Supporting Information

Kinetic Resolution of 2-Substituted-2,3-dihydrofurans by Palladium-Catalyzed Asymmetric Heck Reaction

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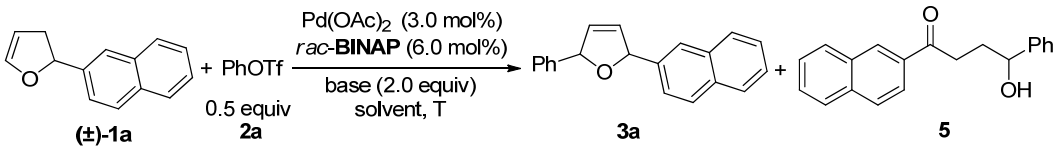
1. General Methods

The reactions were carried out in flame-dried glassware under a dry argon atmosphere. All solvents were purified and dried by using standard methods prior to use. Commercially available reagents were used without further purification. ^{1}H NMR spectra were recorded on a NMR instrument operated at 400 MHz. Chemical shifts are reported in ppm from tetramethylsilane with the solvent resonance as the internal standard ($CDCl_3$: δ 7.26 ppm). Data are reported as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, br = broad, m = multiplet or unresolved), coupling constants (Hz), and integration. ^{13}C NMR spectra were recorded on a NMR instrument operated at 101 MHz with complete proton decoupling. Chemical shifts are reported in ppm from tetramethylsilane with the solvent resonance as the internal standard ($CDCl_3$: δ 77.1 ppm). Infrared spectra were recorded from thin films of pure samples. Mass and HRMS spectra were measured in EI or ESI mode and the mass analyzer type used for the HRMS was TOF. Thin layer chromatography was performed on pre-coated glassback plates and visualized with UV light at 254 nm. Flash column chromatography was performed on silica gel. Enantiomer ratios were determined by chiral HPLC analysis in comparison with authentic racemic materials.

2. Optimization of Reaction Conditions with *rac*-BINAP[a]

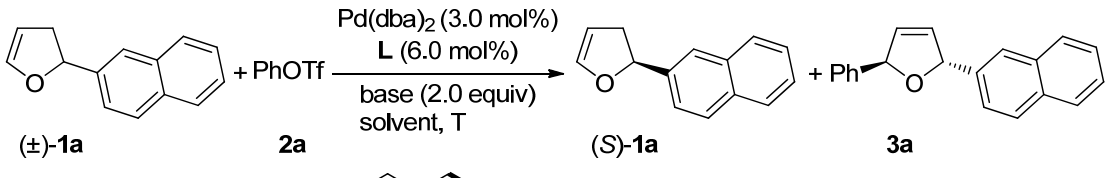


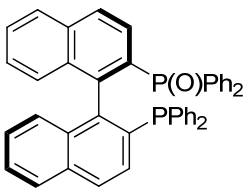
entry	base	T (°C)	solvent	**1a**, yield (%)[b]	**3a**, yield (%)[b]	**5**, yield (%)[b]
1	K_2CO_3	80	THF	92	-	Trace
2	Li_2CO_3	80	THF	44	8	23
3	KOAc	80	THF	93	-	Trace
4	Et_3N	80	THF	56	3	11

5	DABCO	80	THF	82	Trace	Trace
6	Cy_2NMe	80	THF	43	5	26
7	$^{i}Pr_2NEt$	80	THF	44	11	16
8	PS	80	THF	33	18	21
9	DBU	80	THF	91	Trace	Trace
10	PS	80	toluene	91	3	6
11	PS	80	benzene	74	7	19
12	PS	80	DMF	82	10	8
13	PS	80	CH_3CN	82	5	13
14	PS	80	Et_2O	92	/	7
15	PS	80	1,4-dioxane	72	7	19
16	$^{i}Pr_2NEt$	60	THF	58	7	22
17	$^{i}Pr_2NEt$	40	THF	69	-	13

[a]Conditions: molar ratio of **1a**/**2a**/$Pd(dba)_2$/*rac*-**BINAP**/base = 100:50:3:6:200. [b]Isolated yield.

3. Optimization of Reaction Conditions with (*R*)-BINAP(O)[a]





L1: (*R*)-BINAP(O)

entry	solvent	T (^{o}C)	base	**1a**		**3a**		S[d]
				yield (%)[b]	ee (%)[c]	yield (%)[b]	ee (%)[c]	
1	THF	80	KOAc	75	11	20	50	3

2	THF	80	Et_3N	83	11	13	93	31
3	THF	80	PS	52	61	42	88	29
4	2-Me-THF	80	LiOAc	70	17	18	94	38
5	toluene	80	LiOAc	71	12	21	96	55
6	benzene	80	LiOAc	65	12	9	96	55
7	DMF	80	LiOAc	74	0	9	5	-
8	CH_3CN	80	LiOAc	83	1	trace	-	-
9	1,4-dioxane	80	LiOAc	64	4	11	89	18
10	DCE	80	LiOAc	87	0	-	-	-
11	DME	80	LiOAc	73	2	8	83	11
12	2-Me-THF	100	LiOAc	50	52	34	91	36
13	toluene	100	LiOAc	14	9	35	94	35

[a]Conditions: molar ratio of **1a**/**2a**/$Pd(dba)_2$/(*R*)-**BINAP(O)**/base = 100:50:3:6:200. [b]Isolated yield. [c]Determined by chiral HPLC. [d]Calculated by the method describe by Kagan.[1] $S = \ln[(1-C)(1-ee)]/\ln[(1-C)(1+ee)]$ [C = ee/(ee+ee`), ee = enantiomeric excess of **1a**, ee` = enantiomeric excess of **3a**].

An example for calculation of *S* factor (entry 13):

C = ee/ee+ee` = 9/(9+94) = 0.0874;

S = ln[(1-C)(1-ee)]/ln[(1-C)(1+ee)]

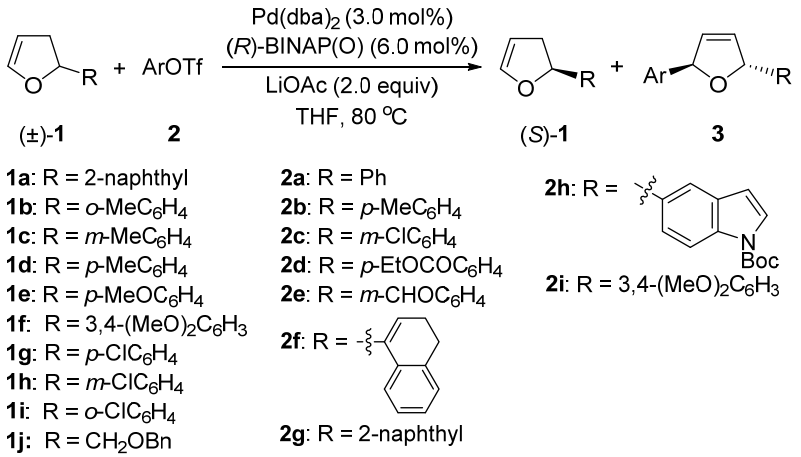
= ln[(1-0.0874)(1-0.09)]/ln[(1-0.0874)(1+0.09)]

= ln[0. 9126* 0.91]/ln[0.9126*1.09)]

= -0.1858/-0.0053

= 35

4. General experimental procedure for the Kinetic Resolution of 2-Substituted-2,3-dihydrofuran

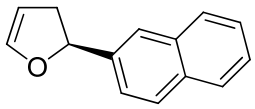


Under dry argon atmosphere, a dry 10-mL Schlenk tube was charged with $Pd(dba)_2$ (0.006 mmol, 3.5 mg), (*R*)-BINAP(O) (0.012 mmol, 7.7 mg) and 0.5 mL of dry THF. After stirring at room temperature for 30 minutes, aryl triflates **2** (0.1 mmol, 0.5 equiv), 2-substituted-2,3-dihydrofuran **1** (0.2 mmol, 1.0 equiv), and LiOAc (26.4 mg, 0.4 mmol, 2equiv) were added. The reaction was stirred at 80 ^{o}C (oil bath) until aryl triflates **2** was fully consumed (monitored by GC-MS). The reaction mixture was directly filtered through a pad of silica gel washed with diethyl ether (10 mL) to remove inorganic salts. The filtrate was concentrated on a rotary evaporator. The resulting residue was directly subjected to flash chromatography on silica gel using petroleum ether and EtOAc as eluent, providing the recovered starting material **1** and Heck product **3**.

The absolute configuration of the recovered 2,3-dihydrofurans **1a**, **1g** and **1h** was determined to be *S* by comparing their sign of the optical rotation with that reported in literature (*vide infra*). Thus, the absolute configuration of other recovered starting materials **1** was assigned as *S* due to the same sign of optical rotation.

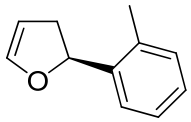
The absolution of the Heck product **3r** was determined to be (2*R*,5*R*) by comparing its sign of the optical rotation with that reported in literature (*vide infra*). Thus, the absolute configuration of other Heck products **3** was assigned as (2*R*,5*R*) due to the same sign of optical rotation.

(*S*)-2-(2-naphthyl)-2,3-dihydrofuran (**1a**)[2]



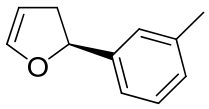
Equation 1: 91.2 mg, 47% yield, 86% ee; white solid, mp: 58-59 ^{o}C, $[\alpha]_D^{26}$ = 72.9 (*c* 1.87, $CHCl_3$) {reported value of (*R*)-**1a** with 96% ee, $[\alpha]_D^{20}$ = -81.8 (*c* 1.8, $CHCl_3$)}[2]; HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.0/1.0, 1.0 mL/min, 254 nm), t_R = 7.77 min (major), 9.05 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87-7.80 (m, 4H), 7.50-7.47 (m, 3H), 6.52 (d, *J* = 2.0 Hz, 1H), 5.70 (t, *J* = 8.8 Hz, 1H), 5.00 (d, *J* = 2.4 Hz, 1H), 3.19-3.12 (m, 1H), 2.72-2.66 (m, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 145.43, 140.28, 133.21, 132.96, 128.56, 127.99, 127.68, 126.19, 125.88, 124.29, 123.68, 99.16 82.49, 37.88; IR (film) 2924.13, 2854.87, 1621.69, 1135.12, 1048.77, 1013.97, 930.38, 817.28, 742.77, 708.09 cm^{-1}; GC-MS (EI) m/z: 196.1 $(M)^+$, 167.1, 152.1, 128.1, 115.1, 89.1, 63.0, 51.0; HRMS (ESI) calcd for $C_{14}H_{13}O$ $(M + H)^+$: 197.0961, found: 197.0964.

(*S*)-2-(2-methylphenyl)-2,3-dihydrofuran (**1b**)[3]



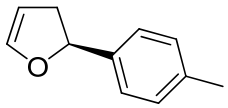
Entry 2, **table 2**: 16.4 mg, 51% yield, 60% ee; colorless oil, $[\alpha]_D^{27}$ = 34.9 (*c* 0.82, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.0/1.0, 1.0 mL/min, 214 nm), t_R = 11.36 min (minor), 12.84 min (major); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.42-7.40 (m, 1H), 7.25-7.15 (m, 3H), 6.48 (dd, *J* = 5.2, 2.4 Hz, 1H), 5.68 (dd, *J* = 10.8, 8.4 Hz, 1H), 4.94 (dd, *J* = 5.2, 2.8 Hz, 1H), 3.15-3.07 (m, 1H), 2.49-2.40 (m, 1H), 2.32(s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 19.15, 36.93, 79.94, 98.87, 124.71, 126.13, 127.27, 130.37, 134.03, 140.15, 145.32; IR (film) 2926.23, 2858.01, 1620.13, 1050.23, 935.10, 747.96, 701.68 cm^{-1}; GC-MS (EI) m/z: 160.1 $(M)^+$, 145.1, 131.1, 115.1, 91.1, 77.1, 65.0, 51.0; HRMS (EI) calcd for $C_{11}H_{12}O$: 160.0888, found: 160.0885.

(*S*)-2-(3-methylphenyl)-2,3-dihydrofuran **(1c)** [3]



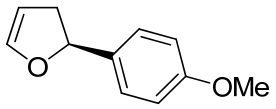
Entry 3, **table 2**: 13.6 mg, 43% yield, 53% ee; colorless oil, $[\alpha]_D^{29}$ = 27.0 (*c* 0.52, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.5/0.5, 0.3 mL/min, 214 nm), t_R = 23.56 min (minor), 25.31 min (major); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36-7.09 (m, 4H), 6.46-6.45 (m, 1H), 6.46 (dd, *J* = 5.2, 2.8 Hz, 1H), 5.48 (dd, *J* = 10.4, 9.2 Hz, 1H), 4.96 (dd, *J* = 5.2, 2.8 Hz, 1H), 3.10-3.02 (m, 1H), 2.65-2.57 (m, 1H), 2.36 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 21.45, 37.80, 82.42, 99.07, 122.70, 126.26, 128.38, 128.43, 138.20, 142.94, 145.31; IR (film) 2921.73, 2858.74, 1618.46, 1134.73, 1049.48, 783.18, 698.34 cm^{-1}; GC-MS (EI) m/z: 160.1, 145.1, 131.2, 115.1, 91.1, 77.1, 65.0, 51.0; HRMS (ESI) calcd for $C_{11}H_{13}O$ $(M + H)^+$: 161.0961, found: 161.0966.

(*S*)-2-(4-methylphenyl)-2,3-dihydrofuran (**1d**)[3]



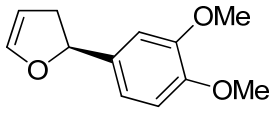
Entry 4, **table 2**: 14.2 mg, 44% yield, 58% ee; colorless oil, $[\alpha]_D^{29}$ = 58.2 (*c* 0.43, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.5/0.5, 0.3 mL/min, 214 nm), t_R = 19.59 min (minor), 21.43 min (major); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37-7.25 (m, 2H), 7.16 (d, *J* = 8.0 Hz, 2H), 6.43 (dd, *J* = 4.4, 2.0 Hz, 1H), 5.48 (dd, *J* = 10.0, 8.4 Hz, 1H), 4.95 (dd, *J* = 5.2, 2.8 Hz, 1H), 3.09-3.01 (m, 1H), 2.64-2.57 (m, 1H), 2.35 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 21.13, 37.78, 82.33, 99.06, 125.60, 129.19, 137.31, 140.01, 145.29; IR (film) 2922.64, 2858.46, 1618.81, 1181.92, 1049.51, 933.88, 806.97, 699.84 cm^{-1}; GC-MS (EI) m/z: 160.1 $(M)^+$, 145.1, 131.1, 115.1, 91.1, 77.1, 65.0, 51.0; HRMS (EI) calcd for $C_{11}H_{12}O$: 160.0888, found: 160.0886.

(*S*)-2-(4-Methoxyphenyl)-2,3-dihydrofuran (**1e**) [4,5]



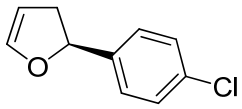
Entry 17, **table 2**: 14.5 mg, 41% yield, 83% ee; colorless oil, $[\alpha]_D^{26} = 84.7$ (*c* 0.59, $CHCl_3$) {reported value of (*R*)-**5e** with 91% ee, $[\alpha]_D^{20} = -92.7$ (*c* 0.51, $CHCl_3$)}[5]; HPLC (Phenomenex Lu×5μ Cellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99/1, 0.7 mL/min, 214 nm), t_R = 9.71 min (major), 10.27 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 (d, *J* = 8.8 Hz, 2H), 6.87 (d, *J* = 8.8 Hz, 2H), 6.42 (dd, *J* = 4.8, 2.4 Hz, 1H), 5.47 (dd, *J* = 10.4, 8.4 Hz, 1H), 4.96 (dd, *J* = 4.8, 2.4 Hz, 1H), 3.81 (s, 3H), 3.07-3.00 (m, 1H), 2.64-2.57 (m, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 37.65, 55.28, 82.20, 99.08, 113.87, 127.06, 135.03, 145.20, 159.15; IR (film) 2933.68, 1615.59, 1512.39, 1243.56, 1134.61, 1047.90, 832.22, 701.80 cm^{-1}; GC-MS (EI) m/z: 176.1$(M)^+$, 147.1, 131.1, 115.1, 103.1, 91.1, 77.1, 65.0, 51.0; HRMS (ESI) calcd for $C_{11}H_{13}O_2$ $(M + H)^+$: 177.0910, found: 177.0914.

(*S*)-2-(3,4-dimethoxyphenyl)-2,3-dihydrofuran (**1f**)[6,7]



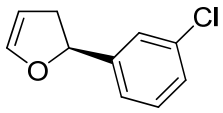
Entry 17, **table 2**: 19.1 mg, 46% yield, 85% ee; yellow oil, $[\alpha]_D^{25} = 57.2$ (*c* 0.81, $CHCl_3$); HPLC (Phenomenex Lu×5μCellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 98/2, 0.7 mL/min, 214 nm), t_R = 29.32 min (major), 32.70 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.90 (d, *J* = 7.6 Hz, 2H), 6.84 (d, *J* = 8.0 Hz, 1H), 6.44 (d, *J* = 2.4 Hz, 1H), 5.49-5.44 (m, 1H), 4.97 (dd, *J* = 6.8, 2.4 Hz, 1H), 3.90 (s, 3H), 3.88 (s, 3H), 3.07-3.00 (m, 1H), 2.66-2.59 (m, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 37.68, 55.83, 55.91, 82.40, 99.18, 108.84, 110.99, 118.08, 135.46, 145.23, 148.58, 149.12; IR (film) 2935.31, 1514.30, 1258.28, 1233.69, 1134.13, 1047.50, 1025.00, 706.37 cm^{-1}; GC-MS (EI) m/z: 206.1$(M)^+$, 177.1, 146.2, 131.1, 115.1, 103.1, 91.1, 77.1; HRMS (ESI) calcd for $C_{12}H_{15}O_3$ $(M + H)^+$: 207.1016, found: 207.1021.

(*S*)-2-(4-chlorophenyl)-2,3-dihydrofuran (**1g**)[3]



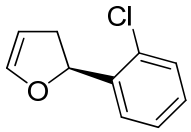
Entry 7, **table 2**: 16.8 mg, 47% yield, 39% ee; colorless oil, $[\alpha]_D^{29}$ = 18.4 (*c* 0.81, $CHCl_3$) {reported value of (*R*)-**1g** with 91% ee, $[\alpha]_D^{20}$ = -64.8 ($CHCl_3$)}[4]; HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.9/0.1, 0.5 mL/min, 214 nm), t_R =14.02 min (major), 16.98 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34-7.28 (m, 4H), 6.44 (dd, *J* = 4.8, 2.4 Hz, 1H), 5.48 (dd, *J* = 10.8, 8.4 Hz, 1H), 4.95 (dd, *J* = 5.2, 2.4 Hz, 1H), 3.12-3.04 (m, 1H), 2.59-2.52 (m, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 37.88, 81.54, 99.02, 126.96, 128.64, 133.29, 141.57, 145.24; IR (film) 3100.39, 2927.80, 1619.44, 1491.66, 1134.83, 1048.37, 831.53, 703.80 cm^{-1}; GC-MS (EI) m/z: 180.0 $(M)^+$, 151.1, 127.1, 115.1, 89.1, 75.0, 63.0, 51.0; HRMS (EI) calcd for $C_{10}H_9OCl$: 180.0342, found:180.0345.

(*S*)-2-(3-chlorophenyl)-2,3-dihydrofuran (**1h**)[3]



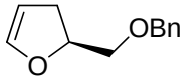
Entry 8, **table 2**: 20.0 mg, 57% yield, 42% ee; colorless oil, $[\alpha]_D^{27}$ = 12.3 (*c* 1.00, $CHCl_3$) {reported value of (*R*)-**1g** with 93% ee, $[\alpha]_D^{20}$ = -49.5 ($CHCl_3$)}[4]; HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.5/0.5, 0.5 mL/min, 214 nm), t_R = 24.84 min (major), 26.70 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36-7.21 (m, 4H), 6.44 (dd, *J* = 4.4, 2.0 Hz, 1H), 5.48 (dd, *J* = 10.8, 8.0 Hz, 1H), 4.96 (dd, *J* = 5.2, 2.8 Hz, 1H), 3.13-3.05 (m, 1H), 2.60-2.53 (m, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 37.87, 81.43, 99.03, 123.68, 125.69, 127.70, 129.83, 134.42, 145.25; IR (film) 2930.96, 2859.07, 1620.00, 1134.27, 1048.13, 782.24, 691.73 cm^{-1}; GC-MS (EI) m/z: 180.0 $(M)^+$, 151.1, 127.1, 115.1, 89.1, 75.0, 63.0, 55.0; HRMS (EI) calcd for $C_{10}H_9OCl$: 180.0342, found: 180.0340.

2-(2-chlorophenyl)-2,3-dihydrofuran (**1i**)[3]



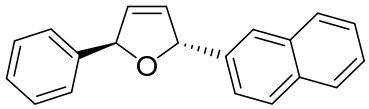
Entry 9, **table 2**: 17.4 mg, 48% yield, 28% ee; colorless oil, $[\alpha]_D^{29}$ = -30.7 (*c* 0.82, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.5/0.5, 0.5 mL/min, 214 nm), t_R = 8.75 min (minor), 9.88 min (major); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47 (dd, *J* = 7.6, 1.6 Hz, 1H),7.35 (dd, *J* = 7.6, 1.2 Hz, 1H), 7.28 (dd, *J* = 7.2, 2.0 Hz, 1H), 7.24-7.19 (m, 1H), 6.49 (dd, *J* = 4.8, 2.4 Hz, 1H), 5.82 (dd, *J* = 10.8, 7.6 Hz, 1H), 4.94 (dd, *J* = 5.6, 2.8 Hz, 1H), 3.29-3.21 (m, 1H), 2.47-2.40 (m, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 37.13, 79.17, 99.11, 126.15, 126.94, 128.43, 129.37, 131.09, 140.94, 145.13; IR (film) 2927.71, 2859.43, 1620.94, 1472.85, 1136.70, 1046.28, 934.48, 750.15, 702.01 cm^{-1}; GC-MS (EI) m/z: 180.0 $(M)^+$, 151.1, 127.1, 115.1, 89.1, 75.0, 63.0, 55.0; HRMS (EI) calcd for $C_{10}H_9OCl$: 180.0342, found: 180.0343.

(*S*)-2-((benzyloxy)methyl)-2,3-dihydrofuran (**1j**)[8]



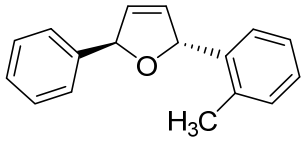
Entry 10, **table 2**: 16.9 mg, 44% yield, 55% ee; yellow oil, $[\alpha]_D^{26}$ = 37.4 (*c* 0.59, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 90/10, 0.7 mL/min, 214 nm), t_R = 7.31 min (minor), 8.30 min (major); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37-7.35 (m, 3H), 7.33-7.27 (m, 1H), 6.29 (dd, *J* = 4.8, 2.4 Hz, 1H), 4.88 (dd, *J* = 8.8, 2.4 Hz, 1H), 4.79-4.72 (m, 1H), 4.59 (dd, *J* = 22.8, 12 Hz, 2H), 3.59 (dd, *J* = 10.4, 6.8 Hz, 1H), 3.53 (dd, *J* = 10.4, 4.4 Hz, 1H), 2.72-2.64 (m, 1H), 2.40-2.33 (m, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 31.62, 72.31, 73.38, 79.81, 99.06, 127.65, 127.74, 128.39, 138.11, 145.12; IR (film) 2926.95, 2857.93, 1619.26, 1136.07, 1051.52, 696.32, 608.37 cm^{-1}; GC-MS (EI) m/z: 190.1, 159.1, 129.1, 121.1, 99.1, 91.1, 77.0, 69.0, 51.0; HRMS (EI) calcd for $C_{12}H_{14}O_2$: 190.0994, found: 190.1000.

(2*R*,5*R*)-2-(naphthalen-2-yl)-5-phenyl-2,5-dihydrofura (**3a**)[9]



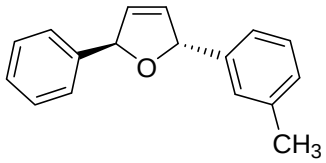
Entry 1, **table 2**: 23.5 mg, 43% yield, 90% ee; white solid, mp: 84-86 ^{o}C, $[\alpha]_D^{25}$ = 393.9 (*c* 0.07, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.0/1.0, 1.0 mL/min, 254 nm), t_R = 13.84 min (major), 18.13 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87-7.84 (m, 4H), 7.51-7.30 (m, 8H), 6.22 (d, *J* = 4.4 Hz, 1H), 6.14-6.09 (m, 3H); ^{13}C NMR(400 MHz, $CDCl_3$) δ 88.51, 124.46, 125.28, 125.95, 126.16, 126.55, 127.73, 128.01, 128.47, 128.63, 130.28, 130.44, 133.20, 133.37, 138.96, 141.54; IR (film) 2873.57, 1248.18, 1049.77, 858.30, 746.67, 693.81 cm^{-1}; GC-MS (EI) m/z: 272.1 $(M)^+$, 255.1, 168.1, 155.1, 144.1, 127.1, 115.1, 105.1, 91.1, 77.1; HRMS (ESI) calcd for $C_{20}H_{17}O$ $(M + H)^+$: 273.1274, found: 273.1279.

(2*R*,5*R*)-2-phenyl-5-(*o*-tolyl)-2,5-dihydrofuran (**3b**)



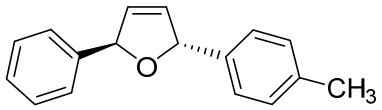
Entry 2, **table 2**: 17.8 mg, 38% yield, 90% ee; colorless oil, $[\alpha]_D^{27}$ = 68.4 (*c* 0.79, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.5/0.5, 1.0 mL/min, 214 nm), t_R = 19.28 min (major), 25.64 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44-7.35 (m, 5H), 7.32-7.30 (m, 1H), 7.23-7.16 (m, 3H), 6.29-6.27 (m, 1H), 6.07-6.03 (m, 3H), 2.43 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 19.11, 85.48, 88.15, 126.14, 126.30, 126.47, 127.69, 127.88, 128.59, 129.40, 130.38, 130.50, 135.13, 139.60, 141.79; IR (film) 3061.78, 1452.09, 1249.05, 1058.94, 842.94, 702.02, 612.89 cm^{-1}; GC-MS (EI) m/z: 236.1 $(M)^+$, 221.1, 158.1, 144.1, 129.1, 119.1, 105.1, 91.1, 77.1; HRMS (EI) calcd for $C_{17}H_{16}O$: 236.1201, found: 236.1198.

(2*R*,5*R*)-2-phenyl-5-(*m*-tolyl)-2,5-dihydrofuran (**3c**)



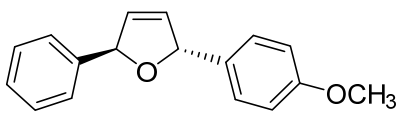
Entry 3, **table 2**: 18.7 mg, 40% yield, 93% ee; colorless oil, $[\alpha]_D^{29}$ = 311.5 (*c* 0.81, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.5/0.5, 0.5 mL/min, 214 nm), t_R = 20.21 min (major), 28.95 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39-7.36 (m, 4H), 7.31-7.27 (m, 1H), 7.23 (d, *J* = 7.6 Hz, 1H), 7.20-7.16 (m, 2H), 7.10 (d, *J* = 3.2 Hz, 1H), 6.03-6.01 (m, 4H), 2.36 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 21.52, 88.32, 88.37, 123.62, 126.55, 127.21, 127.96, 128.53, 128.60, 128.75, 130.26, 130.37, 138.31, 141.50, 141.65; IR (film) 3028.07, 2857.42, 1514.01, 1300.77, 1051.38, 755.46, 695.64 cm^{-1}; GC-MS (EI) m/z: 236.1 $(M)^+$, 221.1, 158.1, 144.1, 129.1, 119.1, 105.1, 91.1, 77.1; HRMS (EI) calcd for $C_{17}H_{16}O$: 236.1201, found: 236.1197.

(2*R*,5*R*)-2-phenyl-5-(*p*-tolyl)-2,5-dihydrofuran (**3d**)



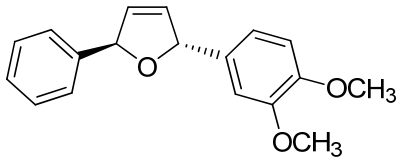
Entry 4, **table 2**: 18.9 mg, 40% yield, 92% ee; colorless oil, $[\alpha]_D^{29}$ = 166.9 (*c* 0.73, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.5/0.5, 1.0 mL/min, 214 nm), t_R = 9.87 min (major), 12.91 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37-7.34 (m, 4H), 7.31-7.22 (m, 3H), 7.16 (d, *J* = 7.6 Hz, 2H), 6.04-6.02 (m, 4H), 2.34 (s, 3H); ^{13}C NMR(400 MHz, $CDCl_3$) δ 21.21, 88.19, 126.54, 127.93, 127.98, 128.59, 128.61, 129.28, 130.25, 130.40, 137.71, 138.57, 141.67; IR (film) 3027.13, 2856.93, 1451.85, 1248.08, 1050.78, 812.57, 751.29, 695.25 cm^{-1}; GC-MS (EI) m/z: 236.1 $(M)^+$, 221.1, 158.1, 144.1, 119.1, 105.1, 91.1, 77.1; HRMS (ESI) calcd for $C_{17}H_{17}O$ $(M+H)^+$: 237.1274, found: 237.1272.

(2*R*,5*R*)-2-(4-methoxyphenyl)-5-phenyl-2,5-dihydrofuran (**3e**)



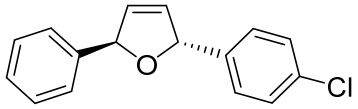
Entry 5, **table 2**: 17.9 mg, 36% yield, 92% ee; colorless oil, $[\alpha]_D^{31}$ = 307.4 (*c* 0.89, $CHCl_3$); HPLC (Phenomenex Lu×5μ Cellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 90/10, 0.7 mL/min, 214 nm), t_R = 8.15 min (major), 9.14 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37-7.36 (m, 4H), 7.30-7.28 (m, 3H), 6.91-6.89 (m, 2H), 6.05-5.99 (m, 4H), 3.78 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 55.32, 87.98, 88.06, 113.98, 126.53, 127.93, 128.01, 128.59, 128.60, 130.35, 133.61, 141.66, 159.48; IR (film) 2835.74, 1510.27, 1240.58, 1030.43, 807.54, 695.15 cm^{-1}; GC-MS (EI) m/z: 252.1 $(M)^+$, 144.1, 135.1, 115.1, 105.1, 91.1, 77.1, 51.0; HRMS (EI) calcd for $C_{17}H_{16}O_2$: 252.1150, found: 252.1153.

(2*R*,5*R*)-2-(3,4-dimethoxyphenyl)-5-phenyl-2,5-dihydrofuran (**3f**)



Entry 6, **table 2**: 23.4 mg, 42% yield, 91% ee; colorless oil, $[\alpha]_D^{27}$ = 176.8 (*c* 1.07, $CHCl_3$); HPLC (Phenomenex Lu×5μ Cellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 90/10, 0.7 mL/min, 214 nm), t_R = 28.29 min (major), 43.20 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39-7.34 (m, 4H), 7.32-7.29 (m, 1H), 6.94-6.91 (m, 2H), 6.85 (d, *J* = 8.4 Hz, 1H), 6.08-5.99 (m, 4H), 3.90 (s, 3H), 3.87 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 55.85, 55.96, 88.08, 88.15, 109.76, 110.04, 119.00, 126.51, 127.96, 128.60, 130.19, 130.51, 133.96, 141.53, 148.85, 149.16; IR (film) 2834.86, 1512.70, 1257.94, 1231.26, 1154.93, 1024.65, 752.69, 696.33 cm^{-1}; GC-MS (EI) m/z: 282.1 $(M)^+$, 251.1, 165.1, 144.1, 138.1, 115.1, 105.1, 91.1, 77.1; HRMS (EI) calcd for $C_{18}H_{18}O_3$: 282.1256, found: 282.1261.

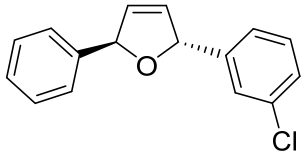
(2*R*,5*R*)-2-(4-chlorophenyl)-5-phenyl-2,5-dihydrofuran (**3g**)



Entry 7, **table 2**: 20.1 mg, 39% yield, 93% ee; white solid, mp: 46-49 ^oC, $[\alpha]_D^{29}$ = 142.6 (*c* 1.06, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm,

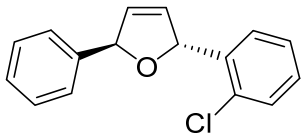
Hexane/*i*-Propanol = 99.5/0.5, 1.0 mL/min, 214 nm), t_R = 10.56 min (major), 13.55 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37-7.34 (m, 5H), 7.33-7.29 (m, 4H), 6.06-5.99 (m, 4H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 87.59, 88.42, 126.49, 127.88, 128.08, 128.65, 128.73, 129.94, 130.64, 133.63, 140.14, 141.27; IR (film) 3029.77, 2869.01, 1488.12, 1051.74, 1010.05, 847.61, 798.77, 752.38, 692.44 cm^{-1}; GC-MS (EI) m/z: 256.0 $(M)^+$, 178.0, 144.1, 139.0, 115.1, 105.1, 77.1, 63.0, 51.0; HRMS (EI) calcd for $C_{16}H_{13}OCl$: 256.0655, found: 256.0651.

(2*R*,5*R*)-2-(3-chlorophenyl)-5-phenyl-2,5-dihydrofuran (**3h**)



Entry 8, **table 2**: 19.0 mg, 37% yield, 93% ee; colorless oil, $[\alpha]_D^{27}$ = 68.8 (*c* 0.95, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.9/0.1, 0.3 mL/min, 214 nm), t_R = 11.92 min (major), 14.72 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40-7.36 (m, 5H), 7.33-7.24 (m, 4H), 6.07-5.99 (m, 4H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 87.60, 88.51, 124.59, 126.49, 126.58, 128.03, 128.09, 128.65, 129.77, 129.88, 130.75, 134.52, 143.75; IR (film) 2855.91, 1245.47, 1027.22, 693.91, 635.78 cm^{-1}; GC-MS (EI) m/z: 256.0 $(M)^+$, 178.0, 141.1, 139.0, 115.1, 105.1, 89.1, 77.1; HRMS (EI) calcd for $C_{16}H_{13}OCl$: 256.0655, found: 256.0654.

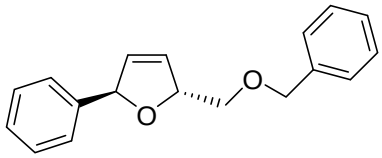
(2*R*,5*R*)-2-(2-chlorophenyl)-5-phenyl-2,5-dihydrofuran (**3i**)



Entry 9, **table 2**: 19.1 mg, 37% yield, 90% ee; colorless oil, $[\alpha]_D^{29}$ = 273.6 (*c* 0.61, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 99.5/0.5, 1.0 mL/min, 214 nm), t_R = 8.23 min (major), 11.74 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (dd, *J* = 7.6, 2.4 Hz, 1H), 7.42-7.28 (m, 7H), 7.24-7.20 (m, 1H), 6.43-6.41 (m, 1H), 6.18 (dt, *J* = 5.6, 2.4 Hz, 1H), 6.11 (dt, *J* = 5.6, 2.0 Hz, 1H), 5.99

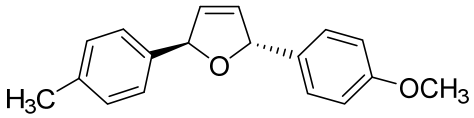
(dt, J = 6.0, 2.4 Hz, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 85.30, 88.71, 126.45, 127.24, 127.25,128.02, 128.62, 128.68, 129.05, 129.38, 130.23, 131.50, 139.54, 141.44; IR (film) 2834.77, 1512.86, 1258.10, 1231.51, 1136.47, 1025.18, 752.29, 696.11 cm^{-1}; GC-MS (EI) m/z: 256.0 $(M)^+$, 141.1, 139.1, 115.1, 105.1, 89.1, 77.1, 51.0; HRMS (EI) calcd for $C_{16}H_{13}OCl$: 256.0655, found: 256.0650.

(2*R*,5*R*)-2-((benzyloxy)methyl)-5-phenyl-2,5-dihydrofuran (**3j**)



Entry 10, **table 2**: 21.2 mg, 40% yield, 91% ee; colorless oil, $[\alpha]_D^{26}$ = 233.4 (*c* 0.43, $CHCl_3$); HPLC (Chiralpak IA, 4.6 mm × 150 mm, Hexane/*i*-Propanol = 90/10, 0.7 mL/min, 214 nm), t_R = 6.81 min (major), 7.24 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38-7.28 (m, 10H), 6.00-5.95 (m, 2H), 5.86 (d, J = 6.0 Hz, 1H), 5.23 (dd, J = 10.4, 5.2 Hz, 1H), 4.63 (dd, J = 17.2, 12 Hz, 2H), 3.85-3.58 (m, 2H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 72.73, 73.46, 85.93, 87.98, 126.42, 127.41, 127.59, 127.66, 127.84, 128.37, 128.49, 131.76, 138.26, 141.61; IR (film) 2887.49, 2861.63, 1475.30, 1065.48, 990.74, 840.88, 733.67, 694.88 cm^{-1}; MS (EI) m/z: 266 $(M)^+$, 175, 160, 145, 127, 117, 105, 91, 77, 65; HRMS (EI) calcd for $C_{18}H_{18}O_2$: 266.1307, found: 266.1299.

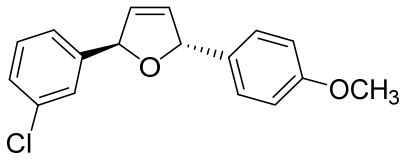
(2*R*,5*R*)-2-(4-methoxyphenyl)-5-(*p*-tolyl)-2,5-dihydrofuran (**3k**)



Entry 11, **table 2**: 20.1 mg, 38% yield, 94% ee; white solid, mp: 63-65 ^oC, $[\alpha]_D^{29}$ = 309.6 (*c* 0.64, $CHCl_3$); HPLC (Phenomenex Lu×5μ Cellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 60/40, 0.7 mL/min, 214 nm), t_R = 6.58 min (major), 7.69 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31-7.23 (m, 4H), 7.16 (d, J = 8.0 Hz, 2H), 6.91-6.88 (m, 2H), 6.04-5.98 (m, 4H), 3.79 (s, 3H), 2.34 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 21.19, 55.32, 87.82, 87.89, 113.96, 126.52, 127.99, 129.25, 130.28, 130.42,

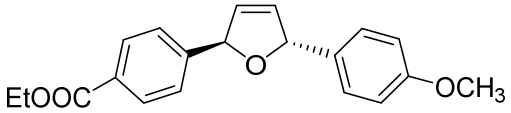
133.71, 137.63, 138.64, 159.44; IR (film) 2838.44, 1509.16, 1235.99, 1046.60, 1032.38, 819.06, 690.81 cm^{-1}; GC-MS (EI) m/z: 266.1 $(M)^+$, 174.1, 158.1, 135.1, 119.1, 103.1, 91.1, 77.1, 65.0; HRMS (EI) calcd for $C_{18}H_{18}O_2$: 266.1307, found: 266.1306.

(2*R*,5*R*)-2-(3-chlorophenyl)-5-(4-methoxyphenyl)-2,5-dihydrofuran (**3l**)



Entry 12, **table 2**: 23.2 mg, 41% yield, 91% ee; colorless oil, $[\alpha]_D^{27} = 141.3$ (*c* 1.33, $CHCl_3$); HPLC (Phenomenex Lu×5μ Cellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 70/30, 0.7 mL/min, 214 nm), t_R = 6.27 min (major), 6.65 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 (s, 1H), 7.31-7.23 (m, 6H), 6.90 (d, *J* = 8.4 Hz, 2H), 6.05-5.97 (m, 4H), 3.81 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 55.32, 87.28, 88.13, 114.00, 124.57, 126.55, 127.96, 129.79, 129.83, 130.76, 133.20, 134.49, 143.81, 159.53; IR (film) 2835.88, 1510.27, 1240.74, 1052.01, 1034.18, 724.43 cm^{-1}; GC-MS (EI) m/z: 286.1 $(M)^+$, 255.1, 207.1, 178.1, 135.1, 115.1, 107.1, 91.1, 77.1; HRMS (EI) calcd for $C_{17}H_{15}O_2Cl$: 286.0761, found: 286.0764.

