Nickel-Catalyzed Cross-Coupling of Potassium Aryl- and Heteroaryltrifluoroborates with Unactivated Alkyl Halides

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Supporting Information

Contents

General Considerations.

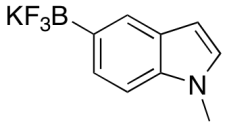
The following chemicals were purchased and used as received: $NiBr_2$•glyme, $NiCl_2$•glyme, LiHMDS, NaHMDS, KHMDS, *L*-prolinol, bathophenanthroline, 3-(4-bromophenyl)propionic acid, triphenylphosphine, carbon tetrabromide, borane dimethylsulfide, benzyl 2-bromoethyl ether, cyclohexyl iodide, 5-bromo-1-pentene, 1-bromo-6-chlorohexane, 1-iodo-4-chlorobutane, tetrahydro-furfuryl chloride, 4-(choloromethyl)-2,2-dimethyl-1,3-dioxolane, cyclohexyl chloride, 2-bromomethyl-1,3-dioxolane and ethyl 6-bromohexanoate. 1-Bromo-3-phenylpropane, 2-(bromomethyl)-tetrahydro-2*H*-pyran, cyclopentyl bromide, cycloheptyl bromide and 3-bromoheptane were distilled under reduced pressure prior to use. The aryl and heteroarylboronic acids were converted to trifluoroborates according to known litterature procedures.[1] *sec*-Butanol and dichloromethane were distilled over CaH_2 prior to use. Standard benchtop techniques were employed for handling air–sensitive reagents.

Melting points (°C) are uncorrected. ^{1}H, ^{13}C, ^{19}F spectra were recorded at 500.39, 125.75, and 470.55 MHz, respectively. ^{19}F NMR chemical shifts were referenced to external $CFCl_3$ (0.0 ppm). ^{11}B NMR spectra at 128.4 MHz were obtained on a spectrometer equipped with the appropriate decoupling accessories. All ^{11}B NMR chemical shifts were referenced to external BF_3•OEt_2 (0.0 ppm) with a negative sign indicating an upfield shift. Analytical thin–layer chromatography (TLC) was performed on TLC silica gel plates (0.25 mm) precoated with a fluorescent indicator. Standard flash chromatography procedures[2] were followed using 40–63 μm silica gel. Visualization was effected with ultraviolet light, $KMnO_4$, cerium molybdate (CAM) or phosphomolybdic acid (PMA).

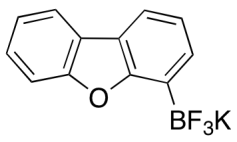
Procedure for Preparation of Starting Materials.

General procedure for the conversion of organoboronic acids to potassium organotrifluoroborates.

To a solution of organoboronic acid (1 equiv) in MeOH (3.5 M or enough to give a free flowing suspension) under N_2 was added KHF_2 (3 equiv) in one portion at 0 °C. H_2O (4.5 M) was added dropwise. The ice-water bath was removed and the reaction was stirred until the full conversion of the organoboronic acid as indicated by ^{11}B NMR (5–30 min). The crude mixture was concentrated under reduced pressure and left under vacuum overnight. The crude solid was purified using continuous Soxhlet extraction (6–24 h) with acetone. The solution obtained was concentrated under reduced pressure and then redissolved in a minimal amount of MeOH, then the solid was precipitated by addition of Et_2O. The product was filtered, concentrated and dried under vacuum to afford the pure potassium organotrifluoroborate as a solid.

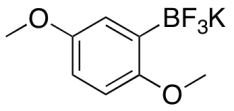


Potassium *N*-methylindole-6-yltrifluoroborate. The general procedure was used employing *N*-methylindole-6-ylboronic acid (1.00 g, 5.71 mmol) to provide the desired product as a light orange-pink solid (1.10 g, 81%). mp > 200 °C. ^1H NMR (500 MHz, DMSO-d_6) δ 7.47 (s, 1H), 7.17 (d, J = 8.1 Hz, 1H), 7.11 (d, J = 8.1 Hz, 1H), 7.07 (d, J = 3.0 Hz, 1H), 6.22 (d, J = 3.0 Hz, 1H), 3.70 (s, 3H); ^{13}C NMR (125.8 MHz, DMSO-d_6) δ 136.49, 128.41, 126.50, 123.81; 123.79, 108.10, 100.72, 33.16; ^{19}F NMR (470.8 MHz, DMSO-d_6) δ -137.29; ^{11}B NMR (128.4 MHz, DMSO-d_6) δ 3.19; IR (KBr) 3097, 2945, 1611, 1514, 1428, 1325, 1250, 1159, 981, 815, 724 cm^{-1}; HRMS (ESI) calcd. for $C_9H_8NBF_3$ (M-K) 198.0702, found 198.0687.

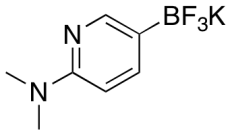


Potassium dibenzofuran-4-yltrifluoroborate. The general procedure was used employing dibenzofuran-4-ylboronic acid (1.00 g, 4.72 mmol) to provide the desired product as a white solid (1.17 g, 90%). mp > 200 °C. ^1H NMR (500 MHz, DMSO-d_6) δ 8.04-8.00 (m, 1H), 7.84 (dd, J = 7.6, 1.4 Hz, 1H), 7.64 (d, J = 8.2 Hz, 1H), 7.50 (dd, J = 7.0, 0.9 Hz, 1H), 7.46-7.39 (m, 1H), 7.33-7.27 (m, 1H), 7.18

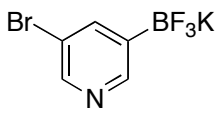
(t, J = 7.3 Hz, 1H); ^{13}C NMR (126 MHz, DMSO-d_6) δ 160.27, 156.19, 132.25, 127.20, 125.37, 122.84, 122.65, 122.33, 121.33, 118.99, 112.25; ^{19}F NMR (470.8 MHz, DMSO-*d*6) δ -136.97; ^{11}B NMR (128.4 MHz, DMSO-*d*6) δ 2.28; IR (KBr) 3050, 1602,1451, 1394, 1180, 1155, 989, 857, 757 cm^{-1}; HRMS (ESI) calcd. for $C_{12}H_7OBF_3$ (M-K) 235.0542, found 235.0540.



Potassium 2,5-dimethoxyphenyltrifluoroborate. The general procedure was used employing 2,5-dimethoxyphenylboronic acid (1.00 g, 5.49 mmol) to provide the desired product as a white solid (1.11 g, 83%). mp > 200 °C. ^{1}H NMR (500 MHz, DMSO-d_6) δ 6.87 (d, J = 3.2 Hz, 1H), 6.59 (d, J = 8.6 Hz, 1H), 6.54 (dd, J = 8.6, 3.2 Hz, 1H), 3.62 (s, 3H), 3.57 (s, 3H); ^{13}C NMR (126 MHz, DMSO-d_6) δ 157.64, 153.67, 120.05, 111.96, 111.72, 56.71, 55.91; ^{19}F NMR (470.8 MHz, DMSO-d_6) δ -137.14; ^{11}B NMR (128.4 MHz, DMSO-d_6) δ 2.11; IR (KBr) 2996, 2952, 2831, 1489, 1403, 1301, 1210, 981, 871, 728 cm^{-1}; HRMS (ESI) calcd. for $C_8H_9O_2BF_3$ (M-K) 205.0648, found 205.0648.



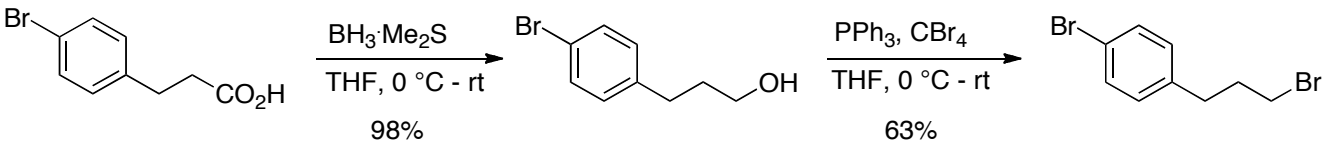
Potasium 2-(*N,N*-dimethylamino)pyridyltrifluoroborate. The general procedure was used employing 2-(*N,N*-dimethylamino)pyridine-5-boronic acid monohydrate (1.00 g, 6.02 mmol) to provide the desired product as a brown solid (1.17 g, 90%). mp > 200 °C. ^{1}H NMR (500 MHz, DMSO-d_6) δ 7.96 (s, 1H), 7.41 (d, J = 8.3 Hz, 1H), 6.44 (d, J = 8.3 Hz, 1H), 2.92 (s, 6H); ^{13}C NMR (126 MHz, DMSO-d_6) δ 158.93, 151.13, 141.61, 105.53, 38.85; ^{19}F NMR (470.8 MHz, DMSO-d_6) δ -137.73; ^{11}B NMR (128.4 MHz, DMSO-d_6) δ 2.62; IR (KBr) 2996, 2952, 2831, 1489, 1403, 1301, 1210, 981, 871, 728 cm^{-1}; HRMS (ESI) calcd. for $C_7H_9N_2BF_3$ (M-K) 189.0811, found 189.0809.

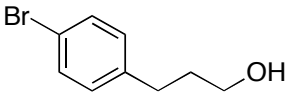


Potassium 3-bromopyridyltrifluoroborate. The general procedure was used employing 3-bromopyridine-5-boronic acid (1.00 g, 4.95 mmol) to provide the desired product as a yellow solid (0.82 g, 63%). mp > 200 °C. ^{1}H NMR (500 MHz, DMSO-d_6) δ ^{1}H NMR (500 MHz, DMSO) δ 7.96 (s, 1H),

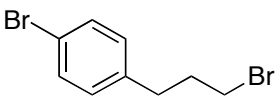
7.41 (dd, J = 8.3, 1.7 Hz, 1H), 6.44 (d, J = 8.3 Hz, 1H); ^{13}C NMR (126 MHz, DMSO-d_6) δ 151.56, 147.73, 142.17, 121.27; ^{19}F NMR (470.8 MHz, DMSO-d_6) δ -139.64; ^{11}B NMR (128.4 MHz, DMSO-d_6) δ 1.49; IR (KBr) 3042, 1581, 1404, 1226, 973, 881, 768, 708 cm^{-1}; HRMS (ESI) calcd. for $C_5H_3O_2NBrBF_3$ (M-K) 223.9494, found 223.9485.

Preparation of 1-bromo-4-(3-bromopropyl)benzene





3-(4-Bromophenyl)propan-1-ol.[3] To a solution of 4-bromophenyl propionic acid (2.00 g, 8.73 mmol) in dry THF (30 mL) at 0 ºC was added BH_3•SMe_2 (3.52 g, 43.6 mmol) dropwise. After complete addition the mixture was maintained at 0 ºC for an additional 1 h, then allowed to reach rt and stirred for 6 h. The reaction was quenched by the dropwise addition of MeOH (20 mL) at 0 ºC. The mixture was allowed to warm to rt and then stirred for 1 h. The solvent was concentrated under reduced pressure to afford a cloudy oil. Et_2O (50 mL) was added to the crude oil and the organic layer was washed consecutively with 10% aq. NaOH (2x20 mL) and brine (2x20 mL), then dried ($MgSO_4$) and concentrated under reduced pressure. The compound was passed through a short plug of silica gel and washed with EtOAc/hexanes (20/80) to afford a colorless oil (1.84 g, 98%). ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.42 (d, J = 8.4 Hz, 2H), 7.10 (d, J = 8.4 Hz, 2H), 3.75-3.63 (t, J = 6.1 Hz, 2H), 2.75-2.64 (t, J = 7.7 Hz, 2H), 1.96-1.82 (m, 2H), 1.30 (broad s, 1H).



1-Bromo-4-(3-bromopropyl)benzene.[4] Triphenylphosphine (1.93 g, 7.34 mmol) and then CBr_4 (2.43 g, 7.34 mmol) were added to a solution of bromo-4-(3-hydroxypropyl)benzene (1.25 g, 5.81 mmol) in dry THF (30 mL) at 0 °C under a nitrogen atmosphere. The mixture was stirred at 0 °C for 15 min and then at rt for 8 h. The solvent was removed under reduced pressure and the crude mixture was purified by flash chromatography (EtOAc/hexanes = 3/97) to afford the title compound as a colorless oil (1.02 g,

63%). ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.44 (d, *J* = 8.4 Hz, 2H), 7.10 (d, *J* = 8.4 Hz, 2H), 3.40 (t, *J* = 6.5 Hz, 2H), 2.76 (t, *J* = 7.3 Hz, 2H), 2.24-2.07 (m, 2H).

HTE OPTIMIZATION

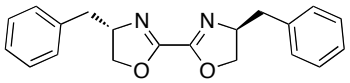
General Procedure for Parallel Microscale Experimentation. Reactions of Potassium Phenethyltrifluoroborate with 2-Chloroanisole or 3-Chloropyridine.

The following procedure is representative of the parallel microscale experimentation reactions run in this publication. The ligands (1 μmol of each bidentate ligand) were dosed into the 96-well reactor vial as solutions (50 μL of a 0.02 M solution in EtOH or 1,2-dimethoxyethane depending upon the solubility of the ligand). Plates of these ligands are typically dosed in advance of the reaction, the solvent is removed by evacuation on a Genovac, and the plates are stored in the glovebox. Ni pre-catalyst (1 μmol, 50 μL of a 0.02 M solution in DME) was then added to the reaction vials and this was evacuated to dryness on a Genovac. LiHMDS or NaHMDS (30 μmol, 50 μL of a 0.6 M solution in THF) was then added added to the ligand/catalyst mixture, and this was evacuated to dryness on the Genovac. A parylene stir-bar was then added to each reaction. The alkyl bromide (10 μmol/reaction), potassium aryltrifluoroborate (12.5 μmol/reaction) and biphenyl (1 μmol/reaction) (used as an internal standard to measure HPLC yield) were then dosed together in the desired reaction solvents (2-butanol or 2-methyl-2-butanol) using a single-tip pipettor. The reactions were then sealed and heated at 60 ºC for 18 h. After cooling to ambient temperature, the reactions were diluted with 500 μL of MeCN, a silicon-rubber storage mat was added, and the contents were shaken to homogenize. Into a separate 96-well-plate LC plate with 1 mL vials was then added 750 μL of MeCN, and then 20 μL of the diluted reaction mixtures. The 96-well plate LC block was then sealed with a silicon rubber storage mat, and an aluminum cover was attached to the block with screws. The reactions were then analyzed using an Agilent Chemstation on an HPLC modified with a 96-well plate auto-sampler.

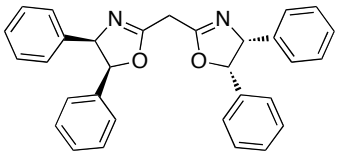
Table 1: Ligand effects

Ligand	Average*
4,4'-*t*-Bu-bipyridine	2.53
4,4'-MeO-bipyridine	2.15
phenanthroline	2.03
4,4'-Ph-bipyridine	1.96
4,4'-Me-bipyridine	1.92
L-*tert*-leucinol	1.59
cis-1,2-cyclohexanediamine	1.53
4,7-Ph-phen (bathophenanthroline)	1.49

5-Cl-phenanthroline	1.41
(1*S*,2*R*)-(+)-2-amino-1,2-diphenylethanol	1.40
3,4,7,8-Me-phenanthroline	1.40
5-NH_2-phenanthroline	1.39
4,7-MeO-phenanthroline	1.26
ligand A	1.12
(-)-*N*-methylephedrine	1.10
(1*R*,2*R*)-*N,N'*-dimethyl-1,2-cyclohexanediamine	1.00
trans-2-aminocyclohexanol hydrochloride	0.99
(1*S*,2*S*)-(+)-trans-1-amino-2-indanol	0.95
(*S,S*)- diphenylethylenediamine	0.88
diphenylglyoxime	0.84
2,2'-bis(2-oxazoline)	0.77
4,5-diazafluoren-9-one	0.75
nioxime	0.75
5,6-oxo-phenanthroline	0.73
2,9-Me-phenanthroline (neocuproine)	0.72
dimethylglyoxime	0.70
ligand B	0.67
2,2'-bis(4,5-Me-imidazole)	0.66
5,5'-Me-bipy	0.58
5-NO_2-phen	0.49
(*R*)-(+)-1,1'-binaphthyl-2,2'-diamine	0.48
2,9-Me-4,7-Ph-phenanthroline (bathocuproine)	0.47
pybox	0.45
bipyridine	0.41
2,9-Bu-phenanthroline	0.40
2,2'-biquinoline	0.32



ligand A



ligand B

Table 2: Ni Effects

Solvent	Nickel cat.	Base	Average*
t-amylOH	NiI_2	NaHMDS	0.83
2-BuOH	NiI_2	NaHMDS	1.01
t-amylOH	NiI_2	LiHMDS	0.93
2-BuOH	NiI_2	LiHMDS	1.08
			0.96
t-amylOH	$NiBr_2$•glyme	NaHMDS	1.16
2-BuOH	$NiBr_2$•glyme	NaHMDS	1.09
t-amylOH	$NiBr_2$•glyme	LiHMDS	1.20
2-BuOH	$NiBr_2$•glyme	LiHMDS	1.22
			1.17

Table 3: Solvent Effects

Solvent	Nickel cat.	Base	Average*
t-amylOH	NiI_2	NaHMDS	0.83
t-amylOH	NiI_2	LiHMDS	0.93
t-amylOH	$NiBr_2$•glyme	NaHMDS	1.16
t-amylOH	$NiBr_2$•glyme	LiHMDS	1.20
			1.03
2-BuOH	NiI_2	NaHMDS	1.01
2-BuOH	NiI_2	LiHMDS	1.08
2-BuOH	$NiBr_2$•glyme	NaHMDS	1.09
2-BuOH	$NiBr_2$•glyme	LiHMDS	1.22
			1.10

Table 4: Base Effects

Solvent	Nickel cat.	Base	Average*
t-amylOH	NiI_2	NaHMDS	0.83
t-amylOH	$NiBr_2$•glyme	NaHMDS	1.16
2-BuOH	NiI_2	NaHMDS	1.01
2-BuOH	$NiBr_2$•glyme	NaHMDS	1.09
			1.02
t-amylOH	NiI_2	LiHMDS	0.93
t-amylOH	$NiBr_2$•glyme	LiHMDS	1.20
2-BuOH	NiI_2	LiHMDS	1.08
2-BuOH	$NiBr_2$•glyme	LiHMDS	1.22
			1.11

*ratio product/internal standard

Table 5: Top Conditions on micromolar scale on model substrate

Top	Solvent	Ligand	Ni cat.	Base	Anisole[1]	Alkyl -Br[2]	Prod[3]	Prod/IS
1	*t*-amylOH	4,4'-tBu-bipy	$NiBr_2$•glyme	NaHMDS	29	259	860	3.15
2	2-BuOH	4,4'-OMe-bipy	$NiBr_2$•glyme	NaHMDS	0	267	776	2.93
3	2-BuOH	4,4'-*t*-Bu-bipy	$NiBr_2$•glyme	NaHMDS	0	277	692	2.86
4	2-BuOH	Phenanthroline	NiI_2	NaHMDS	108	234	882	2.84
5	2-BuOH	4,4'-OMe-bipy	NiI_2	NaHMDS	9	296	869	2.72
6	2-BuOH	4,4'-tBu-bipy	$NiBr_2$•glyme	LiHMDS	6	251	784	2.64
7	2-BuOH	4,4'-OMe-bipy	$NiBr_2$•glyme	LiHMDS	11	280	790	2.63
8	2-BuOH	4,4'-Ph-bipy	$NiBr_2$•glyme	LiHMDS	64	300	717	2.57
9	*t*-amylOH	4,4'-*t*-Bu-bipy	NiI_2	NaHMDS	6	319	806	2.50
10	*t*-amylOH	4,4'-*t*-Bu-bipy	$NiBr_2$•glyme	LiHMDS	68	399	839	2.48

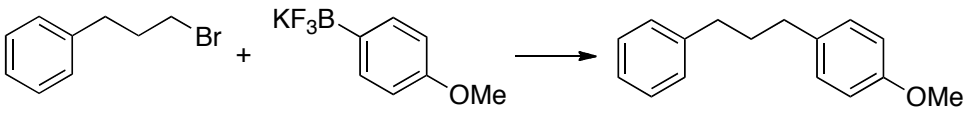
11	*t*-amylOH	4,4'-*t*-Bu-bipy	$NiBr_2$•glyme	LiHMDS	66	515	926	2.42
12	2-BuOH	Phenanthroline	$NiBr_2$•glyme	LiHMDS	85	437	827	2.38
13	2-BuOH	*cis*-1,2-Cy-diamine	$NiBr_2$•glyme	LiHMDS	95	276	828	2.32
14	2-BuOH	4,7-Ph-phen	$NiBr_2$•glyme	LiHMDS	0	347	793	2.32

[1] Product obtained by protodeboronation of the potassium organotrifluoroborate starting material

[2] Starting material recovered

[3] Cross-coupling product

The reactions in Table 5 were ran on a model substrate (eq. 1):



On large scale, the top conditions from Table 5 provided high yields (70-80%) for electron rich or non-substituted aryltrifluoroborates. However, for a general substrate scope, conditions in entry 14 (Table 5) were chosen as they provided average best yield in average for various substrates, including electron poor aryl- and heteroaryltrifluoroborates.

Procedure for the Suzuki–Miyaura Cross-Coupling of Aryl- and Heteroaryltrifluoroborates with Alkyl Halides

General procedure for the cross-coupling of alkyl iodides and bromides on 0.5 mmol scale

Outside the glovebox, bathophenanthroline (16.6 mg, 0.05 mmol) and potassium organotrifluoroborate (0.51 mmol) were added to a Biotage microwave tube equipped with a stir bar. $NiBr_2$•glyme (15.4 mg, 0.05 mmol) and LiHMDS (251 mg, 1.5 mmol) were then added in the glove box. The vial was sealed and removed from the glove box, then *s*-BuOH (1 mL) was added *via* syringe. The mixture was stirred for 15-30 min and alkyl halide (0.5 mmol) was added to the resulting solution. The reaction was stirred at 60 °C for 5-26 h outside the glovebox, then passed through a short plug of silica, which was washed thoroughly with EtOAc (30 mL). The filtrate was concentrated under reduced pressure, then purified by column chromatography on silica gel.

General procedure for the cross-coupling of alkyl chlorides on 0.5 mmol scale

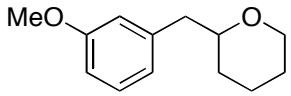
Outside the glovebox, potassium organotrifluoroborate (0.51 mmol) was added to a Biotage microwave tube equipped with a stir bar. L-Prolinol (10.1 mg, 0.1 mmol), $NiCl_2$•glyme (10.9 mg, 0.05 mmol) and NaHMDS (275 mg, 1.5 mmol) or KHMDS (275 mg, 1.5 mmol) were then added in the glove box. The vial was sealed and removed from the glove box, then *s*-BuOH (1 mL) was added *via* syringe. The mixture was stirred for 15-30 min and alkyl halide (0.5 mmol) was added to the resulting solution. The reaction was stirred at 80 °C for 24-48 h, then passed through a short plug of silica, which was washed thoroughly with EtOAc (30 mL). The filtrate was concentrated under reduced pressure, then purified by column chromatography on silica gel.

General procedure for the cross-coupling of alkyl bromides on 5 mmol scale

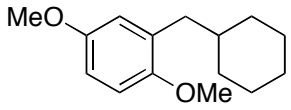
Outside the glovebox, potassium 2-thiophenyltrifluoroborate (0.97 g, 5.10 mmol) or potassium 3-methylphenyltrifluoroborate (1.01 g, 5.10 mmol), bathophenanthroline (16.6 mg, 0.05 mmol), $NiBr_2$•glyme (15.4 mg, 0.05 mmol) and LiHMDS (2.51 g, 1.50 mmol) were added added to a Schlenk tube equipped with a stir bar. The Schlenk tube was purged with Ar (five cycles vacuum/Ar) then *s*-BuOH (8 mL) was added *via* syringe under Ar. The mixture was stirred for 15 min and 2-(bromomethyl)tetrahydro-2*H*-pyran (895 mg, 0.50 mmol) was added to the resulting solution under Ar.

The reaction was stirred at 60 °C for 30 h outside the glovebox, then passed through a short plug of silica, which was washed thoroughly with EtOAc (100 mL). The filtrate was concentrated under reduced pressure, then purified by column chromatography on silica gel to provide 2-(3-methylbenzyl)tetrahydro-2*H*-pyran (0.72 g, 76%) or 2-(thiophen-3-ylmethyl)tetrahydro-2*H*-pyran (0.67 g, 74%).

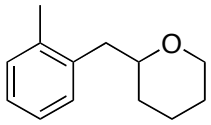
Compound Characterization for the Suzuki–Miyaura Cross-Coupling of Aryl- and Hetero-aryltrifluoroborates with Alkyl Halides



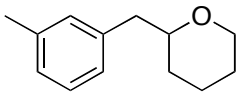
2-(3-Methoxybenzyl)tetrahydro-2*H*-pyran (Table 1, entry 1, R = H). The general procedure was employed using potassium 3-methoxyphenyltrifluoroborate (109.2 mg, 0.51 mmol) and 2-(bromomethyl)-tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 6 h and the compound was obtained as a colorless oil (88.5 mg, 86%). ^{1}H NMR (500 MHz, $CDCl_3$) ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.19 (t, *J* = 7.8 Hz, 1H), 6.83-6.72 (m, 3H), 4.01-3.94 (m, 1H), 3.80 (s, 3H), 3.53-3.45 (m, 1H), 3.41 (dt, *J* = 11.7, 2.3 Hz, 1H), 2.85 (dd, *J* = 13.8, 6.6 Hz, 1H), 2.61 (dd, *J* = 13.8, 6.6 Hz, 1H), 1.85-1.76 (m, 1H), 1.57 (s, 2H), 1.52-1.37 (m, 2H), 1.34-1.23 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 159.64, 140.58, 129.27, 121.94, 115.27, 111.53, 78.84, 68.78, 55.28, 43.37, 31.63, 26.18, 23.63; IR (neat) = 2935, 2838, 1602, 1488, 1258, 1088, 1044, 776 cm^{-1}; HRMS (CI) calcd. for $C_{13}H_{19}O_2$ (MH^+) 207.1385, found 207.1384.



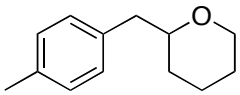
2-(2,5-Dimethoxybenzyl)tetrahydro-2*H*-pyran (Table 1, entry 1, R = OMe). The general procedure was employed using potassium 2,5-dimethoxyphenyltrifluoroborate (124.5 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 5 h and the compound was obtained as a colorless oil (84.1 mg, 72%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 6.80-6.74 (m, 2H), 6.71 (dd, *J* = 8.8, 3.0 Hz, 1H), 4.02-3.93 (m, 1H), 3.77 (s, 3H), 3.76 (s, 3H), 3.57-3.49 (m, 1H), 3.42 (t, *J* = 11.7, 2.1 Hz, 1H), 2.84 (dd, *J* = 13.4, 6.6 Hz, 1H), 2.68 (dd, *J* = 13.4, 6.6 Hz, 1H), 1.79 (d, *J* = 14.5 Hz, 1H), 1.64-1.52 (m, 2H), 1.51-1.37 (m, 2H), 1.35-1.25 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 153.42, 152.13, 128.55, 117.61, 111.54, 111.40, 77.57, 68.70, 56.13, 55.78, 37.54, 31.67, 26.28, 23.67; IR (neat) = 2935, 2843, 1499, 1225, 1048, 804 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{21}O_3$ (MH^+) 237.1491, found 237.1497.



2-(2-Methylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 2, R = *o*-Me). The general procedure was employed using potassium 2-methylphenyltrifluoroborate (101.3 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 8 h and the compound was obtained as a colorless oil (72.0 mg, 76%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.20-7.06 (m, 4H), 4.02-3.94 (m, 1H), 3.54-3.37 (m, 2H), 2.92 (dd, *J* = 13.8, 6.3 Hz, 1H), 2.67 (dd, *J* = 13.8, 7.0 Hz, 1H), 2.34 (s, 3H), 1.86-1.76 (m, 1H), 1.66-1.54 (m, 2H), 1.53-1.29 (m, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 137.13, 136.65, 130.34, 130.29, 126.38, 125.84, 78.11, 68.81, 40.48, 31.74, 26.24, 23.70, 19.88; IR (neat) = 3017, 2934, 2843, 1090, 1048, 742 cm^{-1}; HRMS (CI) calcd. for $C_{13}H_{19}O$ (MH^+) 191.1436, found 191.1437.

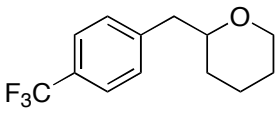


2-(3-Methylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 2, R = *m*-Me). The general procedure was employed using potassium 3-methylphenyltrifluoroborate (100.9 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 8 h and the compound was obtained as a colorless oil (77.1 mg, 81%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.16 (t, *J* = 7.6 Hz, 1H), 7.03-6.98 (m, 3H), 4.01-3.92 (m, 1H), 3.50-3.43 (m, 1H), 3.43-3.36 (m, 1H), 2.84 (dd, *J* = 13.6, 6.6 Hz, 1H), 2.60 (dd, *J* = 13.6, 6.6 Hz, 1H), 2.32 (s, 3H), 1.84-1.74 (m, 1H), 1.64-1.51 (m, 2H), 1.51-1.36 (m, 2H), 1.33-1.21 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 139.01, 137.97, 130.40, 128.30, 127.05, 126.58, 79.05, 68.86, 43.38, 31.71, 26.28, 23.72, 21.62; IR (neat) = 2934, 2842, 1088, 1041 cm $^{-1}$; HRMS (CI) calcd. for $C_{13}H_{19}O$ (MH^+) 191.1436, found 191.1429.

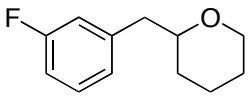


2-(4-Methylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 2, R = *p*-Me). The general procedure was employed using potassium 4-methylphenyltrifluoroborate (101.0 mg, 0.51 mmol) and 2-(bromomethyl)-tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 8 h and the compound was obtained as a colorless oil (77.1 mg, 81%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.09 (s, 4H), 4.01-3.94 (m, 1H), 3.49-

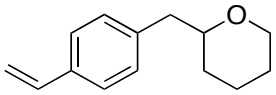
3.36 (m, 2H), 2.84 (dd, *J* = 13.7, 6.6 Hz, 1H), 2.60 (dd, *J* = 13.7, 6.6 Hz, 1H), 2.32 (s, 3H), 1.85-1.74 (m, 1H), 1.65-1.52 (m, 2H), 1.51-1.36 (m, 2H), 1.34-1.19 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 135.63, 135.43, 129.16, 128.82, 78.83, 68.60, 42.68, 31.35, 25.98, 23.46, 20.90; IR (neat) = 2934, 2846, 1091, 1042 cm^{-1}; HRMS (CI) calcd. for $C_{13}H_{19}O$ (MH^+) 191.1436, found 191.1436, found 191.1444.



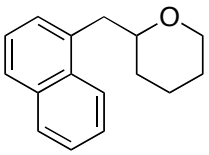
2-(4-(Trifluoromethyl)benzyl)tetrahydro-2*H*-pyran (Table 1, entry 3). The general procedure was employed using potassium 4-(trifluoromethyl)phenyltrifluoroborate (128.5 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 24 h and the compound was obtained as a colorless oil (78.1 mg, 64%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.53 (d, *J* = 8.0 Hz, 2H), 7.32 (d, *J* = 7.9 Hz, 2H), 3.98-3.88 (m, 1H), 3.54-3.47 (m, 1H), 3.38 (td, *J* = 11.7 Hz, 2.2 Hz, 1H), 2.88 (dd, *J* = 13.8, 7.3 Hz, 1H), 2.72 (dd, *J* = 13.8, 5.5 Hz, 1H), 1.86-1.77 (m, 1H), 1.63–1.39 (m, 4H), 1.36-1.30 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 143.24, 129.79, 128.54 (qd, *J* = 32.3 Hz, 2C), 125.21 (qd, J = 3.8 Hz, 1C), 124.5 (qd, J = 271.8 Hz, 1C), 78.39, 68.77, 43.03, 31.70, 26.06, 23.58; ^{19}F NMR (471 MHz, C_6D_6) δ -62.34; IR (neat) = 2939, 2846, 1326, 1162, 1123 cm^{-1}; HRMS (CI) calcd. for $C_{13}H_{15}OF_2$ (M-F^+) 225.1091, found 225.1097.



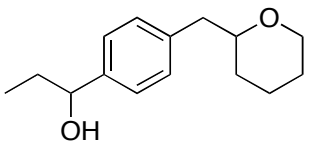
2-(3-Fluorobenzyl)tetrahydro-2*H*-pyran (Table 1, entry 4). The general procedure was employed using potassium 3-fluorophenyltrifluoroborate (102.9 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 24 h and the compound was obtained as a colorless oil (70.7 mg, 73%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.28-7.21 (m, 1H), 7.02-6.87 (m, 3H), 4.02-3.95 (m, 1H), 3.53-3.46 (m, 1H), 3.41 (td, *J* = 10.5, 2.4 Hz, 1H), 2.86 (dd, *J* = 13.8, 7.0 Hz, 1H), 2.66 (dd, *J* = 13.8, 5.9 Hz, 1H), 1.87-1.79 (m, 1H), 1.64-1.40 (m, 4H), 1.36-1.23 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 162.68 (d, *J* = 244.8 Hz, 1C), 141.35 (d, *J* = 7.3 Hz, 1C), 129.42 (d, *J* = 8.2 Hz, 1C), 124.91 (d, *J* = 2.6 Hz, 1C), 116.14 (d, *J* = 20.9 Hz, 1C), 112.85 (d, *J* = 21.7 Hz, 1C), 78.28, 68.52, 42.71, 31.39, 25.87, 23.36; ^{19}F NMR (471 MHz, C_6D_6) δ -114.02 Hz; IR (neat) = 2936, 2847, 1589, 1487, 1450, 1249, 1088, 1043, 780 cm^{-1}; HRMS (CI) calcd. for $C_{12}H_{16}OF$ (M-H^+) 195.1185, found 195.1187.



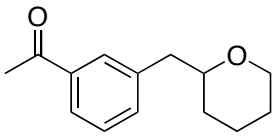
2-(4-Vinylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 5). The general procedure was employed using potassium 4-vinylphenyltrifluoroborate (107.1 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (54.0 mg, 53%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.33 (d, *J* = 8.1 Hz, 1H), 7.17 (d, *J* = 8.1 Hz, 3H), 6.69 (dd, *J* = 17.6, 10.9 Hz, 1H), 5.70 (d, *J* = 17.6 Hz, 1H), 5.19 (d, *J* = 10.9 Hz, 1H), 4.00-3.94 (m 1H), 3.50-3.43 (dd, *J* = 9.9, 5.5 Hz, 1H), 3.40 (td, *J* = 11.8, 2.4 Hz, 1H), 2.85 (dd, *J* = 13.7, 6.7 Hz, 1H), 2.63 (dd, *J* = 13.7, 6.4 Hz, 1H), 1.84-1.76 (m, 1H), 1.63-1.51 (m, 2H), 1.51-1.37 (m, 2H), 1.34 - 1.22 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 138.49, 136.60, 135,43, 129.44, 125.99, 112.97, 78.64, 68.56, 42.81, 31.38, 25.94, 23.41; IR (neat) = 2934, 2847, 1089, 1718, 1041 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{19}O$ (MH^+) 204.1436, found 204.1436.



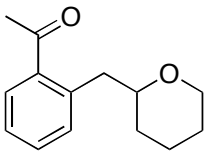
2-(Naphthalen-1-ylmethyl)tetrahydro-2*H*-pyran (Table 1, entry 6). The general procedure was employed using potassium naphtalen-1-yltrifluoroborate (119.4 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (77.0 mg, 68%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.11 (d, *J* = 8.5 Hz, 1H), 7.88 (d, *J* = 7.5 Hz, 1H), 7.76 (d, *J* = 8.0 Hz, 1H), 7.57-7.46 (m, 2H), 7.45-7.35 (m, 2H), 4.06-3.99 (m, 1H), 3.73-3.65 (m, 1H), 3.49-3.40 (m, 2H), 3.10 (dd, *J* = 13.9, 7.3 Hz, 1H), 1.88-1.77 (m, 1H), 1.69-1.33 (m, 5H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 134.90, 133.99, 132.41, 128.87, 127.71, 127.11, 125.90, 125.55, 125.53, 124.18, 78.08, 68.84, 40.43, 31.97, 26.23, 23.60. IR (neat) = 3043, 2934, 2843, 2360, 1086, 1046, 788, 774 cm^{-1}; HRMS (CI) calcd. for $C_{16}H_{19}O$ (MH^+) 227.1436, found 227.1436.



2-(4-(1-Hydroxypropyl)benzyl)tetrahydro-2*H*-pyran (Table 1, entry 7). The general procedure was employed using potassium 4-(1-hydroxypropyl)phenyltrifluoroborate (123.4 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (94.5 mg, 81%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.26 (d, J = 8.1 Hz, 2H), 7.19 (d, J = 8.1 Hz, 2H), 4.57 (t, J = 6.6 Hz, 1H), 4.01-3.94 (s, 1H), 3.51-3.44 (s, 1H), 3.44-3.36 (d, J = 11.7 Hz, 1H), 2.87 (dd, J = 13.7, 6.6 Hz, 1H), 2.64 (dd, J = 13.7, 6.6 Hz, 1H), 1.93 (s, 1H), 1.87-1.70 (m, 3H), 1.63-1.52 (m, 2H), 1.52-1.37 (m, 2H), 1.34-1.23 (d, J = 14.7 Hz, 1H), 0.92 (t, J = 7.4 Hz, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 142.28, 138.00, 129.29, 125.79, 78.65, 75.78, 68.52, 42.72, 31.71, 31.35, 25.93, 23.39, 10.13; IR (neat) = 3400, 2931, 2847, 1084, 1039, 785, 700 cm^{-1}; HRMS (ESI) calcd. for $C_{15}H_{22}O_2Na$ (MNa^+) 257.1517, found 257.1507.

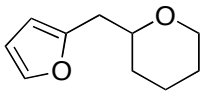


2-(3-Acetylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 8). The general procedure was employed using potassium 3-acetylphenyltrifluoroborate (115.2 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 26 h at 80 ºC and the compound was obtained as a colorless oil (72.1 mg, 66%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.83-7.76 (m, 2H), 7.42 (d, J = 7.5 Hz, 1H), 7.38 (t, J = 7.5 Hz, 1H), 4.01-3.91 (m, 1H), 3.54-3.46 (m, 1H), 3.39 (td, J = 11.8, 2.3 Hz, 1H), 2.89 (dd, J = 13.8, 7.2 Hz, 1H), 2.72 (dd, J = 13.8, 5.7 Hz, 1H), 2.59 (s, 3H), 1.86-1.76 (m, 1H), 1.63-1.38 (m, 4H), 1.36-1.23 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 198.53, 139.65, 137.28, 134.40, 129.24, 128.55, 126.44, 78.58, 68.76, 43.07, 31.67, 26.84, 26.10, 23.59; IR (neat) = 2935, 2848, 1684, 1439, 1357, 1267, 1088, 695 cm^{-1}; HRMS (ESI) calcd. for $C_{14}H_{19}O_2$ (MH^+) 219.1385, found 219.1379.

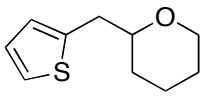


2-(2-Acetylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 9). The general procedure was employed using potassium 2-acetylphenyltrifluoroborate (115.2 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 26 h at 80 ºC and the compound was obtained as a colorless oil (74.2 mg, 68%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.62 (d, J = 7.7 Hz, 1H), 7.41-7.34 (m,

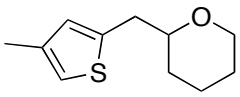
1H), 7.32-7.23 (m, 2H), 3.93- 3.85 (m, 1H), 3.49-3.41 (m, 1H), 3.30 (td, *J* = 11.7, 1.9 Hz, 1H), 3.04 (dd, *J* = 13.5, 4.3 Hz, 1H), 2.95 (dd, *J* = 13.4, 7.8 Hz, 1H), 2.57 (s, 3H), 1.84-1.74 (m, 1H), 1.66-1.59 (m, 1H), 1.57-1.38 (m, 3H), 1.37-1.26 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 202.68, 138.90, 138.75, 132.61, 131.12, 128.90, 126.21, 78.73, 68.59, 40.80, 31.98, 30.06, 26.19, 23.71; IR (neat) = 2934, 2846, 1685, 1441, 1354, 1251, 1089, 1045, 759 cm^{-1}; HRMS (ESI) calcd. for $C_{14}H_{19}O_2$ (MH^+) 219.1385, found 219.1385.



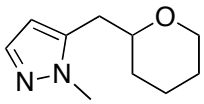
2-(Furan-2-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 1, X = O). The general procedure was employed using potassium 2-furanyltrifluoroborate (88.7 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 15 h and the compound was obtained as a colorless oil (56.51 mg, 68%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.31 (dd, *J* = 1.8, 0.8 Hz, 1H), 6.29 (dd, *J* = 3.1, 1.8 Hz, 1H), 6.06 (dd, *J* = 3.1, 0.8 Hz, 1H), 4.02-3.95 (m, 1H), 3.60-3.53 (m, 1H), 3.43 (td, *J* = 11.7, 2.3 Hz, 1H), 2.86 (dd, *J* = 15.0, 6.7 Hz, 1H), 2.70 (dd, *J* = 15.0, 6.3 Hz, 1H), 1.86-1.78 (m, 1H), 1.64-1.42 (m, 4H), 1.35-1.25 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 152.84, 141.00, 110.11, 106.35, 76.36, 68.55, 35.27, 31.44, 25.83, 23.33; IR (neat) = 2935, 2847, 1087, 1044, 1008, 735 cm^{-1}; HRMS (CI) calcd. for $C_{10}H_{15}O_2$ (MH^+) 167.1072, found 167.1084.



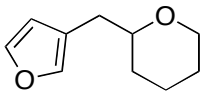
2-(Thiophen-2-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 1, X = S). The general procedure was employed using potassium 2-thiophenyltrifluoroborate (96.9 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 15 h and the compound was obtained as a colorless oil (57.4 mg, 63%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.14 (dd, *J* = 5.1 Hz, 1.1 Hz, 1H), 6.93 (dd, *J* = 5.1, 3.4 Hz, 1H), 6.83 (dd, *J* = 3.4 Hz, 1.1 Hz, 1H), 4.04-3.97 (d, *J* = 11.4 Hz, 1H), 3.54-3.38 (m, 2H), 3.04 (dd, *J* = 14.8, 6.9 Hz, 1H), 2.90 (dd, *J* = 14.8, 5.8 Hz, 1H), 1.87-1.78 (m, 1H), 1.68-1.53 (m, 2H), 1.53-1.42 (m, 2H), 1.37-1.23 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 141.04, 126.58, 125.54, 123.73, 78.48, 68.62, 37.09, 31.33, 25.95, 23.42; IR (neat) = 2934, 2845, 1439, 1090, 1045, 692 cm^{-1}; HRMS (CI) calcd. for $C_{10}H_{15}OS$ (MH^+) 183.0844, found 183.0840.



2-((4-Methylthiophen-2-yl)methyl)tetrahydro-2*H*-pyran (Table 2, entry 2). The general procedure was employed using potassium 4-methylthiophen-2-yltrifluoroborate (104.0 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 15 h and the compound was obtained as a colorless oil (64.7 mg, 66%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 6.69 (s, 1H), 6.63 (s, 1H), 4.03-3.96 (m, 1H), 3.51-3.39 (m, 2H), 2.97 (dd, *J* = 14.8, 6.9 Hz, 1H), 2.82 (dd, *J* = 14.8, 5.9 Hz, 1H), 2.20 (s, 3H), 1.86-1.78 (m, 1H), 1.68-1.62 (m, 1H), 1.60-1.52 (m, 1H), 1.52-1.41 (m, 2H), 1.33-1.23 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 141.06, 137.32, 128.18, 119.00, 78.63, 68.76, 37.40, 31.51, 26.09, 23.56, 15.84; IR (neat) = 2928, 1601, 1454, 1252, 750, 698 cm^{-1}; HRMS (CI) calcd. for $C_{11}H_{17}OS$ (MH^+) 197.1000, found 197.1004.

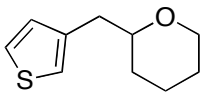


1-Methyl-5-(tetrahydro-2*H*-pyran-2-yl)methyl-1*H*-pyrazole (Table 2, entry 3). The general procedure was employed using potassium 1-methyl-1*H*-pyrazol-5-yltrifluoroborate (88.7 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 20 h and the compound was obtained as a colorless oil (31.6 mg, 35%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.34 (s, 1H), 6.30 (s, 1H), 4.02-3.94 (m, 1H), 3.84 (s, 3H), 3.46-3.36 (m, 2H), 2.63 (dd, *J* = 14.6, 6.8 Hz, 1H), 2.49 (dd, *J* = 14.6, 5.9 Hz, 1H), 1.86-1.77 (m, 1H), 1.66-1.39 (m, 4H), 1.34-1.21 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 142.41, 139.73, 121.38, 111.53, 77.72, 68.48, 31.99, 31.36, 25.91, 23.37; IR (neat) = 2936, 2845, 1090, 1044, 1023, 778 cm^{-1}; HRMS (CI) calcd. for $C_{10}H_{17}ON_2$ (MH^+) 181.1341, found 181.1349.

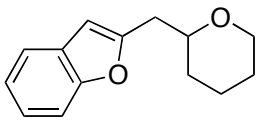


2-(Furan-3-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 4, X = O). The general procedure was employed using potassium 3-furanyltrifluoroborate (88.7 mg, 0.51 mmol) and 2-(bromomethyl)-tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 15 h and the compound was obtained as a colorless oil (59.0 mg, 71%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.34 (s, 1H), 6.30 (s, 1H), 4.02-3.94 (m, 1H), 3.46-3.36 (m, 2H), 2.63 (dd, *J* = 14.6, 6.8 Hz, 1H), 2.49 (dd, *J* = 14.6, 5.9 Hz, 1H), 1.86-1.77

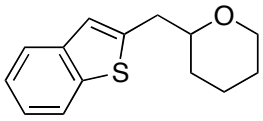
(m, 1H), 1.66-1.39 (m, 4H), 1.34-1.21 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 142.41, 139.73, 121.38, 111.53, 77.72, 68.48, 31.99, 31.36, 25.91, 23.37; IR (neat) = 2936, 2845, 1090, 1044, 1023, 778 cm^{-1}; HRMS (CI) calcd. for $C_{10}H_{15}O_2$ (MH^+) 167.1072, found 16.1077.



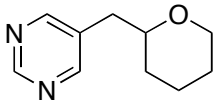
2-(Thiophen-3-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 4, X = S). The general procedure was employed using potassium 3-thiophenyltrifluoroborate (96.9 mg, 0.51 mmol) and 2-(bromomethyl)-tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 6 h and the compound was obtained as a colorless oil (73.8 mg, 80%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.24 (dd, *J* = 4.9, 3.0 Hz, 1H), 7.01 (dd, *J* = 3.0, 1.0 Hz, 1H), 6.98 (dd, *J* = 4.9, 1.0 Hz, 1H), 4.06-3.93 (m, 1H), 3.54-3.37 (m, 2H), 2.87 (dd, *J* = 14.3, 6.7 Hz, 1H), 2.70 (dd, *J* = 14.3, 6.1 Hz, 1H), 1.86-1.77 (m, 1H), 1.63-1.53 (m, 2H), 1.52-1.41 (m, 2H), 1.33-1.24 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 139.17, 129.00, 125.11, 121.62, 78.26, 68.73, 37.57, 31.64, 26.16, 23.61; IR (neat) = 3099, 2934, 2844, 1439, 1091, 1042, 771 cm^{-1}; HRMS (CI) calcd. for $C_{10}H_{15}OS$ (MH^+) 183.0844, found 183.0840.



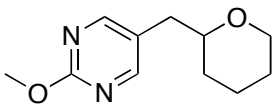
2-((Tetrahydro-2*H*-pyran-2-yl)methyl)benzofuran (Table 2, entry 5, X = O). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and 2-(bromomethyl)-tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (86.0 mg, 80%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.49-7.45 (m, 1H), 7.41 (d, *J* = 8.0 Hz, 1H), 7.23-7.13 (m, 2H), 6.46 (s, 1H), 4.02-3.93 (m, 1H), 3.73-3.64 (m, 1H), 3.43 (td, *J* = 11.7, 2.3 Hz, 1H), 2.99 (dd, *J* = 15.0, 7.0 Hz, 1H), 2.83 (dd, *J* = 15.0, 5.9 Hz, 1H), 1.86-1.77 (m, 1H), 1.69-1.42 (m, 4H), 1.41-1.29 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 156.19, 154.82, 129.05, 123.31, 122.52, 120.44, 110.90, 103.74, 76.18, 68.77, 35.97, 31.77, 25.98, 23.49; IR (neat) = 2934, 2848, 1454, 1253, 1090, 1044, 750 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{17}O_2$ (MH^+) 217.1229, found 217.1219.



2-(Benzo[*b*]thiophen-2-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 5, X = S). The general procedure was employed using potassium 2-benzothiophenyltrifluoroborate (114.3 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless gel (67.0 mg, 58%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 (d, *J* = 7.8 Hz, 1H), 7.69 (d, *J* = 7.7 Hz, 1H), 7.35-7.24 (m, 2H), 7.08 (s, 1H), 4.09-4.01 (m, 1H), 3.65-3.57 (m, 1H), 3.48 (td, *J* = 11.8, 2.3 Hz, 1H), 3.13 (dd, *J* = 14.7, 6.9 Hz, 1H), 3.00 (dd, *J* = 14.8, 5.5 Hz, 1H), 1.90-1.82 (m, 1H), 1.75-1.57 (m, 2H), 1.56-1.46 (m, 2H), 1.43-1.33 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 142.17, 139.92, 139.74, 123.92, 123.40, 122.71, 122.03, 121.96, 77.98, 68.58, 37.90, 31.36, 25.82, 23.33; IR (neat) = 3056, 2934, 2844, 1457, 1437, 1204, 1089, 1045, 745, 726 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{16}OS$ (M^+) 232.0922, found 232.0922.

