



Supporting Information

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Palladium Nanoparticles Supported on Polyaniline Nanofibers as a Semi-Heterogeneous Catalyst in Water

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Experimental

General considerations

Unless stated otherwise, all operations were performed in air with no special considerations. Solvents were purchased from EMD, reagent grade, and used as received. CDCl_3 was purchased from Cambridge Isotopes and was stored over 4 Å sieves. Other chemicals were used as received. ^1H and ^{13}C NMR spectra were recorded on Bruker300 or Bruker500 spectrometers at room temperature in CDCl_3 unless otherwise specified. Chemical shifts are reported with respect to internal solvent, 7.26 ppm (^1H) and 77.00 (^{13}C , CDCl_3).

Suzuki coupling starting from 2-bromoanisole: 2-bromoanisole (2.5 g, 0.0134 mol, 1 eq), phenylboronic acid (1.64 g, 0.0134 mol, 1 eq), and NaOH (2.15 g, 0.0537 mol, 4 eq) were added to a RB flask with DI H_2O , the flask was placed in an oil bath until the temperature reached 100 °C and the solution stirred until the base was completely dissolved. 1.6 mL PANI/Pd (3.2×10^{-6} mol Pd, 0.025 mol% vs halide) was added by syringe to the stirring solution and the system capped with a glass septum and allowed to react for 4 h. The system was cooled to room temperature and extracted with diethyl ether (3 x 100 mL). The organic extracts were washed with DI H_2O (3 x 75 mL) and dried with MgSO_4 . The solvent is removed by rotovap and 2-methoxybiphenyl is collected as a white solid (2.425 g, 98% yield).

4-acetylbiphenyl: 4-chloroacetophenone (5 g, 32.3 mmol, 1.0 eq), phenylboronic acid (3.94 g 32.3 mmol, 1.0 eq) and NaOH (5.1744 g, 129.36 mmol, 4 eq) were added to a round bottom flask with deionized H_2O . The flask was placed in an oil bath and the mixture stirred until the temperature is 80 °C and the base is completely dissolved. An aliquot of 1.5 mL PANI/Pd (3×10^{-3} mmol, 0.01 mol%) is added by syringe to the stirring solution and the system is capped with a glass septum and allowed to react for 4 h. The system is cooled to room temperature and extracted with diethyl ether (3 x 100 mL). The organic extracts are washed with deionized H_2O (3 x 75 mL) and dried with MgSO_4 . The solvent is removed by rotovap and the resulting product is collected. Yield = 6.28 g (99%). Yield can range between 84 and 99%.

4-phenylbenzoic acid: 4-chlorobenzoic acid (5 g, 0.031 mol, 1 eq), phenylboronic acid (5.66 g, 0.046 mol, 1.5 eq), and NaOH (4.96 g, 0.124 mol, 4 eq) were added to deionized H_2O to a RB flask, which is placed in an oil bath until the temperature is 80 °C and the solution is stirred until the base is completely dissolved. 1.0 mL of PANI/Pd (2×10^{-6} mol Pd, 0.006 mol% vs the halide) is added by syringe to the stirring solution and the system is capped with a glass septum and allowed to react for 4 h. The system is cooled to room temperature, the catalyst is removed by filtration through Celite and the aqueous layer is washed with diethyl ether (2 x 50 mL). After washing with Et_2O , aqueous layer is acidified with HCl until pH is approx 1, followed by extraction with ether (3 x 100 mL). The combined organic extracts are washed with deionized H_2O (3 x 75 mL) and dried with MgSO_4 . Solvent is removed by rotovap and the white solid product is collected. Yield is 6.01 g (97%).

4-phenylphenol: 4-chlorophenol (2.5 g, 0.0194 mol, 1 eq), phenylboronic acid (3.55 g, 0.0290 mol, 1.5 eq), and base (3.104 g, 0.0776 mol, 4 eq) were added to a RB flask with DI H₂O, the flask placed in an oil bath until the temperature reaches 100 °C, and the solution is stirred until the base is completely dissolved. 2.1 mL PANI/Pd (4.2×10^{-6} mol, 0.02 mol%) is added by syringe to the stirring solution and the system is capped with a glass septum and allowed to react for 6 h. The system is cooled to room temperature and HCl is added till the pH is 1-2. The acidified aqueous layer is extracted with diethyl ether (3 x 100 mL). The organic extracts are washed with DI H₂O (3 x 75 mL) and dried with MgSO₄. Solvent is removed by rotovap and the white solid product is collected. Yield - 2.9 g (88%).

4-phenylbenzaldehyde: 4-chlorobenzaldehyde (4 g, 0.03 mol, 1 eq), phenylboronic acid (3.66 g, 0.03 mol, 1 eq), and NaOH (4.8 g, 0.12 mol, 4 eq) were added to a RB flask with DI H₂O, the flask was placed in an oil bath until the temperature is 100 °C and the solution stirred until the base is completely dissolved. 2.0 mL PANI/Pd (4×10^{-6} mol Pd, 0.01 mol% vs halide) is added by syringe to the stirring solution and the system is capped with a glass septum and allowed to react for 4 h. The system is cooled to room temperature and extracted with diethyl ether (3 x 100 mL). The organic extracts are washed with DI H₂O (3 x 75 mL) and dried with MgSO₄. The solvent is removed by rotovap and the resulting crude product is collected. Final product is recrystallized from hexanes/diethyl ether. Yield - 5.40 g (99%).

2-methoxybiphenyl: 2-chloroanisole (2 g, 0.014 mol, 1 eq), phenylboronic acid (1.71 g, 0.014 mol, 1 eq), and NaOH (2.244 g, 0.0561 mol, 4 eq) were added to a RB flask with DI H₂O, the flask was placed in an oil bath until the temperature was 100 °C and the solution stirred until the base was completely dissolved. 2.0 mL PANI/Pd (4×10^{-6} mol Pd, 0.03 mol% vs halide) was added by syringe to the stirring solution and the system was capped with a glass septum and allowed to react for 4 h. The system was cooled to room temperature and extracted with diethyl ether (3 x 100 mL). The organic extracts were washed with DI H₂O (3 x 75 mL) and dried with MgSO₄. The solvent was removed by rotovap. Final product was recrystallized from hexanes/diethyl ether. Yield - 92% (2.373 g).

4-ethoxybiphenyl: 4-chlorophenetole (1.5 g, 9.57 mmol, 1 eq), phenylboronic acid (1.749 g, 14.34 mmol, 1.5 eq), and NaOH (4 eq) were added to a RB flask with DI H₂O, the flask was placed in an oil bath until the temperature was 100 °C and the solution stirred until the base was completely dissolved. 2.0 mL PANI/Pd (4×10^{-6} mol Pd, 0.04 mol% to halide) was added by syringe to the stirring solution and the system was capped with a glass septum and allowed to react for 4 h. The system was cooled to room temperature and extracted with diethyl ether (3 x 100 mL). The organic extracts were washed with DI H₂O (3 x 75 mL) and dried with MgSO₄. Solvent is removed by rotovap and the resulting crude product is collected. Final product is recrystallized from hexanes/diethyl ether. Yield - 1.75 g (92%).

Pyridine derivatives: Chloropyridine (1.0 eq), phenylboronic acid (2.0 eq), and NaOH (4 eq) were added to deionized water, the flask immersed in an oil bath until the temperature reached 100° C and the solution was stirred until the base was completely dissolved. Pd/PANI was added by syringe to the stirring solution, the system capped with a glass septum and allowed to stir for 6 h. The reaction mixture was cooled to room temperature and extracted with diethyl ether (3 x 100 mL). The organic extracts were washed with deionized water (3 x 75 mL) and dried with MgSO₄. The solvent was removed on the rotovap and the resulting crude product was collected and recrystallized from hexane and diethyl ether.

2,6-diphenylpyridine: 2,6-dichloropyridine (1.0 g, 6.76 mmol), phenylboronic acid (0.823 g, 6.76 mmol), 2 mL PANI/Pd (4×10^{-6} mol Pd, 0.06 mol%); yield - 96% (1.50 g).

3,5-diphenylpyridine: 3,5-dichloropyridine (1.0 g, 6.76 mmol), phenylboronic acid (0.823 g, 6.757 mmol), 2 mL PANI/Pd (4×10^{-6} mol Pd, 0.06 mol%); yield - 95% (1.48 g).

4-phenylpyridine: 4-chloropyridine (1.0 g, 6.66 mmol, 1.0 eq), phenylboronic acid (0.812 g, 6.66 mmol, 1.0 eq); 2 mL PANI/Pd (4×10^{-6} mol Pd, 0.06 mol%); yield - 0.918g (89 %).

General protocol for the Suzuki coupling with different arylboronic acids. Aryl halide (1 equiv), arylboronic acid (1 equiv), and base (4 equiv) were added to a 50 mL round bottom flask. The solution was stirred in a heated oil bath at 100 °C. Pd/PANI (1 mol%) was syringed into the stirring solution, the flask was sealed with a septum, and the reaction mixture stirred for 6 h or for the time indicated. The reaction mixture was taken out of the oil bath, allowed to cool to room temperature, and transferred to a separatory funnel. The organic product was extracted with diethyl ether (3 x 75 mL). The collected organic fractions were washed with deionized water and then dried with MgSO₄. MgSO₄ was filtered away and the volatiles were removed under reduced pressure to yield the final product.

3,5-bis(trifluoromethyl)-4'-acetyl-biphenyl: 4-chloroacetophenone (0.060 g, 3.87×10^{-4} mol, 1 equiv), 3,5-bis(trifluoromethyl)-phenylboronic acid (0.100 g, 3.87×10^{-4} mol, 1 equiv), NaOH (0.061 g, 15.25×10^{-4} mol, 4 equiv), 1.94 mL of Pd/PANI (1 mol%); crude yield, 0.120 g (93%), final yield, 0.118 g (92%). NMR data compared to those published in Feuerstein, M.; Berthiol, F.; Doucet, H.; Santelli, M. *Synlett*. **2002**, 11, 1807-1810.

2,4-dimethoxy-4'-acetyl-biphenyl: 4-chloroacetophenone (0.085 g, 5.55×10^{-4} mol, 1 equiv), 2,4-dimethoxy-phenylboronic acid (0.100 g, 5.55×10^{-4} mol, 1 equiv), NaOH (0.080 g, 20.00×10^{-4} mol, 4 equiv), 2.5 mL of Pd/PANI (1 mol%); 8 h; yield, 0.099 g (70%).

4-chloro-4'-hydroxy-biphenyl: 4-bromophenol (0.111 g, 6.4×10^{-4} mol, 1 equiv), 4-chloro-phenylboronic acid (0.100 g, 6.4×10^{-4} mol, 1 equiv), NaOH (0.102 g, 25.6×10^{-4} mol, 4 equiv), 3.2 mL of Pd/PANI (1 mol%); same work-up as 4-phenylphenol; yield, 0.105 g (80%).

4-chloro-4'-methoxy-biphenyl: 4-bromoanisole (0.118 g, 6.4×10^{-4} mol, 1 equiv), 4-chloro-phenylboronic acid (0.100 g, 6.4×10^{-4} mol, 1 equiv), NaOH (0.102 g, 25.6×10^{-4} mol, 4 equiv), 3.2 mL of Pd/PANI (1 mol%); 6.5 h; yield, 0.116 g (82%). NMR data compared to those published in Ackermann, L.; Althammer, A. *Org. Lett.* **2006**, 8, 3457-3460.

2-(2'-anisole)-dibenzofuran: 2-chloroanisole (0.067 g, 4.7×10^{-4} mol, 1 equiv), dibenzofuran-2-boronic acid (0.101 g, 4.7×10^{-4} mol, 1 equiv), NaOH (0.055 g, 13.75×10^{-4} mol, 4 equiv), 2.3 mL of Pd/PANI (1 mol%); yield, 0.115 g. ¹H NMR shows two compounds and relative intensities of the OMe peaks suggest that the impurity is ca. 20%. Based on this a conservative yield of 715 was calculated. NMR data for **2-(2'-anisole)-dibenzofuran** were compared to those published in Cram, D. J.; Dicker, I. B.; Lauer, M.; Knobler, C. B.; Trueblood, K. N. *J. Am. Chem. Soc.* **1984**, 106, 7150-7167.

Coupling with a fluoro aryl: A typical procedure was employed: 1,4-difluorobenzene (118 mg, 1.03 mmol), phenylboronic acid (0.250 g, 2.06 mmol), and NaOH (0.164 g, 4.12 mmol) were added to deionized water, the mixture stirred in an oil bath until temperature reached 100 °C and the base was completely dissolved. 0.5 mL PANI/Pd (1×10^{-6} mol, 0.1 mol%) was added by syringe to the stirring solution and the system was capped with a glass septum and allowed to react for 24 h. The system was cooled to room temperature and extracted with diethyl ether (3 x 100 mL). The organic extracts were washed with deionized water (3 x 75 mL) and dried with MgSO₄. The solvent was removed by rotovap and the resulting product was collected (0.143 mg, 60% yield).

Homocoupling reactions. Homocoupling of chlorobenzene: Chlorobenzene (1.0 g, 0.00892 mol) and NaOH (1.43 g, 0.036 mol) were added to a round bottom flask with deionized water, the flask placed in an oil bath until the temperature reached 80 °C, and the solution stirred until the base was completely dissolved. 2.1 mL PANI/Pd (4.2×10^{-6} mol, 0.05 mol%) was added by syringe to the stirring solution and the system was capped with a glass septum and allowed to react for 2 h. The aqueous layer was extracted with diethyl ether (3 x 100 mL). The organic extracts were washed with deionized water (3 x 75 mL) and dried with MgSO₄. The solvent was removed by rotovap and the white solid product was collected (1.36 g, 99% yield).

Homocoupling of fluorobenzene: Fluorobenzene (1.0 g, 0.0104 mol) and NaOH (0.832 g, 0.0208 mol) were added to a RB flask with DI H₂O, the flask placed in an oil bath until temperature was 100 °C, and the solution stirred until the base was completely dissolved. 2.1 mL PANI/Pd (4.2×10^{-6} mol, 0.02 mol%) was added by syringe to the stirring solution and the system was capped with a glass septum and allowed to react for 2 h. The aqueous layer was extracted with ether (3 x 100 mL). The organic extracts were washed with DI H₂O (3 x 75 mL) and dried with MgSO₄. Solvent was removed by rotovap and the white solid product was collected. Yield - 1.28 g (80%).

Synthesis of 4,4'-biphenyl-diol: 4-chlorophenol (2.5 g, 0.0194 mol, 2 eq) and NaOH (3.104 g, 0.0776 mol, 4 eq) were added to a RB flask with DI H₂O, the flask placed in an oil bath until the temperature reached 100 °C, and the solution stirred until the base was completely dissolved. 2.1 mL PANI/Pd (4.2×10^{-6} mol, 0.02 mol%) was added by syringe to the stirring solution and the system was capped with a glass septum and allowed to react for 6 h. The system was cooled to room temperature and HCl was added till the pH was 1-2. The acidified aqueous layer was extracted with diethyl ether (3 x 100 mL). The organic extracts were washed with DI H₂O (3 x 75 mL) and dried with MgSO₄. Solvent was removed by rotovap and the white solid product was collected. Yield - 3.25 g (90%).

Synthesis of 4,4'-^tBu₂-biphenyl: 4-*t*-butylchlorobenzene (1.0 g, 0.0059 mol, 2 eq) and NaOH (0.951 g, 0.0236 mol, 4 eq) were added to a round bottom flask with DI H₂O, the flask placed in an oil bath until temperature is 100 °C, and the solution stirred until the base was completely dissolved. 2.1 mL PANI/Pd (4.2×10^{-6} mol, 0.07 mol%) was added by syringe to the stirring solution and the system was capped with a glass septum and allowed to react for 2.5 h. The aqueous layer was extracted with ether (3 x 100 mL). The organic extracts were washed with DI H₂O (3 x 75 mL) and dried with MgSO₄. Solvent was removed by rotovap and the white solid product collected. Yield - 1.50 g (90%).

3,5-Dimethylphenol. Using the general procedure, 5-bromo-*m*-xylene (136 mg, 1.0 mmol), 4.0 mL PANI/Pd (8×10^{-6} mol, 0.8 mol% Pd), KOH (270 mg, 5.0 mmol) in 1,4-dioxane (0.5 mL) and deionized water (0.5 mL) were allowed to react at 100 °C for 12 h. The crude material was purified by recrystallization in hexanes to give the title compound as a white solid (114 mg, 90%).

2,6-Dimethylphenol. Using the general procedure, 2-bromo-*m*-xylene (136 mg, 1.0 mmol), 4.0 mL PANI/Pd (8×10^{-6} mol, 0.8 mol% Pd), KOH (270 mg, 5.0 mmol) in 1,4-dioxane (0.5 mL) and deionized water (0.5 mL) were allowed to react at 100 °C for 12 h. The crude material was purified by recrystallization in hexanes to give the title compound as a white solid (110 mg, 89%).

2-methylphenol: Using the general procedure, 2-chlorotoluene (136 mg, 1.079 mmol), 4.0 mL PANI/Pd (8×10^{-6} mol, 0.75 mol% Pd), and KOH (270 mg, 5.0 mmol) in 1,4-dioxane (0.5 mL) and deionized water (0.5 mL) were allowed to react at 100 °C for 8 h. The crude material was purified by recrystallization from hexanes to give the title compound as a white solid (105 mg, 90%).

2-Cyanophenol. Using the general procedure, 2-bromobenzonitrile (90 mg, 0.50 mmol), 3.0 mL PANI/Pd (6×10^{-6} mol, 1.2 mol% Pd), KOH (270 mg, 5.0 mmol) in 1,4-dioxane (0.5 mL) and water (0.5 mL) were allowed to react at 100 °C for 8 h. The crude material was purified by recrystallization to give the title compound as a light yellow solid (47 mg, 80%).

Recycling Procedure: The catalyst was removed from the separatory funnel and placed into a round bottom flask. The aqueous layer was collected and heated in a 50 °C oil bath to remove residual ether. After the ether was removed, the aqueous layer was loaded into a 100 mL round bottom flask and stirred for 10 min at high speed to ensure adequate mixing. Aryl halide (4-acetylphenylchloride, 4×10^{-4} mol, 1.0 eq) and phenylboronic acid (4×10^{-4} mol, 1.0 eq) were added to the catalyst solution (0.05 mol% for the first cycle) and allowed to mix for 10 min. Finally, base (NaOH, 4 eq) was added to the solution and the system capped and allowed to proceed. Yield of cycle 1 - 99%; yield of cycle 2 - 98%; yield of

cycle 3 - 97%; yield of cycle 4 - 97%; yield of cycle 5 - 96%; yield of cycle 6 - 95%; yield of cycle 7 - 95%; yield of cycle 8 - 93%; yield of cycle 9 - 93%; yield of cycle 10 - 89%.

Palladium Concentrations in filtrate

	Hot Filtered (M)	Cold Filtered (M)
Original Catalyst	-	7.4 E-05
Filtrate after 1st Cycle	7.9 E-06	1.1 E-05
Filtrate after 2nd Cycle	6.3 E-06	6.8 E-06

Palladium in Product

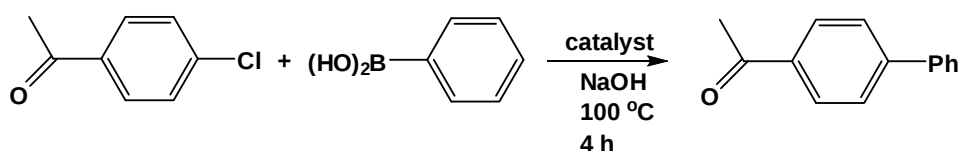
Sample	State	Palladium in Product
3,5-diphenyl-benzene	Solid	5.91 E-03 % by weight
4-phenyl-phenol	Solid	4.58 E-04 % by weight
4-phenyl-benzaldehyde	Solid	1.62 E-03 % by weight
4-Acetyl-biphenyl	Solid	4.86 E-02 % by weight
2-phenyl-benzaldehyde	Liquid	5.54 E-05 M

Catalyst loading experiments: Each experiment used the following procedure: 4-chloroacetophenone (0.500 g, 3.23 mmol, 1.0 eq), phenylboronic acid (0.394 g, 3.23 mmol, 1.0 eq), and NaOH (0.517g, 12.94 mmol, 4 eq) were added to DI H₂O and the flask stirred in an oil bath until the temperature was 80 °C and the base was completely dissolved. A stock solution of PANI/Pd was added by syringe to the stirring solution and the system was capped with a glass septum and allowed to react. Progress of the reaction was monitored at 30 min intervals by TLC analysis (0.1 mL of solution was removed by syringe, extracted with 1 mL of diethyl ether and analyzed on a TLC plate using hexanes as the eluting solvent). When all starting material was consumed, the system was cooled to room temperature and extracted with diethyl ether (3 x 100 mL). The organic extracts were washed with DI H₂O (3 x 75 mL) and dried with MgSO₄. Solvent was removed by rotovap and the resulting product was collected.

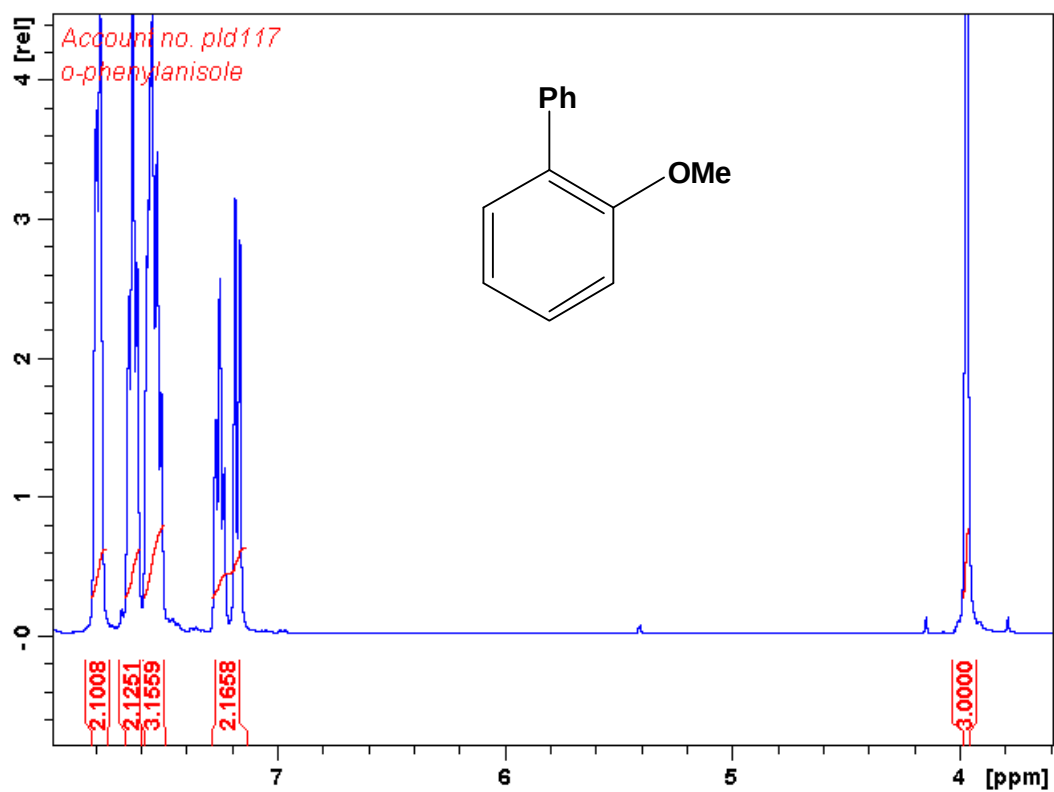
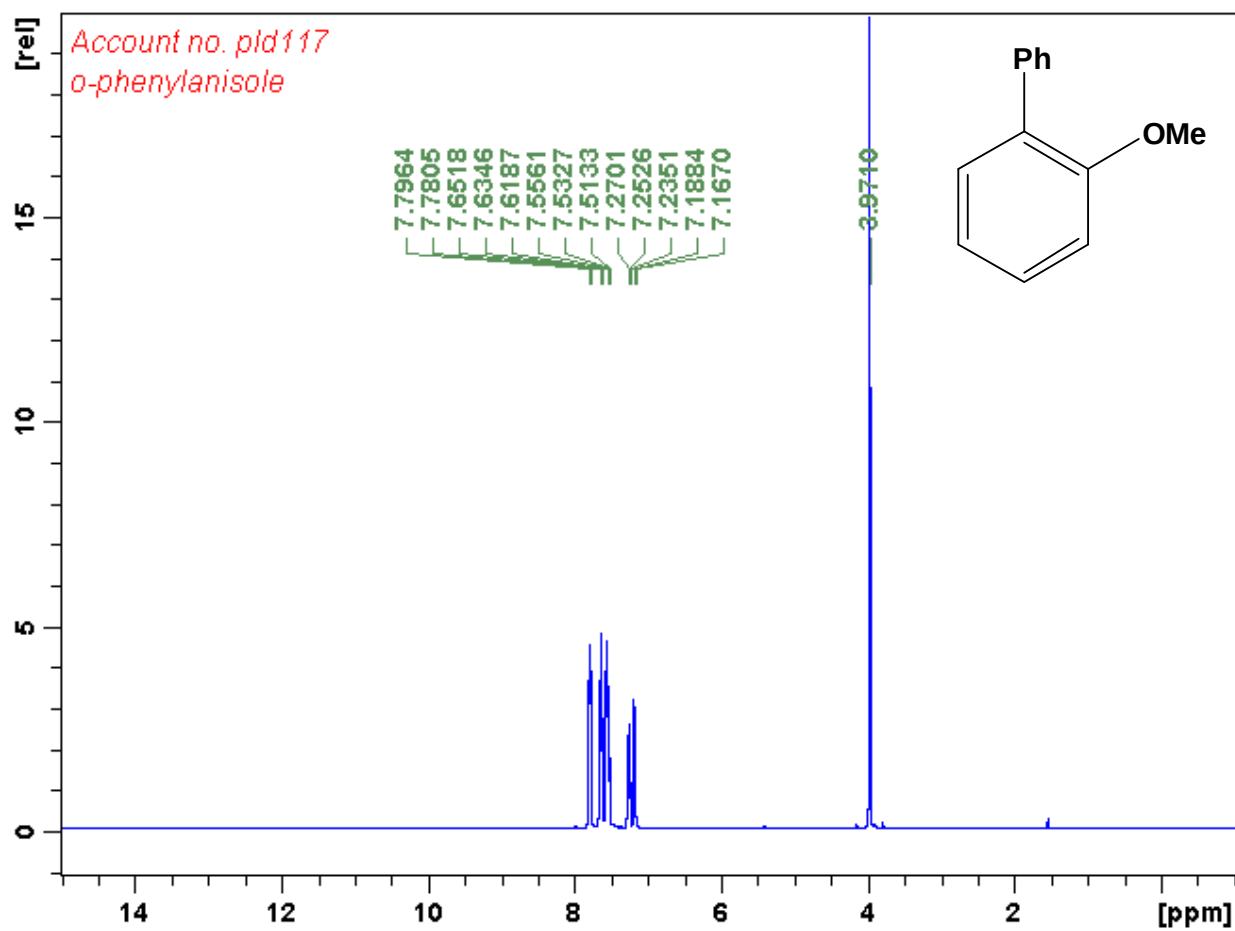
Catalyst loading (mol%)	Yield (%)	Reaction time (h)
0.1	99	4
0.05	99	4
0.01	98	4
0.001	92	12
0.0001	89	16
0.00001	88	24

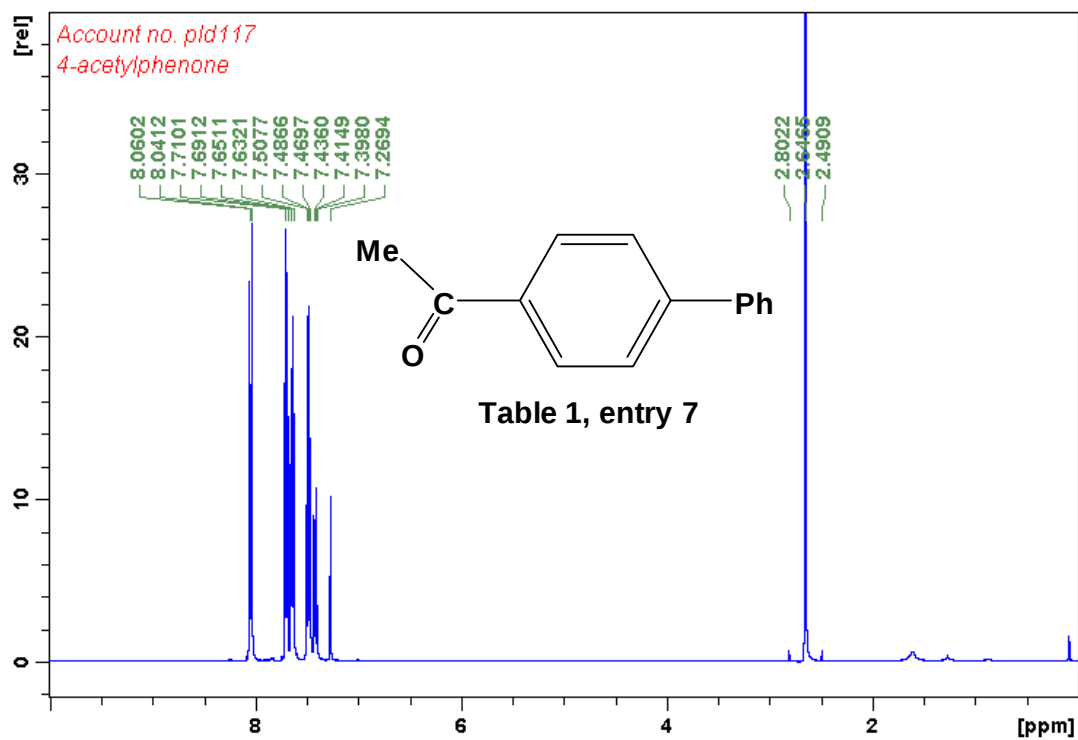
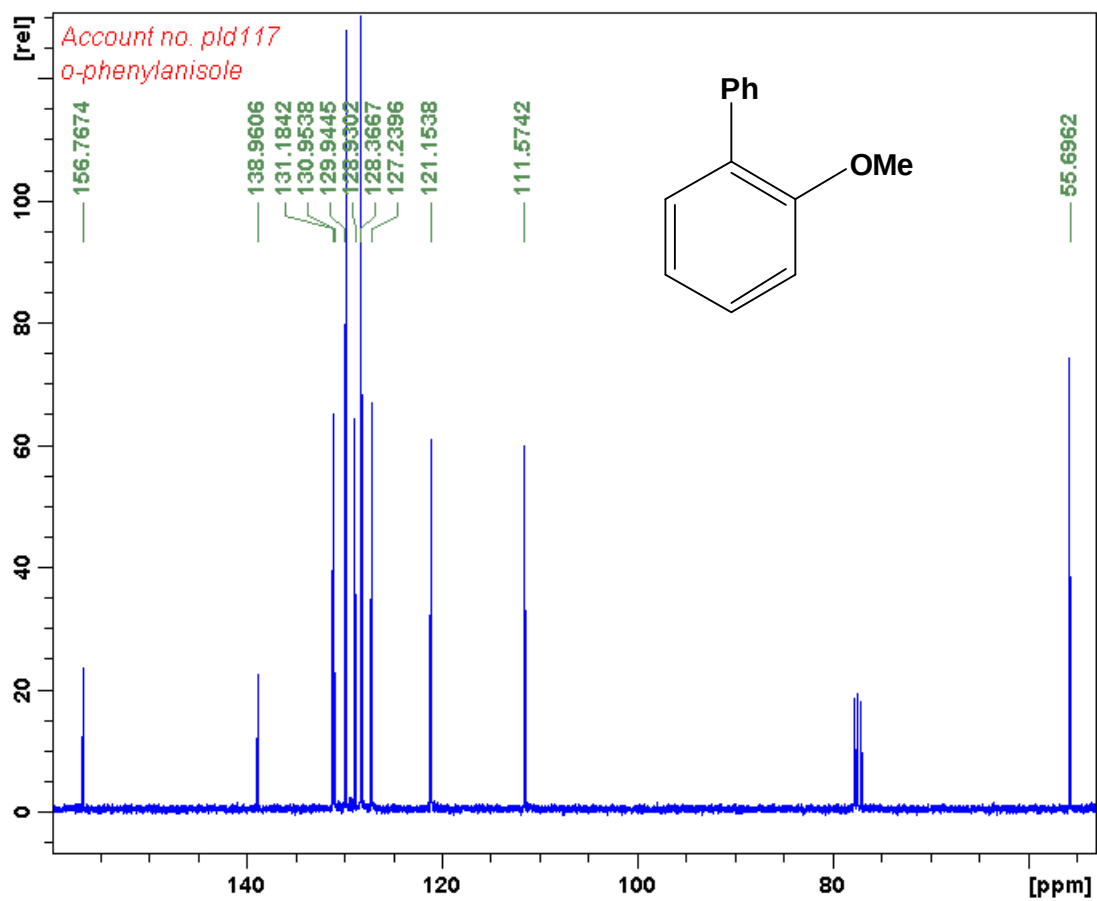
Tandem reaction. Synthesis of 2-phenylphenol. 1,2-dichlorobenzene (1 g, 6.80 mmol, 1 eq), phenylboronic acid (0.83 g, 6.80 mmol, 1 eq), and NaOH (1.088 g, 27.20 mmol, 4 eq) were added to a 100 mL round bottom flask with 15 mL of deionized H₂O. The flask was then placed in a 100 °C oil bath and the solution stirred until the temperature returned to 100 °C. 1.5 mL PANI/Pd (3×10^{-6} mol Pd, 0.05 mol% vs halide) was syringed into the flask, the system was capped with a rubber septum and needle and allowed to react for 6 h. After 6 h, a solution of KOH (1.836 g 0.034 mol, 5 eq) in 5 mL deionized H₂O / 20 mL 1,4-dioxane was syringed into the system and the reaction was allowed to proceed for another 6 h. The system was removed from the oil bath, cooled to room temperature, and conc. HCl was added until the pH was approx 1. The aqueous layer was extracted with diethyl ether (3 x 150 mL). The organic extracts were washed with 20 mL of deionized H₂O, dried with MgSO₄, and the solvent removed under pressure. The crude product was recrystallized from hexanes/ether. Yield was 0.810 g (70%).

