SUPPORTING INFORMATION

Iron and Copper based bifunctional catalysts for base & solvent free C-N coupling of amines and aryl/benzyl chlorides under aerobic conditions

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Experimental Details: The ^{1}H, ^{13}C $\{^{1}H\}$ NMR spectra were recorded using JEOL ECS-400 spectrometer (operating at 400 MHz for ^{1}H and 101 MHz for ^{13}C) at room temperature. FTIR spectra in the range 4000–400 cm^{-1} were recorded on a Perkin Elmer 10.4.00 FT-IR spectrometer as KBr pellets of the sample. Powder XRD was performed on Rikagu (miniflex - 600) equipped with CuKα1 radiation (λ = 1.5409 Å). ESCA+ (Omicron Nanotechnology Oxford Instruments) was used for recording the X-ray photoelectron spectroscopy (XPS) data.

Chemicals and reagents: LR grade Reactants, reagents, chemicals and solvents available commercially from sigma Aldrich, TCI were purchased within the country were used. LG grade $Fe(CO)_5$ was purchased from Acros organics.

Procedure for synthesis of $Fe_3E_2(CO)_9$ [E = S, Se, or Te] catalyst

$Fe_3E_2(CO)_9$ (E = S, Se, or Te) catalyst was synthesised through the earlier known methodology.[S1, S2]

[S1] W. Hieber, J. Gruber, *Zeitschrift für anorganische und allgemeine Chemie,* 1958, *296*, 91-103.

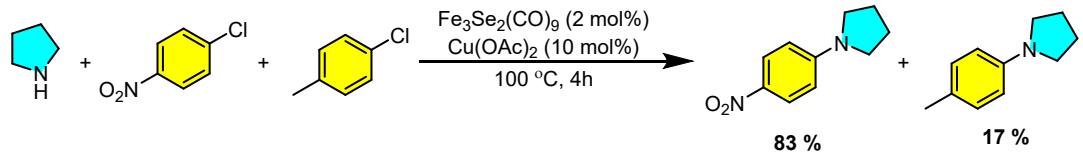
[S2] H. Schumann, M. Michael, P. Joachim, *Journal of Organometallic Chemistry* 1982, 240, 407-411.

Procedure for Catalytic Reaction

In a 10 mL reaction tube, amine and arylhalide (1 mmol of each) were considered, to this 2 mol% of $Fe_3Se_2(CO)_9$ and 10 mol% of $Cu(OAc)_2$ were added. The reaction mixture was then heated at 100 °C with continuous stirring for 4 h. After completion of the reaction, the reaction mixture was cool down at room temperature and the product was extracted in organic layer through solvent extraction using the mixture of ethyl acetate and water. Organic layer was dried over anhydrous Na_2SO_4, and then concentrated on rotatory evaporator. If required desired products can be isolated through column chromatography using hexane-ethylacetate mixture as eluent.

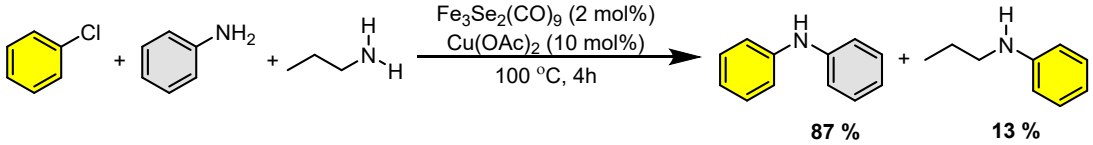
Control Experiments

Intermolecular competitive experiments were conducted to find the selectivity of the reaction towards various amines and arylchlorides. In this sequence, the very first reaction was performed between *p*-nitrochlorobenzene and *p*-methylchlorobenzene with pyrrolidine, which shows a major selectivity towards the electron withdrawing functionality (Scheme S1).

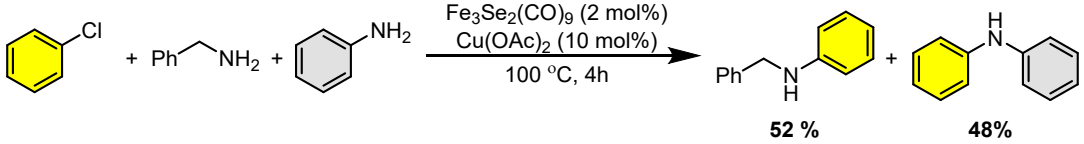


Scheme S1. Selectivity with donating/withdrawing arylchlorides.

Another reaction of aniline & propylamine with chlorobenzene shows the utmost selectivity of the reaction toward aniline, while the competitive reaction between benzylamine & aniline transformed comparable yield, with both aniline & benzylic amine as products (Schemes S2 and S3).

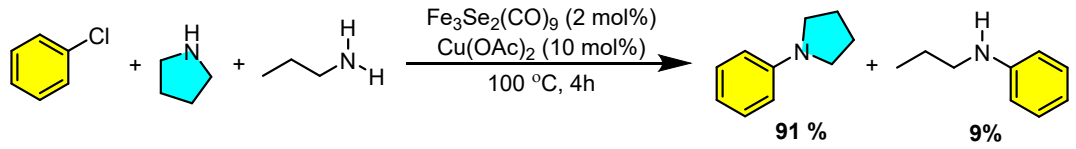


Scheme S2. Selectivity with aniline or propylamine.

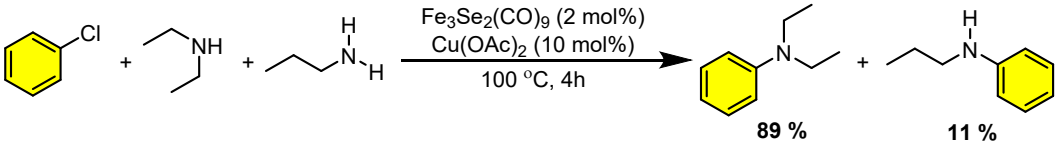


Scheme S3. Selectivity with aniline or benzylamine

Competitive experiments focused on the distinction between primary and secondary aliphatic amines were also executed. Two separate experiments, first consisting of chlorobenzene and a mixture of propylamine and pyrrolidine (cyclic aliphatic amine) while in other experiment, the pyrrolidine was replaced with diethylamine (acyclic aliphatic amine). In both the experiments, the selectivity was dominated with secondary amine, and reaction was found less selective towards primary amine i.e. propylamine (Schemes S4 and S5).

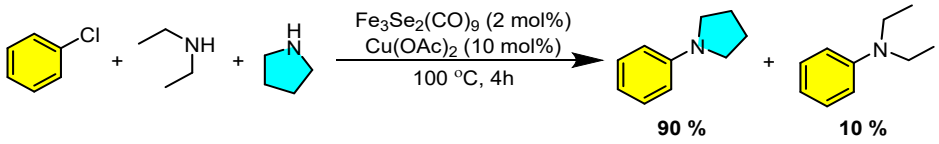


Scheme S4. Selectivity with pyrrolidine and propylamine.



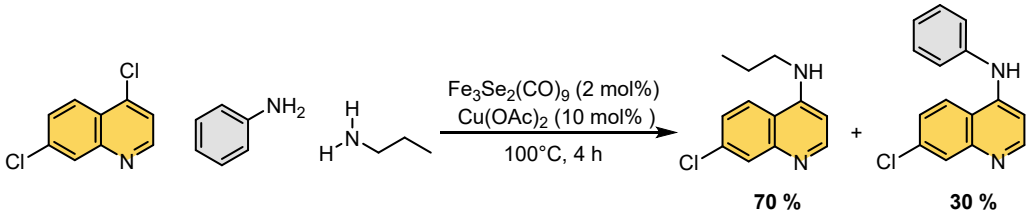
Scheme S5. Selectivity with diethylamine and propylamine.

Further, selectivity order for various secondary aliphatic amines was studied, and excellent selectivity was obtained with cyclic amine (pyrrolidine), while poor selectivity was recorded with acyclic amine (diethylamine) (Scheme S6).

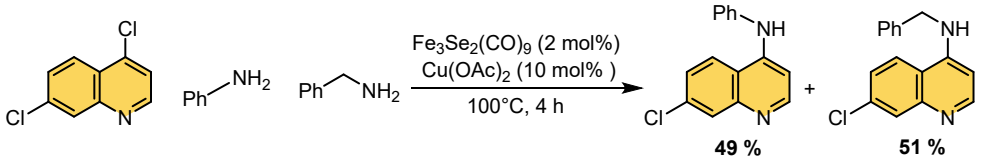


Scheme S6. Selectivity with diethylamine and pyrrolidine.

During the development of substrate scope, a different reactivity order was experienced with heterocyclic arylchloride (4,7-dichloroquinoline). Therefore, some additional reactions has been included in control experiments. Among the aniline & propylamine, good selectivity was obtained with aliphatic amine, which is contrast to the results obtained with chlorobenzene. While similar extent of selectivity was found with benzylic amine and aniline (Schemes S7 and S8).

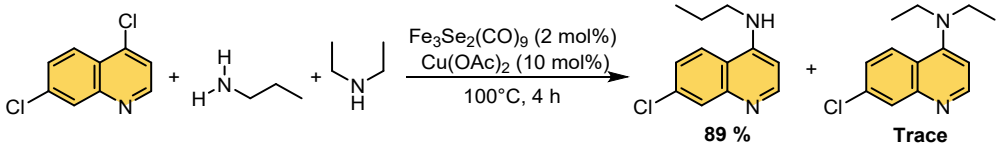


Scheme S7. Selectivity with aniline and propylamine.

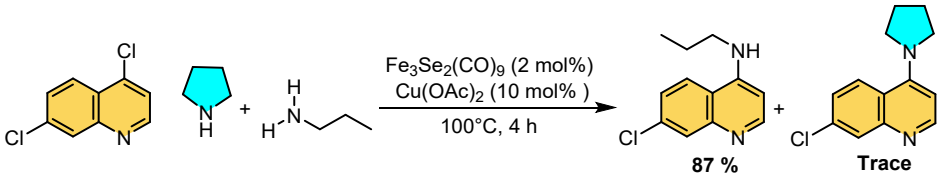


Scheme S8. Selectivity with aniline and benzylamine.

Furthermore, an exclusive selectivity of propylamine was observed over the diethylamine and pyrrolidine (Schemes S9 and S10).

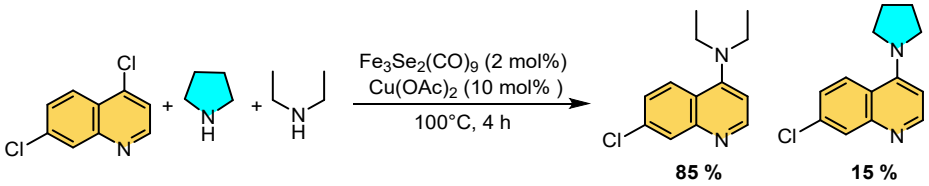


Scheme S9. Selectivity with propylamine and diethylamine.



Scheme S10. Selectivity with propylamine and pyrrolidine.

The selectivity for secondary cyclic & non-cyclic amines were also examined and a significant selectivity was observed with pyrrolidine (Scheme S11).



Scheme S11. Selectivity with diethylamine and pyrrolidine

Characterisation of Recovered Catalyst

The FTIR spectrum does not shows any absorption peaks for Fe, Cu or Se oxides. While, the Raman spectrum reveals the characteristic peaks at 140, 199 and 637 cm^{-1} which indicated the presence of CuSe, FeSe, and FeCu respectively.[1,2] The phase composition of the decomposed catalyst was studied through Powder XRD (Figure S3, SI). While closely observing the pattern it is clearly a mix phase. With the help of literature we found the pattern was in close proximity with the JCPDS card no. 00-020-1020 and 85-0735 that represents the CuSe and FeSe phases.[3-5] Moreover, corroboration of few other peaks confirms the presence of FeCu in the composite.[6] Further, the collected catalyst leftover was characterized through XPS (Figure S4 to S9, SI). The survey scan reveals the presence of Fe, Cu, N, O, and Se atoms in the sample. The recorded quantity Fe, Cu and Se were 34.79, 22.94 and 3.07% respectively, further 27.53 and 14.75% of N and O were also found in the sample. As it is established through FTIR Fe, Cu and Se are not present in the oxide forms. The peak in the region of O (1s) at 531.4 eV corresponds to the organic C=O.[7] The available N (1s) is in the pyridinic and graphitic form which corresponds to the peaks at 398.3 and 399.6 eV.[8] The peaks of Se (3d) at 53.5 and 54.9 eV corresponds to the CuSe and FeSe respectively.[9,10] Two peaks in the region of Cu (2p) corresponding to CuSe can be seen at 932.6 and 952.5 eV which represents 2p (3/2) and 2p (1/2).[52] The deconvolution of the XPS spectrum in the region of Fe (2p) shows two peaks each in the region of 2p (1/2) and 2p (3/2). Two peaks with lower values of maxima (710 and 720.3 eV) in both regions correspond to the lower oxidation state (Fe^{2+}). The other two peaks in both the regions with maxima of 713.9 and 723.7 eV are related to the higher oxidation state of (Fe^{3+}), the literature suggests these peaks corresponds to FeSe and FeCu.[10,11]

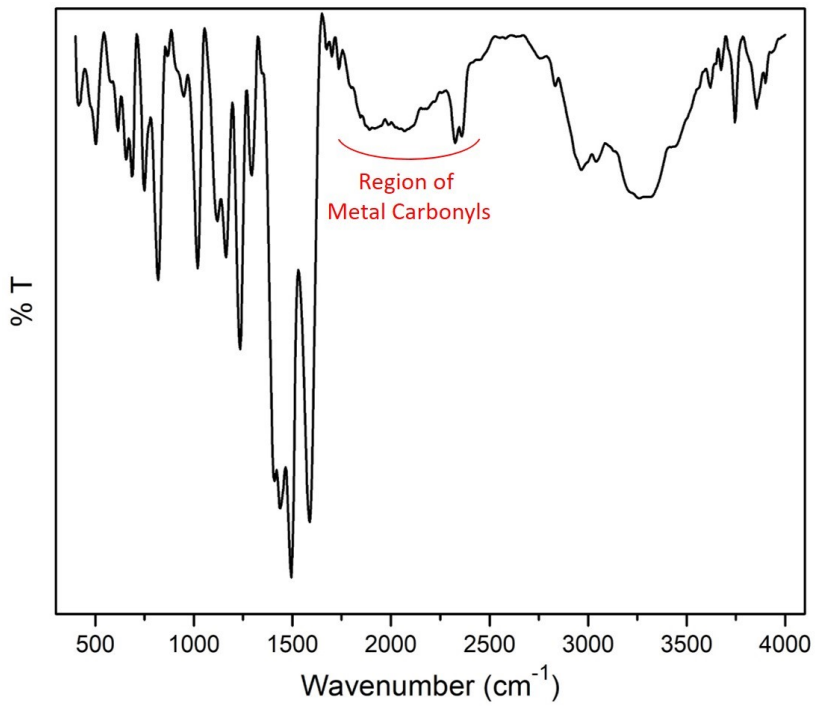


Figure S1. FTIR spectrum of decomposed catalyst

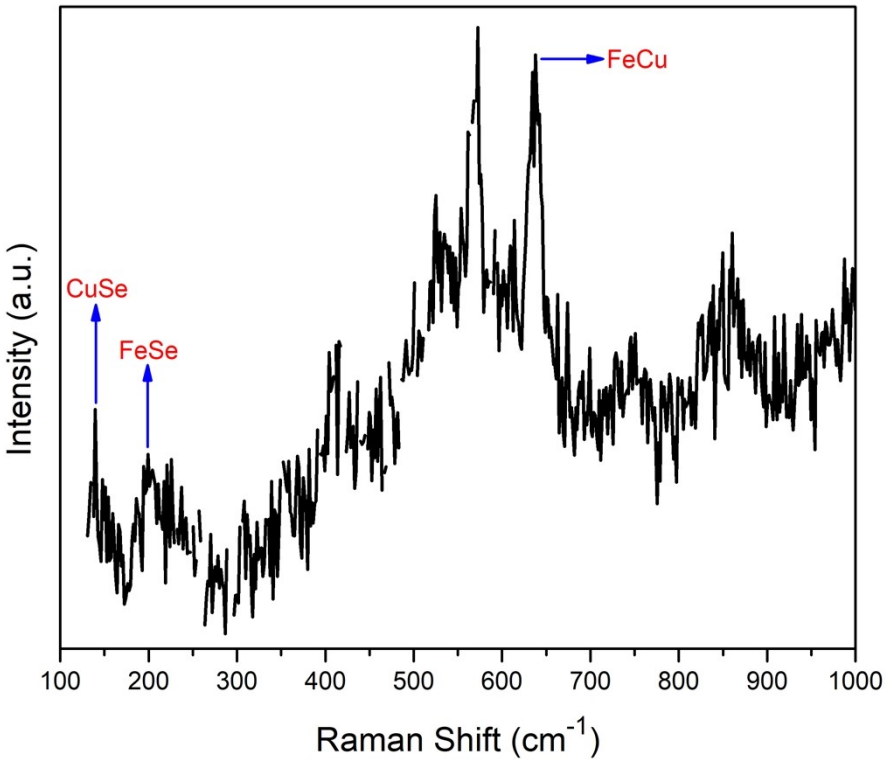


Figure S2. Raman spectrum of decomposed catalyst

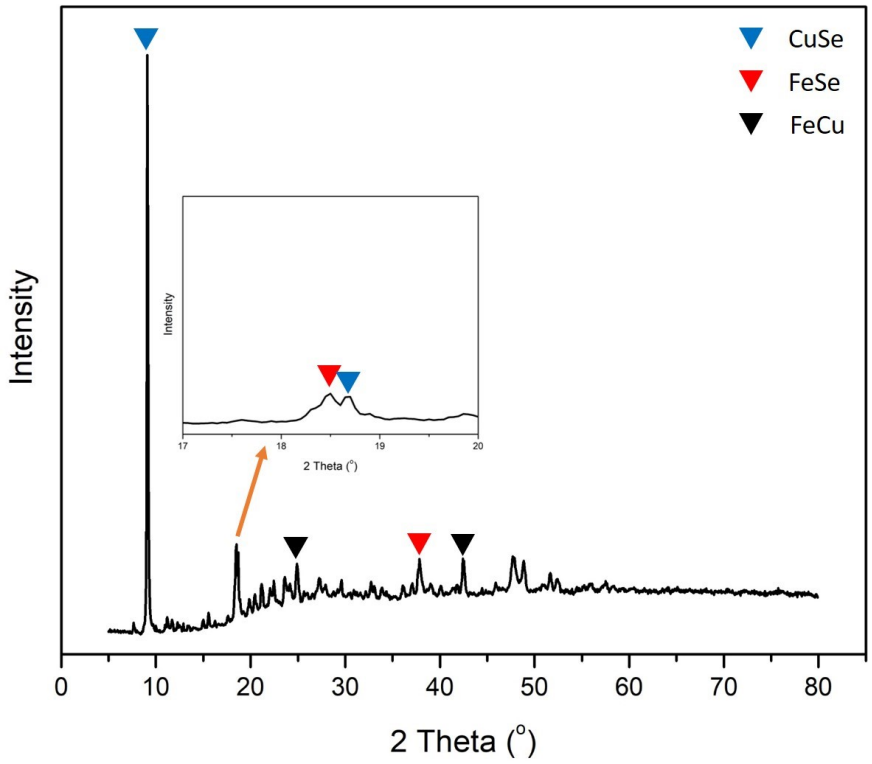


Figure S3. Powder XRD of decomposed catalyst

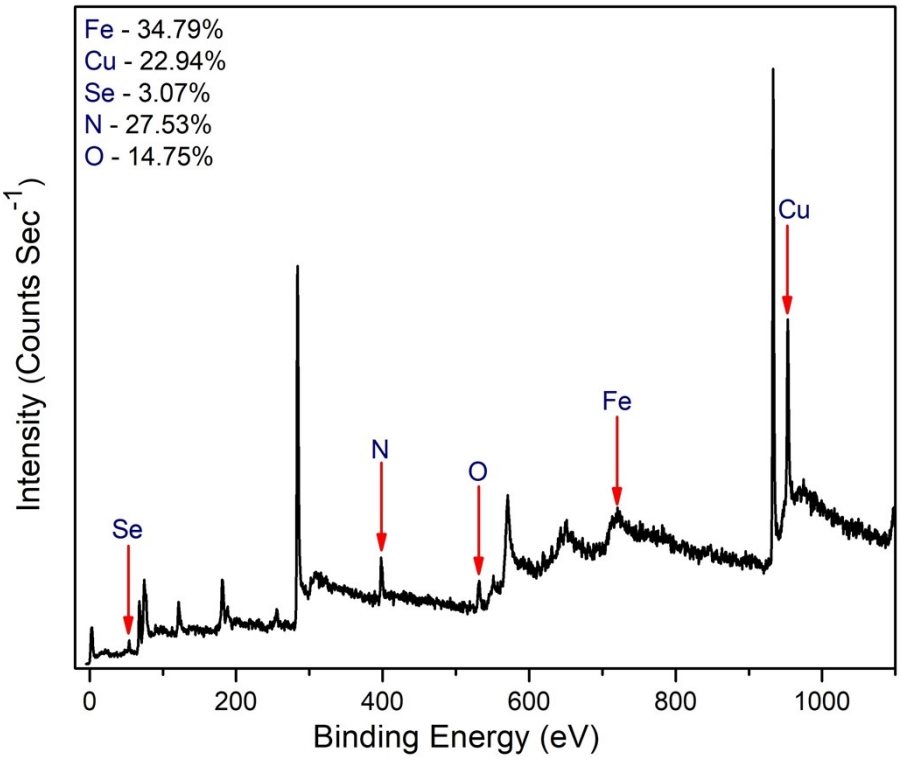


Figure S4. XPS Survey scan

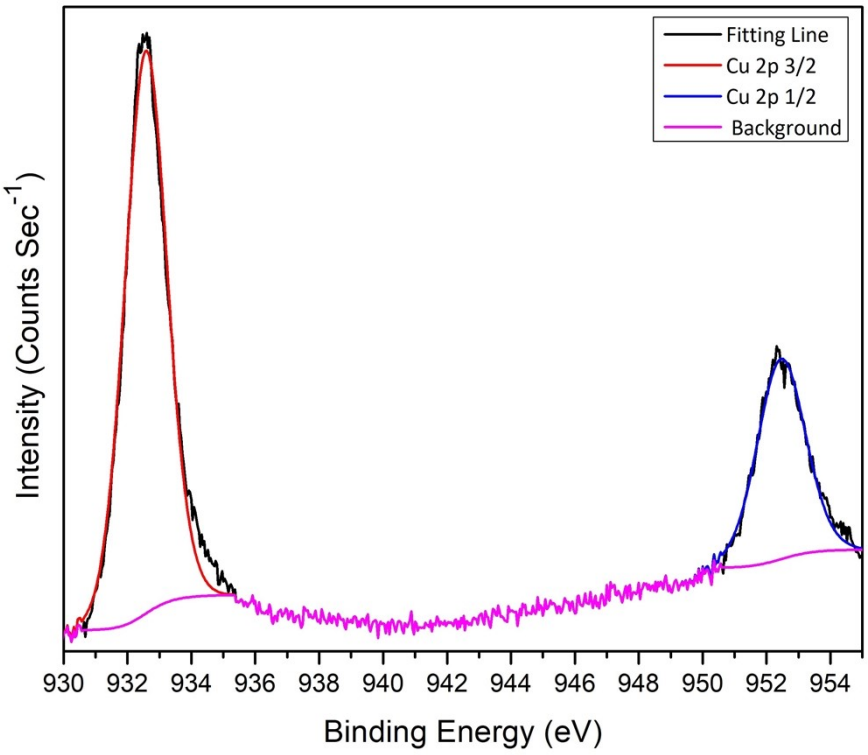


Figure S5. XPS scan for Cu (2p)

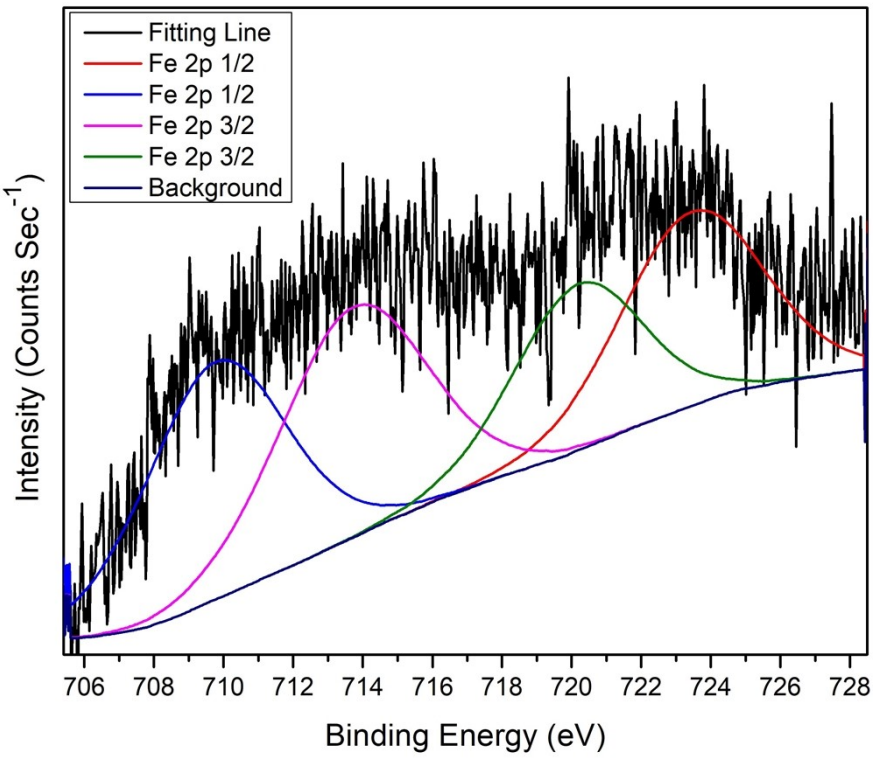


Figure S6. XPS scan for Fe (2p)

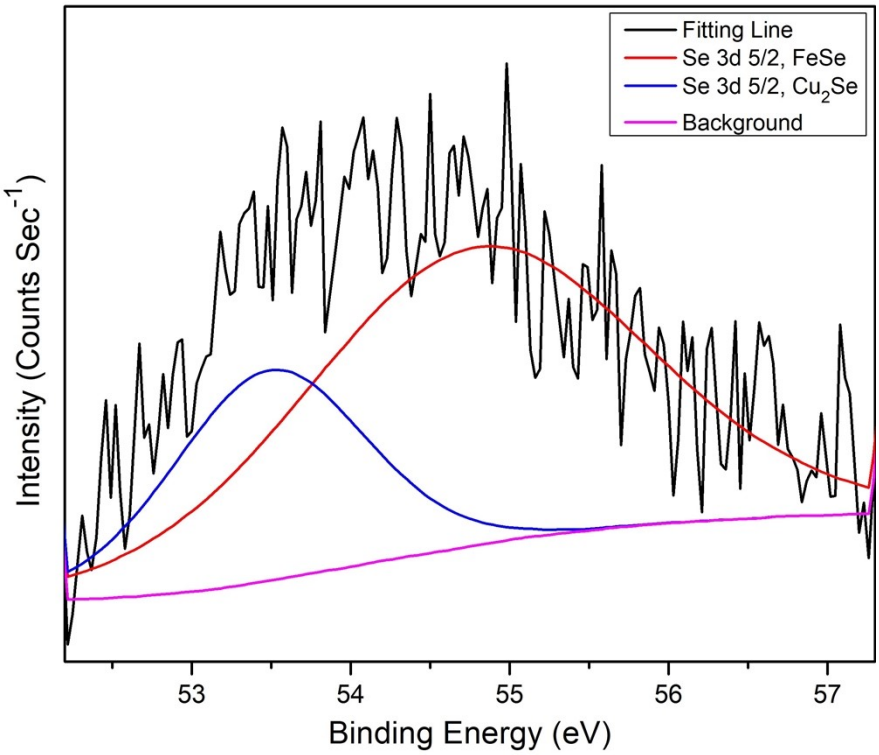


Figure S7. XPS scan for Se (3d)

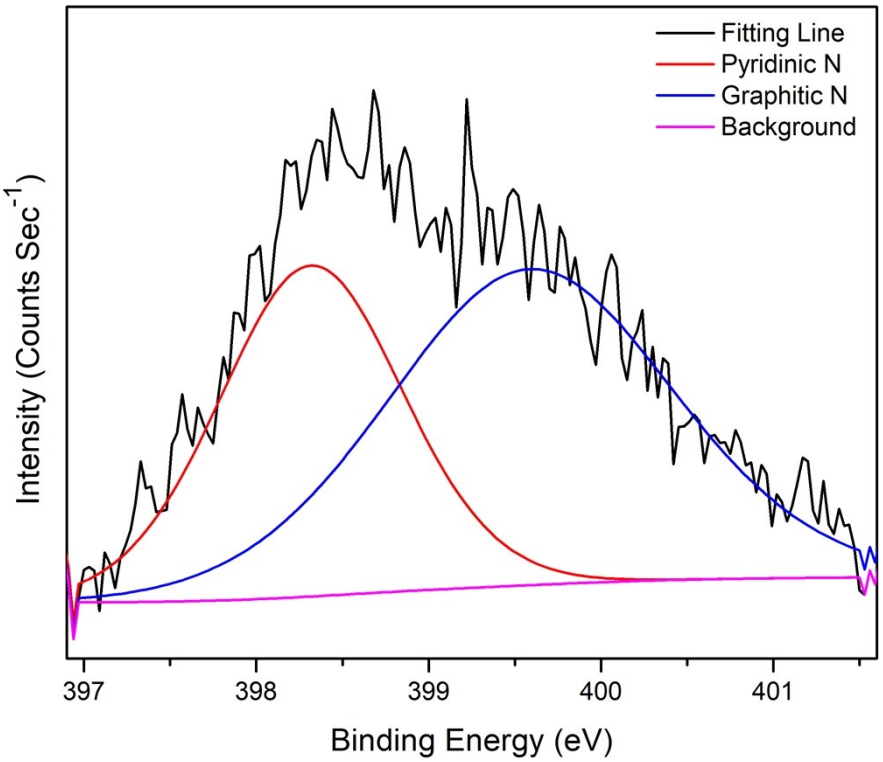


Figure S8. XPS scan for N (1s)

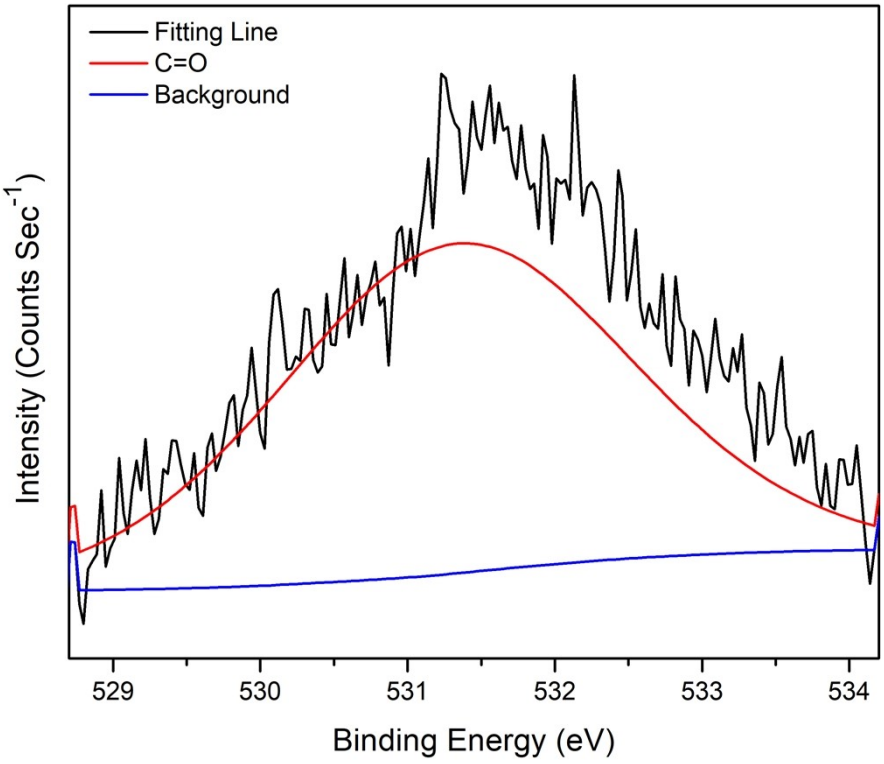
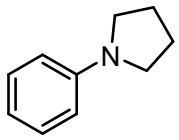
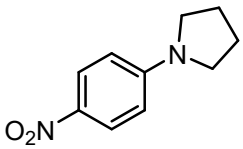
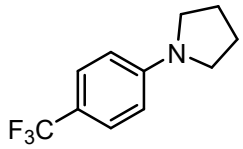
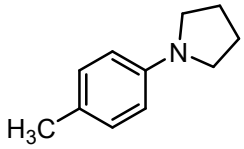
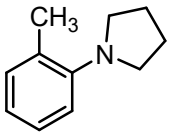
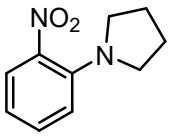
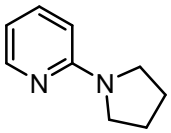
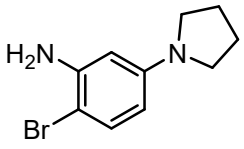
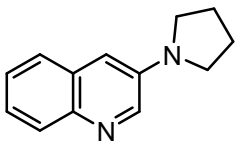
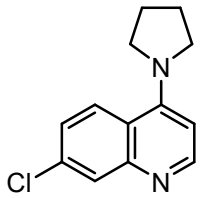
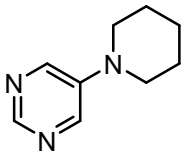
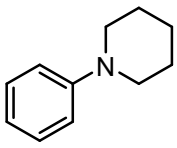


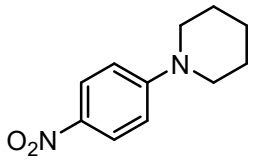
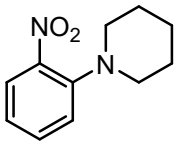
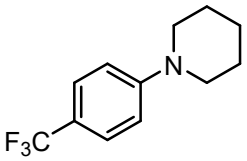
Figure S9. XPS scan for O (1s)

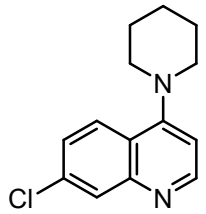
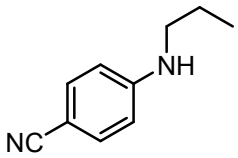
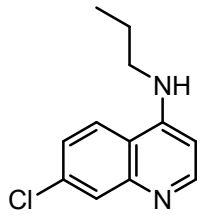
Characterisation Data of Synthesised Compounds

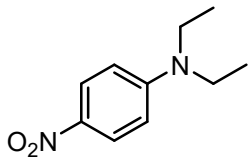
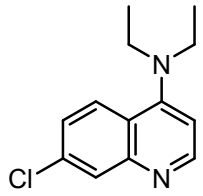
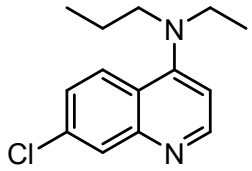
1.		**1-phenylpyrrolidine[12]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.19-7.14 (m, 2H), 6.62-6.58 (m, 1H), 6.52-6.50 (m, 2H), 3.23-3.20 (m, 4H), 1.96-1.90 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 147.97, 129.15, 115.34, 111.63, 47.57, 25.49.
2.		**1-(4-nitrophenyl)pyrrolidine[13]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.19-8.15 (m, 2H), 6.54-6.50 (m, 2H), 3.47-3.43 (m, 4H), 2.16-2.10 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 151.87, 136.57, 126.41, 110.41, 47.95, 25.48.
3.		**1-(4-(trifluoromethyl)phenyl)pyrrolidine[14]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.47 (d, *J* = 8.9 Hz, 2H), 6.57 (d, *J* = 8.7 Hz, 2H), 3.34 (t, *J* = 6.6 Hz, 4H), 2.09-2.02 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 149.82, 126.97 (q, *J* = 3.7 Hz), 125.47 (q, *J* = 268.6 Hz), 116.64 (q, *J* = 32.4 Hz), 110.88, 47.56, 25.52. **19F NMR (400 MHz, $CDCl_3$)** δ -60.62
4.		**1-(p-tolyl)pyrrolidine[12]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.07 (d, *J* = 7.2 Hz, 2H), 6.55-6.53 (m, 2H), 3.28 (q, *J* = 4.4 Hz, 4H), 2.29 (s, 3H), 2.04-2.02 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 145.11, 128.64, 123.47, 110.82, 46.86, 24.81, 19.30

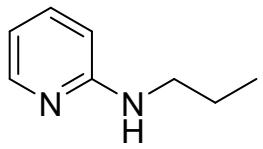
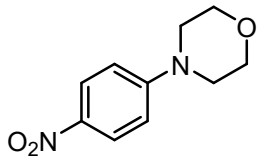
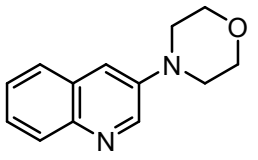
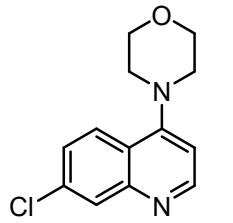
5.		**1-(o-tolyl)pyrrolidine[12]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.18-7.14 (m, 1H), 6.53 (d, *J* = 7.4 Hz, 1H), 6.44 (s, 2H), 3.31 (t, *J* = 6.4 Hz, 4H), 2.36 (s, 3H), 2.06-2.02 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 148.10, 138.83, 129.04, 116.39, 112.41, 108.93, 47.63, 25.49, 21.90
6.		**1-(o-nitro)phenylpyrrolidine[15]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.78 (dd, *J* = 8.2, 1.6 1H), 7.43-7.38 (m, 1H), 6.95 (d, *J* = 8.6 Hz, 1H), 6.75 (t, *J* = 7.6 Hz, 1H), 3.27-3.24 (m, 4H), 2.06-2.01 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 142.81, 137.09, 133.03, 126.78, 115.94, 115.49, 50.41, 25.78
7.		**2-(pyrrolidin-1-yl)pyridine[14]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.12 (dd, *J* = 5.2, 2.0 Hz, 1H), 7.35-7.30 (m, 1H), 6.47 (dd, *J* = 6.4, 5.1 Hz, 1H), 6.31 (d, *J* = 8.5 Hz, 1H), 3.43-3.40 (m, 4H), 1.92-1.89 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 157.33, 148.17, 137.05, 111.11, 106.64, 46.71, 25.62.
8.		**2-bromo-5-(pyrrolidin-1-yl)aniline** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.00 (t, *J* = 8.0 Hz, 1H), 6.03 (dd, *J* = 8, 2.3 Hz, 1H), 5.91 (d, *J* = 2.2 Hz, 1H), 3.28-3.20 (m, 4H), 3.08 (s, 2H), 2.00-1.92 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 149.16, 147.42, 130.02, 103.36, 103.12, 98.67, 47.66, 25.51. **HRMS (CH_3CN) $[M + H]^+$ (m/z)** Calc. Value for $C_{10}H_{13}BrN_2$: 240.0262, observed: 240.0263

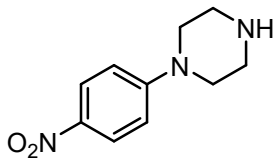
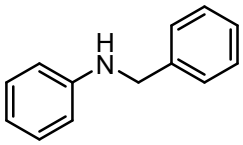
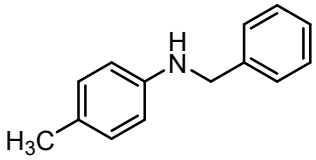
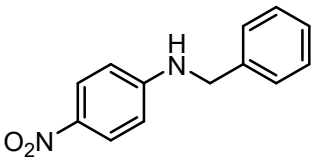
9.		**3-(pyrrolidin-1-yl)quinolone[16]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.52 (d, *J* = 2.8 Hz, 1H), 7.94-7.92 (m, 1H), 7.59 (dd, *J* = 7.7, 1.9 Hz, 1H), 7.39-7.34 (m, 2H), 6.94 (d, *J* = 2.9 Hz, 1H), 3.40 (t, *J* = 6.5 Hz, 4H), 2.08-2.03 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 141.46, 140.57, 129.71, 128.87, 126.88, 125.85, 124.39, 111.08, 47.68, 25.50
10.		**7-chloro-4-(pyrrolidin-1-yl)quinolone[17]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.43 (s, 1H), 8.12-8.09 (m, 1H), 7.93-7.90 (m, 1H), 7.26-7.21 (m, 1H), 6.40 (dd, *J* = 5.6, 2.4 Hz, 1H), 3.68-3.63 (m, 4H), 2.06-2.00 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 152.53, 151.06, 150.95, 134.34, 128.47, 126.61, 123.68, 102.97, 52.27, 26.07.
11.		**5-(piperidin-1-yl)pyrimidine[18]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.58 (s, 1H), 8.11 (s, 2H), 3.36-3.29 (m, 4H), 2.06 – 2.03 (m, 4H), 1.82-1.79 (m, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 161.34, 146.15, 139.18, 47.82, 46.83, 25.21.
12.		**1-phenylpiperidine[18]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.27-7.23 (m, 2H), 6.96-6.93 (m, 2H), 6.84-6.80 (m, 1H), 3.16-3.14 (m, 4H), 1.74-1.68 (m, 4H), 1.62 – 1.53 (m, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 152.37, 129.11, 119.31, 116.67, 50.80, 25.97, 24.41.

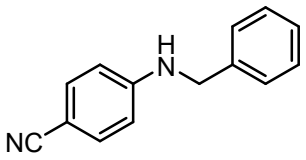
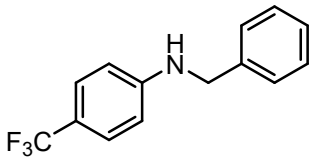
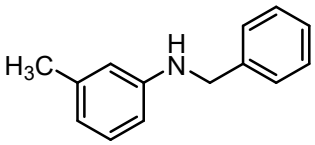
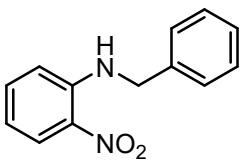
13.		**1-(4-nitrophenyl)piperidine[15]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.17-8.13 (m, 2H), 6.86-6.82 (m, 2H), 3.50 (d, J = 5.1 Hz, 4H), 1.74 (s, 6H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 154.93, 137.46, 126.21, 112.35, 48.42, 25.33, 24.29.
14.		**1-(2-nitrophenyl)piperidine[19]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.78 (dd, *J* = 8.1, 1.5 Hz, 1H), 7.50-7.45 (m, 1H), 7.16 (d, *J* = 8.3 Hz, 1H), 7.01-6.79 (m, 1H), 3.06-3.03 (m, 4H), 1.74 (q, *J* = 5.6 Hz, 4H), 1.63 (q, *J* = 5.8 Hz, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 147.25, 142.82, 136.64, 126.21, 121.09, 120.81, 53.15, 26.18, 24.25.
15.		**1-(4-(trifluoromethyl)phenyl)piperidine[20]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.50 (d, *J* = 8.8 Hz, 2H), 6.96 (d, *J* = 8.8 Hz, 2H), 3.32-3.30 (m, 4H), 1.76-1.63 (m, 6H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 153.84, 126.38 (q, *J* = 3.7 Hz), 124.91 (q, 269.1 Hz), 119.59 (q, *J* = 32.5 Hz), 114.64, 49.36, 25.47, 24.33. **^{19}F NMR (400 MHz, $CDCl_3$)** δ -61.11

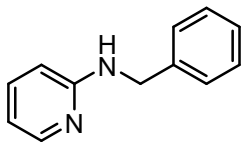
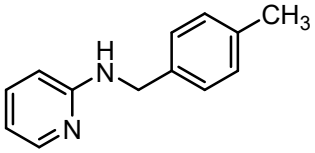
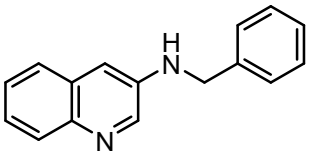
16.		**7-chloro-4-(piperidin-1-yl)quinolone[21]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.65 (d, *J* = 5.1 Hz, 1H), 8.00 (d, *J* = 2.2 Hz, 1H), 7.90 (d, *J* = 9.0 Hz, 1H), 7.38 (dd, *J* = 9.0, 2.2 Hz, 1H), 6.78 (d, *J* = 5.2 Hz, 1H), 3.17 – 3.14 (m, 4H), 1.82 (t, *J* = 5.6 Hz, 4H), 1.73 – 1.64 (m, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 158.08, 151.55, 149.83, 134.74, 128.44, 125.80, 125.44, 122.00, 108.66, 53.55, 24.96, 24.29.
17.		**4-(propylamino)benzonitrile[22]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.77-7.74 (m, 2H), 7.44-7.41 (m, 2H), 6.44 (s, 1H), 3.47-3.42 (m, 2H), 1.68 (t, *J* = 7.4 Hz, 2H), 1.03 (t, *J* = 7.5 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 166.62, 137.53, 133.22, 128.79, 128.38, 41.90, 22.91, 11.49.
18.		**7-chloro-N-propylquinolin-4-amine[23]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.46 (s, 1H), 7.94 (d, *J* = 2.7 Hz, 1H), 7.74 (d, *J* = 9.6 Hz, 1H), 7.38 – 7.29 (m, 1H), 6.40 (d, *J* = 5.3 Hz, 1H), 3.31-3.27 (m, 2H), 1.82-1.76 (m, 2H), 1.08-1.04 (m, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 152.06, 149.86, 149.16, 134.90, 128.83, 125.31, 121.01, 117.22, 99.17, 45.08, 22.21, 11.71.

