Supporting Information

A nanoscale iron catalyst for heterogeneous direct N- and C-alkylations of anilines and ketones using alcohols via hydrogen autotransfer conditions

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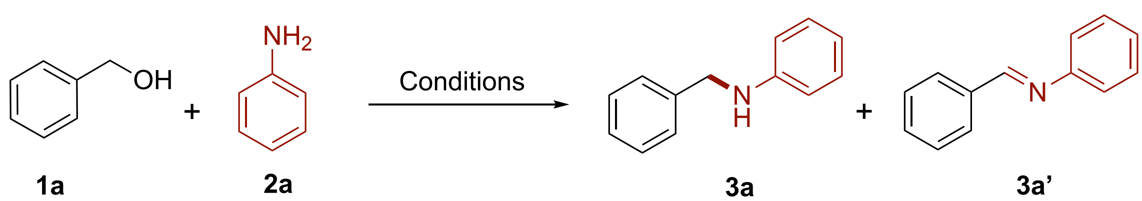
Contents

1. General Information:

Commercially available materials purchased from Alfa Aesar, Merck, Loba Chemie, Sigma-Aldrich, TCI and Combi-Blocks were used as received. Iron(III) oxide, 544884-25g, nanopowder, < 50 nm particle size (BET), p.code:1002329579 purchased from Sigma-Aldrich was used as received. Proton nuclear magnetic resonance (^1H NMR) spectra were recorded on a Bruker BBFO (500 MHz) spectrometer. Chemical shifts were recorded in parts per million (ppm, δ) relative to tetramethylsilane (δ 0.00) or chloroform (δ = 7.26, singlet). ^1H NMR splitting patterns are designated as singlet (s), doublet (d), triplet (t), quartet (q), dd (doublet of doublets), m (multiplets) etc. Carbon nuclear magnetic resonance (^{13}C NMR) spectra were recorded on a Bruker BBFO (126 MHz) spectrometer. High resolution mass spectral analysis (HRMS) was performed on LC/MS, 6230B Time of Flight (TOF), Agilent Technologies. Analytical thin-layer chromatography (TLC) was carried out on Merck 60 F254 pre-coated silica gel plates (0.2 mm thickness).

2. Experiment procedures

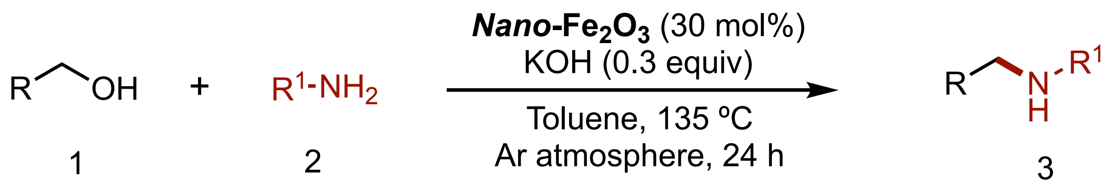
a. Table S1. Optimization of N-Alkylation of anilines with bulk Fe_2O_3



Entry	Catalyst	Base	Solvent	**3a** (%)[b]	**3a'** (%)[b]
1	Fe_2O_3	KOH	toluene	41	-
2[c]	Fe_2O_3	KOH	toluene	43	7
3[d]	Fe_2O_3	KOH	toluene	47	6
4[e]	Fe_2O_3	KOH	toluene	44	9
5	Fe_2O_3	tBuOK	toluene	34	4
6	Fe_2O_3	tBuONa	toluene	26	7
7	Fe_2O_3	Cs_2CO_3	toluene	14	5
8	Fe_2O_3	K_2CO_3	toluene	7	8
9	Fe_2O_3	KOH	m-xylene	21	6
10	Fe_2O_3	KOH	DMSO	9	11
11	Fe_2O_3	KOH	i-PrOH	17	13

[a]Reaction Conditions: Benzyl alcohol (1 eq, 0.9 mmol), Aniline (1.5 eq, 1.38 mmol), catalyst (bulk-Fe_2O_3, 30 mol%), base (0.3 eq, 0.27 mmol) and solvent 1 ml, under Argon atmosphere in a pressure tube at 135 °C for 24 h. [b]GC yield. [c]At 140 °C. [d]60 mmol of catalyst was used. [e]Reaction time 36 h.

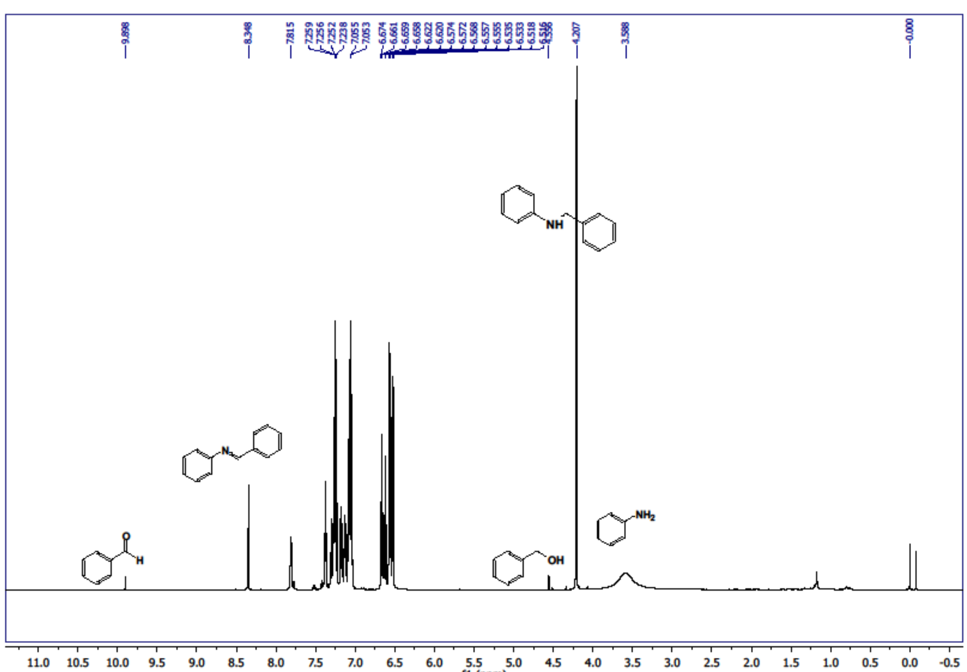
b. General procedure for the N-Alkylation with nano-Fe_2O_3:



Benzyl alcohol (100 mg, 0.9 mmol), was added to a oven-dried 15 ml pressure reaction tube followed by aniline (129 mg, 1.38 mmol), 30 mol% (44 mg) of the nano-Fe_2O_3 catalyst with respect to benzyl alcohol and KOH (15.5 mg, 0.27 mmol). 1 ml of Toluene as solvent was added to the pressure tube which was then flushed with Ar-gas for 1-2 min, and then closed with a PTFE cap. The reaction tube was placed in an oil bath which was preheated to 135 ˚C and the reaction was stirred for the required time. After the completion of the reaction, the reaction tube was cooled to room temperature, the solid catalyst was filtered off and washed thoroughly with ethyl acetate. The corresponding N-alkylation product was purified by column chromatography (silica 100-200 mesh; n-hexane-ethyl acetate mixture, 98:2) and characterized by NMR spectral analysis. Following the procedure above, **N-**benzylaniline (**3a**) was obtained (0.141g, isolated yield = 83%).

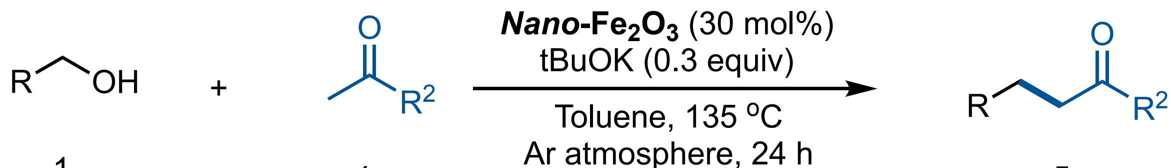
Crude ^1H-NMR of Reaction Mixture

T



The reaction was stopped at 18 hours and solvent was removed by rotary evaporator and the residue was submitted for ^1H-NMR analysis.

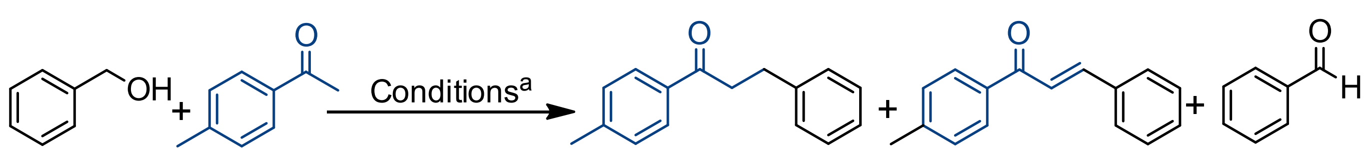
c. *C*-Alkylation of ketones with alcohols:



1 4 5

Acetophenone (120 mg, 1 mmol) was added a oven-dried 15 ml pressure reaction tube followed by benzyl alcohol (162 mg, 1.5 mmol), 30 mol% (48 mg) of catalyst and t-BuOK (33.6 mg, 0.3 mmol). 1 ml of toluene were added as the solvent and the tube was flushed with Ar gas for 1-2 min, and closed with a PTFE cap. The reaction tube was placed in an oil bath which was pre heated to 135 ºC and the reaction was stirred for the required time. After the completion of the reaction, the reaction tube was cooled to room temperature and the solid catalyst was filtered off and washed thoroughly with ethyl acetate. The corresponding C-Alkylation product was purified by column chromatography (silica 100-200 mesh ; n-hexane-ethyl acetate mixture, 99:1) and characterized by NMR spectral analysis. Following the procedure above, 1,3-diphenylpropan-1-one (**5a**) was obtained (203 mg, isolated yield = 97%).

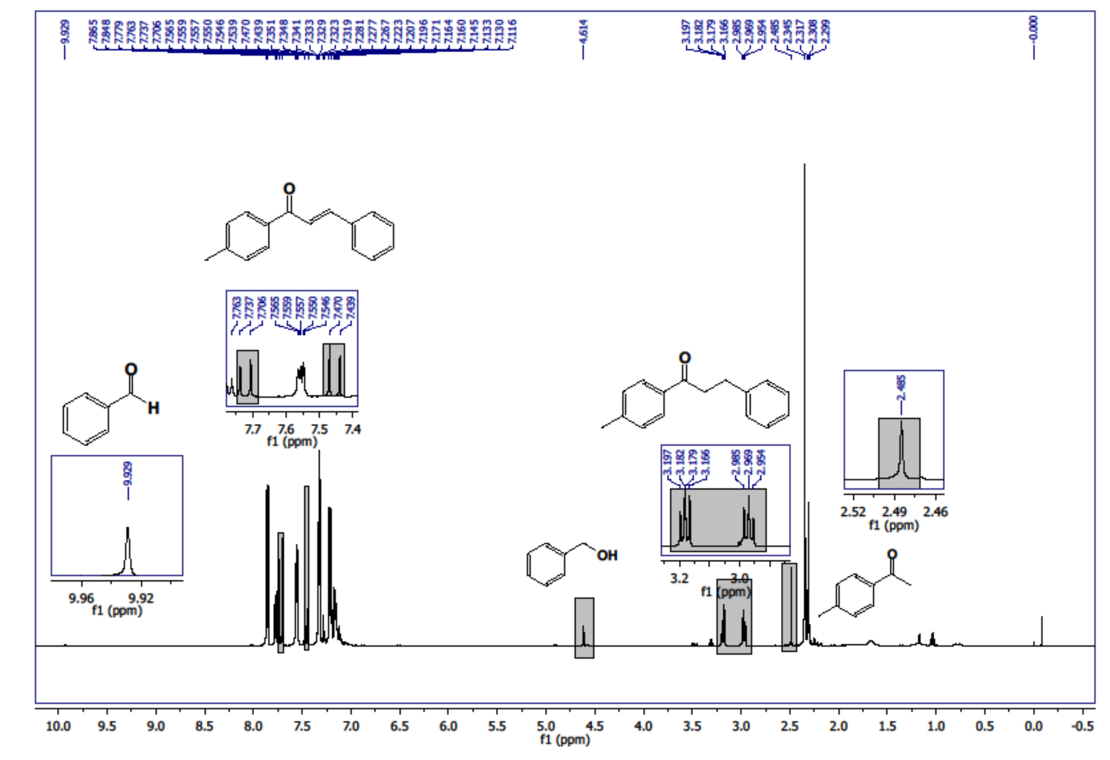
Scheme S1.

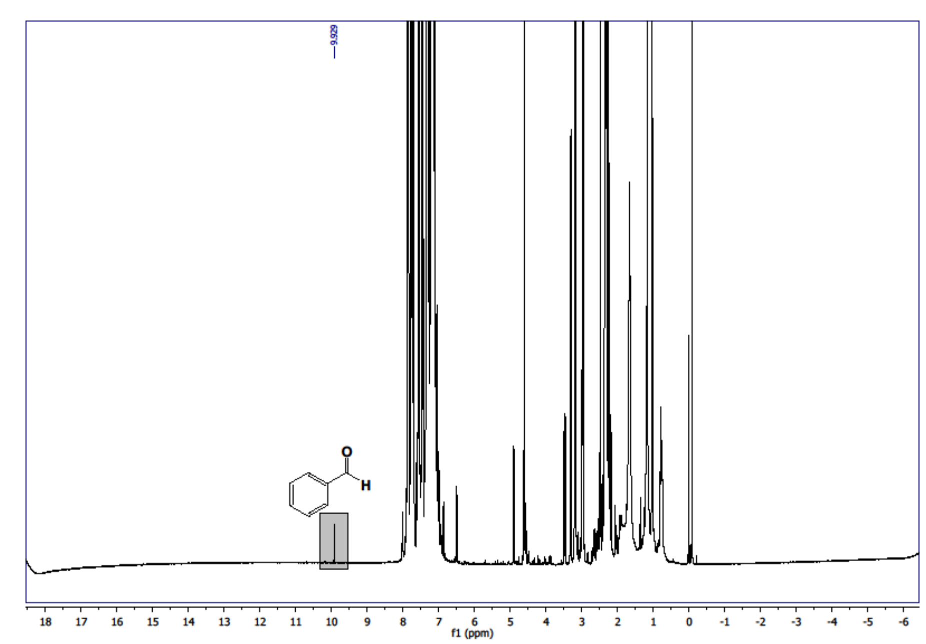


1a **4b** **5b** **5b'** **1a'**

[a]Reaction conditions: 4- methylacetophenone (134 mg, 1 mmol), benzyl alcohol (162 mg, 1.5 mmol), catalyst (48 mg 30 mol%) , tBuOK (33.6 mg, 0.3 mmol) and toluene 1ml, under argon atmosphere in pressure tube at 135 °C for 18 h.

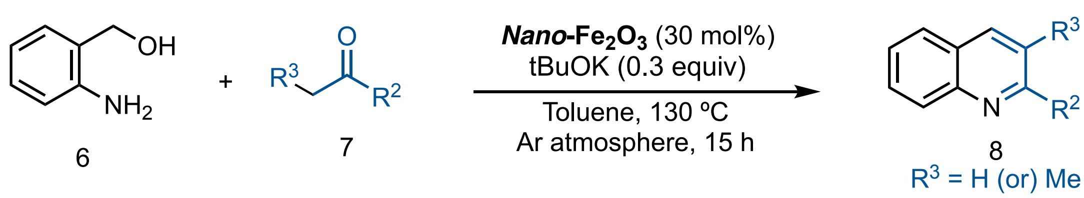
Crude ¹H-NMR of Scheme S1.





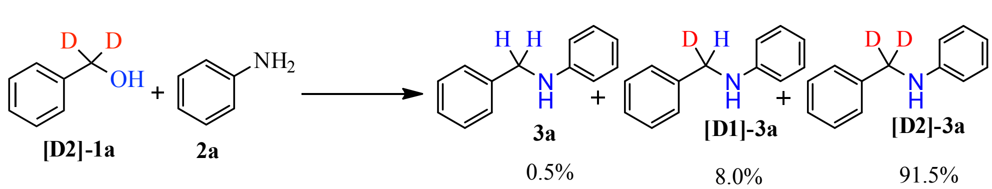
d. General procedure for quinoline synthesis:

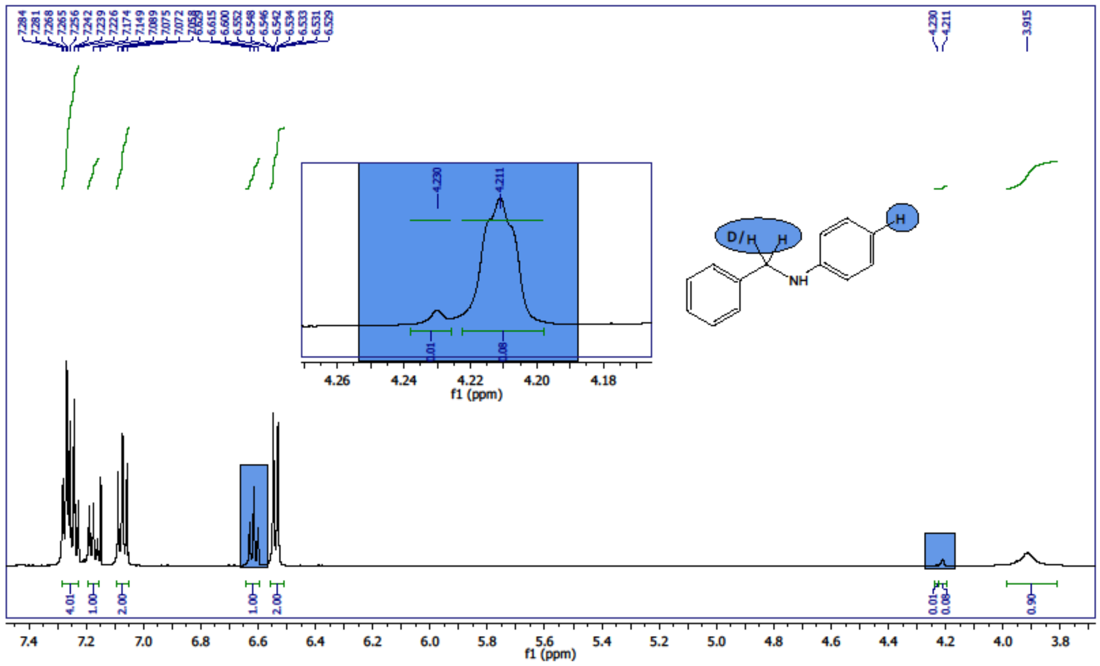
Acetophenone (120 mg, 1 mmol), was added into a oven-dried 15 ml pressure reaction tube followed by 2-Amino benzyl alcohol (185 mg, 1.5 mmol), 30 mol% (48 mg) of catalyst and tBuOK (36.3 mg, 0.3 mmol). 1 ml of toluene was added as a solvent and the tube was flushed with Ar gas for 1-2 min, and closed with a PTFE cap. The reaction tube was placed in an oil bath which was pre-heated to 135 °C for 15 h. After completion of the reaction, the reaction tube was cooled to room temperature. The solid catalyst was filtered off and washed thoroughly with ethyl acetate. The corresponding quinoline products were purified by column chromatography (silica 100-200 mesh; n-hexane-ethyl acetate mixture 97:3) and characterized by NMR spectral analysis. Following the procedure above, 2-phenylquinoline (**8a**) was obtained (195 mg, isolated yield = 95%).



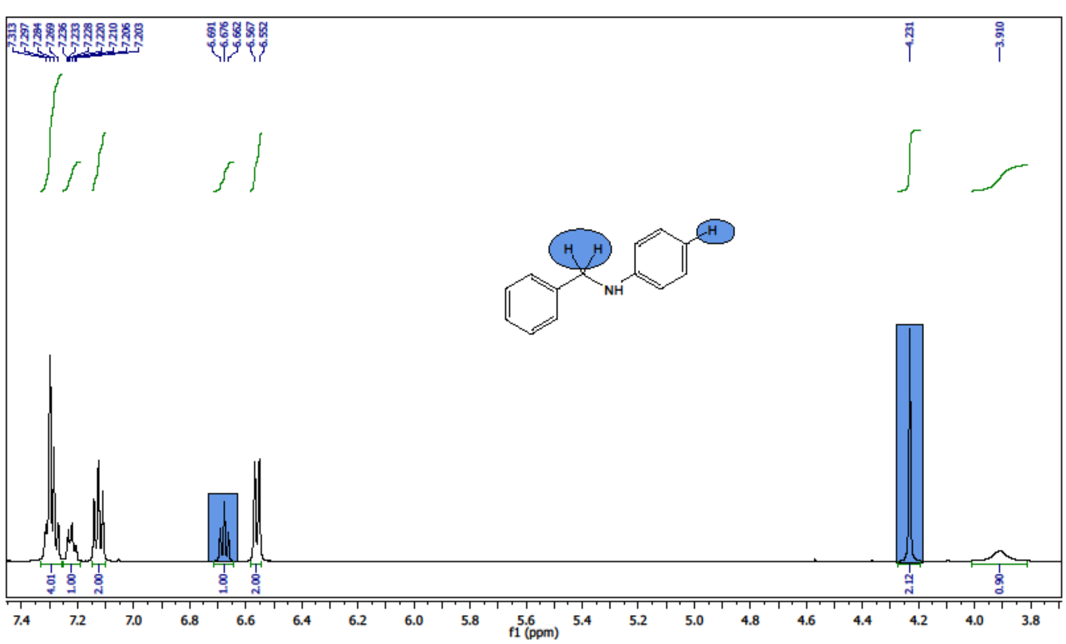
e. Deuterium labeling studies:

Procedure for Deuterium Labelling experiment : Deuterated benzyl alcohol [D2]-1a (110 mg, 1 mmol), was added to a oven-dried 15 ml pressure reaction tube followed by aniline (139 mg, 1.5 mmol), 30 mol% (48 mg) of catalyst and KOH (16.8 mg, 0.3 mmol). 1 ml of toluene as solvent was added to the pressure tube which was then flushed with Ar gas for 1-2 min, and then closed with a PTFE cap . The reaction tube was placed in an oil bath which was preheated to 135 ˚C and the reaction was stirred for 24 h. After the completion of the reaction, the reaction tube was cooled to room temperature. The solid catalyst was filtered off and washed thoroughly with ethyl acetate. The corresponding N-Alkylation product was purified by column chromatography (silica 100-200 mesh ; n-hexane-ethyl acetate mixture 98:2) and characterized by NMR spectral analysis. Following the procedure above, product was obtained (0.148g, isolated yield = 80%).

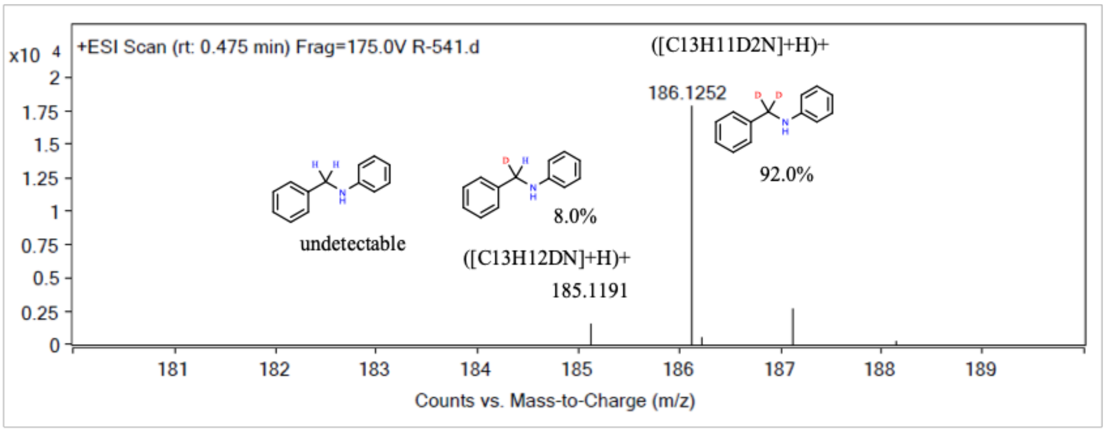




^{1}H NMR of 3a + 3a[D1] + 3a[D2]

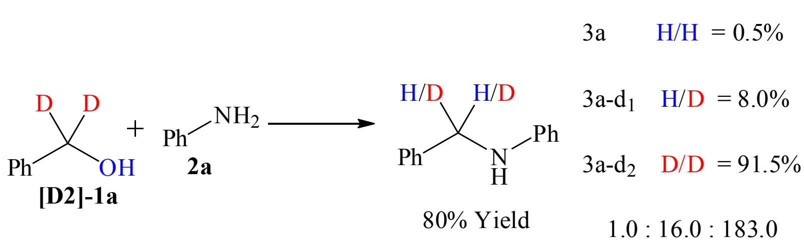


^{1}H NMR of 3a

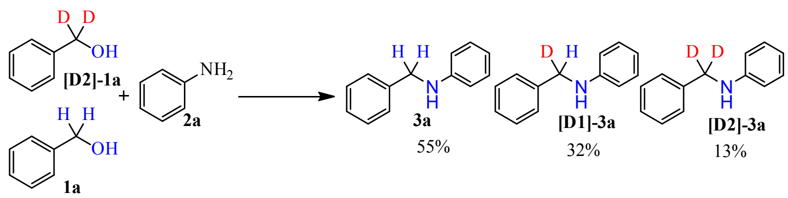


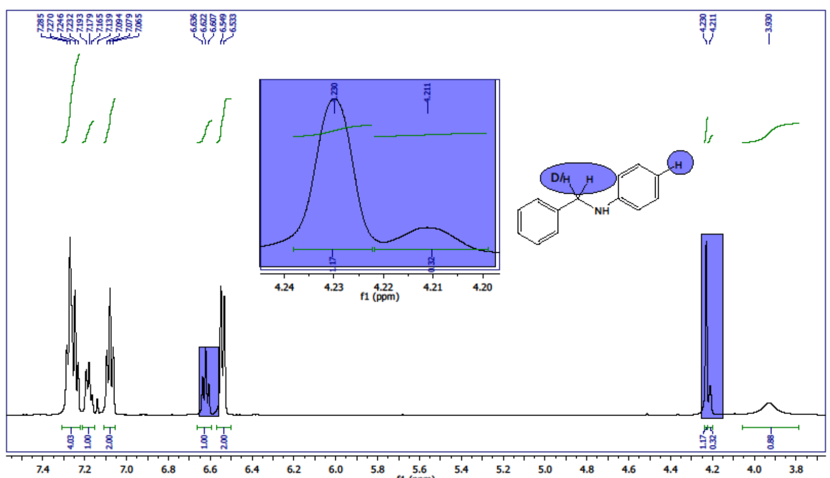
HRMS Spectra of 3a + 3a[D1] + 3a[D2]

	3a + [D1]-3a	3a	[D1]-3a	[D2]-3a
Signal δ	6.61 [para-H, (1H)]	4.21 [benzyl-H (2H)]	4.23 [benzyl-H(1H)]	-
Integral Value	1.00	0.01/2.12=0.0047	0.08	
Calculated ratio		0.5%	8.0%	91.5%
HRMS ratio		0.0%	8.0%	92.0%

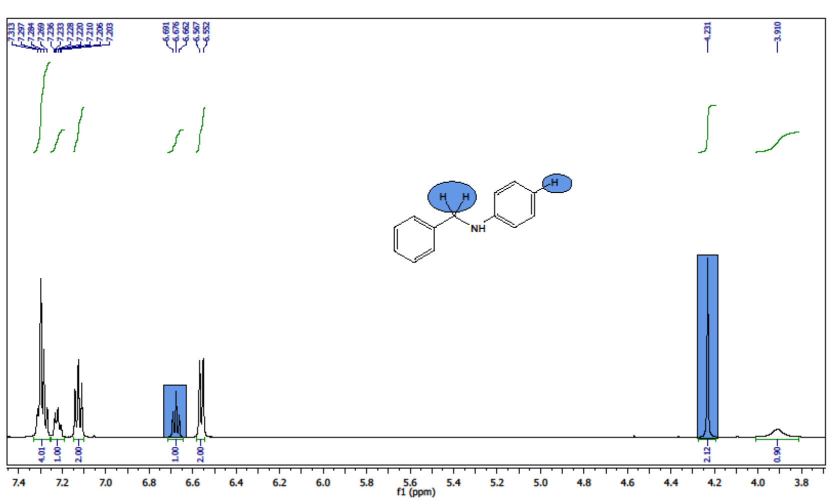


Procedure for competition experiment : Deuterated benzyl alcohol [D2]-1a (55 mg, 0.5 m.mol) and benzyl alcohol 1a (54 mg, 0.5 m.mol) were added to a oven-dried 15 ml pressure reaction tube followed by aniline (139mg, 1.5 mmol), 30 mol% (48 mg) of catalyst and 0.3 mmol KOH (16.8 mg). 1 ml of toluene as solvent was added to the pressure tube which was then flushed with Ar gas for 1-2 min, and then closed with a PTFE cap. The reaction tube was placed in an oil bath which was preheated to 135 ^{o}C and the reaction was stirred for 24 h. After the completion of the reaction, the reaction tube was cooled to room temperature. The solid catalyst was filtered off and washed thoroughly with ethyl acetate. The corresponding N-Alkylation products was purified by column chromatography (silica 100-200 mesh ; n-hexane-ethyl acetate mixture, 98:2) and characterized by NMR spectral analysis. Following the procedure above, product was obtained (0.143g, isolated yield = 78%).

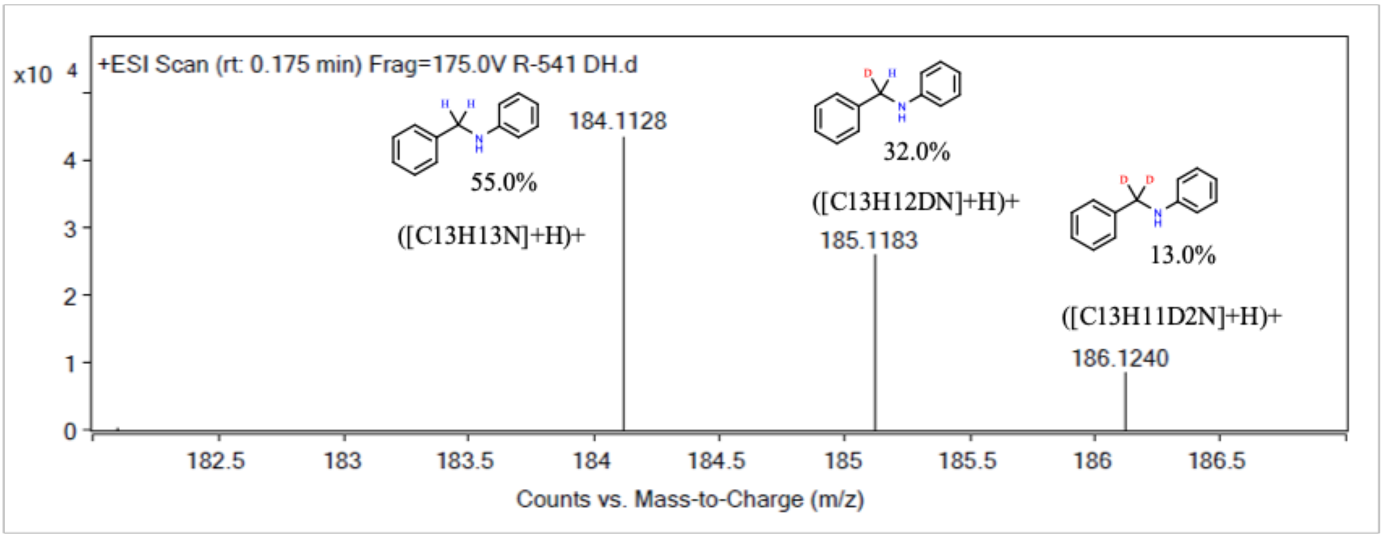




^{1}H NMR of 3a + 3a[D1] + 3a[D2]

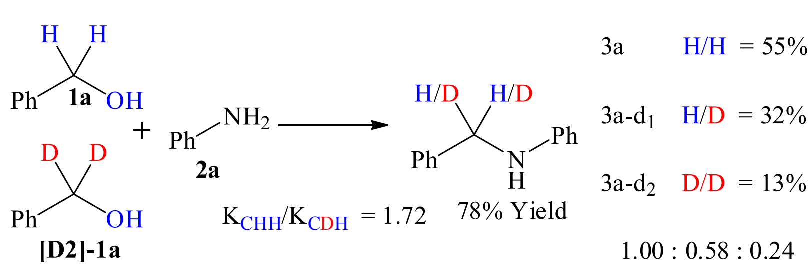


^{1}H NMR of 3a



HRMS Spectra of 3a + 3a[D1] + 3a[D2]

	3a + [D1]-3a	3a	[D1]-3a	[D2]-3a
Signal δ	6.62 [para-H, (1H)]	4.21 [benzyl-H (2H)]	4.23 [benzyl-H(1H)]	-
Integral Value	1.00	1.17/2.12=0.55	0.32	
Calculated ratio		55%	32%	13%
HRMS ratio		55%	32%	13%
KIE		K_{CHH}/K_{CDH} =1.72		



f. Catalyst Recyclability Test

After completing the first run of the N-alkylation reaction under standard conditions, the catalyst was filtered and washed with EtOAc and water. Then it was oven dried at 100 ˚C for 3 h before being used for the next run. This process was repeated over five cycles. The recovered catalyst retained its catalytic activity and the desired product was obtained above 75% yield (Table S2, entry 5).

Table S2

Number of runs	1	2	3	4	5
Isolated Yield	83	82	79	77	75

g. Hot Filtration Test

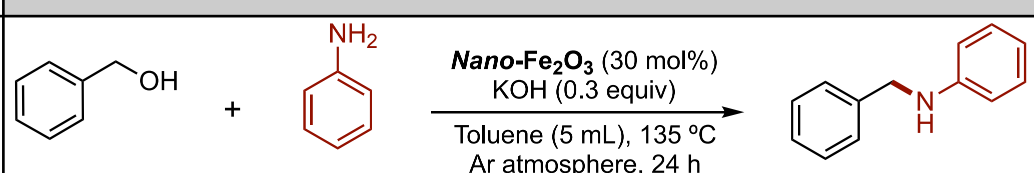
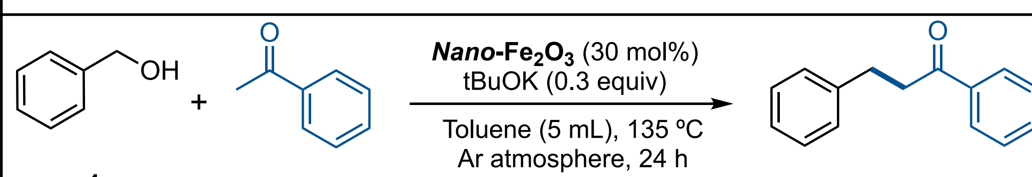
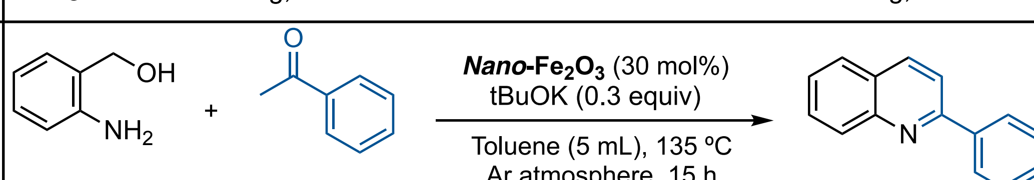
The standard N-alkylation reaction between anilines and benzylalcohols was carried out at 135 °C for 14 h. The iron catalyst was filtered from the hot reaction mixture and the filtrate was further heated at 135 °C for additional 10 h. The obtained results indicate that there was no appreciable leaching of metal ions under the present reaction conditions.

