SUPPLEMENTARY INFORMATION

Photo Catalytic Activity of Rose Bengal Encaptulated on Zeolitic Imidazolate Framework-8 (RB@ZIF-8): A Innovative Approach for the One Pot Synthesis of Highly Functionalized Tetrahydropyridines and Study of their Anti-tubercular Activity.

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I. General Information

All the chemicals were bought from Alfa Aesar, Spectrochem, Sigma-Aldrich & Merck and were used without any further purification. The purity of the prepared compounds were confirmed by using FT-IR, ^{1}H-NMR, ^{13}C-NMR. The HR-MS data for novel derivatives also provided. FT-IR spectra were recorded in KBr pellets on a Bruker ALPHA II spectrometer and the frequencies are expressed in cm^{-1}. ^{1}H-NMR and ^{13}C-NMR spectra were recorded on a Bruker Avance II-400 spectrometer in $CDCl_3$ solvent. Mass spectral data of the newly synthesized compounds were recorded on Waters, Xevo G2-XS QTof Mass Spectrometer. Powder XRD analysis was conducted using Powder XRD Make: Rigaku (Model: SmartLab SE). All reactions were monitored by thin layer chromatography (TLC) using pre-coated aluminum sheets (silica gel 60 F 254 0.2 mm thickness) and developed in an iodine and UV-light chamber. Melting points were recorded in capillary tubes using OPTICS Technology. TEM were conducted using a transmission electron microscope of JEM-2100 make (JEOL). SEM and EDX analyses were carried out using Zeiss, model: Sigma 300 make scanning electron microscope and Gemini 500 FE-SEM. TGA analysis was conducted on a Perkin Elmer STA-6000. 24 W LED light was used as visible light source

II. Preparation of RB@ZIF-8 photocatalyst

Preparation of ZIF-8 and RB@ZIF-8 NPs

ZIF-8 nanoparticles (ZIF-8 NPs) were prepared on the word of a previously published protocol [S1]. Briefly, in 300 mL methanol, 4.5 gm of Zn $(NO_3)_2 \cdot 6H_2O$ (15 mmol) and 9.9 gm of 2-methylimidazole (2-MI)(0.12 mol) were dissolved (solution prepared separately in 150 ml methanol each) and the solution was stirred at room temperature. The resulting solid precipitate was collected through centrifugation, washed with methanol and dried in a vacuum oven at 40 ℃ for 12 hour. Similarly, RB@ZIF-8 NPs were also prepared with a minor modification. 4.5 gm of Zn $(NO_3)_2 \cdot 6H_2O$ (15 mmol) was dissolved in 150 mL methanol, followed by adding 150 mL of methanol containing 9.9 gm of 2-MI (0.12 mol) and 200 mg of RB (0.19 mmol) and stirred at room temperature. Afterwards, the suspension was centrifuged at 12000 rpm for 8 min to obtain RB@ZIF-8 NPs, which were washed with methanol, dried in vacuum and stored at dry environment [S2].

III. Characterization of RB@ZIF-8 NPs

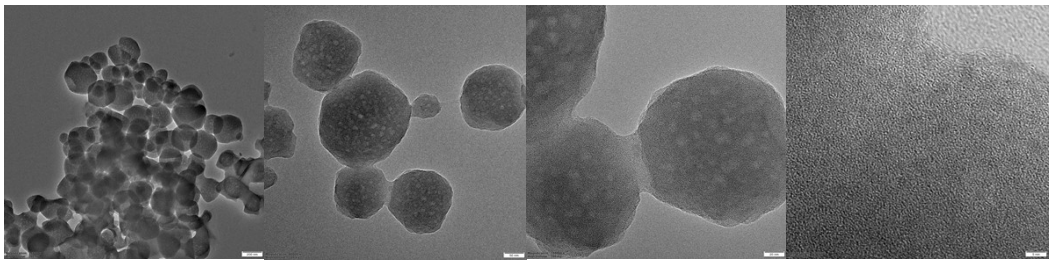


Figure S1. TEM mages of the prepared RB@ZIF-8

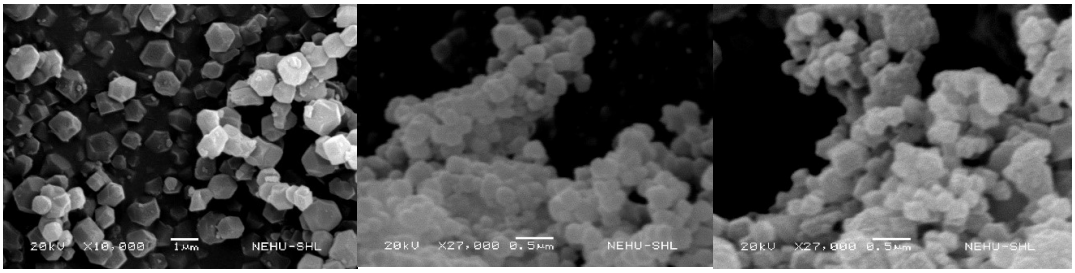


Figure S2. SEM images of (A) ZIF-8, (B) RB@ZIF-8 and (C) Recovered RB@ZIF-8

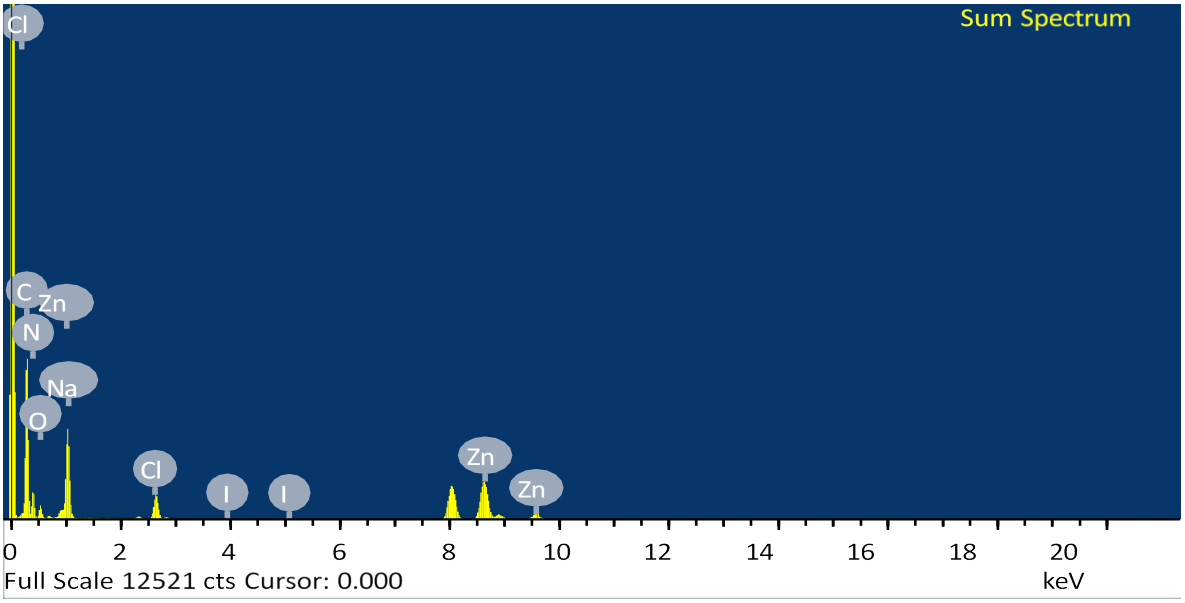


Figure S3. EDS peaks of the prepared RB@ZIF-8

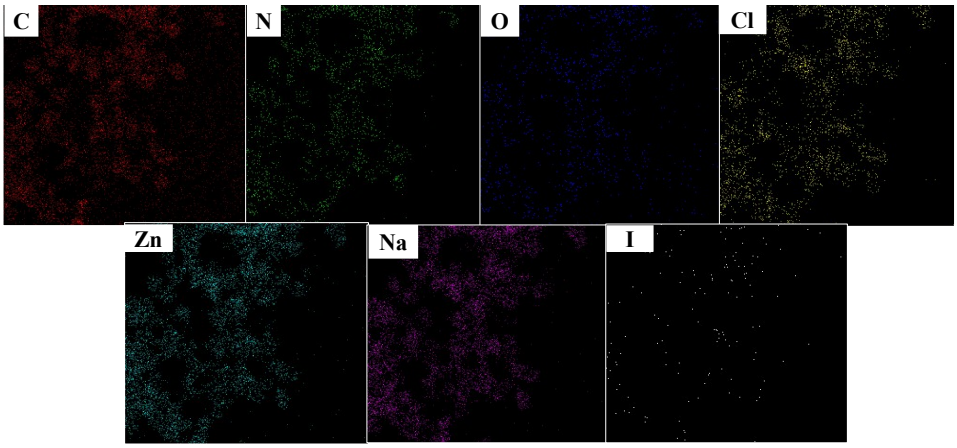


Figure S4. Elementary mapping of the prepared RB@ZIF-8

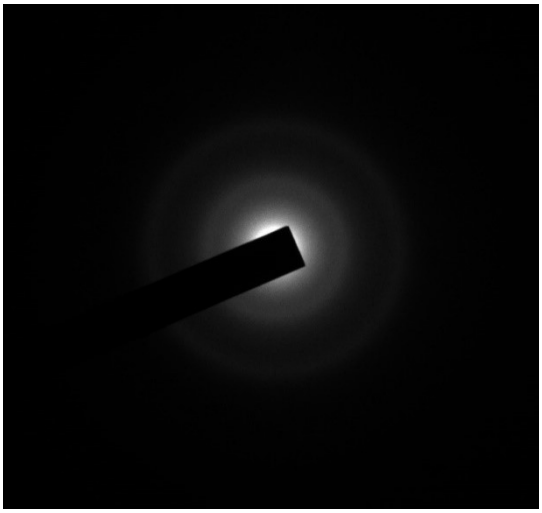


Figure S5. SAED pattern of recovered catalyst

The band gap of the catalyst is calculated by using Tauc method [S3] as given below

$$\alpha = \frac{A(h\nu - E_g)^n}{h\nu} \quad \text{or} \quad (\alpha\, h\nu)^{\frac{1}{n}} = A^{\frac{1}{n}}\, h\nu - A^{\frac{1}{n}}\, E_g$$

Where, $\alpha = \frac{\ln(1/T)}{x}$ = absorption coeeficient, T = Transmittance, x = thickness of the sample, E_g = band gap of the material, n = 2, 1/2, 2/3 and 1/3 for direct allowed, indirect allowed, direct forbidden and indirect forbidden.

By plotting a graph of $(\alpha\, h\nu)^{\frac{1}{n}}$ vs $h\nu$, we got slope as $A^{\frac{1}{n}}$ and y intercept as $A^{\frac{1}{n}}\, E_g$. dividing y intercept by A^n, we can estimate the band gap.

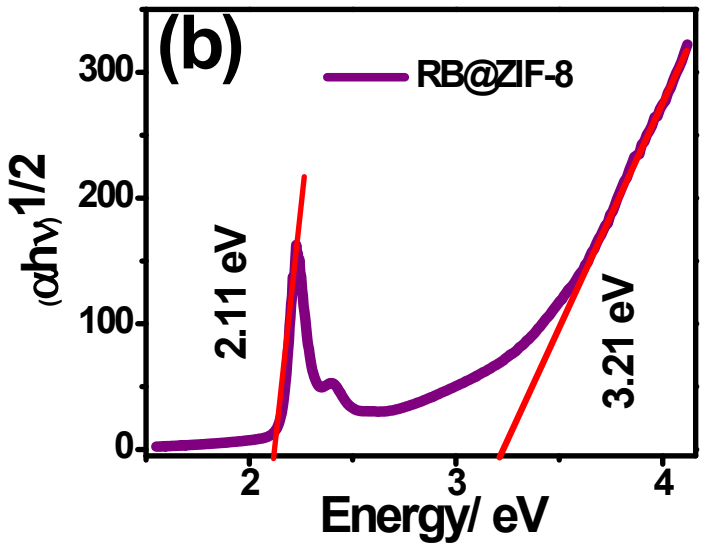


Figure S6. Tauc plot of RB@ZIF-8 **for** Band Gap energy calculation

IV. General methods of compound synthesis

General method for the synthesis of tetrahydropyridine derivatives

In a round bottom flask, a mixture of methyl acetoacetate (1 mmol), aniline (2 mmol), benzaldehyde (2 mmol) and RB@ZIF-8 (25 mg) in 5 mL of ethanol was magnetically stirred under 24W LED light for required times. The progress of the reaction was monitored by TLC. After completion, the catalyst was recovered by simple centrifugation and washed with ethanol and dried it for next run and the pure product was obtained by washing with ethanol or recrystallization from hot ethanol wherever it's needed.

V. Recycling experiments

In a round bottom flask, a mixture of methylacetoacetate (1 mmol), benzaldehyde (2 mmol) and aniline (2 mmol)) in 5 mL of ethanol was stirred under 24W LED light in presence of RB@ZIF-8 for 10 min at room temperature. After completion of the reaction, simple centrifugation method was used to separate the RB@ZIF-8 from the reaction system. The recovered RB@ZIF-8 was washed three times with ethanol. The ethanol solution was combined with reaction solution and

evaporated to dry the solvent. The remaining residue was mixed with internal standard and the mixture was subjected for ^{1}H NMR quantification. The washed RB@ZIF-8 was then dried in an oven and used for the next round of photocatalysis. The catalyst can be reused up to six times without significant loss of the catalytic activity.

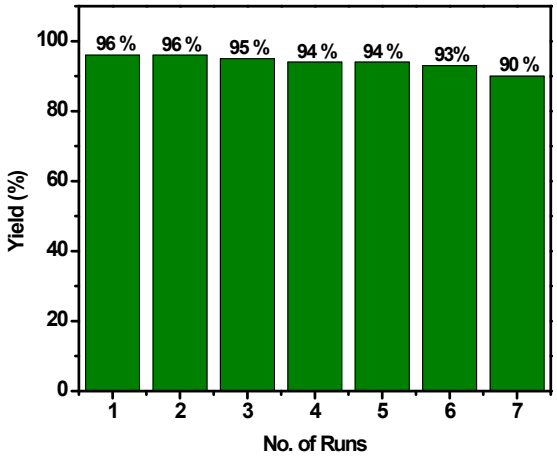


Figure S5. Recyclability of RB@ZIF-8 in the synthesis of **4a**

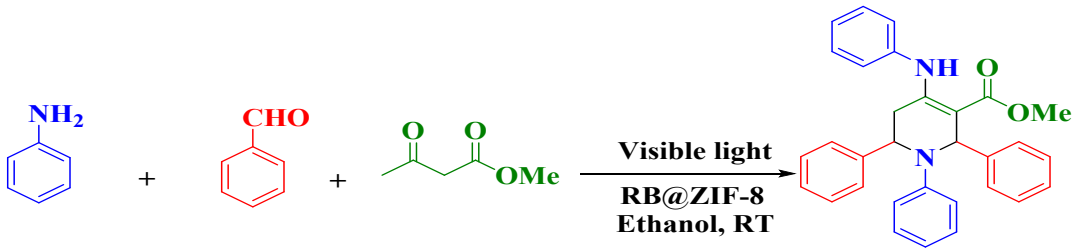
VI. Green chemistry matrix calculations for 4a: Green chemistry matrix has been calculated for the reaction on the basis of following parameters below.

(i) Atom economy (AE)

(ii) Reaction mass efficiency (RME)

(iii) Environmental factor (E-factor)

(iv) Product mass intensity (PMI)



	1	**2**	**3a**	**4a**
MW	93.13 g/mol (2 mmol)	106.12 g/mol (2 mmol)	116.12 g/mol (1 mmol)	460.58 g/mol

(i) Atom economy (AE) for 4a: Atom economy define the efficacy of a chemical reaction with regard to how many atoms from the starting materials reside within the product.

Higher the value of AE, greener is the reaction. The ideal value of AE factor is 100% which indicates that all atoms from the starting materials reside in the product.

$$\text{AE} = \frac{MW\ of\ the\ Product}{\Sigma\ (MW\ of\ stoichiometric\ reactants)}\ x\ 100$$

$$= \frac{460.58}{(93.13\ x\ 2) +\ (106.12\ x\ 2) +\ (116.12\ x\ 1)} x\ 100$$

$$= \frac{460.58}{514.62}\ \text{x } 100$$

$$= 89\ \%$$

(ii) Reaction mass efficiency (RME) for 4a: Reaction mass efficiency is calculated by following equation,

$$\text{RME} = \frac{Mass\ of\ the\ Product}{\Sigma\ (MW\ of\ stoichiometric\ reactants)}\ x\ 100$$

$$= \frac{442.15}{(93.13\ x\ 2) +\ (106.12\ x\ 2) +\ (116.12\ x\ 1)} x\ 100$$

$$= \frac{442.15}{514.62}\ \text{x } 100$$

$$= 85.9\ \%$$

(iii) E-factor or environmental factor for 4a: E-factor implies the total amount of waste generated during a chemical reaction. The ideal value of E-factor is zero

$$\text{E-factor} = \frac{Mass\ of\ waste}{Mass\ of\ Product}$$

Where, mass of waste = (total mass of raw materials) – (the total mass of product)

$$E - Factor = \frac{[\{(93.13\ x\ 2) +\ (106.12\ x\ 2) +\ (116.12\ x\ 1)\} -\ 442.15\ mg]}{442.15\ mg}$$

$$= \frac{[186.26 + 212.24 + 116.12) - 442.15]\ mg}{442.15\ mg}$$

$$= \frac{72.47}{442.15}$$

$$= 0.16$$

(iv) Product mass intensity (PMI) for 4a: PMI can be calculated by the following equation,

$$\text{PMI} = \frac{\Sigma\ (mass\ of\ stoichiometic\ reactants\ +\ solvent)}{mass\ of\ product}$$

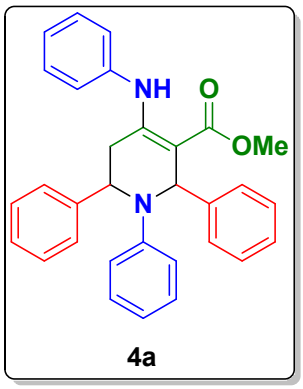
$$= \frac{(93.13\ x\ 2) +\ (106.12\ x\ 2) +\ (116.12\ x\ 1) + 46.06}{442.15}$$

$$= \frac{512.62 + 46.06}{442.15}$$

$$= 1.26$$

VII. Analytical and spectroscopic data of the synthesized compounds

Methyl-1,2,5,6-tetrahydro-1,2,6-triphenyl-4-(phenylamino)pyridine-3-carboxylate, 4a

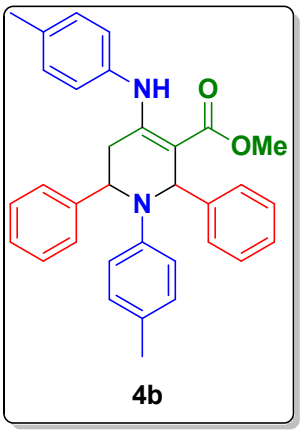


4a

White solid. Melting point: 194-196 ^{0}C. IR (KBr): ν_{max} 3251, 3025, 2949, 2867, 1661, 1587, 1500, 1451, 1377, 1323, 1256, 1186, 1078, 982, 929, 752, 699 cm^{-1}: ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.23 (s, 1H), 7.29 (t, *J* = 6.5 Hz, 3H), 7.25-7.18 (m, 4H), 7.17-7.11 (m, 2H), 7.10 – 7.01 (m, 6H), 6.58 (t, *J* = 7.2 Hz, 1H), 6.50 (d, *J* = 8.3 Hz, 2H), 6.43 (s, 1H), 6.29 – 6.23 (m, 2H), 5.13 (d, *J* = 3.9 Hz, 1H), 3.91 (s, 3H), 2.85 (dd, *J* = 15.1, 5.7 Hz, 1H), 2.74 (dd, *J* = 15.1, 2.4 Hz, 1H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.7, 156.4, 147.0, 144.0, 142.8, 137.9, 129.0, 128.9, 128.7, 128.3, 127.2, 126.7, 126.5, 126.4, 125.9, 125.9, 116.2, 113.0, 98.0, 58.3, 55.2, 51.1, 33.7 ppm.

Methyl-4-(p-tolylamino)-1,2,5,6-tetrahydro-2,6-diphenyl-1-p-tolylpyridine-3-carboxylate, 4b

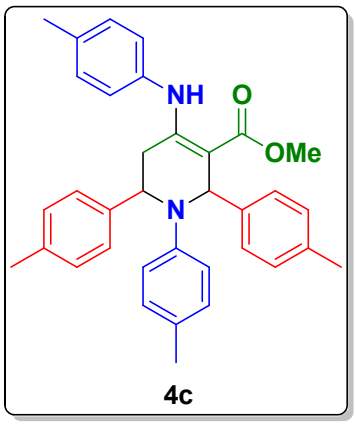
White solid. Melting Point: 220-222 °C. IR (KBr): ν_{max} 3258, 3025, 2945, 2862, 1656, 1594, 1516, 1451, 1318, 1257, 1076, 832, 700 cm^{-1}. ^1H NMR (500 MHz, $CDCl_3$) δ 10.17 (s, 1H), 7.33 -7.16 (m, 10H), 6.90-6.83 (m, 4H), 6.42 (d, *J* = 4.1 Hz, 3H), 6.15 (d, *J* = 7.9 Hz, 2H), 5.12 (s, 1H), 3.93 (s, 3H), 2.85-2.72 (m, 2H), 2.26 (s, 3H), 2.16 (s, 3H) ppm. ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.6, 156.6, 144.8, 144.2, 143.0, 135.6, 135.1, 129.4, 129.4, 128.6, 128.2, 127.0, 126.6, 126.4, 126.2, 126.0, 125.0, 112.8, 97.4, 58.2, 55.1, 50.9, 33.5, 20.9, 20.1 ppm.



4b

Methyl-4-(p-tolylamino)-1,2,5,6-tetrahydro-1,2,6-trip-tolylpyridine-3-carboxylate, 4c

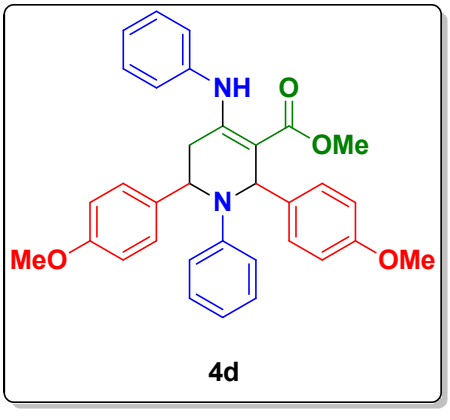
White solid. Melting point: 204-206 ^0C. IR (KBr): ν_{max} 3251, 3022, 2919, 2855, 1906, 1657, 1596, 1457, 1369, 1259, 1182, 1021, 948, 793, 661 cm^{-1}. ^1H NMR (500 MHz, $CDCl_3$) δ 10.17 (s, 1H), 7.20 (d, *J* = 7.9 Hz, 2H), 7.09-7.04 (m, 6H), 6.89 (d, *J* = 8.0 Hz, 2H), 6.87 (d, *J* = 8.5 Hz, 2H), 6.43 (d, *J* = 8.5 Hz, 2H), 6.36 (s, 1H), 6.18 (d, *J*= 8.0 Hz, 2H), 5.08 (s, 1H), 3.91 (s, 3H), 2.82 (dd, *J* = 15.1, 5.6 Hz, 1H), 2.73 (d, *J* = 15.0, 2.4 Hz, 1H), 2.34 (s, 3H), 2.32 (s, 3H), 2.27 (s, 3H), 2.16 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.6, 156.6, 144.9, 141.2, 139.9, 136.5, 135.6, 135.5, 135.2, 129.4, 129.4, 129.2, 128.9, 126.5, 126.3, 125.9, 124.8, 112.8, 97.5, 57.9, 55.0, 50.9, 33.5, 21.1, 21.0, 20.9, 20.1 ppm.



4c

Methyl-1,2,5,6-tetrahydro-2,6-bis(4-methoxyphenyl)-1-phenyl-4-phenylamino)pyridine-3-carboxylate, 4d

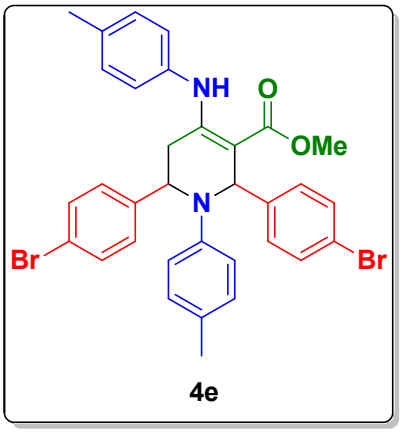
White solid. Melting point: 187-189 ^0C. IR (KBr): ν_{max} 3243, 3062, 2951, 2838, 1654, 1593, 1505, 1454, 1372, 1250, 1185, 1072, 1034, 830, 760, 698 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 10.27 (s, 1H), 7.22 (d, *J* = 8.6 Hz, 2H), 7.05-7.14 (m, 7H), 6.82 (d, *J* = 8.3 Hz, 4H), 6.61 (t, *J*



4d

= 7.2 Hz, 1H), 6.53 (d, *J* = 8.3 Hz, 2H), 6.36 -6.37 (m, 3H), 5.09 (s, 1H), 3.93 (s, 3H), 3.80 (s, 3H), 3.78 (s, 3H), 2.86 (dd, *J* = 15.0, 5.5 Hz, 1H), 2.76 (dd, *J* = 15.0, 2.5 Hz, 1H) ppm.^{13}C NMR (100 MHz, $CDCl_3$) δ 168.7, 158.8, 158.1, 156.5, 147.1, 138.0, 135.9, 134.7, 128.9, 128.9, 127.8, 127.5, 125.8, 125.7, 116.1, 114.1, 113.6, 113.0, 98.2, 57.6, 55.4, 55.3, 54.6, 51.1, 33.8 ppm.

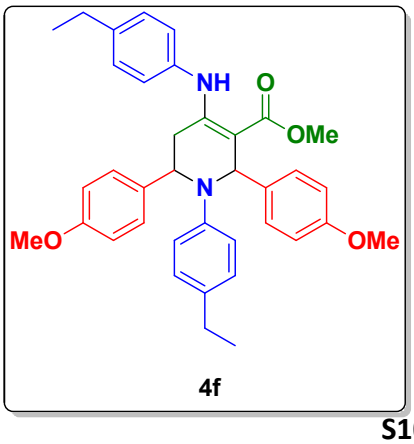
Methyl-4-(p-tolylamino)-2,6-bis(4-bromophenyl)-1,2,5,6-tetrahydro-1-p-tolylpyridine-3-carboxylate, 4e



4e

White solid. M.P. 195-197 ^{0}C. IR (KBr): ν_{max} 3232, 3085, 2922, 2857, 1656, 1624, 1516, 1314, 1252, 1138, 1071, 1013, 925, 794, 536 cm^{-1}:^{1}H NMR (400 MHz, $CDCl_3$) δ 10.15 (s, 1H), 7.38 (d, *J* = 8.4 Hz, 4H), 7.17 (d, *J* = 8.3 Hz, 2H), 6.98 (dd, *J* = 16.0, 8.2 Hz, 4H), 6.88 (d, *J* = 8.4 Hz, 2H), 6.35 (d, *J* = 8.6 Hz, 2H), 6.28 (d, *J* = 7.9 Hz, 3H), 5.04 (s, 1H), 3.90 (s, 3H), 2.77 (dd, *J* = 15.2, 5.4 Hz, 1H), 2.69 (dd, *J* = 15.2, 2.5 Hz, 1H), 2.29 (s, 3H), 2.17 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.3, 156.3, 144.2, 143.2, 141.73, 136.0, 134.91, 131.69, 131.30, 129.6, 128.4, 128.2, 125.9, 125.8, 120.8, 120.1, 120.0, 112.9, 96.9, 57.3, 54.8, 51.1, 33.5, 20.9, 20.1 ppm.

Methyl-4-(4-ethylphenylamino)-1-(4-ethylphenyl)-1,2,5,6-tetrahydro-2,6-bis(4-methoxyphenyl)pyridine-3-carboxylate, 4f

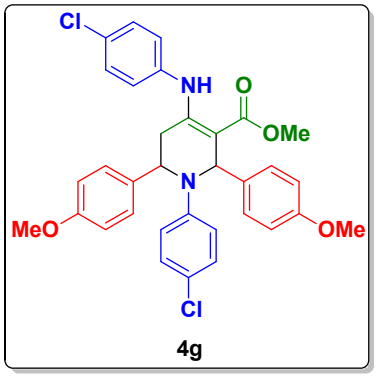


4f

White solid. Melting Point: 202-206 ^{0}C. IR (KBr,): ν_{max} 3256, 3065, 2960, 2866, 1654, 1611, 1512, 1458, 1374, 1248, 1189, 1073, 1032, 981, 812cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.20 (s, 1H), 7.24 – 7.20 (m, 2H), 7.11 – 7.05 (m, 2H), 6.92 (dd, *J* = 15.3, 8.5, 1.9 Hz, 4H), 6.82 (dd, *J* = 8.6, 3.6, 1.8 Hz, 4H), 6.49 – 6.42 (m, 2H), 6.35 – 6.31 (m, 1H), 6.29 – 6.22 (m, 2H), 5.06 (s, 1H), 3.91 (s, 3H), 3.80 (s, 3H), 3.78 (s, 3H), 2.82

(dd, J = 15.1, 5.1 Hz, 1H), 2.73 (d, J = 15.0 Hz, 1H), 2.57 (q, J = 7.5 Hz, 2H), 2.47 (q, J = 7.5 Hz, 2H), 1.19 (t, J = 7.6 Hz, 3H), 1.13 (t, J = 7.5 Hz, 3H) ppm.^{13}C NMR (100 MHz, $CDCl_3$) δ 158.0, 156.8, 145.2, 136.3, 135.5, 135.1, 131.5, 128.3, 128.2, 127.8, 127.6, 126.0, 114.0, 113.6, 113.0, 97.7, 57.6, 55.4, 55.3, 54.8, 51.0, 33.8, 28.3, 27.7, 15.7, 15.5 ppm. HRMS (ESI): calcd Exact Mass: 576.2988; found 576.2985

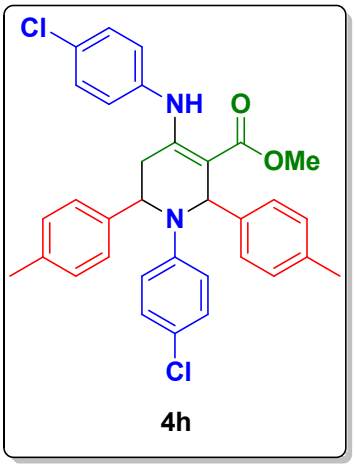
Methyl-4-(4-chlorophenylamino)-1-(4-chlorophenyl)-1,2,5,6-tetrahydro-2,6-bis(4-methoxyphenyl)pyridine-3-carboxylate, 4g



4g

White solid. Melting point: 194-196 ^{0}C. IR (KBr): ν_{max} 3239, 3000, 2947, 1661, 1608, 1501, 1447, 1375, 1252, 1181, 1073, 978, 760, 1012, 812 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.21 (s, 1H), 7.17 (d, J = 8.5 Hz, 2H), 7.09-6.98 (m, 6H), 6.82 (dd, J = 8.5, 4.4 Hz, 4H), 6.43 (d, J = 9.0 Hz, 2H), 6.27 (t, 3H), 5.05 (s, 1H), 3.93 (s, 3H), 3.80 (s, 3H), 3.78 (s, 3H), 2.83 (dd, J = 15.1, 5.6 Hz, 1H), 2.68 (dd, J = 14.8, 1.8 Hz, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.5, 158.9, 158.2, 155.6, 145.5, 136.4, 135.0, 134.0, 131.3, 129.0, 128.6, 127.5, 127.3, 127.0, 121.1, 114.1, 114.0, 114.0, 113.7, 113.6, 98.6, 57.6, 55.3, 55.2, 54.7, 33.6 ppm.

Methyl-4-(4-chlorophenylamino)-1-(4-chlorophenyl)-1,2,5,6-tetrahydro-2,6-dip-tolylpyridine-3-carboxylate, 4h



4h

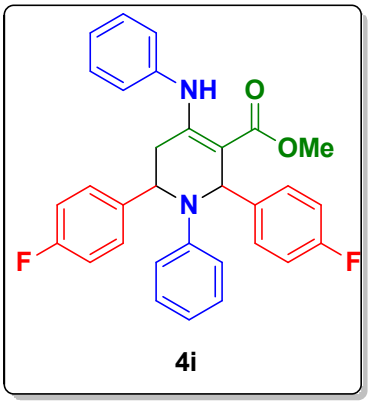
=

White solid; Melting point: 184-186 ^{0}C. IR (KBr): ν_{max} 3260, 2954, 2858, 1650, 1604, 1497, 1375, 1264, 1084, 929, 852, 757, 652 cm-1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.19 (s, 1H), 7.21 – 6.94 (m, 12H), 6.43 (d, J = 8.8 Hz, 2H), 6.32 (s, 1H), 6.19 (d, J 8.3 Hz, 2H), 5.07 (s, 1H), 3.93 (s, 3H), 2.85 (dd, J = 15.1, 5.5 Hz, 1H), 2.69 (d, J = 14.9 Hz, 1H), 2.35 (s, 3H), 2.32 (s, 3H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.6, 155.6, 145.6, 140.2, 139.2, 137.1, 136.5, 136.2, 131.4, 129.5, 129.1, 129.0, 128.7,

127.1, 126.5, 126.2, 121.1, 114.0, 98.6, 58.1, 55.1, 51.2, 33.6, 21.2, 21.1 ppm.

Methyl-2,6-bis(4-fluorophenyl)-1,2,5,6-tetrahydro-1-phenyl-4-(phenylamino)pyridine-3-carboxylate, 4i

White solid. Melting point: 182-184 ^{0}C. IR (KBr): ν_{max} 3258, 3046, 2949, 2860, 1658, 1593, 1469, 1369, 1267, 1196, 1074, 1013, 829, 793, 694 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.27 (s, 1H), 7.28 (s, 1H), 7.24 (s, 1H), 7.19-7.05 (m, 7H), 6.96 (t, *J* 8.6 Hz, 4H), 6.64 (t, *J* = 7.2 Hz, 1H), 6.48 (d, *J* = 8.5 Hz, 2H), 6.39 (dd, *J* = 9.5, 2.7 Hz, 3H), 5.12 (s, 1H), 3.93 (s, 3H), 2.84 (dd, *J* = 15.1, 5.5 Hz, 1H), 2.75 (dd, *J* = 15.1, 2.4 Hz, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.5, 163.3, 162.8, 160.8, 160.4, 156.2, 146.7, 139.4, 138.2, 137.7, 129.1, 128.3, 128.2, 128.0, 127.9, 126.1, 125.8, 116.7, 115.7, 115.5, 115.2, 115.0, 113.0, 97.8, 57.4, 54.7, 51.2, 33.9 ppm.

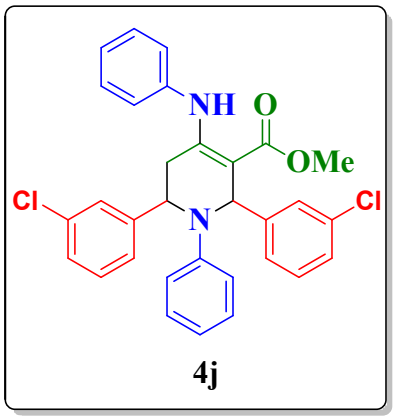


4i

=

Methyl-2,6-bis(3-chlorophenyl)-1,2,5,6-tetrahydro-1-phenyl-4-(phenylamino)pyridine-3-carboxylate, 4j

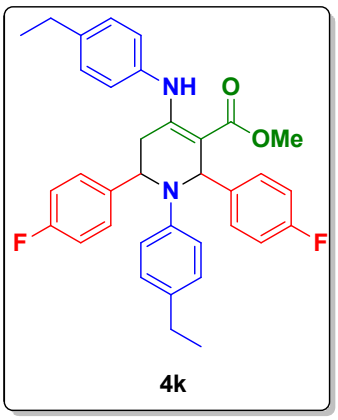
White solid. Melting point: 130-132 ^{0}C. IR (KBr): ν_{max} 3242, 3062, 2948, 2869, 1656, 1598, 1521, 1399, 1266, 1180, 1072, 1012, 859, 747, 695 cm^{-1}.^{1}H NMR (400 MHz, $CDCl_3$) δ 10.25 (s, 1H), 7.24 (s, 5H), 7.20 – 7.03 (m, 8H), 6.65 (t, *J* = 7.1 Hz, 1H), 6.43 (dd, *J* = 19.4, 7.6 Hz, 4H), 6.36 (s, 1H), 5.10 (s, 1H), 3.92 (s, 3H), 2.83 (dd, *J* = 15.1, 5.4 Hz, 1H), 2.74 (d, *J* = 13.7 Hz, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.4, 156.1,



4j

146.5, 142.4, 141.0, 137.6, 132.9, 132.2, 129.1, 129.1, 128.9, 128.5, 128.1, 127.8, 126.1, 125.8, 116.8, 113.0, 97.6, 57.4, 54.8, 51.3, 33.7 ppm.

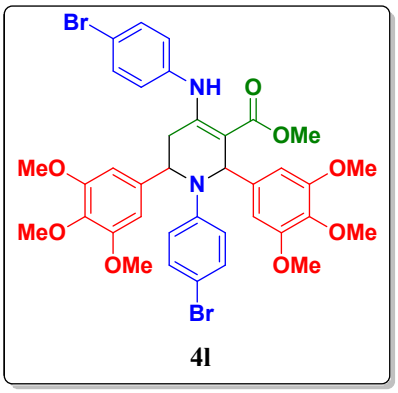
Methyl-4-(4-ethylphenylamino)-1-(4-ethylphenyl)-2,6-bis(4-fluorophenyl)-1,2,5,6-tetrahydropyridine-3-carboxylate, 4k



4k

White solid; Melting point: 220-222 ^{0}C. IR (KBr): ν_{max} 3260, 3052, 2962, 2866, 1654, 1595, 1455, 1374, 1255, 1230, 1226, 1189, 1073, 1017, 979, 826, 668 m^{-1}.^{1}H NMR (400 MHz, $CDCl_3$) δ 10.19 (s, 1H), 7.25 (s, 1H), 7.11 (s, 2H), 6.93 (dd, *J* = 19.7, 6.9 Hz, 9H), 6.40 (d, *J* = 7.8 Hz, 2H), 6.33 (s, 1H), 6.28 (d, *J* = 7.4 Hz, 2H), 5.08 (s, 1H), 3.91 (s, 3H), 2.75 (dd, 2H), 2.57 (q, *J*= 6.8 Hz, 2H), 2.47 (q, *J* = 6.7 Hz, 2H), 1.19 (t, *J* = 7.3 Hz, 3H), 1.12 (t, *J* = 7.3 Hz, 3H).^{13}C NMR (100 MHz, $CDCl_3$) δ 168.2, 156.3, 144.4, 142.0, 134.9, 131.8, 128.1, 128.1, 127.9, 127.9, 127.7, 127.7, 125.7, 115.3, 115.1, 114.8, 114.6, 112.7, 97.0, 57.1, 54.5, 50.8, 33.5, 28.0, 27.4, 15.4, 15.2 ppm. HRMS (ESI): calcd 552.2588; found 552.2598

Methyl-4-(4-bromophenylamino)-1-(4-bromophenyl)-1,2,5,6-tetrahydro-2,6-bis(3,4,5-trimethoxyphenyl)pyridine-3-carboxylate, 4l

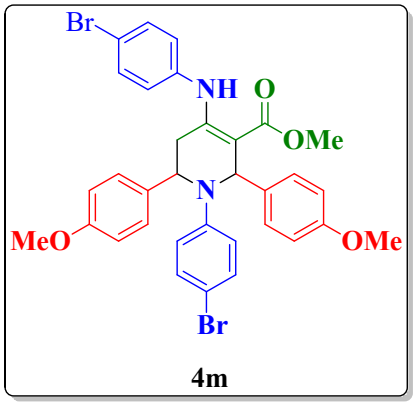


4l

White solid; Melting point: 136-138 ^{0}C. IR (KBr): ν_{max} 3252, 3069, 2994, 2833, 1657, 1590, 1496, 1373, 1255, 1186, 1073, 1038, 960, 779, 698 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.17 (s, 1H), 7.28 (s, 1H), 7.16 (d, *J* = 8.7 Hz, 2H), 6.49 – 6.38 (m, 4H), 6.33 – 6.21 (m, 6H), 4.98 (s, 1H), 3.90 (s, 3H), 3.84 (s, 3H), 3.83 (s, 3H), 3.74 (s, 6H), 3.70 (s, 6H), 2.93 (dd, *J* = 14.9, 5.2 Hz, 1H), 2.70 (d, *J* = 14.6 Hz, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.3, 156.2, 153.5, 153.2, 145.9, 138.8, 137.6,

137.2, 136.9, 136.8, 132.0, 131.6, 127.8, 119.7, 114.7, 108.9, 103.8, 103.0, 97.9, 61.0, 60.9, 58.4, 56.1, 56.1, 55.7, 51.2, 33.7 ppm. HRMS (ESI): calcd 796.0995; found 796.0978.