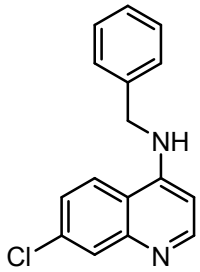
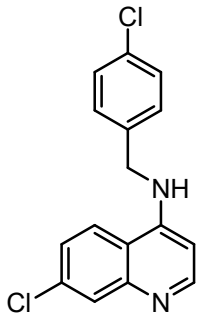
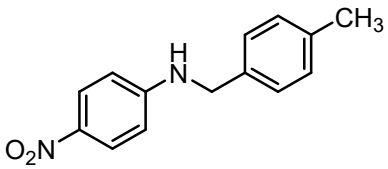
19.		**N,N-diethyl-4-nitroaniline[19]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.17 – 8.13 (m, 2H), 6.64 – 6.62 (m, 2H), 3.51 (q, *J* = 7.1 Hz, 4H), 1.28 (t, *J* = 7.1 Hz, 6H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 152.25, 136.30, 126.57, 109.85, 45.00, 12.45.
20.		**7-chloro-N,N-diethylquinolin-4-amine** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.61 (d, *J* = 5.6 Hz, 1H), 7.99 (t, *J* = 2.2 Hz, 1H), 7.94 (dd, *J* = 9.0, 2.1 Hz, 1H), 7.36-7.33 (m, 1H), 6.78 (dd, *J* = 5.1, 2.2 Hz, 1H), 3.36-3.30 (m, 4H), 1.16-1.12 (m, 6H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 156.05, 151.17, 150.45, 134.81, 128.58, 125.85, 125.63, 122.97, 110.30, 46.56, 12.20. **HRMS (CH_3CN) [M + H]$^+$ (m/z)** Calc. Value $C_{13}H_{15}ClN_2$: 235.0997, observed: 235.0994
21.		**7-chloro-N-ethyl-N-propylquinolin-4-amine** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.62 (d, *J* = 5.2 Hz, 1H), 8.02 (d, *J* = 2.2 Hz, 1H), 7.95 (dd, *J* = 9.0, 1.2 Hz, 1H), 7.38-7.35 (m, 1H), 6.79 (dd, *J* = 5.3 Hz, 1H), 3.40-3.35 (m, 2H), 3.29 – 3.20 (m, 2H), 1.65-1.56 (m, 2H), 1.17-1.14 (m, 3H), 0.88 (t, *J* = 7.4 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 156.37, 150.78, 150.13, 135.02, 128.32, 125.86, 125.69, 122.77, 110.06, 53.50, 47.88, 20.20, 12.28, 11.66. **HRMS (CH_3CN) [M + H]$^+$ (m/z)** Calc. Value for $C_{14}H_{17}ClN_2$: 249.1153, observed: 249.1158

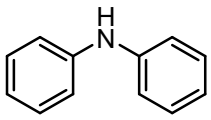
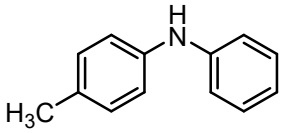
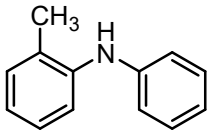
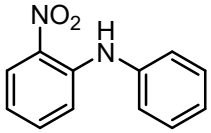
22.		**N-propylpyridin-2-amine[24]** **^{1}H NMR (400MHz, $CDCl_3$)** δ 7.97-7.95 (m, 1H), 7.29-7.25 (m, 1H), 6.45-6.34 (m, 1H), 6.26-6.24 (m, 1H), 4.97 (s, 1H), 3.11-3.06 (m, 2H), 1.56-1.47 (m, 2H), 0.86 (t, *J* = 6.9 Hz, 3H). **^{13}C NMR (101MHz, $CDCl_3$)** δ 159.11, 148.04, 137.41, 112.38, 106.38, 44.03, 22.71, 11.59.
23.		**4-(4-nitrophenyl)morpholine[25]** **^{1}H NMR (400MHz, $CDCl_3$)** δ 8.14-8.11 (m, 2H), 6.84-6.82 (m, 2H), 3.87 – 3.84 (m, 4H), 3.38 – 3.35 (m, 4H). **^{13}C NMR (101MHz, $CDCl_3$)** δ 154.92, 139.03, 125.85, 112.66, 66.31, 47.13.
24.		**4-(quinolin-3-yl)morpholine[26]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.79 (s, 1H), 8.04 (d, *J* = 8.2 Hz, 1H), 7.70-7.68 (m, 1H), 7.56-7.45 (m, 2H), 7.39 (d, *J* = 2.7 Hz, 1H), 3.94-3.91 (m, 4H), 3.29 (dd, *J* = 6.0, 3.6 Hz, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 143.51,143.46, 130.00, 128.37, 127.46, 127.12, 126.74, 117.53, 66.74, 49.35
25.		**4-(7-chloroquinolin-4-yl)morpholine[21]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.72-8.71 (m, 1H), 8.07 (d, *J* = 2.2 Hz, 1H), 7.93 (d, *J* = 9.0 Hz, 1H), 7.43 (dd, *J* = 9.0 , 2 Hz, 1H), 6.84 (d, *J* = 4.7 Hz, 1H), 3.97 (dd, *J* = 5.6 Hz, 1.2 Hz, 4H), 3.23 (t, *J* = 4.6 Hz, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 157.14, 151.57, 149.74, 135.42, 128.69, 126.56, 125.13, 121.70, 108.86, 66.87, 52.69.

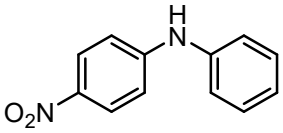
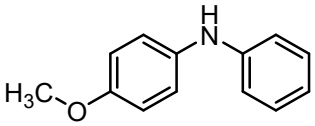
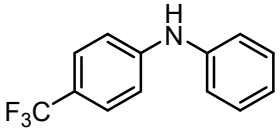
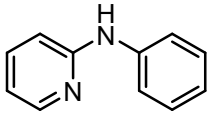
26.		**1-(4-nitrophenyl)piperazine[27]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.10 (d, *J* = 9.0 Hz, 2H), 6.83-6.78 (m, 2H), 3.49-3.46 (m, 4H), 3.02 (t, *J* = 5.1 Hz, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 155.28, 138.49, 126.04, 112.70, 48.17, 45.74
27.		**N-Benzylaniline[28]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.35 – 7.16 (m, 5H), 7.16-7.03 (m, 2H), 6.67-6.6(m, 1H), 6.59 – 6.51 (m, 2H), 4.24 (s, 2H), 3.94 (s, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 148.11, 139.40, 129.25, 128.62, 127.49, 127.21, 117.52, 112.80, 48.27.
28.		**N-benzyl-4-methylaniline[29]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.31-7.16 (m, 5H), 6.92 (d, *J* = 8.1 Hz, 2H), 6.49 (d, *J* = 8.1 Hz, 2H), 4.24 (s, 2H), 3.78 (s, 1H), 2.18 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 145.58, 134.13, 129.79, 128.65, 127.65, 127.56, 127.21, 113.08, 48.73, 20.44.
29.		**N-benzyl-4-nitroaniline[30]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.19-8.06 (m, 2H), 7.48-7.33 (m, 5H), 6.67-6.55 (m, 2H), 4.98 (s, 1H), 4.48 (d, *J* = 5.6 Hz, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 152.07, 136.36, 127.98, 126.88, 126.36, 125.43, 110.34, 98.92, 46.64.

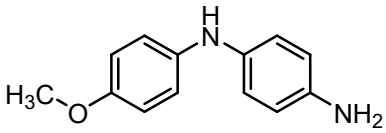
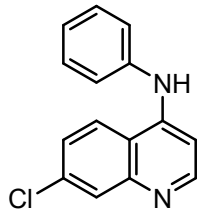
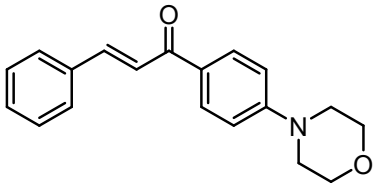
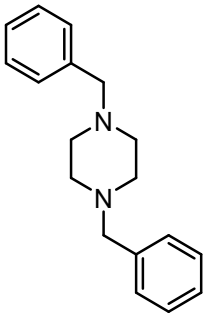
30.		**4-(benzylamino)benzonitrile[30]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.79-7.76 (m, 2H), 7.46-7.34 (m, 7H), 6.46 (s, 1H), 4.68 (d, *J* = 5.6 Hz, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 166.32, 137.95, 137.87, 132.75, 128.91, 128.45, 128.02, 127.81, 44.30.
31.		**N-benzyl-4-(trifluoromethyl)aniline[31]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.44-7.32 (m, 7H), 6.65 (d, *J* = 8.6 Hz, 2H), 4.40 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 150.50, 138.49, 128.84, 127.57, 127.40, 126.67 (q, *J* = 3.7 Hz), 125.02 (q, *J* = 269.0 Hz), 119.01 (q, *J* = 32.4 Hz), 112.00, 47.80 **^{19}F NMR (400 MHz, $CDCl_3$)** δ -61.06
32.		**N-benzyl-3-methylaniline[29]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.43-7.28 (m, 4H), 7.11 (t, *J* = 7.7 Hz, 1H), 6.59 (d, *J* = 7.4 Hz, 1H), 6.52-6.48 (m, 2H), 4.36 (s, 2H), 4.00 (s, 1H), 2.31 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 138.03, 128.11, 128.03, 127.78, 127.61, 126.52, 126.17, 117.48, 112.63, 108.95, 47.25, 20.59.
33.		**N-benzyl-2-nitroaniline[30]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.49 (s, 1H), 8.25 (dd, *J* = 8.6, 1.6 Hz, 1H), 7.38-7.31 (m, 6H), 6.88-6.85 (m, 1H), 6.74-6.72 (m, 1H), 4.61 (d, *J* = 5.7 Hz, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 144.56, 138.26, 137.50, 136.33, 129.03, 127.795, 127.13, 126.98, 115.83, 114.29, 47.18

34.		**N-benzylpyridin-2-amine[29]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.088 (d, *J* = 4.8, 1H), 7.41-7.11 (m, 6H), 6.60-6.56 (m, 1H), 6.35 (d, *J* = 8.4 4.98 (s, 1H), 4.50 (d, *J* = 5.6 Hz, 2H), **^{13}C NMR (101 MHz, $CDCl_3$)** δ 159.17, 148.73, 139.69, 138.03, 129.17, 129.05, 127.92, 113.68, 107.32, 46.84
35.		**N-(4-methylbenzyl)pyridin-2-amine[30]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.15-8.14 (m, 1H), 7.46-7.42 (m, 1H), 7.31-7.26 (m, 2H), 7.19 (d, *J* = 7.9 Hz, 2H), 6.63 (dd, *J* = 7.0 Hz, 1H), 6.41 (d, *J* = 8.3 Hz, 1H), 4.93 (s, 1H), 4.50 (d, *J* = 5.7 Hz, 2H), 2.38 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 159.25, 148.79, 138.04, 137.47, 136.64, 129.89, 127.98, 113.66, 107.33, 46.70, 21.68.
36.		**N-benzylquinolin-3-amine[32]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.51 (d, *J* = 2.8 Hz, 1H), 7.99 (dd, *J* = 6.2 Hz, 1H), 7.62-7.59 (m, 1H), 7.45 (q, *J* = 3.3 Hz, 2H), 7.36-7.32 (m, 4H), 7.31-7.27 (m, 1H), 7.04 (d, *J* = 2.8 Hz, 1H), 4.52 (t, *J* = 5.4 Hz, 1H), 4.45 (d, *J* = 4.7 Hz, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 141.58, 138.30, 131.25,129.97, 129.57, 128.94, 128.41,127.72, 127.58, 127.22, 126.13, 125.37, 125.17, 48.05

37.		**N-benzyl-7-chloroquinolin-4-amine[33]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.52 (d, *J* = 5.4 Hz, 1H), 7.97 (d, *J* = 2.2 Hz, 1H), 7.68 (d, *J* = 8.9 Hz, 1H), 7.41-7.29 (m, 6H), 6.44 (d, *J* = 5.3 Hz, 1H), 5.34 (s, 1H), 4.52 (d, *J* = 5.2 Hz, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 152.14, 149.56, 149.13, 137.25, 135.09, 129.12, 128.98, 128.09, 127.70, 125.63, 121.00, 99.77, 47.69.
38.		**7-chloro-N-(4-chlorobenzyl)quinolin-4-amine** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.49 (s, 1H), 7.95 (s, 1H), 7.77-7.68 (m, 1H), 7.39-7.20 (m, 6H), 6.37 (d, *J* = 4.8 Hz, 1H), 5.50 (t, *J* = 5.4 Hz, 1H), 4.49 (d, *J* = 5.3 Hz, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 152.10, 149.42, 135.75, 135.17, 133.81, 129.24, 128.99, 128.85, 125.75, 121.05, 117.37, 99.90, 46.94. **HRMS (CH_3CN) $[M]^+$ (m/z)** Calc. Value for $C_{16}H_{12}Cl_2N_2$: 303.0451, observed: 303.0454
39.		**N-(4-methylbenzyl)-4-nitroaniline** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.14 (d, *J* = 9.2 Hz, 2H), 7.29-7.22 (m, 4H), 6.61 (d, *J* = 9.2 Hz, 2H), 4.86 (s, 1H), 4.43 (d, *J* = 5.3 Hz, 2H), 2.41 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 153.07, 137.74, 134.30, 129.68, 127.47, 126.46, 122.24, 11.34, 47.50, 21.17. **HRMS (CH_3CN) $[M + H]^+$ (m/z)** Calc. Value for $C_{14}H_{14}N_2O_2$: 242.1055, observed: 242.1052

40.		**Diphenylamine[25]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.31 (t, *J* = 7.9 Hz, 4H), 7.12-7.10 (m, 4H), 6.97 (t, *J* = 7.3 Hz, 2H), 5.74 (s, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 143.13, 129.38, 121.02, 117.82
41.		**4-methyl-N-phenylaniline[34]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.30-7.26 (m, 2H), 7.13 (d, *J* = 8.3 Hz, 2H), 7.06-7.03 (m, 4H), 6.92 (t, *J* = 7.3 Hz, 1H), 5.63 (s, 1H), 2.35 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 142.93, 139.27, 129.91, 128.85, 128.30. 119.28, 117.89, 115.84, 19.69
42.		**2-methyl-N-phenylaniline[35]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.23-7.15 (m, 4H), 7.18 (t, *J* = 7.5 Hz, 1H), 7.01-6.92 (m, 4H), 2.30 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 142.84, 140.09, 129.83, 128.24, 128.22, 128.19, 128.17, 128.16, 127.15, 125.64, 120.85, 119.35, 117.62. 116.37, 116.36, 116.35, 116.34, 116.33, 116.32, 116.31, 116.30, 116.29, 16.80.
43.		**2-nitro-N-phenylaniline[36]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 9.55 (s, 1H), 8.26 (dd, *J* = 8.6, 1.4 Hz, 1H), 7.49-7.40 (m, 3H), 7.33 (d, *J* = 7.9 Hz, 2H), 7.28 (d, *J* = 8.6 Hz, 2H), 6.80-6.75 (m, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 143.16, 138.75, 135.76, 133.37, 129.80, 126.74, 125.73, 124.46, 117.56, 116.10

44.		**4-nitro-N-phenylaniline[36]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.17 (d, *J* = 9.1 Hz, 2H), 7.44 (t, *J* = 7.8 Hz, 2H), 7.27-7.24 (m, 3H), 6.99 (d, *J* = 9.1 Hz, 2H), 6.33 (s, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 150.18, 139.86, 139.52, 129.81, 126.30, 124.74, 121.98, 113.74.
45.		**4-methoxy-N-phenylaniline[34]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.31 (d, 1H), 7.28-7.24 (m, 2H), 7.14-7.12 (m, 2H), 6.97-6.95 (m, 2H), 6.92-6.88 (m, 2H), 3.85 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 155.31, 145.20, 135.74, 129.36, 122.25, 119.60, 115.66, 114.70, 55.63
46.		**N-phenyl-4-(trifluoromethyl)aniline[34]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.51 (d, *J* = 8.4 Hz, 2H), 7.40-7.36 (m, 2H), 7.20-7.18 (m, 2H), 7.12-7.08 (m, 3H), 5.96 (s, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 146.78, 141.16, 126.74 (q, *J* = 3.5 Hz), 124.65 (q, *J* = 269.4 Hz), 122.97, 122.15, 121.66 (q, *J* = 32.4 Hz), 120.05, 115.36. **^{19}F NMR (400 MHz, $CDCl_3$)** δ -61.48
47.		**N-phenylpyridin-2-amine[37]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.25 (d, *J* = 4.8 Hz, 1H), 7.56-7.52 (m, 1H), 7.38 (d, *J* = 3.8 Hz, 4H), 7.10-7.02 (m 1H), 6.93 (d, *J* = 8.3 Hz, 1H), 6.79-6.78 (m, 1H), 6.66 (s, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 156.67, 149.13, 141.13, 138.41, 130.01, 123.55, 121.05, 115.78, 108.92

48.		**N1-(4-methoxyphenyl)benzene-1,4-diamine[38]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.28 (d, *J* = 9.0 Hz, 2H), 7.15 (s, 1H), 7.07-6.96 (m, 2H), 6.75-6.72 (m, 4H), 3.67 (s, 2H), 3.68 (s, 3H) **^{13}C NMR (101 MHz, $CDCl_3$)** δ 154.54, 144.43, 134.97, 128.58, 121.47, 115.69, 114.89, 113.93, 54.86
49.		**7-chloro-N-phenylquinolin-4-amine[17]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 8.39 (s, 1H), 8.05 (s, 2H), 7.44 (t, *J* = 7.8 Hz, 4H), 7.35 (d, *J* = 8.3 Hz, 3H), 6.89 (s, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 151.98, 141.54, 139.46, 135.59, 129.89, 129.08, 126.25, 125.54, 125.13, 122.91, 121.17, 118.13, 102.53.
50.		**(E)-1-(4-morpholinophenyl)-3-phenylprop-2-en-1-one[39]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.97-8.01 (m, 2H), 7.76 (d, *J* = 8 Hz, 1H), 7.58 – 7.55 (m, 2H), 7.50-7.48 (m, 2H), 6.90-6.87 (m, 2H), 3.87-3.84 (m, 4H), 3.28-3.25 (m, 4H). **^{13}C NMR (101 MHz, $CDCl_3$)** δ 190.95, 152.92,145.14, 139.13, 132.51, 130.23, 128.62, 128.47, 126.36, 118.83, 114.73, 66.73, 40.08
51.		**1,4-dibenzylpiperazine[40]** **^{1}H NMR (400 MHz, $CDCl_3$)** δ 7.30-7.22 (m, 10H), 3.50 (s, 4H), 2.48 (s, 8H) **^{13}C NMR (101 MHz, $CDCl_3$)** δ 137.18, 128.41, 127.33, 126.17, 62.21, 52.19

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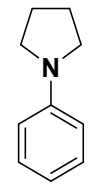


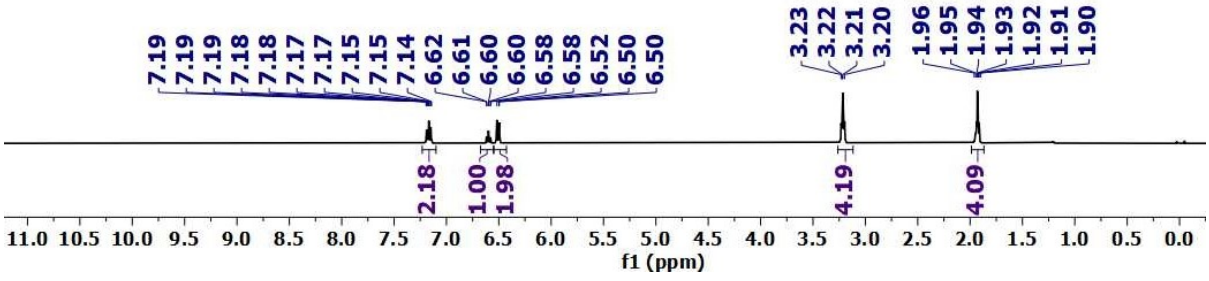
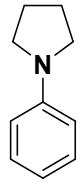


Figure S10: ^{1}H NMR of Compound 2a



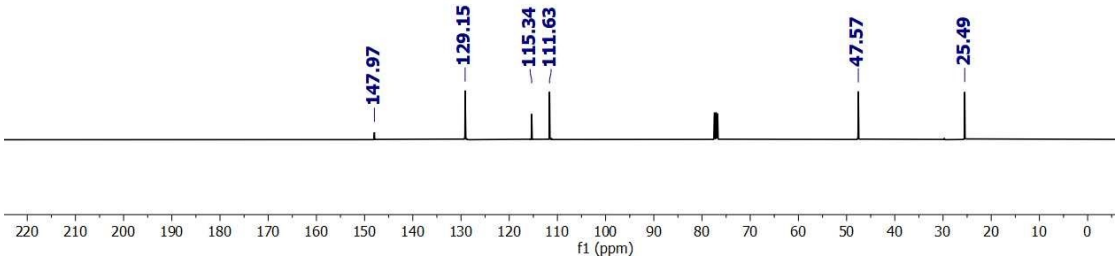


Figure S11: ^{13}C NMR of Compound 2a

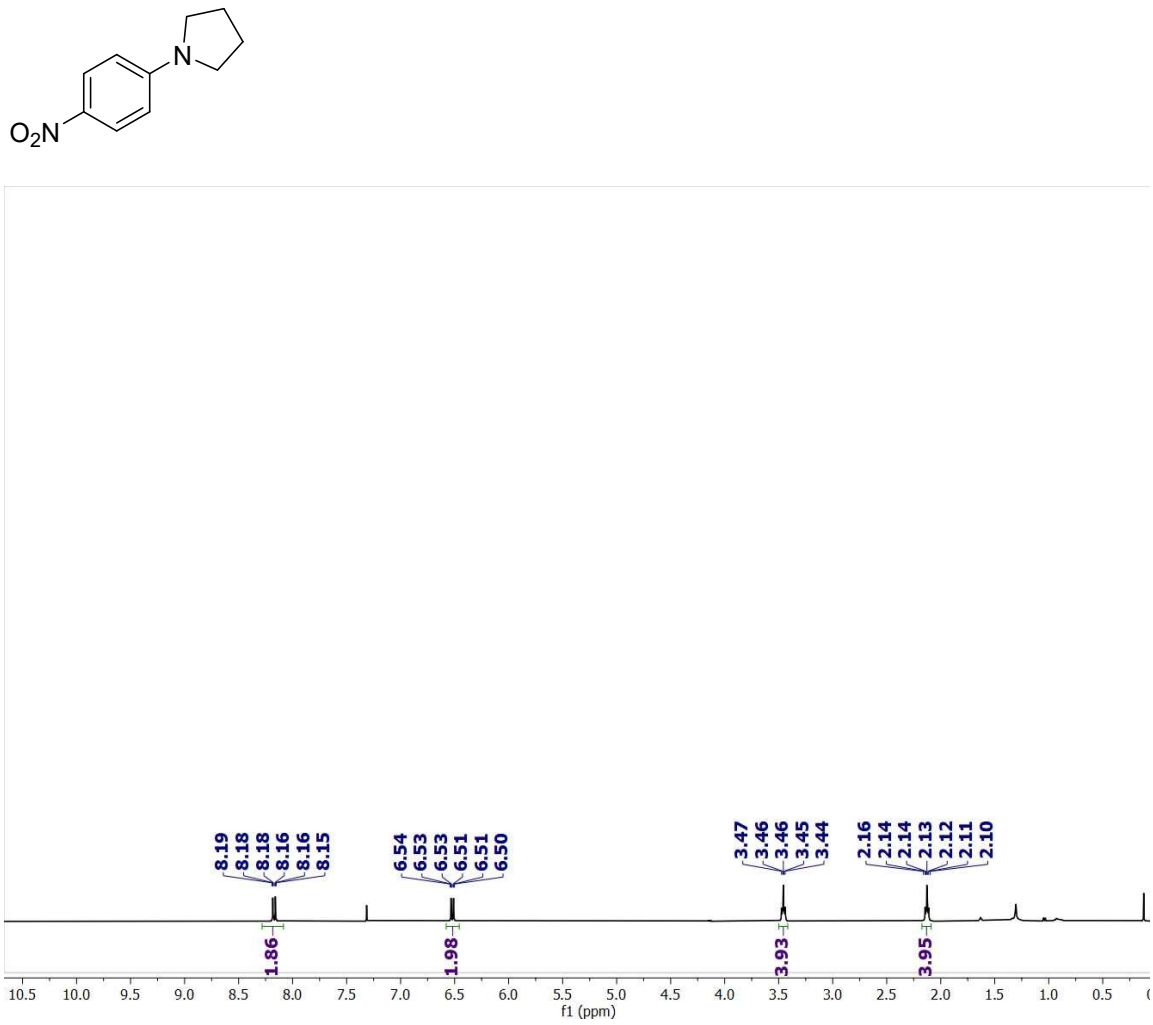
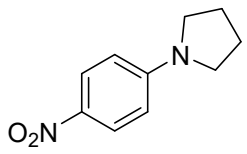


Figure S12: ^{1}H NMR of Compound 2b



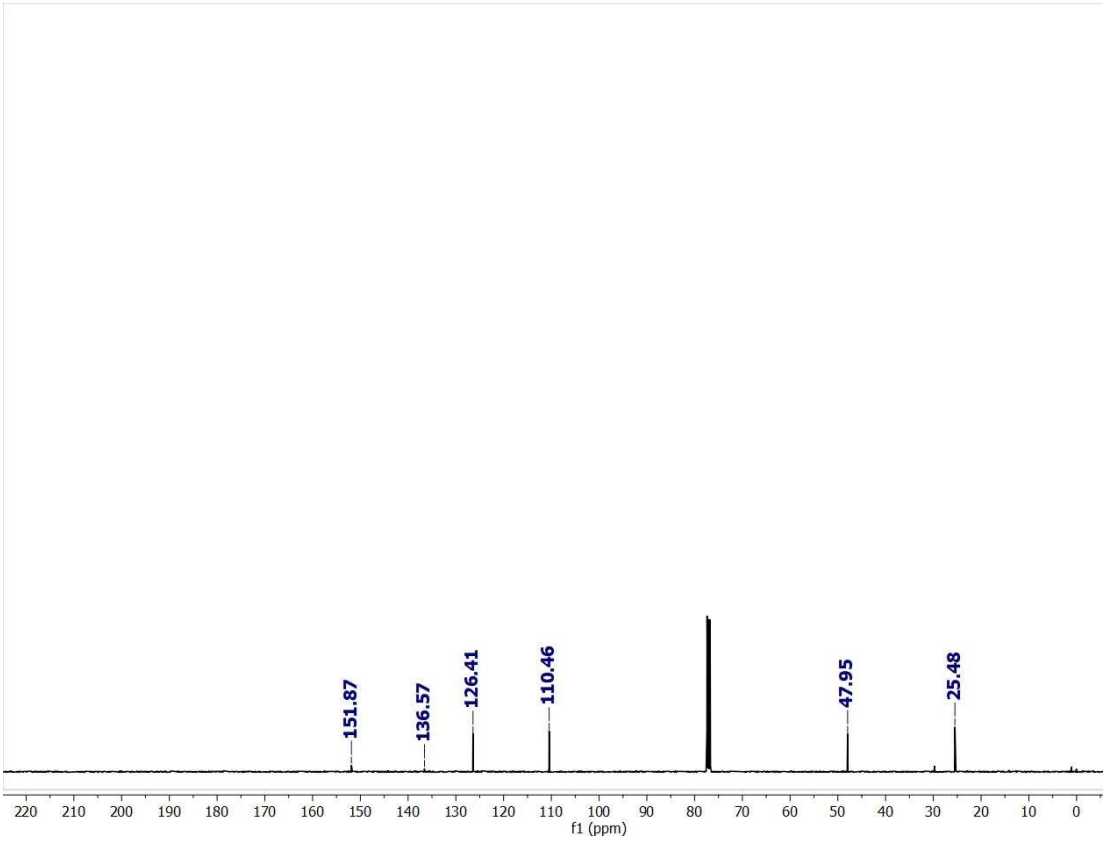


Figure S13: ^{13}C NMR of Compound 2b

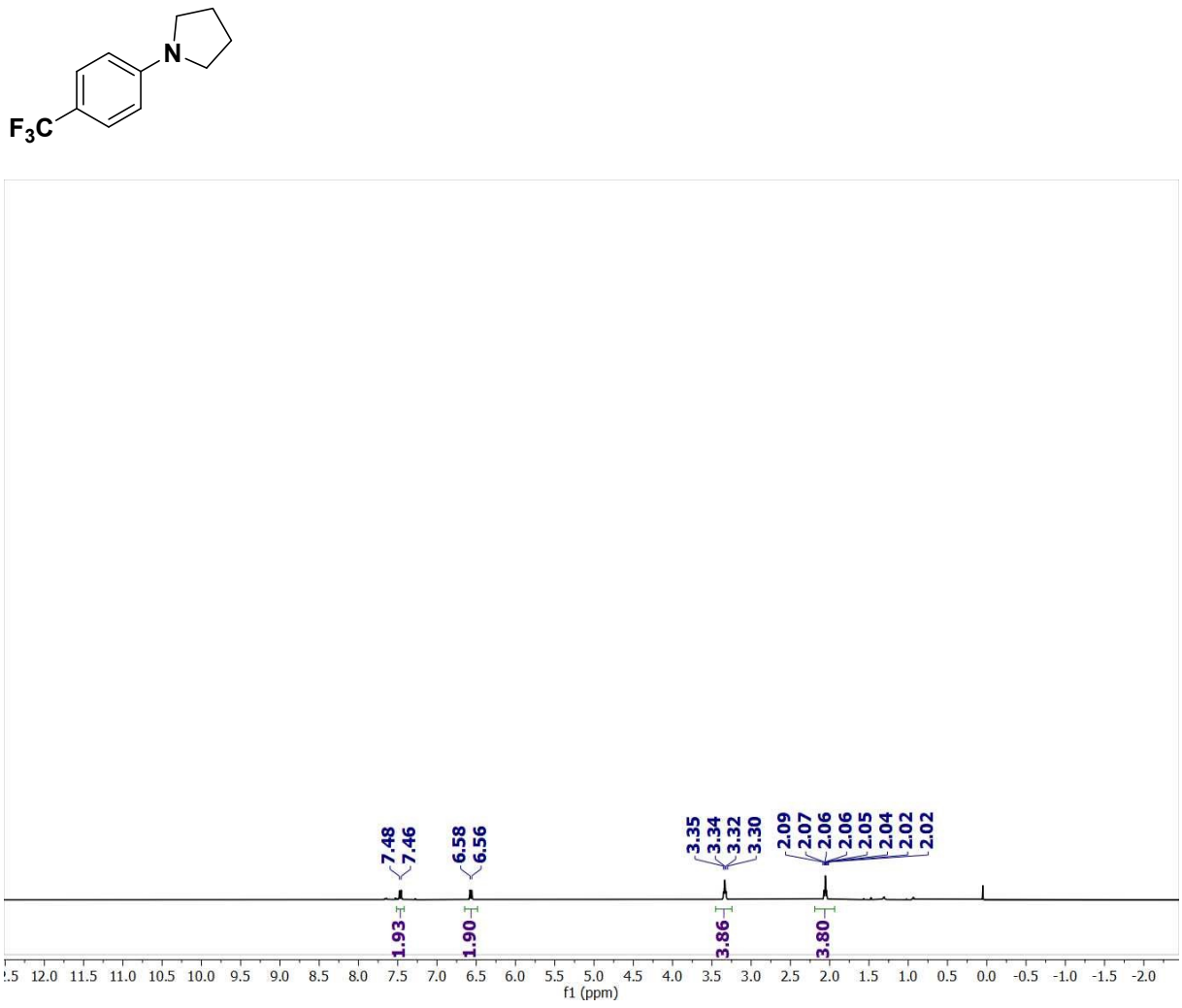
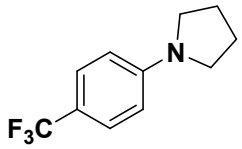


Figure S14: ^{1}H NMR of Compound 2c



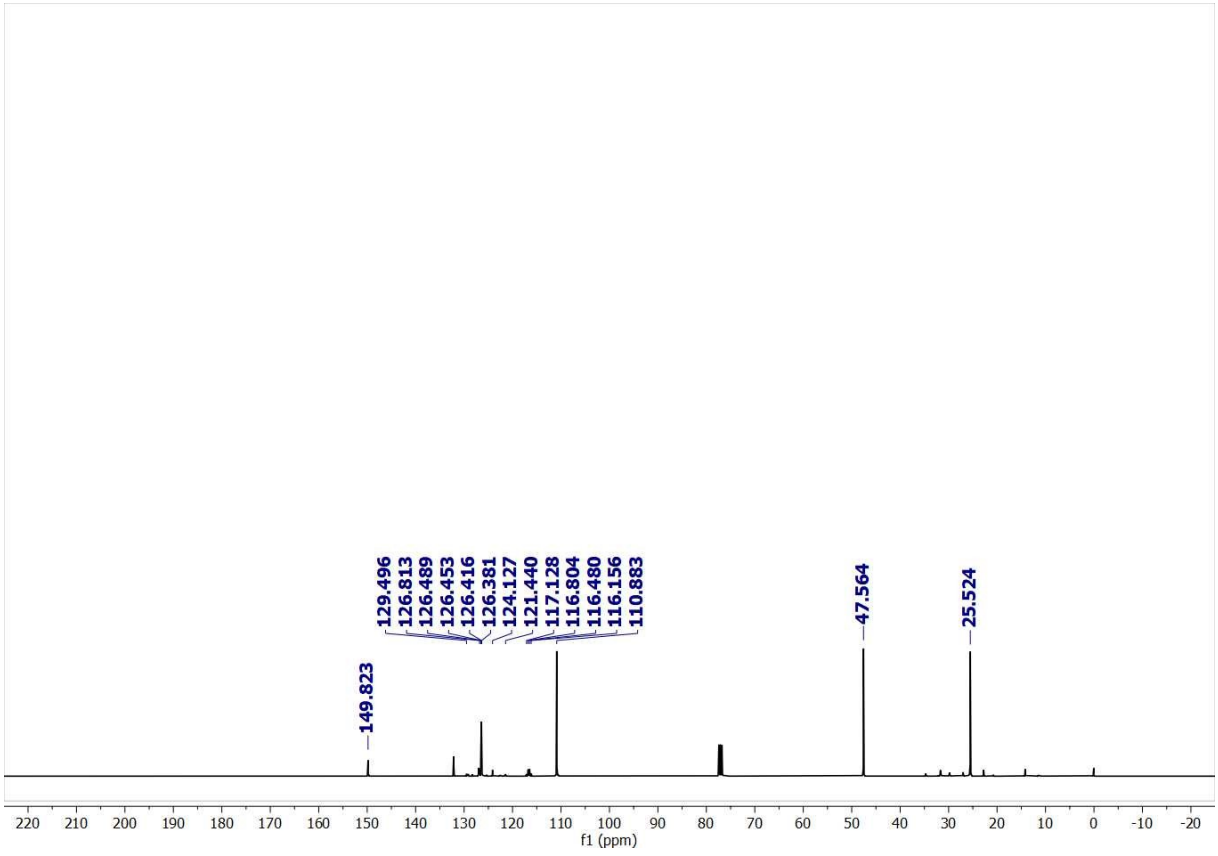


Figure S15: ^{13}C NMR of Compound 2c

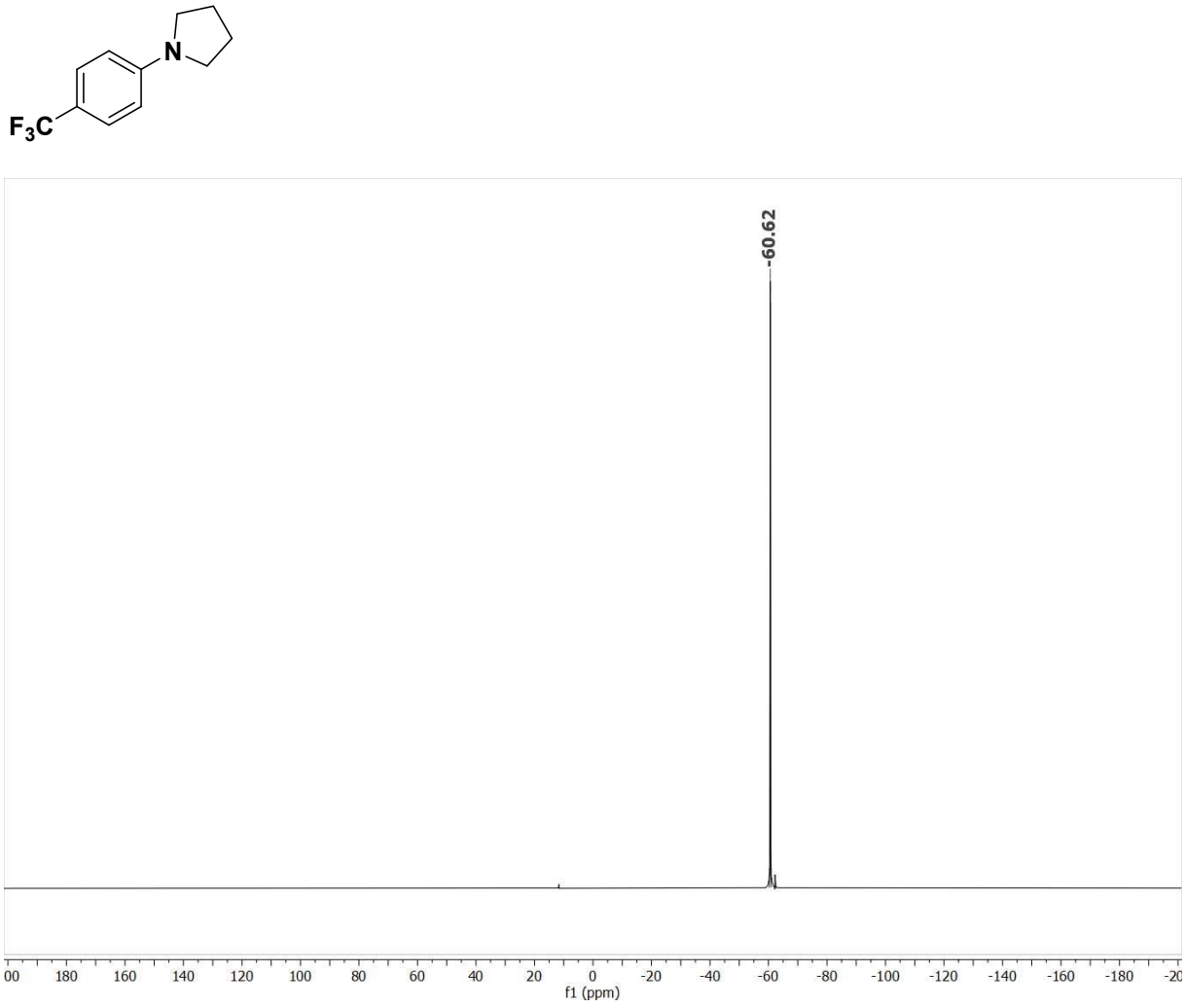
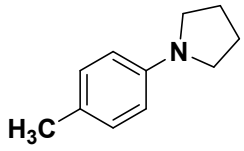


Figure S16: ^{19}F NMR of Compound 2c



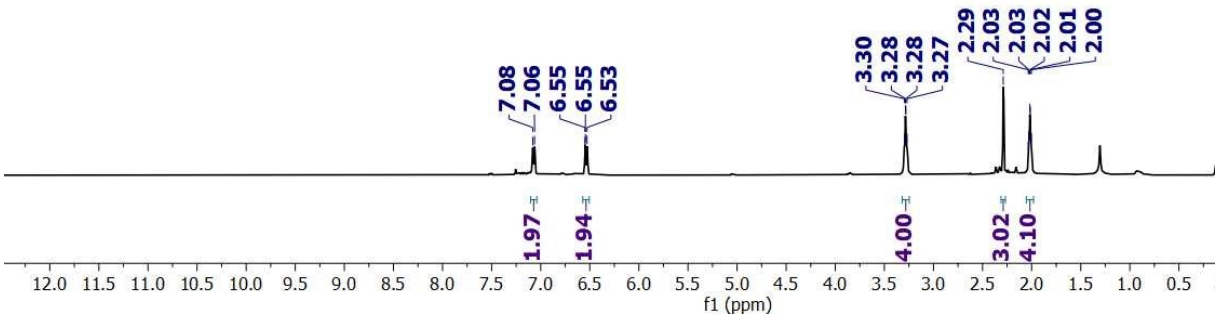
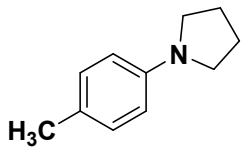


Figure S17: ^{1}H NMR of Compound 2d



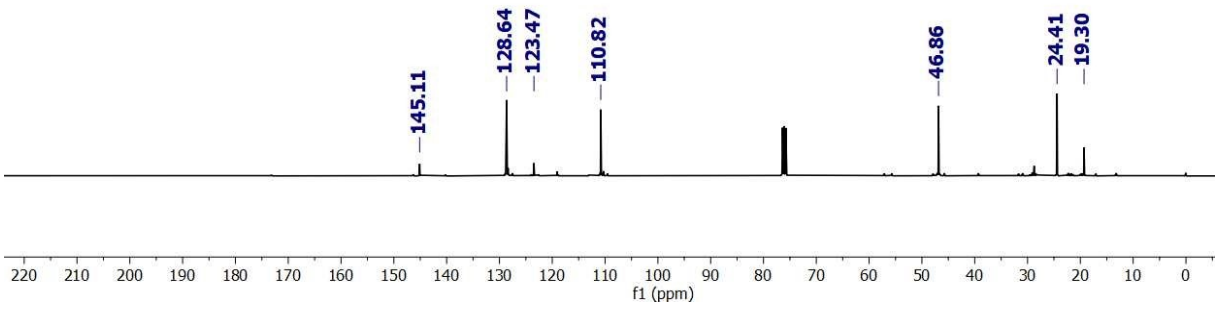
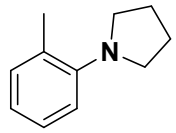


