Electronic Supplementary Information for

Nickel(II)/Lewis acid catalyzed olefin hydroamination and hydroarylation under mild conditions

Kaiwen Li, Hongwu Jiang, Shuangfeng Dong, ShuangLong Li, Zhuqi Chen, Guochuan Yin*

School of Chemistry and Chemical Engineering, Key Laboratory of Material Chemistry for Energy Conversion and Storage, Ministry of Education, Hubei Key Laboratory of Material Chemistry and Service Failure, Huazhong University of Science and Technology, Wuhan 430074, P.R. China

Correspondence to: *gyin@hust.edu.cn*

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1. Experimental section

1.1 Materials and analytical methods

Unless otherwise noted, all reagents were purchased from commercial suppliers and used without further purification. The reactions were monitored by TLC with Haiyang GF–254 silica gel plates (Qingdao Haiyang chemical industry Co. Ltd, Qingdao, China) using UV light or $KMnO_4$ as visualizing agents as needed. Flash column chromatography was performed using 200–300 mesh silica gel under increased pressure. ^1H and ^{13}C NMR{^1H} spectra were respectively recorded on a Brüker AV–600 spectrometer. Chemical shifts (δ) were expressed in ppm (parts per million) with TMS as the internal standard, and coupling constants (*J*) were reported in hertz (Hz). High resolution mass spectra were obtained on a mass spectrometer by using ESI FT–ICR mass.

1.2 General procedures for hydroamination of substituted styrene and aniline with the $Ni(OAc)_2/Sc(OTf)_3$ catalyst in TFE.

In a typical procedure, $Ni(OAc)_2$ (0.01 mmol, 1.7 mg) and $Sc(OTf)_3$ (0.02 mmol, 9.96 mg) were dissolved in TFE (1 mL) in a glass tube. After pre–stirring so prepared catalyst solution for 20 min under 60 °C, substituted styrene **1** (0.1 mmol) and aniline **2** (0.5 mmol, 5eq) were added in. The reaction mixtures were stirred at 60 °C for the desired reaction time with an air balloon as the atmosphere. Then, the mixtures were evaporated under reduced pressure, and the residue was purified by column chromatography (petroleum ether/ethyl acetate: 15:1 to 5:1) to give the corresponding hydroamination product **3** and hydroarylation product **4**.

1.3 General procedures for hydroamination of acrylonitrile or acrylate with aniline in TFE.

In a typical procedure, $Ni(OAc)_2$ (0.01 mmol, 1.7 mg) and $Sc(OTf)_3$ (0.02 mmol, 9.96 mg) were dissolved in TFE (1 mL) in a glass tube. After pre–stirring so prepared solution for 20 min under 70 °C, acrylonitrile or acrylate **5** (0.1 mmol) and aniline **2** (0.5 mmol, 5eq) were added in. The reaction mixtures were stirred at 70 °C for the desired reaction time with an air balloon as the atmosphere. Then, the mixtures were evaporated under reduced pressure, and the residue was purified by column chromatography (petroleum ether/ethyl acetate: 10:1 to 5:1) to give corresponding hydroamination product **6**.

1.4 General procedures for UV-Vis experiments in TFE.

In a typical UV-vis experiment, 4–methylstyrene (**1a,** 5.9 mg, 0.05 mmol) and 4–bromoaniline (**2a,** 8.5 mg, 0.05 mmol) were dissolved in 4 mL of TFE in a glass tube, respectively. $Ni(OAc)_2$ (8.5 mg, 0.05 mmol) and $Sc(OTf)_3$ (24.9 mg, 0.05 mmol) were dissolved in 4 mL of TFE in another glass tube, which was pre–stirred for 20 min under 60 °C, then cooled down to room temperature. Next, these solutions were diluted by 250–folds prior to their UV-Vis studies. The UV–Vis scans were carried out for so prepared solution of **1a**, **1a** with $Ni(OAc)_2/Sc(OTf)_3$, **2a**, **2a** with $Ni(OAc)_2/Sc(OTf)_3$, **2a** with $Ni(OAc)_2$, **2a** with $Sc(OTf)_3$ at room temperature, respectively.

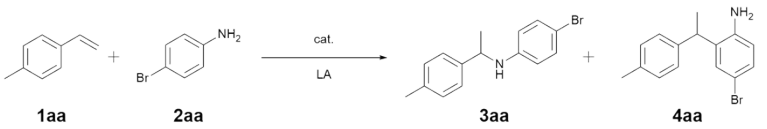
1.5 General procedures for the bromo trapping experiments with TBAB.

In a typical procedure, $Ni(OAc)_2$ (0.01 mmol, 1.7 mg) and $Sc(OTf)_3$ (0.02 mmol, 9.96 mg) were dissolved in TFE (1 mL) in a glass tube. After pre–stirring so prepared solution for 20 min under 60 °C, 4–methylstyrene **1a** (0.1 mmol) or acrylonitrile **5a** (0.1 mmol) and aniline **2** (0.5 mmol, 5eq) were added in, then tetrabutylammonium bromide (TBAB, 0.5 mmol, 5eq) was added to the mixture. The reaction mixtures were stirred at 60 °C for the desired reaction time with an air balloon

as the atmosphere. Then, the yield was determined by GC, 27% for **7** (1–(1–bromoethyl)–4–methylbenzene) and 19% for **8** (3–bromopropanenitrile), respectively.

2. Optimization studies and control experiments of the reaction conditions for the model reaction of 1a and 2a.

Table S1. Different Ni(II) sources for the model reaction [a]



1aa 2aa 3aa 4aa

Entry	Cat.	Yield (%)[b]	
		3	4
1	$Ni(TFA)_2$	5	trace
2	$Ni(TFA)_2/Sc(OTf)_3$	32	3
3	$Ni(ClO_4)_2$	trace	ND
4	$Ni(ClO_4)_2/Sc(OTf)_3$	trace	ND

[a] Conditions: **1a** (0.1 mmol), **2a** (0.5 mmol), Cat., LA, TFE (1 mL), air balloon, 60 °C, 12 h. [b]Isolated yield, n.d. = not detected.

Table S2. Ratio of **1a** and **2a** for the model reaction [a]

Entry	Ratio of 1a/2a	Yield (%)[b]	
		3	**4**
1	2 : 1	25	12
2	1 : 1	30	20
3	1 : 2	57	15
4	1 : 3	62	15
5	1 : 4	66	16
6	1 : 5	74	17

[a] Conditions: **1a** (0.1 mmol), **2a**, $Ni(OAc)_2$ (0.10 equiv), $Sc(OTf)_3$ (0.20 equiv), TFE (1 mL), air balloon, 60 ^oC, 12 h. [b]Isolated yield.

Table S3. Ratio and amount of catalyst loading for the model reaction [a]

Entry	Ratio of Cat/ LA	Yield (%)[b]	
		3	**4**
1	2.5 % : 2.5 %	4	trace
2	2.5 % : 5 %	18	6
3	5 % : 5 %	32	9
4	5 % : 10 %	44	12
5	10 % : 10 %	62	14
6	10 % : 20 %	74	16

[a] Conditions: **1a** (0.1 mmol), **2a** (0.5 mmol),$Ni(OAc)_2$, $Sc(OTf)_3$, TFE (1 mL), air balloon, 60 °C, 12 h. [b]Isolated yield.

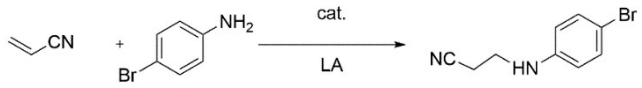
Table S4. Control experiments for the model reaction [a]

Entry	Cat.	Yield (%) [b]	
		3	**4**
1	$Ni(OAc)_2$ (10 mol %) + $Sc(OTf)_3$ (20 mol %)	74	16
2	$Ni(OAc)_2$ (10 mol %) + HOTf (5 mol %)	22	trace
3	$Ni(OAc)_2$ (10 mol %) + HOTf (10 mol %)	32	4
4	$Ni(OAc)_2$ (10 mol %) + HOTf (20 mol %)	27	trace
5	$Ni(OAc)_2$ (10 mol %) + HOTf (40 mol %)	23	trace
6	$Ni(OAc)_2$ (10 mol %) + HOTf (100 mol %)	11	trace

[a] Conditions: **1a** (0.1 mmol), **2a** (0.5 mmol), Cat., LA, TFE (1 mL), air balloon, 60 °C, 12 h. [b]Isolated yield.

3. Optimizations and control experiments for the model reaction of 5a and 2a.

Table S5. Optimization studies of the reaction conditions for the model reaction of **5a** and **2a**



5a **2a** **6aa**

entry	Catalyst	Lewis acid	Solvent	Yield (%)[b]
1	$Ni(OAc)_2$	–	TFE	ND
2	$Ni(OAc)_2$	NaOTf	TFE	trace
3	$Ni(OAc)_2$	$Mg(OTf)_2$	TFE	10
4	$Ni(OAc)_2$	$Cu(OTf)_2$	TFE	13
5	$Ni(OAc)_2$	$Zn(OTf)_2$	TFE	15
6	$Ni(OAc)_2$	$Al(OTf)_3$	TFE	19
7	$Ni(OAc)_2$	$Y(OTf)_3$	TFE	24
8	$Ni(OAc)_2$	$Yb(OTf)_3$	TFE	35
9	$Ni(OAc)_2$	$Sc(OTf)_3$	TFE	43
10	–	$Sc(OTf)_3$	TFE	ND
11	$Ni(OTf)_2$	–	TFE	11
12	$Ni(OAc)_2$	$Sc(OTf)_3$	1,4-Dioxane	ND
13	$Ni(OAc)_2$	$Sc(OTf)_3$	DMF	ND
14	$Ni(OAc)_2$	$Sc(OTf)_3$	DMSO	ND
15	$Ni(OAc)_2$	$Sc(OTf)_3$	DCE	trace
16	$Ni(OAc)_2$	$Sc(OTf)_3$	MeCN	ND
17[c]	$Ni(OAc)_2$	$Sc(OTf)_3$	TFE	34
18[d]	$Ni(OAc)_2$	$Sc(OTf)_3$	TFE	50
19[e]	$Ni(OAc)_2$	$Sc(OTf)_3$	TFE	47

[a]Conditions: **5a** (0.1 mmol), **2a** (0.5 mmol), TFE (1.0 mL), catalyst (10 mol %), LA (20 mol %), air balloon, 60 °C, 12 h. [b]Isolated yield. [c]50 °C. [d]70 °C. [e]80 °C.

Table S6. Ratio of **5a** and **2a** for the model reaction [a]

Entry	Ratio of 6a/ 2a	Yield (%) [b]
1	2 : 1	10
2	1 : 1	13
3	1 : 2	22
4	1 : 3	33
5	1 : 4	41
6	1 : 5	50

[a] Conditions: **5a** (0.1 mmol), **2a**, $Ni(OAc)_2$ (0.10 equiv), $Sc(OTf)_3$ (0.20 equiv), TFE (1 mL), air balloon, 70 °C, 12 h. [b]Isolated yield.

Table S7. Ratio and amount of catalyst loading for the model reaction [a]

Entry	Cat.	Yield (%) [b]
1	$Ni(TFA)_2$	trace
2	$Ni(TFA)_2/Sc(OTf)_3$	12
3	$Ni(ClO_4)_2$	trace
4	$Ni(ClO_4)_2/Sc(OTf)_3$	trace

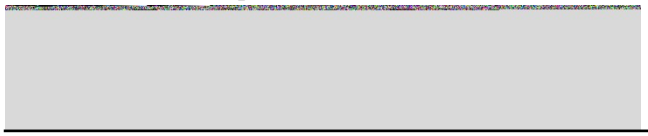
[a] Condition: **5a** (0.1 mmol), **2a** (0.5 mmol), Cat. (0.1 equiv.), LA (0.2 equiv.), TFE (1 mL), air balloon, 70 ºC, 12 h.
[b]Isolated yield.

Table S8. Ratio and amount of catalyst loading for the model reaction [a]

Entry	Cat.	Ratio of Cat/ LA	Yield (%) [b]
1	$Ni(OAc)_2/Sc(OTf)_3$	2.5 % : 2.5 %	trace
2	$Ni(OAc)_2/Sc(OTf)_3$	2.5 % : 5 %	10
3	$Ni(OAc)_2/Sc(OTf)_3$	5 % : 5 %	10
4	$Ni(OAc)_2/Sc(OTf)_3$	5 % : 10 %	24
5	$Ni(OAc)_2/Sc(OTf)_3$	10 % : 10 %	37
6	$Ni(OAc)_2/Sc(OTf)_3$	10 % : 20 %	50

[a] Conditions: **5a** (0.1 mmol), **2a** (0.5 mmol), Cat., LA, TFE (1 mL), air balloon, 70 °C, 12 h. [b]Isolated yield.

Table S9. Control experiments for the model reaction [a]



Entry	Cat.	Yield (%) [b]
1	$Ni(OAc)_2$ (10 mol %) + $Sc(OTf)_3$ (20 mol %)	50
2	$Ni(OAc)_2$ (10 mol %) + HOTf (5 mol %)	18
3	$Ni(OAc)_2$ (10 mol %) + HOTf (10 mol %)	30
4	$Ni(OAc)_2$ (10 mol %) + HOTf (20 mol %)	22
5	$Ni(OAc)_2$ (10 mol %) + HOTf (40 mol %)	17
6	$Ni(OAc)_2$ (10 mol %) + HOTf (100 mol %)	13

[a] Conditions: **5a** (0.1 mmol), **2a** (0.5 mmol), TFE (1 mL), air balloon, 60 °C, 12 h. [b]Isolated yield.

4. UV–Vis studies and control experiments on mechanistic studies.

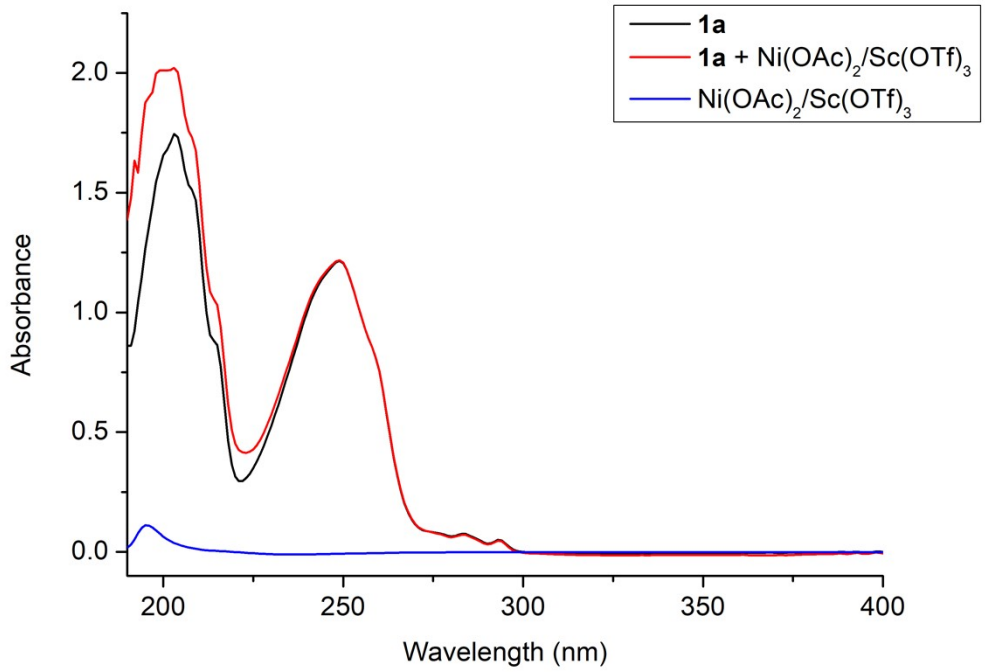


Fig. S1 UV−vis spectra of 4-methylstyrene (**1a**) and $Ni(OAc)_2/Sc(OTf)_3$ with their mixtures in TFE at room temperature.

As shown in Fig. S1, **1a** alone in TFE demonstrated two distinct absorbance bands around 203 nm and 249 nm which could be attributed to the π-π* transition. Adding 1 equiv. of $Ni(OAc)_2/Sc(OTf)_3$ to **1a** in TFE caused no obvious change, indicating that there was no interaction between **1a** and the catalyst.

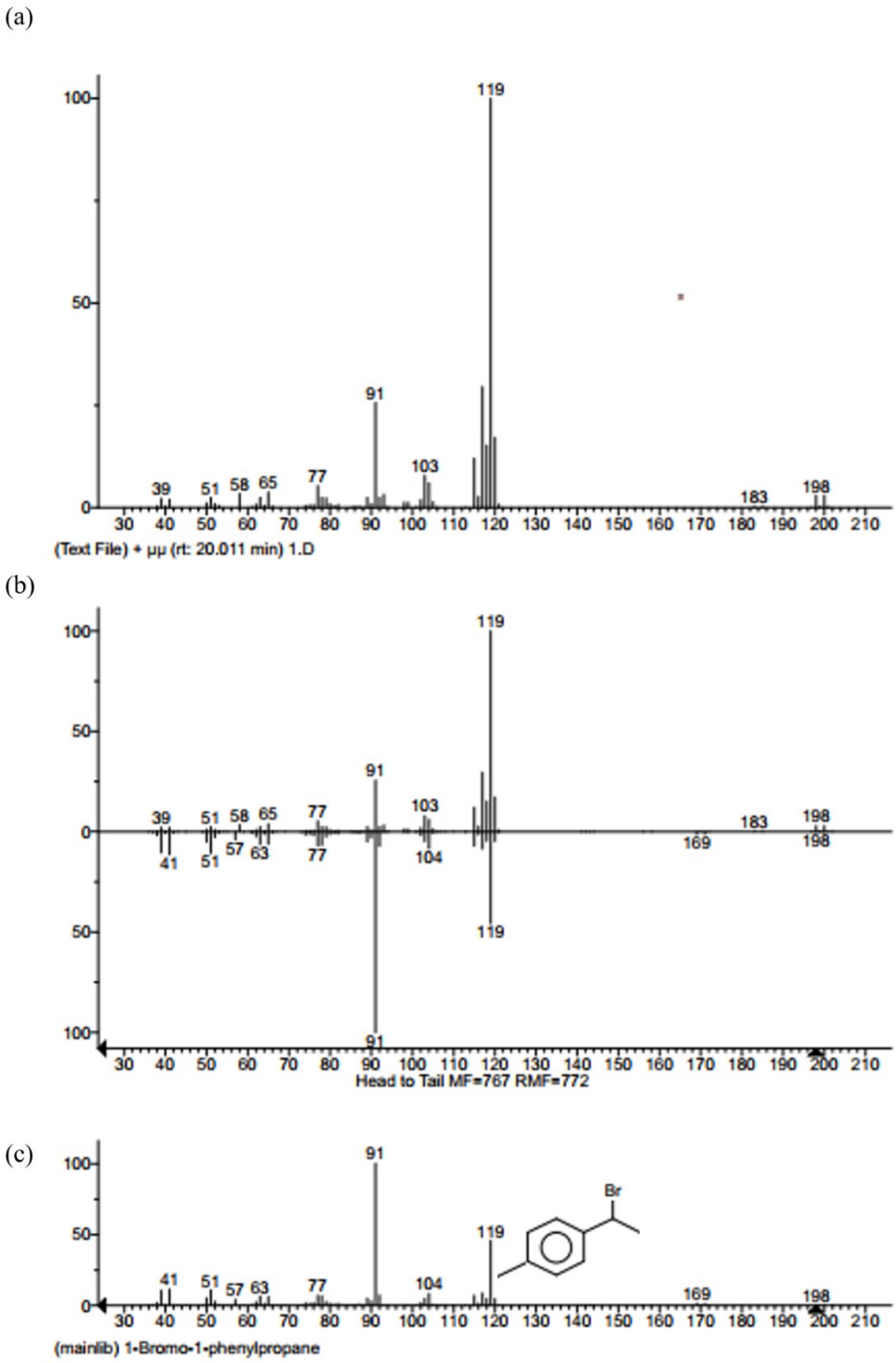


Fig. S2 GC-MS spectra of 1-(1-bromoethyl)-4-methylbenzene (**7**): (a) MS spectrum of **7** from the reaction mixtures; (b) comparison of the MS spectra between the reaction mixtures and the data base; (c) MS spectrum of **7** from the data base.

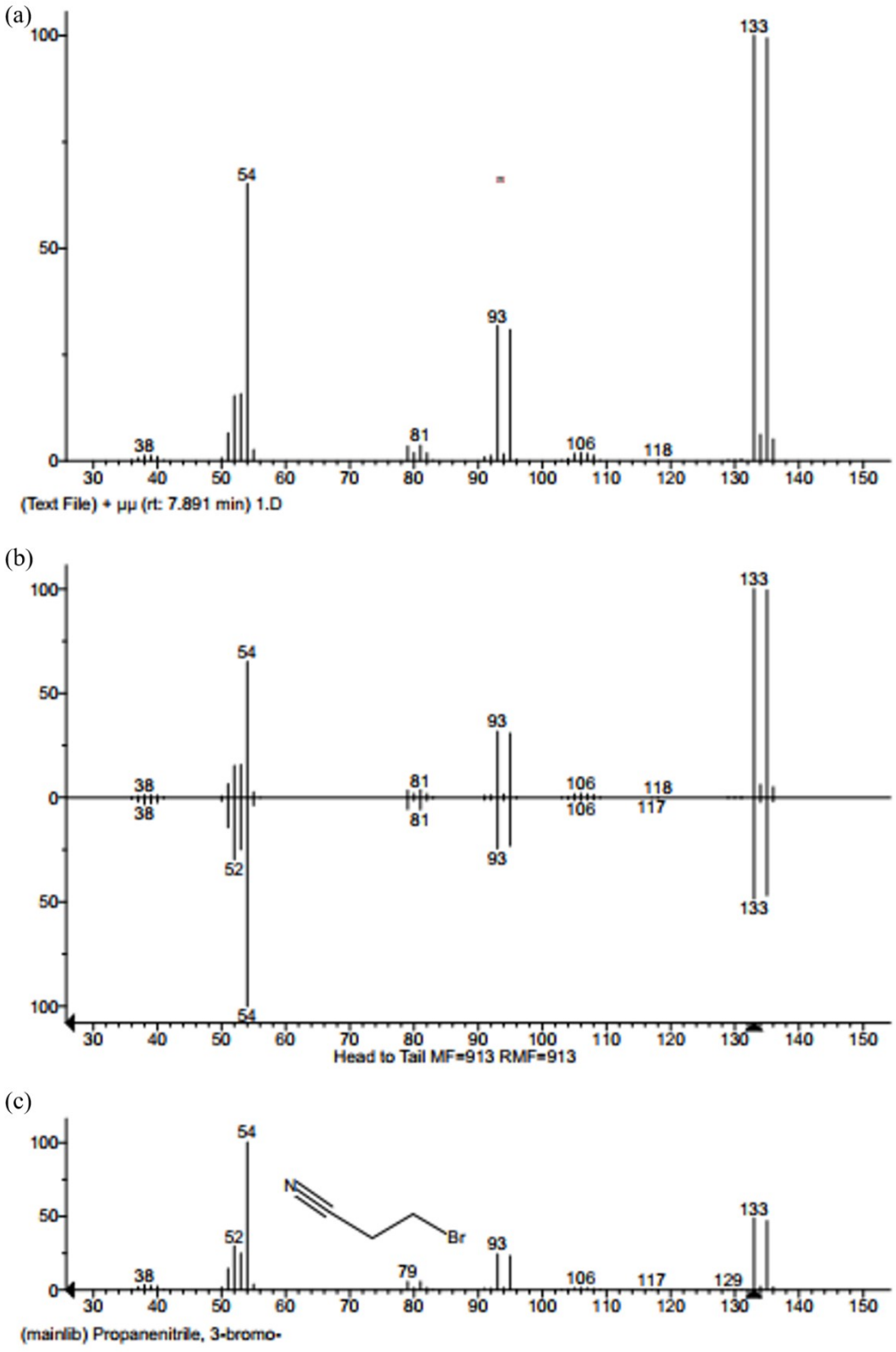


Fig. S3 GC-MS spectra of 3-bromopropanenitrile (**8**): (a) MS spectrum of **8** from the reaction mixtures; (b) comparison of the MS spectra between the reaction mixtures and the data base; (c) MS spectrum of **8** from the data base.

5. Experimental characterization data for products

4–bromo–N–(1–(p–tolyl)ethyl)aniline (3aa): Brown oil (74% yield, 21.4 mg). petroleum ether/ethyl acetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.31 (d, J = 8.1 Hz, 2H), 7.26 (d, J = 8.2 Hz, 2H), 7.11 (d, J = 8.6 Hz, 2H), 6.45 (d, J = 8.7 Hz, 2H), 6.37 (d, J = 7.1 Hz, 1H), 4.41 (t, J = 6.8 Hz, 1H), 1.39 (d, J = 6.7 Hz, 3H), 1.25 (s, 9H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.32, 143.01, 135.94, 129.39, 128.78, 126.23, 119.26, 114.58, 52.31, 25.05, 21.07.

4–bromo–N–(1–(4–(tert–butyl)phenyl)ethyl)aniline (3ba): Brown oil (67% yield, 36.1 mg). petroleum ether/ethyl acetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.31 (d, J = 8.1 Hz, 2H), 7.26 (d, J = 8.2 Hz, 2H), 7.11 (d, J = 8.6 Hz, 2H), 6.45 (d, J = 8.7 Hz, 2H), 6.37 (d, J = 7.1 Hz, 1H), 4.41 (t, J = 6.8 Hz, 1H), 1.39 (d, J = 6.7 Hz, 3H), 1.25 (s, 9H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 149.21, 147.71, 142.91, 131.64, 126.01, 125.55, 115.07, 106.59, 52.04, 34.56, 31.65, 24.93.

4–bromo–N–(1–(4–phenoxyphenyl)ethyl)aniline (3ca): Brown oil (72% yield, 26.3 mg). petroleum ether/ethyl acetate: 15:1 ^{1}H NMR (400 MHz, DMSO–d_6) δ 7.22 (d, J = 8.1 Hz, 1H), 7.18–7.03 (m, 2H), 6.44 (d, J = 8.8 Hz, 1H), 4.38 (d, J = 6.8 Hz, 0H), 2.24 (s, 2H), 1.38 (d, J = 6.7 Hz, 2H) ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 157.19, 155.69, 147.59, 141.01, 131.67, 130.46, 127.90, 123.79, 119.00, 118.95, 115.14, 106.77, 51.92, 24.96.

4–bromo–N–(1–(m–tolyl)ethyl)aniline (3da): Brown oil (62% yield, 18.1 mg). petroleum ether/ethyl acetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.19–7.09 (m, 5H), 7.00 (d, J = 7.4 Hz, 1H), 6.44 (d, J = 8.9 Hz, 2H), 6.36 (d, J = 6.9 Hz, 1H), 4.38 (t, J = 6.8 Hz, 1H), 2.27 (s, 3H), 1.39 (d, J = 6.6 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.68, 146.05, 137.83, 131.63, 128.73, 127.70, 126.84, 123.38, 115.10, 106.66, 52.49, 25.03, 21.60.

4–bromo–N–(1–(2–methoxyphenyl)ethyl)aniline (3ea): Brown oil (60% yield, 18.2 mg). petroleum ether/ethyl acetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.23 (dd, J = 7.6, 1.7 Hz, 1H), 7.20–7.15 (m, 1H), 7.10 (d, J = 8.8 Hz, 2H), 6.99 (dd, J = 8.2, 1.1 Hz, 1H), 6.85 (td, J = 7.4, 1.1 Hz, 1H), 6.36 (dd, J = 11.0, 7.9 Hz, 3H), 4.72 (t, J = 6.9 Hz, 1H), 3.86 (s, 3H), 1.37 (d, J = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 156.90, 147.54, 133.06, 131.68, 128.08, 125.93, 120.96, 114.82, 111.28, 106.63, 55.94, 46.27, 23.01

4–bromo–N–(1–(3,4,5–trimethylphenyl)ethyl)aniline (3ga): Brown oil (72% yield, 23.0 mg). petroleum ether/ethyl acetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.06 (d, J = 8.8 Hz, 2H), 6.72 (s, 2H), 6.32–6.15 (m, 3H), 4.65 (dd, J = 7.2, 5.9 Hz, 1H), 2.33 (s, 6H), 2.15 (s, 3H), 1.44 (d, J = 7.0 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6)δ 147.31, 136.82, 135.31, 135.24, 131.65, 130.63, 113.73, 106.04, 49.13, 20.80, 20.70, 20.38.

4–bromo–N–(1–(naphthalen–2–yl)ethyl)aniline (3ha): Brown oil (43% yield, 13.8 mg). petroleum ether/ethyl acetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.88–7.81 (m, 4H), 7.53 (d, J = 1.7 Hz, 1H), 7.50–7.44 (m, 2H), 7.09 (d, J = 8.9 Hz, 2H), 6.51 (dd, J = 12.0, 7.9 Hz, 3H), 4.61 (t, J = 6.7 Hz, 1H), 1.50 (d, J = 6.8 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.64, 143.62, 133.44, 132.65, 131.65, 128.58, 126.52, 125.93, 125.00, 124.53, 115.21, 106.84, 52.72, 24.83.

4–bromo–N–(2–phenylpropan–2–yl)aniline (3ia): Brown oil (62% yield, 18.0 mg). petroleum ether/ethyl acetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.44–7.39 (m, 2H), 7.32 (t, J = 7.8 Hz, 2H), 7.21 (d, J = 7.3 Hz, 1H), 7.02 (d, J = 8.9 Hz, 2H), 6.24 (d, J = 9.0 Hz, 2H), 6.20 (s, 1H), 1.55 (s, 6H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.81, 146.50, 131.22, 128.92, 126.62, 125.75, 116.80, 106.78, 55.53, 30.40.

4–chloro–N–(1–(p–tolyl)ethyl)aniline (3ab): Brown oil (72% yield, 17.7 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.22 (d, J = 7.9 Hz, 2H), 7.09 (d, J = 7.7

Hz, 2H), 6.98 (d, *J* = 8.8 Hz, 2H), 6.47 (d, *J* = 8.8 Hz, 2H), 6.32 (d, *J* = 6.9 Hz, 1H), 4.39 (t, *J* = 6.7 Hz, 1H), 2.25 (s, 3H), 1.38 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.32, 143.01, 135.94, 129.39, 128.78, 126.23, 119.26, 114.58, 52.31, 25.05, 21.07.

3–(tert–butyl)–N–(1–(p–tolyl)ethyl)aniline (3ac): Brown oil (47% yield, 12.4 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.25 (d, *J* = 8.0 Hz, 2H), 7.09 (d, *J* = 7.7 Hz, 2H), 6.86 (t, *J* = 7.9 Hz, 1H), 6.59 (t, *J* = 2.1 Hz, 1H), 6.51–6.44 (m, 1H), 6.22 (dd, *J* = 7.9, 2.3 Hz, 1H), 5.97 (d, *J* = 6.7 Hz, 1H), 4.38 (p, *J* = 6.7 Hz, 1H), 2.25 (s, 4H), 1.38 (d, *J* = 6.7 Hz, 3H), 1.16 (s, 9H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.58, 142.72, 135.35, 131.25, 129.29, 128.77, 128.55, 127.72, 115.94, 114.24, 37.47, 21.56, 21.01.

3–fluoro–N–(1–(p–tolyl)ethyl)aniline (3ad): Brown oil (72% yield, 16.4 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.24 (d, *J* = 8.0 Hz, 2H), 7.10 (d, *J* = 7.8 Hz, 2H), 6.97 (q, *J* = 8.1 Hz, 1H), 6.47 (d, *J* = 6.9 Hz, 1H), 6.36–6.30 (m, 1H), 6.25–6.16 (m, 2H), 4.41 (t, *J* = 6.8 Hz, 1H), 2.25 (s, 3H), 1.39 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 150.55, 150.44, 143.02, 135.99, 130.45, 130.35, 129.41, 126.21, 109.53, 102.05, 101.84, 99.44, 99.19, 52.22, 24.97, 21.07. ^{19}F NMR (565 MHz, DMSO-d6) δ -113.50 (q, *J* = 9.8, 9.3 Hz).

3–chloro–N–(1–(p–tolyl)ethyl)aniline (3ae): Brown oil (69% yield, 17.0 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.24 (s, 2H), 7.11 (d, *J* = 7.8 Hz, 2H), 6.97 (t, *J* = 8.0 Hz, 1H), 6.48–6.43 (m, 3H), 6.44–6.41 (m, 1H), 4.42 (t, *J* = 6.8 Hz, 1H), 2.25 (s, 3H), 1.38 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 149.92, 142.90, 136.02, 133.77, 130.59, 129.44, 126.20, 115.36, 112.35, 111.87, 52.10, 25.01, 21.07.

3–bromo–N–(1–(p–tolyl)ethyl)aniline (3af): Brown oil (70% yield, 20.1 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.27–7.20 (m, 2H), 7.11 (d, *J* = 7.7 Hz, 2H), 6.91 (t, *J* = 8.0 Hz, 1H), 6.64 (t, *J* = 2.1 Hz, 1H), 6.58 (ddd, *J* = 7.8, 1.9, 0.8 Hz, 1H), 6.48–6.42 (m, 2H), 4.42 (t, *J* = 6.8 Hz, 1H), 2.26 (s, 3H), 1.38 (d, *J* = 6.8 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 150.10, 142.88, 136.03, 130.94, 129.45, 126.20, 122.52, 118.24, 115.30, 112.13, 52.07, 25.01, 21.08.

3–iodo–N–(1–(p–tolyl)ethyl)aniline (3ag): Brown oil (64% yield, 21.7 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.26–7.18 (m, 2H), 7.11 (s, 2H), 6.87 (t, *J* = 1.9 Hz, 1H), 6.79–6.72 (m, 2H), 6.46 (dt, *J* = 7.6, 2.0 Hz, 1H), 6.36 (d, *J* = 7.0 Hz, 1H), 4.39 (p, *J* = 6.8 Hz, 1H), 2.25 (s, 3H), 1.37 (d, *J* = 6.8 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 149.98, 142.91, 136.01, 131.11, 129.43, 126.20, 124.31, 121.46, 112.40, 95.67, 51.99, 25.01, 21.08.

3–((1–(p–tolyl)ethyl)amino)benzonitrile (3ah): Brown oil (64% yield, 21.7 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.25 (d, *J* = 7.8 Hz, 2H), 7.16 (t, *J* = 7.9 Hz, 1H), 7.11 (d, *J* = 7.7 Hz, 2H), 6.87–6.83 (m, 1H), 6.81 (dd, *J* = 8.4, 2.4 Hz, 1H), 6.76 (t, *J* = 1.9 Hz, 1H), 6.70 (d, *J* = 7.0 Hz, 1H), 4.48 (t, *J* = 6.8 Hz, 1H), 2.25 (s, 3H), 1.40 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 148.86, 142.47, 136.17, 130.33, 129.50, 126.23, 119.99, 119.18, 118.03, 115.05, 111.82, 51.93, 24.88, 21.07.

2–methyl–N–(1–(p–tolyl)ethyl)aniline (3ai): Brown oil (51% yield, 11.6 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.27 (d, *J* = 7.9 Hz, 2H), 7.08 (d, *J* = 7.8 Hz, 2H), 6.93 (d, *J* = 7.3 Hz, 1H), 6.86–6.76 (m, 1H), 6.43 (t, *J* = 7.3 Hz, 1H), 6.27 (d, *J* = 8.1 Hz, 1H), 4.96 (d, *J* = 6.8 Hz, 1H), 4.48 (t, *J* = 6.7 Hz, 1H), 2.25 (s, 3H), 2.19 (s, 3H), 1.47 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 145.82, 143.46, 135.80, 130.11, 129.33, 126.82, 126.23, 122.35, 116.20, 111.23, 52.43, 25.33, 21.08, 18.26.

2–ethyl–N–(1–(p–tolyl)ethyl)aniline (3aj): Brown oil (44% yield, 10.4 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.33–7.21 (m, 2H), 7.08 (d, J = 7.9 Hz, 2H), 6.94 (dd, J = 7.3, 1.6 Hz, 1H), 6.81 (td, J = 7.7, 1.6 Hz, 1H), 6.47 (td, J = 7.3, 1.2 Hz, 1H), 6.29 (dd, J = 8.2, 1.1 Hz, 1H), 5.02 (d, J = 6.7 Hz, 1H), 4.48 (t, J = 6.7 Hz, 1H), 2.59 (q, J = 7.5 Hz, 2H), 2.24 (s, 3H), 1.47 (s, 3H), 1.20 (t, J = 7.5 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 145.12, 143.53, 135.80, 129.33, 127.98, 127.91, 126.69, 126.23, 116.40, 111.48, 52.44, 25.30, 23.78, 21.07, 13.69.

2–phenoxy–N–(1–(p–tolyl)ethyl)aniline (3ak): Brown oil (31% yield, 9.5 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.38 (dd, J = 8.6, 7.3 Hz, 2H), 7.21 (d, J = 7.8 Hz, 2H), 7.08 (d, J = 7.6 Hz, 3H), 7.01–6.93 (m, 2H), 6.84 (td, J = 7.7, 1.5 Hz, 1H), 6.75 (dd, J = 7.7, 1.5 Hz, 1H), 6.52 (d, J = 8.1 Hz, 2H), 5.23 (d, J = 7.3 Hz, 1H), 4.53 (t, J = 6.9 Hz, 1H), 2.25 (s, 3H), 1.39 (d, J = 6.8 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 157.94, 142.97, 142.93, 140.00, 136.03, 130.23, 129.38, 126.21, 125.18, 123.11, 119.76, 117.73, 116.58, 113.28, 52.18, 24.96, 21.06.

3,4–difluoro–N–(1–(p–tolyl)ethyl)aniline (3am): Brown oil (70% yield, 17.2 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.24 (d, J = 7.8 Hz, 2H), 7.10 (d, J = 7.8 Hz, 2H), 7.01 (dt, J = 11.0, 9.2 Hz, 1H), 6.42–6.33 (m, 2H), 6.28–6.23 (m, 1H), 4.38 (t, J = 6.8 Hz, 1H), 2.25 (s, 3H), 1.37 (d, J = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 146.12, 146.02, 142.82, 136.05, 129.44, 126.23, 117.70, 117.53, 108.77, 101.14, 100.94, 52.53, 24.98, 21.06. ^{19}F NMR (565 MHz, DMSO-d6) δ -138.85 (ddd, J = 23.5, 13.8, 9.5 Hz), -159.38 (m).

3,4–dichloro–N–(1–(p–tolyl)ethyl)aniline (3an): Brown oil (71% yield, 20.0 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.23 (d, J = 7.8 Hz, 2H), 7.16 (d, J = 8.8 Hz, 1H), 7.11 (d, J = 7.8 Hz, 2H), 6.63 (dd, J = 7.2, 4.7 Hz, 2H), 6.47 (dd, J = 8.9, 2.7 Hz, 1H), 4.42 (t, J = 6.8 Hz, 1H), 2.25 (s, 3H), 1.38 (d, J = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 148.53, 142.49, 136.15, 131.40, 130.73, 129.49, 126.19, 116.68, 113.90, 113.59, 52.17, 24.89, 21.07.

N–(1–(p–tolyl)ethyl)–3,5–bis(trifluoromethyl)aniline (3ao): Brown oil (60% yield, 20.7 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.27 (d, J = 7.8 Hz, 2H), 7.20 (d, J = 6.9 Hz, 1H), 7.13 (d, J = 7.7 Hz, 2H), 7.02 (s, 2H), 6.99 (s, 1H), 4.59 (t, J = 6.8 Hz, 1H), 2.25 (s, 3H), 1.43 (d, J = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 149.53, 141.80, 136.39, 131.31, 130.99, 129.59, 126.19, 125.40, 122.69, 112.33, 52.00, 24.63, 21.05. ^{19}F NMR (565 MHz, DMSO-d6) δ -61.90 (s).

4–chloro–2–iodo–N–(1–(p–tolyl)ethyl)aniline (3ap): Brown oil (71% yield, 26.4 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.66 (d, J = 2.5 Hz, 1H), 7.22 (d, J = 8.0 Hz, 2H), 7.14–7.08 (m, 3H), 6.36 (d, J = 8.9 Hz, 1H), 4.89 (d, J = 6.7 Hz, 1H), 4.56 (p, J = 6.7 Hz, 1H), 2.25 (s, 3H), 1.49 (d, J = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 145.89, 141.73, 137.60, 136.40, 129.59, 129.17, 126.13, 120.93, 113.16, 85.98, 53.09, 24.89, 21.07.

3,4,5–trichloro–N–(1–(p–tolyl)ethyl)aniline (3aq): Brown oil (74% yield, 23.2 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.23 (d, J = 7.8 Hz, 2H), 7.12 (d, J = 7.8 Hz, 2H), 6.88 (d, J = 7.1 Hz, 1H), 6.68 (s, 2H), 4.47 (t, J = 6.8 Hz, 1H), 2.26 (s, 3H), 1.38 (d, J = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 148.24, 141.98, 136.34, 133.17, 129.58, 126.17, 114.96, 113.21, 51.99, 24.70, 21.07.

2,4,6–trimethyl–N–(1–(p–tolyl)ethyl)aniline (3ar): Brown oil (55% yield, 13.8 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.19 (d, J = 7.7 Hz, 2H), 7.06 (d, J = 7.7 Hz, 2H), 6.67 (s, 2H), 4.10 (t, J = 7.9 Hz, 1H), 3.74 (d, J = 10.3 Hz, 1H), 2.25 (s, 3H), 2.11 (s, 3H),

2.07 (s, 6H), 1.41 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 143.44, 143.07, 135.92, 129.76, 129.67, 129.50, 129.03, 126.60, 56.73, 23.57, 21.08, 20.62, 19.07.

5–bromo–N–(1–(p–tolyl)ethyl)pyrazin–2–amine (3as): Brown oil (47% yield, 13.6 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 8.03 (d, *J* = 1.4 Hz, 1H), 7.78–7.72 (m, 2H), 7.23 (d, *J* = 8.0 Hz, 2H), 7.11 (d, *J* = 7.8 Hz, 2H), 4.89 (t, *J* = 7.1 Hz, 1H), 2.26 (s, 3H), 1.42 (d, *J* = 6.9 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 153.88, 143.67, 142.11, 138.63, 136.16, 129.33, 126.31, 124.03, 50.01, 23.58, 21.07.

N–(1–(p–tolyl)ethyl)benzo[b]thiophen–5–amine (3at): Brown oil (60% yield, 15.9 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz,) δ 7.56 (d, *J* = 8.6 Hz, 1H), 7.51 (d, *J* = 5.3 Hz, 1H), 7.28 (d, *J* = 7.6 Hz, 2H), 7.09 (d, *J* = 7.2 Hz, 3H), 6.80–6.74 (m, 2H), 6.15 (d, *J* = 7.0 Hz, 1H), 4.48 (t, *J* = 6.8 Hz, 1H), 2.24 (s, 3H), 1.42 (d, *J* = 6.6 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 146.04, 143.41, 140.99, 135.80, 129.34, 127.33, 126.31, 123.82, 122.75, 114.73, 105.17, 52.51, 25.24, 21.07.

N–(1–(p–tolyl)ethyl)quinolin–8–amine (3au): Brown oil (42% yield, 11.1 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (400 MHz, DMSO–d_6) δ 8.78 (q, *J* = 3.5, 2.9 Hz, 1H), 8.36–8.08 (m, 1H), 7.52 (dq, *J* = 7.7, 3.5 Hz, 1H), 7.31 (dd, *J* = 7.7, 4.6 Hz, 2H), 7.21 (td, *J* = 7.8, 2.9 Hz, 1H), 7.10 (dd, *J* = 7.6, 4.6 Hz, 2H), 7.03 (d, *J* = 8.0 Hz, 1H), 6.71 (d, *J* = 7.5 Hz, 1H), 6.50–6.30 (m, 1H), 4.67 (d, *J* = 7.8 Hz, 1H), 2.24 (t, *J* = 3.4 Hz, 3H), 1.66–1.49 (m, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.54, 143.67, 142.61, 136.47, 135.94, 129.49, 128.83, 128.71, 128.00, 126.21, 122.18, 113.96, 106.29, 52.22, 25.01, 21.08.

4–bromo–2–(1–(4–(tert–butyl)phenyl)ethyl)aniline (4ba): Brown oil (9% yield, 3.12 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.30 (d, *J* = 8.3 Hz, 2H), 7.17 (d, *J* = 8.3 Hz, 2H), 7.08 (d, *J* = 2.4 Hz, 1H), 7.04 (dd, *J* = 8.5, 2.4 Hz, 1H), 6.56 (d, *J* = 8.5 Hz, 1H), 4.98 (s, 2H), 4.13 (q, *J* = 7.1 Hz, 1H), 1.47 (d, *J* = 7.1 Hz, 3H), 1.26 (s, 9H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 148.73, 145.38, 142.39, 132.15, 129.48, 129.45, 127.50, 125.52, 117.30, 107.56, 37.69, 34.52, 31.64, 21.44.

4–bromo–2–(1–(3,4–dimethoxyphenyl)ethyl)aniline (4fa): Brown oil (58% yield, 19.3 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.04 (s, 2H), 6.86 (s, 2H), 6.73 (dd, *J* = 8.3, 2.1 Hz, 1H), 6.60–6.53 (m, 1H), 4.98 (s, 2H), 4.10 (d, *J* = 7.1 Hz, 1H), 3.72 (s, 6H), 1.46 (d, *J* = 7.1 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 149.06, 147.68, 145.37, 137.93, 132.39, 129.46, 119.52, 117.29, 112.38, 107.54, 56.50, 55.99, 37.93, 21.38.

4–bromo–2–(1–(3,4,5–trimethylphenyl)ethyl)aniline (4ga): Brown oil (12% yield, 3.7 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.25 (d, *J* = 2.4 Hz, 1H), 7.11 (dd, *J* = 8.4, 2.3 Hz, 1H), 6.80 (s, 2H), 6.55 (d, *J* = 8.4 Hz, 1H), 4.24 (s, 2H), 4.21 (d, *J* = 7.2 Hz, 1H), 2.18 (s, 3H), 2.10 (d, *J* = 4.4 Hz, 6H), 1.51 (d, *J* = 7.3 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 145.63, 136.91, 136.20, 135.66, 131.31, 130.87, 130.04, 129.51, 117.21, 108.11, 35.94, 21.17, 20.71, 17.77.

4–bromo–2–(1–(naphthalen–2–yl)ethyl)aniline (4ha): Brown oil (30% yield, 9.7 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.89–7.80 (m, 4H), 7.50–7.45 (m, 2H), 7.35 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.08–7.01 (m, 2H), 6.60 (d, *J* = 9.2 Hz, 1H), 5.08 (s, 2H), 4.36 (dd, *J* = 5.8, 2.3 Hz, 1H), 1.58 (d, *J* = 7.0 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 145.53, 143.02, 133.49, 132.18, 131.96, 129.78, 129.67, 128.30, 128.01, 127.87, 127.14, 126.53, 125.95, 125.49, 117.43, 107.61, 38.36, 21.04.

4–bromo–2–(1–phenylvinyl)aniline (4ja): Brown oil (53% yield, 14.5 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.40–7.28 (m, 5H), 7.21 (dd, J = 8.7, 2.4 Hz, 1H), 7.02 (d, J = 2.4 Hz, 1H), 6.67 (d, J = 8.6 Hz, 1H), 5.87–5.82 (m, 1H), 5.33–5.27 (m, 1H), 4.73 (s, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 145.78, 145.35, 139.26, 132.31, 131.34, 129.00, 128.54, 128.12, 126.80, 117.25, 117.19, 107.00.

4–chloro–2–(1–(p–tolyl)ethyl)aniline (4ab): Brown oil (5% yield, 1.3 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.15–7.07 (m, 4H), 6.92 (d, J = 7.8 Hz, 2H), 6.65–6.58 (m, 1H), 4.94 (s, 2H), 4.13 (q, J = 7.1 Hz, 1H), 2.26 (s, 3H), 1.45 (d, J = 7.1 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 144.96, 142.41, 135.48, 131.74, 129.37, 127.77, 126.76, 126.61, 120.02, 116.76, 37.88, 21.32, 21.03.

5–chloro–2–(1–(p–tolyl)ethyl)aniline (4ae): Brown oil (14% yield, 3.5 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.12–7.07 (m, 4H), 6.95 (d, J = 8.2 Hz, 1H), 6.63 (d, J = 2.3 Hz, 1H), 6.53 (dd, J = 8.2, 2.3 Hz, 1H), 5.07 (s, 2H), 4.09 (q, J = 7.1 Hz, 1H), 2.25 (s, 3H), 1.45 (d, J = 7.0 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 151.30, 148.15, 143.76,135.72, 129.26, 126.30, 113.14, 110.96, 110.00, 32.60, 25.12, 21.08.

5–bromo–2–(1–(p–tolyl)ethyl)aniline (4af): Brown oil (11% yield, 3.2 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.09 (q, J = 8.1 Hz, 4H), 6.89 (d, J = 8.2 Hz, 1H), 6.78 (d, J = 2.2 Hz, 1H), 6.66 (dd, J = 8.2, 2.1 Hz, 1H), 5.07 (s, 2H), 4.09 (q, J = 7.1 Hz, 1H), 2.25 (s, 3H), 1.44 (d, J = 7.1 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.87, 142.63, 135.36, 129.30, 129.16, 128.98, 127.73, 119.80, 118.83, 117.11, 37.50, 21.48, 21.01.

5–iodo–2–(1–(p–tolyl)ethyl)aniline (4ag): Brown oil (10% yield, 3.3 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.09 (q, J = 8.2 Hz, 4H), 6.97 (d, J = 1.9 Hz, 1H), 6.84 (dd, J = 8.1, 1.9 Hz, 1H), 6.74 (d, J = 8.1 Hz, 1H), 4.99 (s, 2H), 4.08 (q, J = 7.1 Hz, 1H), 2.25 (s, 3H), 1.43 (d, J = 7.1 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.88, 142.62, 135.35, 129.56, 129.41, 129.29, 127.73, 124.95, 123.13, 92.56, 37.56, 21.39, 21.02.

2–methyl–6–(1–(p–tolyl)ethyl)aniline (4ai): Brown oil (6% yield, 1.5 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.15–7.03 (m, 4H), 6.91 (dd, J = 7.7, 1.5 Hz, 1H), 6.83 (d, J = 7.3 Hz, 1H), 6.52 (t, J = 7.5 Hz, 1H), 4.36 (s, 2H), 4.15 (q, J = 7.1 Hz, 1H), 2.25 (s, 3H), 2.05 (s, 3H), 1.47 (d, J = 7.1 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 143.50, 143.42, 135.21, 129.28, 129.17, 128.32, 127.74, 124.97, 121.88, 116.58, 38.30, 22.09, 21.01, 18.45.

2–ethyl–6–(1–(p–tolyl)ethyl)aniline (4aj): Brown oil (6% yield, 1.2 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.16–7.04 (m, 4H), 6.93 (dd, J = 7.7, 1.5 Hz, 1H), 6.85 (dd, J = 7.7, 1.5 Hz, 1H), 6.57 (t, J = 7.5 Hz, 1H), 4.35 (s, 2H), 4.14 (t, J = 7.1 Hz, 1H), 2.48–2.37 (m, 3H), 2.25 (s, 3H), 1.47 (d, J = 7.1 Hz, 3H), 1.11 (t, J = 7.5 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 143.46, 142.88, 135.23, 129.36, 129.32, 127.74, 127.56, 126.22, 124.87, 116.79, 38.42, 24.22, 22.22, 21.01, 13.65.

2–phenoxy–6–(1–(p–tolyl)ethyl)aniline (4ak): Brown oil (8% yield, 2.3 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.31 (t, J = 7.7 Hz, 2H), 7.13 (d, J = 7.3 Hz, 2H), 7.08 (d, J = 7.9 Hz, 2H), 7.03 (t, J = 7.5 Hz, 1H), 6.89 (dd, J = 14.8, 8.1 Hz, 3H), 6.67 (d, J = 7.8 Hz, 1H), 6.59 (t, J = 7.8 Hz, 1H), 4.49 (s, 2H), 4.22 (d, J = 7.2 Hz, 1H), 2.25 (s, 3H), 1.50 (d, J = 6.8 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 157.92, 142.96, 142.57, 137.77, 135.36, 131.97, 130.16, 129.34, 127.74, 123.30, 122.81, 118.05, 117.32, 116.69, 38.18, 21.88, 21.03.

2–bromo–6–(1–(p–tolyl)ethyl)aniline (4al): Brown oil (47% yield, 13.6 mg). petroleum ether/ethyl cetate: 8:1 ^{1}H NMR (400 MHz, DMSO–d_6) δ 7.16 (d, J = 2.0 Hz, 1H), 7.13–7.03 (m, 4H), 6.94 (dd,

J = 8.3, 2.0 Hz, 1H), 6.71 (d, *J* = 8.1 Hz, 1H), 5.11 (s, 2H), 3.94 (d, *J* = 7.2 Hz, 1H), 2.24 (s, 3H), 1.47 (d, *J* = 7.2 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 144.15, 144.09, 136.35, 135.21, 130.96, 129.31, 127.71, 127.50, 115.86, 107.87, 42.87, 22.08, 21.01.

4,5–difluoro–2–(1–(p–tolyl)ethyl)aniline (4am): Brown oil (11% yield, 2.8 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.14–7.08 (m, 4H), 6.96–6.93 (m, 1H), 6.55 (dd, *J* = 13.2, 7.5 Hz, 1H), 4.93 (s, 2H), 4.09 (q, *J* = 7.1 Hz, 1H), 2.26 (d, *J* = 3.3 Hz, 3H), 1.45 (d, *J* = 7.1 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 143.71, 142.43, 135.50, 129.36, 129.22, 127.69, 116.13, 114.90, 103.00, 102.80, 37.52, 21.60, 21.02. ^{19}F NMR (565 MHz, DMSO-d6) δ δ -142.65 (ddd, *J* = 22.9, 13.3, 9.3 Hz), -154.69 (m).

4,5–dichloro–2–(1–(p–tolyl)ethyl)aniline (4an): Brown oil (11% yield, 3.2 mg). petroleum ether/ethyl cetate: 15:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.17–7.08 (m, 4H), 7.04 (s, 1H), 6.80 (s, 1H), 5.26 (s, 2H), 4.12 (q, *J* = 7.1 Hz, 1H), 2.26 (s, 3H), 1.45 (d, *J* = 7.0 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 146.48, 141.98, 135.62, 130.89, 129.41, 128.88, 128.72, 127.74, 117.15, 115.78, 37.46, 21.22, 21.03

4–chloro–2–iodo–6–(1–(p–tolyl)ethyl)aniline (4ap): Brown oil (9% yield, 3.5 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.51 (d, *J* = 2.4 Hz, 1H), 7.15–7.09 (m, 4H), 7.01 (d, *J* = 2.5 Hz, 1H), 4.96 (s, 2H), 4.24 (q, *J* = 7.0 Hz, 1H), 2.26 (s, 3H), 1.46 (d, *J* = 7.1 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 144.53, 141.78, 135.80, 135.45, 132.00, 129.51, 127.77, 127.36, 121.03, 85.48, 21.45, 21.03.

6–(1–(p–tolyl)ethyl)benzo[b]thiophen–5–amine (4at): Brown solid (17% yield, 4.6 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.51 (d, *J* = 8.5 Hz, 1H), 7.42 (d, *J* = 5.5 Hz, 1H), 7.13 (d, *J* = 8.0 Hz, 2H), 7.09 (d, *J* = 8.0 Hz, 2H), 7.03 (d, *J* = 5.5 Hz, 1H), 6.82 (d, *J* = 8.5 Hz, 1H), 4.72 (dd, *J* = 18.9, 11.7 Hz, 3H), 2.26 (s, 3H), 1.63 (d, *J* = 7.2 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 142.95, 142.21, 139.38, 134.91, 129.41, 129.28, 127.33, 126.28, 123.34, 122.89, 121.13, 116.66, 36.23, 21.01, 17.45.

7–(1–(p–tolyl)ethyl)quinolin–8–amine (4au): Brown solid (33% yield, 8.6 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (400 MHz, DMSO–d_6) δ 8.72 (dd, *J* = 4.2, 1.7 Hz, 1H), 8.15 (dd, *J* = 8.3, 1.7 Hz, 1H), 7.42 (dd, *J* = 8.1, 4.1 Hz, 1H), 7.28 (d, *J* = 8.7 Hz, 1H), 7.19 (d, *J* = 7.8 Hz, 2H), 7.09 (dd, *J* = 10.8, 8.2 Hz, 3H), 5.72 (s, 2H), 4.45 (t, *J* = 7.1 Hz, 1H), 2.23 (s, 3H), 1.57 (d, *J* = 7.1 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.64, 143.08, 141.32, 138.03, 136.17, 135.26, 129.28, 127.80, 127.14, 126.93, 125.67, 121.38, 114.47, 37.94, 21.24, 21.02.

2,6–dimethyl–4–(1–(p–tolyl)ethyl)aniline (4aB): Brown oil (52% yield, 12.5 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.13–7.02 (m, 4H), 6.67 (s, 2H), 4.32 (s, 2H), 3.86 (d, *J* = 7.2 Hz, 1H), 2.24 (s, 3H), 2.03 (s, 6H), 1.46 (d, *J* = 7.3 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 144.95, 142.49, 134.81, 134.17, 129.13, 127.47, 127.08, 120.93, 43.38, 22.35, 20.99, 18.37.

3–((4–bromophenyl)amino)propanenitrile (6aa): Brown oil (50% yield, 11.1 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.30–7.16 (m, 2H), 6.59 (d, *J* = 8.8 Hz, 2H), 6.16 (t, *J* = 6.2 Hz, 1H), 3.31 (d, *J* = 6.5 Hz, 2H), 2.71 (t, *J* = 6.5 Hz, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.55, 131.97, 120.08, 114.62, 107.41, 17.69.

3–((4–chlorophenyl)amino)propanenitrile (6ab): Brown oil (51% yield, 9.2 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.12 (d, *J* = 8.8 Hz, 2H), 6.63 (d, *J* = 8.8 Hz, 2H), 6.13 (t, *J* = 6.2 Hz, 1H), 3.31 (s, 3H), 2.71 (t, *J* = 6.5 Hz, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 147.19, 129.16, 120.08, 120.06, 114.05, 17.73.

3–((3–chlorophenyl)amino)propanenitrile (6ae): Brown oil (43% yield, 7.7 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.10 (t, J = 8.0 Hz, 1H), 6.65 (t, J = 2.2 Hz, 1H), 6.62–6.53 (m, 2H), 6.27 (t, J = 6.1 Hz, 1H), 3.36 (d, J = 6.4 Hz, 2H), 2.71 (t, J = 6.5 Hz, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 149.80, 134.25, 130.98, 116.18, 111.79, 111.38, 17.77.

3–((3–bromophenyl)amino)propanenitrile (6af): Brown oil (37% yield, 8.2 mg). petroleum ether/ethyl cetate: 8:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.04 (t, J = 8.0 Hz, 1H), 6.79 (d, J = 2.1 Hz, 1H), 6.72 (ddd, J = 7.8, 1.9, 0.9 Hz, 1H), 6.62 (dd, J = 8.3, 2.2 Hz, 1H), 6.26 (t, J = 6.2 Hz, 1H), 3.33 (s, 2H), 2.71 (t, J = 6.5 Hz, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 149.97, 131.30, 122.94, 120.06, 119.07, 114.71, 111.66, 30.57, 17.77.

3–((3–iodophenyl)amino)propanenitrile (6ag): Brown oil (48% yield, 12.9 mg). petroleum ether/ethyl cetate: 6:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 6.98 (t, J = 1.8 Hz, 1H), 6.93–6.84 (m, 2H), 6.63 (dt, J = 8.6, 1.6 Hz, 1H), 6.17 (t, J = 6.2 Hz, 1H), 3.31 (d, J = 6.5 Hz, 2H), 2.70 (t, J = 6.5 Hz, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 149.82, 131.45, 125.20, 120.77, 119.49, 111.98, 96.02, 17.76.

3–(benzo[b]thiophen–5–ylamino)propanenitrile (6at): Brown solid (45% yield, 9.0 mg). petroleum ether/ethyl cetate: 6:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.67 (d, J = 8.7 Hz, 1H), 7.62–7.58 (m, 1H), 7.23 (d, J = 5.4 Hz, 1H), 7.01 (d, J = 2.5 Hz, 1H), 6.80 (dd, J = 8.7, 2.4 Hz, 1H), 5.96 (t, J = 6.3 Hz, 1H), 2.86–2.68 (m, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 145.79, 141.33, 128.19, 127.69, 123.93, 123.16, 120.22, 114.31, 104.31, 17.69.

3–(p–tolylamino)propanenitrile (6av): Brown oil (51% yield, 9.8 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 6.92 (d, J = 7.9 Hz, 2H), 6.53 (d, J = 8.3 Hz, 2H), 5.66 (t, J = 6.3 Hz, 1H), 3.30 (q, J = 6.5 Hz, 2H), 2.69 (t, J = 6.5 Hz, 2H), 2.16 (s, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 145.92, 129.92, 125.25, 120.21, 112.84, 20.51, 17.82.

3–((4–(tert–butyl)phenyl)amino)propanenitrile (6aw): Brown oil (66% yield, 13.4 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.13 (d, J = 8.6 Hz, 2H), 6.55 (d, J = 8.6 Hz, 2H), 5.70 (s, 1H), 3.32–3.28 (m, 2H), 2.70 (t, J = 6.5 Hz, 2H), 1.22 (s, 9H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 145.77, 139.07, 126.07, 120.22, 112.43, 33.92, 31.90, 17.88.

3–(m–tolylamino)propanenitrile (6ax): Brown oil (57% yield, 9.2 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 6.98 (t, J = 7.7 Hz, 1H), 6.45–6.38 (m, 3H), 5.80 (t, J = 6.2 Hz, 1H), 3.32–3.29 (m, 2H), 2.70 (t, J = 6.5 Hz, 2H), 2.20 (s, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 148.18, 138.54, 129.35, 120.19, 117.76, 113.29, 109.99, 21.78, 17.83.

3–((3–methoxyphenyl)amino)propanenitrile (6ay): Brown oil (63% yield, 11.2 mg). petroleum ether/ethyl cetate: 8:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.02–6.96 (m, 1H), 6.21 (dt, J = 8.2, 1.4 Hz, 1H), 6.17 (dt, J = 7.2, 1.5 Hz, 2H), 5.93 (t, J = 6.2 Hz, 1H), 3.69 (s, 3H), 3.31 (t, J = 6.4 Hz, 2H), 2.70 (t, J = 6.5 Hz, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 160.89, 149.59, 130.23, 120.19, 105.66, 102.47, 98.38, 55.14, 17.84.

3–((1H–indol–5–yl)amino)propanenitrile (6az): Brown soild (53% yield, 9.7 mg). petroleum ether/ethyl cetate: 6:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 10.67 (s, 1H), 7.21–7.09 (m, 2H), 6.68 (d, J = 2.2 Hz, 1H), 6.55 (dd, J = 8.6, 2.2 Hz, 1H), 6.20 (td, J = 2.0, 1.0 Hz, 1H), 5.28 (t, J = 6.4 Hz, 1H), 3.34–3.31 (m, 2H), 2.73 (t, J = 6.6 Hz, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 141.47, 130.35, 128.92, 125.31, 120.38, 112.32, 111.74, 101.20, 100.55, 17.82.

ethyl 3–((4–bromophenyl)amino)propanoate (6ba): Brown soild (23% yield, 6.2 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.20 (d, J = 8.8 Hz, 2H), 6.53 (d, J = 8.9

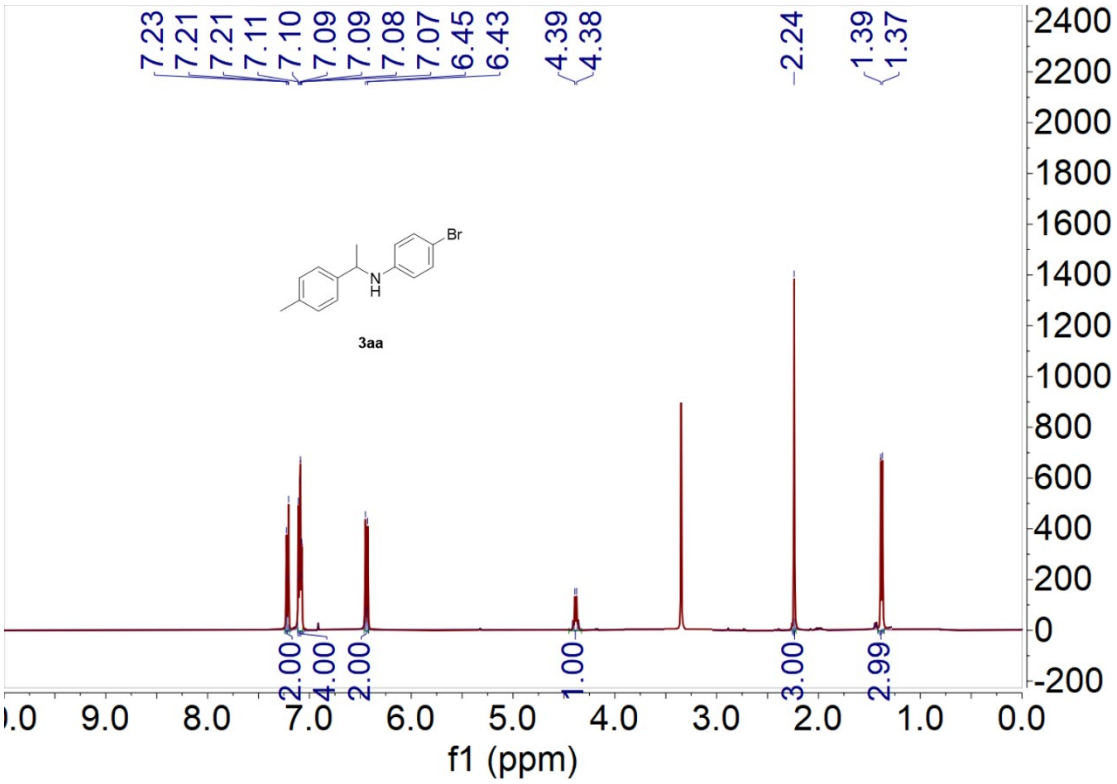
Hz, 2H), 5.88 (t, *J* = 5.8 Hz, 1H), 4.07 (q, *J* = 7.1 Hz, 2H), 3.25 (q, *J* = 6.5 Hz, 2H), 2.55 (d, *J* = 6.7 Hz, 2H), 1.19 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 172.01, 148.18, 131.88, 114.46, 106.88, 60.40, 33.98, 14.53.

butyl 3–((4–bromophenyl)amino)propanoate (6ca): Brown soild (23% yield, 10.7 mg). petroleum ether/ethyl cetate: 12:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.20 (d, *J* = 8.8 Hz, 2H), 6.60–6.50 (m, 2H), 5.87 (t, *J* = 5.8 Hz, 1H), 4.03 (t, *J* = 6.6 Hz, 2H), 3.25 (q, *J* = 6.5 Hz, 2H), 2.55 (t, *J* = 6.7 Hz, 2H), 1.58–1.50 (m, 2H), 1.35–1.29 (m, 2H), 0.88 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 172.78, 148.18, 131.87, 114.45, 106.01, 64.14, 34.00, 30.61, 19.05, 14.1.

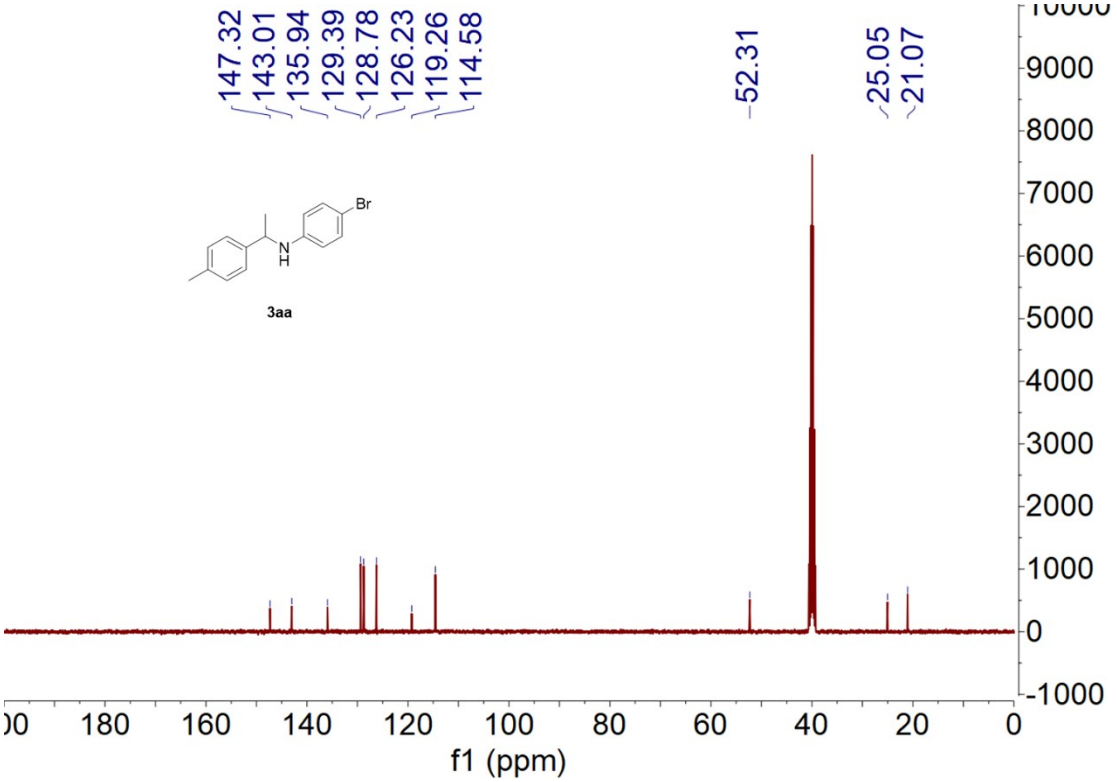
benzyl 3–((4–bromophenyl)amino)propanoate (6da): Brown soild (37% yield, 12.4 mg). petroleum ether/ethyl cetate: 10:1 ^{1}H NMR (600 MHz, DMSO–d_6) δ 7.41–7.32 (m, 5H), 7.24–7.17 (m, 2H), 6.60–6.51 (m, 2H), 5.91 (t, *J* = 5.8 Hz, 1H), 5.11 (s, 2H), 3.29 (q, *J* = 6.5 Hz, 2H), 2.63 (t, *J* = 6.7 Hz, 2H). ^{13}C NMR{^{1}H} (101 MHz, DMSO–d_6) δ 171.93, 148.16, 136.59, 131.89, 128.87, 128.44, 128.34, 114.48, 106.91, 65.98, 33.97.

