Supporting information

Visible light mediated synthesis of 1,3-diarylated imidazo[1,5a] pyridines via oxidative amination of C-H catalyzed by graphitic carbon nitride

*Nandishkumar Talpada[a≠], Anuj S. Sharma[q≠], Vinay S. Sharma[*a], Rajender S Varma[b], Pranav S. Shrivastav*[a], Rahul Ahmed[c], Achalkumar Ammathnadu Sudhakar** [cd]

[a]Department of Chemistry, School of Sciences, Gujarat University, Ahmedabad, Gujarat 380009, India.
[b] Centre of Excellence for Research in Sustainable Chemistry, Department of Chemistry, Federal University of São Carlos, 13565-905 São Carlos-SP, Brazil.
[c]Department of Chemistry, Indian Institute of Technology, Guwahati, 781039, Assam, India.
[d]Centre for Sustainable Polymers, Indian Institute of Technology, Guwahati, 781039, Assam, India.
≠ *Both are equally contributed*

***Corresponding Author**
Vinay S Sharma-Email: vinaysharma3836@gmail.com
Pranav S Shrivastav-Email: pranavs@gujaratuniversity.ac.in
Achalkumar Ammathnadu Sudhakar-Email: achalkumar@iitg.ac.in

Chemicals, reagents and instrumentation

All reagents and the chemicals used for the preparation of catalyst were purchased from commercial sources (Merck and Spectrochem). The crystalline or amorphous nature of graphitic carbon nitride (g-C_3N_4) was analysed by using powder X-ray diffractometer (PXRD) (Shimadzu, Maxima 7000 S) using CuKα (λ=1.5418 Å at 40 kV and 40 mA. 2θ range was from 5 to 80 ºC (scanning speed= 5º min^{-1}). Fourier-transform infrared spectroscopy (FTIR) studies were done for functional group analysis using Perkin Elmer, Frontier equipment. Morphology studies were analyzed using FESEM with OXFORD EDS, Zeiss, Sigma.. Thermogravimetric analysis was conducted from 25 °C to 700 ºC (heating rate, 10ºC/min) under nitrogen atmosphere using STAR system. ^{1}H *NMR* (600 MHz) and ^{13}C *NMR* (151MHz) were recorded on Bruker NMR spectrometerusing TMS as internal standard in $CDCl_3$.

Preparation of g-C_3N_4

Synthesis of g-C_3N_4 was accomplished according to the method reported in our earlier report [1]. The graphitic carbon nitride support (g-C_3N_4) was synthesized by calcinations of urea at 550 ˚C for 3h in Muffle furnace in an inert atmosphere.

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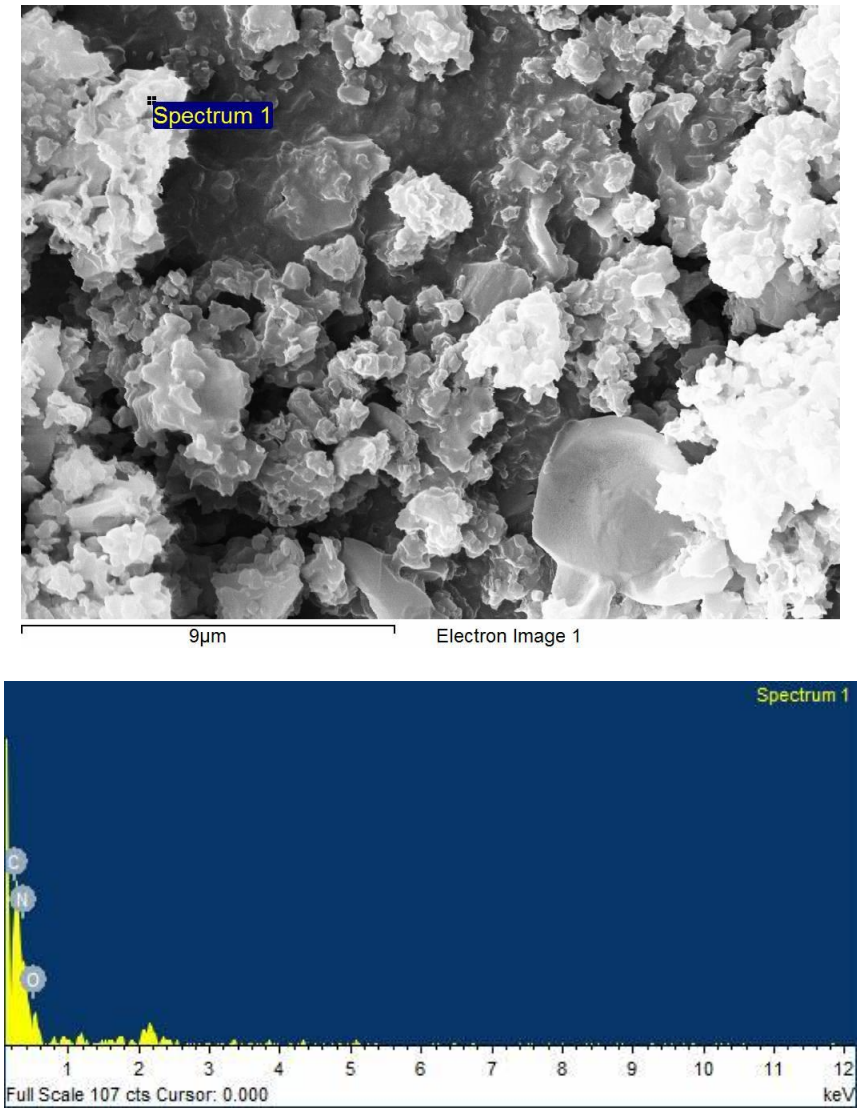

Figure S1. SEM-EDX images of g-C_3N_4(C = 28.24%, N = 53.14% and O = 18.62%).

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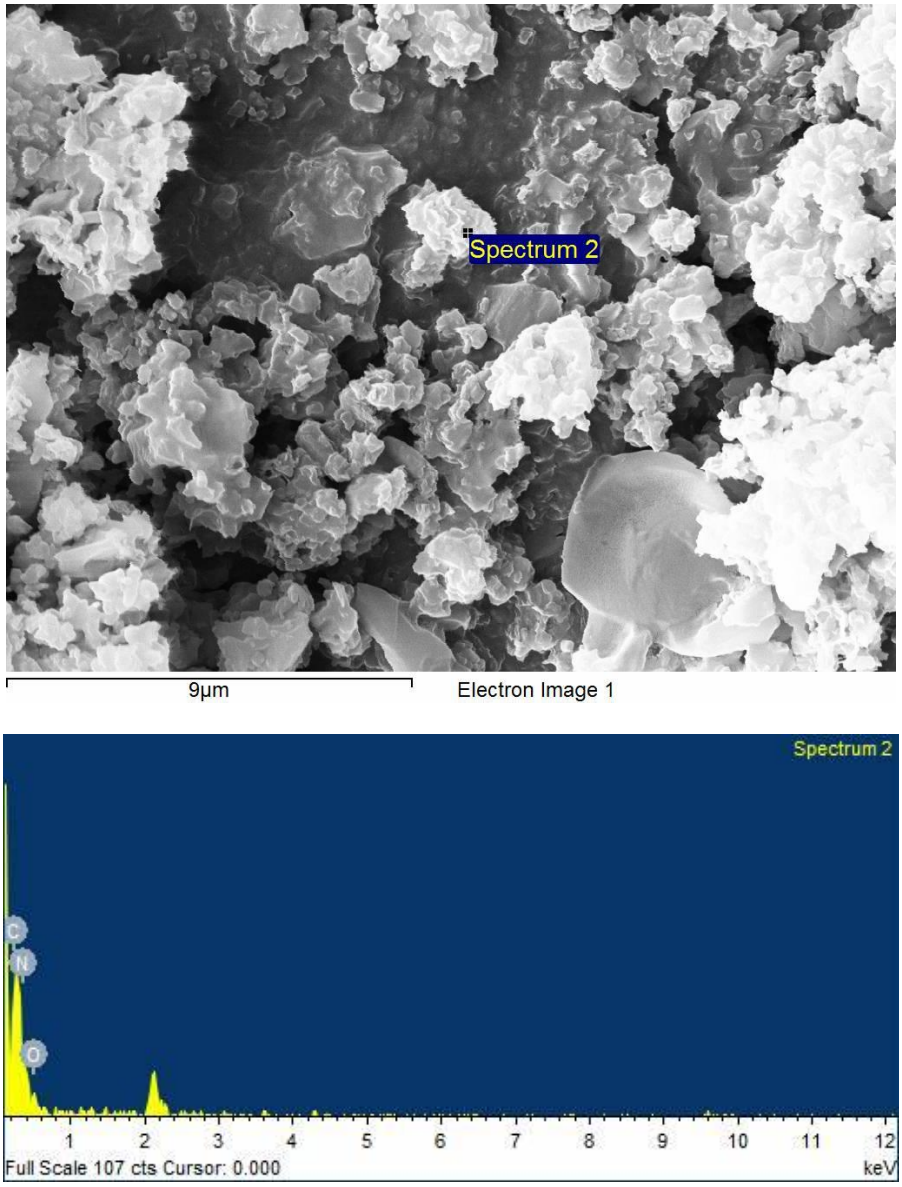

Figure S2. SEM-EDX images of g-C_3N_4(C = 31.97%, N = 53.44% and O = 14.59%).

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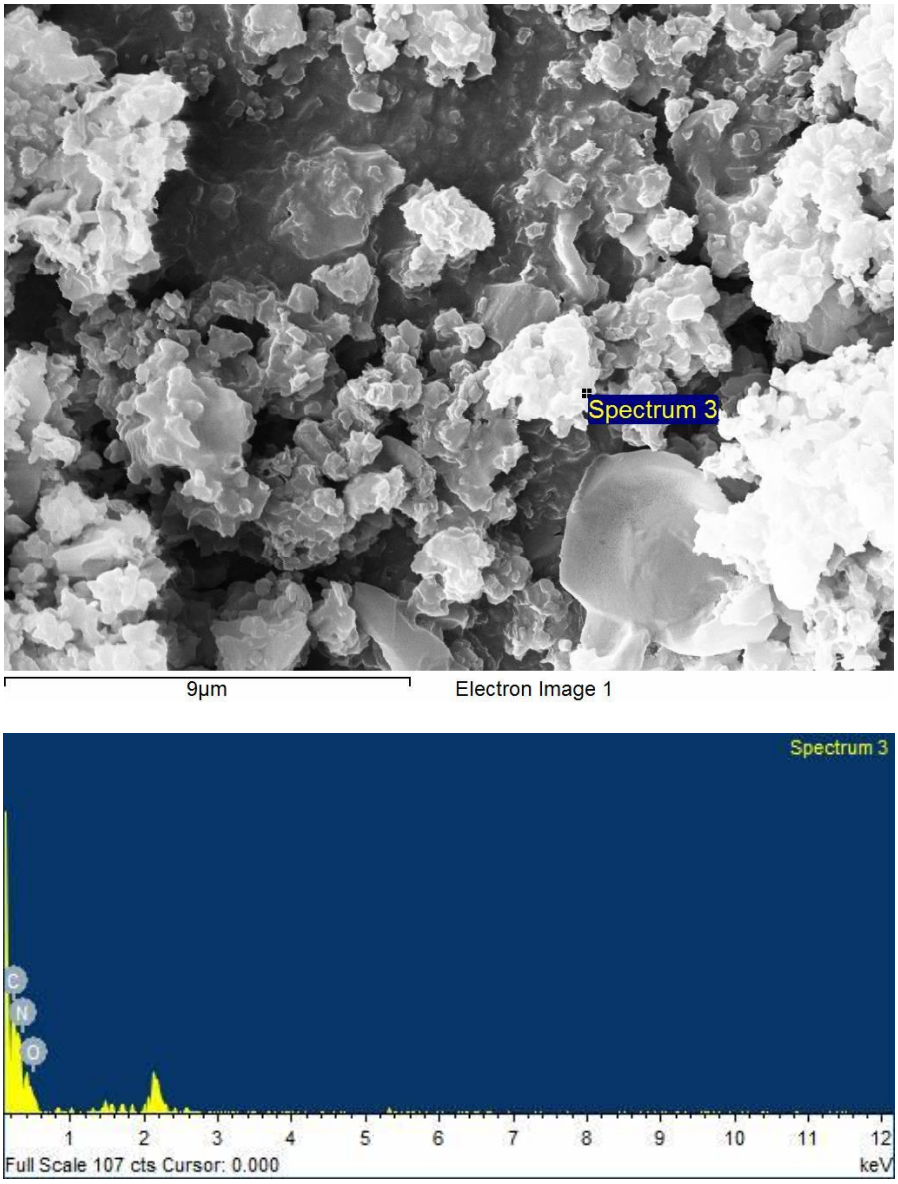

Figure S3. SEM-EDX images of g-C_3N_4 (C = 34.57%, N = 47.17% and O = 18.26%).

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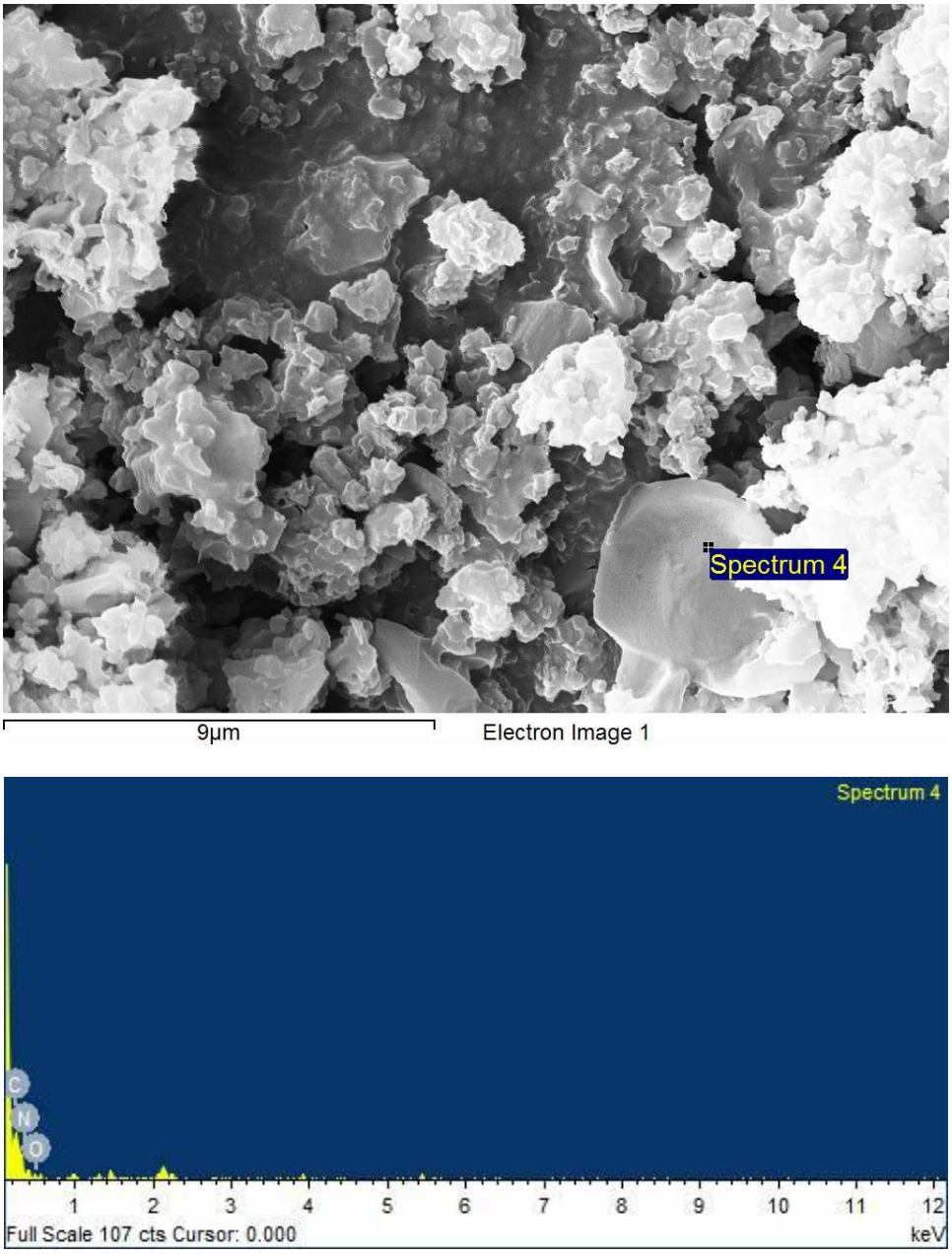

Figure S4. SEM-EDX images of g-C_3N_4 (C = 34.27%, N = 47.43% and O = 18.30%).

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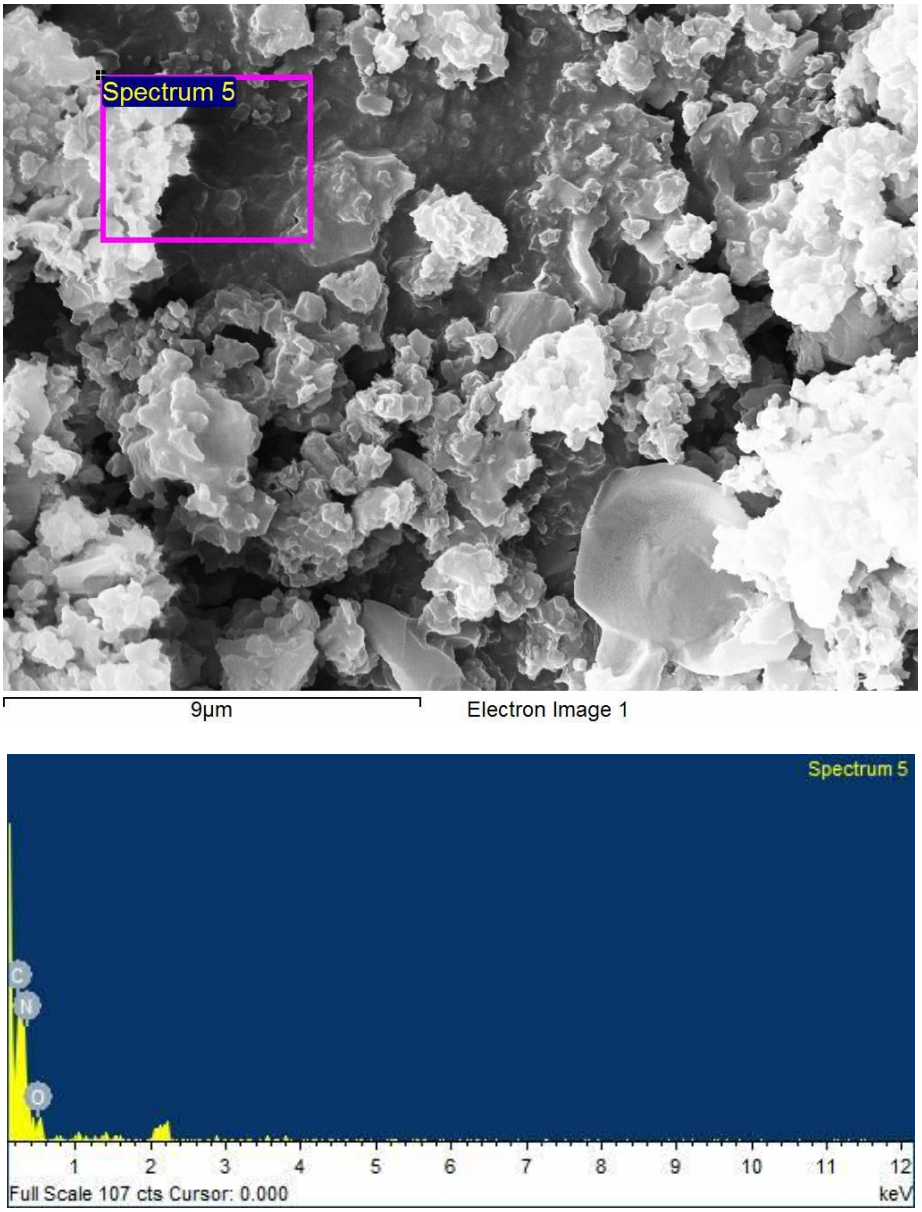

Figure S5. SEM-EDX images of g-C_3N_4 (C = 30.27%, N = 48.43% and O = 21.30%).

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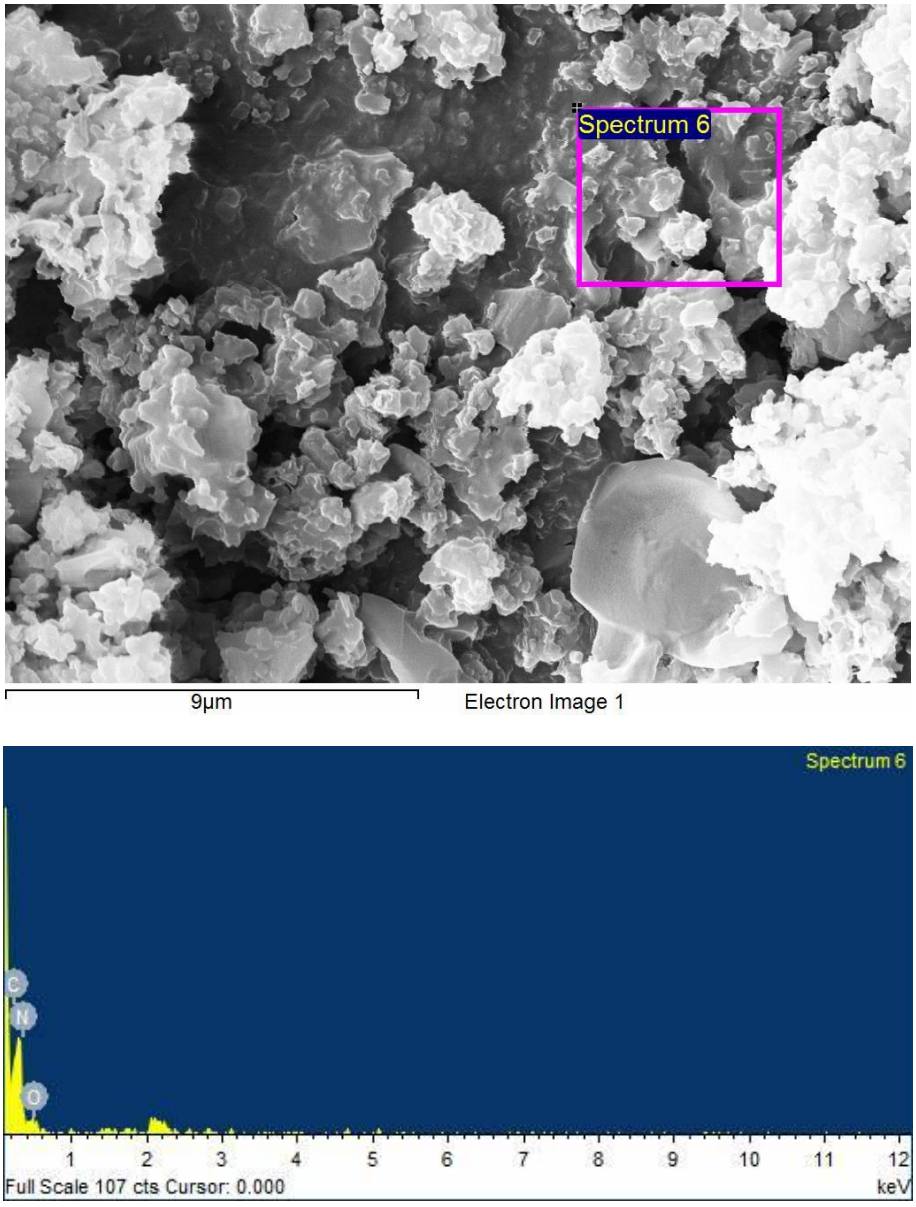

Figure S6. SEM-EDX images of g-C_3N_4 (C = 32.44%, N = 47.16% and O = 20.41%).

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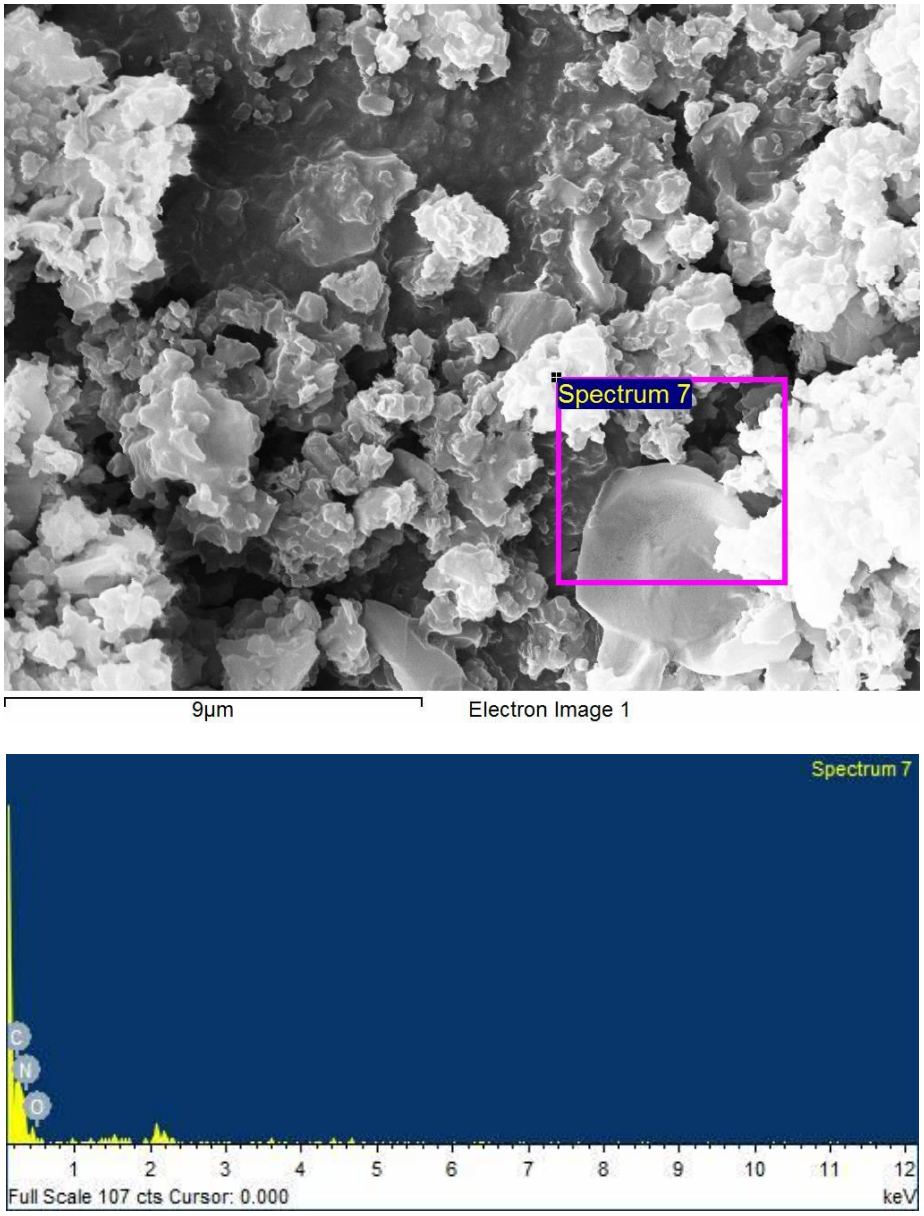

Figure S7. SEM-EDX images of g-C_3N_4 (C = 68.45%, N = 15.74% and O = 15.82%).

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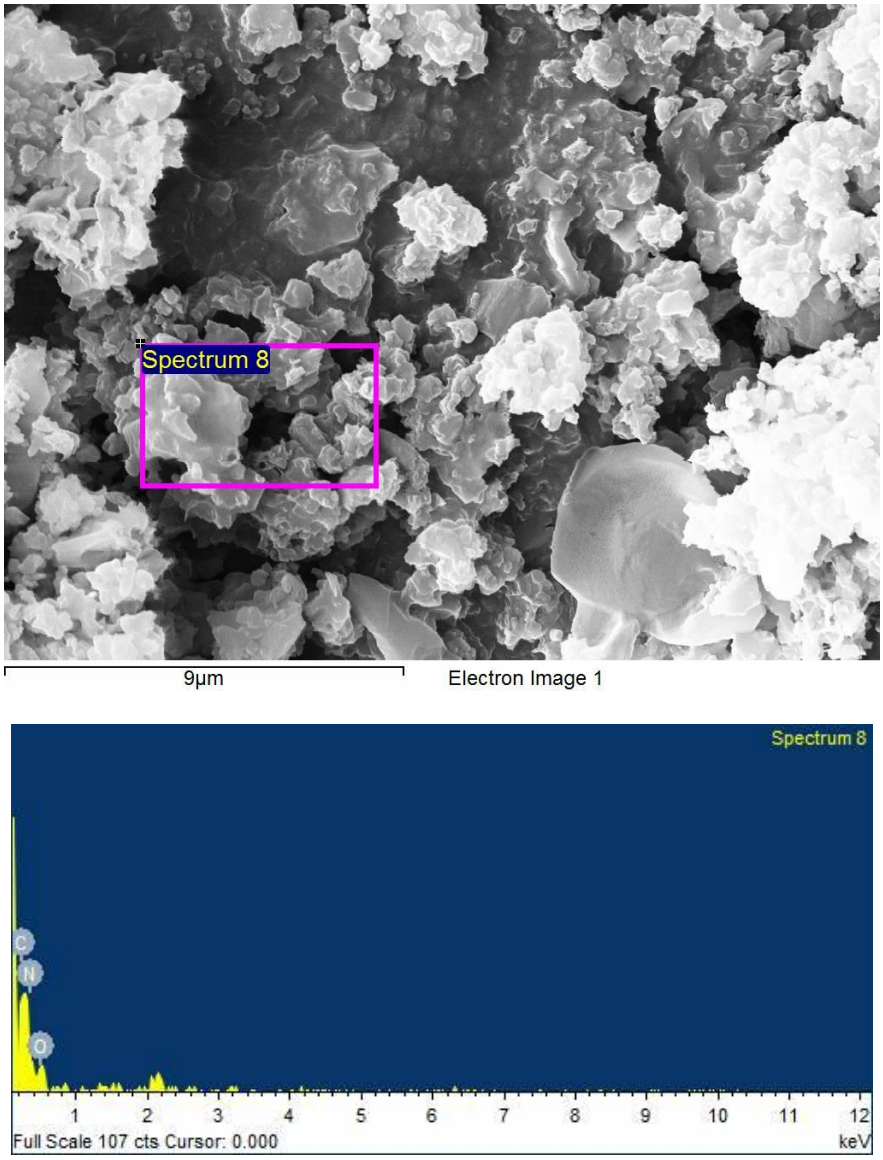

Figure S8. SEM-EDX images of g-C_3N_4 (C = 29.62%, N = 44.81% and O = 25.57%).

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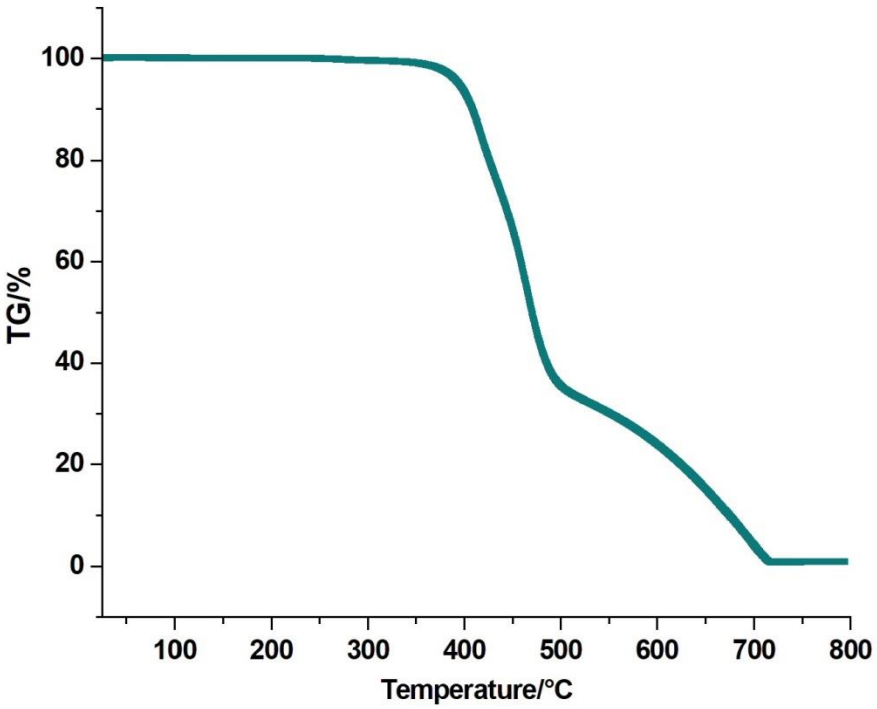
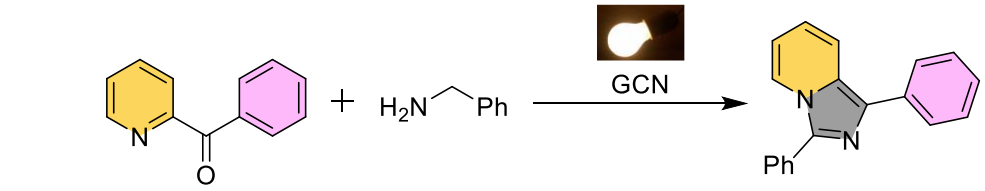


Figure S9. TGA of g-C_3N_4.

Table S1. Comparison table for the GCM (*green chemistry metrics*) for the synthesis of *Compound 3a*.

Green Metrics	**Catalyst**			
	$Cu(OAc)_2.H_2O$	I_2	CuBr	$g\text{-}C_3N_4$
Environmental impact factor ***(Ef)***	38.73	47.33	135	0.97
Process mass intensity ***(PMI)***	39.73	48.33	136	1.96
Reaction mass efficiency ***(RME)***	49.53	89.03	40.68	51.0
Atom economy ***(AE)***	48	52.36	59	93.10
Carbon efficiency ***(CE)***	53.23	95.48	43.6	54.46
Chemical yield ***(CY)***	92.48	99.15	43.72	95.0
Mass intensity ***(MI)***	2.13	1.69	2.67	1.96
Mass productivity ***(MP)***	45.0	59.17	37.45	51.02
Optimum efficiency ***(OE)***	103.18	170.03	69	55.0
References	2	3	4	This Work

Calculation of Green chemistry metrics (GCM) for compound (3a)[5-6].



FW	**183.21**	**107.15**	**270.33**
	1.0 mmol	**3 mmol**	**0.946 mmol**
	0.183 g	**0.321 g**	**0.256 g**

Environmental impact factor (Ef):

E-factor = [Total mass of raw materials minus the total mass of product] / Mass of product

E-factor = [0.183 g + 0.321 g - 0.256 g] / [0.256 g]

E-Factor = 0.97

Process mass intensity (PMI):

$$\boldsymbol{PMI} = \sum(\text{Mass of stoichiometric reactants})/[\text{Mass of product}]$$

$$\boldsymbol{PMI} = \sum[(0.183\ \text{g} + 0.321\ \text{g}]/[0.256\ \text{g}]$$

PMI = 1.96

Reaction mass efficiency (RME):

$$\boldsymbol{RME} = Mass\ of\ product/\sum(\text{Mass of stoichiometric reactants}) \times 100$$

$$\boldsymbol{RME} = [0.256]/\sum[0.183\text{g} + 0.321\ \text{g}] \times 100$$

RME = 51.0 %

Atom economy (AE):

$AE = [MW\ of\ \ product]\ \%\ \sum(\text{MW of stoichiometric reactants}) \times 100$

$AE = [270.33\ ]\ \%\ \sum[183.21 + \ 107.15] \times 100$

AE = 93.10%

Carbon efficiency (CE):

CE = [Amount of carbon in product] / [Total carbon present in reactants] ×100

CE = [no. of moles of product × no. of carbons in product] ×100 / [no. of moles × no. of carbon + (no. of moles × no. of carbon atoms]

$CE = [0.946 \times 19] \times 100 / [1 \times 12 + 3 \times 7]$

CE = 54.46%

Chemical yield (CY):

CY = **[**Weight of product × MW of starting material]×100/ [Weight of Starting material × MW of Product]

$CY = [0.256\ g \times 183.21] \times 100/[0.183 \times 270.33]$

CY = 95.0 %

Mass intensity (MI):

$MI = \sum Weight\ \ (\text{Total materials input})/[\text{Weight of Product}]$

$MI = \sum[(0.183\ g\ \ + 0.321\ g]/[0.256\ g]$

MI = 1.96

Mass productivity (MP):

MP = 100/MI

MP = 51.02 %

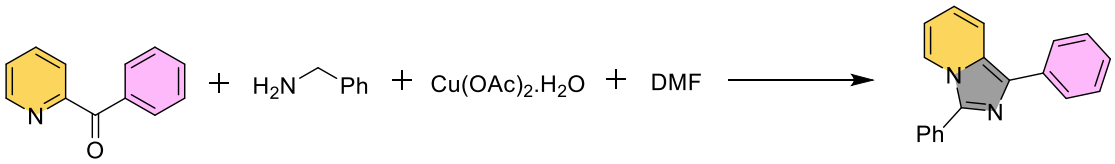
Optimum efficiency (OE):

OE = [RME] ×100/AE

OE = 55.0 %

Note:-The Reaction was performed with g-C_3N_4 catalyst that was recovered and recycled. Hence the mass of the catalyst is excluded.

Calculation of Green chemistry metrics (GCM) for compound (3a) by $Cu(OAc)_2.H_2O$ (reported ones).



FW	183.21	107.15	199.65	73.09	270.33
	0.2 mmol	0.6 mmol	0.15 Eq	2ml	0.1849 mmol
	0.03664 g	0.06429 g	0.00598 g	1.88 g	0.050 g

E-factor = [Total mass of raw materials minus the total mass of product] / mass of product

E-factor = [0.03664 g + 0.06429 g + 0.00598 g (Catalyst) + 1.88 g (DMF)-0.050 g] / [0.050 g]

E-Factor = 38.73

$$\boldsymbol{PMI} = \sum(\text{mass of stoichiometric reactants})/[\text{Mass of product}]$$

$$\boldsymbol{PMI} = \sum[(0.03664\ \text{g} + 0.06429\ \text{g} + 0.00598\ \text{g (Catalyst)} + 1.88\ \text{g (DMF)}]/[0.050\ ]$$

PMI = 39.73

$$\boldsymbol{RME} = mass\ of\ product/\sum(\text{mass of stoichiometric reactants}) \times 100$$

$$\boldsymbol{RME} = [\ 0.050]/\sum[0.03664\ \text{g} + 0.06429\ \text{g}] \times 100$$

RME = 49.53%

$$\boldsymbol{AE} = [MW\ of\ \ product]\ \%\ \sum(\text{MW of stoichiometric reactants}) \times 100$$

$$\boldsymbol{AE} = [270.33\ ]\ \%\ \sum[183.21\ + 107.15\ + 199.65(\text{Catalyst}) + 73.09\ (\text{DMF})] \times 100$$

AE = 48%

CE = [Amount of carbon in product] / [Total carbon present in reactants] ×100

CE = [no. of moles of product × no. of carbons in product] ×100 / [no. of moles × no. of carbon + (no. of moles × no. of carbon atoms + (no. of moles × no. of carbon atoms**)]**

$$\boldsymbol{CE} = [0.1849\times\ 19]\ \times 100/\ [0.2\times 12+\ 0.6\times 7]$$

CE = 53.23

CY = **[**Weight of product × MW of starting material]×100/ [Weight of Starting material × MW of Product]

$$\boldsymbol{CY} = [0.050\ \text{g} \times\ 183.21]\ \times 100/[0.03664\times 270.33]$$

CY = 92.48%

$MI = \sum Weight$ (Total materials input)/[Weight of Product]

MI = ∑[(0.03664 g + 0.06429 g + 0.00598 g]/[0.050 g]

***MI* = 2.13**

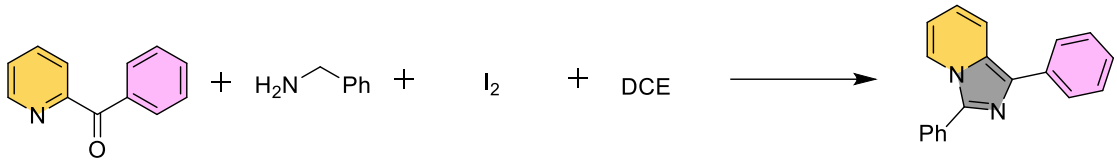
MP = 100/MI

***MP* = 45.0**

OE = [RME] ×100/AE

OE = 103.18

Calculation of Green chemistry metrics (GCM) for compound (3a) by I_2 (reported ones).



FW	**183.21** **0.5 mmol** **0.0916 g**	**107.15** **0.55 mmol** **0.0589 g**	**126.9** **0.6 mmol** **0.0761 g**	**98.95** **5ml** **6.25 g**	**270.33** **0.495 mmol** **0.1340 g**

E-factor = [Total mass of raw materials minus the total mass of product] / mass of product

E-factor = [0.0916 g + 0.0589 g + 0.0761 g (I_2) + 6.25 g (DCE)-0.1340 g] / [0.1340 g]

E-Factor = 47.33

PMI = ∑(mass of stoichiometric reactants)/[Mass of product]

PMI = ∑[(0.0916 g + 0.0589 g + 0.0761 g (I2) + 6.25 g (DCE)]/[0.1340]

PMI = 48.33

RME = $mass\ of\ product$/∑(mass of stoichiometric reactants) × 100

RME = [0.1340]/∑[0.0916 g + 0.0589 g] × 100

RME = 89.03 %

AE = [$MW\ of\ product$] % ∑(MW of stoichiometric reactants) × 100

AE = [270.33] % ∑[183.21 + 107.15 + 126.9(I2) + 98.95 (DCE)] × 100

AE = 52.36 %

CE = [Amount of carbon in product] / [Total carbon present in reactants] ×100

CE = [no. of moles of product × no. of carbons in product] ×100 / [no. of moles × no. of carbon + (no. of moles × no. of carbon atoms)]

CE = [0.495× 19] ×100/ [0.5×12+ 0.55×7]

CE = 95.48 %

Chemical yield (CY):

CY = [Weight of product × MW of starting material]×100/ [Weight of Starting material × MW of Product]

CY = [0.1340 g × 183.21] ×100/[0.0916×270.33]

CY = 99.15 %

Mass intensity (MI):

$MI = \sum Weight$ (Total materials input)/[Weight of Product]

MI = ∑[(0.0916 g + 0.0589 g + 0.0761 g]/[0.1340 g]

***MI* = 1.69**

Mass productivity (MP):

MP = 100/MI

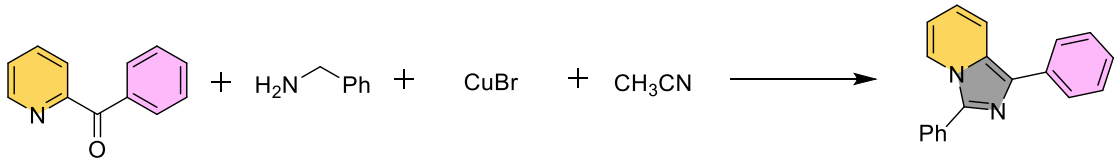
***MP* = 59.17**

Optimum efficiency (OE):

OE = [RME] ×100/AE

OE = 170.03 %

Calculation of Green chemistry metrics (GCM) for compound (3a) by CuBr (reported ones).



FW	183.21	107.15	126.9	41.05	270.33
	0.10 mmol	0.10 mmol	0.2 M Eq	2ml	0.0436 mmol
	0.0183 g	0.0107 g	0.00253 g	1.572 g	0.0118 g

E-factor = [Total mass of raw materials minus the total mass of product] / mass of product

E-factor = [0.0183 g + 0.0107 g + 0.00253 g (CuBr) + 1.572 g (CH_3CN)-0.0118 g] / [0.0118 g]

E-Factor = 135

$\boldsymbol{PMI} = \sum(\text{mass of stoichiometric reactants})/[\text{Mass of product}]$

$\boldsymbol{PMI} = \sum[(0.0183\ \text{g} + 0.0107\ \text{g} + 0.00253\ \text{g (CuBr)} + 1.572\ \text{g (CH3CN)}]/[0.0118\ ]$

PMI = 136

$\boldsymbol{RME} = mass\ of\ product/\sum(\text{mass of stoichiometric reactants}) \times 100$

$\boldsymbol{RME} = [\ 0.0118]/\sum[0.0183\ \text{g} + 0.0107\ \text{g}] \times 100$

RME = 40.68 %

$\boldsymbol{AE} = [MW\ of\ \ product]\ \%\ \sum(\text{MW of stoichiometric reactants}) \times 100$

$\boldsymbol{AE} = [270.33\ ]\ \%\ \sum[183.21\ + 107.15\ + 126.9(\text{CuBr}) + 41.05\ (\text{CH3CN})] \times 100$

AE = 59 %

CE = [Amount of carbon in product] / [Total carbon present in reactants] ×100

CE = [no. of moles of product × no. of carbons in product] ×100 / [no. of moles × no. of carbon + (no. of moles × no. of carbon atoms**)**]

CE = [0.0436× 19] ×100/ [0.1×12+ 0.10×7]

CE = 43.6 %

CY = **[**Weight of product × MW of starting material]×100/ [Weight of Starting material × MW of Product]

CY = [0.0118 g × 183.21] ×100/[0.0183×270.33]

CY = 43.72 %

$\boldsymbol{MI} = \sum Weight\ $ (Total materials input)/[Weight of Product]

MI = $\sum[(0.0183\ \text{g}\ + 0.0107\ \text{g}\ + 0.00253\ \text{g}\ ]/[0.0118\ \text{g}]$

***MI* = 2.67**

MP = 100/MI

MP = 37.45 %

OE = [RME] ×100/AE

OE = 69 %

Table S2. Comparison table for the synthesis of 1,3-diarylated Imidazo[1,5a] pyridines *compound 3a* by deploying other reported catalysts.

Catalyst	T (˚C)	Solvent	Time	Catalyst Quantity	Base	Yield	Ref.
$Cu(OAc)_2.H_2O$	110	DMF	8 h	0.15 Eq	-	93	2
I_2	Reflux	DCE	6 h	0.0006 Eq	NaOAc (0.0015 Eq)	99	3
CuBr	80	CH_3CN	24 h	20 mol %	-	42	4
g-C_3N_4	RT	-	10 h	g-C_3N_4(50 mg)	-	95	Present work

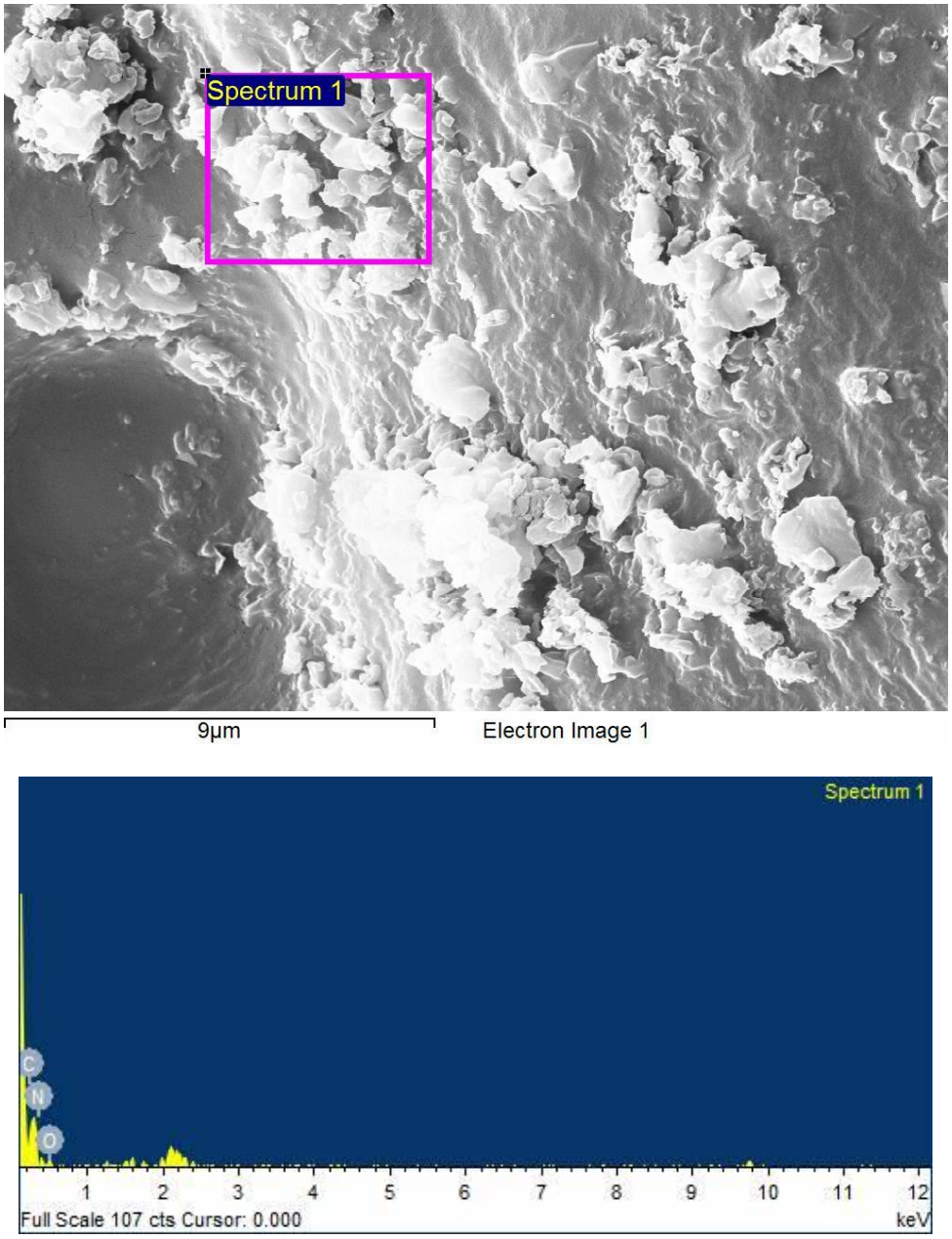


Figure S10. SEM-EDX spectrum of reused g-C_3N_4 (C = 31.72 %, N = 48.06 %, O = 20.22 %).

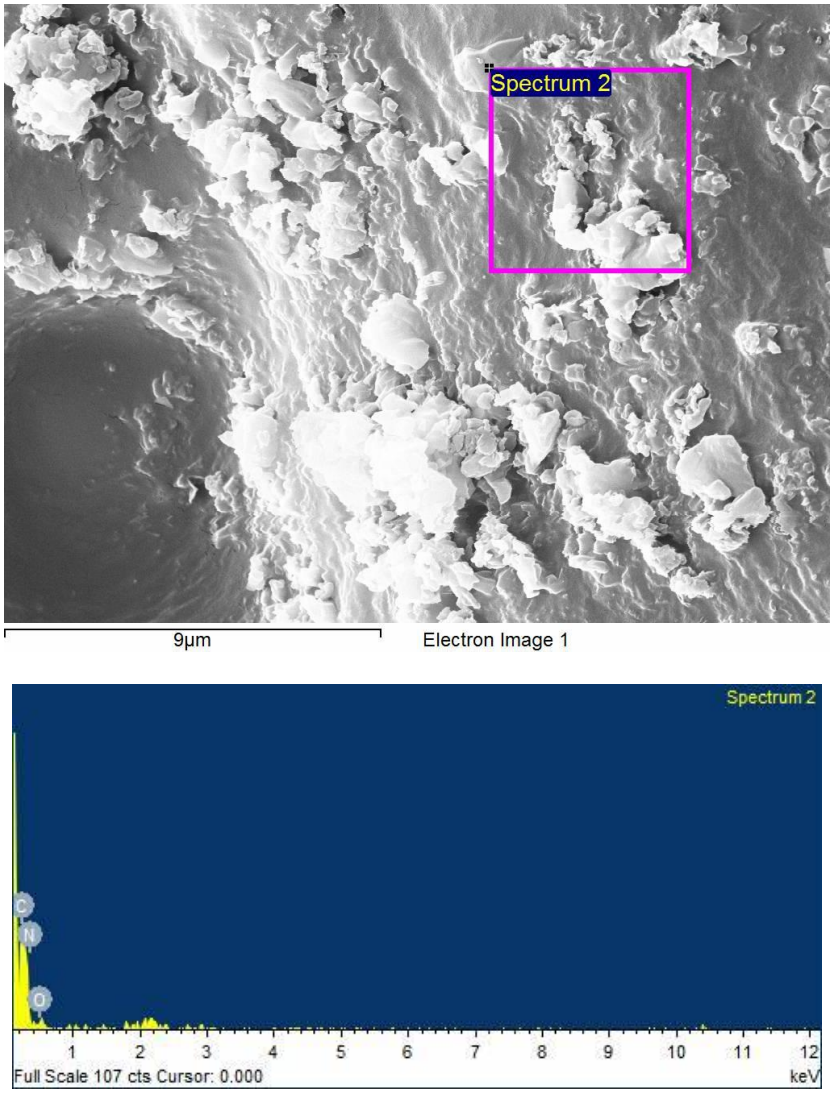


Figure S11. SEM-EDX spectrum of reused g-C_3N_4 (C = 56.16 %, N = 28.45 %, O = 15.39 %).