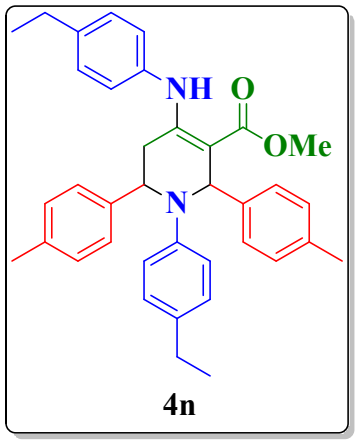
Methyl-4-(4-bromophenylamino)-1-(4-bromophenyl)-1,2,5,6-tetrahydro-2,6-bis(4-methoxyphenyl)pyridine-3-carboxylate, 4m



4m

White solid. Melting point: 178-180 ^{0}C. IR (KBr): ν_{max} 3240, 3062, 2996, 2835, 1659, 1607, 1494, 1374, 1251, 1179, 1071, 1034, 807, 756 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.21 (s, 1H), 7.23 (d, J = 8.5 Hz, 2H), 7.14 (dd, J = 15.9, 8.8 Hz, 4H), 7.04 (d, J = 8.6 Hz, 2H), 6.82 (dd, J = 8.6, 3.9 Hz, 4H), 6.39 (d, J = 9.0 Hz, 2H), 6.28 (s, 1H), 6.20 (d, J = 8.5 Hz, 2H), 5.03 (s, 1H), 3.93 (s, 3H), 3.80 (s, 3H), 3.78 (s, 3H), 2.83 (dd, J = 15.1, 5.6 Hz, 1H), 2.69 (dd, J = 15.0, 2.0 Hz, 1H).^{13}C NMR (100 MHz, $CDCl_3$) δ 168.6, 159.0, 158.3, 155.6, 165.0, 137.0, 135.0, 134.0, 132.1, 131.6, 127.6, 127.4, 127.3, 114.7, 114.2, 113.8, 108.4, 98.8, 57.6, 55.4, 55.3, 54.7, 51.3, 33.6 ppm.

Methyl-4-(4-ethylphenylamino)-1-(4-ethylphenyl)-1,2,5,6-tetrahydro-2,6-dip-tolylpyridine-3-carboxylate, 4n

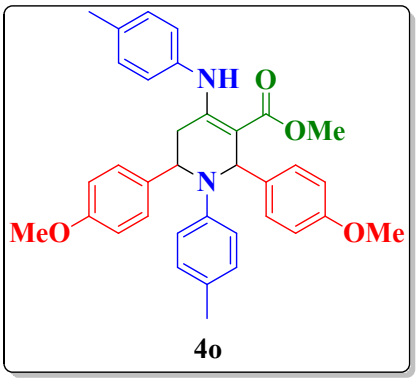


4n

White solid. Melting point: 178-180 ^{0}C. IR (KBr): ν_{max} 3262, 3089, 2960, 2865, 1655, 1595, 1454, 1372, 1254, 1186, 1073, 1022, 786, 690 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.17 (s, 1H), 7.20 (d, J = 7.1 Hz, 2H), 7.12 – 7.03 (m, 6H), 6.90 (t, J = 7.4 Hz, 4H), 6.45 (d, J = 7.7 Hz, 2H), 6.35 (s, 1H), 6.19 (d, J = 7.3 Hz, 2H), 5.08 (s, 1H), 3.90 (s, 3H), 2.82 (dd, J = 14.7, 4.5 Hz, 1H), 2.73 (d, J = 14.7 Hz, 1H), 2.56 (d, J = 7.3 Hz, 2H), 2.46 (d, J = 7.3 Hz, 2H), 2.34 (s, 3H), 2.32 (s, 3H), 1.18 (t, J = 7.2 Hz, 3H), 1.11 (t, J = 7.2 Hz, 3H) ppm. ^{13}C NMR (100 MHz,

$CDCl_3$) δ 168.7, 156.8, 145.2, 141.4, 140.1, 136.6, 135.5, 131.4, 129.3, 128.9, 128.2, 126.6, 126.4, 126.1, 112.9, 97.6, 58.0, 55.1, 51.0, 33.7, 28.3, 27.7, 21.2, 21.1, 15.8, 15.6 ppm.

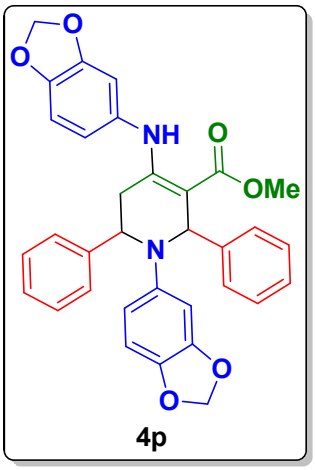
Methyl-4-(p-tolylamino)-1,2,5,6-tetrahydro-2,6-bis(4-methoxyphenyl)-1-p-tolylpyridine-3-carboxylate, 4o



4o

White solid. Melting point: 175-177 ^{0}C. IR (KBr): ν_{max} 3241, 3095, 2949, 2856, 1656, 1609, 1512, 1459, 1370, 1248, 1176, 1069, 1034, 799, 760 690 cm^{-1}.^{1}H NMR (400 MHz, $CDCl_3$) δ 10.19 (s, 1H), 7.21 (d, *J* = 8.6 Hz, 2H), 7.07 (d, *J* = 8.6 Hz, 2H), 6.90 (dd, *J* = 17.3, 8.3 Hz, 4H), 6.81 (dd, *J* = 8.8, 2.3 Hz, 4H), 6.44 (d, *J* = 8.7 Hz, 2H), 6.32 (s, 1H), 6.24 (d, *J* = 8.2 Hz, 2H), 5.05 (s, 1H), 3.91 (s, 3H), 3.80 (s, 3H), 3.78 (s, 3H), 2.81 (dd, *J* = 14.7, 5.2 Hz, 1H), 2.72 (dd, *J* = 15.0, 2.6 Hz, 1H), 2.27 (s, 3H), 2.16 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.7, 158.7, 158.1, 156.8, 144.9, 135.6, 135.3, 135.0, 129.5, 129.5, 127.8, 127.6, 126.0, 125.0, 114.0, 113.6, 113.0, 97.6, 57.5, 55.4, 55.3, 54.7, 51.0, 33.7, 21.0, 20.2 ppm.

Methyl-1-(benzo[d][1,3]dioxol-5-yl)-4-(benzo[d][1,3]dioxol-6-ylamino)-1,2,5,6-tetrahydro-2,6-diphenylpyridine-3-carboxylate, 4p

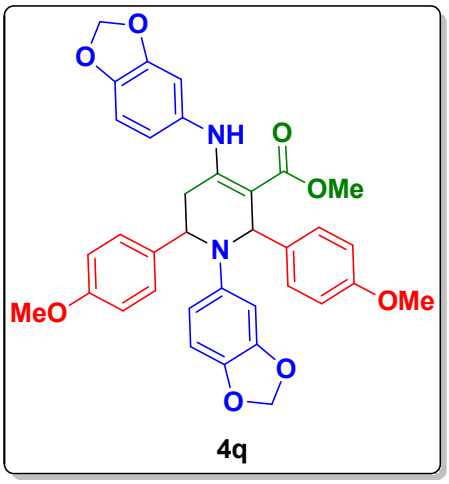


4p

White solid. Melting point: 166-168 ^{0}C. IR (KBr): ν_{max} 3212, 3064, 2946, 2864, 1660, 1589, 1485, 1399, 1288, 1230, 1185, 1071, 1010, 790, 697 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.02 (s, 1H), 7.28 (d, *J* = 6.5 Hz, 1H), 7.25-7.13 (m, 7H), 6.49 (dd, *J* = 12.3, 8.4 Hz, 2H), 6.27 (s, 1H), 6.14 (d, *J* = 2.4 Hz, 1H), 5.88 (d, *J* = 7.5 Hz, 3H), 5.73 (d, *J* = 5.1 Hz, 3H), 5.67 (d, *J* = 1.9 Hz, 1H), 5.02 (s, 1H), 3.88 (s, 3H), 2.77 (dd, *J* = 15.1, 5.8 Hz, 1H), 2.63 (dd, *J* = 15.2, 2.4 Hz, 1H) ppm. ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.6, 156.9, 148.2, 147.7, 146.9, 144.0, 143.2, 143.1, 138.6, 131.8, 128.8, 128.3, 127.3, 126.8,

126.5, 126.4, 120.0, 108.4, 108.1, 107.9, 105.1, 101.5, 100.5, 97.4, 96.1, 58.7, 56.1, 51.0, 33.8 ppm. HRMS (ESI): calcd 548.1947; found 548.1962

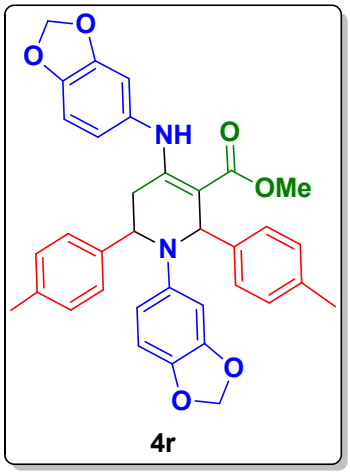
Methyl-1-(benzo[d][1,3]dioxol-5-yl)-4-(benzo[d][1,3]dioxol-6-ylamino)-1,2,5,6-tetrahydro-2,6-bis(4-methoxyphenyl)pyridine-3-carboxylate, 4q



4q

White solid. Melting point: 220-222 ^{0}C. IR (KBr): ν_{max} 3274, 2989, 2946, 2894, 1656, 1586, 1488, 1351, 1291, 1222, 1185, 1098, 1036, 828, 778, 670 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.06 (s, 1H), 7.17 (d, J = 8.6 Hz, 2H), 7.06 (d, J = 8.6 Hz, 2H), 6.82 (t, J = 8.1 Hz, 4H), 6.53 (dd, J = 8.4, 3.1 Hz, 2H), 6.20 (s, 1H), 6.17 (d, J = 2.4 Hz, 1H), 5.91 (dt, J = 8.6, 2.0 Hz, 3H), 5.84 (dd, J = 8.2, 1.8 Hz, 1H), 5.76 (d, J = 3.6 Hz, 3H), 4.97 (s, 1H), 3.89 (s, 3H), 3.80 (s, 3H), 3.78 (s, 3H), 2.77 (dd, J = 15.1, 5.5 Hz, 1H), 2.63 (dd, J = 15.1, 2.7 Hz, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.7, 158.8, 158.1, 157.0, 148.1, 147.7, 145.9, 143.3, 138.5, 135.4, 134.9, 131.9, 127.8, 127.5, 119.9, 114.1, 113.6, 108.3, 108.1, 107.9, 105.3, 101.5, 100.5, 97.4, 96.3, 57.9, 55.6, 55.4, 55.3, 51.0, 33.9 ppm. HRMS (ESI): calcd 608.2159; found 608.2166.

Methyl-1-(benzo[d][1,3]dioxol-5-yl)-4-(benzo[d][1,3]dioxol-6-ylamino)-1,2,5,6-tetrahydro-2,6-dip-tolylpyridine-3-carboxylate, 4r

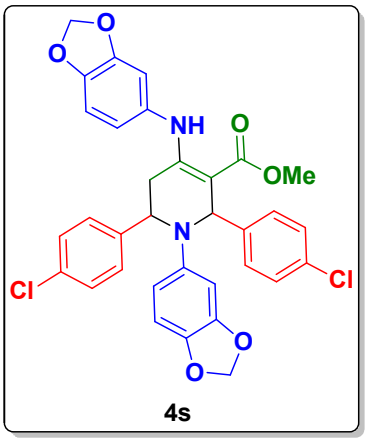


4r

White solid. Melting point: 198-200 ^{0}C. IR (KBr): ν_{max} 3258, 2946, 2861, 1656, 1588, 1487, 1367, 1261, 1228, 1183, 1070, 1035, 840, 799, 657 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.03 (s, 1H), 7.16 (d, J = 8.0 Hz, 2H), 7.10-7.01 (m, 6H), 6.51 (dd, J 12.0, 8.4 Hz, 2H), 6.24 (s, 1H), 6.16 (d, J = 2.5 Hz, 1H), 5.92-5.89 (m, 3H), 5.79-5.74 (m, 3H), 5.68 (d, J = 2.0 Hz, 1H), 5.00 (s, 1H), 3.90 (s, 3H), 2.79 (dd, J = 15.1, 5.7 Hz, 1H), 2.63 (dd, J 15.1, 2.6 Hz, 1H), 2.34 (s, 3H), 2.32 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.4, 156.6, 1478.8, 147.4, 145.6, 143.0, 140.7, = =

139.7, 138.1, 136.5, 135.5, 131.5, 129.1, 128.6, 126.4, 126.1, 119.7, 108.0, 107.8, 107.5, 104.7, 101.2, 100.1, 97.2, 97.8, 58.1, 55.5, 50.7, 33.5, 20.9, 20.8 ppm. HRMS (ESI): calcd 576.2260; found 576.2274

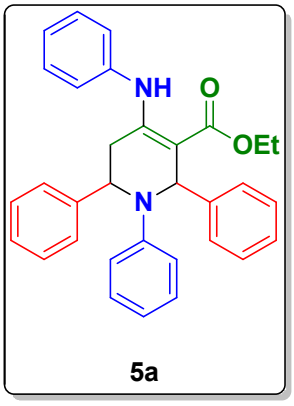
Methyl-1-(benzo[d][1,3]dioxol-5-yl)-4-(benzo[d][1,3]dioxol-6-ylamino)-2,6-bis(4-chlorophenyl)-1,2,5,6-tetrahydropyridine-3-carboxylate, 4s



4s

White solid. Melting point: 196-198 ^{0}C. IR (KBr): ν_{max} 3256, 2998, 2946, 2873, 1661, 1590, 1487, 1359, 1261, 1226, 1184, 1096, 1035, 816, 797, 657 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.06 (s, 1H), 7.28 (d, J = 2.3 Hz, 2H), 7.24-7.19 (m, 4H), 7.07 (d, J = 8.4 Hz, 2H), 6.56 (t, J = 8.8 Hz, 2H), 6.20 (s, 1H), 6.10 (d, J = 2.4 Hz, 1H), 5.95 (d, J = 4.6 Hz, 2H), 5.88-5.83 (m, 3H), 5.80 (d, J = 4.4 Hz, 2H), 4.99 (s, 1H), 3.90 (s, 3H), 2.75 (dd, J = 15.3, 5.6 Hz, 1H), 2.65 (dd, J = 15.3, 2.8 Hz, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.4, 156.6, 148.3, 146.9, 146.2, 142.6, 142.3, 141.2, 139.1, 133.0, 132.2, 131.5, 128.9, 128.4, 128.2, 127.9, 119.9, 108.5, 108.0, 107.9, 105.4, 101.7, 100.7, 96.9, 96.3, 57.7, 55.8, 51.2, 33.8 ppm. HRMS (ESI): calcd 616.1168; found 616.1204 [M^{+}], 618.1190 [M+2]

Ethyl 1,2,5,6-tetrahydro-1,2,6-triphenyl-4-(phenylamino)pyridine-3-carboxylate, 5a

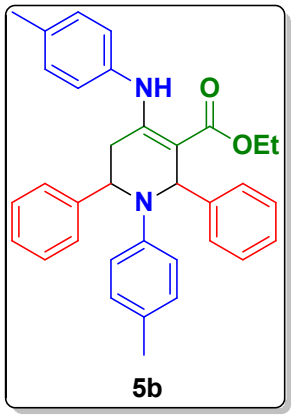


5a

White solid. Melting point: 173-175 ^{0}C: IR (KBr): ν_{max} 3246, 3059, 2979, 2871, 1651, 1595, 1498, 1449, 1370, 1323, 1250, 1173, 1071, 1031, 916, 836, 723, 723, 697 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.29 (s, 1H), 7.34 (d, J = 7.4 Hz, 2H), 7.30 -7.28 (m, 3H), 7.25-7.16 (m, 5H), 7.12-7.04 (m, 5H), 6.62-6.59 (m, 1H), 6.53 (d, J = 8.2 Hz, 2H), 6.46 (s, 1H), 6.29 (d, J = 7.8 Hz, 2H), 5.15 (s, 1H), 4.50-4.42 (m, 1H), 4.37-4.28 (m, 1H), 2.88 (dd, J = 15.1, 5.7 Hz, 1H), 2.77 (dd, J = 15.1, 2.4 Hz, 1H), 1.47 (t, J = 7.1 Hz, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.9, 168.7, 157.7, 150.8, 147.3, 146.7, 144.4, 143.8, 143.1, 139.0, 138.2, 129.7, 129.3, 129.2, 129.1,

129.1, 129.0, 128.8, 128.6, 127.5, 127.4, 127.1, 127.0, 126.8, 126.7, 126.4, 126.1, 125.2, 124.1, 118.4, 116.5, 115.8, 113.3, 98.5, 98.3, 61.8, 60.9, 60.1, 60.1, 58.6, 55.4, 36.8, 34.0, 15.2, 14.9 ppm.

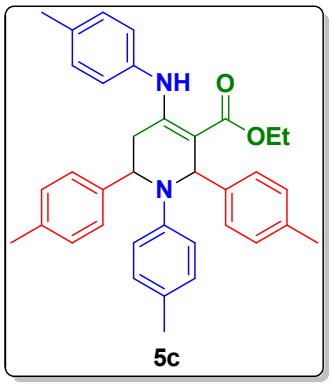
Ethyl-4-(p-tolylamino)-1,2,5,6-tetrahydro-2,6-diphenyl-1-p-tolylpyridine-3-carboxylate, 5b



5b

White solid. Melting point: 194-196 ^{0}C: IR (KBr): ν_{max} 3239, 3059, 3025, 2919, 1650, 1615, 1594, 1515, 1449, 1315, 1250, 1074, 892, 773, 700 cm^{-1}.^{1}H NMR (500 MHz, $CDCl_3$) δ 10.20 (s, 1H), 7.33 (d, J = 7.4 Hz, 2H), 7.29-7.26 (m, 3H), 7.25-7.14 (m, 5H), 6.88 (m, 4H), 6.43 (d, J = 9.0 Hz, 3H), 6.15 (d, J = 8.1 Hz, 2H), 5.11 (s, 1H), 4.47-4.41 (m, 1H), 4.35-4.29 (m, 1H), 2.83 (dd, J = 15.1, 5.7 Hz, 1H), 2.73 (dd, J = 15.1, 2.3 Hz, 1H), 2.25 (s, 3H), 2.15 (s, 3H), 1.45 (t, J = 7.1 Hz, 3H) ppm.^{13}C NMR (100 MHz, $CDCl_3$) δ 168.1, 156.3, 144.7, 144.2, 142.9, 135.4, 135.1, 129.3, 129.2, 128.4, 128.0, 126.9, 126.5, 126.3, 126.3, 126.0, 125.8, 124.9, 112.7, 97.6, 59.4, 58.1, 55.0, 33.4, 20.7, 20.0, 14.7 ppm.

Ethyl 4-(p-tolylamino)-1,2,5,6-tetrahydro-1,2,6-trip-tolylpyridine-3-carboxylate, 5c

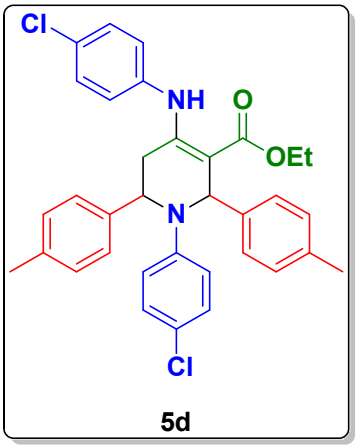


5c

White solid. Melting point: 171-172 ^{0}C. IR (KBr): ν_{max} 3237, 3091, 3025, 2979, 2919, 2868, 1651, 1616, 1596, 1514, 1253, 1072, 795cm^{-1}.^{1}H NMR (400 MHz, $CDCl_3$) δ 10.20 (s, 1H), 7.21 (d, J = 8.0 Hz, 2H), 7.08-7.03 (m, 4H), 6.87 (t, J = 8.1 Hz, 4H), 6.43 (d, J = 8.7 Hz, 2H), 6.36 (s, 1H), 6.17 (d, J = 8.2 Hz, 2H), 5.07 (s, 1H), 4.43 (m, 1H), 4.35-4.27 (m, 1H), 2.81 (dd, J = 15.1, 5.6 Hz, 1H), 2.72 (dd, J = 15.0, 2.6 Hz, 1H), 2.33 (s, 3H), 2.31 (s, 3H), 2.26 (s, 3H), 2.15 (s, 3H), 1.44 (t, J = 7.1

Hz, 3H) ppm.^{13}C NMR (100 MHz, $CDCl_3$) ppm: δ 168.3, 156.4, 144.9, 141.4, 139.9, 136.4, 135.6, 135.3, 129.4, 129.3, 129.2, 128.8, 126.5, 126.3, 125.9, 112.8, 97.7, 59.5, 57.9, 54.9, 33.5, 21.1, 21.0, 20.9, 20.1, 14.8 ppm.

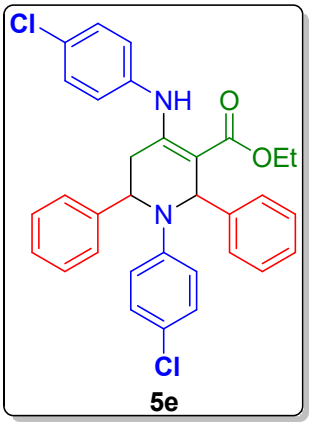
Ethyl-4-(4-chlorophenylamino)-1-(4-chlorophenyl)-1,2,5,6-tetrahydro-2,6-di-*p*-tolylpyridine-3-carboxylate, **5d**



5d

White solid. Melting point: 218-220 ^{0}C. IR (KBr): ν_{max} 3234, 3090, 2979, 2859, 1646, 1604, 1498, 1448, 1319, 1254, 1073, 848, 795, 759, 683 cm^{-1}. ^{1}H NMR (400 MHz,$CDCl_3$): δ 10.24 (s, 1H), 7.16-6.98 (m, 12H), 6.43 (d, J = 7.5 Hz, 2H), 6.33 (s, 1H), 6.19 (d, J = 7.1 Hz, 2H), 5.07 (s, 1H), 4.52-4.44 (m, 1H), 4.34-4.27 (m, 1H), 2.85 (dd, J = 24, 4.0 Hz, 1H), 2.69 (d, J = 14.7 Hz, 1H), 2.34 (s, 3H), 2.32 (s, 3H), 1.46 (t, J = 8.0, 3H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.3, 155.5, 145.7, 140.4, 139.3, 137.1, 136.6, 136.2, 131.3, 129.5, 129.1, 129.0, 128.8, 127.0, 126.5, 126.3, 121.1, 114.1, 99.0, 59.9, 58.1, 55.1, 33.6, 21.2, 21.1, 14.8 ppm.

Ethyl-4-(4-chlorophenylamino)-1-(4-chlorophenyl)-1,2,5,6-tetrahydro-2,6-diphenyl pyridine-3-carboxylate, 5e

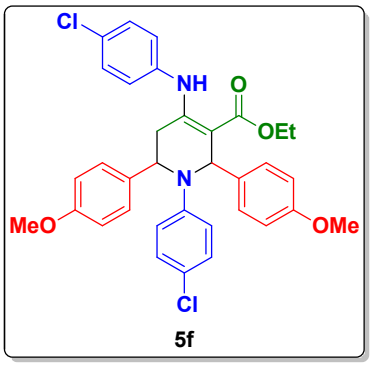


5e

White solid. Melting point: 202-204 ^{0}C. IR (KBr): ν_{max} 3243, 3060, 2976, 2857, 1647, 1496, 1426, 1320, 1227, 1071, 941, 848, 803, 777, 698 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.21 (s, 1H), 7.26-7.20 (m, 9H), 7.12 (d, J = 7.0 Hz, 1H), 7.02 (d, J = 8.2 Hz, 2H), 6.97 (d, J = 8.5 Hz, 2H), 6.40 (d, J = 8.8 Hz, 2H), 6.36 (s, 1H), 6.15 (d, J = 8.2 Hz, 2H), 5.08 (s, 1H), 4.50 – 4.38 (m, 1H), 4.36 – 4.25 (m, 1H), 2.83 (dd, J = 15.0, 5.3 Hz, 1H), 2.67 (d, J = 14.8 Hz, 1H), 1.45 (t, J = 6.9 Hz, 3H).^{13}C NMR (101 MHz, $CDCl_3$) δ 164.4, 156.8, 145.6, 142.4, 140.4, 137.9,

132.5, 131.5, 129.1, 128.9, 128.8, 128.5, 127.1, 126.6, 126.4, 117.9, 114.1, 98.7, 60.0, 58.3, 55.4, 33.6, 14.8 ppm.

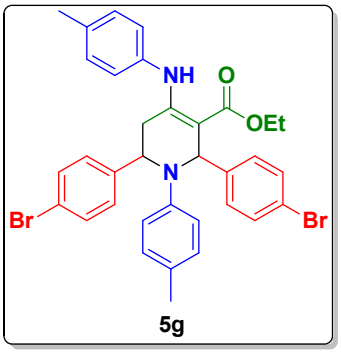
Ethyl-4-(4-chlorophenylamino)-1-(4-chlorophenyl)-1,2,5,6-tetrahydro-2,6-bis(4-methoxyphenyl)pyridine-3-carboxylate, 5f



5f

White solid. Melting point: 182-183 ^{0}C, IR (KBr): ν_{max} 3454, 3101, 2962, 1647, 1608, 1502, 1364, 1249, 1071, 798 cm^{-1}.^{1}H NMR (500 MHz, $CDCl_3$) δ 10.25 (s, 1H), 7.19 (d, *J* = 7.8 Hz, 2H), 7.06 (dd, *J* = 15.4, 8.1 Hz, 4H), 7.00 (d, *J* = 8.3 Hz, 2H), 6.86 – 6.79 (m, 4H), 6.44 (d, *J* = 8.3 Hz, 2H), 6.30 (s, 1H), 6.26 (d, *J* = 7.9 Hz, 2H), 5.04 (s, 1H), 4.50 – 4.40 (m, 1H), 4.37 – 4.27 (m, 1H), 3.80 (s, 3H), 3.78 (s, 3H), 2.83 (dd, *J* = 15.6, 5.6 Hz, 1H), 2.69 (d, *J* = 14.7 Hz, 1H), 1.46 (t, *J* = 6.7 Hz, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.3, 159.0, 155.5, 145.7, 136.7, 135.3, 134.2, 131.3, 129.1, 128.8, 127.7, 127.5, 127.0, 121.2, 114.2, 114.2, 113.8, 99.0, 60.0, 57.7, 55.4, 55.3, 54.9, 33.7, 14.9 ppm.

Ethyl-4-(p-tolylamino)-2,6-bis(4-bromophenyl)-1,2,5,6-tetrahydro-1-p-tolylpyridine-3-carboxylate, 5g

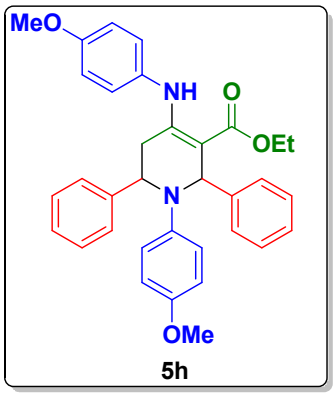


5g

White solid. Melting point: 191-192 ^{0}C. IR (KBr): 3236, 3089, 2979, 2860, 1647, 1495, 1370, 1253, 1070, 896, 794 cm^{-1}. ^{1}H NMR (500 MHz, $CDCl_3$) δ 10.24 (s, 1H), 7.20 (d, *J* = 8.3 Hz, 2H), 7.17 (d, *J* = 7.7 Hz, 2H), 7.13 – 7.10 (m, 6H), 7.03 (d, *J* = 7.5 Hz, 2H), 6.39 (d, *J* = 8.6 Hz, 2H), 6.33 (s, 1H), 6.14 (d, *J* = 8.1 Hz, 2H), 5.07 (s, 1H), 4.49-4.43 (m, 1H), 4.36 – 4.30 (m, 1H), 2.85 (dd, *J* = 15.1, 5.3 Hz, 1H), 2.70 (d, *J* = 15.0 Hz, 1H), 2.35 (s, 3H), 2.33 (s, 3H), 1.47 (t, *J* = 7.0 Hz, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.2, 155.3, 146.1,

140.3, 139.2, 137.1, 132.0, 131.6, 129.5, 129.2, 127.3, 126.5, 126.3, 114.6, 108.4, 99.1, 60.0, 58.1, 55.1, 33.6, 21.2, 21.1, 14.8 ppm.

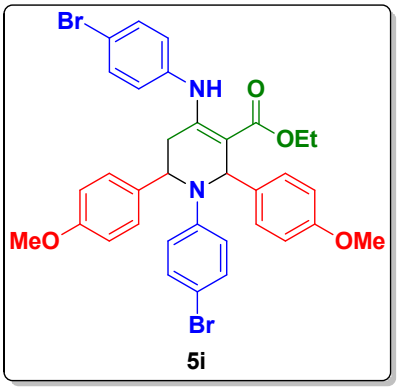
Ethyl-4-(4-methoxyphenylamino)-1,2,5,6-tetrahydro-1-(4-methoxyphenyl)-2,6-diphenylpyridine-3-carboxylate, 5h



5h

White solid. Melting point: 173-175 ^{0}C. IR (KBr): ν_{max} 3247, 3047, 2981, 2834, 1652, 1607, 1511, 1460, 1319, 1243, 1068, 1038, 947, 845, 810, 736 cm^{-1}. ^{1}H NMR (500 MHz, $CDCl_3$) δ 10.14 (s, 1H), 7.21 (d, J = 7.7 Hz, 2H), 7.10-7.05 (m, 6H), 6.66 (d, J = 9.1 Hz, 2H), 6.62 (d, J = 8.7 Hz, 2H), 6.46 (d, J = 9.0 Hz, 2H), 6.29 (s, 1H), 6.23 (d, J = 8.6 Hz, 2H), 5.02 (s, 1H), 4.46-4.40 (m, 1H), 4.33-4.27 (m, 1H), 3.75 (s, 3H), 3.66 (s, 3H), 2.79 (dd, J = 15.1, 5.6 Hz, 1H), 2.64 (dd, J = 15.0, 2.6 Hz, 1H), 2.35 (s, 3H), 2.32 (s, 3H), 1.44 (t, J = 7.1 Hz, 3H) ppm. ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.4, 156.9, 150.9, 141.8, 140.3, 136.6, 135.7, 131.0, 129.3, 128.9, 127.9, 126.8, 126.6, 114.6, 114.2, 114.0, 97.5, 59.5, 58.0, 55.7, 55.6, 55.5, 33.7, 21.2, 21.1, 14.9 ppm.

Ethyl-4-(4-bromophenylamino)-1-(4-bromophenyl)-1,2,5,6-tetrahydro-2,6-bis(4-methoxyphenyl)pyridine-3-carboxylate, 5i

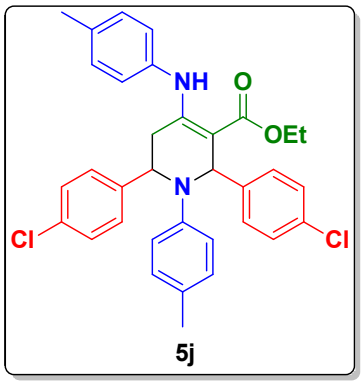


5i

White solid. Melting point: 218-220 ^{0}C. IR (KBr): ν_{max} = 3243, 3064, 2977, 2835, 1648, 1606, 1585, 1505, 1251, 1068, 1034, 757 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.25 (s, 1H), 7.21 (dd, J = 17.0, 8.6 Hz, 4H), 7.13 (d, J = 9.0 Hz, 2H), 7.05 (d, J = 8.6 Hz, 2H), 6.82 (dd, J = 8.8, 2.4 Hz, 4H), 6.39 (d, J = 9.1 Hz, 2H), 6.29 (s, 1H), 6.20 (d, J = 8.6 Hz, 2H), 5.03 (s, 1H), 4.50 – 4.40 (m, 1H), 4.38 – 4.25 (m, 1H), 3.80 (s, 3H), 3.78 (s, 3H), 2.84 (dd, J = 15.1, 5.6 Hz, 1H), 2.70 (dd, J = 15.1, 2.2 Hz, 1H), 1.46 (t, J = 7.1 Hz, 3H).^{13}C NMR (100 MHz, $CDCl_3$) δ 167.9, 158.7, 158.0, 155.1, 145.7,

136.8, 134.8, 133.7, 131.8, 131.3, 127.3, 127.1, 126.9, 114.4, 113.9, 113.5, 108.1, 98.8, 59.7, 57.4, 55.1, 55.0, 54.4, 33.3, 14.5 ppm.

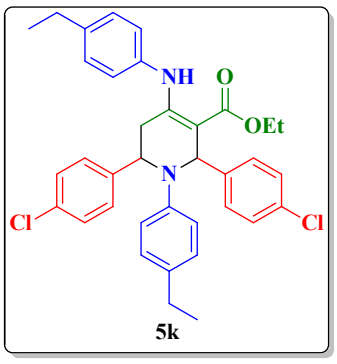
Ethyl-4-(p-tolylamino)-2,6-bis(4-chlorophenyl)-1,2,5,6-tetrahydro-1-p-tolylpyridine-3-carboxylate, 5j



5j

White Solid. Melting Point: 238-240 ^{0}C.IR (KBr): ν_{max} = 3249, 3095, 3065, 3032, 2981, 2921, 1654, 1618, 1593, 1516, 1255, 1074, 804 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.21 (s, 1H), 7.24 – 7.20 (m, 6H), 7.06 (d, *J* = 8.0 Hz, 2H), 6.95 (d, *J* = 8.0 Hz, 2H), 6.88 (d, *J* = 8.0 Hz, 2H), 6.36 (d, *J* = 7.4 Hz, 2H), 6.30 (d, *J* = 4.1 Hz, 2H), 6.28 (s, 1H), 5.04 (s, 1H), 4.47 – 4.40 (m, 1H), 4.35 – 4.28 (m, 1H), 2.77 (dd, *J* = 15.2, 5.3 Hz, 1H), 2.71 (dd, *J* = 15.5, 3.1 Hz, 1H), 2.28 (s, 3H), 2.17 (s, 3H), 1.42 (d, *J* = 7.4 Hz, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.1, 156.2, 144.4, 142.9, 141.3, 135.9, 135.1, 132.8, 132.1, 129.7, 128.9, 128.8, 128.7, 128.5, 128.4, 128.2, 128.1, 127.9, 125.9, 125.8, 124.2, 113.1, 97.3, 59.8, 57.4, 54.9, 33.7, 31.0, 21.0, 20.4, 14.9 ppm.

Ethyl-4-(4-ethylphenylamino)-2,6-bis(4-chlorophenyl)-1-(4-ethylphenyl)-1,2,5,6-tetrahydropyridine-3-carboxylate, 5k

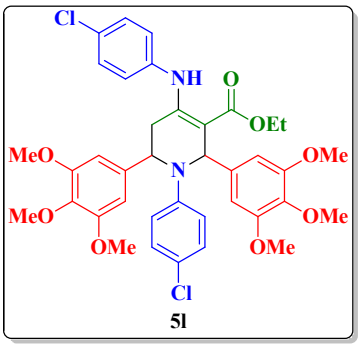


5k

White Solid. Melting Point: 204-206 ^{0}C IR (KBr): ν_{max} = 3222, 3027, 3005, 2974, 2926, 2863, 1647, 1602, 1574, 1514, 1254, 1091, 1012, 813 cm^{-1}.^{1}H NMR (400 MHz, $CDCl_3$) δ 10.22 (s, 1H), 7.26-7.23 (m, 6H), 7.06 (s, 2H), 6.97 (d, *J* = 7.9 Hz, 2H), 6.92 (d, *J* = 8.3 Hz, 2H), 6.38 (d, *J* = 8.4 Hz, 2H), 6.32 (d, *J* = 5.4 Hz, 2H), 6.29 (s, 1H), 5.06 (s, 1H), 4.48 – 4.38 (m, 1H), 4.36 – 4.26 (m, 1H), 2.79 (dd, *J* = 15.2, 5.2 Hz, 1H), 2.73 (d, *J* = 14.8 Hz, 1H), 2.58 (q, *J* = 7.5 Hz, 2H), 2.48 (q, *J* = 7.5 Hz, 2H), 1.44 (t, *J* = 7.1 Hz, 3H), 1.19 (t, *J* = 7.6 Hz, 3H), 1.13 (t, *J* = 7.5 Hz, 3H) ppm.

^{13}C NMR (101 MHz, $CDCl_3$) δ 169.2, 157.4, 145.8, 144.0, 143.4, 142.5, 136.4, 133.9, 133.4, 129.9, 129.5, 129.3, 129.1, 127.1, 114.2, 98.5, 60.9, 58.6, 56.0, 34.8, 29.5, 28.8, 16.9, 16.7, 16.0 ppm.