6. The ^{1}H NMR, ^{13}C NMR{^{1}H} and ^{19}F NMR spectra of the synthesized compounds

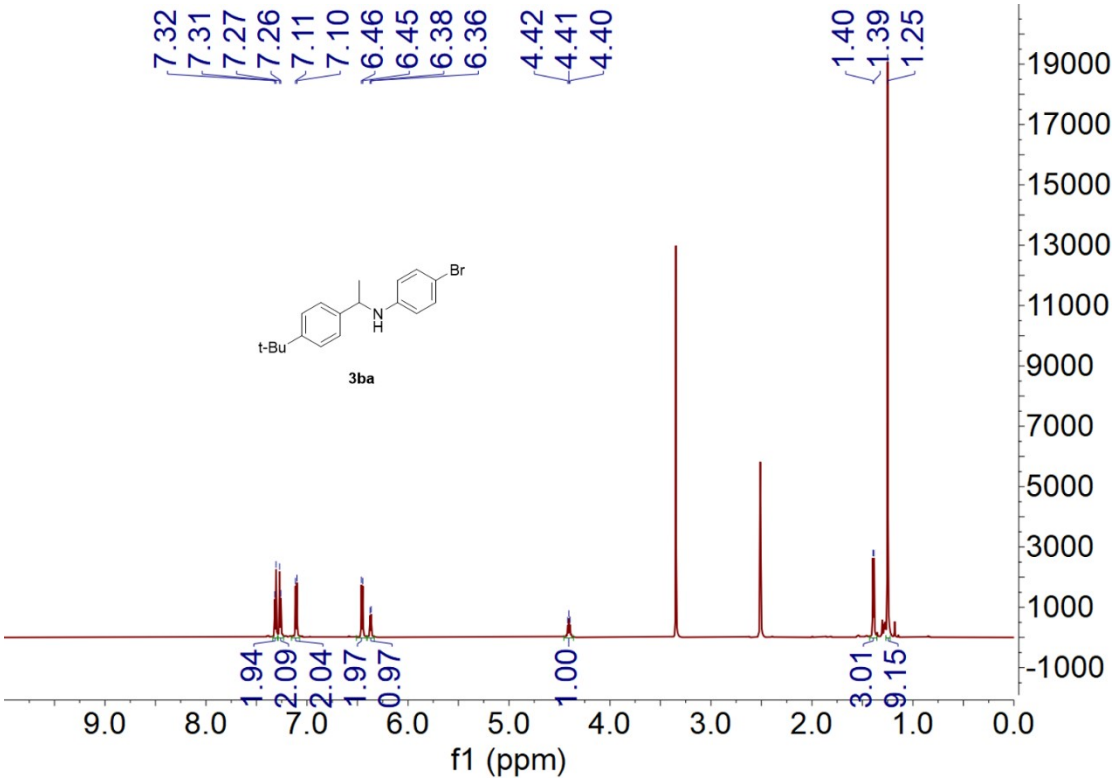
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3aa**



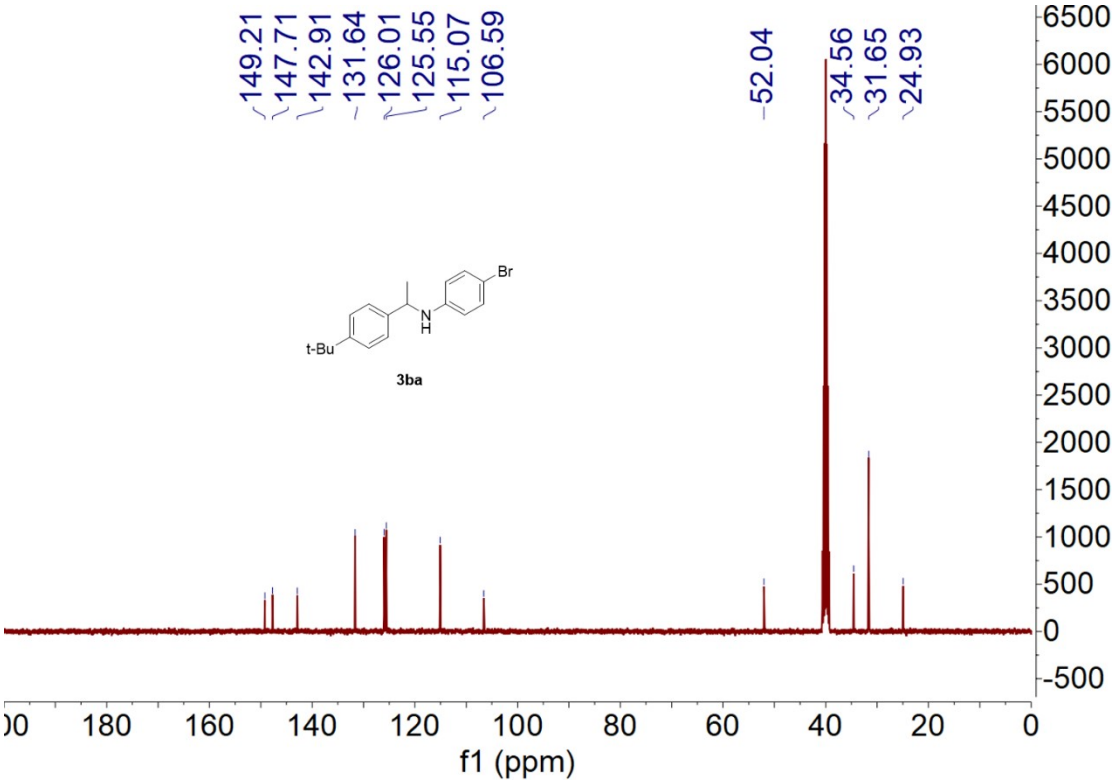
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3aa**



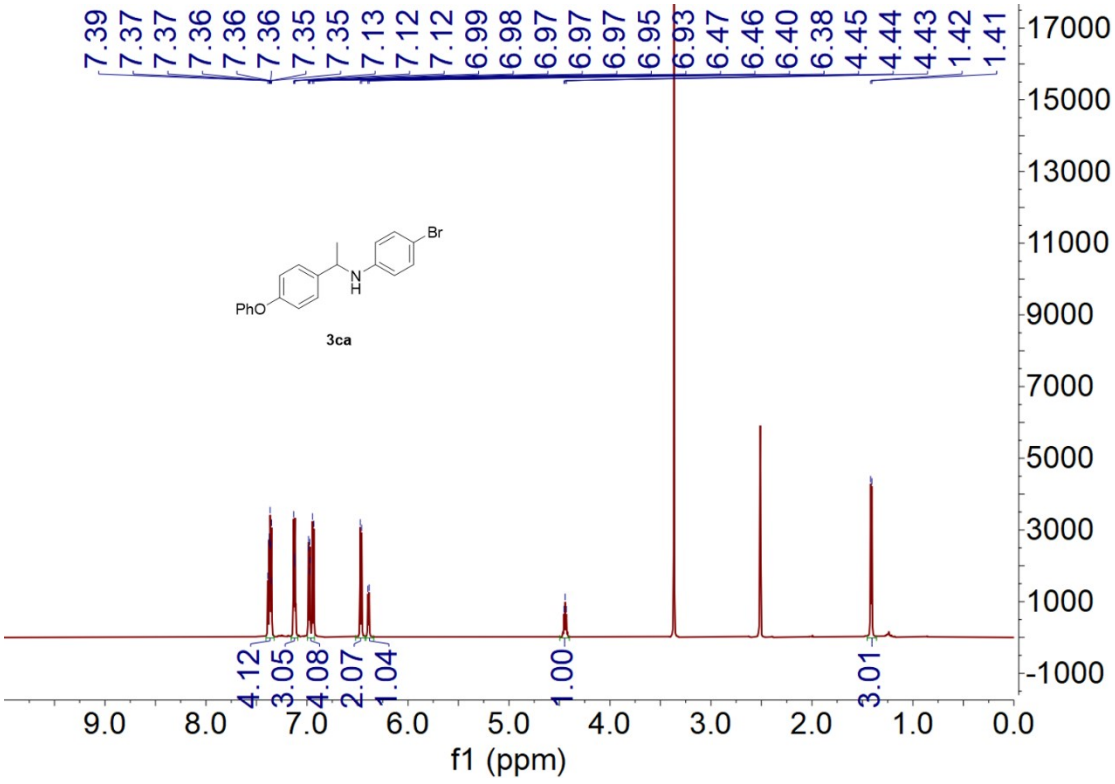
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ba**



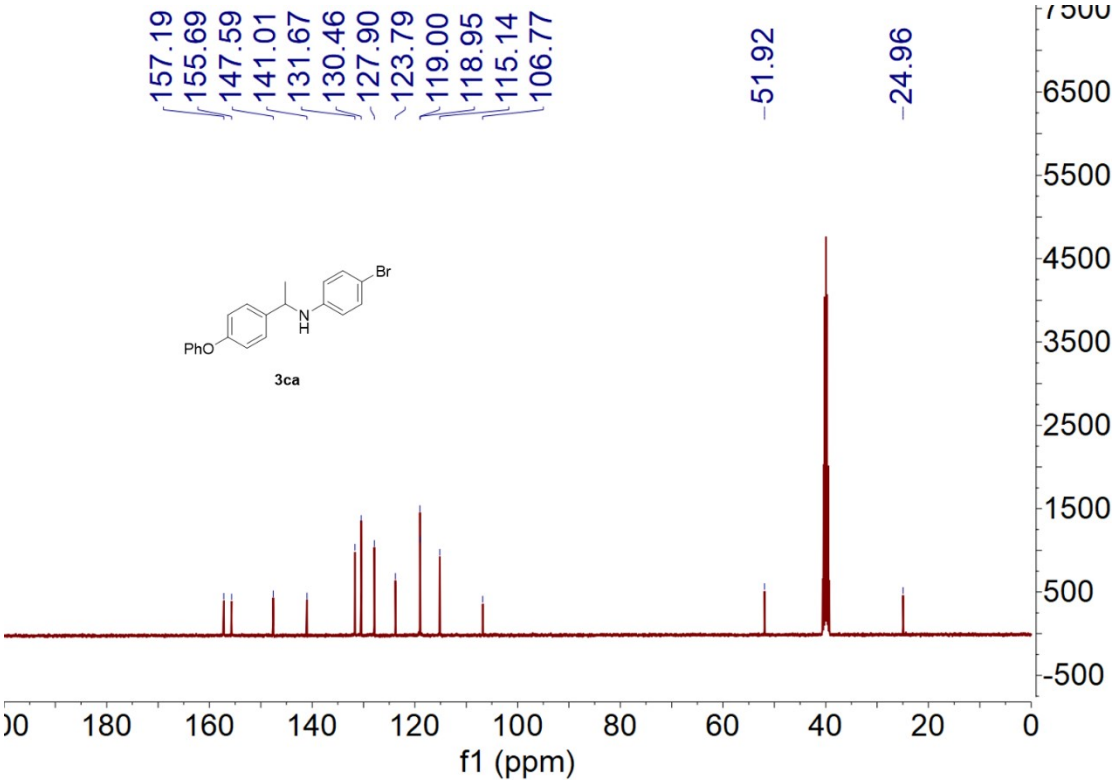
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ba**



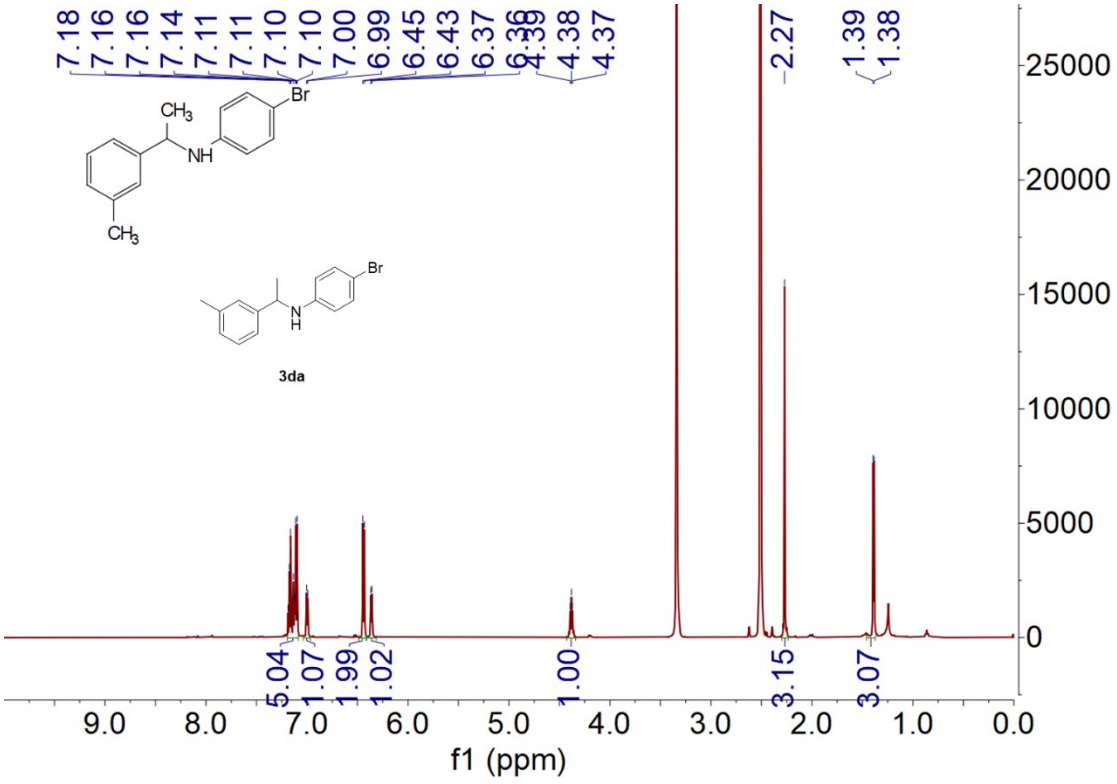
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ca**



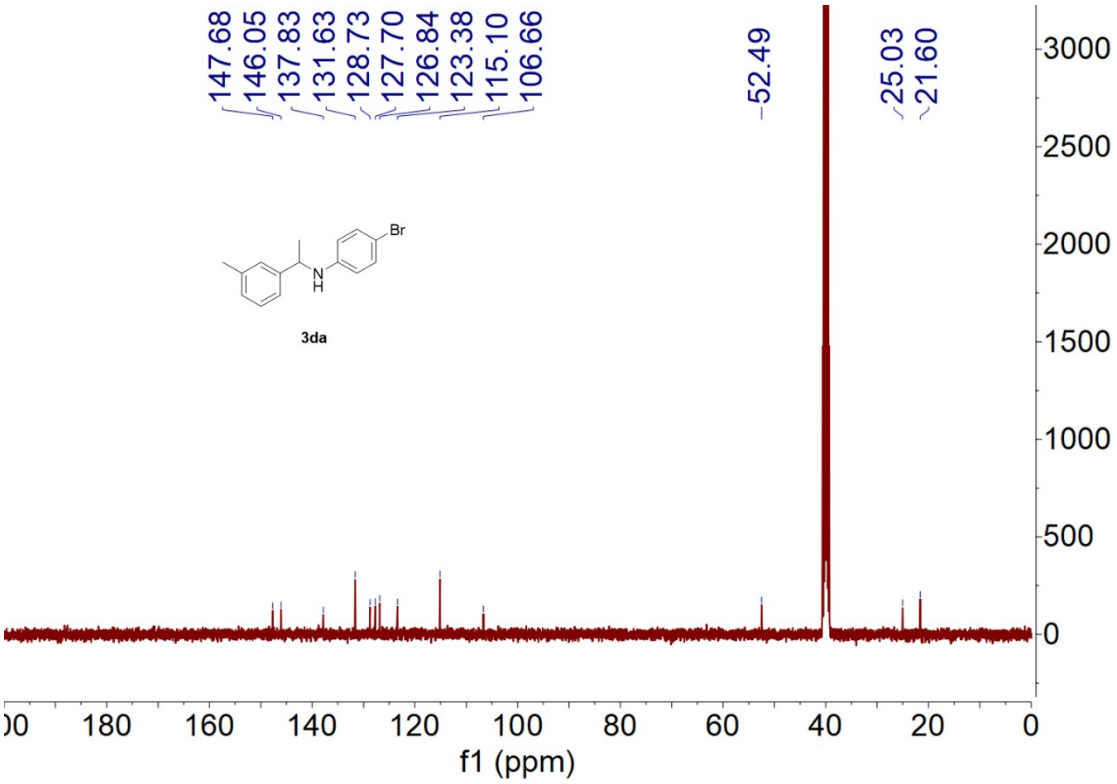
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ca**



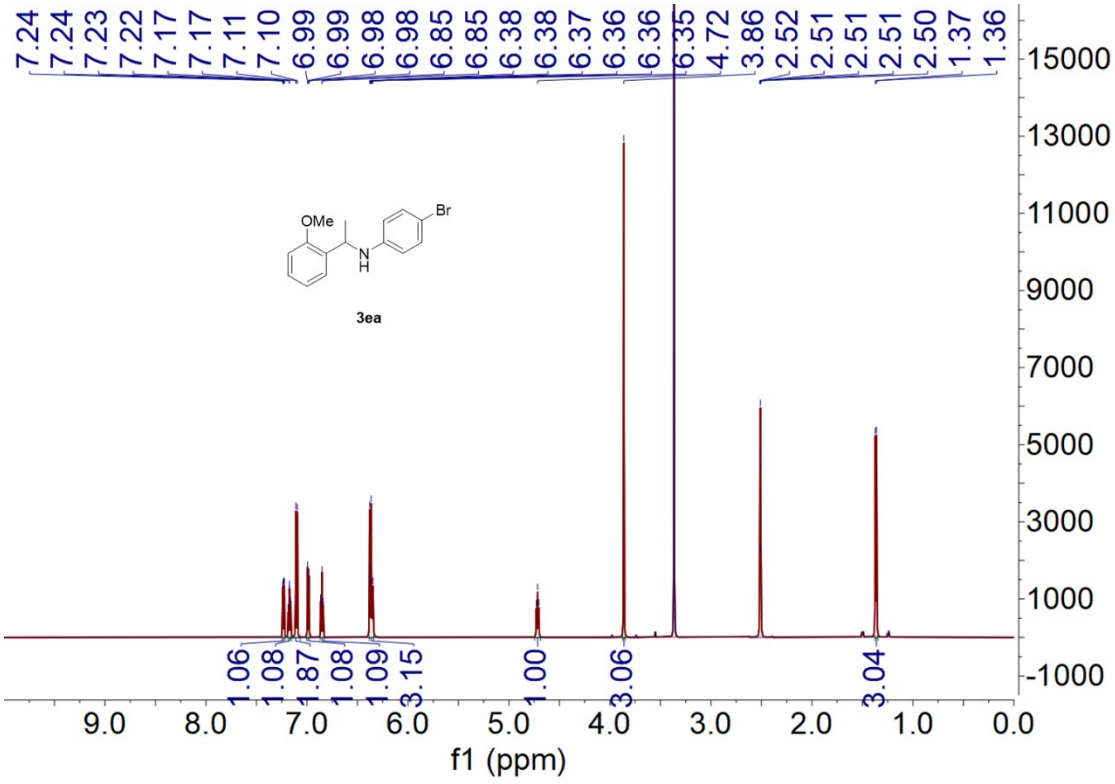
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3da**



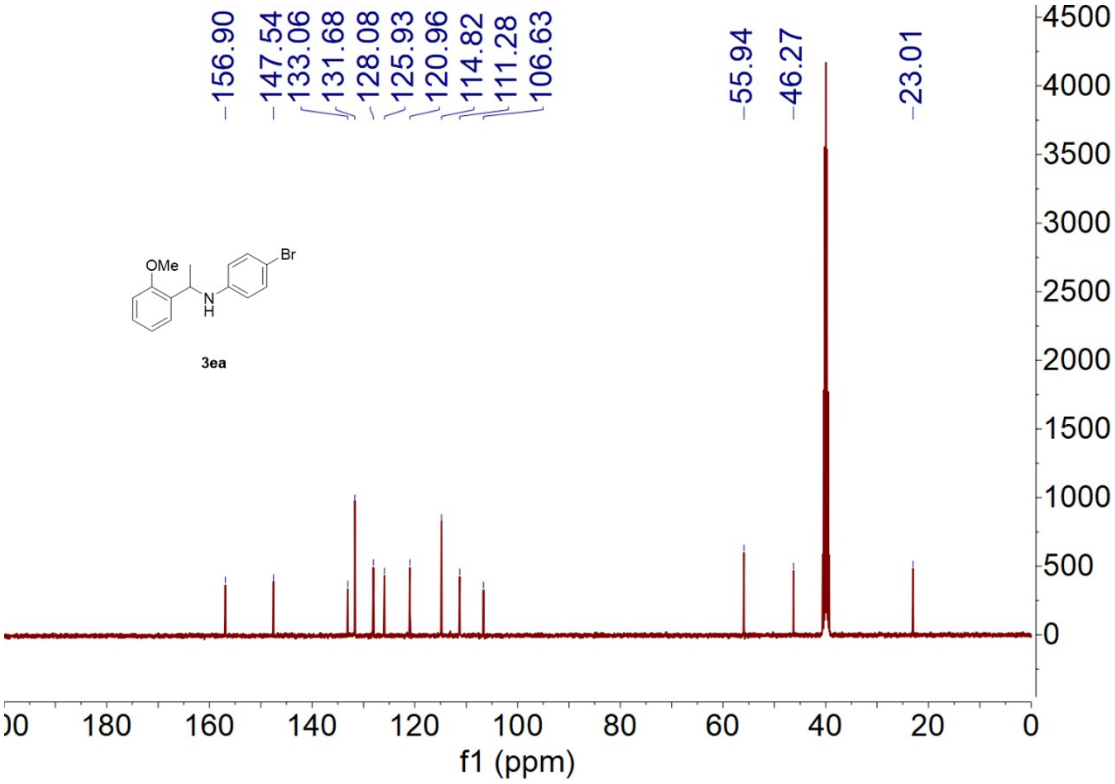
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3da**



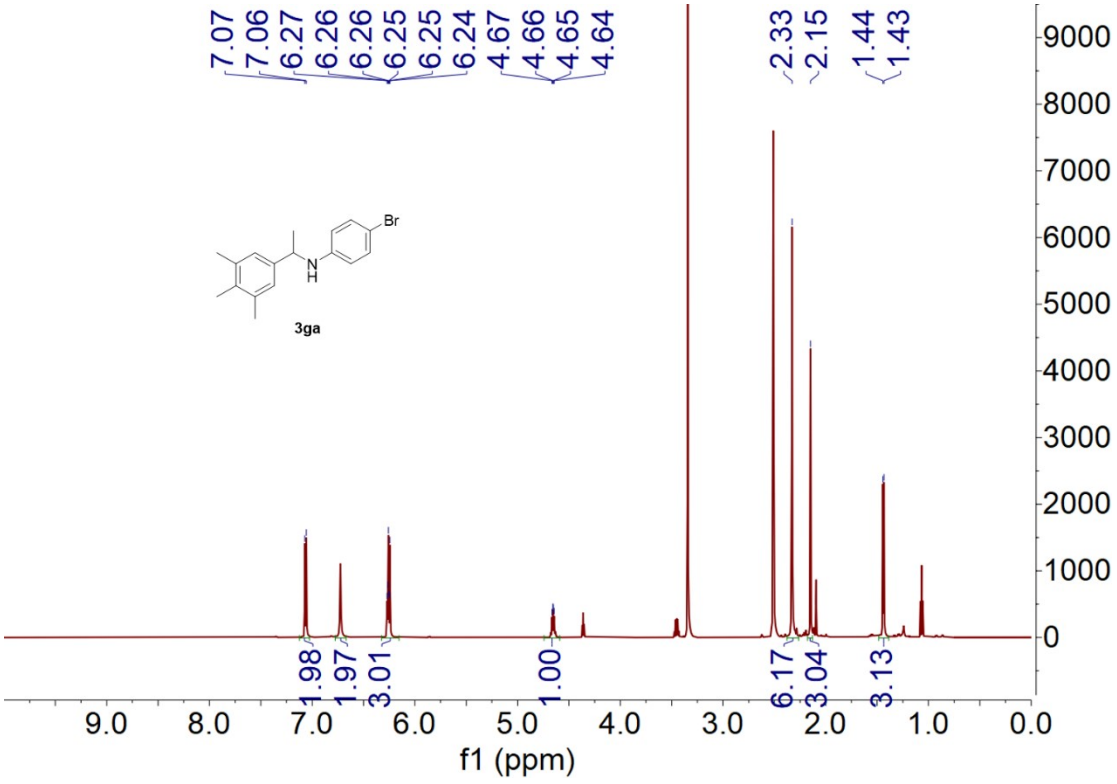
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ea**



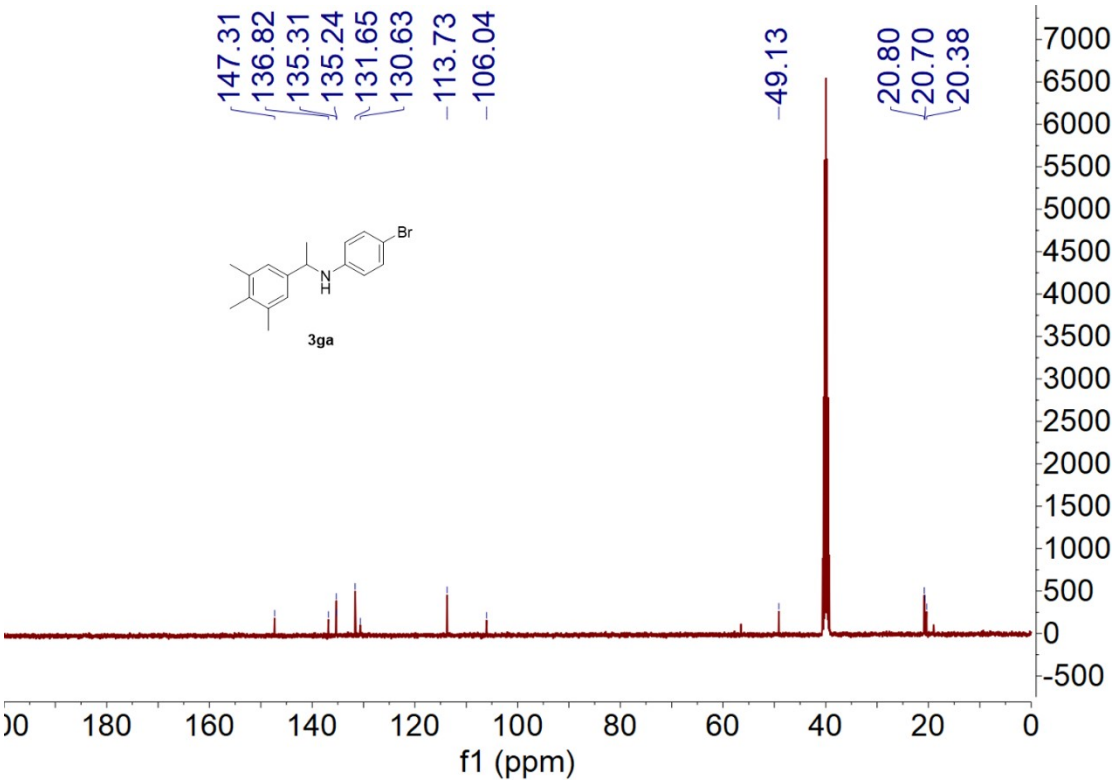
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ea**



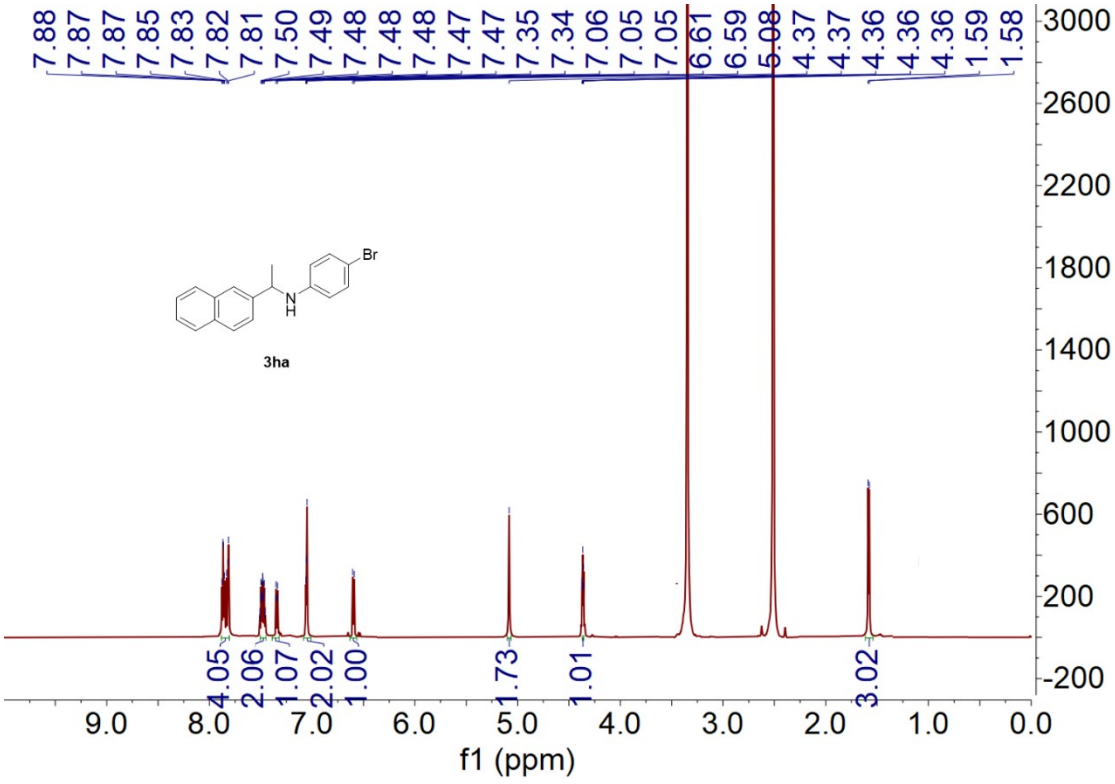
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ga**



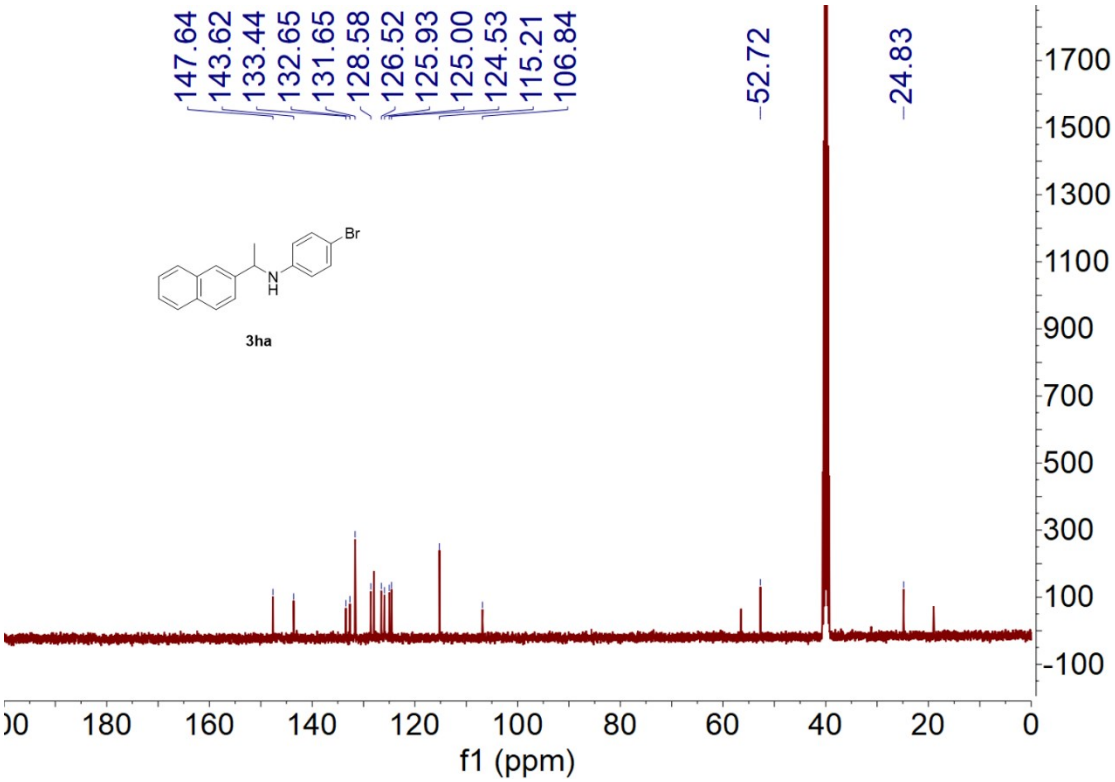
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ga**



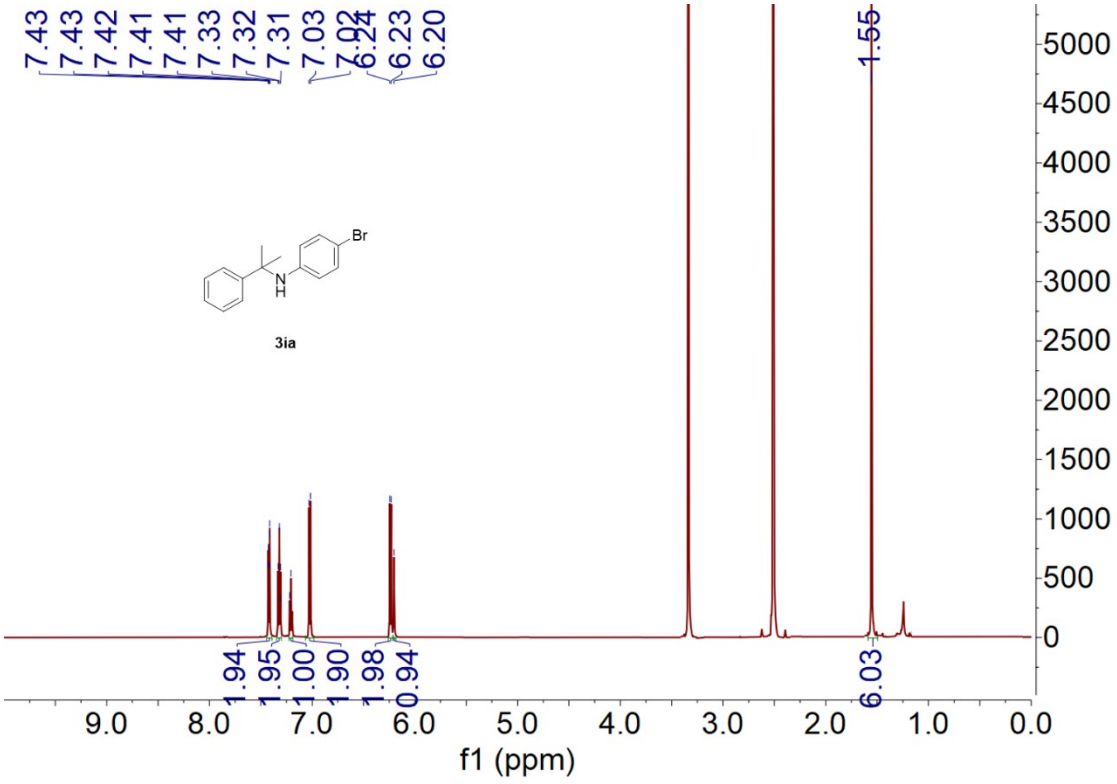
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ha**



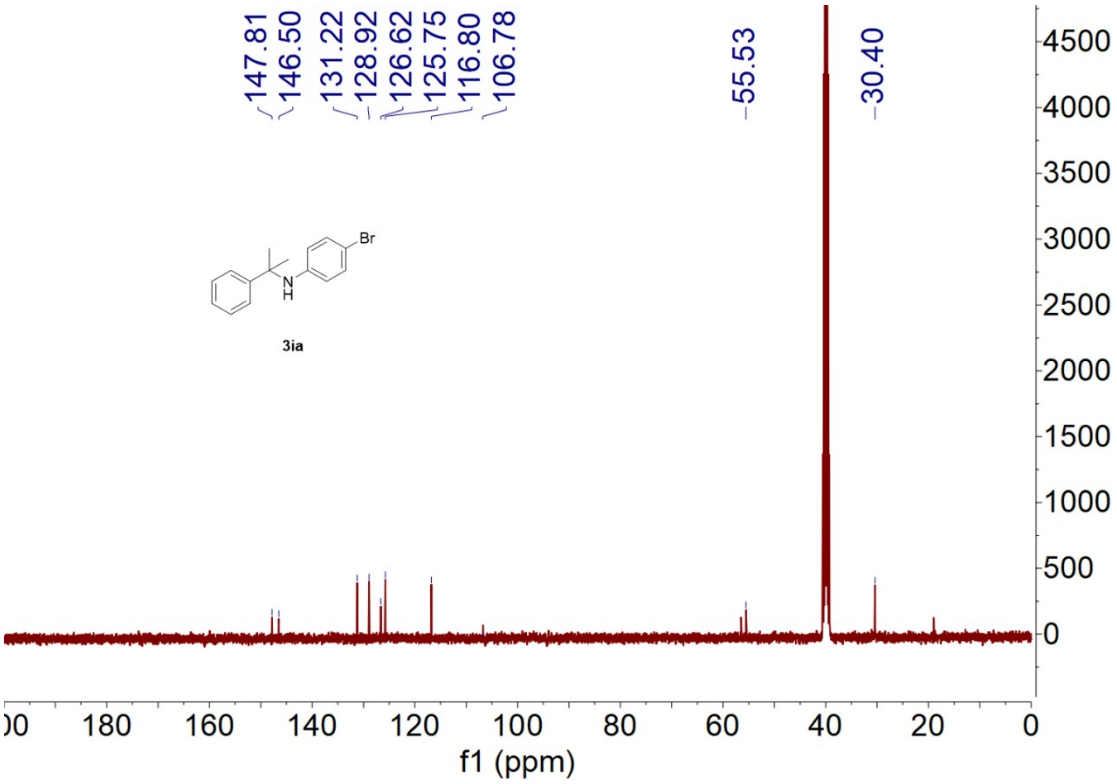
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ha**



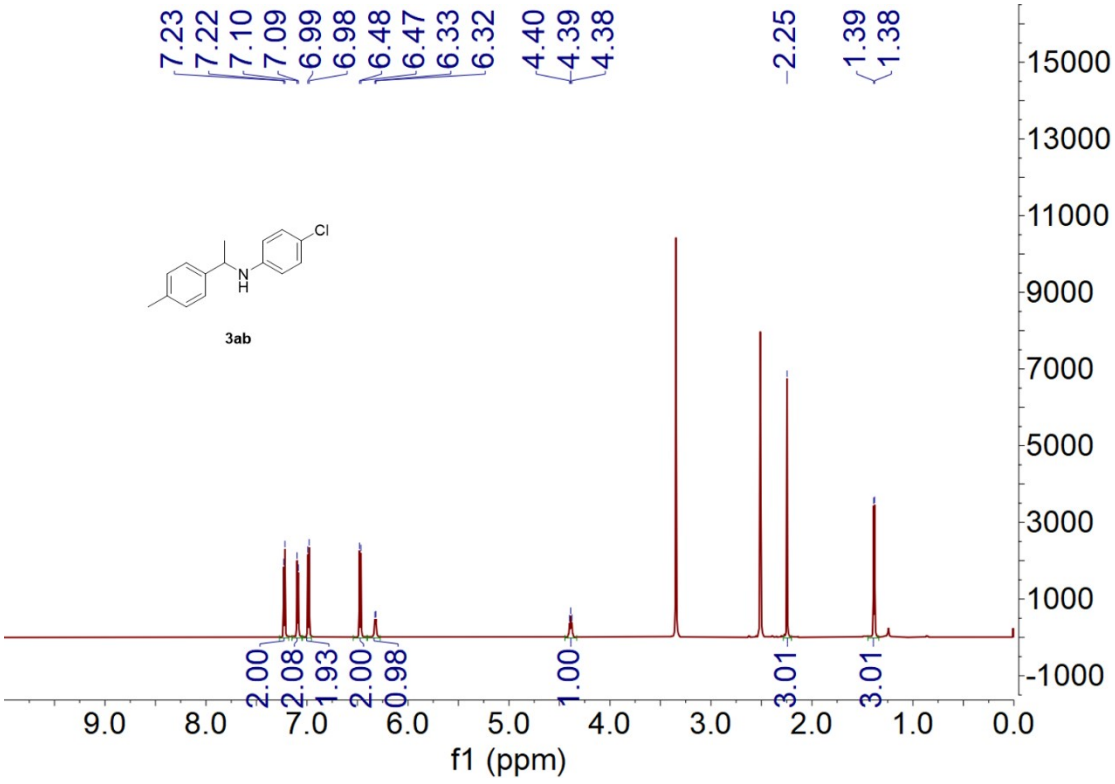
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ia**



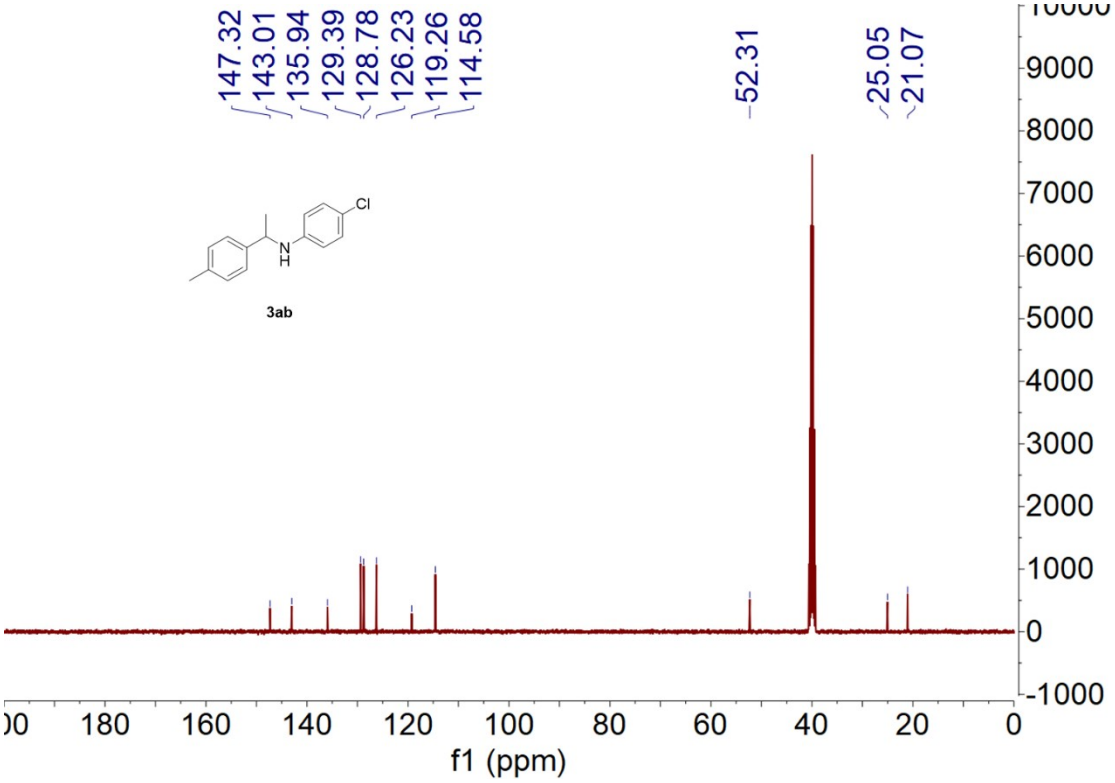
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ia**



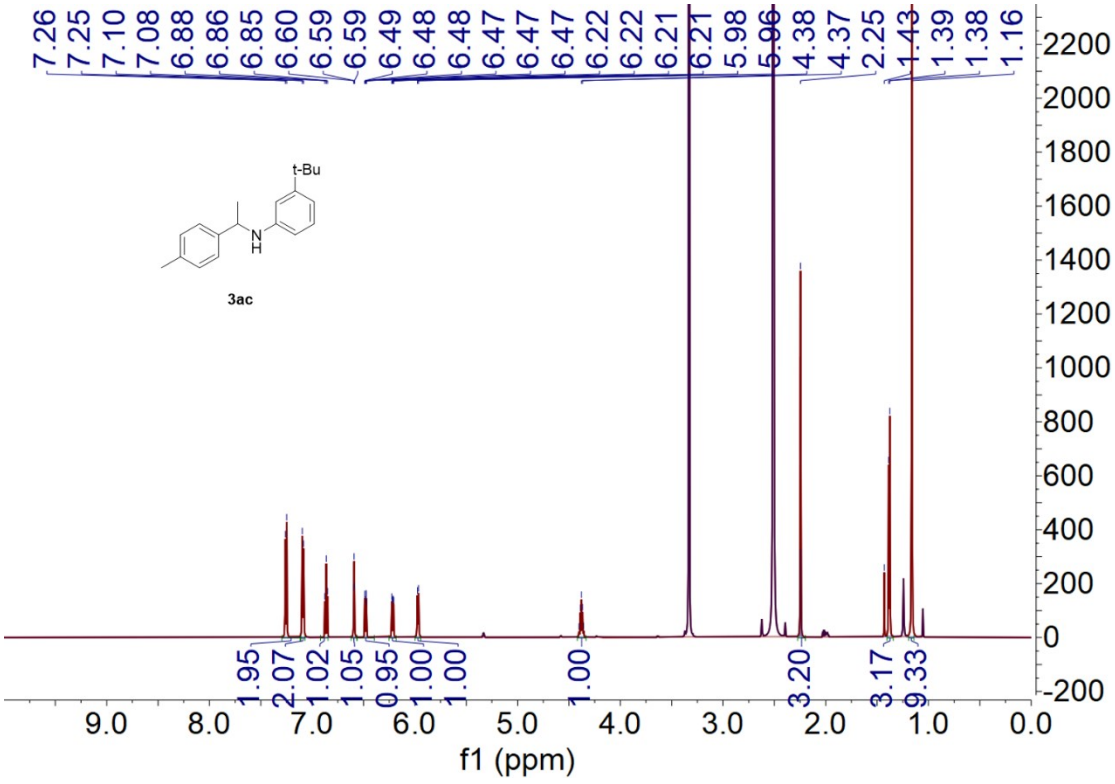
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ab**



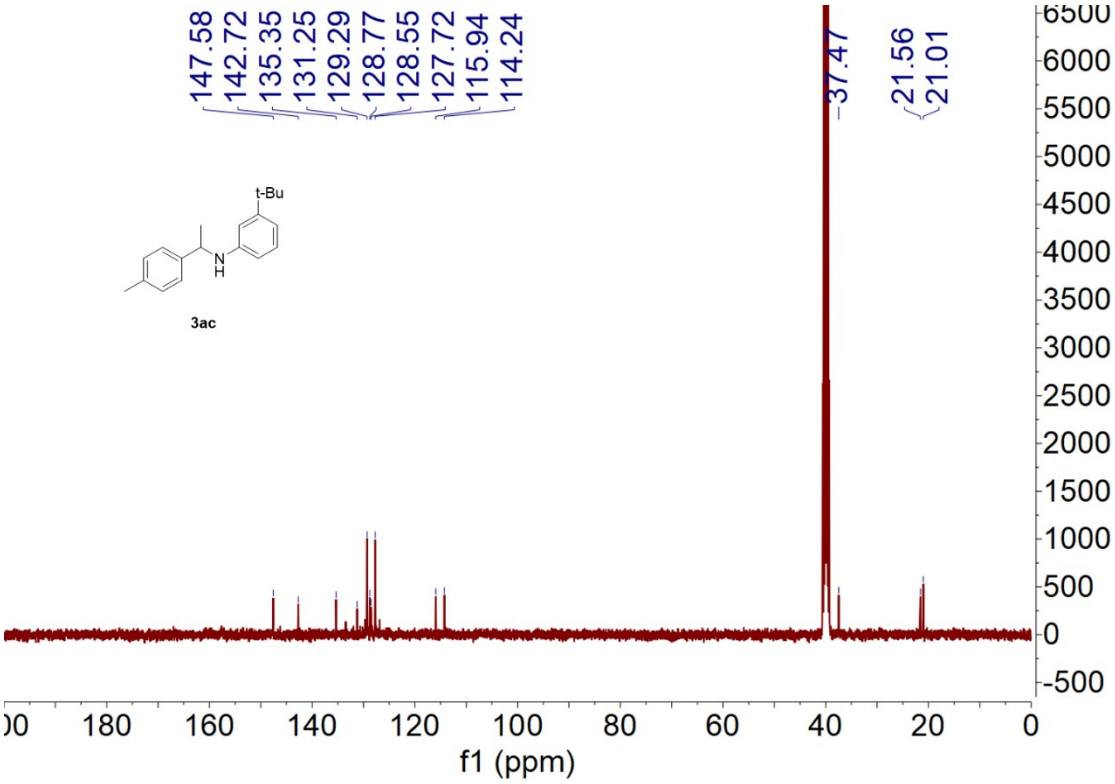
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ab**



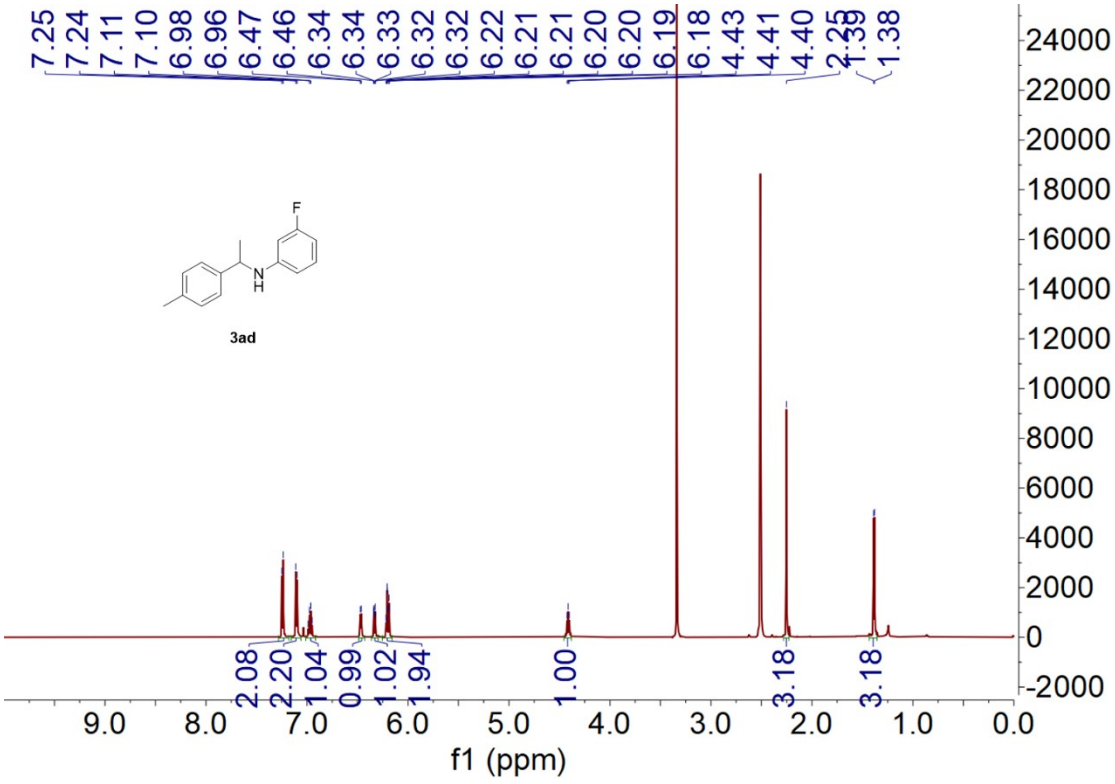
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ac**



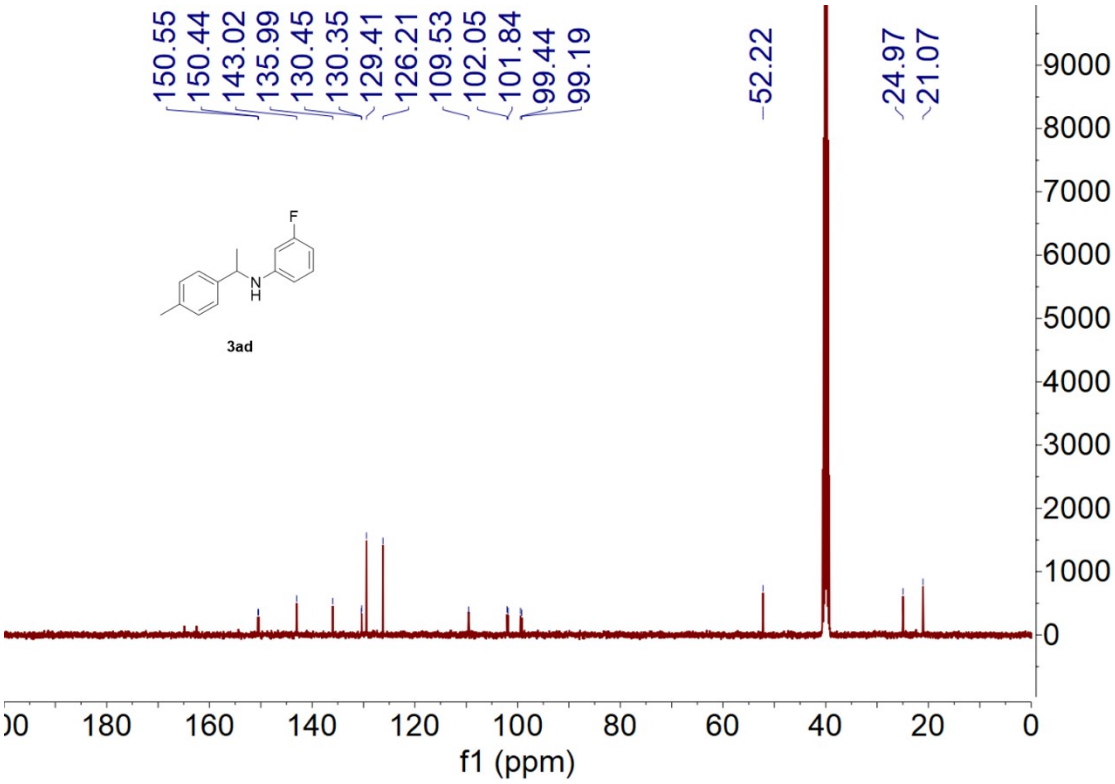
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ac**



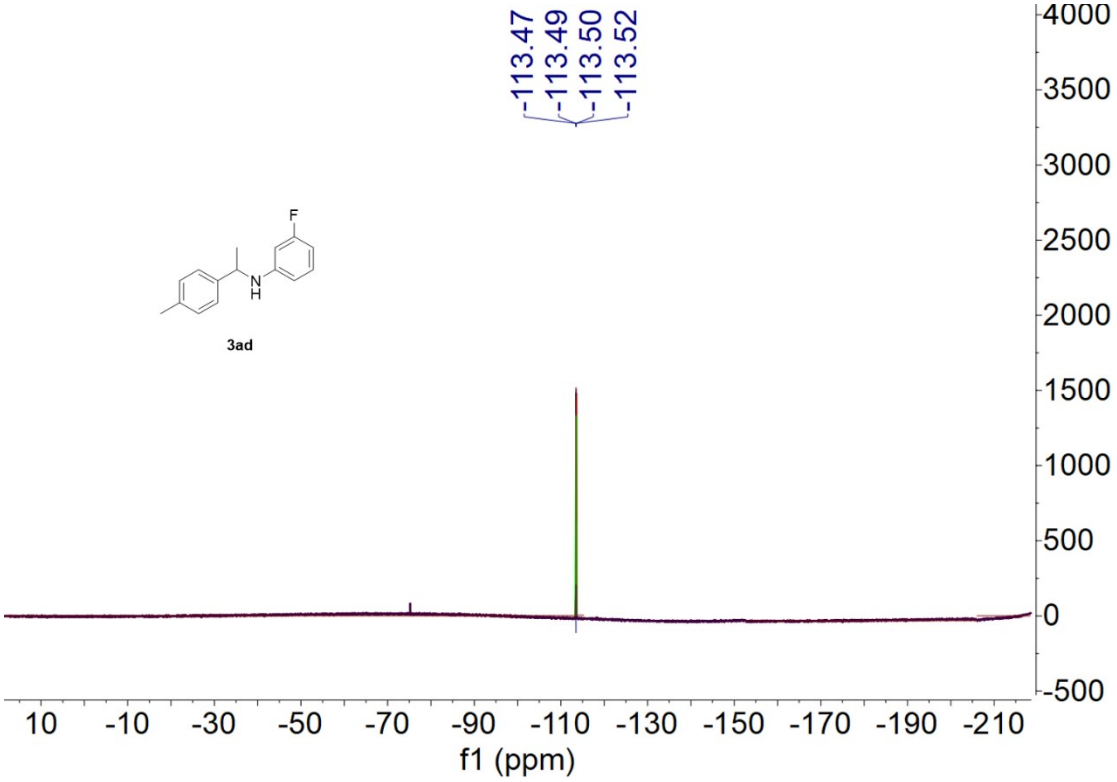
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ad**



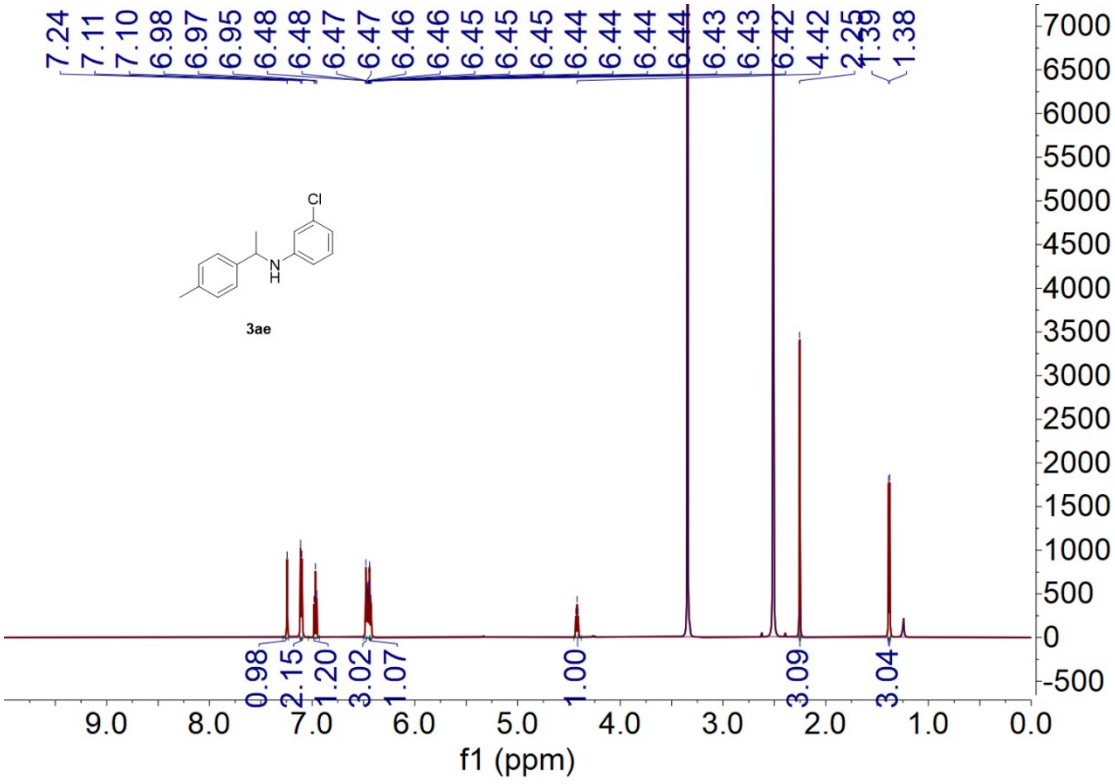
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ad**



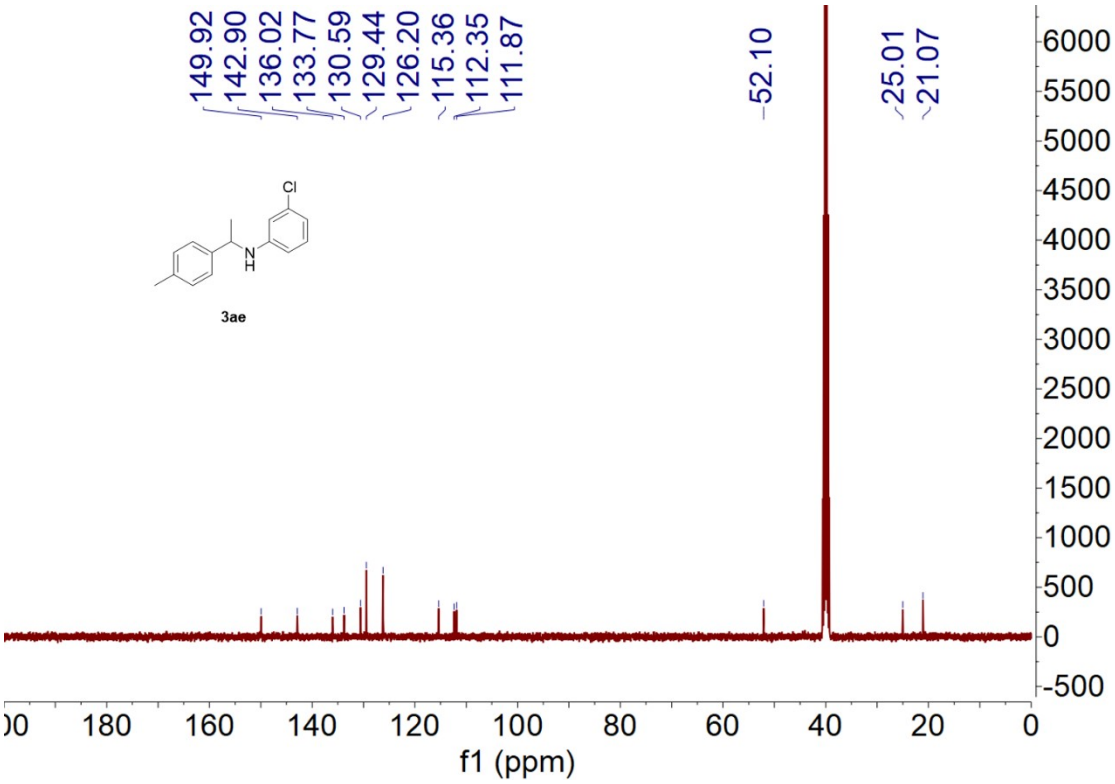
^{19}F NMR spectrum (565 MHz, DMSO-d_6) of **3ad**



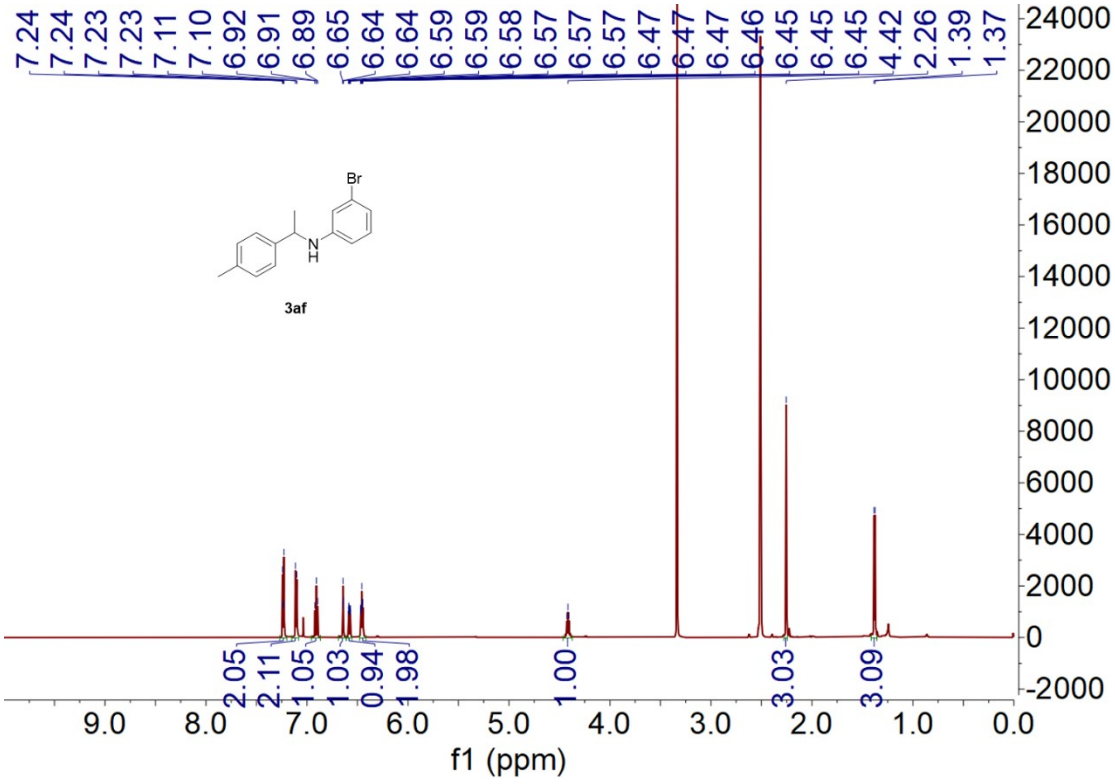
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ae**



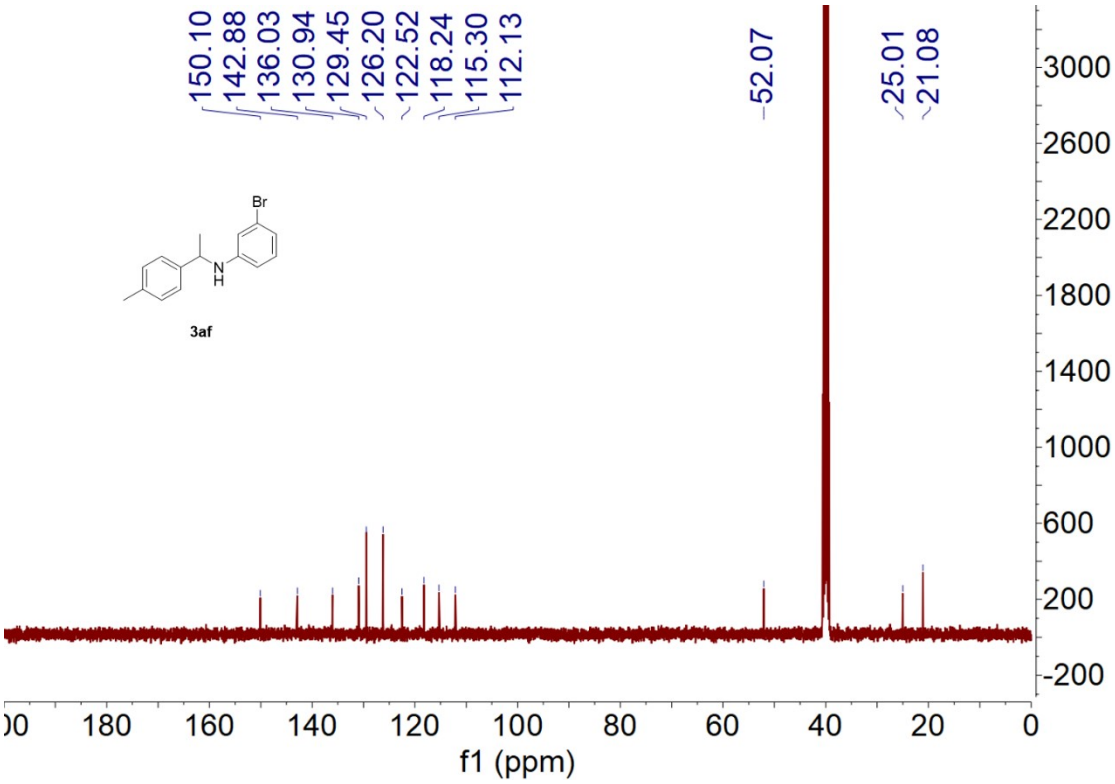
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ae**



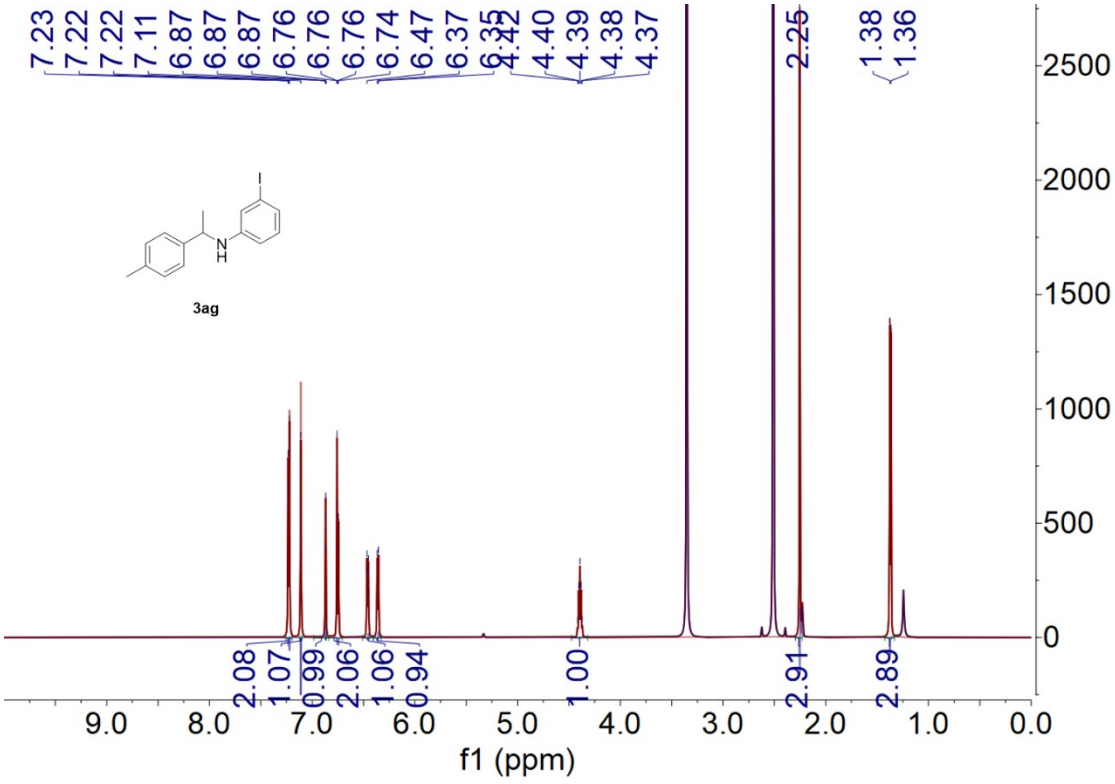
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3af**