Table S3

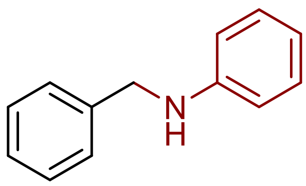
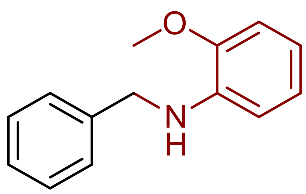
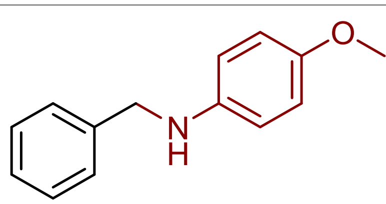
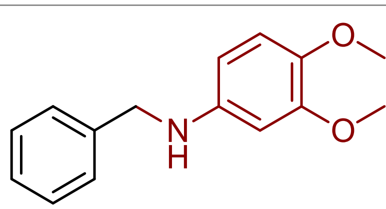
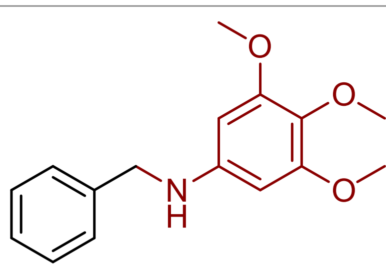
Catalyst	Time	GC Yield(%)
nano-Fe2O3	14 h	43
-	14 + 10 h	44

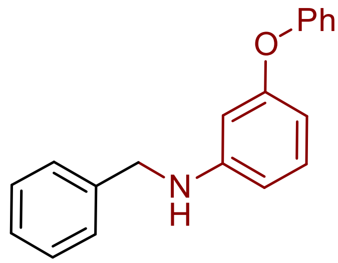
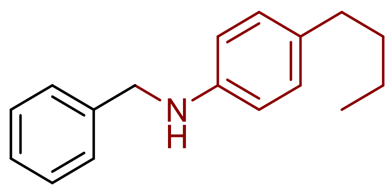
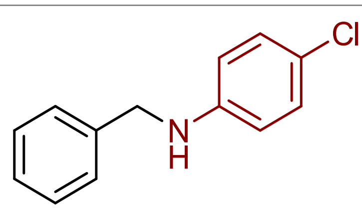
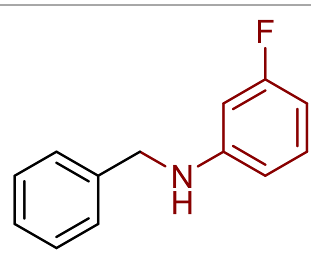
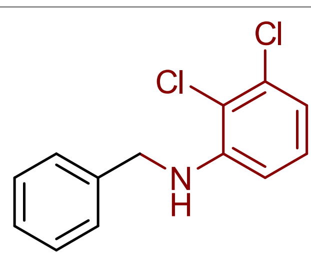
h. Gram Scale Reactions

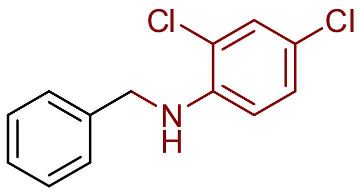
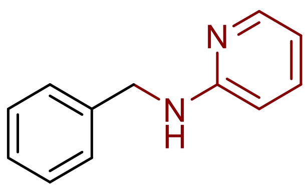
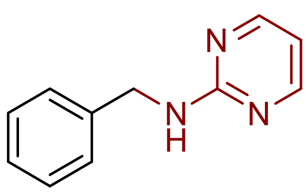
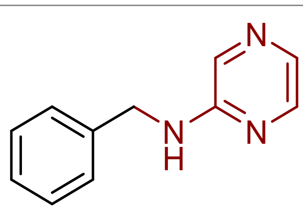
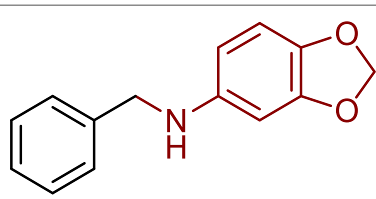
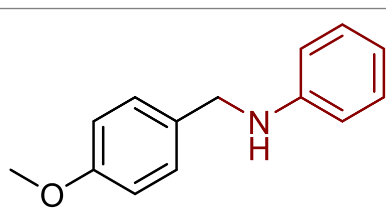
Table S4

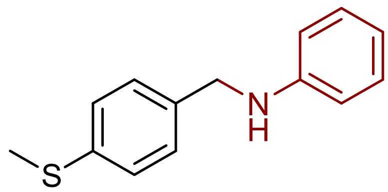
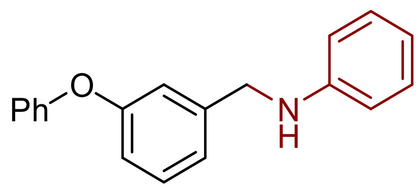
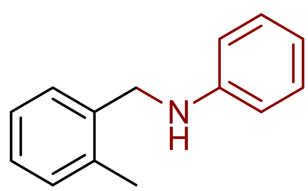
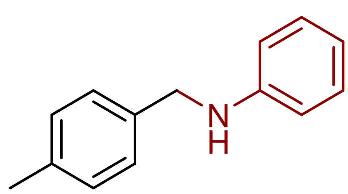
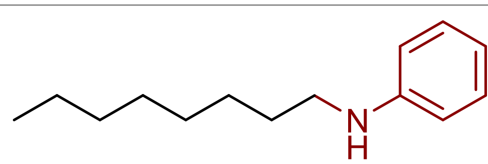
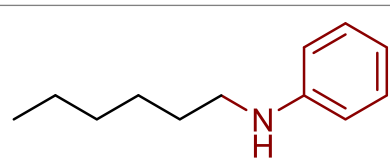
N-Alkylation	 **1a** 1.08 g, 10 mmol; **2a** 1.39 g, 15 mmol; **3a** 1.22 g, 67%
C-Alkylation	 **1a** 1.62 g, 15 mmol; **4a** 1.2 g, 10 mmol; **5a** 1.91 g, 91%
Quinoline Synthesis	 **6** 1.85 g, 15 mmol; **7** 1.2 g, 10 mmol; **8** 1.88 g, 92%

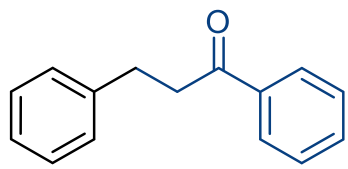
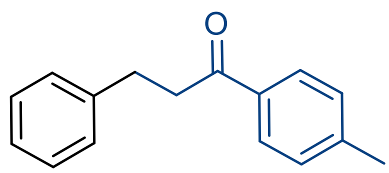
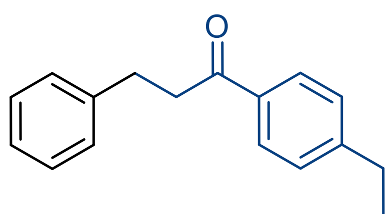
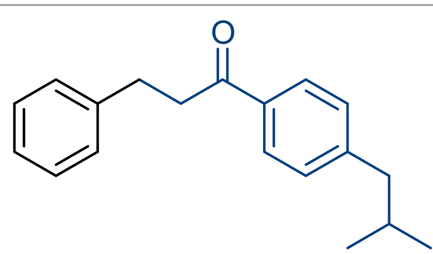
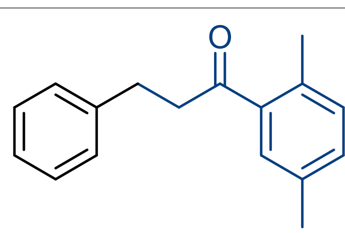
3. Characterization Data:

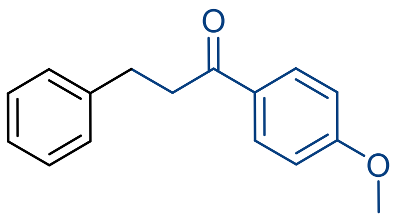
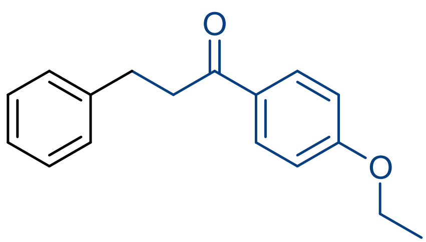
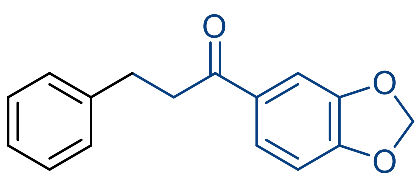
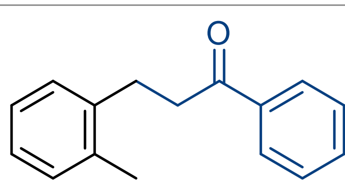
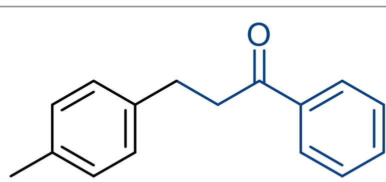
1		**N-benzylaniline[1] (3a):** Yellow oil (0.141g, 83% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.34 – 7.19 (m, 5H), 7.13 (t, *J* = 7.9 Hz, 2H), 6.68 (t, *J* = 7.3 Hz, 1H), 6.56 (d, *J* = 7.8 Hz, 2H), 4.23 (s, 2H), 3.91 (br, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.18, 139.52, 129.29, 128.64, 127.50, 127.21, 117.51, 112.86, 48.21.
2		**N-benzyl-2-methoxyaniline[2] (3b):** Yellow oil (0.167 g, 85% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.73 – 7.54 (m, 5H), 7.19 (td, *J* = 7.6, 1.5 Hz, 1H), 7.09 (dd, *J* = 7.9, 1.4 Hz, 1H), 7.07 – 7.00 (m, 1H), 6.94 (dd, *J* = 7.8, 1.4 Hz, 1H), 4.99 (br, 1H), 4.63 (s, 1H), 4.08 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 146.88, 139.71, 138.24, 128.66, 127.58, 127.19, 121.39, 116.71, 113.42, 110.17, 109.50, 55.45, 48.10.
3		**N-benzyl-4-methoxyaniline[2] (3c):** Brown solid (0.169 g, 86% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.31 – 7.17 (m, 5H), 6.73 – 6.69 (m, 2H), 6.53 – 6.48 (m, 2H), 4.17 (s, 2H), 3.71 (br, 1H), 3.63 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 152.41, 142.58, 139.82, 128.78, 127.75, 127.36, 115.10, 114.34, 56.00, 49.47.
4		**N-benzyl-3,4-dimethoxyaniline[3] (3d):** black solid (0.180 g, 80% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.30 – 7.14 (m, 5H), 6.63 (d, *J* = 8.5 Hz, 1H), 6.17 (d, *J* = 2.5 Hz, 1H), 6.07 (dd, *J* = 8.5, 2.5 Hz, 1H), 4.18 (s, 2H), 3.68 (s, 3H), 3.69 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 150.19, 143.26, 141.87, 139.72, 128.79, 127.76, 127.41, 113.45, 103.81, 99.20, 56.89, 55.88, 49.39.
5		**N-benzyl-3,4,5-trimethoxyaniline (3e):** pale green crystals (0.199g, 79% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.37-7.26 (m, 5H), 5.86 (s, 2H), 4.27 (s, 2H), 4.00 (br, 1H), 3.75 (s, 9H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 154.14, 145.14, 139.47, 128.85, 127.78, 127.53, 90.67, 61.27, 56.09, 49.09, HRMS for $C_{16}H_{19}NO_3$ [M+H] Calculated: 274.1444, Found: 274.1430.

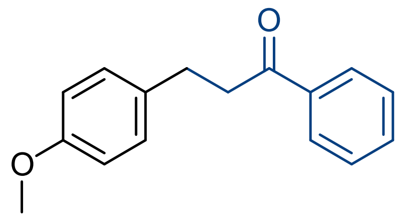
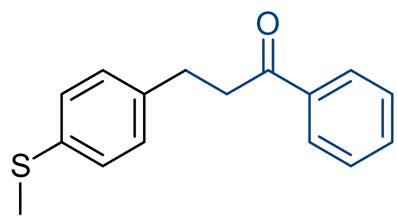
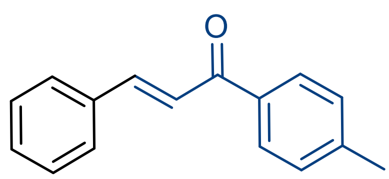
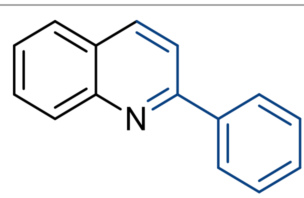
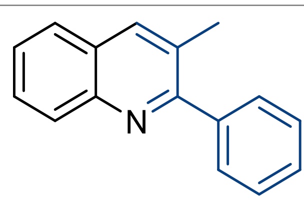
6		**N-benzyl-3-phenoxyaniline[4] (3f):** Yellow oil (0.217 g, 85% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.33 – 7.19 (m, 3H), 7.17 – 6.80 (m, 8H), 6.73 – 6.52 (m, 3H), 4.23 (s, 2H), 4.00 (br, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 158.53, 157.31, 149.81, 139.18, 130.34, 129.72, 128.75, 127.63, 127.39, 123.13, 119.09, 108.13, 107.90, 103.43, 48.31.
7		**N-benzyl-4-butylaniline[5] (3g):** Orange liquid (0.181 g, 82% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.12-7.33 (m, 5H), 6.98 (d, *J* = 7.9 Hz, 2H), 6.56 (d, *J* = 8.2 Hz, 2H), 4.28 (s, 2H), 3.87 (br, 1H), 2.49 (t, *J* = 7.7 Hz, 2H), 1.59 – 1.47 (m, 2H), 1.33 (dd, *J* = 14.8, 7.4 Hz, 2H), 0.90 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 146.16, 139.73, 132.11, 129.20, 128.66, 127.62, 127.23, 112.96, 48.72, 34.80, 34.09, 22.42, 14.09.
8		**N-benzyl-4-chloroaniline[6, 7] (3h):** Yellow oil (0.161 g, 80% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.59 – 7.45 (m, 5H), 7.30 (d, *J* = 8.0 Hz, 2H), 6.67 (d, *J* = 8.0 Hz, 2H), 4.41 (s, 2H), 4.18 (br, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 146.83, 139.11, 129.25, 128.88, 127.59, 127.55, 122.29, 114.10, 48.53.
9		**N-benzyl-3-fluoroaniline[8] (3i):** Yellow oil (0.143 g, 77% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.61 – 7.44 (m, 5H), 7.37 – 7.19 (m, 1H), 6.69 – 6.45 (m, 3H), 4.43 (s, 1H), 4.27 (br, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 164.19 (d, *J* = 242.8 Hz), 149.97 (d, *J* = 10.7 Hz), 138.90, 130.36 (d, *J* = 10.2 Hz), 128.78, 127.52, 127.47, 108.78, 103.99 (d, *J* = 21.5 Hz), 99.58 (d, *J* = 25.4 Hz). 48.21.
10		**N-benzyl-2,3-dichloroaniline (3j):** Yellow oil (0.203g, 87% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.37 – 7.25 (m, 5H), 6.98 (t, *J* = 8.1 Hz, 1H), 6.78 (dd, *J* = 8.0, 1.2 Hz, 1H), 6.49 (d, *J* = 8.3 Hz, 1H), 4.89 (br, 1H), 4.38 (d, *J* = 5.5 Hz, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 145.42, 138.38, 132.99, 128.94, 127.88, 127.64, 127.34, 118.25, 117.26, 109.52, 48.08. HRMS for $C_{13}H_{11}Cl_2N$ [M+H] Calculated: 252.0348, Found: 252.0340.

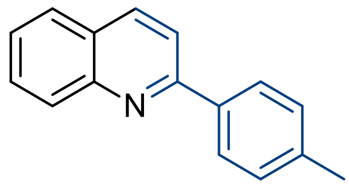
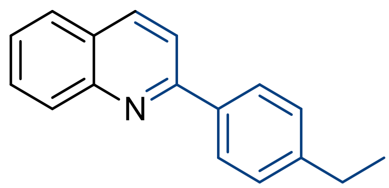
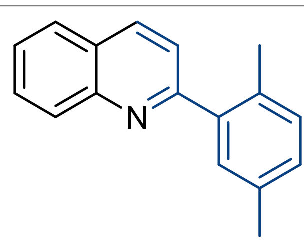
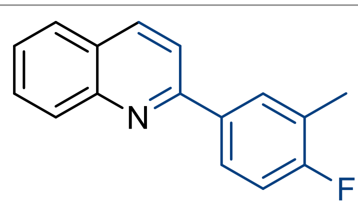
11		**N-benzyl-2,4-dichloroaniline[9] (3k):** Yellow oil (0.189 g, 81% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.37 – 7.22 (m, 6H), 7.01 (dd, J = 8.7, 2.3 Hz, 1H), 6.49 (d, J = 8.7 Hz, 1H), 4.71 (br, 1H), 4.34 (d, J = 5.5 Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$, 25^{o}C, TMS) δ 142.67, 138.36, 128.93, 128.82, 127.87, 127.80, 127.64, 127.32, 121.46, 119.47, 112.18, 47.96.
12		**N-benzylpyridin-2-amine[10] (3l):** Colourless crystals (0.153 g, 90% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.05-8.04 (m, 1H), 7.37-7.29 (m, 5H), 7.25-7.22 (m, 1H), 6.56-6.53 (m, 1H), 6.33(d, J=8.3Hz, 1H), 5.19 (br, 1H), 4.47 (d, J=6.1 Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 158.82, 148.42, 139.36, 137.67, 128.83, 127.60, 127.44, 113.39, 107.01, 46.53.
13		**N-benzylpyrimidin-2-amine[9] (3m):** Colourless crystals (0.150g, 88% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.25 (d, J = 3.5 Hz, 2H), 7.39 – 7.23 (m, 5H), 6.53 (t, J = 4.8 Hz, 1H), 5.69 (br, 1H), 4.64 (d, J = 5.9 Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 162.52, 158.27, 139.26, 128.79, 127.67, 127.43, 111.03, 45.63.
14		**N-benzylpyrazin-2-amine[11] (3n):** Colourless crystals (0.147 g, 86% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.98 (dd, J = 2.5, 1.4 Hz, 1H), 7.88 (d, J = 1.3 Hz, 1H), 7.81 (d, J = 2.8 Hz, 1H), 7.34 (d, J = 4.4 Hz, 4H), 7.32 – 7.23 (m, 1H), 5.07 (br, 1H), 4.55 (d, J = 5.8 Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 154.62, 142.14, 142.11, 138.62, 133.27, 132.25, 128.91, 127.73, 127.70, 45.71.
15		**N-benzylbenzo[d][1,3]dioxol-5-amine[12] (3o):** Black solid (0.168 g, 80% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.25-7.15 (m, 5H), 6.54 (d, J=8.3Hz, 1H), 6.15 (d, J=2.3Hz, 1H), 5.95 (dd, J=8.3Hz, 2.4Hz, 1H), 5.71 (s, 2H), 4.13 (s, 2H), 3.71 (br, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.51, 144.12, 139.88, 139.58, 128.81, 127.71, 127.43, 108.81, 104.61, 100.76, 96.19, 49.45.
16		**N-(4-methoxybenzyl)aniline[1] (3p):** Brown oil (0.165 g, 86% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.18-7.17 (m, 2H), 7.09-7.05 (m, 2H), 6.78-6.76 (m, 2H), 6.63 -6.60 (m, 1H), 6.53-6.51 (m, 2H), 4.13 (s, 2H), 3.68 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 159.05, 148.36, 131.58, 129.43, 129.00, 117.72, 114.21, 113.05, 55.49, 48.01.

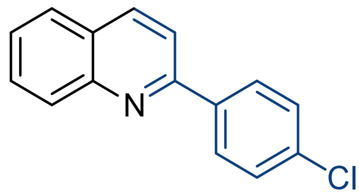
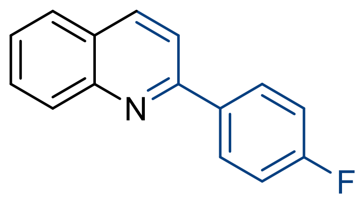
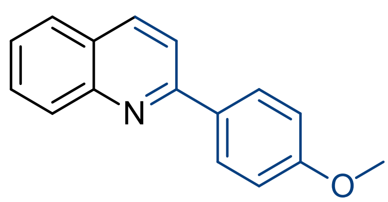
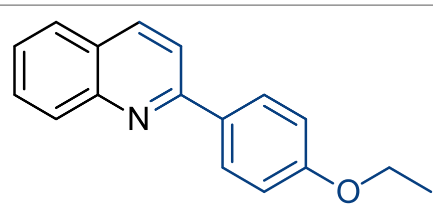
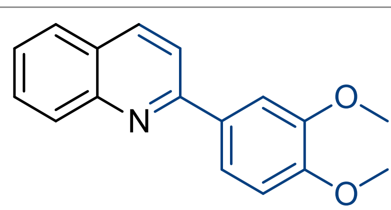
17		**N-(4-(methylthio)benzyl)aniline[13] (3q):** Yellow oil (0.186 g, 90% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.11 (dd, *J* = 22.4, 7.8 Hz, 4H), 7.04 (t, *J* = 7.4 Hz, 2H), 6.59 (t, *J* = 7.3 Hz, 1H), 6.47 (d, *J* = 7.9 Hz, 2H), 4.11 (s, 1H), 3.85 (br, 1H), 2.31 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.14, 137.24, 136.51, 129.37, 128.12, 127.05, 117.71, 112.98, 47.89, 16.08.
18		**N-(3-phenoxybenzyl)aniline[5] (3r):** Pale yellow crystals (0.208 g, 84% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.39 – 6.96 (m, 10H), 6.95 – 6.67 (m, 2H), 6.61 (t, *J* = 5.8 Hz, 2H), 4.30 (s, 2H), 4.04 (br, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 157.72, 157.20, 148.08, 141.84, 130.10, 129.95, 129.43, 123.49, 122.31, 119.11, 117.93, 117.80, 117.64, 113.05, 48.14.
19		**N-(2-methylbenzyl)aniline[14](3s):** Yellow oil (0.153 g, 86% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.24 (d, *J* = 7.1 Hz, 1H), 7.14 – 7.07 (m, 5H), 6.64 (t, *J* = 7.3 Hz, 1H), 6.55 (d, *J* = 7.7 Hz, 2H), 4.18 (s, 2H), 3.73 (br, 1H), 2.28 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.33, 137.08, 136.55, 130.59, 129.46, 128.47, 127.62, 126.34, 117.75, 112.97, 46.62, 19.11.
20		**N-(4-methylbenzyl)aniline[15] (3t):** Yellow oil (0.155 g, 87% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.23 (d, *J* = 7.9 Hz, 2H), 7.18 – 7.11 (m, 4H), 6.69 (t, *J* = 7.3 Hz, 1H), 6.60 (d, *J* = 7.8 Hz, 2H), 4.24 (s, 2H), 3.92 (br, 1H), 2.32 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.33, 137.06, 136.48, 129.48, 129.42, 127.71, 117.71, 113.05, 48.29, 21.27.
21		**N-octylaniline[28] (3u):** Yellow oil (0.136 g, 73% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.20 – 7.13 (m, 2H), 6.68 (tt, *J* = 7.3, 1.0 Hz, 1H), 6.60 (dt, *J* = 8.8, 1.6 Hz, 2H), 3.59 (br, 1H), 3.10 (t, *J* = 7.7 Hz, 2H), 1.61 (dt, *J* = 14.6, 7.1 Hz, 2H), 1.36 – 1.21 (m, 10H), 0.89 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.71, 129.39, 117.23, 112.84, 44.17, 32.01, 29.75, 29.60, 29.45, 27.37, 22.85, 14.30.
22		**N-hexylaniline[29] (3v):** Yellow oil (0.108 g, 67% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.13 – 7.03 (m, 2H), 6.60 (tt, *J* = 7.3, 1.0 Hz, 1H), 6.51 (dt, *J* = 8.8, 1.6 Hz, 2H), 3.48 (br, 1H), 3.00 (t, *J* = 7.7 Hz, 2H), 1.52 (dt, *J* = 14.7, 7.2 Hz, 2H), 1.37 – 1.21 (m, 6H), 0.82 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.68, 129.35, 117.18, 112.81, 44.13, 31.81, 29.68, 27.02, 22.80, 14.22.

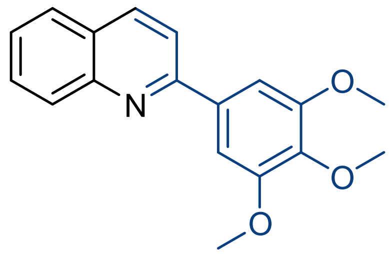
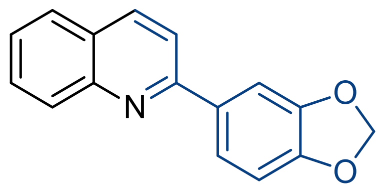
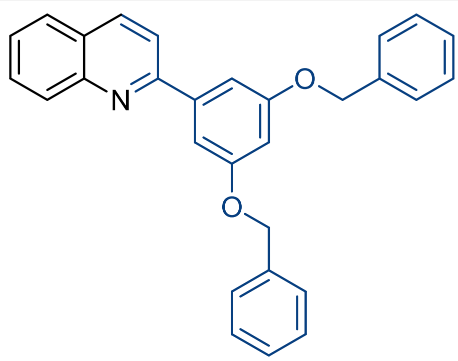
23		**1,3-diphenylpropan-1-one[16, 21] (5a):** Colourless oil (0.203 g, 97% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.93 (d, *J* = 7.2 Hz, 1H), 7.51 (t, *J* = 7.4 Hz, 1H), 7.41 (t, *J* = 7.7 Hz, 1H), 7.31 – 7.16 (m, 3H), 3.26 (t, *J* = 7.7 Hz, 1H), 3.05 (t, *J* = 7.7 Hz, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 199.42, 141.49, 137.07, 133.24, 128.79, 128.72, 128.62, 128.23, 126.32, 40.64, 30.33.
24		**3-phenyl-1-(p-tolyl)propan-1-one[16] (5b):** Yellow oil (0.204 g, 91% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.86 (d, *J* = 8.2 Hz, 2H), 7.35 – 7.13 (m, 7H), 3.24 (t, J= 7.7Hz, 2H), 3.05 (t, J= 7.8Hz, 2H), 2.40 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 199.09, 144.01, 141.56, 134.53, 129.44, 128.67, 128.59, 128.33, 126.26, 40.51, 30.37, 21.80.
25		**1-(4-ethylphenyl)-3-phenylpropan-1-one[17] (5c):** Yellow oil (0.207 g, 87% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.81 (dd, *J* = 8.1, 1.3 Hz, 2H), 7.25 – 7.16 (m, 6H), 7.16 – 7.09 (m, 1H), 3.20 (t, J= 7.6Hz, 2H), 2.98 (t, *J* = 7.7 Hz, 2H), 2.62 (q, *J* = 7.6 Hz, 2H), 1.18 (t, *J* = 7.6 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 198.95, 150.04, 141.43, 134.62, 128.53, 128.44, 128.29, 128.12, 126.11, 40.38, 30.23, 28.94, 15.21.
26		**1-(4-isobutylphenyl)-3-phenylpropan-1-one (5d):** Yellow oil (0.240 g, 90% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25^{o}C, TMS) δ 7.88-7.86 (m, 2H), 7.31-7.18 (m, 7H), 3.28 (t, J= 7.8Hz, 2H), 3.06 (t, J= 7.6Hz, 2H), 2.52 (d, J= 7.2Hz, 2H), 1.91-1.86 (m, 1H), 0.90 (d, J=6.5 Hz, 6H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 199.14, 147.74, 141.61, 134.84, 129.50, 128.69, 128.62, 128.22, 126.27, 45.56, 40.54, 30.40, 30.29, 22.51. HRMS for $C_{19}H_{22}O$ [M+H] Calculated : 267.1750, Found: 267.1745.
27		**1-(2,5-dimethylphenyl)-3-phenylpropan-1-one[18] (5e):** Yellow oil (0.197 g, 83% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25^{o}C, TMS) δ 7.30 (s, 1H), 7.21 (t, *J* = 7.5 Hz, 2H), 7.17 – 7.06 (m, 4H), 7.03 (d, *J* = 7.8 Hz, 1H), 3.13 (t, *J* = 7.6 Hz, 2H), 2.95 (t, *J* = 7.7 Hz, 2H), 2.34 (s, 3H), 2.24 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 203.66, 141.45, 137.98, 135.30, 135.05, 132.11, 132.01, 129.14, 128.66, 128.60, 126.26, 43.40, 30.50, 21.05, 20.92.

28		**1-(4-methoxyphenyl)-3-phenylpropan-1-one[16] (5f):** White solid (0.205 g, 86% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.94-7.92 (m, 2H), 7.30-7.17 (m, 5H), 6.92-6.90 (m, 2H), 3.86 (s, 3H), 3.25 (t, J=7.7Hz, 2H), 3.05 (t, J=7.8Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 198.03, 163.64, 141.67, 130.50, 128.70, 128.62, 126.27, 113.92, 55.65, 40.31, 30.53.
29		**1-(4-ethoxyphenyl)-3-phenylpropan-1-one[19] (5g):** Yellow solid (0.236 g, 93% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.86-7.84 (m, 2H), 7.23-7.11 (m, 5H), 6.83-6.81 (m, 2H), 4.01(q, J= 7.5 Hz, 2H), 3.16 (t, J=7.5Hz, 2H), 2.97 (t, J= 7.6 Hz, 2H), 1.35 (t, J= 7.7Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 198.02, 163.05, 141.66, 130.48, 129.94, 128.67, 128.60, 126.24, 114.32, 63.91, 40.27, 30.51, 14.84.
30		**1-(benzo[d][1,3]dioxol-5-yl)-3-phenylpropan-1-one[20] (5h):** Yellow oil (0.195 g, 77% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.48 (d, J= 7.8Hz, 1H), 7.36 (d, *J* = 1.7 Hz, 1H), 7.25 – 7.10 (m, 5H), 6.75 (d, *J* = 8.2 Hz, 1H), 5.95 (s, 2H), 3.14 (t, J=7.5Hz, 2H), 2.96 (t, J=7.6Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 197.32, 151.73, 148.20, 141.34, 131.77, 128.53, 128.43, 126.13, 124.26, 107.90, 107.87, 101.84, 40.23, 30.36.
31		**1-phenyl-3-(o-tolyl)propan-1-one[17] (5i):** Yellow oil (0.204 g, 91% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.98-7.95 (m, 2H), 7.57-7.53 (m, 1H), 7.46-7.44 (m, 2H), 7.20-7.11 (m, 4H), 3.25 (t, J=7.6Hz, 2H), 3.06 (t, J= 7.5Hz, 2H), 2.35 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 199.56, 139.57, 137.04, 136.18, 133.27, 130.53, 128.92, 128.81, 128.23, 126.51, 126.36, 39.30, 27.70, 19.53.
32		**1-phenyl-3-(p-tolyl)propan-1-one[22] (5j)** Colourless oil (0.206 g, 92% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 7.84 (d, *J* = 8.2 Hz, 2H), 7.42 (t, *J* = 7.4 Hz, 1H), 7.32 (t, *J* = 7.7 Hz, 2H), 7.01 (dd, *J* = 20.3, 7.9 Hz, 4H), 3.15 (t, *J* = 7.7 Hz, 2H), 2.92 (t, *J* = 7.7 Hz, 2H), 2.20 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 199.38, 138.28, 136.93, 135.68, 133.12, 129.30, 128.68, 128.39, 128.12, 40.68, 29.78, 21.11.

33		**3-(4-methoxyphenyl)-1-phenylpropan-1-one[17] (5k):** Yellow solid (0.232 g, 97% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.99-7.97 (m, 2H), 7.59-7.56 (m, 1H), 7.49-7.46 (m, 2H), 7.20-7.19 (m, 2H), 6.86-6.87 (m, 2H), 3.81 (s, 3H), 3.29 (t, J=7.5Hz, 2H), 3.04 (t, J=7.4Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 199.59, 158.17, 137.08, 133.49, 133.21, 129.53, 128.77, 128.22, 114.12, 55.45, 40.88, 29.46.
34		**3-(4-(methylthio)phenyl)-1-phenylpropan-1-one[19] (5l):** Yellow oil (0.210 g, 82% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.92 (d, *J* = 8.2 Hz, 2H), 7.50 (t, *J* = 7.3 Hz, 1H), 7.40 (t, *J* = 7.6 Hz, 2H), 7.17-7.13 (m, 4H), 3.23 (t, *J* = 7.6 Hz, 2H), 2.99 (t, *J* = 7.6 Hz, 2H), 2.40 (s, 3H). ^{13}C NMR (126 MHz, DMSO) δ 198.96, 138.26, 136.71, 135.72, 133.04, 128.96, 128.56, 127.96, 127.05, 40.21, 29.44, 16.11.
35		**(E)-3-phenyl-1-(p-tolyl)prop-2-en-1-one[30] (5b'):** White crystals (0.210 g, 95% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 7.92 (d, *J* = 8.2 Hz, 2H), 7.78 (d, *J* = 15.7 Hz, 1H), 7.61 – 7.56 (m, 2H), 7.51 (d, *J* = 15.7 Hz, 1H), 7.38 – 7.31 (m, 3H), 7.26 – 7.21 (m, 2H), 2.36 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 189.73, 144.24, 143.57, 135.53, 134.89, 130.38, 129.29, 128.87, 128.60, 128.37, 121.89, 21.60.
36		**2-phenylquinoline[22, 23] (8a):** White solid (0.195 g, 95% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.18 – 8.06 (m, 4H), 7.81 (d, *J* = 8.6 Hz, 1H), 7.76 (d, *J* = 8.1 Hz, 1H), 7.67-7.63 (m, 1H), 7.50 – 7.43 (m, 3H), 7.40-7.37 (m, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 157.58, 148.47, 139.88, 136.98, 129.92, 129.85, 129.51, 129.03, 127.77, 127.65, 127.38, 126.48, 119.22.
37		**3-methyl-2-phenylquinoline[22] (8b):** White solid (0.213 g, 97% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.01 (d, *J* = 8.5 Hz, 1H), 7.81 (s, 1H), 7.59 (d, *J* = 8.1 Hz, 1H), 7.52-7.48 (m, 1H), 7.46-7.44 (m, 2H), 7.35-7.32 (m, 3H), 7.31 – 7.25 (m, 1H), 2.28 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 160.52, 146.68, 140.92, 136.74, 129.30, 129.16, 128.90, 128.75, 128.32, 128.20, 127.61, 126.74, 126.41, 20.63.

38		**2-(p-tolyl)quinoline[24] (8C):** White solid (0.210 g, 96% yield); ^{1}H-NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.15 (t, *J* = 8.7 Hz, 2H), 8.06 (d, *J* = 8.2 Hz, 2H), 7.81 (d, *J* = 8.6 Hz, 1H), 7.77 (d, *J* = 8.2 Hz, 1H), 7.72 – 7.67 (m, 1H), 7.51 – 7.45 (m, 1H), 7.31 (d, *J* = 7.9 Hz, 2H), 2.41 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 157.43, 148.39, 139.52, 136.97, 136.79, 129.75, 129.70, 127.56, 127.21, 126.20, 118.98, 21.49.
39		**2-(4-ethylphenyl)quinoline[26] (8d):** White solid (0.226 g, 97% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.16 (dd, *J* = 8.4, 0.7 Hz, 1H), 8.09 – 8.03 (m, 2H), 8.00 (d, *J* = 8.6 Hz, 1H), 7.71 (d, *J* = 8.6 Hz, 1H), 7.69 – 7.60 (m, 2H), 7.40 (ddd, *J* = 8.0, 6.9, 1.1 Hz, 1H), 7.28 (d, *J* = 8.4 Hz, 2H), 2.66 (q, *J* = 7.6 Hz, 2H), 1.23 (t, *J* = 7.6 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 157.28, 148.31, 145.68, 137.11, 136.60, 129.67, 129.54, 128.41, 128.38, 127.56, 127.46, 127.08, 126.04, 118.81, 28.74, 15.59.
40		**2-(2,5-dimethylphenyl)quinoline (8e):** Yellow oil (0.226 g, 97% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.18 (d, *J* = 8.4 Hz, 1H), 8.07 (d, *J* = 8.5 Hz, 1H), 7.74 (d, *J* = 8.1 Hz, 1H), 7.70 – 7.62 (m, 1H), 7.46 (dd, *J* = 11.8, 5.5 Hz, 2H), 7.32 (d, *J* = 1.5 Hz, 1H), 7.17 (d, *J* = 7.7 Hz, 1H), 7.11 (dd, *J* = 7.8, 1.7 Hz, 1H), 2.34 (s, 6H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 160.30, 147.84, 140.45, 135.83, 135.31, 132.62, 130.73, 130.25, 129.48, 129.18, 127.42, 126.60, 126.23, 122.31, 20.90, 19.81. HRMS for $C_{17}H_{15}N$ [M+H] Calculated : 234.1283, Found: 234.1289.
41		**2-(4-fluoro-3-methylphenyl)quinoline (8f):** White solid (0.216 g, 91% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.14 (d, *J* = 8.5 Hz, 1H), 8.09 (d, *J* = 8.6 Hz, 1H), 7.99 (dd, *J* = 7.5, 1.6 Hz, 1H), 7.91 – 7.84 (m, 1H), 7.77 – 7.66 (m, 3H), 7.47 (ddd, *J* = 8.0, 7.0, 1.1 Hz, 1H), 7.10 (t, *J* = 8.9 Hz, 1H), 2.35 (d, *J* = 1.6 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 162.44 (d, *J* = 247.8 Hz), 156.49, 148.22, 136.84, 135.46 (d, *J* = 3.4 Hz), 130.88 (d, *J* = 5.6 Hz), 129.77, 129.60, 127.52, 127.06, 126.69 (d, *J* = 8.4 Hz), 126.28, 125.33 (d, *J* = 17.6 Hz), 118.73, 118.54, 115.38 (d, *J* = 22.7 Hz), 14.79 (d, *J* = 2.8 Hz). HRMS for $C_{16}H_{12}FN$ [M+H] Calculated : 238.1033, Found: 238.1032.