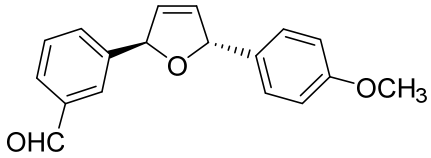
ethyl 4-((2*R*,5*R*)-5-(4-methoxyphenyl)-2,5-dihydrofuran-2-yl)benzoate (**3m**)



Entry 13, **table 2**: 31.2 mg, 48% yield, 87% ee; colorless oil, $[\alpha]_D^{26} = 288.7$ (*c* 1.31, $CHCl_3$); HPLC (Phenomenex Lu×5μ Cellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 60/40, 0.7 mL/min, 214 nm), t_R = 8.53 min (major), 9.73 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04 (d, *J* = 8.0 Hz, 2H), 7.43 (d, *J* = 8.8 Hz, 2H), 7.29 (d, *J* = 8.8 Hz, 2H), 6.90 (d, *J* = 8.8 Hz, 2H), 6.05-6.01 (m, 4H), 4.37 (dd, *J* = 14.4, 7.2 Hz, 2H), 3.81 (s, 3H), 1.39 (t, *J* = 7.6 Hz, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 14.31, 55.29, 60.92, 87.48, 88.25, 113.98, 126.14, 127.94, 129.81, 129.87, 129.90, 130.64, 133.22, 146.76, 159.52, 166.42; IR (film) 2836.83, 1711.74, 1510.81,

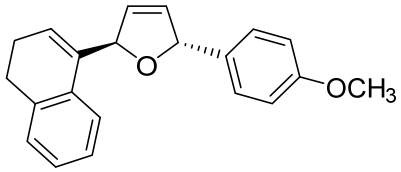
1271.30, 1242.19, 1103.18, 1017.79, 828.47, 755.74 cm^{-1}; GC-MS (EI) m/z: 324.1 $(M)^+$, 293.1, 207.1, 188.0, 174.1, 144.1, 135.1, 115.1, 105.1, 91.1, 77.0; HRMS (EI) calcd for $C_{20}H_{20}O_4$: 324.1362, found: 324.1358.

3-((2*R*,5*R*)-5-(4-methoxyphenyl)-2,5-dihydrofuran-2-yl)benzaldehyde (**3n**)



Entry 14, **table 2**: 23.7 mg, 42% yield, 93% ee; colorless oil, $[\alpha]_D^{26} = 252.4$ (*c* 1.04, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 80/20, 0.7 mL/min, 214 nm), t_R = 15.43 min (major), 21.58 min (minor); ^1H NMR (400 MHz, $CDCl_3$) δ 10.03 (s, 1H), 7.90 (s, 1H), 7.80 (d, *J* = 7.6 Hz, 1H), 7.64 (d, *J* = 7.6 Hz, 1H), 7.54 (d, *J* = 7.6Hz, 1H), 7.33-7.29 (m, 2H), 6.93-6.90 (m, 2H), 6.09-6.04 (m, 4H), 3.81 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 55.32, 87.31, 88.26, 114.03, 114.06, 127.45, 127.98, 129.30, 129.38, 129.75, 130.96, 132.56, 133.13, 136.71, 143.06, 159.56, 192.27; IR (film) 2836.19, 1693.81, 1510.74, 1240.74, 1032.48, 826.85, 689.83 cm^{-1}; GC-MS (EI) m/z: 280.1 $(M)^+$, 249.0, 172.1, 165.1, 144.1, 135.1, 115.1, 103.1, 91.1, 77.1; HRMS (EI) calcd for $C_{18}H_{16}O_3$: 280.1099, found: 280.1094.

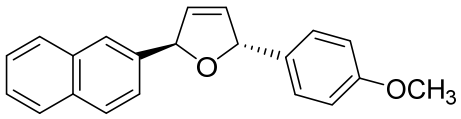
(2*R*,5*R*)-2-(3,4-dihydronaphthalen-1-yl)-5-(4-methoxyphenyl)-2,5-dihydrofuran **(3o**)



Entry 15, **table 2**: 25.3 mg, 42% yield, 90% ee; colorless oil, $[\alpha]_D^{26} = 262.0$ (*c* 1.20, $CHCl_3$); HPLC (Phenomenex Lu×5μ Cellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 90/10, 0.7 mL/min, 214 nm), t_R = 7.99 min (minor), 8.46 min (major); ^1H NMR (400 MHz, $CDCl_3$) δ 7.42 (d, *J* = 7.6 Hz, 2H), 7.30 (d, *J* = 7.6 Hz, 2H), 7.22-7.16 (m, 1H), 7.13 (d, *J* = 4.0 Hz, 2H), 6.89 (d, *J* = 8.8 Hz, 2H), 6.20 (t, *J* = 4.8 Hz, 1H), 6.10 (d, *J* = 5.2 Hz, 1H), 5.99-5.97 (m, 2H), 5.90 (d, *J* = 5.2 Hz, 1H), 3.79 (s, 3H), 2.76 (t, *J* = 8.0 Hz, 2H), 2.31 (dd, *J* = 8.0, 12.4 Hz, 2H); ^{13}C NMR (400

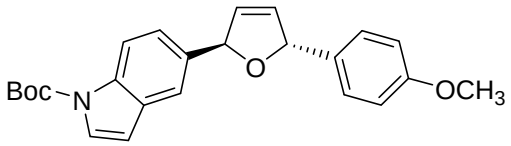
MHz, $CDCl_3$) δ 23.0, 28.11, 55.33, 85.52, 87.36, 113.95, 122.99, 125.94, 126.48, 126.92, 127.70, 128.00, 129.38, 130.90, 133.71, 133.84, 136.58, 136.60, 159.41; IR (film) 2999.17, 2831.27, 1509.98, 1241.00, 1033.24, 731.78 cm^{-1}; GC-MS (EI) m/z: 304.2 $(M)^+$, 169.1, 167.1, 141.1, 135.1, 115.1, 103.1, 91.1, 77.1; HRMS (EI) calcd for $C_{21}H_{20}O_2$: 304.1463, found: 304.1467.

(2*R*,5*R*)-2-(4-methoxyphenyl)-5-(naphthalen-2-yl)-2,5-dihydrofuran (**3p**)



Entry 16, **table 2**: 24.7 mg, 41% yield, 87% ee; white solid, mp: 106-108 ^oC, $[\alpha]_D^{30}$ = 369.4 (*c* 1.04, $CHCl_3$); HPLC (Phenomenex Lu×5μ Cellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 98/2, 0.7 mL/min, 214 nm), t_R = 7.76 min (major), 9.62 min (minor); ^1H NMR (400 MHz, $CDCl_3$) δ 7.86-7.82 (m, 4H), 7.50-7.45 (m, 3H), 7.36-7.32 (m, 2H), 6.94-6.90 (m, 2H), 6.19-6.17 (m, 1H), 6.13-6.10 (m, 1H), 6.09-6.05 (m, 2H), 3.81 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 55.33, 88.13, 88.15, 114.00, 124.49, 125.25, 125.90, 126.13, 127.71, 128.02, 128.43, 130.32, 130.48, 133.19, 133.37, 133.60, 139.06, 159.49; IR (film) 2887.46, 1510.39, 1243.05, 1039.45, 1013.73, 811.84, 751.57 cm^{-1}; GC-MS (EI) m/z: 302.1 $(M)^+$, 194.0, 174.1, 165.1, 135.1, 115.1, 103.1, 77.1; HRMS (EI) calcd for $C_{21}H_{18}O_2$: 302.1307, found: 302.1311.

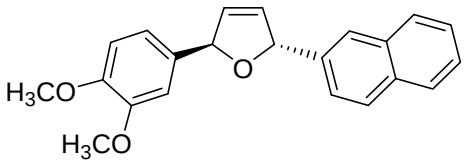
tert-butyl-5-((2*R*,5*R*)-5-(4-methoxyphenyl)-2,5-dihydrofuran-2-yl)-*1H*-indole-1-carbo xylate (**3q**)



Entry 17, **table 2**: 37.6 mg, 48% yield, 88% ee; colorless oil, $[\alpha]_D^{26}$ = 246.3 (*c* 1.84, $CHCl_3$); HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 80/20, 0.7 mL/min, 214 nm), t_R = 8.46 min (major), 10.47 min (minor); ^1H NMR (400 MHz, $CDCl_3$) δ 8.18 (s, 1H), 7.59-7.54 (m, 2H), 7.31 (d, *J* = 8.4 Hz, 2H), 7.27 (s, 1H), 6.90

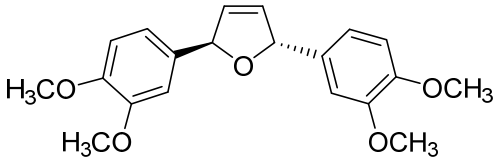
(d, J = 8.4 Hz, 2H), 6.55 (d, J = 3.2 Hz, 1H), 6.14-6.10 (m, 2H), 6.06-6.04 (m, 2H), 3.81 (s, 3H), 1.68 (s, 9H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 28.19, 55.32, 87.86, 88.68, 107.15, 113.42, 113.95, 120.99, 121.56, 126.28, 127.99, 128.40, 128.97, 130.19, 130.73, 133.72, 137.86, 148.01, 159.41; IR (film) 2933.42, 1728.99, 1335.13, 1243.06, 1145.83, 1035.22, 851.51, 766.24 cm^{-1}; GC-MS (EI) m/z: 289.2 $(M)^+$, 274.2, 246.2, 217.1, 144.6, 135.1, 123.1, 108.8; HRMS (EI) calcd for $C_{19}H_{15}NO_2$ ($M-C_5H_9O_2$): 289.1103, found: 289.1099.

(2*R*,5*R*)-2-(3,4-dimethoxyphenyl)-5-(naphthalen-2-yl)-2,5-dihydrofuran (3r)[2]



Entry 18, **table 2**: 33.1 mg, 50% yield, 92% ee; white solid, mp: 96-97 °C, $[\alpha]_D^{25}$ = 387.0 (c 0.39, $CHCl_3$) {reported value of (2*R*,5*R*)-**3r**, $[\alpha]_D^{20}$ = 438 (c 1.4, $CHCl_3$)}[2]; HPLC (Phenomenex Lu×5μCellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 60/40, 0.7 mL/min, 214 nm), t_R = 19.02 min (major), 30.79 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.85-7.80 (m, 4H), 7.49-7.43 (m, 3H), 6.95-6.94 (m, 2H), 6.87-6.85 (m, 1H), 6.17 (d, J = 5.6 Hz, 1H), 6.13-6.10 (m, 1H), 6.08-6.06 (m, 2H), 3.90 (s, 3H), 3.86 (s, 3H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 55.89, 55.99, 88.26, 88.33, 109.85, 111.14, 119.04, 124.47, 125.27, 125.96, 126.18, 127.74, 128.01, 128.48, 130.37, 130.50, 133.22, 133.40, 134.02, 138.99, 148.93, 149.23; IR (film) 2839.08, 1512.60, 1256.94, 1231.42, 1154.68, 1056.46, 1024.53, 811.30, 752.22 cm^{-1}; GC-MS (EI) m/z: 332.1 $(M)^+$, 301.1, 204.1, 194.1, 165.1, 127.1, 77.1; HRMS (EI) calcd for $C_{22}H_{20}O_3$: 332.1412, found: 332.1409.

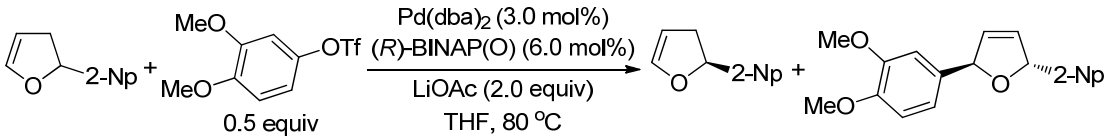
(2*R*,5*R*)-2,5-bis(3,4-dimethoxyphenyl)-2,5-dihydrofuran (**3s**)[6]



Entry 19, **table 2**: 25.6 mg, 42% yield, 92% ee; white solid, mp: 100-102 °C, $[\alpha]_D^{25}$ =

391.4 (*c* 0.35, $CHCl_3$); HPLC (Phenomenex Lu×5μ Cellulose-4, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 50/50, 0.7 mL/min, 214 nm), t_R = 34.47 min (major), 59.35 min (minor); ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.93 (d, J = 2.0 Hz, 1H), 6.91 (s, 3H), 6.85 (d, J = 8.0 Hz, 2H), 6.08 (t, J = 2.0 Hz, 2H), 5.98 (t, J = 2.0 Hz, 2H), 3.91 (s, 6H), 3.89 (s, 6H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 55.84, 55.96, 87.89, 109.76, 111.04, 118.97, 130.39, 133.90, 148.87, 149.16; IR (film) 2847.57, 1590.62, 1250.00, 1136.47, 1051.48, 1021.48, 778.45 cm^{-1}; GC-MS (EI) m/z: 342.1 $(M)^+$, 311.1, 204.1, 165.1, 133.1, 105.1, 91.1, 77.1, 65.0; HRMS (EI) calcd for $C_{20}H_{22}O_5$: 342.1467, found: 342.1470.

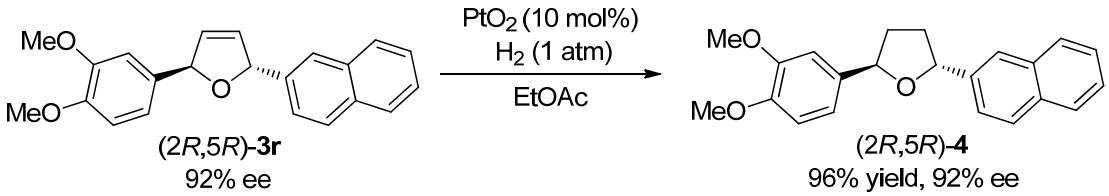
5. Pd-catalyzed kinetic resolution of 2,3-dihydrofuran 1a with triflate 2i on 6.0 mmol scale



(±)-1a **2i** **(*S*)-1a** **3r**

Under dry argon atmosphere, a dry 10-mL Schlenk tube was charged with $Pd(dba)_2$ (0.18 mmol, 103.5 mg), (*R*)-BINAP(O) (0.36 mmol, 229.8 mg) and 10 mL of dry THF. After stirring at room temperature for 30 minutes, aryl triflate **2i** (3.0 mmol, 858.1 mg), 2,3-dihydrofuran **1a** (6.0 mmol, 1.18 g), and LiOAc (12.0 mg, 792.0 mmol) were added. The reaction was stirred at 80 °C (oil bath) until aryl triflate **2i** was fully consumed (monitored by GC-MS). The reaction mixture was directly filtered through a pad of silica gel washed with diethyl ether (30 mL) to remove inorganic salts. The filtrate was concentrated on a rotary evaporator and the residue was directly subjected to flash chromatography on silica gel with petroleum ether and ethyl acetate as eluent to give the product **3r** in 45% yield (0.46 g) with 82% ee and the recovered **1a** in 39% yield (0.89 g) with 95% ee.

6. Hydrogenation of Heck product 3r[2,10]



The mixture of the compound (2*R*,5*R*)-**3r** (0.1 mmol, 33.2 mg, 92% ee) with 83% PtO_2 (0.01 mmol, 2.27 mg) in EtOAc (1.0 mL) was subjected to hydrogenation in a 25-mL Parr bomb with H_2 (80 psi) for 24 h at room temperature. The resulting mixture was subjected to flash chromatography (silica gel, 5:1 Petroleum ether/EtOAc). The product (2*R*,5*R*)-**4** was isolated as white solid (31.78 mg, 96% yield) with 92% ee. mp: 107-109 ^{o}C, $[\alpha]_D^{25}$ = 294.6 (*c* 0.62 , $CHCl_3$) {reported value of (2*R*,5*R*)-**4**, $[\alpha]_D^{20}$ = 132 (c 0.98, $CHCl_3$)}[2]; HPLC (Chiralpak OD-H, 4.6 mm × 250 mm, Hexane/*i*-Propanol = 70/30, 0.7 mL/min, 214 nm), t_R = 14.85 min (minor), 17.36 min (major); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87 (s, 1H), 7.85-7.81 (m, 3H), 7.51-7.42 (m, 3H), 7.01 (d, *J* = 1.2 Hz, 1H), 6.96 (dd, *J* = 8.0, 1.6 Hz, 1H), 6.85 (d, *J* = 8.0Hz, 1H), 5.43 (t, *J* = 6.4 Hz, 1H), 5.28 (t, *J* = 6.4 Hz, 1H), 3.92 (s, 3H), 3.89 (2, 3H), 2.59-2.53 (m, 1H), 2.48-2.43 (m, 1H), 2.12-2.02 (m, 2H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 35.61, 35.66, 55.90, 55.96, 81.32, 81.43, 108.89, 110.98, 117.89, 123.92, 123.96, 125.64, 126.09, 127.69, 127.91, 128.22, 132.81, 133.33, 135.98, 141.15, 148.15, 149.01; IR (film) 2960.37, 1512.95，1311.03, 1139.39, 1025.19，814.54, 748.27 cm^{-1}; GC-MS (EI) m/z: 334.1, 180.1, 164.1, 153.1, 128.1, 107.1, 91.1, 77.1; HRMS (EI) calcd for $C_{22}H_{22}O_3$: 334.1569, found: 334.1566.

7. Reference

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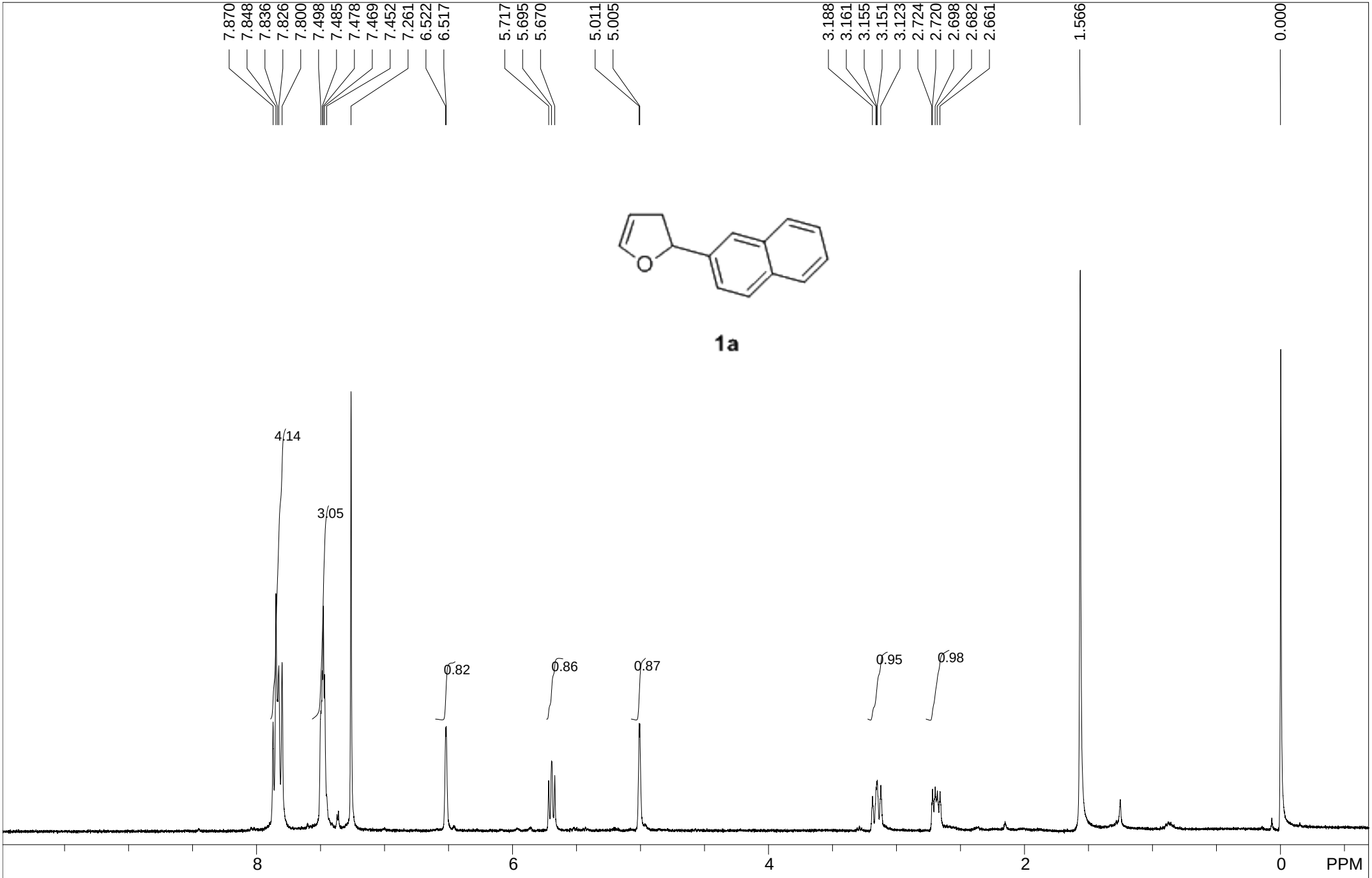

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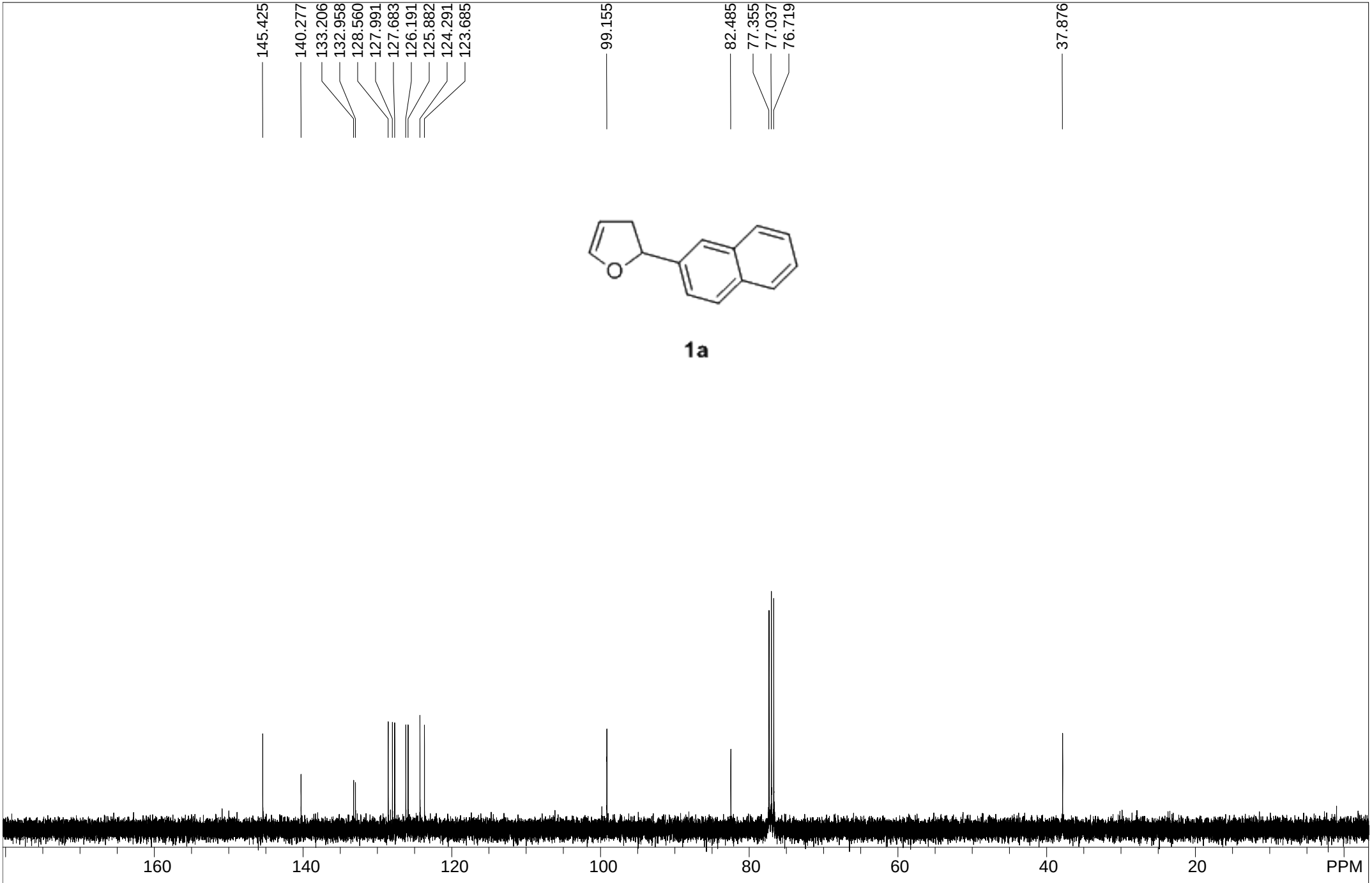

Std carbon;blank line

USER: -- DATE: Jul 7 2014

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==== Shimadzu LCsolution Analysis Report ====

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Sample ID	: OD-H,99/1,1.0,254
Vail #	: 0
Injection Volume	: 800 uL
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Method File Name	: 1234.lcm
Batch File Name	:
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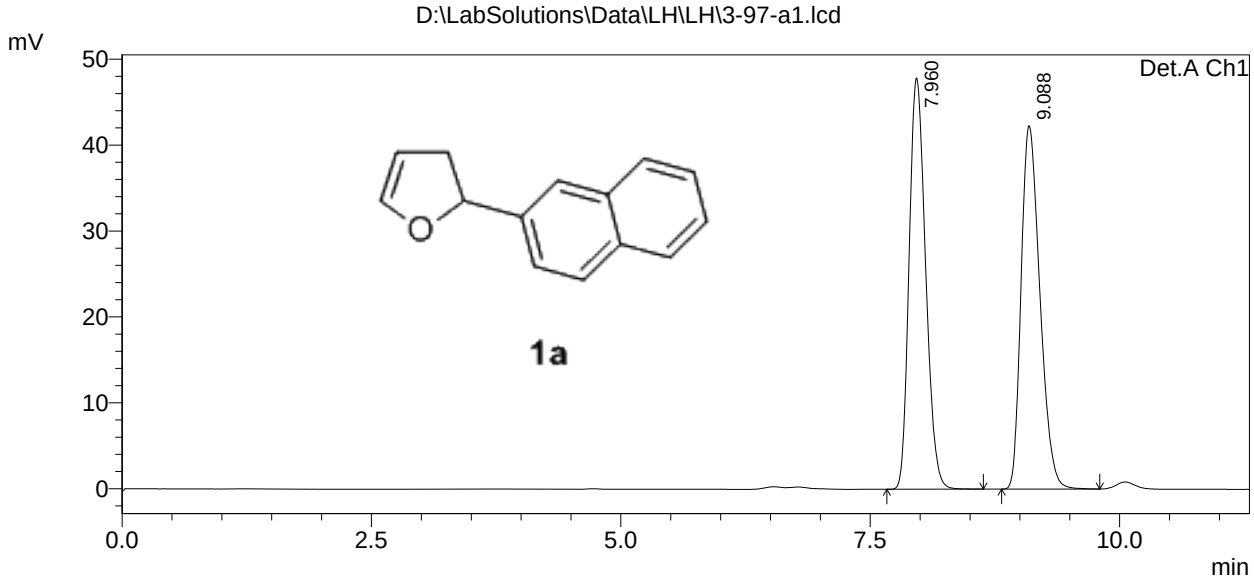

1 Det.A Ch1/254nm

PeakTable

Detector A Ch1 254nm

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Total		1105177	90189	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

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Sample ID	: OD-H,99/1,1.0,254
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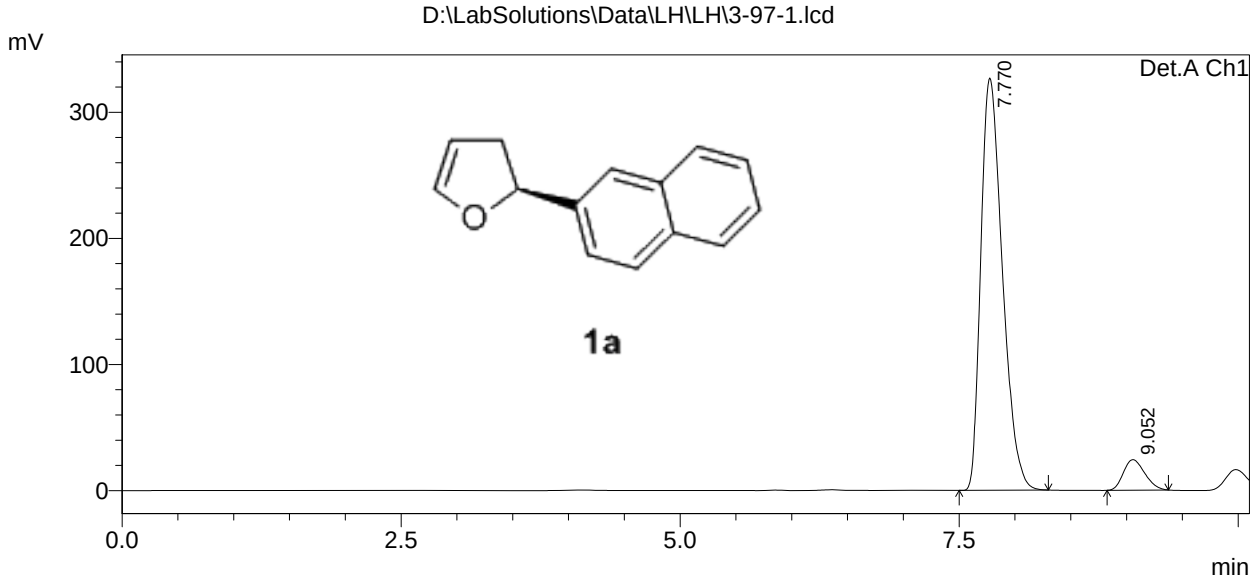

1 Det.A Ch1/254nm

PeakTable

Detector A Ch1 254nm

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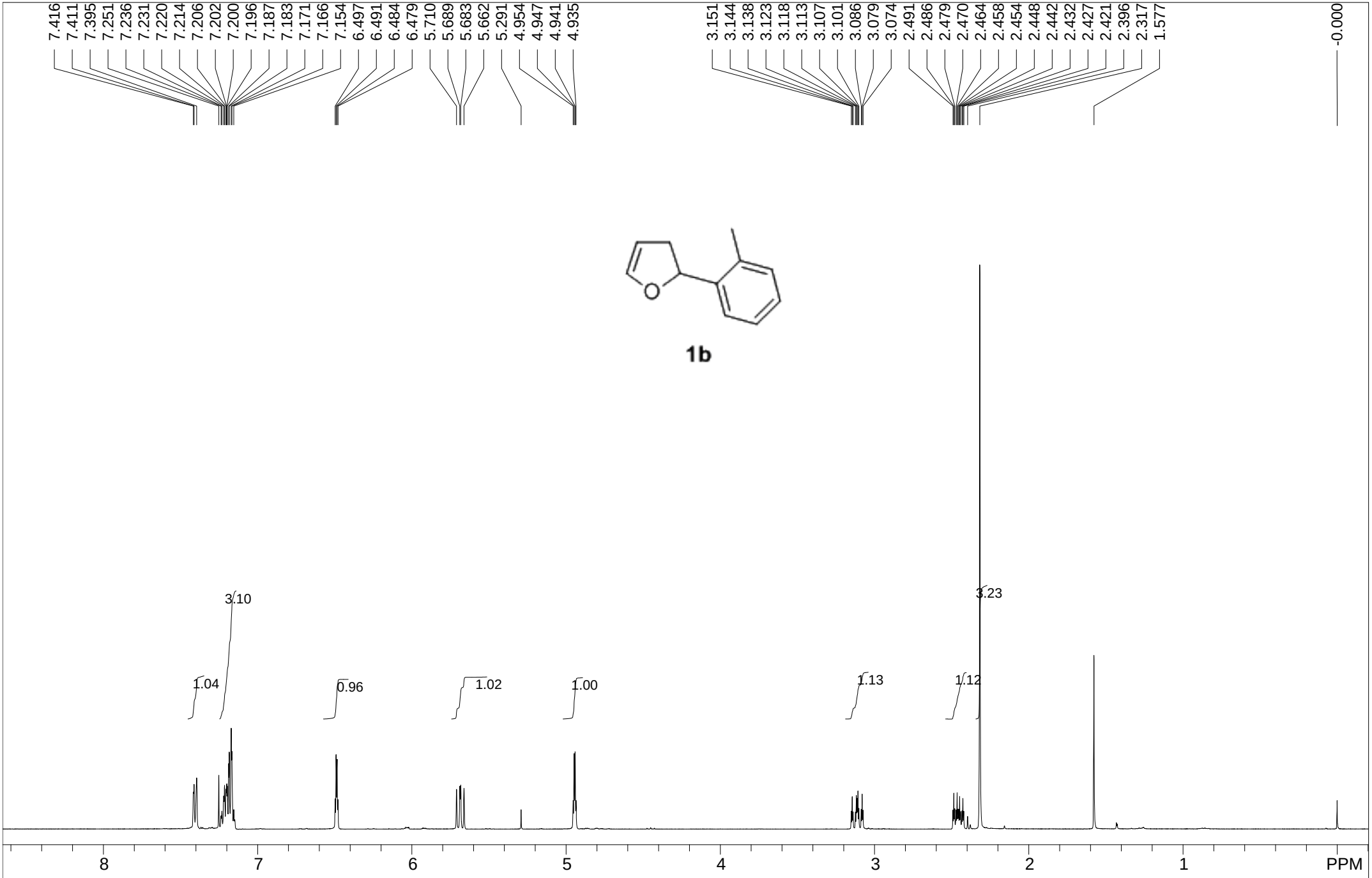

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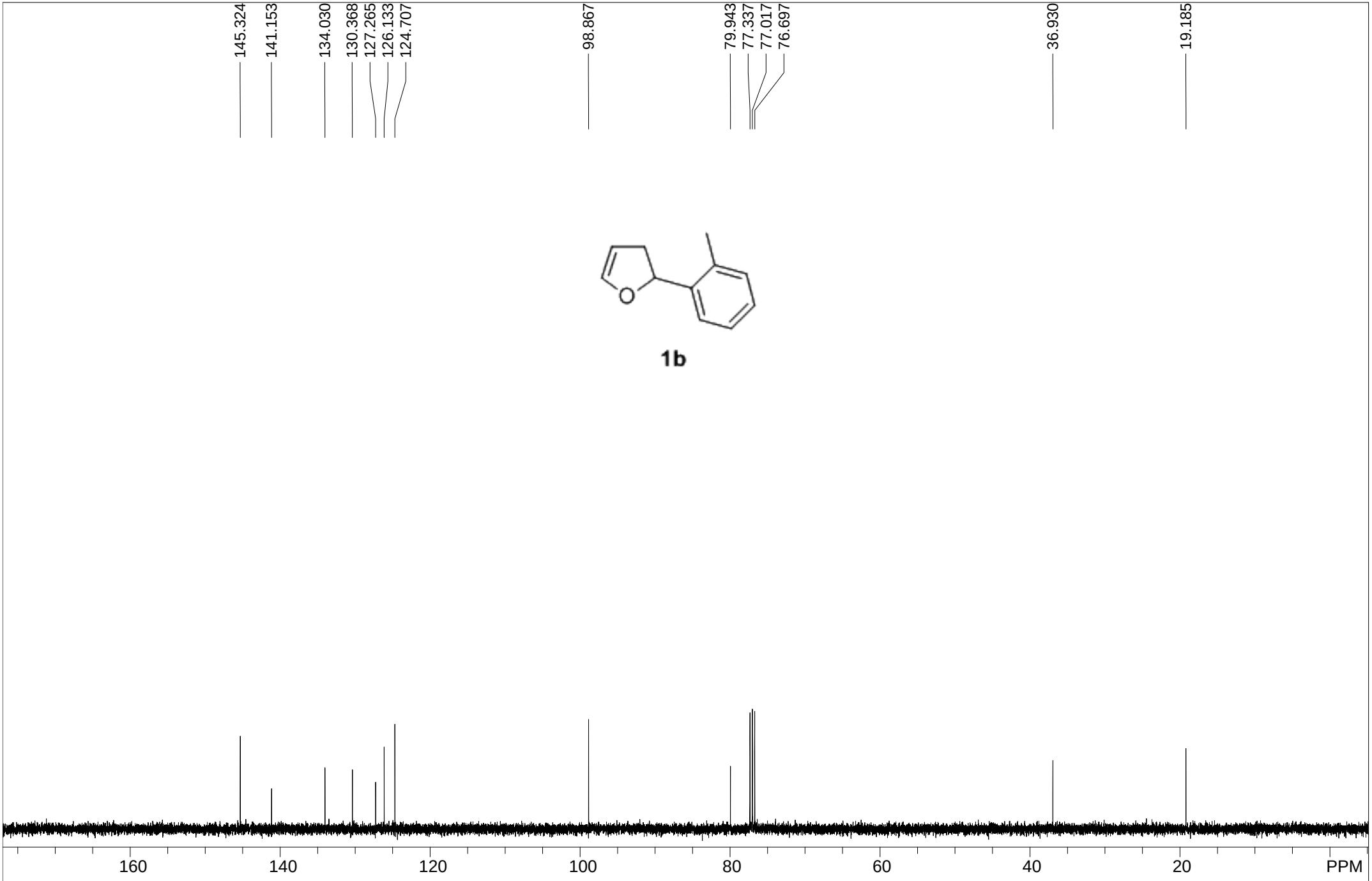

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USER: -- DATE: Sep 18 2014

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==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-56-0.lcd

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Sample ID	: OD-H,99.0/1.0,1.0,214
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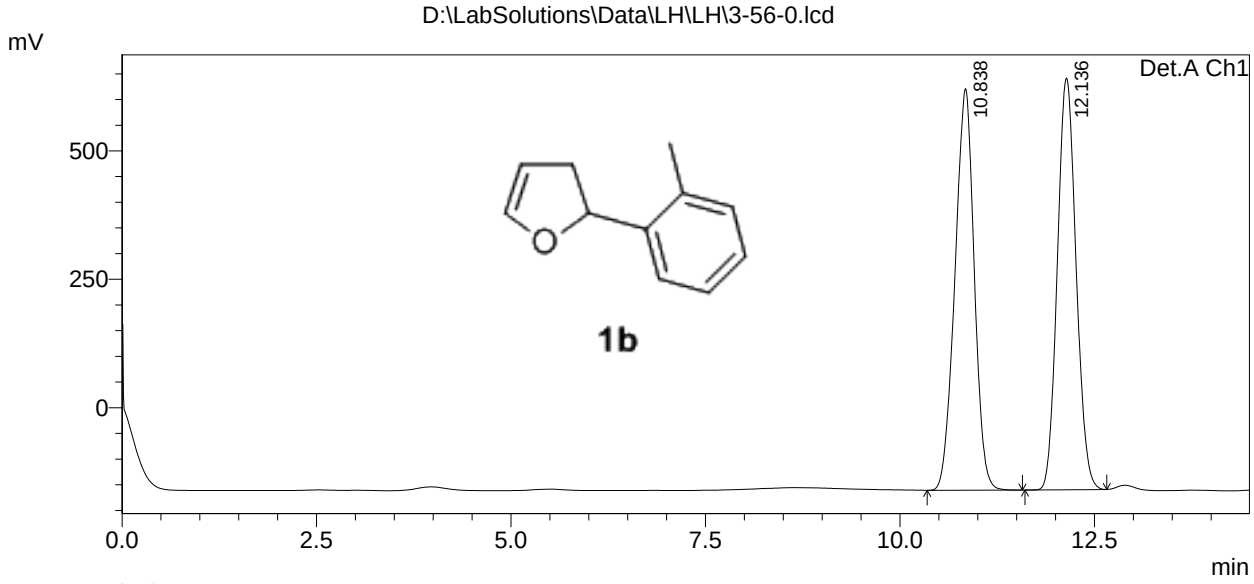
Injection Volume	: 800 uL
Data File Name	: 3-56-0.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-10 19:16:31
Data Processed	: 2013-11-10 19:31:01

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

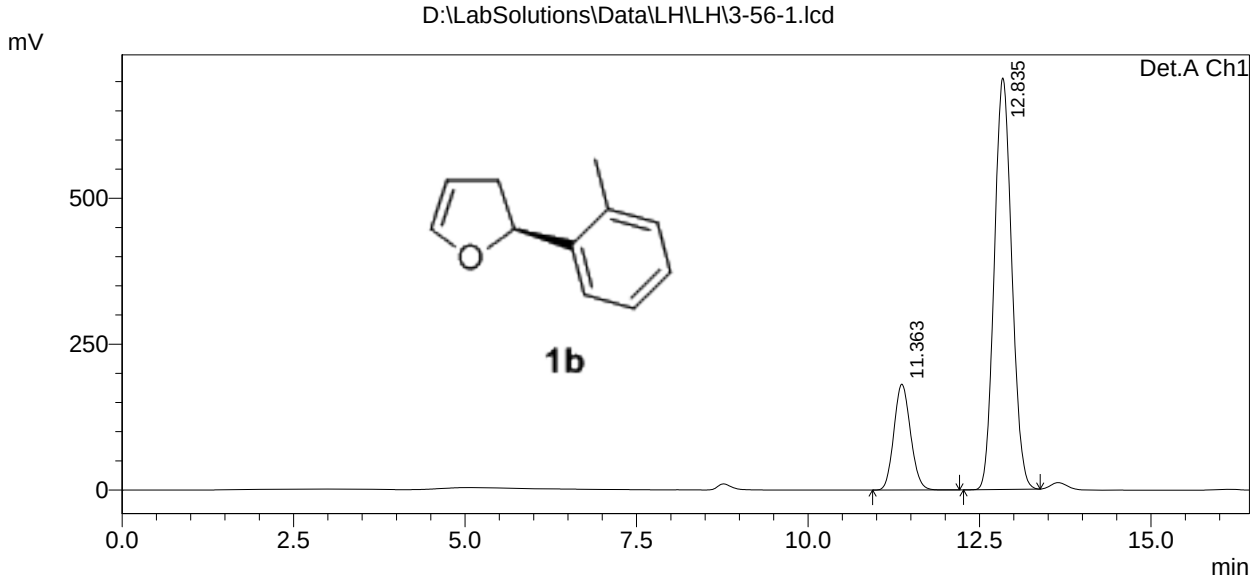
Peak#	Ret. Time	Area	Height	Area %	Height %
1	10.838	13492592	781789	50.114	49.364
2	12.136	13431097	801923	49.886	50.636
Total		26923690	1583712	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-56-1.lcd