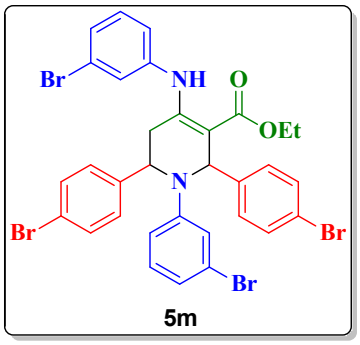
Ethyl-4-(4-chlorophenylamino)-1-(4-chlorophenyl)-1,2,5,6-tetrahydro-2,6-bis(3,4,5-trimethoxyphenyl)pyridine-3-carboxylate, 5l



5l

White Solid. Melting Point: 162-164 ^{0}C. IR (KBr): ν_{max} = 3217, 3067, 2984, 2837, 1724, 1610, 1541, 1516, 1261, 1061, 1035, 950, 892, 814 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.24 (s, 1H), 7.11 (d, J = 8.1 Hz, 2H), 7.04 (d, J = 8.5 Hz, 2H), 6.53 – 6.43 (m, 4H), 6.34 – 6.24 (m, 5H), 4.98 (s, 1H), 4.52 – 4.40 (m, 1H), 4.34 – 4.23 (m, 1H), 3.84 (s, 3H), 3.83 (s, 3H), 3.74 (s, 6H), 3.70 (s, 6H), 2.93 (dd, J = 15.0, 5.5 Hz, 1H), 2.68 (d, J = 14.9 Hz, 1H), 1.43 (t, J = 7.1 Hz, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.0, 156.2, 153.6, 153.2, 145.5, 139.0, 137.9, 136.7, 136.4, 129.0, 128.8, 127.5, 121.6, 114.1, 103.8, 103.0, 98.1, 61.0, 60.9, 59.8, 58.5, 56.1, 56.0, 55.7, 33.7, 15.1 ppm.

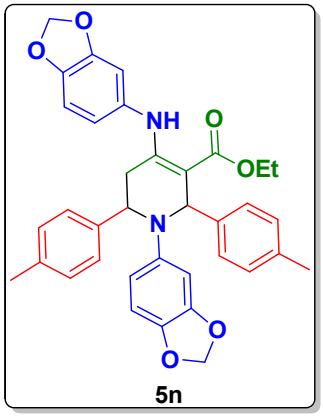
Ethyl-4-(3-bromophenylamino)-1-(3-bromophenyl)-2,6-bis(4-bromophenyl)-1,2,5,6-tetrahydropyridine-3-carboxylate, 5m



5m

White Solid. Melting Point: 179-181 °C. IR (KBr): ν_{max} = 3241, 3055, 2980, 2926, 1660, 1613, 1586, 1256, 1097, 1028, 821 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.27 (s, 1H), 7.41 (dd, J = 13.4, 8.3 Hz, 4H), 7.25 (s, 1H), 7.13 (d, J = 8.2 Hz, 2H), 7.03 (t, J = 7.9 Hz, 1H), 6.98 (d, J = 8.2 Hz, 2H), 6.91 (t, J = 8.1 Hz, 1H), 6.76 (d, J = 7.7 Hz, 1H), 6.58 (s, 1H), 6.44 – 6.32 (m, 3H), 6.26 (s, 1H), 5.05 (s, 1H), 4.52 – 4.41 (m, 1H), 4.37 – 4.25 (m, 1H), 2.78 (dd, J = 15.2, 5.4 Hz, 1H), 2.68 (d, J = 13.9 Hz, 1H), 1.45 (t, J = 7.1 Hz, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.3, 148.1, 142.3, 141.0, 139.3, 132.6, 132.0, 130.7, 130.7, 129.6, 129.0, 128.6, 128.3, 124.7, 123.8, 122.9, 121.9, 121.0, 120.3, 116.0, 112.0, 98.7, 60.6, 57.9, 55.2, 33.8, 15.2 ppm.

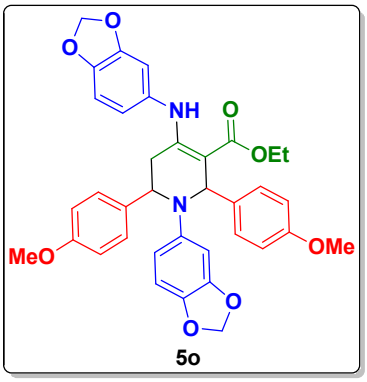
Ethyl-1-(benzo[d][1,3]dioxol-5-yl)-4-(benzo[d][1,3]dioxol-6-ylamino)-1,2,5,6-tetrahydro-2,6-dip-tolylpyridine-3-carboxylate, 5n



5n

White Solid. Melting Point: 234-236 ^{0}C. IR (KBr): ν_{max}= 3247, 3083, 3048, 2879, 1655, 1632, 1592, 1488, 1367, 1255, 1067, 1037, 933, 813, 568 cm^{-1}.^{1}H NMR (400 MHz, $CDCl_3$) δ 10.08 (s, 1H), 7.19 (d, *J* = 8.0 Hz, 2H), 7.08 (t, 4H), 7.04 (d, *J* = 8.0 Hz, 2H), 6.52 (dd, *J* = 15.2, 8.4 Hz, 2H), 6.26 (s, 1H), 6.18 (d, *J* = 2.4 Hz, 1H), 5.95 – 5.87 (m, 3H), 5.81 – 5.73 (m, 3H), 5.69 (d, *J* = 2.0 Hz, 1H), 5.01 (s, 1H), 4.49 – 4.37 (m, 1H), 4.34 – 4.24 (m, 1H), 2.80 (dd, *J* = 15.1, 5.7 Hz, 1H), 2.64 (dd, *J* = 15.1, 2.5 Hz, 1H), 2.34 (s, 3H), 2.32 (s, 3H), 1.45 (t, *J* = 7.1 Hz, 3H) ppm.^{13}C NMR (100 MHz, $CDCl_3$) δ 168.3, 156.7, 148.1, 147.7, 145.8, 143.4, 141.1, 140.0, 138.4, 136.8, 135.8, 131.9, 129.4, 128.9, 126.7, 126.4, 119.9, 108.4, 108.1, 107.8, 105.0, 101.5, 100.4, 97.7, 96.1, 59.7, 58.4, 55.8, 33.8, 21.2, 21.1, 14.9 ppm. HRMS (ESI): calcd 591.2417; found 591.2563

Ethyl-1-(benzo[d][1,3]dioxol-5-yl)-4-(benzo[d][1,3]dioxol-6-ylamino)-1,2,5,6-tetrahydro-2,6-bis(4-methoxyphenyl)pyridine-3-carboxylate, 5o

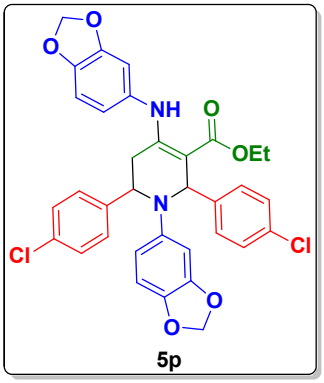


5o

White Solid. Melting Point: 183-185 ^{0}C. IR (KBr): ν_{max} = 3259, 3170, 3066, 2977, 2903, 1650, 1605, 1592, 1506, 1248, 1064, 1036, 930, 811, 549 cm^{-1}^{1}H NMR (400 MHz, CDCl3) δ 10.10 (s, 1H), 7.19 (d, *J* = 8.6 Hz, 2H), 7.06 (d, *J* = 8.6 Hz, 2H), 6.82 (dd, *J* = 8.6, 7.1 Hz, 4H), 6.53 (dd, *J* = 8.4, 5.5 Hz, 2H), 6.20 (s, 1H), 6.17 (d, *J* = 2.5 Hz, 1H), 5.91 (dd, 3H), 5.84 (dd, *J* = 8.2, 1.9 Hz, 1H), 5.78 – 5.75 (m, 3H), 4.96 (s, 1H), 4.46 – 4.37 (m, 1H), 4.33 – 4.24 (m, 1H), 3.80 (s, 3H), 3.78 (s, 3H), 2.77 (dd, *J* = 15.1, 5.5 Hz, 1H), 2.63 (dd, *J* = 15.1, 2.7 Hz, 1H), 1.43 (t, *J* = 7.1 Hz, 3H) ppm. ^{13}C NMR (101 MHz,

CDCl3) δ 168.0, 158.5, 157.8, 156.5, 147.8, 145.6, 138.2, 135.7, 131.7, 127.5, 127.2, 119.6, 113.8, 113.3, 108.0, 107.7, 107.6, 105.0, 101.2, 100.2, 97.4, 96.0, 59.3, 57.6, 55.3, 55.1, 55.0, 33.6, 14.6 ppm. HRMS (ESI): calcd 622.2315; found 622.2327

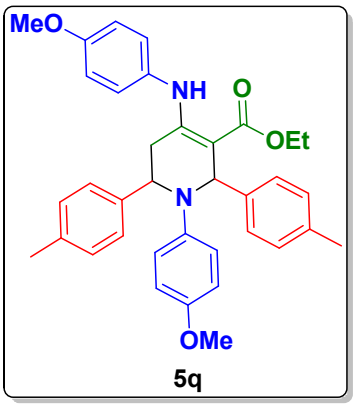
Ethyl-1-(benzo[d][1,3]dioxol-5-yl)-4-(benzo[d][1,3]dioxol-6-ylamino)-2,6-bis(4-chlorophenyl)-1,2,5,6-tetrahydropyridine-3-carboxylate, 5p



5p

White Solid. Melting Point: 205-207 ^{0}C. IR (KBr): ν_{max} = 3255, 3086, 2973, 2877, 1649, 1594, 1487, 1243, 1093, 932, 818 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.09 (s, 1H), 7.25 – 7.18 (m, 5H), 7.06 (d, J = 8.4 Hz, 2H), 6.61 – 6.50 (m, 2H), 6.18 (s, 1H), 6.09 (J = 2.5 Hz, 1H), 5.93 (dd, J = 5.6, 1.2 Hz, 2H), 5.87 (s, 2H), 5.86 5.83 (m, 1H), 5.82 (d, J = 2.5 Hz, 1H), 5.78 (dd, J = 5.7, 1.3 Hz, 2H), 4.96 (s, 1H), 4.46 – 4.3qw5 (m, 1H), 4.33 – 4.23 (m, 1H), 2.74 (dd, J = 15.3, 5.5 Hz, 1H), 2.64 (dd, J = 15.3, 3.0 Hz, 1H), 1.41 (t, J = 7.1 Hz, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.1, 156.4, 148.3, 147.9, 142.7, 142.4, 141.2, 139.1, 133.0, 132.2, 131.6, 128.9, 128.4, 128.2, 127.9, 119.8, 108.5, 108.0, 107.9, 105.6, 101.6, 100.7, 97.1, 96.5, 59.9, 57.8, 55.9, 33.8, 14.8 ppm. HRMS (ESI): calcd 630.1324; found 630.1306.

Ethyl-4-(4-methoxyphenylamino)-1,2,5,6-tetrahydro-1-(4-methoxyphenyl)-2,6-dip-tolylpyridine-3-carboxylate, 5q

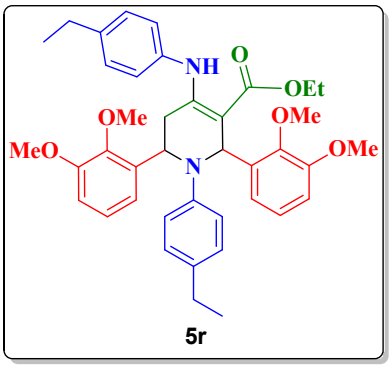


5q

White Solid. Melting Point: 222-224 ^{0}C. IR (KBr): ν_{max} = 3247, 3047, 2981, 2835, 1652, 1606, 1511, 1244, 1069, 810 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.13 (s, 1H), 7.19 (d, J = 7.2 Hz, 2H), 7.07 (d, J = 8.7 Hz, 6H), 6.63 (dd, J = 20.0, 8.2 Hz, 4H), 6.44 (d, J = 8.2 Hz, 2H), 6.29 (s, 1H), 6.21 (d, J = 7.9 Hz, 2H), 5.01 (s, 1H), 4.48 – 4.36 (m, 1H), 4.34 – 4.25 (m, 1H), 3.75 (s, 3H), 3.66 (s, 3H), 2.77 (dd, J = 14.8, 4.6 Hz, 1H), 2.63 (d, J = 14.9 Hz, 1H), 2.34 (s, 3H), 2.32 (s, 3H), 1.43 (t, J = 6.6 Hz, 3H)

ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.3, 156.8, 141.7, 141.4, 140.2, 136.5, 135.6, 130.8, 129.2, 128.8, 127.8, 126.7, 126.4, 114.4, 114.0, 113.8, 97.3, 59.4, 57.9, 55.6, 55.4, 55.3, 33.6, 21.1, 21.0, 14.8 ppm.

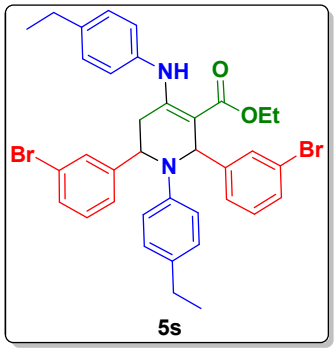
Ethyl-4-(4-ethylphenylamino)-1-(4-ethylphenyl)-1,2,5,6-tetrahydro-2,6-bis(2,3-dimethoxyphenyl)pyridine-3-carboxylate, 5r



5r

White Solid. Melting Point: 162-164 °C. IR (KBr): ν_{max} = 3252, 2987, 2831, 1653, 1613, 1590, 1514, 1253, 1061, 1030, 942, 806 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.73 (s, 1H), 6.92 – 6.81 (m, 5H), 6.77 (s, 1H), 6.74 (s, 2H), 6.69 (dd, *J* = 8.7, 2.6 Hz, 1H), 6.64 – 6.60 (m, 1H), 6.40 (s, 1H), 6.35 (d, *J* = 8.4 Hz, 2H), 6.20 (d, *J* = 8.0 Hz, 2H), 5.39 (s, 1H), 4.37 – 4.22 (m, 2H), 3.78 (s, 3H), 3.64 (s, 3H), 3.61 (s, 3H), 3.56 (s, 3H), 2.91 – 2.82 (m, 2H), 2.54 (q, *J* = 7.5 Hz, 2H), 2.45 (q, *J* = 7.4 Hz, 2H), 1.39 (t, *J* = 7.1 Hz, 3H), 1.16 (t, *J* = 7.6 Hz, 3H), 1.11 (t, *J* = 7.6 Hz, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.9, 153.7, 153.0, 151.8, 150.3, 144.9, 141.4, 136.2, 132.8, 131.4, 131.3, 128.1, 128.0, 126.2, 116.0, 113.7, 113.4, 112.8, 112.0, 110.8, 110.4, 97.4, 59.5, 56.0, 55.6, 55.3, 53.2, 29.7, 28.4, 27.7, 15.8, 14.9 ppm. HRMS (ESI): calcd 651.3434; found 651.3427

Ethyl-4-(4-ethylphenylamino)-2,6-bis(3-bromophenyl)-1-(4-ethylphenyl)-1,2,5,6-tetrahydropyridine-3-carboxylate, 5s

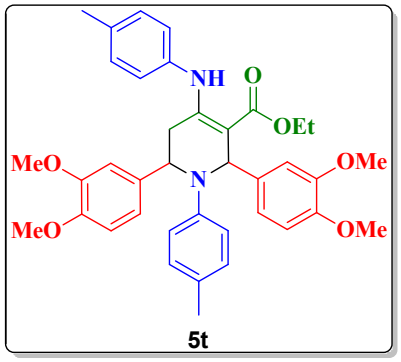


5s

White Solid. Melting Point: 166-168 ^{0}C. IR (KBr): ν_{max} = 3233, 2963, 2928, 2871, 1651, 1595, 1514, 1253, 1091, 1026, 894, 776, 697 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.20 (s, 1H), 7.55 (s, 1H), 7.39 (d, *J* = 7.6 Hz, 1H), 7.34 (d, *J* = 7.5 Hz, 1H), 7.25 (s, 1H), 7.21 – 7.05 (m, 4H), 7.00 (d, *J* = 7.9 Hz, 2H), 6.92 (d, *J* = 8.3 Hz, 2H), 6.39 (d, *J* = 8.4 Hz, 2H), 6.33 (s, 1H), 6.25 (d, *J* = 8.0 Hz, 2H), 5.07 (s, 1H), 4.53 – 4.42 (m, 1H), 4.37 – 4.26 (m, 1H), 2.79 (dd, *J* = 15.1, 5.3 Hz, 1H), 2.71 (d, *J* = 15.3 Hz, 1H), 2.59 (q, *J* = 7.5 Hz, 2H), 2.48 (q, *J* = 7.4 Hz, 2H), 1.47 (t, *J* = 7.0 Hz, 3H), 1.20 (t, *J* = 7.6 Hz, 3H), 1.13 (t, *J* = 7.5 Hz, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.9, 156.2, 145.3, 142.4, 130.2, 130.2, 129.7, 129.7, 129.5, 129.4, 128.4, 128.3, 126.3, 125.3, 125.0, 122.6,

113.0, 96.8, 59.7, 57.5, 55.1, 33.5, 28.3, 27.6, 15.6, 15.4, 14.8 ppm. HRMS (ESI): calcd 686.1144; found 686.1150

Ethyl-4-(p-tolylamino)-1,2,5,6-tetrahydro-2,6-bis(3,4-dimethoxyphenyl)-1-*p*-tolylpyridine-3-carboxylate, 5t

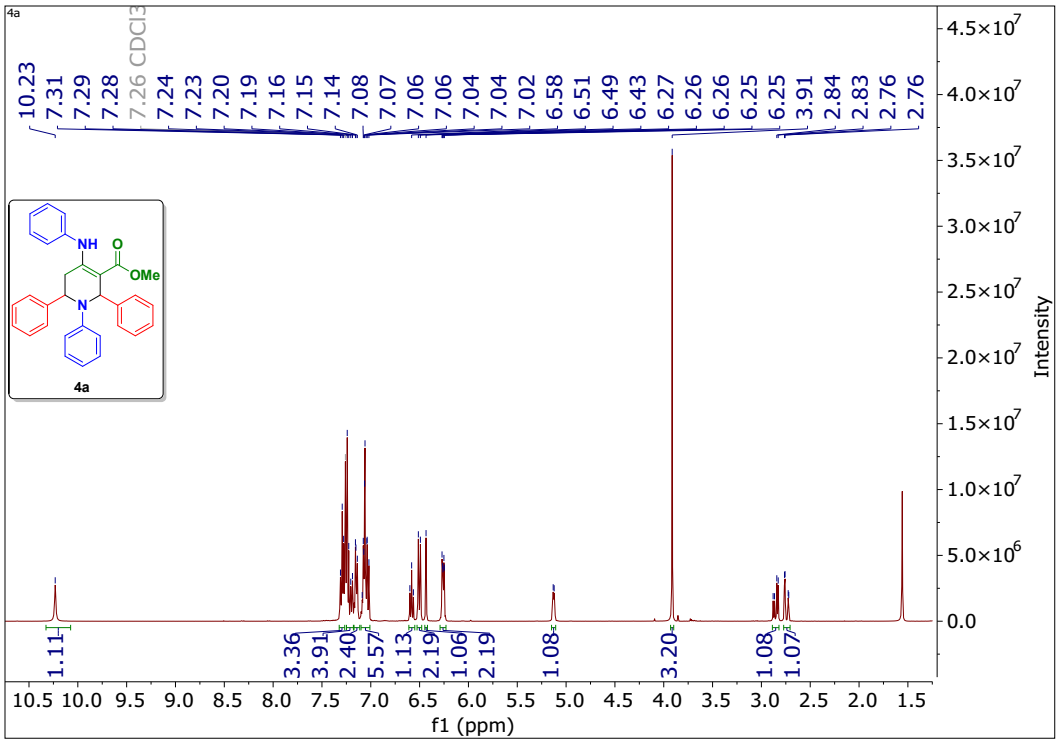


5t

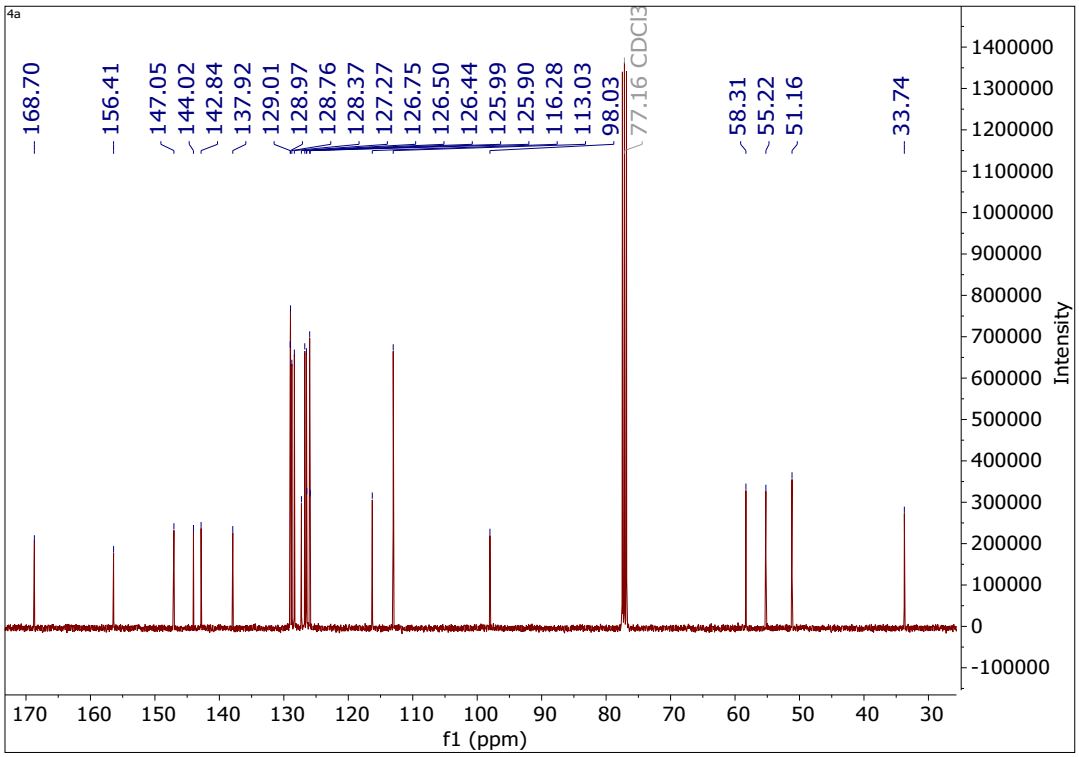
White Solid. Melting Point: 176-178 ^{0}C. IR (KBr): ν_{max} = 3228, 3087, 3062, 2998, 2905, 1711, 1653, 1587, 1514, 1257, 1069, 1027, 920, 864, 630, 578 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.32 (s, 1H), 7.17 – 7n.04 (m, 5H), 6.97 (s, 1H), 6.76 (d, J = 8.3 Hz, 4H), 6.63 (d, J = 7.3 Hz, 2H), 6.54 (d, J = 7.9 Hz, 2H), 6.42 – 6.32 (m, 3H), 5.06 (s, 1H), 4.56 – 4.38 (m, 1H), 4.35 – 4.21 (m, 1H), 3.86 (s, 3H), 3.84 (s, 3H), 3.81 (s, 3H), 3.72 (s, 3H), 2.93 (dd, J = 14.8, 4.9 Hz, 1H), 2.78 (d, J = 14.6 Hz, 1H), 1.45 (t, J = 6.9 Hz, 3H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.5, 149.0, 148.8, 147.9, 147.4, 137.9, 136.3, 135.1, 128.8, 128.8, 125.9, 125.7, 118.6, 118.5, 116.2, 113.0, 111.1, 110.5, 110.1, 109.2, 97.8, 59.5, 57.8, 55.9, 55.8, 55.7, 55.7, 54.9, 33.7, 14.9 ppm.