42		**2-(4-chlorophenyl)quinoline[22] (8g):** White solid (0.230 g, 96% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 8.14 (d, *J* = 8.5 Hz, 2H), 8.07 (d, *J* = 8.5 Hz, 2H), 7.77-7.74 (m, 2H), 7.73 – 7.67 (m, 1H), 7.53 – 7.43 (m, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 156.05, 148.33, 138.13, 137.05, 135.64, 129.95, 129.80, 129.11, 129.02, 128.92, 127.61, 127.32, 126.61, 118.63.
43		**2-(4-fluorophenyl)quinoline[24] (8h):** White solid (0.210 g, 94% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 8.16 – 8.02 (m, 4H), 7.72 (d, *J* = 8.3 Hz, 2H), 7.64 (t, *J* = 7.6 Hz, 1H), 7.43 (t, *J* = 7.5 Hz, 1H), 7.11 (t, *J* = 8.5 Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 163.82 (d, *J* = 249.0 Hz), 156.25, 148.24, 136.93, 135.83 (d, *J* = 3.1 Hz), 129.82, 129.65, 129.43 (d, *J* = 8.5 Hz), 127.51, 127.10, 126.37, 118.64, 115.79 (d, *J* = 21.6 Hz).
44		**2-(4-methoxyphenyl)quinoline[24] (8i):** White solid (0.228 g, 97% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 8.14-8.10 (m, 4H), 7.83 – 7.72 (m, 2H), 7.70-7.76 (m, 1H), 7.47-7.44 (m, 1H), 7.07 – 6.96 (m, 2H), 3.84 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 160.90, 157.00, 148.37, 136.76, 132.31, 129.70, 129.59, 129.00, 127.56, 127.01, 126.02, 118.66, 114.32, 55.48.
45		**2-(4-ethoxyphenyl)quinoline (8j):** White solid (0.242 g, 97% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 8.16 – 8.07 (m, 4H), 7.75 (t, *J* = 8.9 Hz, 2H), 7.68 (ddd, *J* = 8.3, 6.9, 1.4 Hz, 1H), 7.48 – 7.42 (m, 1H), 7.03 – 6.96 (m, 2H), 4.05 (q, *J* = 7.0 Hz, 2H), 1.41 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 160.27, 157.00, 148.36, 136.69, 132.09, 129.64, 129.58, 128.95, 127.54, 126.96, 125.95, 118.61, 114.80, 63.61, 14.91. HRMS for $C_{17}H_{15}NO$ [M+H] Calculated : 250.1233, Found: 250.1236.
46		**2-(3,4-dimethoxyphenyl)quinoline[27] (8k):** White solid (0.252 g, 95% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C, TMS) δ 8.14 (dd, *J* = 11.7, 8.7 Hz, 2H), 7.88 (d, *J* = 2.0 Hz, 1H), 7.79 (dd, *J* = 17.5, 8.4 Hz, 2H), 7.73 – 7.66 (m, 1H), 7.63 (dd, *J* = 8.3, 2.0 Hz, 1H), 7.51 – 7.44 (m, 1H), 6.96 (d, *J* = 8.4 Hz, 1H), 4.03 (s, 3H), 3.93 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 156.88, 150.44, 149.45, 148.28, 136.71, 132.58, 129.69, 129.56, 127.53, 127.05, 126.07, 120.32, 118.68, 111.08, 110.45, 56.09, 56.04.

47		**2-(3,4,5-trimethoxyphenyl)quinoline[24] (8l):** White solid (0.268 g, 91% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.18 (dd, *J* = 8.2, 5.5 Hz, 2H), 7.84 – 7.78 (m, 2H), 7.73-7.70 (m, 1H), 7.52-7.49 (m, 1H), 7.40 (s, 2H), 3.99 (s, 6H), 3.92 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 157.01, 153.63, 148.20, 139.47, 136.87, 135.38, 129.81, 129.65, 127.55, 127.19, 126.35, 118.93, 104.89, 61.05, 56.34.
48		**2-(benzo[d][1,3]dioxol-5-yl)quinoline[25] (8m):** White solid (0.241 g, 97% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.17 (d, *J* = 8.6 Hz, 1H), 8.13 (d, *J* = 8.5 Hz, 1H), 7.79 (t, *J* = 7.3 Hz, 2H), 7.74 (d, *J* = 1.7 Hz, 1H), 7.71 (ddd, *J* = 8.4, 7.0, 1.3 Hz, 1H), 7.65 (dt, *J* = 7.2, 3.6 Hz, 1H), 7.53 – 7.47 (m, 1H), 6.95 (d, *J* = 8.1 Hz, 1H), 6.04 (s, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 156.85, 148.98, 148.55, 148.32, 136.88, 134.28, 129.83, 129.69, 127.59, 127.15, 126.24, 121.92, 118.80, 108.65, 108.08, 101.54.
49		**2-(3,5-bis(benzyloxy)phenyl)quinoline (8n):** White solid (0.396 g, 95% yield); ^{1}H NMR (500 MHz, $CDCl_3$, 25 ^{o}C, TMS) δ 8.18 (d, *J* = 8.4 Hz, 1H), 8.10 (d, *J* = 8.6 Hz, 1H), 7.75 (d, *J* = 8.6 Hz, 2H), 7.69-7.66 (m, 1H), 7.50 – 7.42 (m, 7H), 7.41 – 7.34 (m, 4H), 7.31-7.28 (m, 2H), 6.71 (t, *J* = 2.2 Hz, 1H), 5.10 (s, 4H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 160.46, 156.97, 148.21, 141.89, 136.95, 136.89, 129.82, 129.79, 128.72, 128.15, 127.80, 127.58, 127.44, 126.49, 119.16, 106.96, 103.25, 70.33. HRMS for $C_{29}H_{23}NO_2$ [M+H] Calculated : 418.1808, Found: 418.1815.

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[1]H NMR and [13]C NMR Spectra

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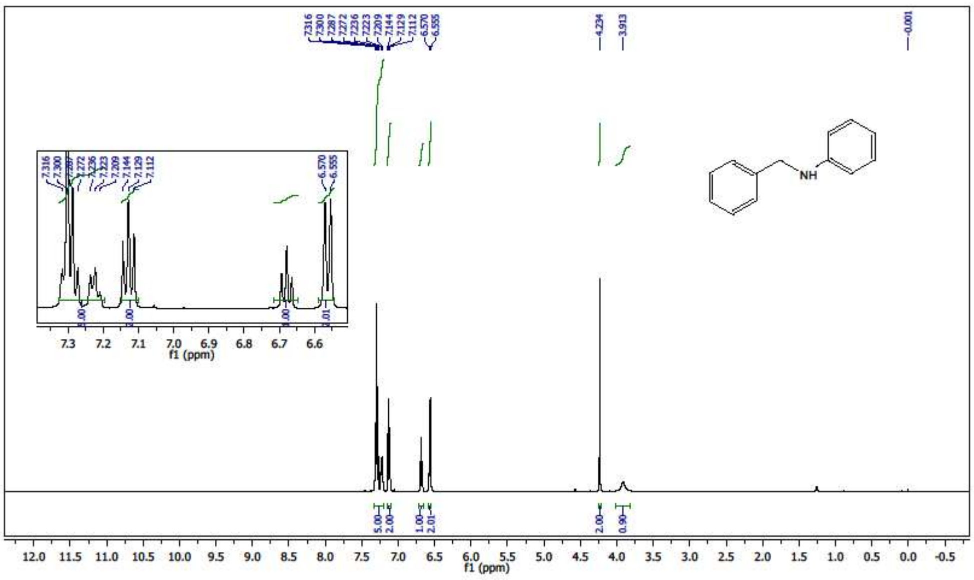
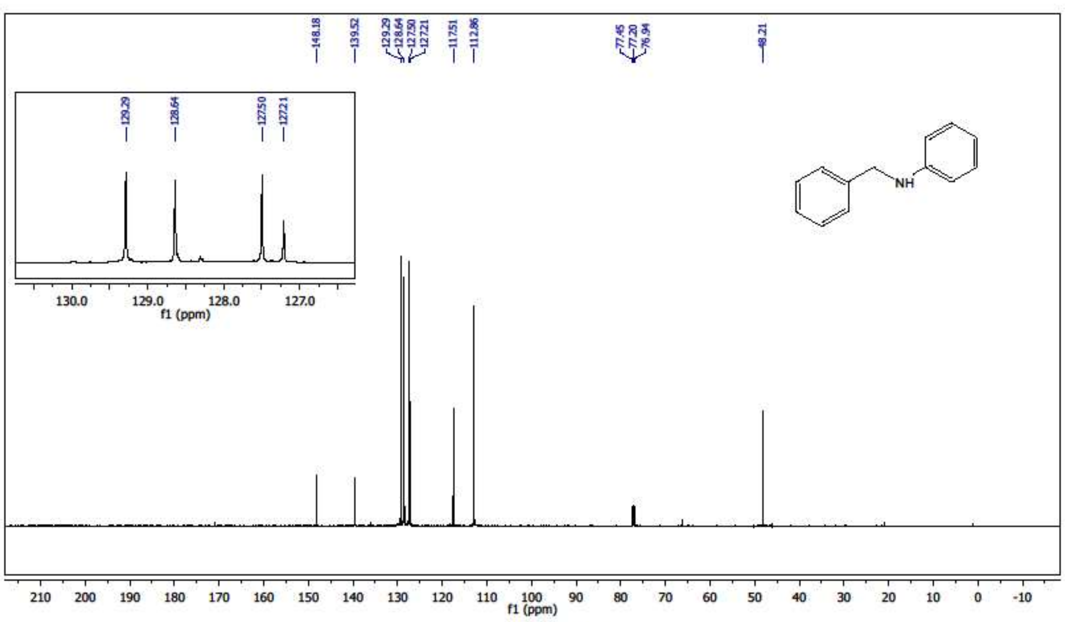
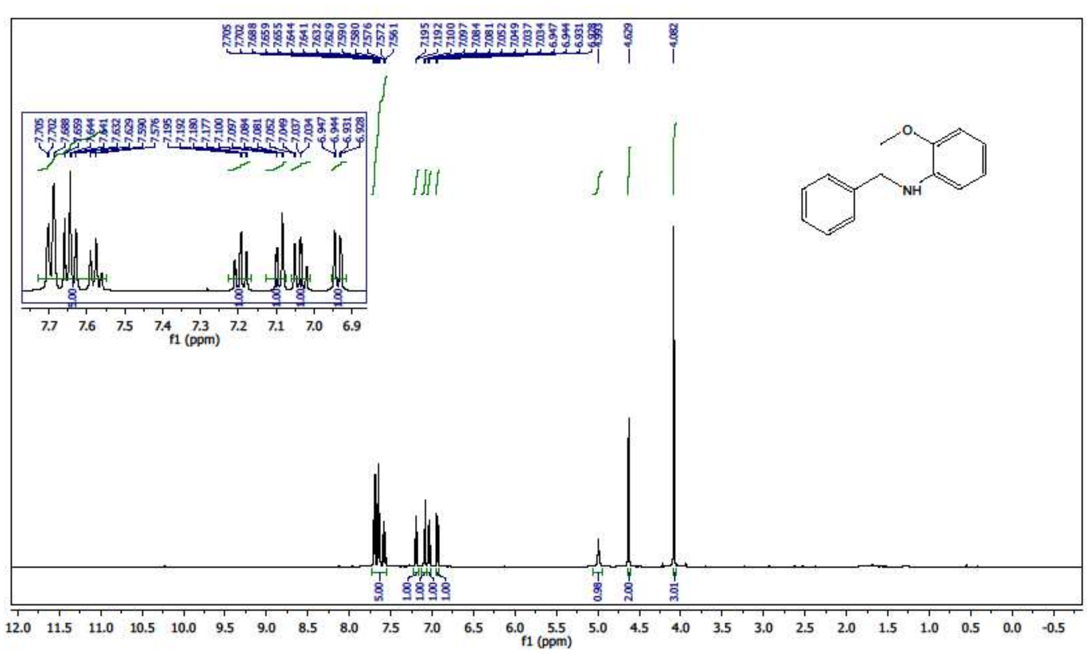


^{1}H NMR FOR N-benzylaniline



13C NMR FOR N-benzylaniline

3b



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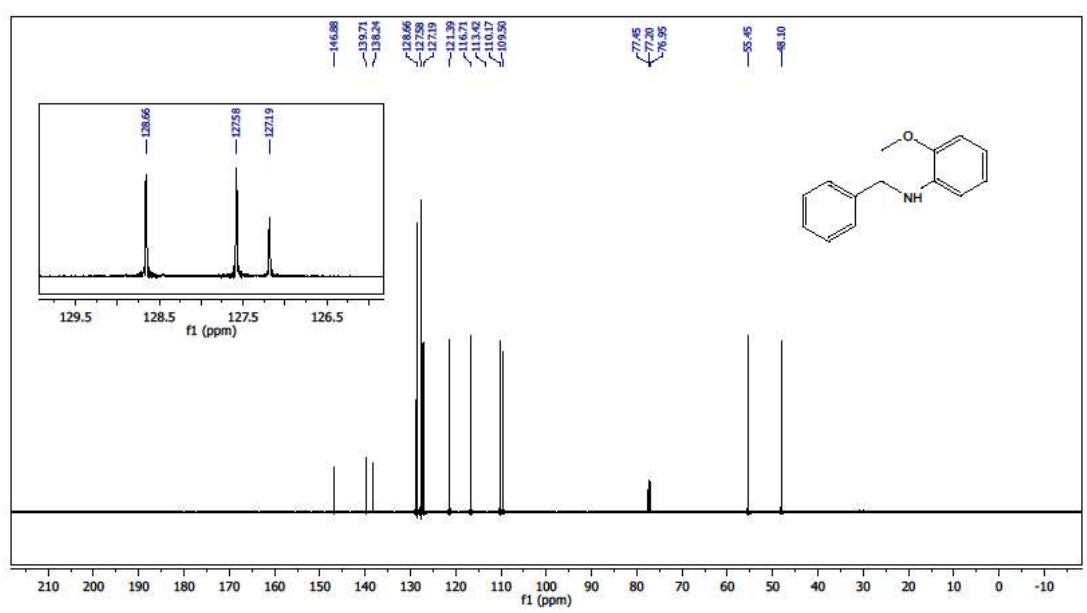

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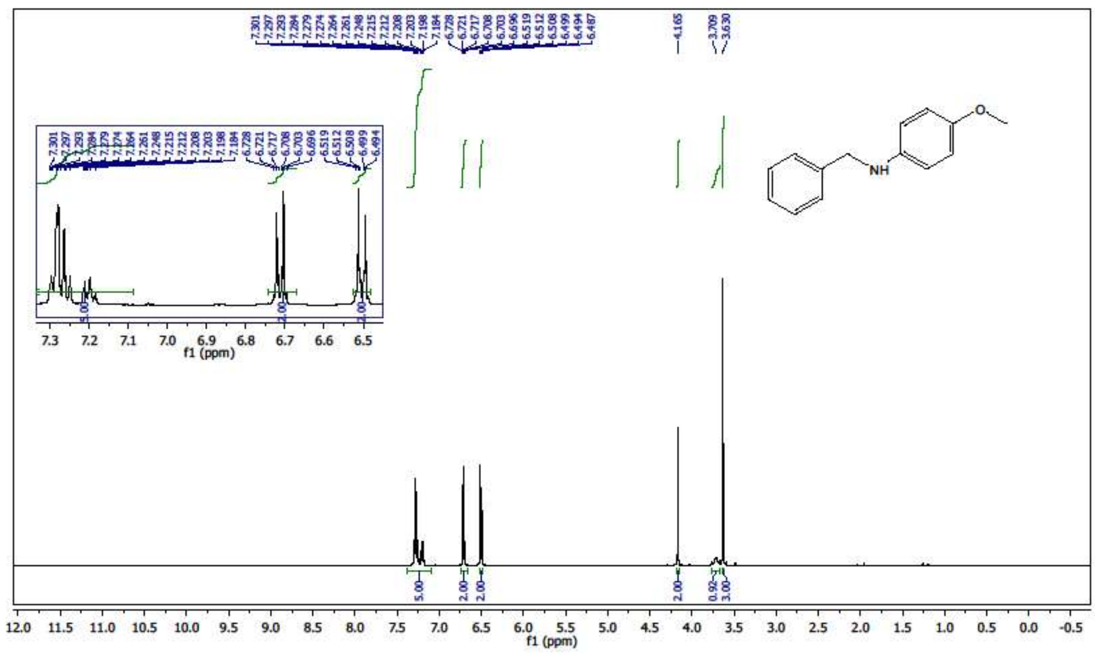

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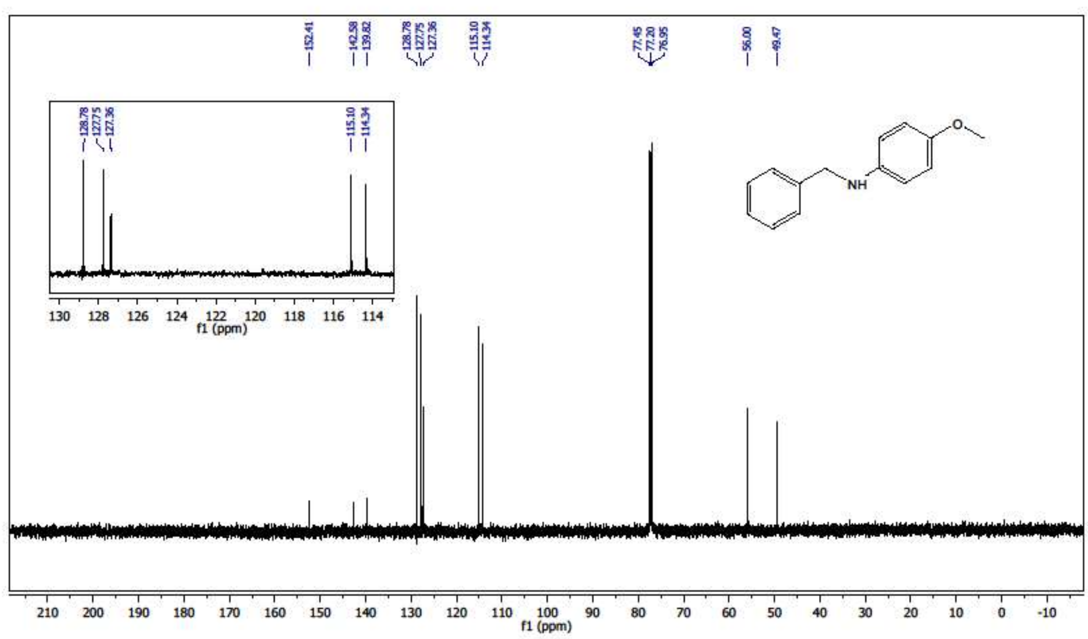

^{13}C NMR for N-benzyl-4-methoxyaniline

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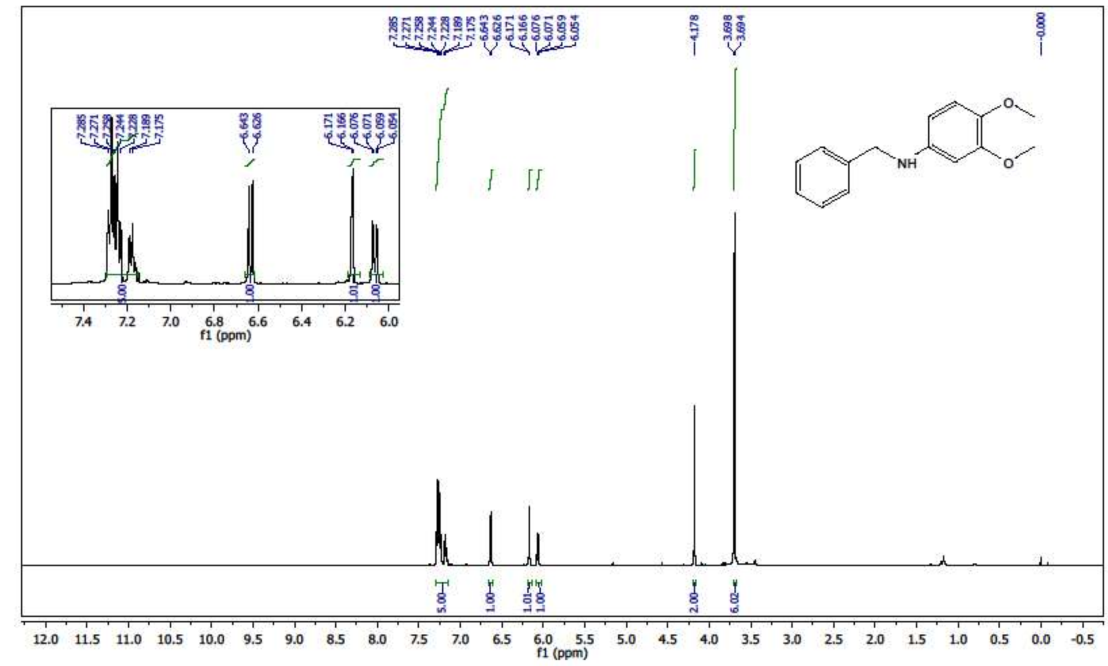

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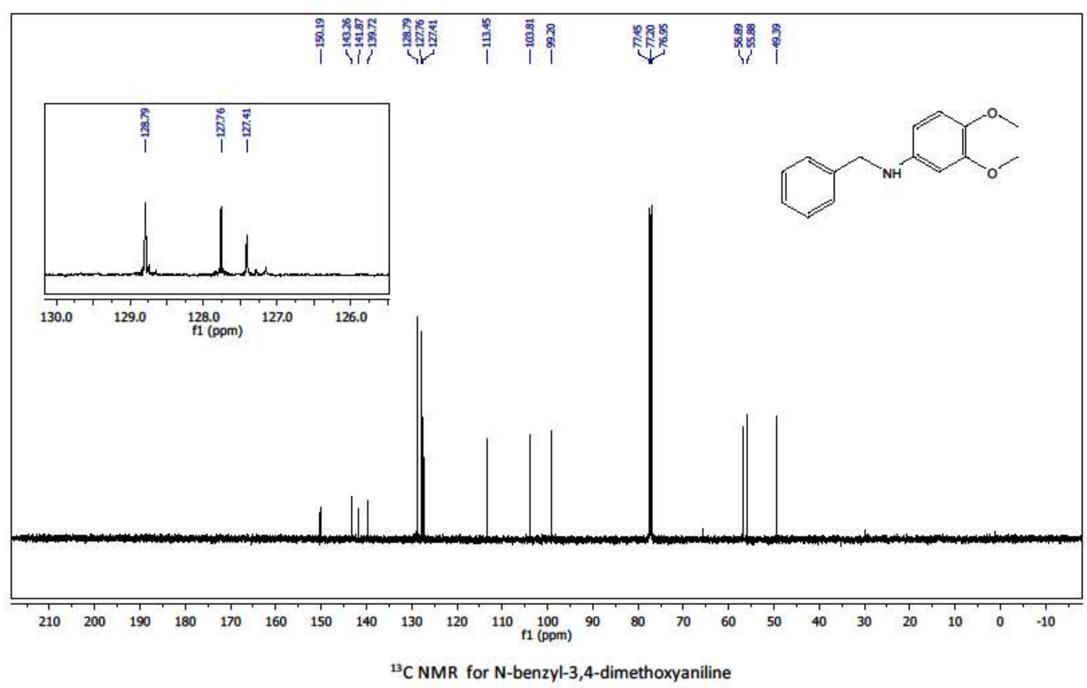

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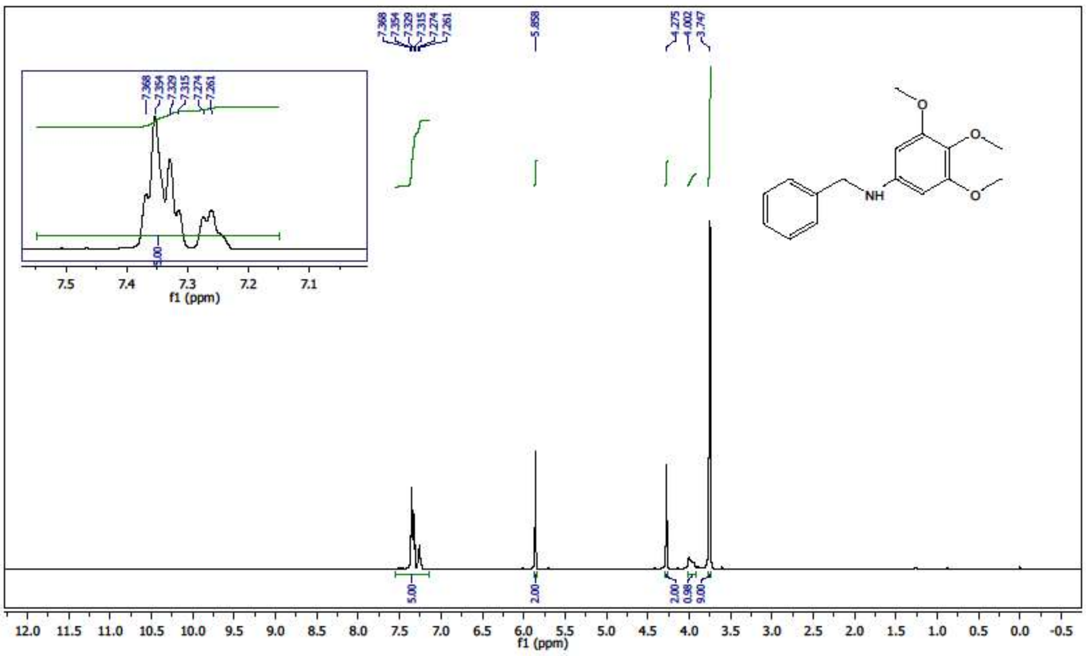

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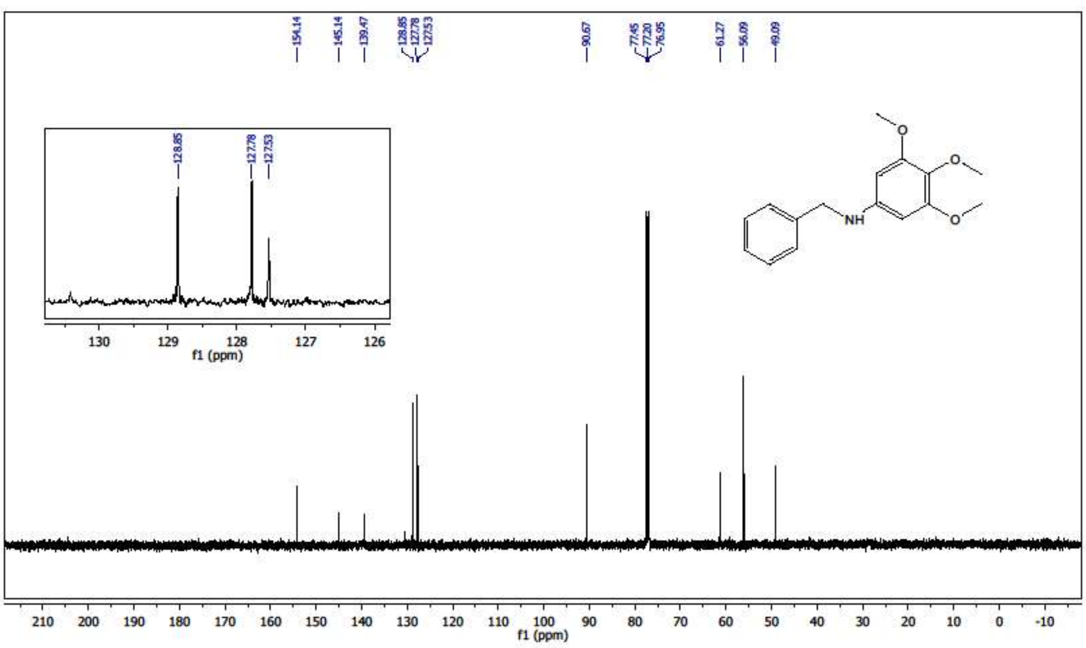
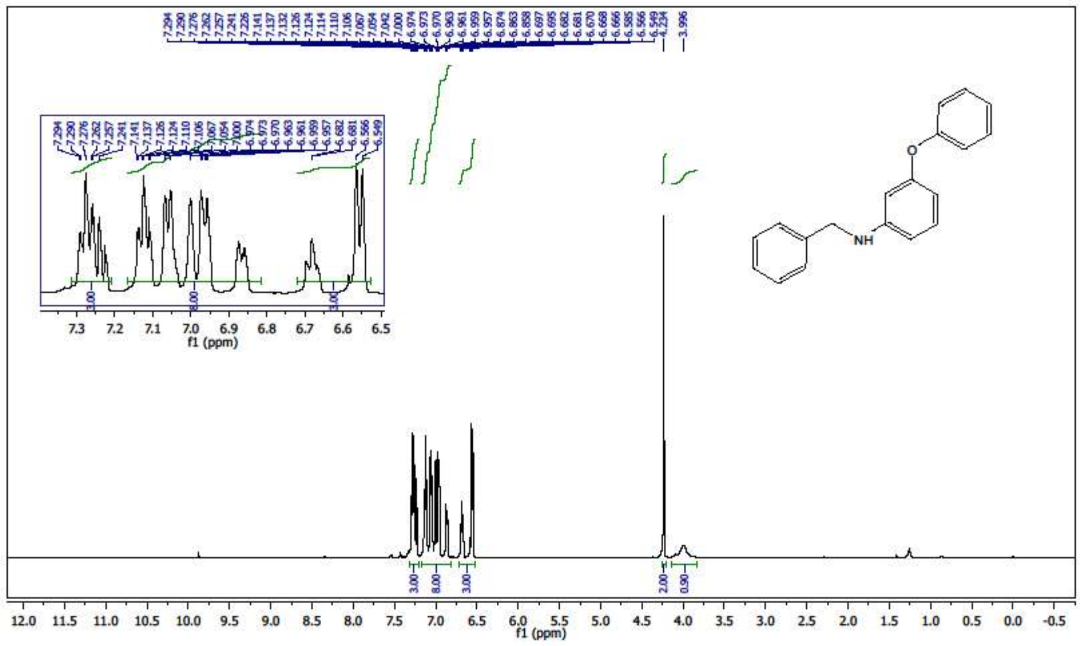


[13]C NMR for N-benzyl-3,4,5-trimethoxyaniline

3f



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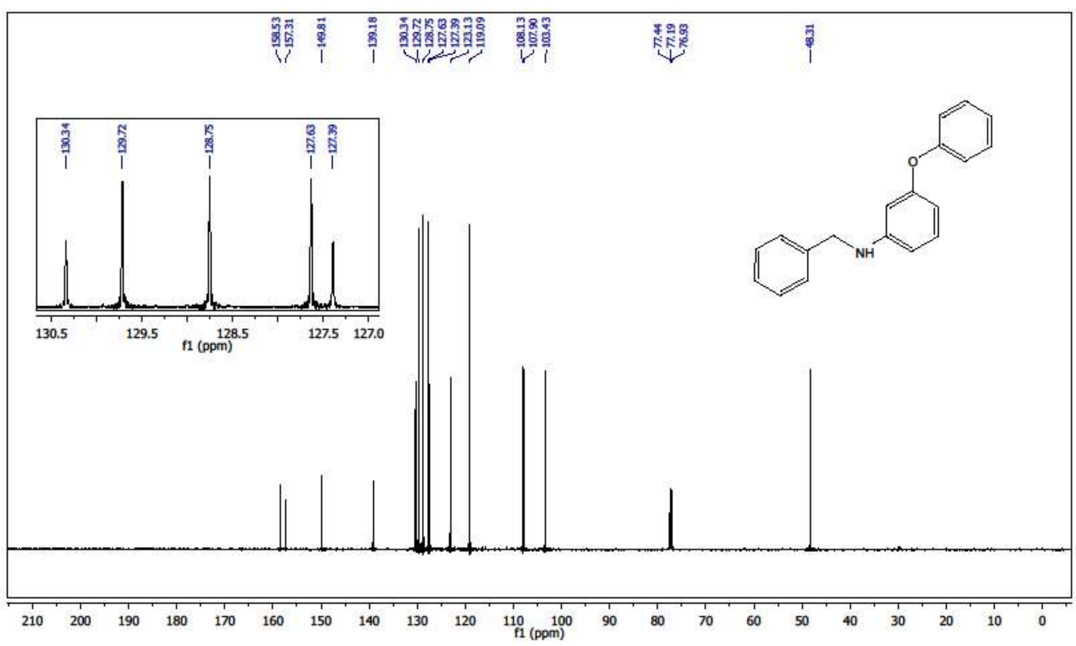

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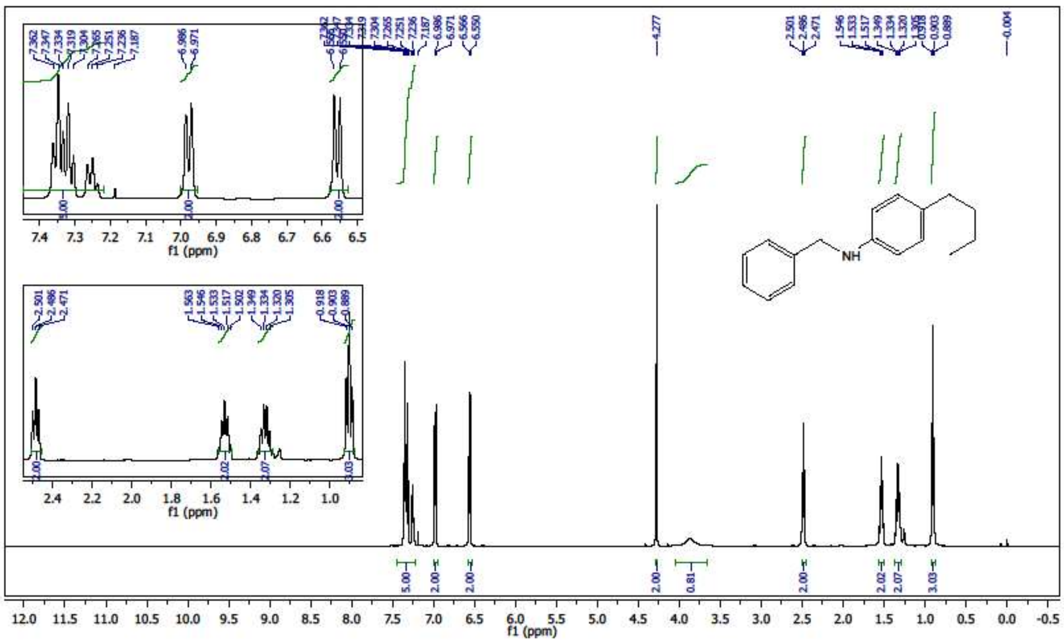

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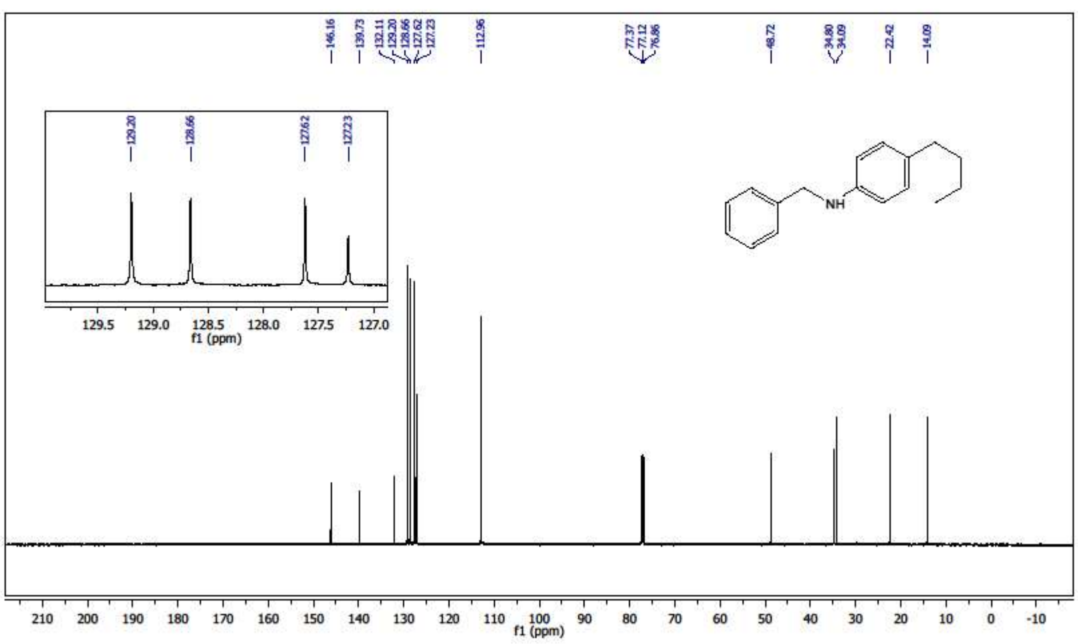

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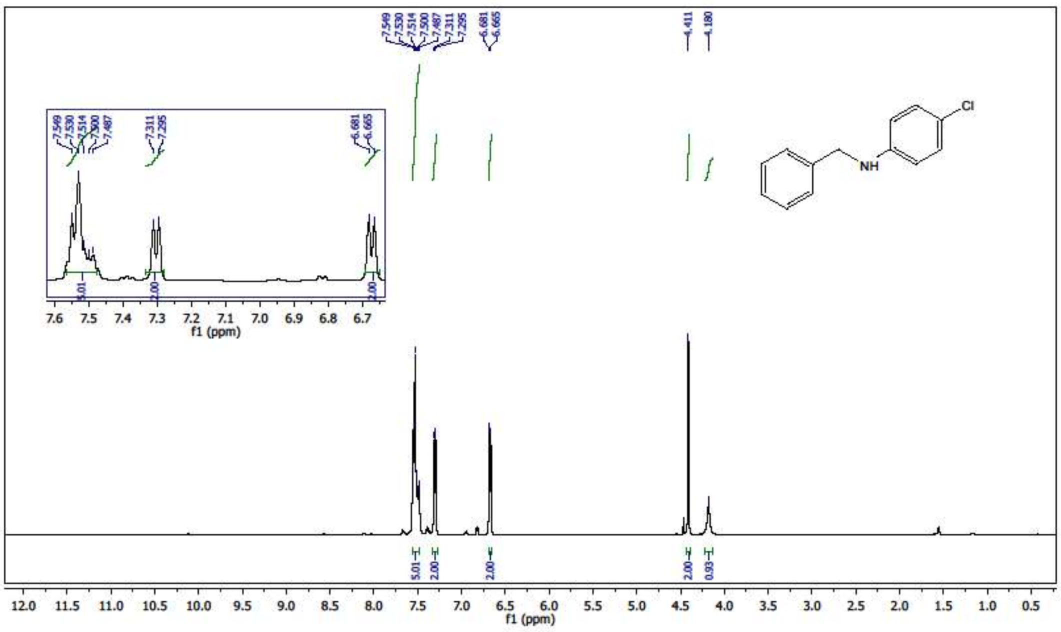
3h



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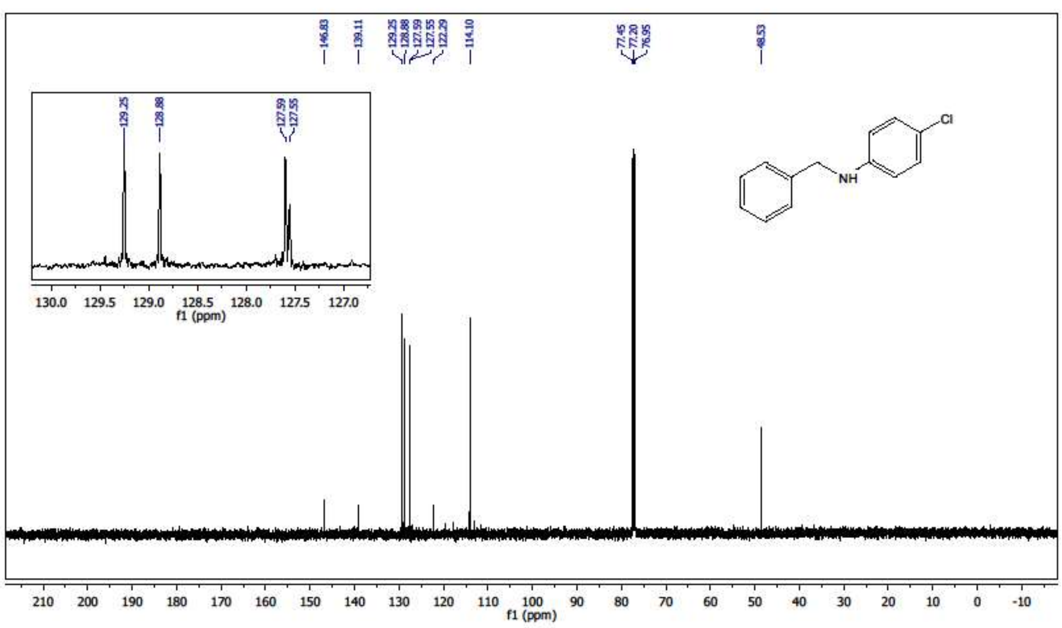

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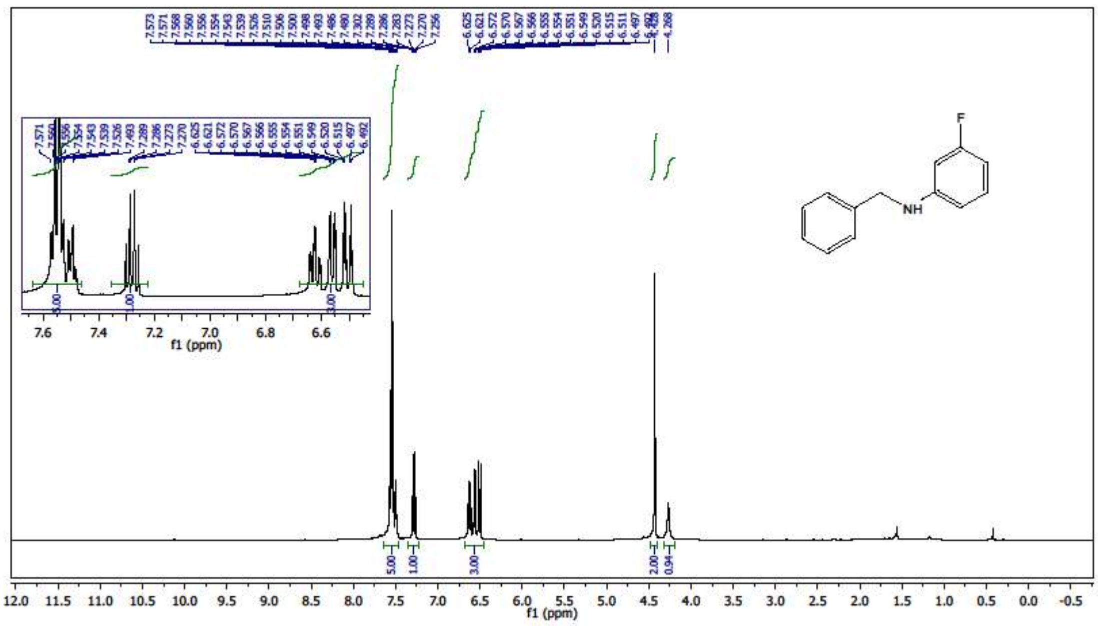

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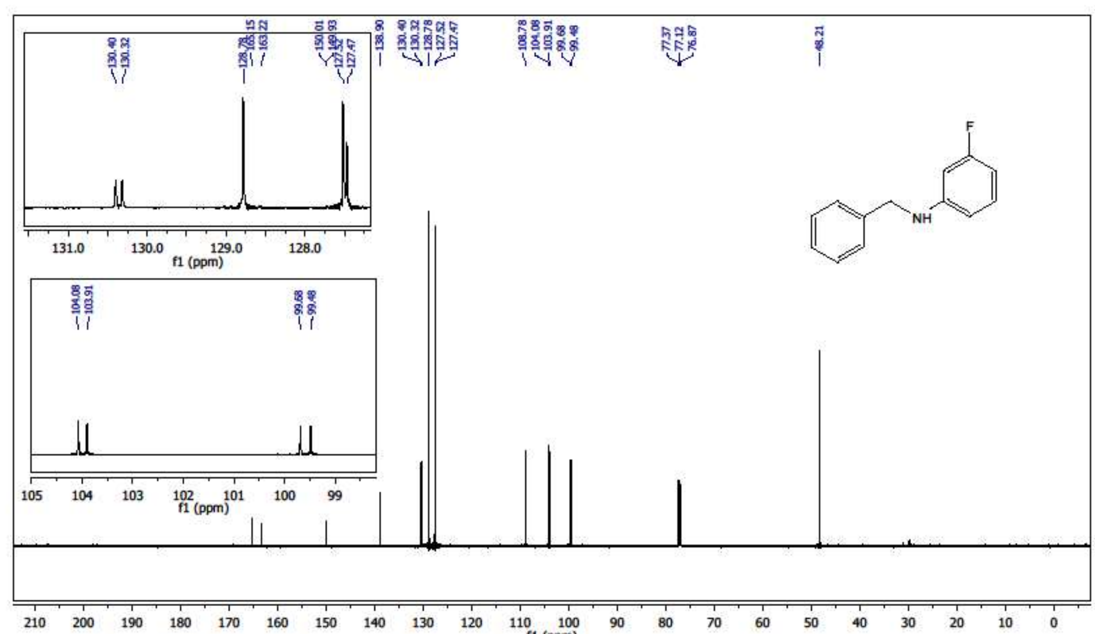

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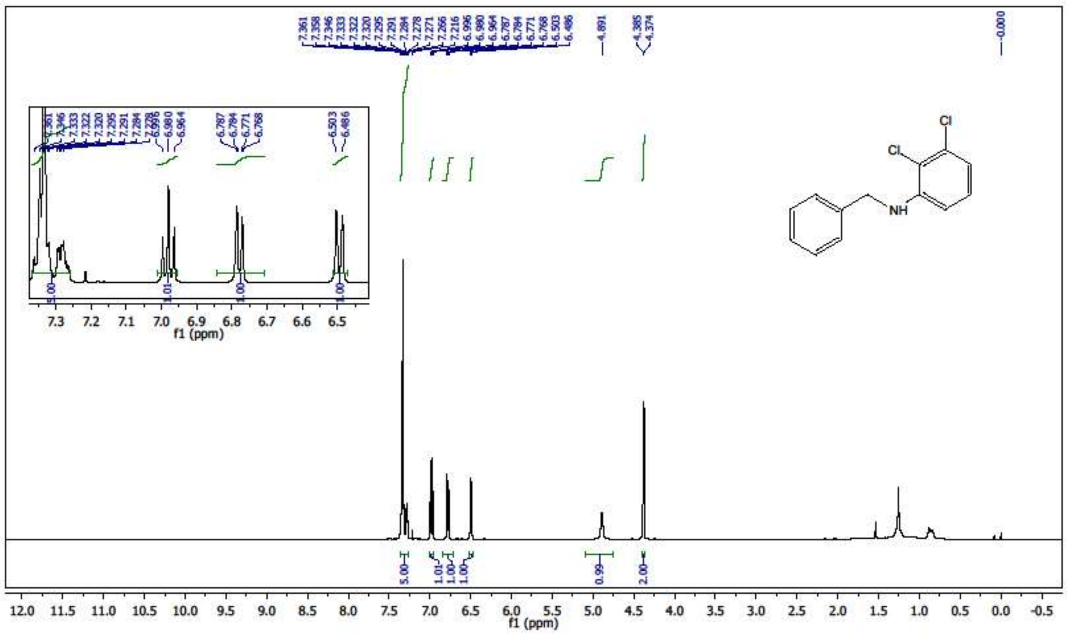
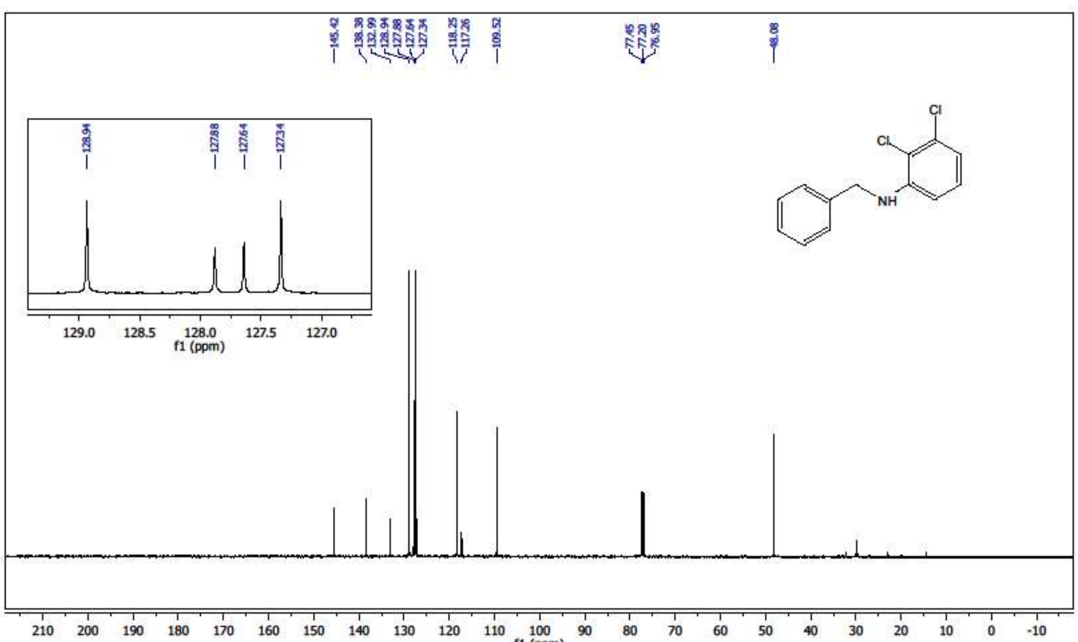


^{1}H NMR FOR N-benzyl-2,3-dichloroaniline



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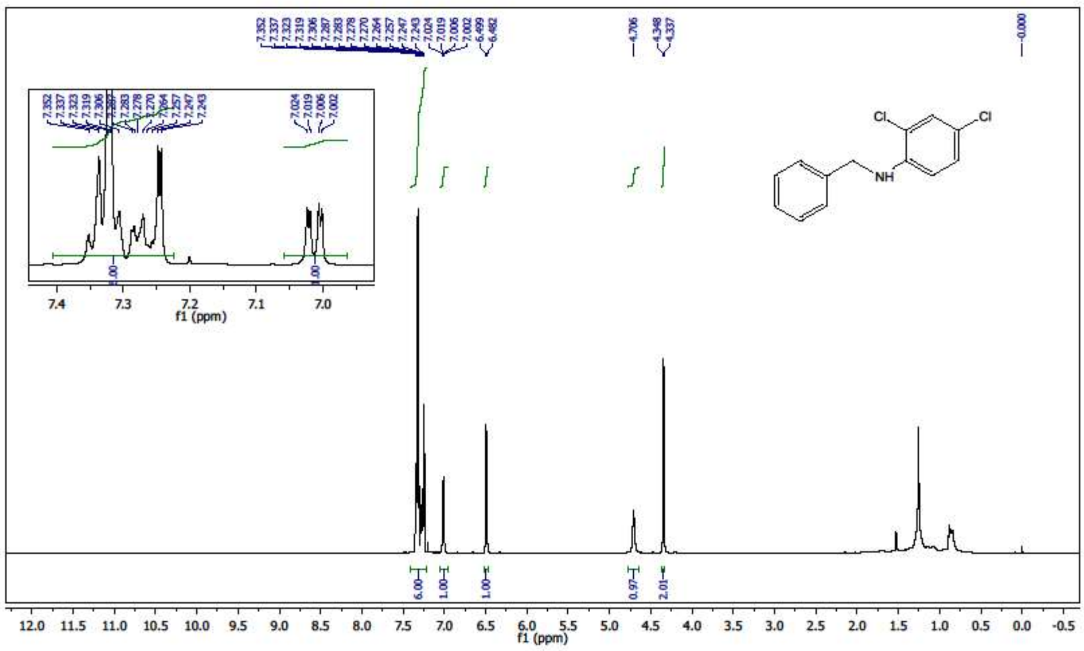

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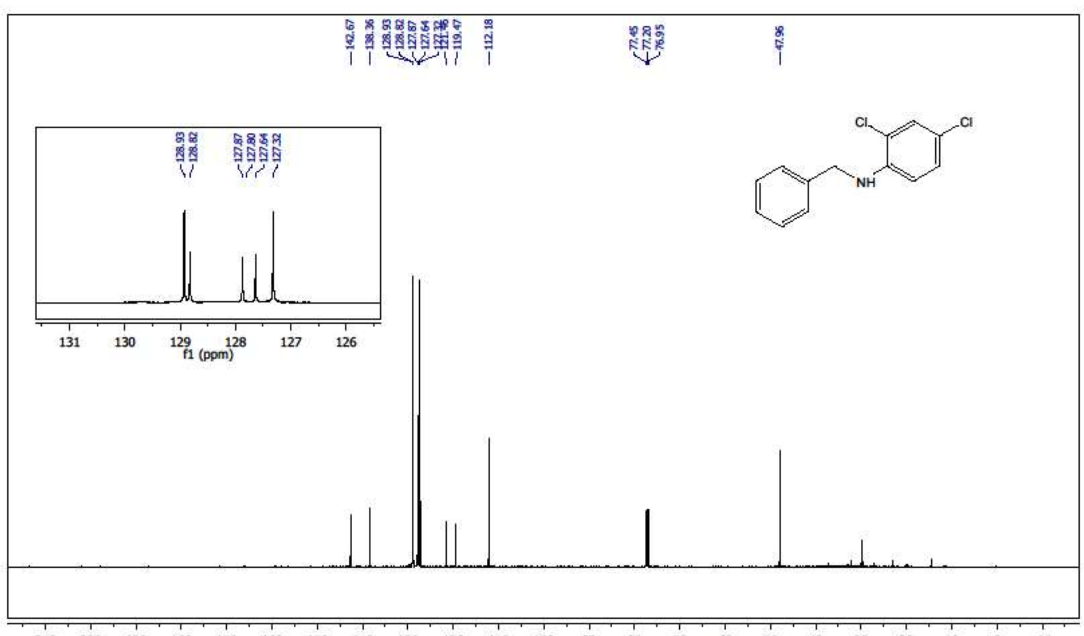

^{13}C NMR FOR N-benzyl-2,4-dichloroaniline

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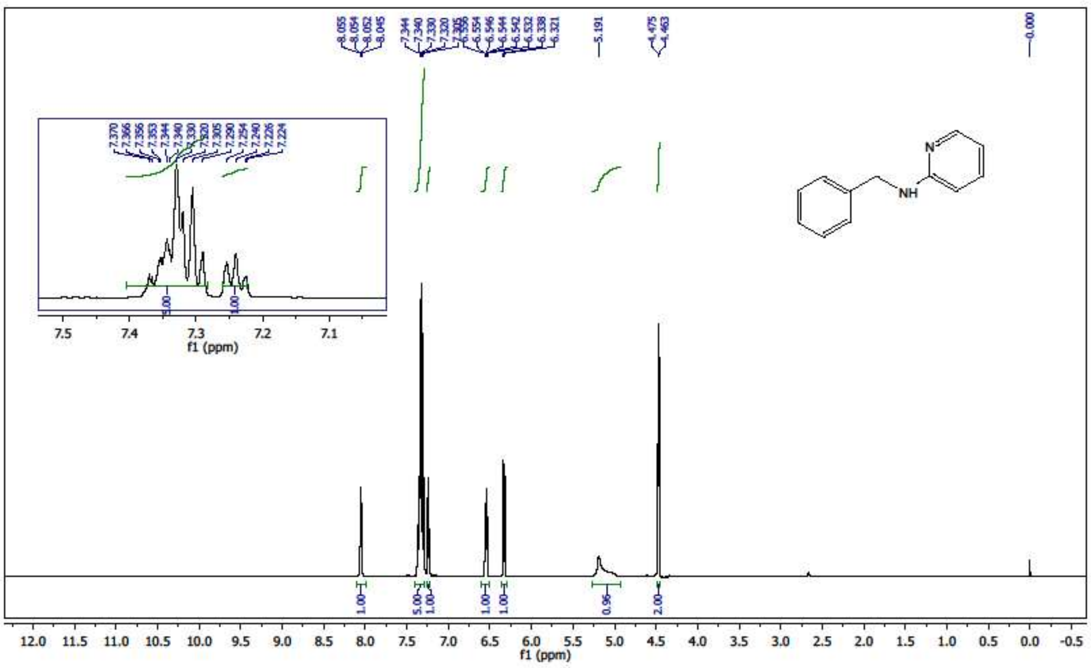
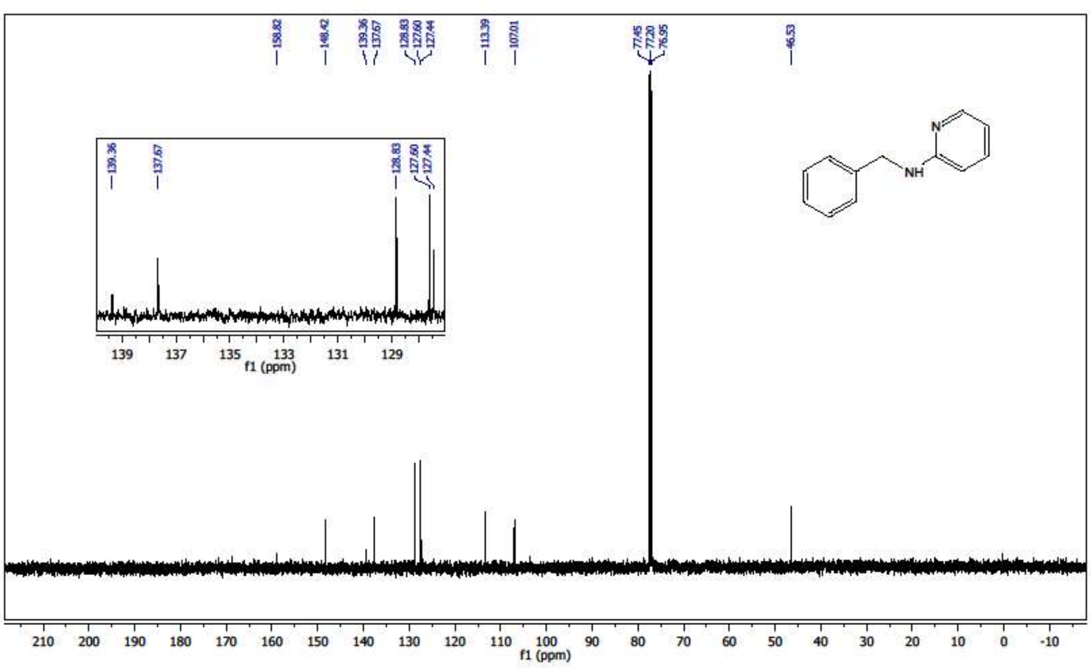
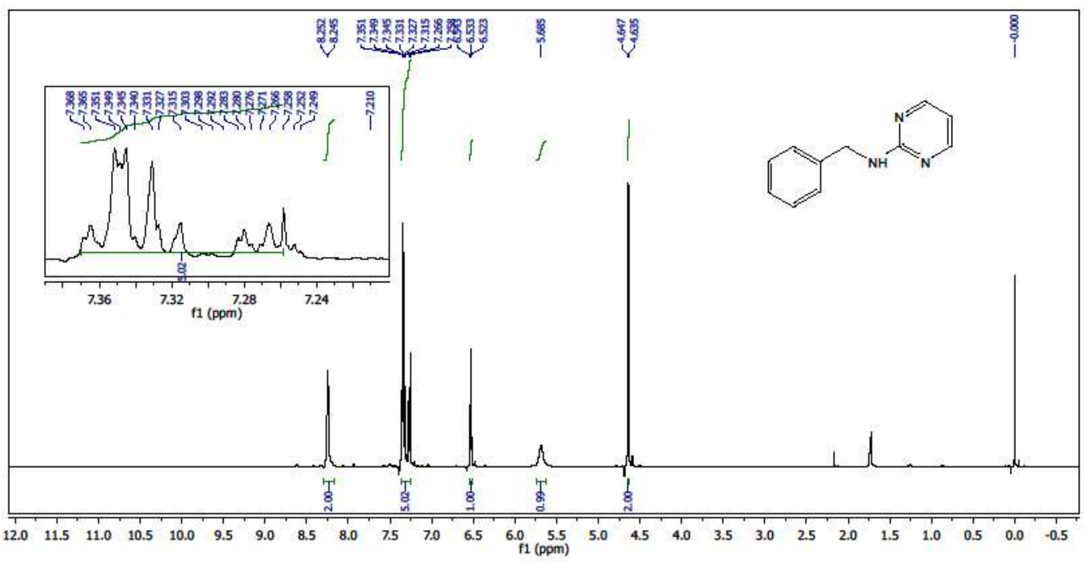