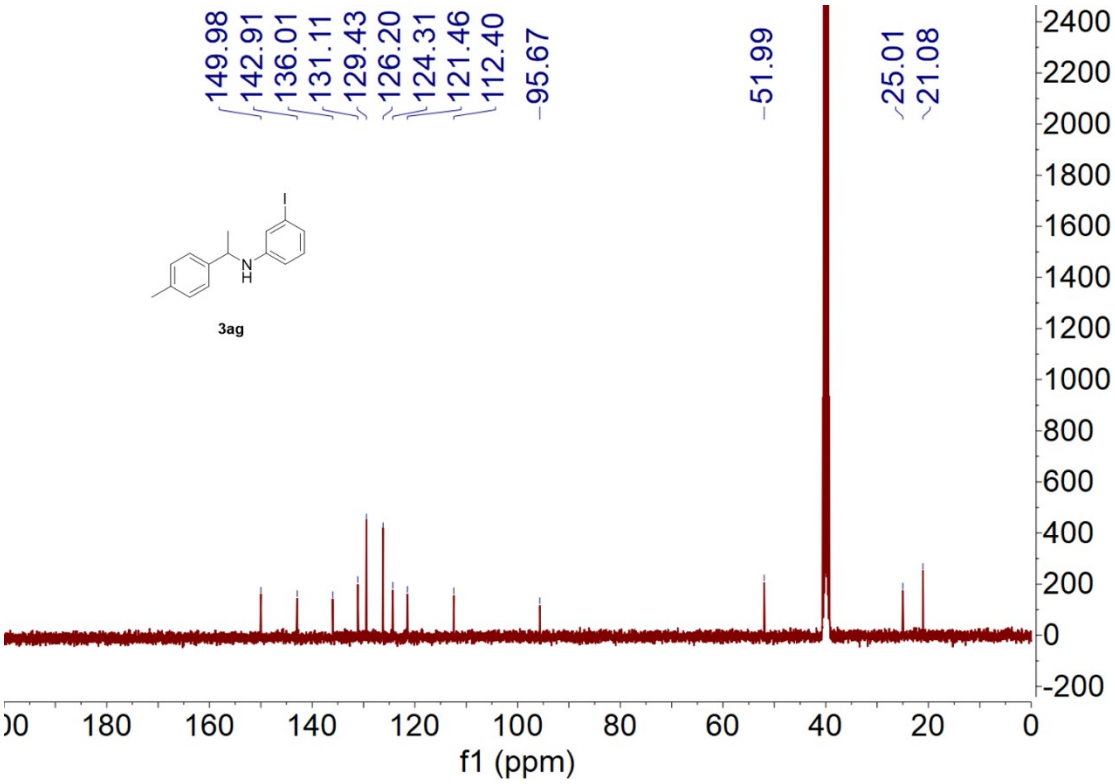
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3af**



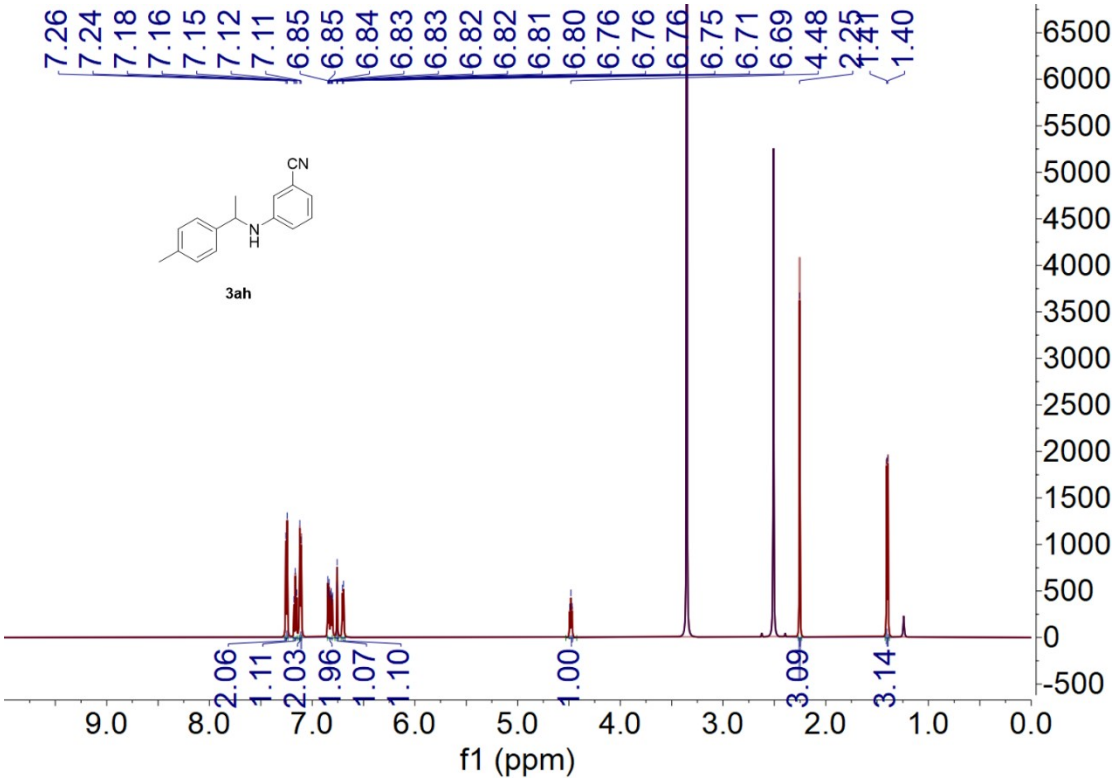
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ag**



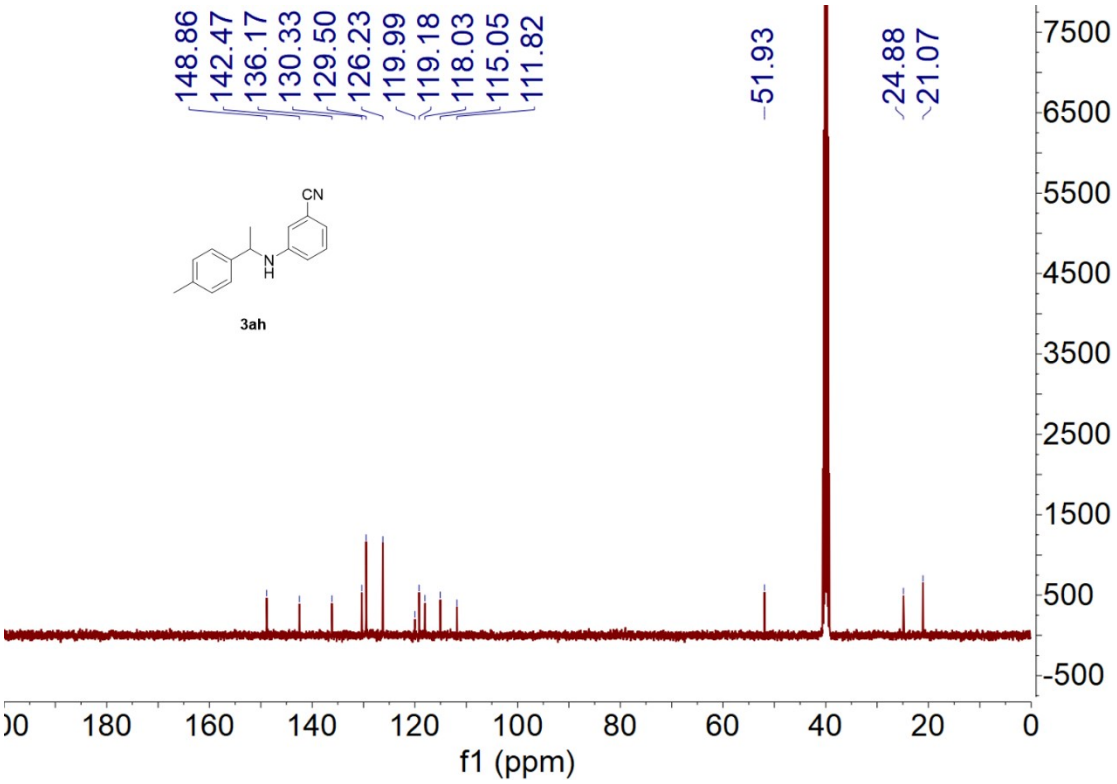
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ag**



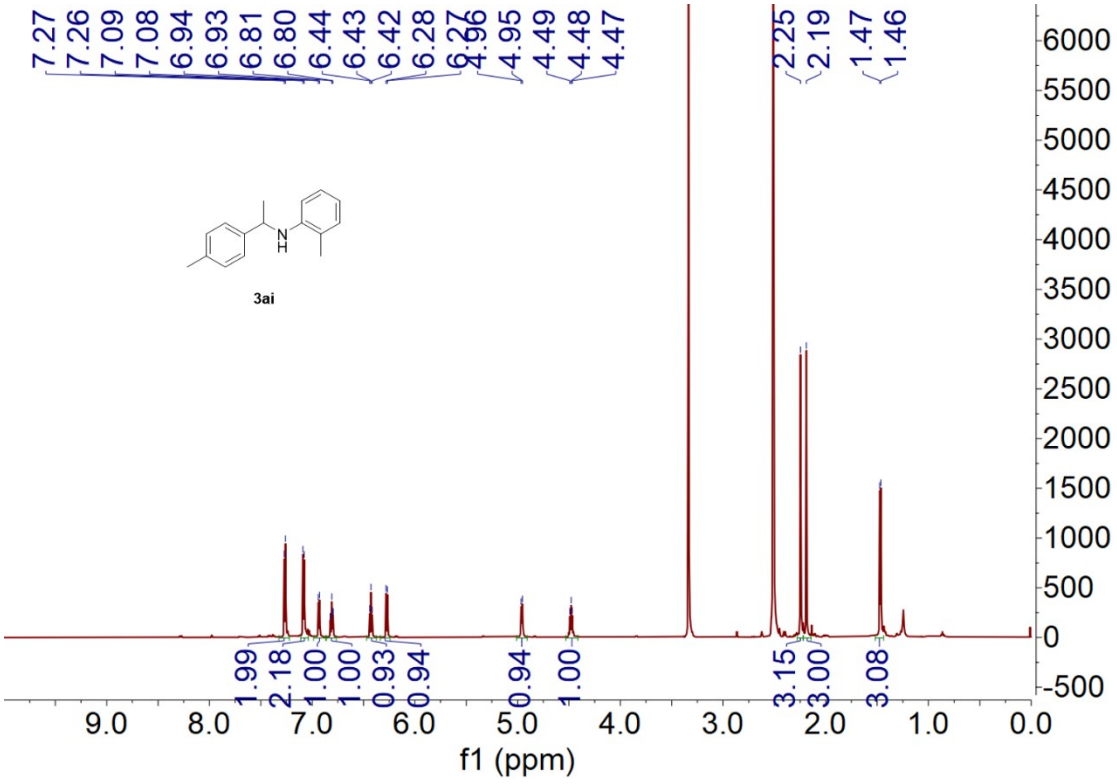
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ah**



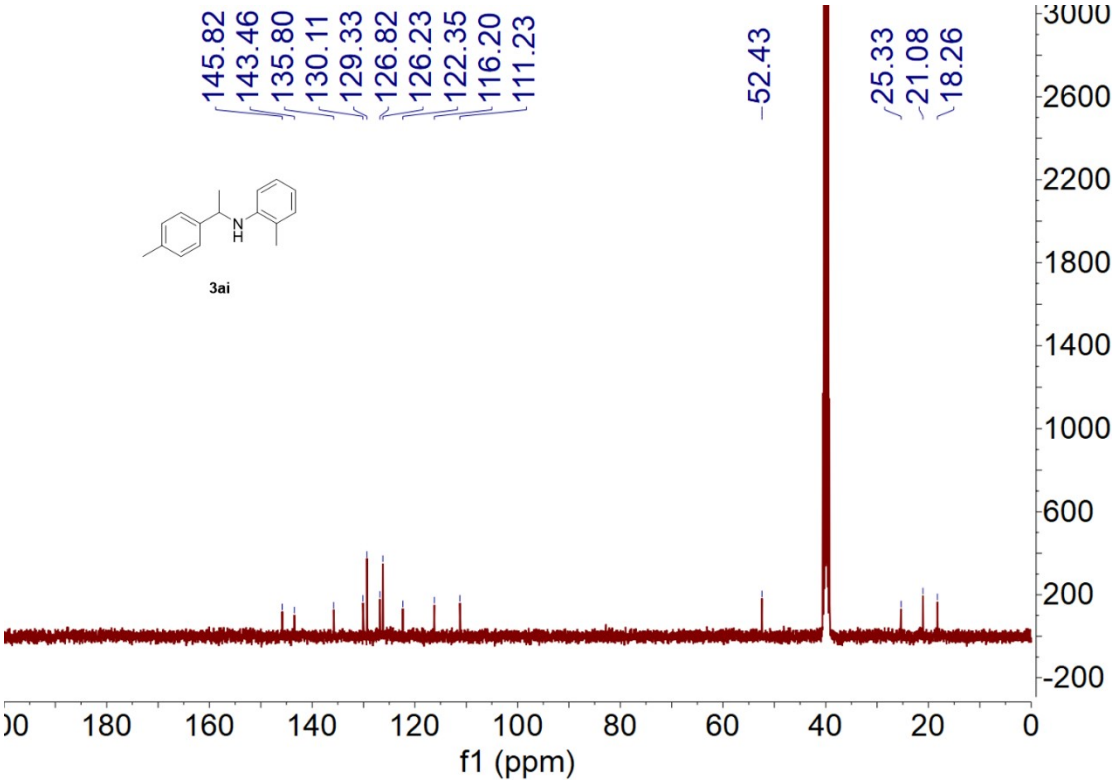
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ah**



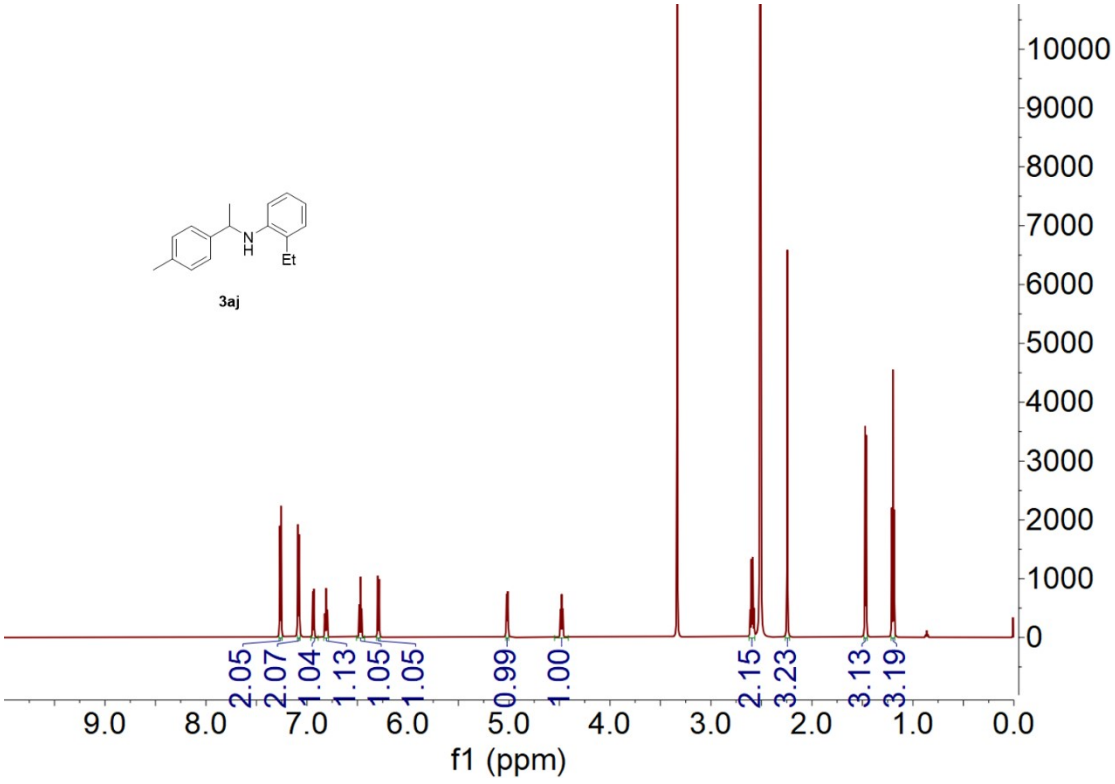
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ai**



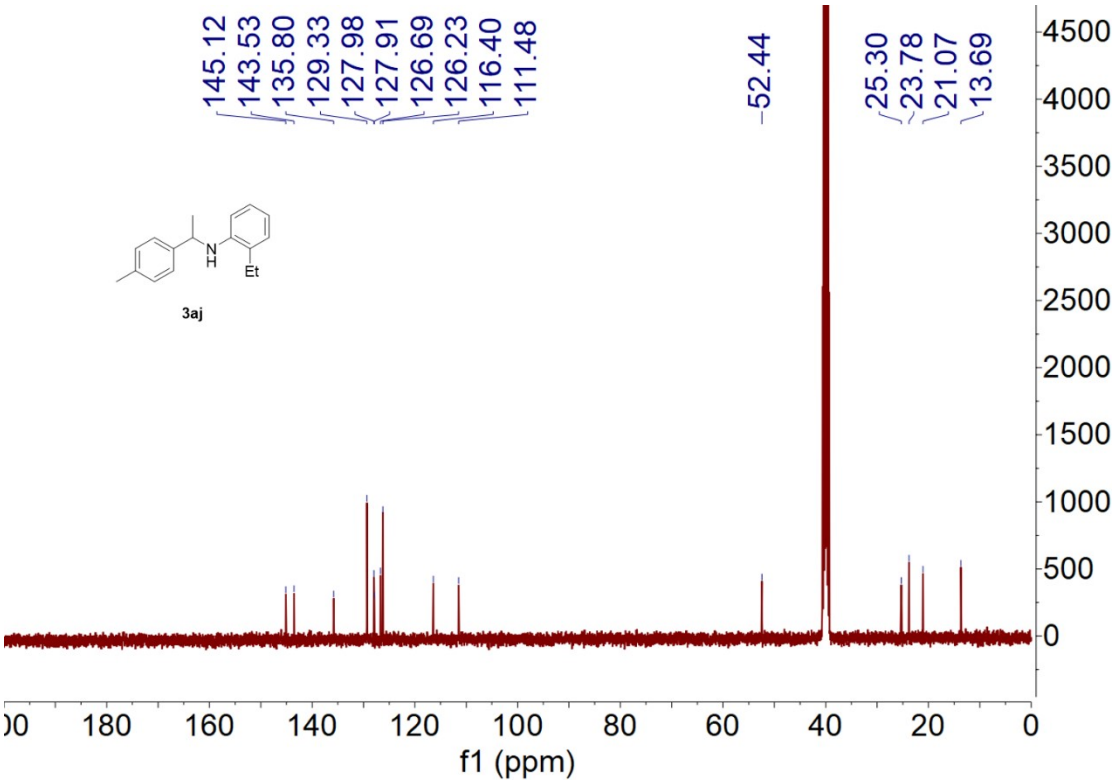
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ai**



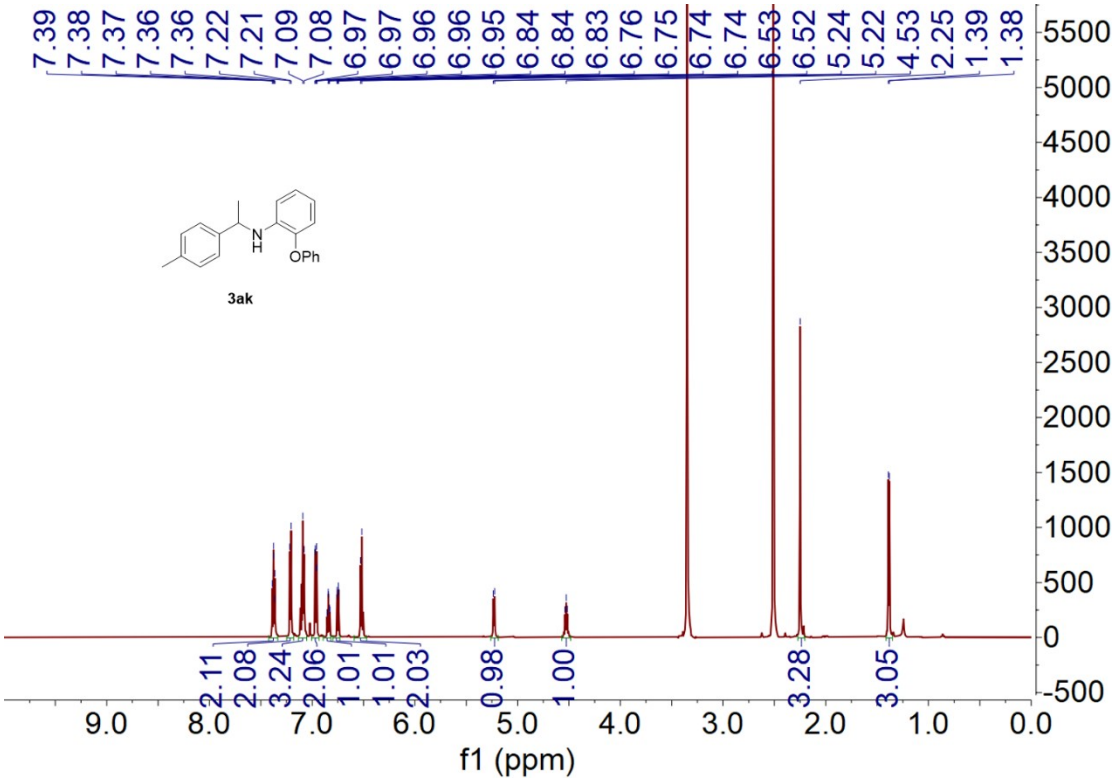
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3aj**



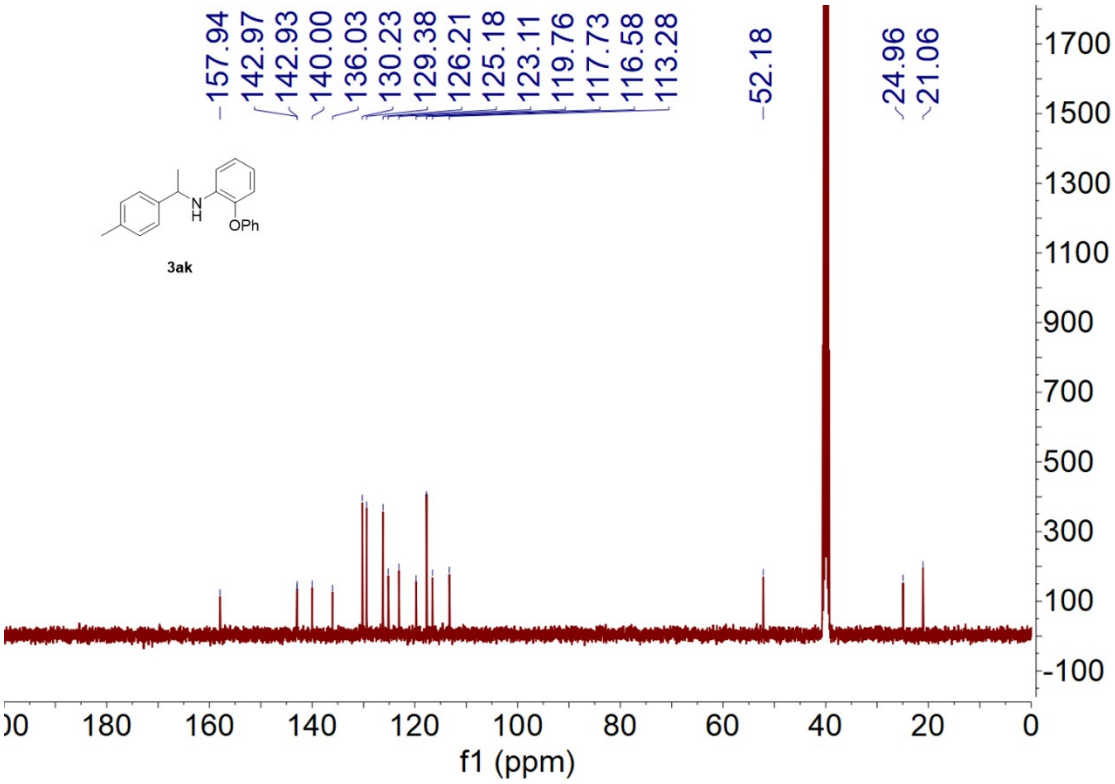
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3aj**



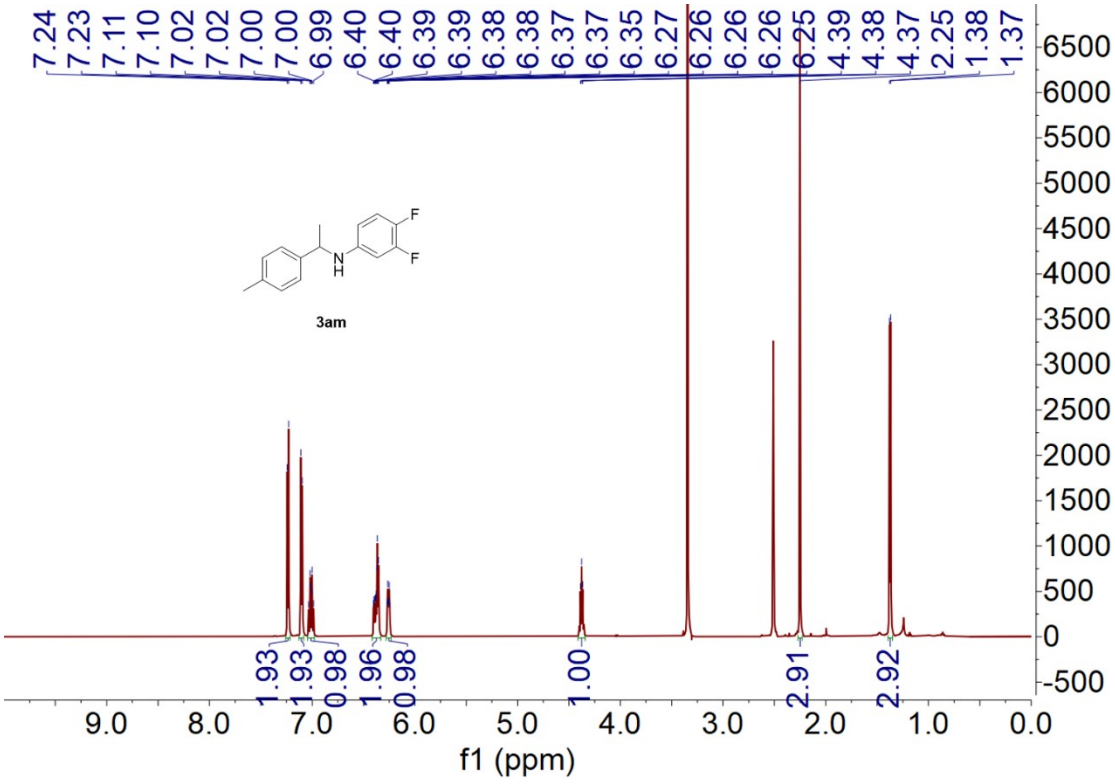
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ak**



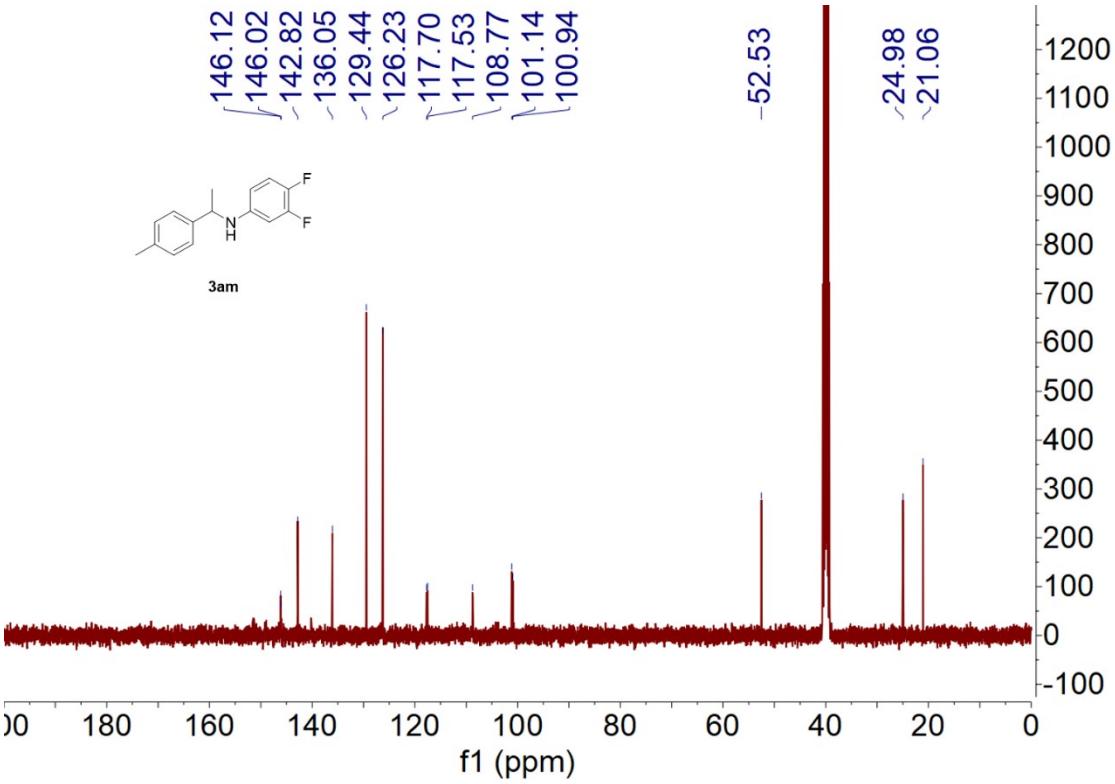
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ak**



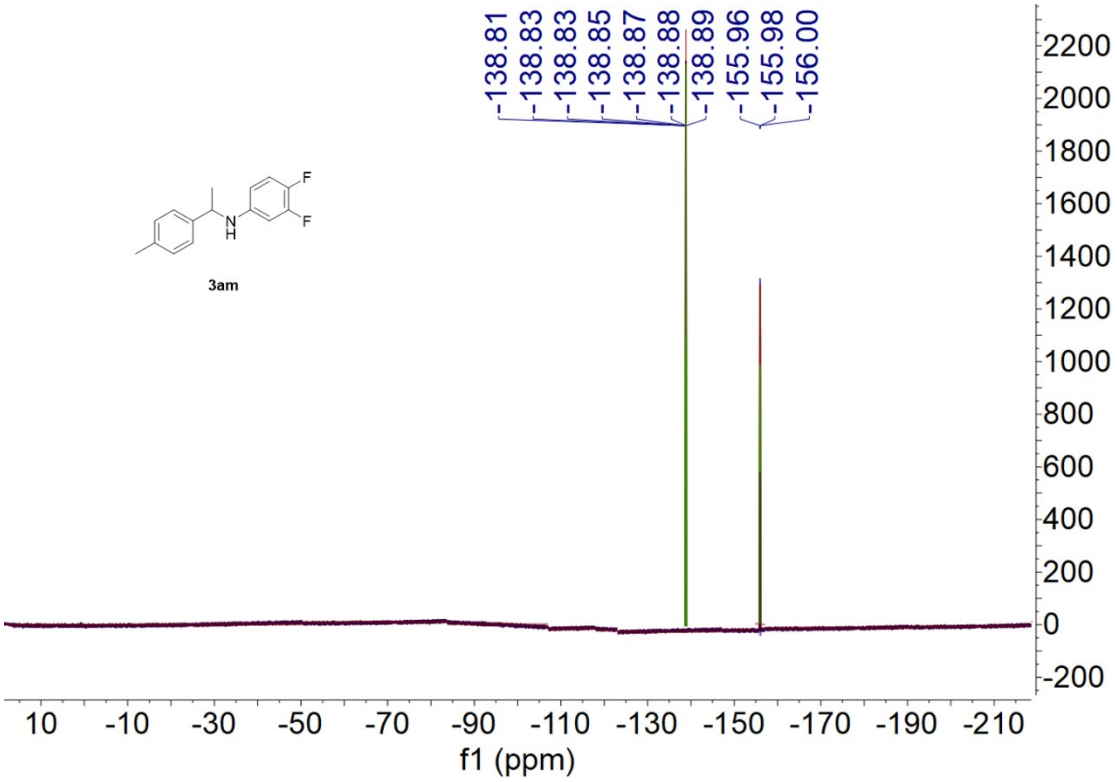
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3am**



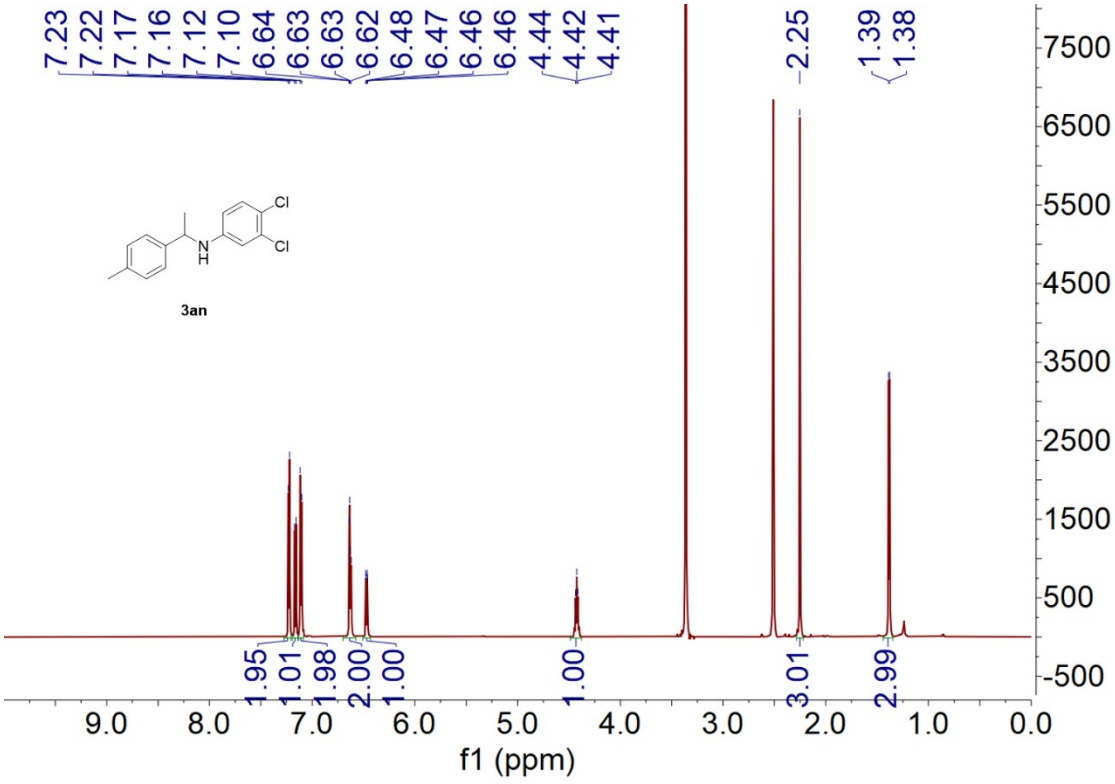
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3am**



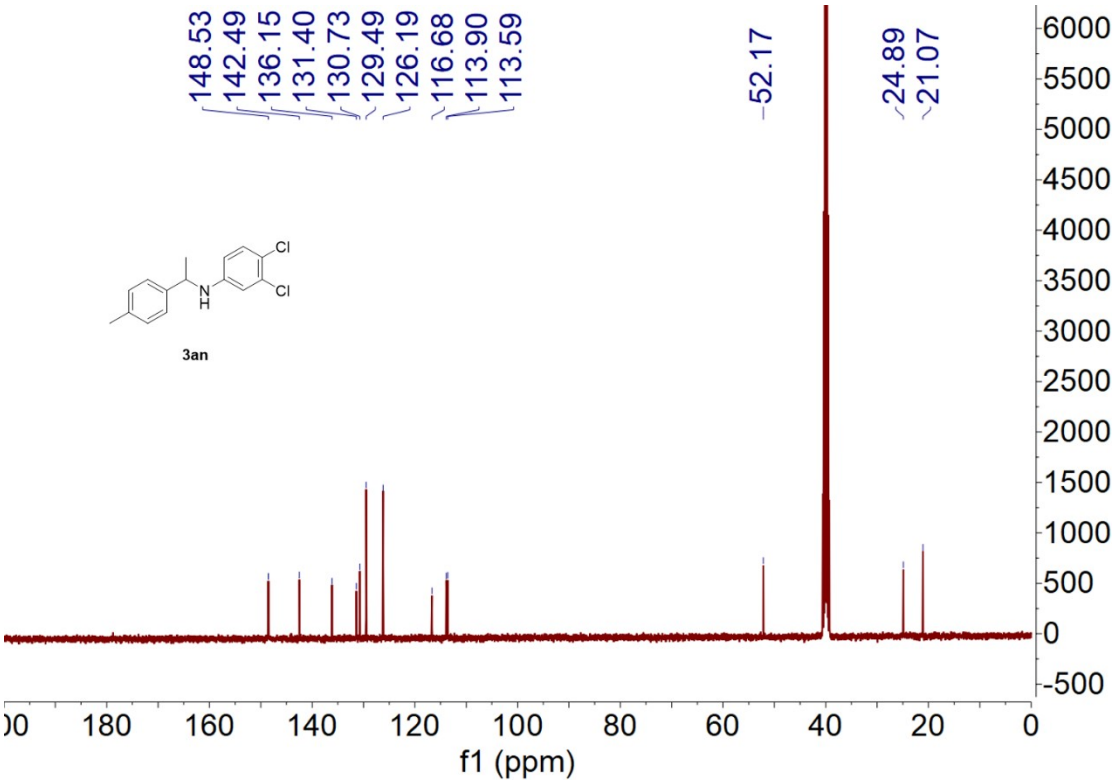
^{19}F NMR spectrum (565 MHz, DMSO-d_6) of **3am**



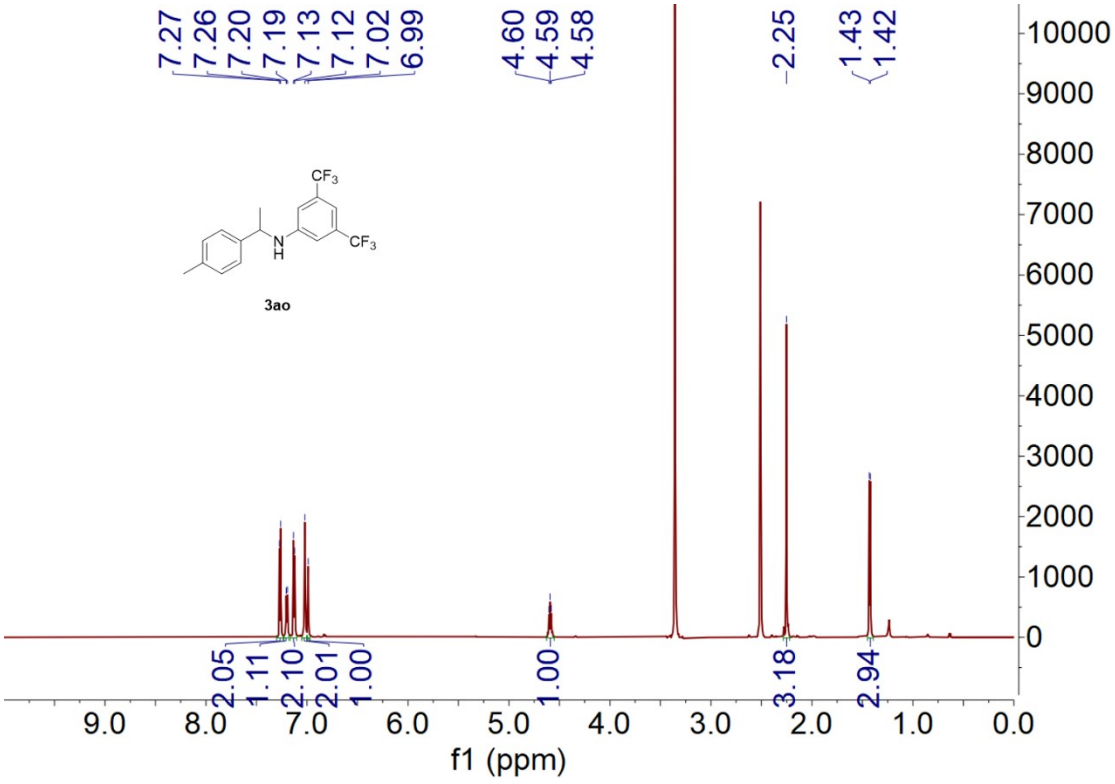
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3an**



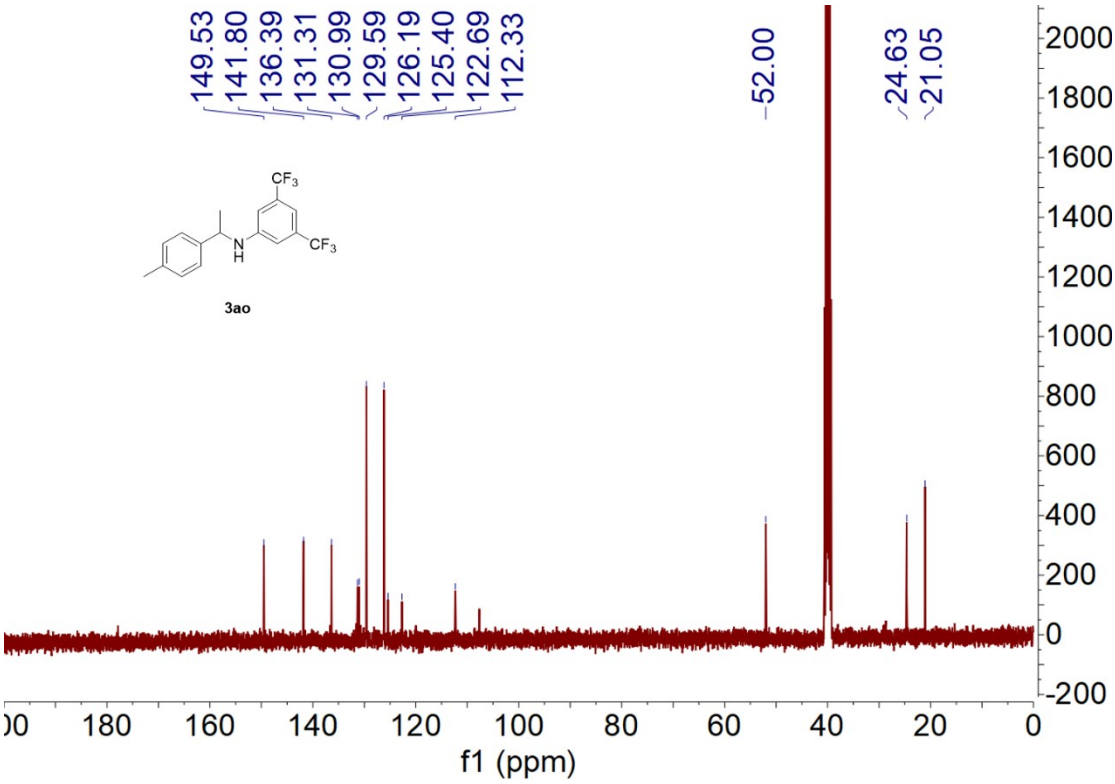
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3an**



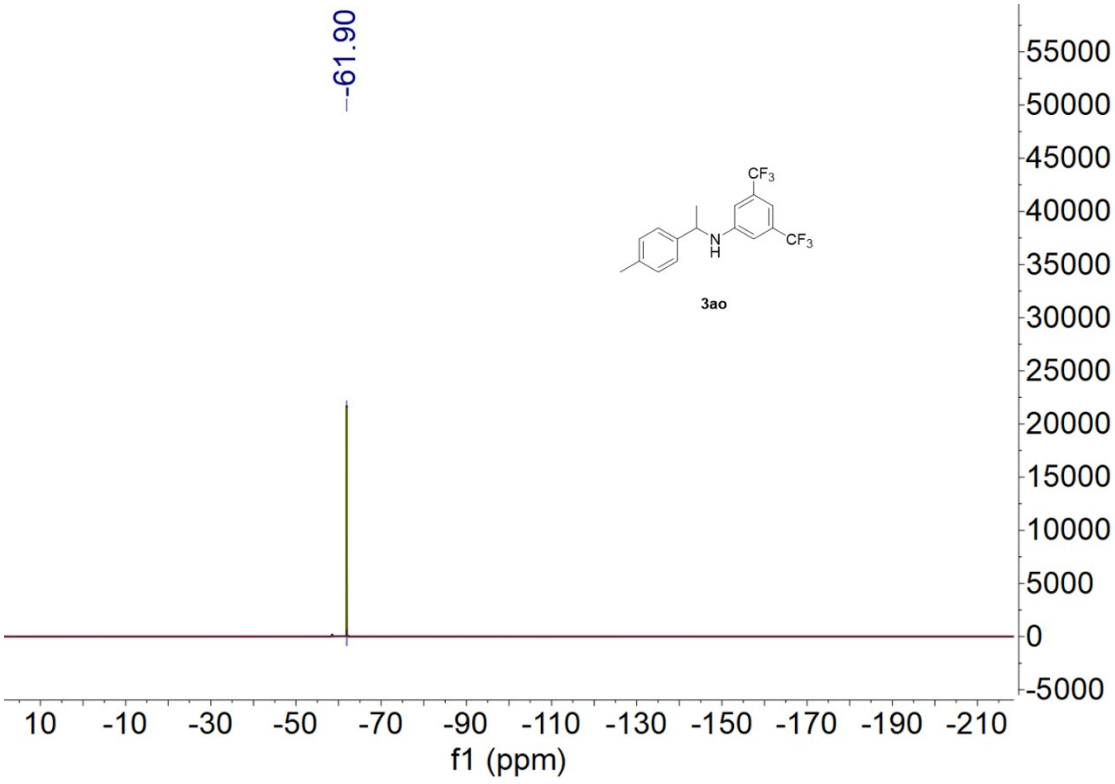
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ao**



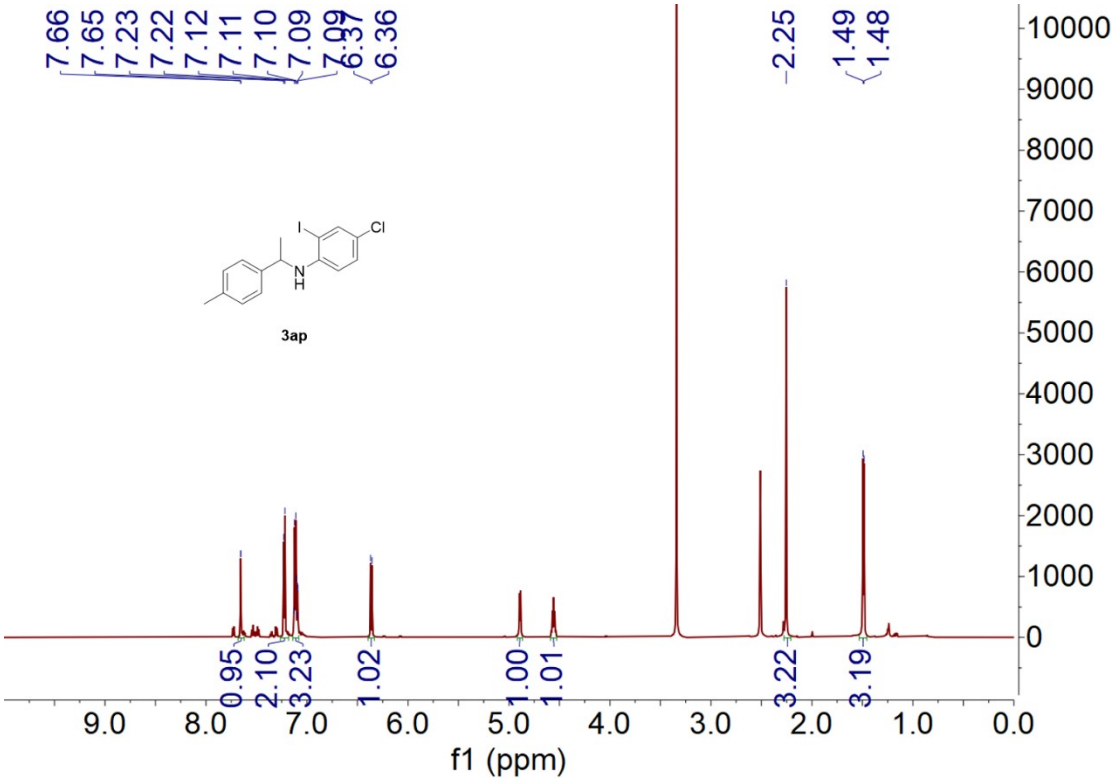
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ao**



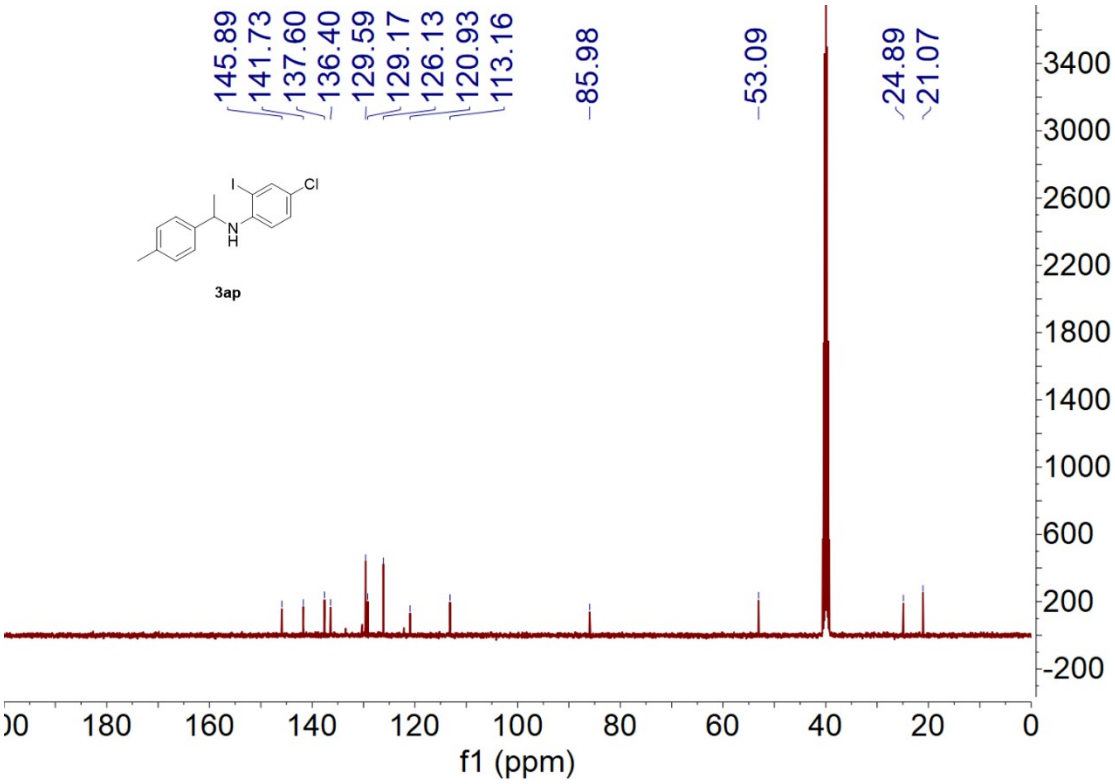
^{19}F NMR spectrum (565 MHz, DMSO-d_6) of **3ao**



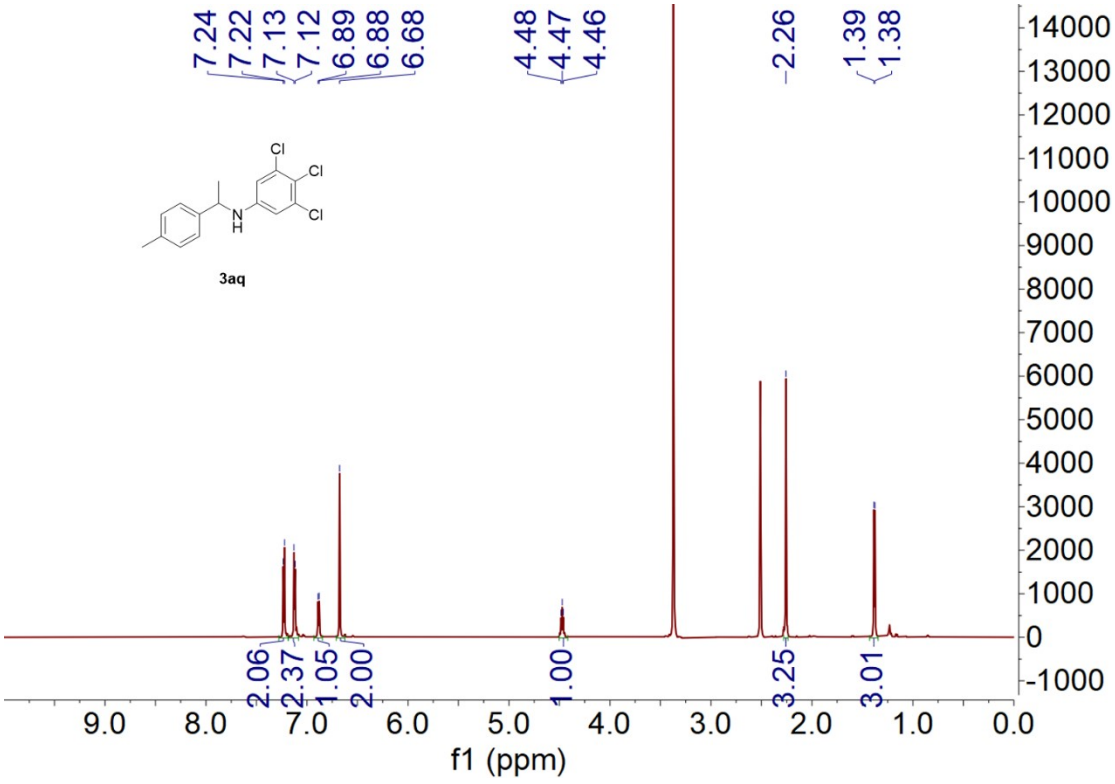
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ap**



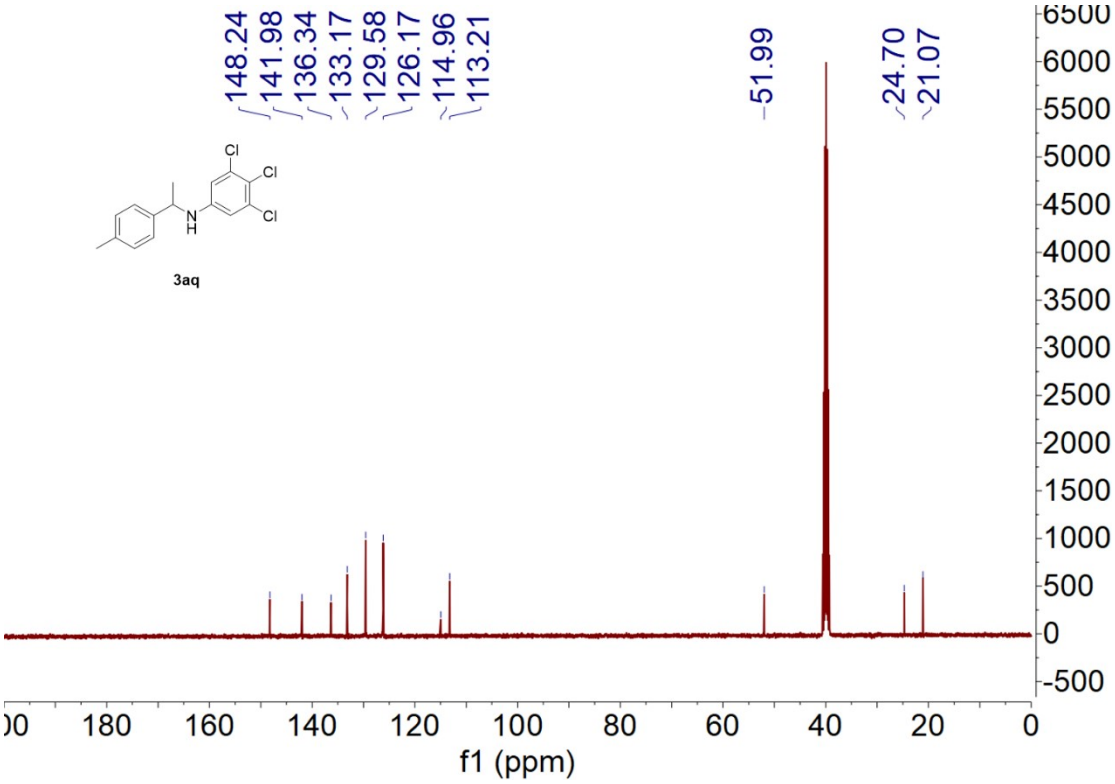
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ap**



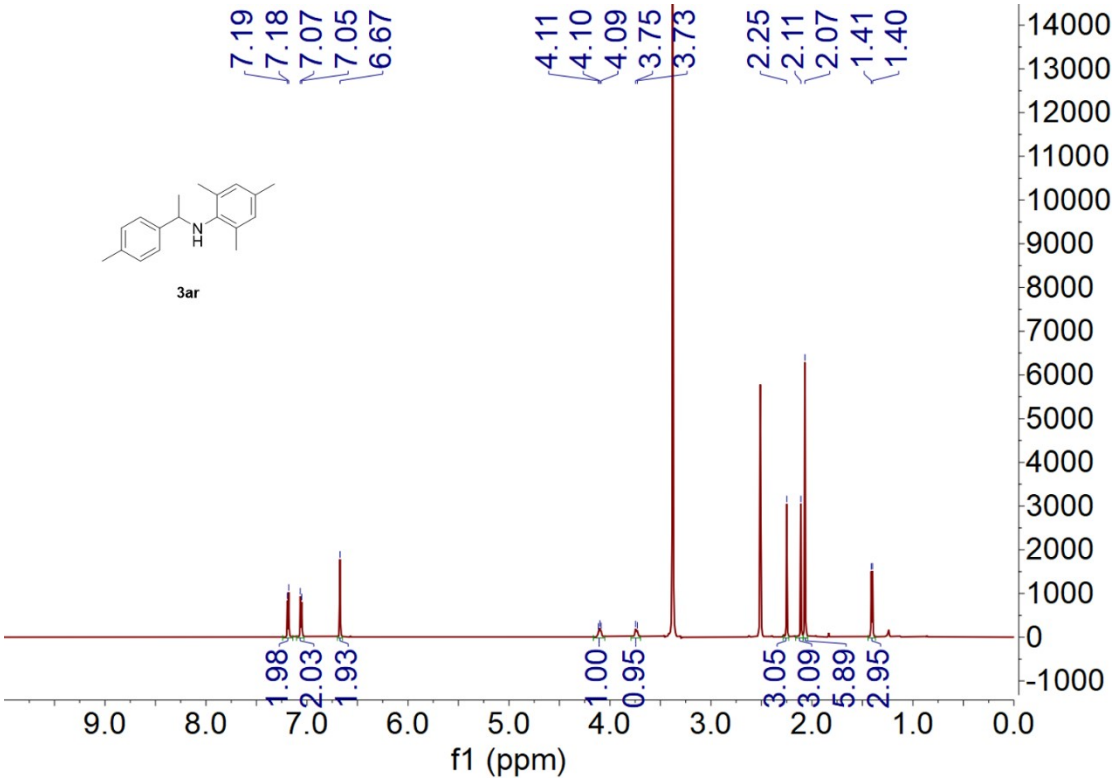
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3aq**



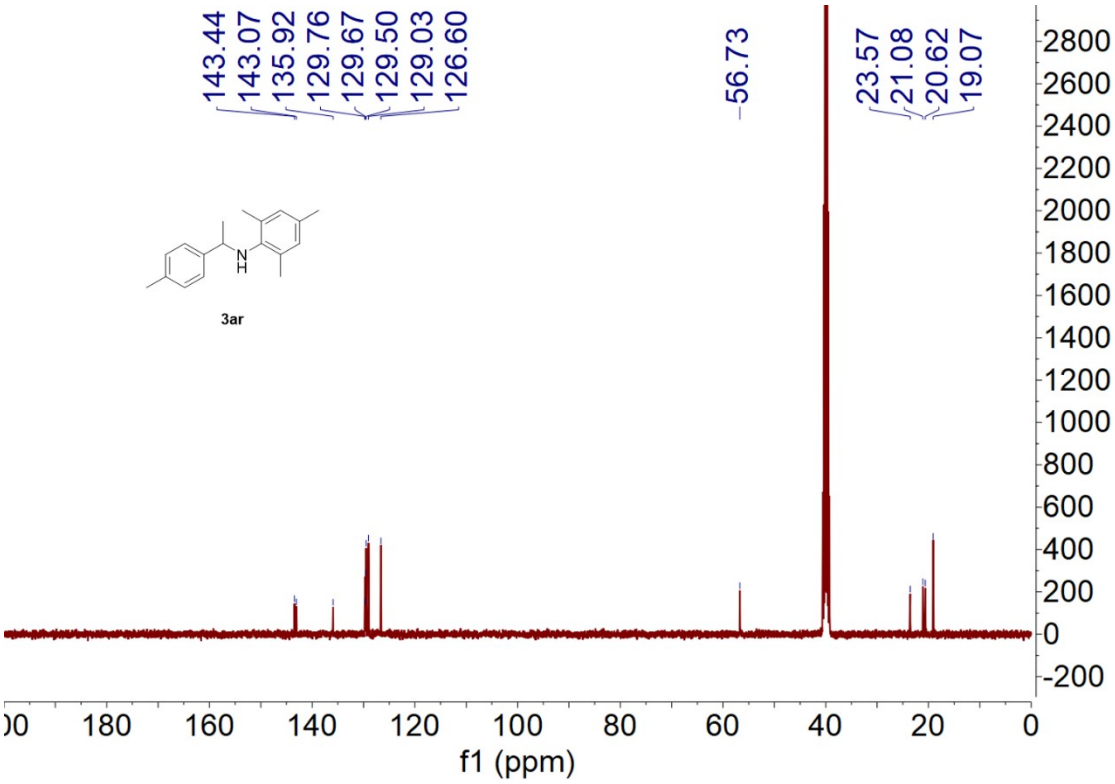
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3aq**



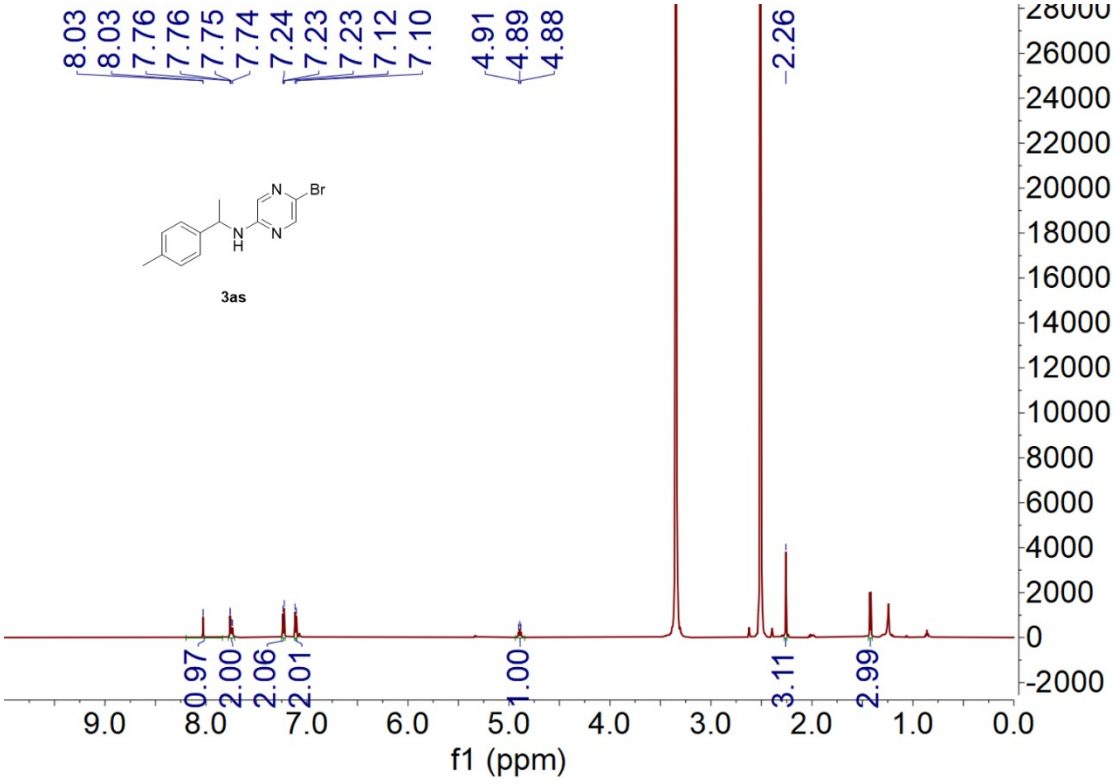
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3ar**



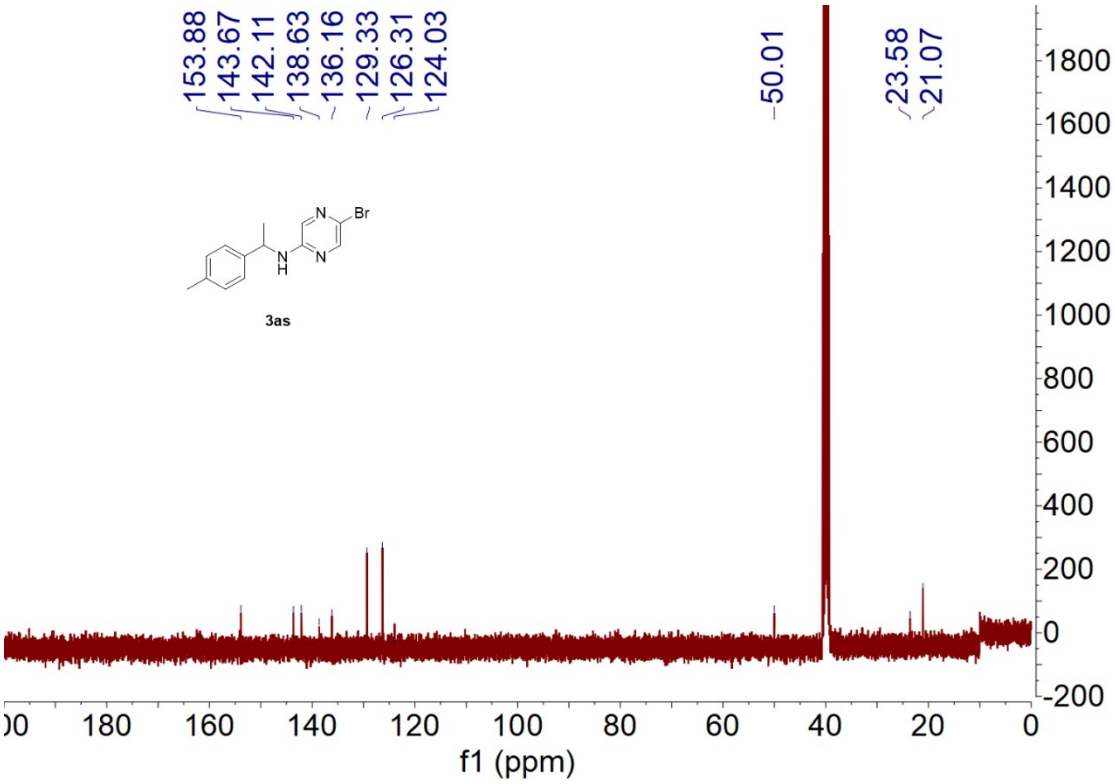
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3ar**



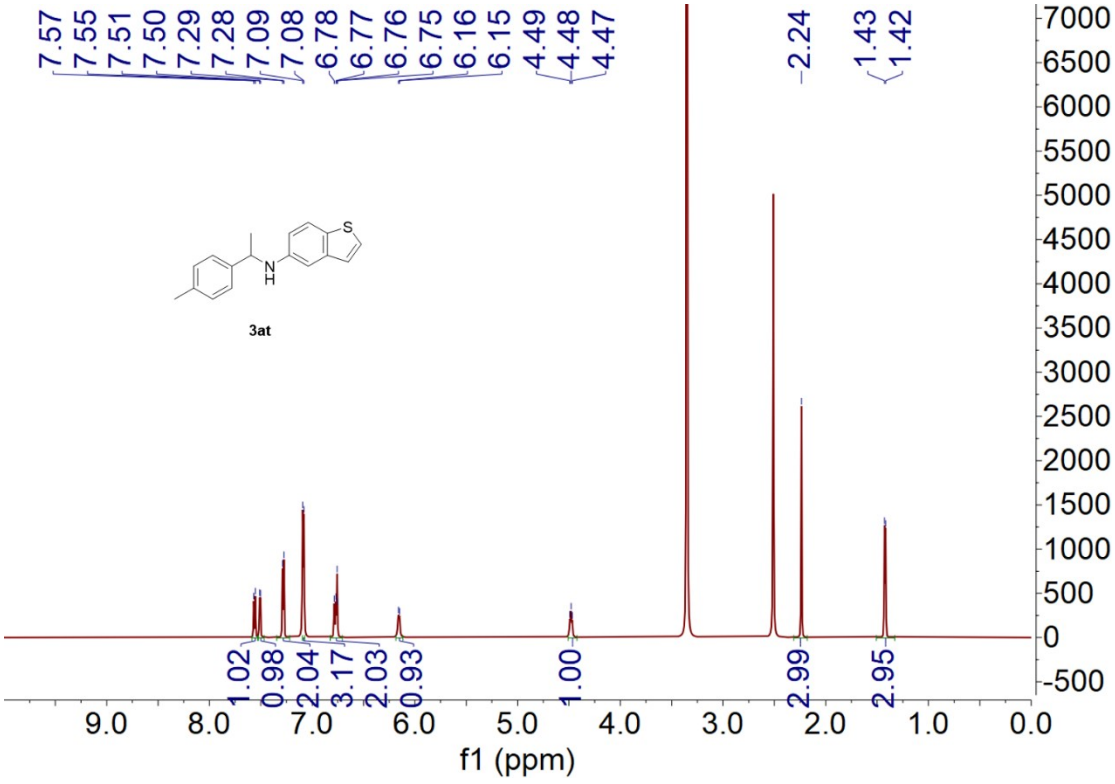
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3as**



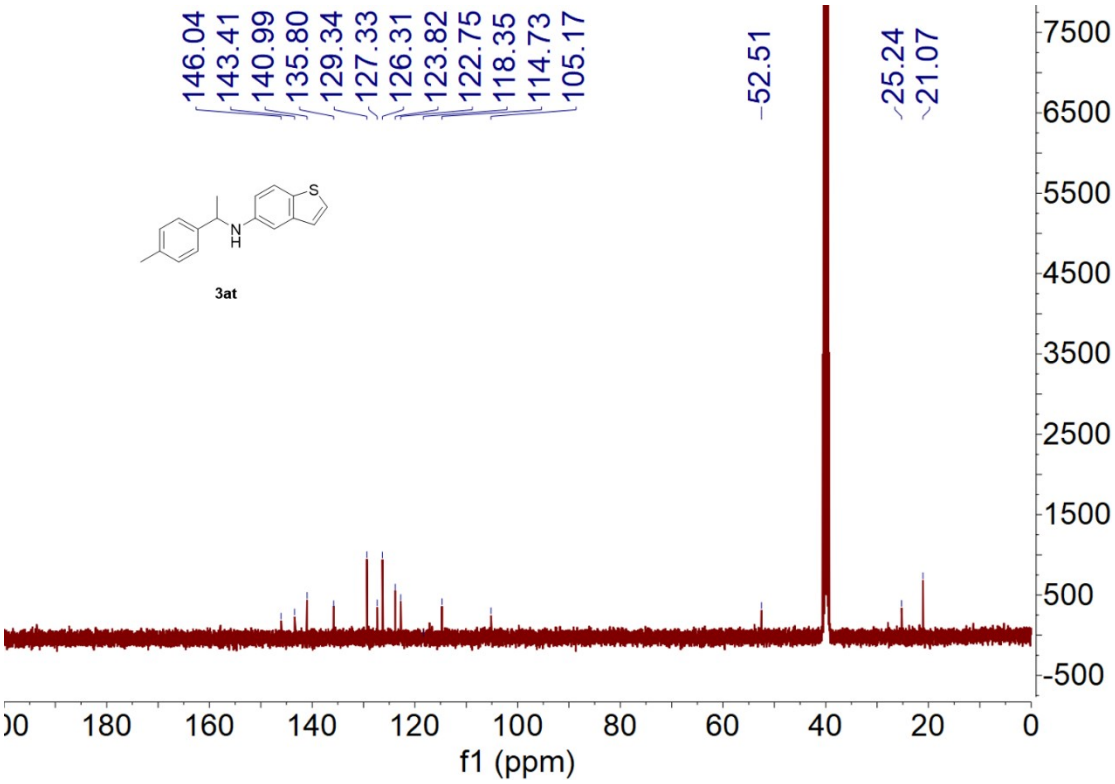
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3as**



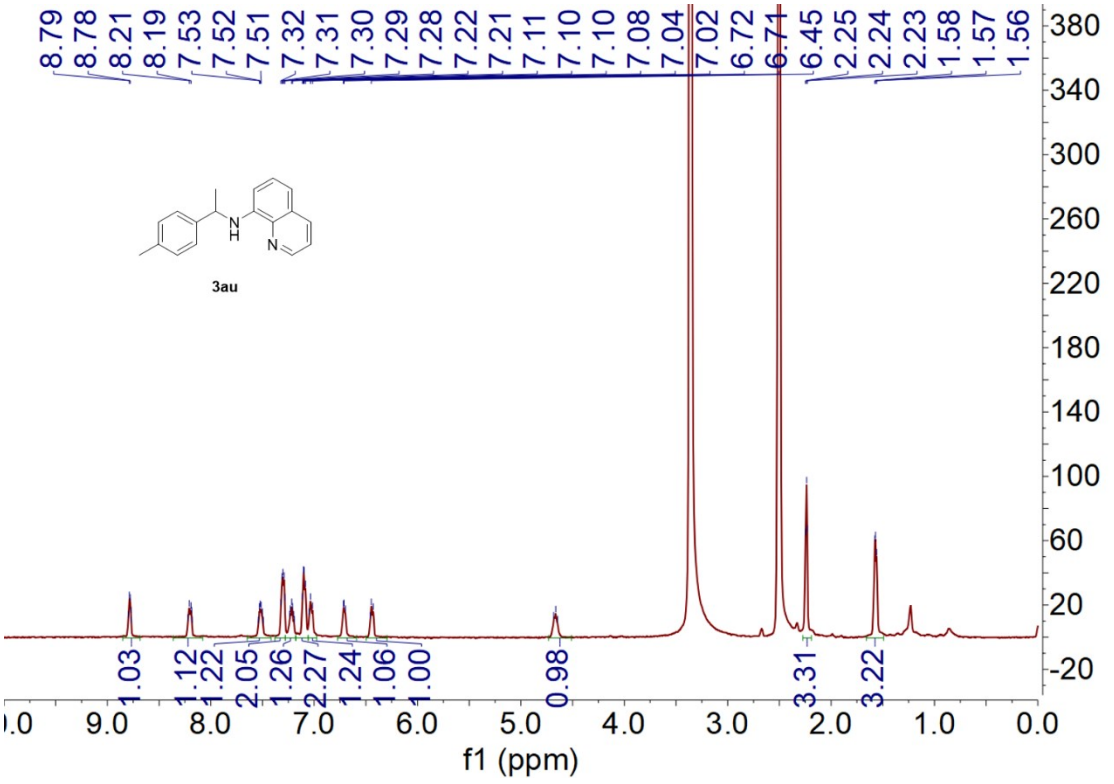
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3at**



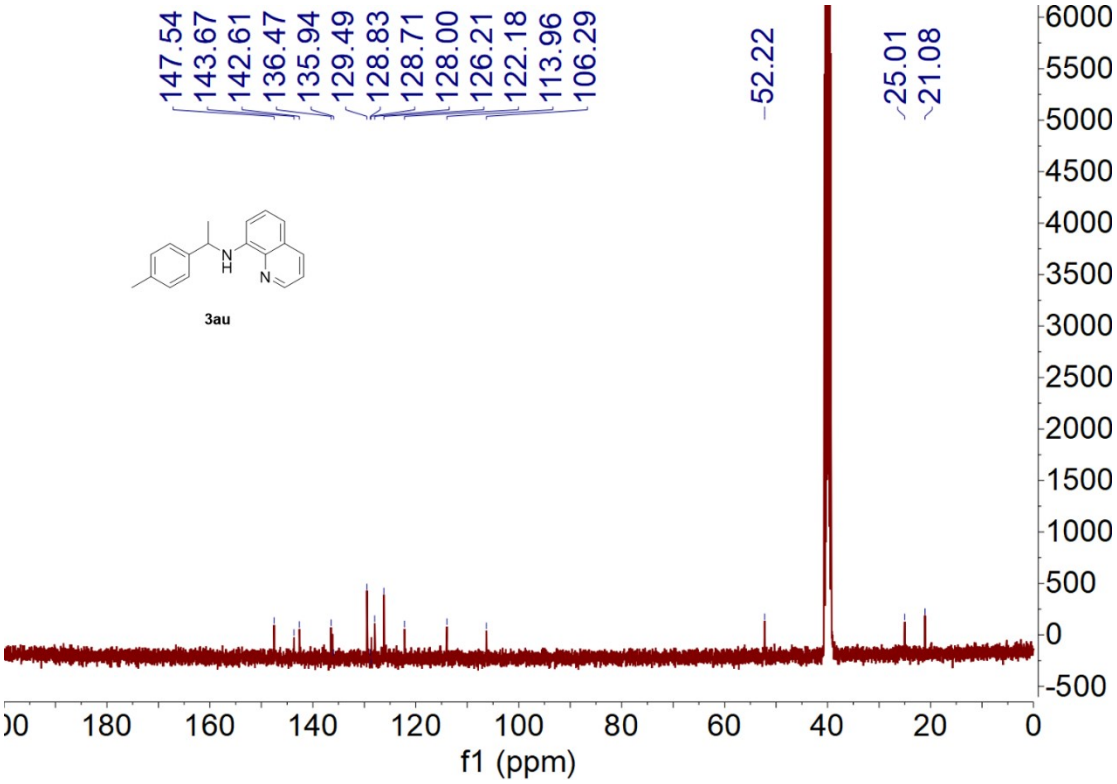
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3at**



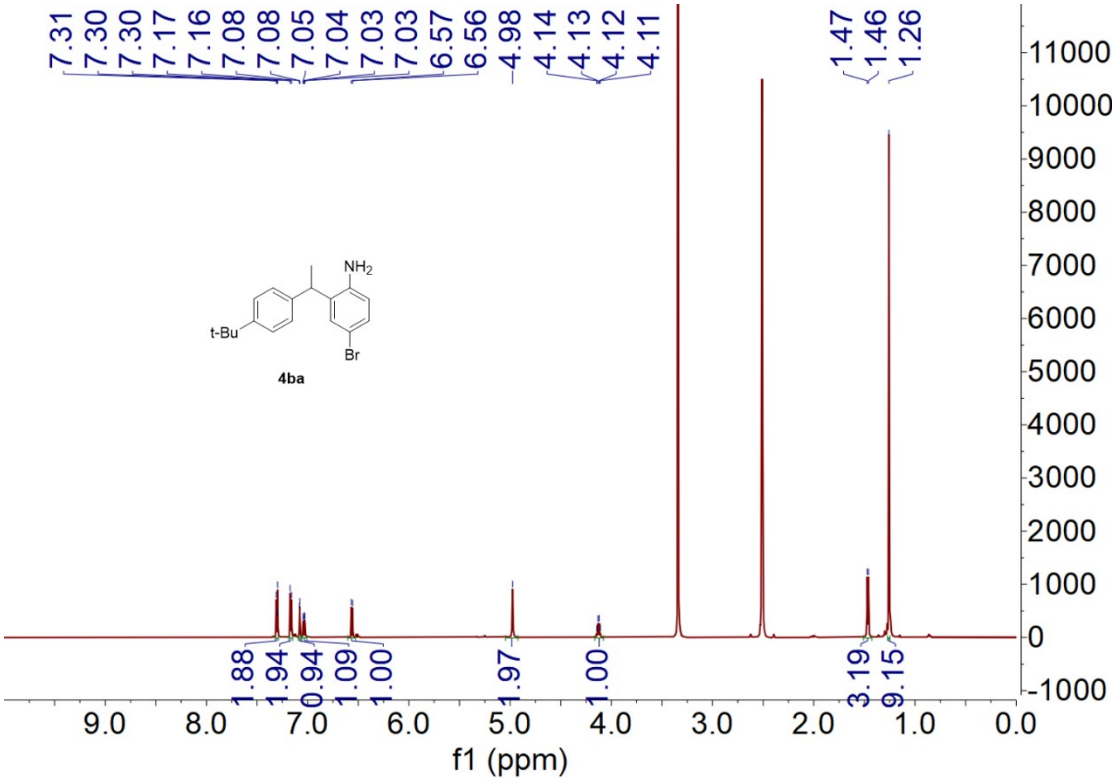
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **3au**



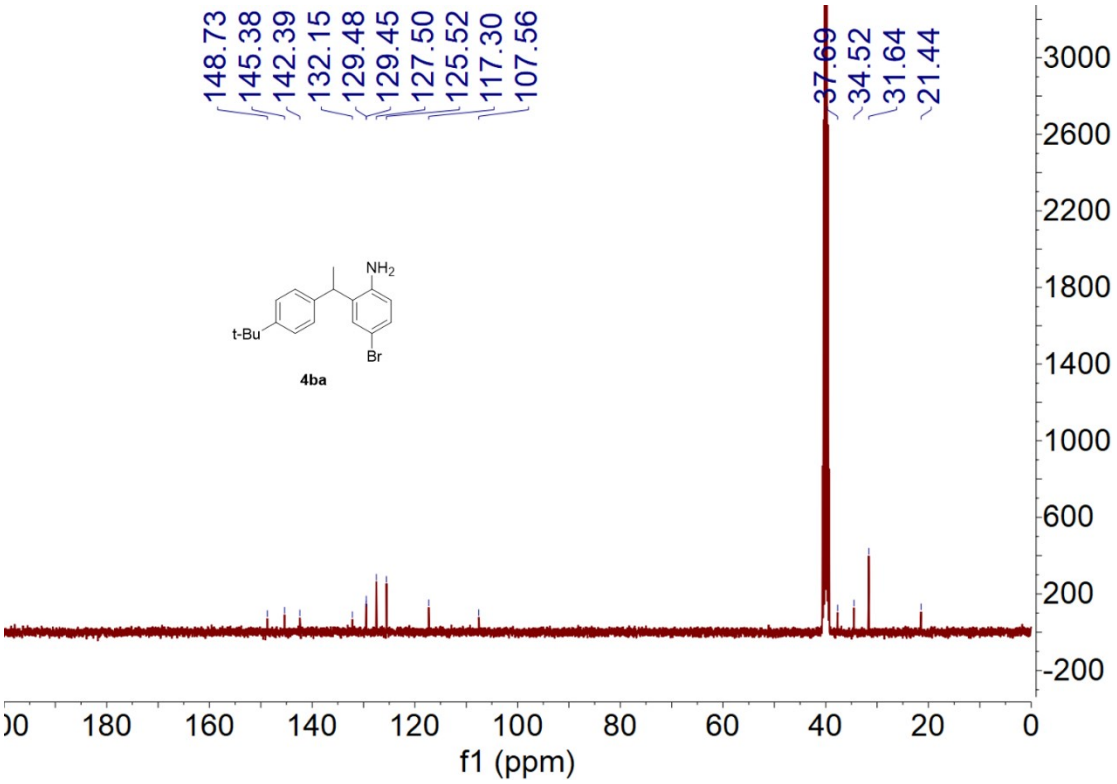
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **3au**



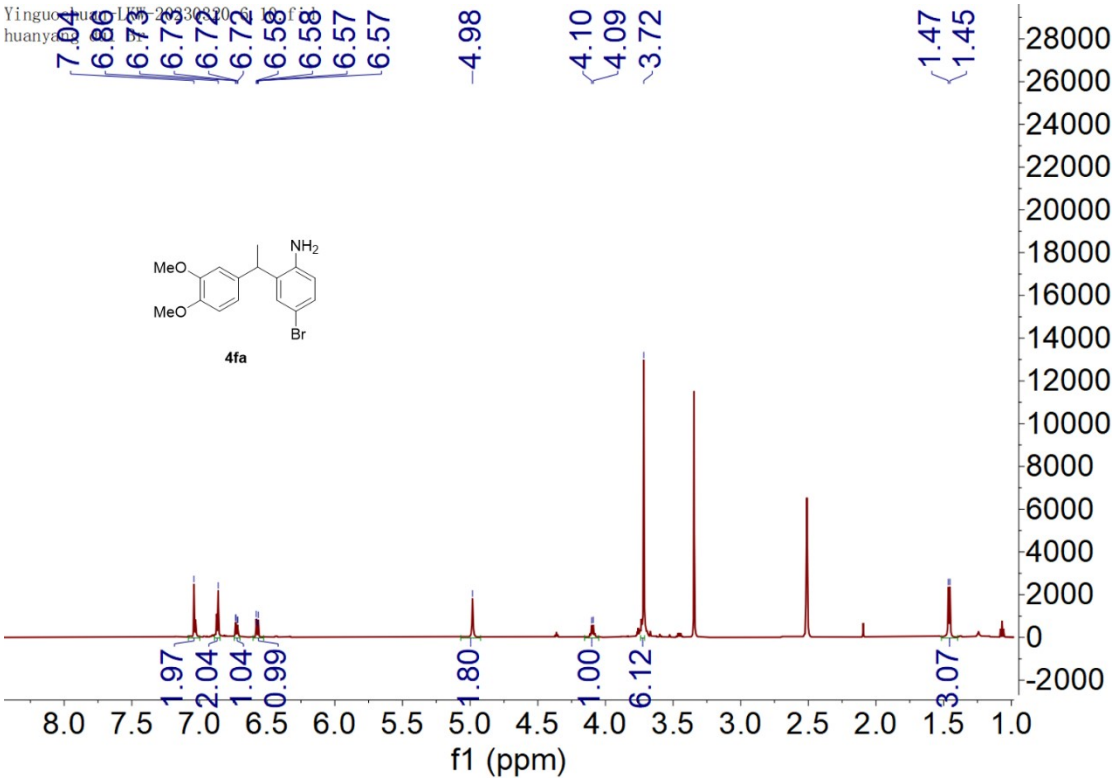
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ba**



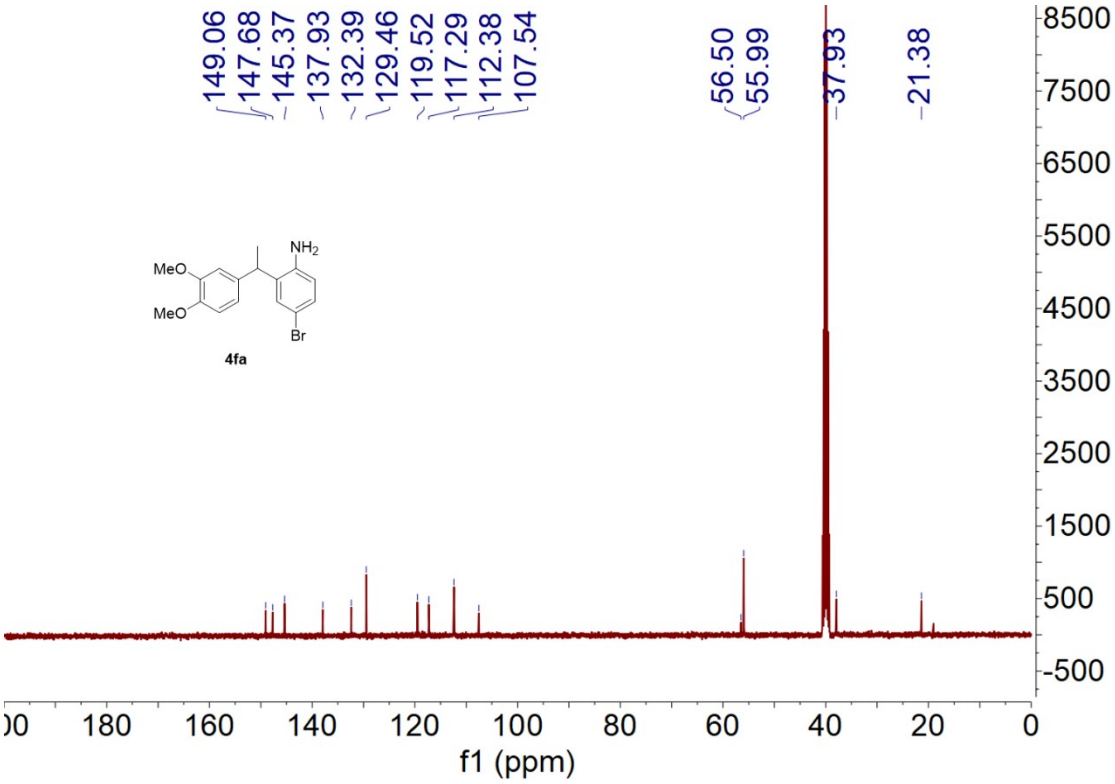
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ba**



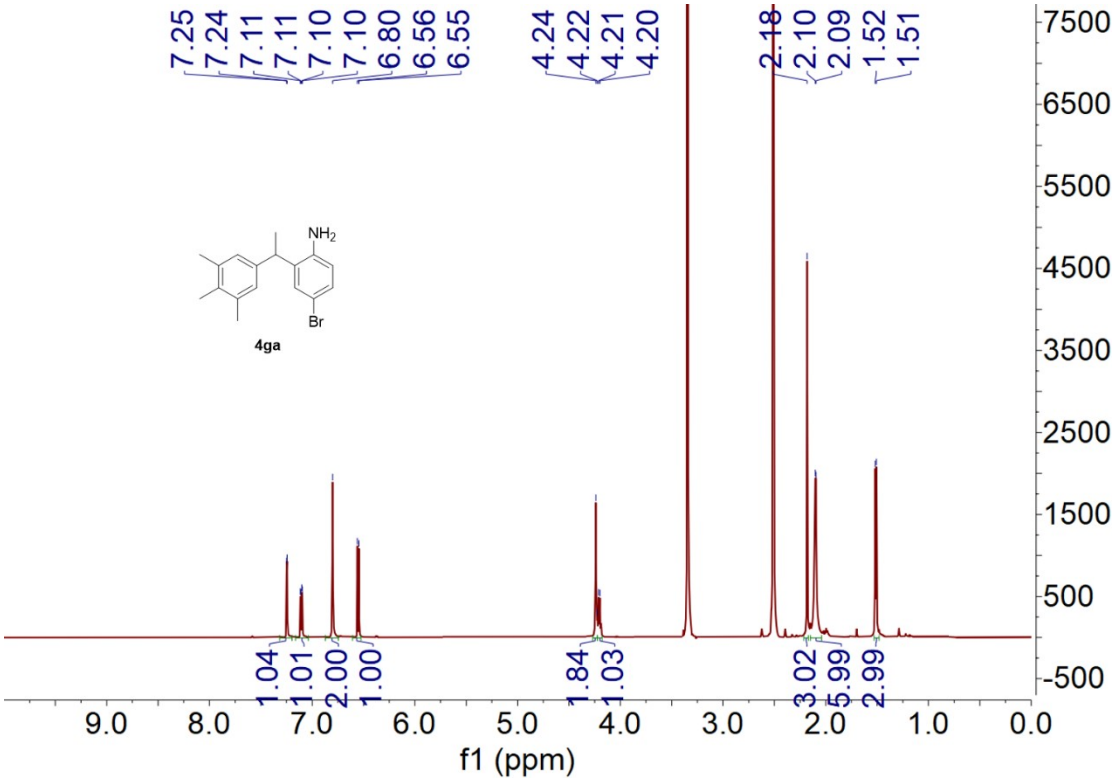
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4fa**



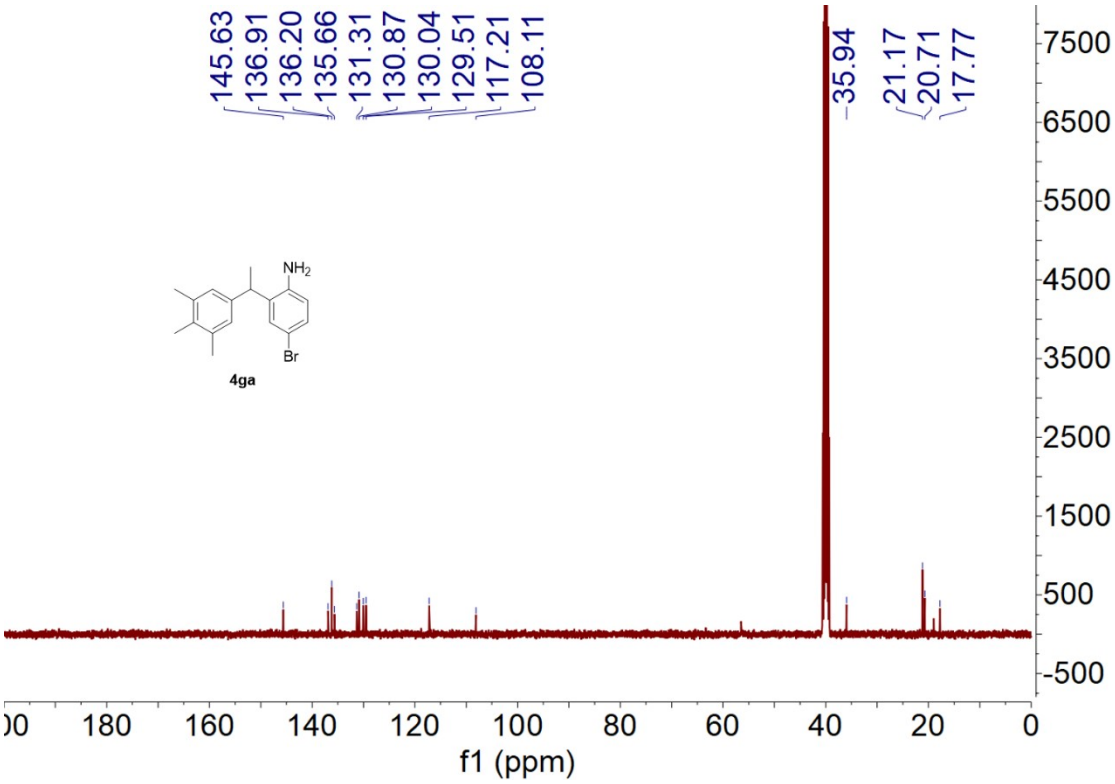
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4fa**



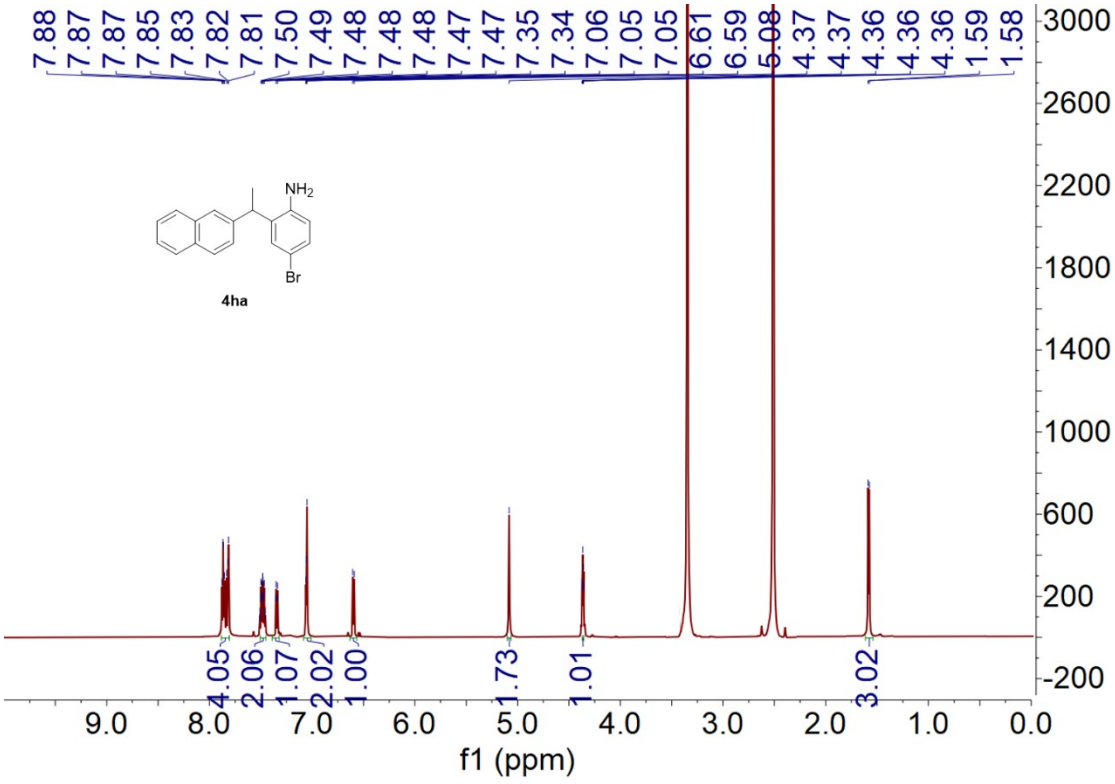
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ga**



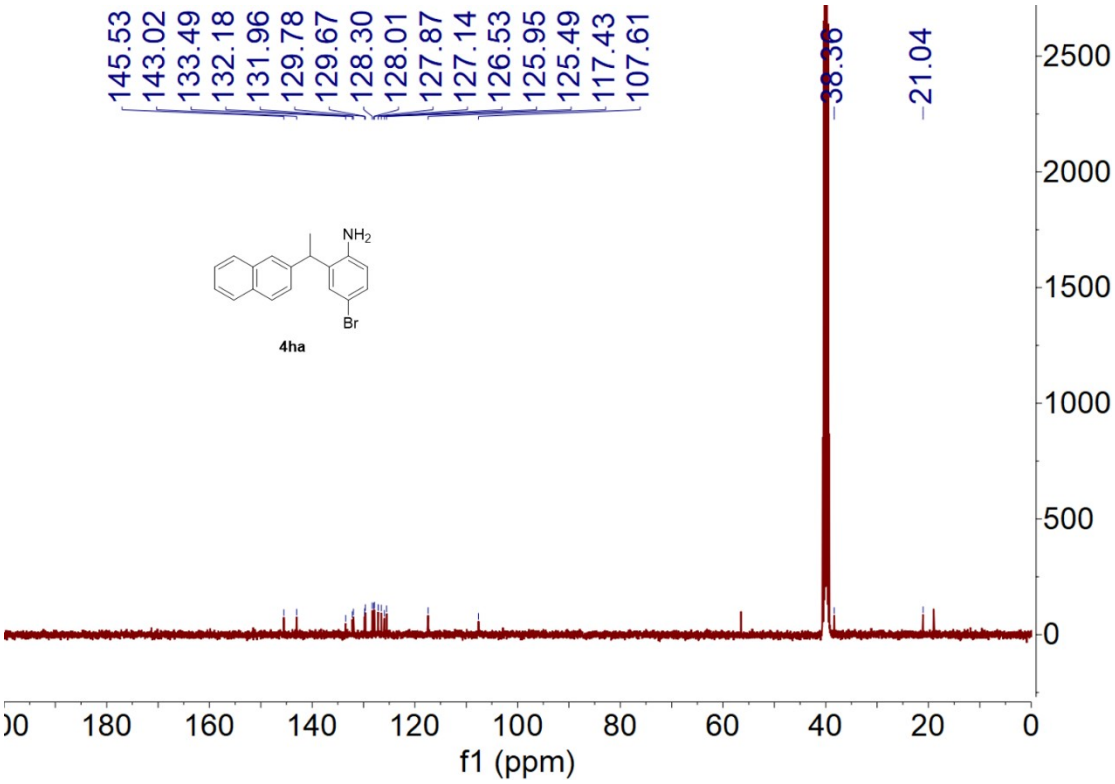
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ga**



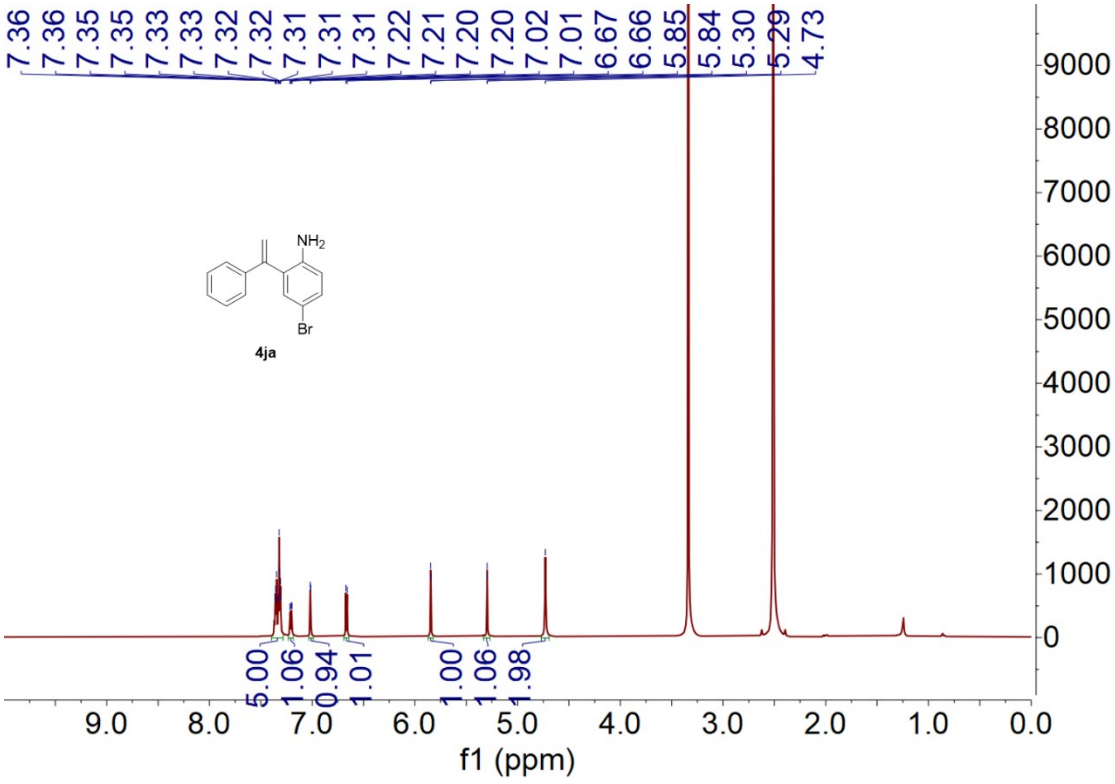
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ha**



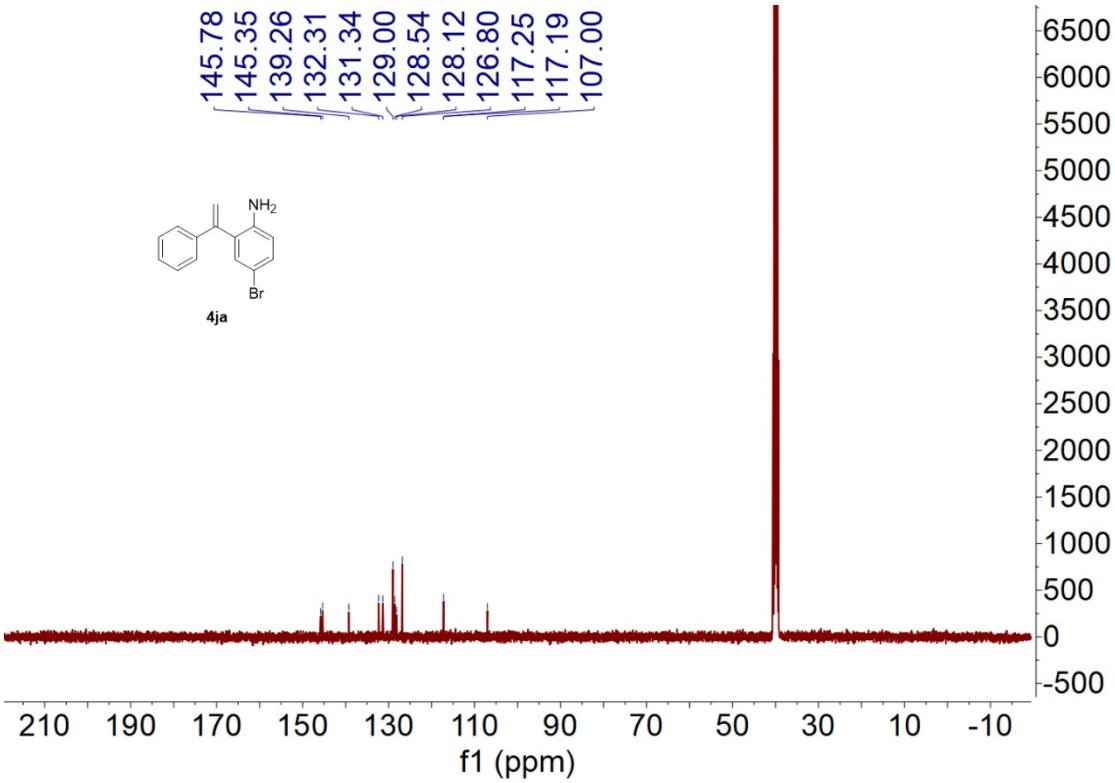
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ha**



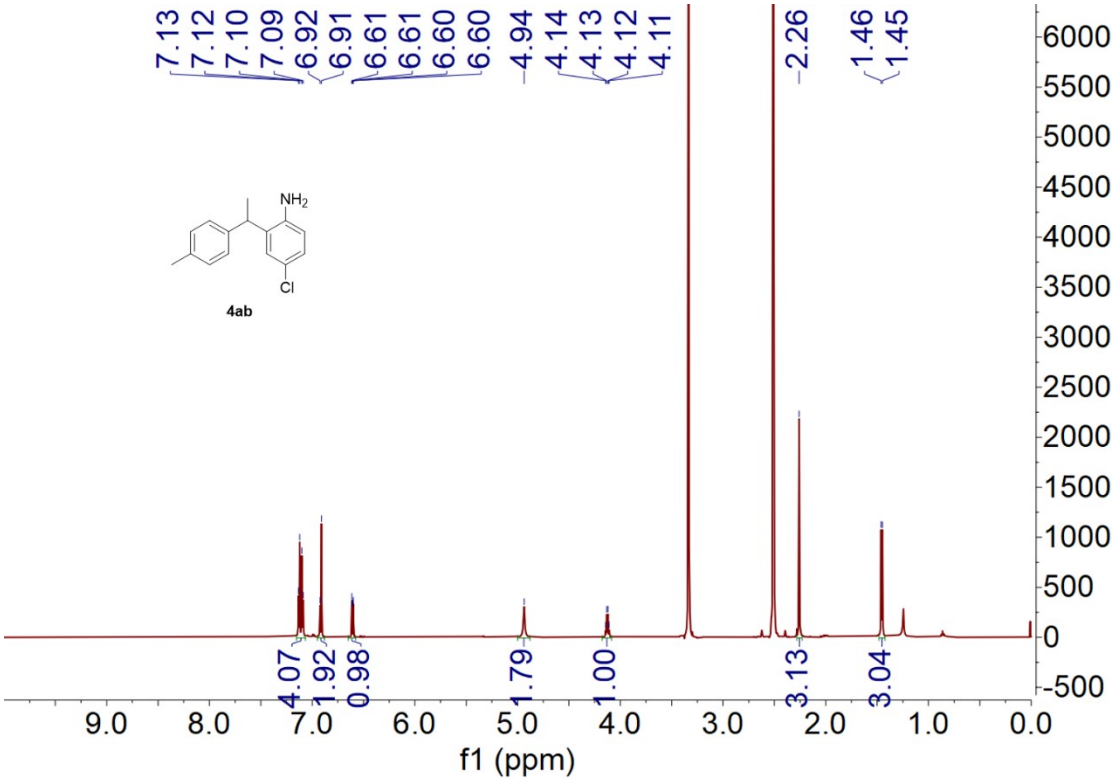
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ja**



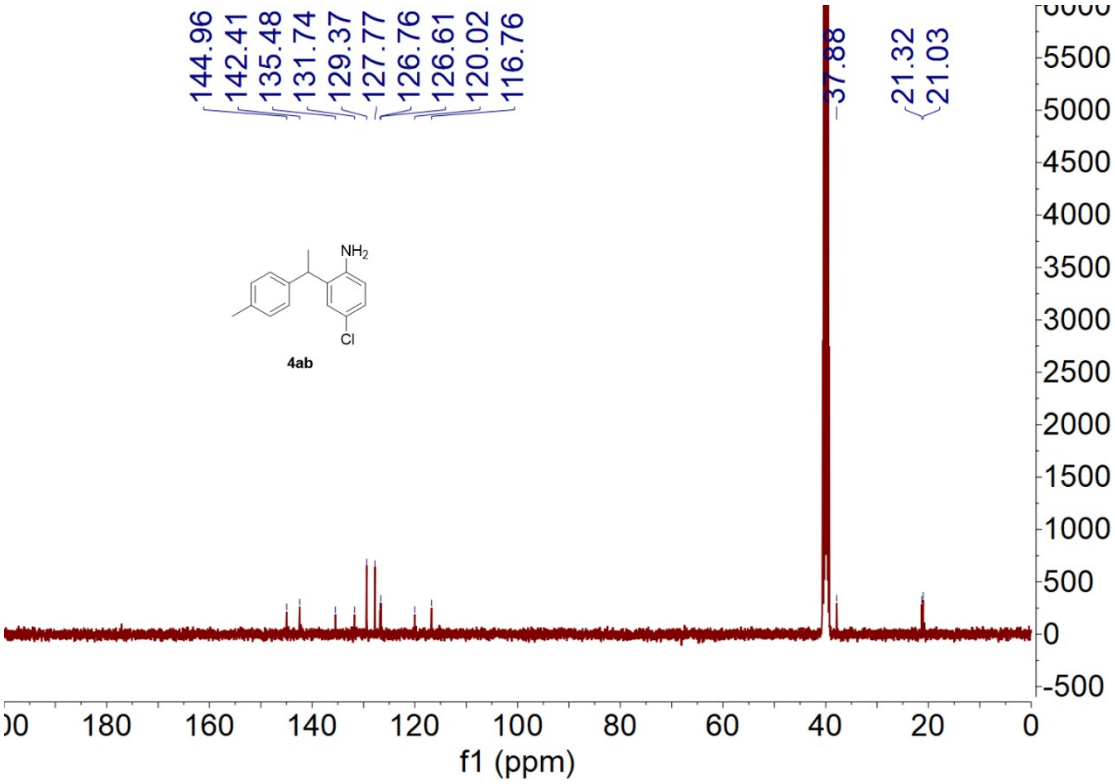
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ja**



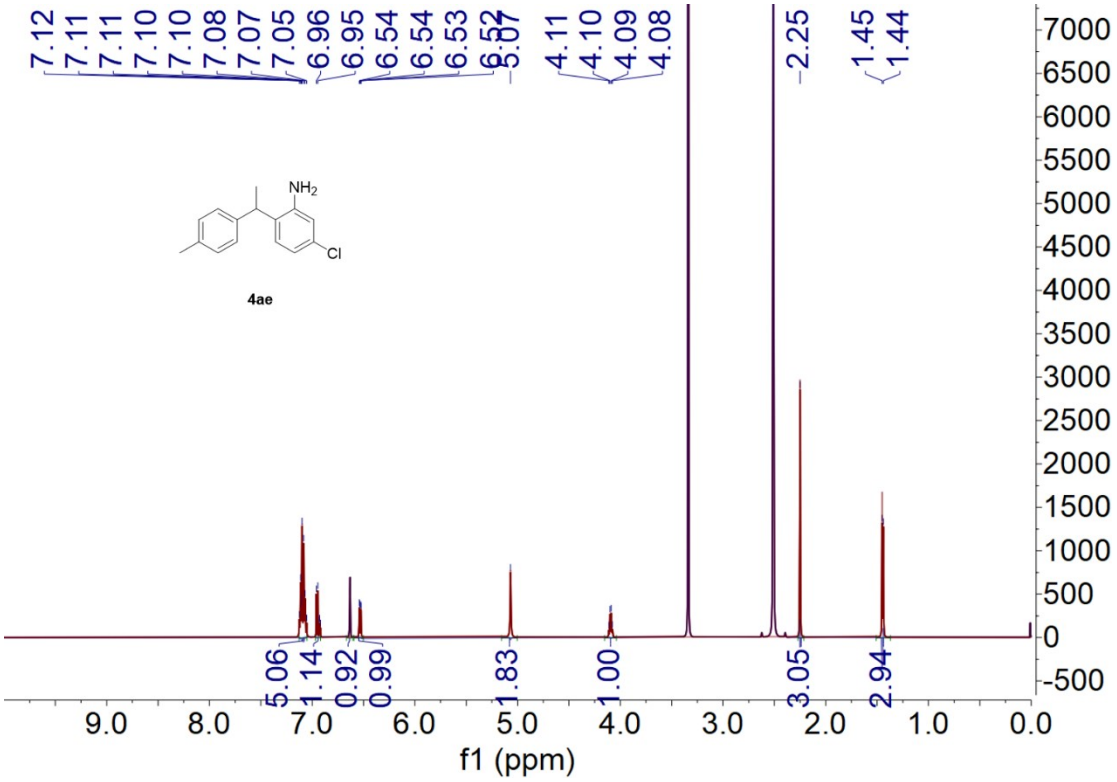
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ab**



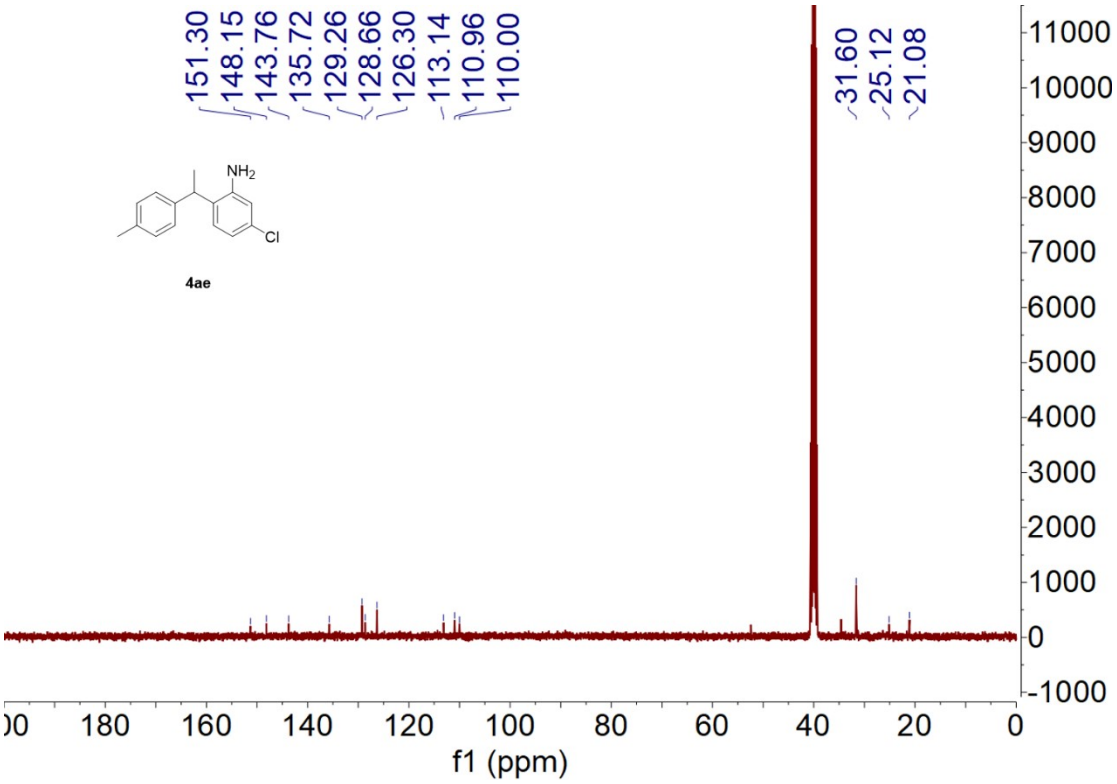
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ab**



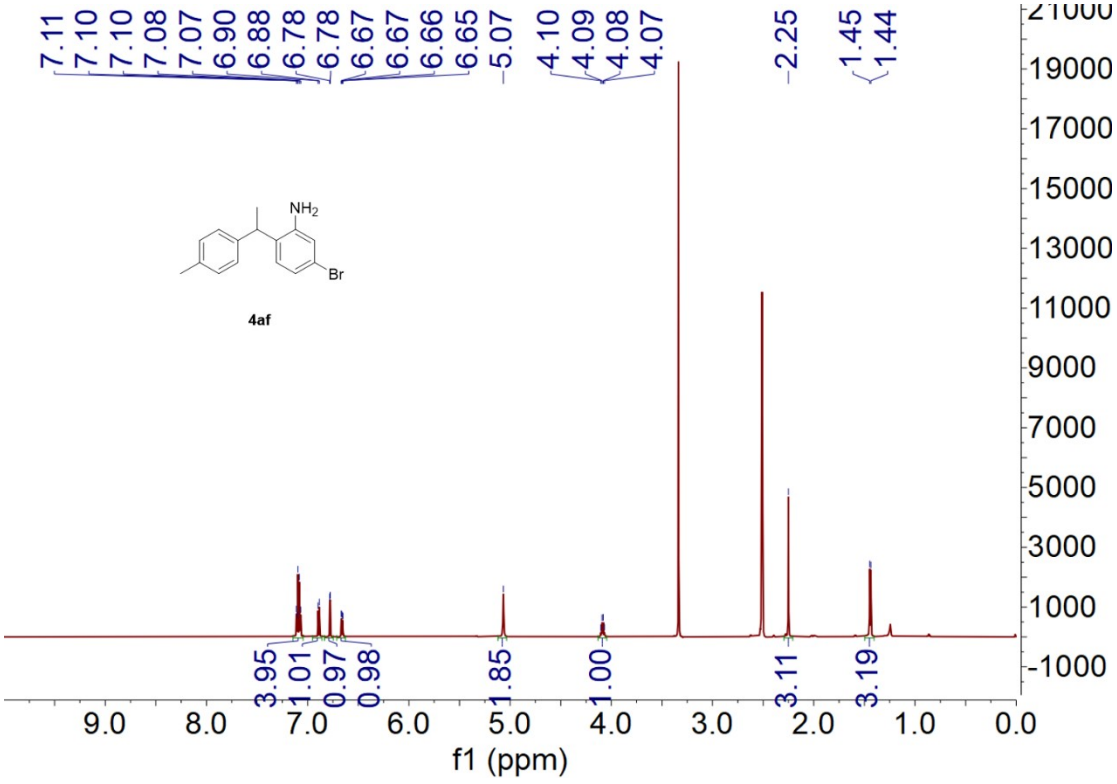
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ae**



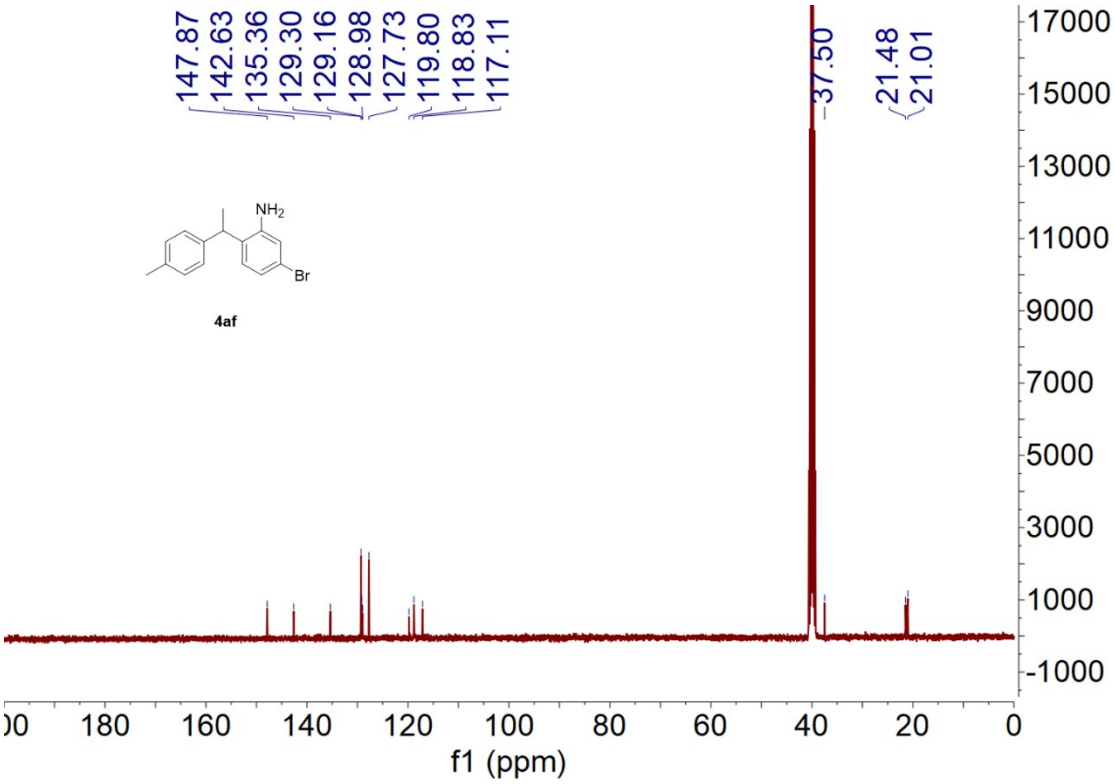
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ae**



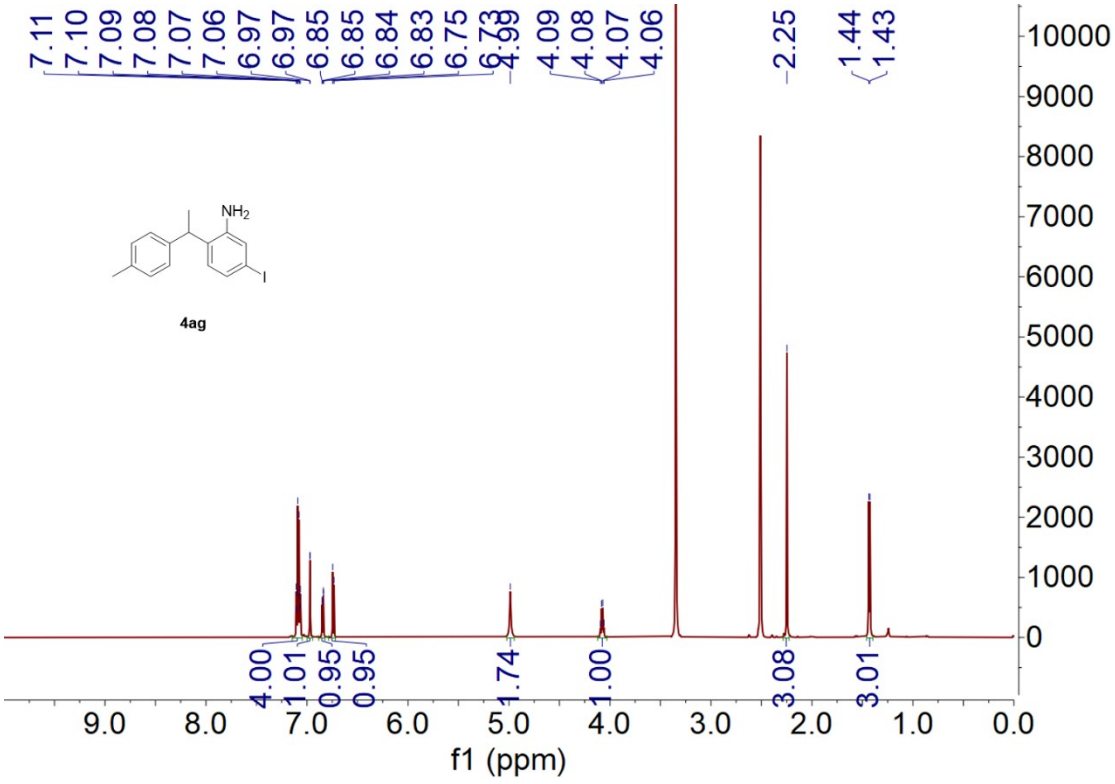
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4af**



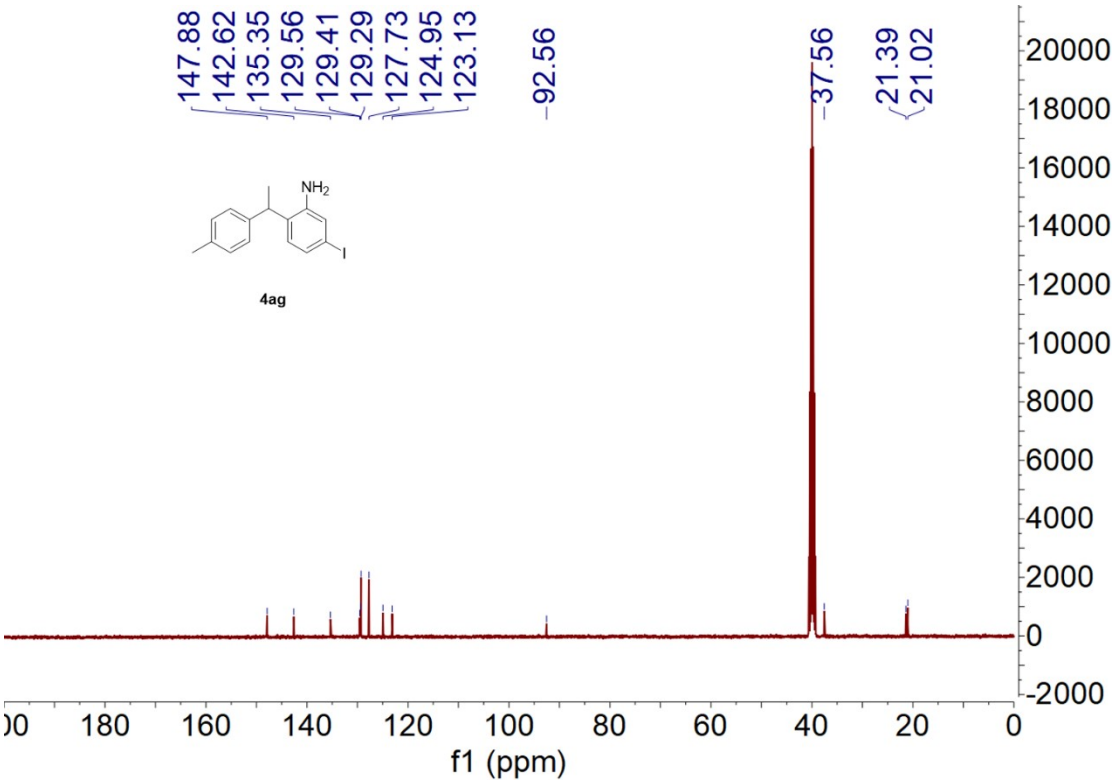
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4af**



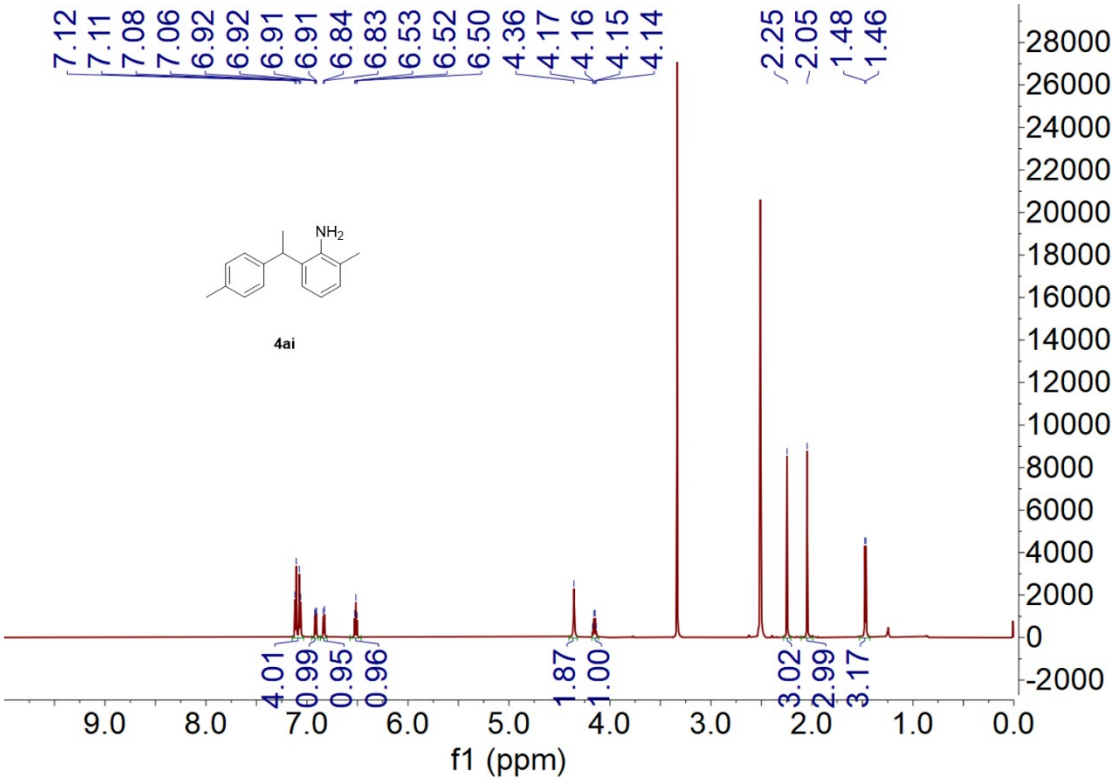
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ag**



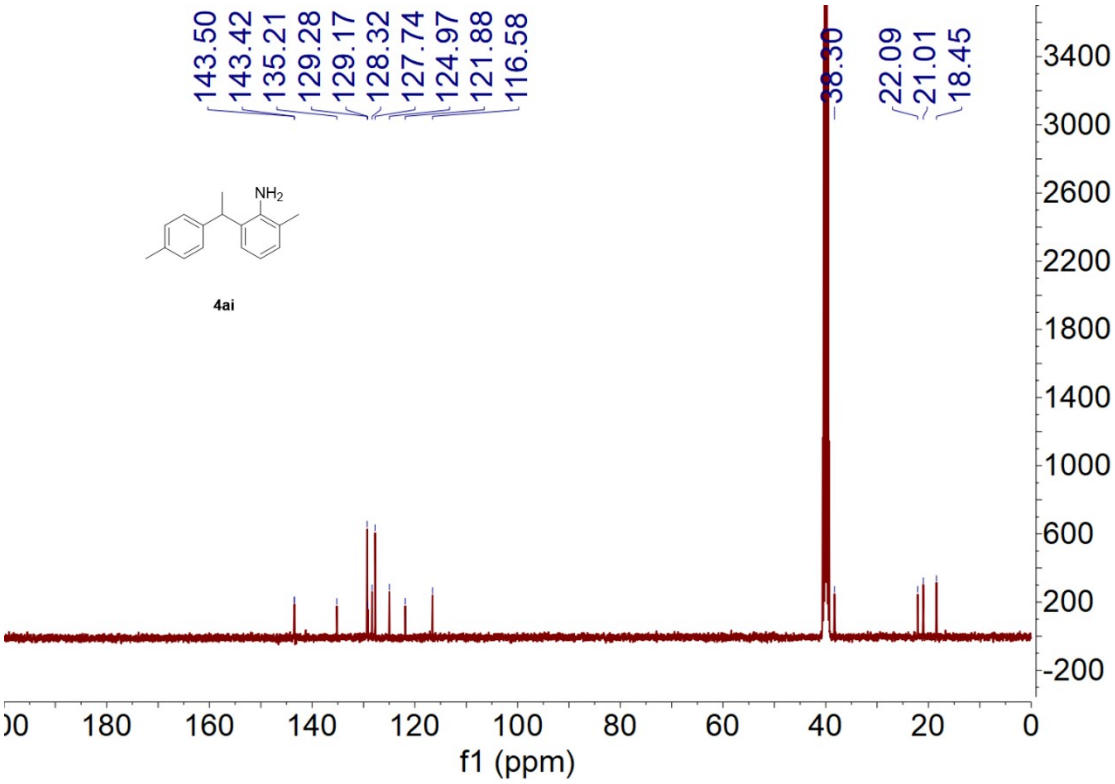
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ag**



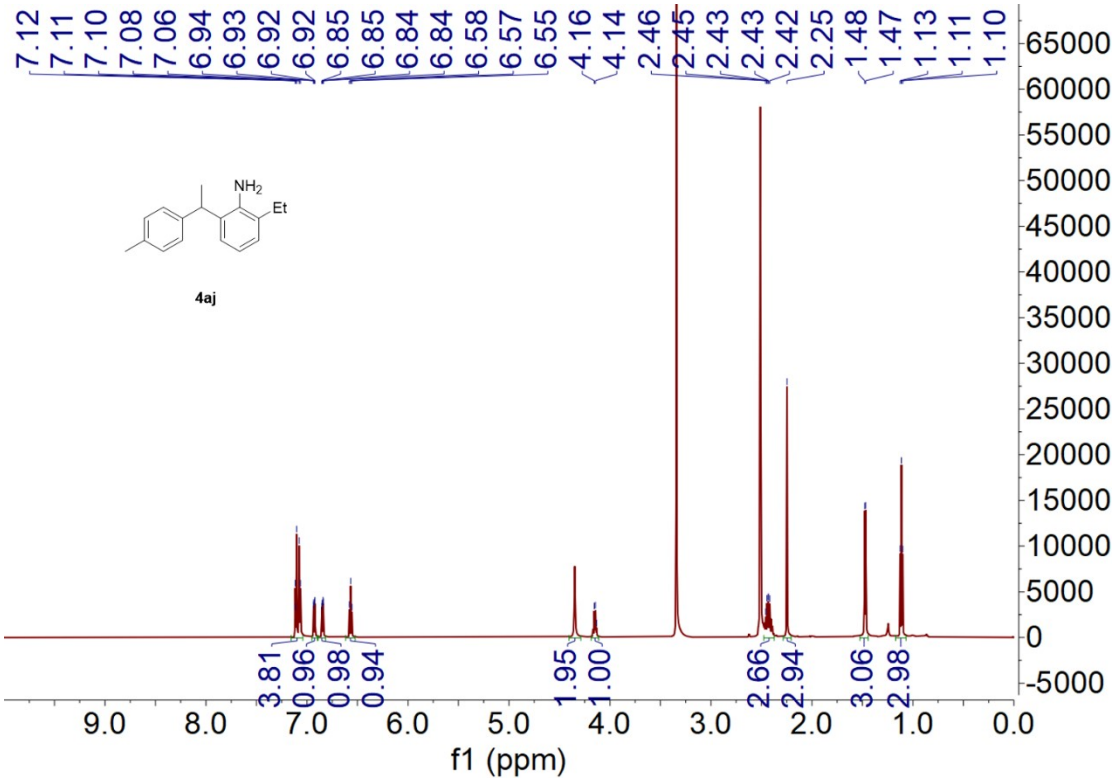
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ai**



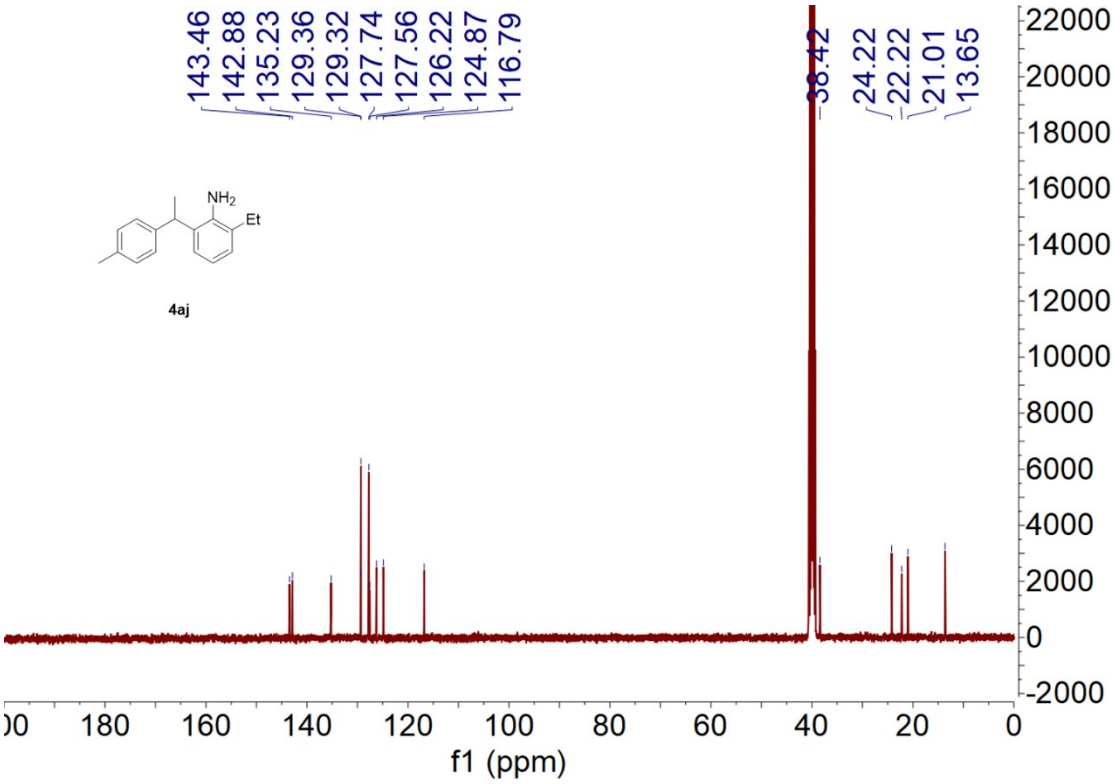
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ai**



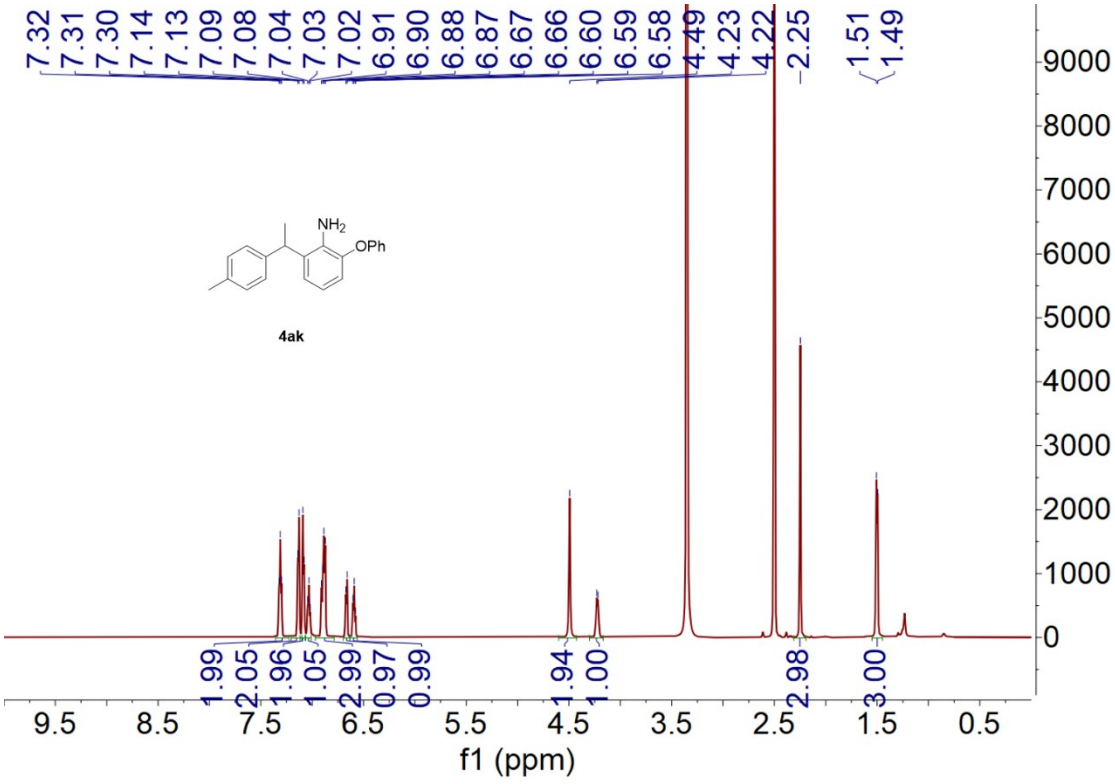
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4aj**



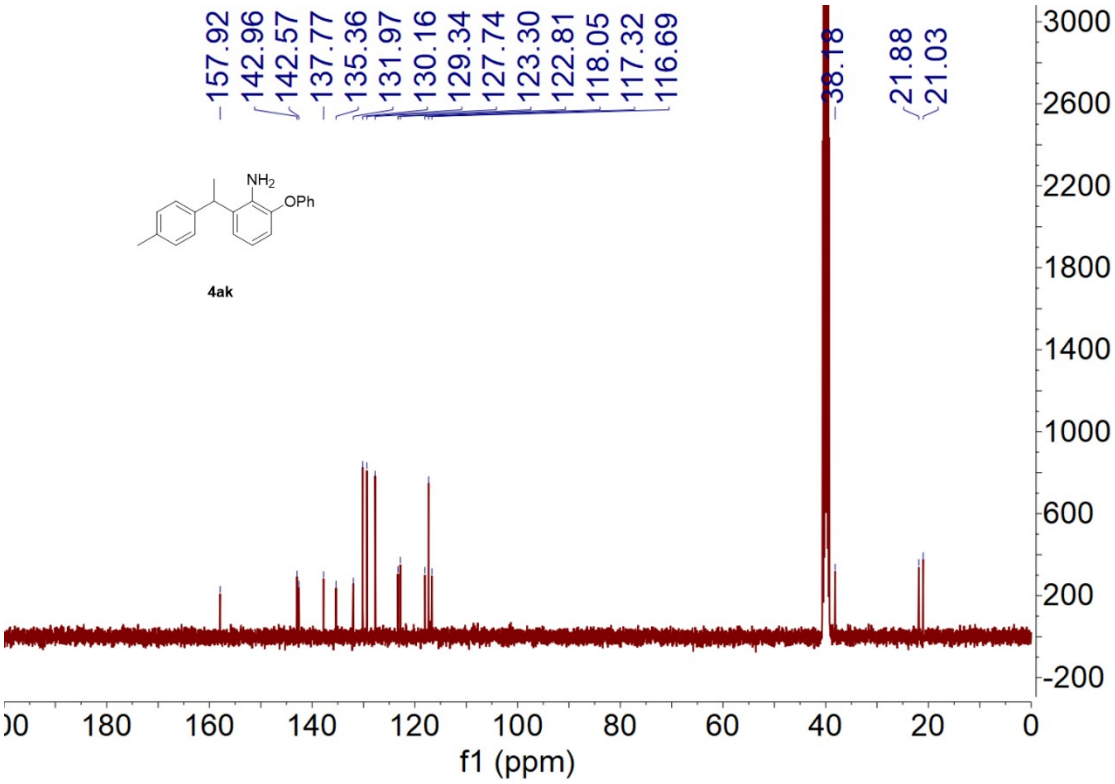
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4aj**



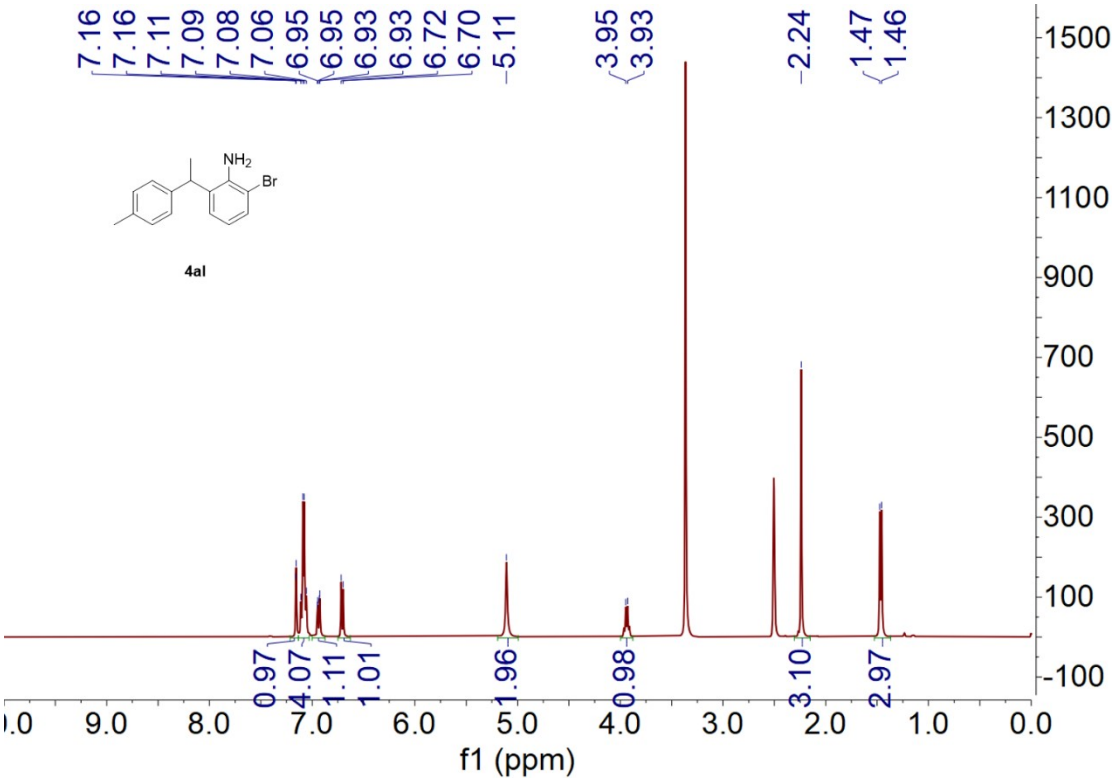
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ak**



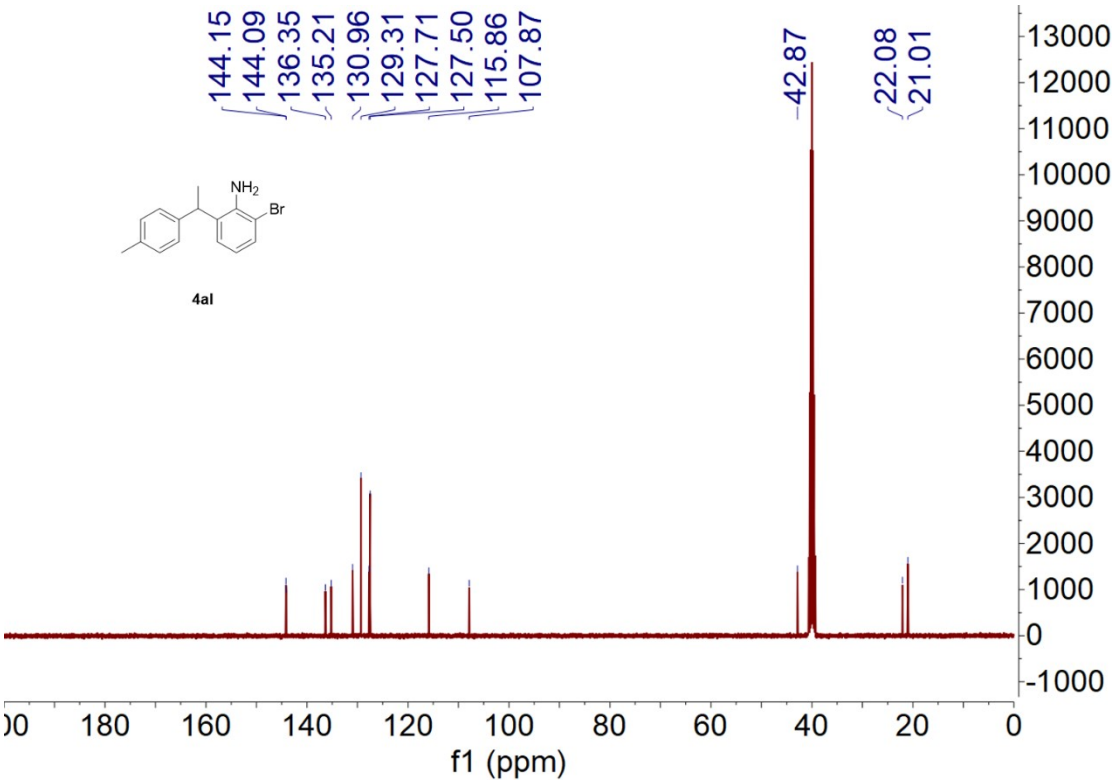
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ak**



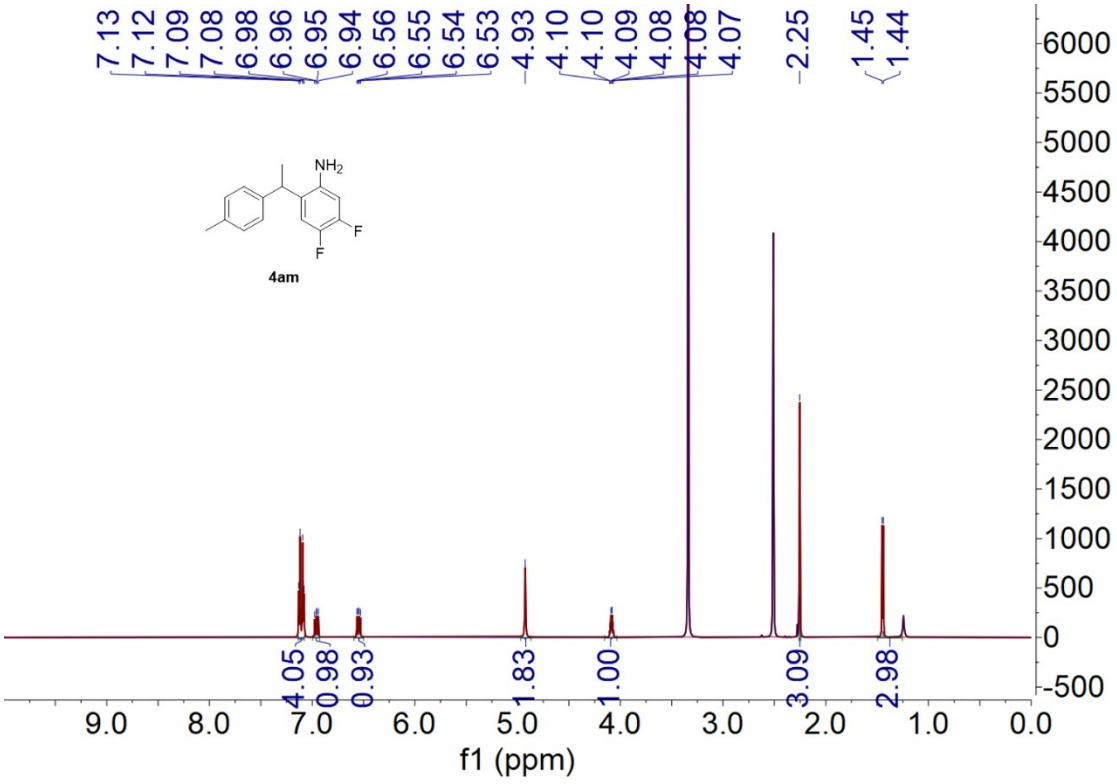
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4al**



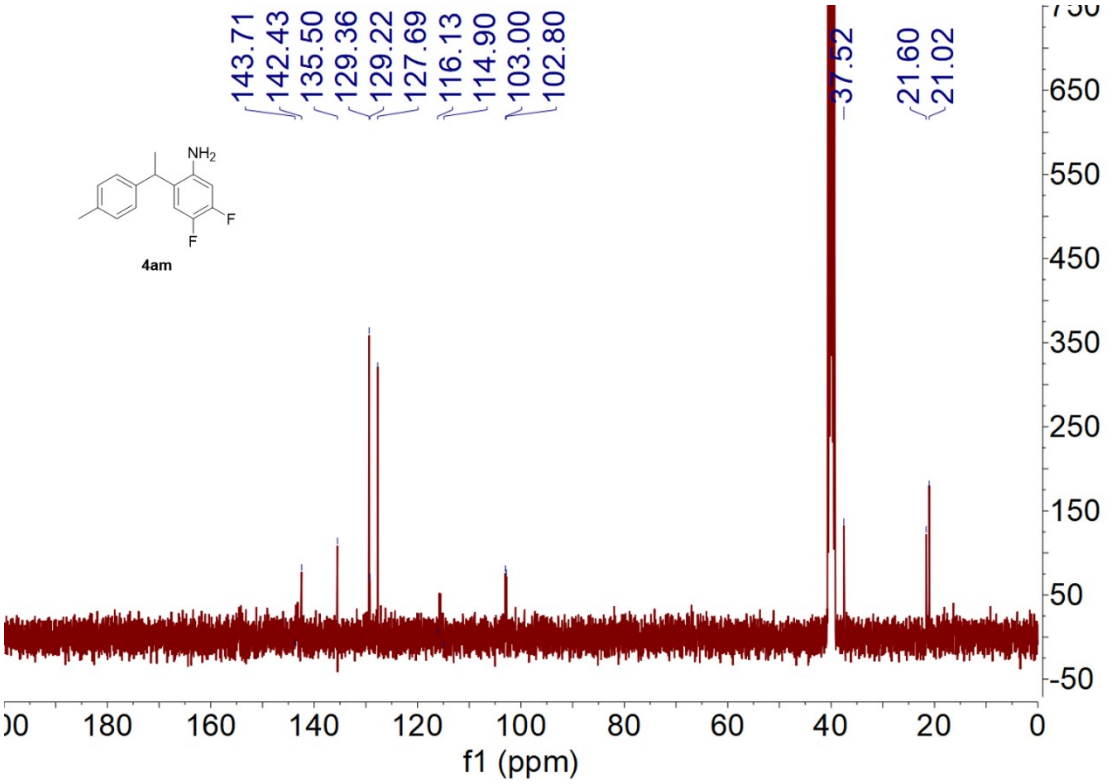
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4al**



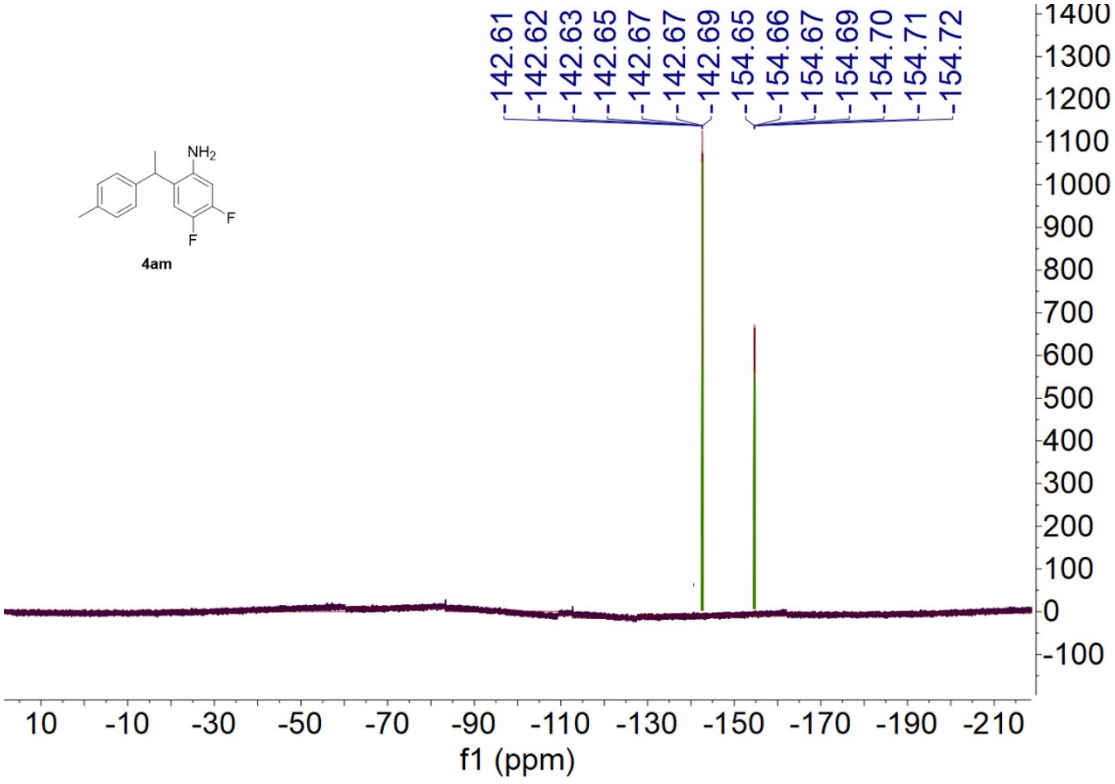
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4am**



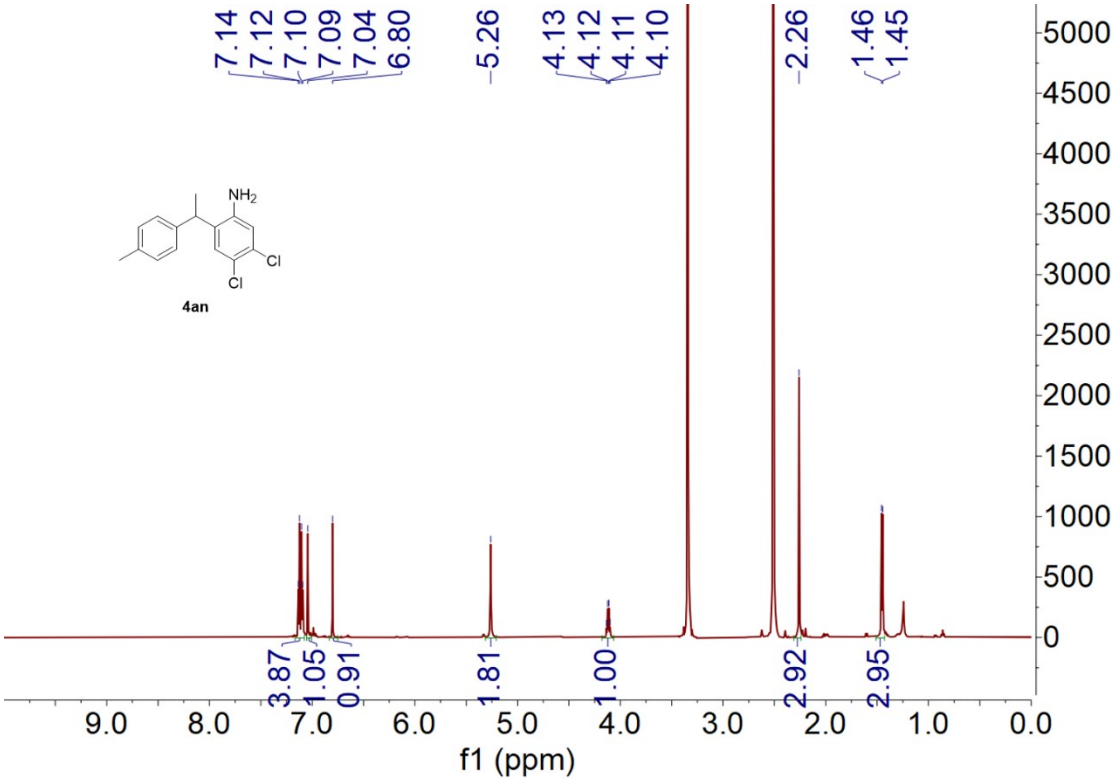
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4am**



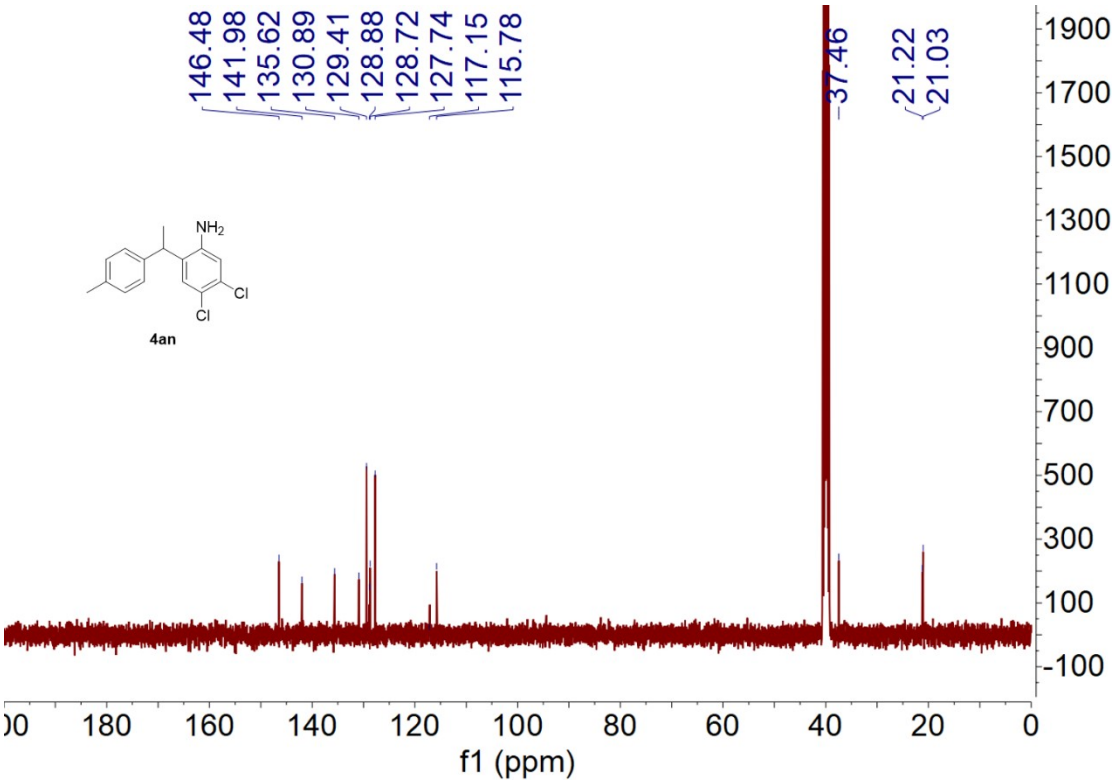
^{19}F NMR spectrum (565 MHz, DMSO-d_6) of **4am**



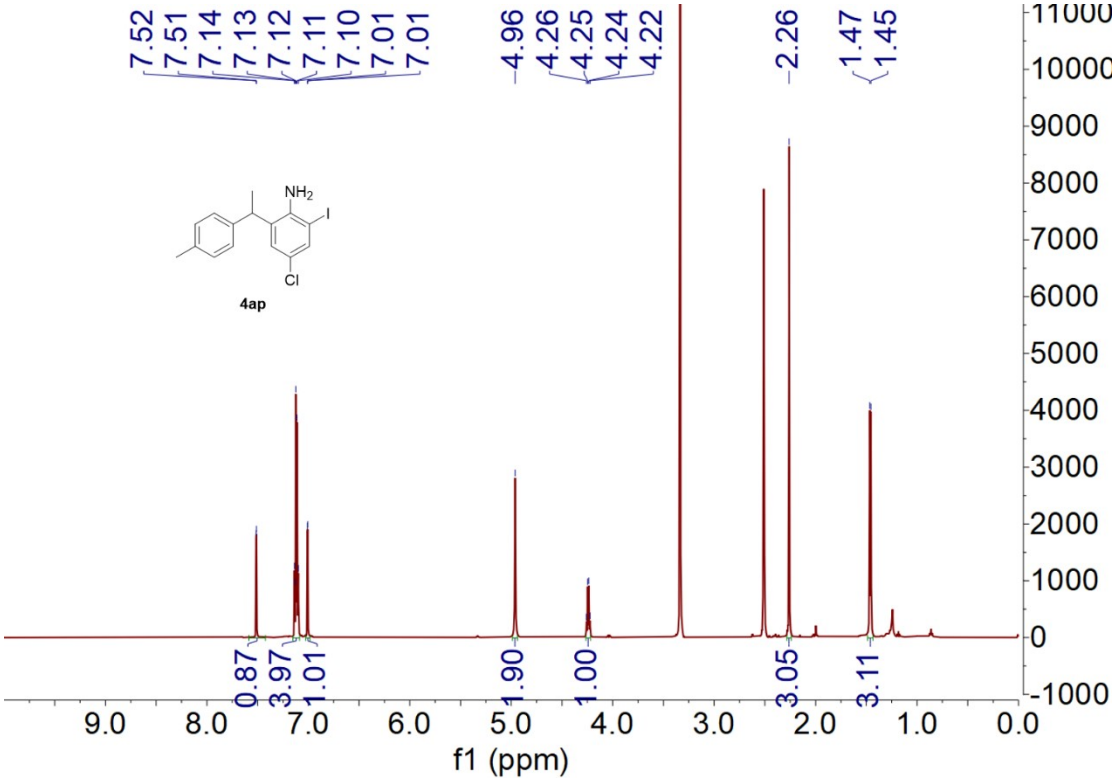
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4an**



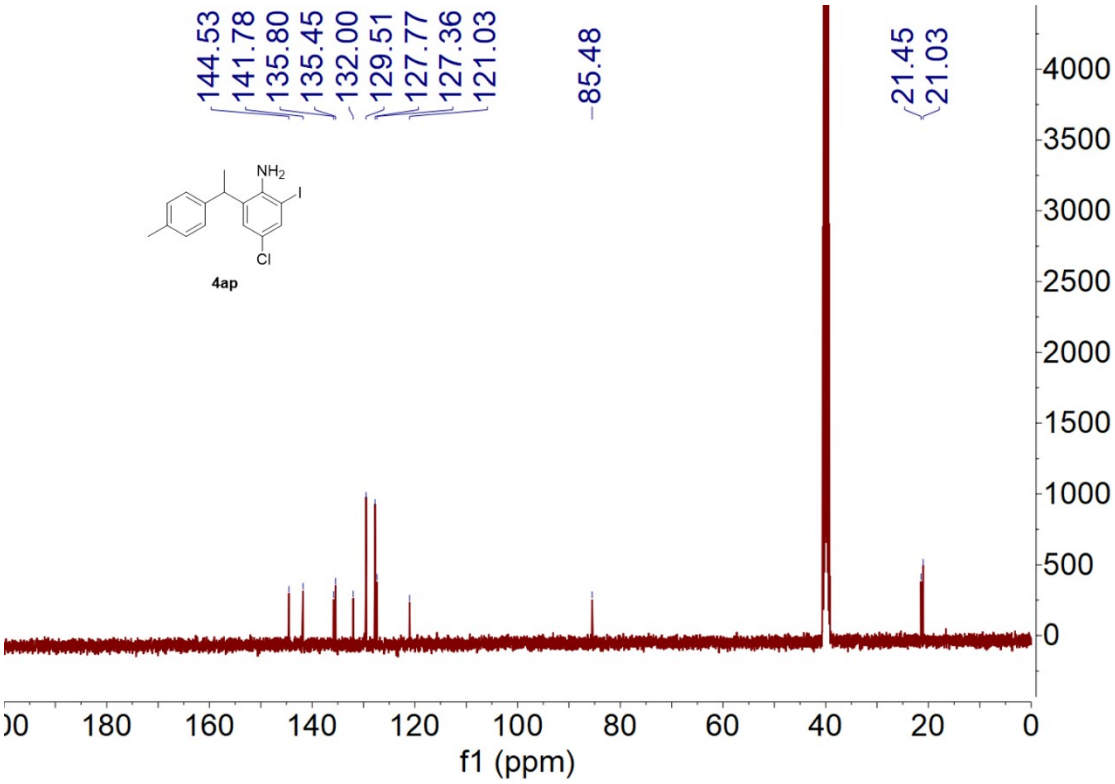
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4an**



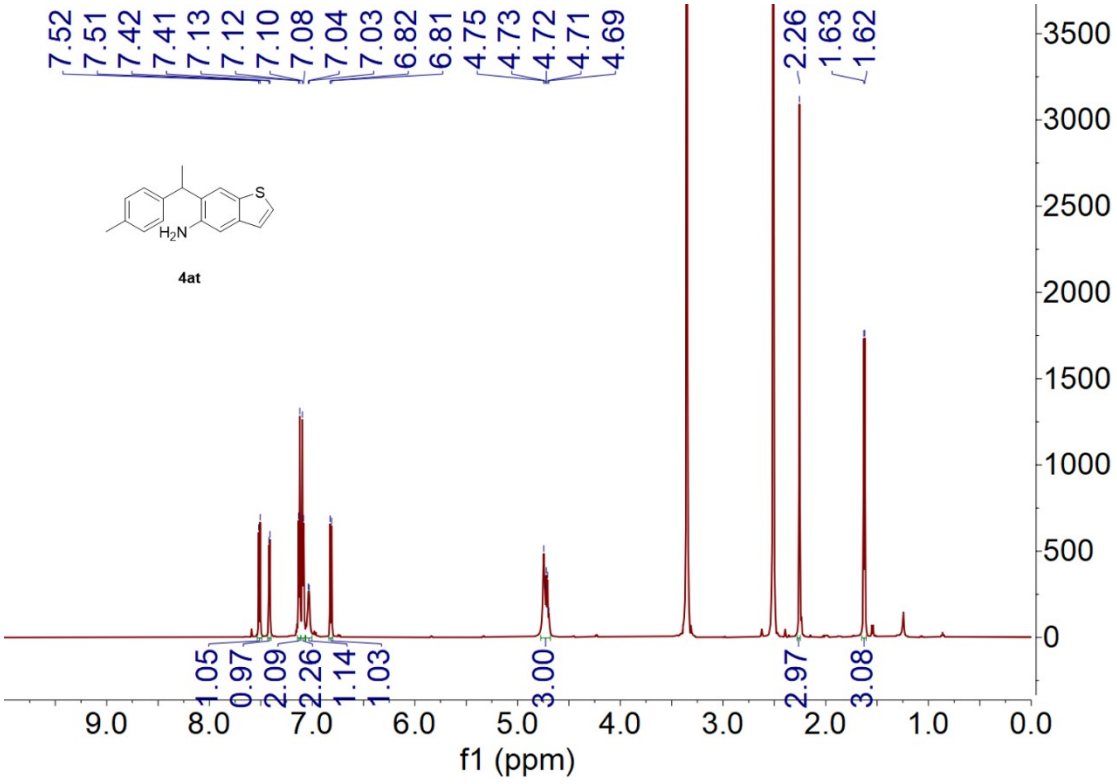
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4ap**



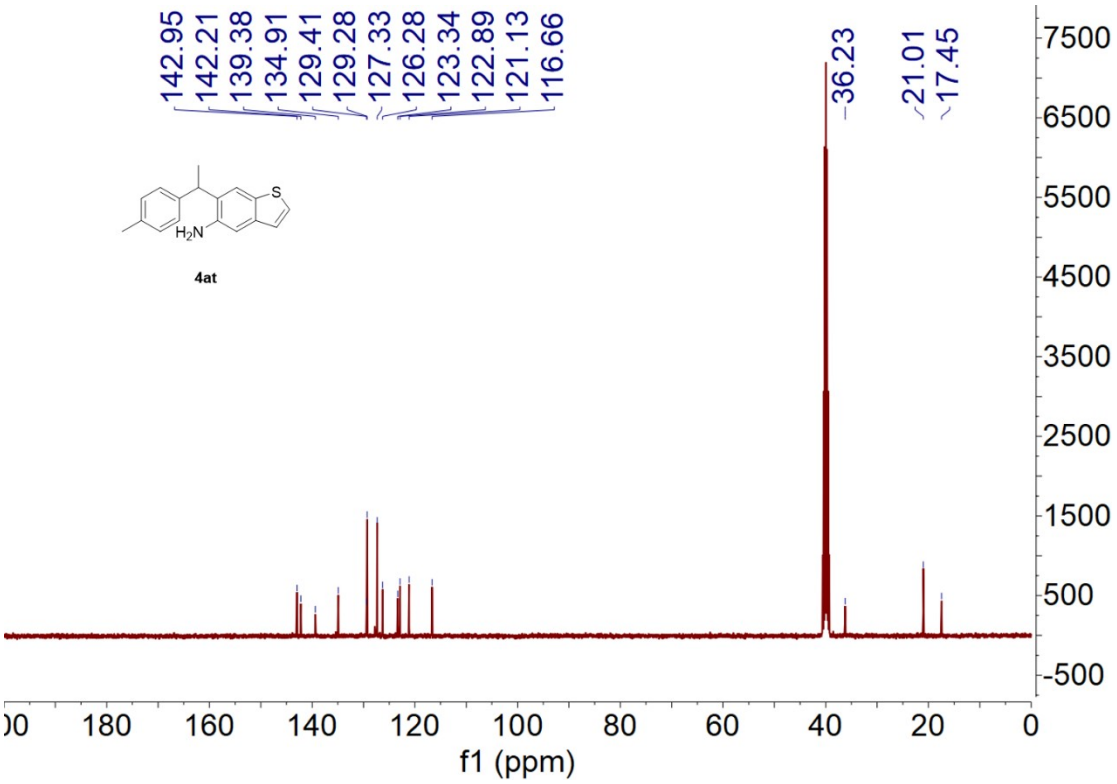
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4ap**



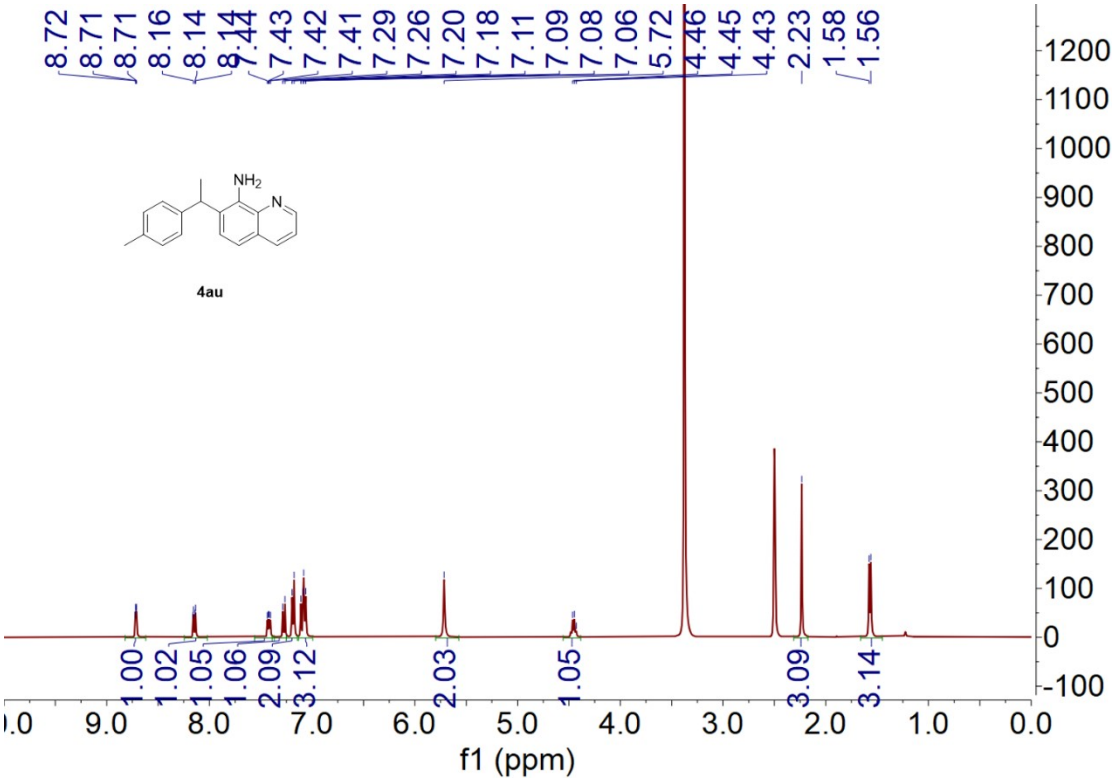
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4at**



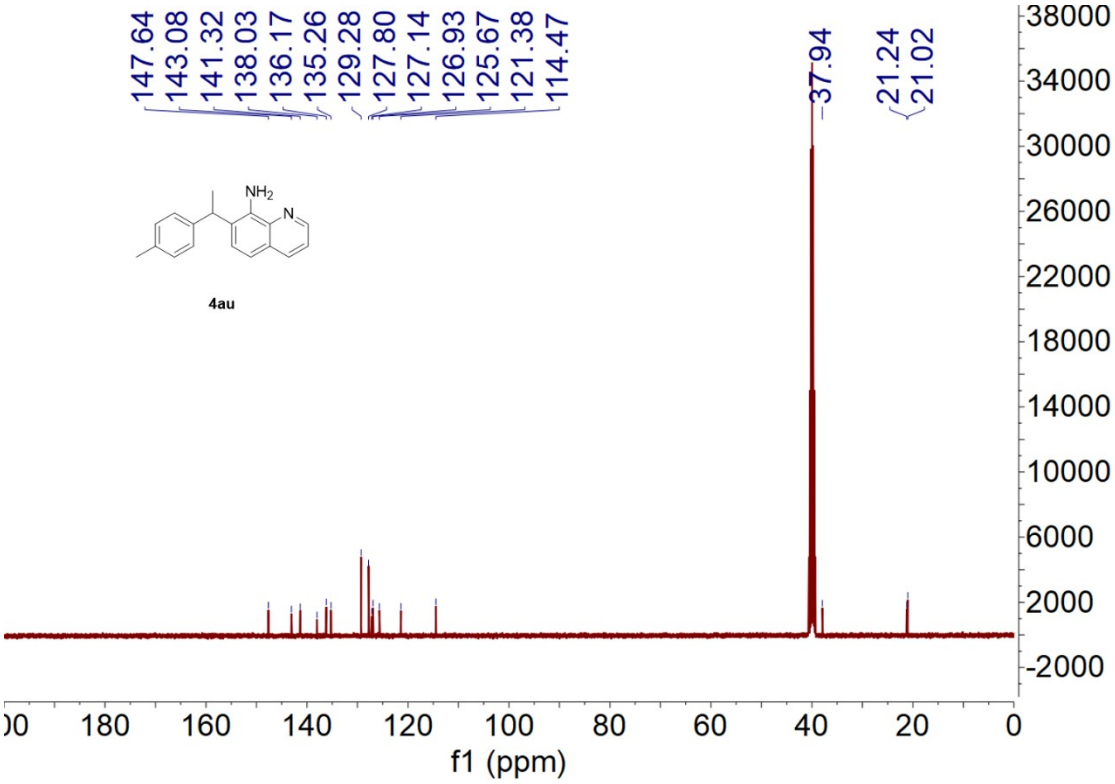
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4at**



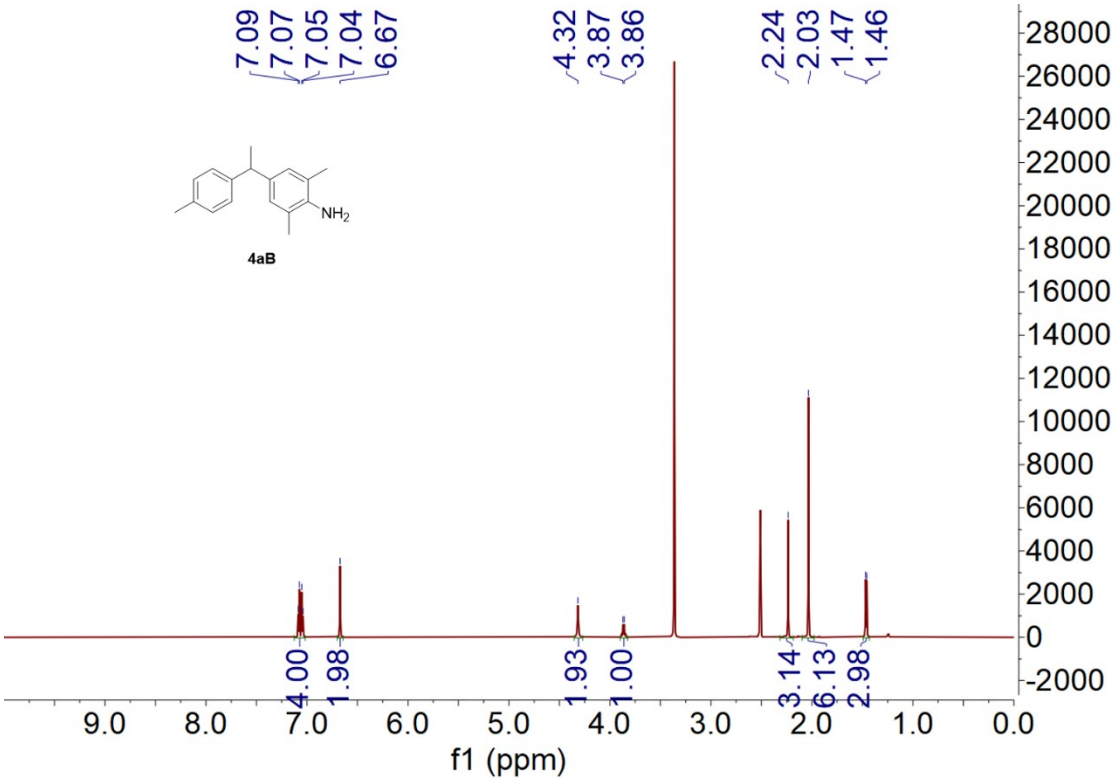
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4au**



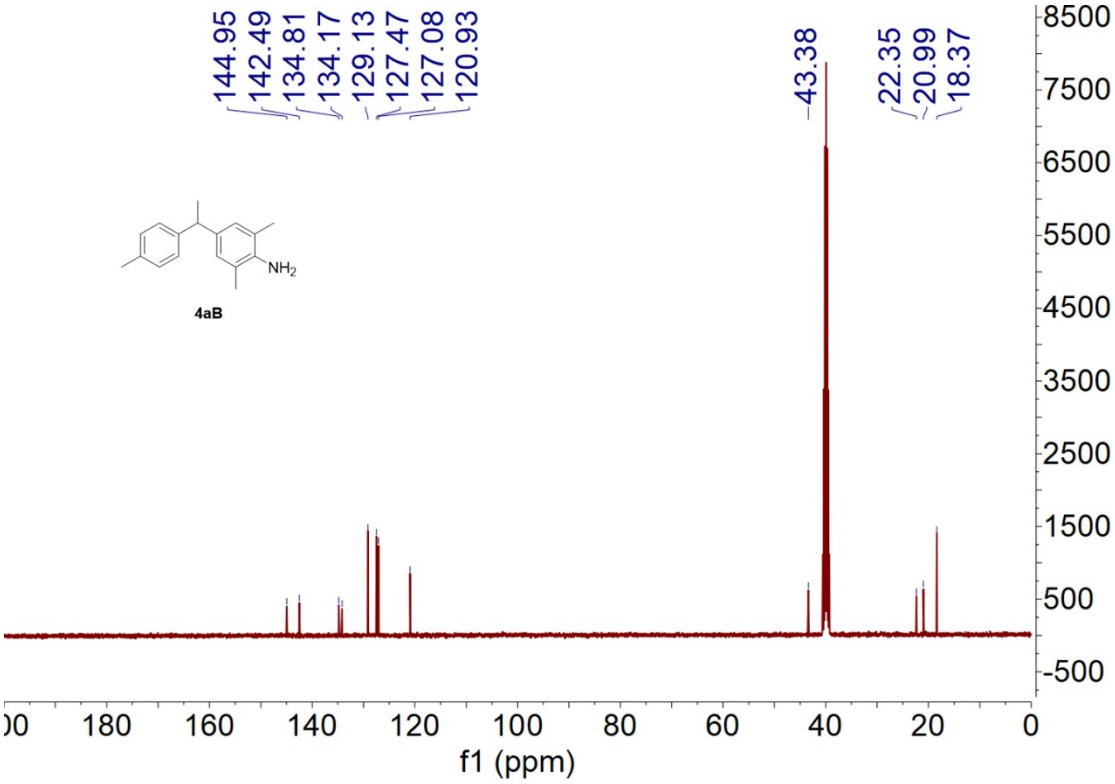
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4au**



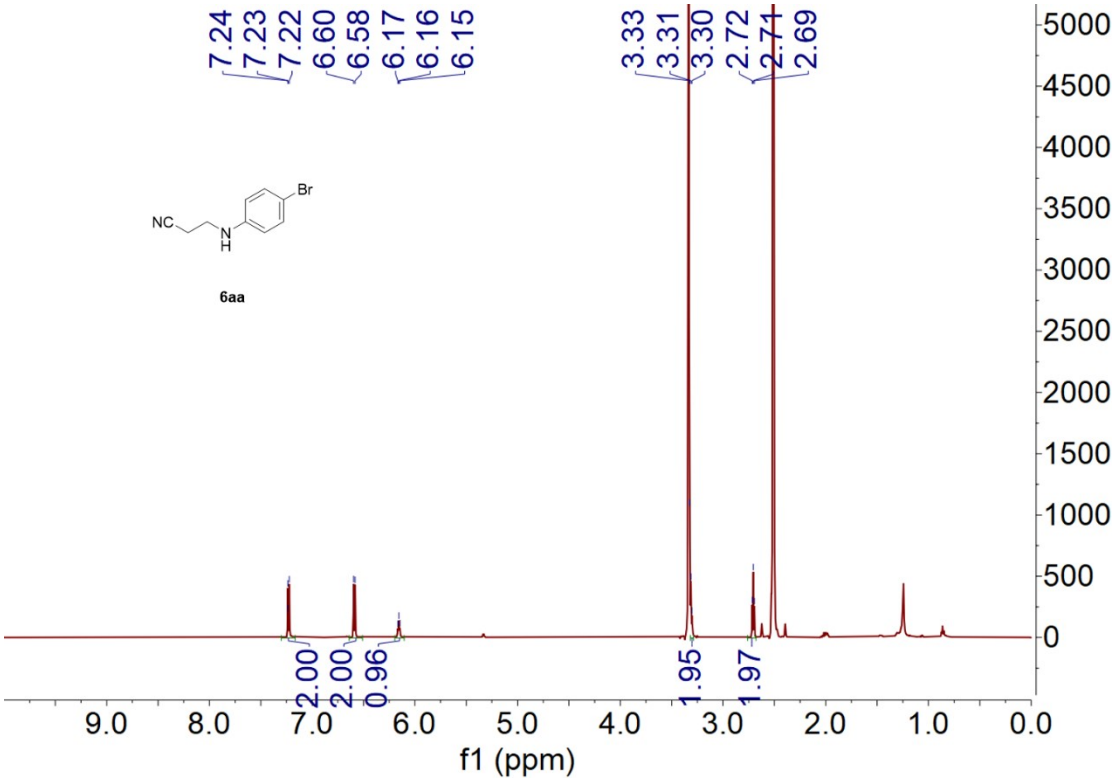
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **4aB**



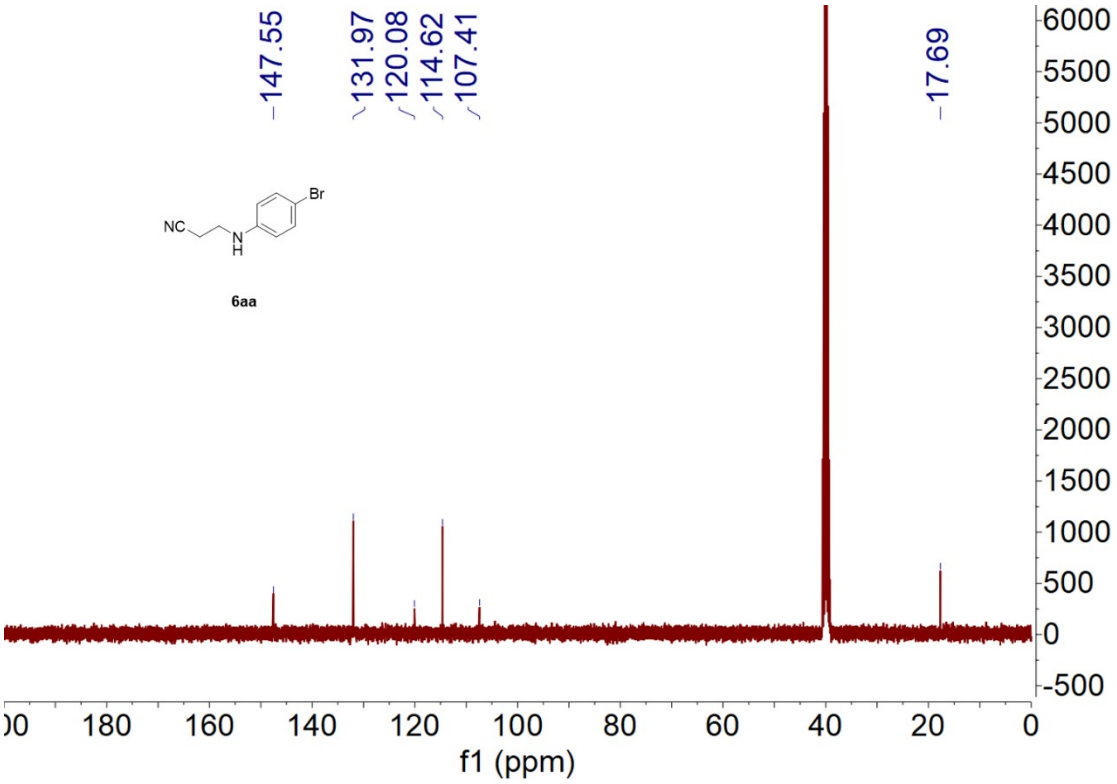
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **4aB**



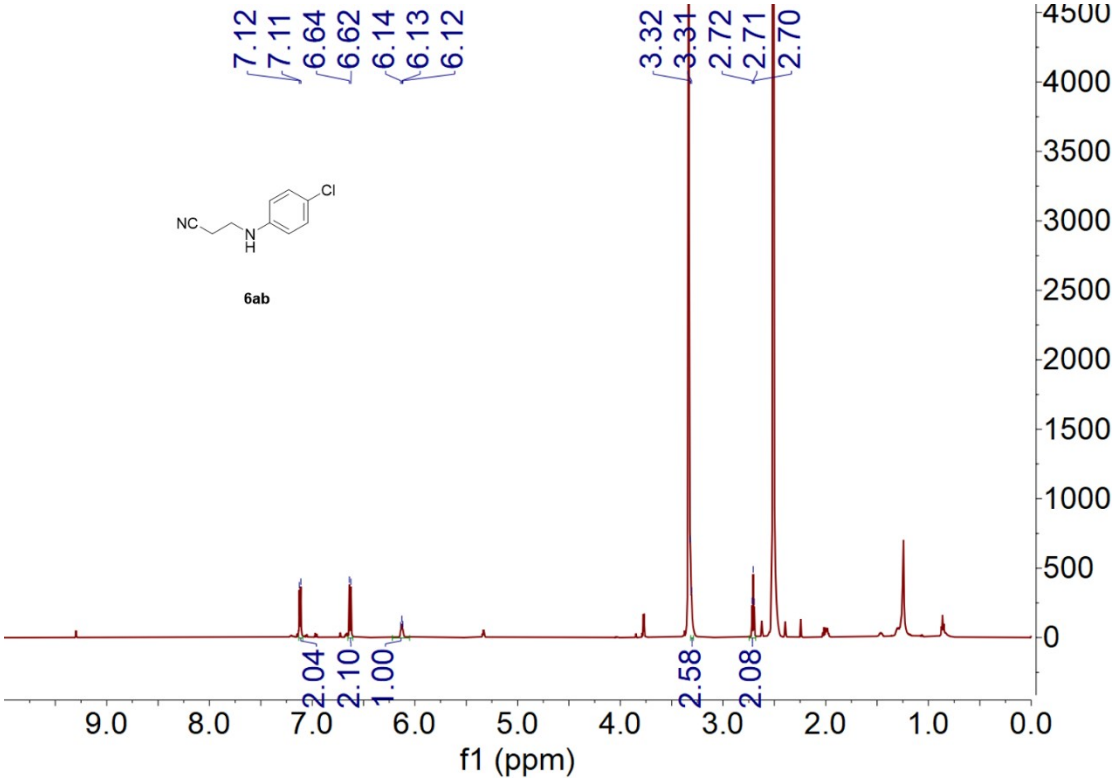
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6aa**



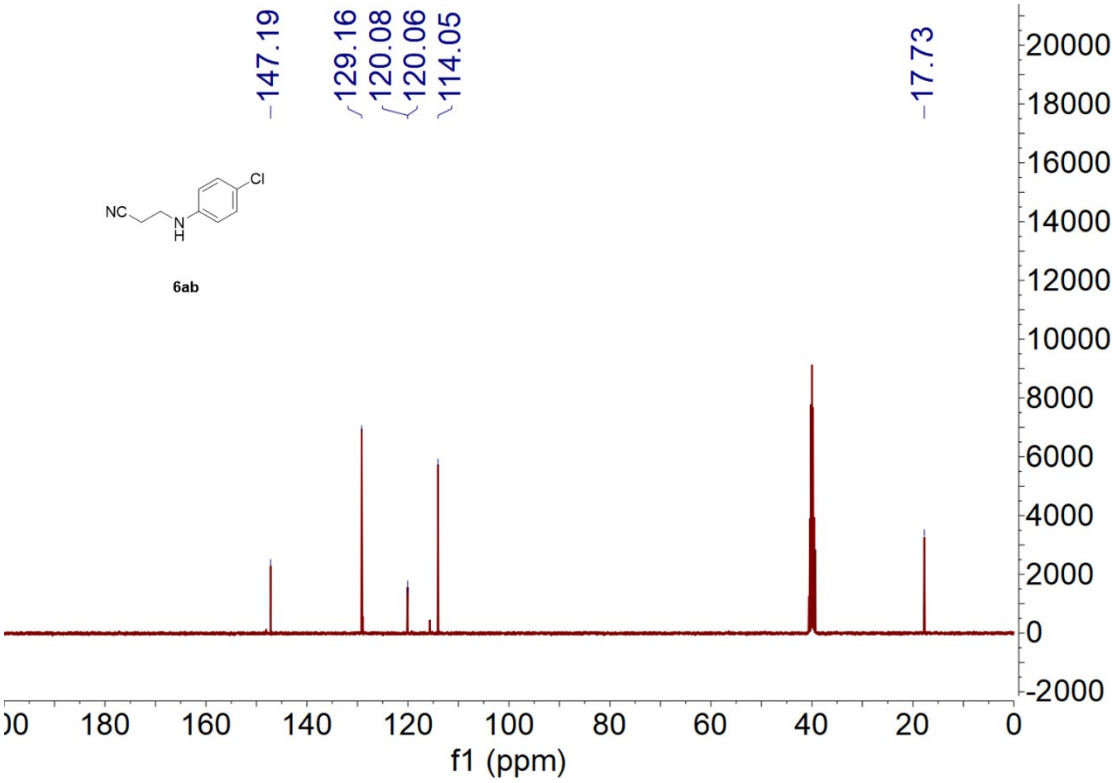
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6aa**



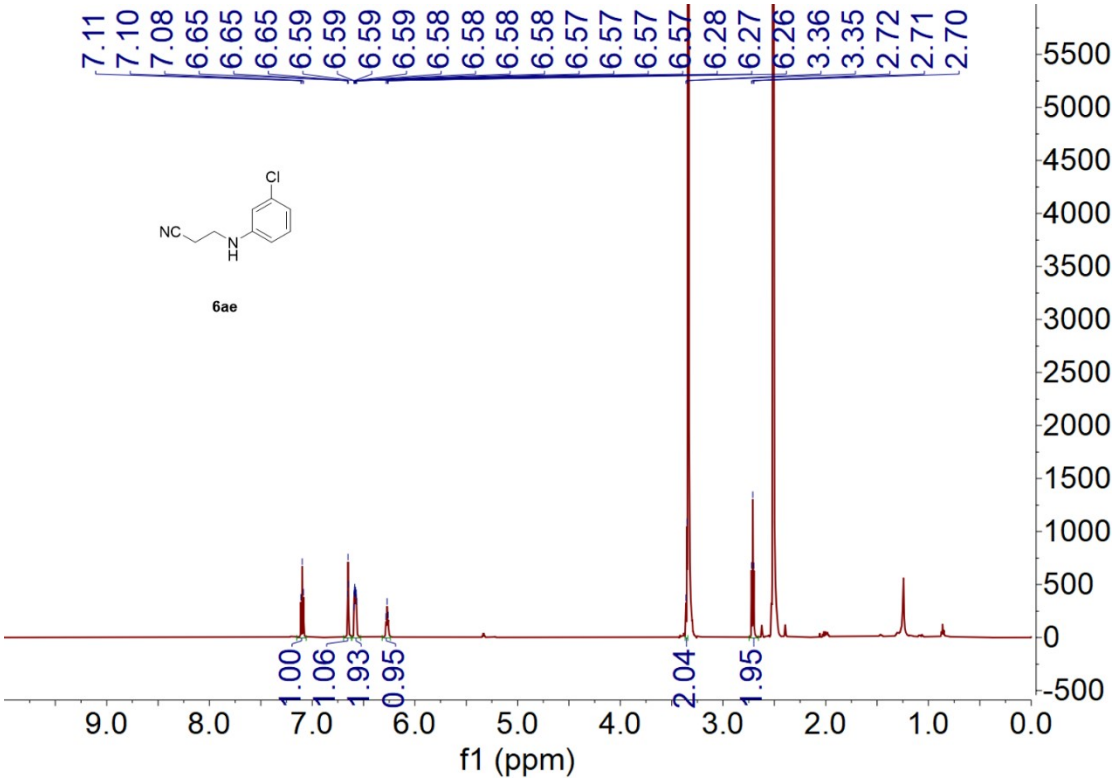
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6ab**



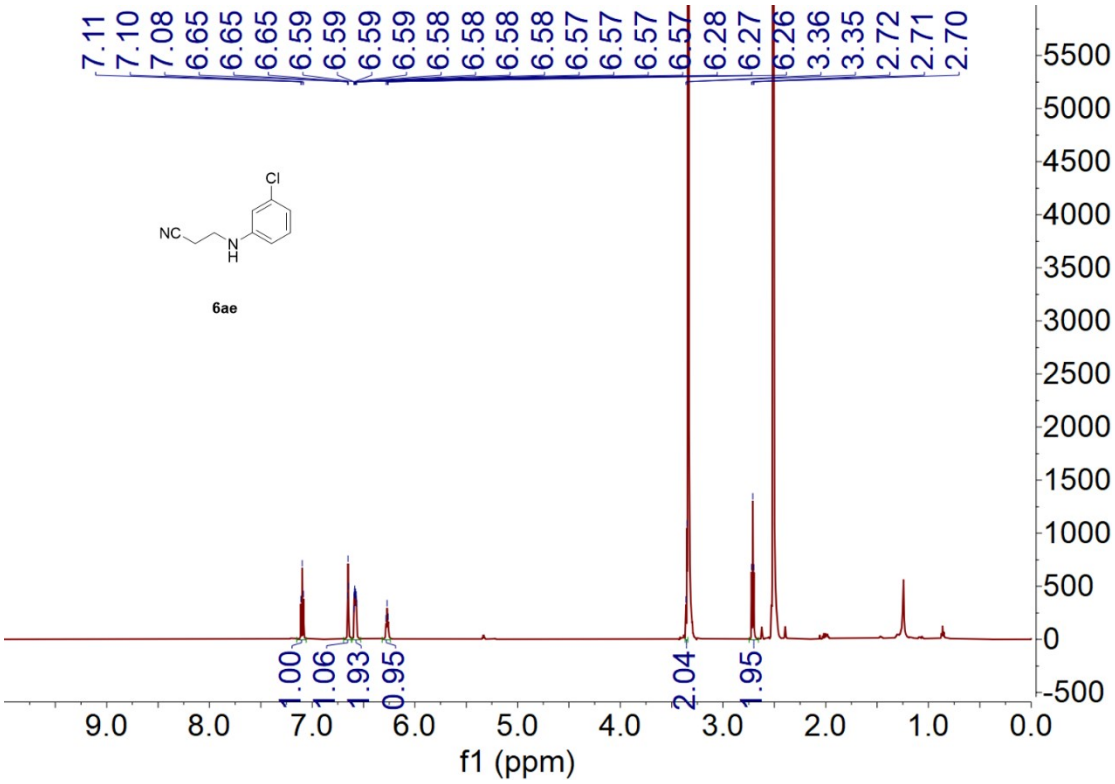
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6ab**



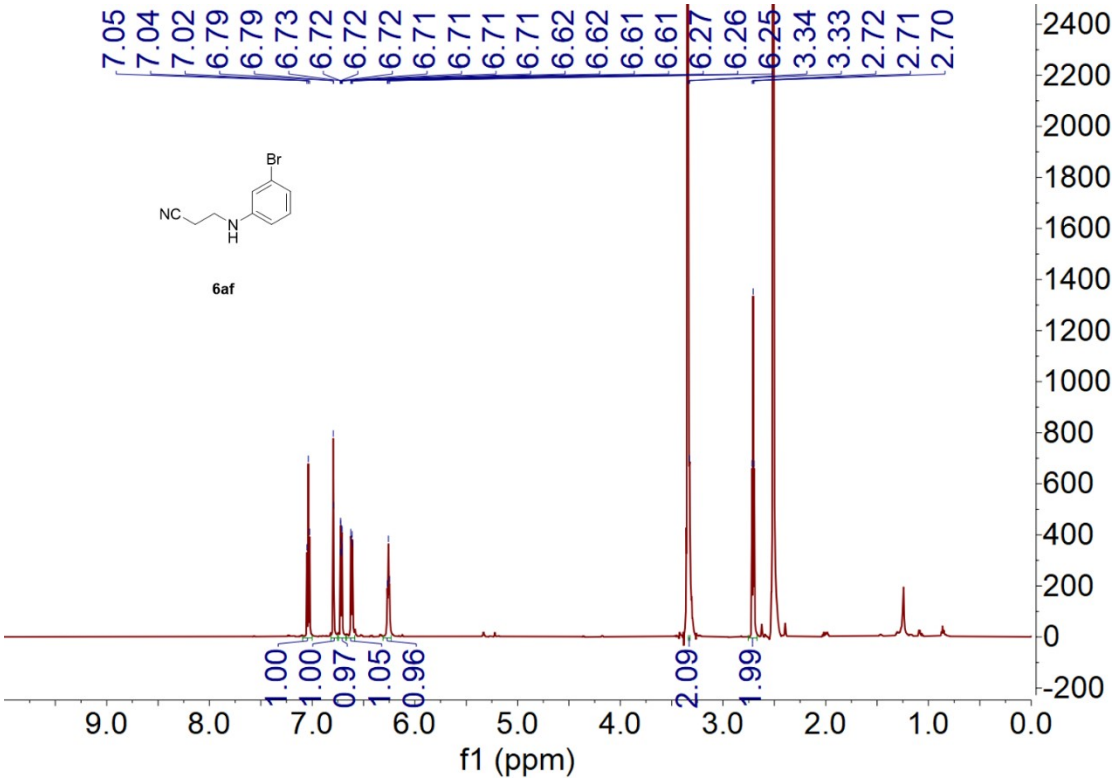
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6ae**



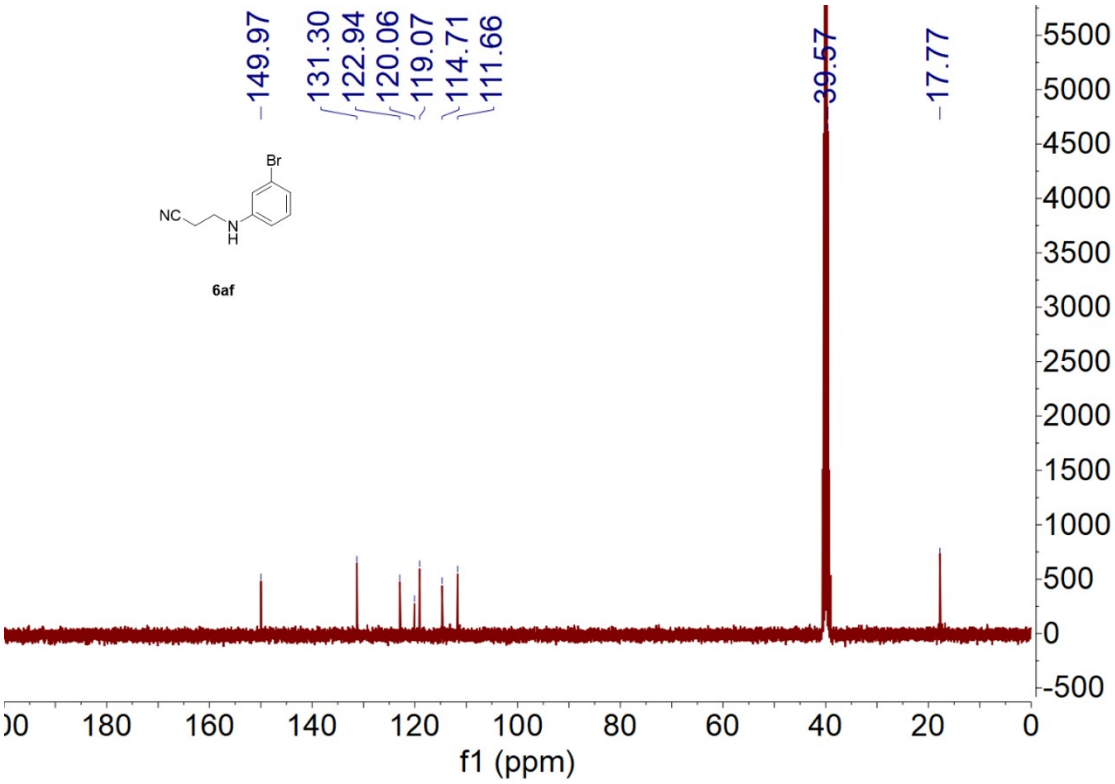
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6ae**



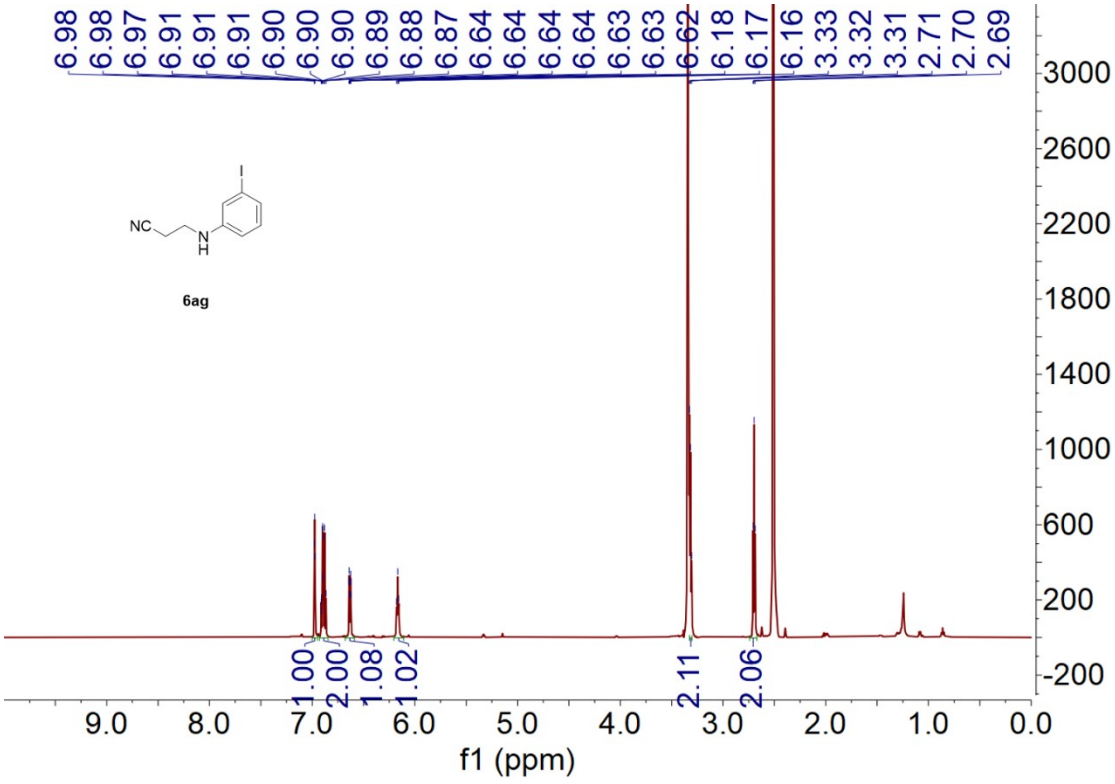
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6af**



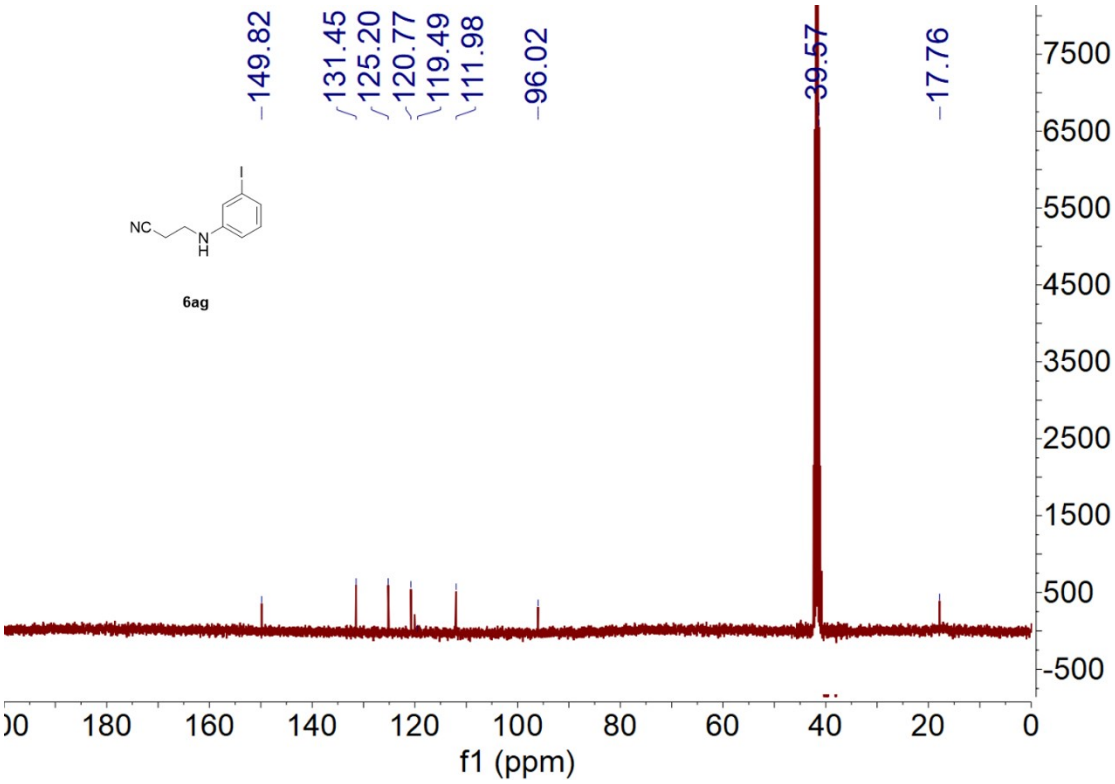
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6af**



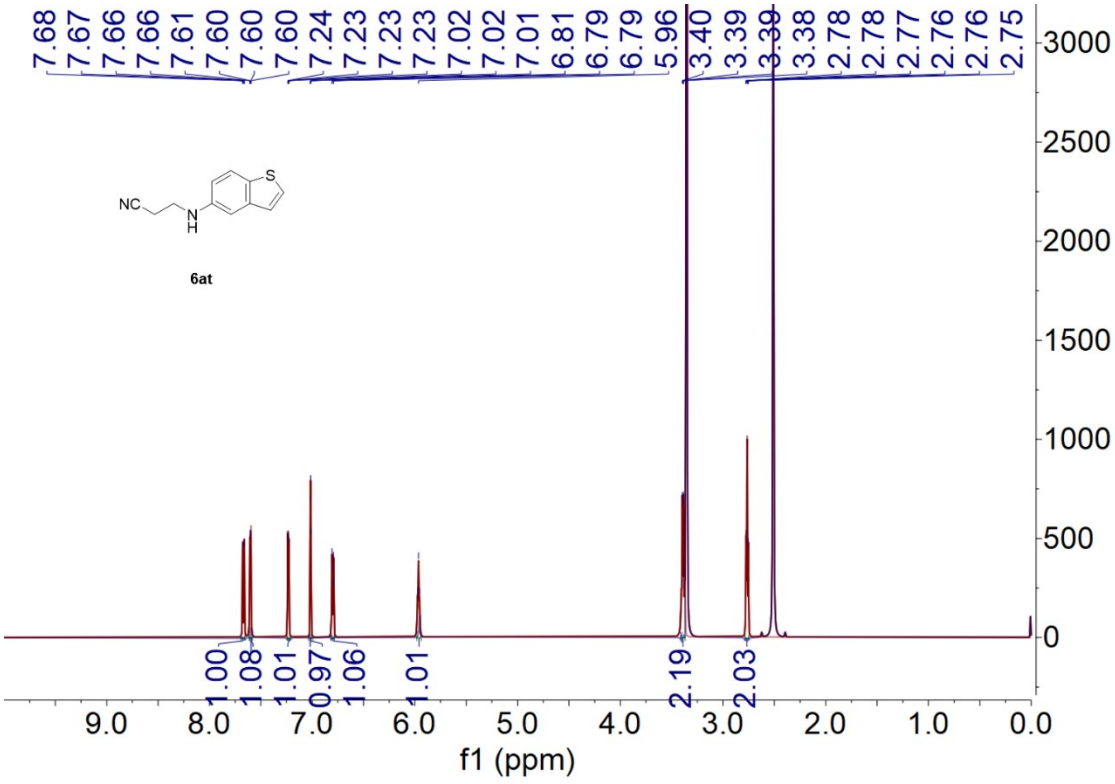
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6ag**



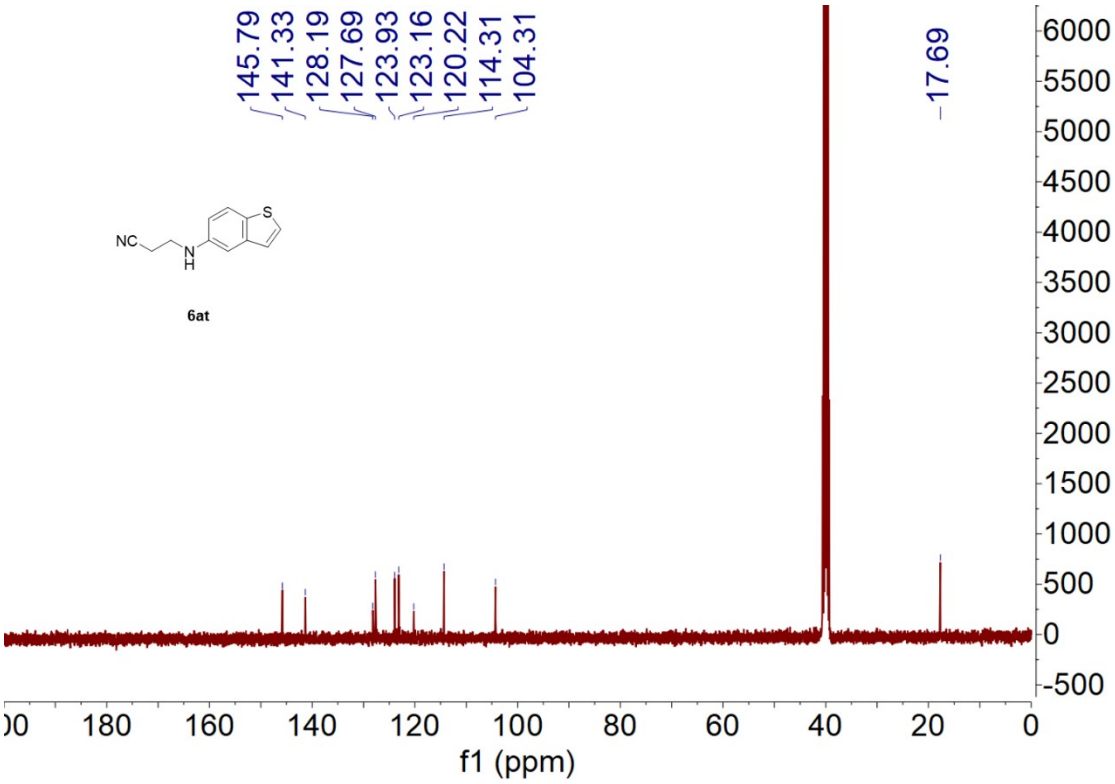
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6ag**



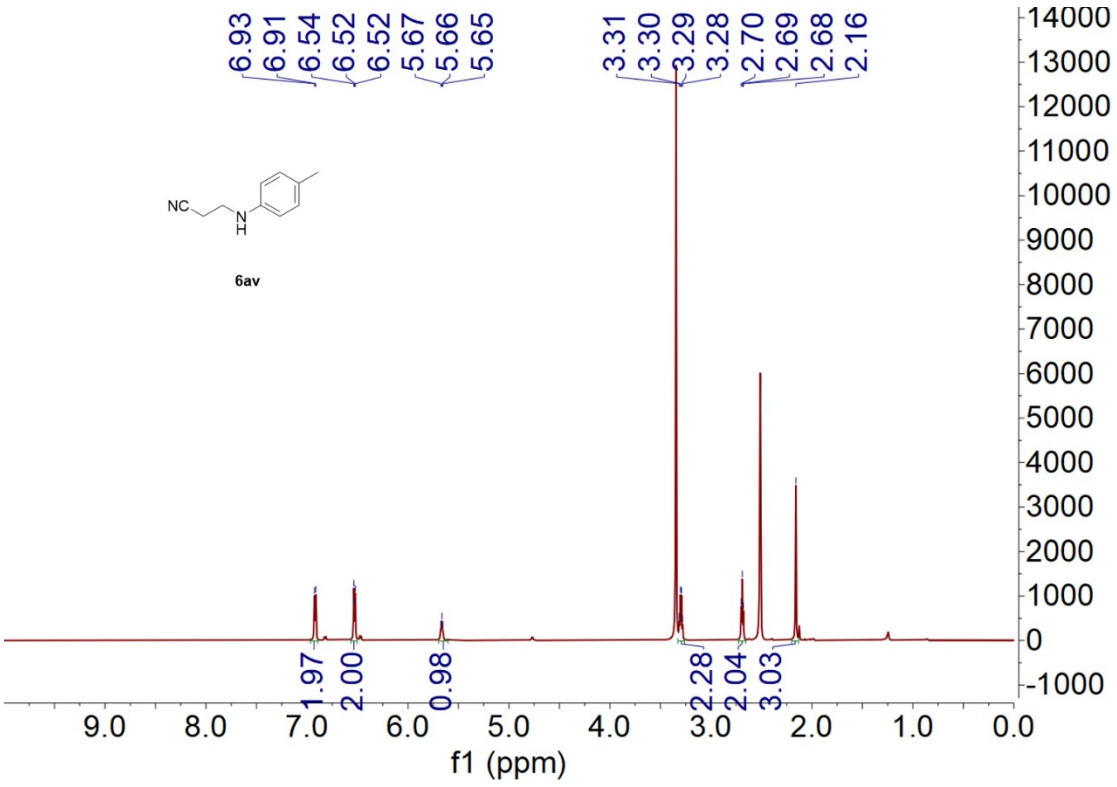
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6at**



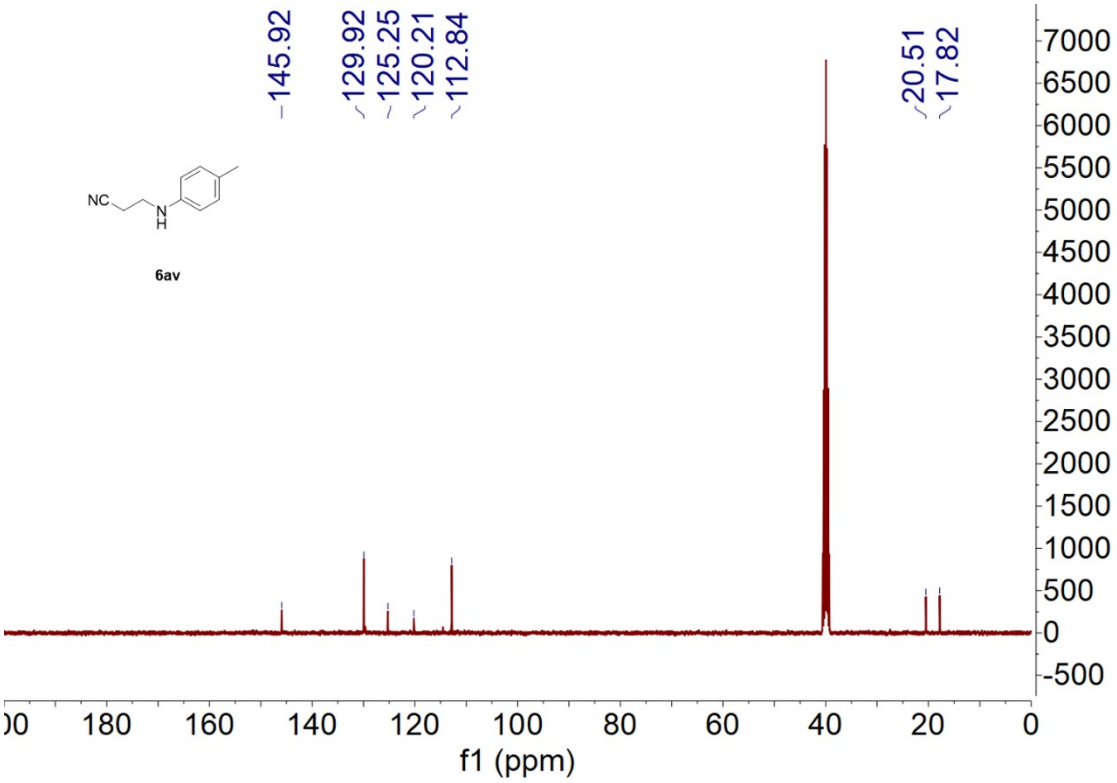
^{13}C NMR{1H}{1H} spectrum (100 MHz, DMSO-d_6) of **6at**



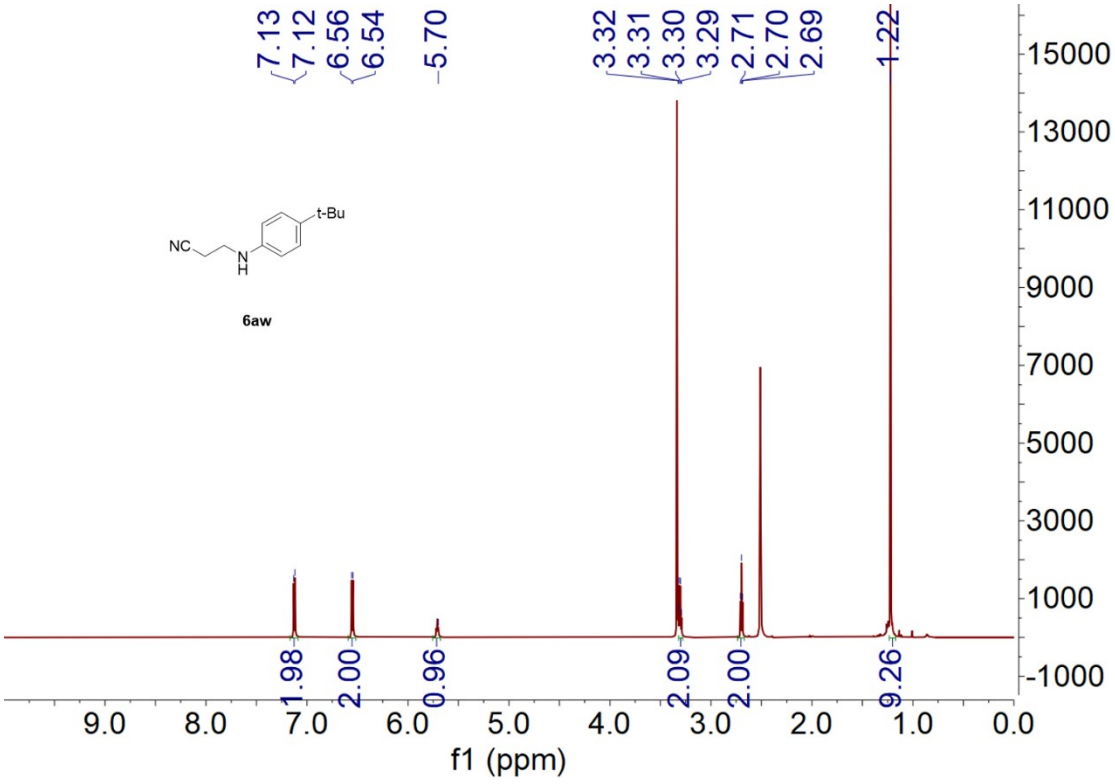
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6av**



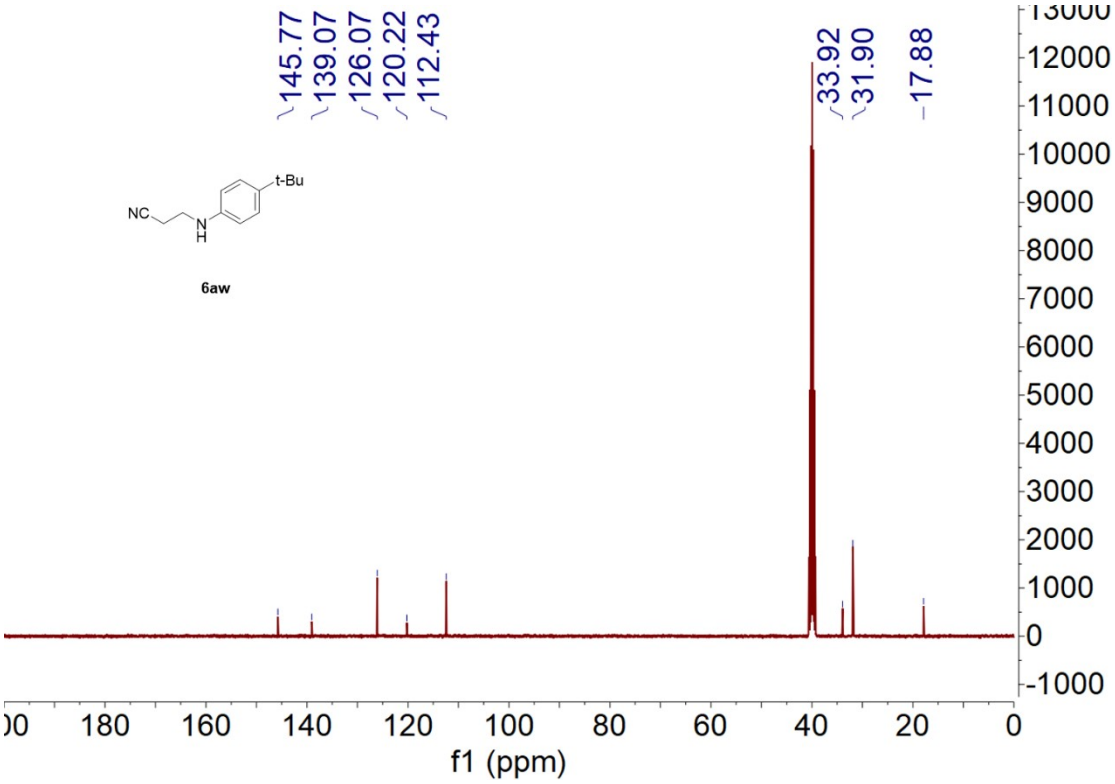
^{13}C NMR{1H}{1H} spectrum (100 MHz, DMSO-d_6) of **6av**



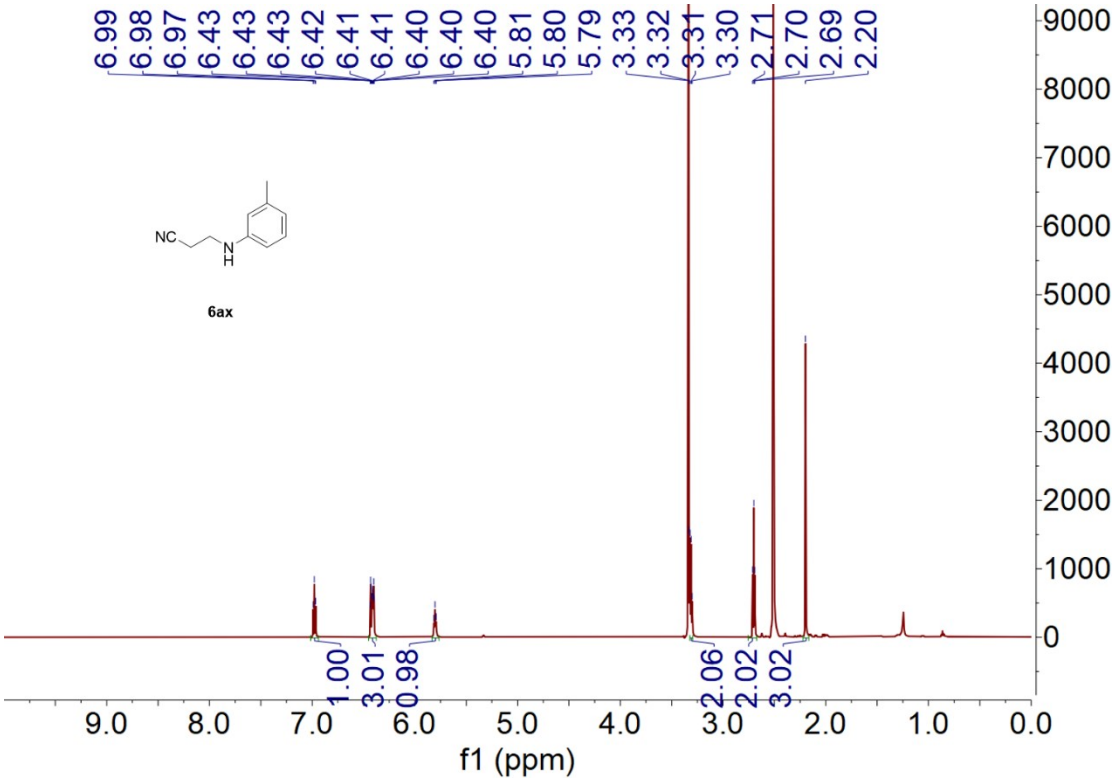
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6aw**



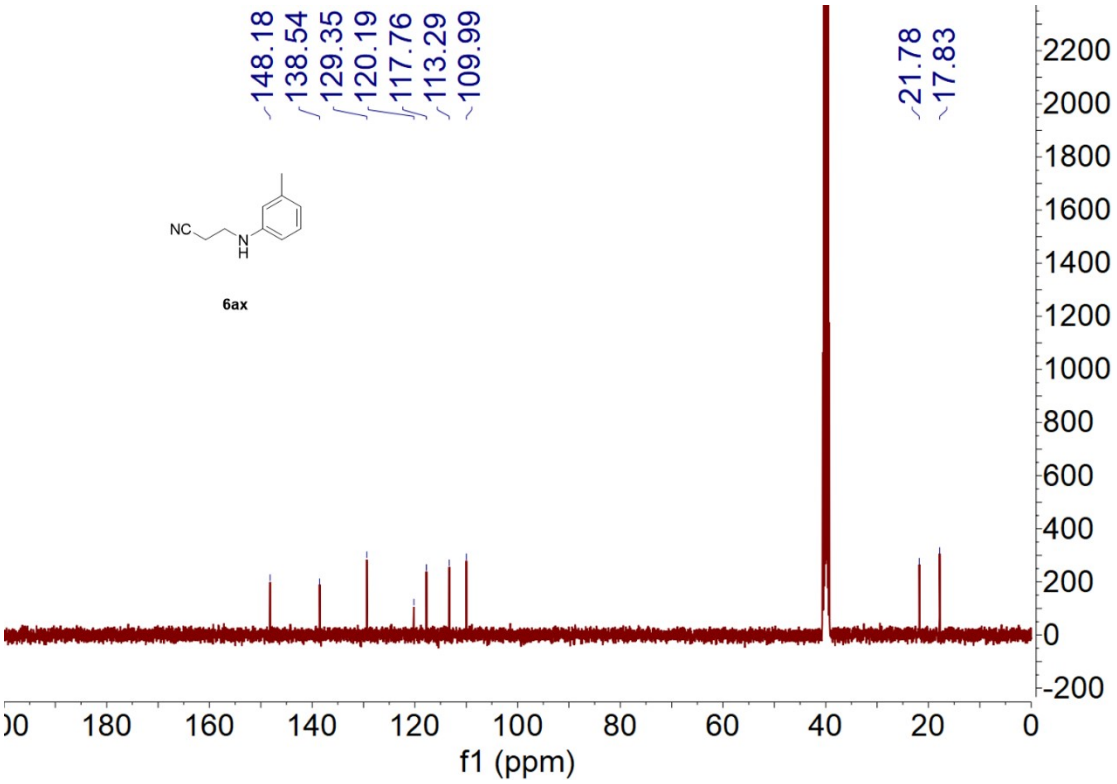
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6aw**



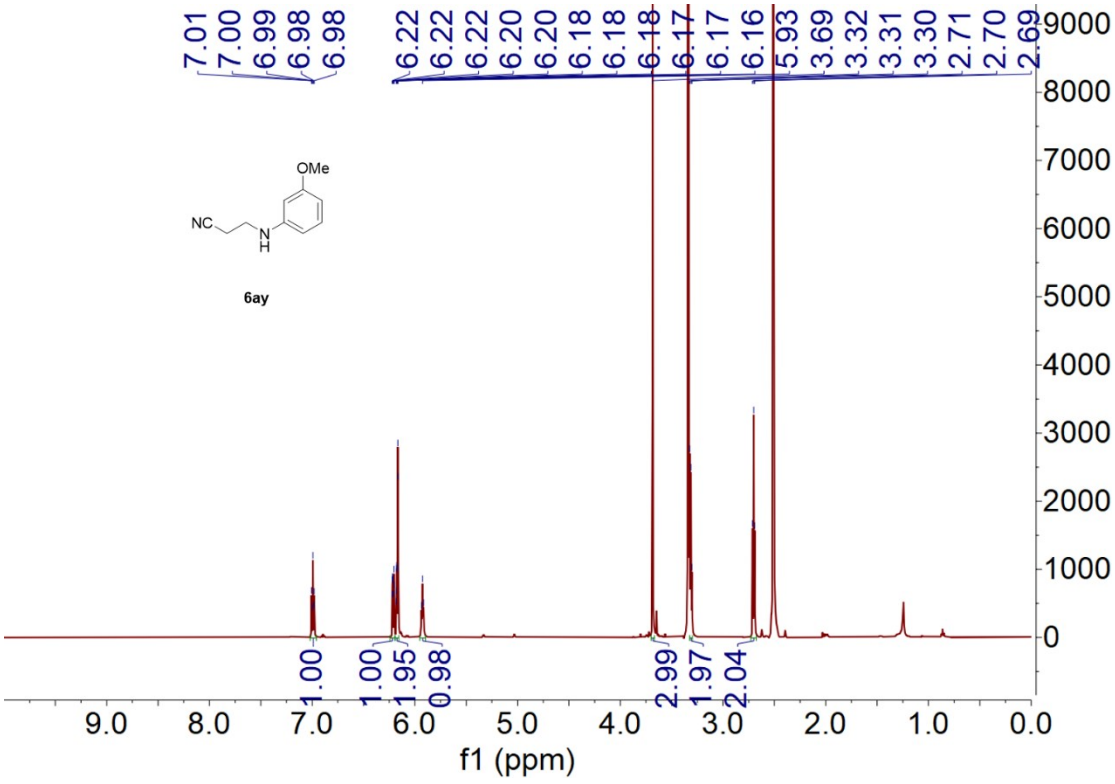
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6ax**



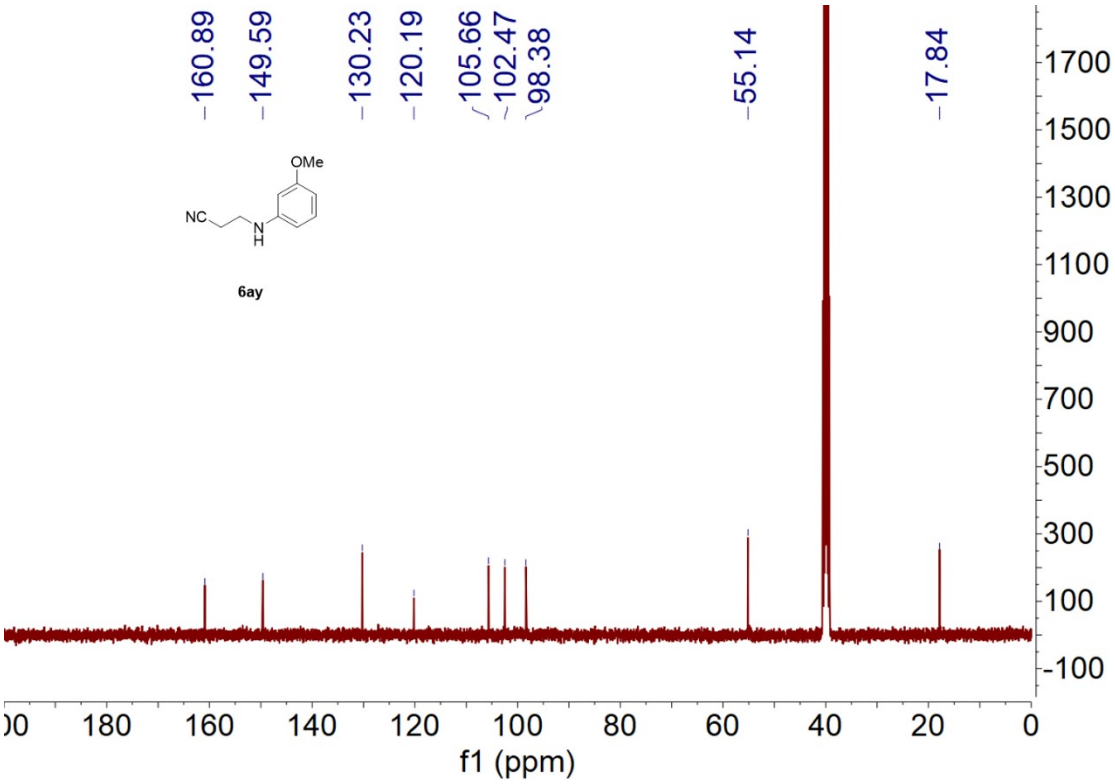
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6ax**



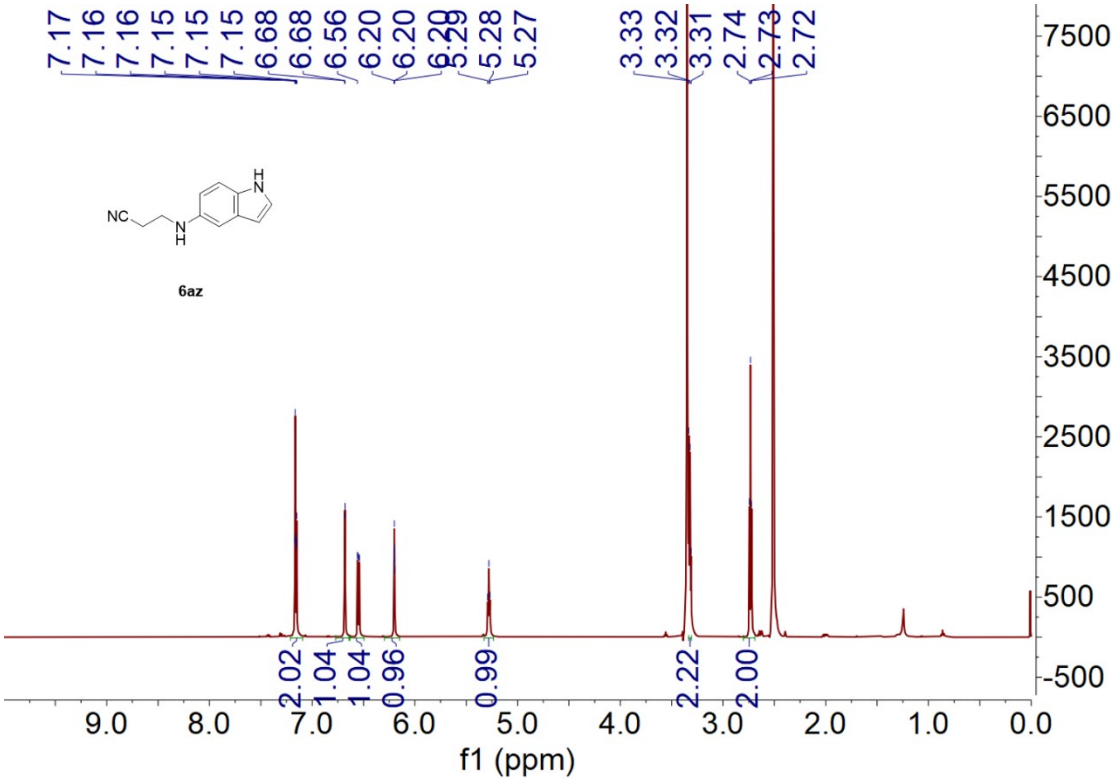
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6ay**



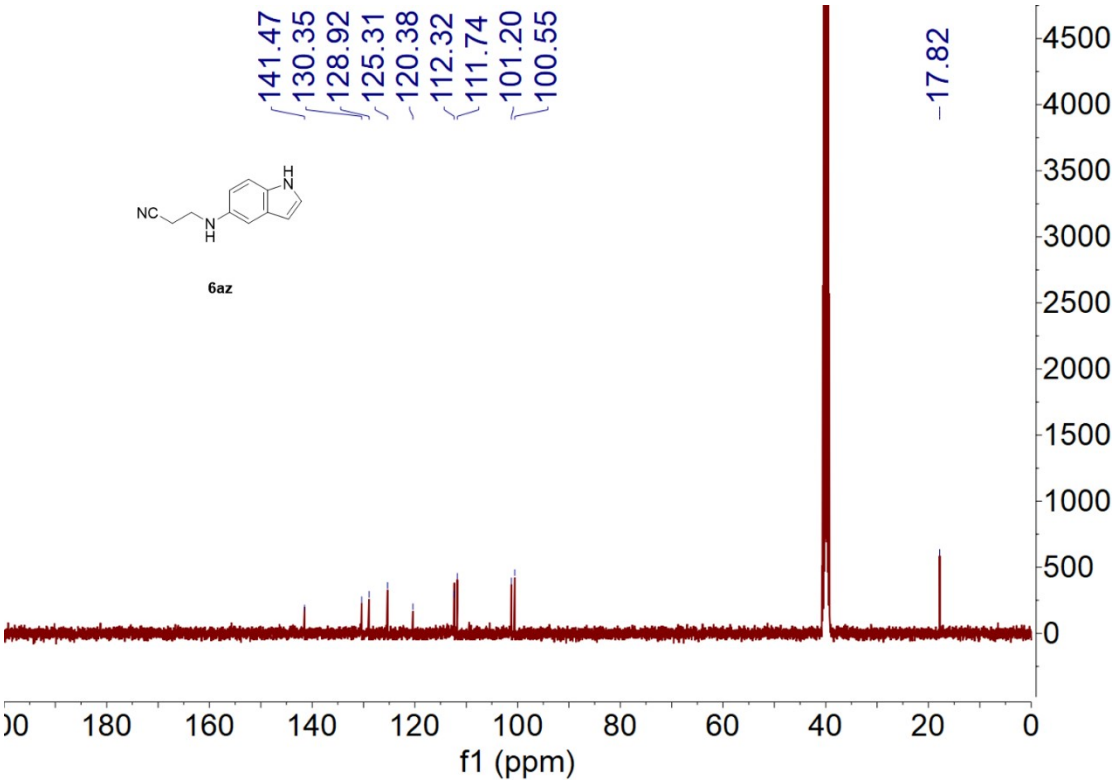
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6ay**



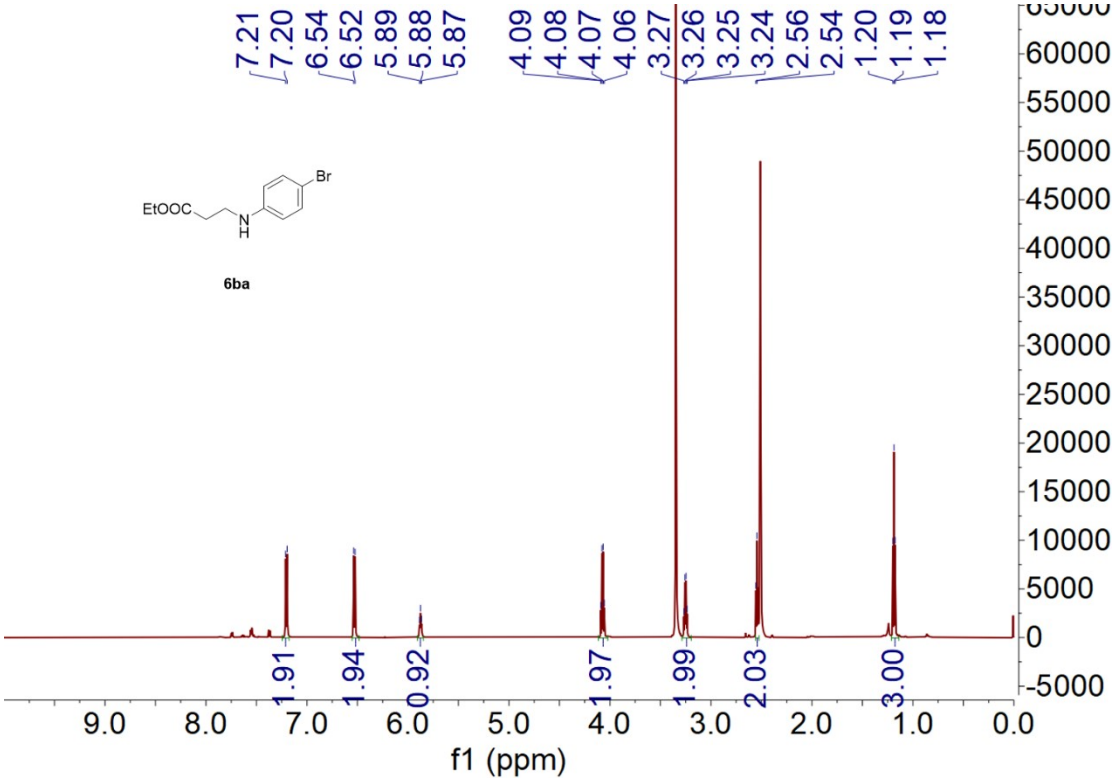
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6az**



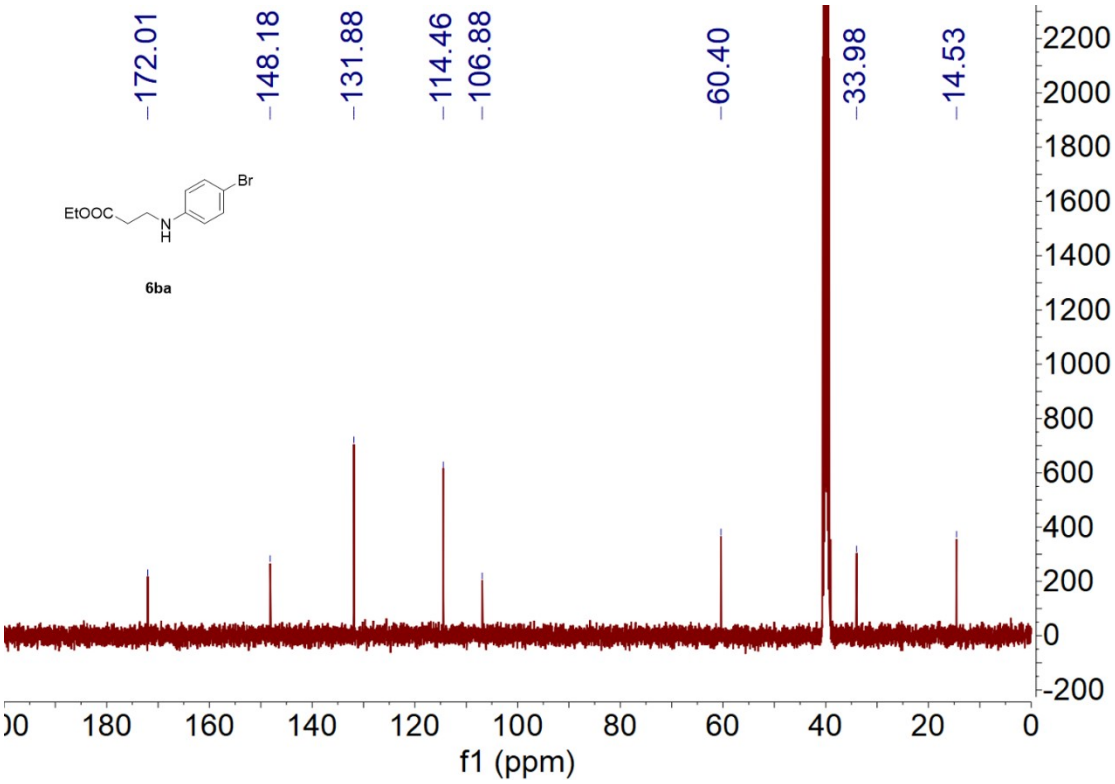
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6az**



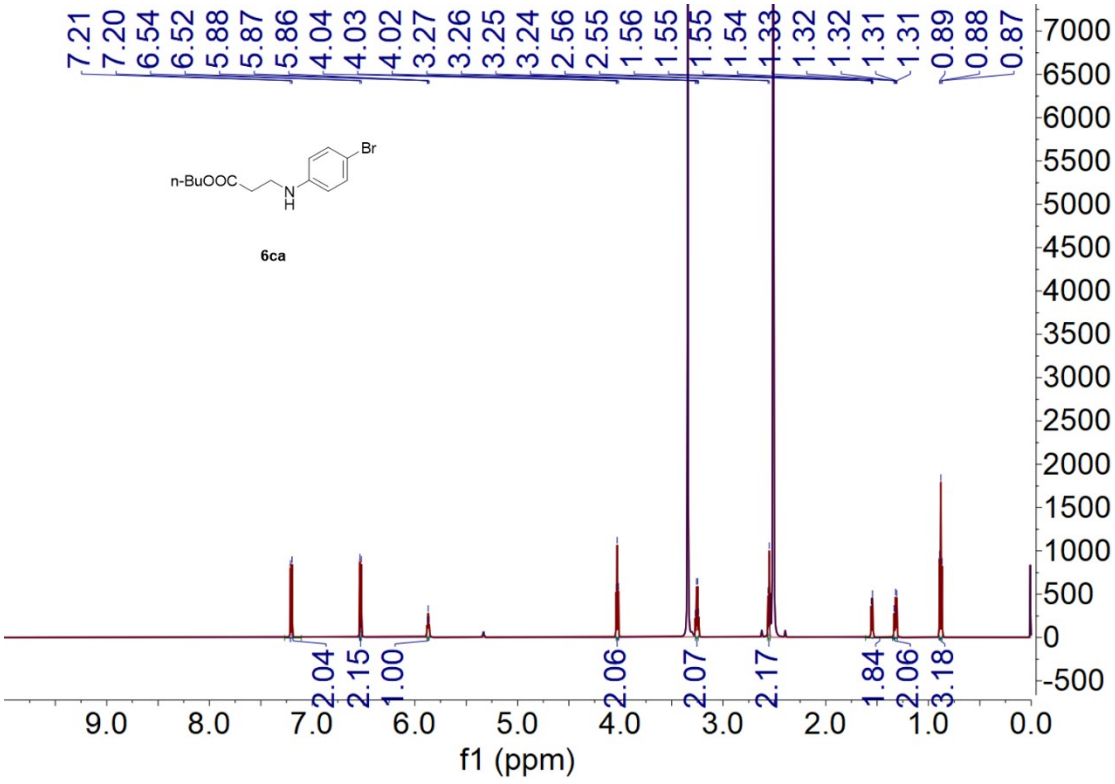
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6ba**



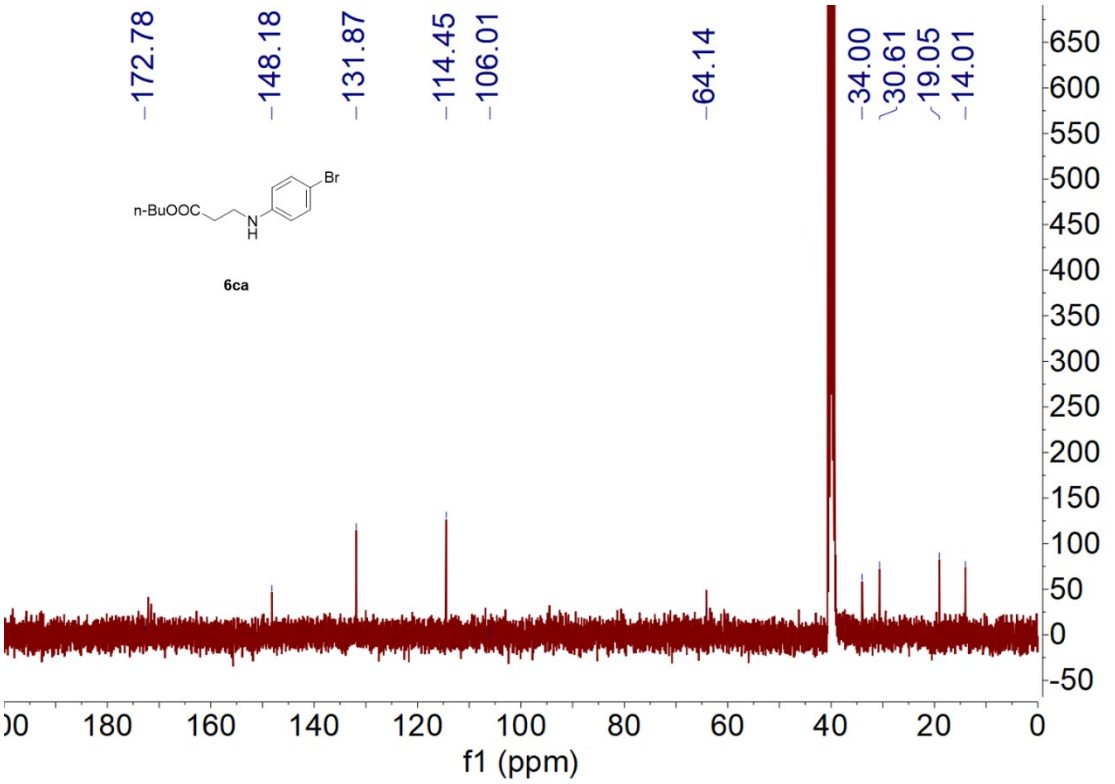
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6ba**



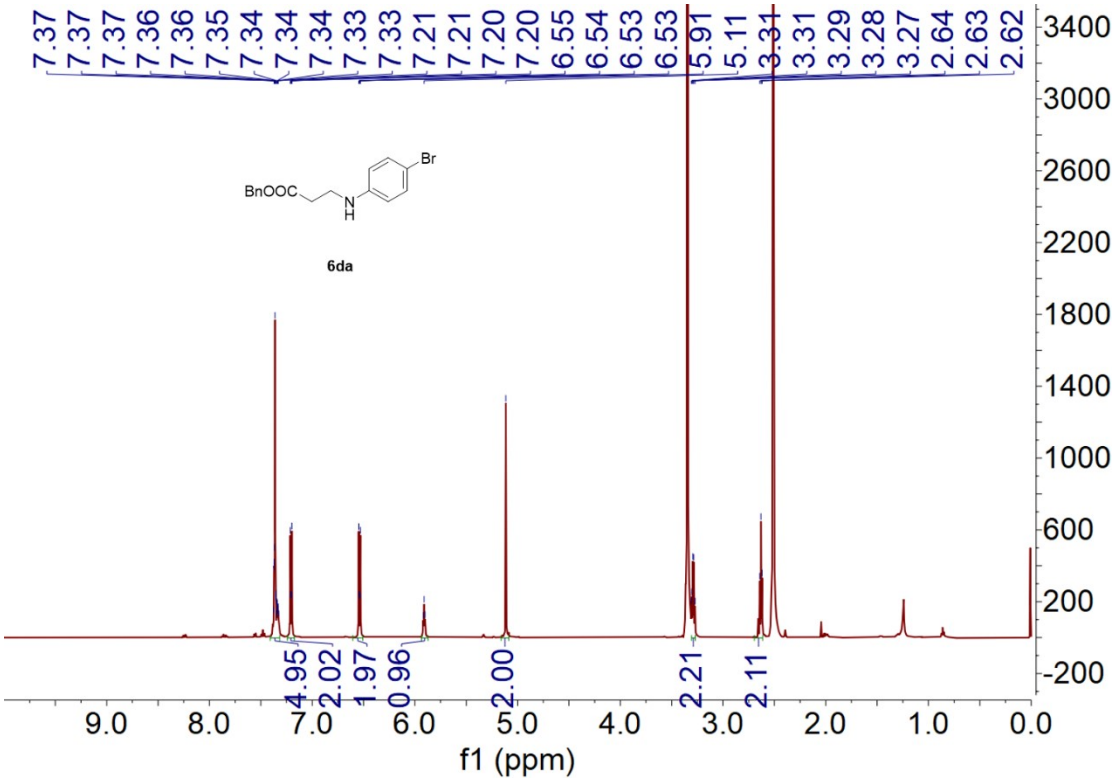
^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6ca**



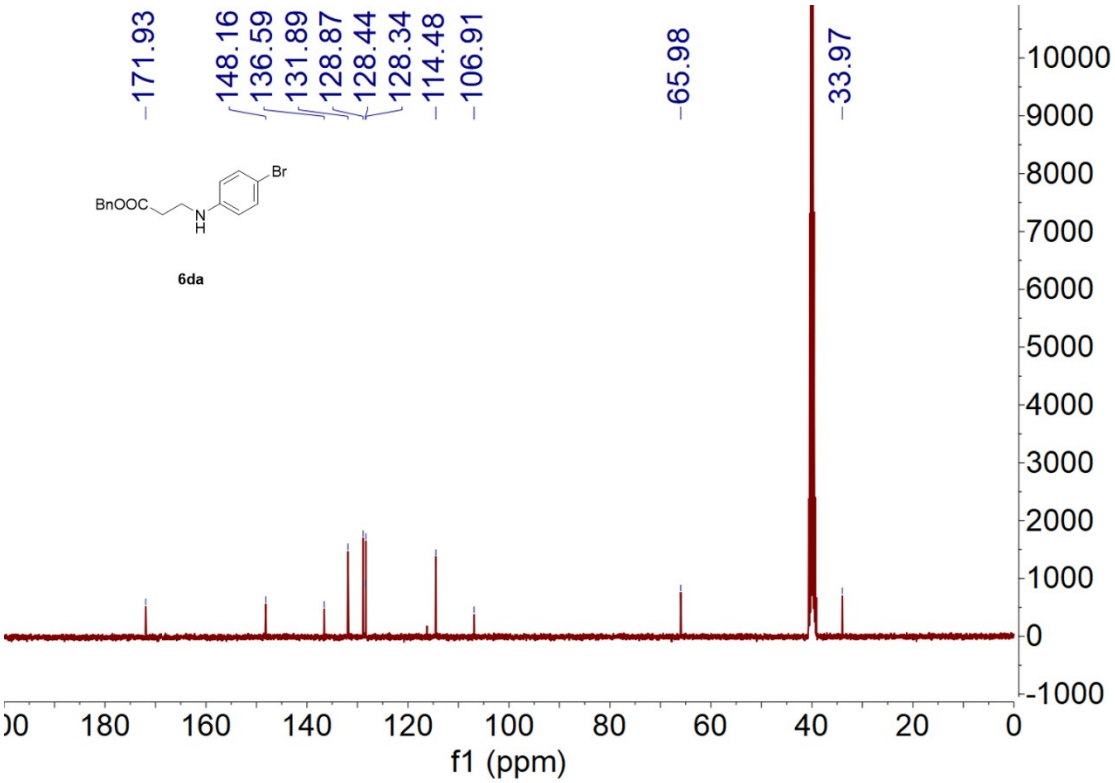
^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6ca**



^{1}H NMR spectrum (600 MHz, DMSO-d_6) of **6da**

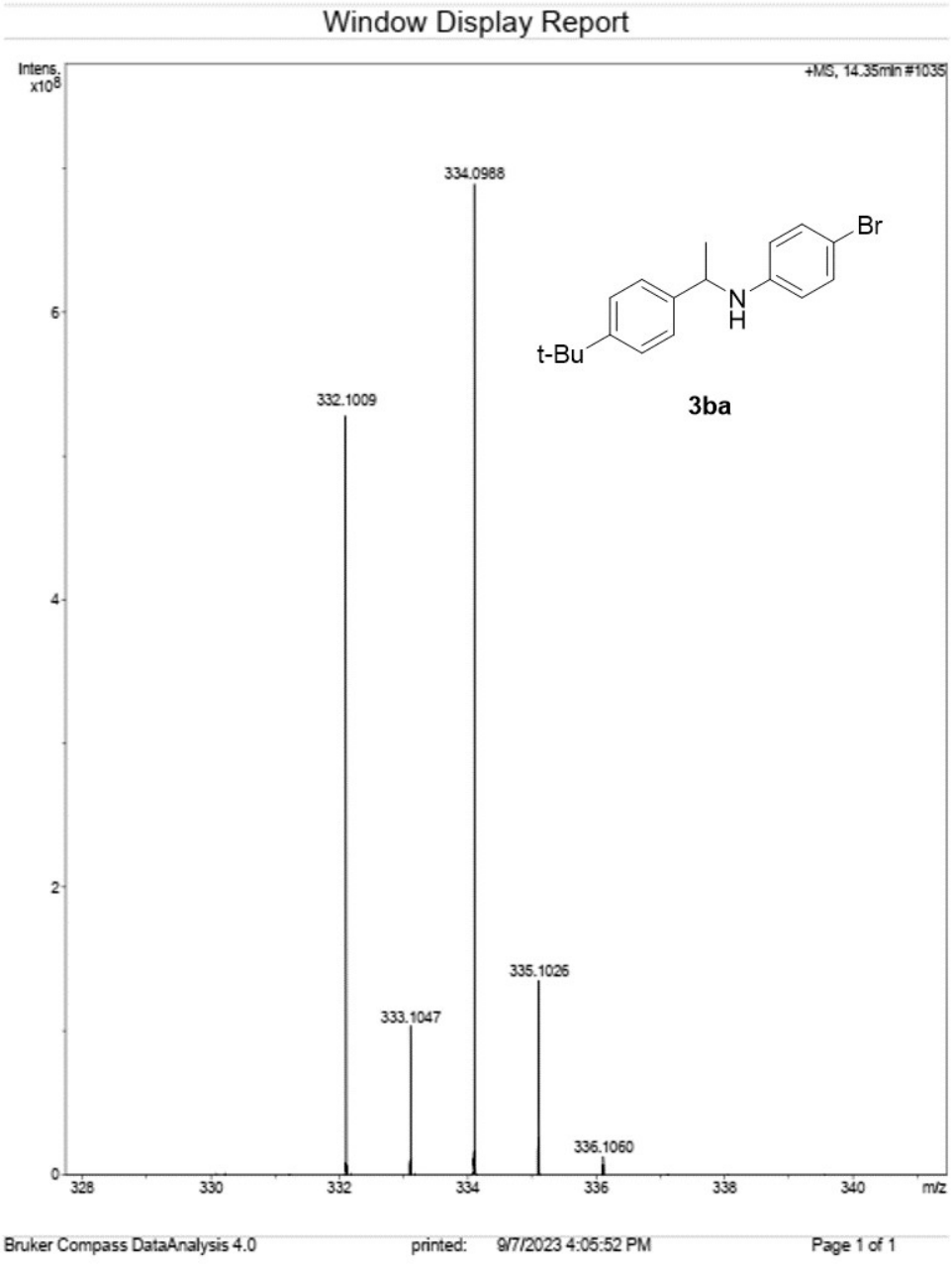


^{13}C NMR{1H} spectrum (100 MHz, DMSO-d_6) of **6da**

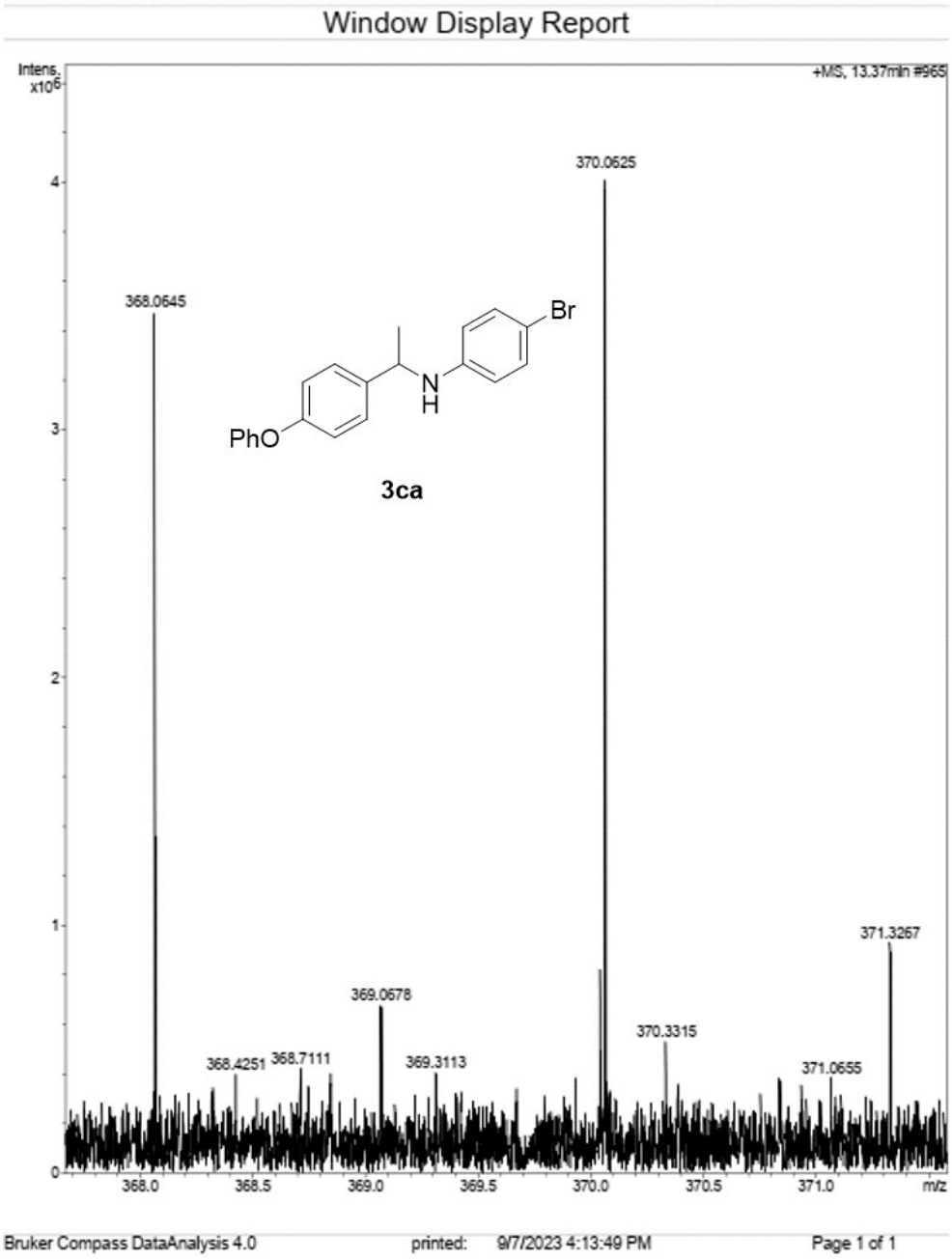


7. The HRMS spectra of the new compounds

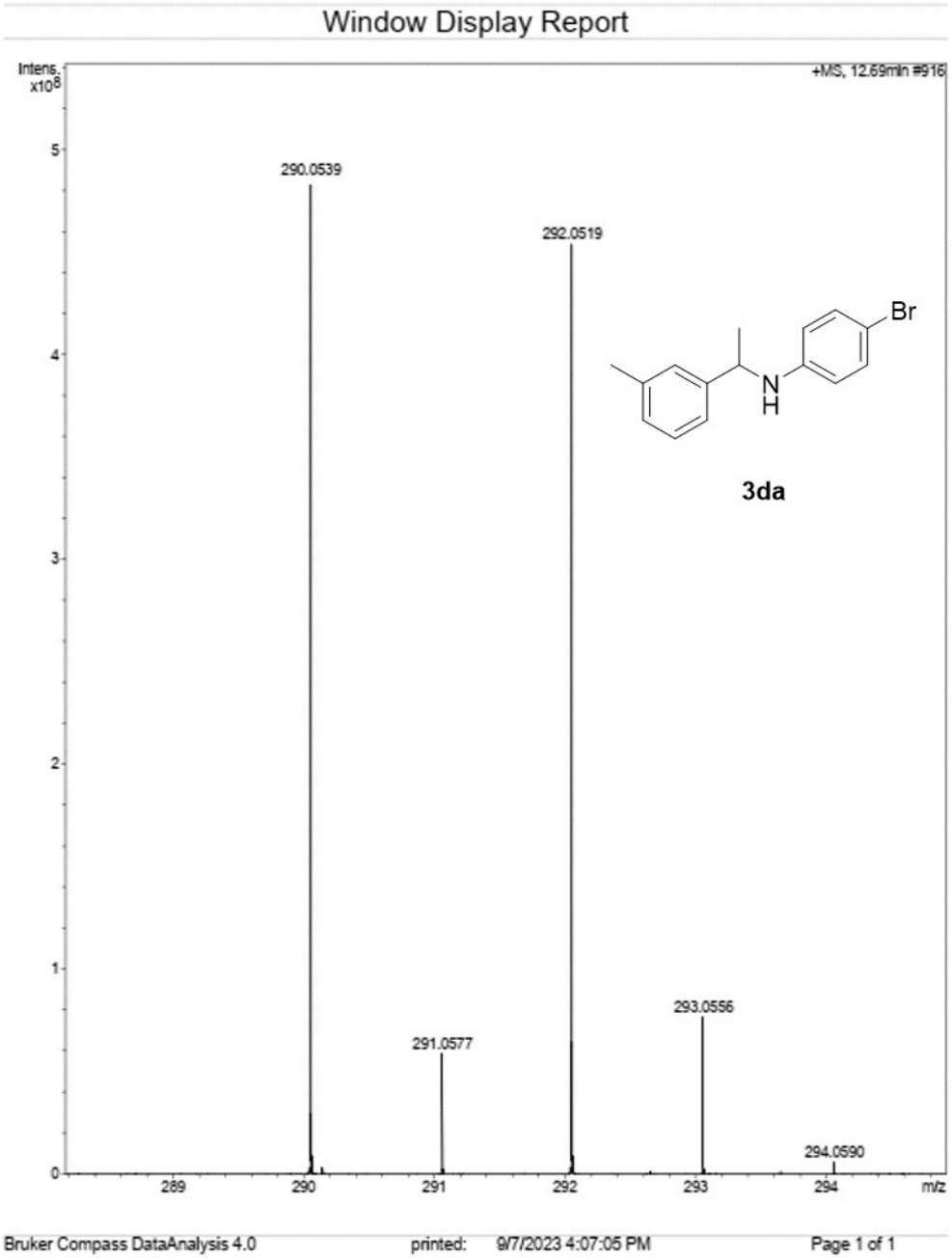
HRMS (ESI-TOF) spectrum of **3ba**



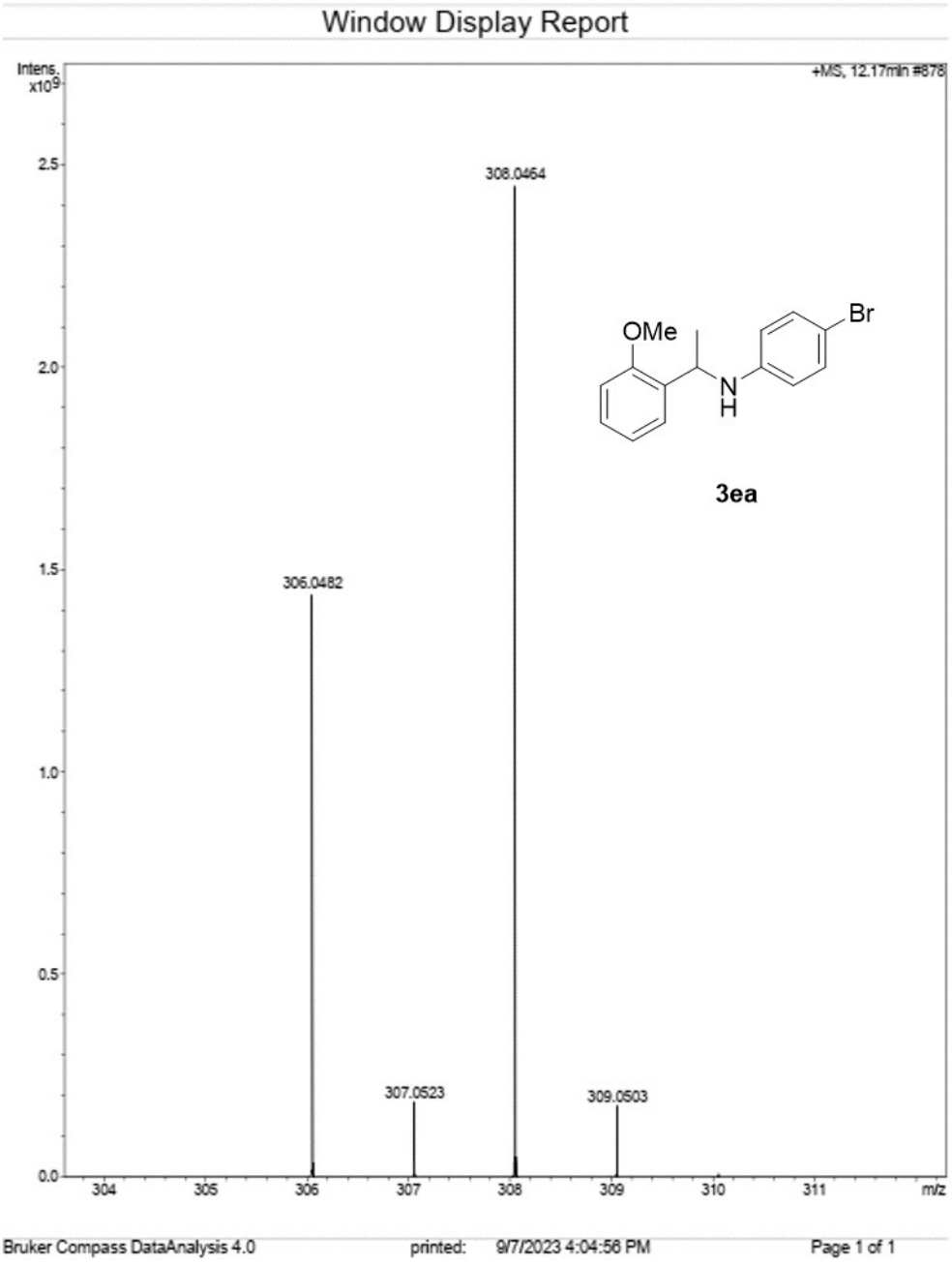
HRMS (ESI-TOF) spectrum of **3ca**



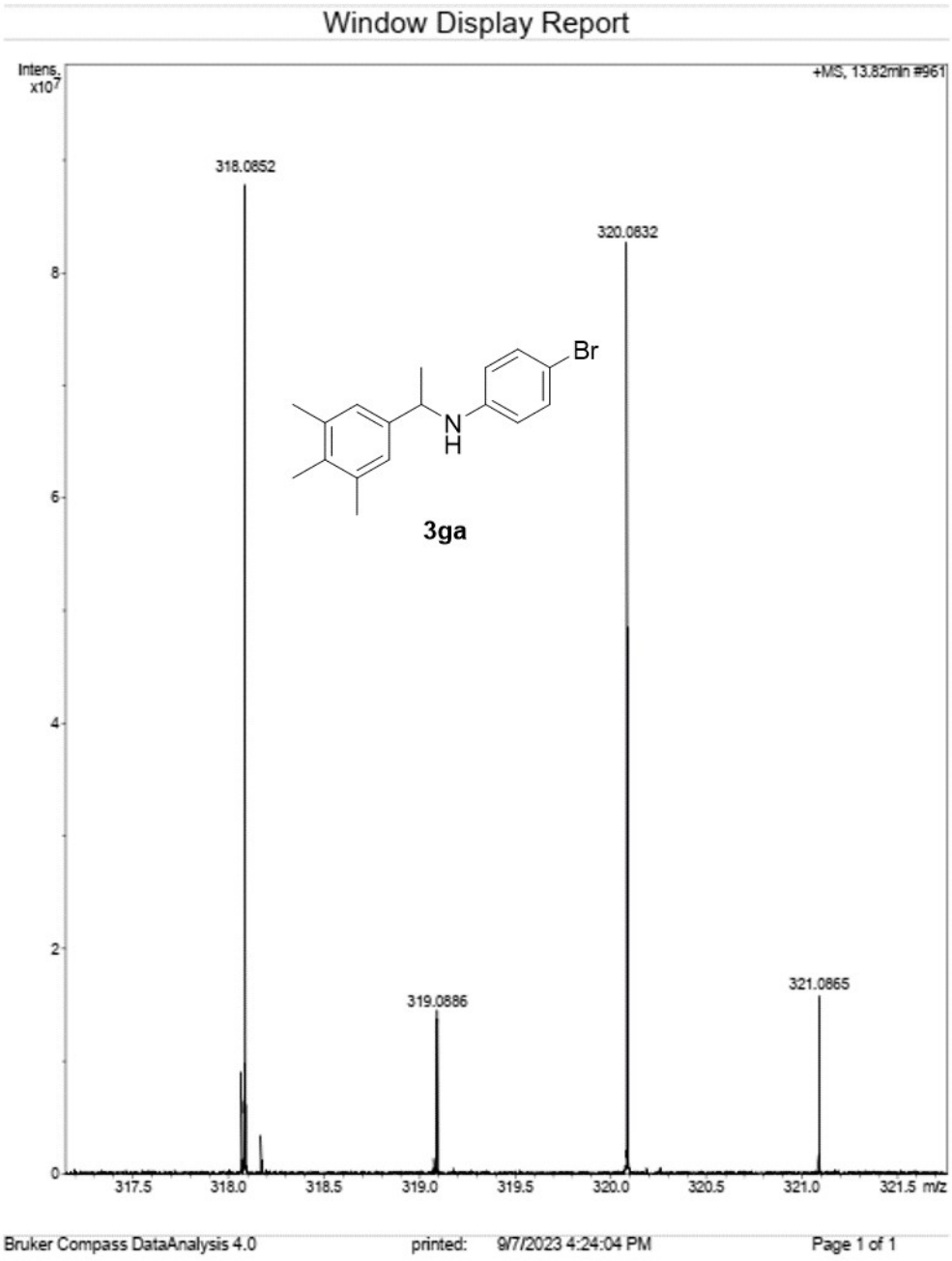
HRMS (ESI-TOF) spectrum of **3da**



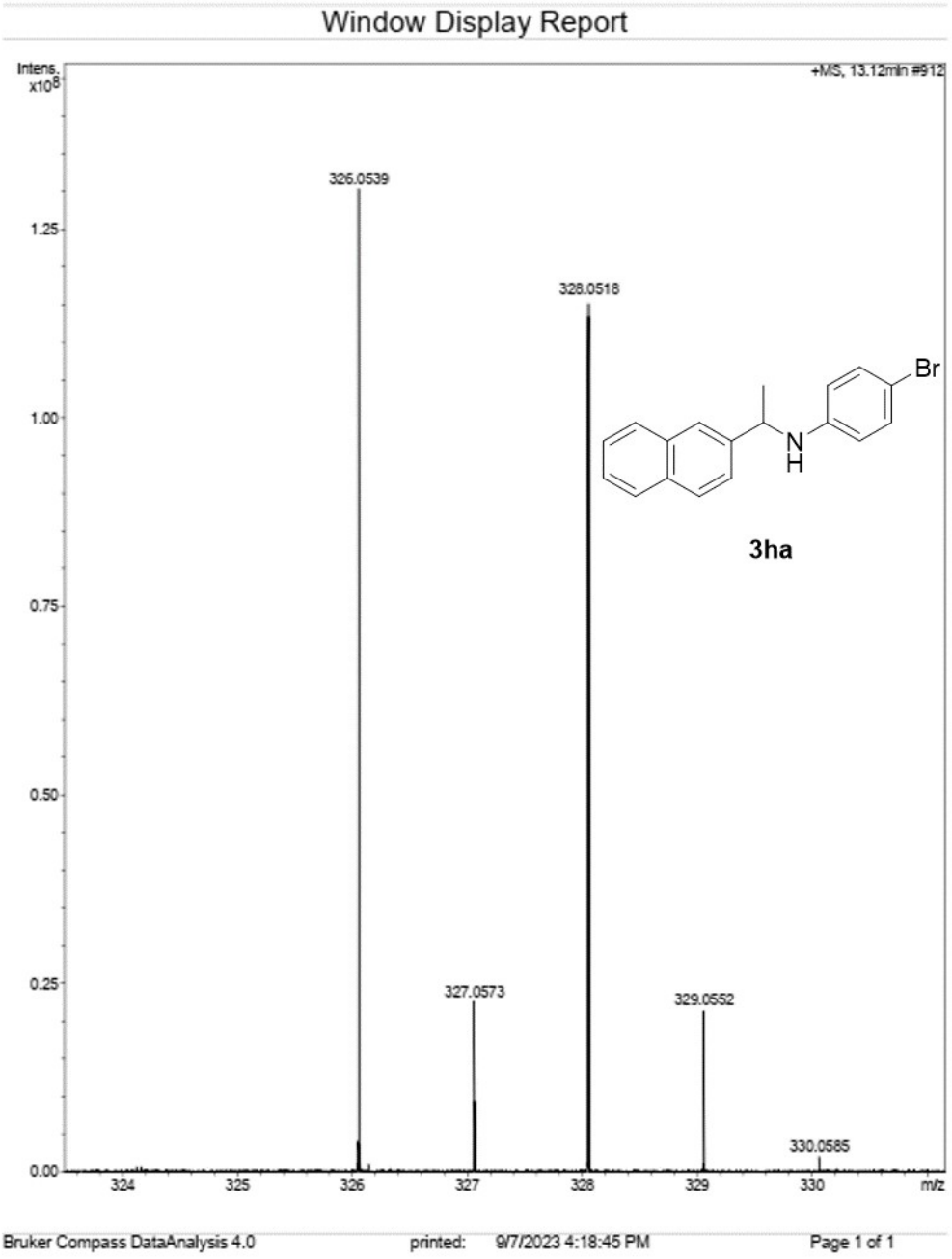
HRMS (ESI-TOF) spectrum of **3ea**



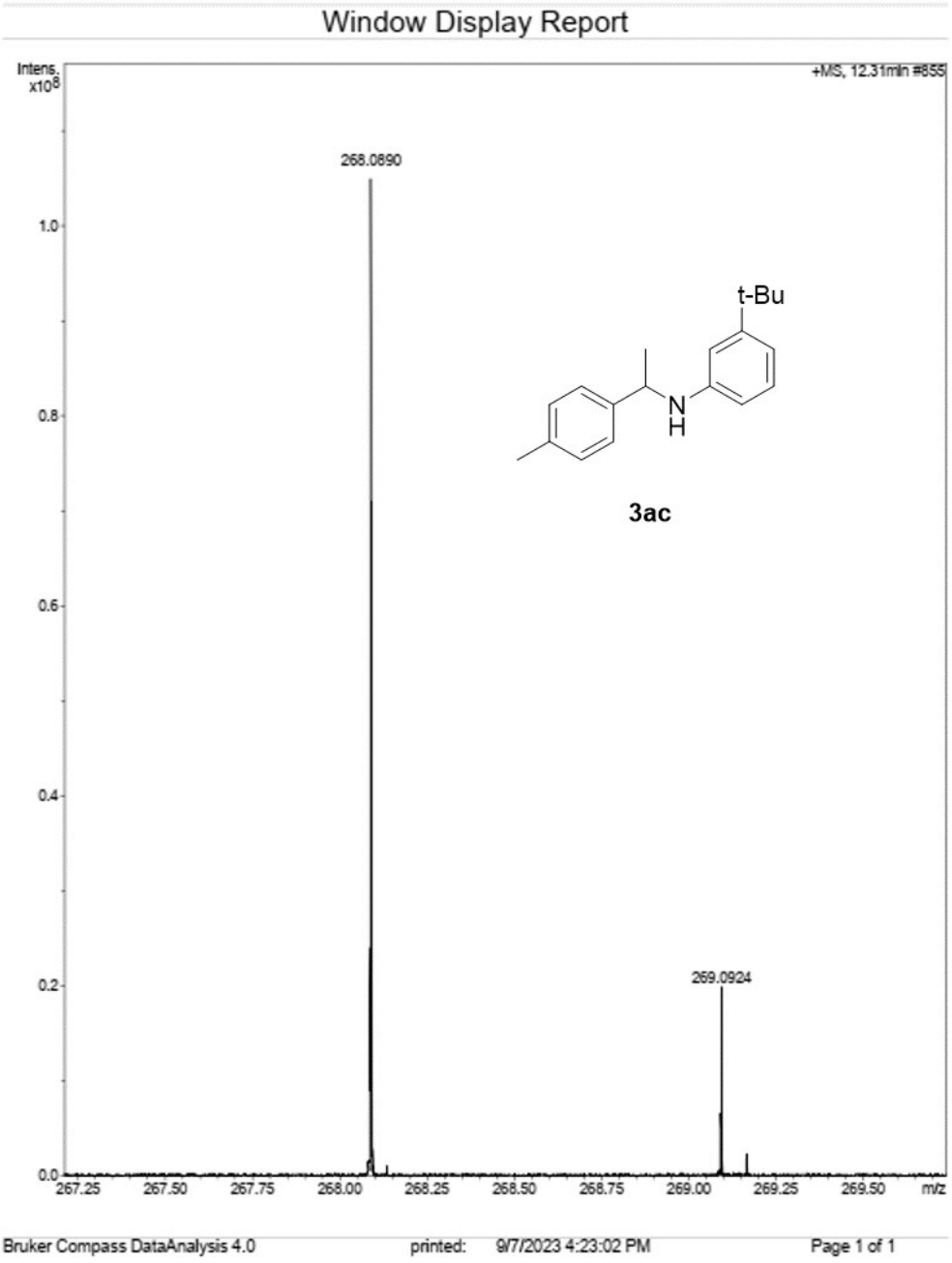
HRMS (ESI-TOF) spectrum of **3ga**



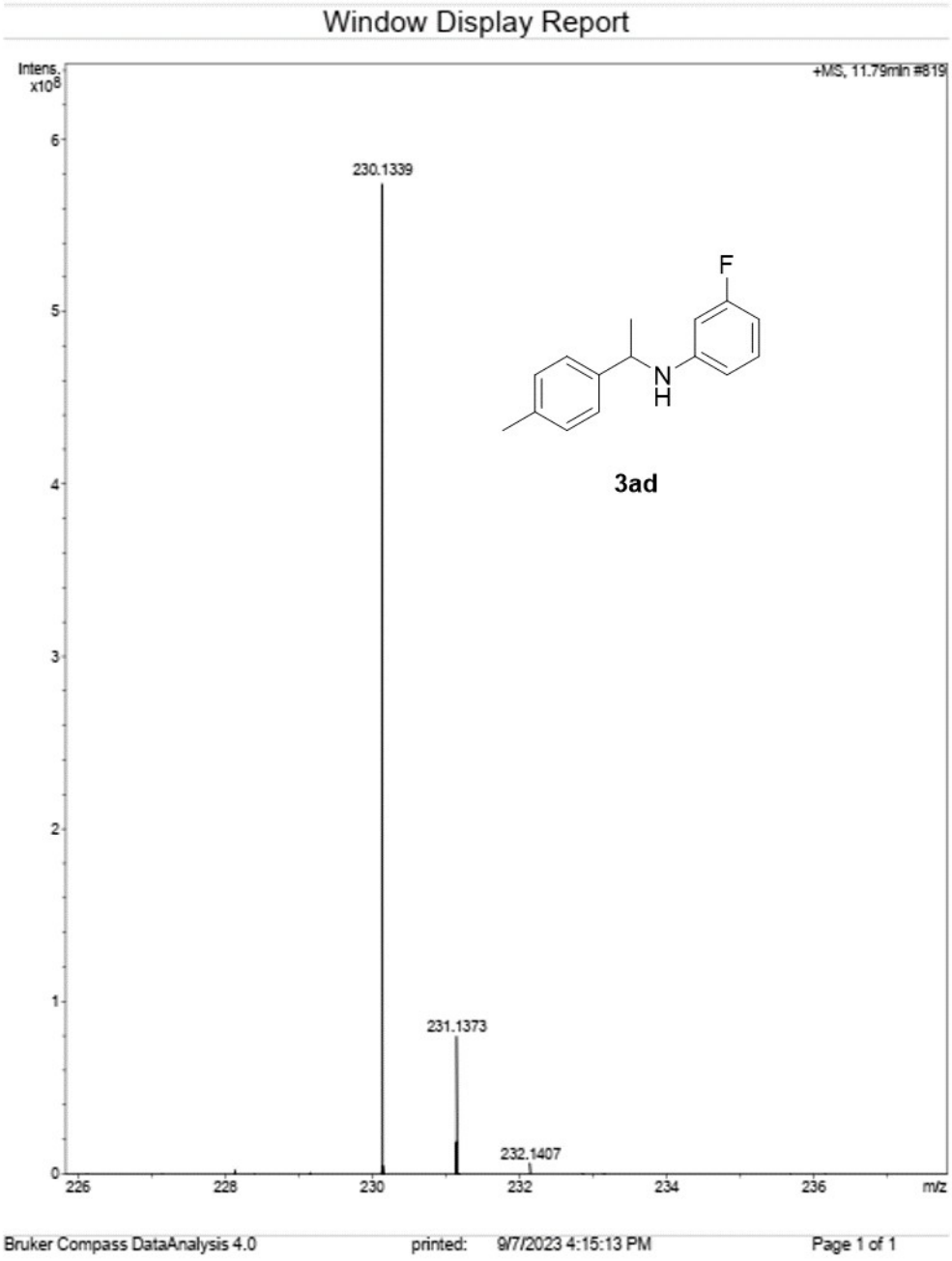
HRMS (ESI-TOF) spectrum of **3ha**



HRMS (ESI-TOF) spectrum of **3ac**



HRMS (ESI-TOF) spectrum of **3ad**



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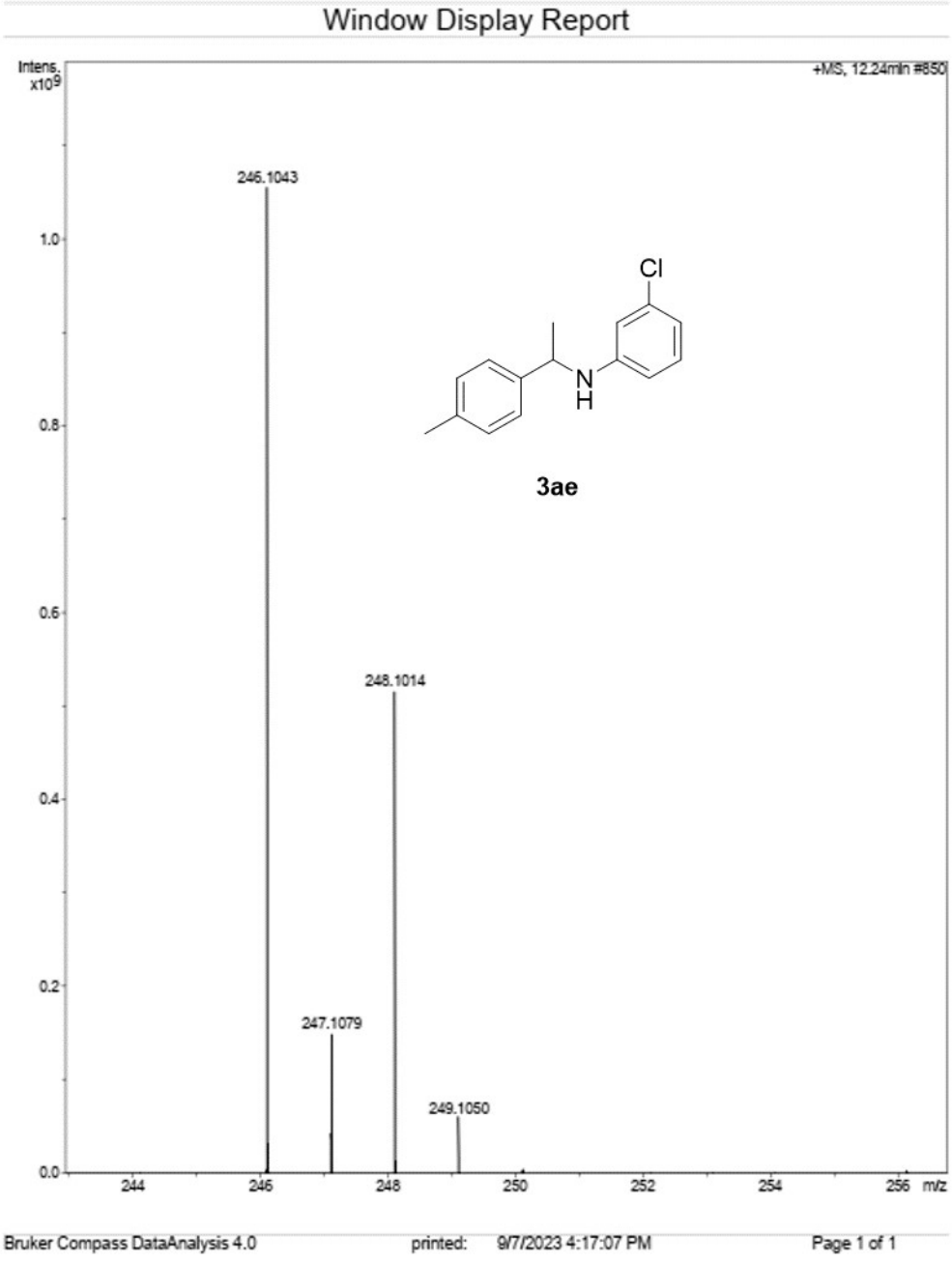
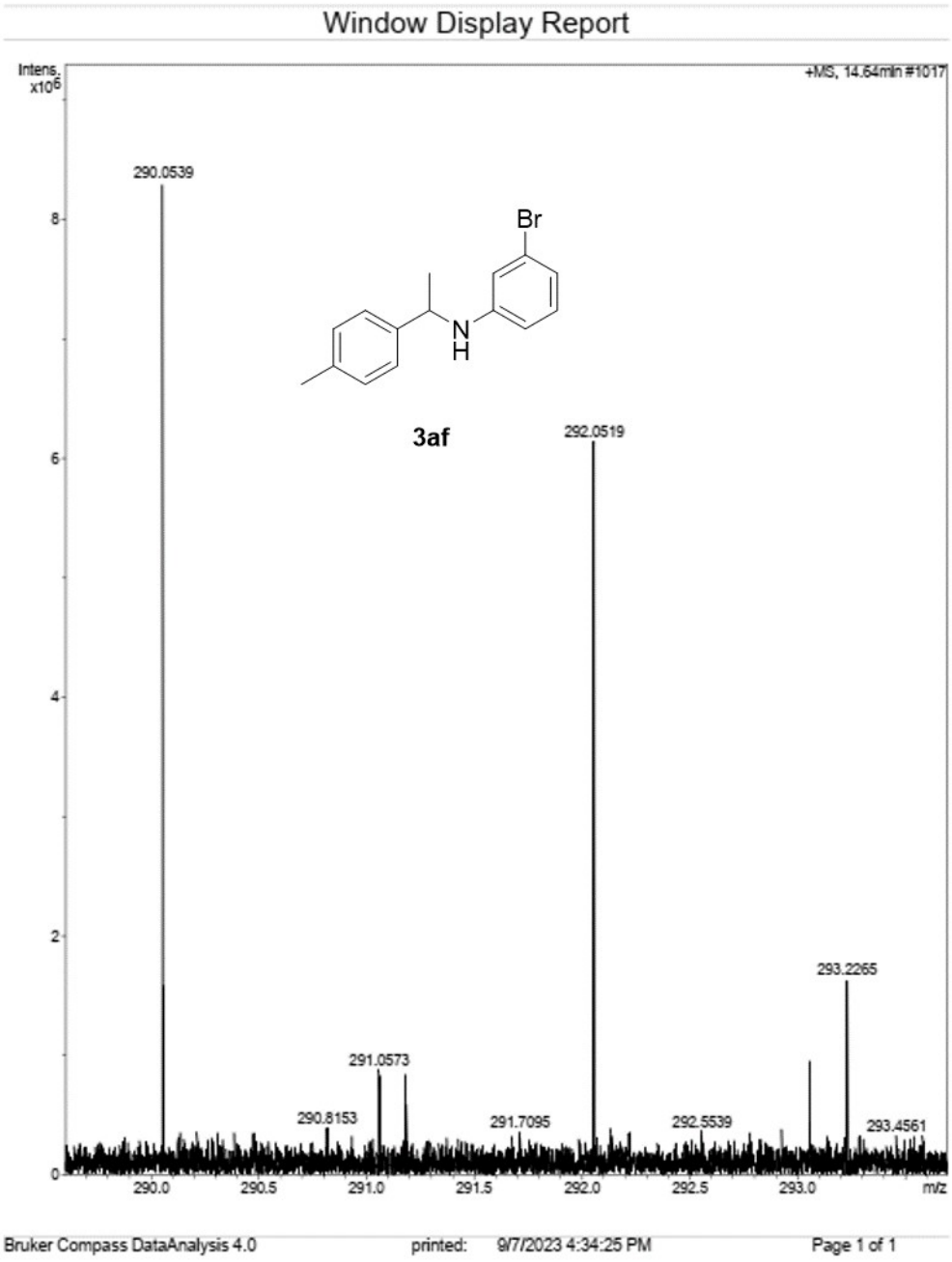
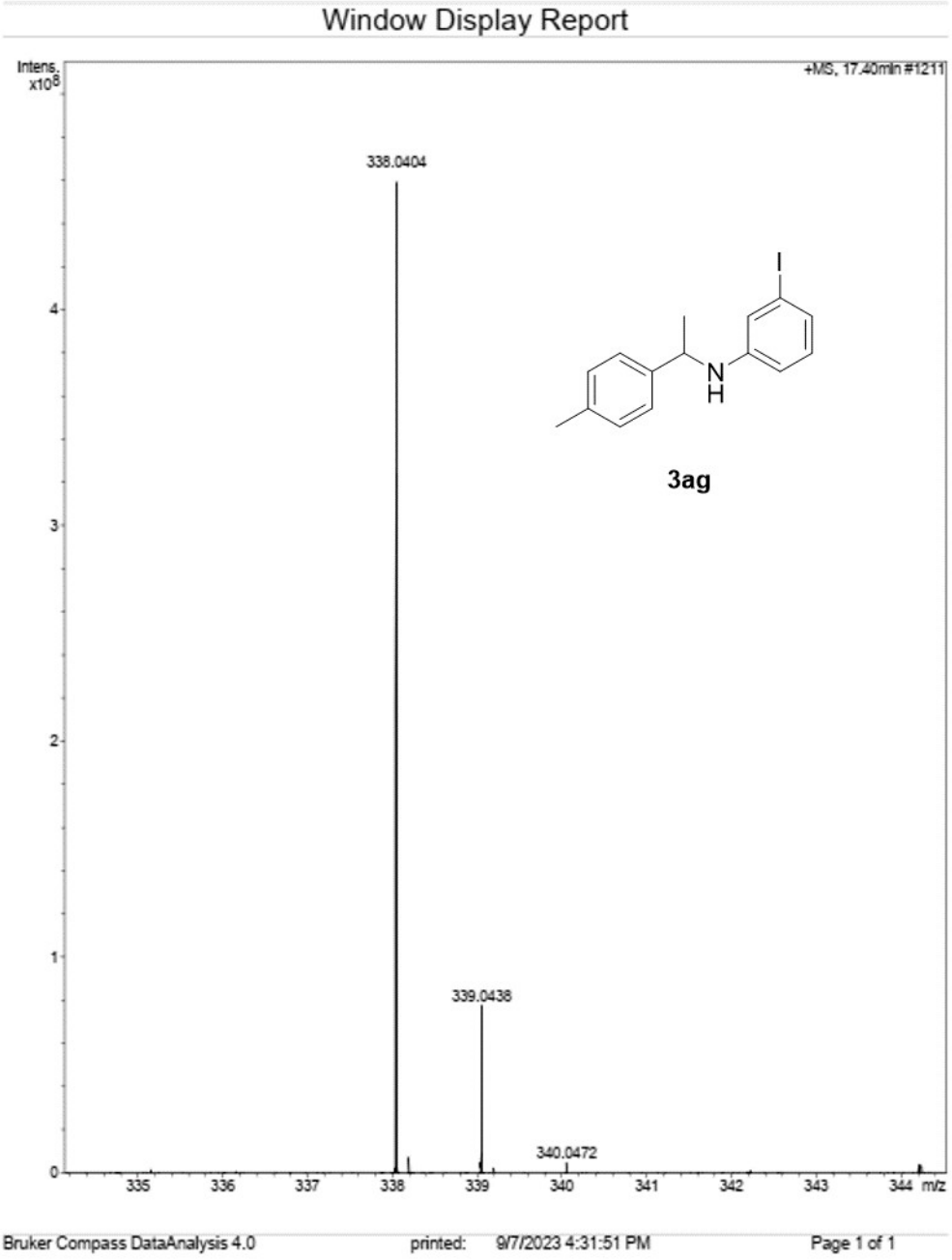
HRMS (ESI-TOF) spectrum of **3ae**