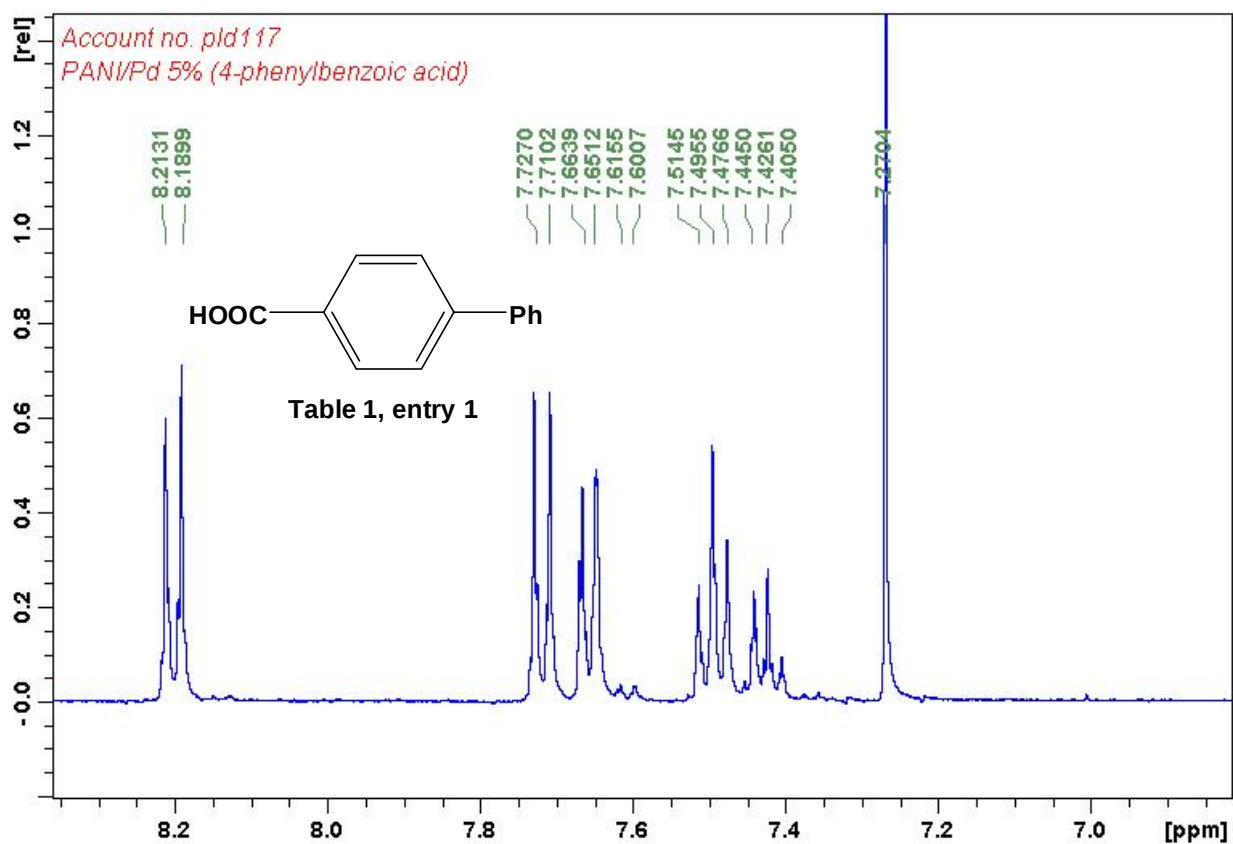
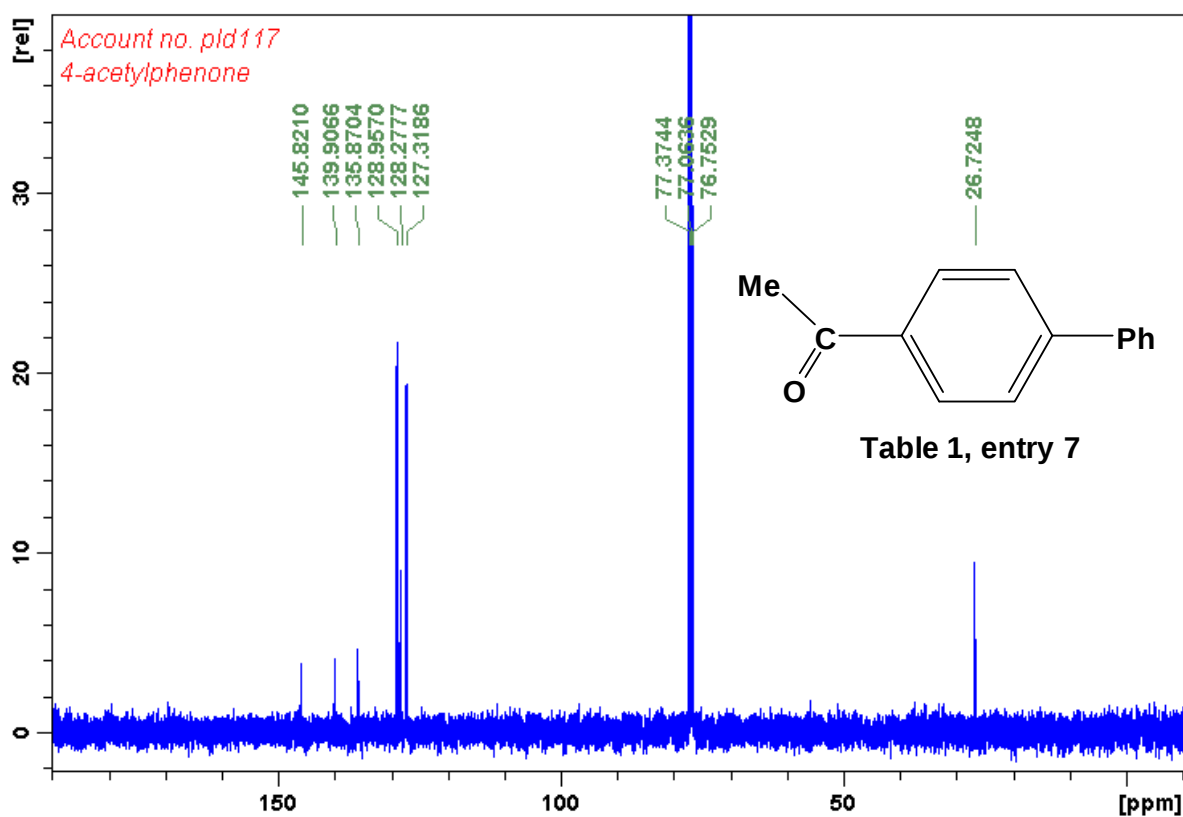
Comparison with other catalysts

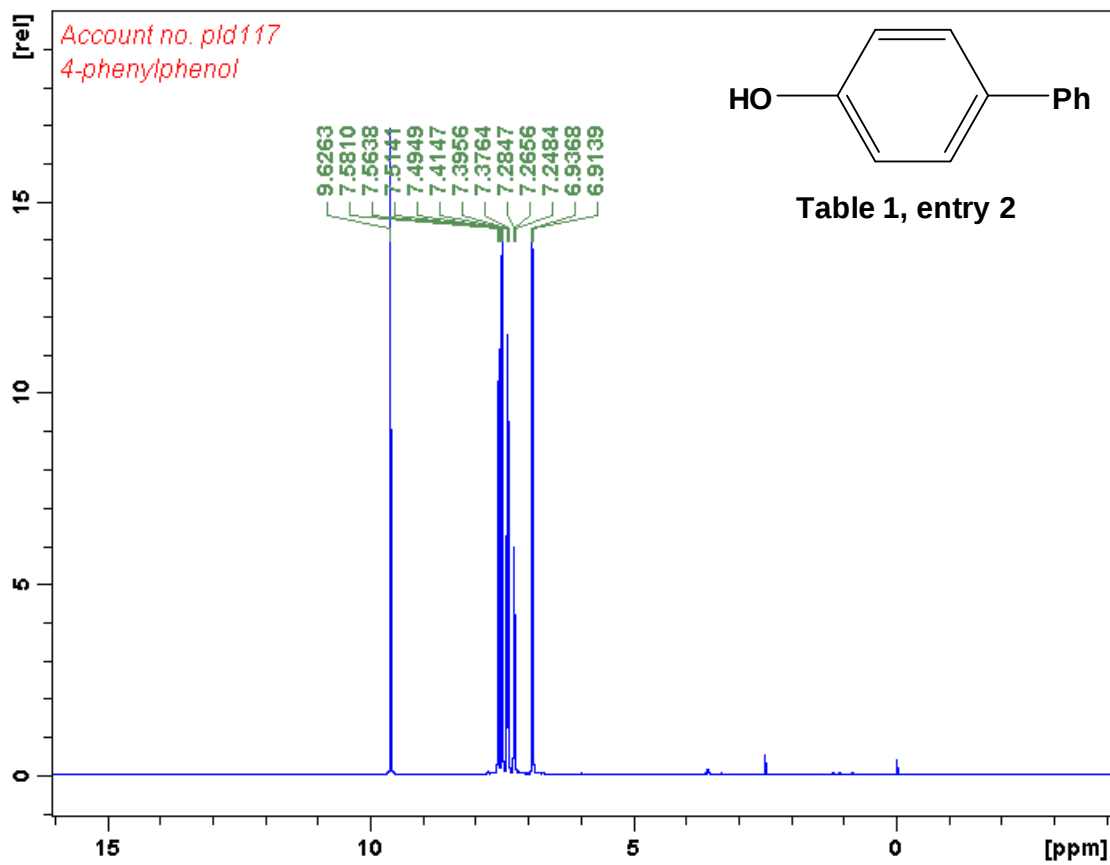
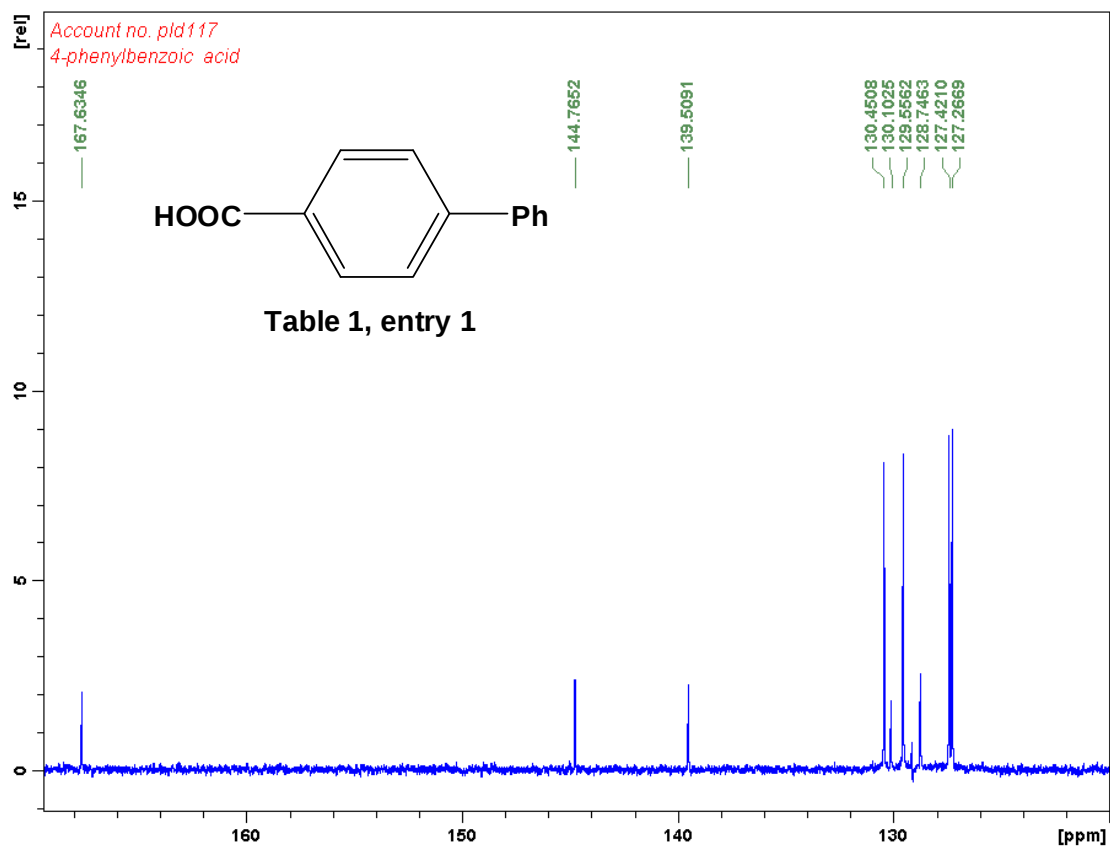


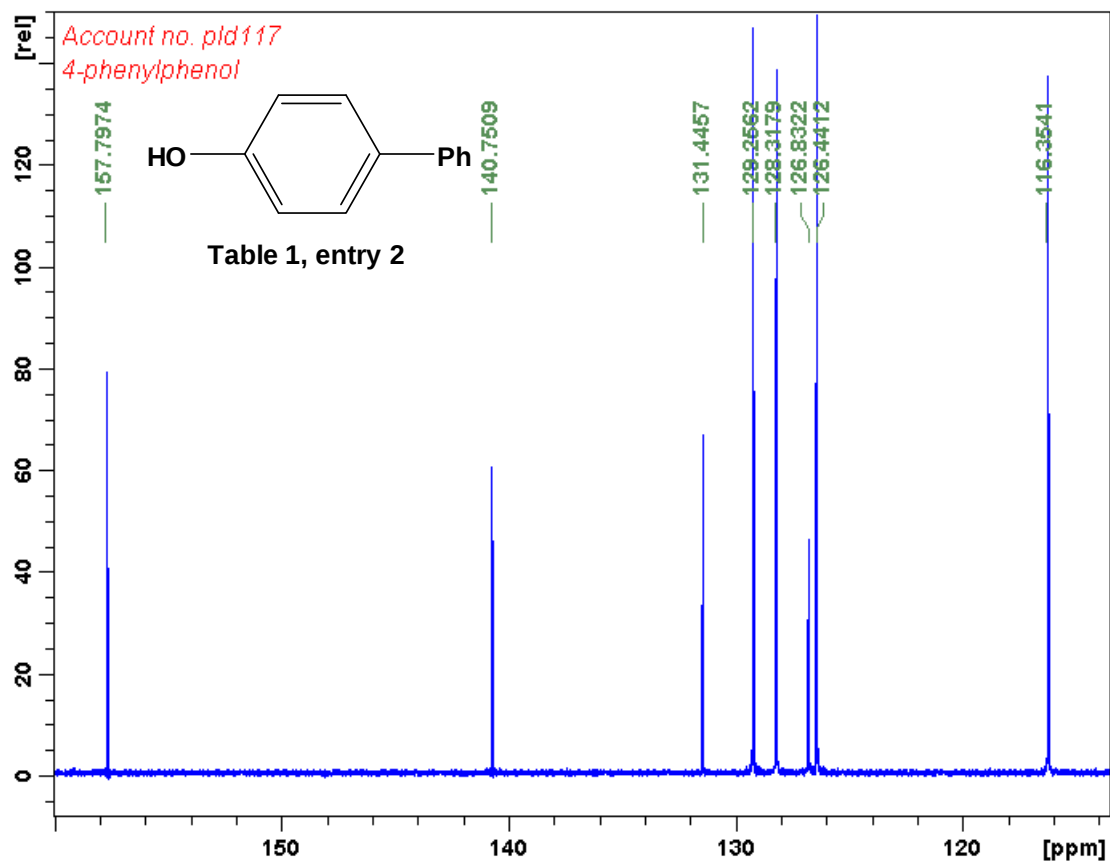
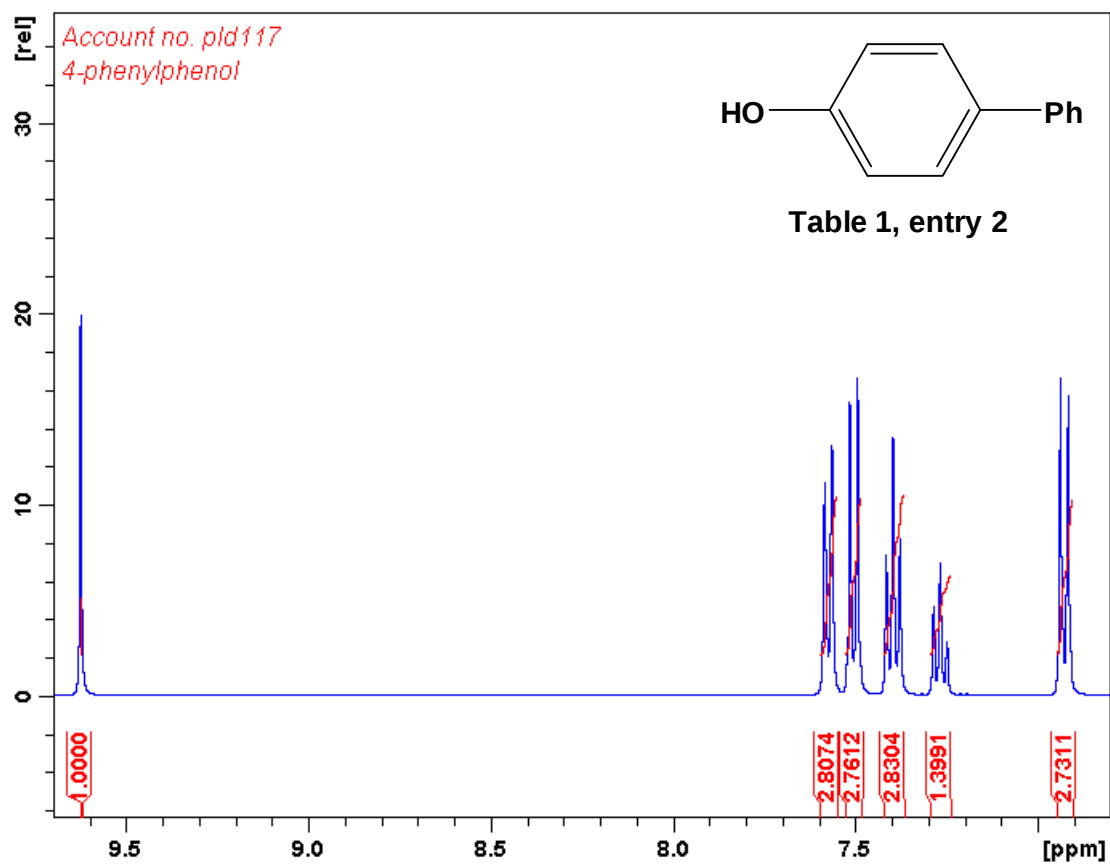
catalyst	yield (%)
Pd(OAc) ₂	0
Pd(NO ₃) ₂	0
5% Pd/C	homocoupling
Pd(OAc) ₂ / PPh ₃	homocoupling
Pd(NO ₃) ₂ / PhNH ₂	0
Pd(NO ₃) ₂ / PANI	0

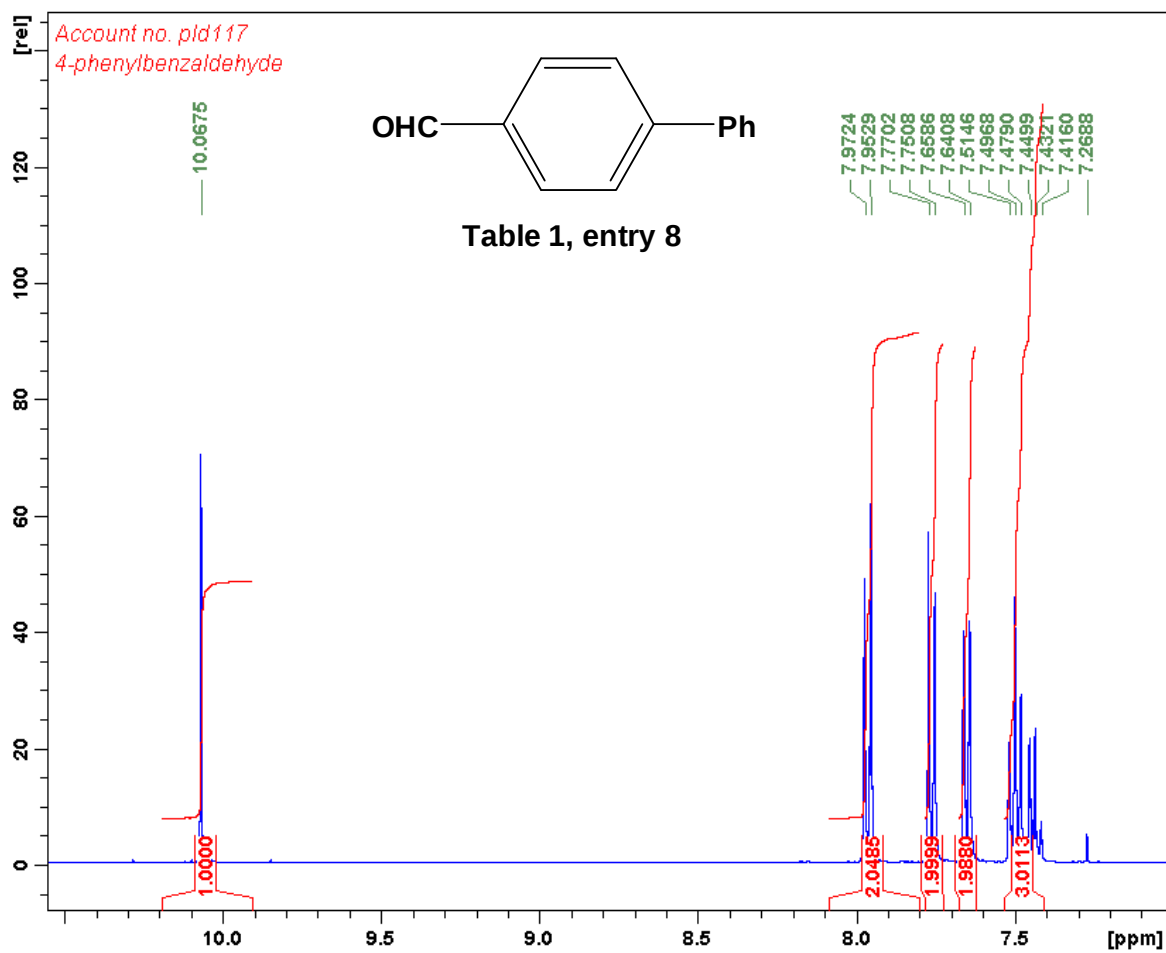
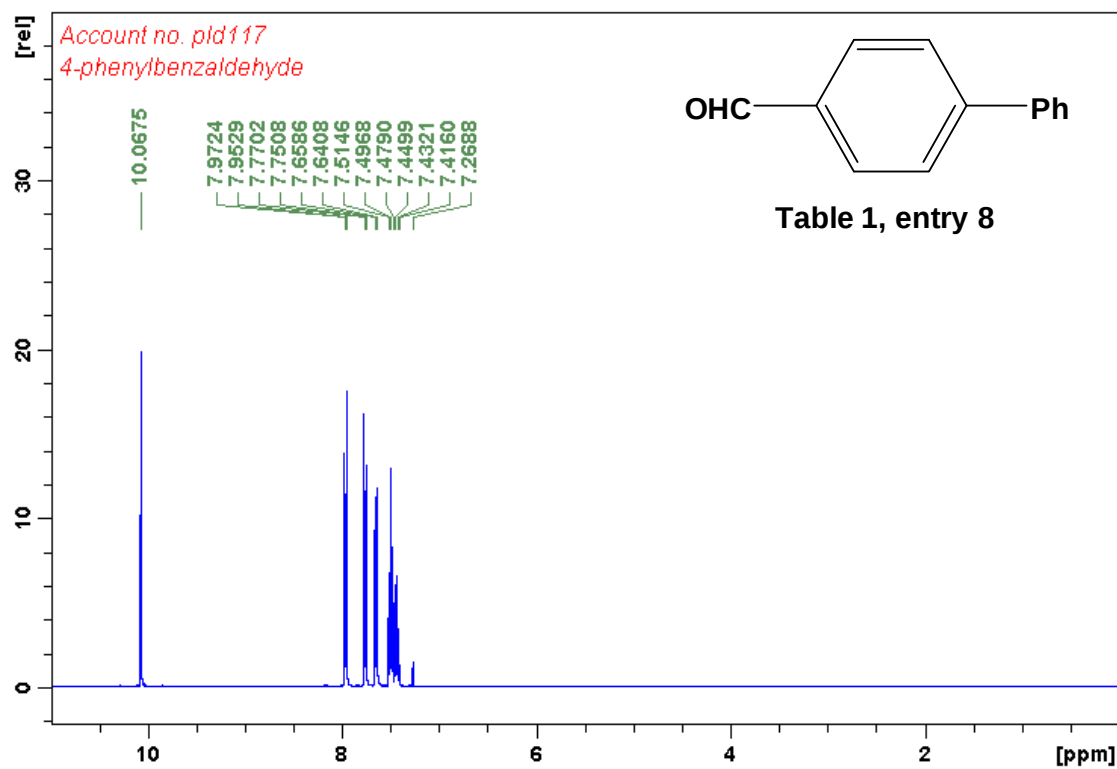


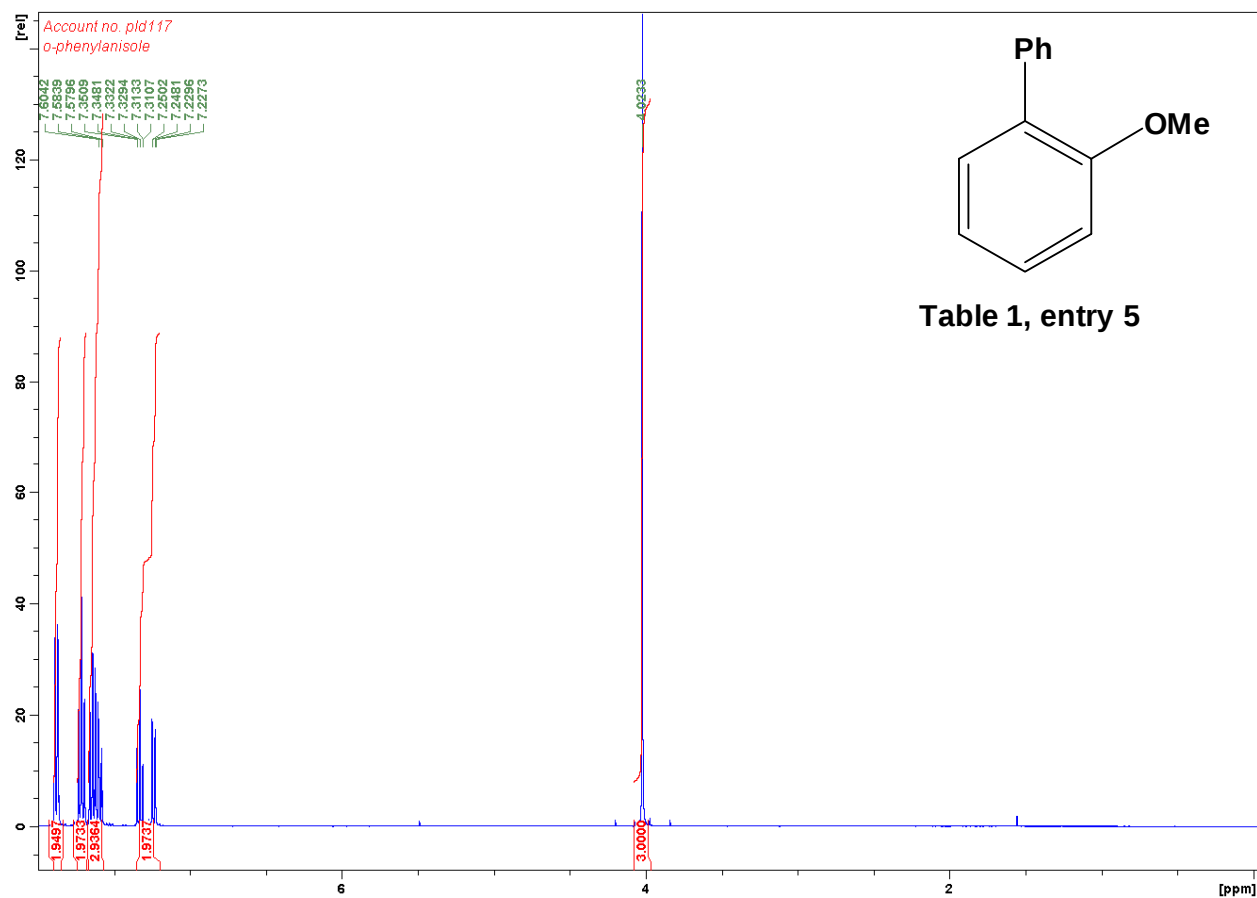
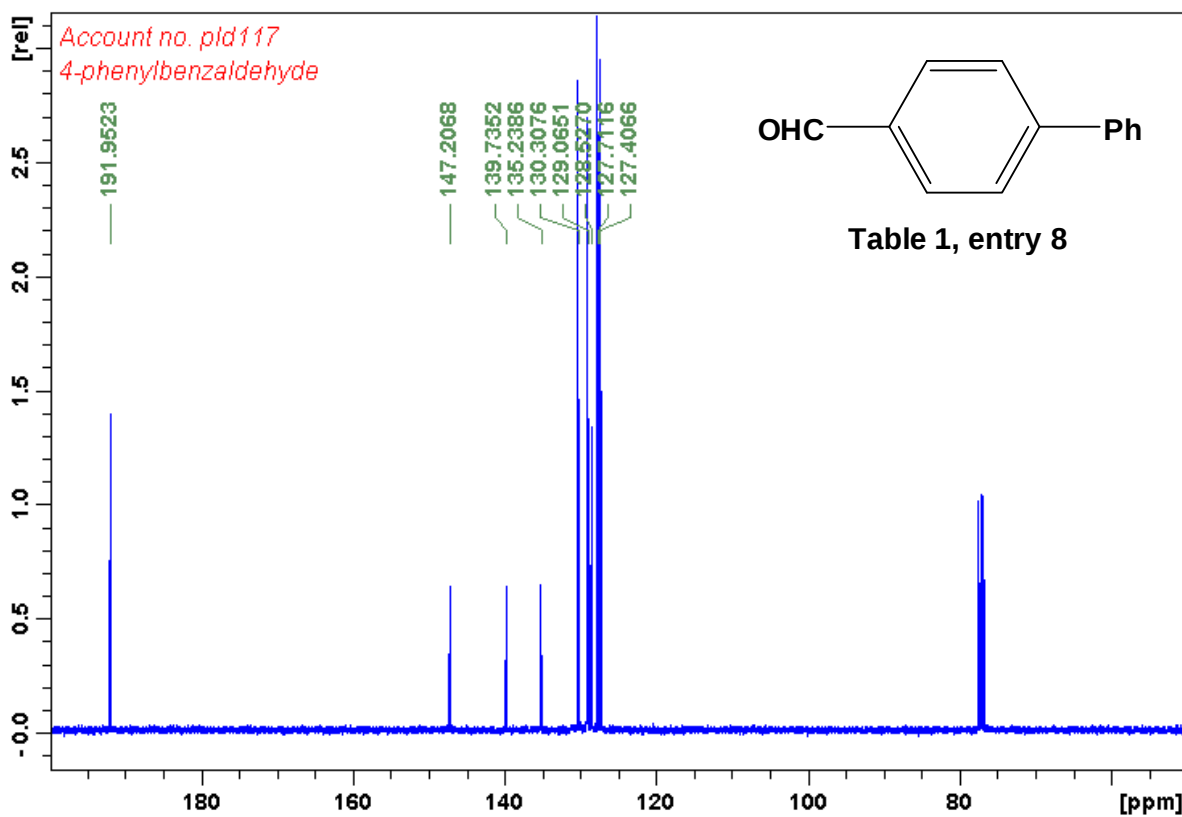