[1]H-NMR for N-benzylpyridin-2-amine

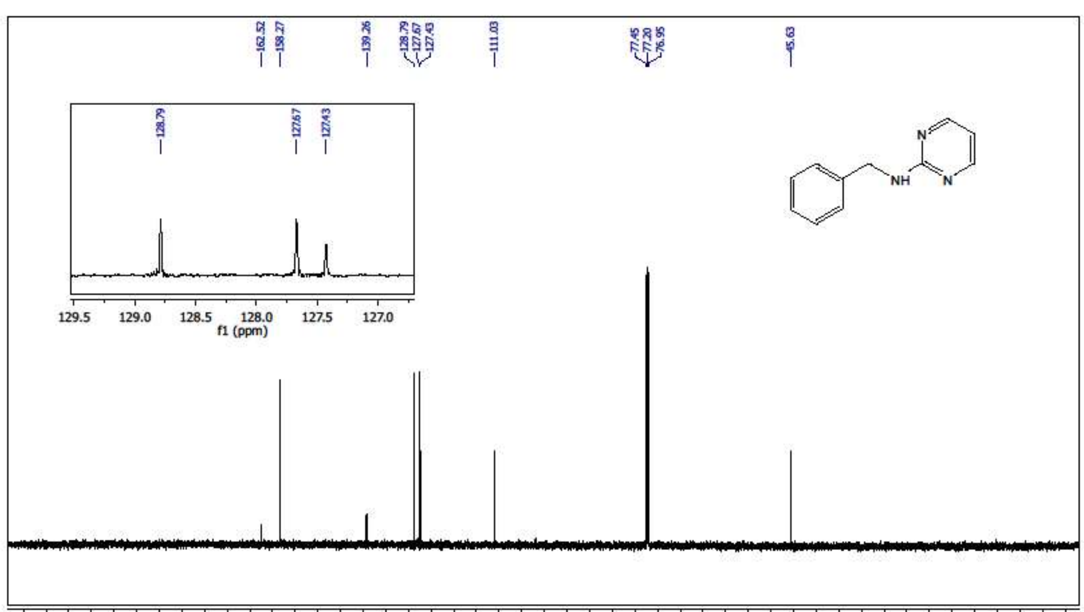


[13]C NMR for N-benzylpyridin-2-amine

3m

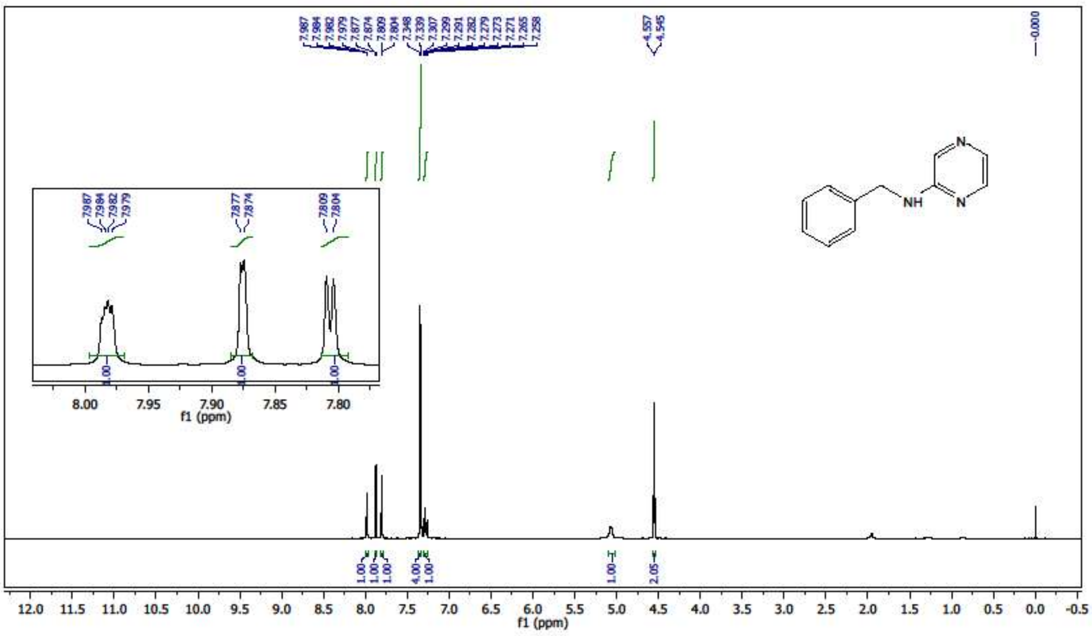


[1]H-NMR for N-benzylpyrimidin-2-amine

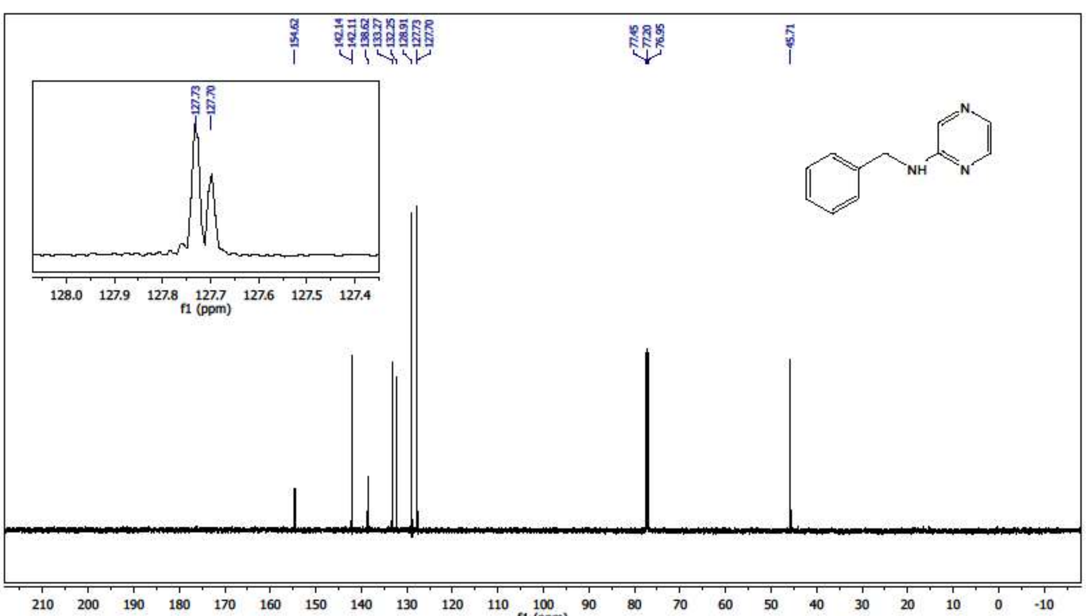


[13]C NMR for N-benzylpyrimidin-2-amine

3n

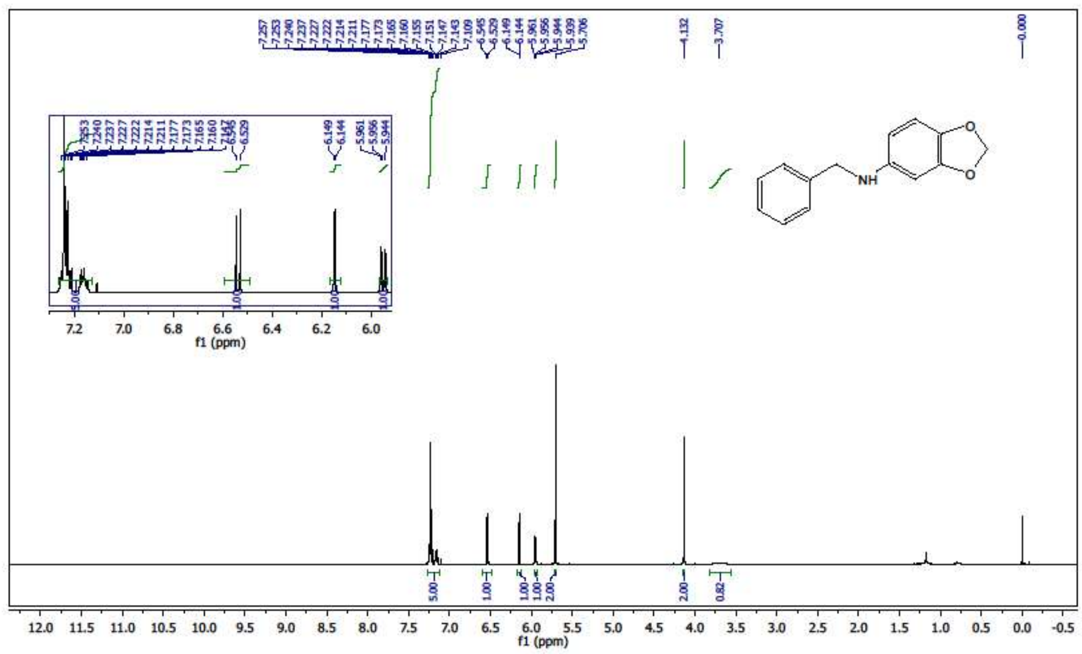


^{1}H-NMR for N-benzylpyrazin-2-amine

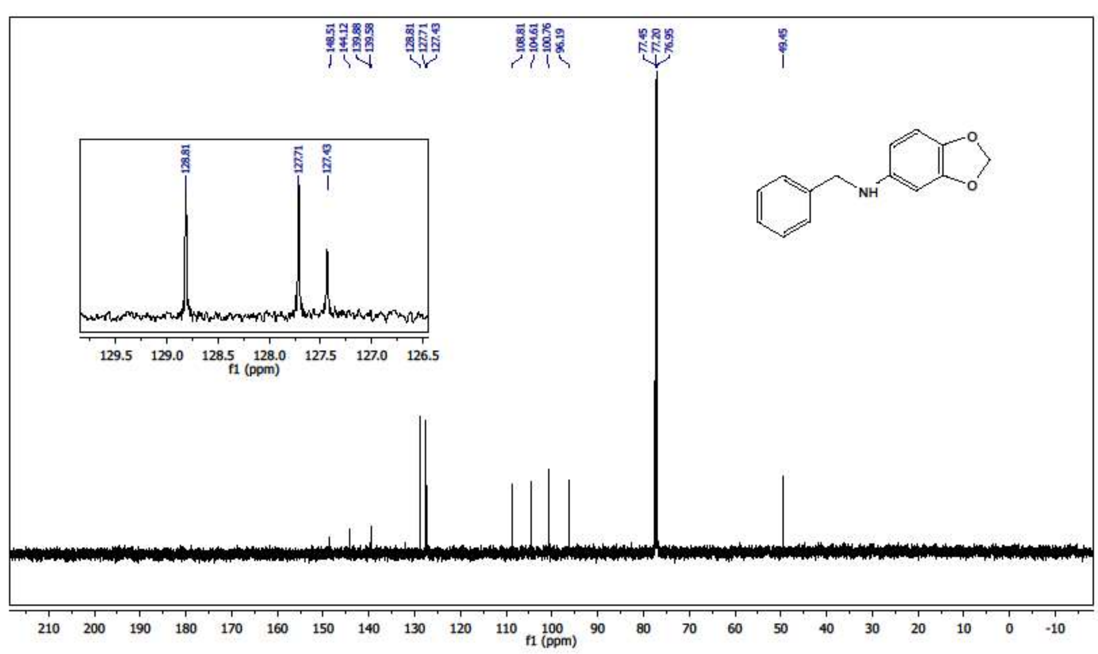


^{13}C NMR for N-benzylpyrazin-2-amine

3o

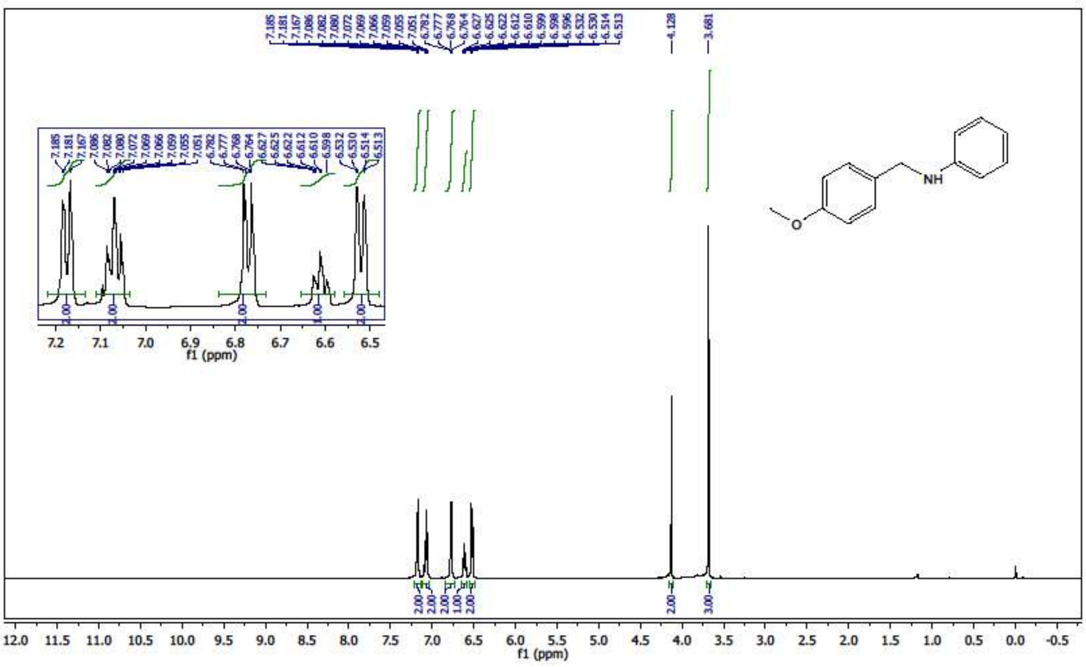


1H-NMR for N-benzylbenzo[d][1,3]dioxol-5-amine

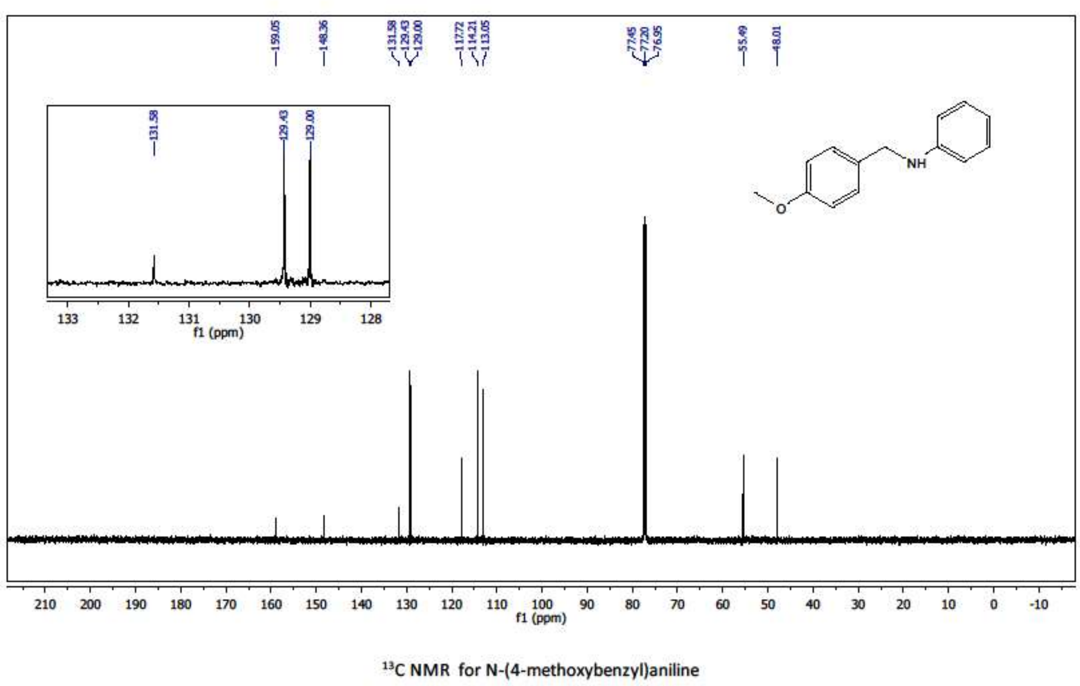


^{13}C NMR for N-benzylbenzo[d][1,3]dioxol-5-amine

3p

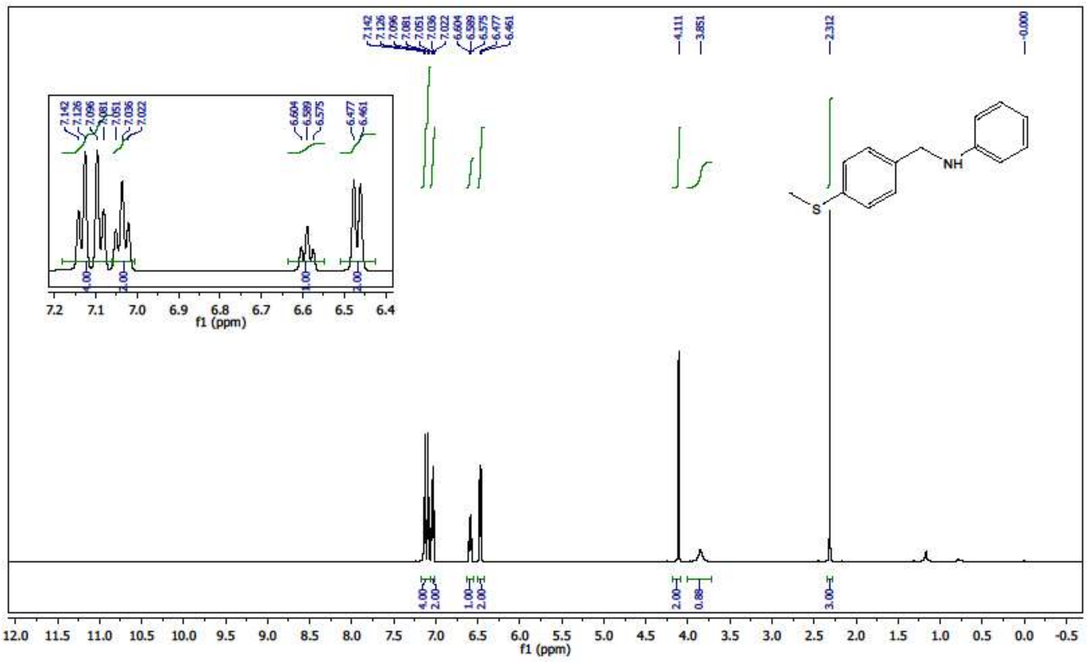


^{1}H-NMR for N-(4-methoxybenzyl)aniline

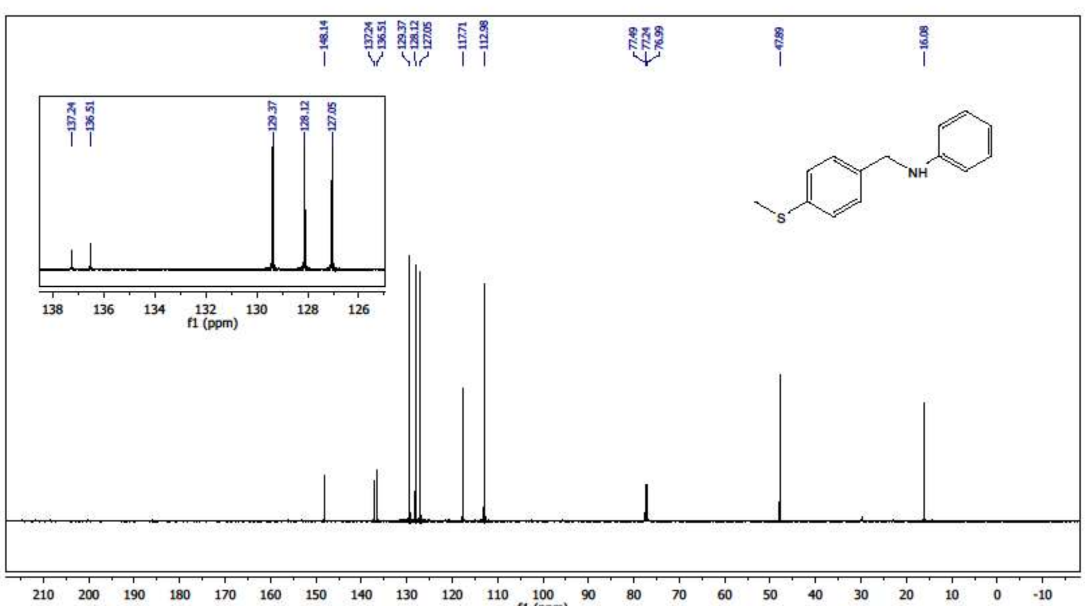


^{13}C NMR for N-(4-methoxybenzyl)aniline

3q

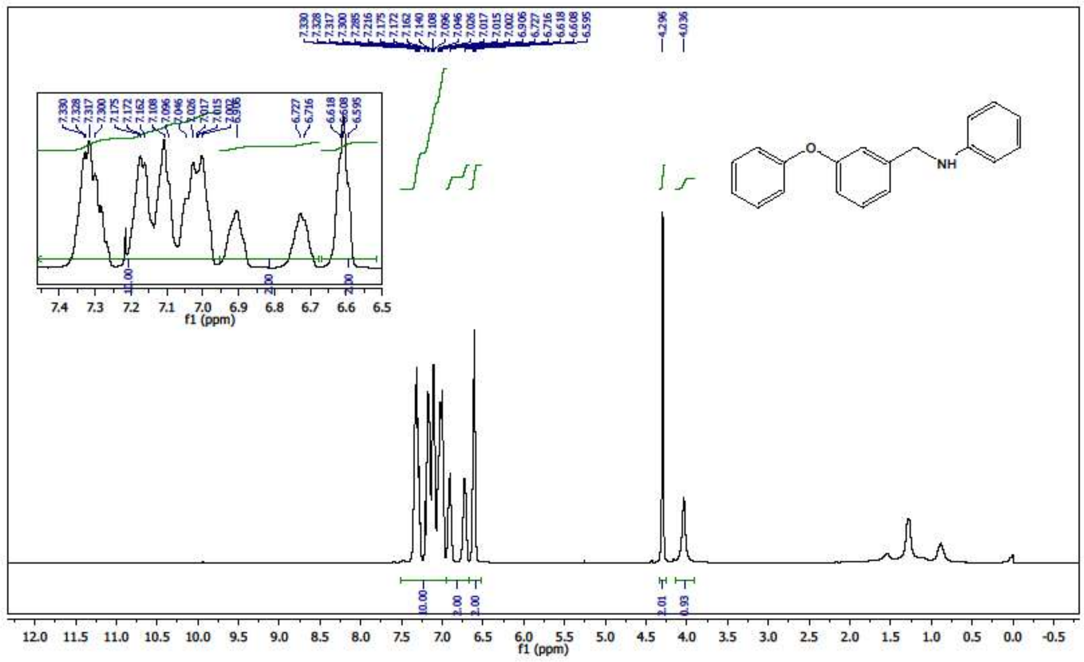


[1]H NMR FOR N-(4-(methylthio)benzyl)aniline

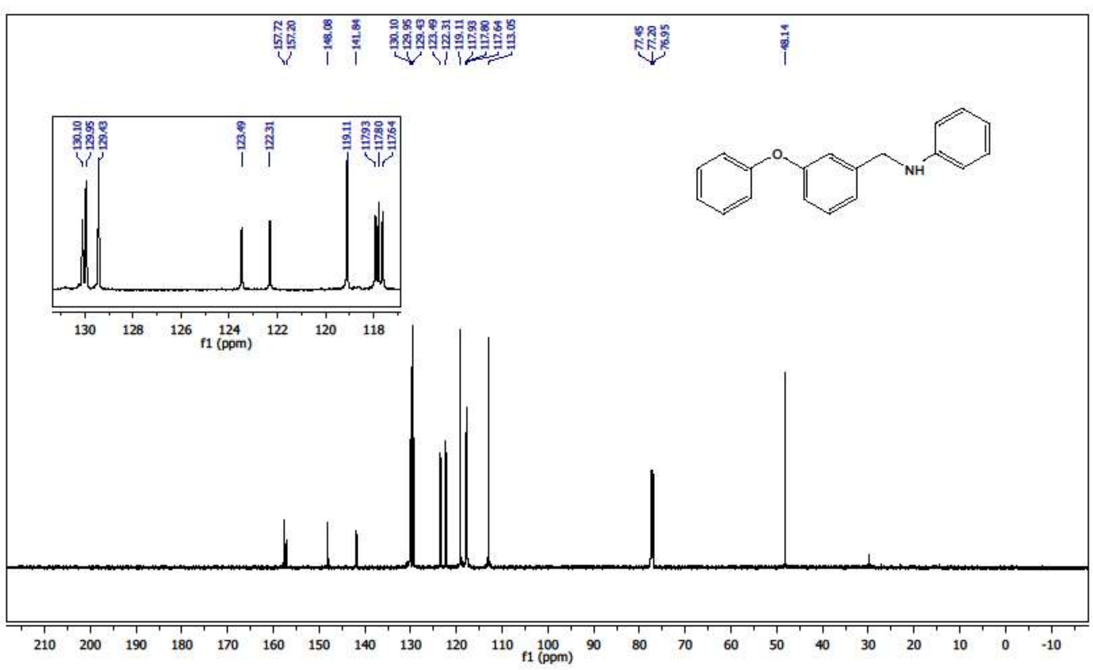


[13]C-NMR for N-(4-(methylthio)benzyl)aniline

3r

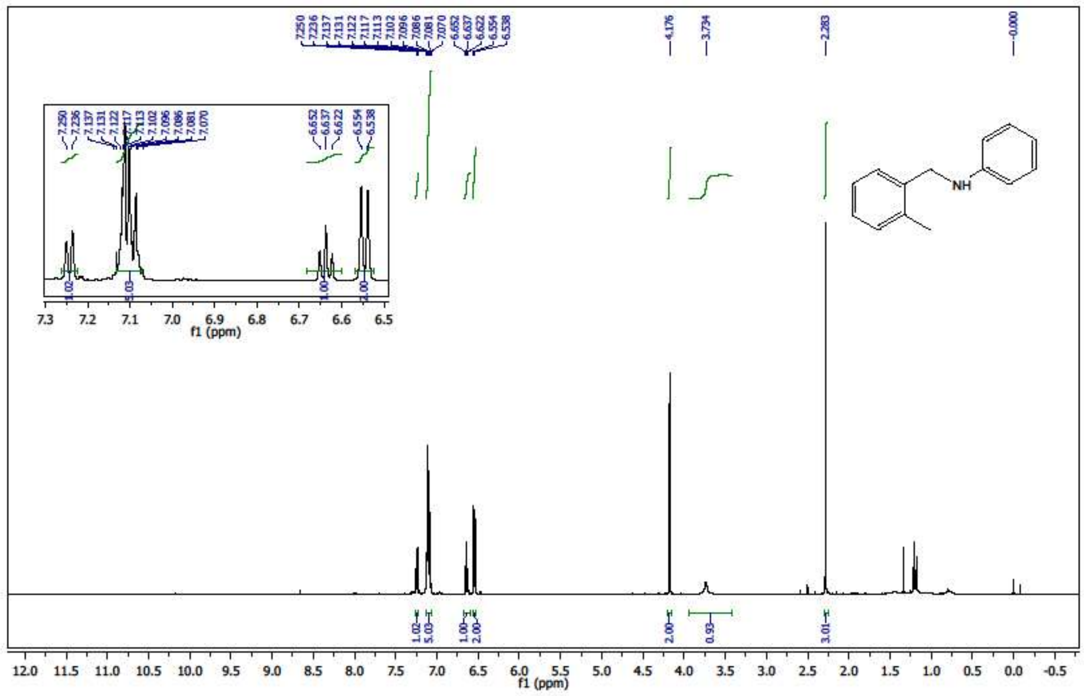


^{1}H NMR FOR N-(3-phenoxybenzyl)aniline

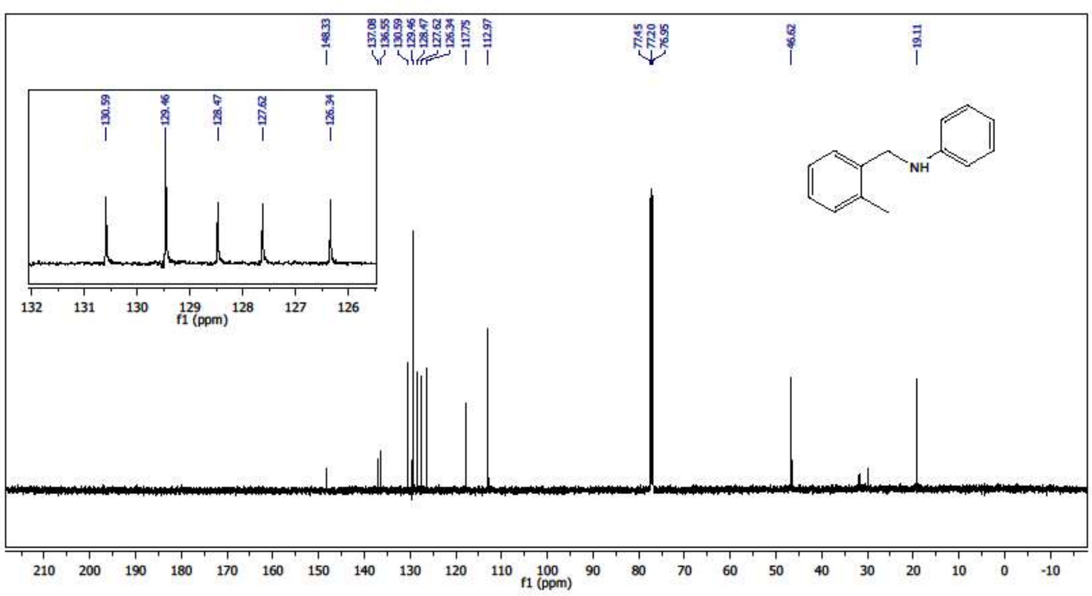


^{13}C NMR for N-(3-phenoxybenzyl)aniline

3s

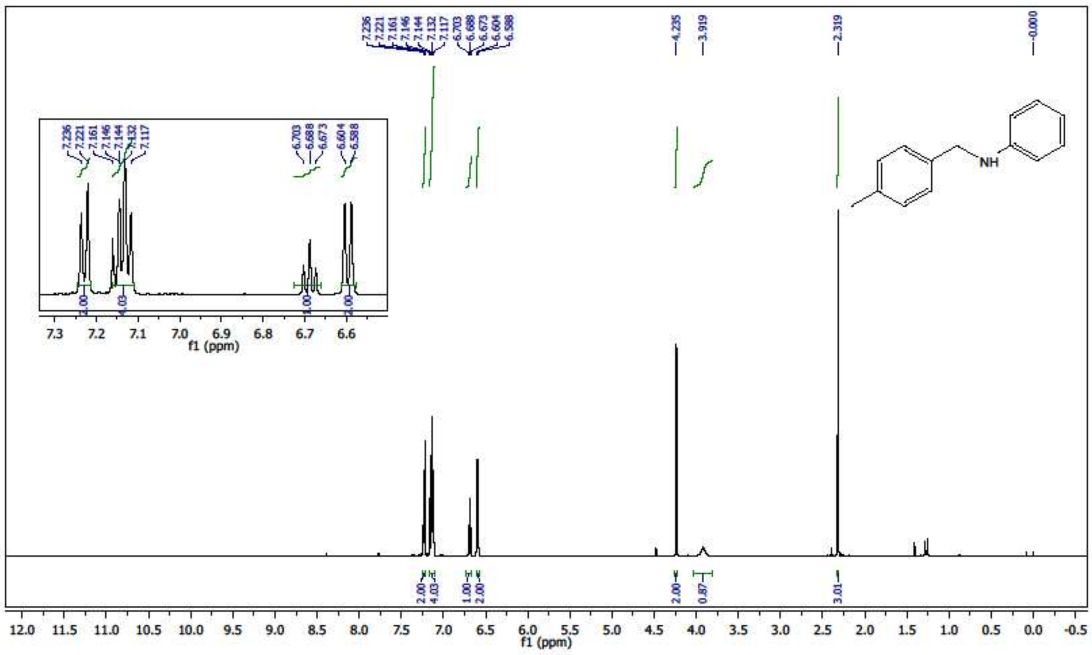


[1]H- NMR FOR N-(2-methylbenzyl)aniline

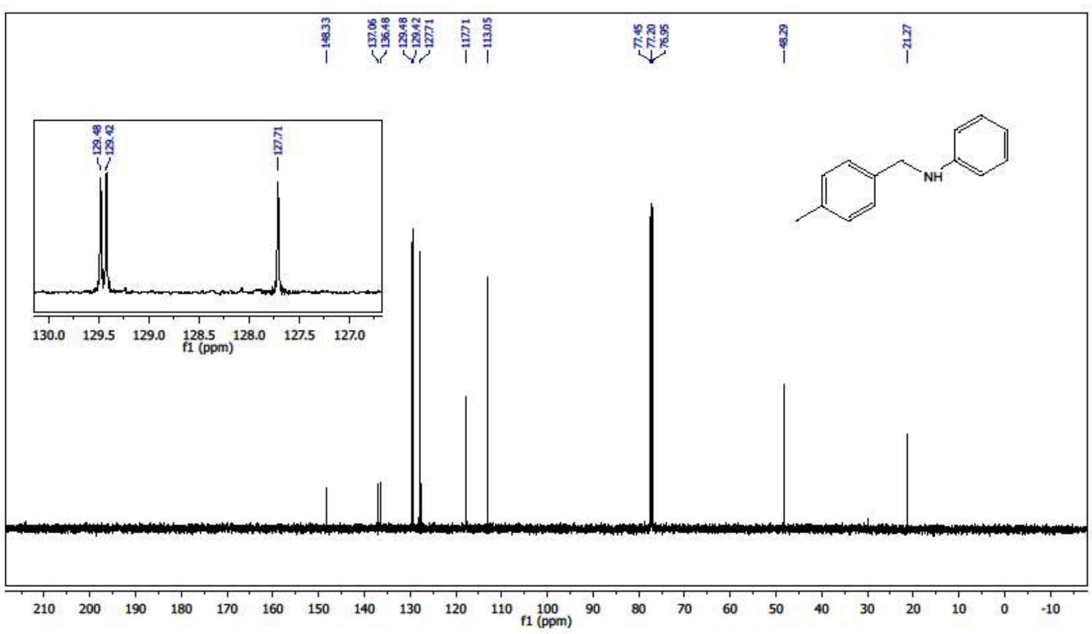


[13]C NMR for N-(2-methylbenzyl)aniline

3t



¹H NMR FOR N-(4-methylbenzyl)aniline



¹³C for N-(4-methylbenzyl)aniline

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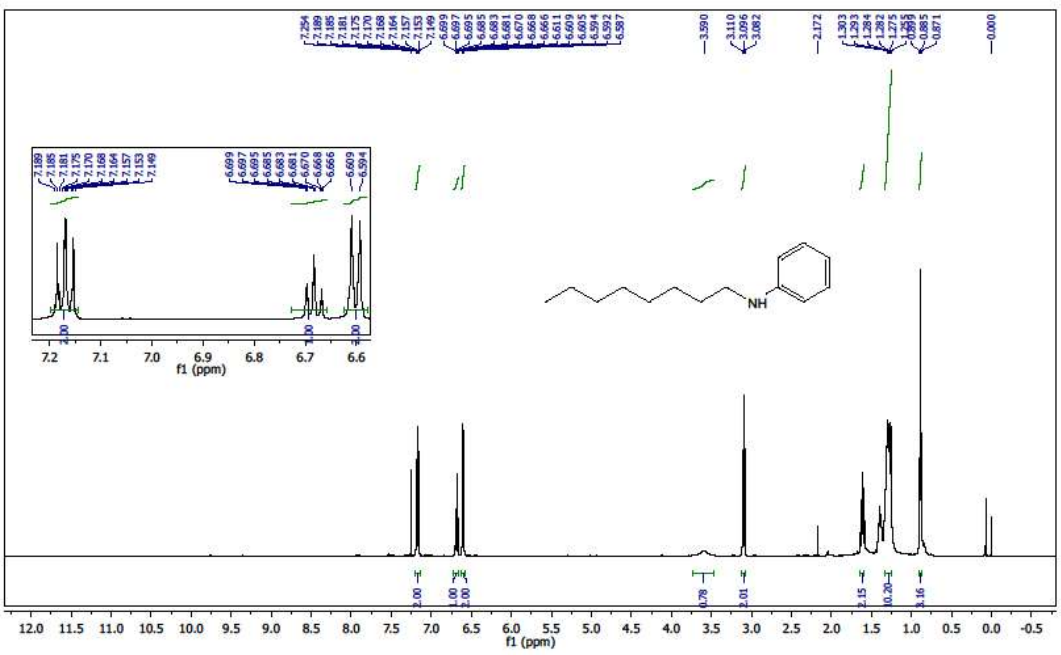
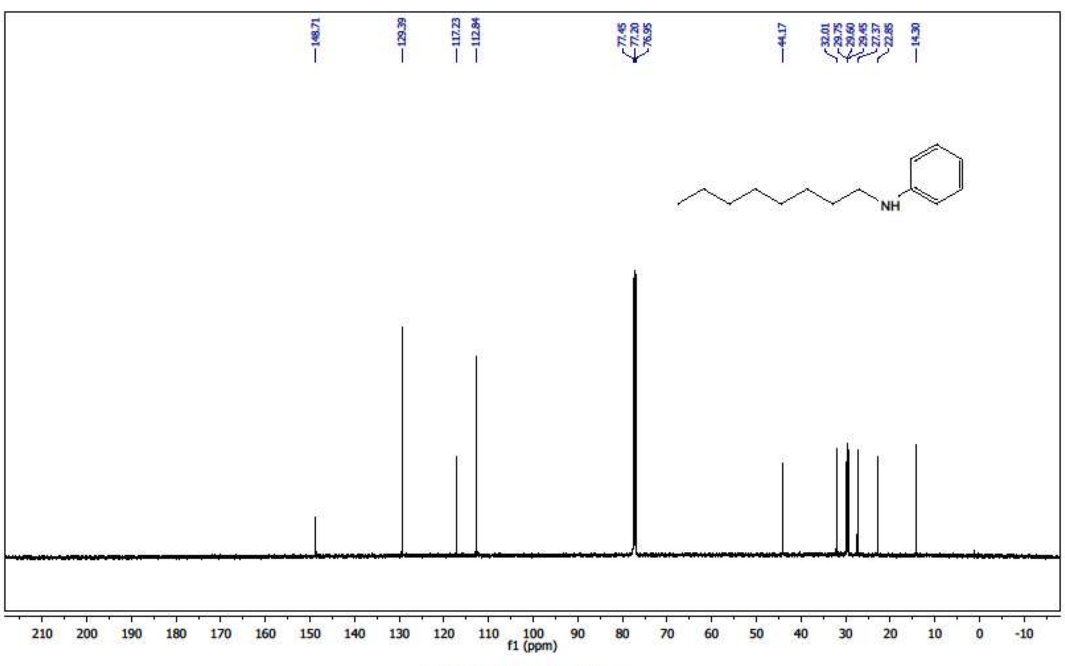


^{1}H NMR FOR N-octylaniline



^{13}C NMR FOR N-octylaniline

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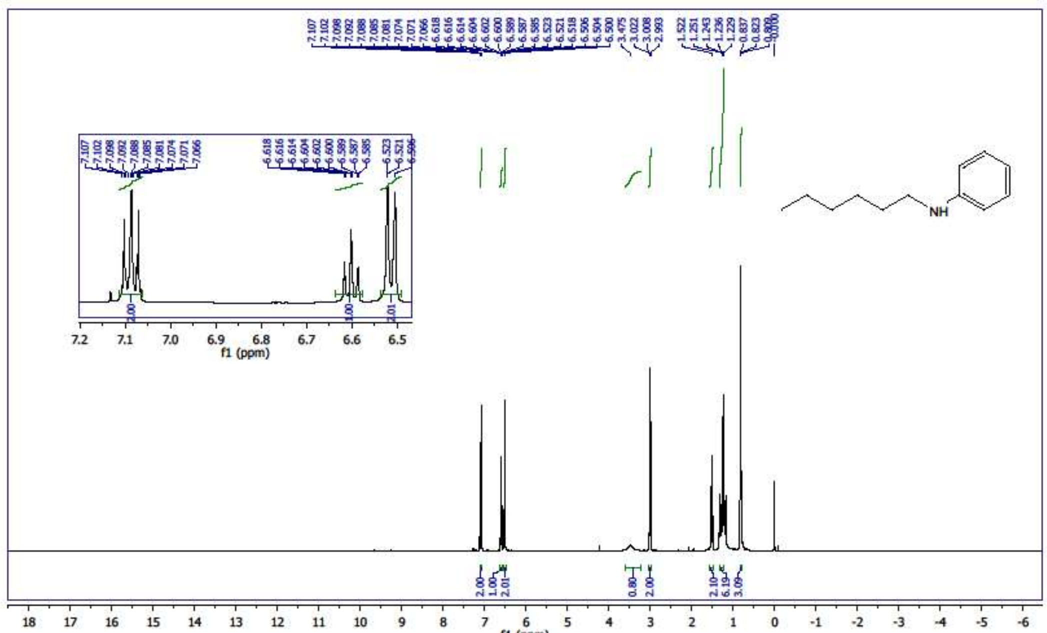
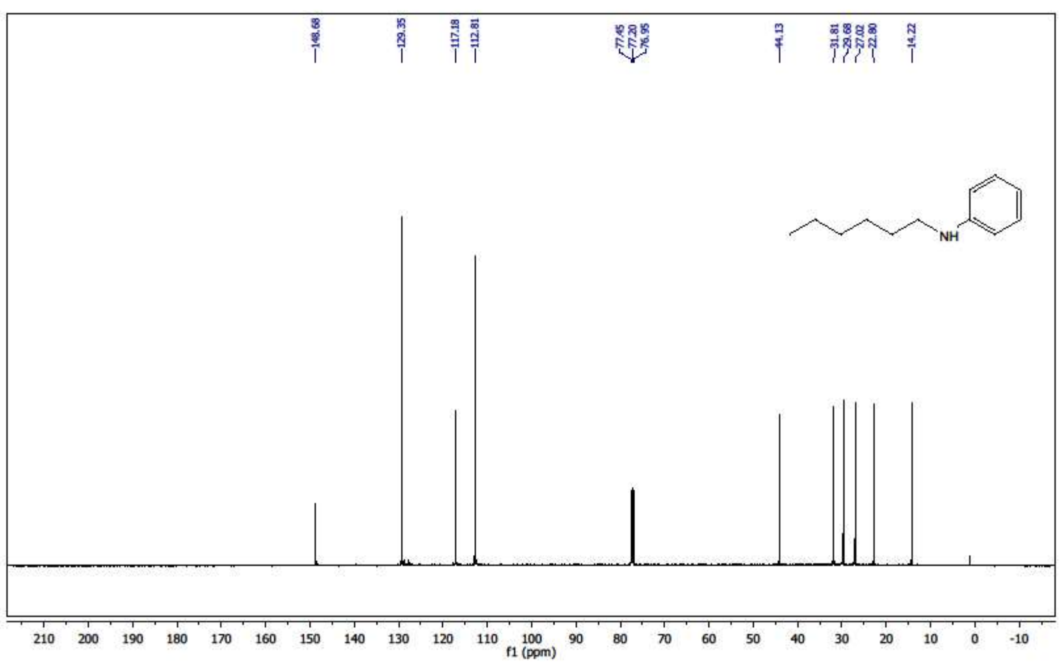
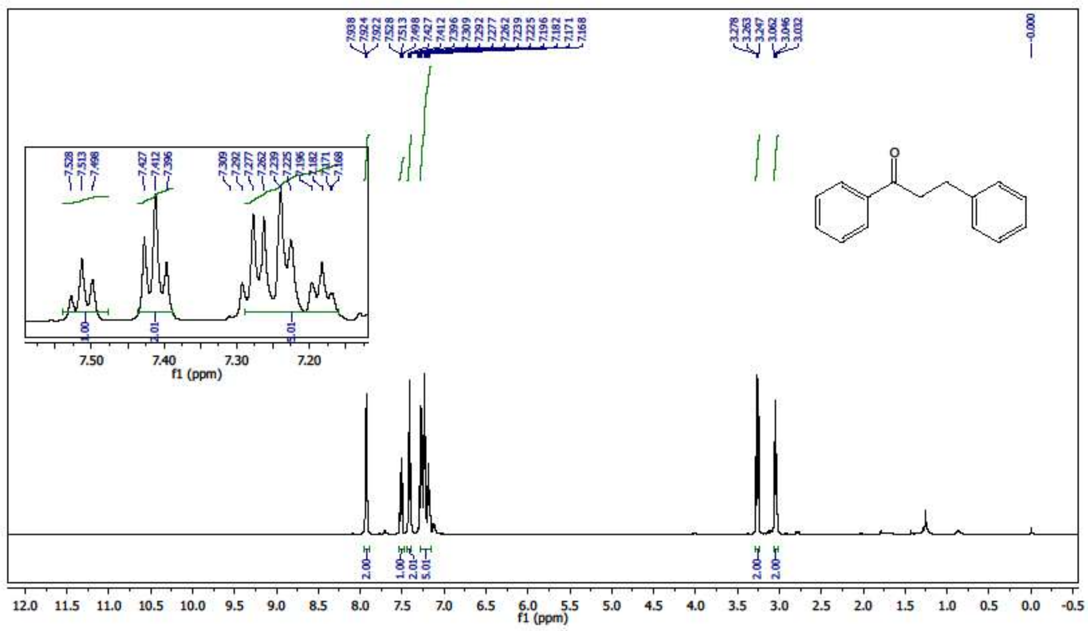


[1]H NMR FOR N-hexylaniline

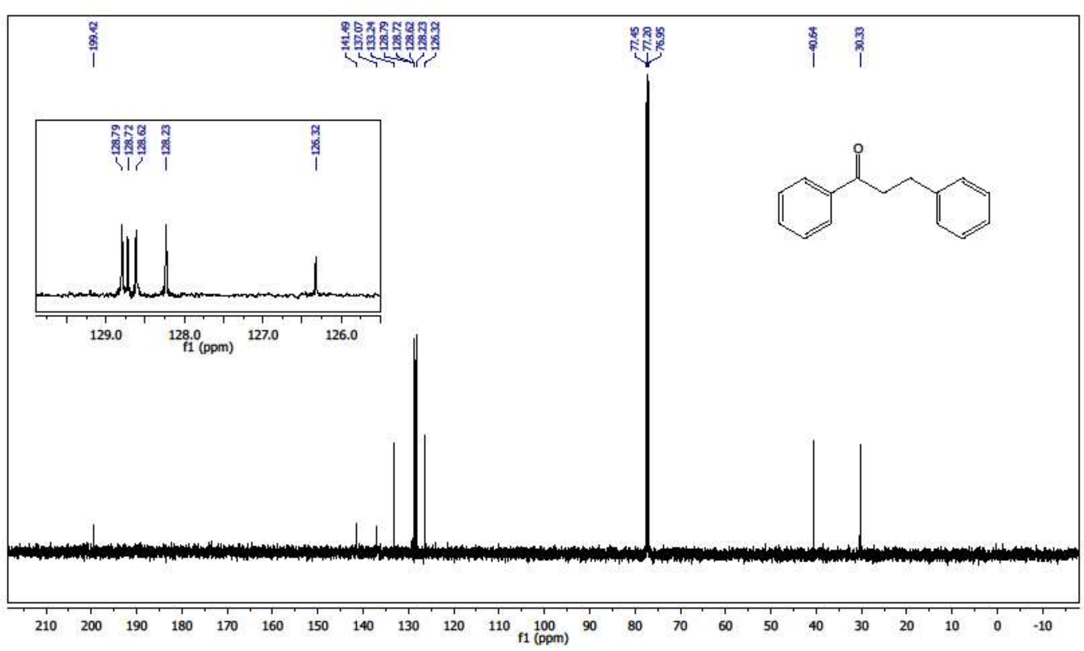


[13]C NMR FOR N-hexylaniline

5a

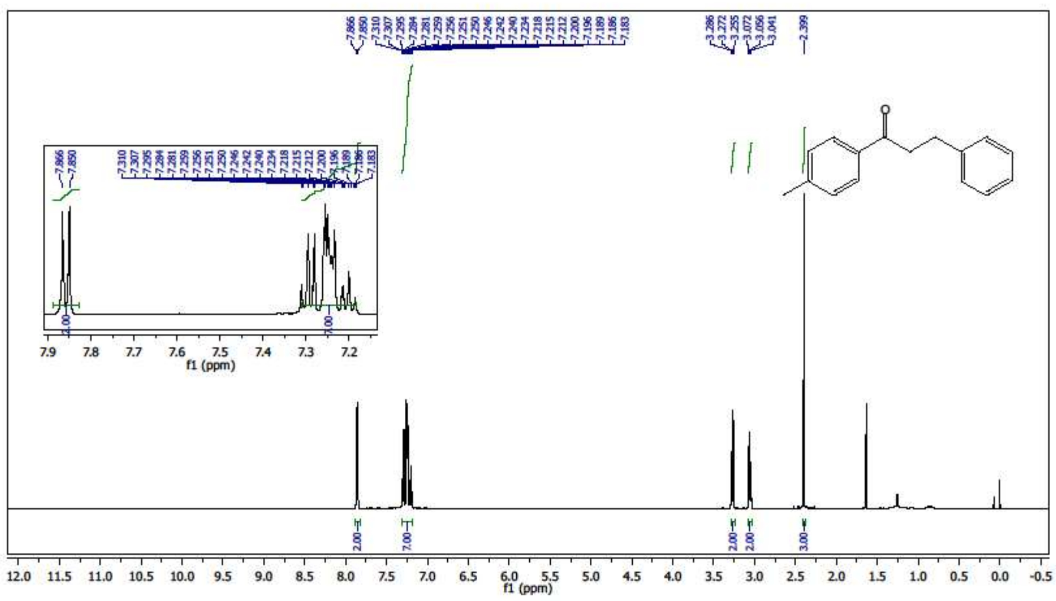


[1]H-NMR for 1,3-diphenylpropan-1-one

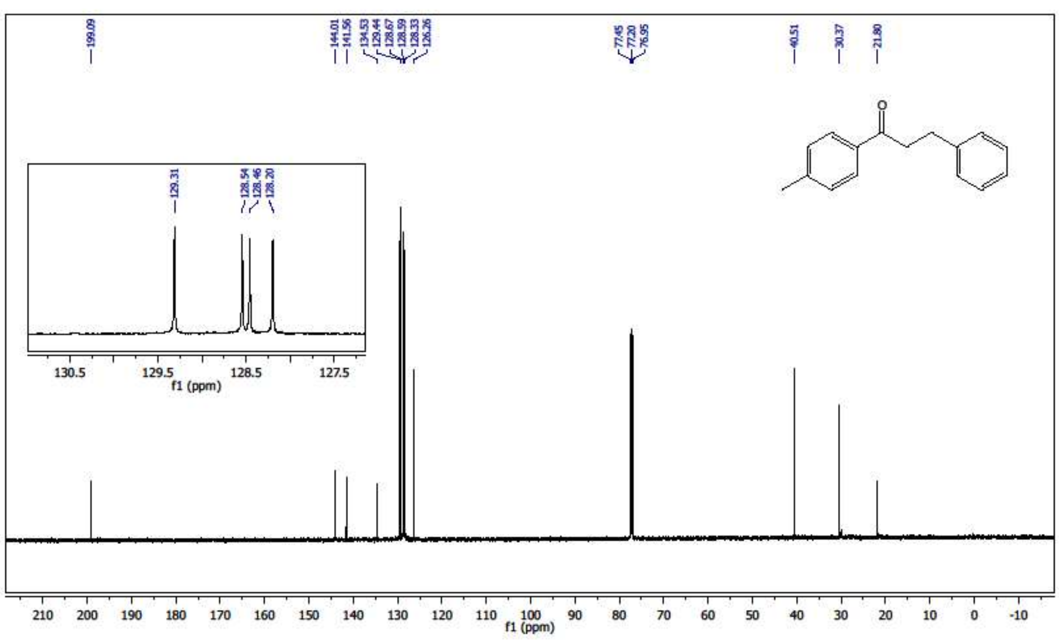


[13]C NMR for 1,3-diphenylpropan-1-one

5b



[1]H-NMR for 3-phenyl-1-(p-tolyl)propan-1-one



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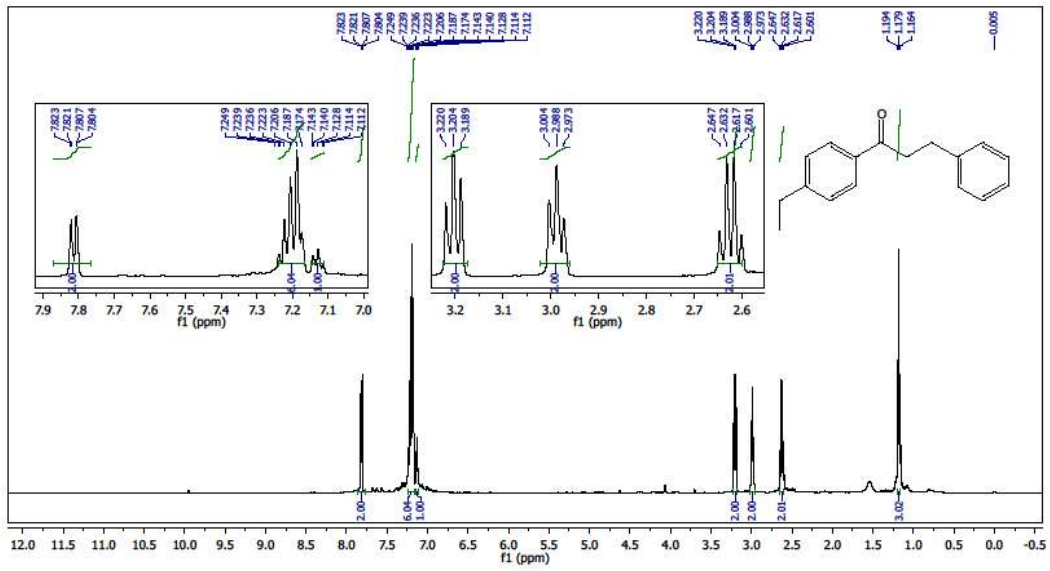
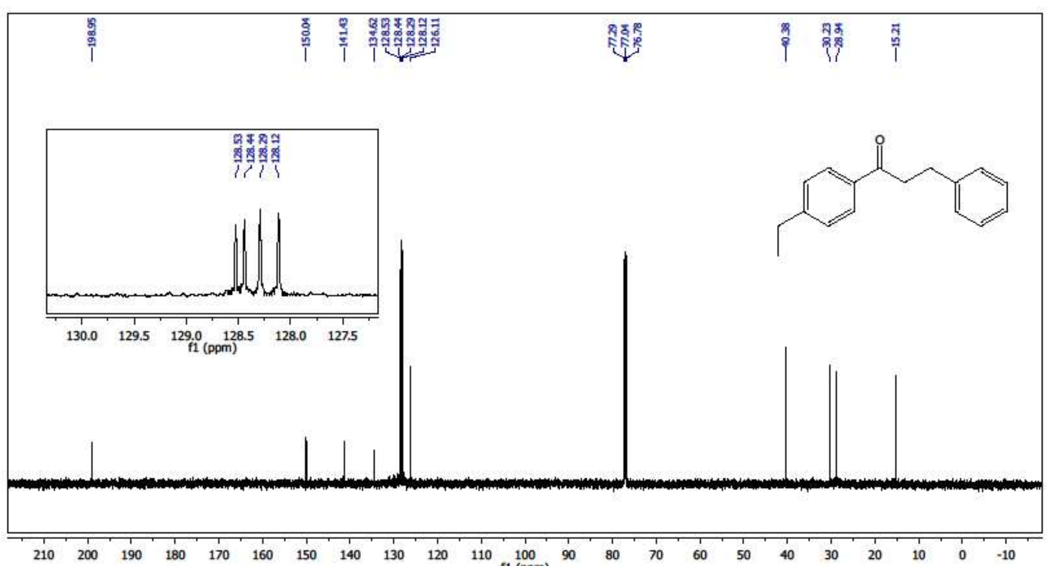
5c

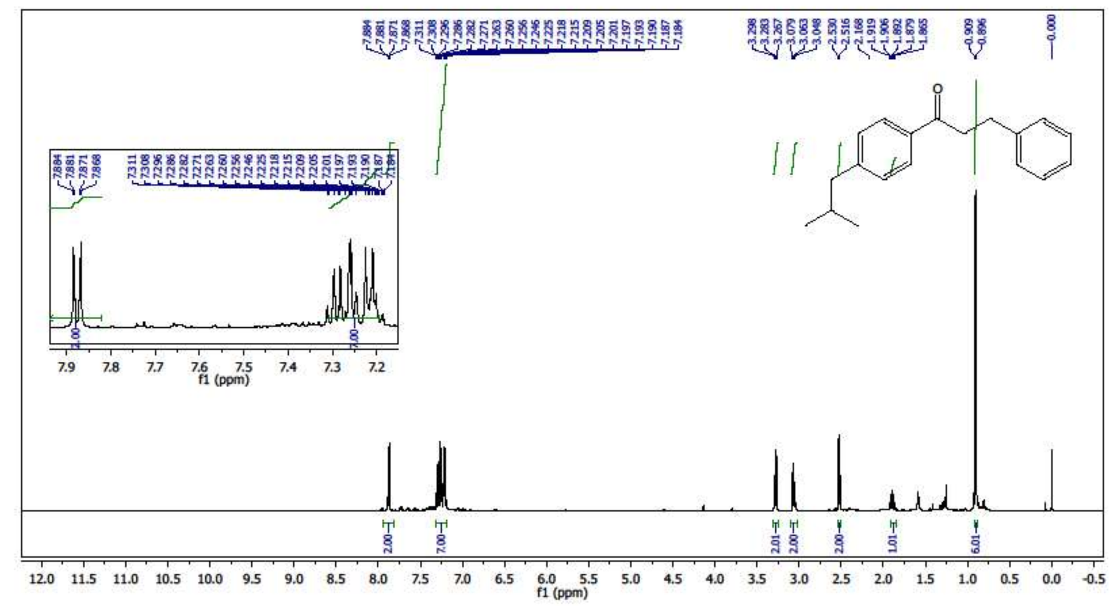


[1]H-NMR for 1-(4-ethylphenyl)-3-phenylpropan-1-one

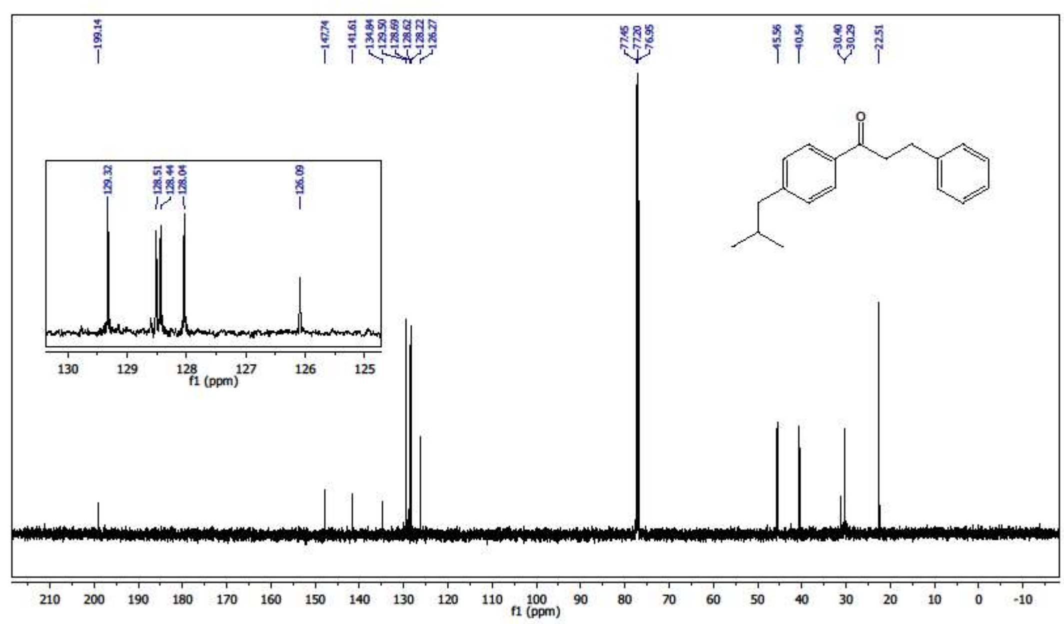


[13]C-NMR for 1-(4-ethylphenyl)-3-phenylpropan-1-one

5d

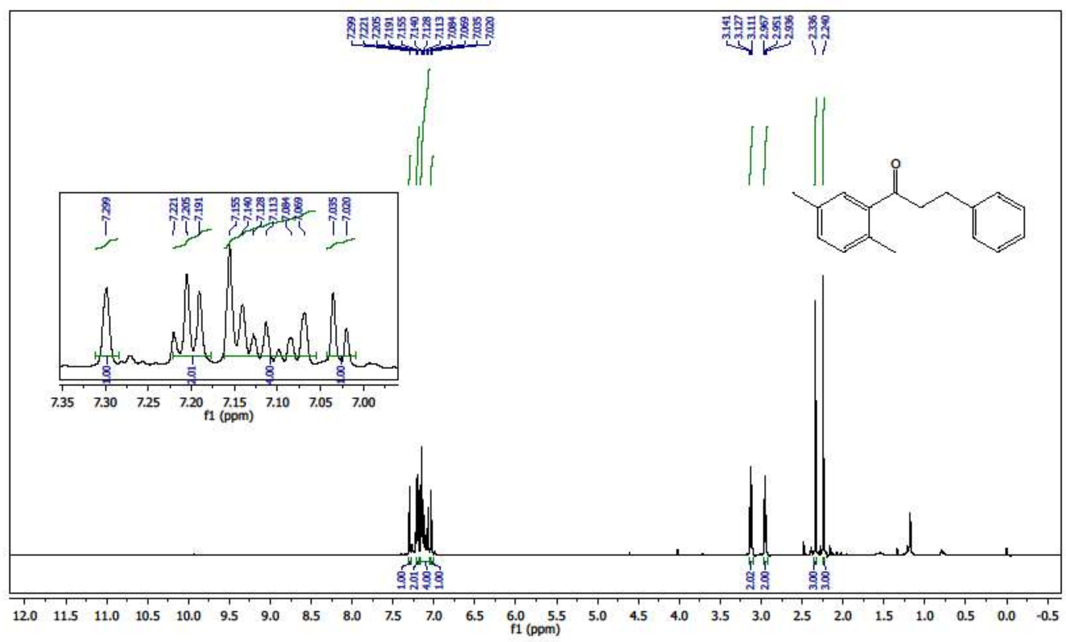


[1]H-NMR for 1-(4-isobutylphenyl)-3-phenylpropan-1-one

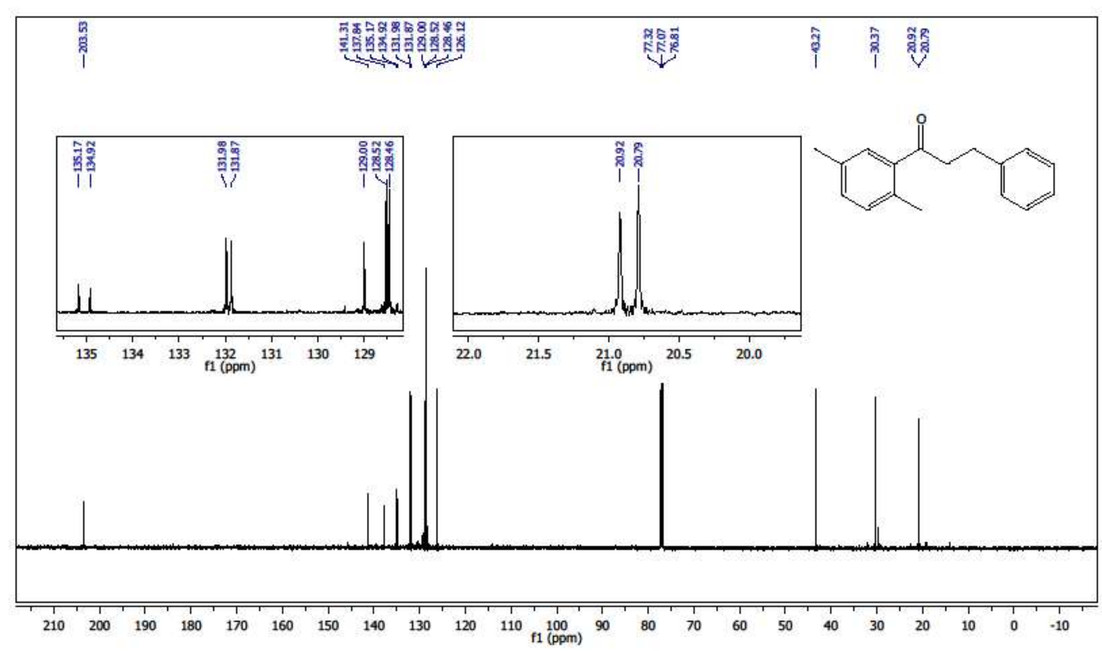


[13]C NMR for 1-(4-isobutylphenyl)-3-phenylpropan-1-one

5e

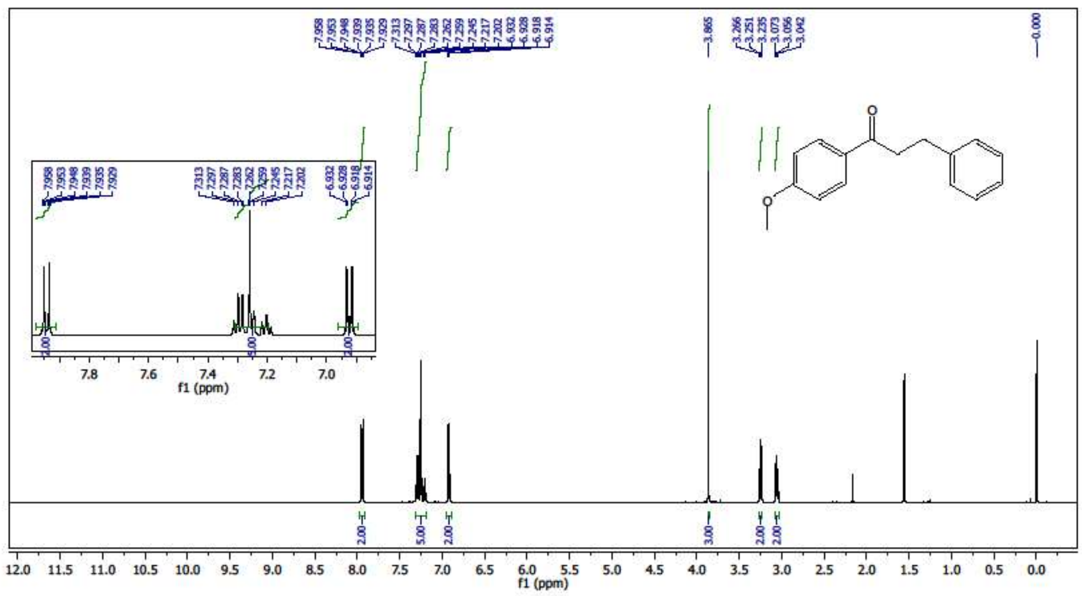


1H-NMR for 1-(2,5-dimethylphenyl)-3-phenylpropan-1-one

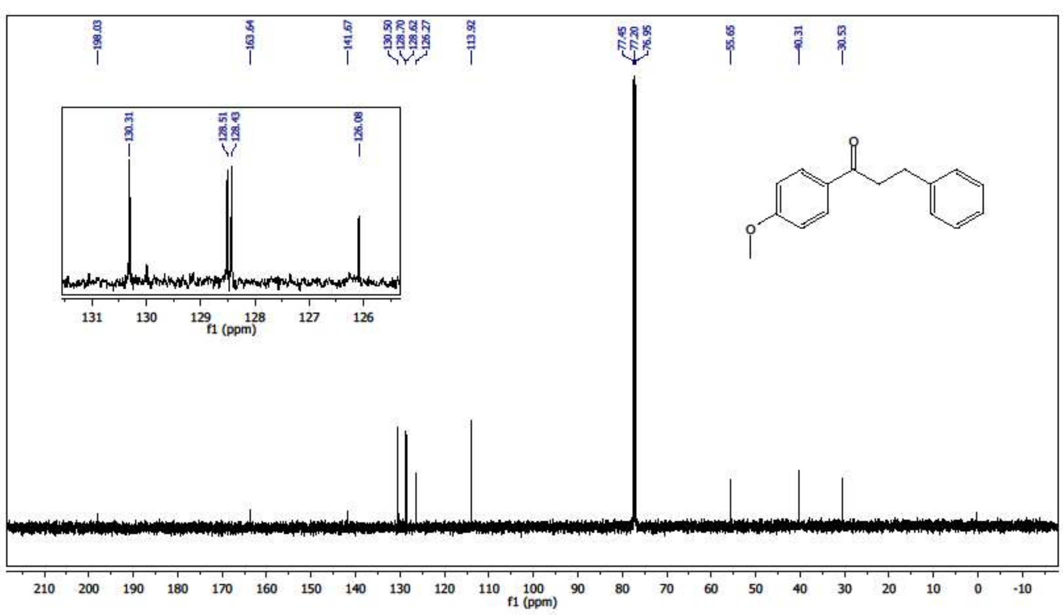


^{13}C-NMR for 1-(2,5-dimethylphenyl)-3-phenylpropan-1-one

5f

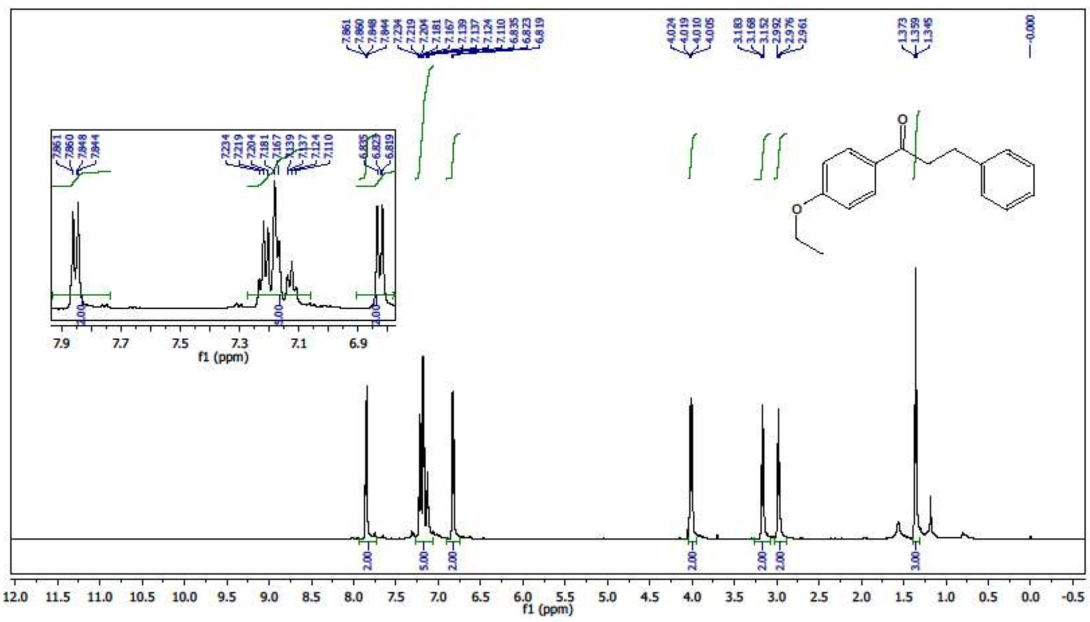


[1]H-NMR for 1-(4-methoxyphenyl)-3-phenylpropan-1-one

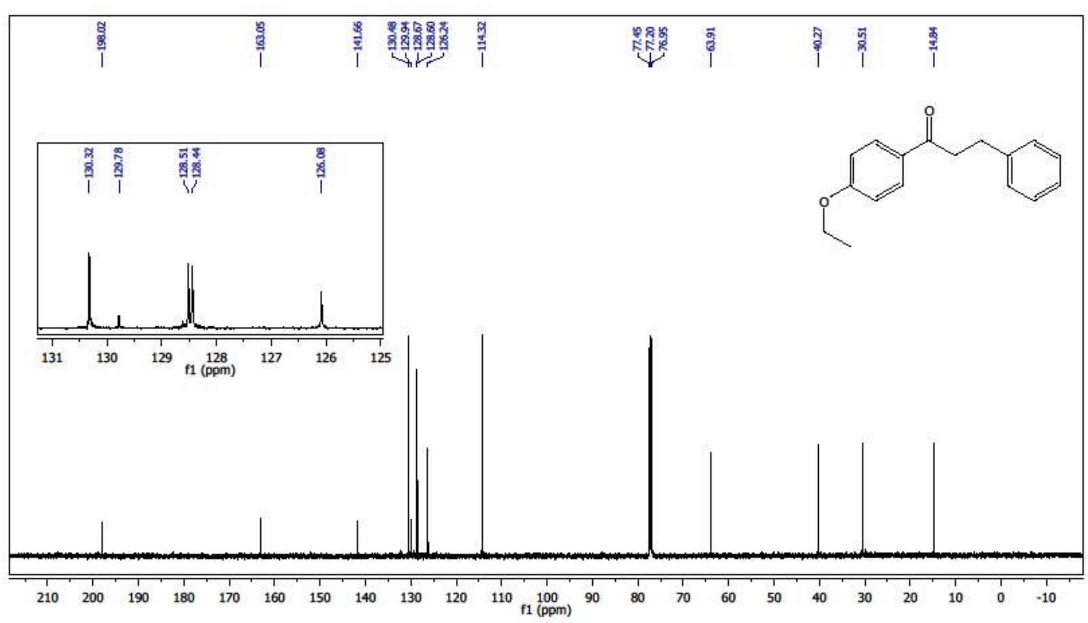


[13]C NMR for 1-(4-methoxyphenyl)-3-phenylpropan-1-one

5g

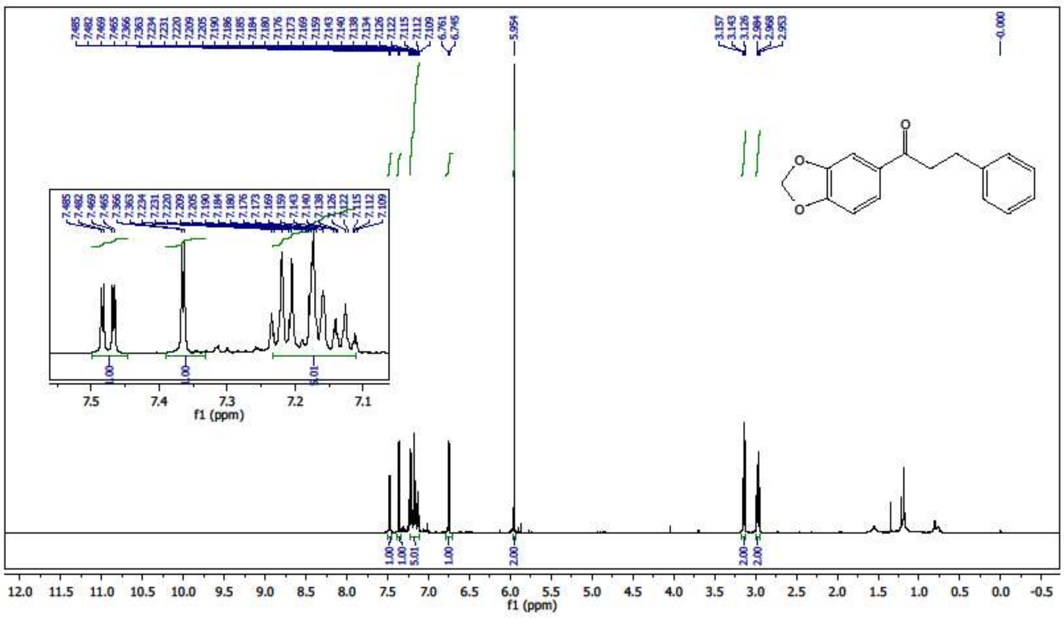


[1]H-NMR for 1-(4-ethoxyphenyl)-3-phenylpropan-1-one

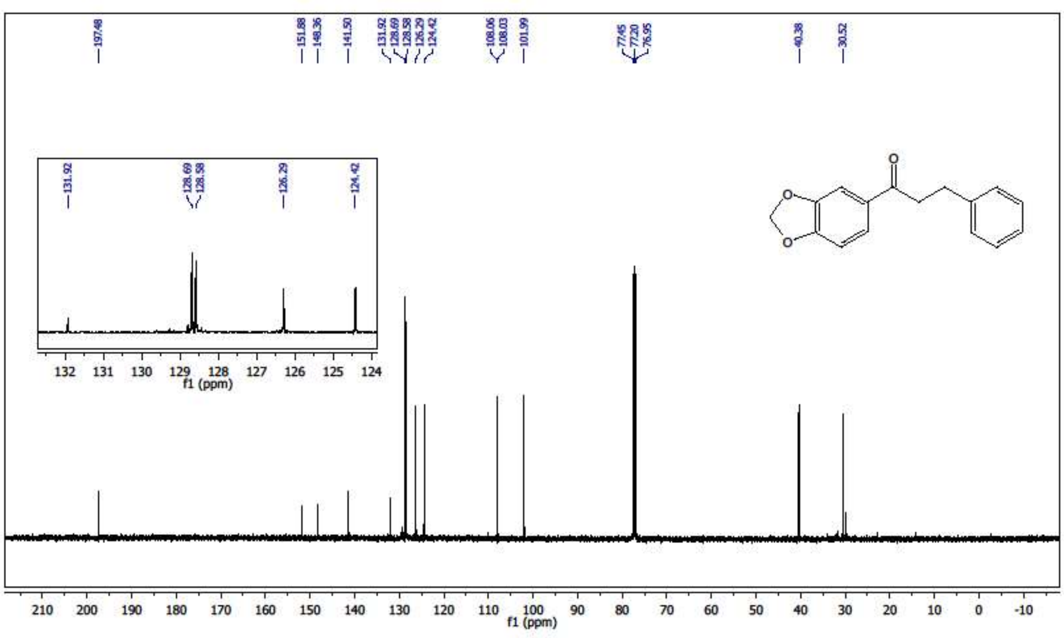


[13]C-NMR for 1-(4-ethoxyphenyl)-3-phenylpropan-1-one

5h

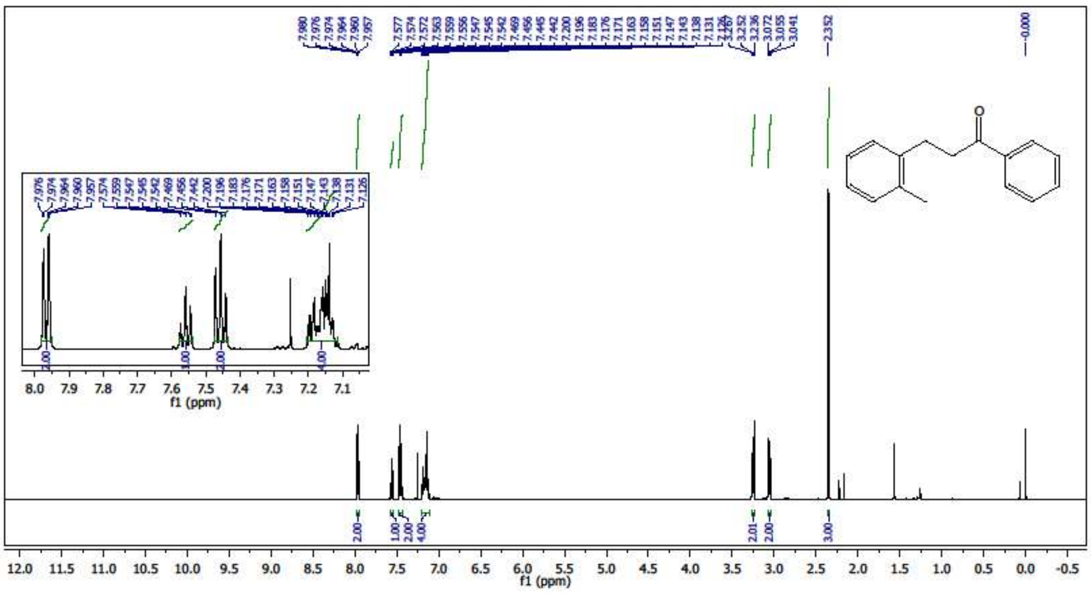


[1]H-NMR for 1-(benzo[d][1,3]dioxol-5-yl)-3-phenylpropan-1-one

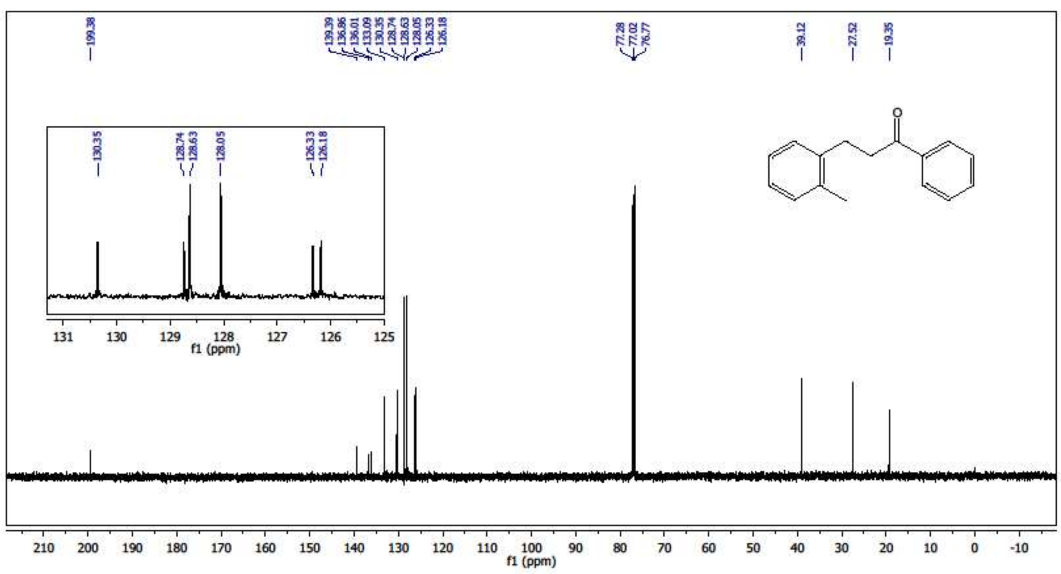


[13]C-NMR for 1-(benzo[d][1,3]dioxol-5-yl)-3-phenylpropan-1-one

5i

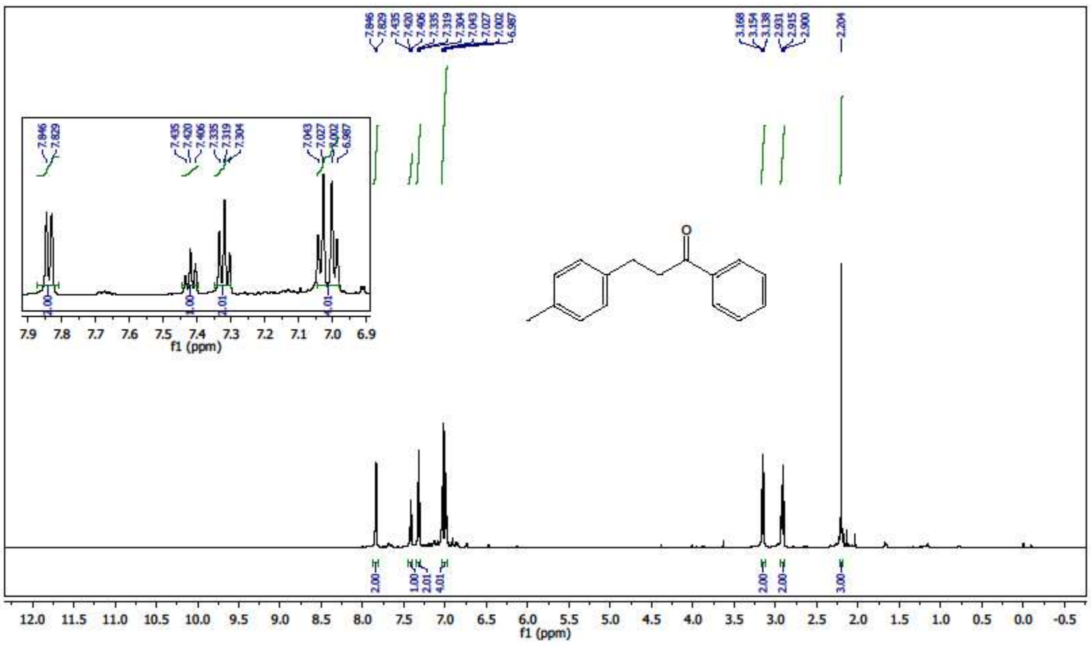


^{1}H-NMR for 1-phenyl-3-(o-tolyl)propan-1-one

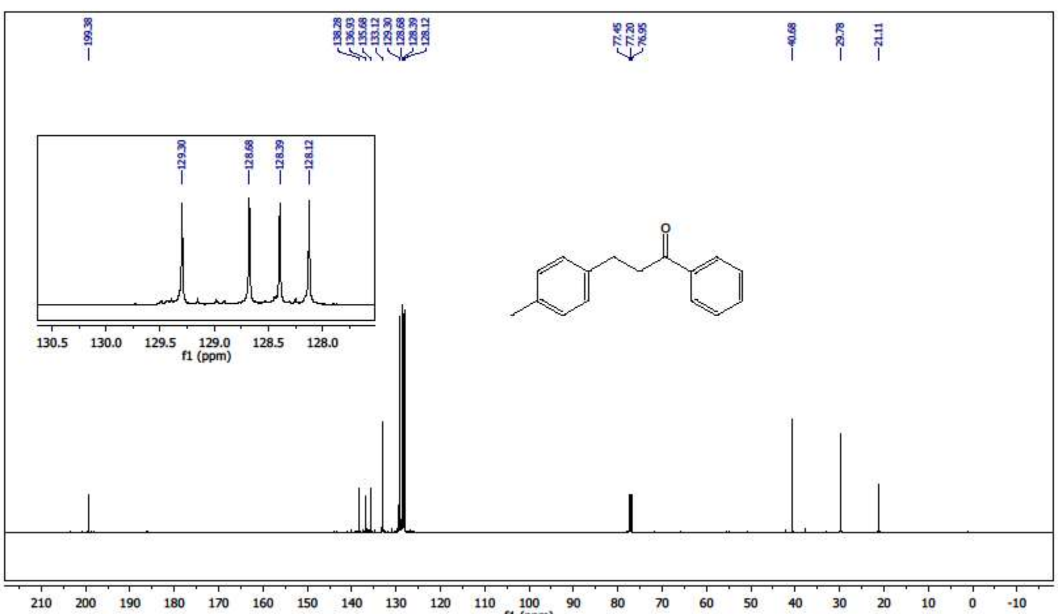


^{13}C NMR for 1-phenyl-3-(o-tolyl)propan-1-one

5j

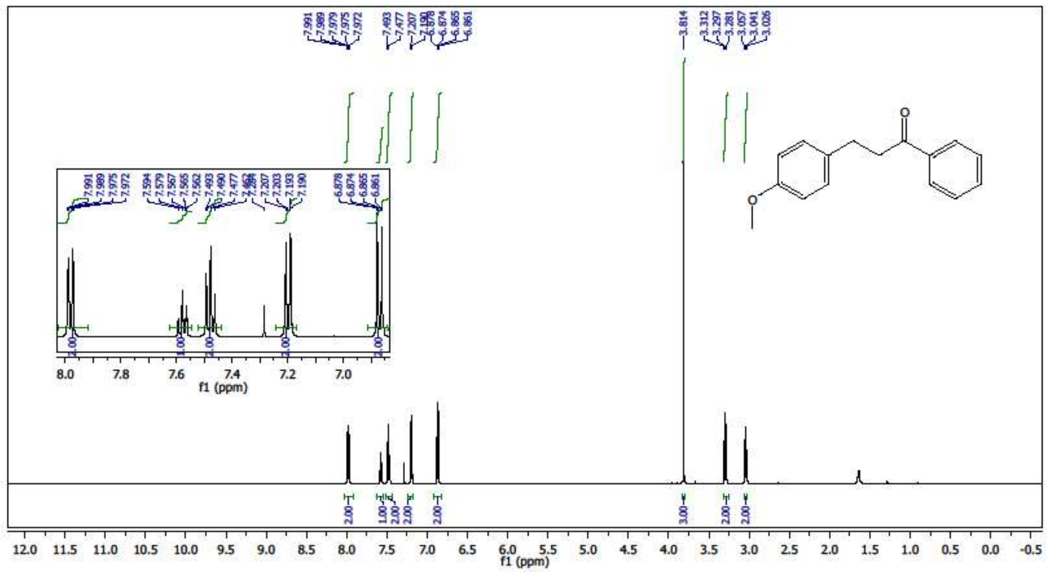


[1]H NMR FOR 1-phenyl-3-(p-tolyl)propan-1-one

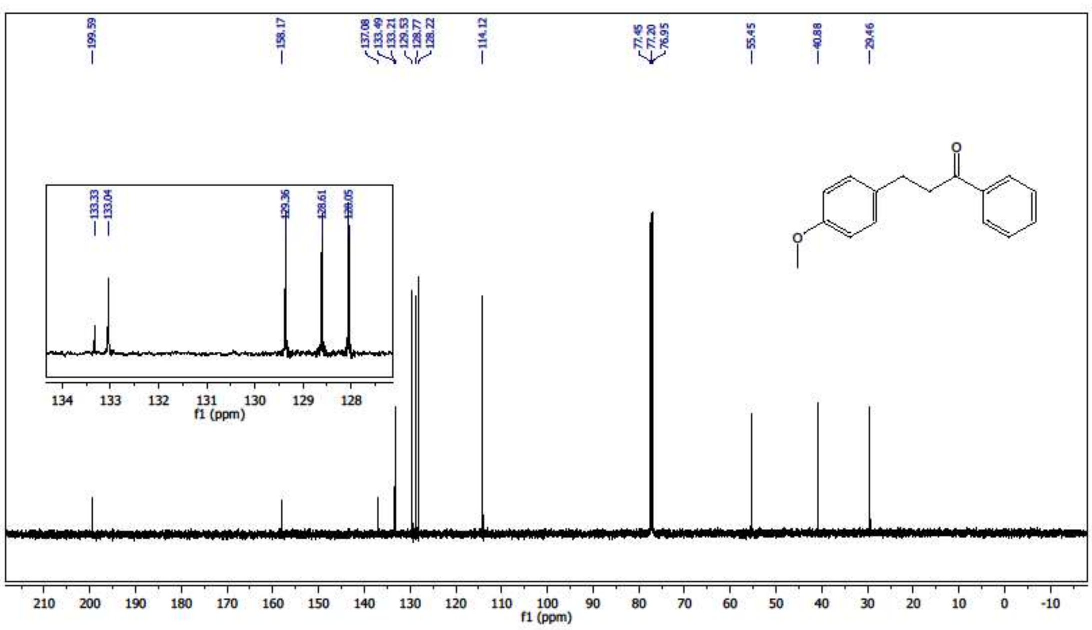


[13]C NMR FOR 1-phenyl-3-(p-tolyl)propan-1-one

5k

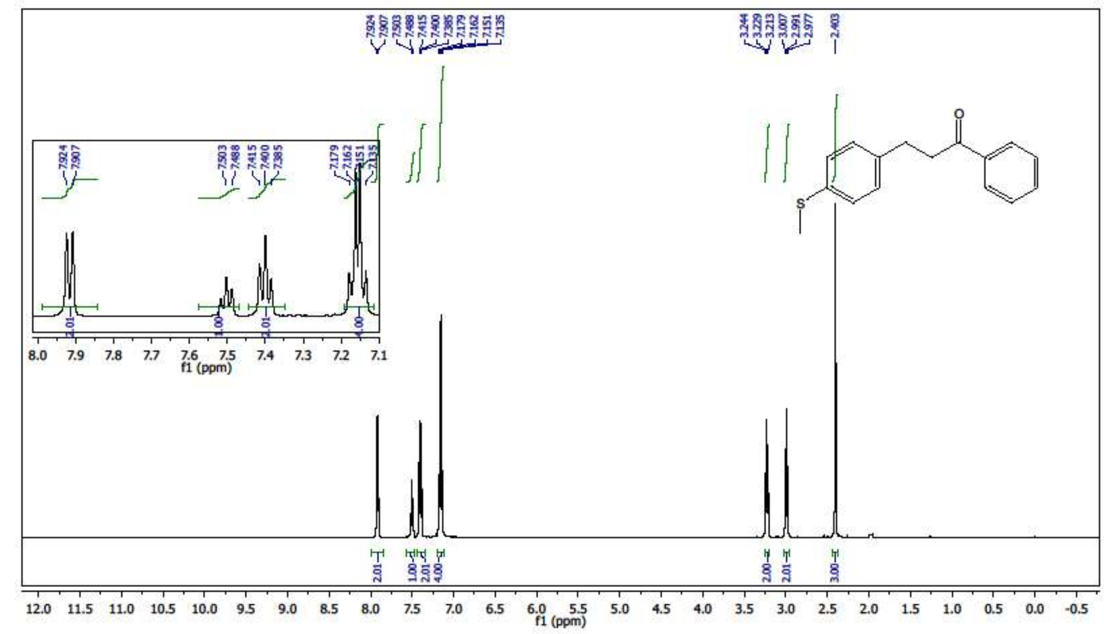


^{1}H-NMR for 3-(4-methoxyphenyl)-1-phenylpropan-1-one

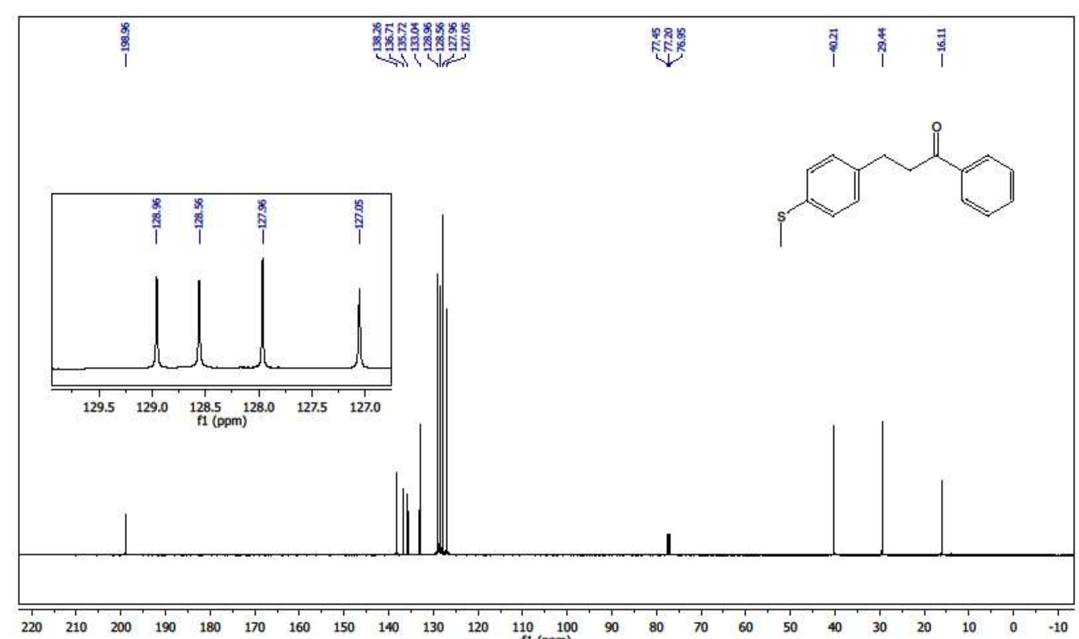


^{13}C NMR for 3-(4-methoxyphenyl)-1-phenylpropan-1-one

5l

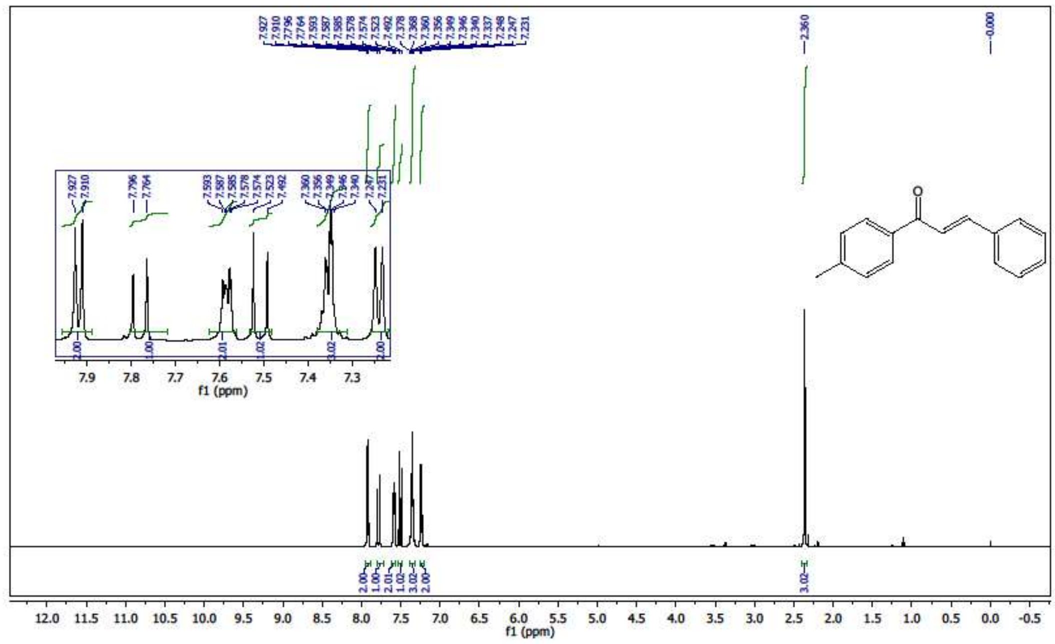


¹H NMR FOR 3-(4-(methylthio)phenyl)-1-phenylpropan-1-one

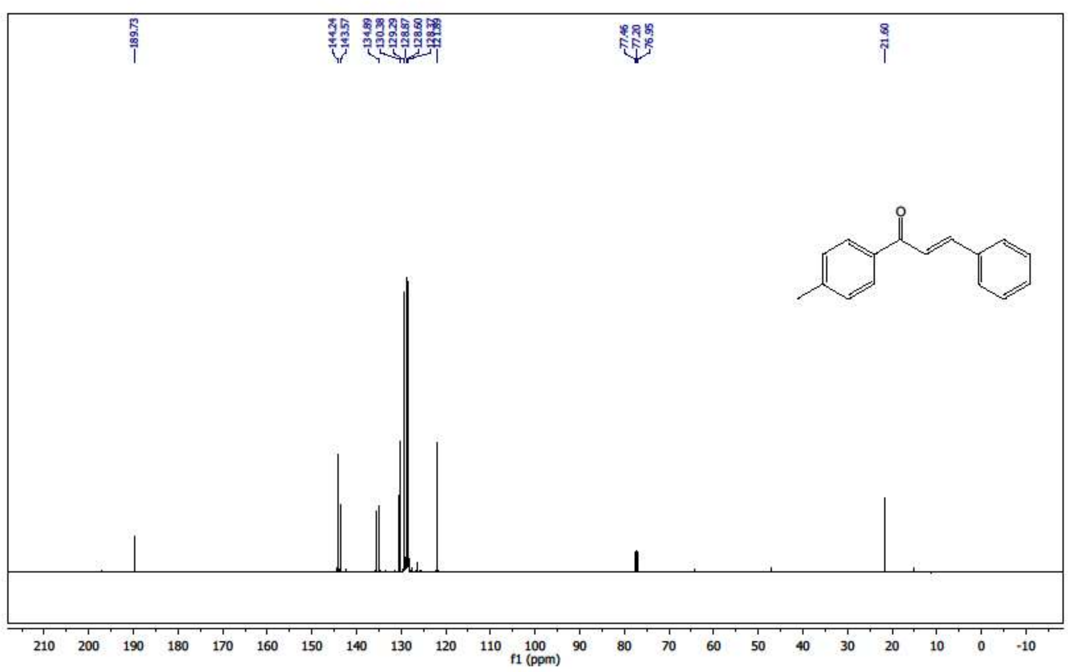


¹³C NMR FOR 3-(4-(methylthio)phenyl)-1-phenylpropan-1-one

XX

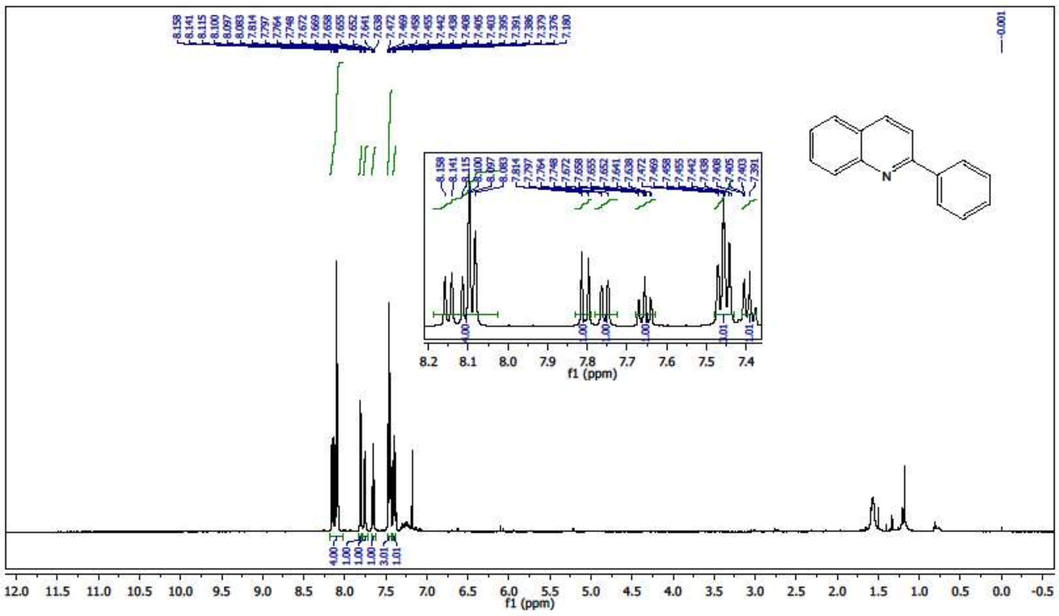


^{1}H NMR FOR (E)-3-phenyl-1-(p-tolyl)prop-2-en-1-one

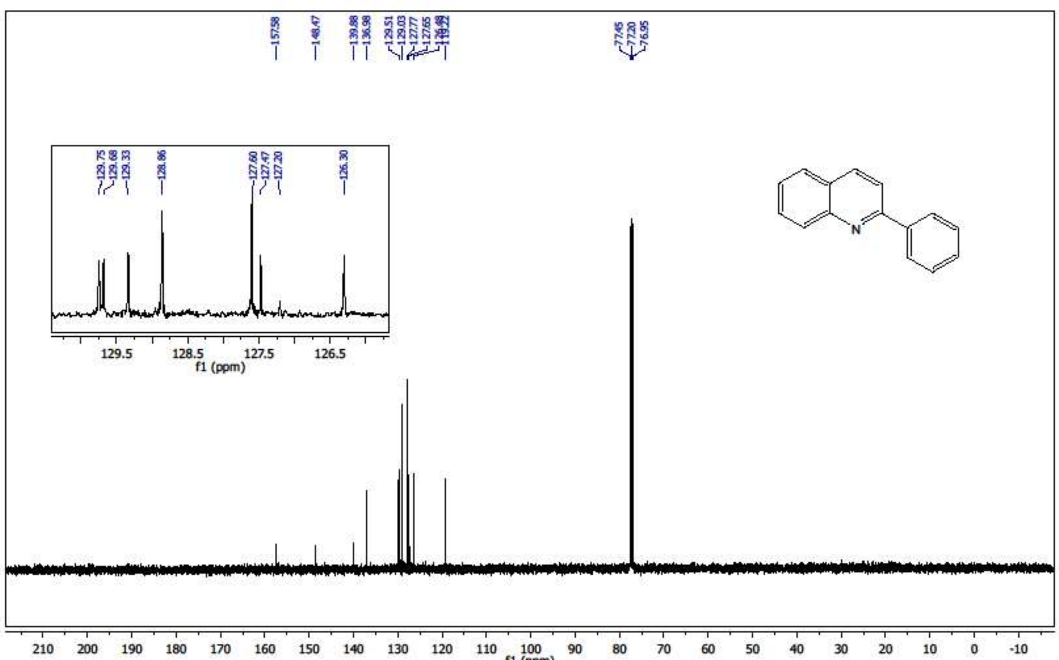


^{1}H NMR FOR (E)-3-phenyl-1-(p-tolyl)prop-2-en-1-one

8a

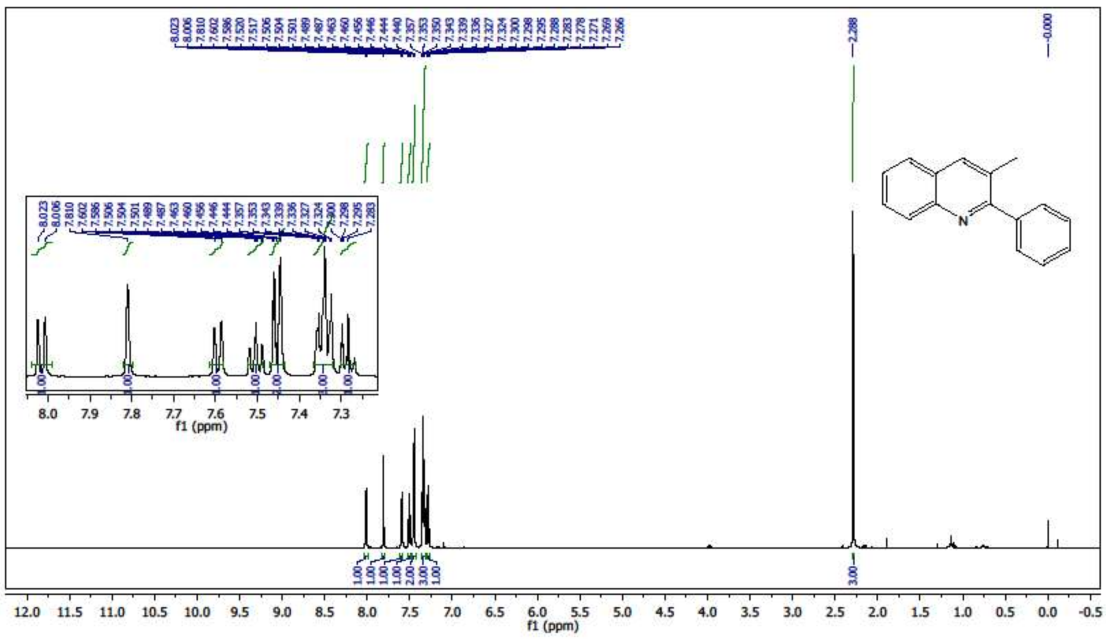


[1]H-NMR for 2-phenylquinoline

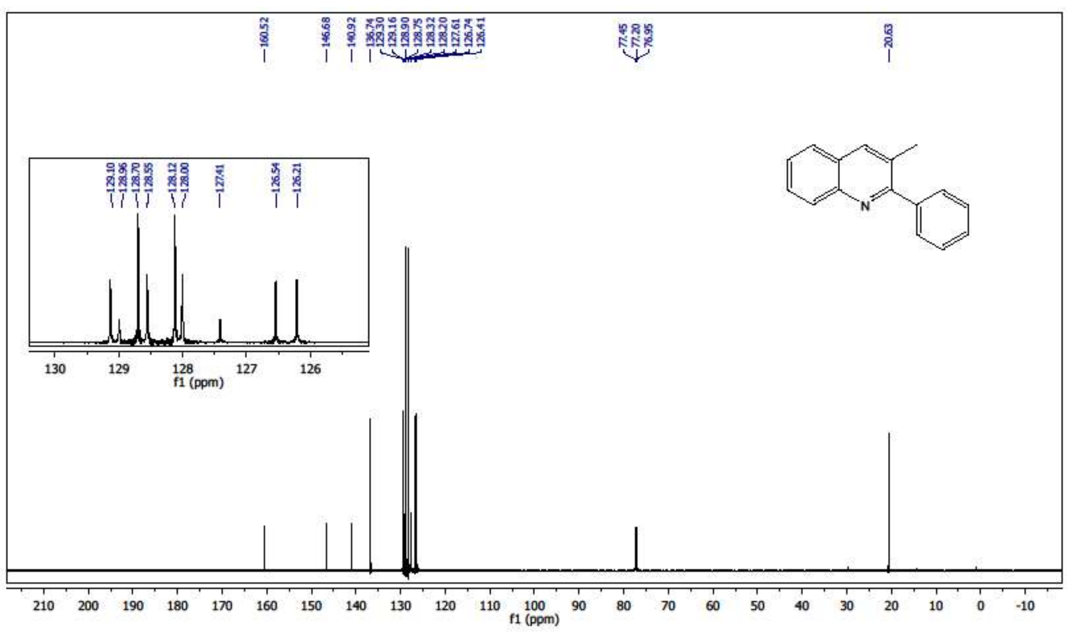


[13]C NMR for 2-phenylquinoline

8b

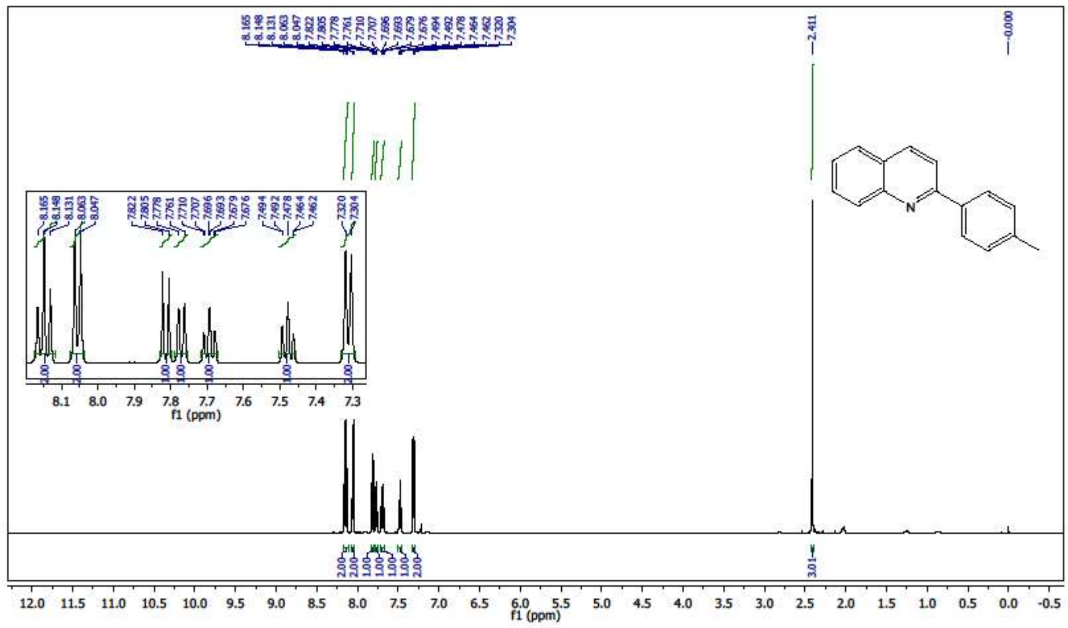


[1]H-NMR for 3-methyl-2-phenylquinoline

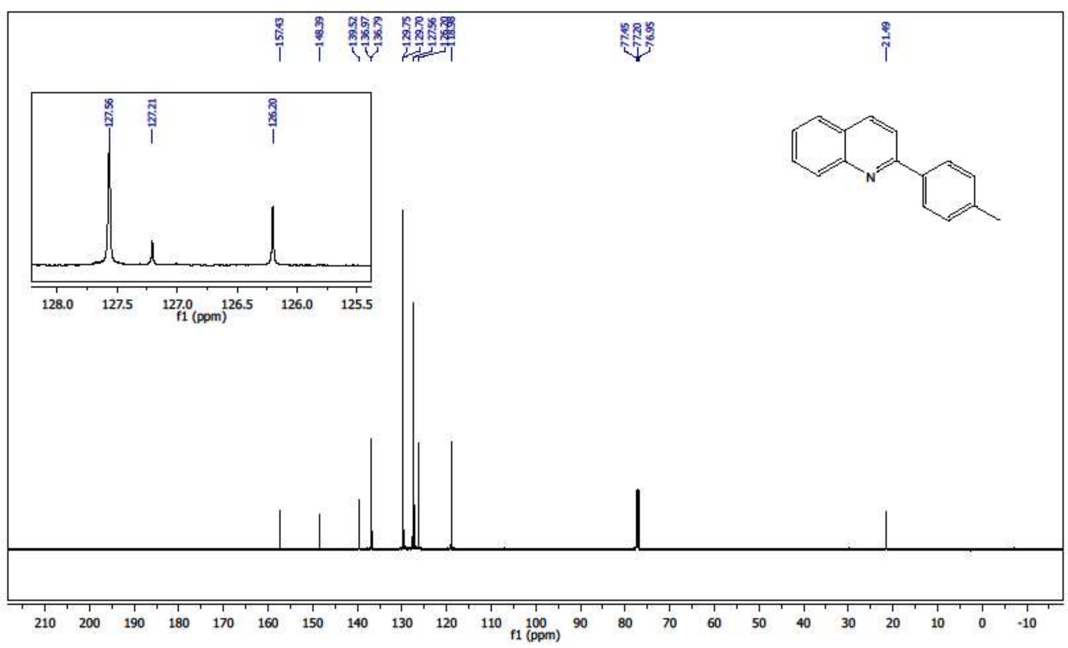


[13]C NMR for 3-methyl-2-phenylquinoline

8c

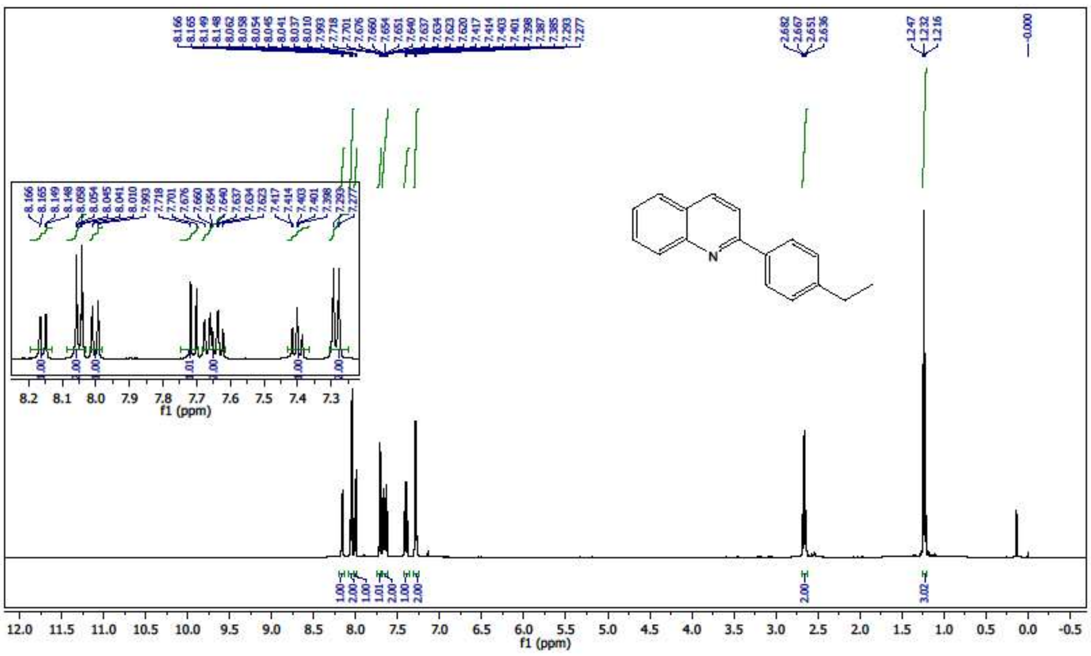


^{1}H NMR FOR 2-(p-tolyl)quinoline

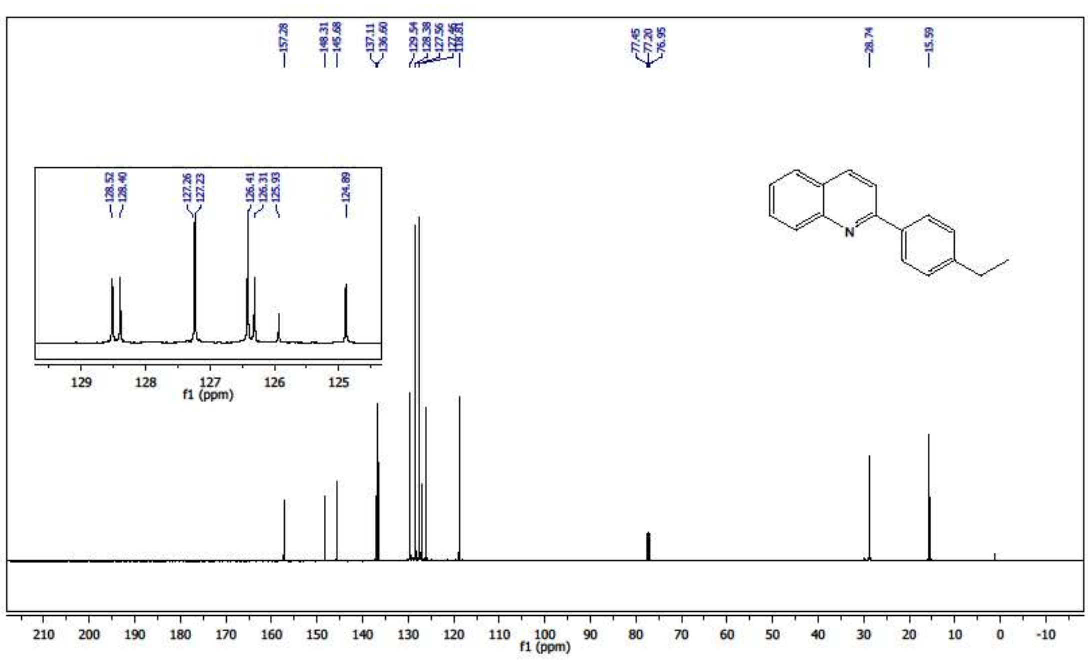


^{13}C NMR FOR 2-(p-tolyl)quinoline

8d

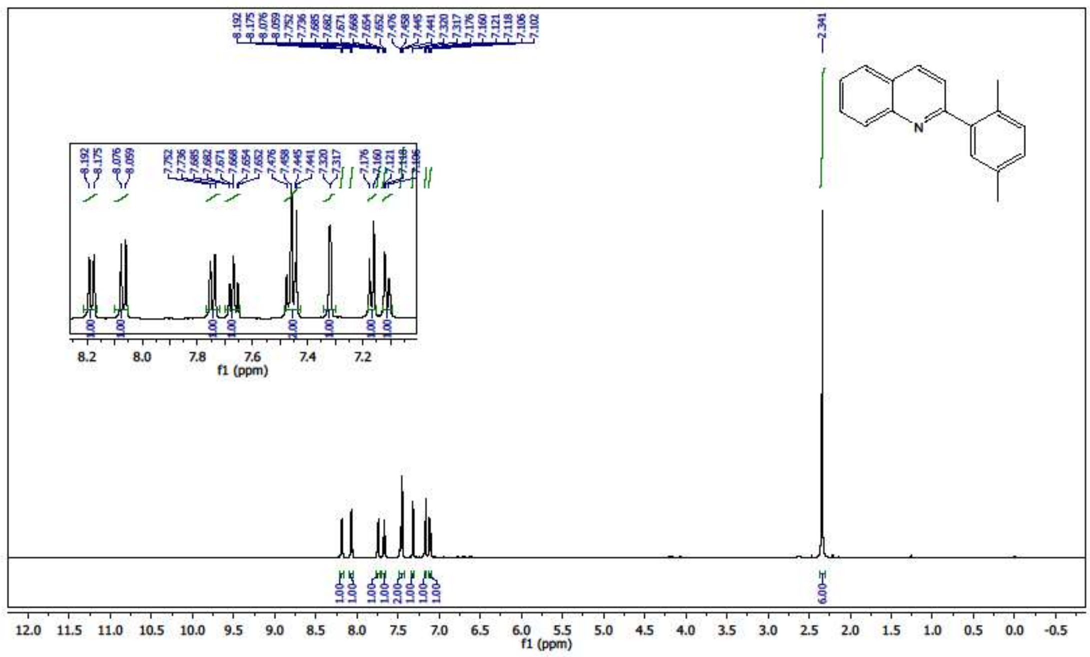


^{1}H NMR FOR 2-(4-ethylphenyl)quinoline

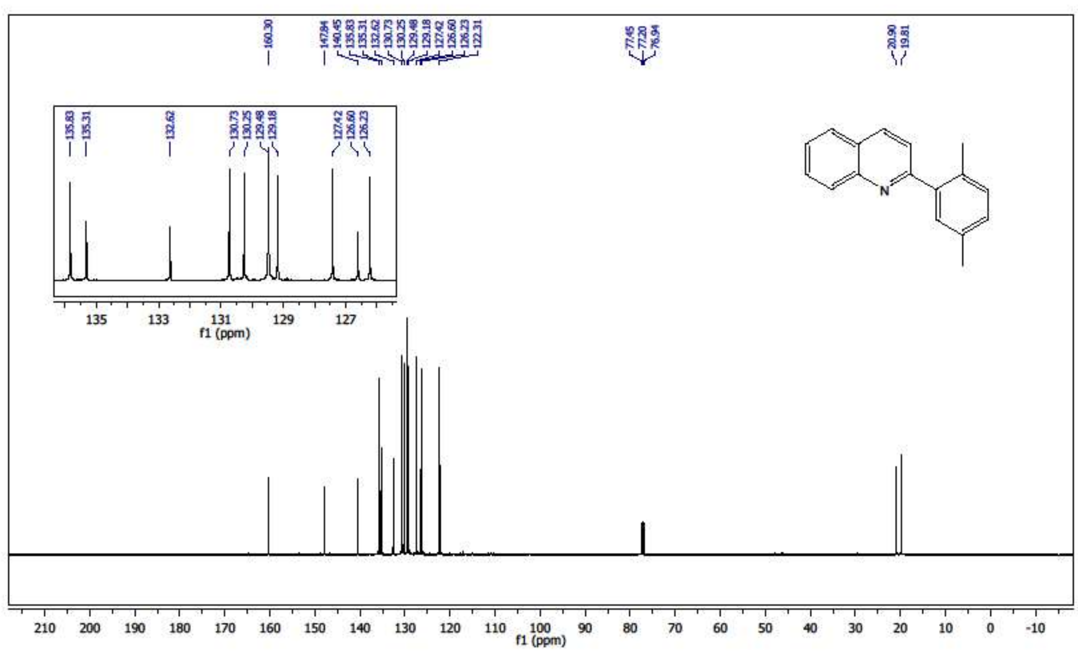


^{13}C NMR for 2-(4-ethylphenyl)quinoline

8e

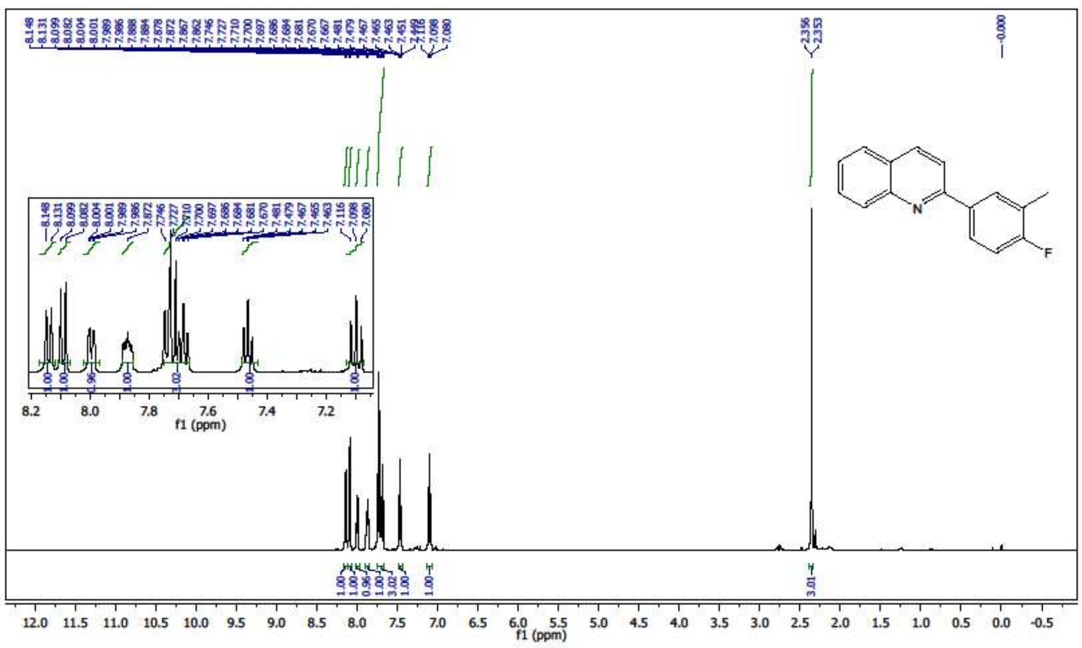


^{1}H NMR FOR 2-(2,5-dimethylphenyl)quinoline

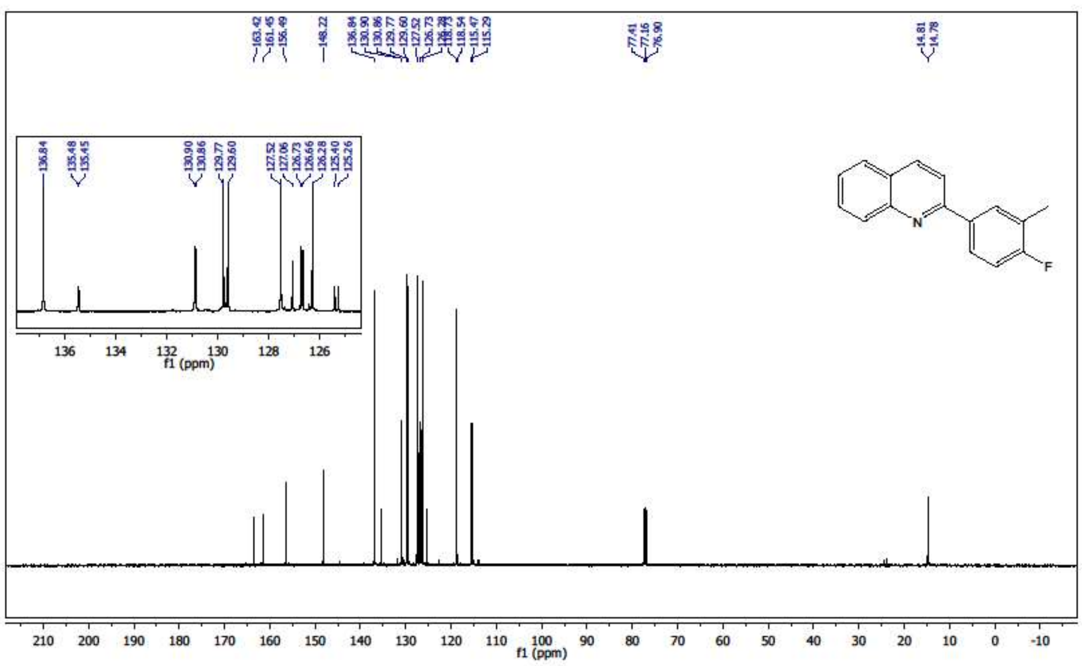


^{13}C NMR FOR 2-(2,5-dimethylphenyl)quinoline

8f

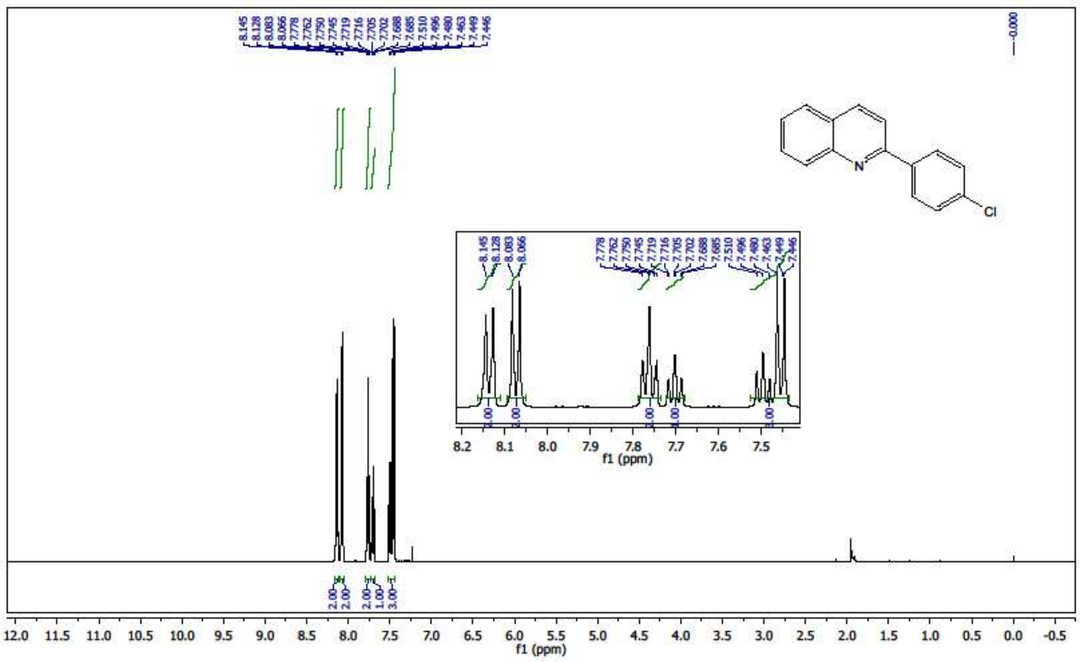


[1]H NMR FOR 2-(4-fluoro-3-methylphenyl)quinoline

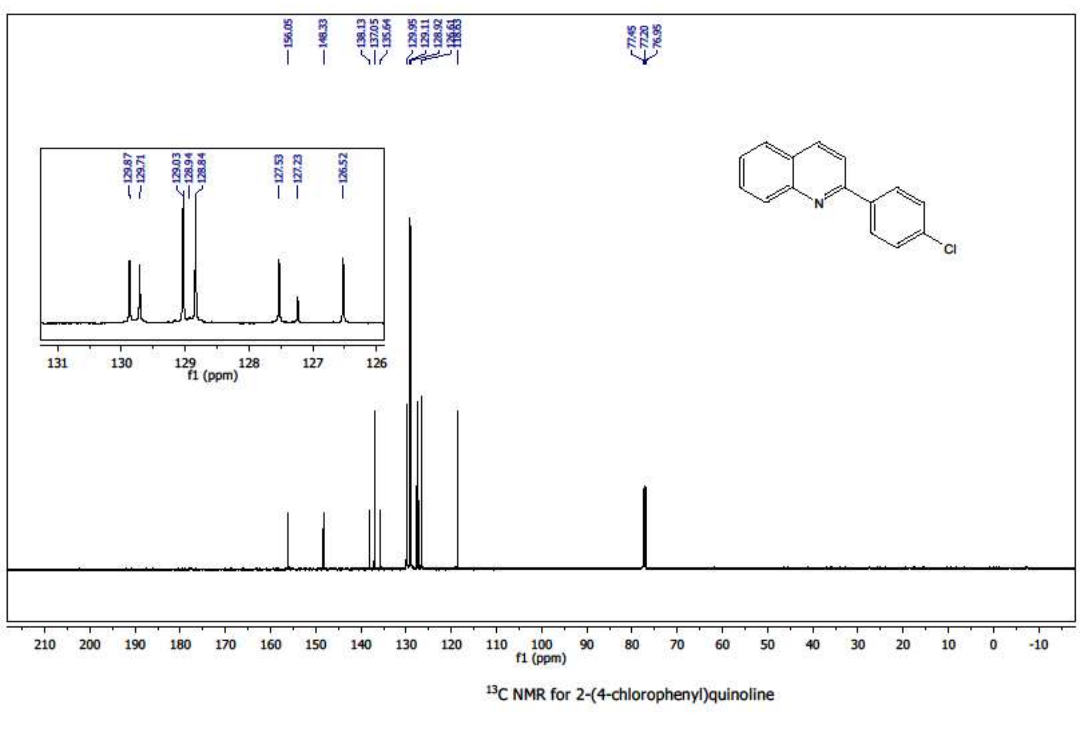


[13]C NMR FOR 2-(4-fluoro-3-methylphenyl)quinoline

8g

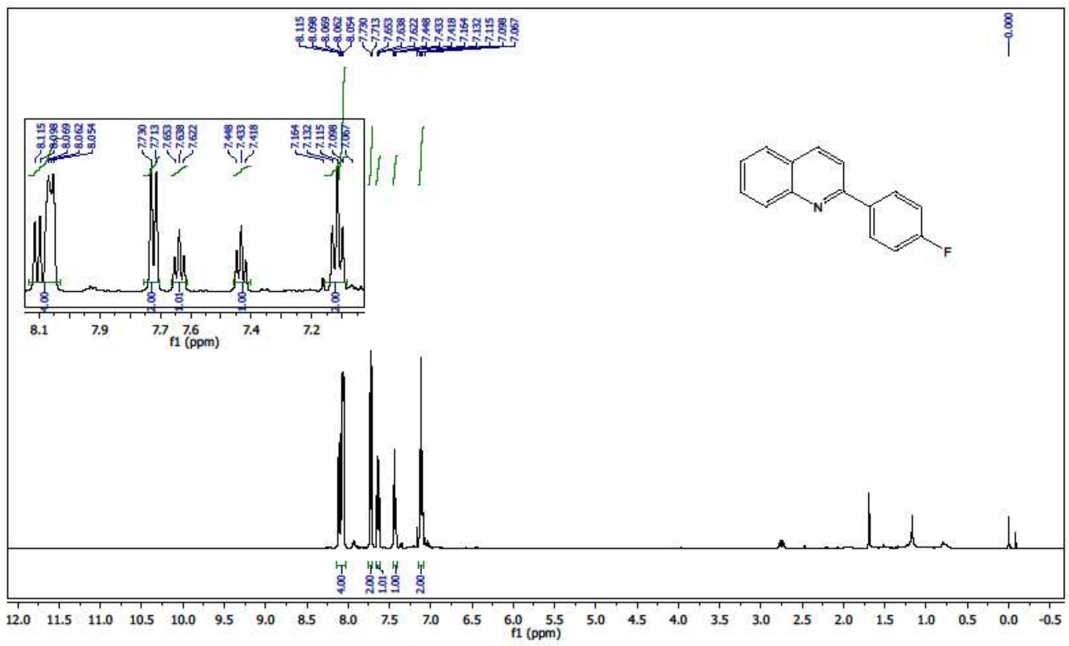


^{1}H NMR for 2-(4-chlorophenyl)quinoline

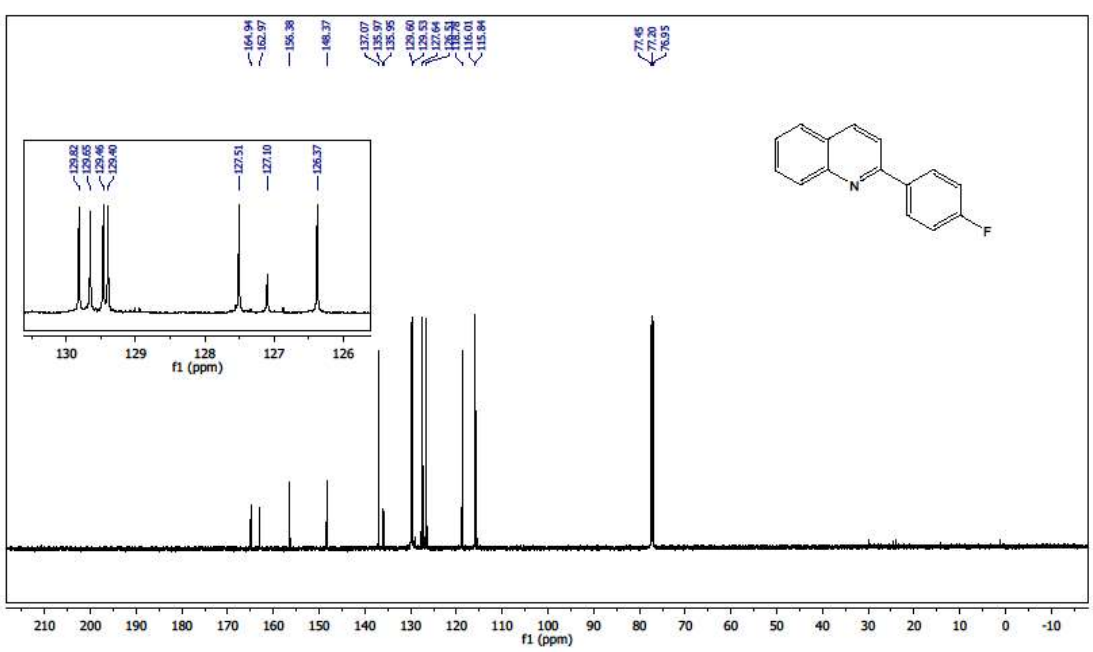


^{13}C NMR for 2-(4-chlorophenyl)quinoline

8h

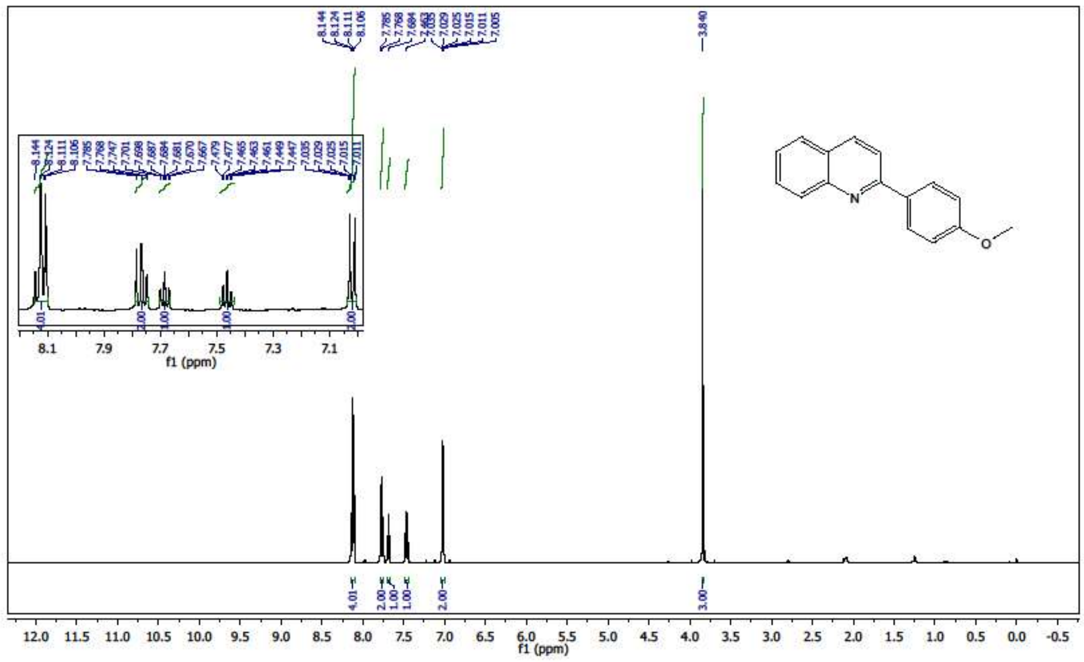


^{1}H NMR FOR 2-(4-fluorophenyl)quinoline

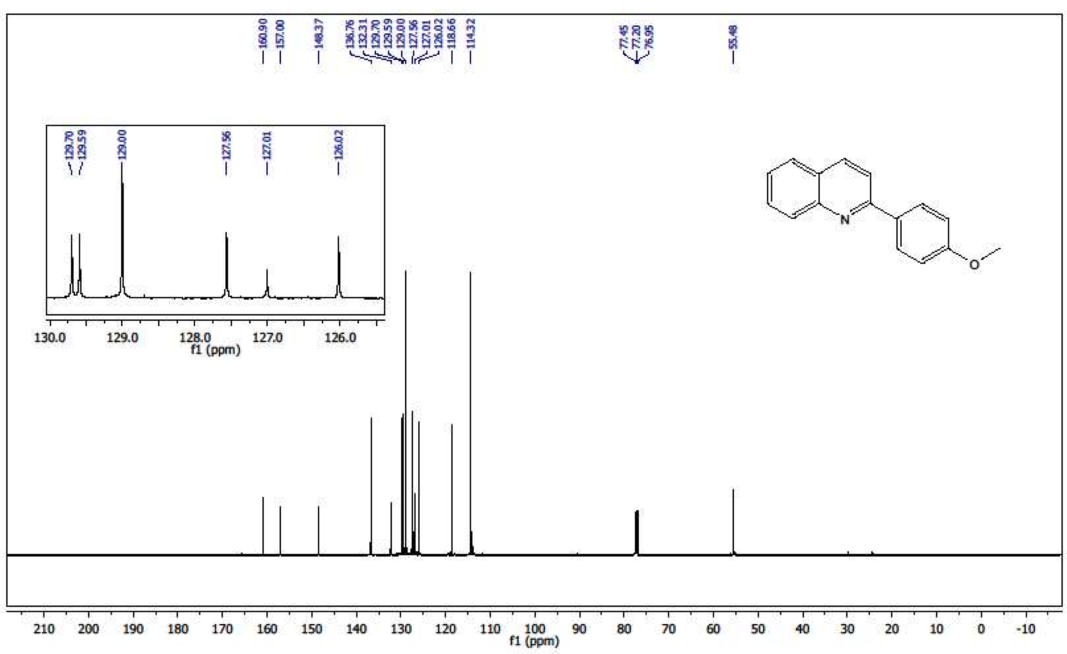


13C NMR for 2-(4-fluorophenyl)quinoline

8i

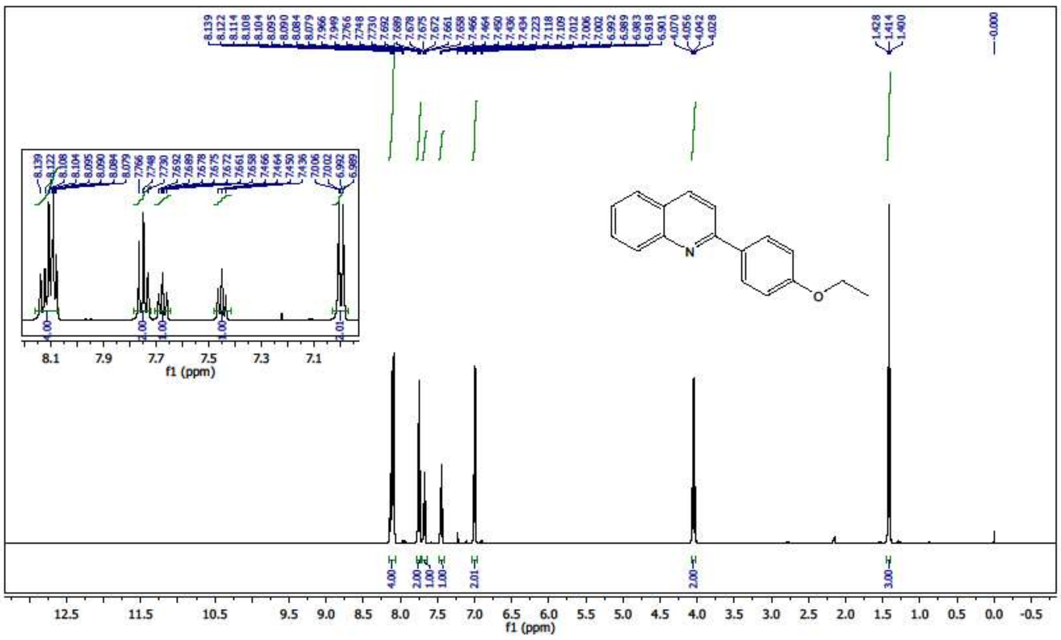


^{1}H NMR FOR 2-(4-methoxyphenyl)quinoline

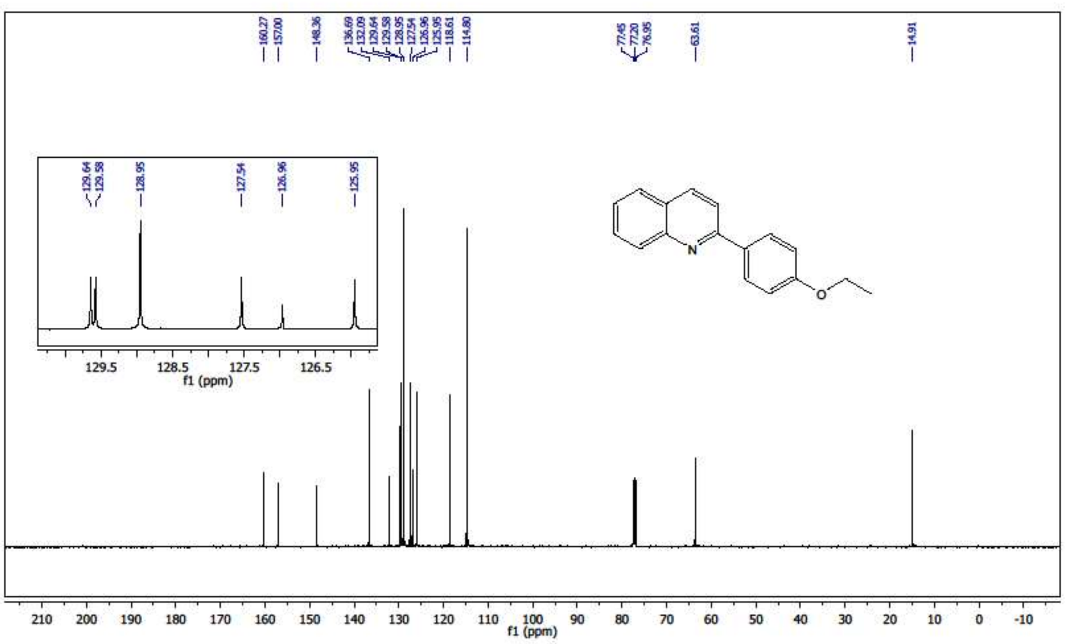


^{13}C NMR FOR 2-(4-methoxyphenyl)quinoline

8j

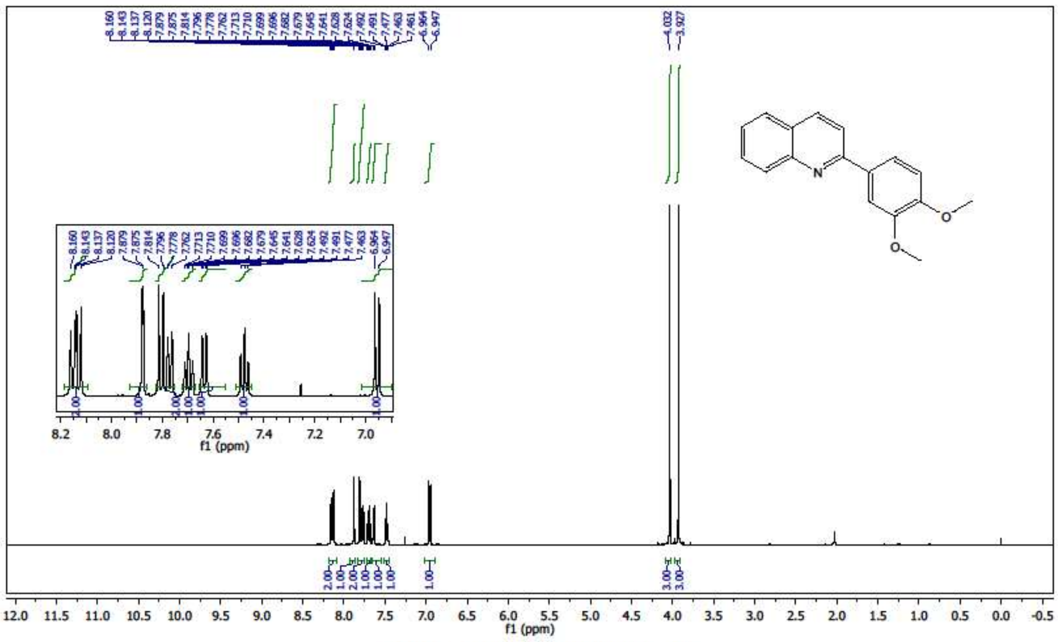


^{1}H NMR FOR 2-(4-ethoxyphenyl)quinoline

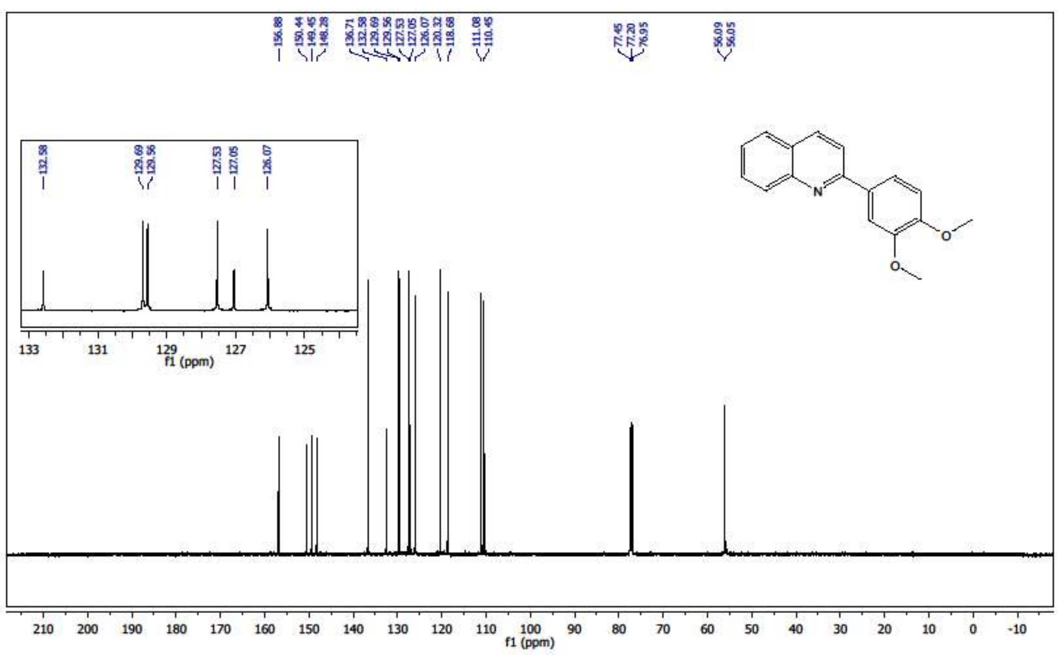


^{13}C NMR FOR 2-(4-ethoxyphenyl)quinoline

8k

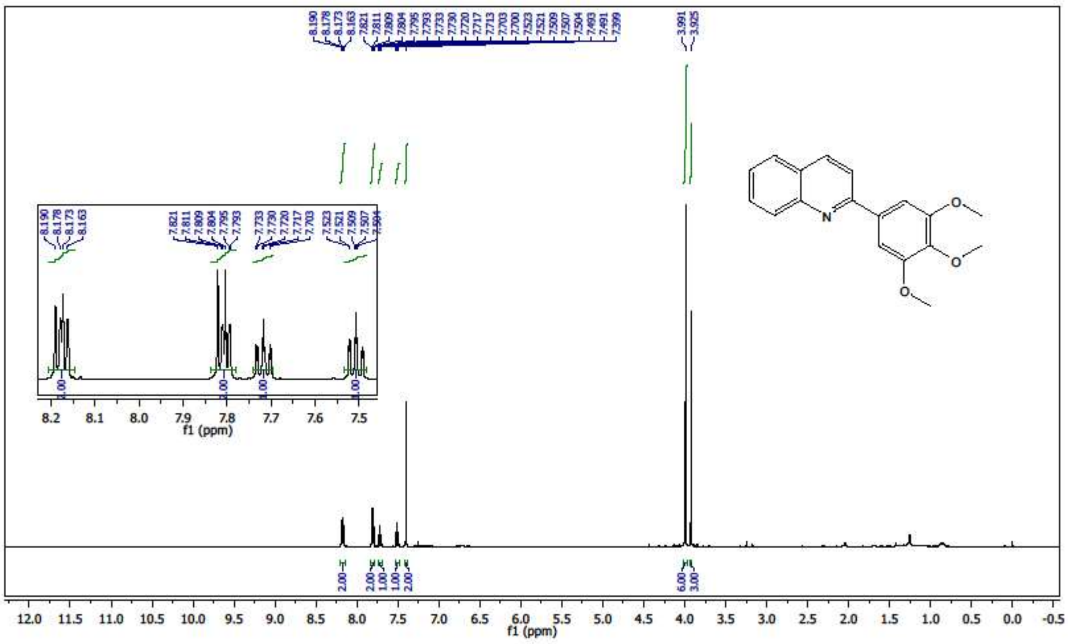


^{1}H NMR for 2-(3,4-dimethoxyphenyl)quinoline

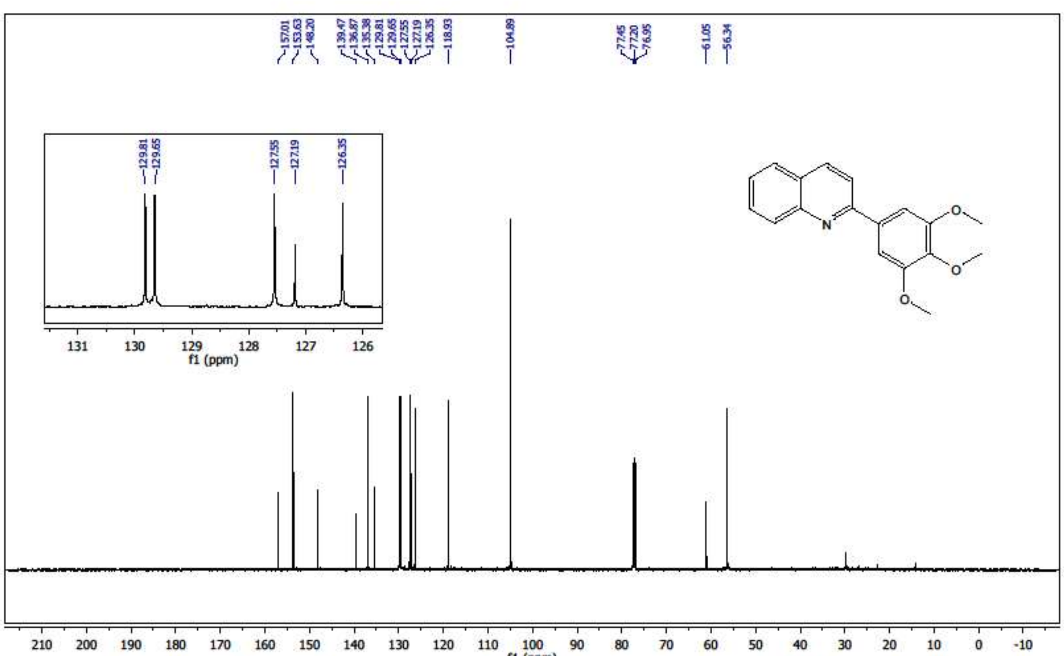


^{13}C NMR for 2-(3,4-dimethoxyphenyl)quinoline

8l

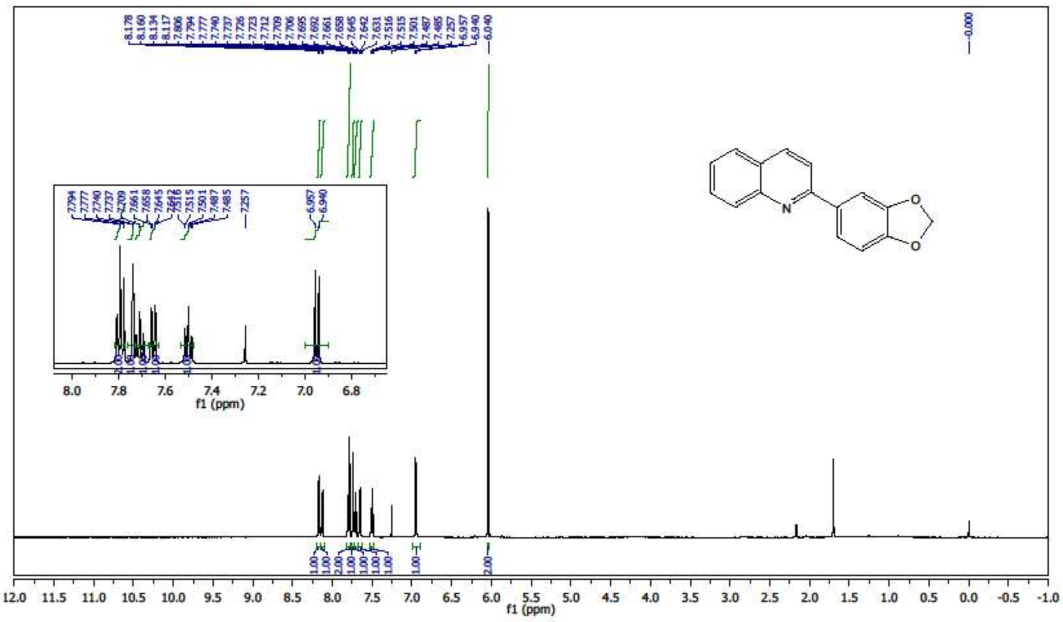


^{1}H NMR for 2-(3,4,5-trimethoxyphenyl)quinoline

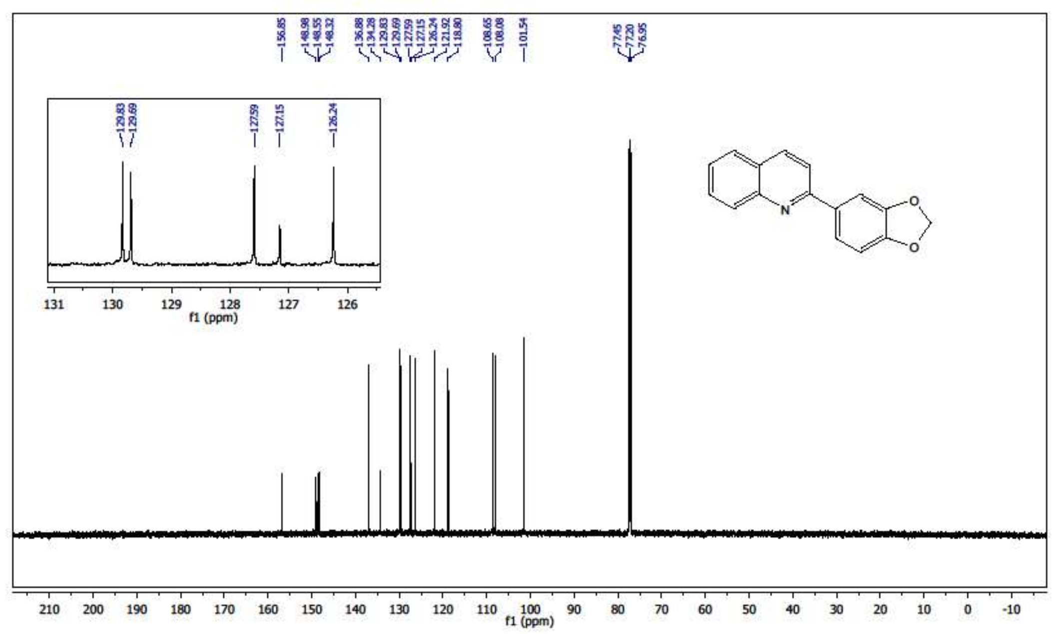


^{13}C NMR for 2-(3,4,5-trimethoxyphenyl)quinoline

8m

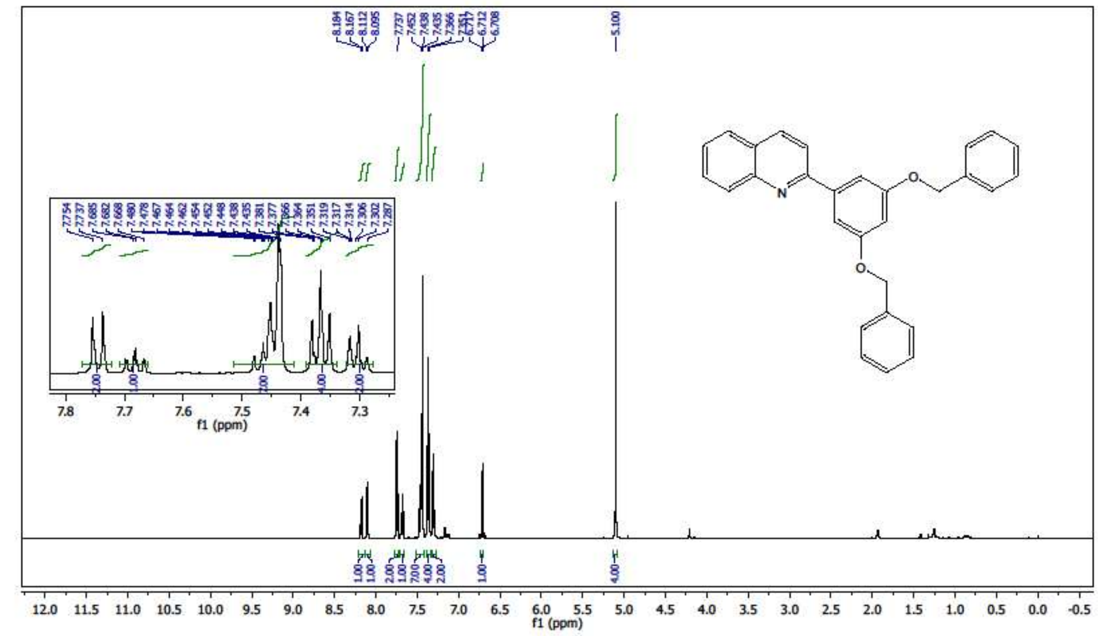


^{1}H NMR FOR 2-(benzo[d][1,3]dioxol-5-yl)quinoline

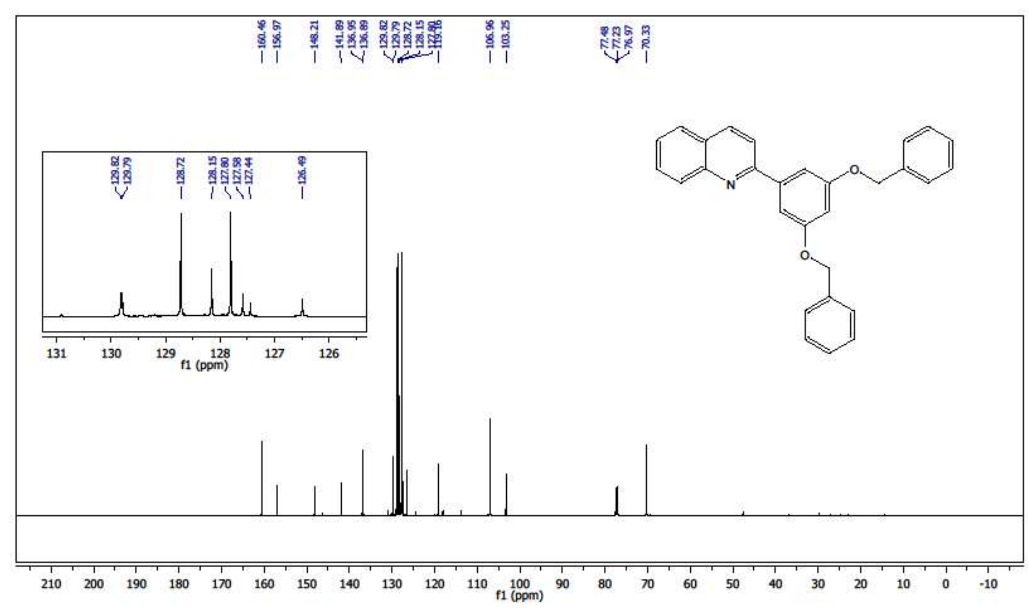


^{13}C NMR FOR 2-(benzo[d][1,3]dioxol-5-yl)quinoline

8n



^{1}H NMR for 2-(3,5-bis(benzyloxy)phenyl)quinoline



^{13}C NMR for 2-(3,5-bis(benzyloxy)phenyl)quinoline