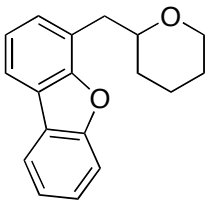


5-((Tetrahydro-2*H*-pyran-2-yl)methyl)pyrimidine (Table 2, entry 6, R = H). The general procedure was employed using potassium pyrimidine-5-yltrifluoroborate (94.8 mg, 0.51 mmol) and 2-(bromo-methyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a colorless oil (68.7 mg, 77%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 9.08 (s, 1H), 8.62 (s, 2H), 3.99-3.91 (m, 1H), 4.05-3.84 (m, 1H), 3.48-3.42 (m, 1H), 3.36 (td, *J* = 14.4, 7.8 Hz, 1H), 2.75 (dd, *J* = 14.4, 7.8 Hz, 1H), 2.69 (dd, *J* = 14.4, 4.5 Hz, 1H), 1.90-1.82 (m, 1H), 1.59-1.43 (m, 3H), 1.39-1.28 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 157.56, 156.95, 132.33, 77.31, 68.63, 37.54, 31.66, 25.85, 23.43; IR (neat) = 2936, 2845, 1603, 1416, 1352, 1206, 1089, 1043, 808, 789 cm^{-1}; HRMS (CI) calcd. for $C_{10}H_{15}N_2O$ (MH^+) 179.1184, found 179.1191.

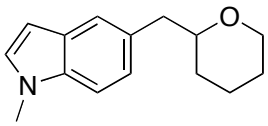


2-Methoxy-5-((tetrahydro-2*H*-pyran-2-yl)methyl)pyrimidine (Table 2, entry 6, R = OMe). The general procedure was employed using potassium 4-methoxypyrimidine-5-yltrifluoroborate (110.2 mg, 0.51 mmol) and 2-(bromo-methyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 16

h and the compound was obtained as a colorless oil (73.8 mg, 71%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.38 (s, 2H), 3.99 (s, 3H), 3.98 (s, 1H), 3.43-3.31 (m, 2H), 2.68 (dd, *J* = 14.4, 7.6 Hz, 1H), 2.61 (dd, *J* = 14.4, 4.7 Hz, 1H), 1.87-1.80 (m, 1H), 1.64-1.42 (m, 4H), 1.35-1.25 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 164.67, 159.73, 125.23, 77.70, 68.65, 54.82, 36.56, 31.51, 25.92, 23.46; IR (neat) = 2935, 2848, 1599, 1561, 1471, 1407, 1322, 1088, 1043, 805 cm^{-1}; HRMS (CI) calcd. for $C_{11}H_{17}N_2O_2$ (MH^+) 209.1290, found 209.1290.

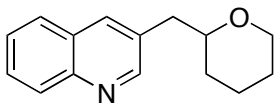


4-((Tetrahydro-2*H*-pyran-2-yl)methyl)dibenzo[*b*,*d*]furan (Table 2, entry 7). The general procedure was employed using potassium 4-dibenzofuranyltrifluoroborate (139.78 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (103.9 mg, 78%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.95 (d, *J* = 7.7 Hz, 1H), 7.82 (dd, *J* = 7.6, 1.2 Hz, 1H), 7.61 (d, *J* = 8.2 Hz, 1H), 7.49-7.42 (m, 1H), 7.38-7.24 (m, 3H), 4.00 (d, *J* = 11.4 Hz, 1H), 3.76 (s, 1H), 3.45 (td, *J* = 11.8, 2.3 Hz, 1H), 3.22 (dd, *J* = 13.8, 6.8 Hz, 1H), 3.08 (dd, *J* = 13.8, 6.5 Hz, 1H), 1.86-1.78 (m, 1H), 1.67-1.56 (m, 2H), 1.53-1.37 (m, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 156.18, 155.13, 128.68, 127.06, 124.77, 123.97, 123.03, 122.79, 122.71, 120.82, 118.74, 111.89, 77.58, 68.80, 37.26, 31.78, 26.20, 23.61; IR (neat) = 3057, 2934, 2844, 1451, 1422, 1185, 1049, 752 cm^{-1}; HRMS (CI) calcd. for $C_{18}H_{19}O_2$ (MH^+) 267.1385, found 267.1380.

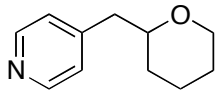


1-Methyl-5-((tetrahydro-2*H*-pyran-2-yl)methyl)-1*H*-indole (Table 2, entry 8). The general procedure was employed using potassium *N*-methyl-indol-4-yltrifluoroborate (120.9 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil, which turns into brick-red glassy solid upon standing (93.9 mg, 82%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.50-7.45 (m, 1H), 7.29-7.24 (m, 1H), 7.12 (dd, *J* = 6.9 Hz, 1.5 Hz, 1H), 7.04 (d, *J* = 3.1 Hz, 1H), 6.45 (d, *J* = 3.1 Hz, 1H), 4.07-3.98 (m, 1H), 3.79 (s, 3H), 3.59-3.51 (m, 1H), 3.46 (td, *J* = 11.8, 2.4 Hz, 1H), 3.04 (dd, *J* = 13.5, 6.2 Hz, 1H), 2.76 (dd, *J* = 13.5, 7.1 Hz,

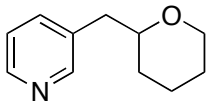
1H), 1.86-1.78 (m, 1H), 1.68-1.56 (m, 2H), 1.54-1.38 (m, 2H), 1.37-1.27 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 135.66, 129.56, 128.99, 128.71, 123.46, 121.30, 108.92, 100.64, 79.70, 68.79, 43.43, 32.93, 31.49, 26.28, 23.66; IR (neat) = 2981, 2847, 1493, 1423, 1333, 1078, 1041,899, 727 cm^{-1}; HRMS (ESI) calcd. for $C_{15}H_{20}NO$ (MH^+) 230.1545, found 230.1552.



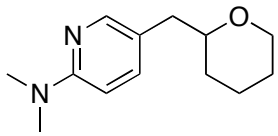
3-((Tetrahydro-2*H*-pyran-2-yl)methyl)quinoline (Table 2, entry 9). The general procedure was employed using potassium 4-isoquinolinyltrifluoroborate (119.87 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (79.6 mg, 70%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.81 (d, *J* = 2.1 Hz, 1H), 8.08 (d, *J* = 8.4 Hz, 1H), 7.96 (d, *J* = 1.5 Hz, 1H), 7.76 (dd, *J* = 8.1, 0.7 Hz, 1H), 7.65 (ddd, *J* = 8.4, 6.9, 1.4 Hz, 1H), 7.54-7.47 (m, 1H), 4.00-3.93 (m, 1H), 3.59-3.52 (m, 1H), 3.38 (td, *J* = 11.8, 2.3 Hz, 1H), 2.98 (dd, *J* = 14.1, 7.4 Hz, 1H), 2.86 (dd, *J* = 14.1, 5.3 Hz, 1H), 1.86-1.78 (m, 1H), 1.67-1.52 (m, 2H), 1.52-1.31 (m, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 152.42, 146.87, 135.40, 131.62, 129.06, 128.56, 127.97, 127.35, 126.37, 78.07, 68.52, 40.27, 31.49, 25.80, 23.34; IR (neat) = 2935, 2844, 1495, 1088, 1043, 786, 752 cm^{-1}; HRMS (ESI) calcd. for $C_{15}H_{18}NO$ (MH^+) 228.1388, found 228.1389.



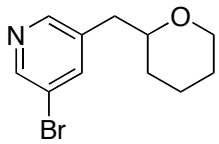
4-((Tetrahydro-2*H*-pyran-2-yl)methyl)pyridine (Table 2, entry 10). The general procedure was employed using potassium 3-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and 2-(bromo-methyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (62.92 mg, 71%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.49 (d, *J* = 5.8 Hz, 2H), 7.15 (d, *J* = 5.8 Hz, 2H), 3.99-3.92 (m, 1H), 3.54-3.48 (m, 1H), 3.38 (td, *J* = 11.7, 2.4 Hz, 1H), 2.81 (dd, *J* = 13.9, 7.5 Hz, 1H), 2.66 (dd, *J* = 13.9, 5.2 Hz, 1H), 1.87-1.79 (m, 1H), 1.62-1.41 (m, 4H), 1.37-1.27 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 149.60, 148.05, 124.83, 77.67, 68.65, 42.41, 31.68, 25.91, 23.47; IR (neat) = 2936, 2845, 1423, 1199, 1090, 1043, 715 cm^{-1}; HRMS (ESI) calcd. for $C_{11}H_{16}NO$ (MH^+) 178.1232, found 178.1237.



3-((Tetrahydro-2*H*-pyran-2-yl)methyl)pyridine (Table 2, entry 11). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (52.28 mg, 59%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.51-8.41 (m, 2H), 7.55 (d, *J* = 7.8 Hz, 1H), 7.20 (dd, *J* = 7.7, 4.8 Hz, 1H), 3.99-3.92 (m, 1H), 3.50-3.43 (m, 1H), 3.38 (td, *J* = 11.6, 2.4 Hz, 1H), 2.81 (dd, *J* = 14.0, 7.3 Hz, 1H), 2.67 (dd, *J* = 14.0, 5.4 Hz, 1H), 1.87-1.78 (m, 1H), 1.62-1.40 (m, 4H), 1.37-1.25 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 150.70, 147.65, 137.00, 134.44, 123.24, 78.19, 68.69, 40.24, 31.59, 26.00, 23.52; IR (neat) = 2936, 2847, 1560, 1409, 1089, 1043, 730 cm^{-1}; HRMS (ESI) calcd. for $C_{11}H_{16}NO$ (MH^+) 178.1232, found 178.1231.

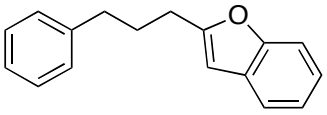


***N*,*N*-Dimethyl-5-((tetrahydro-2*H*-pyran-2-yl)methyl)pyridin-2-amine (Table 2, entry 12).** The general procedure was employed using potassium *N*,*N*-dimethylaminopyridin-5-yltrifluoroborate (116.3 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (56.12 mg, 51%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.01 (d, *J* = 2.3 Hz, 1H), 7.33 (dd, *J* = 8.7, 2.3 Hz, 1H), 6.47 (d, *J* = 8.7 Hz, 1H), 4.00-3.92 (m, 1H), 3.43-3.33 (m, 2H), 3.06 (s, 6H), 2.70 (dd, *J* = 14.0, 6.6 Hz, 1H), 2.51 (dd, *J* = 14.0, 6.3 Hz, 1H), 1.85-1.76 (m, 1H), 1.62-1.36 (m, 4H), 1.31-1.20 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 158.36, 148.12, 138.66, 121.47, 105.65, 78.90, 68.72, 39.34, 38.39, 31.37, 26.16, 23.60; IR (neat) = 2933, 2848, 1609, 1509, 1398, 1090, 1042 cm^{-1}; HRMS (ESI) calcd. for $C_{13}H_{21}N_2O$ (MH^+) 221.1654, found 221.1657.

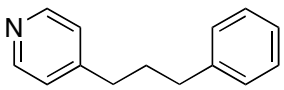


3-Bromo-5-((tetrahydro-2*H*-pyran-2-yl)methyl)pyridine (Table 2, entry 13). The general procedure was employed using potassium 3-bromopyridin-5-yltrifluoroborate (134.6 mg, 0.51 mmol) and 2-(bromomethyl)tetrahydro-2*H*-pyran (89.5 mg, 0.50 mmol). The reaction time was 12 h and the

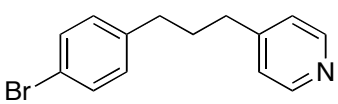
compound was obtained as a colorless oil (80.7 mg, 63%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.52 (s, 1H), 8.38 (s, 1H), 7.72 (s, 1H), 3.99-3.91 (m, 1H), 3.50-3.41 (m, 1H), 3.37 (td, *J* = 11.6, 2.5 Hz, 1H), 2.76 (dd, *J* = 14.2, 7.7 Hz, 1H), 2.66 (dd, *J* = 14.2, 4.8 Hz, 1H), 1.88-1.79 (m, 1H), 1.63-1.42 (m, 4H), 1.36-1.26 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.81, 148.67, 139.51, 136.39, 120.50, 77.72, 68.64, 39.72, 31.65, 25.90, 23.45; IR (neat) = 2935, 2845, 1422, 1090, 1043, 708 cm^{-1}; HRMS (ESI) calcd. for $C_{11}H_{15}NOBr$ (MH^+) 256.0337, found 256.0327.



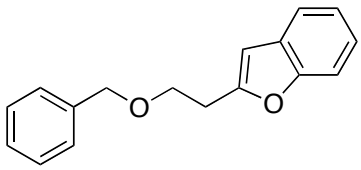
2-(3-Phenylpropyl)benzofuran (Table 3, entry 1, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and 1-bromo-3-phenylpropane (99.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (93.3 mg, 79%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.49-7.46 (m, 1H), 7.43-7.38 (m, 1H), 7.32-7.26 (m, 2H), 7.23-7.15 (m, 5H), 6.39 (s, 1H), 2.79 (t, *J* = 7.6 Hz, 2H), 2.72 (t, *J* = 7.6 Hz, 2H), 2.10 (quintet, *J* = 7.6 Hz, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 159.27, 154.82, 141.87, 129.09, 128.65, 128.54, 126.07, 123.27, 122.56, 120.35, 110.87, 102.25, 35.36, 29.41, 28.03; IR (neat) = 3061, 3027, 2931, 2859, 1601, 1454, 1252, 750, 699 cm^{-1}; HRMS (CI) calcd. for $C_{17}H_{17}O$ (MH^+) 237.1279, found 237.1283.



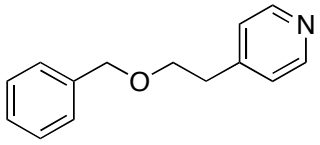
4-(3-Phenylpropyl)pyridine (Table 3, entry 1, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and 1-bromo-3-phenylpropane (99.5 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a colorless oil (79.8 mg, 81%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.49 (d, *J* = 5.4 Hz, 2H), 7.34-7.24 (m, 2H), 7.23-7.13 (m, 3H), 7.10 (d, *J* = 5.9 Hz, 2H), 2.69-2.58 (m, 4H), 2.02-1.92 (m, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 151.32, 149.84, 141.76, 128.57, 128.56, 126.14, 124.07, 35.42, 34.77, 31.91; IR (neat) = 3029, 2954, 2857, 1601, 1495, 1453, 1414, 791, 750, 699 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{16}N$ (MH^+) 198.1283, found 198.1283.



4-(3-(4-Bromophenyl)propyl)pyridine (Table 3, entry 2, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and 1-bromo-4-(3-bromopropyl)benzene (138.49 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a colorless oil (84.23 mg, 61%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.49 (d, J = 5.5 Hz, 2H), 7.40 (d, J = 8.3 Hz, 2H), 7.09 (d, J = 5.5 Hz, 2H), 7.04 (d, J = 8.3 Hz, 2H), 2.64-2.56 (m, 4H), 1.99-1.89 (m, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 150.94, 149.87, 140.63, 131.58, 130.26, 123.97, 119.83, 34.73, 34.59, 31.67; IR (neat) = 3064, 3028, 2938, 2857, 2360, 1601, 1487, 1414, 1071, 1010, 803 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{15}BrN$ (MH^+) 276.0388, found 276.0386.

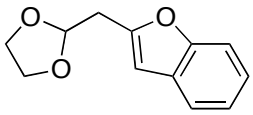


2-(2-(Benzyloxy)ethyl)benzofuran (Table 3, entry 3, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and benzyl 2-bromoethyl ether (107.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (100.9 mg, 80%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.49-7.46 (m, 1H), 7.42-7.37 (m, 1H), 7.33-7.24 (m, 5H), 7.22-7.14 (m, 2H), 6.46 (s, 1H), 4.54 (s, 2H), 3.82 (t, J = 6.7 Hz, 2H), 3.08 (t, J = 6.7 Hz, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 156.36, 154.79, 138.26, 129.01, 128.52, 127.79, 123.43, 122.59, 120.48, 110.90, 103.25, 73.17, 67.94, 49.53, 29.50; IR (neat) = 3059, 3031, 2858, 1602, 1454, 1362, 1252, 1170, 1099, 798, 738, 696 cm^{-1}; HRMS (CI) calcd. for $C_{17}H_{16}O_2$ (M^+) 252.1150, found 252.1150.

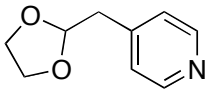


4-(2-(Benzyloxy)ethyl)pyridine (Table 3, entry 3, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and benzyl 2-bromoethyl ether (107.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (81.0 mg, 76%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.50 (d, J = 5.4 Hz, 2H), 7.35-7.30 (m, 2H), 7.29-7.25 (m, 3H), 7.15 (d, J = 5.9 Hz, 2H), 4.51 (s, 2H), 3.71 (t, J = 6.6 Hz, 2H), 2.90 (t, J = 6.6 Hz, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 149.81, 148.42, 138.17, 128.57, 127.84, 127.75, 124.50, 73.22, 69.77, 35.79; IR (neat) =

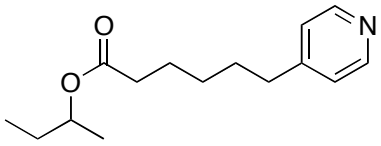
3029, 2925, 2859, 1602, 1453, 1415, 1363, 1103, 804, 737, 698 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{16}NO$ (MH^+) 214.1224, found 214.1232.



2-((1,3-Dioxolan-2-yl)methyl)benzofuran (Table 3, entry 4, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and 2-(bromoethyl)-1,3-dioxolane (83.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (77.6 mg, 76%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.51 (d, J = 7.2 Hz, 1H), 7.45 (d, J = 8.3 Hz, 1H), 7.27-7.16 (m, 2H), 6.57 (s, 1H), 5.26 (t, J = 4.8 Hz, 1H), 4.03-3.96 (m, 2H), 3.94-3.86 (m, 2H), 3.16 (d, J = 4.8 Hz, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 155.00, 153.74, 128.90, 123.67, 122.70, 120.67, 111.12, 104.57, 102.52, 65.32, 34.20; IR (neat) = 2956, 2887, 1603, 1455, 1253, 1132, 1040, 804, 752 cm^{-1}; HRMS (CI) calcd. for $C_{12}H_{13}O_3$ (MH^+) 205.0865, found 205.0863.

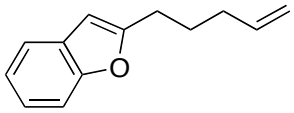


4-((1,3-Dioxolan-2-yl)methyl)pyridine (Table 3, entry 4, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and 2-(bromoethyl)-1,3-dioxolane (83.5 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a colorless oil (77.4 mg, 78%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.49 (d, J = 4.9 Hz, 2H), 7.18 (d, J = 4.9 Hz, 2H), 5.07 (t, J = 4.5 Hz, 1H), 3.92-3.77 (m, 4H), 2.93 (d, J = 4.5 Hz, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 149.70, 145.20, 125.33, 103.57, 65.20, 40.14, 11.83; IR (neat) = 2962, 2885, 1603, 1415, 1133, 1037, 994, 802, 732; HRMS (ES) calcd. for $C_9H_{12}O_2N$ (MH^+) 166.0867, found 166.0868.

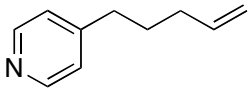


***sec*-Butyl 6-(pyridin-4-yl)hexanoate (Table 3, entry 5, 2).** The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.3 mg, 0.51 mmol) and ethyl 6-bromohexanoate (111.6 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a light yellow oil (87.0 mg, 70%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.48 (d, J = 5.2 Hz, 2H), 7.09 (d, J = 5.8 Hz, 2H), 4.88-4.78 (m,

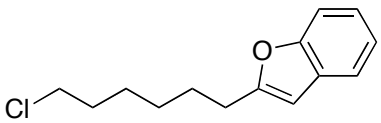
1H), 2.60 (app t, J = 7.7 Hz, 2H), 2.28 (app t, J = 7.4 Hz, 2H), 1.70-1.61 (m, 4H), 1.61-1.46 (m, 2H), 1.40-1.32 (m, 2H), 1.18 (d, J = 6.3 Hz, 3H), 0.88 (t, J = 7.5 Hz, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 173.19, 151.24, 149.57, 123.77, 71.93, 34.90, 34.40, 29.81, 28.70, 28.50, 24.70, 19.38, 9.59; IR (neat) = 2966, 2936, 2359, 1729, 1602, 1190, 1125, 992 cm^{-1}; HRMS (ESI) calcd. for $C_{15}H_{24}NO_2$ (MH^+) 250.1801, found 250.1807.



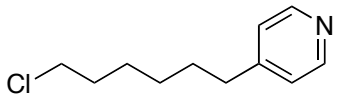
2-(Pent-4-en-1-yl)benzofuran (Table 3, entry 6, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and 5-bromo-1-pentene (74.51 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (58.7 mg, 63%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.53-7.47 (m, 1H), 7.43 (d, J = 8.0 Hz, 1H), 7.25-7.16 (m, 2H), 6.40 (s, 1H), 5.92-5.80 (m, 1H), 5.13-4.98 (m, 2H), 2.80 (app t, J = 7.5 Hz, 2H), 2.22-2.14 (m, 2H), 1.92-1.82 (m, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 159.42, 154.80, 138.16, 129.11, 123.23, 122.53, 120.32, 115.34, 110.86, 102.14, 33.25, 27.92, 26.99; IR (neat) = 3069, 2928, 2853, 1585, 1455, 1250, 1167, 1007, 946, 762, 750, 739 cm^{-1}; HRMS (CI) calcd. for $C_{13}H_{15}O$ (MH^+) 187.1123, found 187.1119.



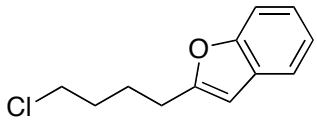
4-(Pent-4-en-1-yl)pyridine (Table 3, entry 6, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and 5-bromo-1-pentene (74.51 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a light yellow oil (50.1 mg, 68%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.48 (br. s, 2H), 7.10 (br. s, 2H), 5.87-5.75 (m, 1H), 5.08-4.96 (m, 2H), 2.69-2.54 (t, J = 7.1 Hz, 2H), 2.10 (m, 2H), 1.79-1.68 (m, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 151.61, 150.02, 138.29, 124.26, 115.57, 34.85, 33.41, 29.71; IR (neat) = 3068, 2930, 1602, 1415, 992, 912, 795 cm^{-1}; HRMS (CI) calcd. for $C_{10}H_{14}N$ (MH^+) 148.1126, found 148.1123.



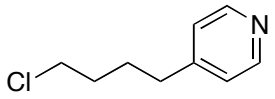
2-(6-Chlorohexyl)benzofuran (Table 3, entry 7, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and 1-bromo-6-chlorohexane (99.7 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (82.9 mg, 70%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.50-7.47 (m, 1H), 7.42 (d, *J* = 8.0 Hz, 1H), 7.24-7.16 (m, 2H), 6.38 (s, 1H), 3.54 (t, *J* = 6.7 Hz, 2H), 2.78 (t, *J* = 7.5 Hz, 2H), 1.84-1.73 (m, 4H), 1.54-1.39 (m, 4H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 159.51, 154.77, 129.11, 123.24, 122.55, 120.33, 110.86, 102.06, 45.20, 32.62, 28.54, 28.46, 27.67, 26.75; IR (neat) = 2933, 2858, 1455, 1251, 1172, 945, 796, 750 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{18}ClO$ (MH^+) 237.1046, found 237.1047.



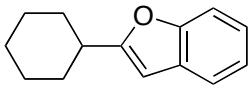
2-(6-Chlorohexyl)pyridine (Table 3, entry 7, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and 1-bromo-6-chlorohexane (99.7 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a yellow oil (60.2 mg, 61%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.46 (d, *J* = 5.3 Hz, 2H), 7.09 (d, *J* = 5.3 Hz, 2H), 3.50 (t, *J* = 6.7 Hz, 2H), 2.59 (app t, *J* = 7.7 Hz, 2H), 1.79-1.70 (m, 2H), 1.66-1.57 (m, 2H), 1.49-1.41 (m, 2H), 1.37-1.31 (m, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 151.71, 149.67, 124.06, 45.13, 35.21, 32.55, 30.21, 28.51, 26.73; IR (neat) = 2932, 2852, 1601, 1415, 803, 728; HRMS (CI) calcd. for $C_{11}H_{17}ClN$ (MH^+) 198.1050, found 198.1048.



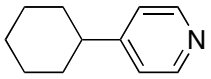
2-(4-Chlorobutyl)benzofuran (Table 3, entry 8, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and 1-iodo-4-butane (85.7 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (87.6 mg, 84%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.49 (d, *J* = 7.1 Hz, 1H), 7.41 (d, *J* = 8.1 Hz, 1H), 7.24-7.16 (m, 2H), 6.41 (s, 1H), 3.58 (t, *J* = 6.3 Hz, 2H), 2.82 (t, *J* = 6.8 Hz, 2H), 1.96-1.85 (m, 4H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 158.73, 154.81, 128.98, 123.39, 122.62, 120.40, 110.90, 102.40, 44.79, 32.04, 27.81, 25.14; IR (neat) = 2952, 1454, 1253, 1175, 941, 796, 750 cm^{-1}; HRMS (CI) calcd. for $C_{12}H_{14}ClO$ (MH^+) 209.0722, found 209.0733.



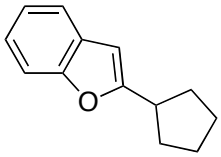
4-(4-Chlorobutyl)pyridine (Table 3, entry 8, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and 1-iodo-4-butane (85.7 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a light yellow oil (53.5 mg, 63%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.48 (d, J = 6.0 Hz, 2H), 7.10 (d, J = 5.7 Hz, 2H), 3.54 (t, J = 6.0 Hz, 2H), 2.63 (t, J = 7.1 Hz, 2H), 1.81-1.75 (m, 4H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 150.87, 149.88, 123.98, 44.74, 34.51, 32.01, 27.51; IR (neat) = 2922, 2850, 1602, 1415, 953, 803, 732 cm^{-1}; HRMS (CI) calcd. for $C_9H_{13}NCl$ (MH^+) 170.0737, found 170.0760.



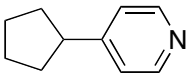
2-Cyclohexylbenzofuran (Table 3, entry 9, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and cyclohexyl iodide (74.51 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (60.1 mg, 60%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.50 (d, J = 6.7 Hz, 1H), 7.43 (d, J = 8.0 Hz, 1H), 7.25-7.16 (m, 2H), 6.36 (s, 1H), 2.82-2.73 (m, 1H), 2.18-2.10 (m, 2H), 1.91-1.82 (m, 2H), 1.80-1.72 (m, 1H), 1.57-1.38 (m, 4H), 1.37-1.26 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 163.99, 154.31, 128.81, 122.90, 122.20, 120.17, 110.63, 99.68, 37.51, 31.25, 26.01, 25.85; IR (neat) = 3074, 2930, 2857, 1601, 1455, 1251, 912, 795, 750 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{16}O$ (M^+) 200.1201, found 200.1220.



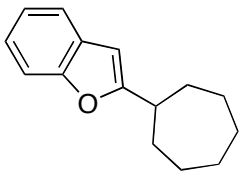
4-Cyclohexylpyridine (Table 3, entry 9, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and cyclohexyl iodide (105 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a light yellow oil (57.1 mg, 71%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.48 (d, J = 6.0 Hz, 2H), 7.12 (d, J = 6.0 Hz, 2H), 2.56-2.41 (m, 1H), 1.95-1.80 (m, 4H), 1.80-1.71 (m, 1H), 1.47-1.33 (m, 4H), 1.33-1.18 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 156.66, 149.83, 122.46, 43.93, 33.63, 26.65, 26.05; IR (neat) = 2926, 2852, 1597, 1448, 814 cm^{-1}; HRMS (CI) calcd. for $C_{11}H_{16}N$ (MH^+) 162.1283, found 162.1283.



2-Cyclopentylbenzofuran (Table 3, entry 10, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and cyclopentyl bromide (74.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (62.2 mg, 67%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.48 (dd, J = 7.0, 1.9 Hz, 1H), 7.41 (d, J = 8.1 Hz, 1H), 7.23-7.15 (m, 2H), 6.38 (s, 1H), 3.23 (s, 1H), 2.14-2.04 (m, 2H), 1.85-1.76 (m, 4H), 1.74-1.66 (m, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 163.39, 154.79, 129.08, 123.13, 122.45, 120.31, 110.85, 100.43, 39.13, 31.86, 25.52; IR (neat) = 2958, 2870, 1454, 1253, 1169, 794, 750 cm^{-1}; HRMS (CI) calcd. for $C_{13}H_{15}O$ (MH^+) 187.1123, found 187.1117.

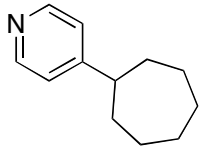


4-Cyclopentylpyridine (Table 3, entry 10, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and cyclopentyl bromide (74.5 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a light yellow oil (50.2 mg, 68%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.48 (d, J = 5.8 Hz, 2H), 7.14 (d, J = 5.8 Hz, 2H), 2.98 (quintet, J = 8.6 Hz, 1H), 2.16-2.03 (m, 2H), 1.89-1.66 (m, 4H), 1.66-1.53 (m, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 155.66, 149.70, 122.72, 45.22, 34.01, 25.61; IR (neat) = 2954, 2869, 1598, 1410, 814 cm^{-1}; HRMS (CI) calcd. for $C_{10}H_{14}N$ (MH^+) 148.1126, found 148.1120.

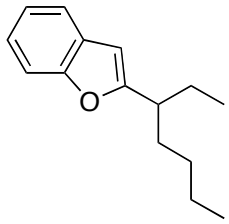


2-Cycloheptylbenzofuran (Table 3, entry 11, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and cyclopentyl bromide (74.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a colorless oil (76.1 mg, 71%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.49 (dd, J = 7.0, 1.9 Hz, 1H), 7.42 (d, J = 8.0 Hz, 1H), 7.24-7.15 (m, 2H), 6.37 (s, 1H), 3.03-2.95 (m, 1H), 2.19-2.10 (m, 2H), 1.85-1.57 (m, 10H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 164.99, 154.58, 129.09, 123.14, 122.44, 120.39, 110.86, 100.07, 39.66, 33.19, 28.58, 26.41; IR

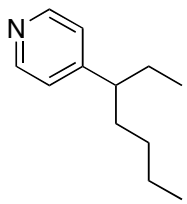
(neat) = 2925, 2865, 1583, 1455, 1255, 1175, 793, 749 cm^{-1}; HRMS (ES) calcd. for $C_{15}H_{18}O$ (M^+) 214.1358, found 214.1359.



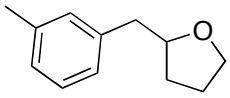
4-Cycloheptylpyridine (Table 3, entry 11, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and cycloheptyl bromide (88.6 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a light yellow oil (60.2 mg, 69%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.44 (d, *J* = 6.1 Hz, 2H), 7.08 (d, *J* = 6.1 Hz, 2H), 2.66-2.59 (m, 1H), 1.90-1.83 (m, 2H), 1.82-1.74 (m, 2H), 1.71-1.49 (m, 8H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 158.52, 149.82, 122.37, 46.37, 36.03, 27.97, 27.19; IR (neat) = 3021, 2924, 2854, 1596, 1460, 1411, 804 cm^{-1}; HRMS (CI) calcd. for $C_{12}H_{18}N$ (MH^+) 176.1439, found 176.1442.



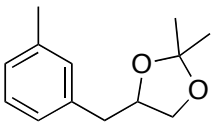
2-(Heptan-3-yl)benzofuran (Table 3, entry 12, 1). The general procedure was employed using potassium 2-benzofuranyltrifluoroborate (114.3 mg, 0.51 mmol) and 3-heptyl bromide (89.5 mg, 0.50 mmol). The reaction time was 12 h and the compound was obtained as a light yellow oil (66.8 mg, 62%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.49 (dd, *J* = 6.8, 2.2 Hz, 1H), 7.43 (d, *J* = 7.6 Hz, 1H), 7.19 (dd, *J* = 8.0, 6.2 Hz, 2H), 6.39 (s, 1H), 2.74-2.66 (m, 1H), 1.78-1.62 (m, 4H), 1.35-1.21 (m, 4H), 0.90-0.84 (m, 6H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 162.52, 154.72, 129.04, 123.01, 122.41, 120.29, 110.95, 102.27, 41.38, 33.40, 29.70, 27.00, 22.86, 14.16, 11.95; IR (neat) = 2959, 2930, 2859, 1584, 1455, 1253, 796, 750 cm^{-1}; HRMS (ES) calcd. for $C_{15}H_{21}O$ (MH^+) 217.1588, found 217.1592.



4-(Heptan-3-yl)pyridine (Table 3, entry 12, 2). The general procedure was employed using potassium 4-pyridinyltrifluoroborate (94.34 mg, 0.51 mmol) and 3-heptyl bromide (89.5 mg, 0.50 mmol). The reaction time was 16 h and the compound was obtained as a colorless oil (55.5 mg, 63%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.48 (d, *J* = 4.8 Hz, 2H), 7.05 (d, *J* = 4.8 Hz, 2H), 2.45-2.29 (m, 1H), 1.74-1.59 (m, 2H), 1.59-1.47 (m, 2H), 1.31-1.18 (m, 2H), 1.16-1.01 (m, 2H), 0.82 (t, *J* = 7.1 Hz, 3H), 0.75 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 155.33, 149.78, 123.49, 47.54, 35.65, 29.76, 29.19, 22.82, 14.08, 12.12; IR (neat) = 3024, 2928, 2858, 1598, 1461, 1414, 818 cm^{-1}; HRMS (CI) calcd. for $C_{12}H_{20}N$ (MH^+) 178.1596, found 178.1589.

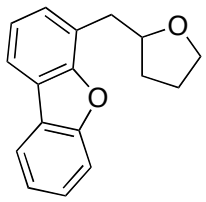


2-(3-Methylbenzyl)tetrahydrofuran (Table 4, entry 1). The general procedure was employed using potassium 3-methylphenyltrifluoroborate (100.9 mg, 0.51 mmol) and tetrahydrofurfuryl chloride (60.3 mg, 0.50 mmol). The reaction time was 24 h and the compound was obtained as a colorless oil (52.6 mg, 60%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.16 (t, *J* = 7.5 Hz, 1H), 7.06-6.98 (m, 3H), 4.09-4.01 (m, 1H), 3.92-3.85 (m, 1H), 3.76-3.68 (m, 1H), 2.87 (dd, *J* = 13.5, 6.5 Hz, 1H), 2.69 (dd, *J* = 13.5, 6.6 Hz, 1H), 2.31 (s, 3H), 1.95-1.77 (m, 3H), 1.59-1.50 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 138.83, 137.74, 129.88, 128.11, 126.81, 126.09, 80.04, 67.79, 41.79, 30.94, 25.47, 21.32; IR (neat) = 2924, 2856, 1604, 1459, 1063 cm^{-1}; HRMS (CI) calcd. for $C_{12}H_{17}O$ (MH^+) 177.1279, found 177.1283.

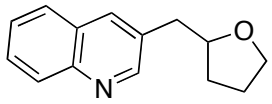


2,2-Dimethyl-4-(3-methylbenzyl)-1,3-dioxolane (Table 4, entry 2). The general procedure was employed using potassium 3-methylphenyltrifluoroborate (100.9 mg, 0.51 mmol) and 4-(cholоromethyl)-2,2-dimethyl-1,3-dioxolane (75.3 mg, 0.50 mmol). The reaction time was 24 h and the compound was obtained as a colorless oil (55.5 mg, 54%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.17 (t, *J* = 7.5 Hz, 1H), 7.04-6.97 (m, 3H), 4.34-4.26 (m, 1H), 3.94 (dd, *J* = 8.1, 5.9 Hz, 1H), 3.62 (dd, *J* = 8.0, 7.0 Hz, 1H), 2.97 (dd, *J* = 13.6, 6.0 Hz, 1H), 2.71 (dd, *J* = 13.6, 7.4 Hz, 1H), 2.31 (s, 3H), 1.42 (s, 3H), 1.34 (s, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 137.97, 137.35, 129.84, 128.29, 127.19, 126.04, 108.99, 68.93,

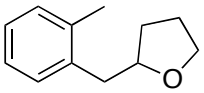
40.00, 26.94, 25.65, 21.30; IR (neat) = 2985, 2932, 2868, 1607, 1369, 1225, 1062 cm^{-1}; HRMS (CI) calcd. for $C_{12}H_{19}O$ (MH^+) 207.1385, found 207.1385.



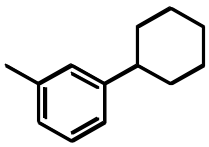
4-((Tetrahydrofuran-2-yl)methyl)dibenzo[*b*,*d*]furan (Table 4, entry 3). The general procedure was employed using potassium 4-dibenzofuranyltrifluoroborate (139.8 mg, 0.51 mmol) and tetrahydrofurfuryl chloride (60.3 mg, 0.50 mmol). The reaction time was 28 h and the compound was obtained as a colorless oil (59.3 mg, 47%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.94 (d, *J* = 7.6 Hz, 1H), 7.82 (d, *J* = 7.6 Hz, 1H), 7.59 (d, *J* = 8.2 Hz, 1H), 7.50-7.42 (m, 1H), 7.39-7.24 (m, 3H), 4.40-4.31 (m, 1H), 4.00-3.92 (m, 1H), 3.83-3.74 (m, 1H), 3.27 (dd, *J* = 13.7, 6.6 Hz, 1H), 3.16 (dd, *J* = 13.7, 6.6 Hz, 1H), 2.01-1.83 (m, 3H), 1.73-1.64 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 156.18, 155.07, 128.38, 127.08, 124.76, 124.01, 123.23, 122.93, 122.72, 120.83, 118.80, 111.83, 78.94, 68.16, 36.00, 31.31, 25.80; IR (neat) = 2971, 2867, 1450, 1184, 1061, 751 cm^{-1}; HRMS (CI) calcd. for $C_{17}H_{17}O_2$ (MH^+) 253.1235, found 253.1229.



3-((Tetrahydrofuran-2-yl)methyl)quinoline (Table 4, entry 4). The general procedure was employed using potassium 4-isoquinolinyltrifluoroborate (119.8 mg, 0.51 mmol) and tetrahydrofurfuryl chloride (60.3 mg, 0.50 mmol). The reaction time was 28 h and the compound was obtained as a colorless oil (50.1 mg, 42%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.82 (s, 1H), 8.08 (d, *J* = 8.4 Hz, 1H), 8.01 (d, *J* = 1.5 Hz, 1H), 7.78 (dd, *J* = 8.2, 1.2 Hz, 1H), 7.69-7.63 (m, 1H), 7.54-7.49 (m, 1H), 4.21-4.12 (m, 1H), 3.93-3.85 (m, 1H), 3.80-3.71 (m, 1H), 3.02 (2 dd, *J* = 12.1, 6.2 Hz, 2H), 2.04-1.95 (m, 1H), 1.93-1.82 (m, 2H), 1.66-1.56 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 152.53, 147.13, 135.64, 131.85, 129.29, 128.90, 128.24, 127.62, 126.69, 79.46, 68.21, 39.19, 31.11, 25.82; IR (neat) = 2938, 2853, 1463, 1065, 784 cm^{-1}; HRMS (CI) calcd. for $C_{14}H_{16}ON$ (MH^+) 214.1232, found 214.1223.



2-(2-Methylbenzyl)tetrahydrofuran (Table 4, entry 5). The general procedure was employed using potassium 2-methylphenyltrifluoroborate (100.9 mg, 0.51 mmol) and tetrahydrofurfuryl chloride (60.3 mg, 0.50 mmol). The reaction time was 26 h and the compound was obtained as a colorless oil (52.5 mg, 60%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.22-7.18 (m, 1H), 7.17-7.10 (m, 3H), 4.14-4.06 (m, 1H), 3.96-3.89 (m, 1H), 3.79-3.72 (m, 1H), 2.97 (dd, *J* = 13.9, 6.5 Hz, 1H), 2.75 (dd, *J* = 13.9, 6.7 Hz, 1H), 2.35 (s, 3H), 1.99-1.83 (m, 3H), 1.66-1.57 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 137.42, 136.50, 130.33, 129.92, 126.44, 126.02, 79.27, 68.00, 39.20, 31.37, 25.78, 19.84; IR (neat) = 2969, 2866, 1489, 1060, 742 cm^{-1}; HRMS (CI) calcd. for $C_{12}H_{16}O$ (M^+) 176.1201, found 176.1203.



Cyclohexyl-3-methylbenzene (Table 4, entry 6). The general procedure was employed using potassium 3-methylphenyltrifluoroborate (100.9 mg, 0.51 mmol) and cyclohexyl chloride (59.3 mg, 0.50 mmol). The reaction time was 26 h and the compound was obtained as a colorless oil (42.5 mg, 49%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.22 (t, *J* = 7.5 Hz, 1H), 7.08-7.01 (m, 3H), 2.53-2.46 (m, 1H), 2.37 (s, 3H), 1.95-1.84 (m, 4H), 1.82-1.75 (m, 1H), 1.51-1.37 (m, 4H), 1.35-1.24 (m, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.27, 137.91, 128.36, 127.85, 126.70, 124.00, 44.76, 34.67, 27.14, 26.39, 21.68; IR (neat) = 2923, 2851, 1447, 779, 701 cm^{-1}; HRMS (CI) calcd. for $C_{13}H_{19}$ (M^+) 175.1487, found 175.1489.

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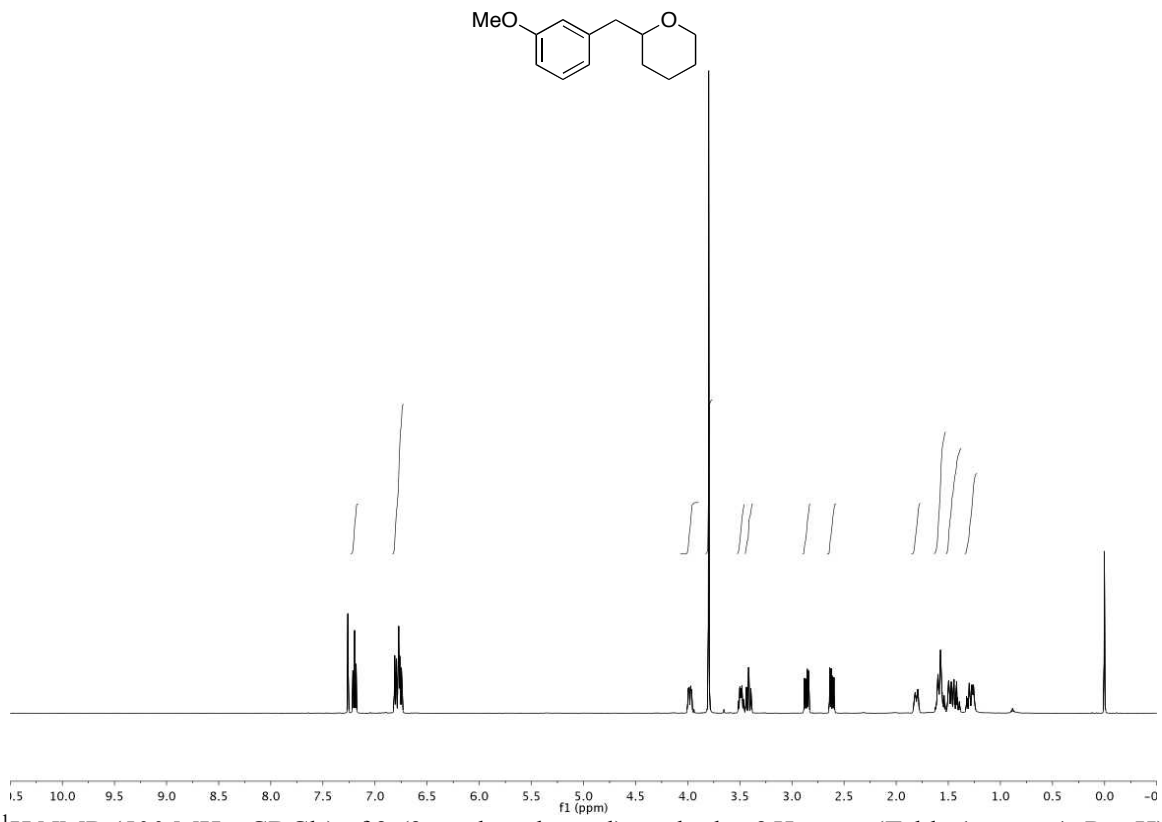
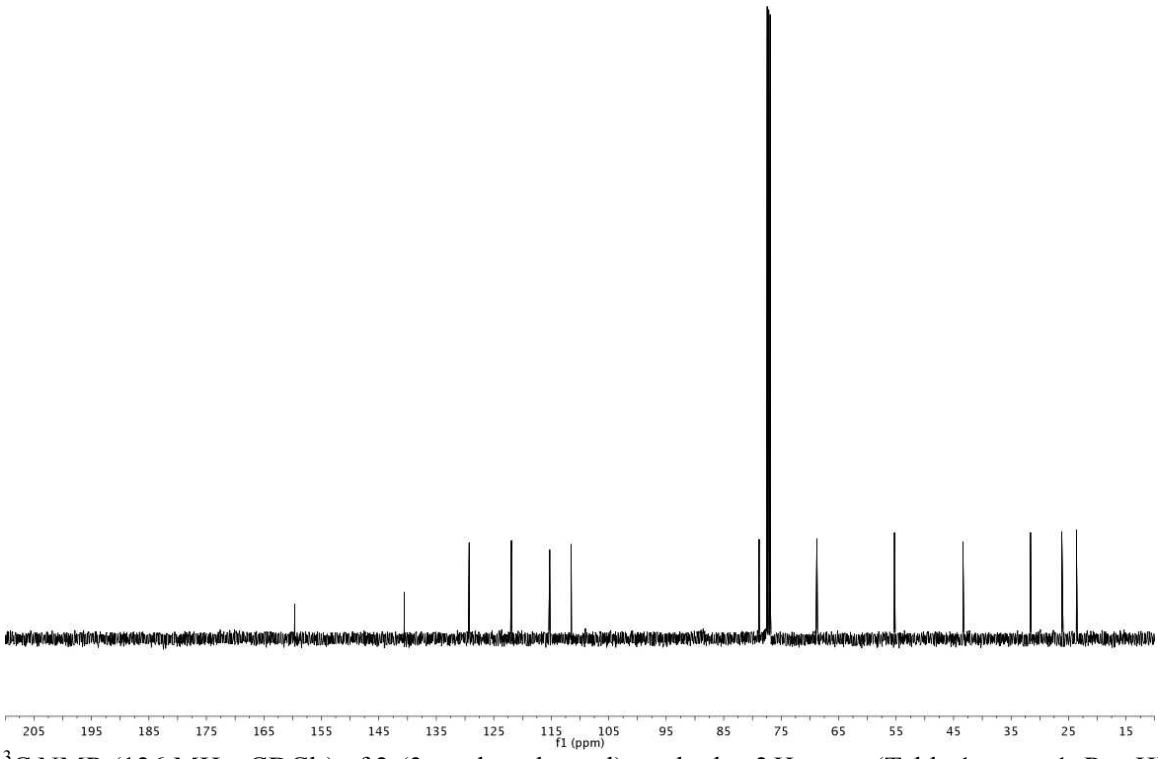
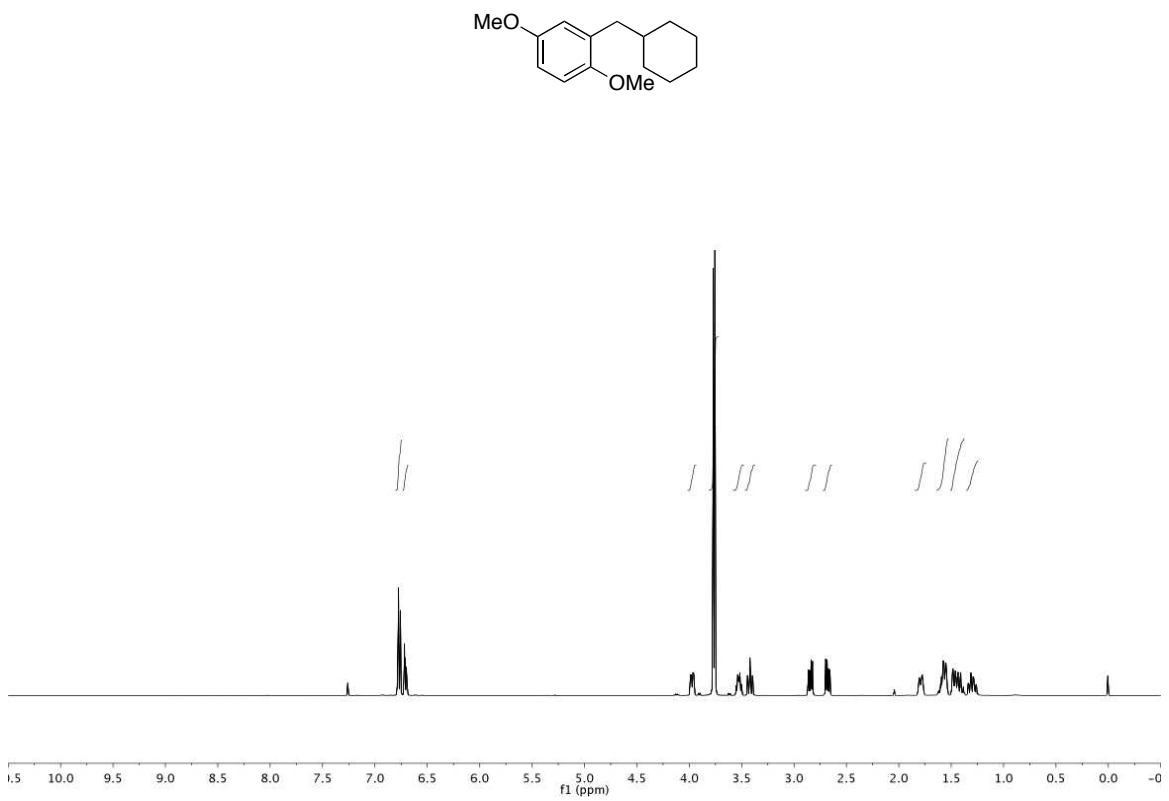