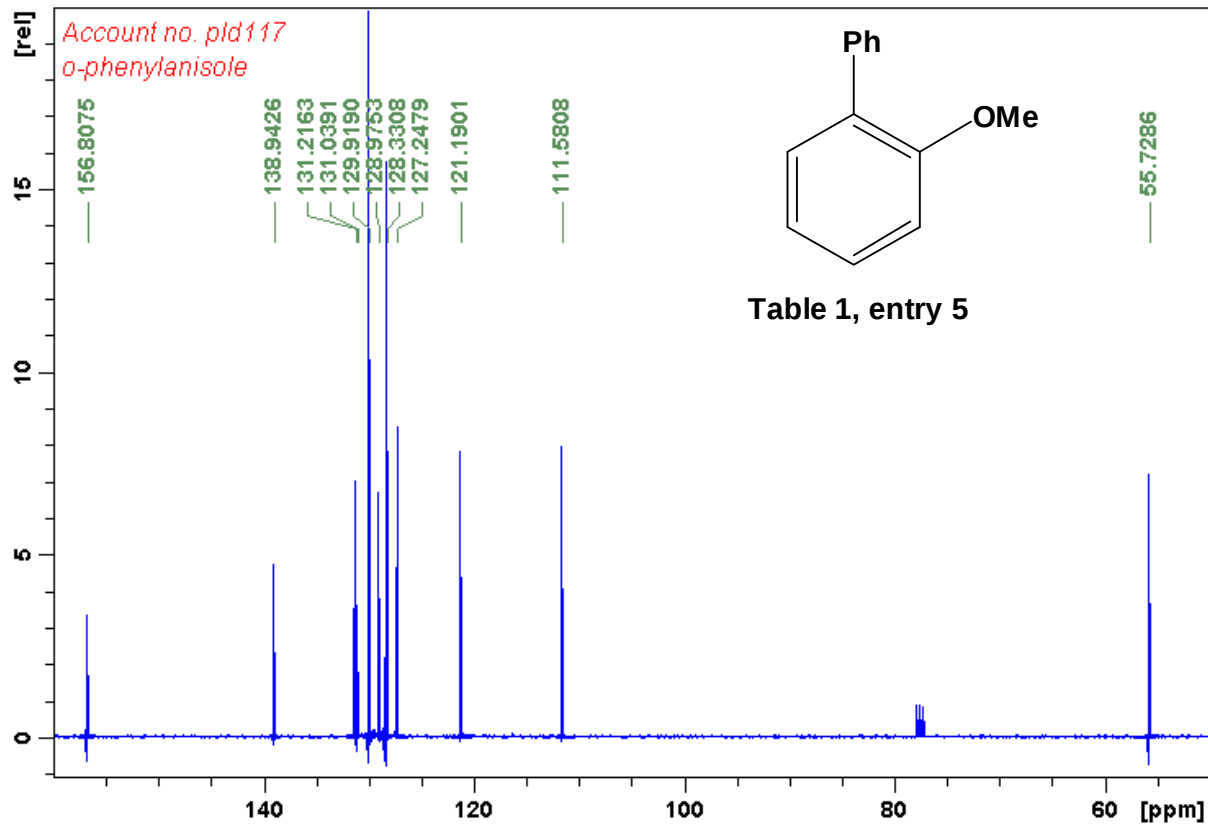
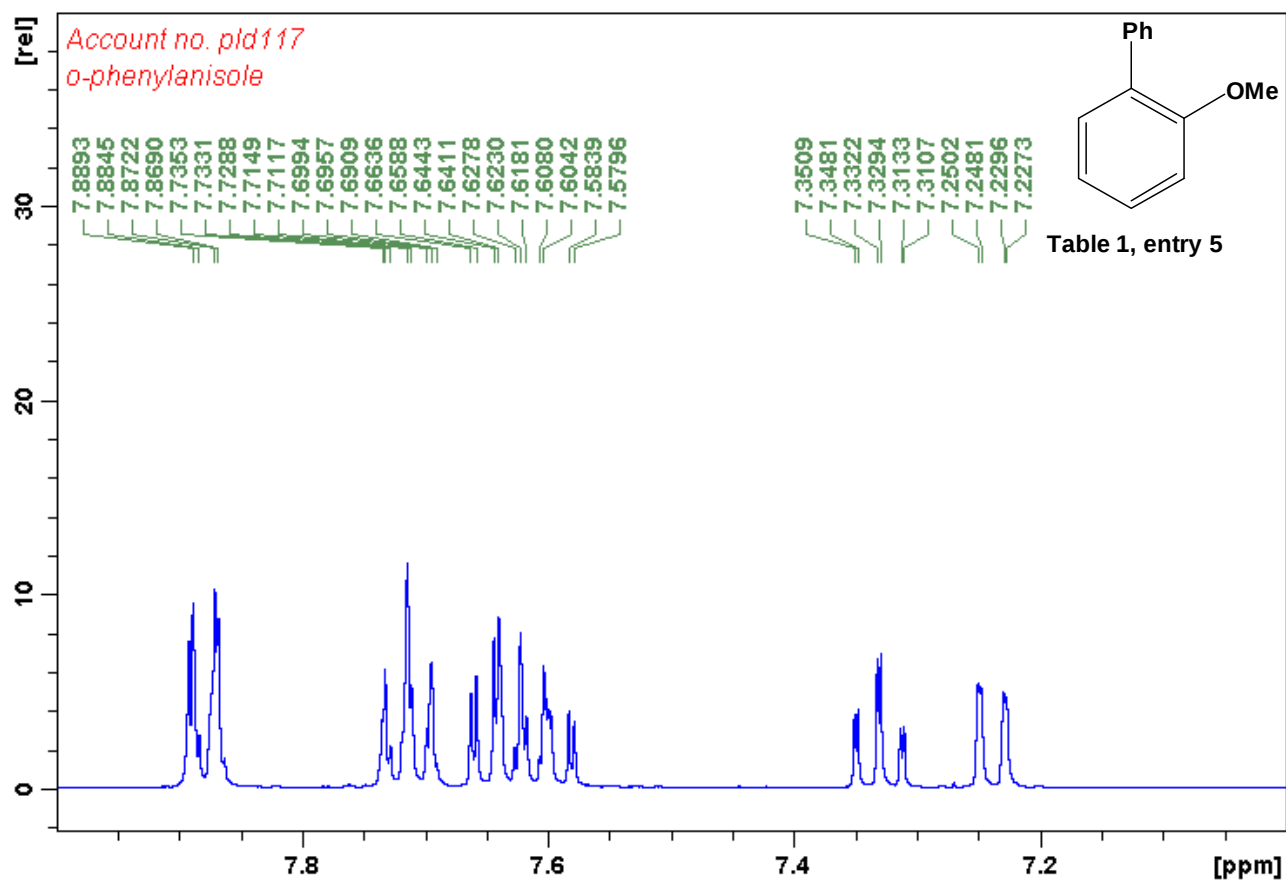


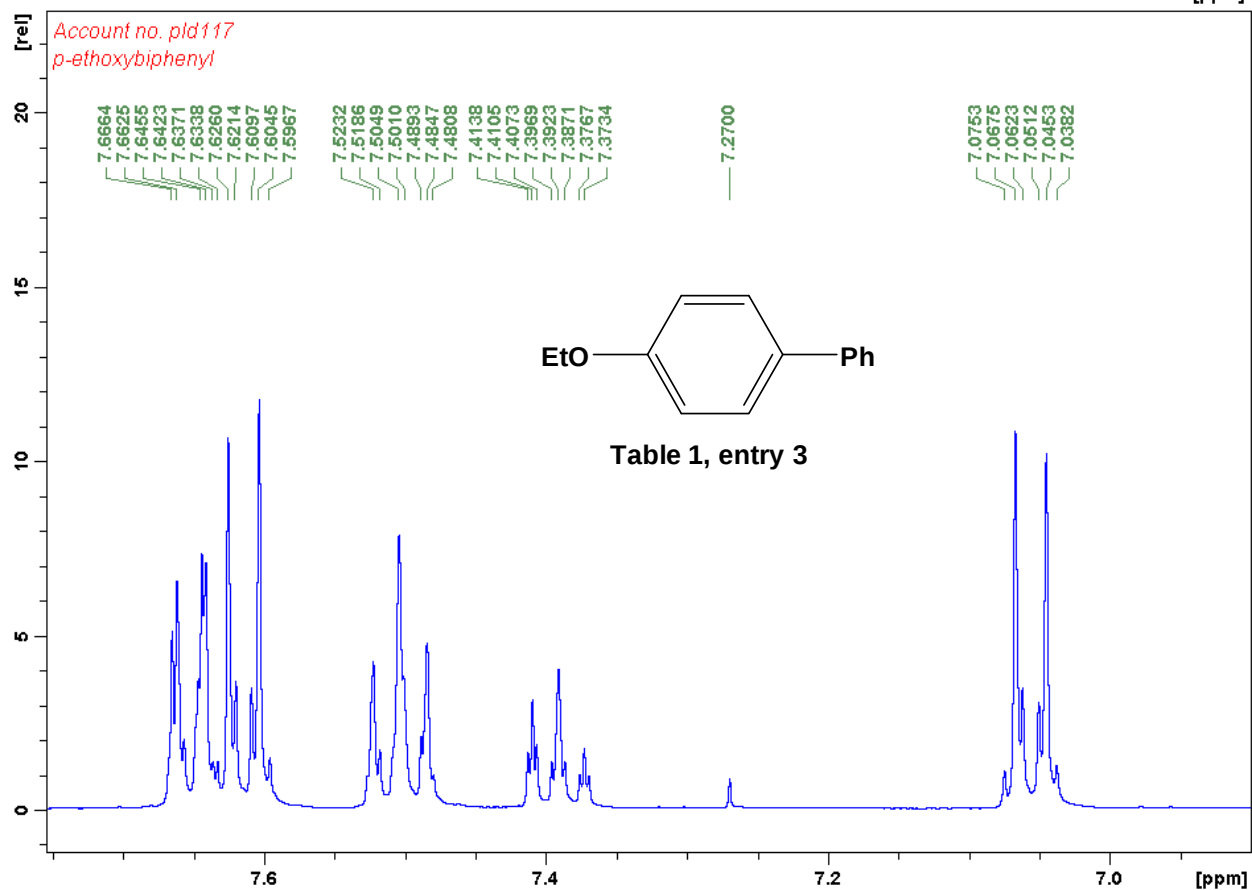
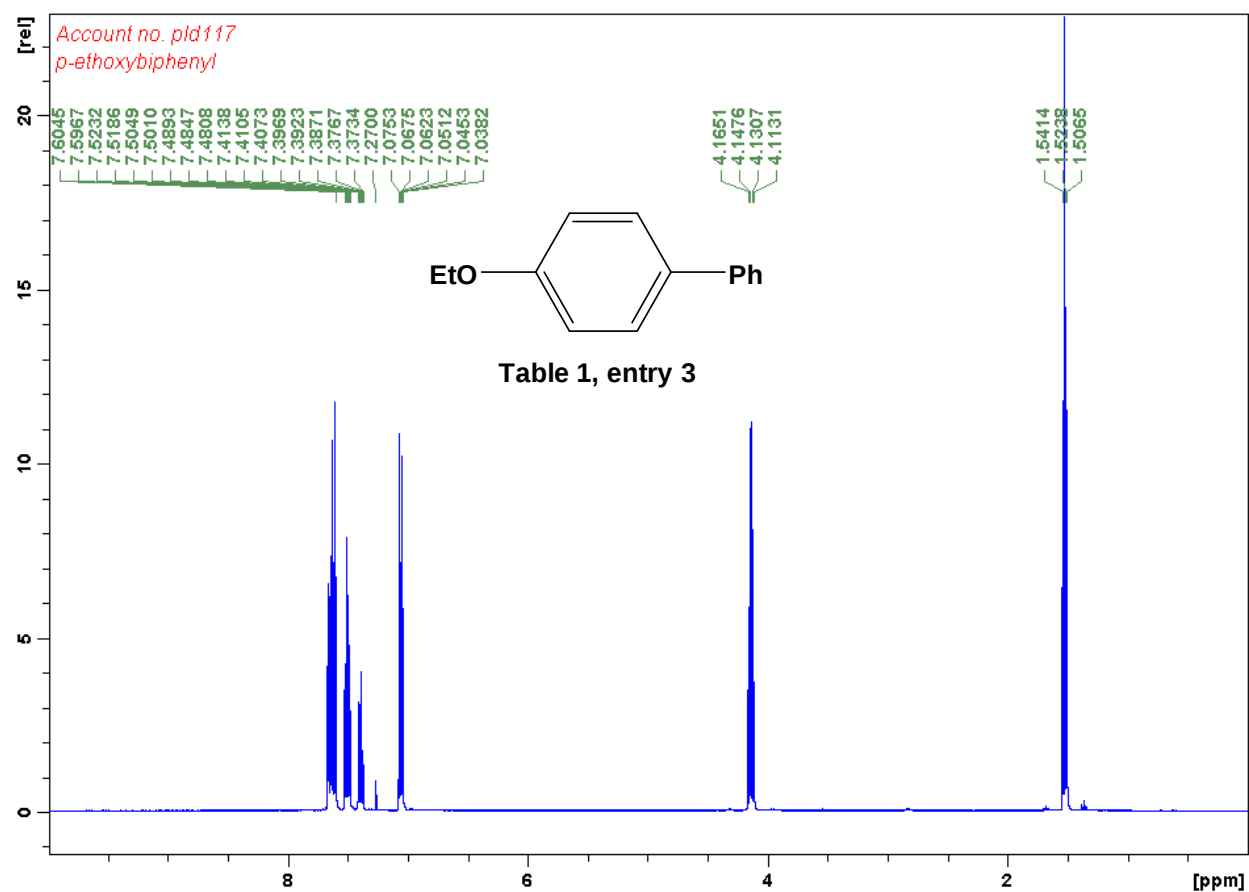


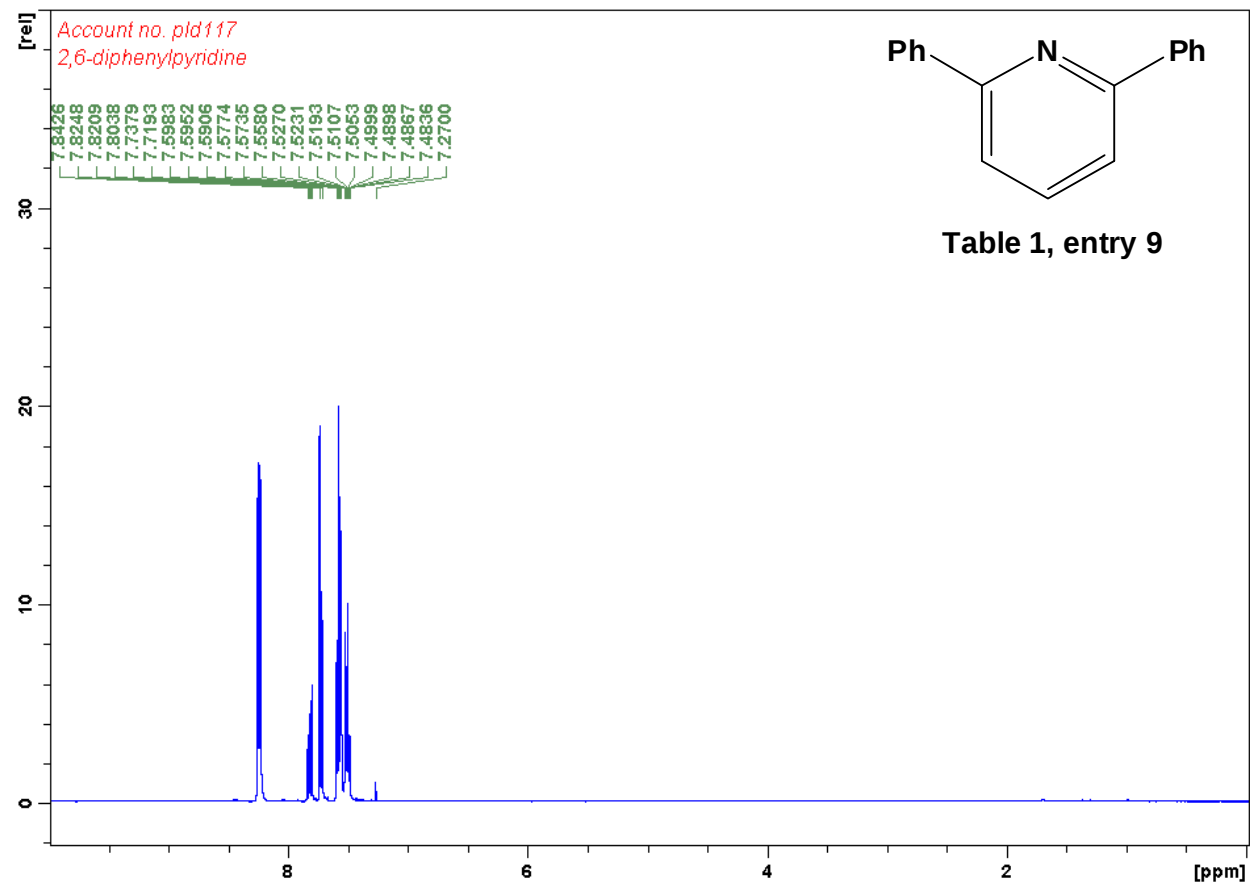
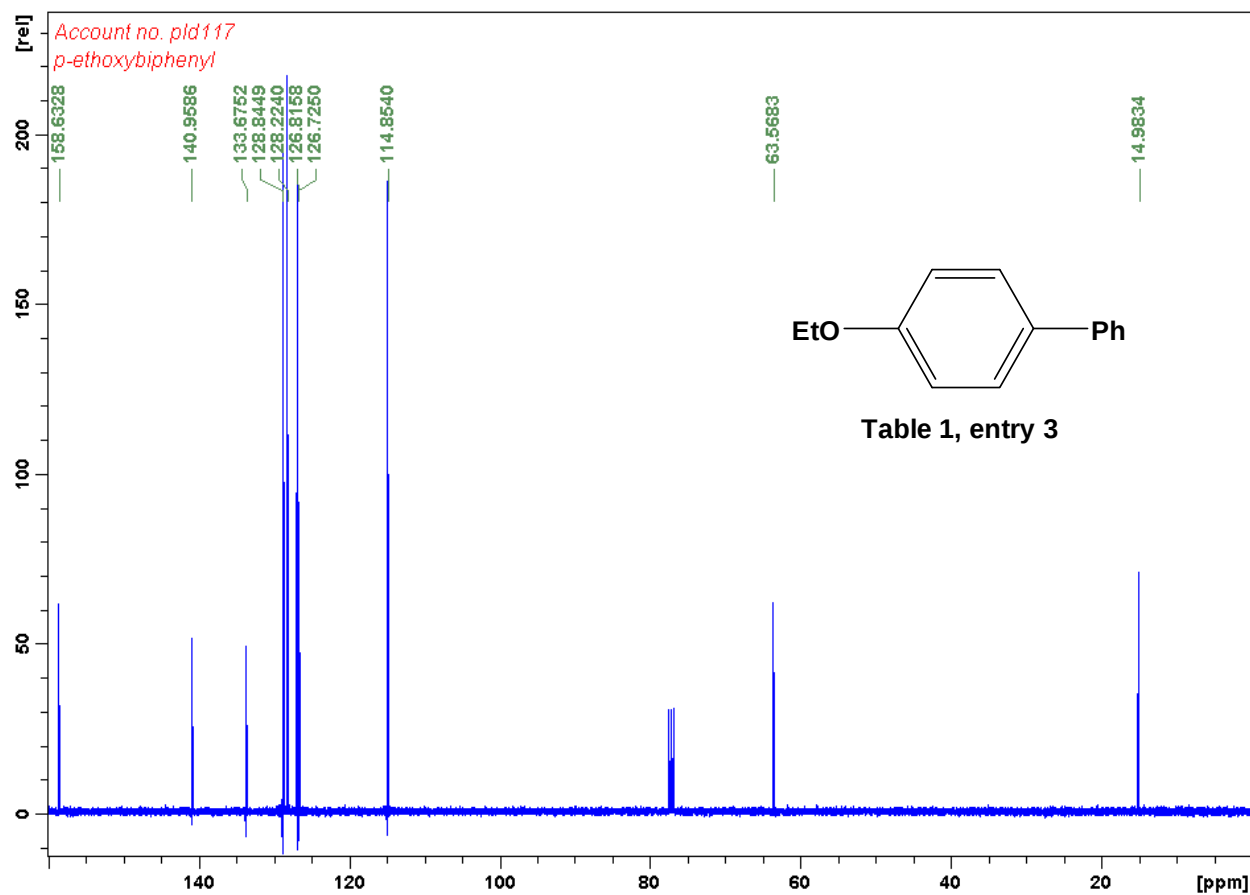


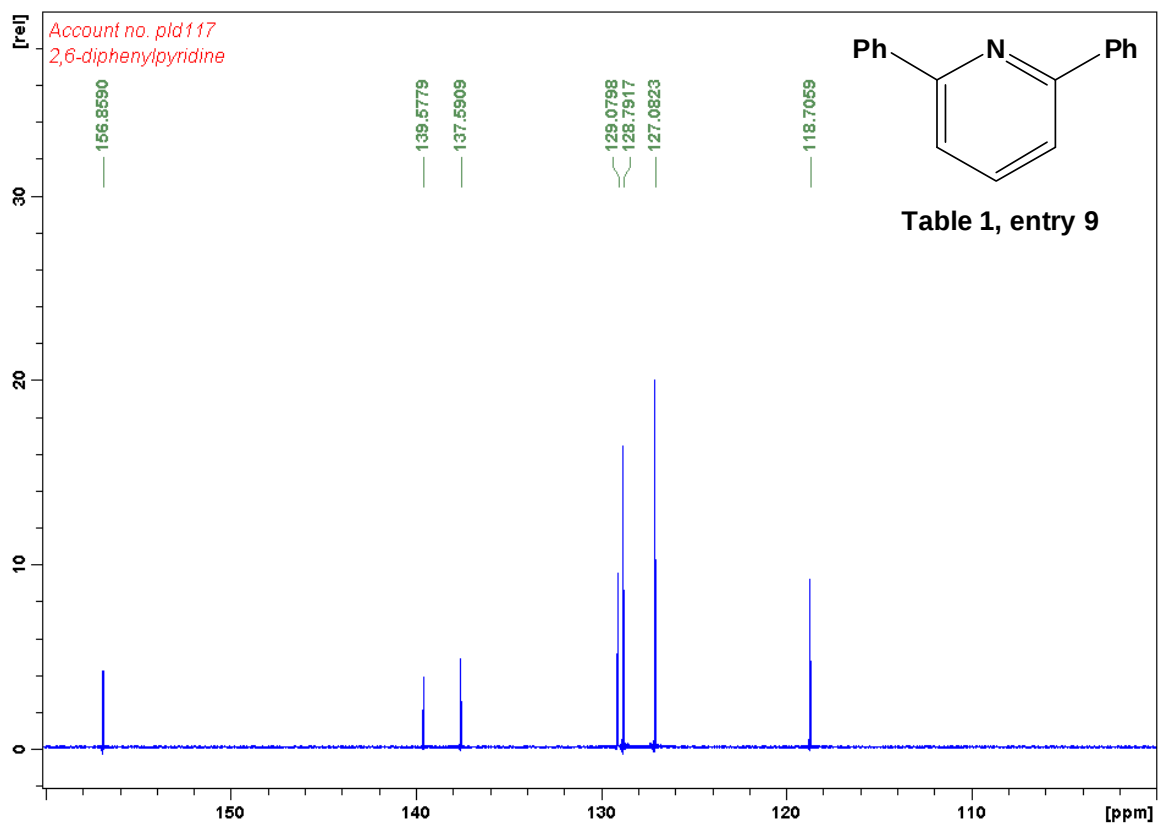
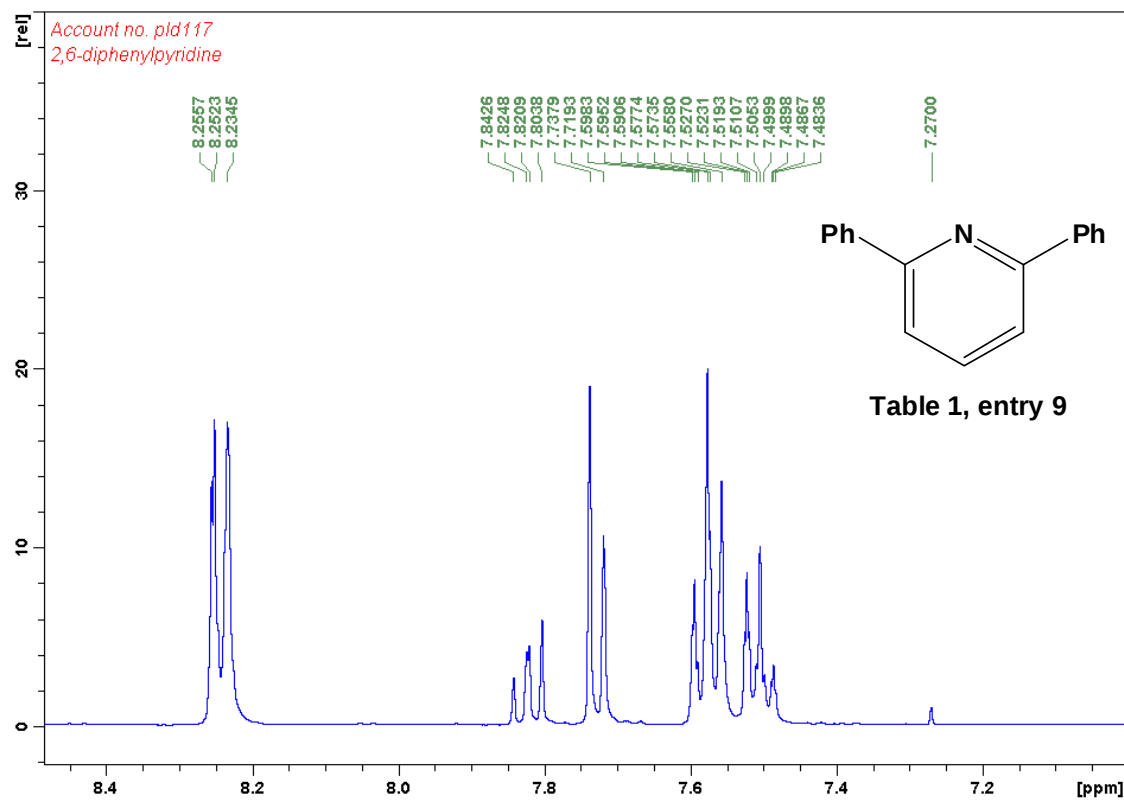


