ESI

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1. **General Information:** All chemicals were purchased from Aldrich, Sd-Fine and HIMEDIA (India) and used as received, except all solvents which were used after distillation. All reactions were carried out with oven-dried glassware under air. Distilled n- hexane and ethyl acetate were used for column chromatography. Analytical TLC was performed on Merck 60F254 silica gel plates (0.25 mm thickness). Column chromatography was performed on silica gel (60-120 mesh size, HIMEDIA, India). ^{1}H NMR spectra were recorded on Bruker AV 400. The ^{1}H NMR chemical shifts are reported relative to the center of solvent resonance ($CDCl_3$: 7.26 (1H). Chemical shifts are expressed in parts per million (δ) and the signals were reported as s (singlet), d (doublet), t (triplet), q(quartet) m (multiplet) and coupling constants *J* were given in Hz. ^{13}C NMR spectra were recorded at 100 MHz in $CDCl_3$ solution. Chemical shifts are expressed in parts per million (δ) and are referenced to $CDCl_3$ (δ = 77.16) as internal standard.

2. **Methods for the preparation of $CoFe_2O_4$ Nano-particles:** The preparation of $CoFe_2O_4$ nanoparticles were carried out following reported procedure. Solution of $Co(OAc)_2.7H_2O$ (4.2 g) and anhydrous $FeCl_3$ (4.8 g) was dissolved in distilled water and vigorously mixed under sonication for 3h at 70 ^{0}C. Subsequently, 0.3 M NaOH was added drop by drop into the solutions till the pH is reached up to 11 and black precipitate is formed. Then reaction mixture was centrifuged and rinsed with ethanol and distilled water and was dried in electric oven. The resulting powder is then calcinated at 550 °C in an oven for 4 hours.

3. **General method for the synthesis of 2,3,5-substituted furan derivative from *α,β*-unsaturated carboxylic acid and ketone (Table 1):** A mixture of α,β-unsaturated carboxylic acid (0.5 mmol), ketone (0.5 mmol) and $CoFe_2O_4$ nanoparticles (23 mg) in water (5 mL) was stirred in presence of LED light for 2-3 h. After completion of the reaction (TLC monitored), and an external magnet was used for the separation of the catalyst from the resulting crude reaction mixture. The reaction mixture was extracted with ethyl acetate (20 mL), washed with brine solution (2×5 mL) and distilled water (1×10 mL) and dried over anhydrous sodium sulphate. Solvent was removed under reduced pressure and left the crude solid product which was purified by column chromatography on silica gel (ethyl acetate/n-hexane = 1/9) to provide pure 2,3,5- substituted functionalized product. The product was confirmed by ^{1}H NMR and ^{13}C NMR spectroscopy. The spectroscopic data of the compounds has been given below.

4. **Detailed spectral data of the 2,3,5-substituted furan derivatives listed in Table 2:** The ^{1}H and ^{13}C NMR spectra were recorded 400 MHz and 100 MHz Bruker NMR spectrometer and $CDCl_3$ was used as solvent.

Compound **3a**: Colourless solid, mp 85–86 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (4H, d, J = 7.9 Hz), 7.49 (4H, t, J = 6.7 Hz), 7.34 (2H, t, J = 5.4 Hz), 6.41 (2H, s); ^{13}C NMR (100 MHz, $CDCl_3$) δ 153.3, 130.7, 128.7, 127.3, 123.7, 107.2; IR ($CHCl_3$) ν 3061, 3020, 1615, 1593 cm^{-1}. Anal. Calcd for $C_{16}H_{12}O$: C, 87.25; H, 5.49. Found: C, 87.30; H, 5.58.

Compound **3b**: Colorless oil (89%, 104 mg); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.68 (d, J = 9.2 Hz, 2H), 7.57 (d, J = 8.4 Hz, 2H), 7.34−7.30 (m, 2H), 7.20−7.16 (m, 1H), 7.14 (d, J = 8.0 Hz, 2H), 6.66 (d, J = 3.6 Hz, 1H), 6.60 (d, J = 3.6 Hz, 1H), 2.30 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 153.8, 153.1, 137.3, 131.0, 129.5, 128.8, 128.2, 127.3, 123.8, 123.7, 107.3, 106.6, 22.4. Anal. Calcd for $C_{17}H_{14}O$: C, 87.15; H, 6.02%. Found: C, 87.14; H, 6.09%.

Compound **3c**: Colorless oil (84%, 112 mg); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, J = 9.2 Hz, 2H), 7.64 (d, J = 8.8 Hz, 2H), 7.38 (t, J = 8.0 Hz, 2H), 7.28−7.24 (m, 3H), 6.71 (d, J = 3.2 Hz, 1H), 6.67 (d, J = 3.6 Hz, 1H), 2.50 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 153.3, 153.1, 137.7, 130.8, 128.8, 127.9, 127.4, 126.9, 124.2, 123.8, 107.4, 107.0, 16.0. Anal. Calcd for $C_{17}H_{14}OS$: C, 76.66; H, 5.30%. Found: C, 76.86; H, 5.64%.

Compound **3d**: Colorless oil (85%, 105 mg); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.78 (d, J = 7.6 Hz, 1H), 7.63 (d, J = 8.0 Hz, 2H), 7.27−7.24 (m, 3H), 7.21 (d, J = 8.0 Hz, 2H), 6.70 (d, J = 3.6 Hz, 1H), 6.62 (d, J = 3.6 Hz, 1H), 2.56 (s, 3H), 2.37 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 153.5, 152.8, 137.3, 134.5, 131.4, 130.3, 129.5, 128.3, 127.4, 126.9, 126.1, 123.8, 110.7, 106.5, 22.2, 21.4. Anal. Calcd for $C_{18}H_{16}O$: C, 87.06; H, 6.49%. Found: C, 87.38; H, 6.65%.

Compound **3e**: Colorless solid (93%, 109 mg), mp 46−47 °C (lit. mp 45−46 °C); ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.63 (d, J = 7.6 Hz, 4H), 7.36–7.26 (m, 4H), 7.18–7.14 (m, 2H), 6.54 (s, 1H), 2.23 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 151.7, 148.3, 131.8, 130.9, 128.7, 128.6, 127.3, 126.7, 125.3, 123.7, 118.7, 110.9, 12.2. Anal. Calcd for $C_{17}H_{14}O$: C, 87.15; H, 6.04%; Found: C, 87.18; H, 6.10%.

Compound **3f**: Colourless solid (85%, 106 mg), mp 95−96 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79 (d, J = 8.4 Hz, 2H), 7.69 (d, J = 8.4 Hz, 2H), 7.46−7.43 (m, 2H), 7.32−7.29 (m, 3H), 6.65 (s, 1H), 2.45 (s, 3H), 2.37 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 151.4, 148.5, 136.5, 131.0, 129.3, 129.1, 128.7, 127.1, 125.3, 123.7, 123.7, 118.0, 110.8, 21.3, 12.1. Anal. Calcd for $C_{18}H_{16}O$: C, 87.06; H, 6.49%. Found: C, 87.43; H, 6.50%.

Compound **3g**: Colorless solid (93%, 115 mg), mp 81−83 °C (lit. mp 80−82 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77 (d, J = 7.6 Hz, 2H), 7.67 (d, J = 8.0 Hz, 2H), 7.48 (t, J = 8.0 Hz, 2H), 7.32 (t, J =

7.2 Hz, 1H), 7.28-7.23 (m, 2H), 6.63 (s, 1H), 2.42 (s, 3H), 2.37 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.9, 147.7, 137.0, 131.8, 129.3, 128.5, 128.1, 126.5, 125.1, 123.6, 118.6, 110.1, 21.2, 12.1. Anal. Calcd for $C_{17}H_{16}O$: C, 87.09; H, 6.49%; Found: C, 87.18; H, 6.39%.

Compound **3h**: Colorless solid (86%, 113 mg), mp 97−98 °C (lit. mp 97−98 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63–7.56 (m, 4H), 7.35 (t, *J* = 8.0 Hz, 2H), 7.20–7.18 (m, 1H), 6.86 (d, *J* = 8.8 Hz, 2H), 6.42 (s, 1H), 3.76 (s, 3H), 2.24 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 159.2, 151.9, 147.6, 132.0, 128.6, 126.5, 125.2, 125.2, 124.0, 118.7, 114.3, 109.4, 55.4, 12.2. Anal. Calcd for $C_{17}H_{16}O_2$: C, 81.79; H, 6.12%; Found: C, 81.58; H, 6.09%.

Compound **3i**: Colorless solid (88%, 111 mg), mp 83−85 °C (lit. mp 85−86 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63−7.57 (m, 4H), 7.35 (t, *J* = 7.6 Hz, 2H), 7.21− 7.17 (m, 1H), 7.00 (d, *J* = 8.8 Hz, 2H), 6.46 (s, 1H), 2.24 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.5 (d, 1*J* C−F = 245 Hz), 150.9, 148.3, 131.8, 128.7, 127.2, 126.8, 125.5 (d, 3*J* C−F = 8 Hz), 125.3, 118.8, 115.8 (d, 2*J* C−F = 22 Hz), 110.6, 12.5. Anal. Calcd for $C_{17}H_{13}FO$: C, 80.99; H, 5.20%; Found: C, 80.75; H, 5.25%.

Compound **3j**: Colorless oil (91%, 122 mg); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, *J* = 7.6 Hz, 2H), 7.65 (d, *J* = 8.8 Hz, 2H), 7.48 (t, *J* = 8.0 Hz, 2H), 7.39–7.37 (m, 2H), 7.35–7.33 (m, 1H), 6.62 (s, 1H), 2.37 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 150.7, 148.6, 132.8, 131.6, 129.3, 128.9, 128.7, 126.9, 125.3, 124.9, 118.8, 111.3, 12.1. Anal. Calcd for $C_{17}H_{13}ClO$: C, 75.89; H, 4.84%; Found: C, 75.78; H, 4.89%.

Compound **3k**: Colorless solid (92% yield, 144 mg). Mp 83–85 °C; ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.74 (d, *J* = 8.4 Hz, 2H), 7.65 (d, *J* = 8.4 Hz, 2H), 7.48–7.45 (m, 2H), 7.39–7.36 (m, 2H), 7.34–7.28 (m, 1H), 6.62 (s, 1H), 2.36 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 150.7, 148.6, 132.8, 131.6, 129.3, 129.0, 128.7, 126.9, 125.3, 124.9, 123.7, 118.8, 111.3, 12.2. Anal. Calcd for $C_{17}H_{13}BrO$: C, 65.19; H, 4.18%; Found: C, 65.38; H, 4.29%.

Compound **3l**: Colorless solid (92%, 120 mg), mp 98−99 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (d, *J* = 8.0 Hz, 4H), 7.16−7.09 (m, 4H), 6.45 (s, 1H), 2.30 (s, 3H), 2.28 (s, 3H), 2.22 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 151.7, 148.2 137.0, 136.4, 129.4, 129.3, 129.2, 128.3, 125.3, 125.0, 123.7, 117.9, 110.1, 21.4, 21.3, 12.2. Anal. Calcd for $C_{19}H_{18}O$: C, 86.99; H, 6.92%. Found: C, 87.22; H, 6.98%.

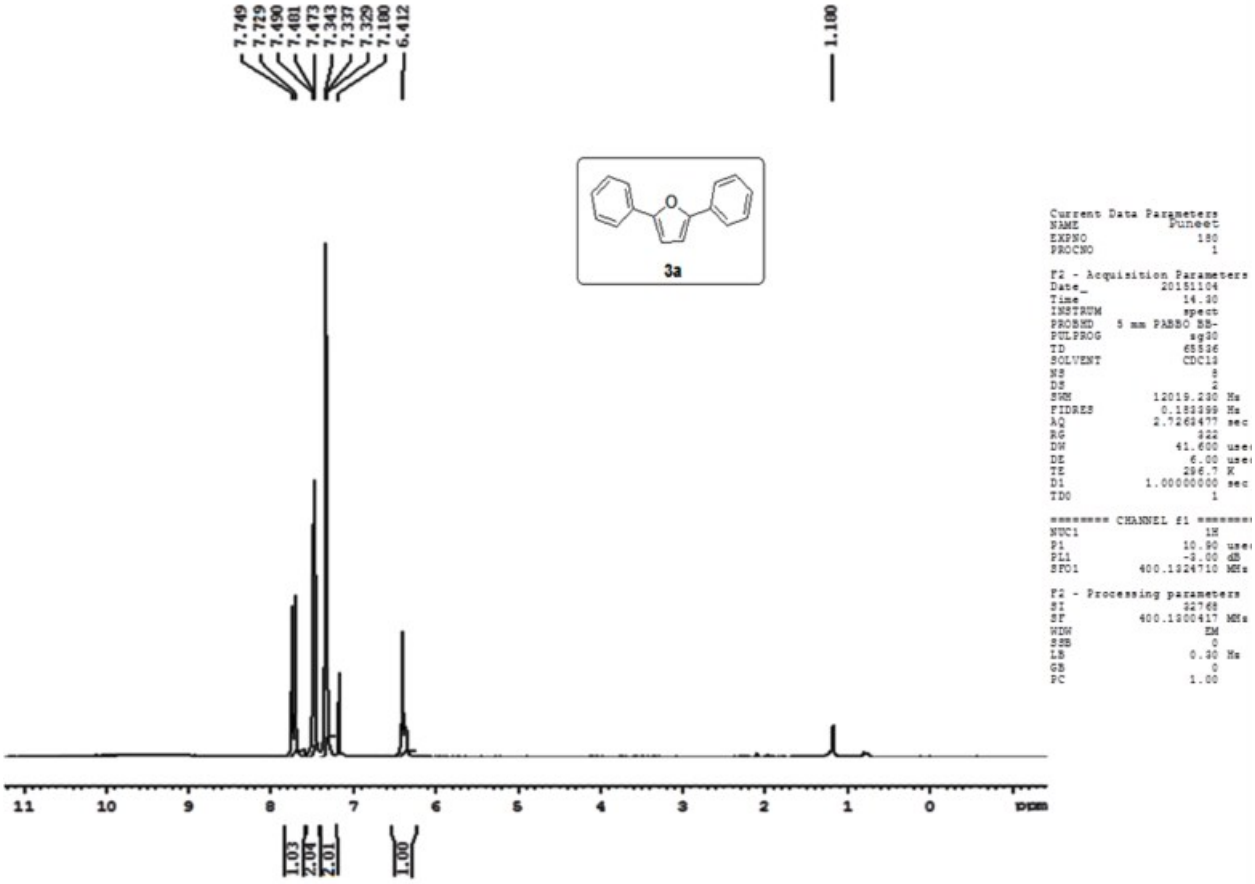
Compound **3m**: Colorless oil (91%, 113 mg); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.78–7.71 (m, 4H), 7.48–7.39 (m, 4H), 7.33–7.28 (m, 2H), 6.73 (s, 1H), 2.77 (q, *J* = 7.6 Hz, 2H), 1.33 (t, *J* = 7.6 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 151.9, 147.5, 131.7, 130.8, 128.6, 128.5, 128.4, 127.1, 126.7, 125.4, 125.3, 125.1, 123.6, 108.6, 19.2, 14.3. Anal. Calcd for $C_{18}H_{16}O$: C, 87.02; H, 7.25%; Found: C, 87.30; H, 7.16%.