Figure S18: ^{13}C NMR of Compound 2d



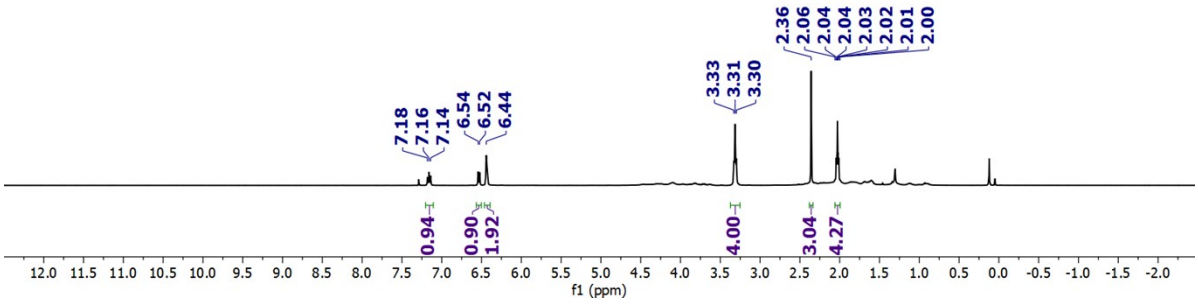


Figure S19: ^{1}H NMR of Compound 2e

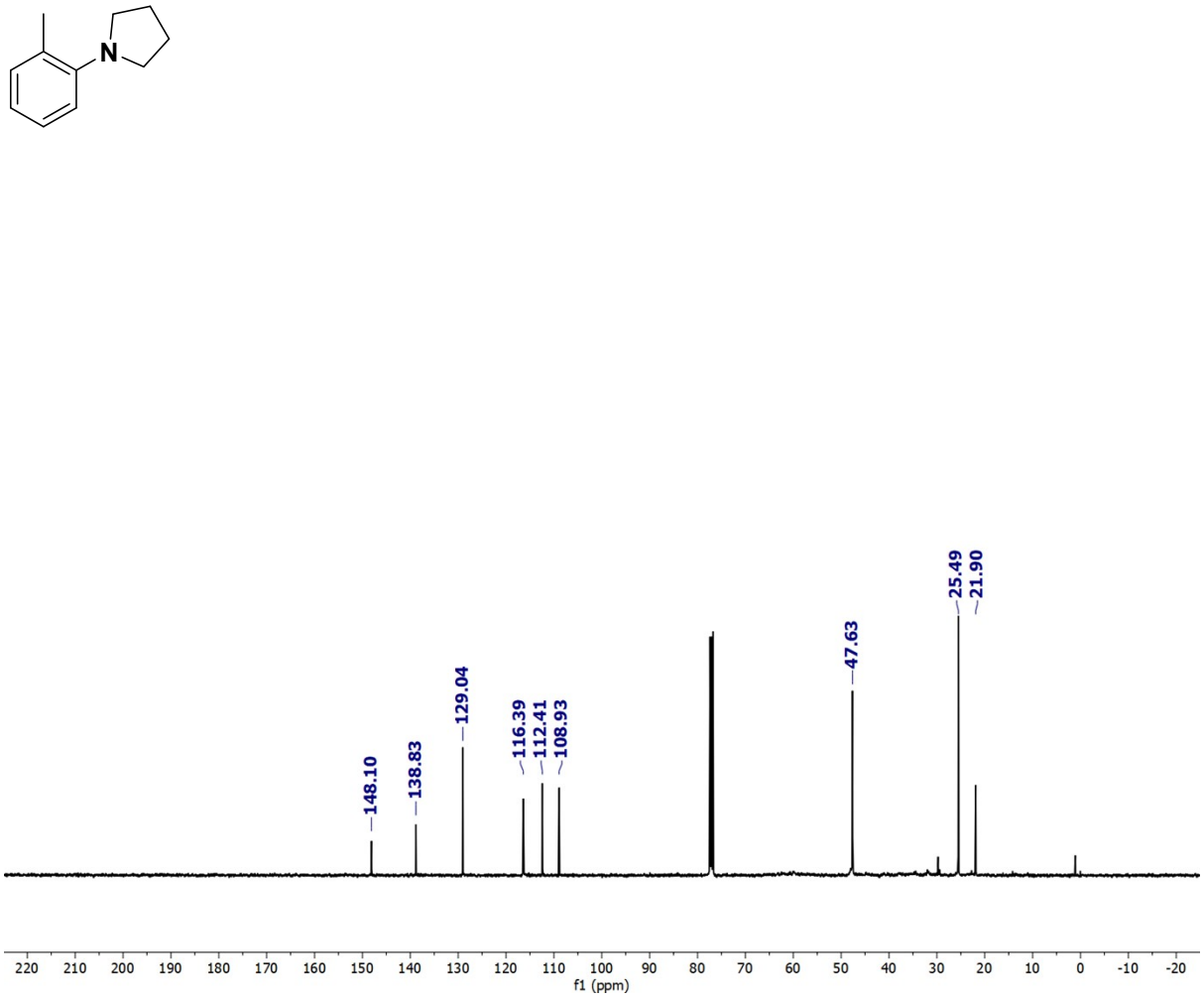
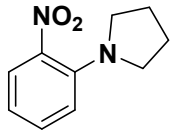


Figure S20: ^{13}C NMR of Compound 2e



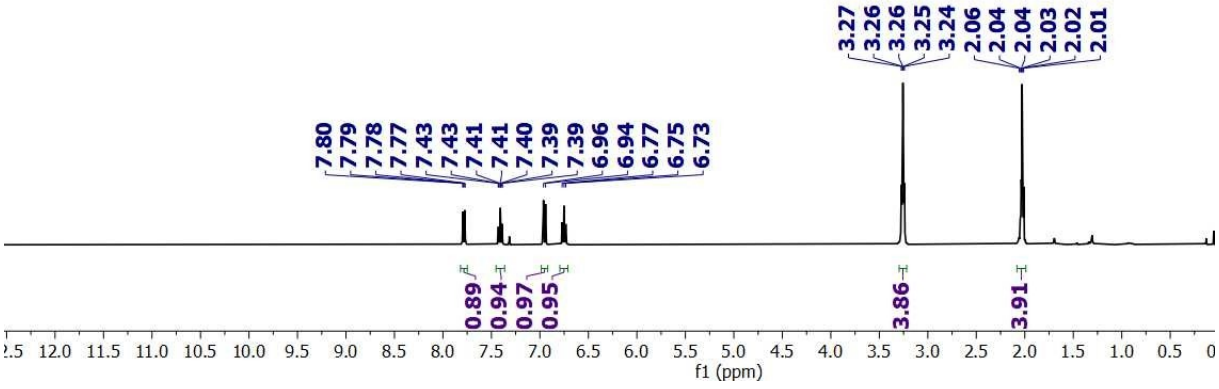
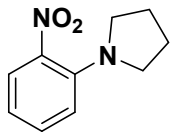


Figure S21: ^{1}H NMR of Compound 2f



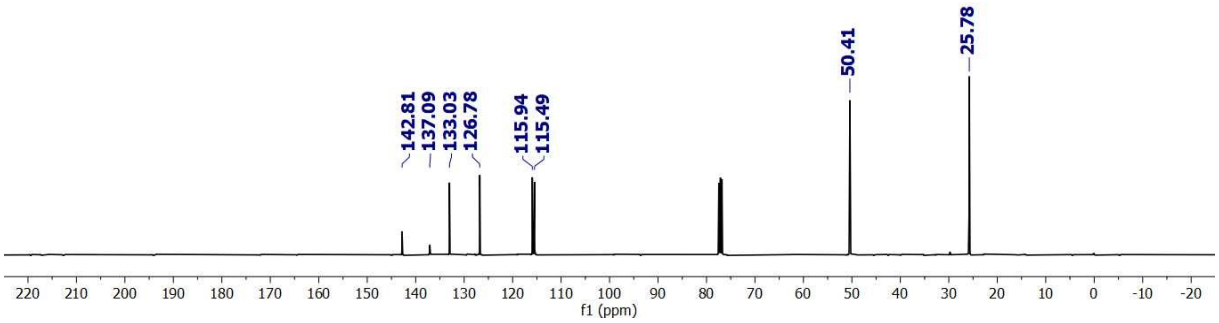
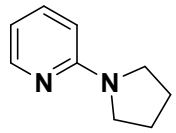


Figure S22: ^{13}C NMR of Compound 2f



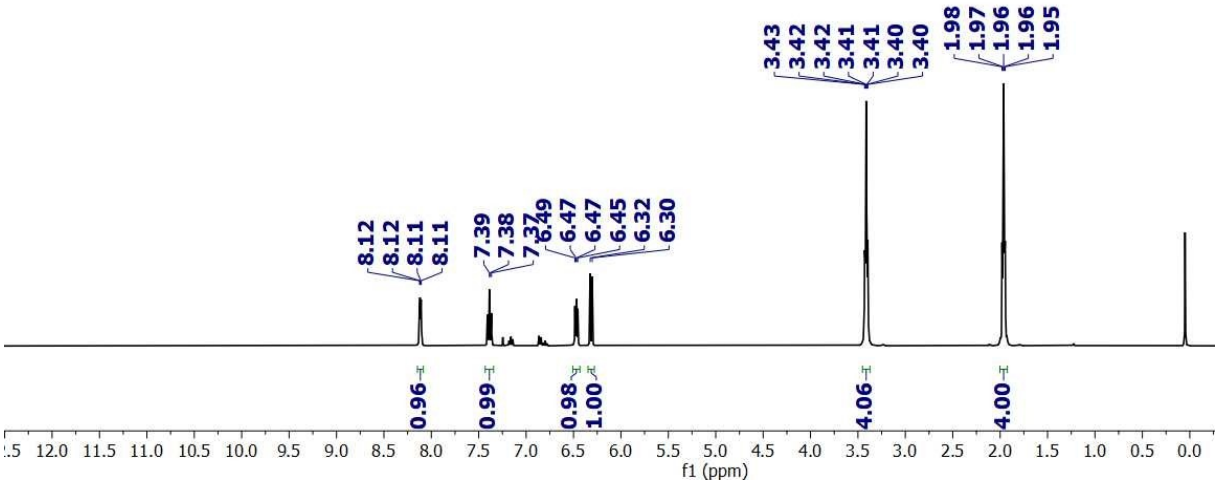
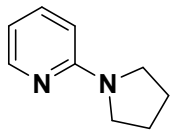


Figure S23: ^{1}H NMR of Compound 2g



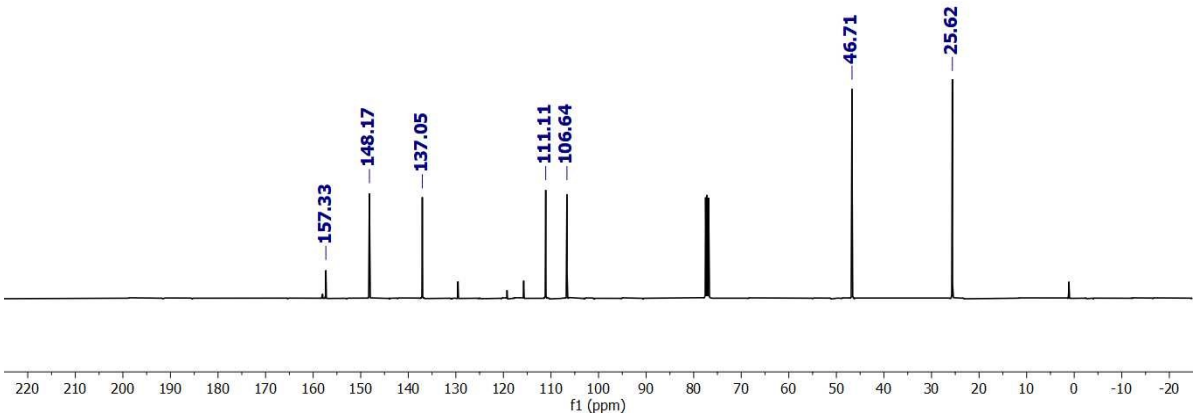


Figure S24: ^{13}C NMR of Compound 2g

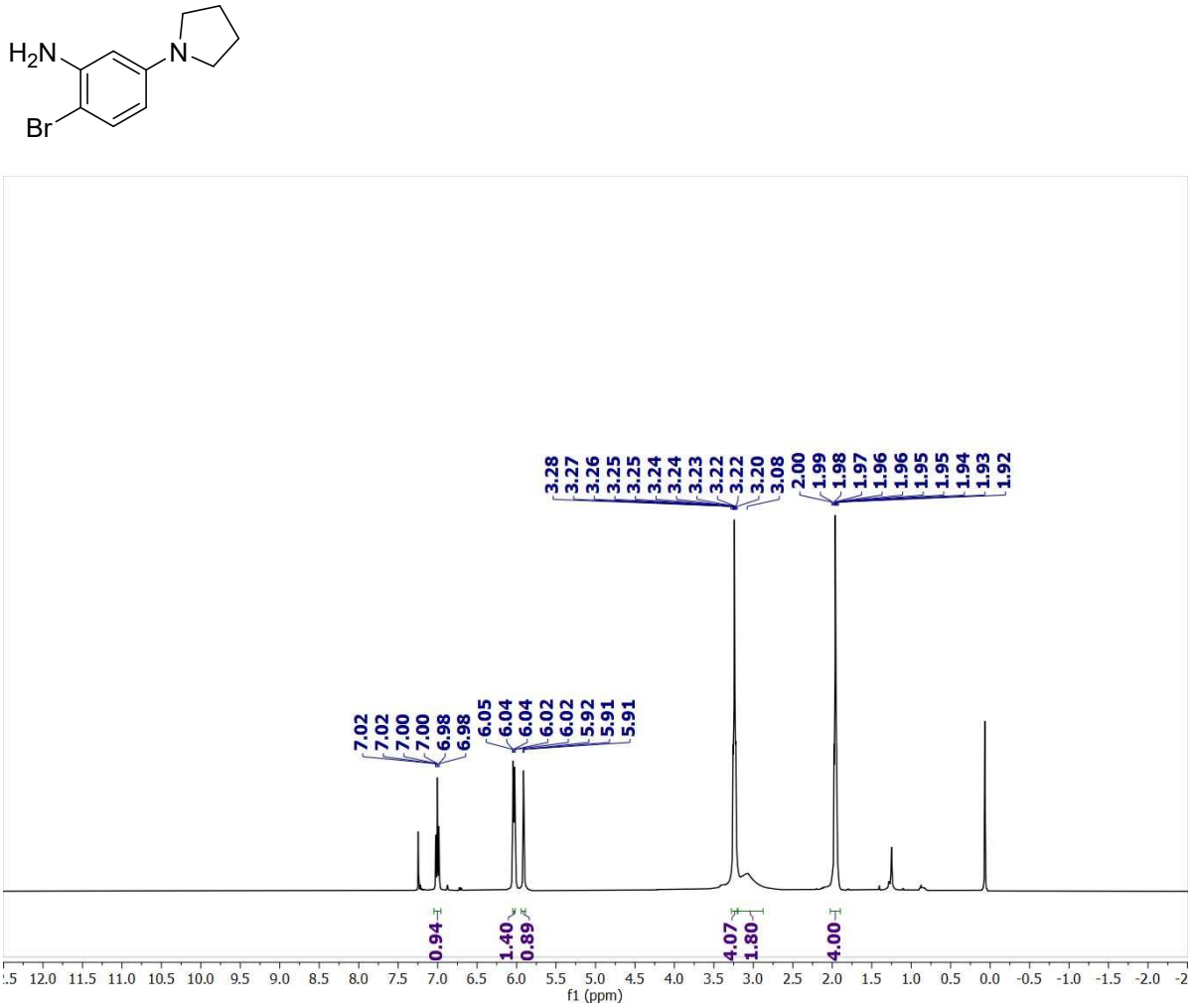


Figure S25: ^{1}H NMR of Compound 2i

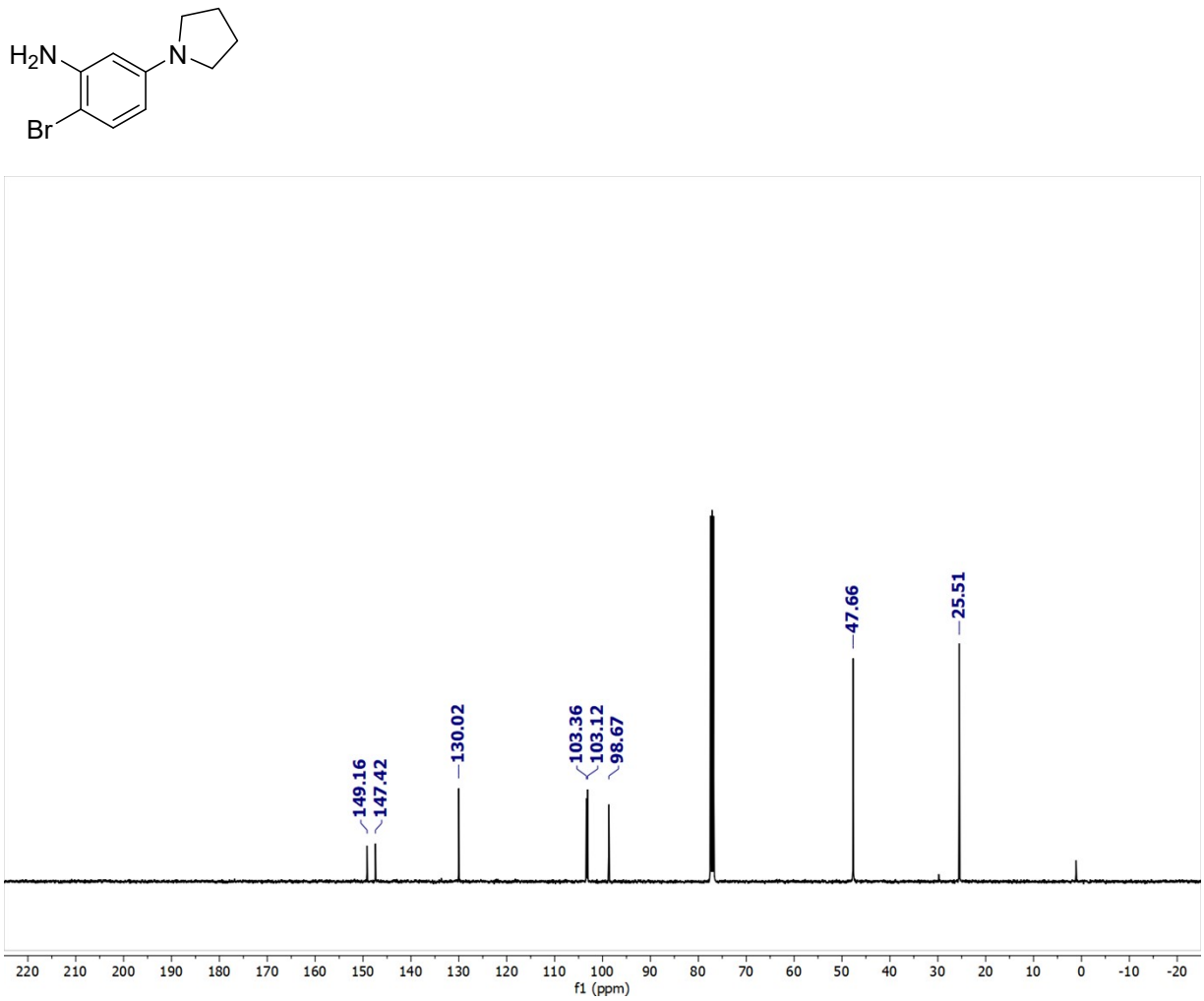


Figure S26: ^{13}C NMR of Compound 2i

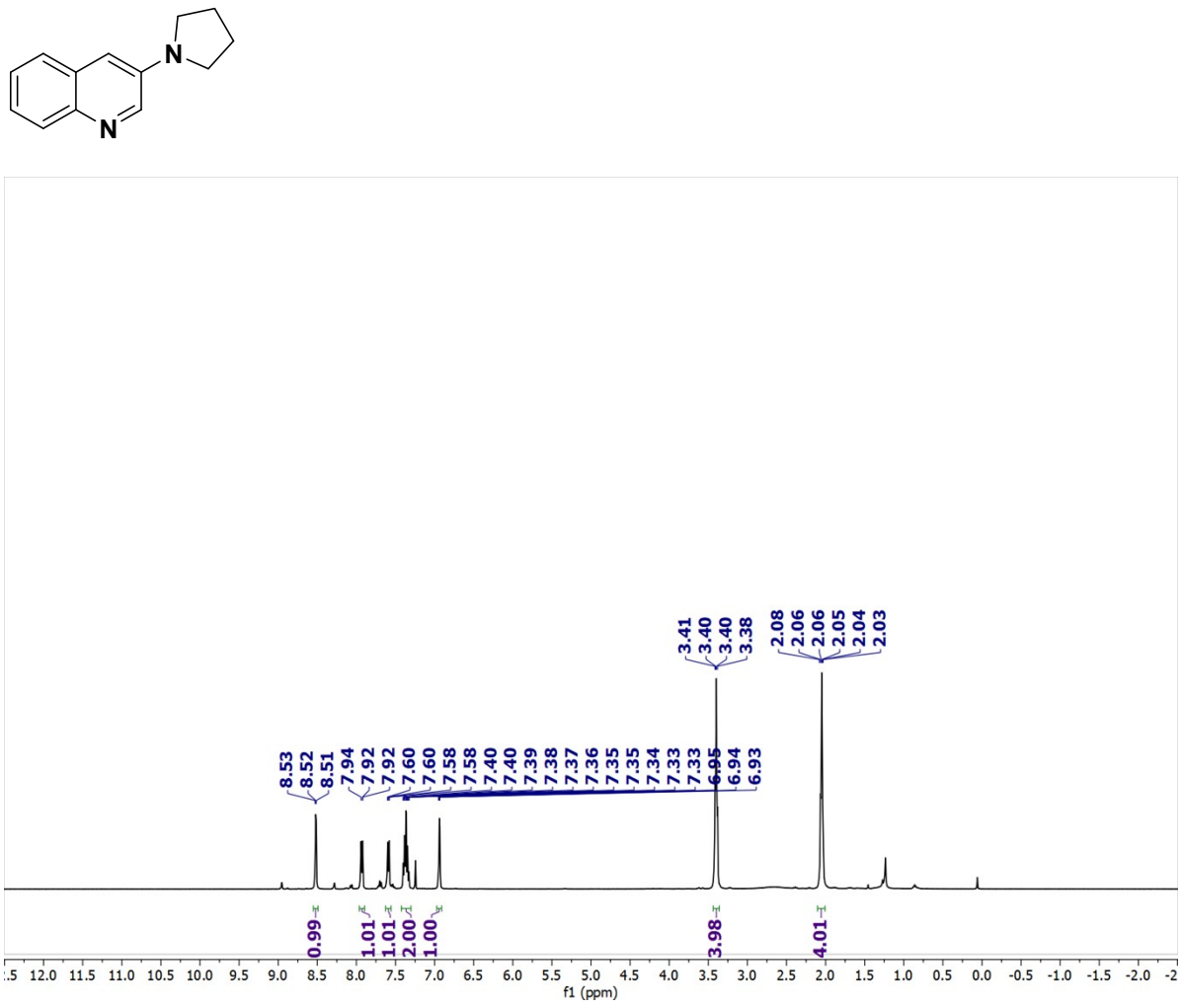
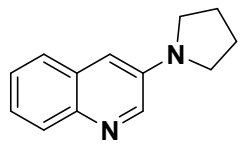


Figure S27: ^{1}H NMR of Compound 2h



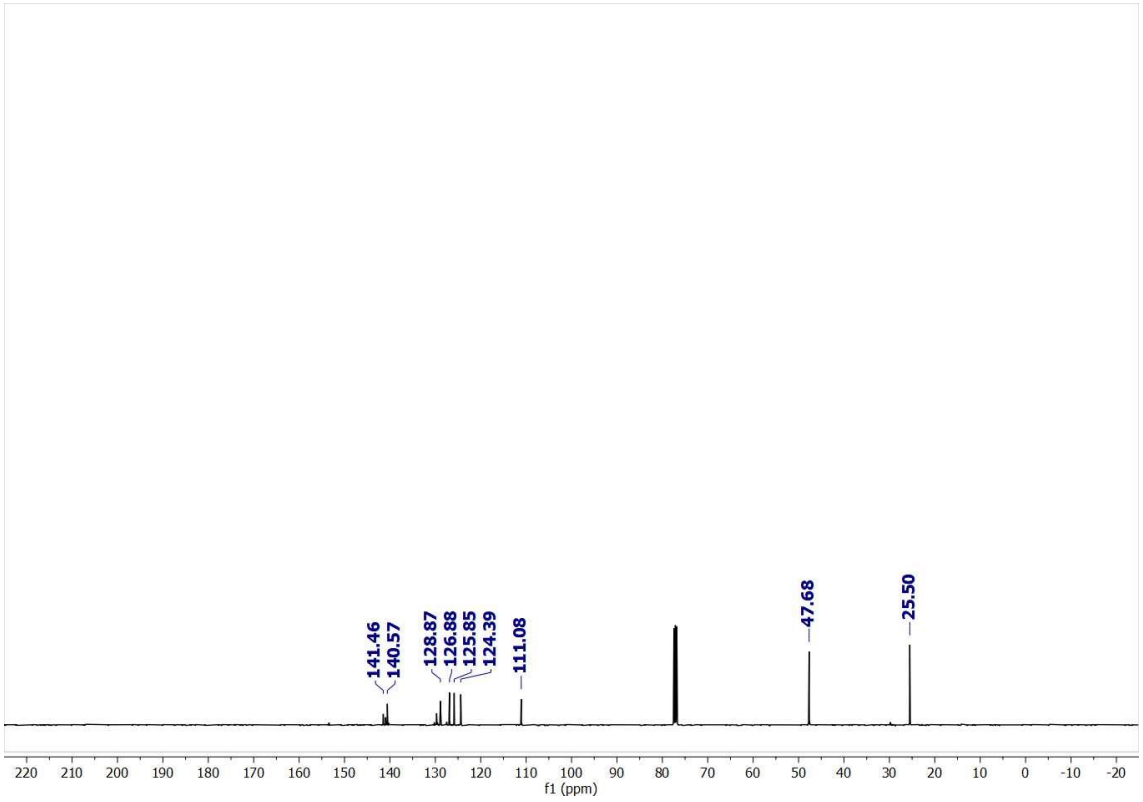


Figure S28: ^{13}C NMR of Compound 2h

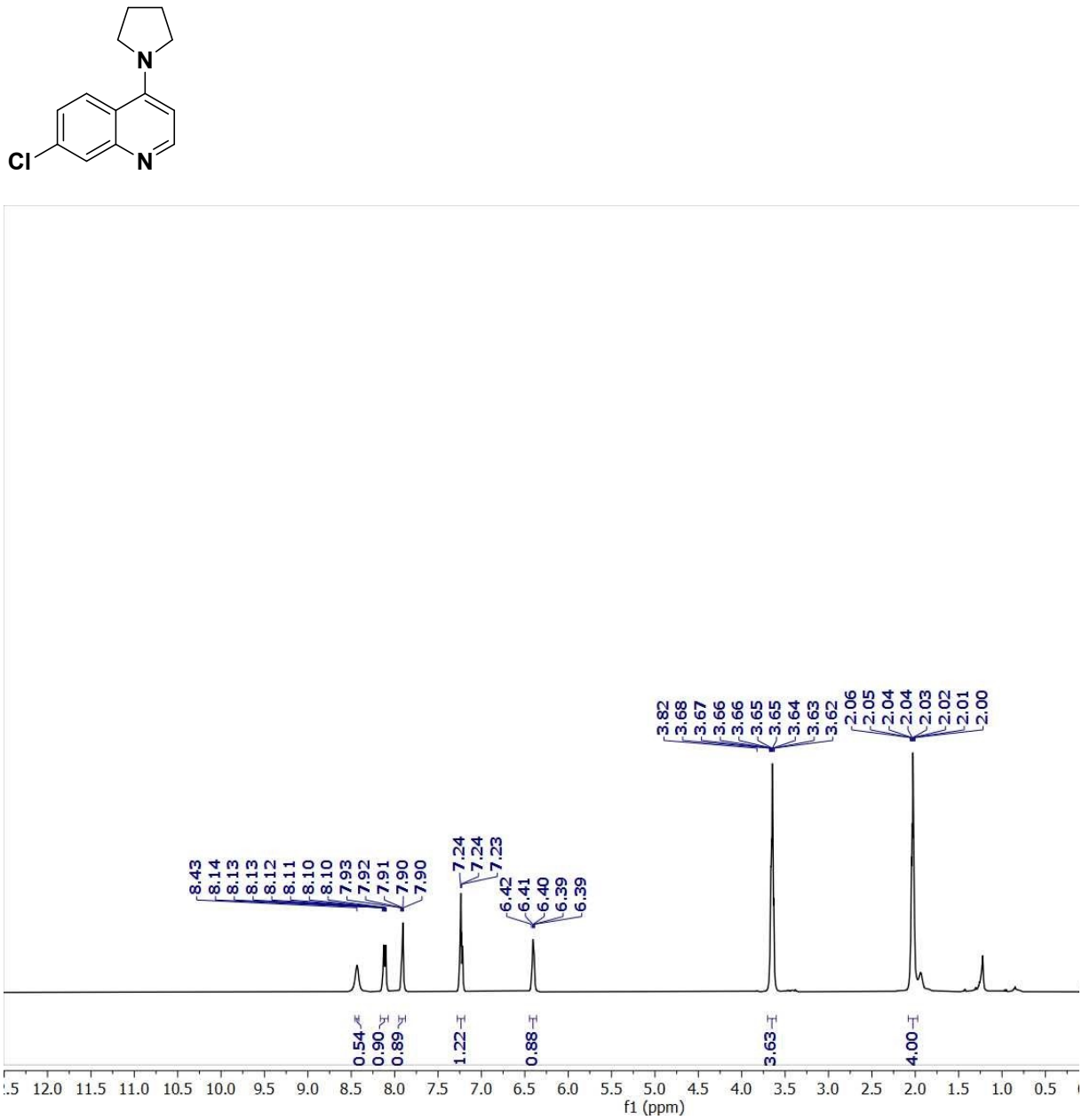


Figure S29: ^{1}H NMR of Compound 2j

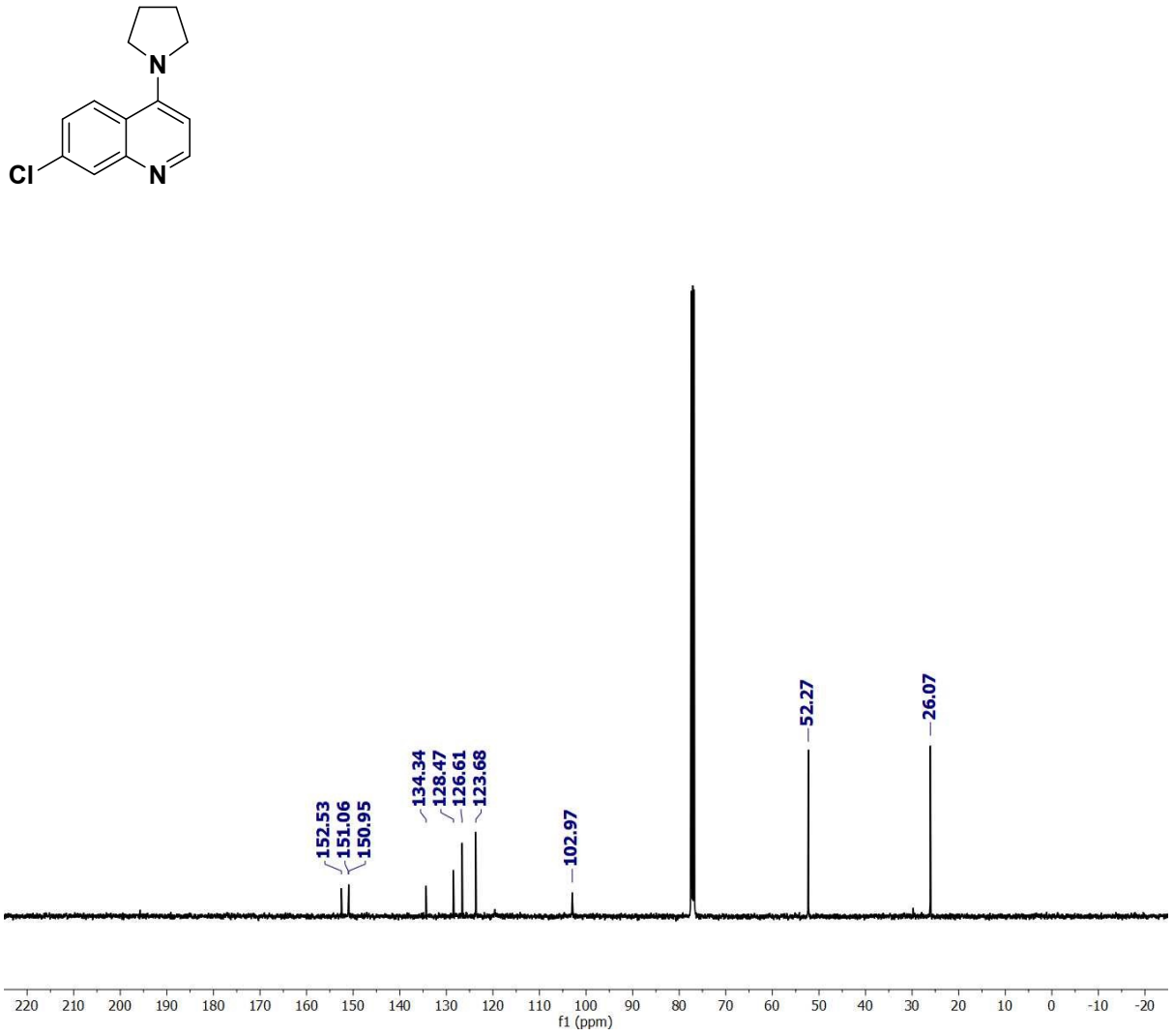
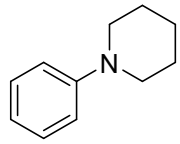


Figure S30: ^{13}C NMR of Compound 2j



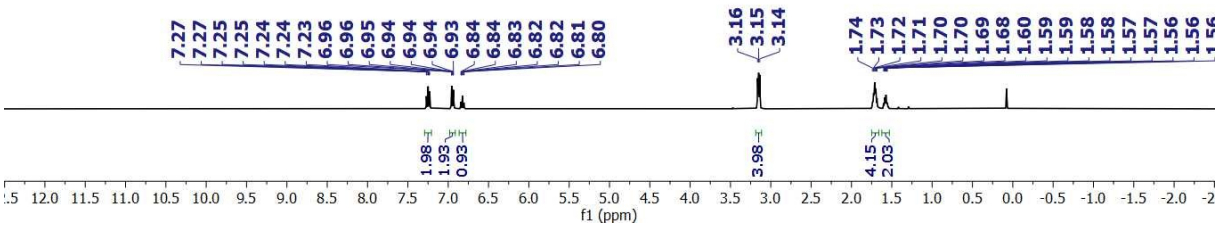
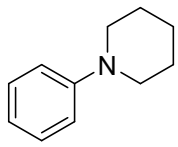


Figure S31: ^{1}H NMR of Compound 3a



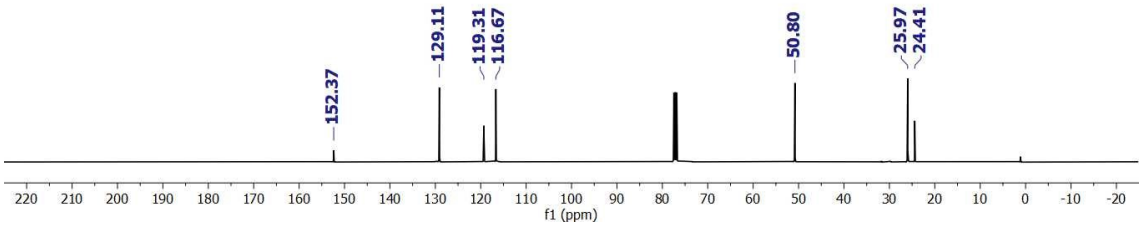


Figure S32: ^{13}C NMR of Compound 3a

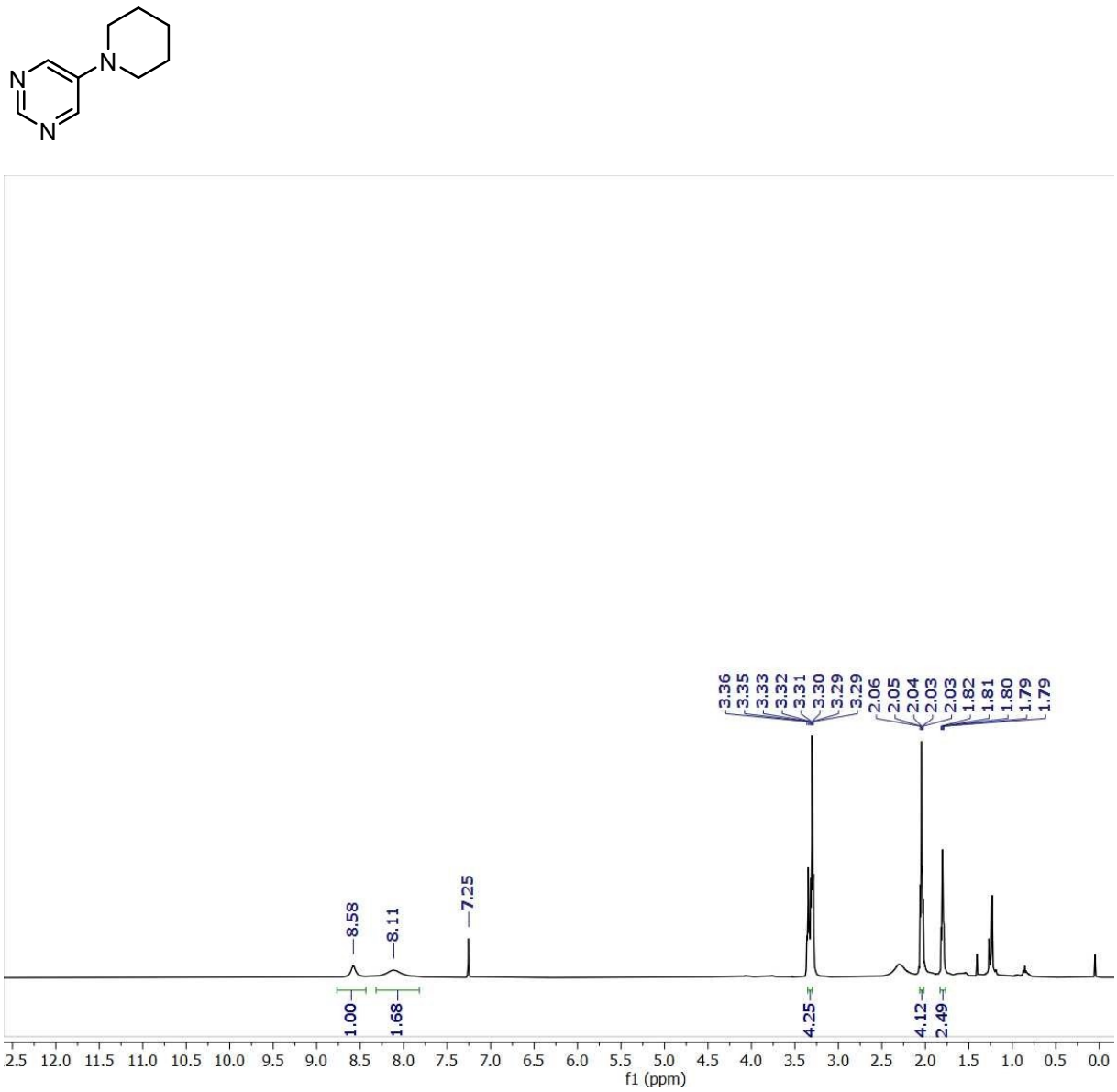


Figure S33: ^{1}H NMR of Compound 3j

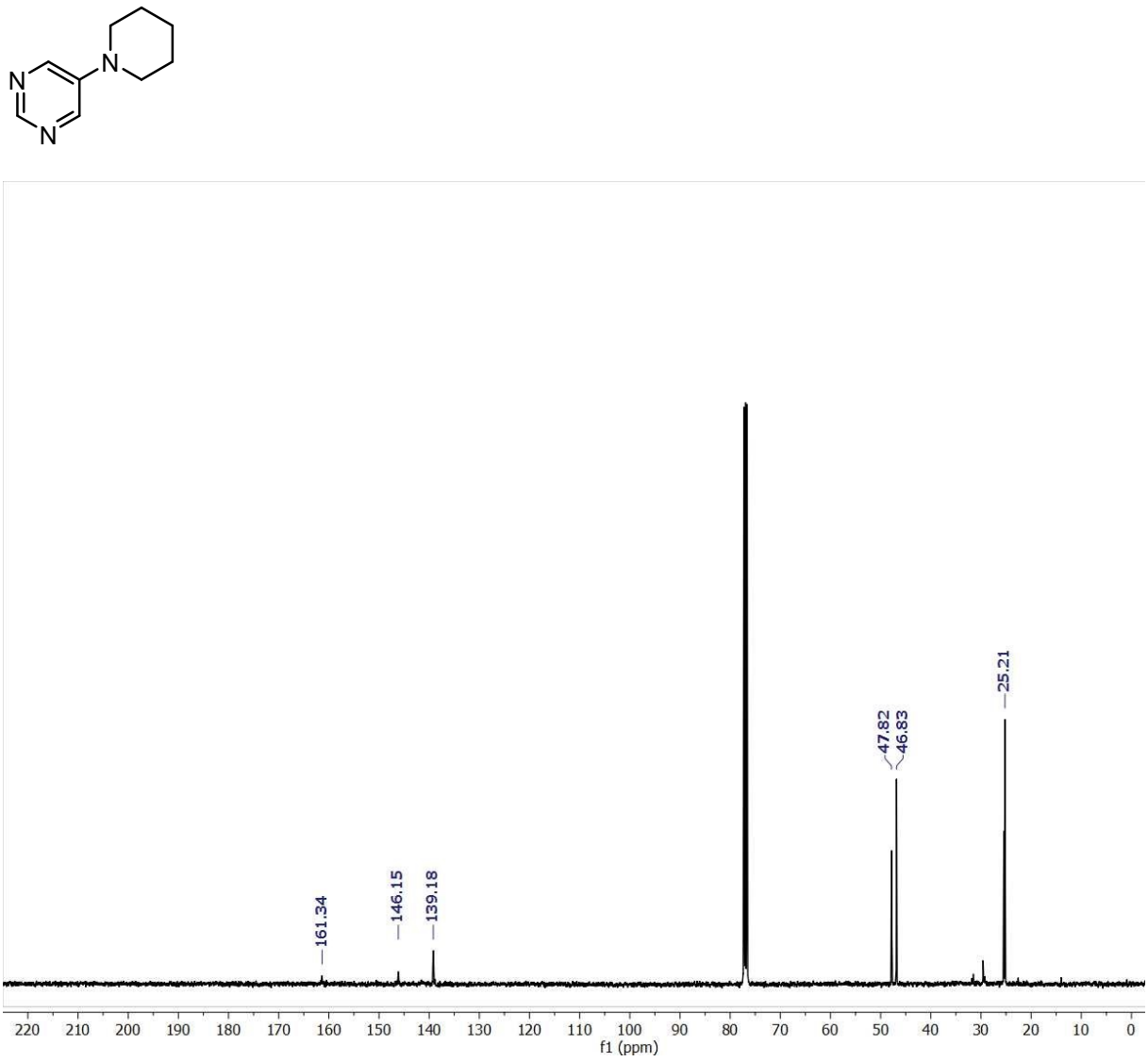


Figure S34: ^{13}C NMR of Compound 3j

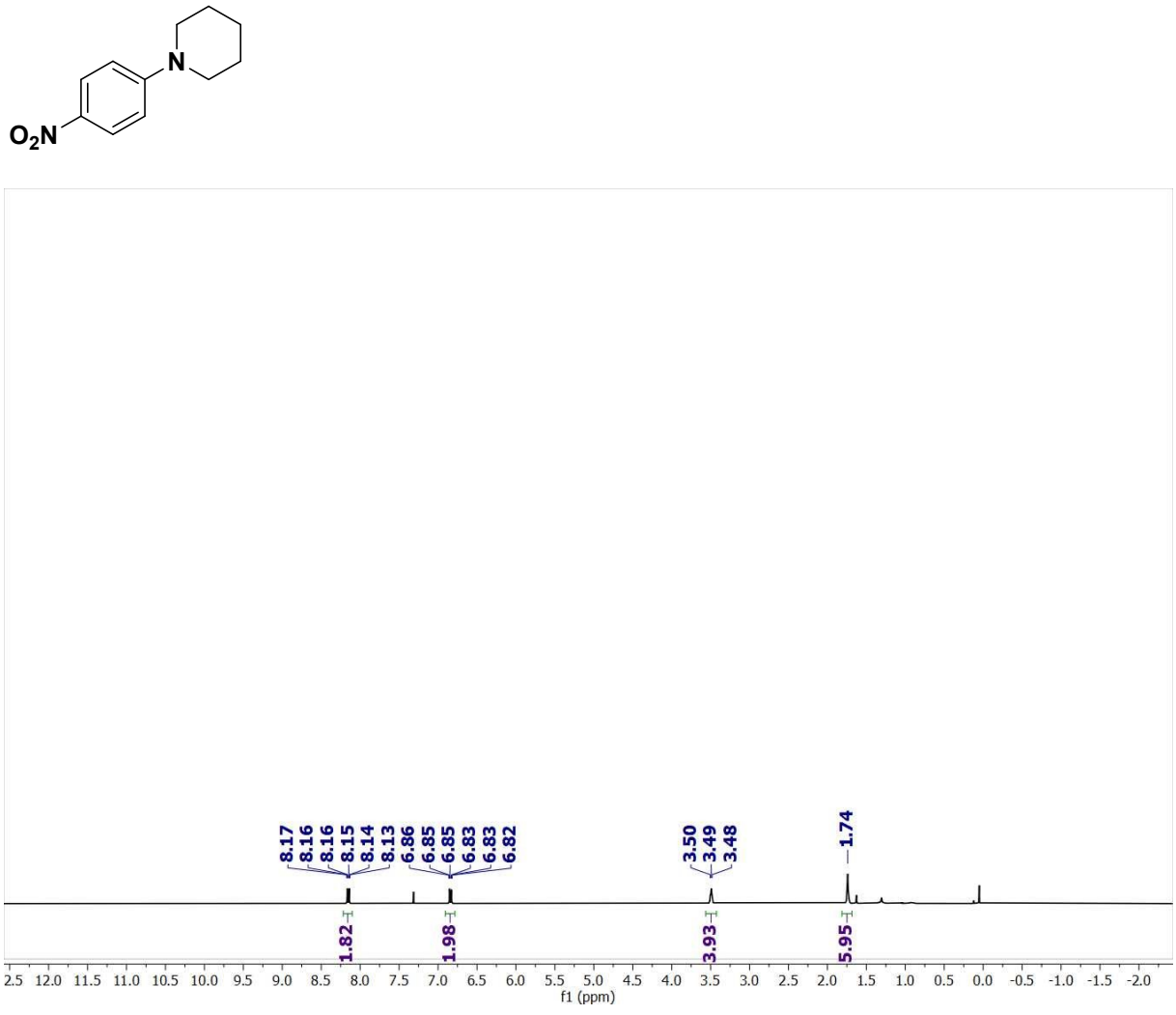


Figure S35: ^{1}H NMR of Compound 3b

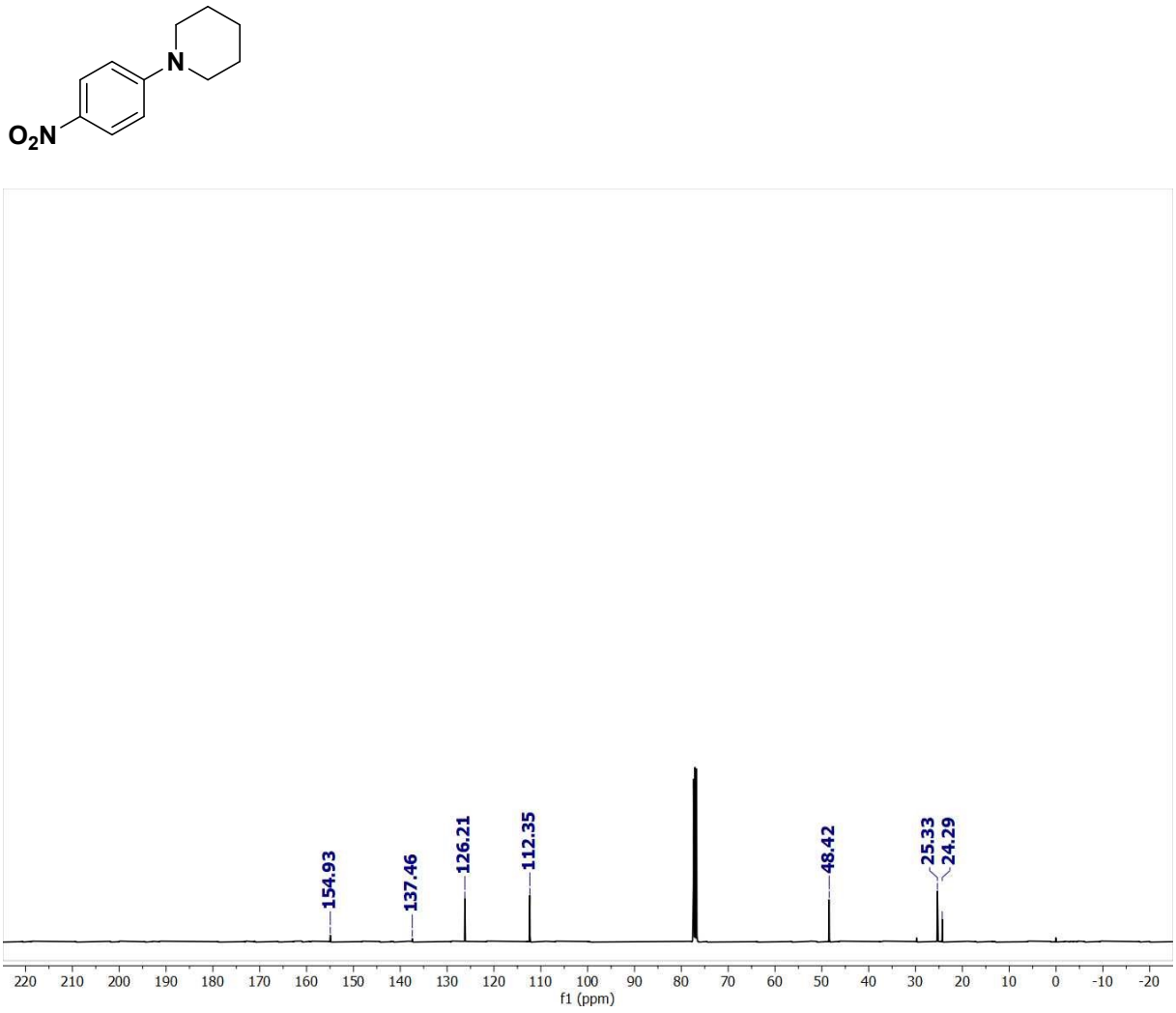
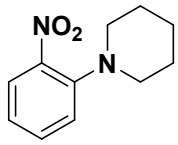