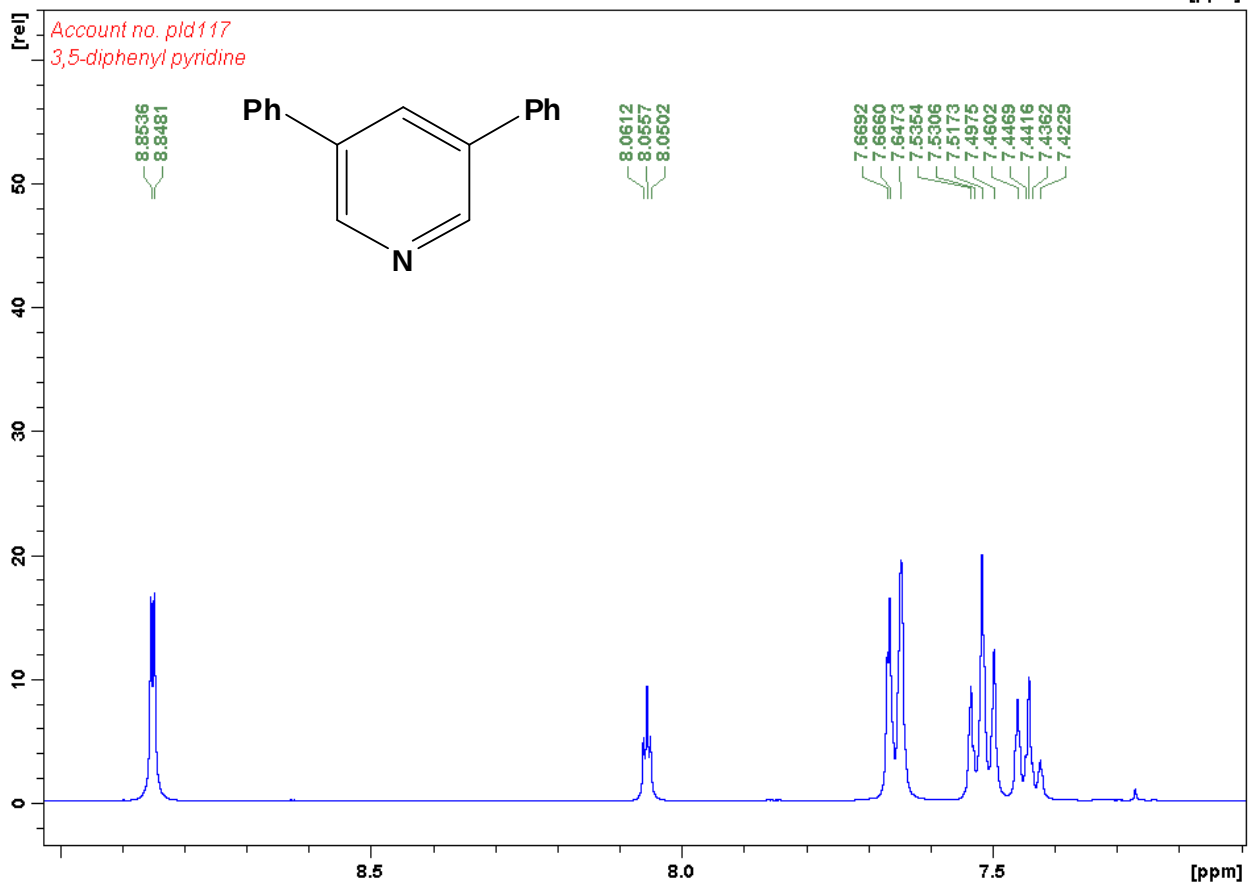
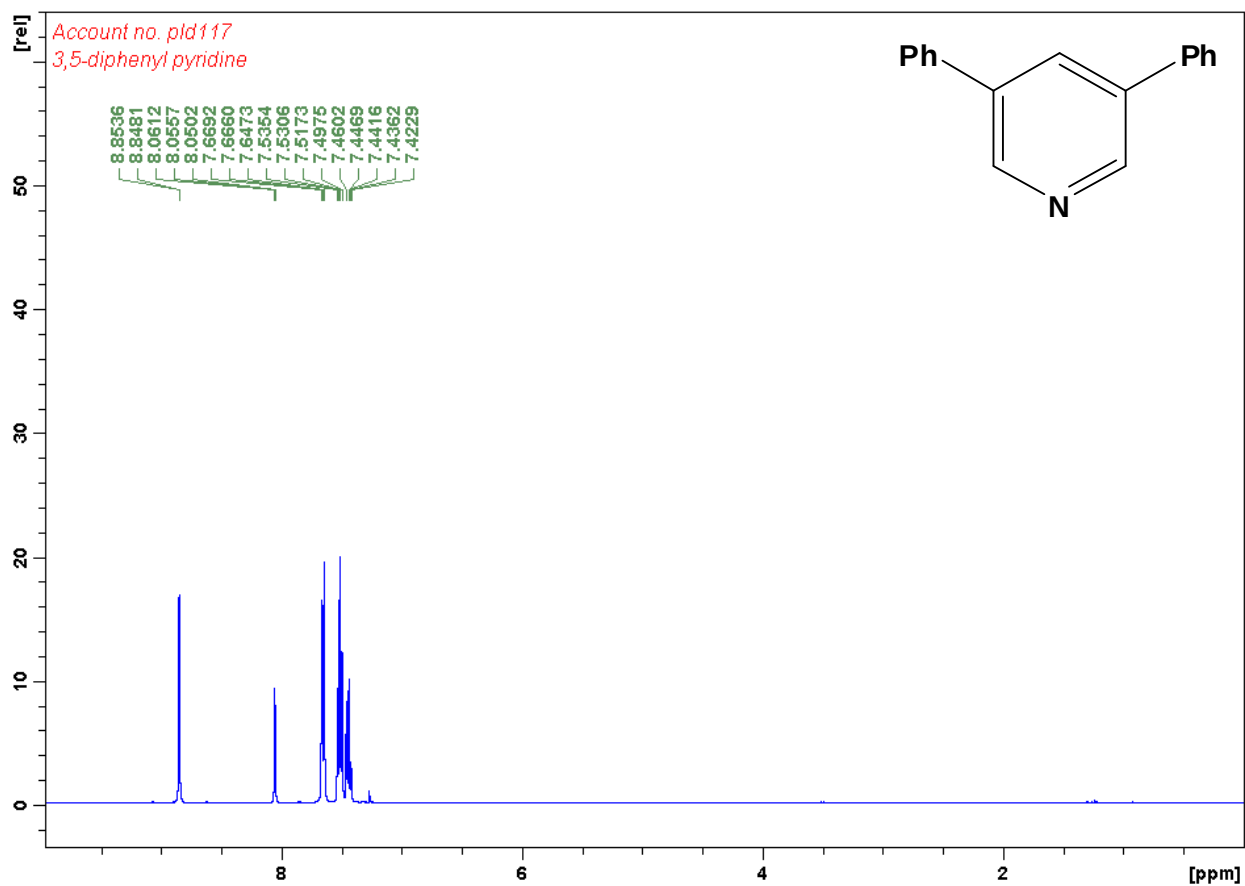


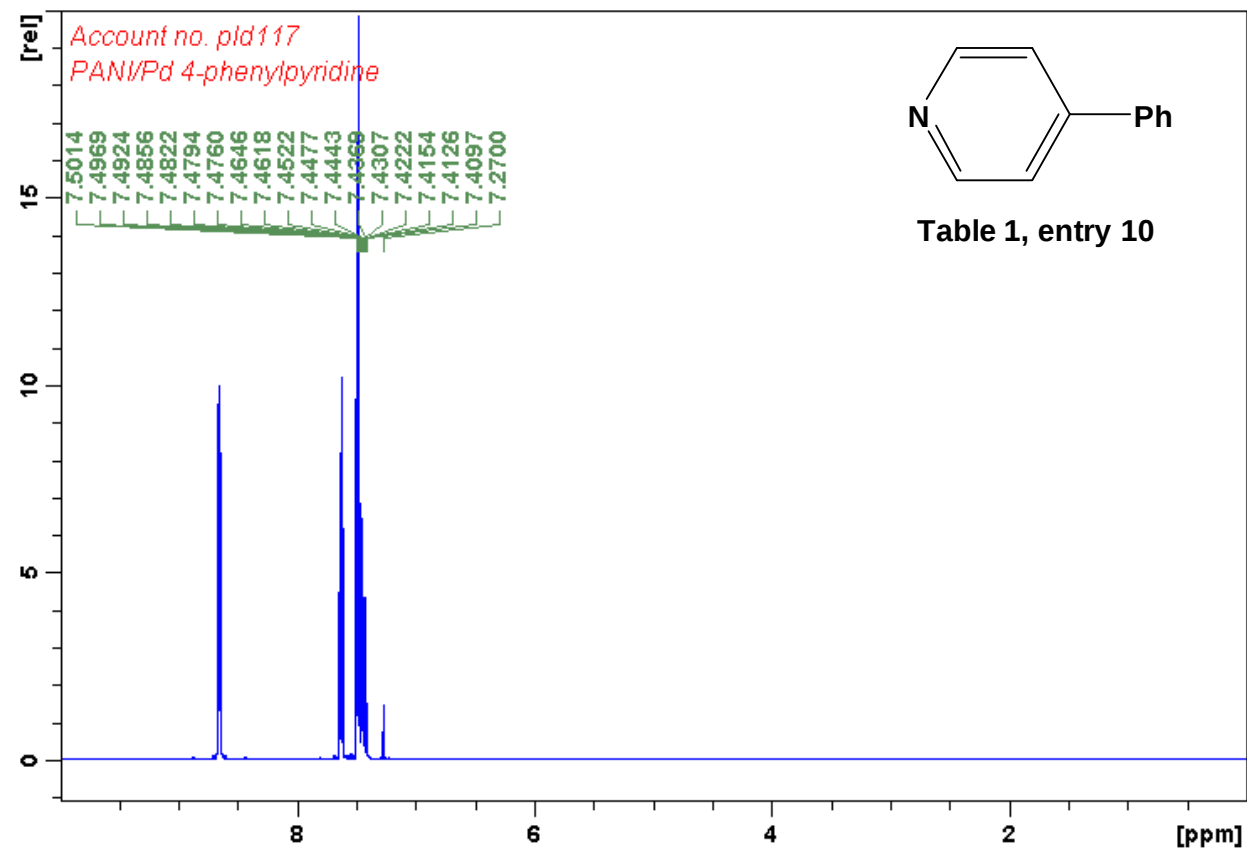
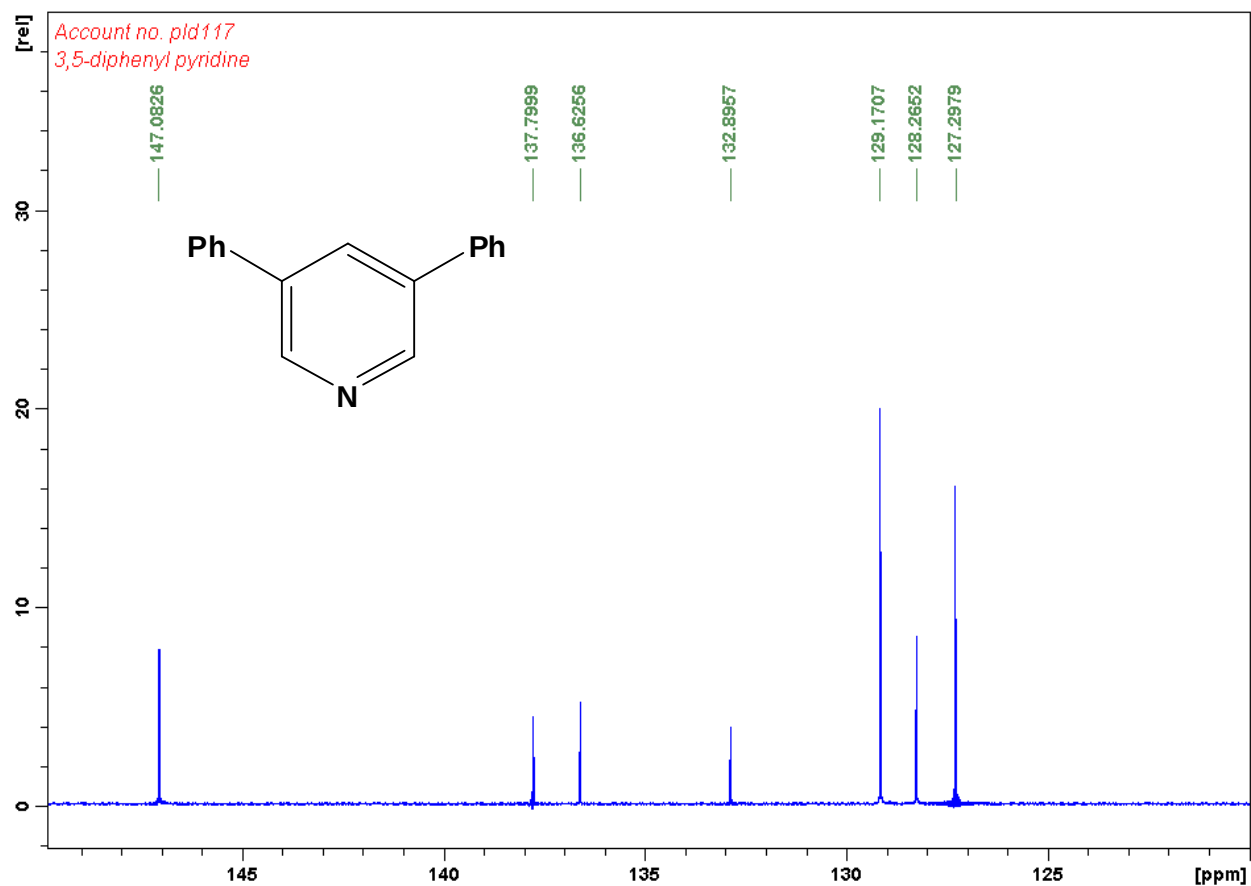


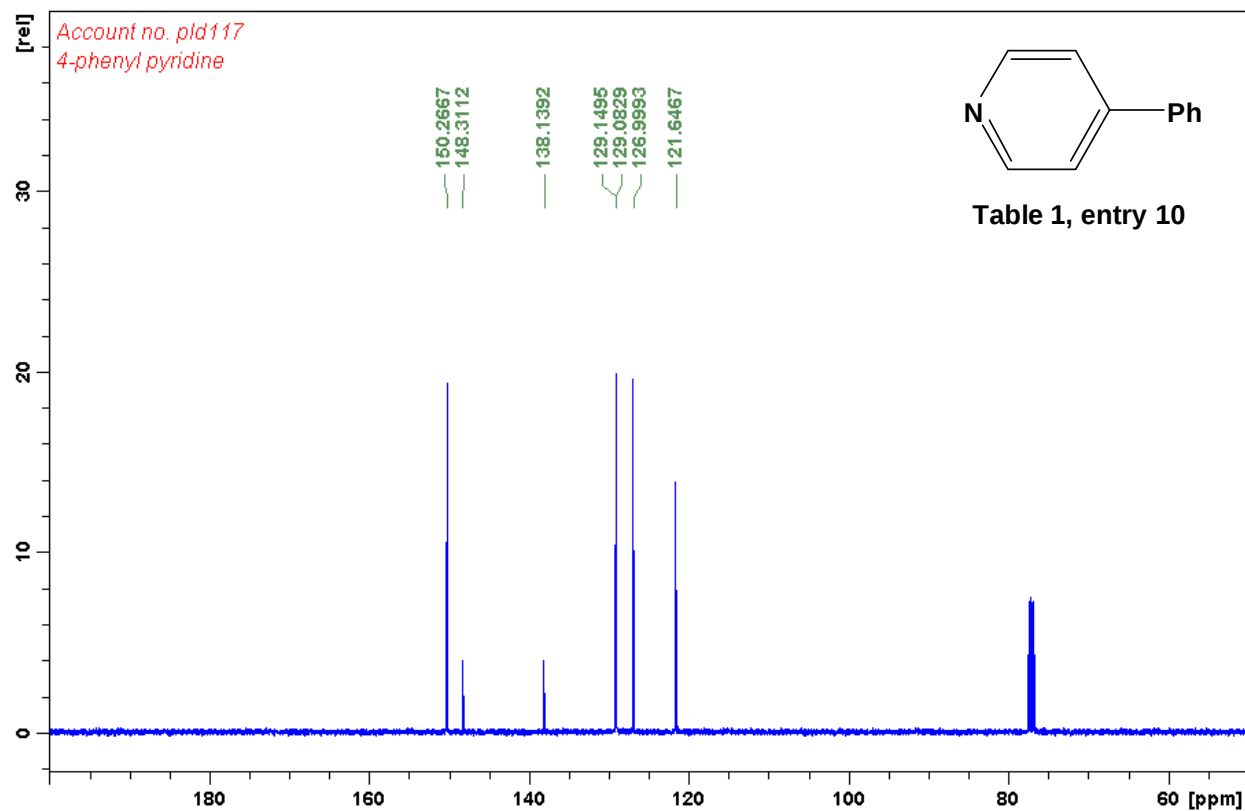
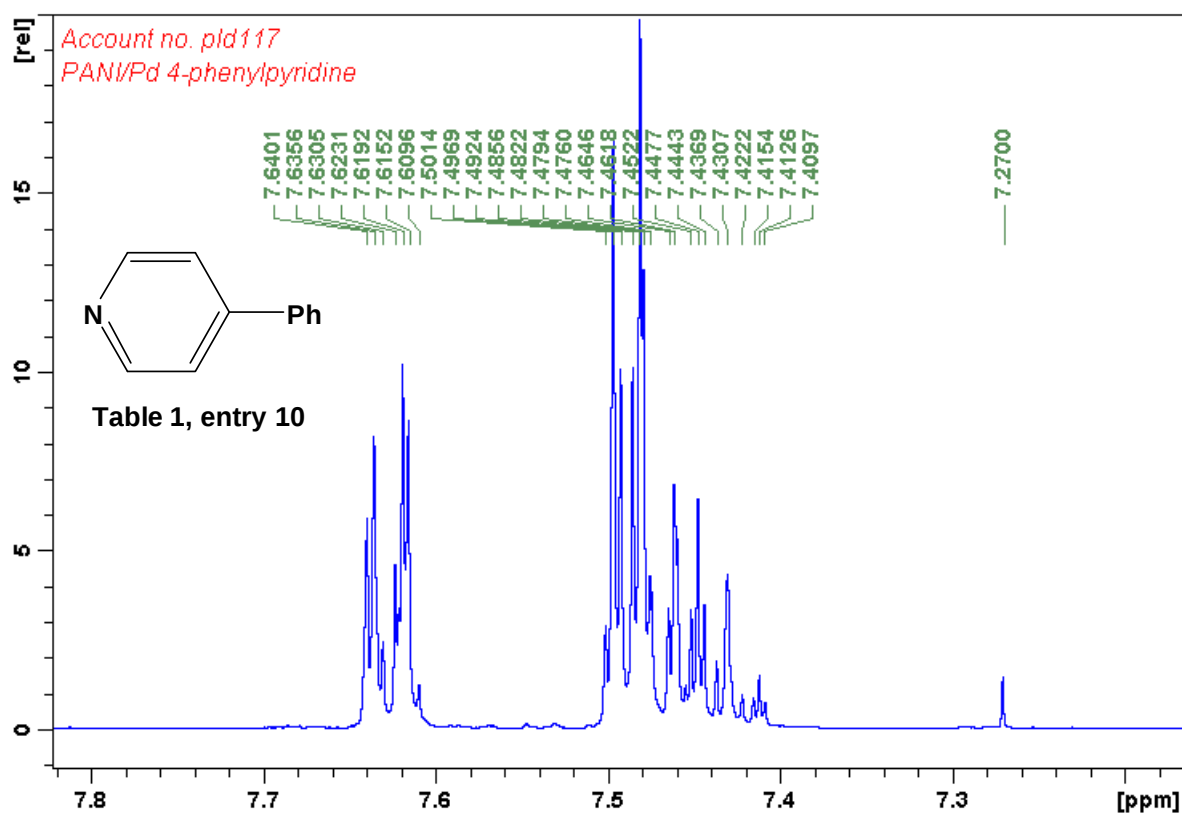


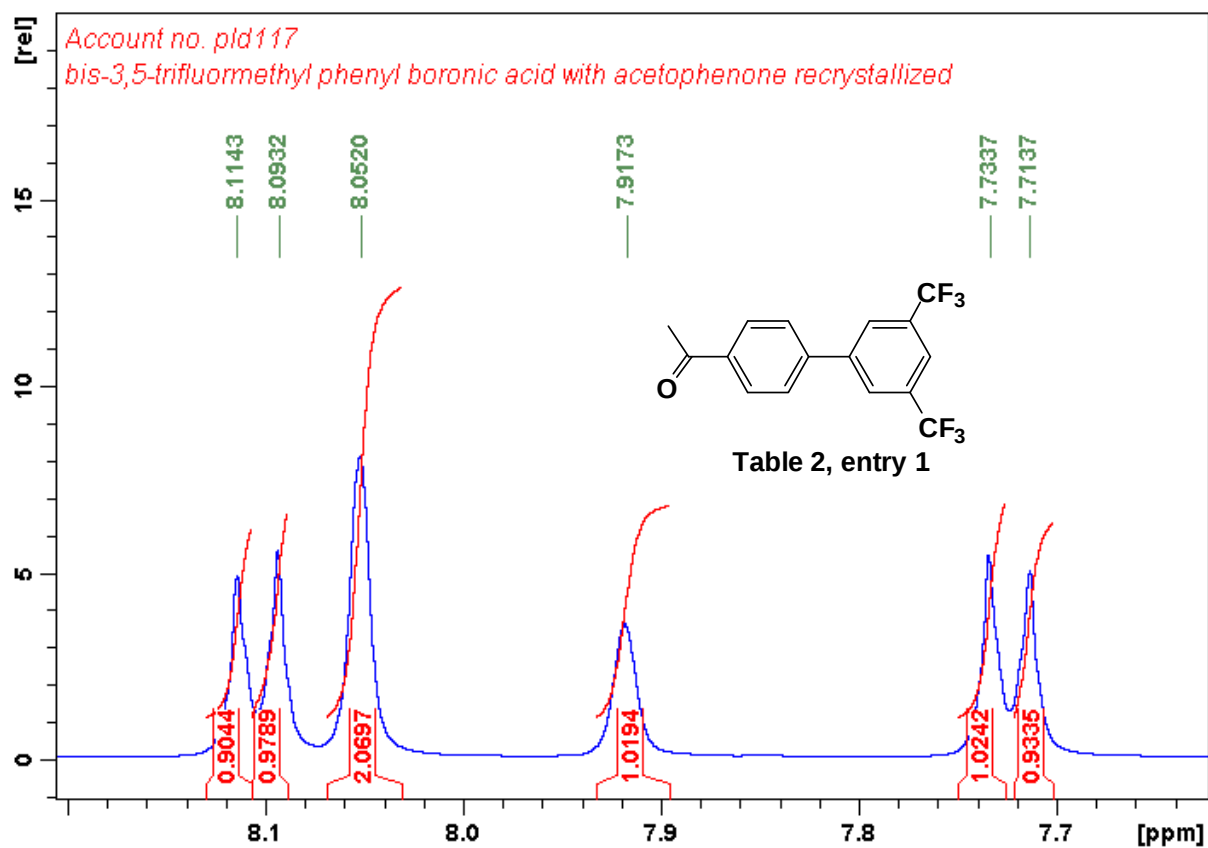
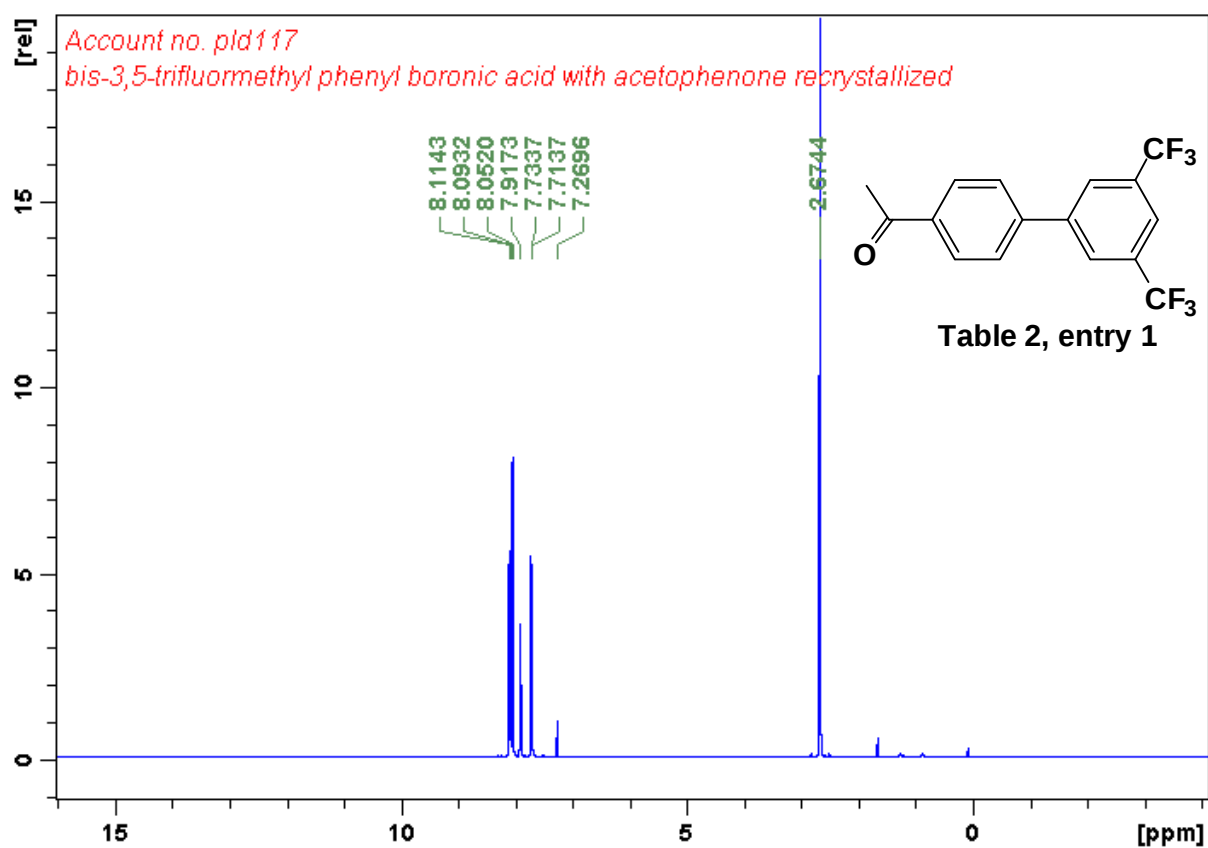


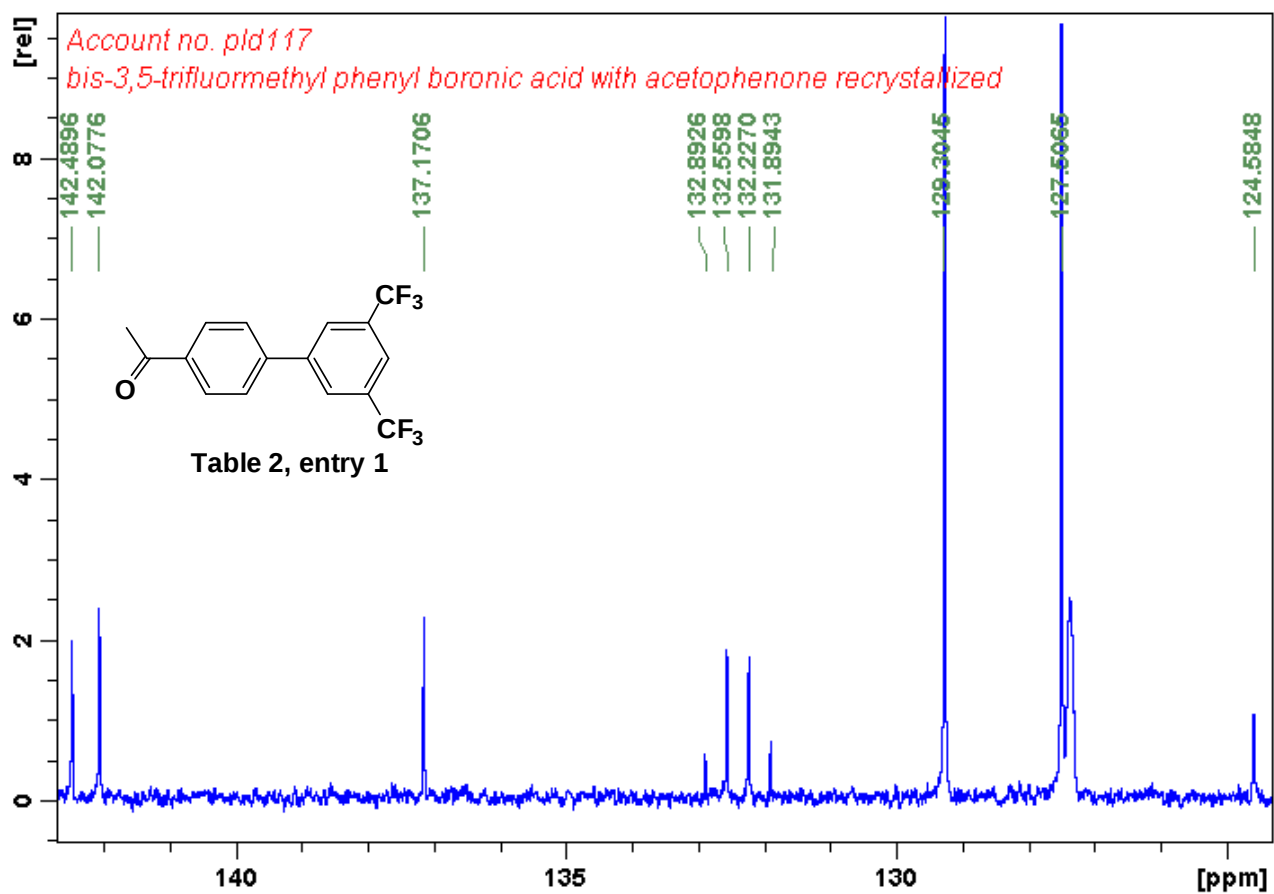
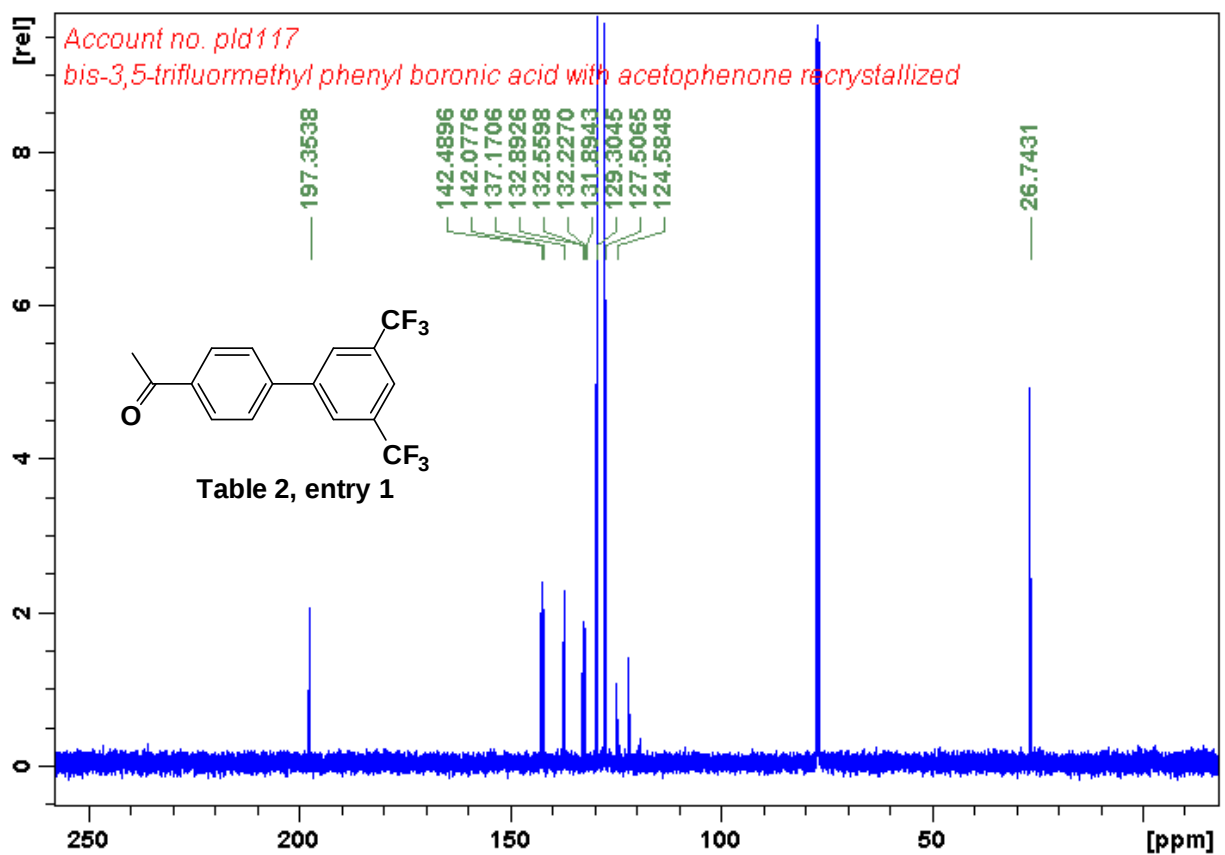


