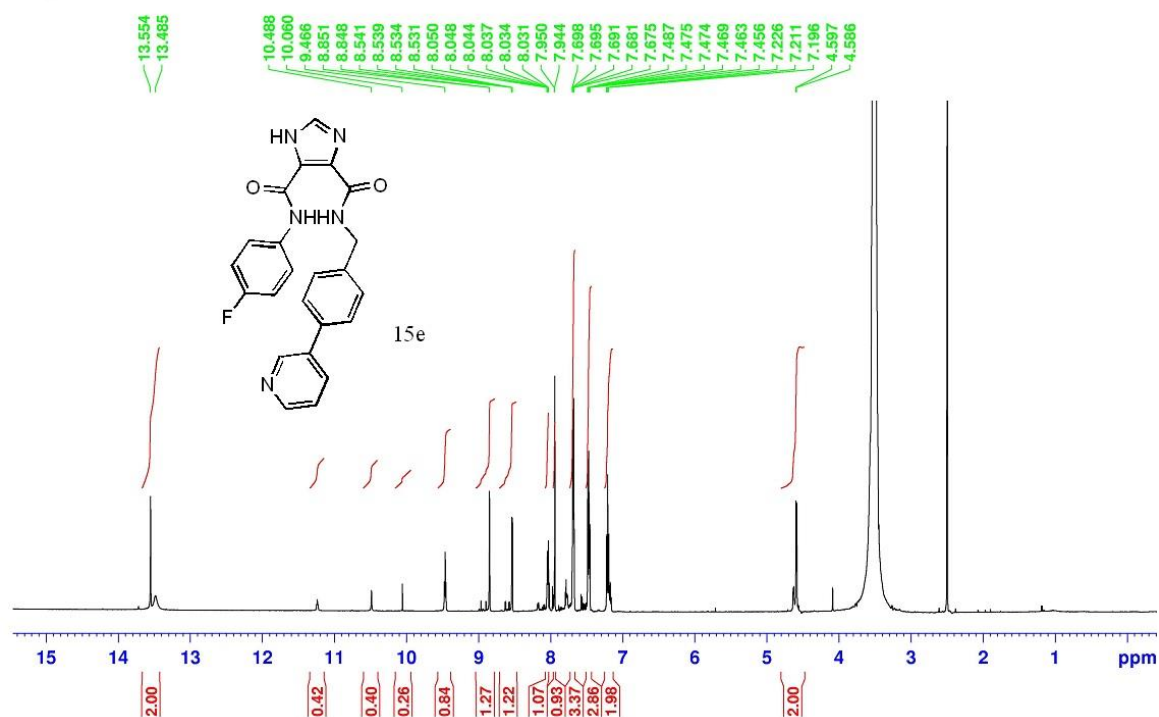
HRMS (ES⁺)



¹H NMR (300 MHz, DMSO)

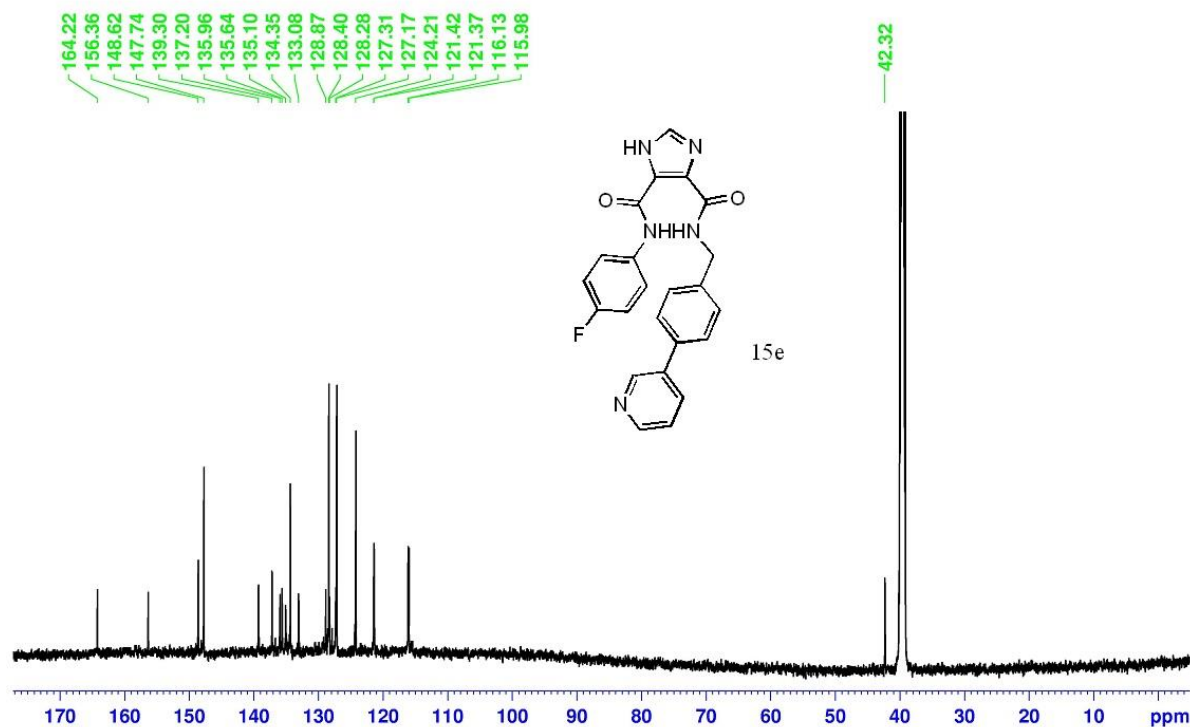
MS-V-42-600 in DMSO
proton spectrum

temp=25C



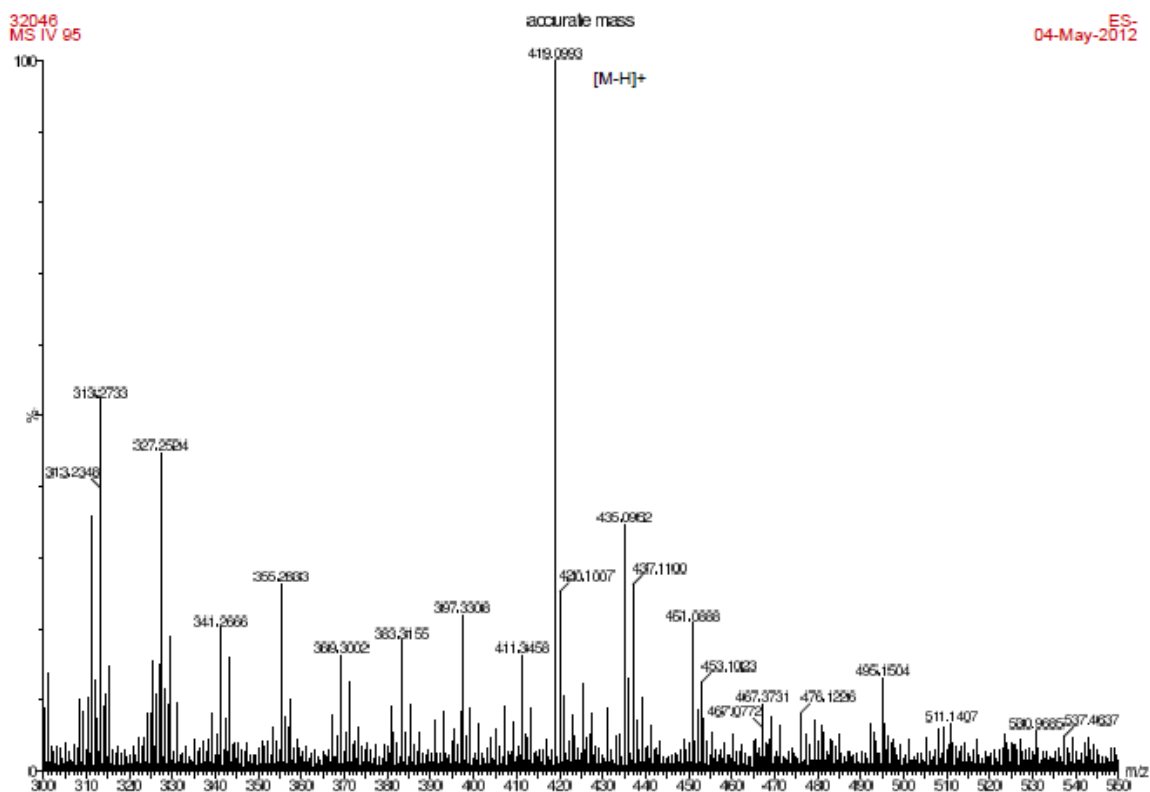
^{13}C NMR (75 MHz, DMSO)

MS-V-42-600 in DMSO
 ^{13}C
 ^1H decoupled



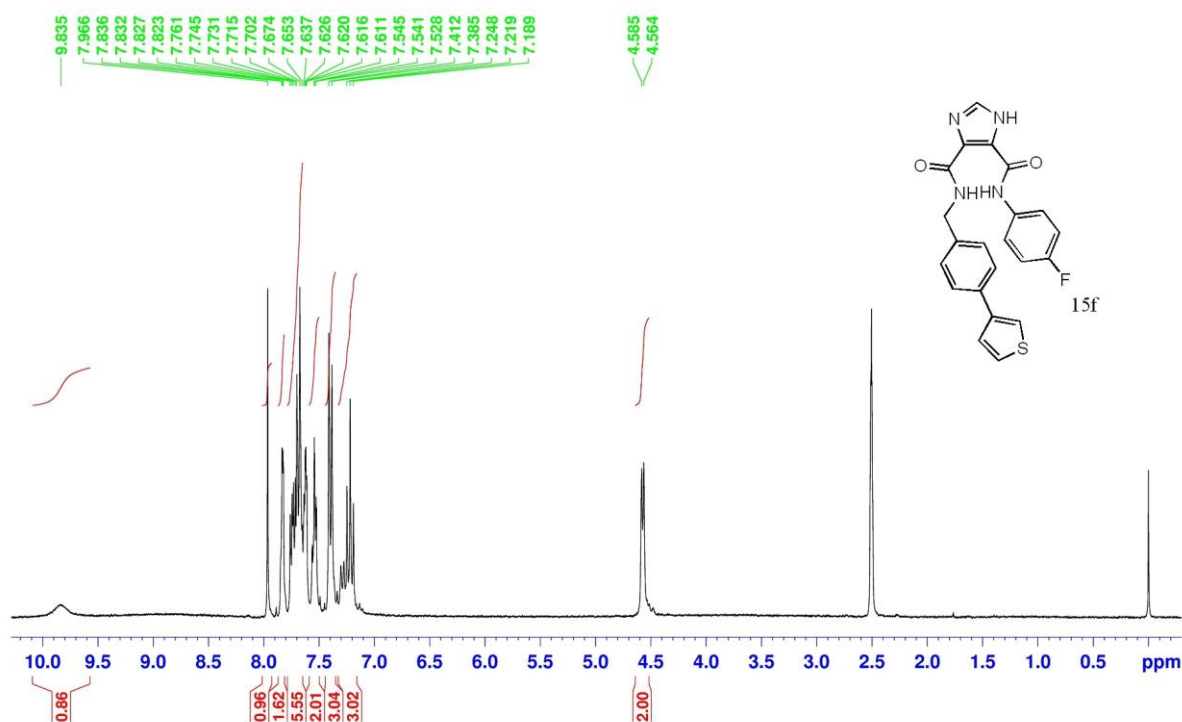
N^5 -(4-fluorophenyl)- N^4 -(4-(thiophen-3-yl)benzyl)-1H-imidazole-4,5-dicarboxamide (15f)

HRMS (ES⁺)



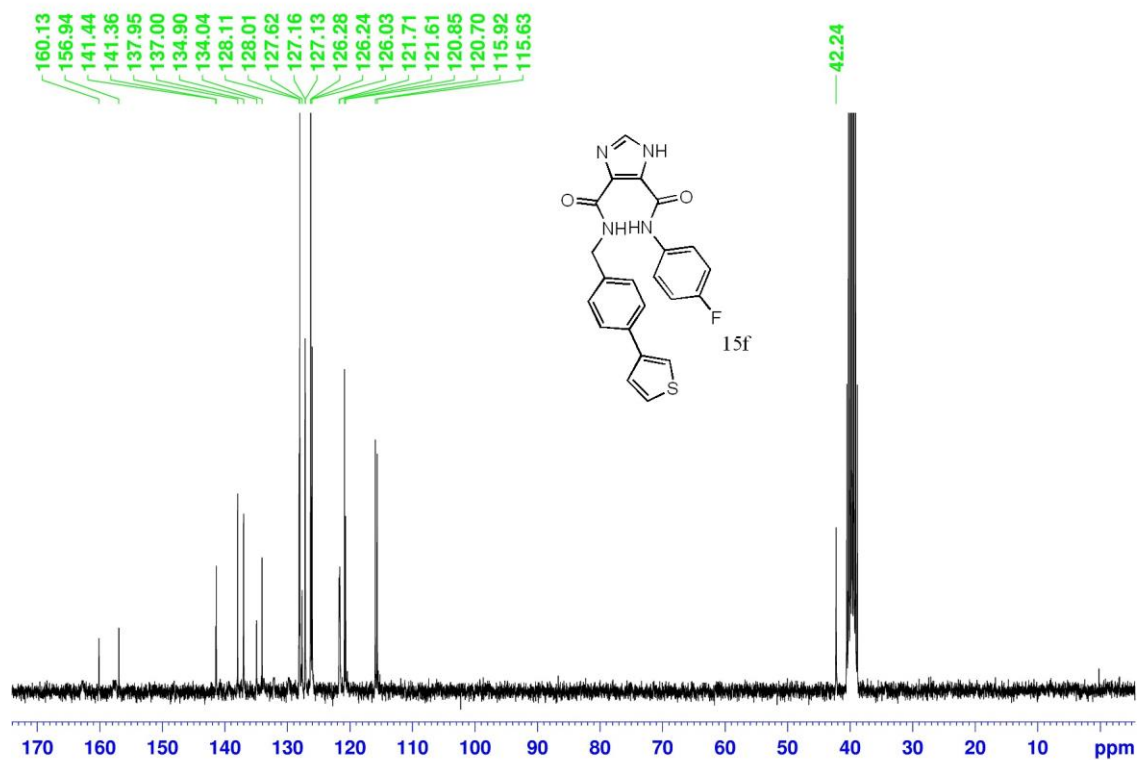
¹H NMR (300 MHz, DMSO)

MS-IV-95 in DMSO
01/05/2012



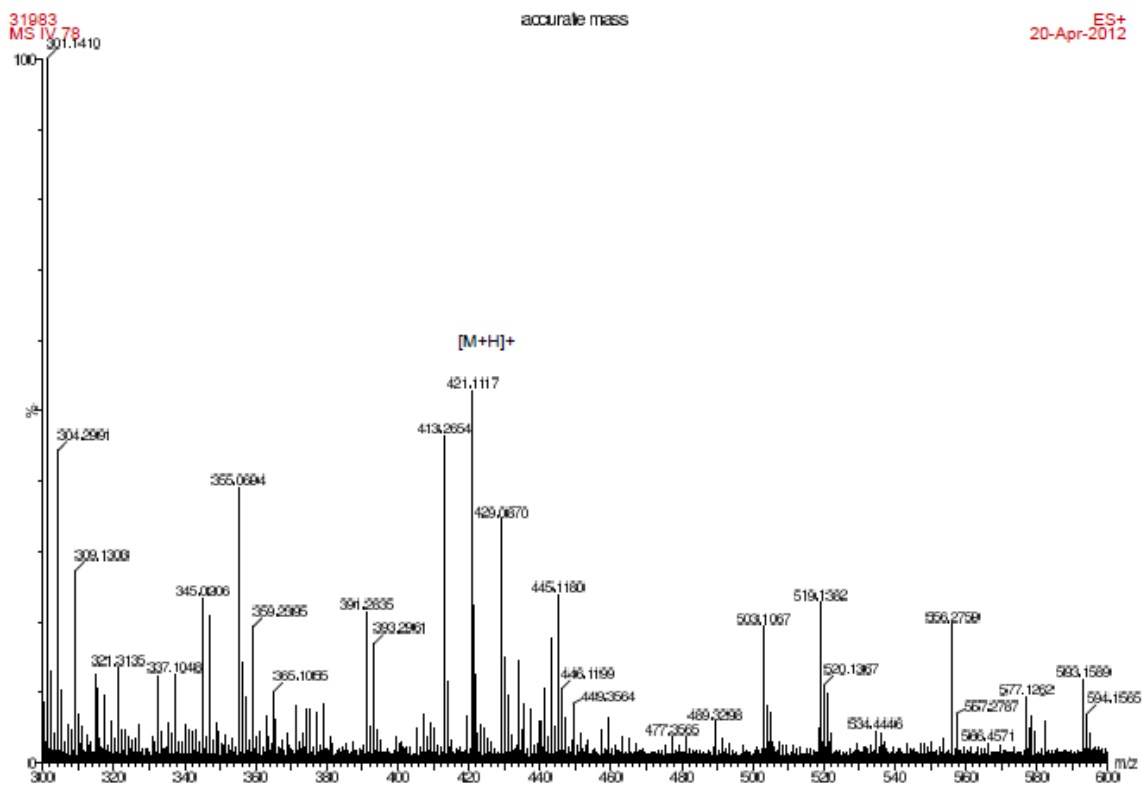
¹³C NMR (75 MHz, DMSO)

MS-IV-95 C13 in DMSO
01/05/2012



***N*⁵-(4-fluorophenyl)-*N*⁴-(4-(pyridin-4-yl)benzyl)-1*H*-imidazole-4,5-dicarboxamide (15g)**

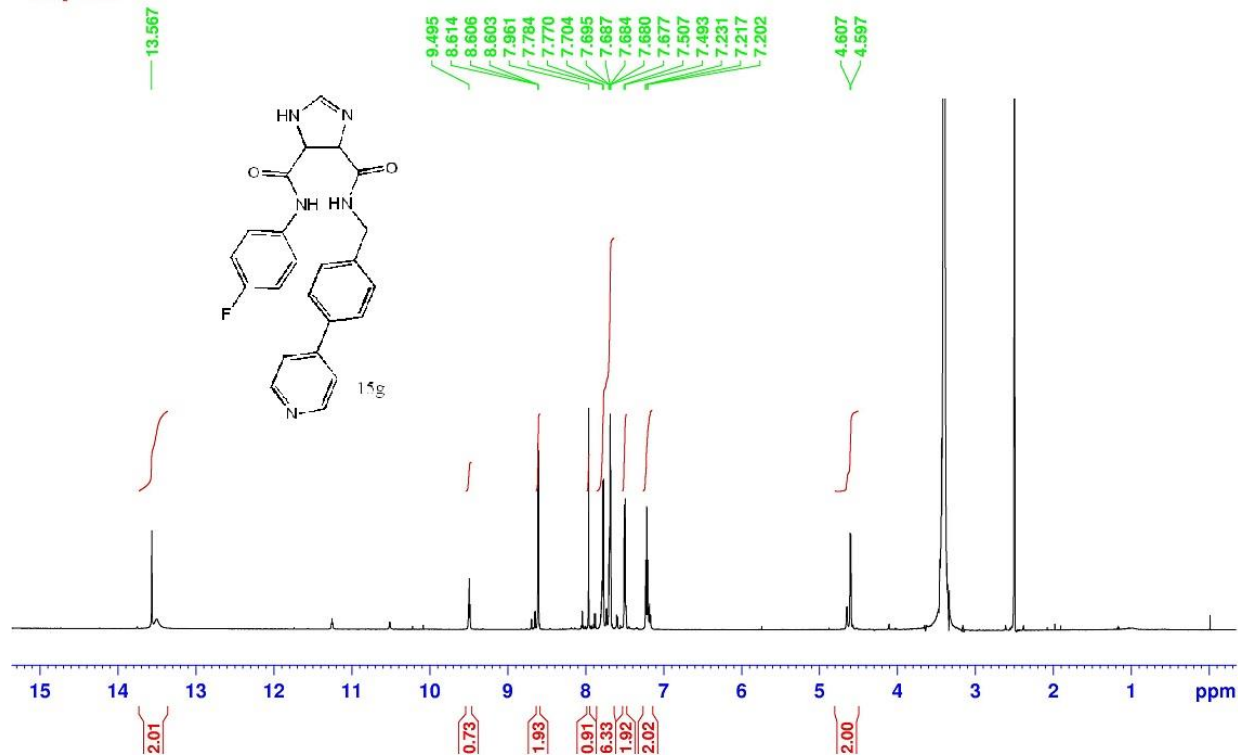
HRMS (ES+)



¹H NMR (600 MHz, DMSO)

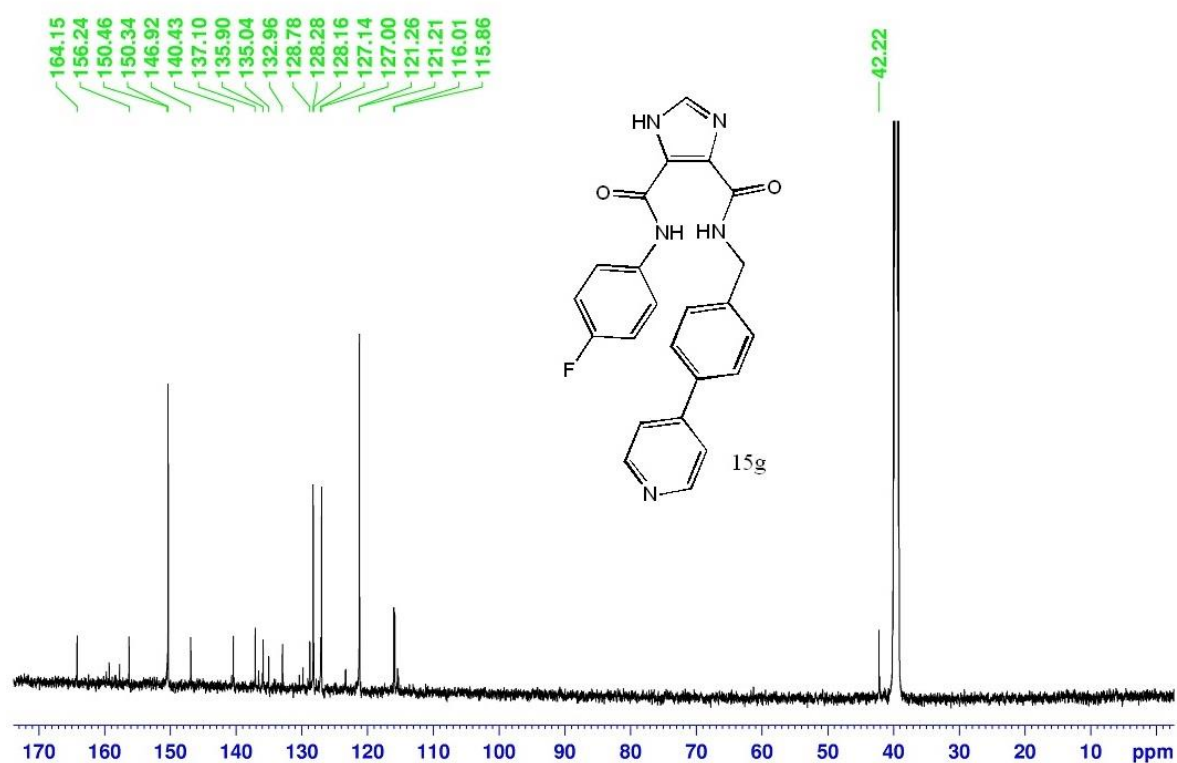
MS-V-41-600 in DMSO
proton spectrum

temp=25C



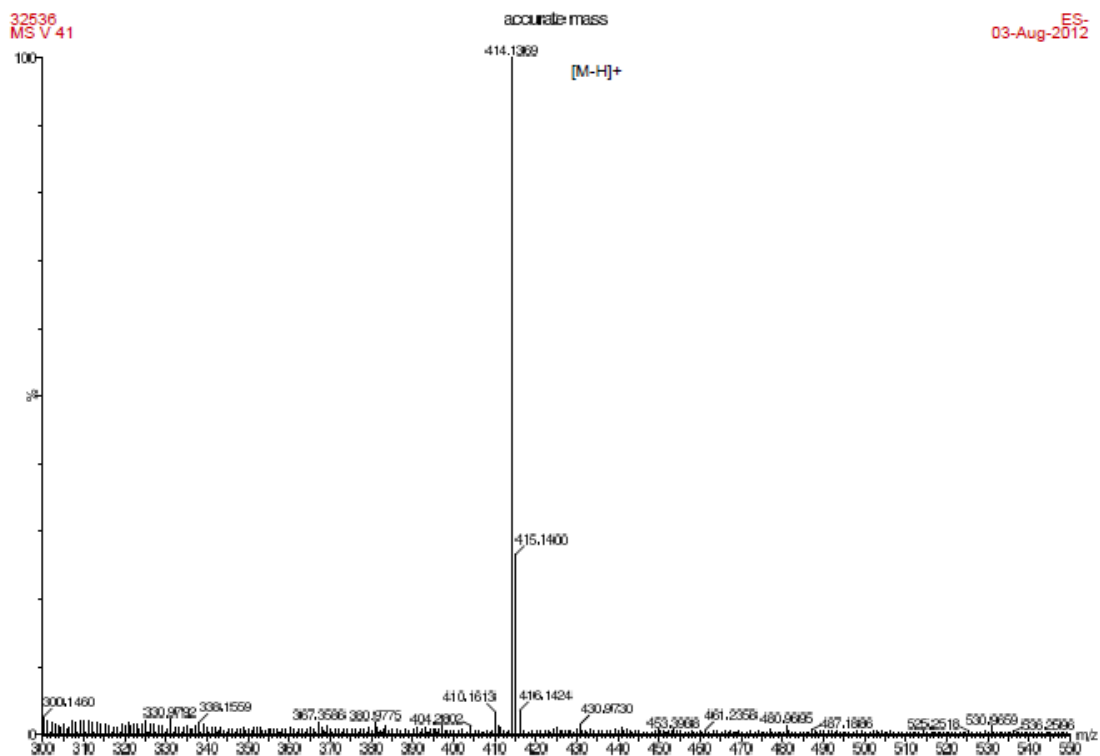
^{13}C NMR (125 MHz, DMSO)

MS-V-41-600 in DMSO
 ^{13}C



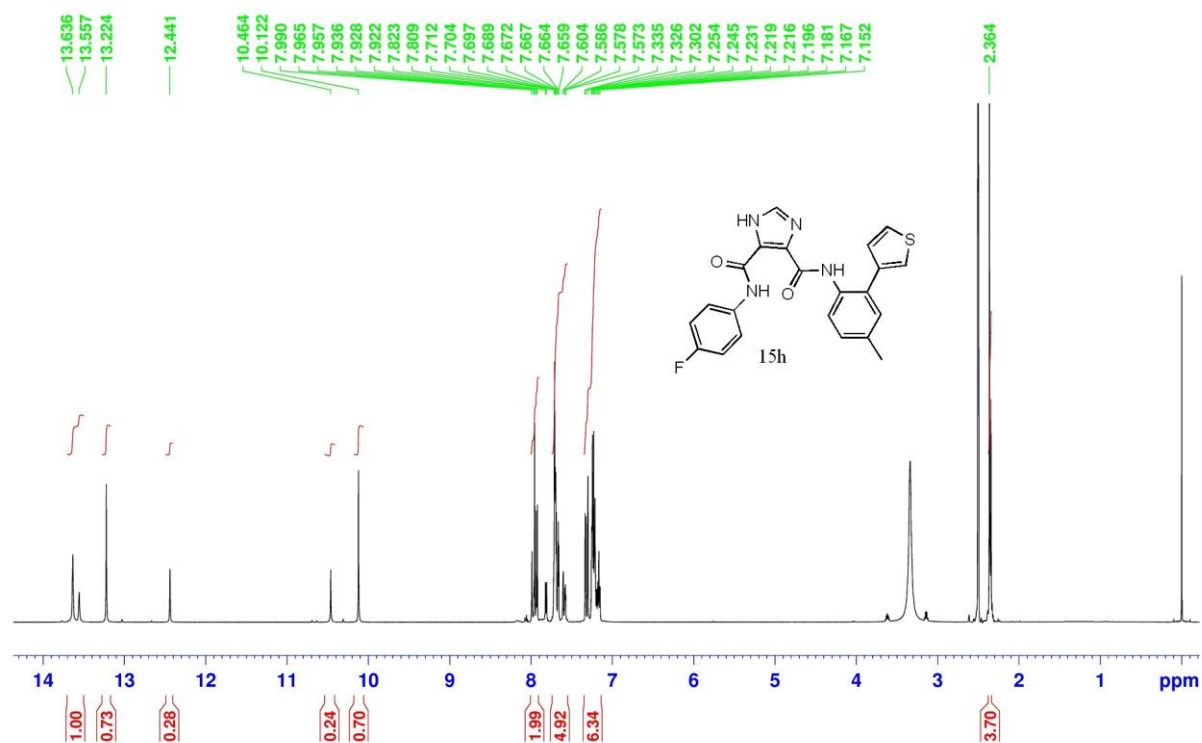
N^5 -(4-fluorophenyl)- N^4 -(4-methyl-2-(thiophen-3-yl)phenyl)-1H-imidazole-4,5-dicarboxamide (**15h**)