Acquired by	: Admin
Sample Name	: 3-56-1
Sample ID	: OD-H,99.0/1.0,1.0,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-56-1.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-10 18:59:10
Data Processed	: 2013-11-10 19:15:37

<Chromatogram>

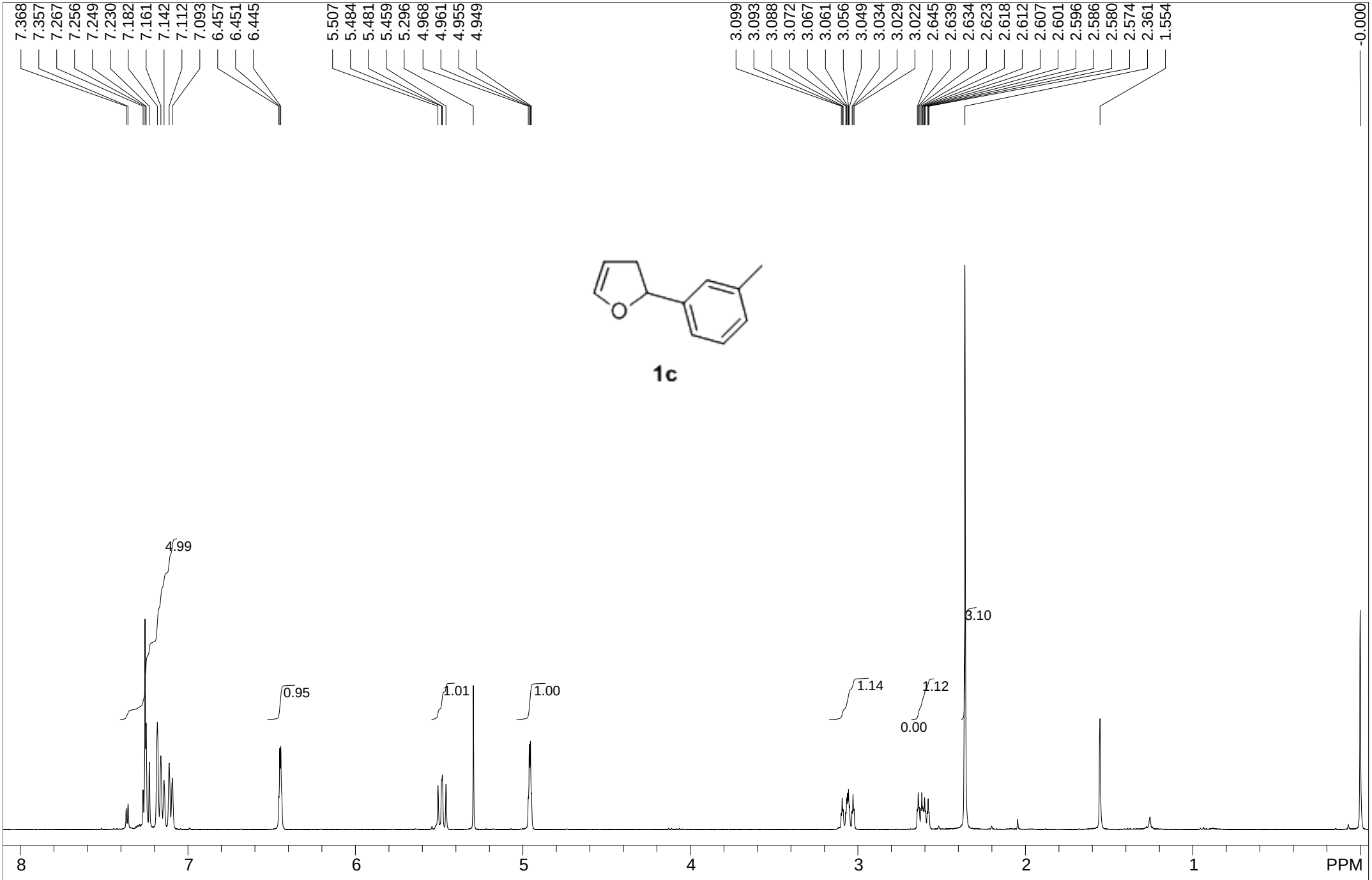


1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	11.363	3060646	181519	19.608	20.463
2	12.835	12548877	705534	80.392	79.537
Total		15609523	887053	100.000	100.000



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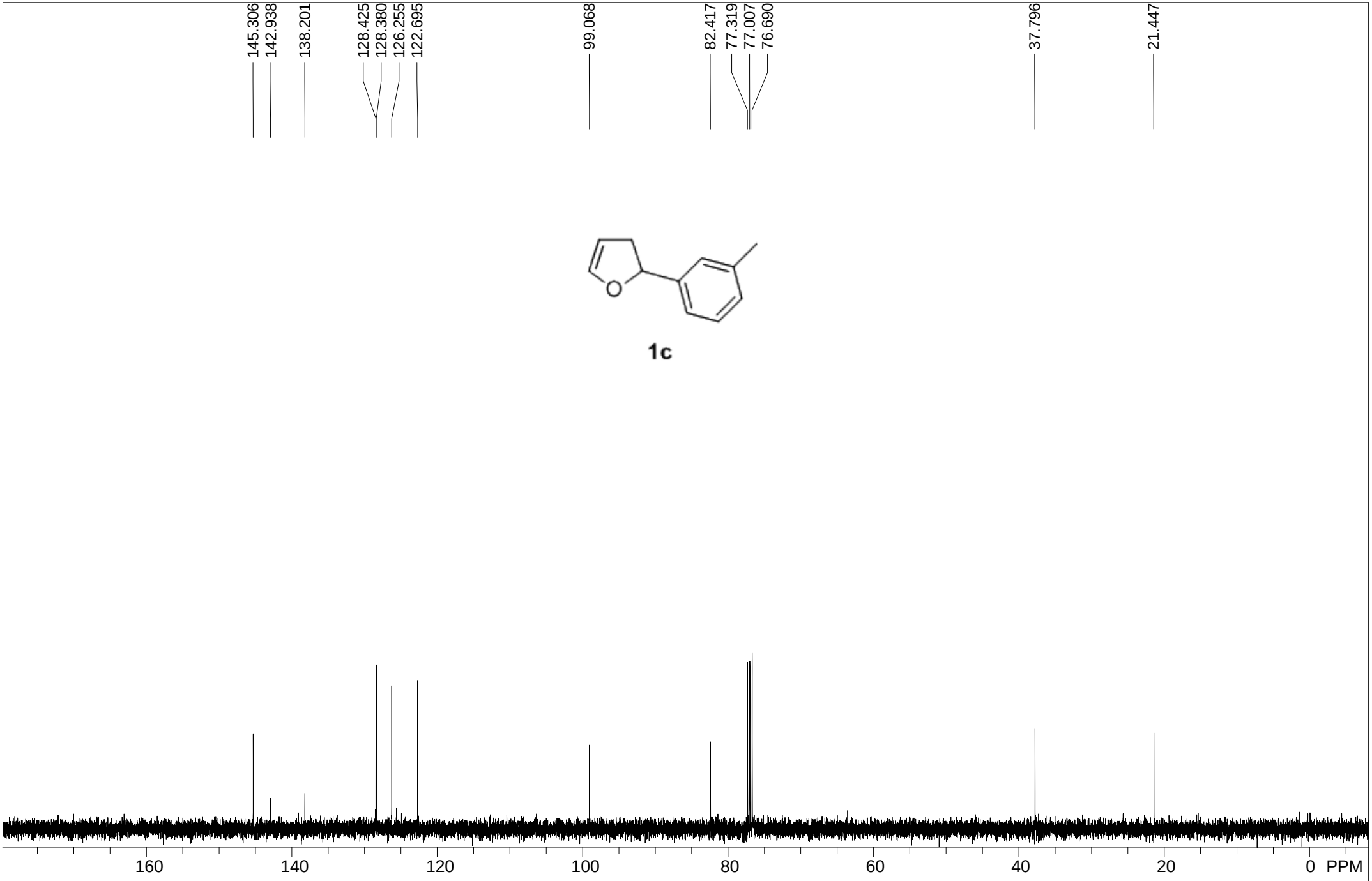
USER: -- DATE: Sep 2 2014

F1: 399.722	F2: 100.519	SW1: 6410		OF1: 2396.9		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 12	LB: 0.0		Nuts - $lh-2-43-1-h.fid



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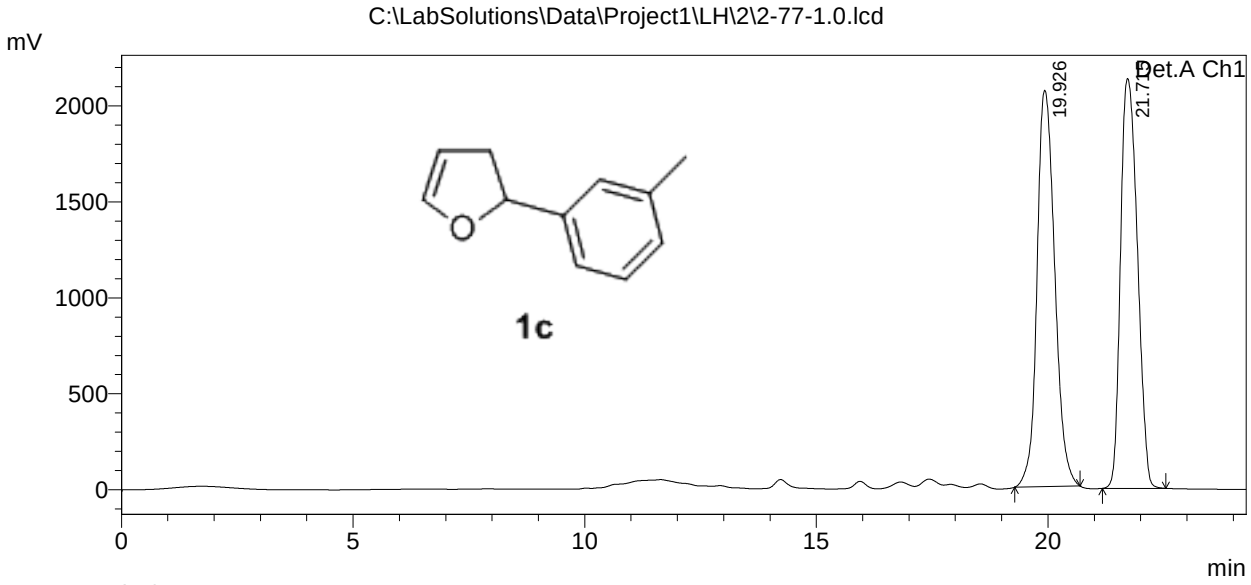
F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 120	LB: 0.0		Nuts - $lh-2-77-0-c.fid

==== Shimadzu LCsolution Analysis Report ====

C:\LabSolutions\Data\Project1\LH\2\2-77-1.0.lcd

Acquired by	: Admin
Sample Name	: 2-77-1.0
method	:OD-H,99.5/0.5,0.3,214
Injection Volume	: 2.5 uL
Data File Name	: 2-77-1.0.lcd
Method File Name	: 1.lcm
Report File Name	: 1.lcr
Data Acquired	: 2014-9-28 18:15:37
Data Processed	: 2014-9-28 18:39:54

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %
1	19.926	54944057	2066186	50.418
2	21.715	54031984	2136188	49.582
Total		108976041	4202374	100.000

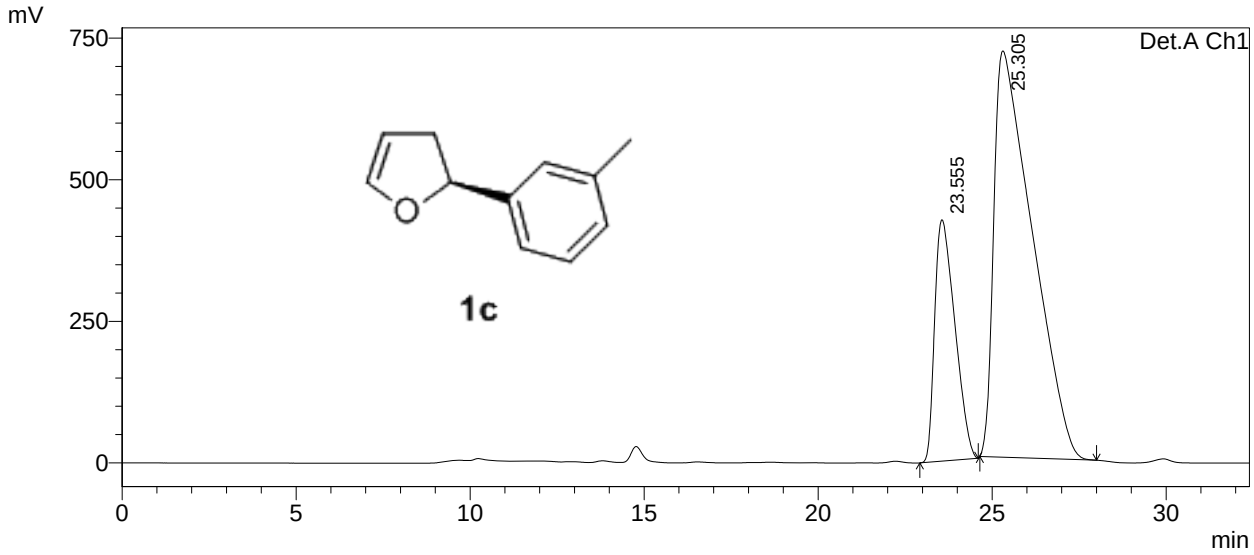
==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-47-1.lcd

Acquired by	: Admin
Sample Name	: 3-47-1
Sample ID	: OD-H,99.5/0.5,0.3,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-47-1.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-5 17:55:27
Data Processed	: 2013-11-5 18:27:50

<Chromatogram>

D:\LabSolutions\Data\LH\LH\3-47-1.lcd

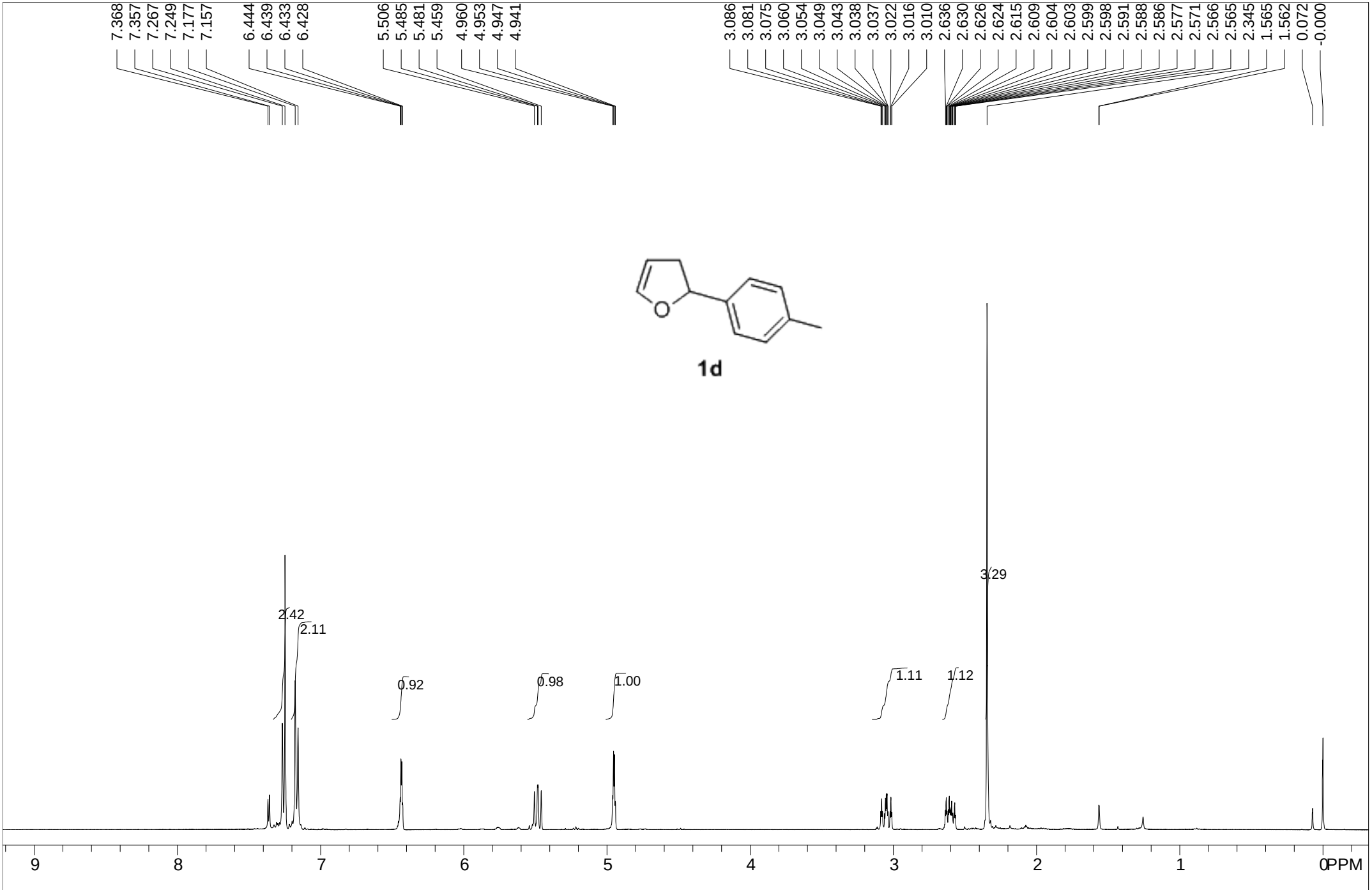


1 Det.A Ch1/214nm

PeakTable

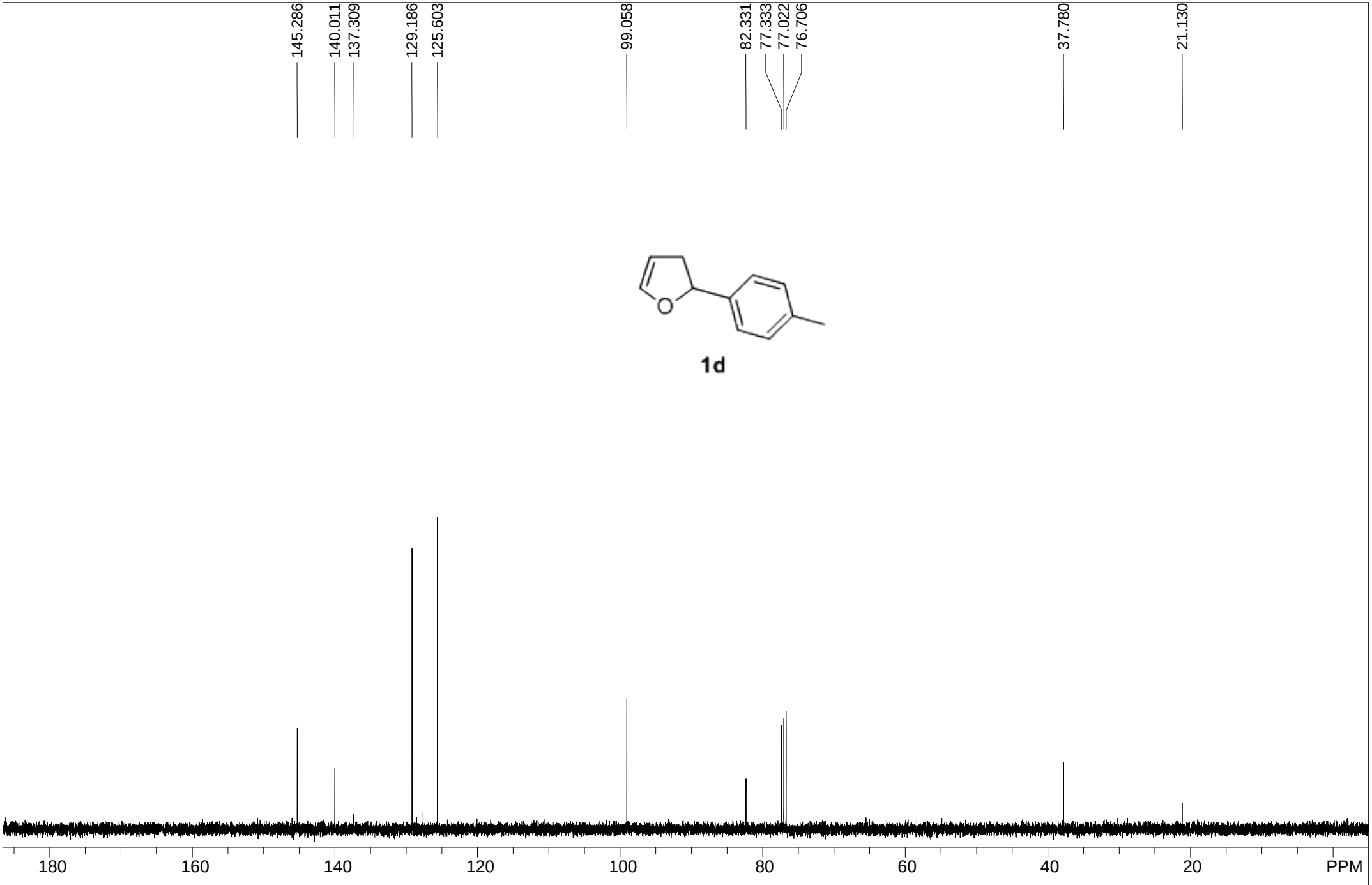
Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	23.555	17183496	426036	23.781	37.263
2	25.305	55072790	717289	76.219	62.737
Total		72256286	1143325	100.000	100.000



ldy-2014-9-9 USER: -- DATE: Sep 28 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2793.8		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-86-1-h.fid



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USER: -- DATE: Sep 28 2014

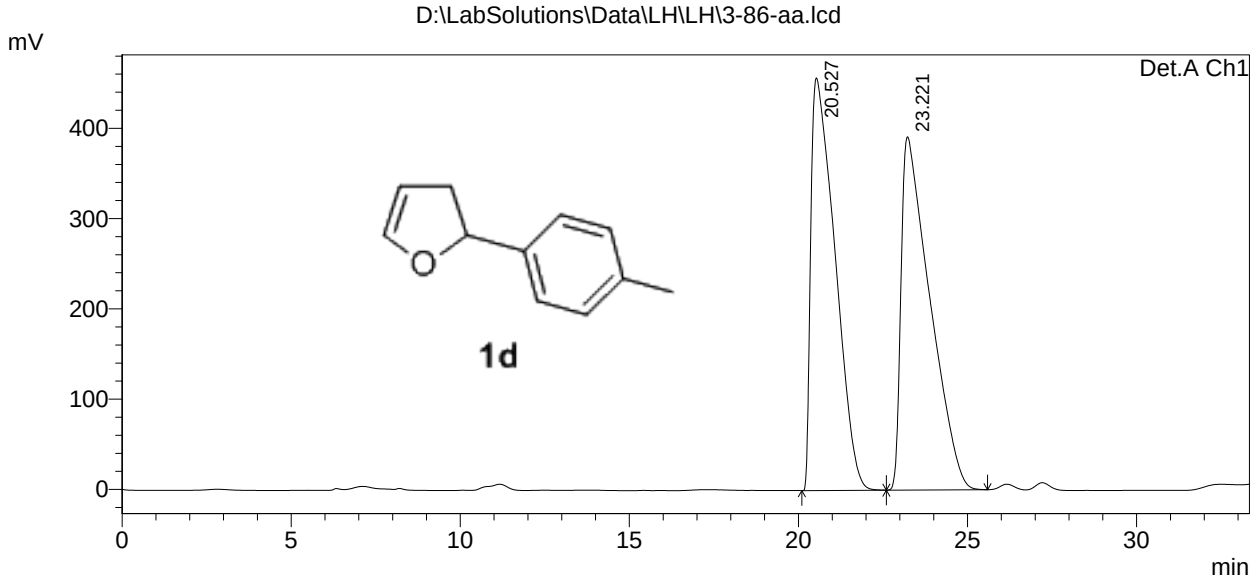
F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 56	LB: 0.0	Nuts - $lh-2-86-1.0-c.fid	

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-86-aa.lcd

Acquired by	: Admin
Sample Name	: 3-86-aa
Sample ID	: OD-H,99.9/0.1,0.5,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-86-aa.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-25 17:08:40
Data Processed	: 2013-11-25 17:42:01

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

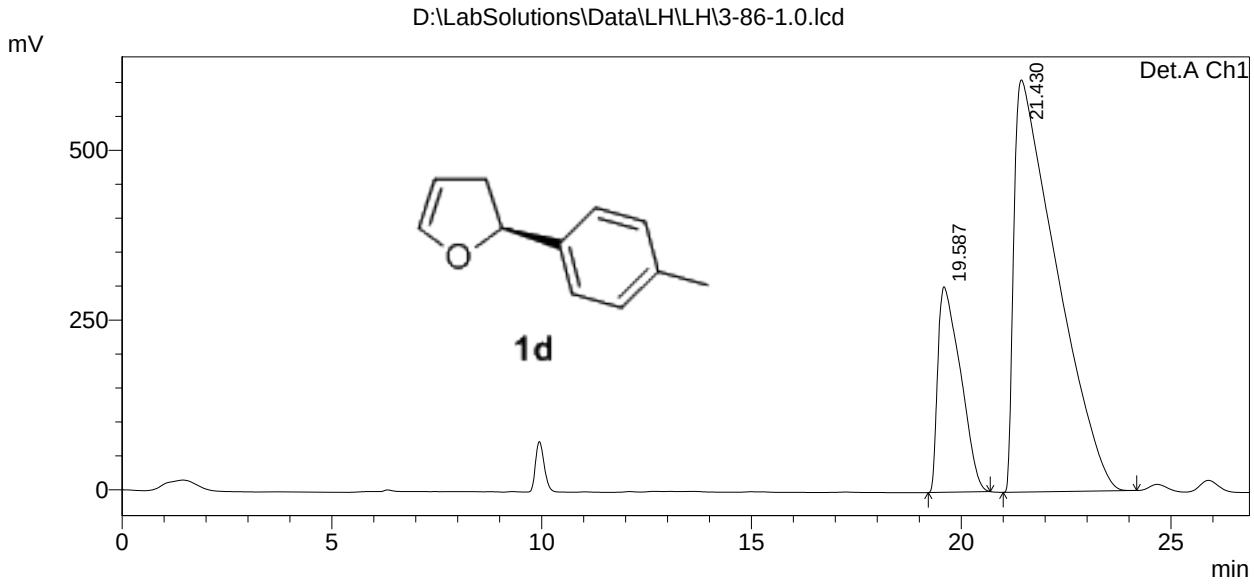
Peak#	Ret. Time	Area	Height	Area %	Height %
1	20.527	22725426	457071	49.475	53.877
2	23.221	23207507	391285	50.525	46.123
Total		45932933	848356	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-86-1.0.lcd

Acquired by	: Admin
Sample Name	: 3-86-1.0
Sample ID	: OD-H,99.9/0.1,0.5,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-86-1.0.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-25 18:30:03
Data Processed	: 2013-11-25 18:56:56

<Chromatogram>

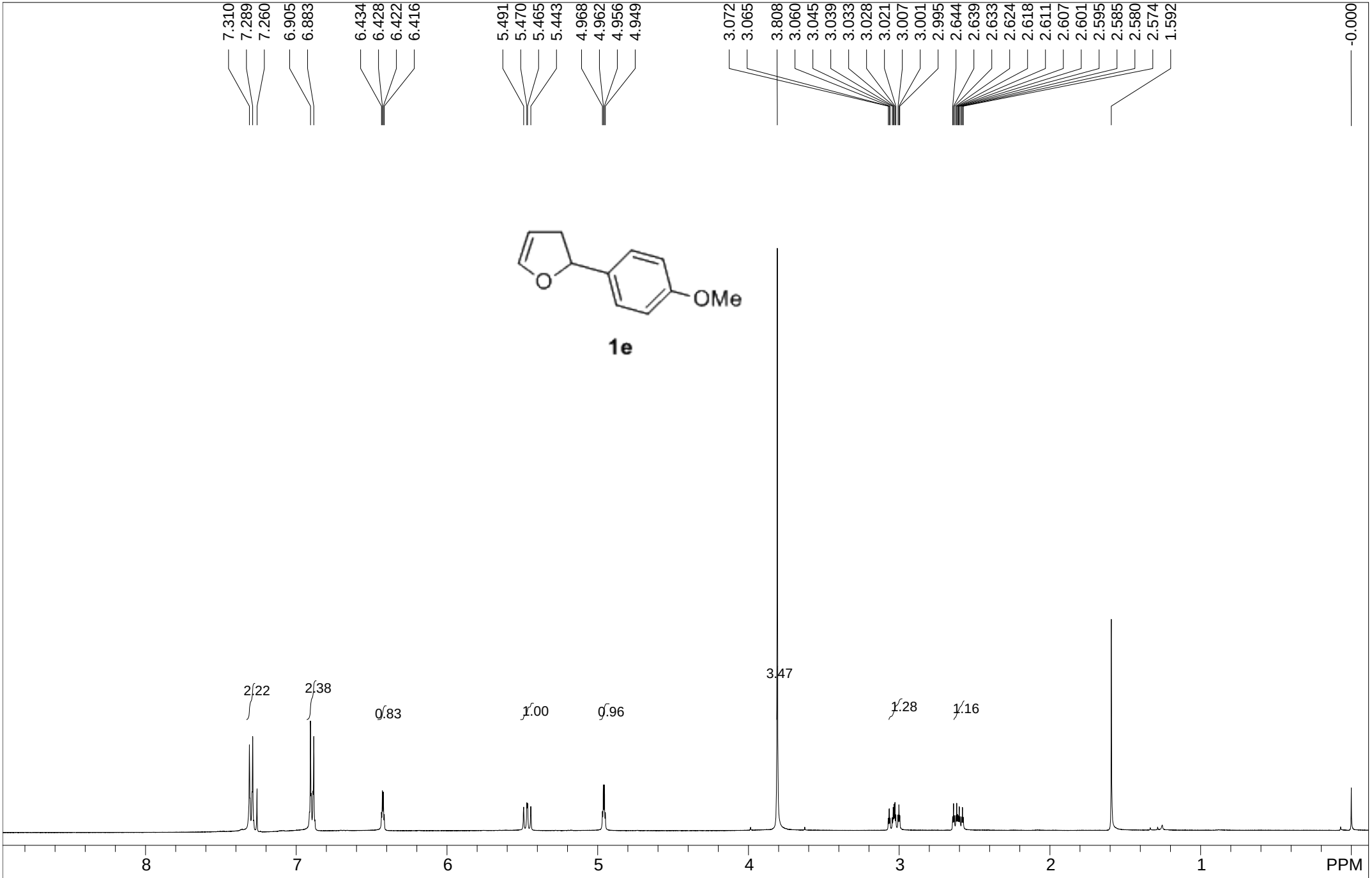


1 Det.A Ch1/214nm

PeakTable

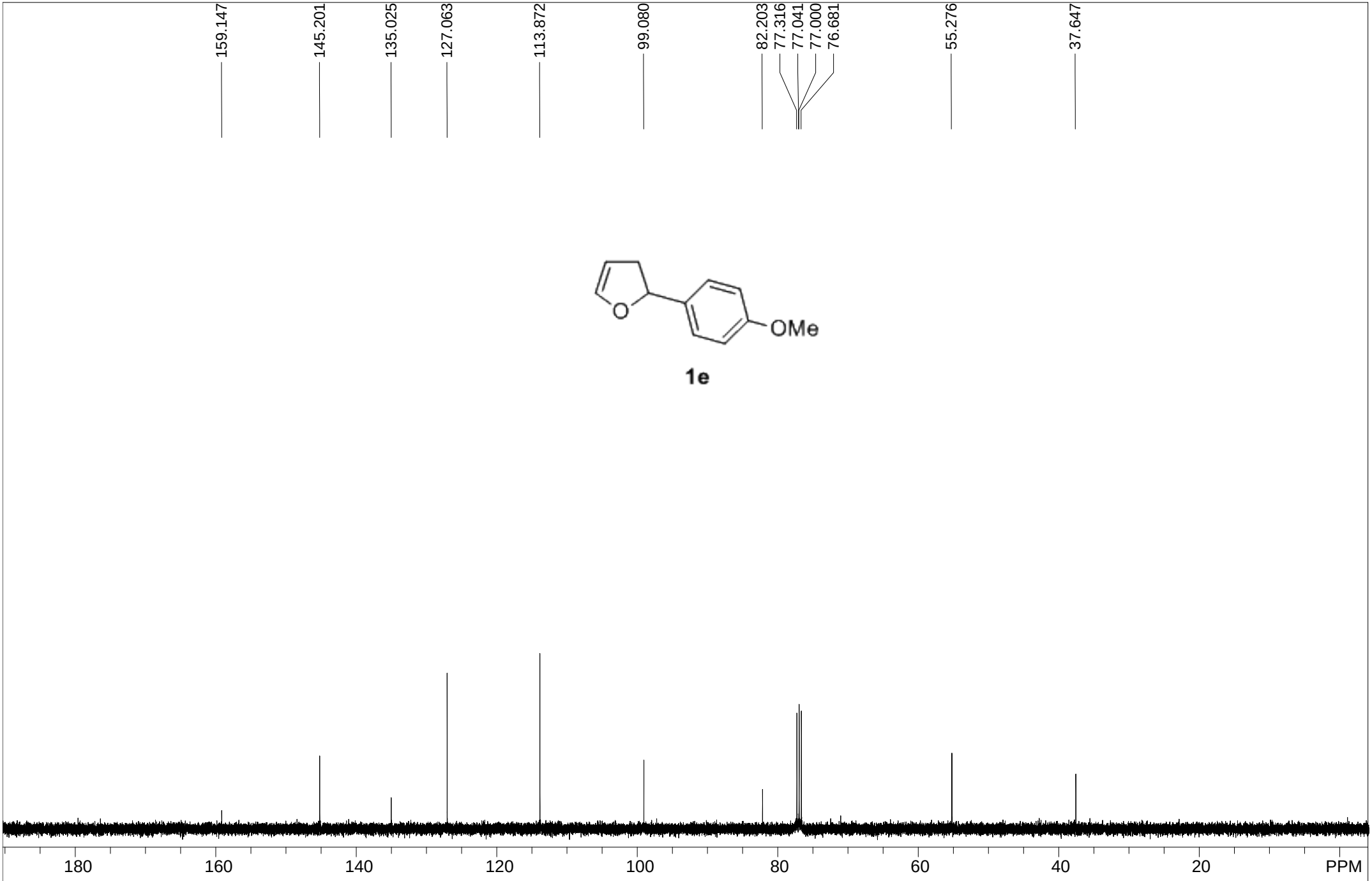
Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	19.587	11381424	302675	20.986	33.272
2	21.430	42853060	607036	79.014	66.728
Total		54234485	909712	100.000	100.000



Std proton;blank line USER: -- DATE: Aug 22 2014

F1: 400.032	F2: 100.597	SW1: 7310		OF1: 2807.4		PTS1d: 32768	
EX: s2pul		PW: 21.2 usec	PD: 1.0 sec	NA: 12	LB: 0.0		Nuts - $lh-2-26-1-h.fid

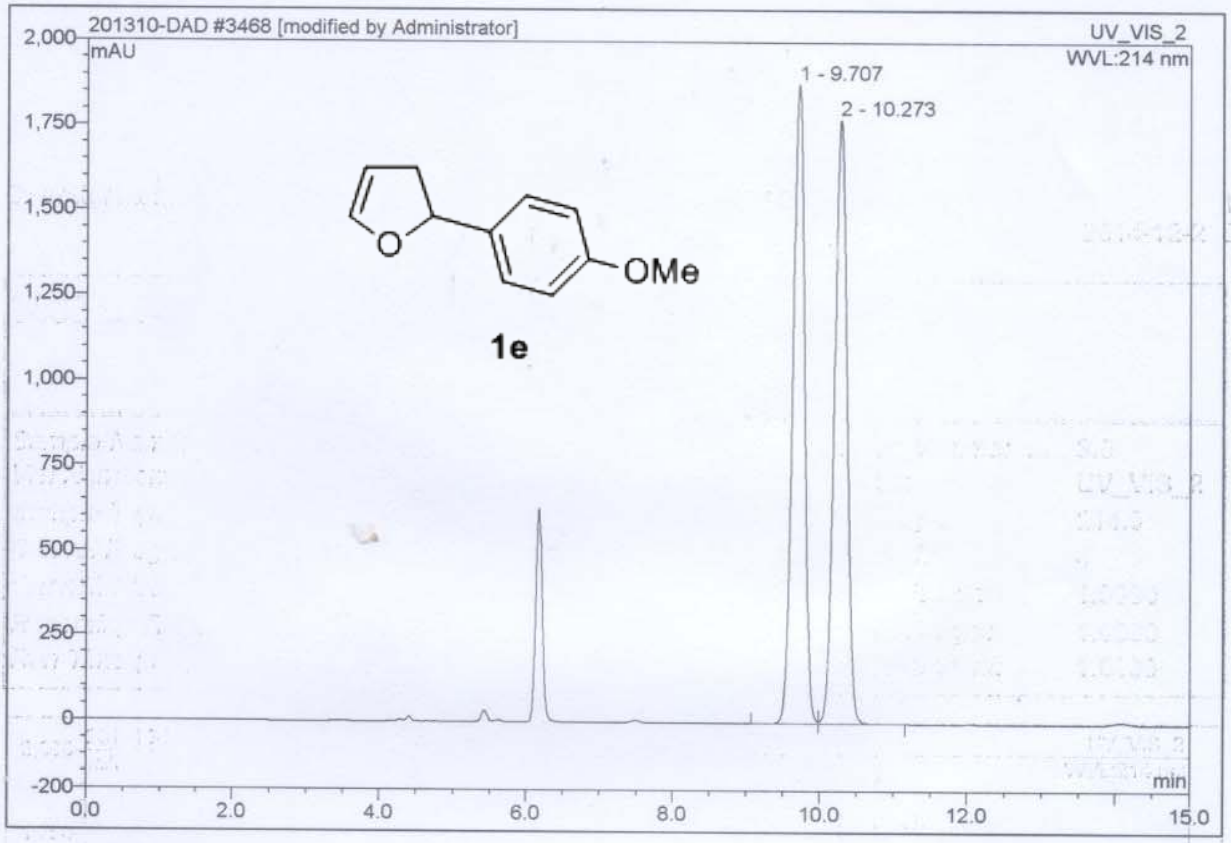


Std carbon;blank line USER: -- DATE: Aug 22 2014

F1: 100.598	F2: 400.031	SW1: 24510		OF1: 10561.6		PTS1d: 65536	
EX: s2pul		PW: 4.1 usec	PD: 1.0 sec	NA: 248	LB: 0.0		Nuts - $lh-2-26-1-c.fid

3468 LH-1+- PC-4 991 214 0.7

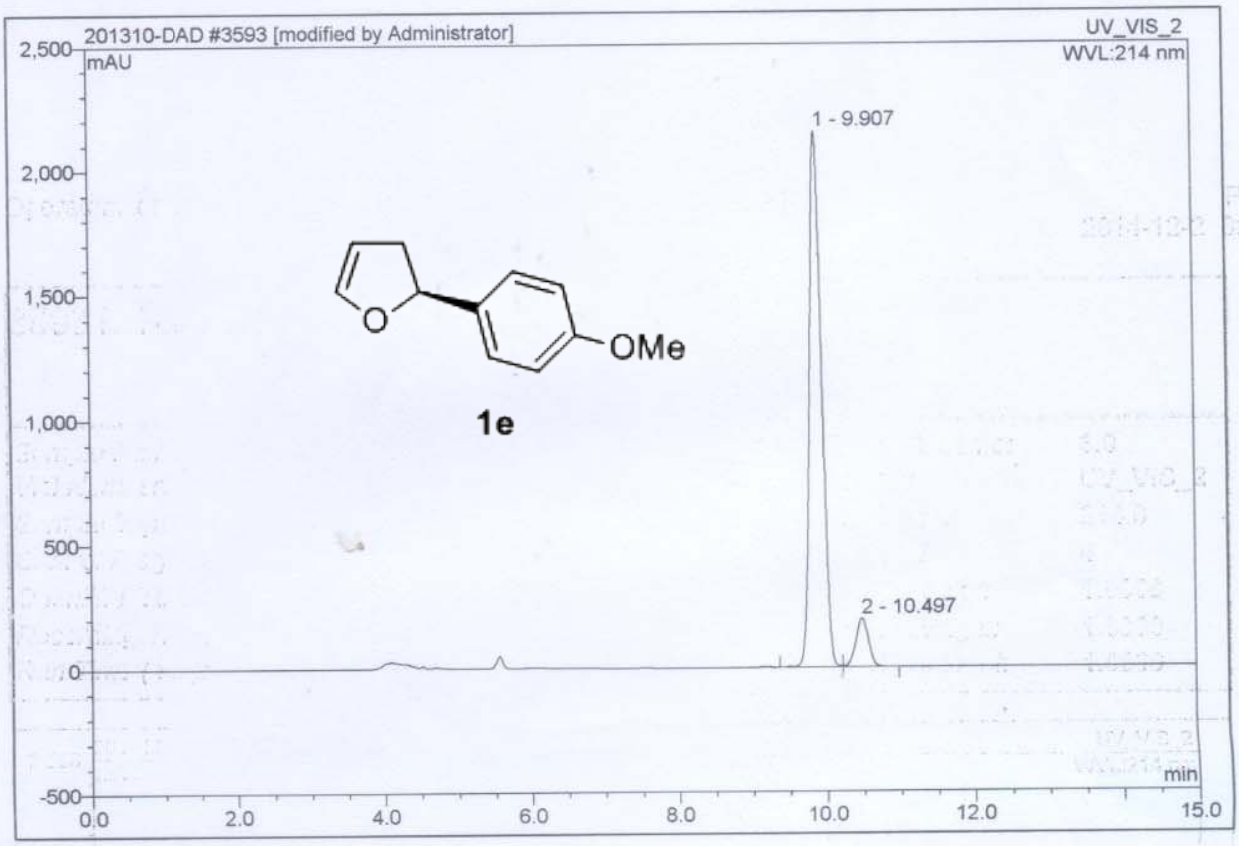
Sample Name:	**LH-1+- PC-4 991 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**GA2**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-17 10:13**	*Sample Weight:*	**1.0000**
Run Time (min):	**23.19**	*Sample Amount:*	**1.0000**



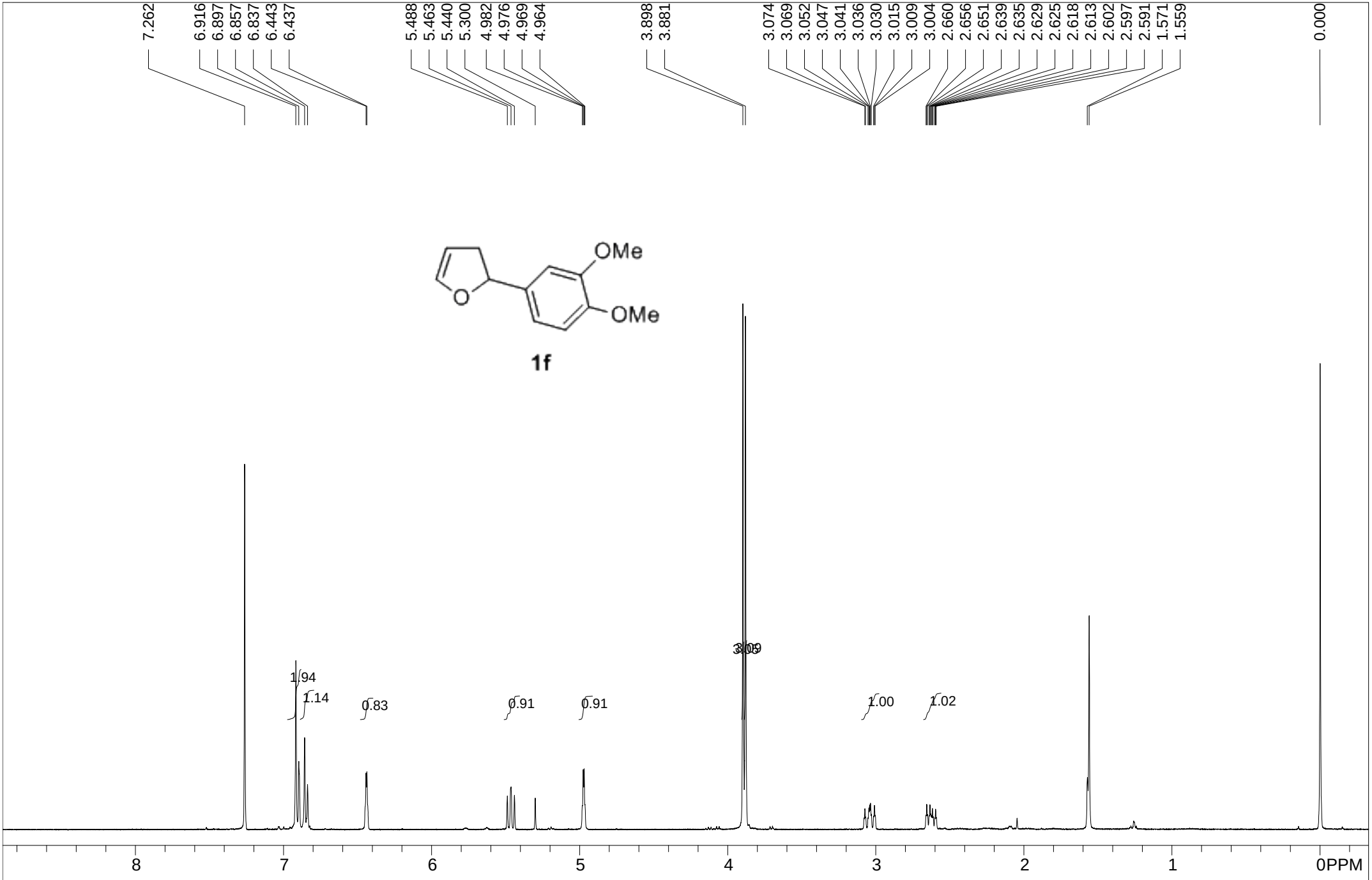
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	9.71	n.a.	1877.518	349.600	49.83	n.a.	BM
2	10.27	n.a.	1774.132	351.982	50.17	n.a.	MB
Total:			3651.650	701.582	100.00	0.000	

3593 LH-3-94-1 PC-4 991 214 0.7

Sample Name:	**LH-3-94-1 PC-4 991 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**BD2**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad4**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-12-2 17:32**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	9.91	n.a.	2151.315	407.308	91.26	n.a.	BM *
2	10.50	n.a.	195.303	39.004	8.74	n.a.	MB*
Total:			2346.617	446.312	100.00	0.000	



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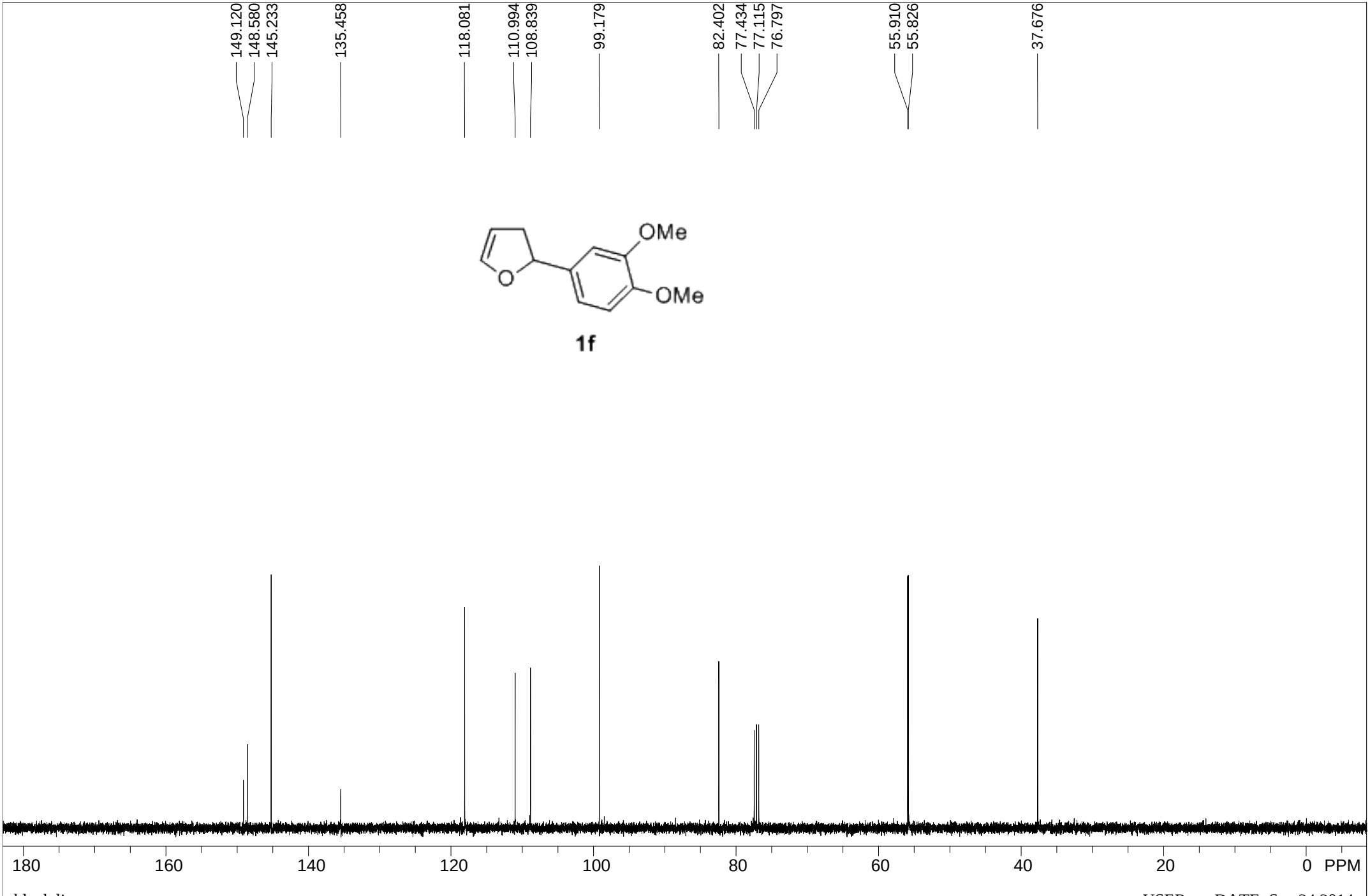
USER: -- DATE: Sep 2 2014

F1: 399.722	F2: 100.519	SW1: 6410		OF1: 2399.4		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 12	LB: 0.0		Nuts - $lh-2-42-1-h.fid



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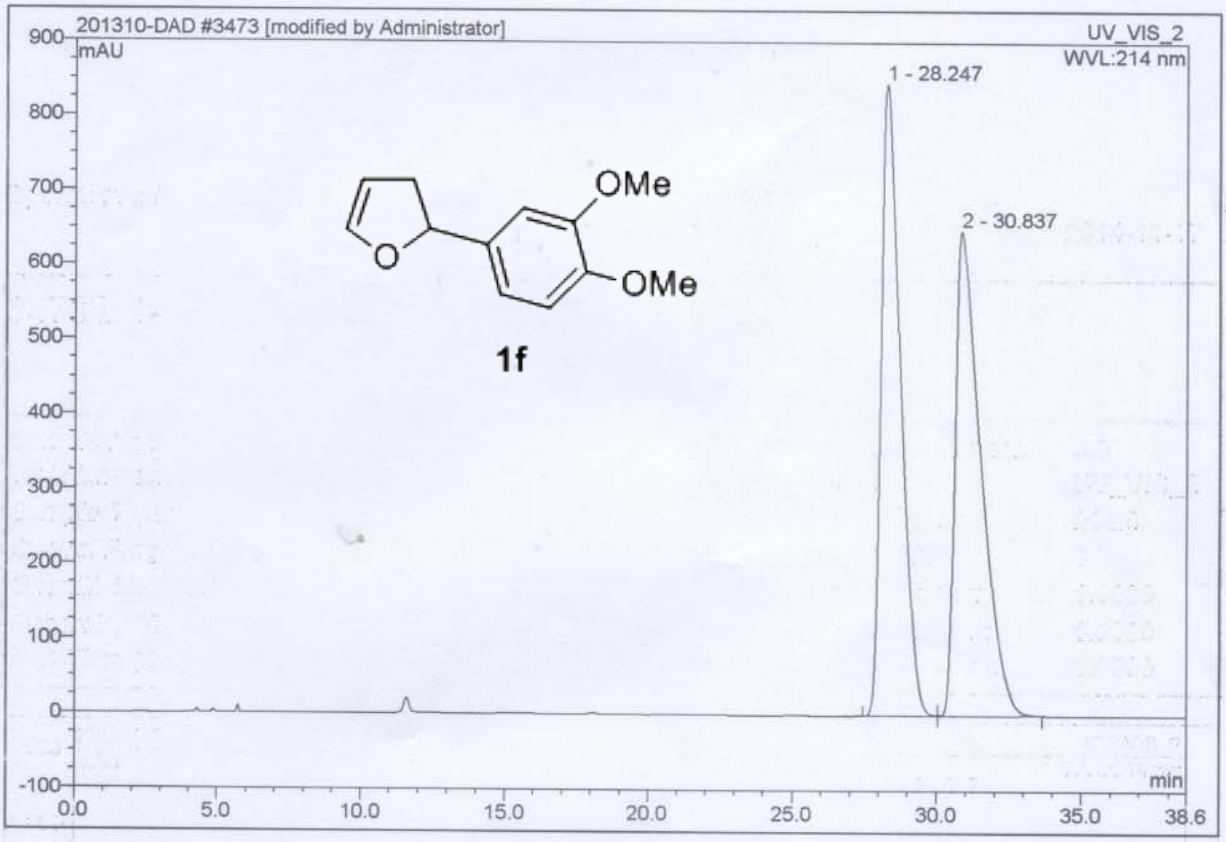
USER: -- DATE: Sep 24 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 28	LB: 0.0		Nuts - $lh-2-79-0-c.fid

3473 LH-2+- PC-4 982 214 0.7

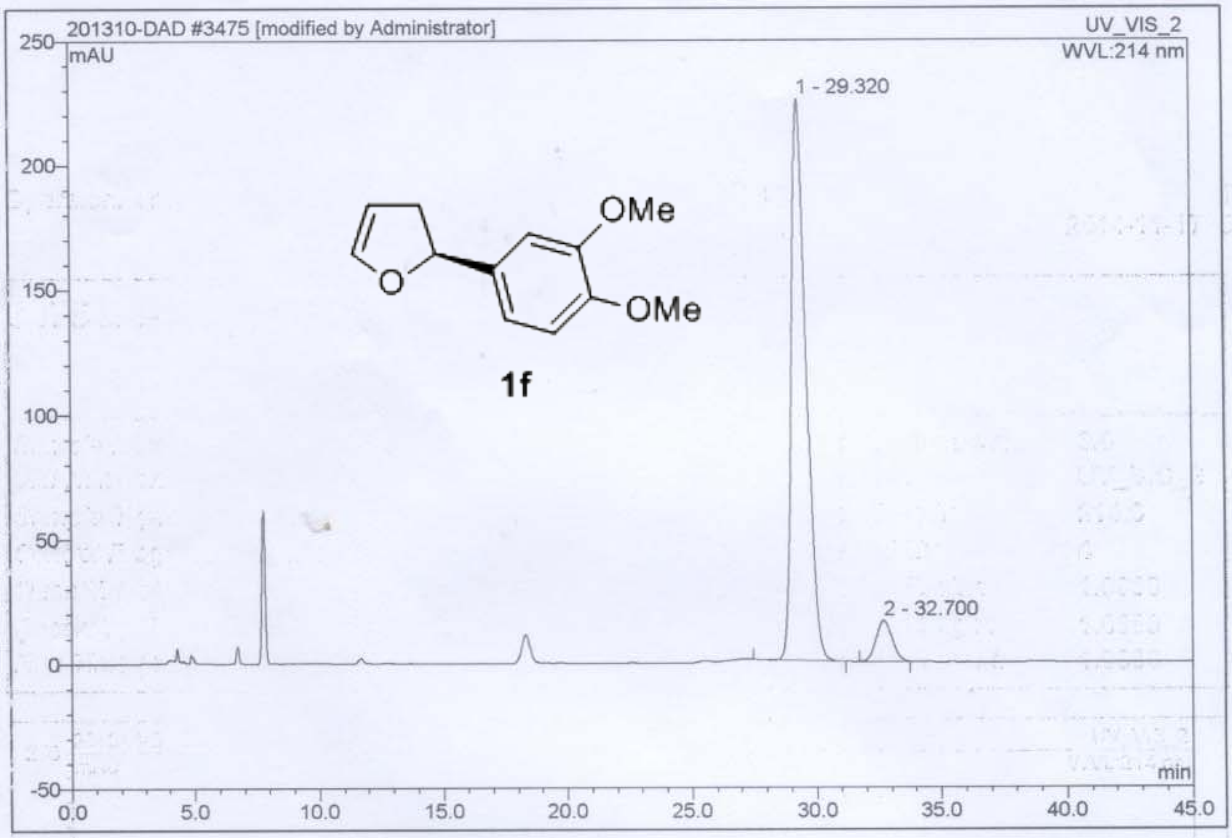
Sample Name:	**LH-2+- PC-4 982 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**GA3**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-17 14:02**	*Sample Weight:*	**1.0000**
Run Time (min):	**38.60**	*Sample Amount:*	**1.0000**



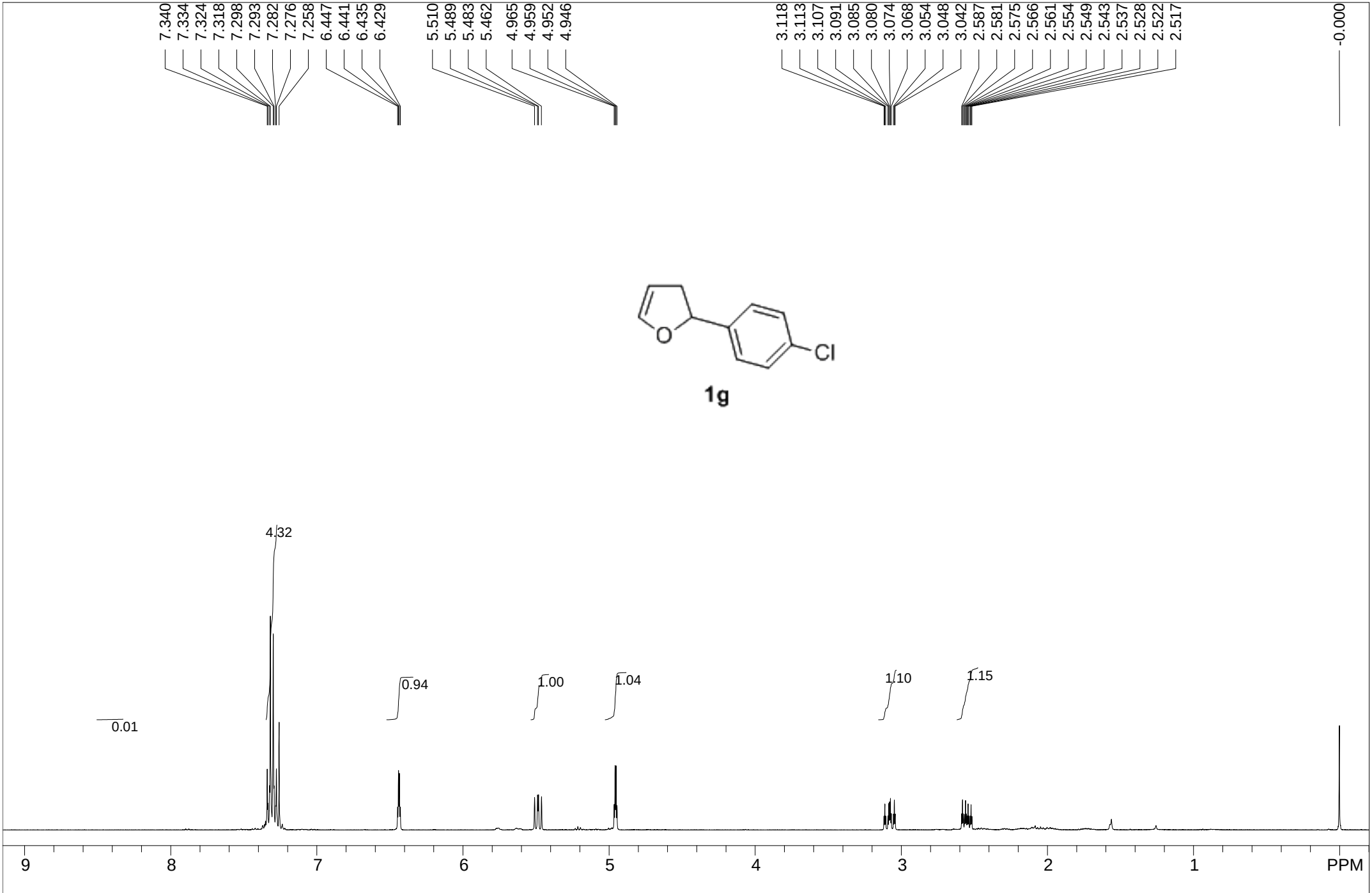
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	28.25	n.a.	844.810	660.368	49.81	n.a.	BM
2	30.84	n.a.	647.371	665.491	50.19	n.a.	MB
Total:			1492.181	1325.858	100.00	0.000	

3475 LH-3-64-1 PC-4 982 214 0.7

Sample Name:	**LH-3-64-1 PC-4 982 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**GB3**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-17 14:52**	*Sample Weight:*	**1.0000**
Run Time (min):	**45.00**	*Sample Amount:*	**1.0000**

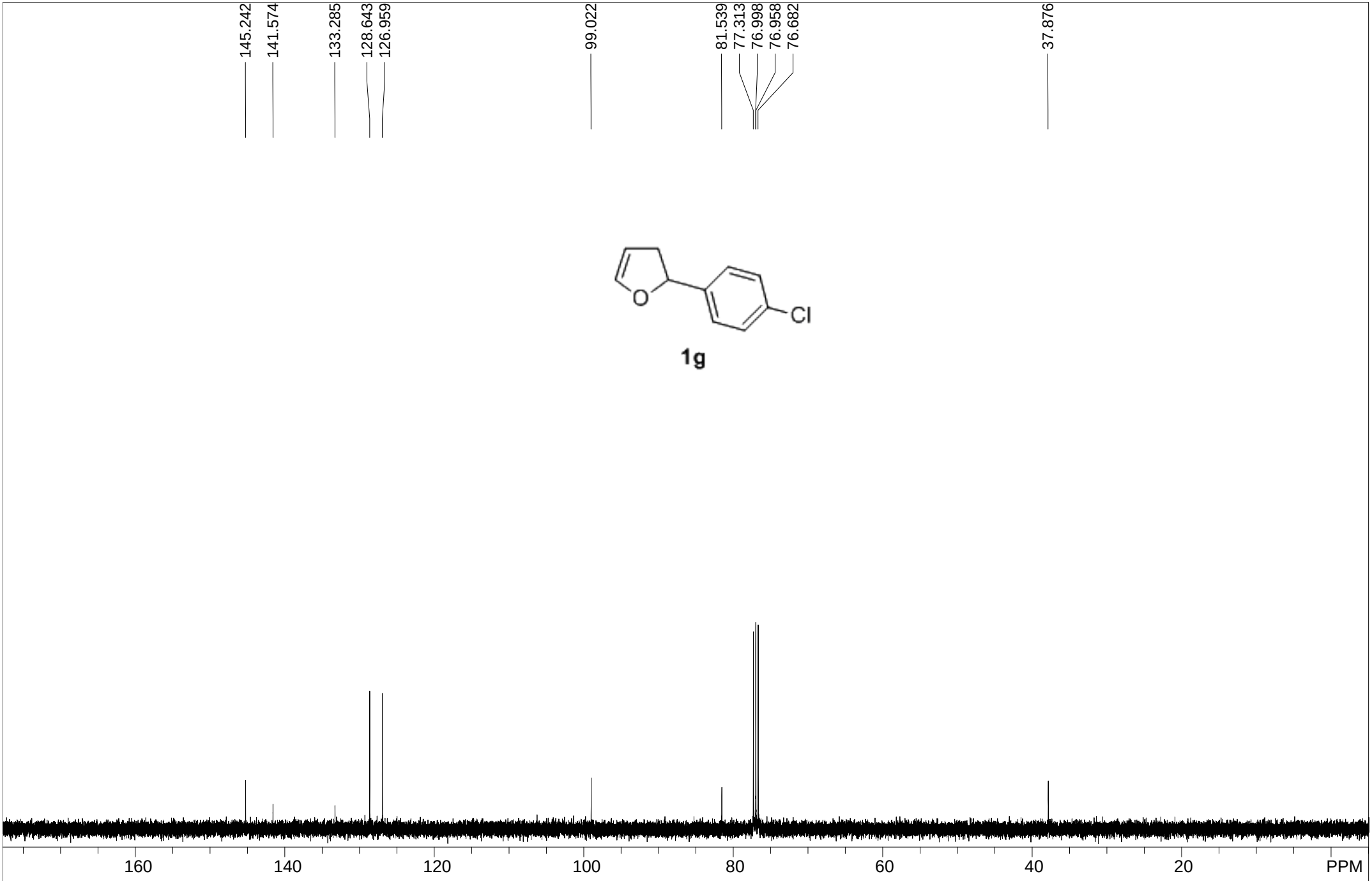


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	29.32	n.a.	225.312	152.966	92.56	n.a.	BMB*
2	32.70	n.a.	16.566	12.297	7.44	n.a.	BMB
Total:			241.878	165.262	100.00	0.000	



ldy-2014-9-9 USER: -- DATE: Sep 26 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2797.8		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 4	LB: 0.0		Nuts - $lh-2-82-0-h.fid



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USER: -- DATE: Sep 26 2014

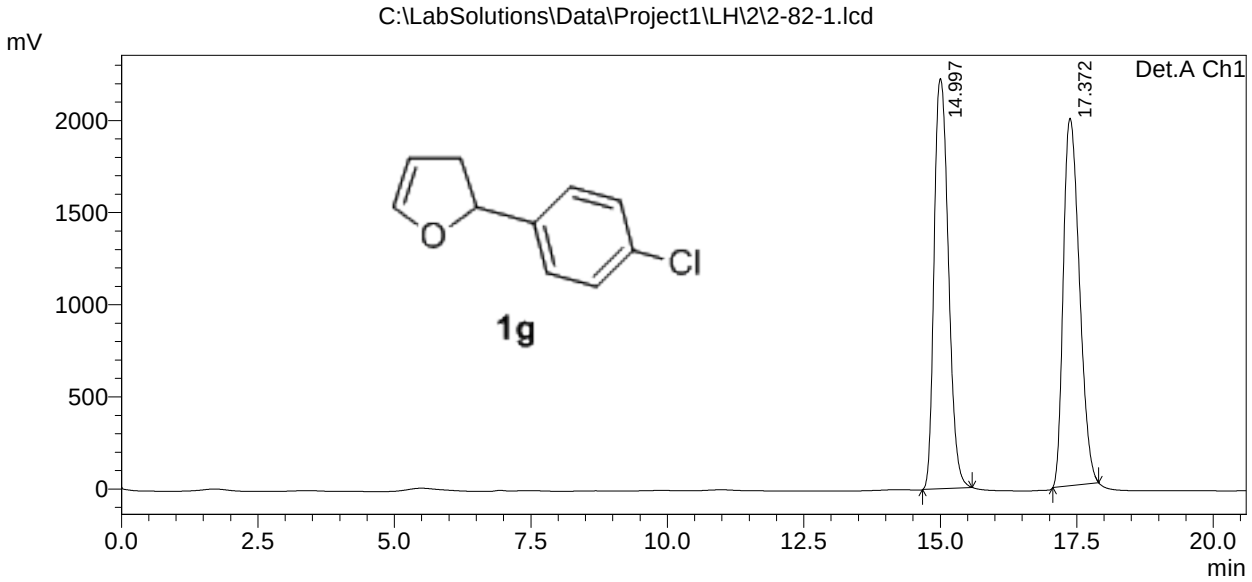
F1: 100.598	F2: 400.031	SW1: 25000		OF1: 10310.2		PTS1d: 65536	
EX: s2pul		PW: 4.1 usec	PD: 1.0 sec	NA: 140	LB: 0.0		Nuts - $lh-2-82-0-c.fid

==== Shimadzu LCsolution Analysis Report ====

C:\LabSolutions\Data\Project1\LH\2\2-82-1.lcd

Acquired by	: Admin
Sample Name	: 2-82-1
method	:OD-H,99.9/0.1,0.5,214
Injection Volume	: 2.5 uL
Data File Name	: 2-82-1.lcd
Method File Name	: 1.lcm
Report File Name	: 1.lcr
Data Acquired	: 2014-9-27 12:20:34
Data Processed	: 2014-9-27 12:41:10

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

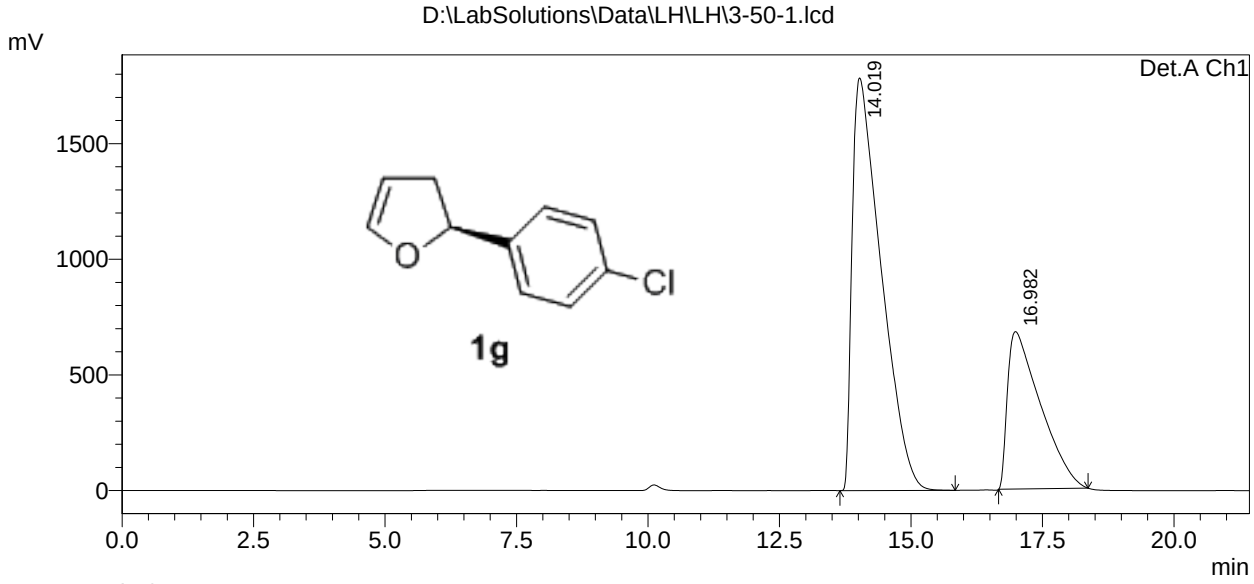
Peak#	Ret. Time	Area	Height	Area %
1	14.997	40561114	2227434	49.798
2	17.372	40890715	1995224	50.202
Total		81451829	4222659	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-50-1.lcd

Acquired by	: Admin
Sample Name	: 3-50-1
Sample ID	: OD-H,99.9/0.1,0.5,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-50-1.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-6 10:33:25
Data Processed	: 2013-11-6 10:54:57

<Chromatogram>

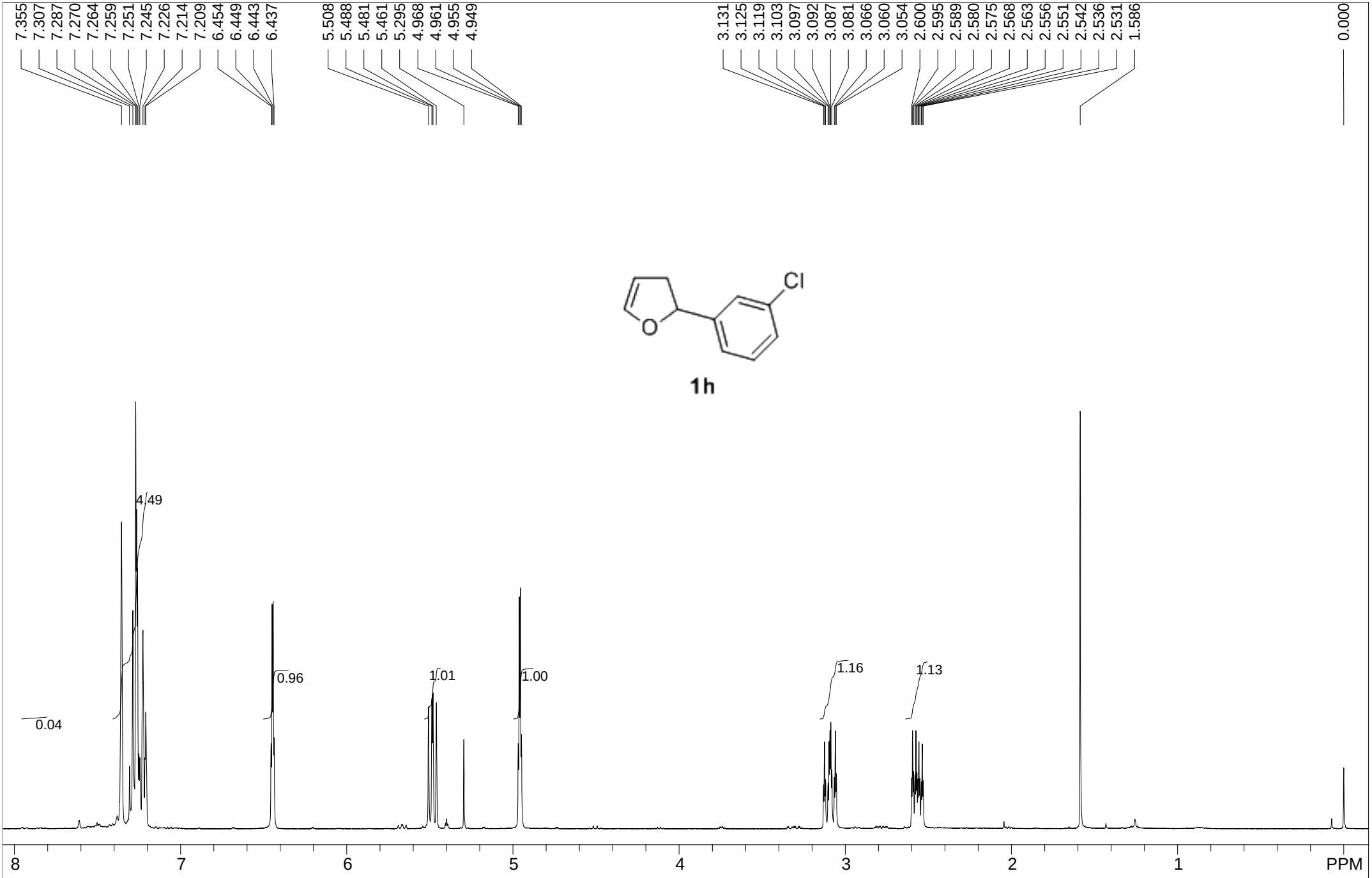


1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	14.019	68321160	1784634	69.732	72.374
2	16.982	29655774	681217	30.268	27.626
Total		97976934	2465851	100.000	100.000



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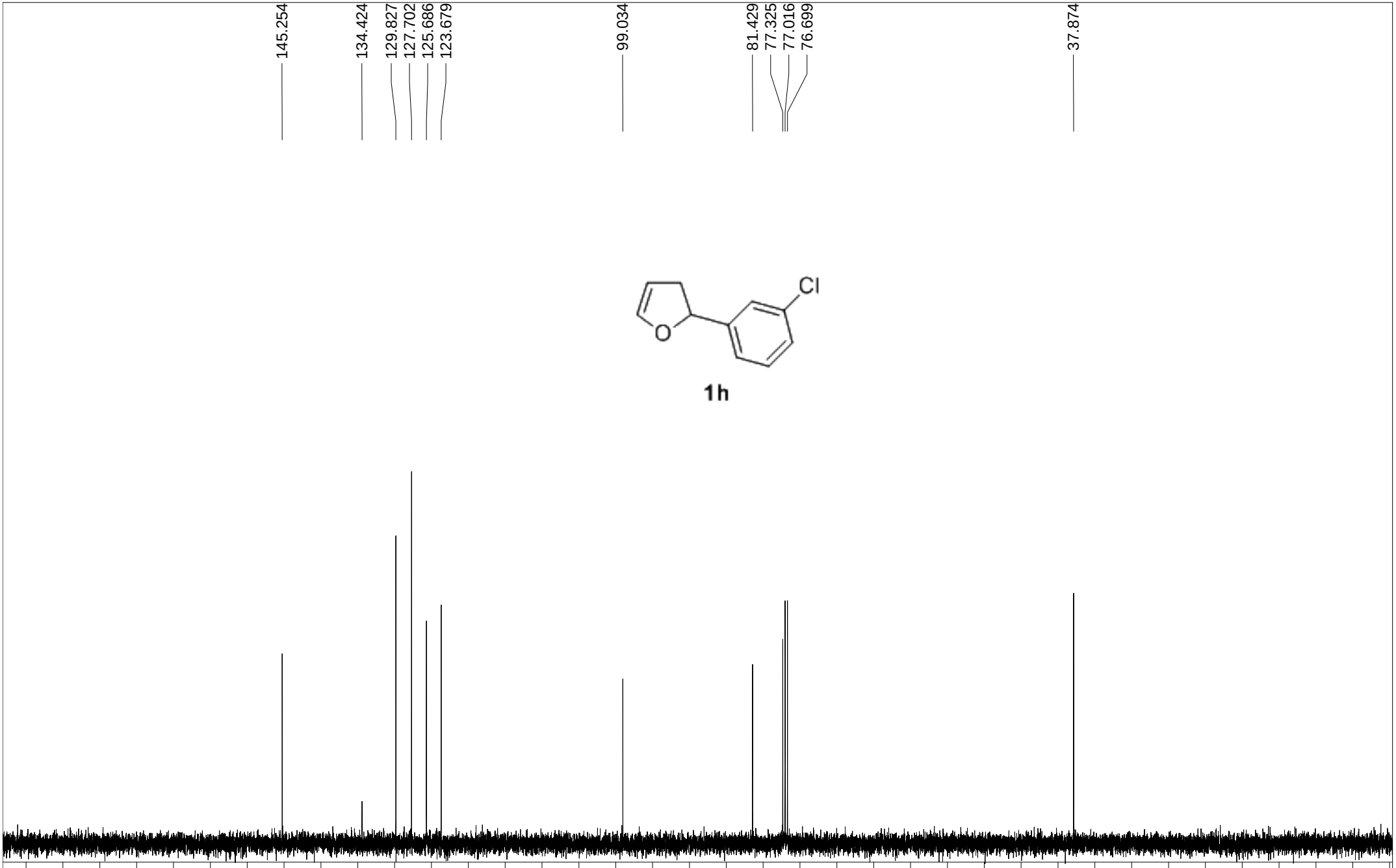
USER: -- DATE: Sep 17 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2797.5		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 12	LB: 0.0		Nuts - $lh-2-654-1-h.fid



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USER: -- DATE: Sep 17 2014

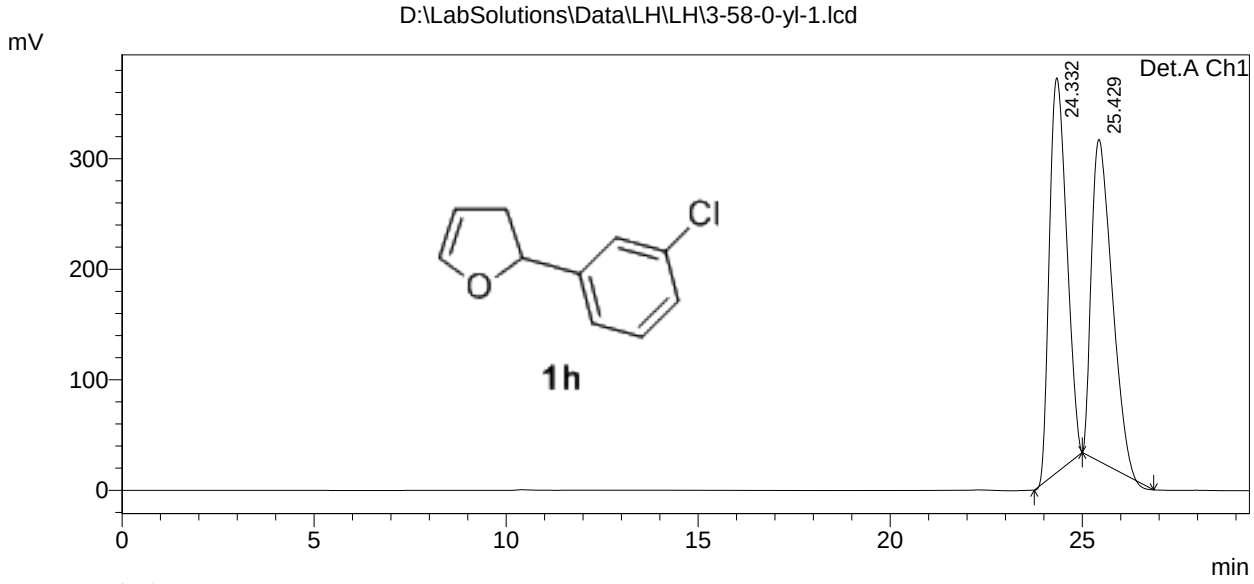
F1: 100.521	F2: 399.722	SW1: 27778		OF1: 11307.3		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 120	LB: 0.0		Nuts - $lh-2-65-1-c.fid

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-58-0-yl-1.lcd

Acquired by	: Admin
Sample Name	: 3-58-0-yl-1
Sample ID	: OD-H,99.9/0.1,0.3,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-58-0-yl-1.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-12 13:23:21
Data Processed	: 2013-11-12 13:52:43

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

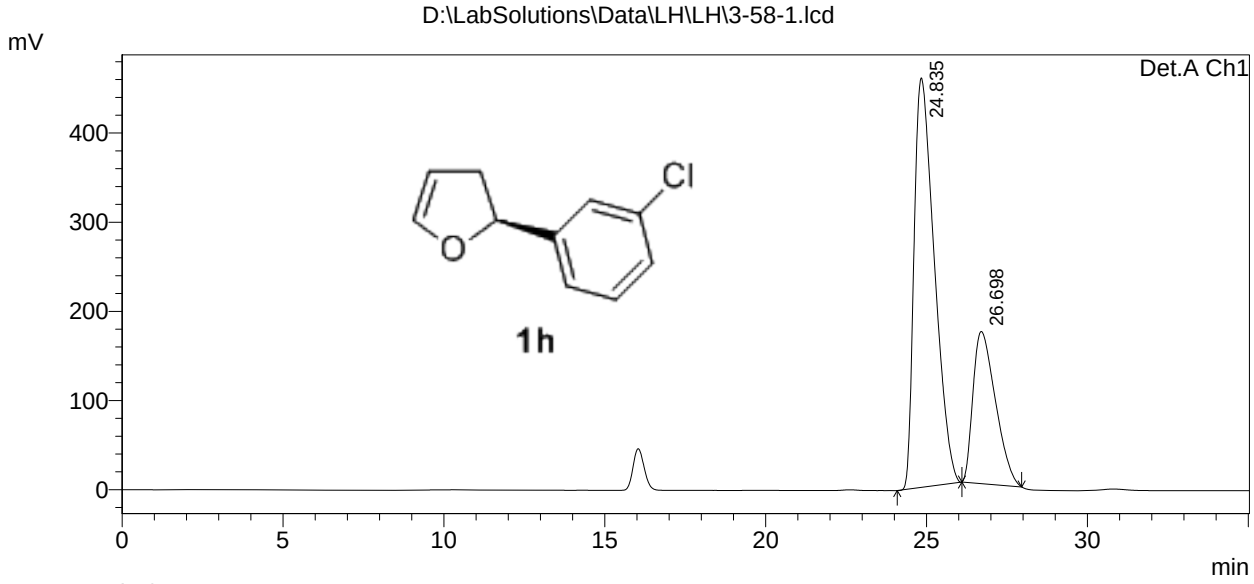
Peak#	Ret. Time	Area	Height	Area %	Height %
1	24.332	11181288	357162	50.727	55.092
2	25.429	10860922	291134	49.273	44.908
Total		22042210	648296	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-58-1.lcd

Acquired by	: Admin
Sample Name	: 3-58-1
Sample ID	: OD-H,99.9/0.1,0.3,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-58-1.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-12 10:50:48
Data Processed	: 2013-11-12 11:25:50

<Chromatogram>

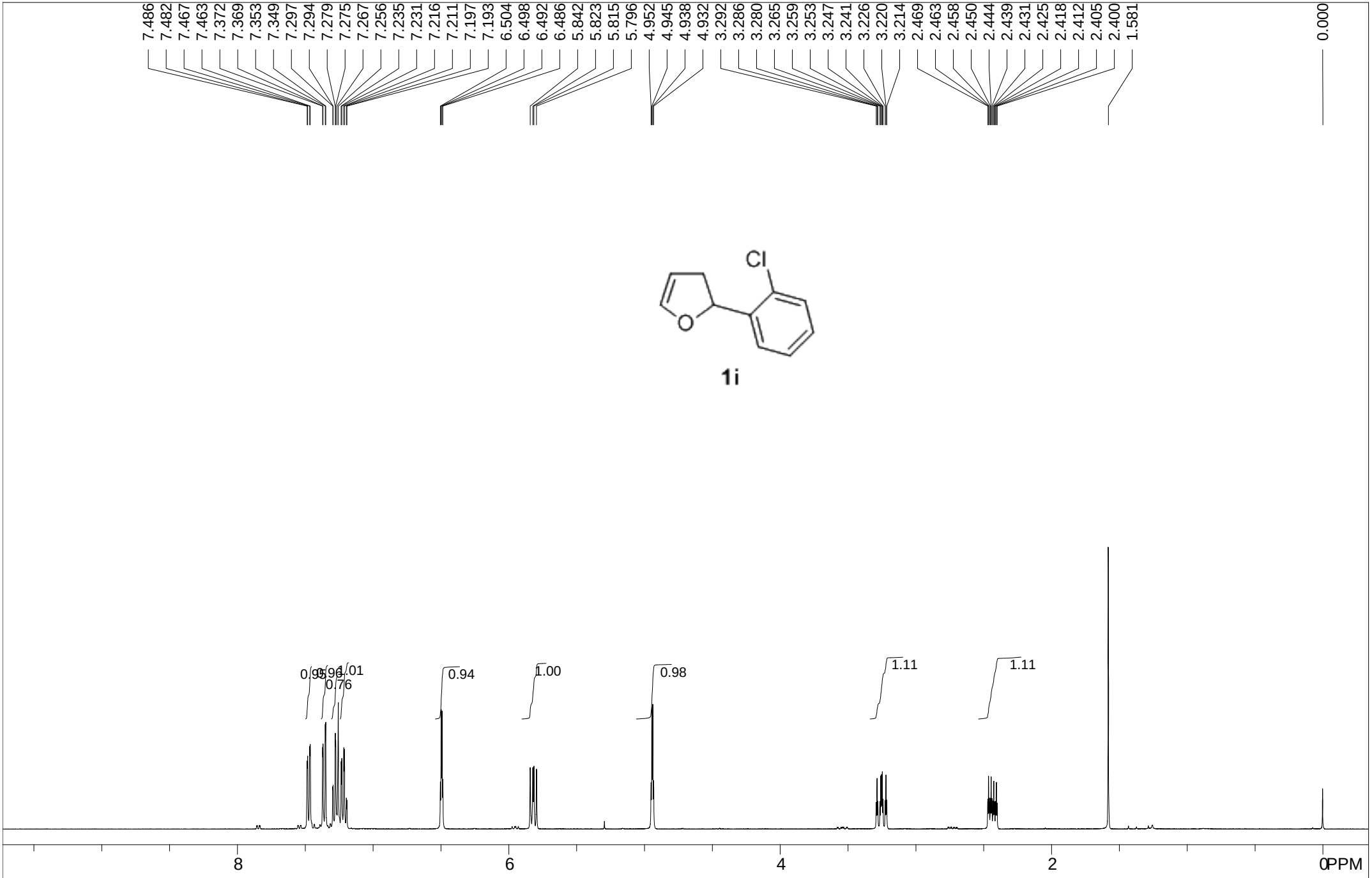


1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	24.835	20121269	459306	70.842	72.909
2	26.698	8281623	170664	29.158	27.091
Total		28402892	629969	100.000	100.000



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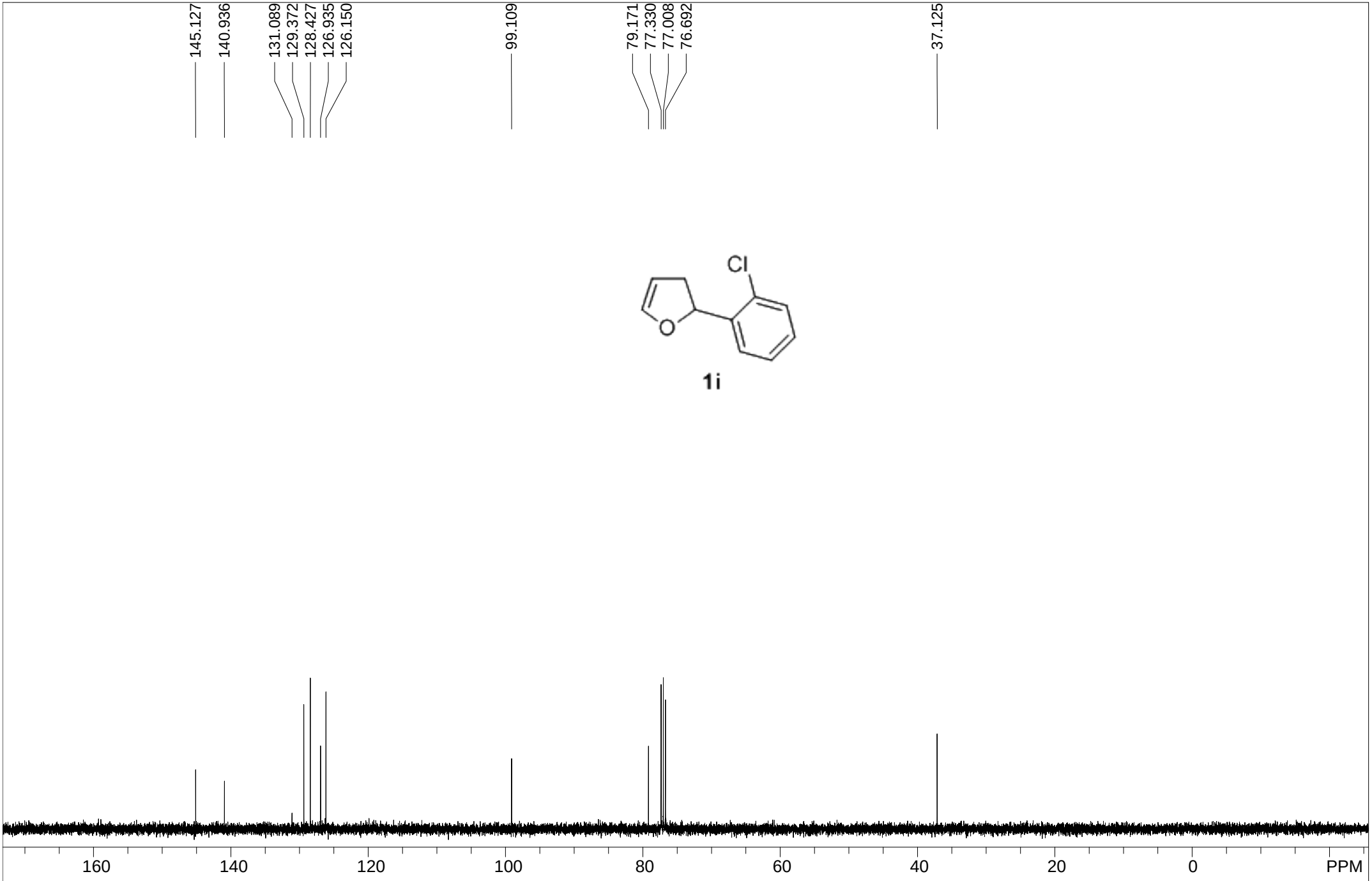
USER: -- DATE: Sep 17 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2797.3		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-64-1-h.fid



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USER: -- DATE: Sep 17 2014

F1: 100.521	F2: 399.722	SW1: 27778		OF1: 11307.3		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 80	LB: 0.0		Nuts - $lh-2-64-1-c.fid

==== Shimadzu LCsolution Analysis Report ====

C:\LabSolutions\Data\Project1\LH\2\2-80-1.0lcd.lcd

Acquired by	: Admin
Sample Name	: 2-80-1.0
method	:OD-H,99.5/0.5,0.5,214
Injection Volume	: 2.5 uL
Data File Name	: 2-80-1.0lcd.lcd
Method File Name	: 1.lcm
Report File Name	: 1.lcr
Data Acquired	: 2014-9-26 21:34:28
Data Processed	: 2014-9-26 21:45:47

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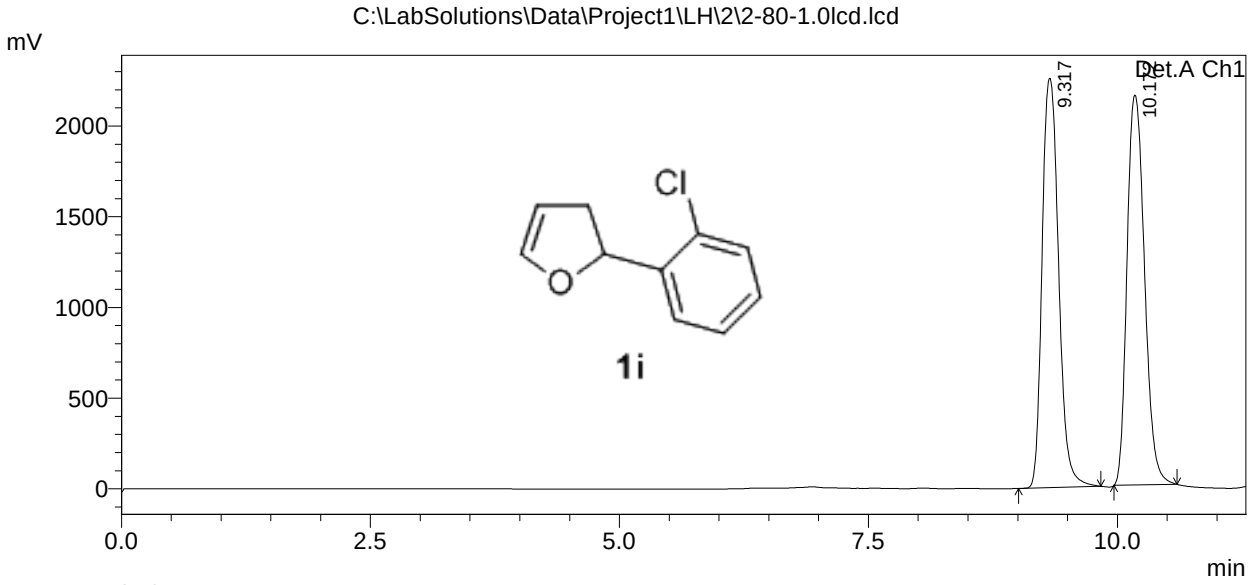


1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

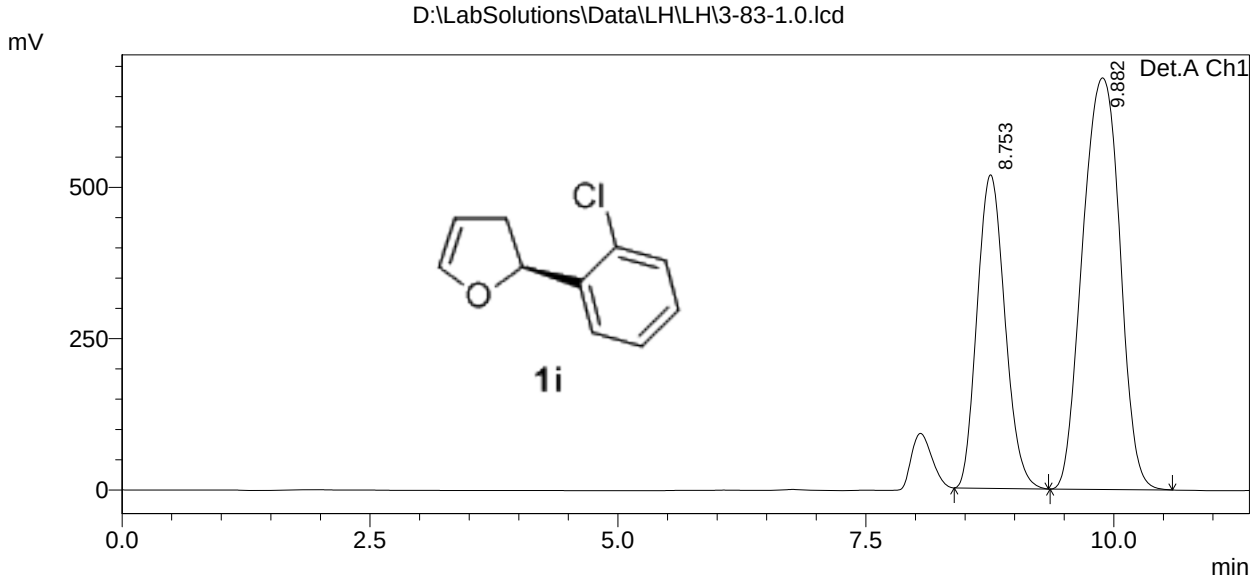
Peak#	Ret. Time	Area	Height	Area %
1	9.317	25970263	2255403	49.700
2	10.172	26283549	2150173	50.300
Total		52253811	4405576	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-83-1.0.lcd

Acquired by	: Admin
Sample Name	: 3-83-1.0
Sample ID	: OD-H,99.5/0.5,0.5,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-83-1.0.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-25 14:48:27
Data Processed	: 2013-11-25 14:59:50

<Chromatogram>

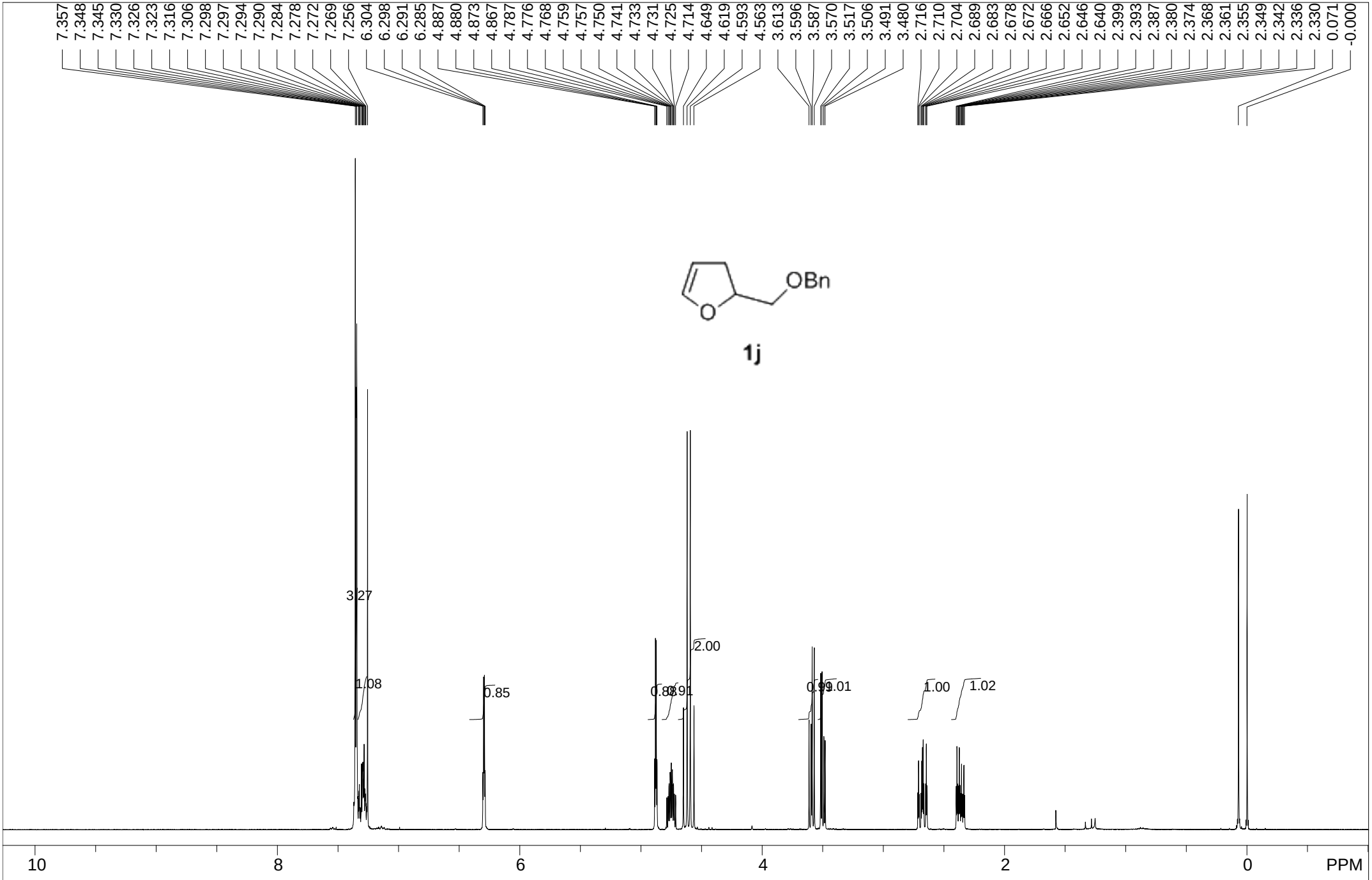


1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	8.753	10107110	518099	36.168	43.242
2	9.882	17837592	680033	63.832	56.758
Total		27944702	1198132	100.000	100.000



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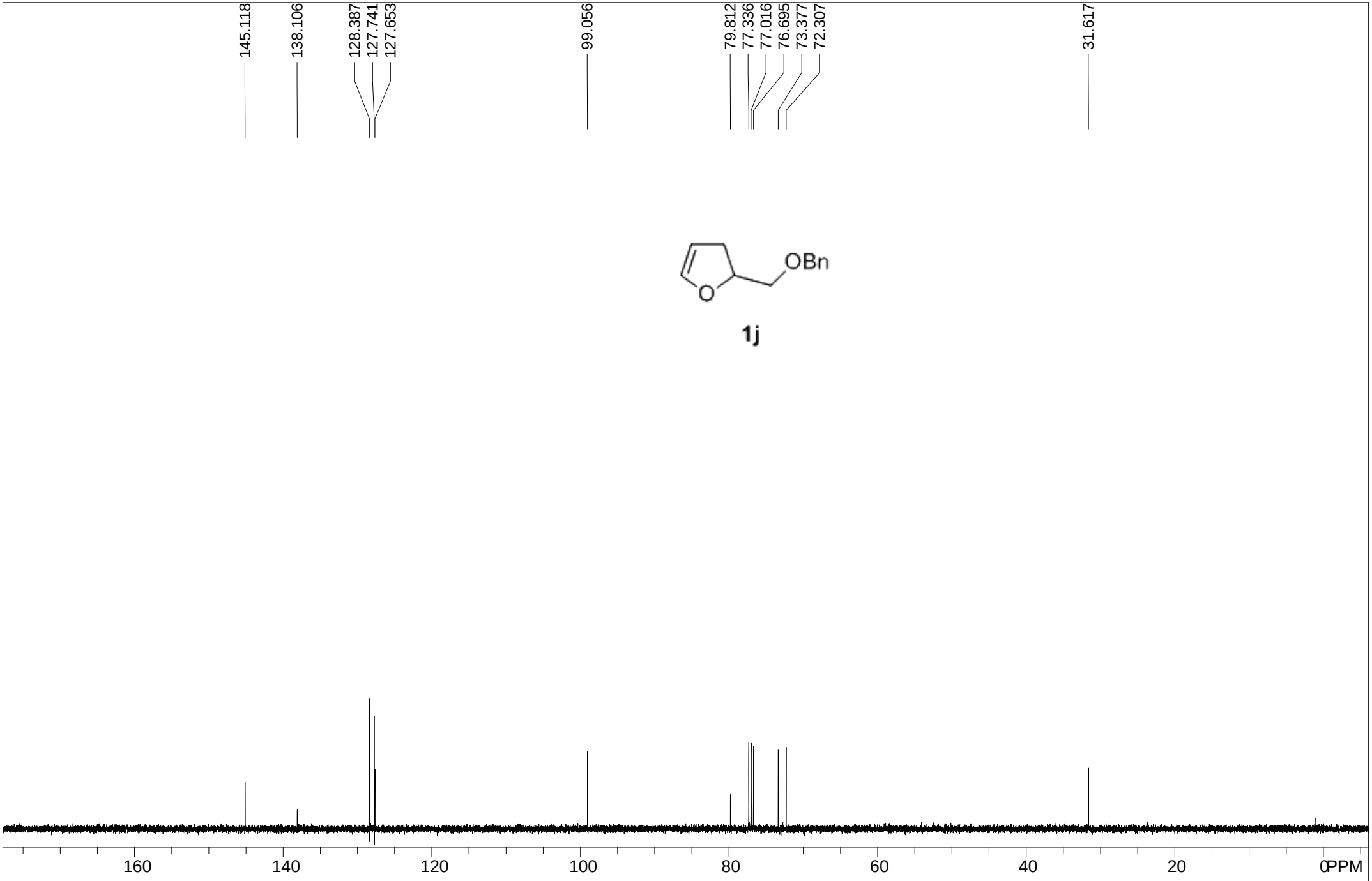
USER: -- DATE: Dec 23 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2796.8		PTS1d: 32768
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0	Nuts - $lh-4-21-1-h-400m.fid



1j

new experiment USER: -- DATE: Dec 23 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.0		PTS1d: 32768
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 80	LB: 0.0	Nuts - $lh-4-21-1-c-400m.fid

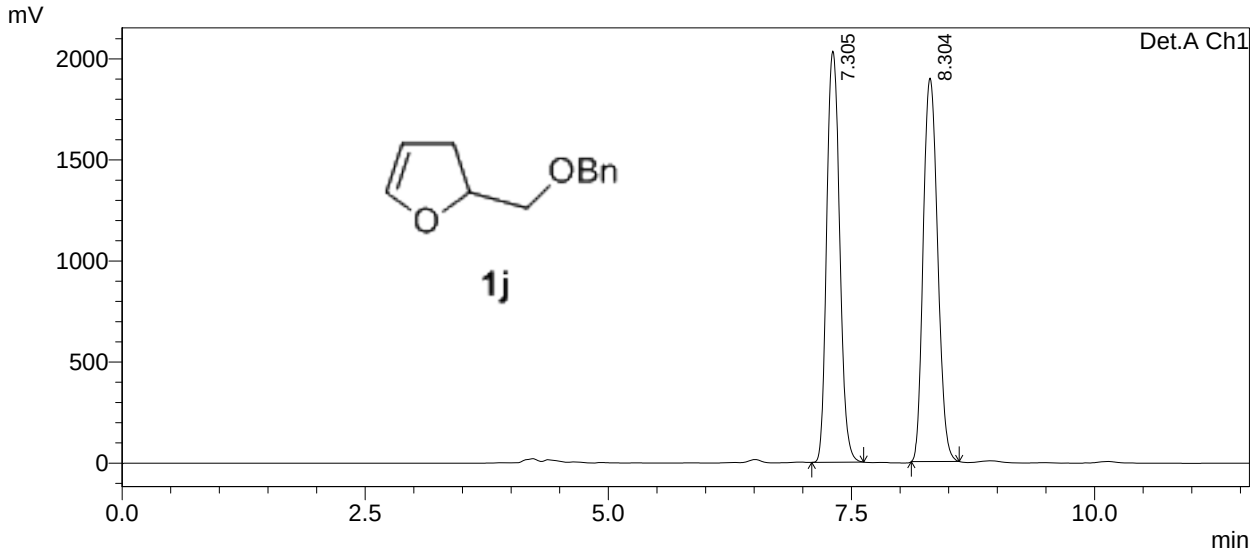
==== Shimadzu LCsolution Analysis Report ====

G:\lh-4-25-01.lcd

Acquired by	: Admin
Sample Name	: LH-4-25-01
Sample ID	: OD-H/90:10/0.7,214
Vail #	:
Injection Volume	: 1 uL
Data File Name	: lh-4-25-01.lcd
Method File Name	: 123.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2014-12-26 11:47:05
Data Processed	: 2014-12-26 11:58:40

<Chromatogram>

G:\lh-4-25-01.lcd



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	7.305	18862056	2035426	49.115	51.749
2	8.304	19542096	1897834	50.885	48.251
Total		38404152	3933260	100.000	100.000

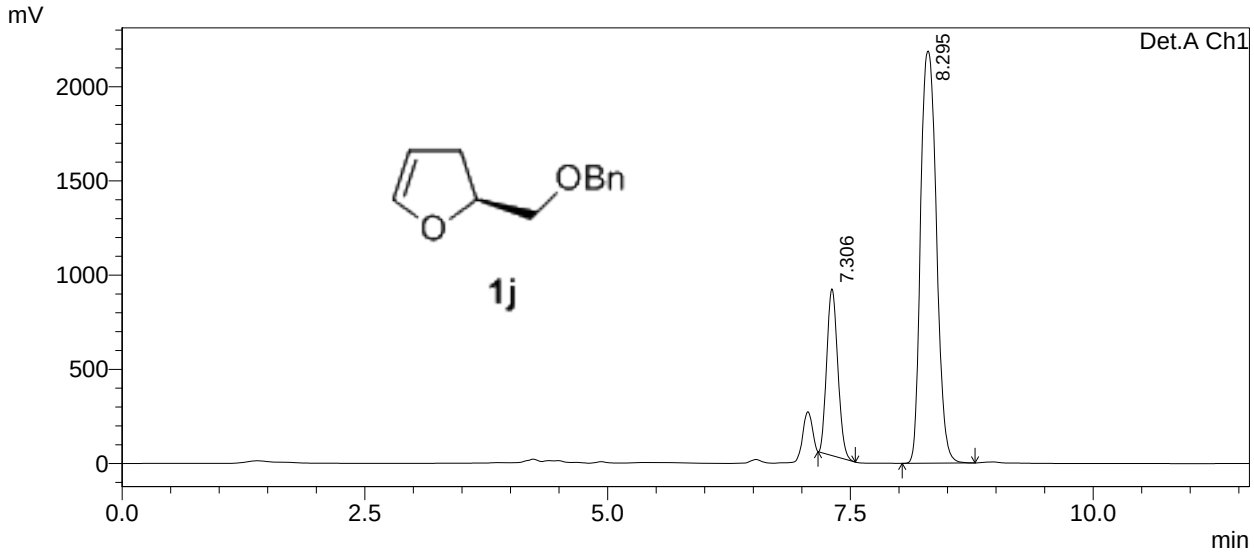
==== Shimadzu LCsolution Analysis Report ====

G:\lh-4-26-1.lcd

Acquired by	: Admin
Sample Name	: LH-4-26-1.
Sample ID	: OD-H/90:10/0.7,214
Vail #	:
Injection Volume	: 1 uL
Data File Name	: lh-4-26-1.lcd
Method File Name	: 123.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2014-12-26 12:24:41
Data Processed	: 2014-12-26 12:36:19

<Chromatogram>

G:\lh-4-26-1.lcd

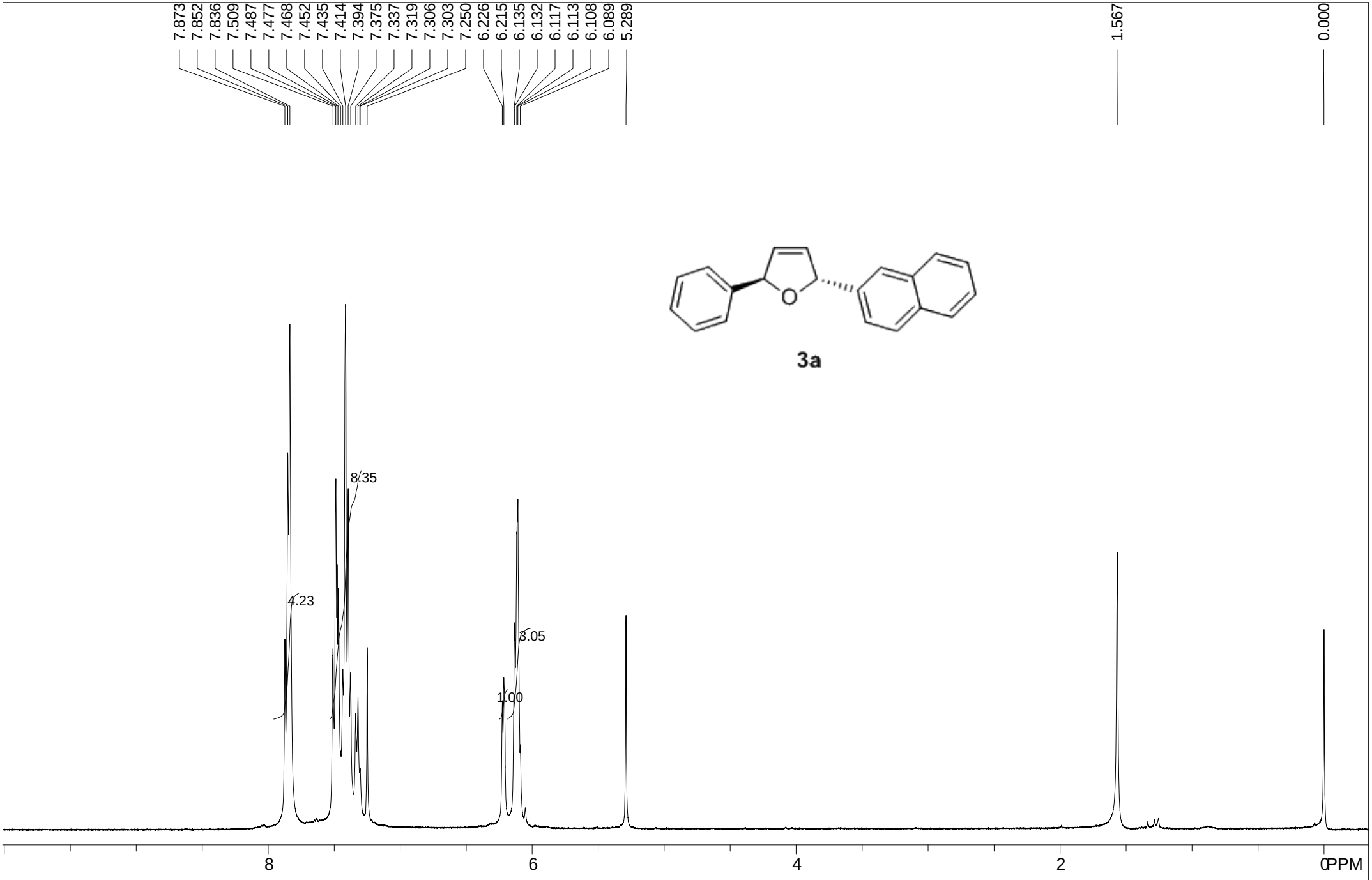


1 Det.A Ch1/214nm

PeakTable

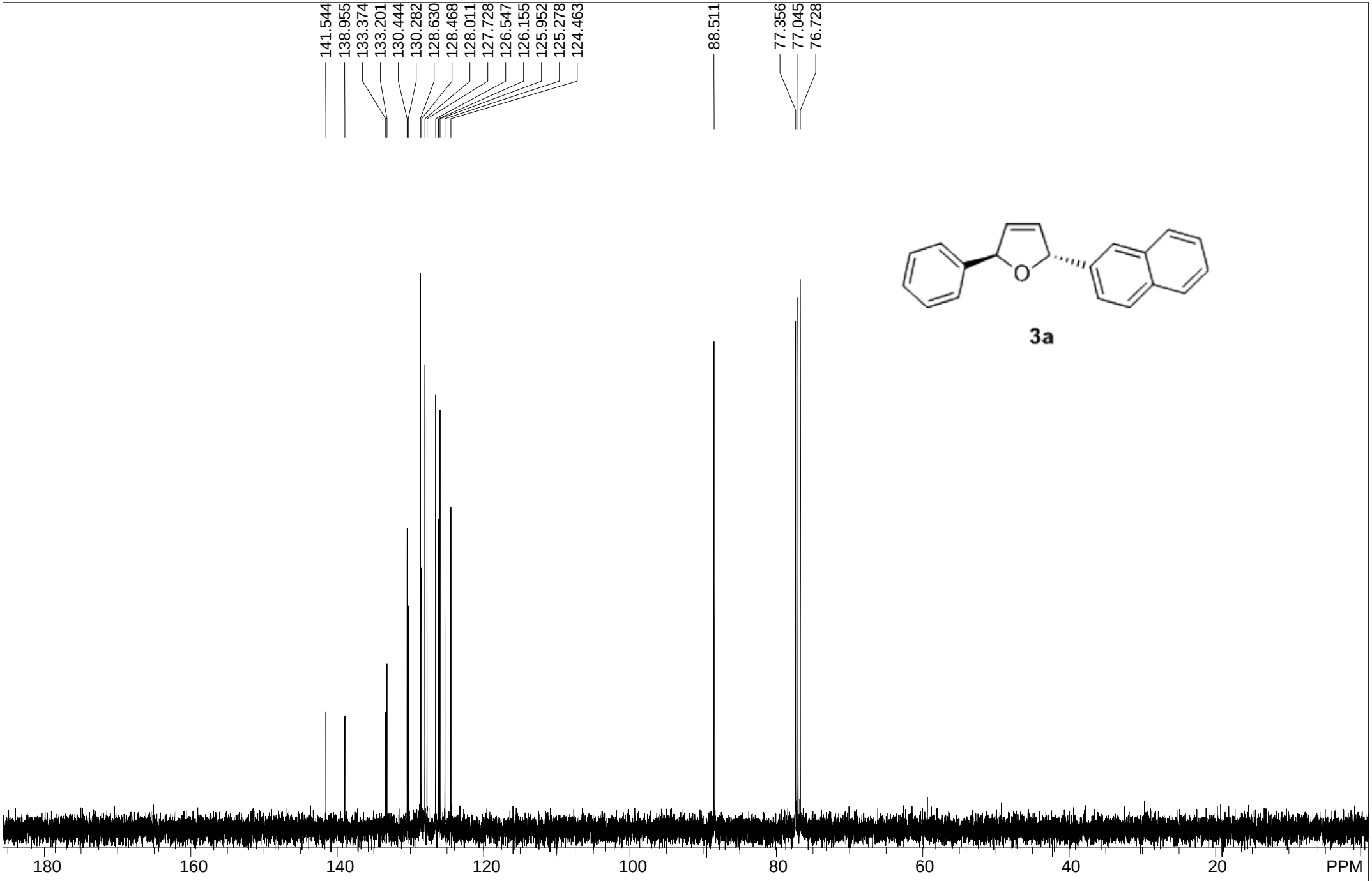
Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	7.306	7027603	885319	22.055	28.805
2	8.295	24836828	2188204	77.945	71.195
Total		31864431	3073523	100.000	100.000



Std proton;blank line USER: -- DATE: Apr 16 2014

F1: 400.032	F2: 100.597	SW1: 7225		OF1: 2803.0		PTS1d: 32768	
EX: s2pul		PW: 10.4 usec	PD: 1.0 sec	NA: 20	LB: 0.0		Nuts - $lh-1-12-1-h.fid



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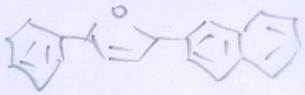
USER: -- DATE: Aug 19 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 224	LB: 0.0		Nuts - $lh-2-2-c.fid



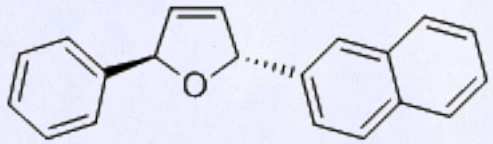
2-2-noesy

Sample Name:
2-2-noesy
Data Collected on:
OMC-NMR600-vnmrs600
Archive directory:
/home/omc/vnmrsys/data
Sample directory:
2-2-noesy_20140820_01
FidFile: NOESY_01

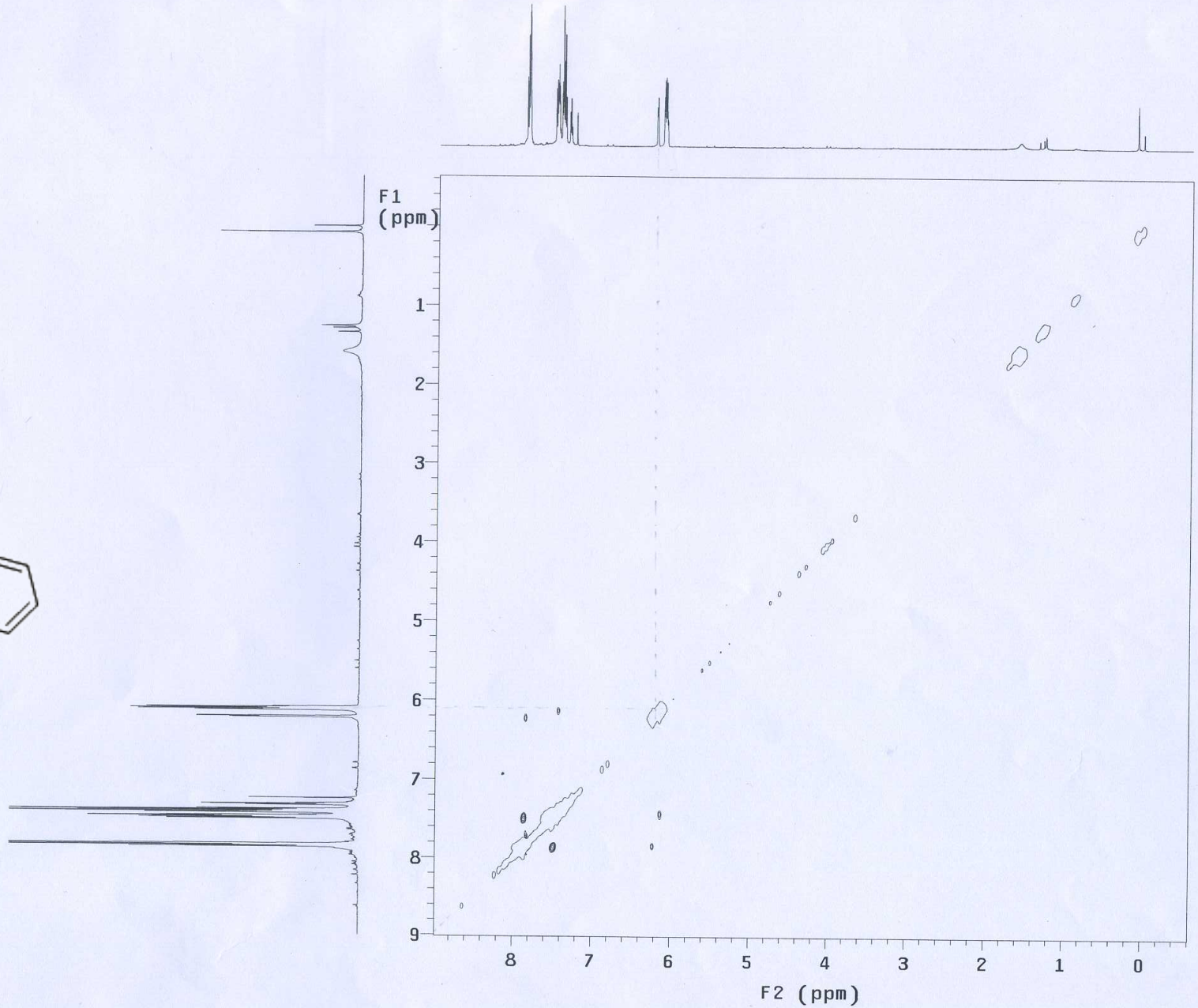
Pulse Sequence: NOESY
Solvent: CDCl3
Data collected on: Aug 20 2014