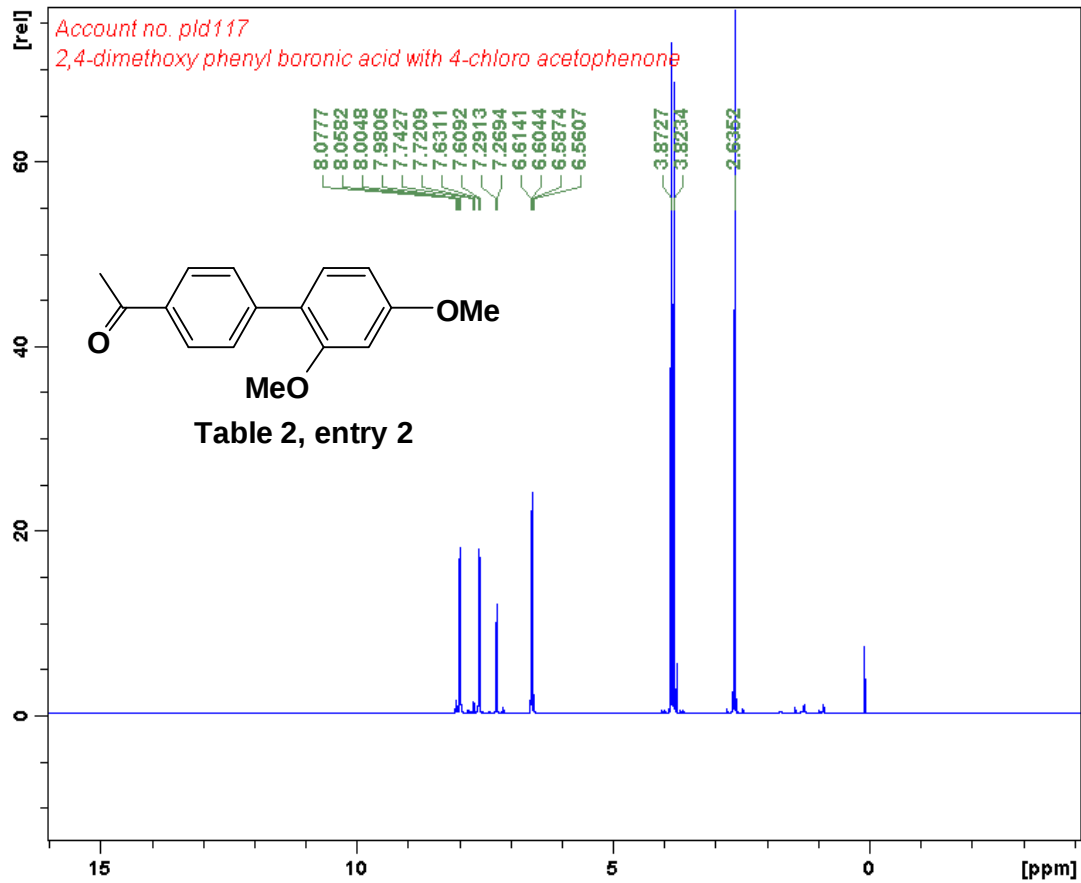
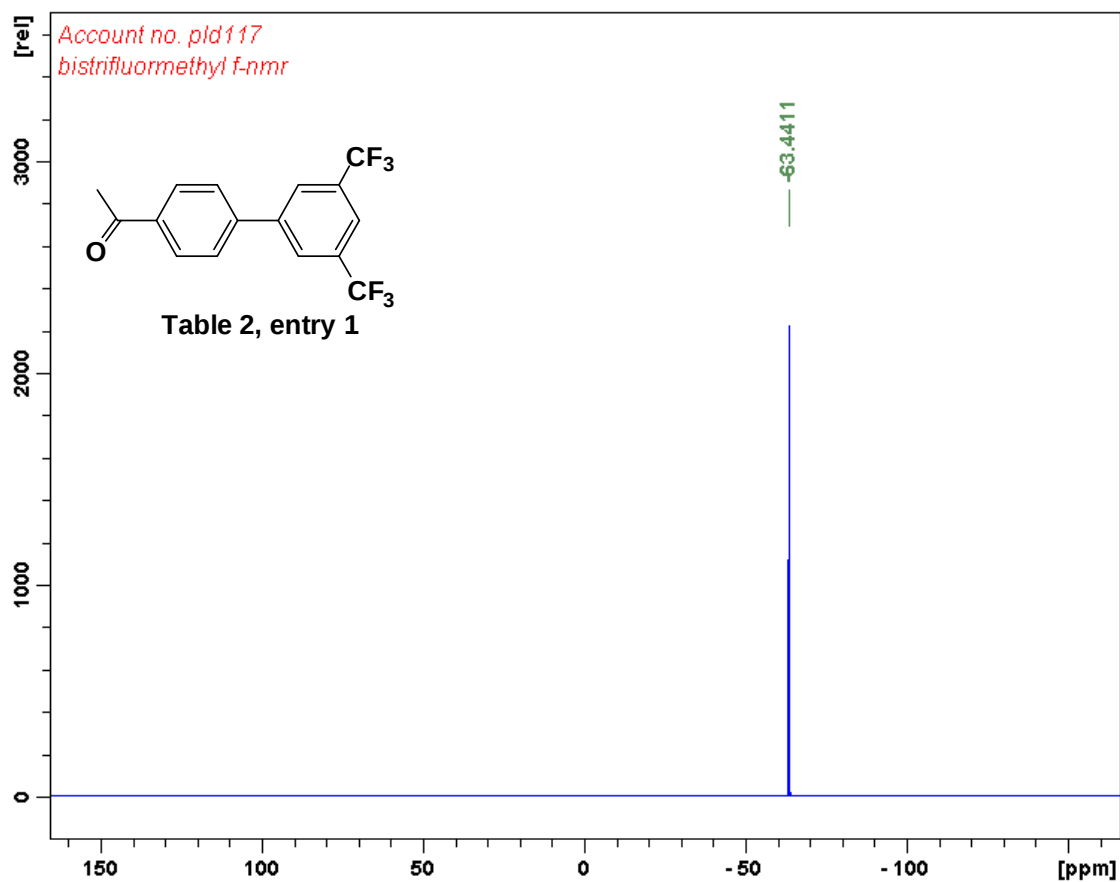


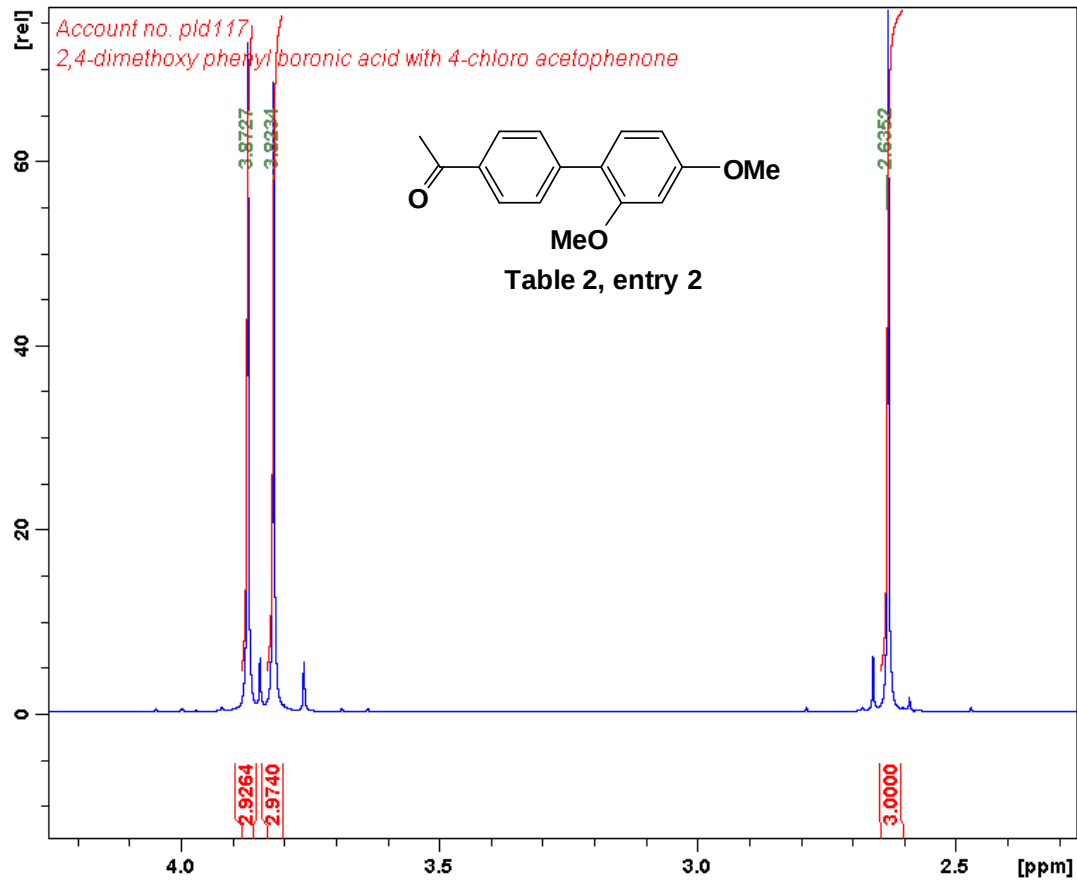
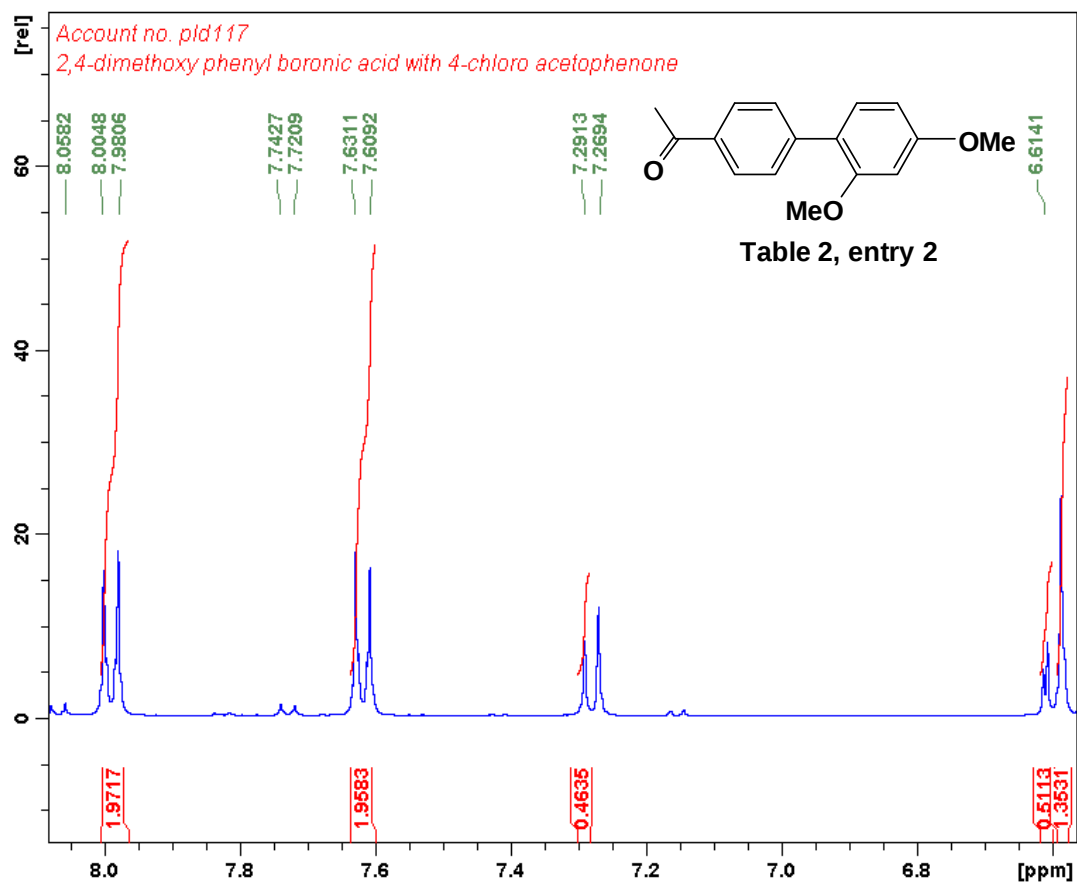


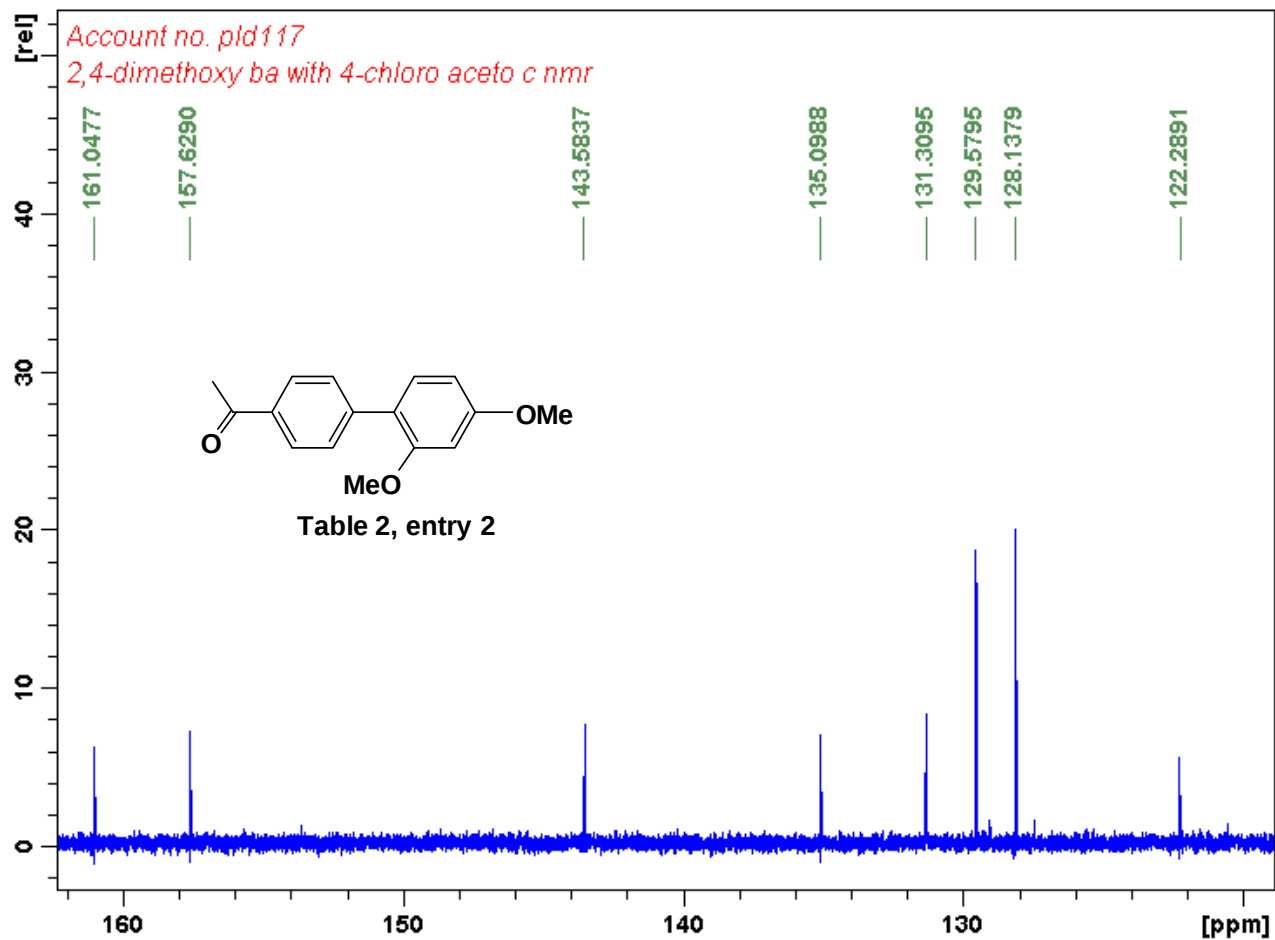
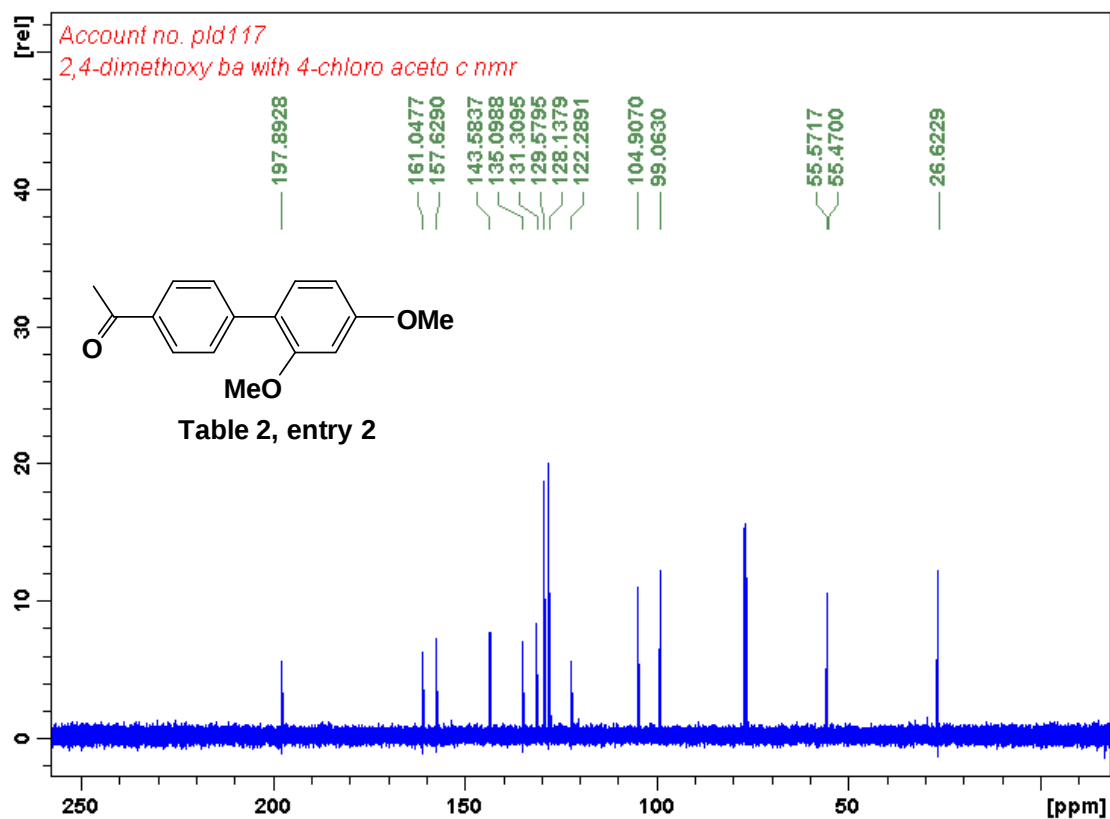


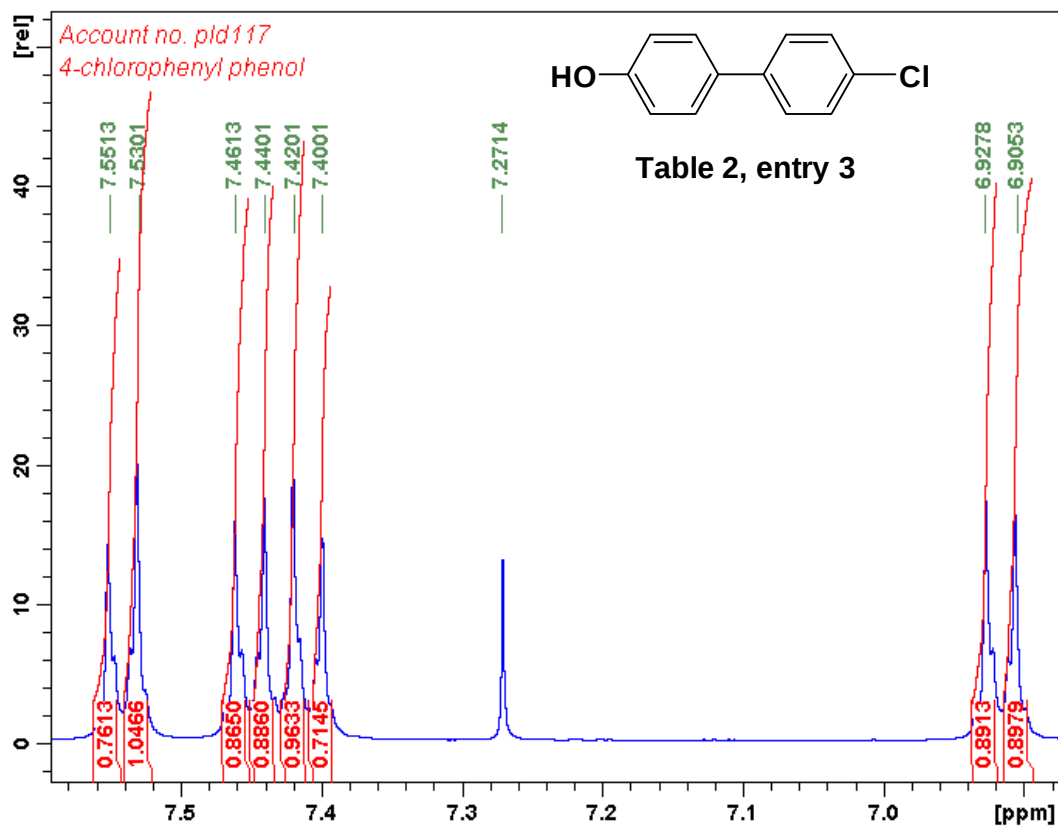
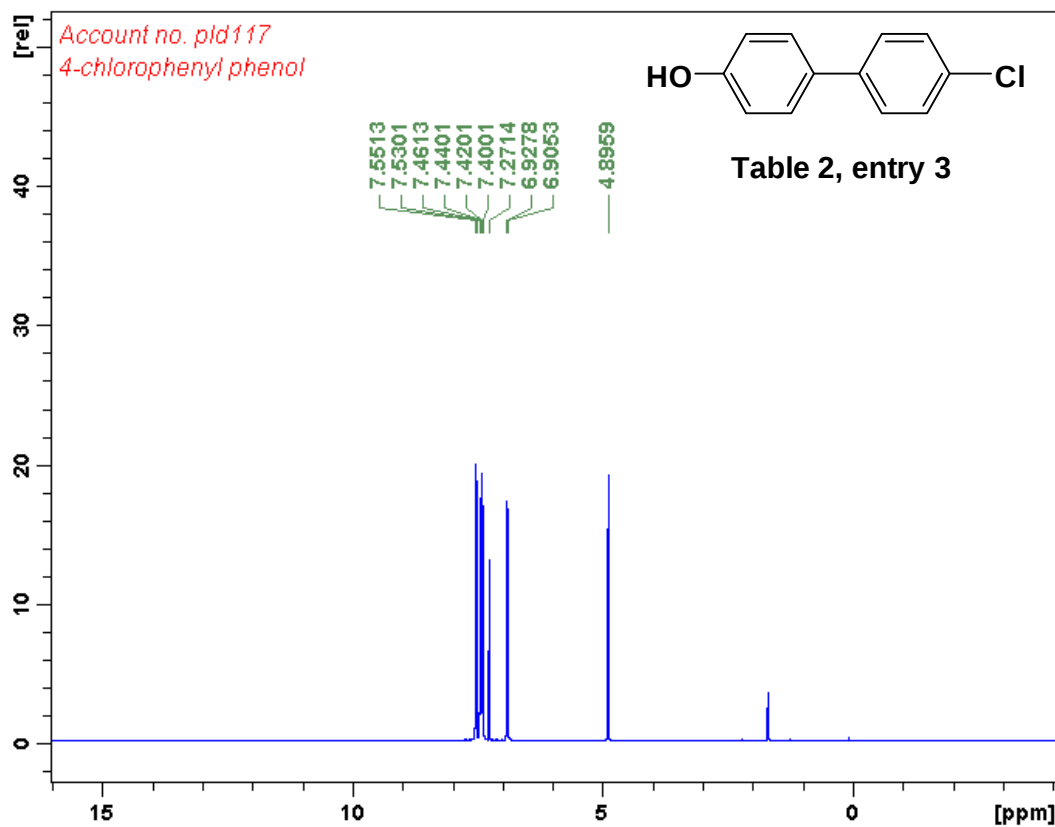


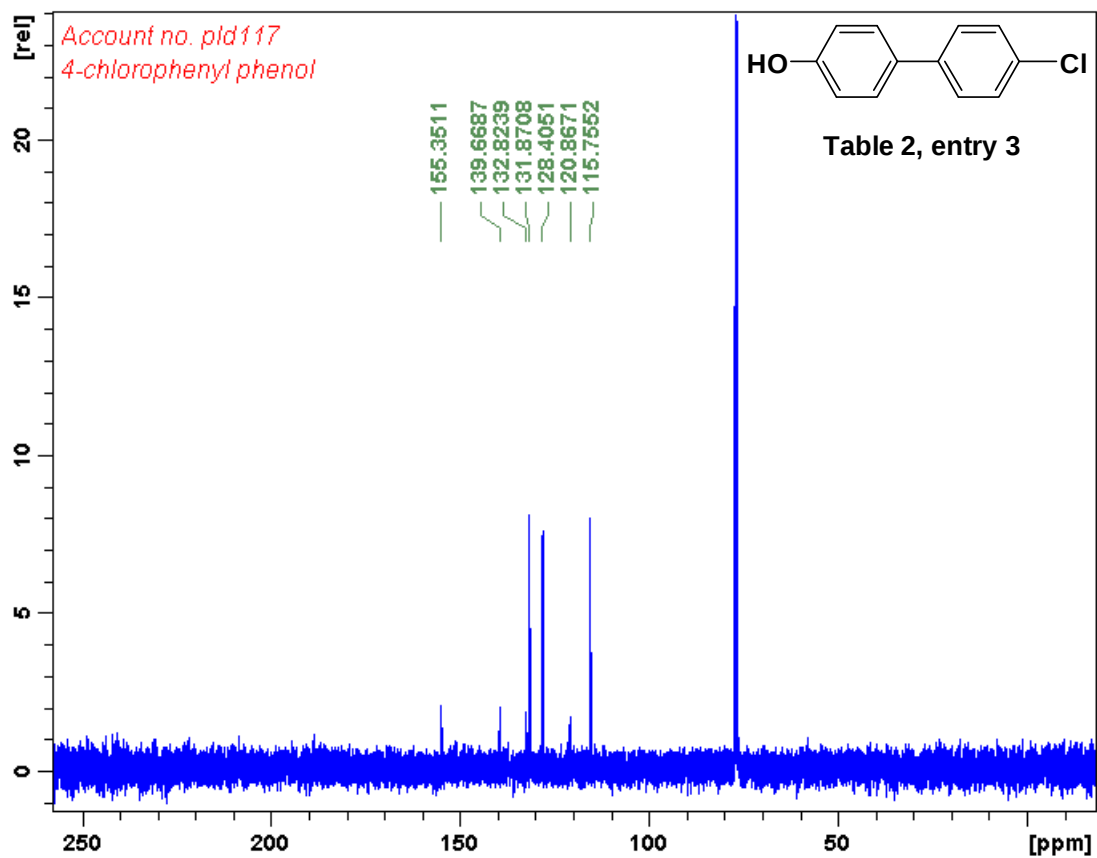
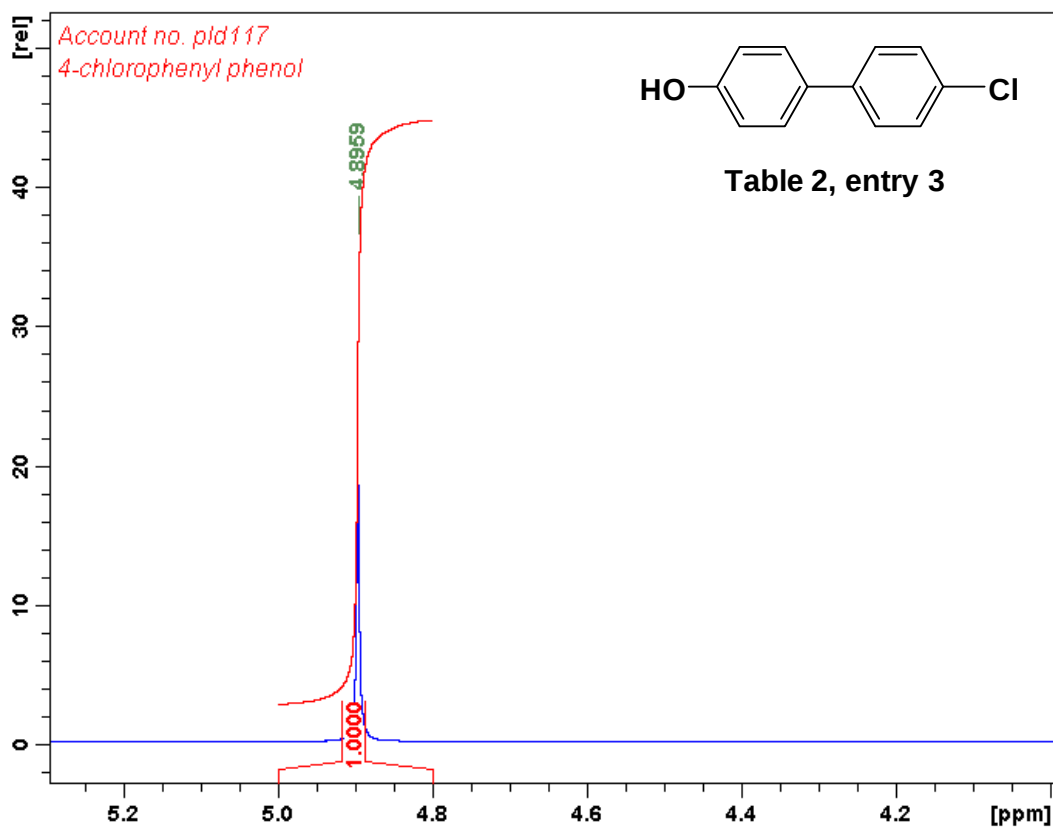