Figure S36: ^{13}C NMR of Compound 3b



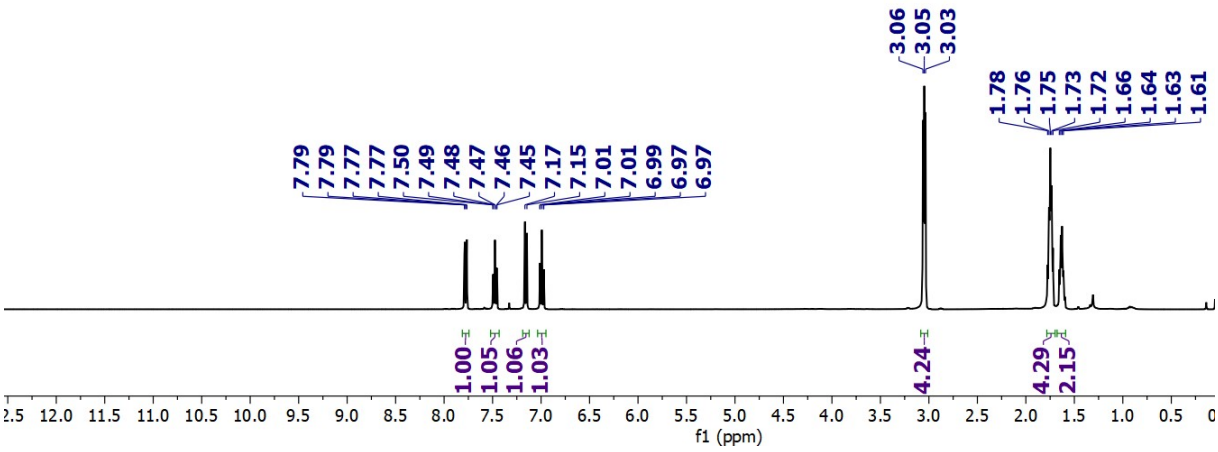
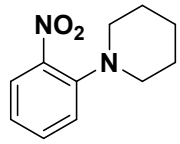


Figure S37: ^{1}H NMR of Compound 3d



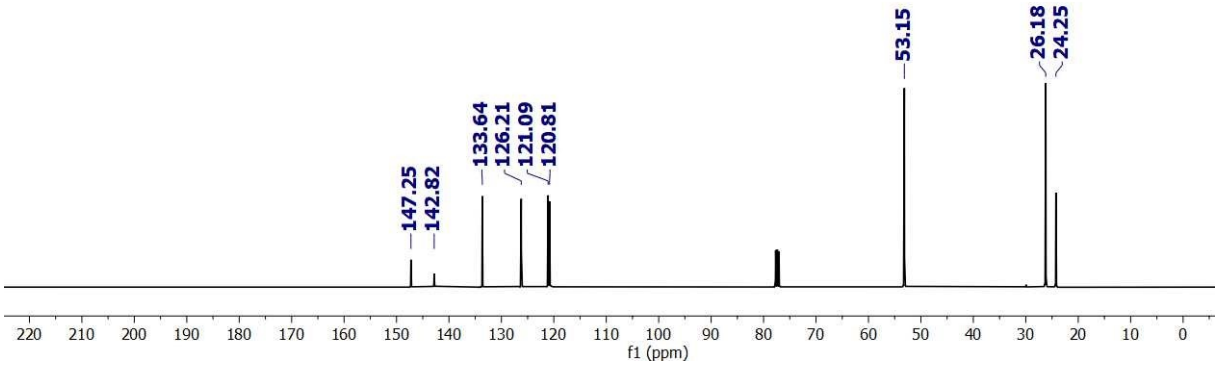


Figure S38: ^{13}C NMR of Compound 3d

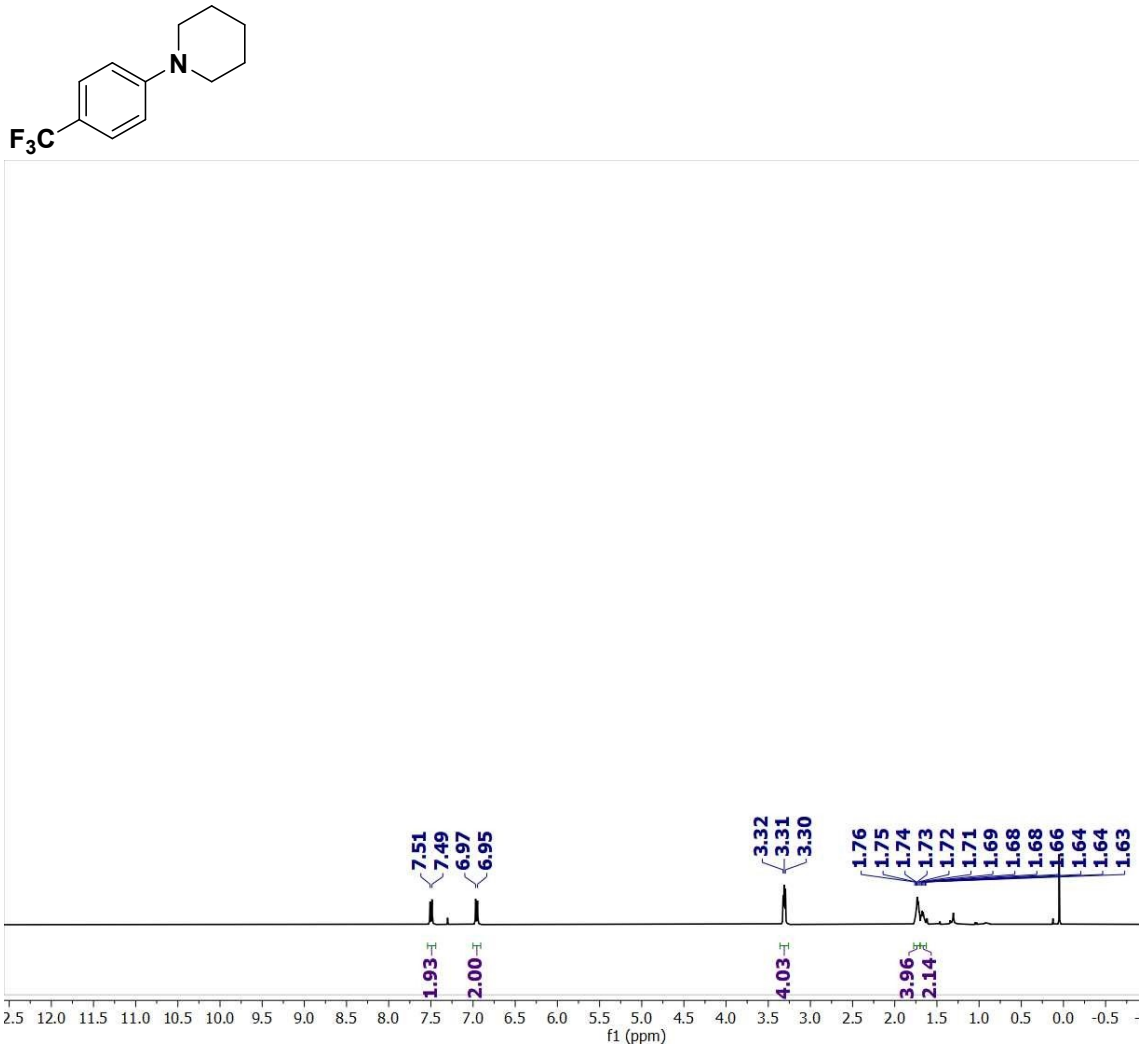


Figure S39: ^{1}H NMR of Compound 3c

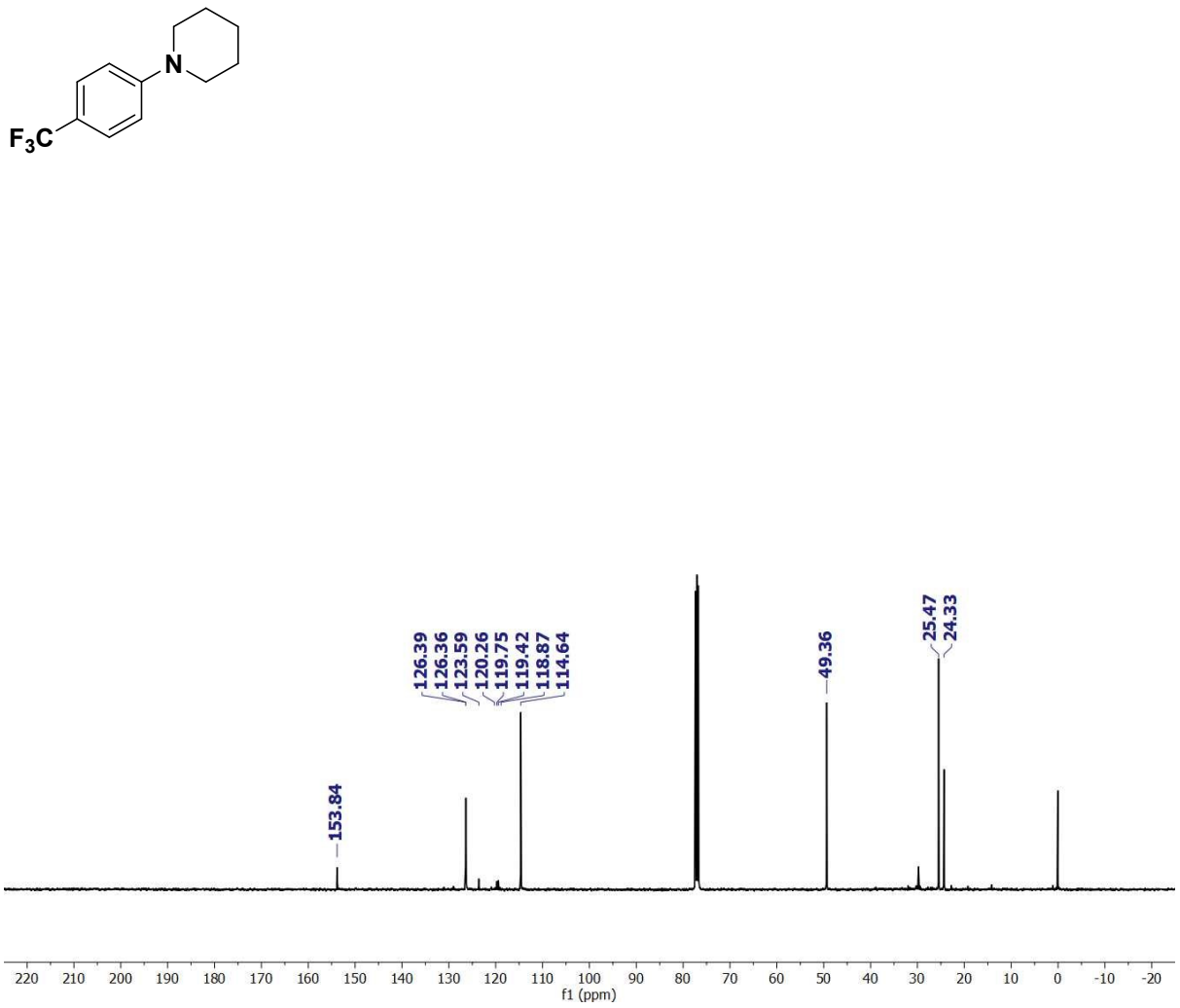


Figure S40: ^{13}C NMR of Compound 3c

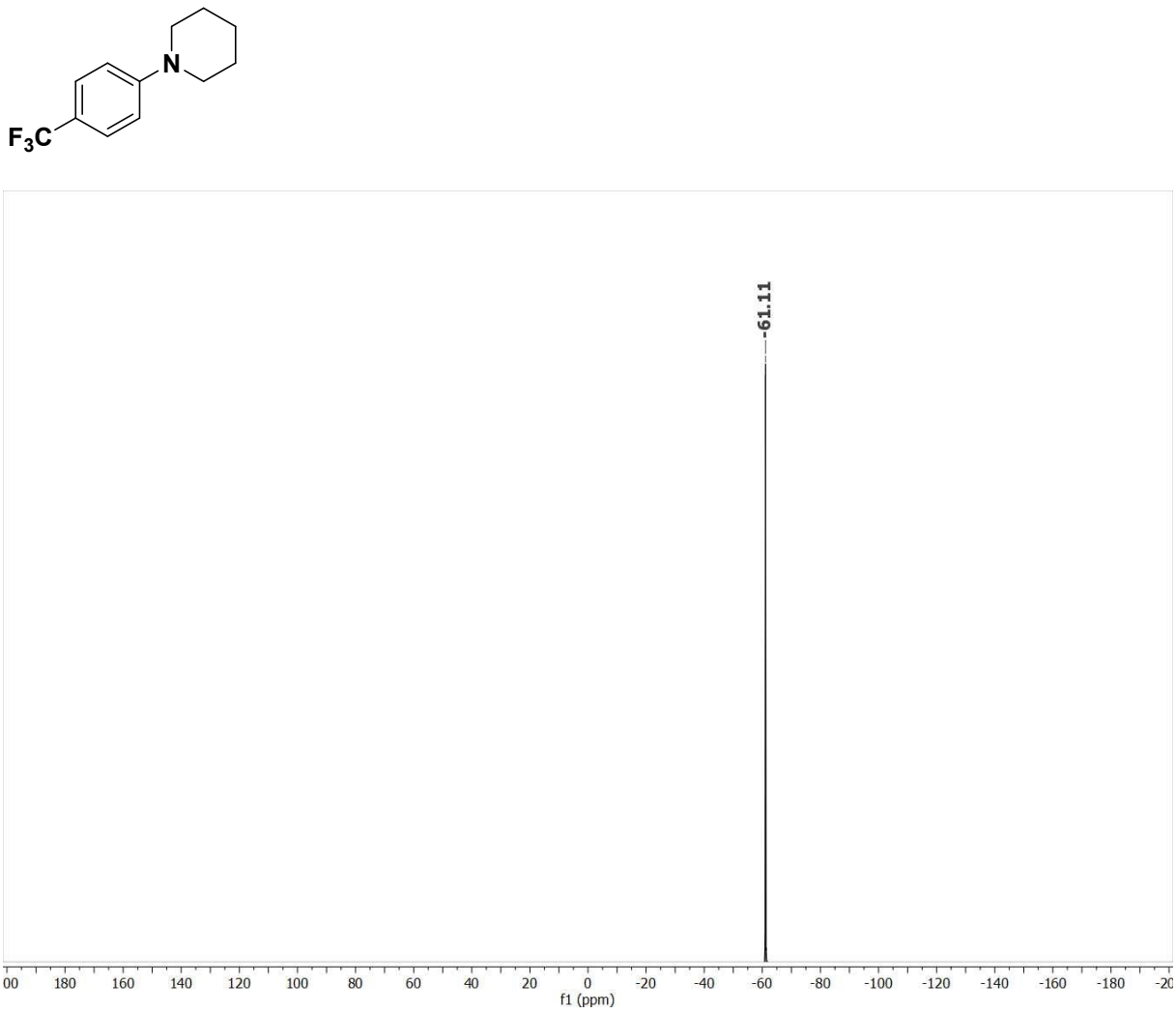


Figure S41: ^{19}F NMR of Compound 3c

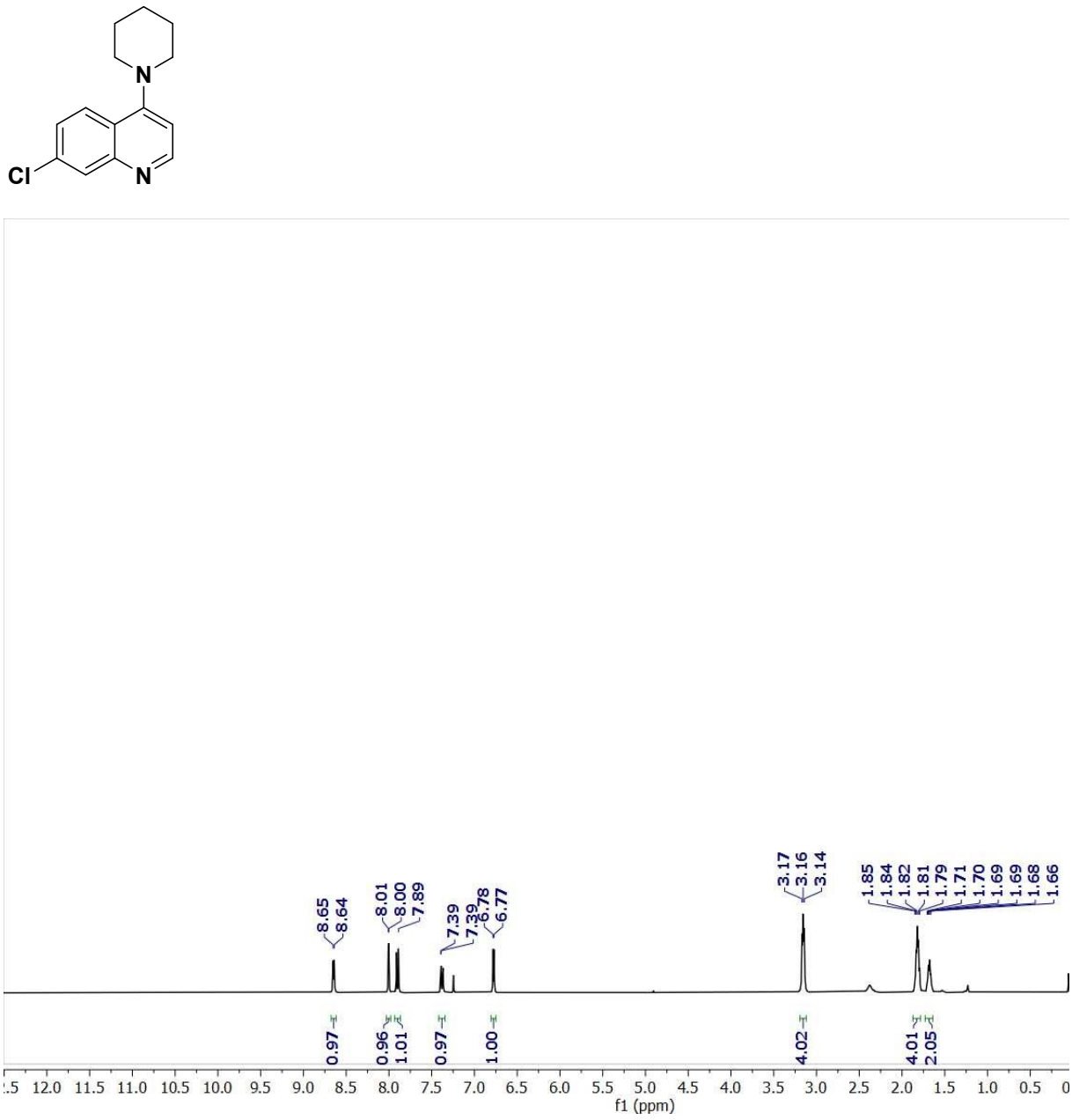


Figure S42: ^{1}H NMR of Compound 3e

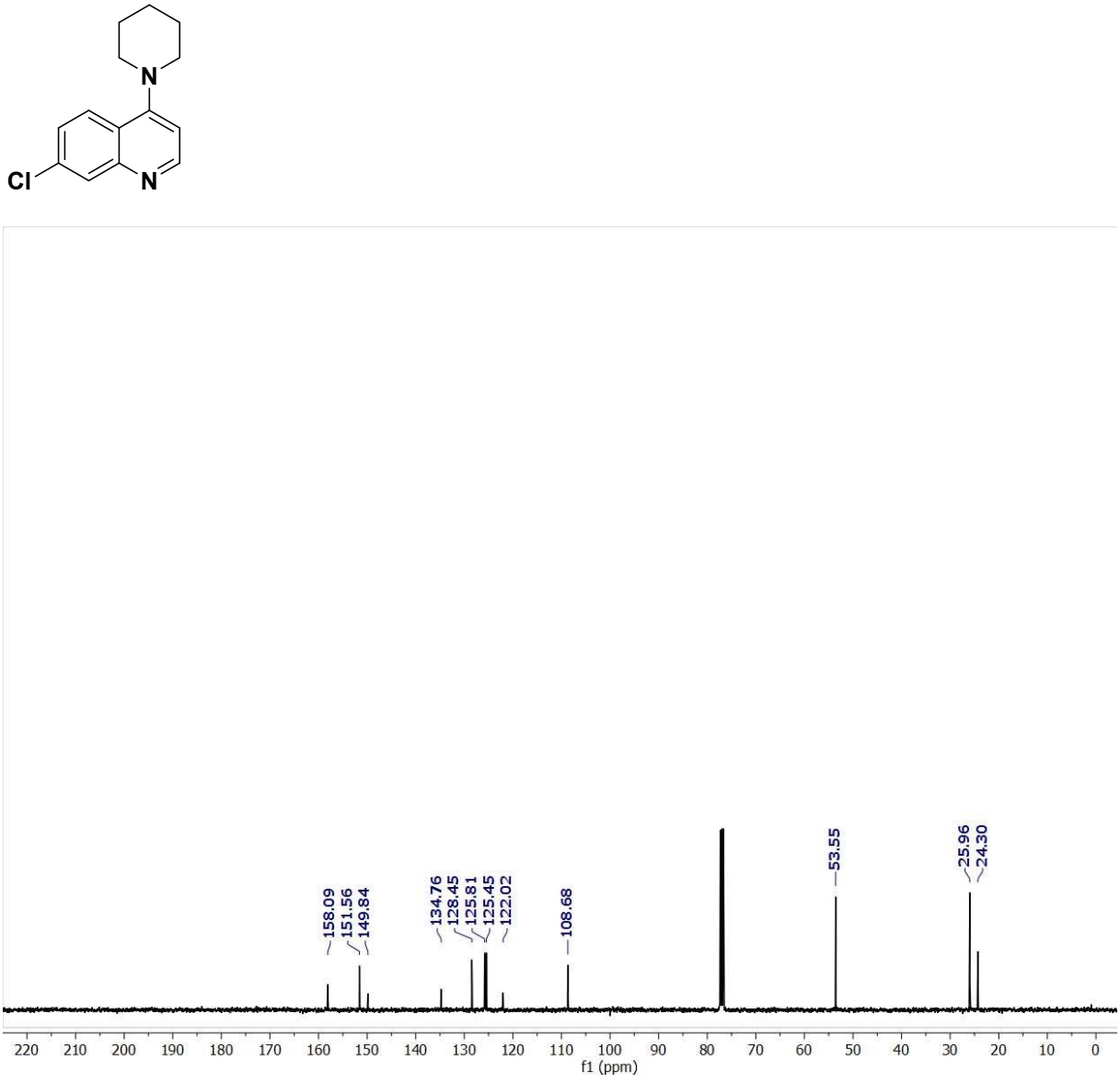
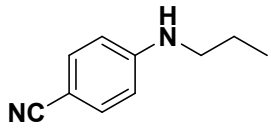


Figure S43: ^{13}C NMR of Compound 3e



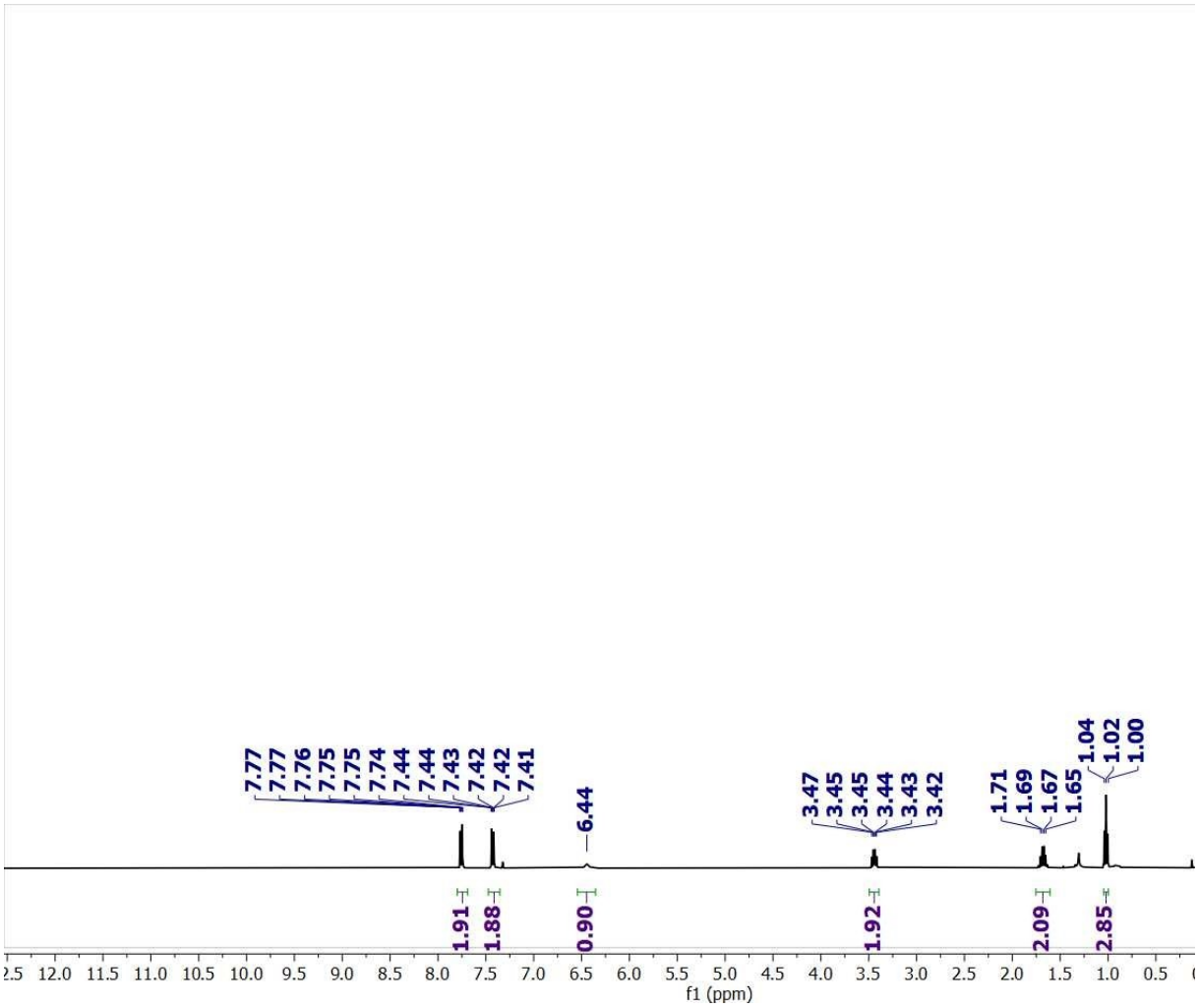
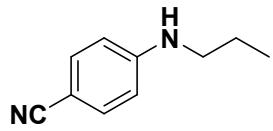


Figure S44: ^{1}H NMR of Compound 4a



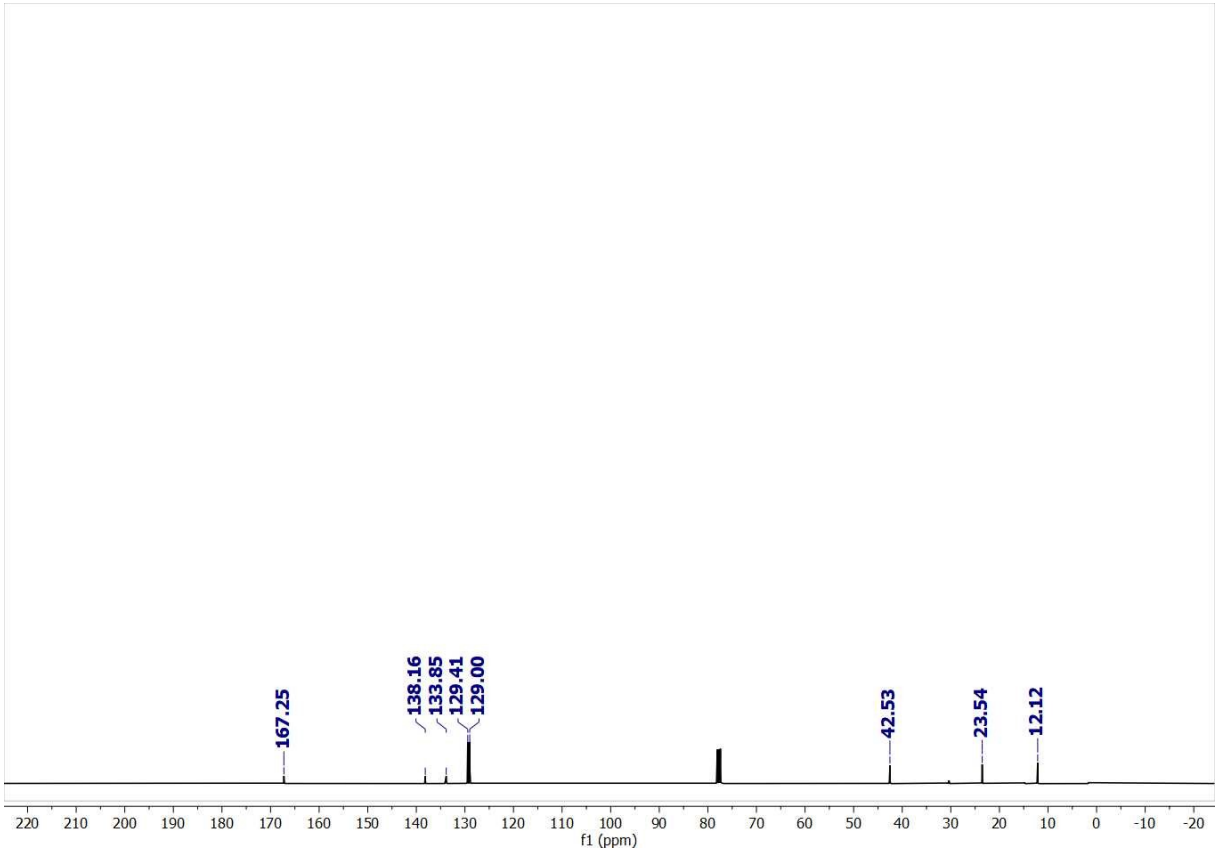
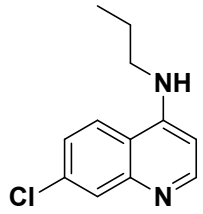