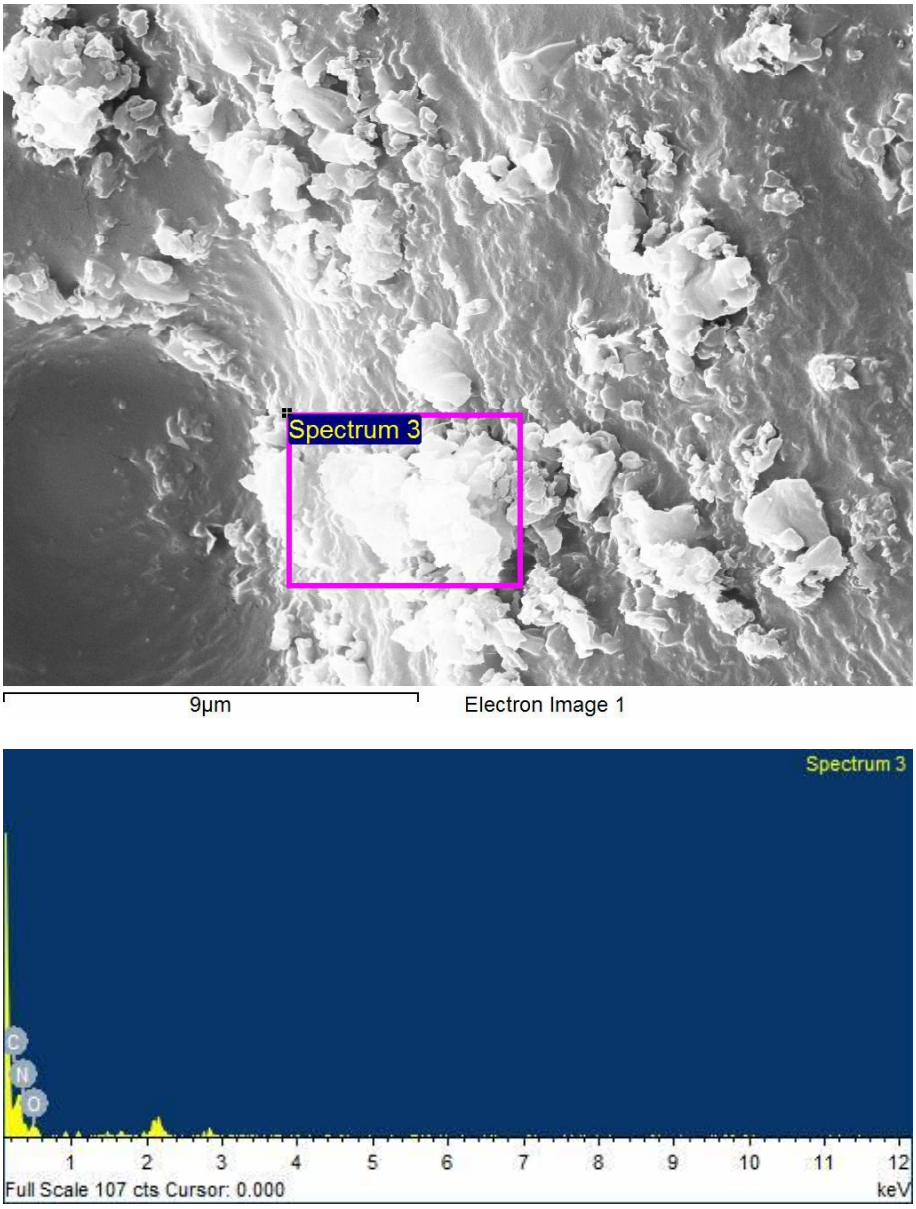
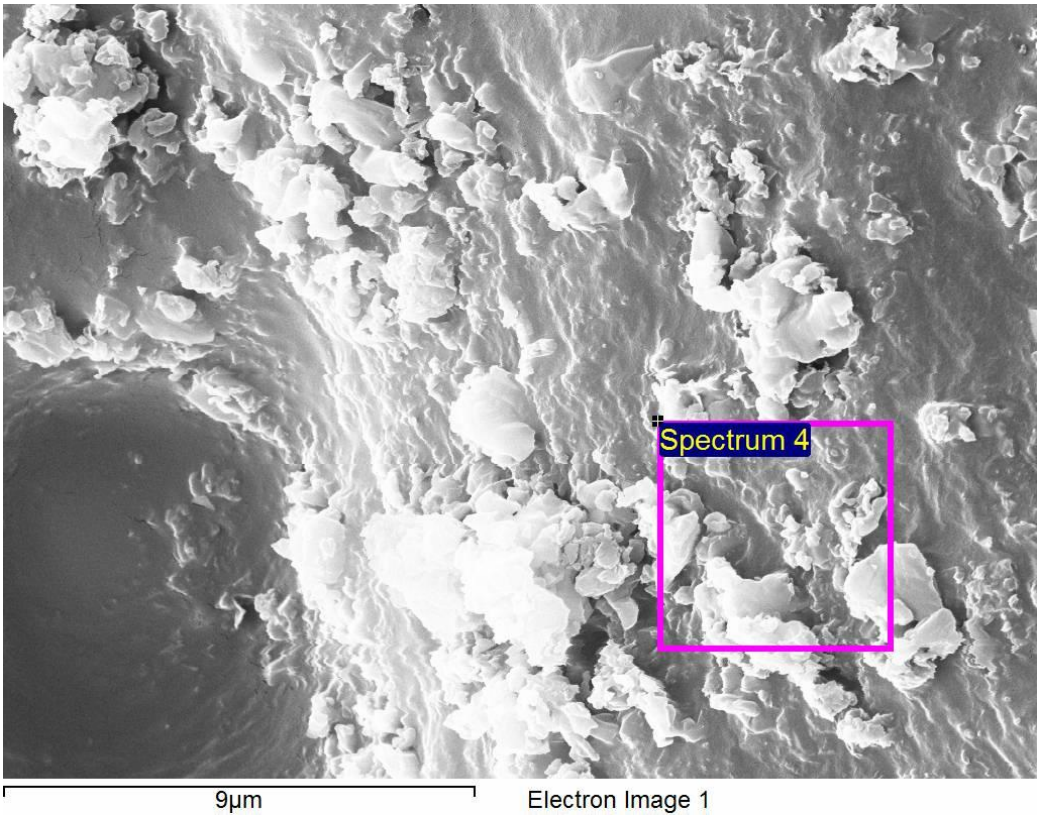


Figure S12. SEM-EDX spectrum of reused g-C_3N_4 (C = 27.04 %, N = 44.68 %, O = 28.28 %).



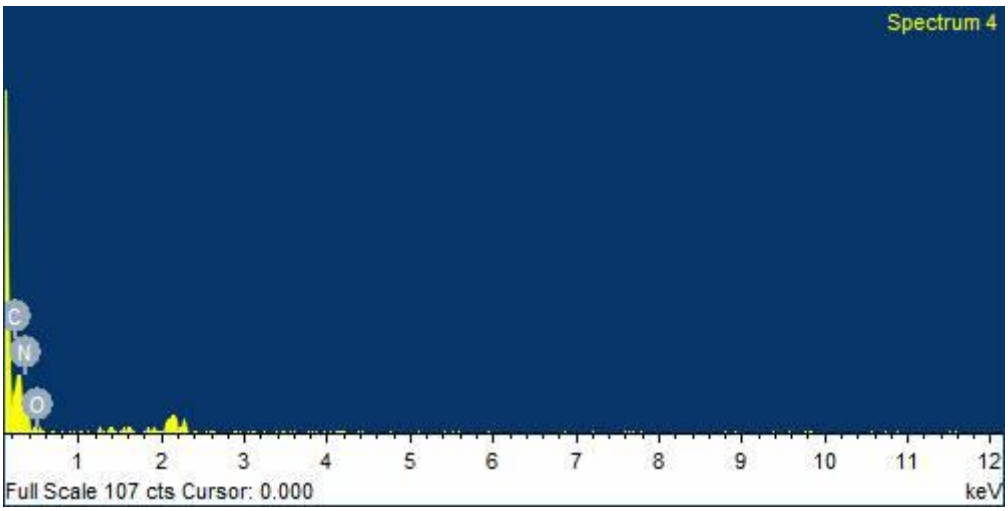
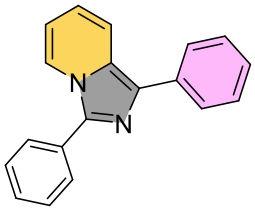


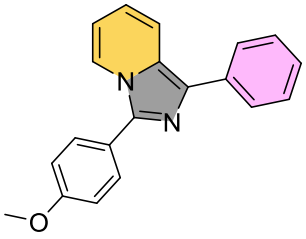
Figure S13. SEM-EDX spectrum of reused g-C_3N_4 (C = 30.13 %, N = 51.71 %, O = 18.15 %).

Synthesis and Structural characterization of Compounds 3a to Compound 3v



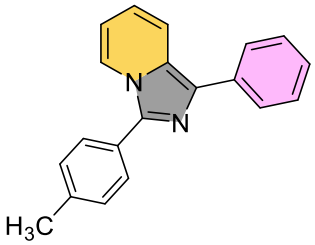
In a 20 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *benzyl amine* (0.321, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3a***).

1,3-Diphenylimidazo[1,5-a]pyridine (*Compound 3a*)[2]: LCMS 97.98%(254 nm) (ES^+) calcd for $C_{19}H_{14}N_2^+$, 270.11; found, 271.2 (MH^+). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.21 (d, *J = 7.2 Hz*, 1H), 7.94 (d, *J = 7.8 Hz*, 2H), 7.87 (d, *J = 9.6 Hz*, 1H), 7.81 (d, *J = 8.4 Hz*, 2H), 7.53 (d, *J= 8.4 Hz*, 2H), 7.49 (t, *J = 7.2 Hz*, 2H), 7.33 (t, *J = 7.2 Hz*, 1H), 6.82-6.84 (m, 1H), 6.63 (t, *J = 6.6 Hz*, 1H). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 138.14, 134.97, 132.02, 130.18, 129.03, 128.83, 128.73, 128.34, 126.85, 126.55, 121.78, 119.71, 119.18, 113.24.



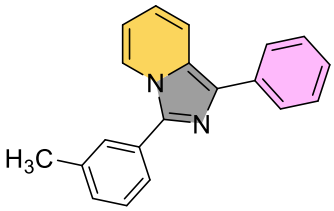
In a 20 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *4-methoxy benzyl amine* (0.411 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3b***).

3-(4-Methoxyphenyl)-1-phenylimidazo[1,5-a]pyridine (*Compound 3b*)[2]: LCMS 93.66%(220 nm) (ES+) calcd for $C_{20}H_{16}N_2O^+$, 300.12; found, 301.2 (MH+). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.18 (*d, J = 7.2 Hz, 1H*), 7.95 (*d, J = 7.2 Hz, 2H*), 7.84 (*d, J = 9 Hz, 1H*), 7.77 (*d, J = 9.0 Hz, 2H*), 7.48 (*t, J = 7.8 Hz, 2H*), 7.31 (*t, J = 7.2 Hz, 1H*), 7.08 (*d, J = 8.4 Hz, 2H*), 6.79-6.77 (*m, 1H*), 6.57 (t, J = 6.6 Hz, 1H), 3.90 (s, 3H). **^{13}C NMR(*151MHz,$CDCl_3$*)**δ160.05,138.15,135.05,131.65,129.81,128.71,127.36,126.77,126.45,122.62,121.76,119.44,119.13,114.47,113 03, 55.43.



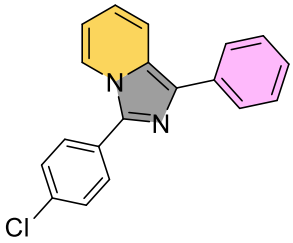
In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *4-methyl benzyl amine* (0.363 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3c***).

1-**Phenyl-3-p-tolylimidazo[1,5-a]pyridine** (***Compound 3c***)[2]. LCMS 97.14%(254 nm) (ES+) calcd for $C_{20}H_{16}N_2^+$, 284.13; found, 285.2 (MH+). **^{1}H NMR (600 MHz, CDCl$_3$)** δ 8.22 (*d, J = 7.2 Hz, 1H*), 7.96 (*d, J = 7.8 Hz, 2H*), 7.85 (*d, J = 9 Hz, 1H*), 7.75 (*d, J = 7.8 Hz, 2H*), 7.49 (*t, J = 7.8 Hz, 2H*), 7.36 (*d, J = 7.8 Hz, 2H*), 7.32 (*t, J = 7.2 Hz, 1H*), 6.77-6.80 (*m, 1H*), 6.57 (*t, J = 6.6 Hz, 1H*), 2.46 (*s, 3H*). ***^{13}C NMR (151 MHz, CDCl$_3$)*** δ 138.84, 138.32, 135.05, 131.82, 129.70, 128.72, 128.25, 127.55, 127.28, 126.81, 126.48, 121.85, 119.56, 119.12, 113.09, 21.46.



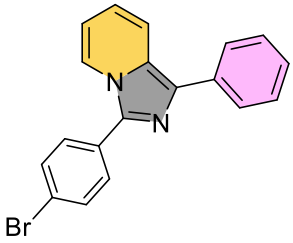
In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *3-methyl benzyl amine* (0.363 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3d***).

1-Phenyl-3-m-tolylimidazo[1,5-a]pyridine (Compound 3d)[2]. **Mass** LCMS 100%(210 nm) (ES+) calcd for $C_{20}H_{16}N_2^+$, 284.13; found, 285.2 (MH+). **^{1}H NMR (*600 MHz, CDCl$_3$*)** δ 8.25 (*d, J = 7.2 Hz, 1H*), 7.97 (*d, J = 7.8 Hz, 2H*), 7.85 (*d, J = 9 Hz, 1H*), 7.70(*s, 1H*), 7.64 (*d, J = 7.2 Hz, 1H*), 7.49 (*t, J = 7.2 Hz, 2H*), 7.44 (*t, J = 7.8 Hz, 1H*), 7.33 (*t, J = 7.2 Hz, 1H*), 7.28-7.30 (*m, 1H*), 6.78-6.80 (*m,1H*), 6.58 (*t, J = 6.6 Hz, 1H*), 2.48 (*s, 3H*). **^{13}C NMR (*151 MHz, CDCl$_3$*)** δ 138.92, 138.32, 135.02, 131.92, 130.05, 129.65, 129.24, 128.8, 127.62, 126.83, 126.51, 125.11, 121.89, 119.64, 119.12, 113.14, 21.52.



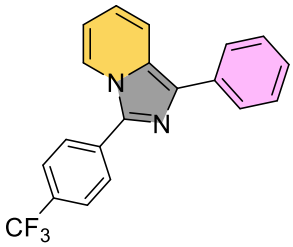
In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183g, 1 mmol), *4-chloro benzyl amine* (0.424g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3e***).

3-(4-Chlorophenyl)-1-phenylimidazo[1,5-a]pyridine (*Compound 3e*)[2]. LCMS 100%(210 nm) (ES^+) calcd for $C_{19}H_{13}ClN_2$+, 304.07; found, 305.2 (MH^+). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.21 (*d, J = 7.2 Hz, 1H*), 7.94 (*d, J = 7.8 Hz, 2H*), 7.87 (*d, J = 9.6 Hz, 1H*), 7.81 (*d, J = 8.4 Hz, 2H*), 7.53 (*d, J= 8.4 Hz, 2H*), 7.49 (*t, J = 7.2 Hz, 2H*), 7.33 (*t, J = 7.2 Hz, 1H*), 6.82-6.84(*m, 1H*), 6.63 (*t, J = 6.6 Hz, 1H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 136.93, 134.76, 132.33, 129.4, 129.18, 128.72, 128.47, 127.90, 126.80,, 121.45, 119.81, 119.28, 113.61.



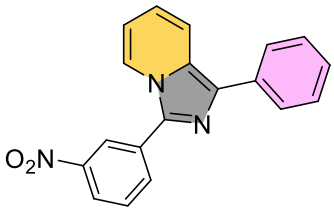
In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *4-bromo benzyl amine* (0.558 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3f***).

3-(4-Bromophenyl)-1-phenylimidazo[1,5-a]pyridine (Compound 3f)[7]. **^{1}H NMR (*600 MHz, $CDCl_3$*) ^{1}H NMR (600 MHz, $CDCl_3$)** δ 8.21 (*d, J = 7.2 Hz, 1H*), 7.94 (*d, J = 7.8 Hz, 2H*), 7.87 (*d, J = 9 Hz, 1H*), 7.75 (*d, J = 8.4 Hz, 2H*), 7.69 (*d, J=9.0Hz,2H*), 7.49 (*t, J = 7.8 Hz, 2H*), 7.33 (*t, J = 7.2 Hz, 1H*), 6.82-6.84 (*m, 1H*), 6.63 (*t, J = 7.2 Hz, 1H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 136.93, 134.74, 132.38, 132.23, 129.69, 129.38, 129.11, 128.78, 128.39, 127.9, 126.8, 122.83, 121.53, 119.89, 119.29, 113.65.



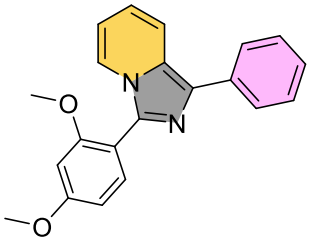
In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183g, 1 mmol), *4-trifluoro methyl* (0.525 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3g***).

1-Phenyl-3-(4-(trifluoromethyl)phenyl)imidazo[1,5-a]pyridine (Compound 3g)[2]. **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.28 (*d, J = 7.8 Hz, 1H*), 8.02 (*d, J = 8.4 Hz, 2H*), 7.95 (*d, J = 7.2 Hz, 2H*), 7.90 (*d, J = 9 Hz, 1H*), 7.81 (*d, J = 7.8 Hz, 2H*), 7.50 (*t, J = 7.8 Hz,2H*), 7.35 (*t, J = 7.8 Hz,1H*), 6.86 (*dd, J = 9.6, 6.6 Hz, 1H)*, 6.67 (*t, J = 7.8 Hz, 1H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 136.48, 134.64, 133.71, 132.86, 130.37 (*q, J = 32.6 Hz*), 128.82, 128.32, 128.25, 126.87, 126.00 (*q, J = 3.7 Hz*), 124.02 (*d, J = 272.1 Hz*), 121.49, 120.21, 119.37, 122.15, 119.65, 113.95.



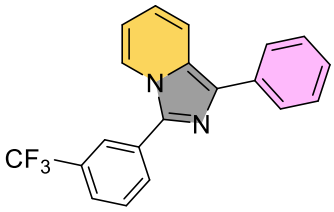
In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *3-nitro benzyl amine* (0.456 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow orange solid*). (***Compound 3h***)[7].

3-(3-nitrophenyl)-1-phenylimidazo[1,5-a]pyridine (*Compound 3h*). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.75 (*s, 1H*), 8.26-8.31 (*m, 3H*), 7.91-7.95 (*m, 3H*), 7.74 (*t, J = 7.8Hz, 1H*), 7.51 (*t, J = 6.6 Hz, 2H*), 7.36 (*t, J = 6.6 Hz, 1H*), 6.91 (*t, J = 7.2 Hz, 1H*), 6.74 (*s, 1H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 148.66, 133.96, 131.93, 130.21, 128.87, 127.03, 126.87, 123.17, 122.39, 121.25, 120.51, 119.51, 114.47.



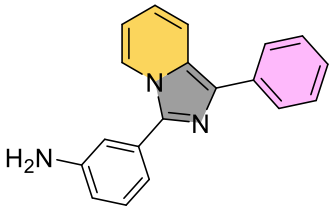
In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *2, 4 dimethoxy benzyl amine* (0.501 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Pale yellow solid*). (***Compound 3i***).

3-(3-nitrophenyl)-1-phenylimidazo[1,5-a]pyridine (*Compound 3i*). **^{1}H NMR (*600 MHz, CDCl$_3$*)** δ 7.97 (*d, J = 8.4 Hz, 2H*), 7.86 (*d, J = 9 Hz, 1H*), 7.60 (*t, J = 7.2 Hz,2H*), 7.47 (*t, J = 7.8 Hz, 2H*), 7.29 (*t, J = 7.2 Hz, 1H*), 6.79-6.83 (*m, 1H*), 6.68 (*dd, J = 1.8 Hz, 1H*), 6.62 (*d, J = 2.4 Hz, 1H*), 6.53 (*t, J = 7.2 Hz, 1H*), 3.90 (*s, 1H*), 3.81 (*s, 1H*). **^{13}C NMR (*151 MHz, CDCl$_3$*)** δ 162.18, 158.64, 136.19, 135.27, 133.57, 131.16, 128.63, 127.24, 126.72, 126.19, 123.46, 119.41, 118.61, 111.8, 105.30, 98.79, 55.58.



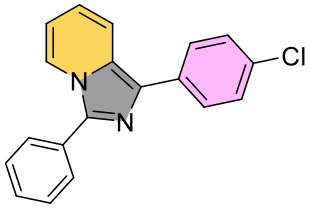
In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *3-trifluoromethyl benzyl amine* (0.525, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3j***).

1-Phenyl-3-(3-(trifluoromethyl) phenyl) imidazo[1,5-a]pyridine (Compound 3j)[3]. **^{1}H NMR (*600 MHz, CDCl$_3$*)** δ 8.24 (*d, J = 7.2 Hz, 1H*), 8.16 (*s, 1H*), 8.06 (*d, J = 7.2 Hz, 1H*), 7.95 (*d, J = 7.8 Hz, 2H*), 7.89 (*d, J = 9 Hz, 1H*), 7.72 (*d, J = 7.8 Hz,1H*), 7.68 (*t, J = 7.8 Hz, 1H*), 7.51 (*t, J = 7.8 Hz, 2H*), 7.35 (*t, J = 7.8 Hz,1H*), 6.85-6.87 (*m, 1H*), 6.67 (*t, J = 6.6 Hz, 1H*). **^{13}C NMR (*151 MHz, CDCl$_3$*)** δ 136.45, 134.64, 132.66, 131.68 (*t, J = 32.7 Hz*), 131.24, 131.07, 129.59, 128.83, 128.14, 126.87, 126.84, 125.32 (*q, J = 3.9 Hz*), 125.07 (*q, J = 3.7 Hz*), 123.93 (*d, J = 272.8 Hz*), 121.33, 121.23, 120.15, 119.36, 113.97.



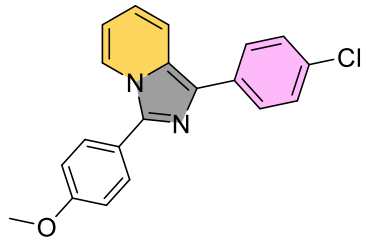
In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *3-amino benzyl amine* (0.366 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3k***).

3-(1-phenylimidazo[1,5-a]pyridin-3-yl)aniline (*Compound 3k*). **^{1}H NMR (600 MHz, $CDCl_3$)** δ 8.27 (*d, J = 7.2 Hz, 1H*), 7.95 (*d, J = 7.2 Hz, 2H*), 7.84 (*d, J = 9.6 Hz, 1H*), 7.48 (*t, J = 7.8 Hz, 2H*), 7.31 (*t, J = 7.8 Hz, 2H*), 7.18 (*t, J = 7.2Hz, 2H)*, 6.76-6.80 (*m, 2H*), 6.56 (*t, J = 6.6 Hz, 1H*), 3.85(*s, 2H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 147.20, 138.36, 135.00, 131.75, 131.01, 129.81, 128.72, 127.61, 126.82, 126.49, 122.16, 119.65, 119.05, 117.98, 115.62. 115.13, 113.04.



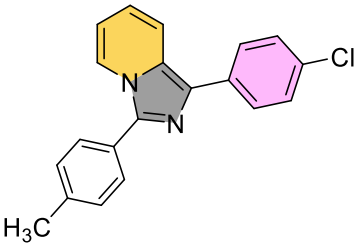
In a 30 mL glass vial, *(4-chlorophenyl)(pyridin-2-yl)methanone* (0.217 g, 1 mmol), *benzyl amine* (0.321 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3l***).

1-(4-Chlorophenyl)-3-phenylimidazo[1,5-a]pyridine (*Compound 3l*)[3]. LCMS 98.26%(254 nm) (ES^+) calcd for $C_{19}H_{13}ClN_2^+$, 304.07; found, 305.2 (MH^+). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.26 (*s, 1H*), 7.89 (*d, J = 5.4 Hz, 2H*), 7.82-7.84 (*m, 3H*), 7.56 (*s, 2H*), 7.45-7.48 (*m, 3H*), 6.83 (*s, 1H*), 6.61 (*s,1H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 138.32, 133.52, 132.10, 130.77, 129.99, 129.07, 128.97, 128.86, 128.33, 127.86, 127.75, 121.91, 120.14, 118.87. 113.31.



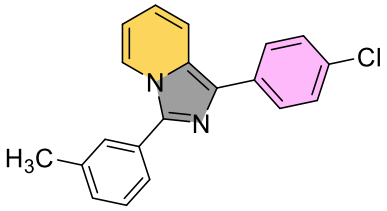
In a 30 mL glass vial, *(4-chlorophenyl)(pyridin-2-yl)methanone* (0.217 g, 1 mmol), *4-methoxy benzylamine* (0.411 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3m***).

1-(4-chlorophenyl)-3-(4-methoxyphenyl)imidazo[1,5-a]pyridine (*Compound 3m*). LCMS 97.25%(210 nm) (ES^+) calcd for $C_{20}H_{15}ClN_2O^+$, 334.08; found, 335.2 (MH^+). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.18 (*d, J = 7.2 Hz, 1H*), 7.89 (*d, J = 8.4 Hz, 2H*), 7.75-7.79 (*m, 3H*), 7.44 (*d, J = 8.4 Hz, 2H*), 7.08 (*d, J = 8.4 Hz, 2H*), 6.79-6.82 (*m, 1H*), 6.58 (*t, J = 7.2 Hz, 1H*), 3.90(*s, 3H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 160.17, 138.35, 133.63, 131.99, 130.42, 129.81, 128.84, 127.82, 127.46, 122.44, 121.90, 119.88, 118.84, 114.53, 113.10, 55.43.



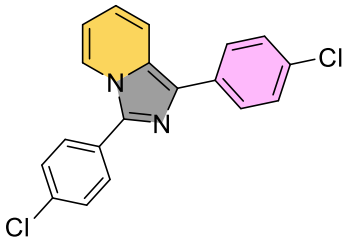
In a 30 mL glass vial, *(4-chlorophenyl)(pyridin-2-yl)methanone* (0.217 g, 1 mmol), *4-methyl benzylamine* (0.363 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3n***).

1-(4-chlorophenyl)-3-(p-tolyl)imidazo[1,5-a]pyridine (*Compound 3n*). LCMS 100%(210 nm) (ES+) calcd for $C_{20}H_{15}ClN_2^+$, 318.09; found, 319.2 (MH+). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.22 (*d, J = 7.2 Hz, 1H*), 7.89 (*d, J = 8.4 Hz, 2H*), 7.78 (*d, J = 9 Hz, 1H*), 7.72 (*d, J = 7.8 Hz, 2H*), 7.44 (*d, J = 8.4 Hz, 2H*), 7.36 (*d, J = 7.8 Hz, 2H*), 6.79-6.82 (*m, 1H*), 6.58 (*t, J = 7.2 Hz, 1H*), 2.46 (*s, 3H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 139.01, 138.50, 133.61, 132.01, 130.57, 129.74, 128.84, 128.24, 127.85, 127.62, 127.10, 121.99, 119.99, 118.83, 113.15, 21.44.



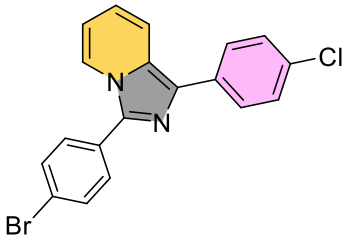
In a 30 mL glass vial, *(4-chlorophenyl)(pyridin-2-yl)methanone* (0.217 g, 1 mmol), *3-methyl benzyl amine* (0.363 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3o***).

1-(4-chlorophenyl)-3-(m-tolyl)imidazo[1,5-a]pyridine (*Compound 3o*). LCMS 100%(210 nm) (ES+) calcd for $C_{20}H_{15}ClN_2^+$, 318.09; found, 319.2 (MH+). **^{1}H NMR (600 MHz, $CDCl_3$)** δ 8.25 (*d, J = 6.6 Hz, 1H*), 7.89 (*d, J = 8.4 Hz, 2H*), 7.79 (*d, J = 9.0 Hz, 1H*), 7.67 (*s, 1H*), 7.62 (*d, J = 7.2 Hz, 1H*), 7.43-7.45 (*m, 3H*), 7.29 (*t, J = 7.2 Hz, 1H*), 6.81-6.84 (*m, 1H*), 6.60 (*t, J = 6.6 Hz, 1H*), 2.47 (*s, 3H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 138.98, 138.51, 133.55, 132.49, 132.06, 130.66,129.86, 129.21, 128.84, 127.87, 127.68, 125.12, 122.03, 120.07, 118.83, 113.20, 21.50.



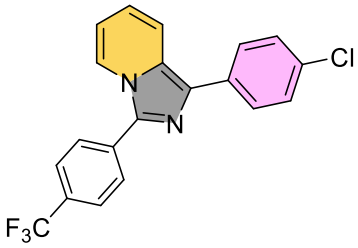
In a 30 mL glass vial, *(4-chlorophenyl)(pyridin-2-yl)methanone* (0.217 g, 1 mmol), *4-chloro benzyl amine* (0.424 g, 3 mmol), *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3p***).

1,3-bis(4-chlorophenyl)imidazo[1,5-a]pyridine (Compound 3p). LCMS 197.90%(254 nm) (ES+) calcd for $C_{19}H_{12}C_{l2}N_2^+$, 338.03; found, 339.2 (MH+). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.21 (*d, J = 7.2 Hz, 1H*), 7.87 (*d, J = 9.0 Hz, 2H*), 7.79-7.82 (*m, 3H*), 7.53 (*d, J = 8.4 Hz, 2H*), 7.45 (*d, J = 8.4 Hz, 2H*), 6.85-6.87 (*m,1H*), 6.65 (*t, J = 7.2 Hz, 1H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 137.12, 134.85, 133.31, 132.31, 131.09, 129.49, 129.35, 128.92, 128.49, 127.97, 127.88, 121.69, 120.30, 119.00, 113.68.



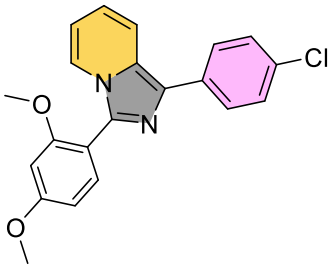
In a 30 mL glass vial, *(4-chlorophenyl)(pyridin-2-yl)methanone* (0.217 g, 1 mmol), *4-bromo benzyl amine* (0.558 g, 3 mmol) and *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3q***).

3-(4-bromophenyl)-1-(4-chlorophenyl)imidazo[1,5-a]pyridine (*Compound 3q*). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.21 (*d, J = 7.2 Hz, 1H*), 7.87 (*d, J = 8.4 Hz, 2H*), 7.81 (*d, J = 9.6 Hz, 1H*), 7.73 (*d, J=8.4 Hz,2H*), 7.69 (*d, J = 7.8 Hz, 2H*), 7.45 (*d, J =7.8 Hz, 2H*), 6.86 (*t, J = 7.2 Hz, 1H*), 6.64 (*t, J = 6.6 Hz, 1H*).**^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 137.14, 133.29, 132.29, 131.14, 129.69, 128.92, 128.02, 127.88, 123.02, 121.68, 120.33, 119.01, 113.73.



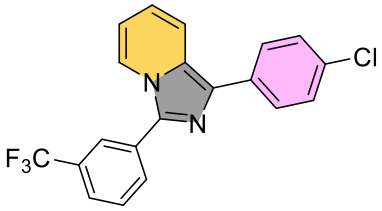
In a 30 mL glass vial, *(4-chlorophenyl)(pyridin-2-yl)methanone* (0.217 g, 1 mmol), *4-trifluoromethyl benzylamine* (0.525 g, 3 mmol) and *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3r***).

1-(4-chlorophenyl)-3-(4-(trifluoromethyl)phenyl)imidazo[1,5-a]pyridine(*Compound 3r*). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.28 (*d, J = 7.2 Hz, 1H*), 8.00 (*d, J = 7.8 Hz, 2H*), 7.88 (*d, J = 8.4 Hz, 2H*), 7.81-7.85 (*m, 3H*), 7.46 (*d, J = 7.8 Hz, 2H*), 6.89 (*t, J = 6.6 Hz, 1H*), 6.69 (*t, J = 6.6 Hz, 1H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 136.65, 133.51, 133.16, 132.47, 131.57, 130.55 (*q, J = 33.2 Hz*), 128.95, 128.36, 128.28, 127.92, 126.05 (*q, J = 3.9 Hz*), 123.97 (d, *J = 272.1 Hz*), 121.62, 120.64, 119.08, 114.03.



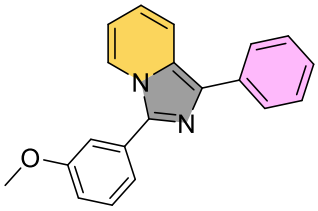
In a 30 mL glass vial, *(4-chlorophenyl)(pyridin-2-yl)methanone* (0.217 g, 1 mmol), *2,4-dimethoxy benzylamine* (0.501 g, 3 mmol) and *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*) (***Compound 3s***).

1-(4-chlorophenyl)-3-(2,4-dimethoxyphenyl)imidazo[1,5-a]pyridine (*Compound 3s*). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 7.90 (*d, J = 5.4 Hz, 2H*), 7.80 (*d, J = 7.8 Hz, 1H*), 7.59 (*s, 2H*), 7.43 (*s, 2H*), 6.83 (*s, 1H*), 6.68 (*d, J = 5.4 Hz, 1H*), 6.62 (*s, 1H*), 6.55 (*s, 1H*), 3.90 (*s, 3H*), 3.81 (*s, 3H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 162.28, 158.65, 136.42, 133.87, 133.48, 131.68, 129.97, 128.75, 127.75, 127.35, 123.58, 119.83, 118.30, 111.97, 105.36, 98.82, 55.58.



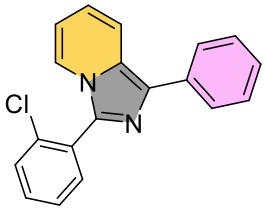
In a 30 mL glass vial, *(4-chlorophenyl)(pyridin-2-yl)methanone* (0.217 g, 1 mmol), *3-trifluoromethyl benzyl amine* (0.525 g, 3 mmol) and *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3t***).

1-(4-chlorophenyl)-3-(3-(trifluoromethyl)phenyl)imidazo[1,5-a]pyridine (*Compound 3t*). **^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 8.24 (*d, J = 7.2 Hz, 1H*), 8.14 (*s, 1H*), 8.05 (*d, J = 7.2 Hz, 1H*), 7.89 (*d, J = 8.4 Hz, 2H*), 7.84 (*d, J = 9 Hz, 1H*), 7.73 (*d, J = 7.8 Hz, 1H*), 7.69 (*t, J = 7.2 Hz, 1H*), 7.46 (*d, J = 8.4 Hz, 2H*), 6.88-6.90 (*m, 1H*), 6.69 (*t, J = 7.2 Hz, 1H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 136.63, 133.19, 132.44, 131.54 (*t, J = 32.6 Hz*), 131.24, 130.90, 129.63, 128.95, 128.20, 127.91, 126.60, 125.46 (*q, J = 3.9 Hz*), 125.07 (*q, J = 3.7 Hz*), 123.89 (*d, J = 272.7 Hz*), 121.47, 121.18, 120.55, 119.07, 114.02.



In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *3-methoxy benzylamine* (0.411 g, 3 mmol) and *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (**Compound 3u**).

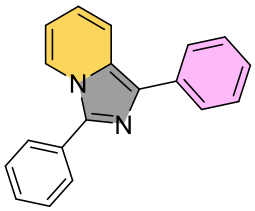
3-(2-methoxyphenyl)-1-phenylimidazo[1,5-a]pyridine (*Compound 3u*)[7]. LCMS 96.47%(254 nm) (ES+) calcd for $C_{20}H_{16}N_2O$+, 300.12; found, 301.2 (MH^+). ^{1}H NMR (*400 MHz, DMSO-d6*) δ 8.49 (*d, J = 7.2 Hz, 1H*), 8.01 (*d, J = 9.6 Hz, 1H*), 7.95 (*d, J = 7.6 Hz, 2H*), 7.51-7.44 (*m, 4H*), 7.39 (*s, 1H*), 7.30 (*t, J = 7.6 Hz, 1H*), 7.09 (*d, J = 7.2 Hz, 1H*), 6.98 (*t, J = 6.0 Hz, 1H*), 6.79 (*d, J = 6.8 Hz, 1H*), 3.86 (*s, 3H*).**^{13}C NMR (*100 MHz, $CDCl_3$*)** δ 160.14137.96, 134.88, 131.93, 131.33, 130.04, 128.76, 127.76, 126.87, 126.62, 121.97, 120.42, 119.81, 119.18, 114.98, 113.78, 113.32, 55.51.



In a 30 mL glass vial, *phenyl(pyridin-2-yl)methanone* (0.183 g, 1 mmol), *2-chloro benzylamine* (0.424 g, 3 mmol) and *g-C_3N_4* (50 mg) were added at room temperature (RT). The reaction mixture (RM) was stirred under visible light irradiation (60 W) for 10 h. After the reaction completion, the resulting reaction mass was extracted with EtOAc (3×10 mL) and dried with sodium sulphate. The obtained filtrate was concentrated under reduced pressure. The obtained crude material was further purified by column chromatography (90-10% hexane:ethyl acetate) to afford the desired product (*Yellow solid*). (***Compound 3v***).

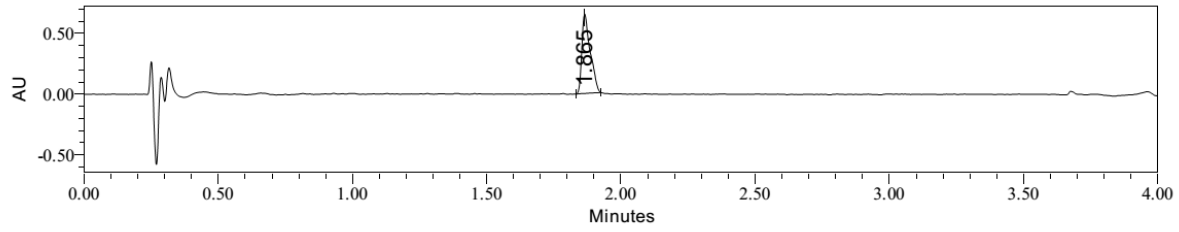
3-(2-chlorophenyl)-1-phenylimidazo[1,5-a]pyridine (Compound 3v)[7]**. ^{1}H NMR (*600 MHz, $CDCl_3$*)** δ 7.98 (*d, J = 5.2 Hz, 2H*), 7.91 (*d, J = 9 Hz, 1H*), 7.70 (*d, J = 6.6 Hz, 1H*), 7.62 (*d, J = 7.2 Hz, 1H*), 7.58 (*d, J = 7.2 Hz, 1H*), 7.44-7.50 (*m, 4H*), 7.32 (*t, J = 7.2 Hz, 1H*), 6.87 (*t, J = 7.2 Hz, 1H*), 6.63 (*t, J = 6.6 Hz, 1H*). **^{13}C NMR (*151 MHz, $CDCl_3$*)** δ 135.71, 134.92, 134.40, 133.40, 132.93, 131.65, 130.98, 130.86, 129.96, 129.35, 128.72, 128.17, 127.29, 127.27, 126.76, 126.53, 124.63, 122.62, 119.94, 118.89, 112.86.

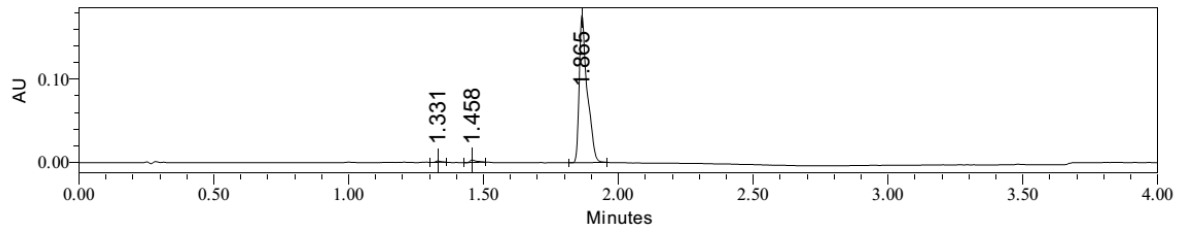
Copies of LC-MS, ^{1}H NMR and ^{13}C NMR



Compound (3a)

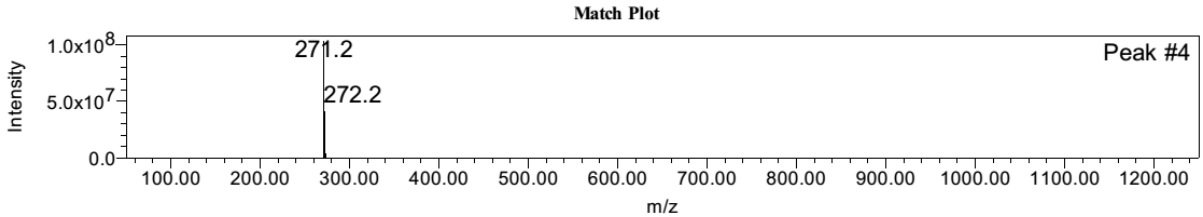
LC-MS of Compound 3a





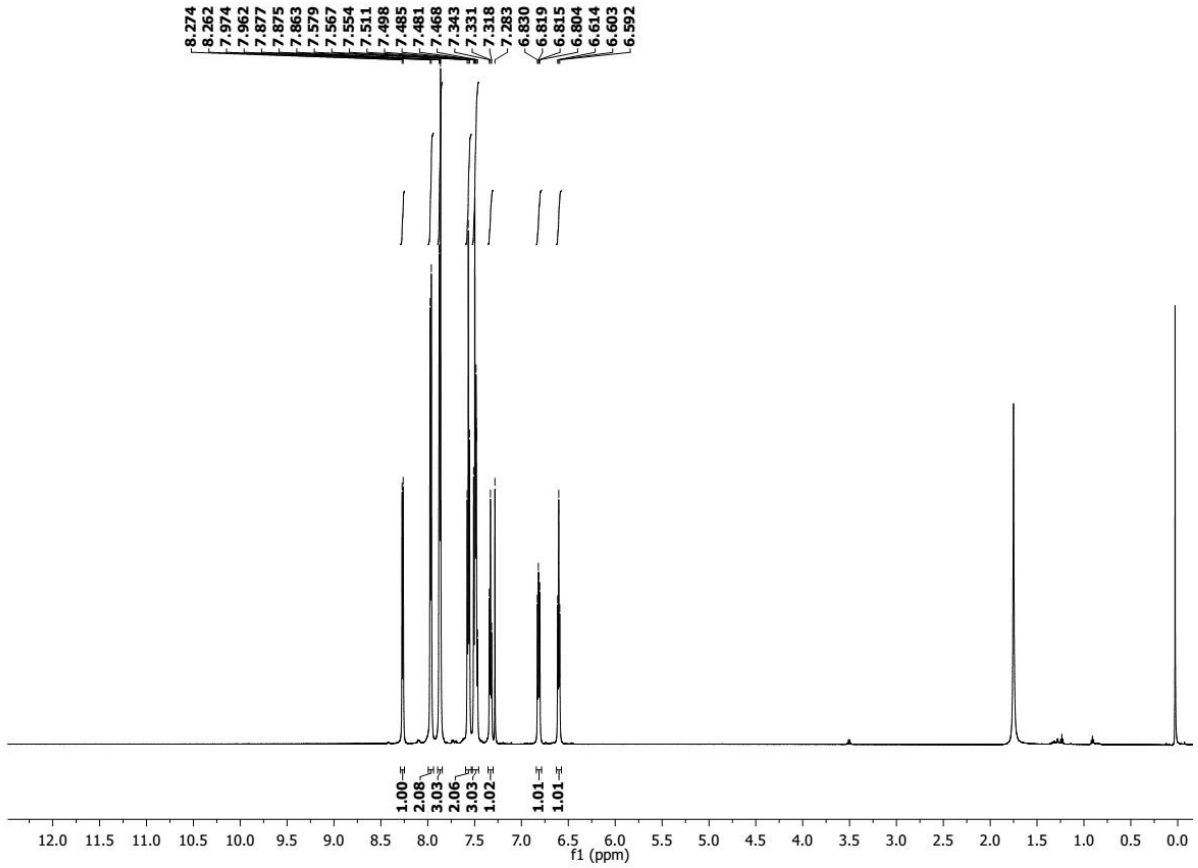
Peak Results
Channel: PDA Spectrum

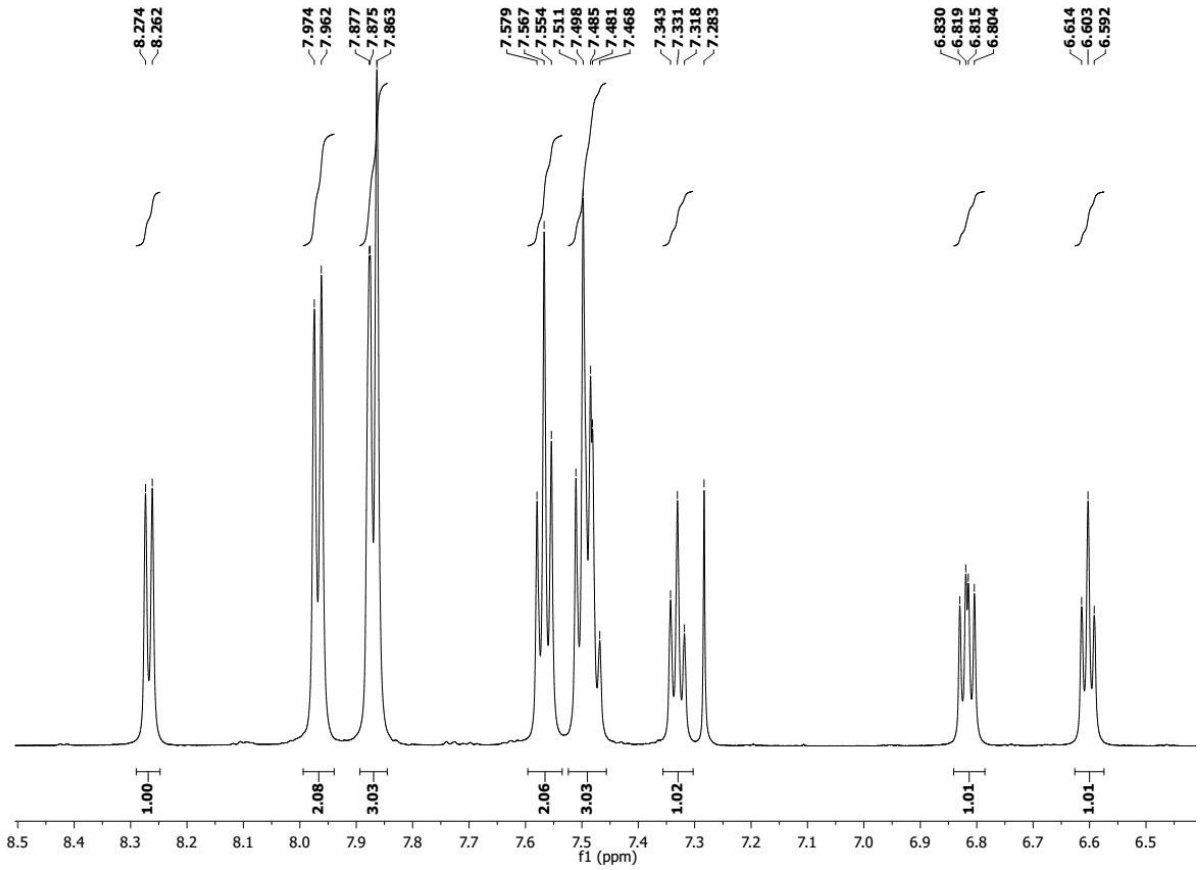
	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	1.331		1624	2266	0.61	PDA Spectrum	254.0nm
2	1.458		3019	5248	1.41	PDA Spectrum	254.0nm
3	1.865		653321	1419185	100.00	PDA Spectrum	210.0nm
4	1.865		176653	363634	97.98	PDA Spectrum	254.0nm



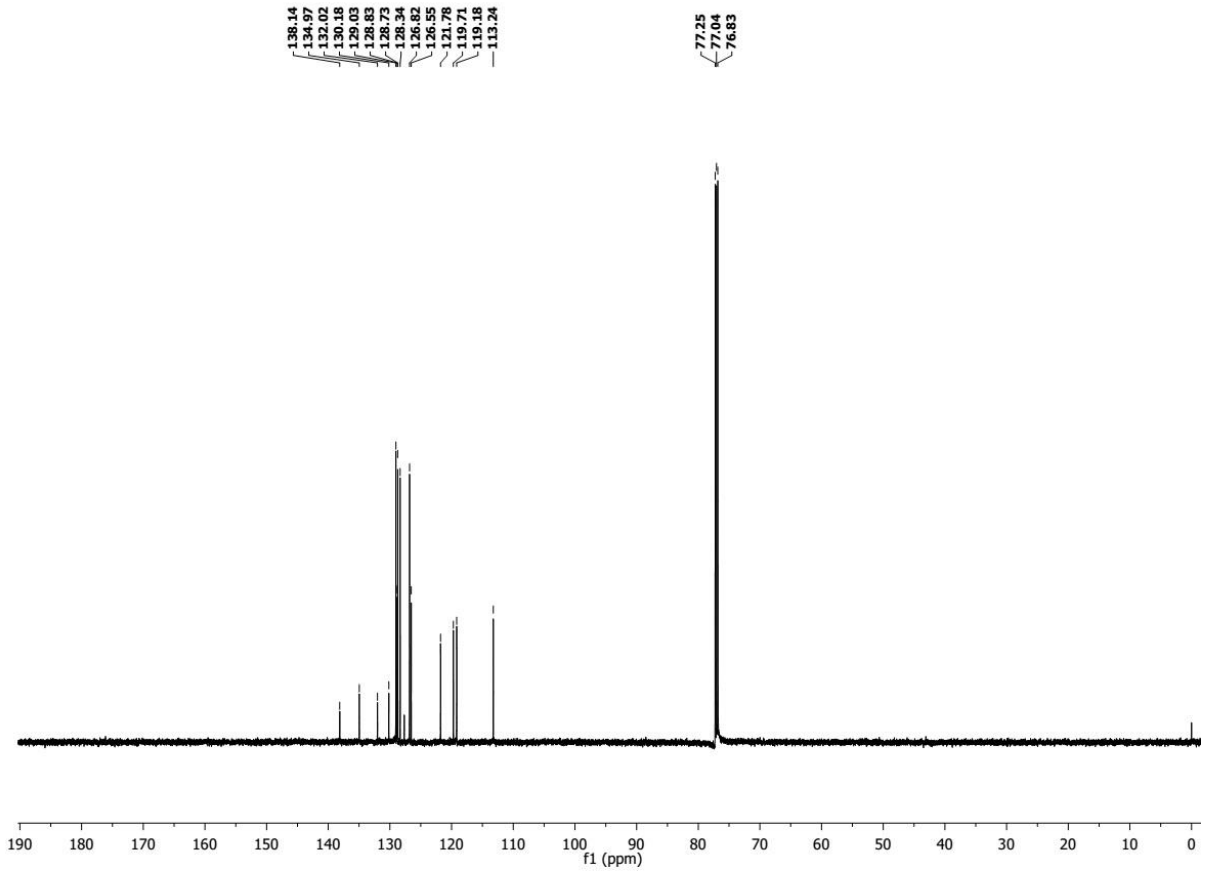
Base Peak 271.19 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (1.6:1.7;2.2:3.8;0.2:1.2) x 20.000 Th: 0.010 Retention Time 1.889

^{1}H NMR of Compound 3a





^{13}C NMR of Compound 3a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129.03
128.83
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126.55
121.78
119.71
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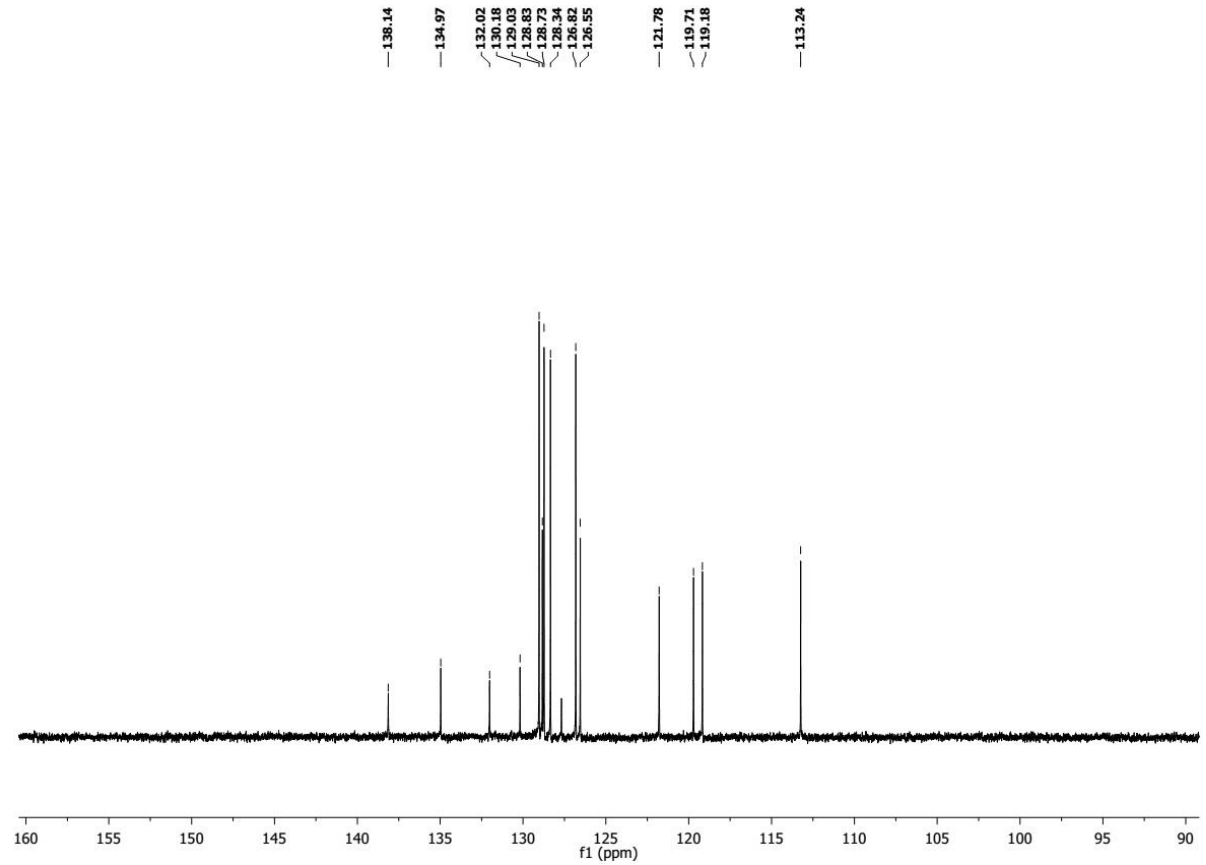
113.24
77.25
77.04
76.83
f1 (ppm)


138.14
134.97
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130.18
129.03
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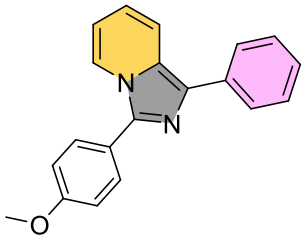
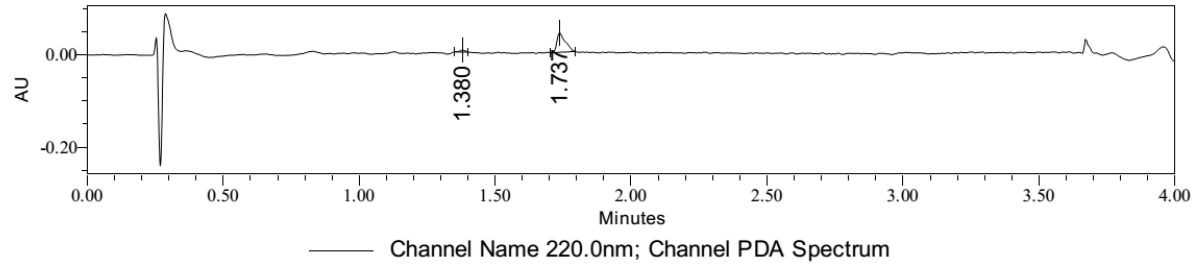
113.24
f1 (ppm)



Compound (3b)

LC-MS analysis of Compound 3b



Peak Results
Channel: PDA Spectrum

	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
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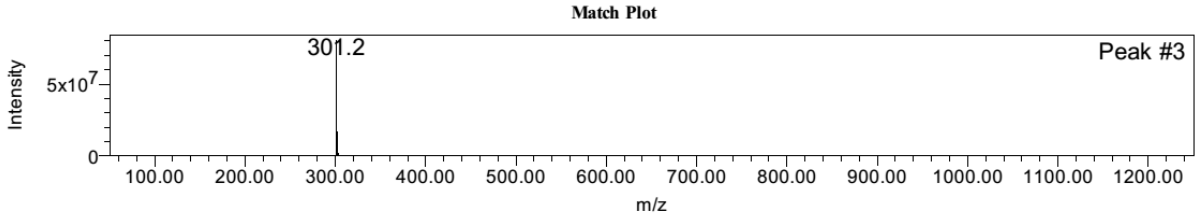
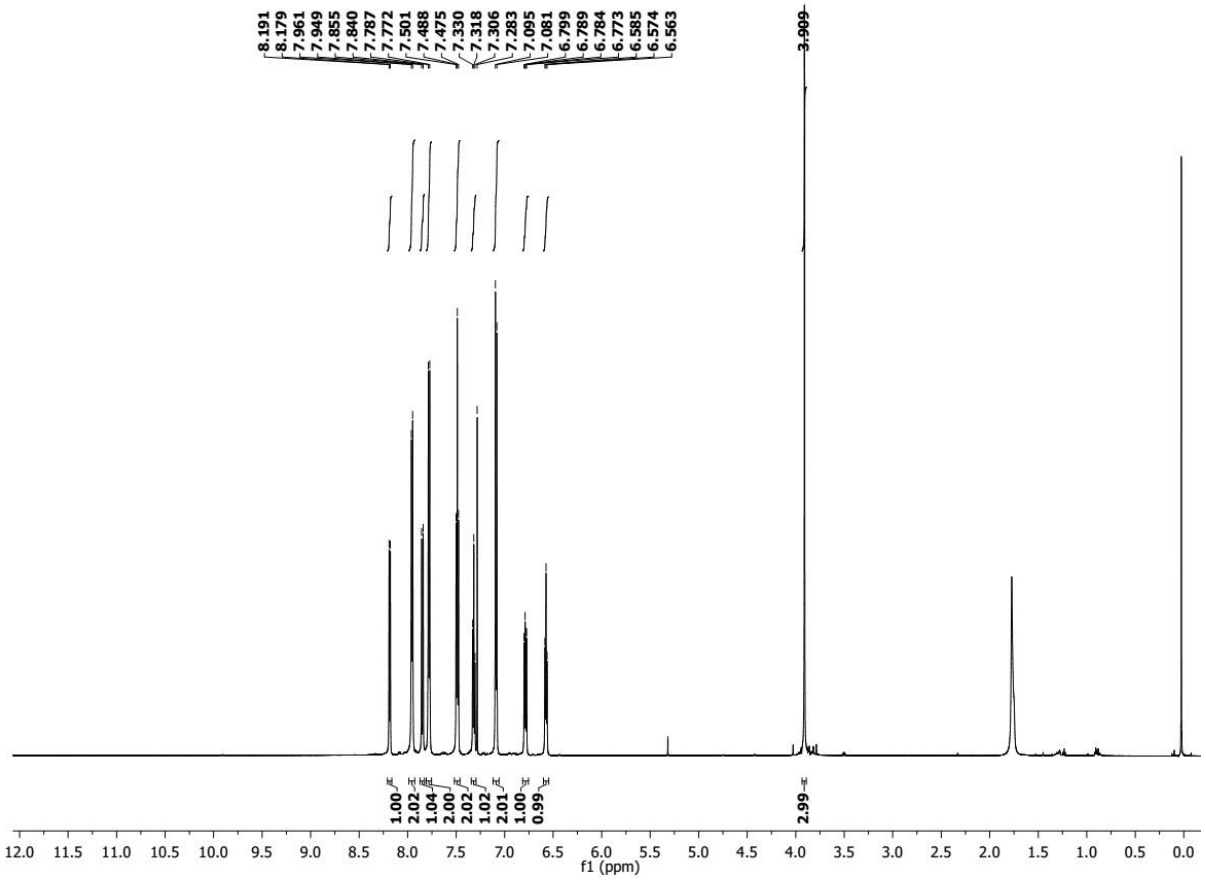
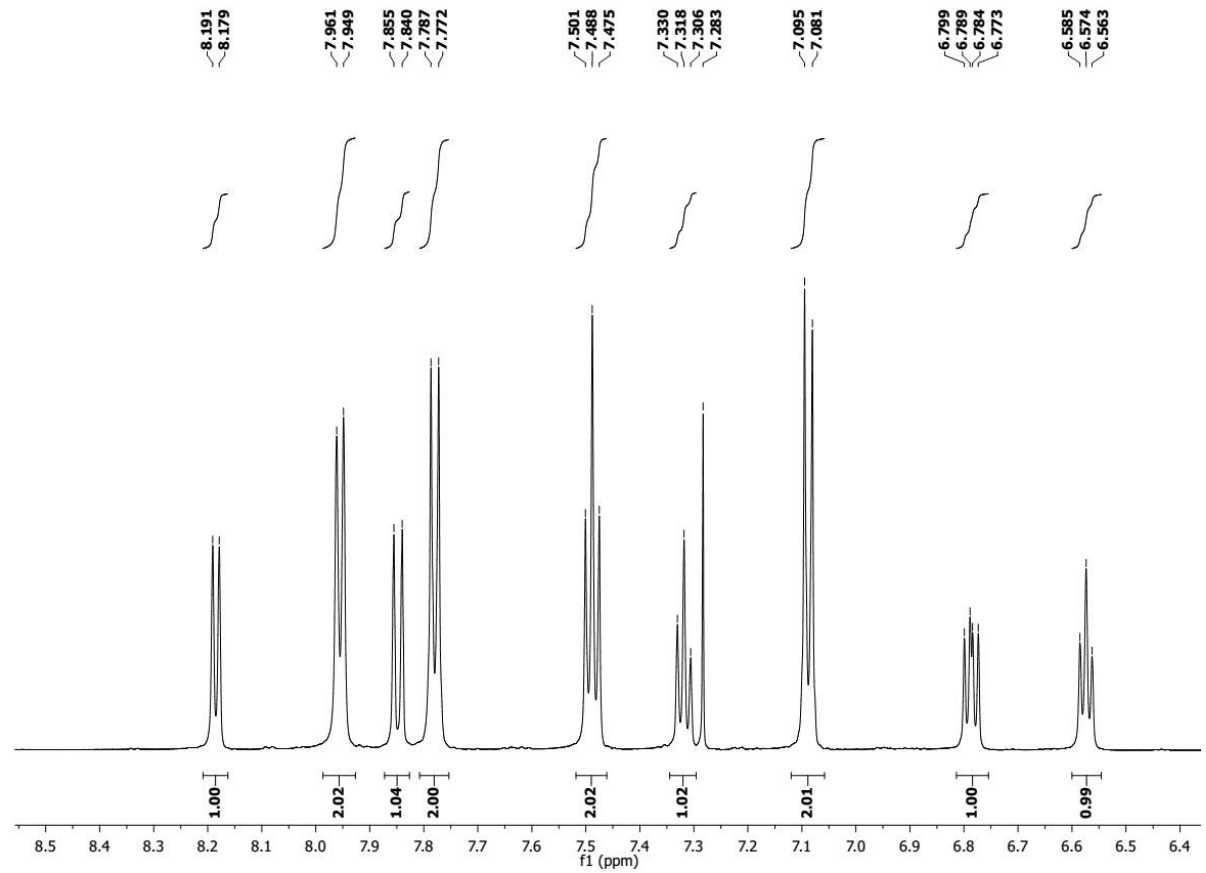
2	1.737		42212	90240	93.66	PDA Spectrum	220.0nm

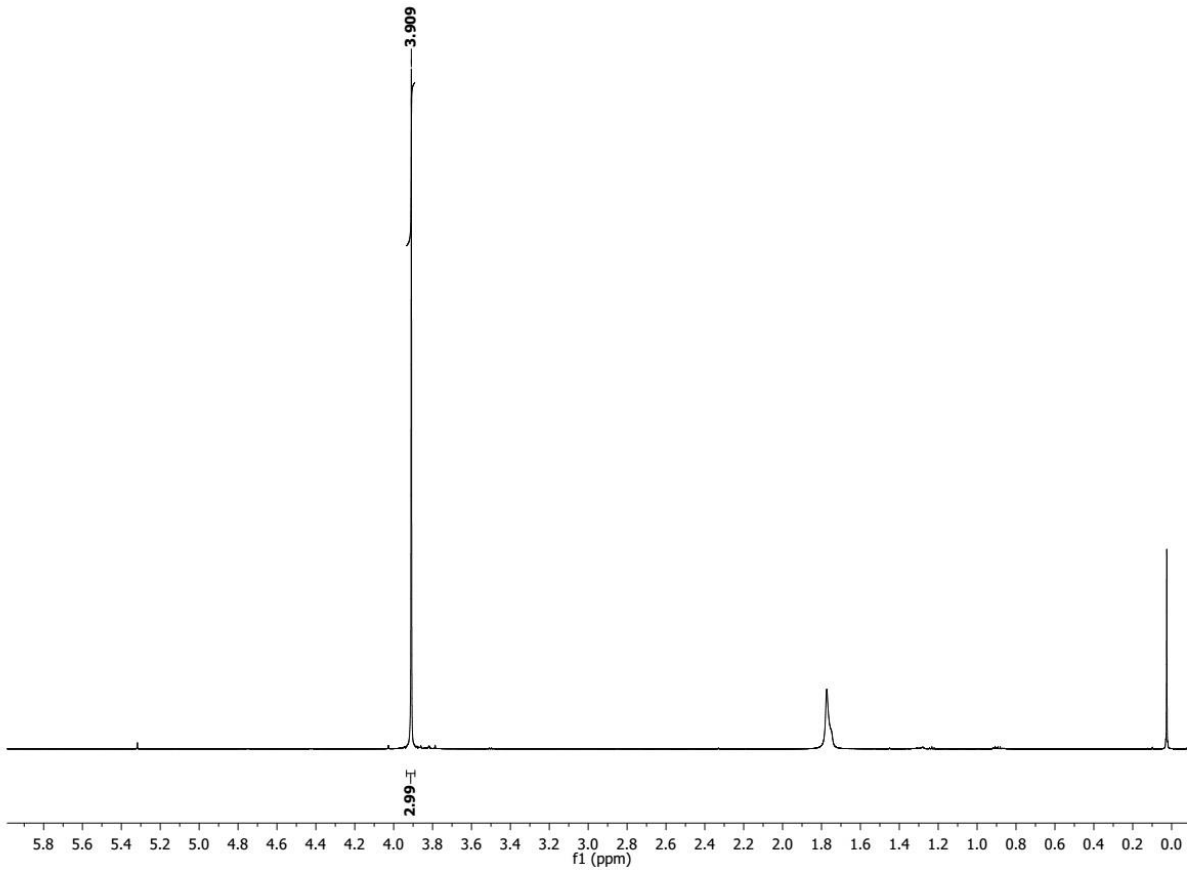


Base Peak 301.18 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (0.1:1.5;1.9:3.8) x 20.000 Th: 0.010 Retention Time 1.766

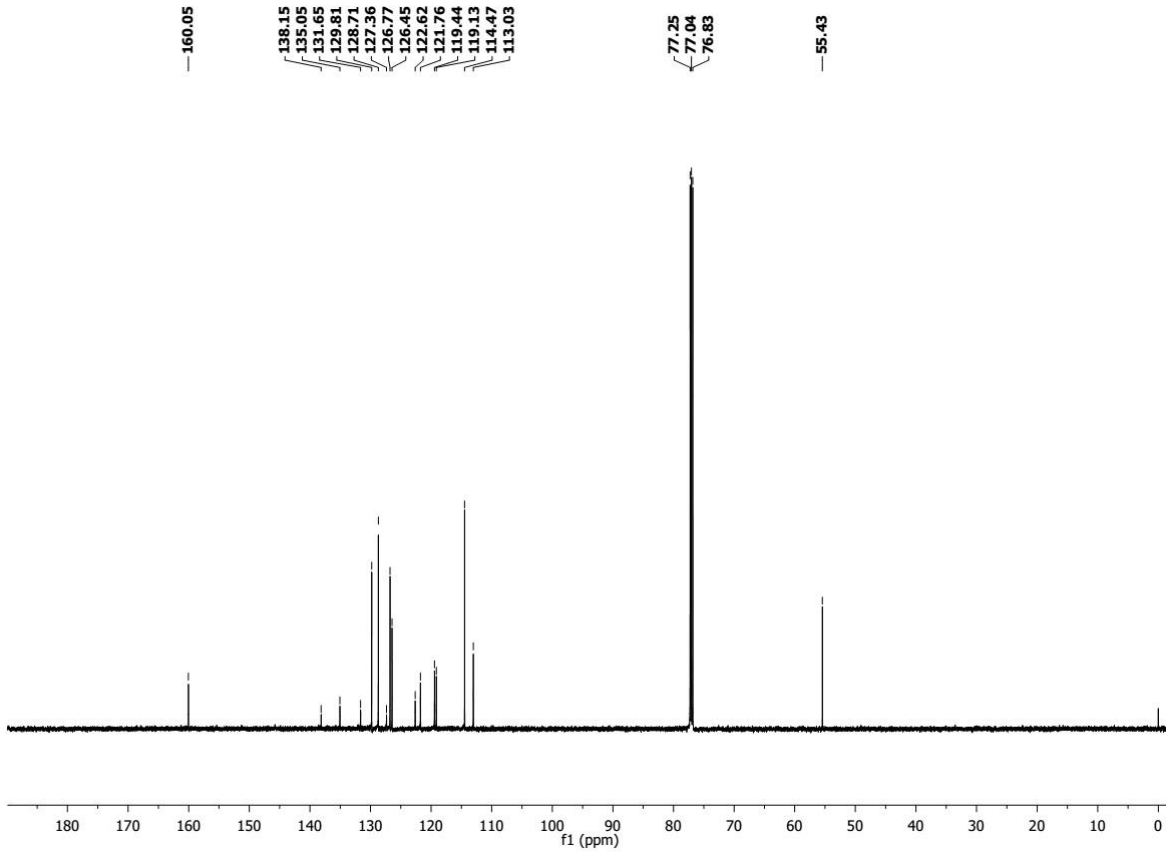
^{1}H NMR of Compound 3b

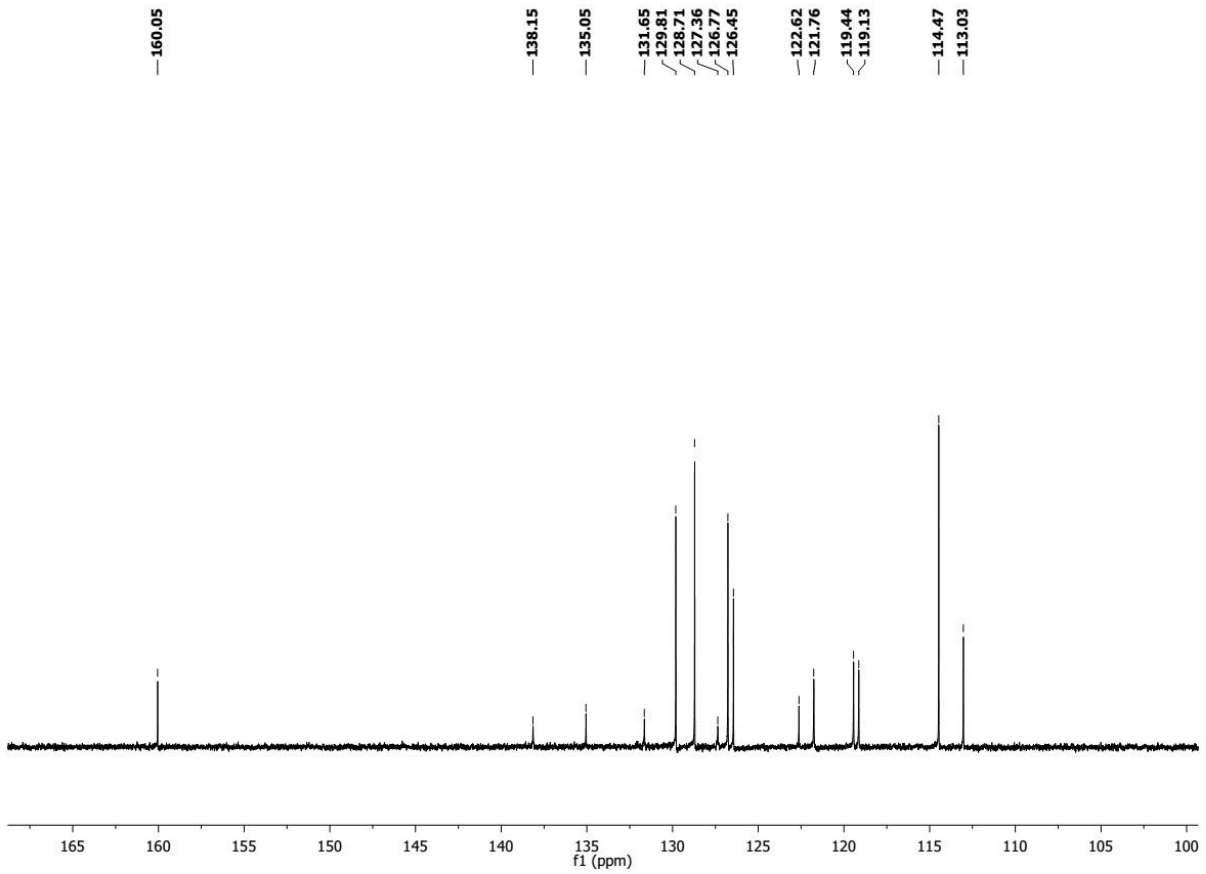






^{13}C NMR of Compound 3b




160.05
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135.05
131.65
129.81
128.71
127.36
126.77
126.45
122.62
121.76
119.44
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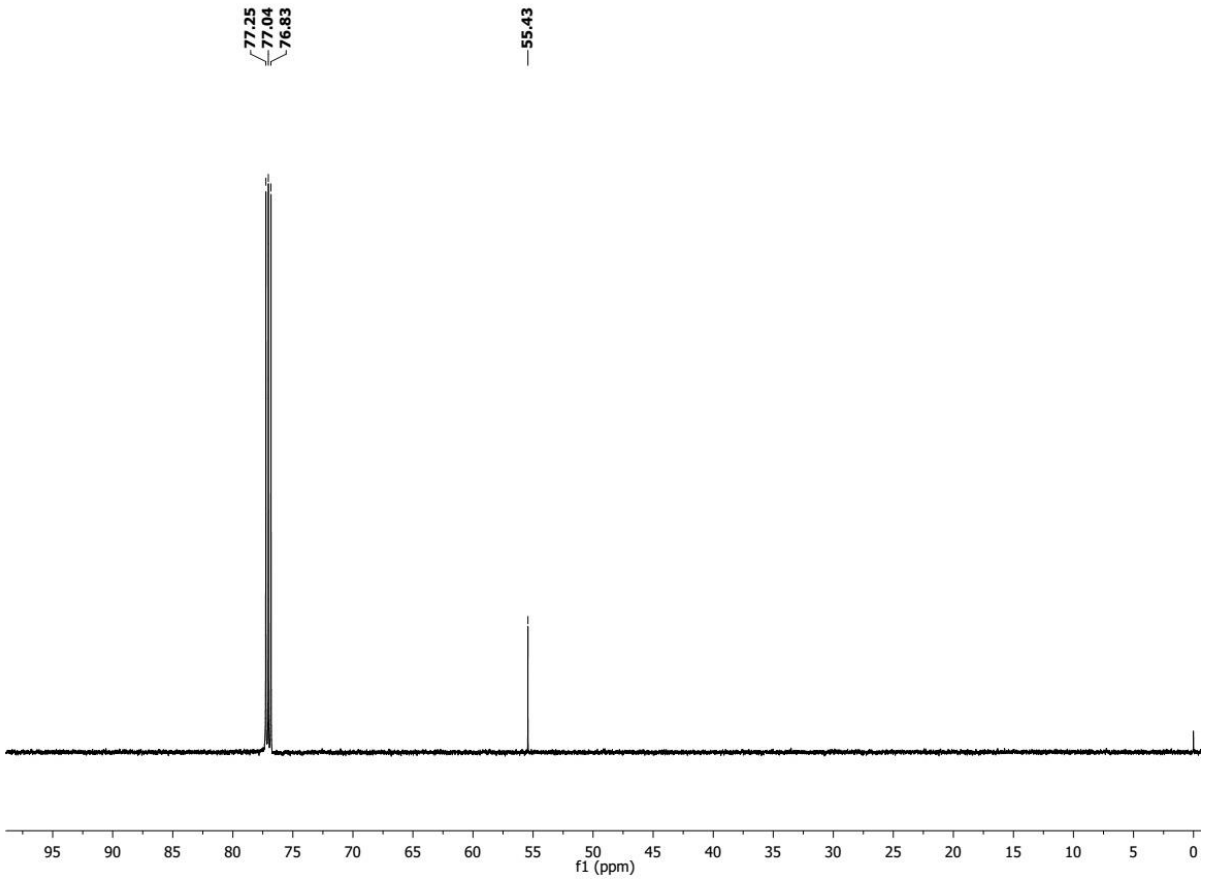
f1 (ppm)


77.25
77.04
76.83
55.43
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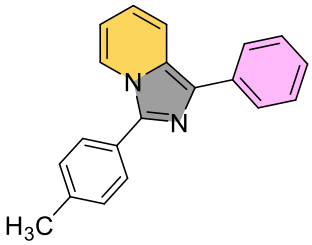
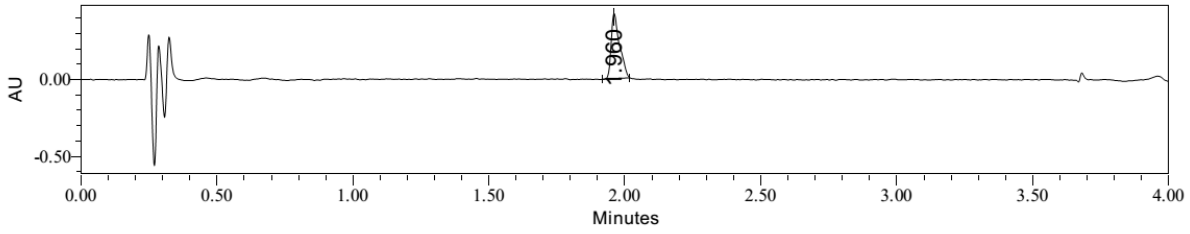
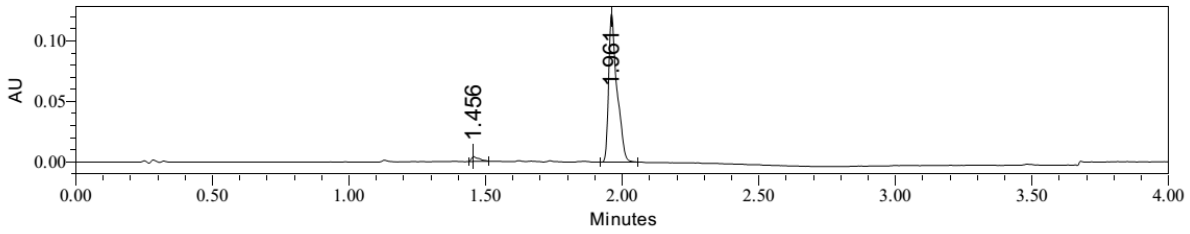
f1 (ppm)



Compound (3c)

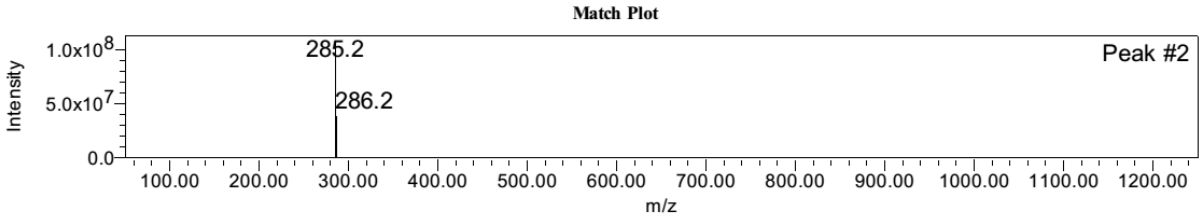
LC-MS analysis of Compound 3c





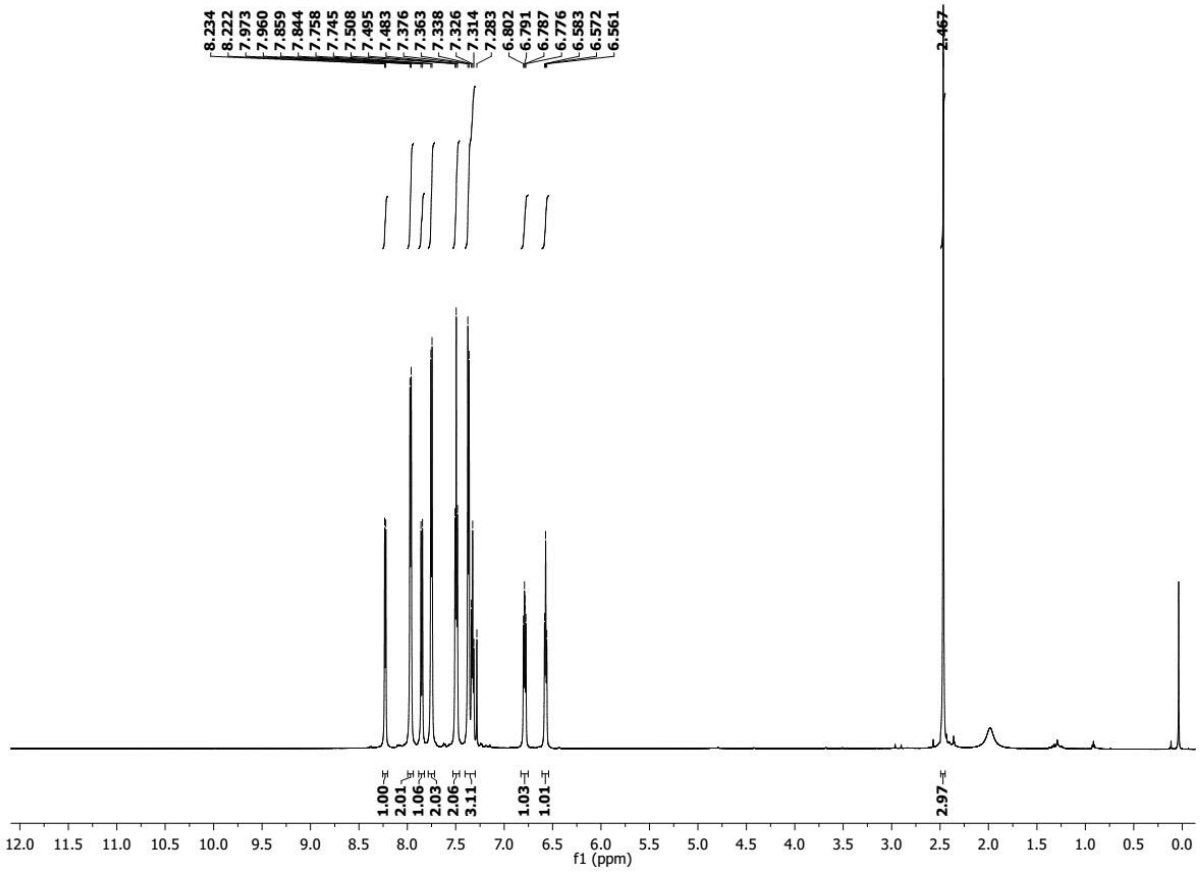
Peak Results
Channel: PDA Spectrum

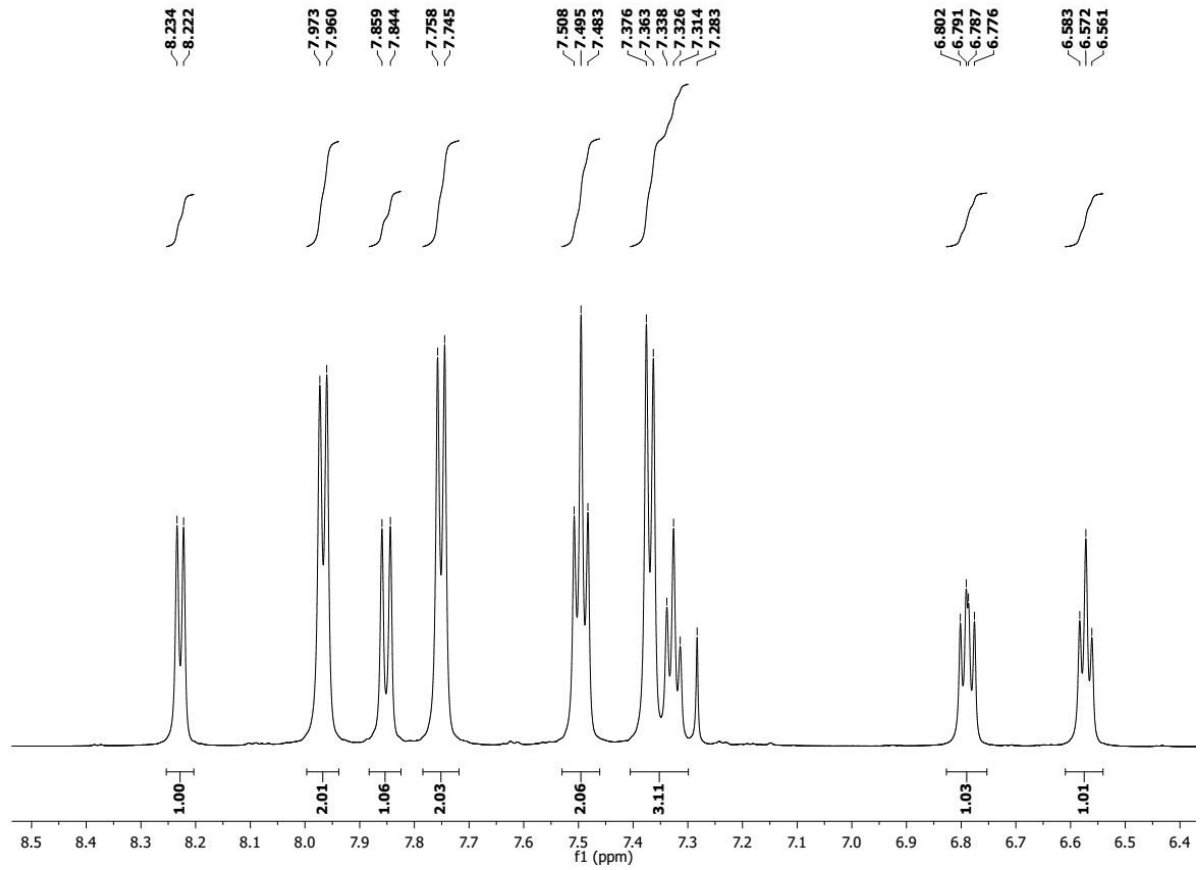
	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	1.456		3931	7630	2.86	PDA Spectrum	254.0nm
2	1.960		424520	902743	100.00	PDA Spectrum	210.0nm
3	1.961		122448	259546	97.14	PDA Spectrum	254.0nm

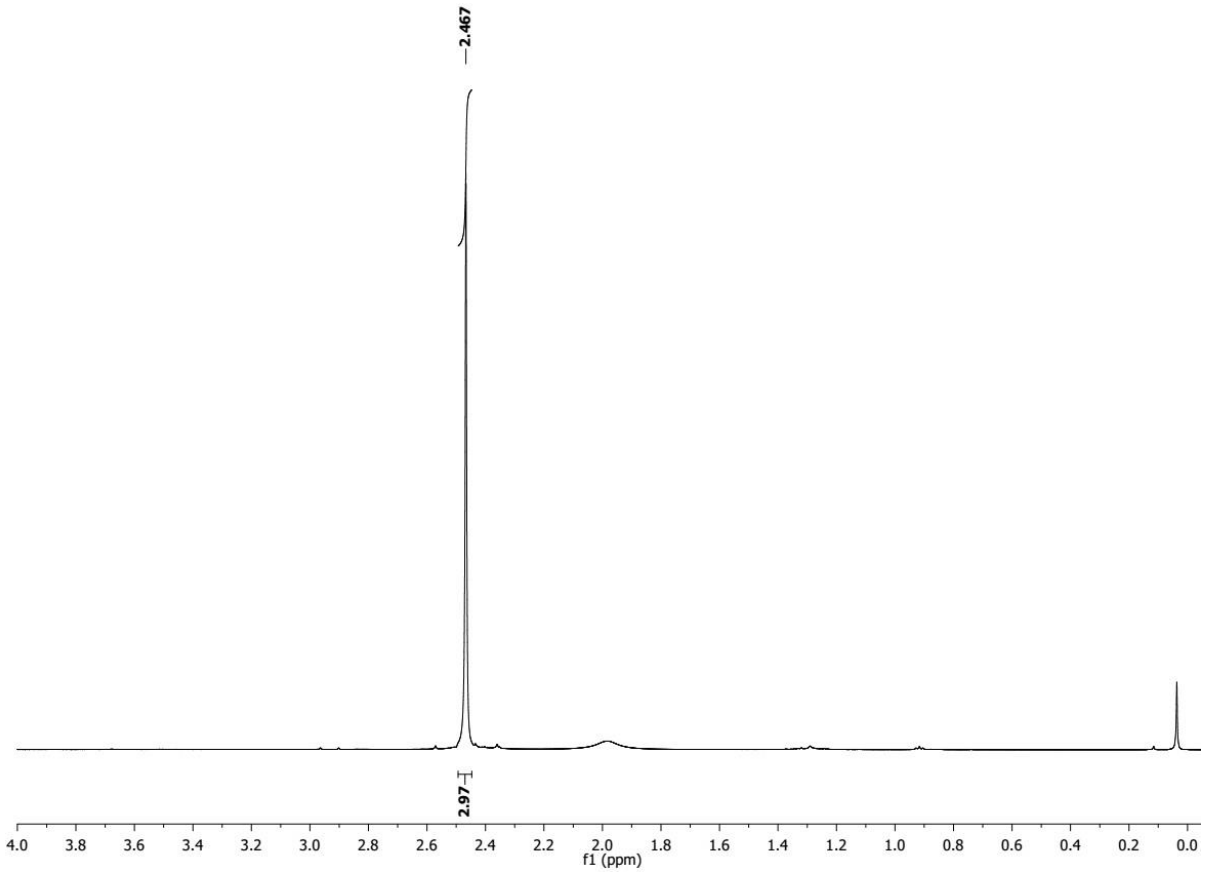


Base Peak 285.21 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (1.6:1.8;0.5:1.3;2.2:3.8) x 20.000 Th: 0.010 Retention Time 1.990

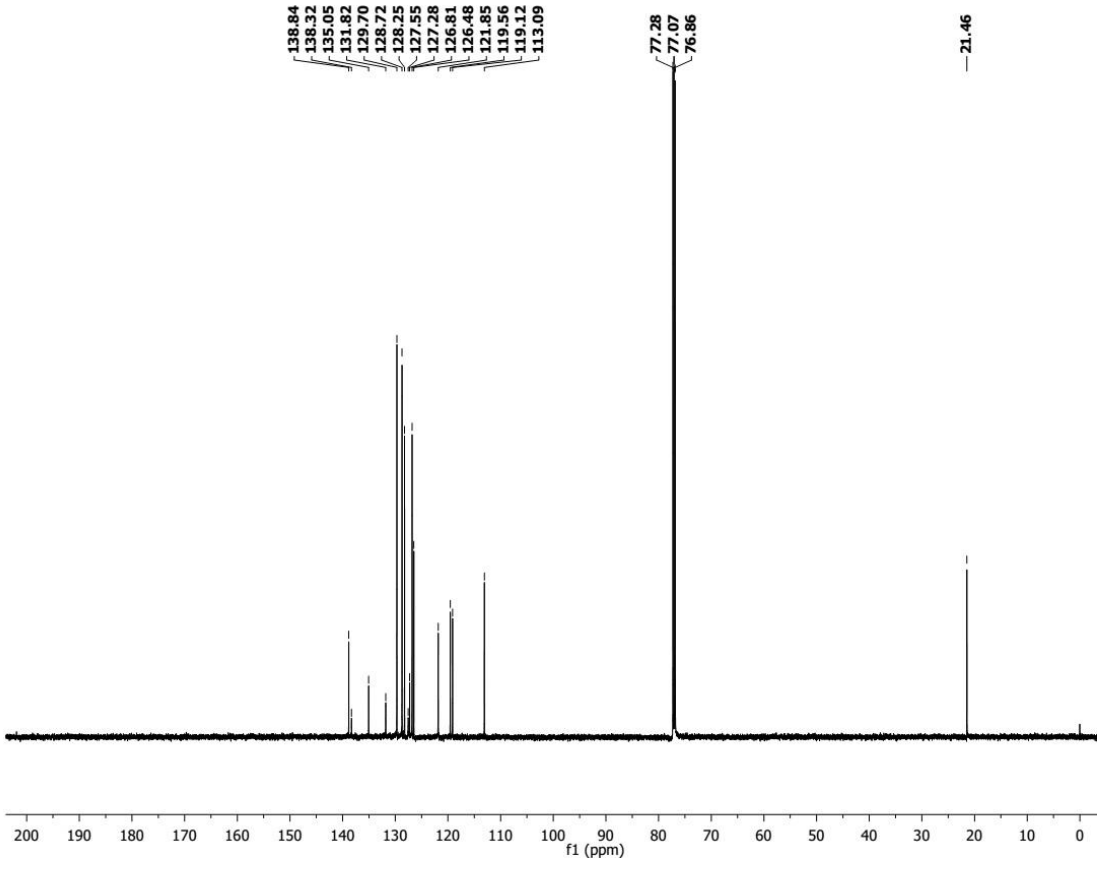
^{1}H NMR of Compound 3c

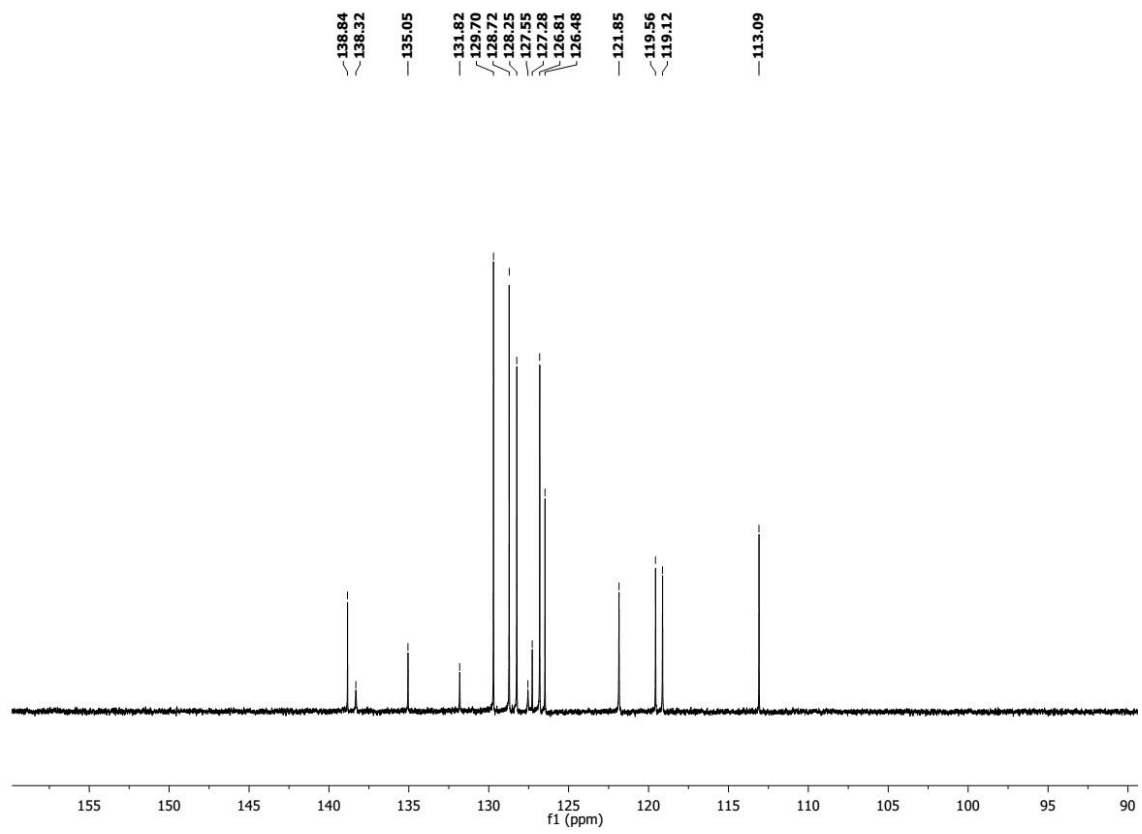


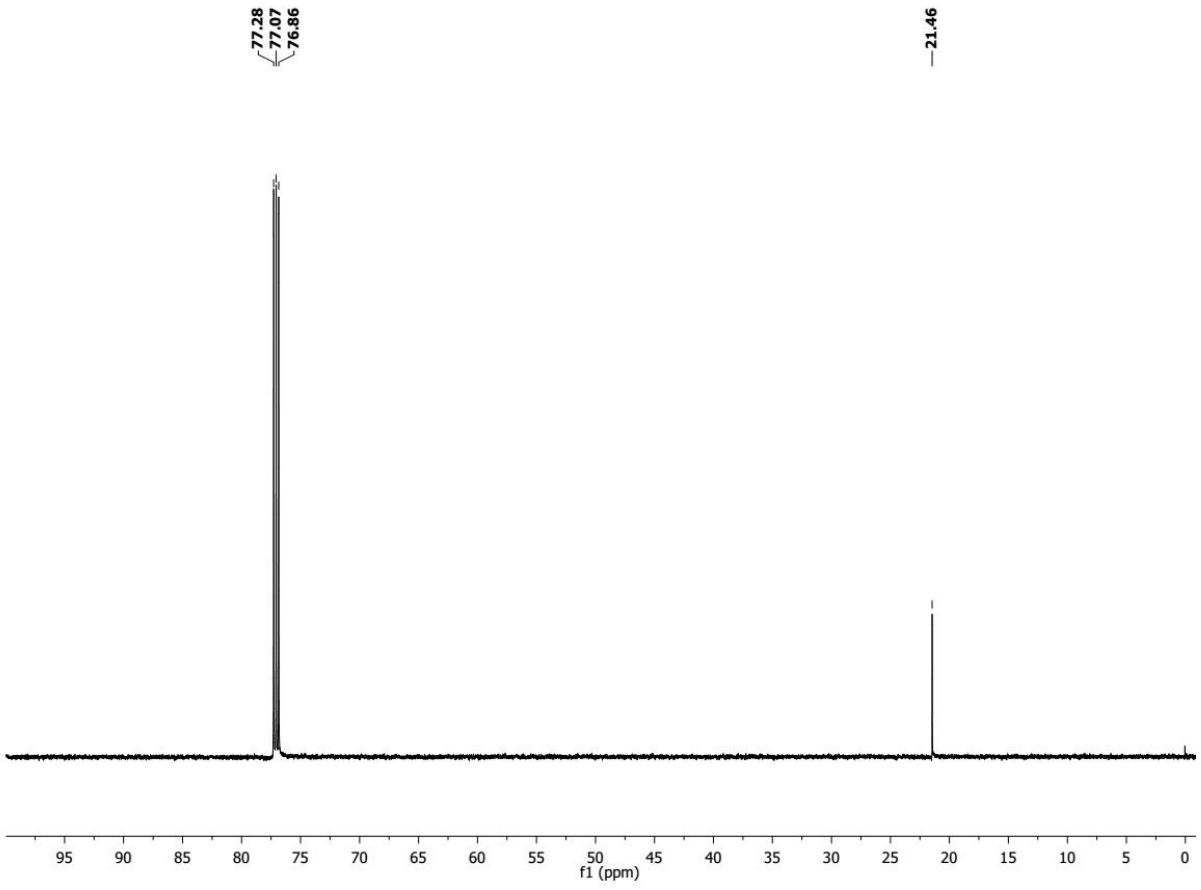


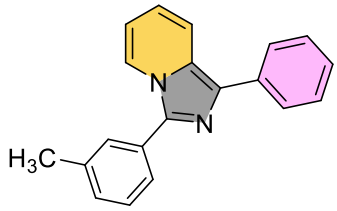


^{13}C NMR of Compound 3c



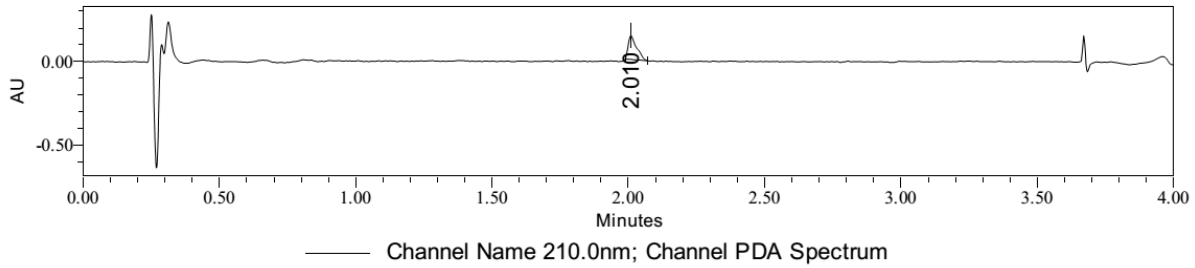

138.84
138.32
135.05
131.82
129.70
128.72
128.25
127.55
127.28
126.81
126.48
121.85
119.56
119.12
113.09
155 150 145 140 135 130 125 120 115 110 105 100 95 90
f1 (ppm)


77.28
77.07
76.86
21.46
95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0
f1 (ppm)



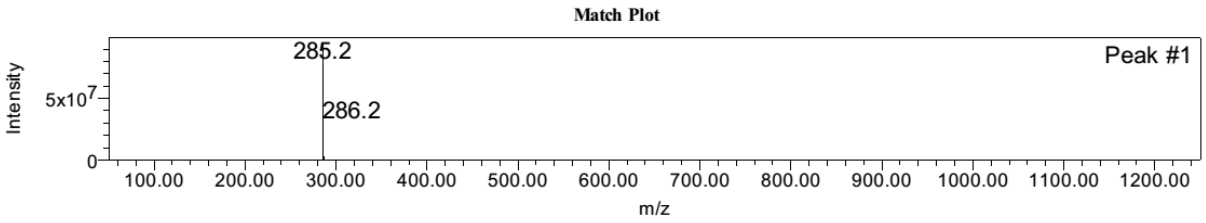
Compound (3d)

LC-MS analysis of Compound 3d



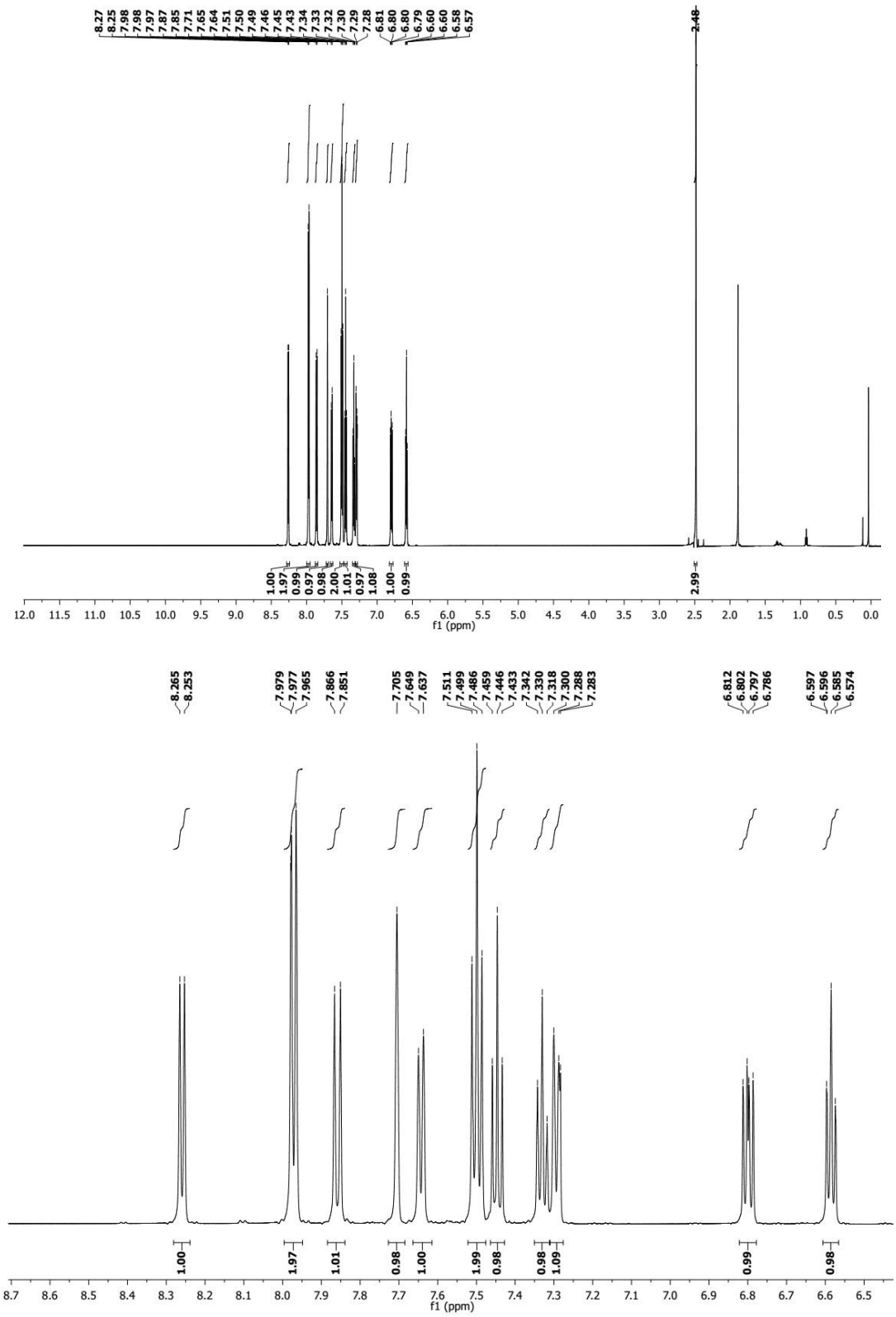
Peak Results
Channel: PDA Spectrum

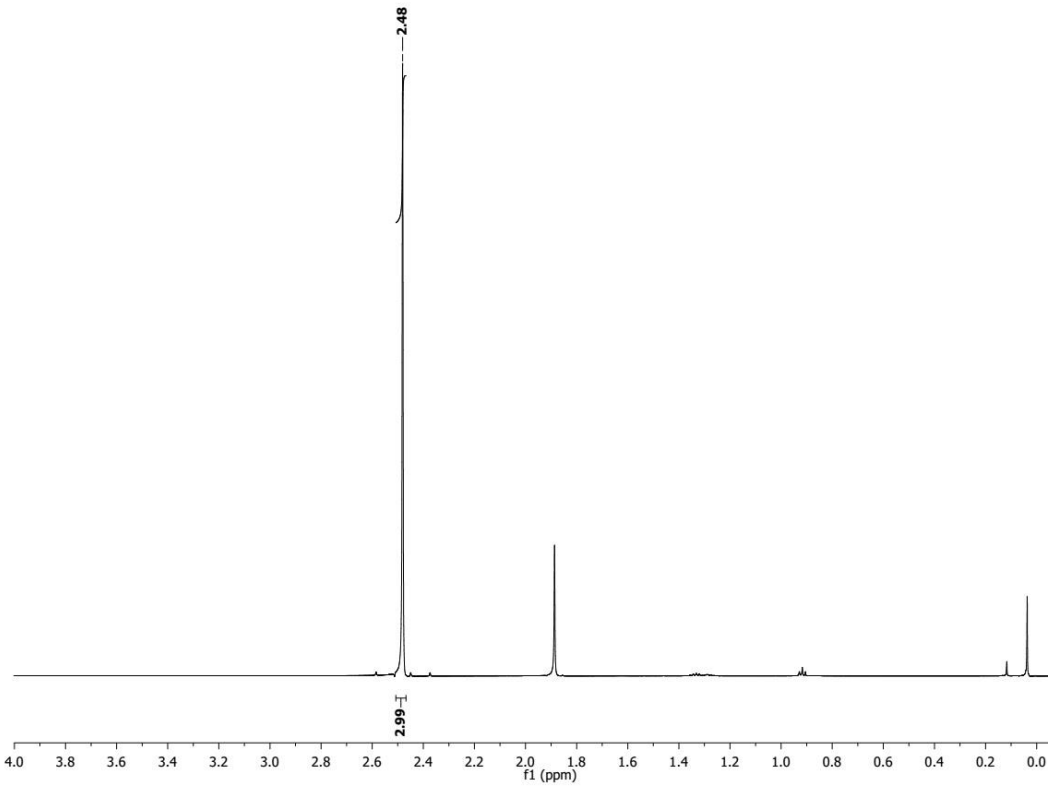
	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	2.010		141643	302143	100.00	PDA Spectrum	210.0nm



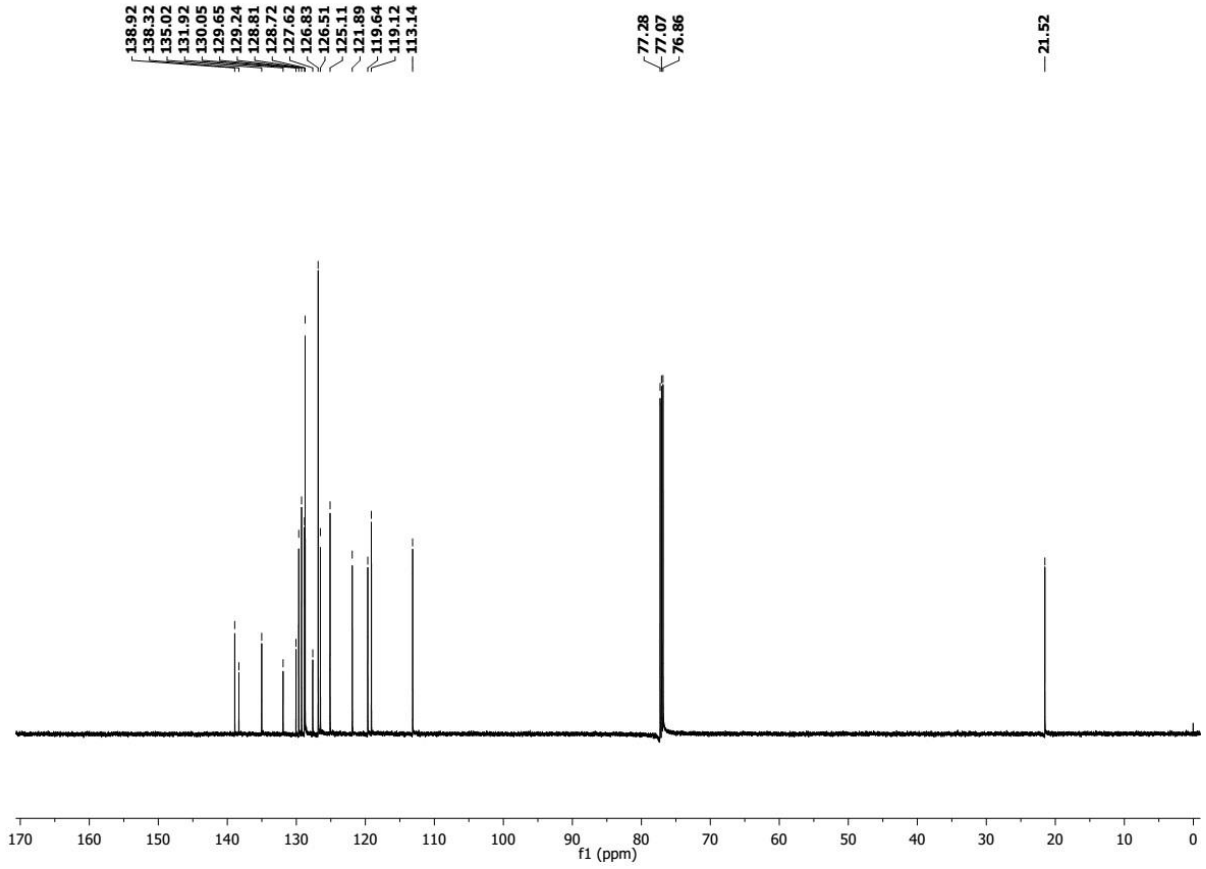
Base Peak 285.18 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (0.0:1.9;2.2:3.8) x 20.000 Th: 0.010 Retention Time 2.039

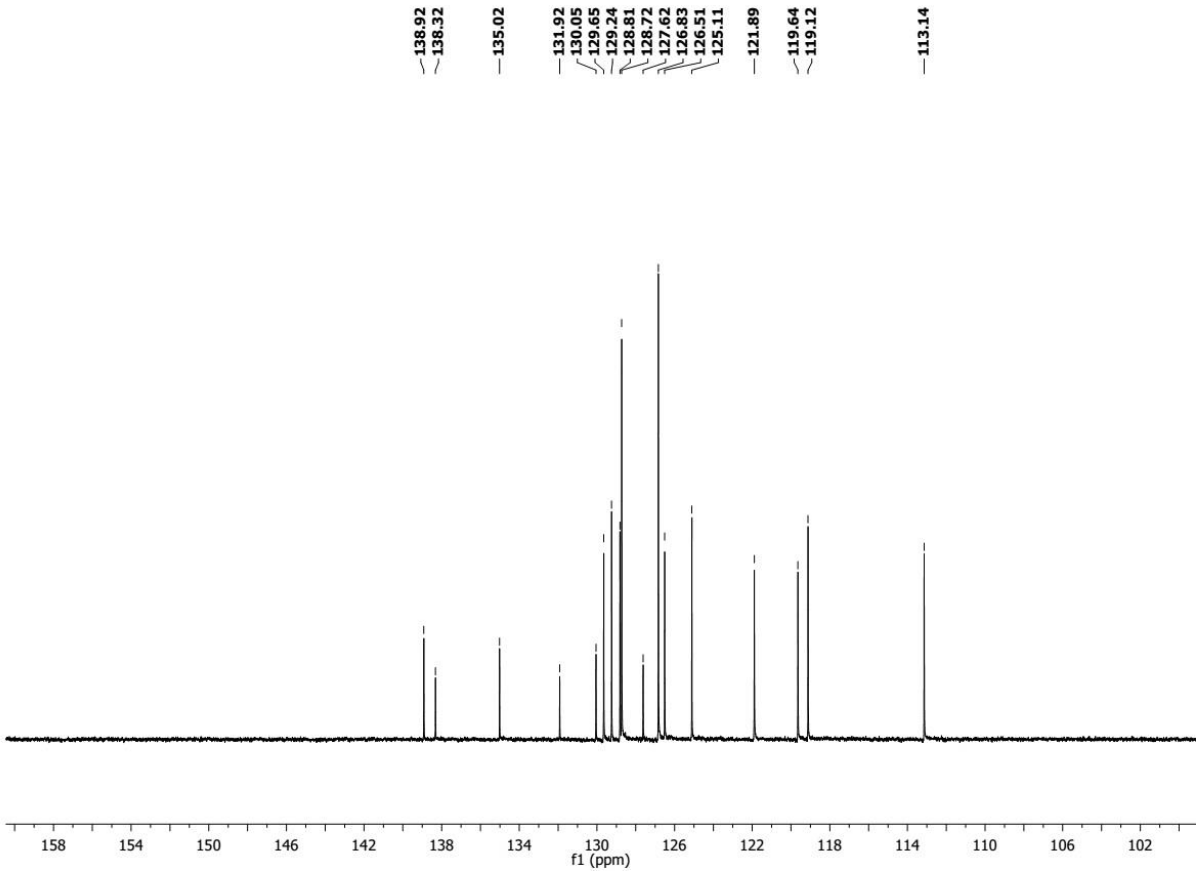
^{1}H NMR of Compound 3d

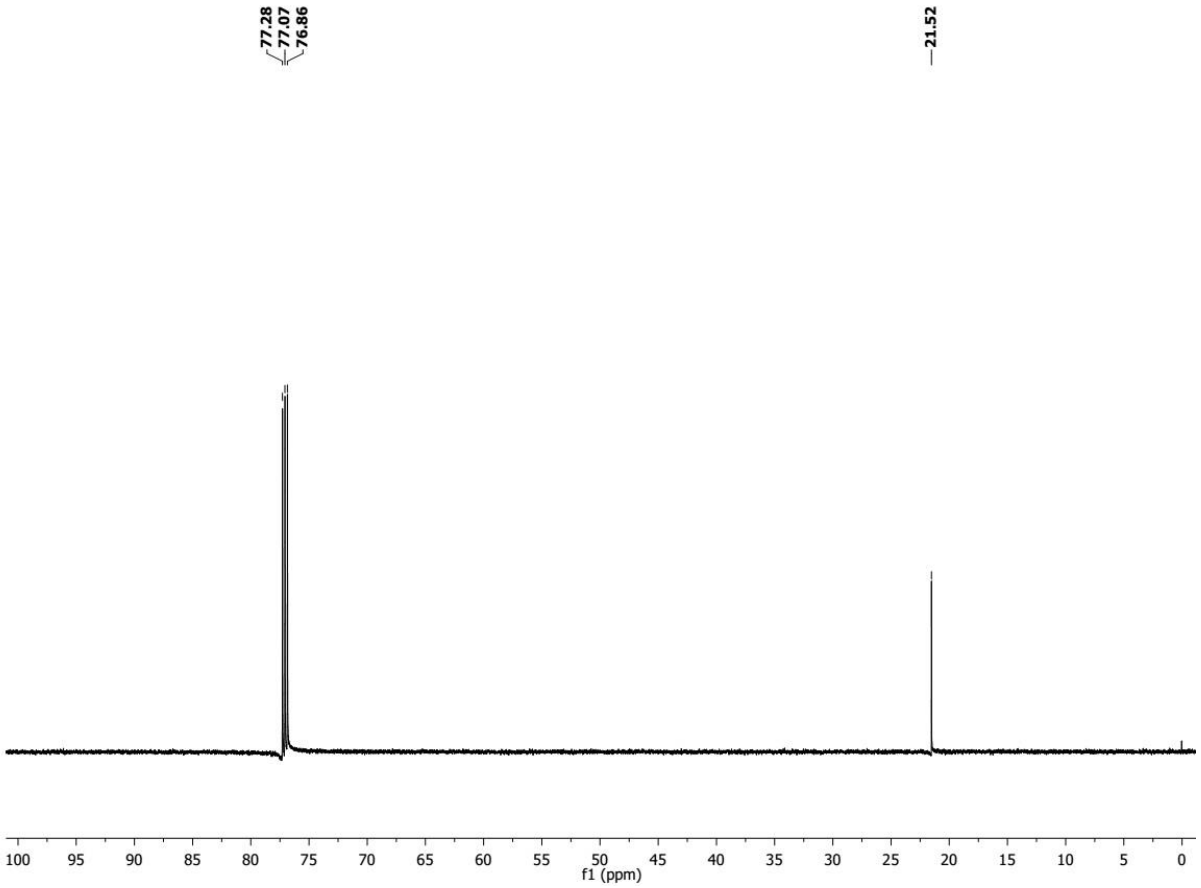


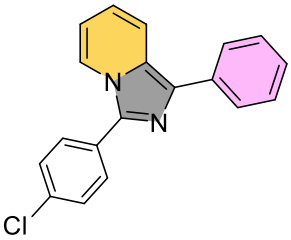


^{13}C NMR of Compound 3d



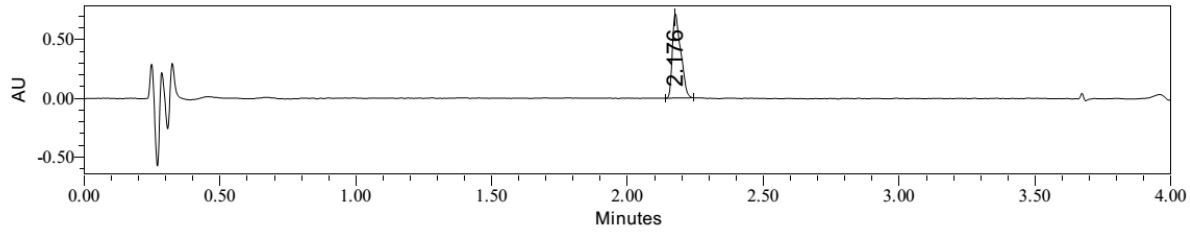

138.92
138.32
135.02
131.92
130.05
129.65
129.24
128.81
128.72
127.62
126.83
126.51
125.11
121.89
119.64
119.12
113.14
158
154
150
146
142
138
134
130
126
122
118
114
110
106
102
f1 (ppm)

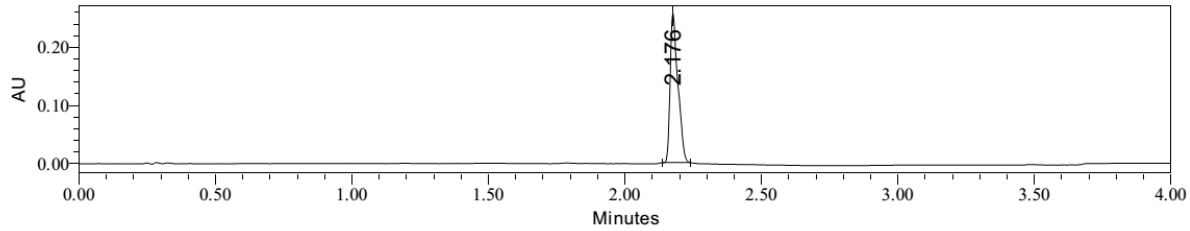

77.28
77.07
76.86
21.52
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
f1 (ppm)



Compound (3e)

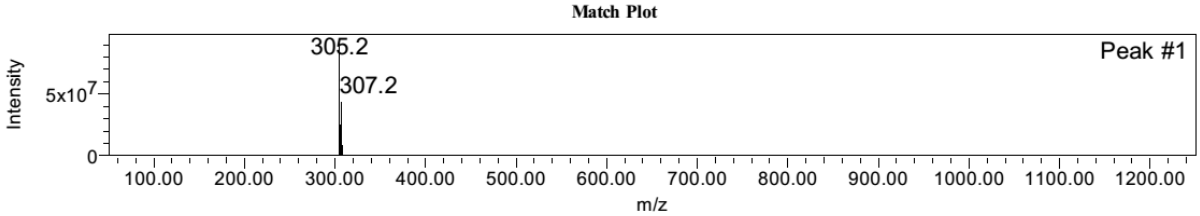
LC-MS analysis of Compound 3e





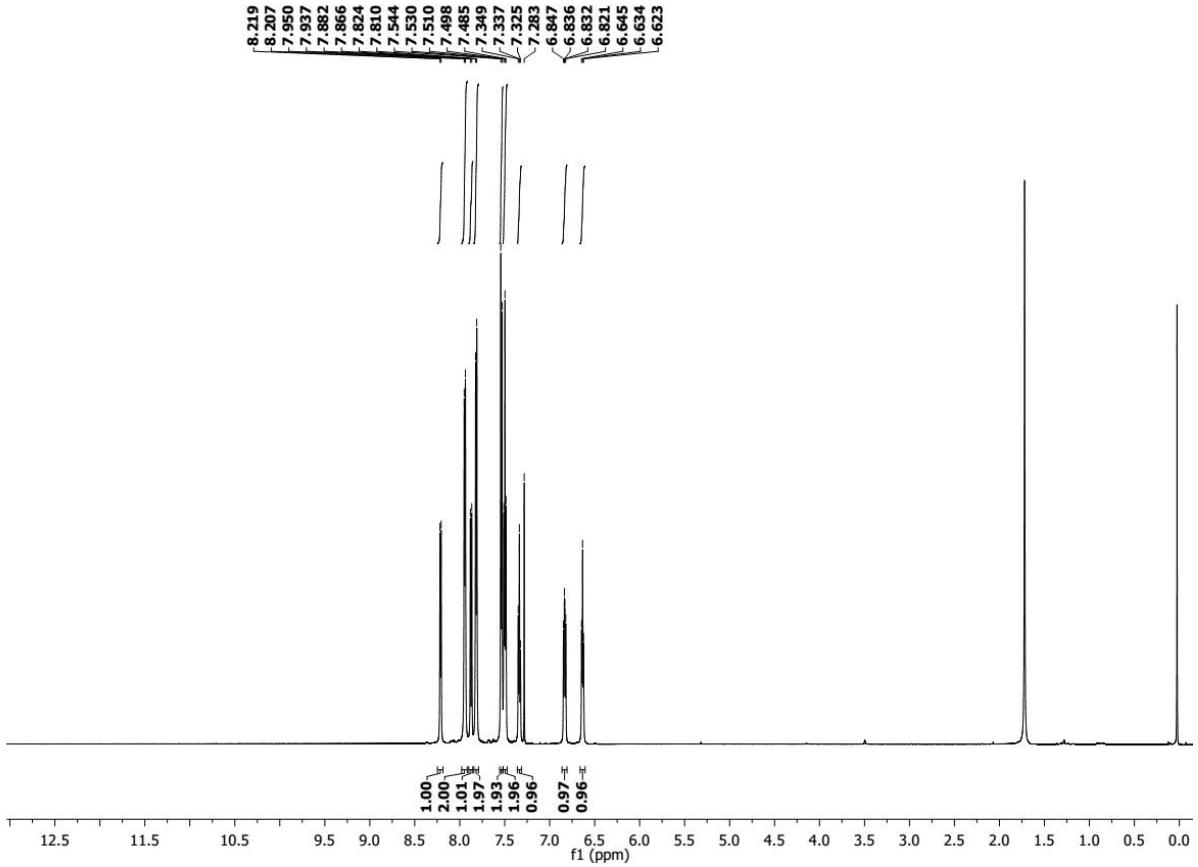
Peak Results
Channel: PDA Spectrum

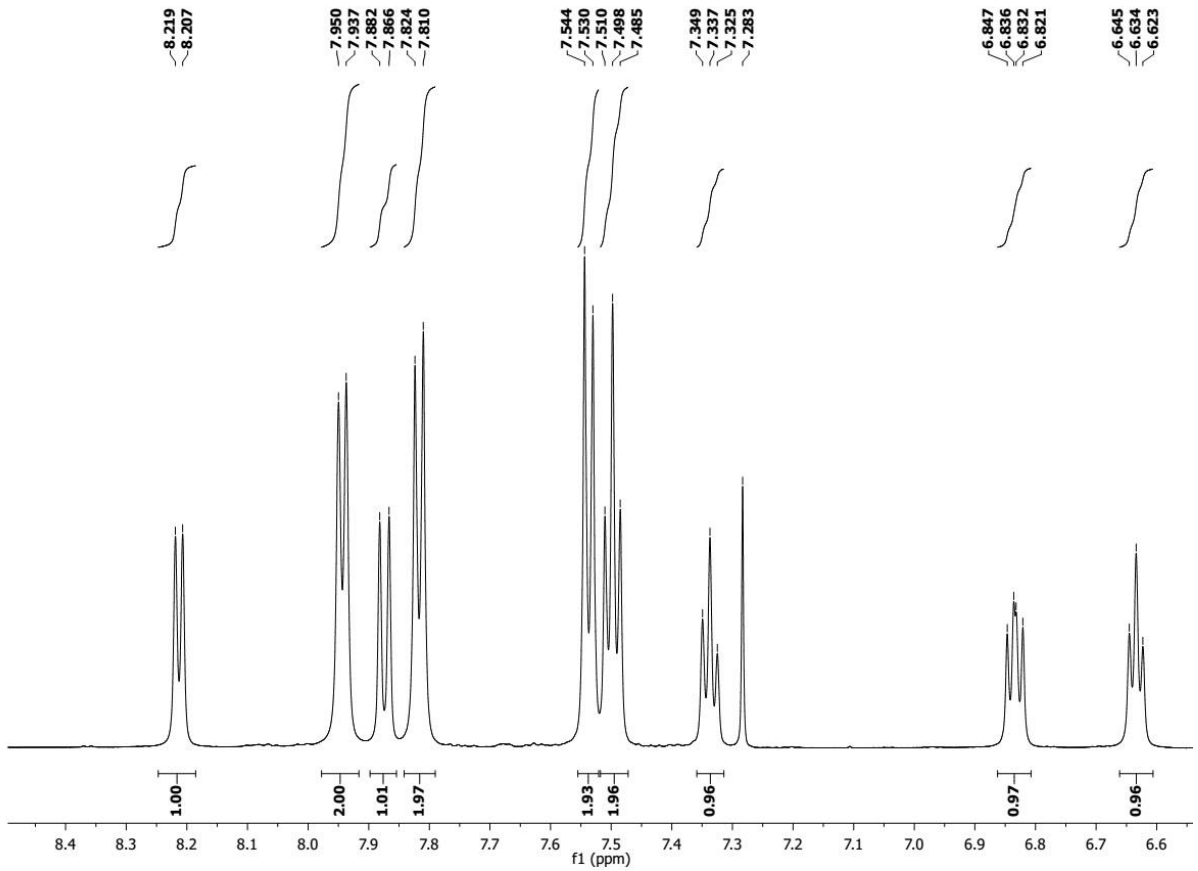
	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	2.176		257212	506509	100.00	PDA Spectrum	254.0nm
2	2.176		716419	1524302	100.00	PDA Spectrum	210.0nm



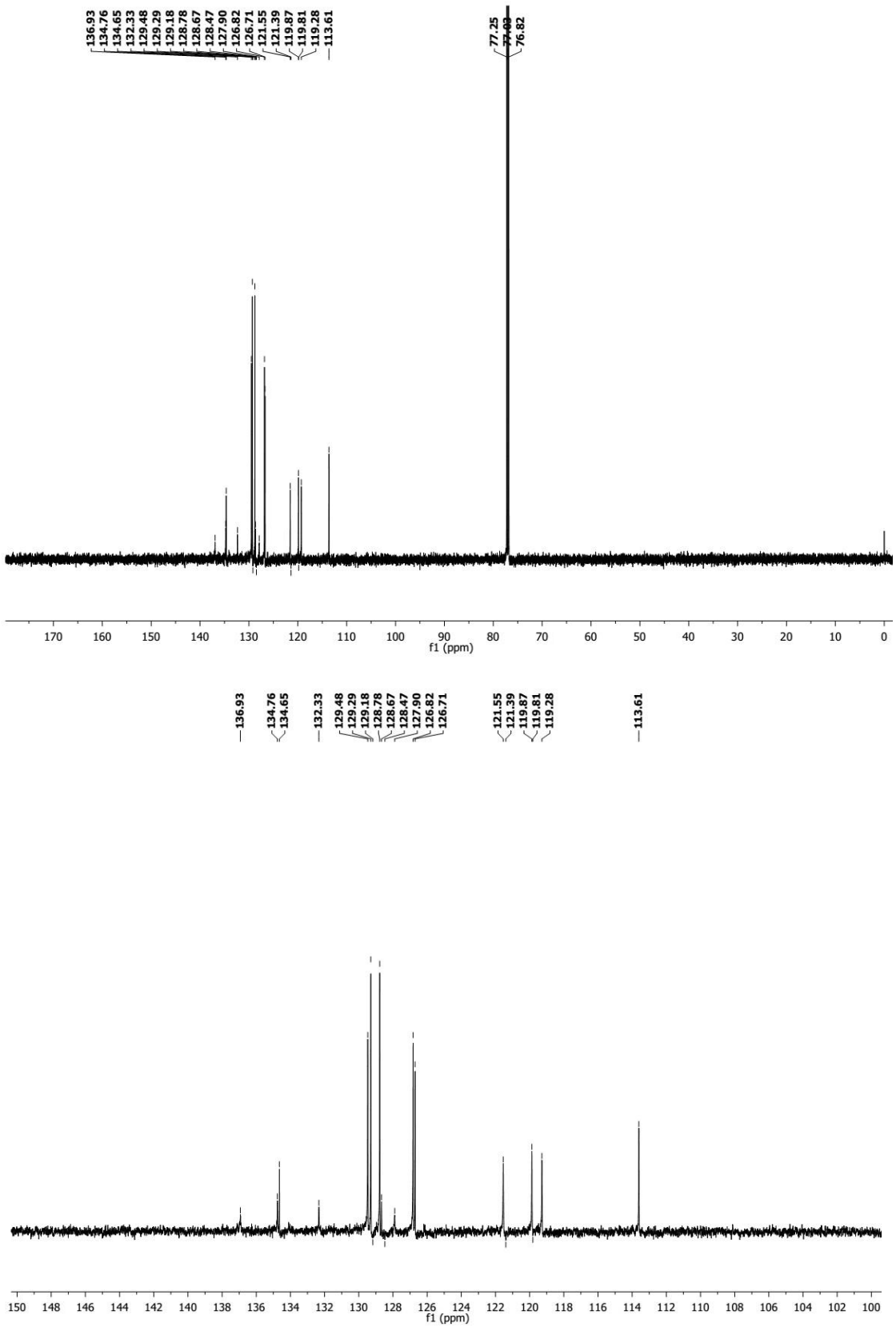
Base Peak 305.16 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (0.1:2.1;2.5:3.8) x 20.000 Th: 0.100 Retention Time 2.207

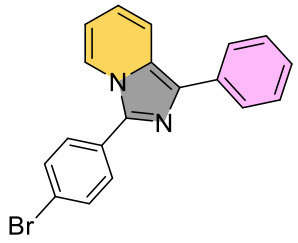
[1]H NMR of Compound 3e





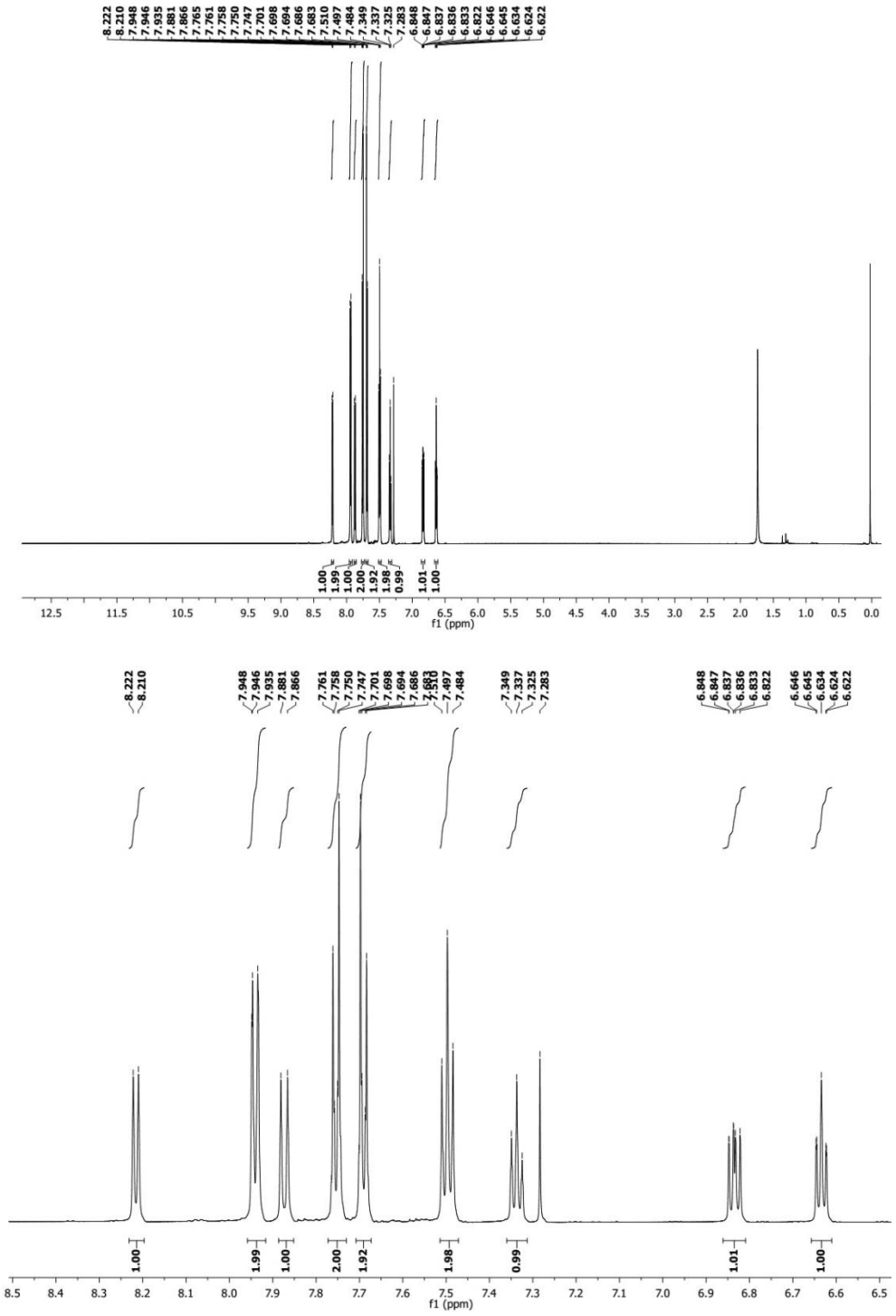
^{13}C NMR of Compound 3e



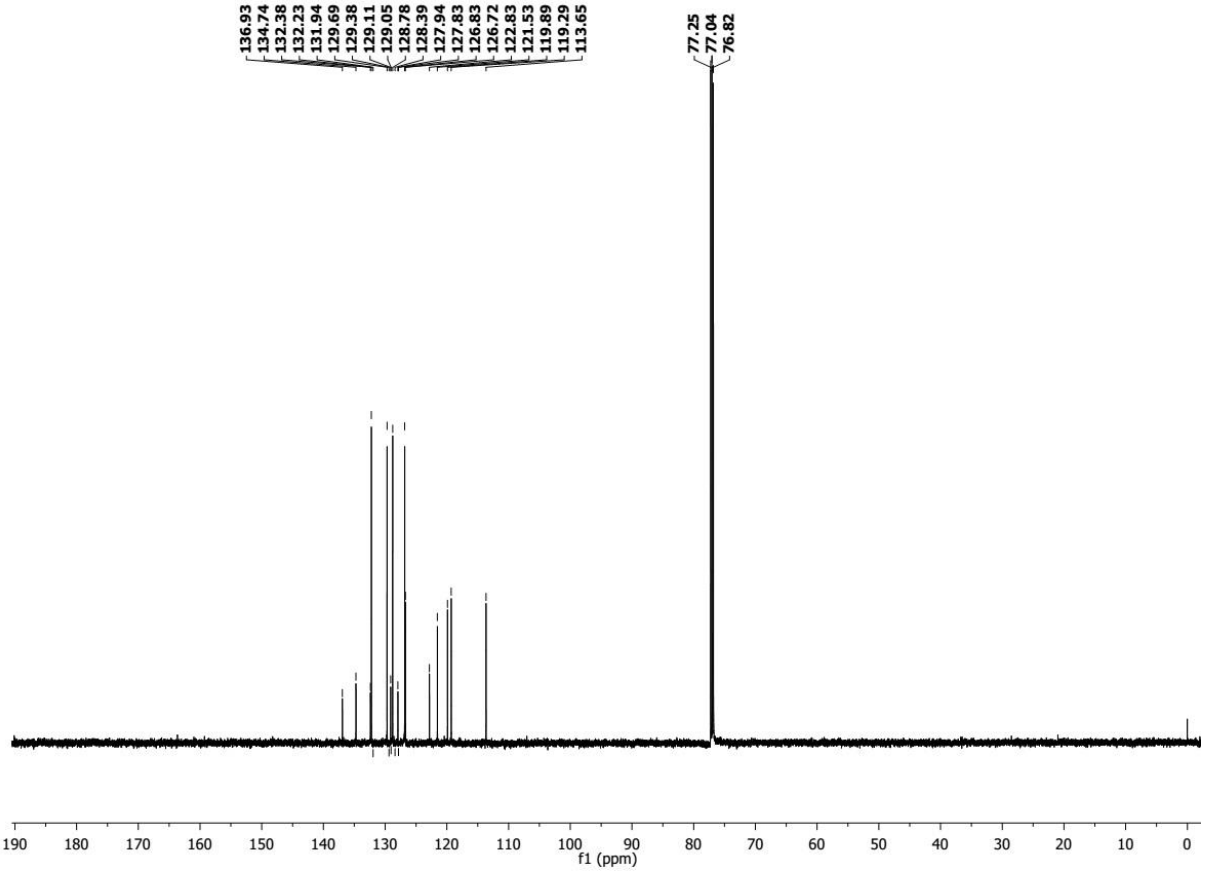


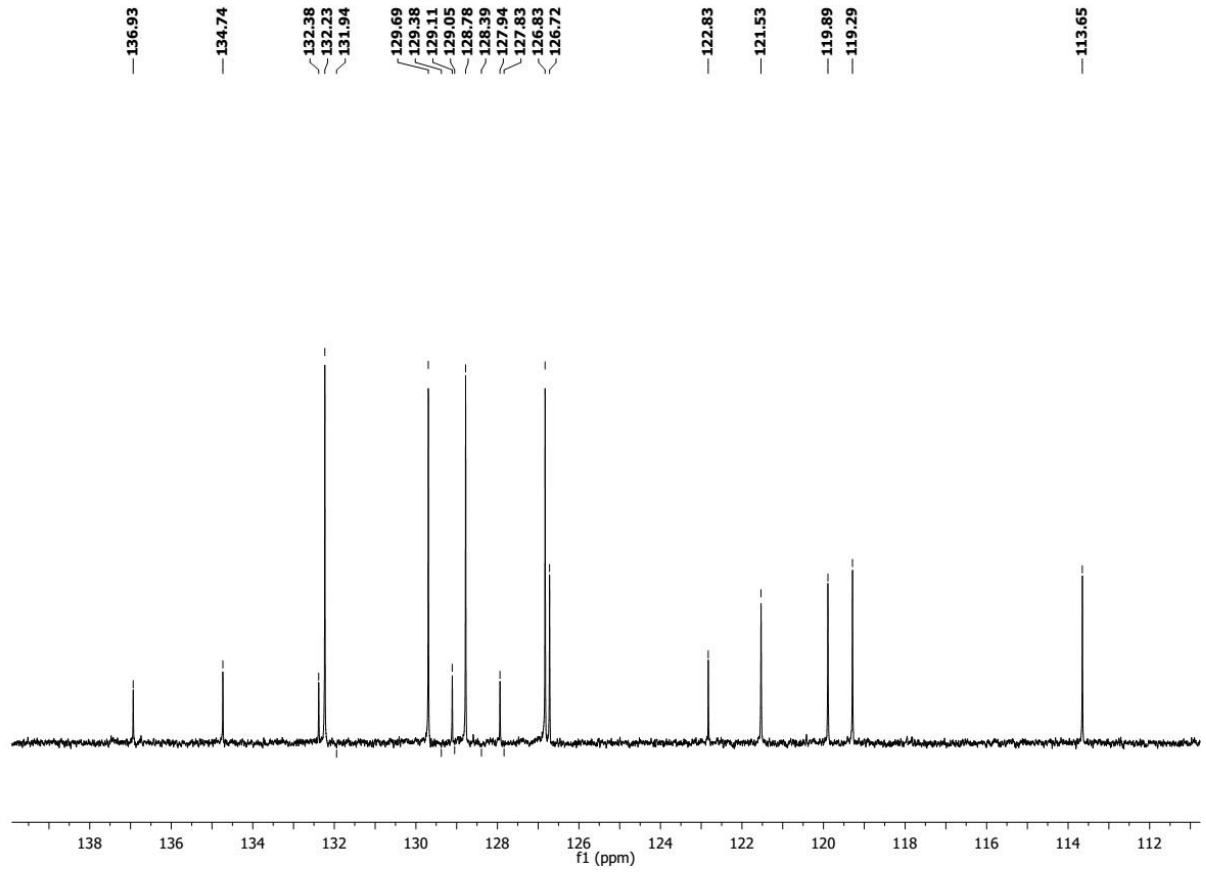
Compound (3f)

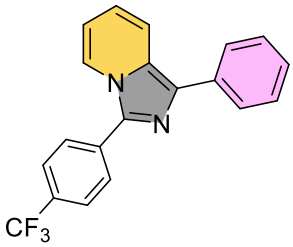
^{1}H NMR of Compound 3f



^{13}C NMR of Compound 3f

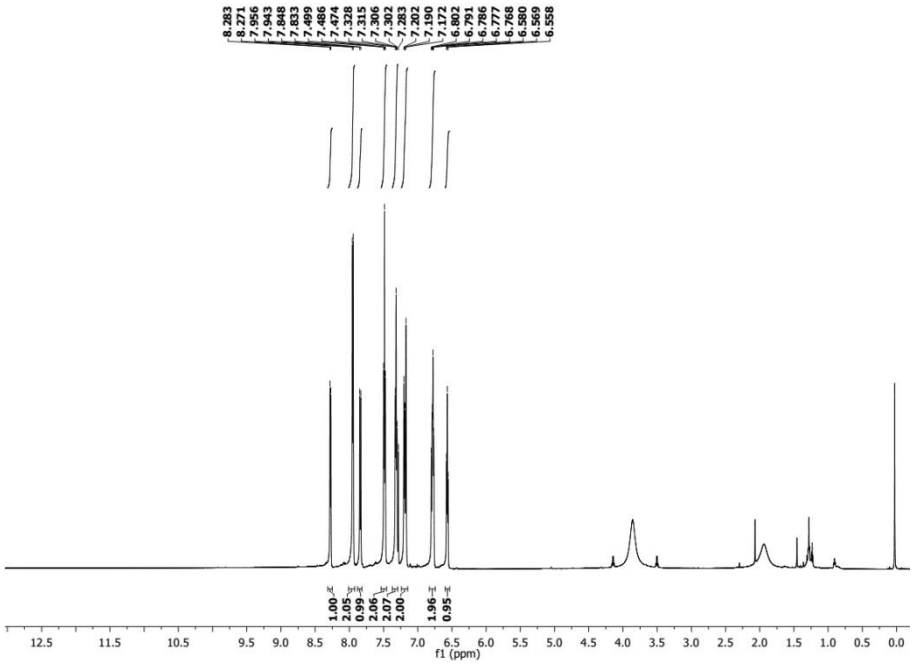


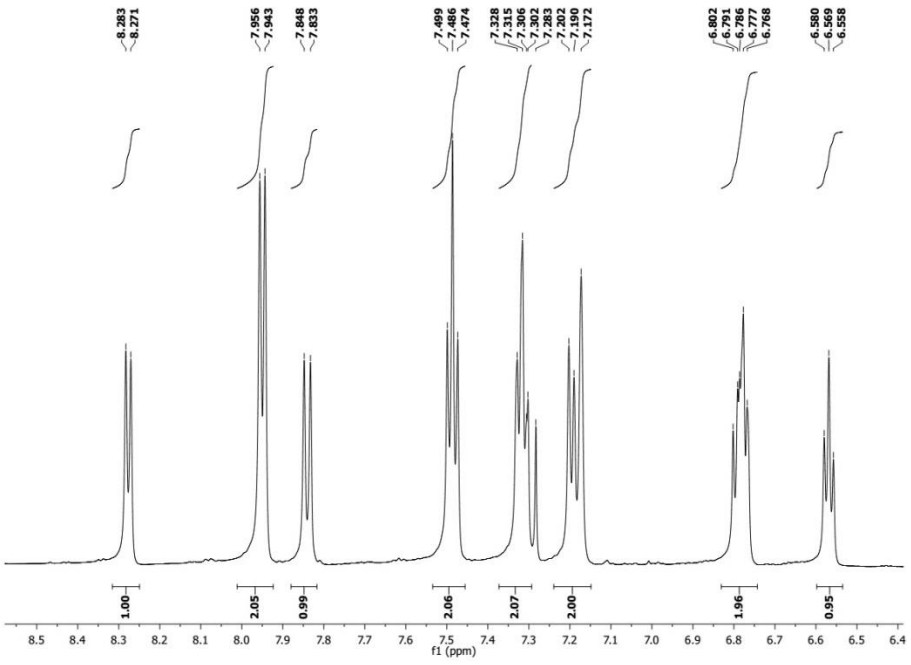




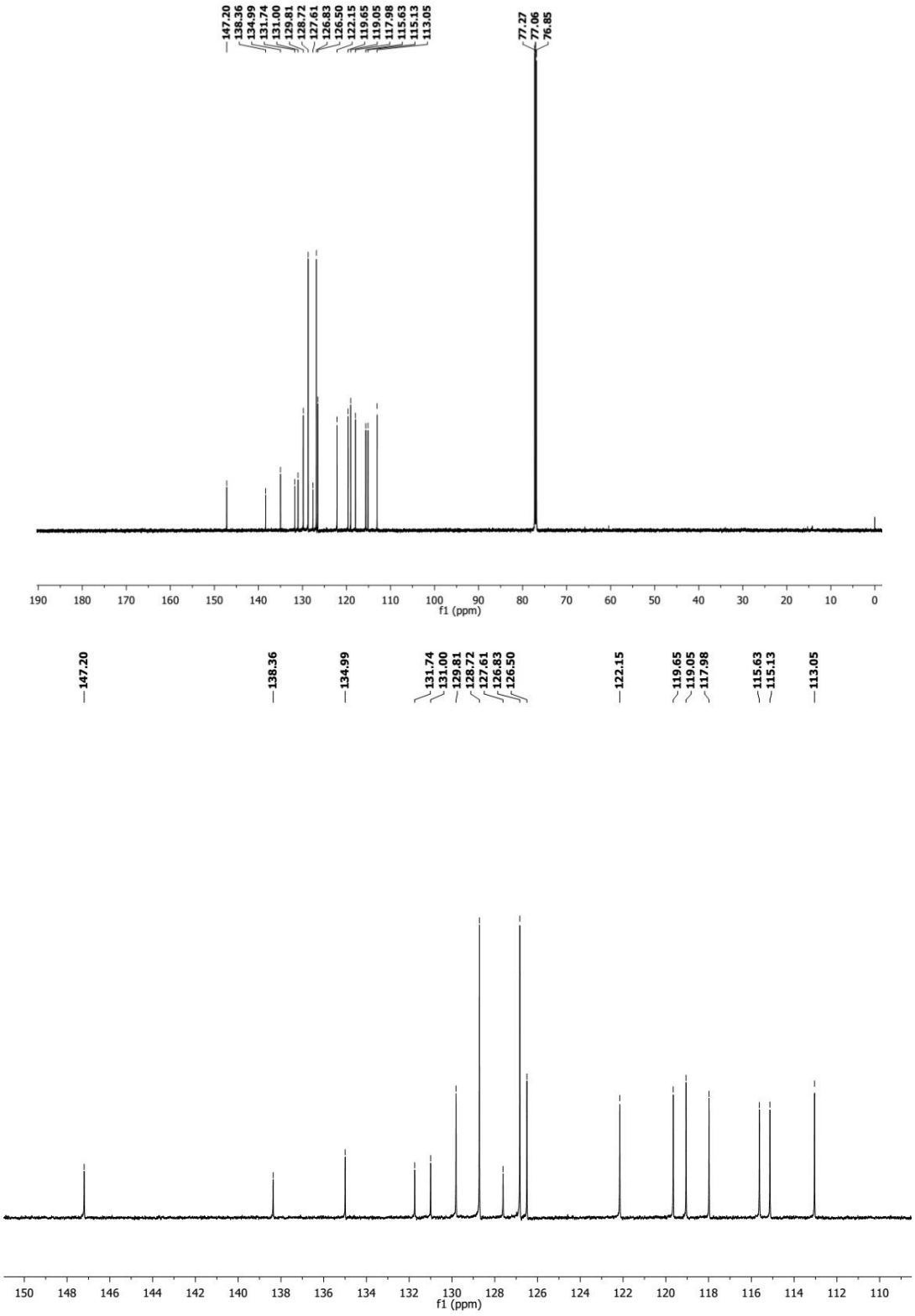
Compound (3g)

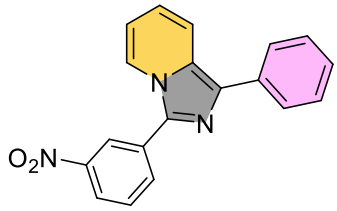
^{1}H NMR of Compound 3g





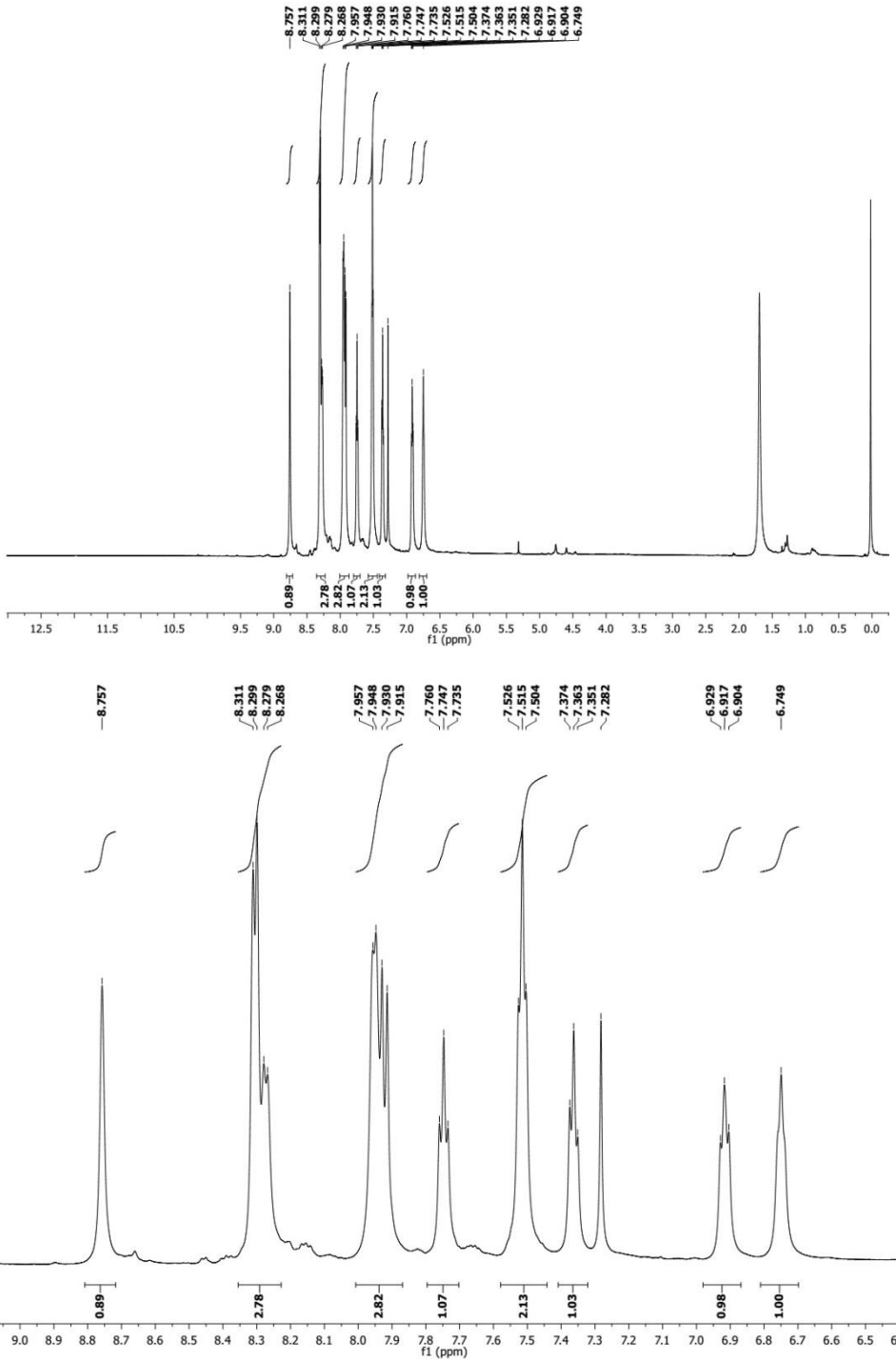
^{13}C NMR of Compound 3g



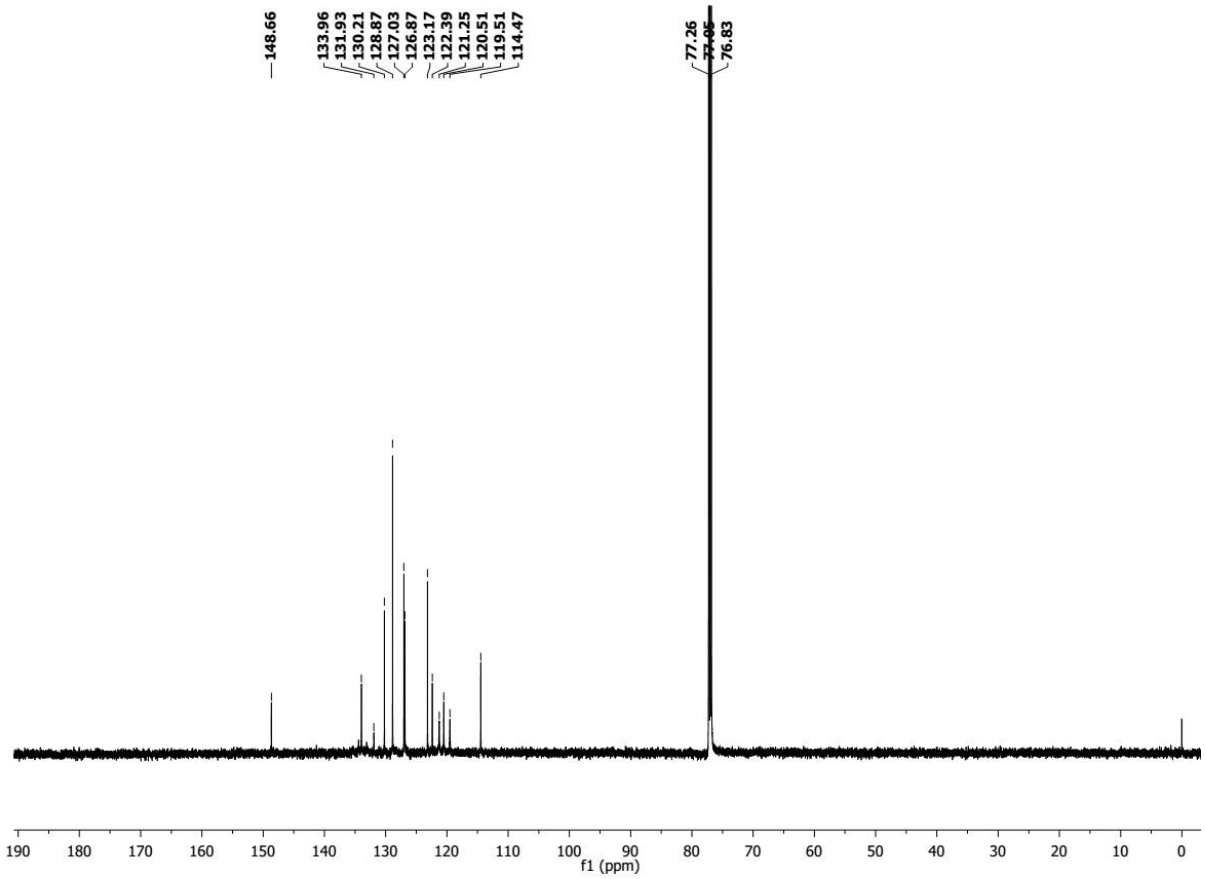


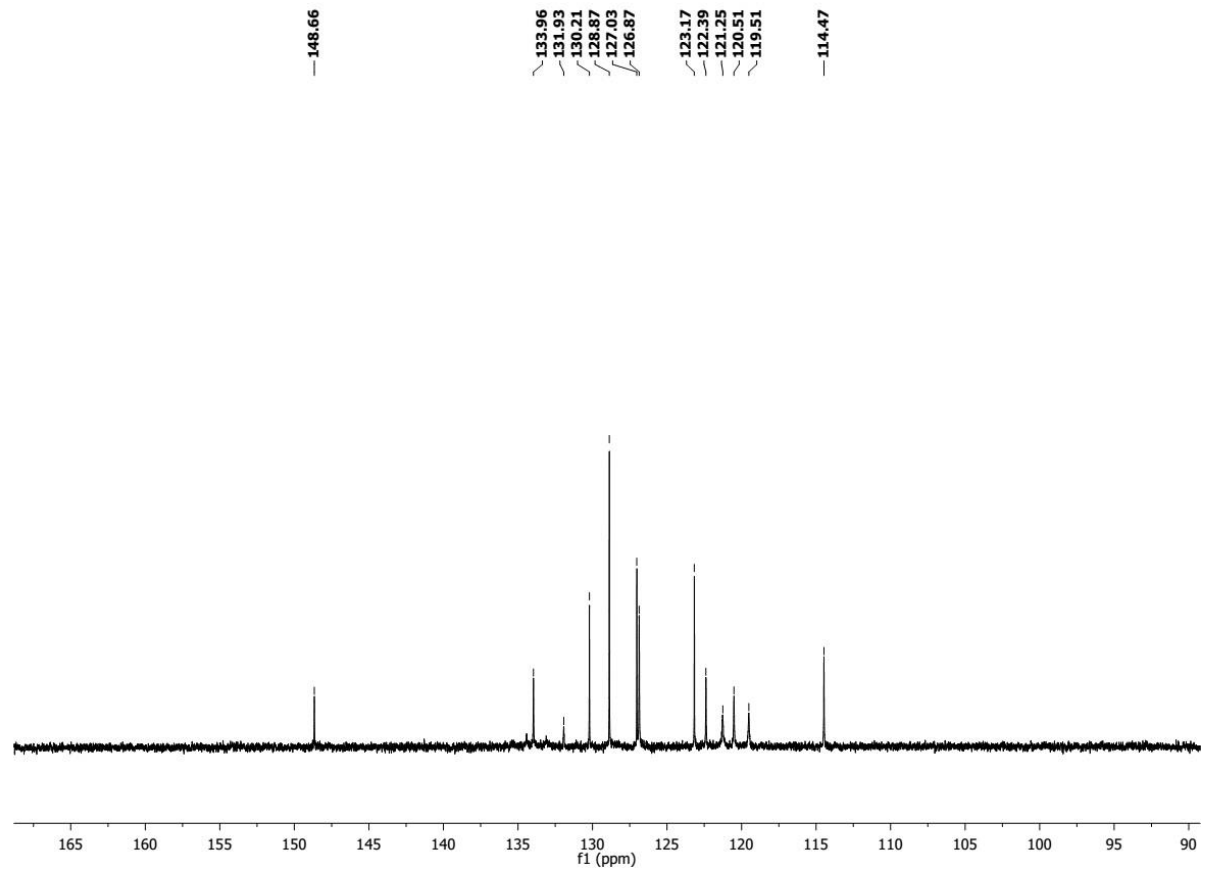
Compound (3h)

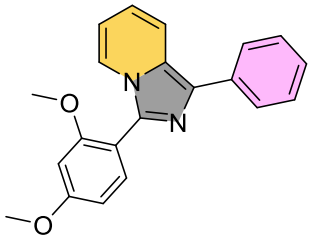
[1]H NMR of Compound 3h



^{13}C NMR of Compound 3h

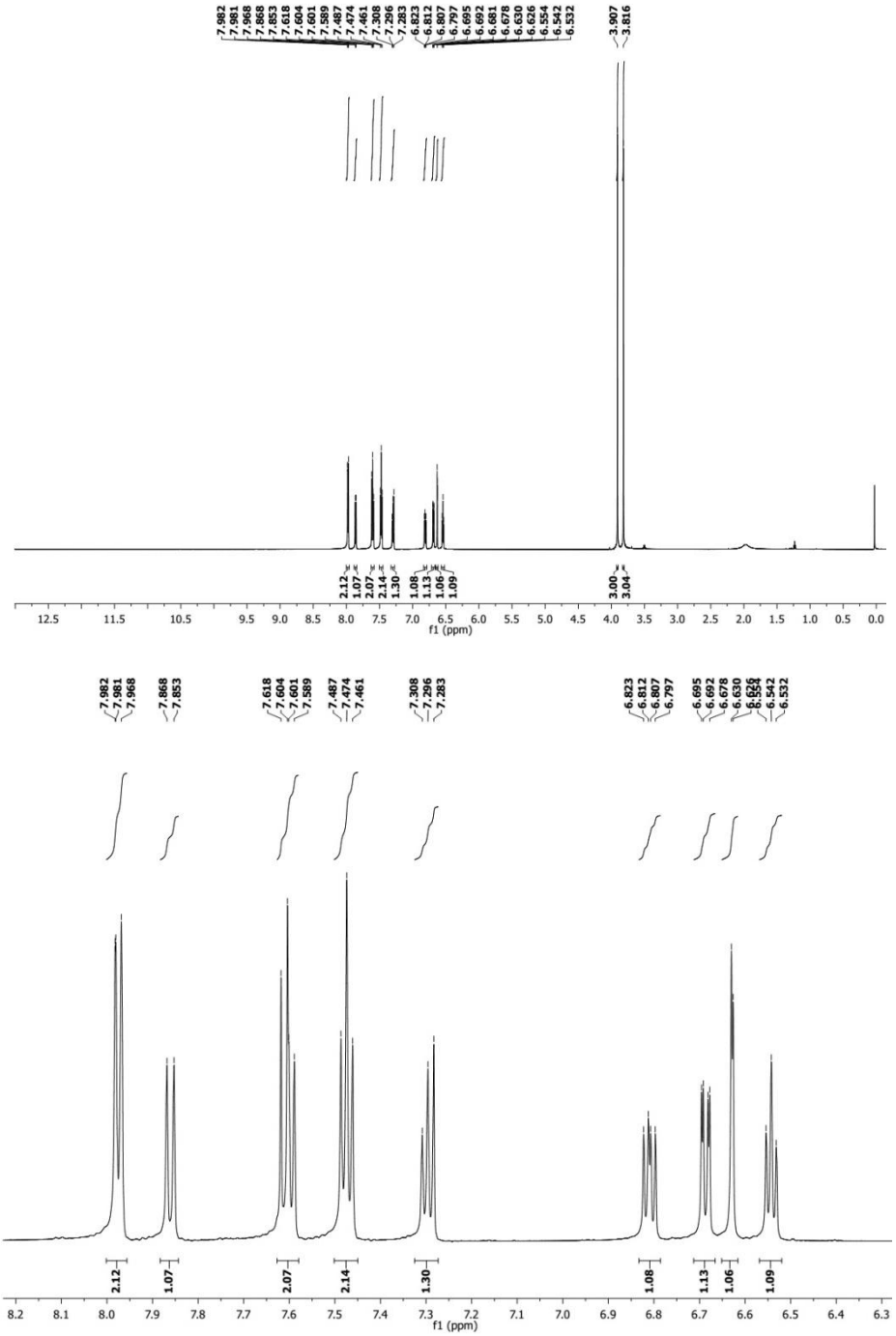


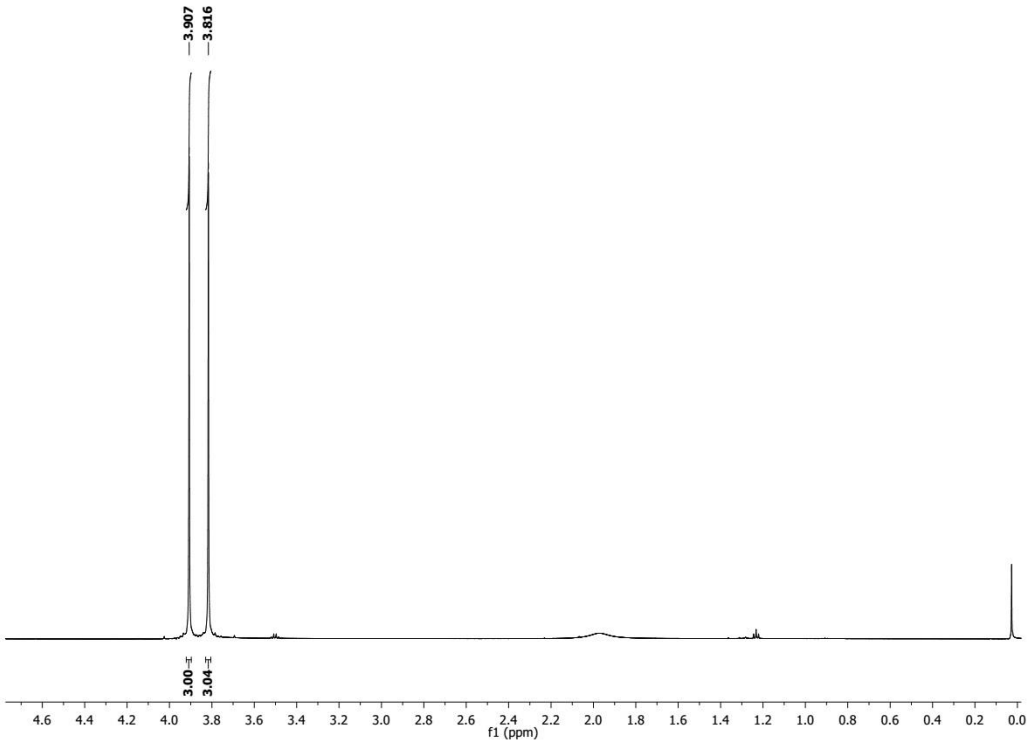




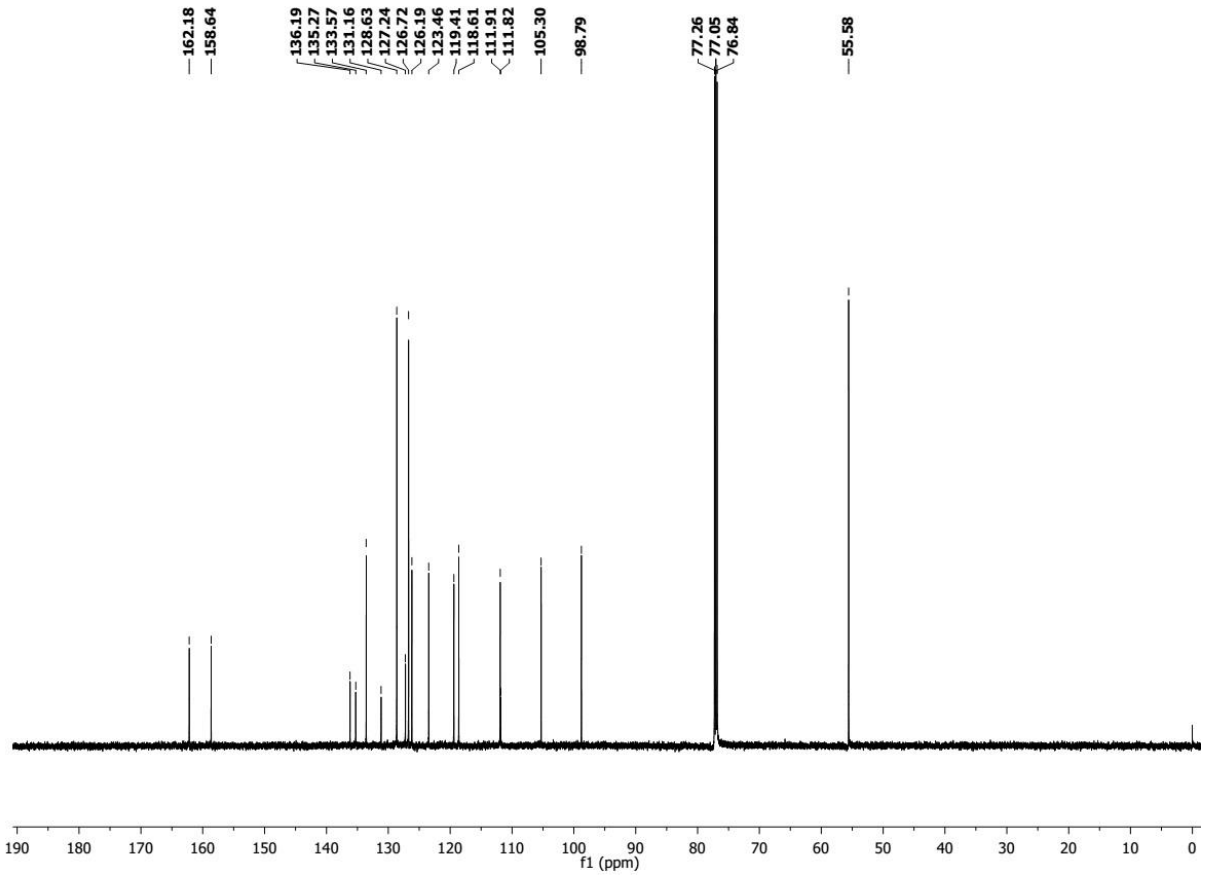
Compound (3i)

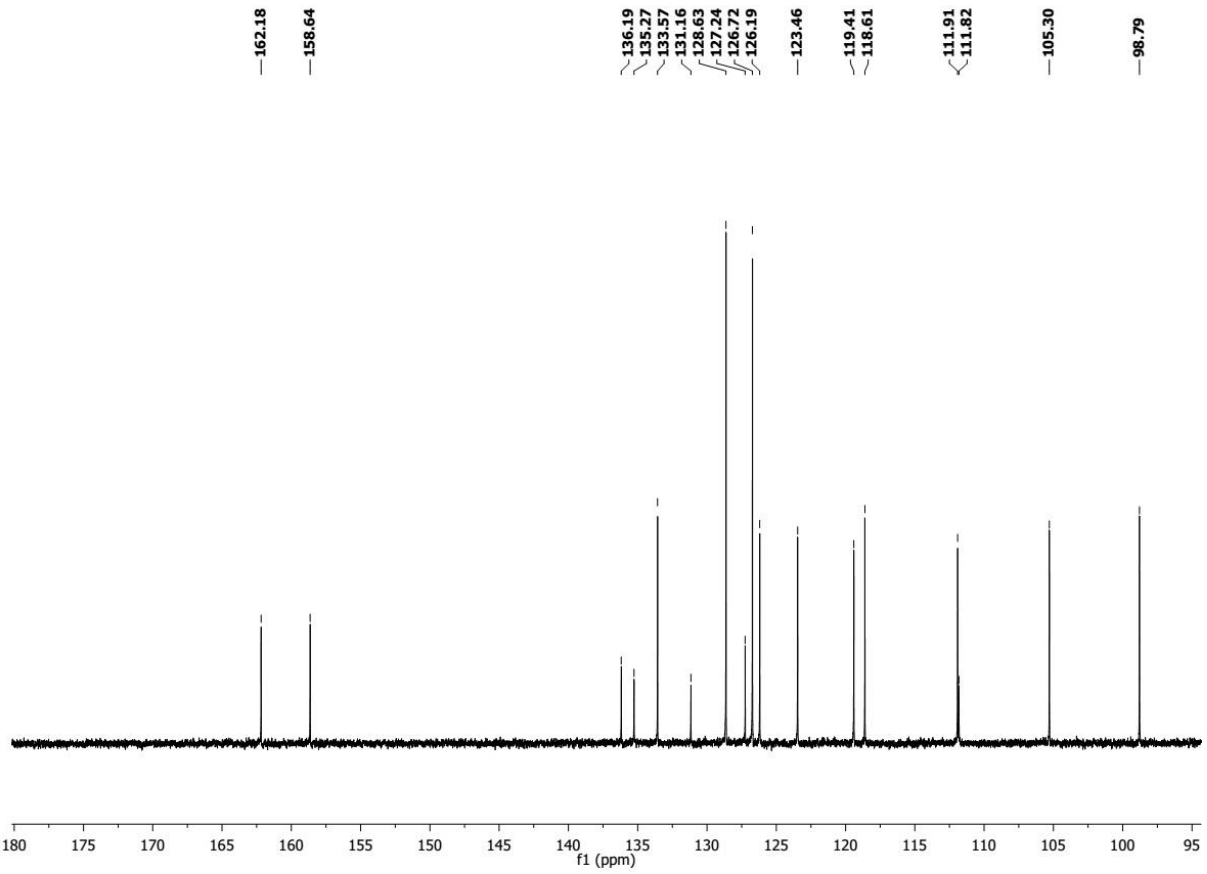
^{1}H NMR of Compound 3i

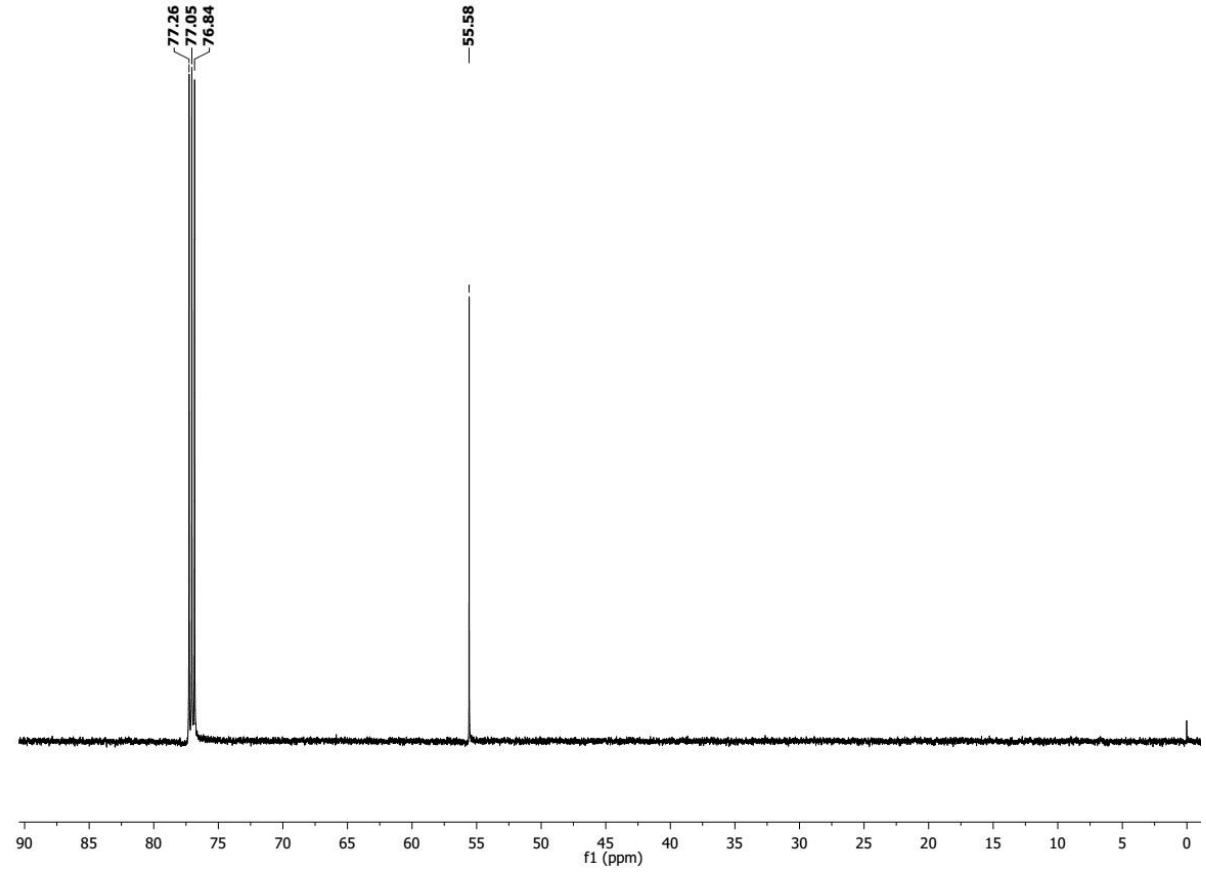


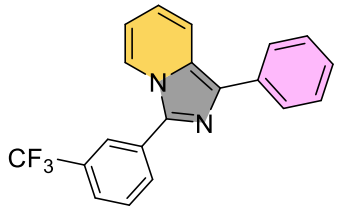


^{13}C NMR of Compound 3i



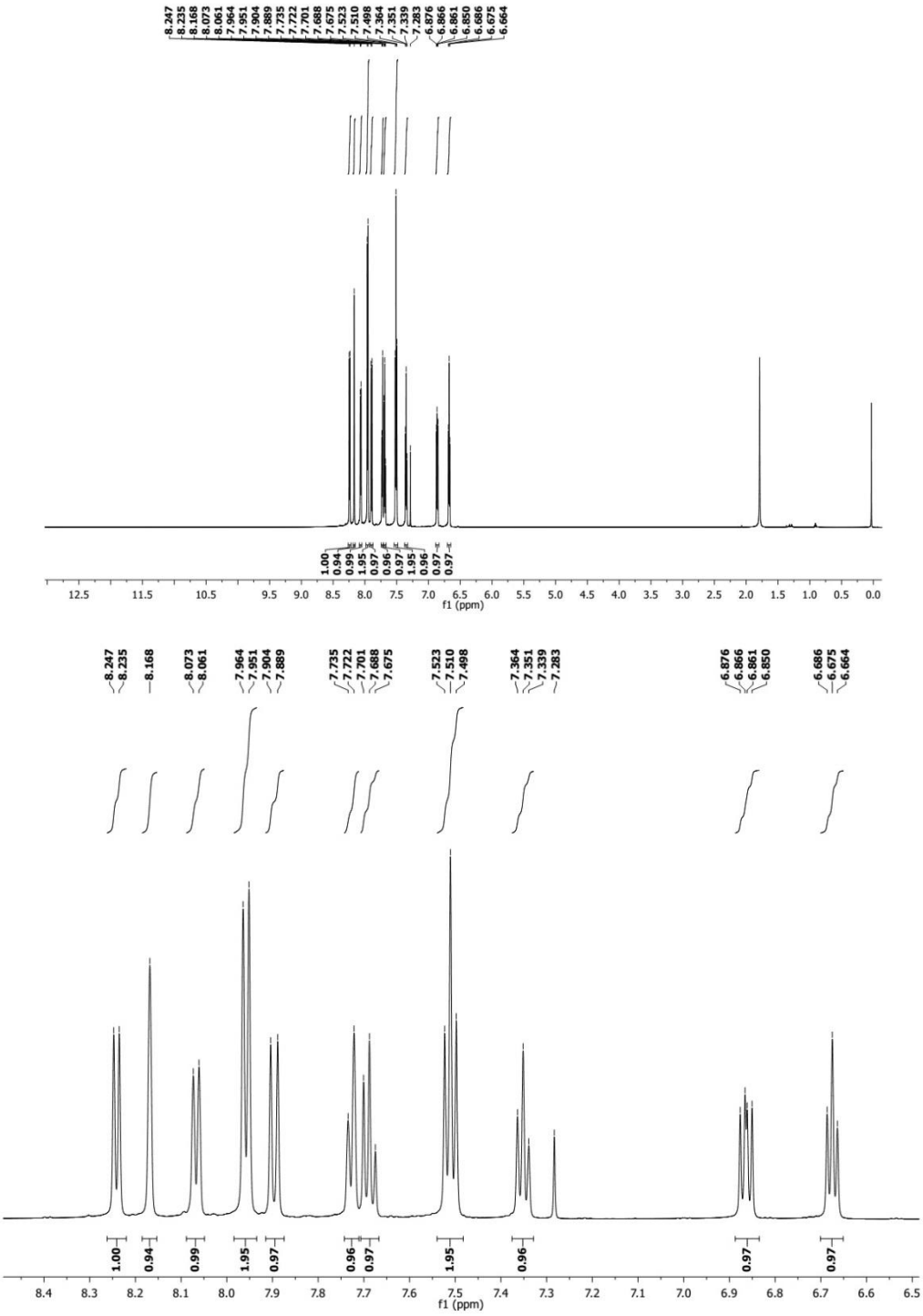

162.18
158.64
136.19
135.27
133.57
131.16
128.63
127.24
126.72
126.19
123.46
119.41
118.61
111.91
111.82
105.30
98.79
180 175 170 165 160 155 150 145 140 135 130 125 120 115 110 105 100 95
f1 (ppm)


77.26
77.05
76.84
55.58
90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0
f1 (ppm)

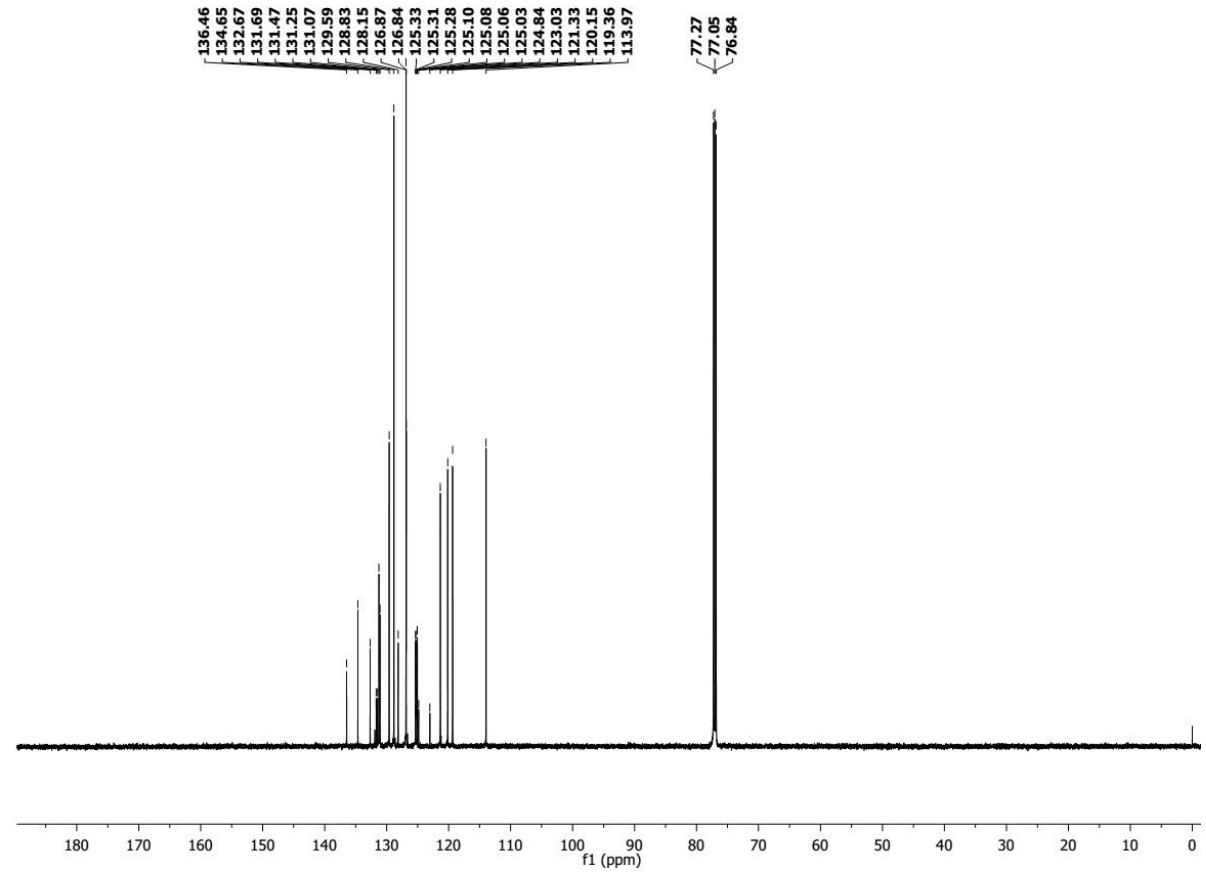


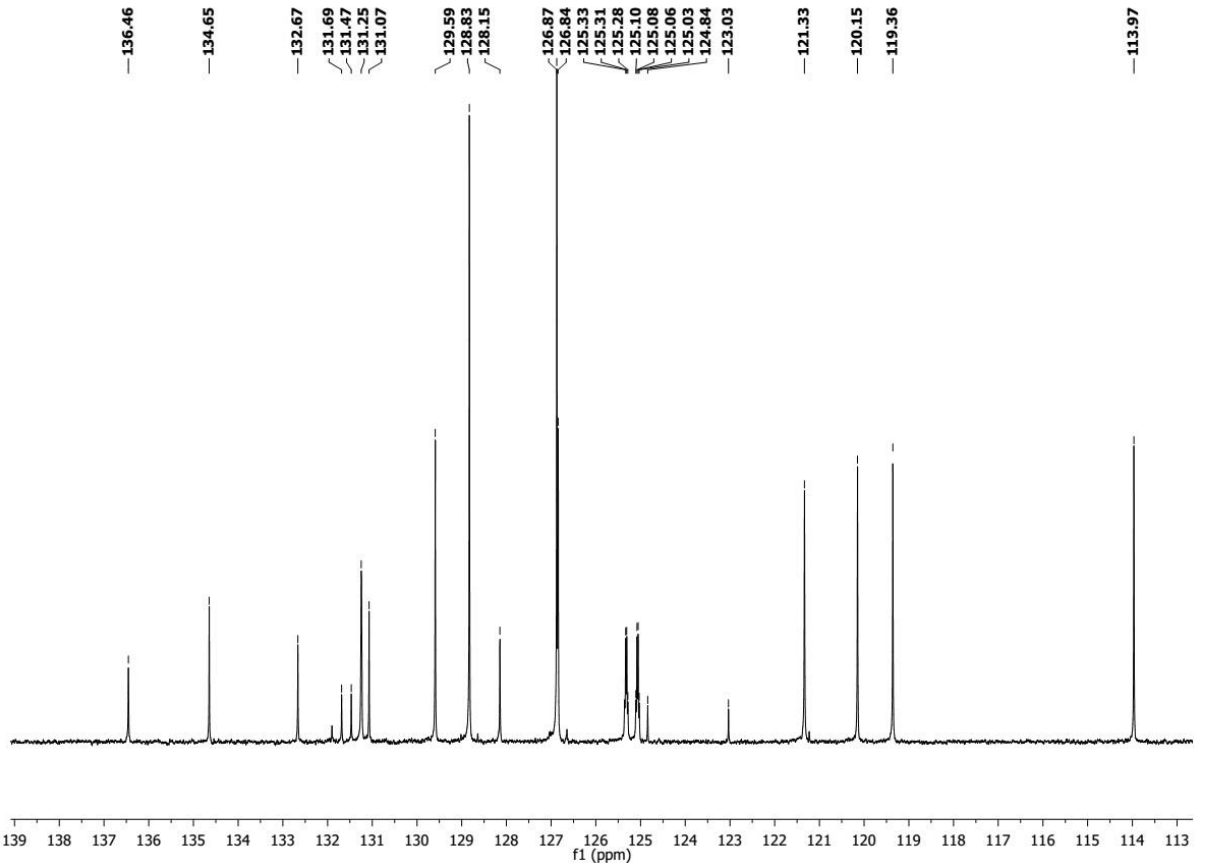
Compound (3j)

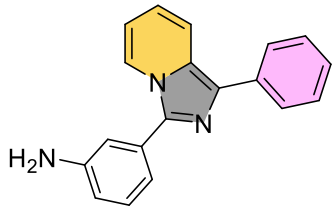
^{1}H NMR of Compound 3j



^{13}C NMR of Compound 3j

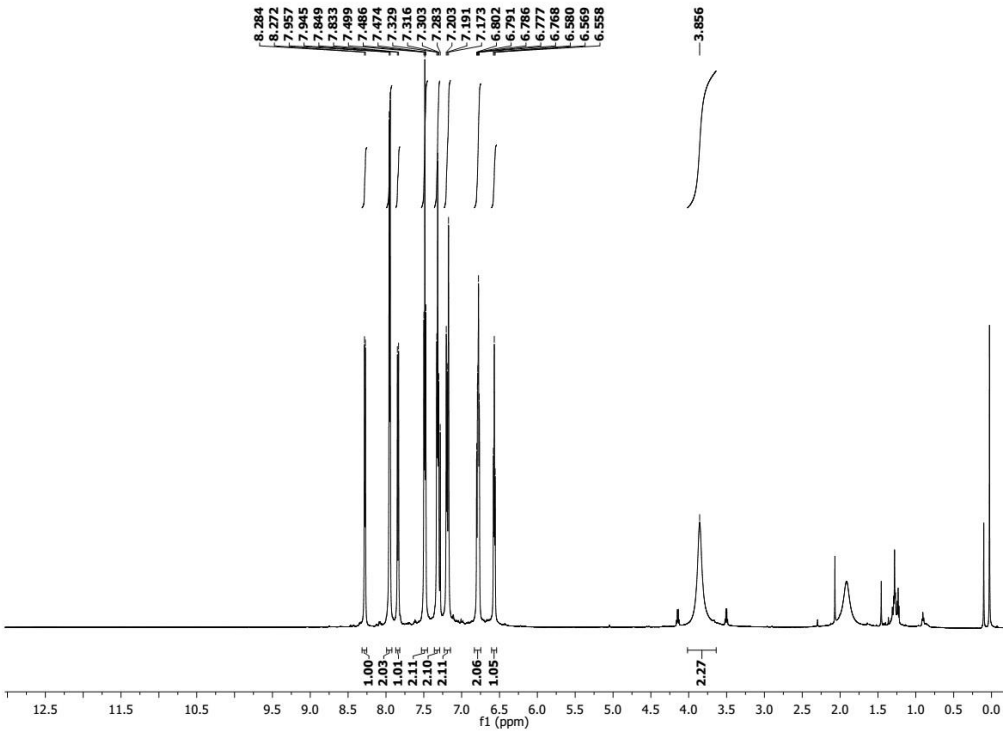


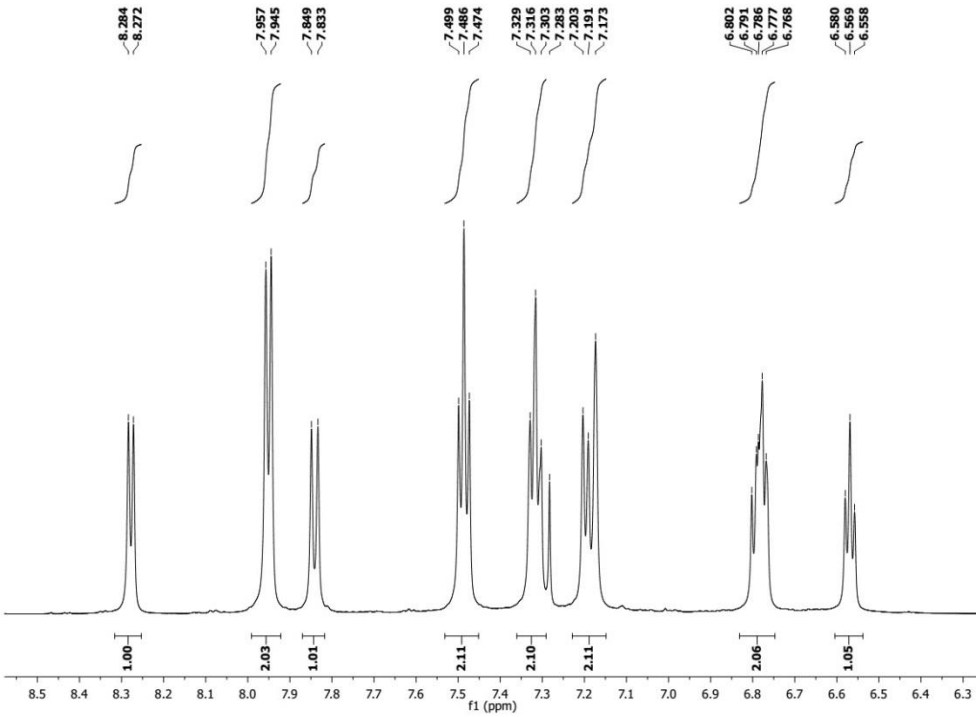




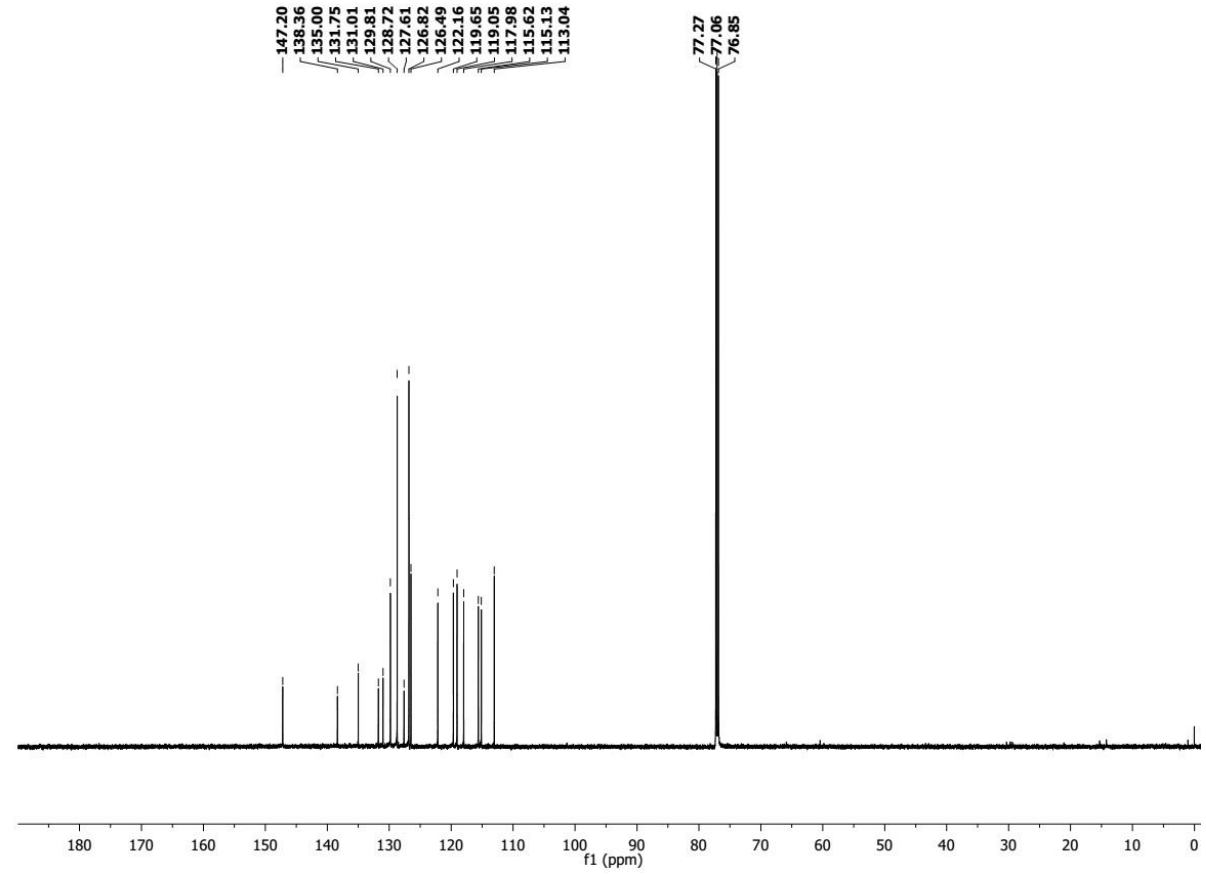
Compound (3k)

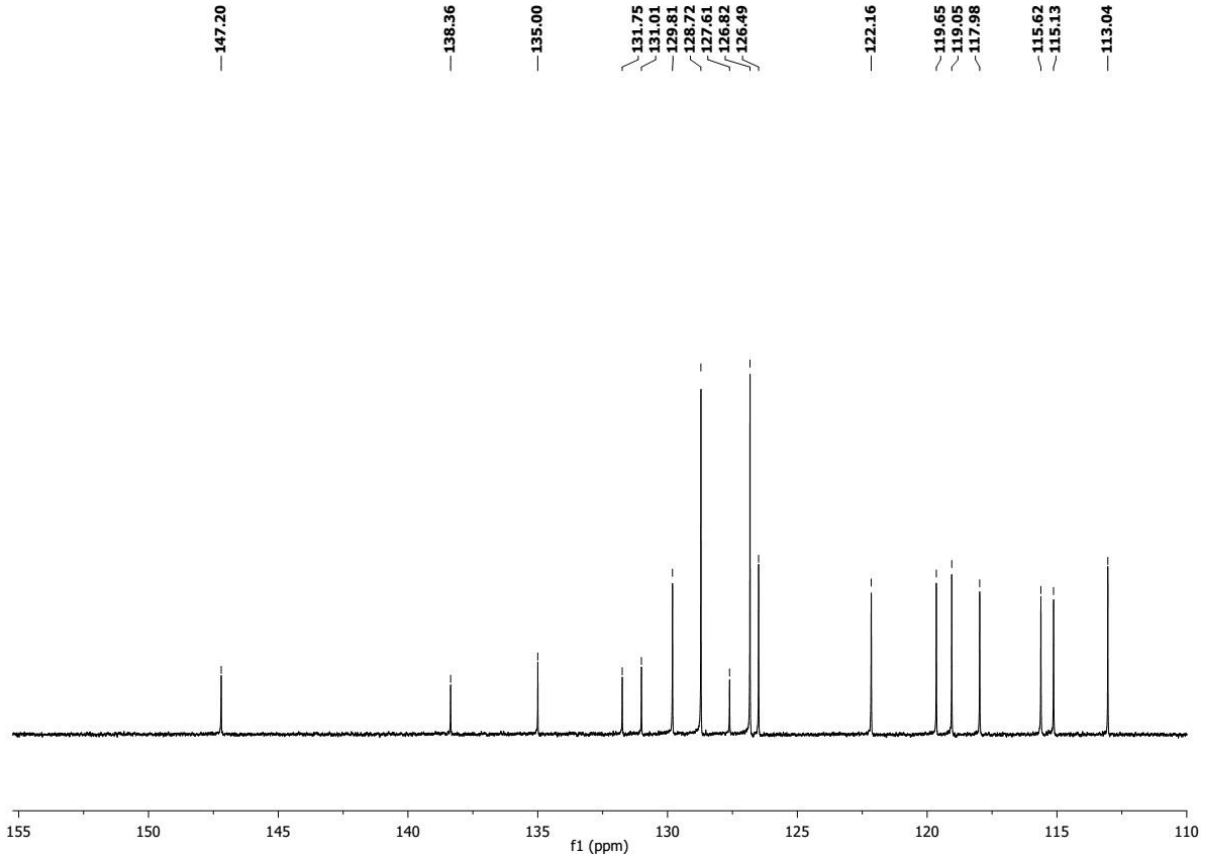
[1]H NMR of Compound 3k

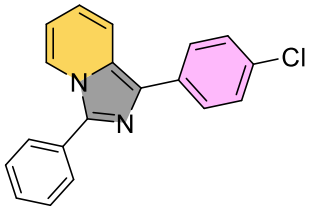




^{13}C NMR of Compound 3k

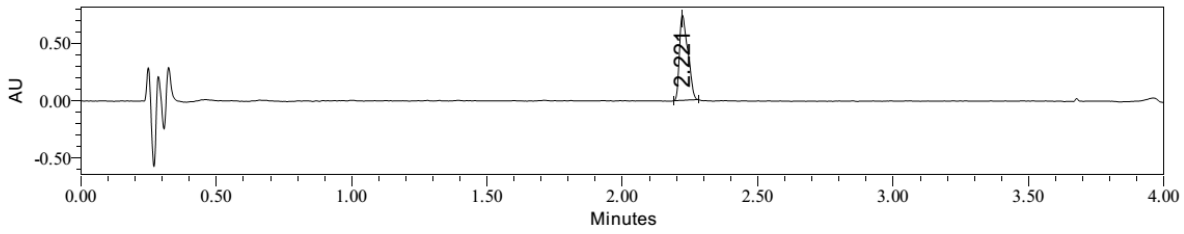


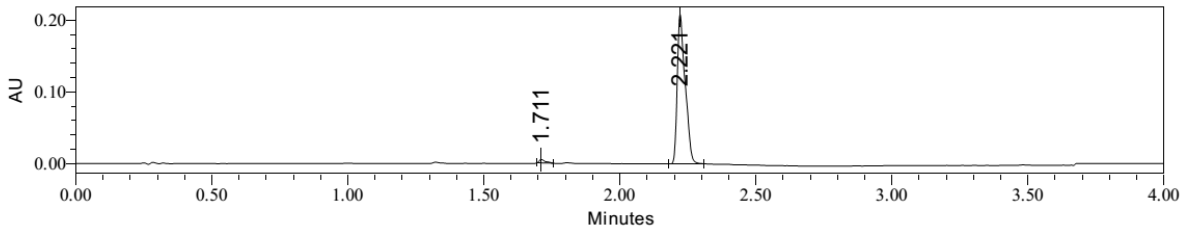




Compound (3l)

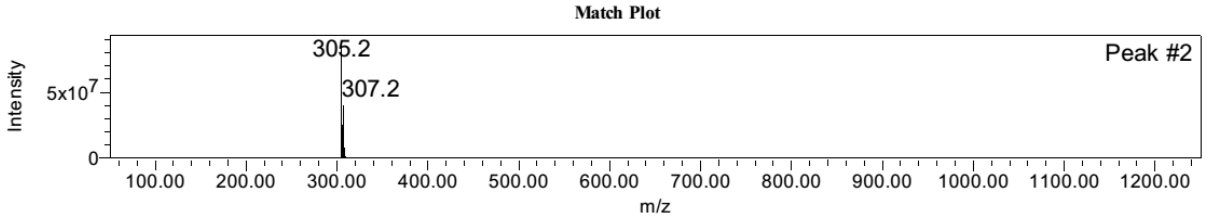
LC-MS analysis of Compound 3l





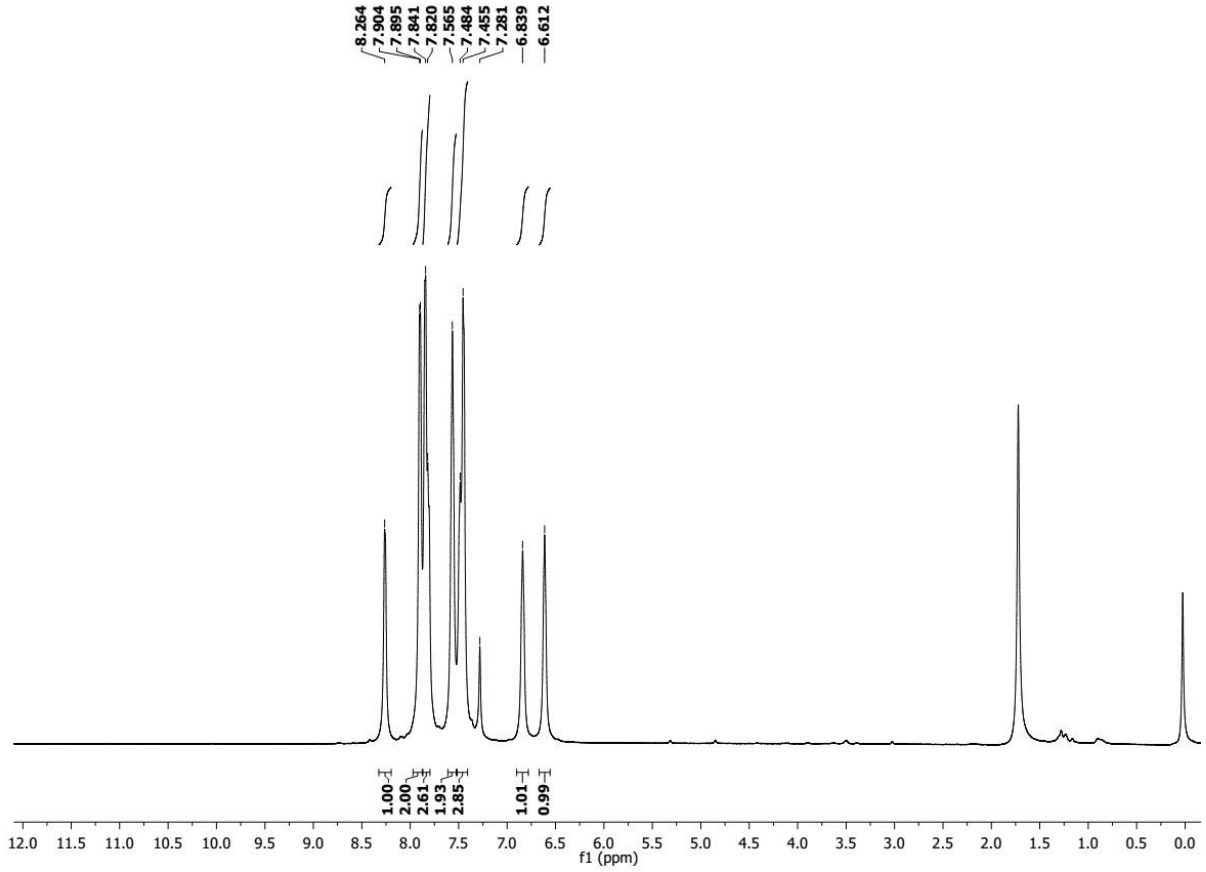
Peak Results
Channel: PDA Spectrum

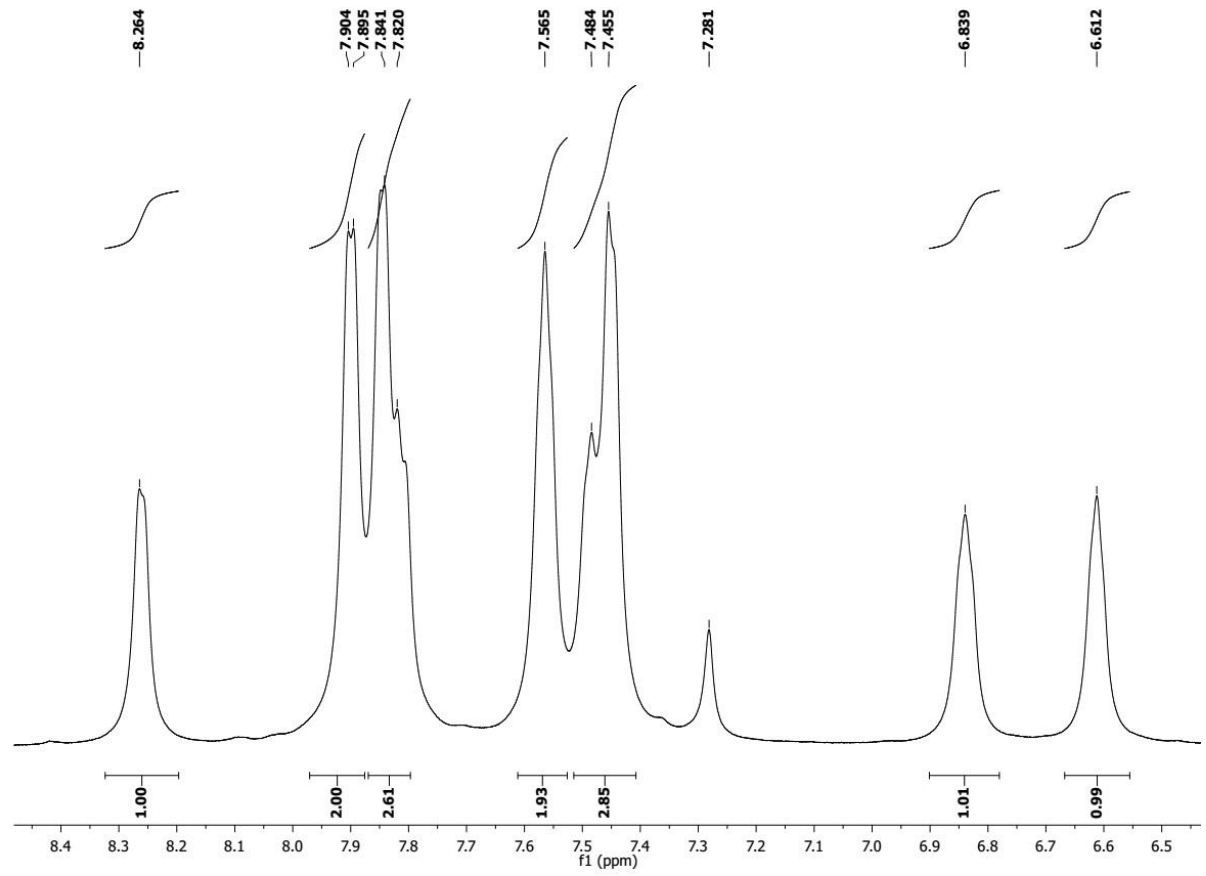
	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	1.711		4749	7451	1.74	PDA Spectrum	254.0nm
2	2.221		208743	421874	98.26	PDA Spectrum	254.0nm
3	2.221		743355	1605691	100.00	PDA Spectrum	210.0nm



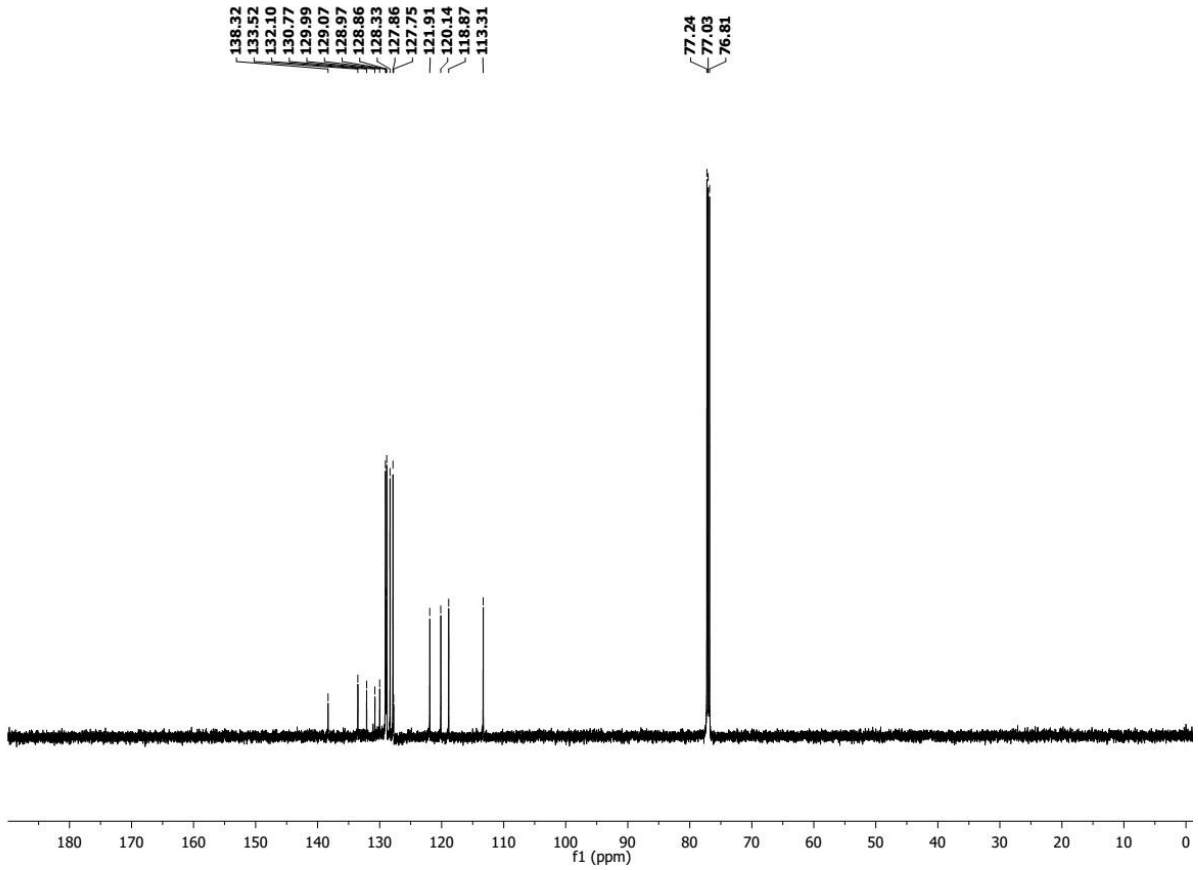
Base Peak 305.15 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (1.8:2.1;0.1:1.3;2.4:3.9) x 20.000 Th: 0.010 Retention Time 2.251

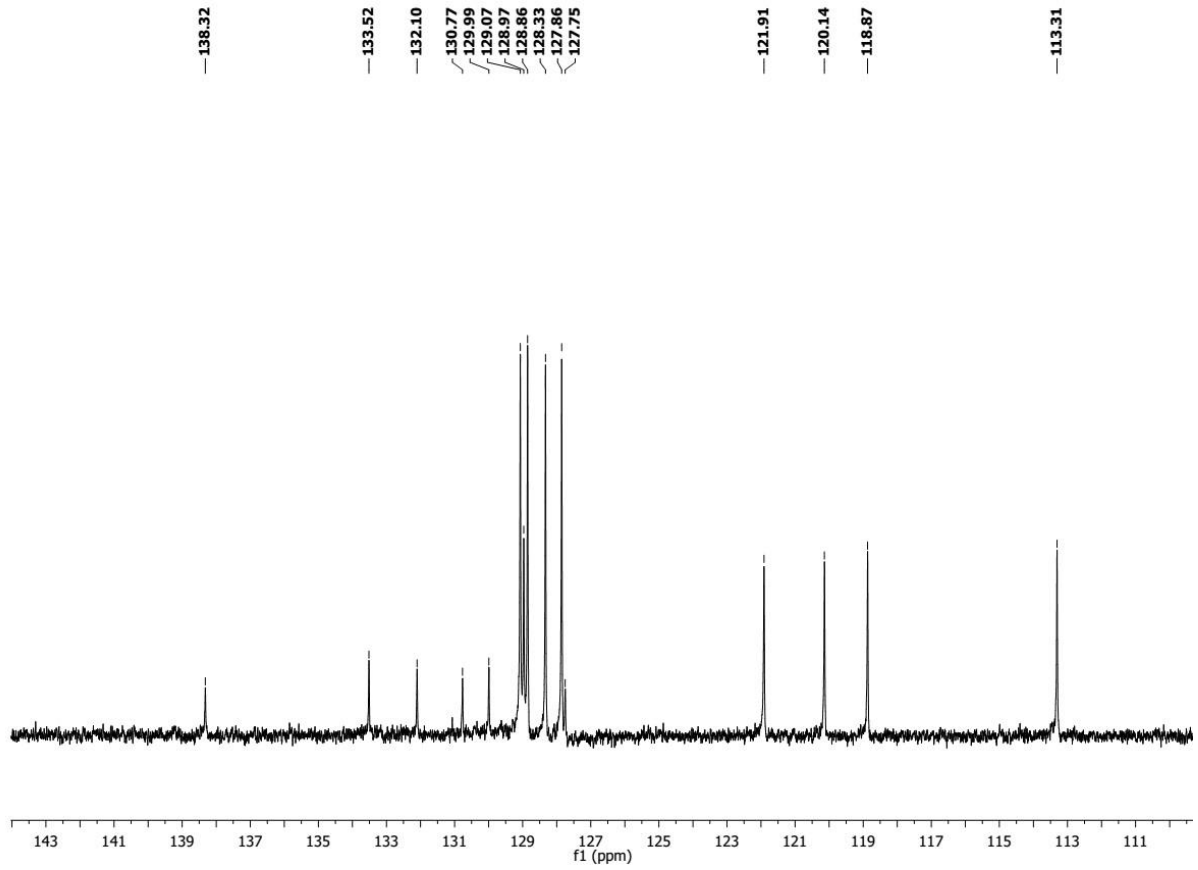
^{1}H NMR of Compound 3l

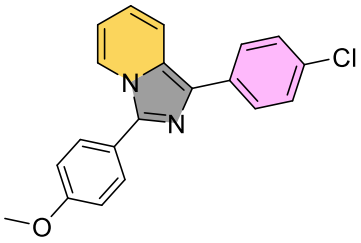




^{13}C NMR of Compound 3l

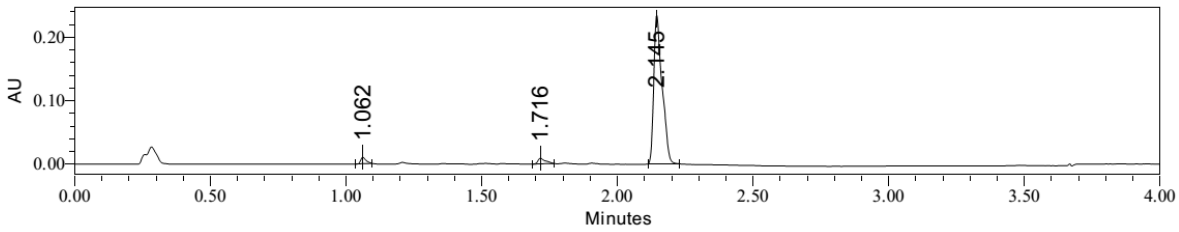


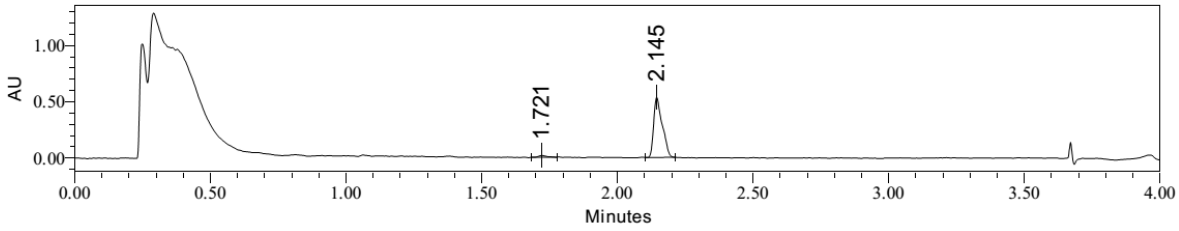




Compound (3m)

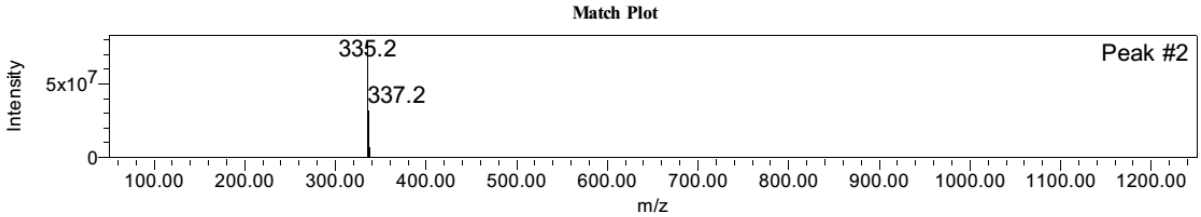
LC-MS analysis of Compound 3m





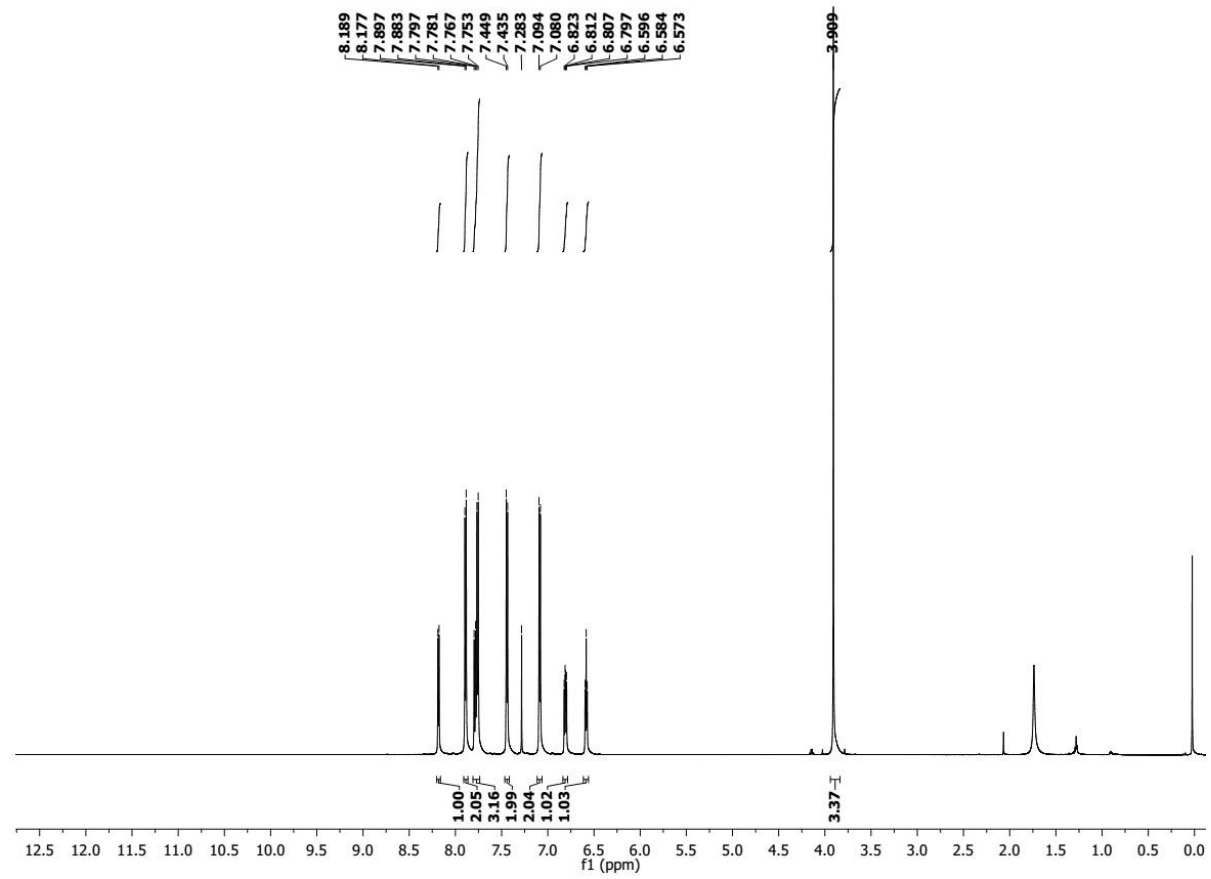
Peak Results
Channel: PDA Spectrum

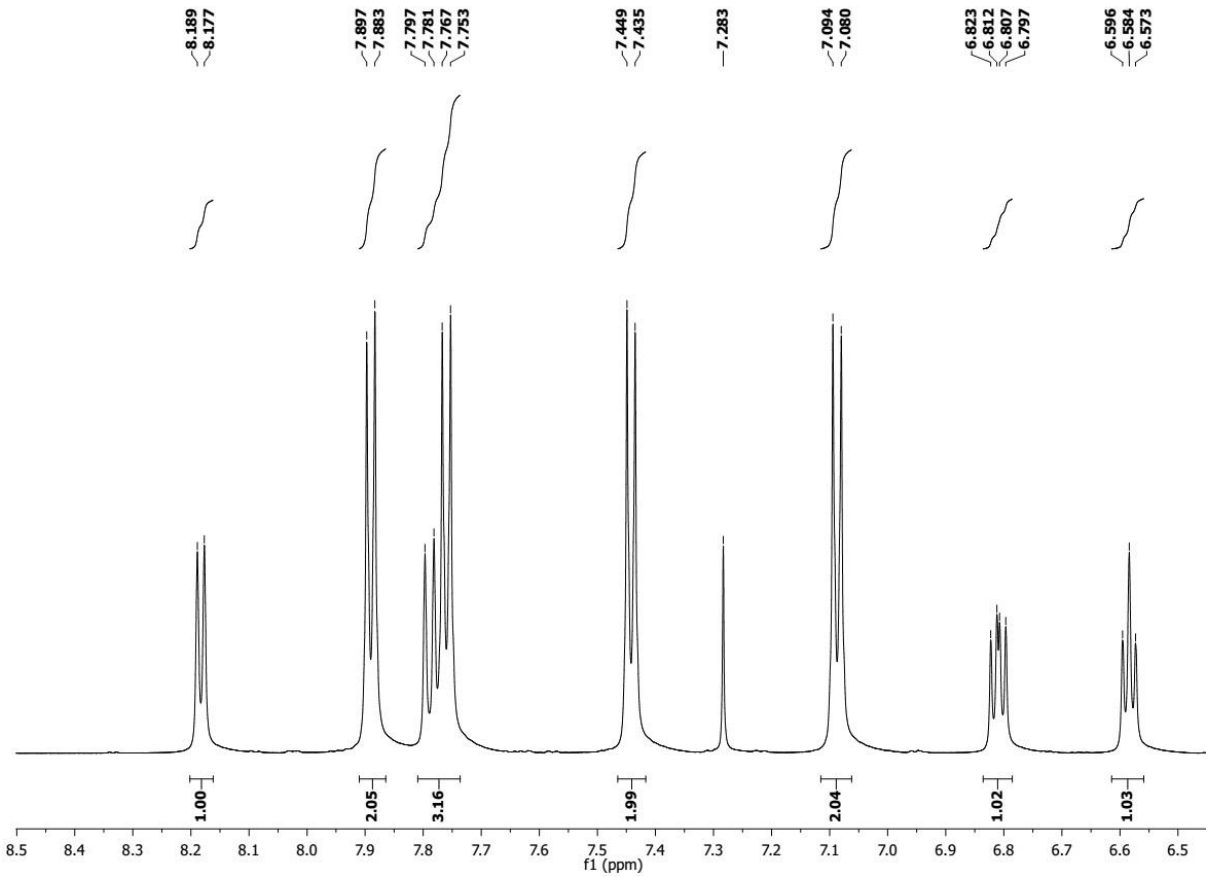
	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	1.062		10211	13613	2.56	PDA Spectrum	254.0nm
2	1.716		8991	17321	3.26	PDA Spectrum	254.0nm
3	1.721		15545	33244	2.75	PDA Spectrum	210.0nm
4	2.145		533284	1177286	97.25	PDA Spectrum	210.0nm
5	2.145		234635	500175	94.18	PDA Spectrum	254.0nm

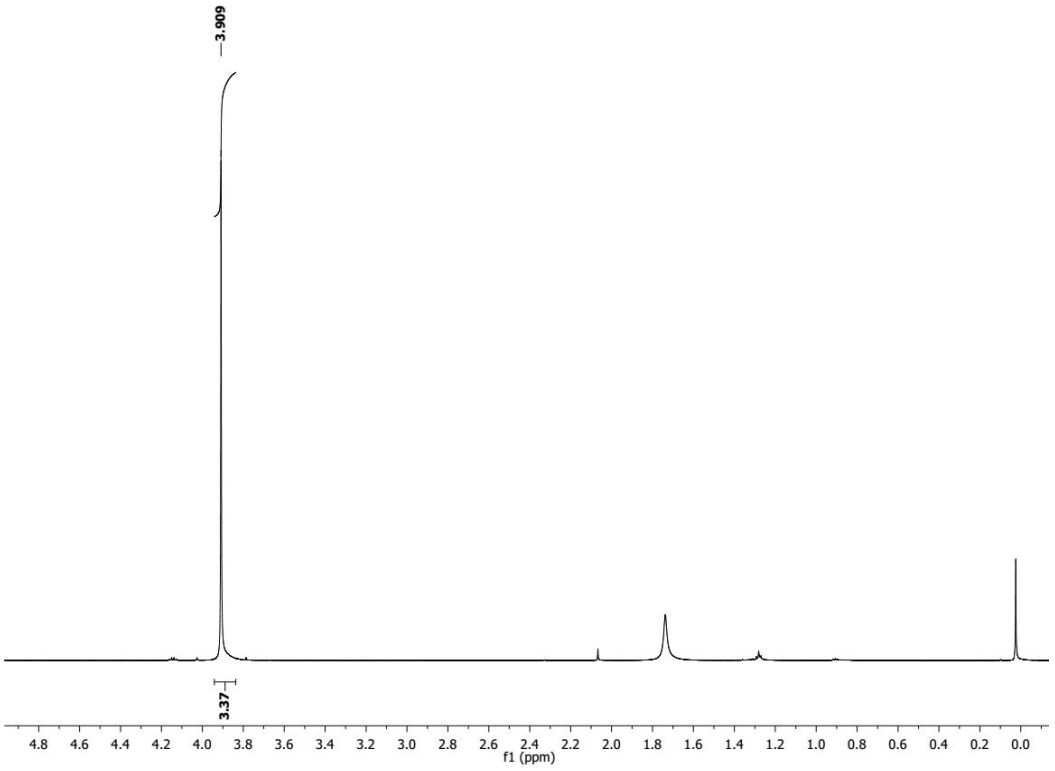


Base Peak 335.21 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (0.1:1.8;2.4:3.9) x 20.000 Th: 0.010 Retention Time 2.177

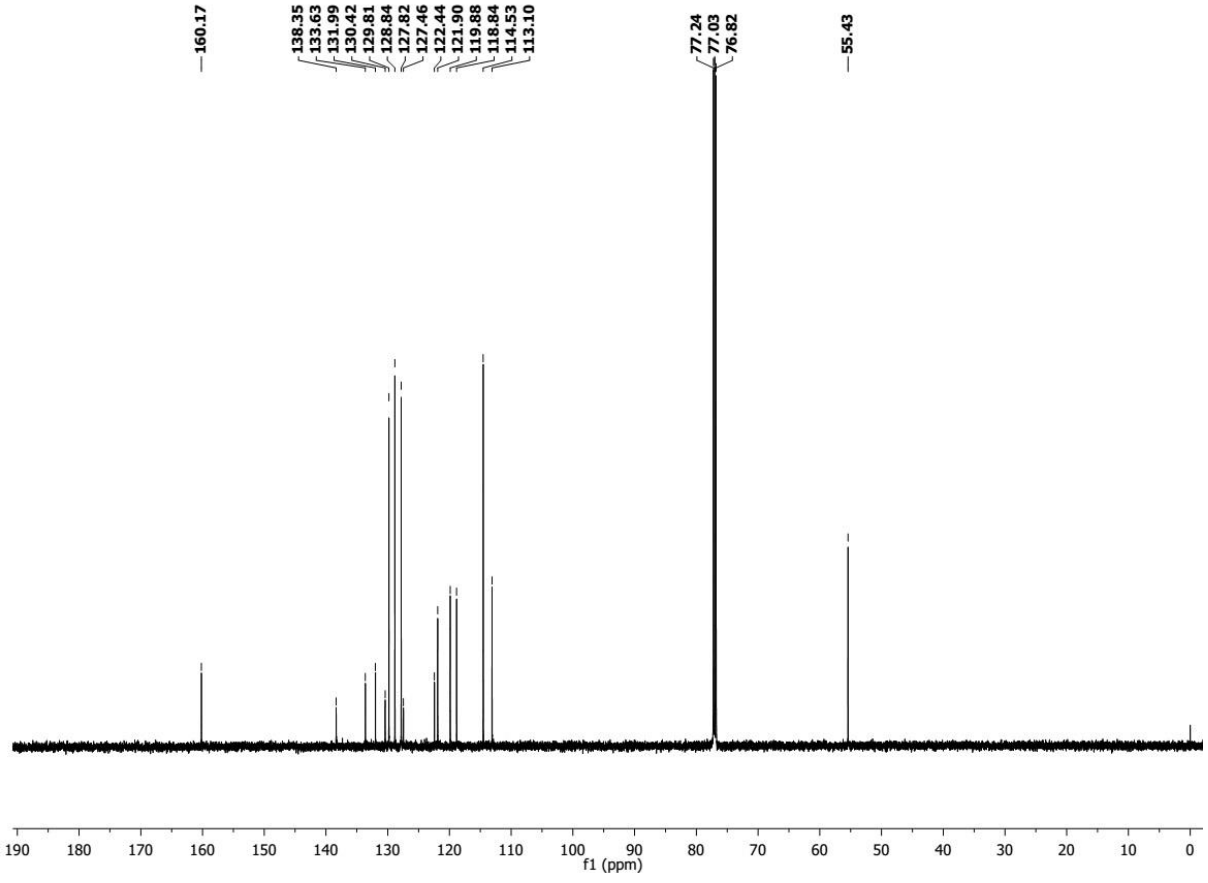
^{1}H NMR of Compound 3m

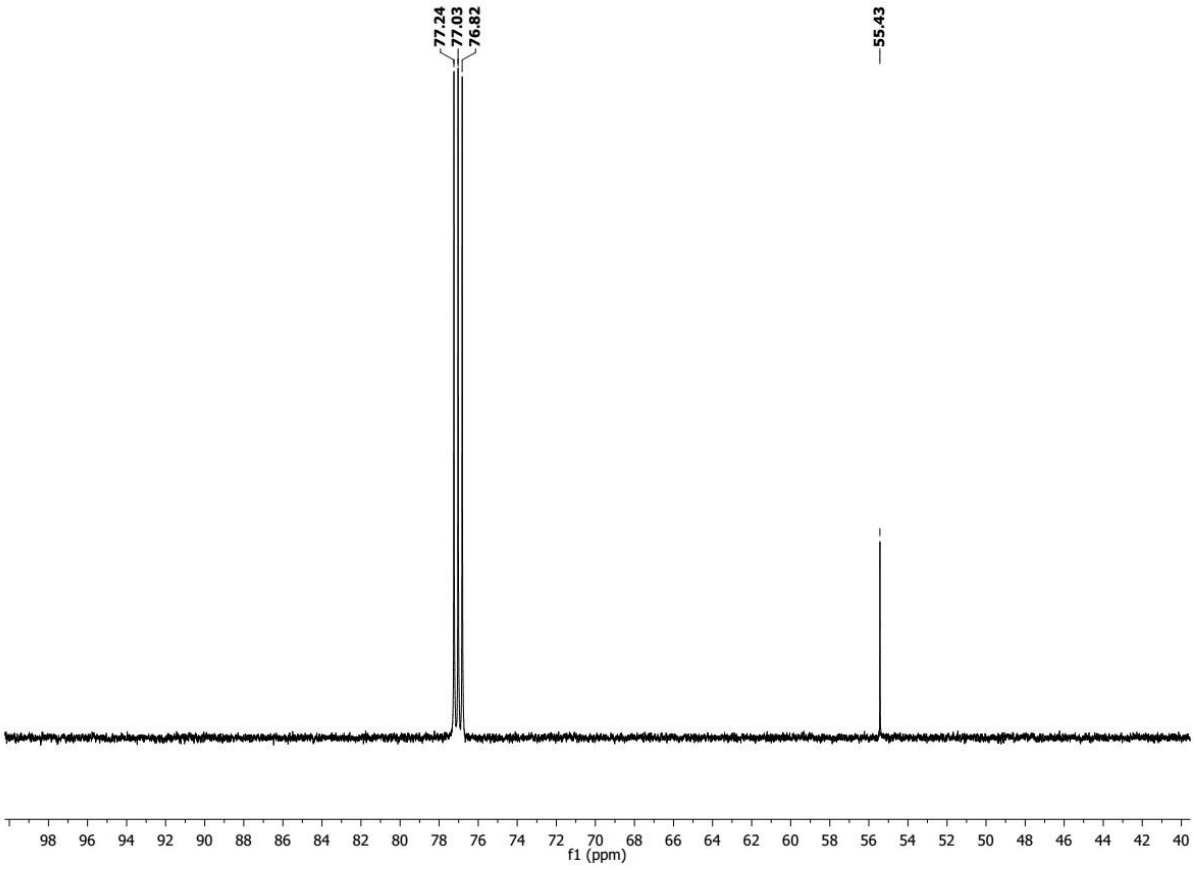


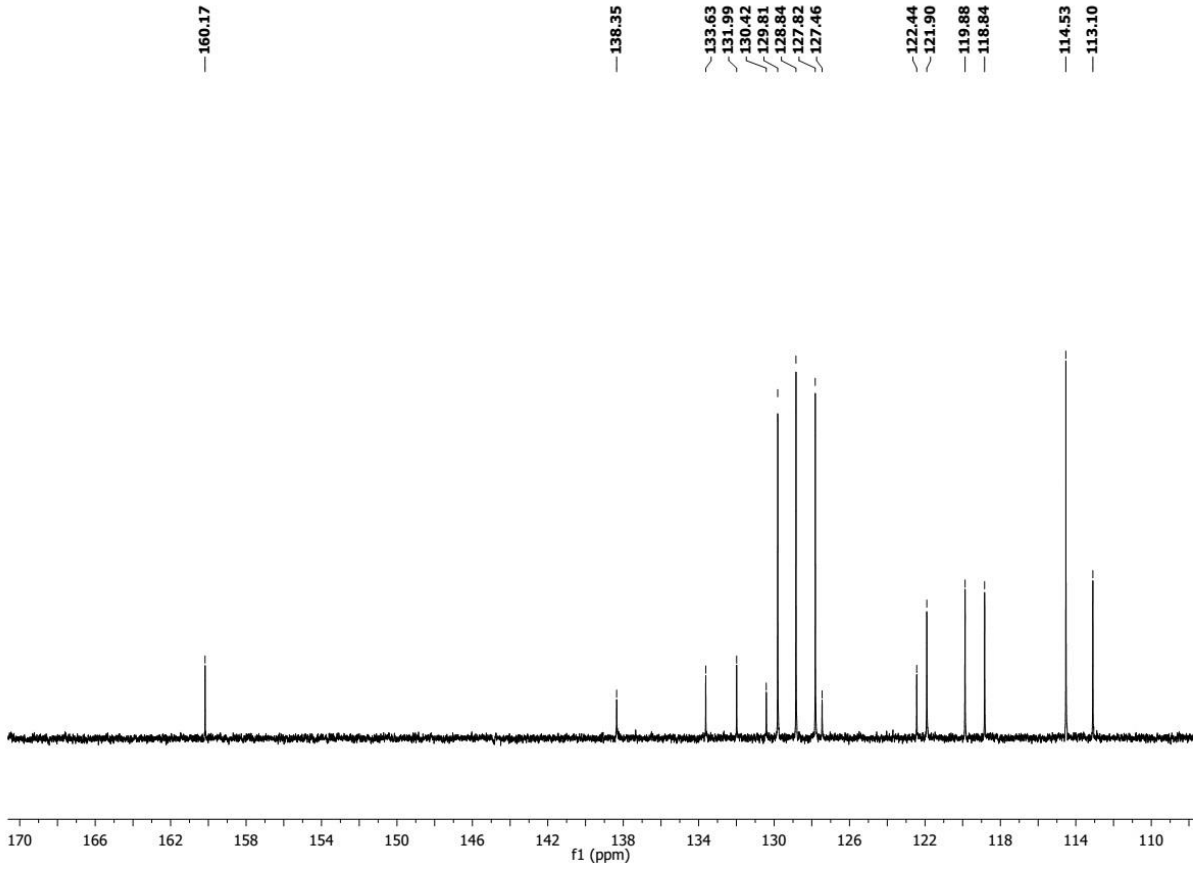


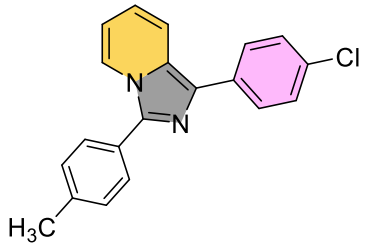


^{13}C NMR of Compound 3m



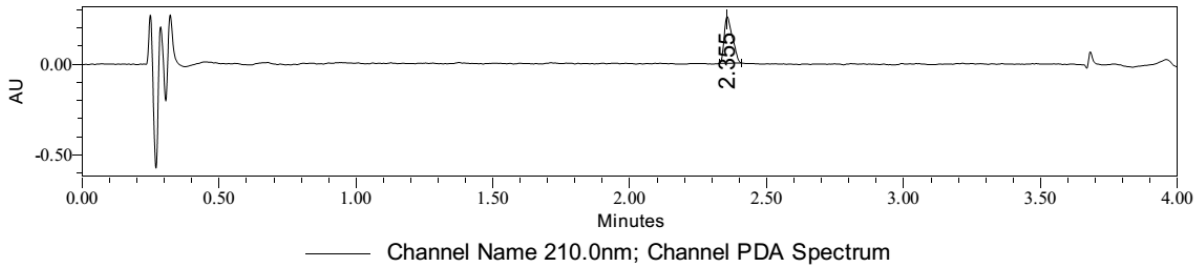

77.24
77.03
76.82
55.43
98 96 94 92 90 88 86 84 82 80 78 76 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40
f1 (ppm)


160.17
138.35
133.63
131.99
130.42
129.81
128.84
127.82
127.46
122.44
121.90
119.88
118.84
114.53
113.10
170 166 162 158 154 150 146 142 138 134 130 126 122 118 114 110
f1 (ppm)



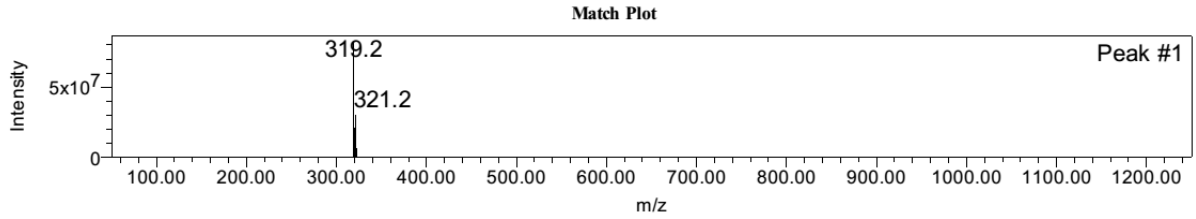
Compound (3n)

LC-MS analysis of Compound 3n



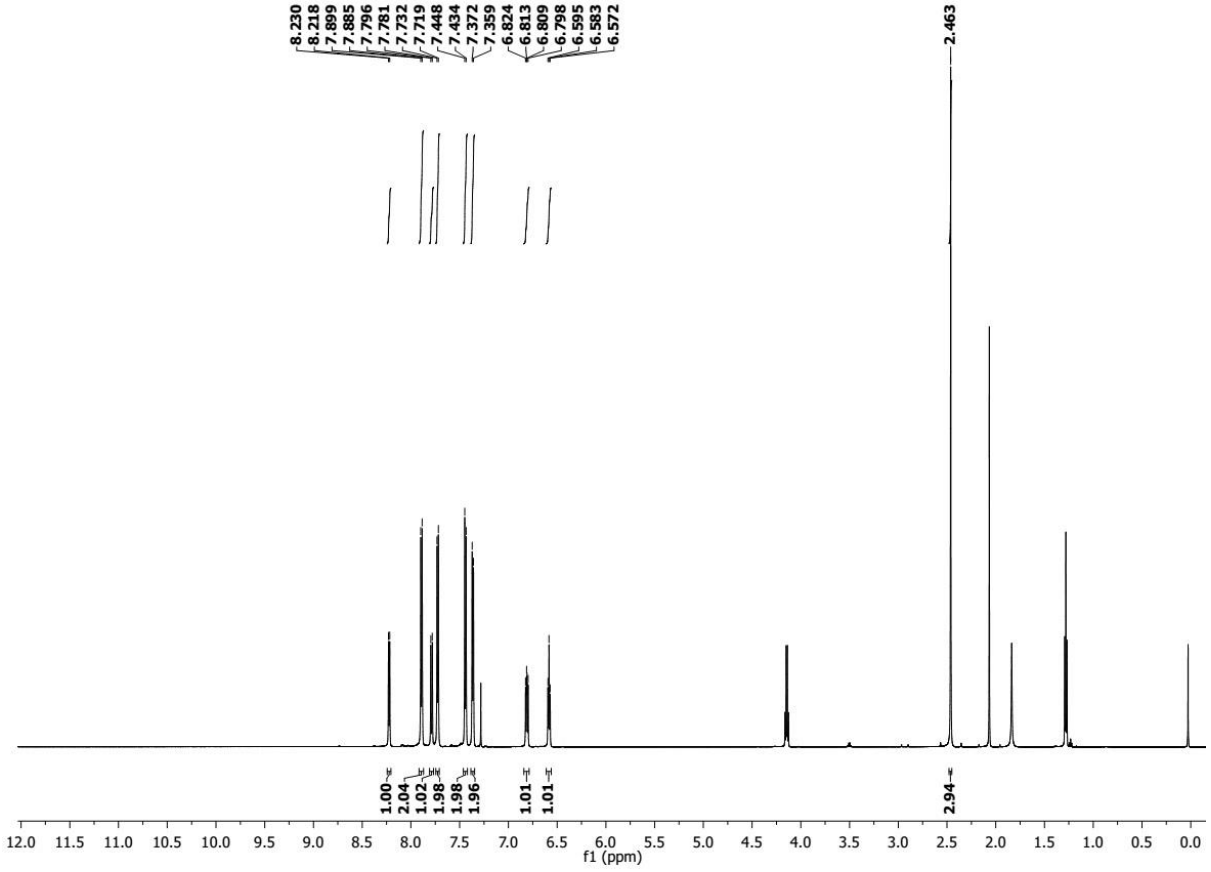
Peak Results
Channel: PDA Spectrum

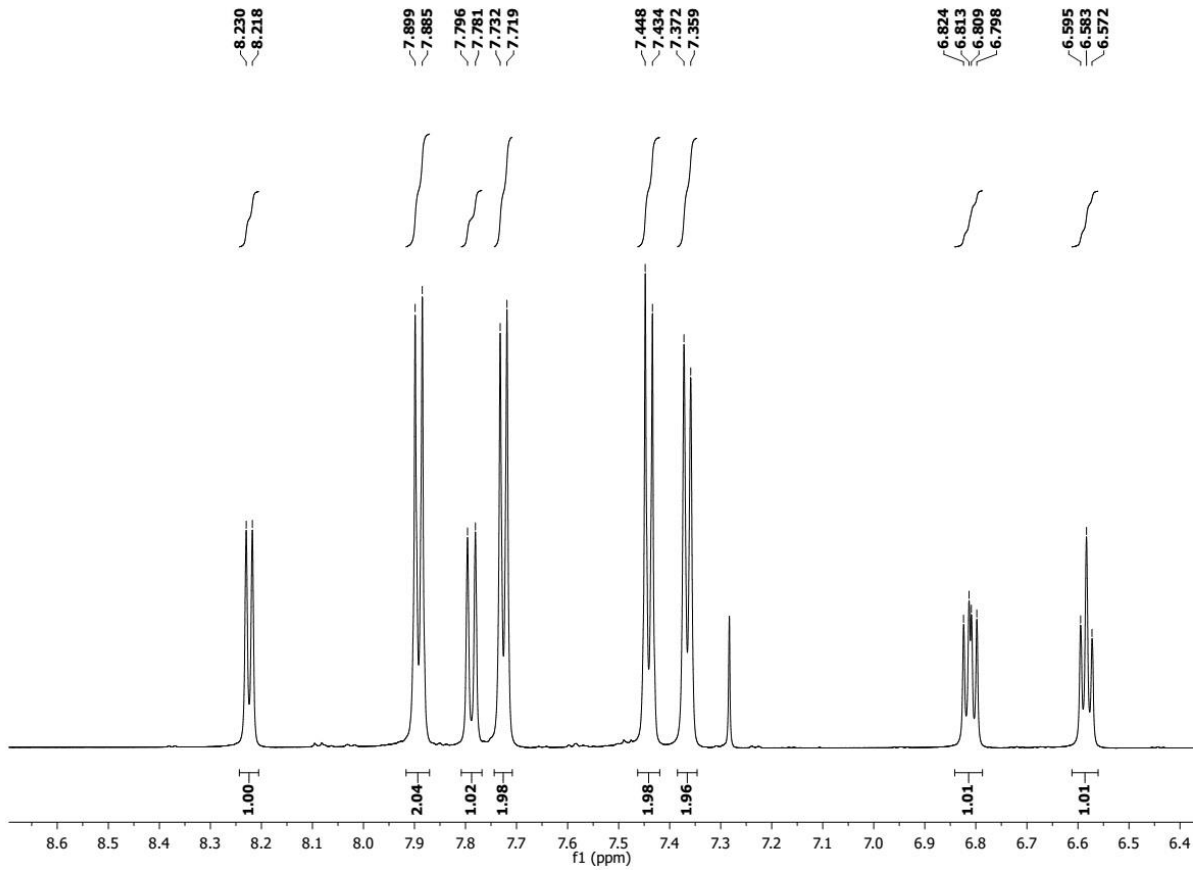
	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	2.355		257651	531715	100.00	PDA Spectrum	210.0nm

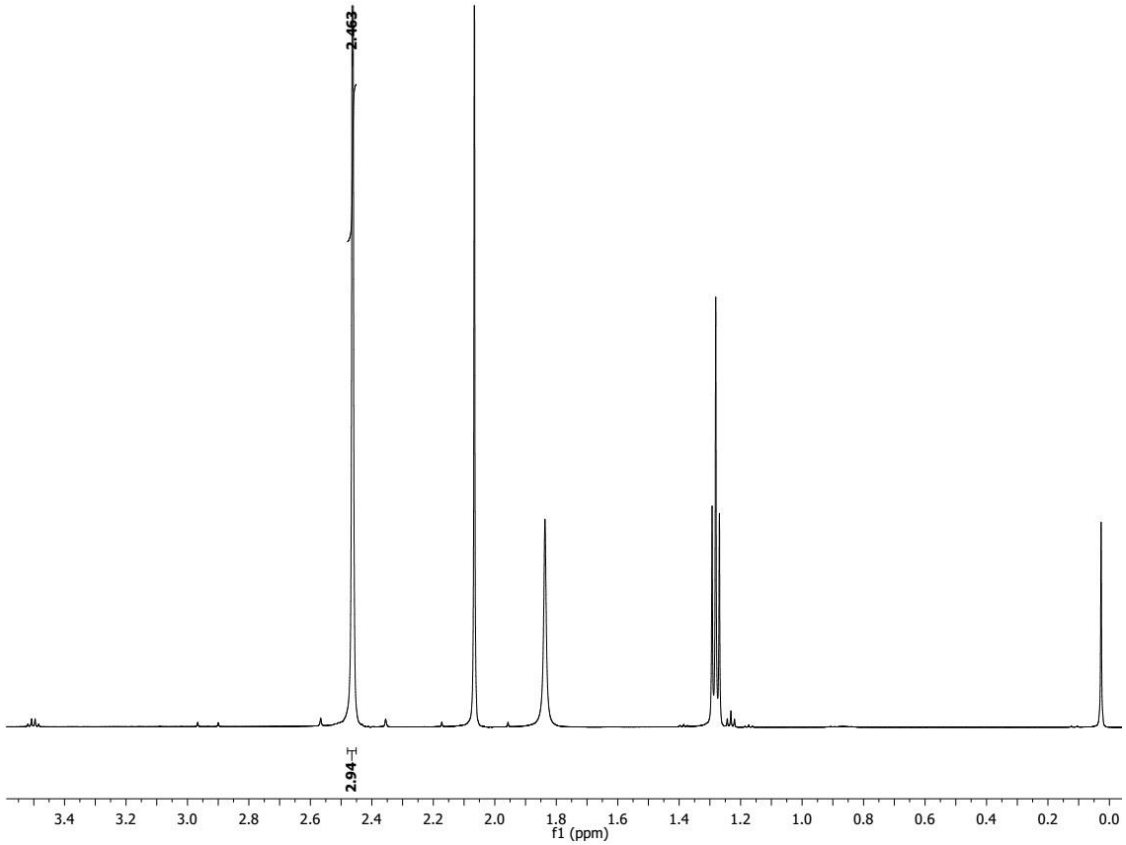


Base Peak 319.20 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (0.2:2.2;2.8:3.9) x 20.000 Th: 0.001 Retention Time 2.382

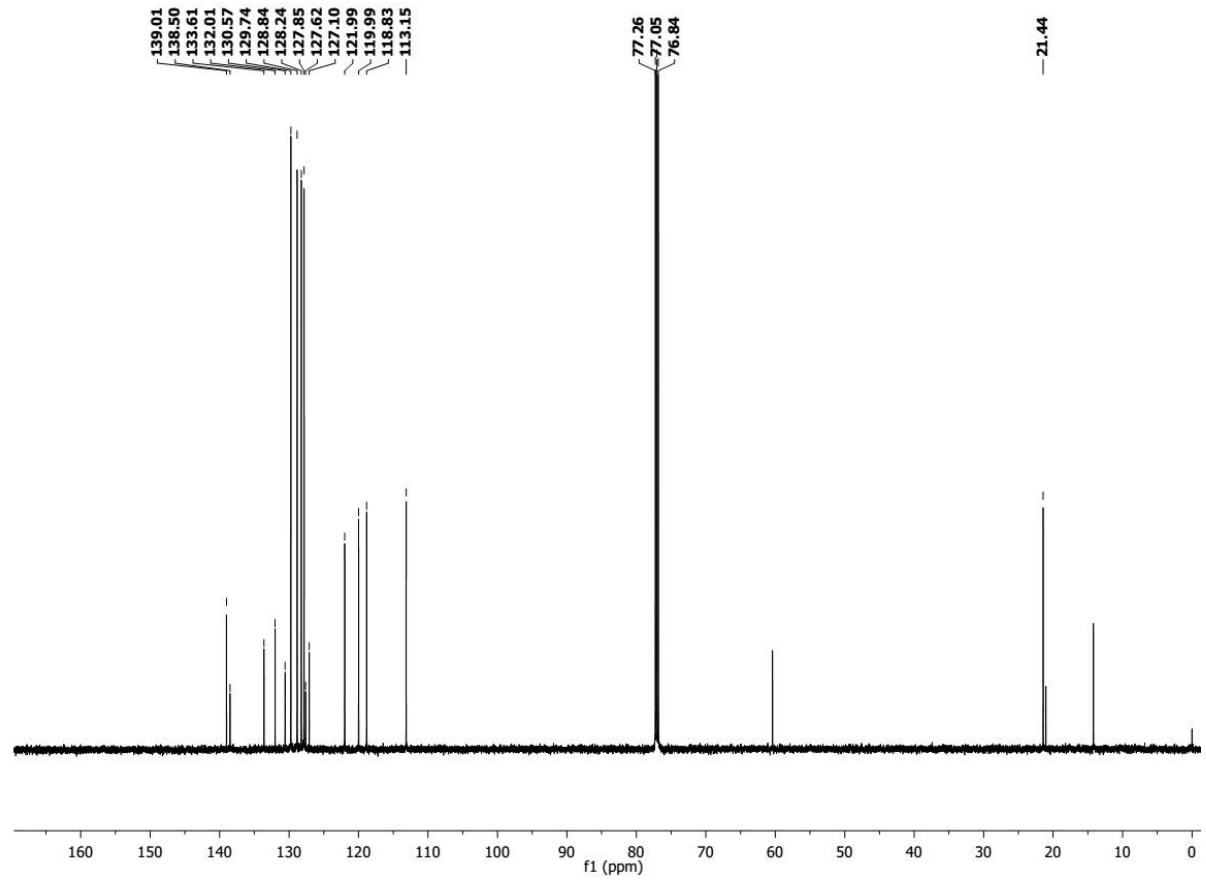
^{1}H NMR of Compound 3n

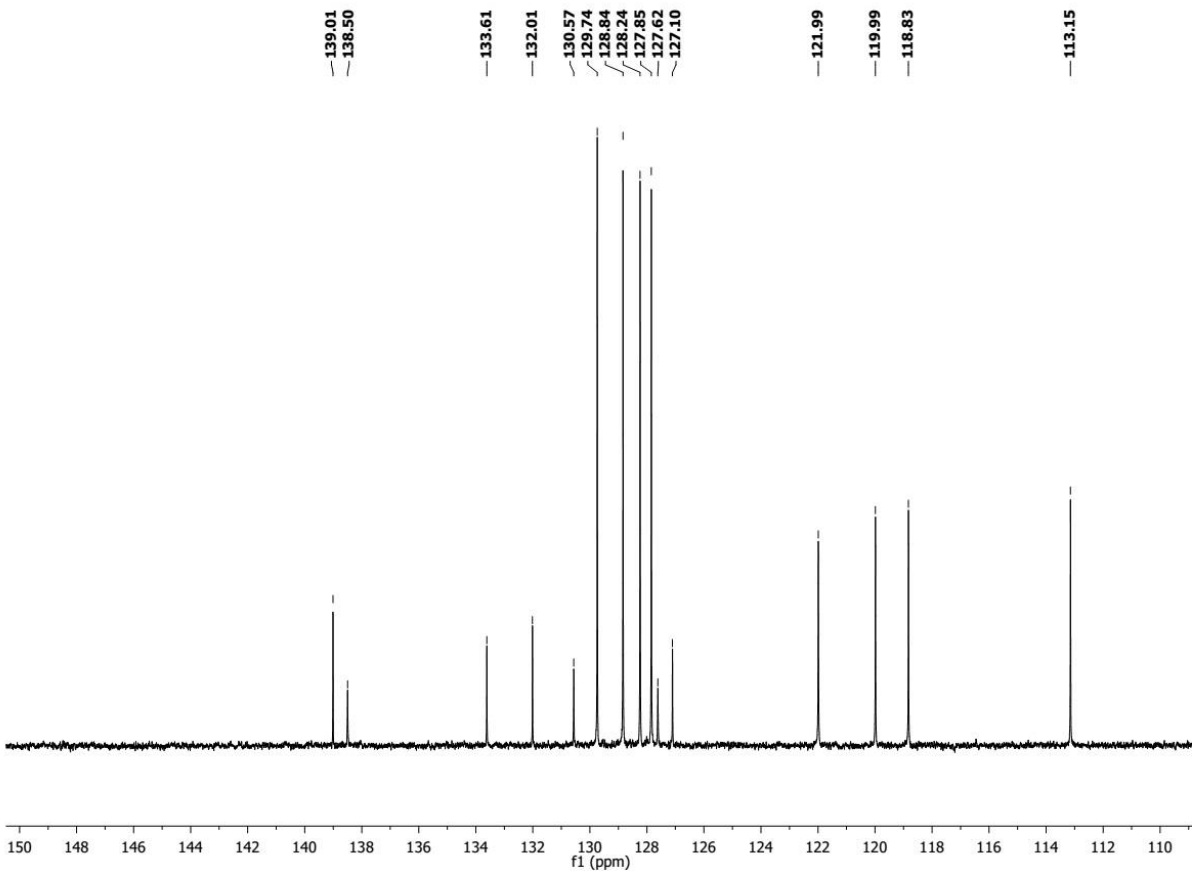


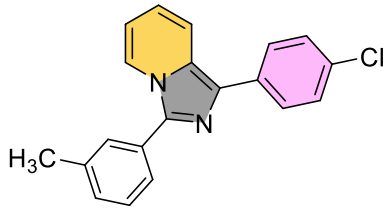




^{13}C NMR of Compound 3n

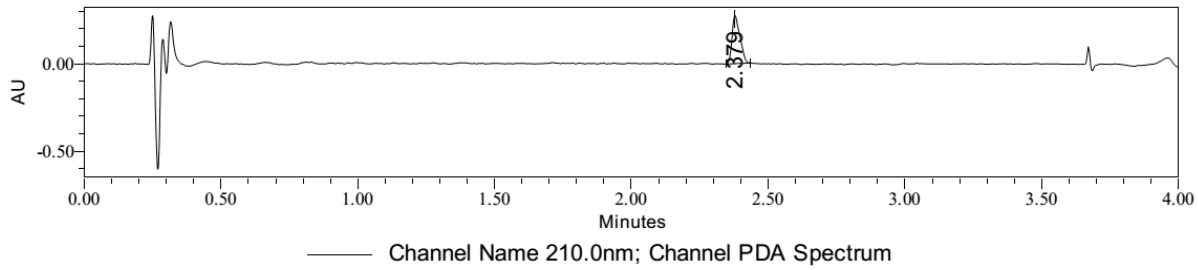



139.01
138.50
133.61
132.01
130.57
129.74
128.84
128.24
127.85
127.62
127.10
121.99
119.99
118.83
113.15
150 148 146 144 142 140 138 136 134 132 130 128 126 124 122 120 118 116 114 112 110
f1 (ppm)



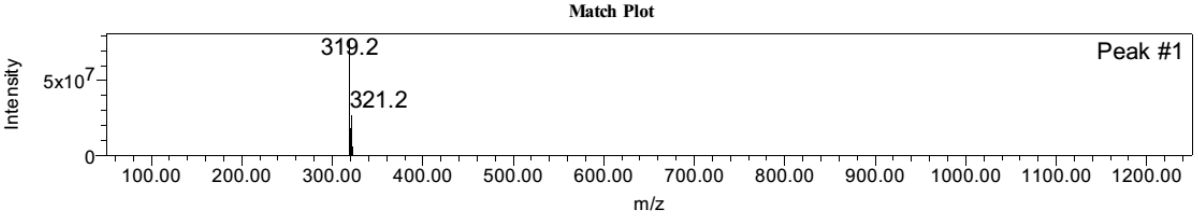
Compound (30)

LC-MS of Compound 30



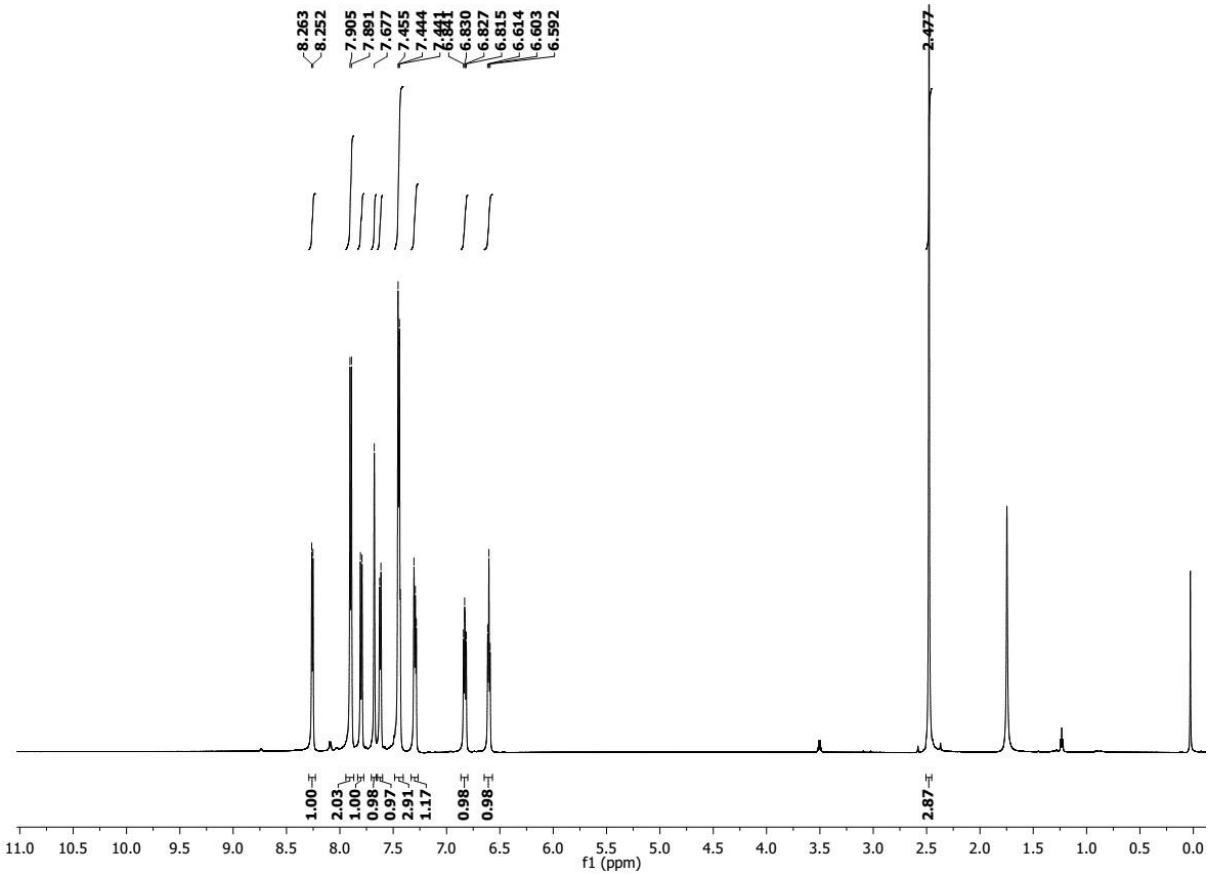
Peak Results
Channel: PDA Spectrum

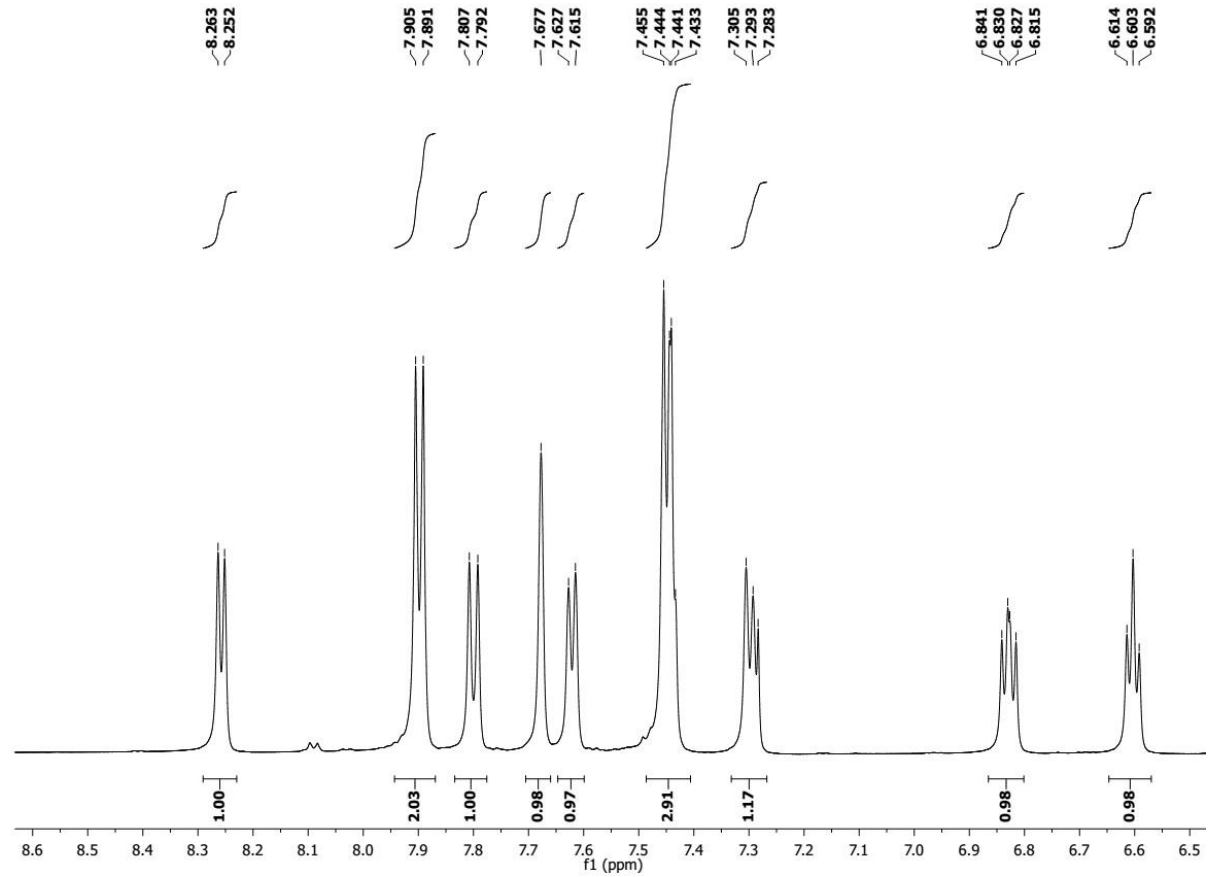
	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	2.379		275987	550076	100.00	PDA Spectrum	210.0nm

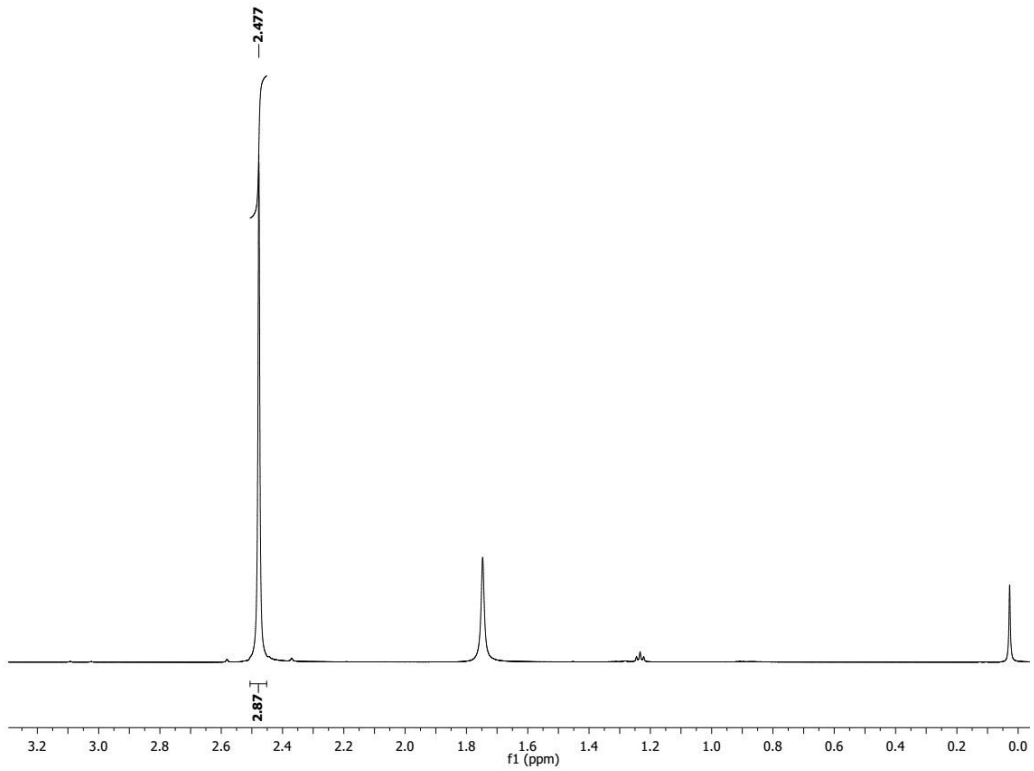


Base Peak 319.20 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (1.0:2.2;2.7:3.9;0.1:1.5) x 20.000 Th: 0.010 Retention Time 2.407

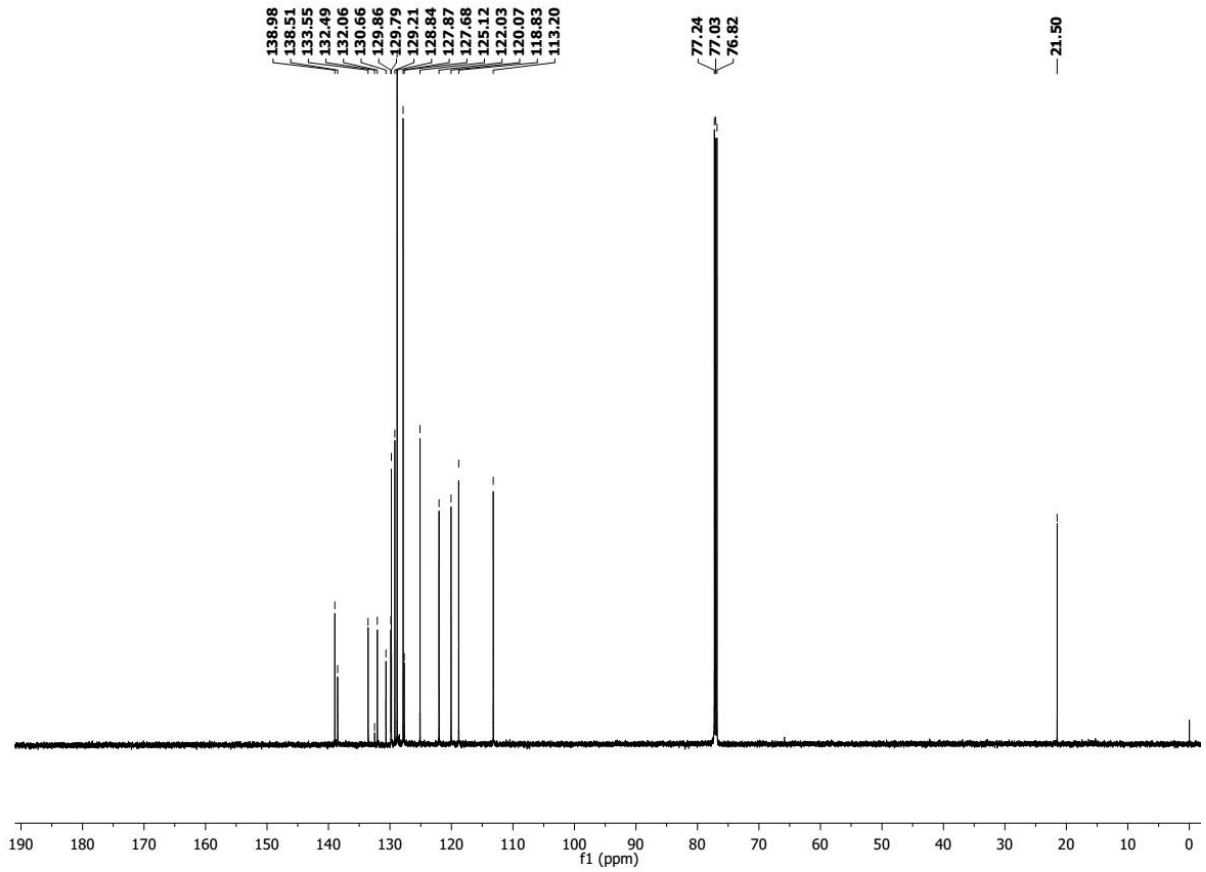
^{1}H NMR of Compound 30

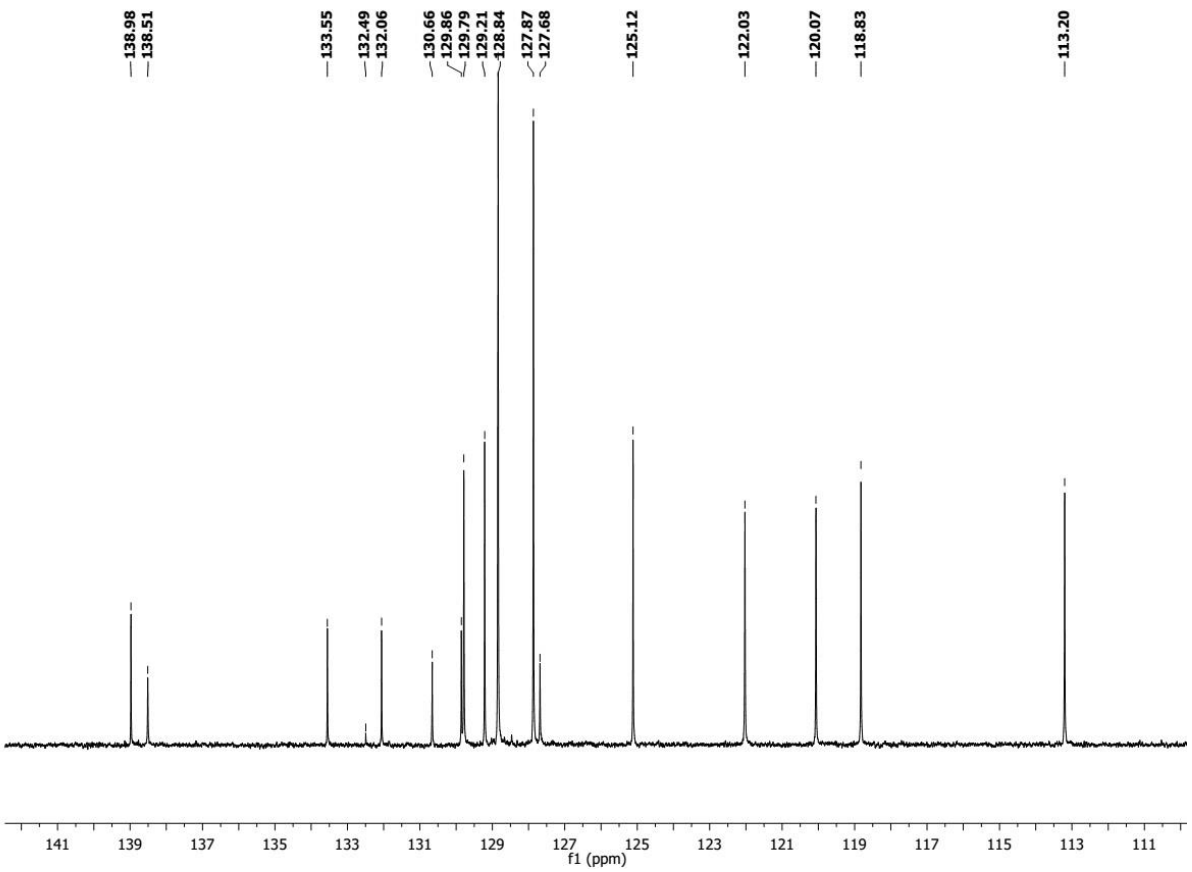


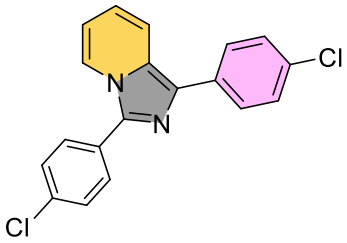




^{13}C NMR of Compound 30

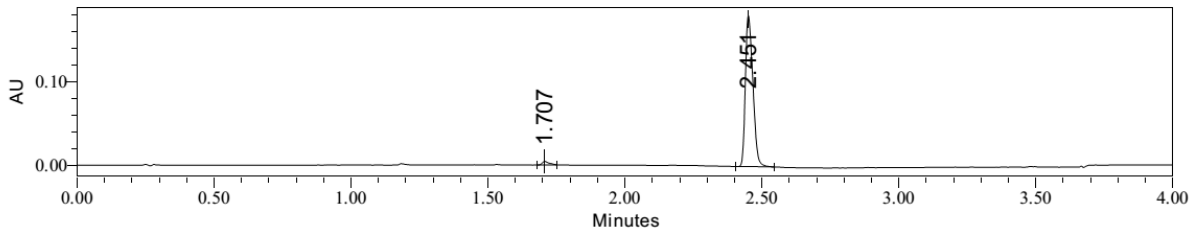


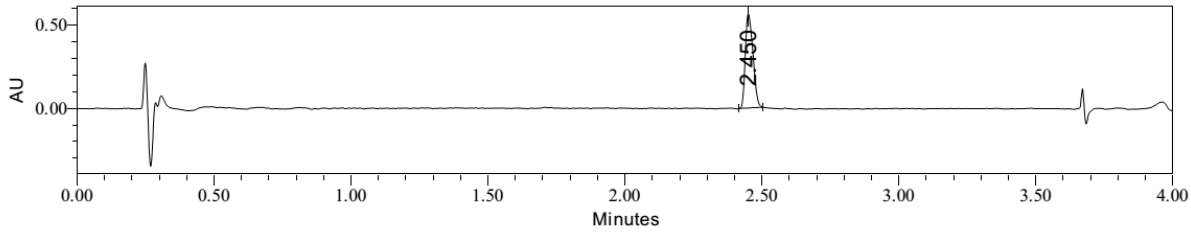

138.98
138.51
133.55
132.49
132.06
130.66
129.86
129.79
129.21
128.84
127.87
127.68
125.12
122.03
120.07
118.83
113.20
141
139
137
135
133
131
129
127
125
123
121
119
117
115
113
111
f1 (ppm)



Compound (3p)

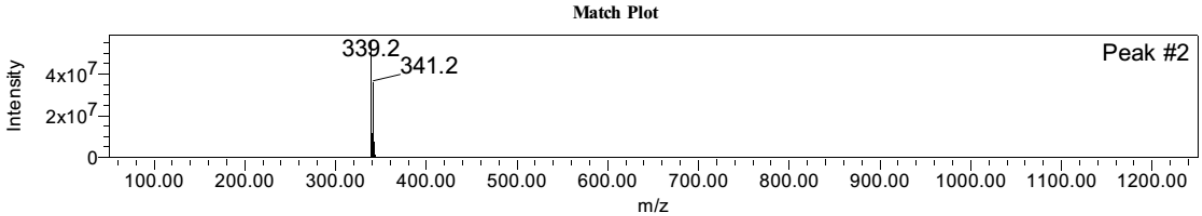
LC-MS of Compound 3p





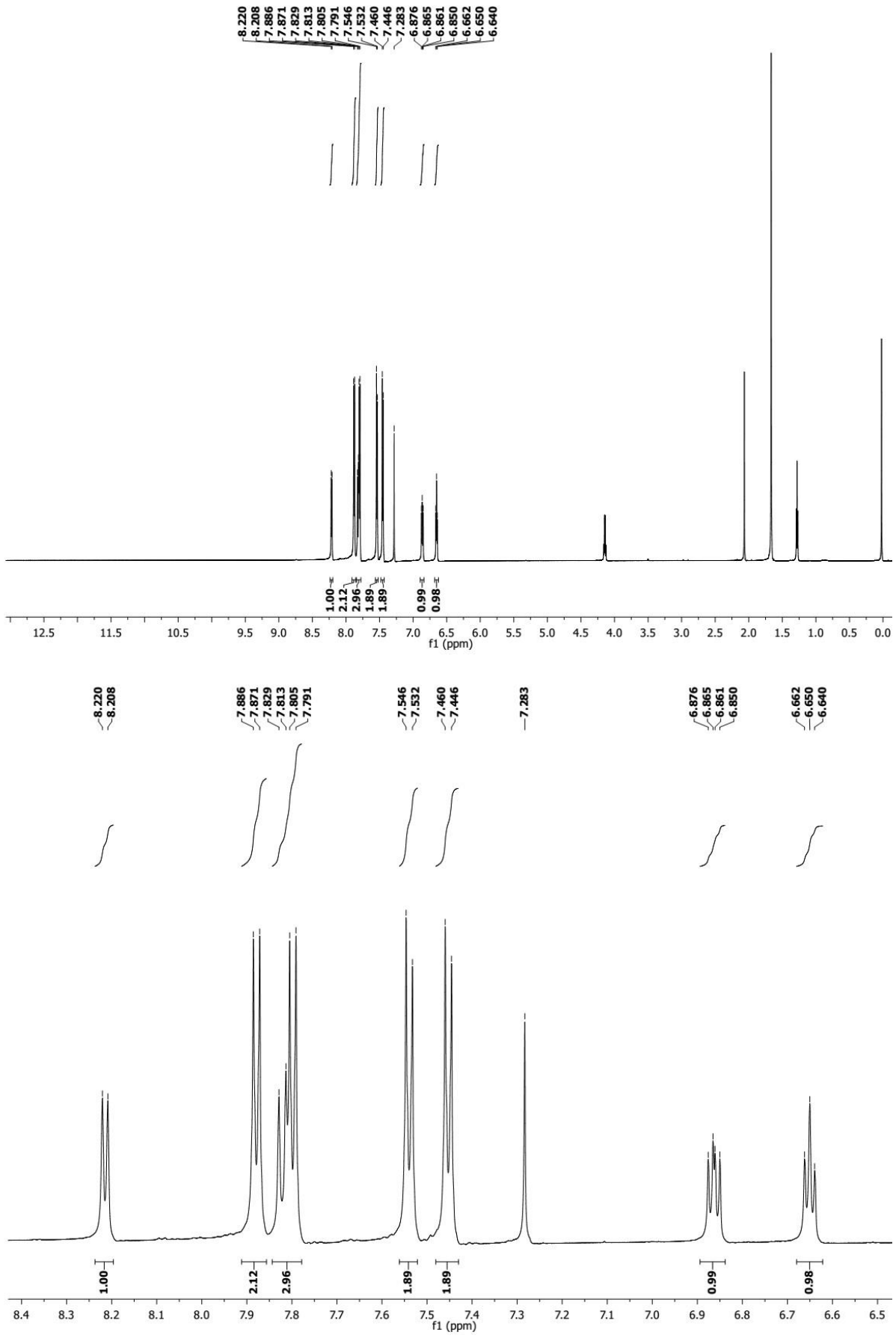
Peak Results
Channel: PDA Spectrum

	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	1.707		4294	7433	2.10	PDA Spectrum	254.0nm
2	2.450		564323	1093627	100.00	PDA Spectrum	210.0nm
3	2.451		181645	345792	97.90	PDA Spectrum	254.0nm

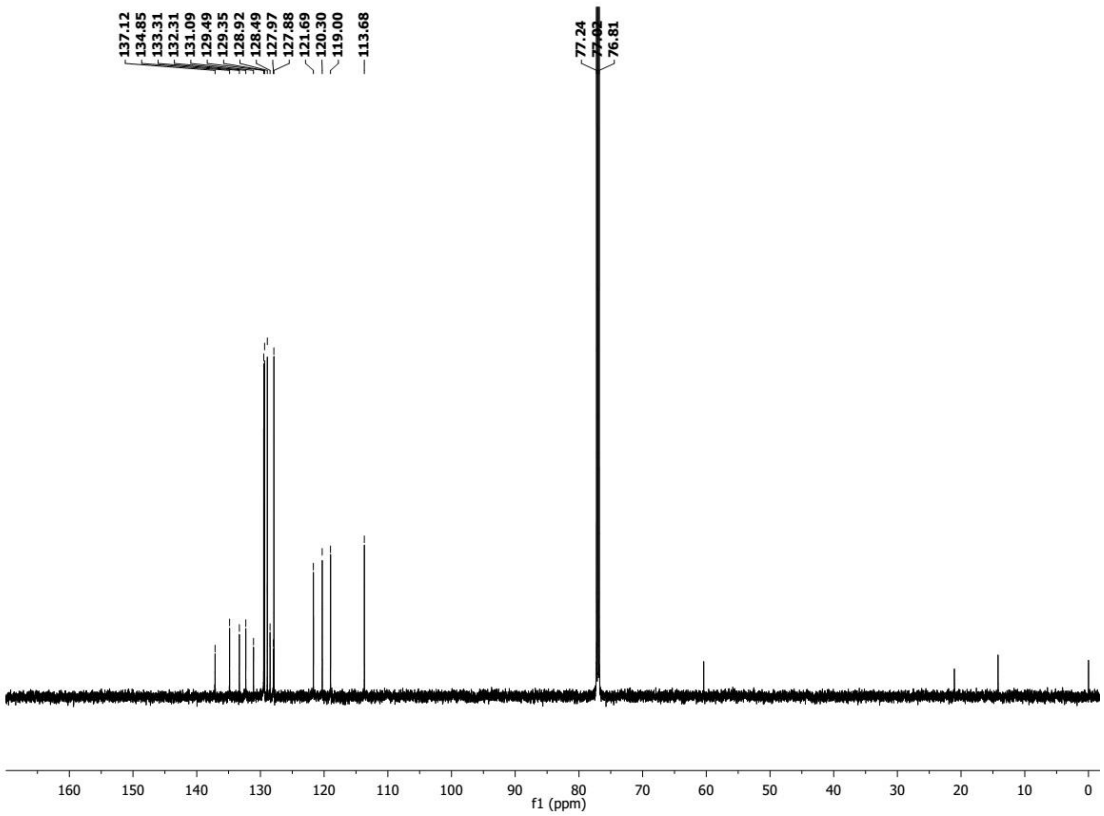


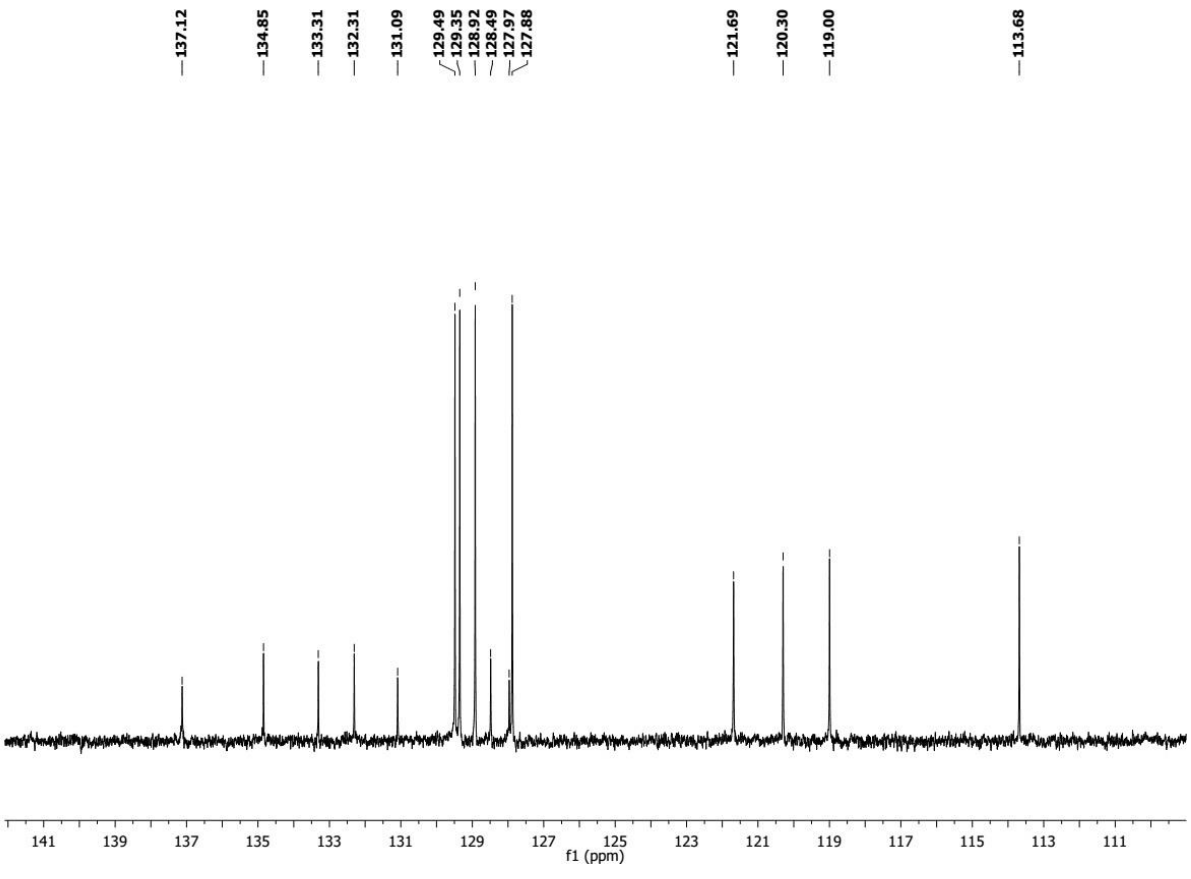
Base Peak 339.18 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (1.8:2.4;0.0:1.6;2.7:3.9) x 20.000 Retention Time 2.479

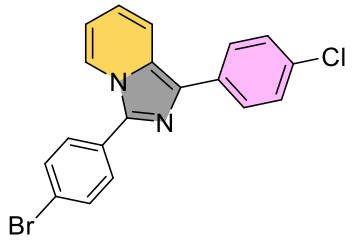
[1]H NMR of Compound 3p



^{13}C NMR of Compound 3p

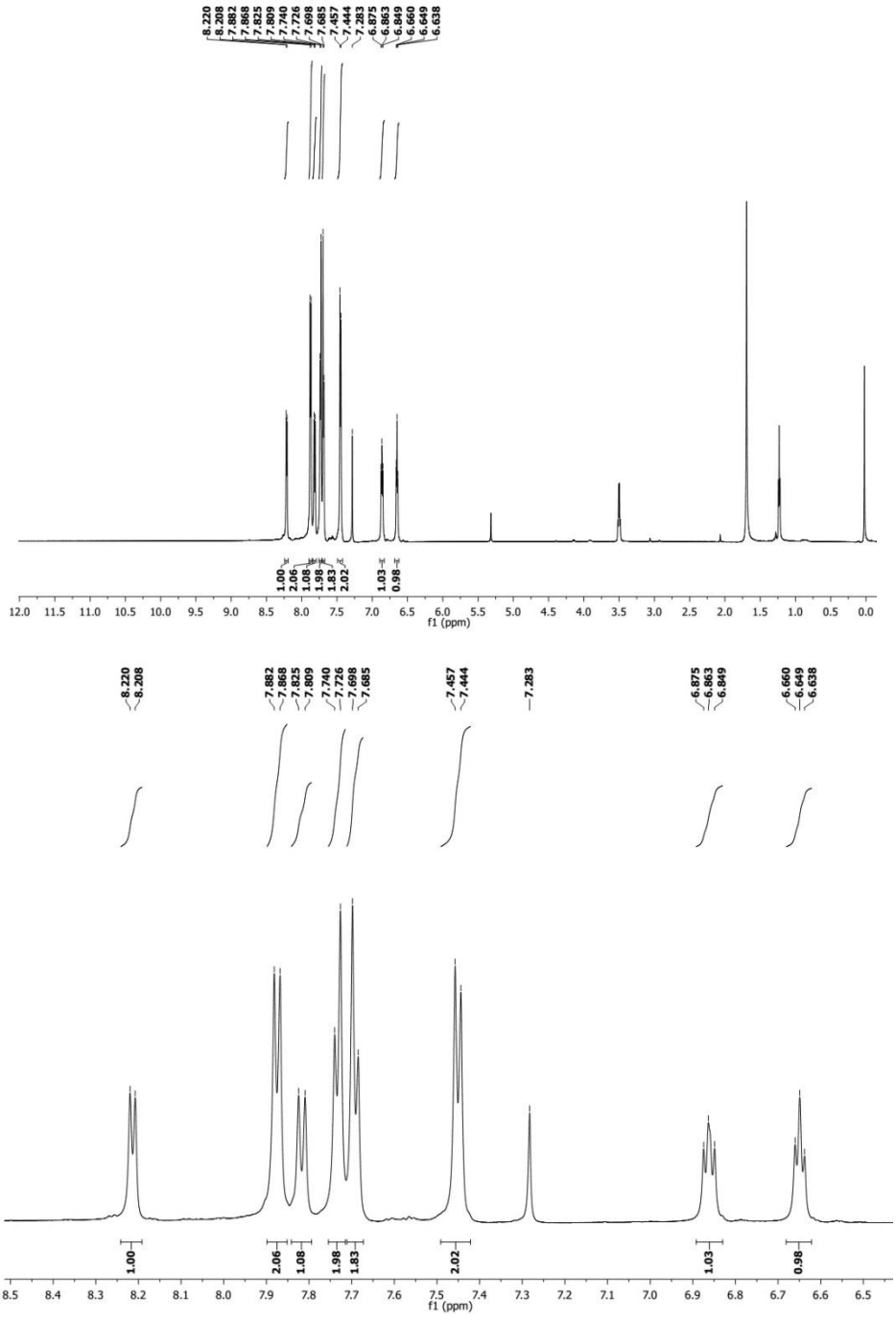




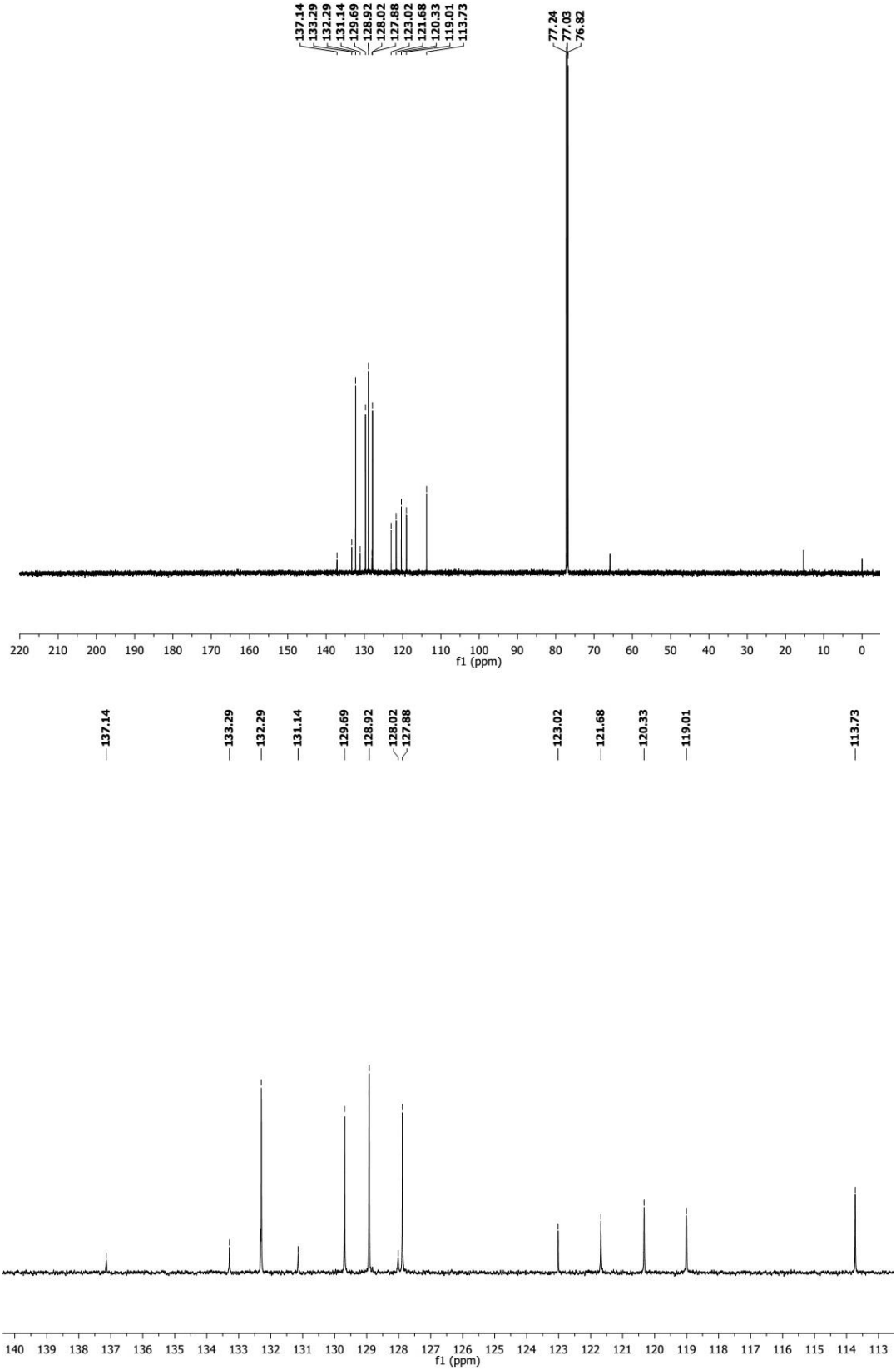


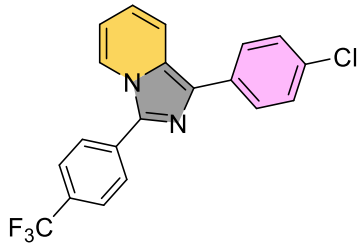
Compound (3q)

^{1}H NMR of Compound 3q



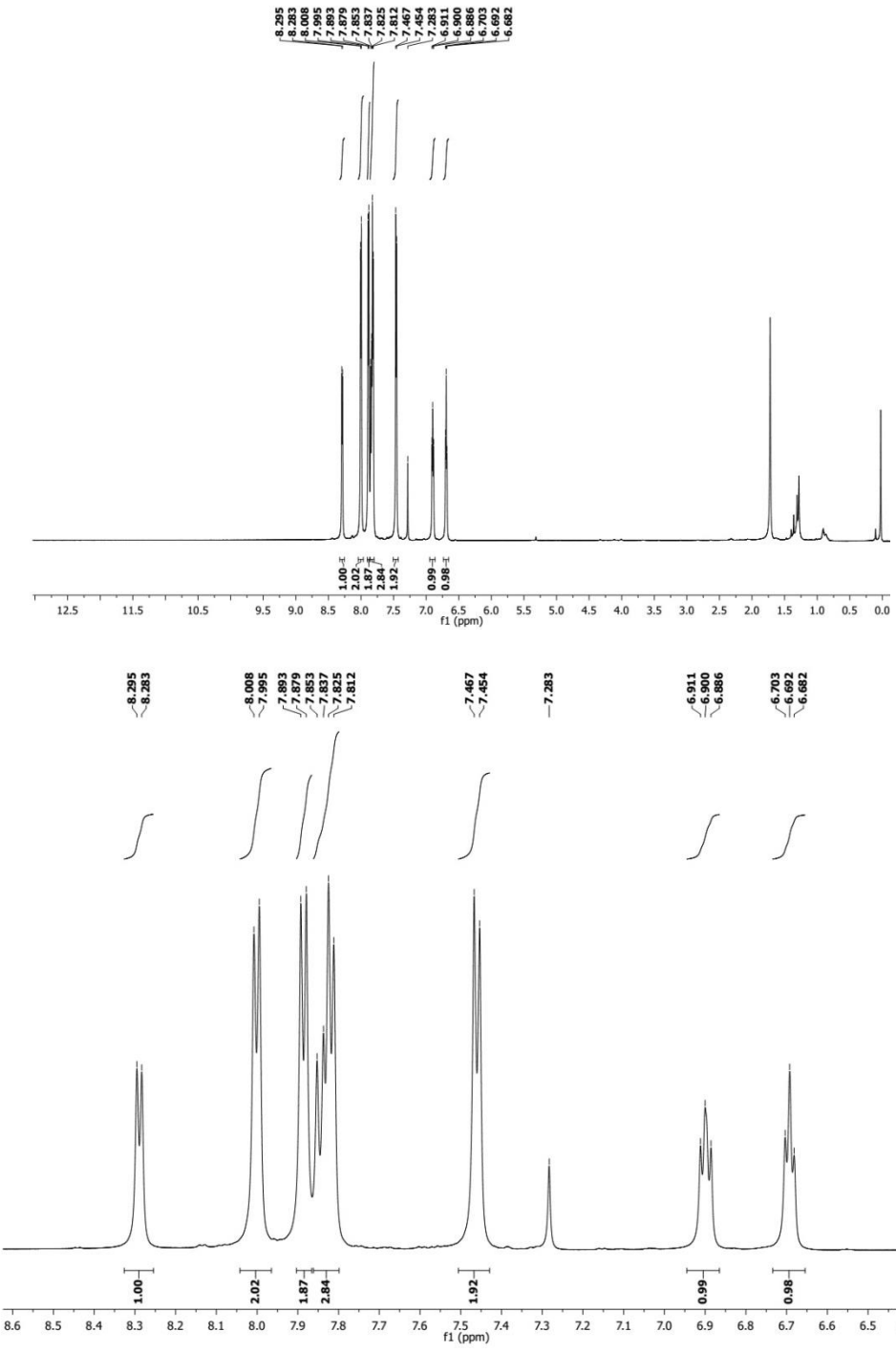
^{13}C NMR of Compound 3q



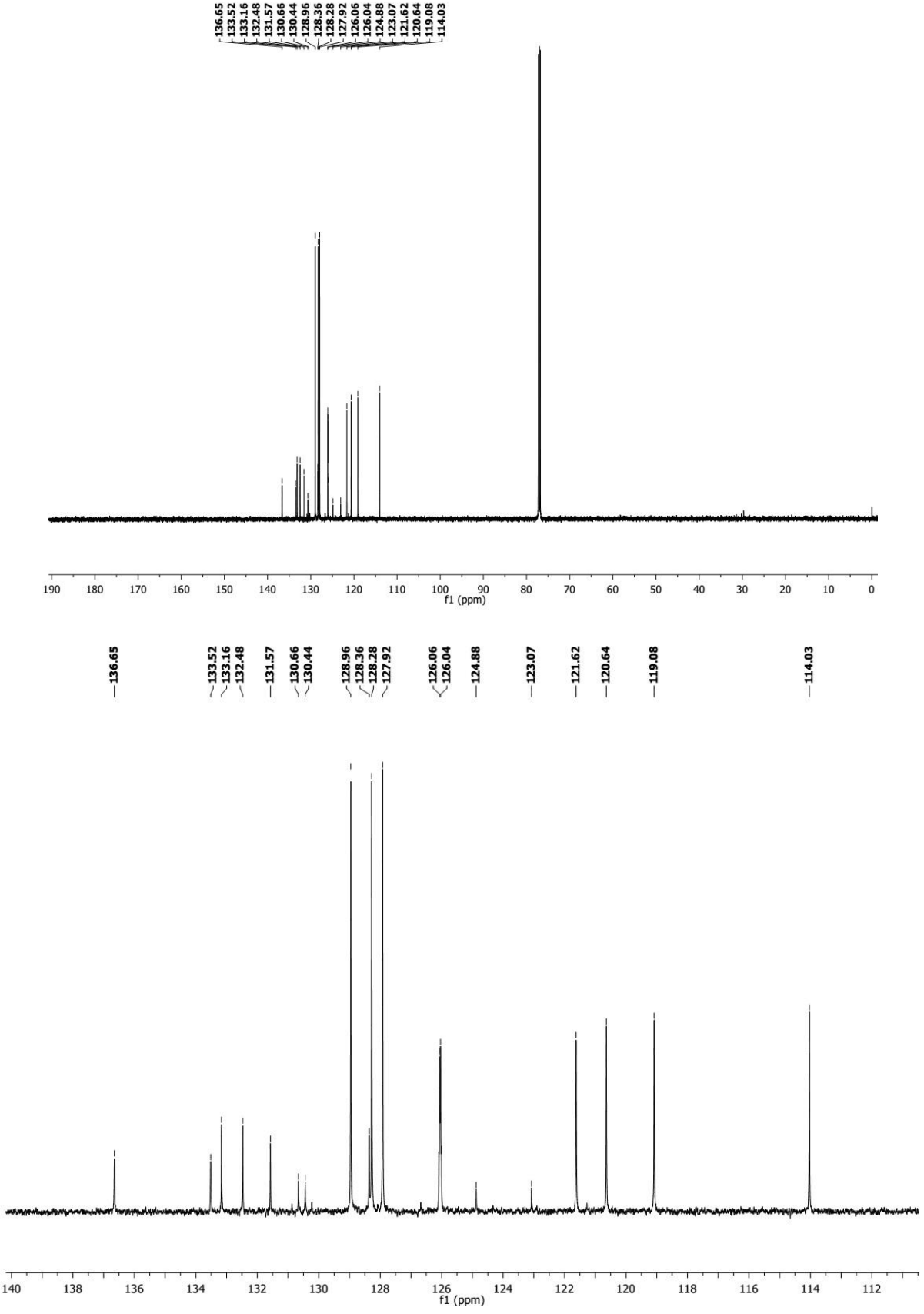


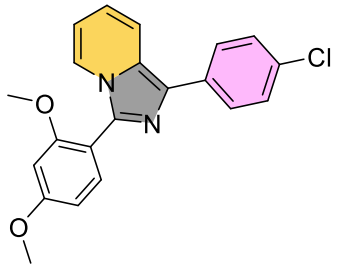
Compound (3r)

^{1}H NMR of Compound 3r



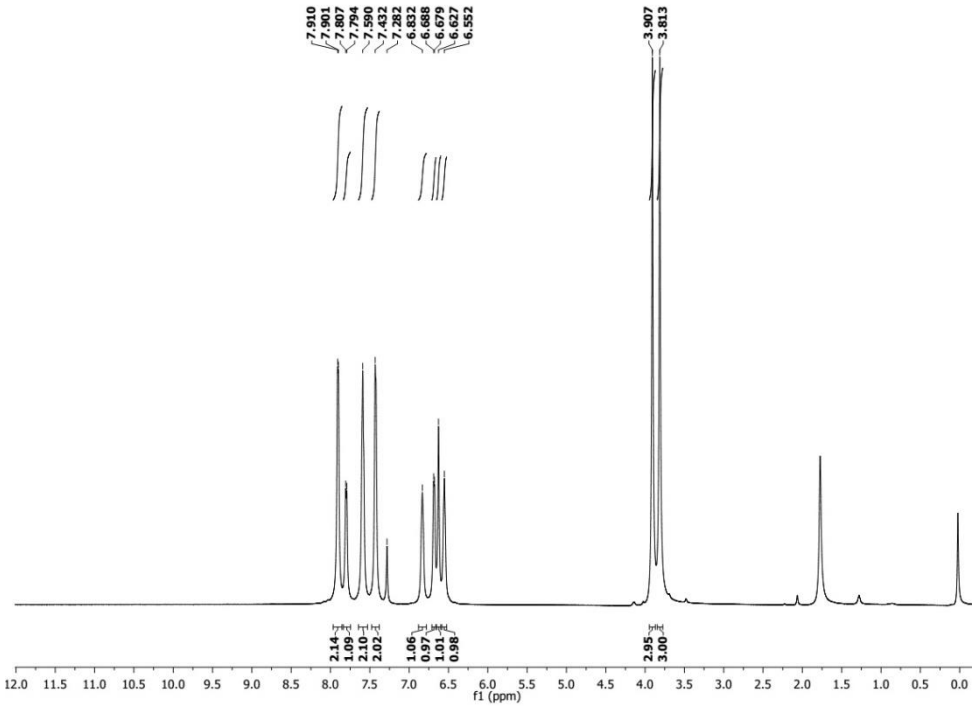
^{13}C NMR of Compound 3r

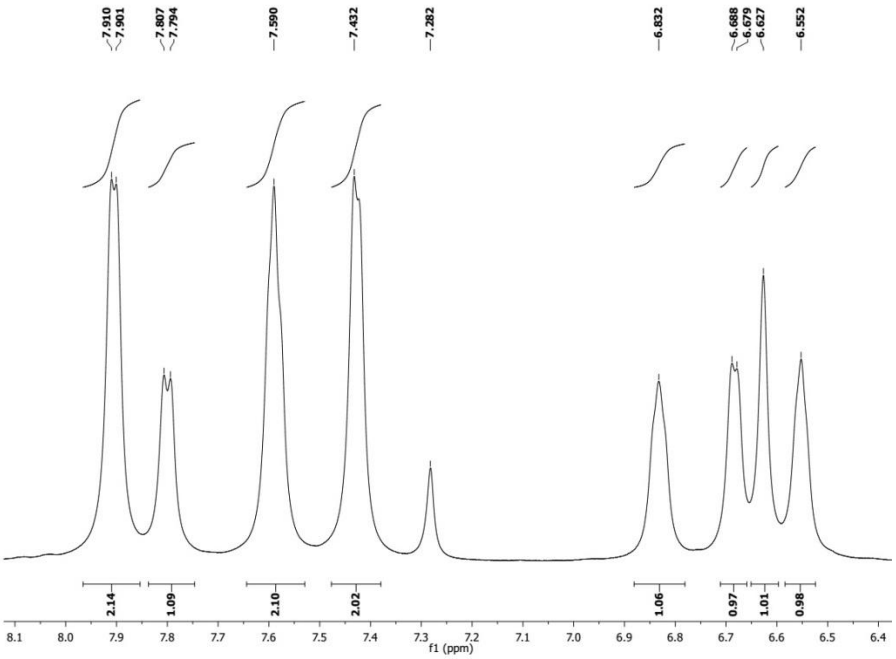


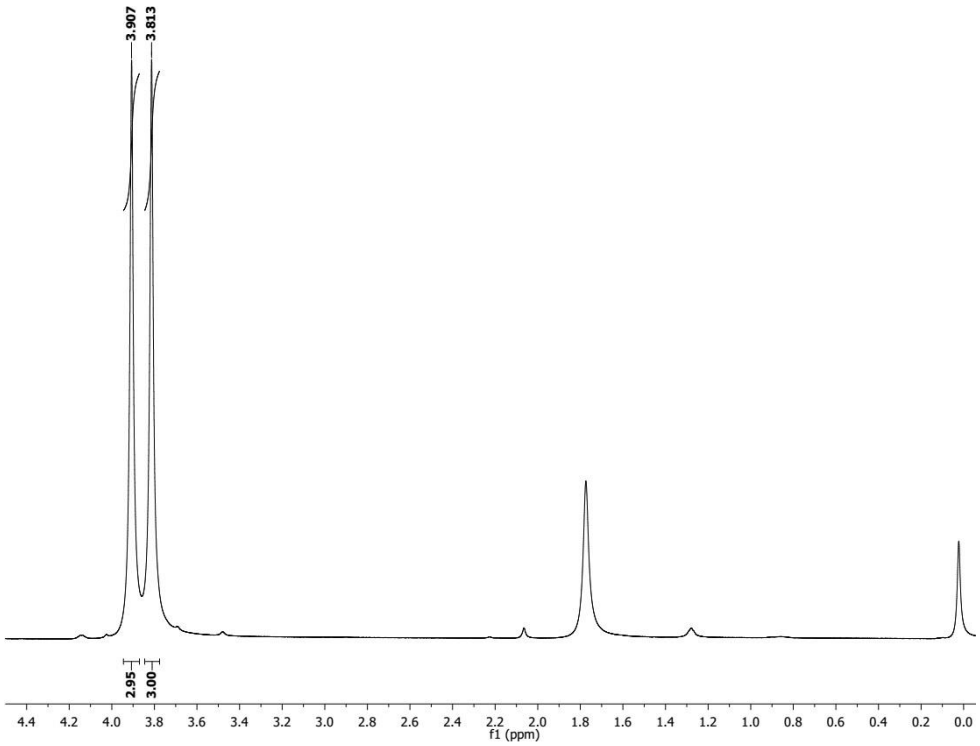


Compound (3s)

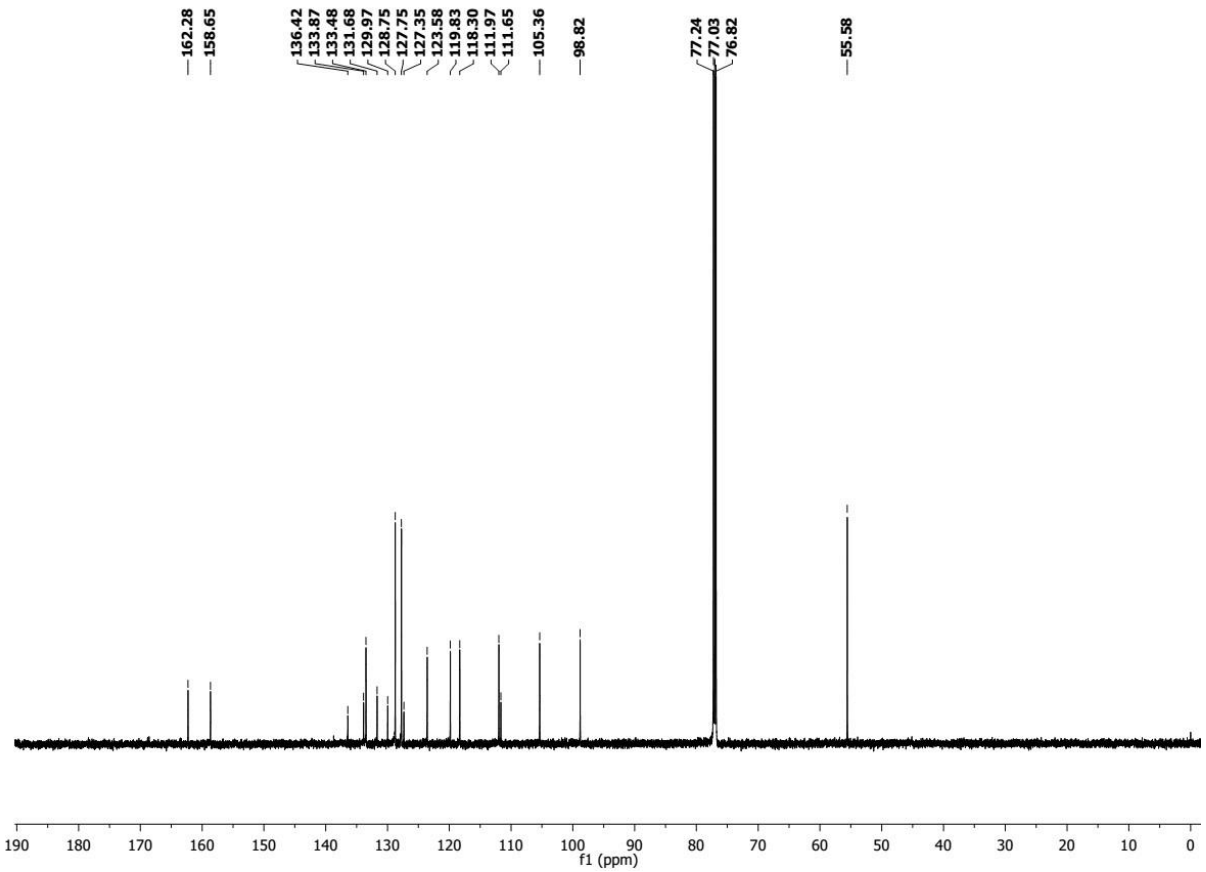
^{1}H NMR of Compound 3s

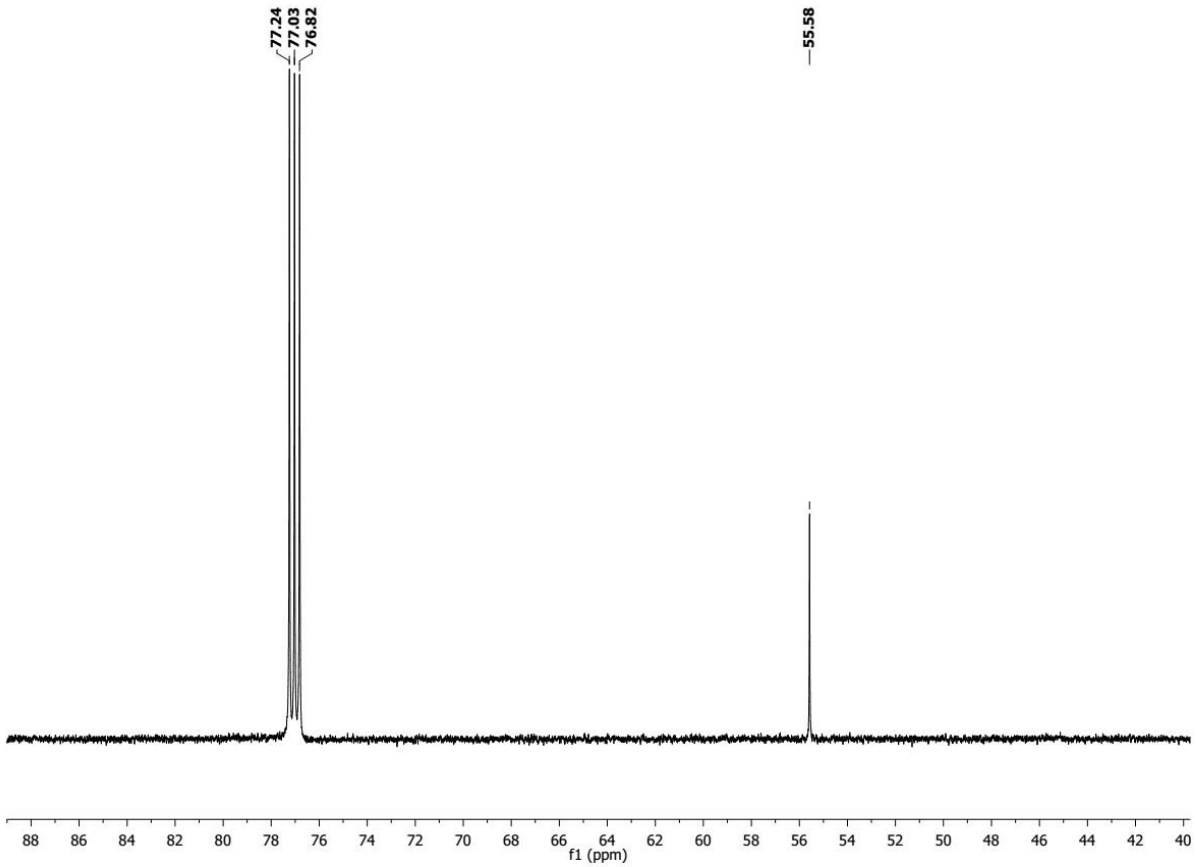


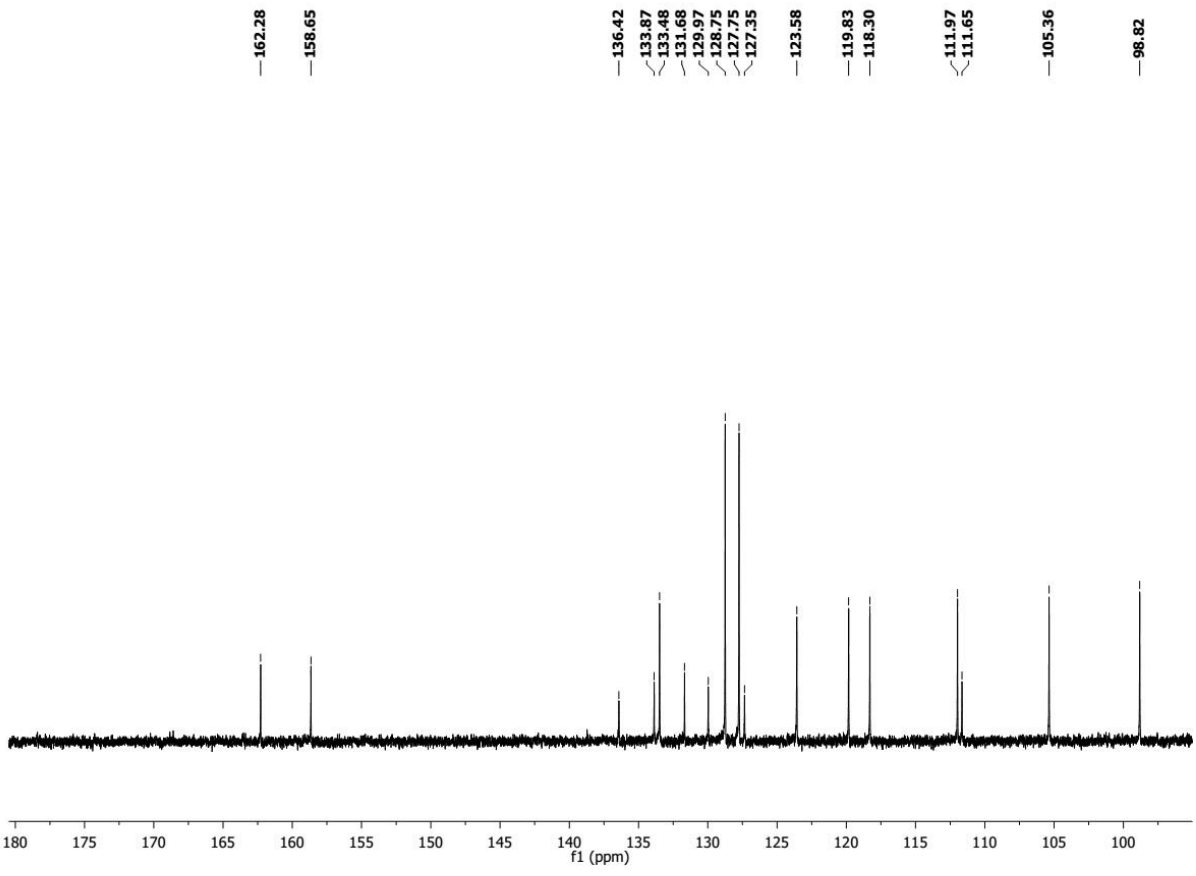


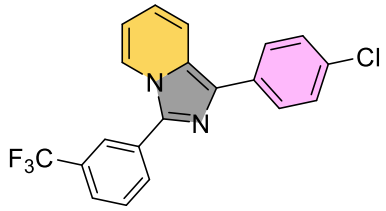


^{13}C NMR of Compound 3s



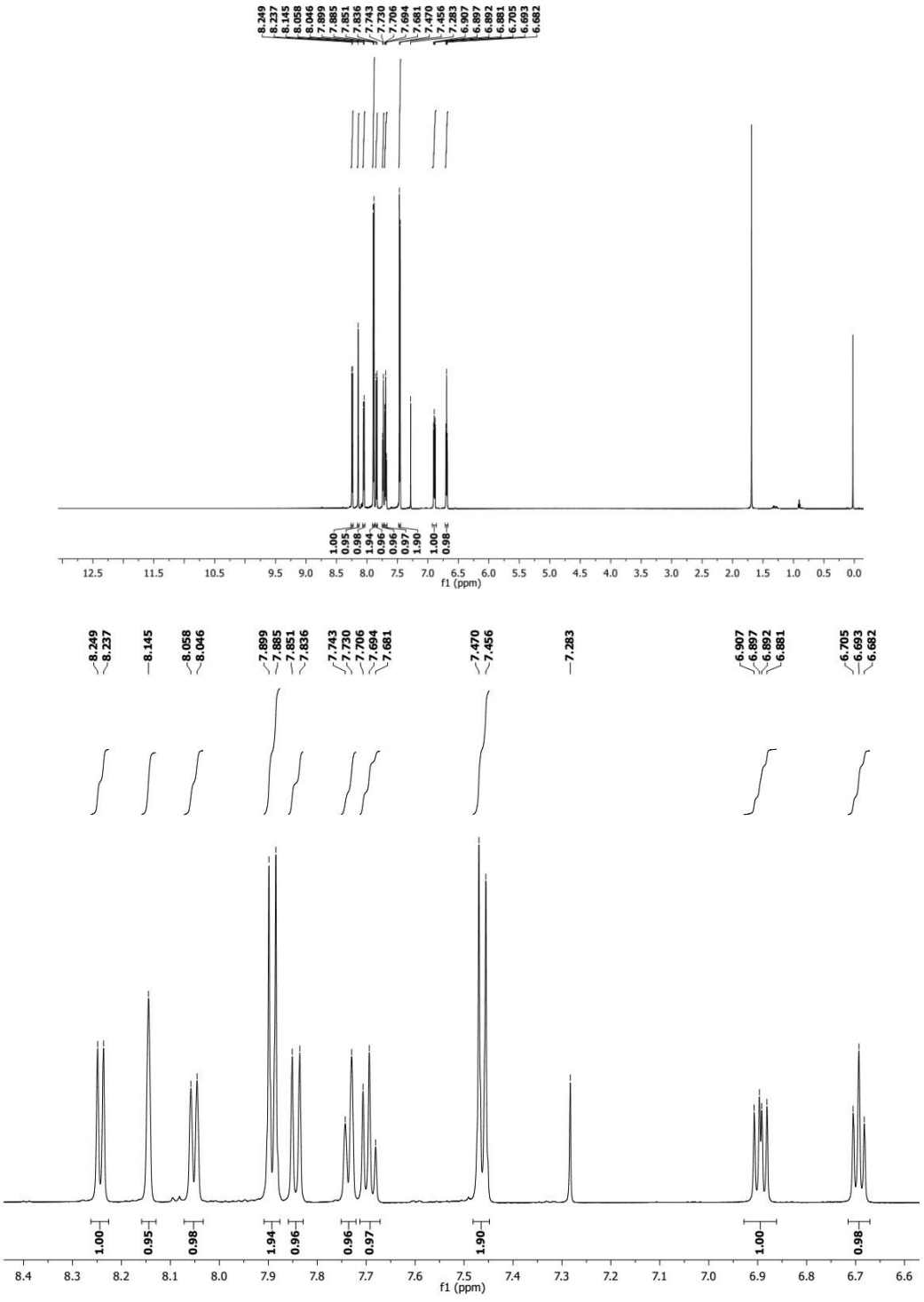

77.24
77.03
76.82
55.58
88 86 84 82 80 78 76 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40
f1 (ppm)


162.28
158.65
136.42
133.87
133.48
131.68
129.97
128.75
127.75
127.35
123.58
119.83
118.30
111.97
111.65
105.36
98.82
180 175 170 165 160 155 150 145 140 135 130 125 120 115 110 105 100
f1 (ppm)

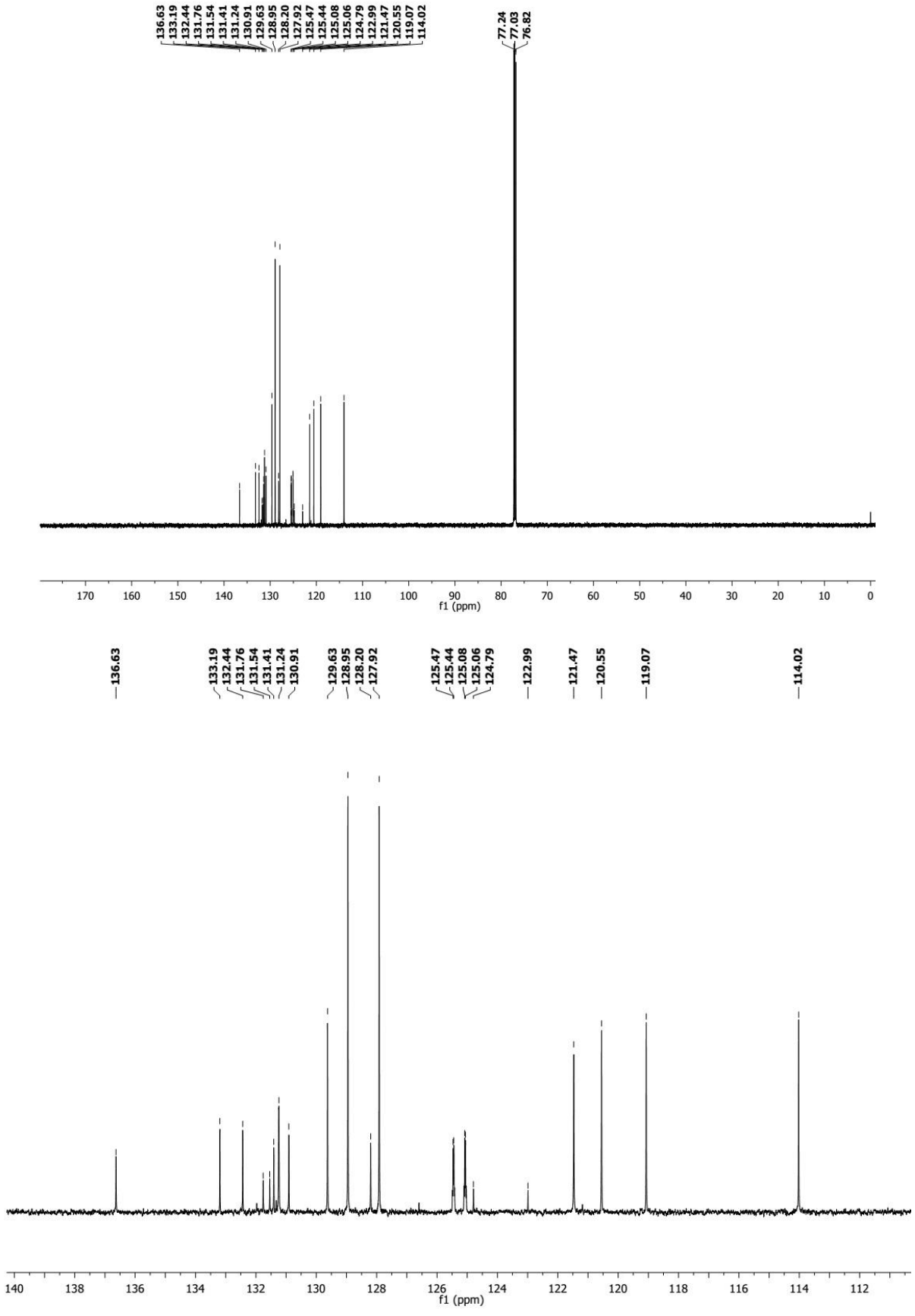


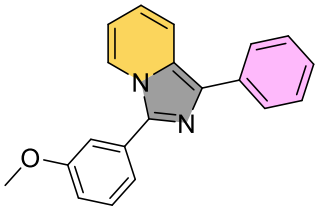
Compound (3t)

[1]H NMR of Compound 3t



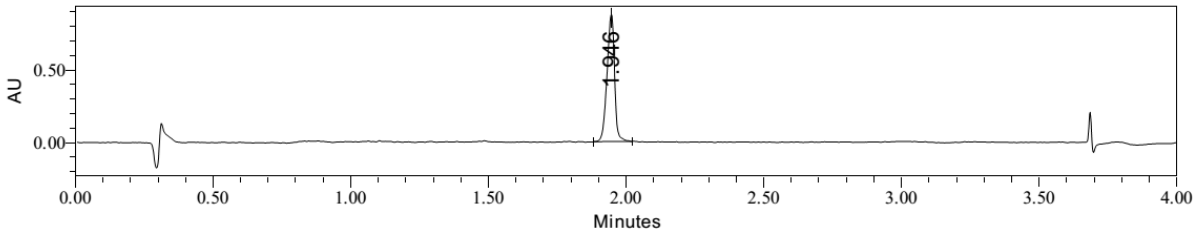
^{13}C NMR of Compound 3t

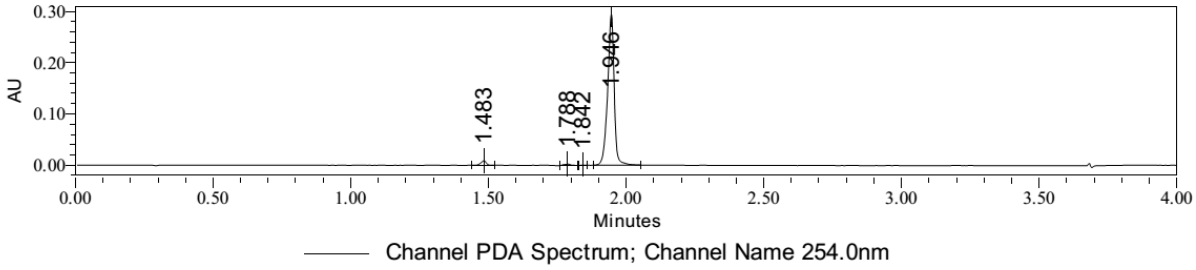




Compound (3u)

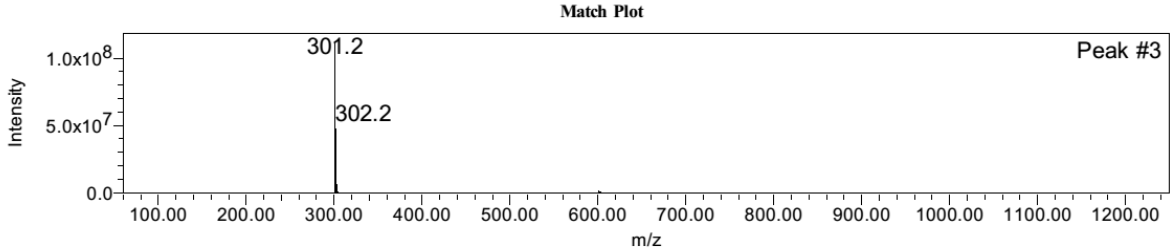
LC-MS of Compound 3u





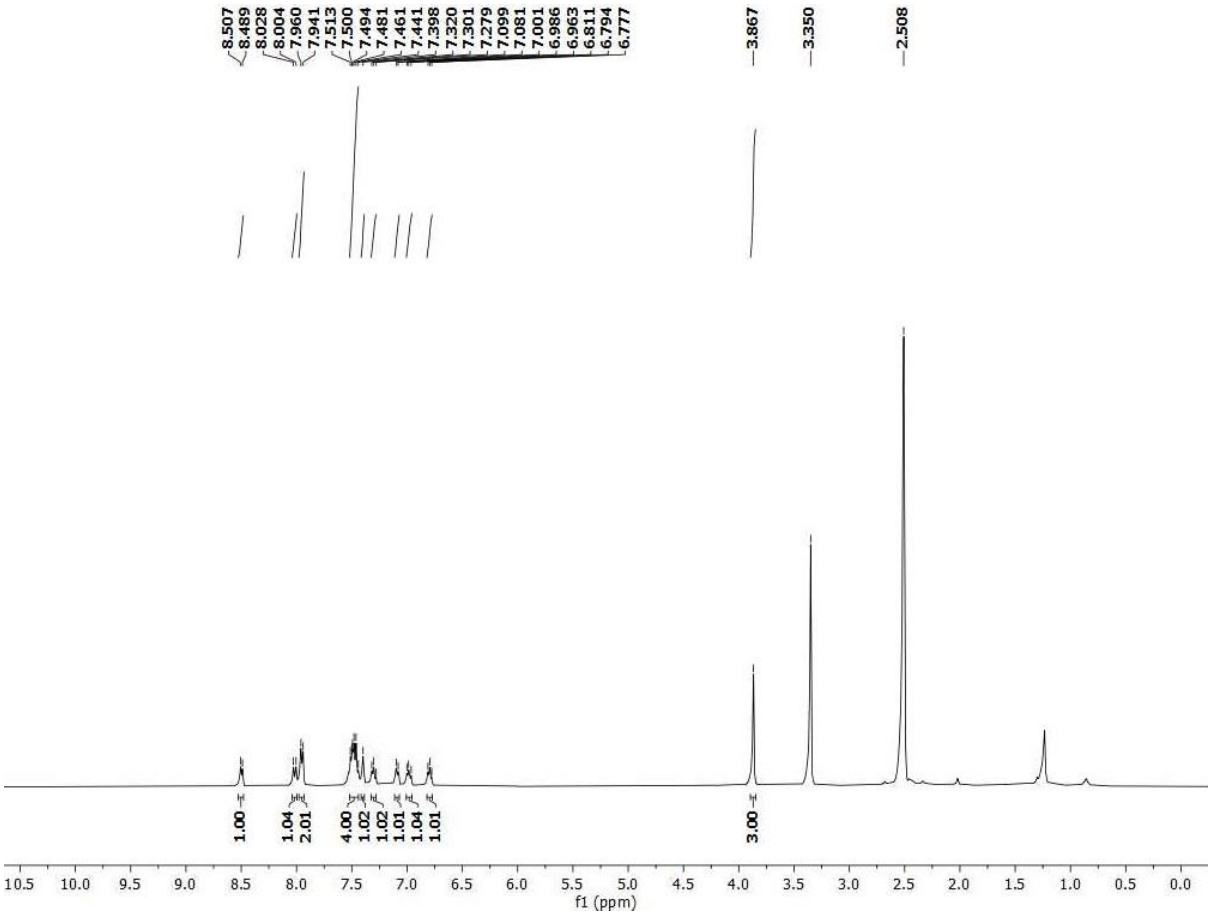
Peak Results
Channel: PDA Spectrum

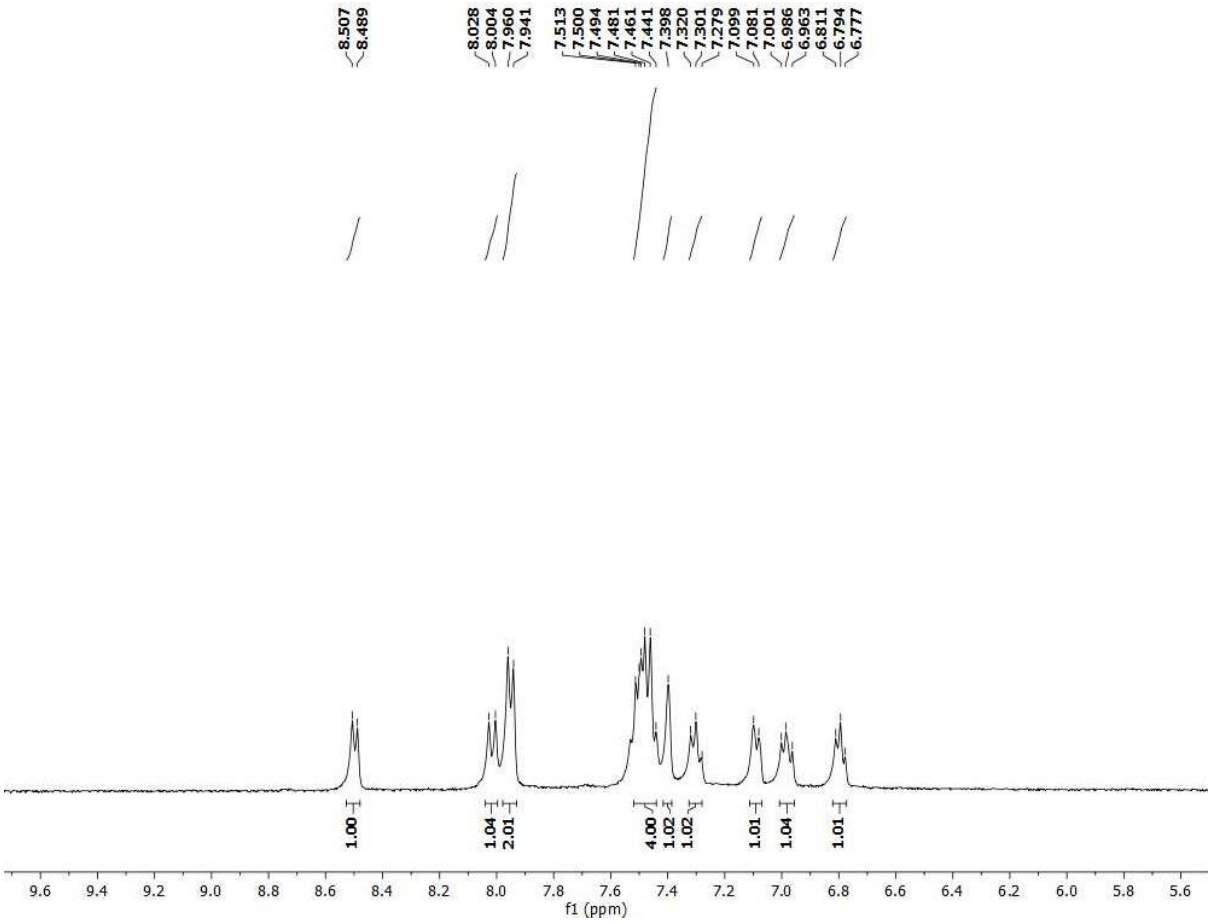
	RT	Base Peak (m/z)	Height	Area	% Area	Channel	Channel Name
1	1.483		9020	11930	2.37	PDA Spectrum	254.0nm
2	1.788		2950	5060	1.00	PDA Spectrum	254.0nm
3	1.842		799	809	0.16	PDA Spectrum	254.0nm
4	1.946		294870	486016	96.47	PDA Spectrum	254.0nm
5	1.946		875637	1666342	100.00	PDA Spectrum	210.0nm

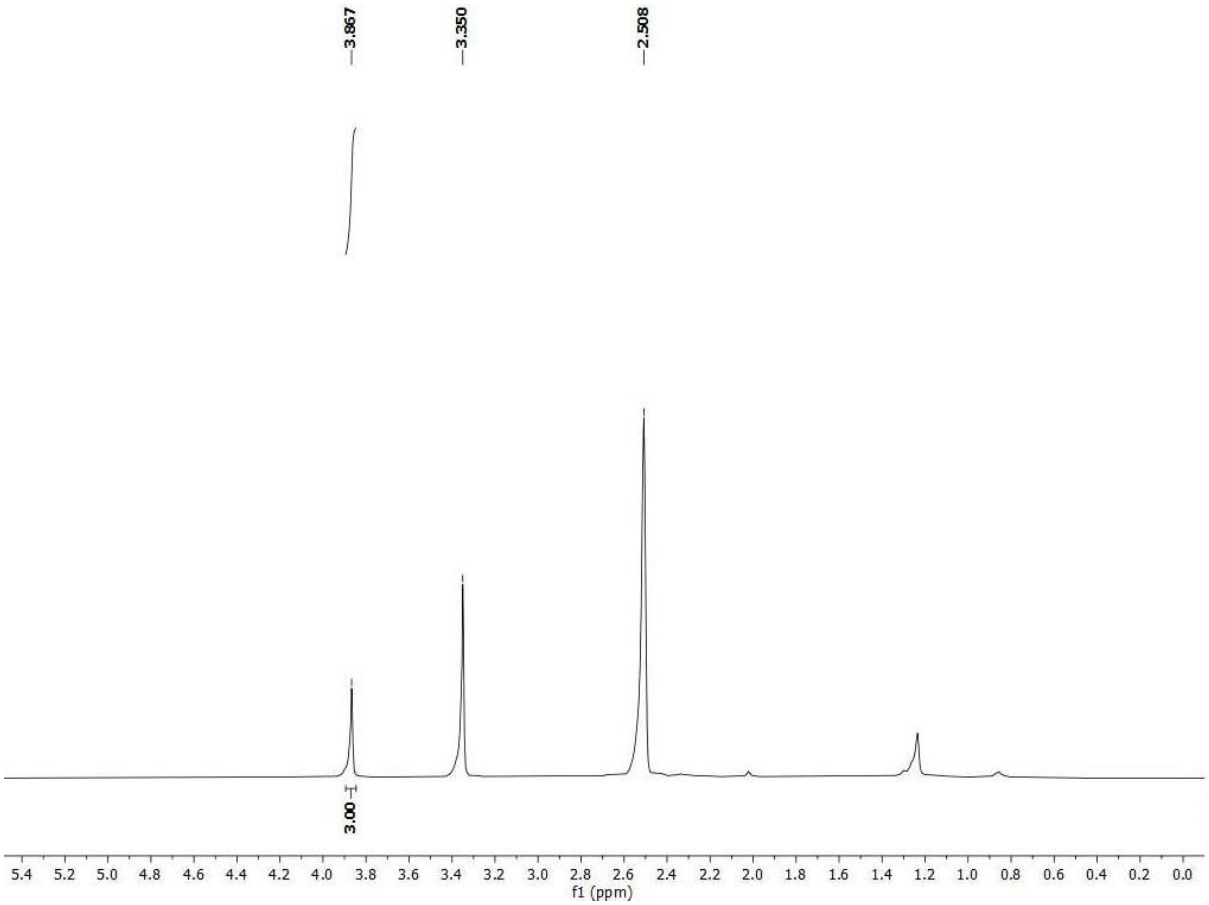


Base Peak 301.18 Channel Description 1: QDa Positive(+) Scan (60.00-1250.00)Da, Centroid, CV=10 - AVG (2.7:3.9) 20.000 Th: 0.010 Retention Time 1.966

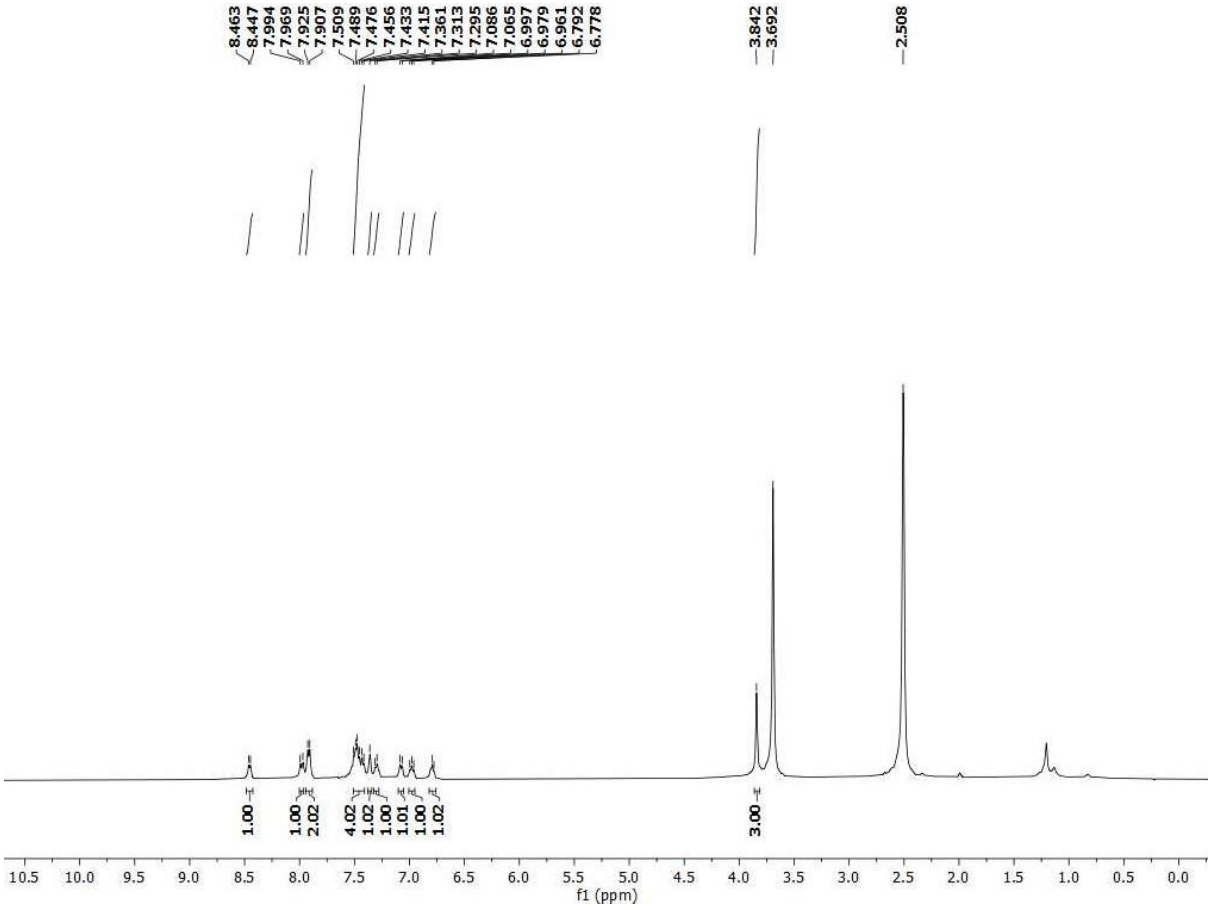
^{1}H NMR of Compound 3u

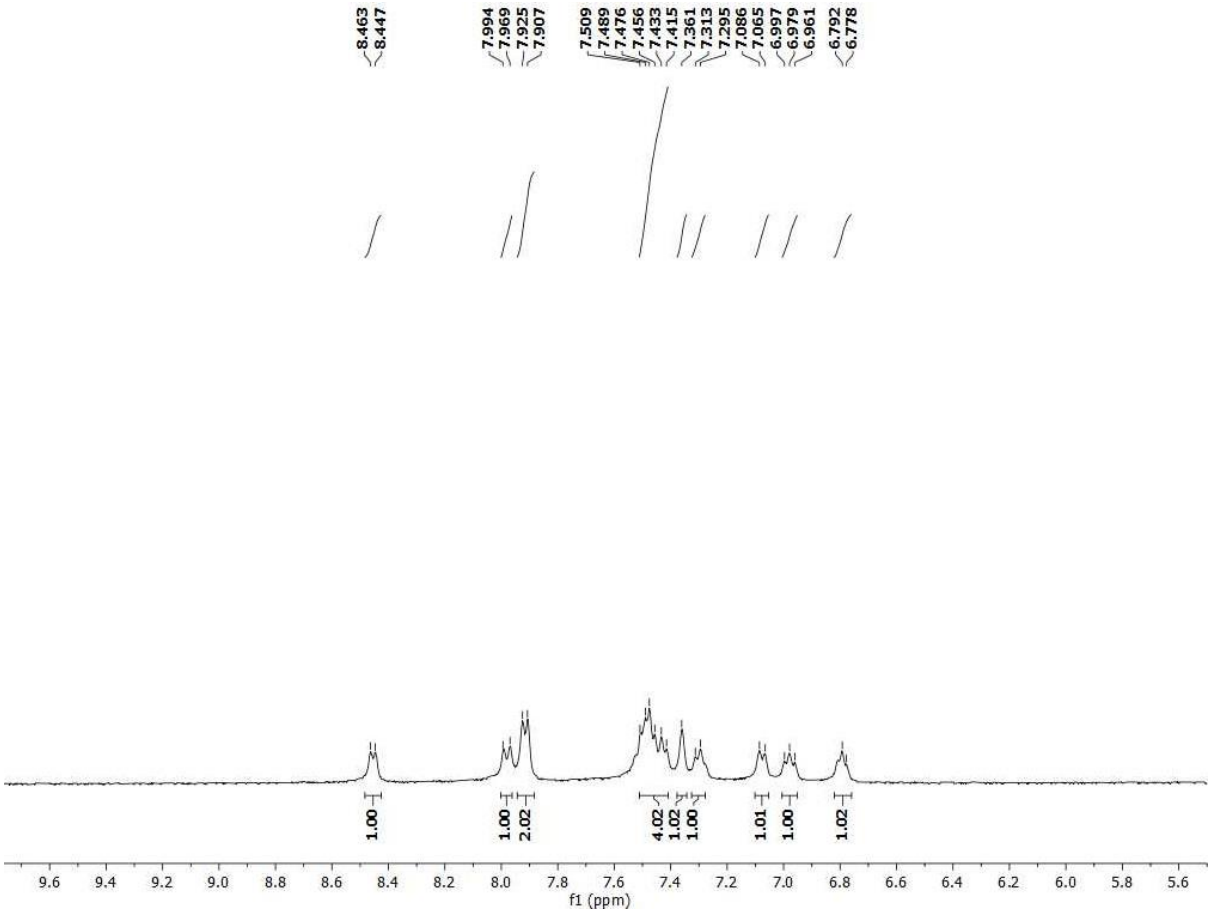


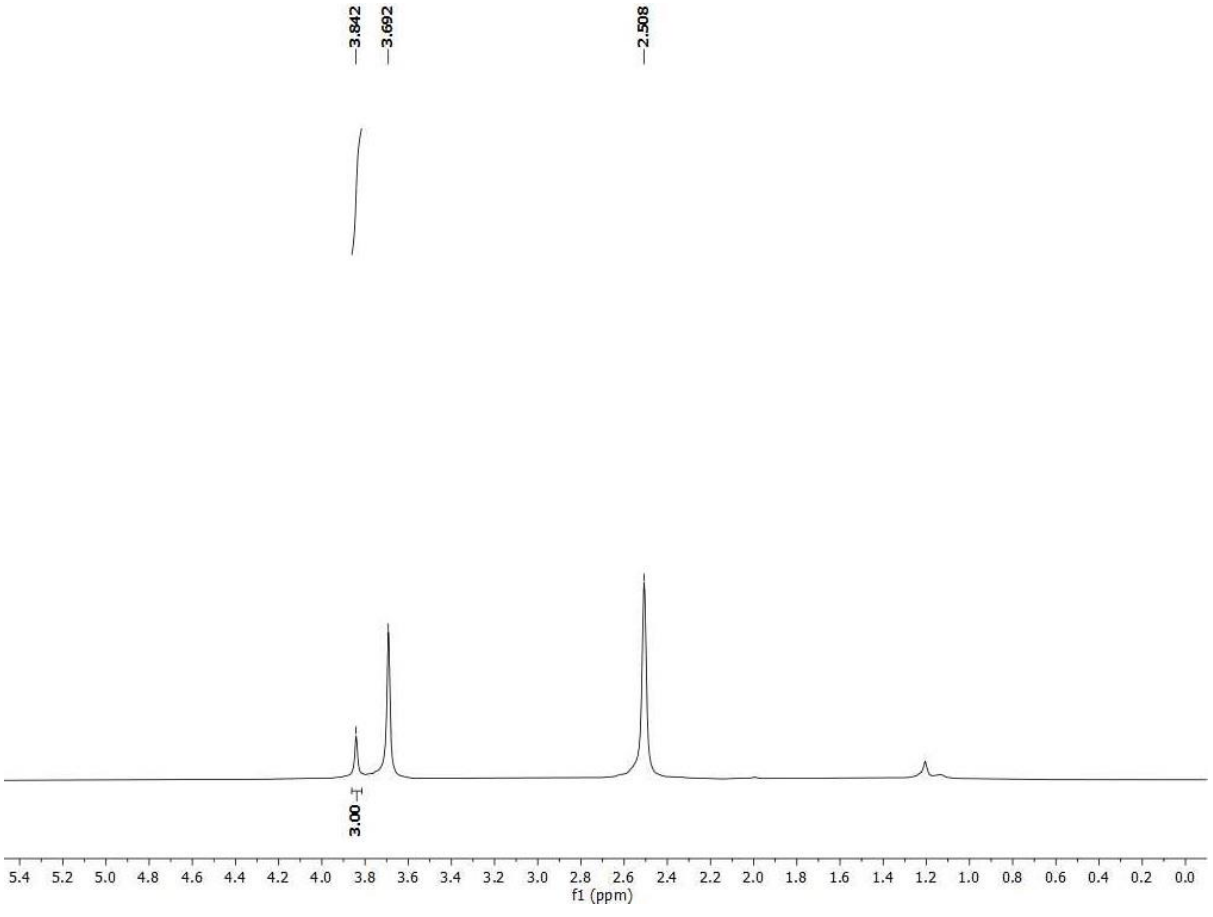

8.507
8.489
8.028
8.004
7.960
7.941
7.513
7.500
7.494
7.481
7.461
7.441
7.398
7.320
7.301
7.279
7.099
7.081
7.001
6.986
6.963
6.811
6.794
6.777
1.00
1.04
2.01
4.00
1.02
1.02
1.01
1.04
1.01
f1 (ppm)


3.867
3.350
2.508
3.00
f1 (ppm)

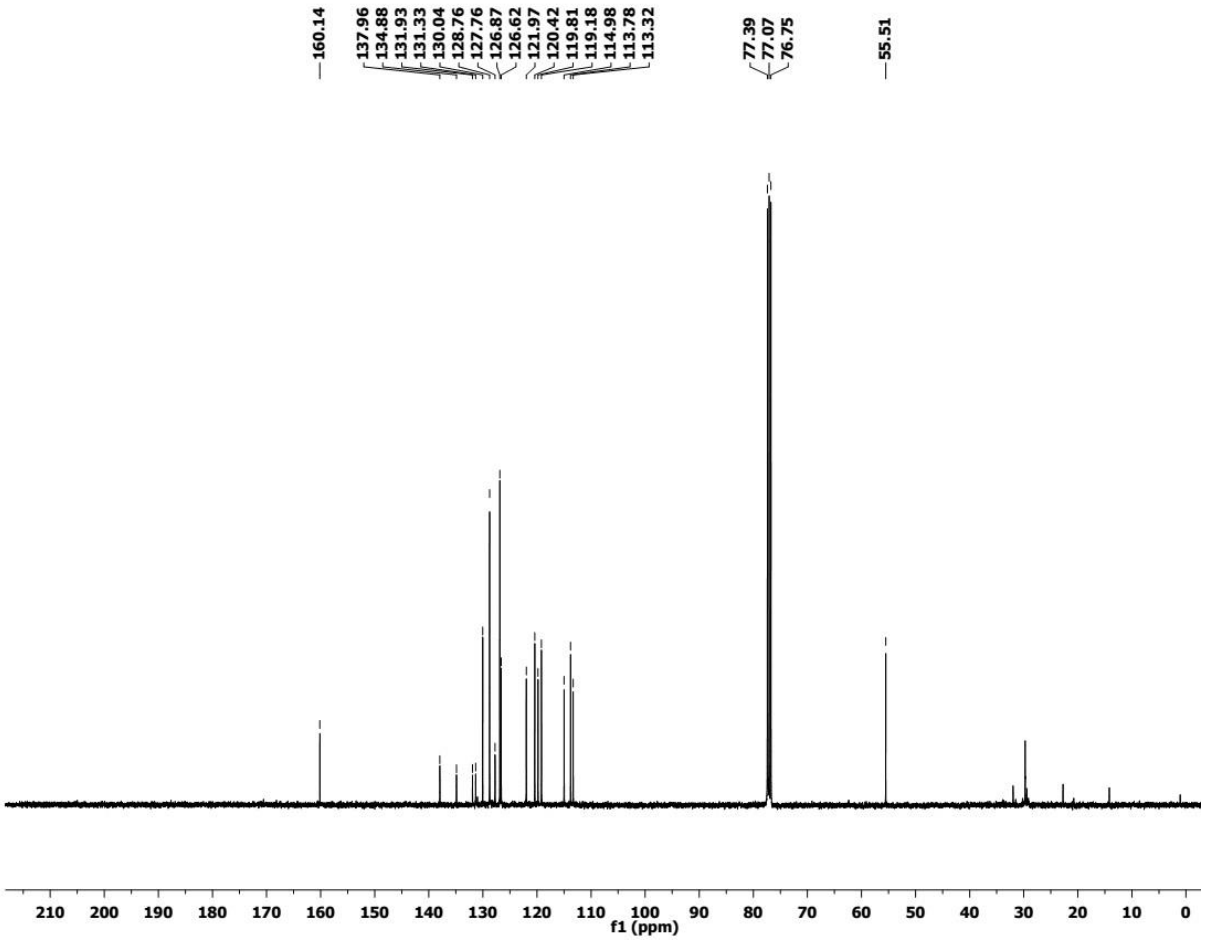
D_2O NMR of Compound 3u

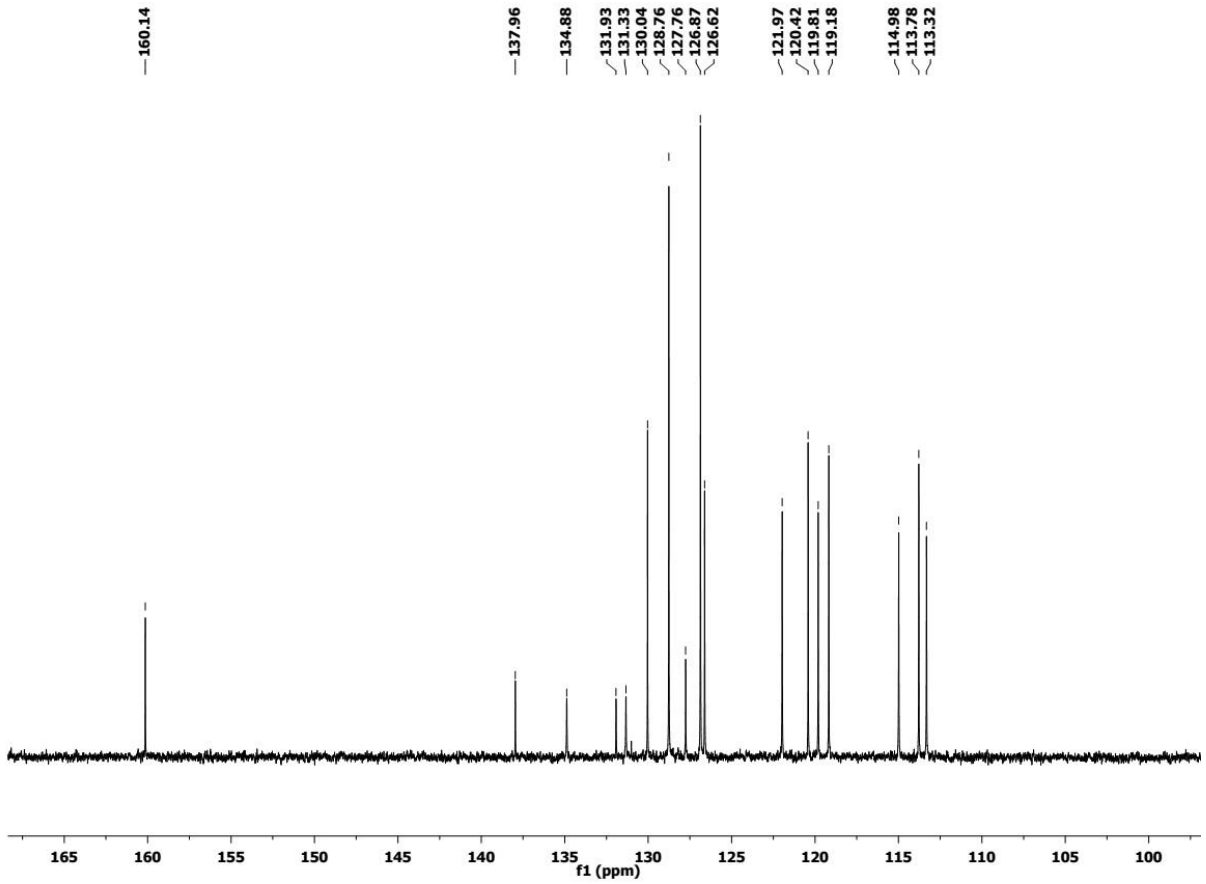


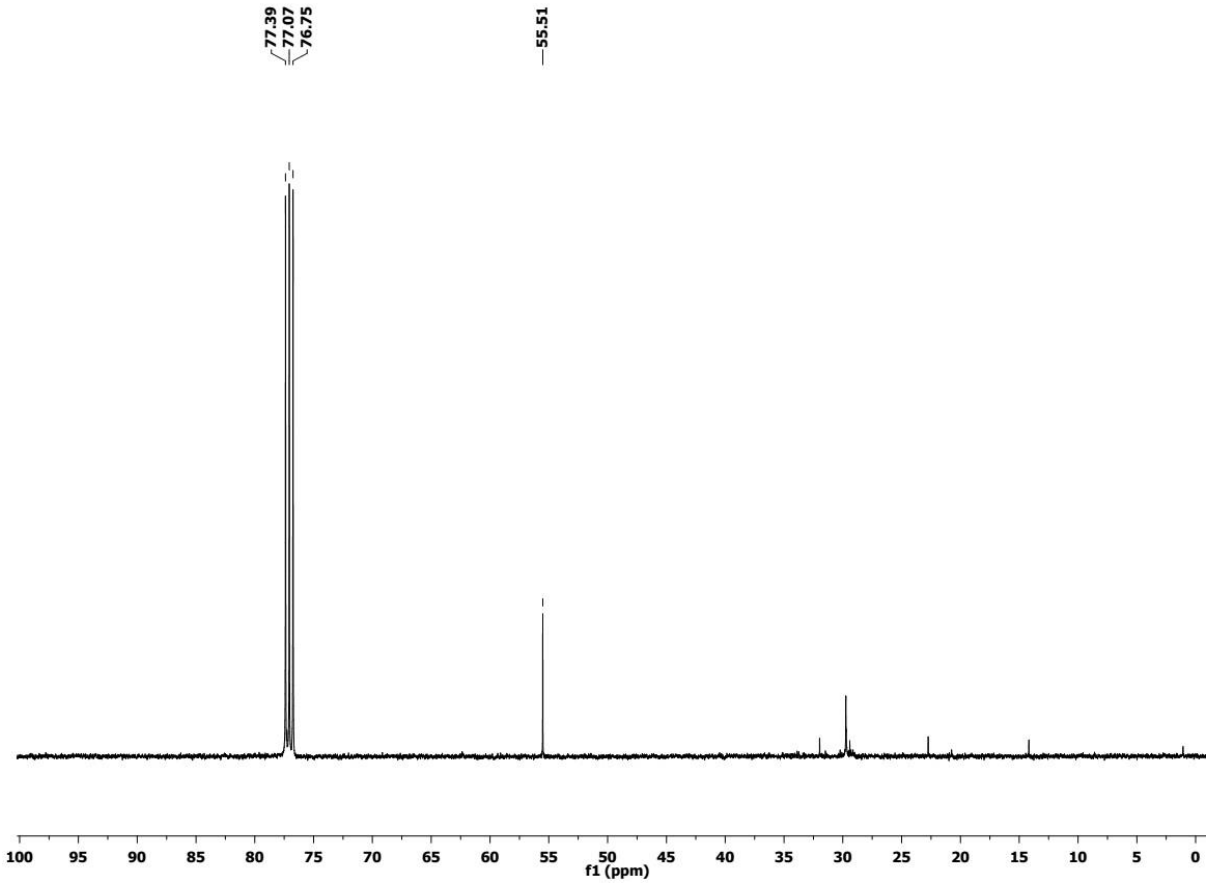

8.463
8.447
7.994
7.969
7.925
7.907
7.509
7.489
7.476
7.456
7.433
7.415
7.361
7.313
7.295
7.086
7.065
6.997
6.979
6.961
6.792
6.778
1.00
1.00
2.02
4.02
1.02
1.00
1.01
1.00
1.02
f1 (ppm)

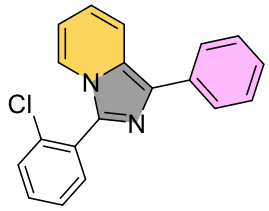

3.842
3.692
2.508
3.00
f1 (ppm)

^{13}C NMR of Compound 3u



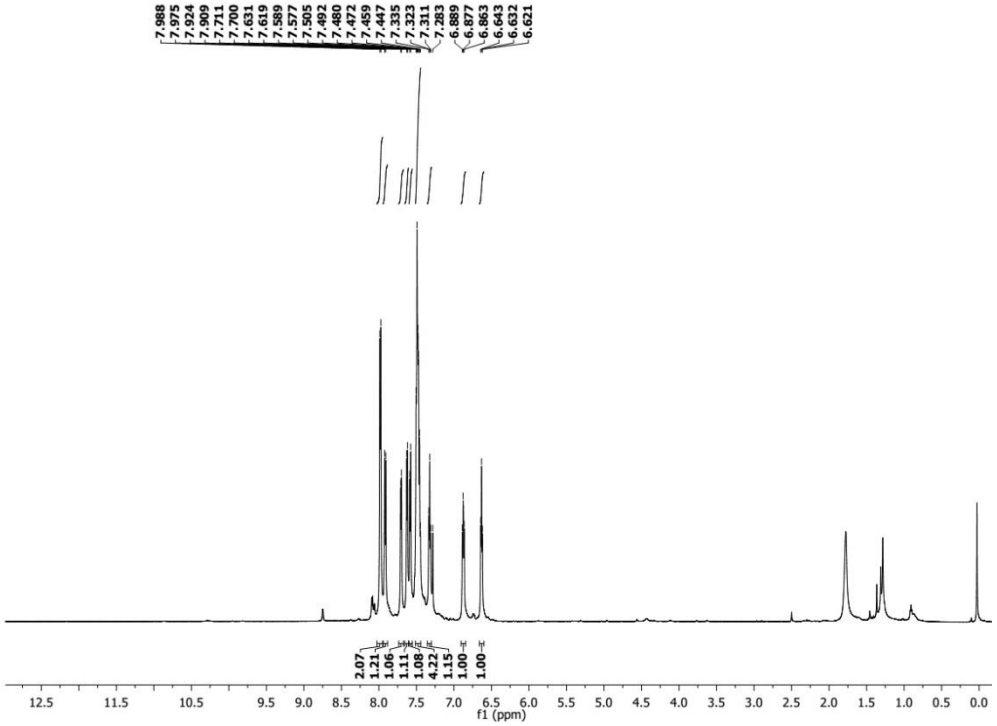

160.14
137.96
134.88
131.93
131.33
130.04
128.76
127.76
126.87
126.62
121.97
120.42
119.81
119.18
114.98
113.78
113.32
165
160
155
150
145
140
135
130
125
120
115
110
105
100
f1 (ppm)

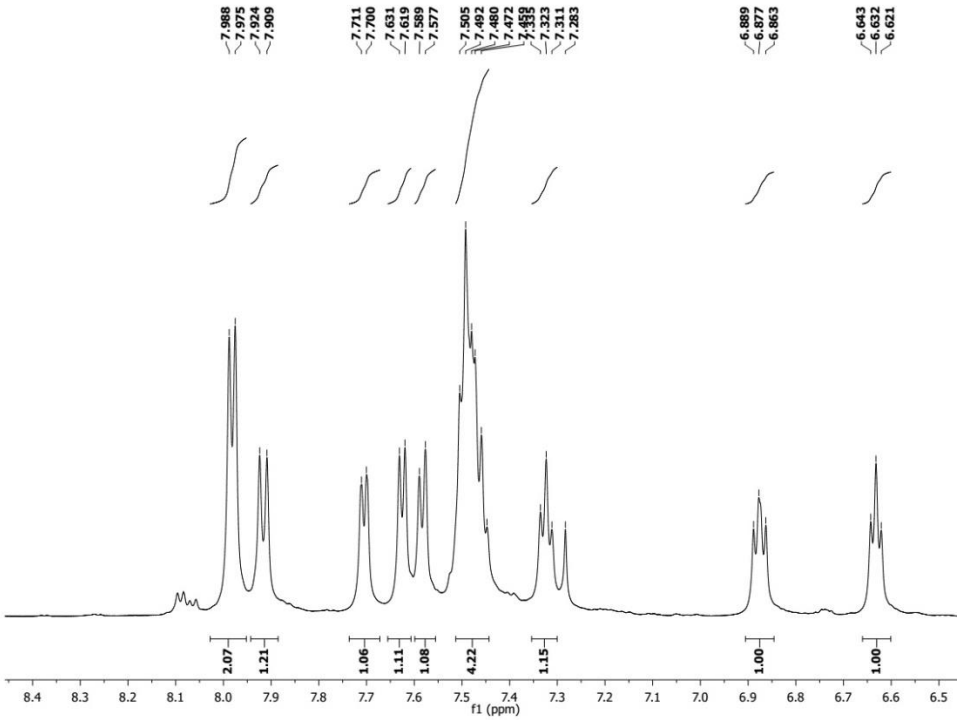

77.39
77.07
76.75
55.51
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
f1 (ppm)



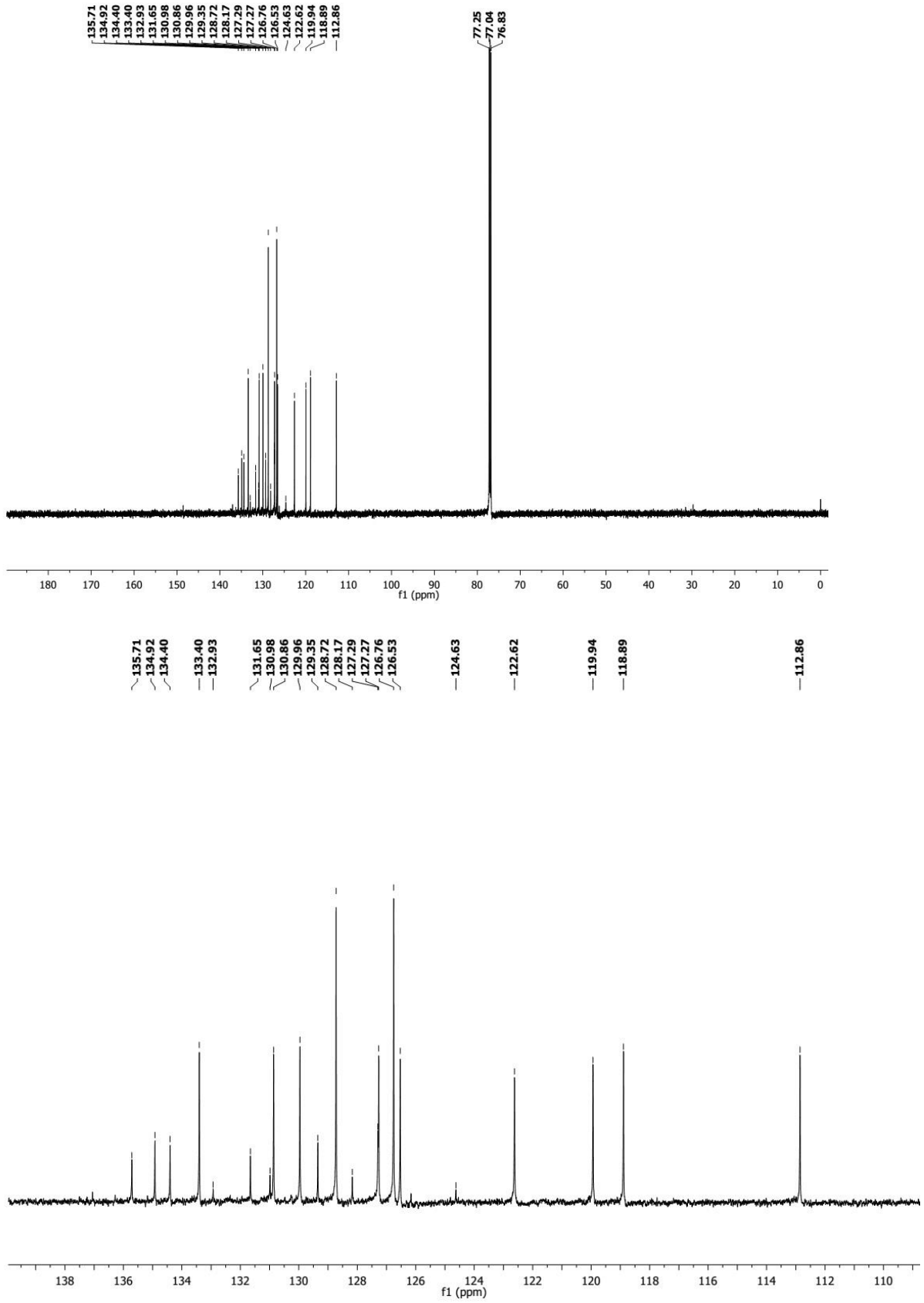
Compound (3v)

[1]H NMR of Compound 3v





^{13}C NMR of Compound 3v



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