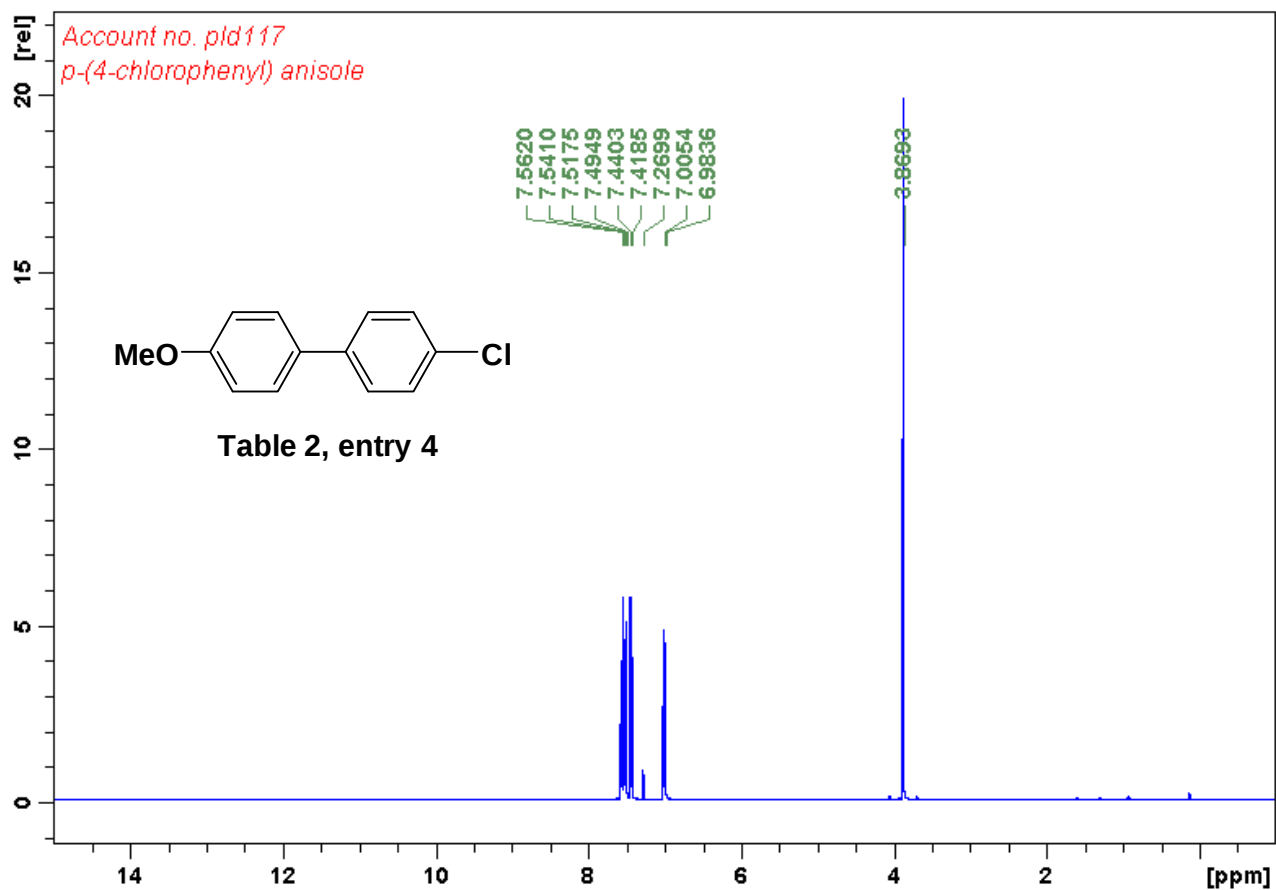
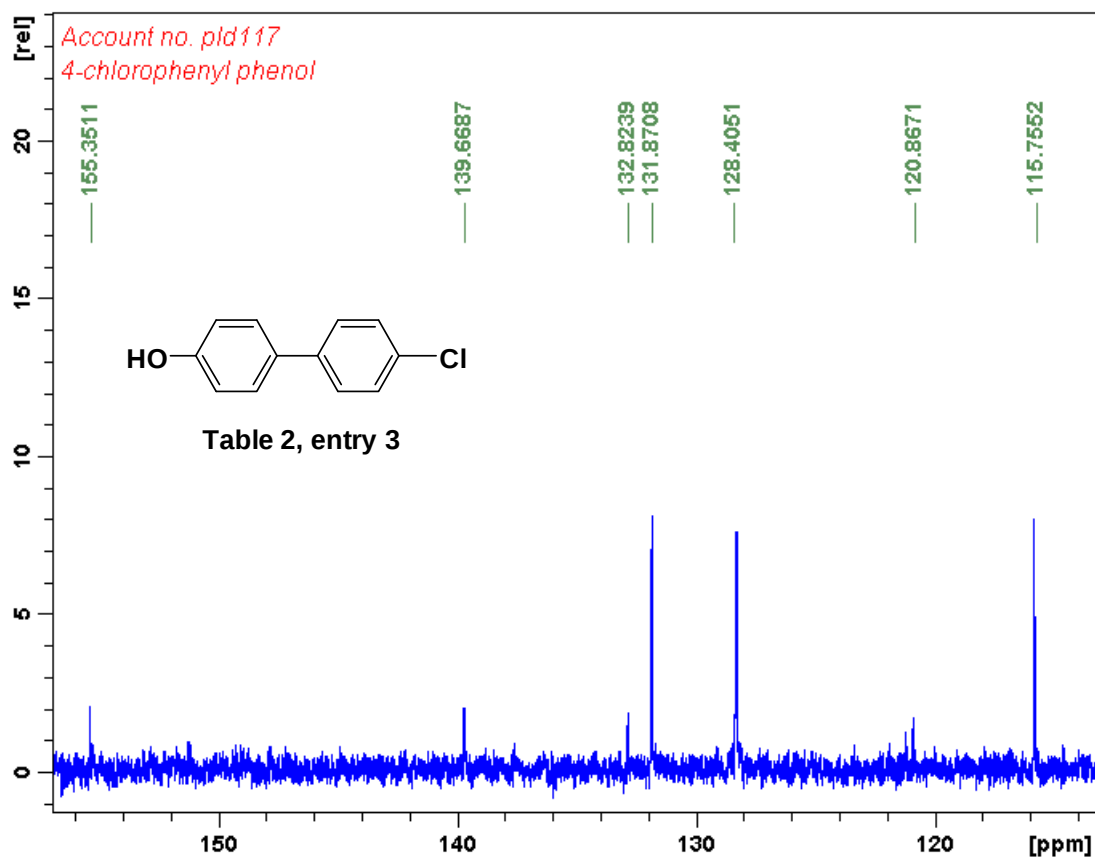


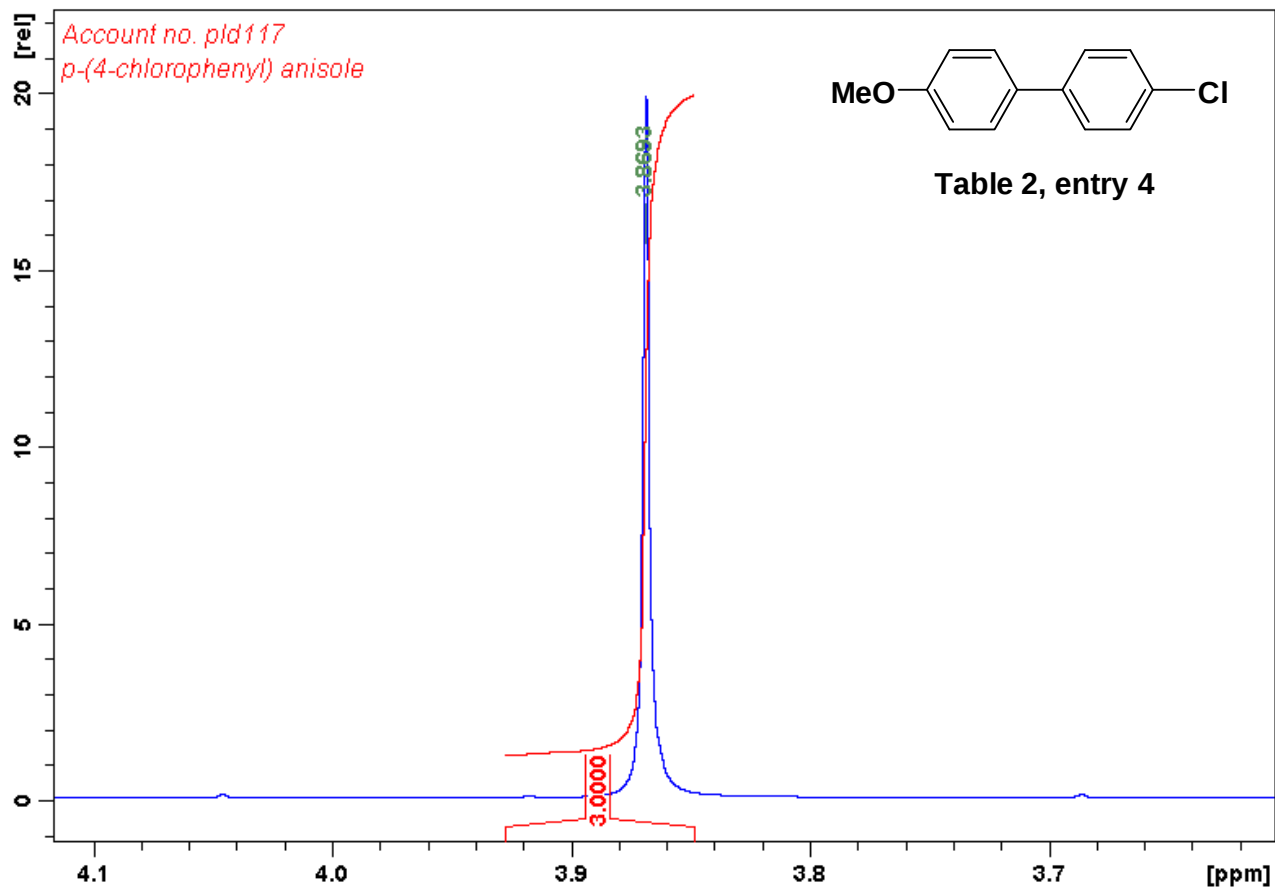
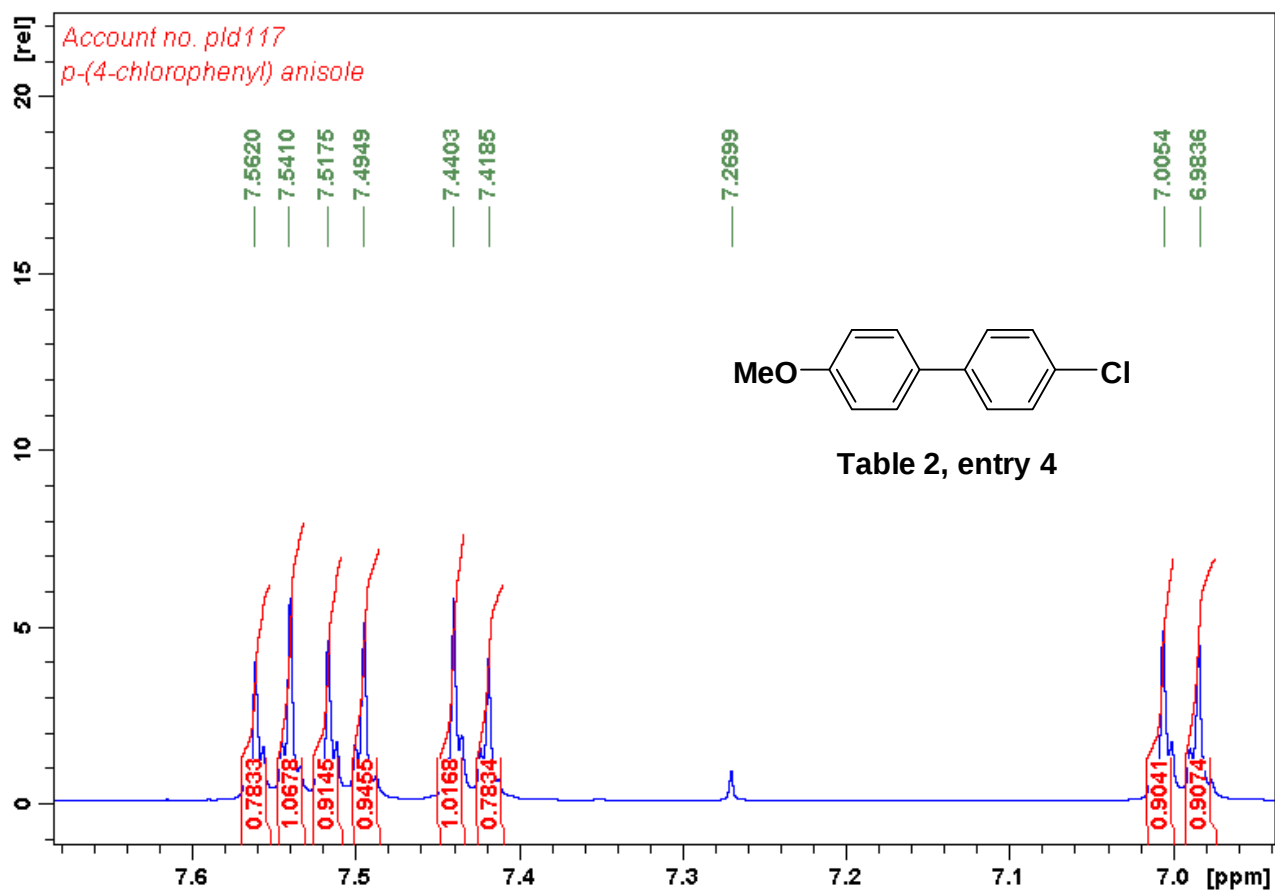


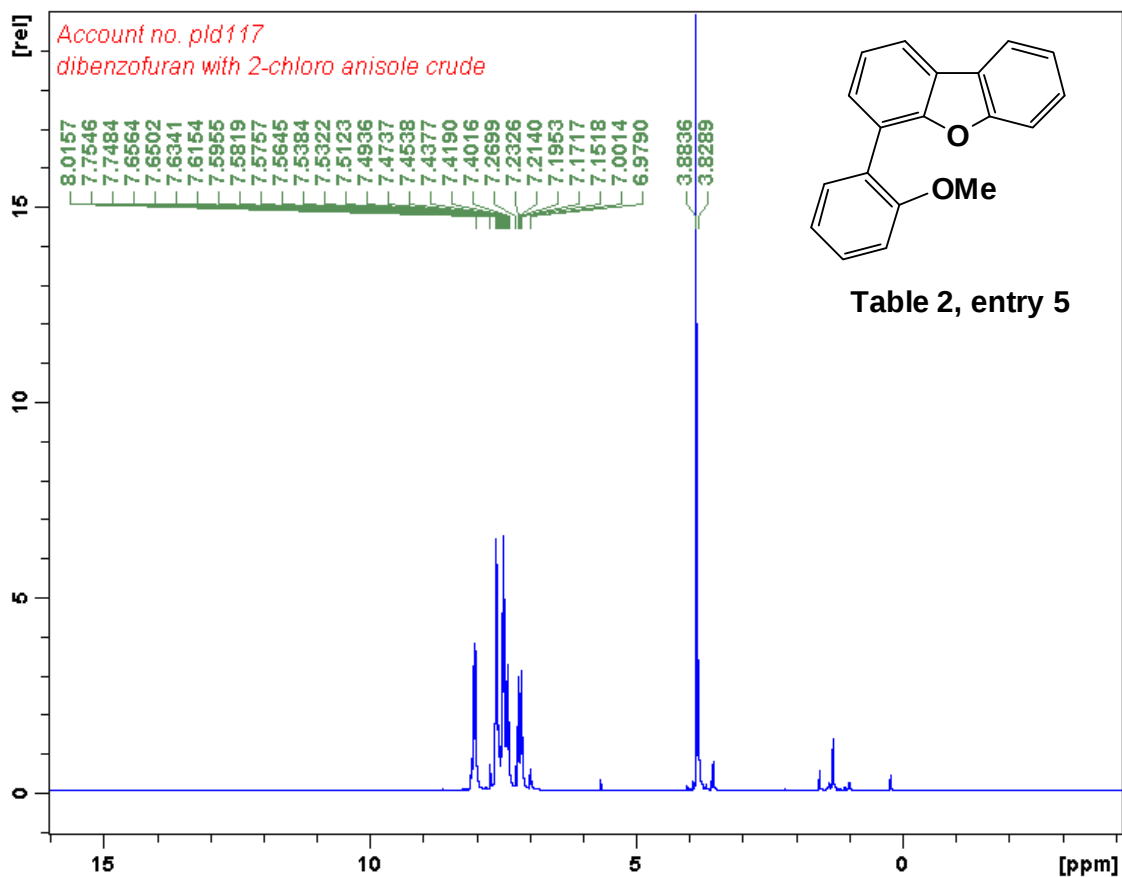
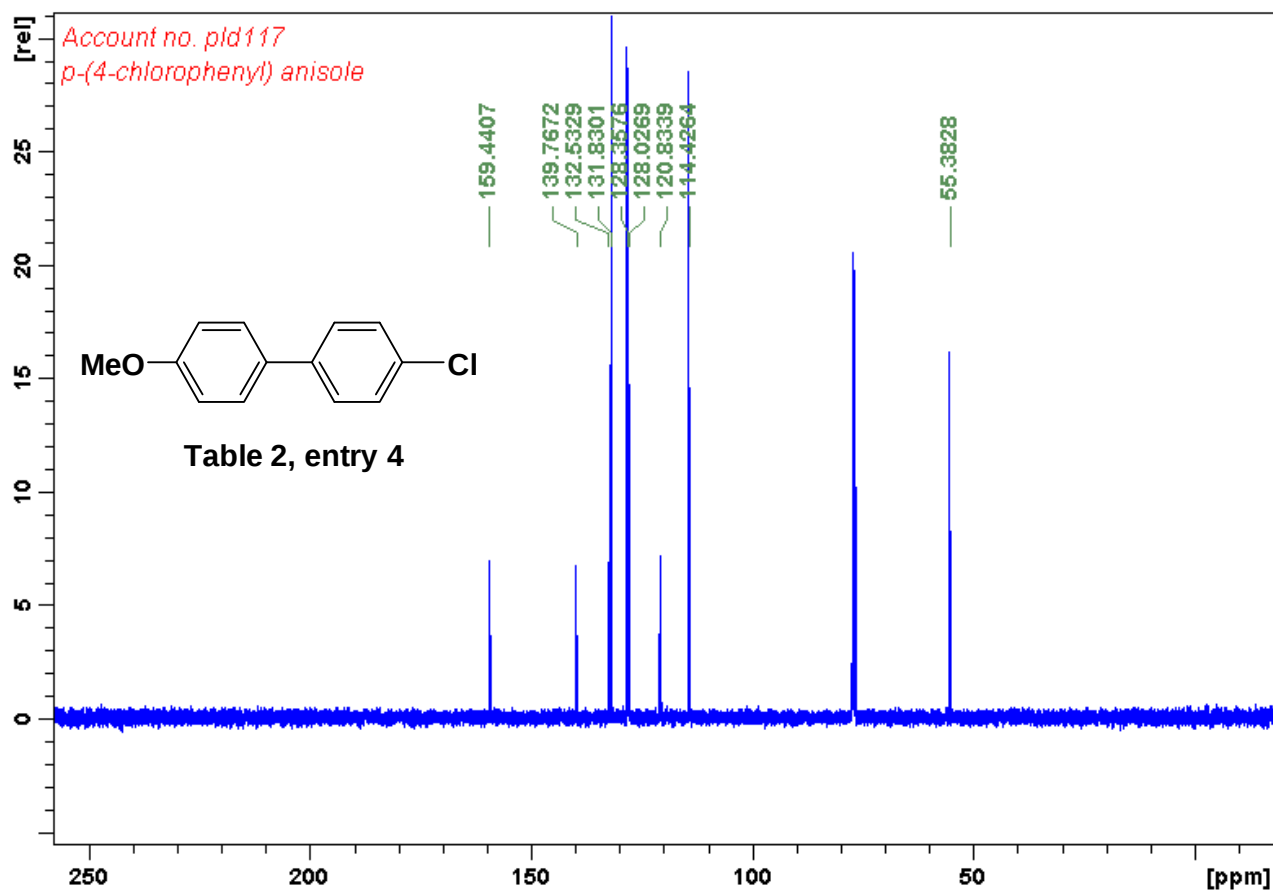


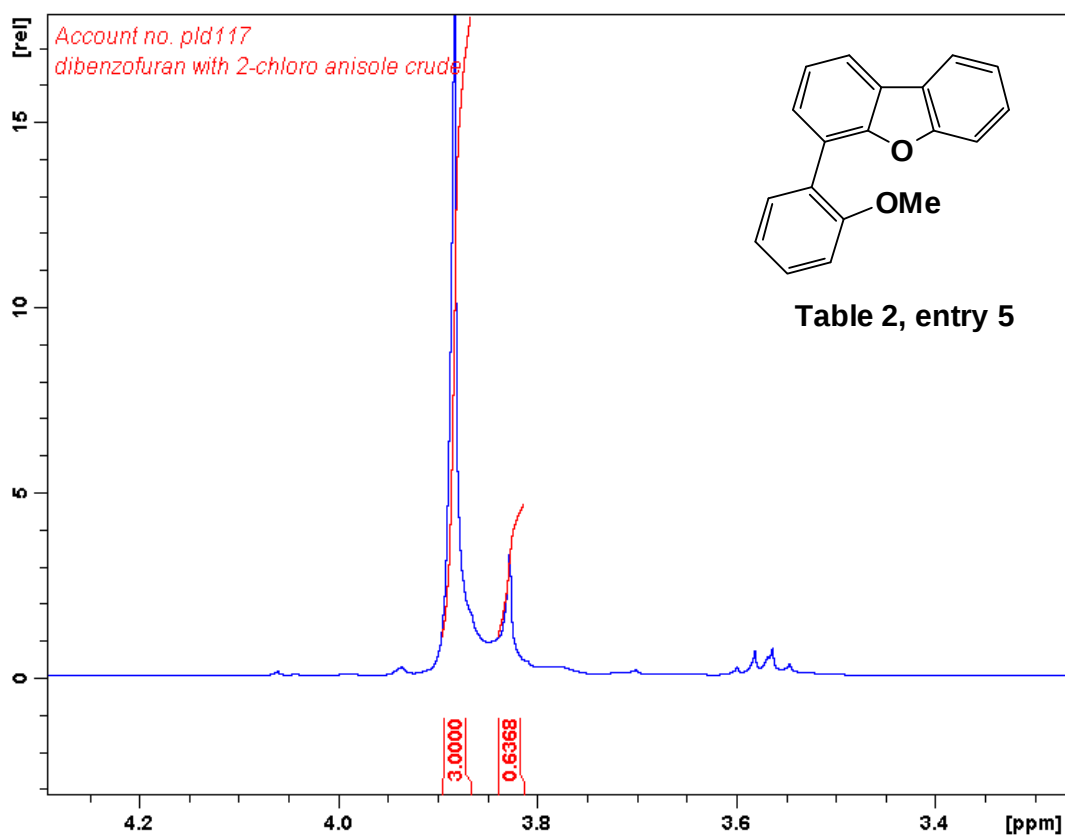
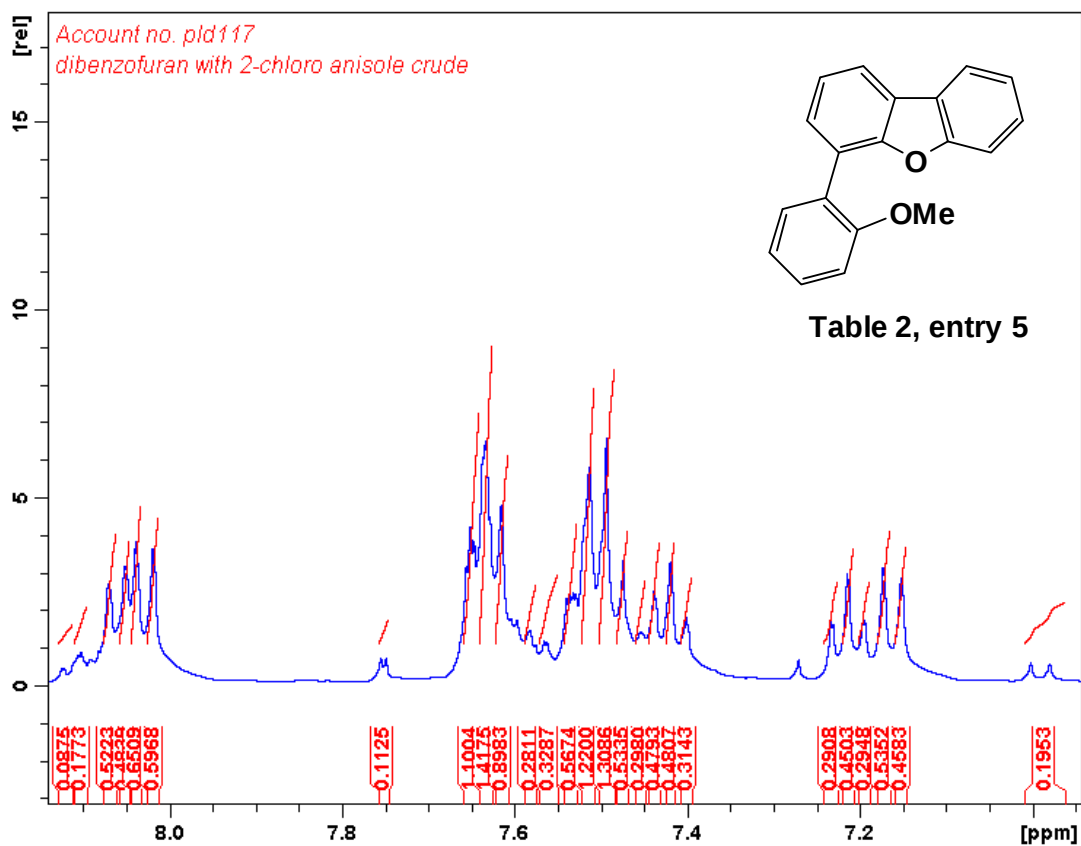




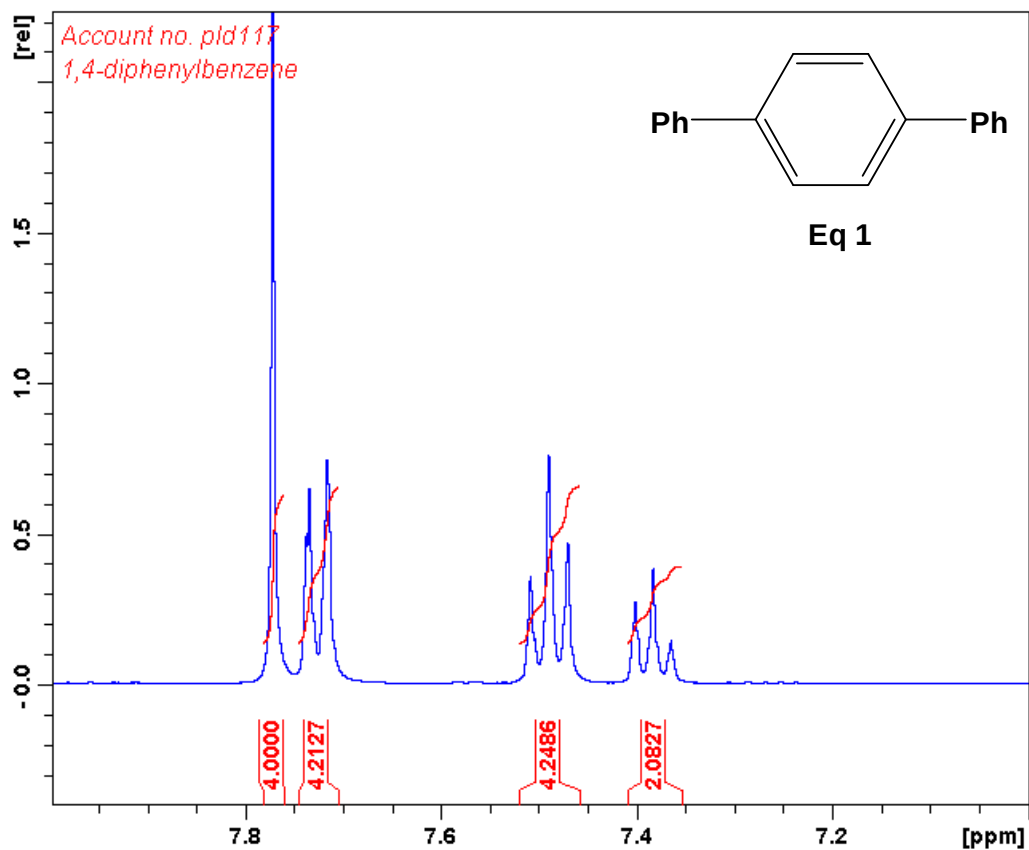
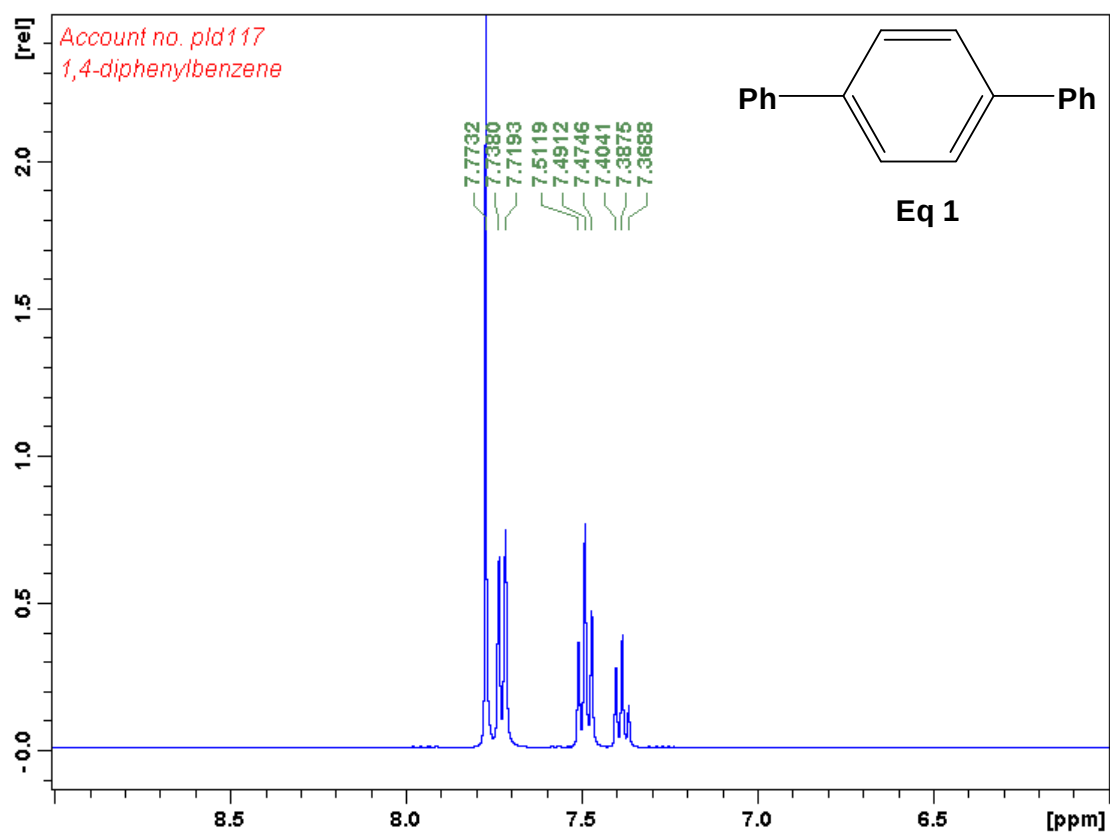