Figure S45: ^{13}C NMR of Compound 4a



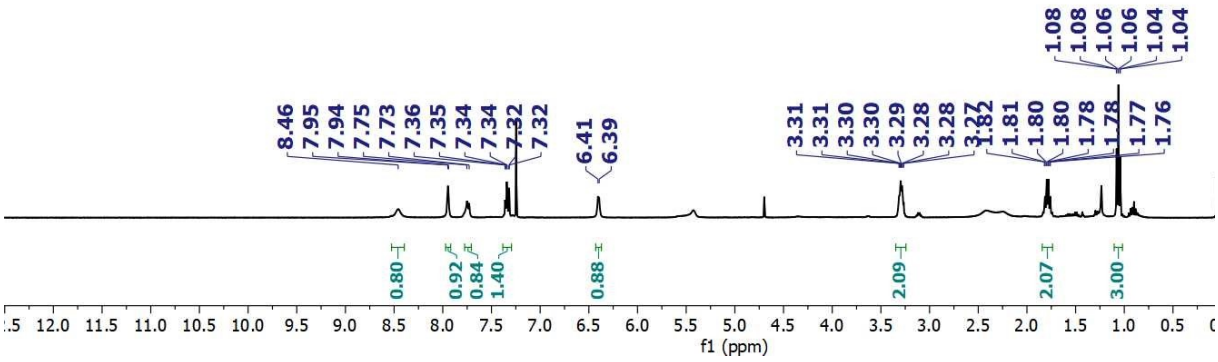


Figure S46: ^{1}H NMR of Compound 4c

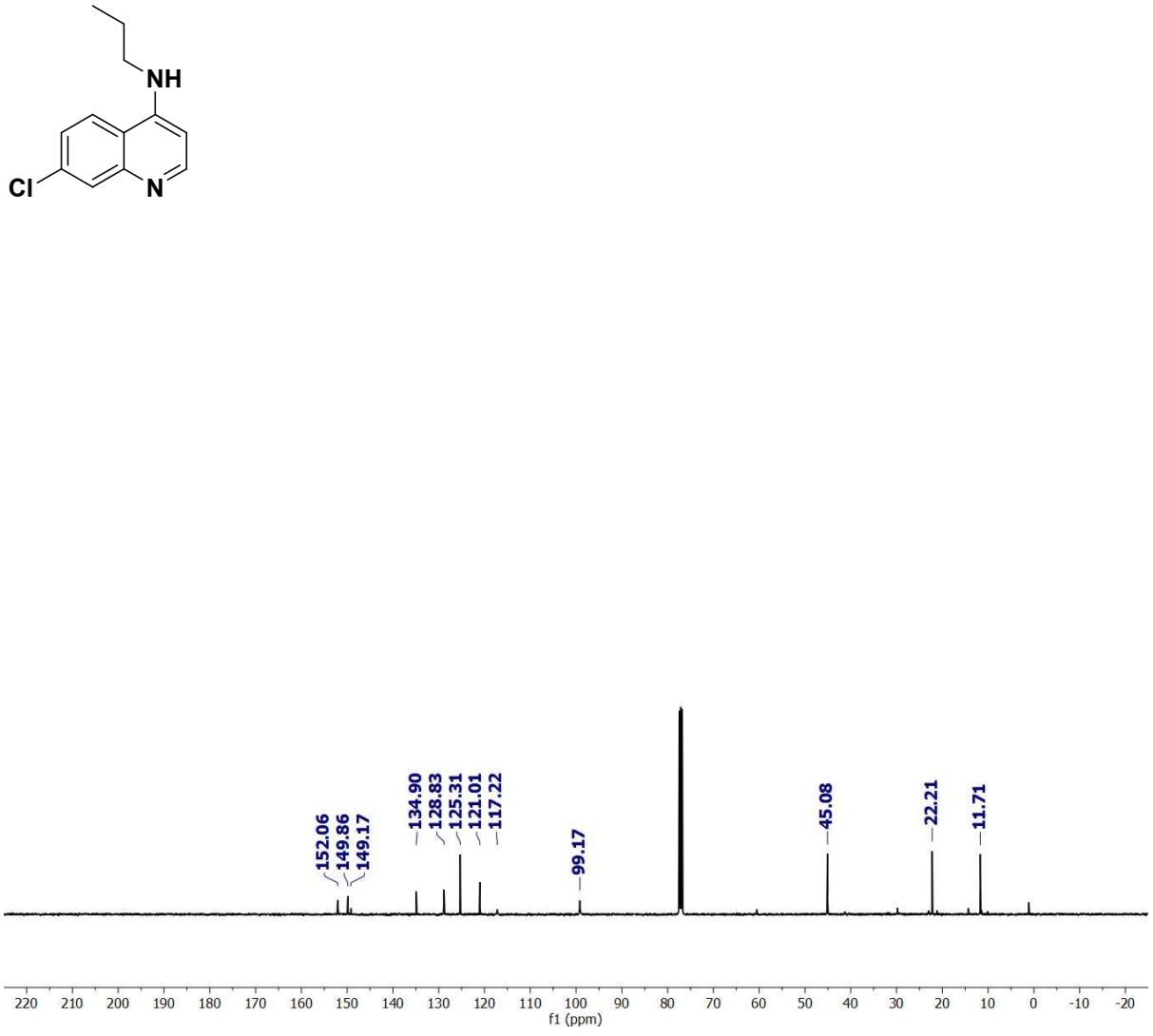


Figure S47: ^{13}C NMR of Compound 4c

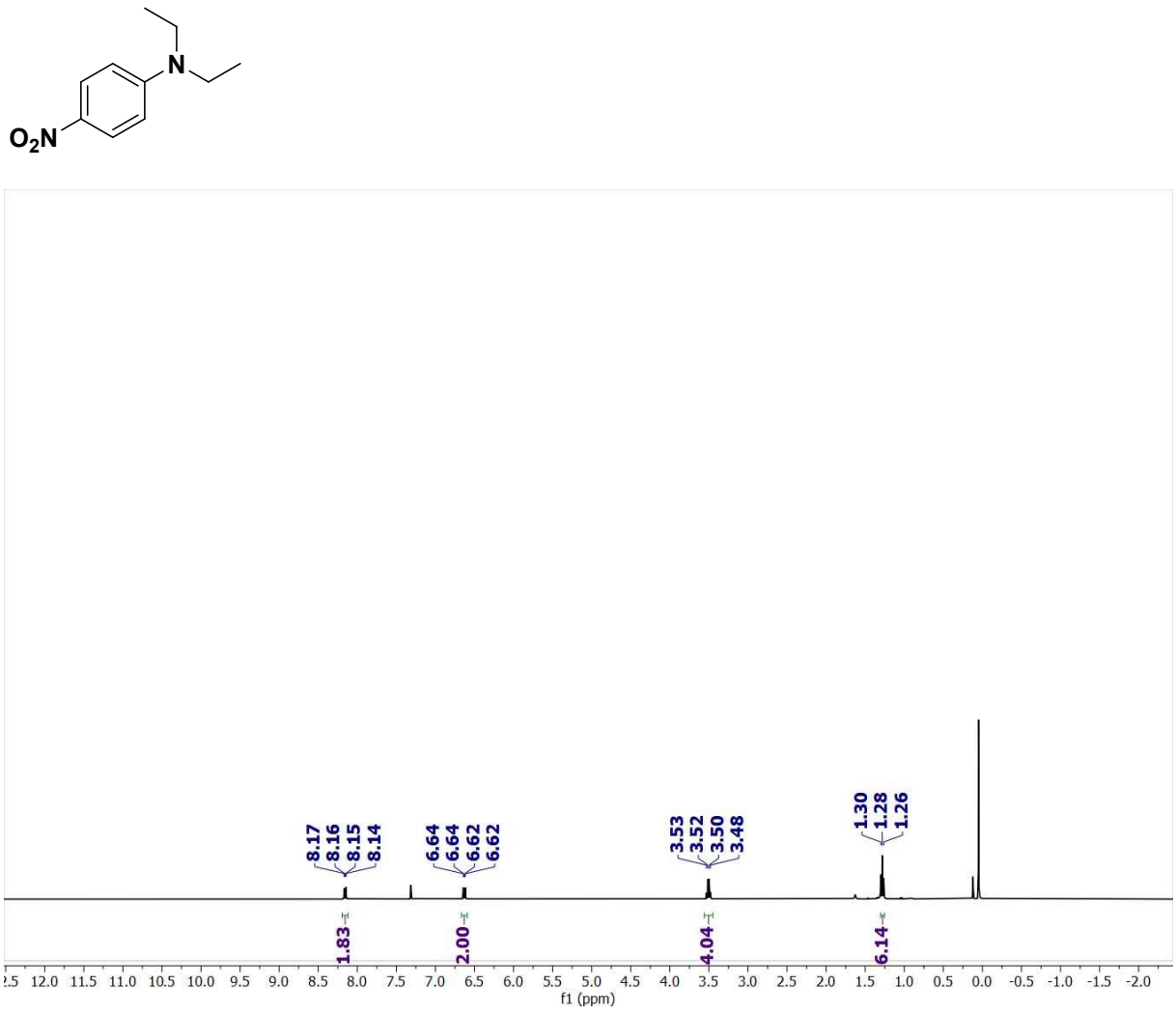


Figure S48: ^{1}H NMR of Compound 4d

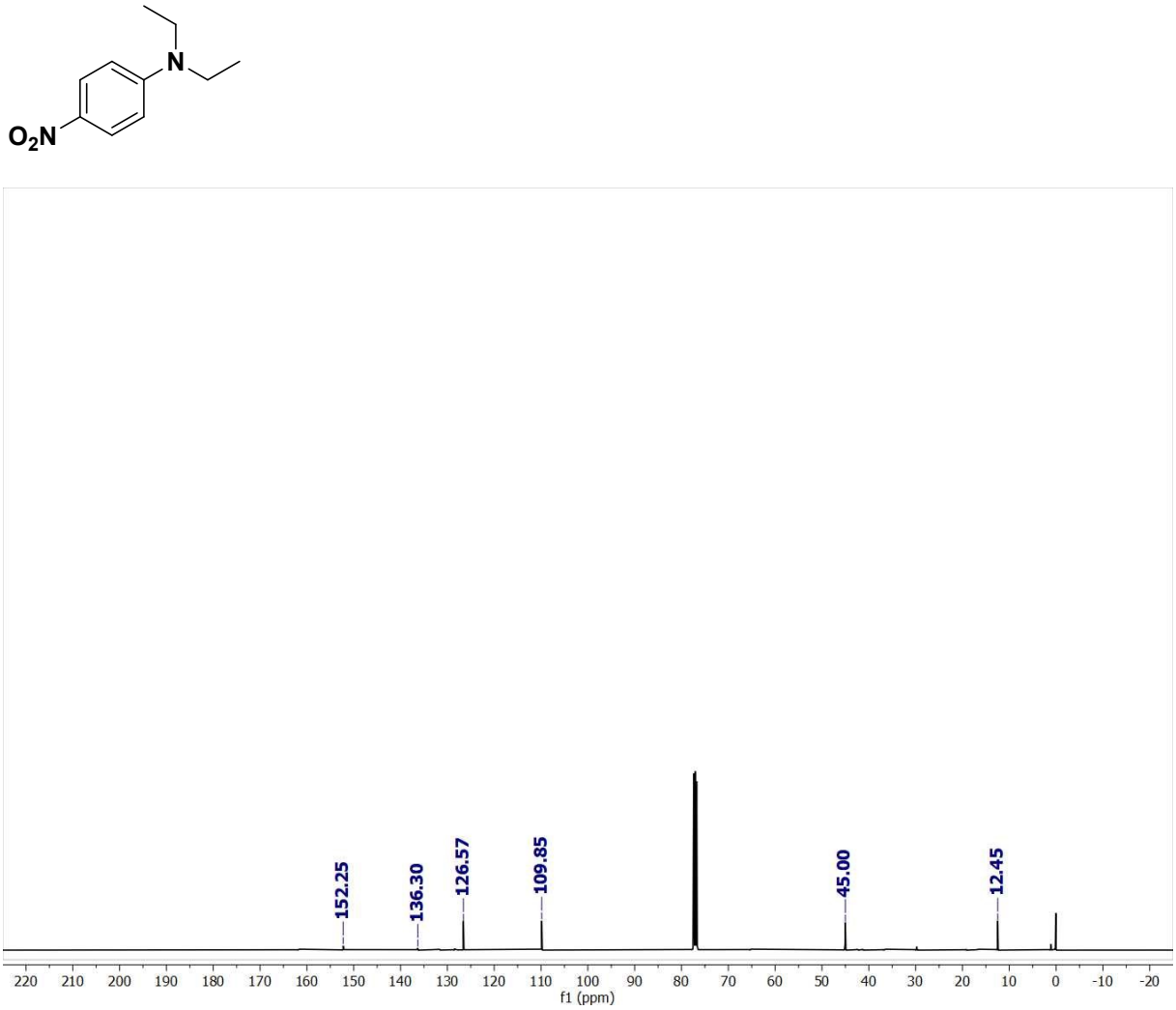


Figure S49: ^{13}C NMR of Compound 4d

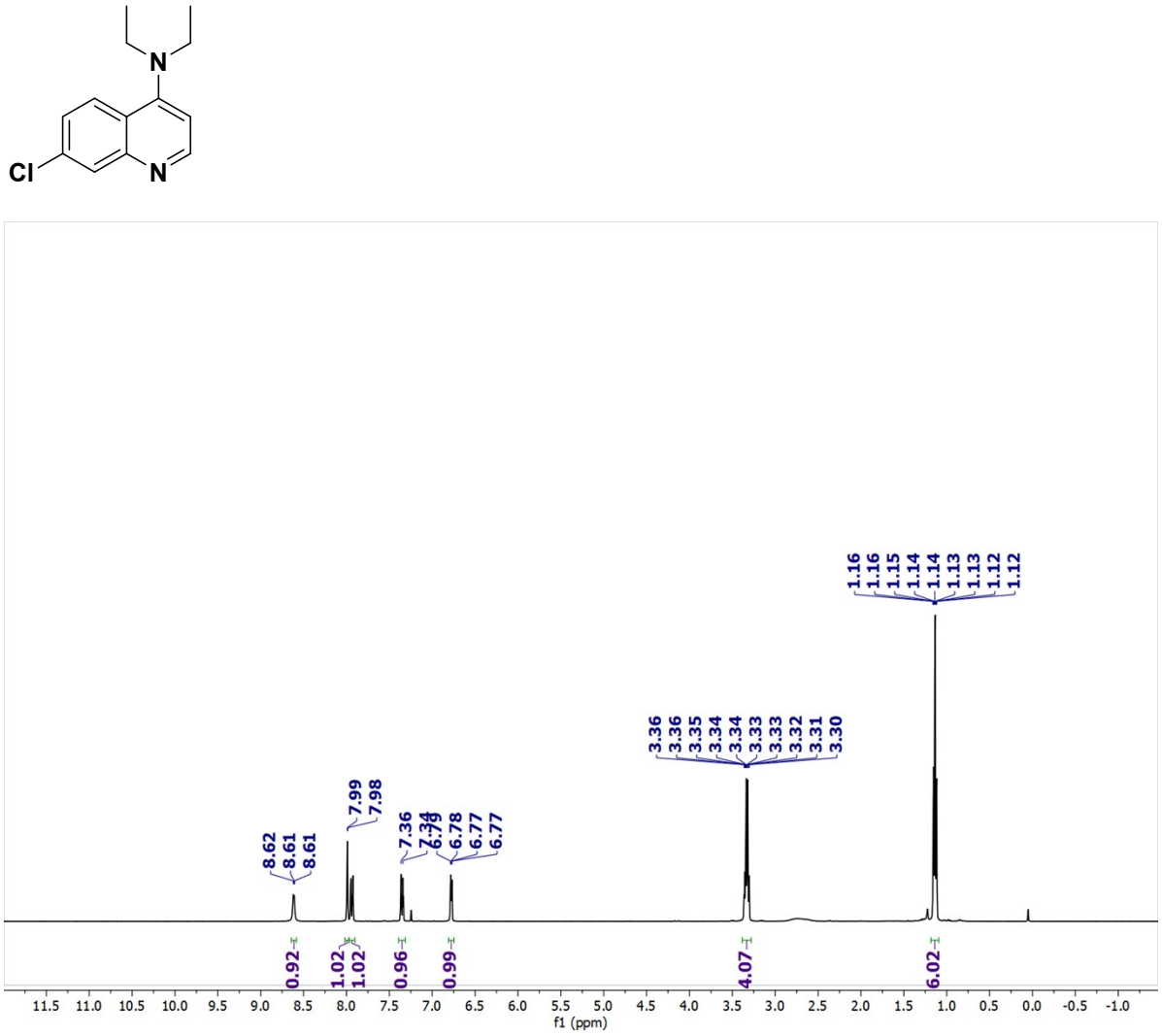


Figure S50: ^{1}H NMR of Compound 4e

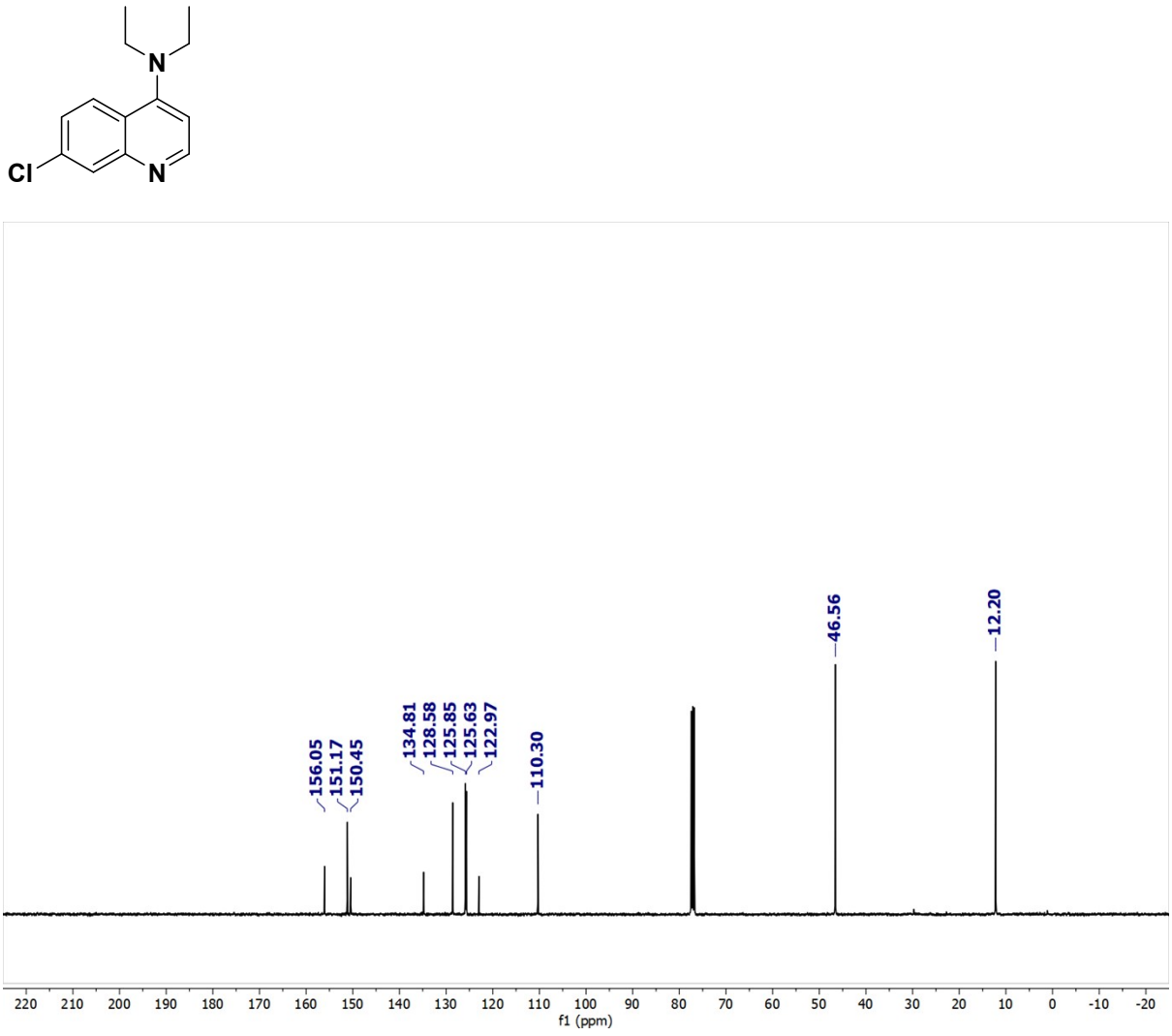
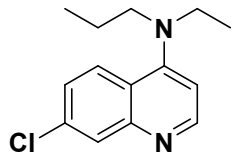


Figure S51: ^{13}C NMR of Compound 4e



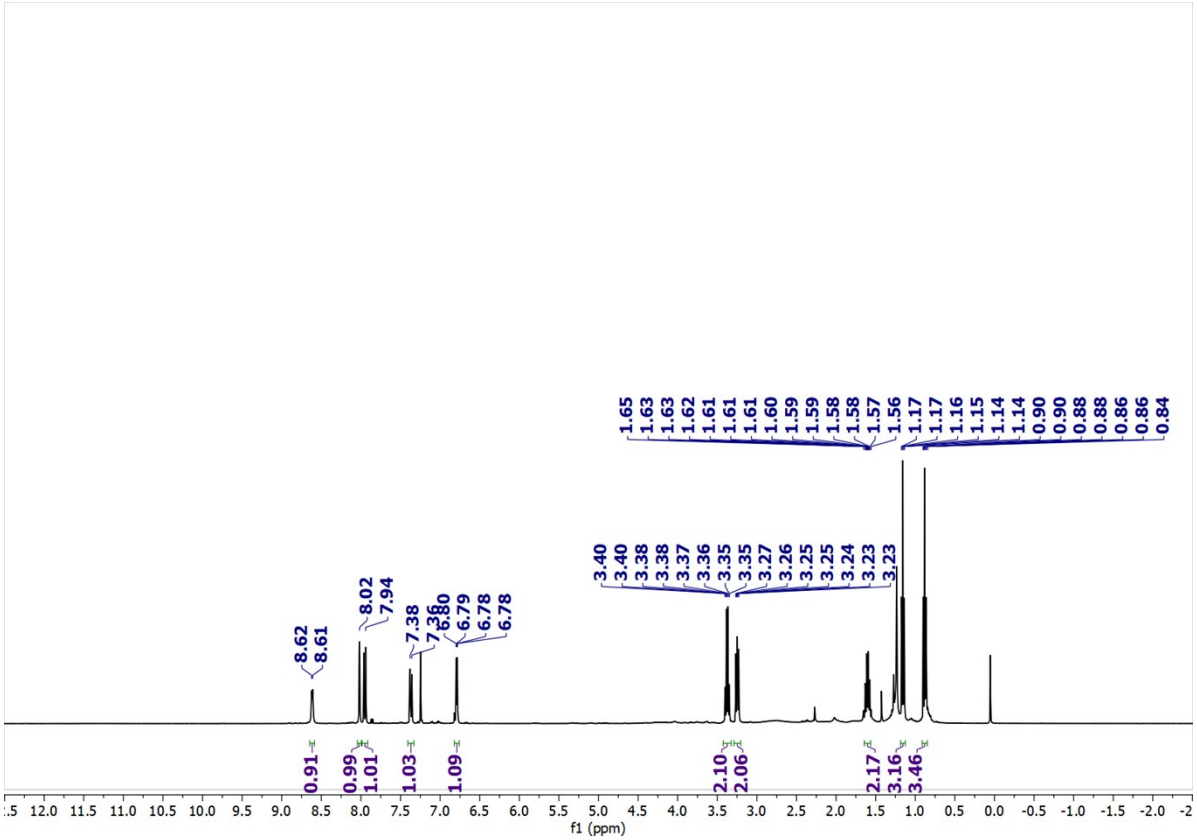


Figure S52: ^{1}H NMR of Compound 4f

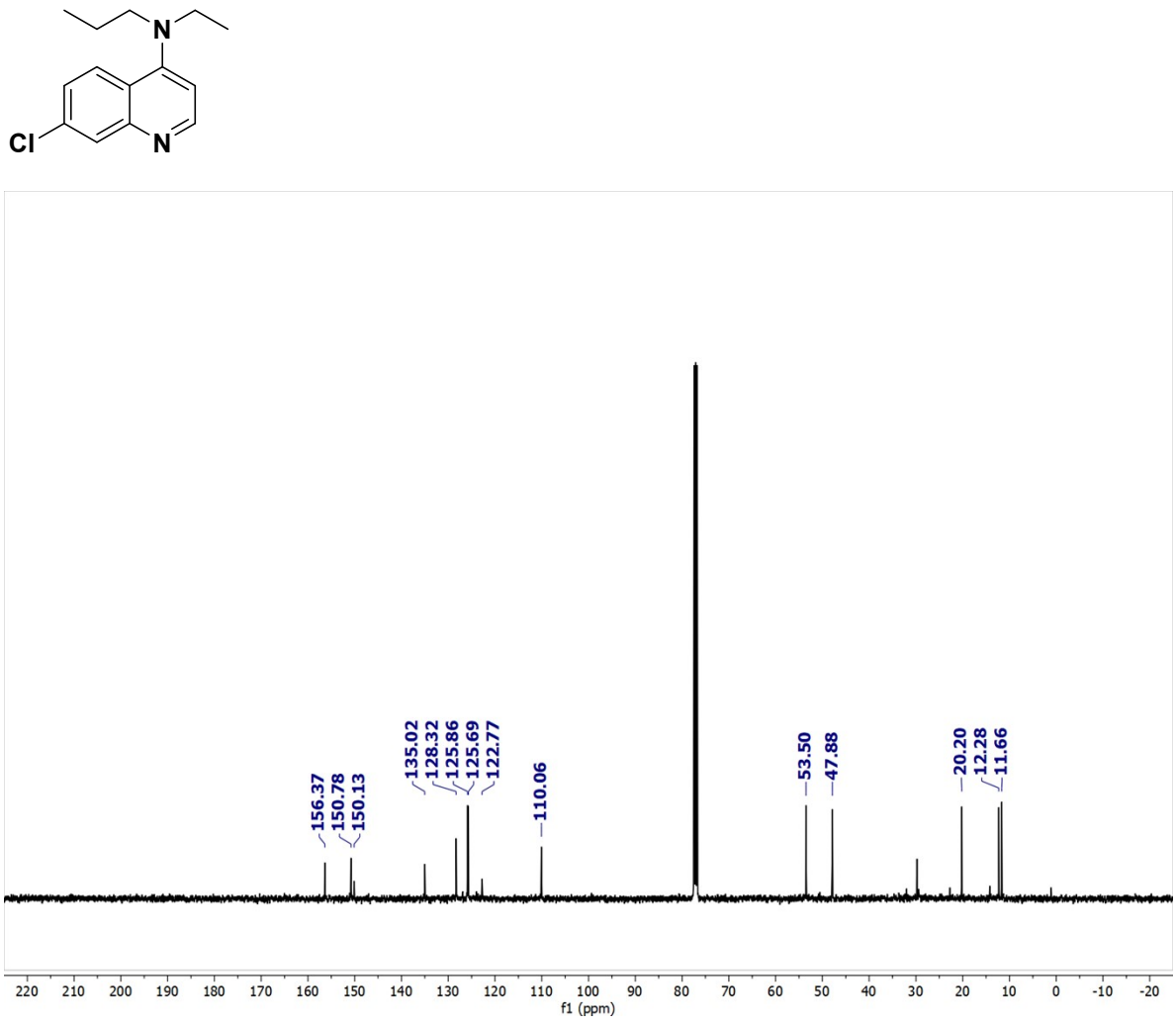
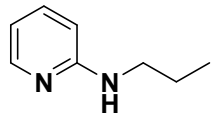


Figure S53: ^{13}C NMR of Compound 4f



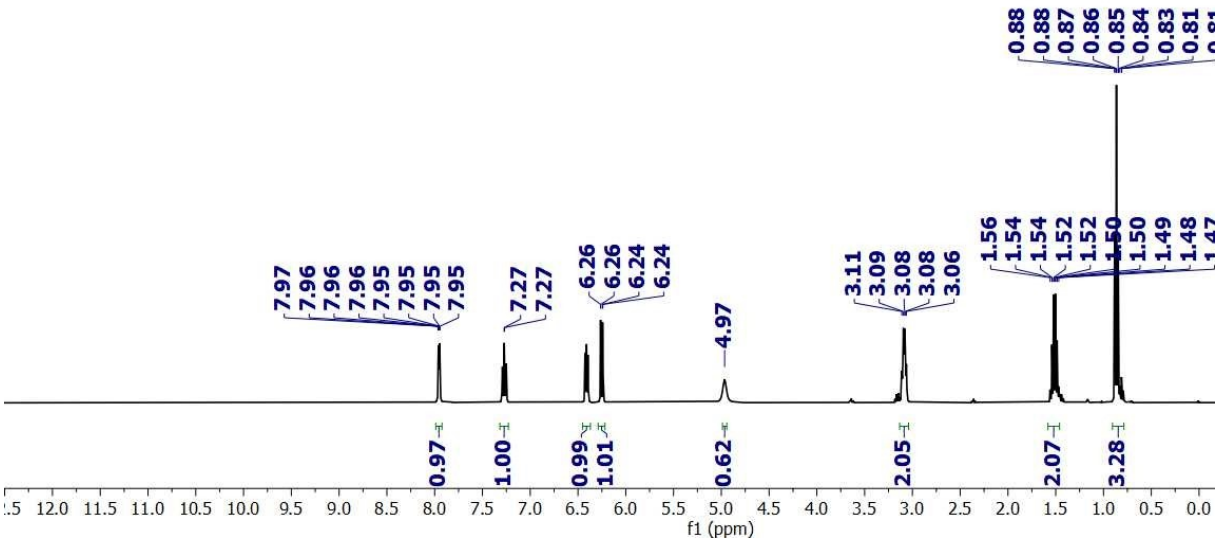
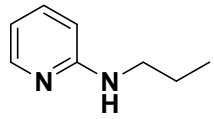


Figure S54: ^{1}H NMR of Compound 4b



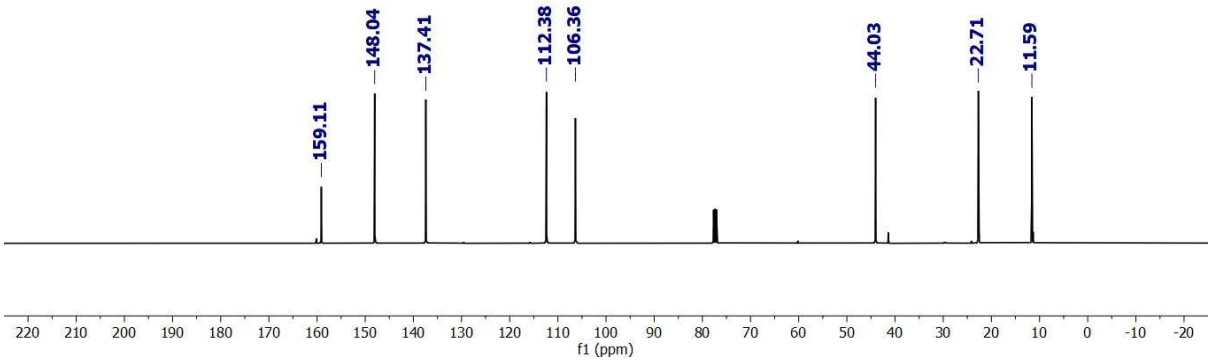


Figure S55: ^{13}C NMR of Compound 4b

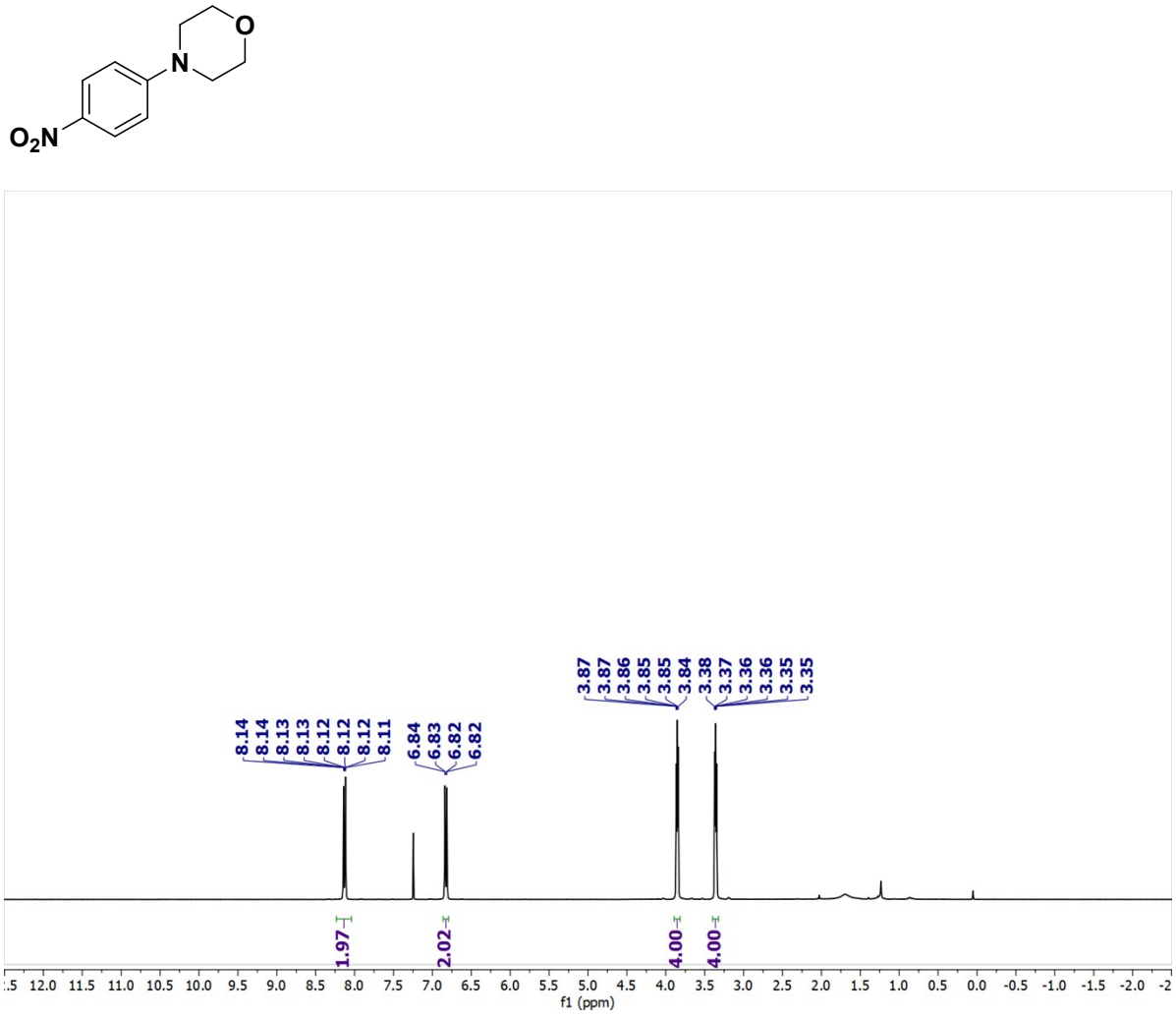


Figure S56: ^{1}H NMR of Compound 3g

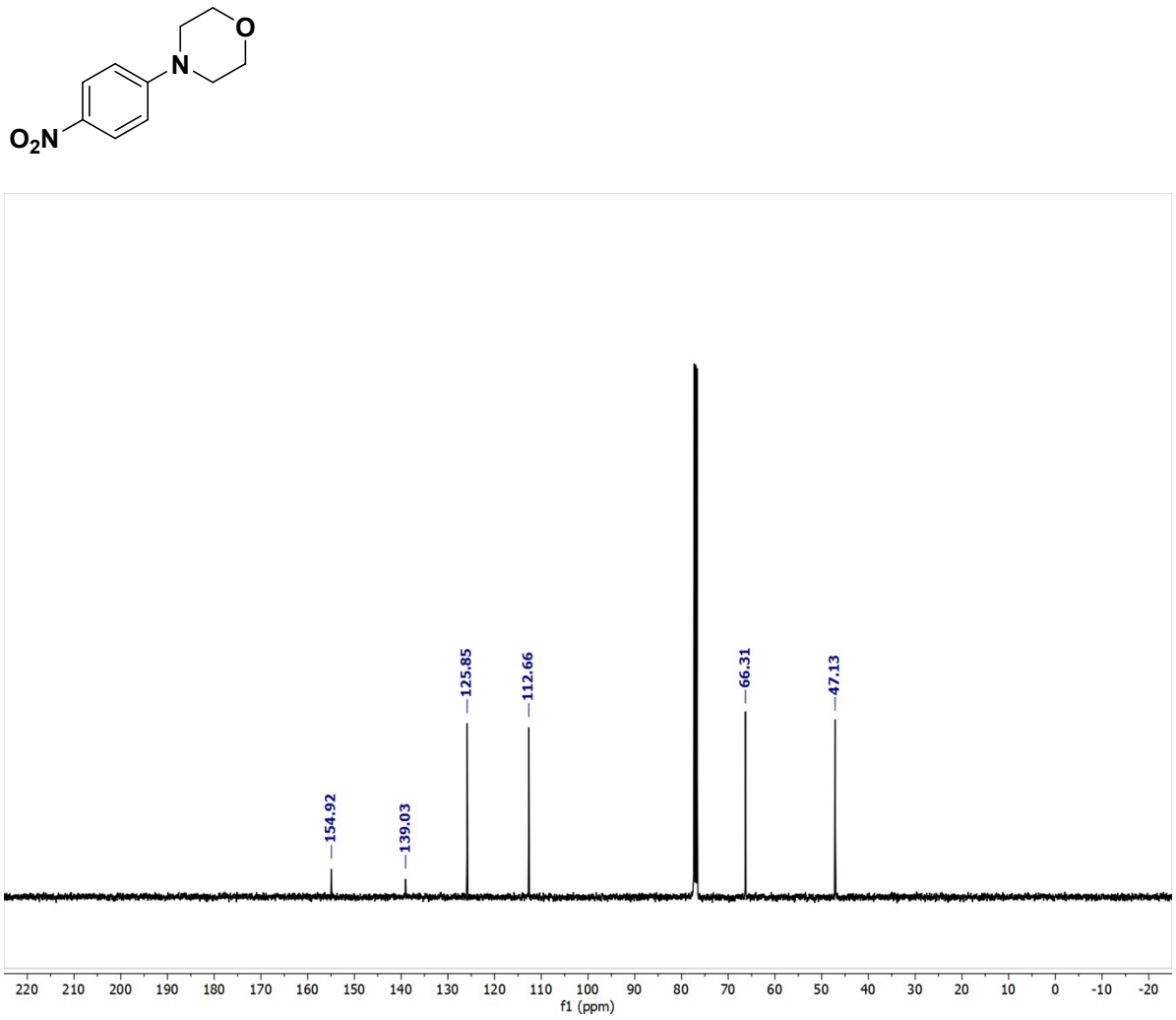
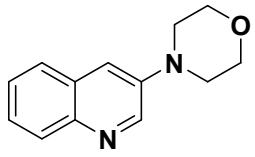


Figure S57: ^{13}C NMR of Compound 3g



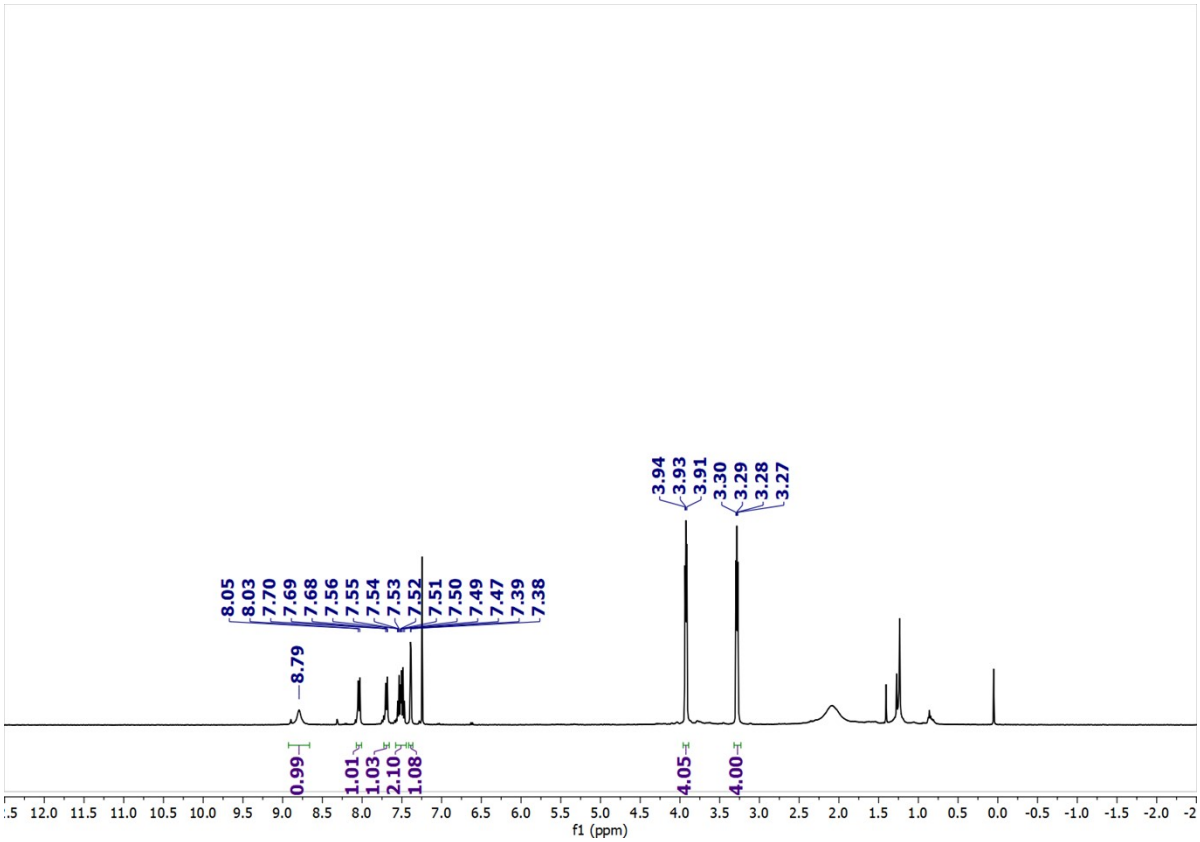


Figure S58: ^{1}H NMR of Compound 3h

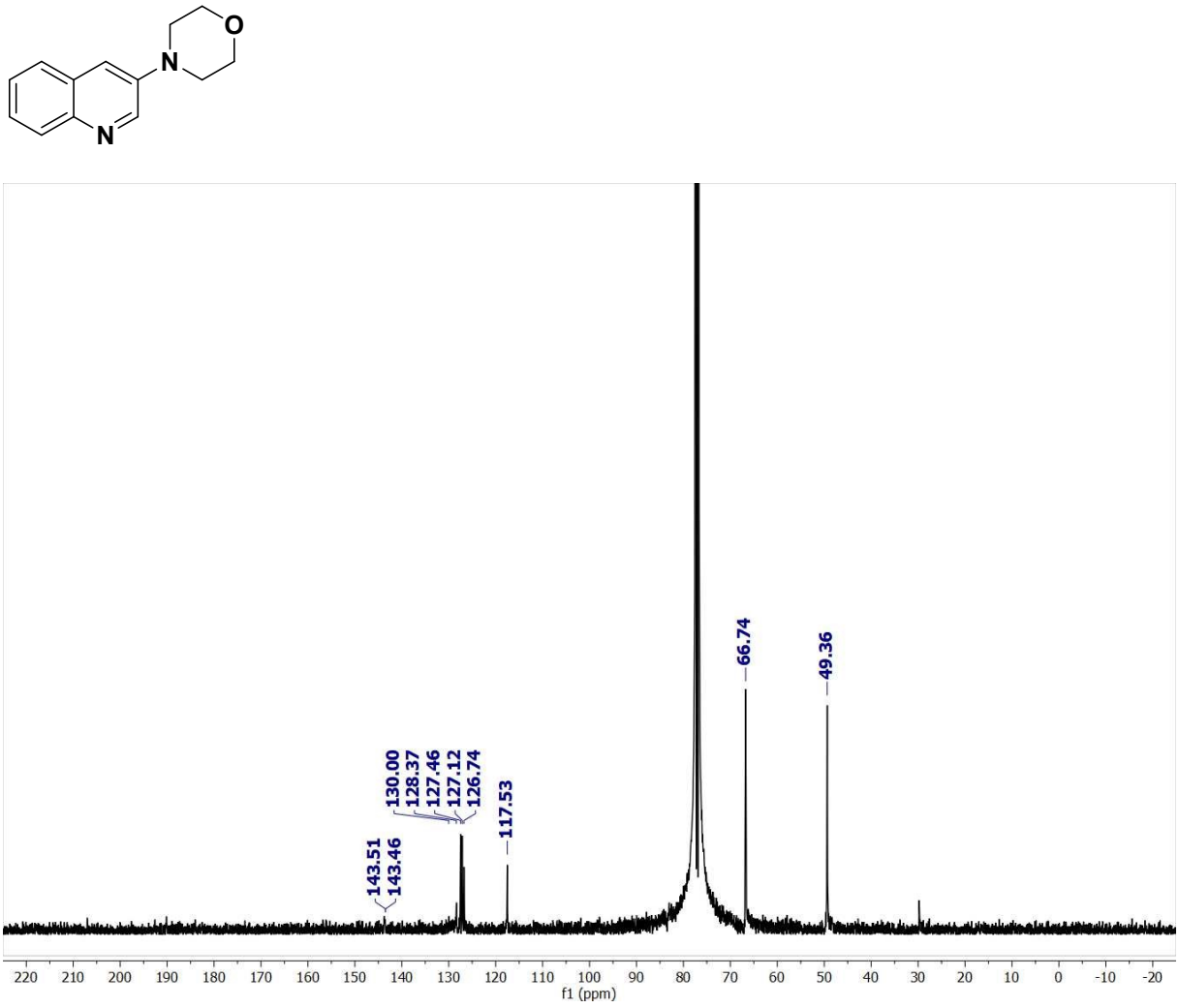
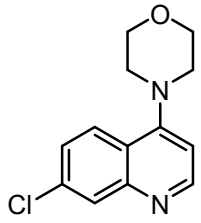


Figure S59: ^{13}C NMR of Compound 3h



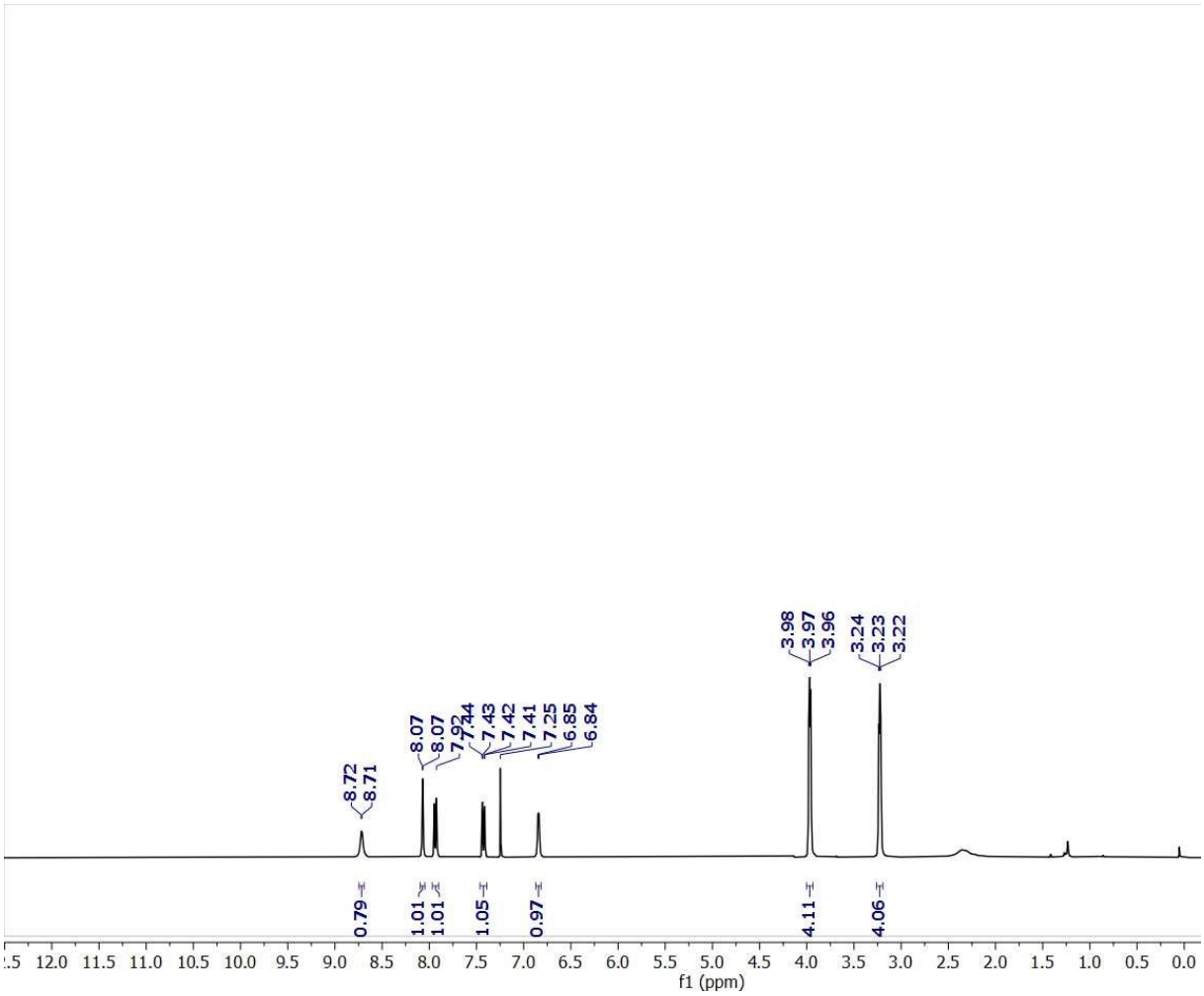
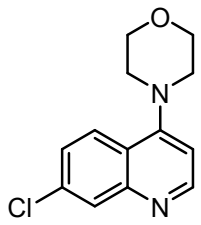


Figure S60: ^{1}H NMR of Compound 3i


O
N
Cl
N

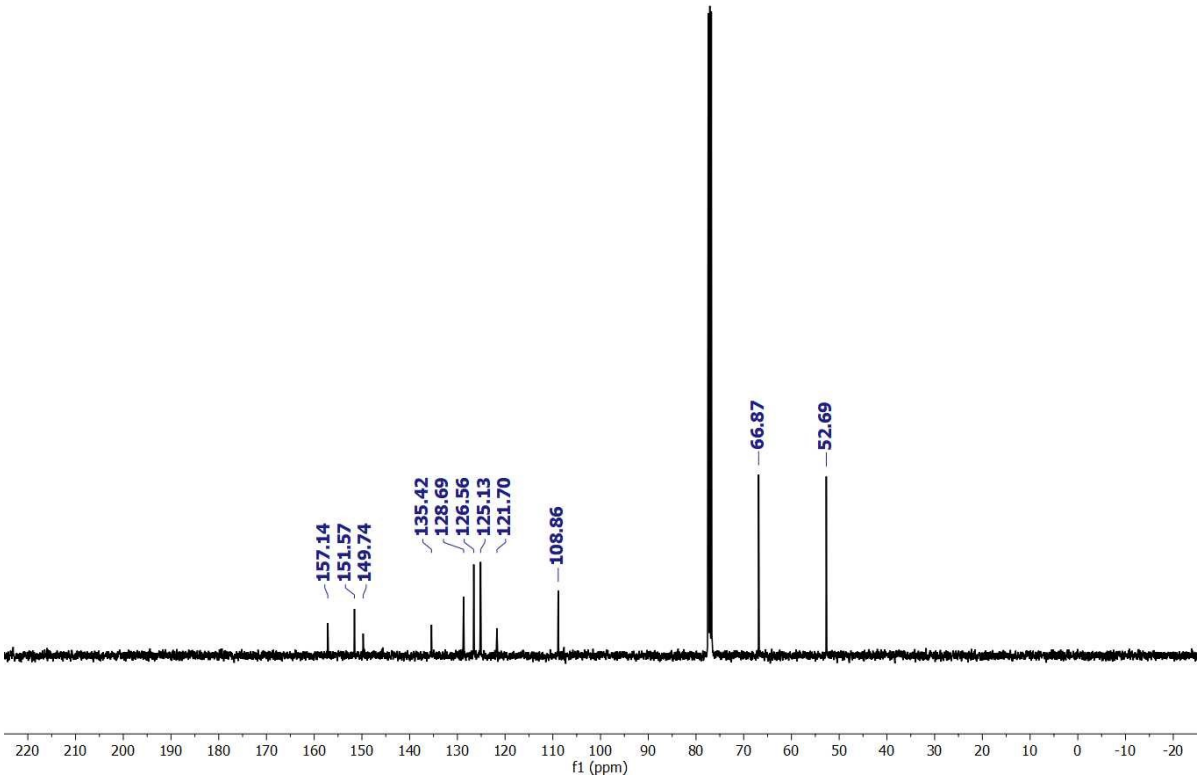

157.14
151.57
149.74
135.42
128.69
126.56
125.13
121.70
108.86
66.87
52.69
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20
f1 (ppm)

Figure S61: ^{13}C NMR of Compound 3i

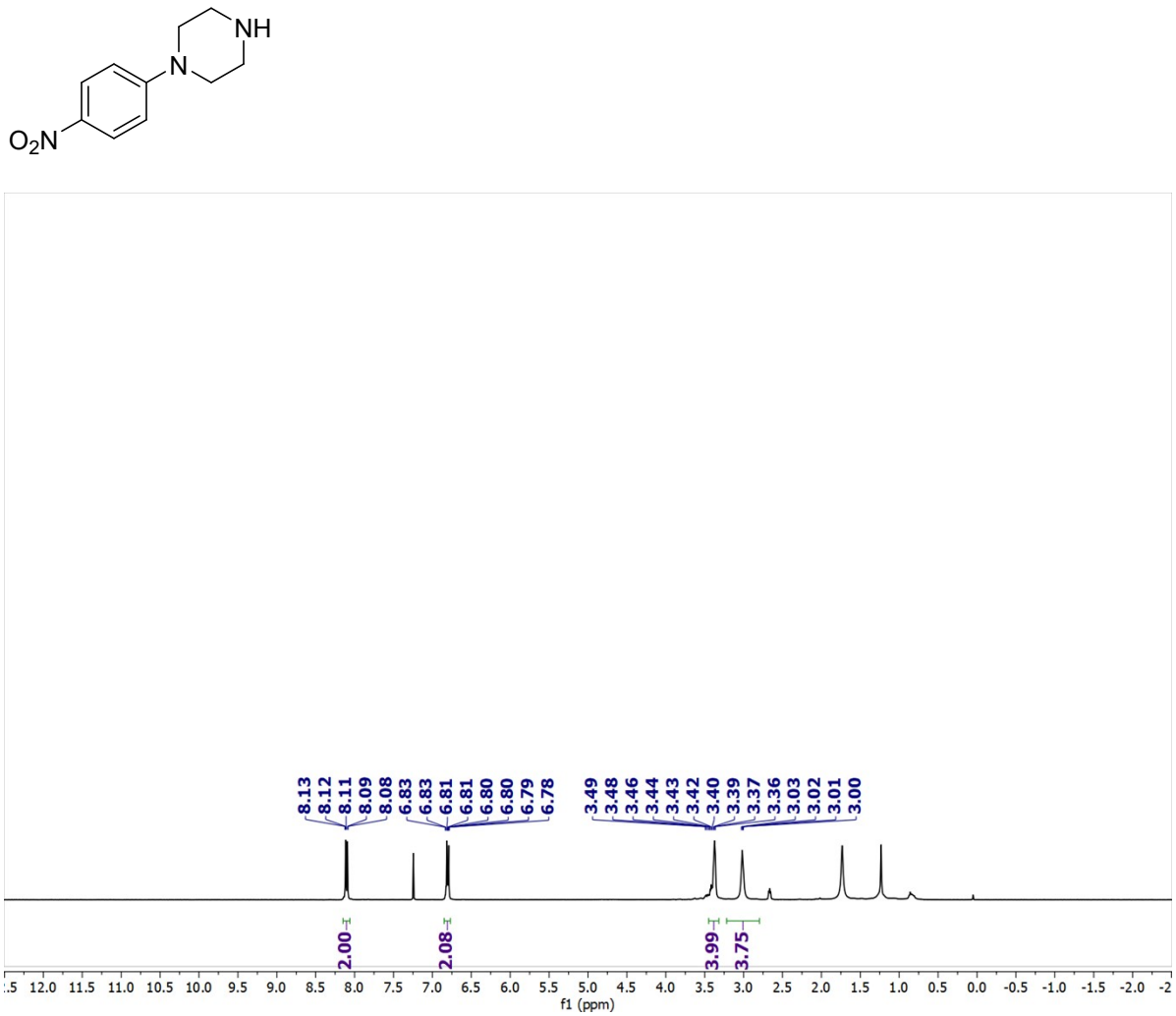
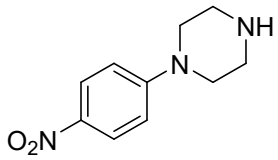