HRMS (ES+)



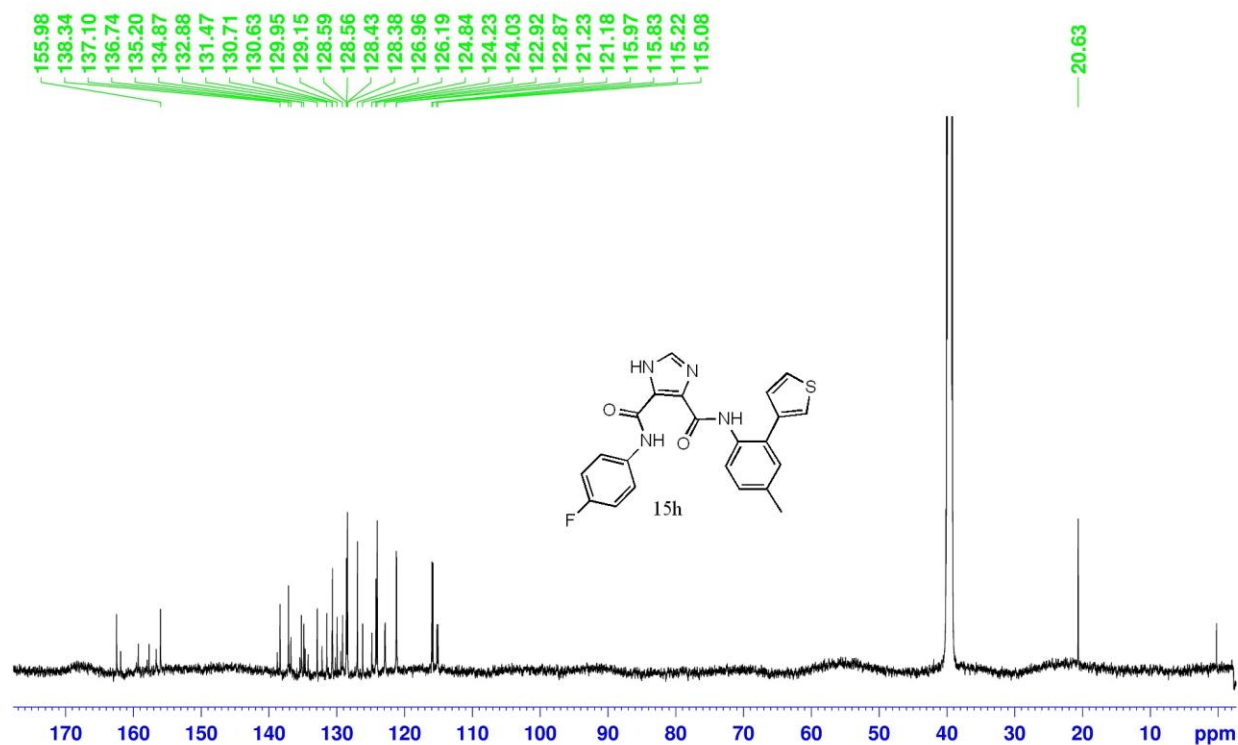
¹H NMR (500 MHz, DMSO)

MS-IV-78 in DMSO
proton spectrum
temp=25C



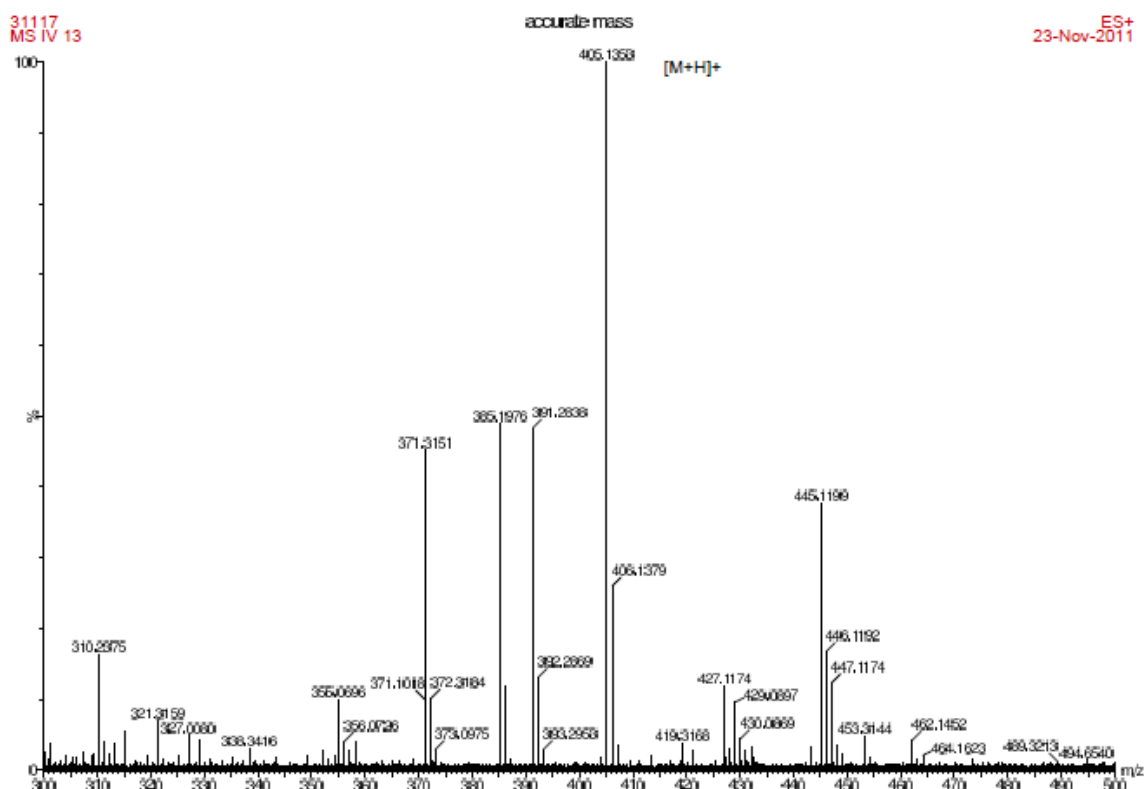
¹³C NMR (125 MHz, DMSO)

MS-IV-78 in DMSO
temp = 20C
13C



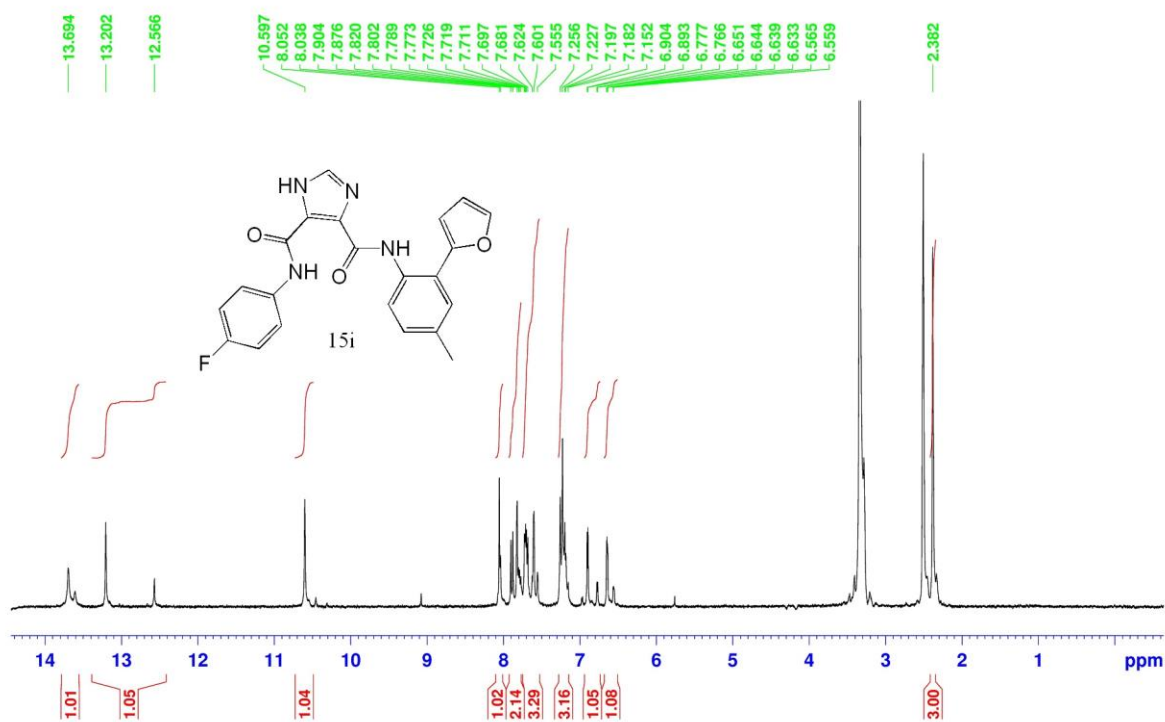
***N*⁵-(4-fluorophenyl)-*N*⁴-(2-(furan-2-yl)-4-methylphenyl)-1*H*-imidazole-4,5-dicarboxamide (**15i**)**

HRMS (ES+)



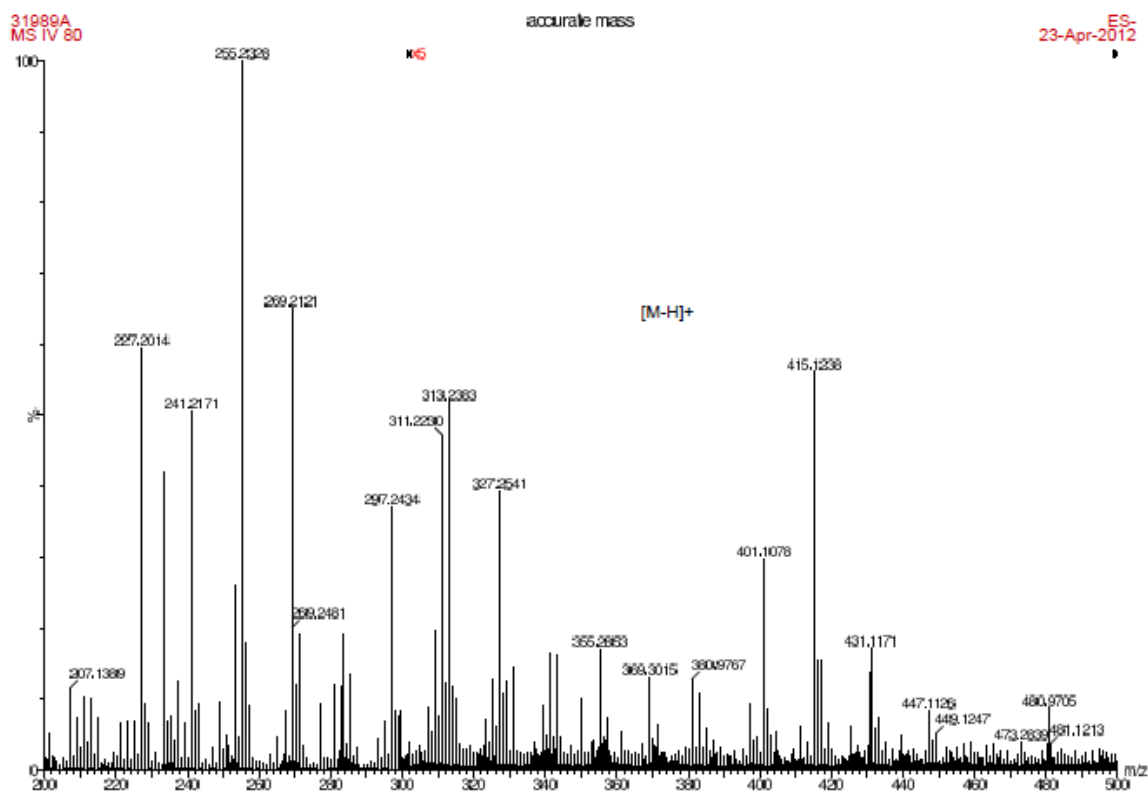
¹H NMR (300 MHz, DMSO)

MS-IV-13 in DMSO
08/10/2011



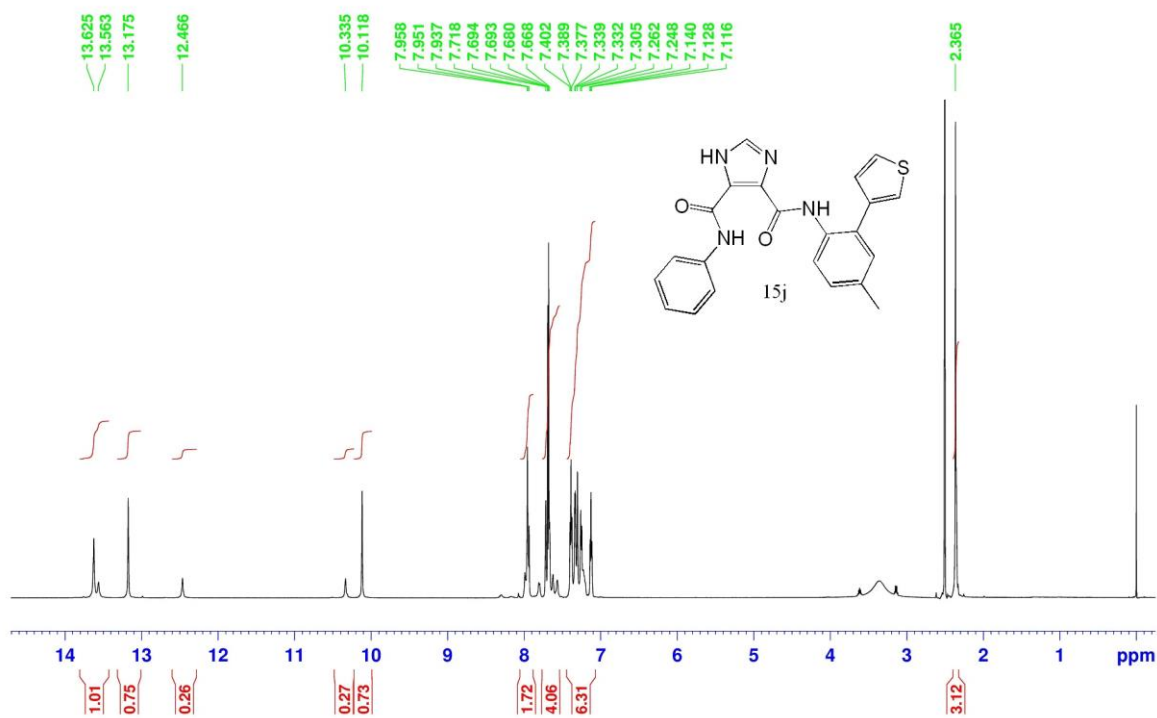
***N*⁴-(4-methyl-2-(thiophen-3-yl)phenyl)-*N*⁵-phenyl-1H-imidazole-4,5-dicarboxamide (15j)**

HRMS (ES⁺)



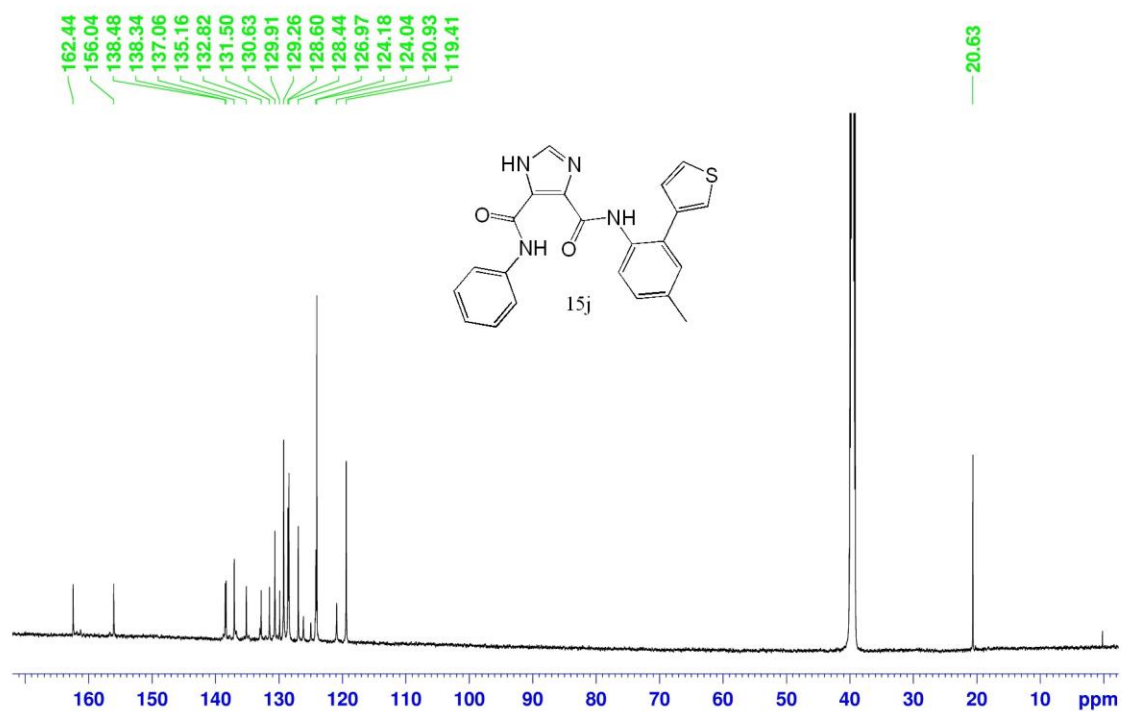
¹H NMR (500 MHz, DMSO)

MS-IV-80 in DMSO
proton spectrum
temp=25C



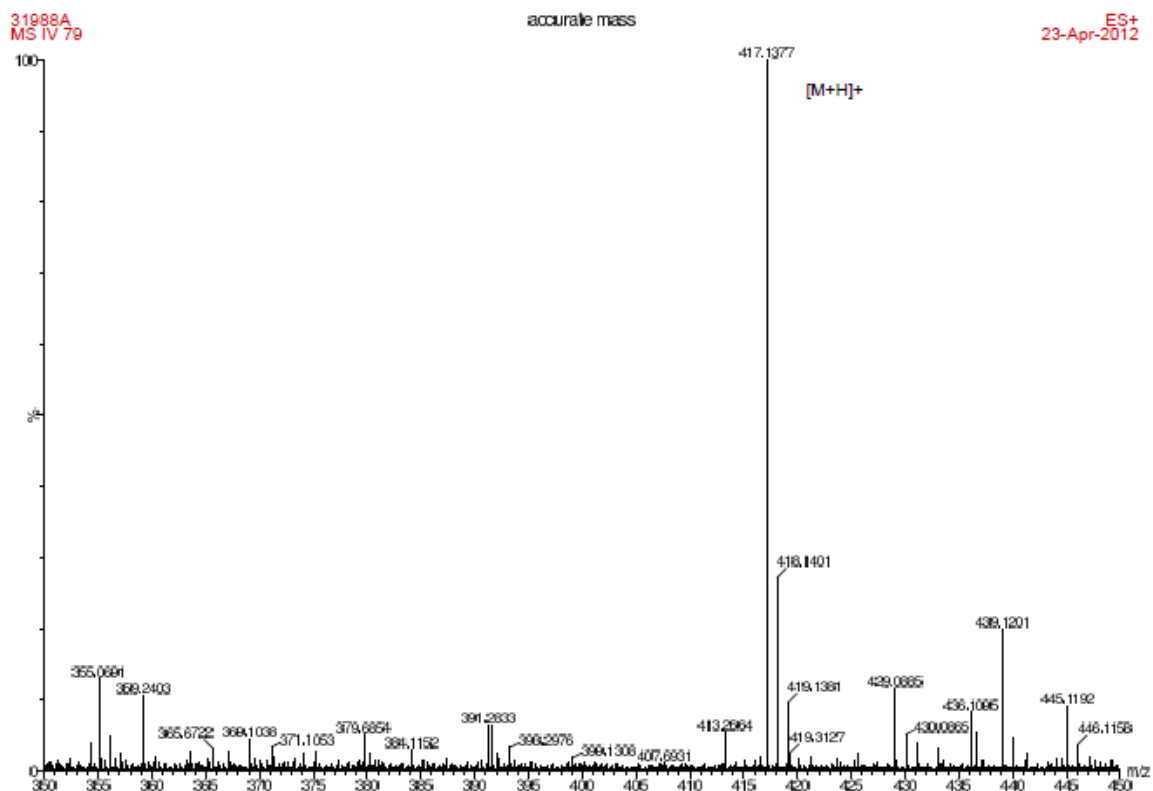
^{13}C NMR (125 MHz, DMSO)

MS-IV-80 in DMSO
proton spectrum
temp=25C



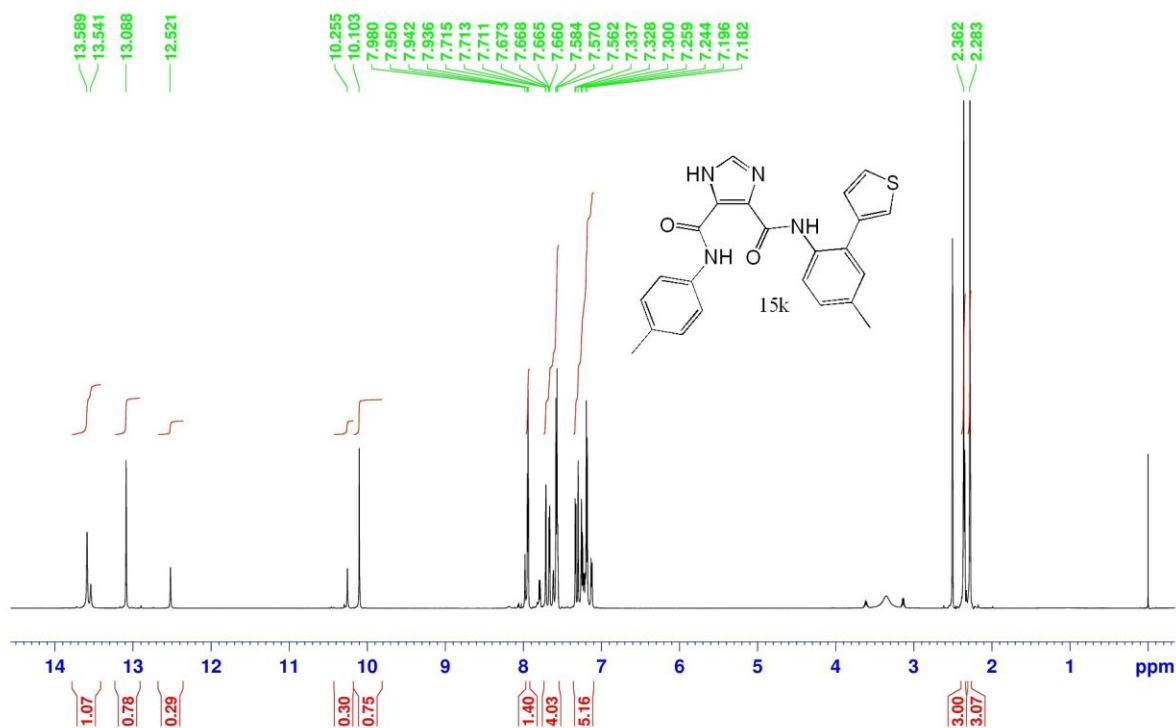
N^4 -(4-methyl-2-(thiophen-3-yl)phenyl)- N^5 -(p-tolyl)-1H-imidazole-4,5-dicarboxamide (15k)

HRMS (ES+)



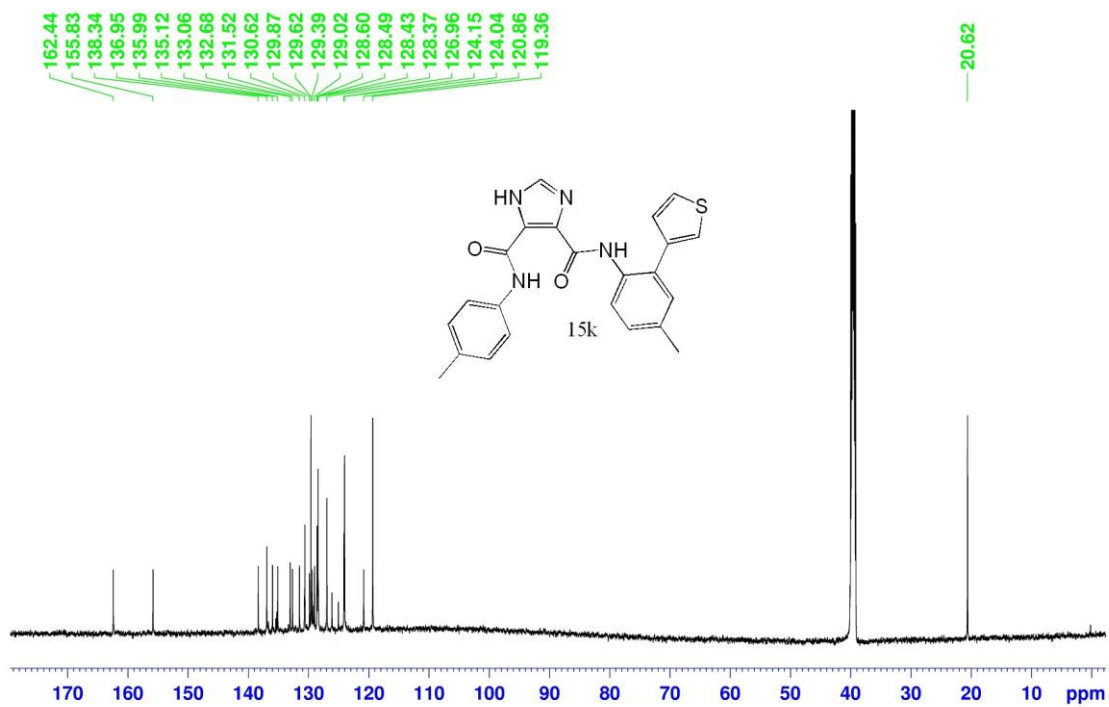
¹H NMR (500 MHz, DMSO)

MS-IV-79 in DMSO
proton spectrum
temp=25C



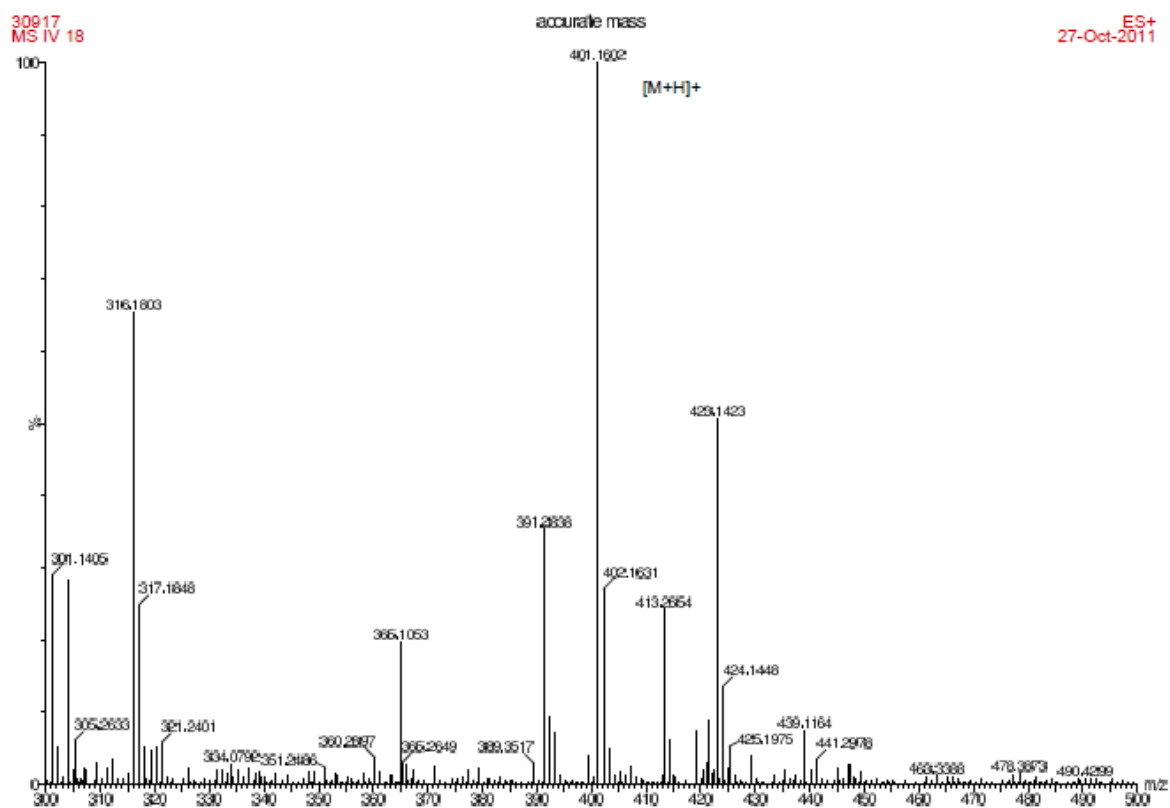
¹³C NMR (125 MHz, DMSO)