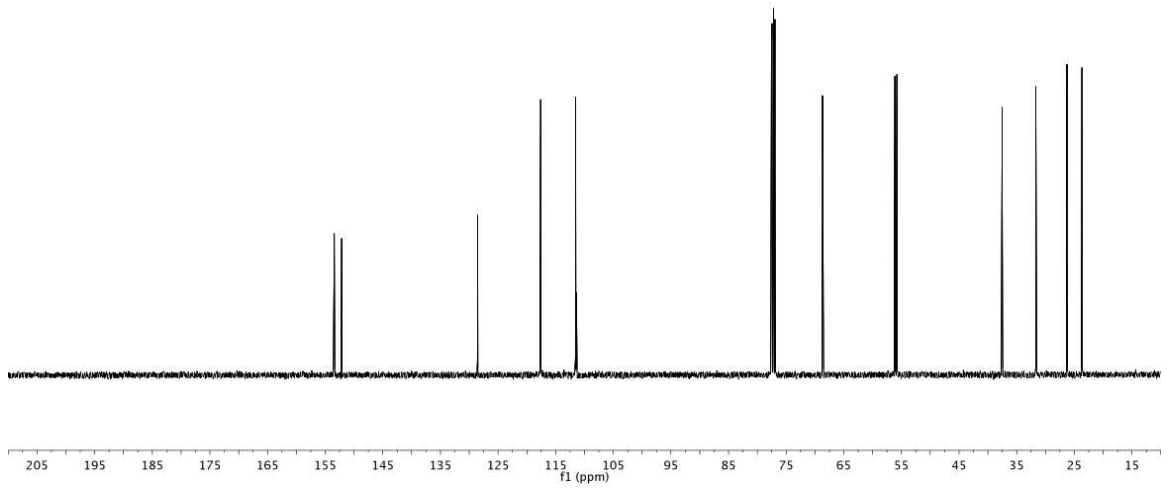
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(3-methoxybenzyl)tetrahydro-2*H*-pyran (Table 1, entry 1, R = H)



^{13}C NMR (126 MHz, $CDCl_3$) of 2-(3-methoxybenzyl)tetrahydro-2*H*-pyran (Table 1, entry 1, R = H)

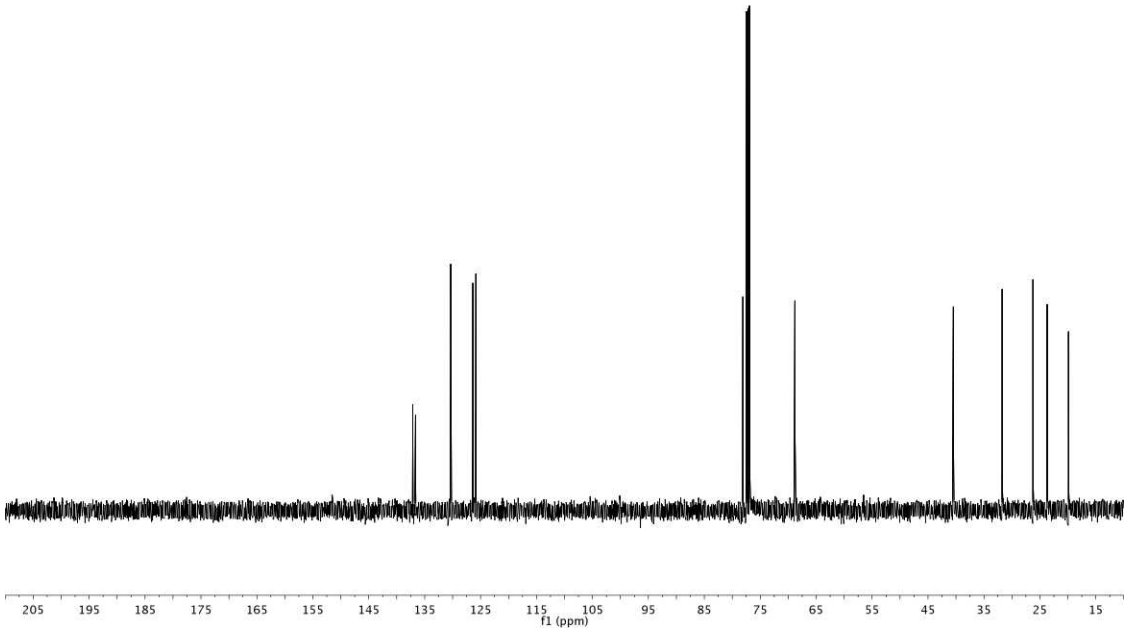


^{1}H NMR (500 MHz, $CDCl_3$) of 2-(2,5-dimethoxybenzyl)tetrahydro-2*H*-pyran (Table 1, entry 1, R = OMe)

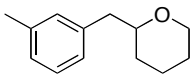


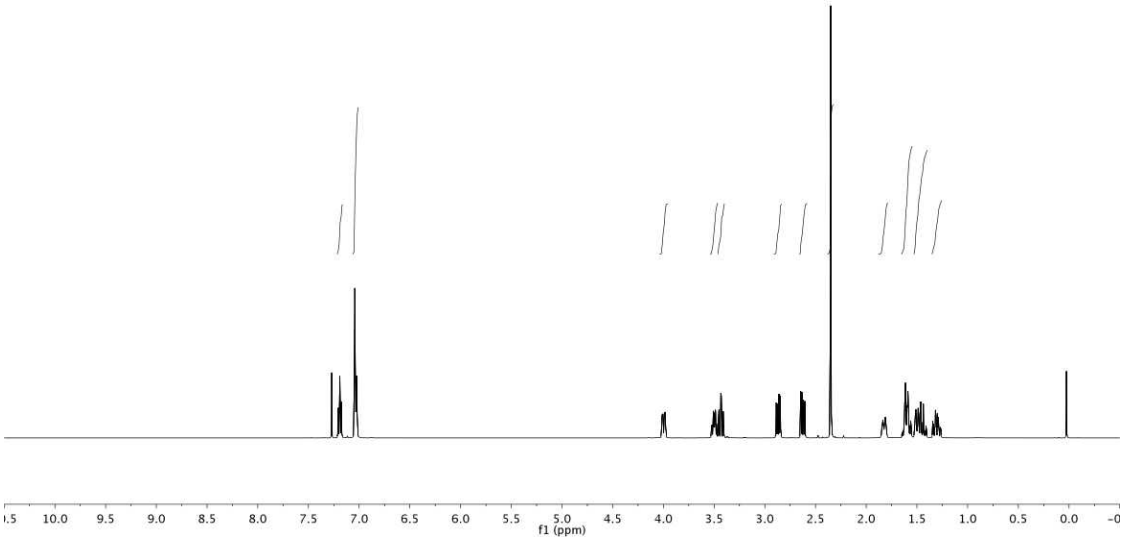
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(3-dimethoxybenzyl)tetrahydro-2*H*-pyran (Table 1, entry 1, R = OMe)

^{1}H NMR (500 MHz, $CDCl_3$) of 2-(2-methylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 2, R = *o*-Me)

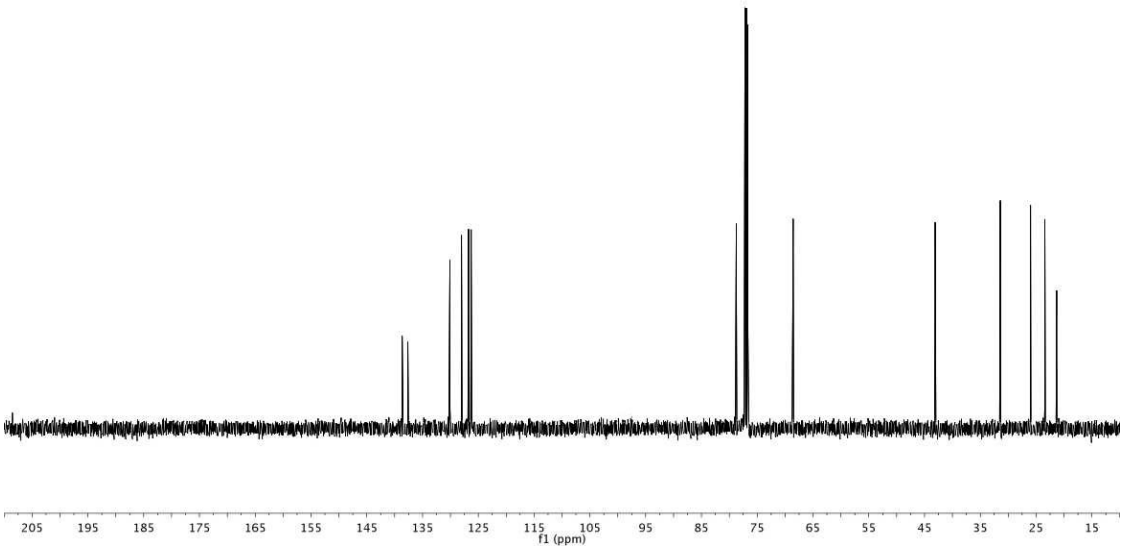


^{13}C NMR (126 MHz, $CDCl_3$) of 2-(2-methylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 2, R = *o*-Me)

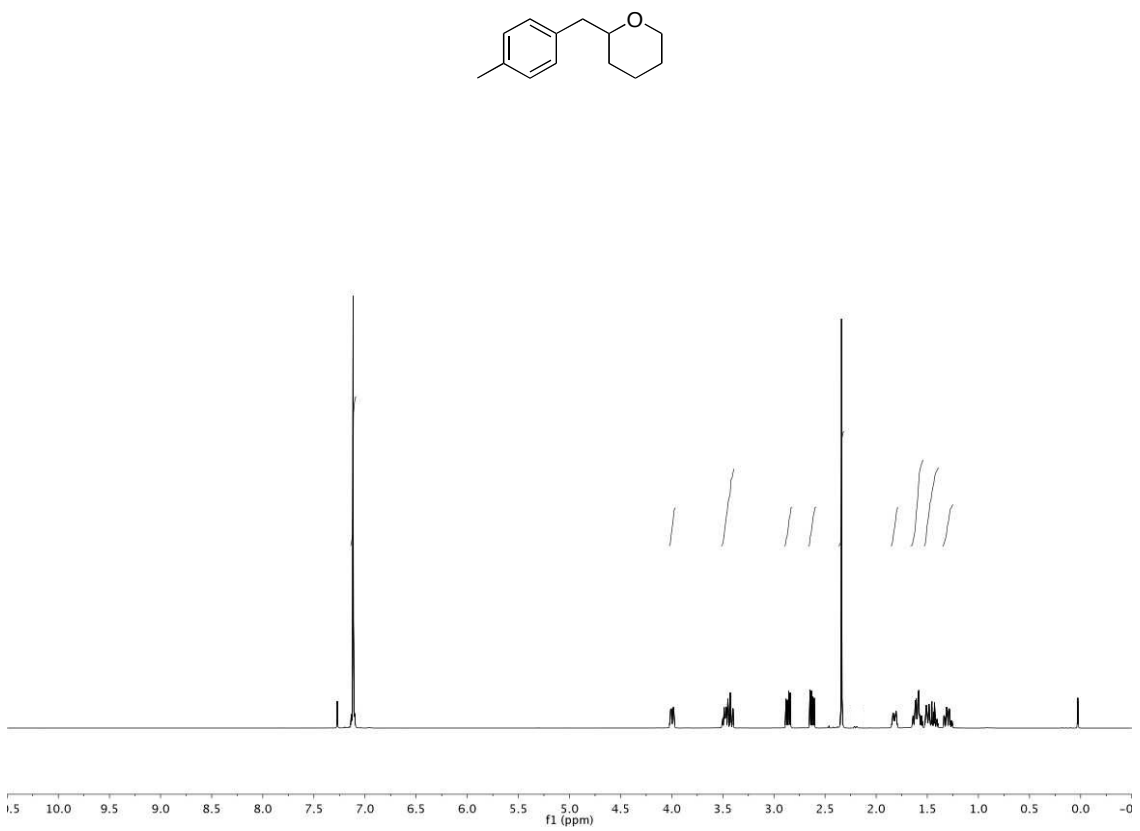




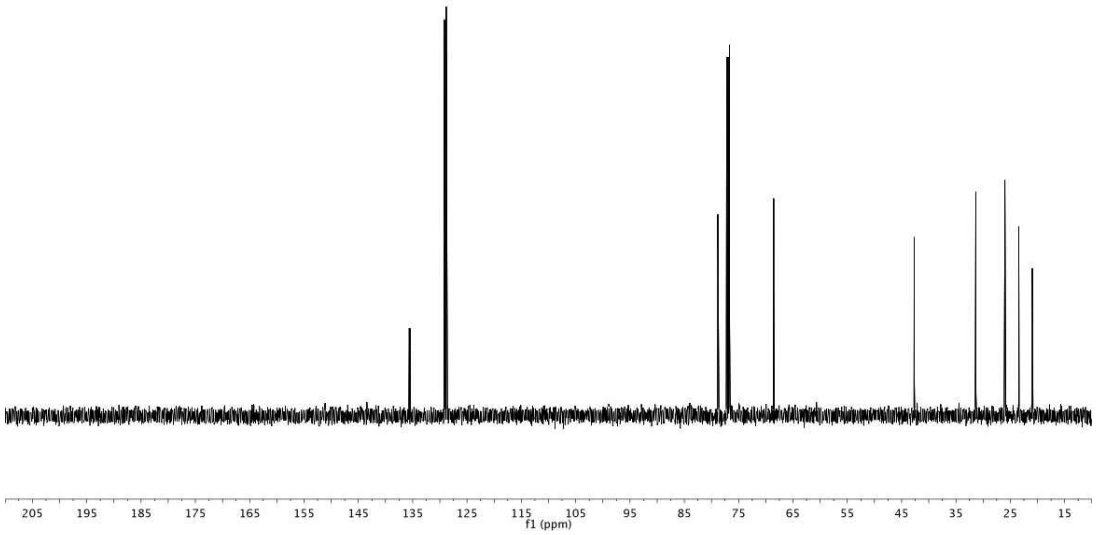
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(3-methylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 2, R = *m*-Me)



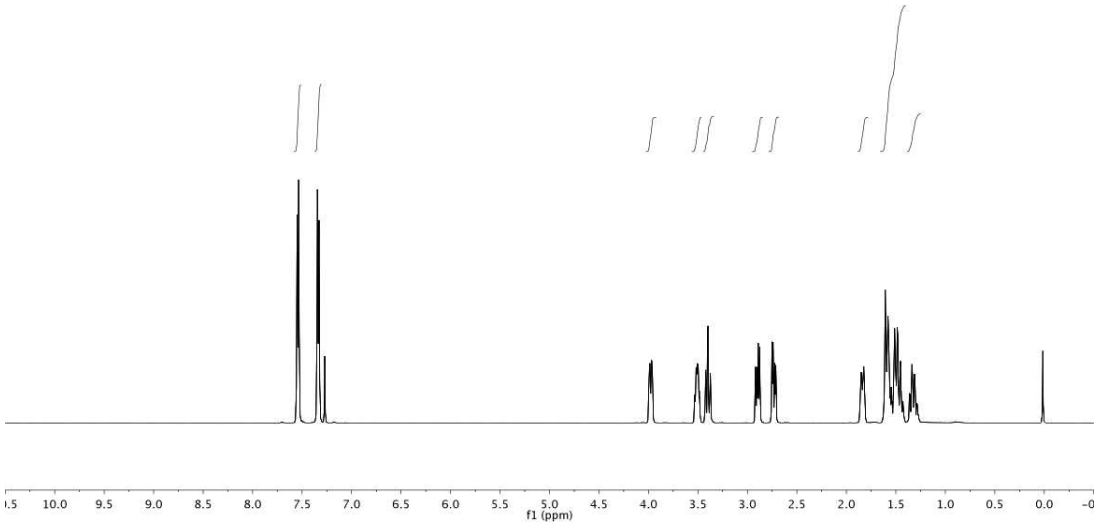
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(3-methylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 2, R = *m*-Me)



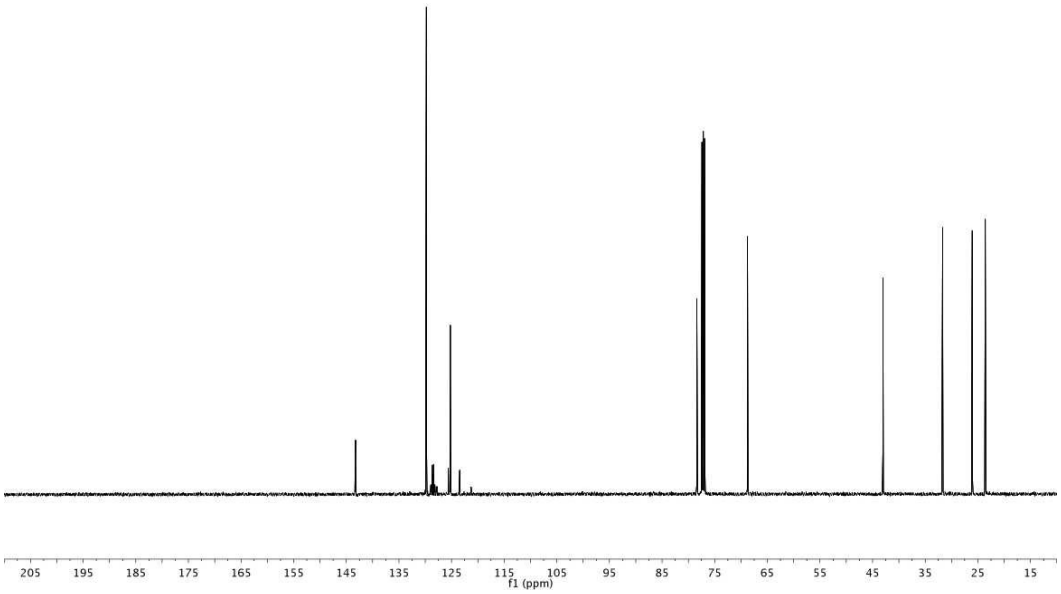
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(4-methylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 2, R = *p*-Me)



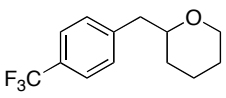
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(4-methylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 2, R = *p*-Me)

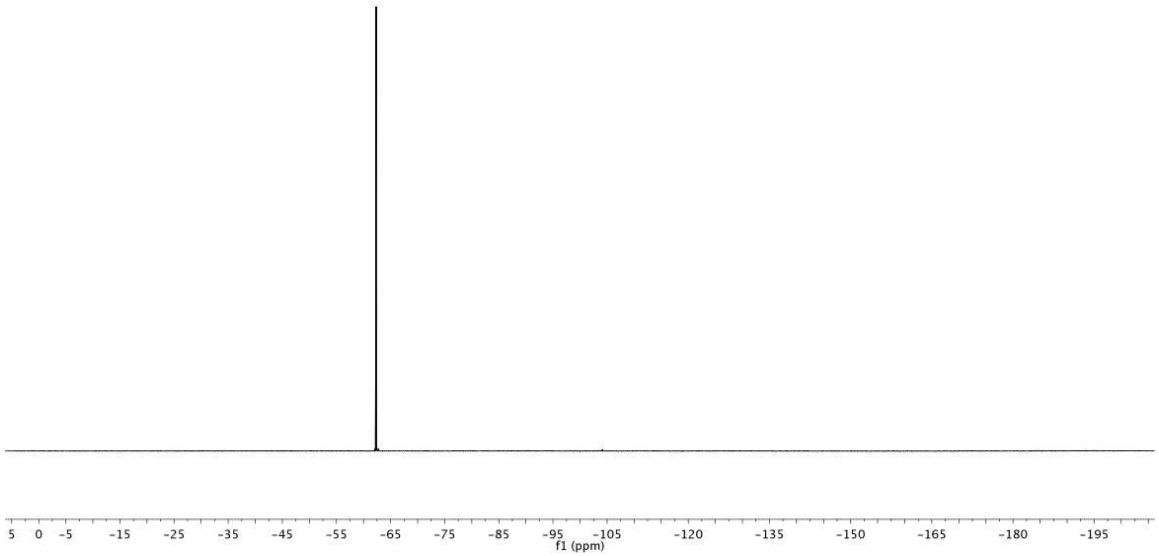


^{1}H NMR (500 MHz, $CDCl_3$) of 2-(4-(trifluoromethyl)benzyl)tetrahydro-2*H*-pyran (Table 1, entry 3)

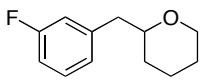


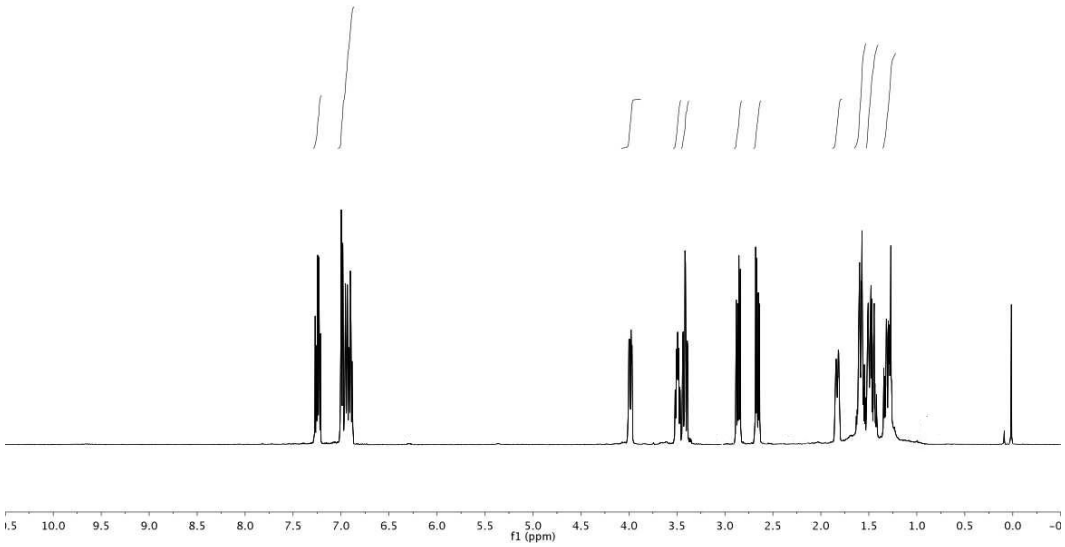
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(4-(trifluoromethyl)benzyl)tetrahydro-2*H*-pyran (Table 1, entry 3)



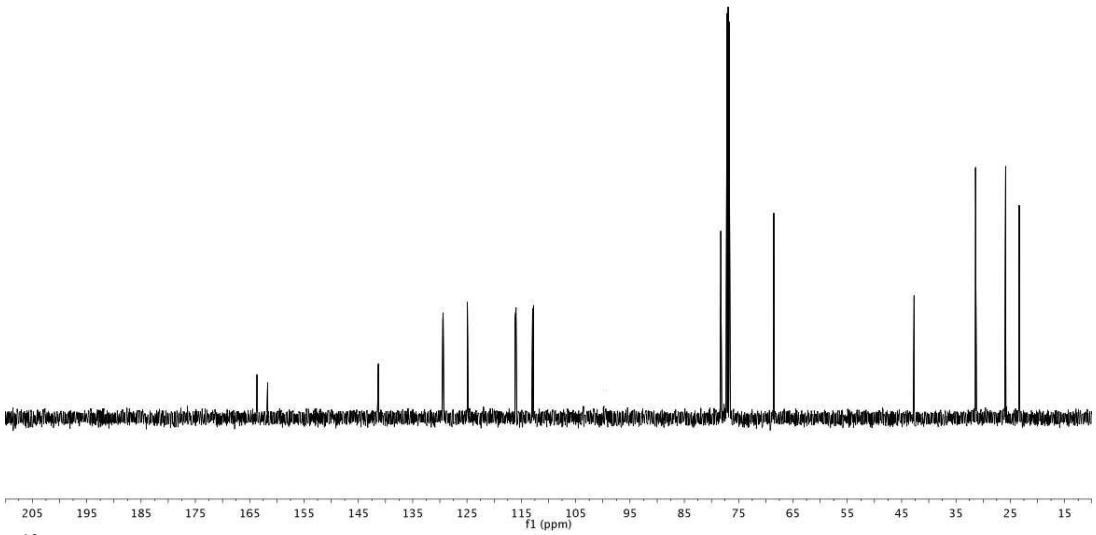


^{19}F NMR (471 MHz, C_6D_6) of 2-(4-(trifluoromethyl)benzyl)tetrahydro-2*H*-pyran (Table 1, entry 3)

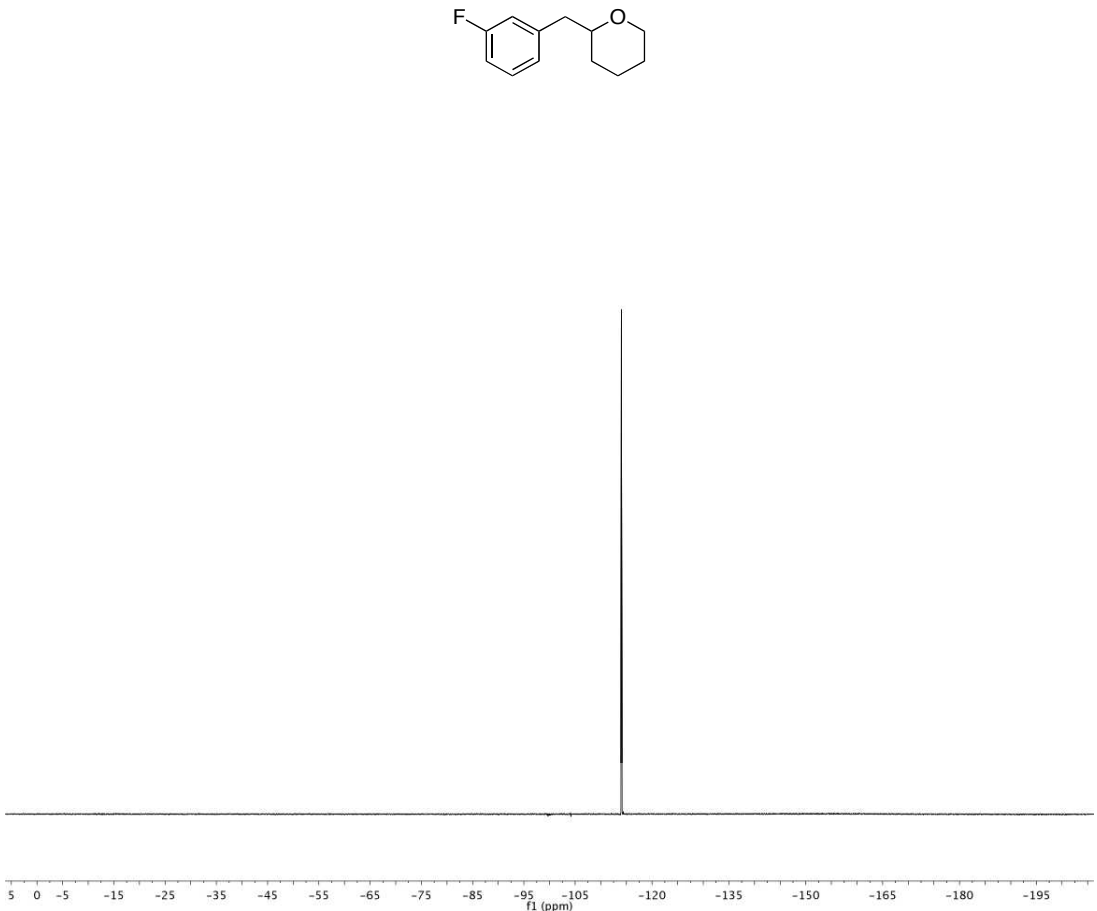




^{1}H NMR (500 MHz, $CDCl_3$) of 2-(3-fluorobenzyl)tetrahydro-2*H*-pyran (Table 1, entry 4)

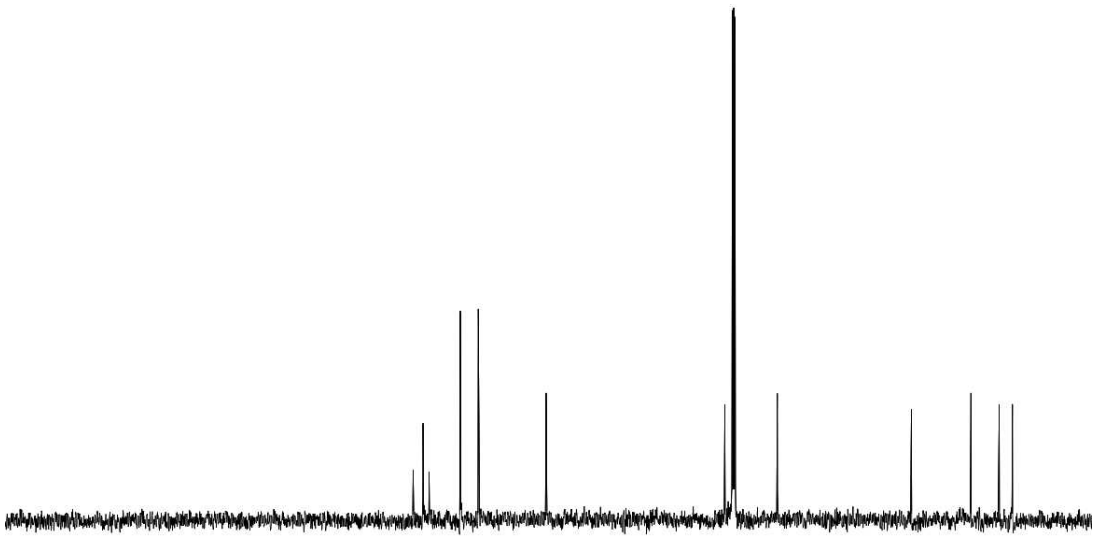


^{13}C NMR (126 MHz, $CDCl_3$) of 2-(3-fluorobenzyl)tetrahydro-2*H*-pyran (Table 1, entry 4)

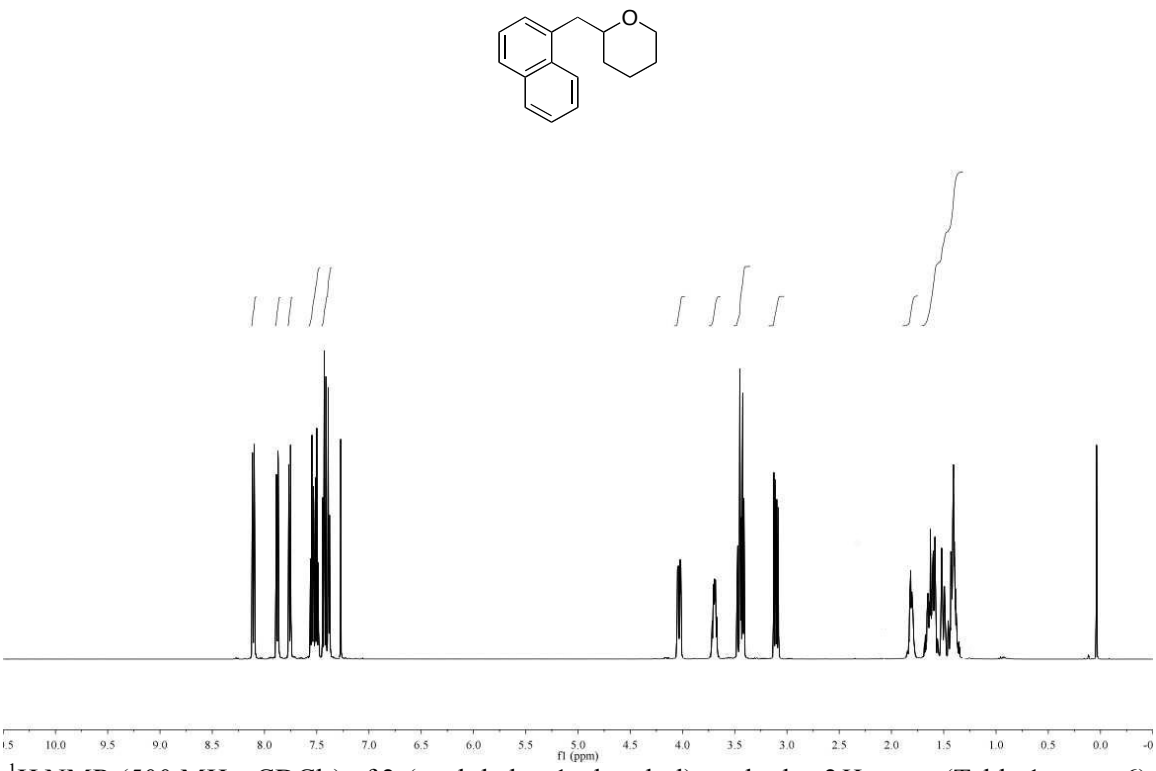


^{19}F NMR (471 MHz, C_6D_6) of 2-(3-fluorobenzyl)tetrahydro-2*H*-pyran (Table 1, entry 4)

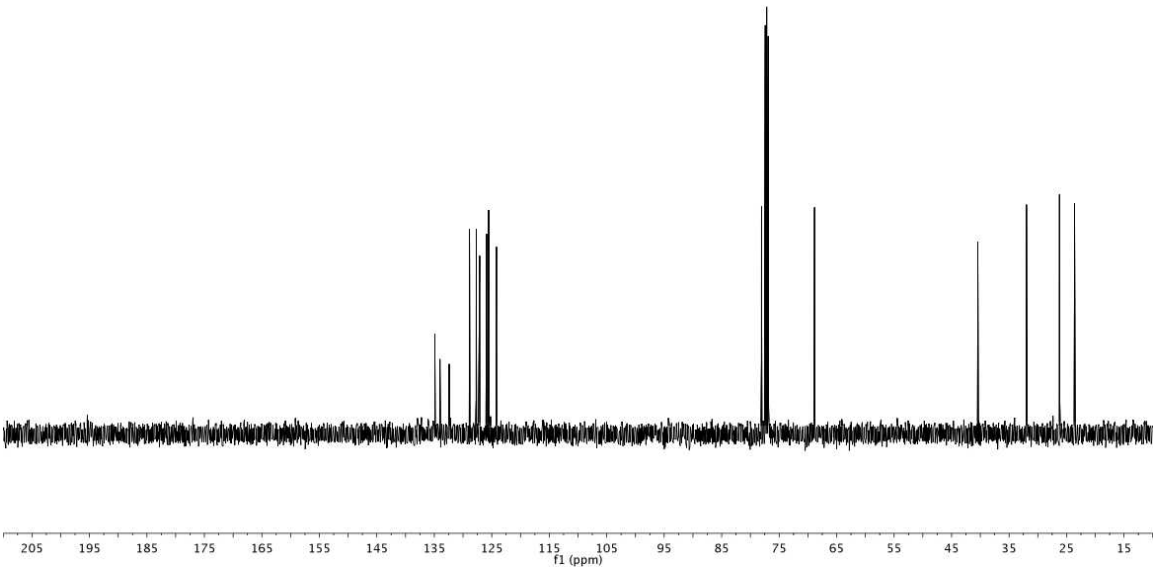
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(4-Vinylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 5)



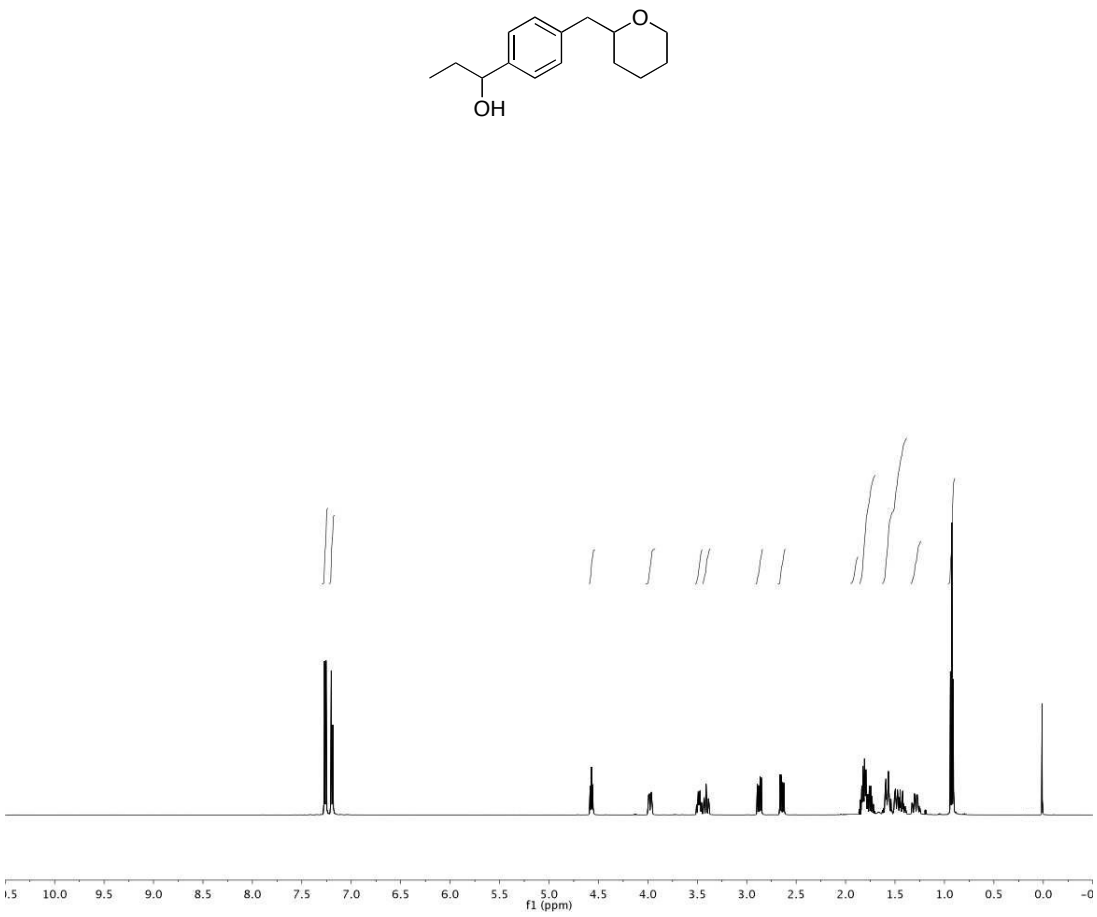
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(4-Vinylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 5)



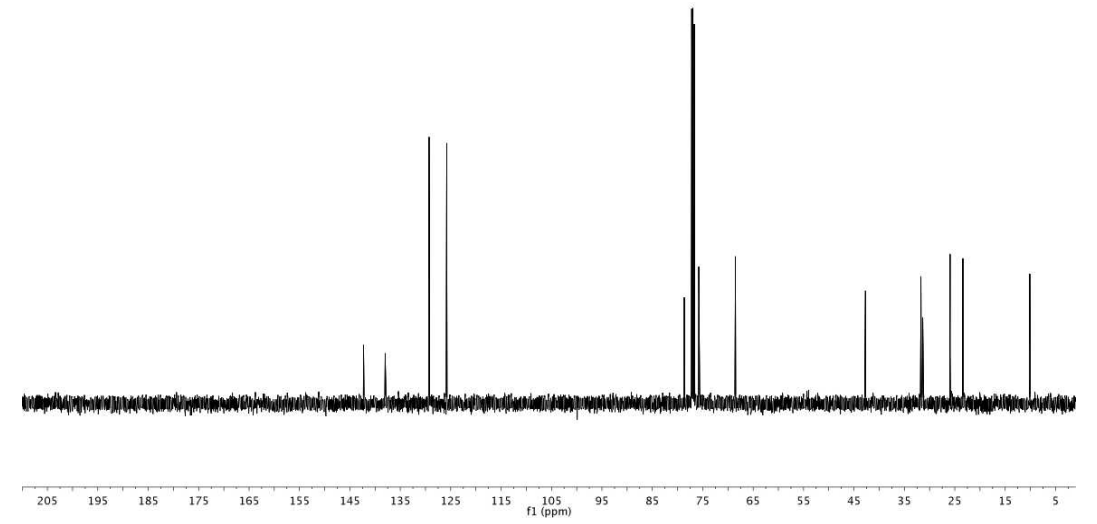
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(naphthalen-1-ylmethyl)tetrahydro-2*H*-pyran (Table 1, entry 6)



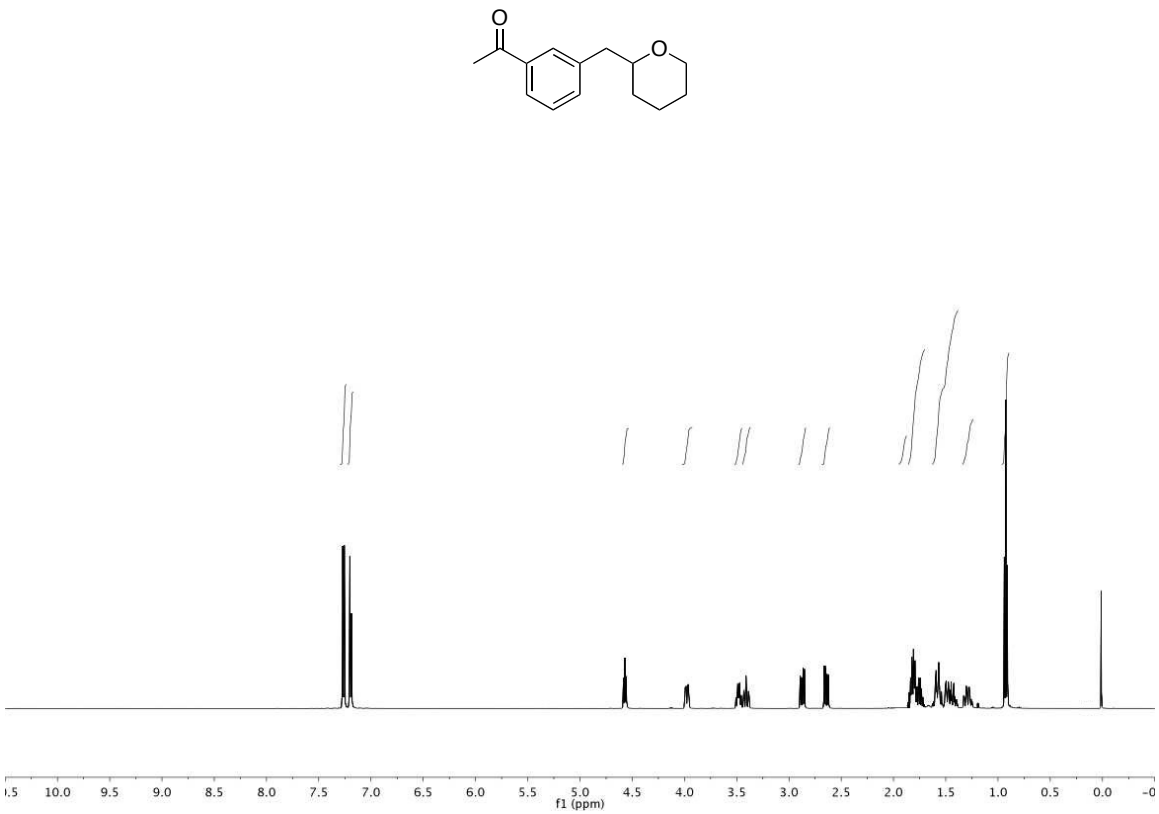
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(naphthalen-1-ylmethyl)tetrahydro-2*H*-pyran (Table 1, entry 6)



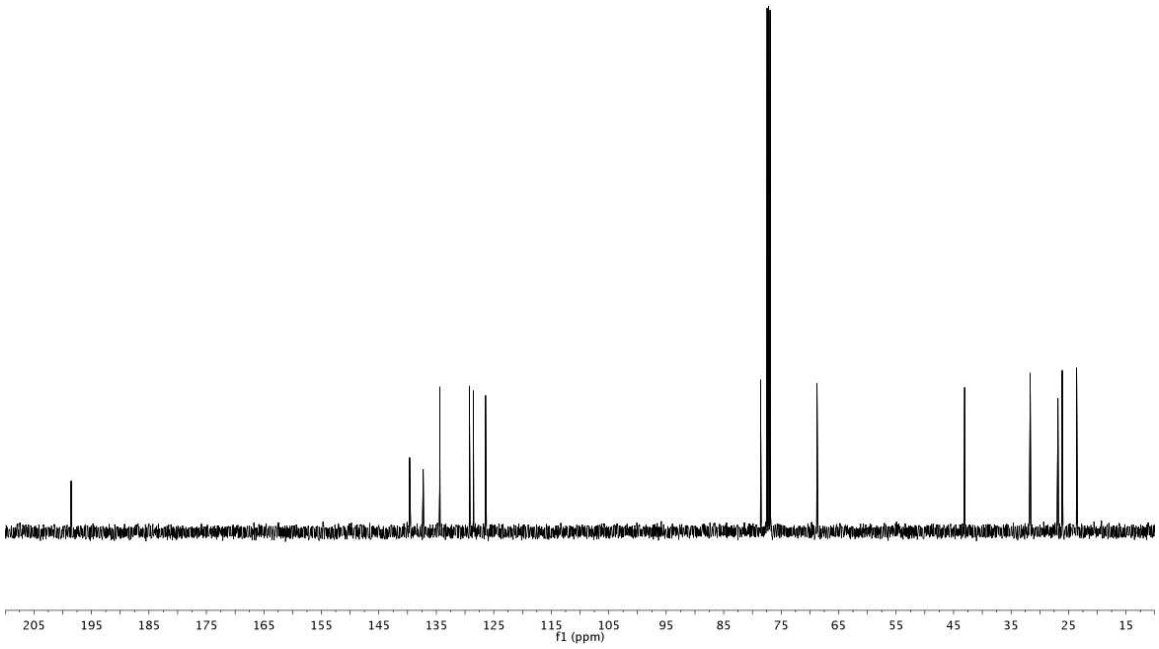
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(4-(1-hydroxypropyl)benzyl)tetrahydro-2*H*-pyran (Table 1, entry 7)



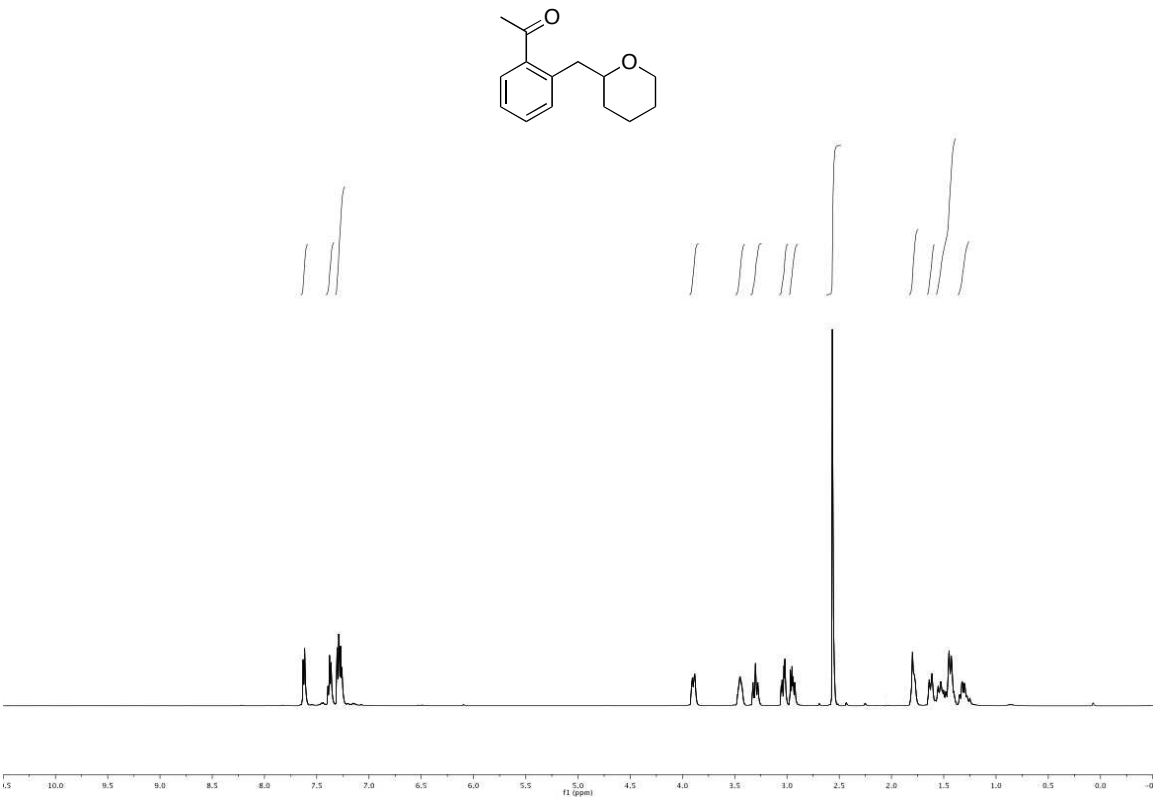
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(4-(1-hydroxypropyl)benzyl)tetrahydro-2*H*-pyran (Table 1, entry 7)