Figure S62: ^{1}H NMR of Compound 3f


NH
N
O2N

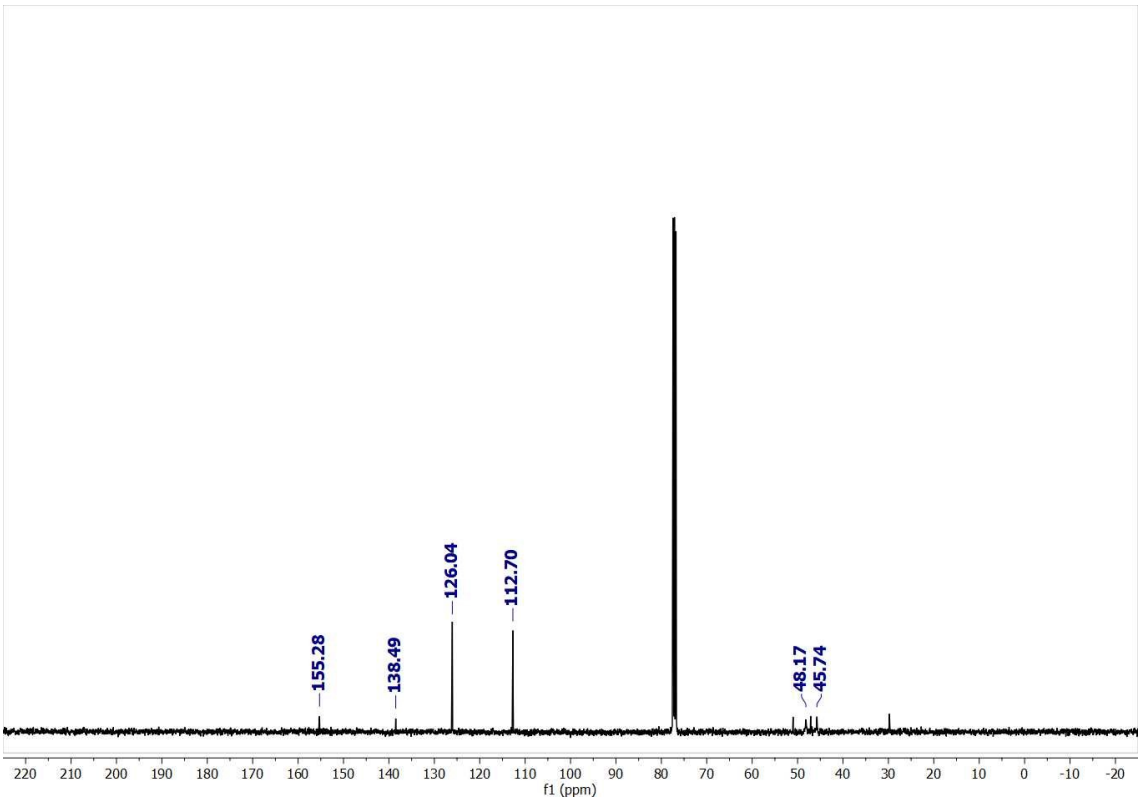
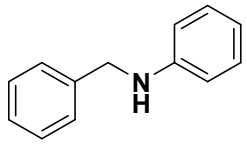

155.28
138.49
126.04
112.70
48.17
45.74
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20
f1 (ppm)

Figure S63: ^{13}C NMR of Compound 3f



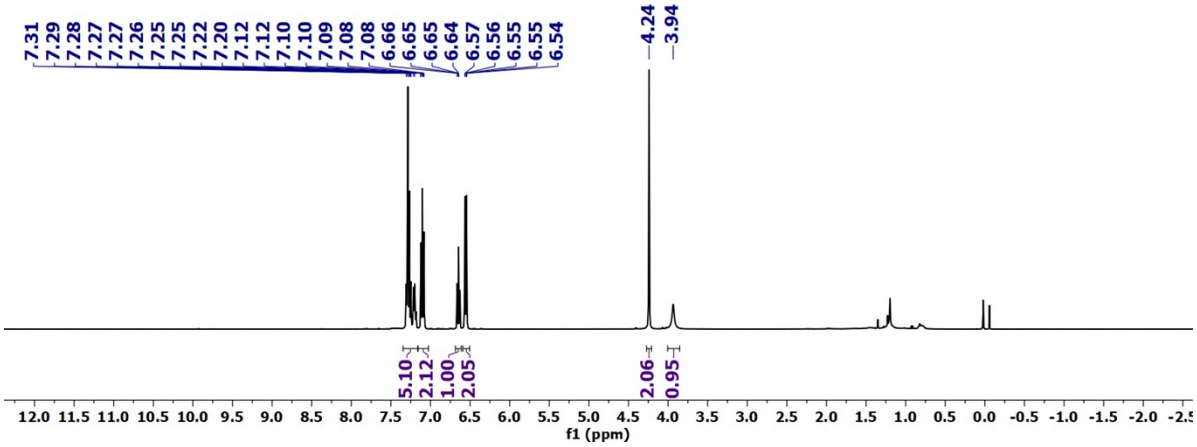
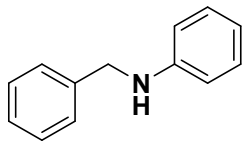


Figure S64: ^{1}H NMR of Compound 5a


N
H

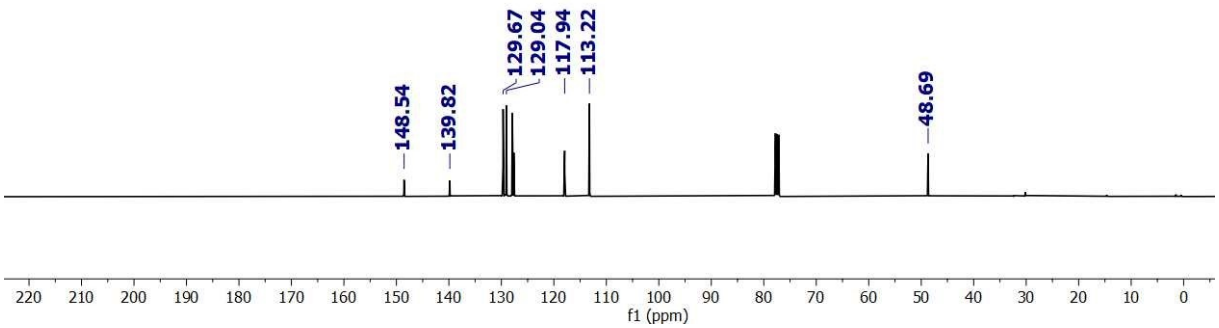
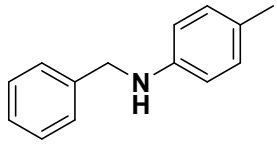

148.54
139.82
129.67
129.04
117.94
113.22
48.69
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

Figure S65: ^{13}C NMR of Compound 4a



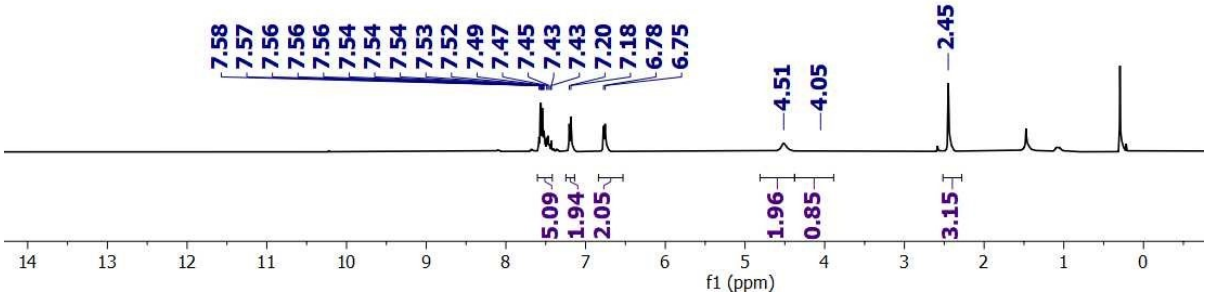


Figure S66: ^{1}H NMR of Compound 5e

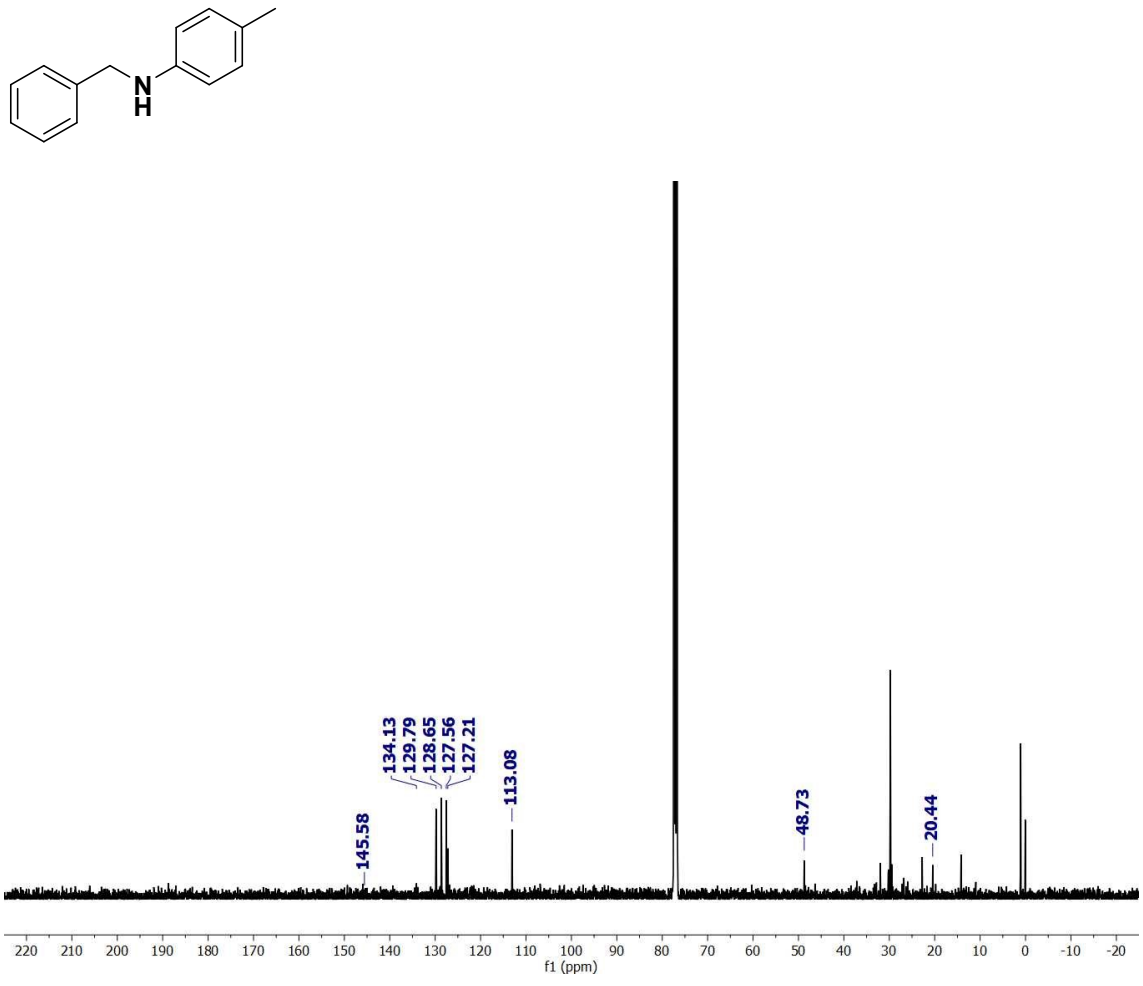
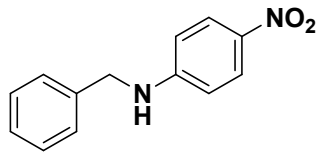


Figure S67: ^{13}C NMR of Compound 5e



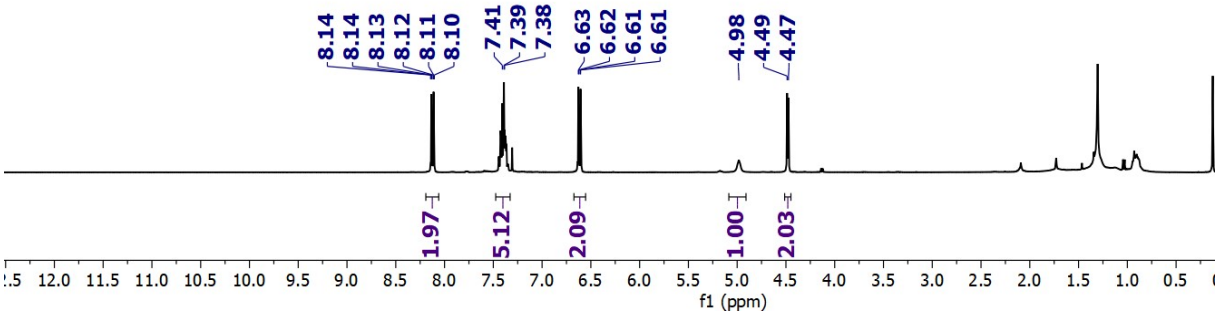


Figure S68: ^{1}H NMR of Compound 5b

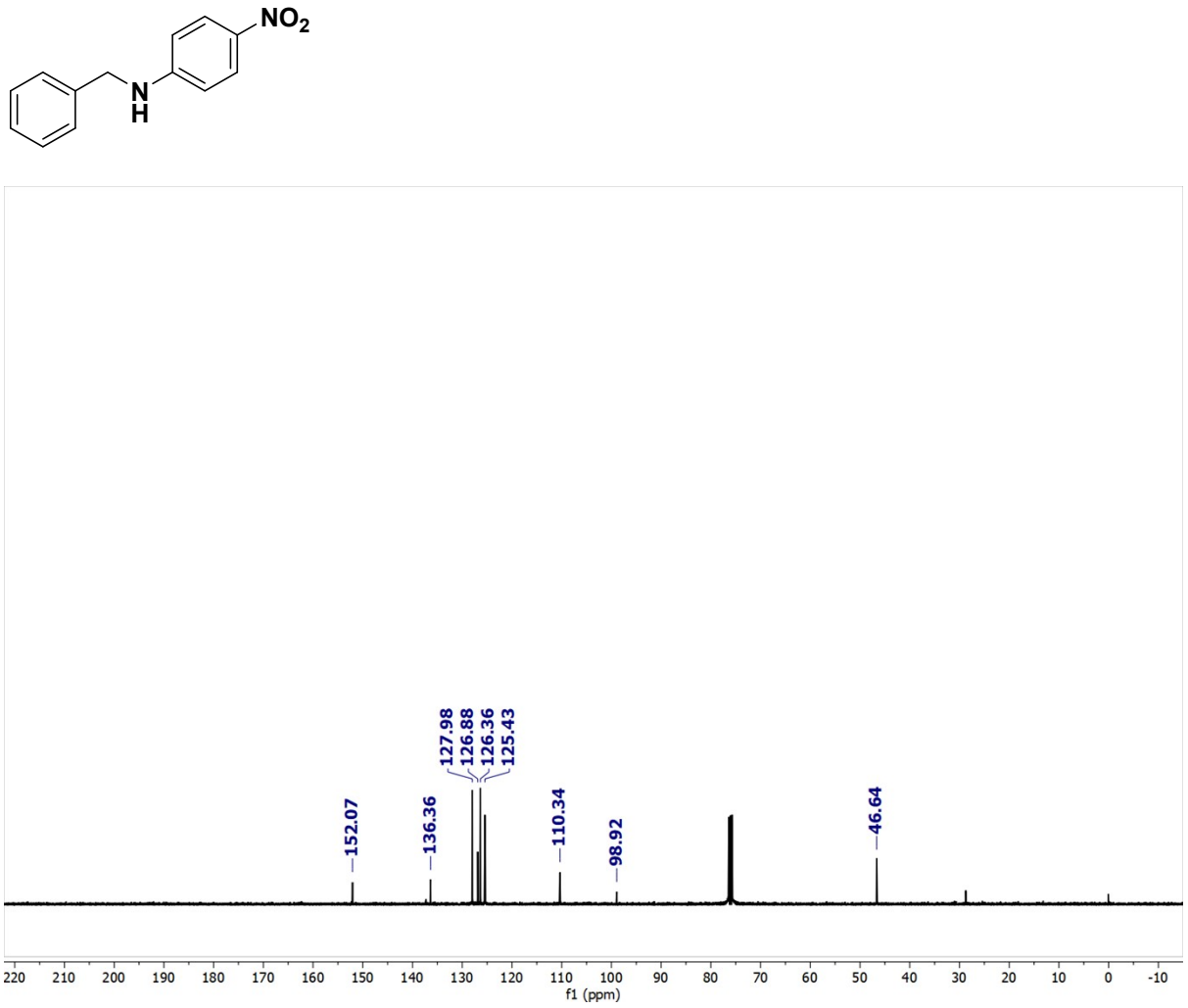
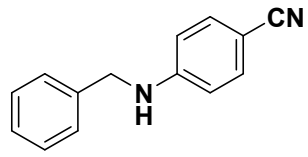


Figure S69: ^{13}C NMR of Compound 5b



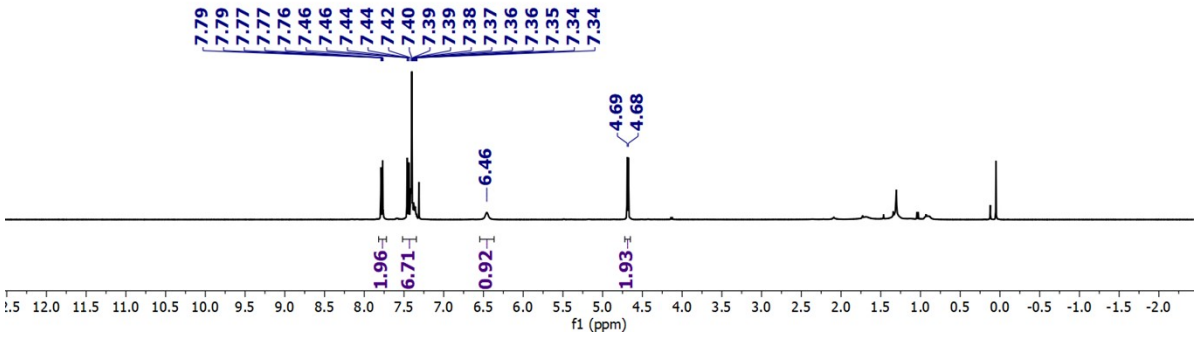


Figure S70: ^{1}H NMR of Compound 5d

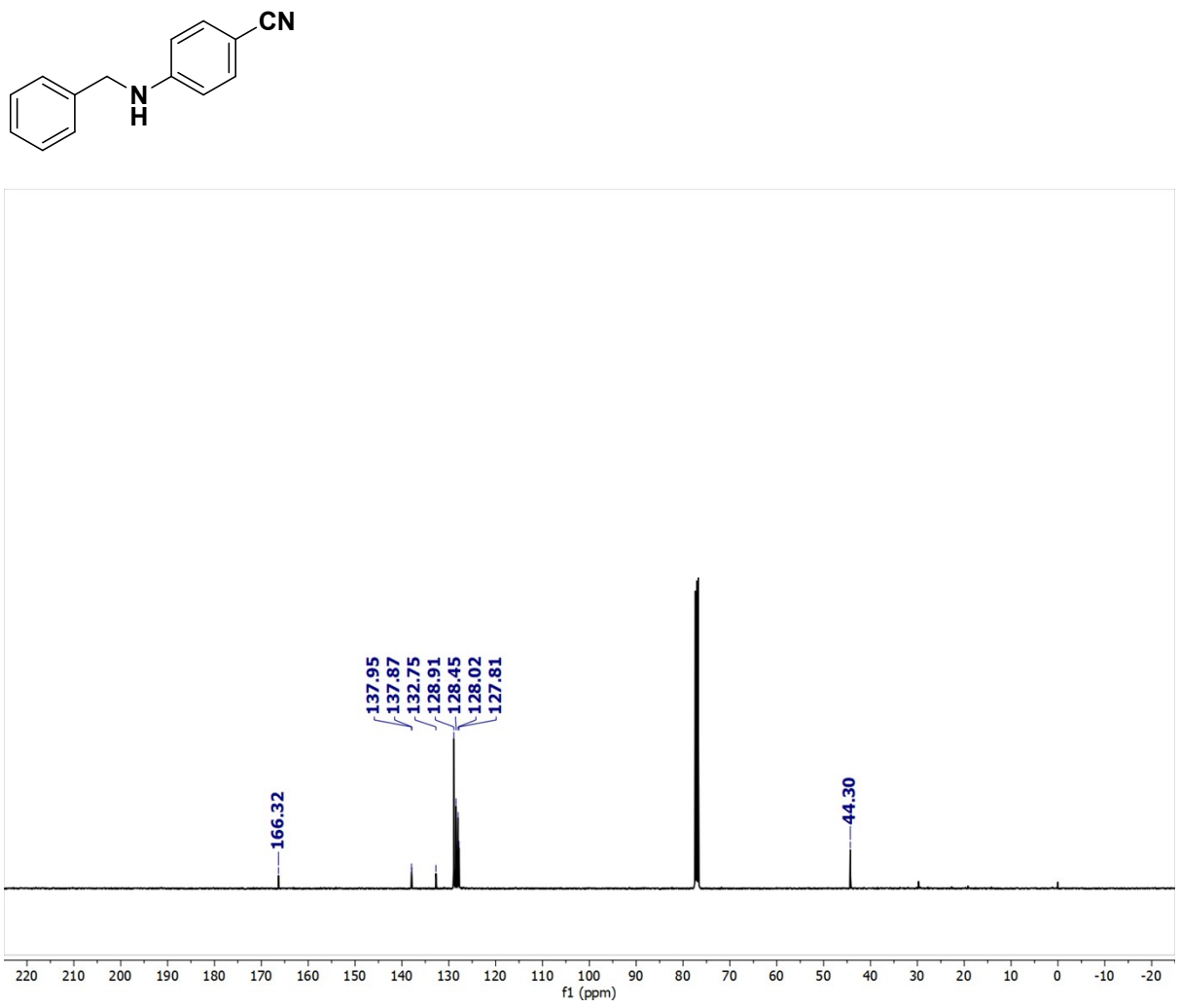
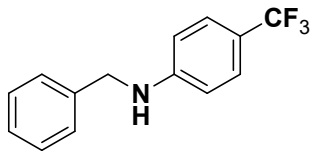


Figure S71: ^{13}C NMR of Compound 5d



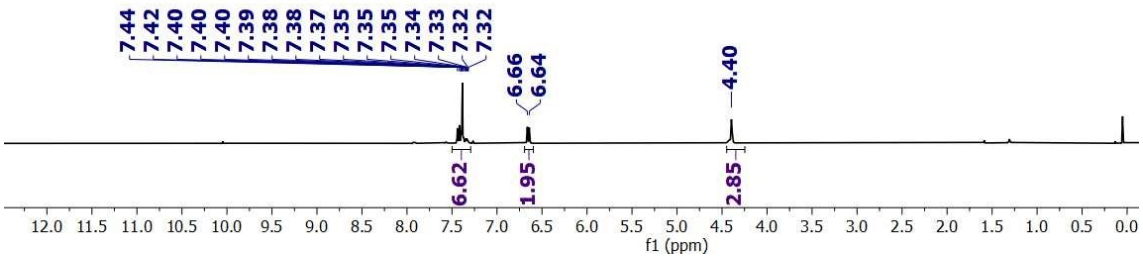


Figure S72: ^{1}H NMR of Compound 5c

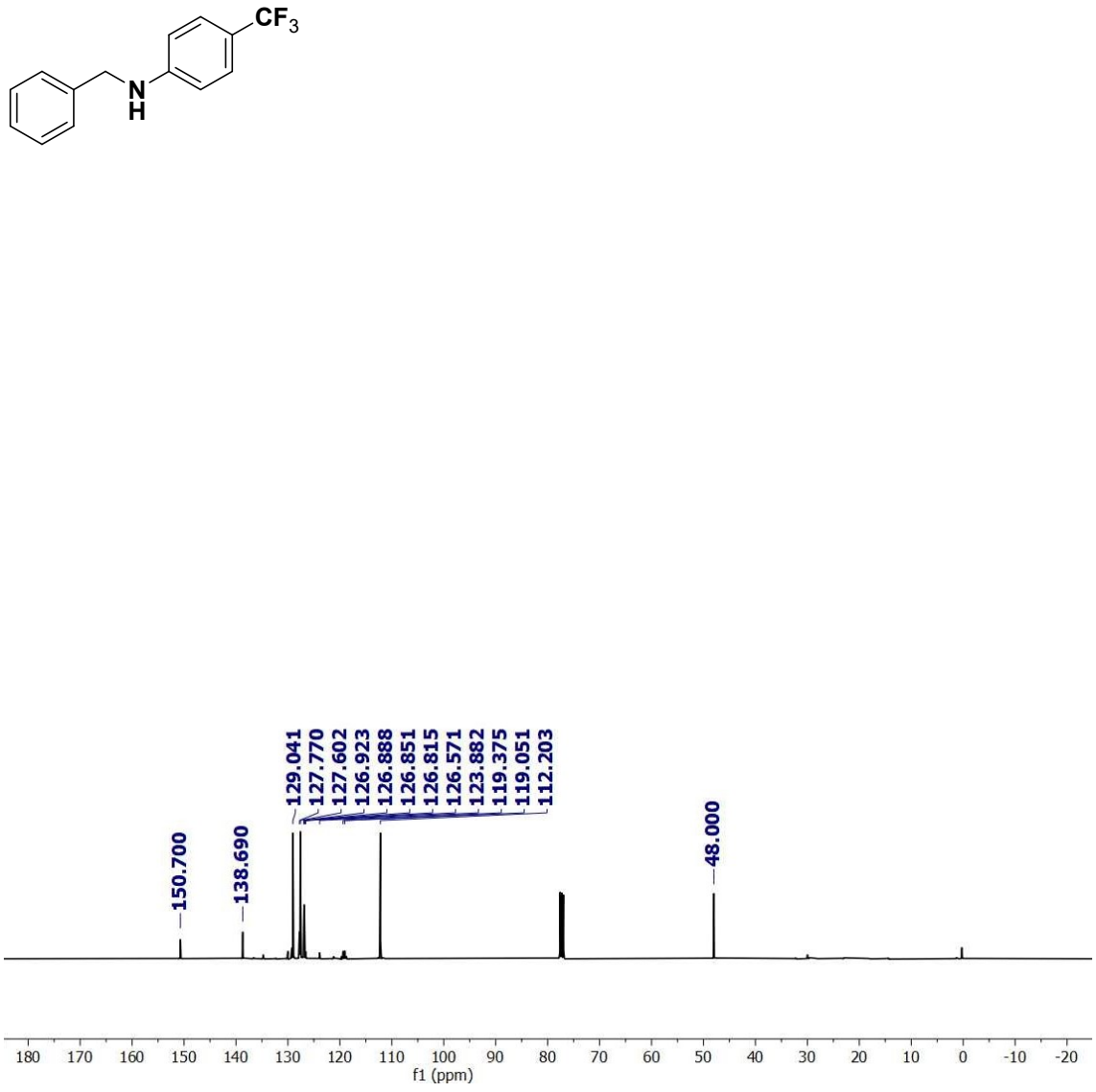
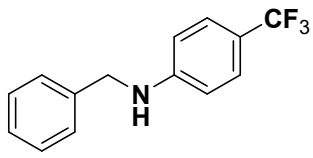


Figure S73: ^{13}C NMR of Compound 5c



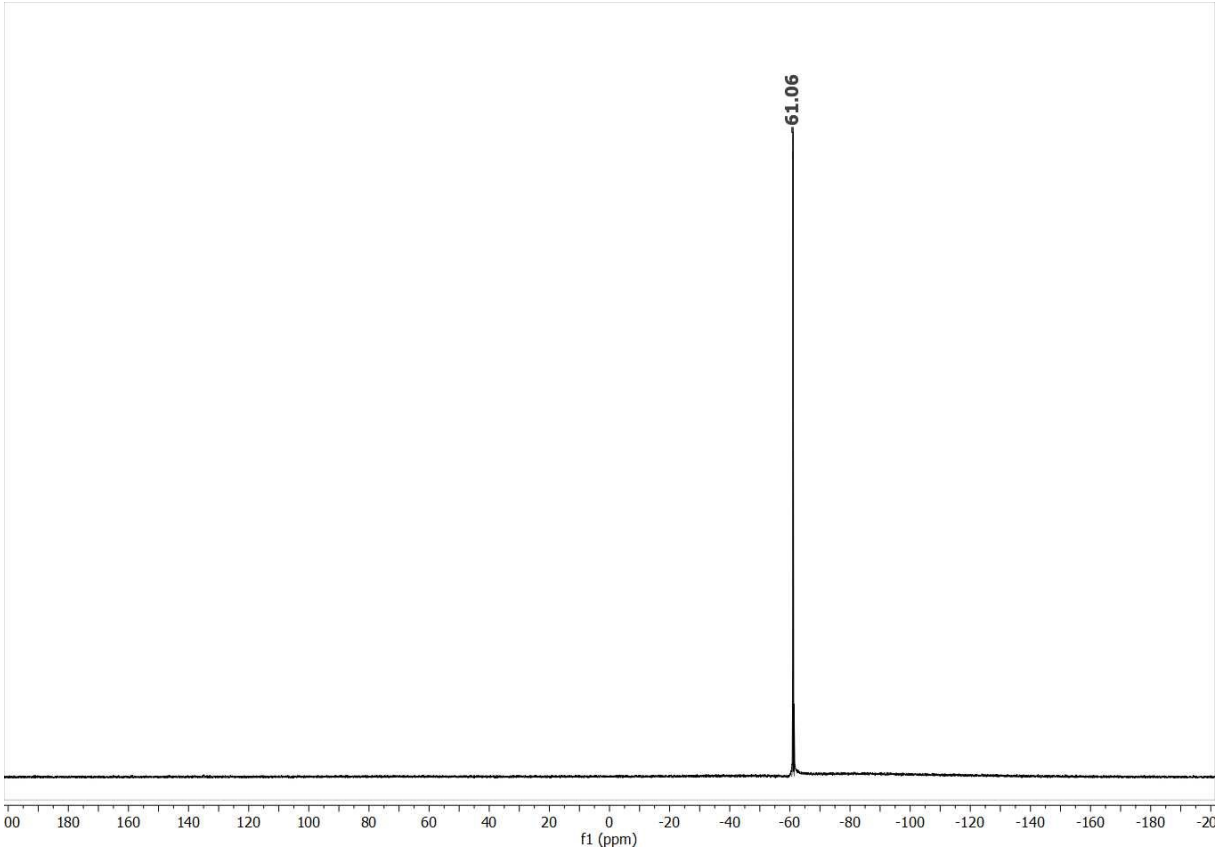
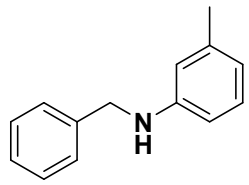


Figure S74: ^{19}F NMR of Compound 5c



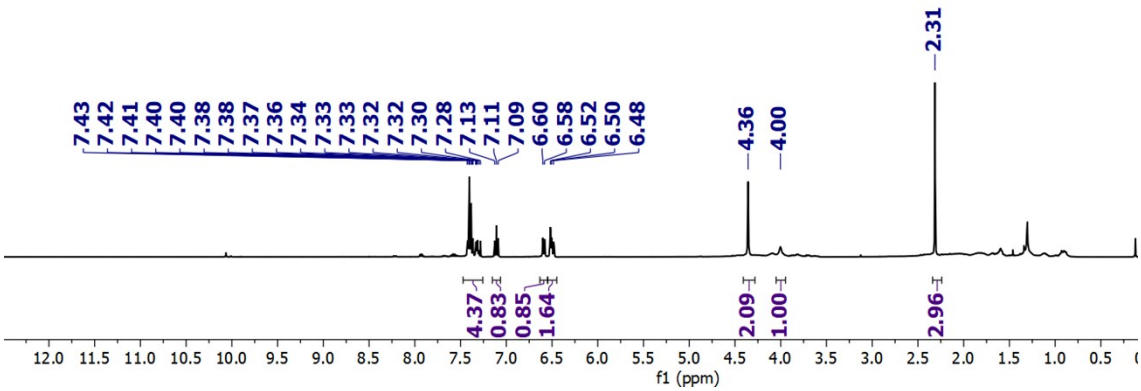


Figure S75: ^{1}H NMR of Compound

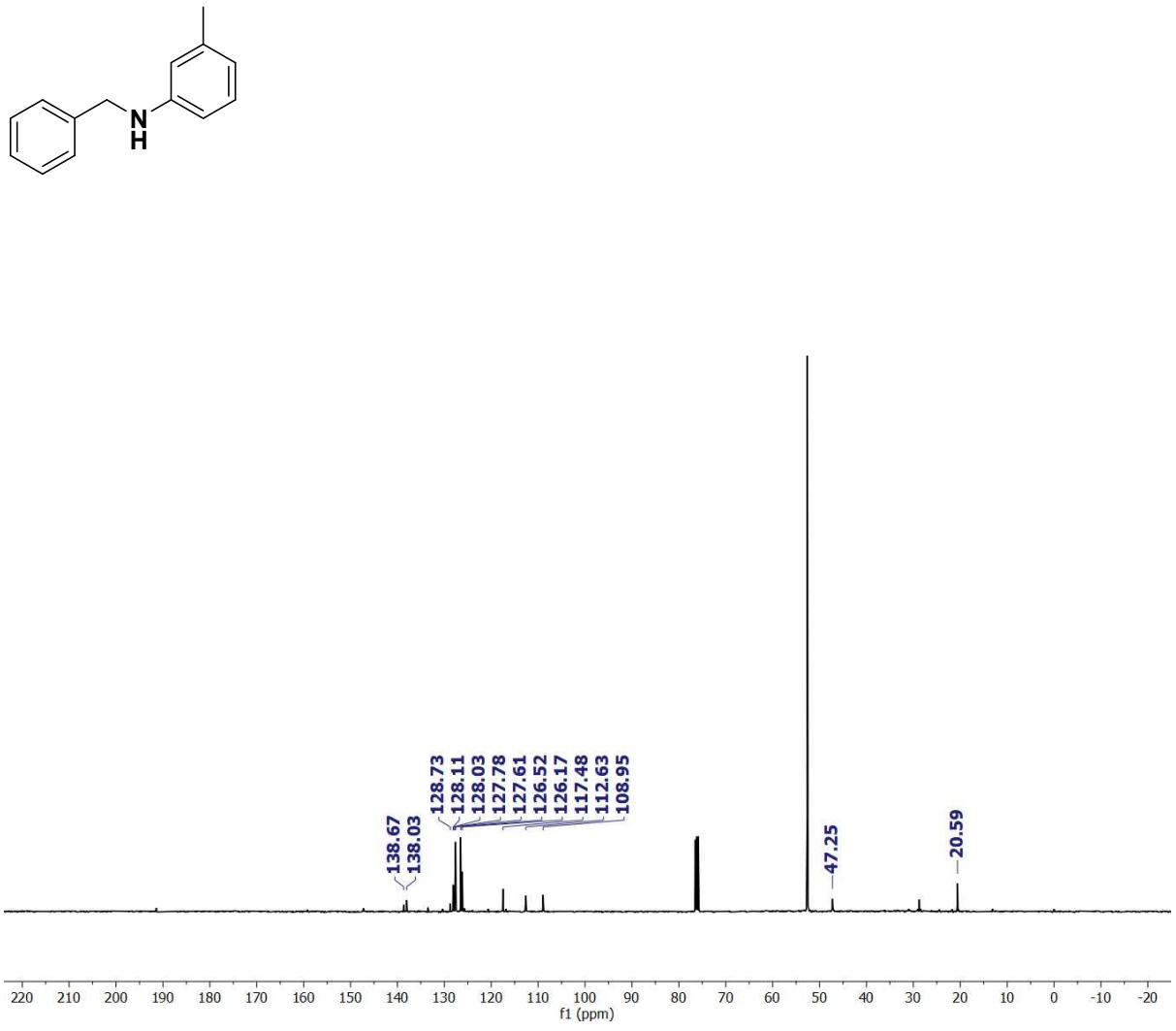
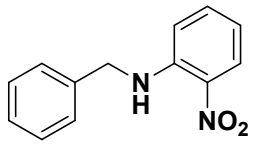


Figure S76: ^{13}C NMR of Compound



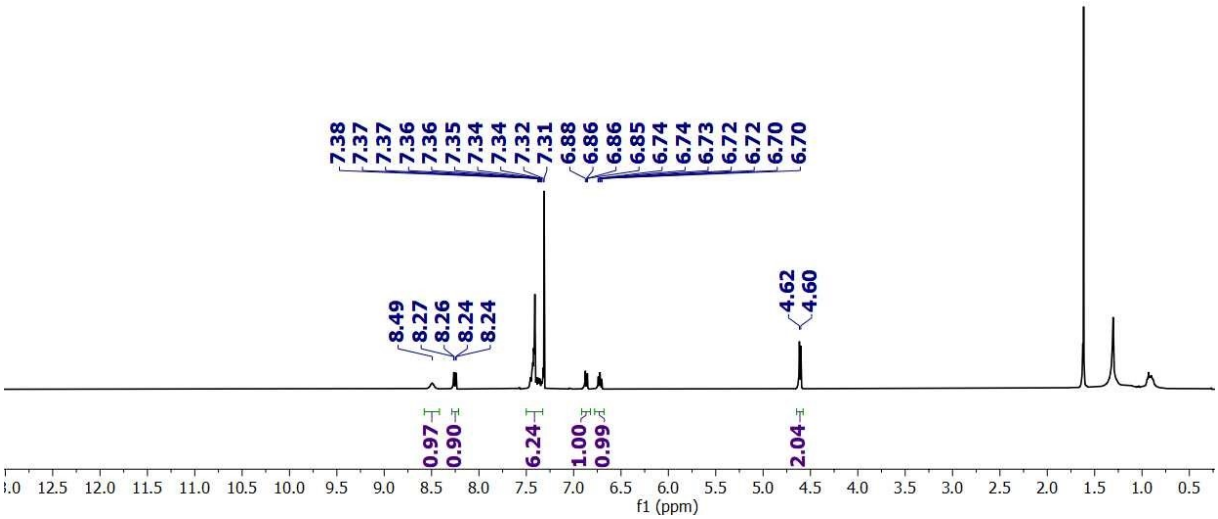


Figure S77: ^{1}H NMR of Compound 5f

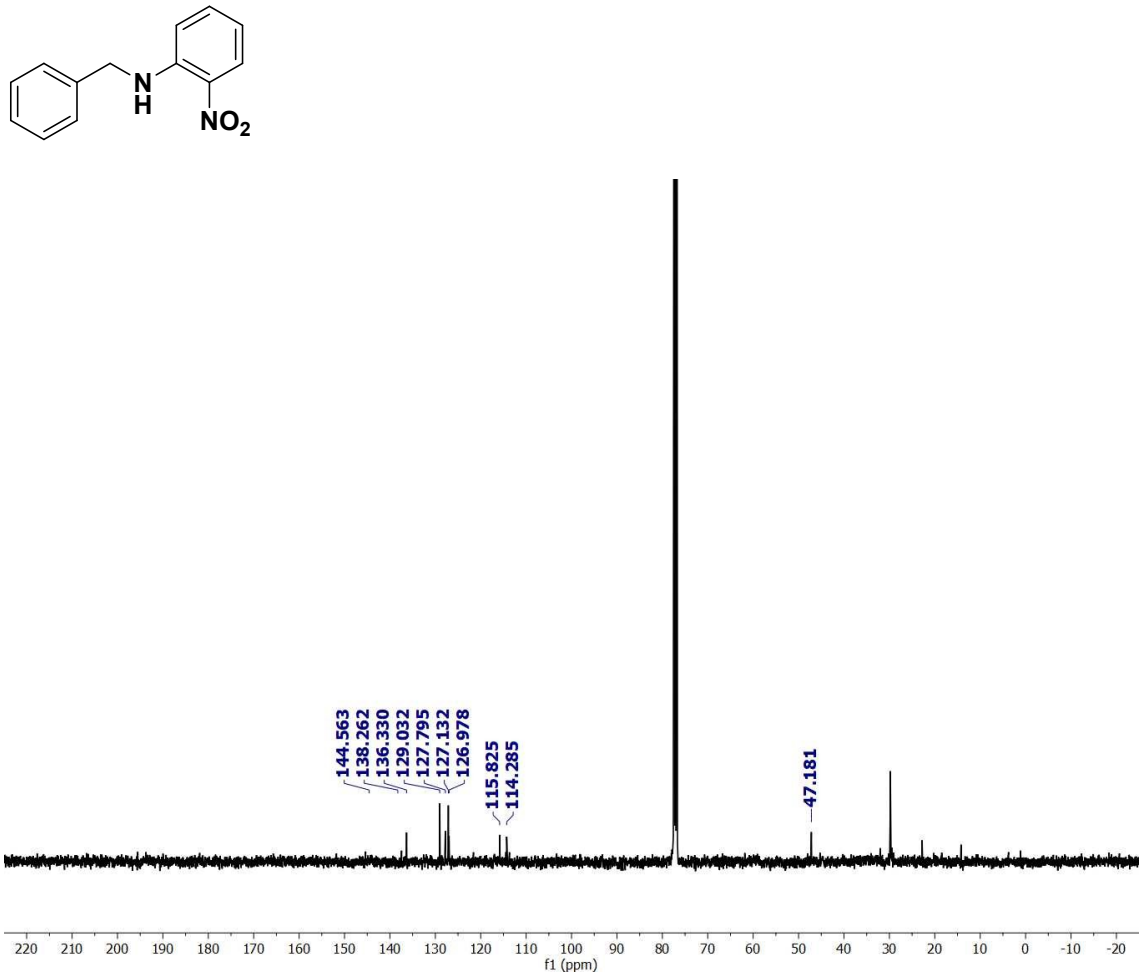
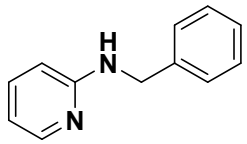


Figure S78: ^{13}C NMR of Compound 5f



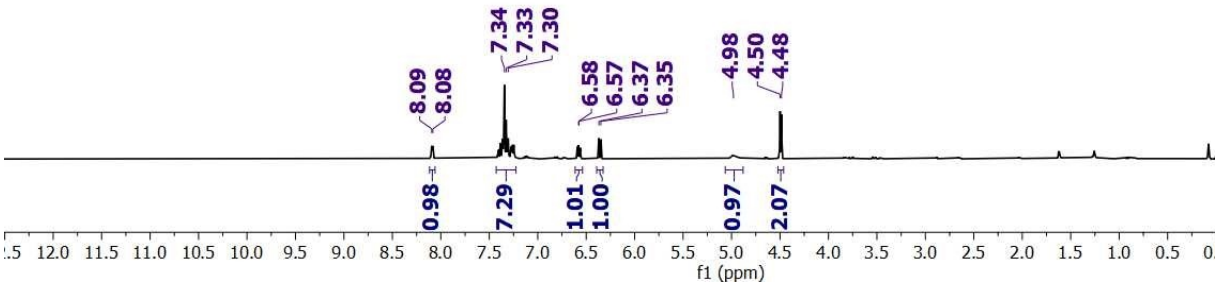
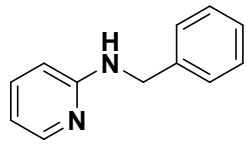