MS-IV-79 in DMSO
temp = 20C
13C
1H decoupled



***N*⁴-(2-(furan-2-yl)-4-methylphenyl)-*N*⁵-(*p*-tolyl)-1*H*-imidazole-4,5-dicarboxamide (151)**

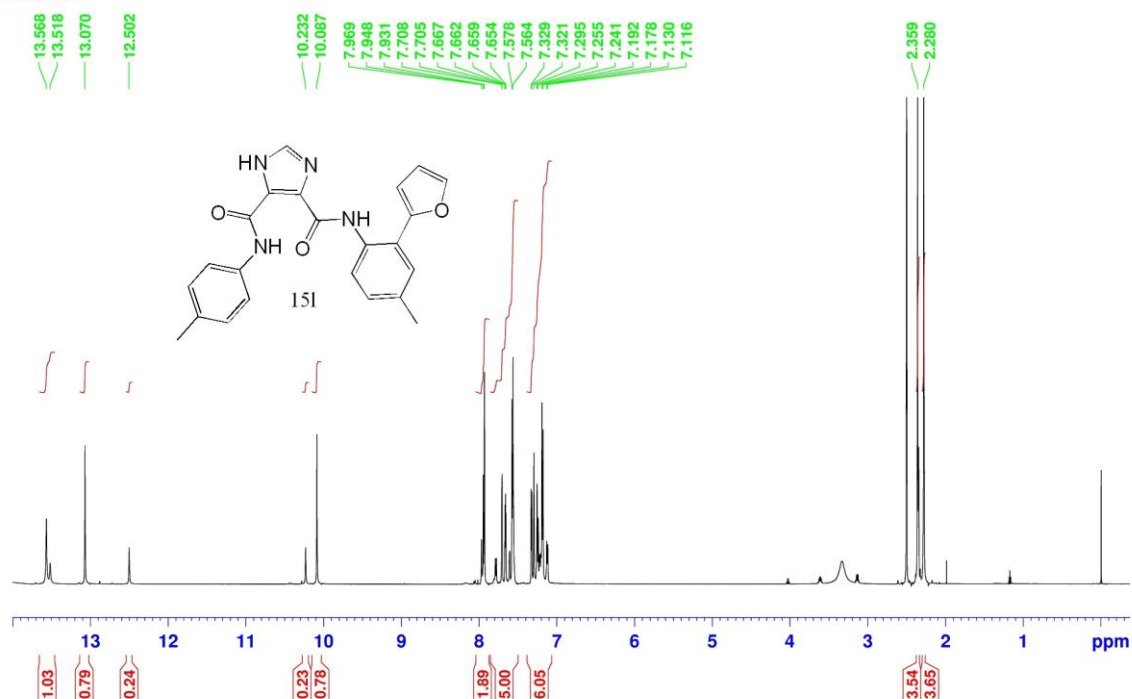
HRMS (ES⁺)



¹H NMR (600 MHz, DMSO)

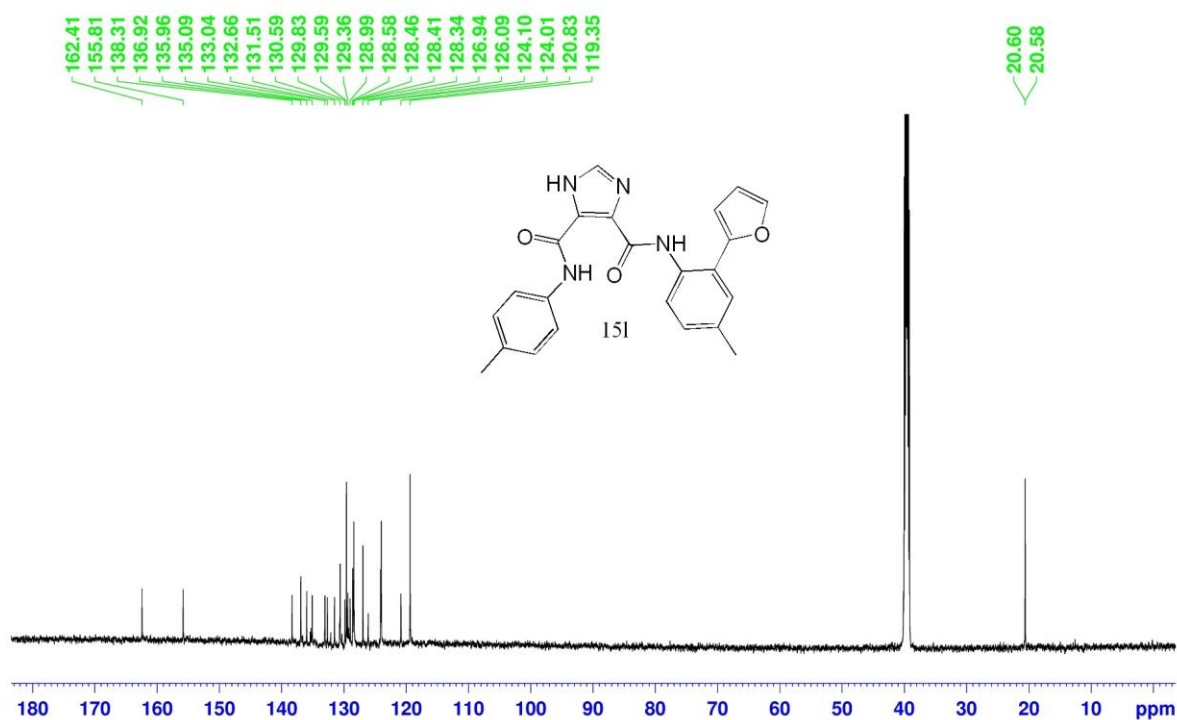
MS-IV-18-600 in DMSO
proton spectrum

temp=25C



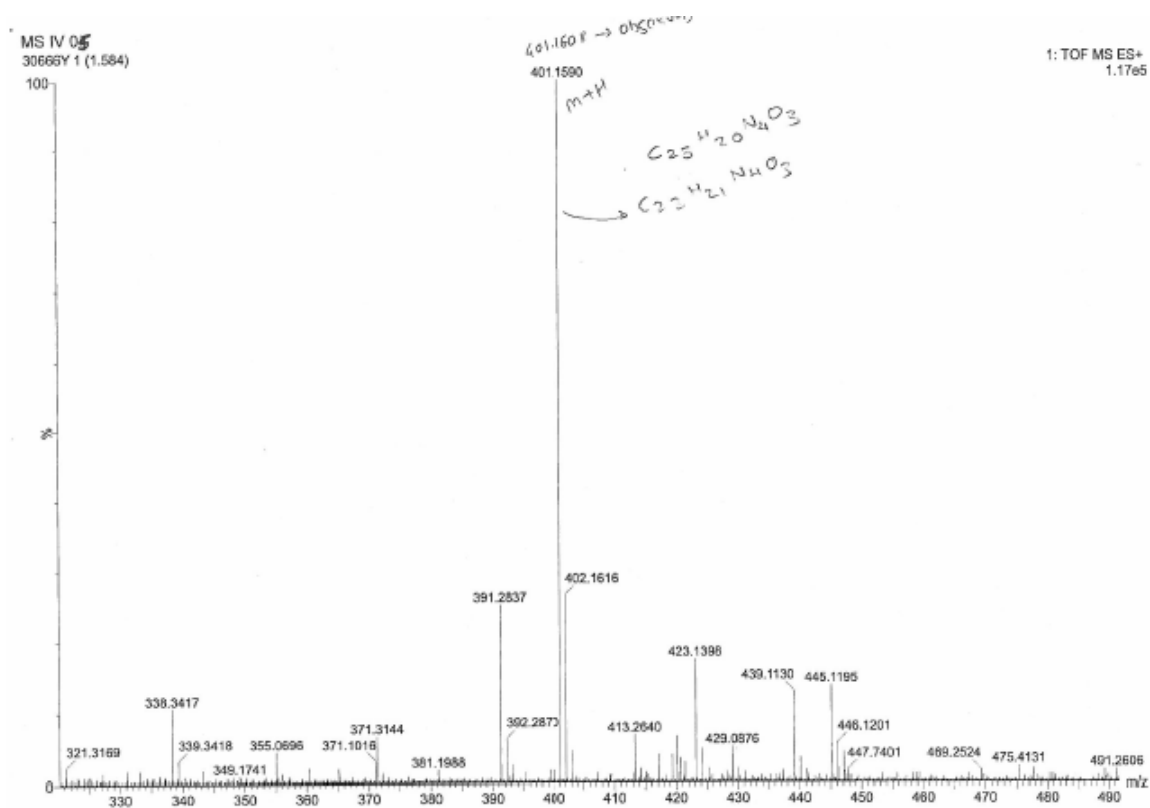
¹³C NMR (150 MHz, DMSO)

MS-IV-18-600 in DMSO
13C
1H decoupled



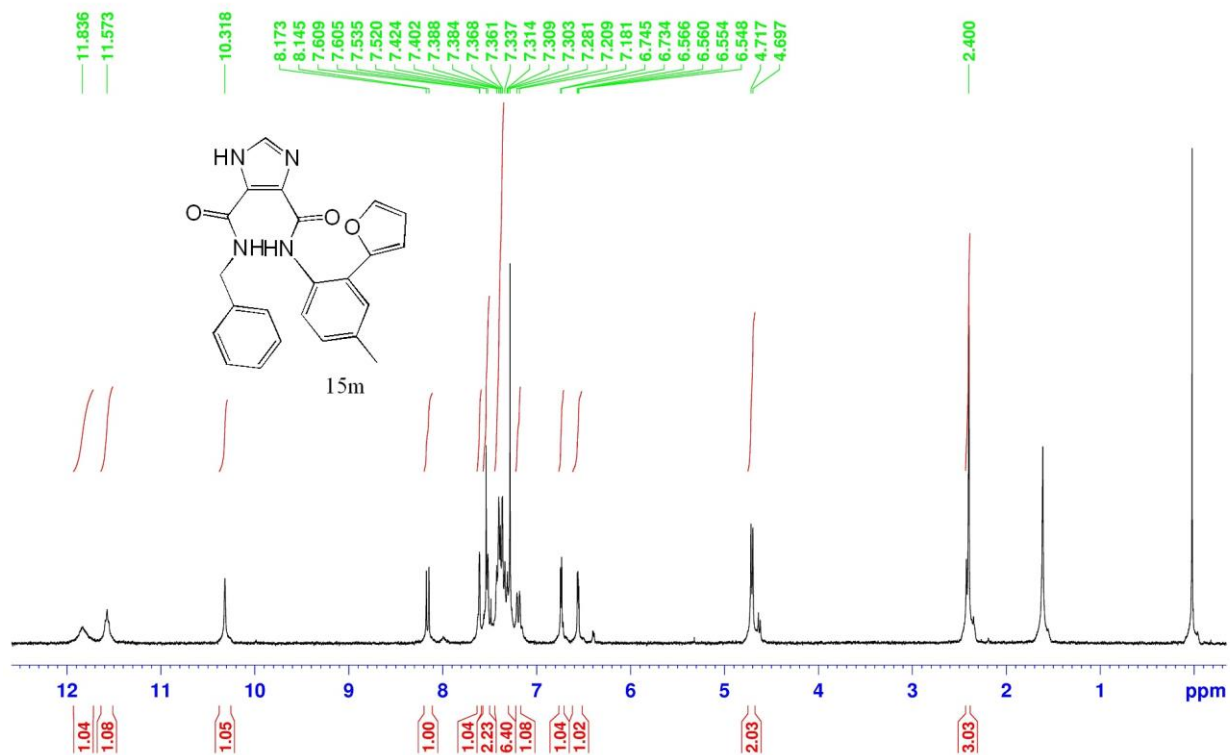
***N*⁵-benzyl-*N*⁴-(2-(furan-2-yl)-4-methylphenyl)-1*H*-imidazole-4,5-dicarboxamide (15m)**

HRMS (ES+)



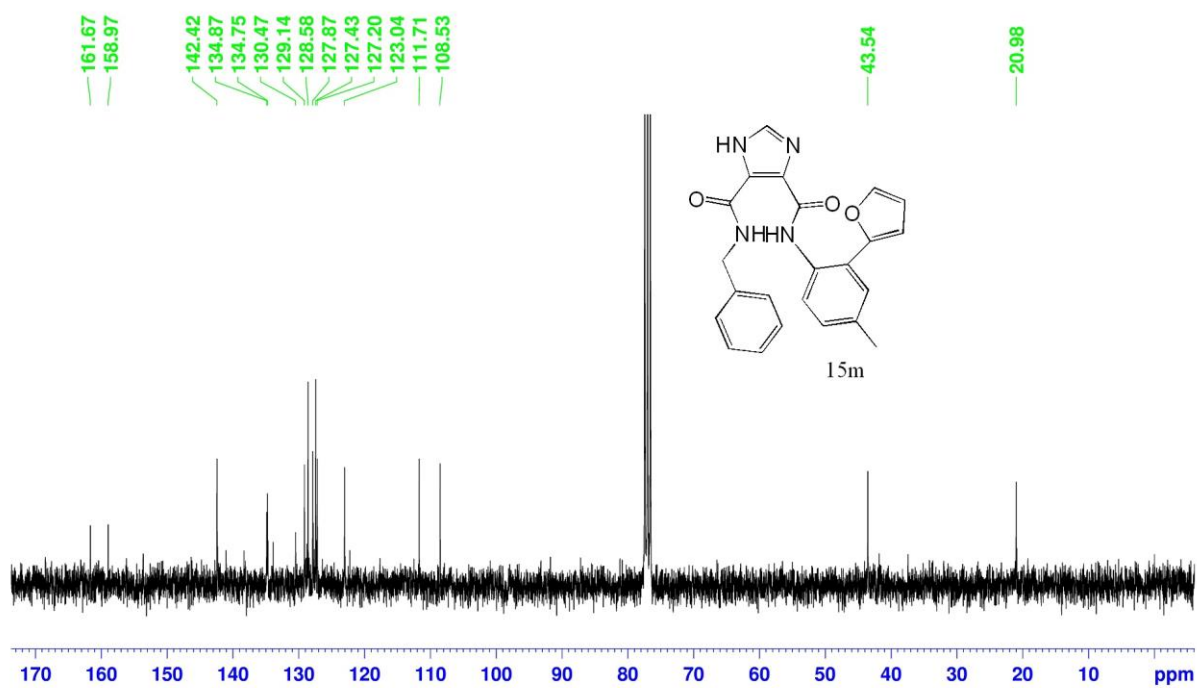
^1H NMR (300 MHz, CDCl_3)

MS-IV-05 in CDCl_3
21/09/2011



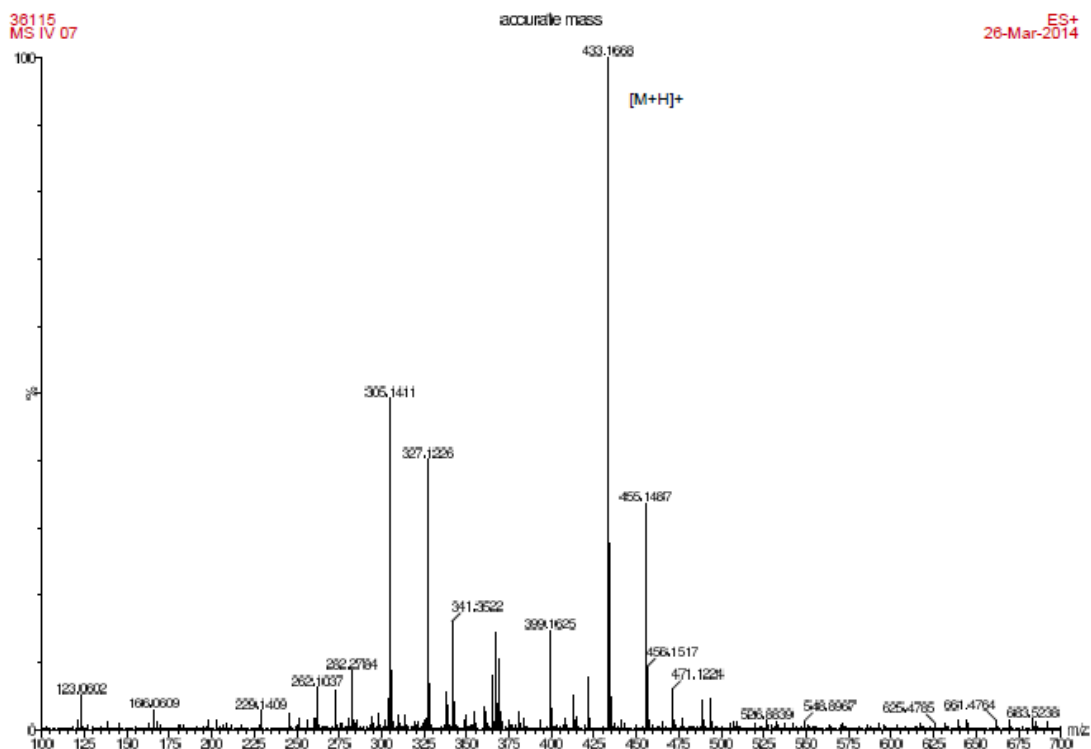
^{13}C NMR (75 MHz, CDCl_3)

MS-IV-05 C13 in CDCl_3
21/09/2011



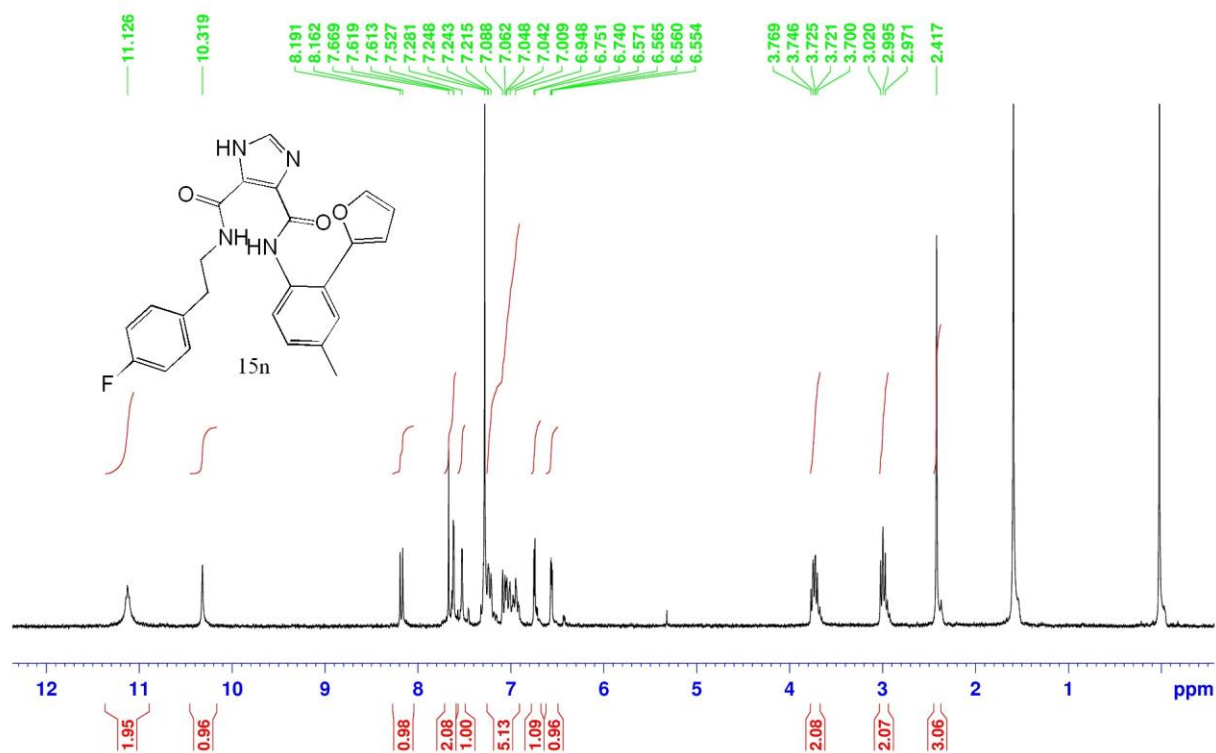
***N*⁵-(4-fluorophenethyl)-*N*⁴-(2-(furan-2-yl)-4-methylphenyl)-1*H*-imidazole-4,5-dicarboxamide (15n)**

HRMS (ES+)

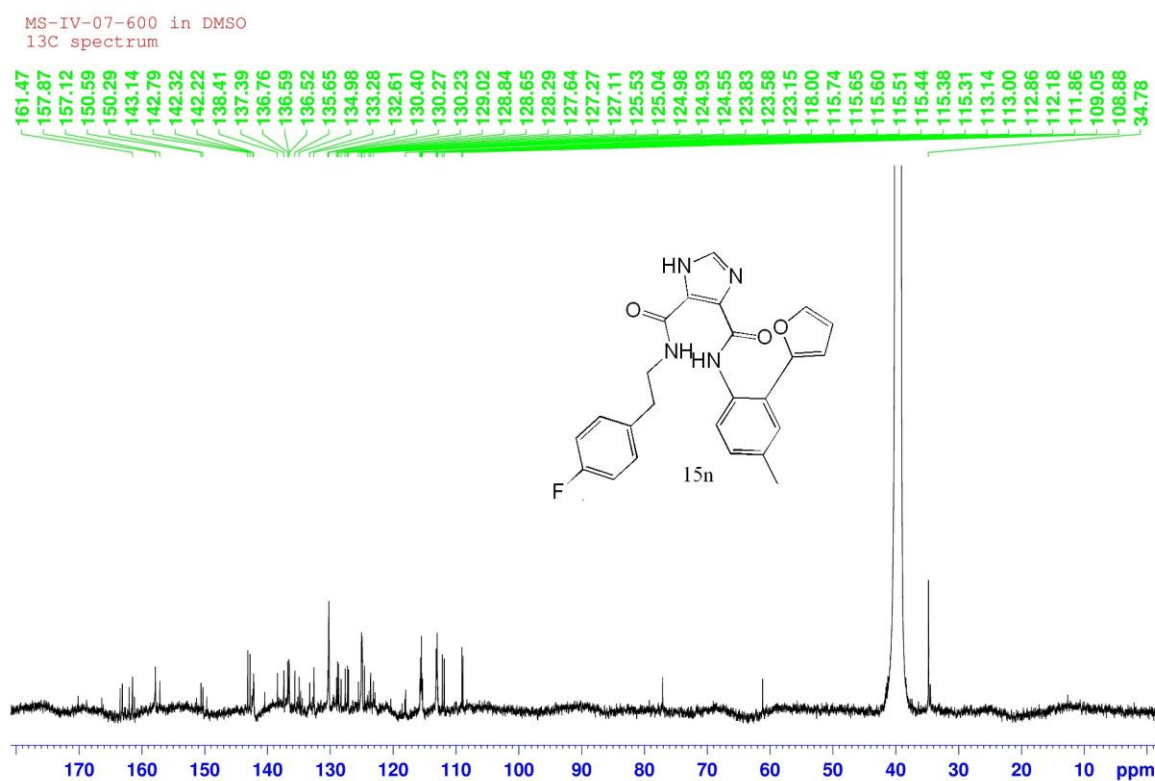


¹H NMR (300 MHz, CDCl₃)

MS-IV-07 in CDCl₃
22/09/2011

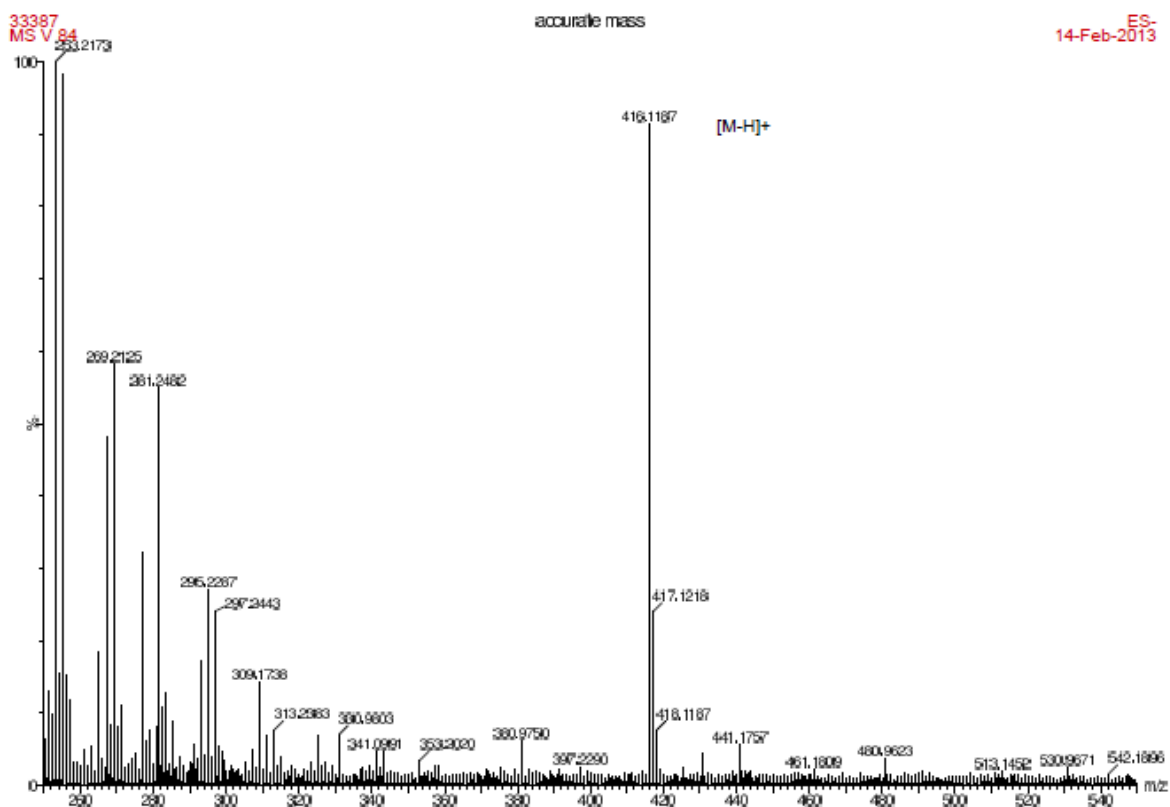


^{13}C NMR (125 MHz, CDCl_3)



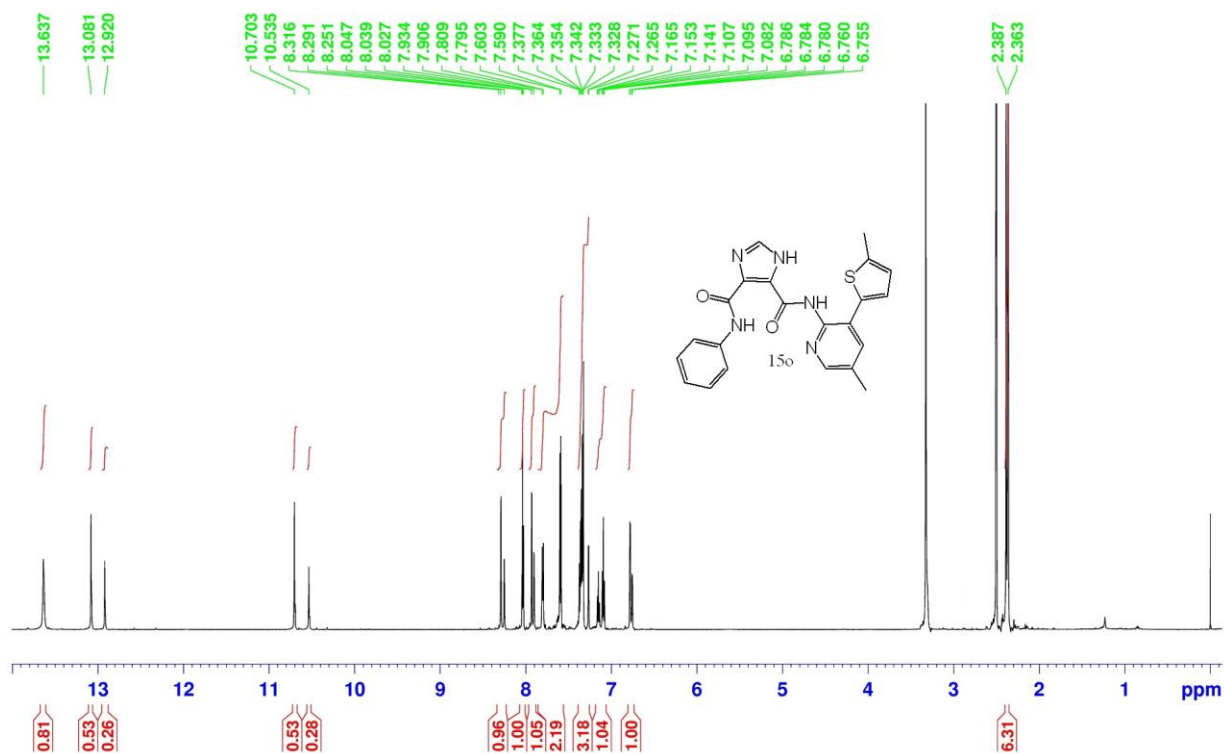
N^5 -(5-methyl-3-(5-methylthiophen-2-yl)pyridin-2-yl)- N^4 -phenyl-1H-imidazole-4,5-dicarboxamide (**15o**)