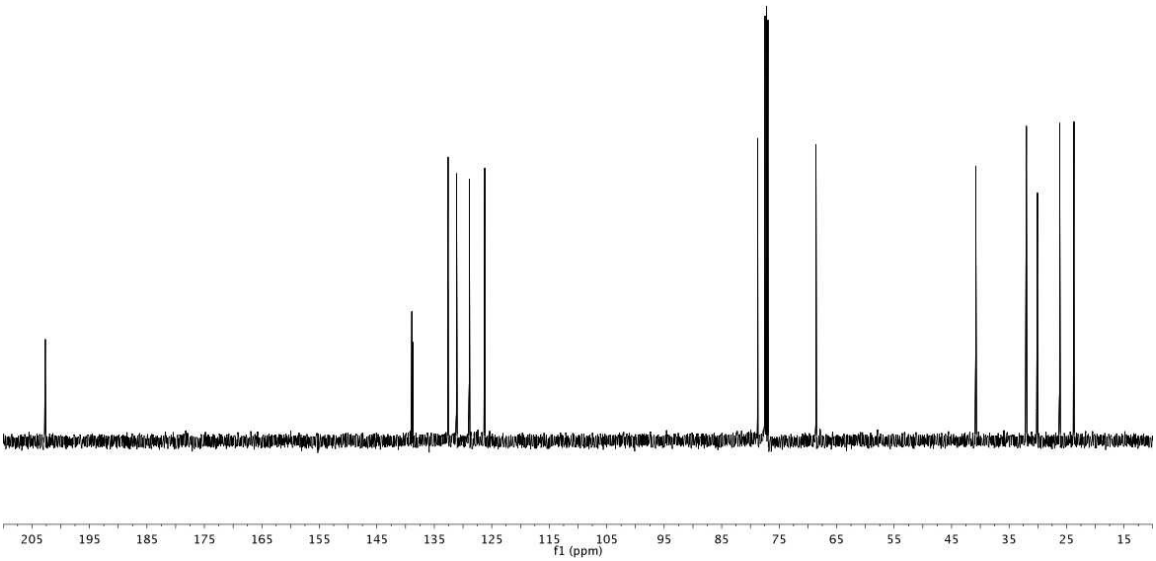
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(3-acetylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 8)



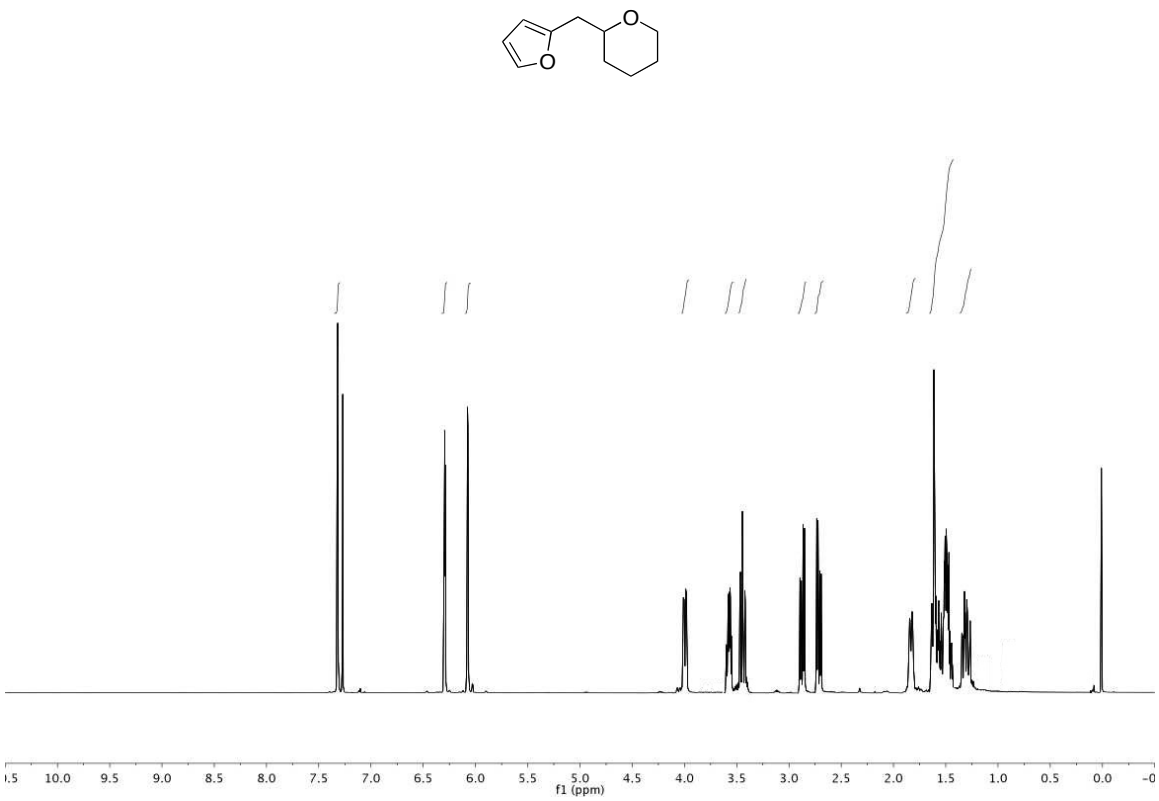
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(3-acetylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 8)



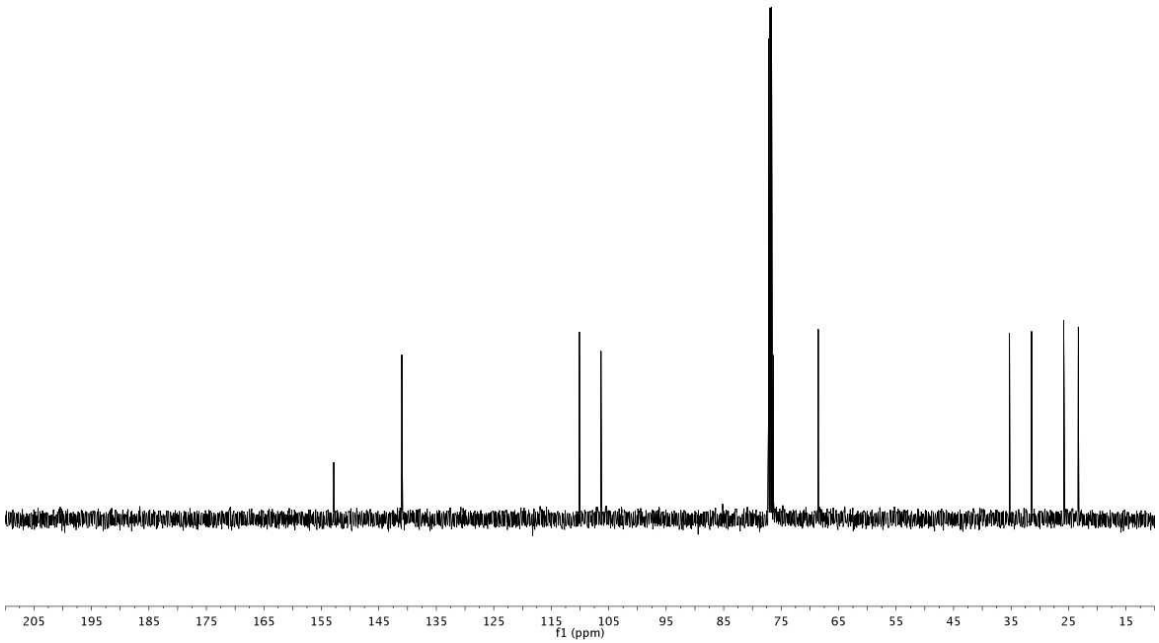
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(2-acetylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 9)



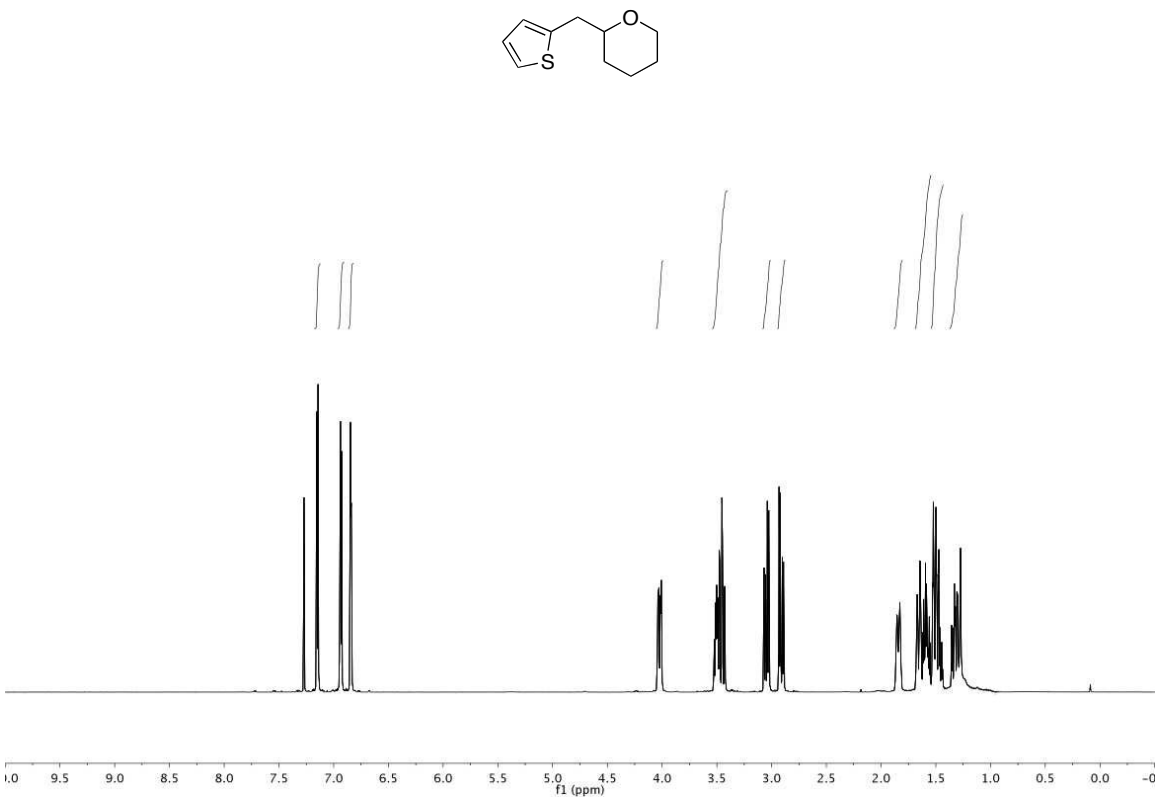
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(2-acetylbenzyl)tetrahydro-2*H*-pyran (Table 1, entry 9)



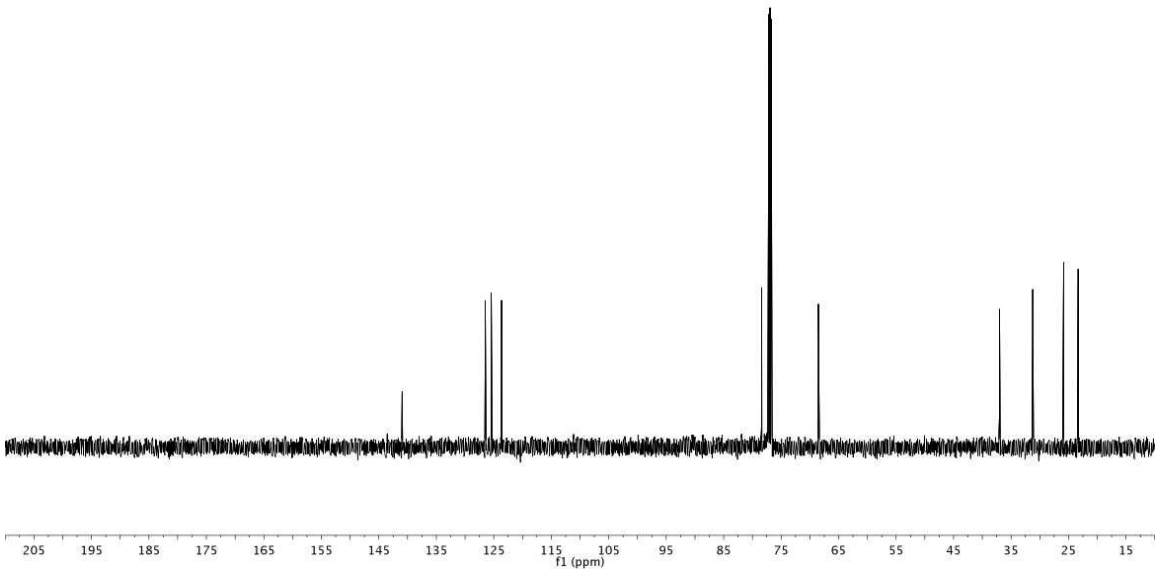
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(furan-2-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 1, X = O)



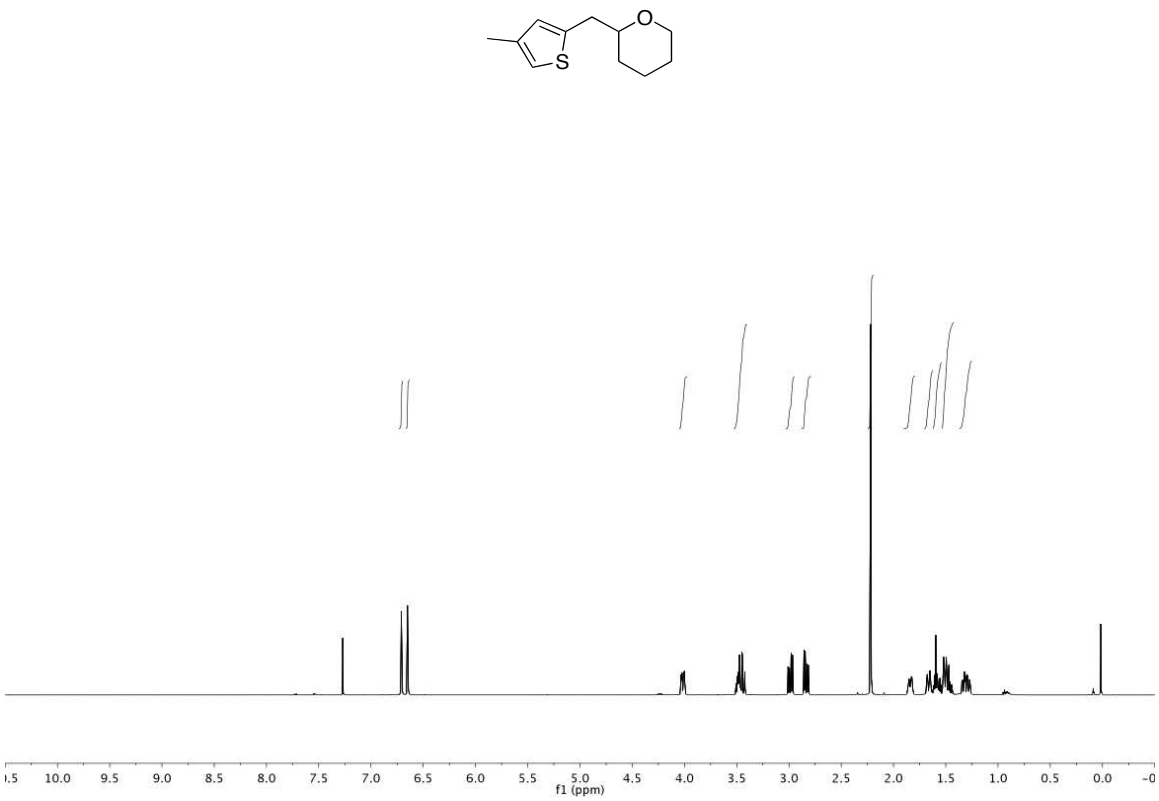
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(furan-2-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 1, X = O)



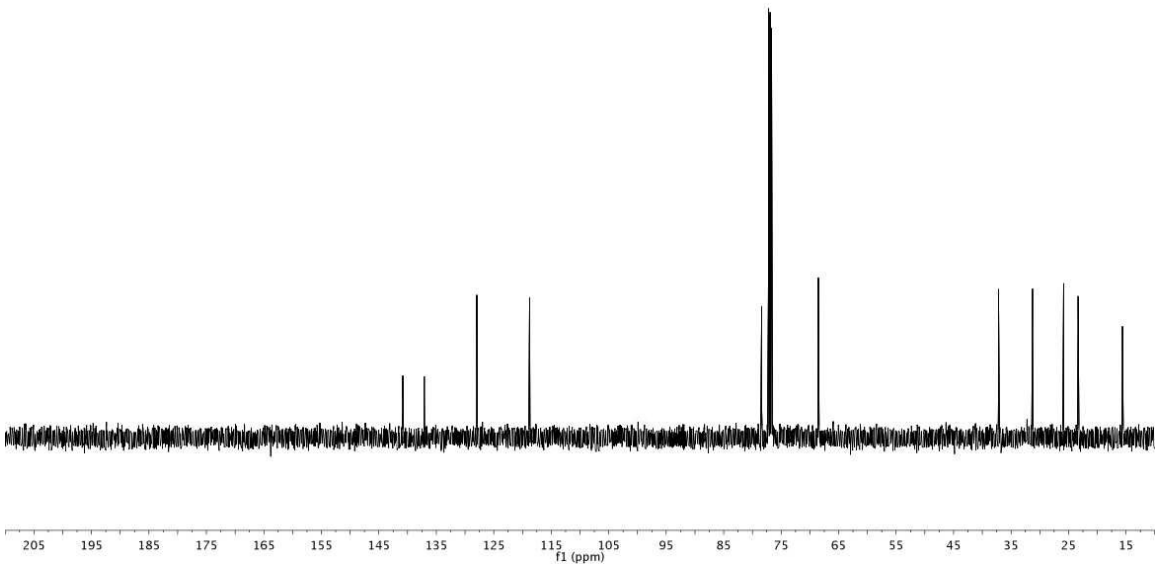
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(thiophen-2-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 1, X = S)



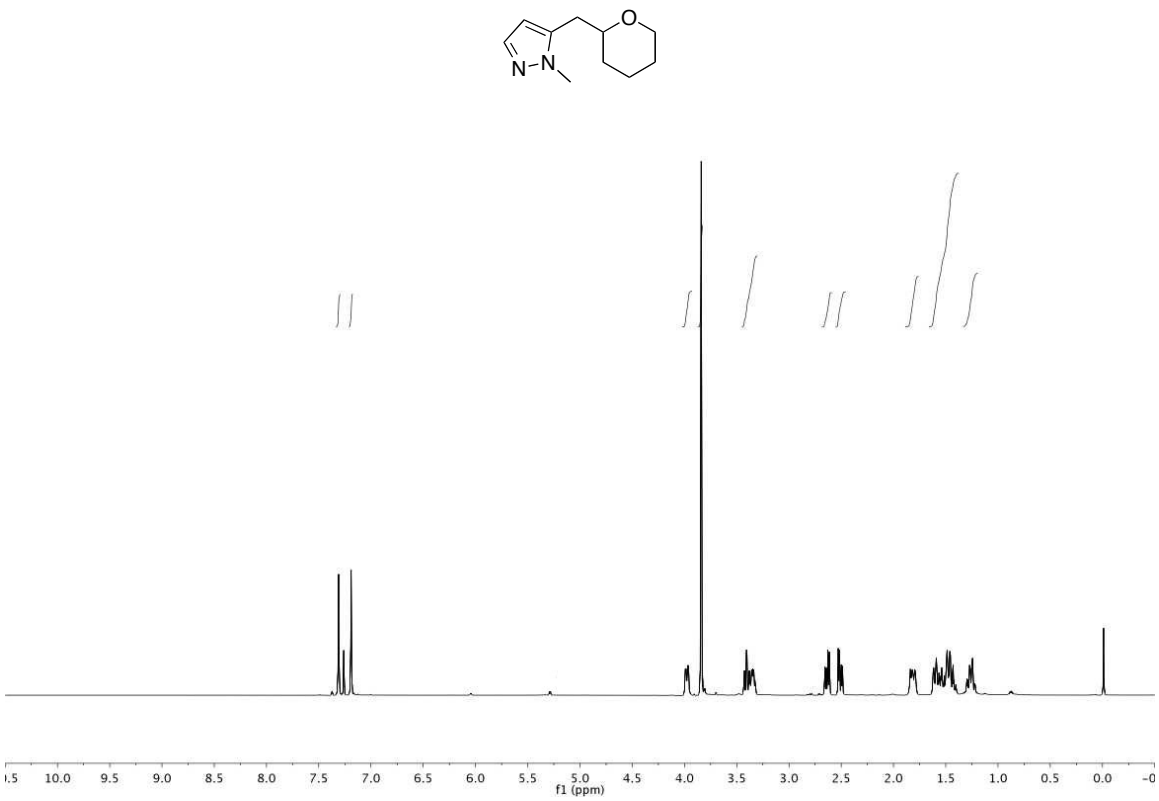
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(thiophen-2-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 1, X = S)



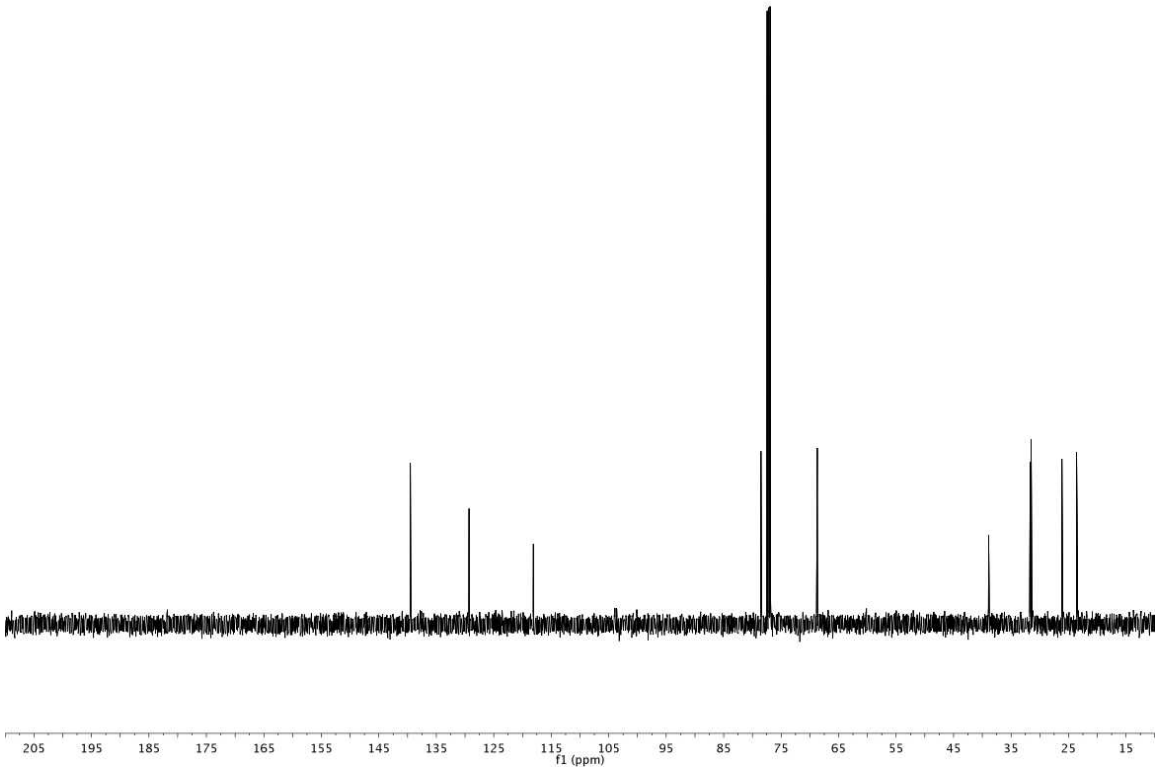
^{1}H NMR (500 MHz, $CDCl_3$) of 2-((4-methylthiophen-2-yl)methyl)tetrahydro-2*H*-pyran (Table 2, entry 2)



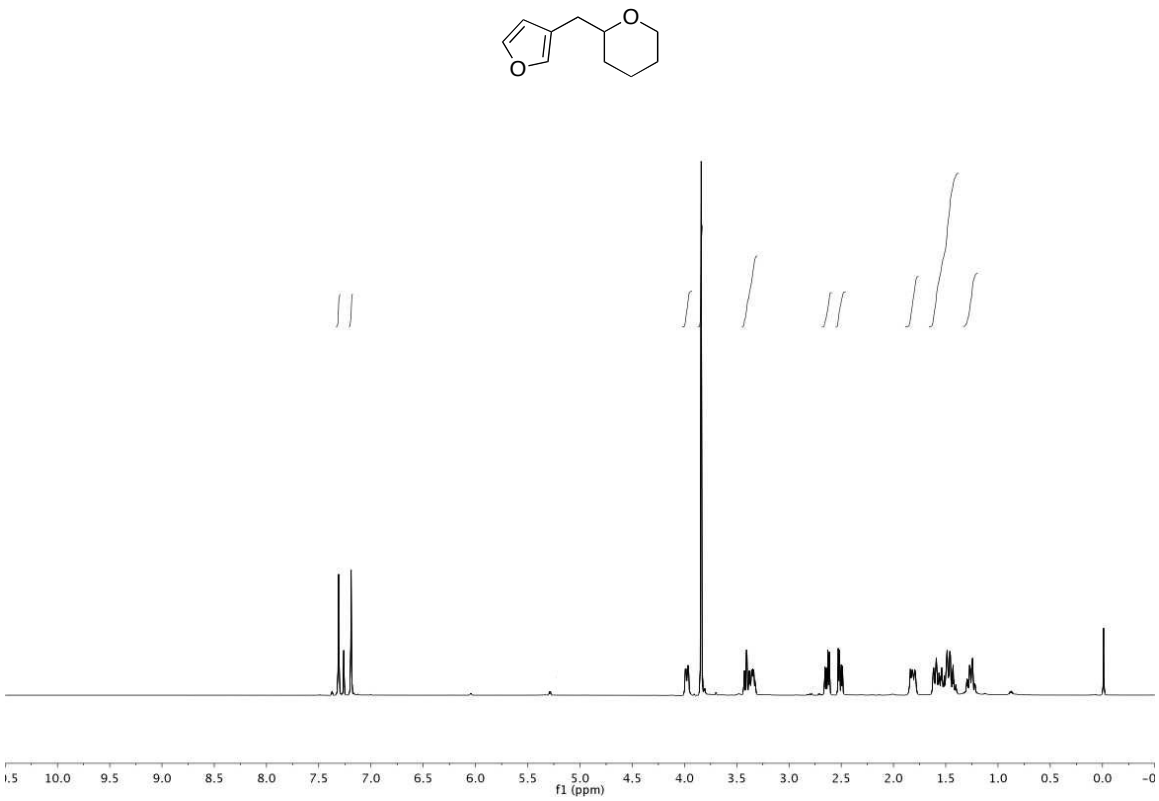
^{13}C NMR (126 MHz, $CDCl_3$) of 2-((4-methylthiophen-2-yl)methyl)tetrahydro-2*H*-pyran (Table 2, entry 2)



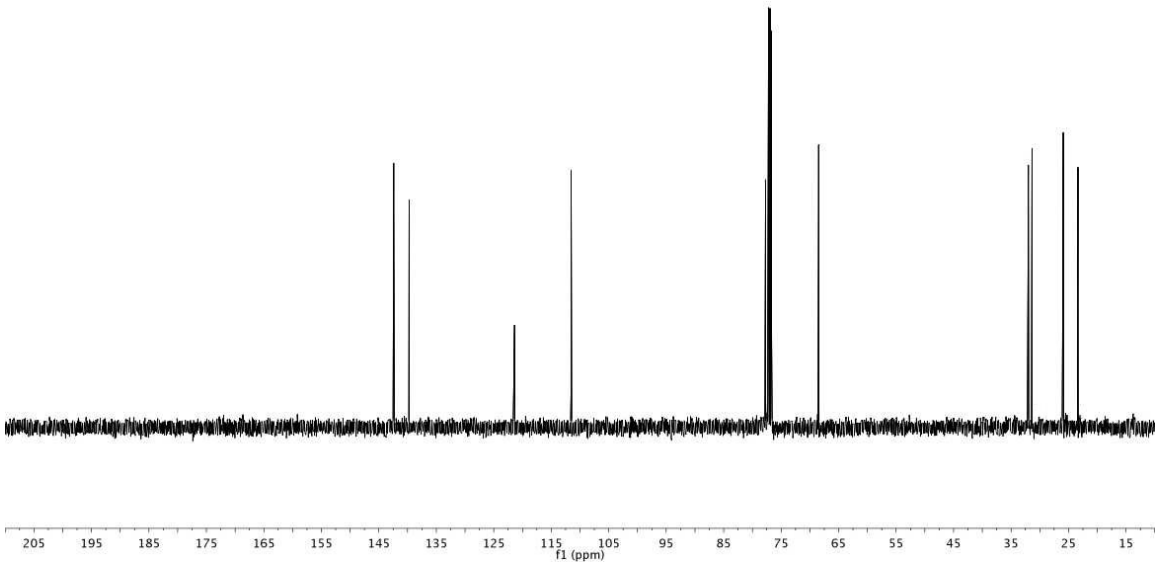
^{1}H NMR (500 MHz, $CDCl_3$) of 1-methyl-5-(tetrahydro-2*H*-pyran-2-yl)methyl-1*H*-pyrazole (Table 2, entry 3)



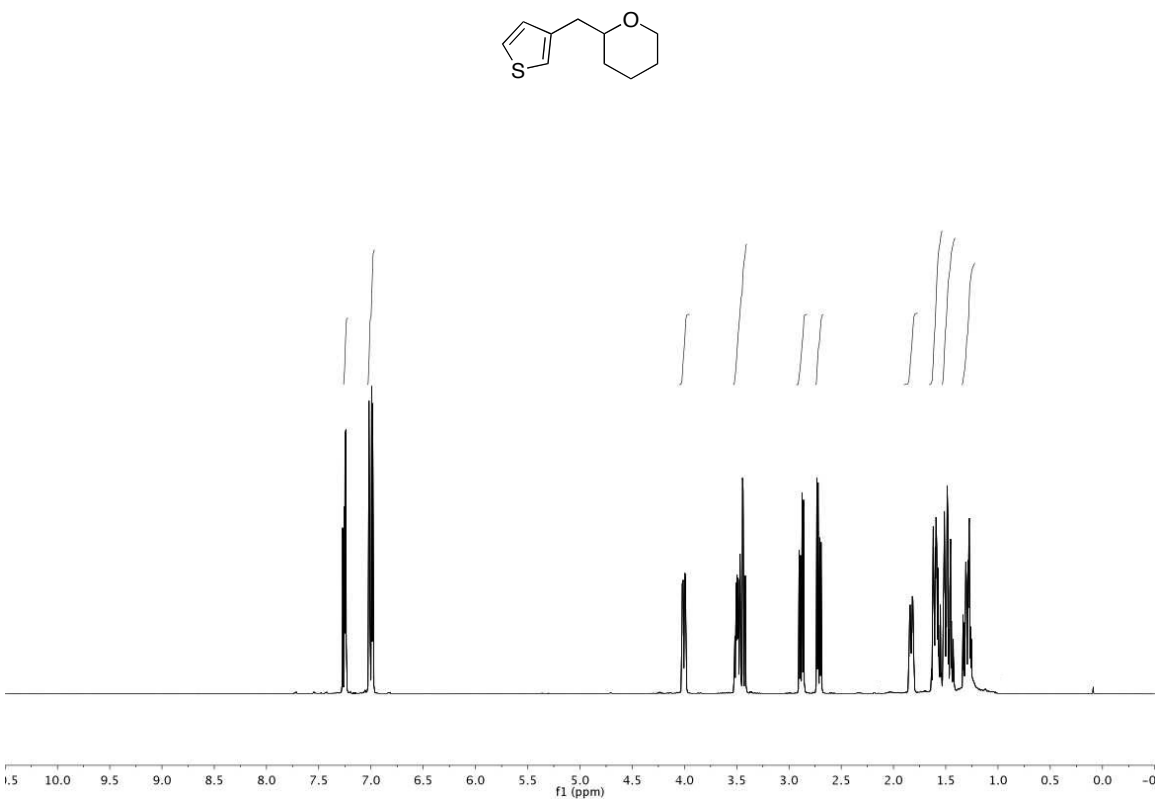
^{13}C NMR (126 MHz, $CDCl_3$) of 1-methyl-5-(tetrahydro-2*H*-pyran-2-yl)methyl-1*H*-pyrazole (Table 2, entry 3)



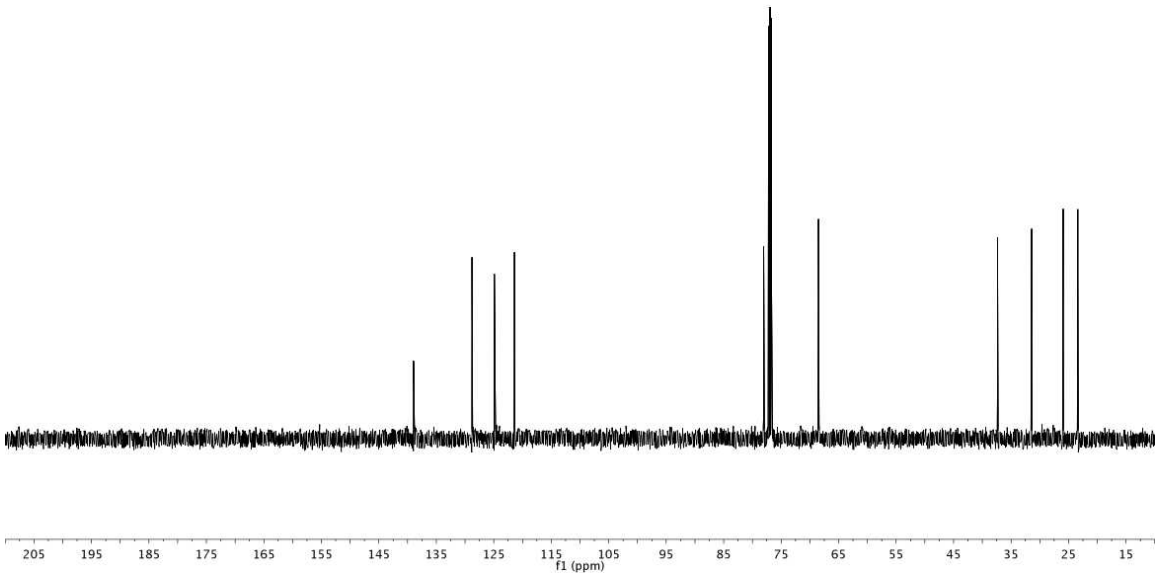
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(furan-3-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 4, X = O)



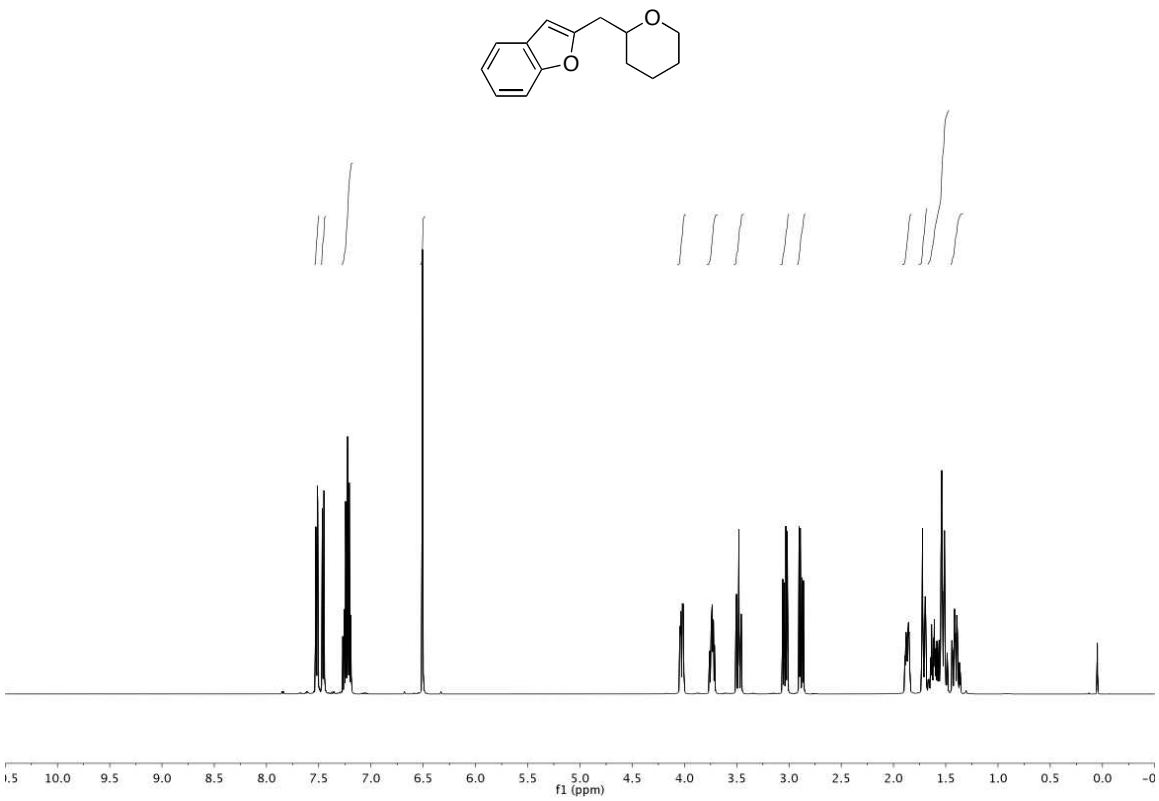
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(furan-3-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 4, X = O)



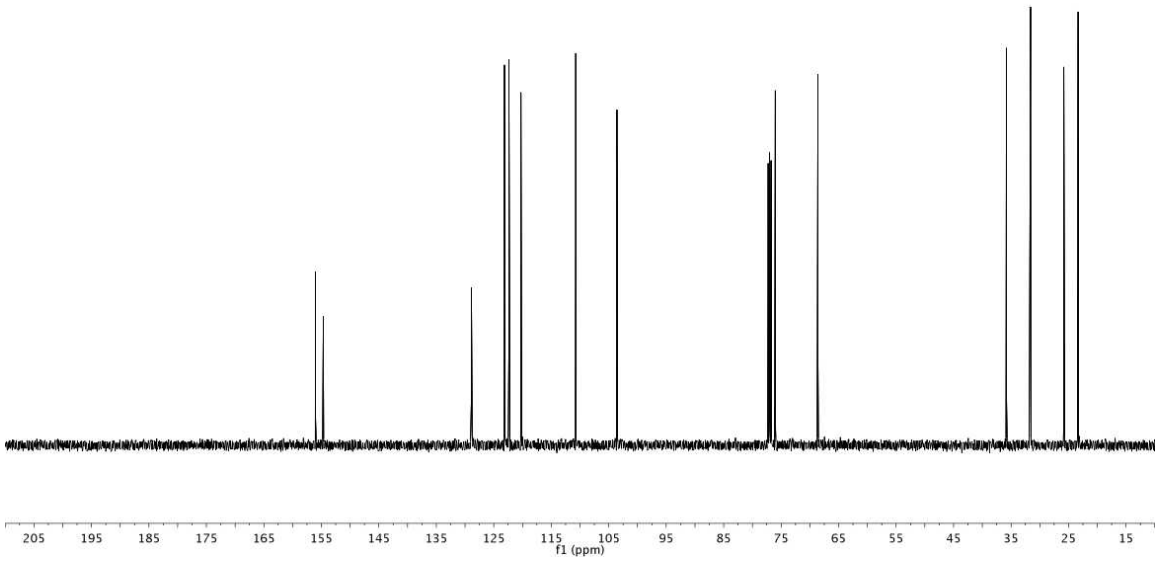
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(thiphen-3-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 4, X = S)



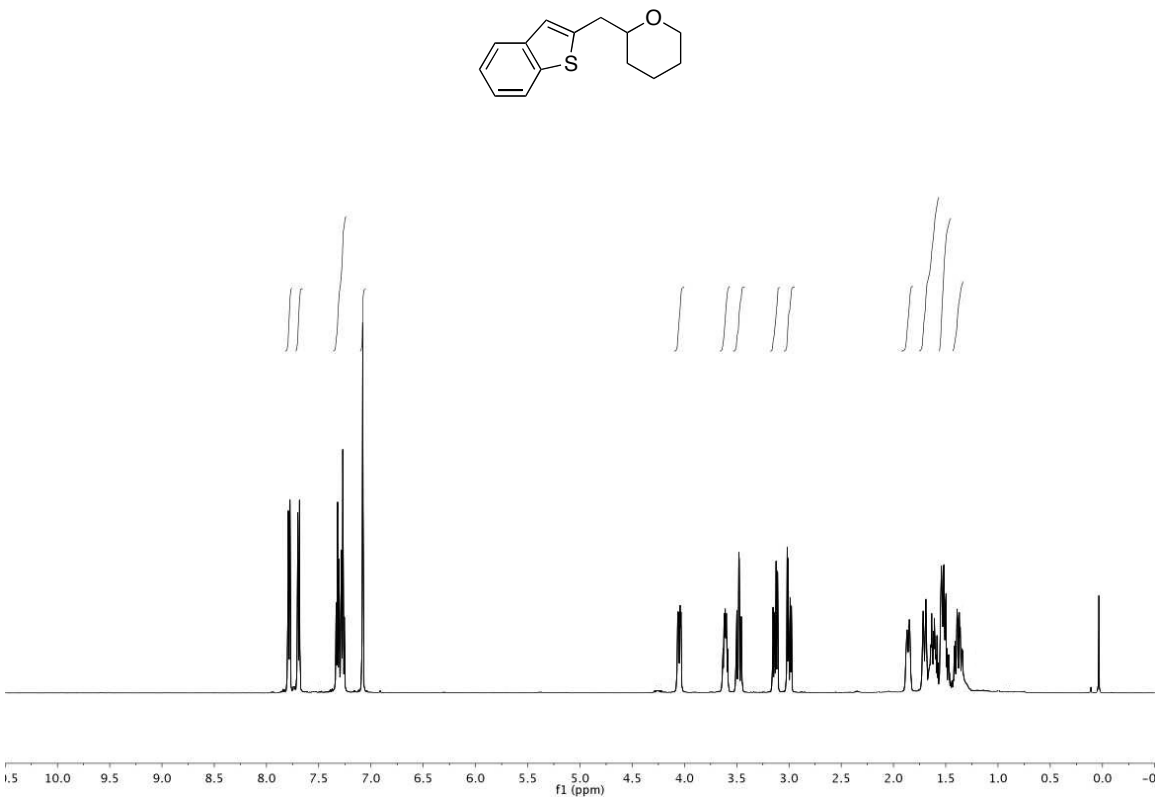
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(thiphen-3-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 4, X = S)



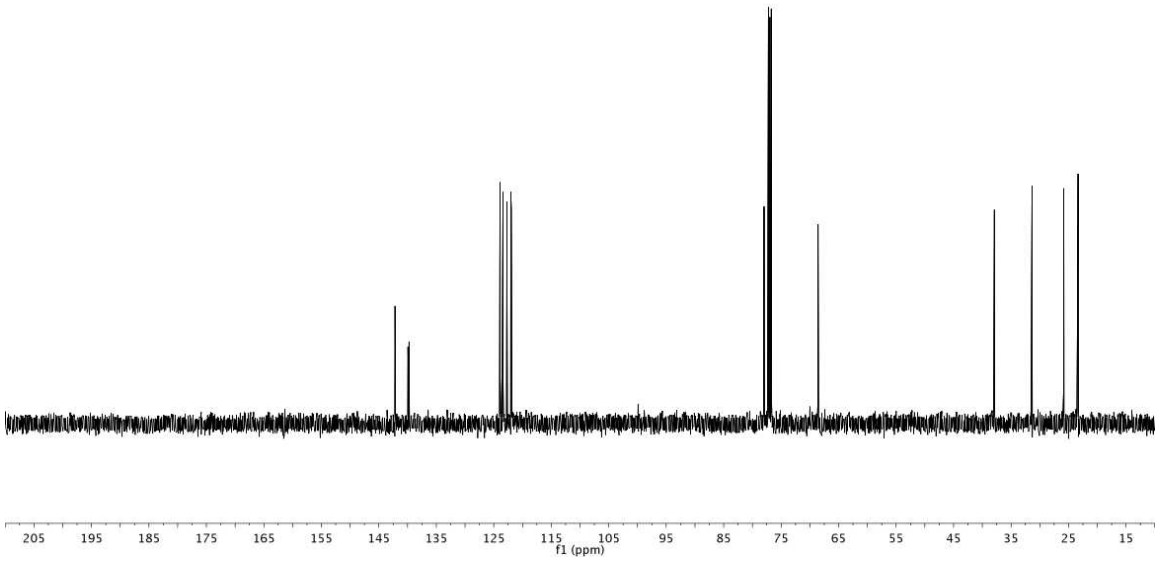
^{1}H NMR (500 MHz, $CDCl_3$) of 2-((tetrahydro-2*H*-pyran-2-yl)methyl)benzofuran (Table 2, entry 5, X = O)



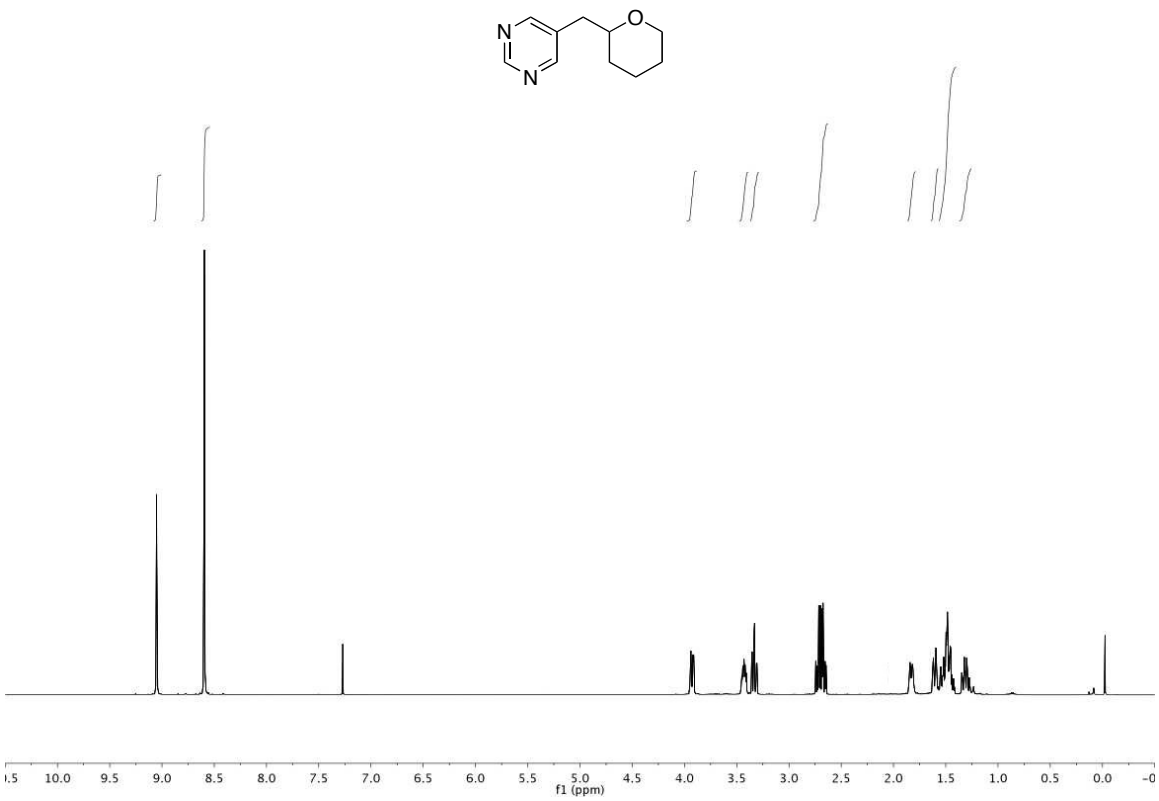
^{13}C NMR (126 MHz, $CDCl_3$) of 2-((tetrahydro-2*H*-pyran-2-yl)methyl)benzofuran (Table 2, entry 5, X = O)



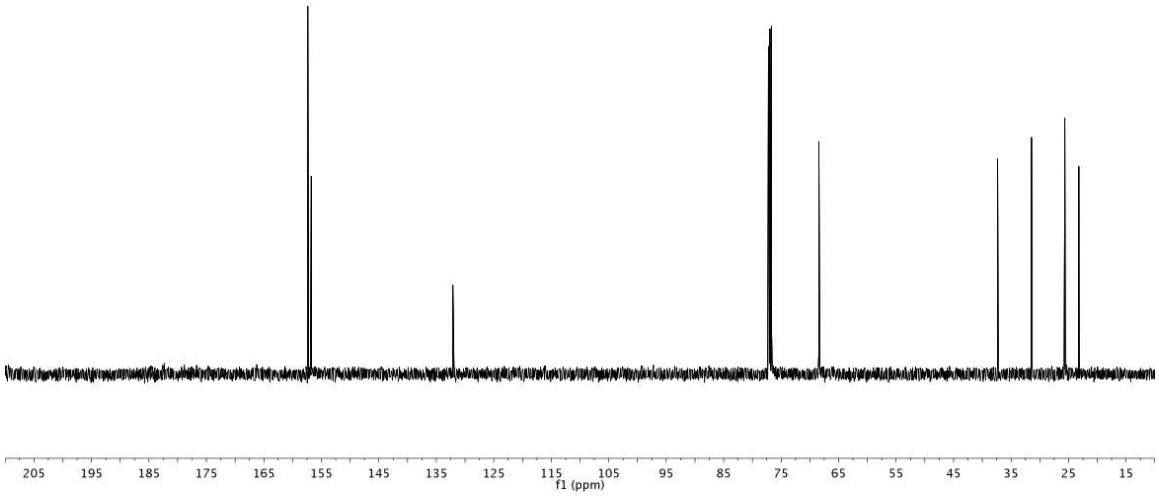
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(benzo[*b*]thiophen-2-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 5, X = S)