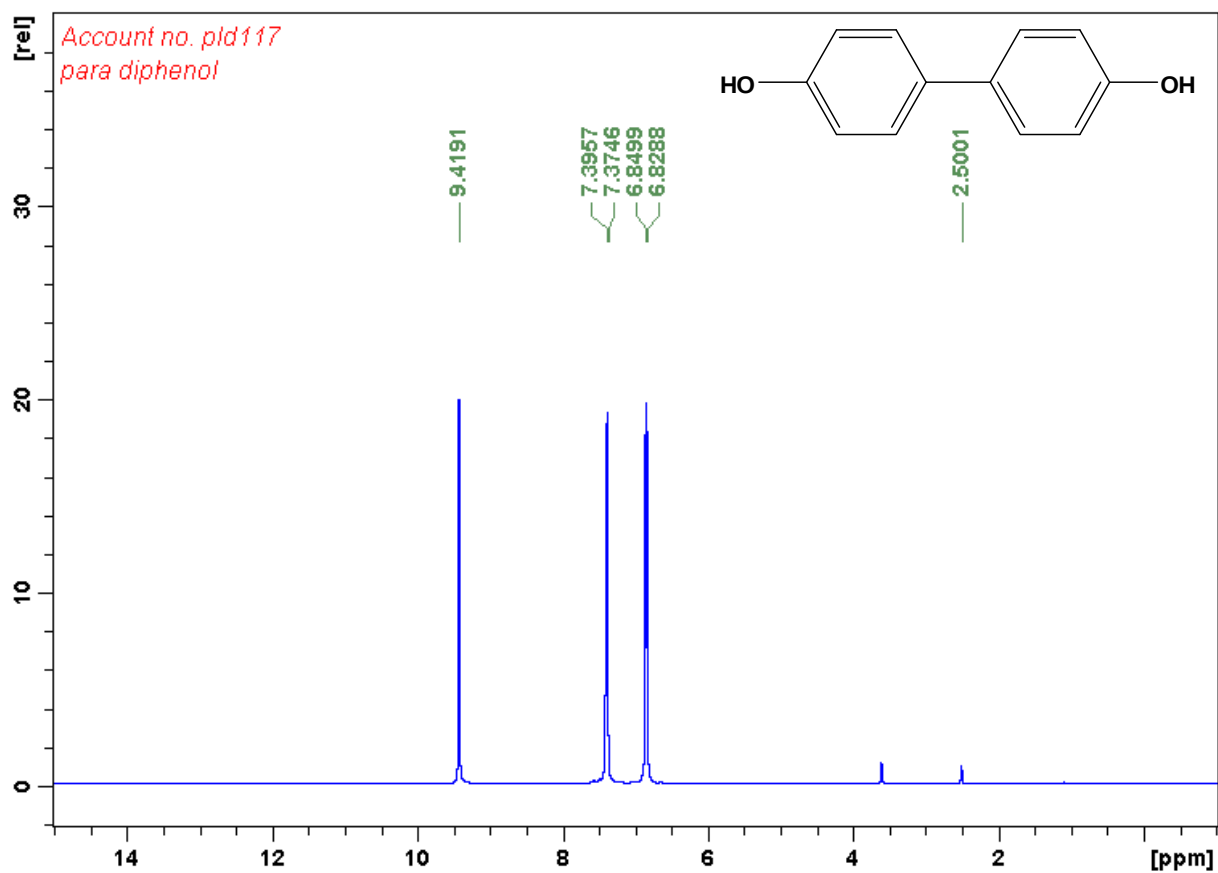
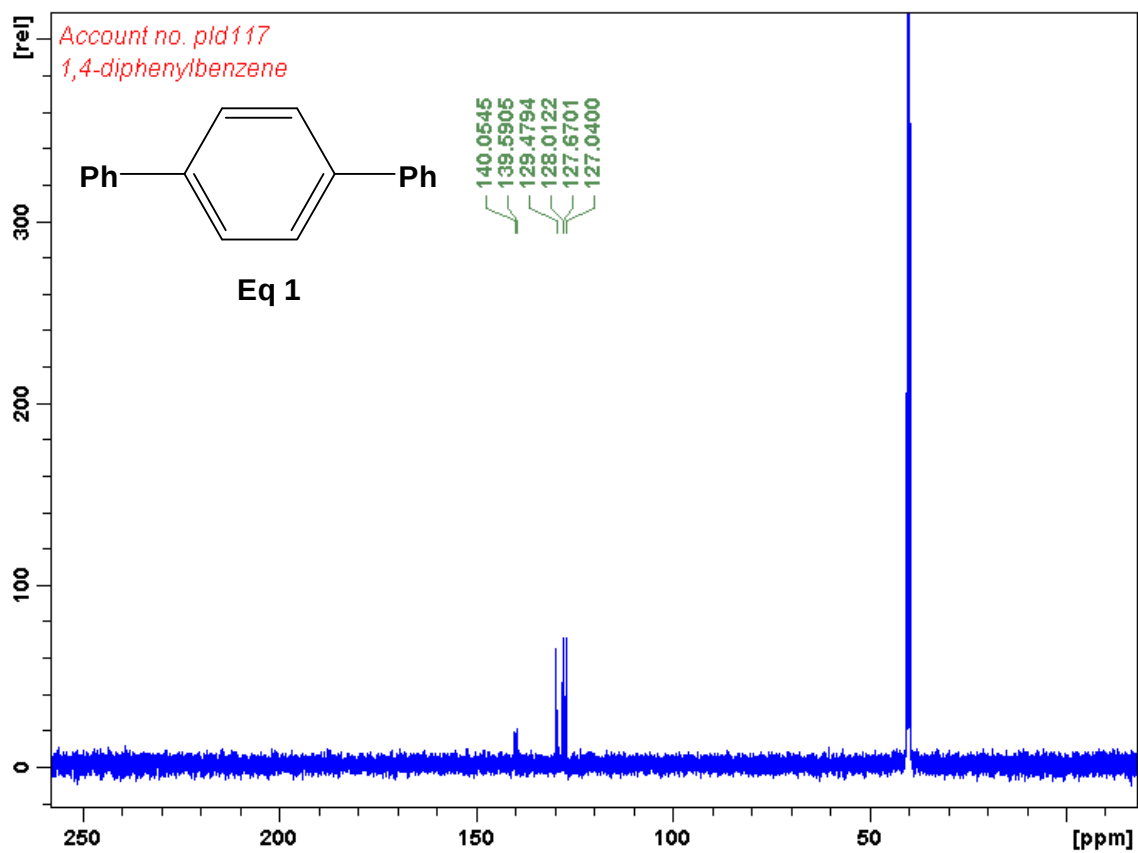


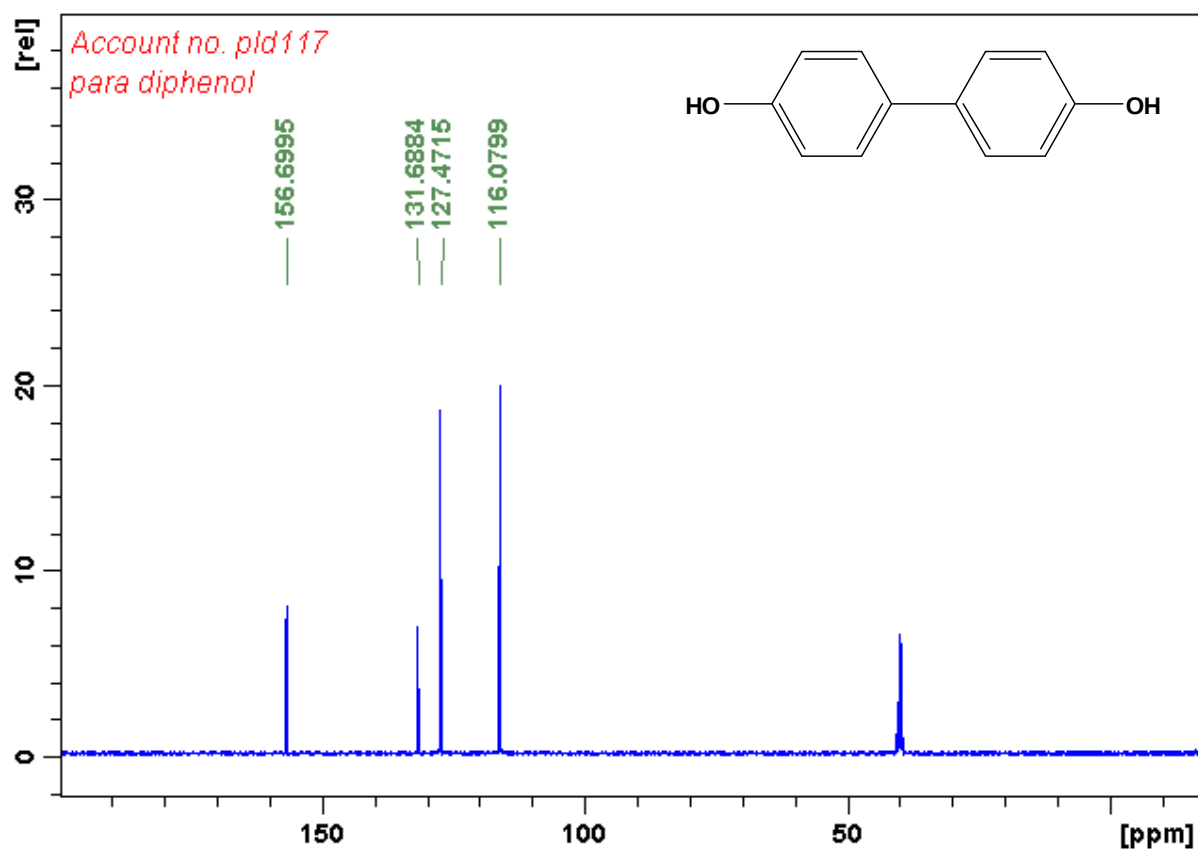
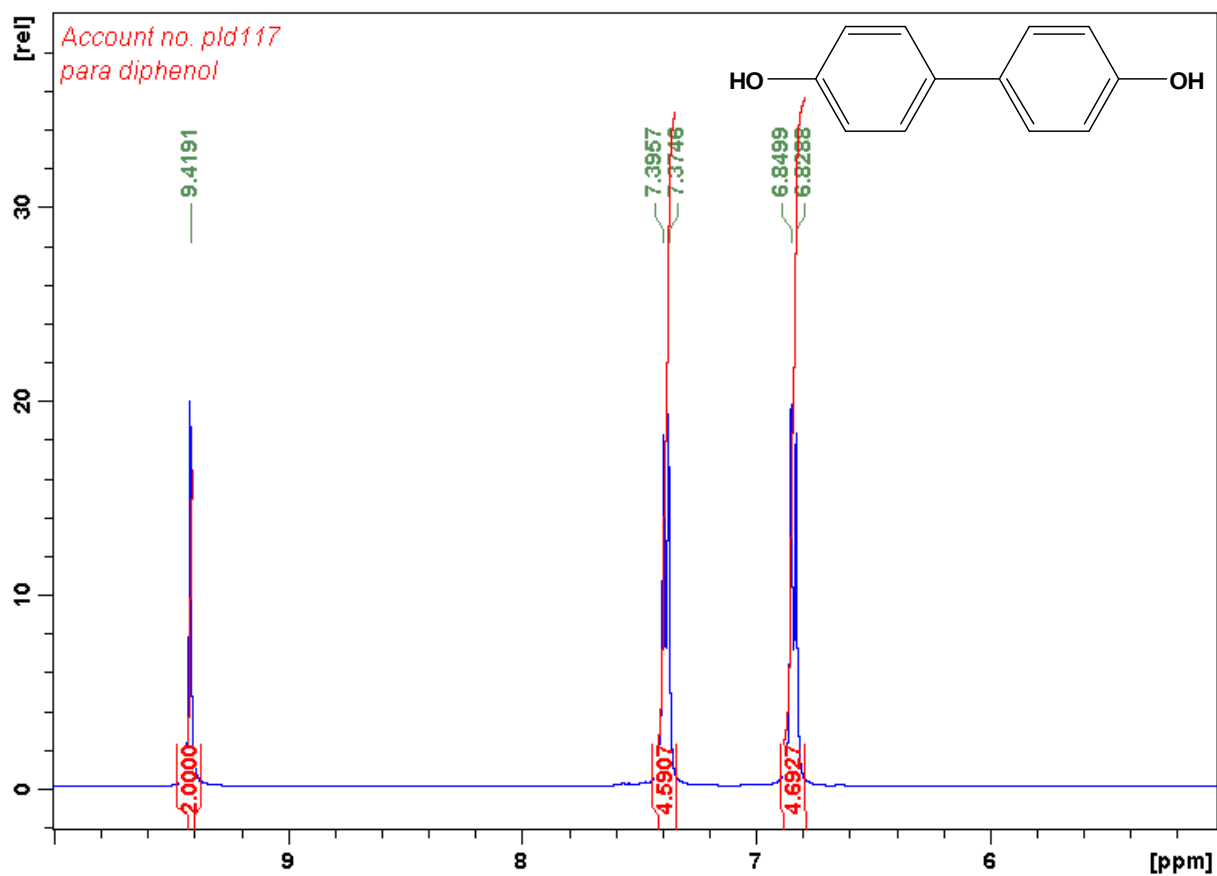


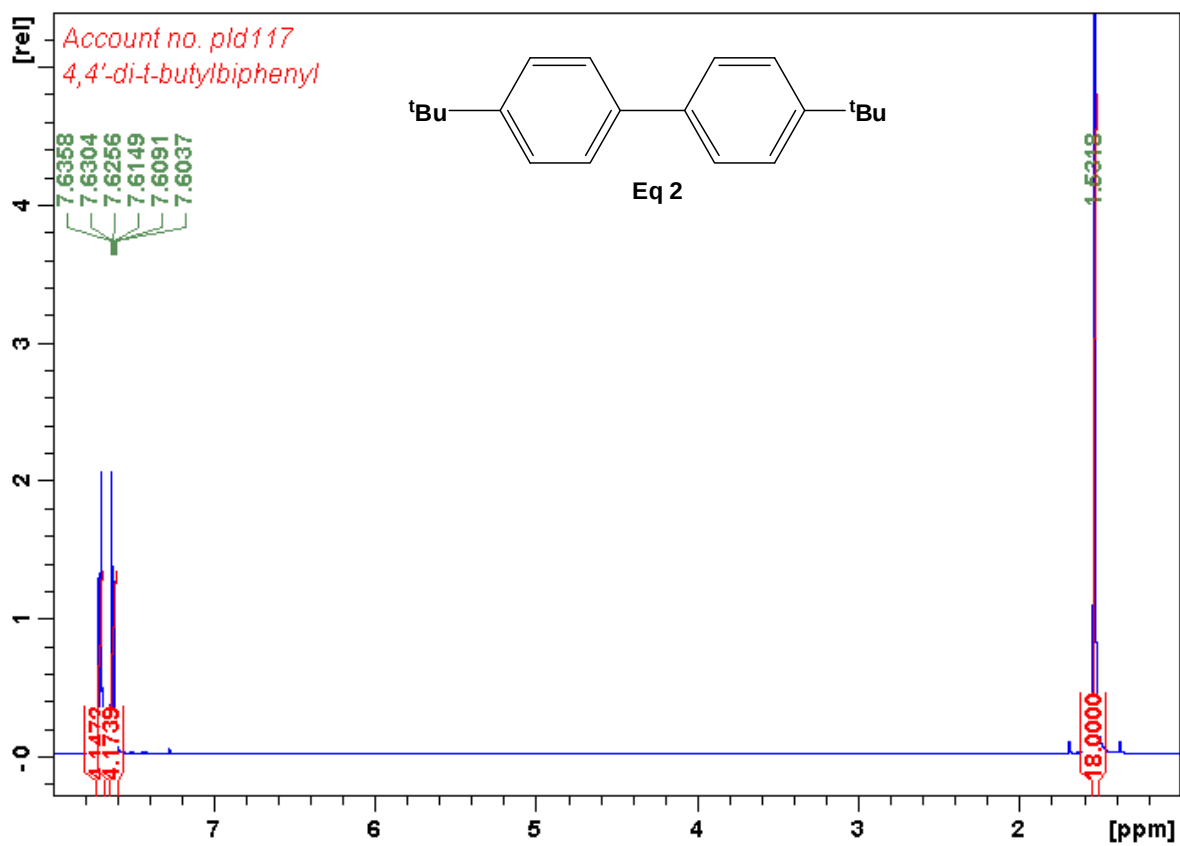
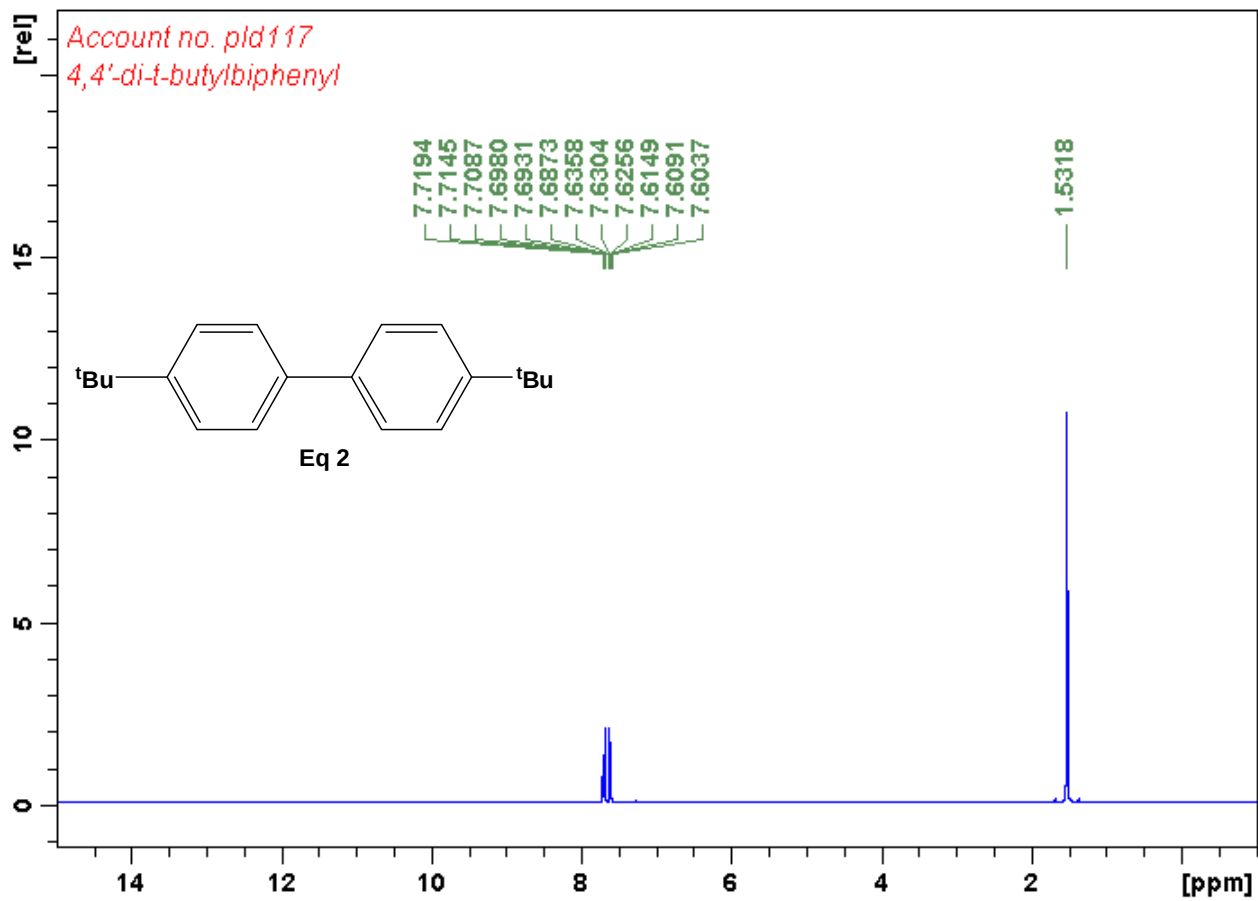


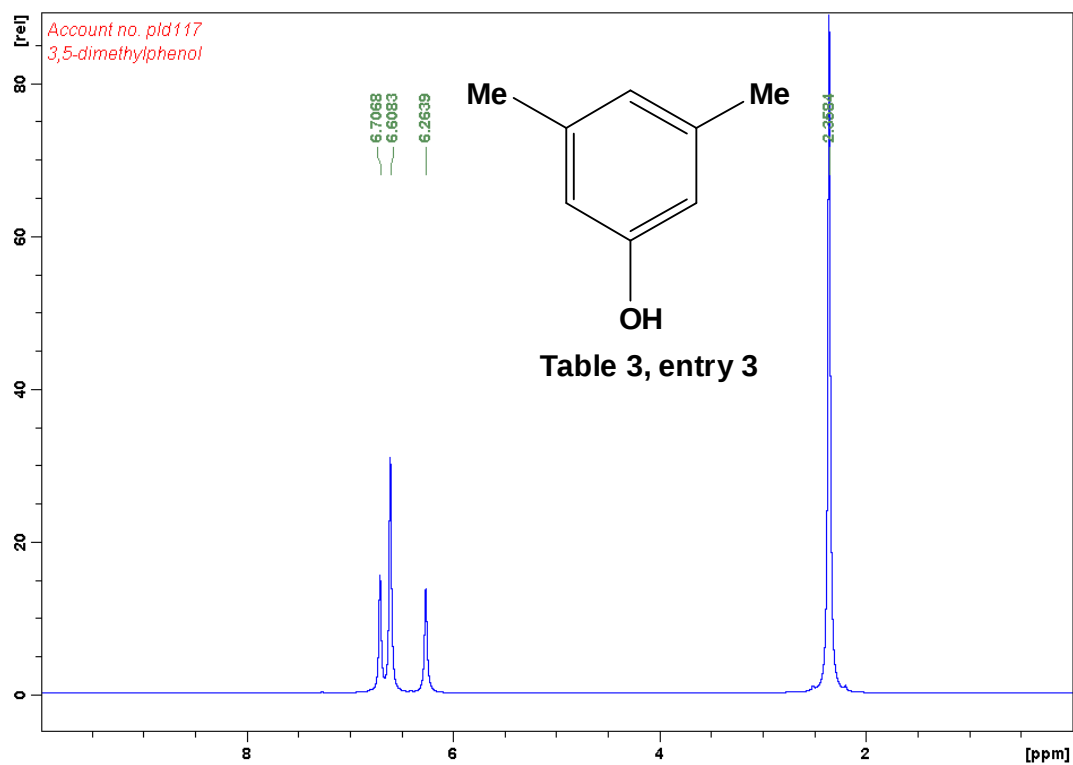
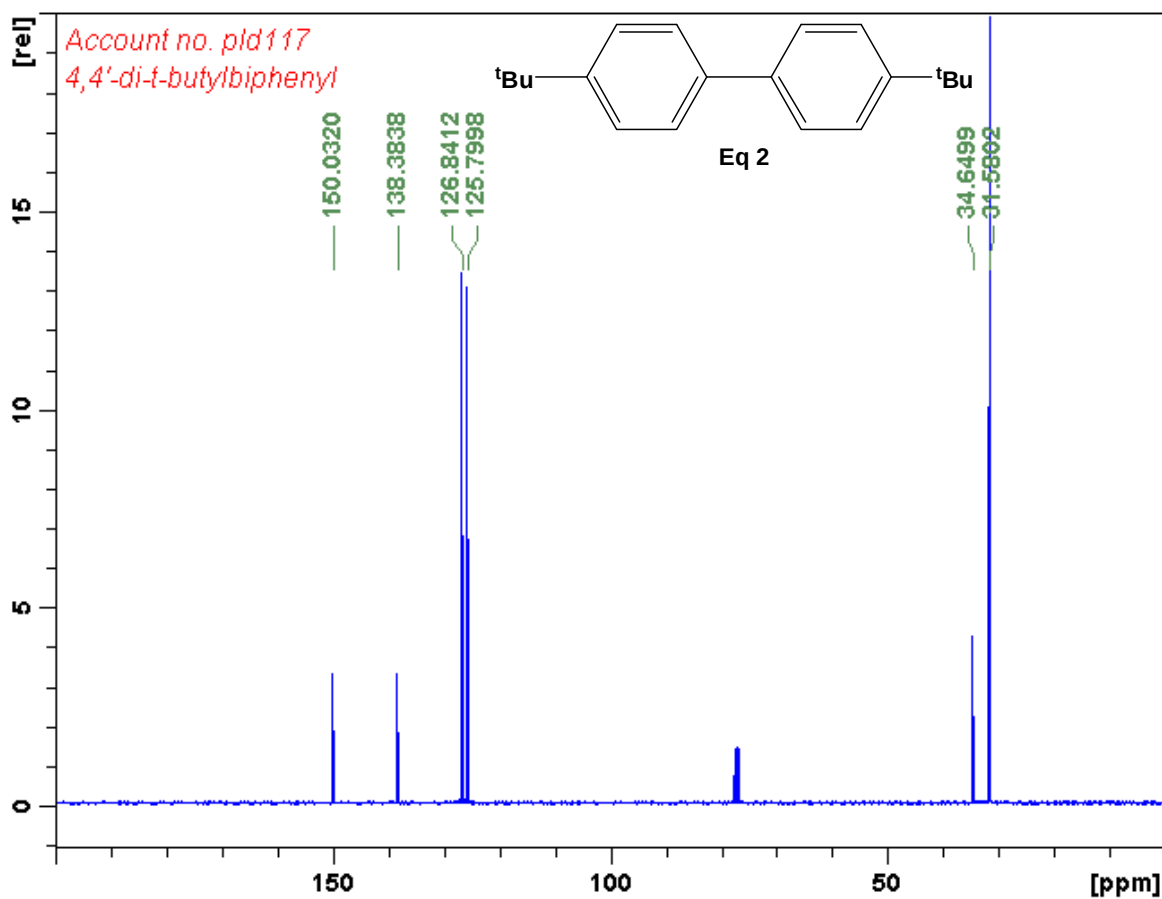
Coupling with a fluoro aryl: ^1H and ^{13}C NMR spectra were collected in $\text{dms}\text{-}d_6$.

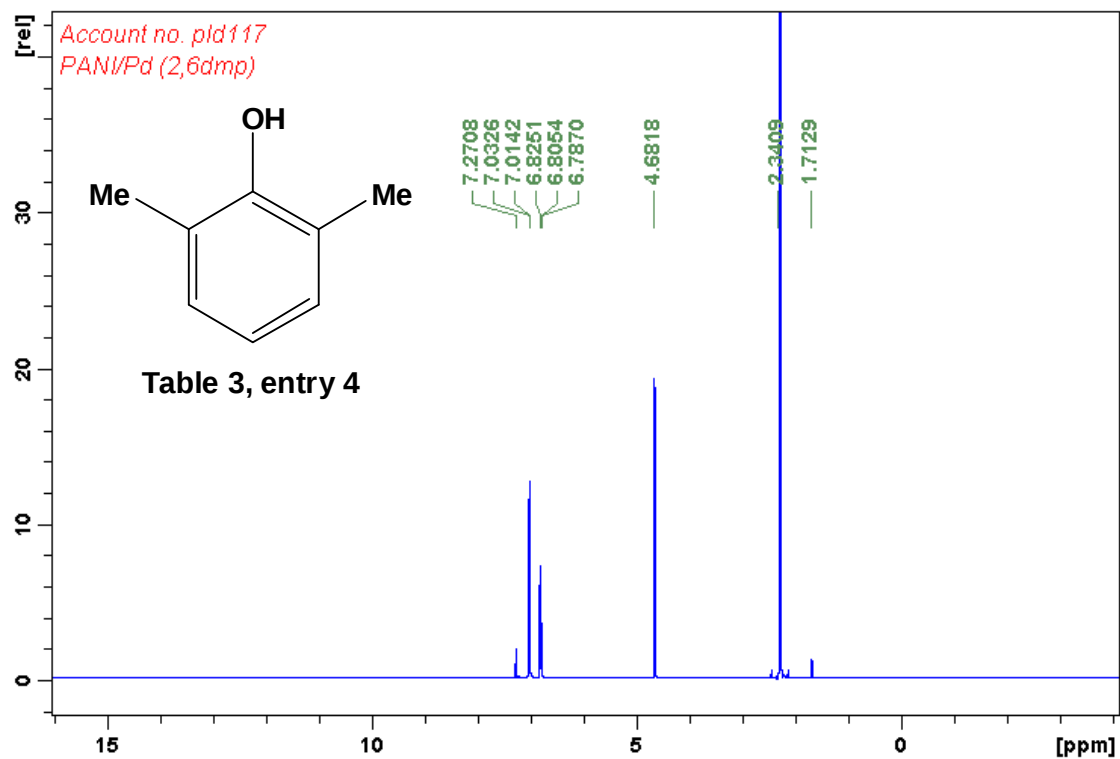
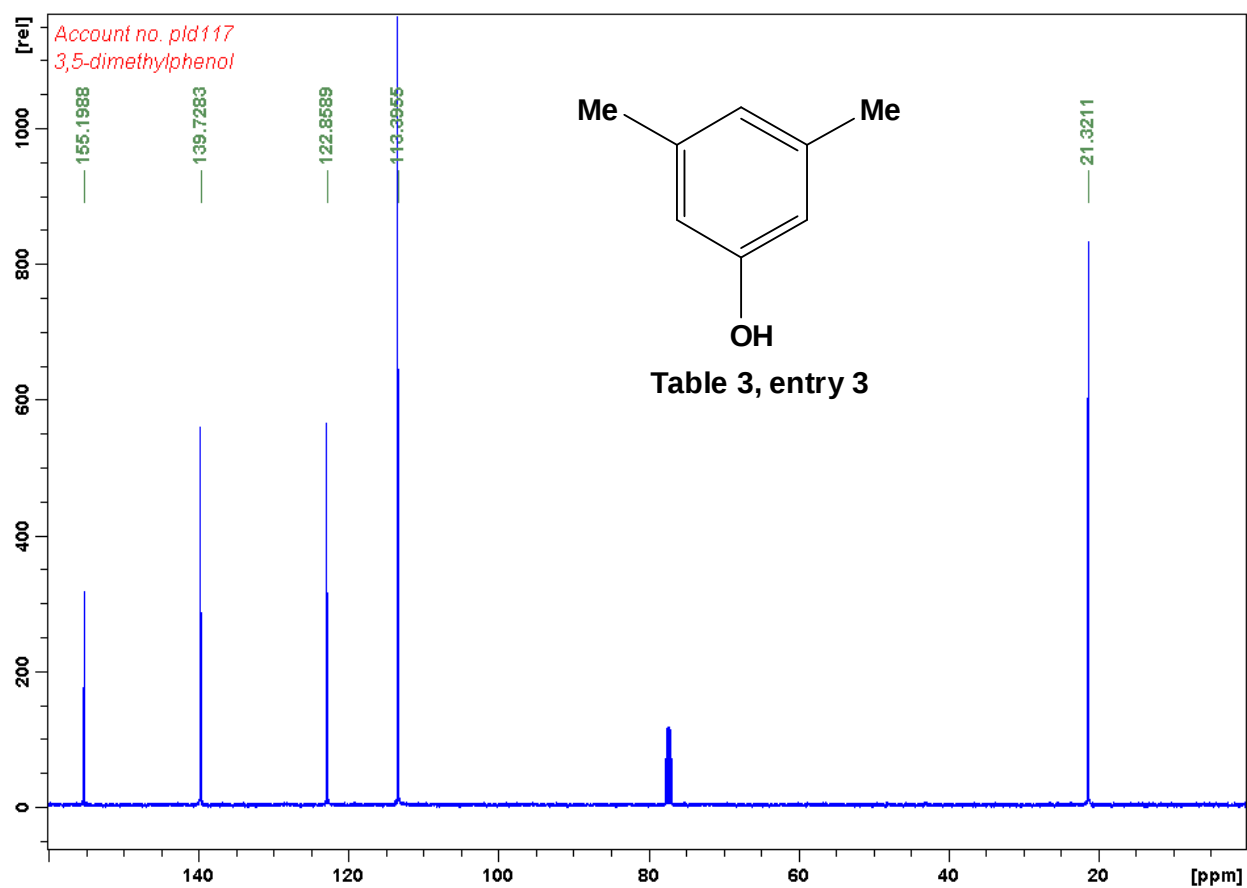