HRMS (ES $^+$)



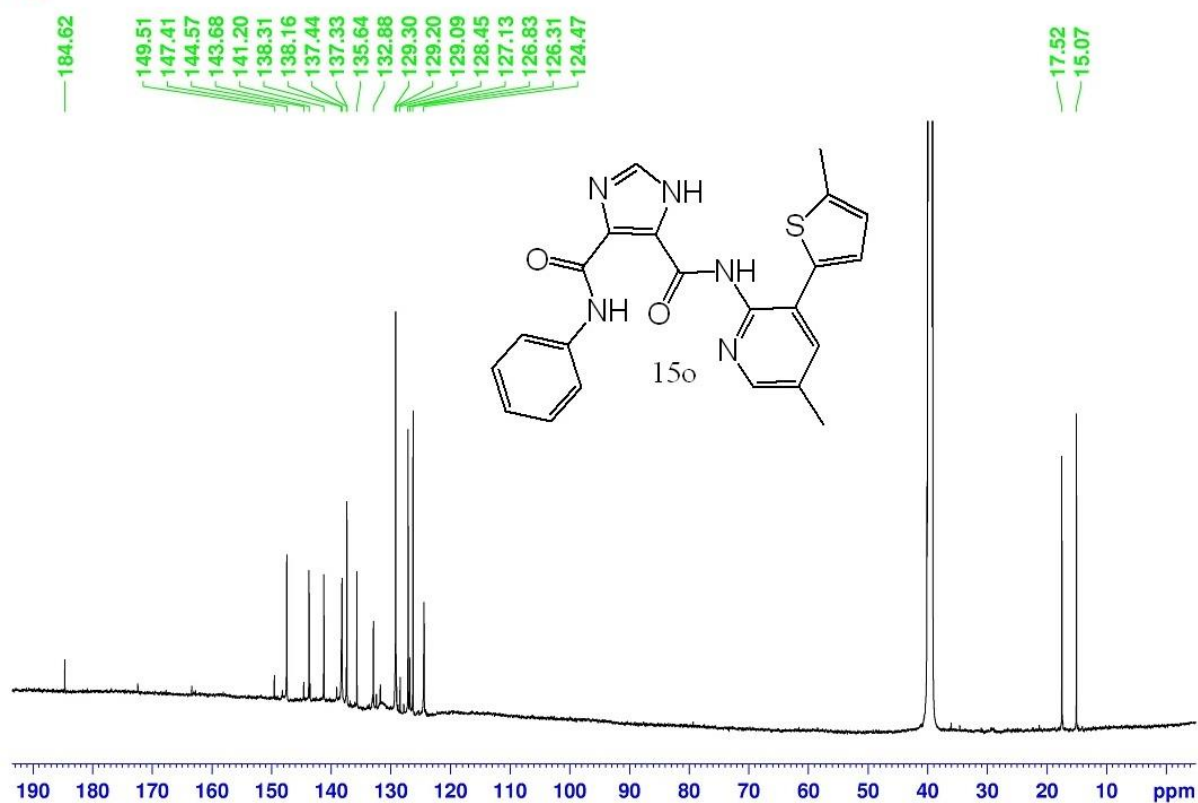
^1H NMR (600 MHz, DMSO)

MS-V-84-600 in DMSO
proton spectrum
temp=25C
1 mg



^{13}C NMR (150 MHz, DMSO)

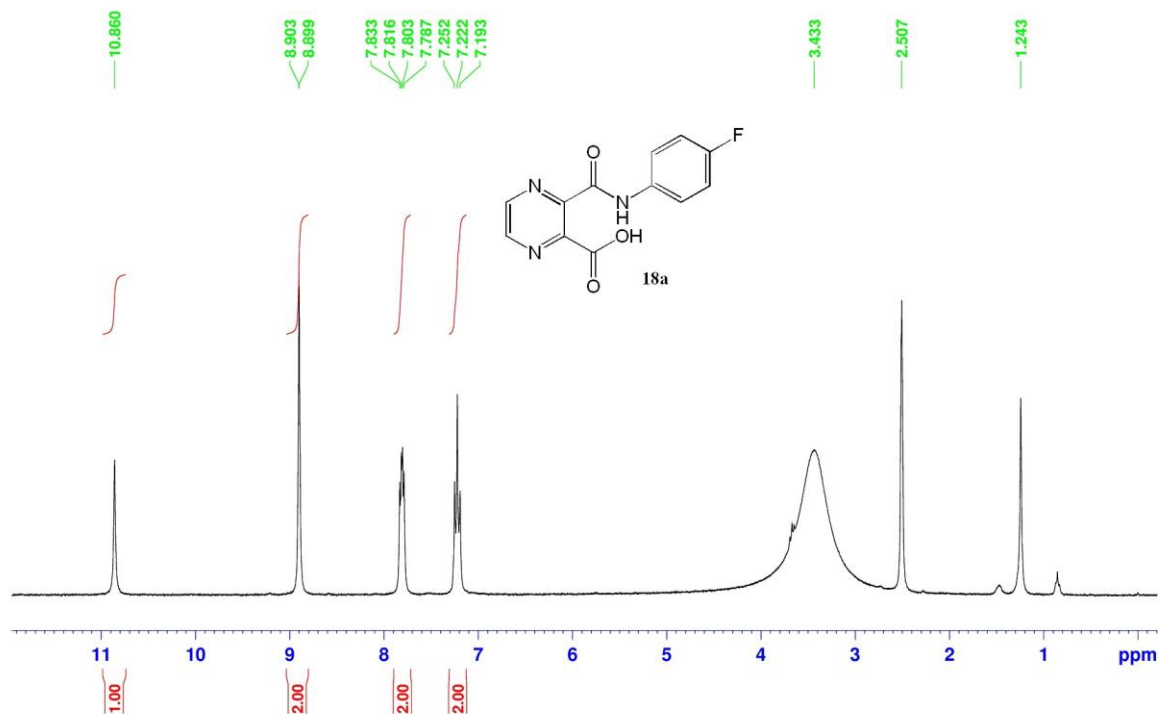
MS-V-84-600 in DMSO
 ^{13}C



3-((4-fluorophenyl)carbamoyl)pyrazine-2-carboxylic acid (18a)

¹H NMR (300 MHz, DMSO)

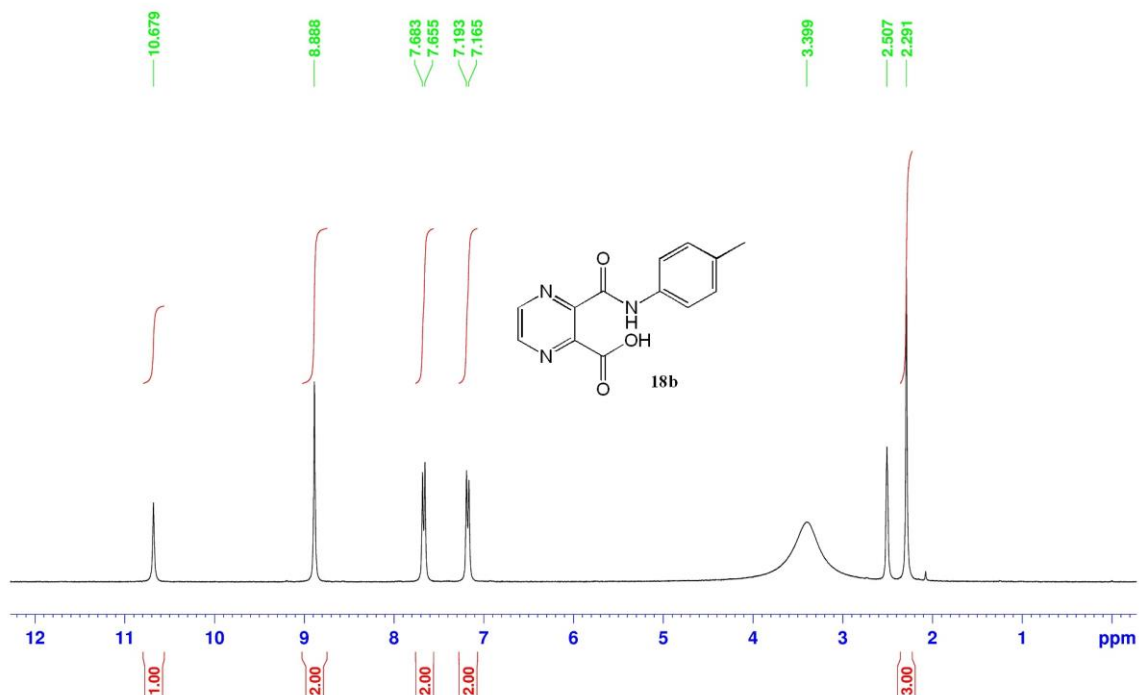
MS-IV-23 in DMSO
02/11/2011



3-(p-tolylcarbamoyl)pyrazine-2-carboxylic acid (18b)

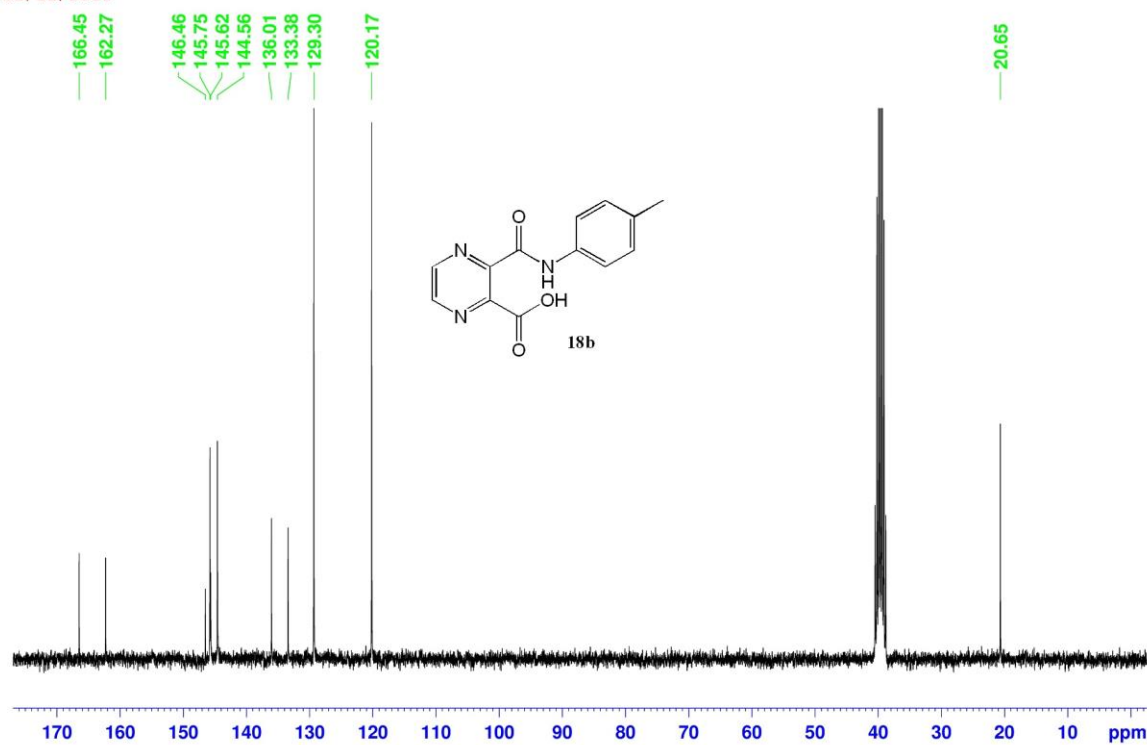
¹H NMR (300 MHz, DMSO)

MS-IV-24 in DMSO
02/11/2011



^{13}C NMR (75 MHz, DMSO)

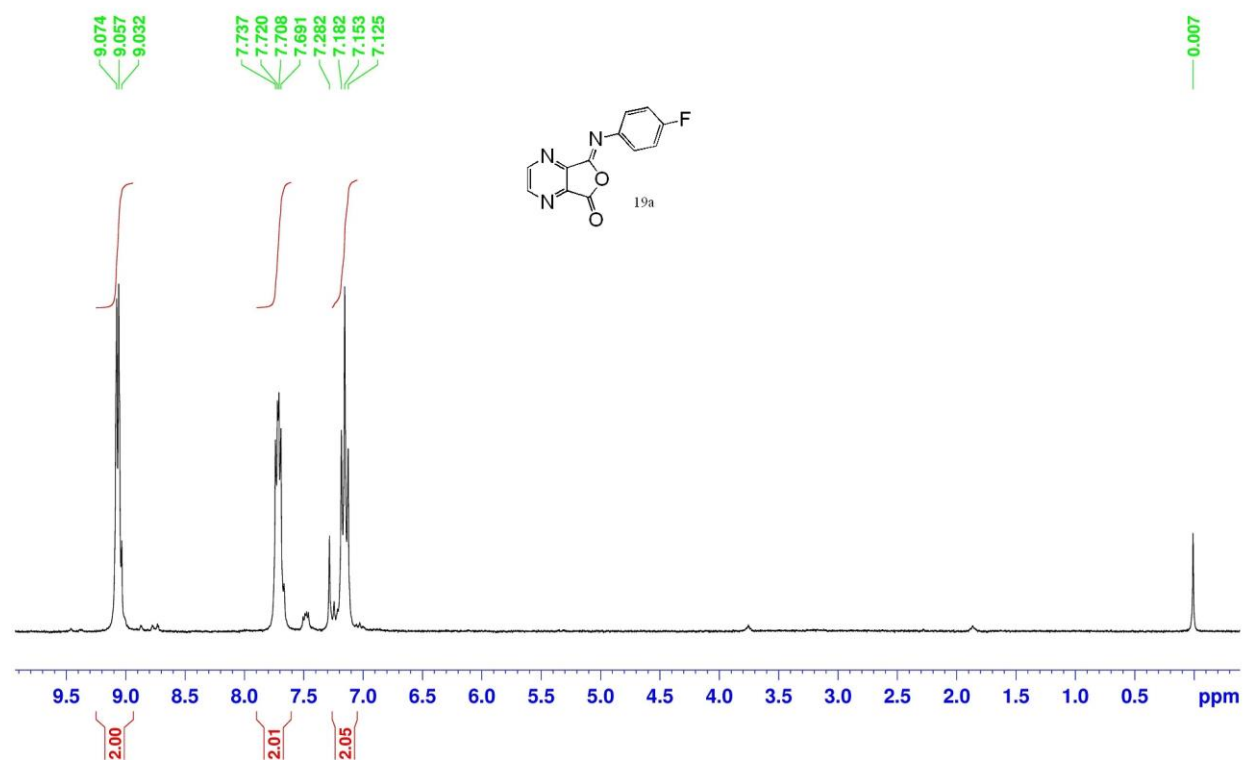
MS-IV-24 C13 in DMSO
02/11/2011



(Z)-7-((4-fluorophenyl)imino)furo[3,4-b]pyrazin-5(7H)-one (19a)

^1H NMR (300 MHz, CDCl_3)

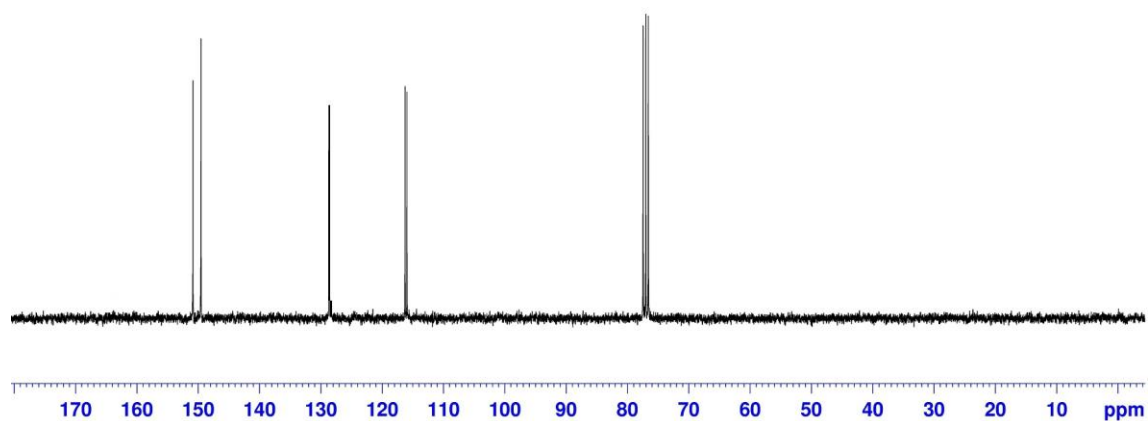
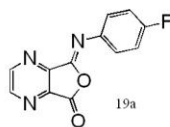
MS-IV-25 in CDCl_3
25/01/2014



^{13}C NMR (75 MHz, CDCl_3)

MS-IV-25 C13 in CDCl_3 300 mhz
25/01/2014

150.85
149.53
128.68
128.57
116.24
115.94



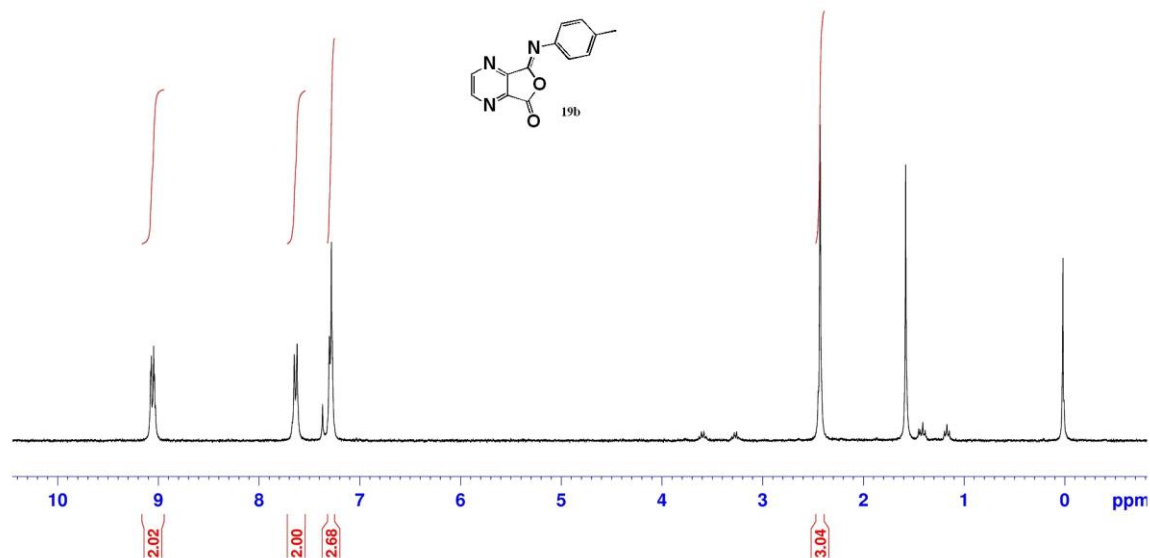
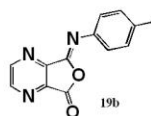
(Z)-7-(p-tolylimino)furo[3,4-b]pyrazin-5(7H)-one (19b)

^1H NMR (300 MHz, CDCl_3)

MS-IV-26 in CDCl_3
03/11/2011

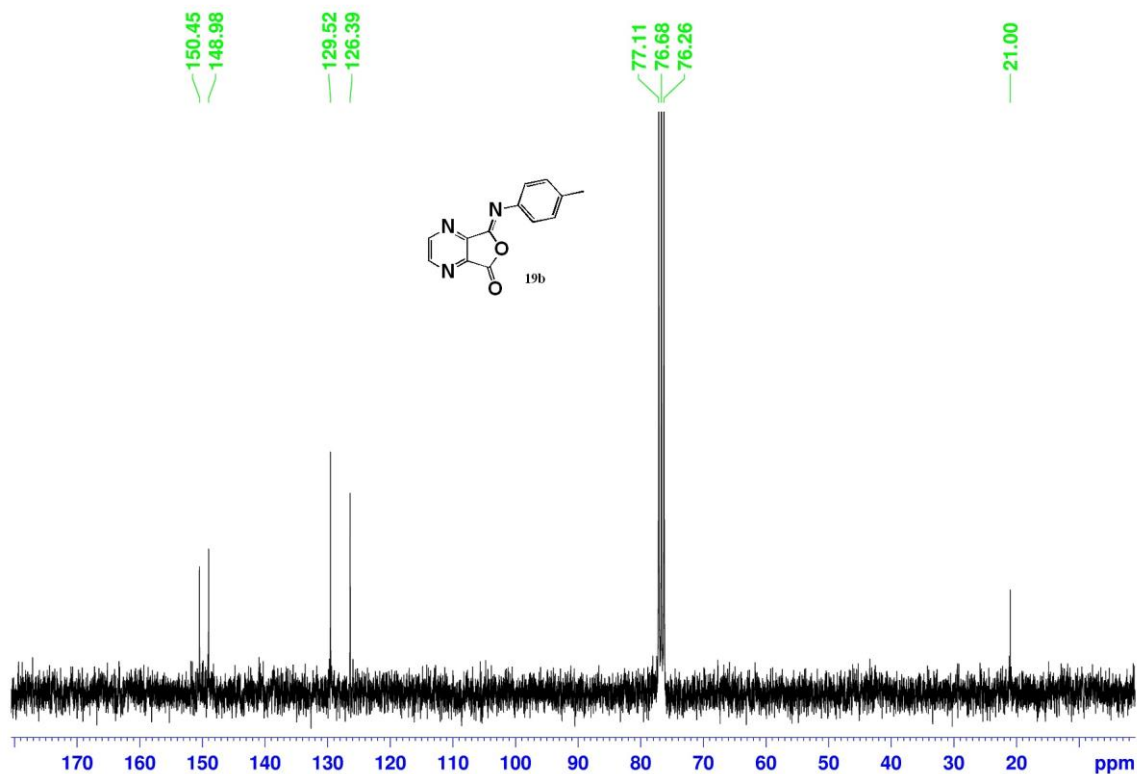
9.076
9.069
9.046
9.038
9.028
7.649
7.622
7.368
7.301
7.281

2.430



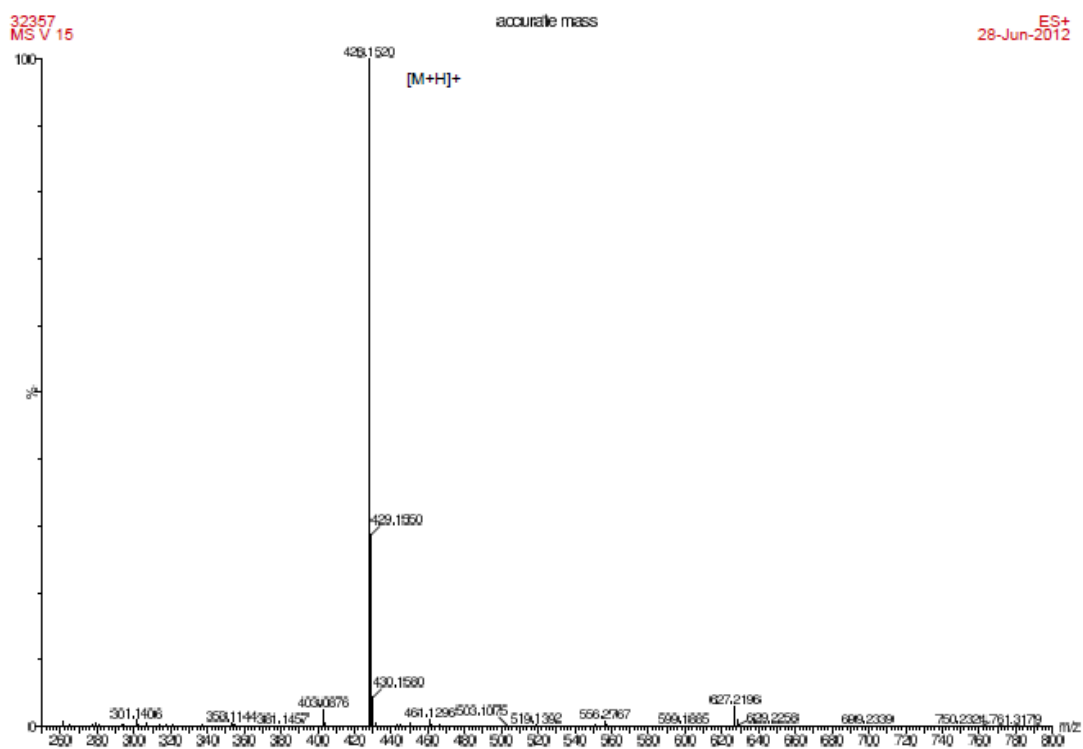
^{13}C NMR (75 MHz, CDCl_3)

MS-IV-26 C13 in CDCl_3
03/11/2011



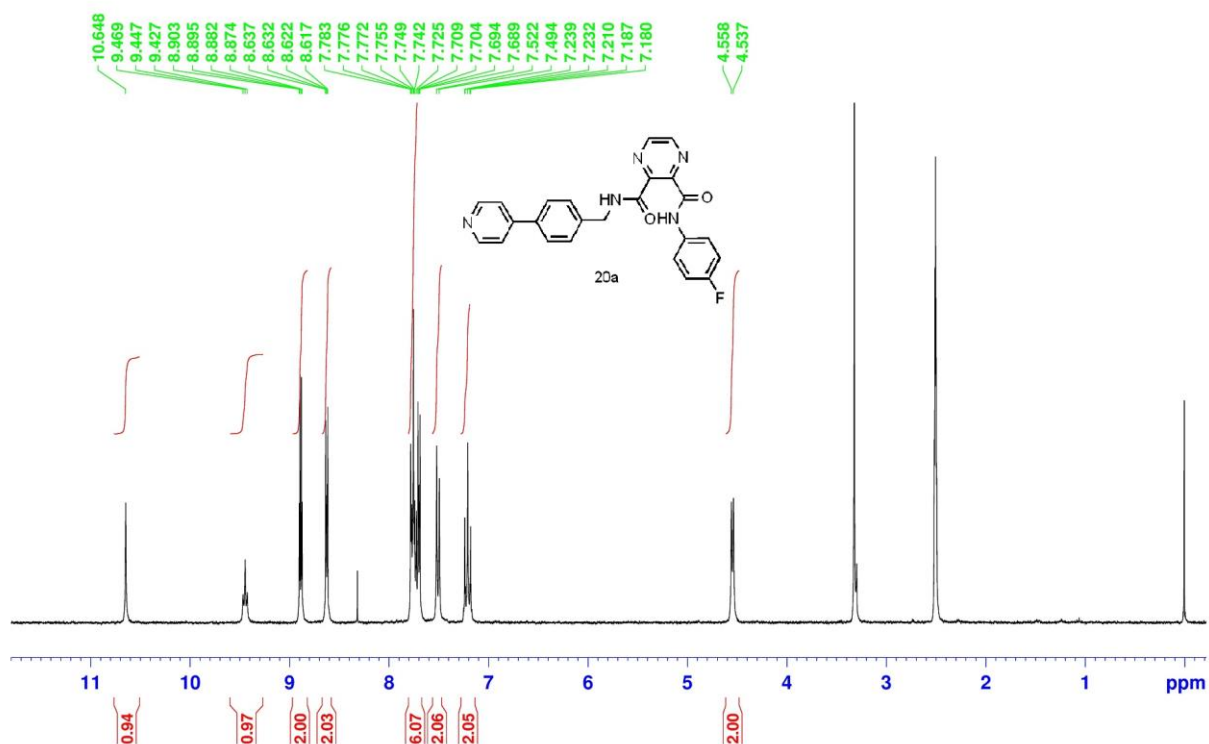
N^2 -(4-fluorophenyl)- N^3 -(4-(pyridin-4-yl) benzyl) pyrazine-2,3-dicarboxamide
(20a)

HRMS (ES+)