VIII. ^{1}H & ^{13}C NMR spectra of the synthesized compounds

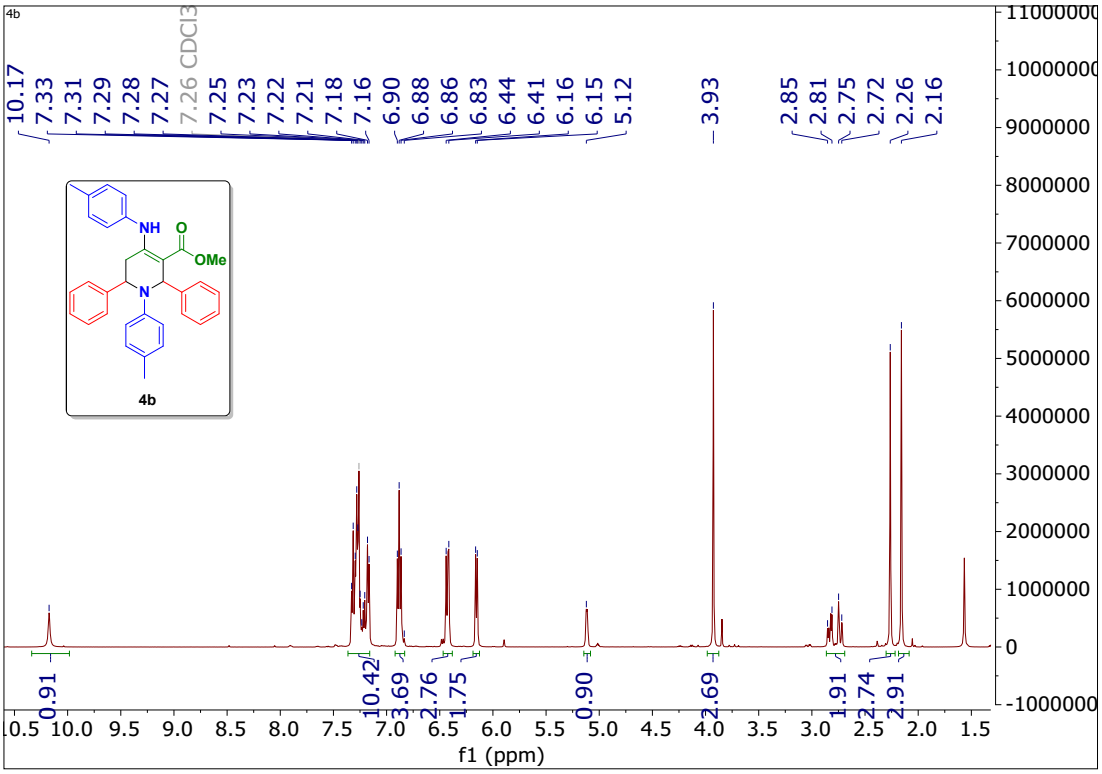
^{1}H NMR spectra of 4a



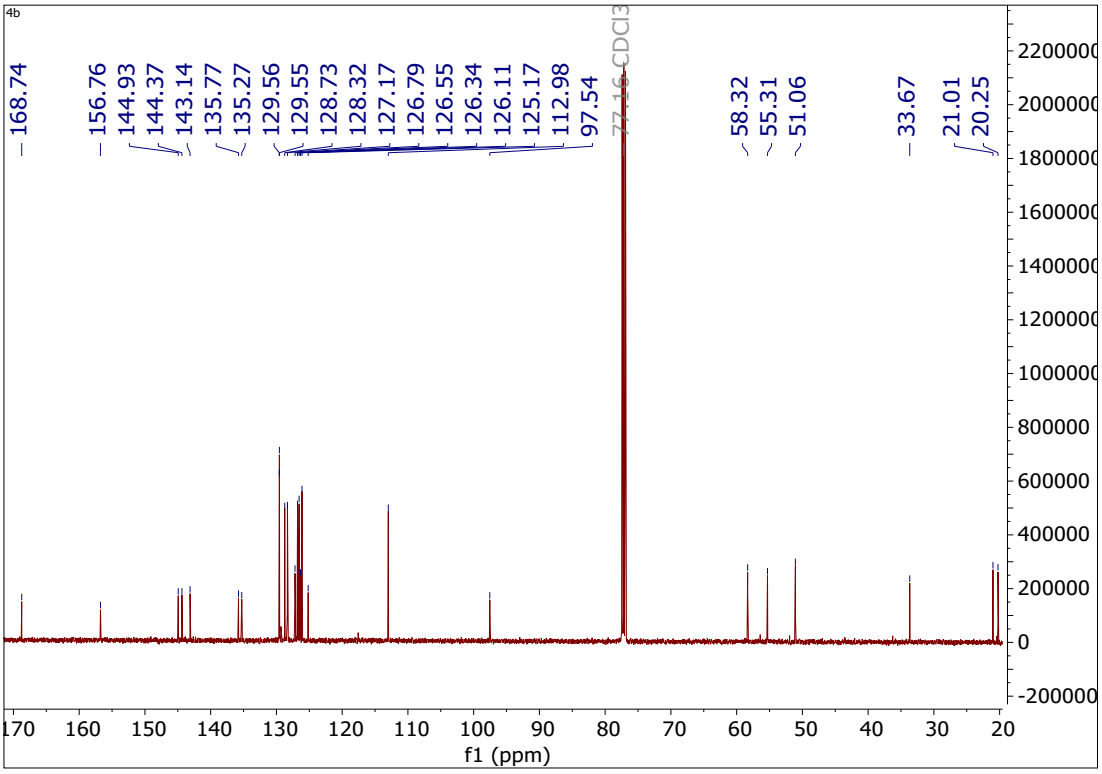
^{13}H NMR spectra of 4a



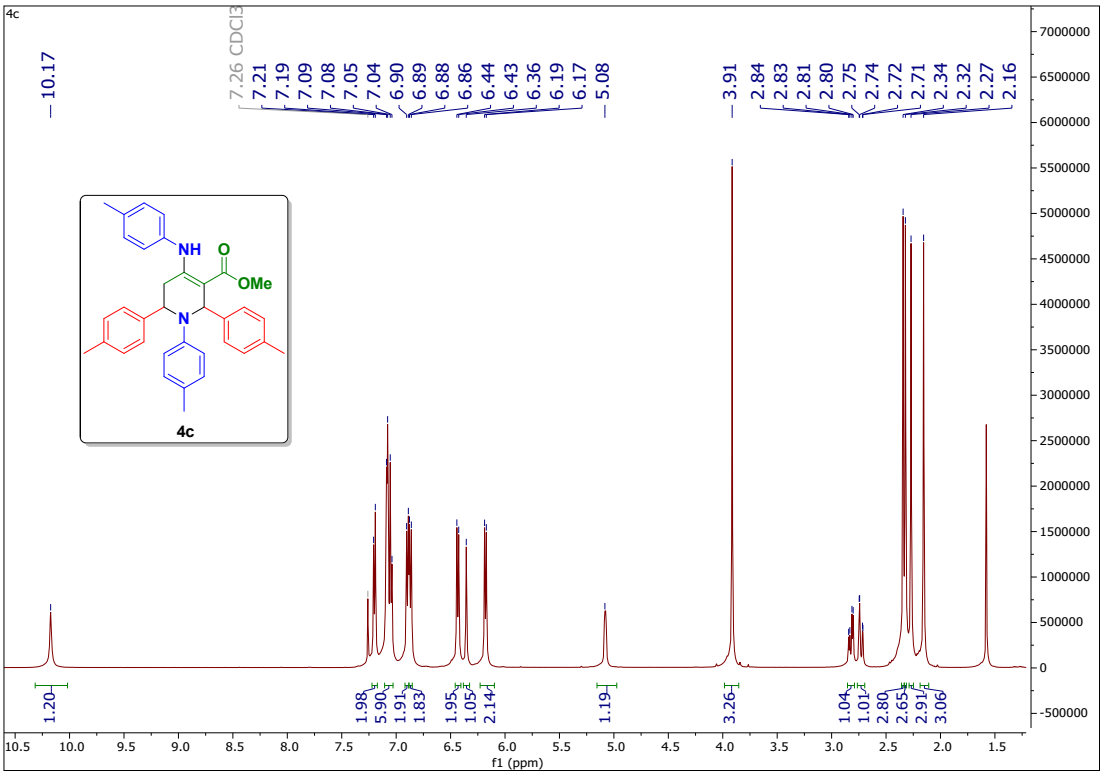
^{1}H NMR Spectrum of 4b



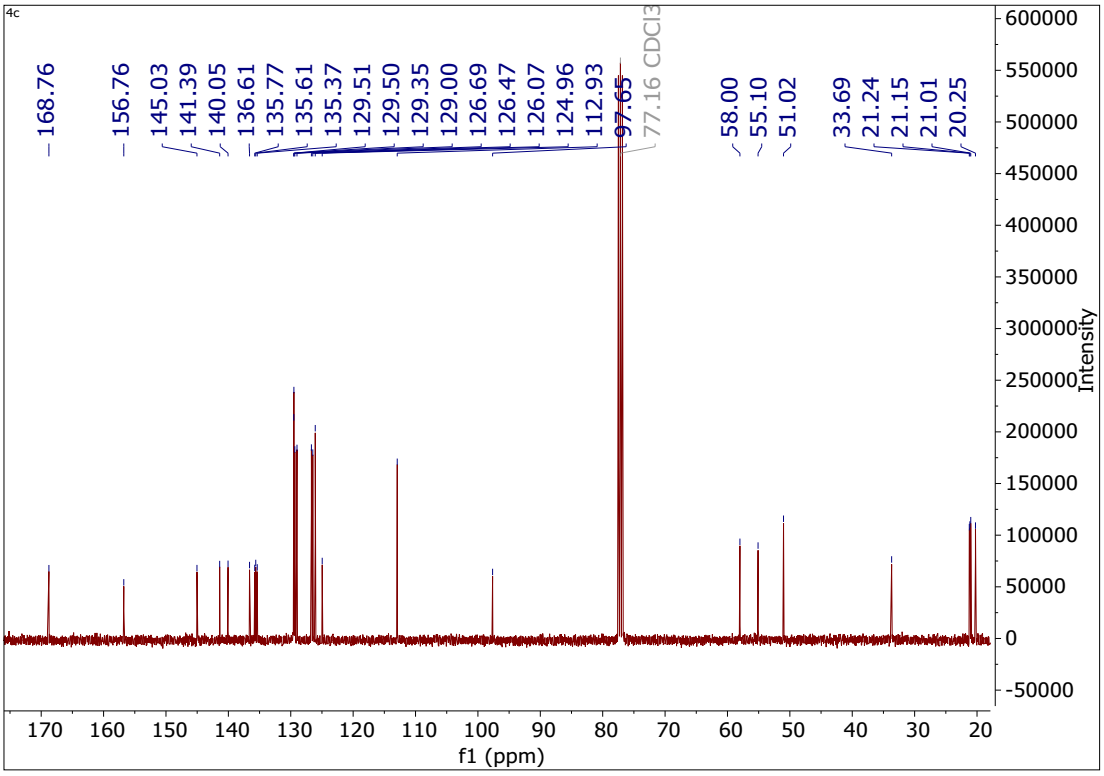
^{13}C NMR Spectrum of 4b



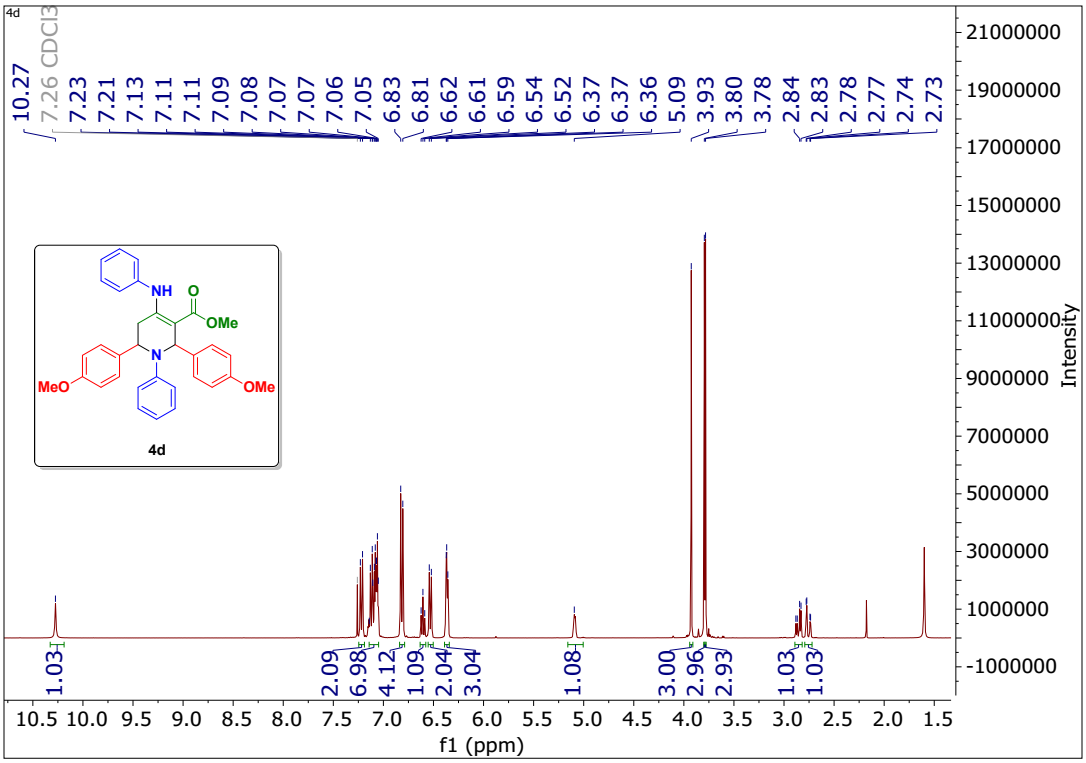
^{1}H NMR spectrum of 4c



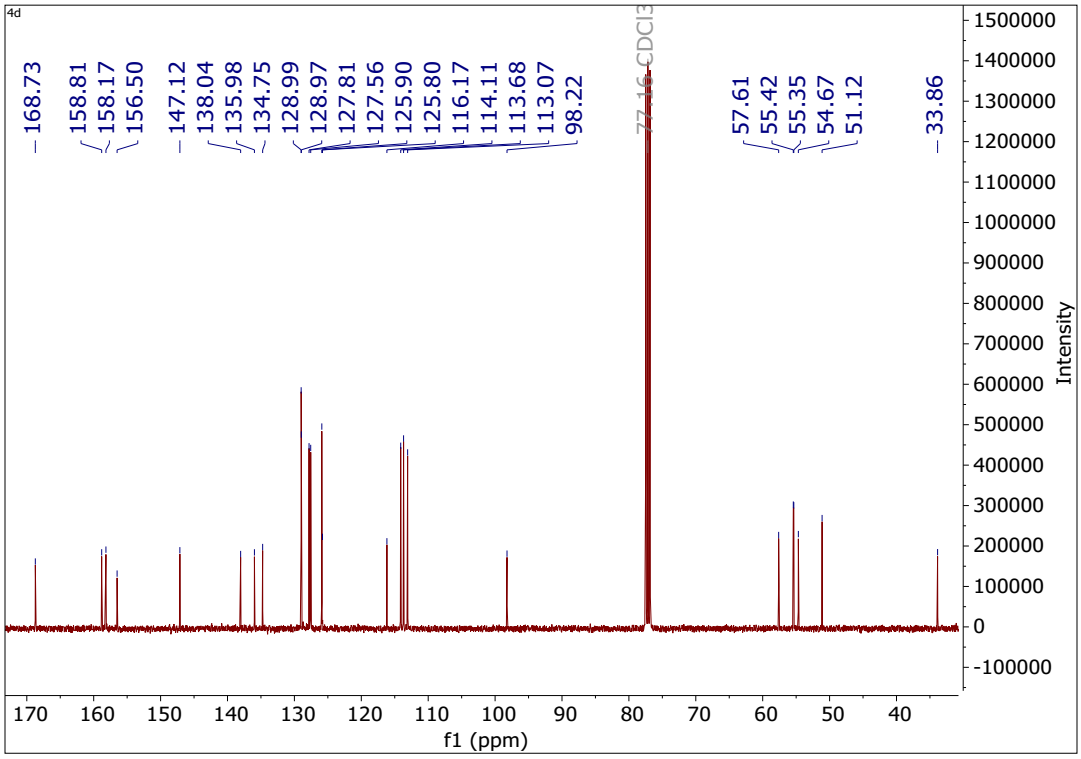
^{13}C NMR spectrum of 4c



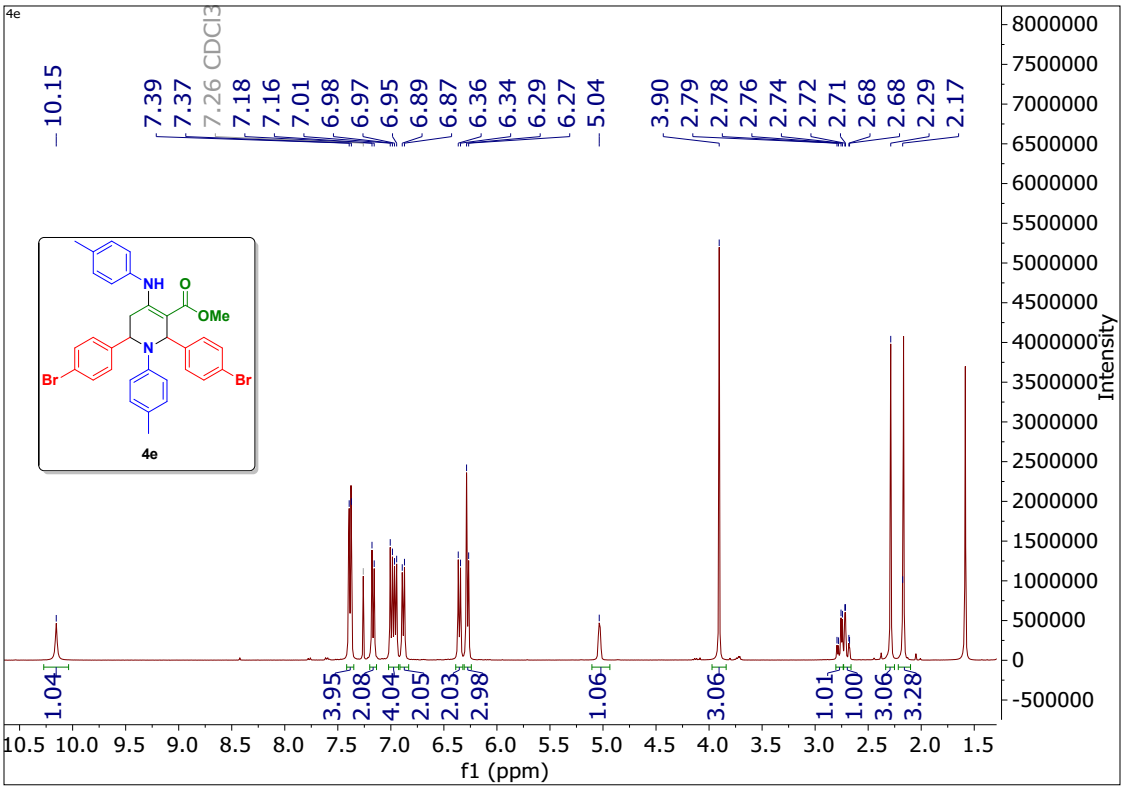
^{1}H NMR spectrum of 4d



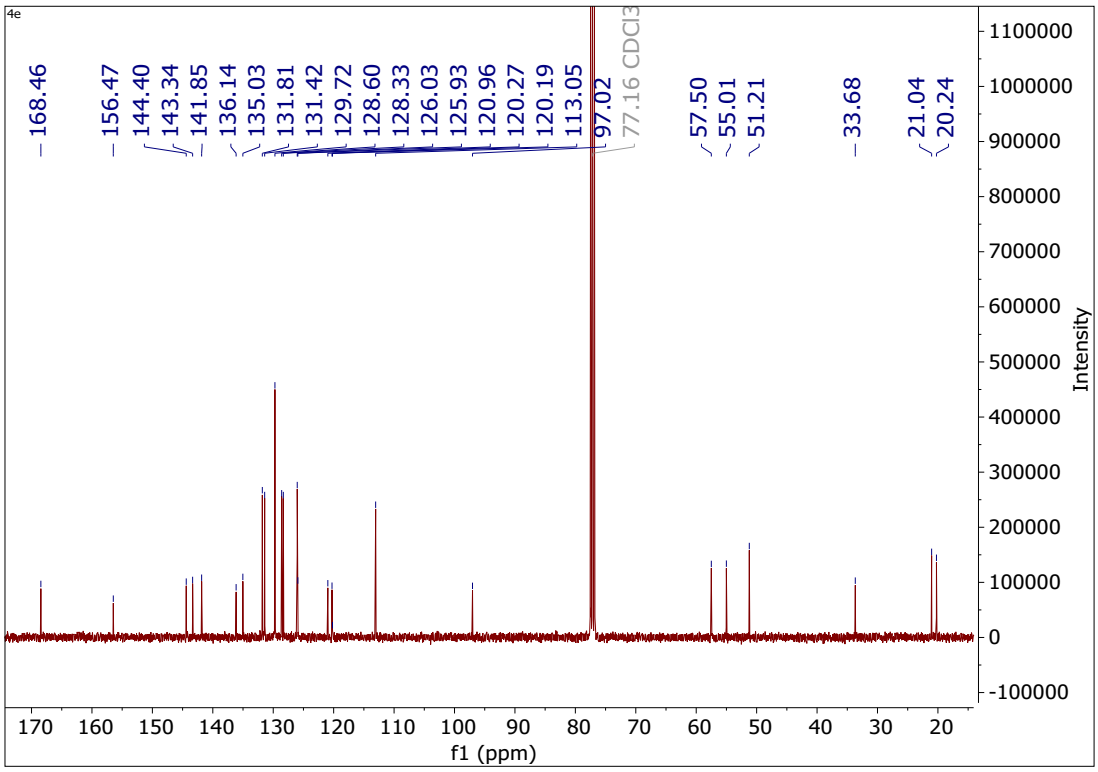
^{13}C NMR spectrum of 4d



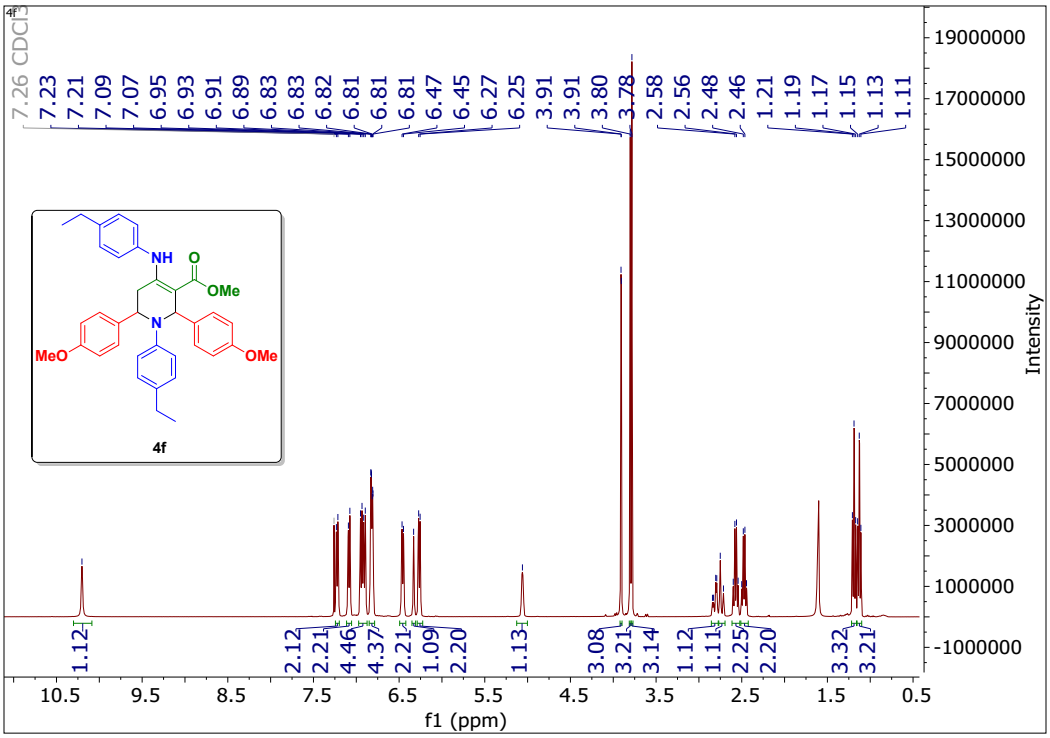
^{1}H NMR spectrum of 4e



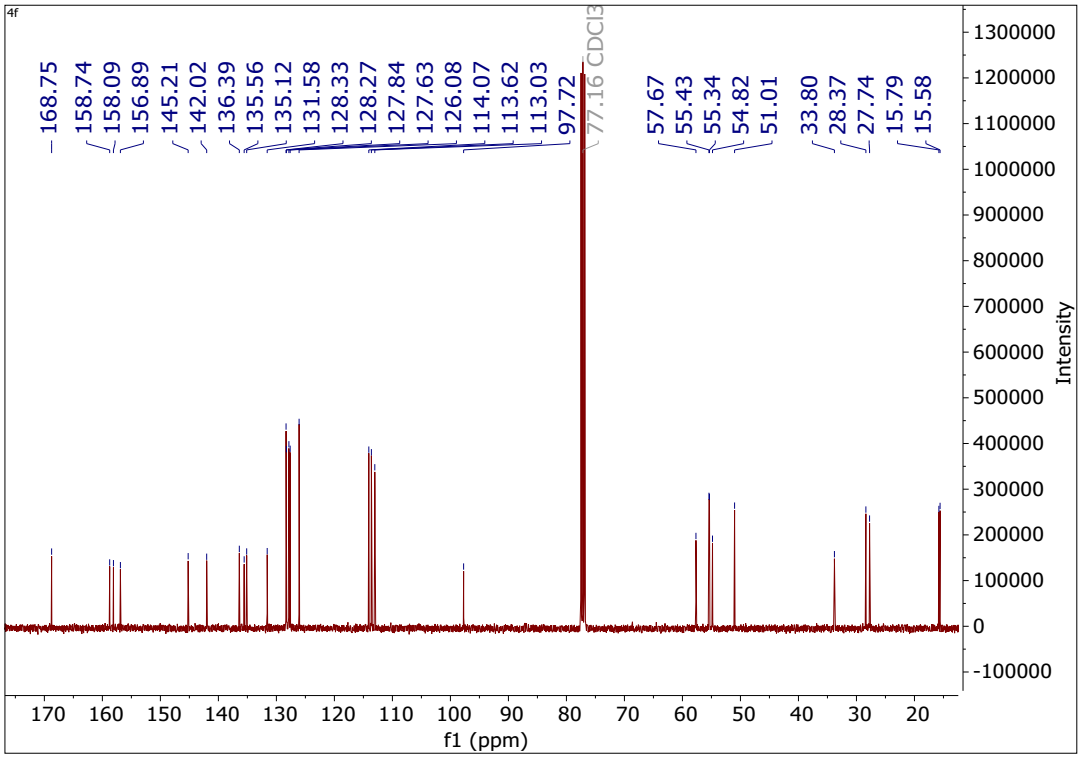
^{13}C NMR spectrum of 4e



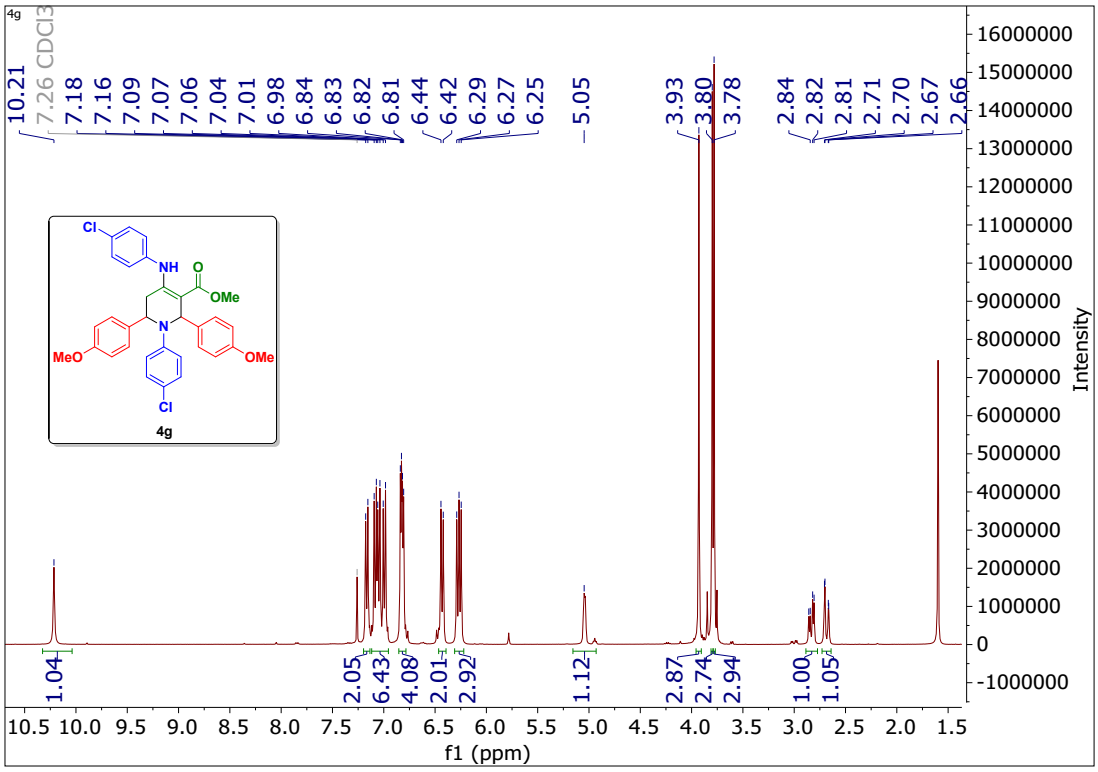
^{1}H NMR spectrum of 4f



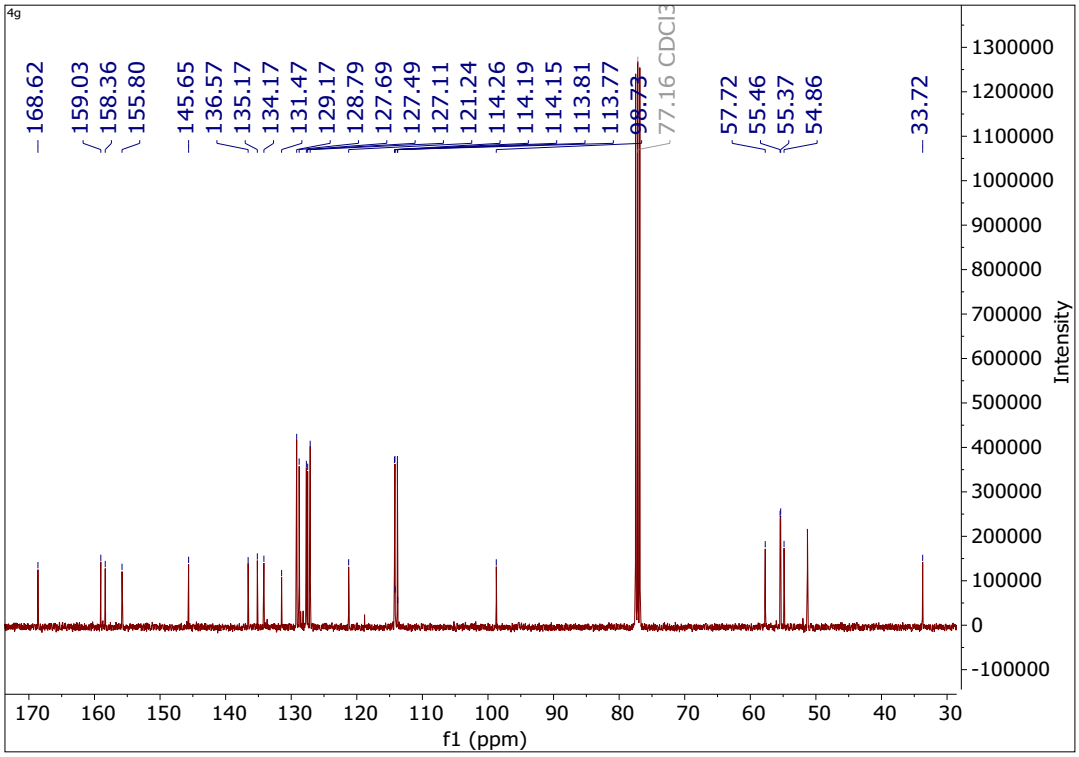
^{13}C NMR Spectrum of 4f



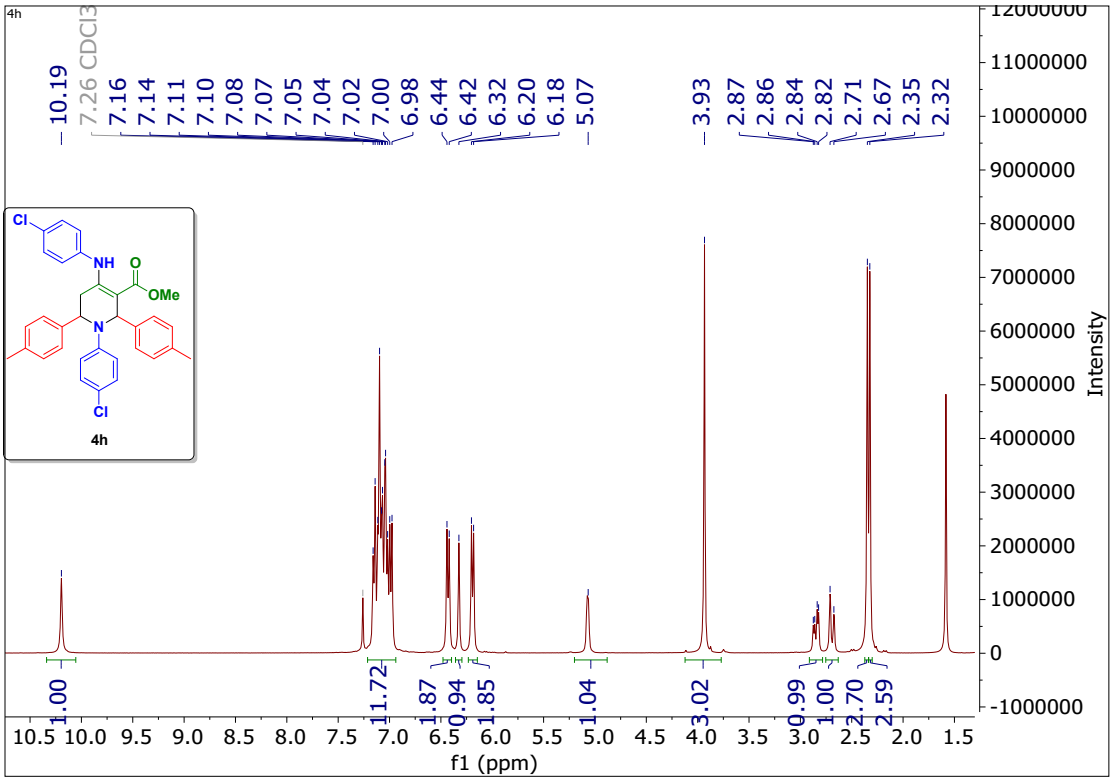
^{1}H NMR Spectrum of 4g



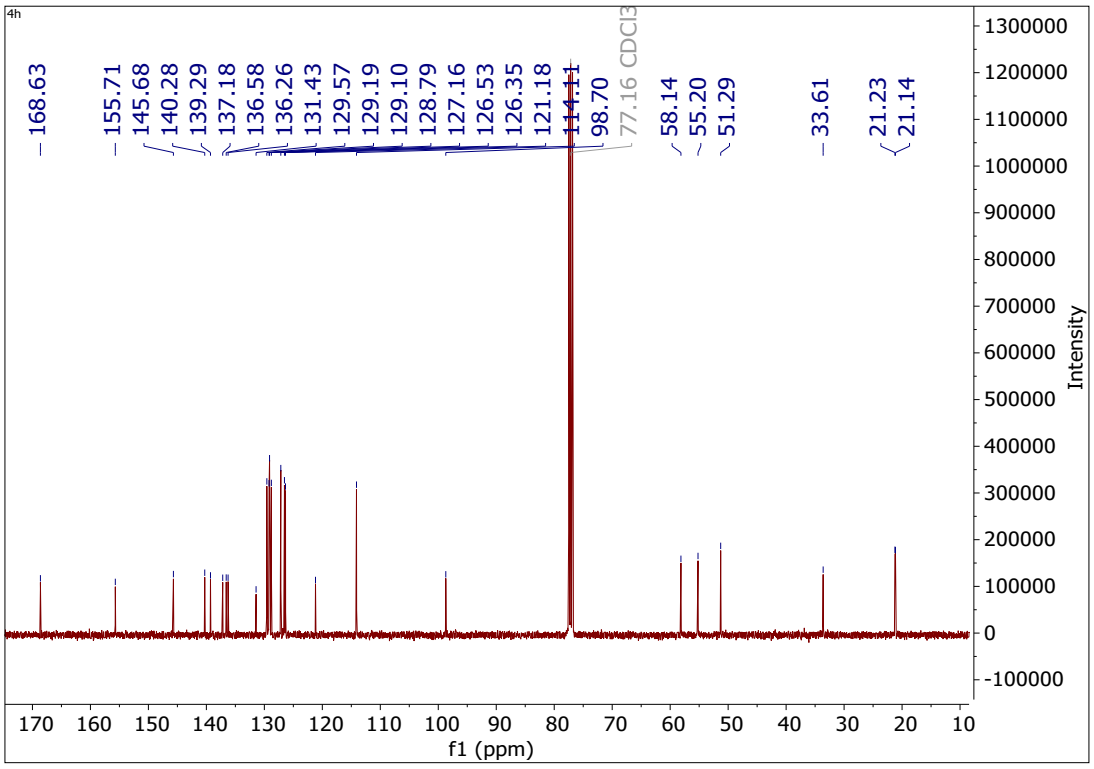
^{13}C NMR Spectrum of 4g



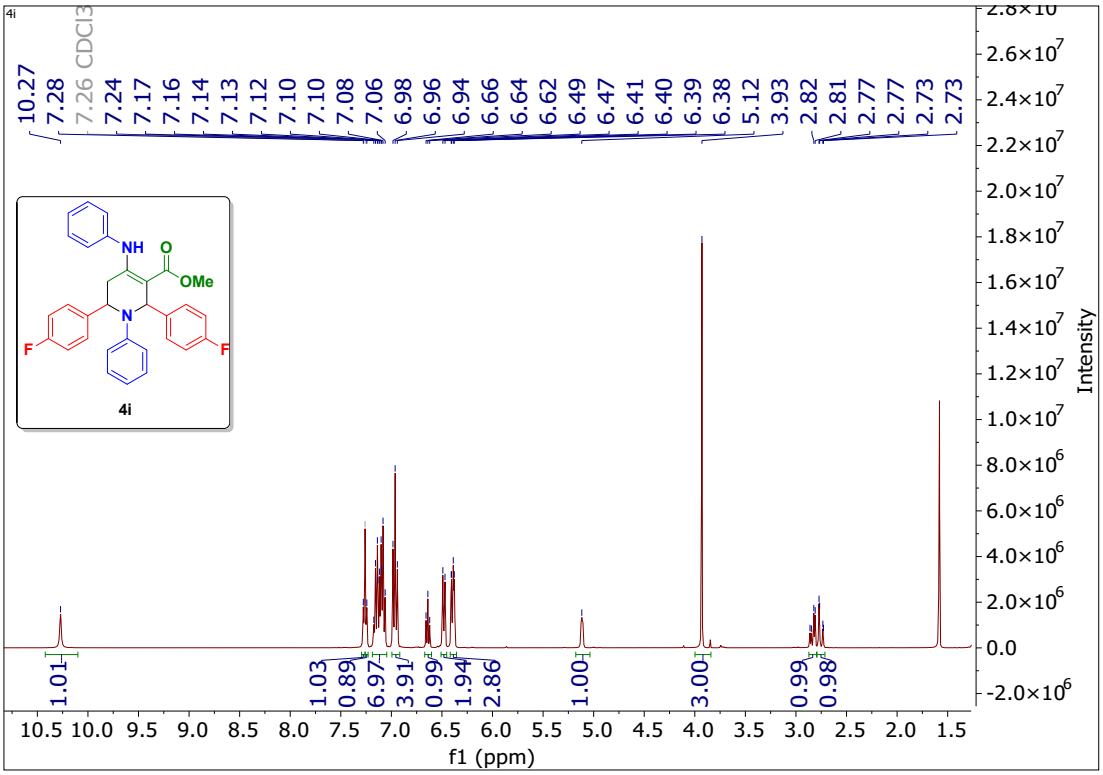
^{1}H NMR spectrum of 4h



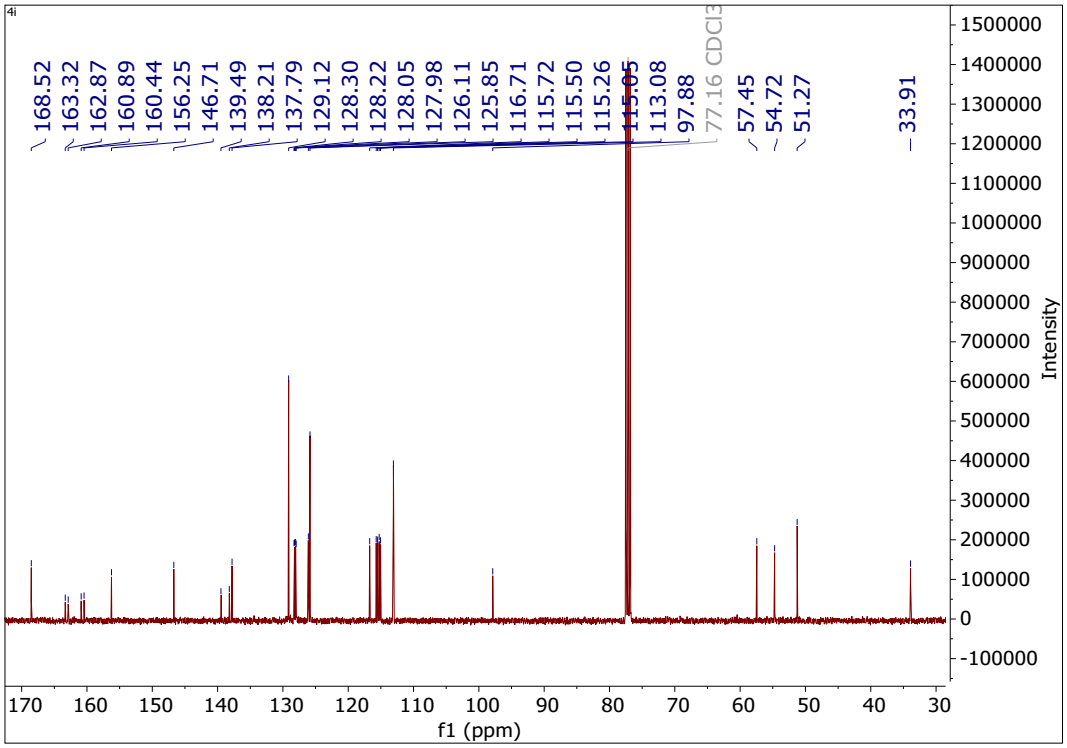
^{13}C NMR spectrum of 4h



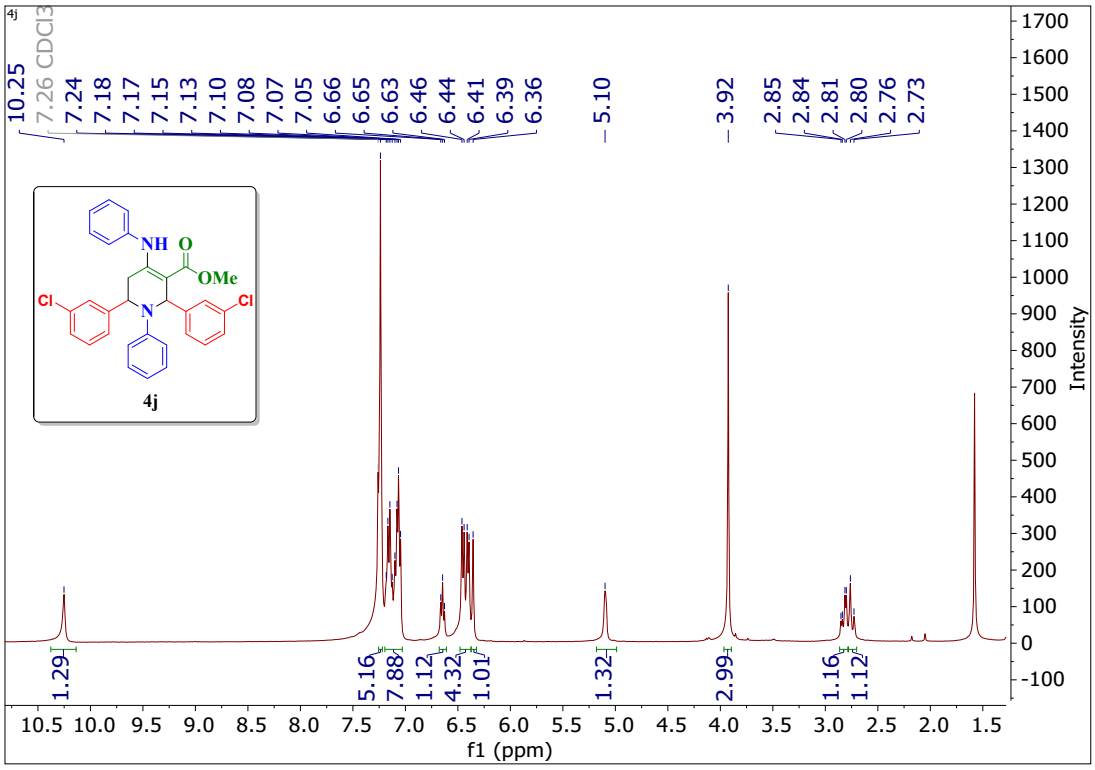
[1]H NMR Spectrum of 4i



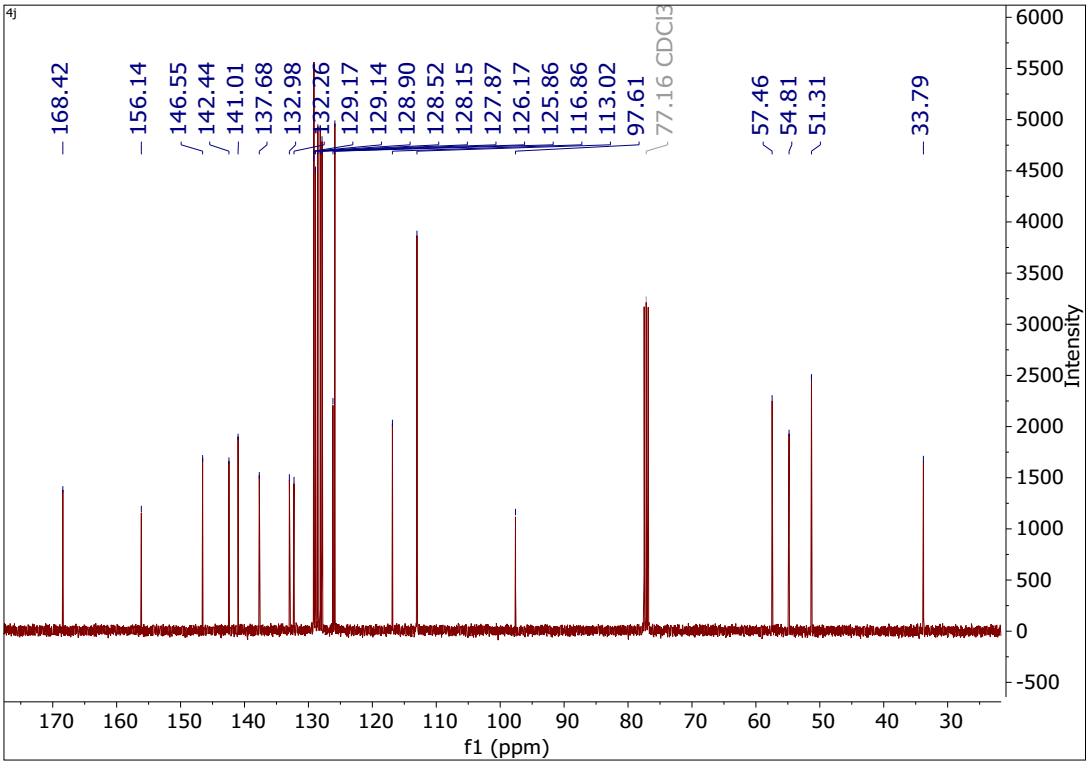
[13]C NMR spectrum of 4i



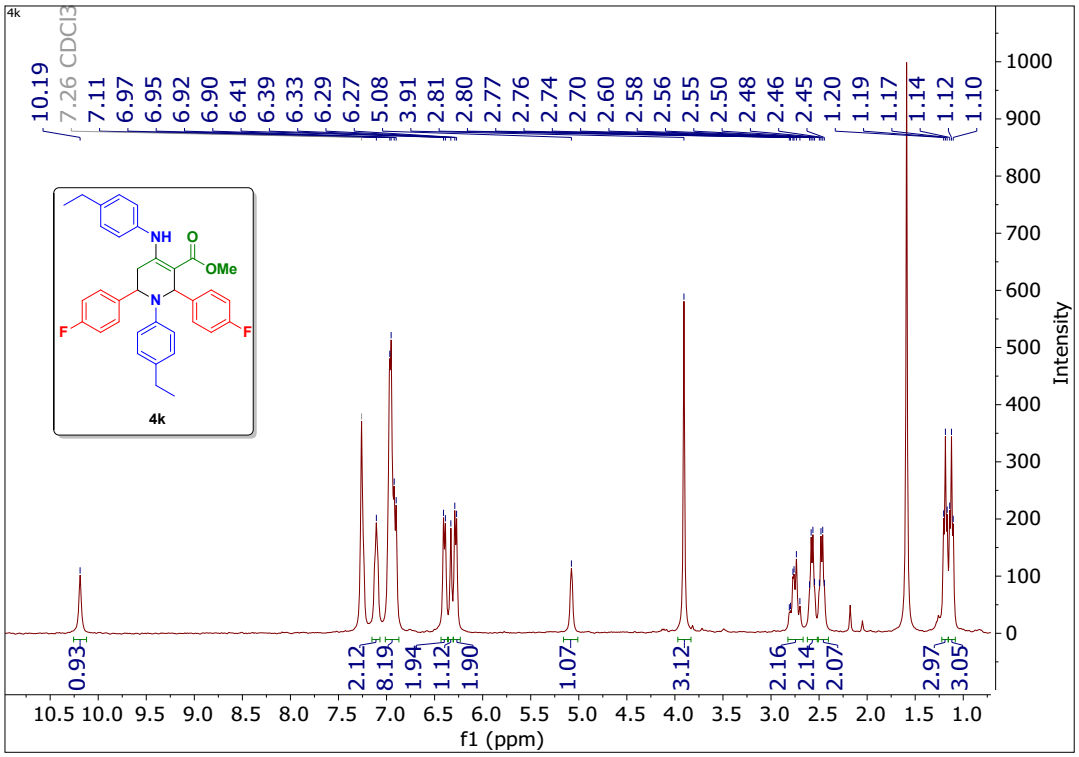