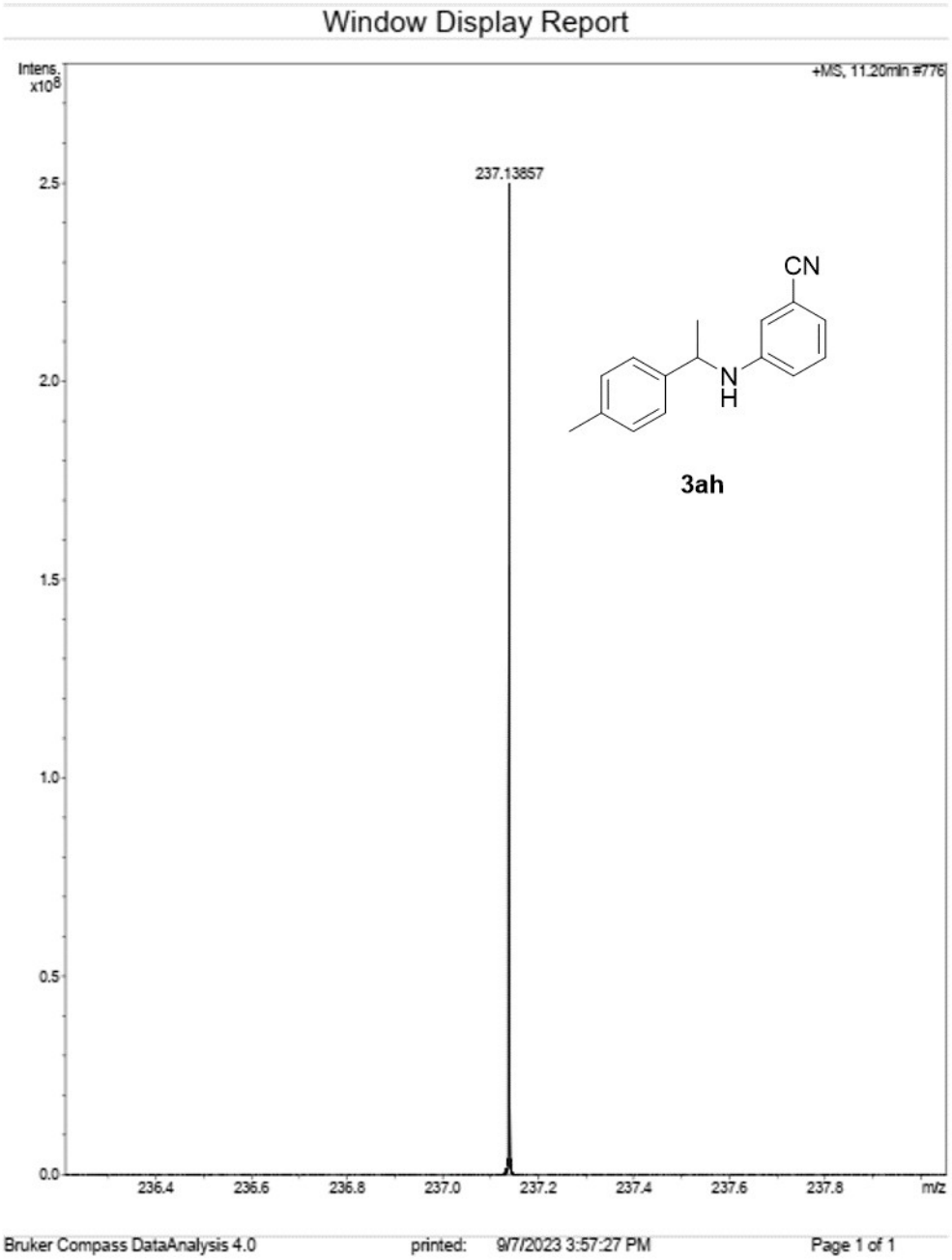
HRMS (ESI-TOF) spectrum of **3af**



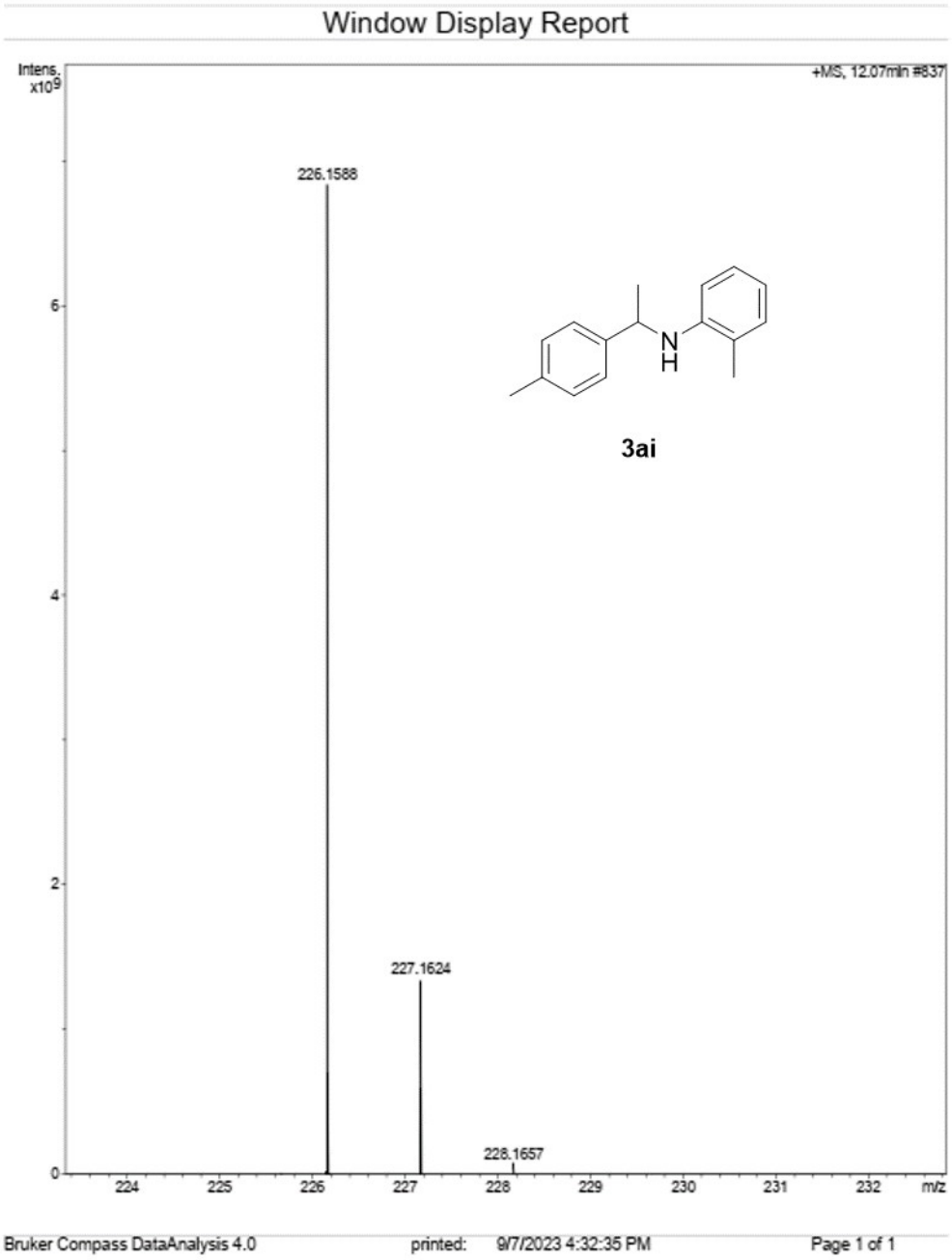
HRMS (ESI-TOF) spectrum of **3ag**



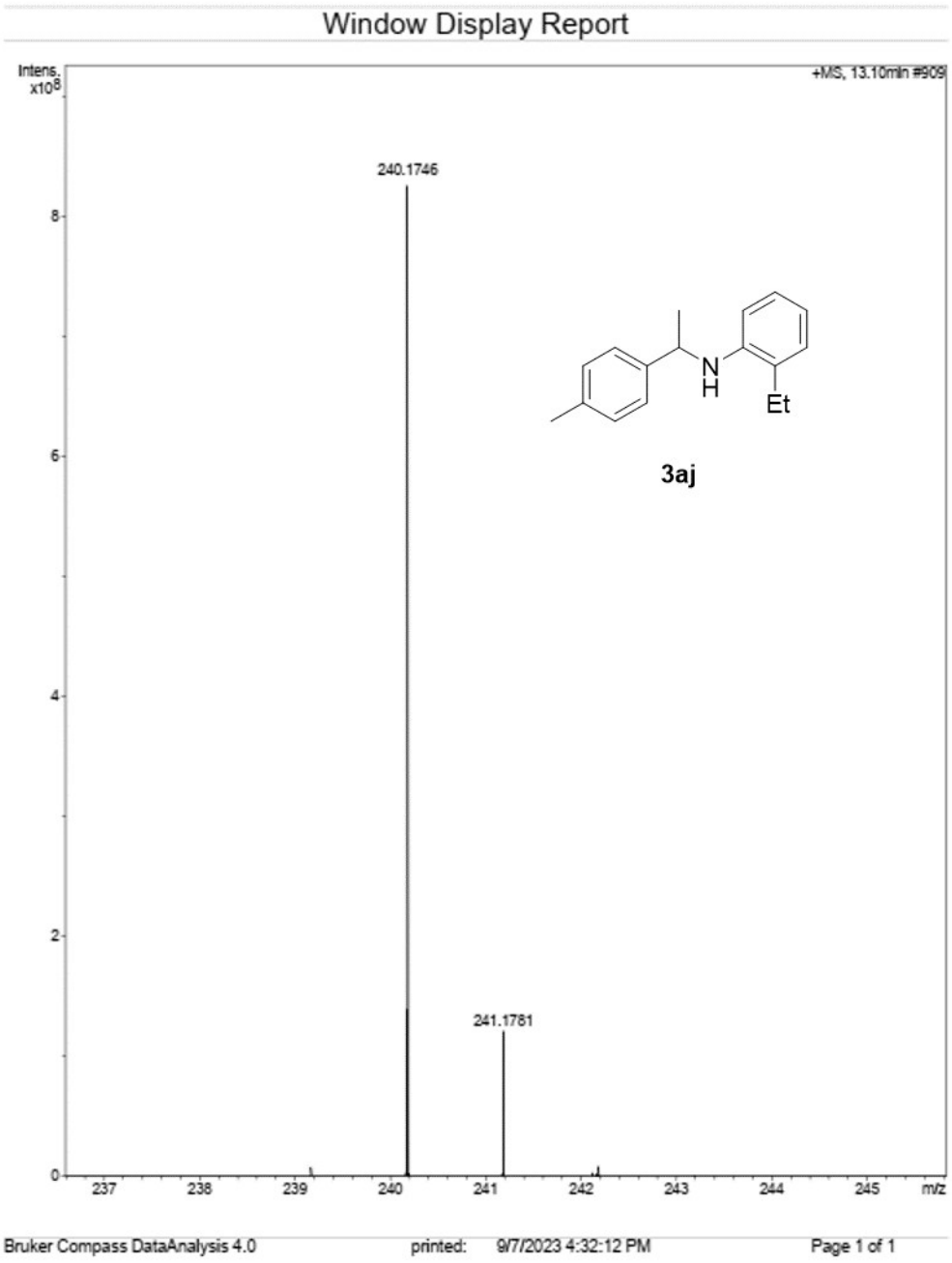
HRMS (ESI-TOF) spectrum of **3ah**



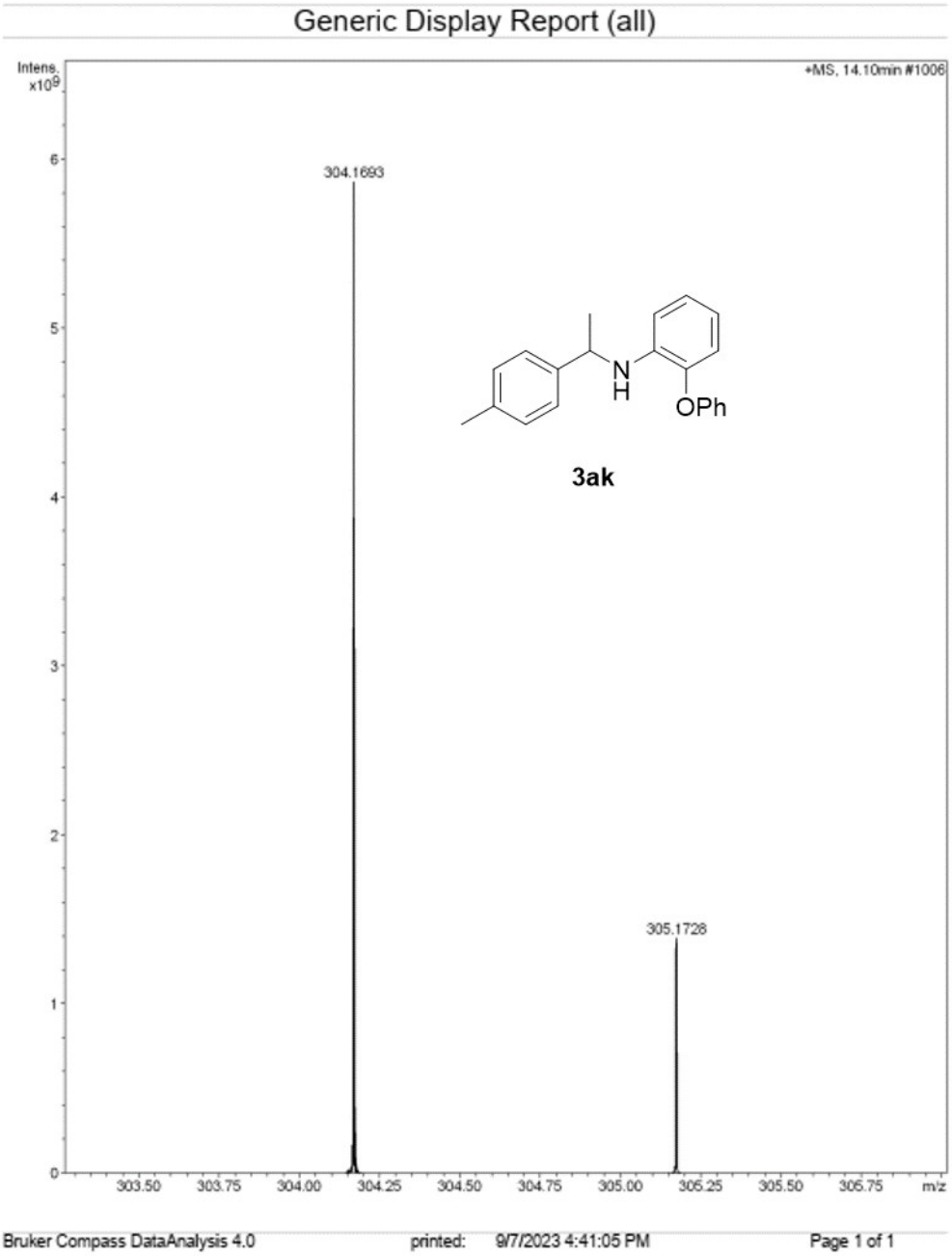
HRMS (ESI-TOF) spectrum of **3ai**



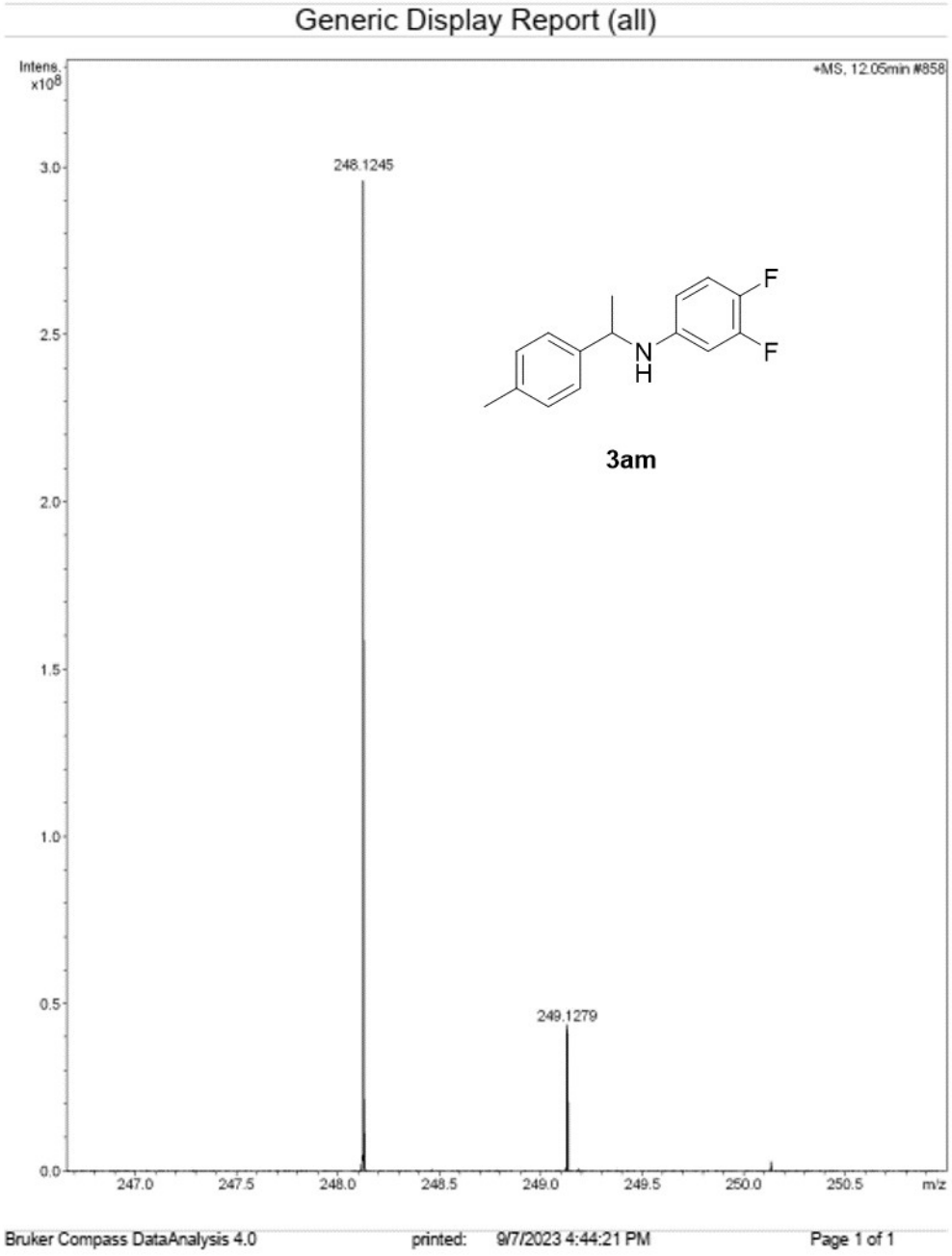
HRMS (ESI-TOF) spectrum of **3aj**



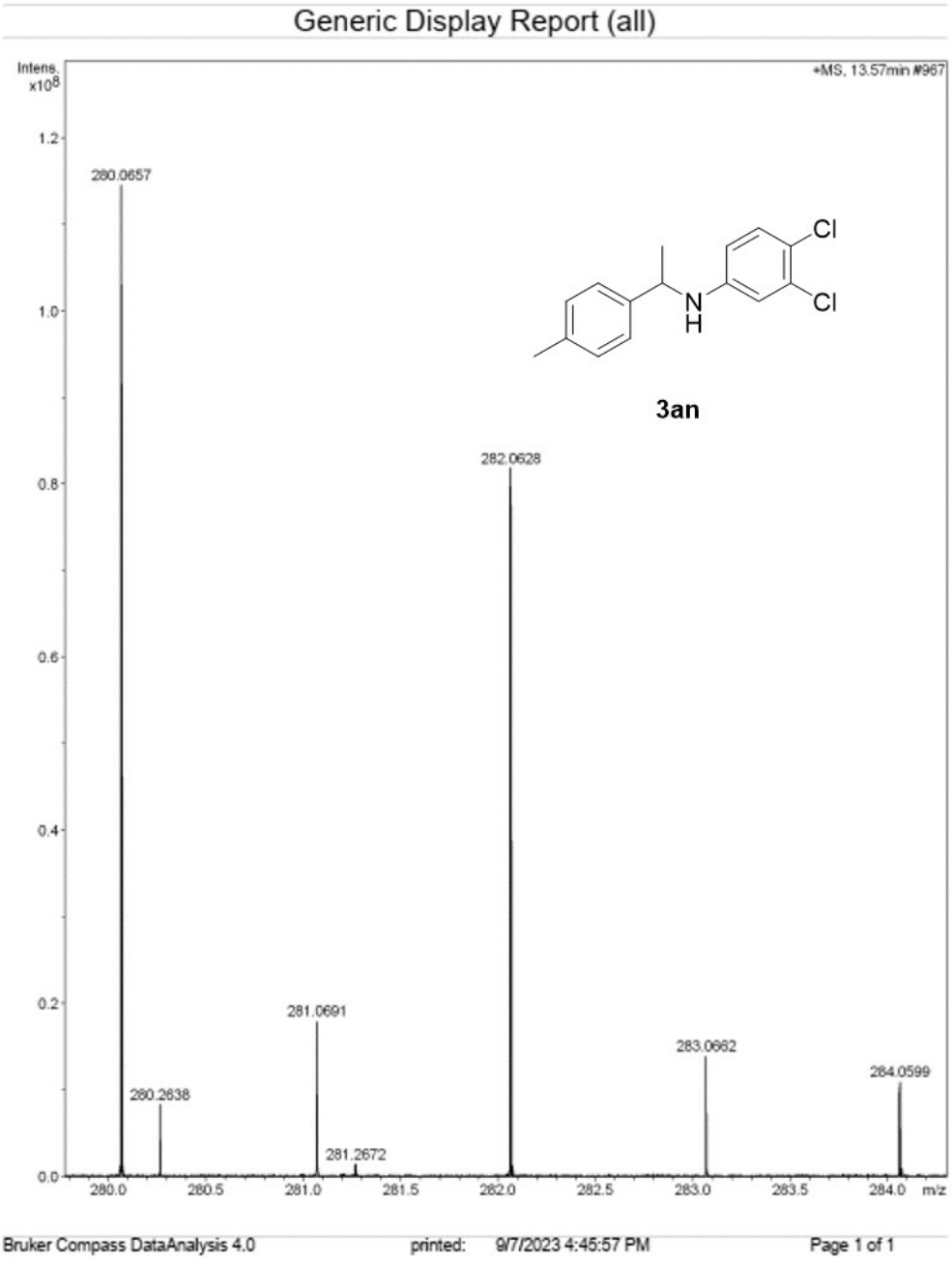
HRMS (ESI-TOF) spectrum of **3ak**



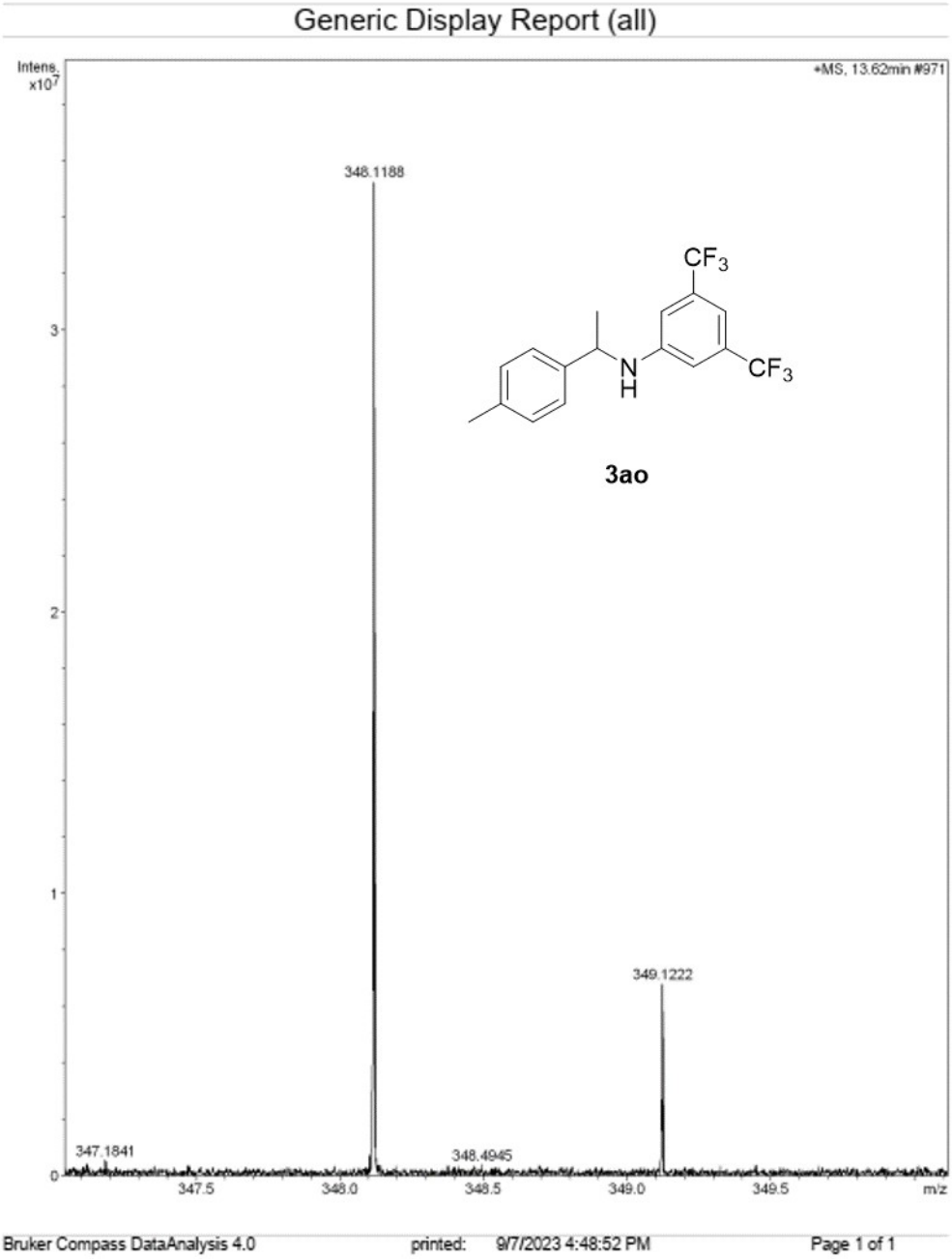
HRMS (ESI-TOF) spectrum of **3am**



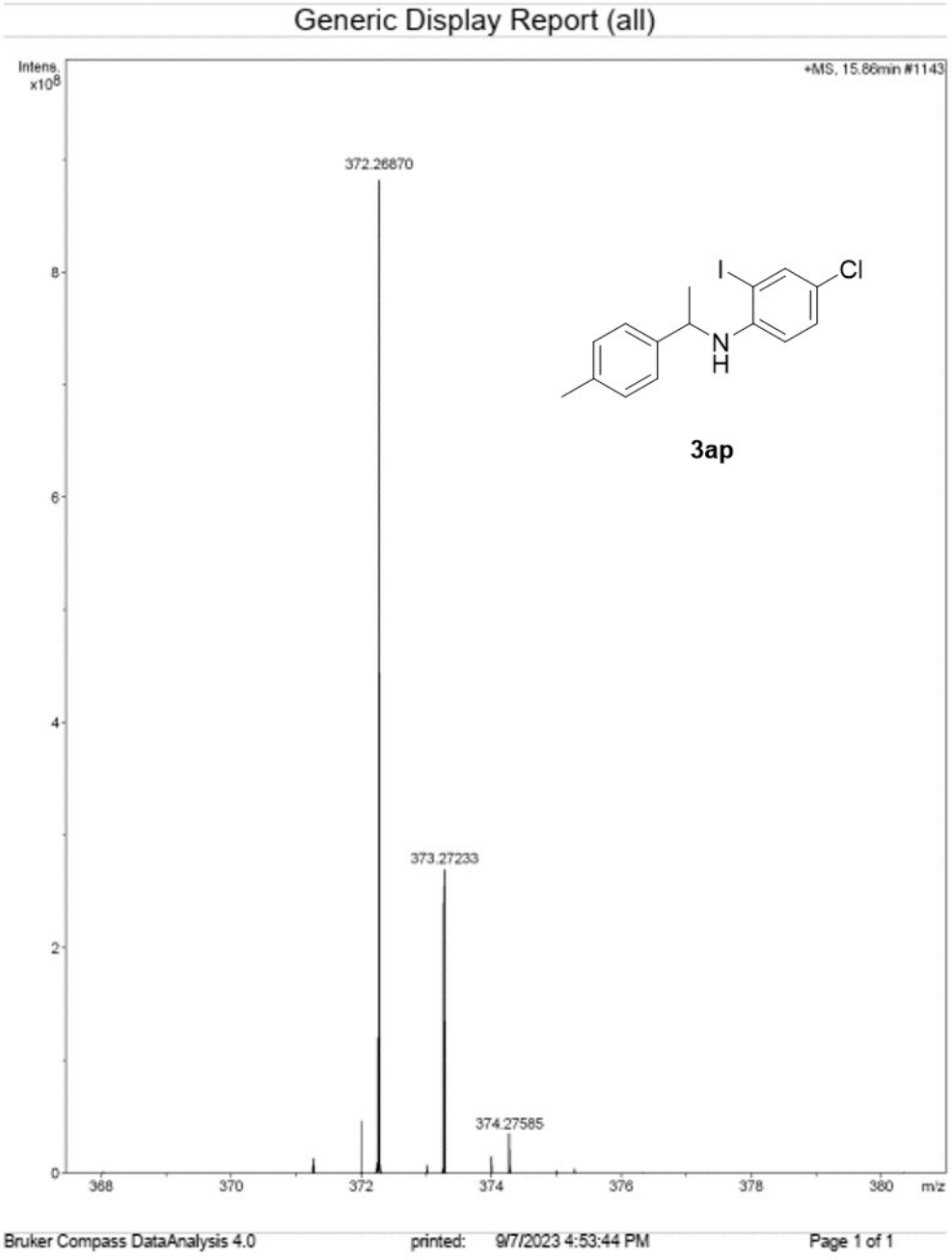
HRMS (ESI-TOF) spectrum of **3an**



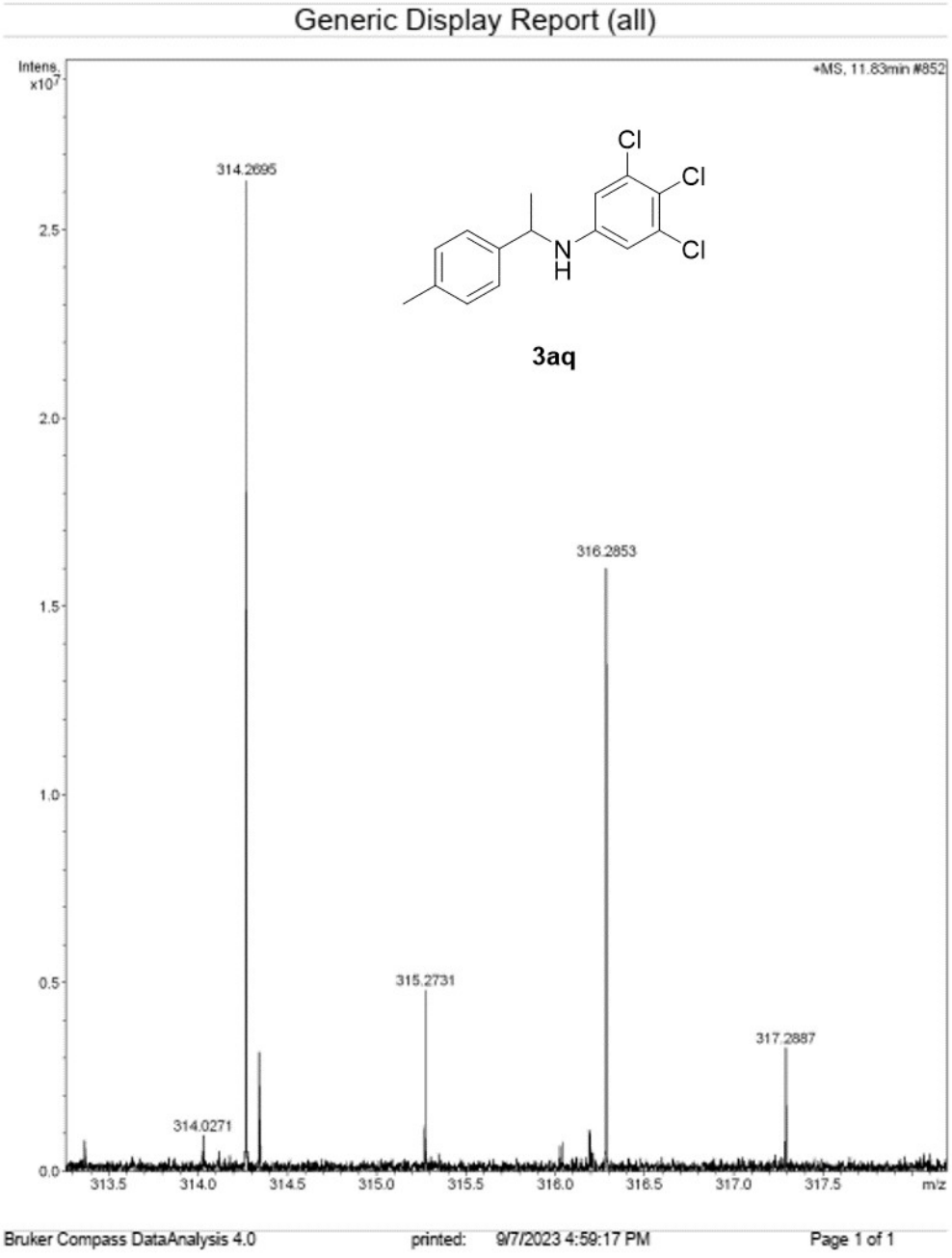
HRMS (ESI-TOF) spectrum of **3ao**



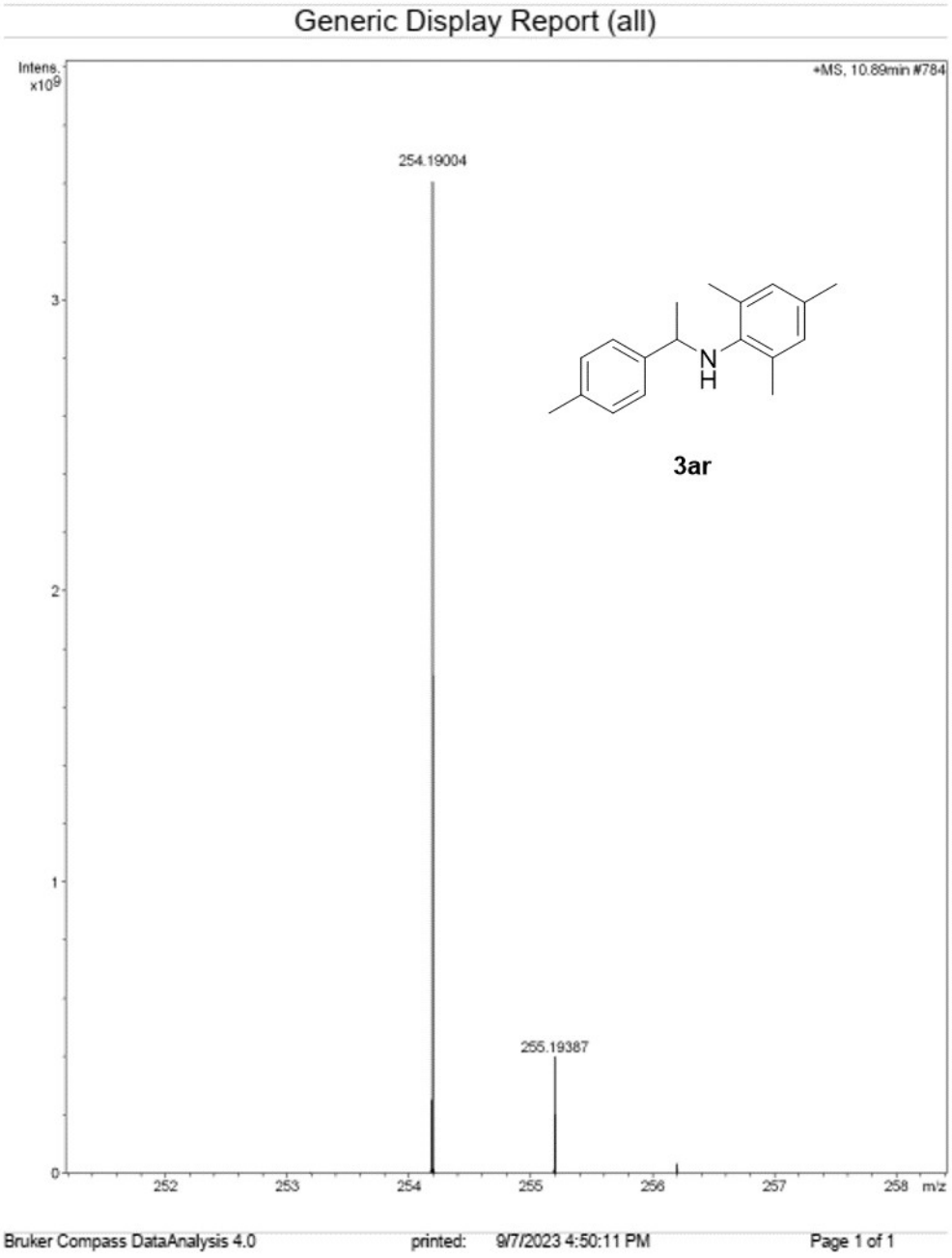
HRMS (ESI-TOF) spectrum of **3ap**



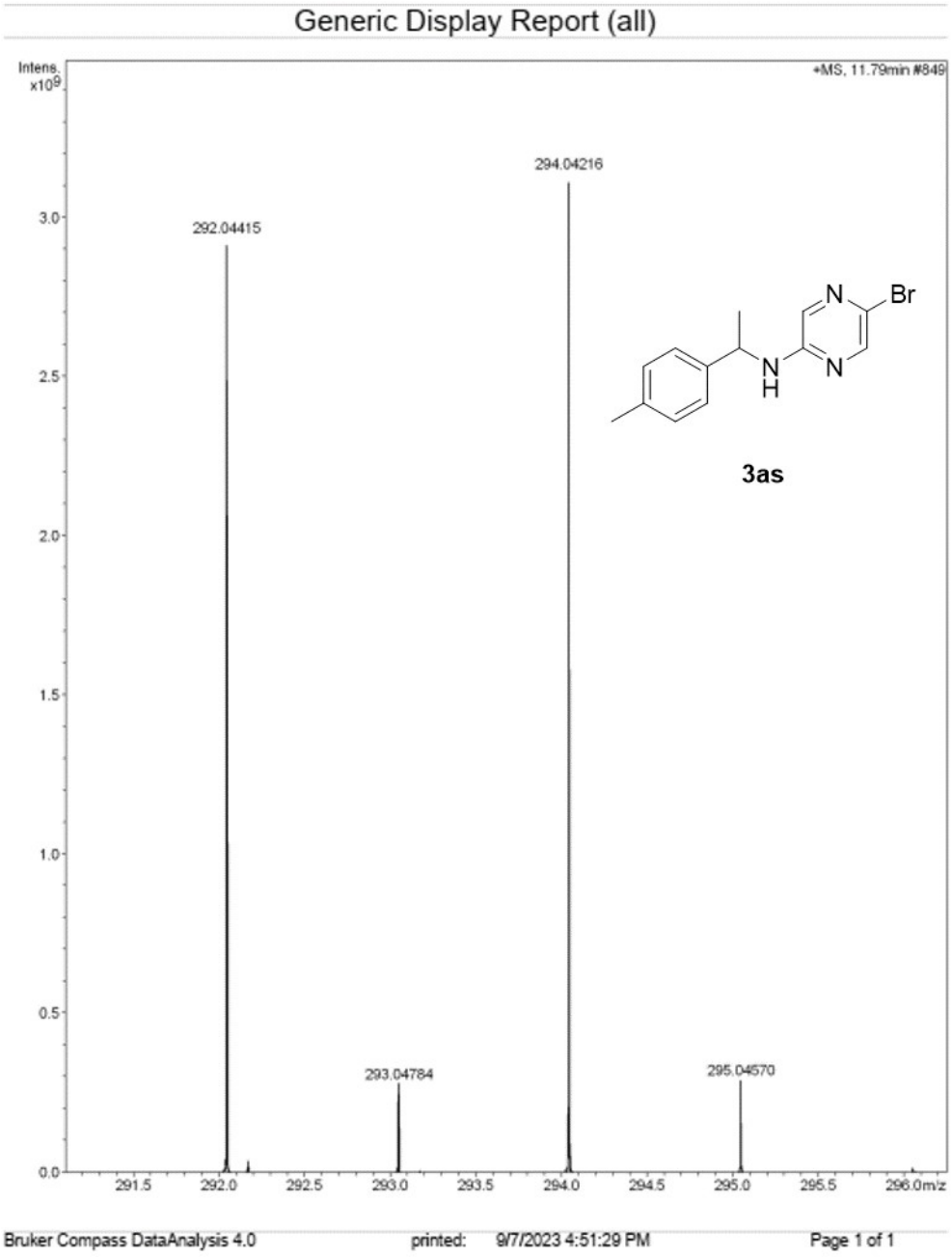
HRMS (ESI-TOF) spectrum of **3aq**



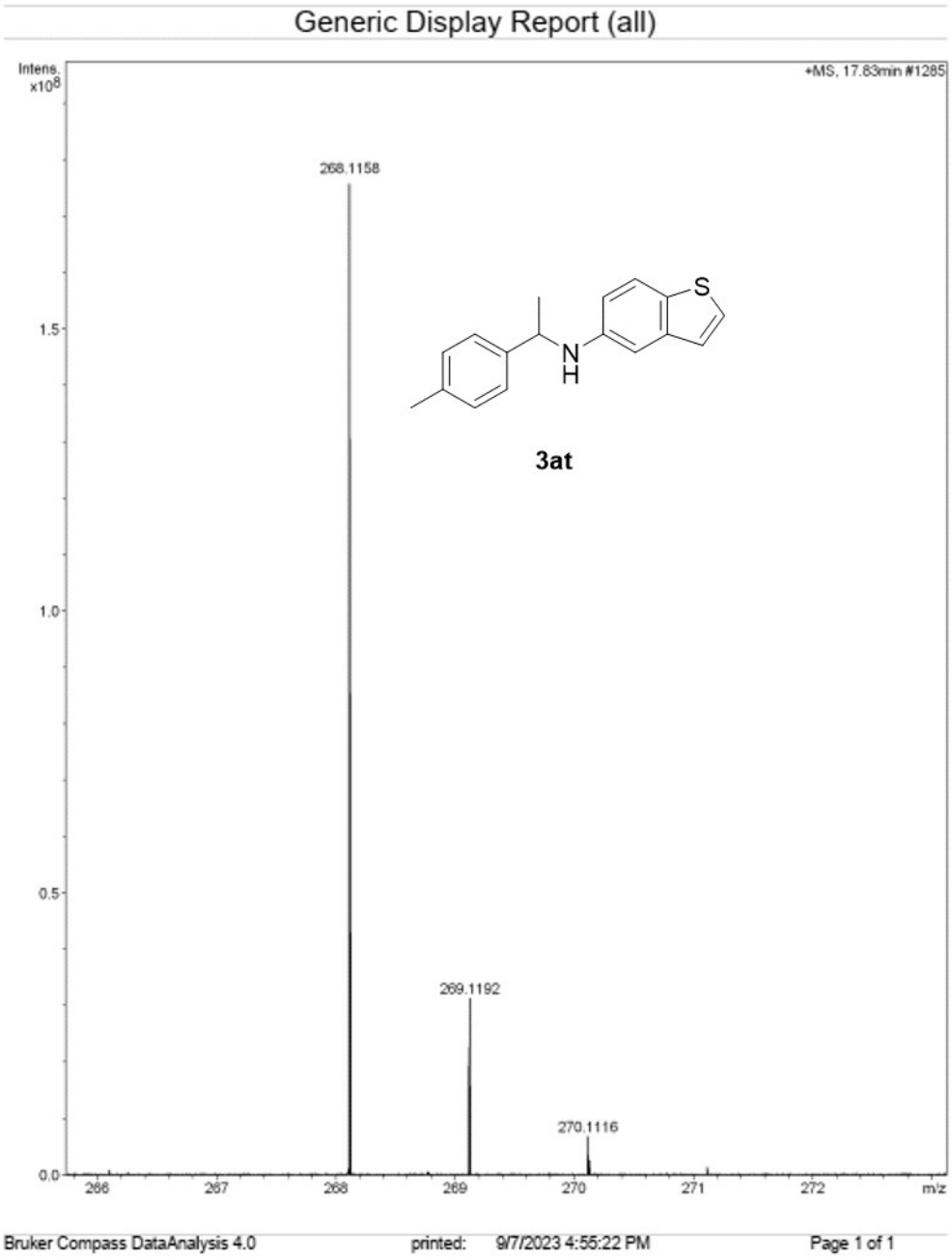
HRMS (ESI-TOF) spectrum of **3ar**



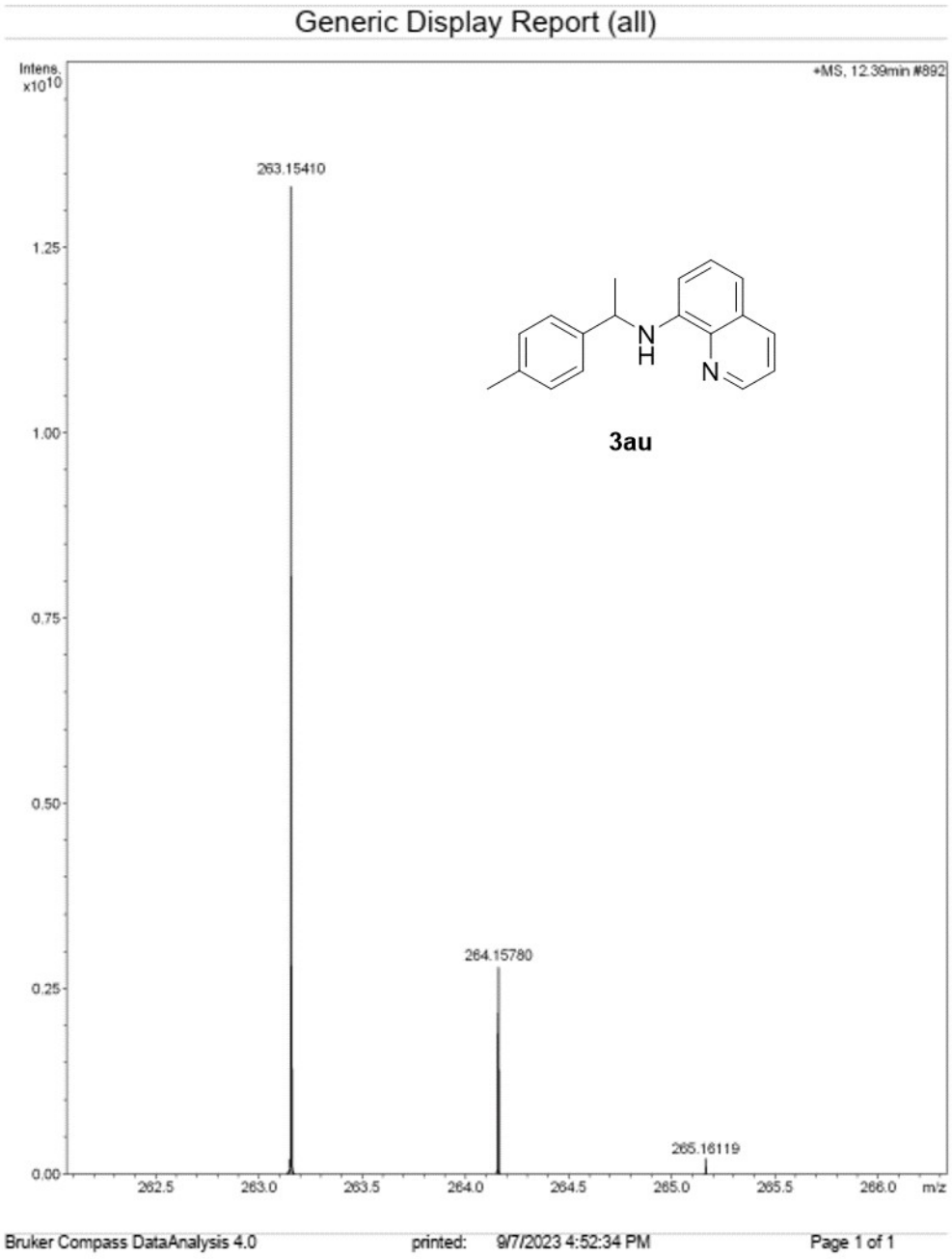
HRMS (ESI-TOF) spectrum of **3as**



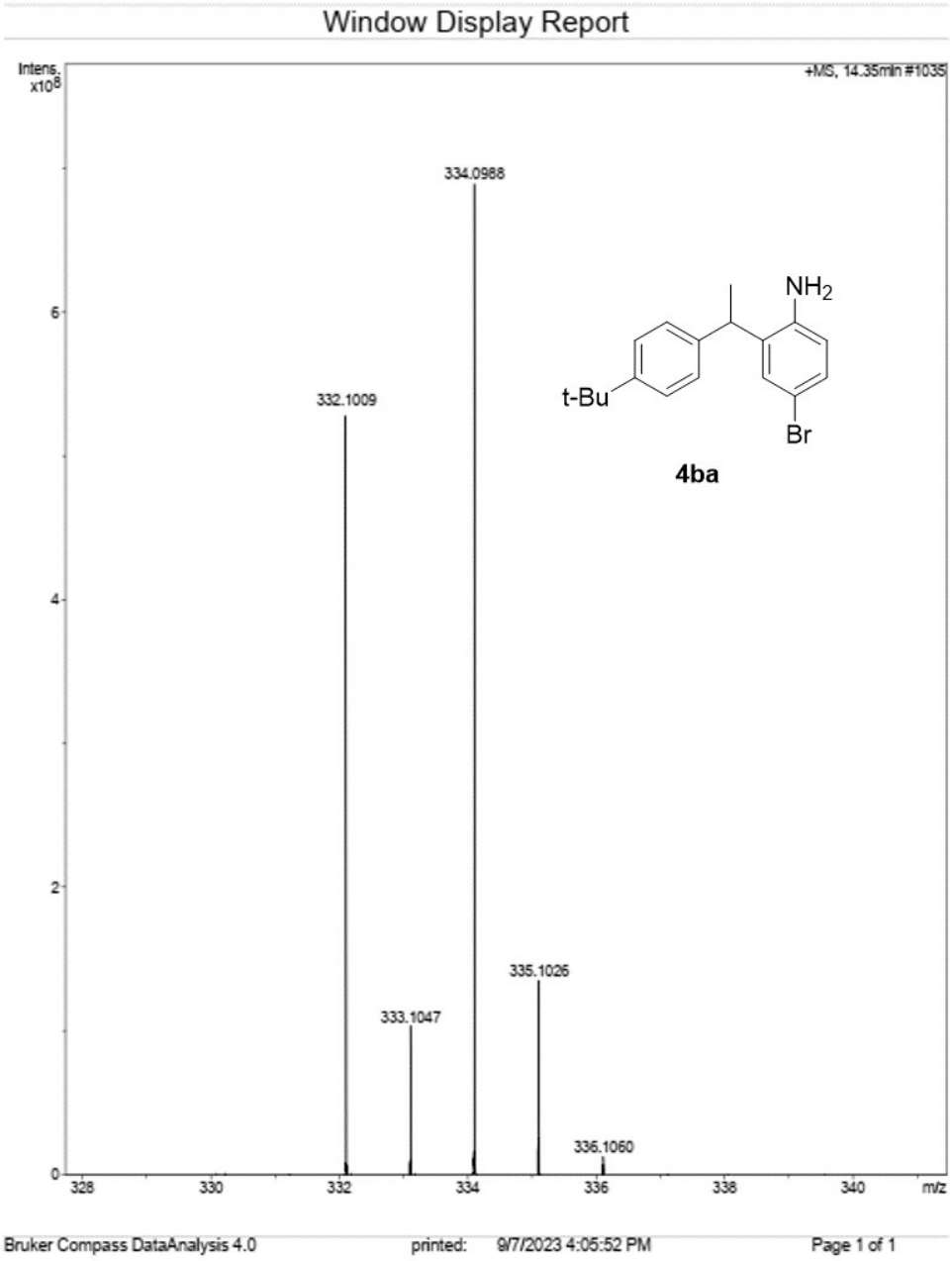
HRMS (ESI-TOF) spectrum of **3at**



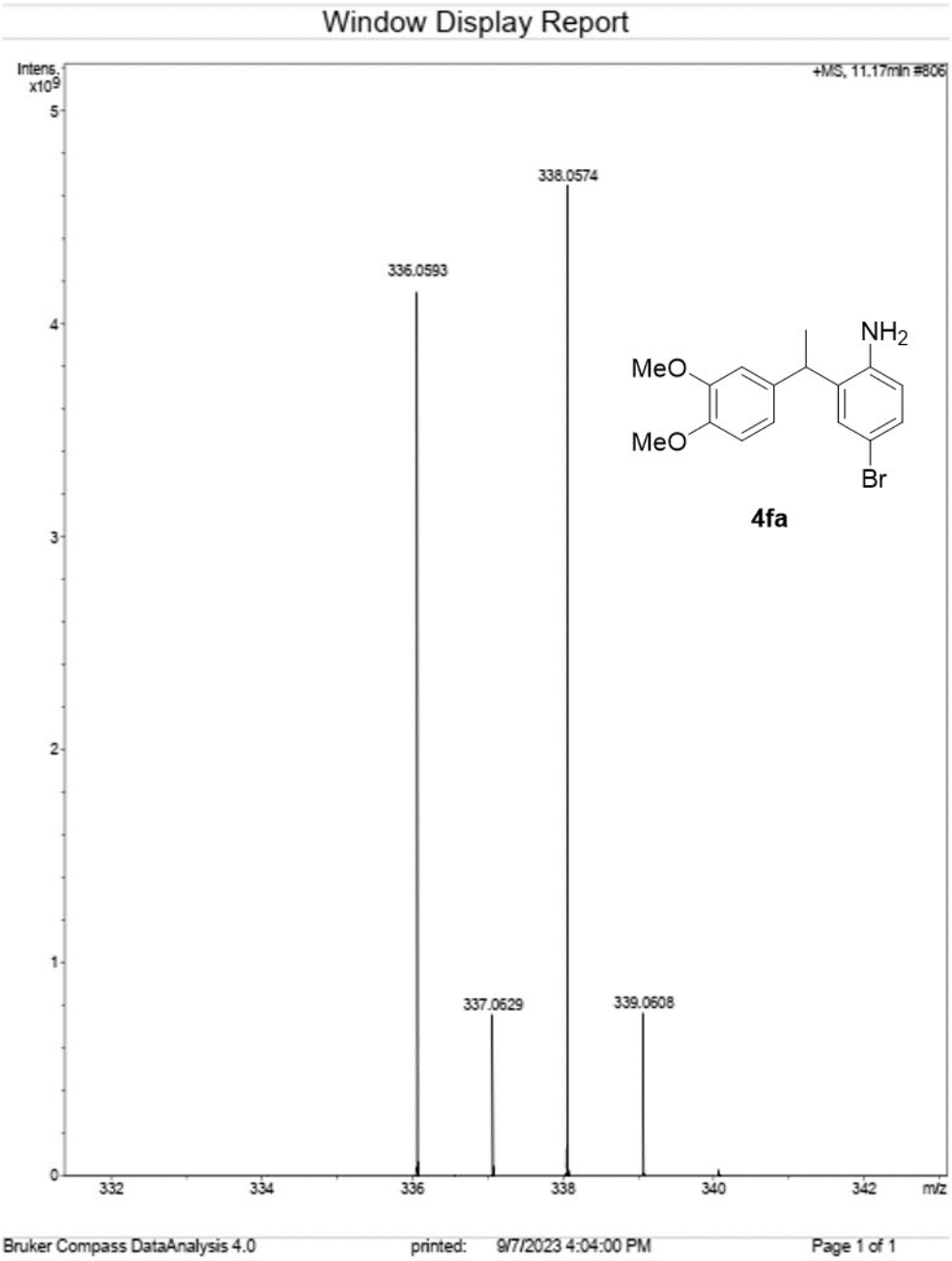
HRMS (ESI-TOF) spectrum of **3au**



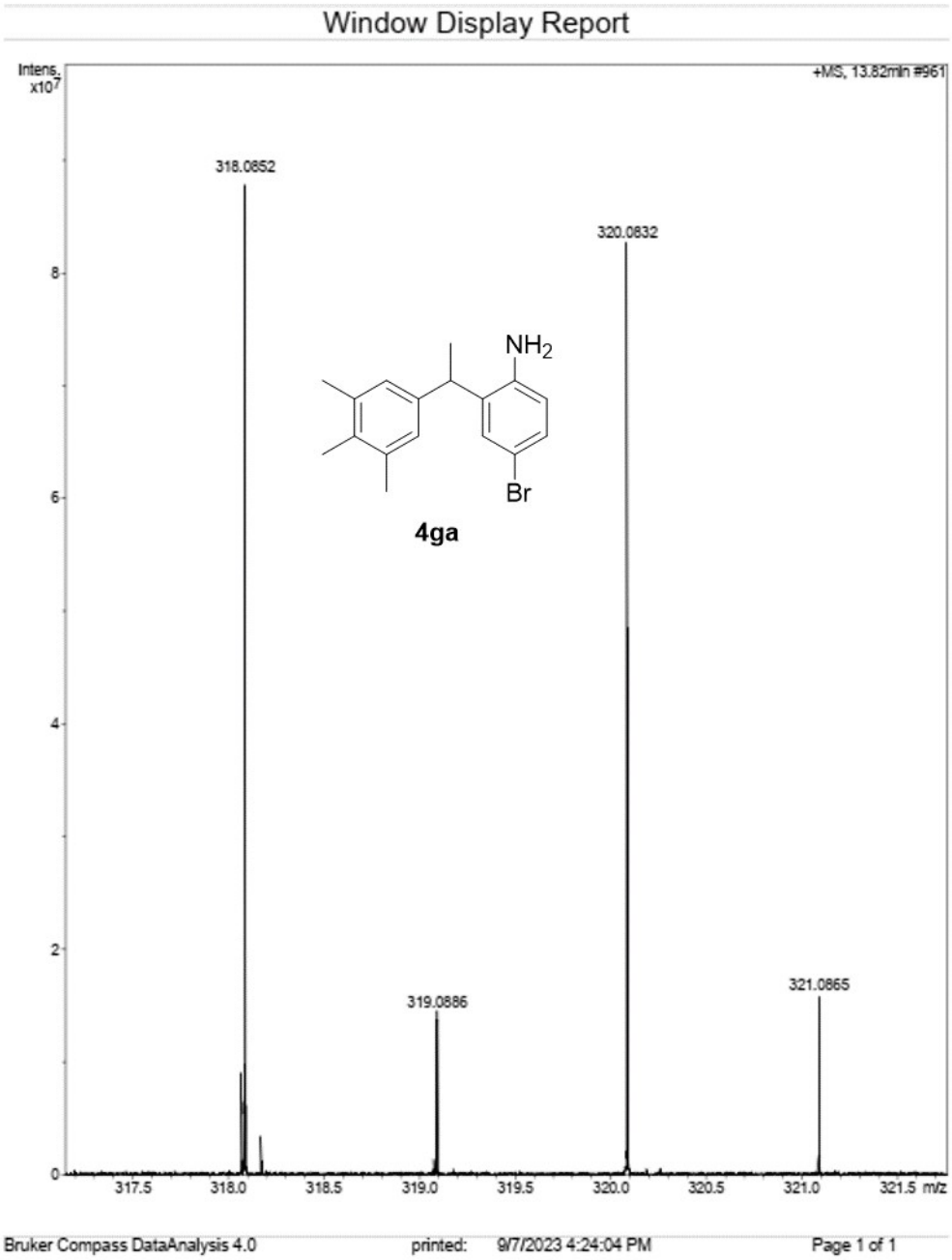
HRMS (ESI-TOF) spectrum of **4ba**



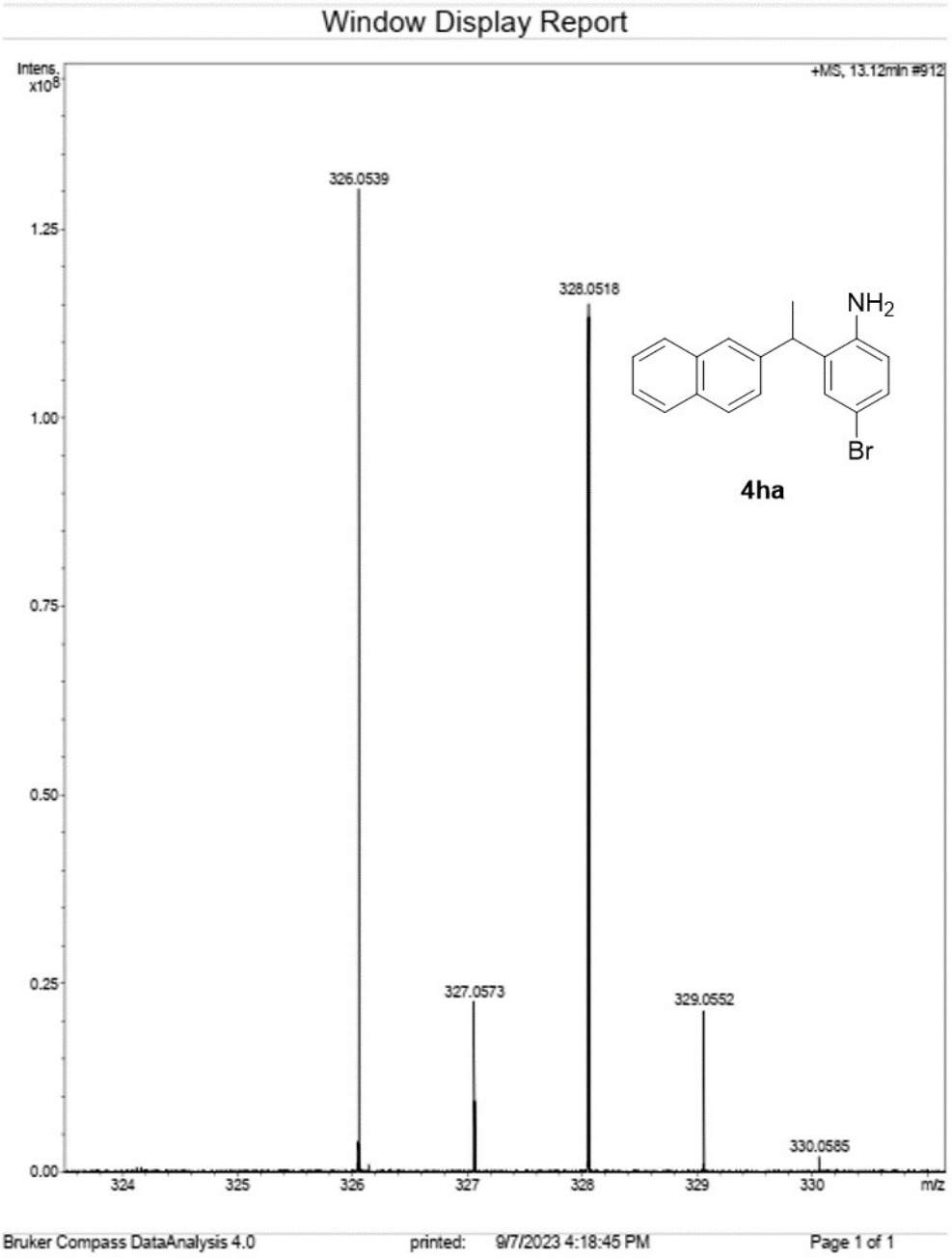
HRMS (ESI-TOF) spectrum of **4fa**



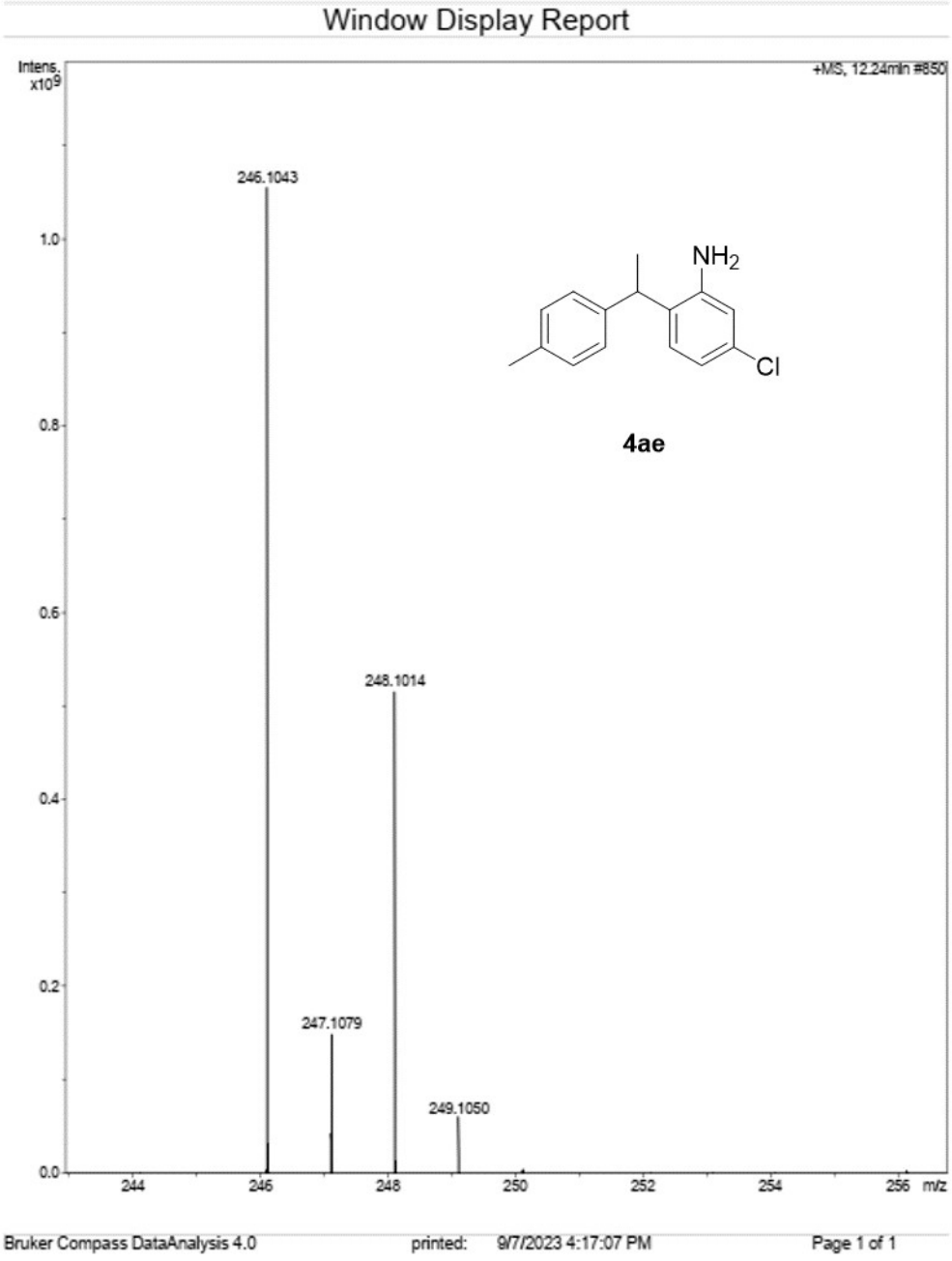
HRMS (ESI-TOF) spectrum of **4ga**



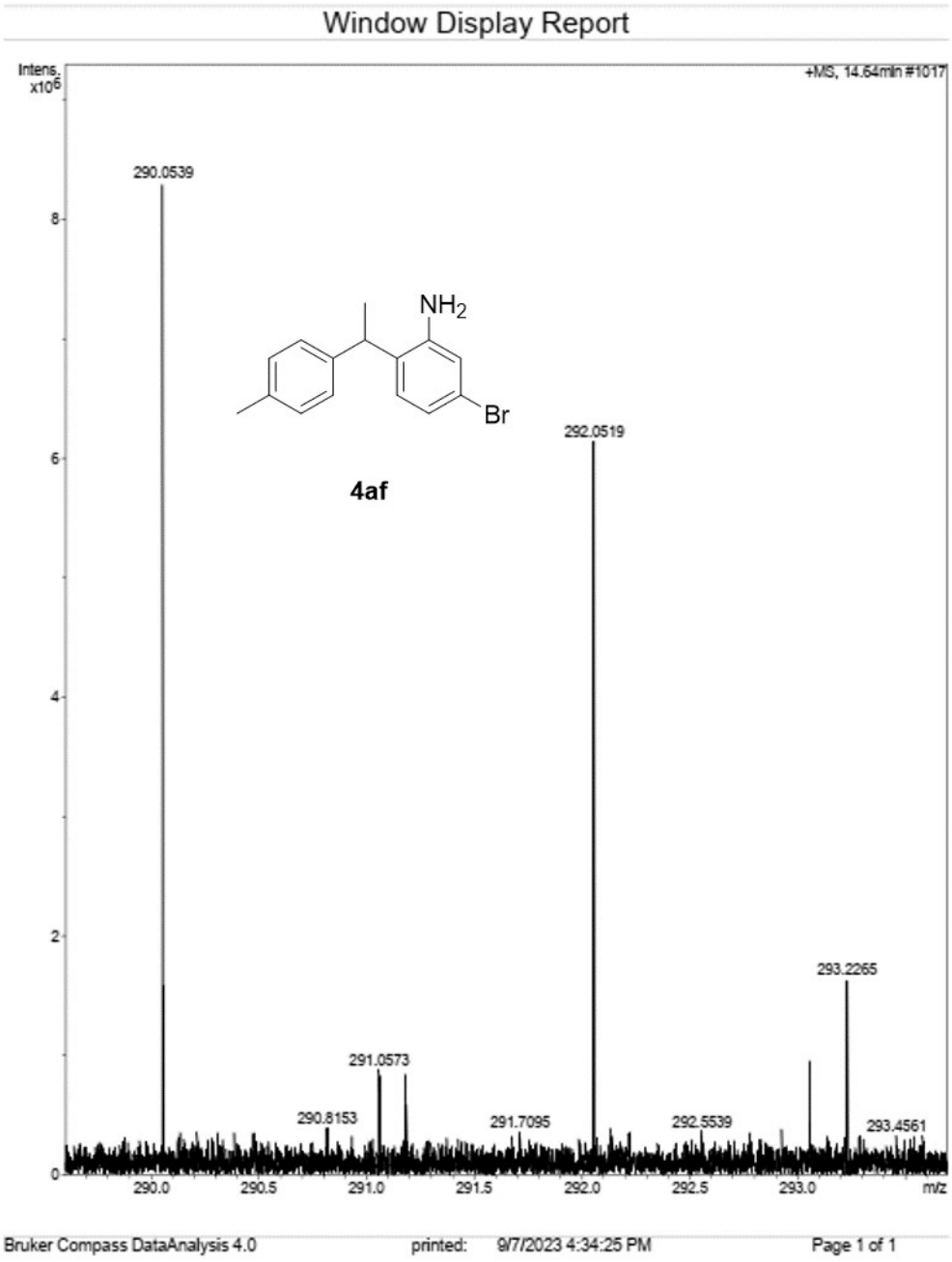
HRMS (ESI-TOF) spectrum of **4ha**



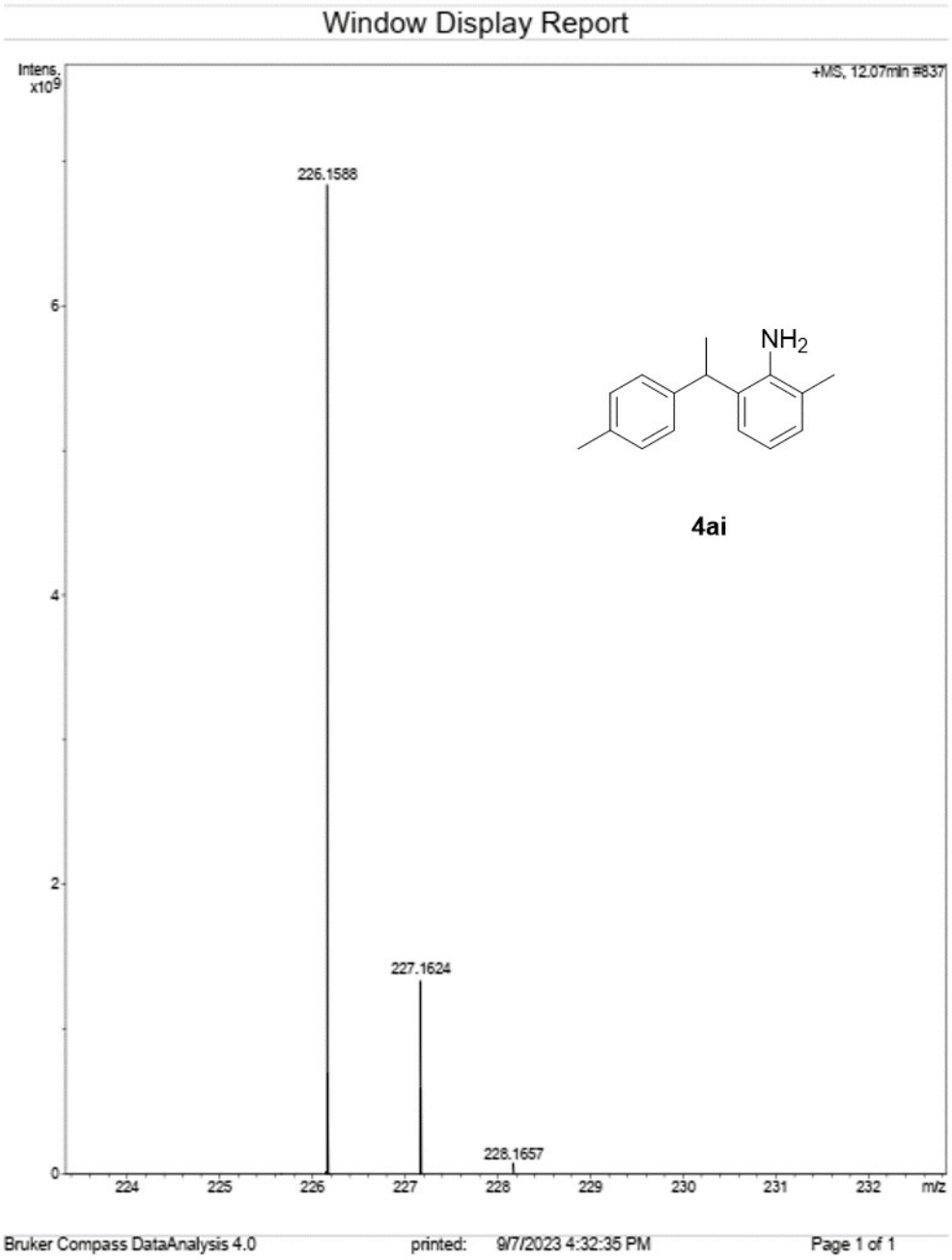
HRMS (ESI-TOF) spectrum of **4ae**



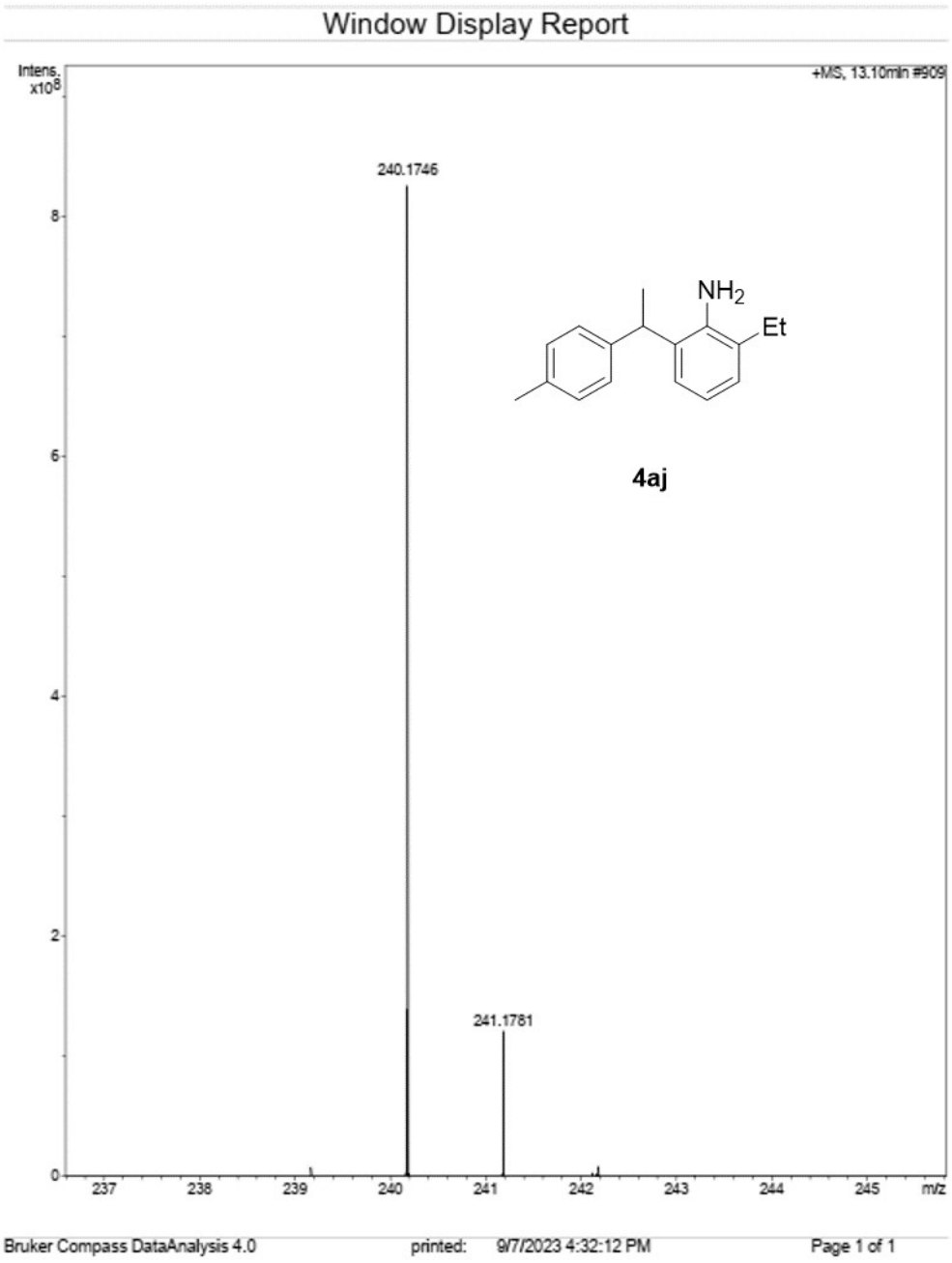
HRMS (ESI-TOF) spectrum of **4af**



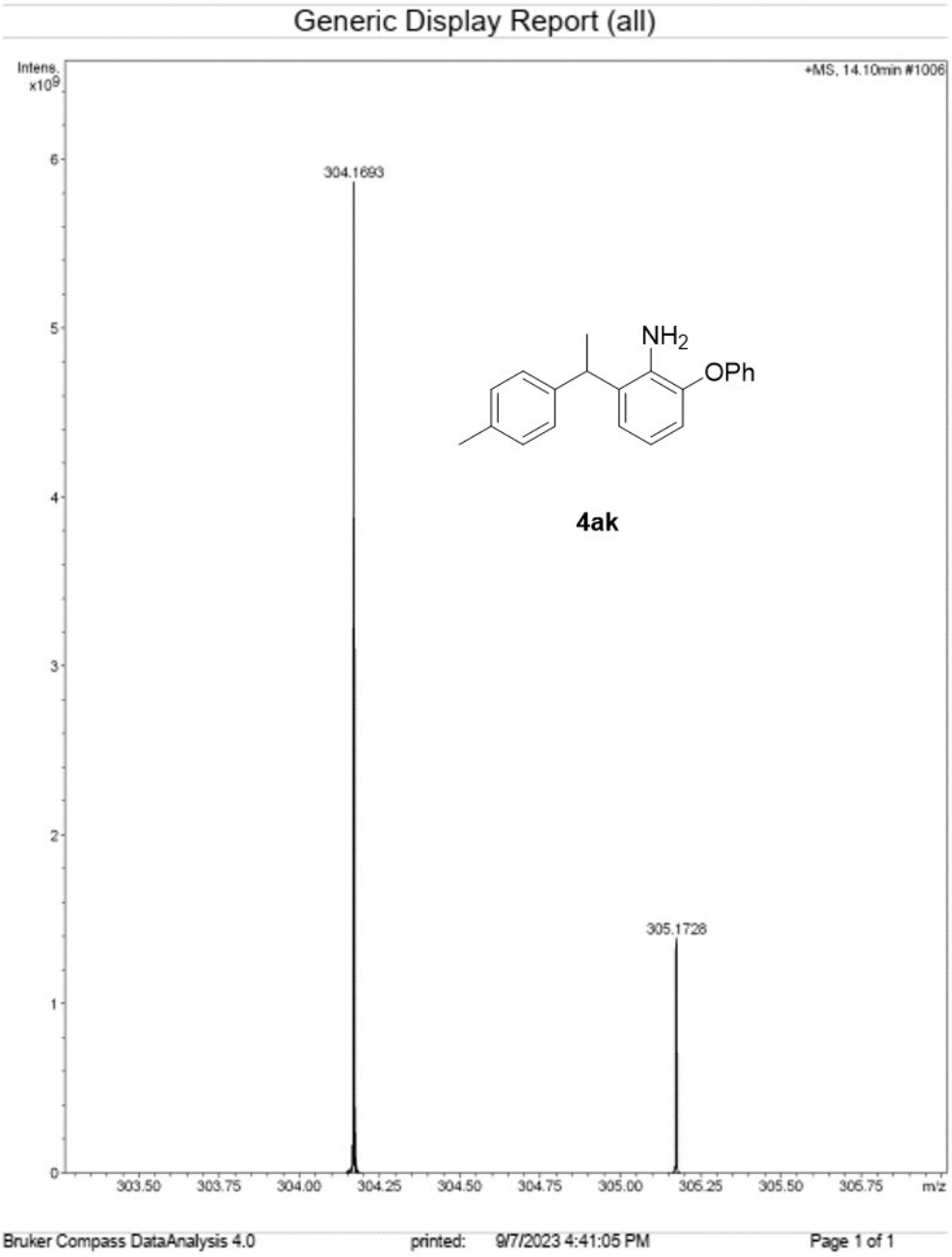
HRMS (ESI-TOF) spectrum of **4ai**



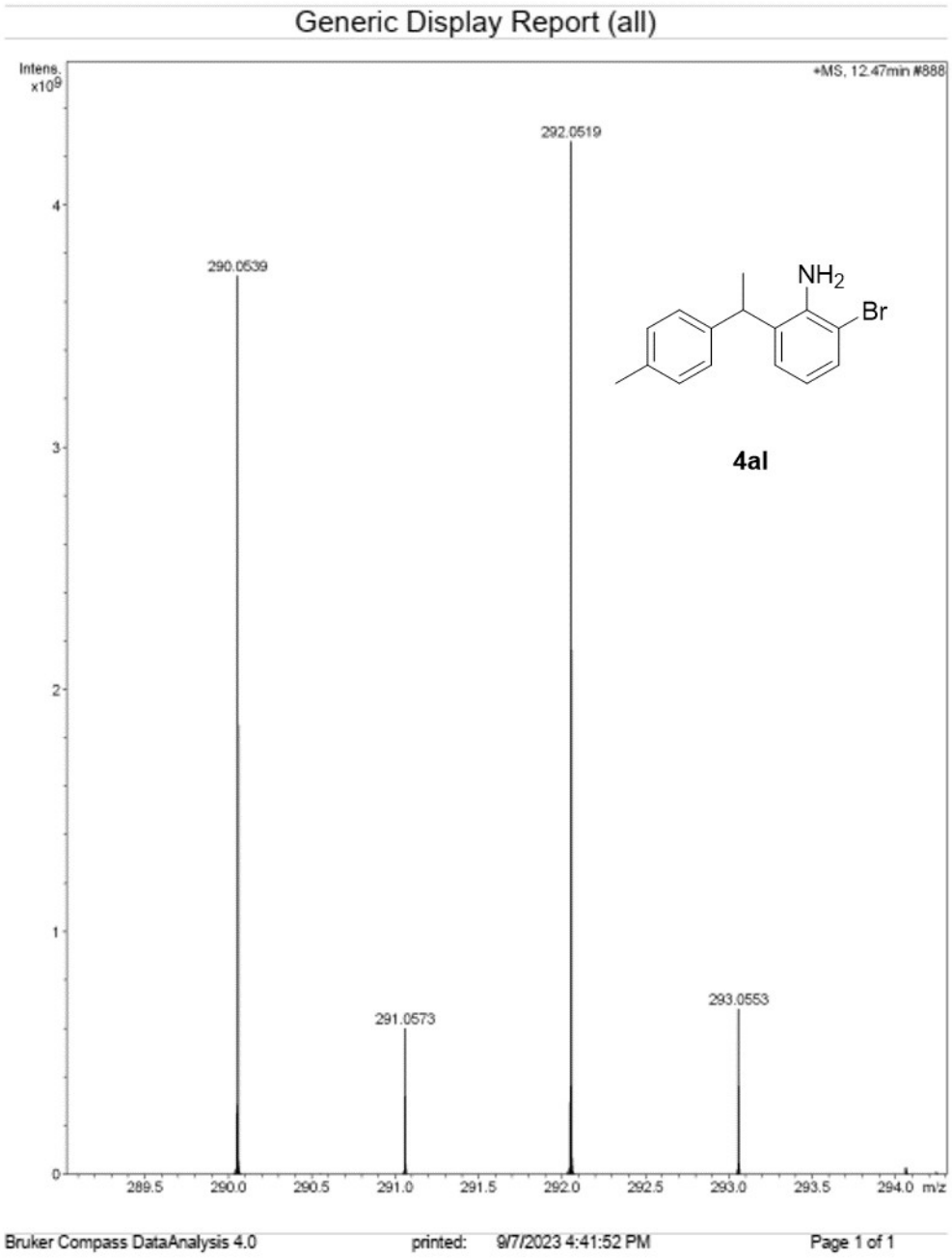
HRMS (ESI-TOF) spectrum of **4aj**



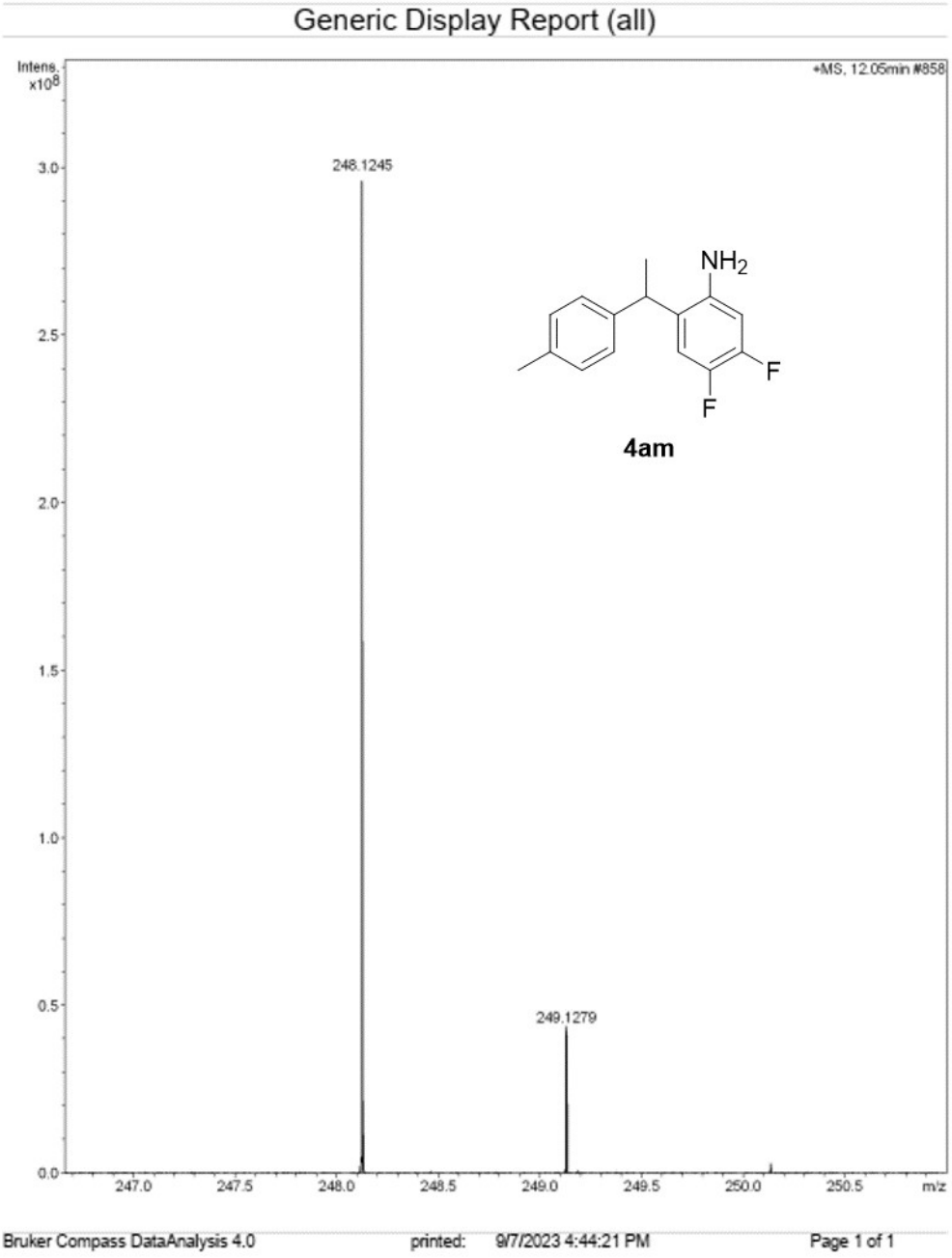
HRMS (ESI-TOF) spectrum of **4ak**



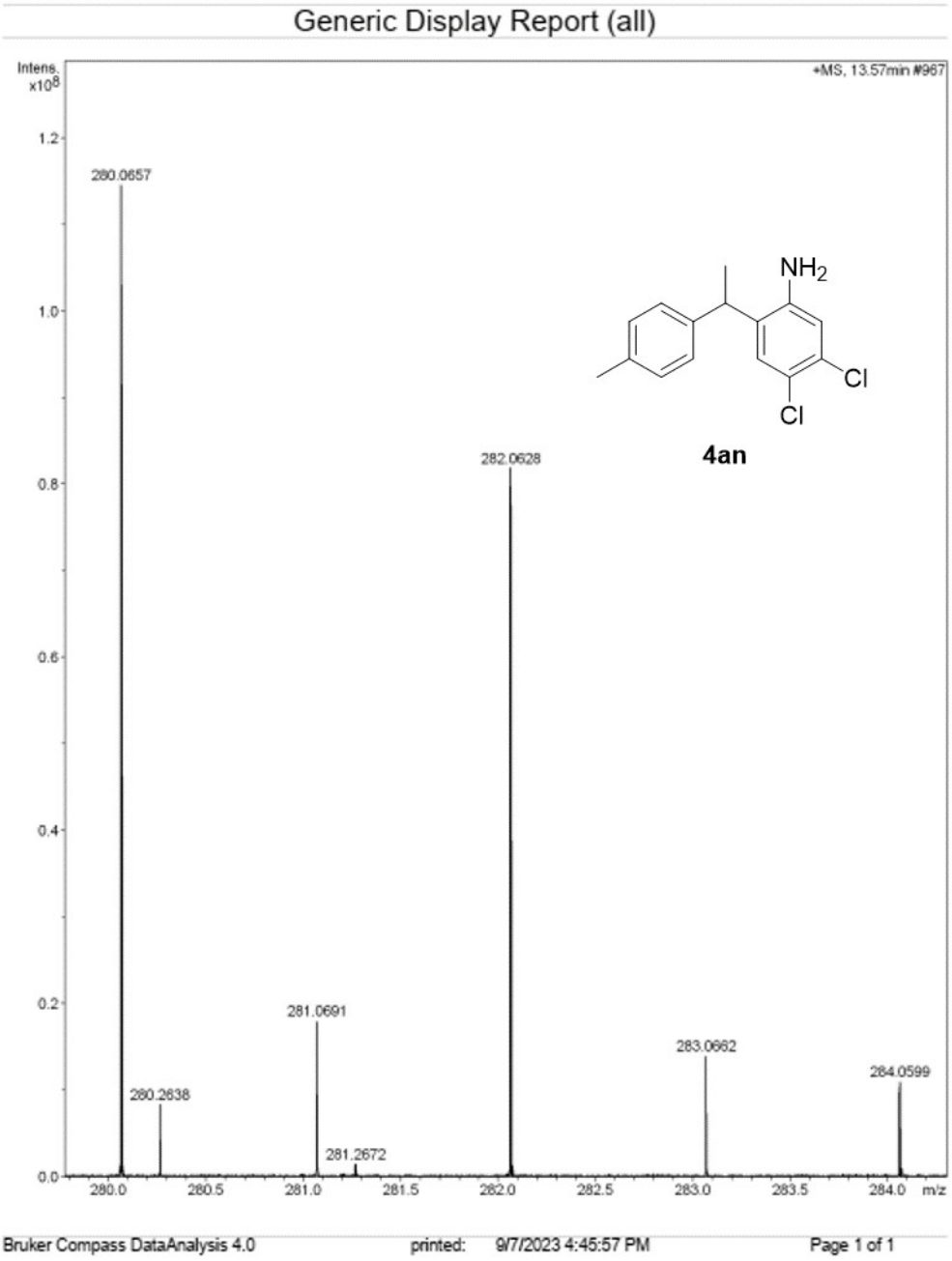
HRMS (ESI-TOF) spectrum of **4al**



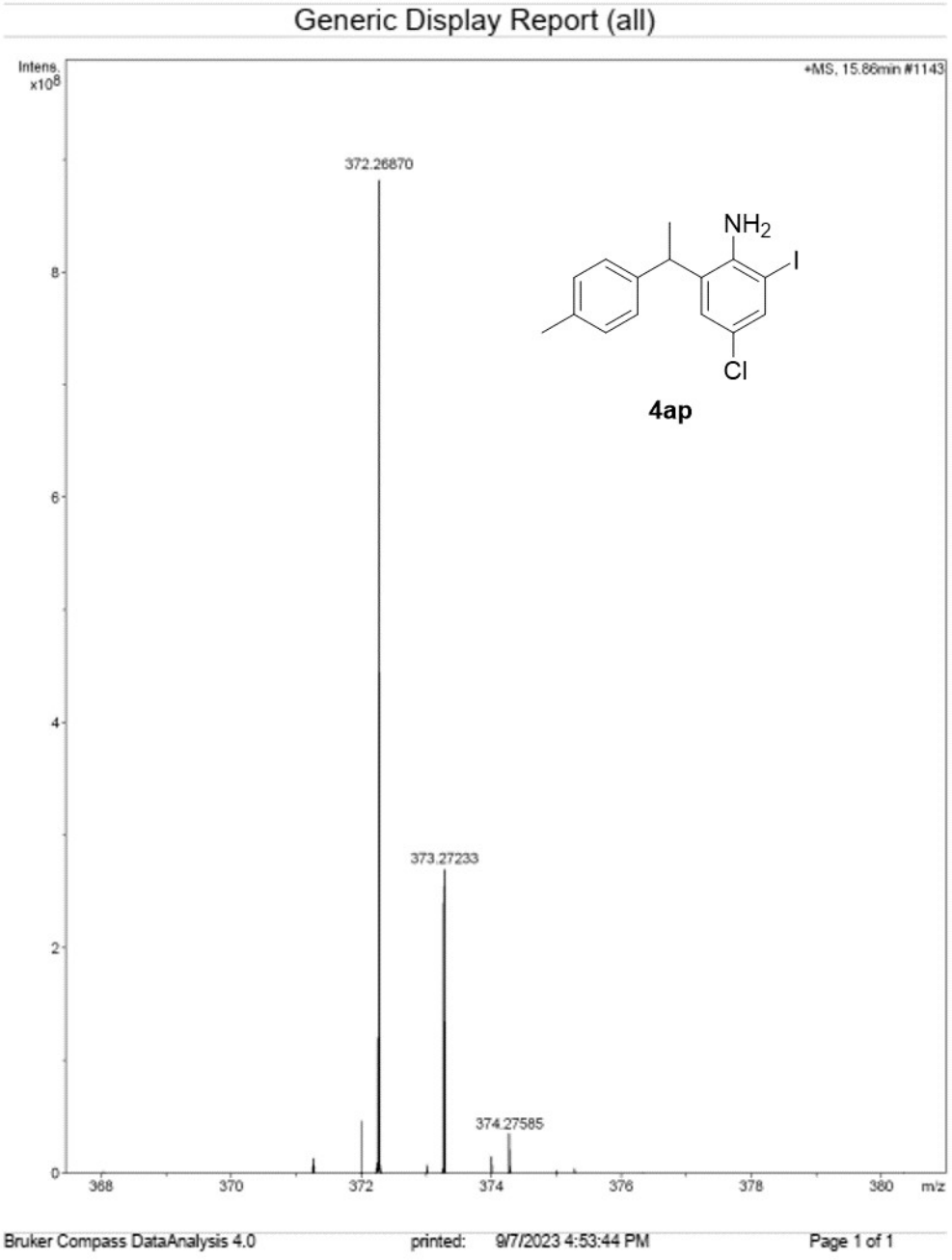
HRMS (ESI-TOF) spectrum of **4am**



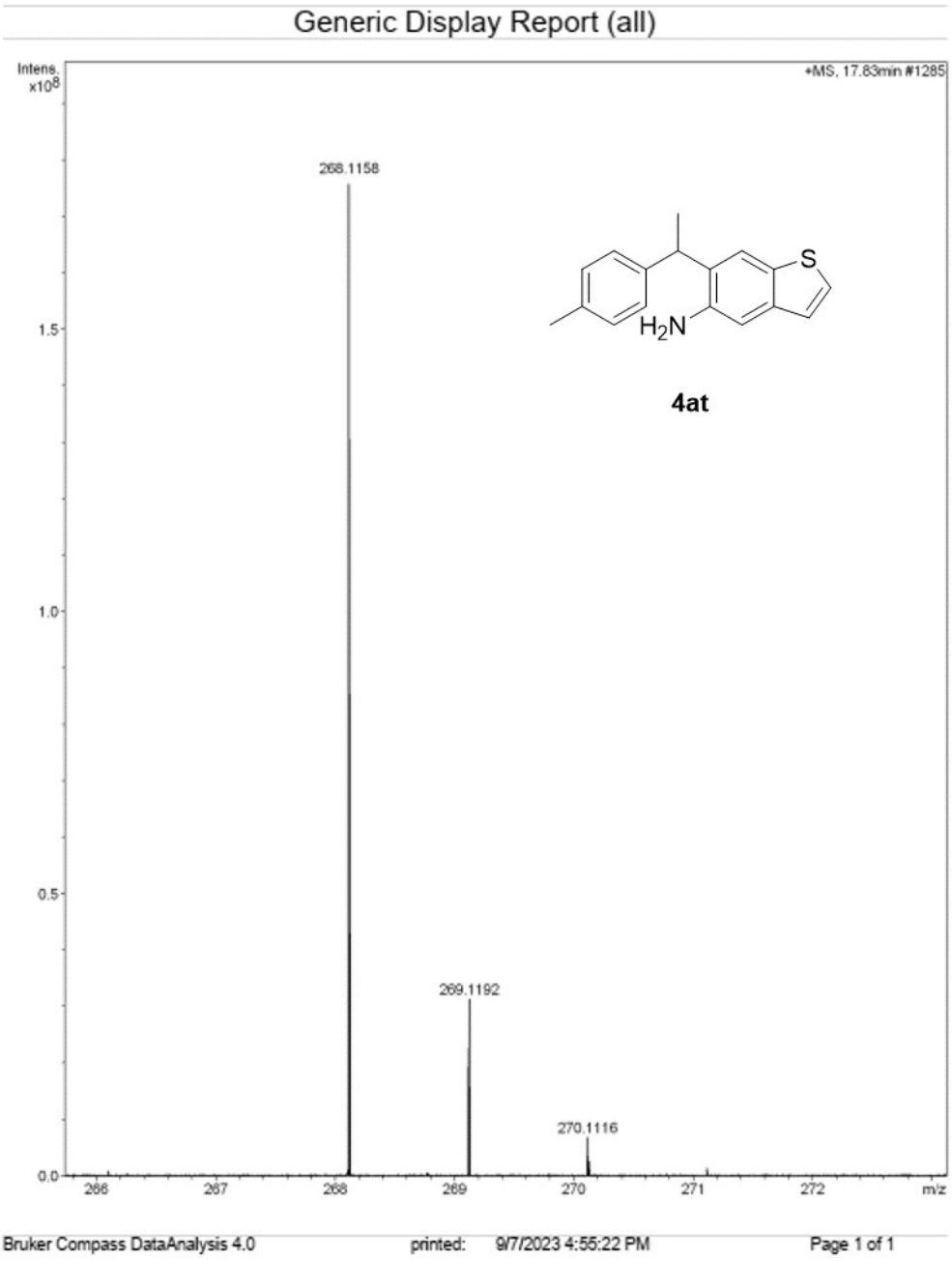
HRMS (ESI-TOF) spectrum of **4an**



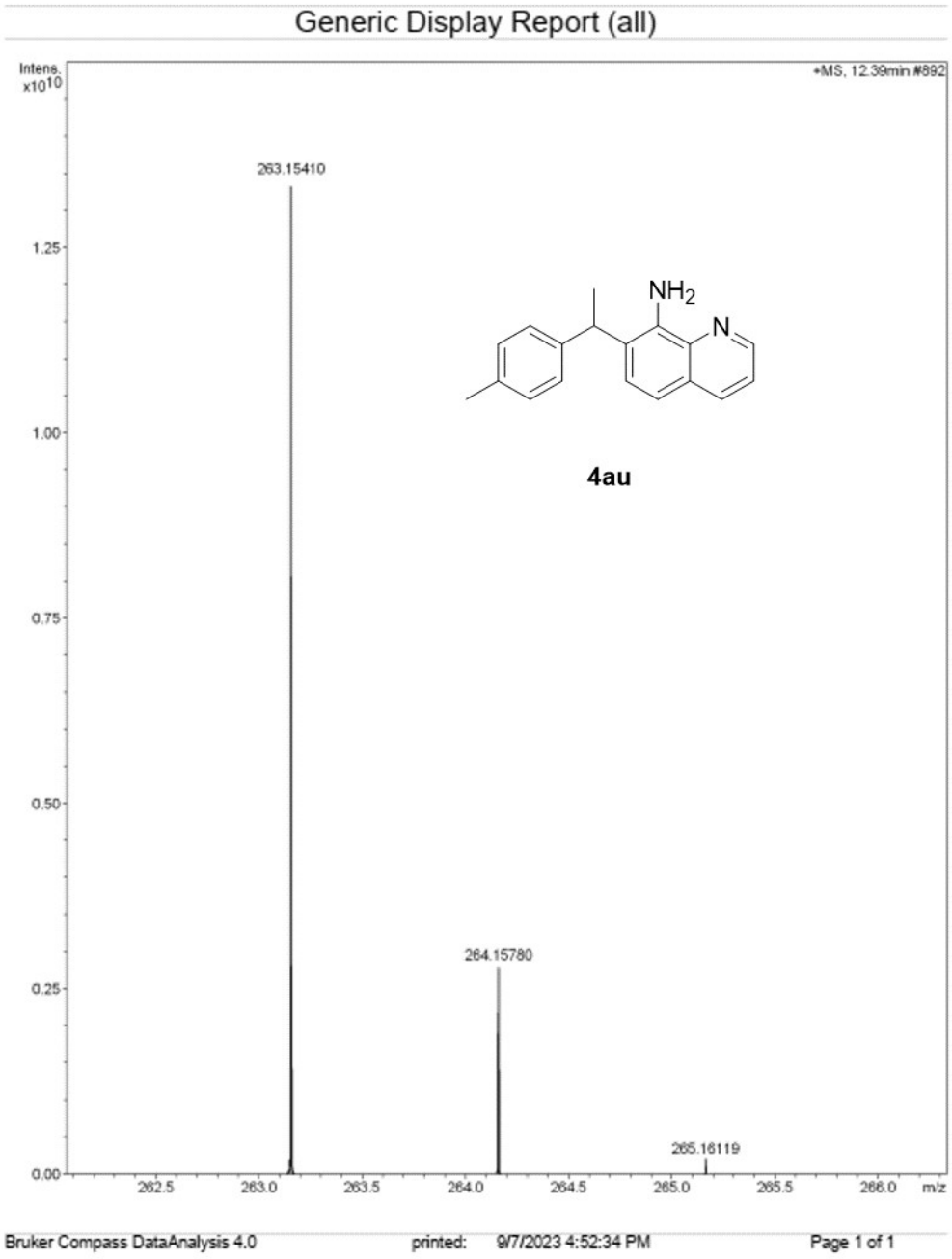
HRMS (ESI-TOF) spectrum of **4ap**



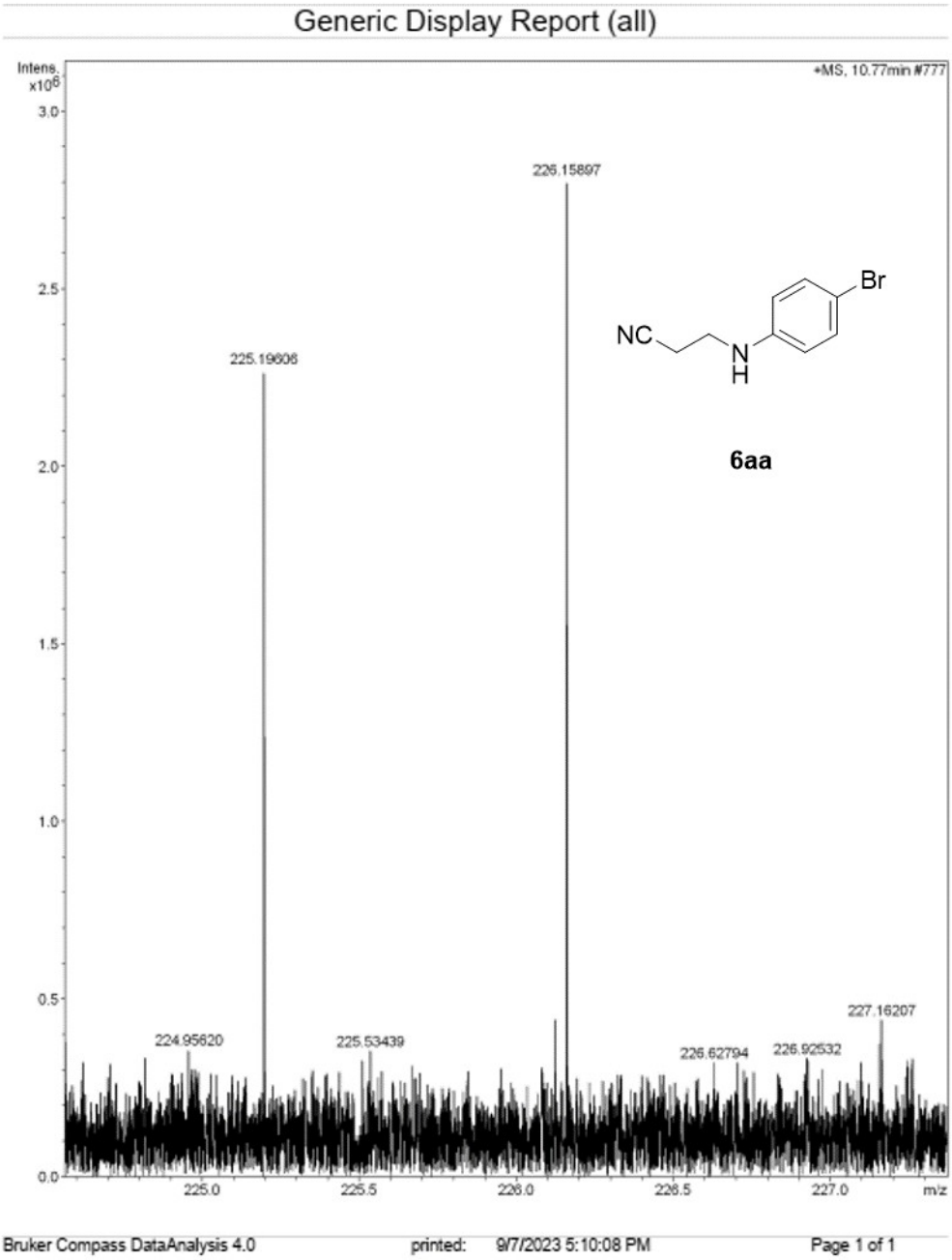
HRMS (ESI-TOF) spectrum of **4at**



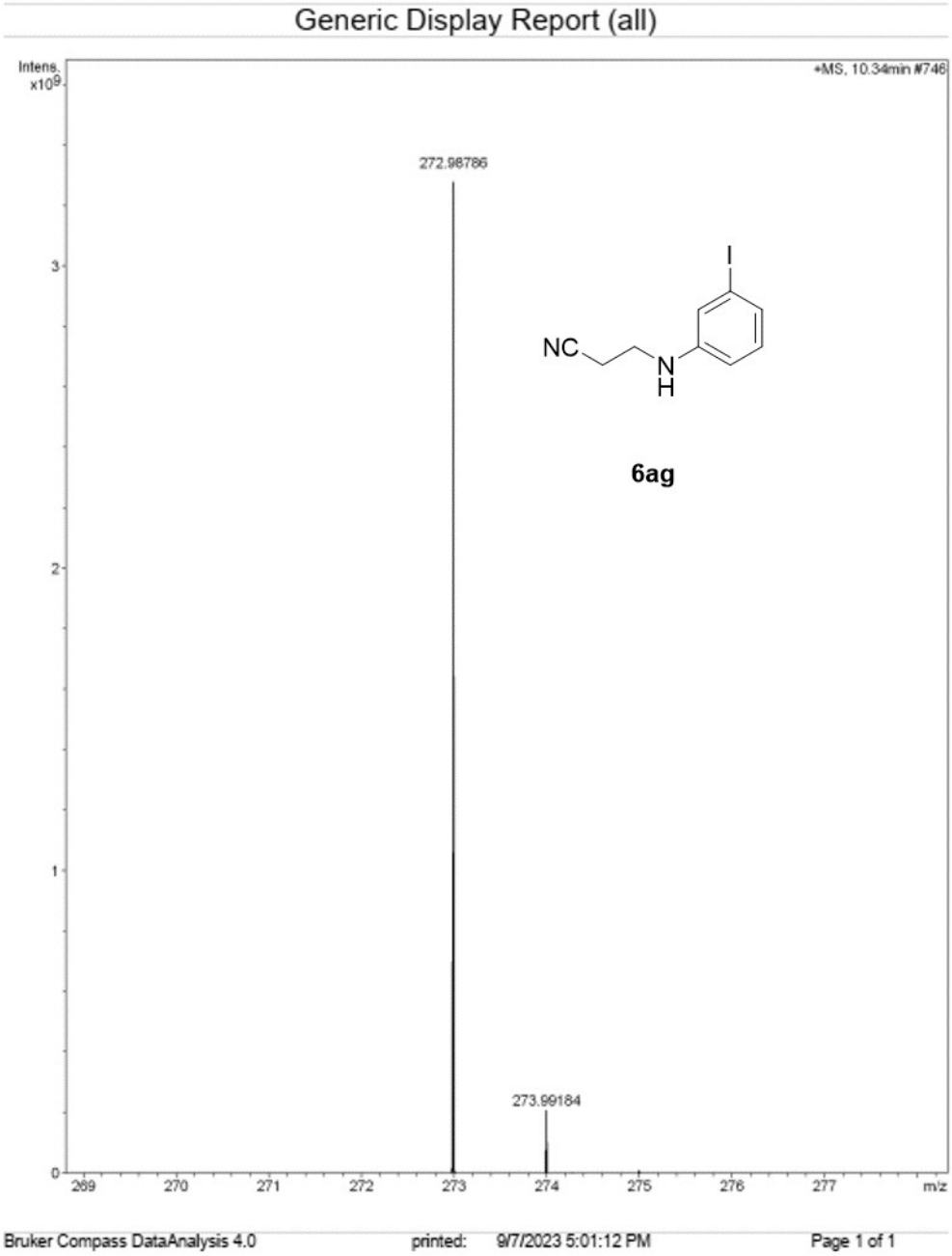
HRMS (ESI-TOF) spectrum of **4au**



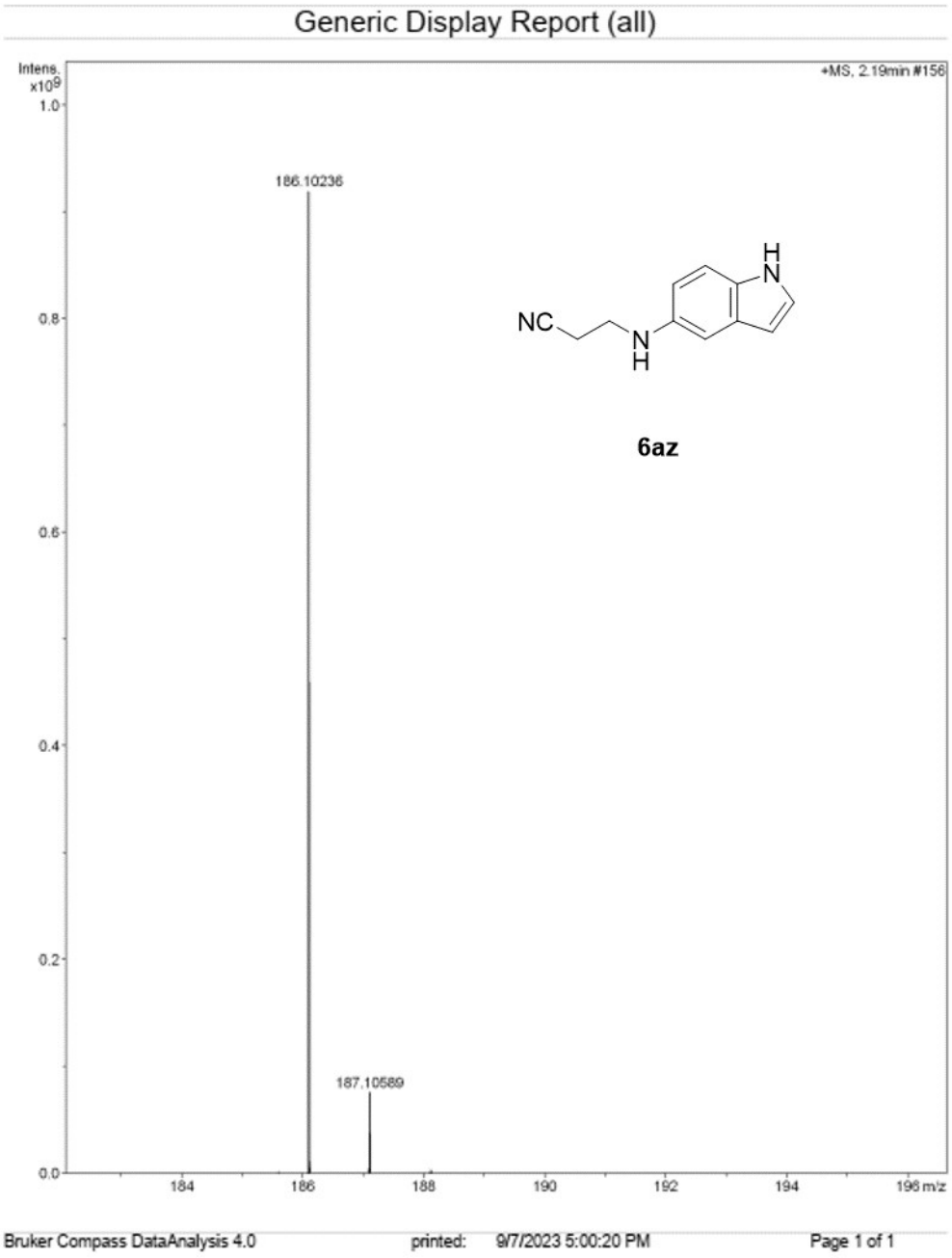
HRMS (ESI-TOF) spectrum of **6aa**



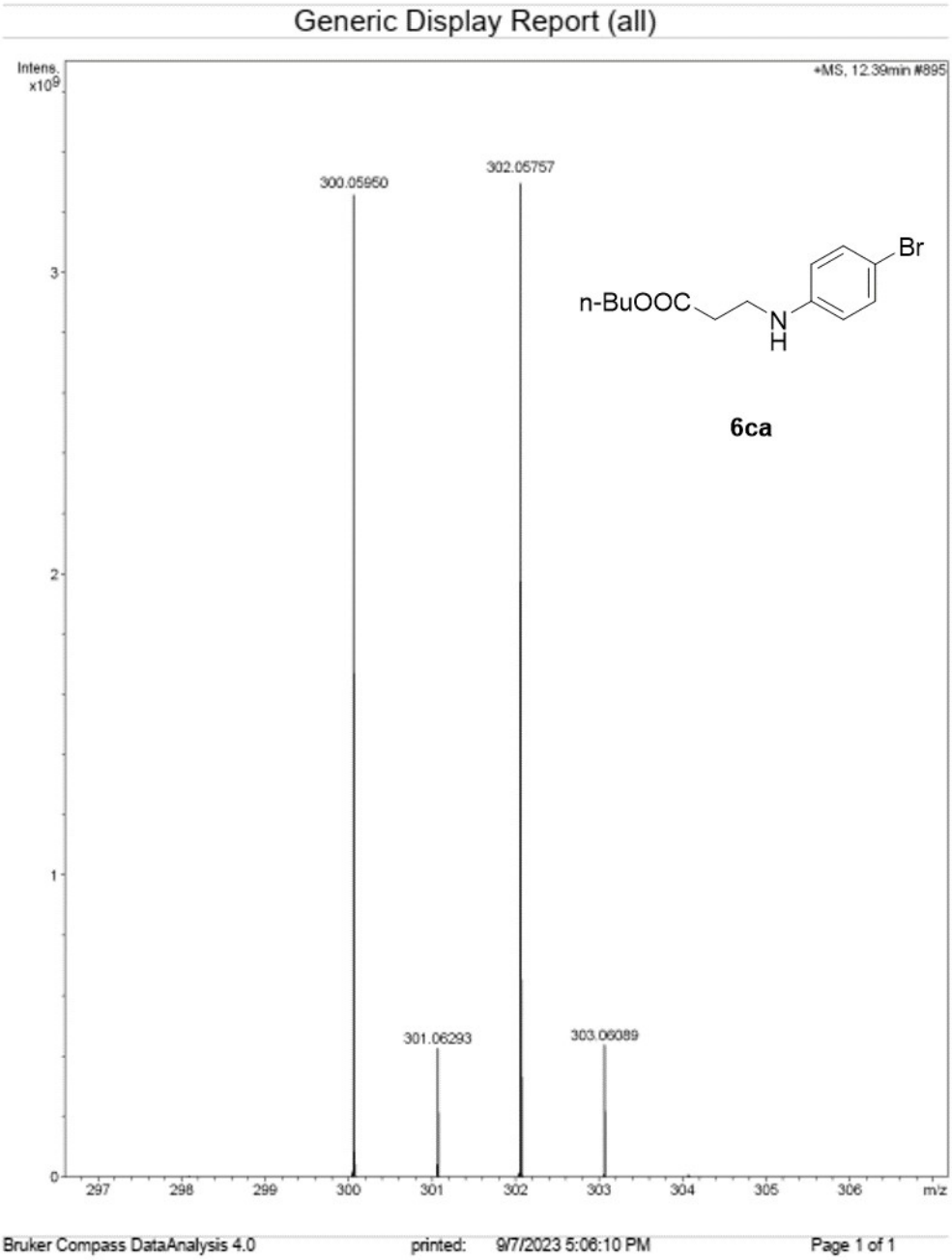
HRMS (ESI-TOF) spectrum of **6ag**



HRMS (ESI-TOF) spectrum of **6az**



HRMS (ESI-TOF) spectrum of **6ca**



HRMS (ESI-TOF) spectrum of **6da**