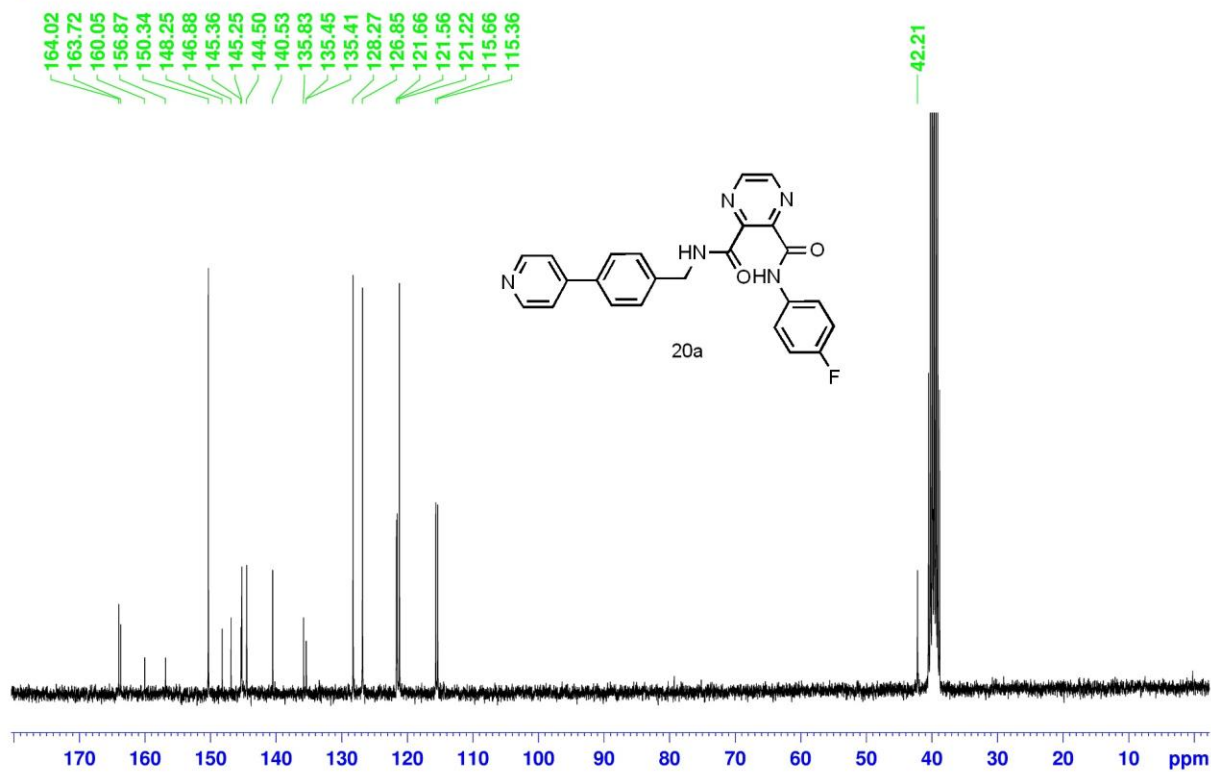
¹H NMR (300 MHz, DMSO)

MS-V-15 in DMSO
20/06/2012



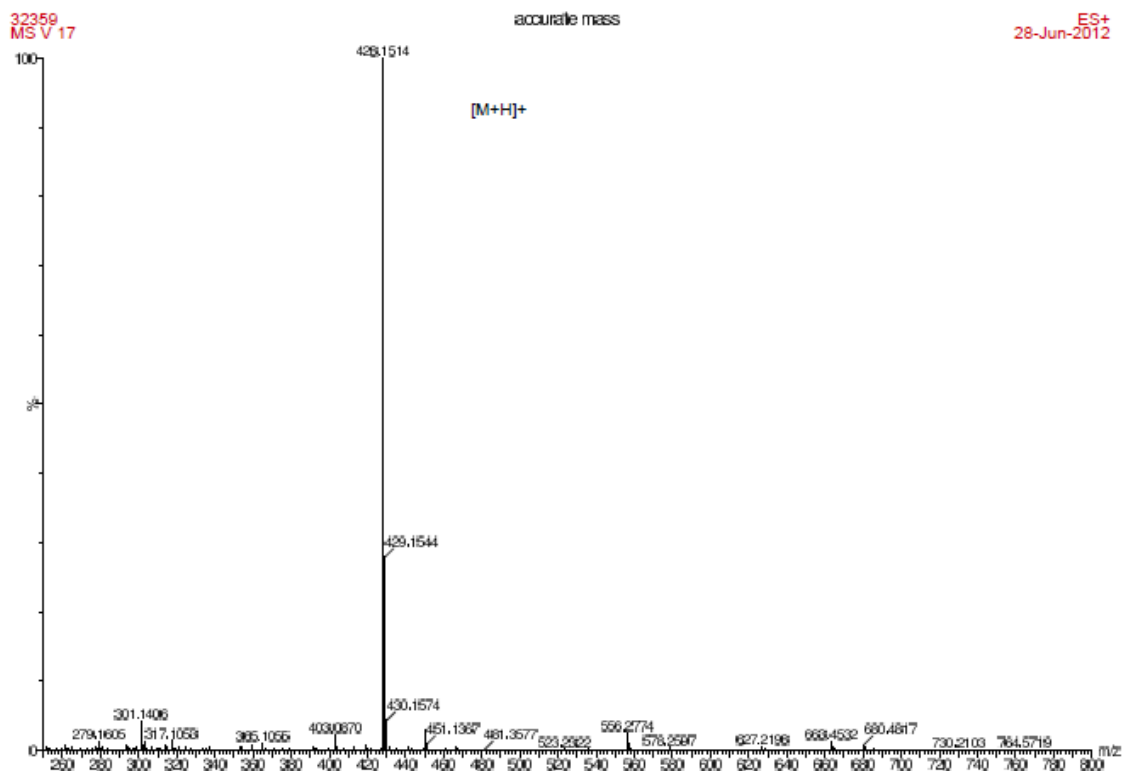
¹³C NMR (75 MHz, DMSO)

MS-V-15C13 in DMSO
20/06/2012

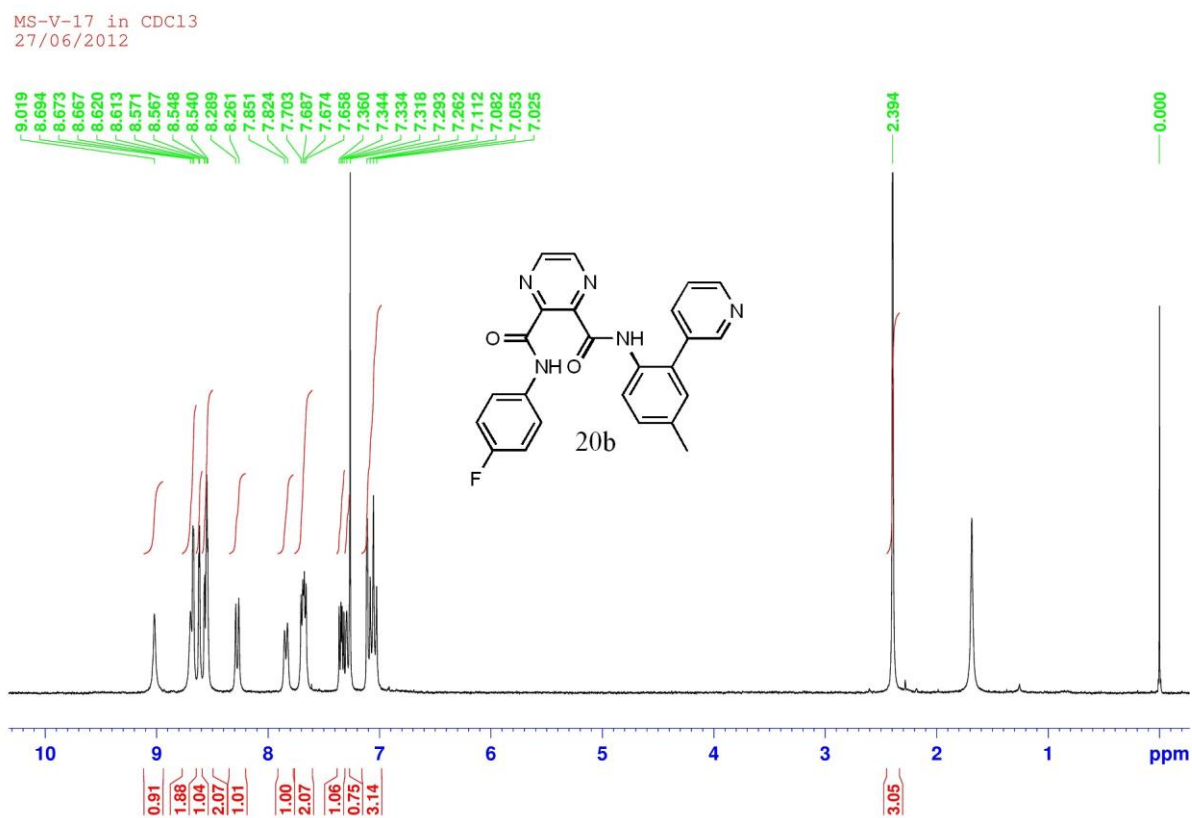


***N*²-(4-fluorophenyl)-*N*³-(4-methyl-2-(pyridin-3-yl)phenyl)pyrazine-2,3-dicarboxamide (20b)**

HRMS (ES+)

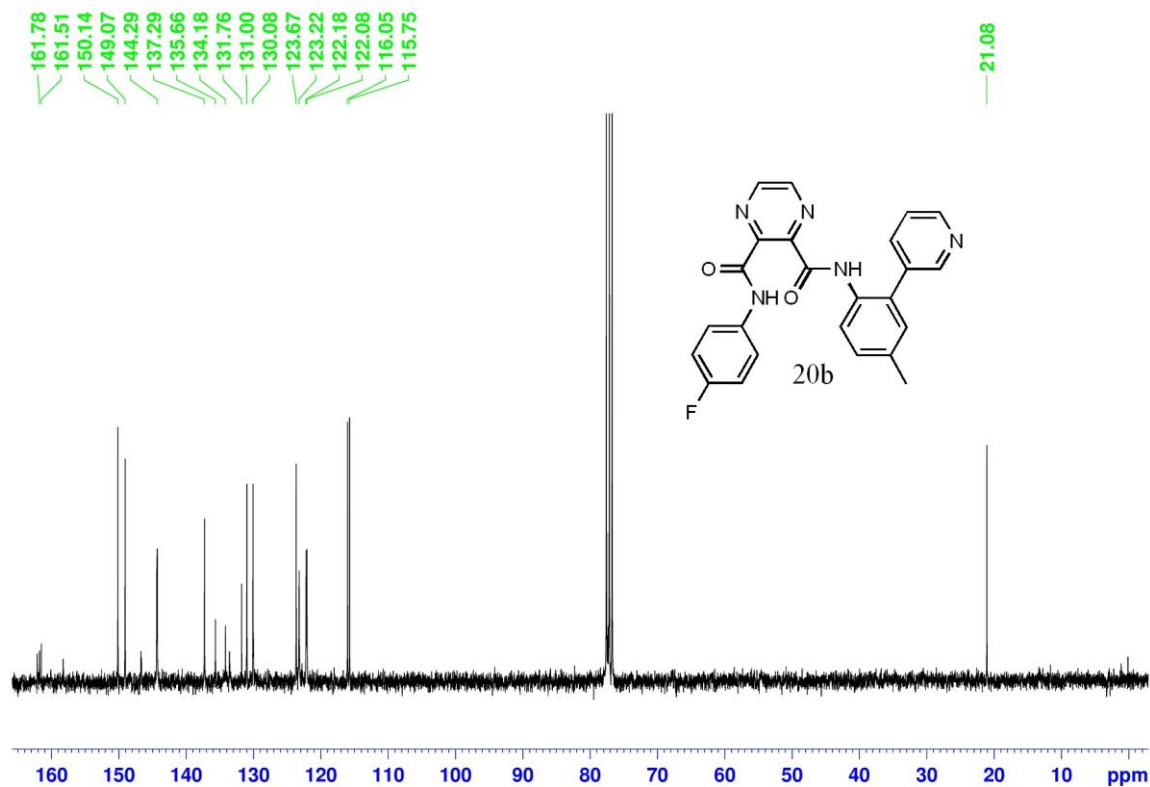


¹H NMR (300 MHz, CDCl₃)



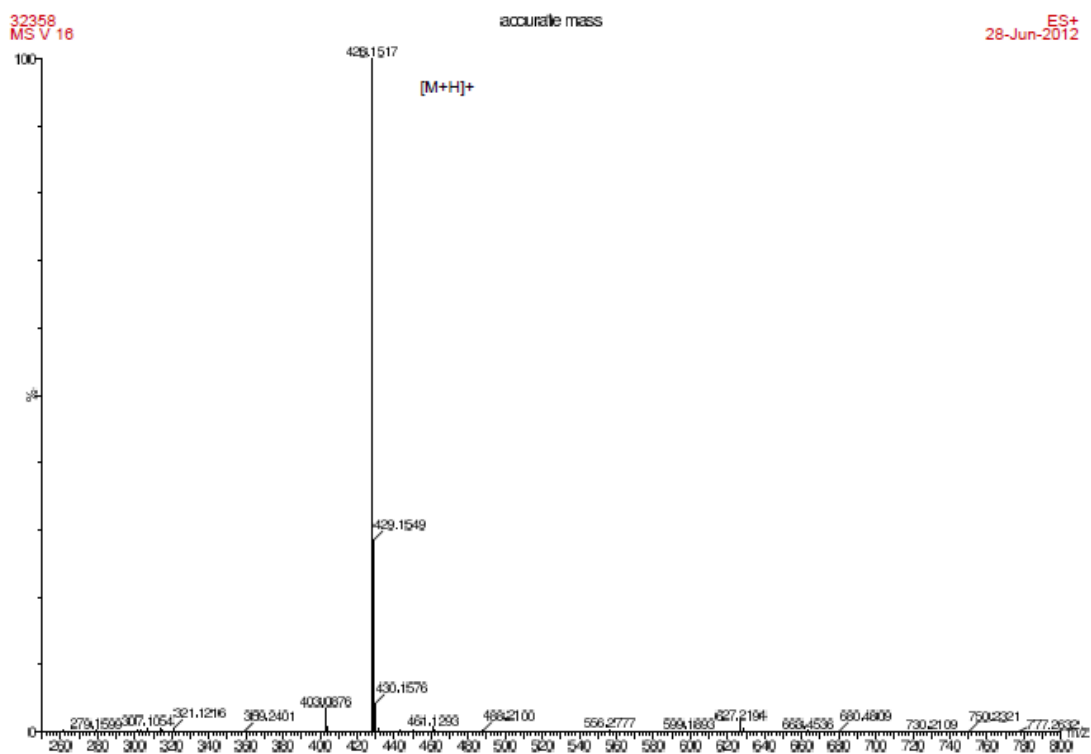
^{13}C NMR (75 MHz, CDCl_3)

MS-V-17 C13 in CDCl_3
29/06/2012



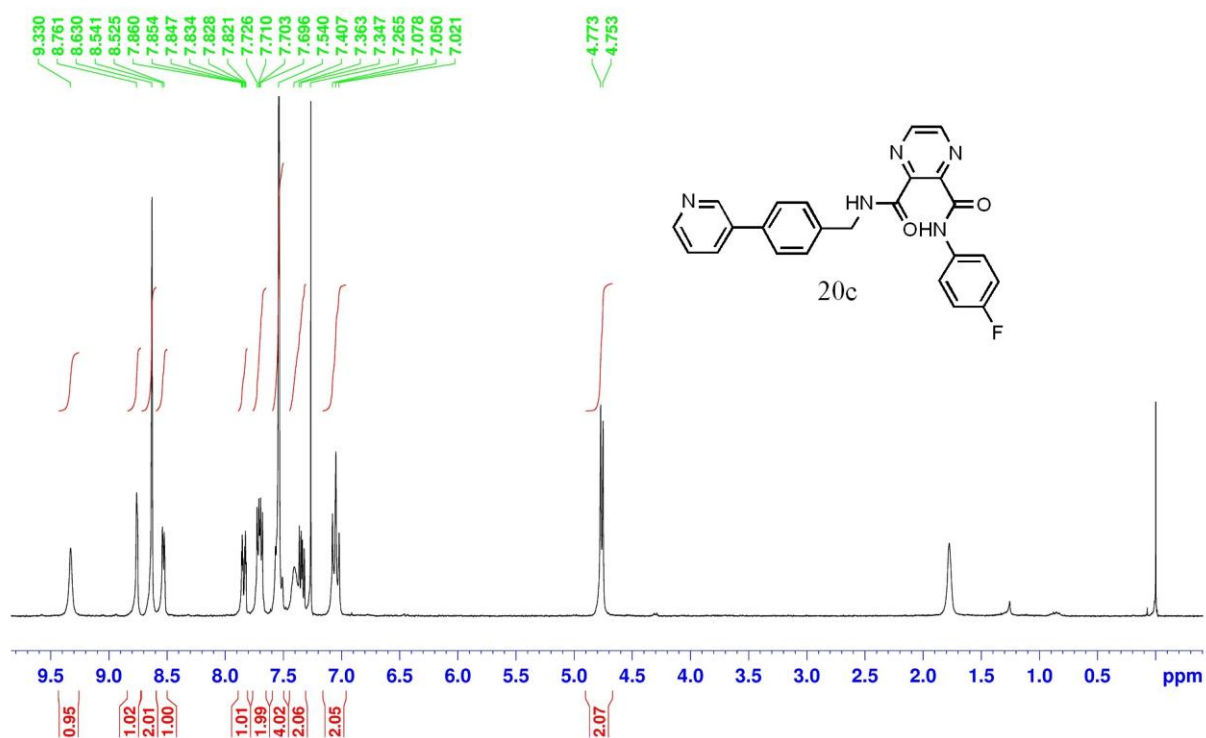
N^2 -(4-fluorophenyl)- N^3 -(4-(pyridin-3-yl) benzyl) pyrazine-2,3-dicarboxamide (20c)

HRMS (ES+)



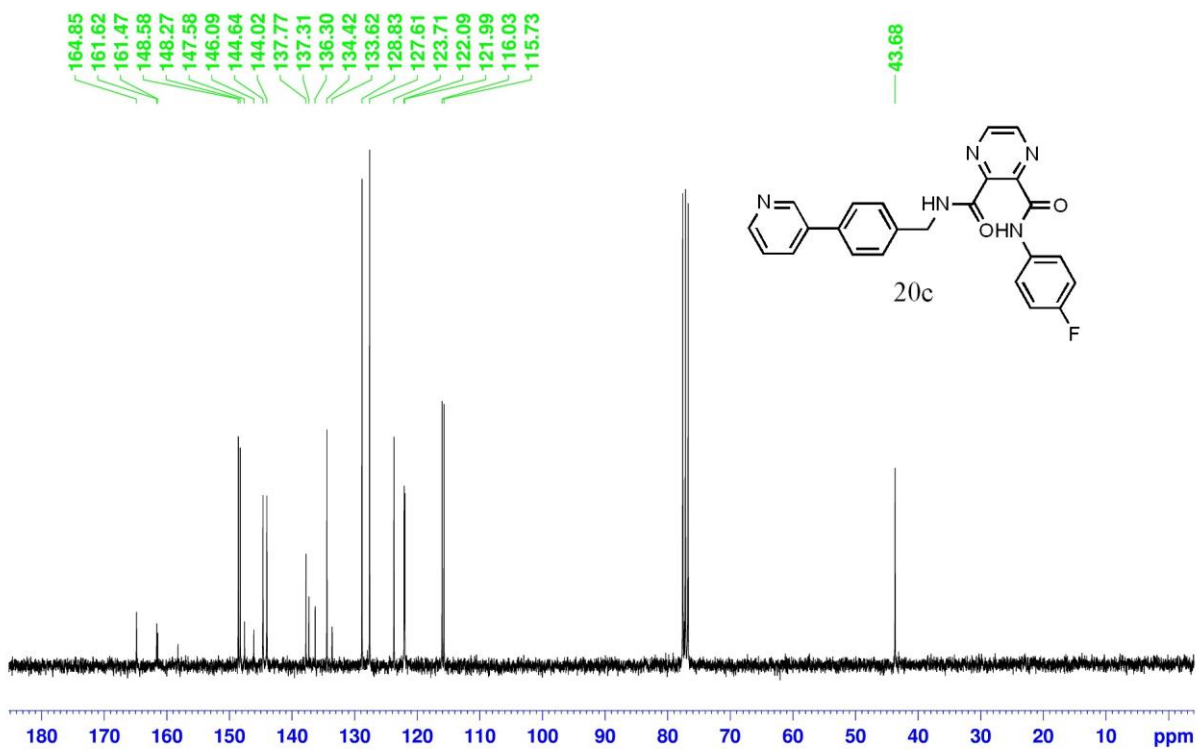
^1H NMR (300 MHz, CDCl_3)

MS-V-16 in CDCl_3
27/06/2012



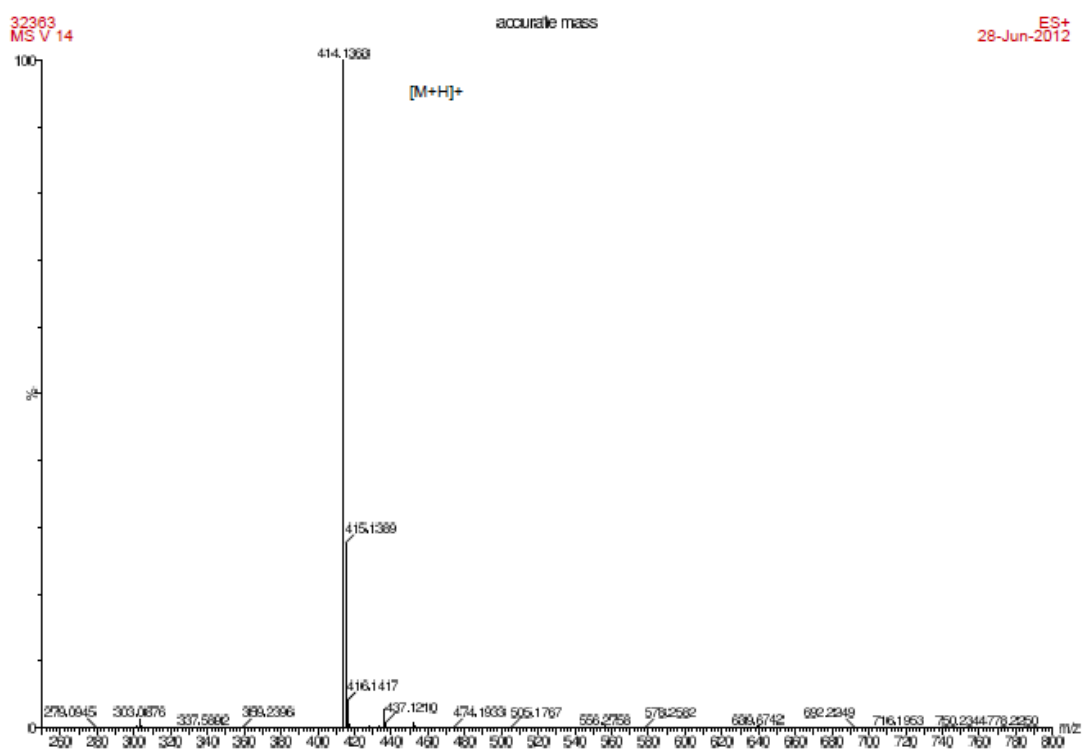
^{13}C NMR (75 MHz, CDCl_3)

MS-V-16 C13 in CDCl_3
28/06/2012



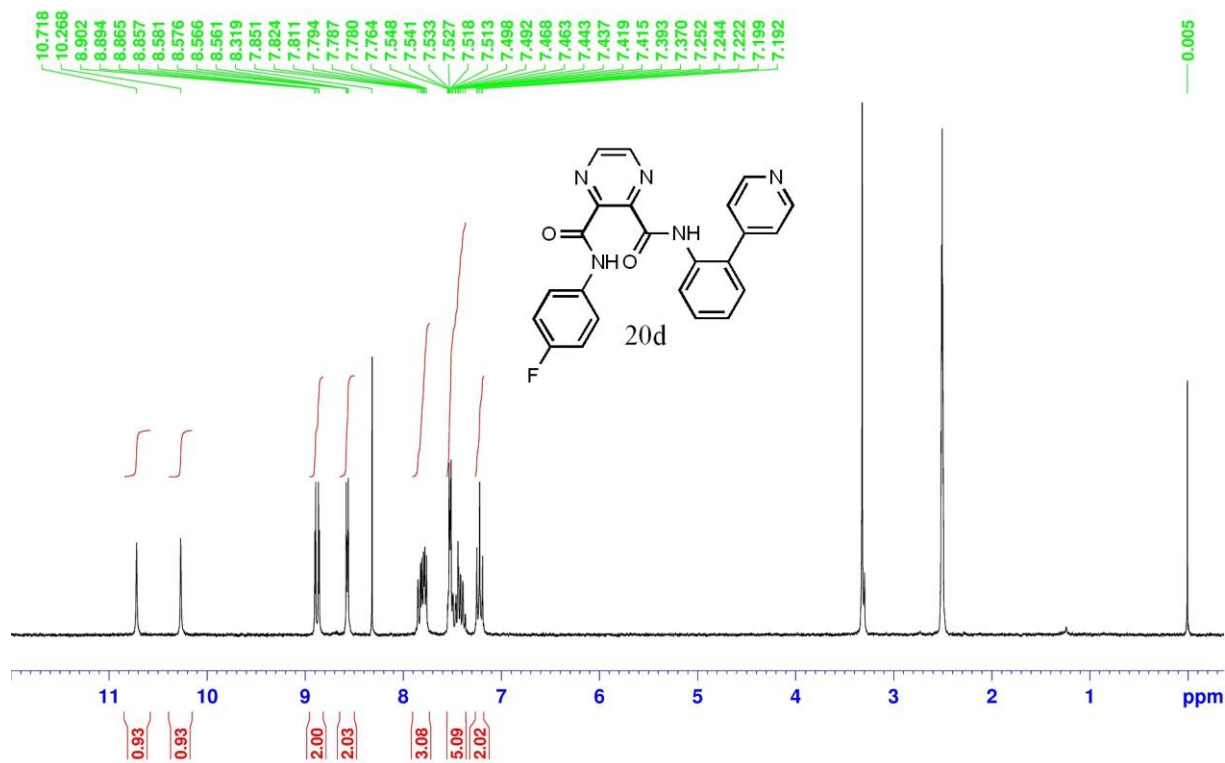
***N*²-(4-fluorophenyl)-*N*³-(2-(pyridin-4-yl) phenyl) pyrazine-2,3-dicarboxamide (20d)**

HRMS (ES⁺)



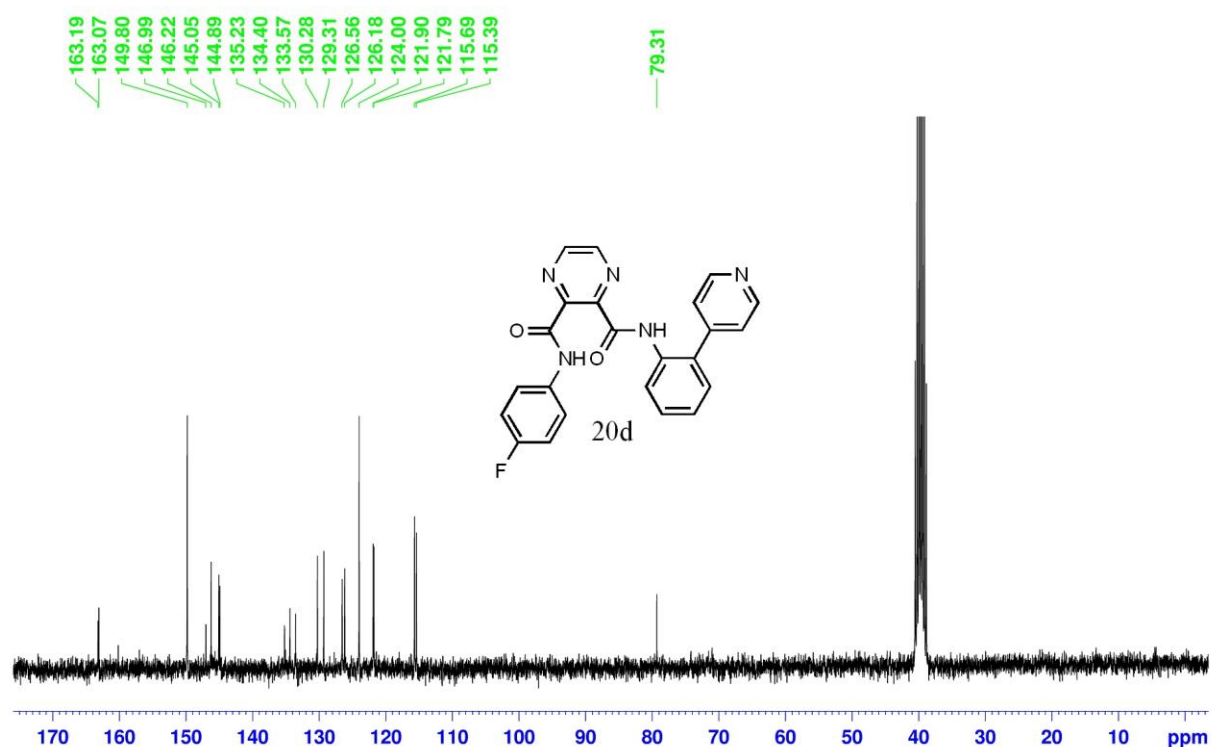
¹H NMR (300 MHz, DMSO)