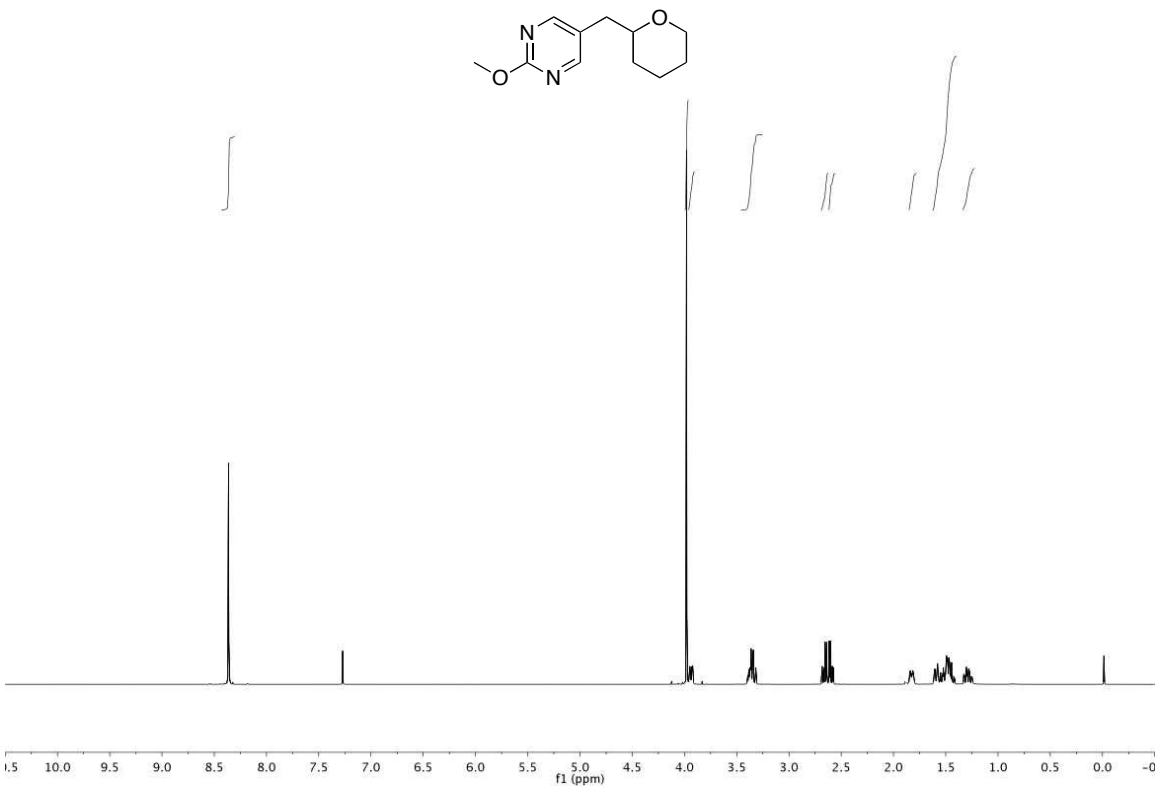
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(benzo[*b*]thiophen-2-ylmethyl)tetrahydro-2*H*-pyran (Table 2, entry 5, X = S)



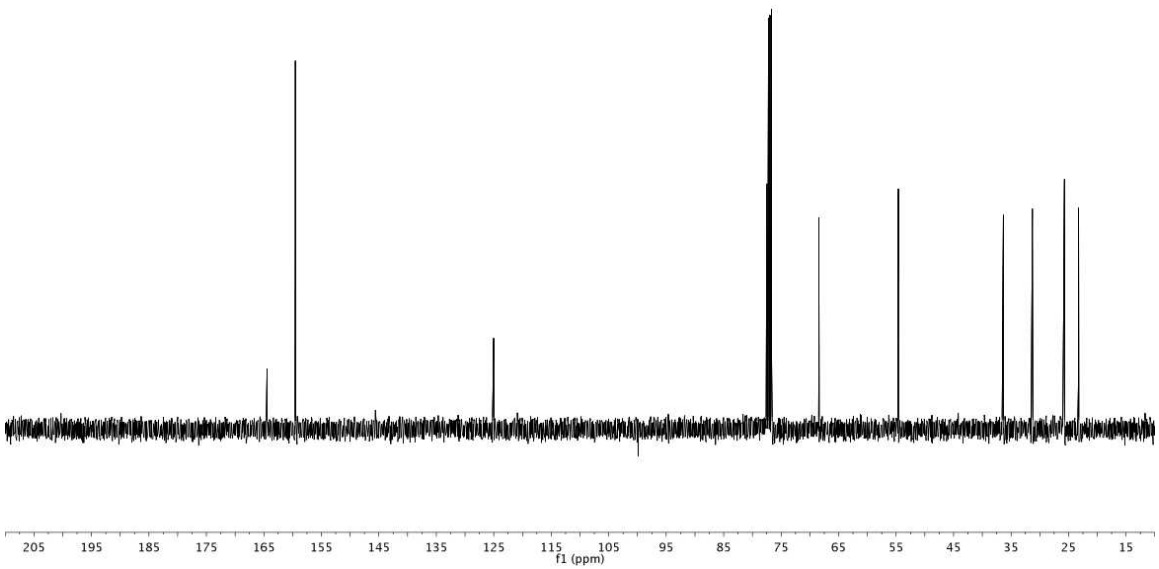
^{1}H NMR (500 MHz, $CDCl_3$) of 5-((tetrahydro-2*H*-pyran-2-yl)methyl)pyrimidine (Table 2, entry 6, X = H)



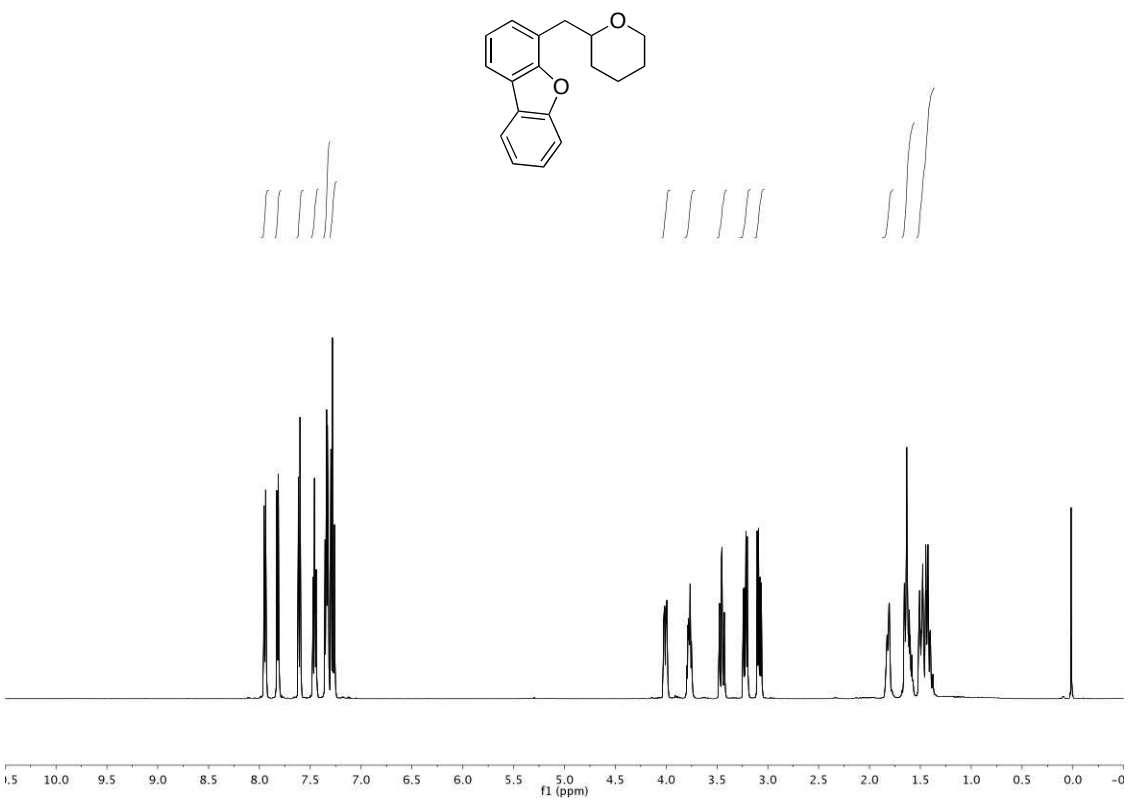
^{13}C NMR (126 MHz, $CDCl_3$) of 5-((tetrahydro-2*H*-pyran-2-yl)methyl)pyrimidine (Table 2, entry 6, X = H)



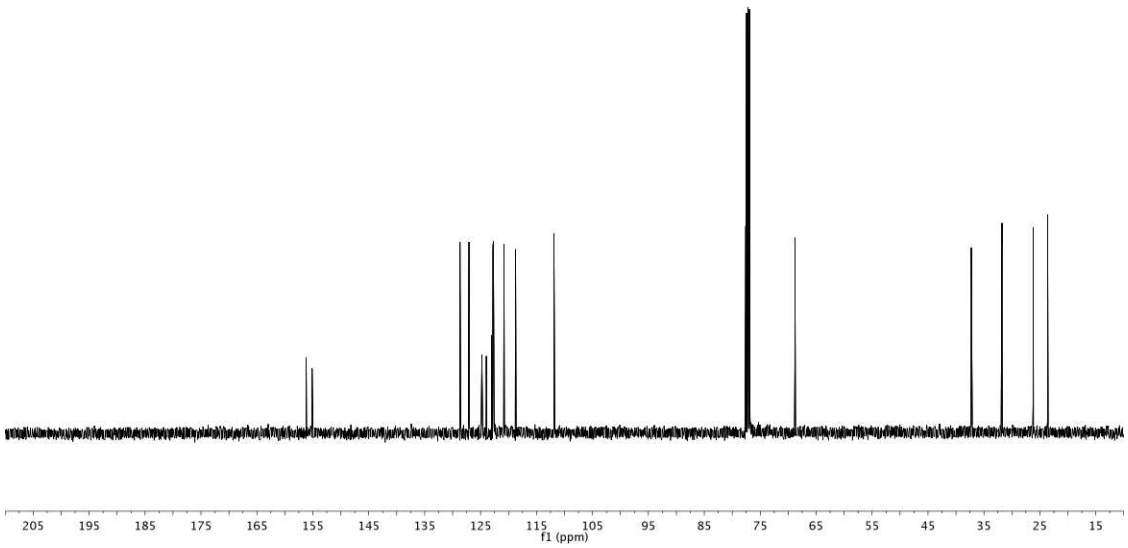
^{1}H NMR (500 MHz, $CDCl_3$) of 2-OMe-5-((tetrahydro-2*H*-pyran-2-yl)Me)pyrimidine (Table 2, entry 6, X = OMe)



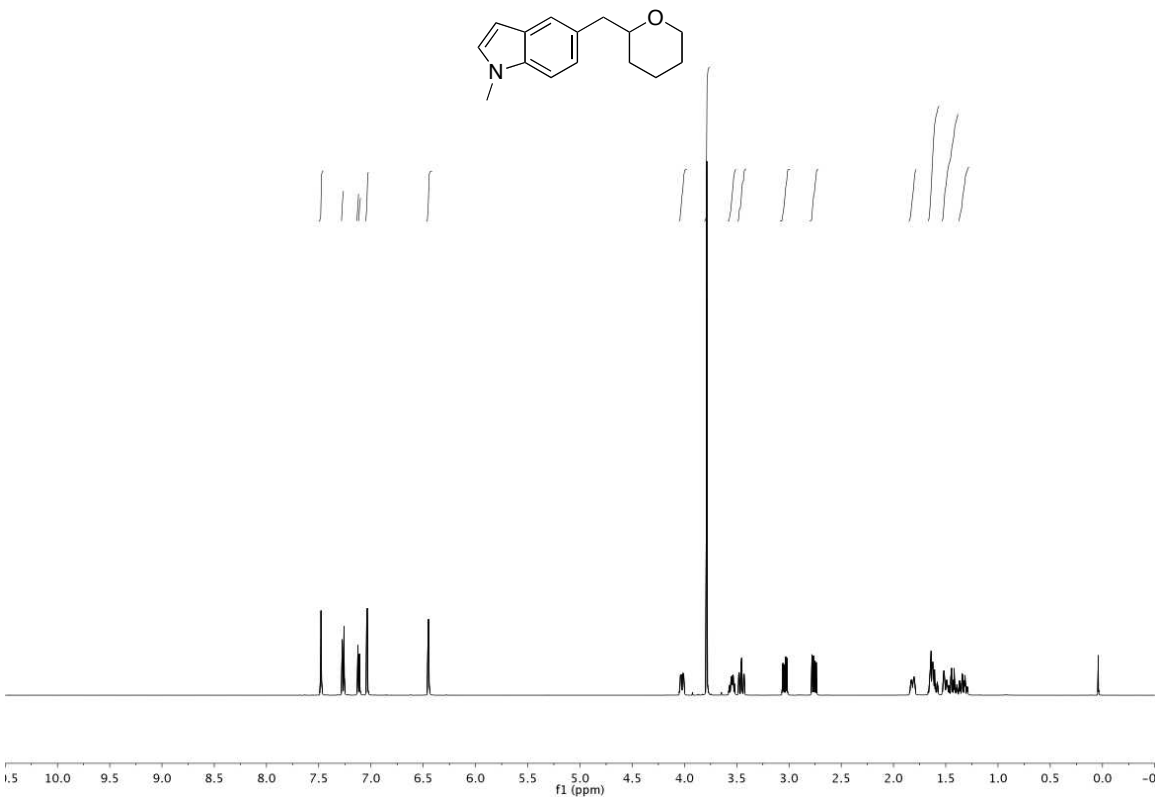
^{13}C NMR (126 MHz, $CDCl_3$) of 2-OMe-5-((tetrahydro-2*H*-pyran-2-yl)Me)pyrimidine (Table 2, entry 6, X = OMe)



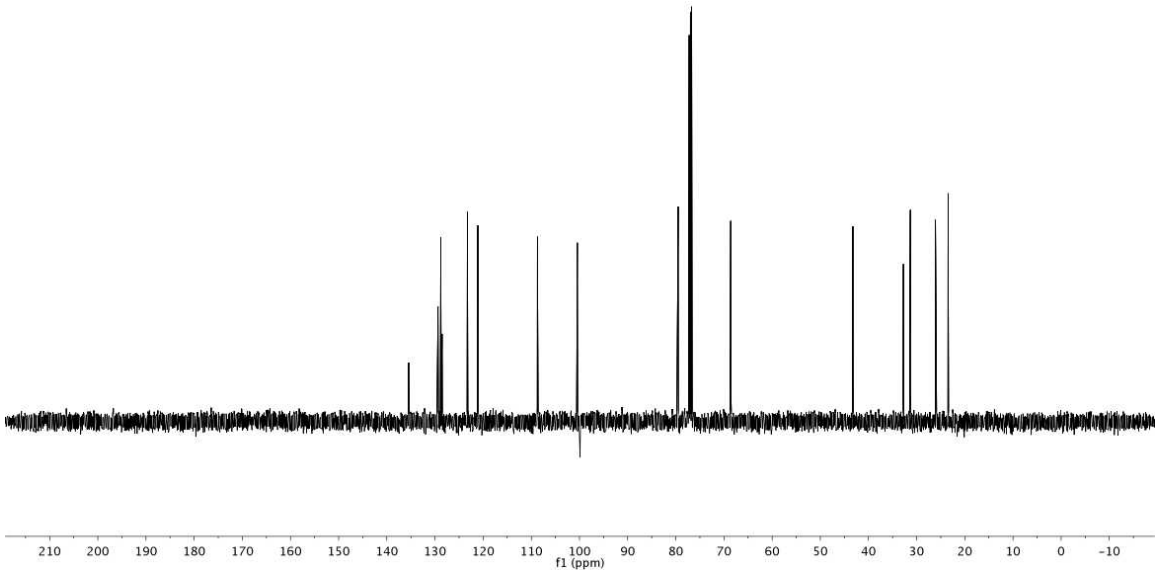
^{1}H NMR (500 MHz, $CDCl_3$) of 4-((tetrahydro-2*H*-pyran-2-yl)methyl)dibenzo[*b*,*d*]furan (Table 2, entry 7)



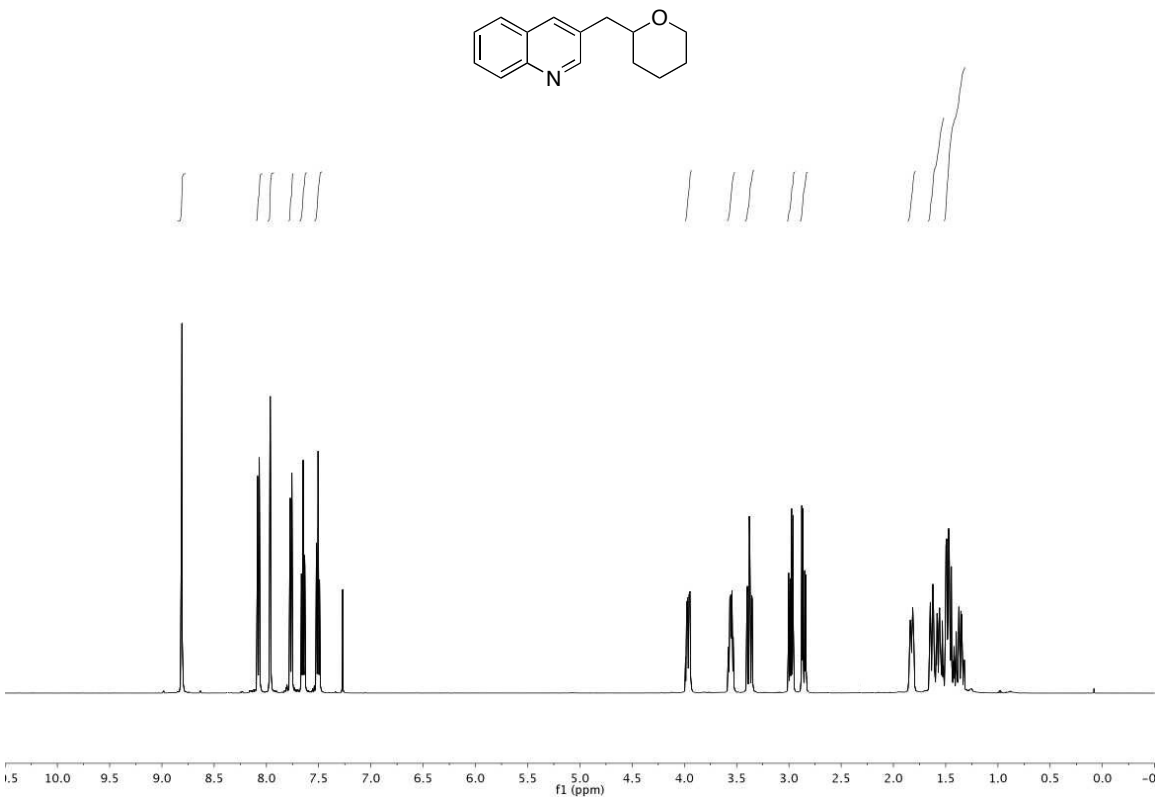
^{13}C NMR (126 MHz, $CDCl_3$) of 4-((tetrahydro-2*H*-pyran-2-yl)methyl)dibenzo[*b*,*d*]furan (Table 2, entry 7)



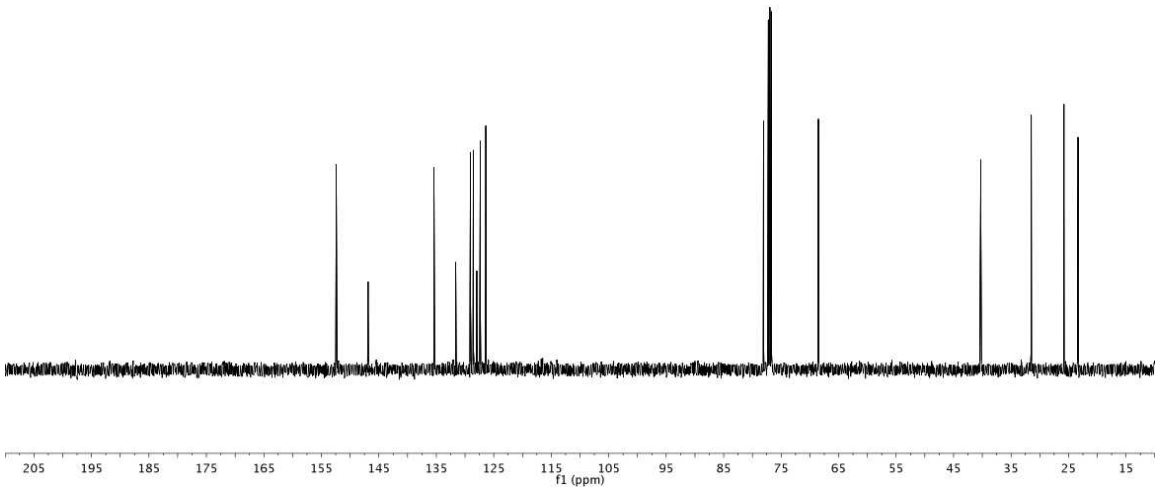
^{1}H NMR (500 MHz, $CDCl_3$) of 1-methyl-5-((tetrahydro-2*H*-pyran-2-yl)methyl)-1*H*-indole (Table 2, entry 8)



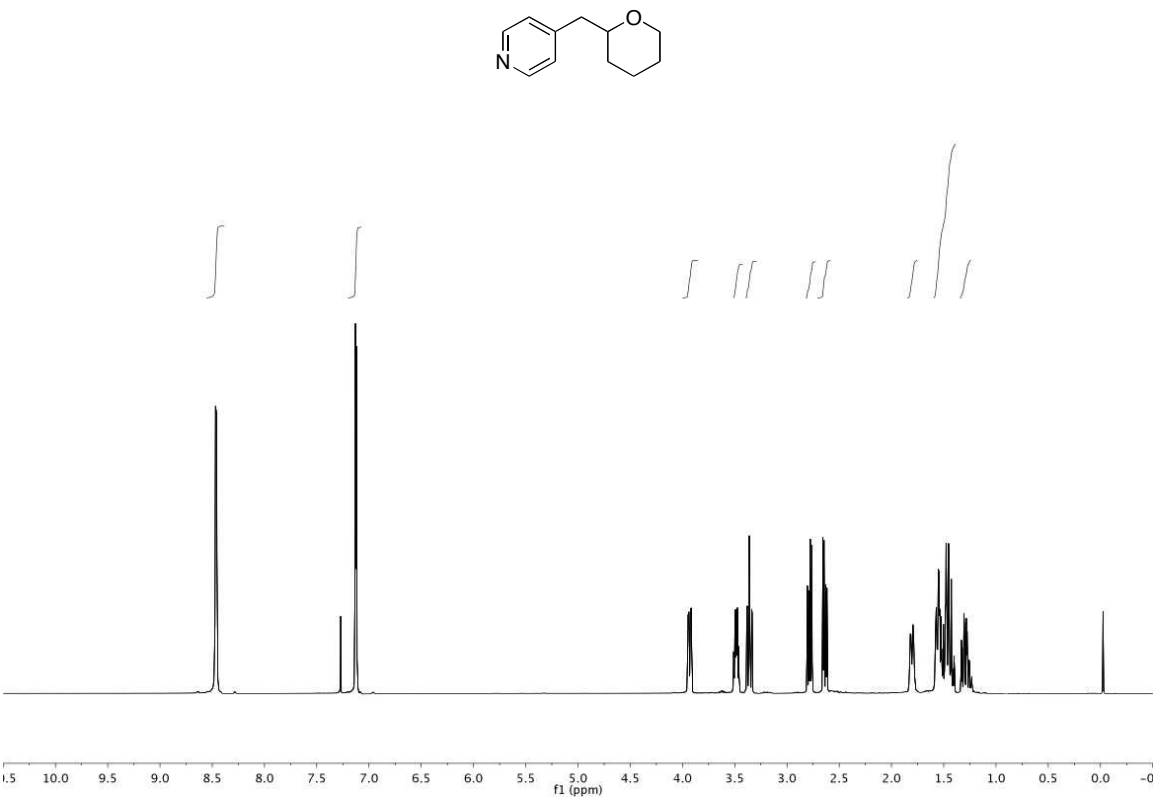
^{13}C NMR (126 MHz, $CDCl_3$) of 1-methyl-5-((tetrahydro-2*H*-pyran-2-yl)methyl)-1*H*-indole (Table 2, entry 8)



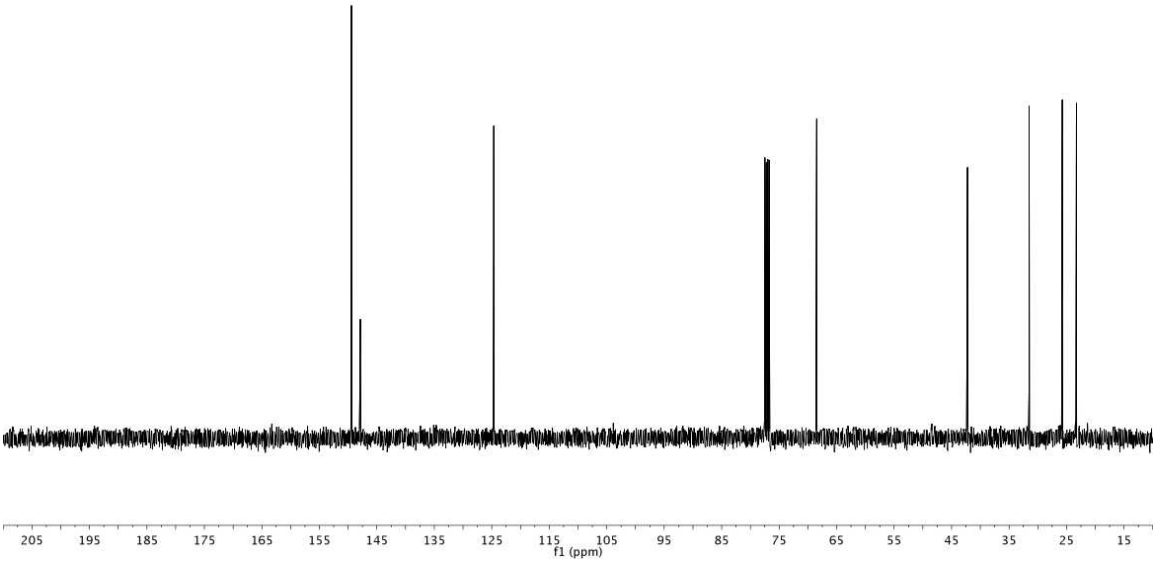
^{1}H NMR (500 MHz, $CDCl_3$) of 3-((tetrahydro-2*H*-pyran-2-yl)methyl)quinoline (Table 2, entry 9)



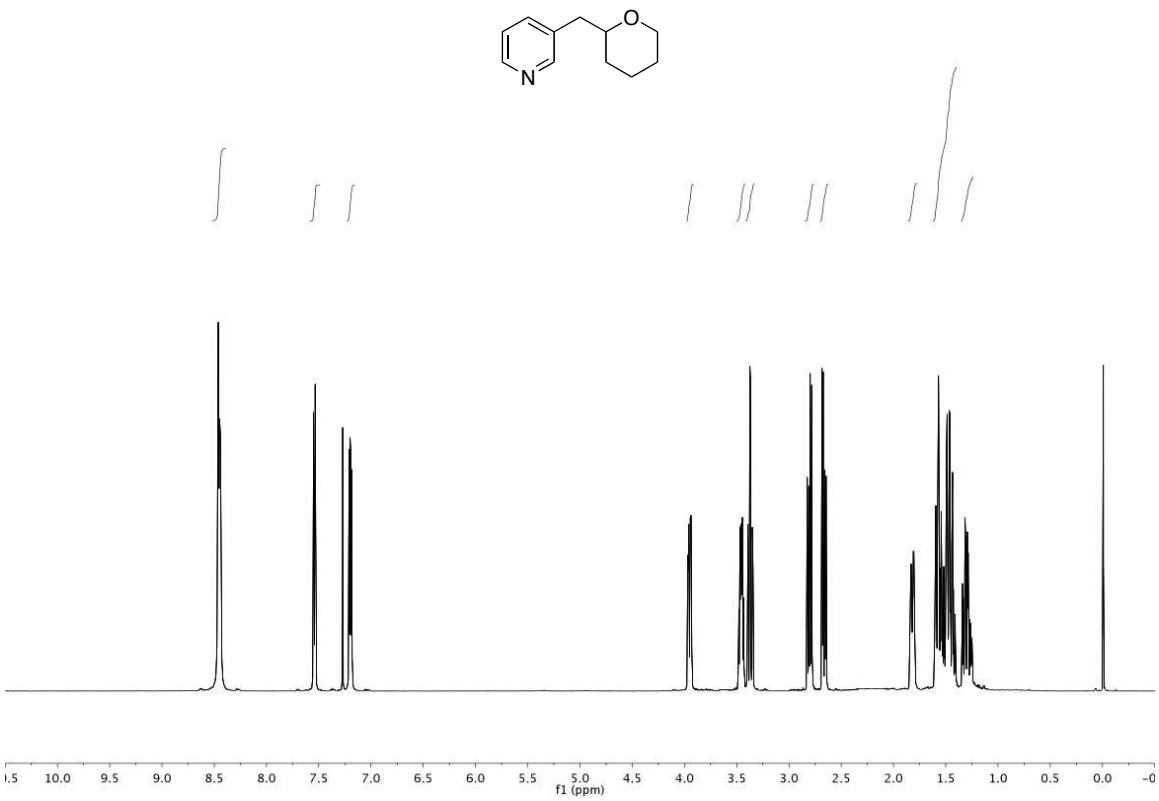
^{13}C NMR (126 MHz, $CDCl_3$) of 3-((tetrahydro-2*H*-pyran-2-yl)methyl)quinoline (Table 2, entry 9)



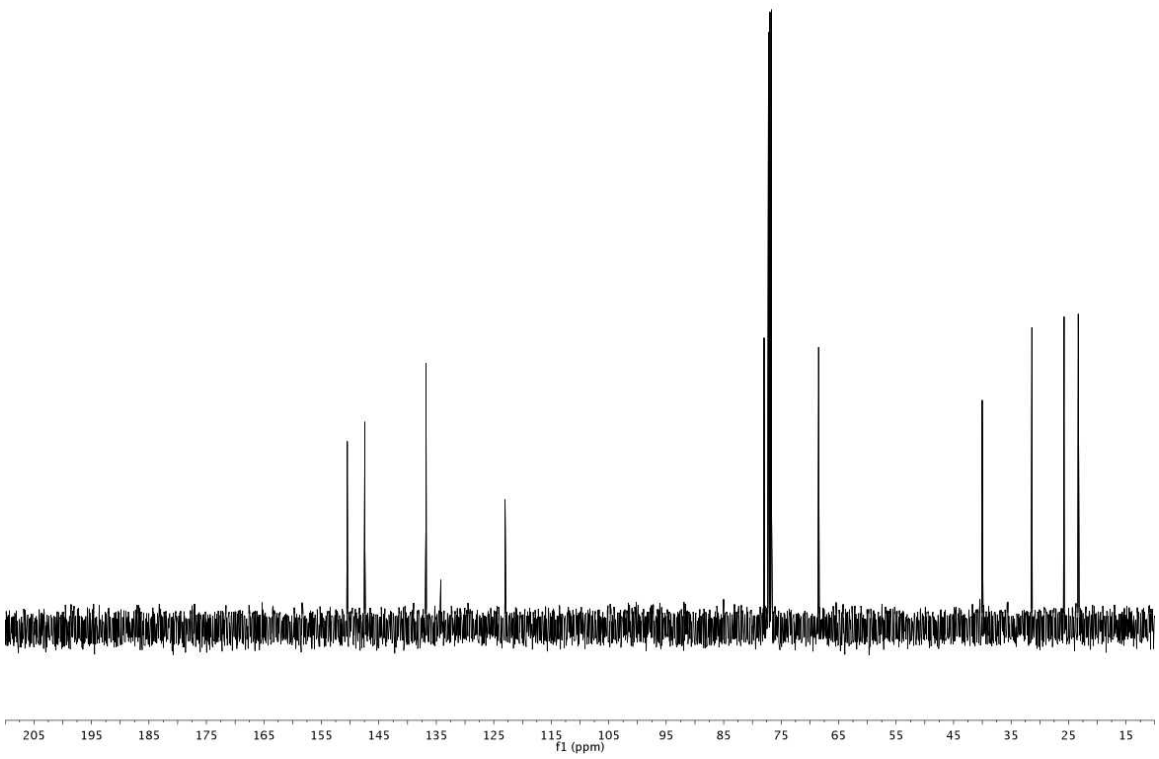
^{1}H NMR (500 MHz, $CDCl_3$) of 4-((tetrahydro-2*H*-pyran-2-yl)methyl)pyridine (Table 2, entry 10)



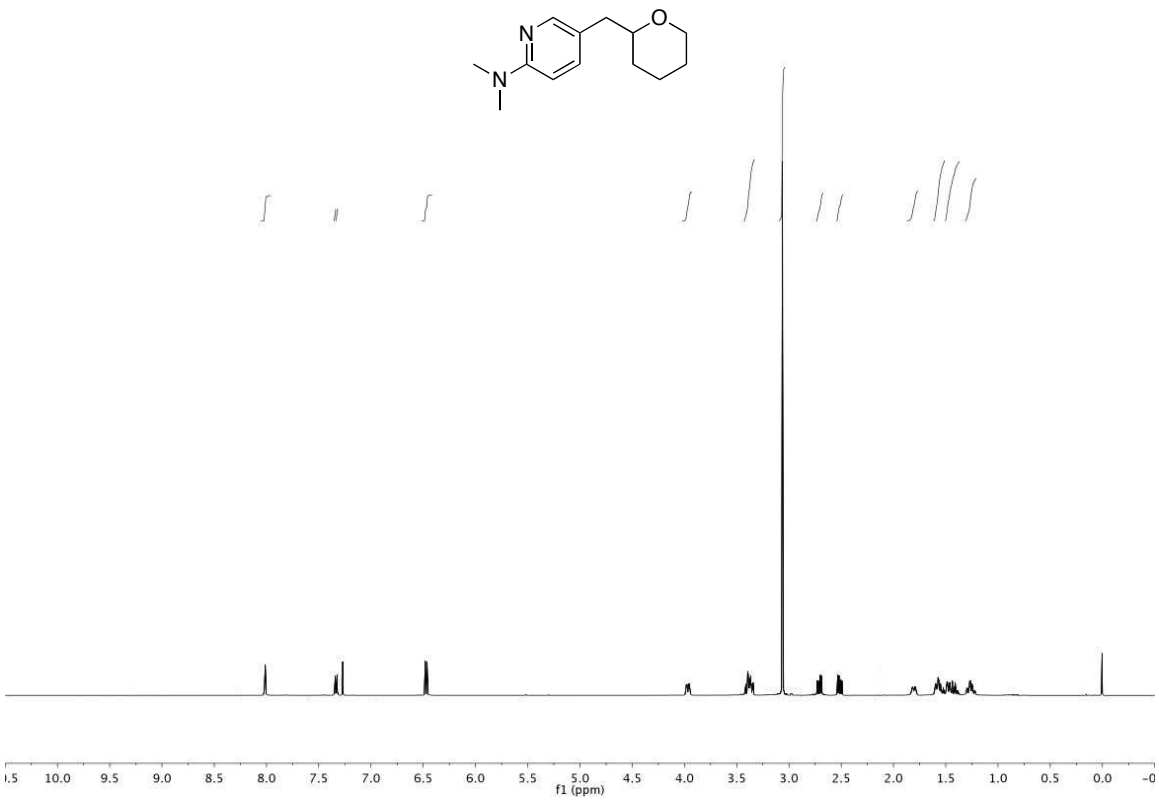
^{13}C NMR (126 MHz, $CDCl_3$) of 4-((tetrahydro-2*H*-pyran-2-yl)methyl)pyridine (Table 2, entry 10)



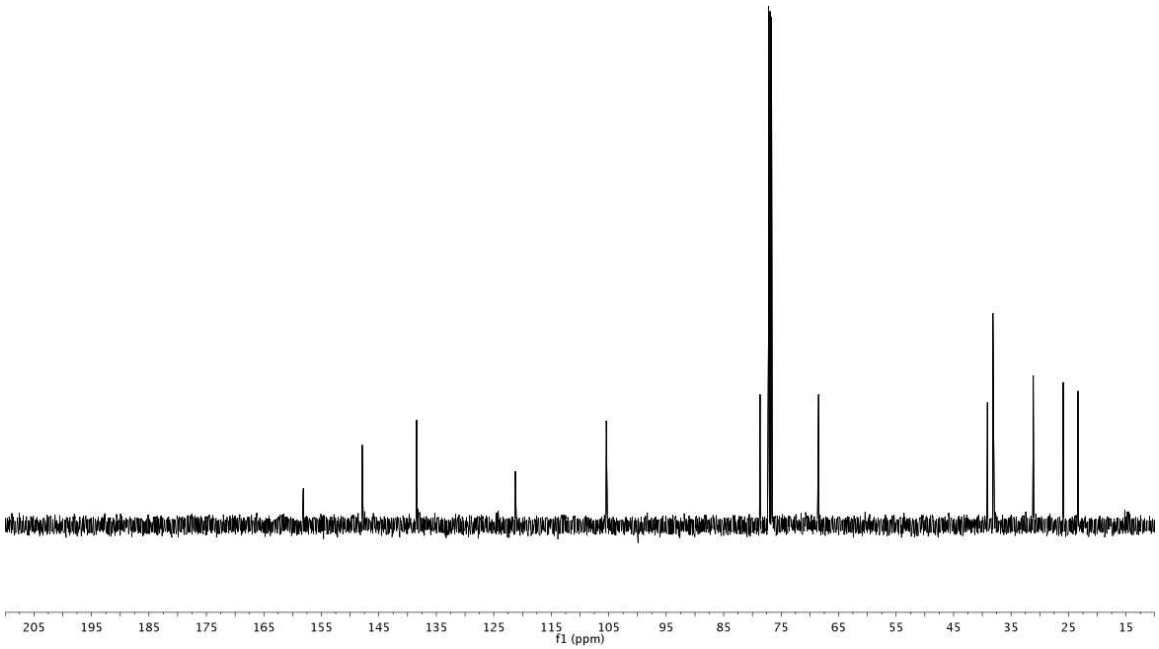
^{1}H NMR (500 MHz, $CDCl_3$) of 3-((tetrahydro-2*H*-pyran-2-yl)methyl)pyridine (Table 2, entry 11)



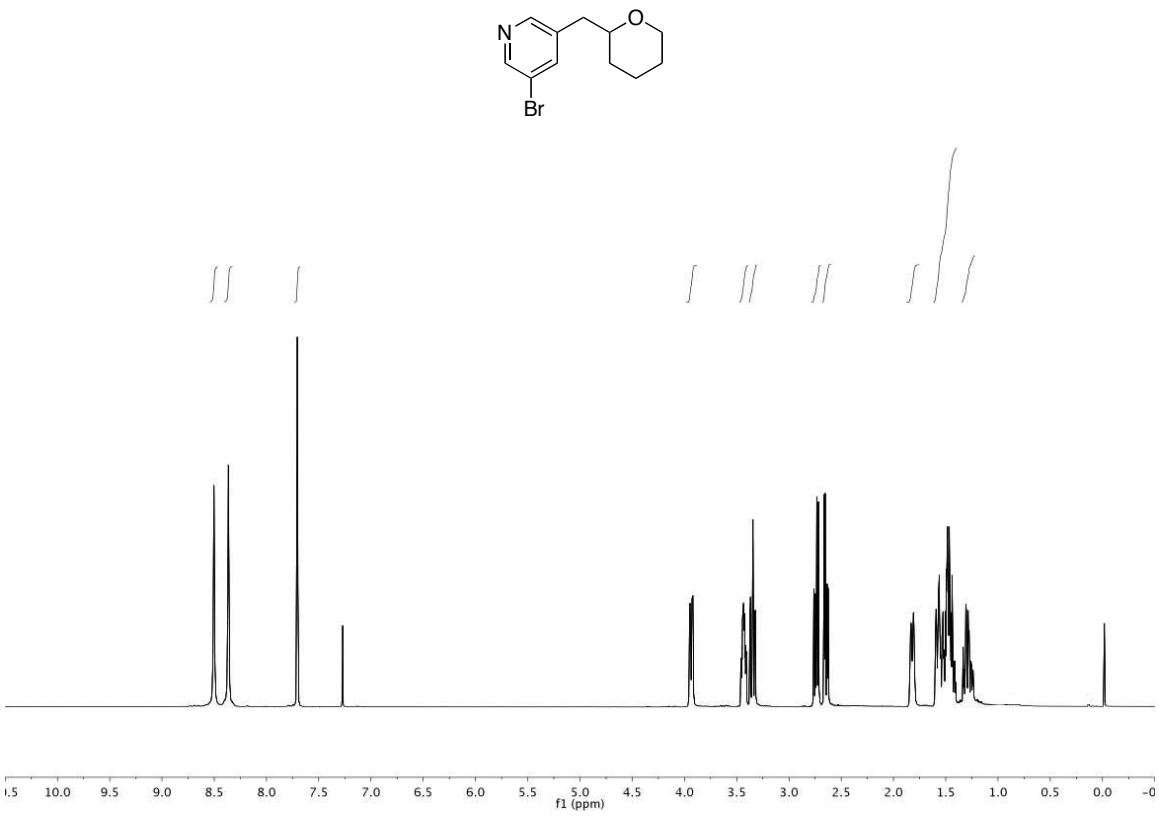
^{13}C NMR (126 MHz, $CDCl_3$) of 3-((tetrahydro-2*H*-pyran-2-yl)methyl)pyridine (Table 2, entry 11)



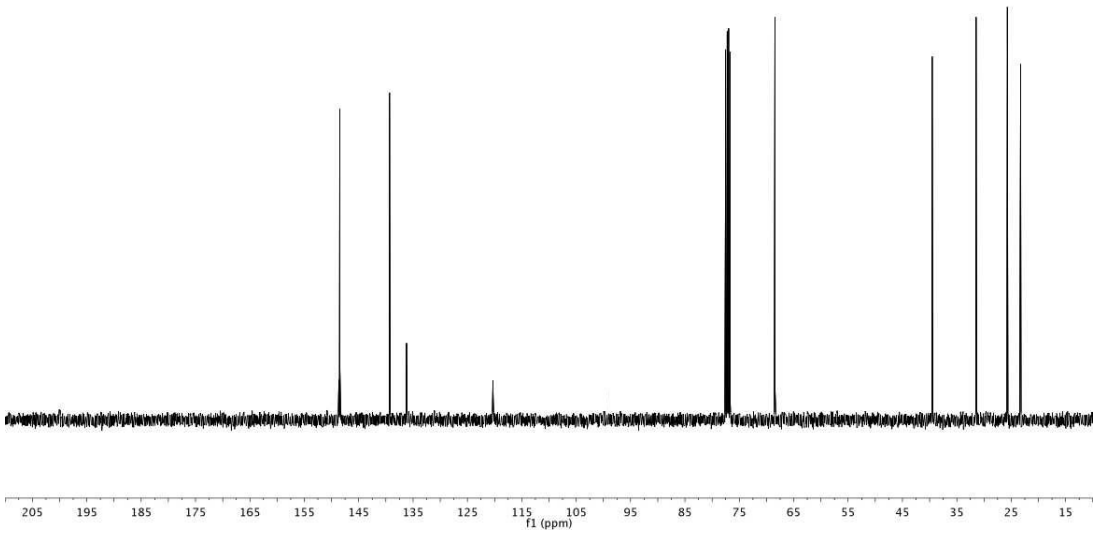
^{1}H NMR (500 MHz, $CDCl_3$) of *N*,*N*-diMe-5-((tetrahydro-2*H*-pyran-2-yl)Me)pyridin-2-amine (Table 2, entry 12)



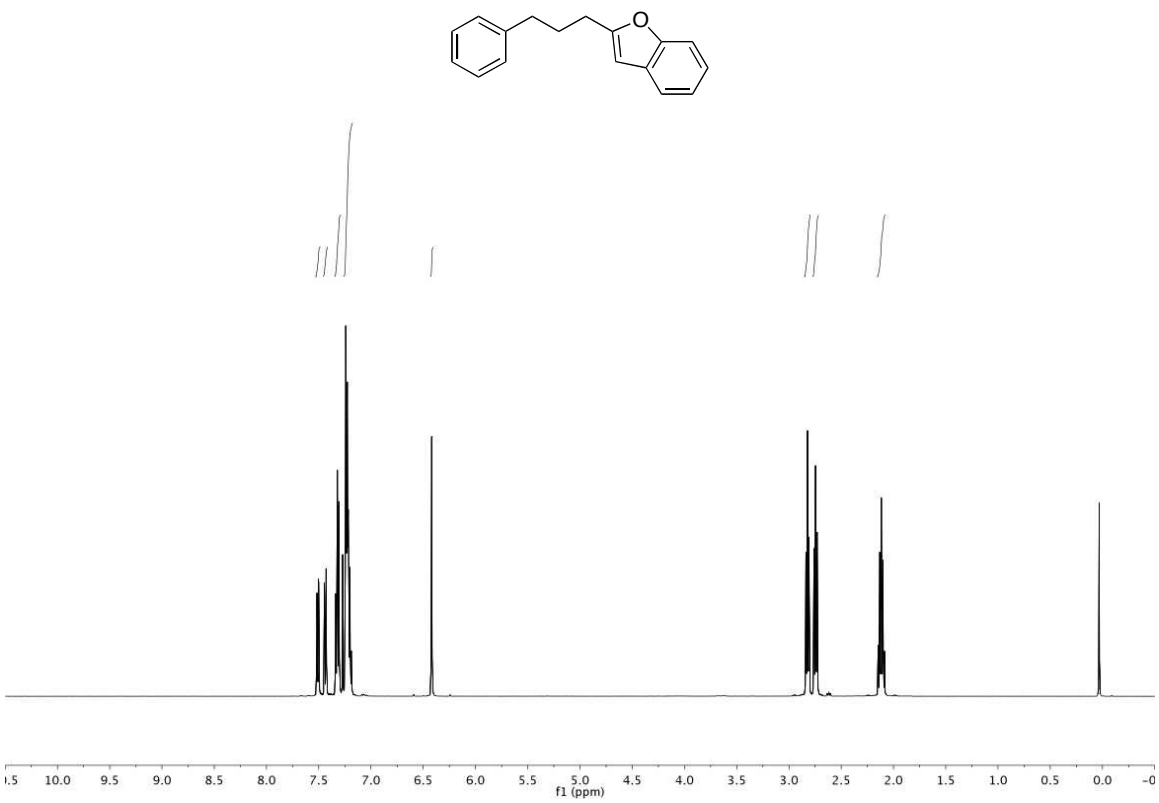
^{13}C NMR (126 MHz, $CDCl_3$) of *N*,*N*-diMe-5-((tetrahydro-2*H*-pyran-2-yl)Me)pyridin-2-amine (Table 2, entry 12)



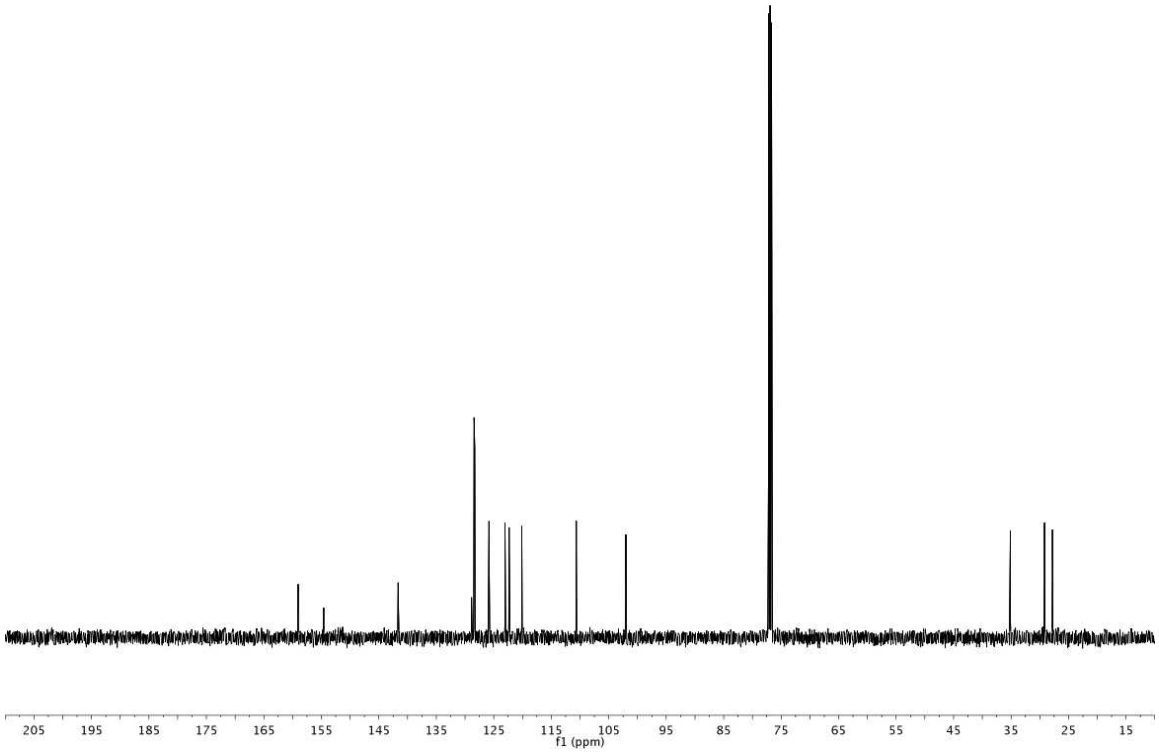
^{1}H NMR (500 MHz, $CDCl_3$) of 3-bromo-5-((tetrahydro-2*H*-pyran-2-yl)methyl)pyridine (Table 2, entry 13)