^{1}H NMR Spectrum of 4j



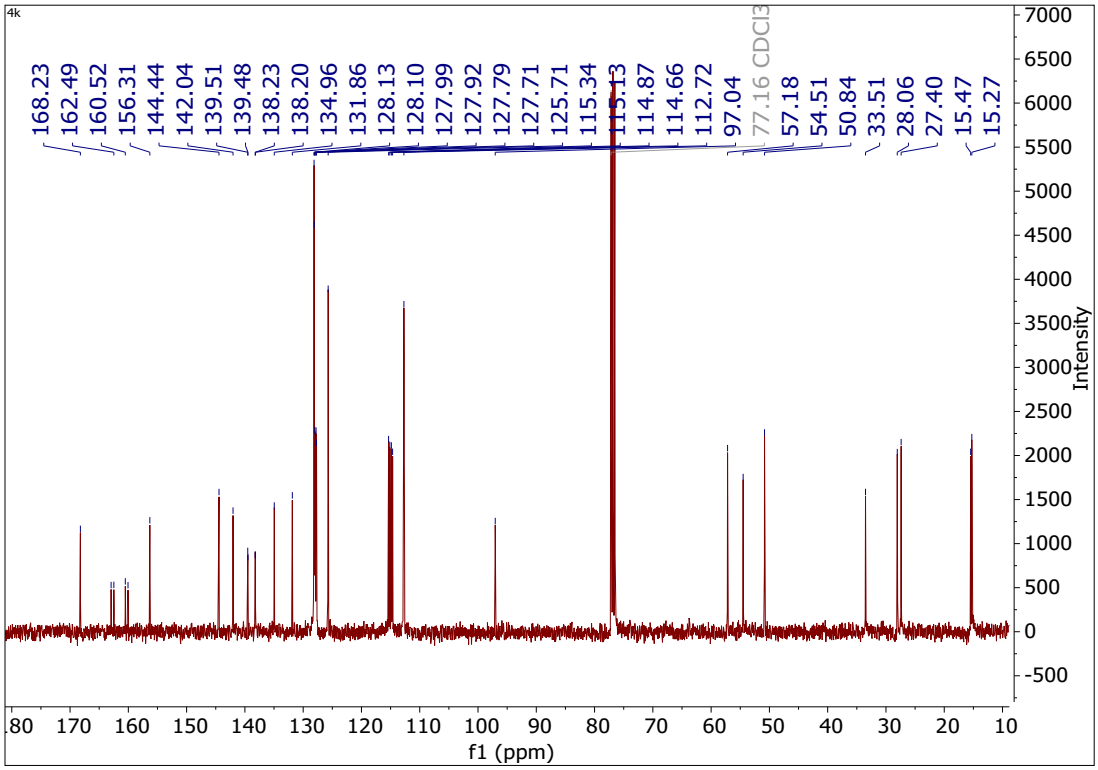
^{13}C NMR spectrum of 4j



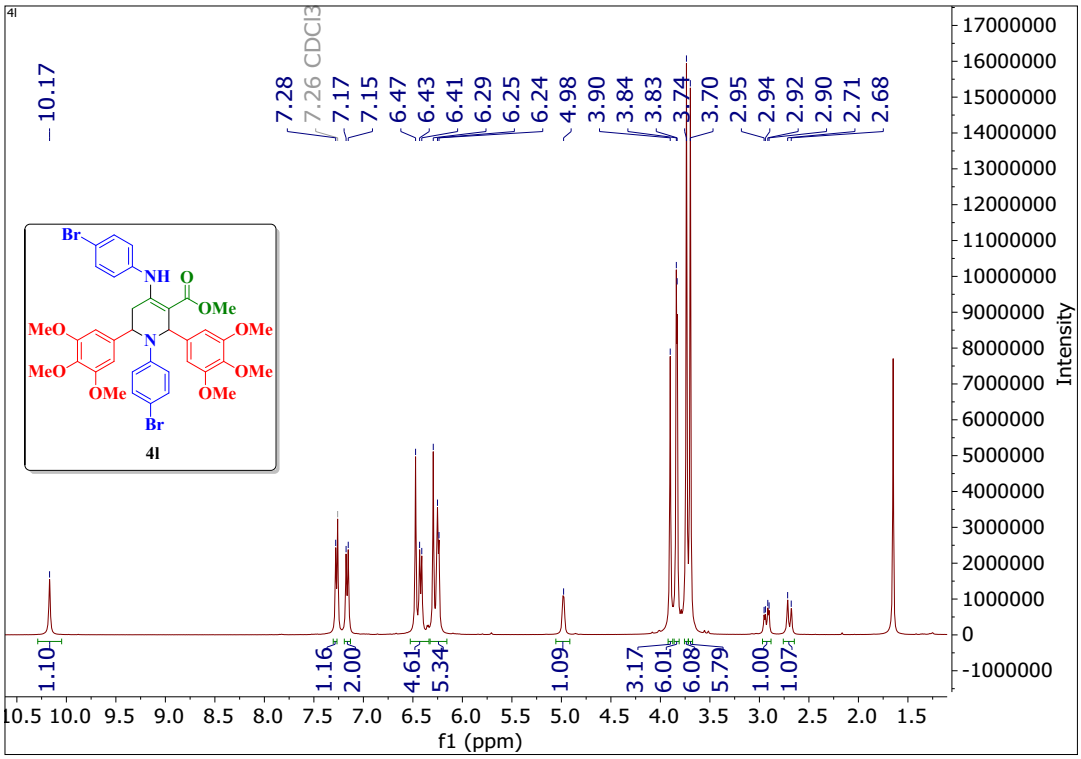
^{1}H NMR Spectrum of 4k



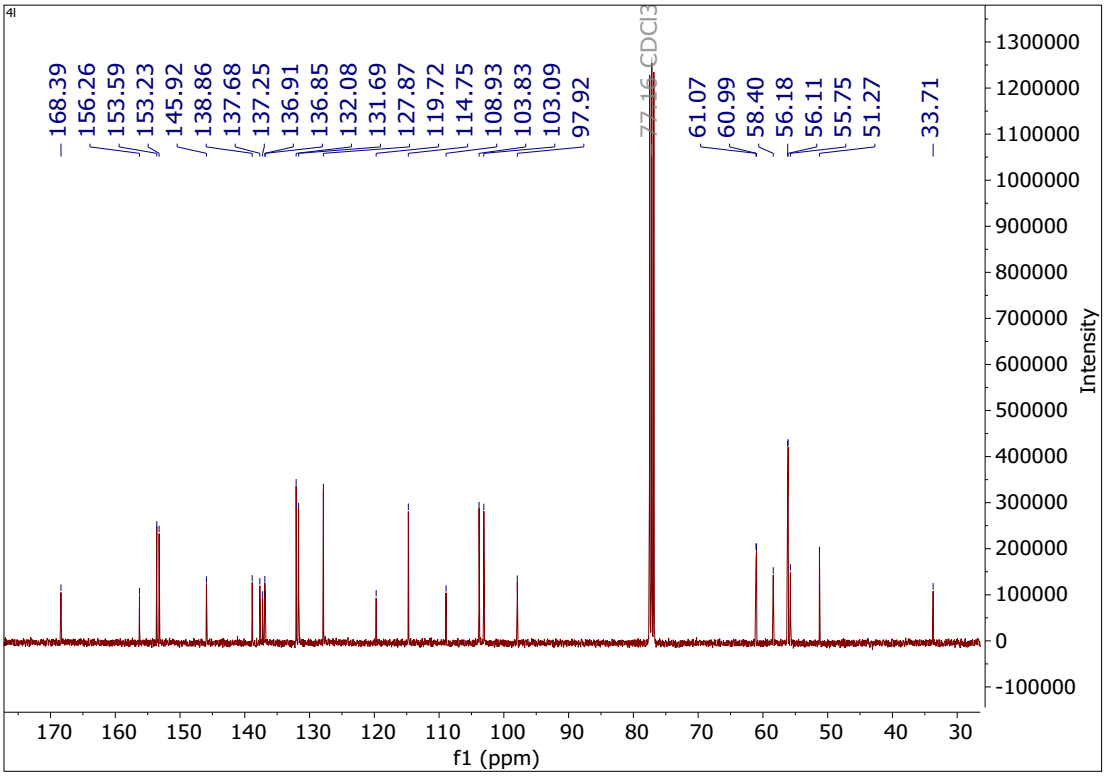
^{13}C NMR spectrum of 4k



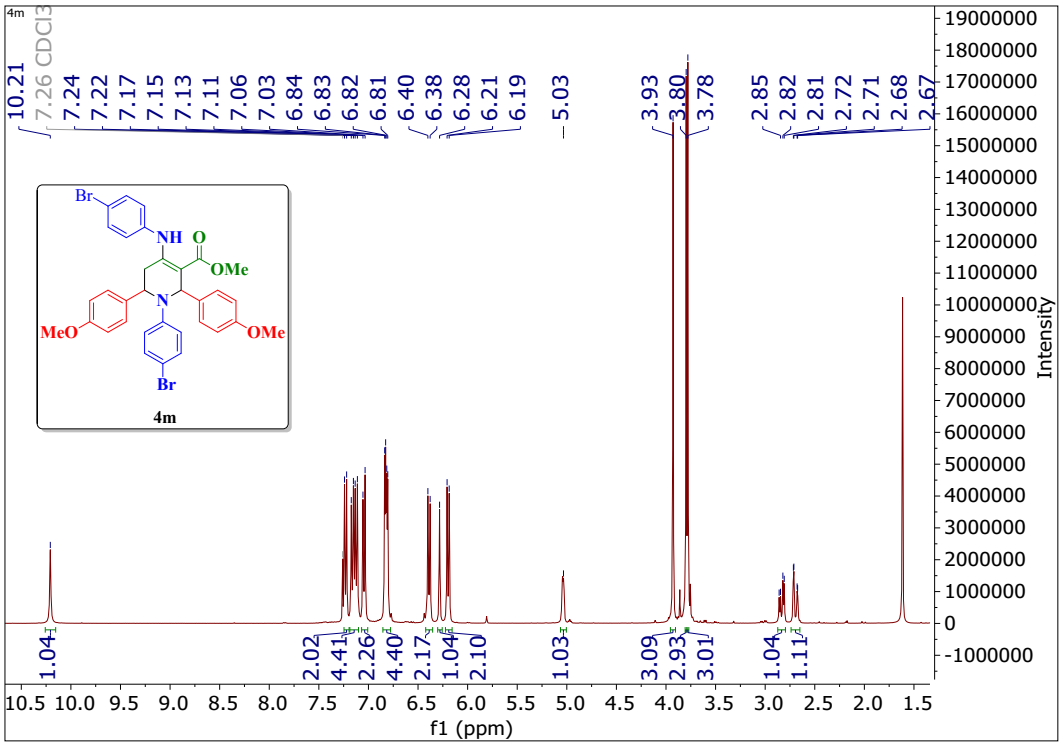
^{1}H NMR spectrum of 4l



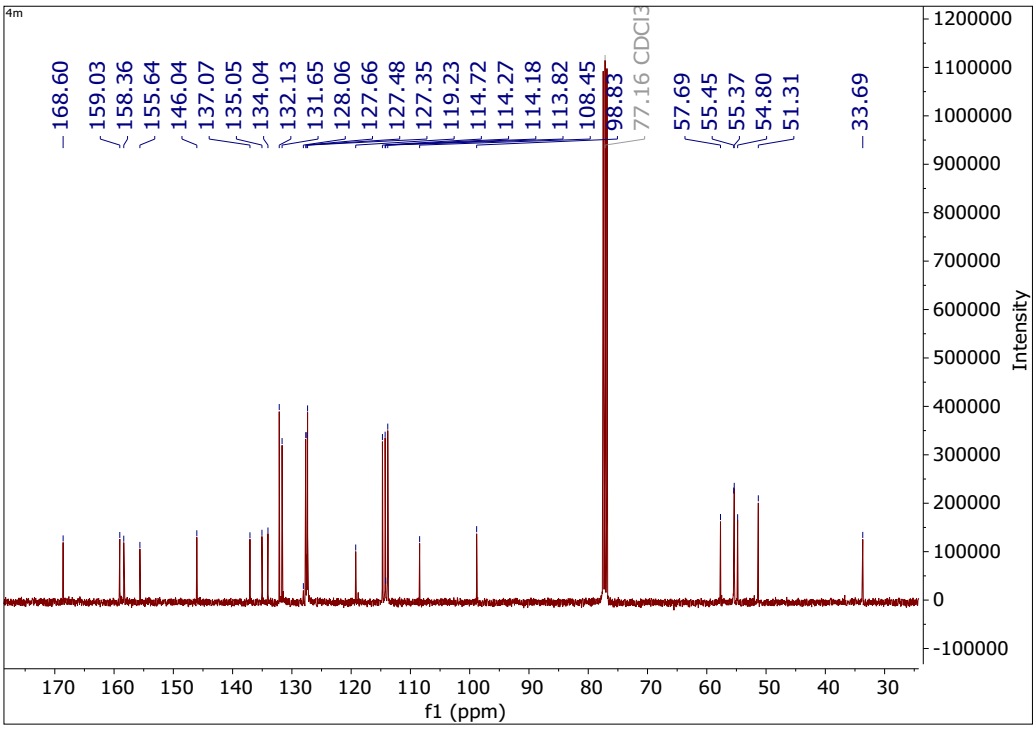
^{13}C NMR Spectrum of 4l



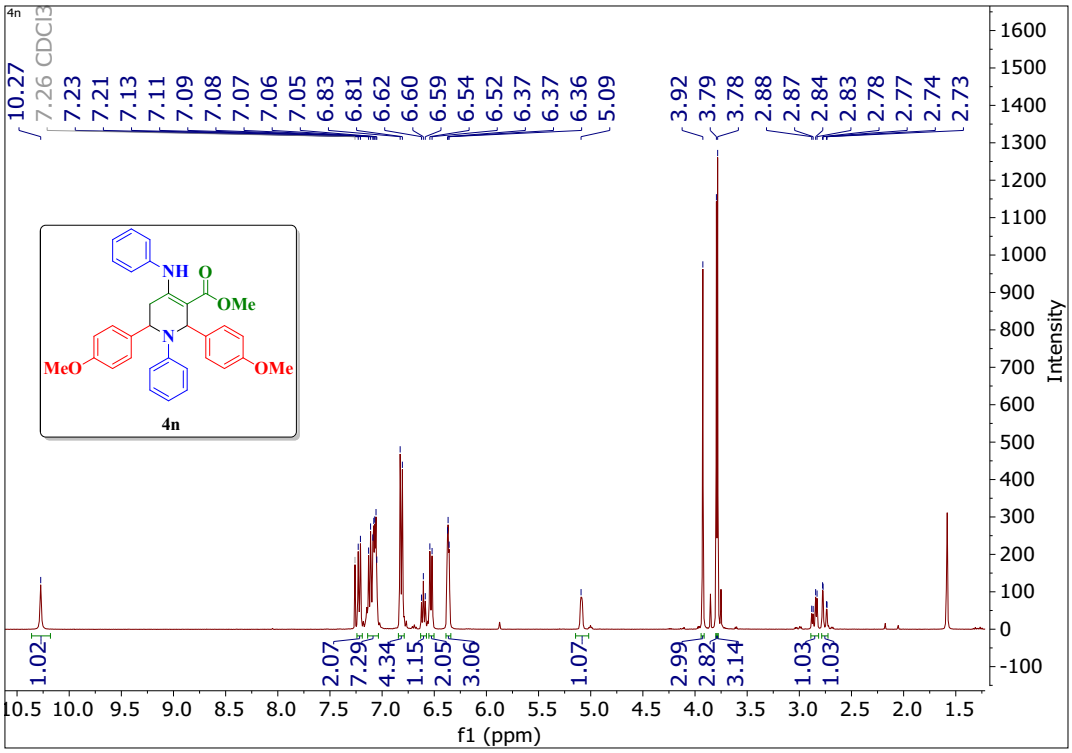
[1]H NMR spectrum of 4m



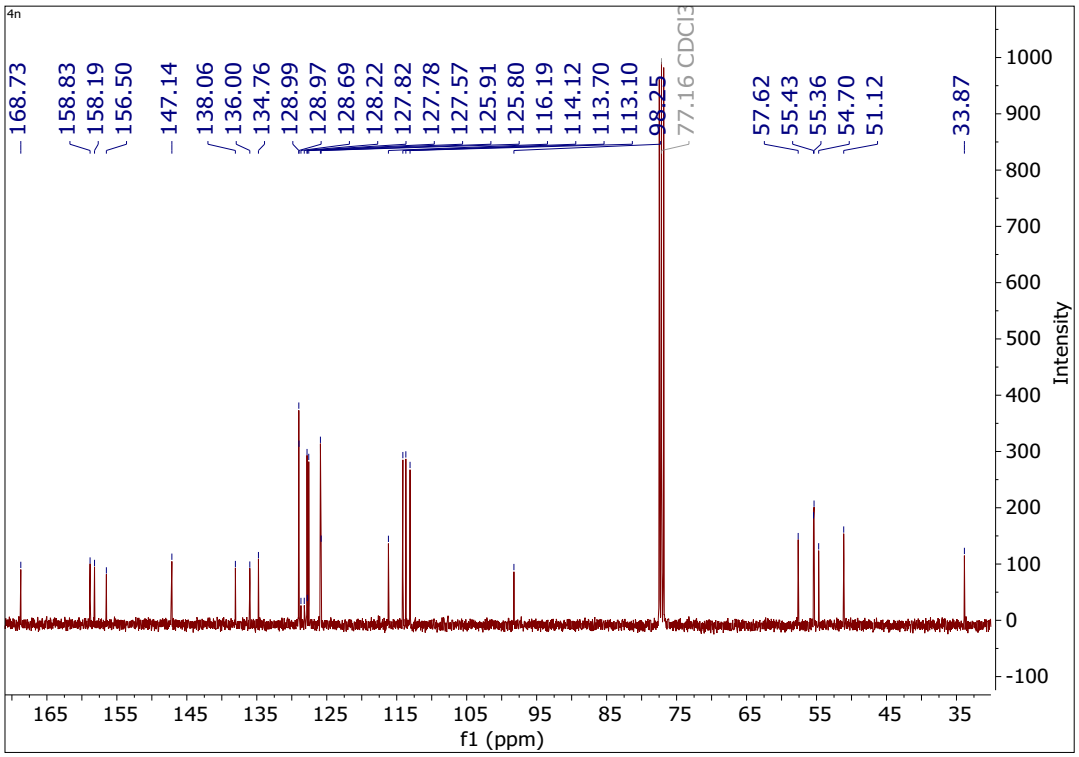
[13]C NMR spectrum of 4m



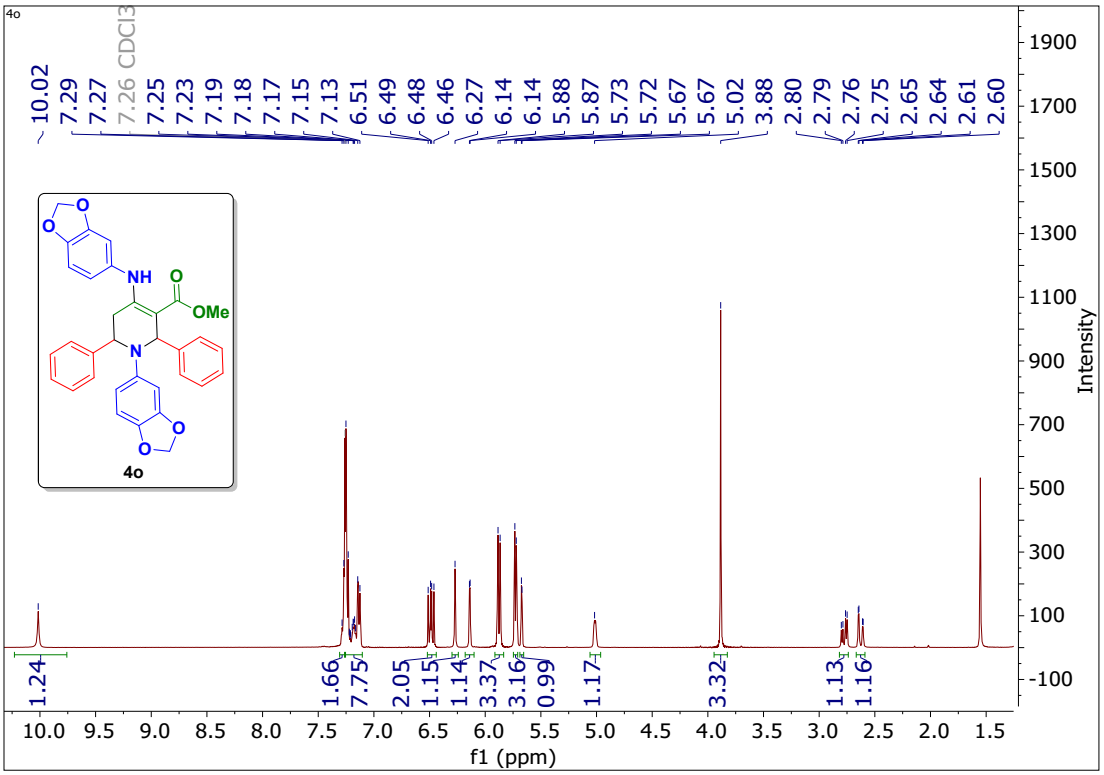
^{1}H NMR spectrum of 4n



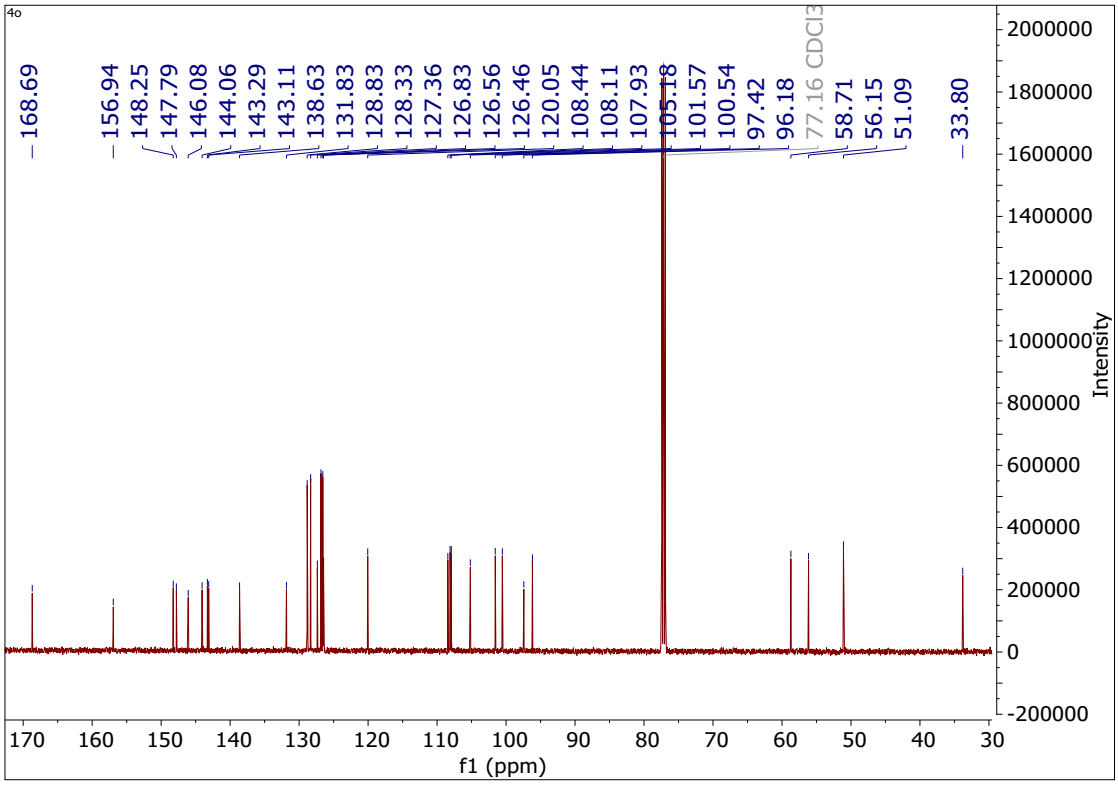
^{13}C NMR Spectrum of 4n



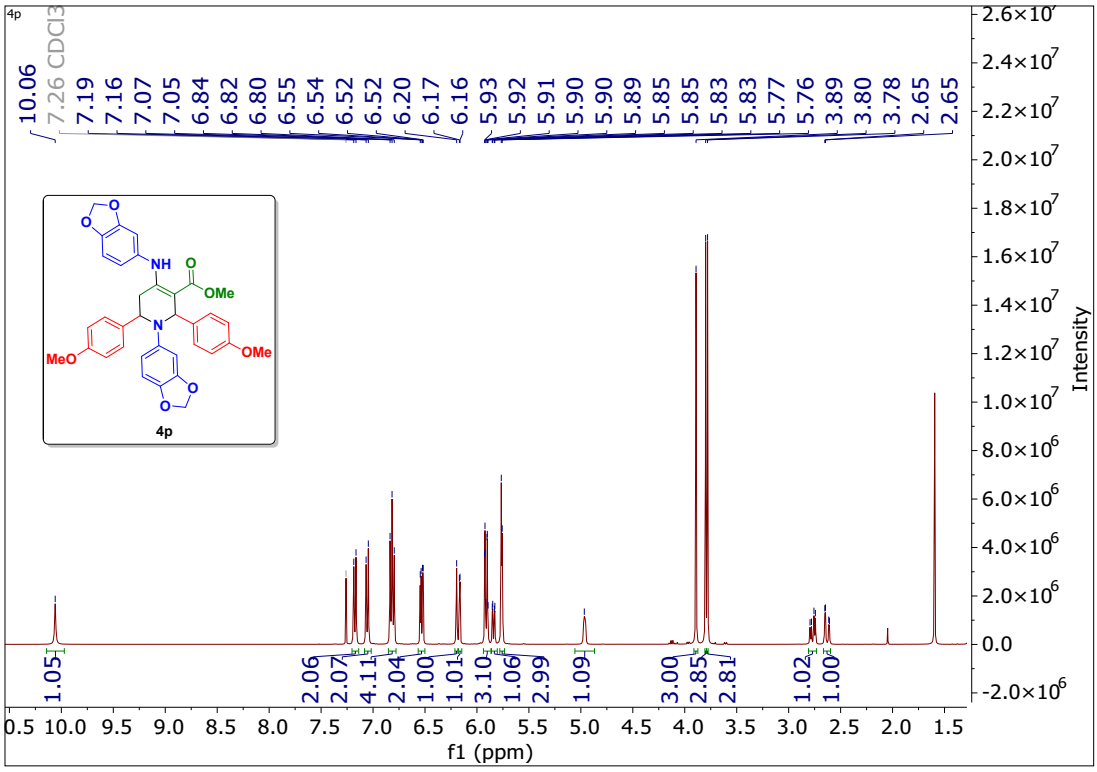
^{1}H NMR spectrum of 4o



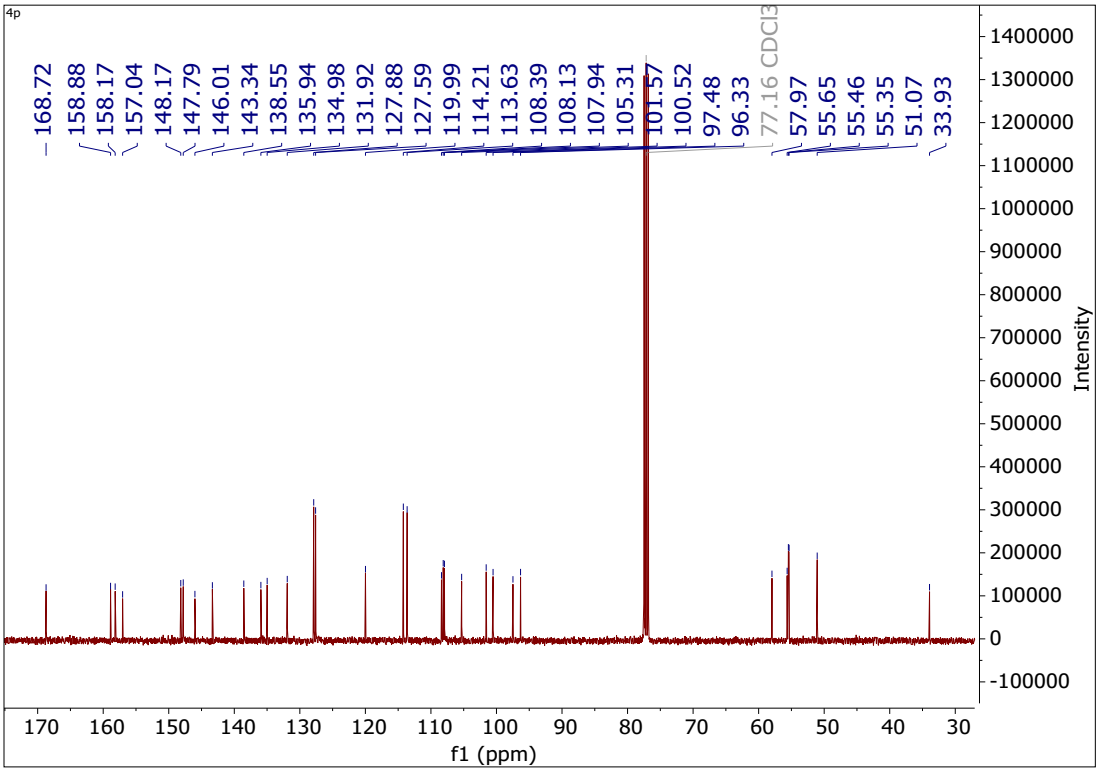
^{13}C NMR spectrum of 4o



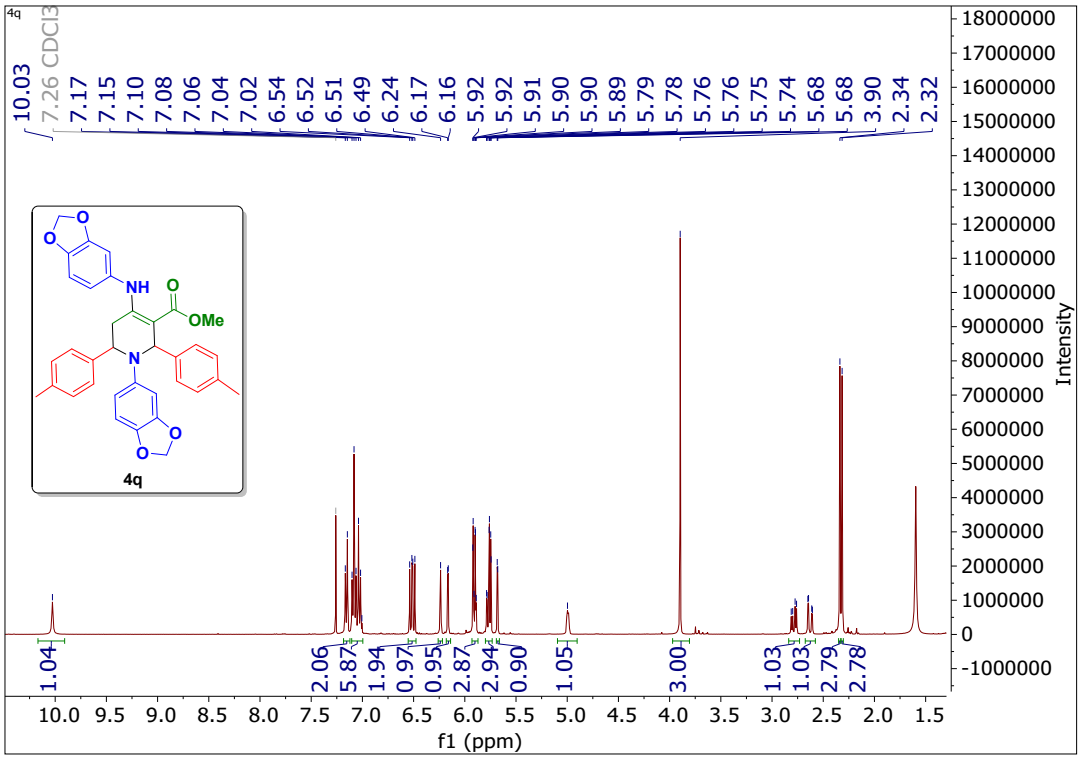
^{1}H NMR spectrum of 4p



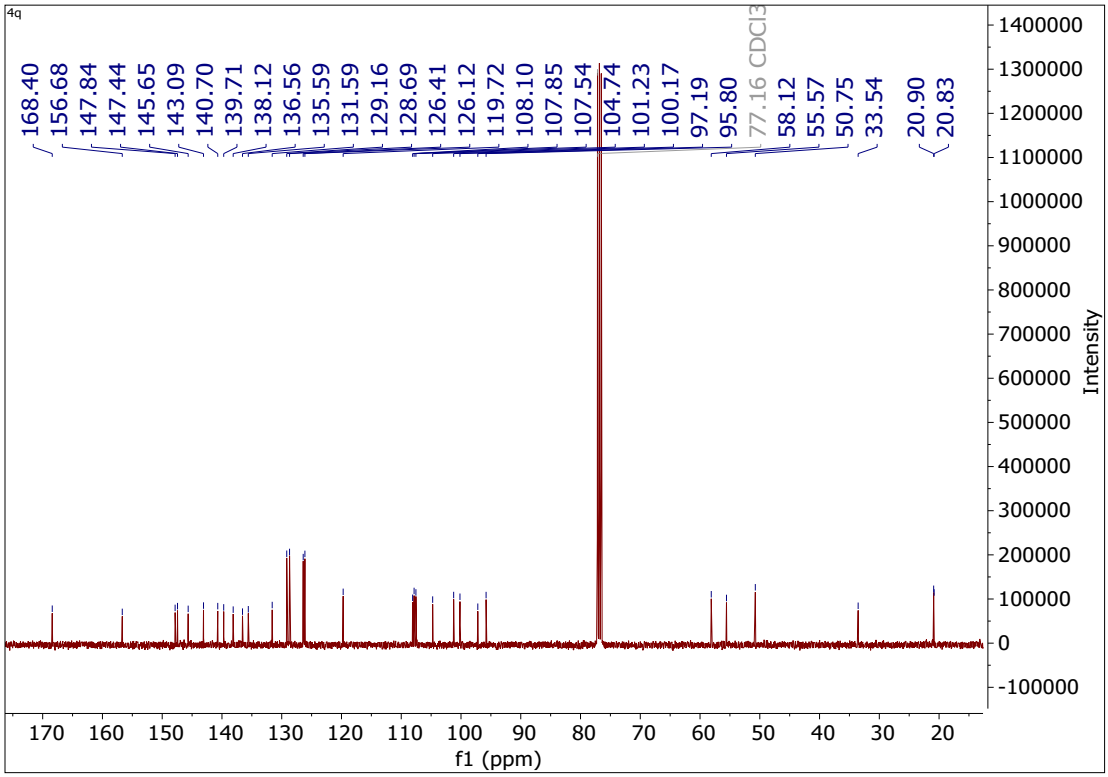
^{13}C NMR spectrum of 4p



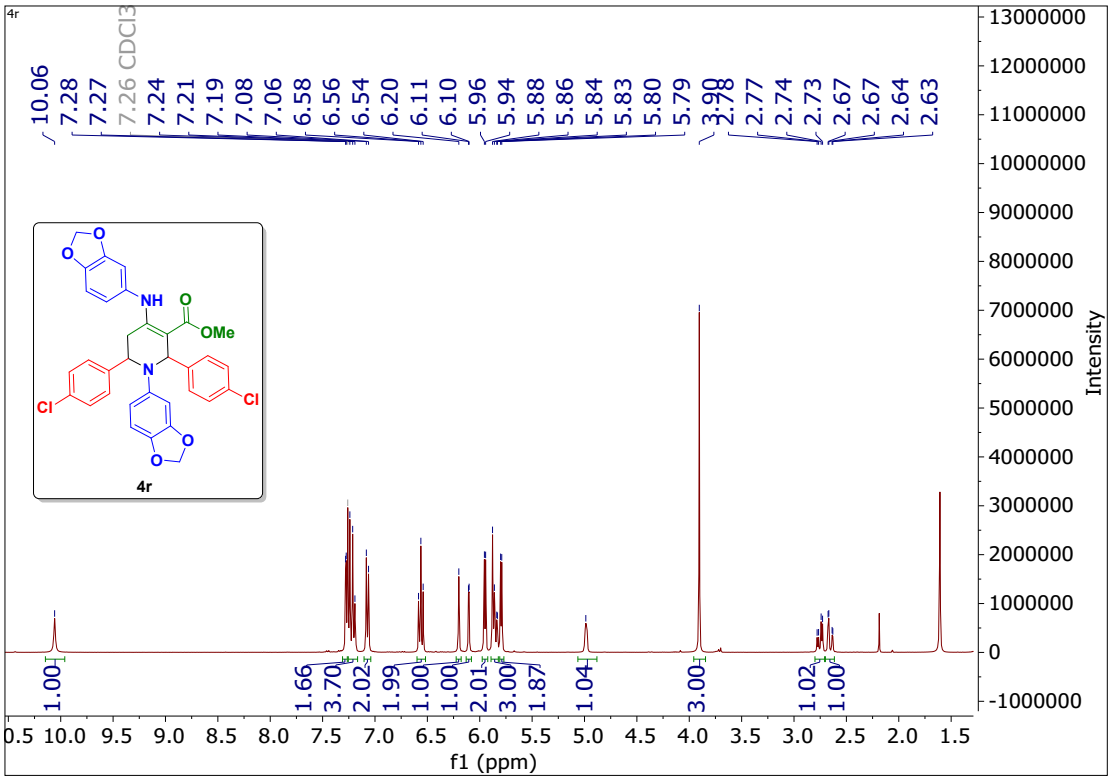
^{1}H NMR spectrum of 4q



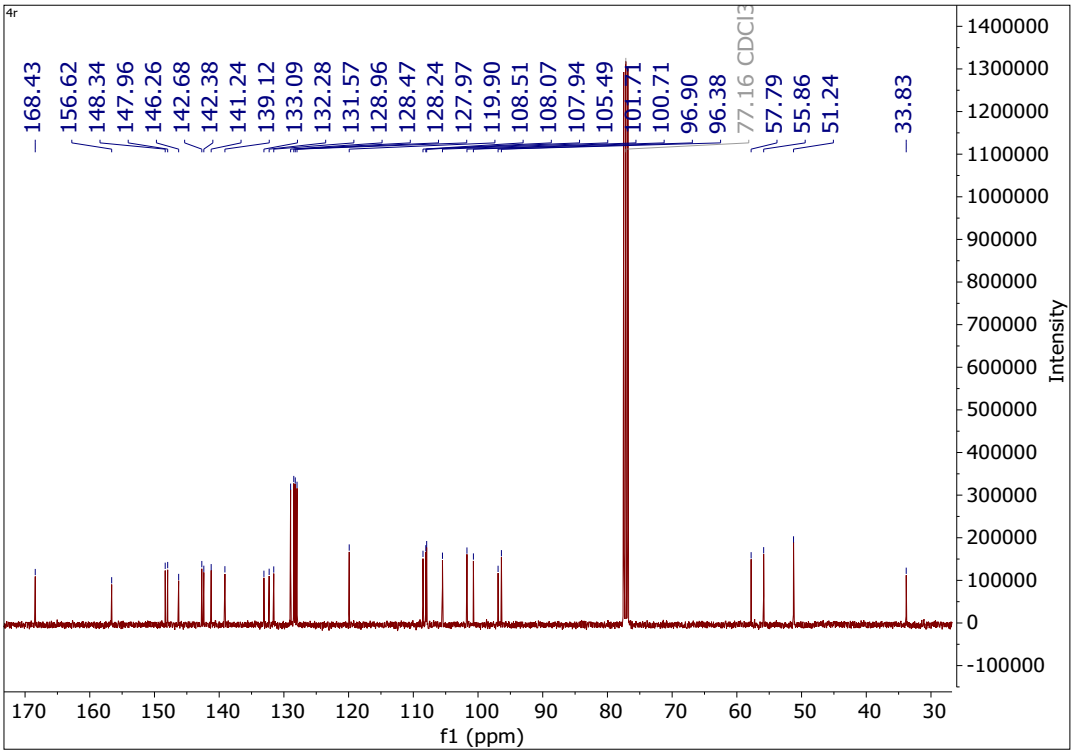
^{13}C NMR spectrum of 4q



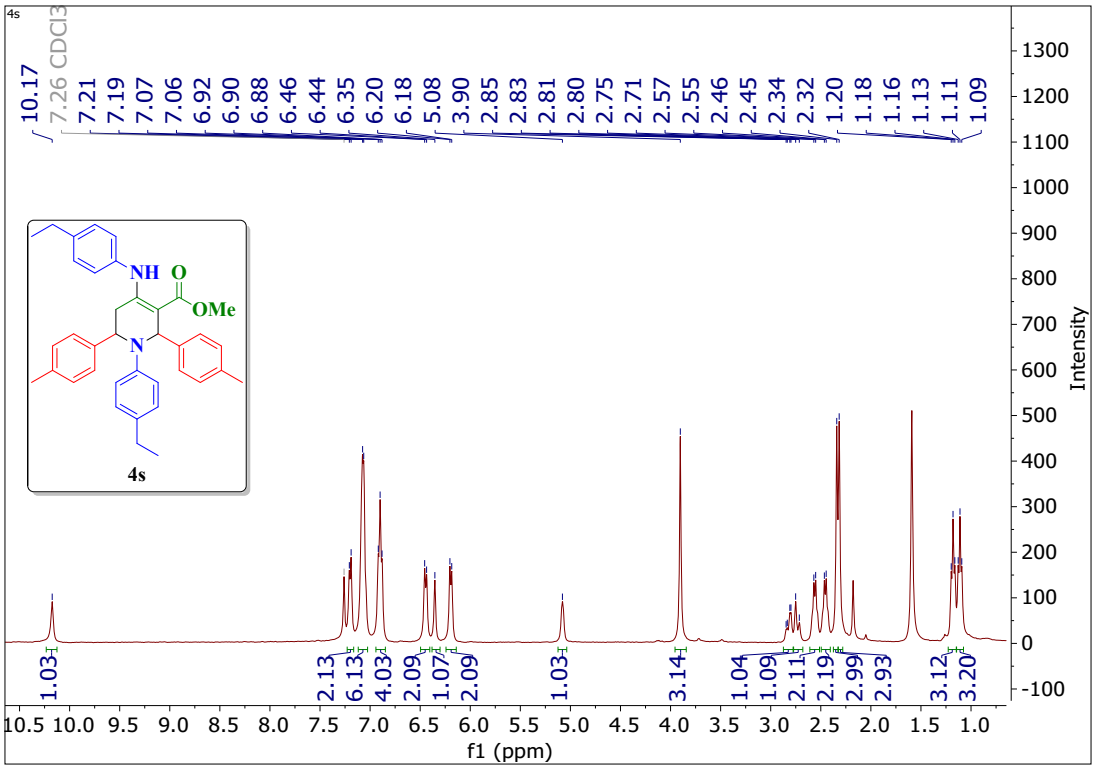
^{1}H NMR spectrum of 4r



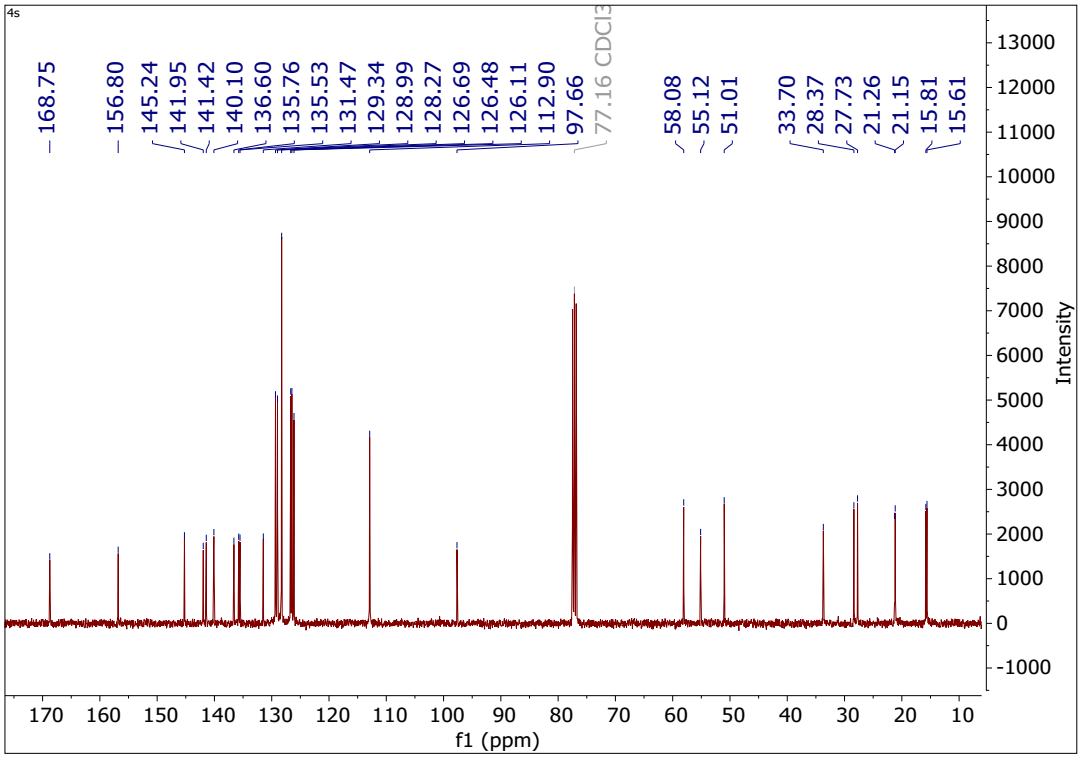
^{13}C NMR spectrum of 4r



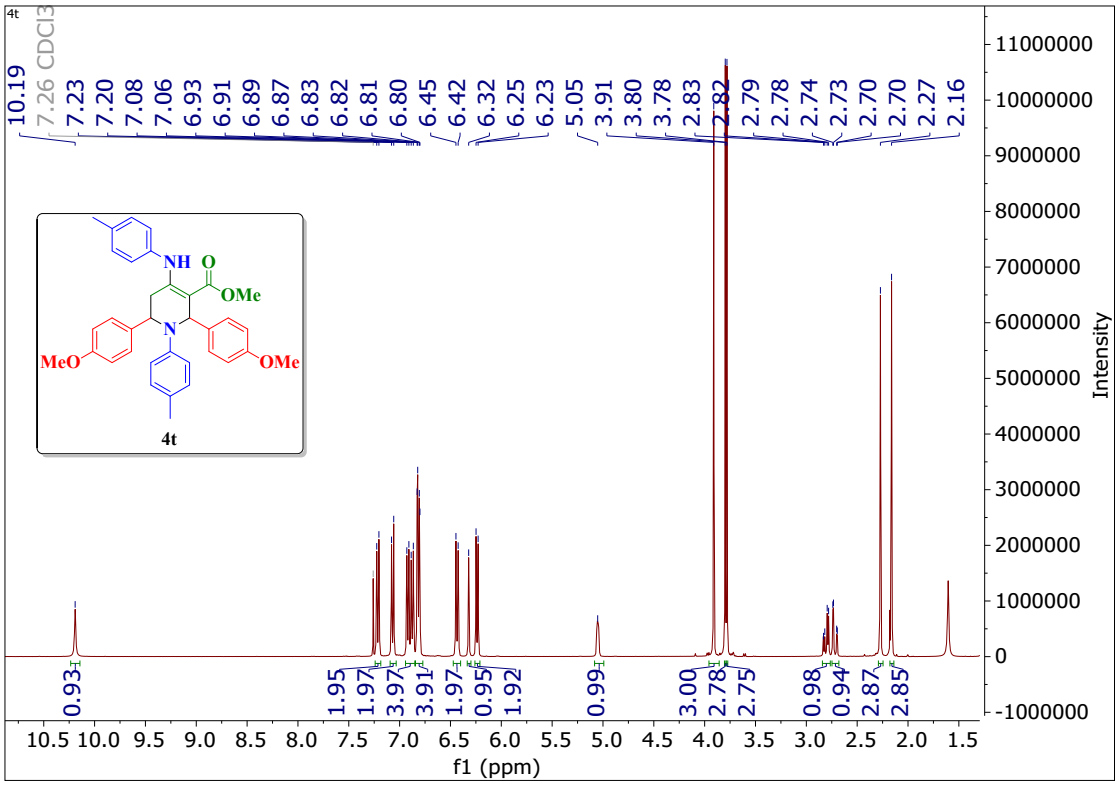
^{1}H NMR spectrum of 4s



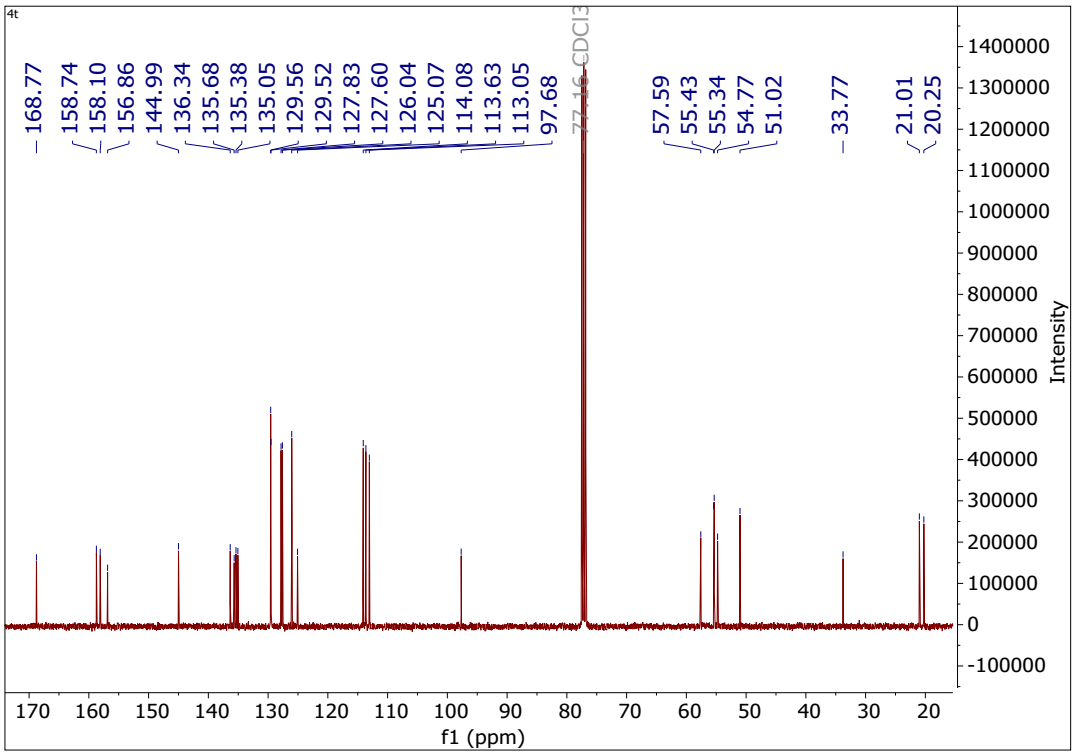
^{13}C NMR spectrum of 4s



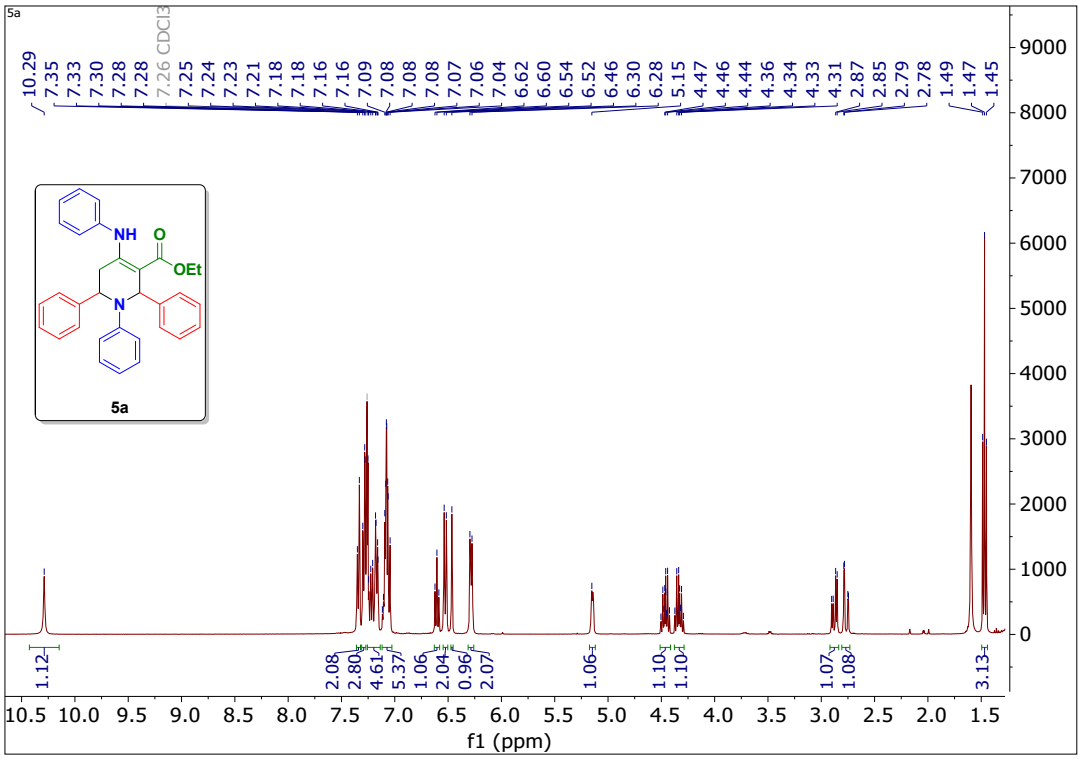
^{1}H NMR spectrum of 4t



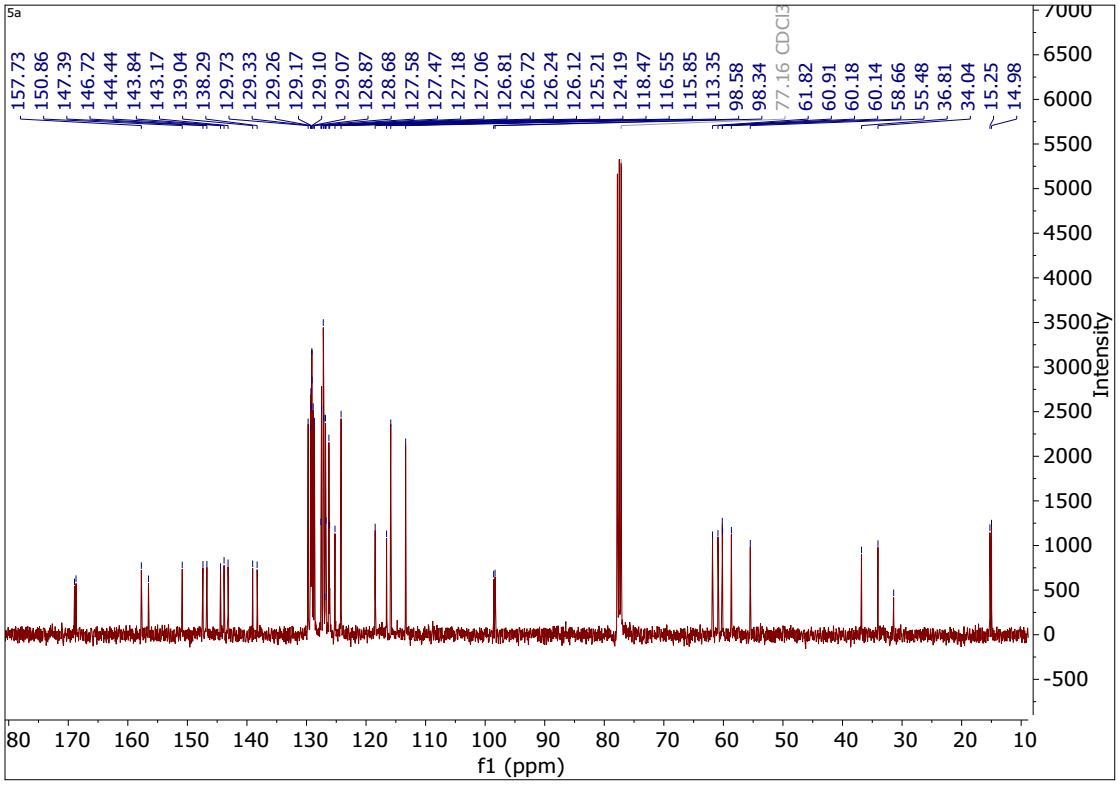
^{13}C NMR spectrum of 4t



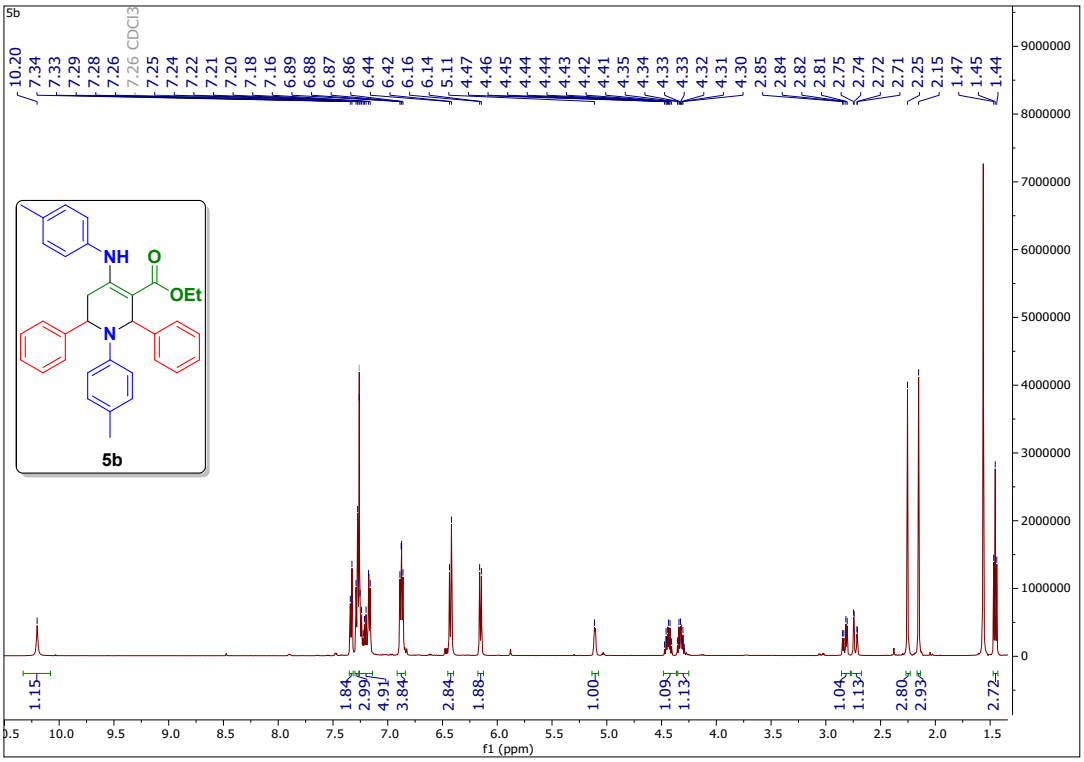
^{1}H NMR spectrum of 5a



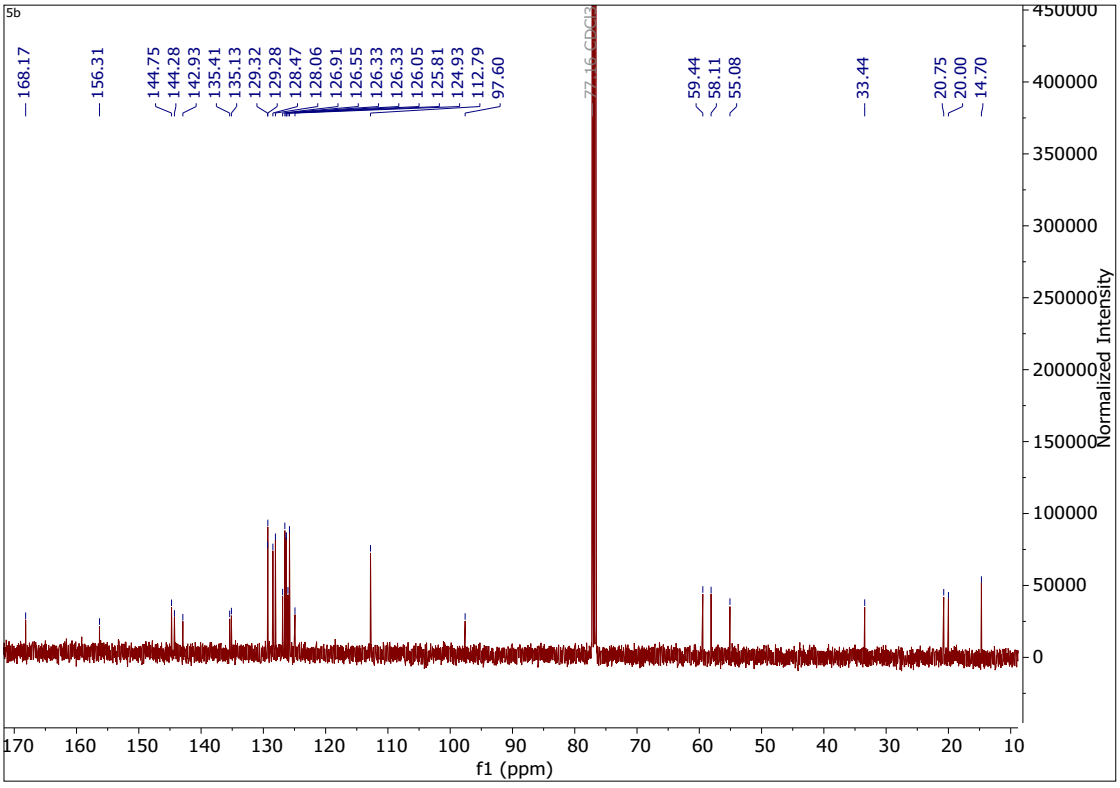
^{13}C NMR spectrum of 5a



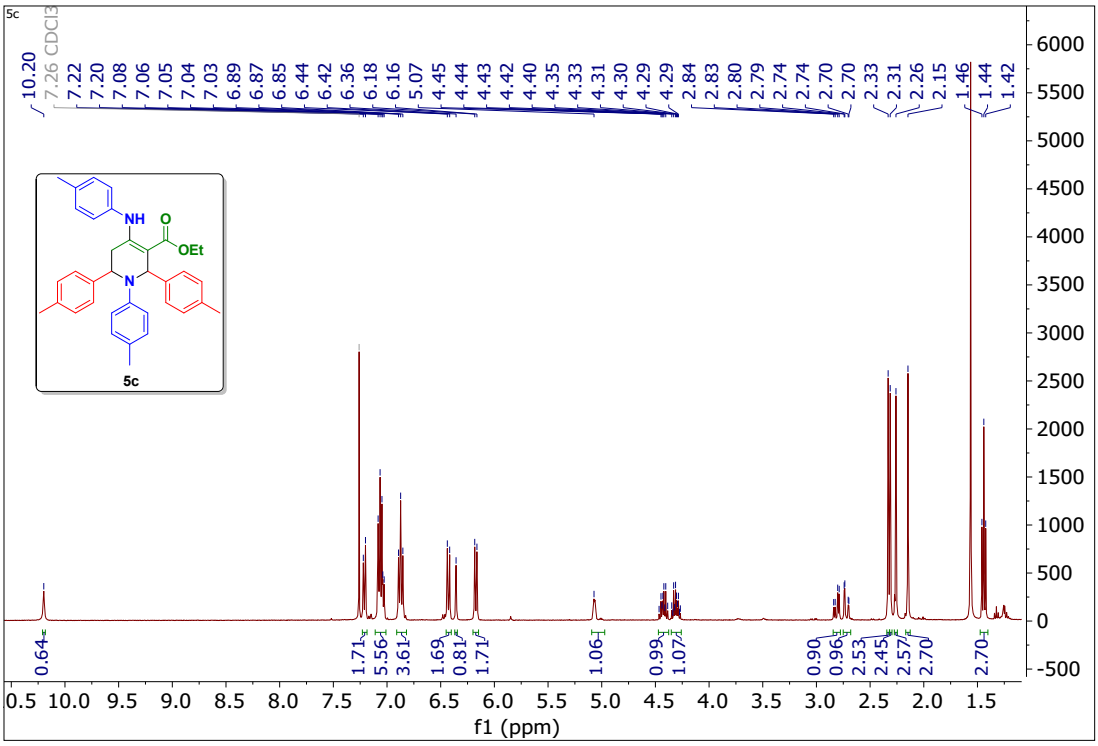
^{1}H NMR spectrum of 5b



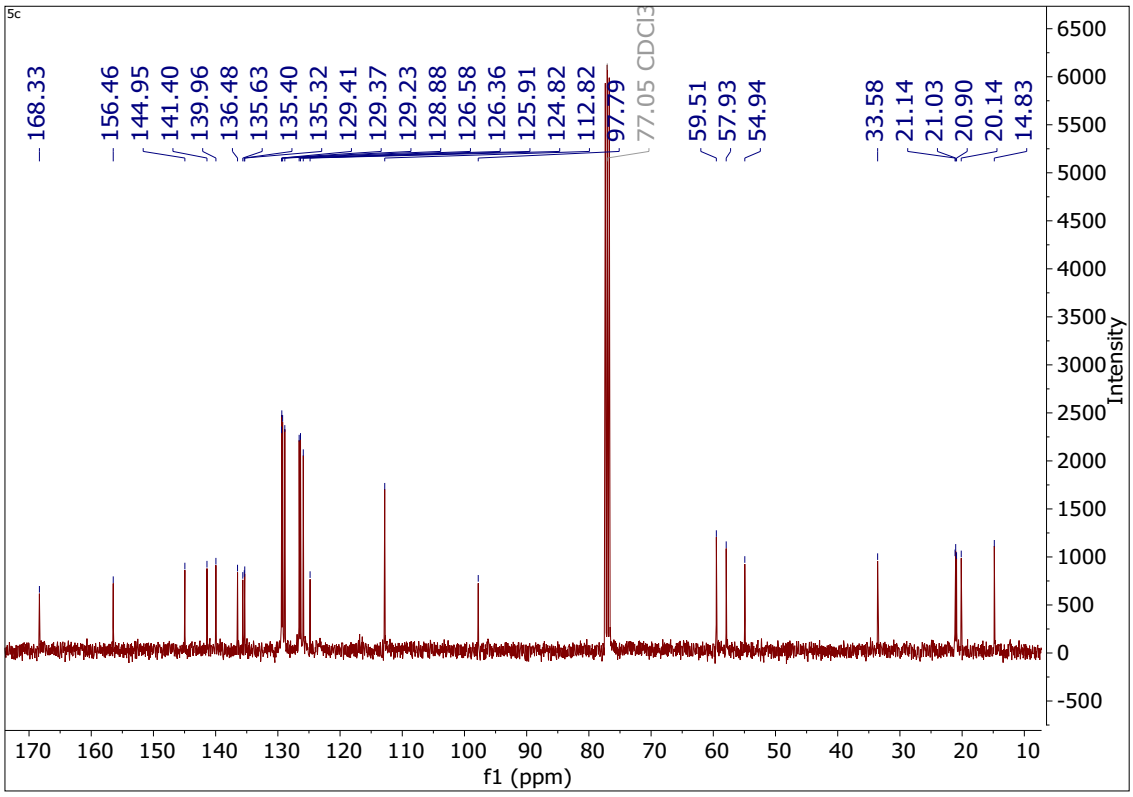
^{13}C NMR spectrum of 5b



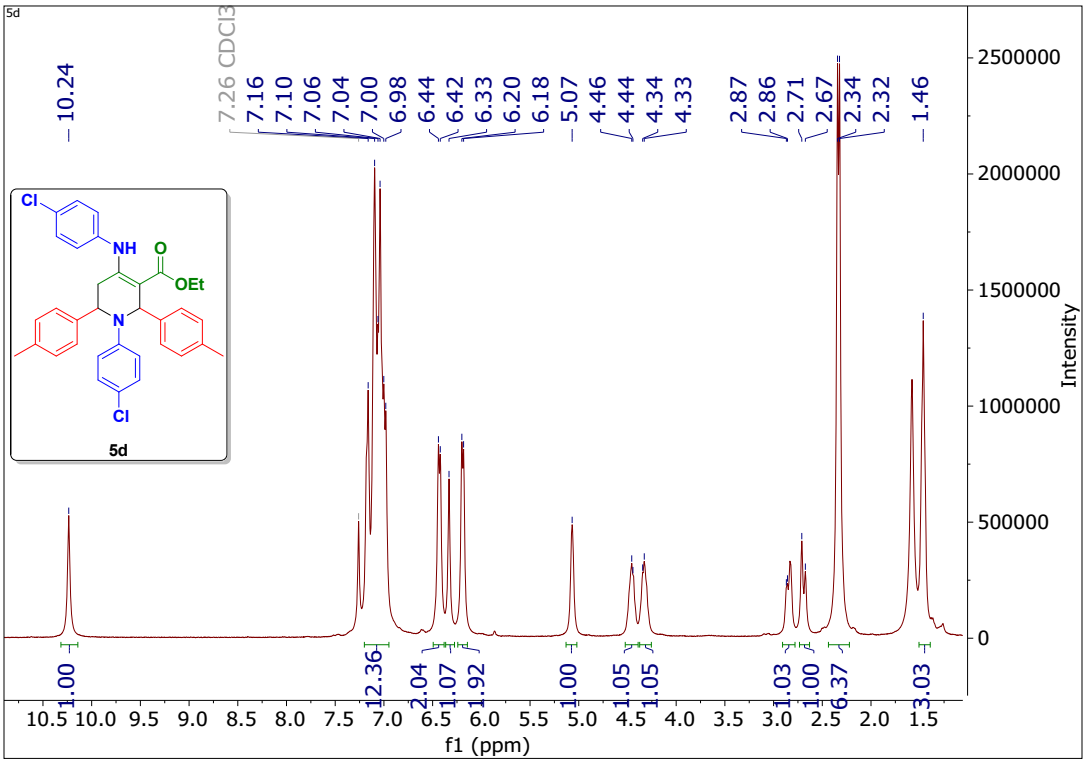
^{1}H NMR spectrum of 5c



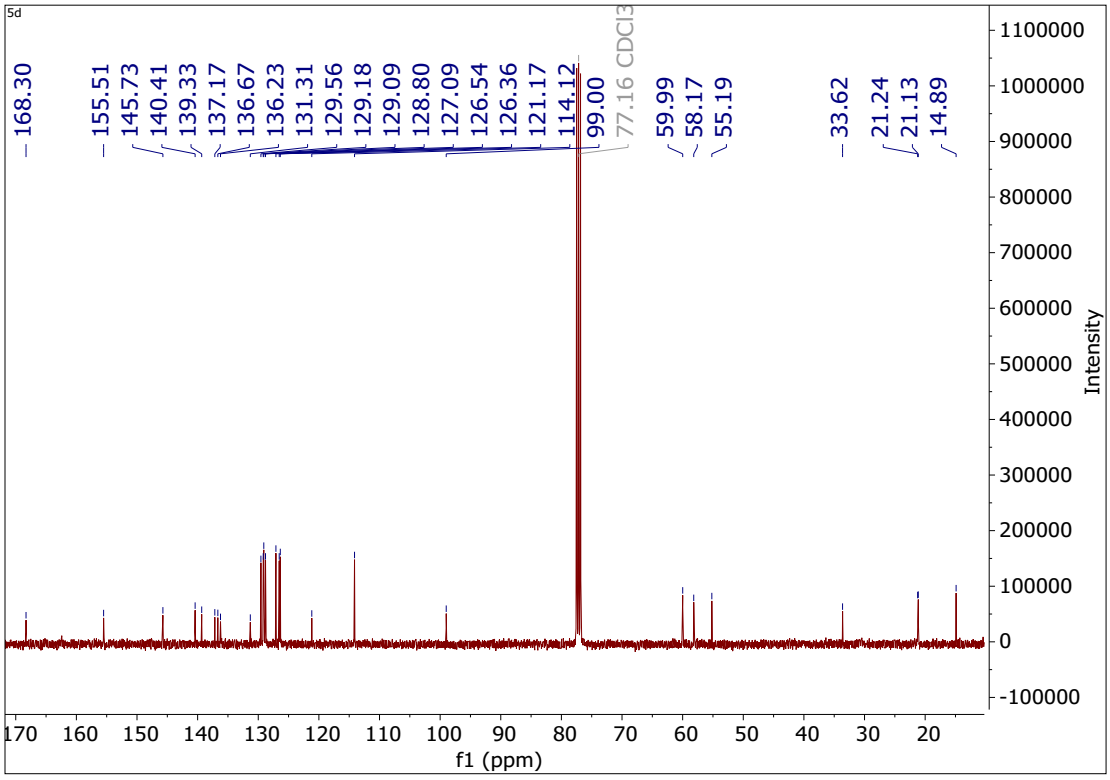
^{13}C NMR spectrum of 5c



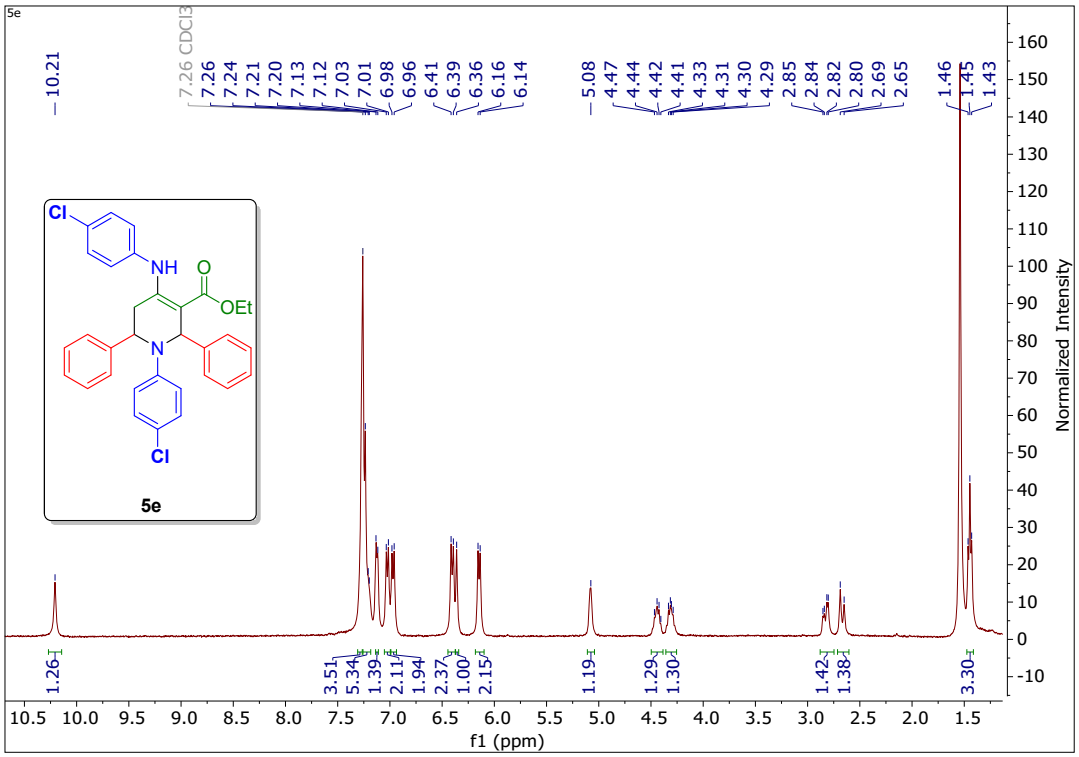
[1]H NMR spectrum of 5d



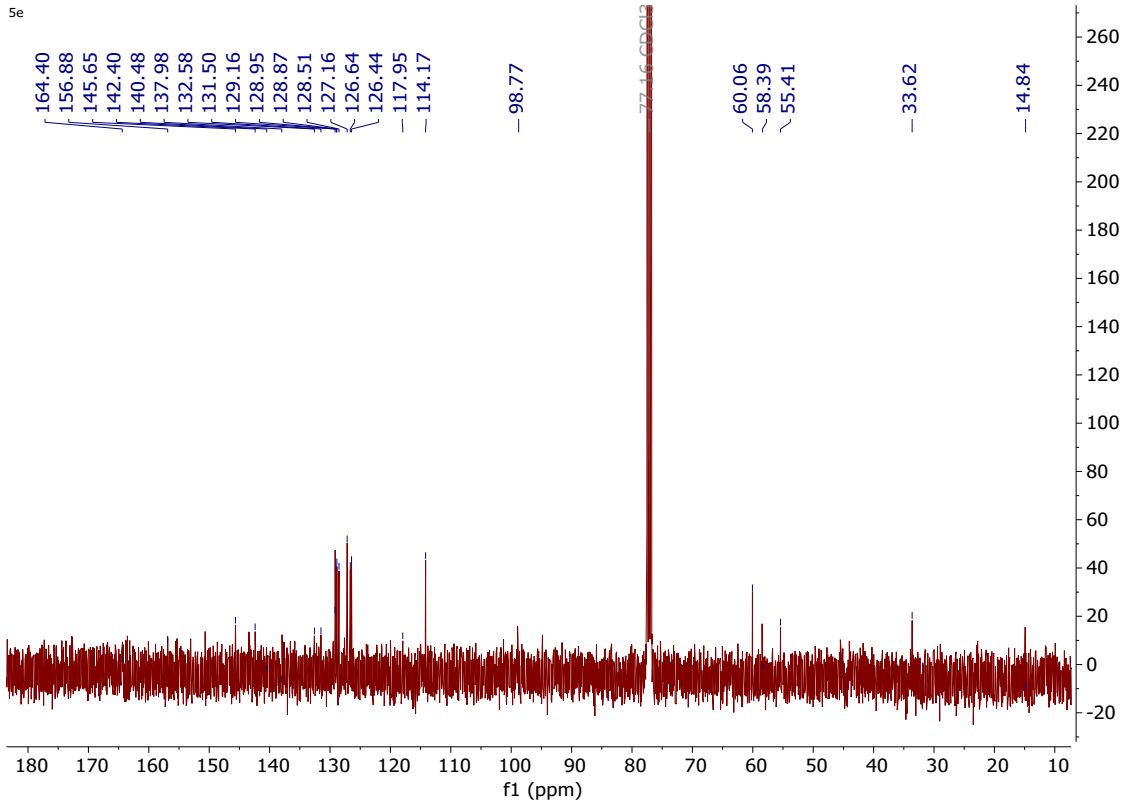
[13]C NMR spectrum of 5d



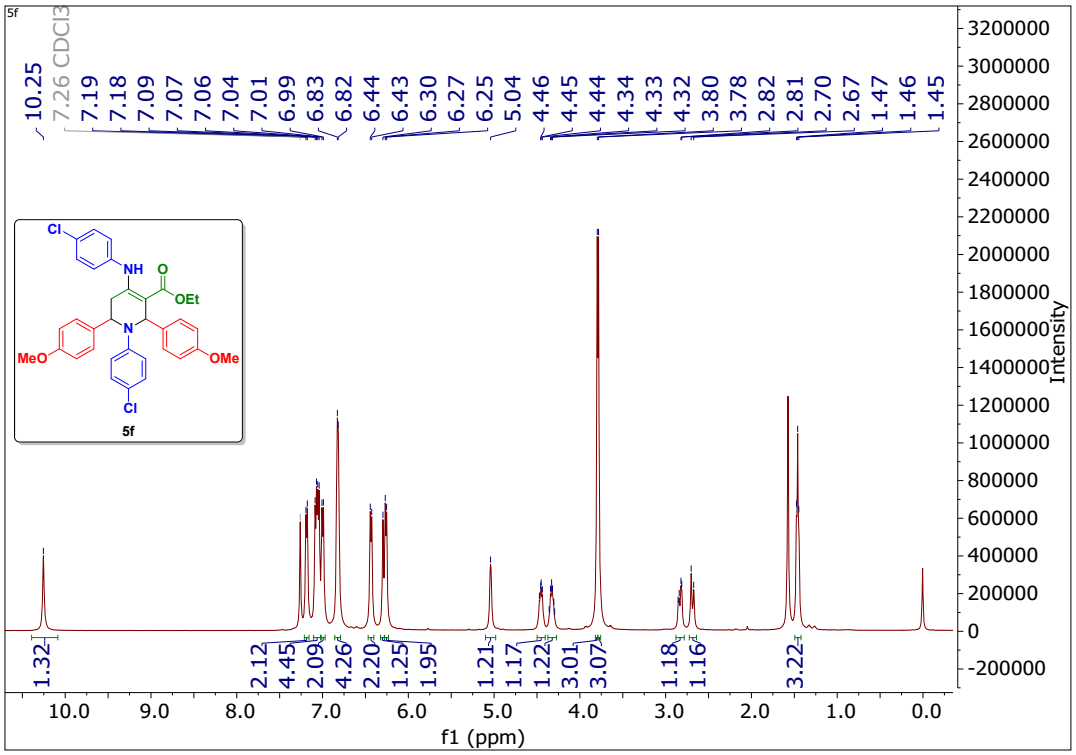
^{1}H NMR spectrum of 5e



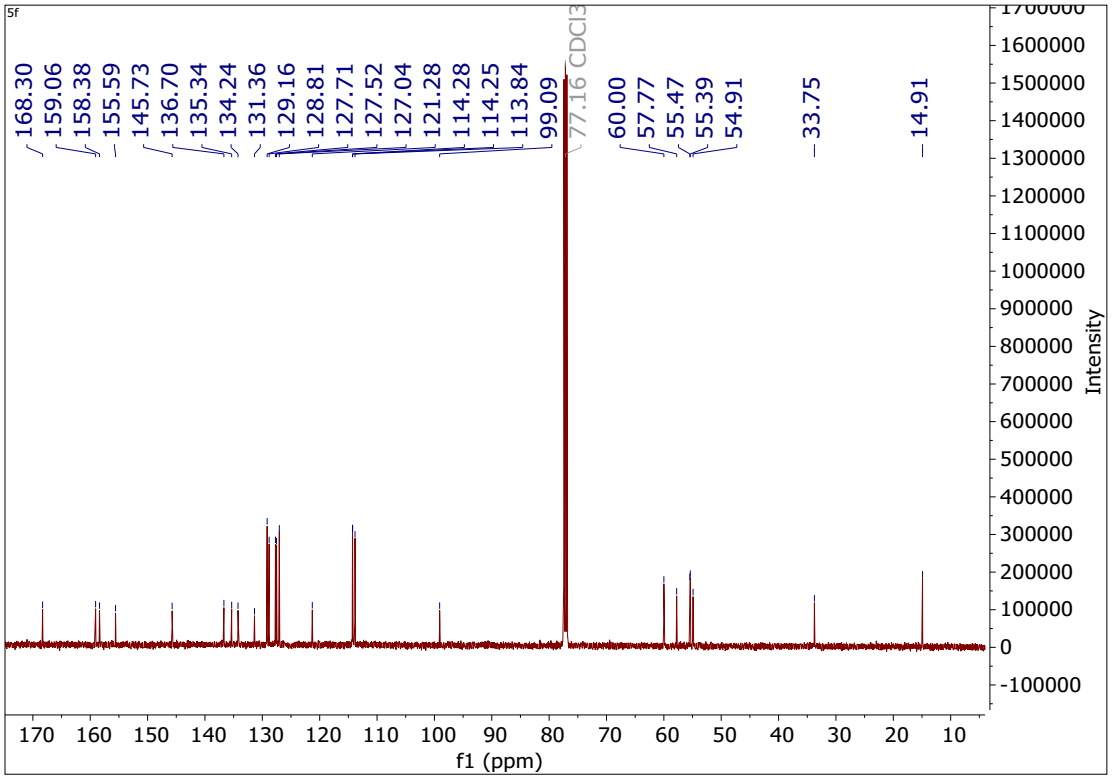
^{13}C NMR spectrum of 5e



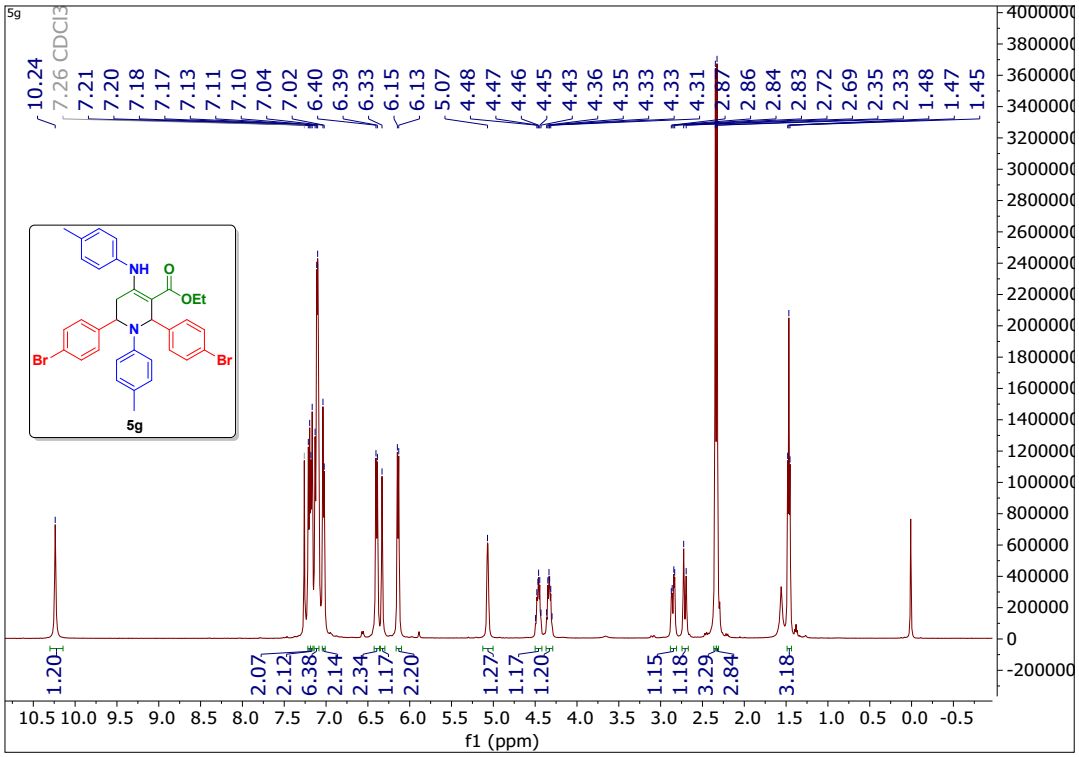
[1]H NMR spectrum of 5f



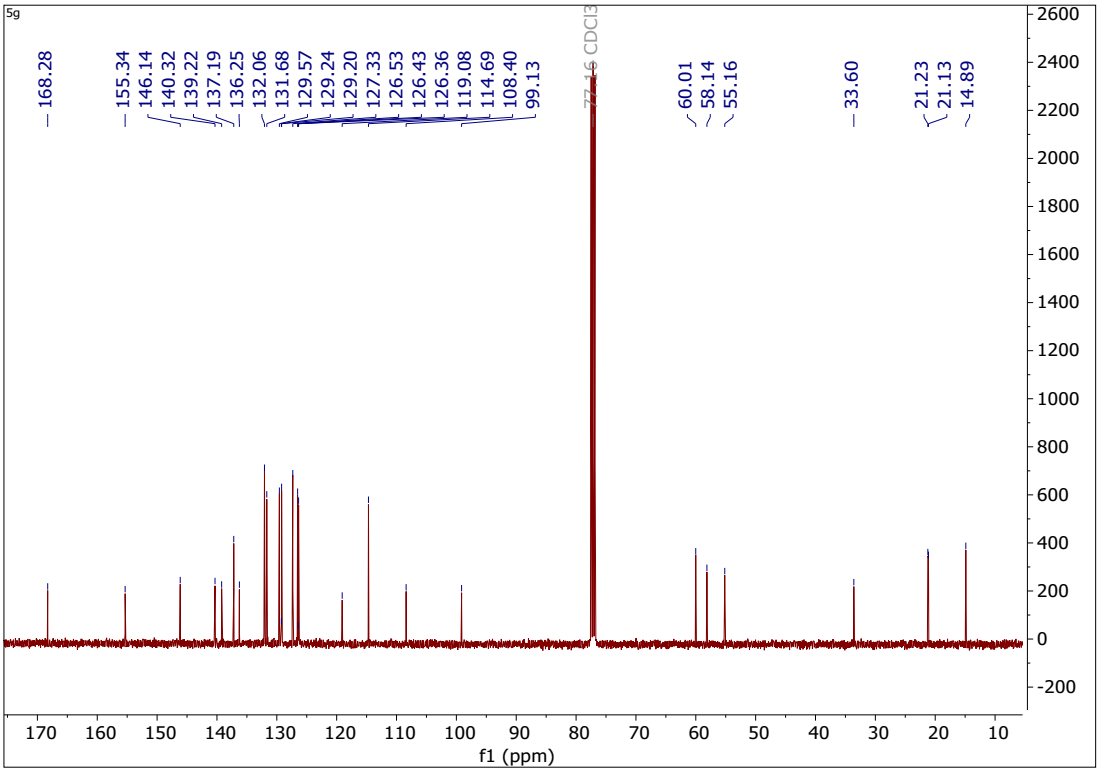
[13]C NMR spectrum of 5f



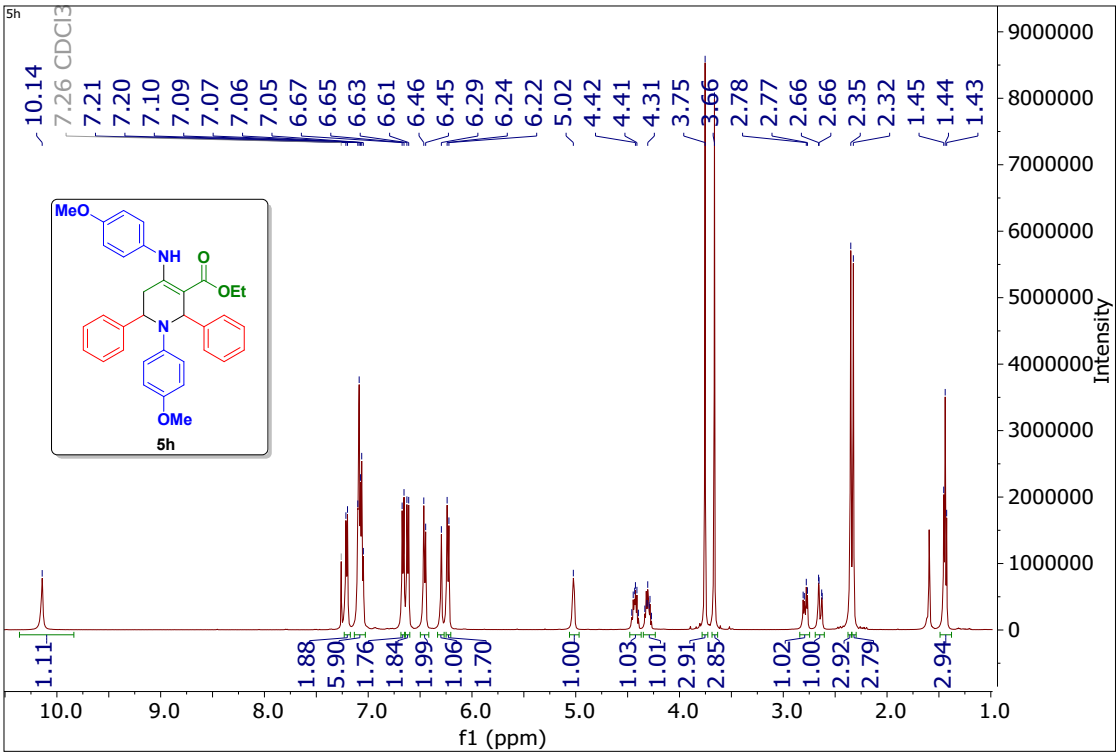
^{1}H NMR spectrum of 5g



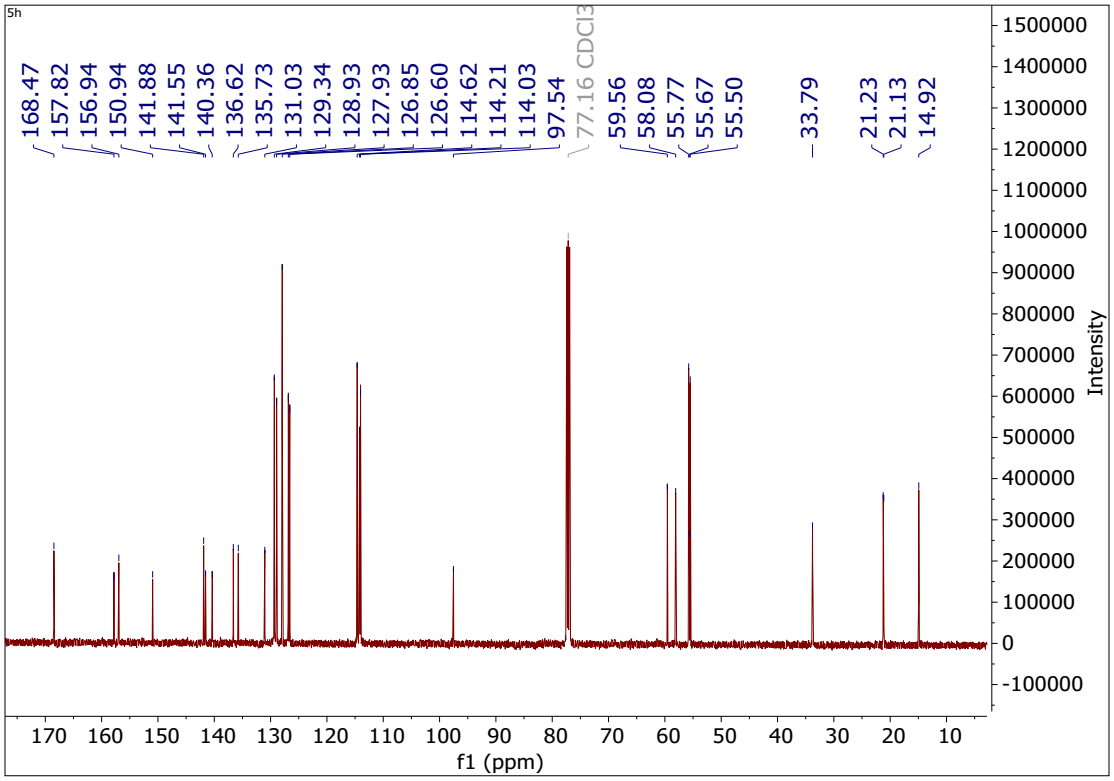
^{13}C NMR spectrum of 5g



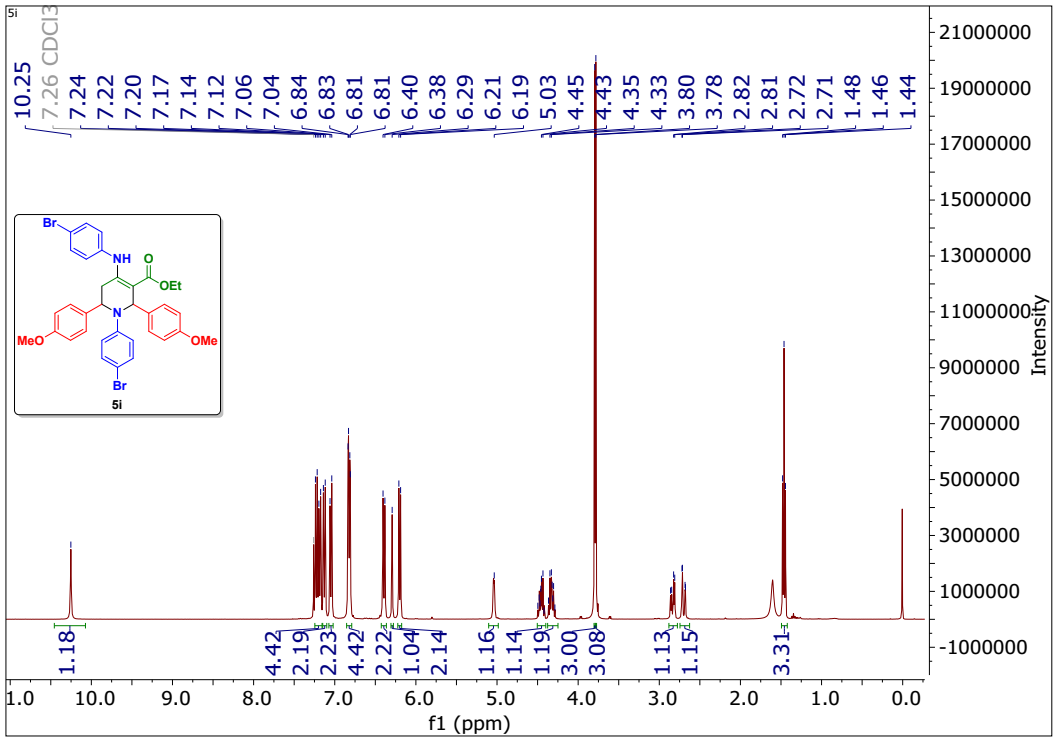
^{1}H NMR spectrum of 5h



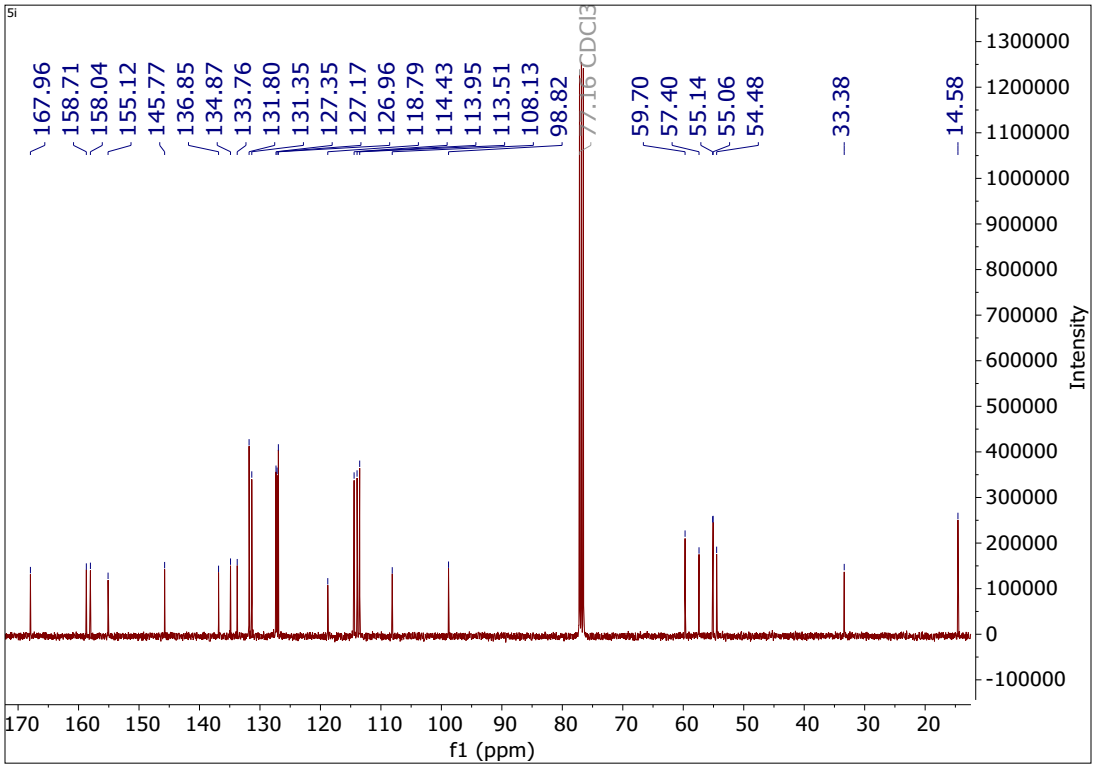
^{13}C NMR spectrum of 5h



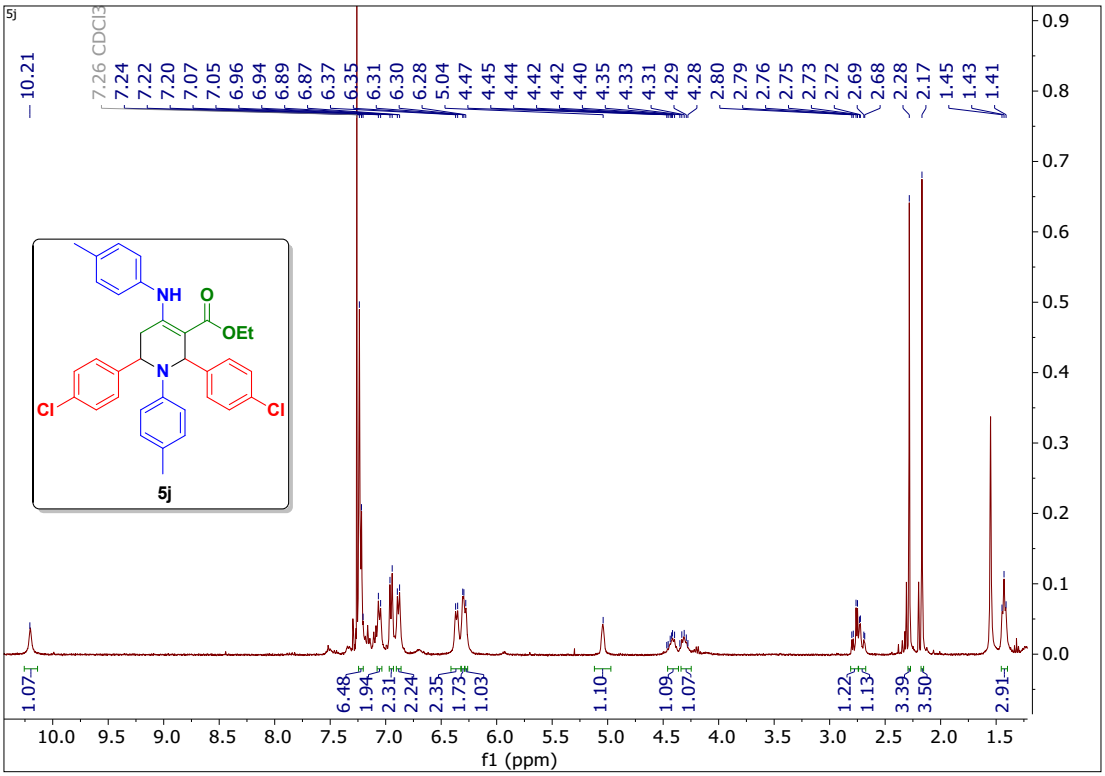
^{1}H NMR spectrum of 5i



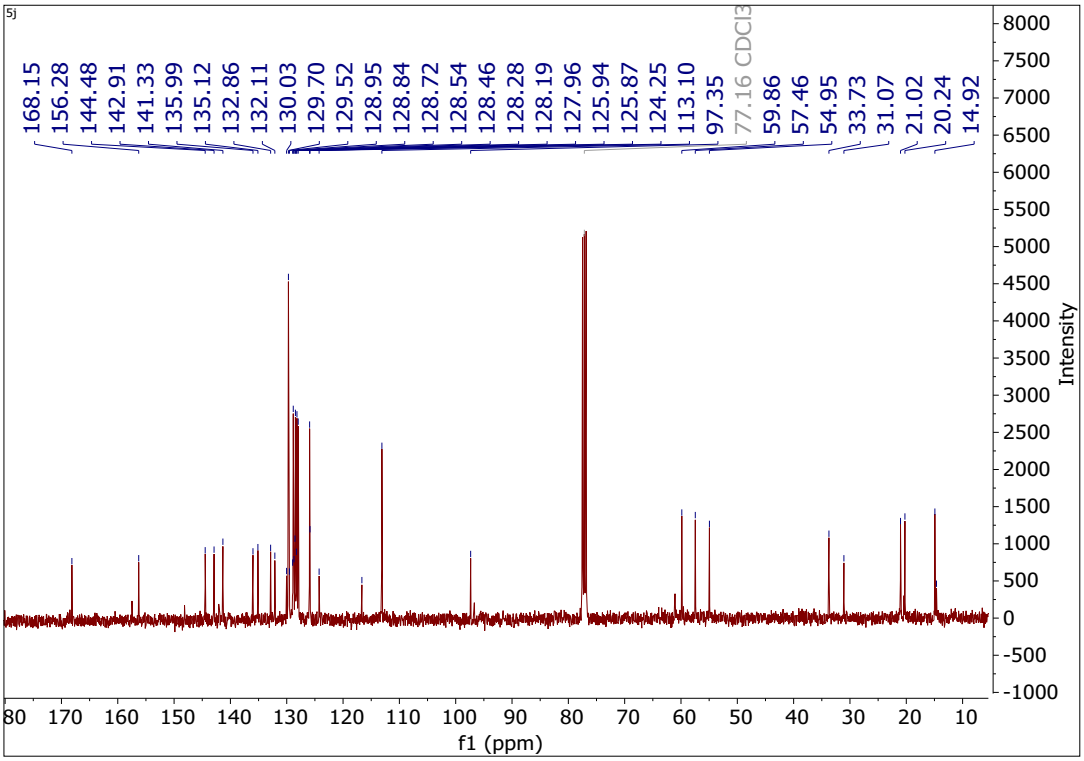
^{13}C NMR spectrum of 5i



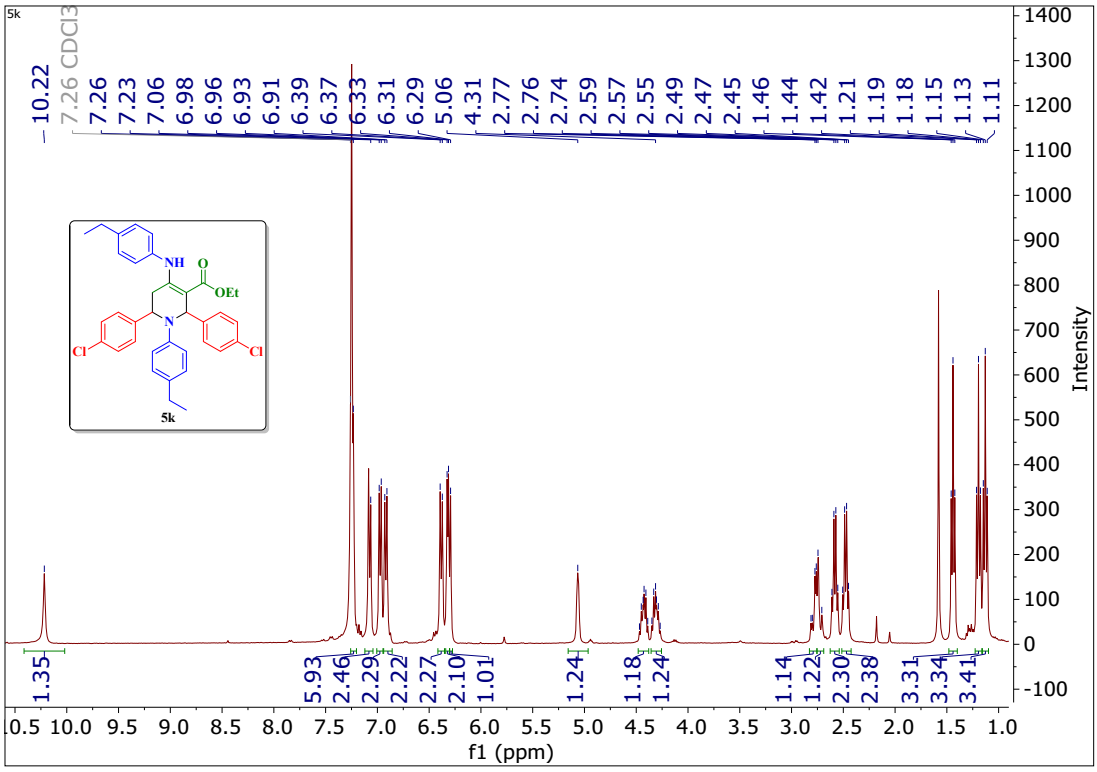
^{1}H NMR spectrum of 5j



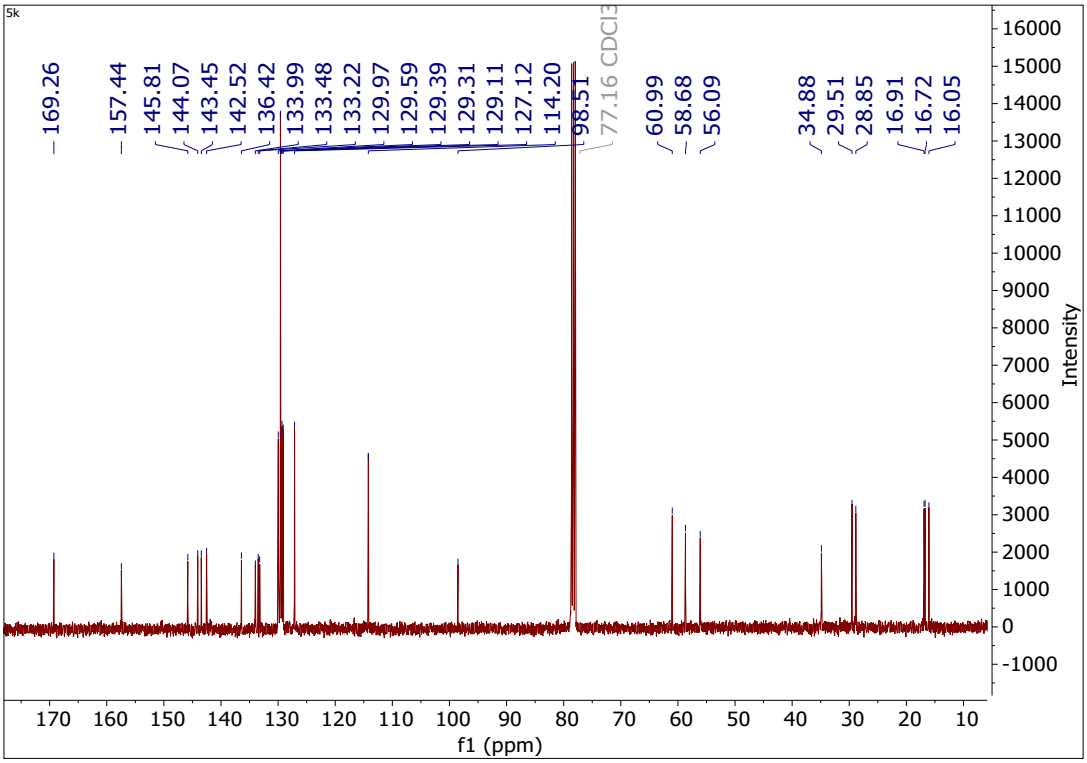
^{13}C NMR spectrum of 5j



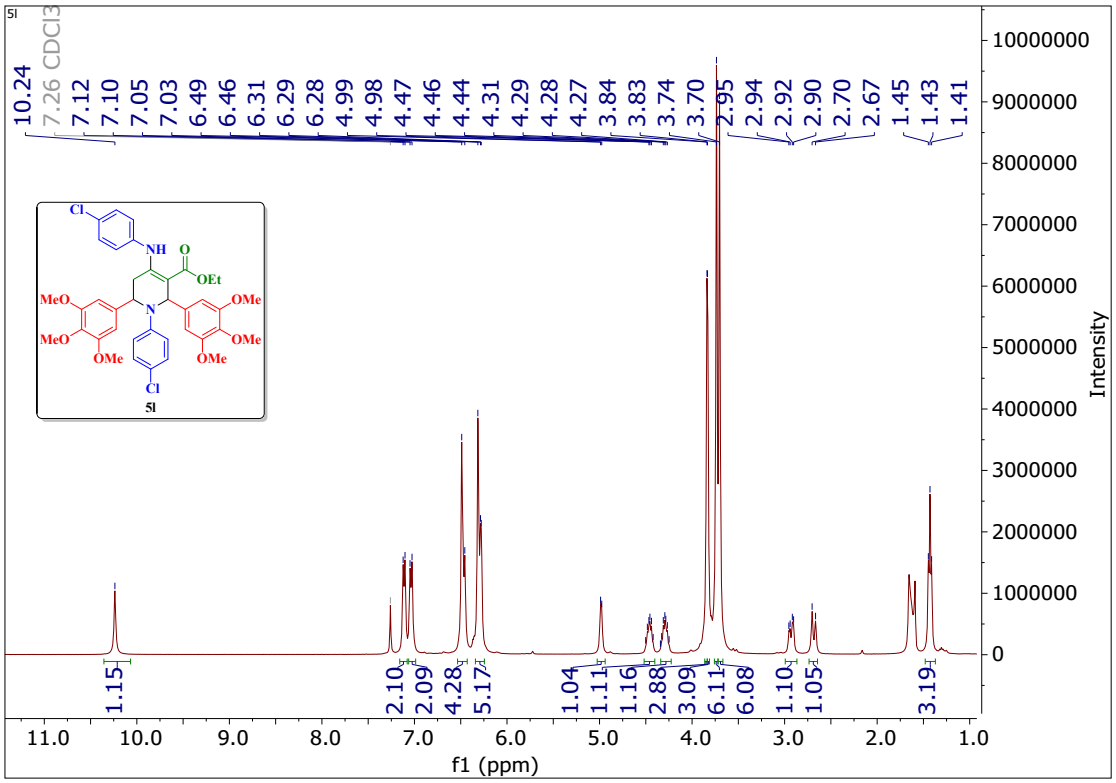
^{1}H NMR spectrum of 5k



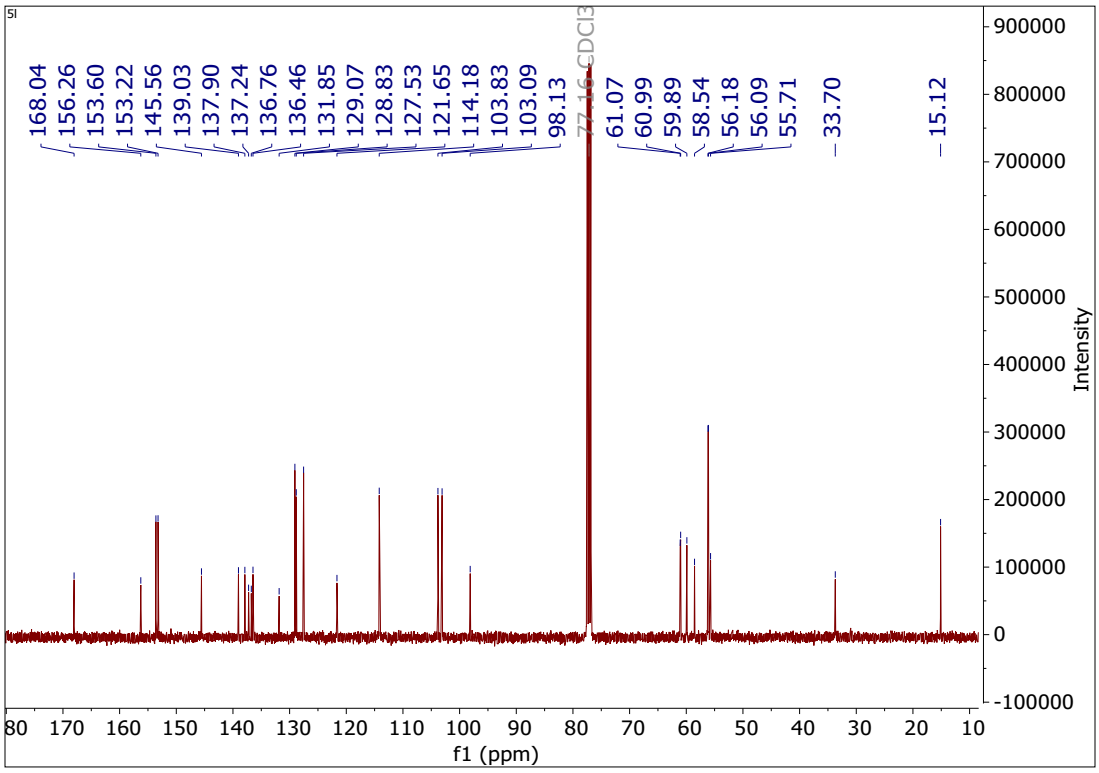
^{13}C NMR spectrum of 5k



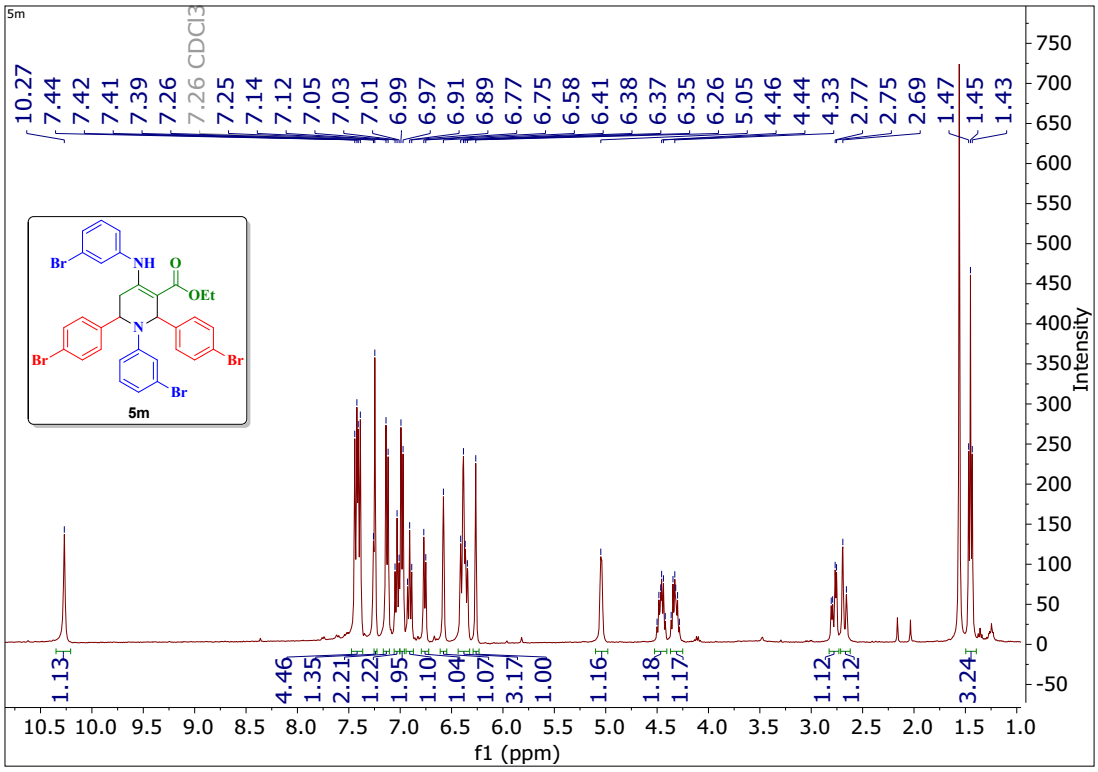
^{1}H NMR spectrum of 5l



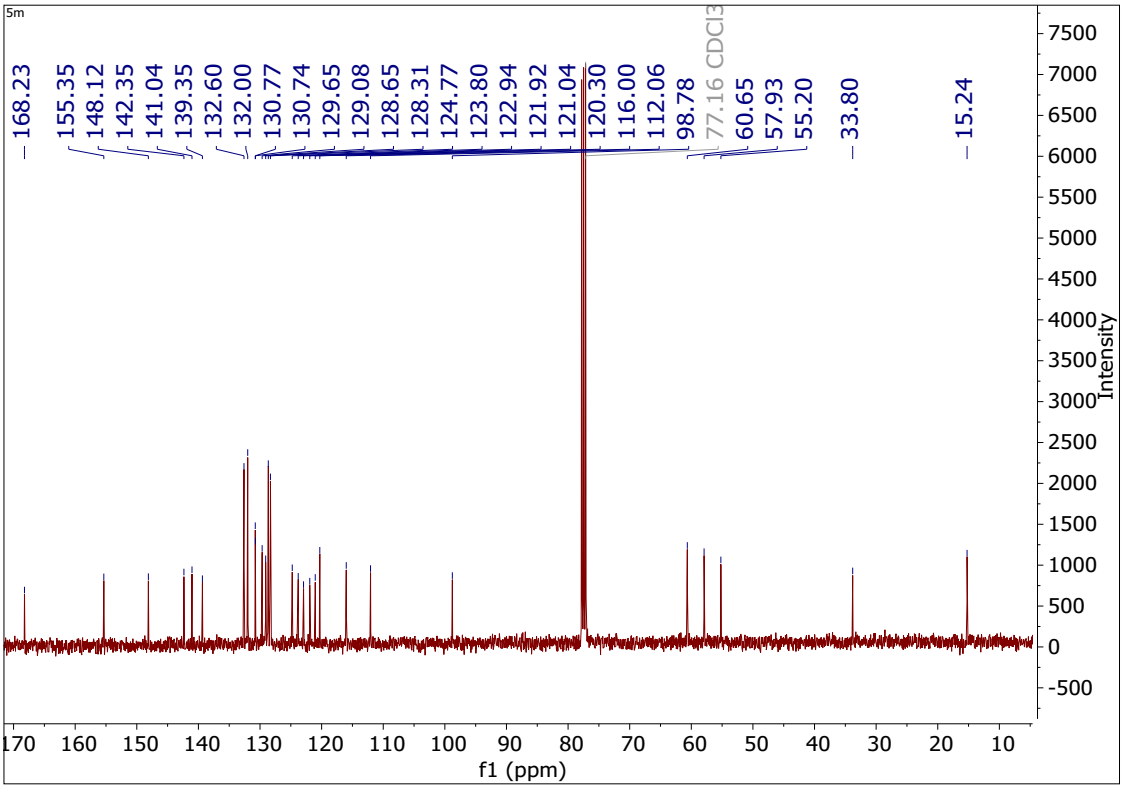
^{13}C NMR spectrum of 5l



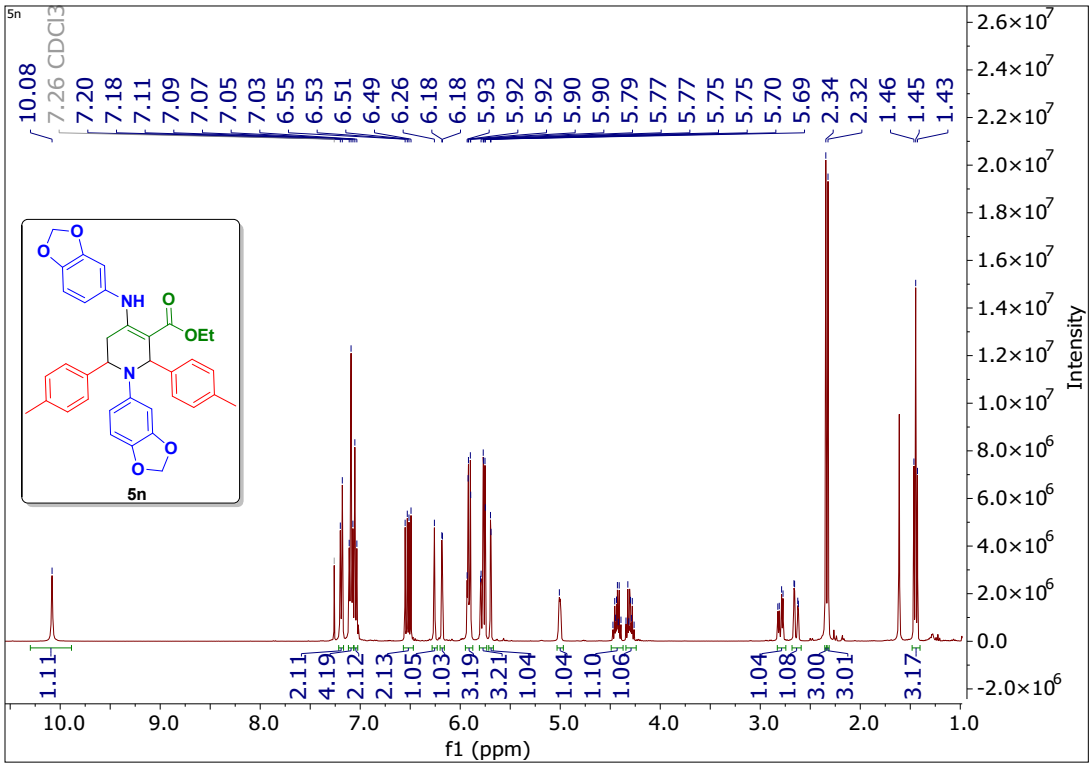
^{1}H NMR spectrum of 5m



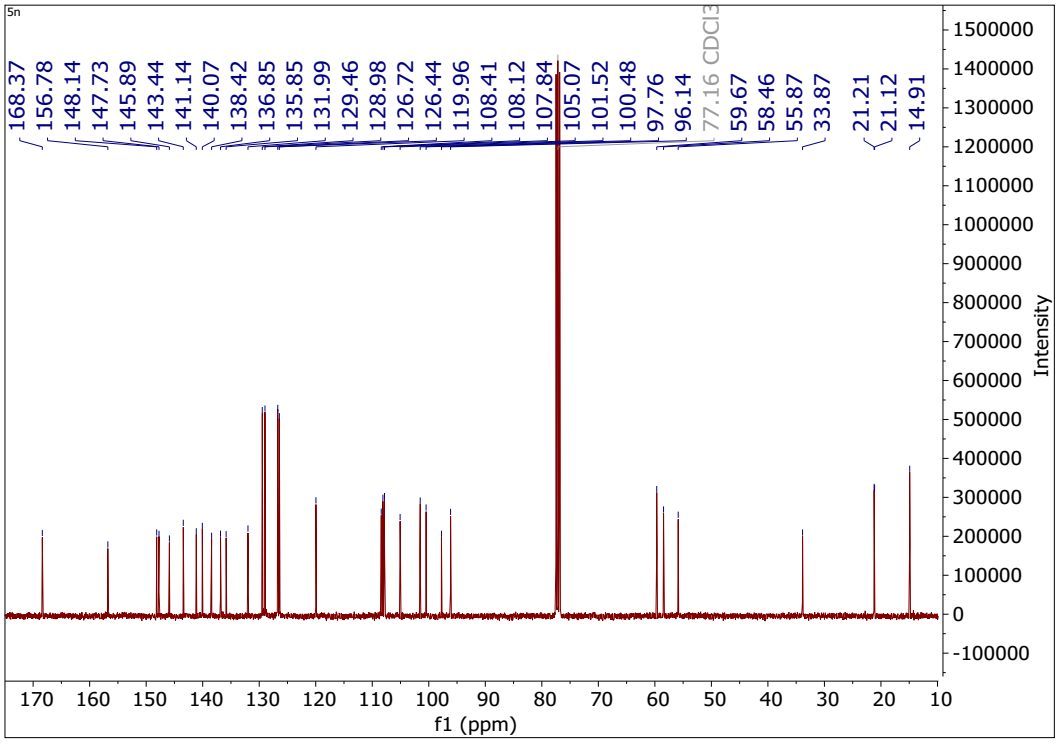
^{13}C NMR spectrum of 5m



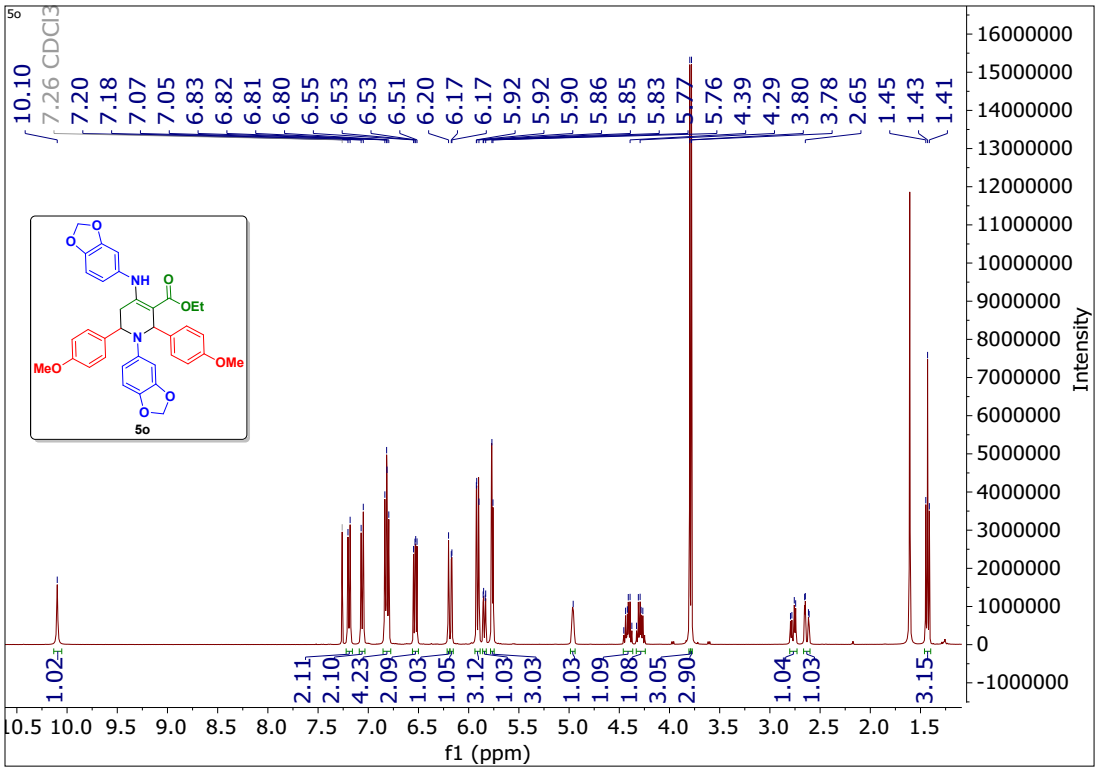
^{1}H NMR spectrum of 5n



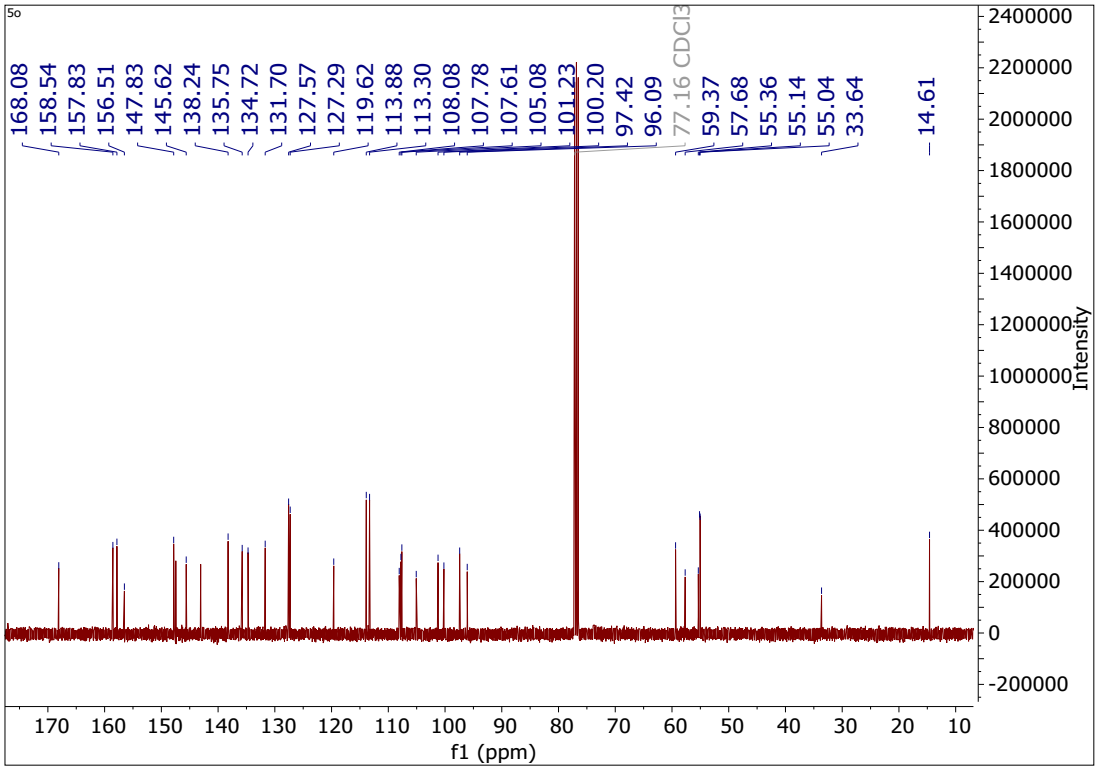
^{13}C NMR spectrum of 5n



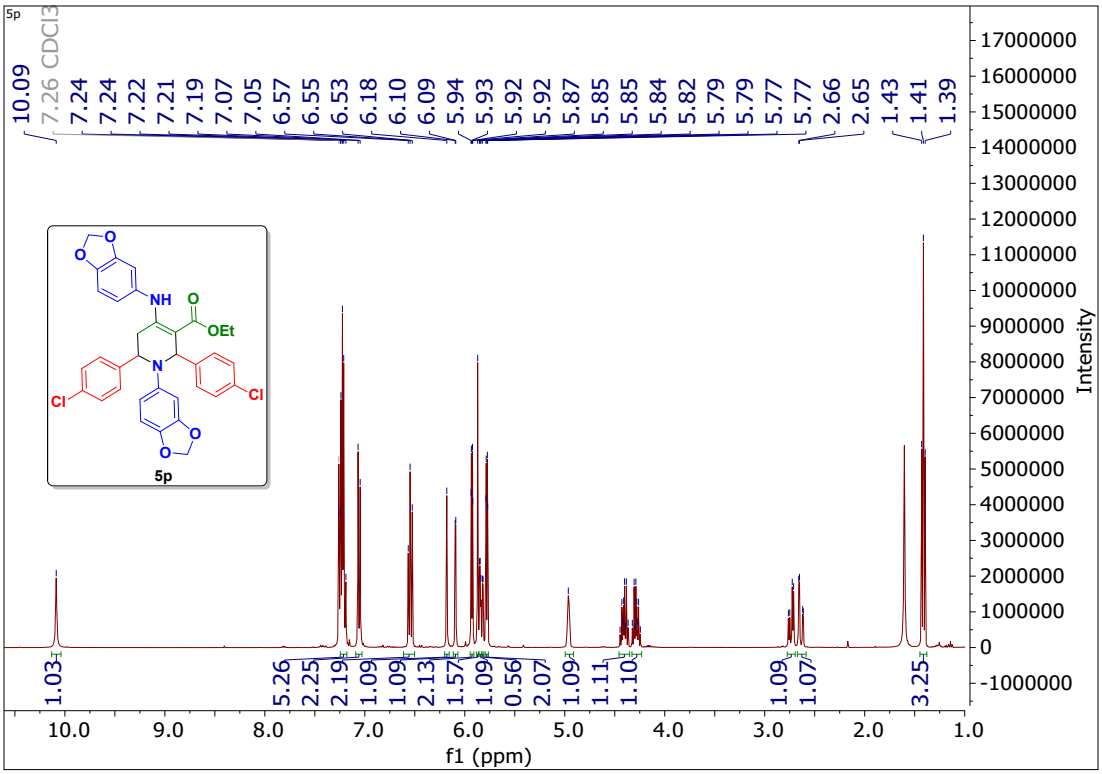
[1]H NMR spectrum of 5o



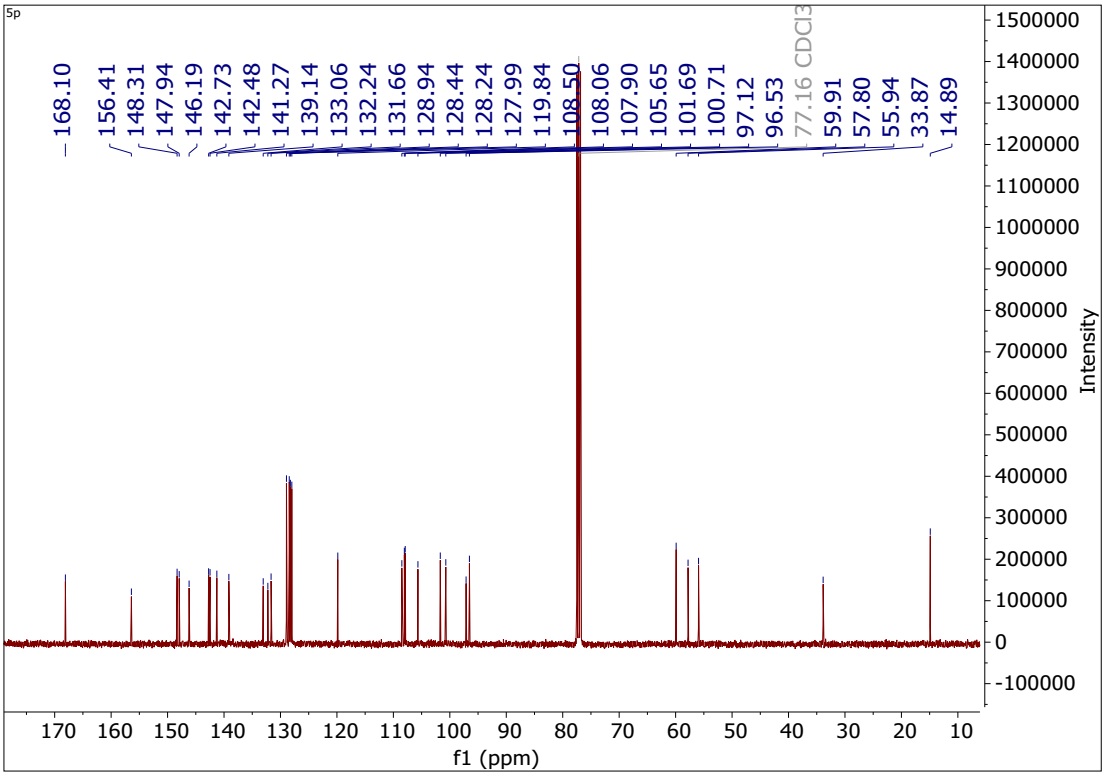
[13]C NMR spectrum of 5o



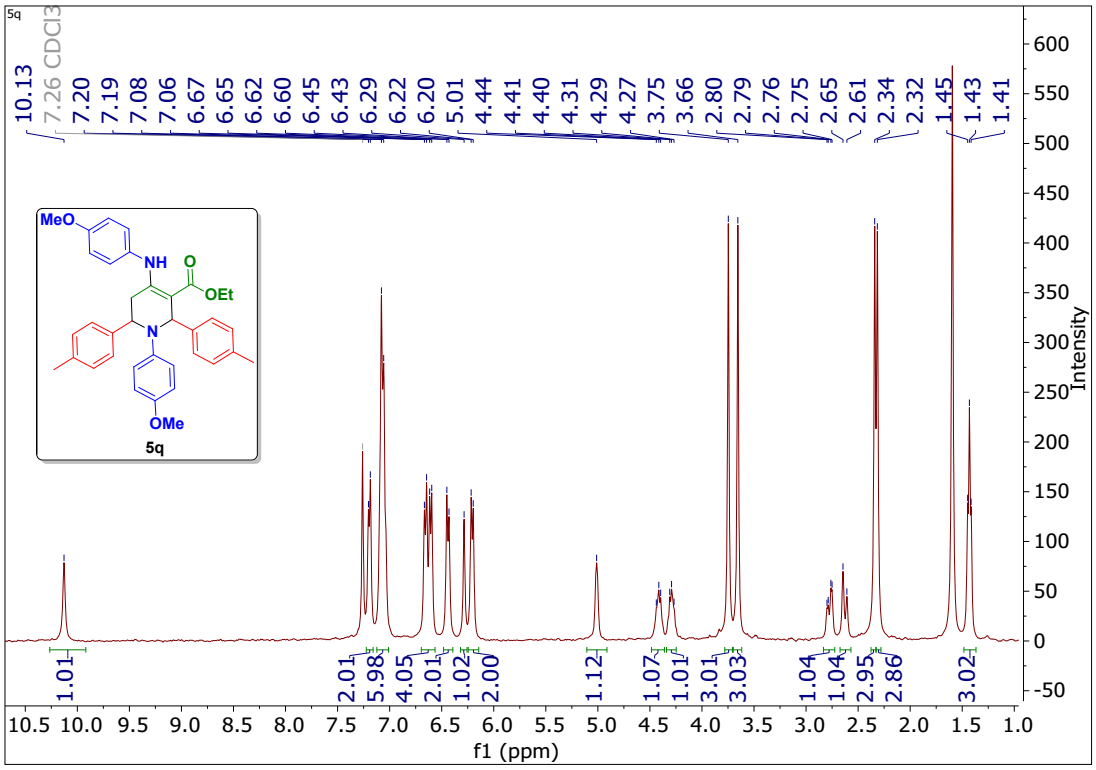
^{1}H NMR spectrum of 5p



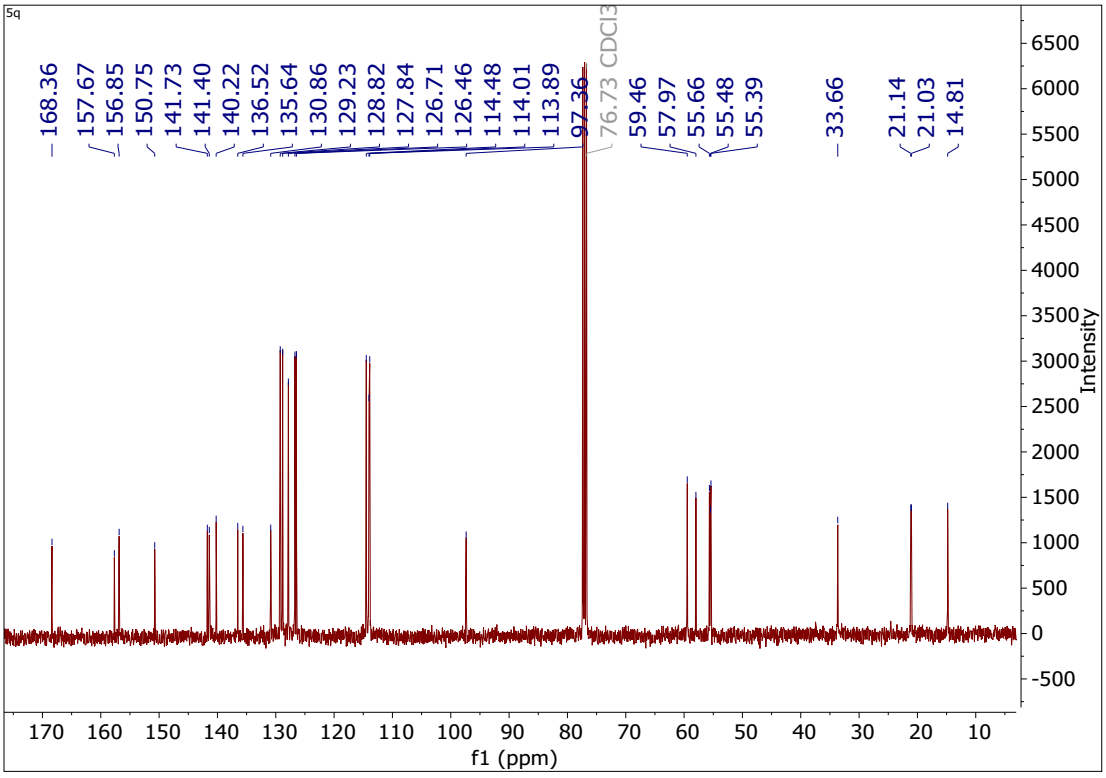
^{13}C NMR spectrum of 5p



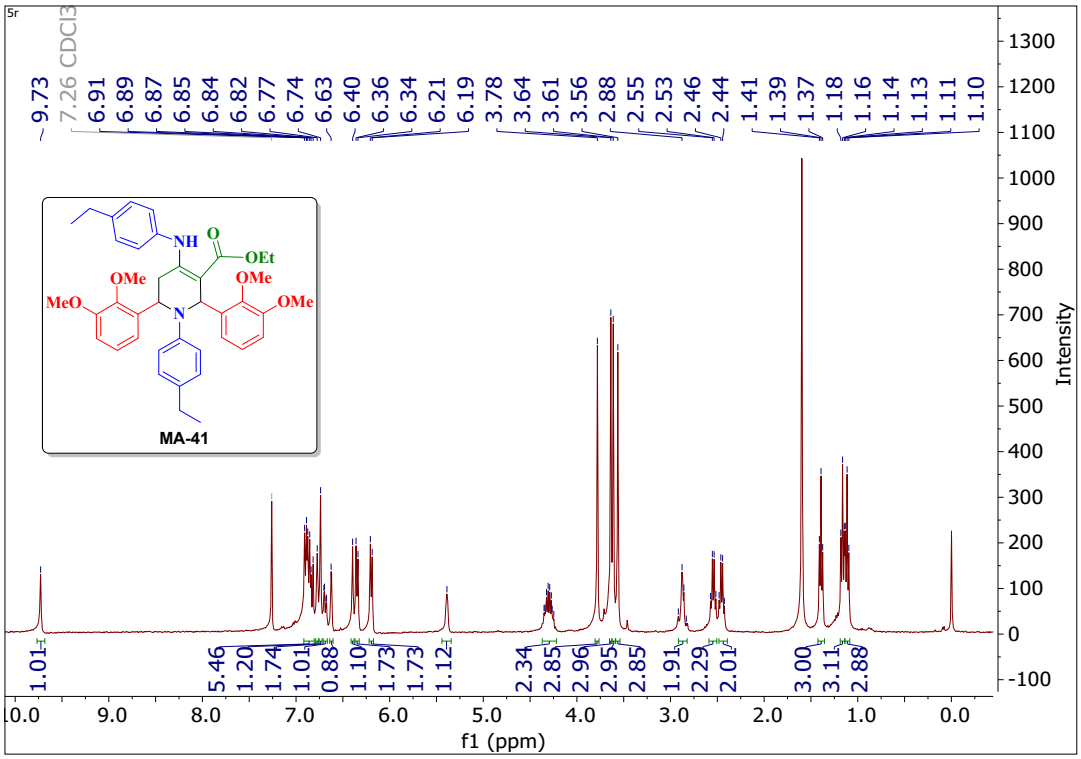
^{1}H NMR spectrum of 5q



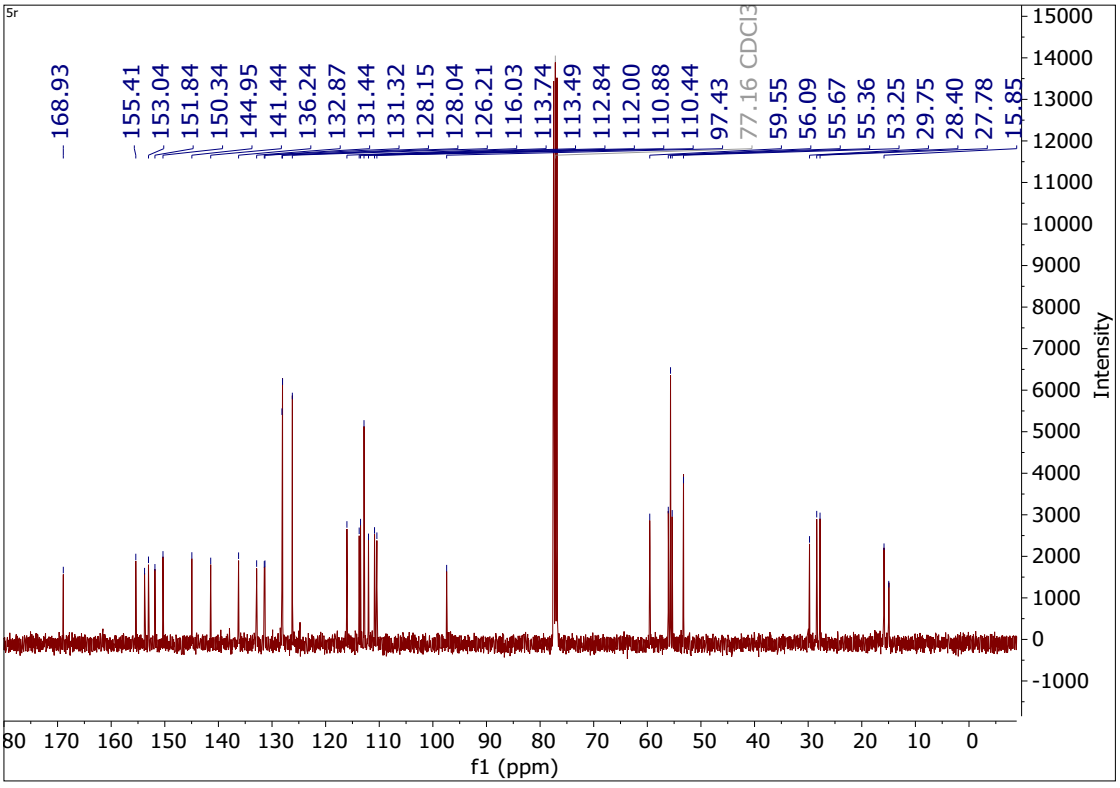
^{13}C NMR spectrum of 5q



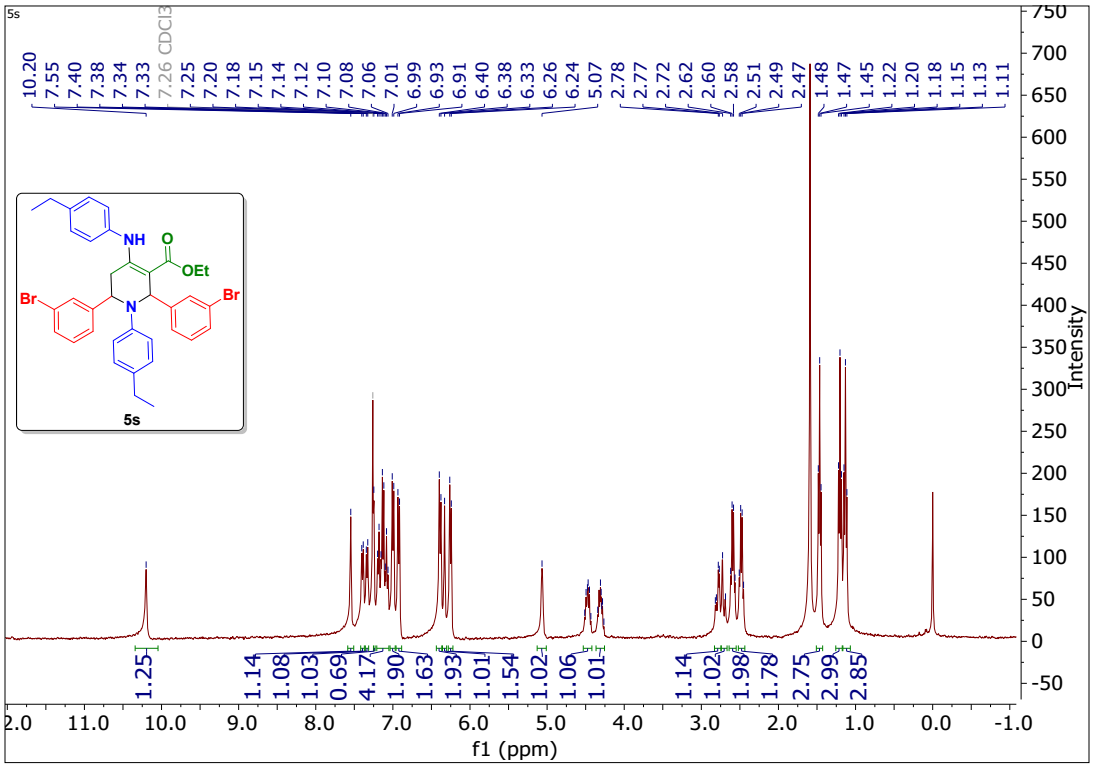
^{1}H NMR spectrum of 5r



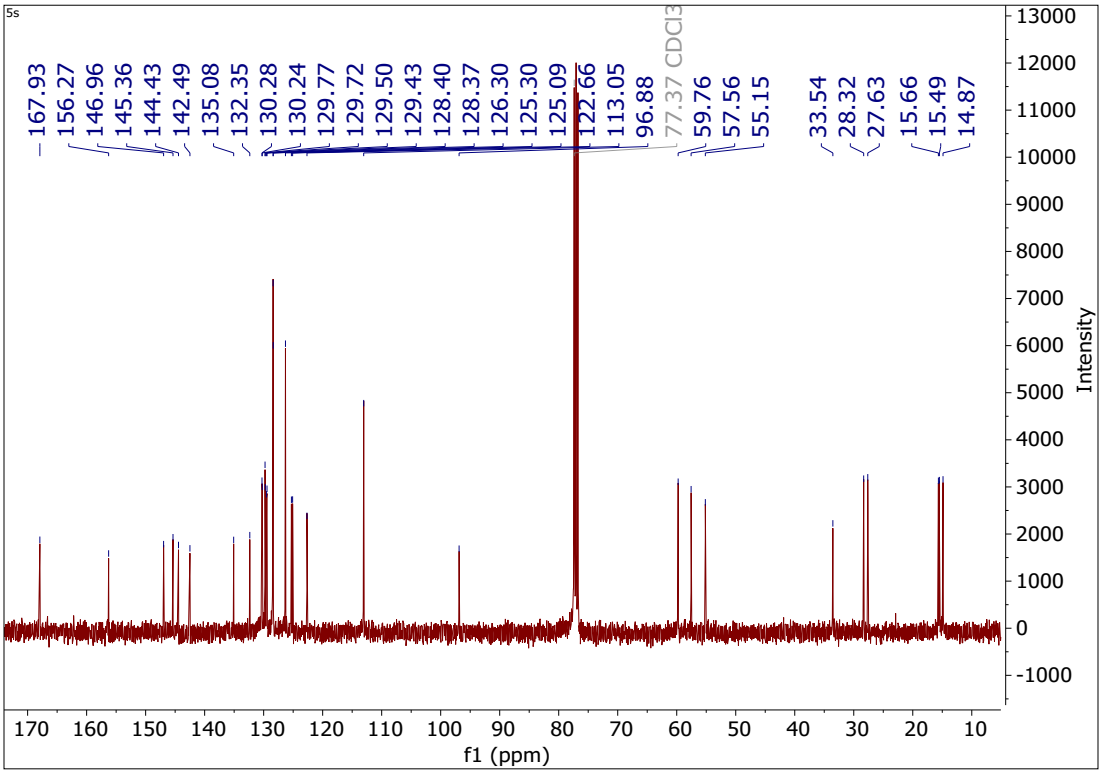
^{13}C NMR spectrum of 5r



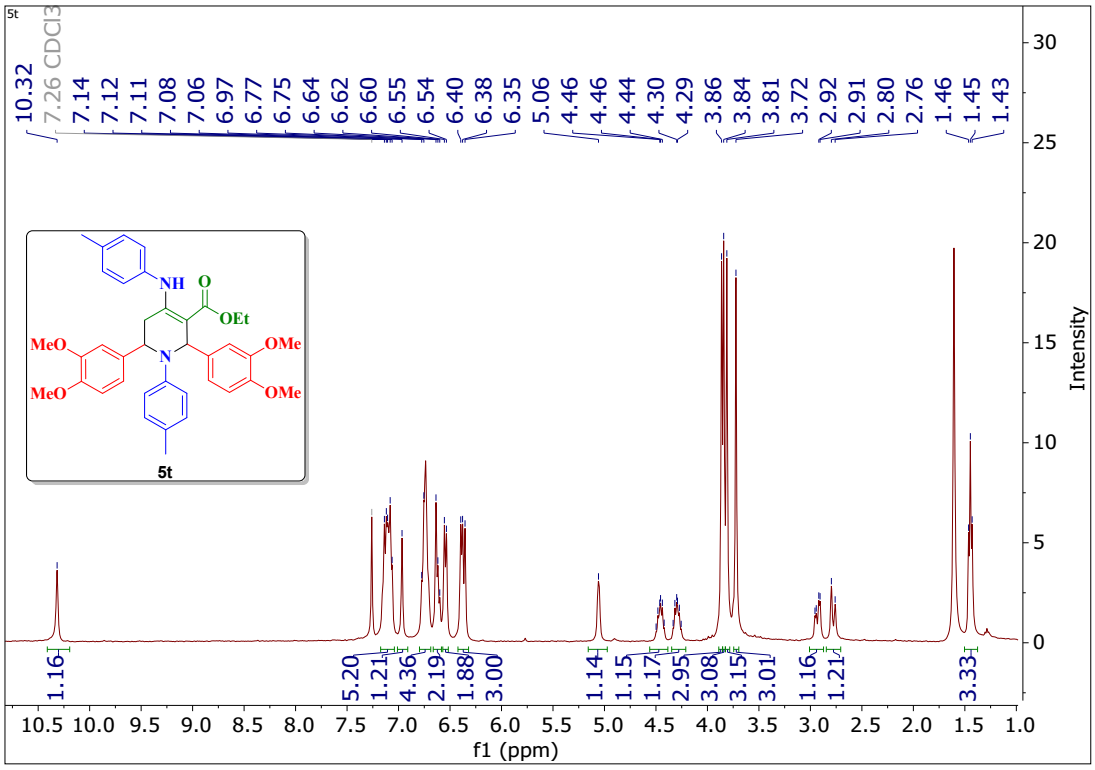
^{1}H NMR spectrum of 5r