MS-V-14 in DMSO
20/06/2012



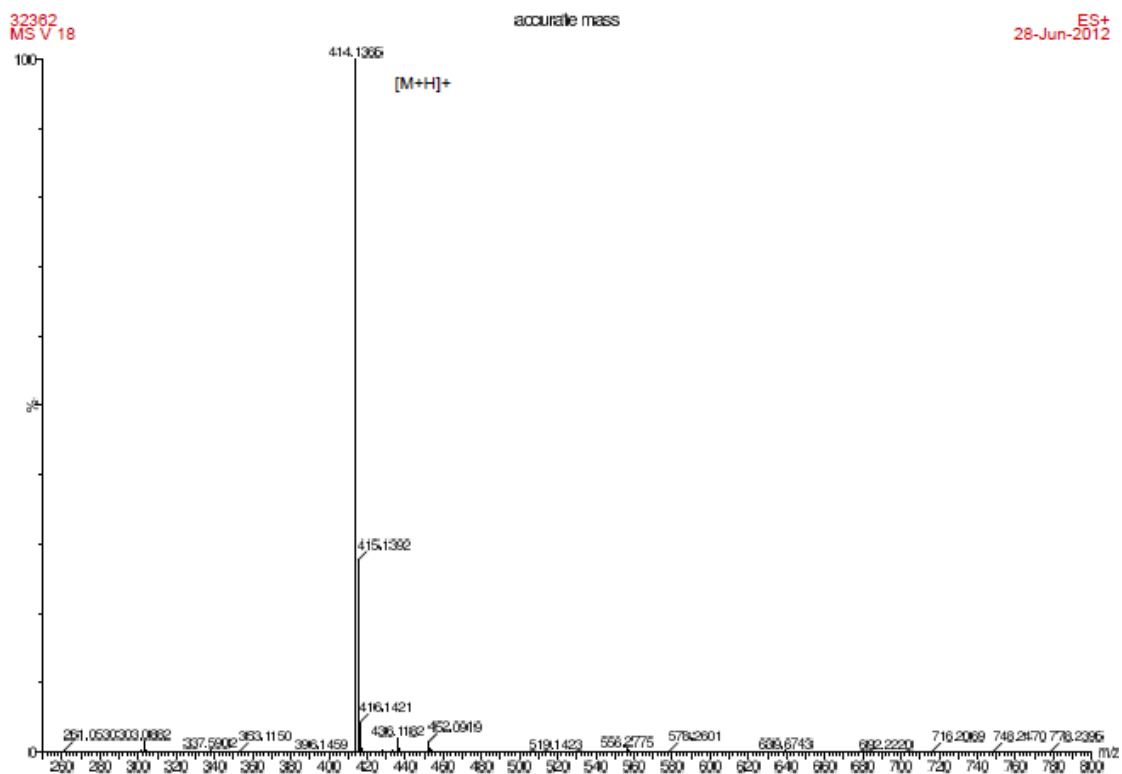
^{13}C NMR (75 MHz, DMSO)

MS-V-14 C13 in DMSO
20/06/2012



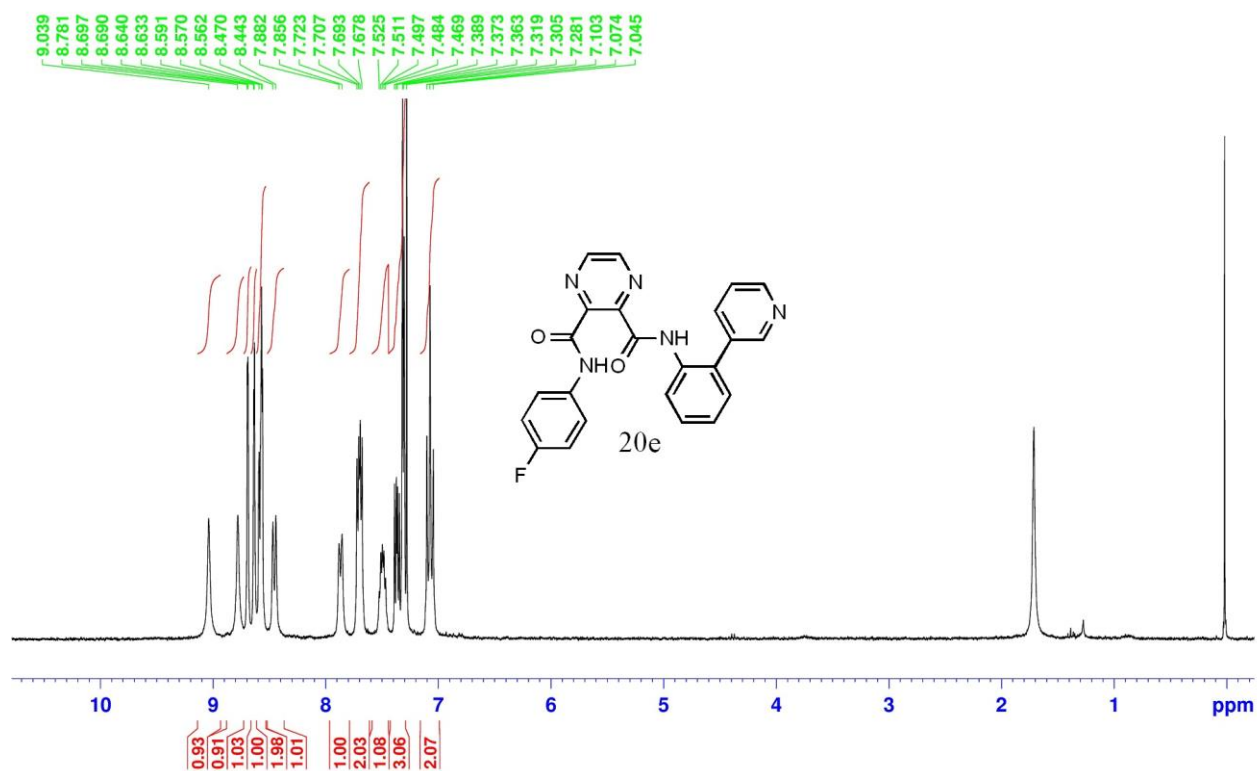
N^2 -(4-fluorophenyl)- N^3 -(2-(pyridin-3-yl) phenyl) pyrazine-2,3-dicarboxamide (20e)

HRMS (ES+)



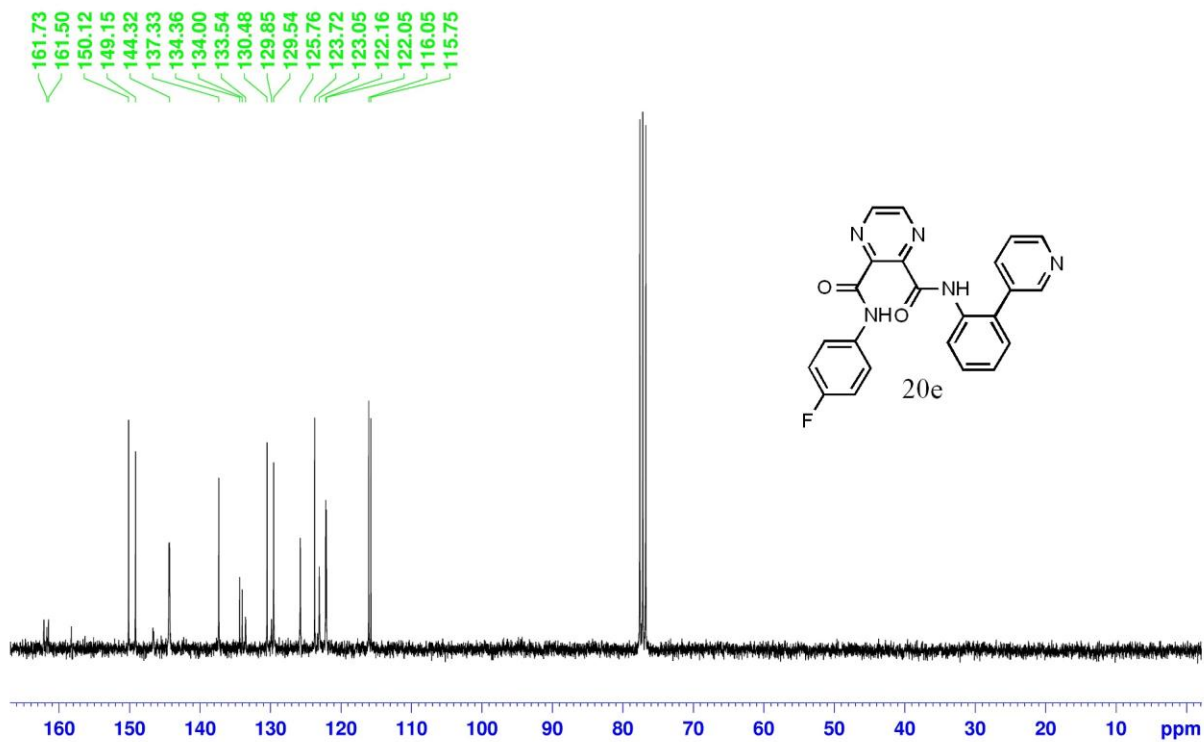
¹H NMR (300 MHz, CDCl₃)

MS-V-18 in CDCl₃
27/06/2012



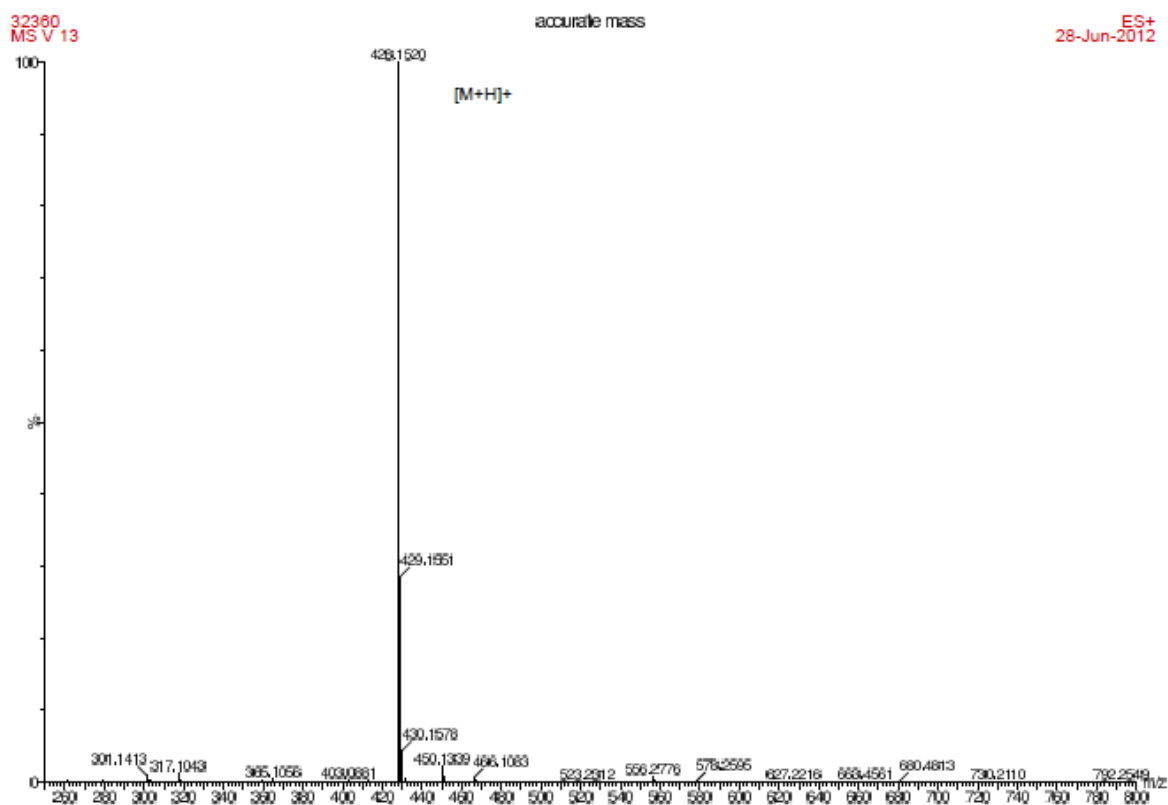
¹³C NMR (75 MHz, CDCl₃)

MS-V-18 C13 in CDCl₃
02/07/2012



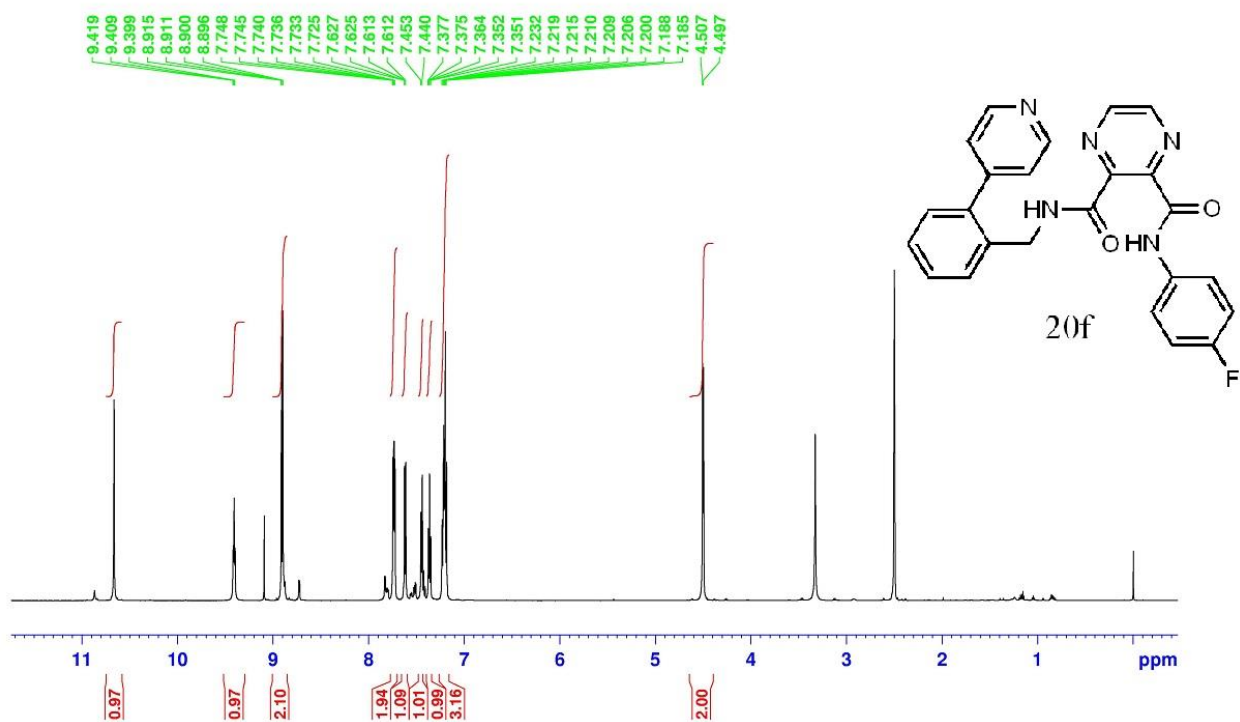
***N*²-(4-fluorophenyl)-*N*³-(2-(pyridin-4-yl) benzyl) pyrazine-2,3-dicarboxamide (20f)**

HRMS (ES⁺)



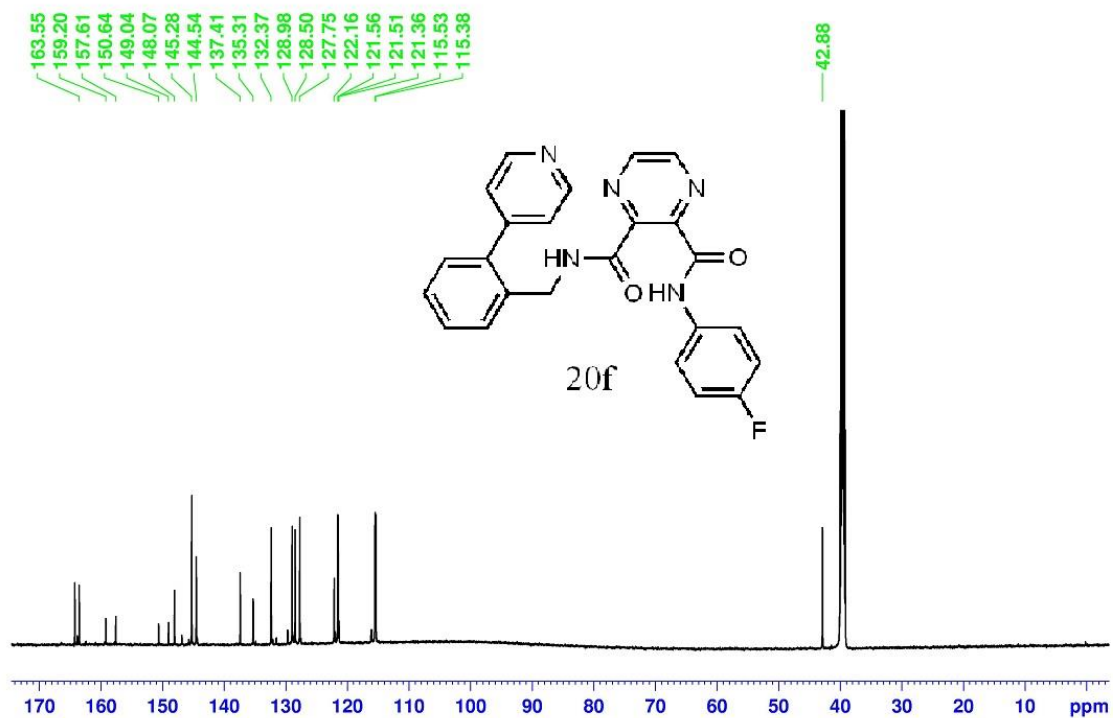
¹H NMR (600 MHz, DMSO)

MS-V-13-600 in DMSO
proton spectrum
temp=25C



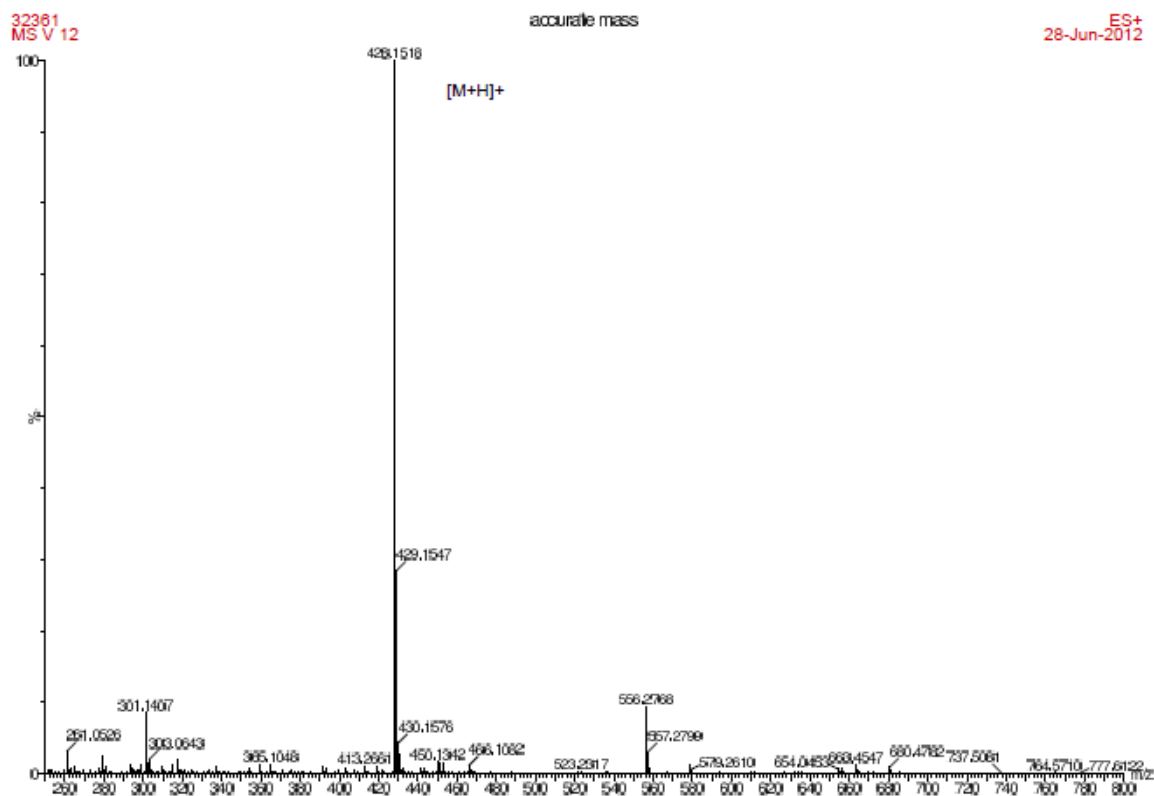
^{13}C NMR (150 MHz, DMSO)

MS-V-13-600 in DMSO
 ^{13}C



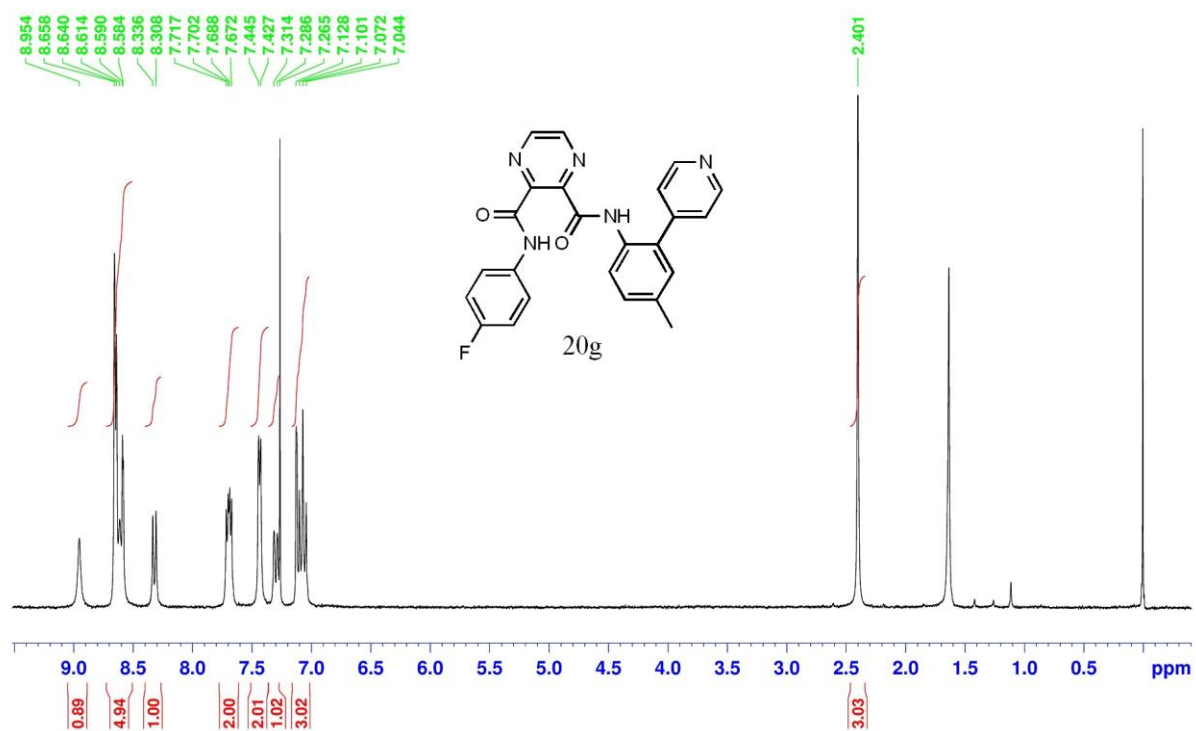
N^2 -(4-fluorophenyl)- N^3 -(4-methyl-2-(pyridin-4-yl)phenyl)pyrazine-2,3-dicarboxamide (20g)

HRMS (ES+)



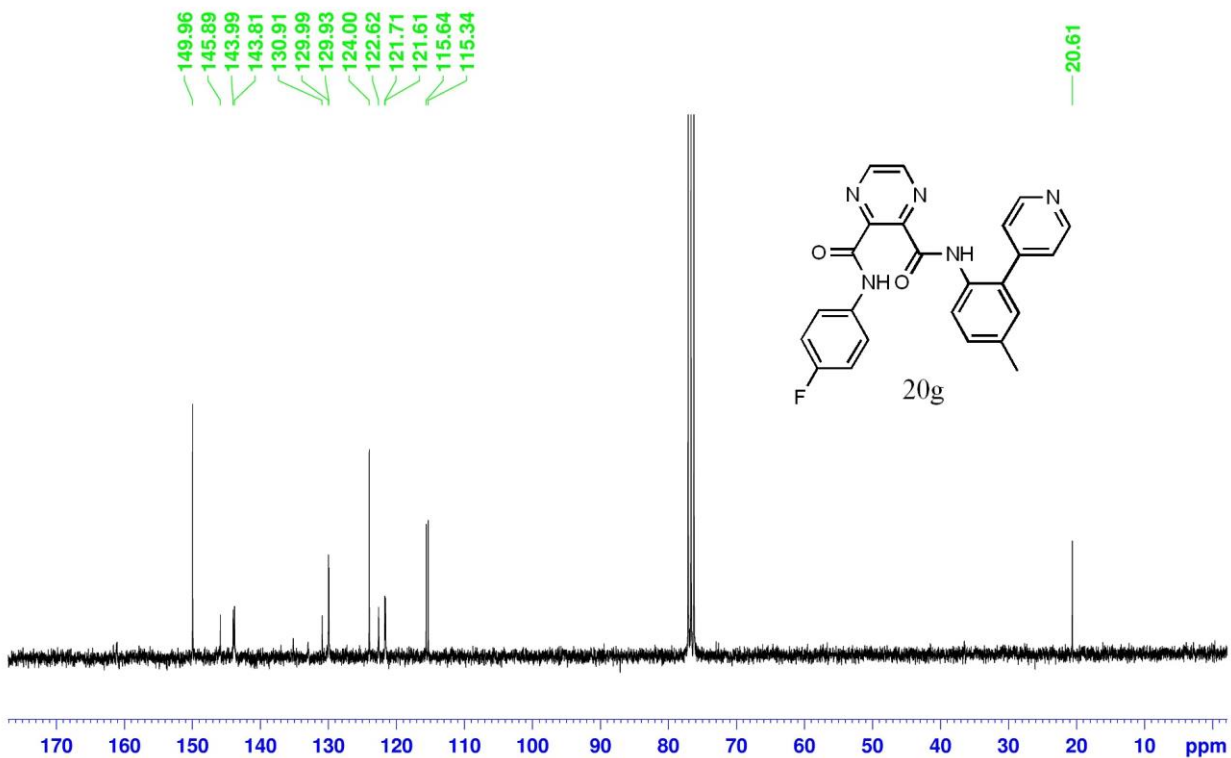
^1H NMR (300 MHz, CDCl_3)

MS-V-12 in CDCl_3
27/06/2012



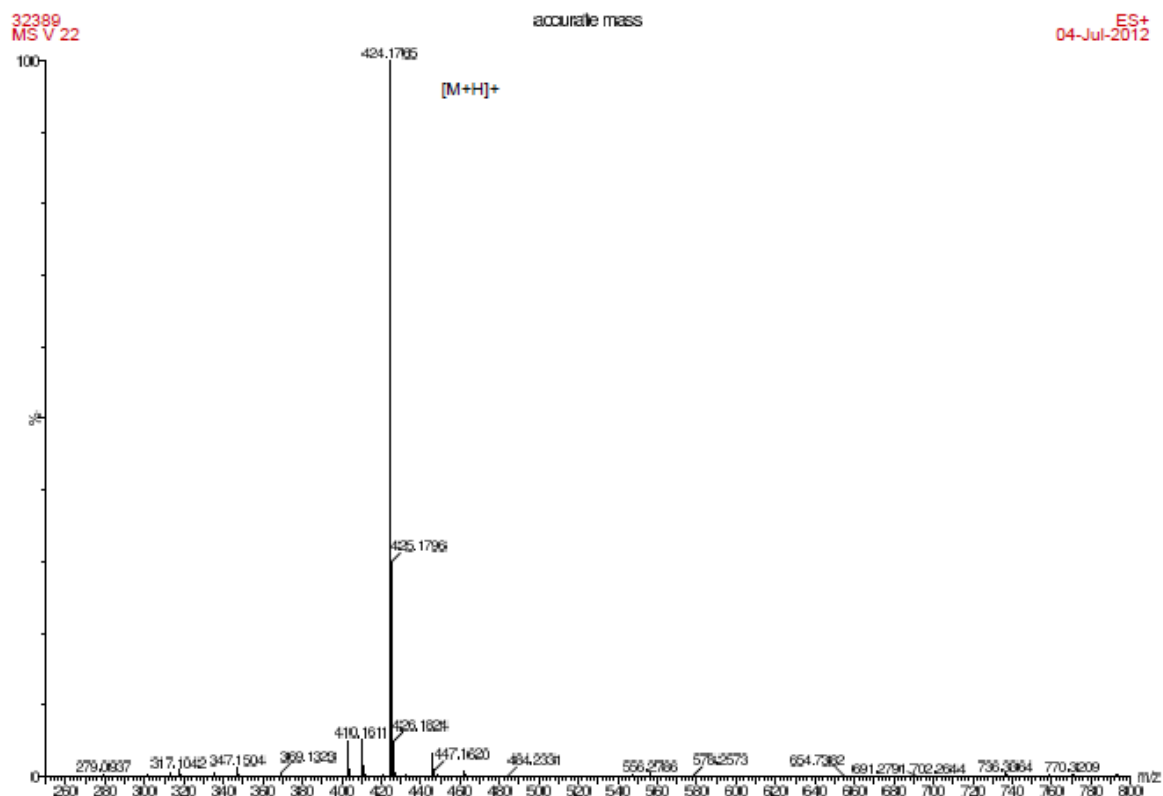
^{13}C NMR (75 MHz, CDCl_3)