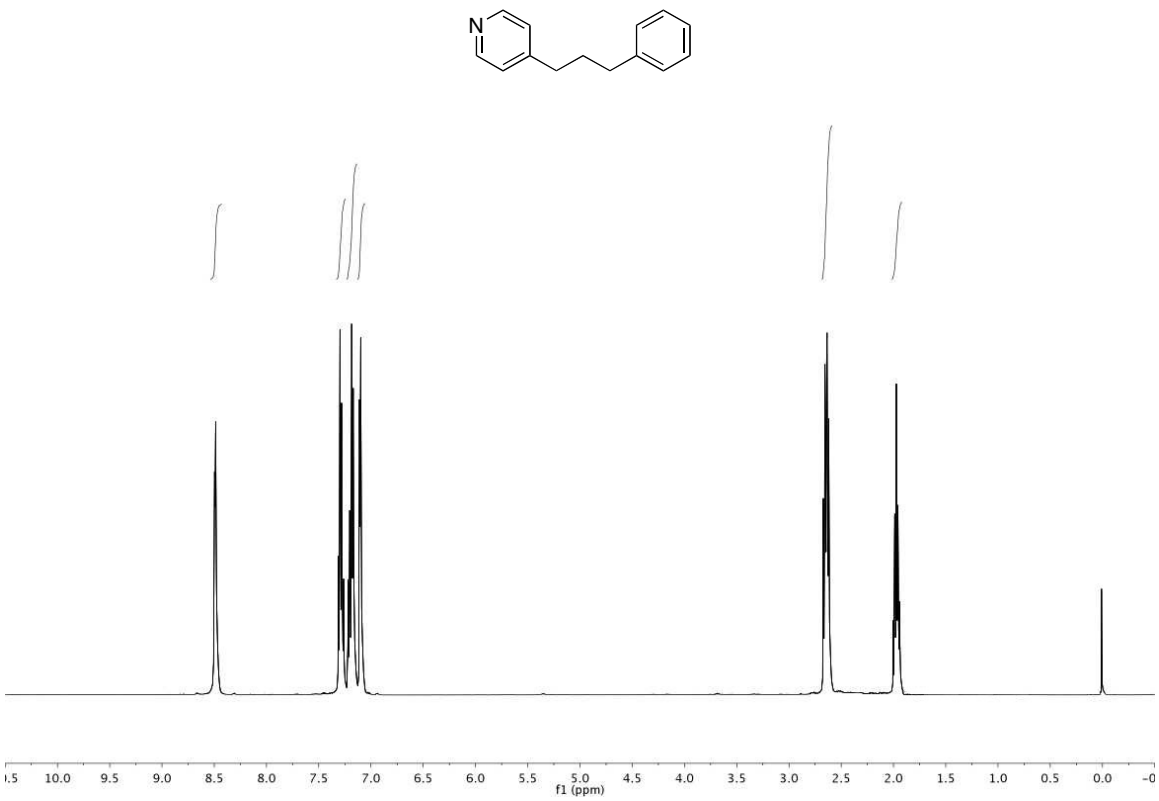
^{13}C NMR (126 MHz, $CDCl_3$) of 3-bromo-5-((tetrahydro-2*H*-pyran-2-yl)methyl)pyridine (Table 2, entry 13)



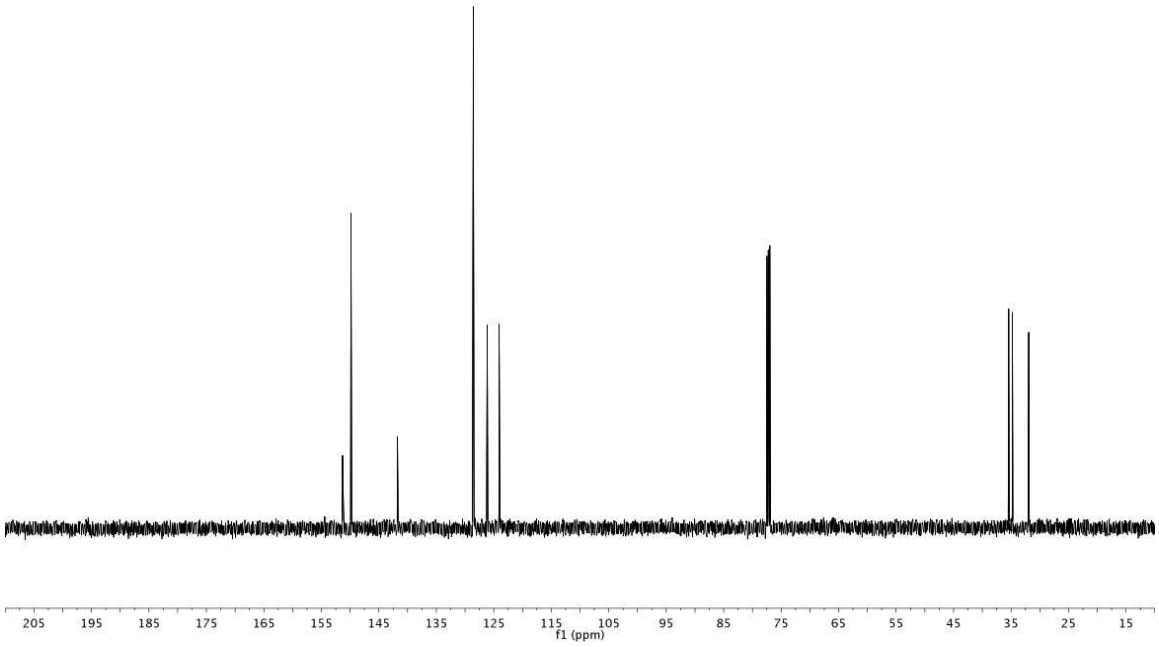
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(3-phenylpropyl)benzofuran (Table 3, entry 1, 1)



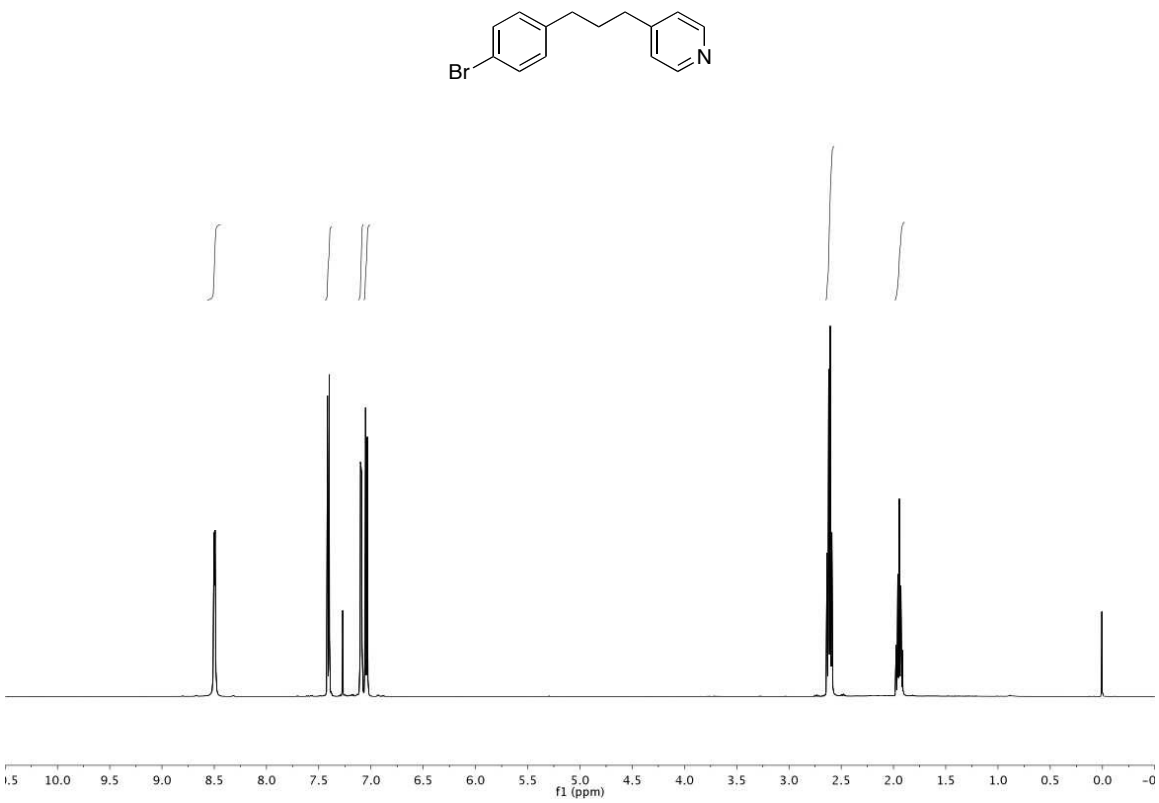
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(3-phenylpropyl)benzofuran (Table 3, entry 1, 1)



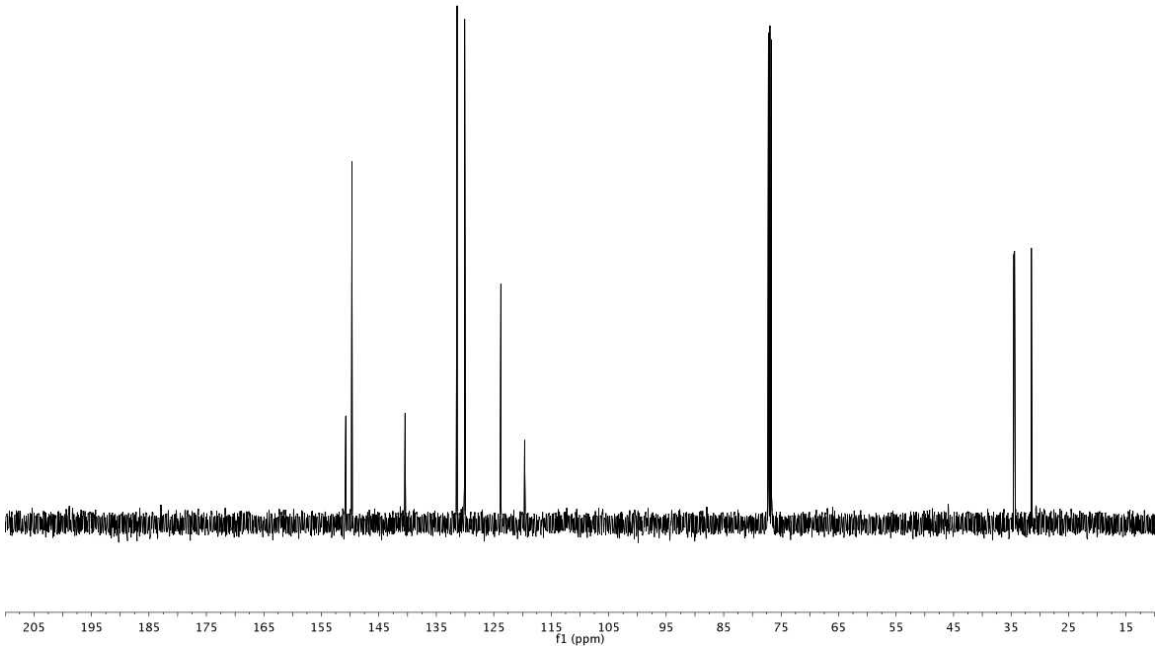
^{1}H NMR (500 MHz, $CDCl_3$) of 4-(3-phenylpropyl)pyridine (Table 3, entry 1, 2)



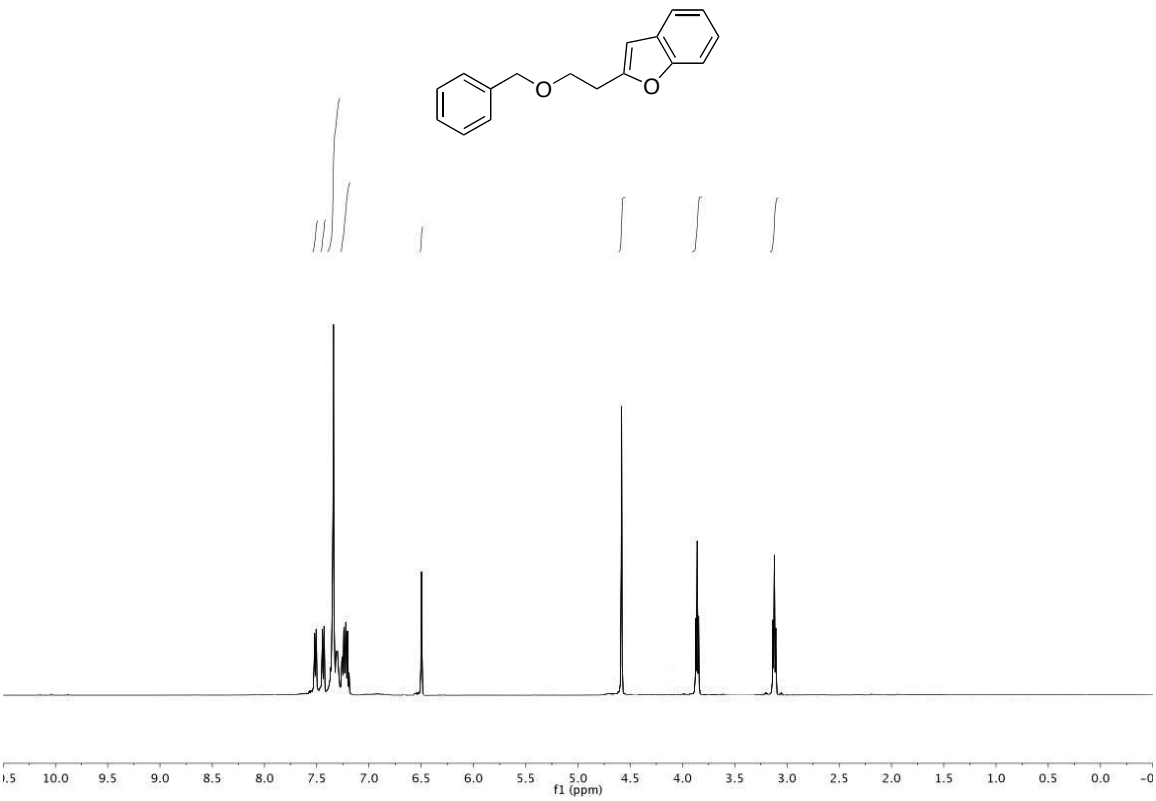
^{13}C NMR (126 MHz, $CDCl_3$) of of 4-(3-phenylpropyl)pyridine (Table 3, entry 1, 2)



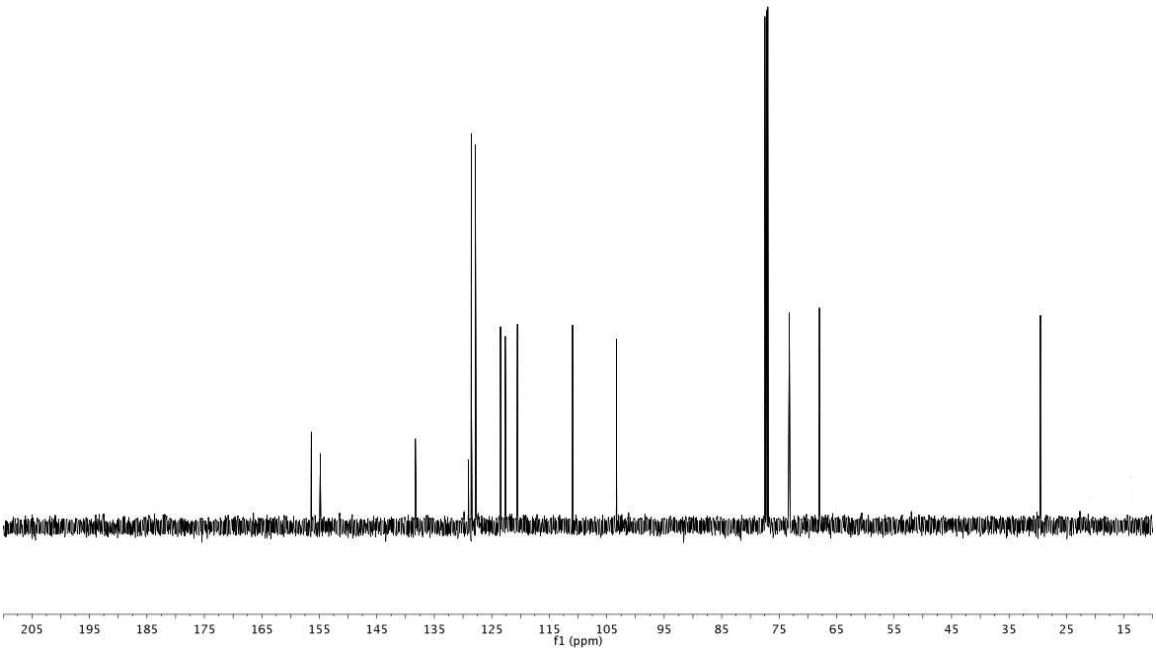
^{1}H NMR (500 MHz, $CDCl_3$) of 4-(3-(4-bromophenyl)propyl)pyridine (Table 3, entry 2, 2)



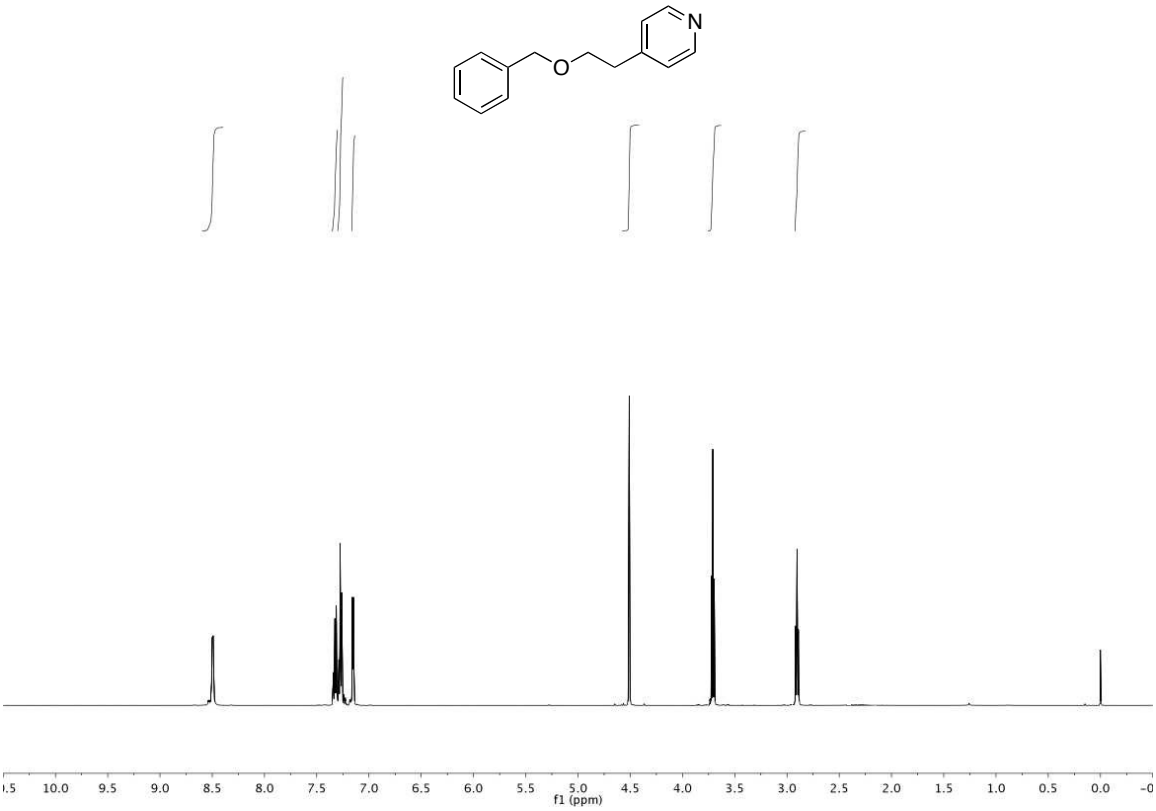
^{13}C NMR (126 MHz, $CDCl_3$) of 4-(3-(4-bromophenyl)propyl)pyridine (Table 3, entry 2, 2)



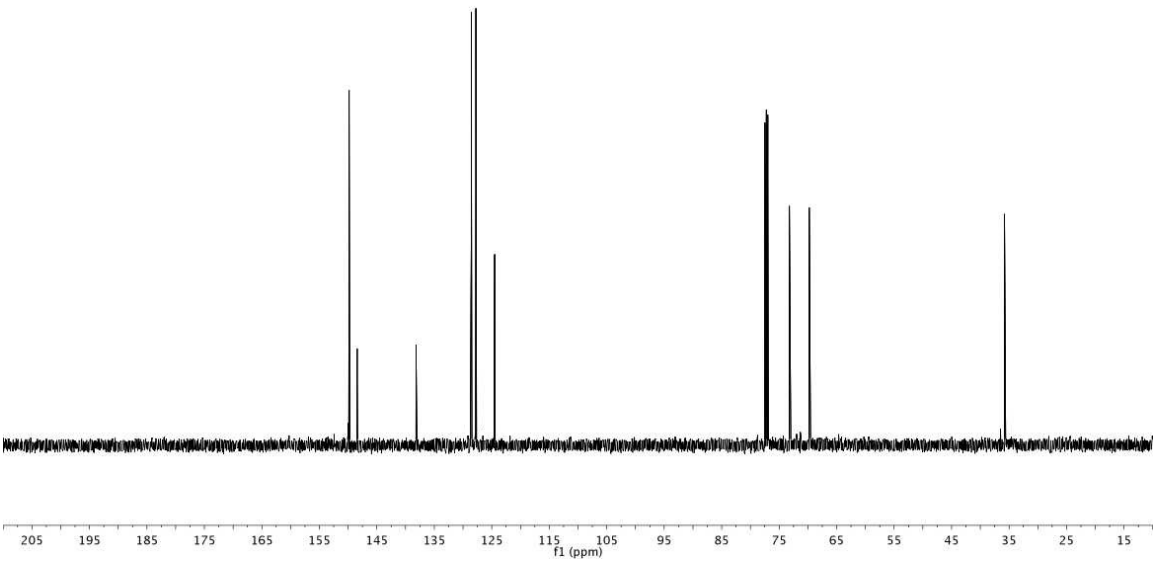
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(2-(benzyloxy)ethyl)benzofuran (Table 3, entry 3, 1)



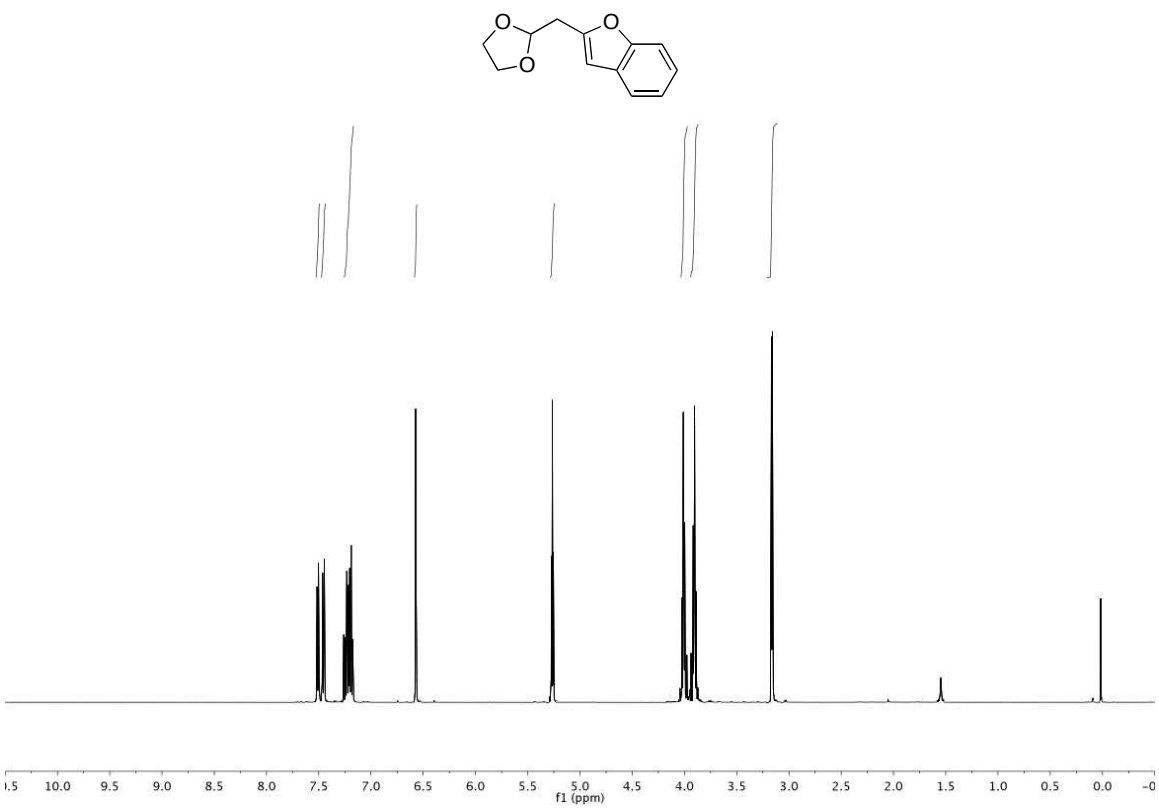
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(2-(benzyloxy)ethyl)benzofuran (Table 3, entry 3, 1)



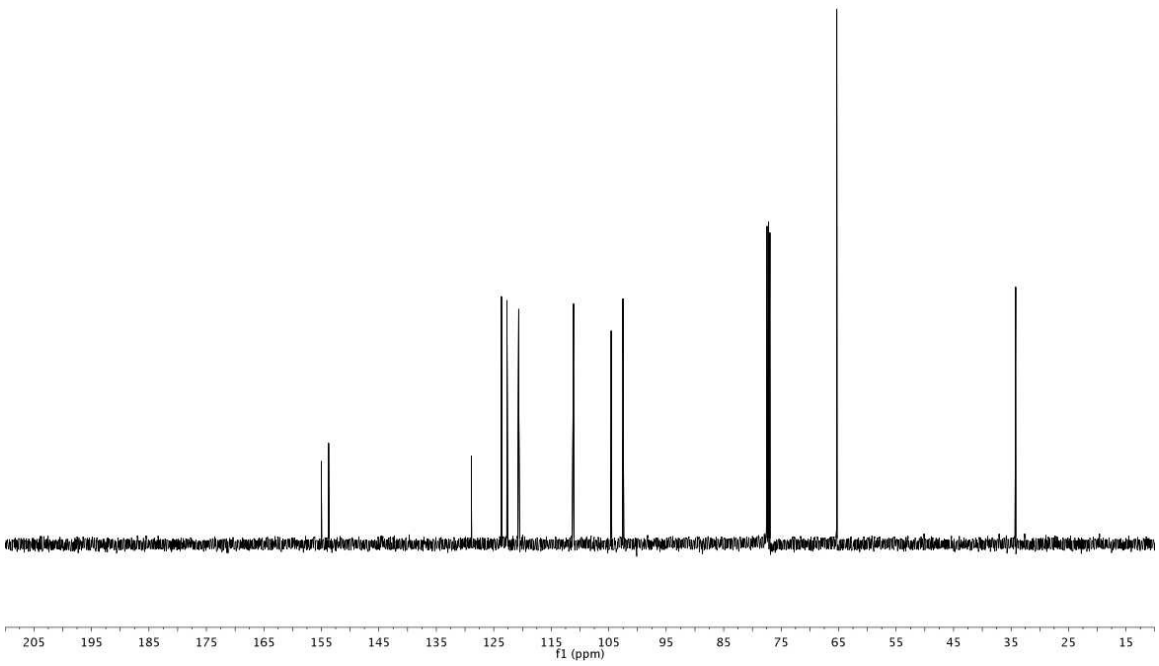
^{1}H NMR (500 MHz, $CDCl_3$) of 4-(2-(benzyloxy)ethyl)pyridine (Table 3, entry 3, 2)



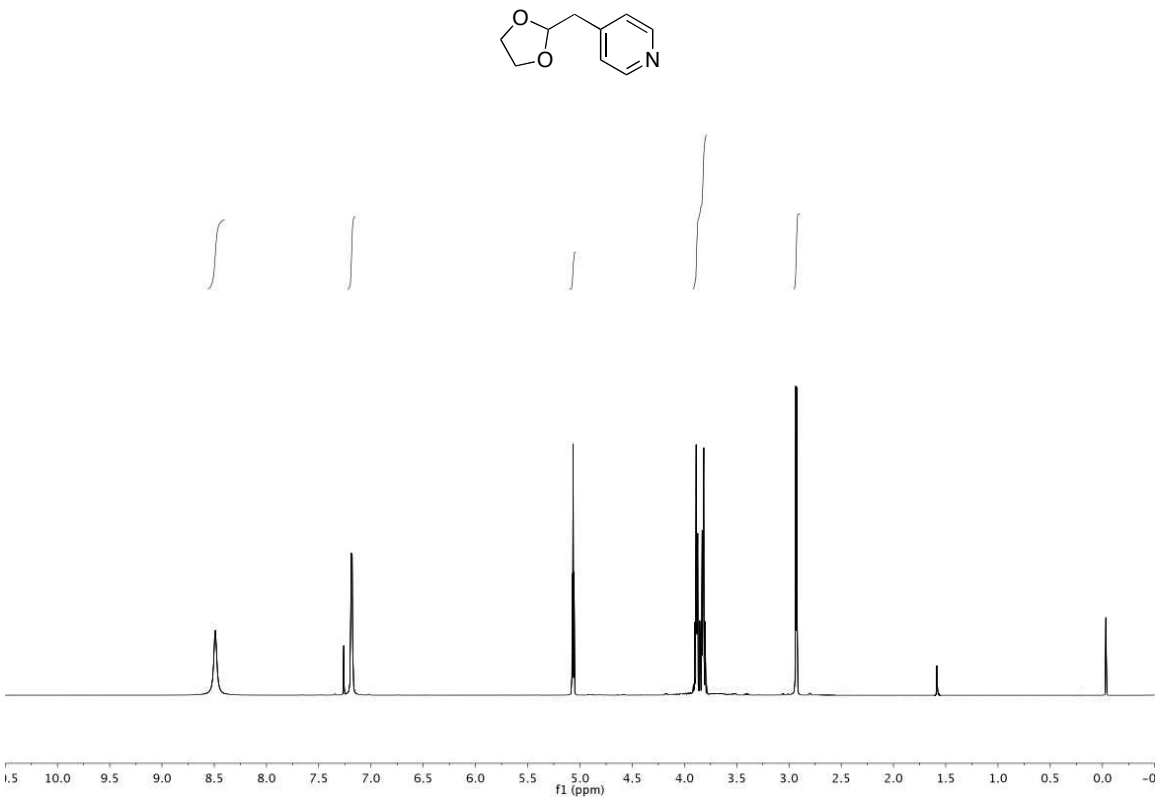
^{13}C NMR (126 MHz, $CDCl_3$) of 4-(2-(benzyloxy)ethyl)pyridine (Table 3, entry 3, 2)



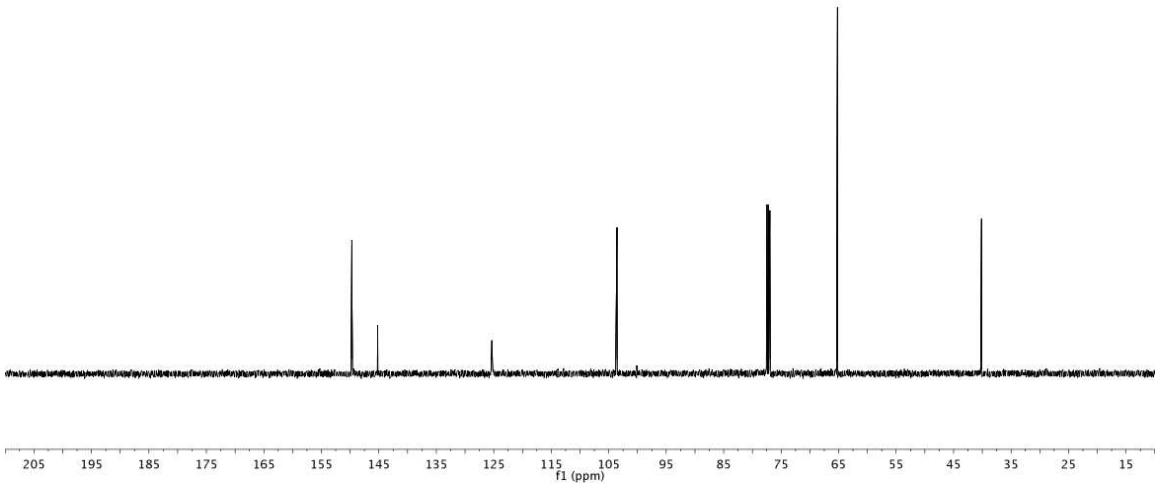
^{1}H NMR (500 MHz, $CDCl_3$) of 2-((1,3-dioxolan-2-yl)methyl)benzofuran (Table 3, entry 4, 1)



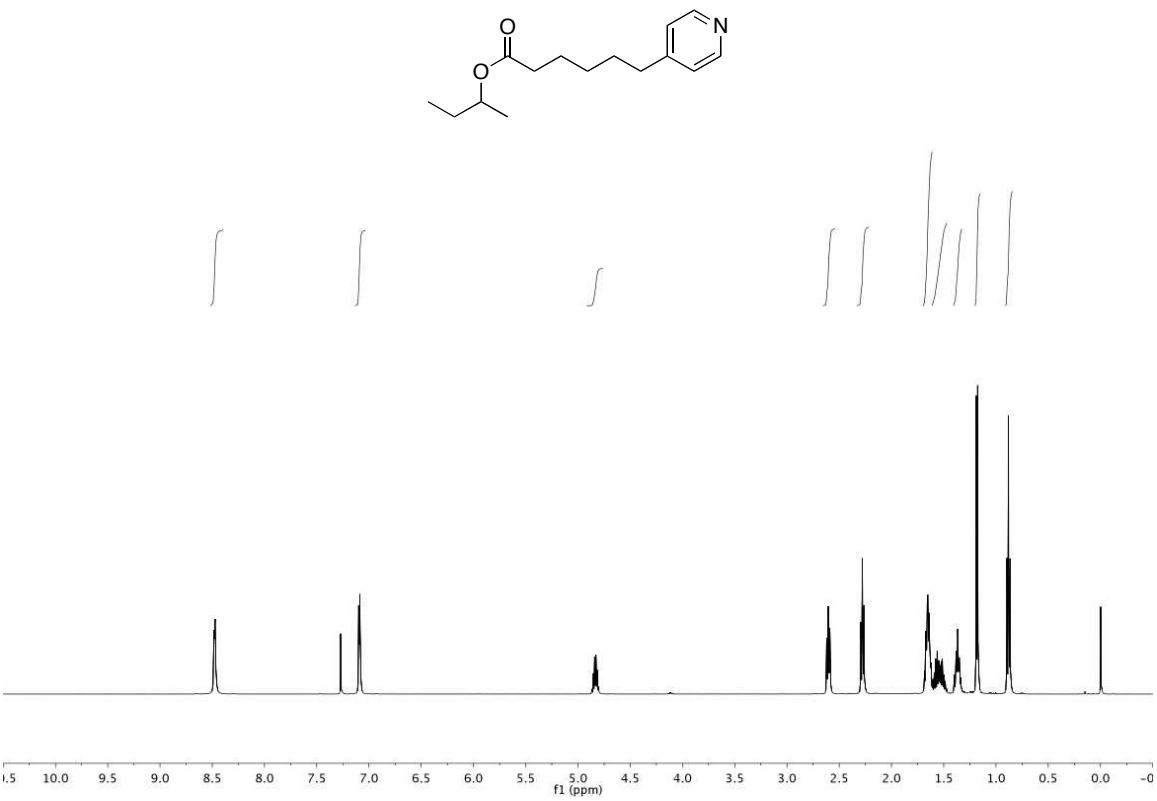
^{13}C NMR (126 MHz, $CDCl_3$) of 2-((1,3-dioxolan-2-yl)methyl)benzofuran (Table 3, entry 4, 1)



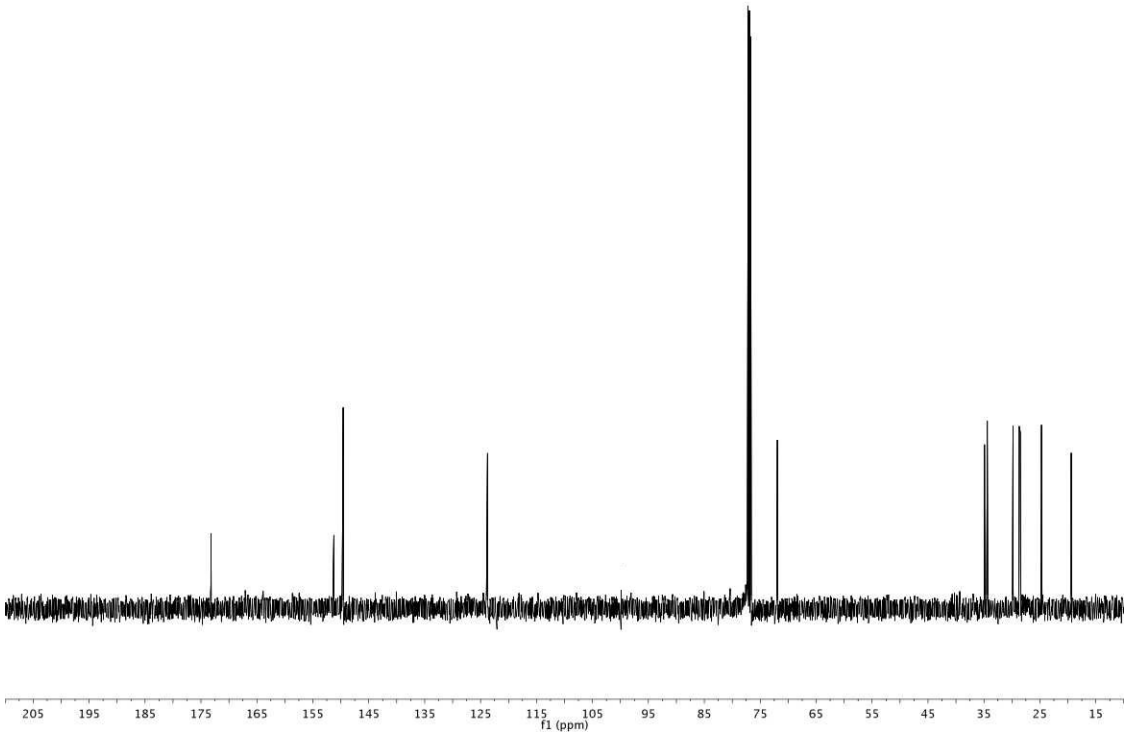
^{1}H NMR (500 MHz, $CDCl_3$) of 4-((1,3-dioxolan-2-yl)methyl)pyridine (Table 3, entry 4, 2)



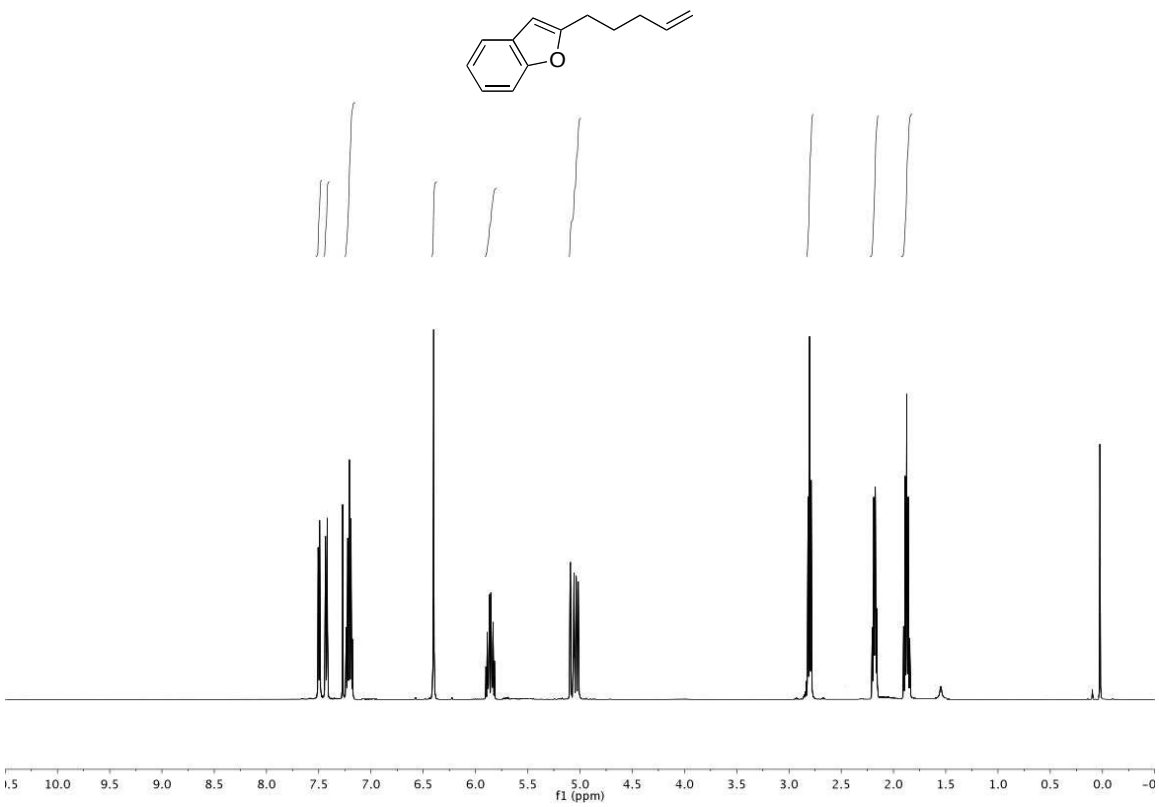
^{13}C NMR (126 MHz, $CDCl_3$) of 4-((1,3-dioxolan-2-yl)methyl)pyridine (Table 3, entry 4, 2)



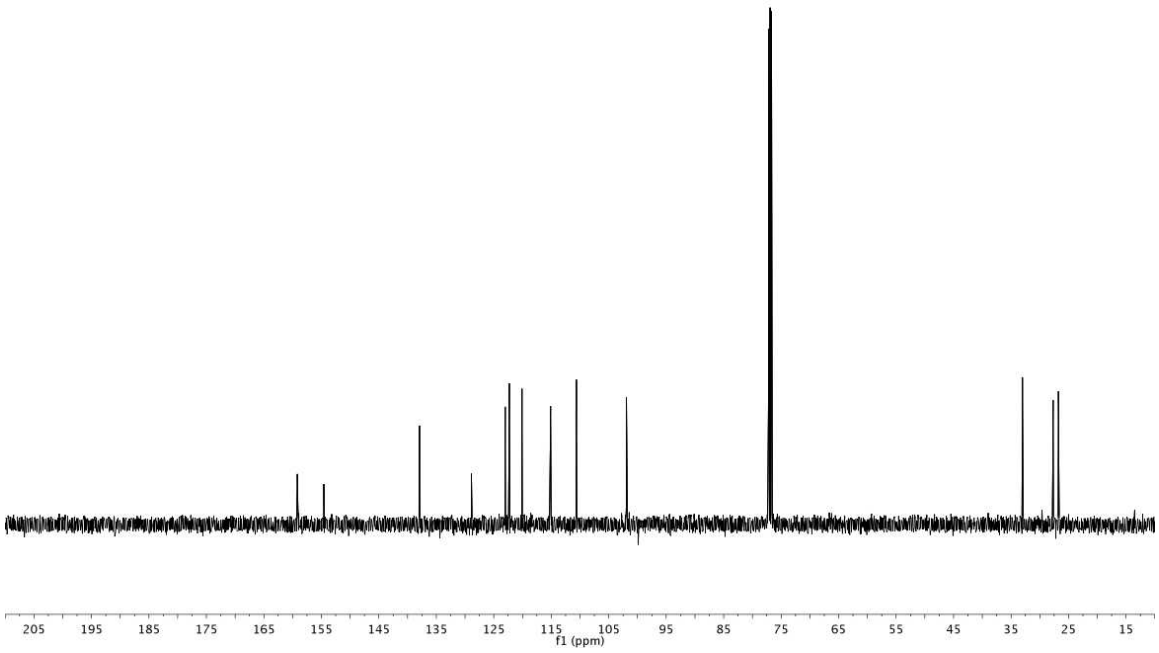
^{1}H NMR (500 MHz, $CDCl_3$) of *sec*-butyl 6-(pyridin-4-yl)hexanoate (Table 3, entry 5, 2)



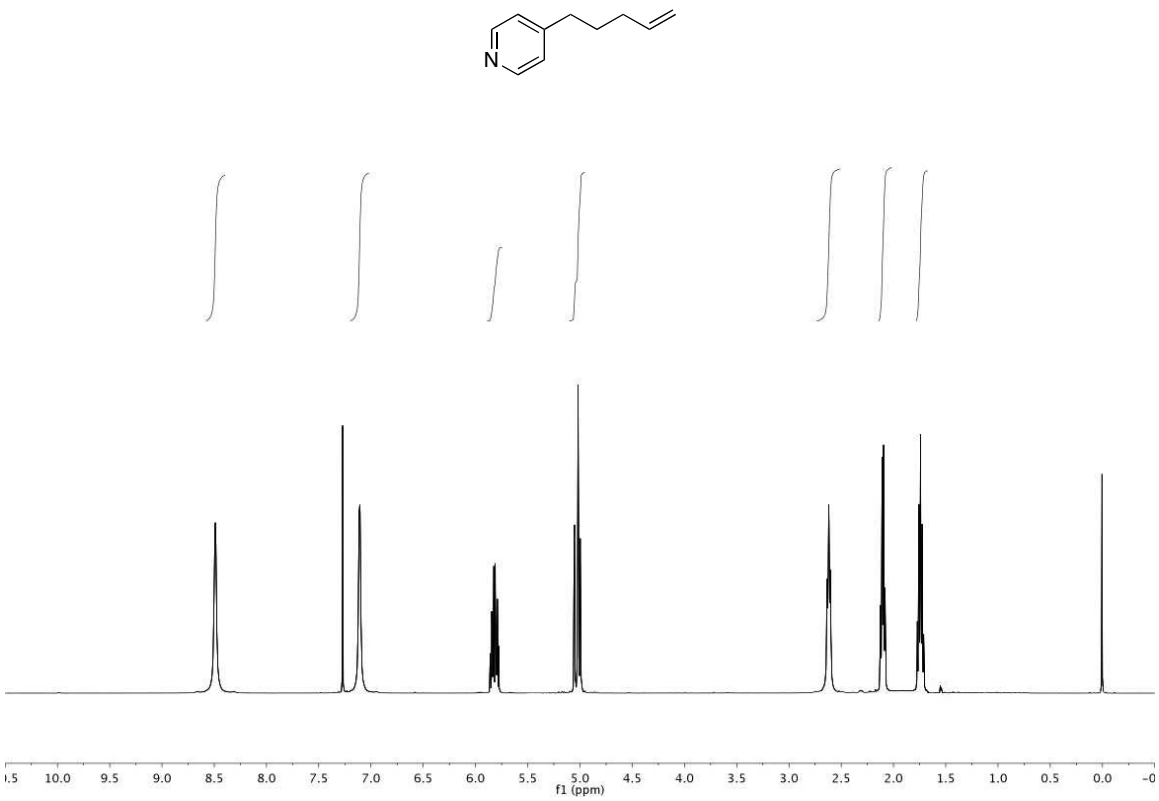
^{13}C NMR (126 MHz, $CDCl_3$) of *sec*-butyl 6-(pyridin-4-yl)hexanoate (Table 3, entry 5, 2)



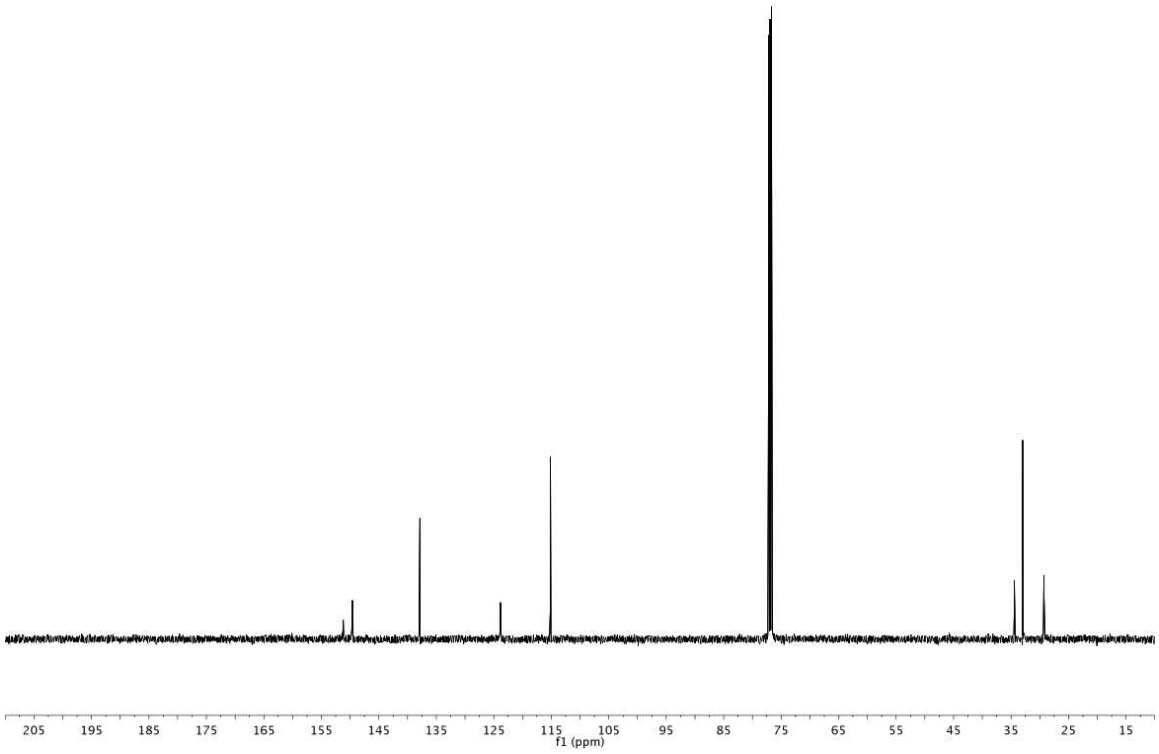
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(pent-4-en-1-yl)benzofuran (Table 3, entry 6, 1)



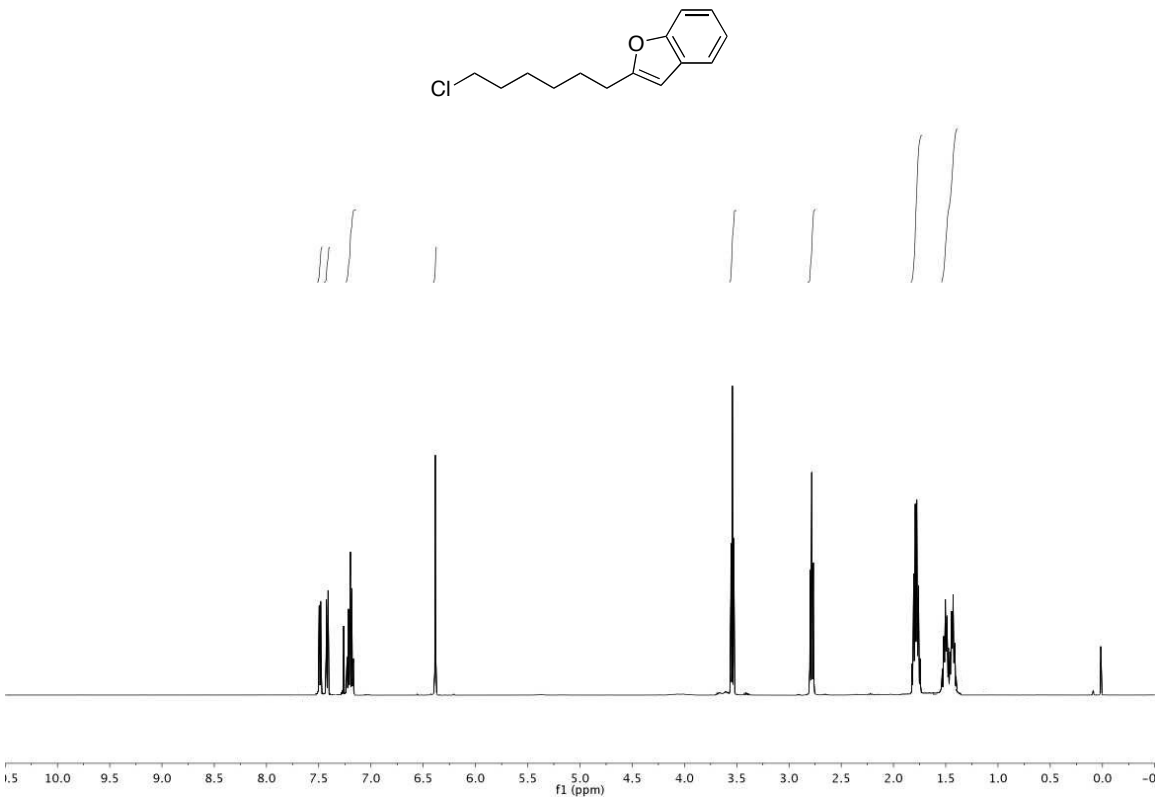
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(pent-4-en-1-yl)benzofuran (Table 3, entry 6, 1)



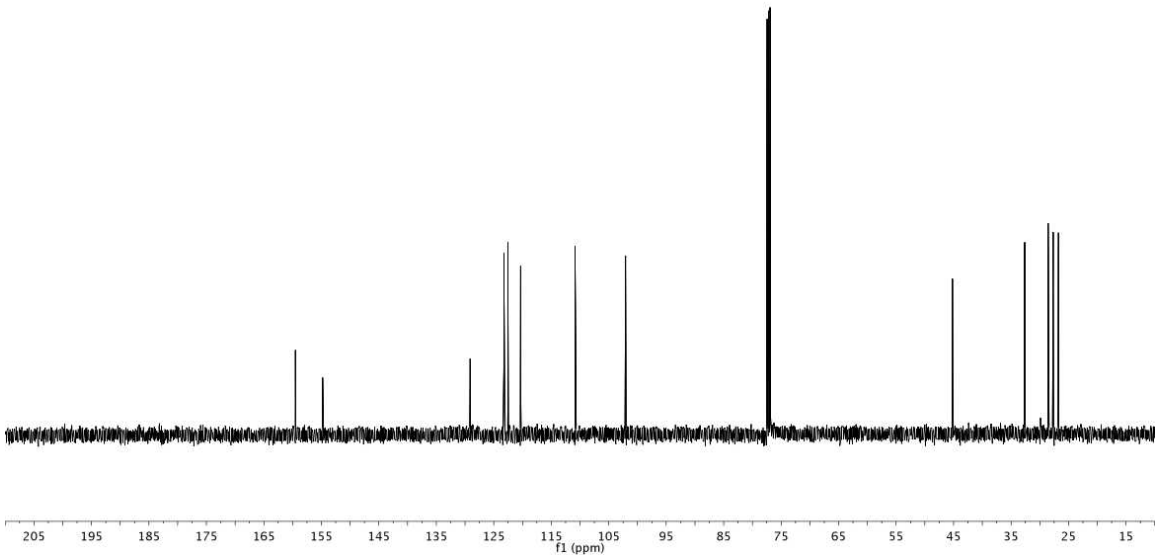
^{1}H NMR (500 MHz, $CDCl_3$) of 4-(pent-4-en-1-yl)pyridine (Table 3, entry 6, 2)



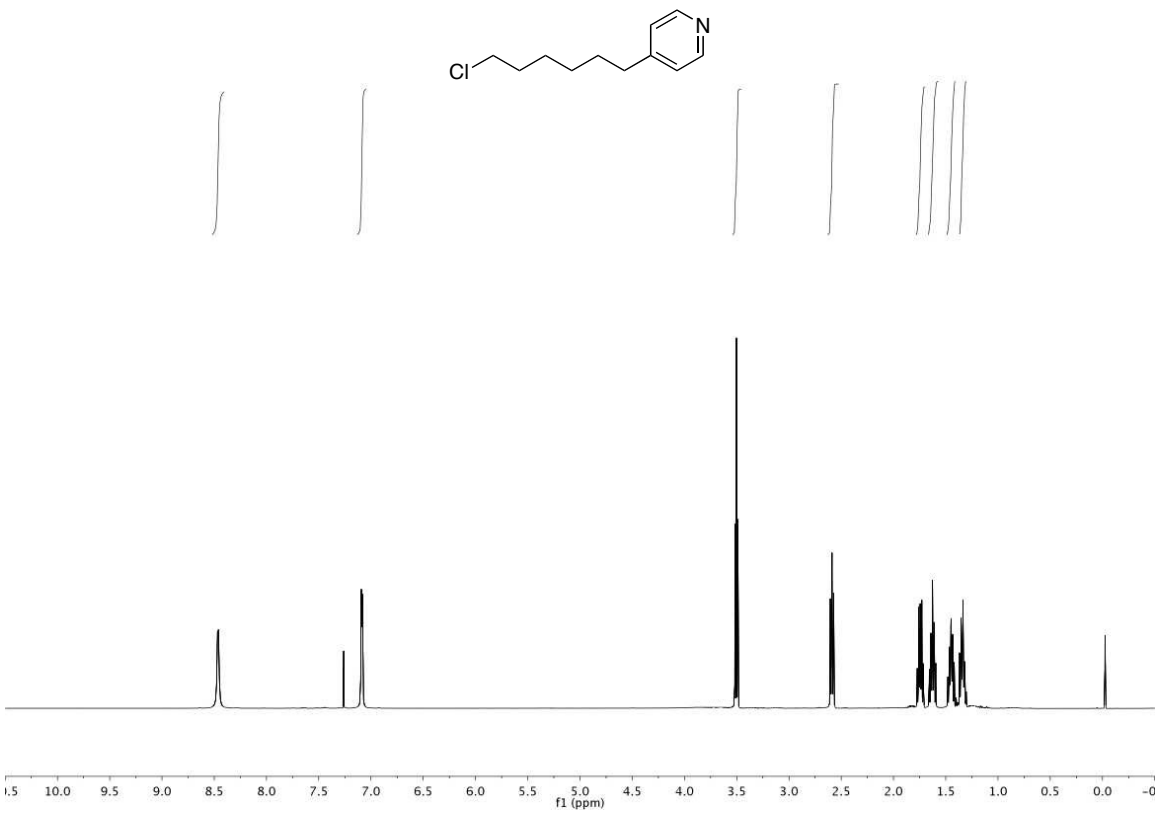
^{13}C NMR (126 MHz, $CDCl_3$) of 4-(pent-4-en-1-yl)pyridine (Table 3, entry 6, 2)



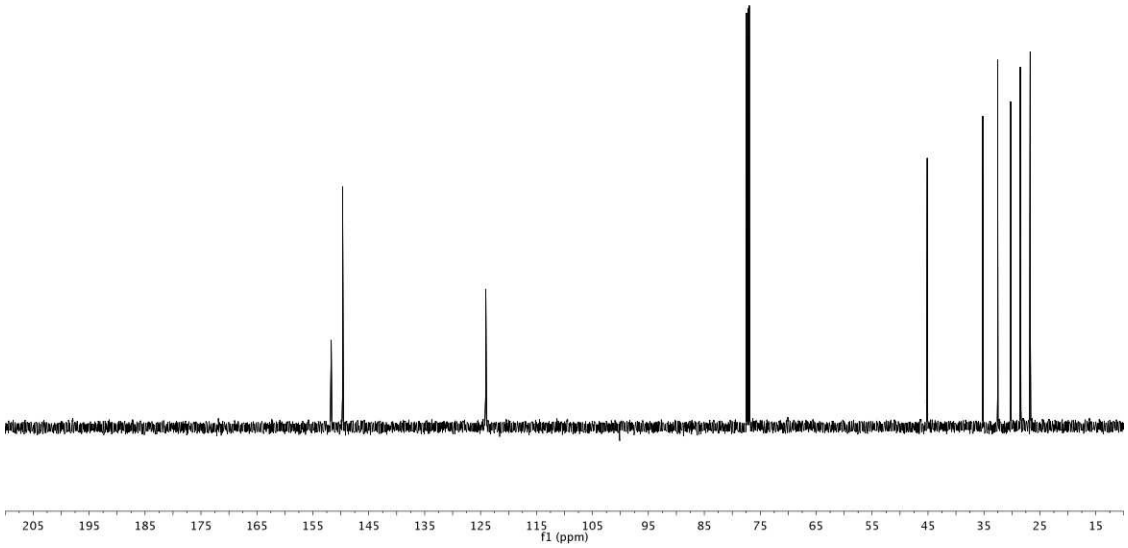
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(6-chlorohexyl)benzofuran (Table 3, entry 7, 1)



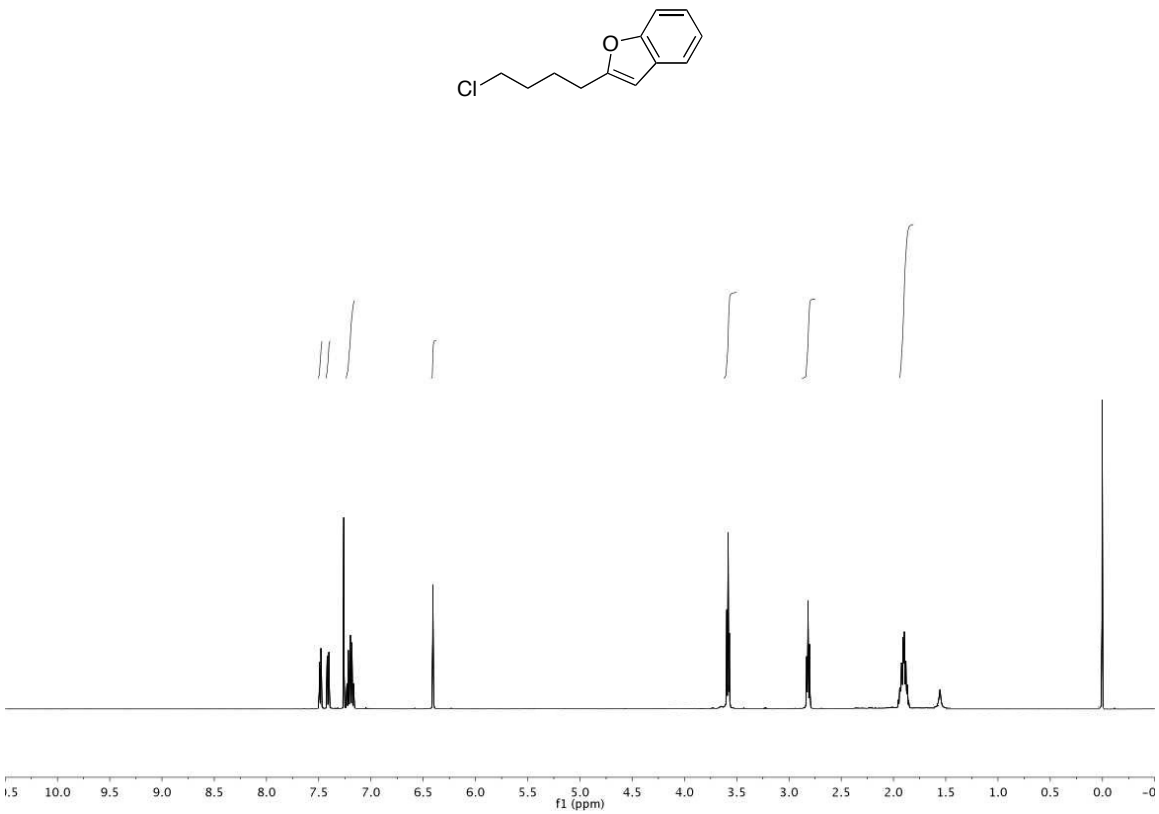
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(6-chlorohexyl)benzofuran (Table 3, entry 7, 1)



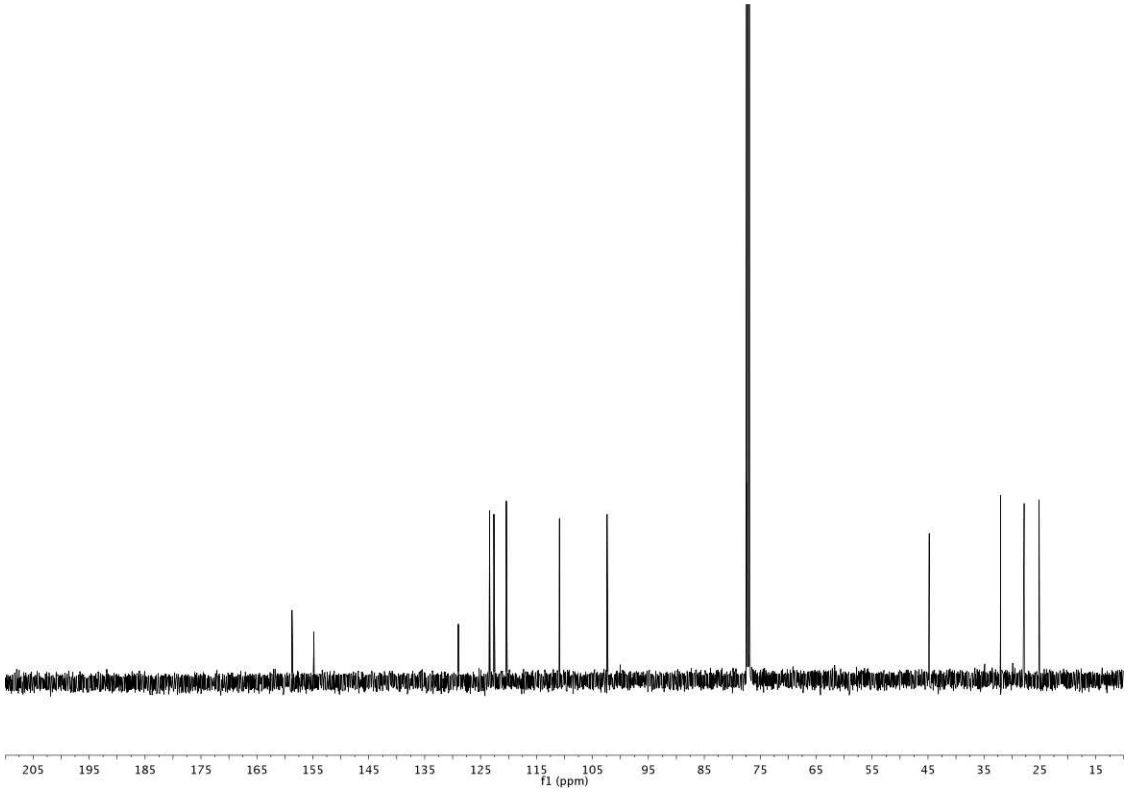
^{1}H NMR (500 MHz, $CDCl_3$) of 4-(6-chlorohexyl)pyridine (Table 3, entry 7, 2)



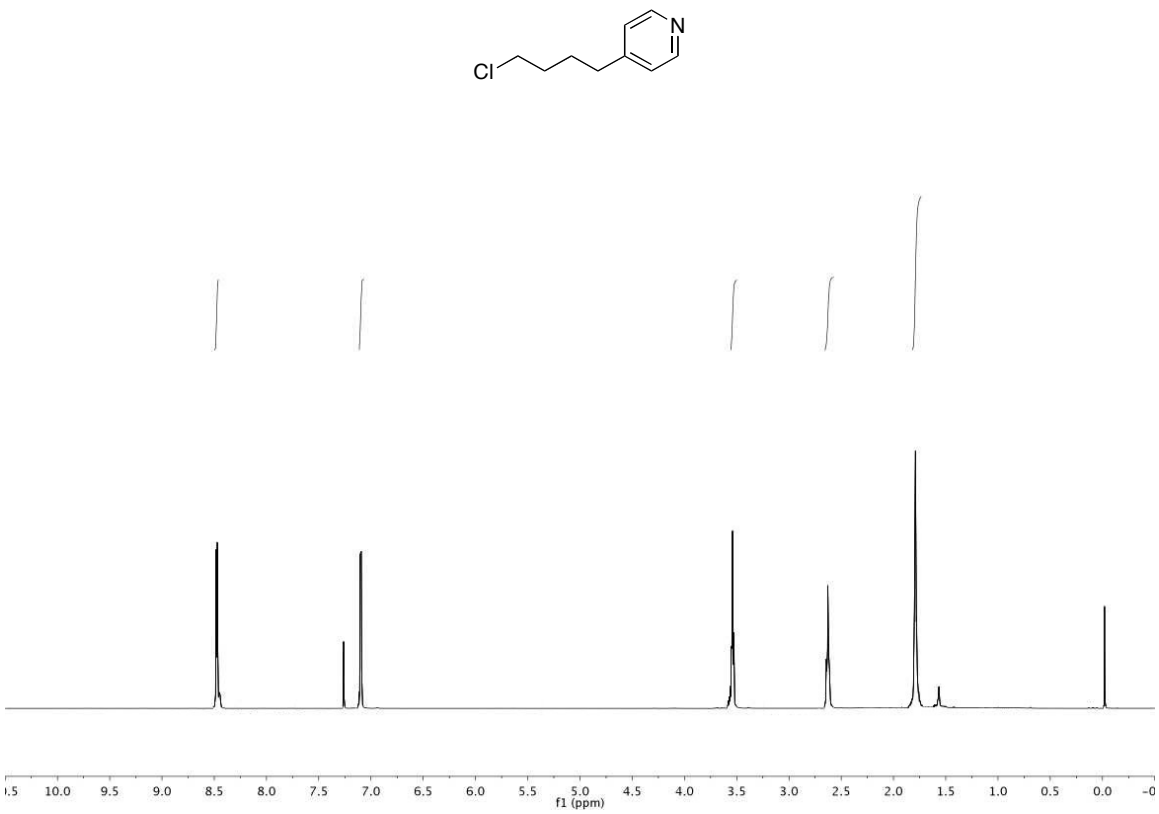
^{13}C NMR (126 MHz, $CDCl_3$) of 4-(6-chlorohexyl)pyridine (Table 3, entry 7, 2)



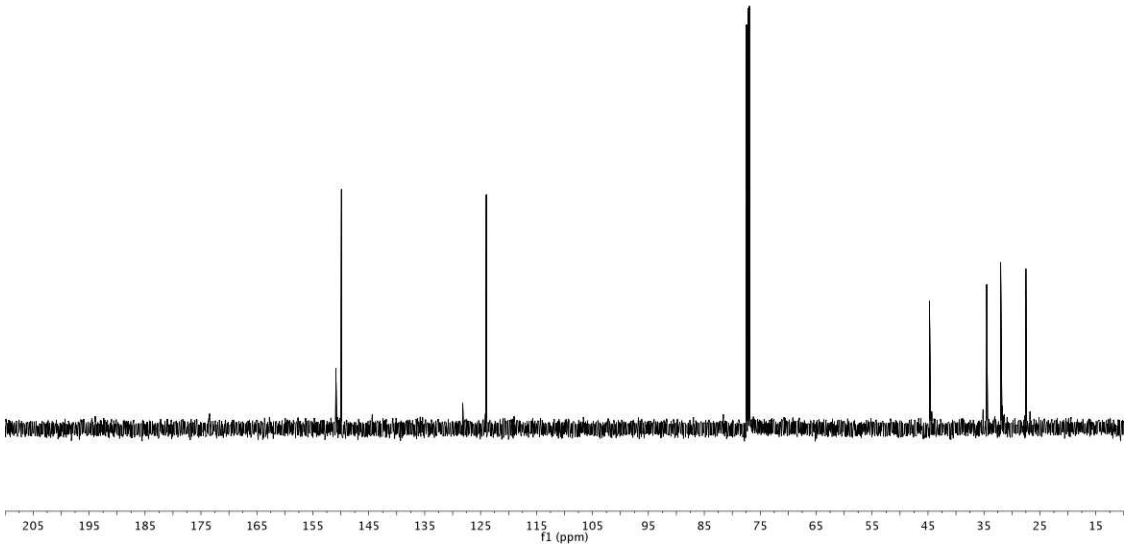
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(pent-4-en-1-yl)benzofuran (Table 3, entry 8, 1)



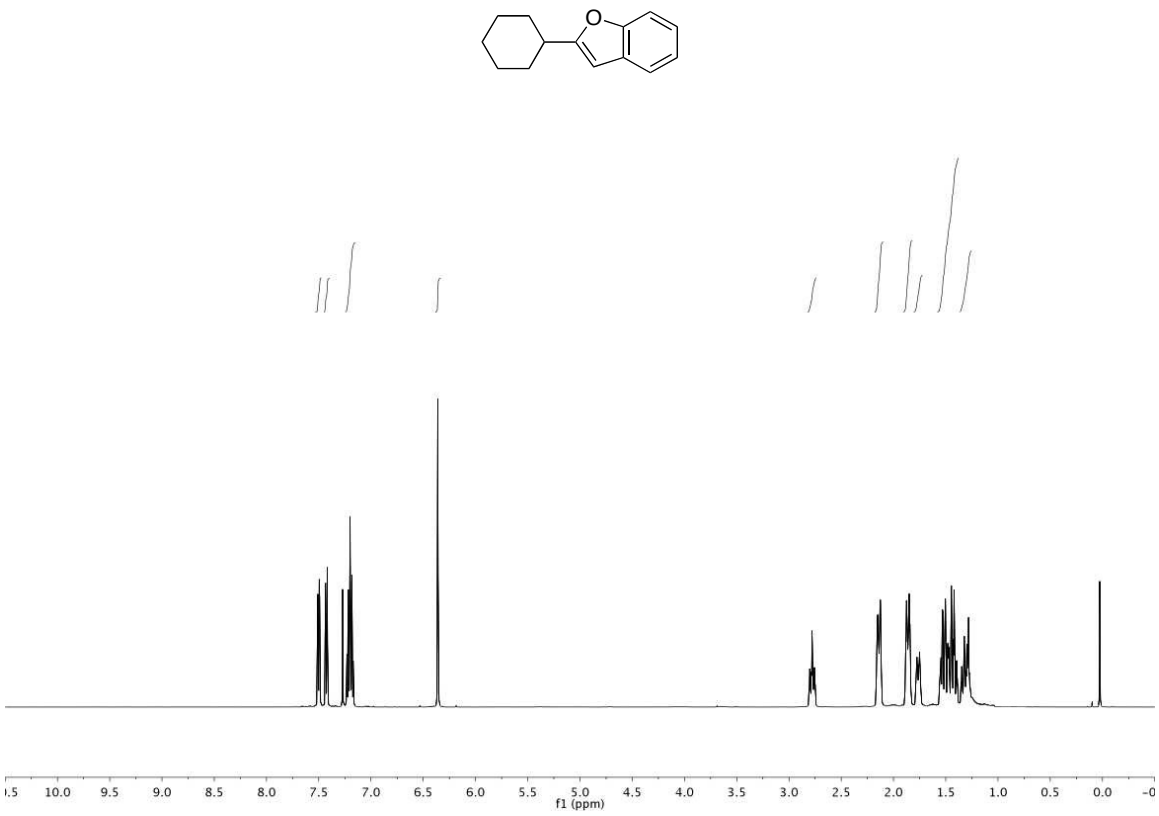
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(pent-4-en-1-yl)benzofuran (Table 3, entry 8, 1)



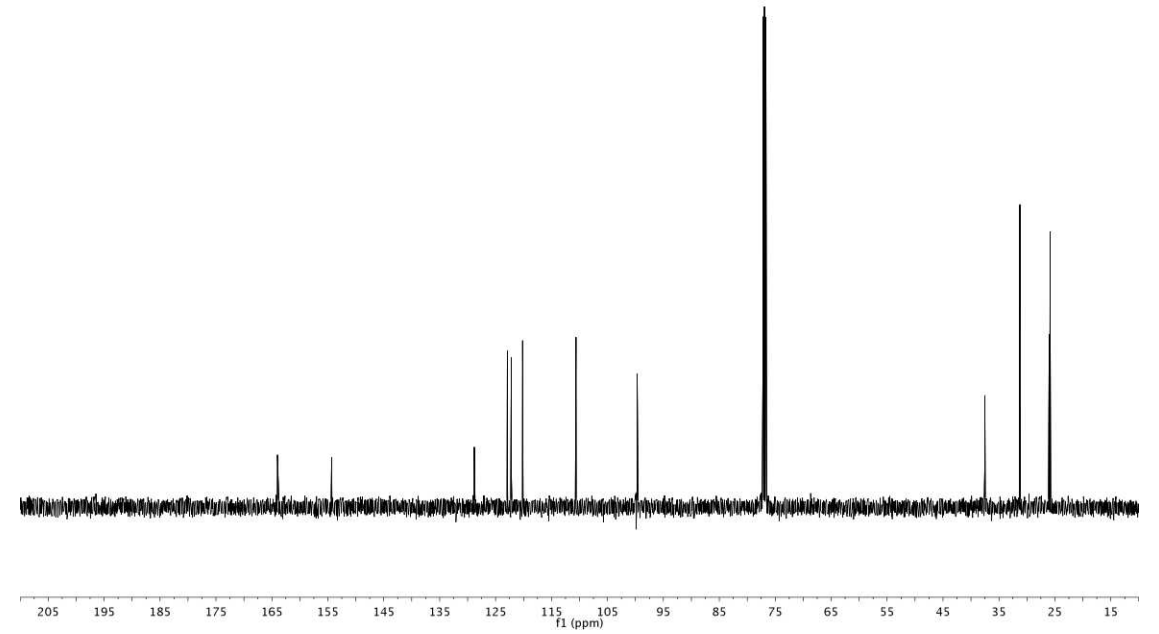
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(pent-4-en-1-yl)benzofuran (Table 3, entry 8, 2)



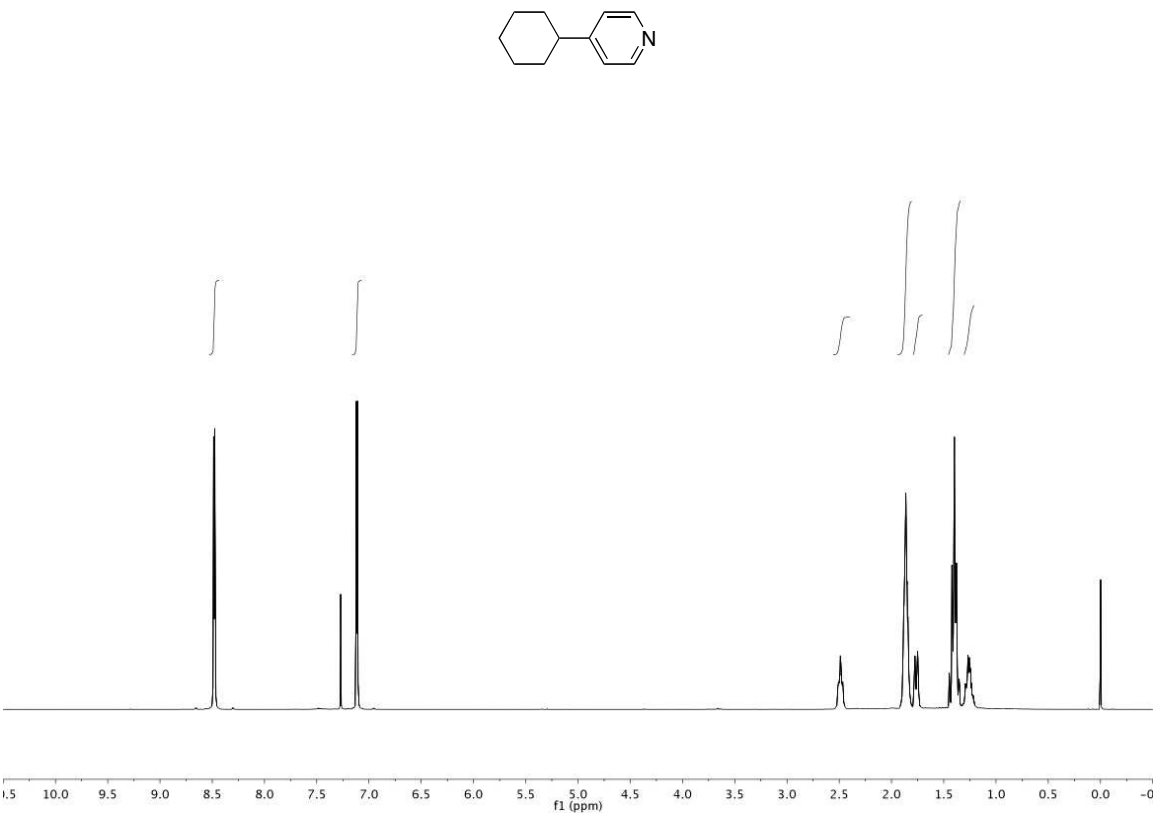
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(pent-4-en-1-yl)benzofuran (Table 3, entry 8, 2)



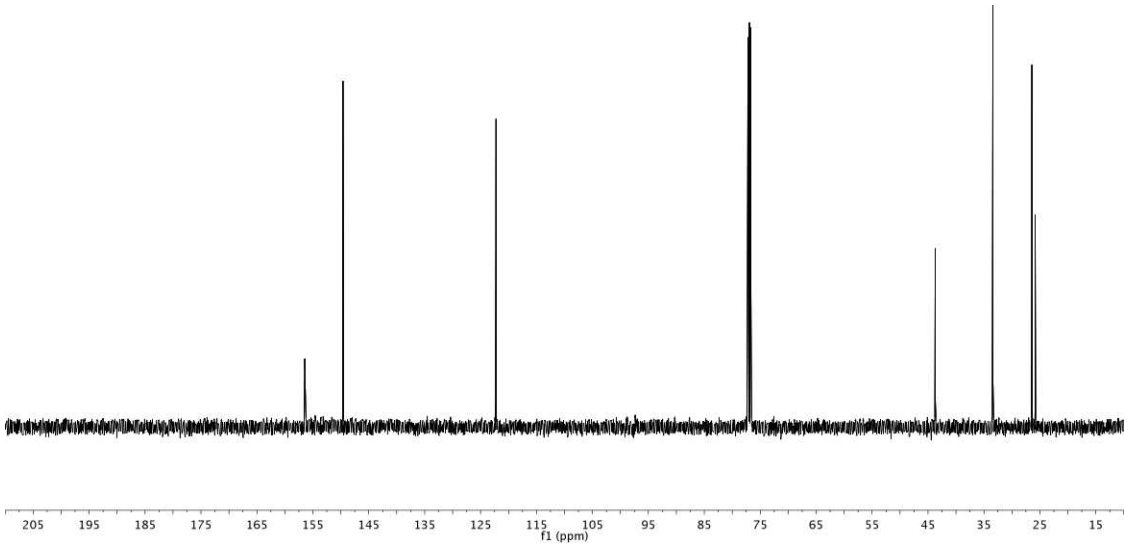
^{1}H NMR (500 MHz, $CDCl_3$) of 2-cyclohexylbenzofuran (Table 3, entry 9, 1)



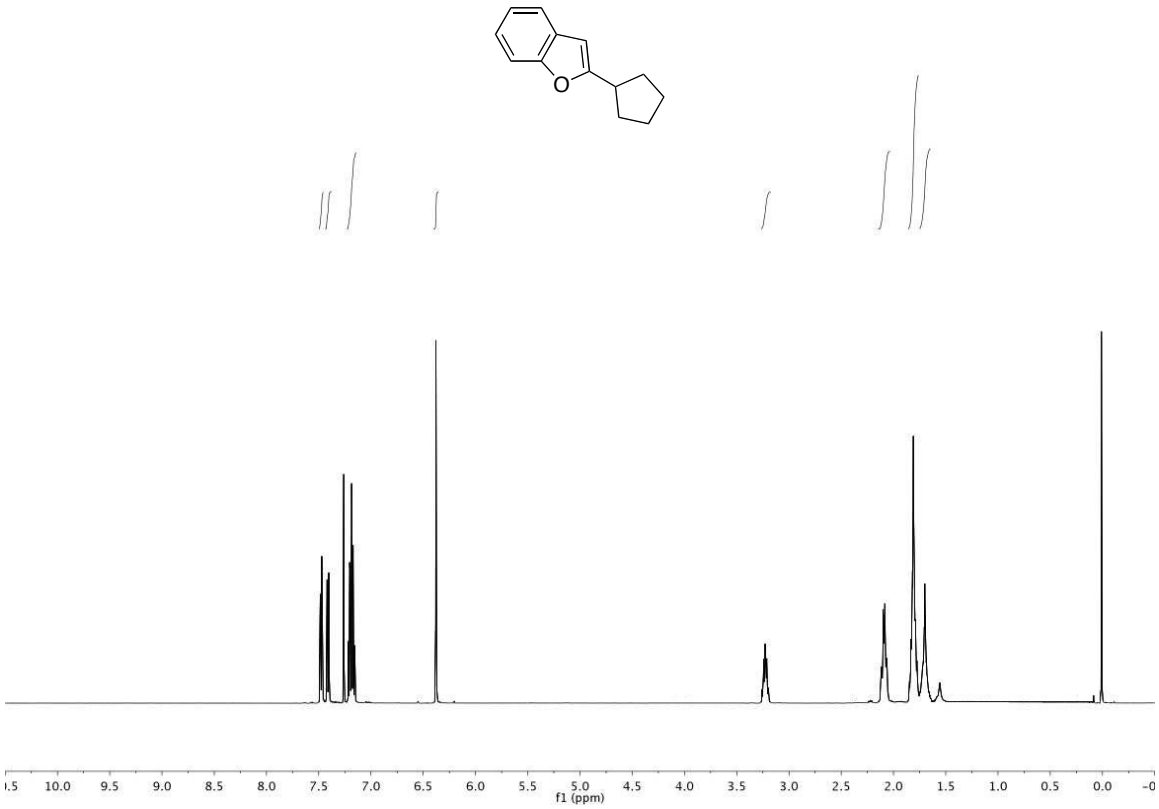
^{13}C NMR (126 MHz, $CDCl_3$) of 2-cyclohexylbenzofuran (Table 3, entry 9, 1)



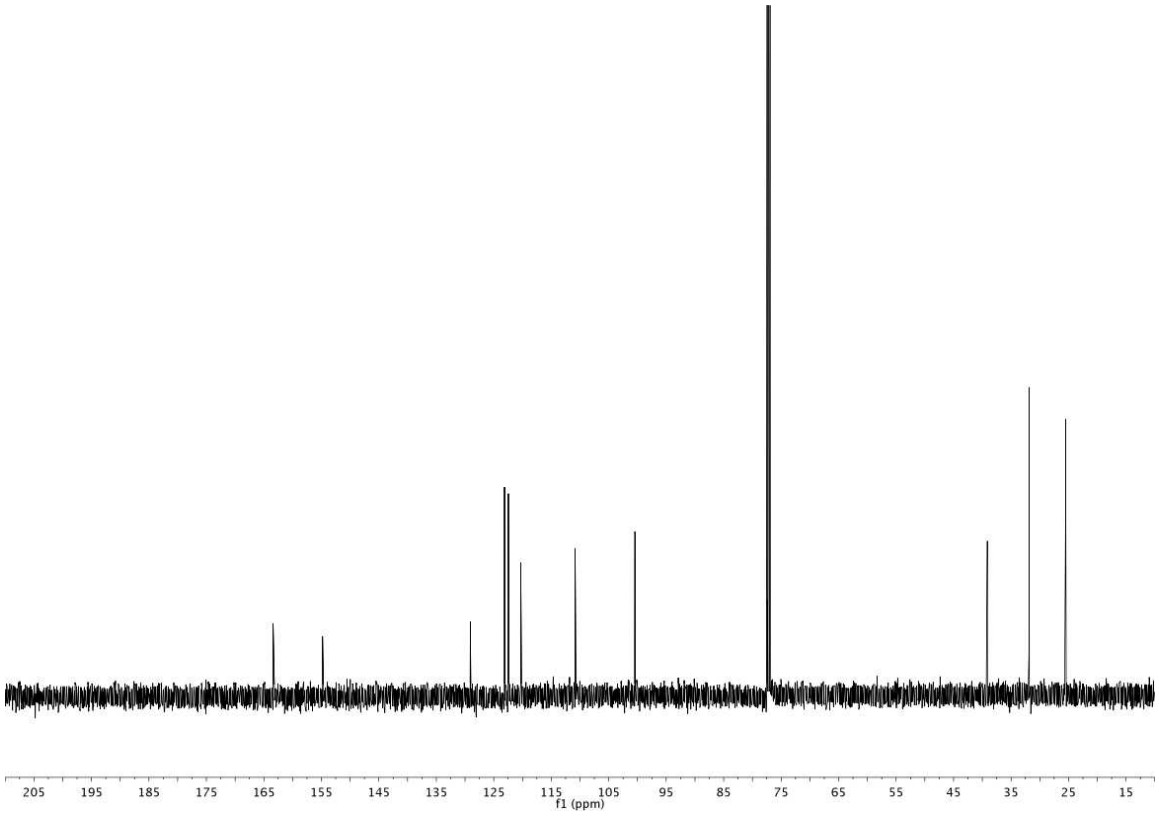
^{1}H NMR (500 MHz, $CDCl_3$) of 4-cyclohexylpyridine (Table 3, entry 9, 2)



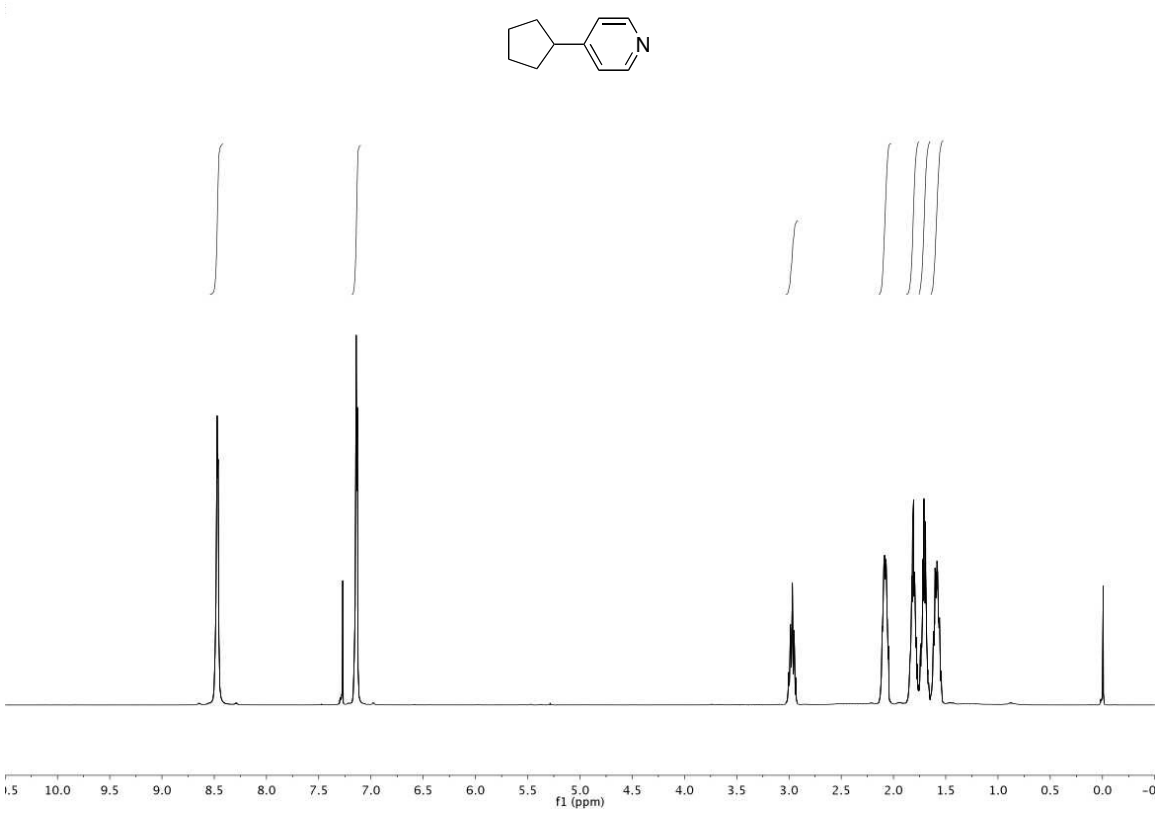
^{13}C NMR (126 MHz, $CDCl_3$) of 4-cyclohexylpyridine (Table 3, entry 9, 2)



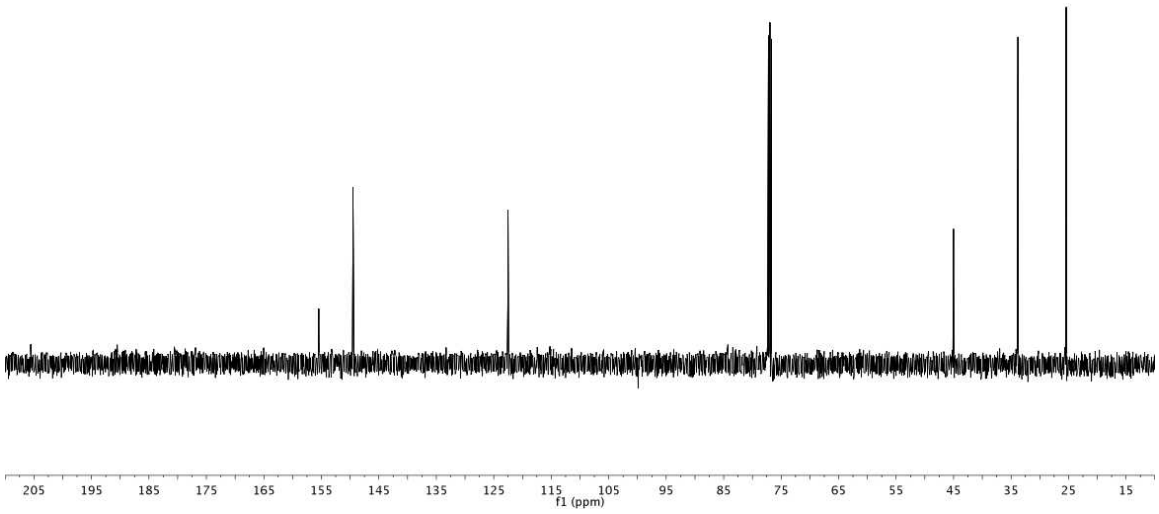
^{1}H NMR (500 MHz, $CDCl_3$) of 2-cyclopentylbenzofuran (Table 3, entry 10, 1)



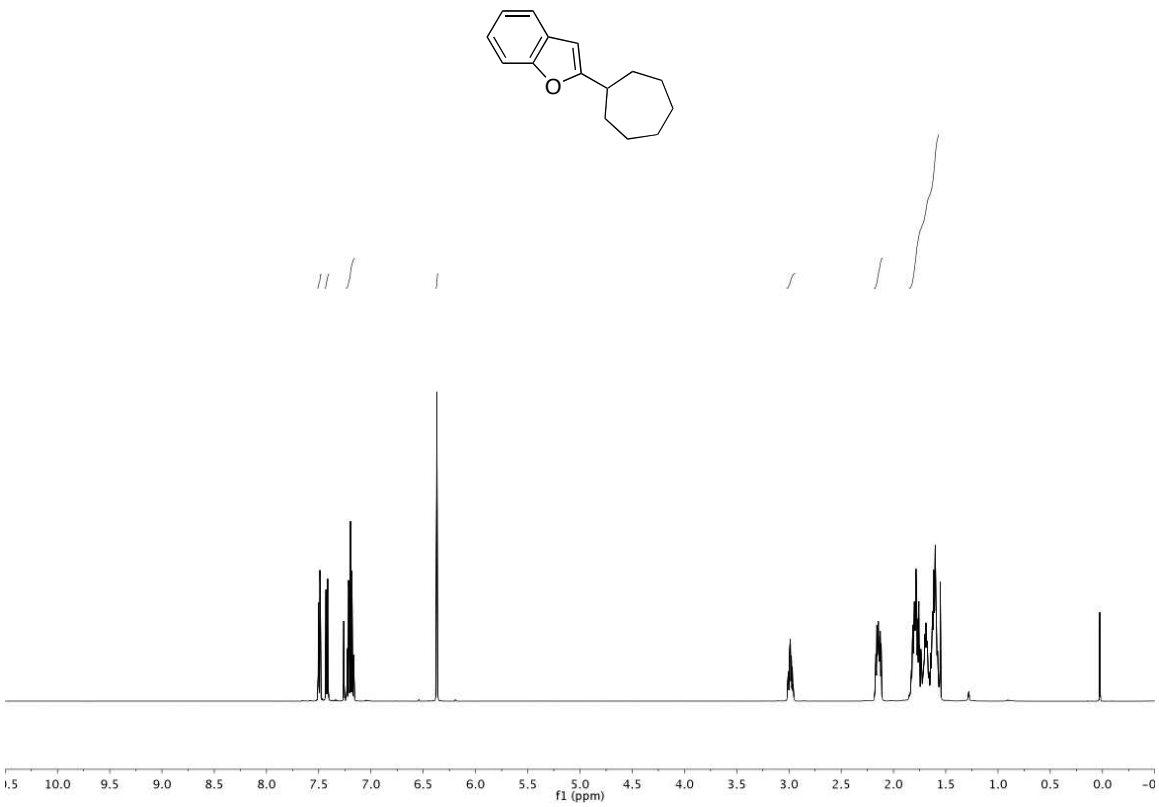
^{13}C NMR (126 MHz, $CDCl_3$) of 2-cyclopentylbenzofuran (Table 3, entry 10, 1)



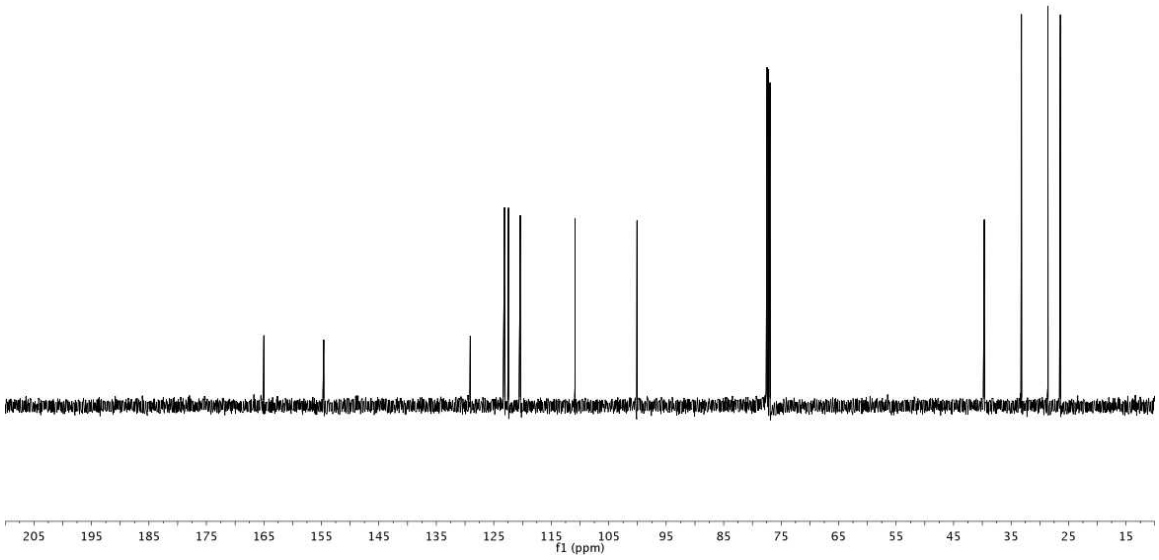
^{1}H NMR (500 MHz, $CDCl_3$) of 4-cyclopentylpyridine (Table 3, entry 10, 2)