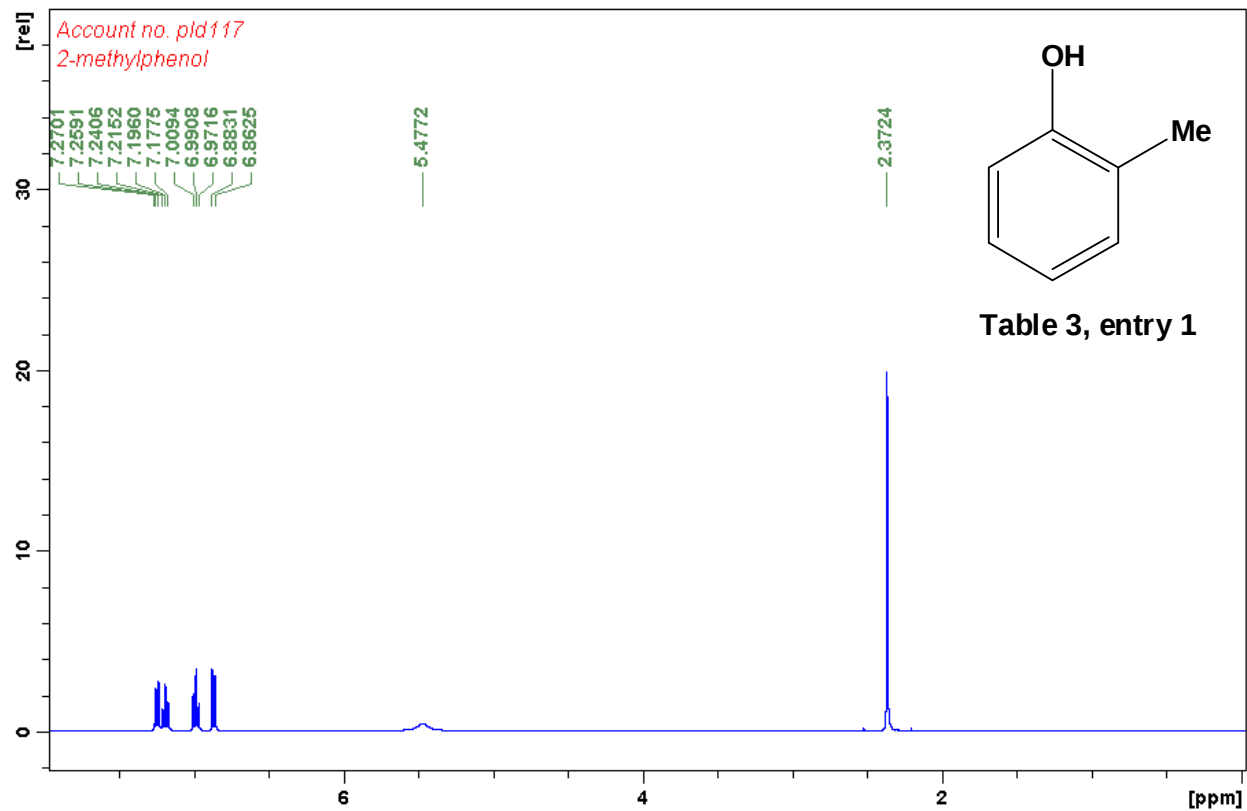
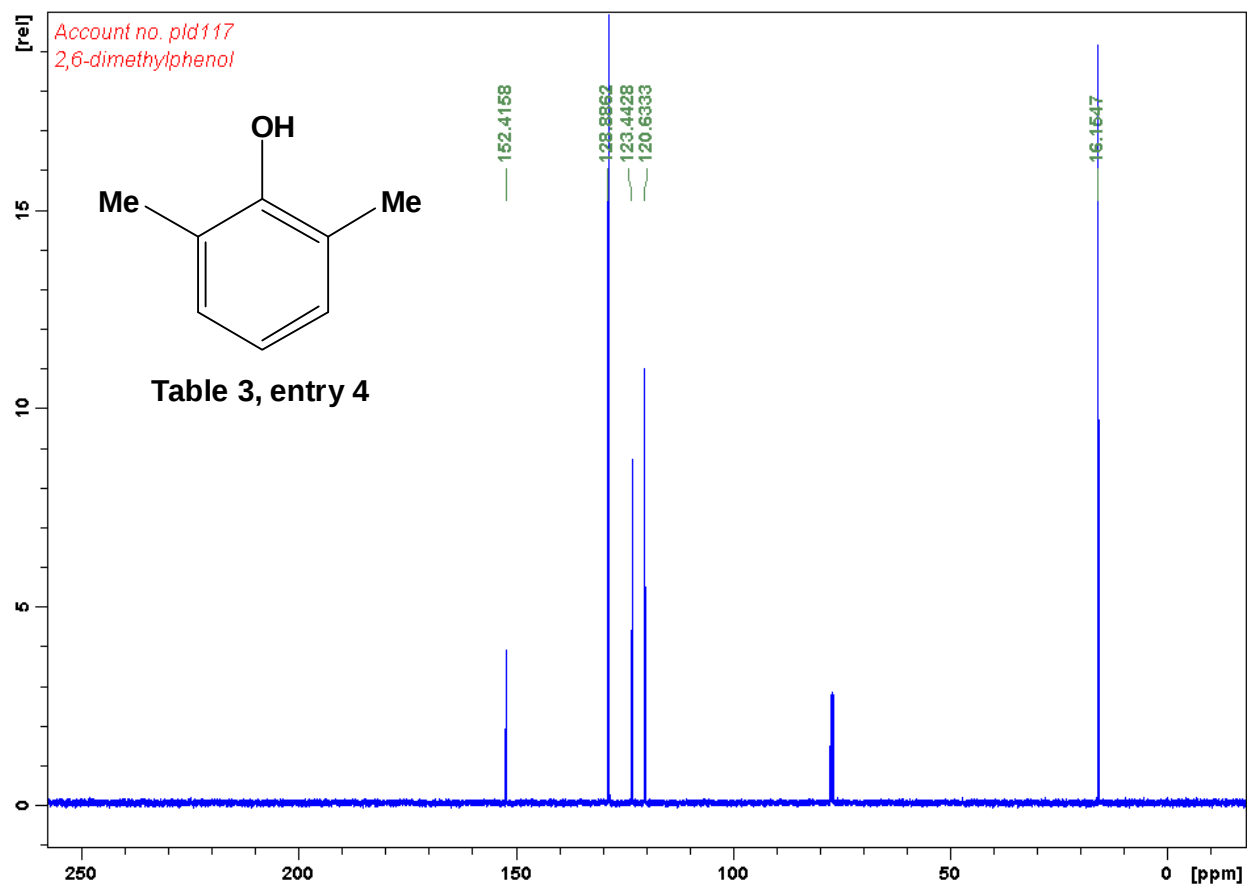


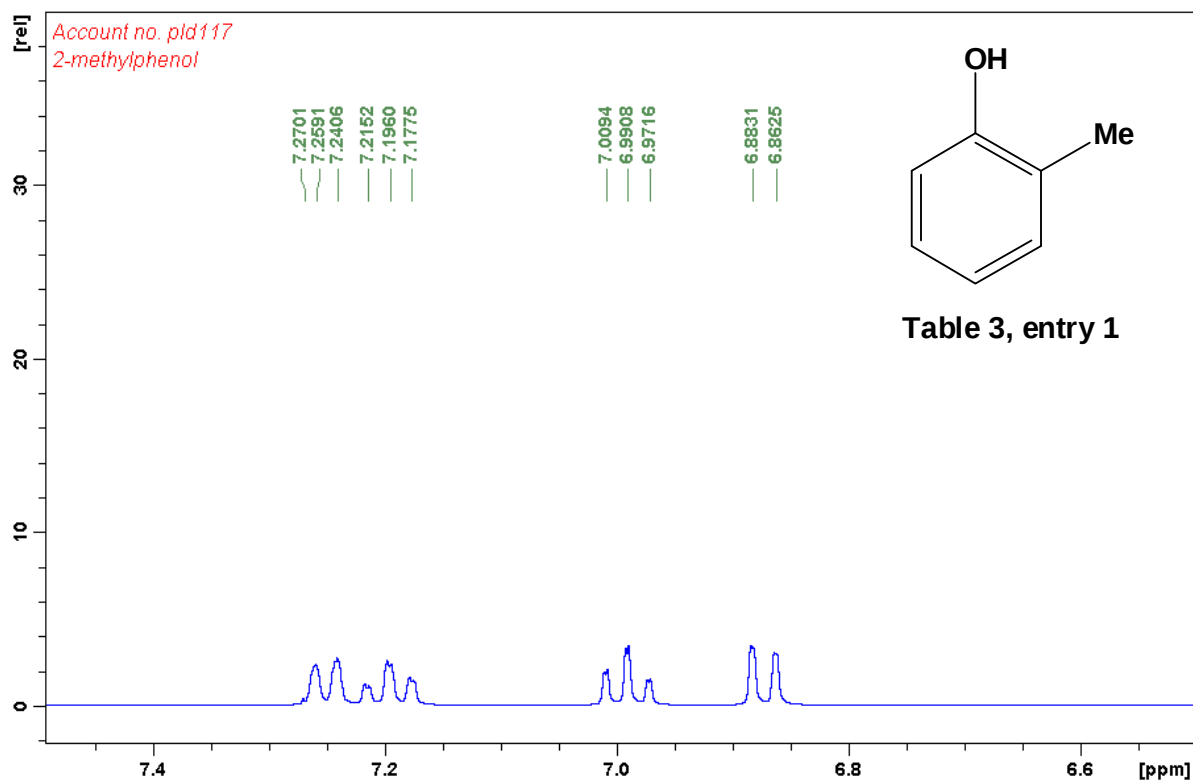
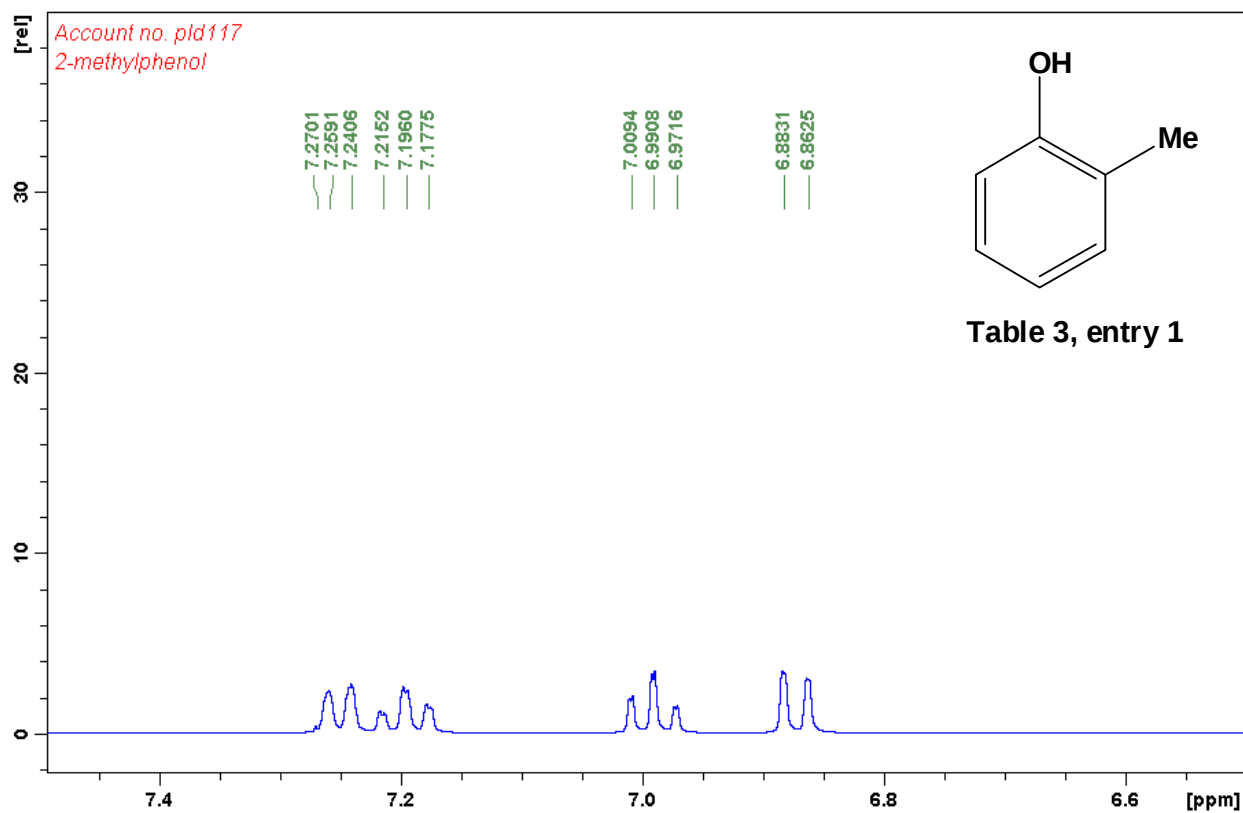


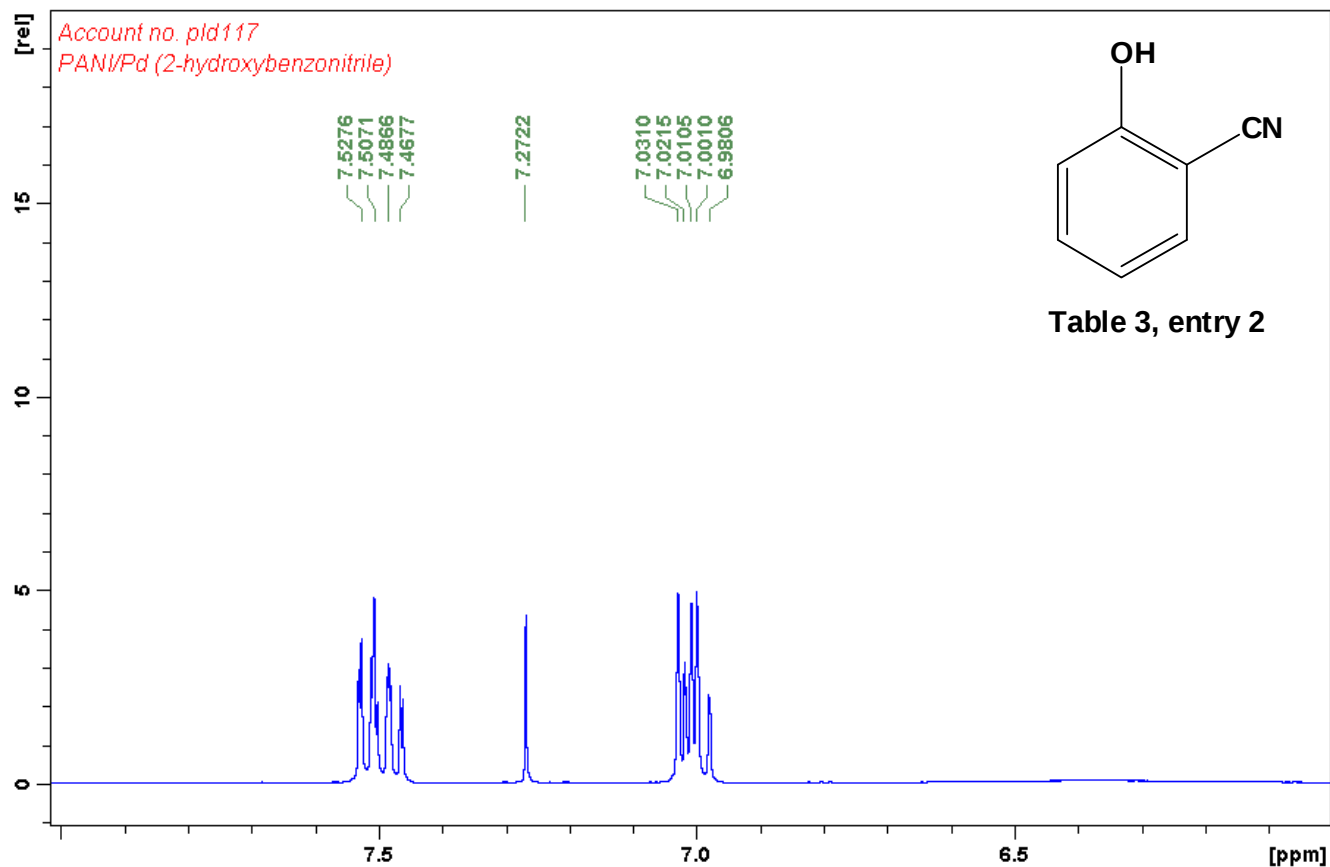
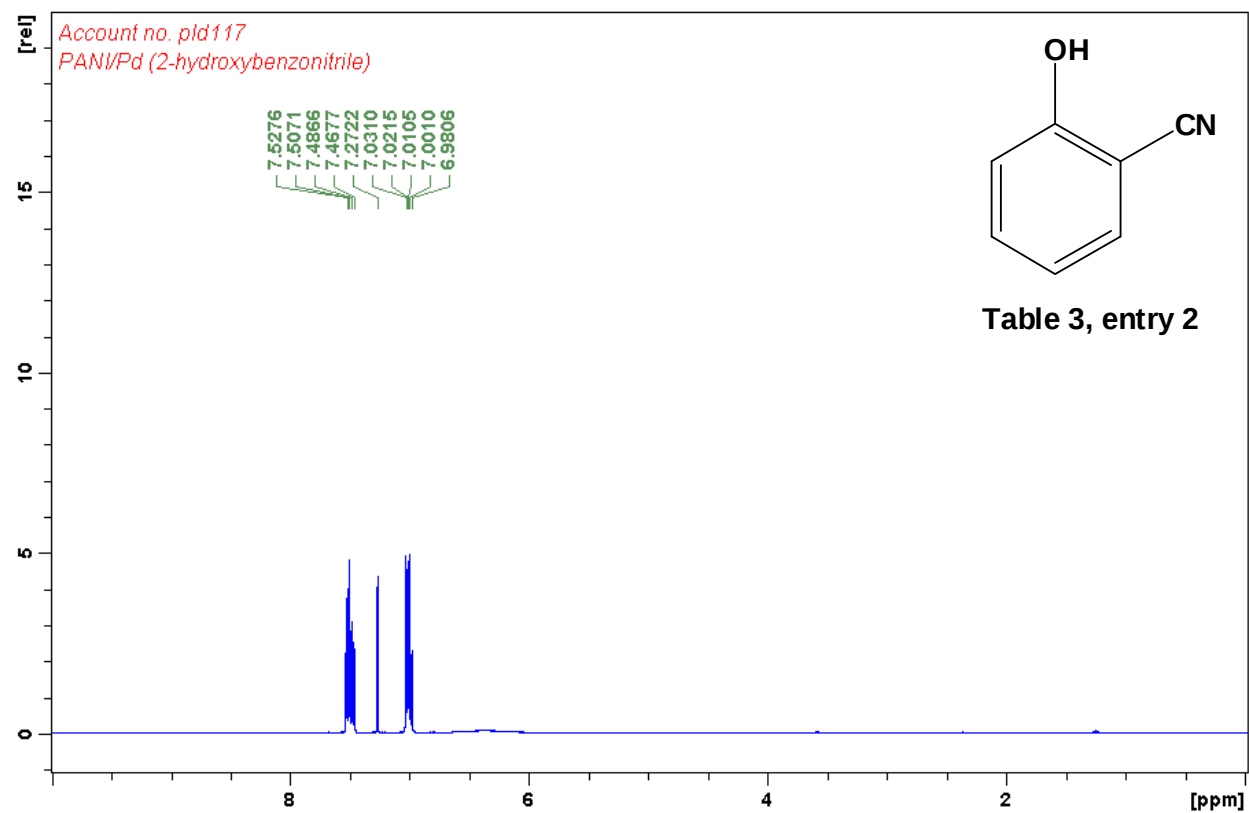


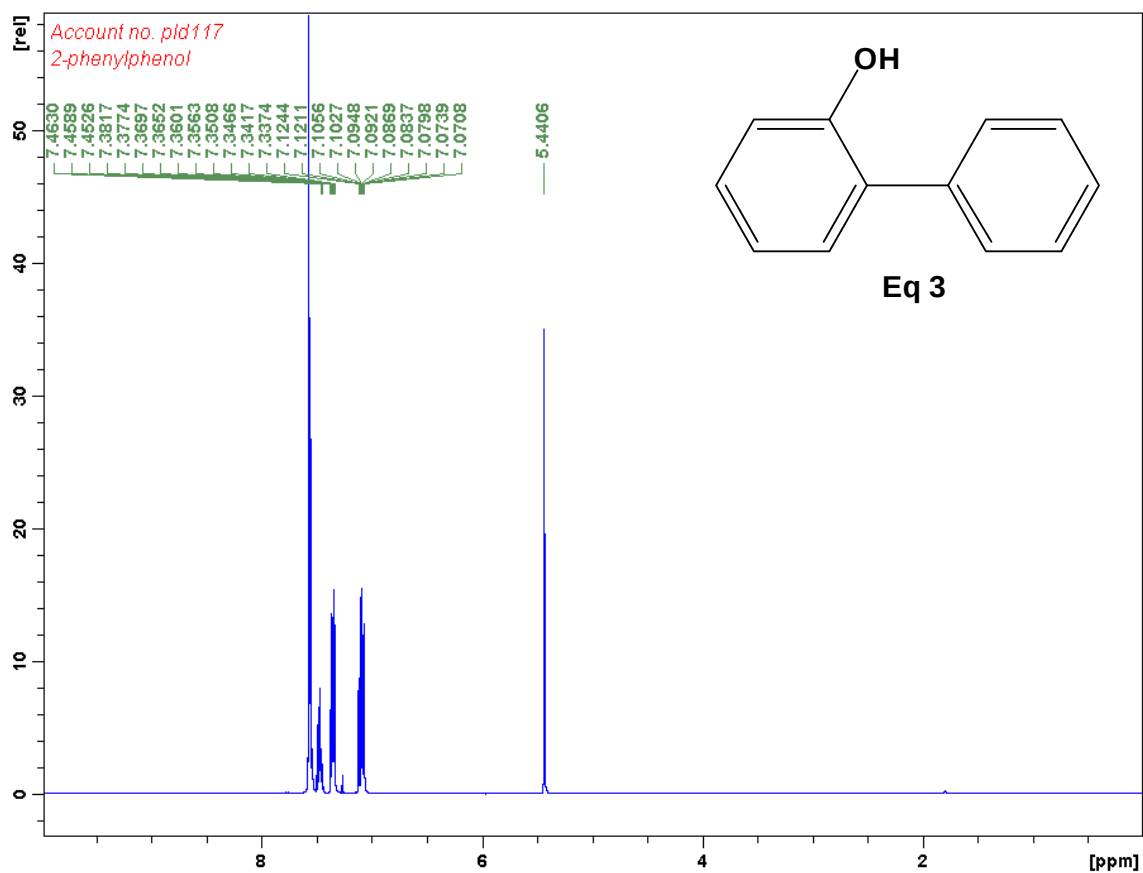
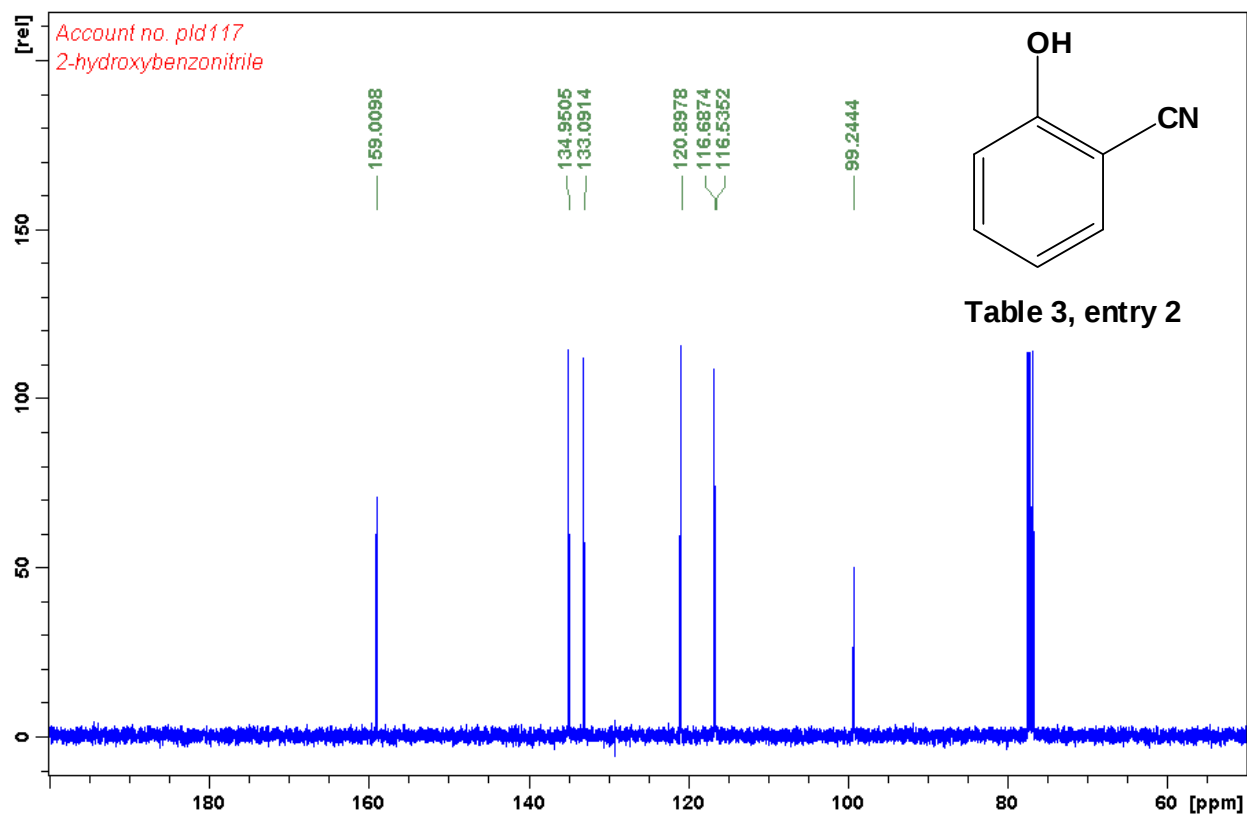


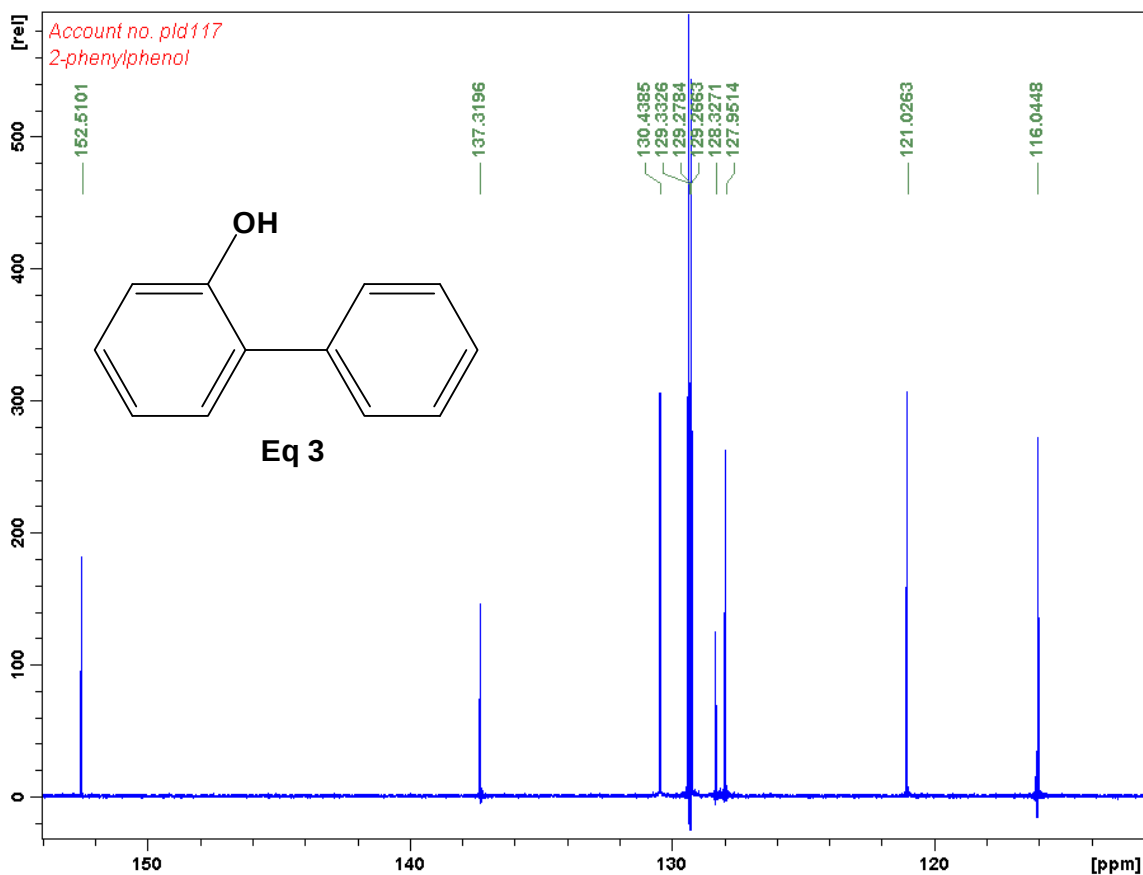
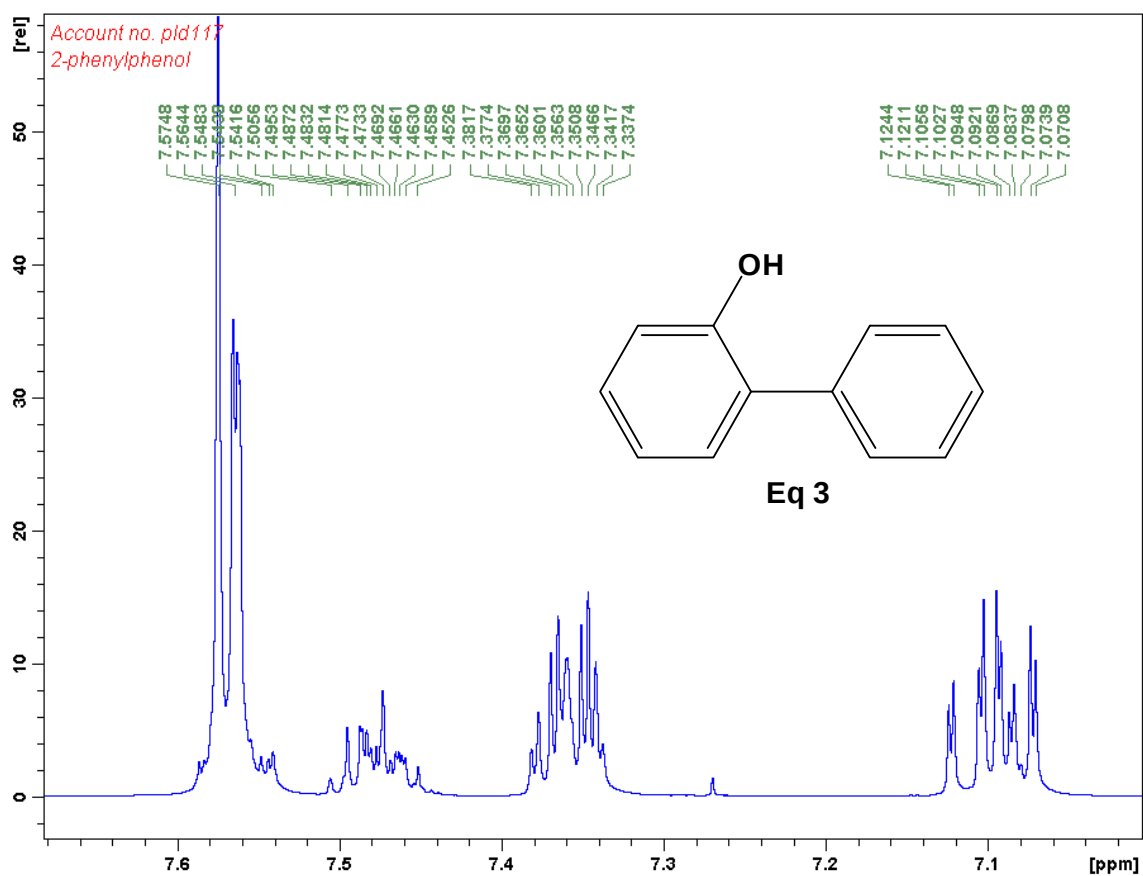












dmsol-d₆ NMR spectra:

