Supporting Information

An Newly-designed PE-supported Arsine for efficient and Practical Catalytic Wittig Olefination

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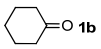
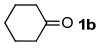
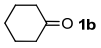
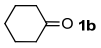
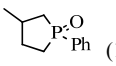
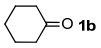
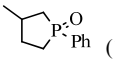
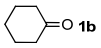
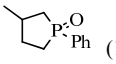
General Information All reactions were carried out under N_2 unless otherwise noted. All carbonyl compounds and solvents were purified according to standard methods unless otherwise noted.

^{1}H NMR spectra were recorded on a VARIAN Mercury 300 MHz or VARIAN Mercury 400 MHz spectrometer in chloroform-d. All signals are reported in ppm with the internal TMS signal at 0.0 ppm or chloroform signal at 7.26 ppm as a standard. The data are reported as (s = singlet, d = doublet, t = triplet, q = quadruplet, m = multiplet or unresolved, coupling constant(s) in Hz, integration). ^{13}C NMR spectra signals are reported in ppm with the internal chloroform signal at 77.0 ppm as a standard.

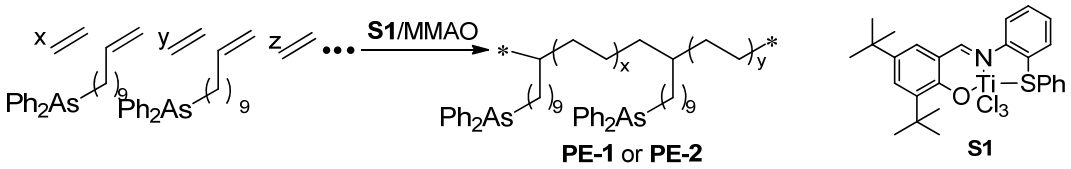
Fe(TCP)Cl was synthesized according to literature procedure.[1]

Table S1. Ylide Olefination of Ketones Using Different Catalysts

Entry	Catalyst (mol%)	Substrates	Conv. (%)[a,b]
1[c]	As(*n*-Bu)$_3$ (20)	 **1b**	trace
2[c]	As(*n*-Bu)$_3$ (20)	 **1h**	trace
3[d]	AsPh$_3$ (20)	 **1b**	<5
4[d]	AsPh$_3$ (100)	 **1b**	31 (31)
5[d]	AsPh$_3$ (20)	 **1h**	NR
6[e]	^{n}BuTe-PEG-TeBu^n (2.0)	 **1b**	19
7[e]	^{n}BuTe-PEG-TeBu^n (2.0)	 **1h**	NR
8[f]	 (10)	 **1b**	trace
9[f]	 (100)	 **1b**	trace
10[f]	 (10)	 **1h**	NR

[a] Determined by ^{1}H NMR. [b] Isolated yields in brackets. [c] Ketones (1.0 mmol), As(*n*-Bu)$_3$ (49 mg, 0.2 mmol), P(OPh)$_3$ (0.31 mL, 1.2 mmol), Ethyl bromoacetate (0.13 mL, 1.2 mmol), K_2CO_3 (165.6 mg, 1.2 mmol), CH_3CN/THF (4.0/0.5 mL), rt, 36 h; [d] Ketones (0.6 mmol), $AsPh_3$ (cat.), Fe(TCP)Cl (2.5 mg, 0.5 mol%), $Na_2S_2O_4$ (210 mg, 1.2 mmol), EDA (136.8 mg, 1.2 mmol), Toluene/H_2O (2.0/2.5 mL), 80 ^{o}C, 8 h; [e] Ketones (1.0 mmol), Ethyl bromoacetate (0.16 mL, 1.4 mmol), ^{n}BuTe-PEG-TeBu^n (74.7 mg, 2.0 mol%), P(OPh)$_3$ (0.36 mL, 1.4 mmol), K_2CO_3 (179.6 mg, 1.3 mmol), Toluene (4.0 mL), 80 ^{o}C, 52 h; [f] Ketones (1.0 mmol), 3-methyl-1-phenyl- phospholane 1-oxide (cat.), methyl bromoacetate (199 μL, 1.3 mmol), Na_2CO_3 (159 mg, 1.5 mmol), Ph_2SiH_2 (225 μL, 1.2 mmol), Toluene (0.33 mL), 100 ^{o}C, 24 h.

Part I General Procedure of Preparation of PE-1 and PE-2[2]



1 atm H_2, **PE-1** activity: 1.6 x 10^5 g poylmer/mol Ti.h.atm with 5.2 mol%incorporation
10 atm H_2 **PE-2** activity:0.11 x 10^5 g poylmer/mol Ti.h.atm with 0.39 mol%incorporation

To a solution of $^{i}Bu_3Al$-protreated diphenyl(undec-10-enyl)arsine (4.6 g, 12 mmol, 1.0 M in toluene) was added MMAO (15 mL, 28.5 mmol, Al/Ti molar ratio: 1000, 7 wt% Al in heptane) under 1 atm of ethylene atmosphere, followed by toluene (total volume of the solution, 120 mL). At 30°C, complex **S1** (1.6 mg, 2.8 μmol, 0.35 μmol/mL in toluene) was added and the polymerization was carried out for 30 minutes, quenched with concentrated HCl in ethanol (HCl/EtOH, 1/20, v/v, 5 mL) and the resulting mixture was poured into HCl-ethanol (HCl/EtOH, 1/20, v/v, 700 mL) and further stirred for 2 hours. The precipitated polymer was collected, washed with ethanol, and dried *in vacuo* at 60 °C overnight affording **PE-1** 2.2 g; M_n: 3.4 kg/mol. The content of arsonium: 5.2 mol %.

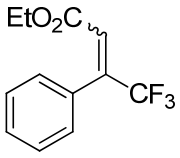
PE-2 was synthesized by a similar procedure except under 10 atm of ethylene atmosphere, yield 3.2 g. M_n: 230 kg/mol. The content of Arsonium: 0.39 mol %.

Part II General Procedures for Wittig Reaction

1. Procedure for Iron(III) Porphyrin and PE-1-Catalyzed Olefination Reaction of Ketones.

Procedure A: A mixture of Fe(TCP)Cl (6.3 mg, 0.007 mmol), **PE-1** (53.5 mg, 0.024 mmol) and ketone (3.0 mmol) in toluene (2.0 mL) was heated to 110 °C and a mixture of EDA (684 mg, 6.0 mmol) and PMHS (0.25 mL, 3.9 mmol) in toluene (1.0 mL) was added within 12 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature and concentrated. The residue was purified by flash chromatography (silica gel) to give the product.

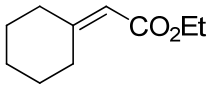
Ethyl 4,4,4-trifluoro-3-phenylbut-2-enoate(3a)[3]:



97% yield. E/Z = 95/5. *E*-isomer: ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 7.43-7.38 (m,

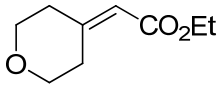
3H), 7.29-7.26 (m, 2H), 6.60 (d, *J* = 1.2 Hz, 1H), 4.04 (q, *J* = 7.2 Hz, 2 H), 1.06 (t, *J* = 7.2 Hz, 3H). ^{19}F NMR (376 MHz, $CDCl_3$/TMS): δ -67.6 (s, 3F).

Ethyl 2-cyclohexylideneacetate (3b)[4]:



98% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 5.60 (s, 1H), 4.14 (q, *J* = 7.2 Hz, 2H), 2.83-2.81 (m, 2H), 2.21-2.17 (t, *J* = 5.4 Hz, 2H), 1.65-1.61 (m, 6H), 1.28 (t, *J* = 7.2 Hz, 3H).

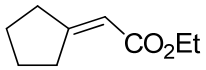
Ethyl 2-(tetrahydropyran-4-ylidene)acetate (3c) [5]:



95% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 5.69 (s, 1H), 4.16 (q, *J* = 7.2 Hz, 2H), 3.80-3.72 (m, 4H), 3.03-2.99 (m, 2H), 2.35-2.31 (m, 2H), 1.28 (t, *J* = 7.5 Hz, 3H).

Procedure B: A mixture of Fe(TCP)Cl (6.3 mg, 0.007 mmol), **PE-1** (80.3 mg, 0.09 mmol) and ketone (3.0 mmol) in toluene (2.0 mL) was heated to 110 ^{o}C and a solution of EDA (855 mg, 7.5 mmol) and PMHS (0.25 mL, 3.9 mmol) in toluene (1.0 mL) were added within 15 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature and concentrated. The residue was purified by flash chromatography (silica gel) to give the product.

Ethyl 2-cyclopentylideneacetate (3d)[4]:

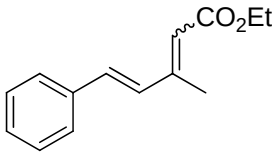


93% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 5.80 (t, *J* = 2.1 Hz, 1H), 4.15 (q, *J* = 7.5 Hz, 2H), 2.79-2.74 (m, 2H), 2.44 (t, *J* = 7.2 Hz, 2H), 1.80-1.61 (m, 4H), 1.27 (t, *J* = 7.2 Hz, 3H).

Procedure C: A mixture of Fe(TCP)Cl (6.3 mg, 0.0075 mmol), **PE-1** (107 mg, 0.12mmol) and ketone (3.0 mmol) in toluene (2.0 mL) was heated to 110 ^{o}C and a solution of EDA (1026 mg, 6.0 mmol) and PMHS (0.25 mL, 3.9 mmol) in toluene

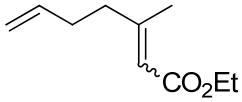
(1.0 mL) was added within 18 h *via* a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature and concentrated. The residue was purified by flash chromatography (silica gel) to give the product.

Ethyl 3-methyl-5-phenylpenta-2,4-dienoate (3e)[4]:



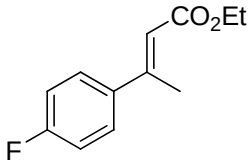
81% Yield. E/Z = 60/40. ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.42 (d, *J* = 16.2 Hz, 0.40H), 7.56-7.28 (m, 5H), 6.97-6.78 (m, 1.6H), 5.91 (s, 0.60H), 5.75 (s, 0.40H), 4.24-4.16 (m, 2H), 2.41 (s, 1.8 H), 2.13 (s, 1.2H), 1.34-1.28 (m, 3H).

Ethyl 3-methylhepta-2,6-dienoate (3f)[6]:



83% yield. E/Z = 63/37. ^{1}H NMR (300 MHz, $CDCl_3$/TMS): δ 5.89-5.72 (m, 1H), 5.67 (s, 1H) , 5.07-4.95 (m, 2H), 4.18-4.00 (m, 2H), 2.72 (t, *J* = 7.5 Hz, 0.74H), 2.27-2.20 (m, 3.26H), 2.16 (s, 1.9H), 1.89 (d, *J* = 1.2 Hz, 1.1 H), 1.30-1.25 (m, 3 H).

(*E*)-ethyl 3-(4-fluorophenyl)but-2-enoate (3g)[7]:

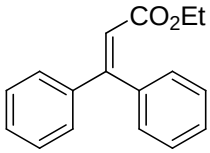


81% yield. E/Z = 83/17. *(E)-isomer:* ^{1}H NMR (300 MHz, $CDCl_3$/TMS): δ 7.48-7.44 (m, 2 H), 7.09-7.03 (m, 2 H) , 6.10 (s, 1H), 4.22 (q, *J* = 6.9 Hz, 2 H), 2.56 (s, 3 H), 1.32 (t, *J* = 6.9 Hz, 3 H). ^{19}F NMR (282 MHz, $CDCl_3$/TMS): δ -112.96 (m, 1F).

Procedure D: A mixture of Fe(TCP)Cl (6.3 mg, 0.0075 mmol), **PE-1** (214 mg, 0.24 mmol) and benzophenone (546 mg, 3.0 mmol) in toluene (2.0 mL) was heated to 110 ^{o}C and then a solution of EDA (1368 mg, 12 mmol) and PMHS (0.25mL, 3.9 mmol) and toluene (1.0 mL) was added within 48 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature and concentrated. The residue was purified by flash chromatography (silica gel) to give 487 mg ethyl

3,3-diphenylacrylate.

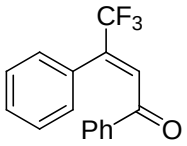
Ethyl 3,3-diphenylacrylate(3h)[8]**:**



64% yield. ^{1}H NMR (300 MHz, $CDCl_3$/TMS): δ 7.39-7.20 (m, 10H), 6.37 (s, 1H), 4.05 (q, *J* = 7.2 Hz, 2H), 1.11 (t, *J* = 7.2 Hz, 3H).

Procedure for PE-1-catalyzed Olefination Reaction of Ketones With Diazo Acetophenone: A mixture of Fe(TCP)Cl (6.3 mg, 0.0075 mmol), **PE-1** (107 mg, 0.12 mmol) and substrate (3.0 mmol) in toluene (1.0 mL) was heated to 110 ^{o}C and a mixture of diazo acetophenone (1095 mg, 2.5 mmol) and PMHS (0.25 mL, 3.9 mmol) in toluene (3.0 mL) was added within 38 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature and concentrated. The residue was purified by flash chromatography (silica gel) to give the product.

(*E*)-4,4,4-trifluoro-1,3-diphenylbut-2-en-1-one (3i)[9]**:**

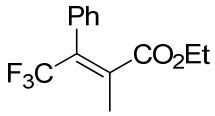


98% yield. E/Z = 95/5. *E*-isomer: ^{1}H NMR (300 MHz, $CDCl_3$/TMS): δ 7.83-7.80 (m, 2H), 7.55-7.50 (m, 1H), 7.42-7.37 (m, 2H), 7.30-7.26 (m, 6H). ^{19}F NMR (282 MHz, $CDCl_3$/TMS): δ = -66.7 (s, 3F).

Procedure for PE-1-Catalyzed Olefination Reaction of Ketones With Ethyl 2-diazopropanoate: A mixture of Fe(TCP)Cl (6.3 mg, 0.0075 mmol), **PE-1** (107 mg, 0.12 mmol) and substrate (3.0 mmol) in toluene (1.0 mL) was heated to 110 ^{o}C and a solution of 2-diazo ethyl propionate (1.15 g, 9.0 mmol) and PMHS (0.25 mL, 3.9 mmol) in toluene (0.5 mL) was added within 36 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature and concentrated. The residue was purified by flash chromatography (silica gel) to give

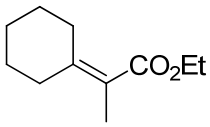
the product.

(*E*)-ethyl 4,4,4-trifluoro-2-methyl-3-phenylbut-2-enoate (3j)[10]**:**



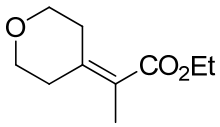
94% yield. E/Z = 93/7. *E*- isomer: ^{1}H NMR (300 MHz, $CDCl_3$/TMS): δ 7.36-7.29 (m, 3H), 7.22-7.19 (m, 2H), 3.86 (q, *J* = 6.9 Hz, 2H), 2.24 (q, *J* = 2.4, 3H), 0.81 (t, *J* = 7.2 Hz, 3H). ^{19}F NMR (282 MHz, $CDCl_3$/TMS): δ = -55.63 (d, *J* = 3.1 Hz, 3F).

Ethyl 2-cyclohexylidenepropanoate (3k)[11]**:**



84%. ^{1}H NMR (300 MHz, $CDCl_3$/TMS): δ 4.23-4.14 (m, 2H), 2.42-2.40 (m, 2H), 2.22-2.20 (m, 2H), 1.86 (s, 3H), 1.60-1.57 (m, 6H), 1.30 (t, *J* = 7.2 Hz, 3H).

Ethyl 2-(tetrahydropyran-4-ylidene)propanoate (3l)[12]**:**

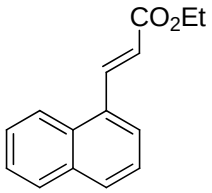


85%. ^{1}H NMR (400 MHz, $CDCl_3$/TMS): δ 4.20 (q, *J* = 7.2 Hz, 2H), 3.75-3.69 (m, 4H), 2.69-2.66 (m, 2H), 2.40-2.36 (m, 2H), 1.88 (s, 3H), 1.30 (t, *J* = 7.2 Hz, 3H).

2. Procedure for 0.05 mol% Iron(III) Porphyrin and PE-1-Catalyzed Olefination Reaction.

A mixture of Fe(TCP)Cl (6.1 mg, 0.0072 mmol), **PE-1** (10.7 mg, 0.012 mmol) and **4a** (3.26 mL, 24.0 mmol) in toluene (4.0 mL) was heated to 110 ^{o}C and a solution of EDA (8.2 g, 72.0 mmol), PMHS (2.2 mL, 36.0 mmol) in toluene(2.0 mL) was added within 98 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature and concentrated. The residue was purified by flash chromatography (silica gel) to give the product in 87% yield.

(*E*)-ethyl 3-(naphthalen-5-yl)acrylate (5a)[13]**:**

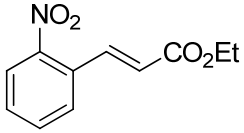


99% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 8.53 (d, *J* = 15.6 Hz, 1H), 8.20 (d, *J* = 8.4 Hz, 1H), 7.91-7.86 (m, 2H), 7.75 (d, *J* = 6.9 Hz, 1H), 7.61-7.46 (m, 3H), 6.53 (d, *J* = 15.9 Hz, 1H), 4.32 (q, *J* = 7.2 Hz, 2H), 1.38 (t, *J* = 7.2 Hz, 3H).

3. General Procedure for Iron(Ⅲ) Porphyrin and PE-1-Catalyzed Olefination Reaction of Aldehydes.

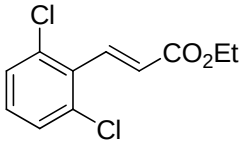
A mixture of Fe(TCP)Cl (6.3 mg, 0.007 mmol), **PE-1** (21.4 mg, 0.024 mmol) and **4** (3.0 mmol) in toluene (2.0 mL) was heated to 110 ^{o}C and then a solution of EDA (560 mg, 4.8 mmol) and PMHS (0.25 mL, 3.9 mmol) in toluene (1.0 mL) were added within 12 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature and was concentrated. The residue was chromatographized on silica gel to give the product.

(*E*)-ethyl 3-(2-nitrophenyl)acrylate(5b)[13]:



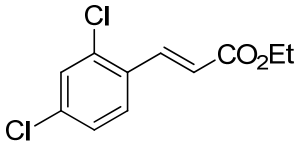
95% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 8.13-8.02 (m , 2H), 7.70-7.64 (m, 2H), 7.58-7.53(m, 1H), 6.38 (d, *J* = 15.9 Hz, 1H), 4.29 (q, *J* = 7.5 Hz, 2H), 1.35 (t, *J* = 7.2 Hz, 3H).

(*E*)-ethyl 3-(2,6-dichlorophenyl)acrylate(5c)[14]:



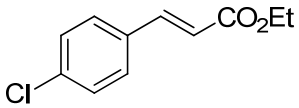
98% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 7.79 (d , *J* = 16.5 Hz, 1H), 7.36 (d, *J* = 8.1 Hz, 2H), 7.21-7.16 (m, 1H), 6.59 (d, *J* = 16.5 Hz, 1H), 4.30 (q, *J* = 7.2 Hz, 2H), 1.36 (t, *J* = 6.9 Hz, 3H).

(*E*)-ethyl 3-(2,4-dichlorophenyl)acrylate (5d)[14]:



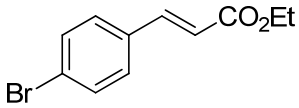
99% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 8.01 (d , *J* = 15.9 Hz, 1H), 7.56 (d , *J* = 8.7 Hz, 1H), 7.45 (d, *J* = 1.8 Hz, 1H), 7.29-7.26 (m, 1H), 6.42 (d, *J* = 16.2 Hz, 1H), 4.28 (q, *J* = 7.5 Hz, 2H), 1.35 (t, *J* = 6.9 Hz, 3H).

(*E*)-ethyl 3-(4-chlorophenyl)acrylate (5e)[14]:



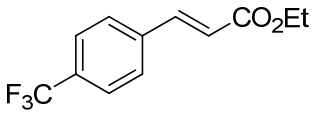
99% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 7.63 (d, *J* = 16.5 Hz, 1H), 7.46 (d, *J* = 8.1 Hz, 2H), 7.36 (d, *J* = 8.1 Hz, 2H), 6.41 (d, *J* = 16.2 Hz, 1H), 4.27 (q, *J* = 7.5 Hz, 2H), 1.34 (t, *J* = 7.2 Hz, 3H).

(*E*)-ethyl 3-(4-bromophenyl)acrylate (5f)[14]:



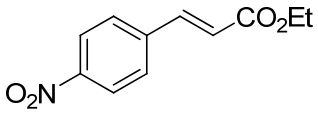
99% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 7.61 (d, *J* = 16.5 Hz, 1H), 7.52 (d, *J* = 7.5 Hz, 2H), 7.38 (d, *J* = 7.8 Hz, 2H), 6.42 (d, *J* = 15.9 Hz, 1H), 4.26 (q, *J* = 6.8 Hz, 2H), 1.34 (t, *J* = 7.8 Hz, 3H).

(*E*)-ethyl 3-(4-(trifluoromethyl)phenyl)acrylate (5g)[14]:



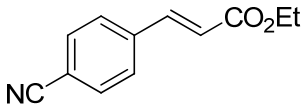
96% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 7.72-7.61 (m, 5H), 6.51 (d, *J* = 16.0 Hz, 1H), 4.28 (q, *J* = 7.2 Hz, 2H), 1.35 (t, *J* = 6.8 Hz, 3H). ^{19}F NMR (282 MHz, $CDCl_3$/TMS): δ -63.3 (s, 3F).

(*E*)-ethyl 3-(4-nitrophenyl)acrylate(5h)[13]:



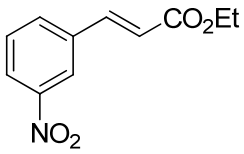
99% yield. ^{1}H NMR (300 MHz, $CDCl_3$/TMS) δ 8.25 (d, *J* = 8.7 Hz, 2H), 7.74-7.67 (m, 3H), 6.57 (d, *J* = 15.9 Hz, 1H), 4.30 (q, *J* = 7.2 Hz, 2H), 1.36 (t, *J* = 7.2 Hz, 3H).

(*E*)-ethyl 3-(4-cyanophenyl) acrylate(5i)[15]:



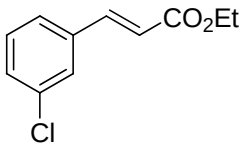
99% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 7.72-7.61 (m, 5H), 6.51 (d, *J* = 16.0 Hz, 1H), 4.28 (q, *J* = 7.2 Hz, 2H), 1.34 (t, *J* = 7.2 Hz, 3H).

(*E*)-ethyl 3-(3-nitrophenyl)acrylate(5j)[13]**:**



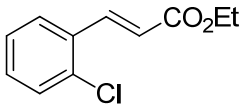
98% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 8.39 (s, 1H), 8.24-8.22 (m, 1H), 7.83 (d, *J* = 7.2 Hz, 1H), 7.72 (d, *J* = 16.0 Hz, 1H), 7.59 (t, *J* = 7.6 Hz, 1H), 6.57 (d, *J* = 16.0 Hz, 1H), 4.30 (q, *J* = 7.2 Hz, 2H), 1.36 (t, *J* = 7.2 Hz, 3H).

(*E*)-ethyl 3-(3-chlorophenyl)acrylate(5k)[16]**:**



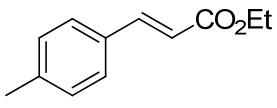
99% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 7.61 (d, *J* = 15.6 Hz, 1H), 7.52 (s, 1H), 7.41-7.29 (m, 3H), 6.44 (d, *J* = 16.2 Hz, 1H), 4.27 (q, *J* = 7.2 Hz, 2H), 1.34 (t, *J* = 7.5 Hz, 3H).

(E)-ethyl 3-(2-chlorophenyl)acrylate (5l)[16]**:**



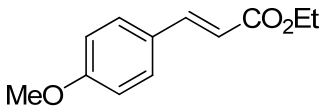
98% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 8.09 (d, *J* = 16.0 Hz, 1H), 7.63-7.61 (m, 1H), 7.43-7.41 (m, 1H), 7.32-7.26 (m, 2H), 6.43 (d, *J* = 16.0 Hz, 1H), 4.28 (q, *J* = 7.6 Hz, 2H), 1.35 (t, *J* = 7.6 Hz, 3H).

(E)-ethyl 3-(p-tolyl)acrylate (5m)[14]**:**



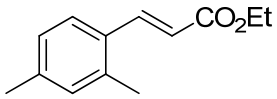
99% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 7.67 (d, *J* = 15.0 Hz, 1H), 7.42 (d, *J* = 8.7 Hz, 2H), 7.19 (d, *J* = 9.0 Hz, 2H), 6.39 (d, *J* = 16.5 Hz, 1H), 4.26 (q, *J* = 7.2 Hz, 2H), 2.37 (s, 3H), 1.33 (t, *J* = 6.3 Hz, 3H).

(*E*)-ethyl 3-(4-methoxyphenyl)acrylate (5n)[14]**:**



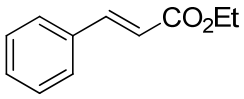
97% yield. ^{1}H NMR (300 MHz, $CDCl_3$/TMS) δ 7.64 (d, *J* =16.2 Hz, 1H), 7.48 (d, *J* = 8.4 Hz, 2H), 6.90 (d, *J* = 8.4 Hz, 2H), 6.31 (d, *J* = 16.2 Hz, 1H), 4.25 (q, *J* = 7.2 Hz, 2H), 3.84 (s, 3H), 1.33 (t, *J* = 7.2 Hz, 3H).

***(E)*-ethyl 3-(2,4-dimethylphenyl)acrylate (5o)**[17]**:**



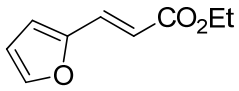
94% yield. ^{1}H NMR (300 MHz, $CDCl_3$/TMS) δ 7.64 (d, *J* =15.6 Hz, 1H), 7.26-7.30 (m, 2H), 7.14 (d, *J* = 7.8 Hz, 2H), 6.39 (d, *J* = 15.9 Hz, 1H), 4.26 (q, *J* = 7.8 Hz, 2H), 2.28 (s, 6H), 1.33 (t, *J* = 7.5 Hz, 3H).

(*E*)-ethyl cinnamate (5p)[14]**:**



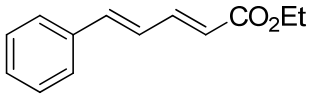
99% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 7.69 (d, *J* = 15.9 Hz, 1H), 7.54-7.52 (m, 2H), 7.40-7.38 (m, 3H), 6.44 (d, *J* = 16.5 Hz, 1H), 4.27 (q, *J* = 7.2 Hz, 2H), 1.34 (t, *J* = 6.3 Hz, 3H).

(*E*)-ethyl 3-(furan-2-yl)acrylate (5q)[14]**:**



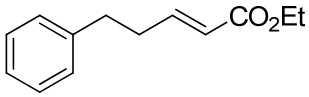
98% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 7.48-7.40 (m, 2H), 6.61 (d, *J* = 3.3 Hz, 1H), 6.47 (dd, *J* = 1.8 Hz, 3.3 Hz, 1H), 6.32 (d, *J* = 15.6 Hz, 1H), 4.24 (q, *J* = 7.5 Hz, 2H), 1.32 (t, *J* = 7.2 Hz, 3H).

(2*E*,4*E*)-Ethyl 5-phenylpenta-2,4-dienoate (5r)[16]**:**



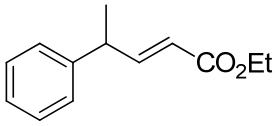
96% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 7.50-7.28 (m, 5H), 6.94-6.82 (m, 2H), 5.99 (d, *J* = 15.3 Hz, 1H), 4.23 (q, *J* = 6.9 Hz, 2H), 1.32 (t, *J* = 6.9 Hz, 3H).

(*E*)-ethyl 5-phenylpent-2-enoate (5s)[18]:



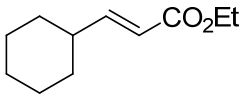
97% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 7.32-7.28 (m, 2H), 7.22-7.17 (m, 3H), 7.04-6.97 (m, 1H), 5.85 (dt, *J* = 1.6 Hz, 16.0 Hz, 1H), 4.18 (q, *J* = 7.2 Hz, 2H), 2.78 (t, *J* = 6.8 Hz, 2H), 2.55-2.49 (m, 2H), 1.28 (t, *J* = 7.2 Hz, 3H).

***(E)*-ethyl 4-phenylpent-2-enoate(5t)[19]:**



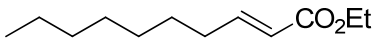
98% yield. ^{1}H NMR (300 MHz,$CDCl_3$/TMS) δ 7.35-7.18 (m, 5H), 7.11 (dd, *J* = 6.9, 15.6 Hz, 1H), 5.80 (dt, *J* = 1.2 Hz, 15.6 Hz, 1H), 4.18 (q, *J* = 6.9 Hz, 2H), 3.62 (m, 1H), 1.43 (d, *J* = 7.2 Hz, 3H), 1.28 (t, *J* = 6.9 Hz, 3H).

(*E*)-ethyl 3-cyclohexylacrylate (5u)[14]:



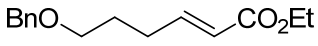
98% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 6.92 (dd, *J* = 6.8, 16.0 Hz, 1H), 5.76 (dd, *J* = 15.6, 1.2 Hz, 1H), 4.18 (q, *J* = 6.8 Hz, 2 H), 2.17-2.09 (m, 1 H), 1.78-1.65 (m, 5 H), 1.34-1.09 (m, 8 H).

(*E*)-ethyl dec-2-enoate(5v)[14]:



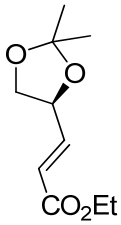
94% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 7.02-6.92 (m, 1H), 5.81(d, *J* = 16.2 Hz, 1H), 4.18 (q, *J* = 7.2 Hz, 2H), 2.23-2.15 (m, 2H), 1.50-1.40 (m, 2H), 1.31-1.27 (m, 11 H), 0.88 (t, *J* = 7.2 Hz, 3H).

(*E*)-ethyl 6-(benzyloxy)hex-2-enoate(5w)[20]:



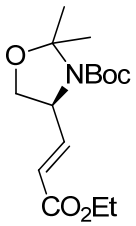
93% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 7.37-7.25 (m, 5H), 7.02-6.92 (m, 1H), 5.82 (dt, *J* = 15.6, 1.5 Hz, 1H), 4.49 (s, 2H), 4.18 (q, *J* = 7.2 Hz, 2H), 3.48 (t, *J* = 6.0 Hz, 2H), 2.35-2.27 (m, 2H), 1.82-1.72 (m, 2H), 1.28 (t, *J* = 7.5 Hz, 3H).

(S) -(*E*)-ethyl 3-(2,2-dimethyl-1,3-dioxolan-4-yl)acrylate (5x)[21]:



87% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 6.88 (dd, *J* = 15.6, 5.6 Hz, 1H), 6.10 (dd, *J* = 15.2, 1.6 Hz, 1H), 4.70-4.64 (m, 1H), 4.24-4.17 (m, 3H), 3.68 (dd, *J* = 8.4, 7.8 Hz, 1H), 1.45 (s, 3H), 1.41 (s, 3H), 1.30 (t, *J* = 6.8 Hz, 3H). Ee was determined by HPLC (OJ-H, Hexane/*i*-PrOH = 99/1, 0.6 mL/min, 230 nm; t_r(major) = 15.73 min, t_r(minor) = 13.56 min) 100% ee.

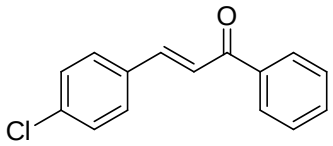
(S)-Tert-butyl-4-((*E*)-2-(ethoxycarbonyl)vinyl)-2,2-dimethyloxazolidine-3-carboxylate (5y)[22]**:**



99% yield. ^{1}H NMR (400 MHz,$CDCl_3$/TMS) δ 6.89-6.80 (m, 1H), 5.97-5.87 (m, 1H), 4.58-4.39 (m, 1H), 4.22-4.19 (m, 2H), 4.11-4.07 (m, 1H), 3.80 (dd, *J* = 9.6, 2.4 Hz, 1H), 1.64-1.42 (m, 15H), 1.31-1.27 (m, 3H). Ee of **5y** was determined by HPLC (Amy lose, Hexane/*i*-PrOH = 98.5/1.5, 0.6 mL/min, 230 nm; t_r(major) = 15.12 min, t_r(minor) = 19.88 min) 94% ee.

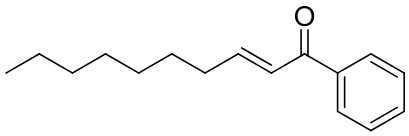
General Procedure for Iron(III) Porphyrin and PE-1-Catalyzed Olefination Reaction of Diazo Acetophenone: A mixture of Fe(TCP)Cl (6.3 mg, 0.007 mmol), **PE-1** (26.8 mg, 0.03 mmol) and substrate (3.0 mmol) in toluene (1.0 mL) was heated to 110 ^{o}C. Then a solution of diazo acetophenone (701 mg, 4.8 mmol) and PMHS (0.25 mL, 3.9 mmol) in toluene (2.0 mL) was added within 12 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature and concentrated. The residue was purified by flash chromatography (silica gel) to give the product.

(*E*)-3-(4-chlorophenyl)-1-phenylprop-2-en-1-one (5e')[16]**:**



98% yield. ^{1}H NMR (300 MHz, $CDCl_3$/TMS): δ 8.02 (d, *J* = 7.2 Hz, 2H), 7.77 (d, *J* = 15.6 Hz, 1H), 7.60-7.49 (m, 6H), 7.40 (d, *J* = 8.4 Hz, 2H).

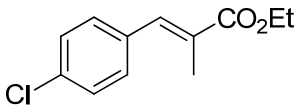
(*E*)-1-phenyloct-2-en-1-one (5v')[23]**:**



95% yield. ^{1}H NMR (300 MHz, $CDCl_3$/TMS): δ 7.94-7.91 (m, 2H), 7.58-7.44 (m, 3H), 7.12-7.02 (m, 1H), 6.90-6.84 (m, 1H), 2.35-2.78 (m, 2H), 1.57-1.48 (m, 2H), 1.38-1.29 (m, 8H), 0.889-0.86 (m, 3H).

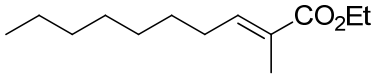
General Procedure for Iron(III) Porphyrin and PE-1-Catalyzed Olefination Reaction of 2-Diazo Ethyl Propionate: A mixture of Fe(TCP)Cl (6.3 mg, 0.0075 mmol), **PE-1** (26.8 mg, 0.03mmol) and substrate (3.0 mmol) in toluene (2.0 mL) was heated to 110 ^{o}C and a mixture of 2-diazo ethyl propionate (768 mg, 6.0 mmol) and PMHS (0.25 mL, 3.9 mmol) in toluene(1.0 mL) were added within 15 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature, concentrated. The residue was purified by flash chromatography (silica gel) to give the product.

(*E*)-ethyl 3-(4-chlorophenyl)-2-methylacrylate (5e")[24]**:**



94% yield. ^{1}H NMR (400 MHz, $CDCl_3$/TMS): δ 7.54 (s, 1H), 7.29-7.23 (m, 4H), 4.19 (q, *J* = 7.2 Hz, 2H), 2.01 (s, 3H), 1.27 (t, *J* = 7.2 Hz, 3H).

(*E*)-ethyl 2-methyloct-2-enoate (5v")[23]**:**



94% yield. E/Z = 79/21, ^{1}H NMR (300 MHz, $CDCl_3$/TMS): 6.76 (t, *J* = 7.2 Hz,

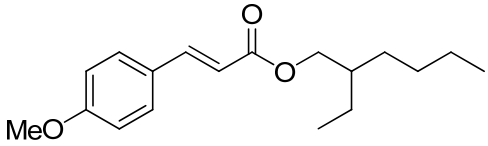
0.79H), 5.92 (t, *J* = 7.5 Hz, 0.21H), 4.19 (q, *J* = 7.2 Hz, 2H), 2.47-2.40 (m, 0.42H), 2.20-2.12 (m, 1.58H), 1.89 (s, 0.63H), 1.83 (s, 2.37H), 1.48-1.27(m, 12H) , 0.90-0.86 (m, 3 H).

4. Procedure for Iron(III) Porphyrin and PE-2-Catalyzed Olefination Reaction.

Fe(TCP)Cl (6.3 mg, 0.007 mmol), **PE-2** (181 mg, 0.024 mmol) and **4e** (420 mg, 3.0 mmol) were mixed in a Schlenk tube. The tube was evacuated and backfilled with nitrogen. Toluene (2.0 mL) was added and the reaction mixture was heated to 110 ºC. To this solution was added a mixtute of EDA (0.56 g, 4.8 mmol) and PMHS (0.25 mL, 3.9 mmol) in toluene (1.0 mL) within 18 h *via* a syringe pump or in portions. The mixture was further stirred at 110 °C until **4e** disappeared (determined by ^{1}H NMR). The resulting mixture was cooled to room temperature and EtOH (10 mL), petroleum ether (10 mL) was added sequentially to precipitate the polymer (overnight at room temperature). The precipitated polymer (**PE-2**) was collected and washed by ethyl acetate (3 × 10 mL), dried under reduced pressure and reused as catalyst in the next run. The filtrate was collected and concentrated to give the crude product **5e**, which was purified by column chromatography on silica gel with PE/EA (30/1) to afford the product.

5. Synthesis of (*E*)-2-ethylhexyl 3-(4-methoxyphenyl)-acrylate[25]:

A mixture of Fe(TCP)Cl (4.2 mg, 0.005 mmol), **PE-1** (17.9 mg, 0.002 mmol) and **4n** (272 mg, 2.0 mmol) in toluene (1.0 mL) was heated to 110 ^{o}C and a solution of **6** (713 mg, 3.6 mmol), PMHS (0.18 mL, 2.6 mmol) in toluene (1.0 mL) was added within 20 h via a syringe pump. After the reaction was complete, the resulting mixture was cooled to room temperature, concentrated. The residue was purified by flash chromatography (silica gel) to give the product **7**, yield 569 mg (98 %).



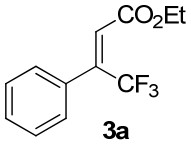
Yield: 569.3 mg (98%). ^{1}H NMR (300 MHz, $CDCl_3$/TMS): δ 7.63 (d, *J* =15.9 Hz,

1H), 7.48 (d, *J* = 9.0 Hz, 2H), 6.90 (d, *J* = 9.0 Hz, 2H), 6.32 (d, *J* = 15.9 Hz, 1H), 4.14-4.08 (m, 2H), 3.83 (s, 3H), 1.68-1.61(m，1H), 1.46-1.33 (m, 8H), 0.95-0.88 (m, 6H).

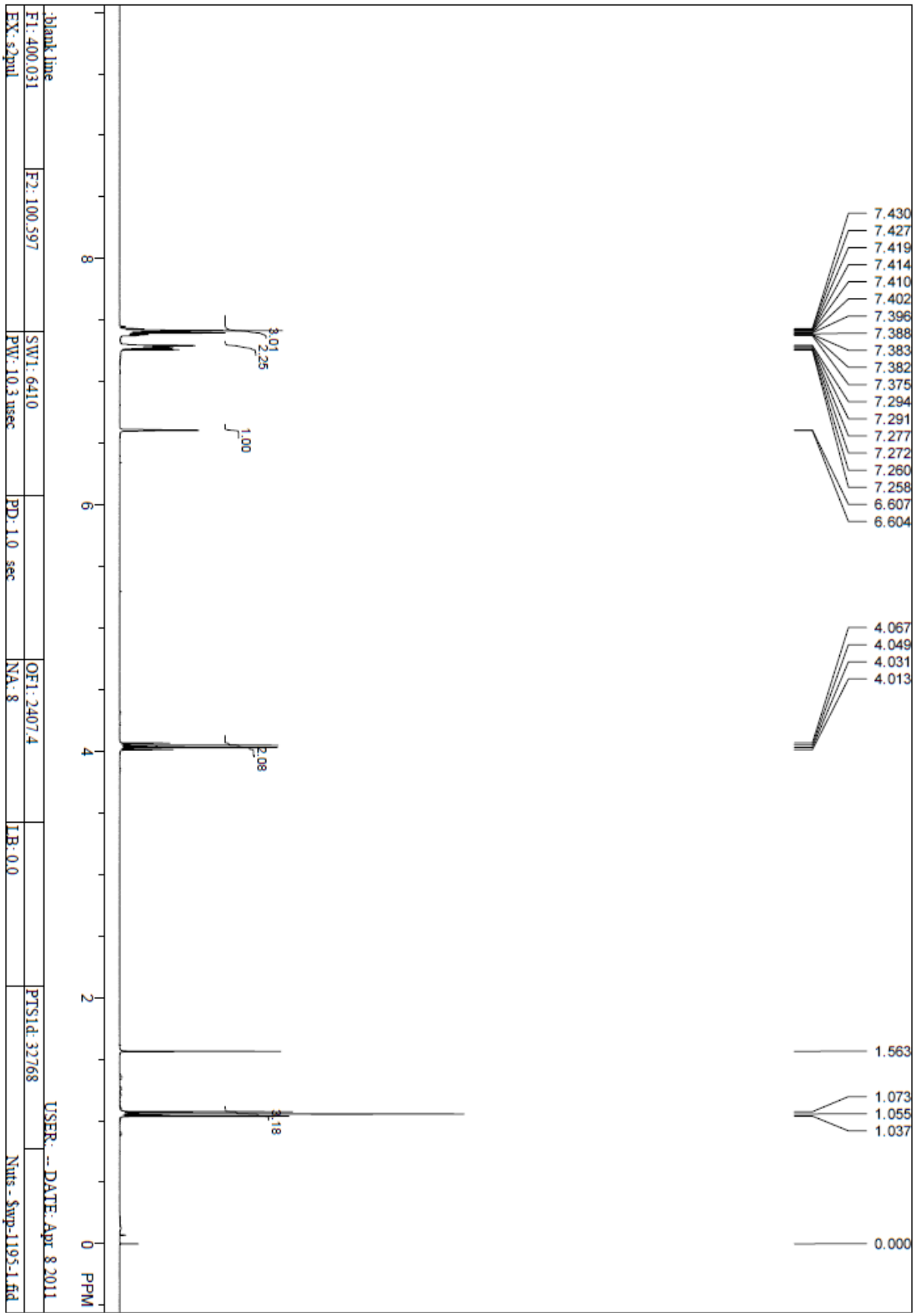
References:

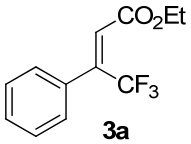
1. V. V. Borovkov, J. M. Lintuluoto, Y. Inove, *Synlett.* **1999**, 61.
2. X.-H. Yang, C.-R. Liu, C. Wang, X.-L. Sun, Y.-H. Guo, X.-K. Wang, Z. Wang, Z. Xie, Y. Tang, *Angew. Chem. Int. Ed.* **2009**, *48*, 8099.
3. M. Kimura, T. Yamazaki, T. Kitazume, T. Kubota, *Org. Lett.*, **2004**, *6*, 4651.
4. Y. Chen, L. Huang, X. P. Zhang, *Org. Lett.*, **2003**, *5*, 2493.
5. R. Kitbunnadaj, M. Hoffmann, S. A. Fratantoni, G. Bongers, R. A. Bakker, K. Wieland, A. el Jilali, I. J. P. De Esch, W. M. P. B. Menge, H. Timmerman, R. Leurs, *Bioorg. Med. Chem.*, **2005**, *13*, 6309.
6. B. B. Snider, E. Ron, B. W. Burbaum, *J. Org. Chem.*, **1987**, *52*, 5413.
7. J. Simard-Mercier, J. L. Jiang, M. L. Ho, A. B. Flynn, W. W. Ogilvie, *J. Org. Chem.*, **2008**, *73*, 5899.
8. X. Zhou, J. Luo, J. Liu, S. Peng, G.-J. Deng, *Org. Lett.*, **2011**, *13*, 1432.
9. K. Matoba, H. Kawai, T. Furukawa, A. Kusuda, E. Tokunaga, S. Nakamura, M. Shiro, N. Shibata, *Angew. Chem. Int, Ed.* **2010**, *49*, 5762.
10. Y. Shen, Y. Xiang, *J. Fluorine Chem.* **1991**, *52*, 221.
11. R. L**.** Danheiser, J. S. Nowick, *J. Org. Chem.* **1991**, *56*, 1176.
12. M. Shimano, N. Kamei, T. Tanaka, T. Harada, M. Haino, A. Okuyama, Y. Arakawa, Y. Murakami, Eur. Pat. 1431285 A1, 2004.
13. A. Bouziane, M. Hélou, B. Carboni, F. Carreaux, B. Demerseman, C. Bruneau, J.-L. Renaud, *Chem. Eur. J.* **2008**, *14*, 5630.
14. P. Cao, C.-Y. Li, Y.-B. Kang, Z. Xie, X.-L. Sun, Y. Tang, *J. Org. Chem.* **2007**, *72*, 6628-6630.
15. V. R. Chintareddy, A. Ellern, J. G. Verkade, *J. Org. Chem.*, **2010**, *75*, 7166.
16. Z.-Z. Huang, Y. Tang, *J. Org. Chem.*, **2002**, *67*, 5320.
17. A. K. Chatterjee, T.-L. Choi, D. P. Sanders, R. H. Grubbs, *J. Am. Chem. Soc.*, **2003**, *125*, 11360.
18. M. Nishizawa, H. Hirakawa, Y. Nakagawa, H. Yamamoto, K. Namba, H. Imagawa, *Org. Lett.*, **2007**, *9*, 5577.
19. J. M. Cóncellon, C. Concellón, C. Méjica, *J. Org. Chem.*, **2005**, *70*, 6111.
20. J. S. Yadav, M. Sreenivas, A. S. Reddy, B. V. S. Reddy, *J. Org. Chem.*, **2010**, *75*, 8307.
21. J. D. White, P. Hrnciar, *J. Org. Chem.*, **2000**, *65*, 9129.
22. Y. Ohfune, T. Kan, T. Nakajima, *Tetrahedron*, **1998**, *54*, 5207.
23. J. M. Cóncellon, H. Rodríguez-Solla, C. Méjica, *Tetrahedron*, **2006**, *62*, 3292.
24. P. S.-W. Leung, Y. Teng, P. H. Toy, *Org. Lett.*, **2010**, *12*, 4996.
25. K. Selvakumar, A. Zapf, A. Spannenberg, M. Beller, *Chem. Eur. J.* **2002**, *8*, 3901.

Part III NMR Spectra of the Compounds and Copolymers



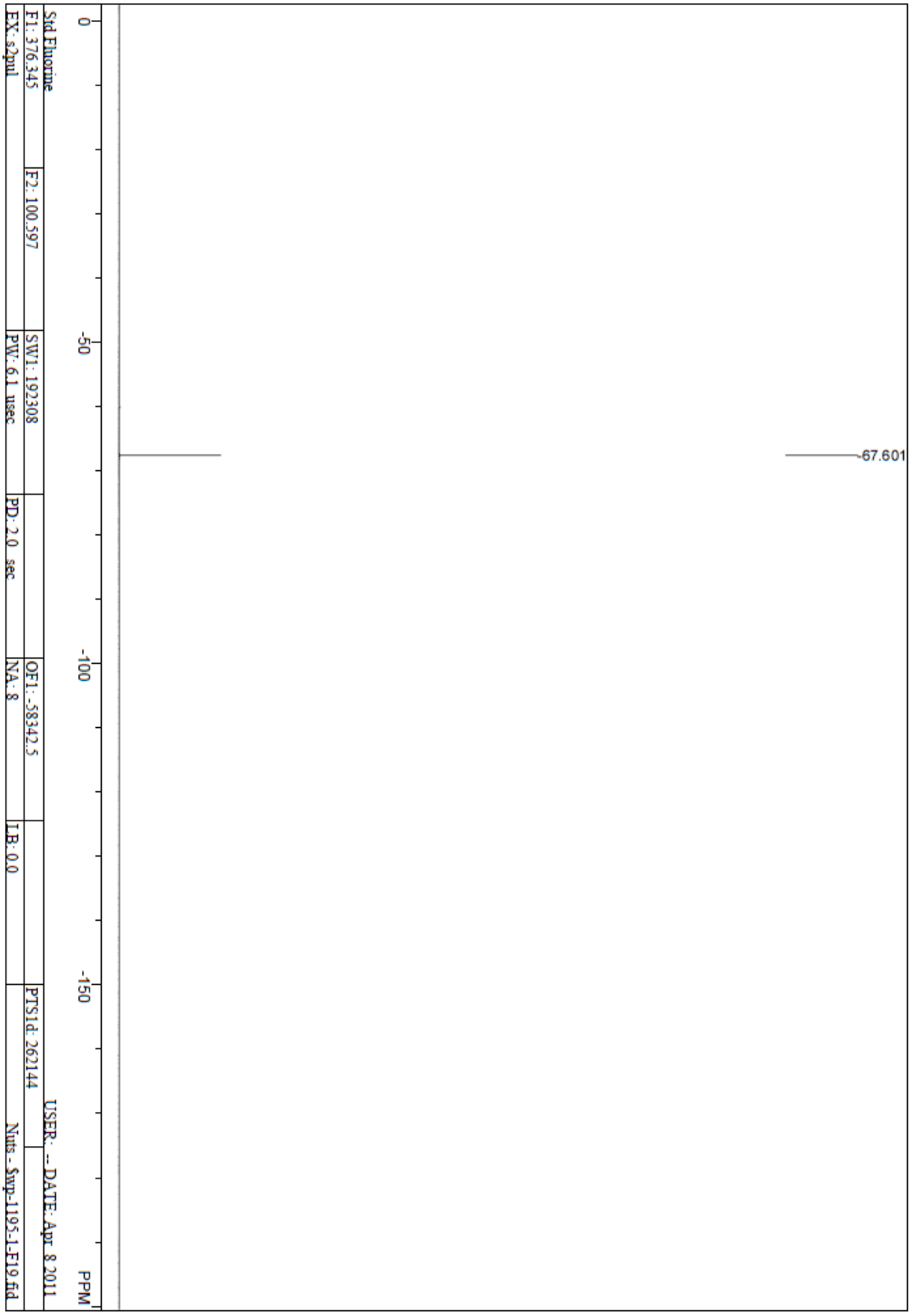
3a ^{1}H NMR (400 MHz in $CDCl_3$)

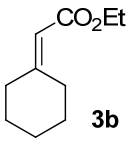




3a

^{19}F NMR (376 MHz in $CDCl_3$)





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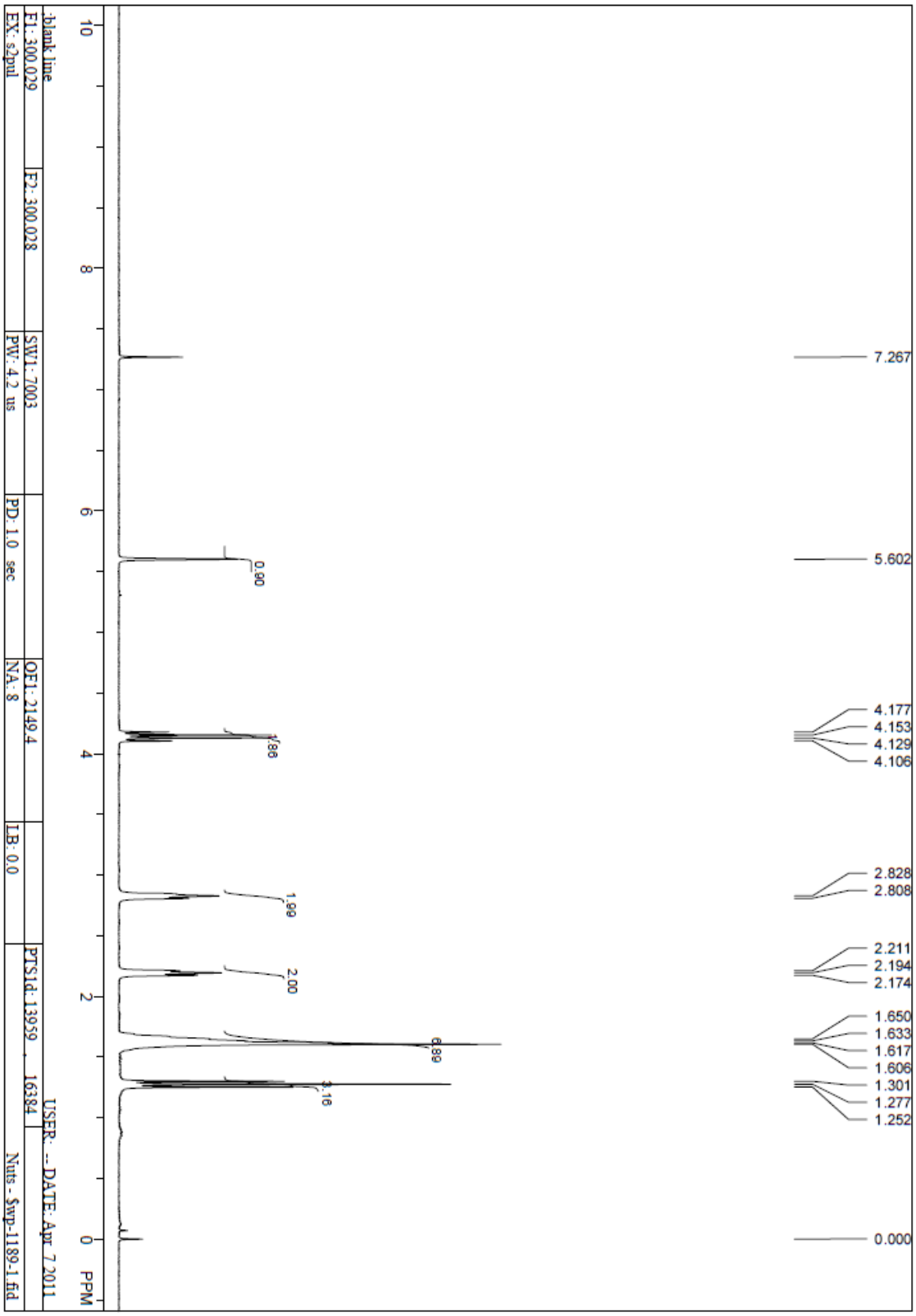
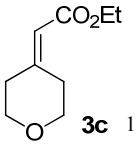
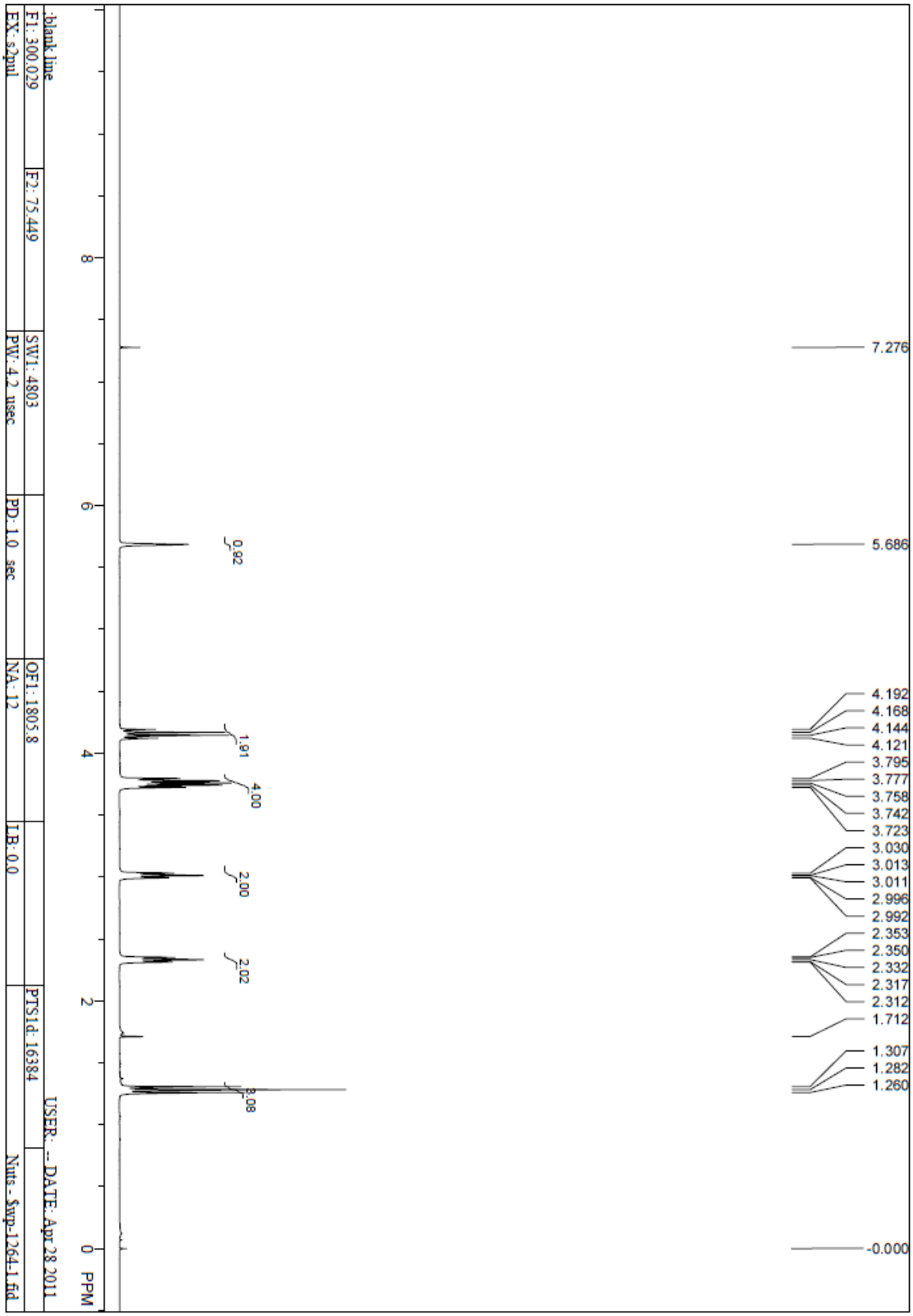
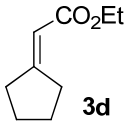


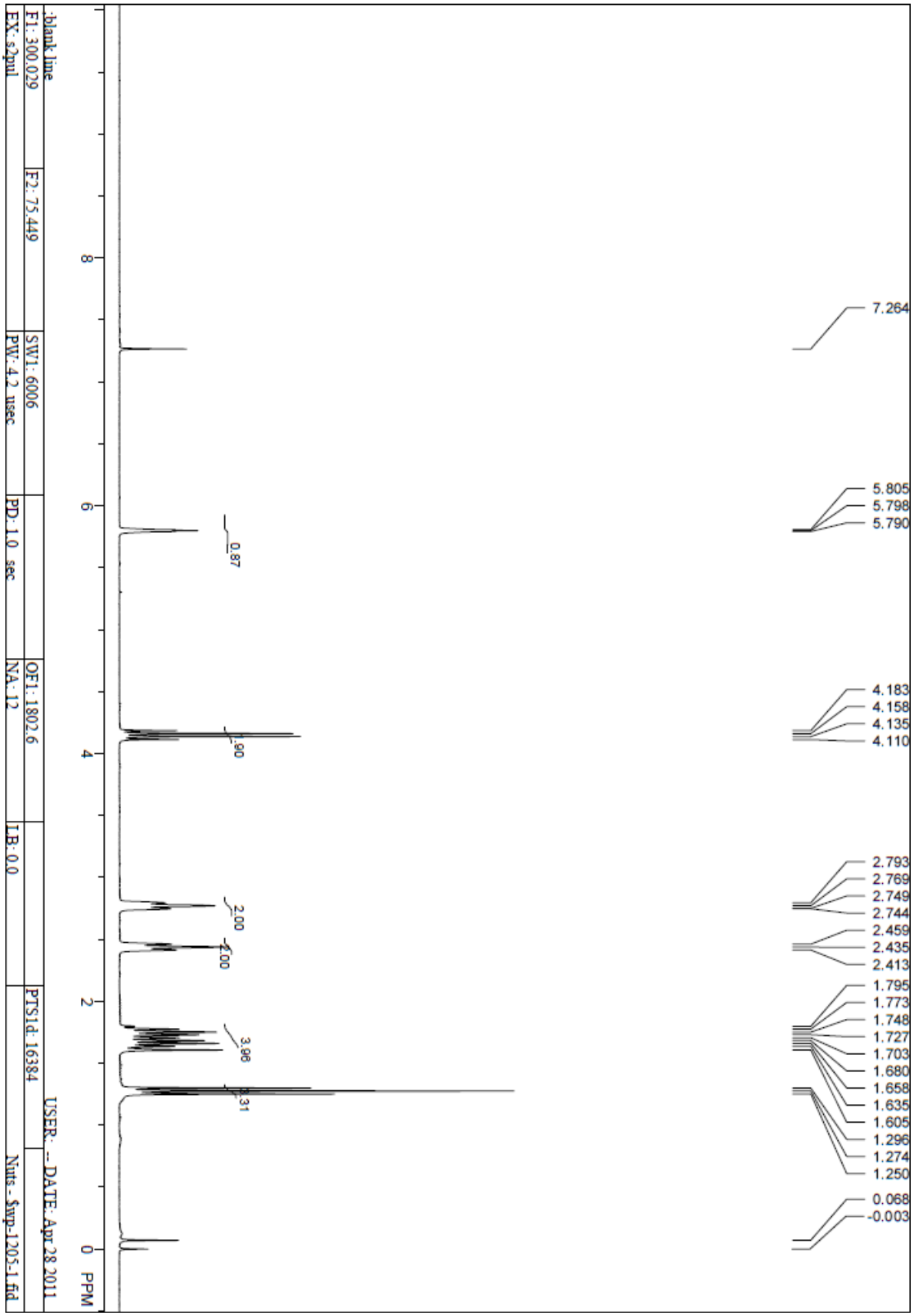


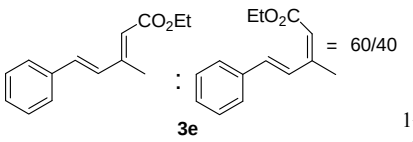
3c ^{1}H NMR (300 MHz in $CDCl_3$)





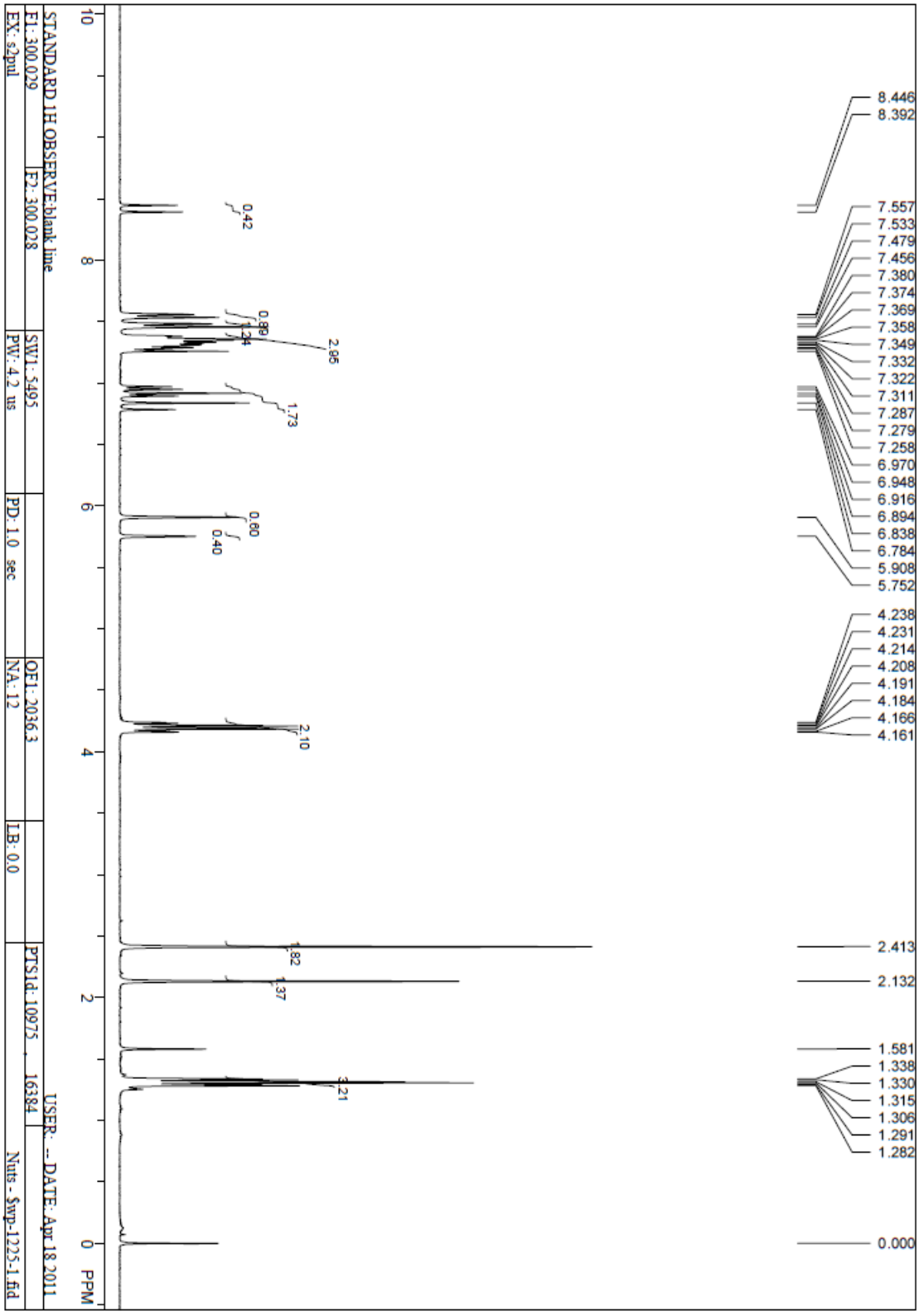
3d ^{1}H NMR (300 MHz in $CDCl_3$)

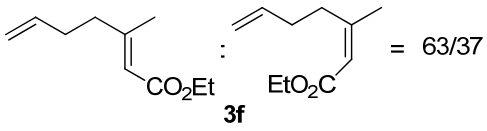




3e

^{1}H NMR (300 MHz in $CDCl_3$)

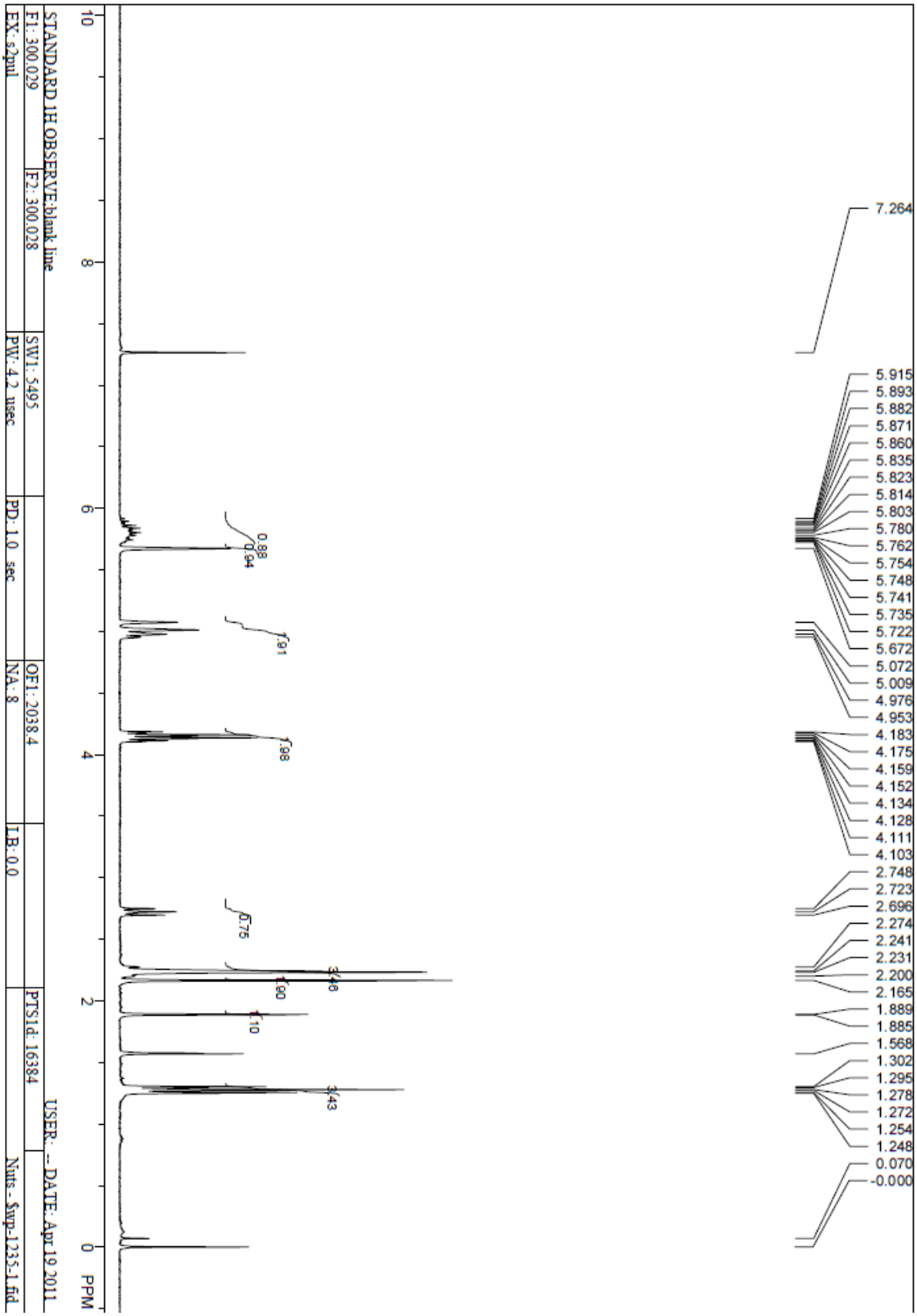


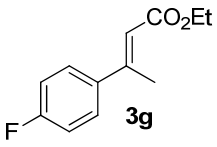


= 63/37

3f

^{1}H NMR (300 MHz in $CDCl_3$)





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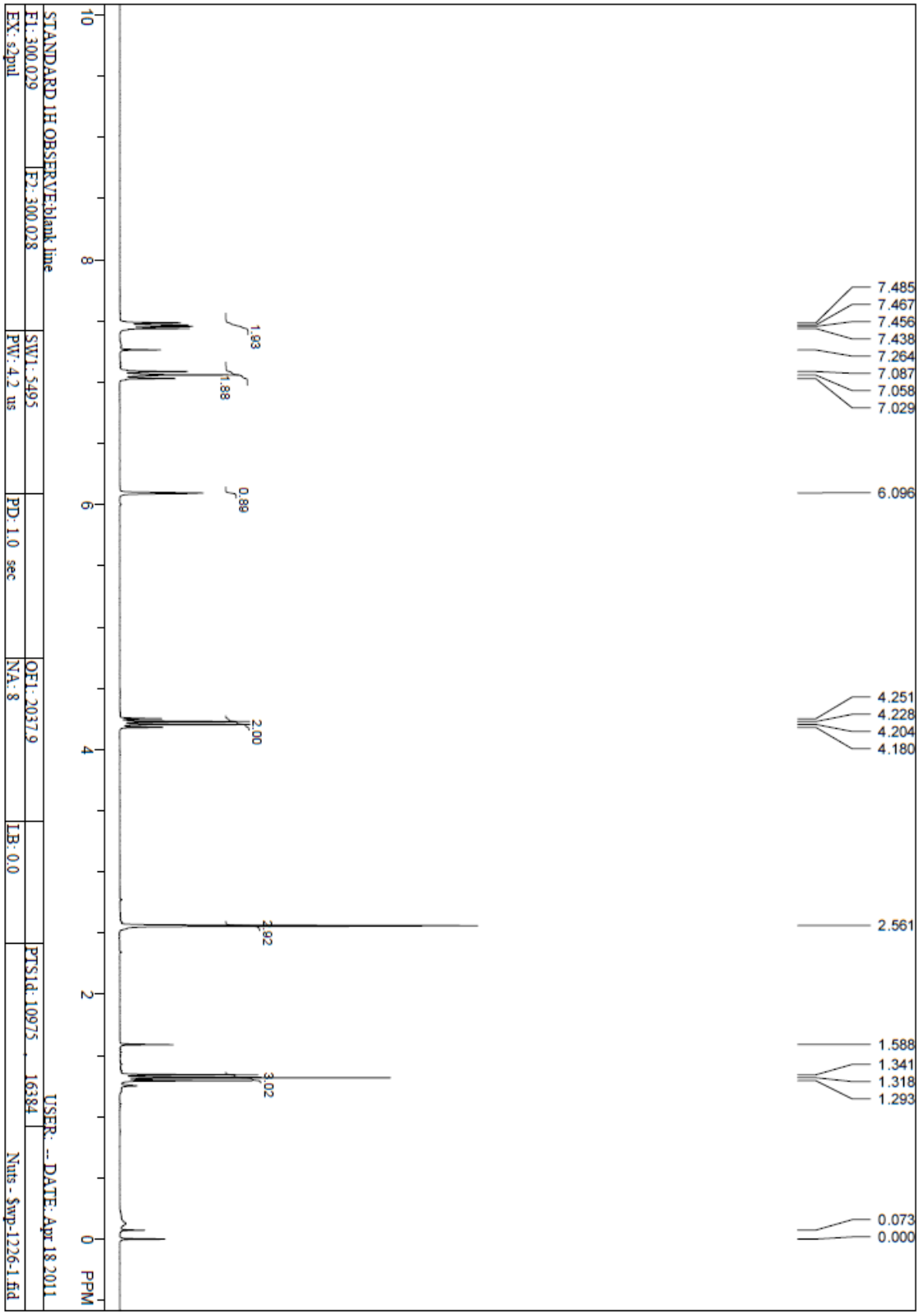
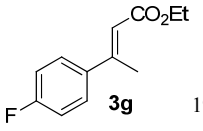
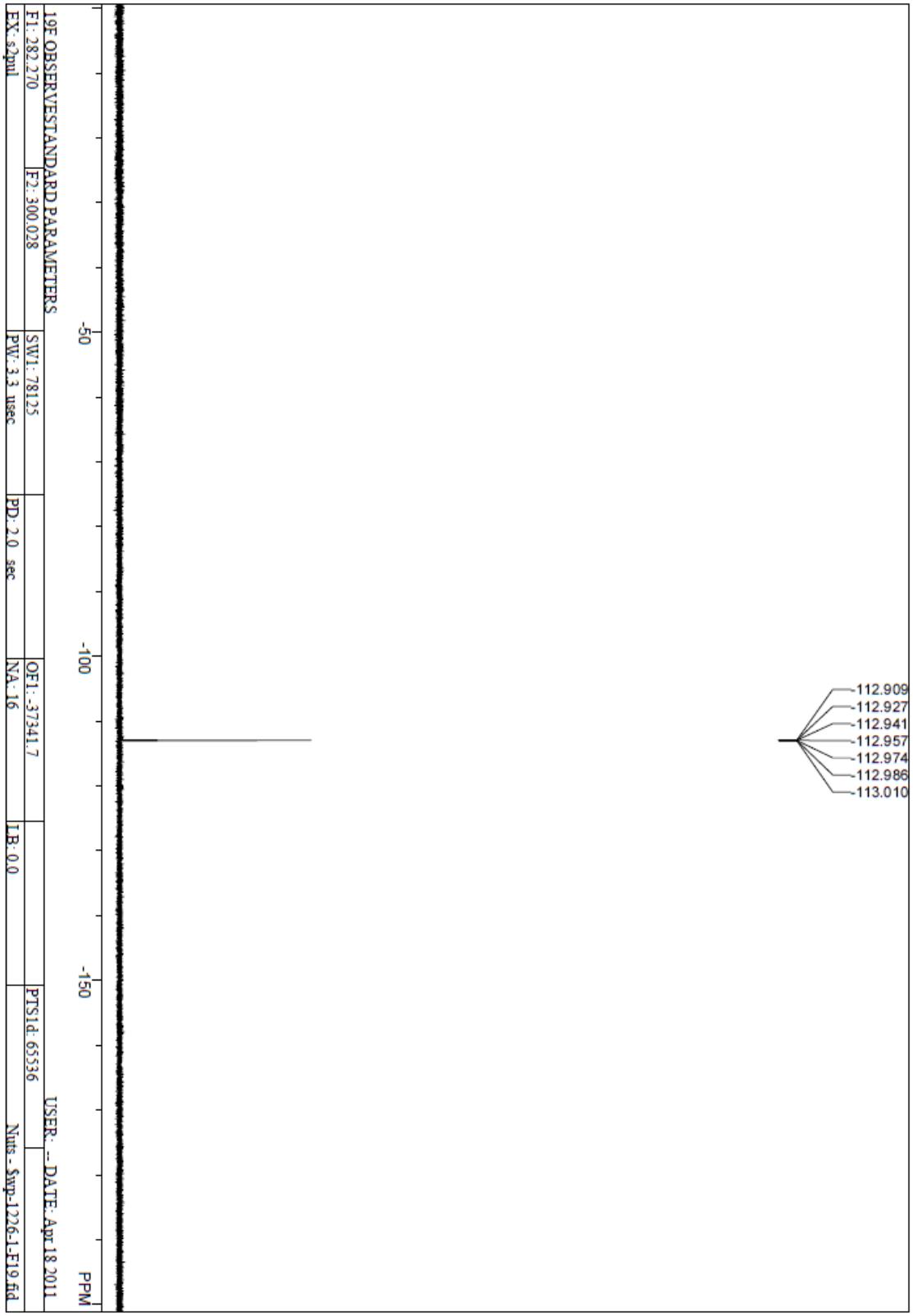
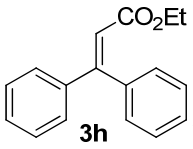


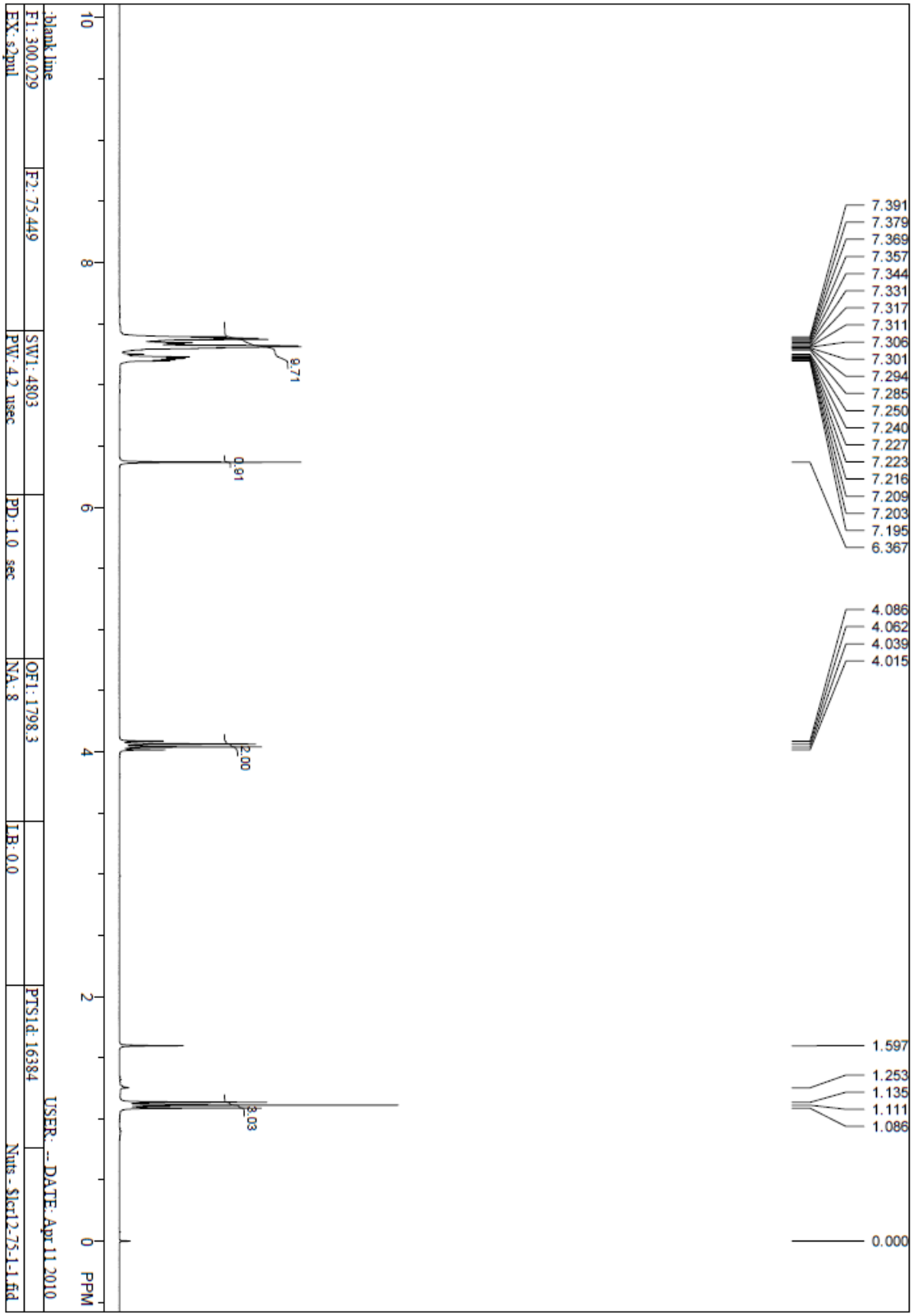


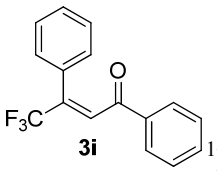
^{19}F NMR (282 MHz in $CDCl_3$)



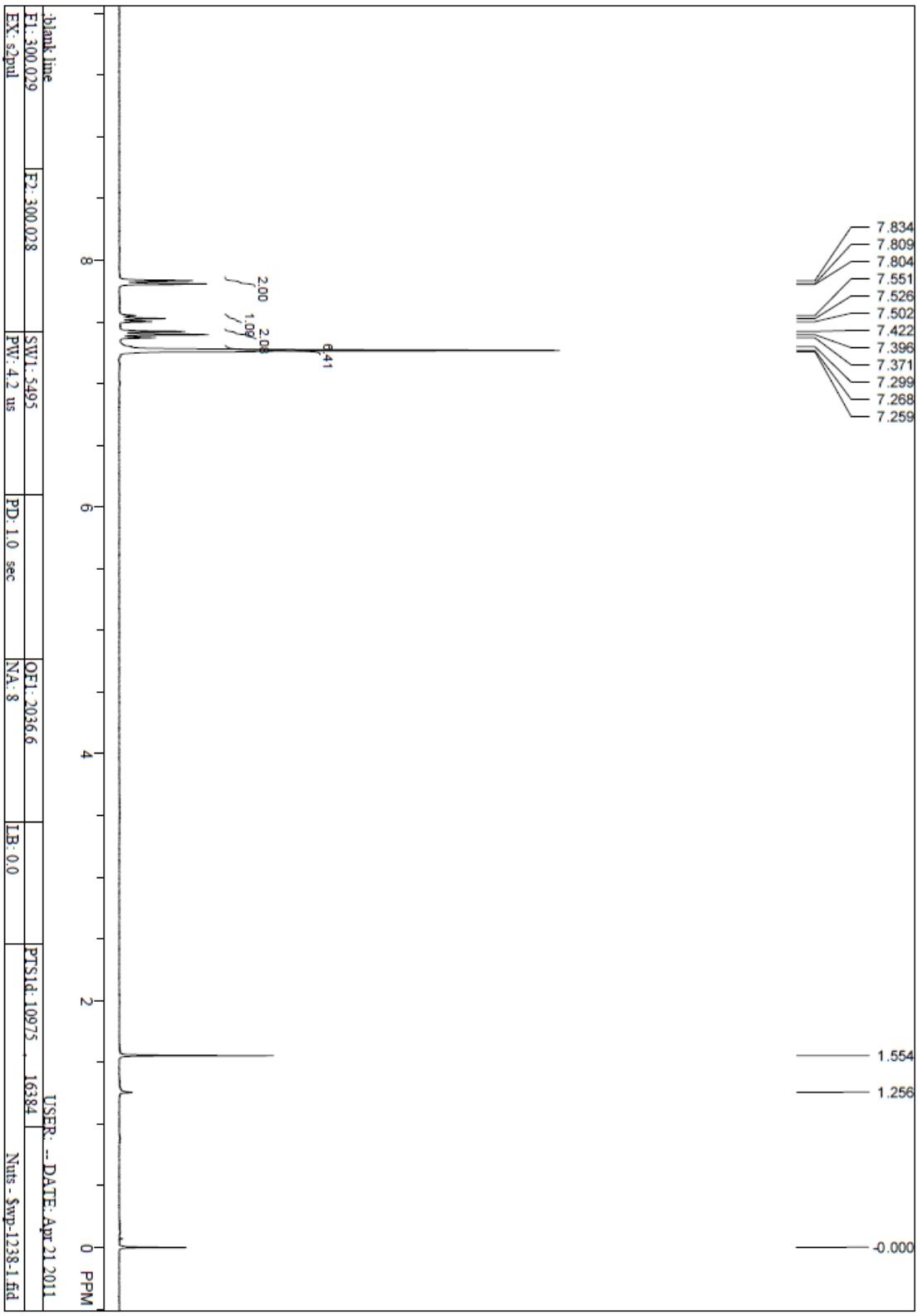


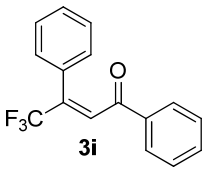
3h ^{1}H NMR (300 MHz in $CDCl_3$)





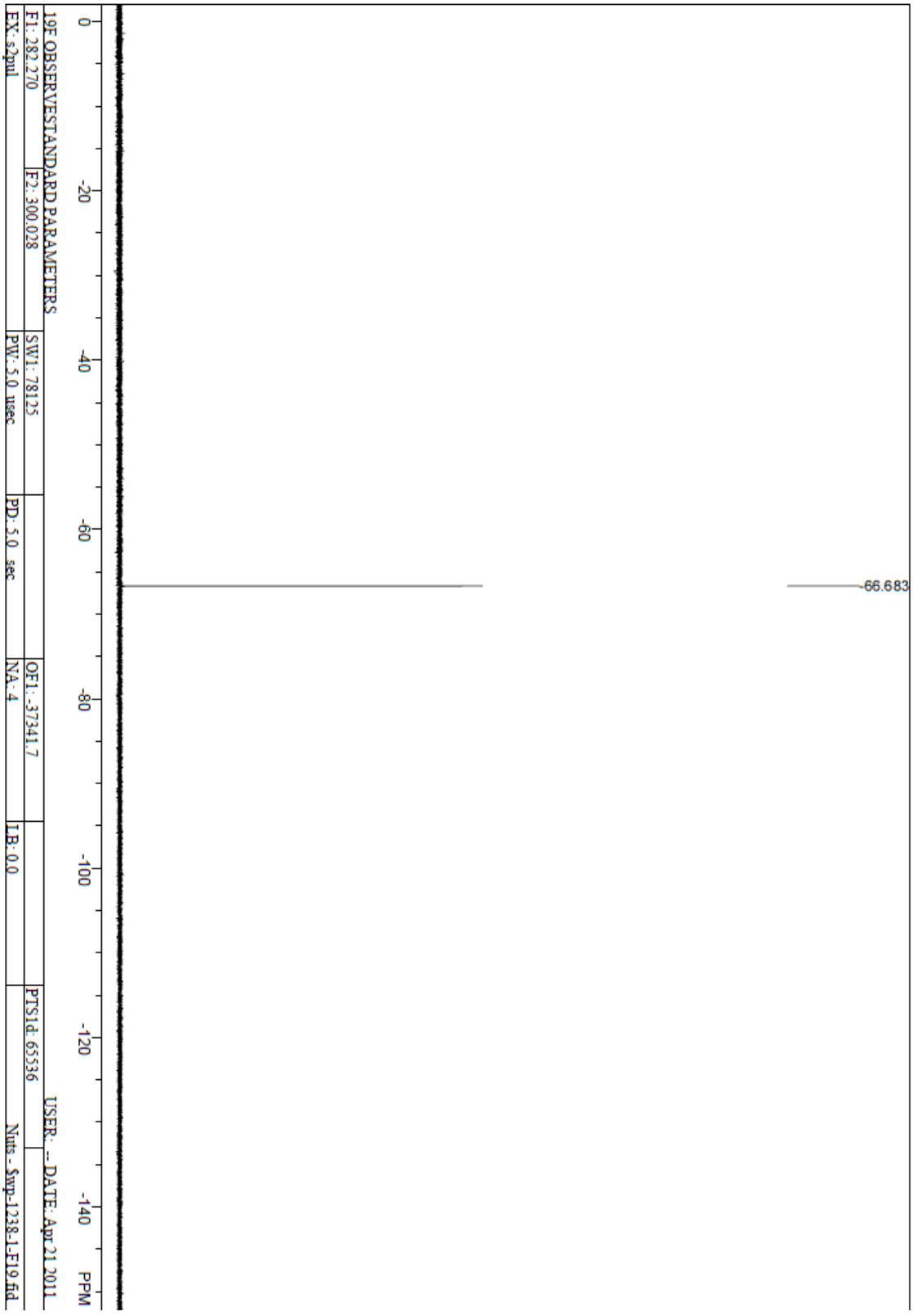
3i ^{1}H NMR (300 MHz in $CDCl_3$)

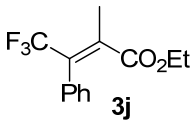




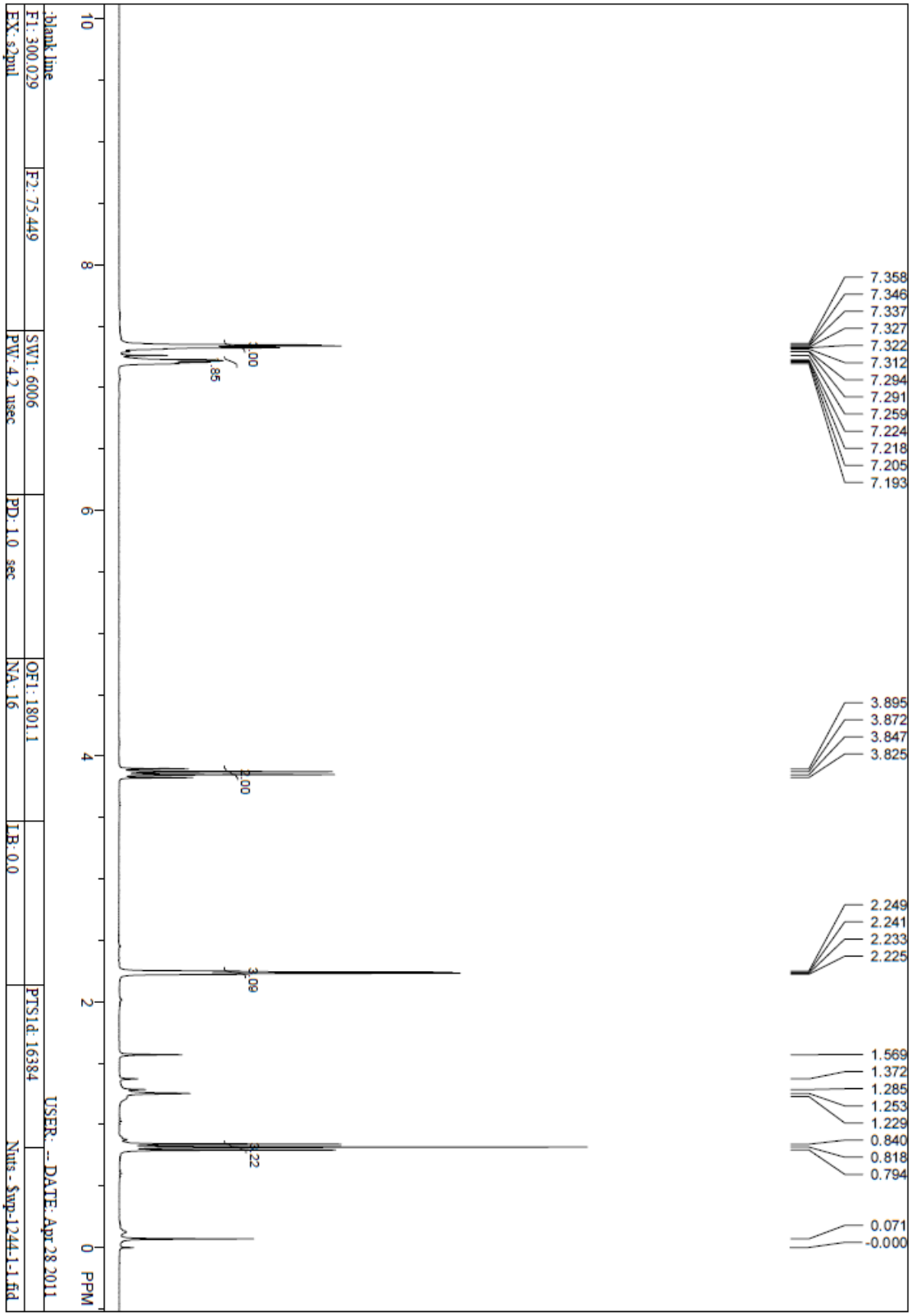
3i

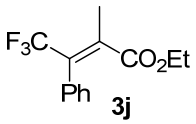
^{19}F NMR (282 MHz in $CDCl_3$)





3j ^{1}H NMR (300 MHz in $CDCl_3$)





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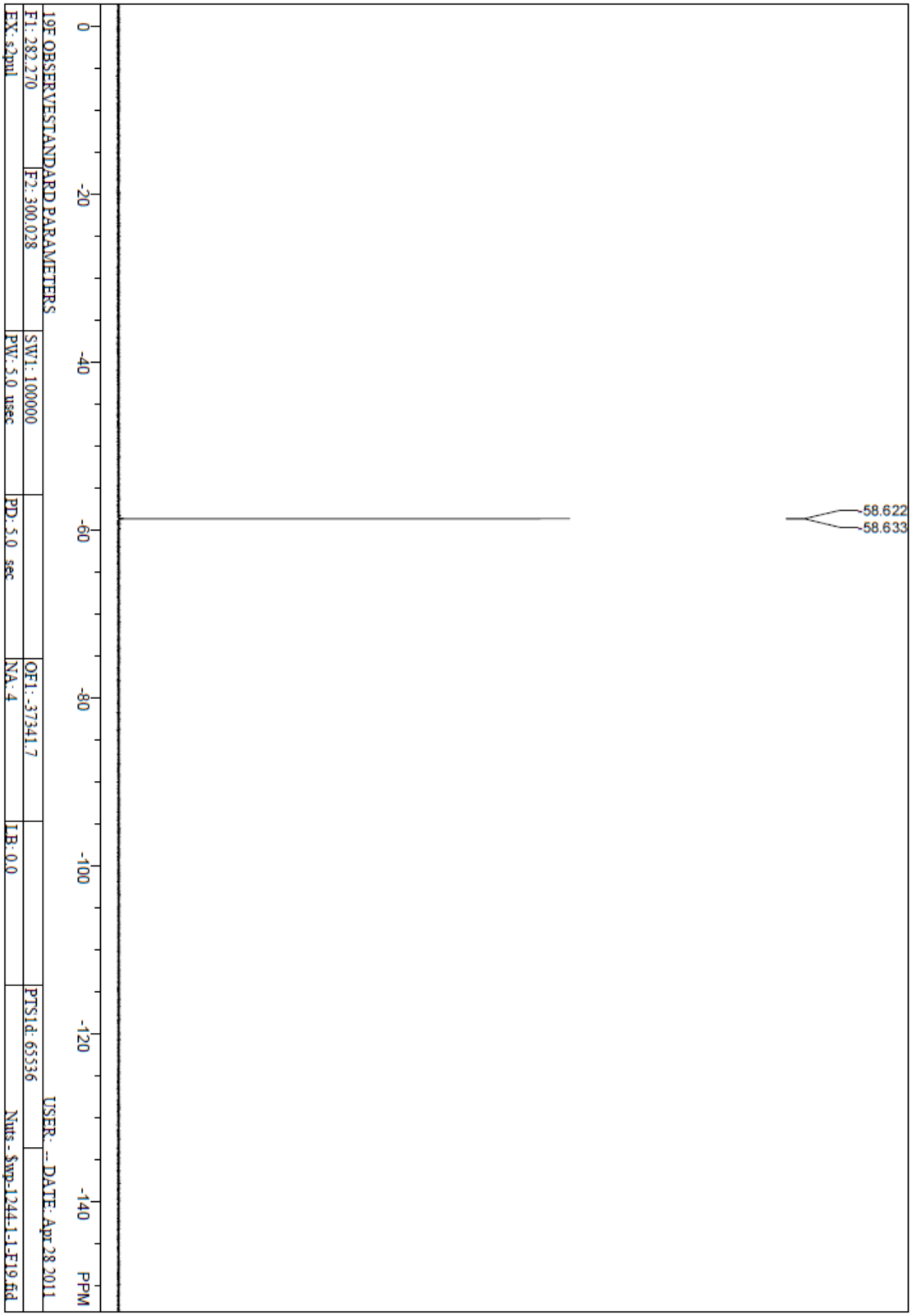
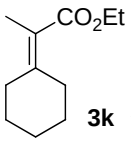
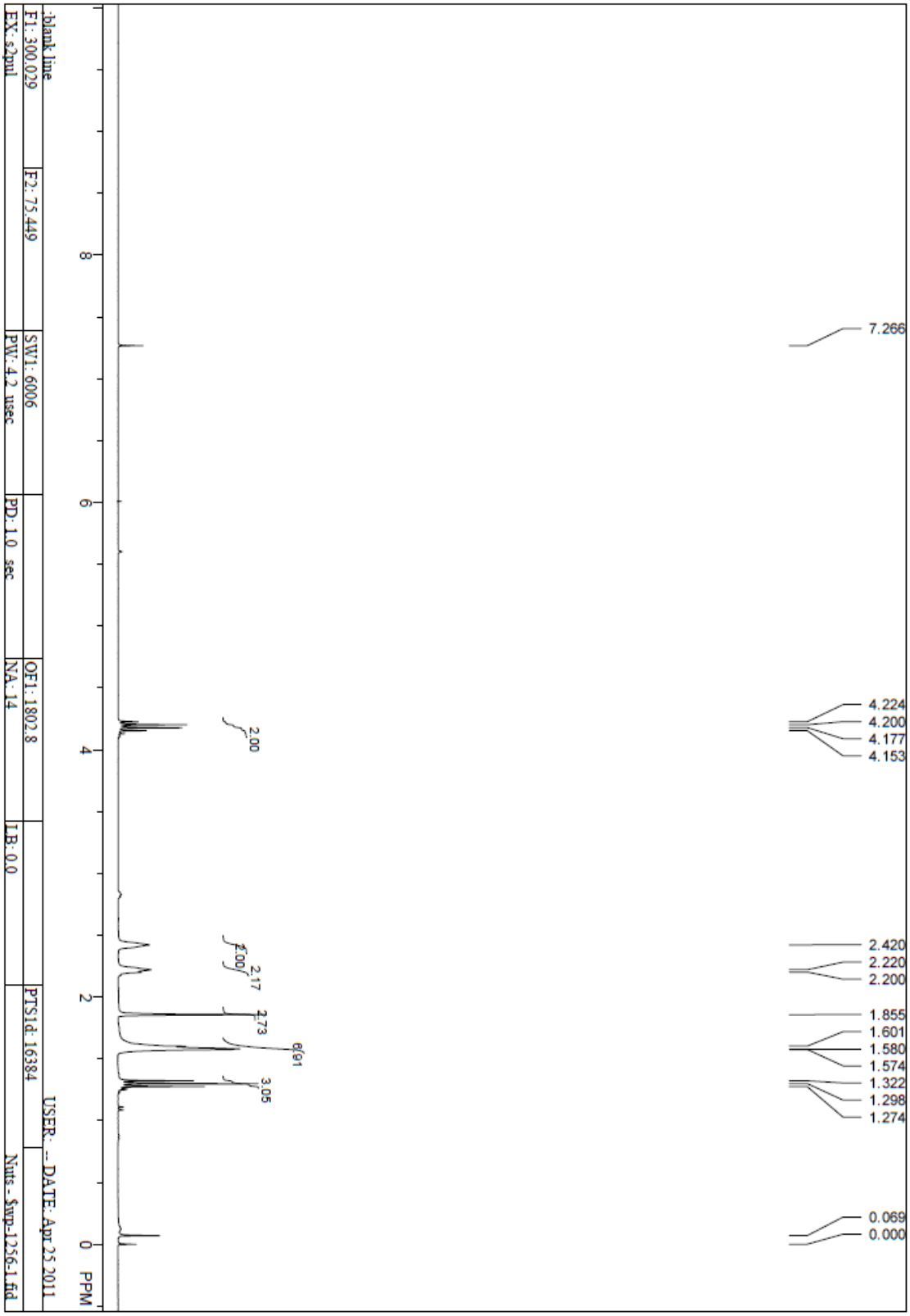
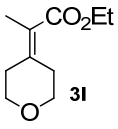


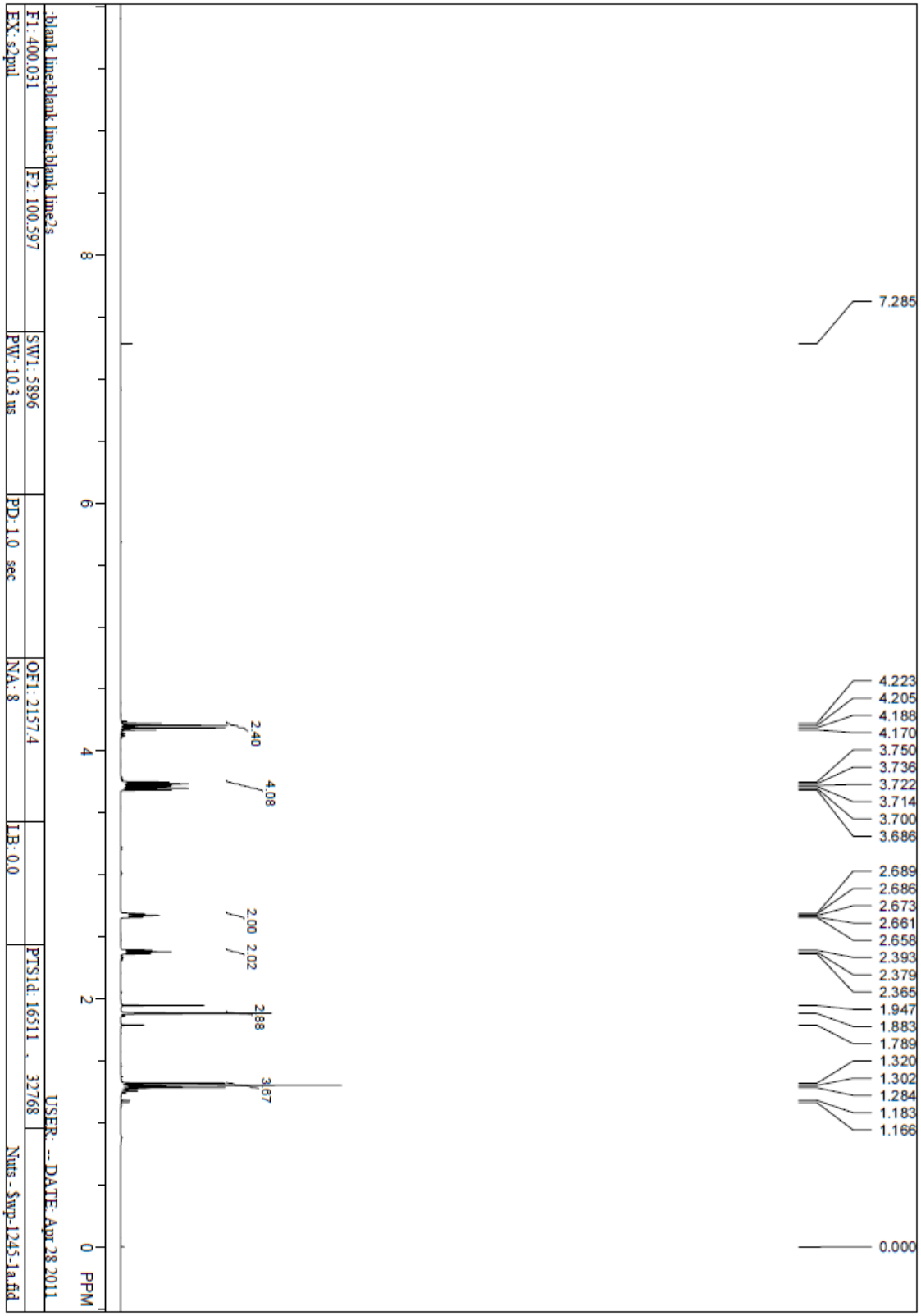


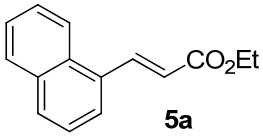
3k ^{1}H NMR (300 MHz in $CDCl_3$)



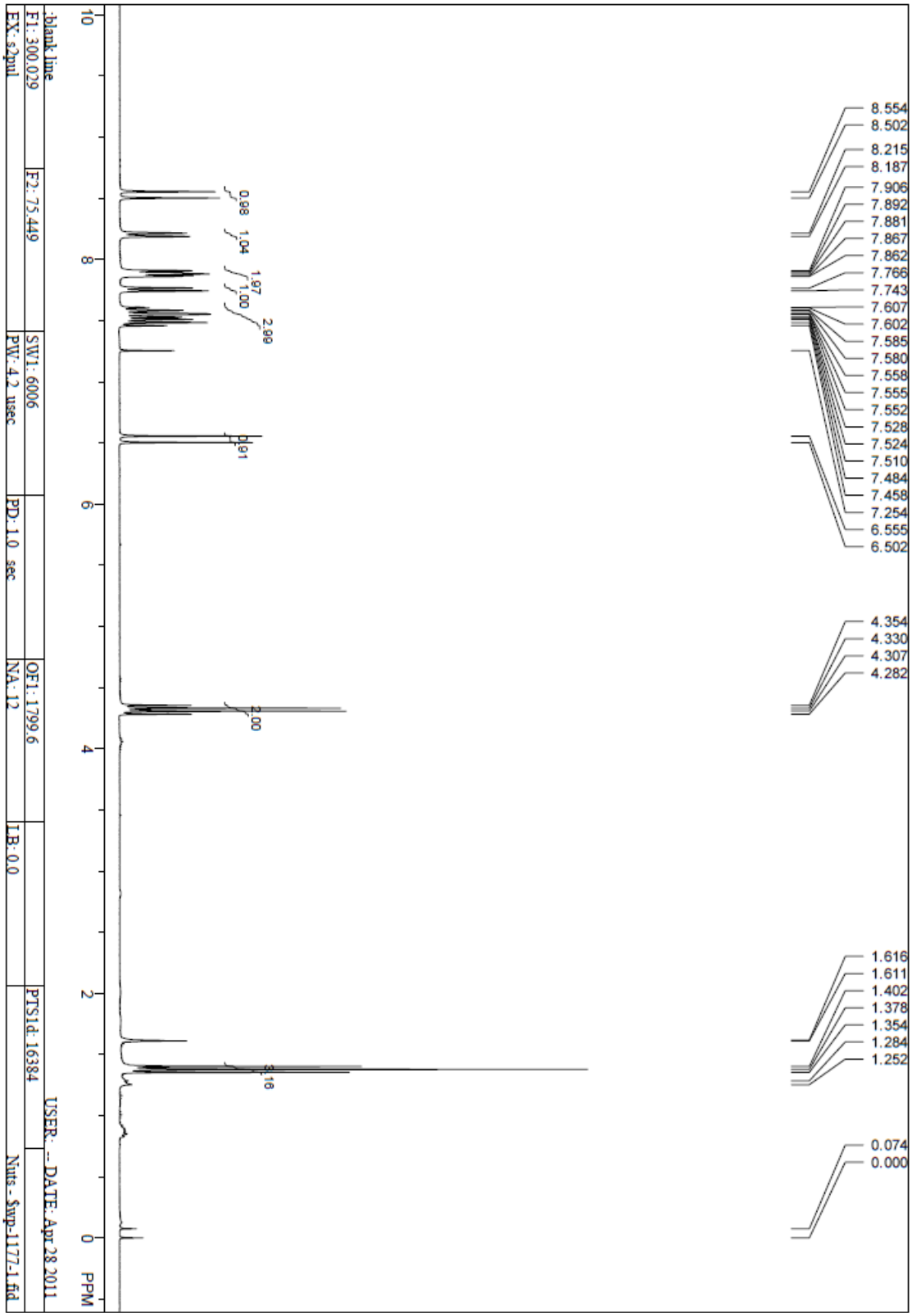


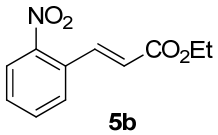
^{1}H NMR (400 MHz in $CDCl_3$)





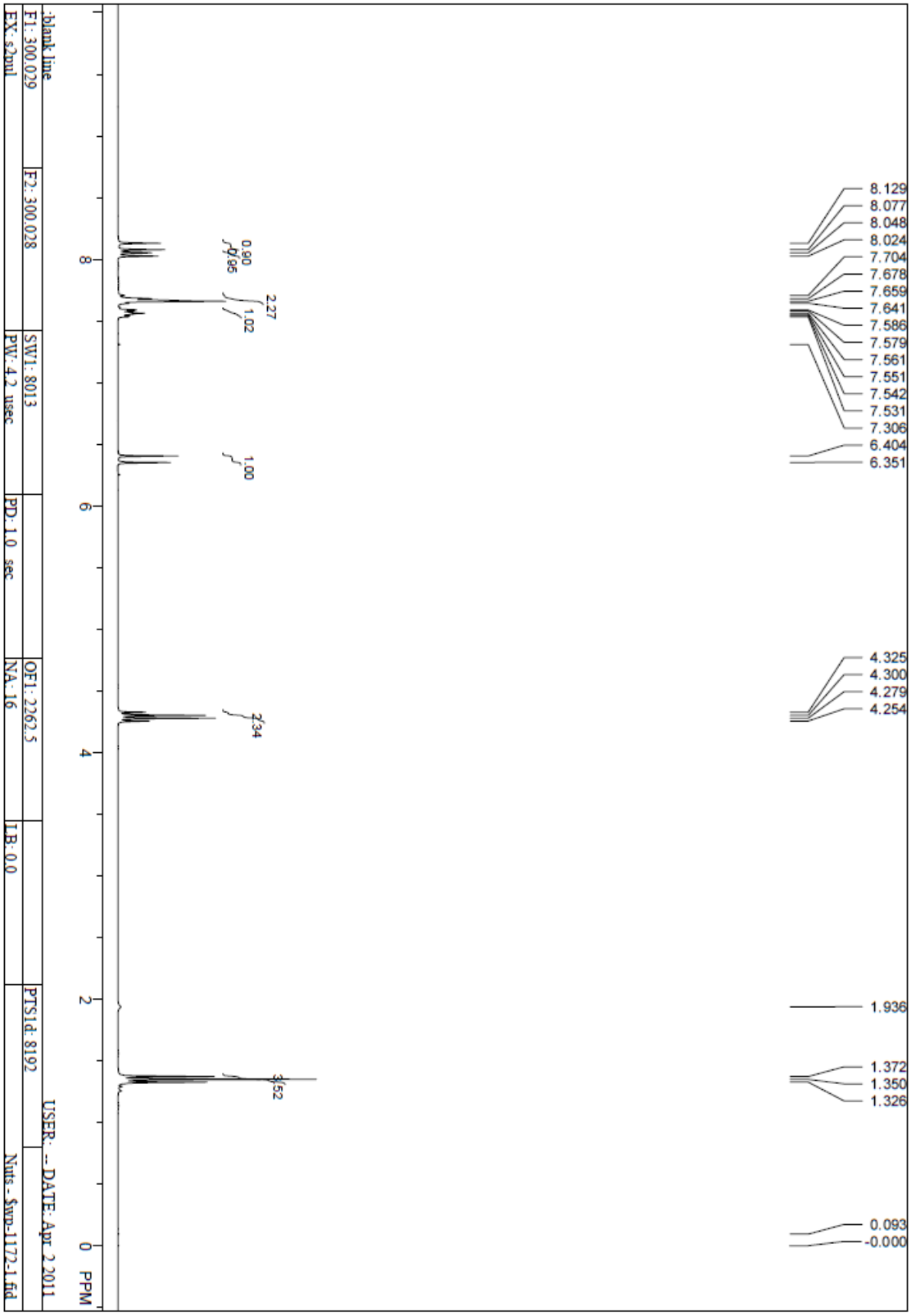
5a ^{1}H NMR (300 MHz in $CDCl_3$)

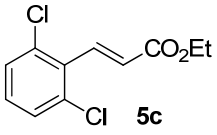




5b

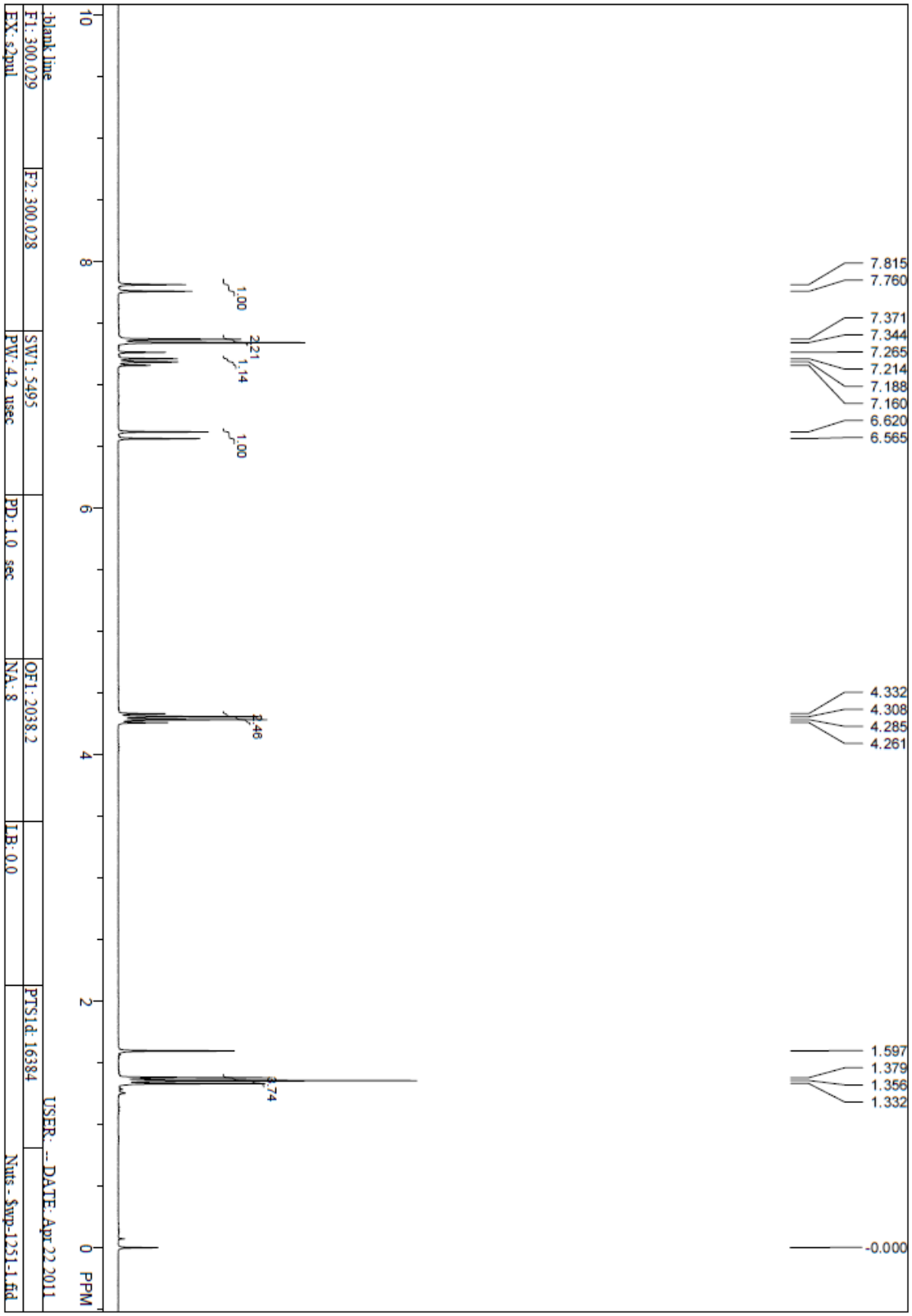
^{1}H NMR (300 M Hz in $CDCl_3$)

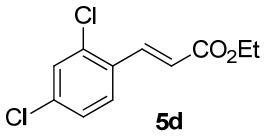




5c

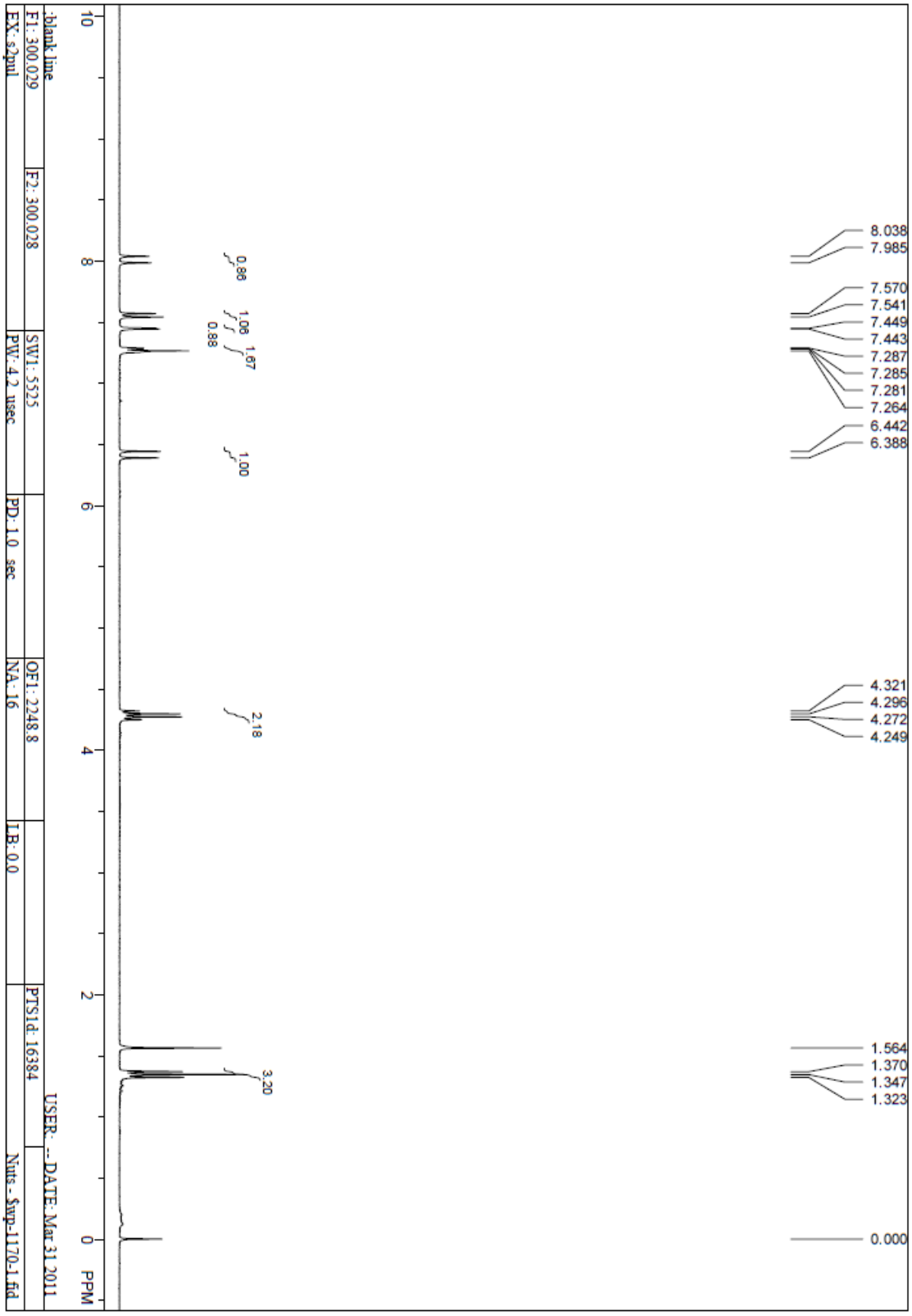
^{1}H NMR (300 M Hz in $CDCl_3$)

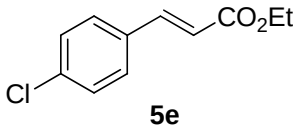




5d

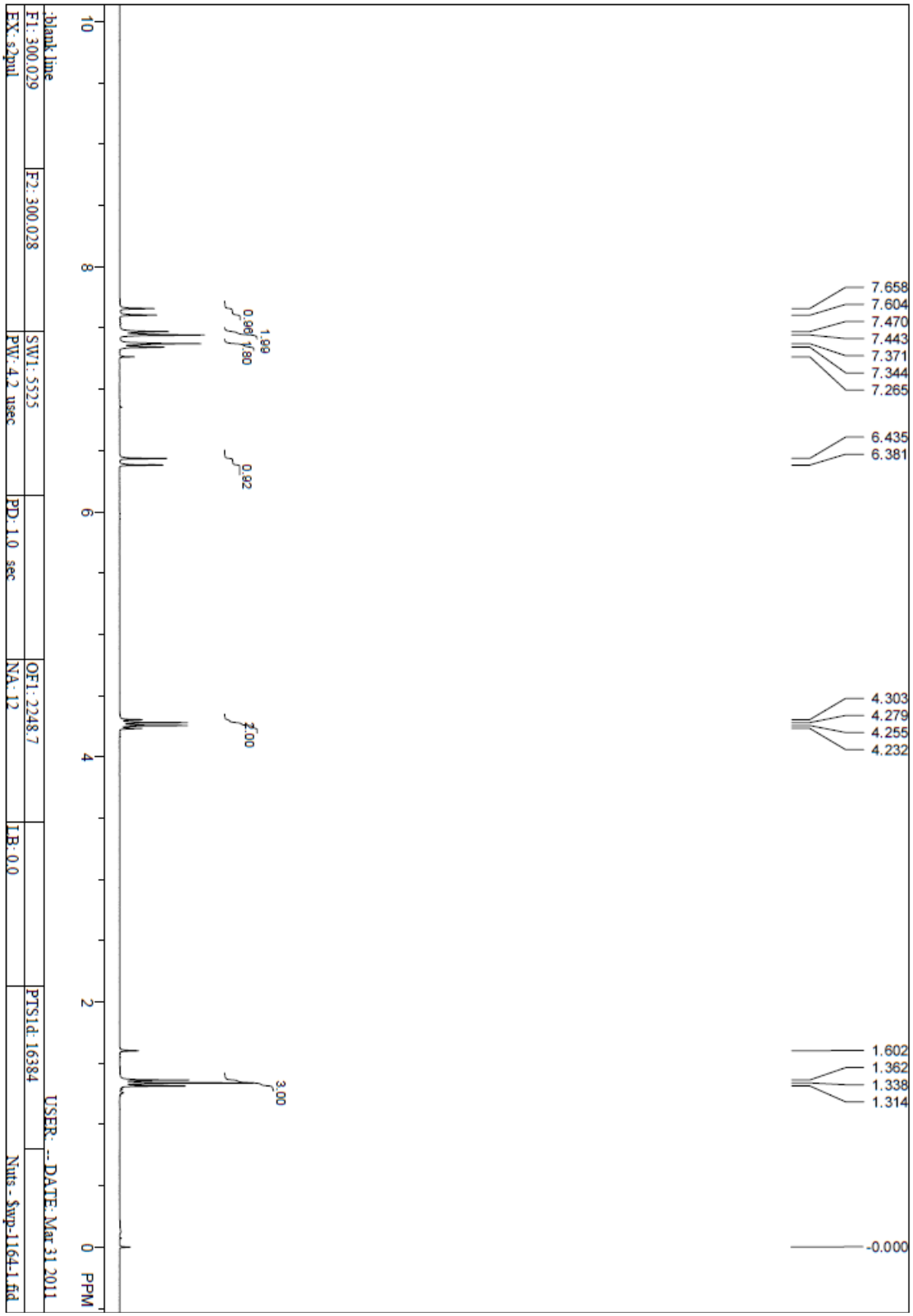
^{1}H NMR (300 MHz in CDCl3)

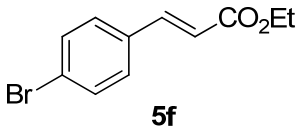




5e

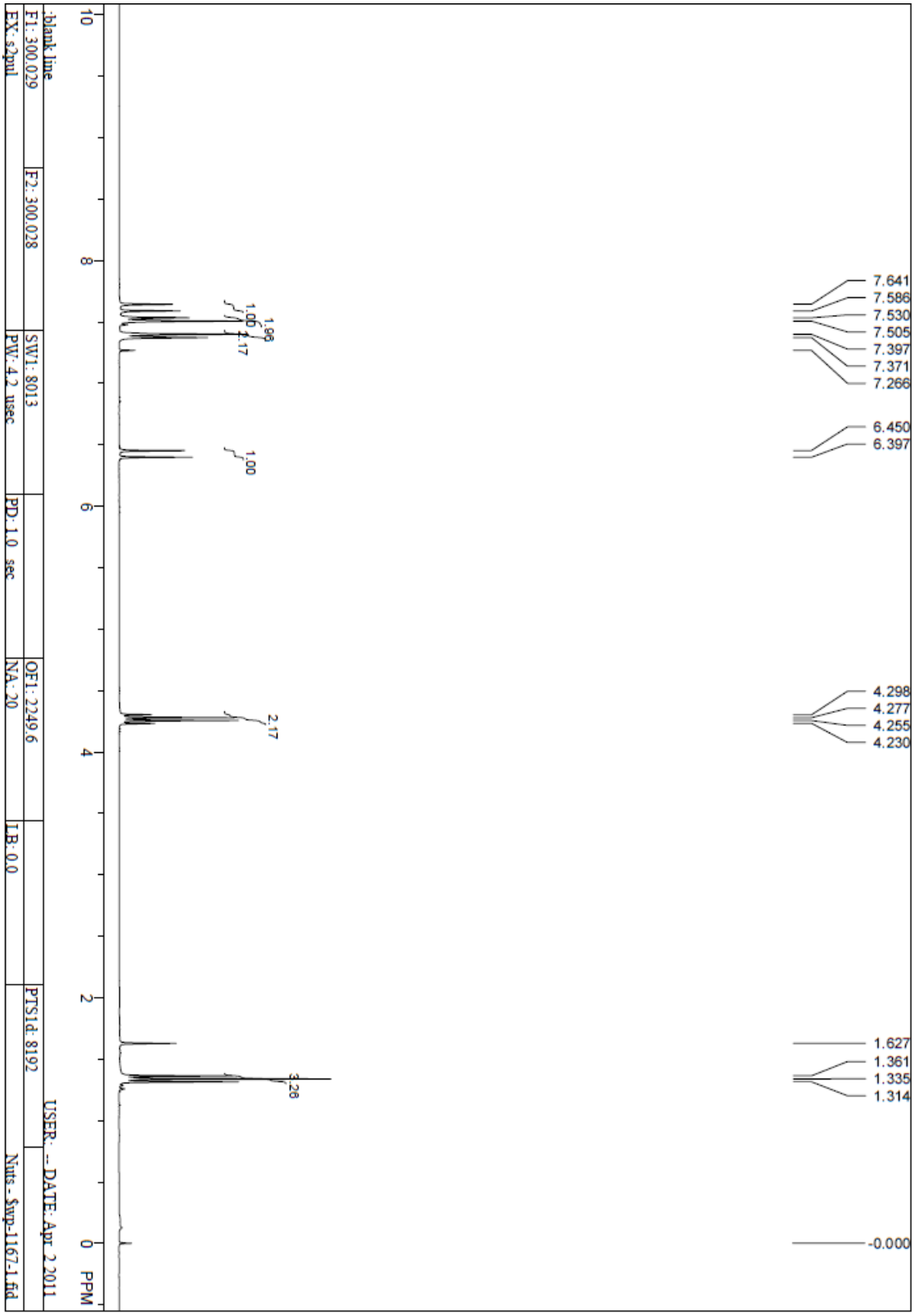
^{1}H NMR (300 MHz in $CDCl_3$)

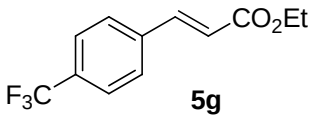




5f

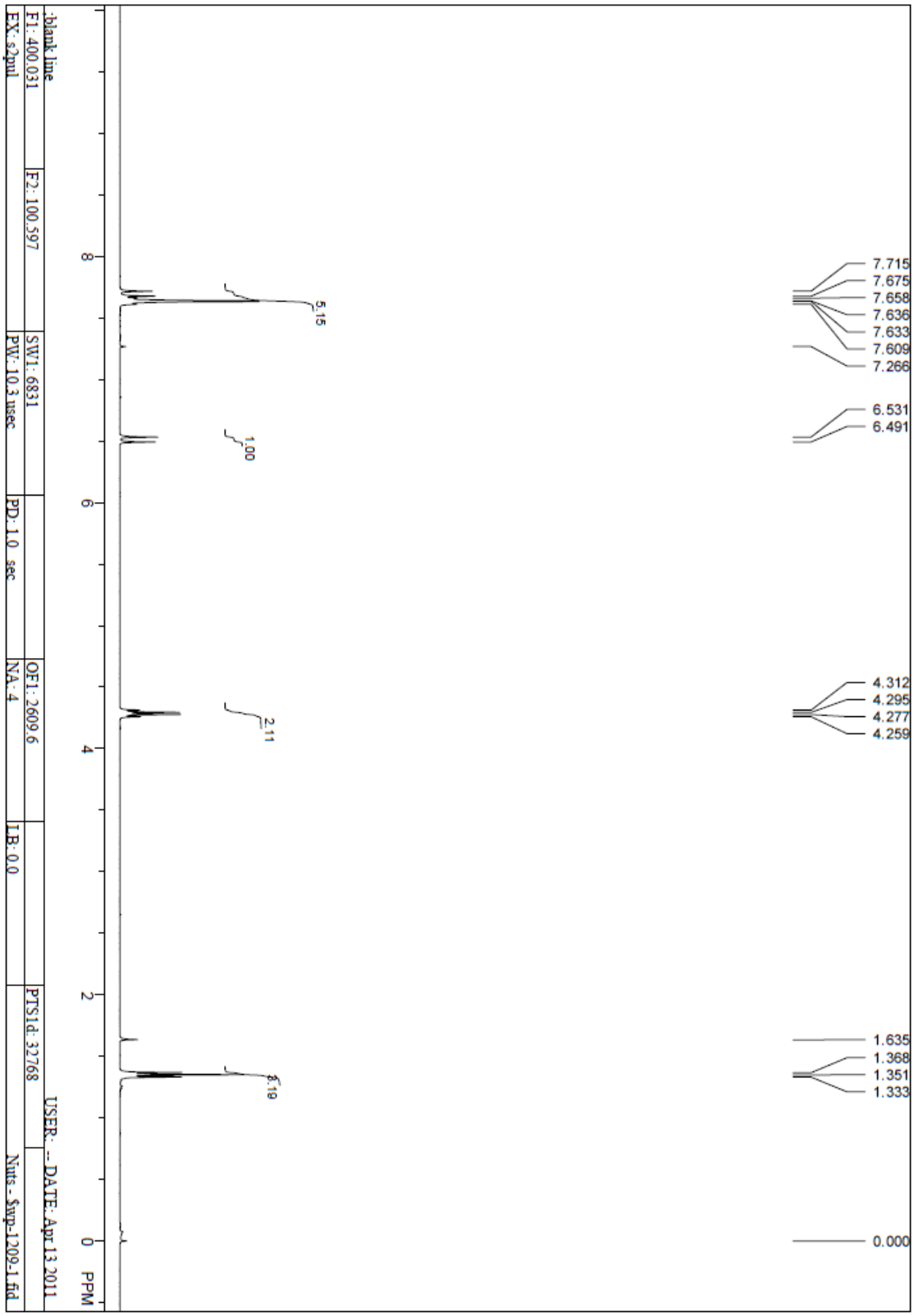
^{1}H NMR (300 MHz in $CDCl_3$)

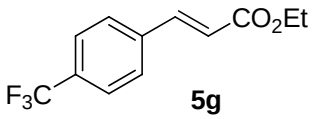




5g

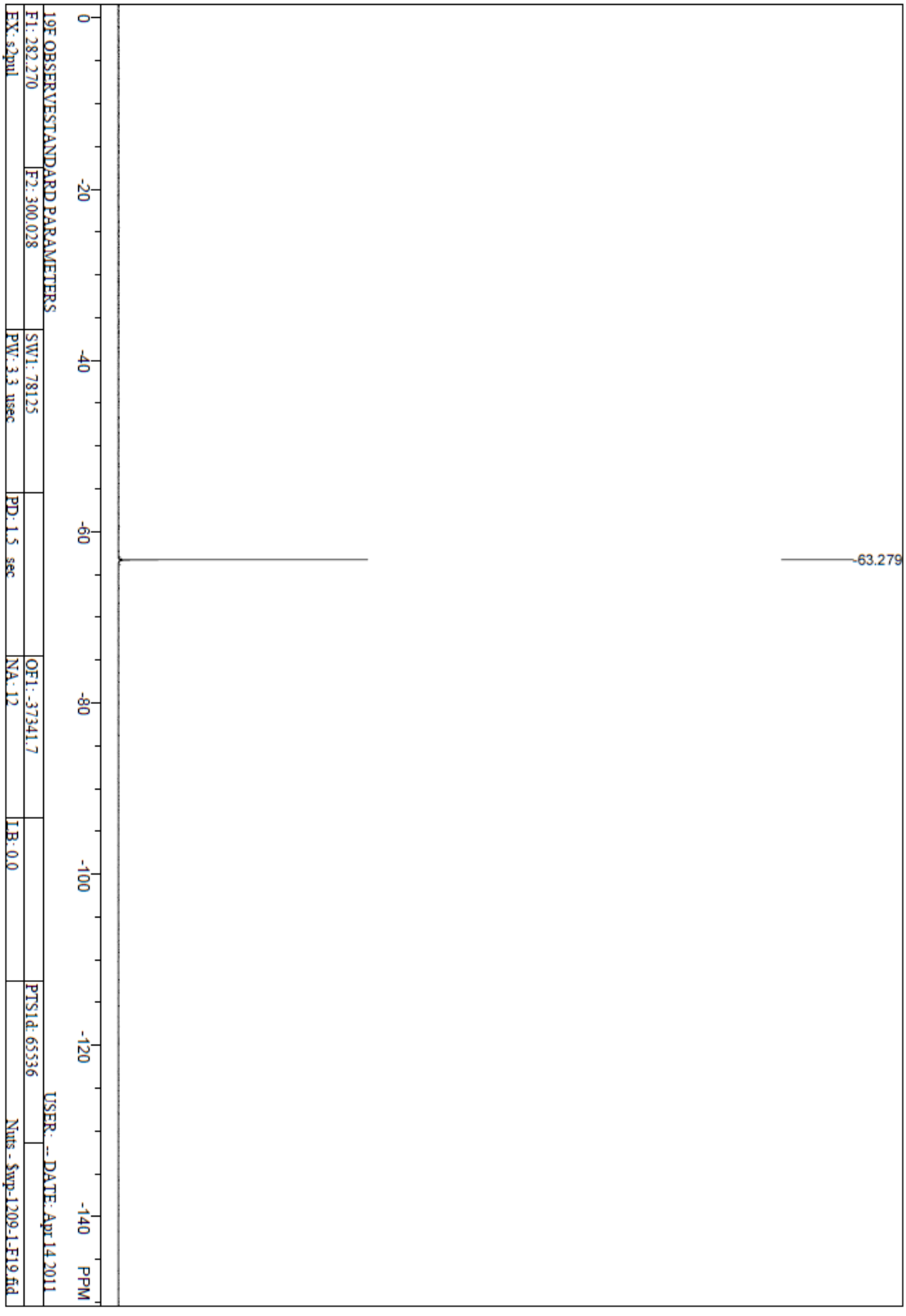
^{1}H NMR (400 MHz in $CDCl_3$)

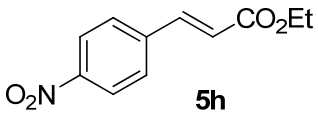




5g

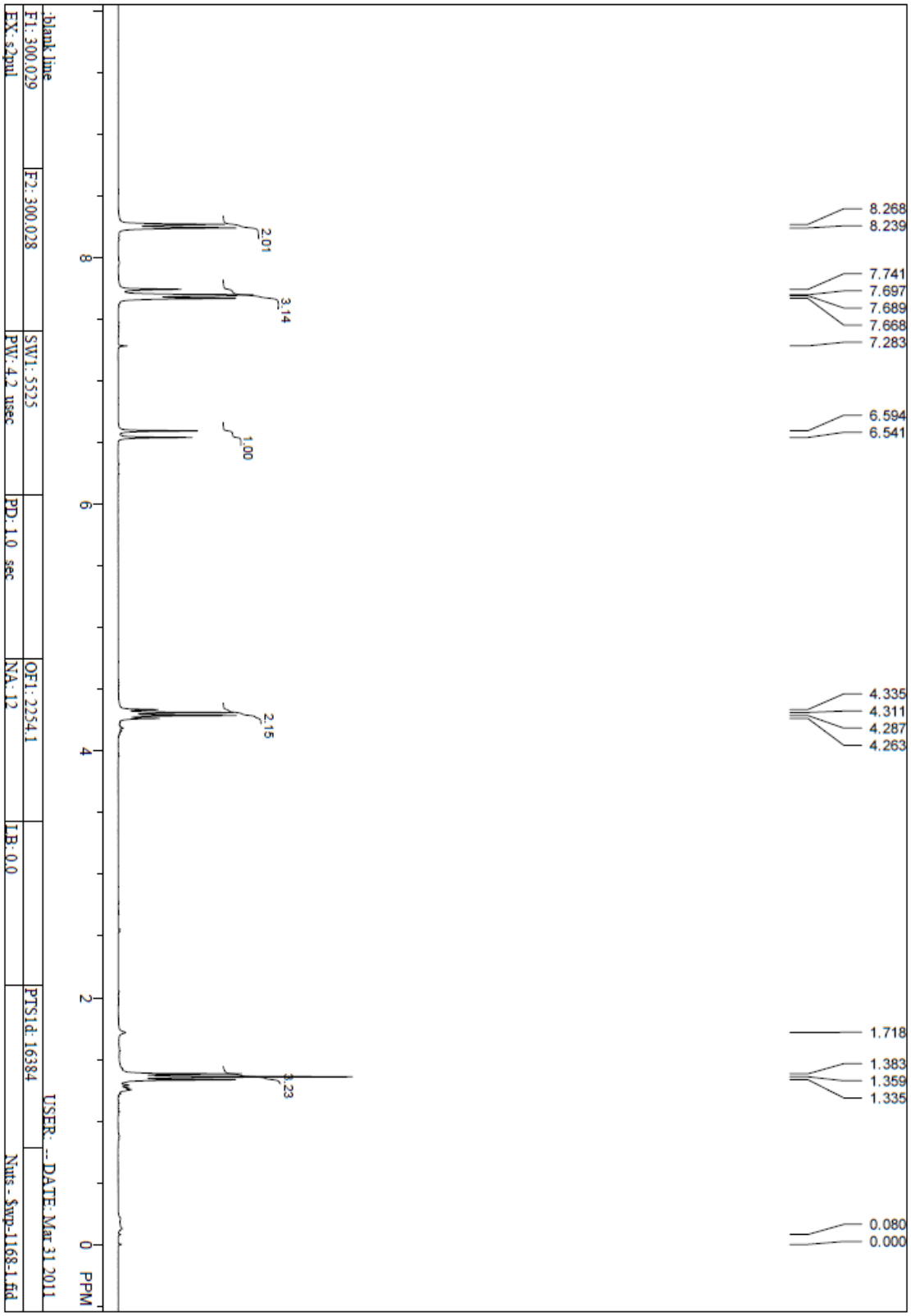
^{19}F NMR (282 MHz in $CDCl_3$)

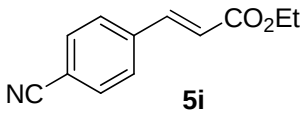




5h

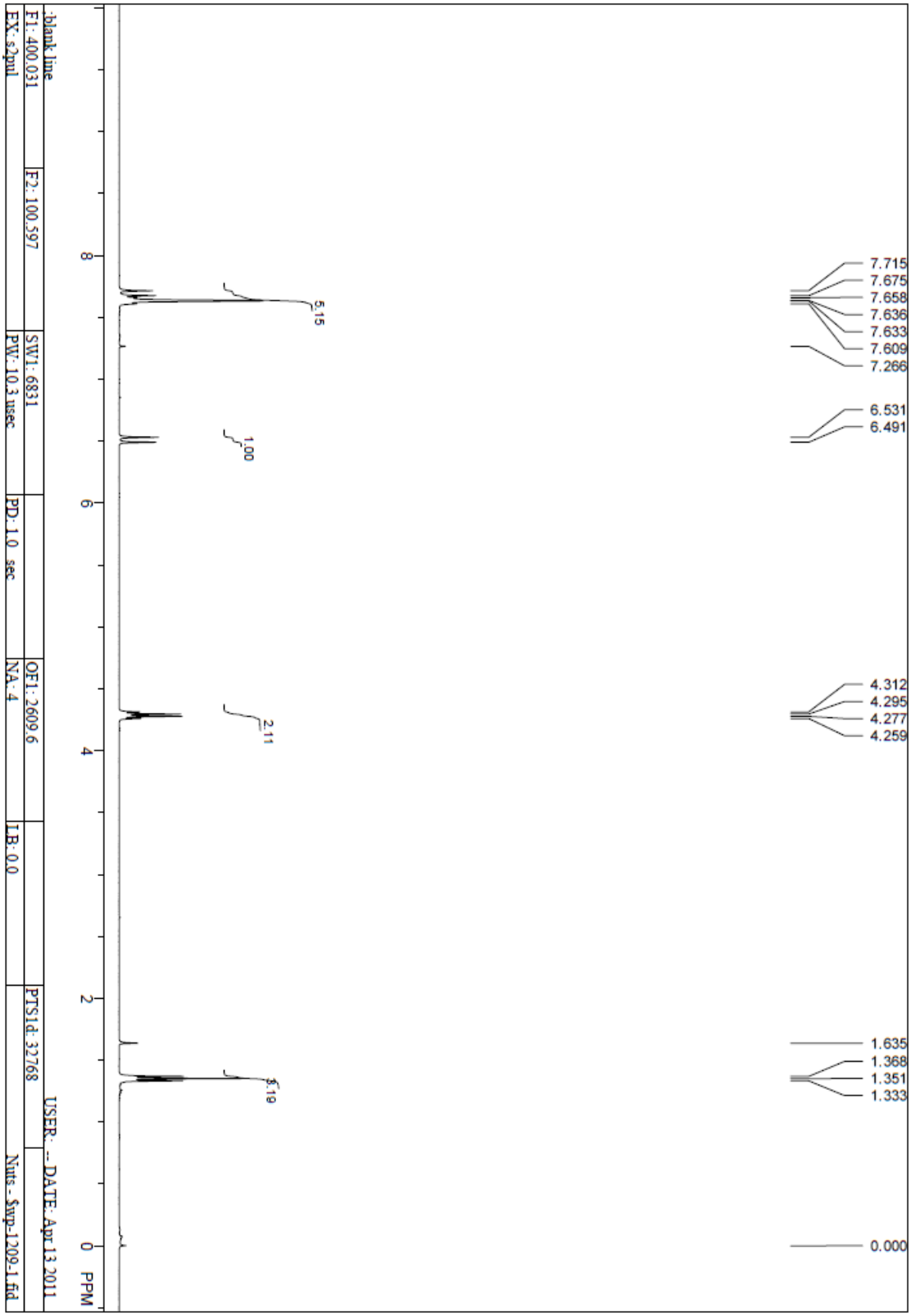
^{1}H NMR (300 MHz in $CDCl_3$)

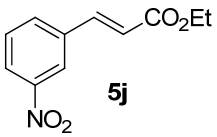




5i

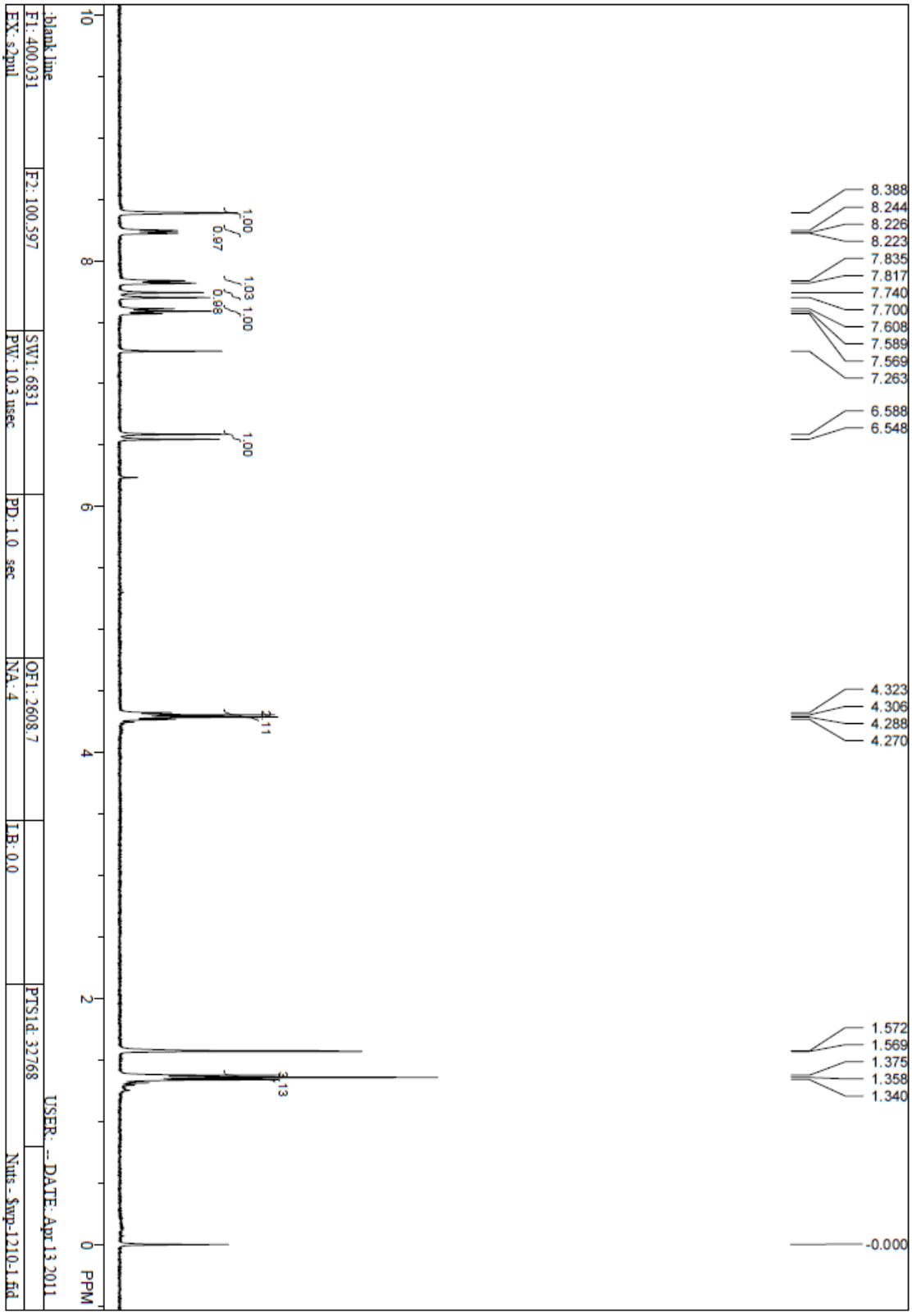
^{1}H NMR (400 MHz in $CDCl_3$)

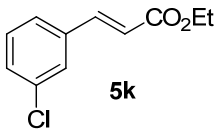




5j

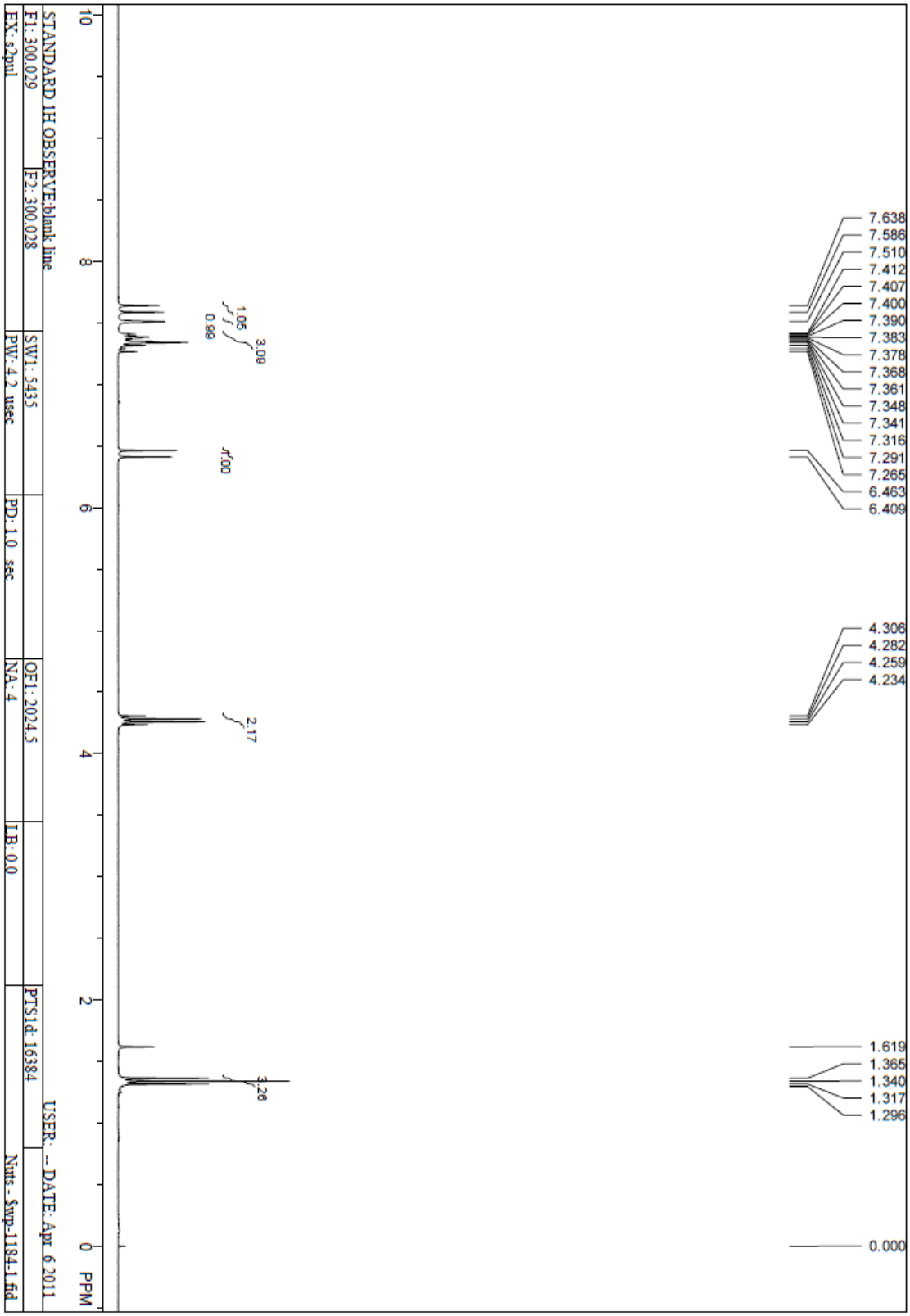
^{1}H NMR (400 MHz in $CDCl_3$)

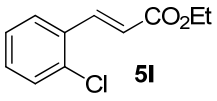




5k

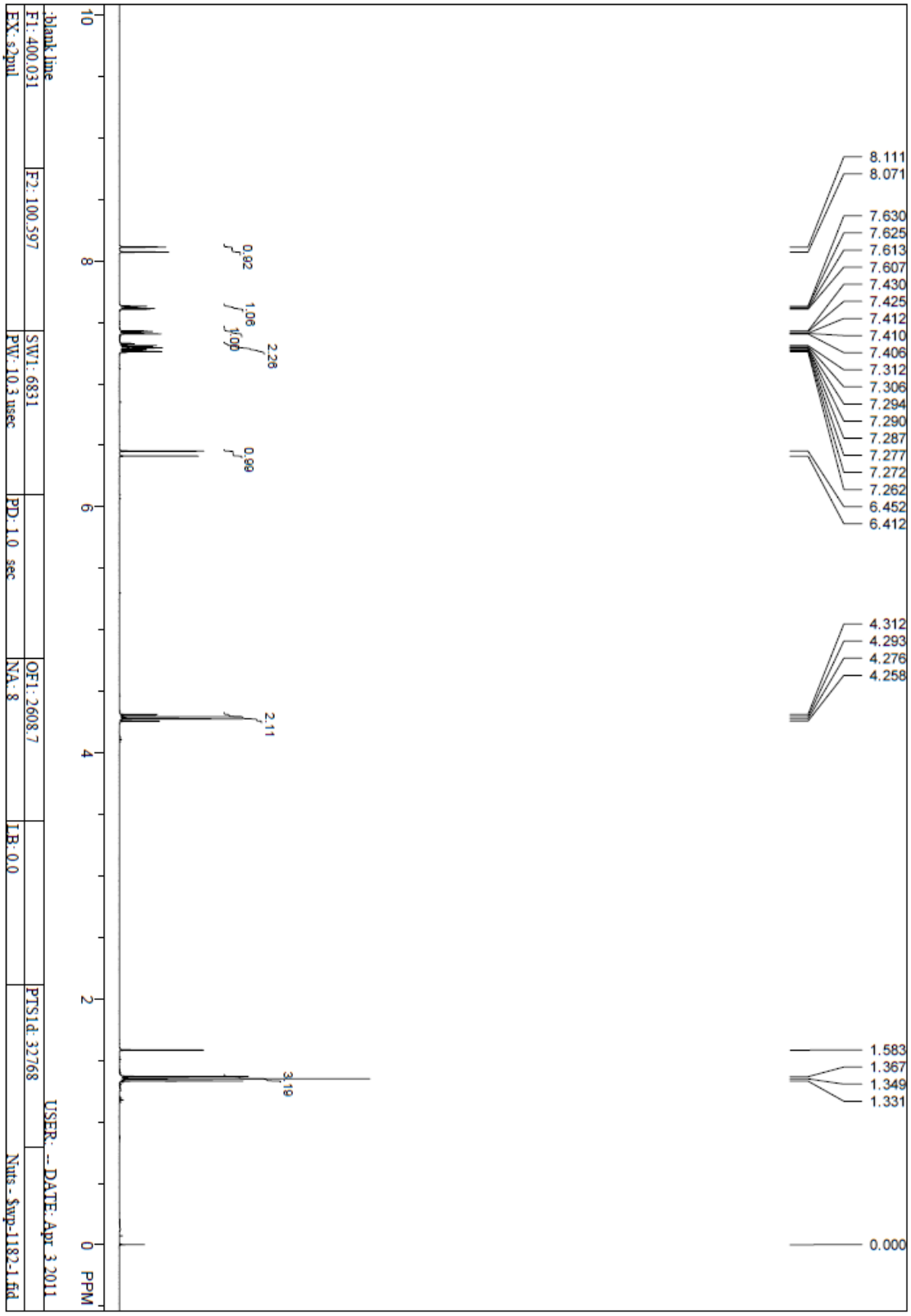
^{1}H NMR (300 MHz in $CDCl_3$)

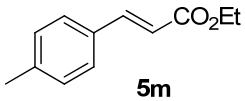




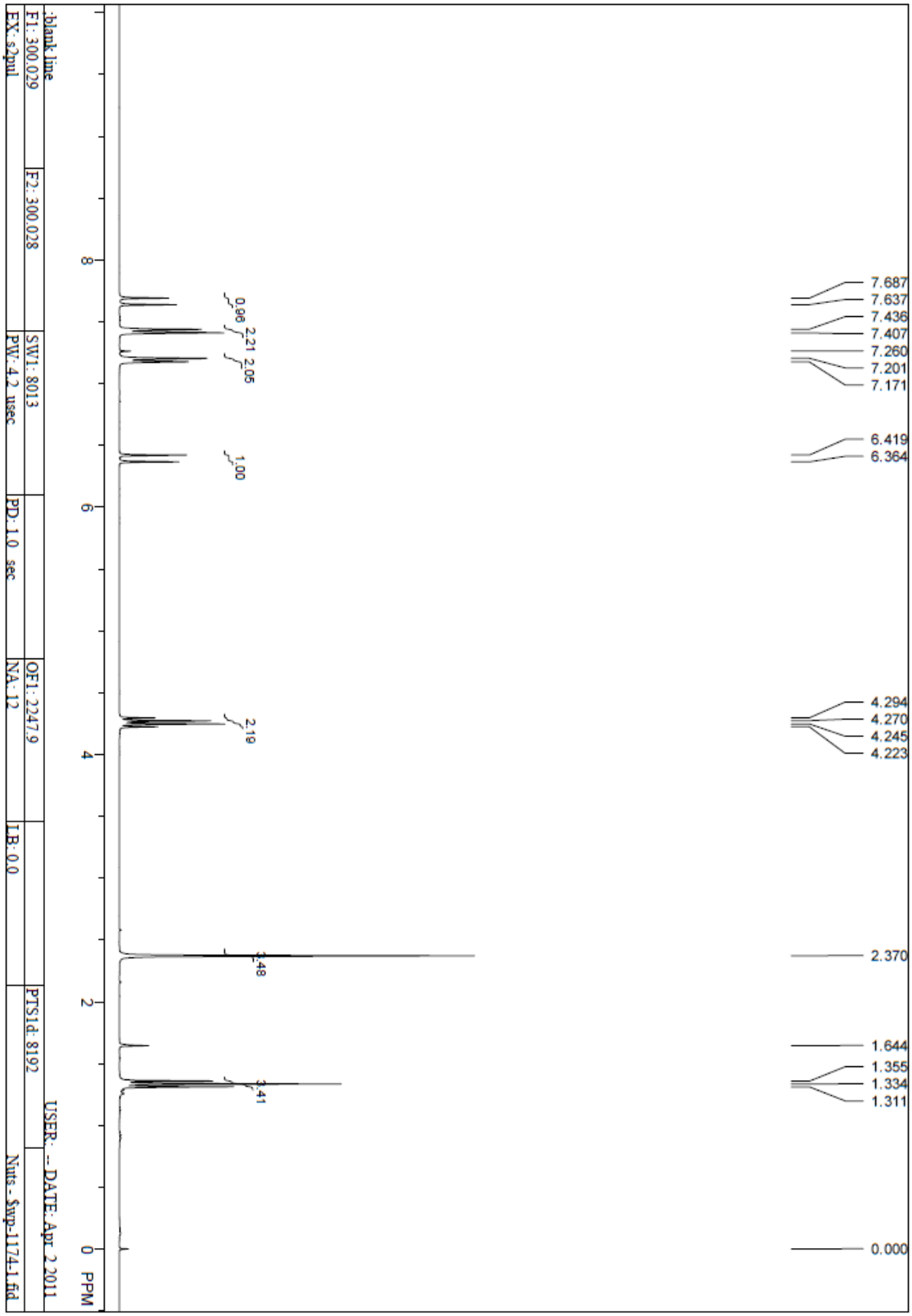
5l

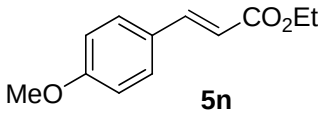
^{1}H NMR (400 MHz in $CDCl_3$)





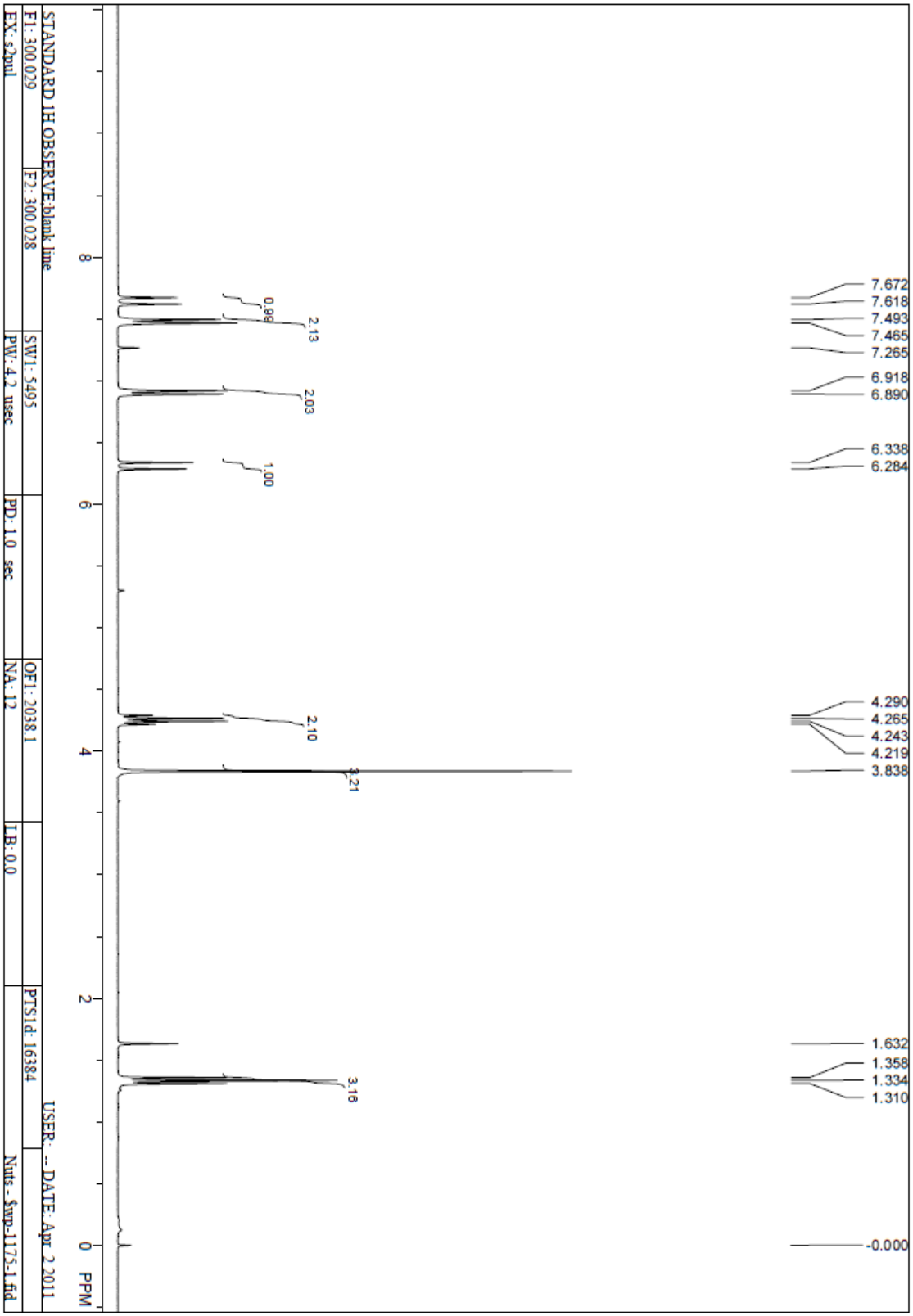
5m ^{1}H NMR (300 MHz in $CDCl_3$)

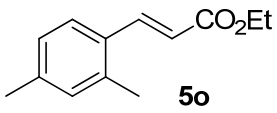




5n

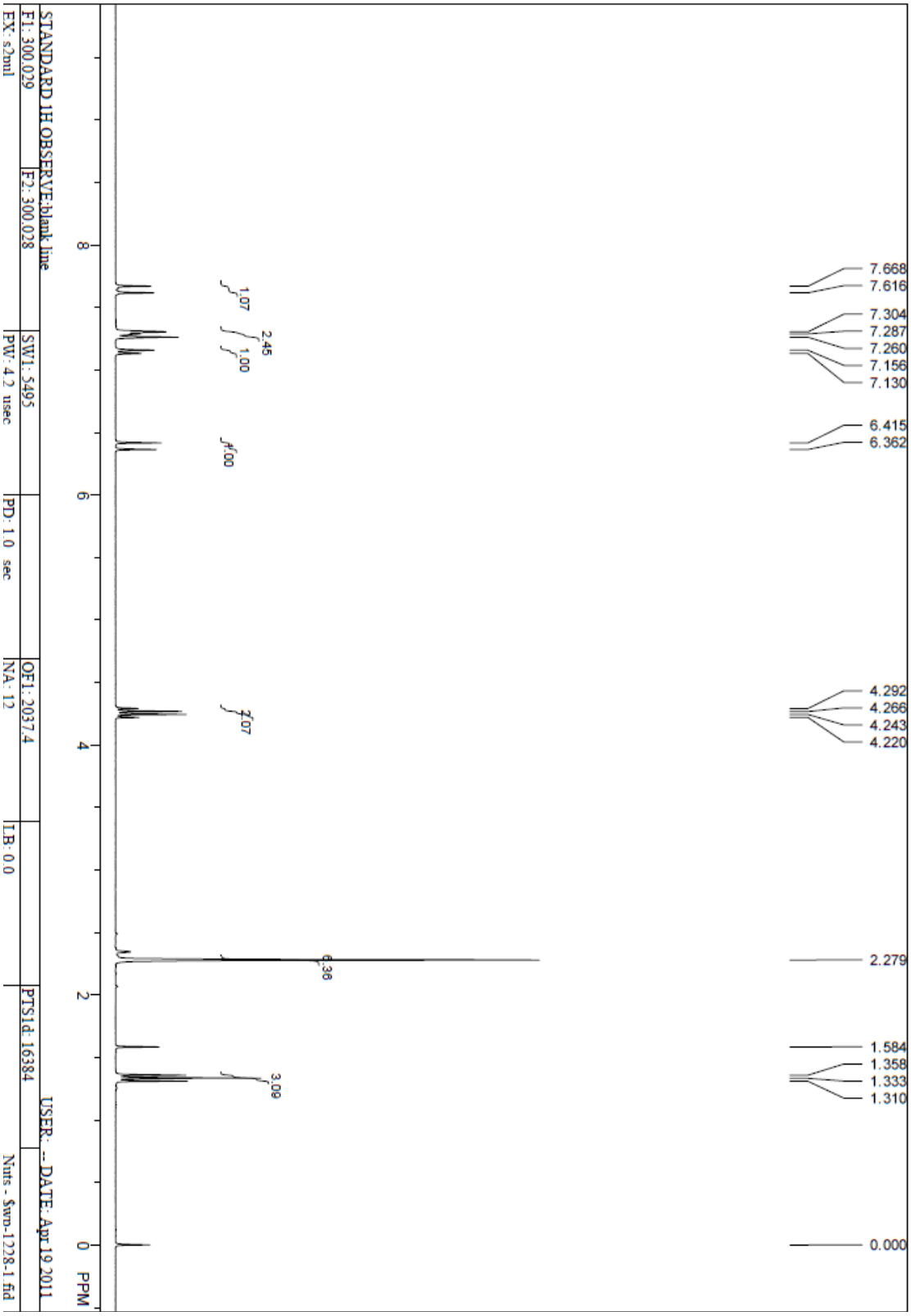
^{1}H NMR (300 MHz in $CDCl_3$)

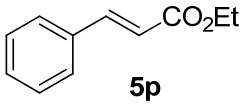




5o

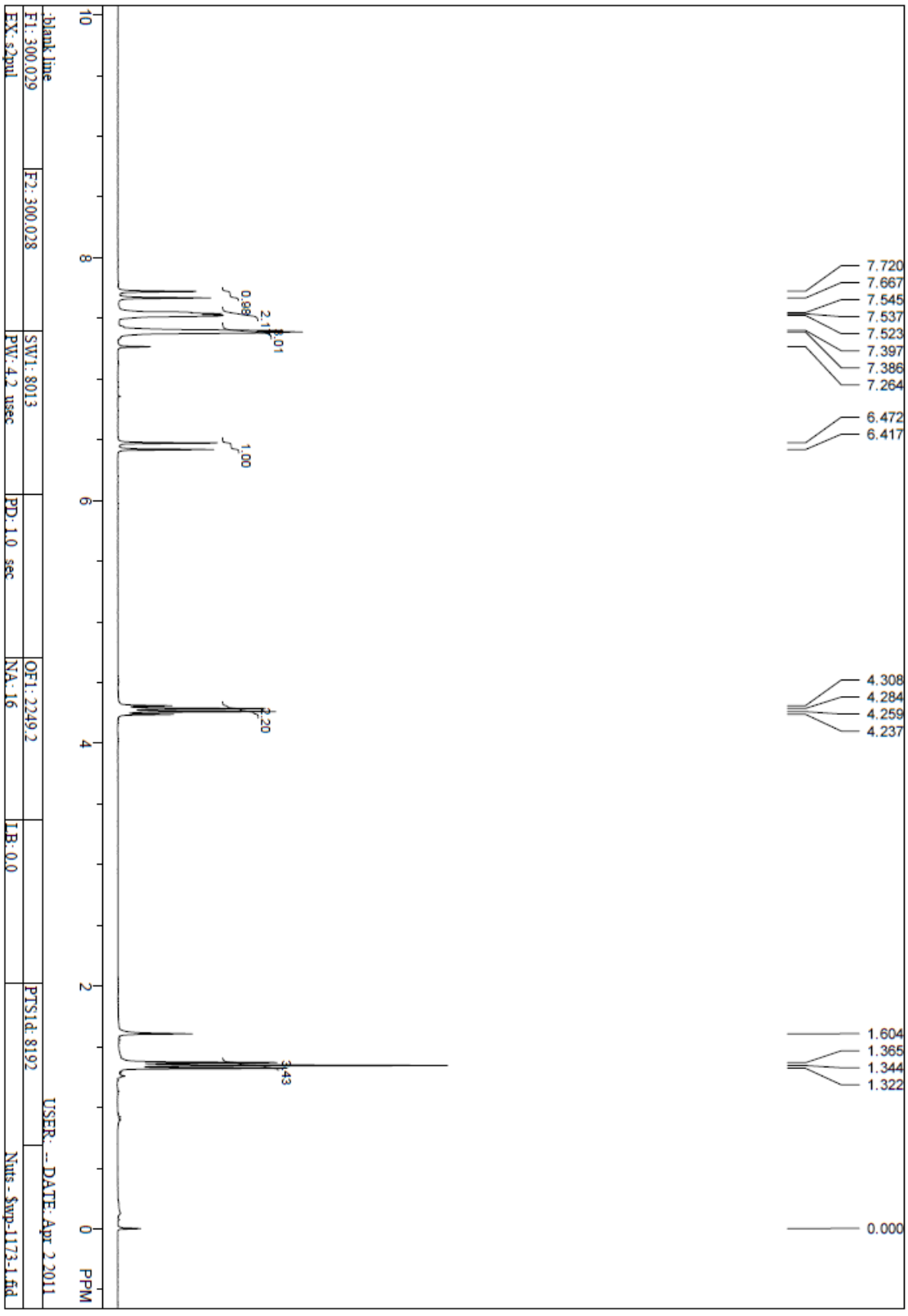
^{1}H NMR (300 MHz in $CDCl_3$)

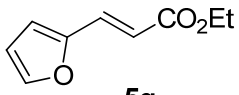




5p

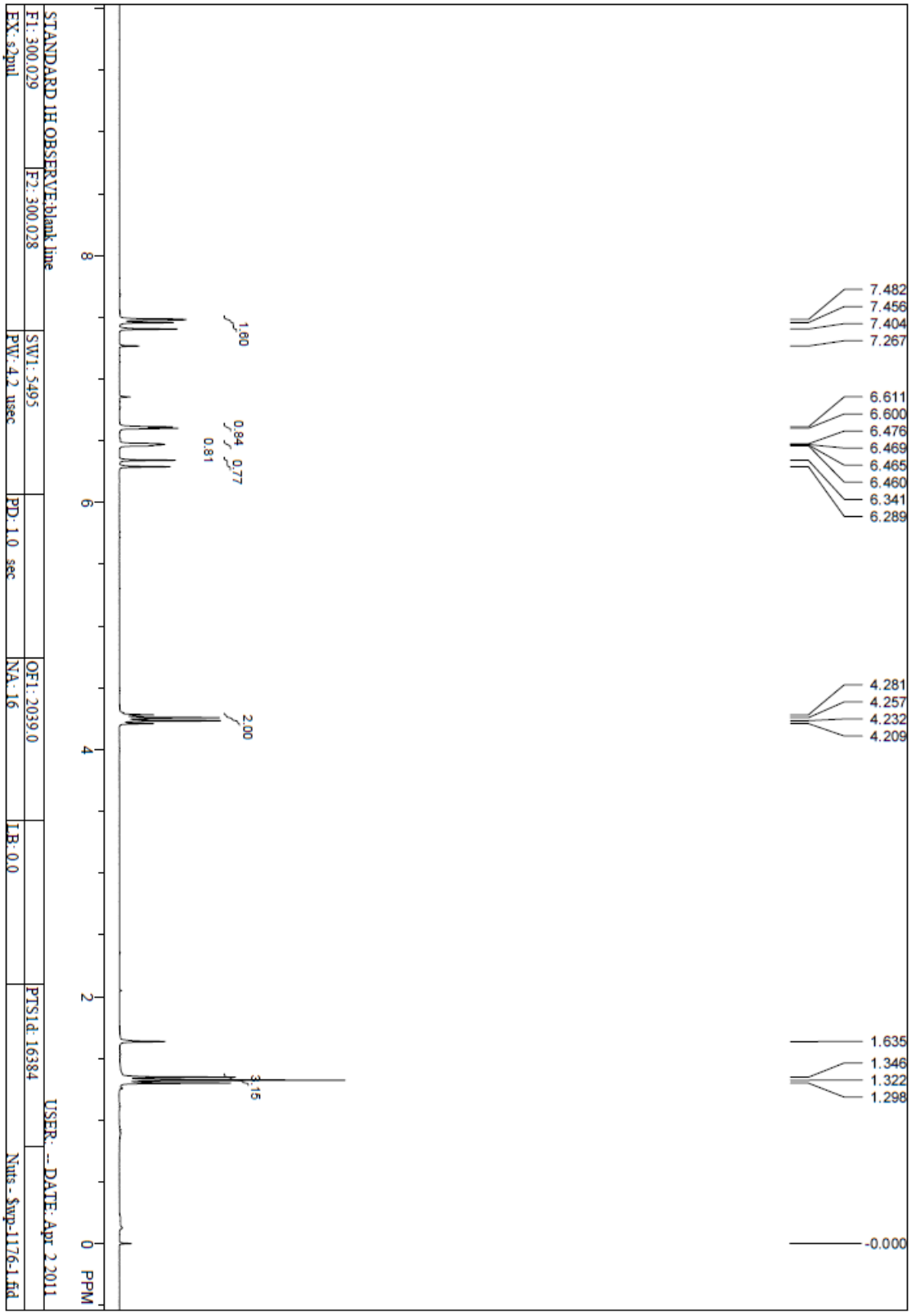
^{1}H NMR (300 MHz in $CDCl_3$)

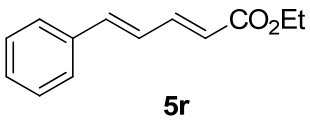




5q

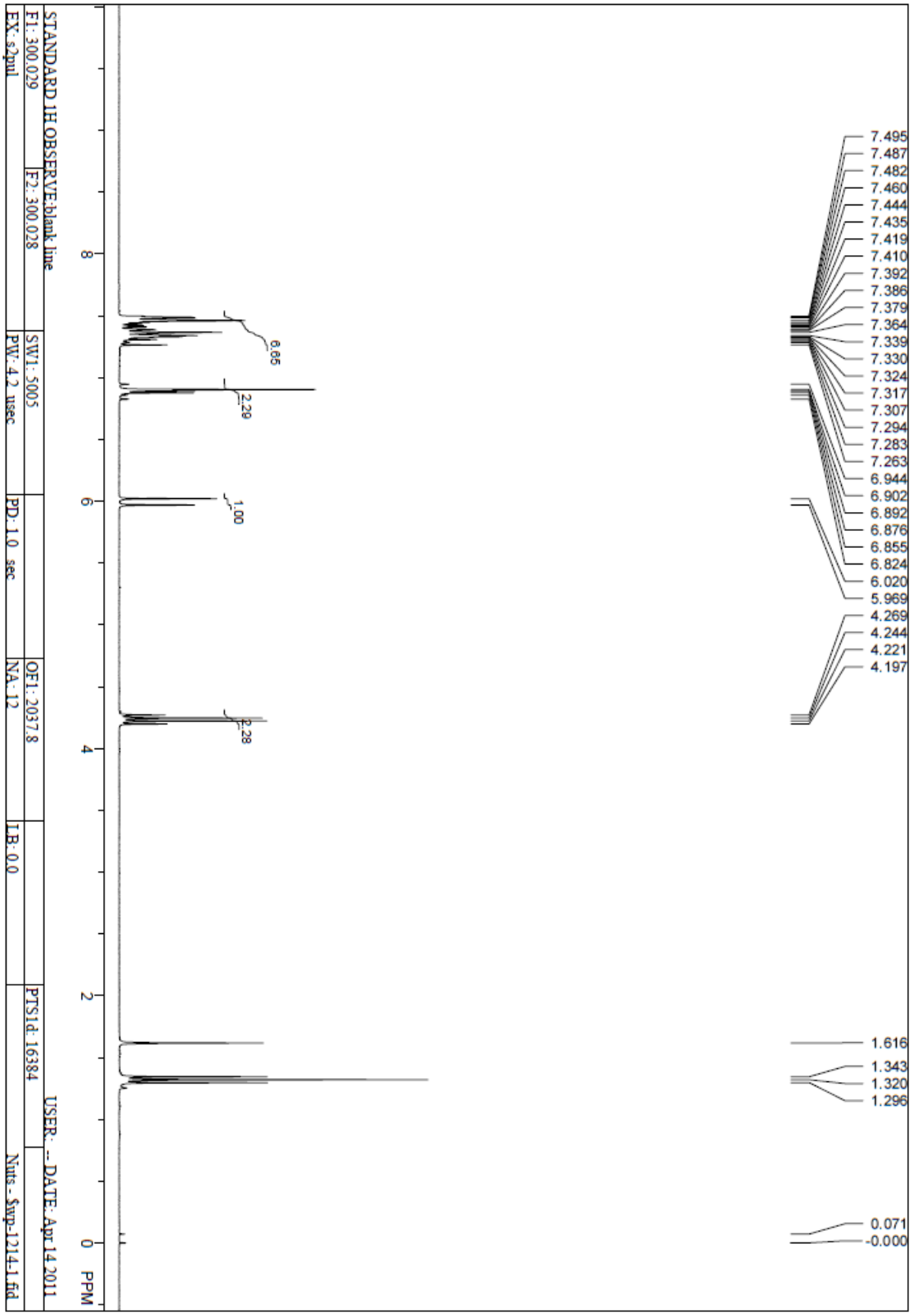
^{1}H NMR (300 MHz in $CDCl_3$)

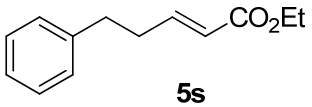




5r

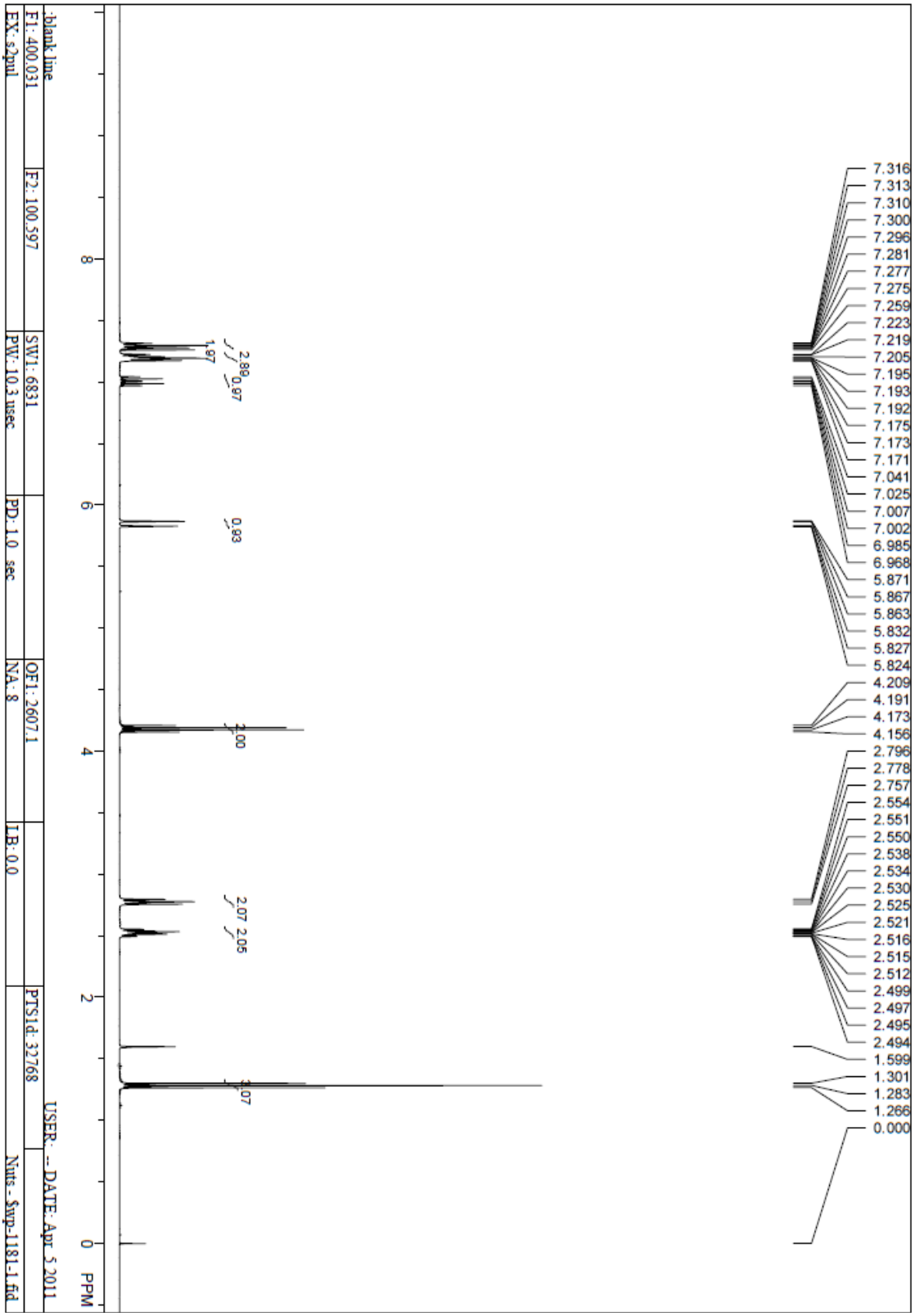
^{1}H NMR (300 MHz in $CDCl_3$)

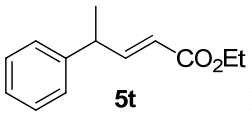




5s

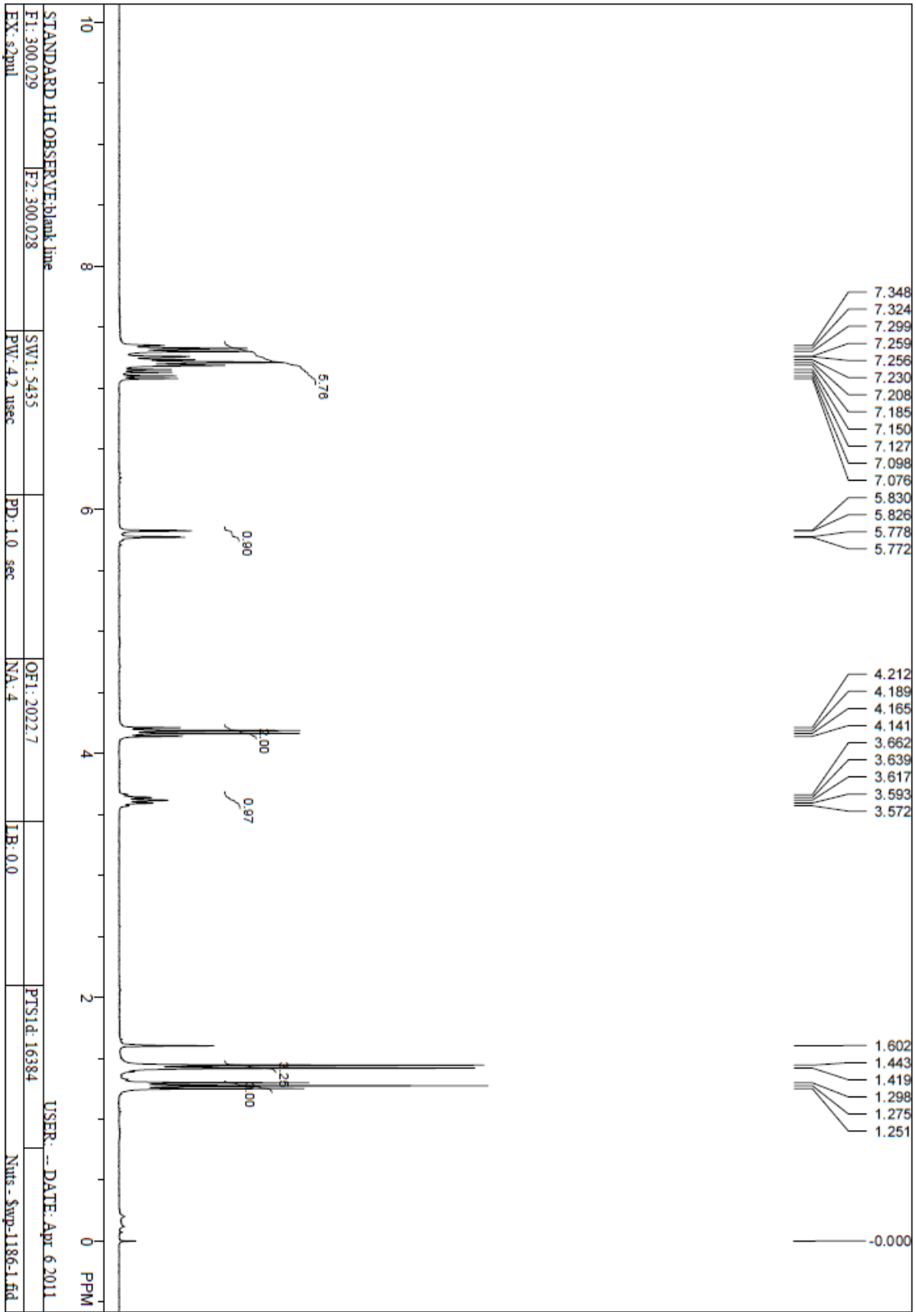
^{1}H NMR (400 MHz in $CDCl_3$)

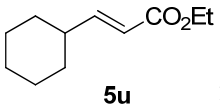




5t

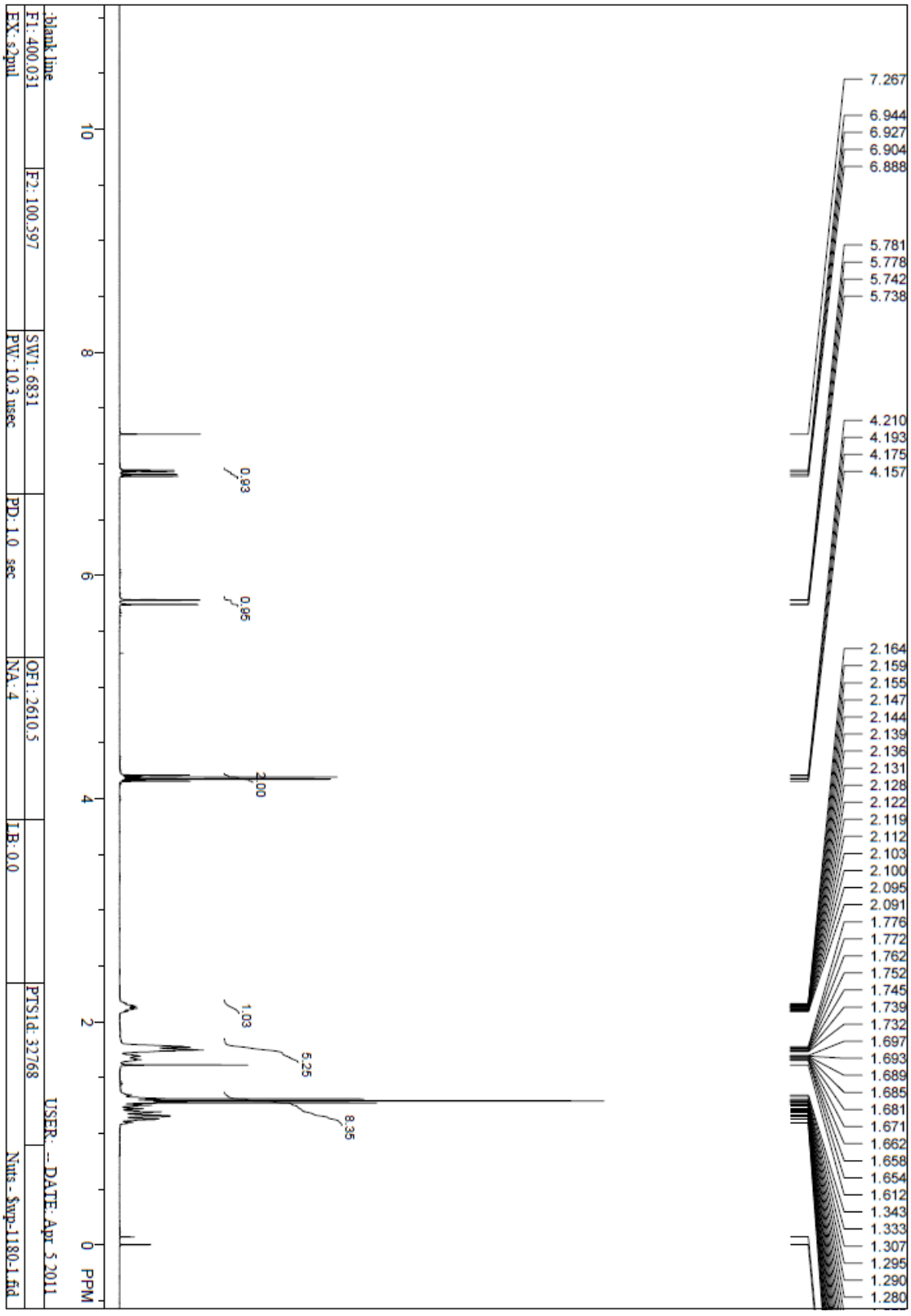
^{1}H NMR (300 MHz in $CDCl_3$)

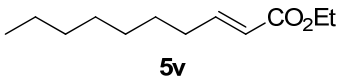




5u

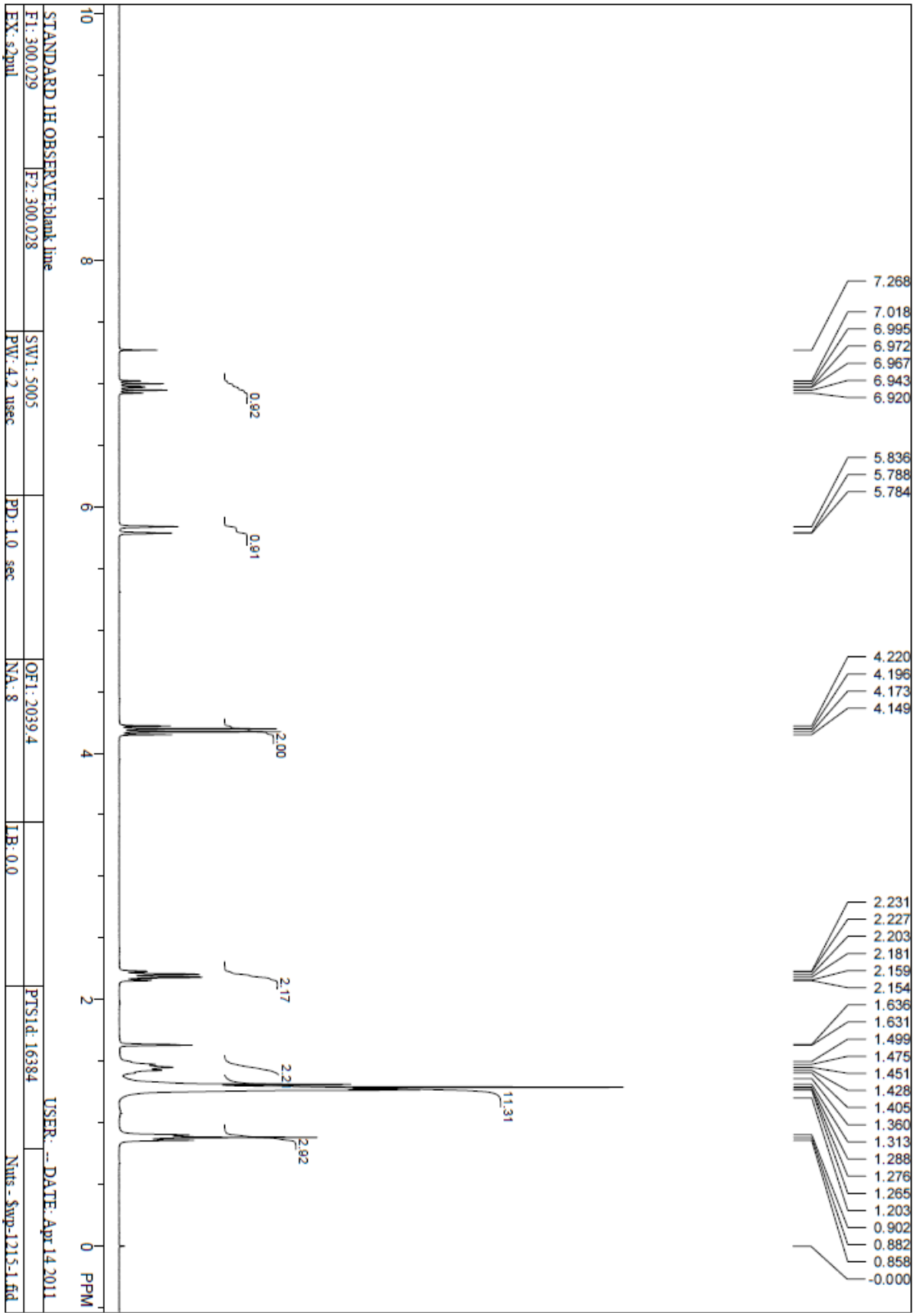
^{1}H NMR (400 MHz in $CDCl_3$)

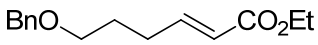




5v

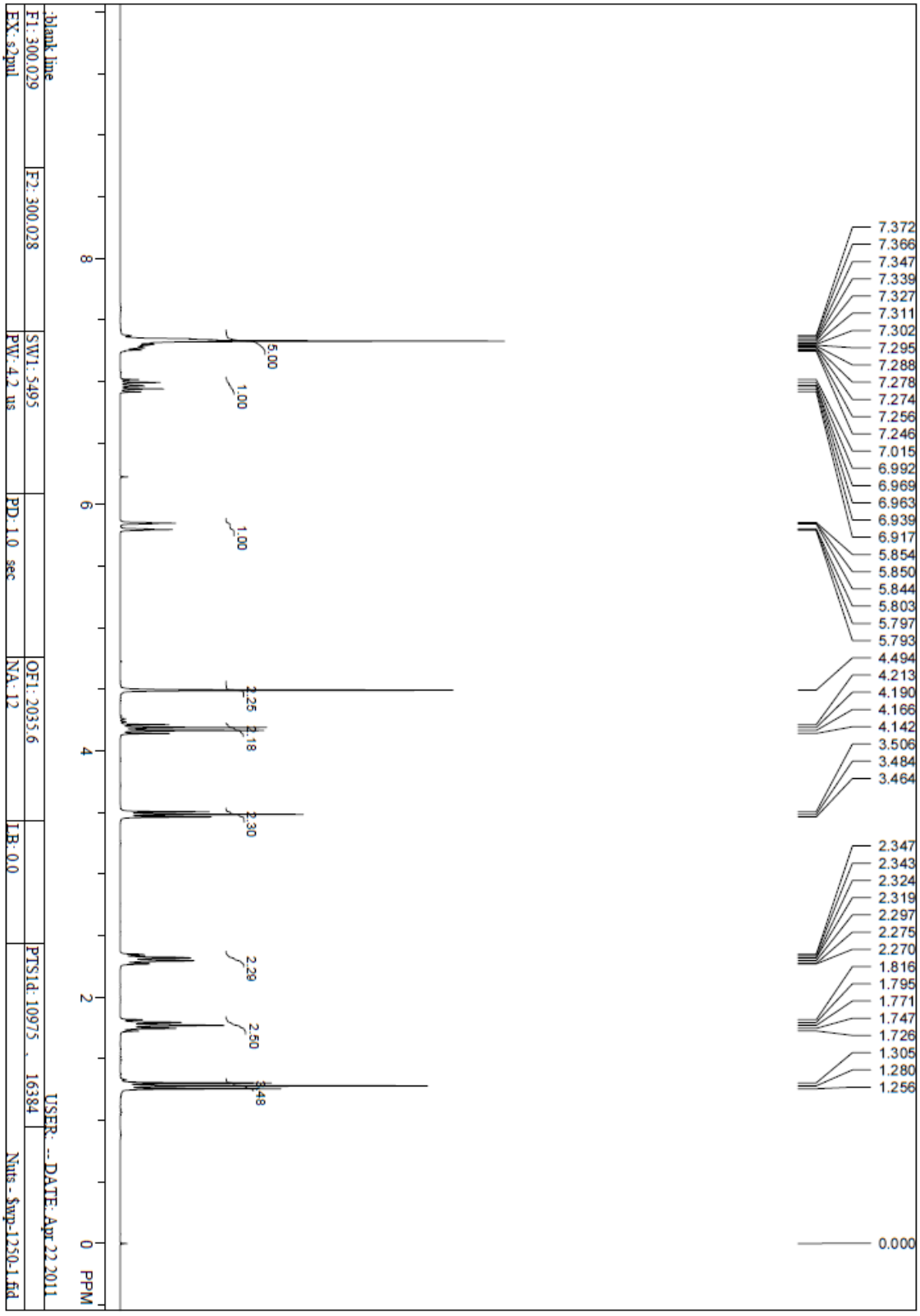
^{1}H NMR (300 MHz in $CDCl_3$)

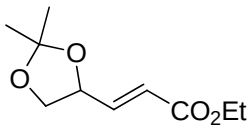




5w

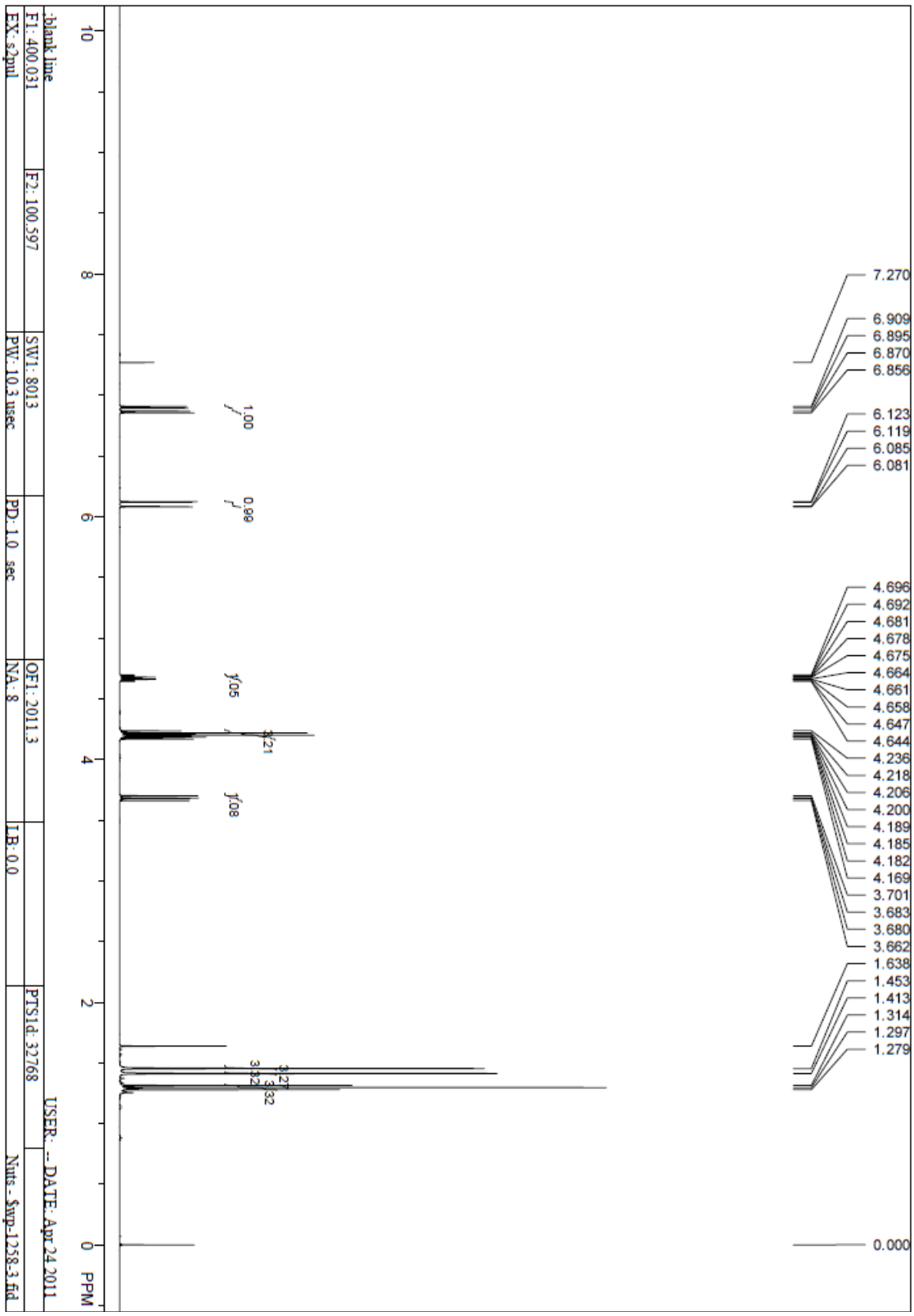
^{1}H NMR (300 MHz in $CDCl_3$)

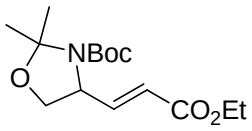




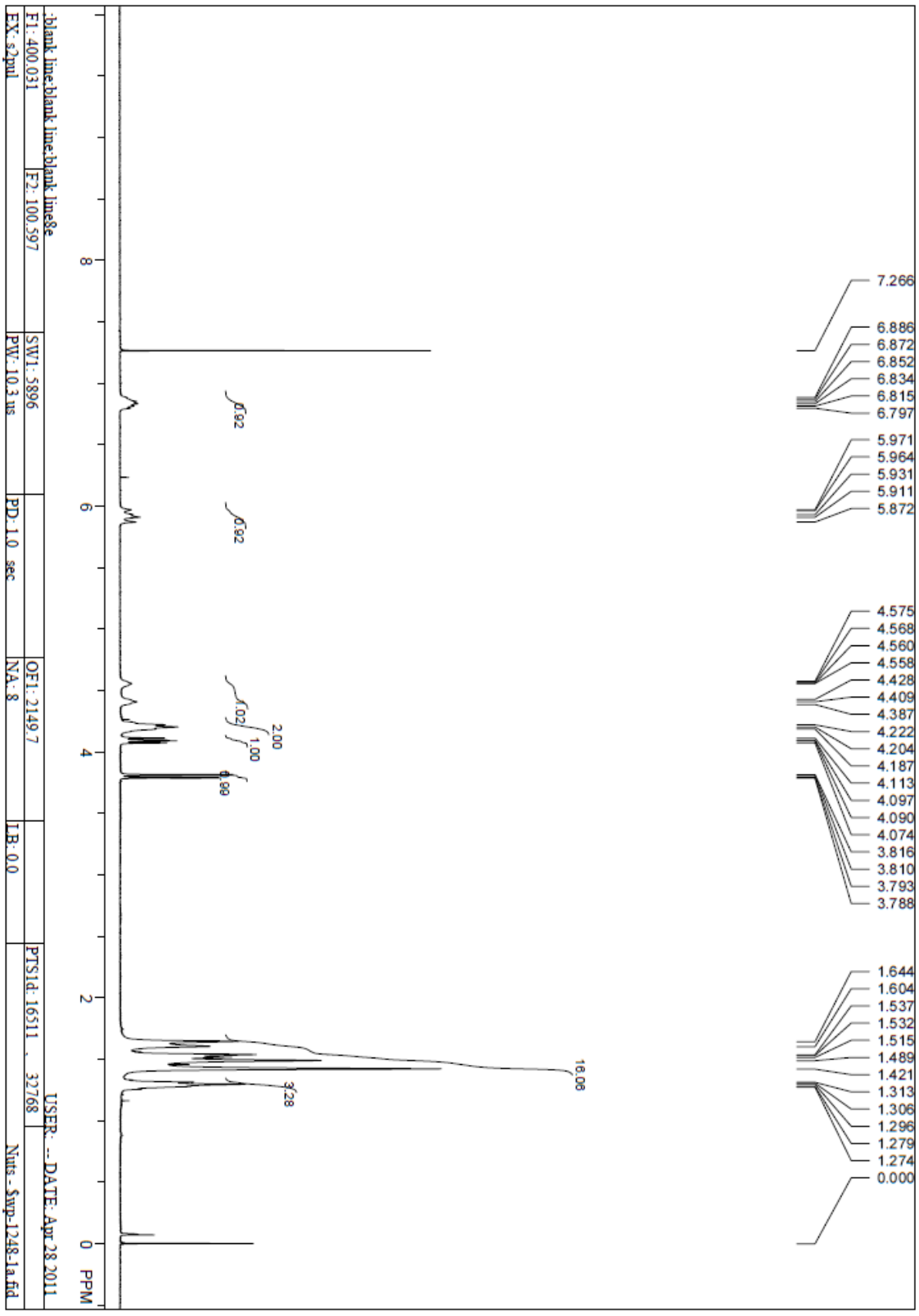
5x

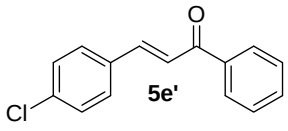
^{1}H NMR (400 MHz in $CDCl_3$)





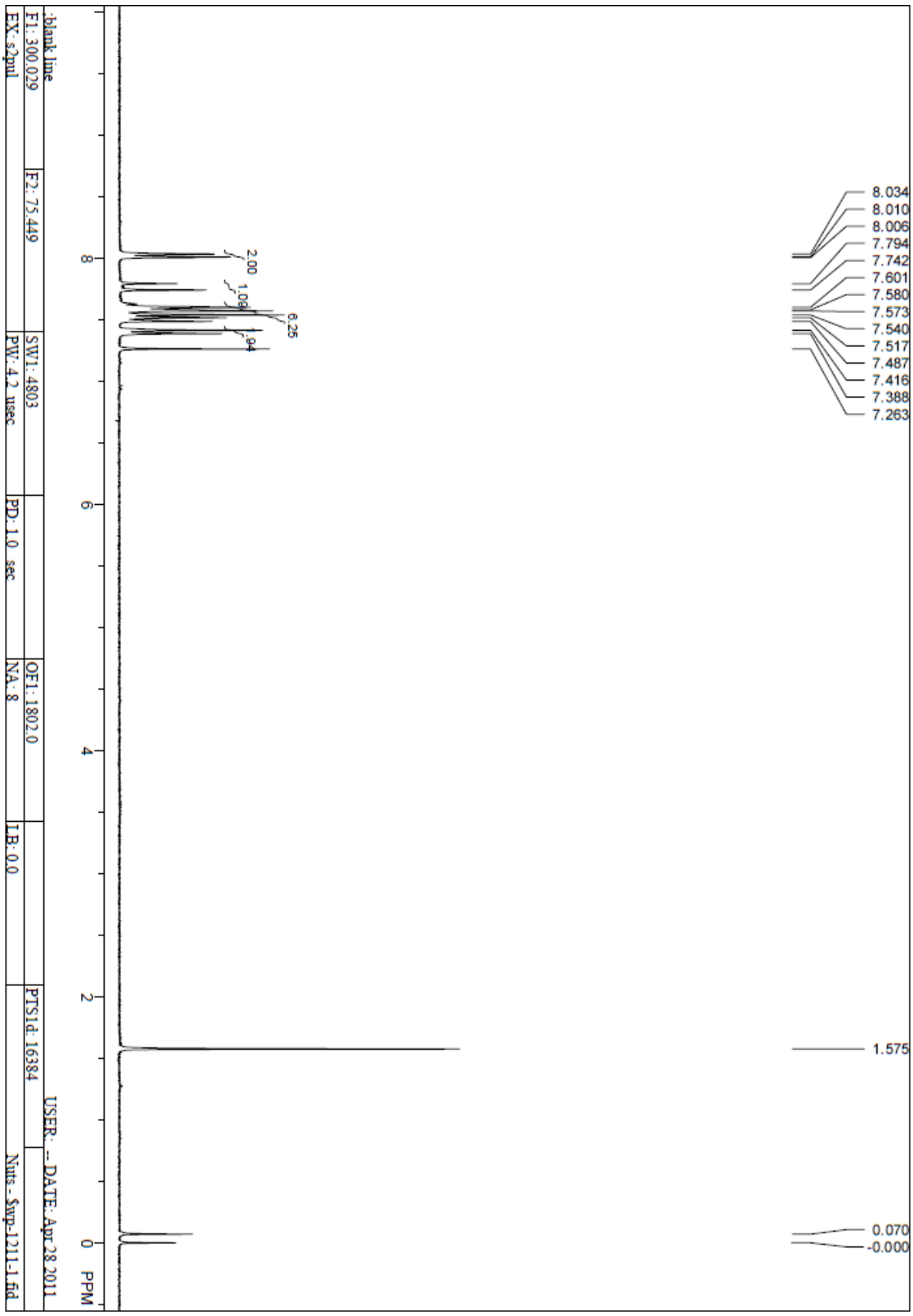
5y ^{1}H NMR (400 MHz in $CDCl_3$)

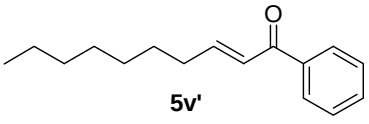




5e'

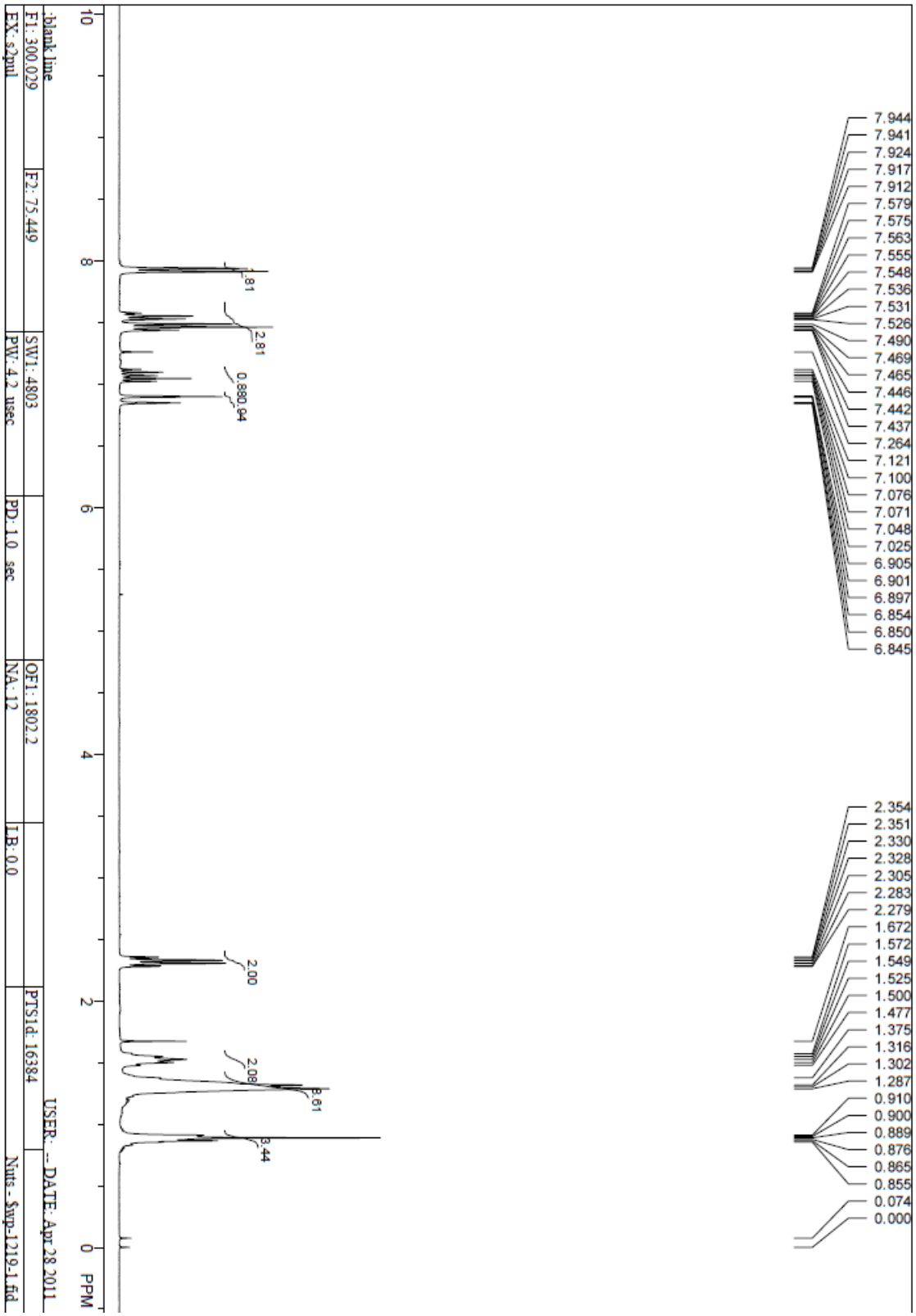
^{1}H NMR (300 MHz in $CDCl_3$)

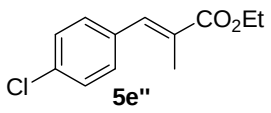




5v'