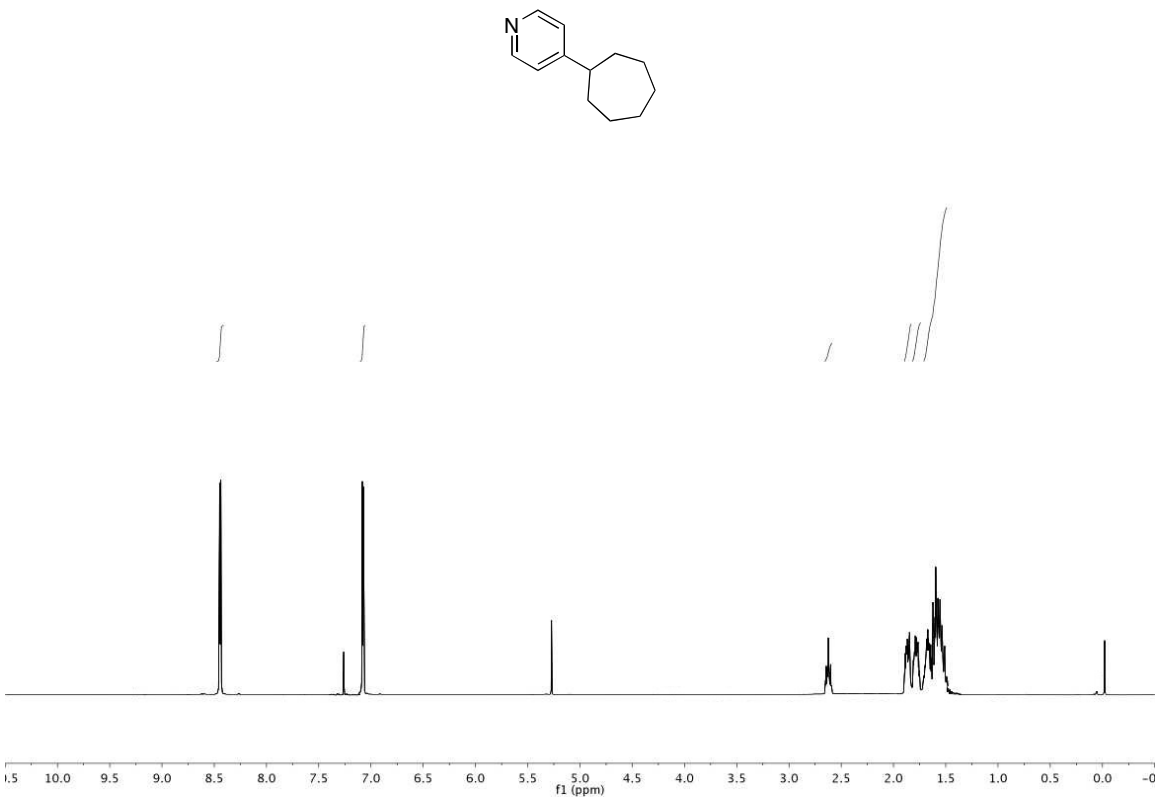
^{13}C NMR (126 MHz, $CDCl_3$) of 4-cyclopentylpyridine (Table 3, entry 10, 2)



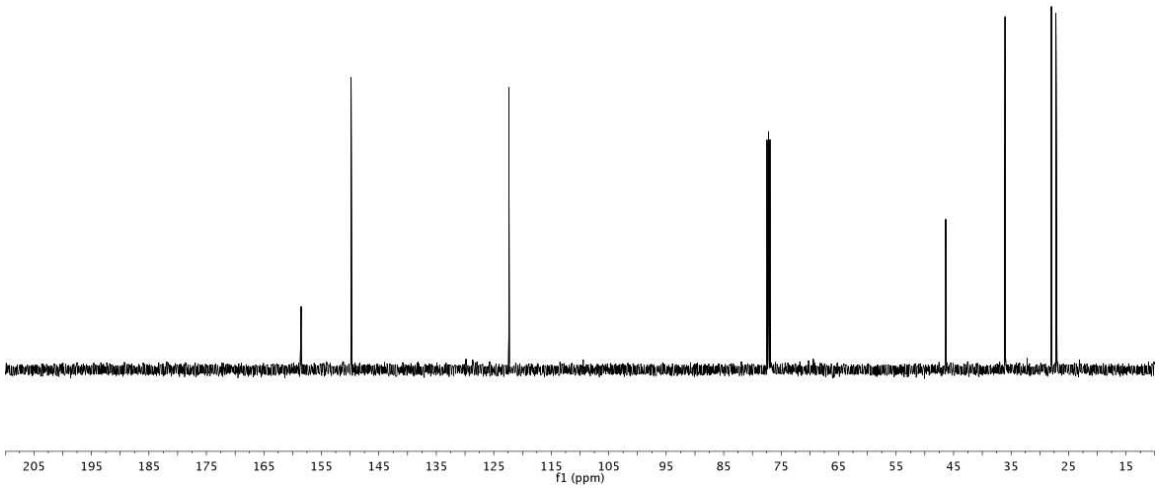
^{1}H NMR (500 MHz, $CDCl_3$) of 2-cycloheptylbenzofuran (Table 3, entry 11, 1)



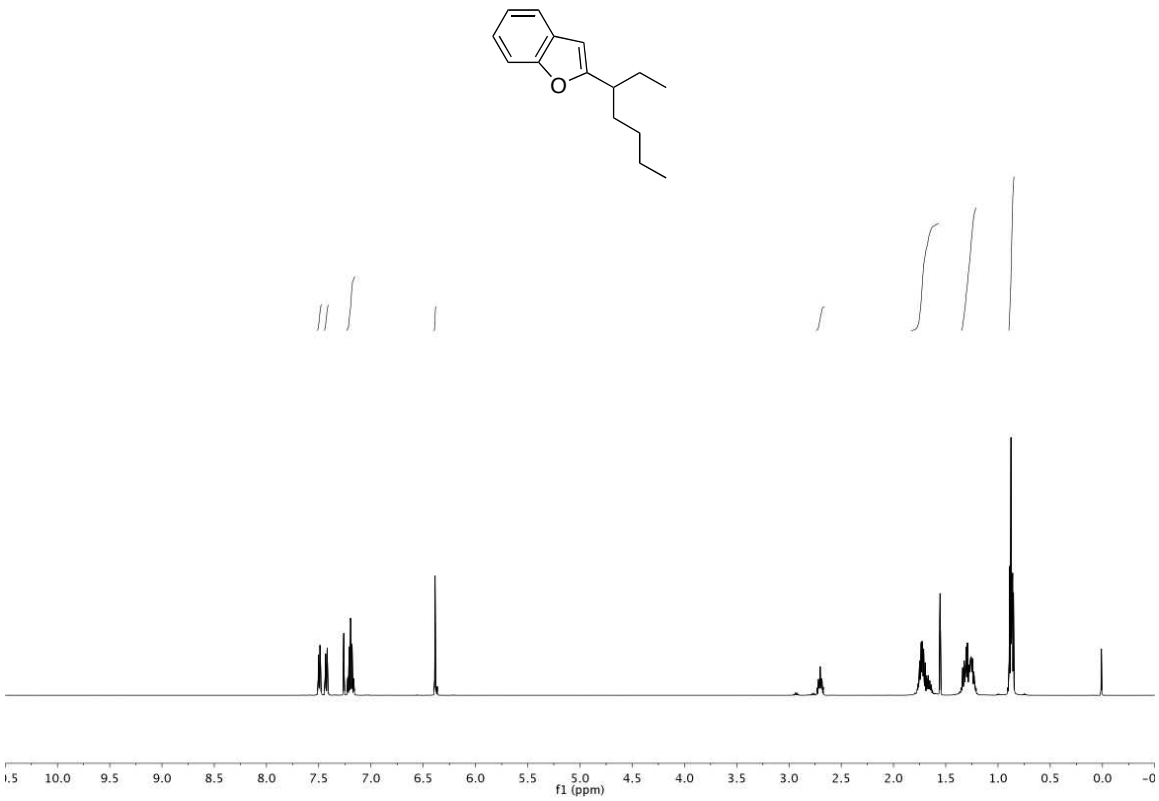
^{13}C NMR (126 MHz, $CDCl_3$) of 2-cycloheptylbenzofuran (Table 3, entry 11, 1)



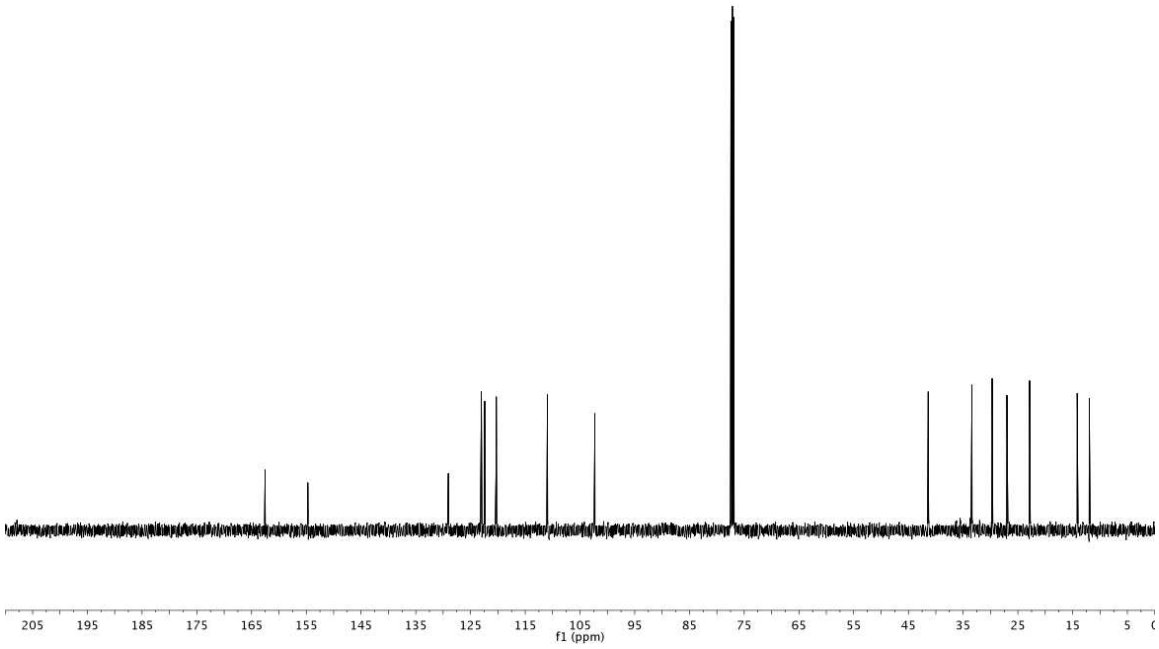
^{1}H NMR (500 MHz, $CDCl_3$) of 2-cycloheptylpyridine (Table 3, entry 11, 2)



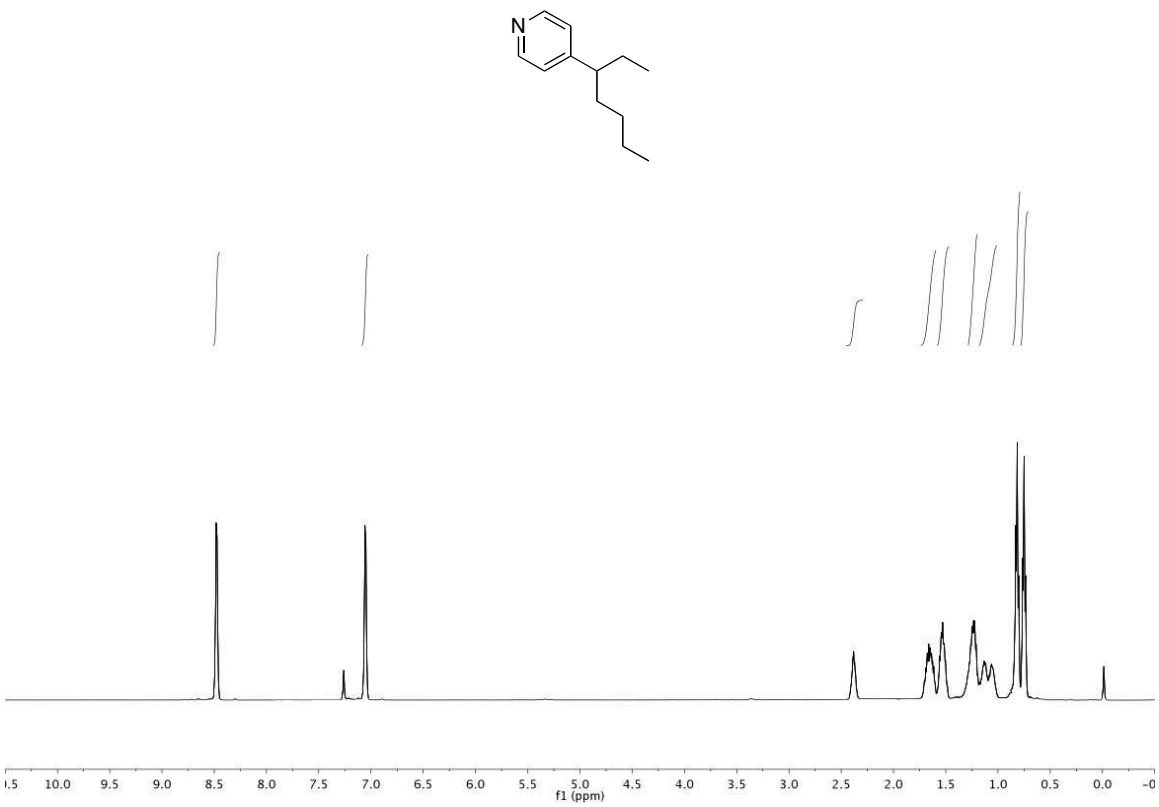
^{13}C NMR (126 MHz, $CDCl_3$) of 2-cycloheptylpyridine (Table 3, entry 11, 2)



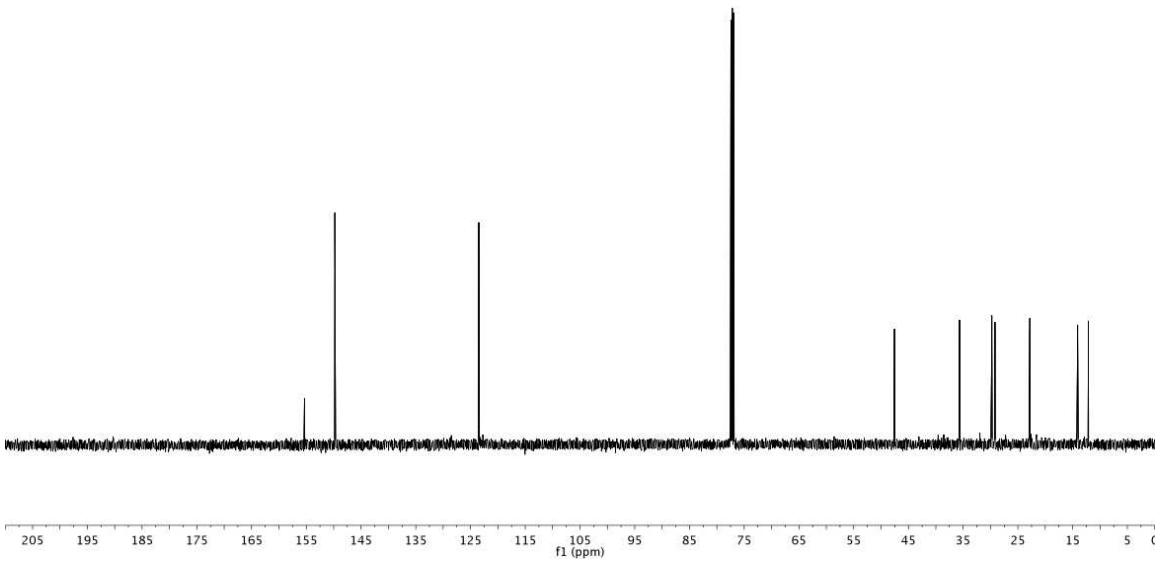
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(heptan-3-yl)benzofuran (Table 3, entry 12, 1)



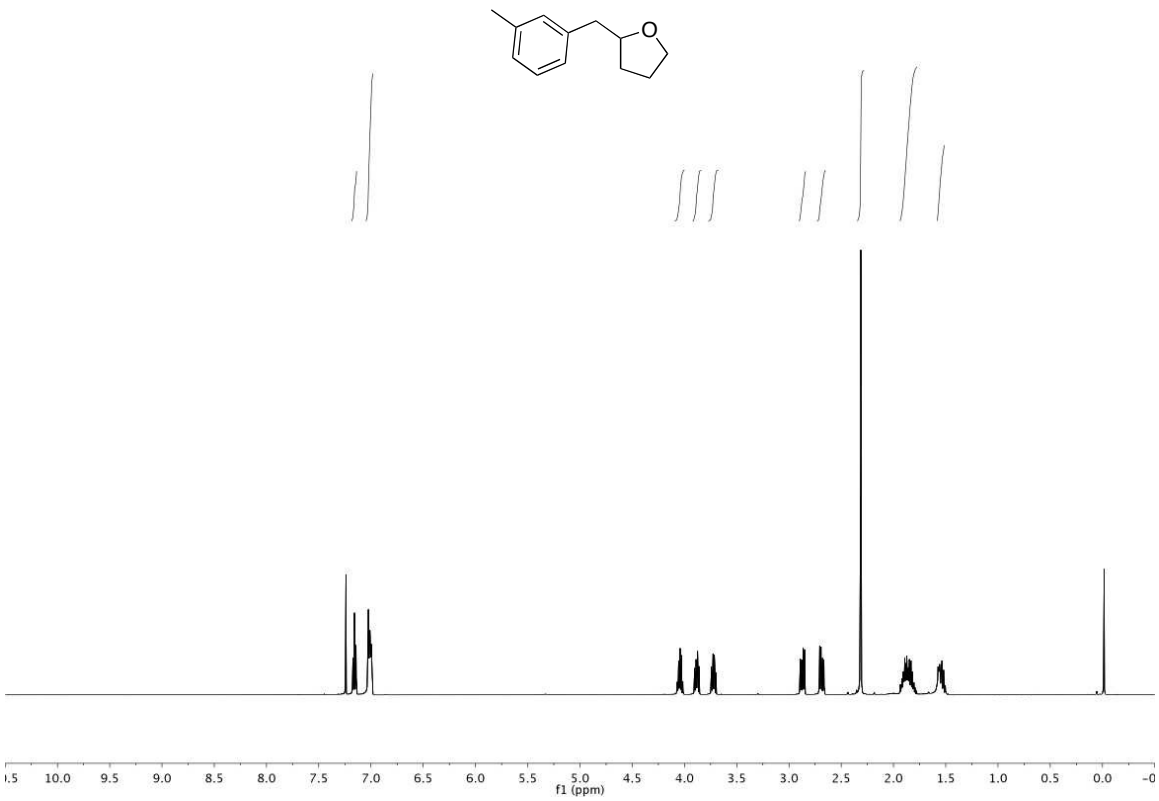
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(heptan-3-yl)benzofuran (Table 3, entry 12, 1)



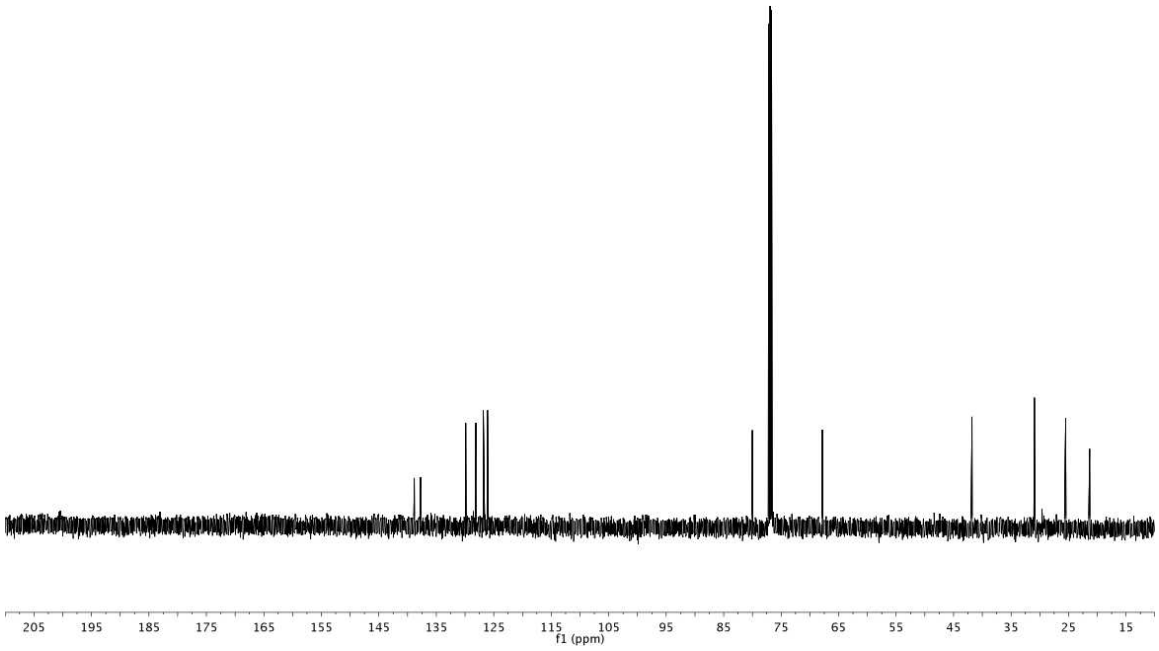
^{1}H NMR (500 MHz, $CDCl_3$) of 4-(heptan-3-yl)pyridine (Table 3, entry 12, 2)



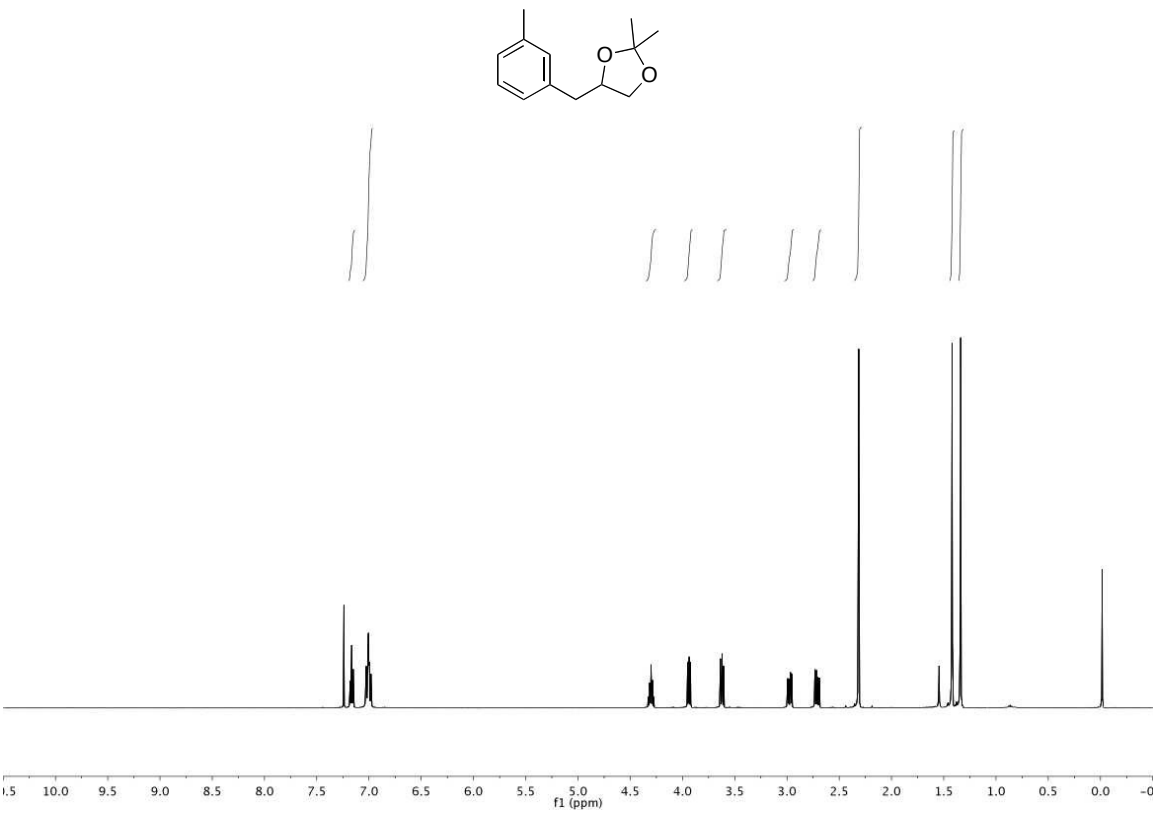
^{13}C NMR (126 MHz, $CDCl_3$) of 4-(heptan-3-yl)pyridine (Table 3, entry 12, 2)



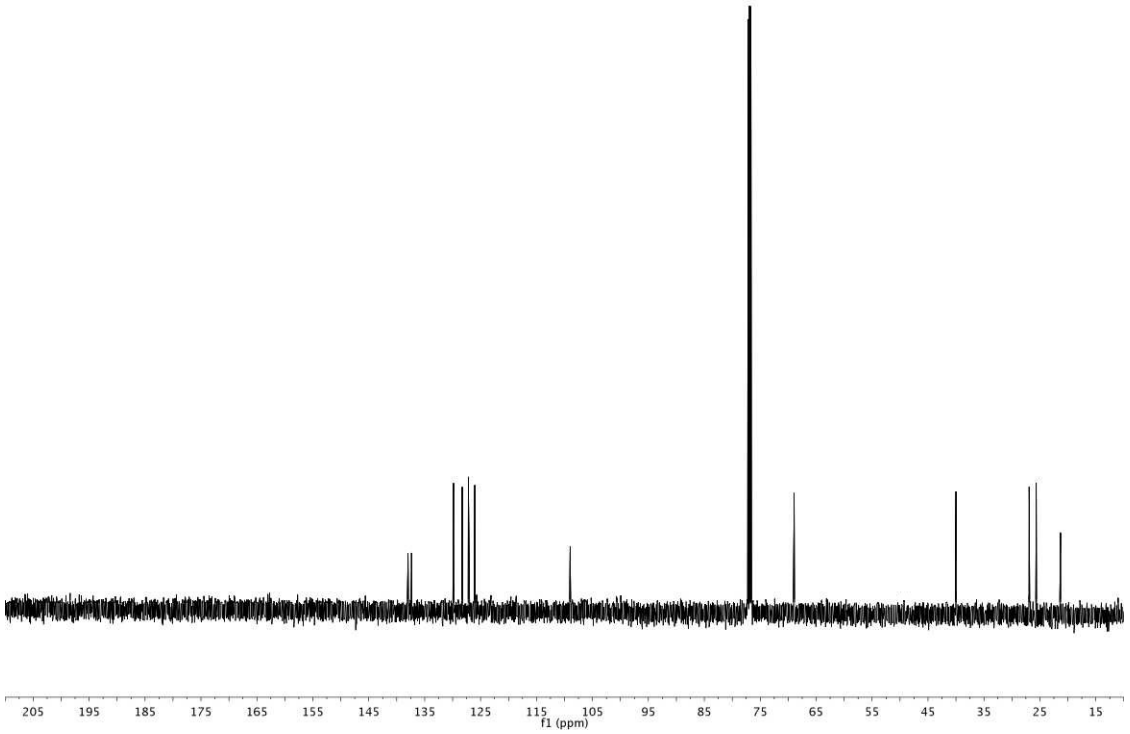
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(3-methylbenzyl)tetrahydrofuran (Table 4, entry 1)



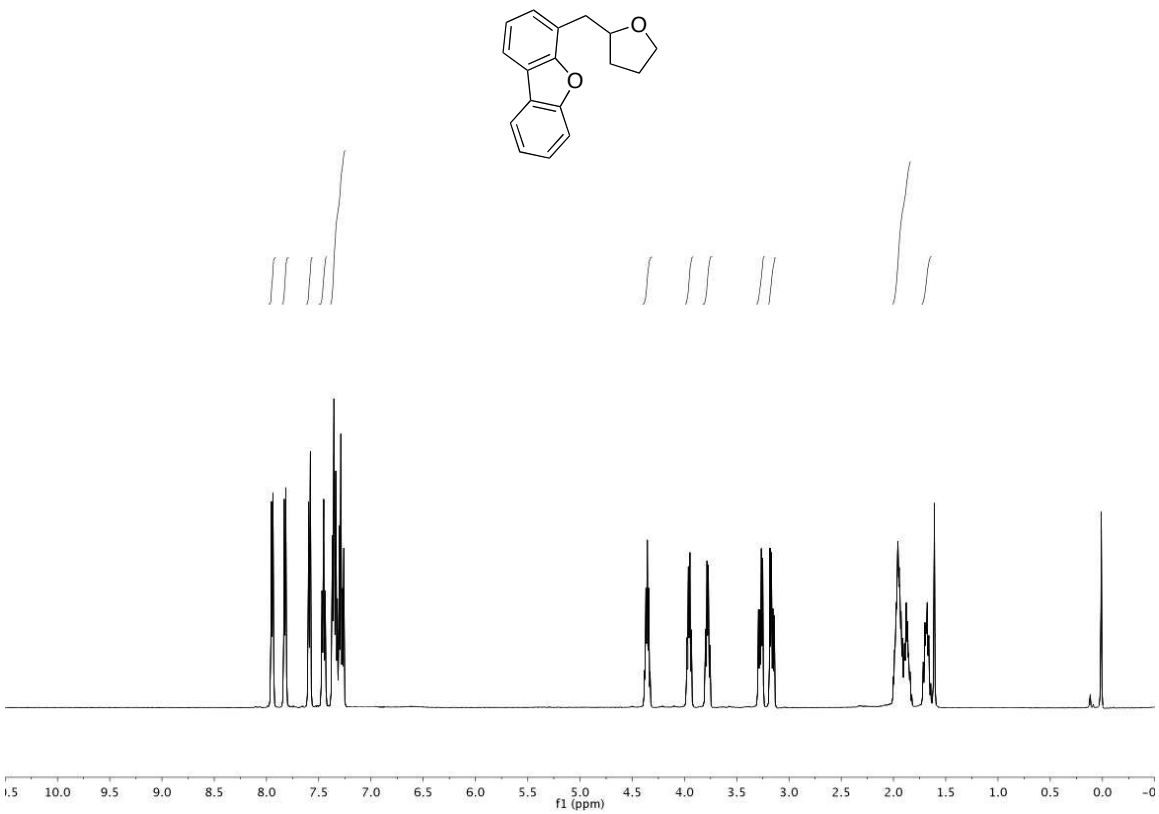
^{13}C NMR (126 MHz, $CDCl_3$) of 2-(3-methylbenzyl)tetrahydrofuran (Table 4, entry 1)



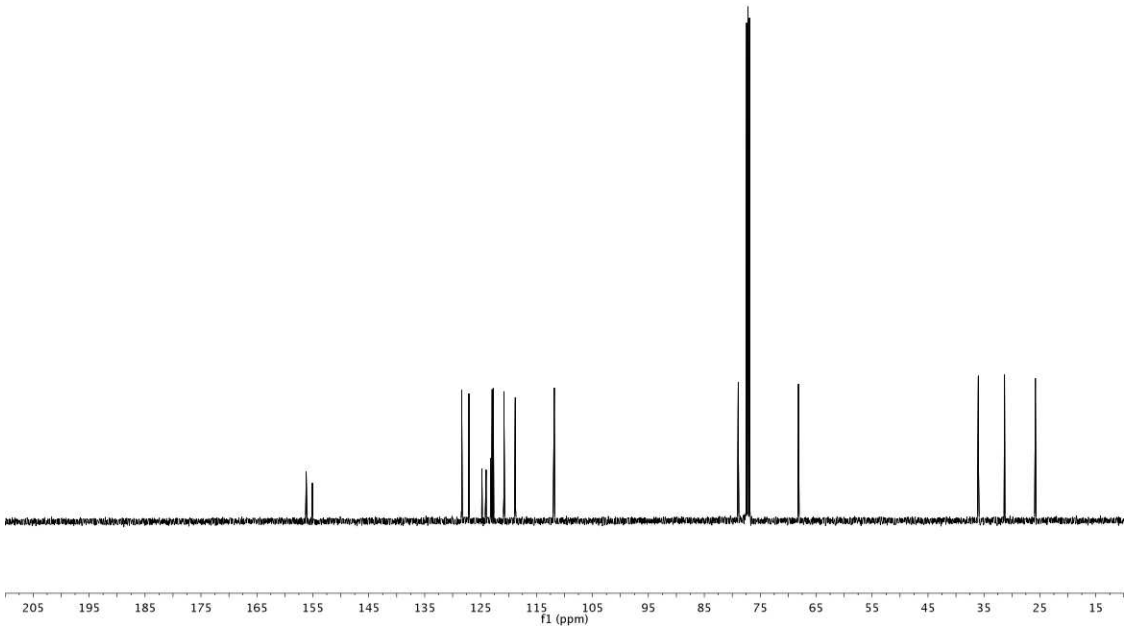
^{1}H NMR (500 MHz, $CDCl_3$) of 2,2-dimethyl-4-(3-methylbenzyl)-1,3-dioxolane (Table 4, entry 2)



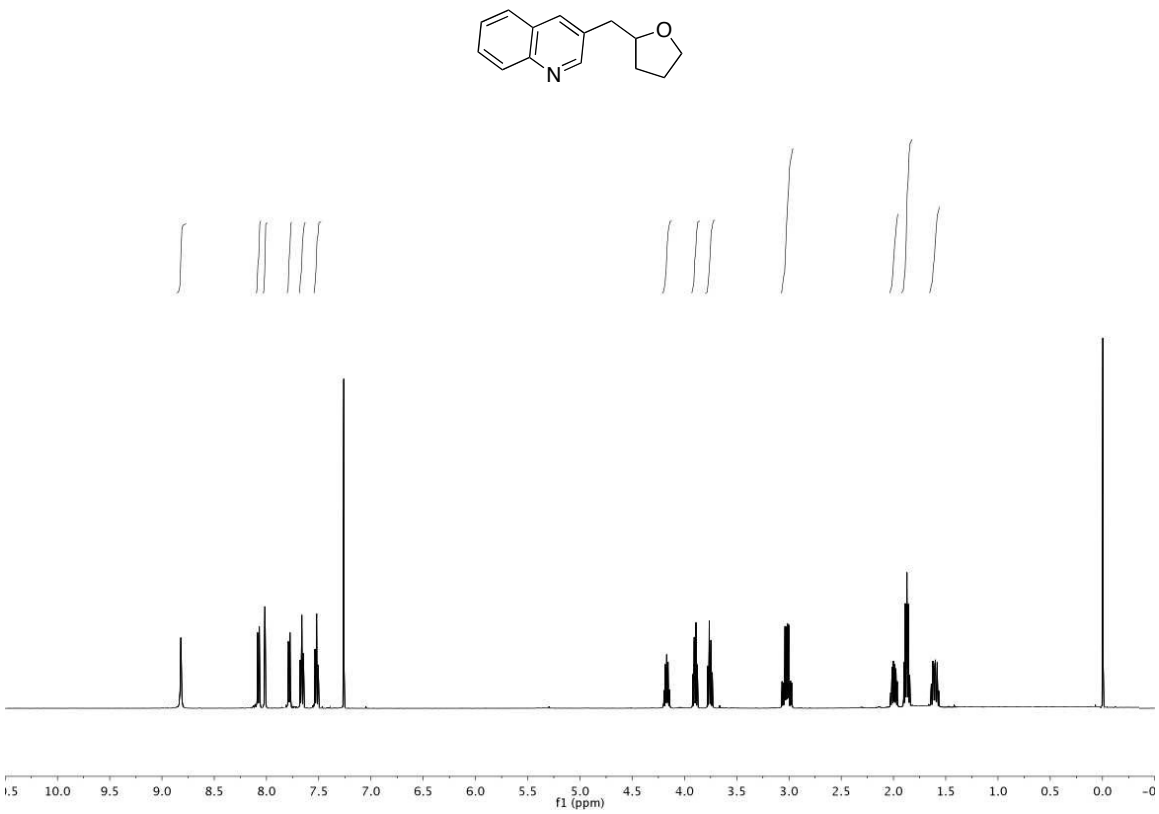
^{13}C NMR (126 MHz, $CDCl_3$) of 2,2-dimethyl-4-(3-methylbenzyl)-1,3-dioxolane (Table 4, entry 2)



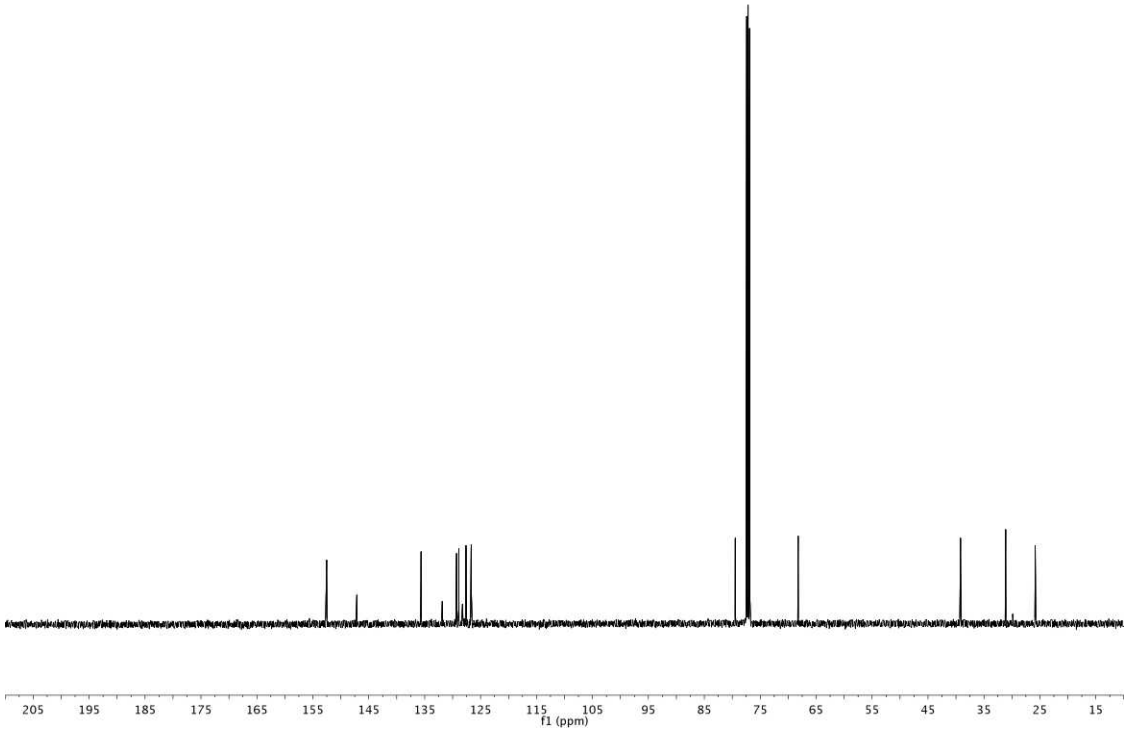
^{1}H NMR (500 MHz, $CDCl_3$) of 4-((tetrahydrofuran-2-yl)methyl)dibenzo[*b*,*d*]furan (Table 4, entry 3)



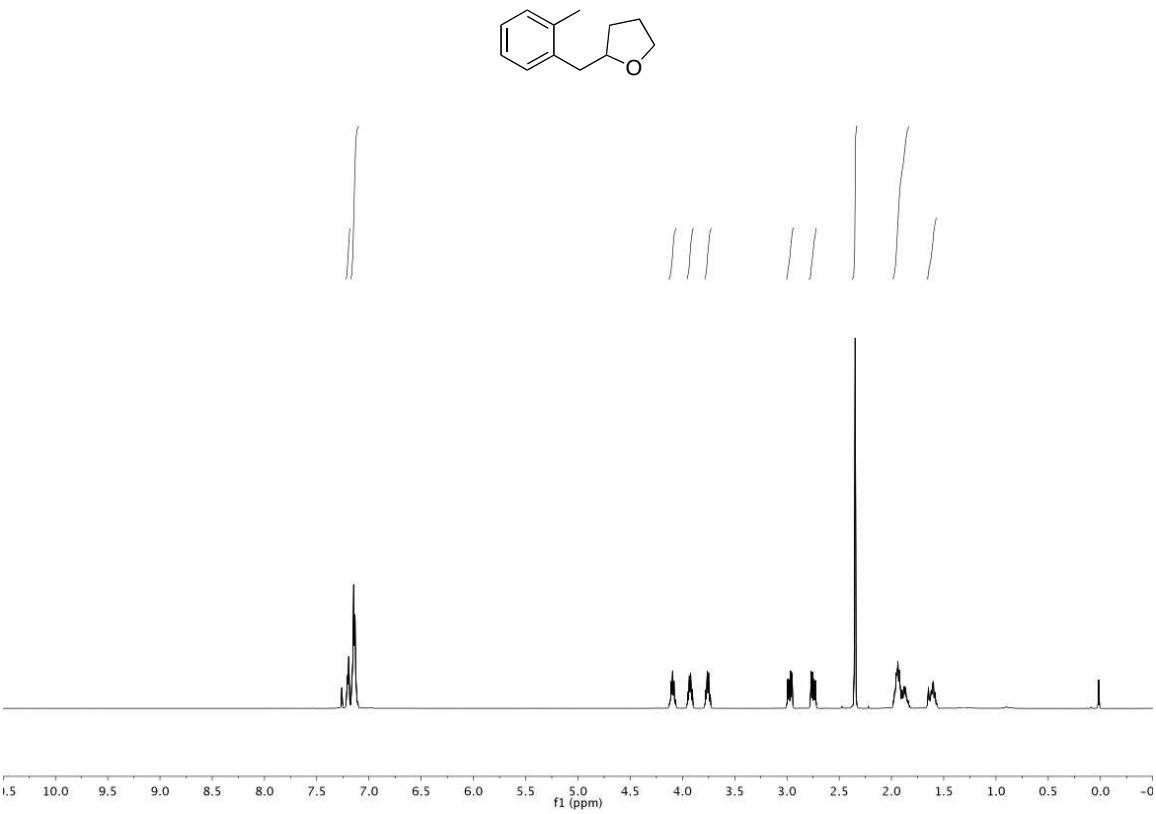
^{13}C NMR (126 MHz, $CDCl_3$) of 4-((tetrahydrofuran-2-yl)methyl)dibenzo[*b*,*d*]furan (Table 4, entry 3)



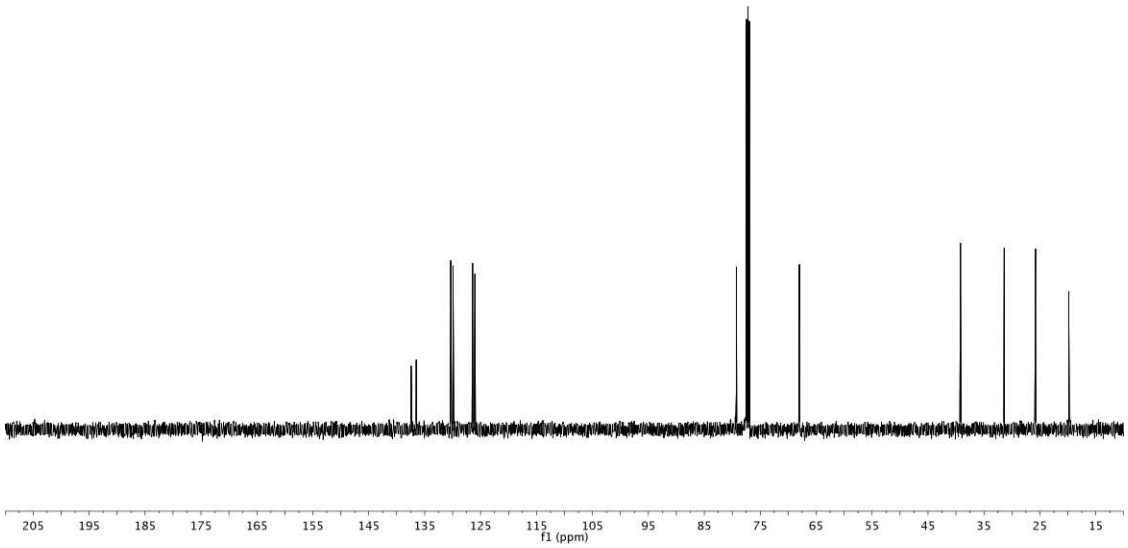
^{1}H NMR (500 MHz, $CDCl_3$) of 3-((tetrahydrofuran-2-yl)methyl)quinoline (Table 4, entry 4)



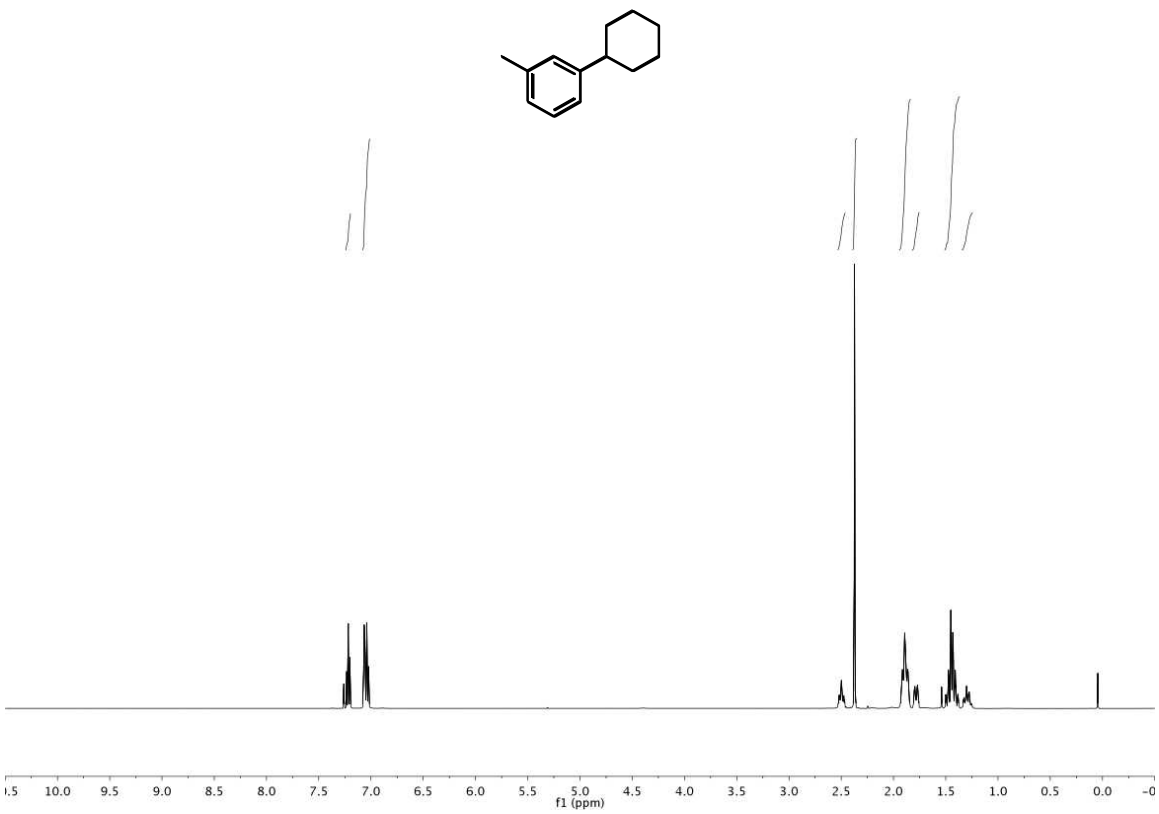
^{13}C NMR (126 MHz, $CDCl_3$) of 3-((tetrahydrofuran-2-yl)methyl)quinoline (Table 4, entry 4)



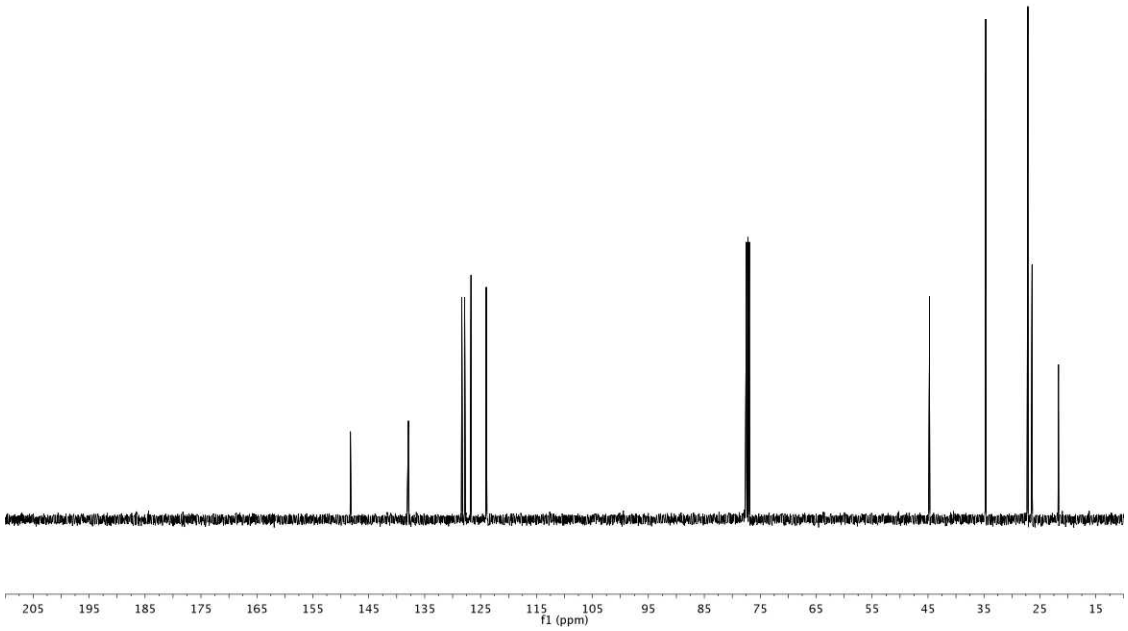
^{1}H NMR (500 MHz, $CDCl_3$) of 2-(2-methylbenzyl)tetrahydrofuran (Table 4, entry 5)



^{13}C NMR (126 MHz, $CDCl_3$) of 2-(2-methylbenzyl)tetrahydrofuran (Table 4, entry 5)



^{1}H NMR (500 MHz, $CDCl_3$) of cyclohexyl-3-methylbenzene (Table 4, entry 6)



^{13}C NMR (126 MHz, $CDCl_3$) of cyclohexyl-3-methylbenzene (Table 4, entry 6)