Compound **3n**: Sticky liquid (89% yield, 126mg); ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.72–7.65 (m, 4H), 7.46 (t, *J* = 7.2 Hz, 2H), 7.39–7.36 (m, 2H), 7.34–7.28 (m, 1H), 6.71 (s, 1H), 2.76 (q, *J* = 7.6 Hz, 2H), 1.32 (t, *J* = 7.6 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 151.0, 148.1, 132.8, 131.6, 129.4, 129.0, 128.7, 127.1, 125.6, 125.6, 124.9, 109.2, 19.4, 14.5. Anal. Calcd for $C_{18}H_{15}ClO$: C, 76.46; H, 5.35%; Found: C, 76.83; H, 5.52%.

Compound **3o**: Colorless oil (88%, 115 mg); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62 (d, *J* = 9.2 Hz, 2H), 7.55 (d, *J* = 8.4 Hz, 2H), 7.36−7.32 (m, 2H), 7.21−7.17 (m, 1H), 7.12 (d, *J* = 8.0 Hz, 2H), 6.55 (s, 1H), 2.66 (q, *J* = 7.6 Hz, 2H), 2.29 (s, 3H), 1.22 (t, *J* = 7.6 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.3, 147.3, 137.1, 131.9, 129.4, 128.6, 128.3, 126.8, 125.5, 125.5, 123.7, 108.2, 22.4, 19.4, 14.5. Anal. Calcd for $C_{19}H_{18}O$: C, 86.99; H, 6.92%. Found: C, 87.06; H, 6.99%.

Compound **3p**: Colourless solid (82%, 127 mg), mp 97−99 °C (lit. mp 99−100 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56 (d, *J* = 8.0 Hz, 2H), 7.52 (d, *J* = 8.4 Hz, 2H), 7.40–7.37 (m, 2H), 7.32–7.28 (m, 2H), 7.26–7.20 (m, 3H), 7.17–7.13 (m, 3H), 6.68 (s, 1H), 2.30 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 152.9, 147.6, 137.5, 134.5, 131.3, 129.5, 128.8, 128.7, 128.5, 127.9, 127.5, 127.3, 126.2, 124.6, 123.9, 108.9, 21.4. Anal. Calcd for $C_{23}H_{18}O$: C, 89.00; H, 5.85%; Found: C, 89.32; H, 5.97%.

Compound **3q**: Colourless solid (89% yield, 147 mg). Mp 95–96 °C; ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.72 (d, *J* = 8.4 Hz, 2H), 7.64 (d, *J* = 8.0 Hz, 2H), 7.50–7.47 (m, 2H), 7.45–7.38 (m, 4H), 7.38–7.34 (m, 2H), 7.32–7.27 (m, 2H), 6.84 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 151.6, 148.3, 134.2, 133.2, 131.0, 129.1, 129.1, 128.8, 128.8, 128.5, 127.8, 127.5, 126.3, 125.1, 124.7, 110.0. Anal. Calcd for $C_{22}H_{15}ClO$: C, 79.88; H, 4.57%; Found: C, 79.98; H, 4.75%.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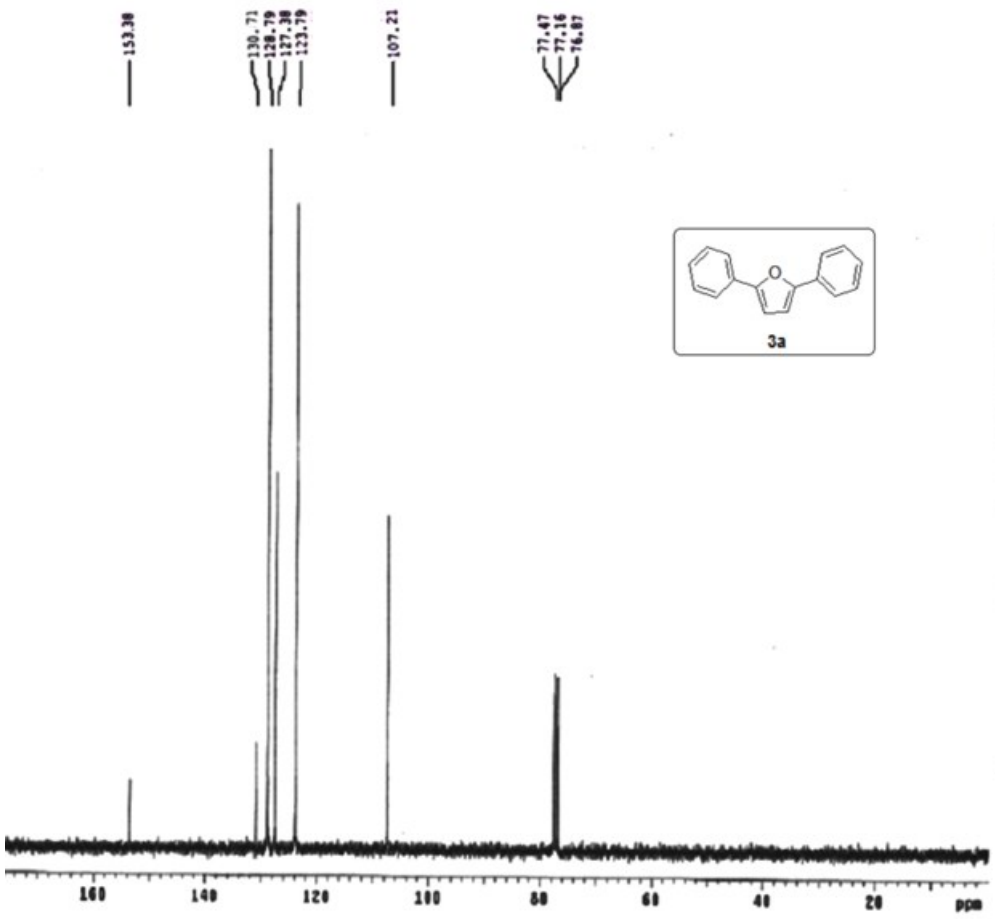

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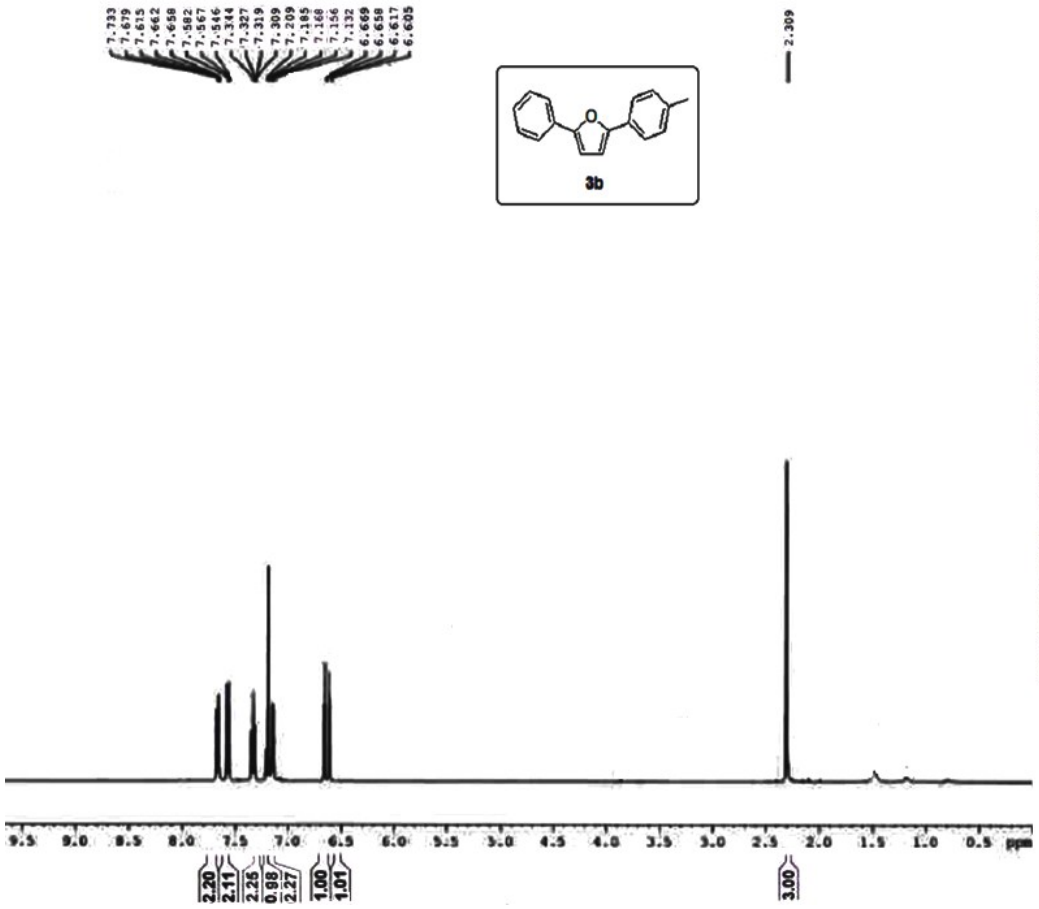


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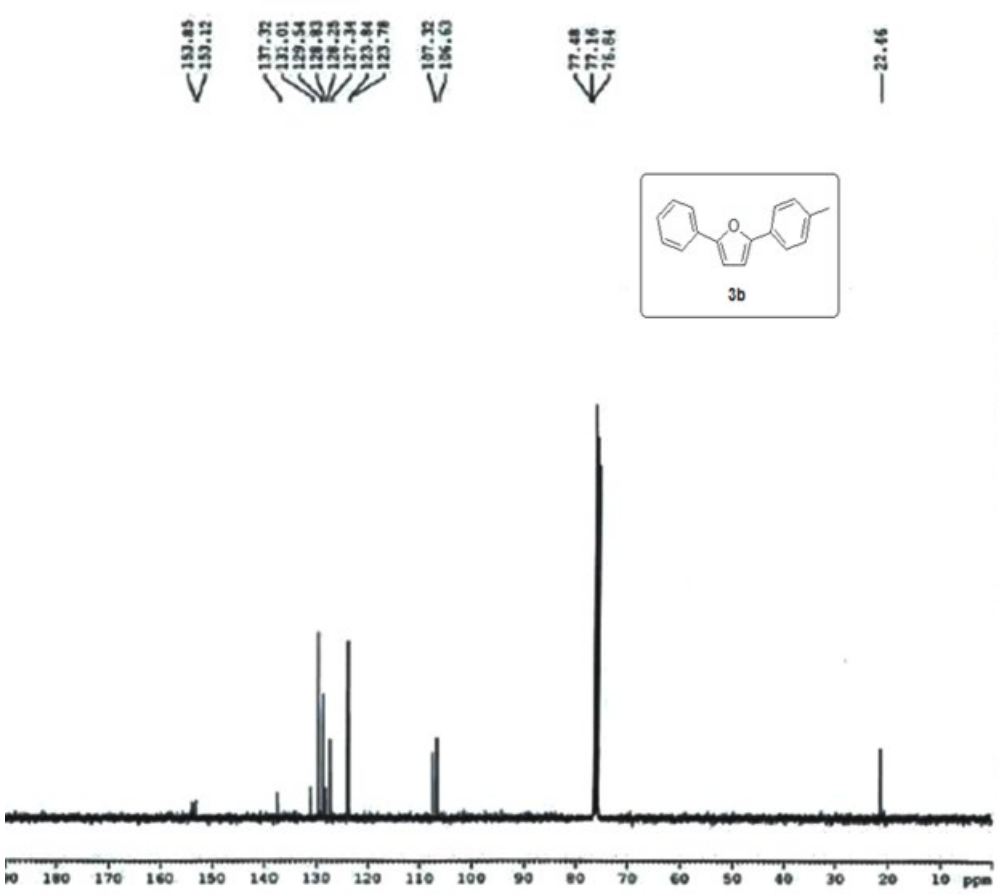
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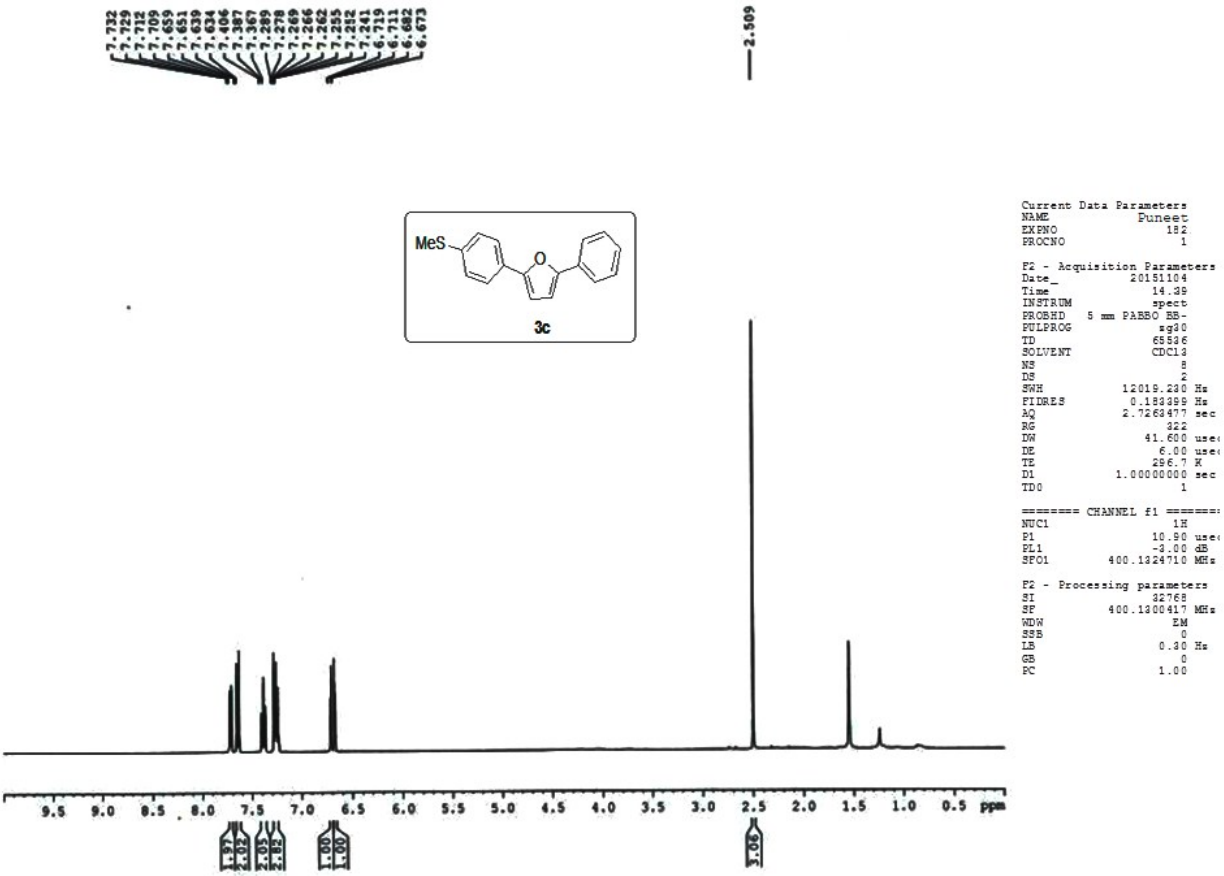
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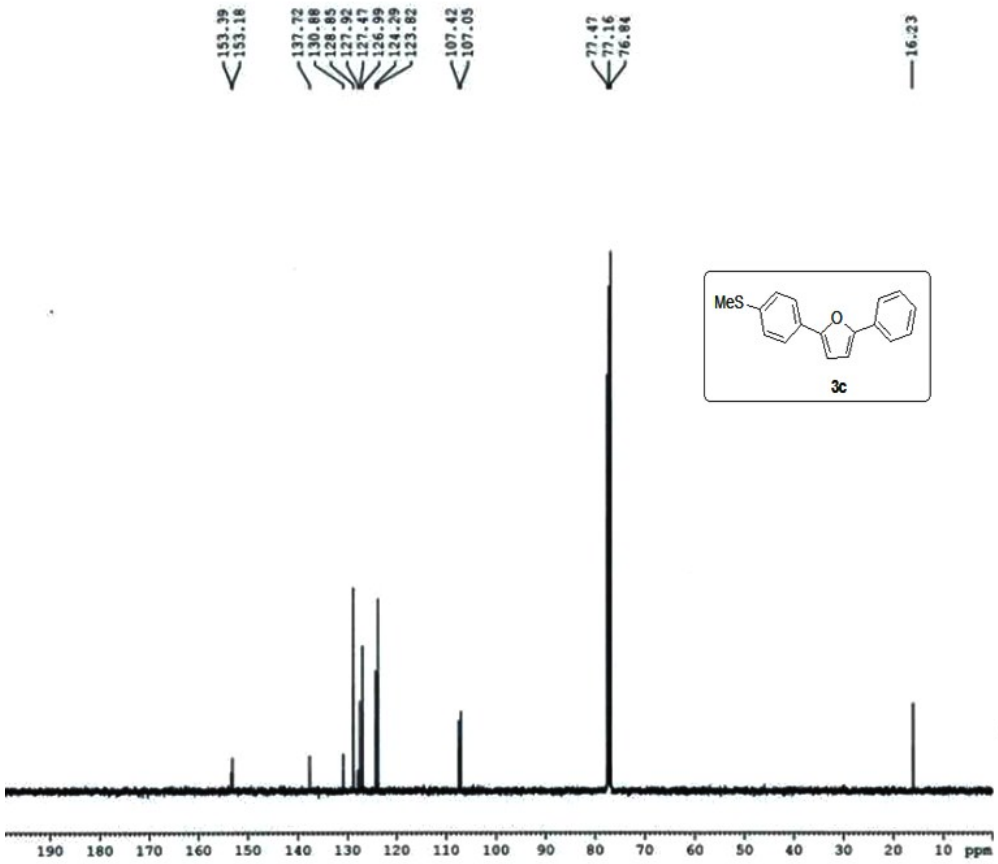

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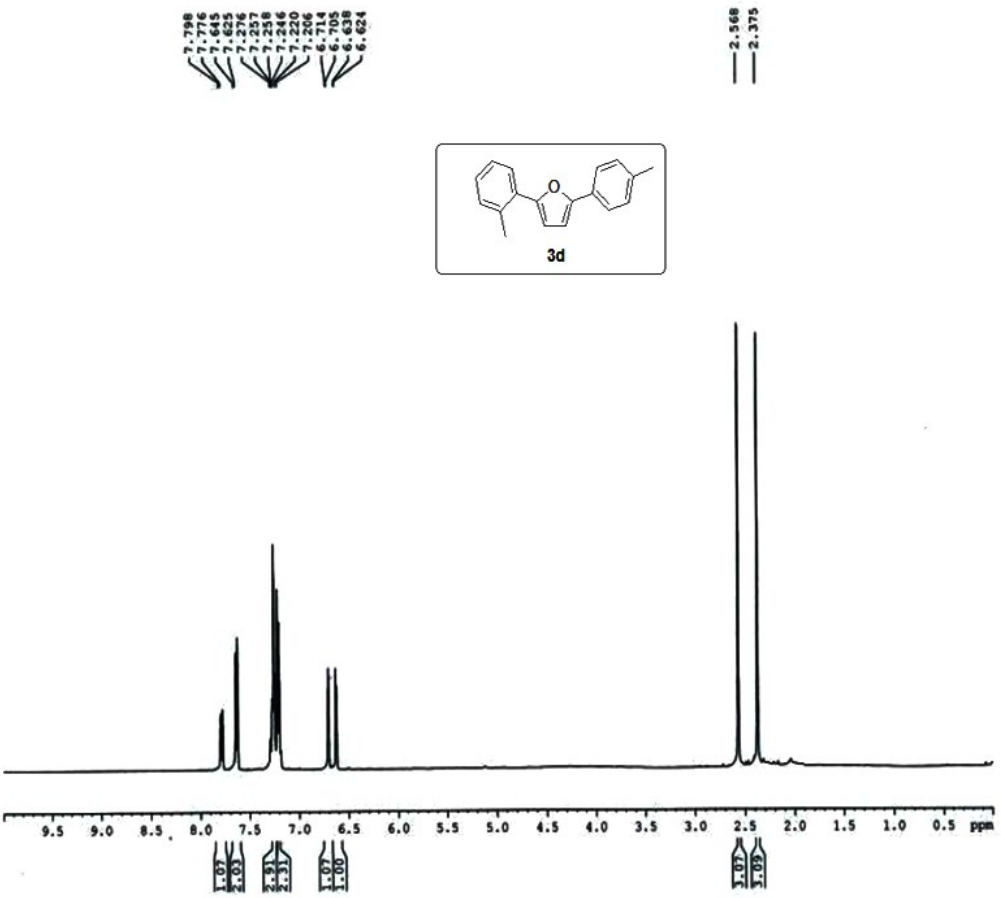
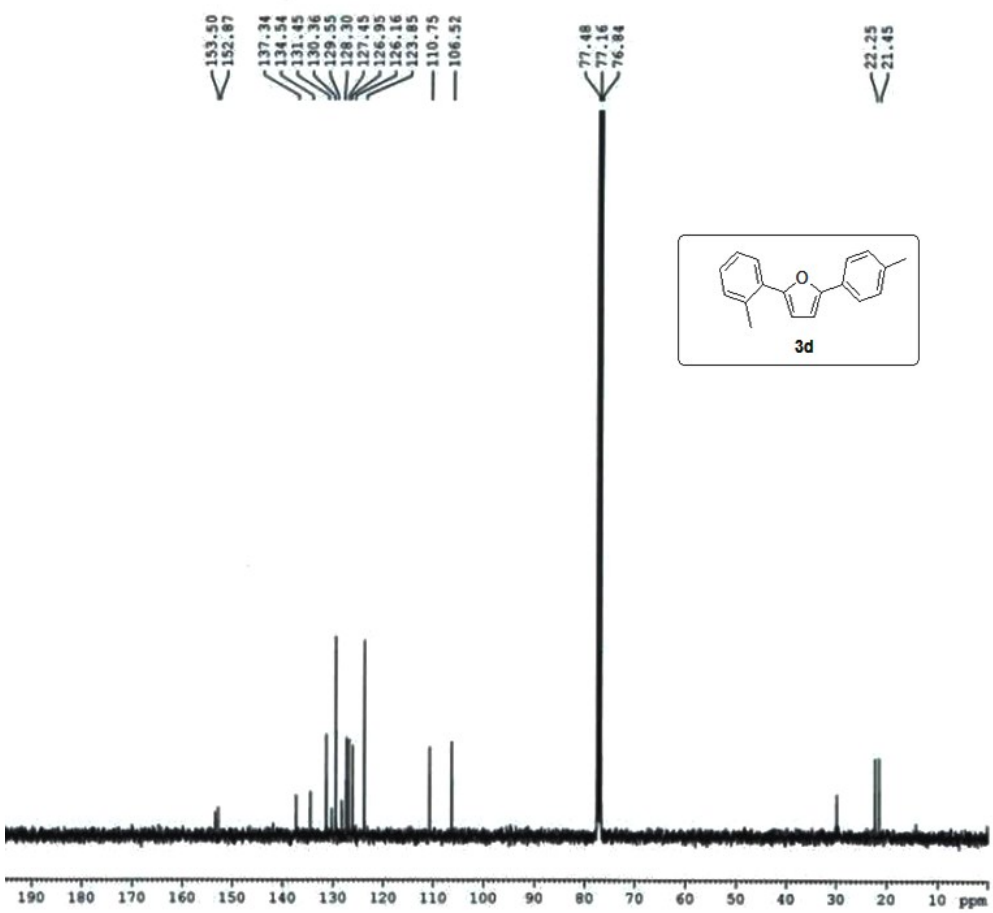
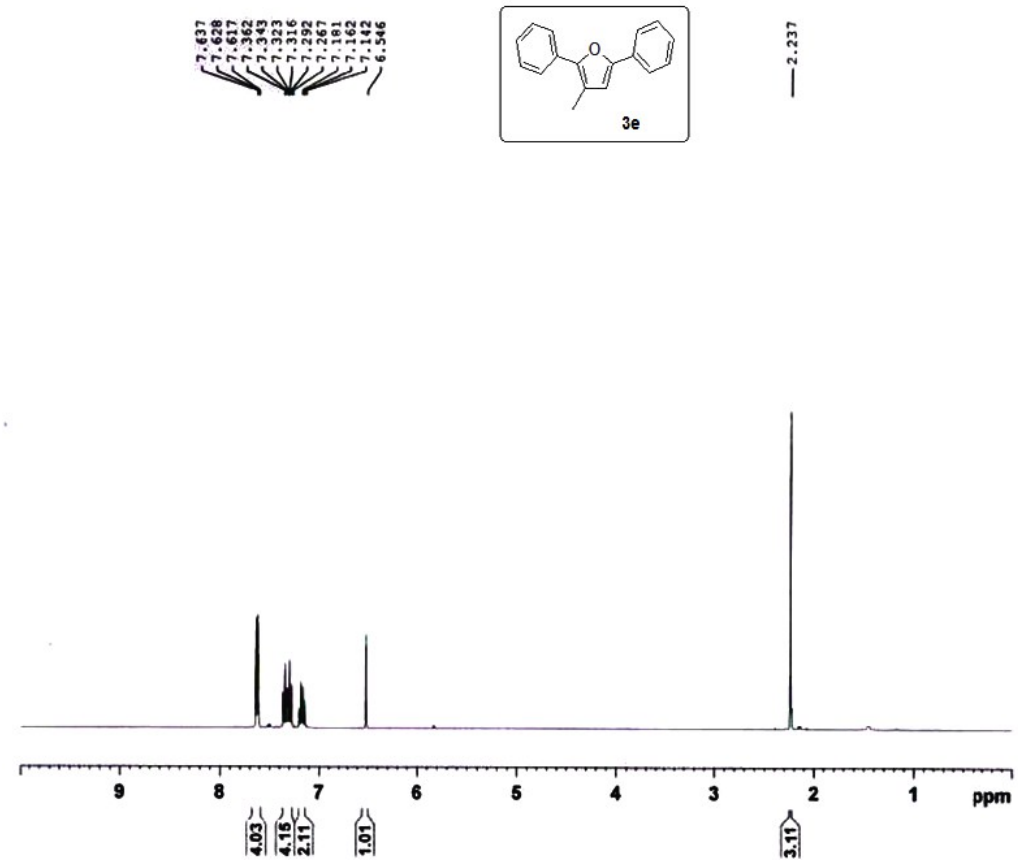
PL12W	0.33072606 W
PL13W	0.33072606 W
SFO2	400.1516006 MHz
SI	32768
SF	100.6177980 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0

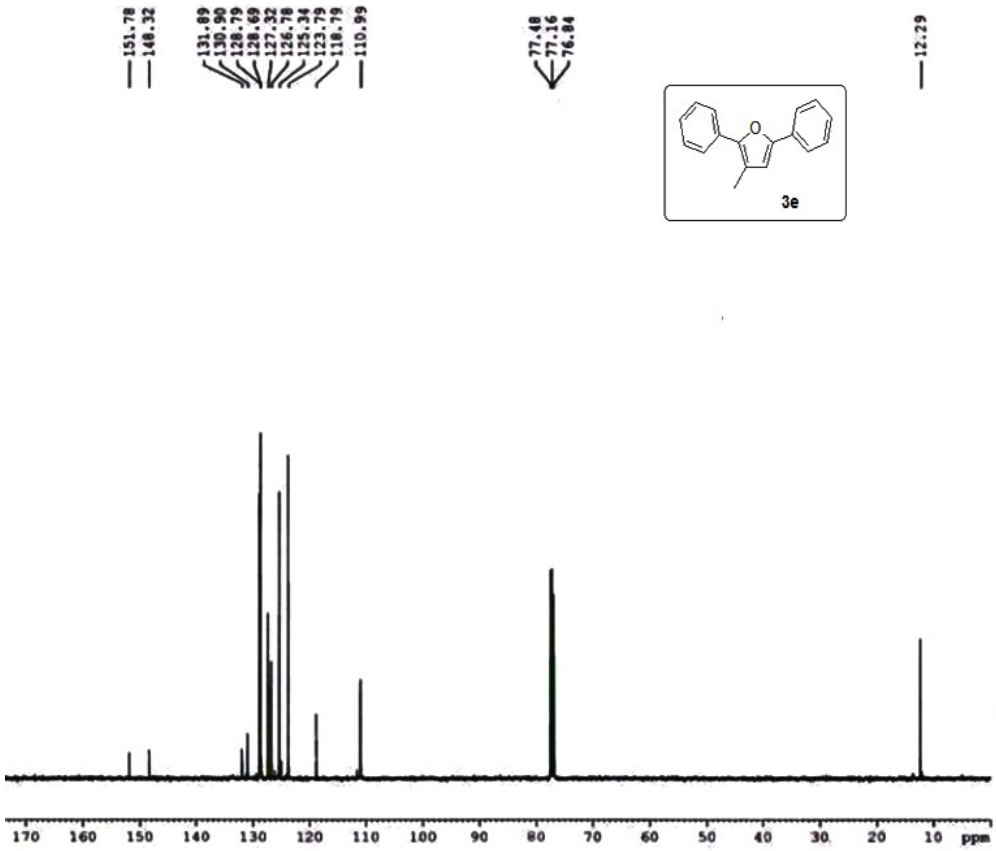



```
Current Data Parameters
NAME                 Puneet
EXPNO                   141
PROCNO                    1

F2 - Acquisition Parameters
Date_               20151104
Time                   14.58
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                zg30
TD                     65536
SOLVENT                CDCl3
NS                         8
DS                         2
SWH                12019.230 Hz
FIDRES              0.183399 Hz
AQ                  2.7263477 sec
RG                       322
DW                    41.600 use
DE                     6.00 use
TE                    296.7 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     10.90 use
PL1                    -3.00 dB
SFO1          400.1324710 MHz

F2 - Processing parameters
SI                     32768
SF                400.1300417 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```

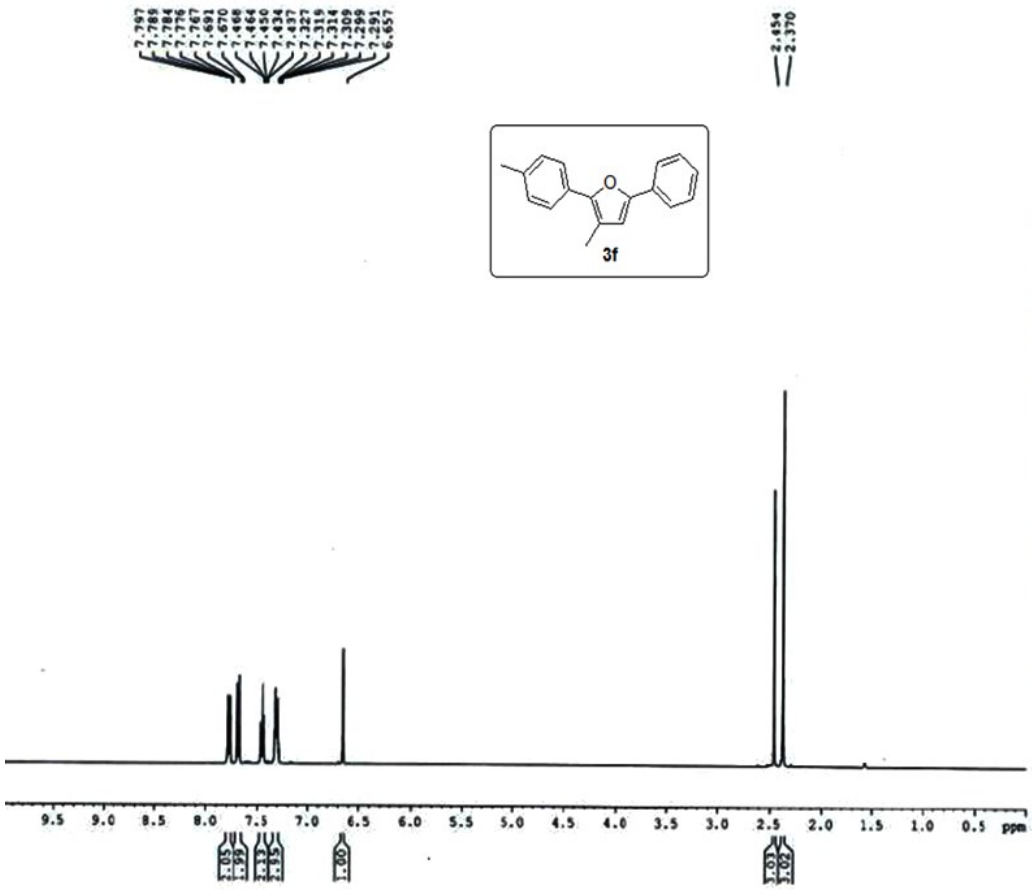


NAME	PV	
EXPNO	141	
PROCNO	1	
Date_	20160202	
Time_	12.05	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	

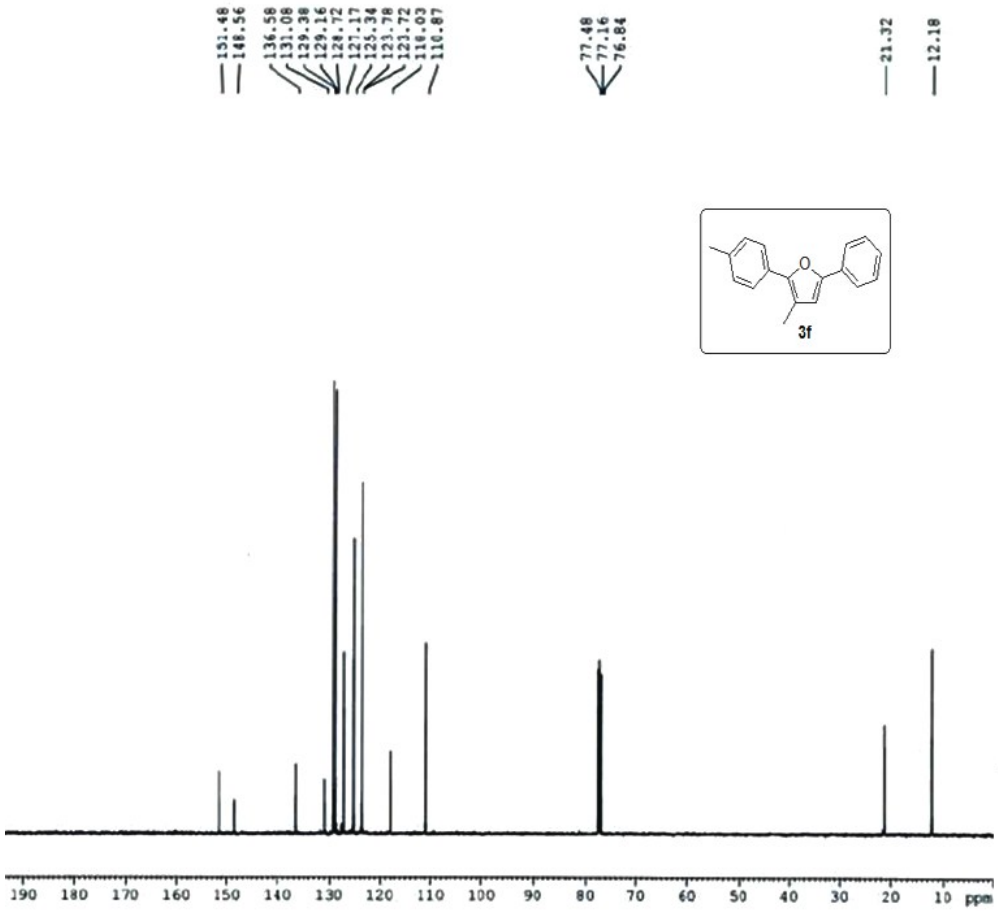

7.637
7.628
7.617
7.362
7.343
7.323
7.316
7.292
7.267
7.181
7.162
7.142
6.546
3e
2.237
Current Data Parameters
NAME Puneet
EXPNO 184
PROCNO 1
F2 - Acquisition Parameters
Date_ 20151104
Time 14.41
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263477 sec
RG 322
DW 41.600 use
DE 6.00 use
TE 296.7 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 1H
P1 10.80 use
PL1 -3.00 dB
SFO1 400.1324710 MHz
F2 - Processing parameters
SI 32768
SF 400.1300417 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
9
8
7
6
5
4
3
2
1
ppm
4.03
4.15
2.11
1.01
3.11



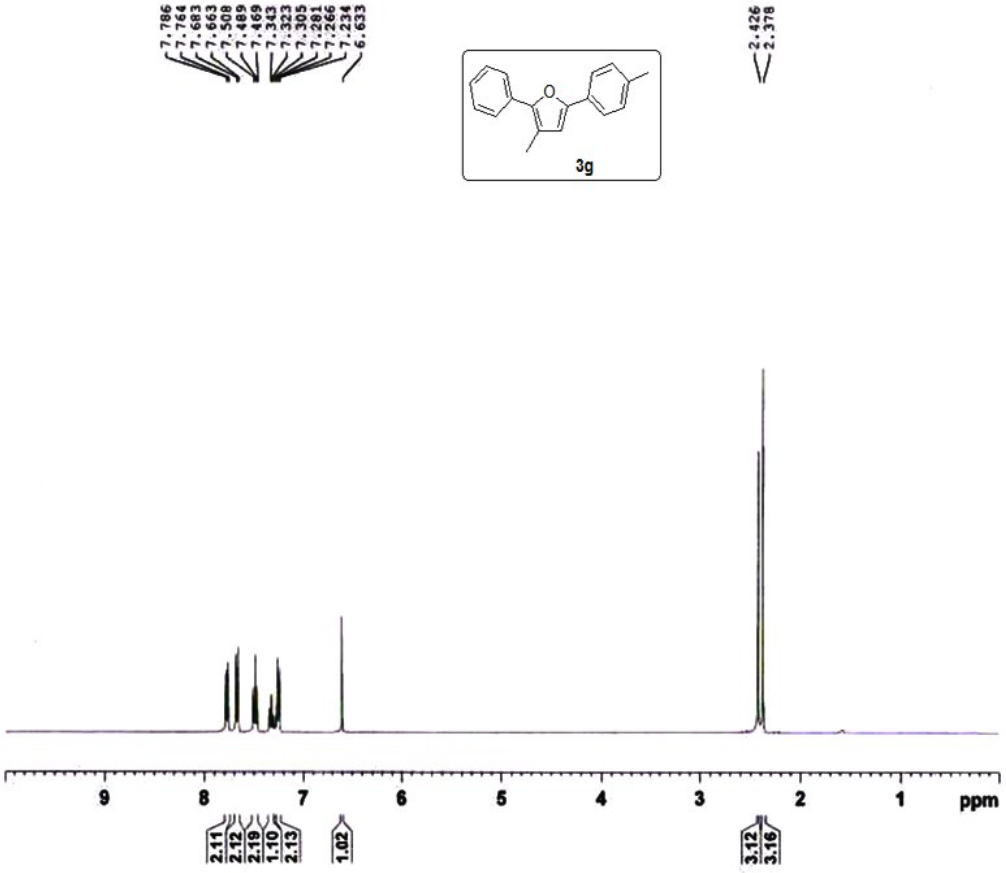
NAME	PV	
EXPNO	184	
PROCNO	1	
Date_	20160502	
Time_	13.15	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	

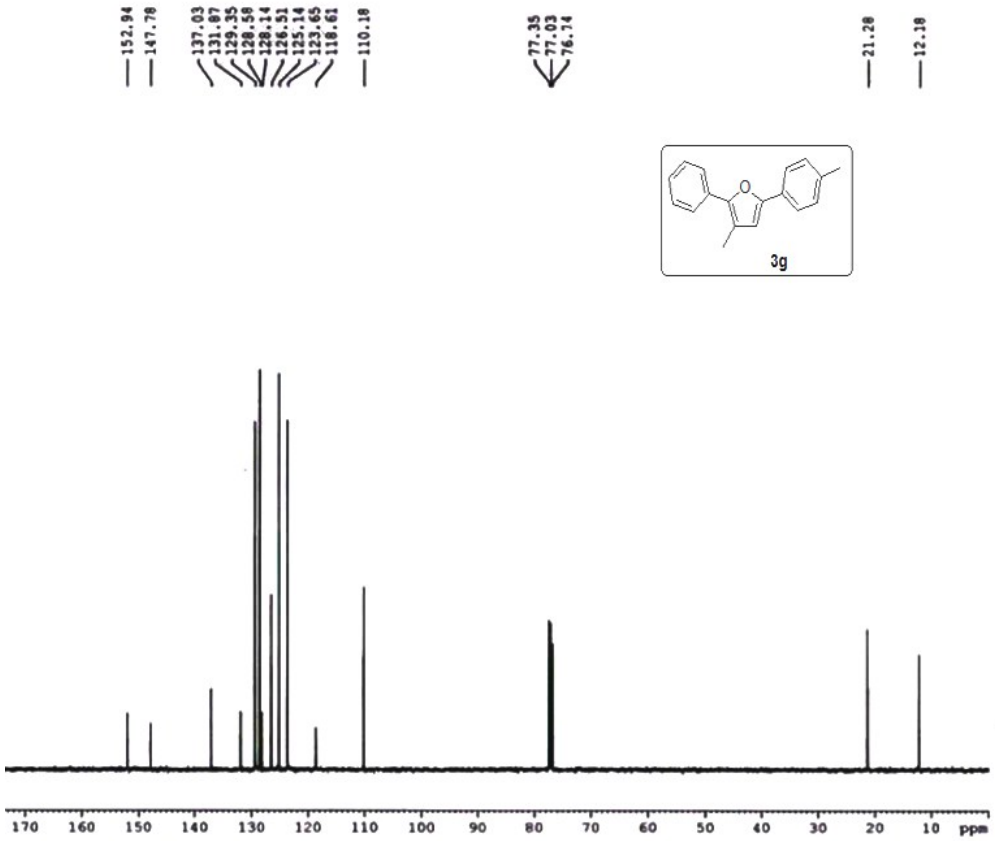



```
Current Data Parameters
NAME                  Puneet
EXPNO                    110
PROCNO                     1

F2 - Acquisition Parameters
Date_               20151104
Time                   14.12
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                zg30
TD                     65536
SOLVENT                CDCl3
NS                         8
DS                         2
SWH                12019.230 Hz
FIDRES              0.183399 Hz
AQ                  2.7263477 sec
RG                       322
DW                    41.600 use
DE                     6.00 use
TE                    296.7 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     10.90 use
PL1                    -3.00 dB
SFO1          400.1324710 MHz

F2 - Processing parameters
SI                     32768
SF            400.1300417 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```

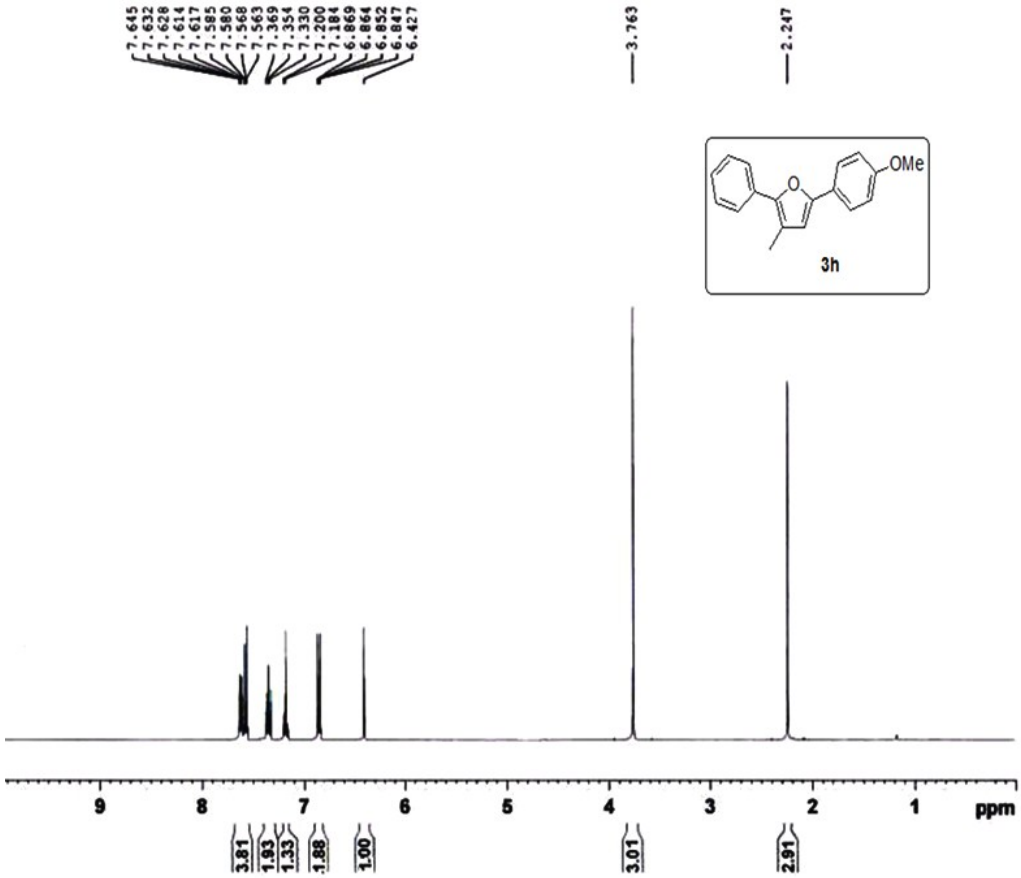


NAME	PV	
EXPNO	110	
PROCNO	1	
Date_	20160502	
Time	13.24	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	

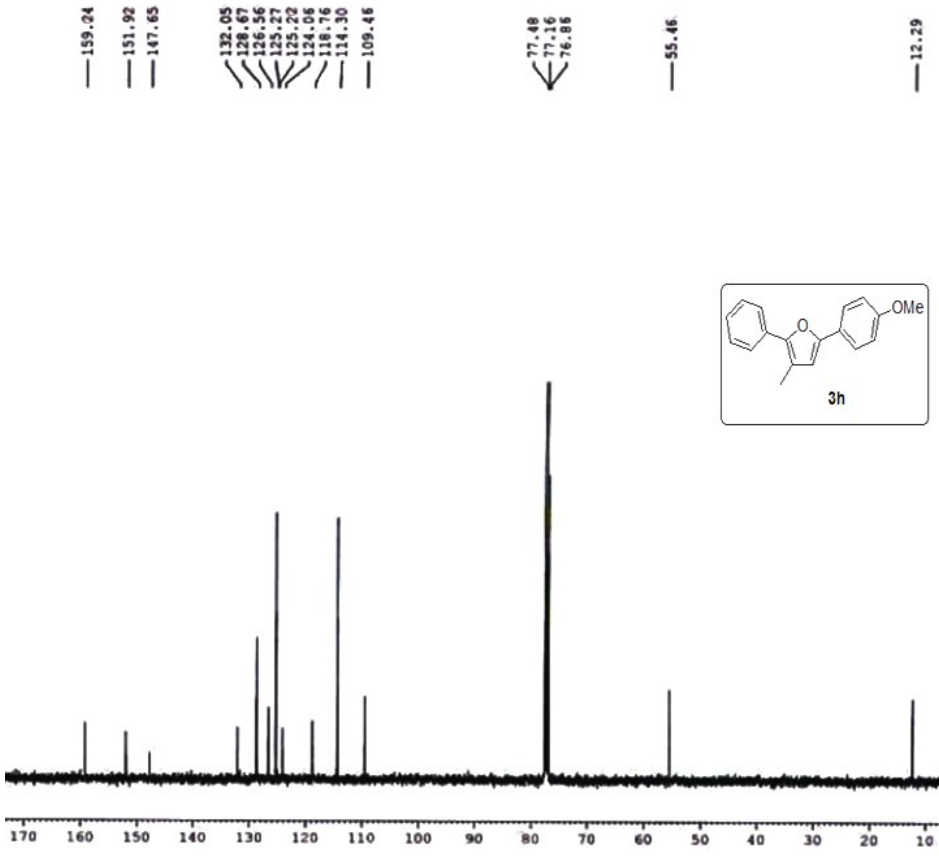

7.786
7.764
7.683
7.663
7.508
7.489
7.469
7.343
7.323
7.305
7.281
7.266
7.234
6.633
2.426
2.378
3g
Current Data Parameters
NAME Prashant
EXPNO 201
PROCNO 1
F2 - Acquisition Parameters
Date_ 20151120
Time 15.30
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183389 Hz
AQ 2.7263477 sec
RG 322
DW 41.600 use
DE 6.00 use
TE 296.7 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 1H
P1 10.90 use
PL1 -3.00 dB
SFO1 400.1324710 MHz
F2 - Processing parameters
SI 32768
SF 400.1300417 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
9
8
7
6
5
4
3
2
1
ppm
2.11
2.12
2.19
1.10
2.13
1.02
3.12
3.16



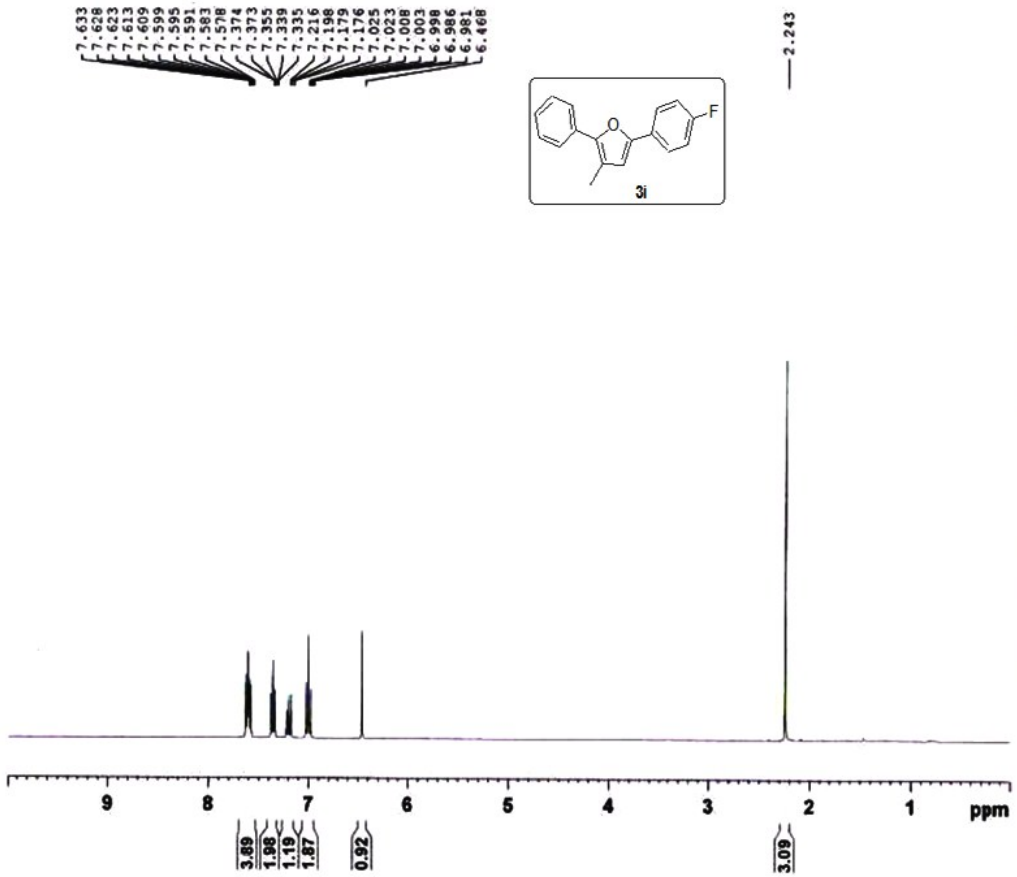
NAME	PV	
EXPNO	201	
PROCNO	1	
Date_	20160502	
Time	13.38	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	



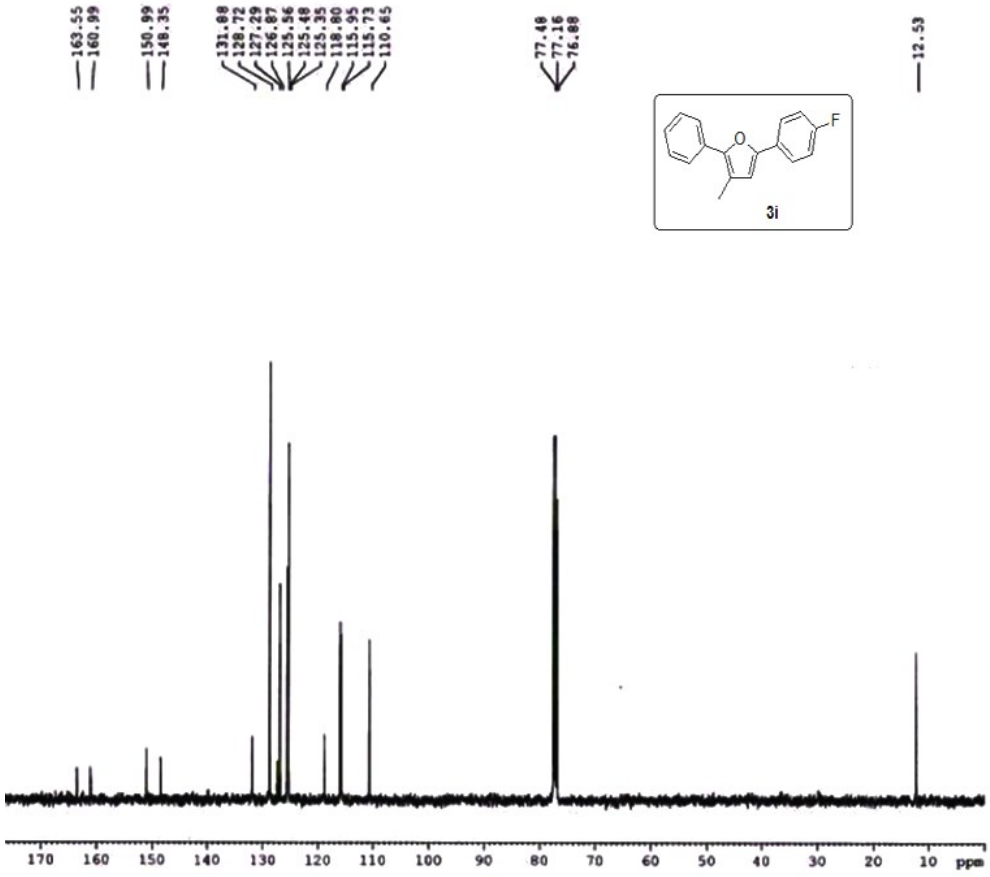

```
Current Data Parameters
NAME                  Prashant
EXPNO                      200
PROCNO                       1

F2 - Acquisition Parameters
Date_               20151120
Time                     14.30
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                     65536
SOLVENT                  CDCl3
NS                           8
DS                           2
SWH                12019.230 Hz
FIDRES              0.183399 Hz
AQ                  2.7263477 sec
RG                         322
DW                    41.600 use
DE                     6.00 use
TE                    296.7 K
D1                  1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       1H
P1                      10.90 use
PL1                     -3.00 dB
SFO1             400.1324710 MHz

F2 - Processing parameters
SI                       32768
SF                400.1300417 MHz
WDW                        EM
SSB                         0
LB                       0.30 Hz
GB                          0
PC                       1.00
```



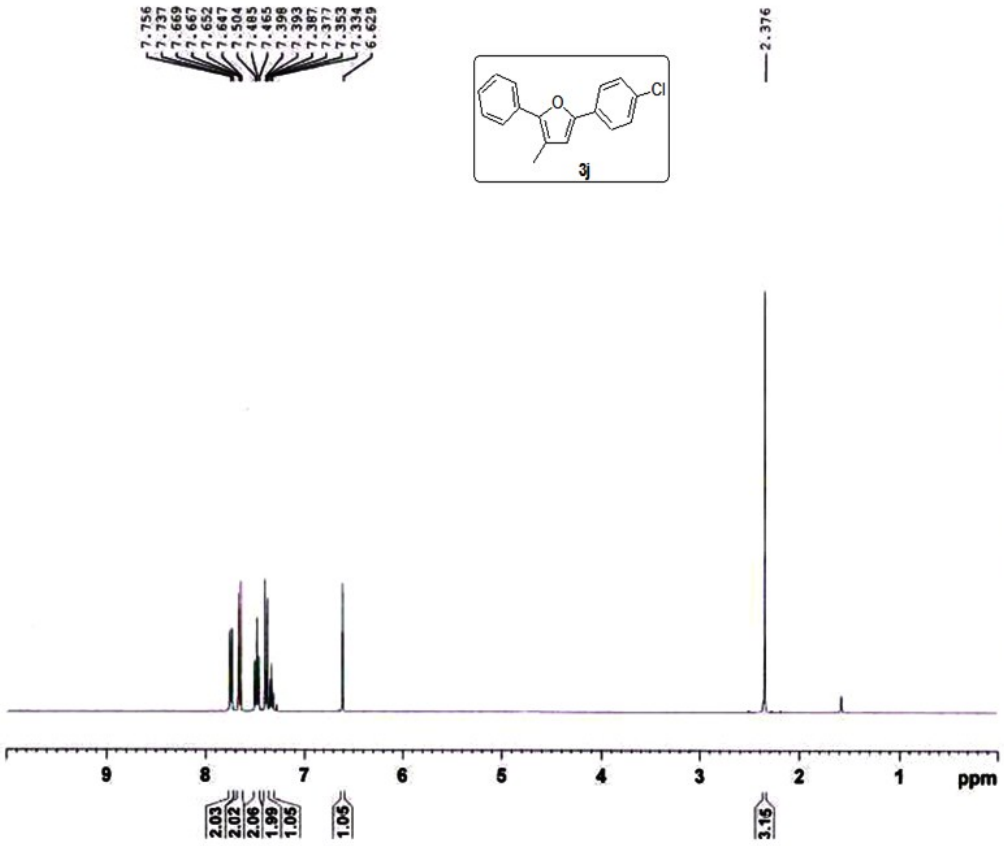
NAME	PV
EXPNO	200
PROCNO	1
Date_	20160502
Time_	13.46
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	512
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	575
DW	20.800 usec
DE	6.50 usec
TE	292.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	12.00 usec
PL1	-2.00 dB
PL1W	56.92932510 W
SFO1	100.6278593 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	0.00 dB
PL12	15.14 dB
PL13	15.14 dB
PL2W	10.80111122 W
PL12W	0.33072606 W
PL13W	0.33072606 W
SFO2	400.1516006 MHz
SI	32768
SF	100.6177980 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0



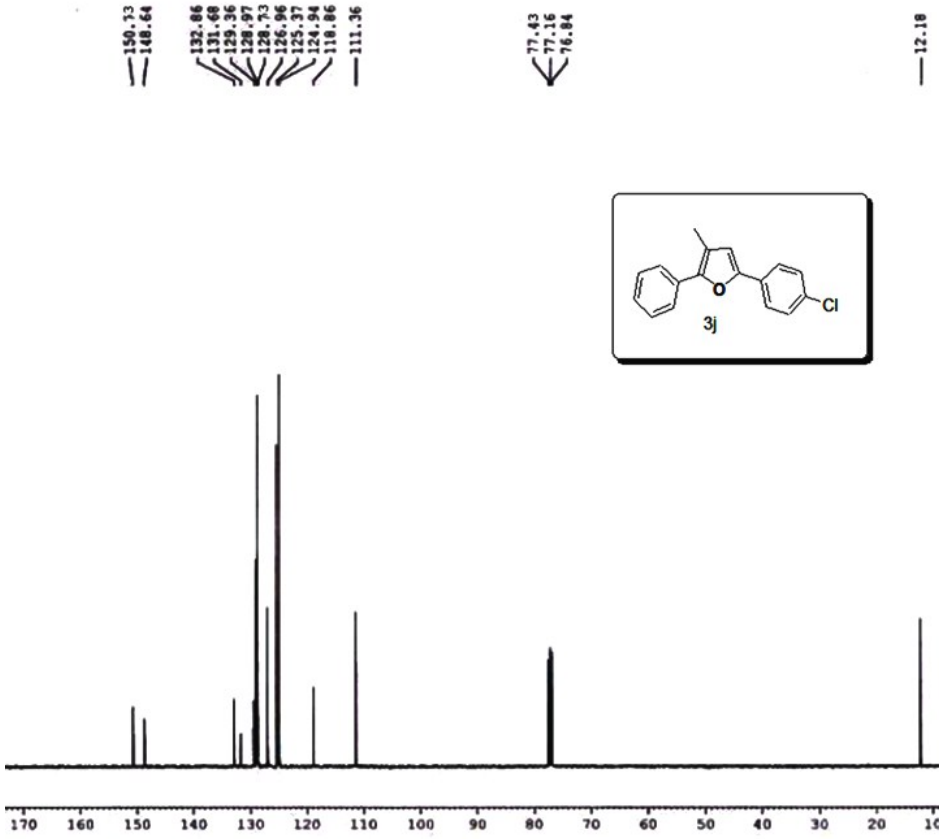

```
Current Data Parameters
NAME                  Prashant
EXPNO                      160
PROCNO                       1

F2 - Acquisition Parameters
Date_               20151120
Time                     16.01
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                     655536
SOLVENT                  CDCl3
NS                           8
DS                           2
SWH                12019.230 Hz
FIDRES                0.183389 Hz
AQ                 2.7263477 sec
RG                         322
DW                    41.600 use
DE                     6.00 use
TE                     296.7 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       1H
P1                      10.90 use
PL1                     -3.00 dB
SFO1             400.1324710 MHz

F2 - Processing parameters
SI                       32768
SF                 400.1300417 MHz
WDW                         EM
SSB                          0
LB                        0.30 Hz
GB                           0
PC                        1.00
```



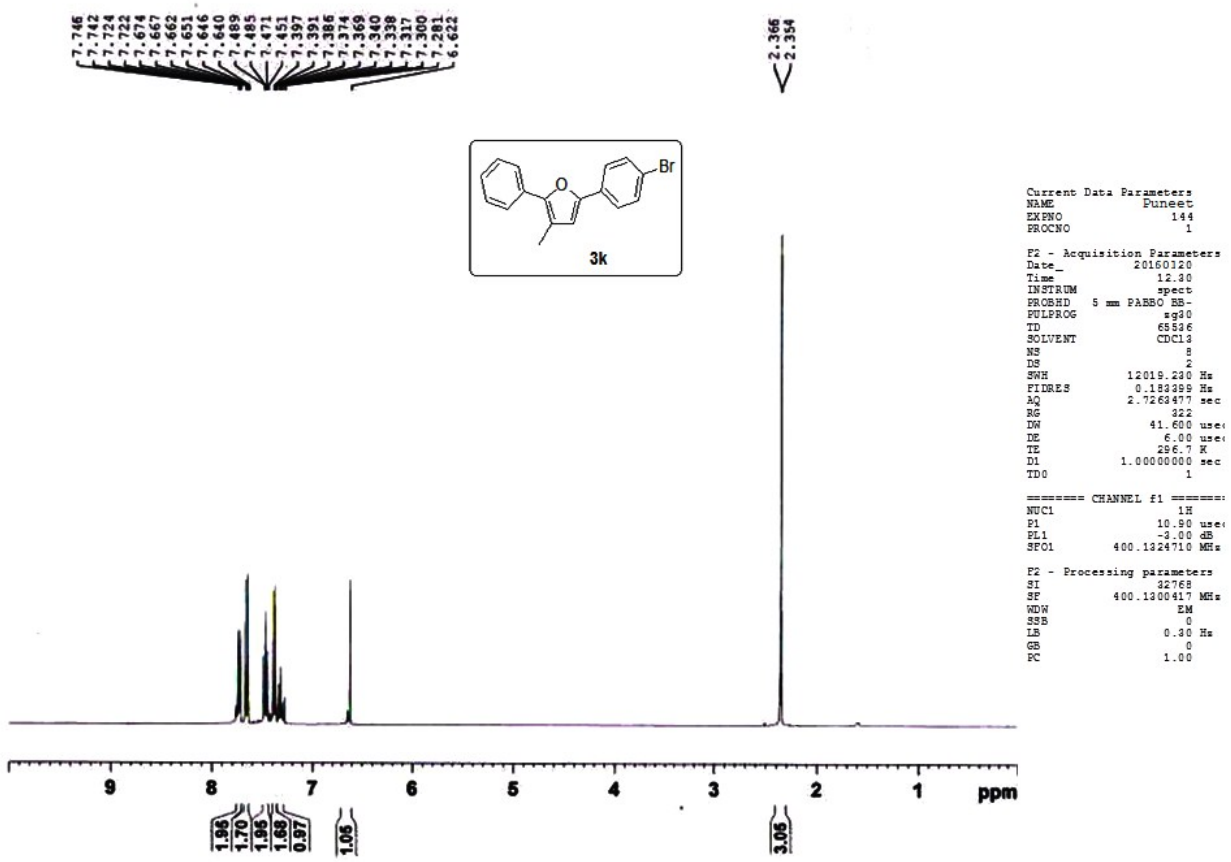
NAME	PV	
EXPNO	160	
PROCNO	1	
Date_	20160502	
Time	15.05	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	

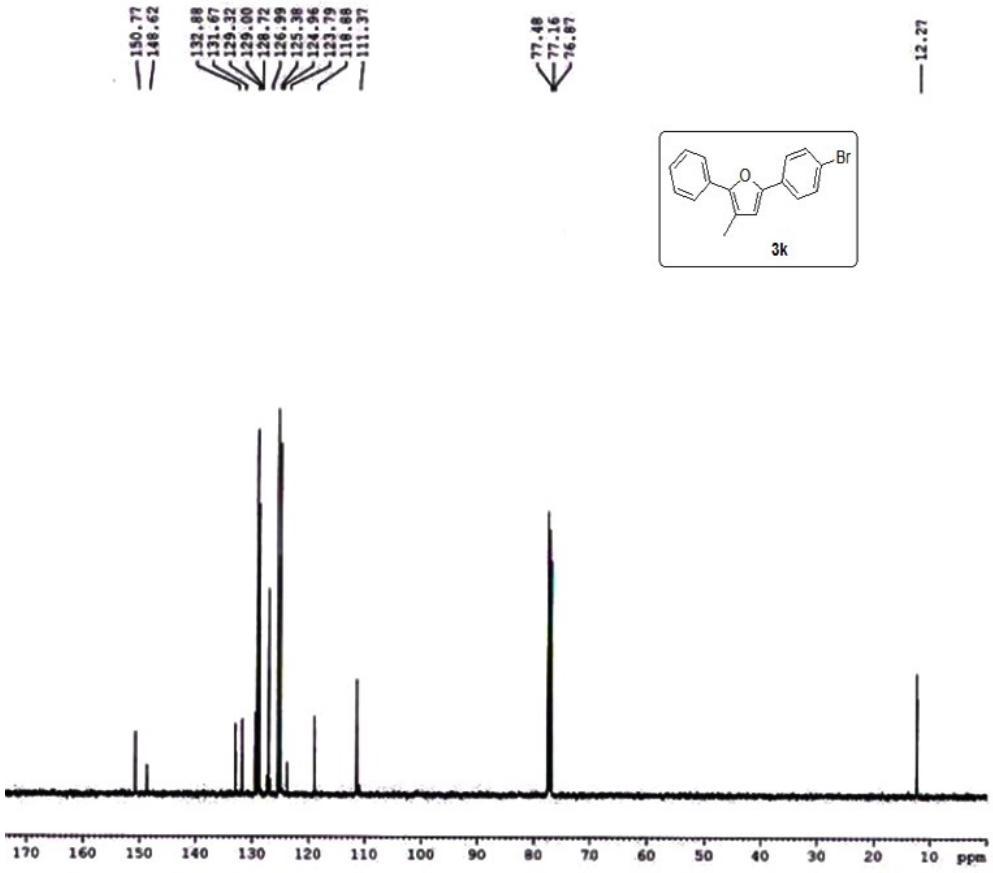



```
Current Data Parameters
NAME                  Prashant
EXPNO                      165
PROCNO                       1

F2 - Acquisition Parameters
Date_               20151120
Time                     14.16
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                       65536
SOLVENT                  CDCl3
NS                           8
DS                           2
SWH                 12019.230 Hz
FIDRES                0.183399 Hz
AQ                    2.7263477 sec
RG                         322
DW                      41.600 use
DE                       6.00 use
TE                      296.7 K
D1                    1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       10.90 use
PL1                      -3.00 dB
SFO1               400.1324710 MHz

F2 - Processing parameters
SI                       32768
SF                 400.1300417 MHz
WDW                         EM
SSB                          0
LB                        0.30 Hz
GB                           0
PC                        1.00
```

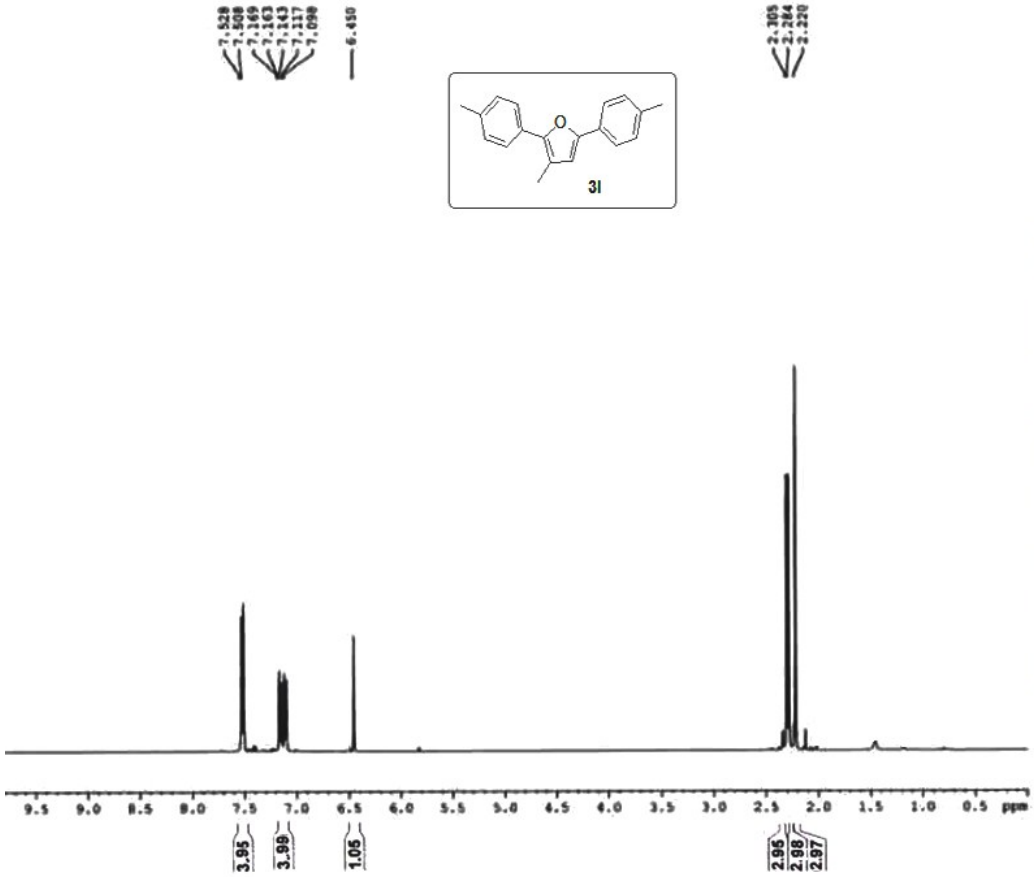


NAME	PV	
EXPNO	165	
PROCNO	1	
Date_	20160502	
Time	14.12	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	

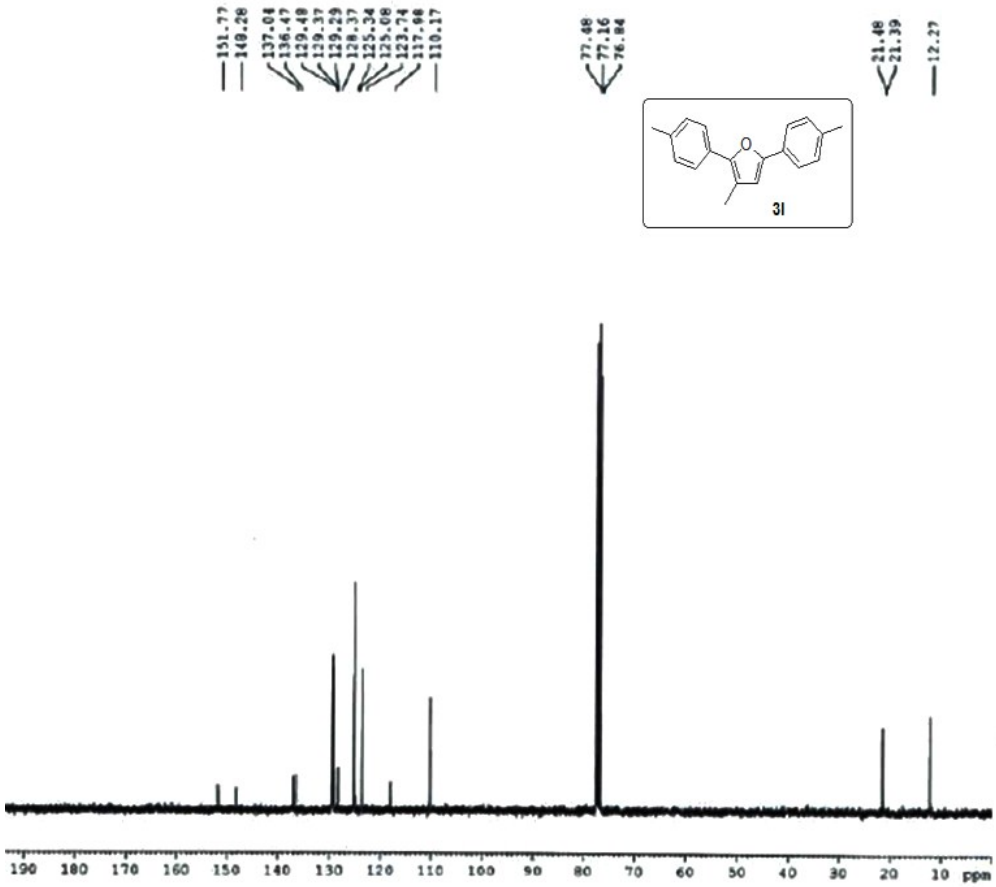

7.746
7.742
7.724
7.722
7.674
7.667
7.662
7.651
7.646
7.640
7.489
7.485
7.471
7.451
7.397
7.391
7.386
7.374
7.369
7.340
7.338
7.317
7.300
7.281
6.622
2.366
2.354
Br
O
3k
Current Data Parameters
NAME Puneet
EXPNO 144
PROCNO 1
F2 - Acquisition Parameters
Date_ 20160120
Time 12.30
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263477 sec
RG 322
DW 41.600 use
DE 6.00 use
TE 296.7 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 1H
P1 10.90 use
PL1 -3.00 dB
SFO1 400.1324710 MHz
F2 - Processing parameters
SI 32768
SF 400.1300417 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
9
8
7
6
5
4
3
2
1
ppm
1.96
1.70
1.95
1.68
0.97
1.06
3.06



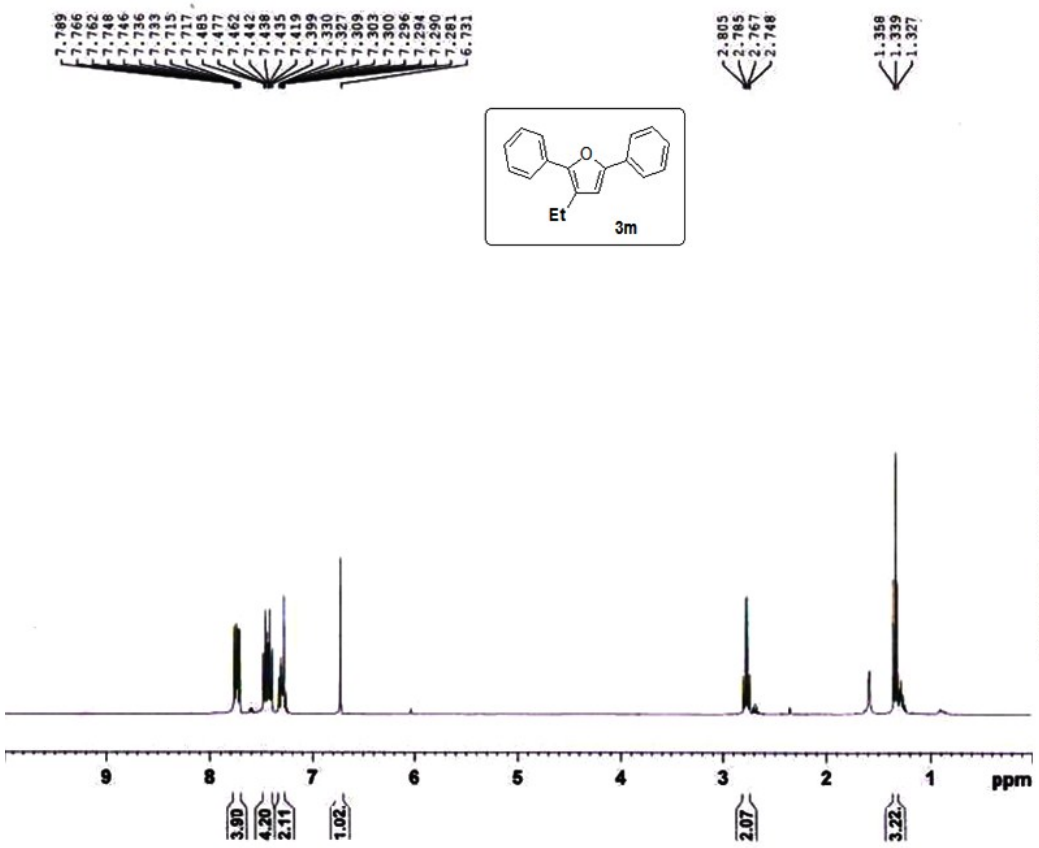
NAME	PV	
EXPNO	144	
PROCNO	1	
Date_	20160805	
Time	13.30	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	



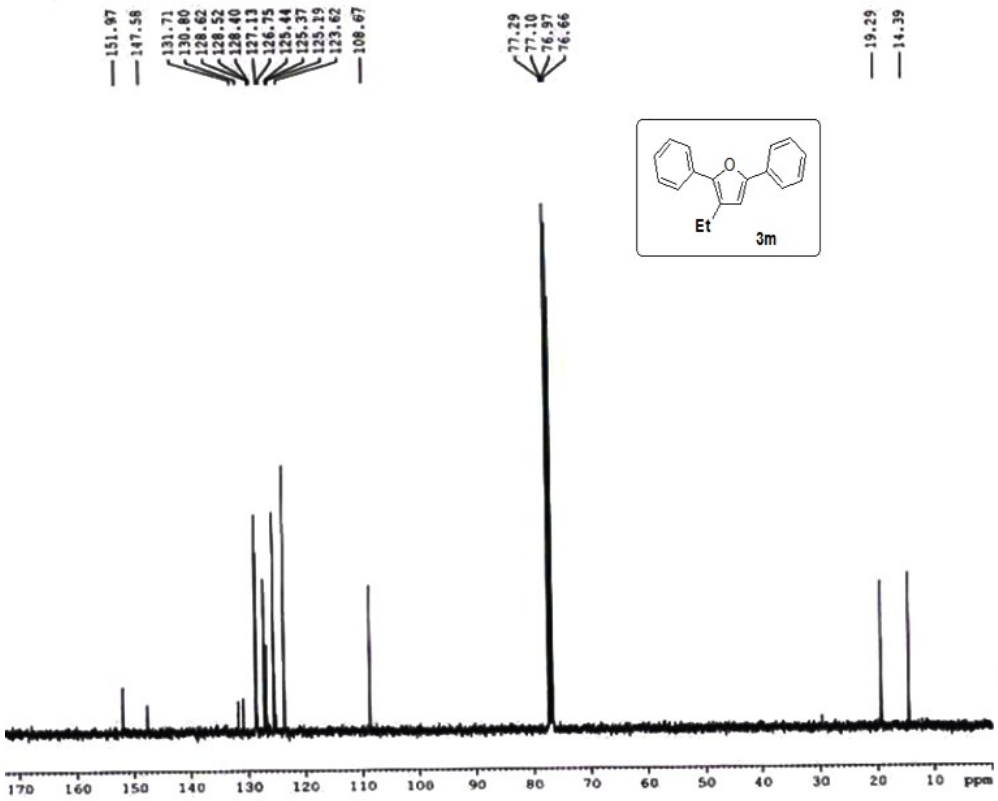

```
Current Data Parameters
NAME                  Puneet
EXPNO                    153
PROCNO                     1

F2 - Acquisition Parameters
Date_               20160120
Time                   14.32
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                zg30
TD                     65536
SOLVENT                CDCl3
NS                         8
DS                         2
SWH                12019.230 Hz
FIDRES                0.183389 Hz
AQ                 2.7263477 sec
RG                       322
DW                    41.600 use
DE                     6.00 use
TE                    296.7 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     10.80 use
PL1                    -3.00 dB
SFO1             400.1324710 MHz

F2 - Processing parameters
SI                       32768
SF                400.1300417 MHz
WDW                        EM
SSB                         0
LB                       0.30 Hz
GB                          0
PC                       1.00
```



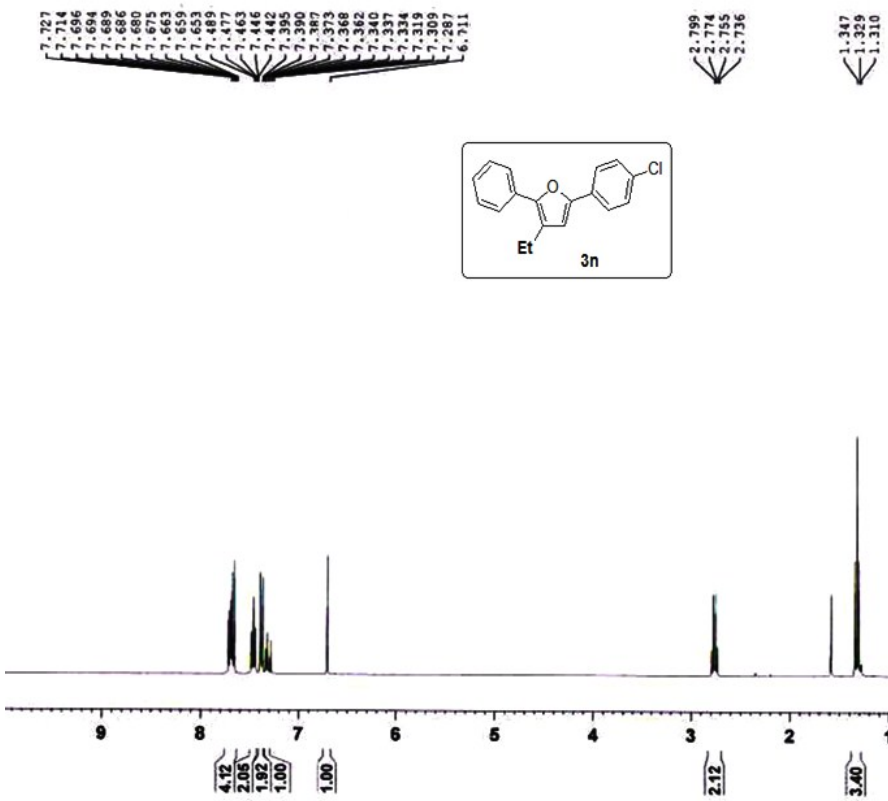
NAME	RV	
EXPNO	153	
PROCNO	2	
Date_	20160805	
Time	13.42	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	



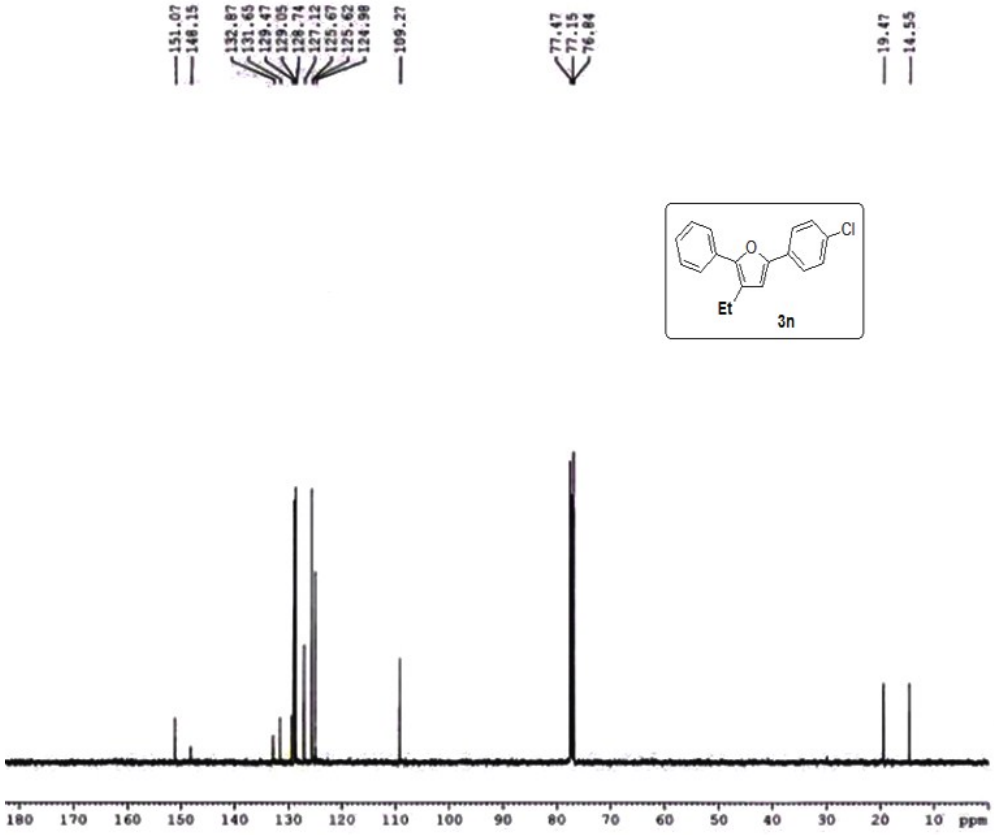

```
Current Data Parameters
NAME                  Puneet
EXPNO                    132
PROCNO                     1

F2 - Acquisition Parameters
Date_               20160120
Time                   11.30
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                zg30
TD                     65536
SOLVENT                CDCl3
NS                         8
DS                         2
SWH                12019.230 Hz
FIDRES                 0.183399 Hz
AQ                 2.7263477 sec
RG                       322
DW                    41.600 use
DE                     6.00 use
TE                    296.7 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     10.90 use
PL1                    -3.00 dB
SFO1             400.1324710 MHz

F2 - Processing parameters
SI                       32768
SF               400.1300417 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```



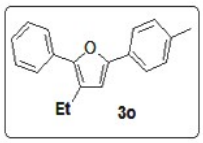
NAME	PV	
EXPNO	132	
PROCNO	2	
Date_	20160805	
Time	13.51	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	

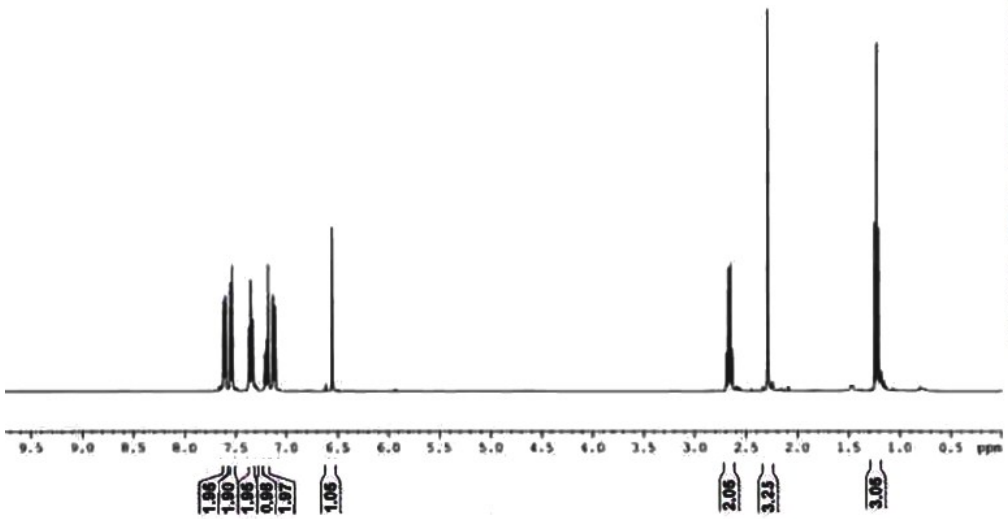



```
Current Data Parameters
NAME                  Prashant
EXPNO                      150
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160120
Time                     14.14
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                          8
DS                          2
SWH                 12019.230 Hz
FIDRES               0.183399 Hz
AQ                   2.7263477 sec
RG                        256
DW                     41.600 usec
DE                      6.00 usec
TE                     296.5 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                       1H
P1                      10.90 usec
PL1                     -3.00 dB
SFO1             400.1324710 MHz

F2 - Processing parameters
SI                      32768
SF                400.1300000 MHz
WDW                        EM
SSB                         0
LB                       0.30 Hz
GB                          0
PC                       1.00
```

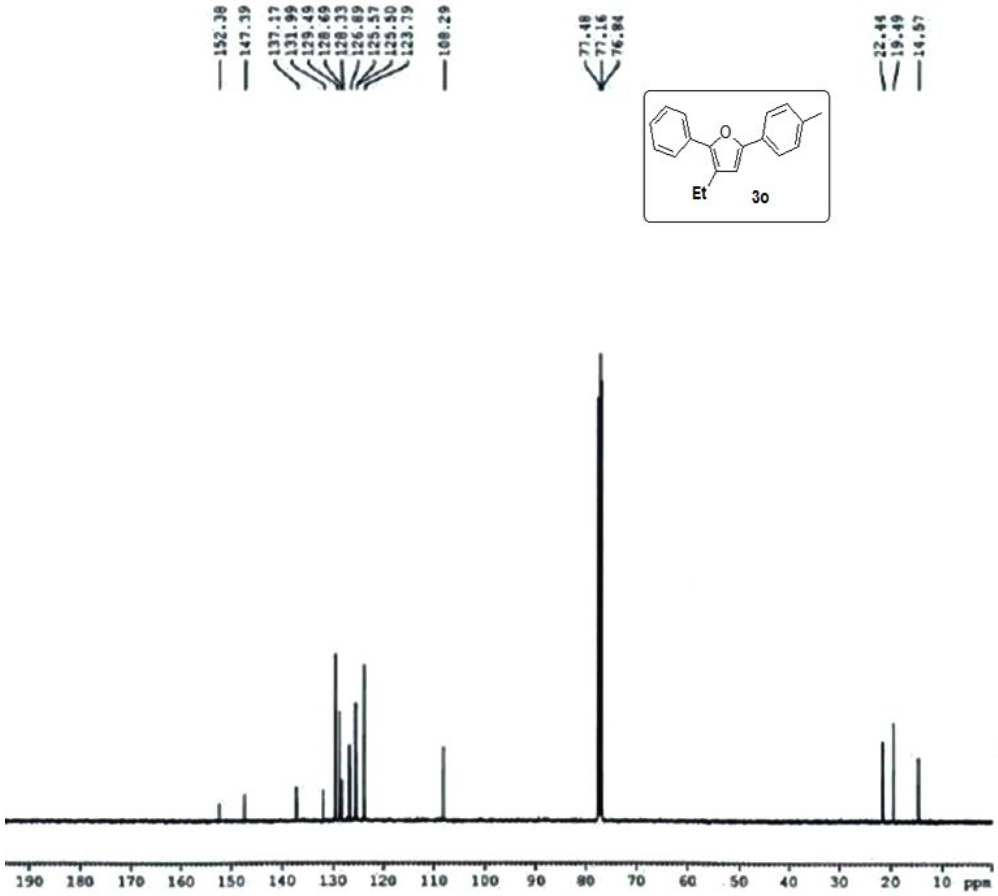


NAME	PV	
EXPNO	150	
PROCNO	1	
Date_	20160805	
Time	13.05	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	

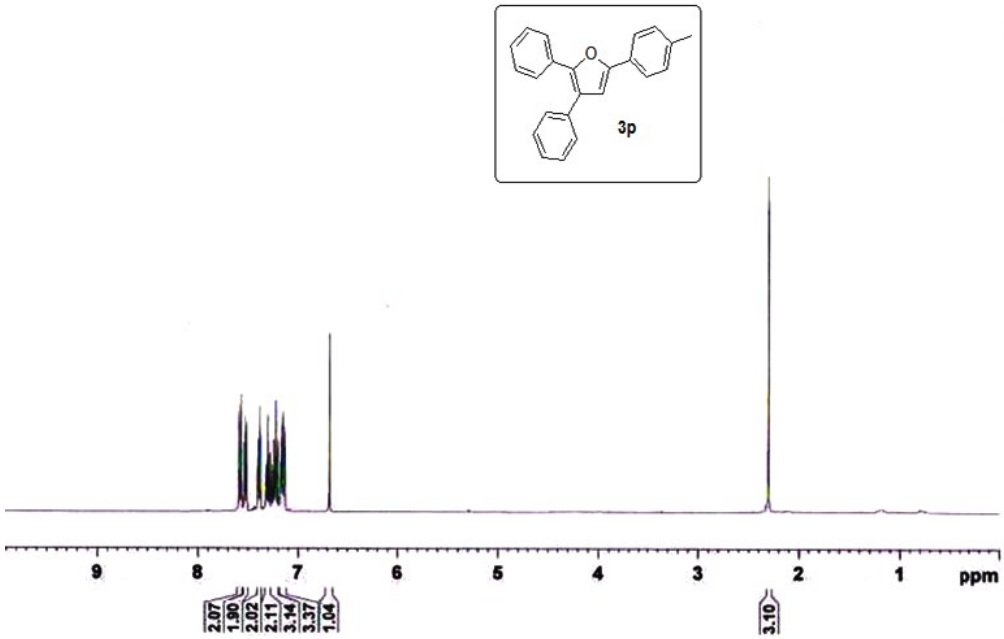




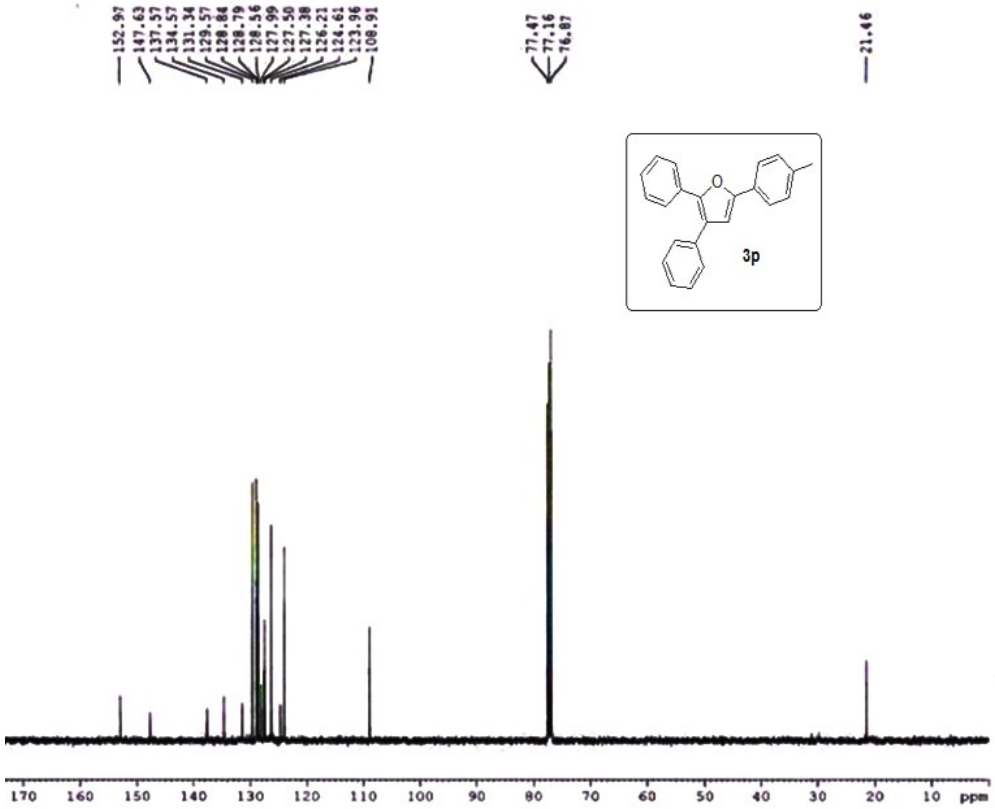

```
F2 - Acquisition Parameters
Date_              20160120
Time                  14.20
INSTRUM               spect
PROBHD    5 mm PABBO BB-
PULPROG               zg30
TD                   65536
SOLVENT              CDCl3
NS                       8
DS                       2
SWH              12019.230 Hz
FIDRES           0.183399 Hz
AQ               2.7263477 sec
RG                     256
DW                  41.600 usec
DE                   6.00 usec
TE                  296.5 K
D1               1.00000000 sec
TD0                      1

======== CHANNEL f1 ========
NUC1                   1H
P1                  10.90 usec
PL1                 -3.00 dB
SFO1         400.1324710 MHz

F2 - Processing parameters
SI                    32768
SF           400.1300000 MHz
WDW                      EM
SSB                       0
LB                     0.30 Hz
GB                        0
PC                     1.00
```



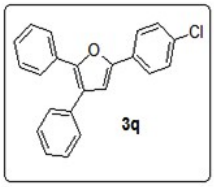
NAME	PV	
EXPNO	114	
PROCNO	1	
Date_	20160805	
Time	14.19	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	

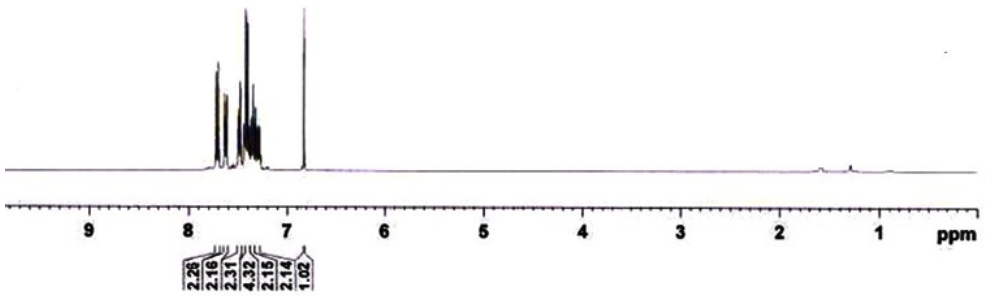



```
Current Data Parameters
NAME                  Prashant
EXPNO                      120
PROCNO                       1

F2 - Acquisition Parameters
Date_               20160120
Time                    14.23
INSTRUM                 spect
PROBHD     5 mm PABBO BB-
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                         8
DS                         2
SWH                12019.230 Hz
FIDRES              0.183399 Hz
AQ                  2.7263477 sec
RG                       256
DW                    41.600 usec
DE                     6.00 usec
TE                    296.5 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     10.90 usec
PL1                    -3.00 dB
SFO1           400.1324710 MHz

F2 - Processing parameters
SI                       32768
SF             400.1300000 MHz
WDW                         EM
SSB                         0
LB                      0.30 Hz
GB                          0
PC                      1.00
```

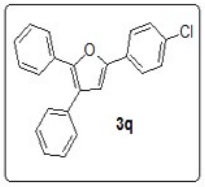


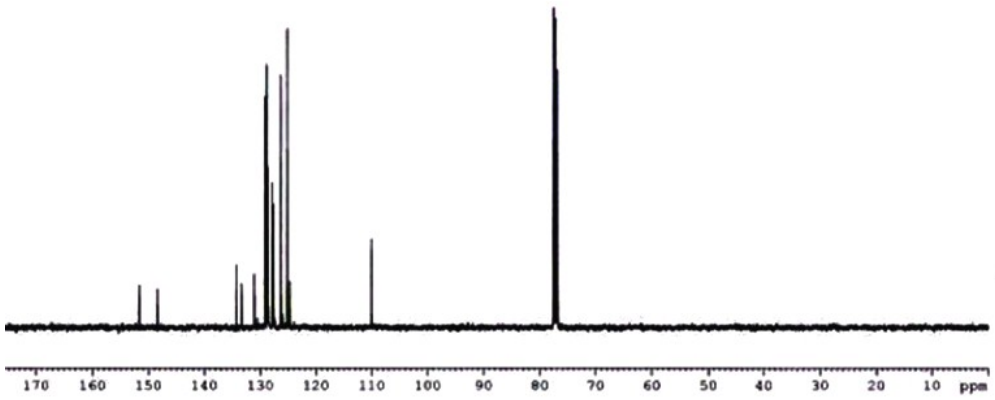
NAME	PV	
EXPNO	12	
PROCNO	1	
Date_	20160805	
Time	12.36	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	






```
Current Data Parameters
NAME                  Prashant
EXPNO                      140
PROCNO                       1

F2 - Acquisition Parameters
Date_               20160120
Time                   12.14
INSTRUM                spect
PROBHD     5 mm PABBO BB-
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        8
DS                        2
SWH                12019.230 Hz
FIDRES             0.183399 Hz
AQ                 2.7263477 sec
RG                      256
DW                   41.600 usec
DE                    6.00 usec
TE                   296.5 K
D1                 1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     1H
P1                    10.90 usec
PL1                   -3.00 dB
SFO1          400.1324710 MHz

F2 - Processing parameters
SI                    32768
SF            400.1300000 MHz
WDW                      EM
SSB                       0
LB                     0.30 Hz
GB                        0
PC                     1.00
```





NAME	PV	
EXPNO	140	
PROCNO	1	
Date_	20160805	
Time	15.30	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	CDCl3	
NS	512	
DS	4	
SWH	24038.461	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	575	
DW	20.800	usec
DE	6.50	usec
TE	292.0	K
D1	2.00000000	sec
D11	0.03000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	12.00	usec
PL1	-2.00	dB
PL1W	56.92932510	W
SFO1	100.6278593	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	0.00	dB
PL12	15.14	dB
PL13	15.14	dB
PL2W	10.80111122	W
PL12W	0.33072606	W
PL13W	0.33072606	W
SFO2	400.1516006	MHz
SI	32768	
SF	100.6177980	MHz
WDW	EM	
SSB	0	
LB	1.00	Hz
GB	0	