Temp. 23.0 C / 296.1 K
Operator: omc

Relax. delay 1.500 sec
Acq. time 0.202 sec
Width 7622.0 Hz
2D Width 7622.0 Hz
4 repetitions
2 x 128 increments
OBSERVE H1, 599.7754542 MHz
DATA PROCESSING
Line broadening 3.0 Hz
Gauss apodization 0.035 sec
F1 DATA PROCESSING
Gauss apodization 0.012 sec
FT size 4096 x 4096
Total time 42 min



3a



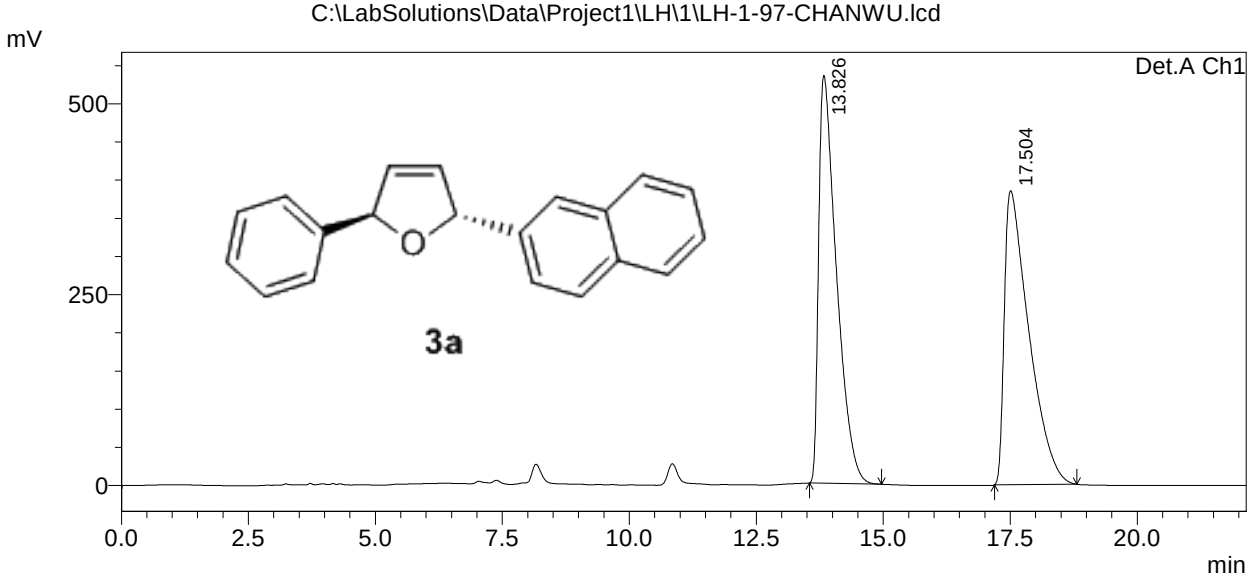
==== Shimadzu LCsolution Analysis Report ====

C:\LabSolutions\Data\Project1\LH\1\LH-1-97-CHANWU.lcd

Acquired by	: Admin
Sample Name	: 1-97-CHANWU
method	:OD-H, 99/1,1.0, 254
Injection Volume	: 2.5 uL
Data File Name	: LH-1-97-CHANWU.lcd
Method File Name	: 1.lcm
Report File Name	: 1.lcr
Data Acquired	: 2014-7-16 12:11:38
Data Processed	: 2014-7-16 12:33:47

<Chromatogram>

C:\LabSolutions\Data\Project1\LH\1\LH-1-97-CHANWU.lcd



1 Det.A Ch1/254nm

PeakTable

Detector A Ch1 254nm

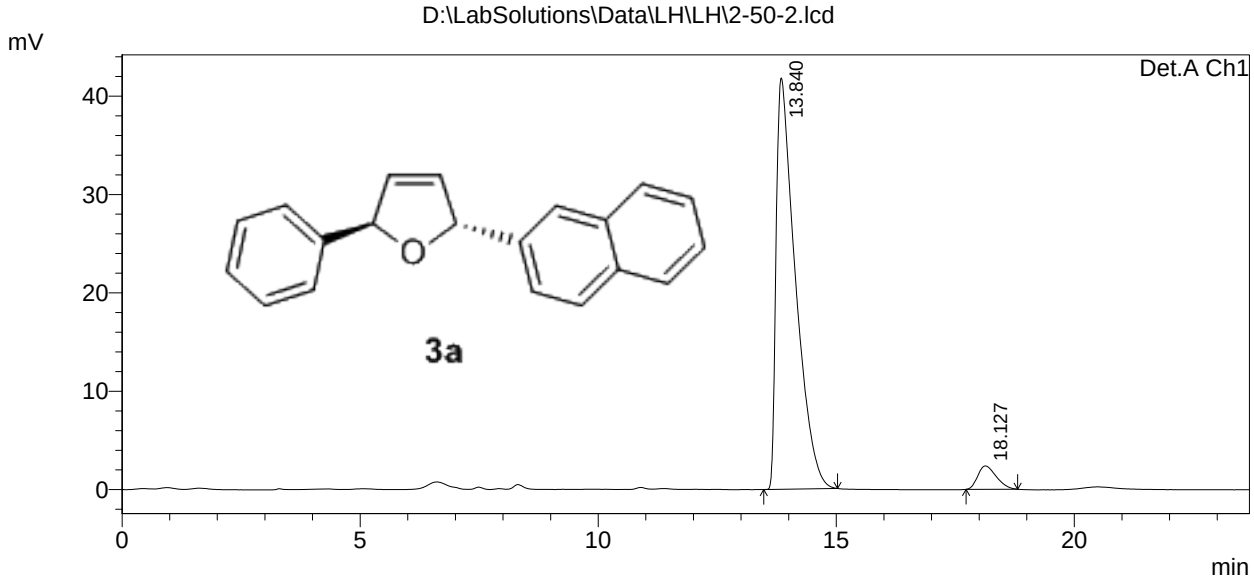
Peak#	Ret. Time	Area	Height	Area %
1	13.826	13002827	534018	50.105
2	17.504	12948462	385264	49.895
Total		25951290	919283	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\2-50-2.lcd

Acquired by	: Admin
Sample Name	: LH-2-50-2
Sample ID	: OD-H,99/1, 1.0, 254
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 2-50-2.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-9-3 9:13:43
Data Processed	: 2013-9-3 10:29:38

<Chromatogram>

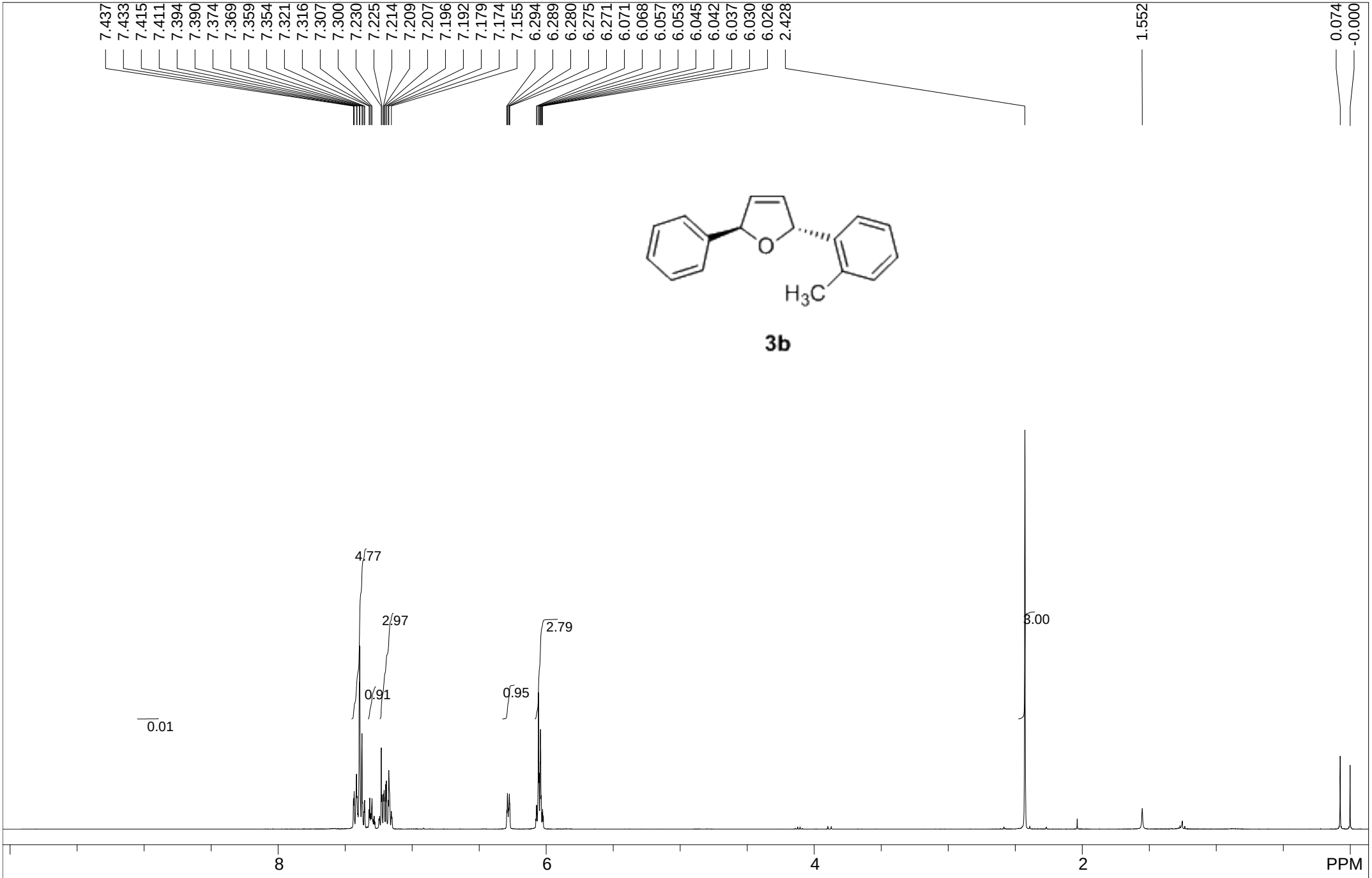


1 Det.A Ch1/254nm

PeakTable

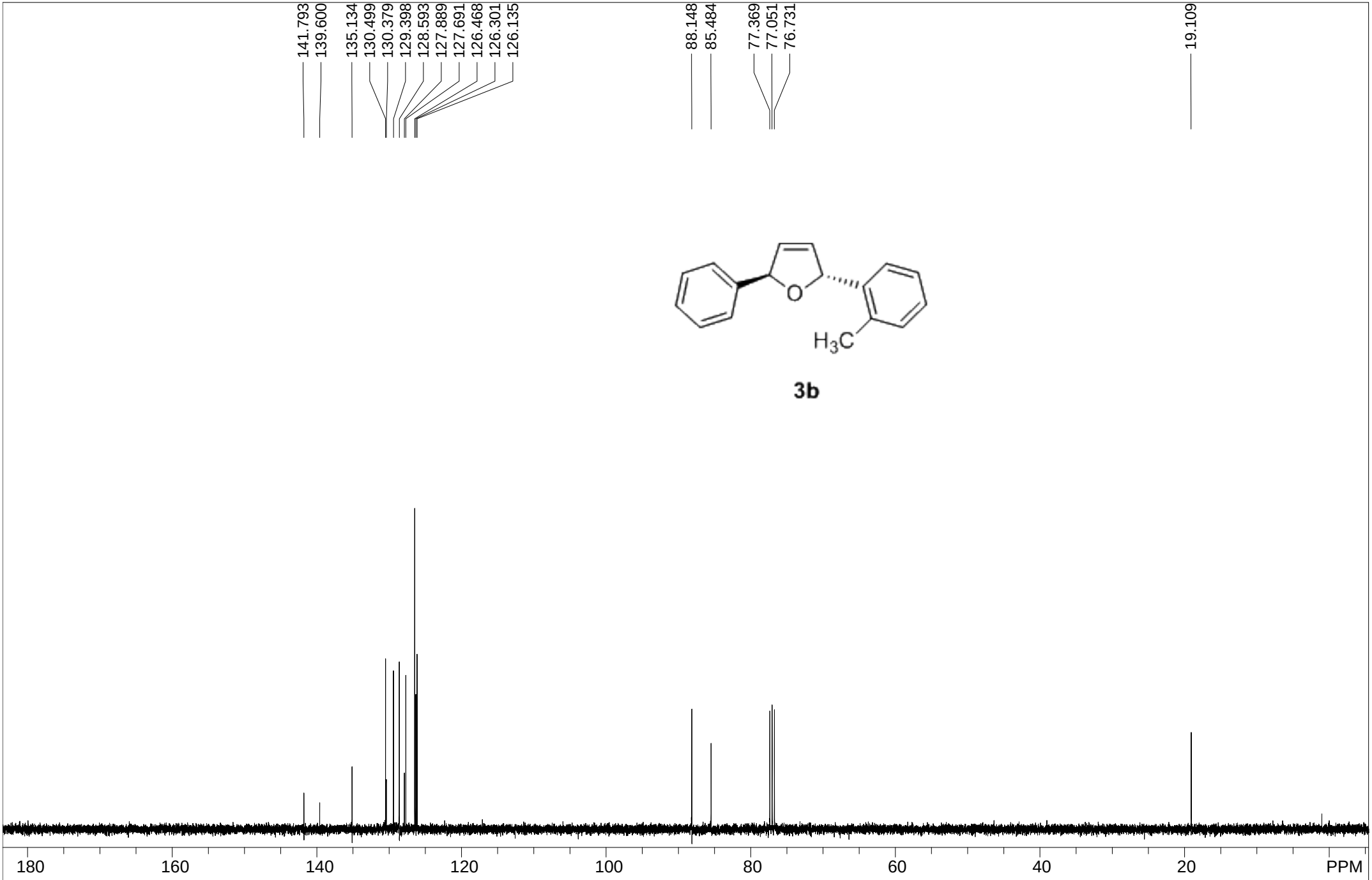
Detector A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	13.840	1175280	41823	94.819	94.614
2	18.127	64214	2381	5.181	5.386
Total		1239493	44204	100.000	100.000



ldy-2014-9-9 USER: -- DATE: Sep 26 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2786.8		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-76-1-h.fid



3b

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USER: -- DATE: Sep 26 2014

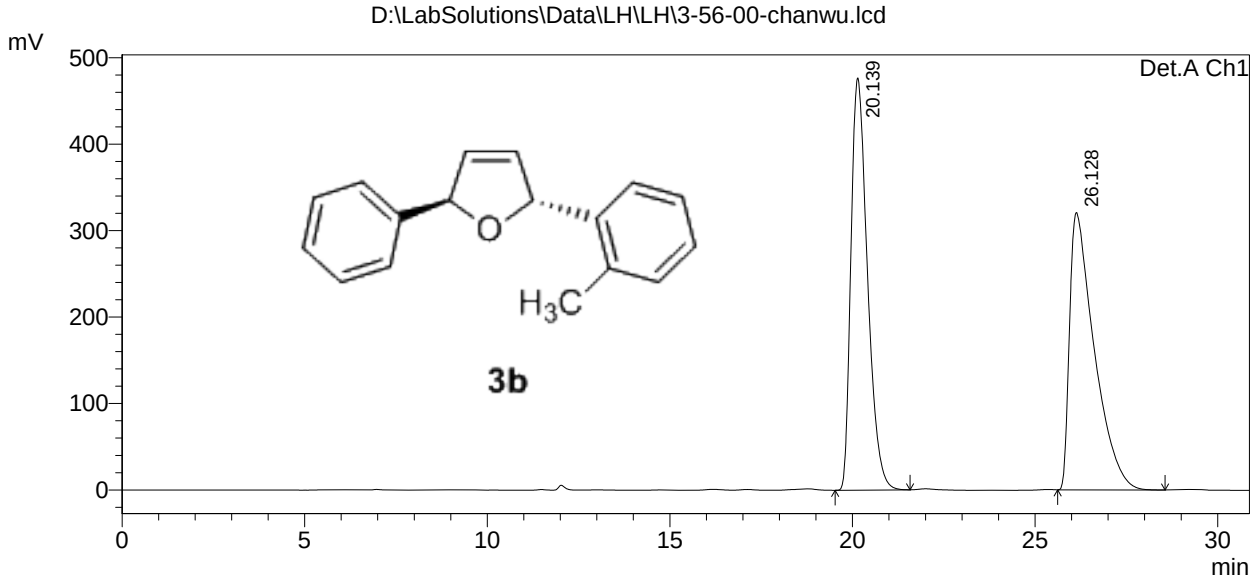
F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 72	LB: 0.0		Nuts - $lh-2-76-1-c.fid

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-56-00-chanwu.lcd

Acquired by	: Admin
Sample Name	: 3-56-00-chanwu
Sample ID	: OD-H,99.5/0.5,1.0,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-56-00-chanwu.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-10 20:15:52
Data Processed	: 2013-11-10 20:46:45

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

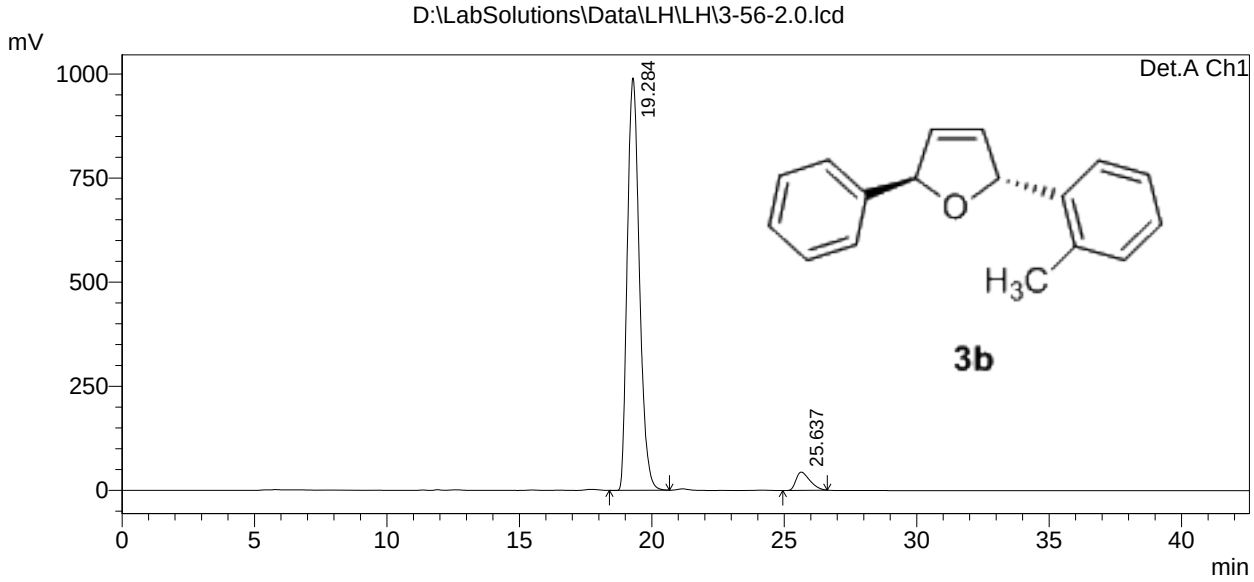
Peak#	Ret. Time	Area	Height	Area %	Height %
1	20.139	15009130	476936	49.896	59.780
2	26.128	15071639	320887	50.104	40.220
Total		30080768	797823	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-56-2.0.lcd

Acquired by	: Admin
Sample Name	: 3-56-2.0
Sample ID	: OD-H,99.5/0.5,1.0,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-56-2.0.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-10 21:19:12
Data Processed	: 2013-11-10 22:01:47

<Chromatogram>

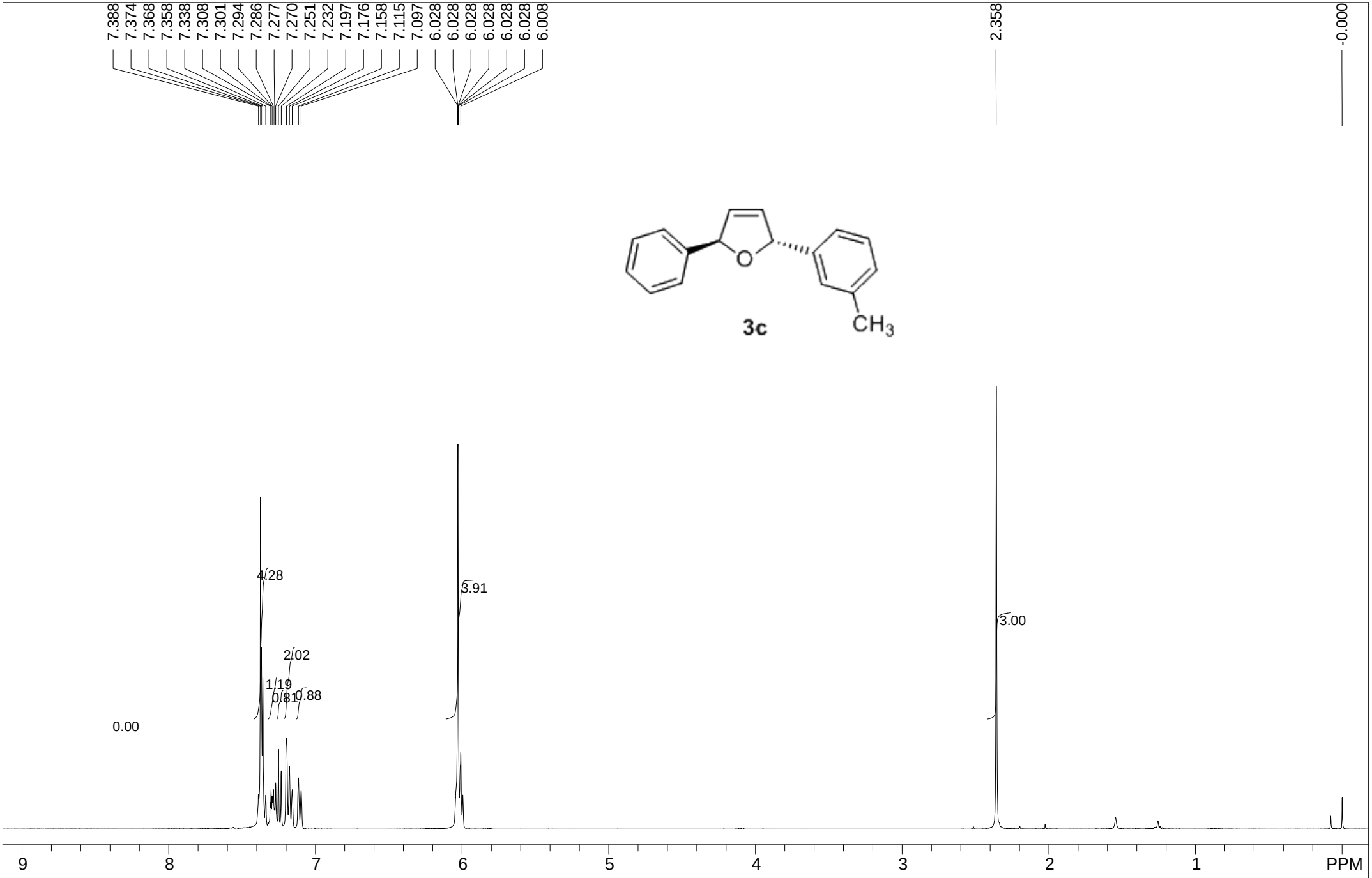


1 Det.A Ch1/214nm

PeakTable

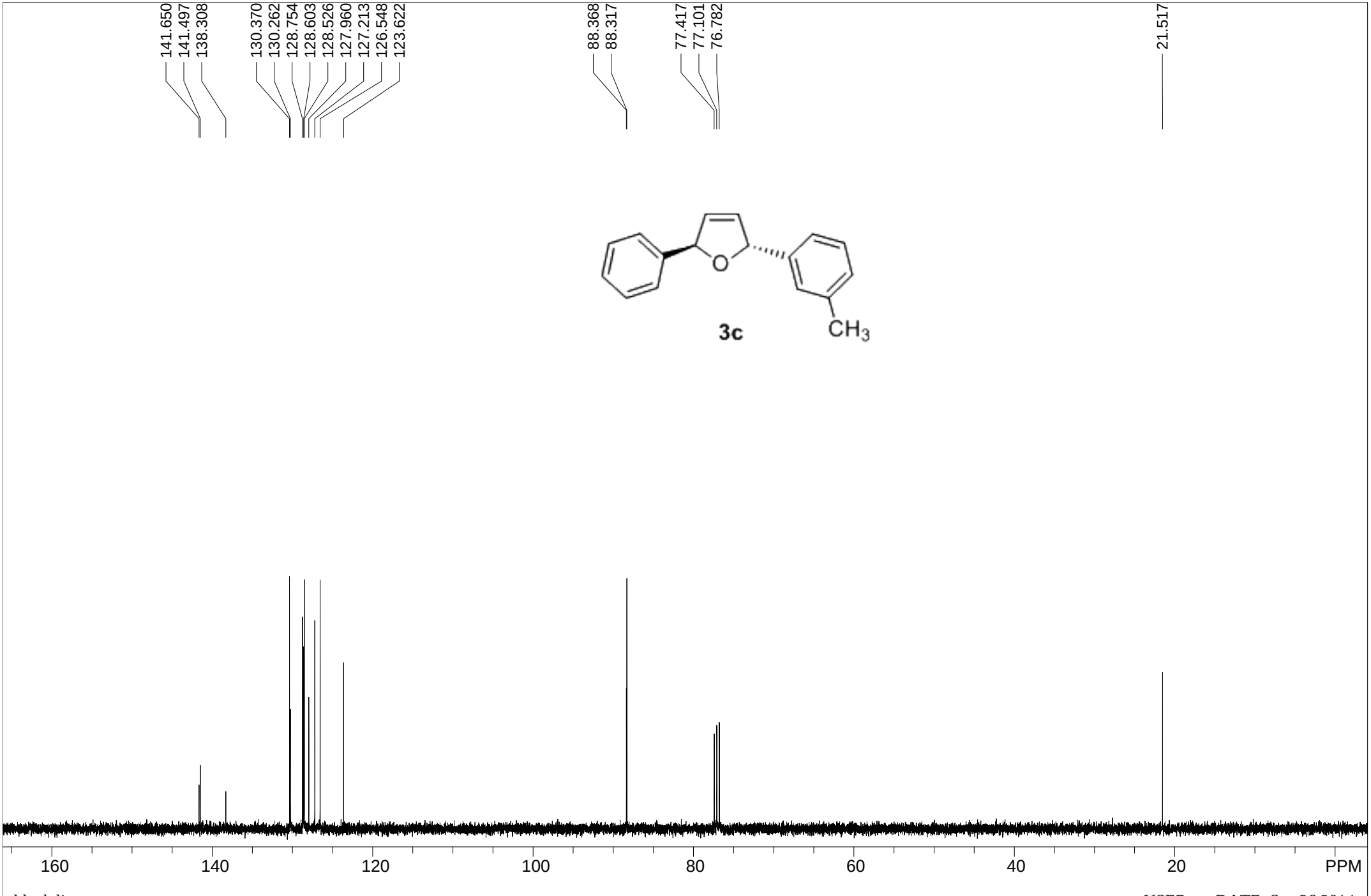
Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	19.284	31488963	990619	95.166	95.755
2	25.637	1599342	43913	4.834	4.245
Total		33088305	1034532	100.000	100.000



ldy-2014-9-9 USER: -- DATE: Sep 26 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2774.6		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-77-1-h.fid



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USER: -- DATE: Sep 26 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 40	LB: 0.0		Nuts - $lh-2-77-1-c.fid

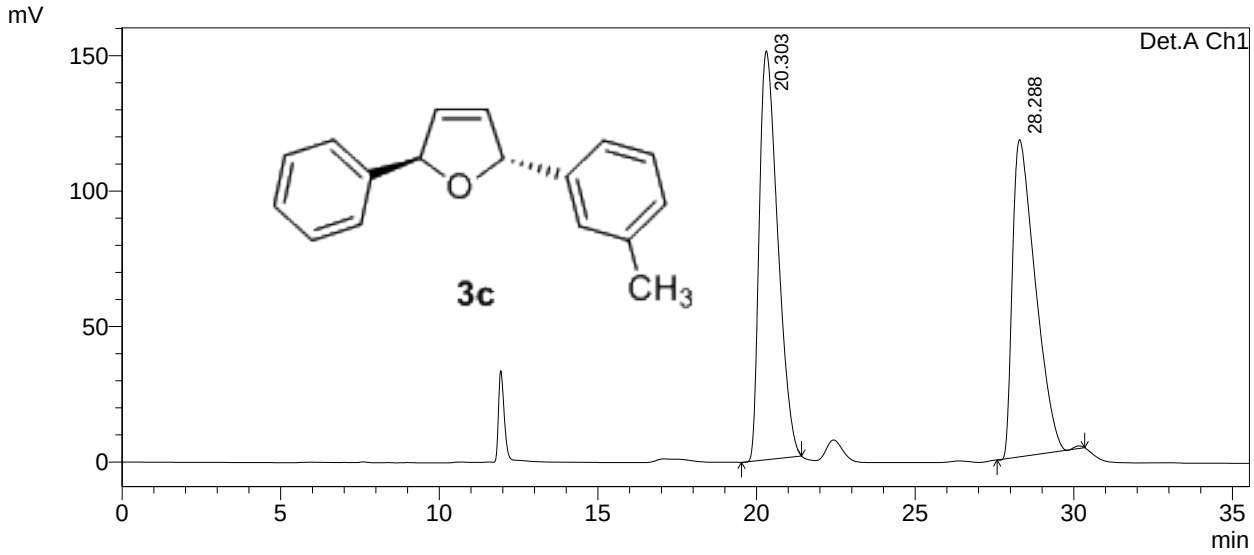
==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-47-2-xiaoxuan.lcd

Acquired by	: Admin
Sample Name	: 3-47-2-xiaoxuan
Sample ID	: OD-H,99.5/0.5,0.5,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-47-2-xiaoxuan.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-5 14:57:25
Data Processed	: 2013-11-5 15:32:58

<Chromatogram>

D:\LabSolutions\Data\LH\LH\3-47-2-xiaoxuan.lcd



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

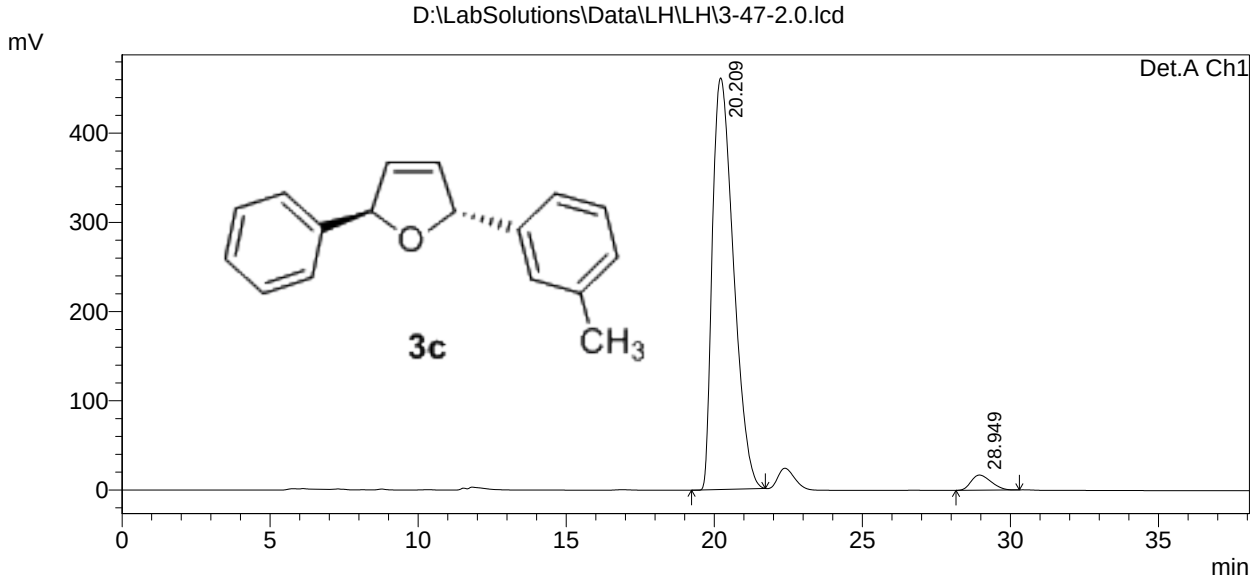
Peak#	Ret. Time	Area	Height	Area %	Height %
1	20.303	6111951	150925	50.932	56.309
2	28.288	5888174	117103	49.068	43.691
Total		12000125	268029	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-47-2.0.lcd

Acquired by	: Admin
Sample Name	: 3-47-2.0
Sample ID	: OD-H,99.5/0.5,0.5,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-47-2.0.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-5 15:35:34
Data Processed	: 2013-11-5 16:13:45

<Chromatogram>

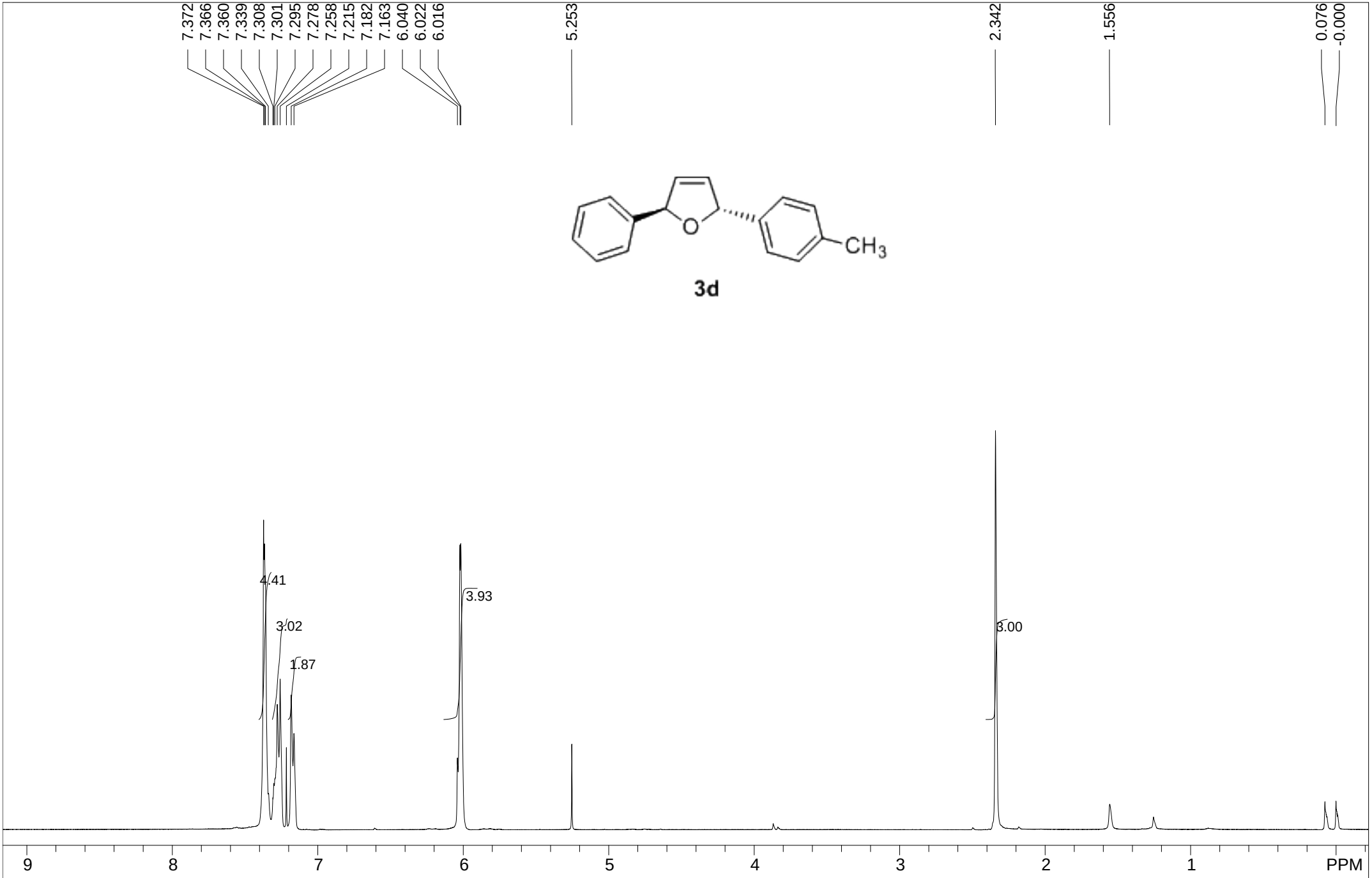


1 Det.A Ch1/214nm

PeakTable

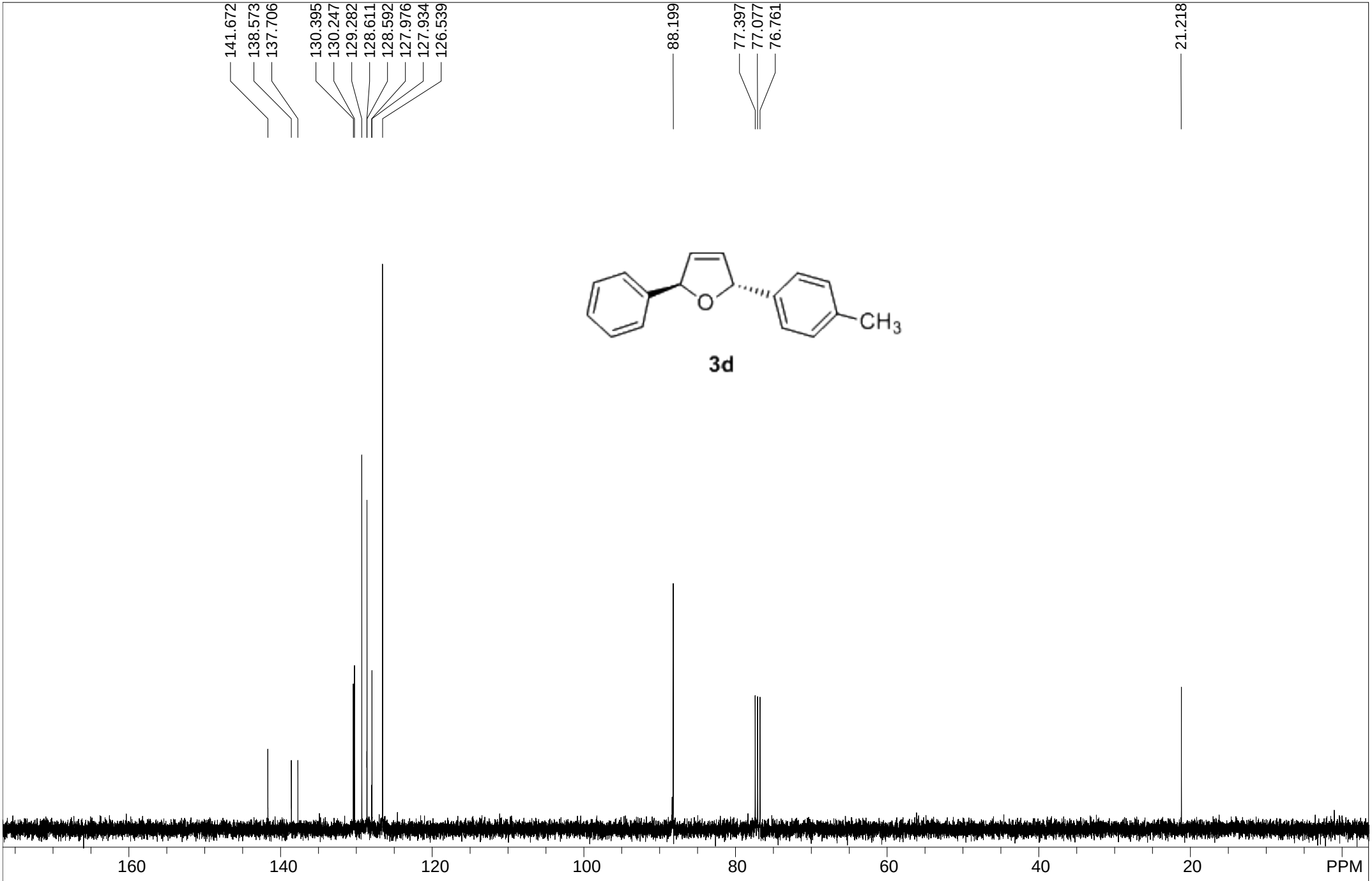
Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	20.209	22901225	461516	96.662	96.456
2	28.949	790728	16958	3.338	3.544
Total		23691953	478474	100.000	100.000



ldy-2014-9-9 USER: -- DATE: Sep 29 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2780.6		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-89-1-h.fid