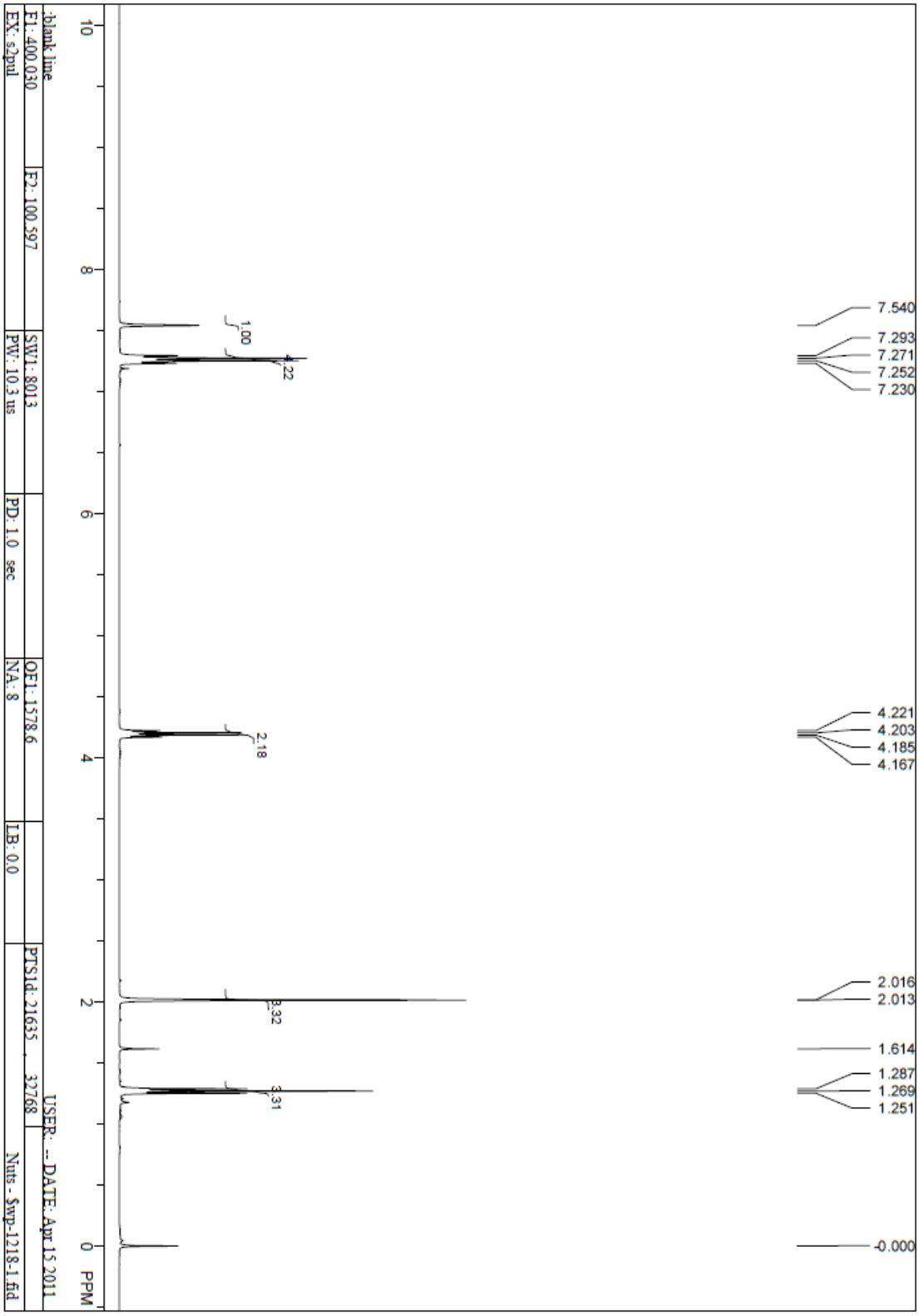
^{1}H NMR (300 MHz in $CDCl_3$)

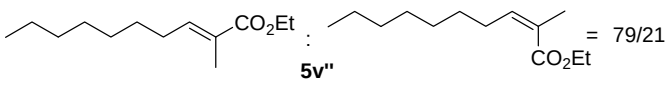




5e''

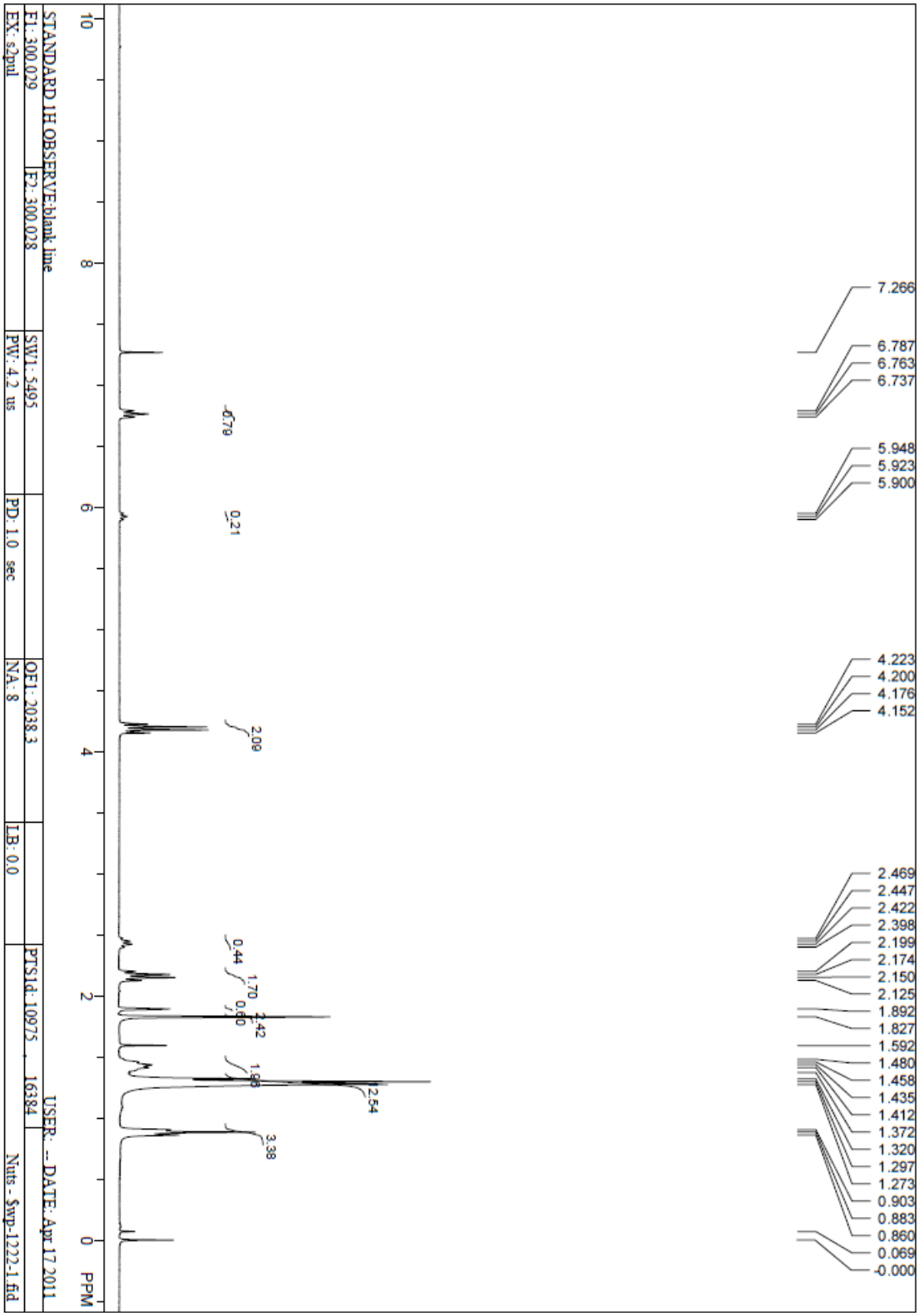
^{1}H NMR (400 MHz in $CDCl_3$)

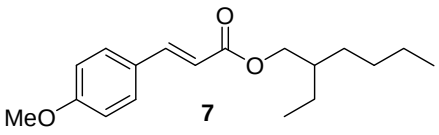




5v''

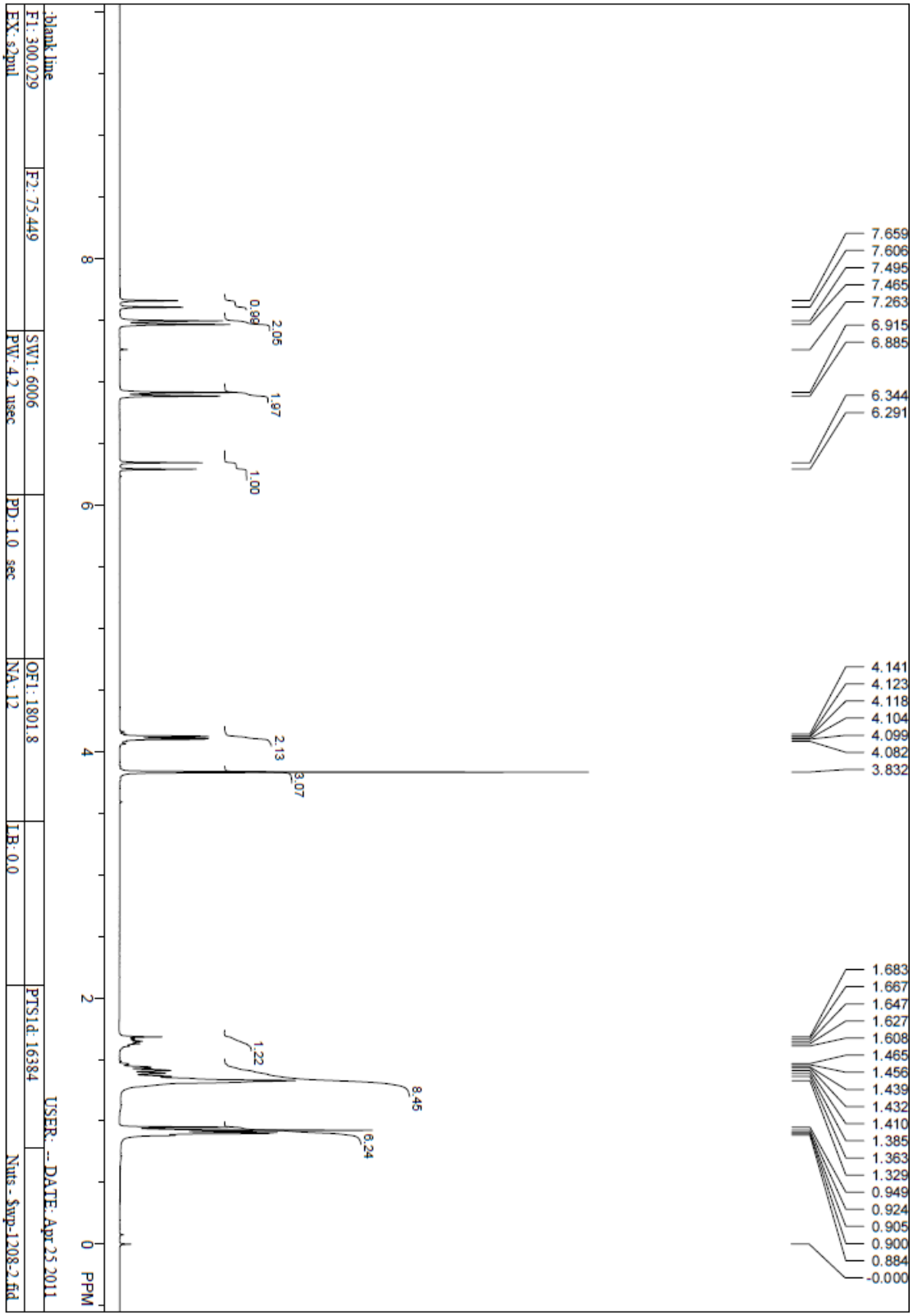
^{1}H NMR (300 MHz in $CDCl_3$)

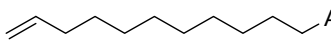




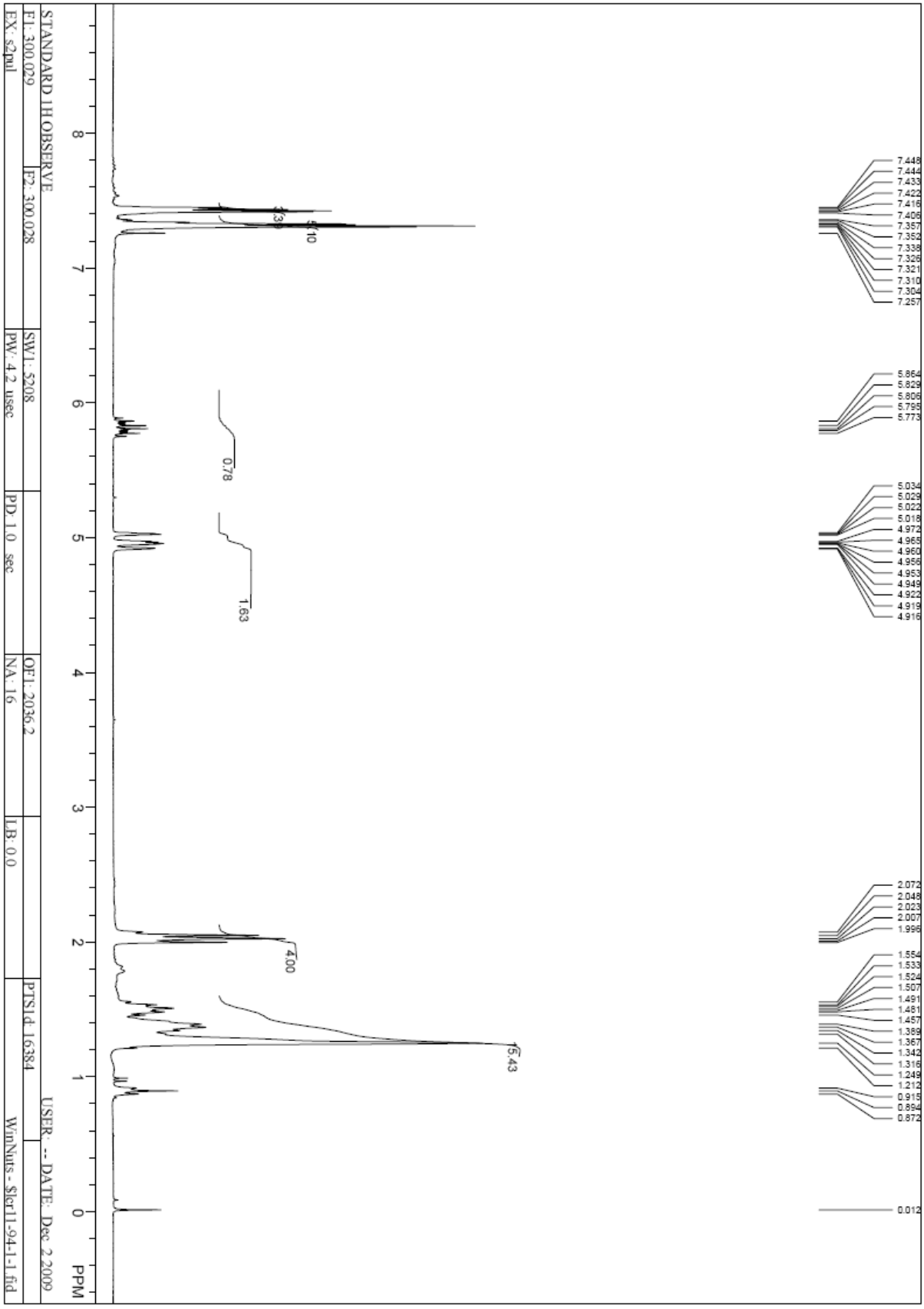
7

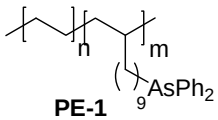
^{1}H NMR (300 MHz in $CDCl_3$)



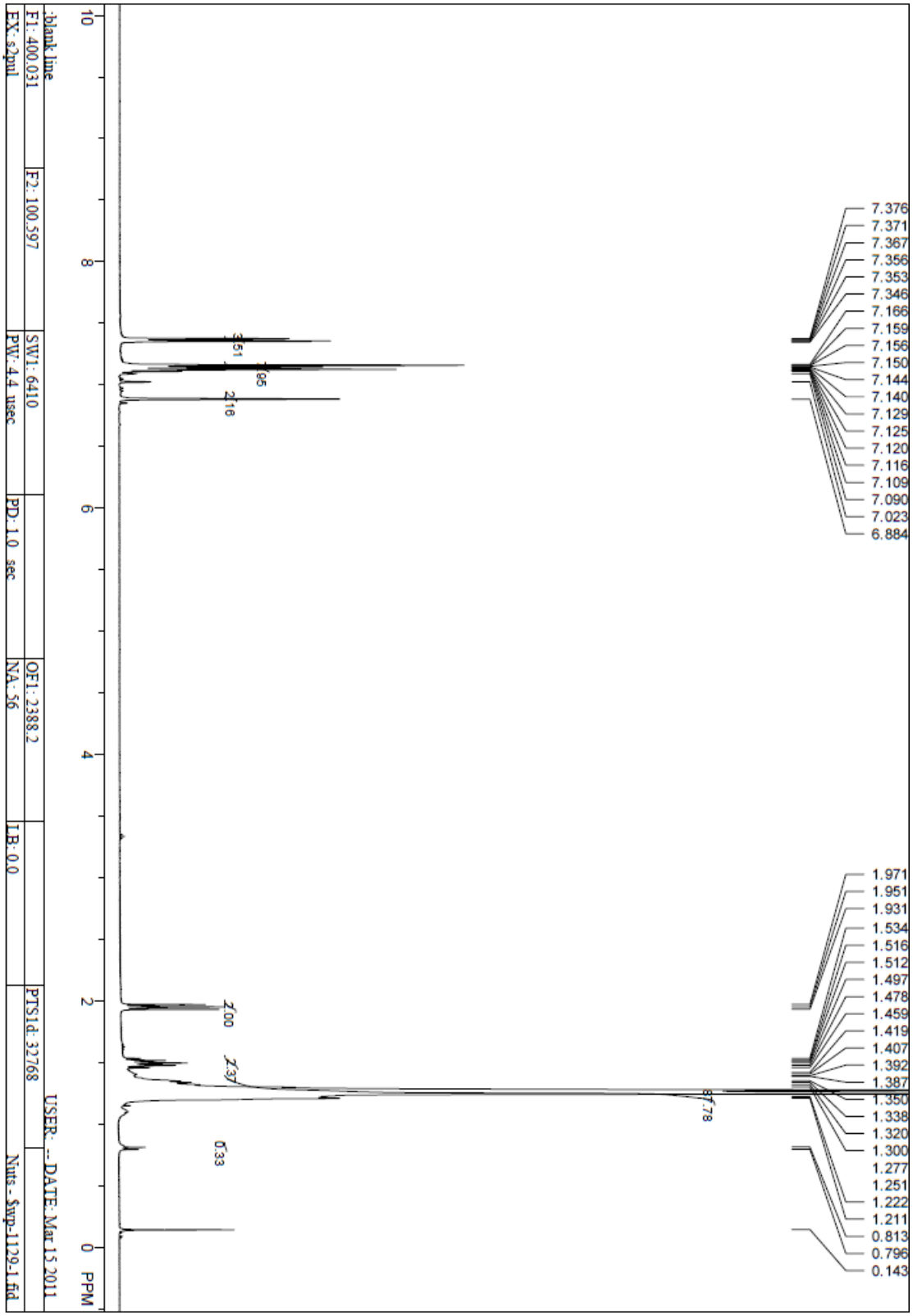


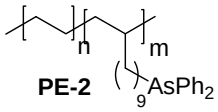
^{1}H NMR (300 MHz in $CDCl_3$)



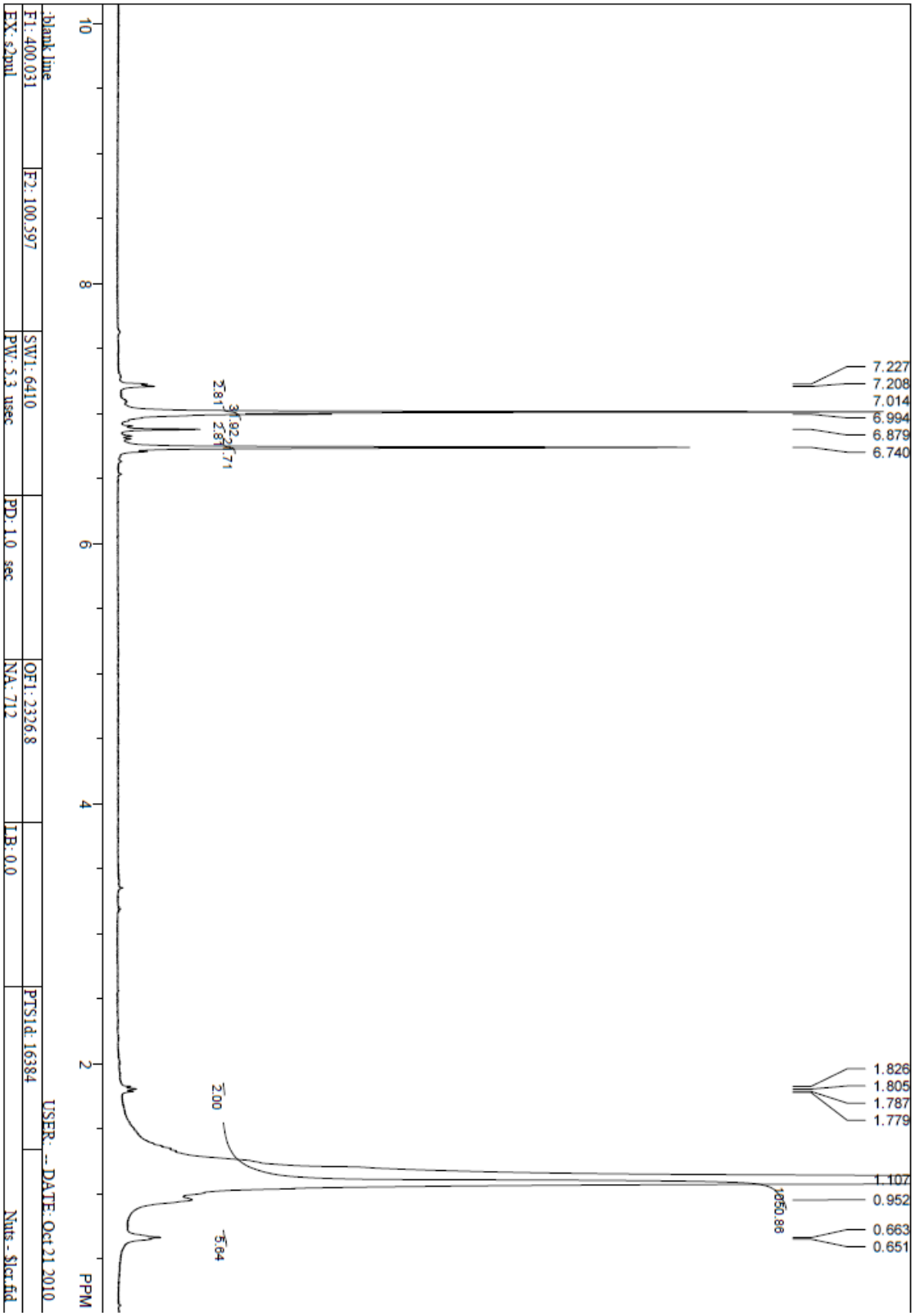


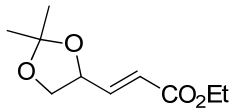
PE-1 ^{1}H NMR (400 MHz in $C_6D_4Cl_2$， 110 ^{o}C)





PE-2 ^{1}H NMR (400 MHz in $C_6D_4Cl_2$， 110 ^{o}C)



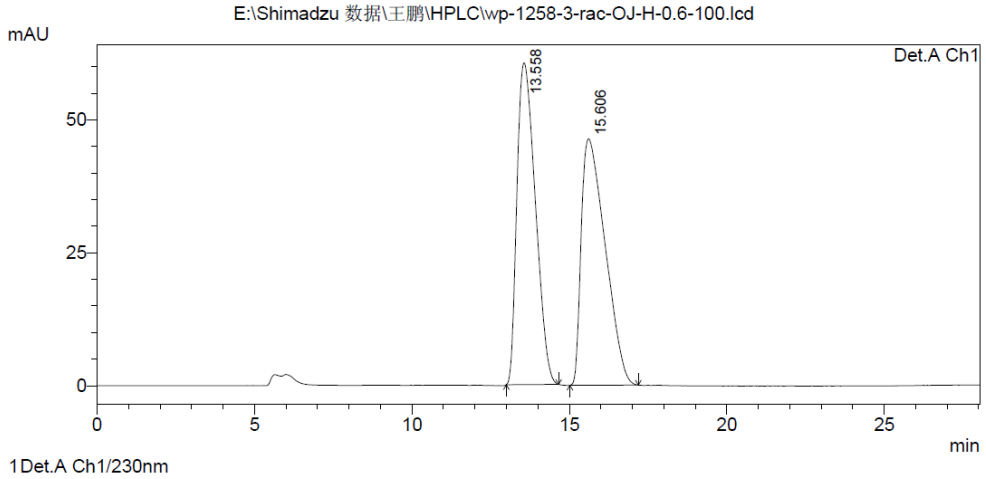


5x

HPLC ：

Sample Name : wp-1258-3-rac-OJ-H-0.6-99
Injection Volume : 10 uL
Description: OJ-H(250), Hex/iPrOH=99/1, 0.6 mL

<Chromatogram>



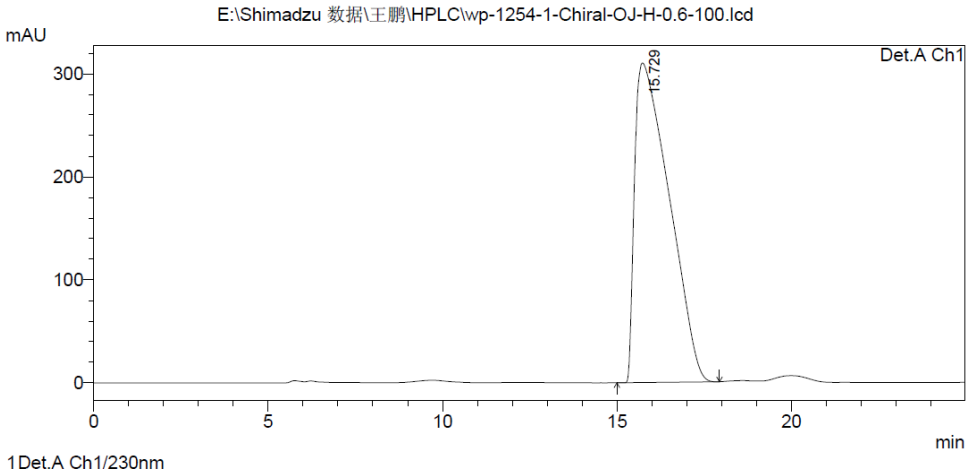
PeakTable

Detector A Ch1 230nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	13.558	2464526	60522	50.148	56.638
2	15.606	2449977	46336	49.852	43.362
Total		4914503	106858	100.000	100.000

Sample Name : wp-1254-1-Chiral-OJ-H-0.6-99
Injection Volume : 10 uL
Discription: OJ-H(250), Hex/iPrOH=99/1, 0.6 mL/min

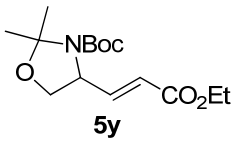
<Chromatogram>



PeakTable

Detector A Ch1 230nm

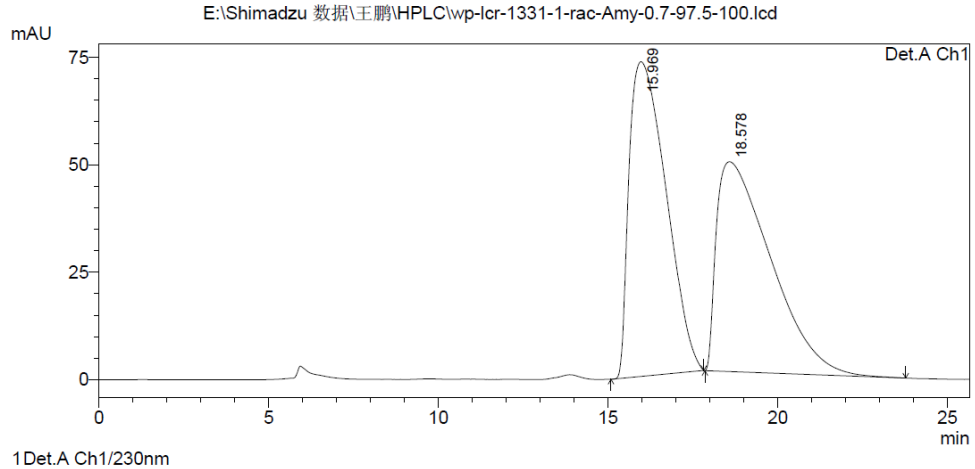
Peak#	Ret. Time	Area	Height	Area %	Height %
1	15.729	21332168	310140	100.000	100.000
Total		21332168	310140	100.000	100.000



5y

Sample Name : wp-lcr-1331-1
Injection Volume : 10 uL
Descrption: Amy lose(250), Hex/iPrOH = 98.5/1.5, 0.6 mL/h

<Chromatogram>



1Det.A Ch1/230nm

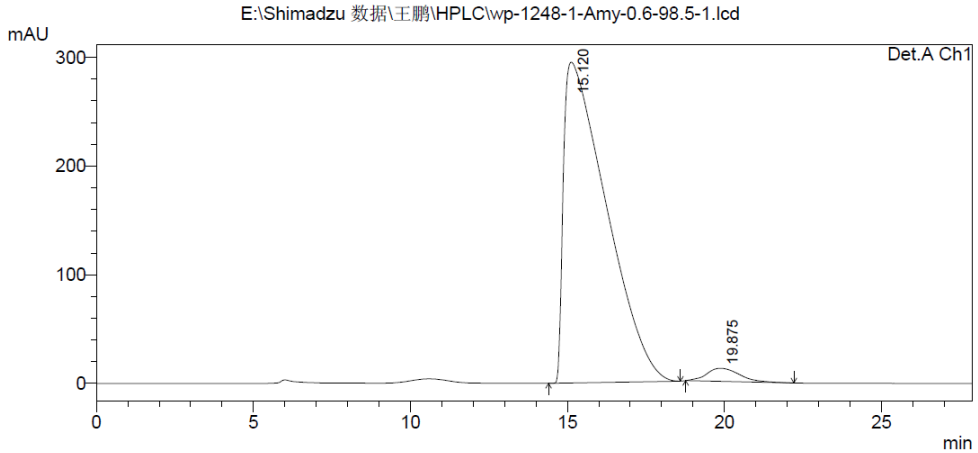
PeakTable

Detector A Ch1 230nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	15.969	5534754	73225	50.392	59.991
2	18.578	5448582	48834	49.608	40.009
Total		10983337	122059	100.000	100.000

Injection Volume : 10 uL
Description: Amy-lose(250), Hex/iPrOH = 98.5/1.5, 0.6 mL/h

<Chromatogram>



1Det.A Ch1/230nm

PeakTable

Detector A Ch1 230nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	15.120	27956232	295045	96.935	96.084
2	19.875	883956	12025	3.065	3.916
Total		28840188	307070	100.000	100.000