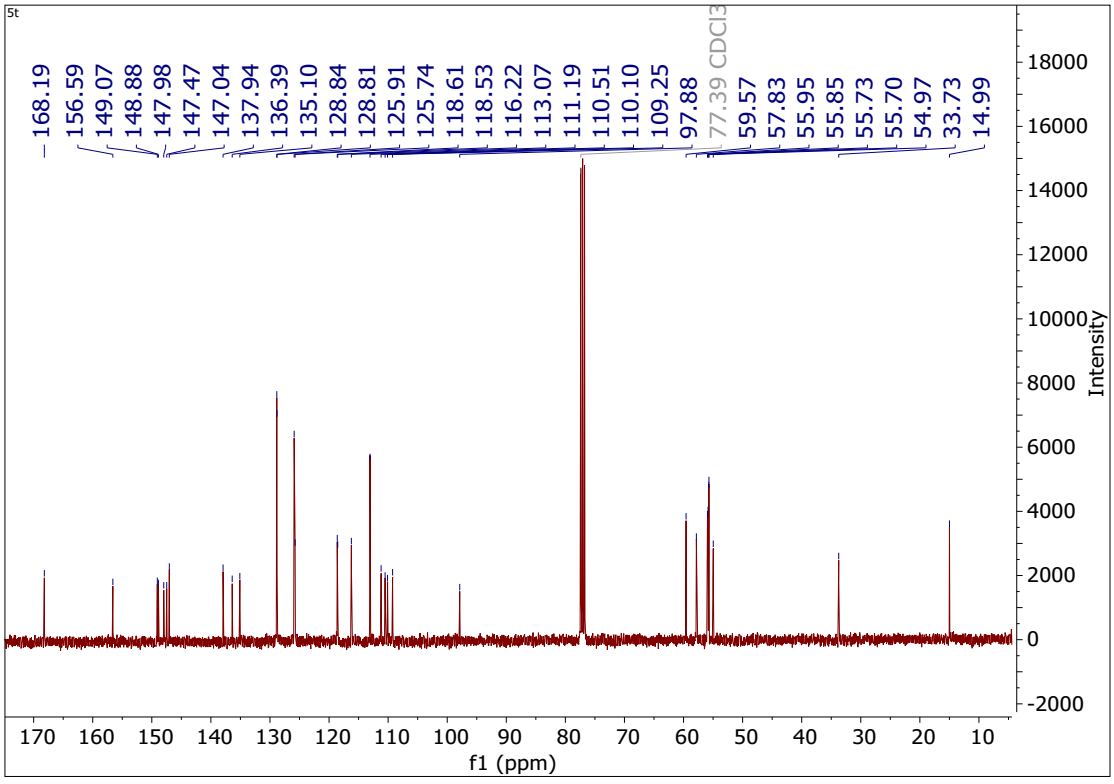
^{13}C NMR spectrum of 5r



^{1}H NMR spectrum of 5t



^{13}C NMR spectrum of 5t



IX. Evaluation of Anti-tubercular activities

In-vitro *MTB* MABA assay

Briefly, the inoculum was prepared from fresh LJ medium re-suspended in 7H9-S medium (7H9 broth, 0.1% casitone, 0.5% glycerol, supplemented oleic acid, albumin, dextrose, and catalase [OADC]), adjusted to a OD_{590} 1.0, and diluted 1:20; 100 µl was used as inoculum. Each drug stock solution was thawed and diluted in 7H9-S at four-fold the final highest concentration tested. Serial two-fold dilutions of each drug were prepared directly in a sterile 96-well microtiter plate using 100 µl 7H9-S. A growth control containing no antibiotic and a sterile control were also prepared on each plate. Sterile water was added to all perimetre wells to avoid evaporation during the incubation. The plate was covered, sealed in plastic bags and incubated at 37^{o}C in normal atmosphere. After 7 days incubation, 30 µl of alamar blue solution was added to each well, and the plate was re-incubated overnight. A change in colour from blue (oxidised state) to pink (reduced) indicated the growth of bacteria, and the MIC was defined as the lowest concentration of drug that prevented this change in colour [S4, S5]

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