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USER: -- DATE: Sep 29 2014

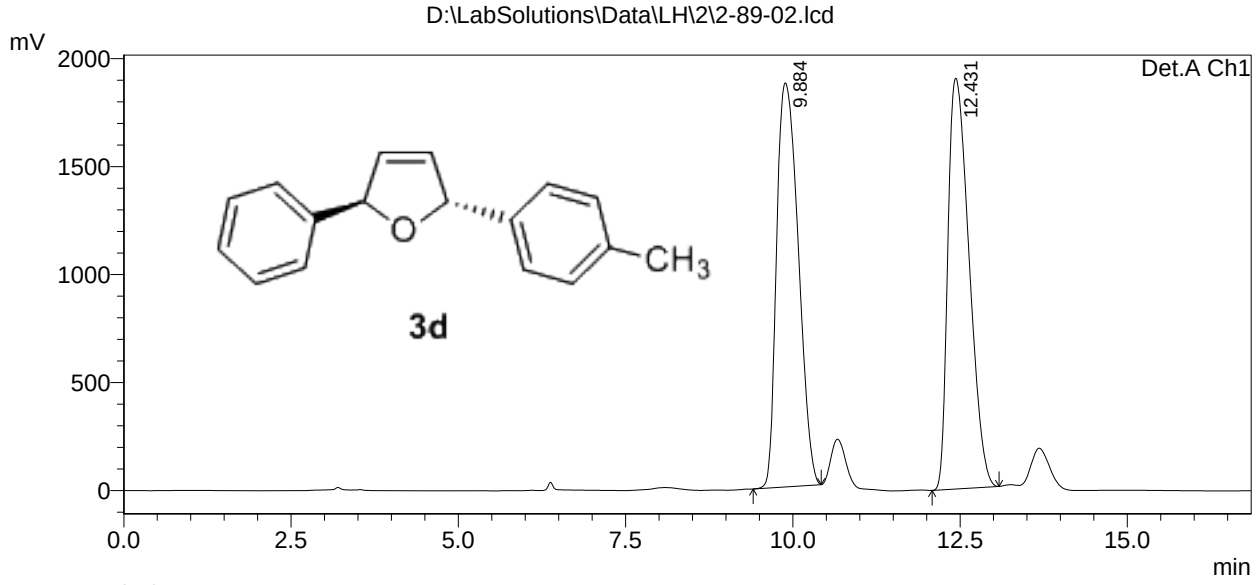
F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 84	LB: 0.0		Nuts - $lh-2-89-1-c.fid

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\2\2-89-02.lcd

Acquired by	: Admin
Sample Name	: 2-89-02
method	:OD-H,99.5/0.5,1.0,214
Injection Volume	: 2.5 uL
Data File Name	: 2-89-02.lcd
Method File Name	: 1.lcm
Report File Name	: 1.lcr
Data Acquired	: 2014-9-30 16:30:37
Data Processed	: 2014-9-30 16:47:29

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

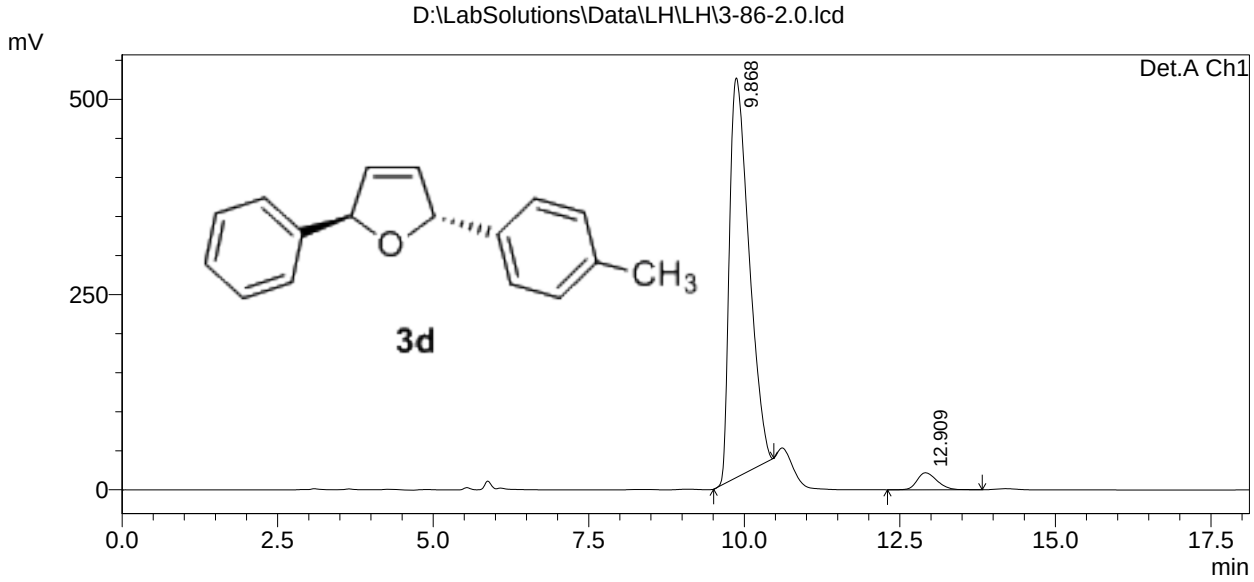
Peak#	Ret. Time	Area	Height	Area %
1	9.884	42224449	1870978	50.154
2	12.431	41965081	1903126	49.846
Total		84189530	3774104	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-86-2.0.lcd

Acquired by	: Admin
Sample Name	: 3-86-2.0
Sample ID	: OD-H,99.5/0.5,1.0,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-86-2.0.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-25 19:48:07
Data Processed	: 2013-11-25 20:06:16

<Chromatogram>

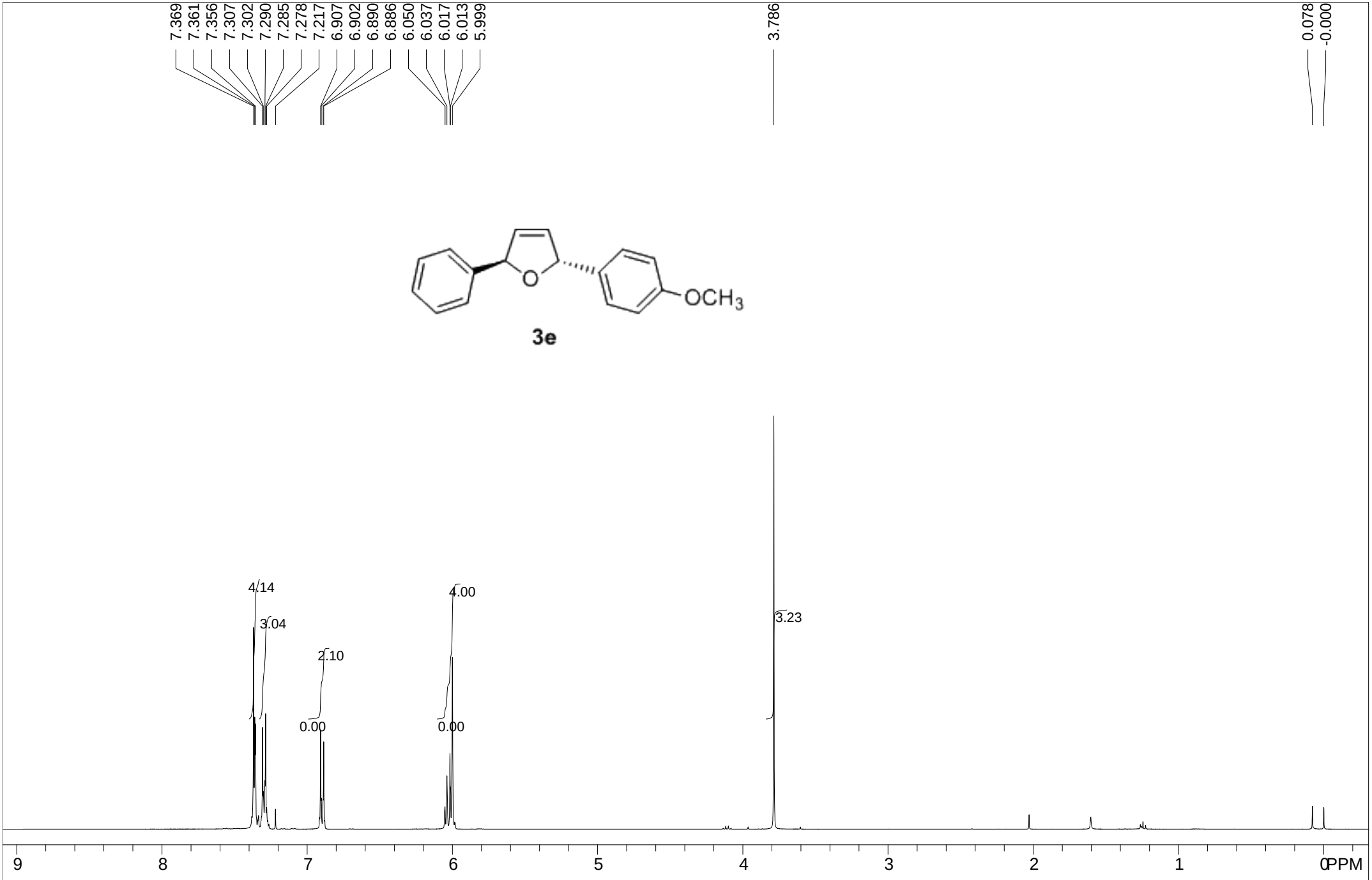


1 Det.A Ch1/214nm

PeakTable

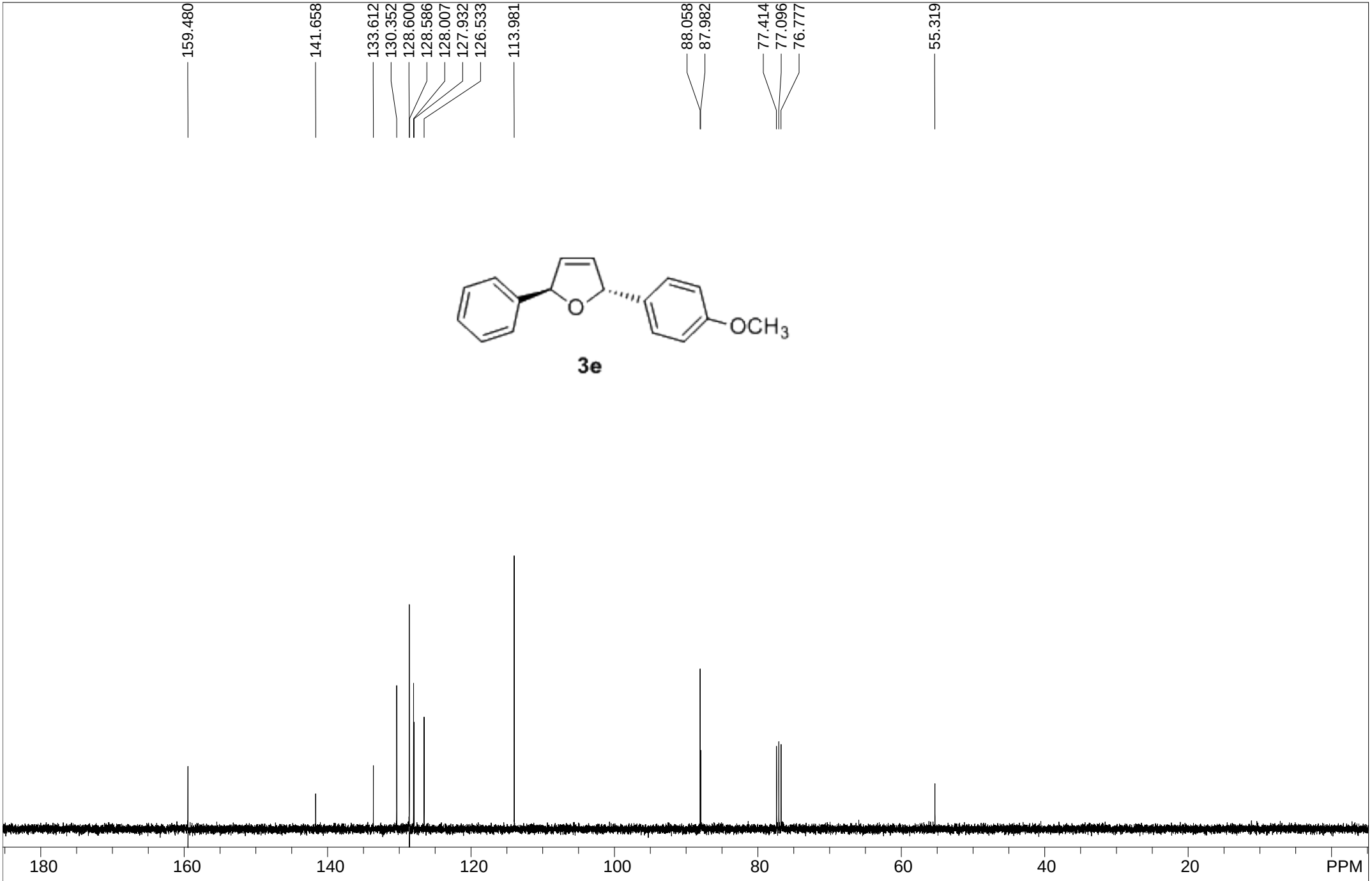
Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	9.868	11203510	512026	95.839	95.912
2	12.909	486475	21824	4.161	4.088
Total		11689985	533850	100.000	100.000



ldy-2014-9-9 USER: -- DATE: Sep 26 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2781.7		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-78-1-h.fid



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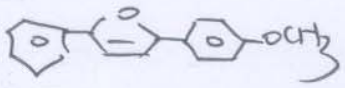
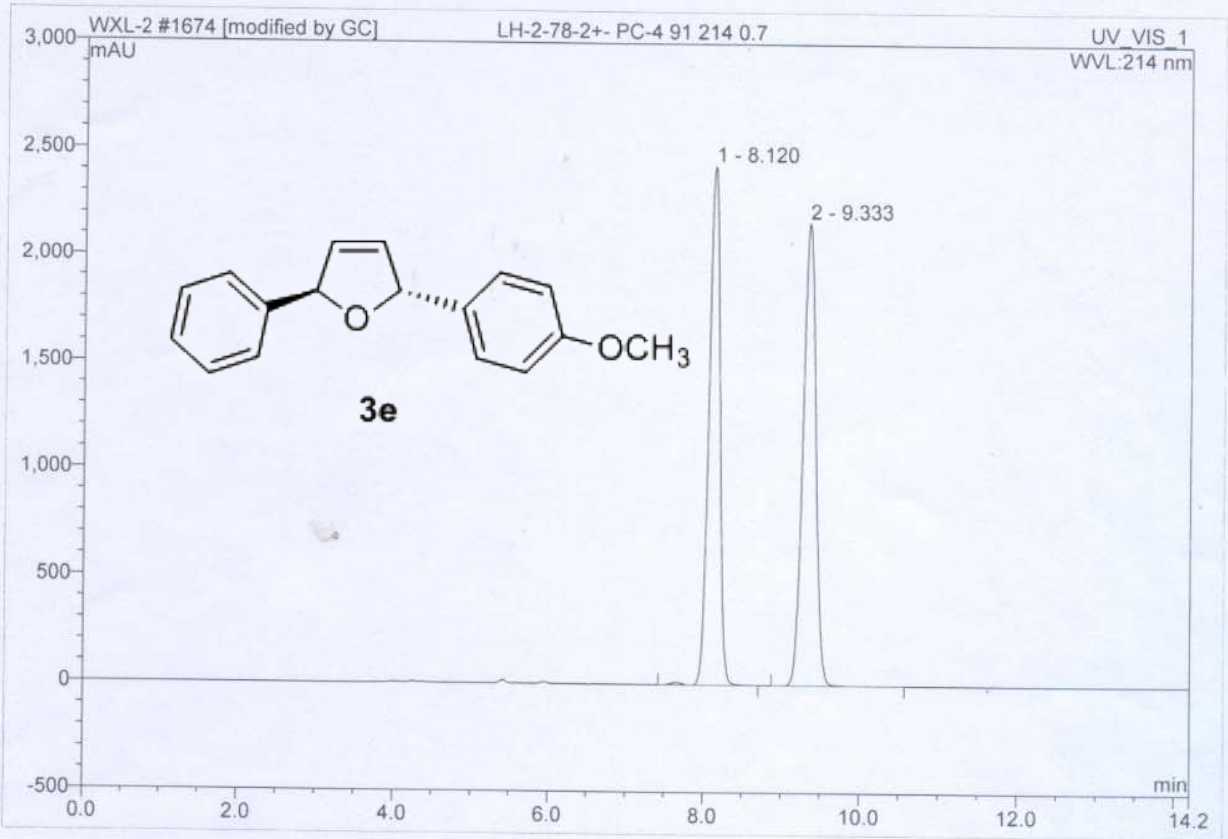
USER: -- DATE: Sep 26 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 20	LB: 0.0		Nuts - $lh-2-78-1-c.fid



1674 LH-2-78-2+- PC-4 91 214 0.7

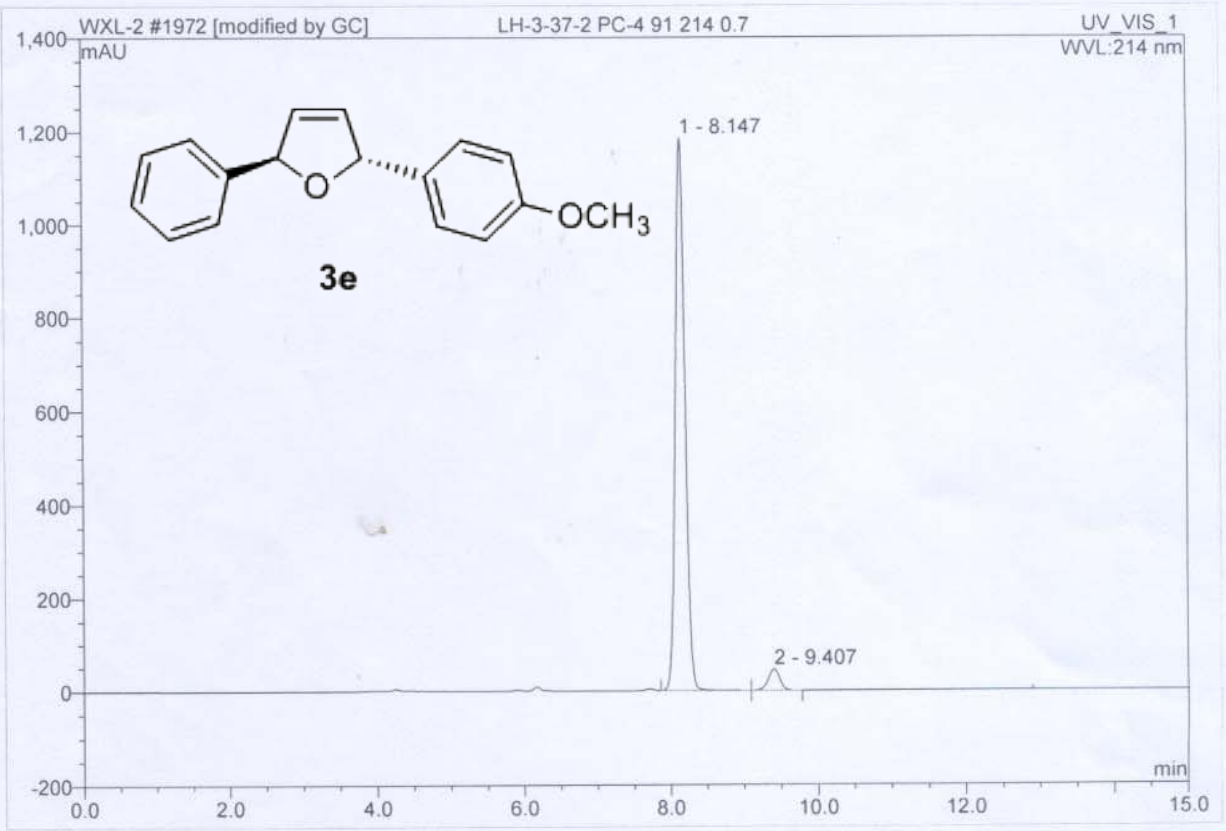
Sample Name:	**LH-2-78-2+- PC-4 91 214 0.7**	*Injection Volume:*	**2.0**
Vial Number:	**RC1**	*Channel:*	**UV_VIS_1**
Sample Type:	**unknown**	*Wavelength:*	**214**
Control Program:	**WXL-2014**	*Bandwidth:*	**n.a.**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014/9/30 15:04**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.20**	*Sample Amount:*	**1.0000**



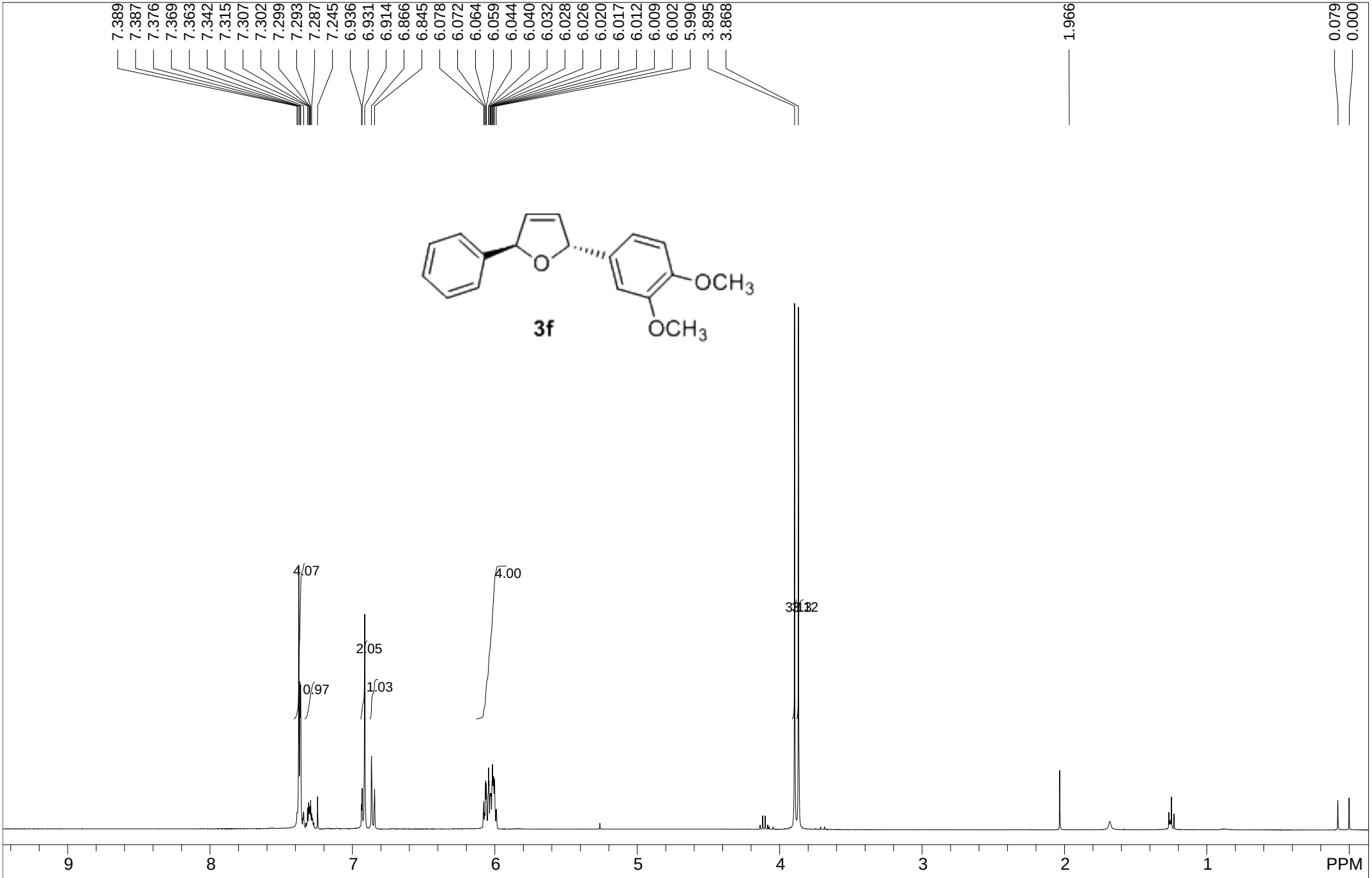
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	8.12	n.a.	2431.174	397.599	49.24	n.a.	BMB*
2	9.33	n.a.	2168.478	409.942	50.76	n.a.	BMB*
Total:			4599.652	807.541	100.00	0.000	

1972 LH-3-37-2 PC-4 91 214 0.7

Sample Name:	**LH-3-37-2 PC-4 91 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**BB5**	*Channel:*	**UV_VIS_1**
Sample Type:	**unknown**	*Wavelength:*	**214**
Control Program:	**WXL-2014-2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014/10/30 12:15**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

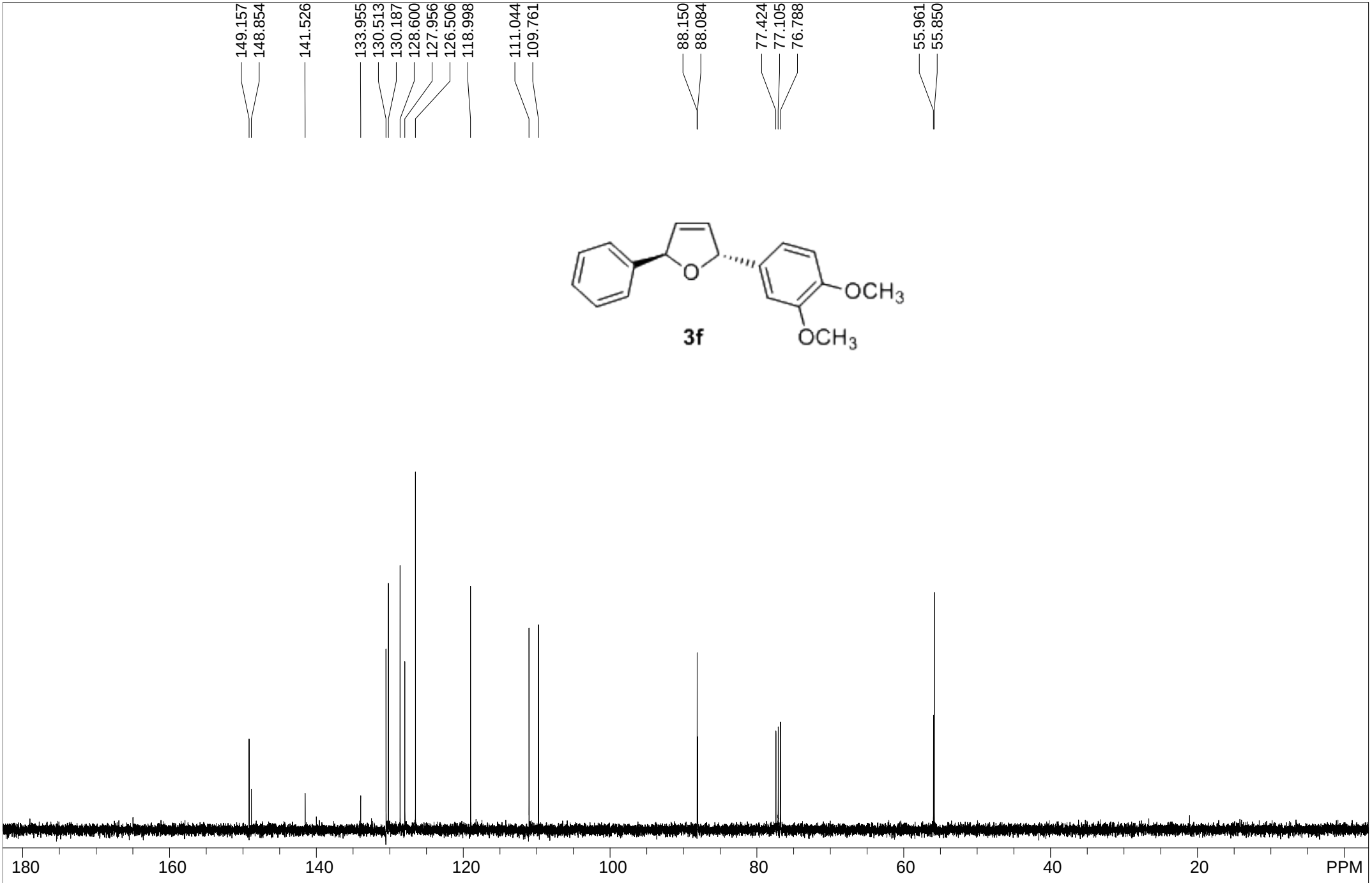


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	8.15	n.a.	1184.979	179.976	95.74	n.a.	BMb*
2	9.41	n.a.	45.421	8.014	4.26	n.a.	bMB
Total:			1230.399	187.989	100.00	0.000	



ldy-2014-9-9 USER: -- DATE: Sep 26 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2792.4		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-79-1-h.fid



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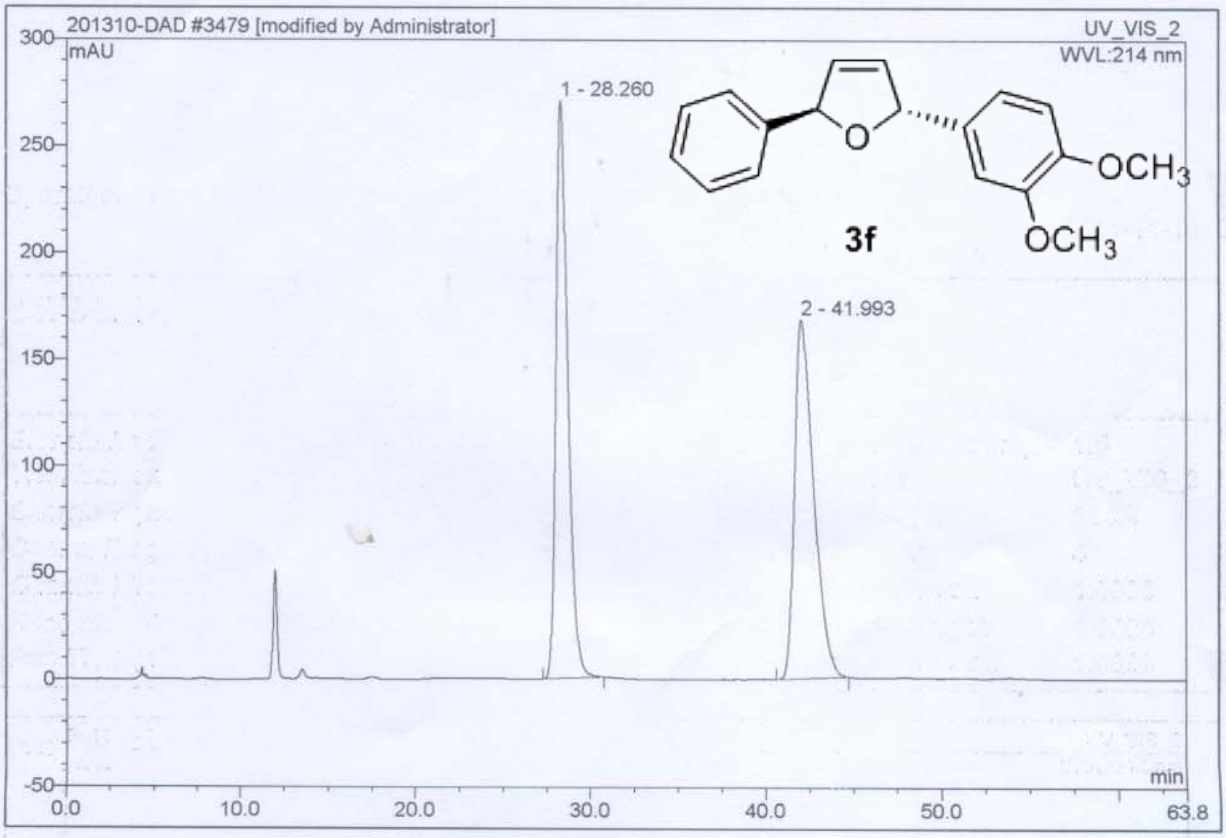
USER: -- DATE: Sep 26 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 40	LB: 0.0		Nuts - $lh-2-79-1-c.fid

3479 LH-5+- PC-4 91 214 0.7

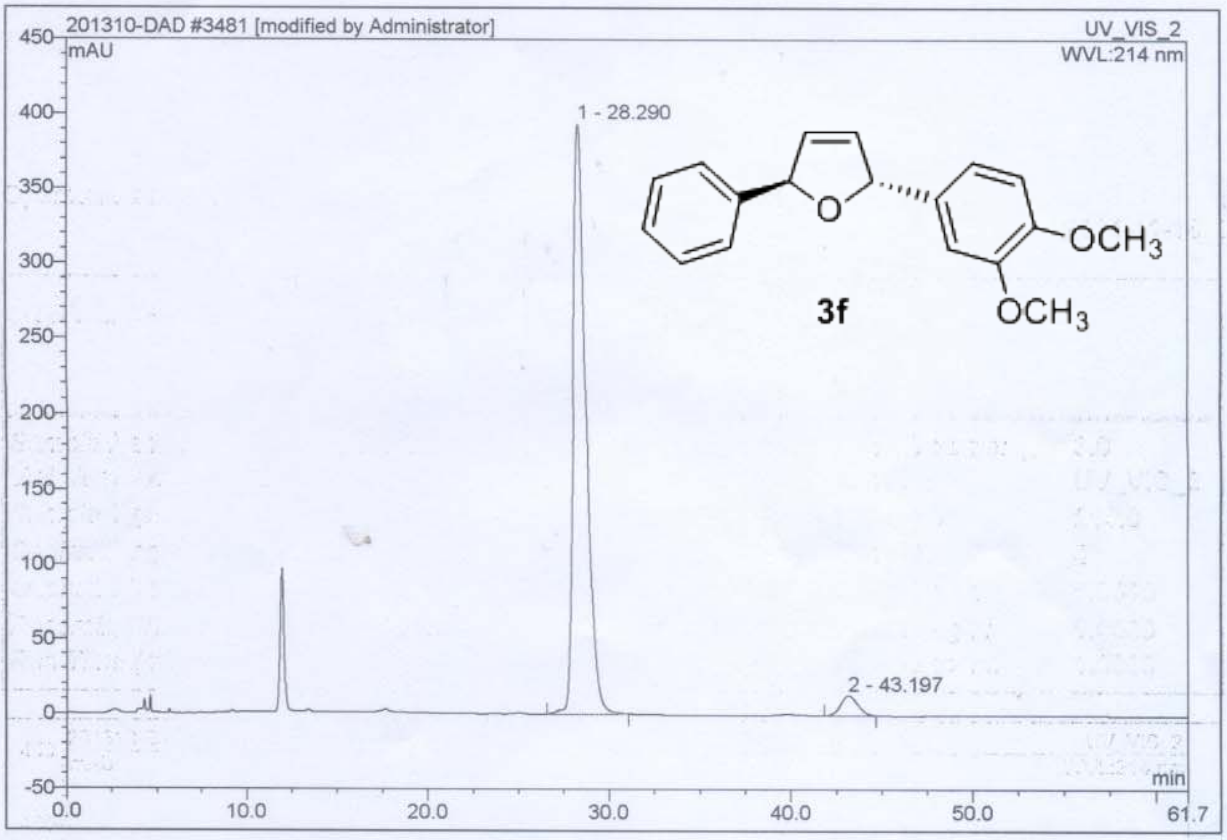
Sample Name:	**LH-5+- PC-4 91 214 0.7**	*Injection Volume:*	**1.5**
Vial Number:	**GB2**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-17 18:03**	*Sample Weight:*	**1.0000**
Run Time (min):	**63.84**	*Sample Amount:*	**1.0000**



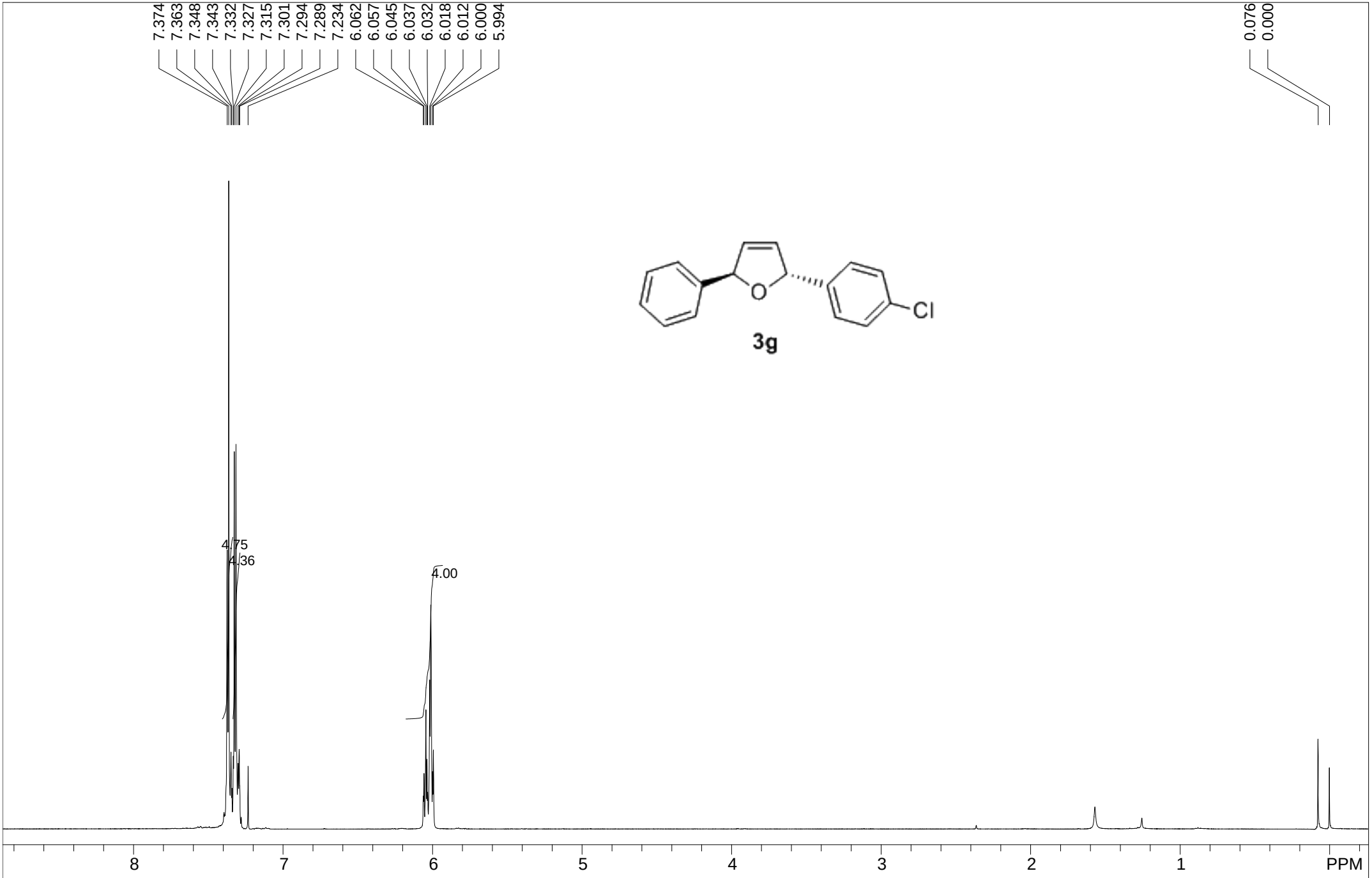
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	28.26	n.a.	270.642	213.739	50.13	n.a.	BMB
2	41.99	n.a.	168.094	212.600	49.87	n.a.	BMB
Total:			438.736	426.339	100.00	0.000	

3481 LH-3-32-2 PC-4 91 214 0.7

Sample Name:	**LH-3-32-2 PC-4 91 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**GC2**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-17 19:34**	*Sample Weight:*	**1.0000**
Run Time (min):	**61.73**	*Sample Amount:*	**1.0000**