Figure S79: ^{1}H NMR of Compound 5g



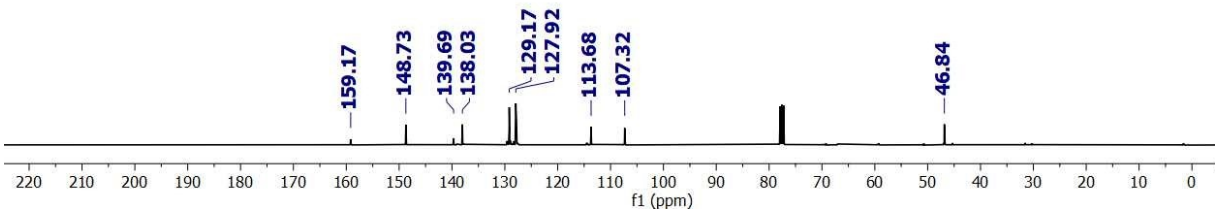
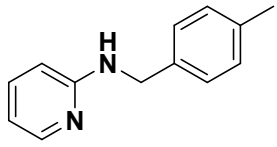


Figure S80: ^{13}C NMR of Compound 5g



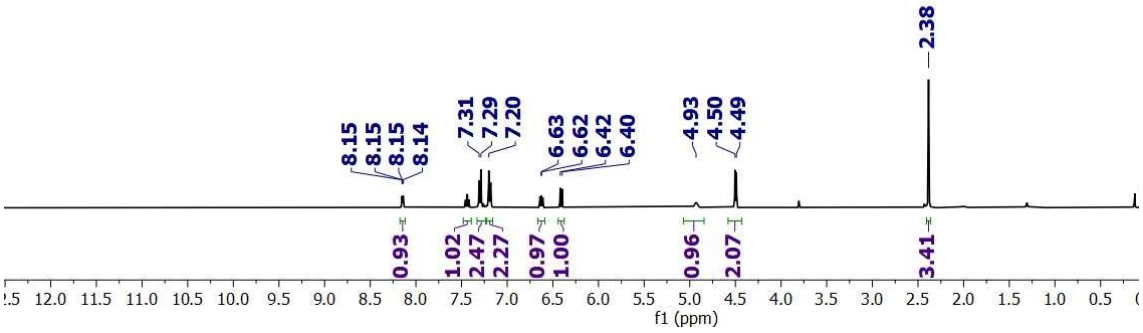
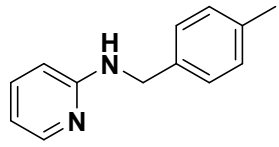


Figure S81: ^{1}H NMR of Compound 5i



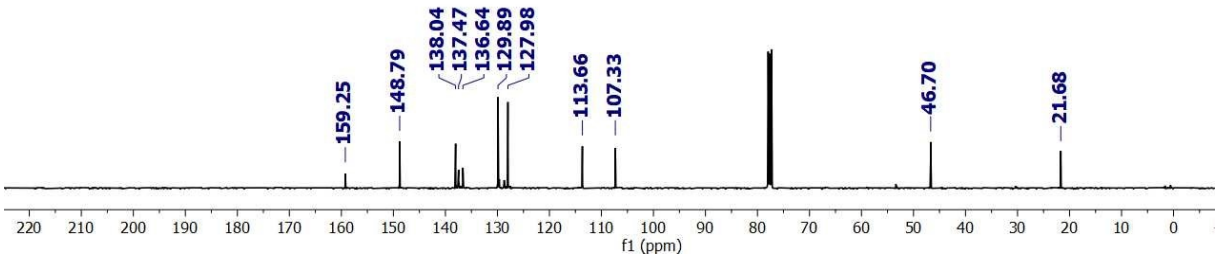


Figure S82: ^{13}C NMR of Compound 5i

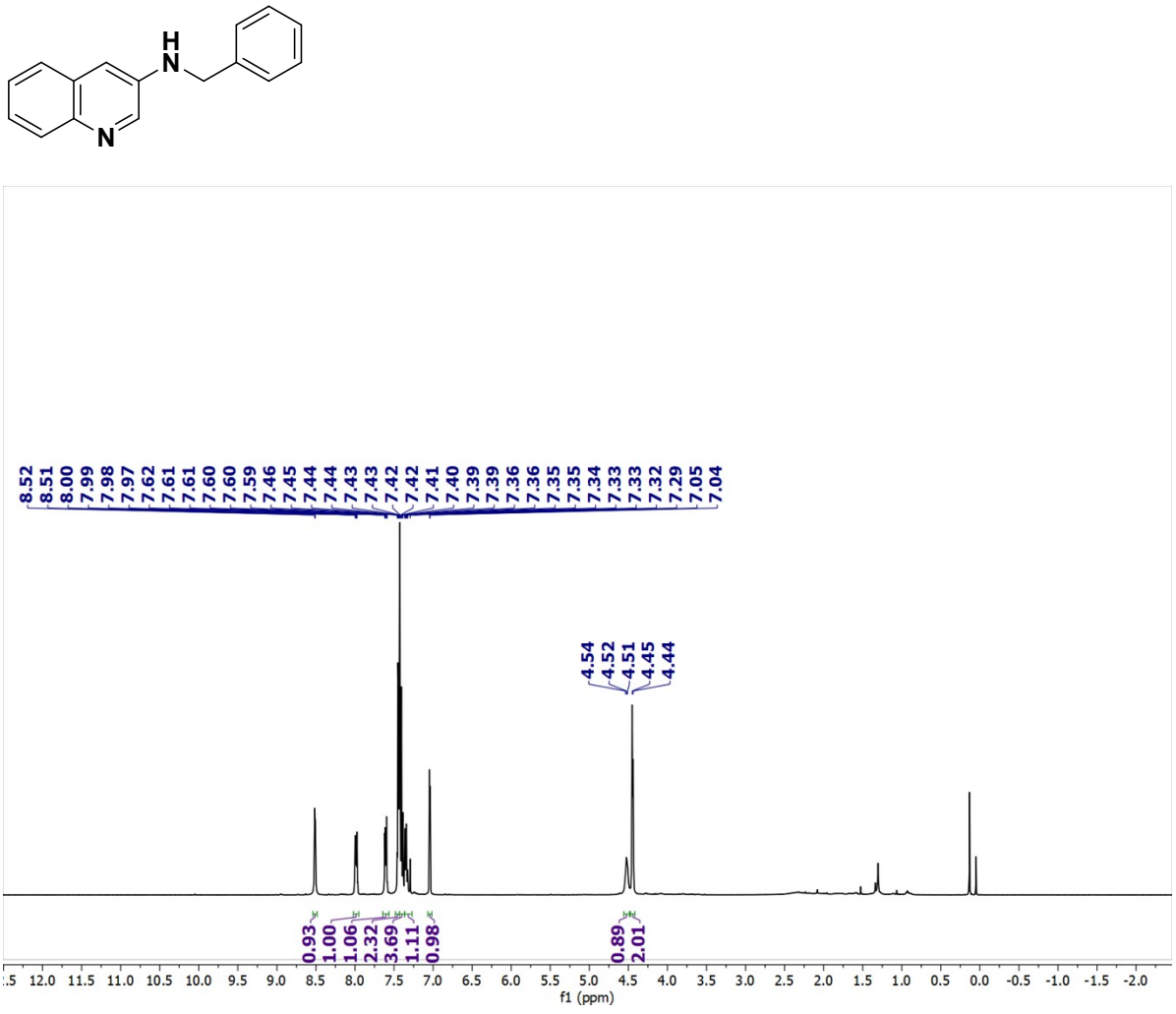


Figure S83: ^{1}H NMR of Compound 5l

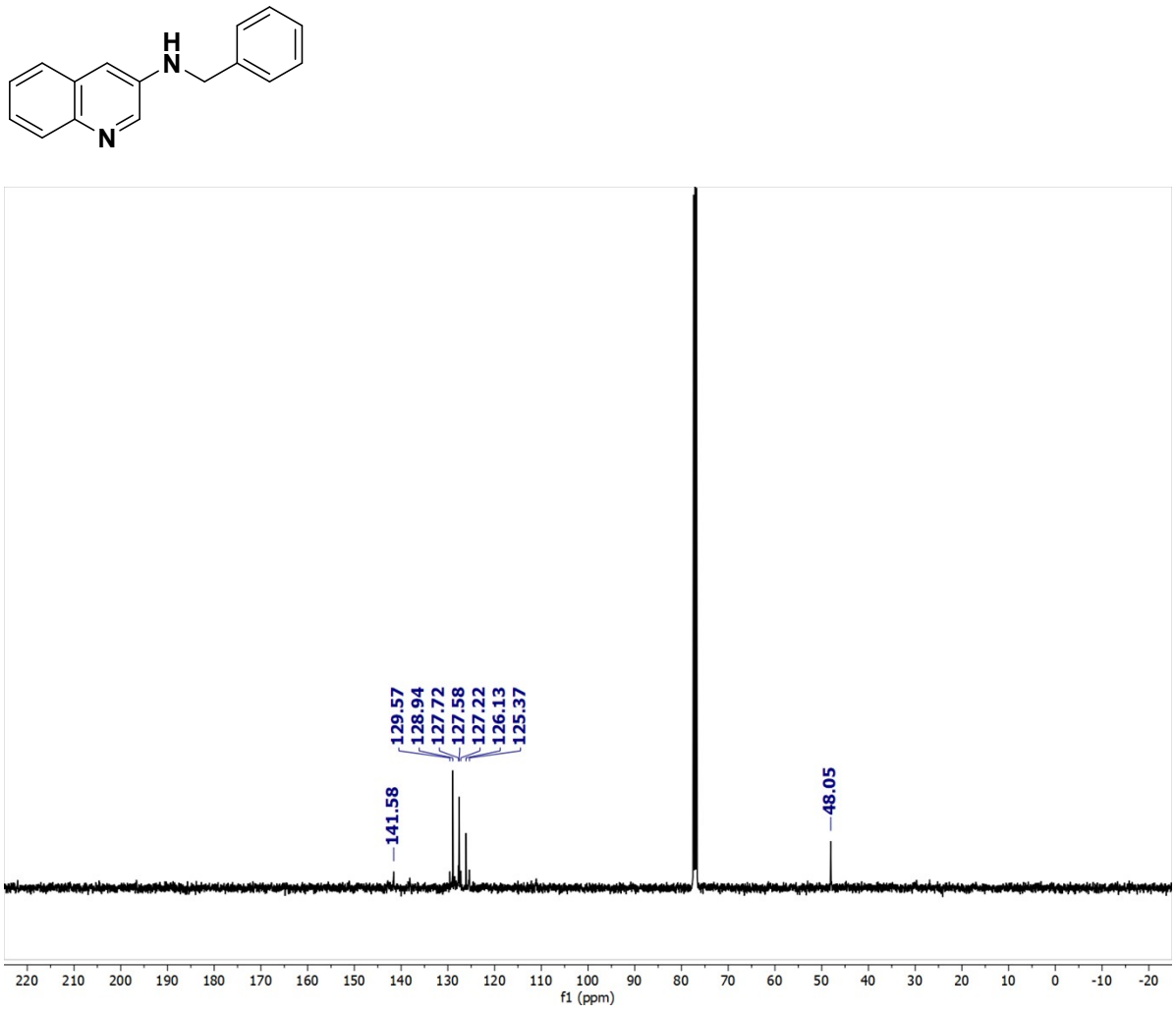


Figure S84: ^{13}C NMR of Compound 5l

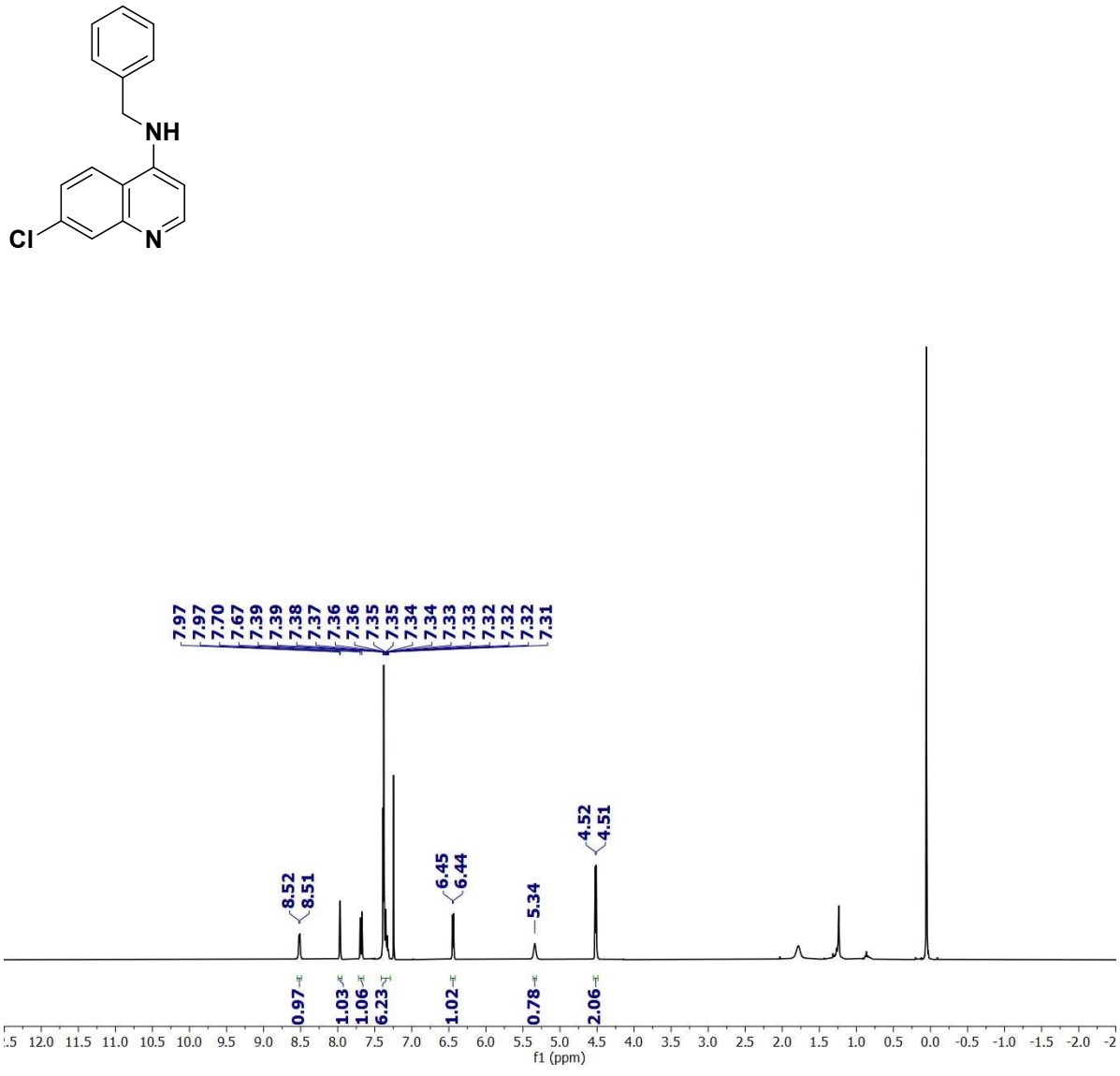


Figure S85: ^{1}H NMR of Compound 5k

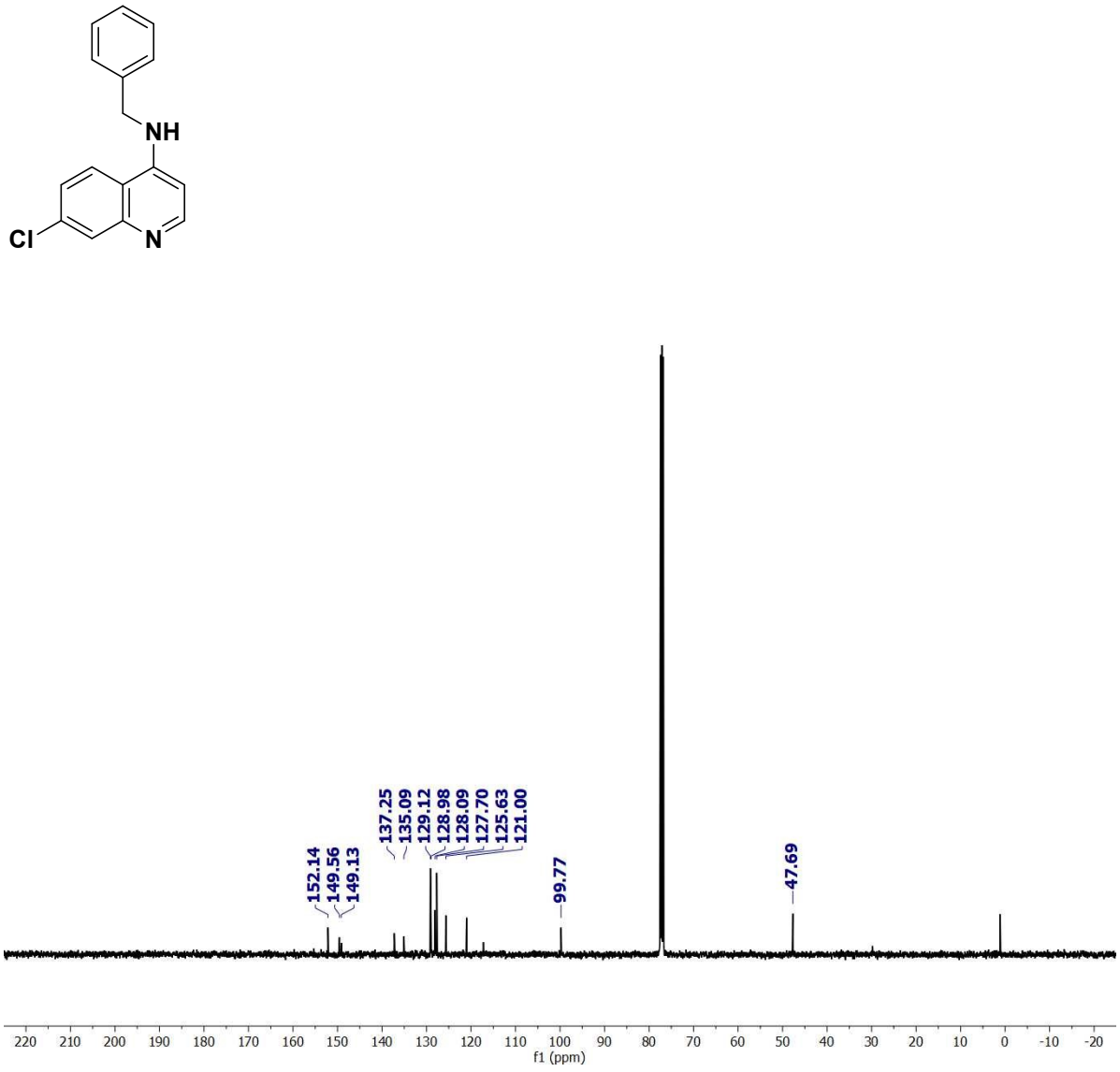


Figure S86: ^{13}C NMR of Compound 5k

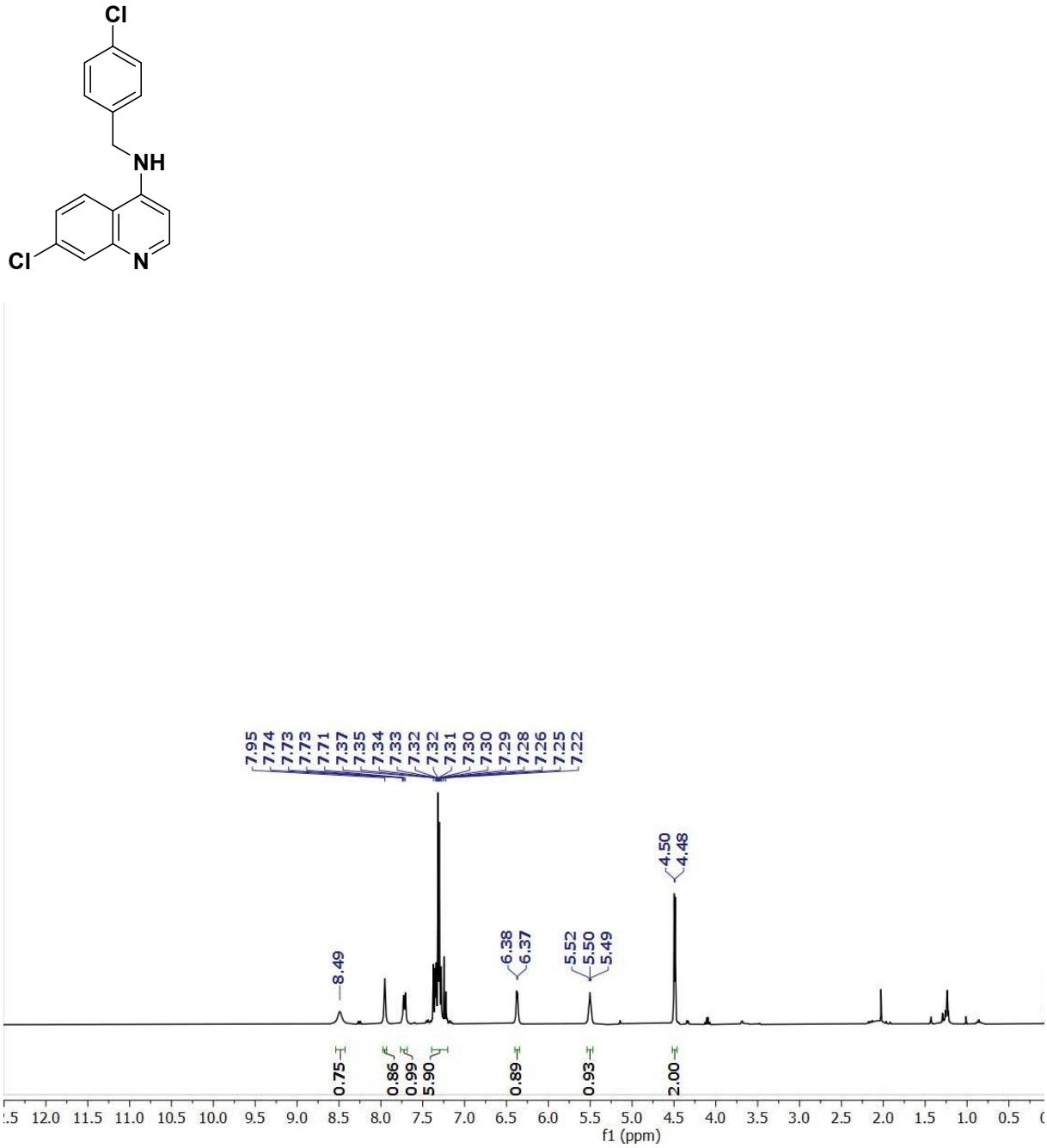


Figure S87: ^{1}H NMR of Compound 5j

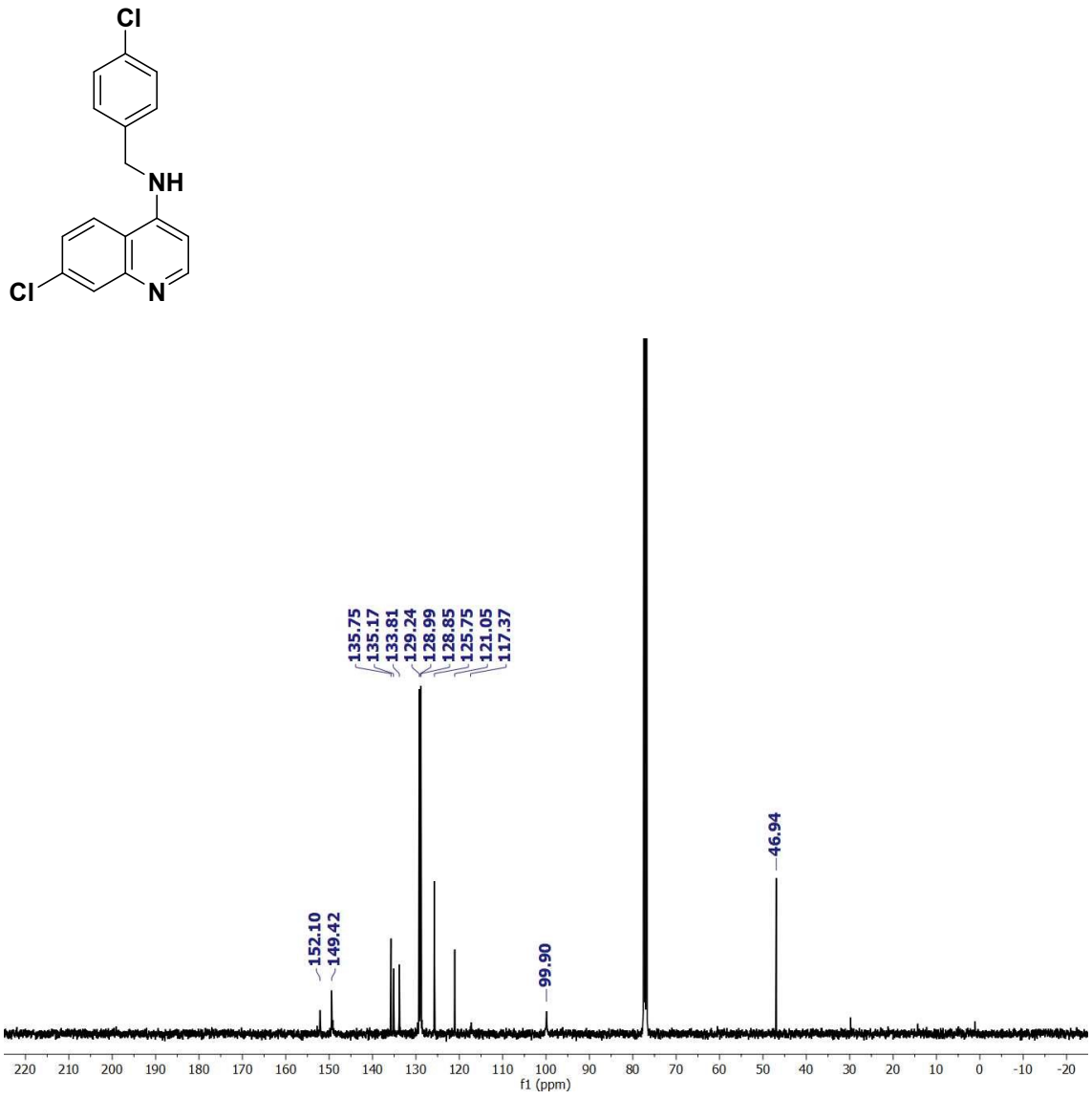
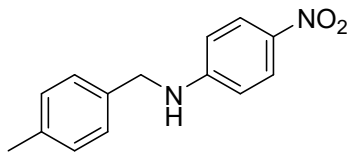


Figure S88: ^{13}C NMR of Compound 5j



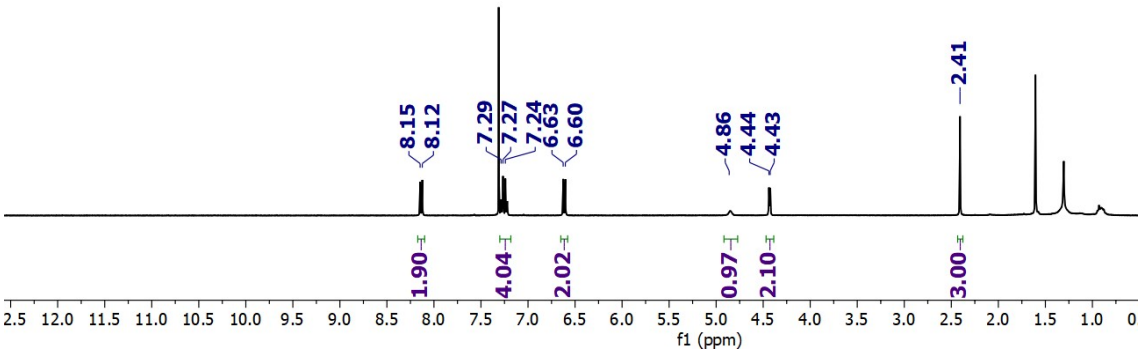


Figure S89: ^{1}H NMR of Compound 5h

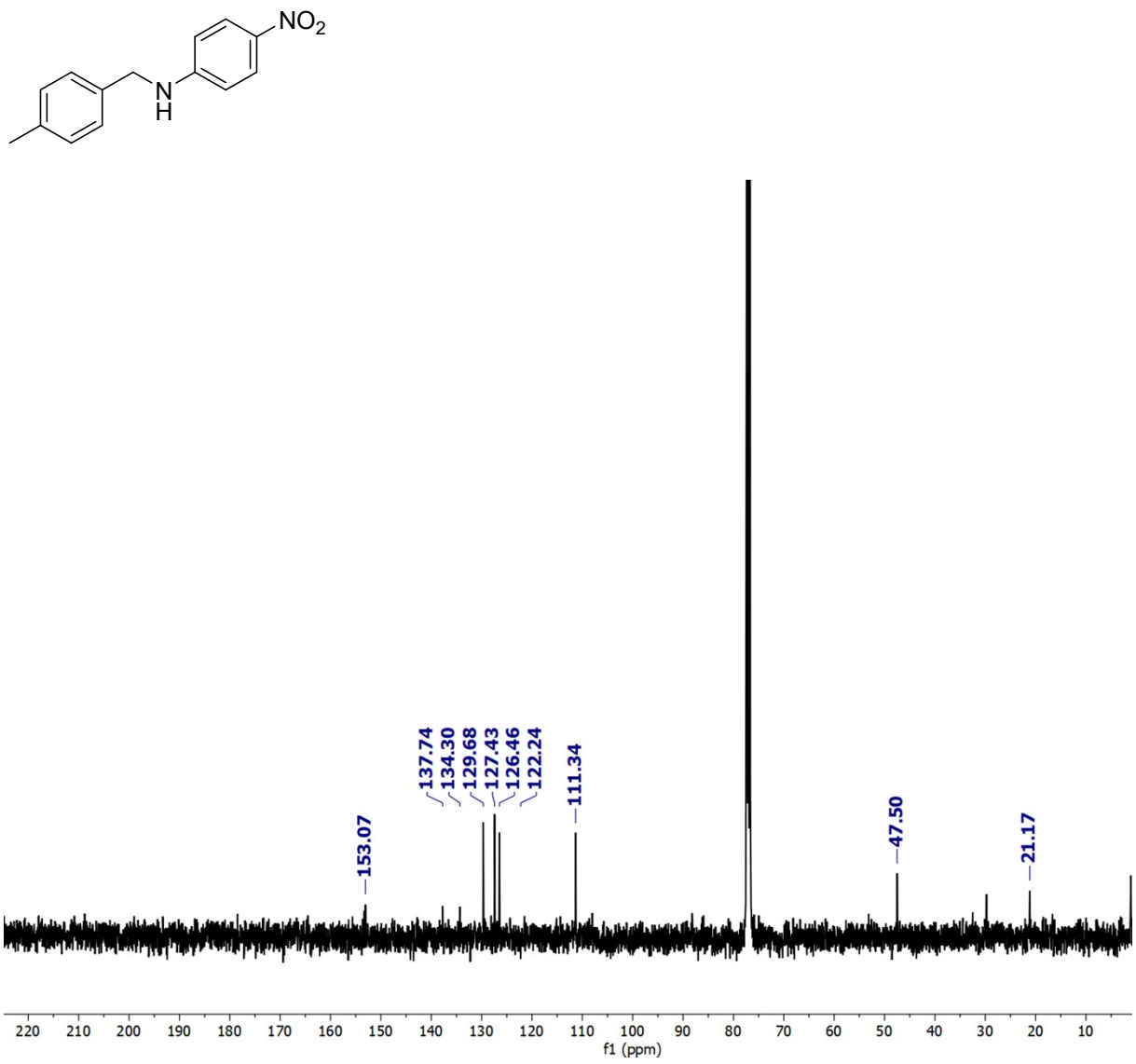
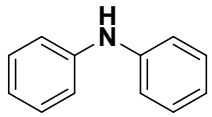


Figure S90: ^{13}C NMR of Compound 5h



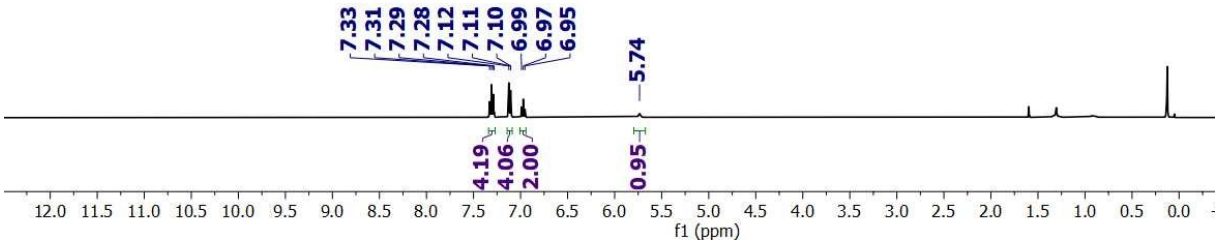
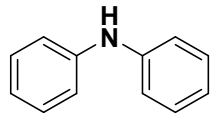


Figure S91: ^{1}H NMR of Compound 6a



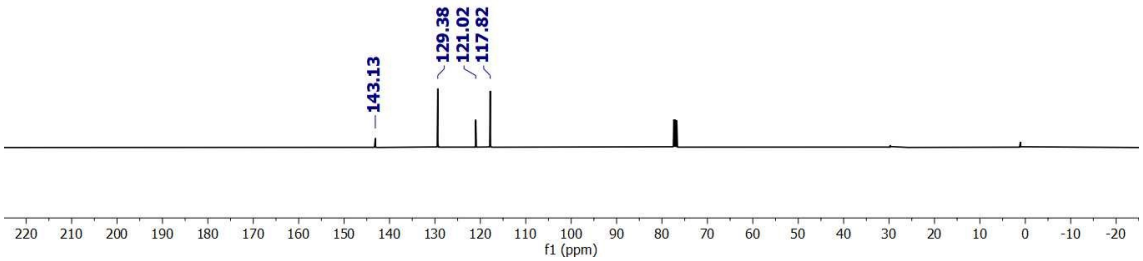
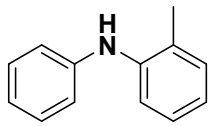


Figure S92: ^{13}C NMR of Compound 6b



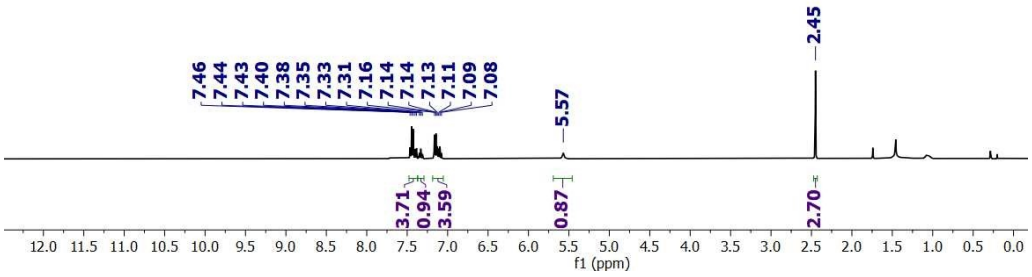
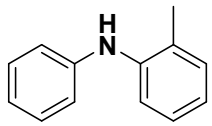


Figure S93: ^{1}H NMR of Compound 6g



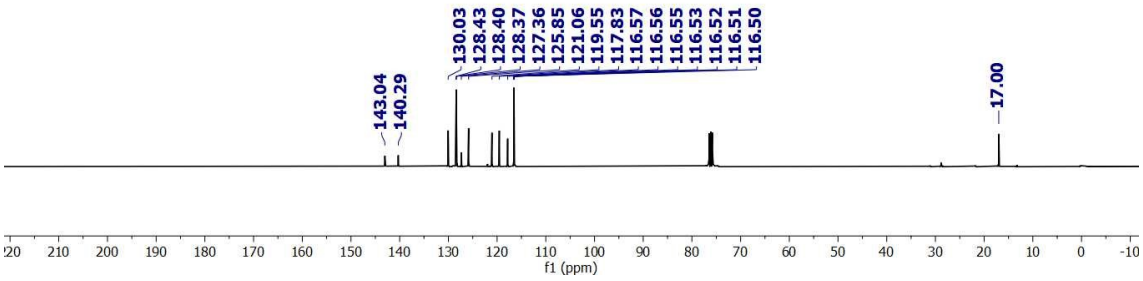
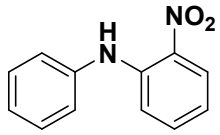


Figure S94: ^{13}C NMR of Compound 6g



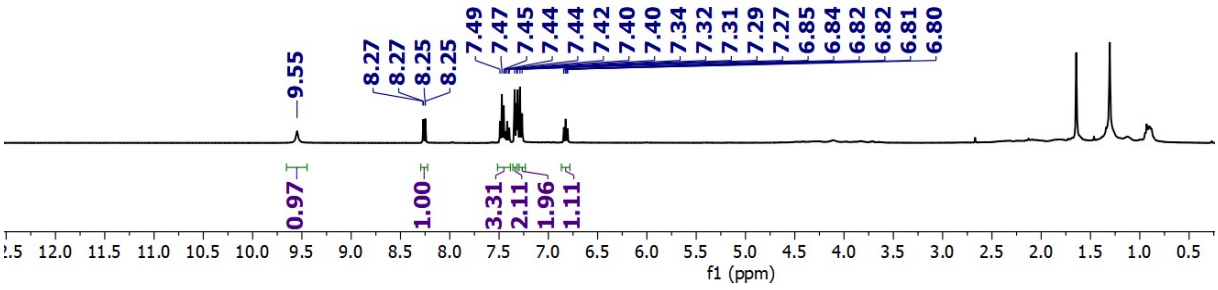


Figure S95: ^{1}H NMR of Compound 6f

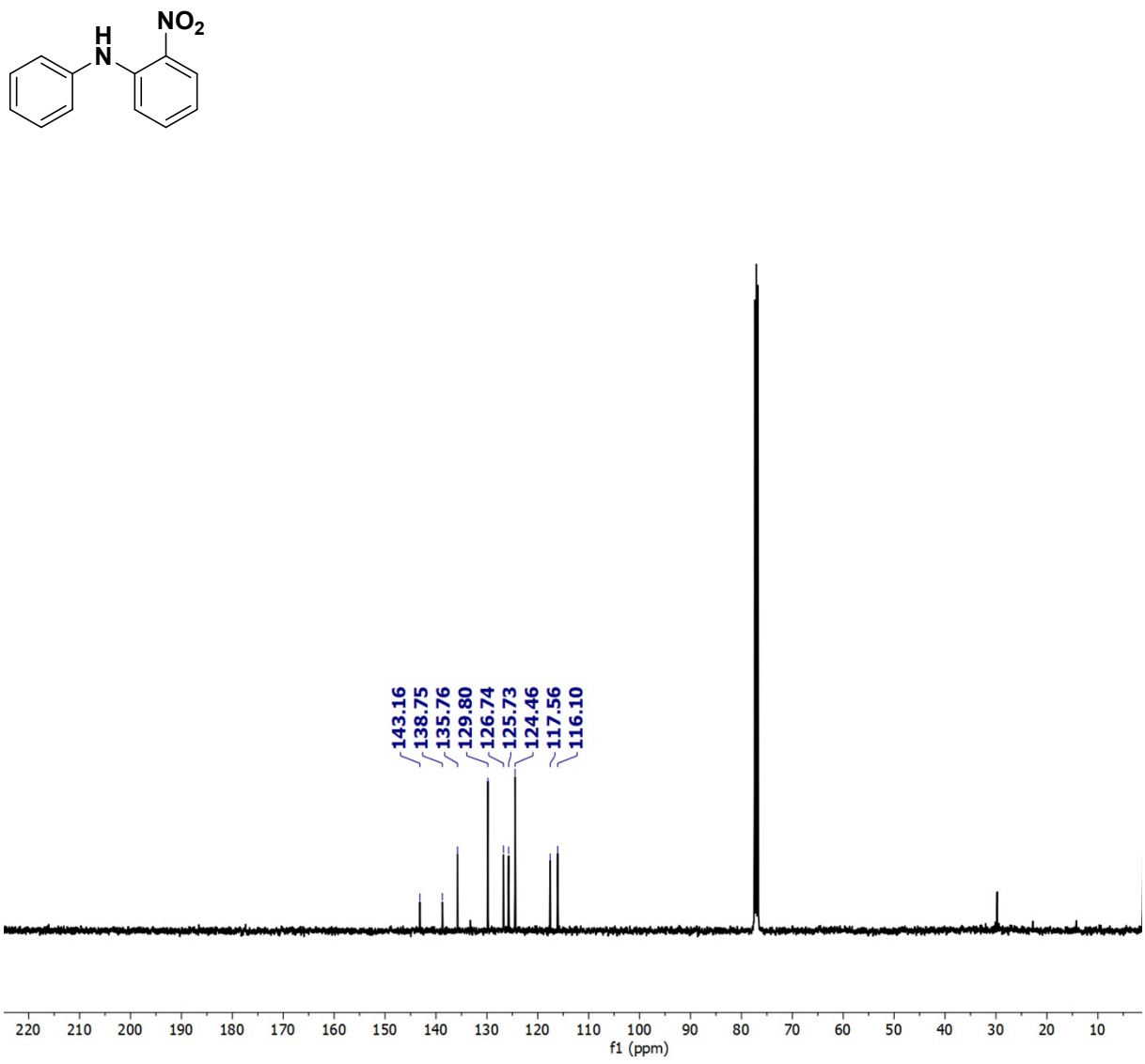
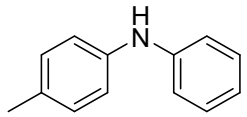


Figure S96: ^{13}C NMR of Compound 6f



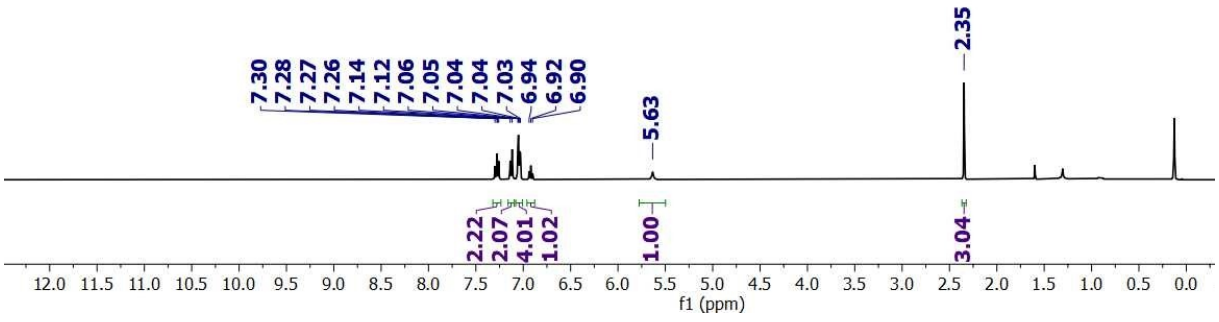
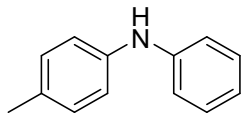


Figure S97: ^{1}H NMR of Compound 6d



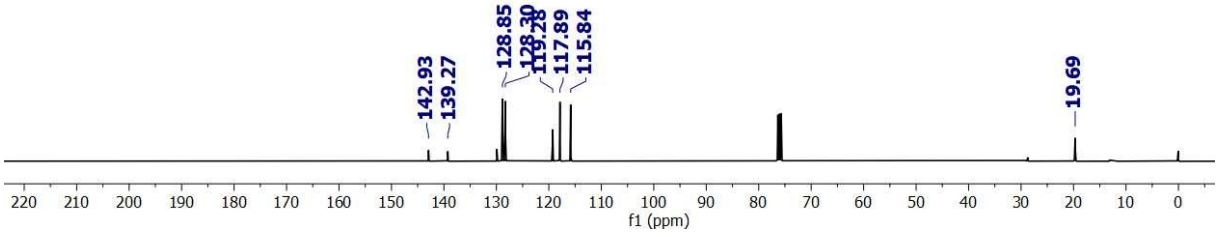
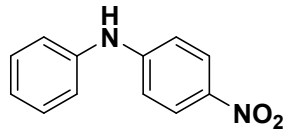


Figure S98: ^{13}C NMR of Compound 6d



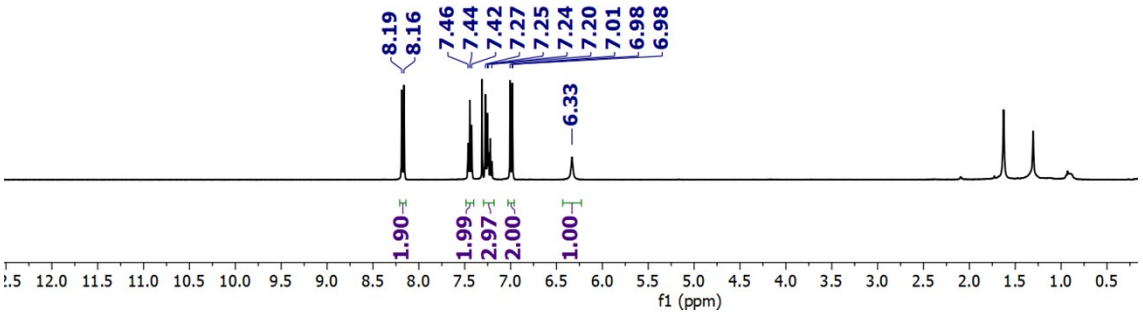


Figure S99: ^{1}H NMR of Compound 6b

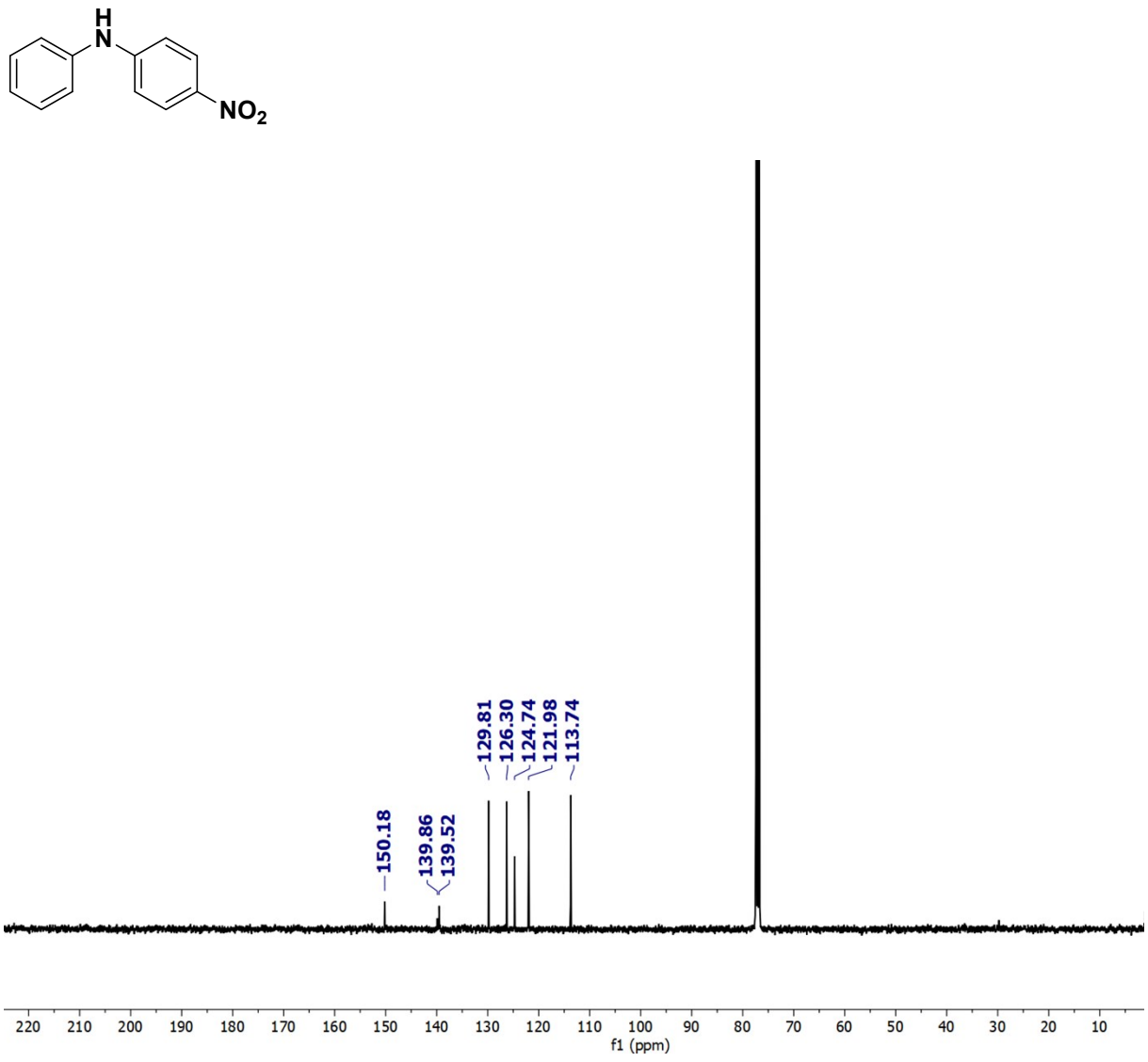
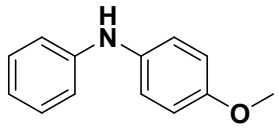


Figure S100: ^{13}C NMR of Compound 6b


H
N
O

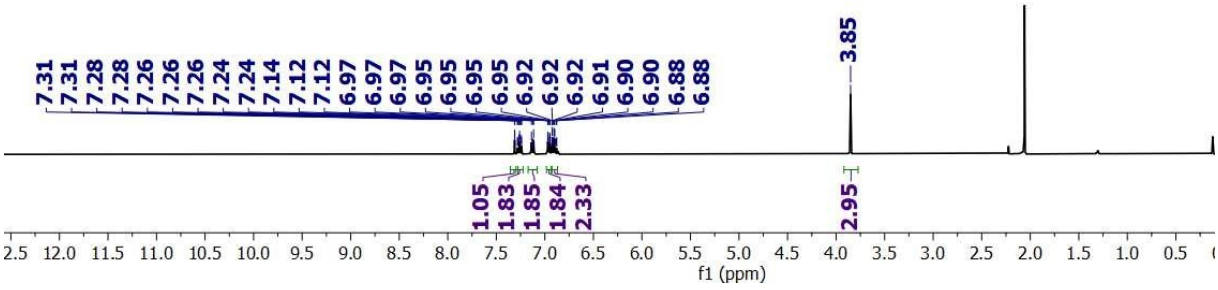
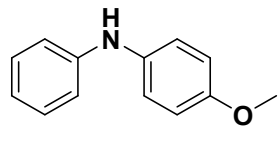

7.31
7.31
7.28
7.28
7.26
7.26
7.26
7.24
7.24
7.14
7.12
7.12
6.97
6.97
6.97
6.95
6.95
6.95
6.95
6.92
6.92
6.92
6.91
6.90
6.90
6.88
6.88
3.85
1.05
1.83
1.85
1.84
2.33
2.95
f1 (ppm)

Figure S101: ^{1}H NMR of Compound 6e



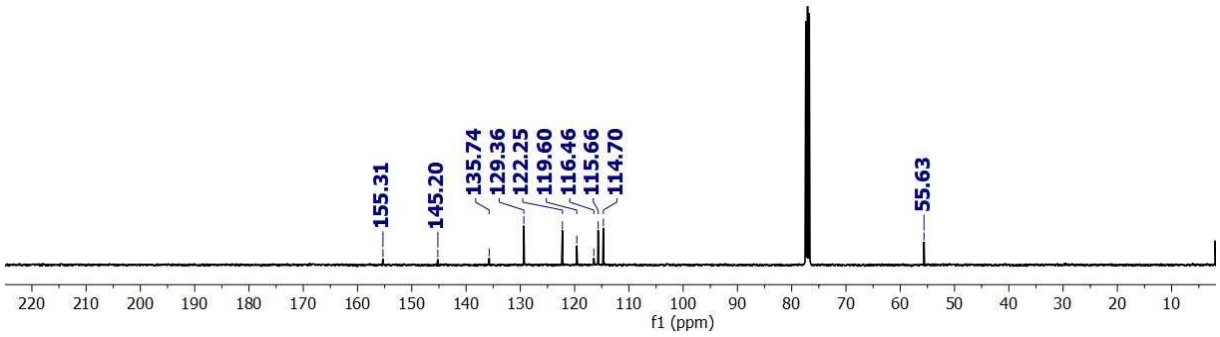
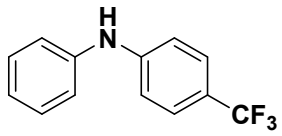


Figure S102: ^{13}C NMR of Compound 6e



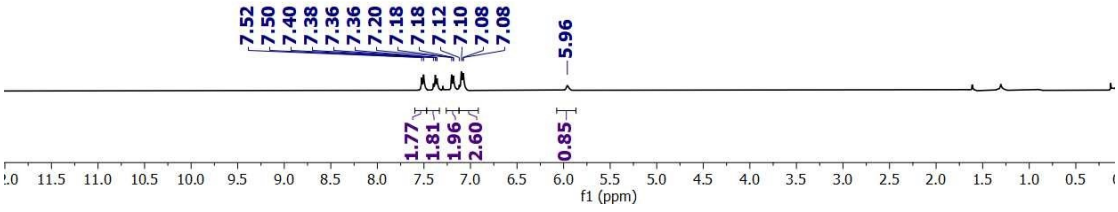
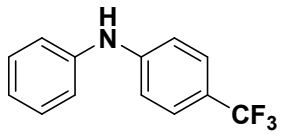


Figure S103: ^{1}H NMR of Compound 6c



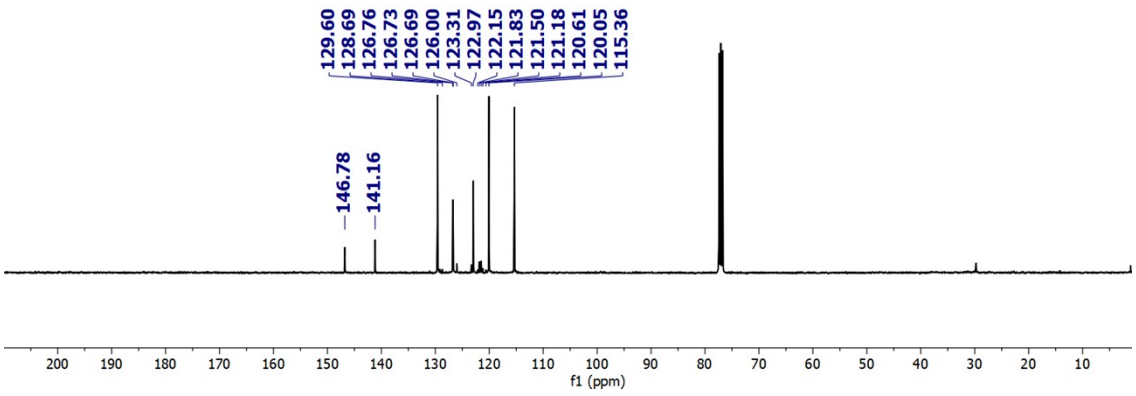
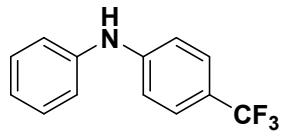


Figure S104: ^{13}C NMR of Compound 6c



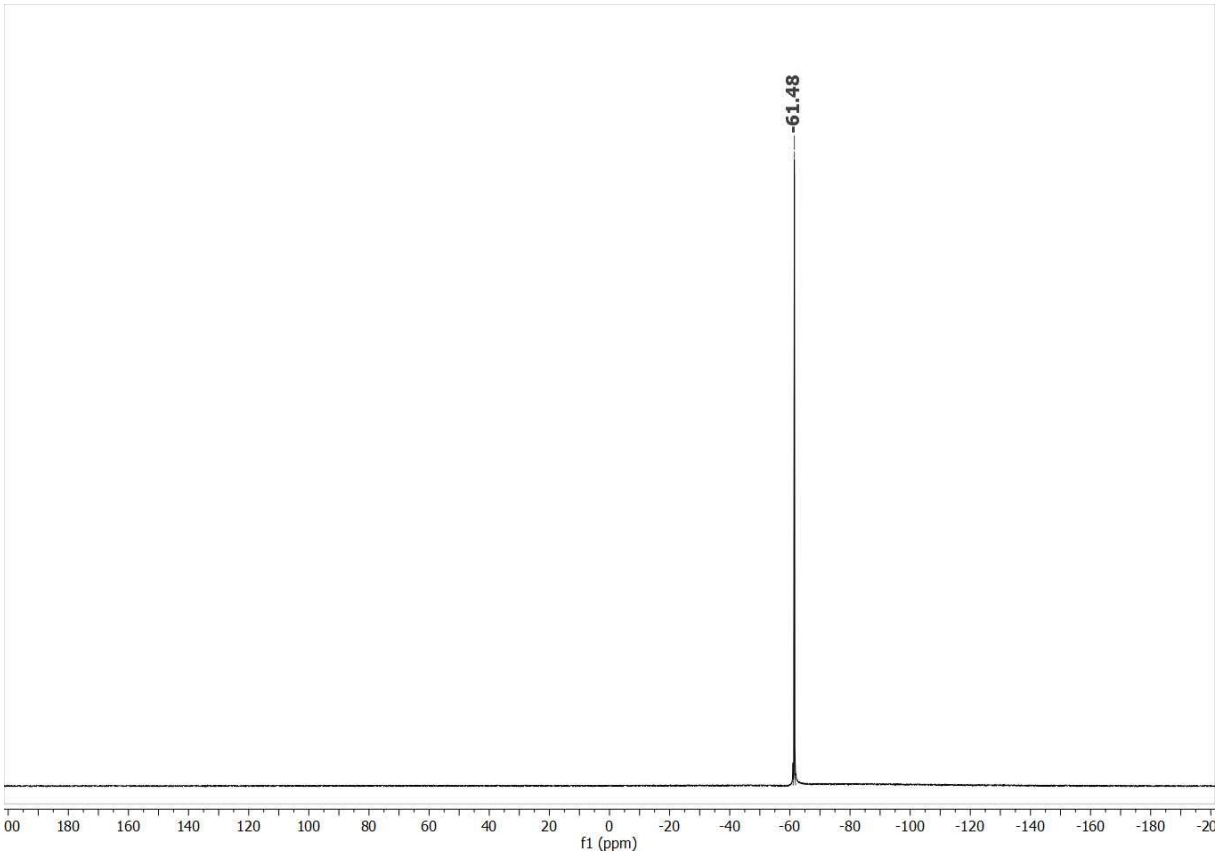
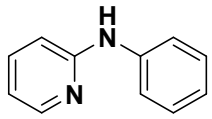


Figure S105: ^{19}F NMR of Compound 6c



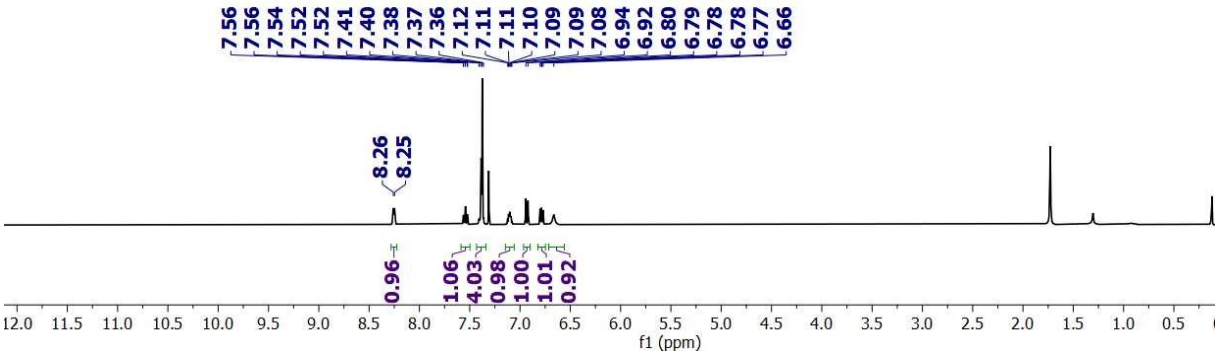
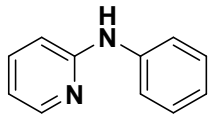


Figure S106: ^{1}H NMR of Compound 6h



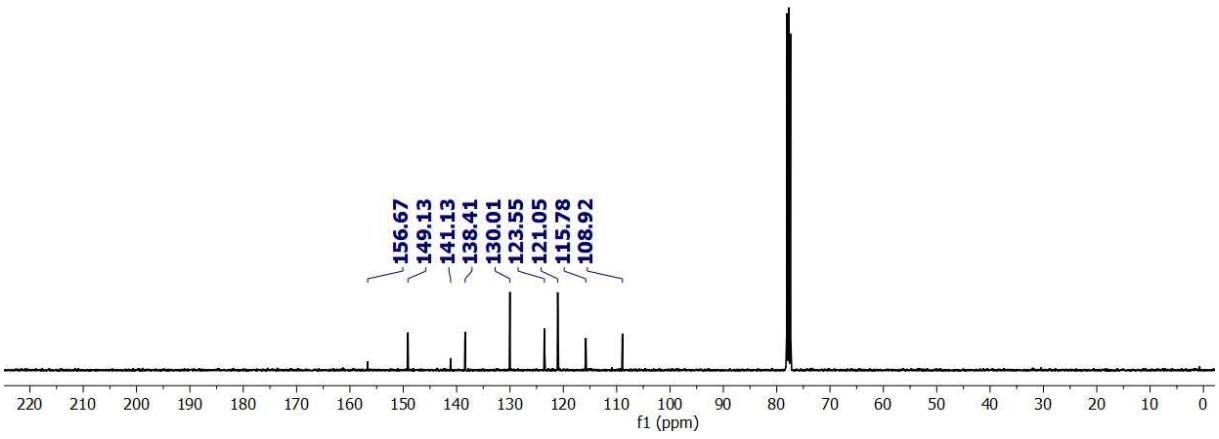


Figure S107: ^{13}C NMR of Compound 6h

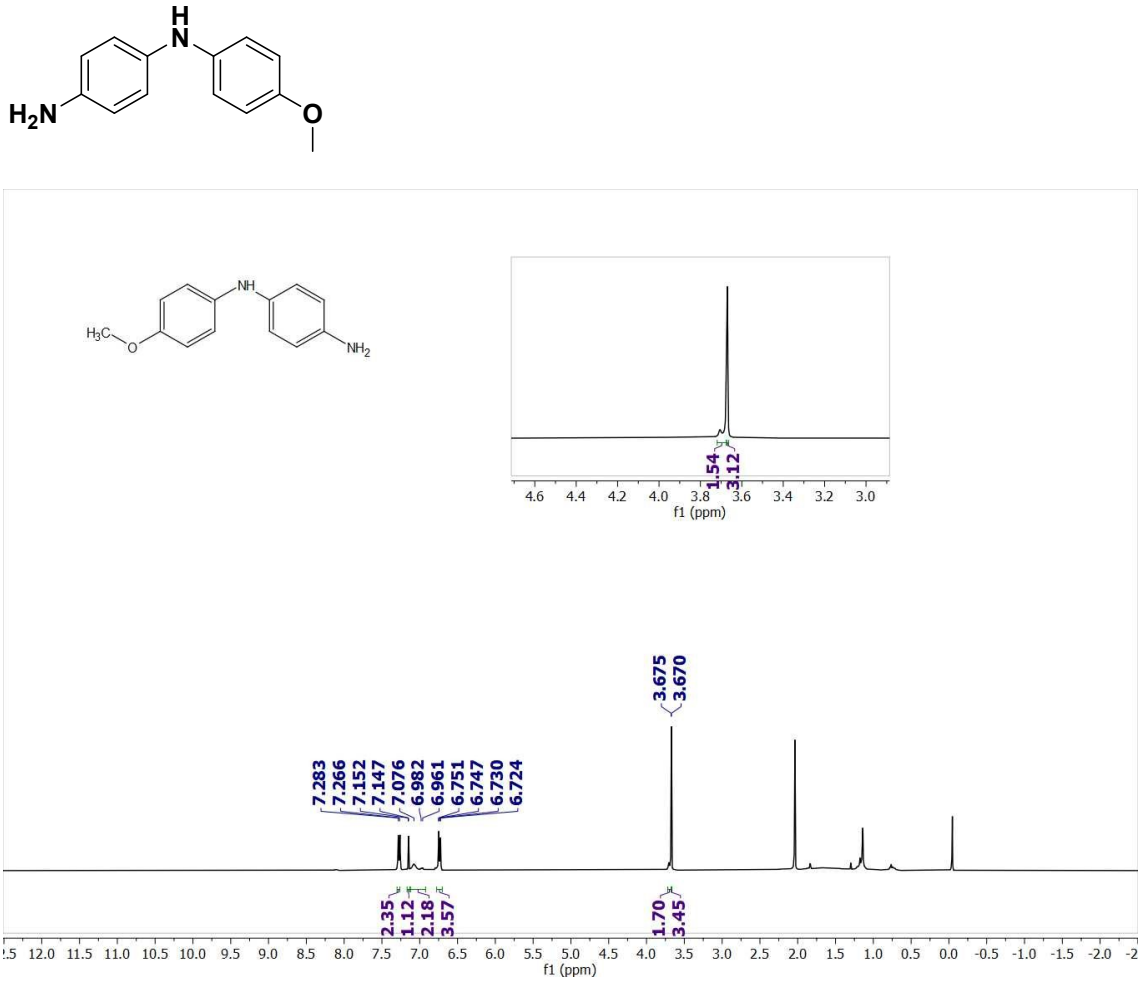
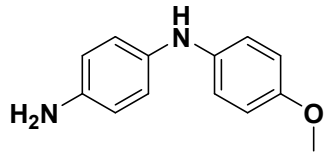
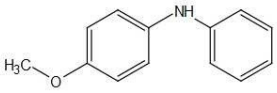


Figure S108: ^{1}H NMR of Compound





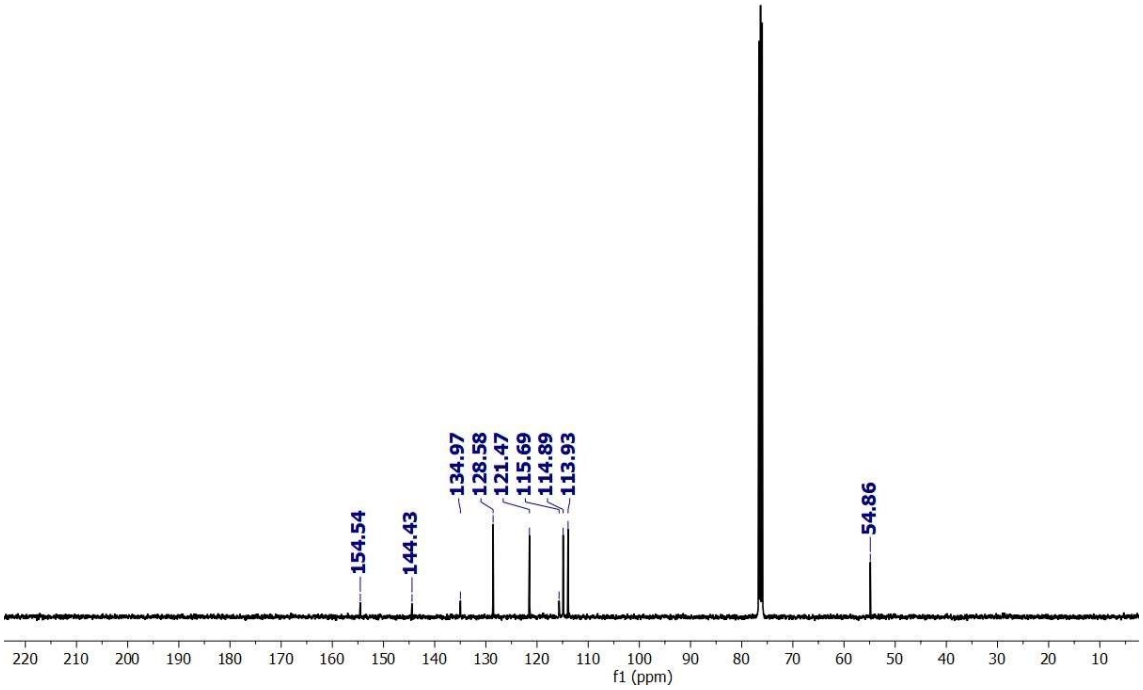
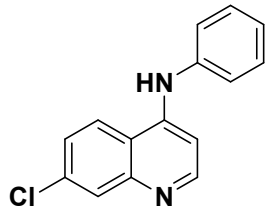


Figure S109: ^{13}C NMR of Compound



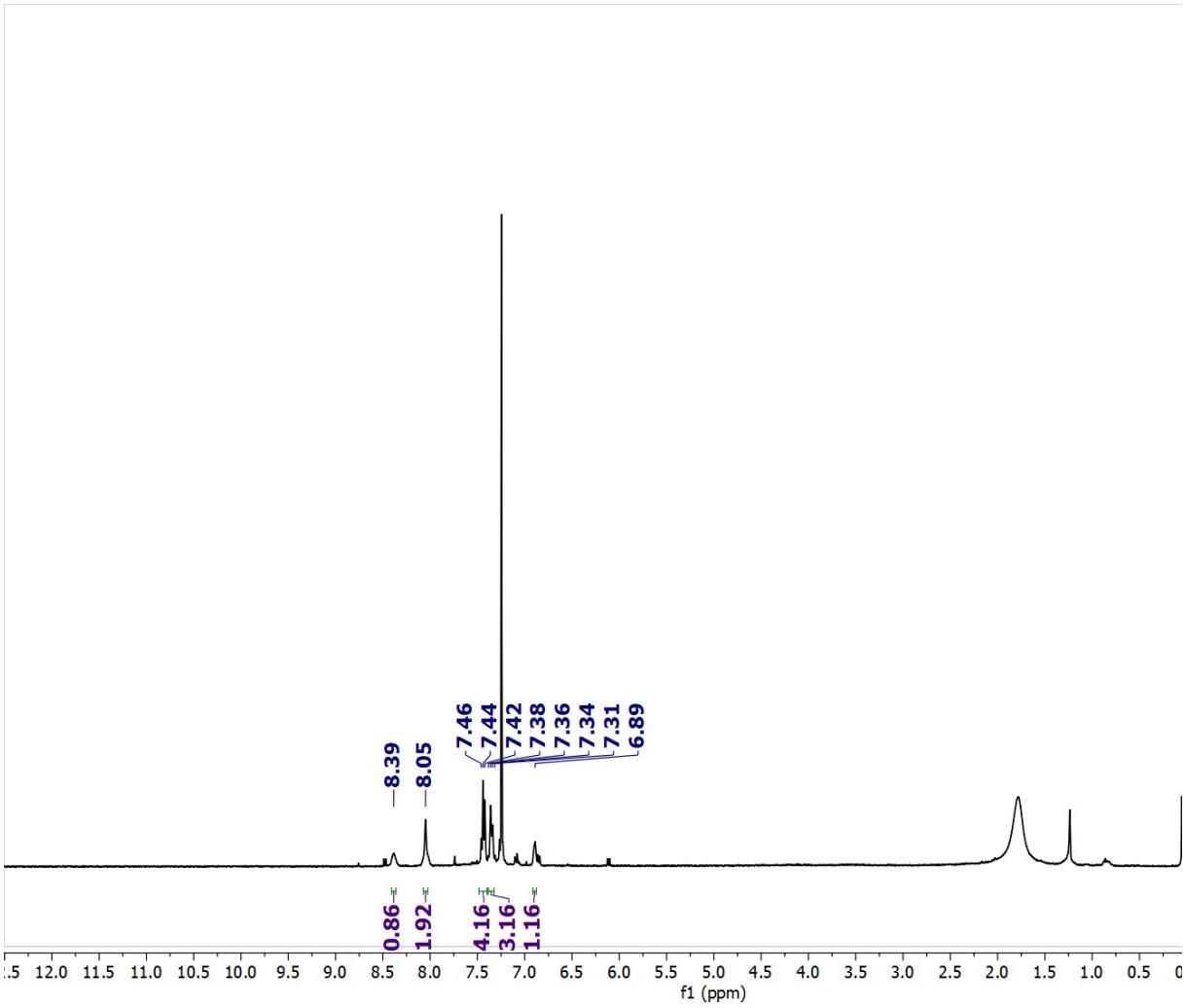


Figure S110: ^{1}H NMR of Compound 6i

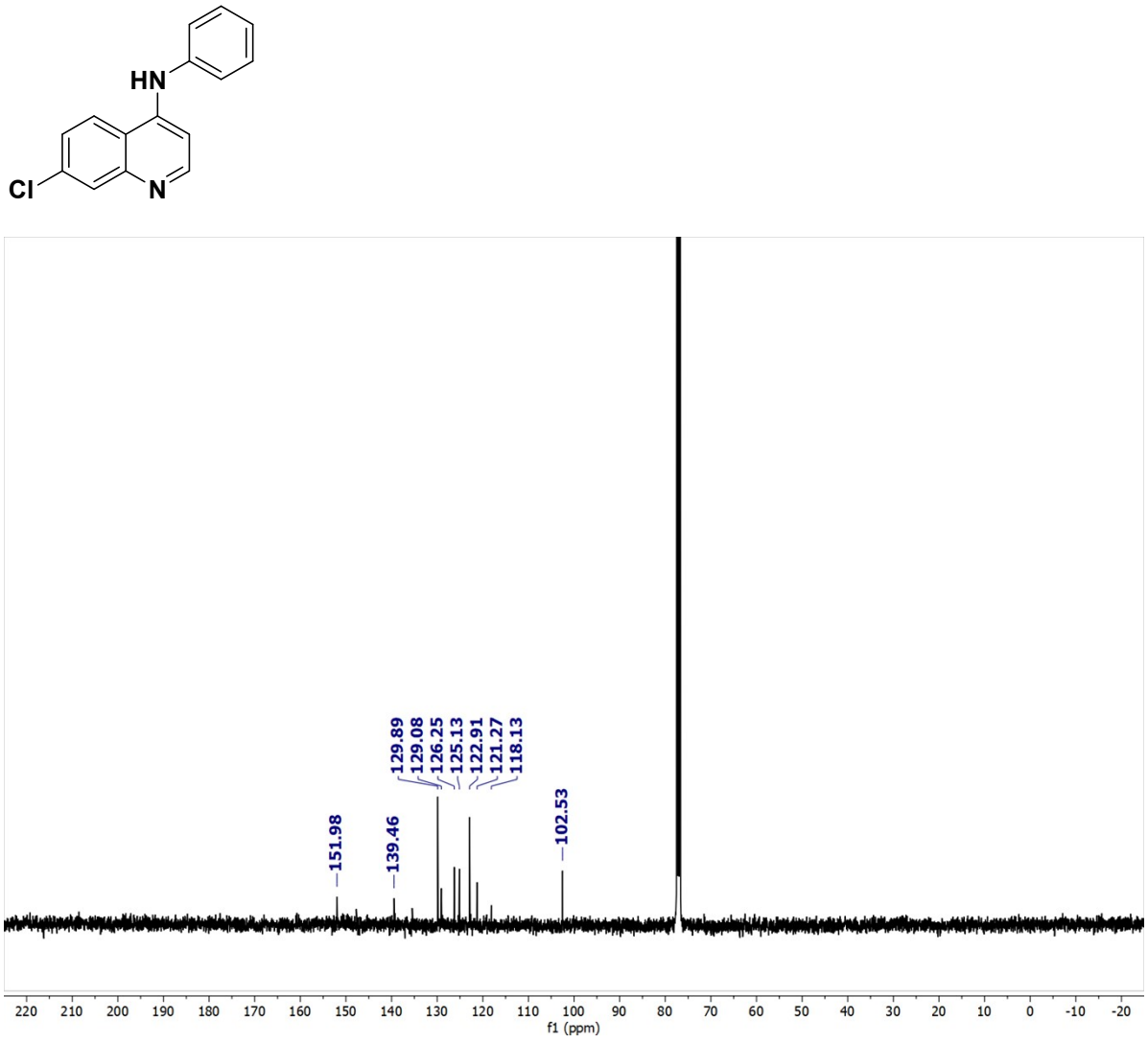


Figure S111: ^{13}C NMR of Compound 6i

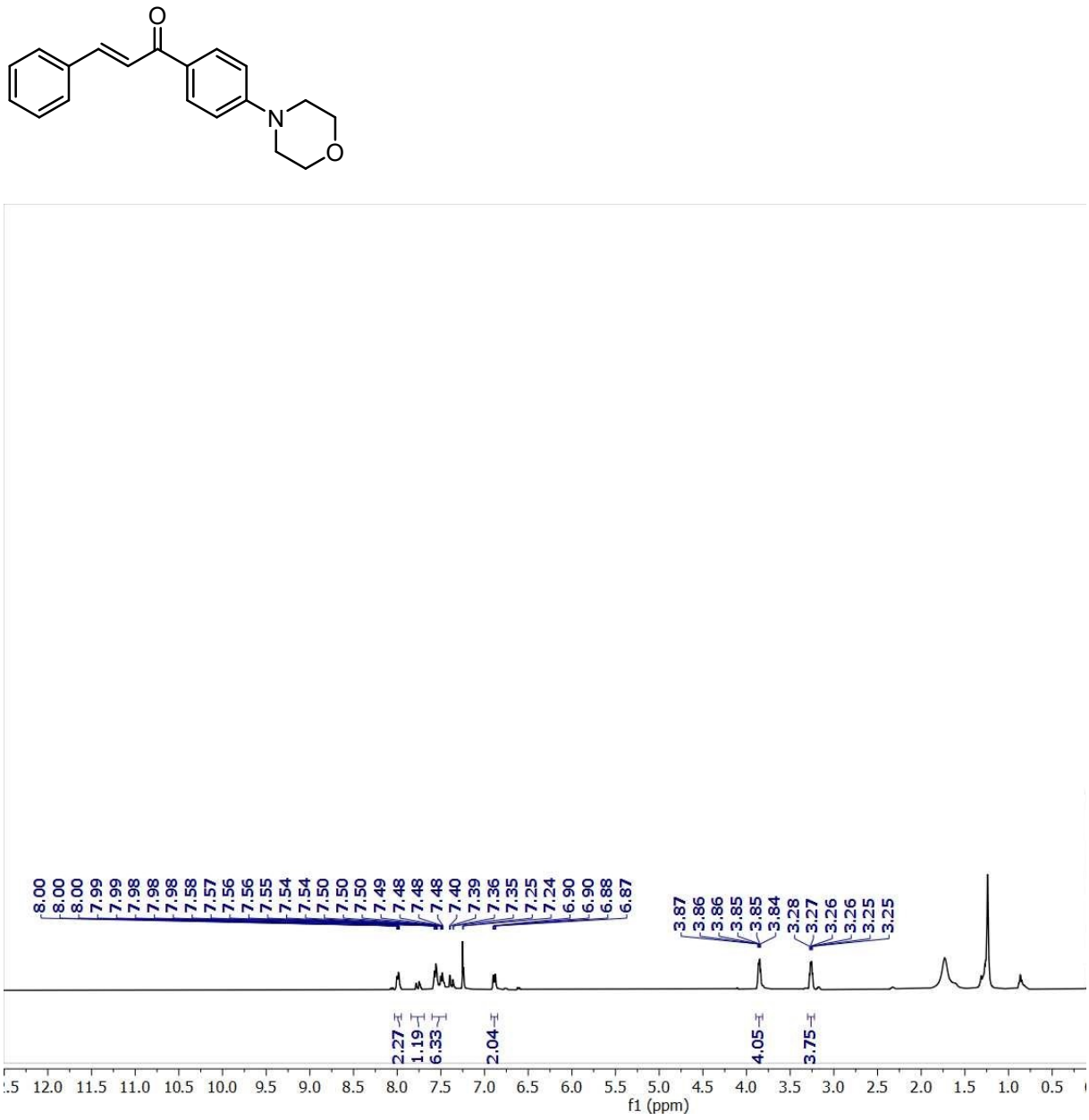


Figure S112: ^{1}H NMR

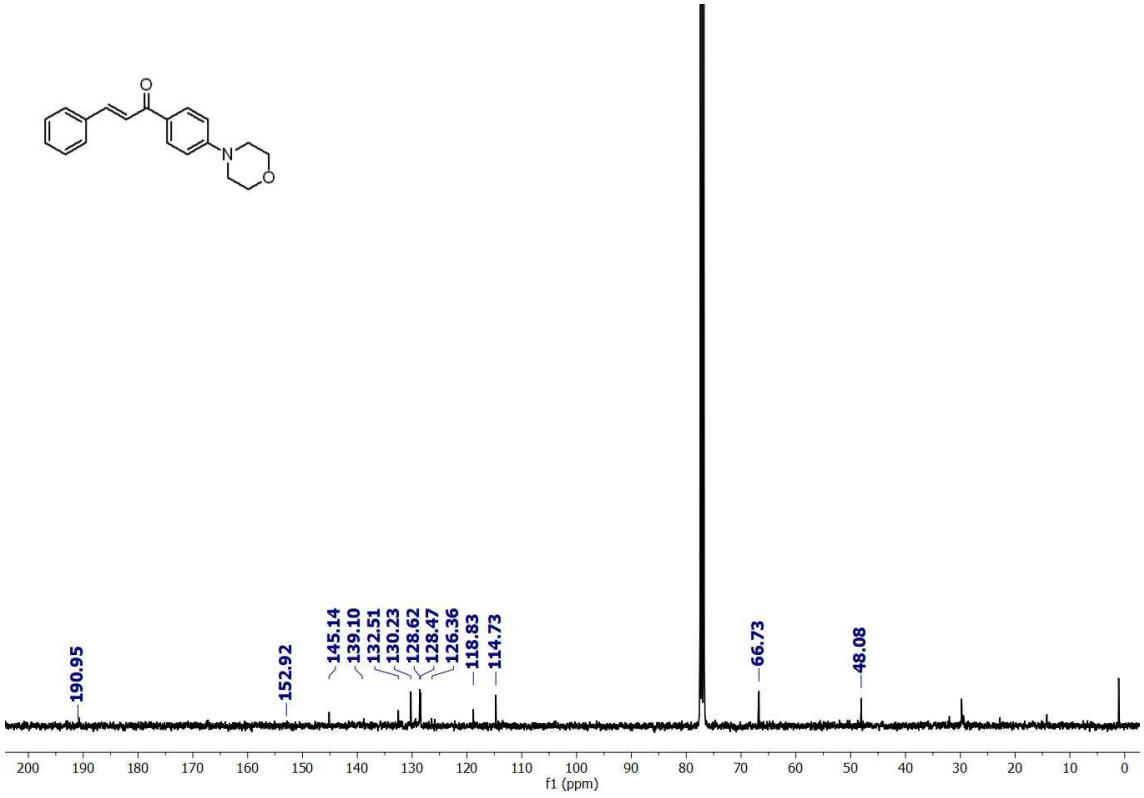
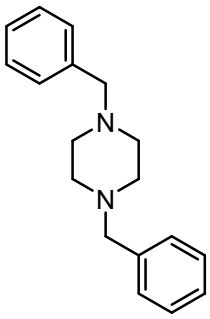


Figure S113: ^{13}C NMR



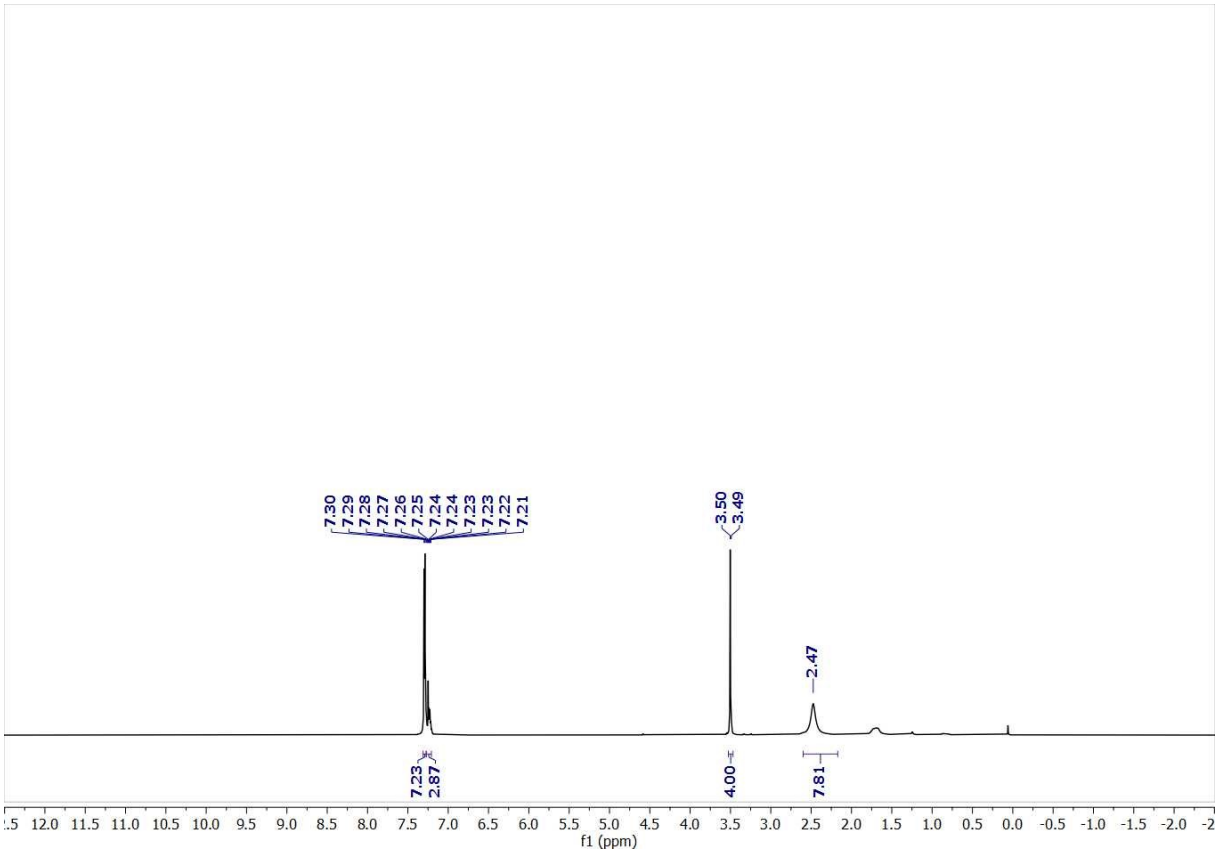
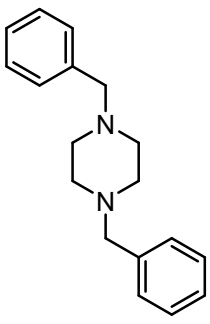


Figure S114: ^{1}H NMR



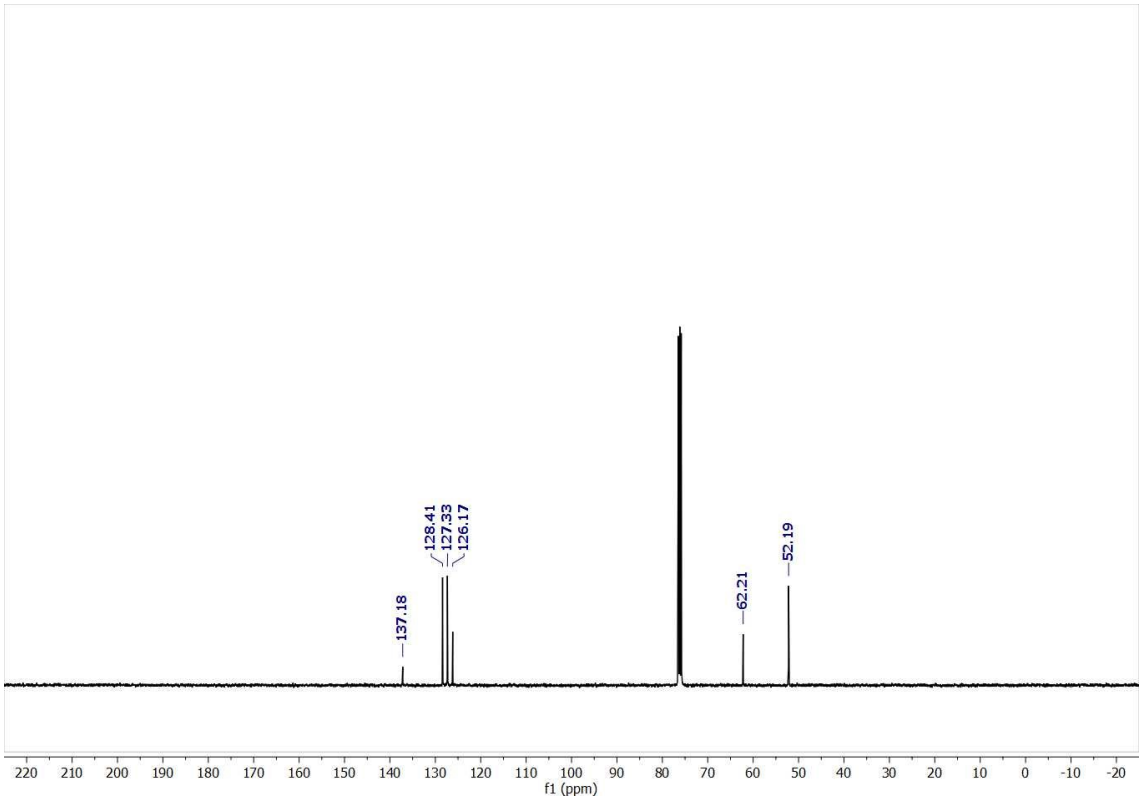


Figure S115: ^{13}C NMR