MS-V-12 C13 in CDCl_3
27/06/2012



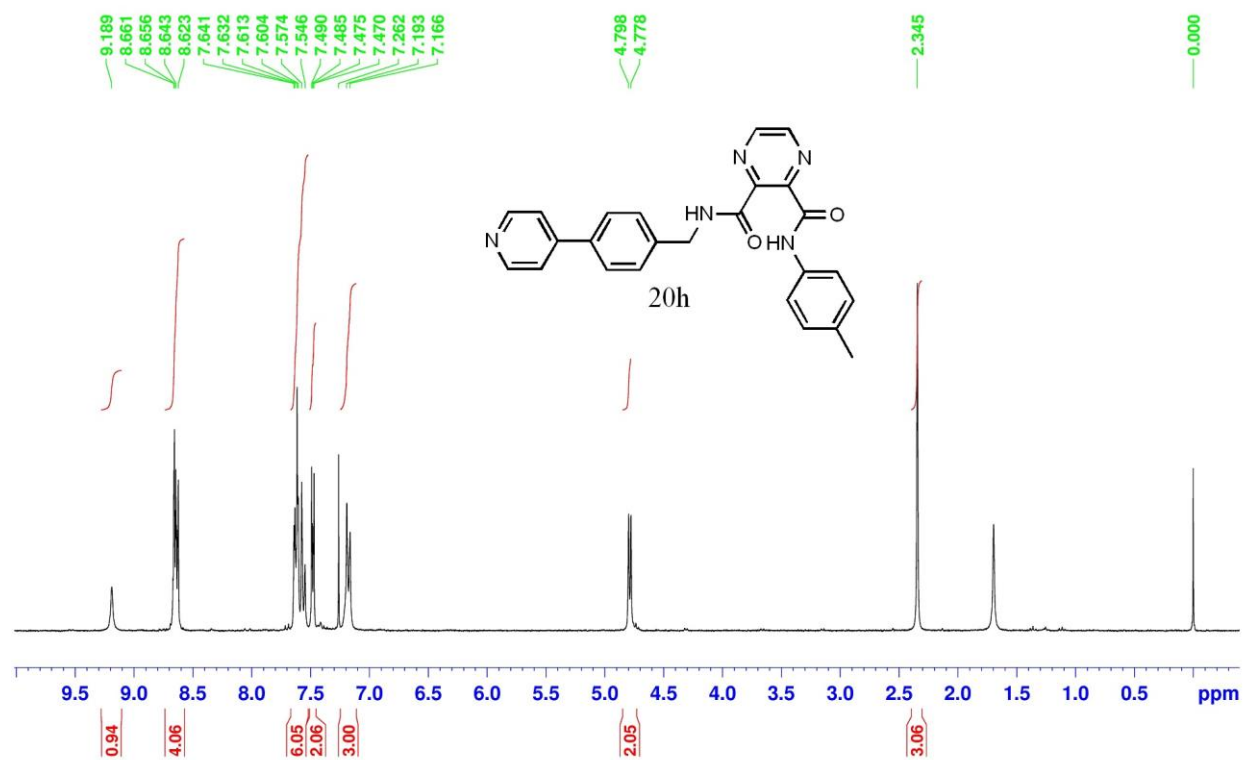
***N*²-(4-(pyridin-4-yl) benzyl)-*N*³-(p-tolyl) pyrazine-2,3-dicarboxamide (20h)**

HRMS (ES⁺)



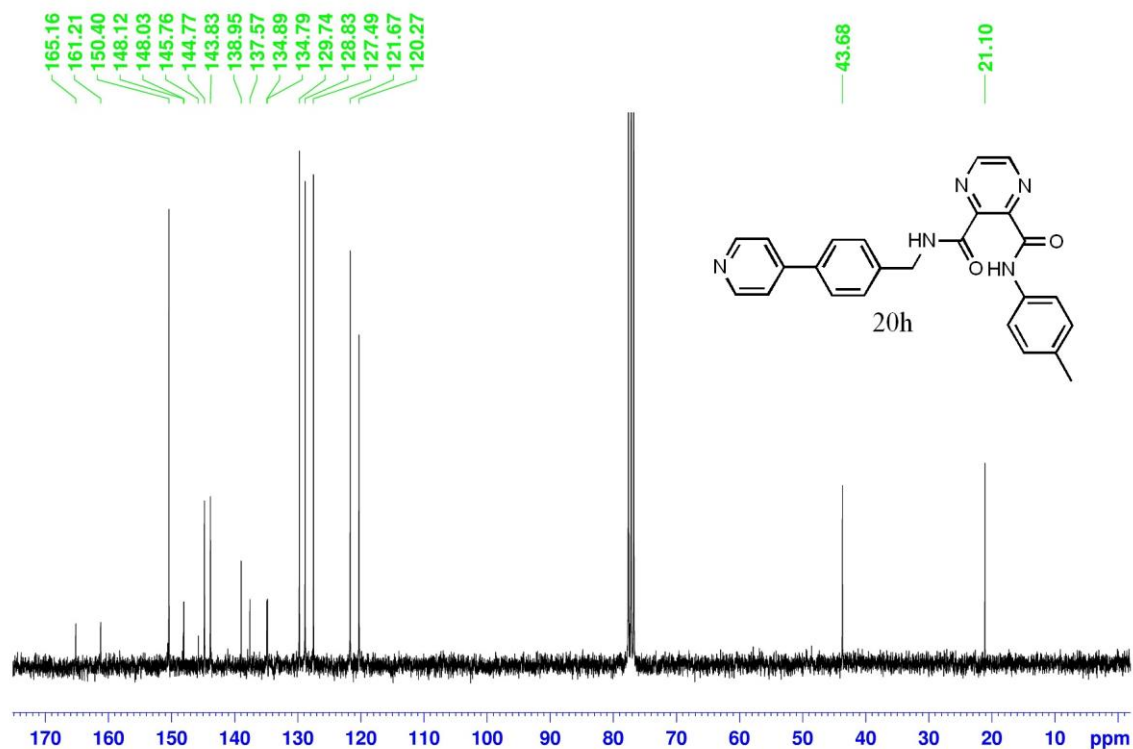
¹H NMR (300 MHz, CDCl₃)

MS-V-22 in CDCl₃
03/07/2012



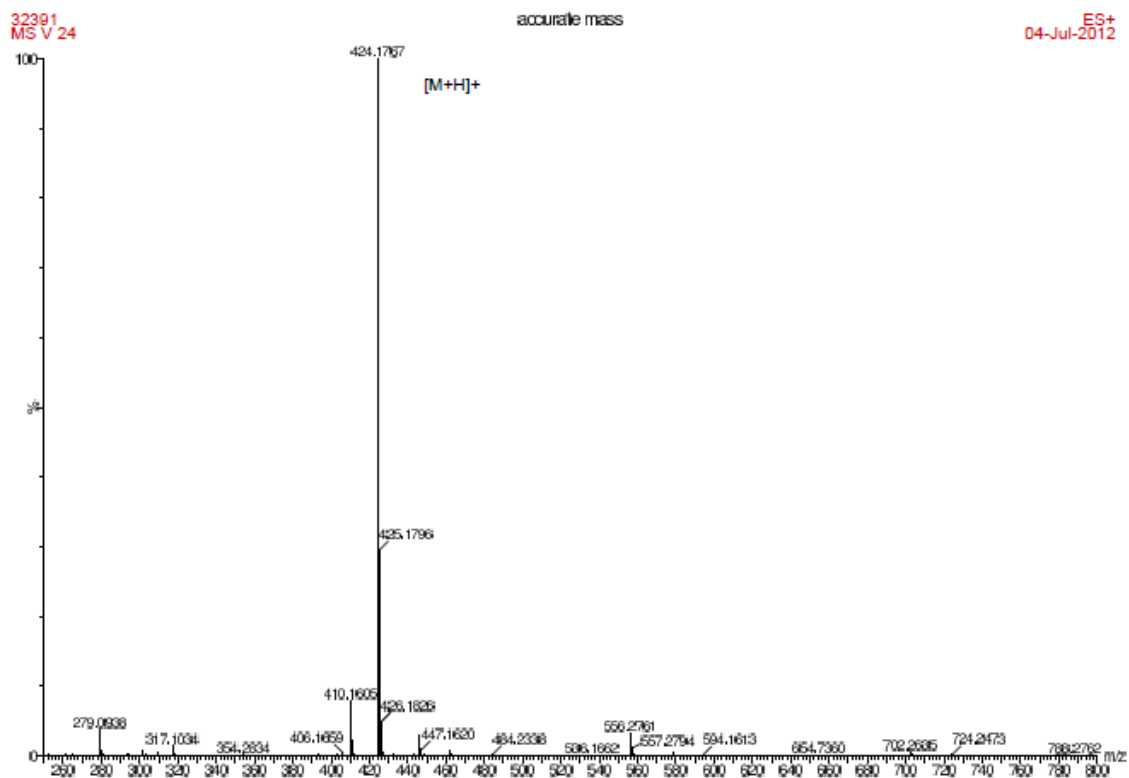
^{13}C NMR (75 MHz, CDCl_3)

MS-V-22 C13 in CDCl_3
03/07/2012



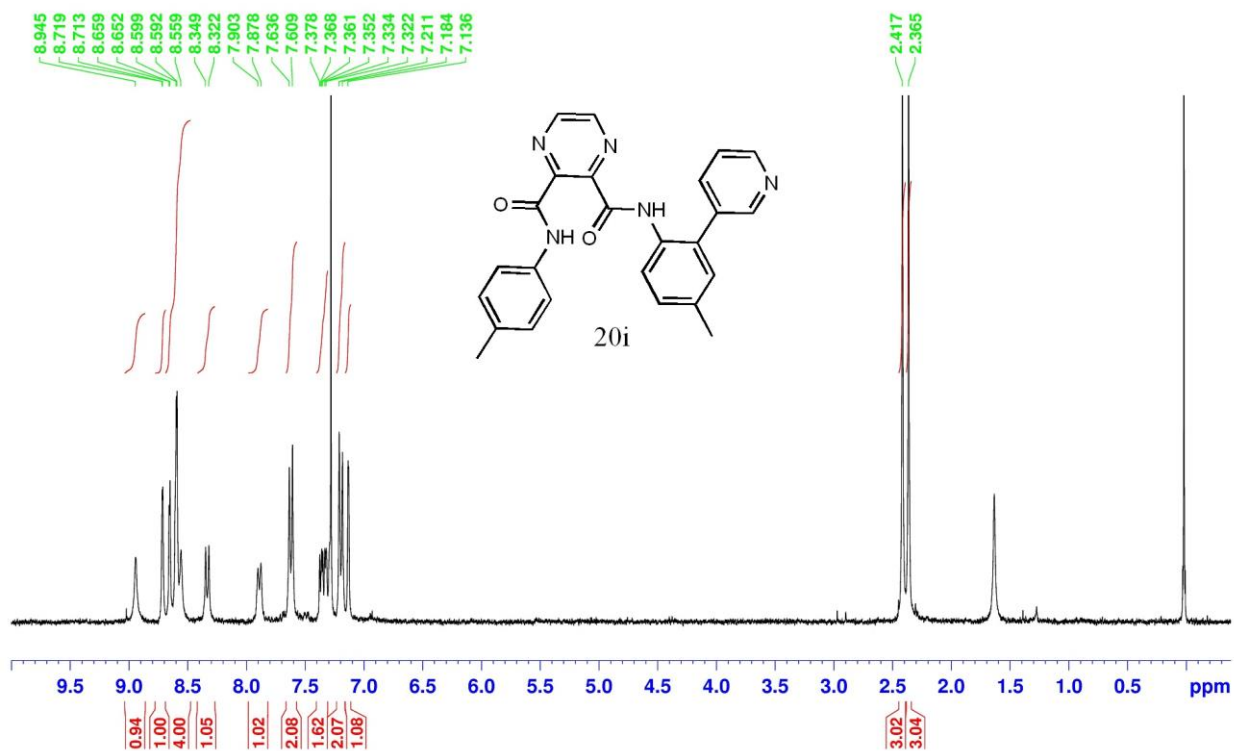
N^2 -(4-methyl-2-(pyridin-3-yl) phenyl)- N^3 -(p-tolyl) pyrazine-2,3-dicarboxamide
(**20i**)

HRMS (ES+)



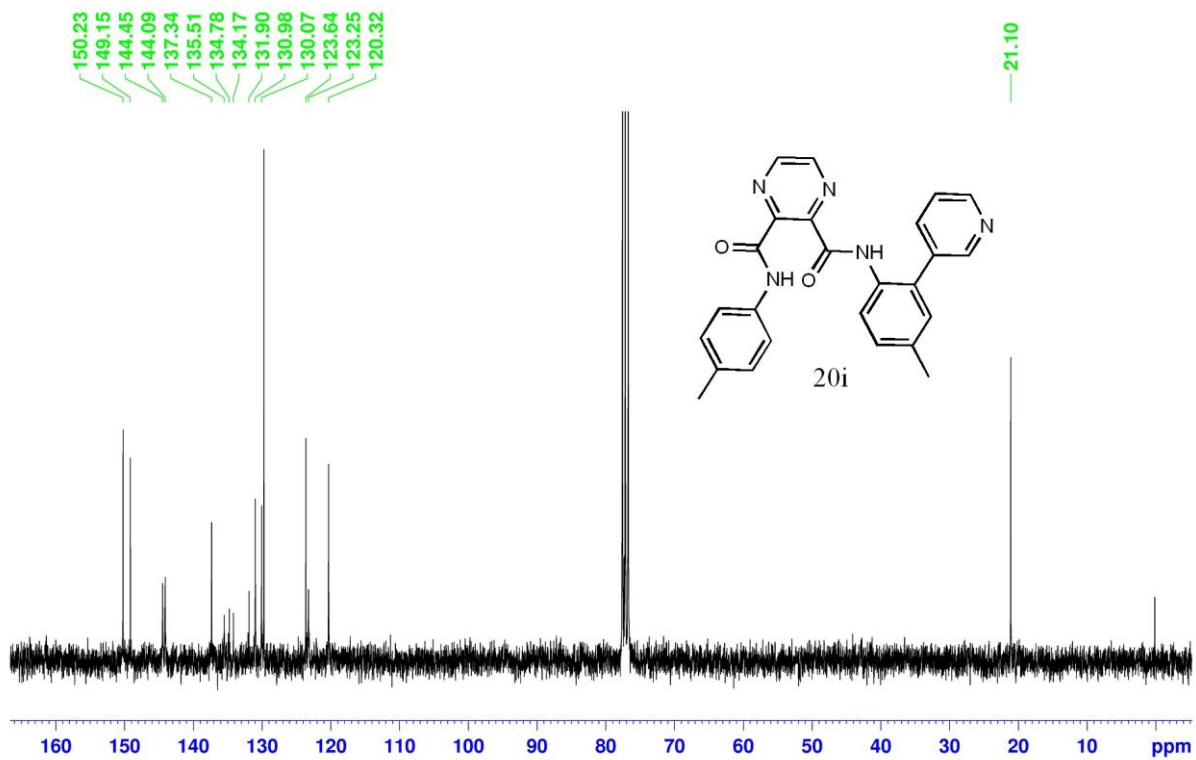
¹H NMR (300 MHz, CDCl₃)

MS-V-24 in CDCl₃
08/07/2012



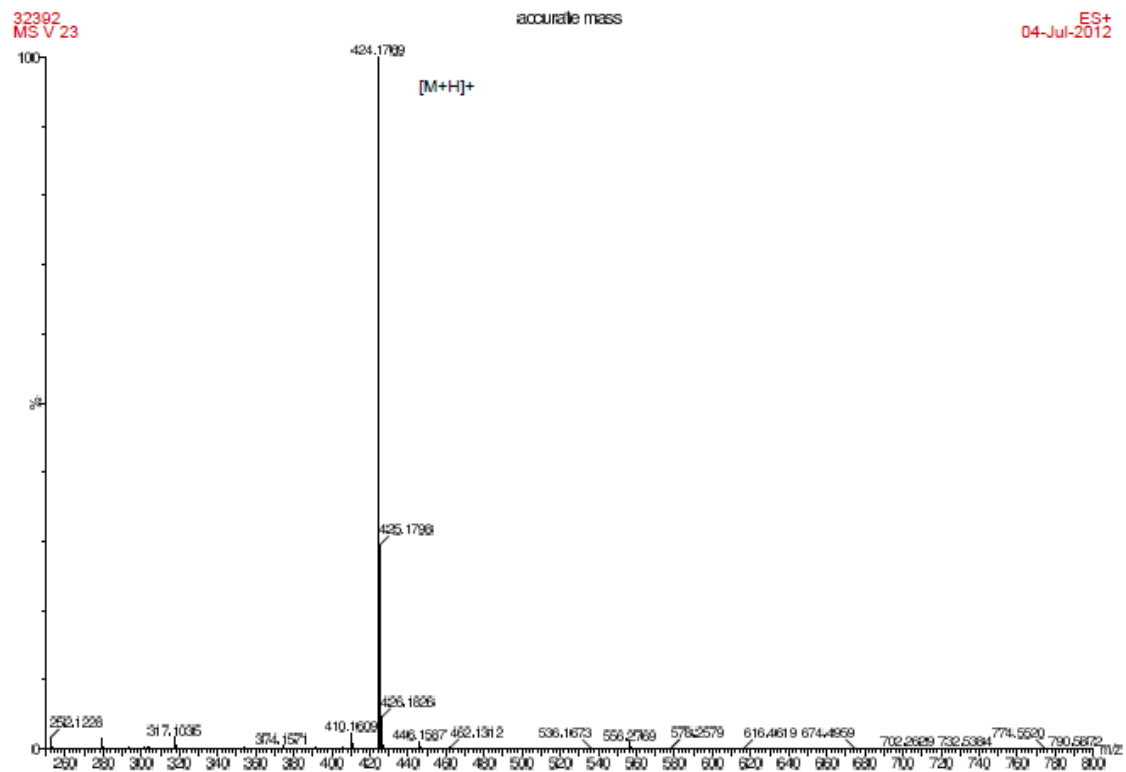
¹³C NMR (75 MHz, CDCl₃)

MS-V-24 C13 in CDCl₃
08/07/2012



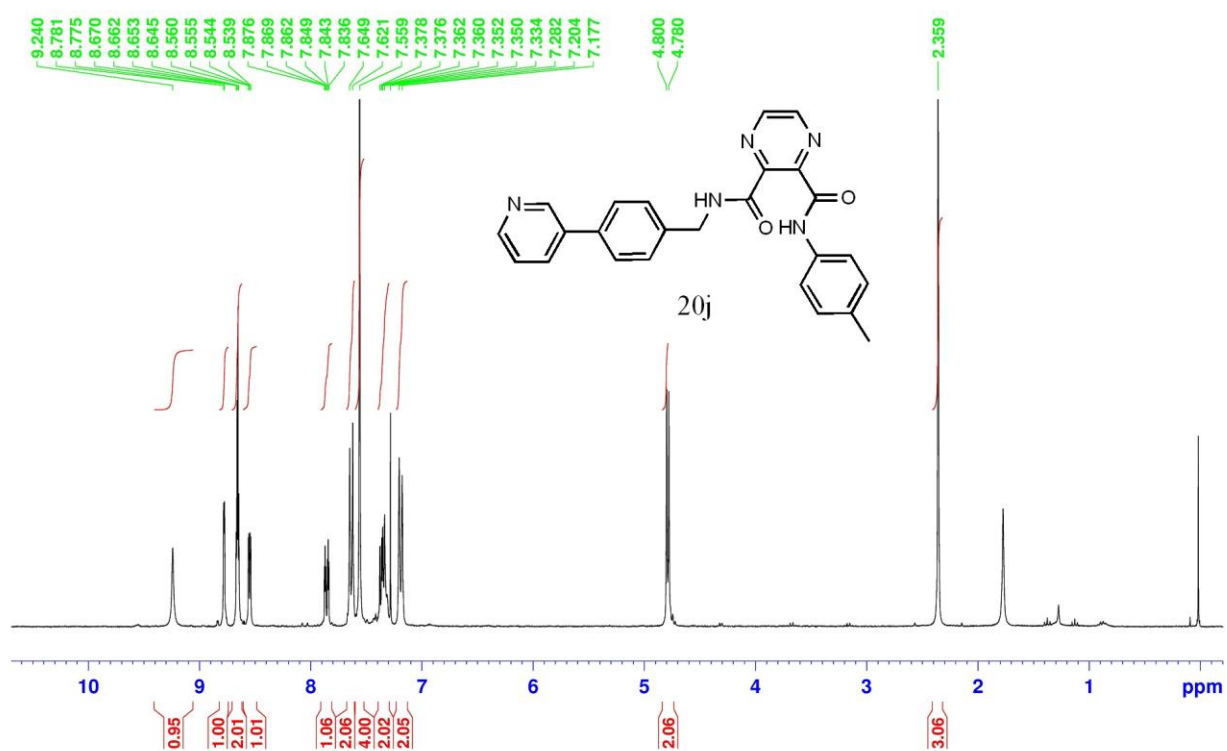
*N*²-(4-(pyridin-3-yl) benzyl)-*N*³-(p-tolyl) pyrazine-2,3-dicarboxamide (20j)

HRMS (ES+)



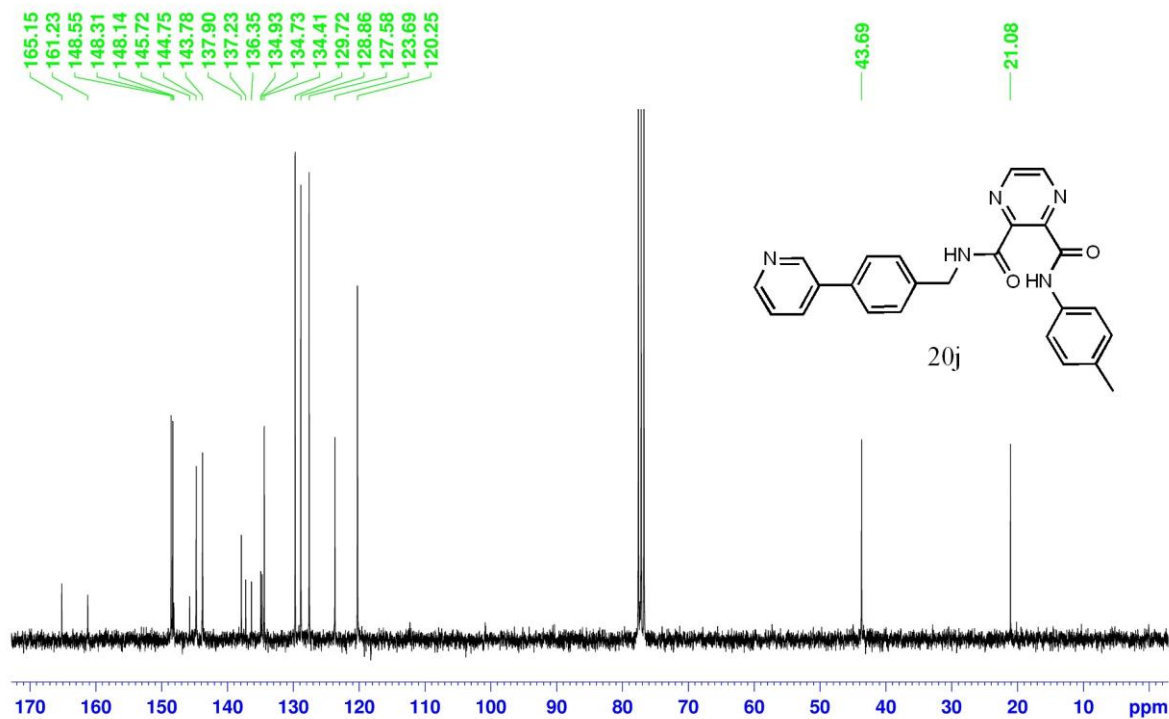
¹H NMR (300 MHz, CDCl₃)

MS-V-23 in CDCl₃
04/07/2012



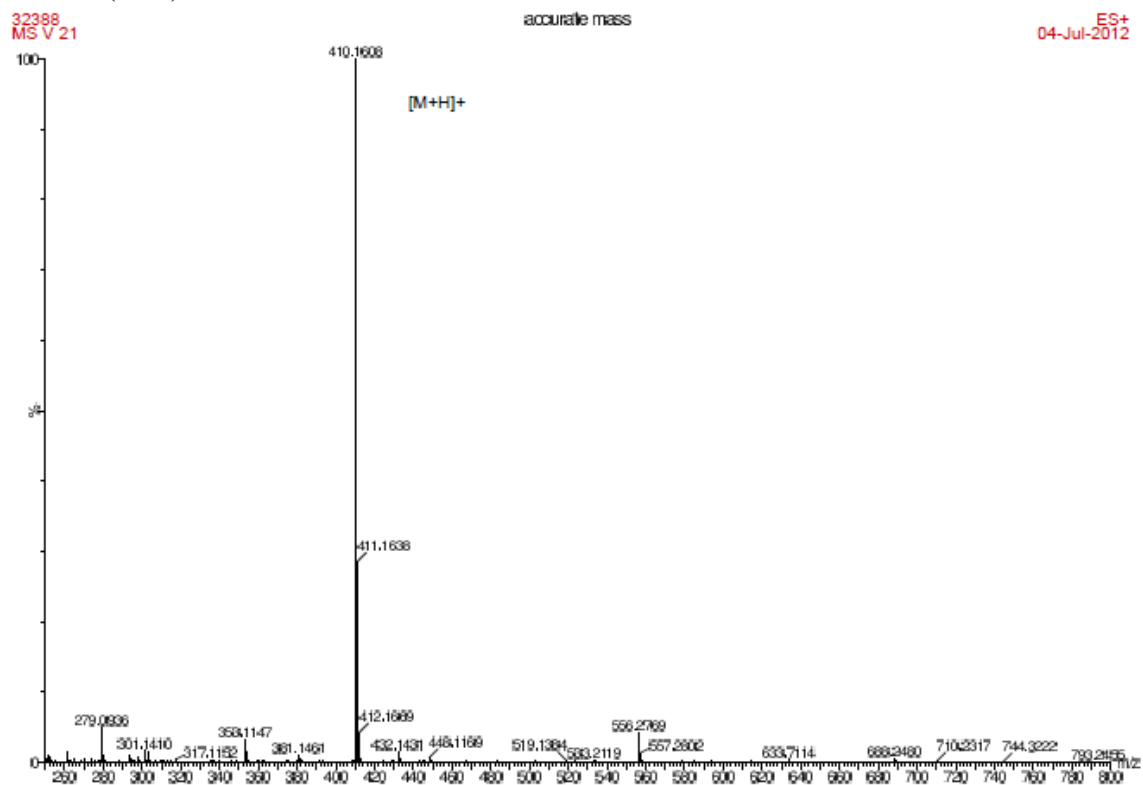
^{13}C NMR (75 MHz, CDCl_3)

MS-V-23 C13 in CDCl_3
05/07/2012



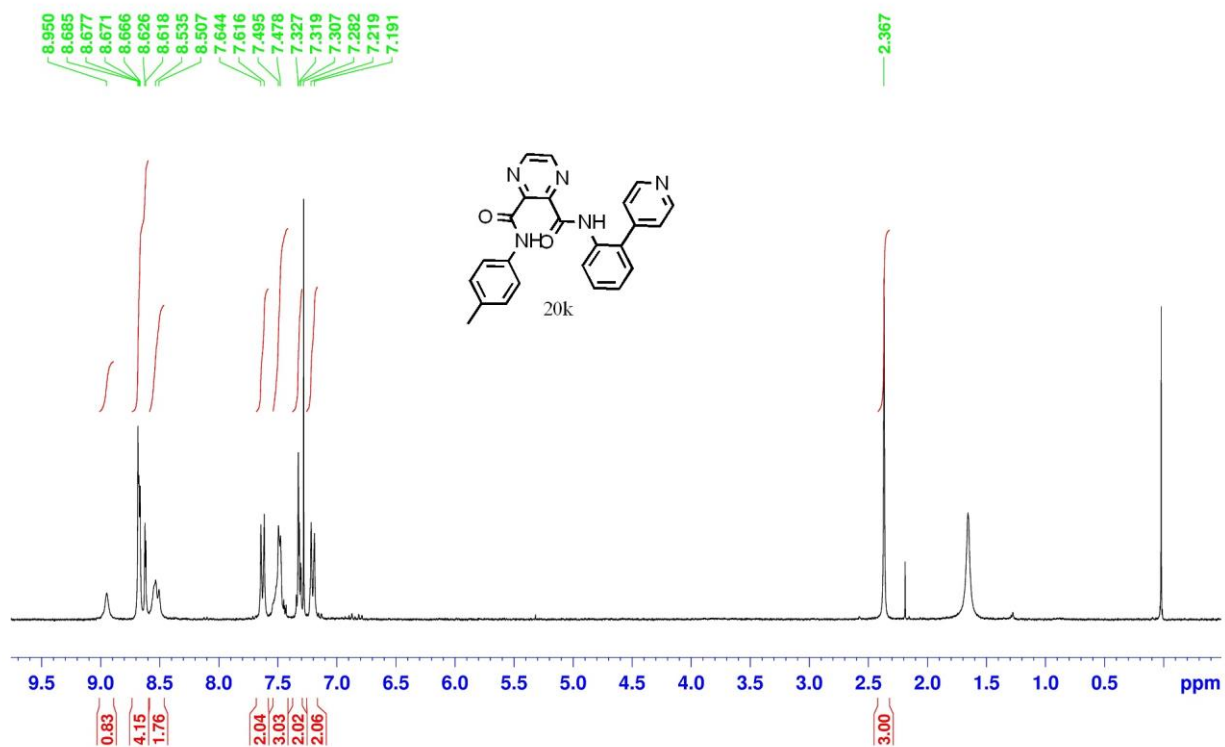
4.4.1.7.11 N^2 -(2-(pyridin-4-yl) phenyl)- N^3 -(p-tolyl) pyrazine-2,3-dicarboxamide (20k)

HRMS (ES+)



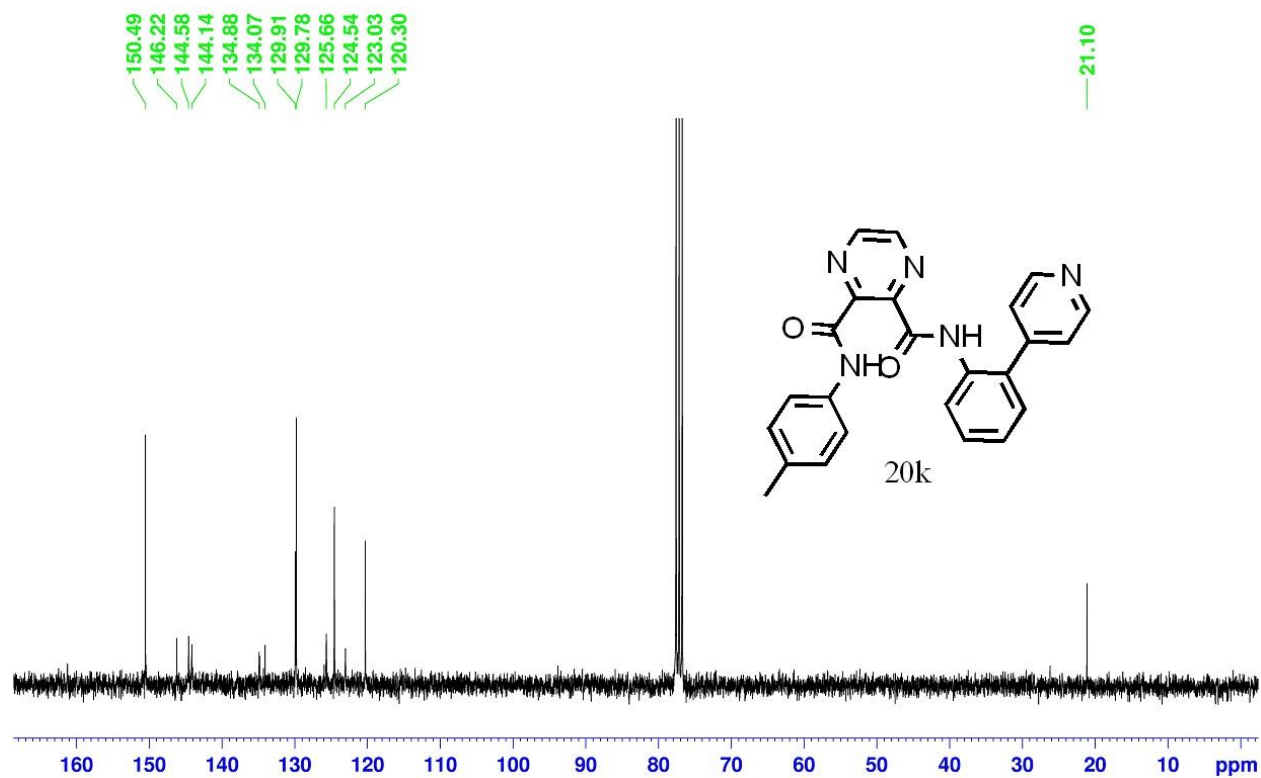
¹H NMR (300 MHz, CDCl₃)

MS-V-21 in CDCl₃
06/07/2012



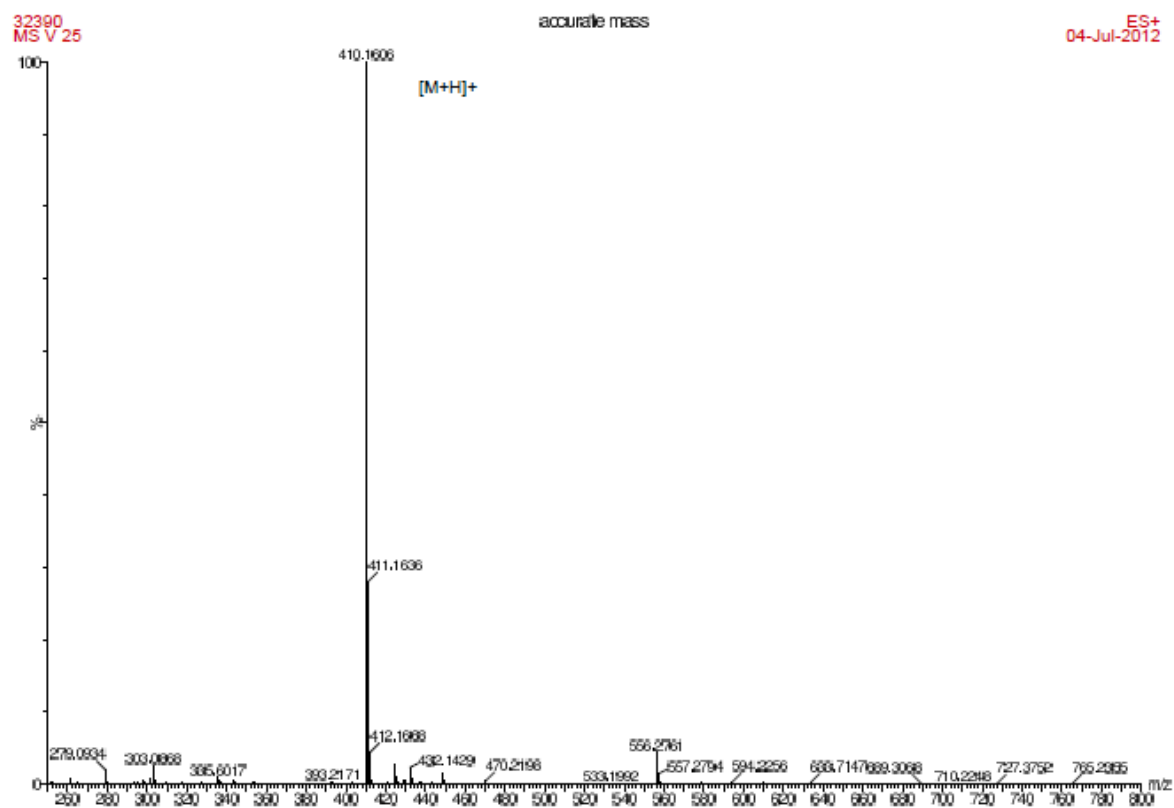
¹³C NMR (75 MHz, CDCl₃)

MS-V-21C13 in CDCl₃
09/07/2012



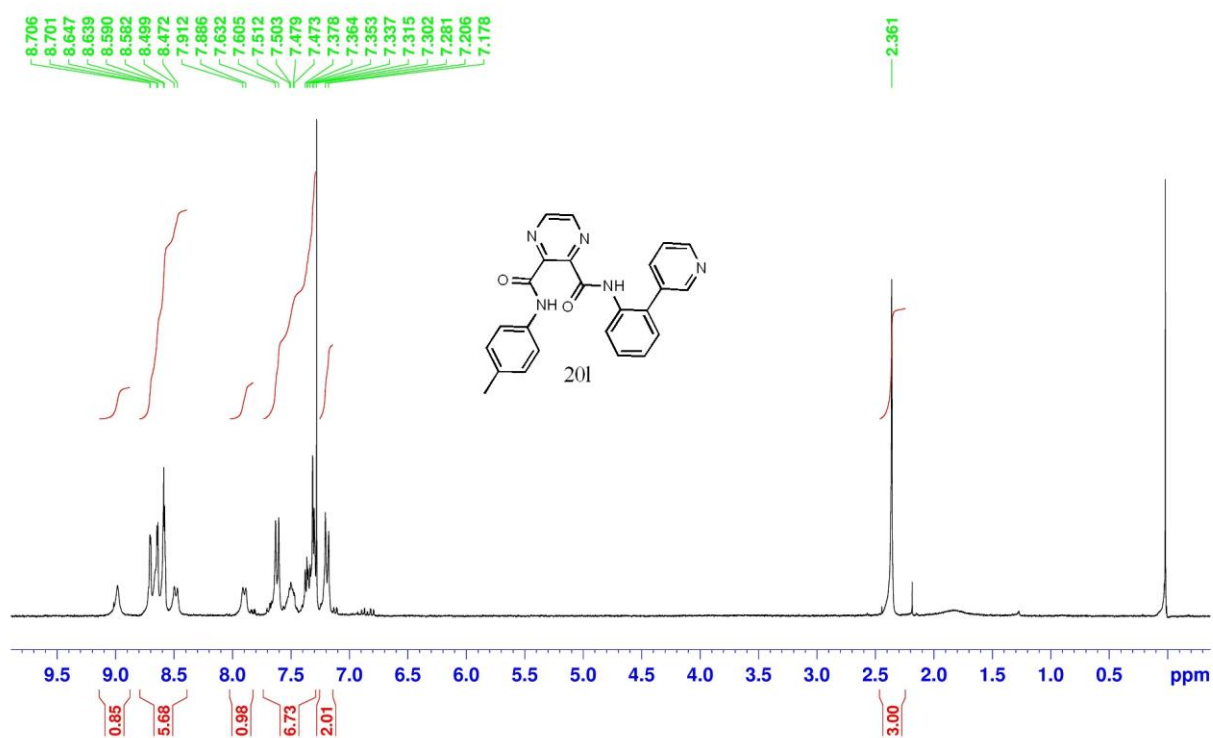
***N*²-(2-(pyridin-3-yl) phenyl)-*N*³-(*p*-tolyl) pyrazine-2,3-dicarboxamide (201)**

HRMS (ES+)



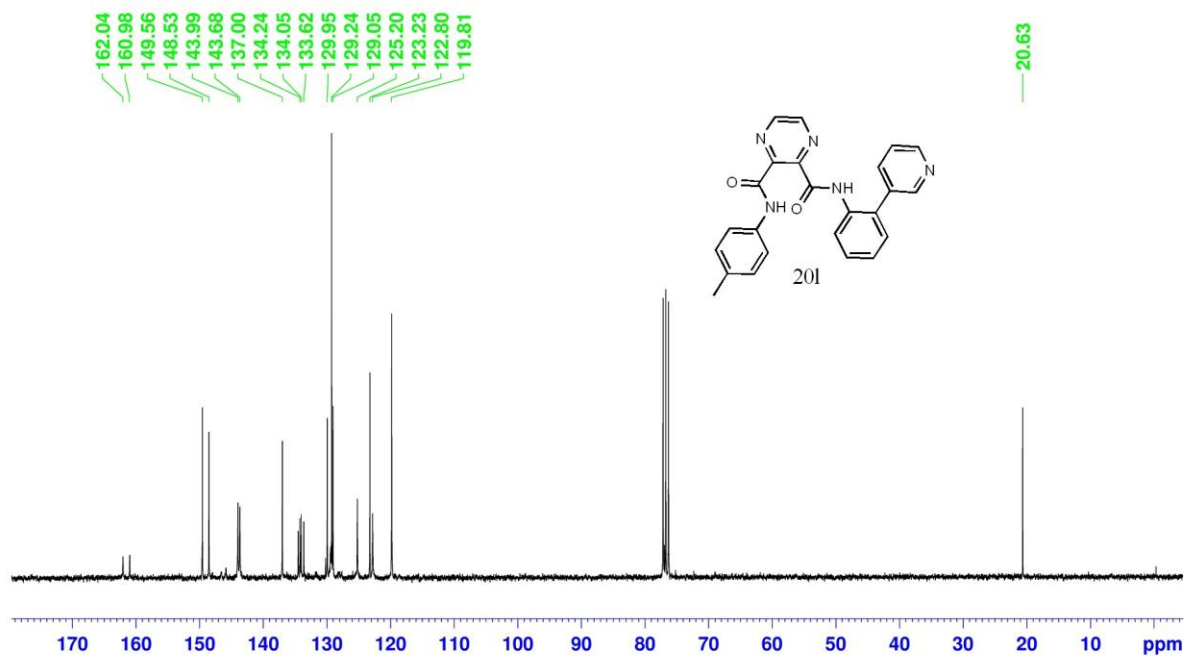
¹H NMR (300 MHz, CDCl₃)

MS-V-25 in CDCl₃
13/07/2012



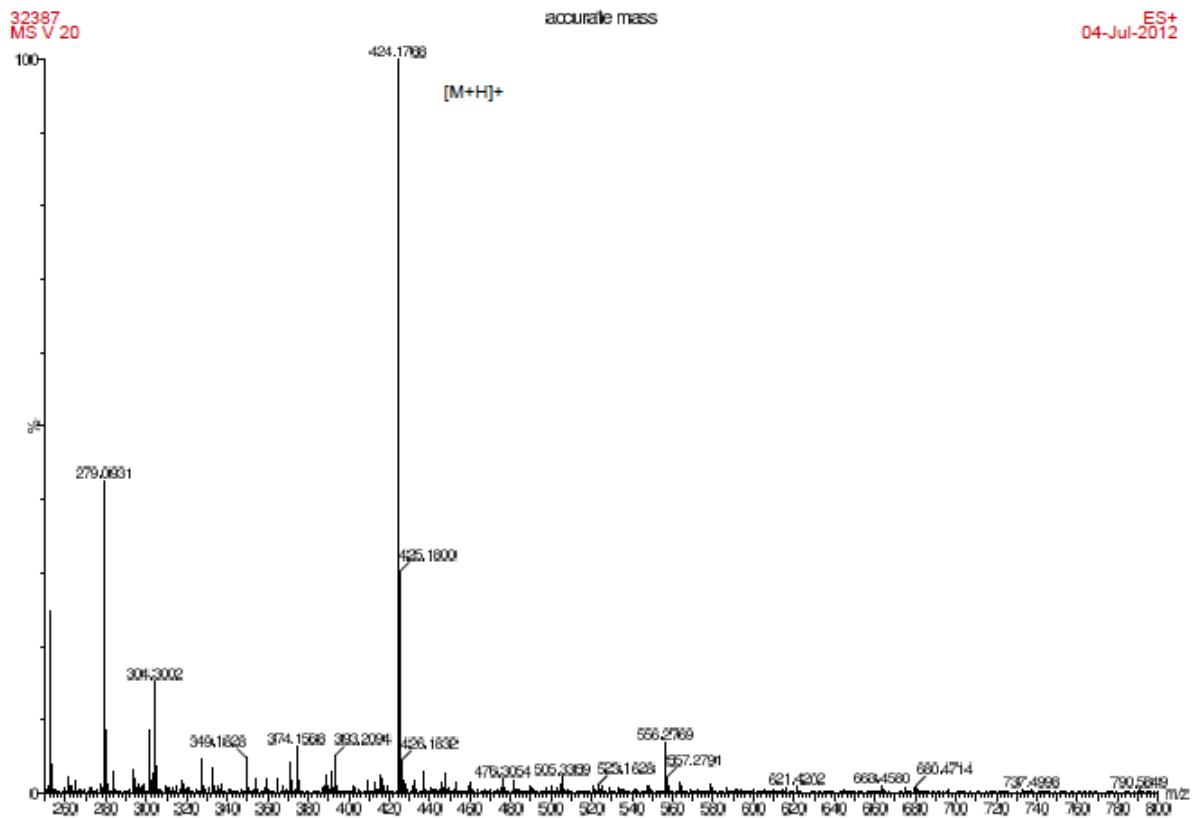
^{13}C NMR (75 MHz, CDCl_3)

MS-V-25 C13 in CDCl_3 300 MHz
03/03/2014



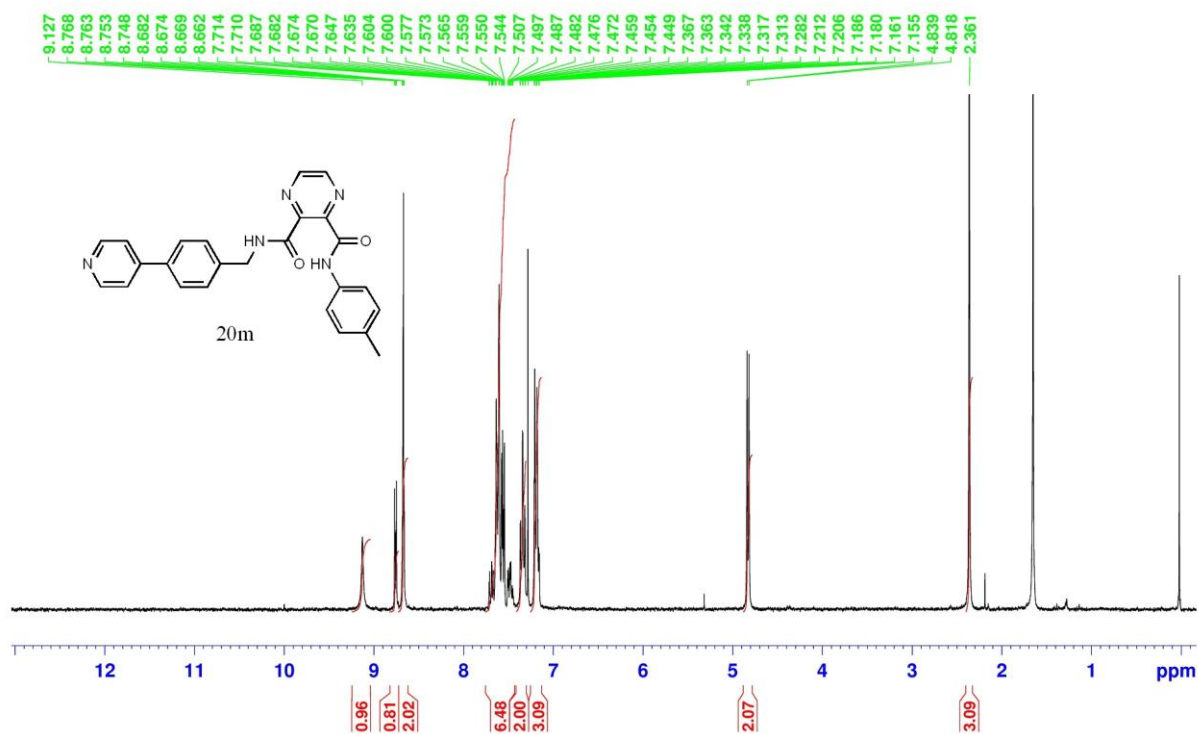
N^2 -(4-(pyridin-4-yl)benzyl)- N^3 -(p-tolyl)pyrazine-2,3-dicarboxamide (20m)

HRMS (ES+)



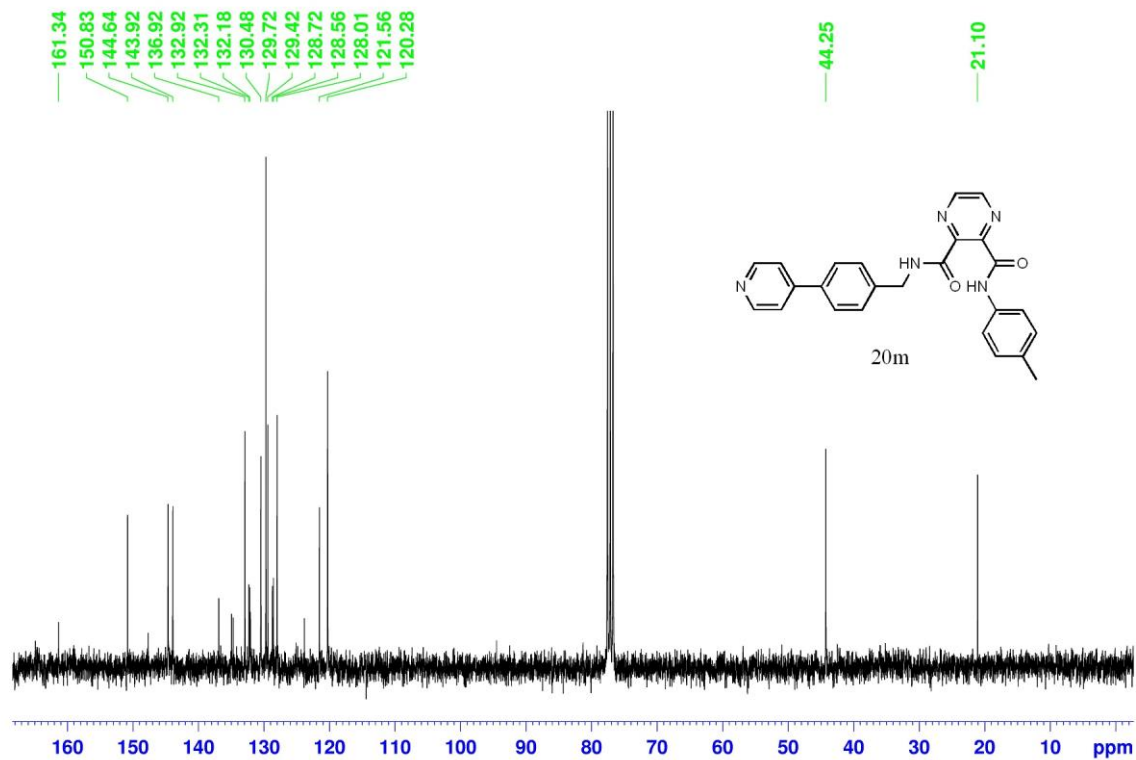
¹H NMR (300 MHz, CDCl₃)

MS-V-20 in CDCl₃
06/07/2012



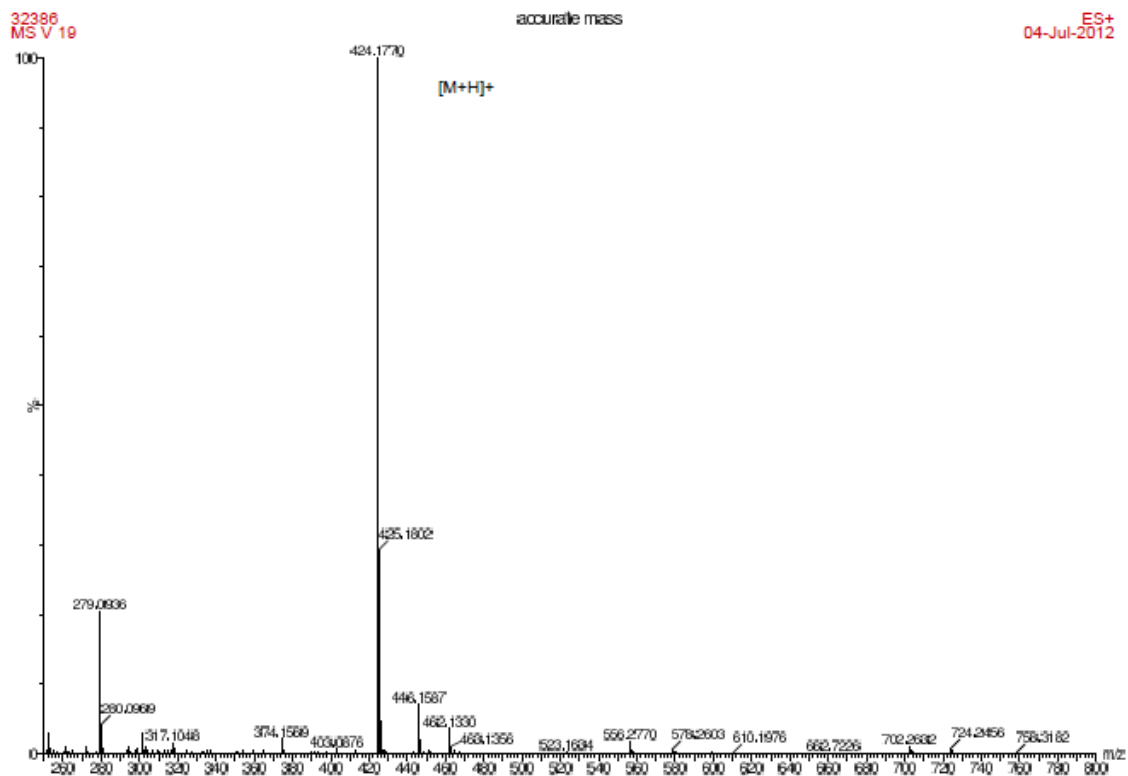
¹³C NMR (75 MHz, CDCl₃)

MS-V-20 C13 in CDCl₃
06/07/2012



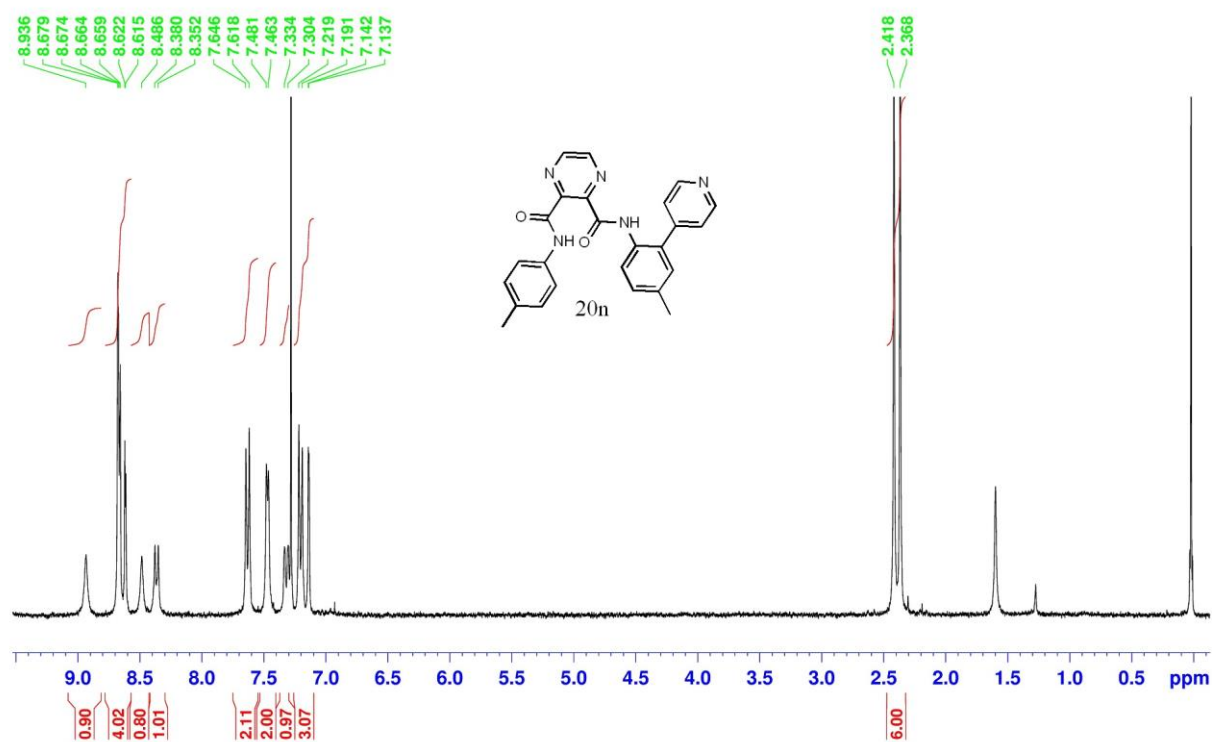
***N*²-(4-methyl-2-(pyridin-4-yl) phenyl)-*N*³-(*p*-tolyl) pyrazine-2,3-dicarboxamide (20n)**

HRMS (ES+)



¹H NMR (300 MHz, CDCl₃)

MS-V-19 in CDCl₃
09/07/2012



^{13}C NMR (75 MHz, CDCl_3)

MS-V-19 C13 in CDCl_3
09/07/2012