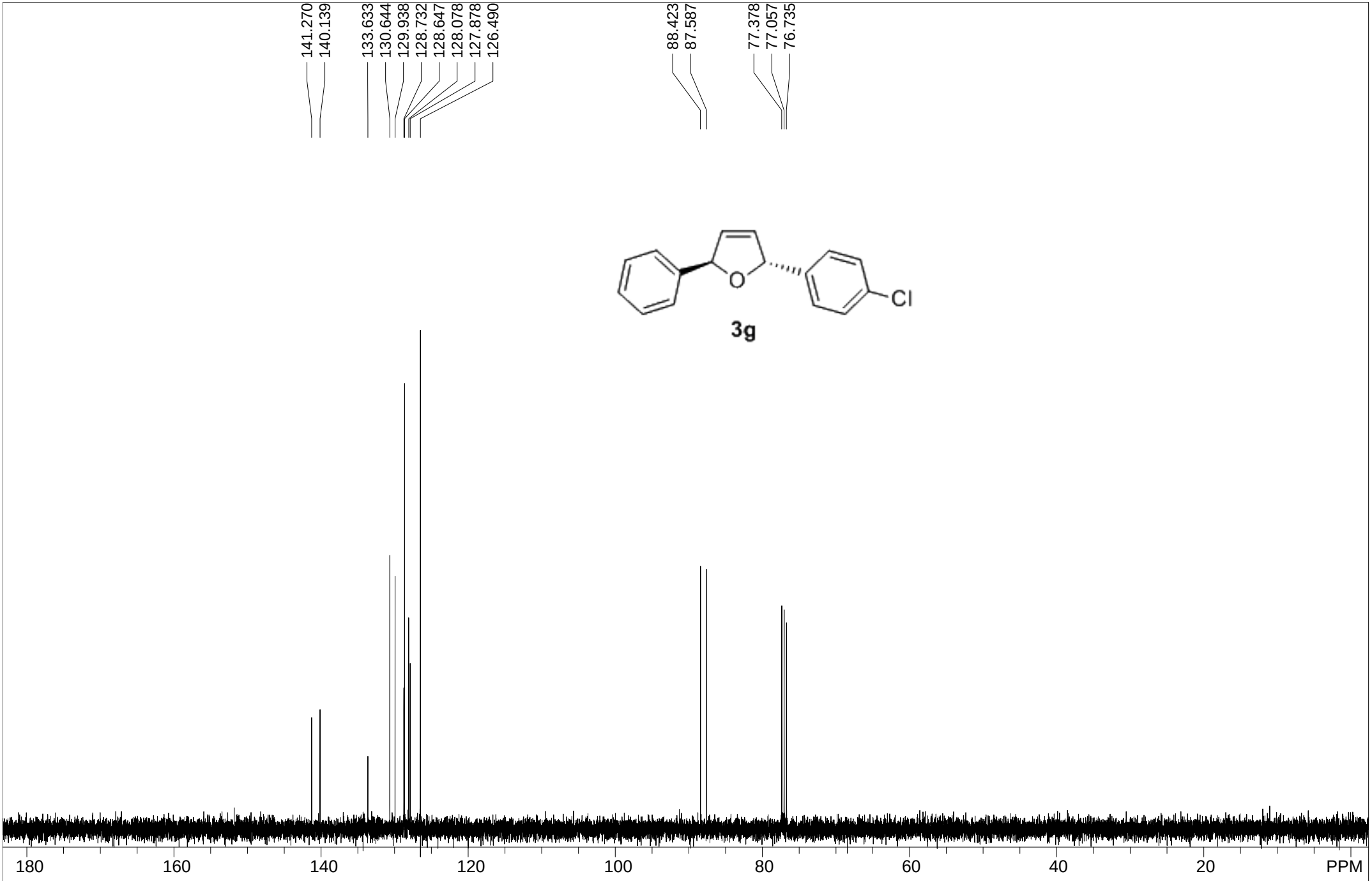


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	28.29	n.a.	393.734	322.460	95.63	n.a.	BMB
2	43.20	n.a.	13.384	14.742	4.37	n.a.	BMB
Total:			407.119	337.202	100.00	0.000	



ldy-2014-9-9 USER: -- DATE: Sep 26 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2788.0		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-82-1-h.fid



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USER: -- DATE: Sep 26 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 20	LB: 0.0		Nuts - $lh-2-82-1-c.fid

==== Shimadzu LCsolution Analysis Report ====

C:\LabSolutions\Data\Project1\LH\2\2-82-2.lcd

Acquired by	: Admin
Sample Name	: 2-82-2
method	:OD-H,99.5/0.5,1.0,214
Injection Volume	: 2.5 uL
Data File Name	: 2-82-2.lcd
Method File Name	: 1.lcm
Report File Name	: 1.lcr
Data Acquired	: 2014-9-29 11:23:43
Data Processed	: 2014-9-29 11:40:09

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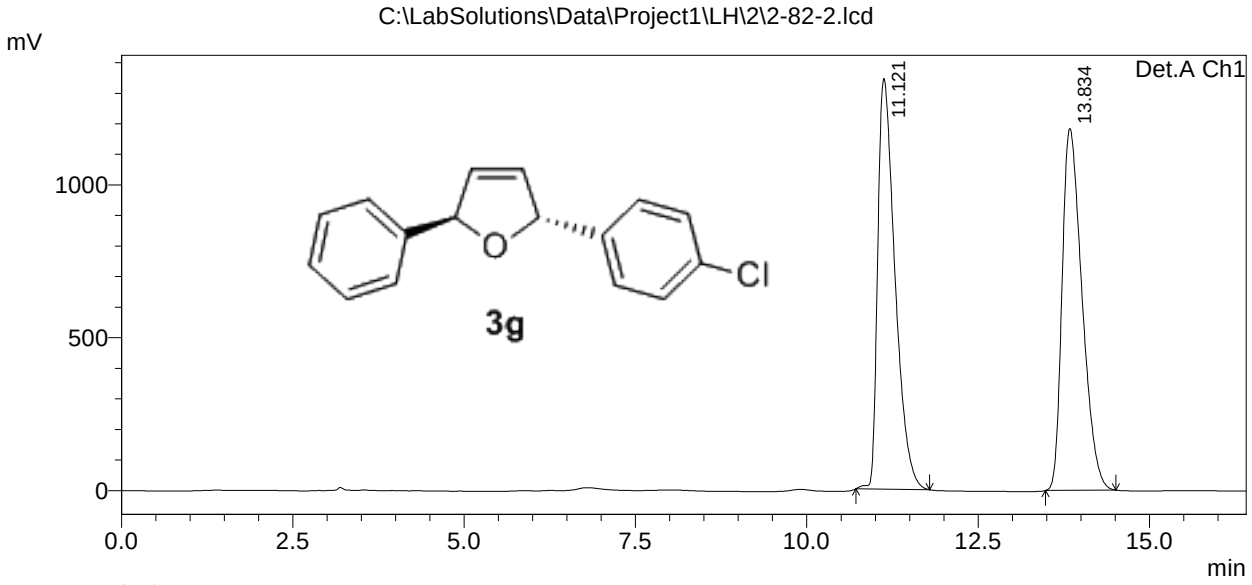


1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

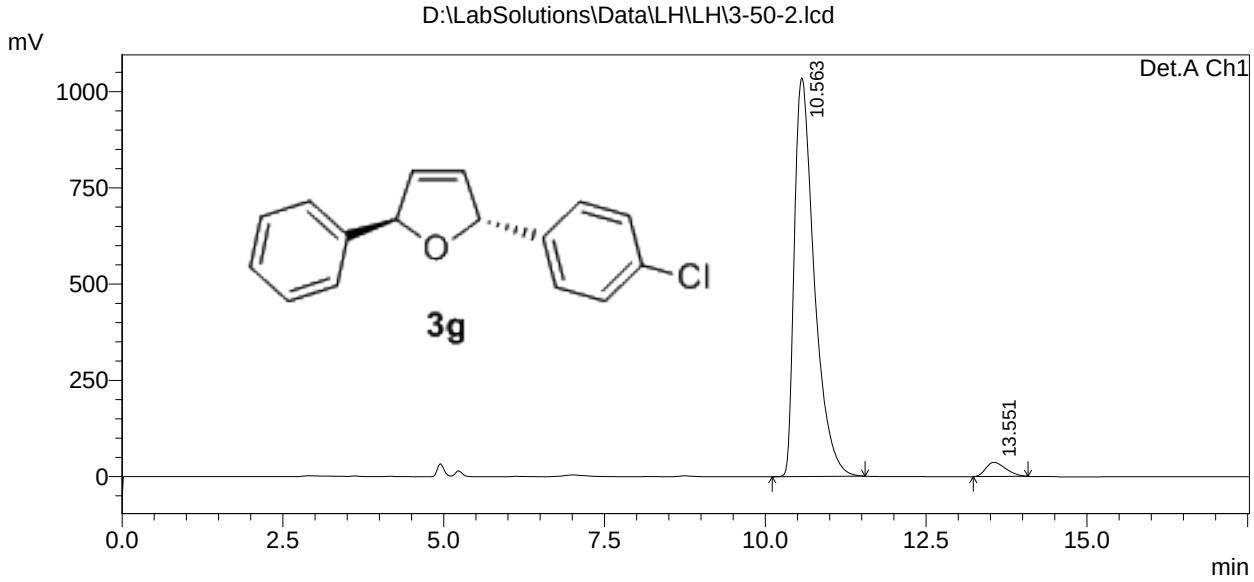
Peak#	Ret. Time	Area	Height	Area %
1	11.121	23594431	1343697	49.561
2	13.834	24012327	1183420	50.439
Total		47606758	2527118	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-50-2.lcd

Acquired by	: Admin
Sample Name	: 3-50-2
Sample ID	: OD-H,99.5/0.5,1.0,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-50-2.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-6 12:19:27
Data Processed	: 2013-11-6 12:36:59

<Chromatogram>

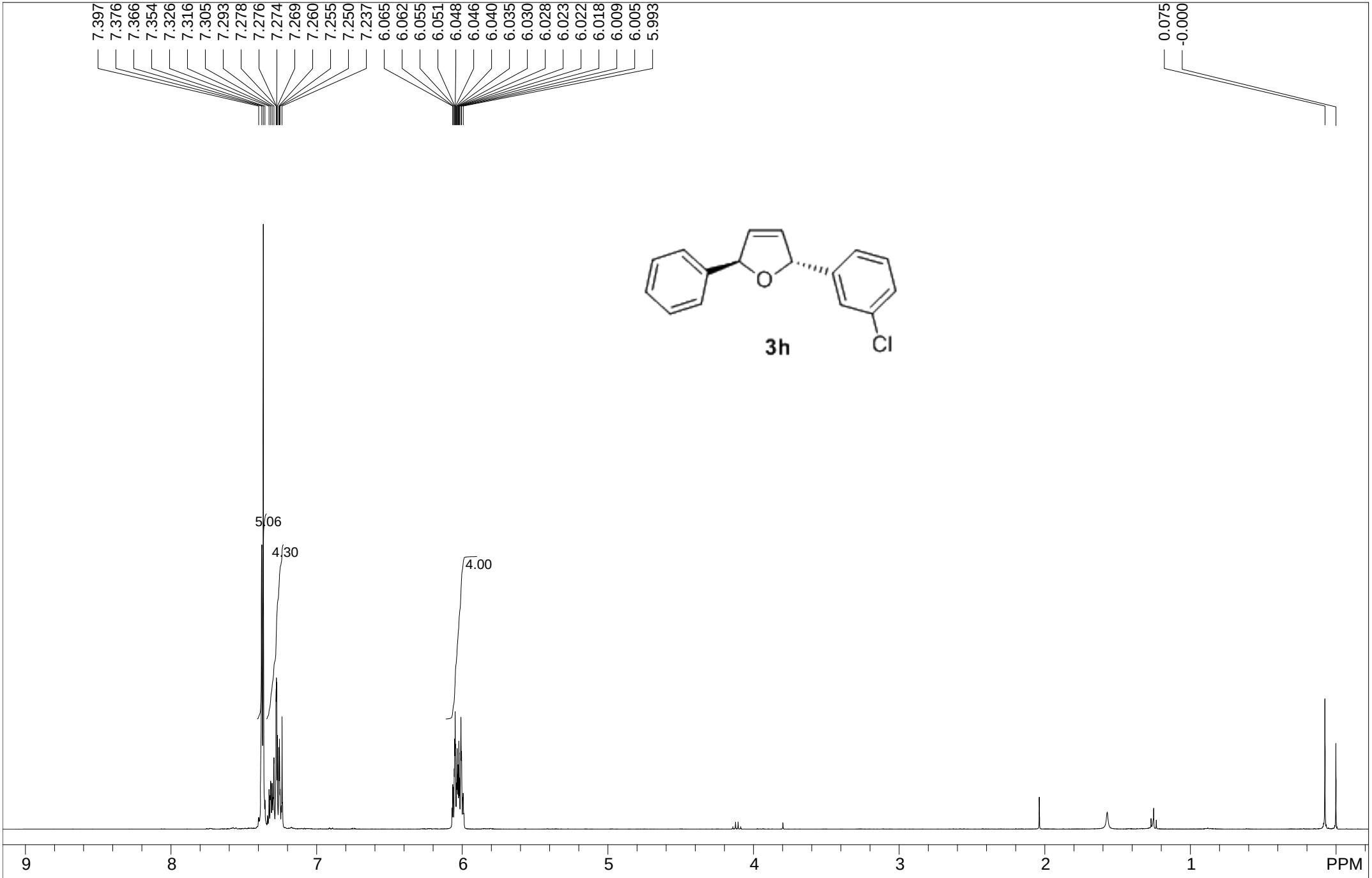


1 Det.A Ch1/214nm

PeakTable

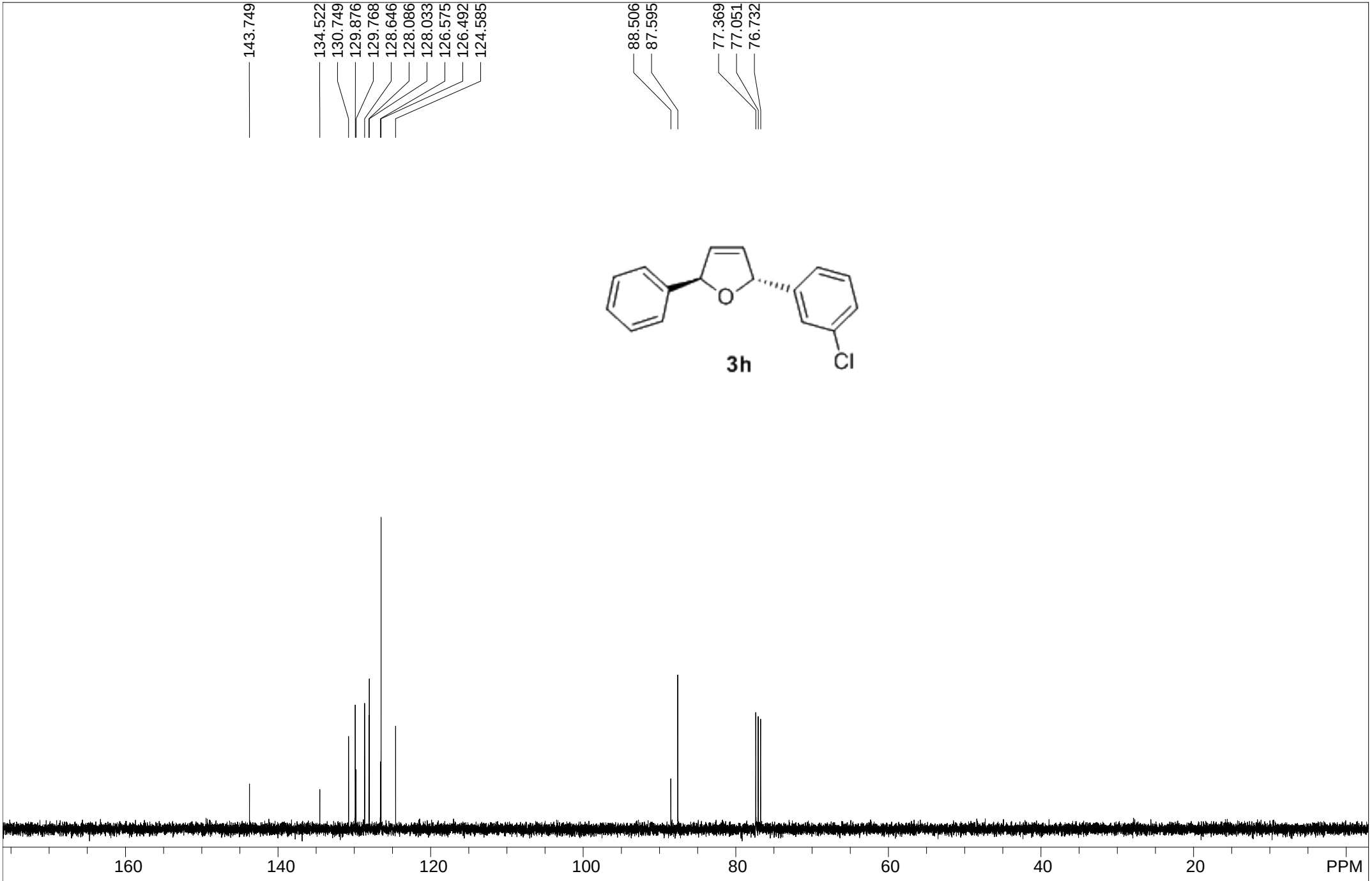
Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	10.563	22276006	1035551	96.557	96.573
2	13.551	794419	36744	3.443	3.427
Total		23070425	1072294	100.000	100.000



ldy-2014-9-9 USER: -- DATE: Sep 26 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2789.4		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-81-1-h.fid



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USER: -- DATE: Sep 26 2014

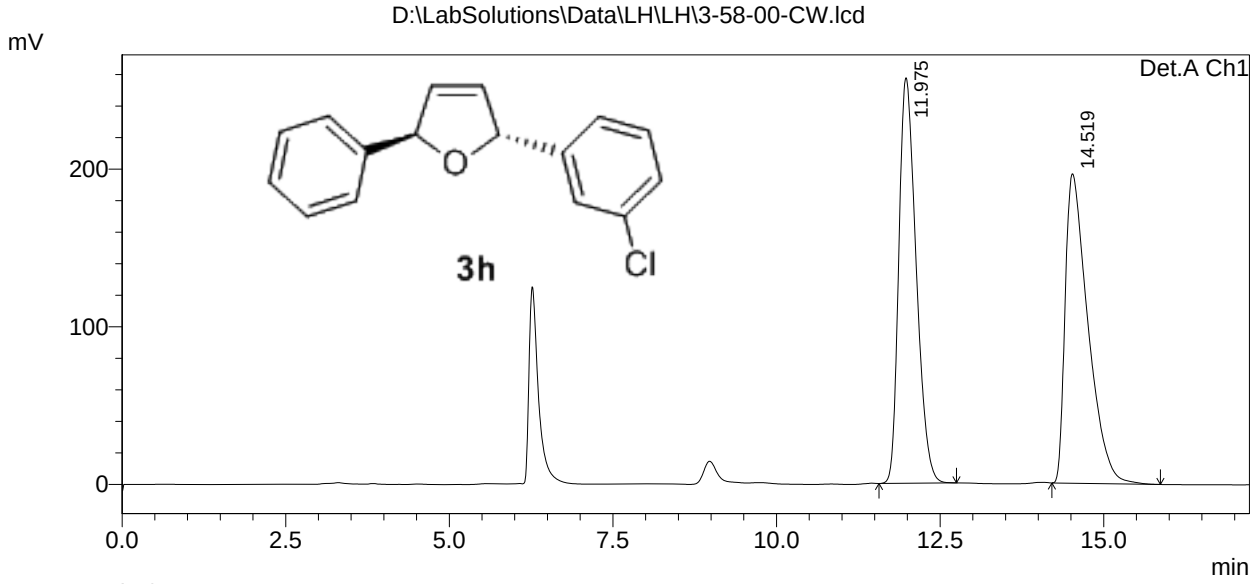
F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 32	LB: 0.0		Nuts - $lh-2-81-1-c.fid

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-58-00-CW.lcd

Acquired by	: Admin
Sample Name	: 3-58-00-CW
Sample ID	: OD-H,99.5/0.5,1.0,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-58-00-CW.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-12 14:42:44
Data Processed	: 2013-11-12 14:59:59

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

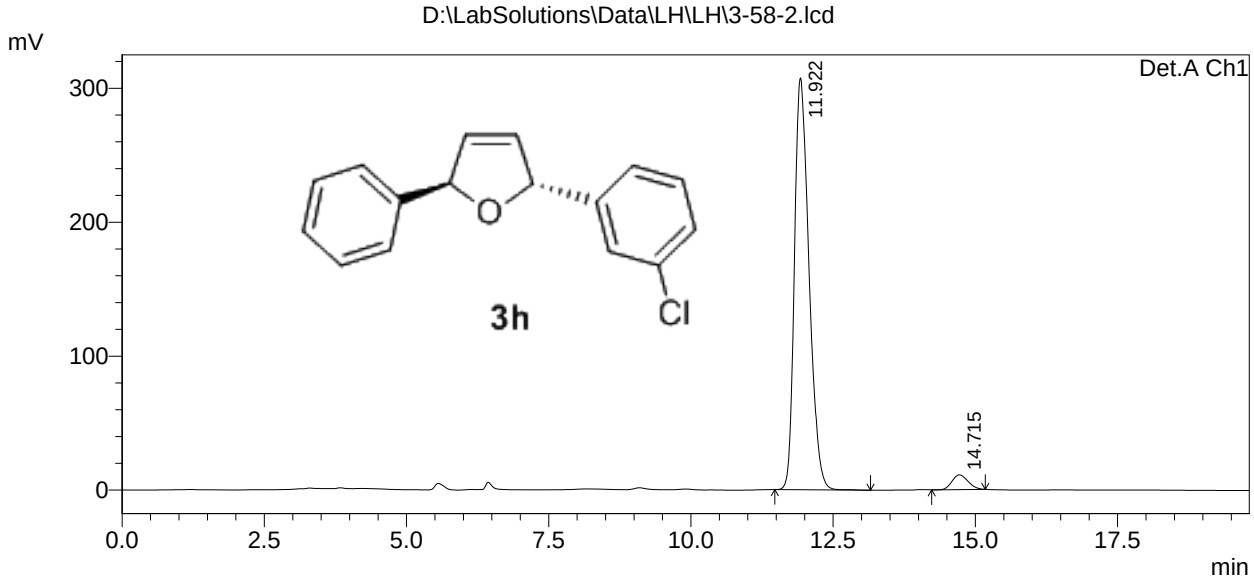
Peak#	Ret. Time	Area	Height	Area %	Height %
1	11.975	4749491	257148	49.940	56.705
2	14.519	4760924	196338	50.060	43.295
Total		9510416	453487	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-58-2.lcd

Acquired by	: Admin
Sample Name	: 3-58-2
Sample ID	: OD-H,99.5/0.5,1.0,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-58-2.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-12 15:01:56
Data Processed	: 2013-11-12 15:21:52

<Chromatogram>

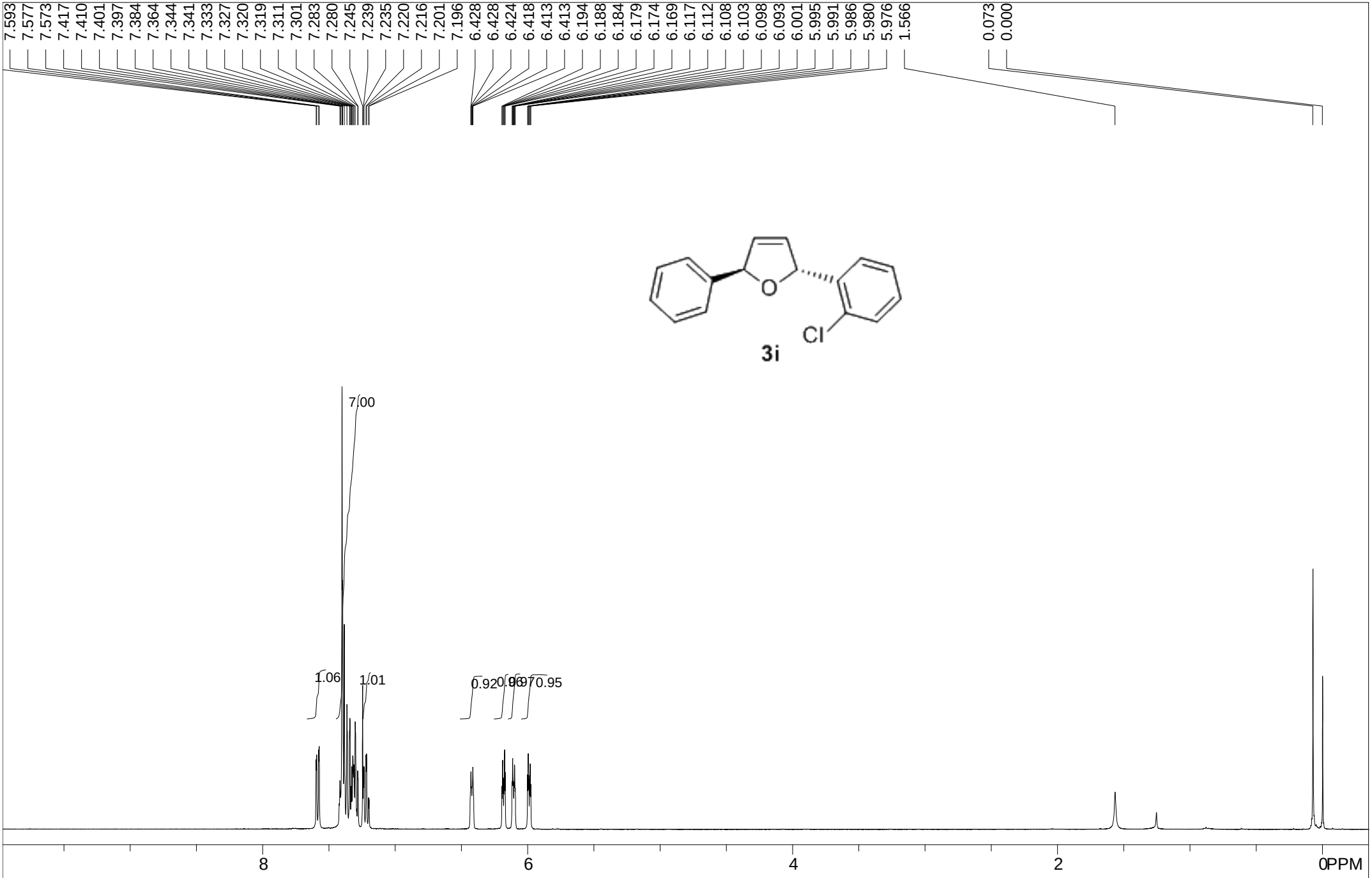


1 Det.A Ch1/214nm

PeakTable

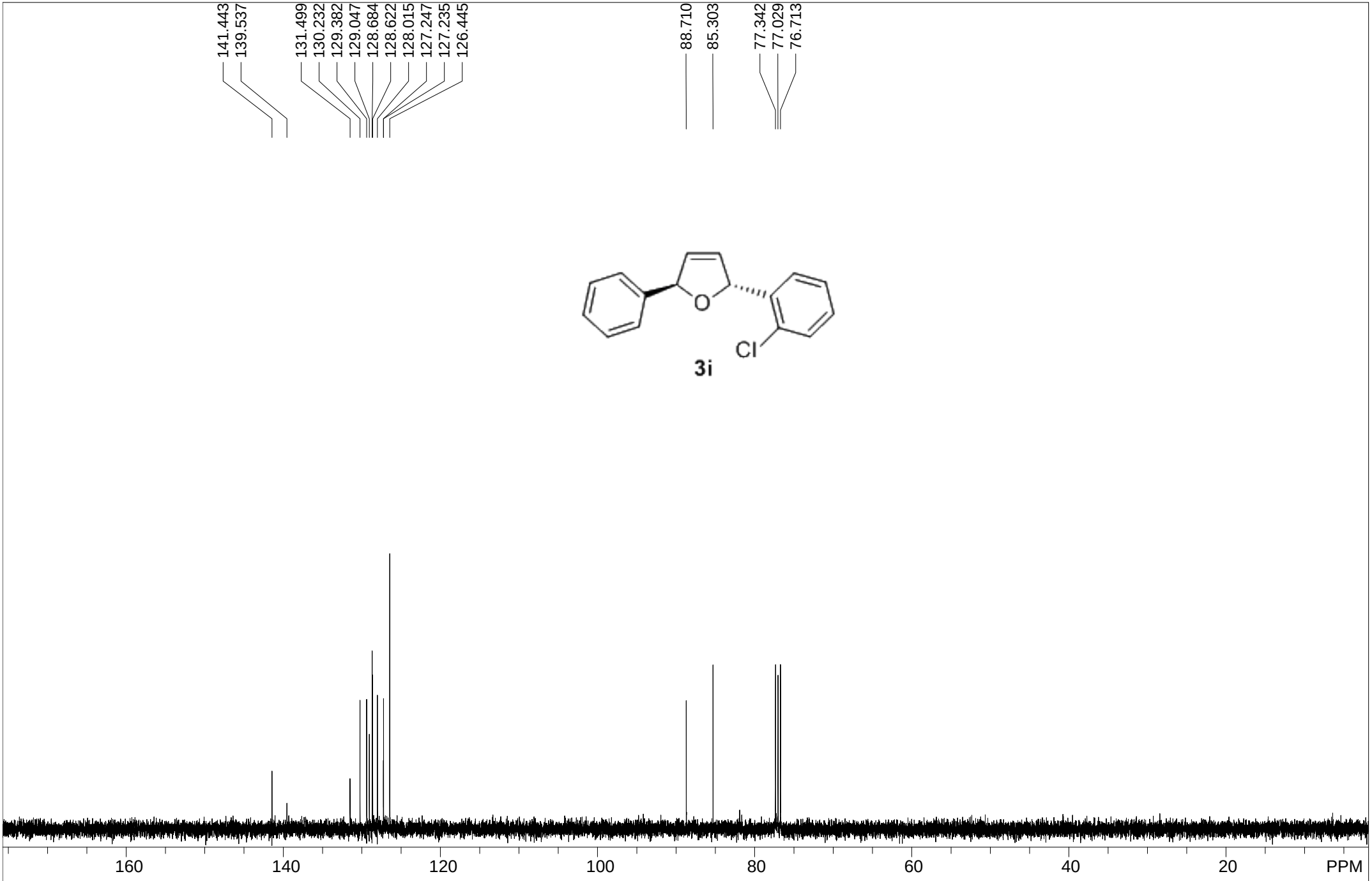
Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	11.922	5485674	307493	96.218	96.542
2	14.715	215598	11014	3.782	3.458
Total		5701272	318507	100.000	100.000



ldy-2014-9-9 USER: -- DATE: Sep 26 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2792.6		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-80-1-h.fid



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USER: -- DATE: Sep 26 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 44	LB: 0.0		Nuts - $lh-2-80-1-c.fid

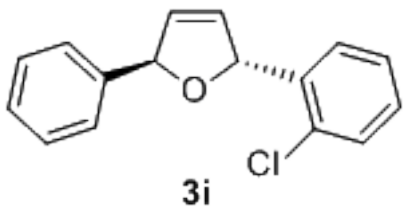
lh-2-80-1-2D

Sample Name:
lh-2-80-1-2D
Data Collected on:
OMC-NMR600-vnmrs600
Archive directory:
/home/omc/vnmrsys/data
Sample directory:
lh-2-80-1-2D_20141021_01
FidFile: NOESY_01

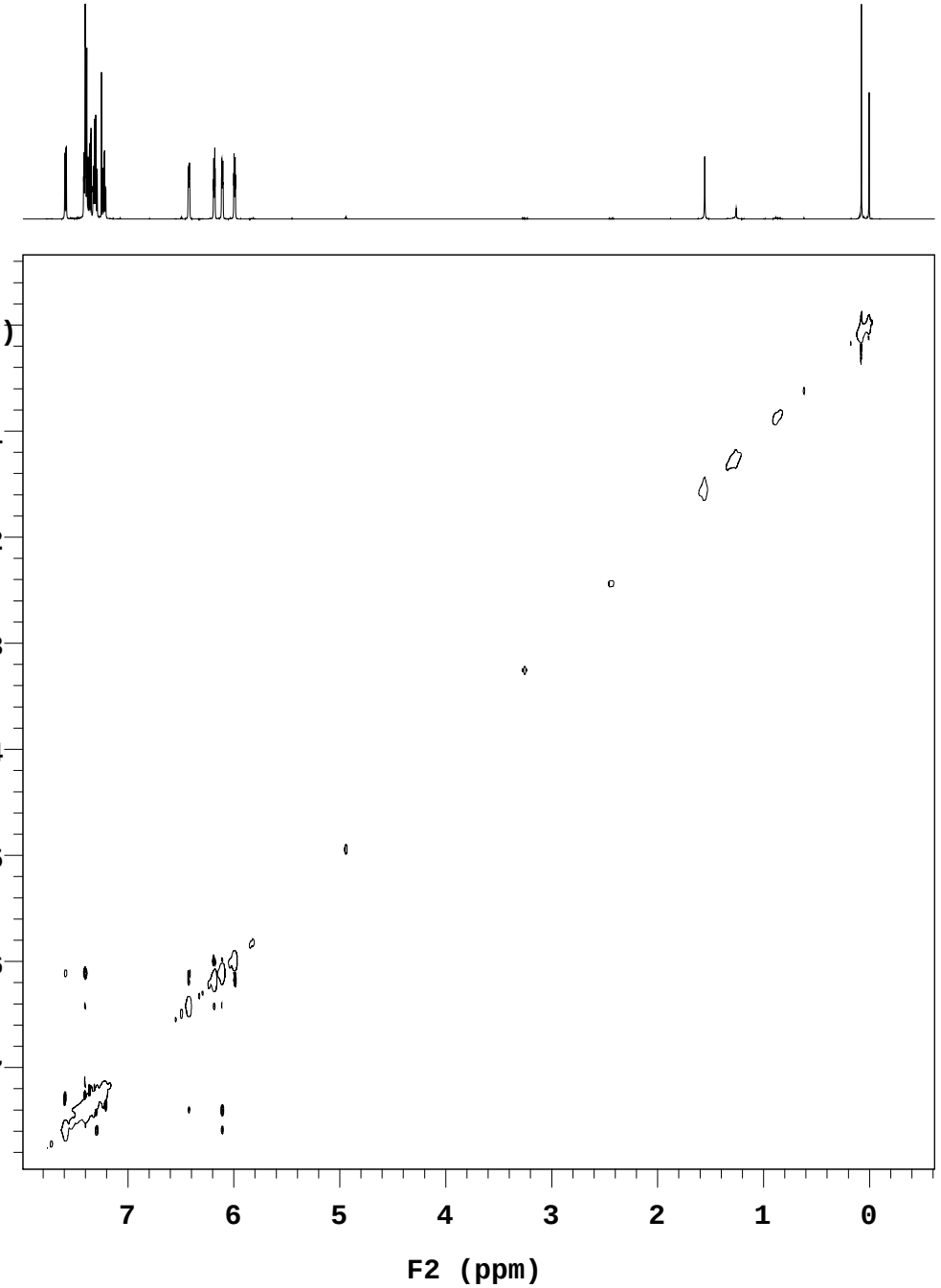
Pulse Sequence: NOESY
Solvent: cdcl3
Data collected on: Oct 21 2014

Temp. 23.0 C / 296.1 K
Operator: omc

Relax. delay 1.500 sec
Acq. time 0.196 sec
Width 7861.6 Hz
2D Width 7861.6 Hz
8 repetitions
2 x 128 increments
OBSERVE H1, 599.7754542 MHz
DATA PROCESSING
Gauss apodization 0.074 sec
F1 DATA PROCESSING
Gauss apodization 0.012 sec
FT size 4096 x 4096
Total time 1 hr, 24 min



3i



Plotname: --Not assigned--

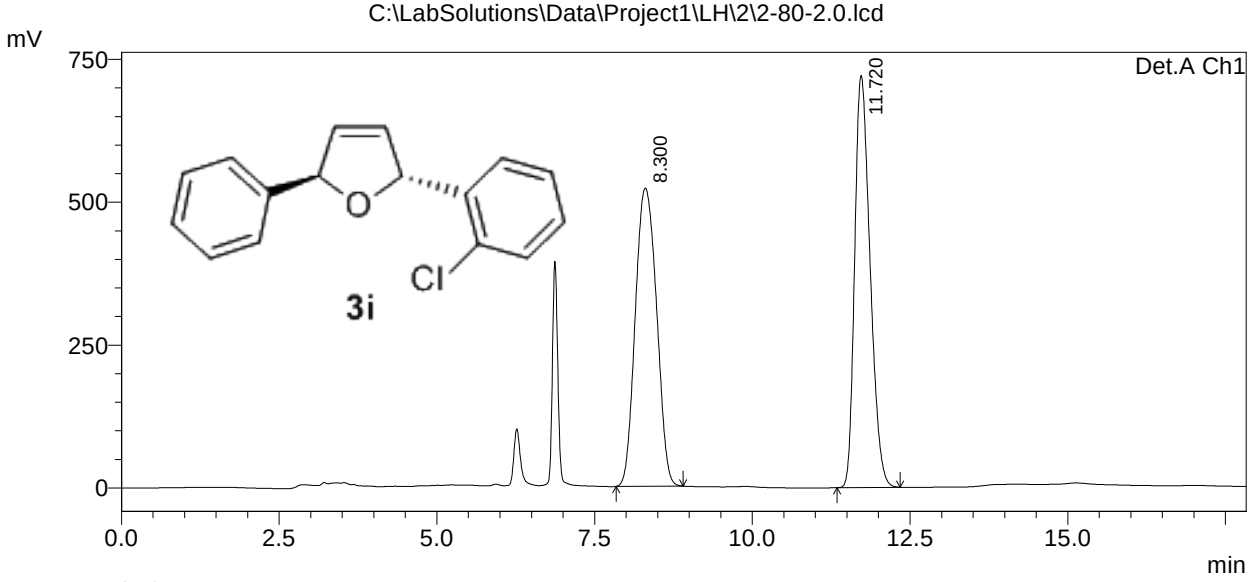
==== Shimadzu LCsolution Analysis Report ====

C:\LabSolutions\Data\Project1\LH\2\2-80-2.0.lcd

Acquired by	: Admin
Sample Name	: 2-80-2.0
method	:OD-H,99.5/0.5,1.0,214
Injection Volume	: 2.5 uL
Data File Name	: 2-80-2.0.lcd
Method File Name	: 1.lcm
Report File Name	: 1.lcr
Data Acquired	: 2014-9-29 10:42:14
Data Processed	: 2014-9-29 11:00:05

<Chromatogram>

C:\LabSolutions\Data\Project1\LH\2\2-80-2.0.lcd



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

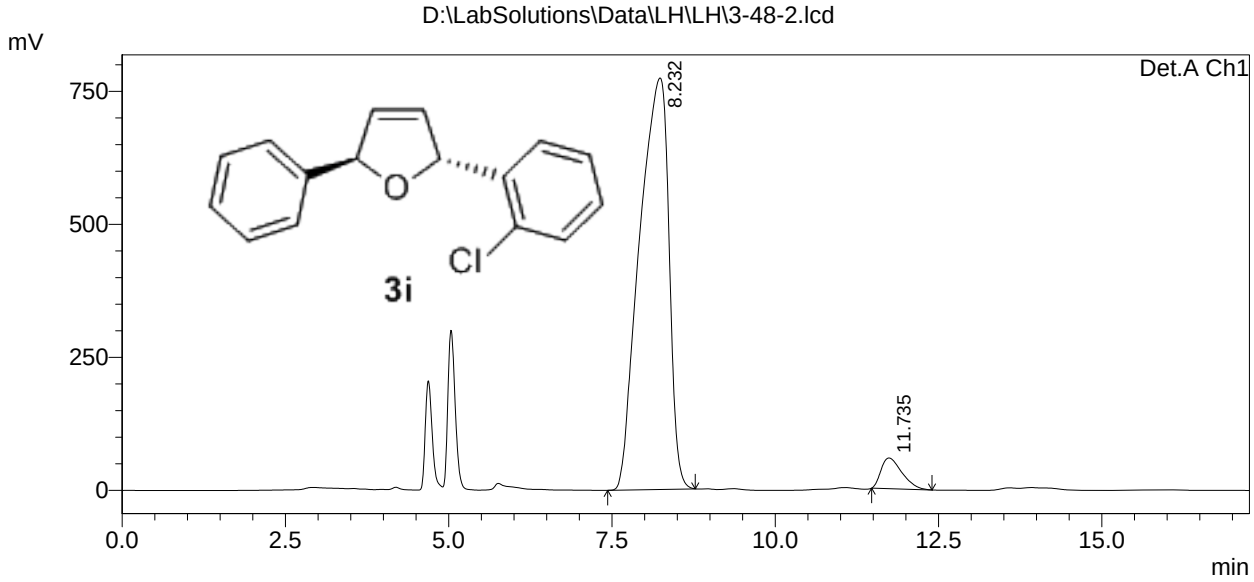
Peak#	Ret. Time	Area	Height	Area %
1	8.300	12250586	522034	50.004
2	11.720	12248776	721073	49.996
Total		24499362	1243107	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\LH\3-48-2.lcd

Acquired by	: Admin
Sample Name	: 3-48-2
Sample ID	: OD-H,99.5/0.5,1.0,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 3-48-2.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-11-6 12:40:42
Data Processed	: 2013-11-6 12:57:58

<Chromatogram>

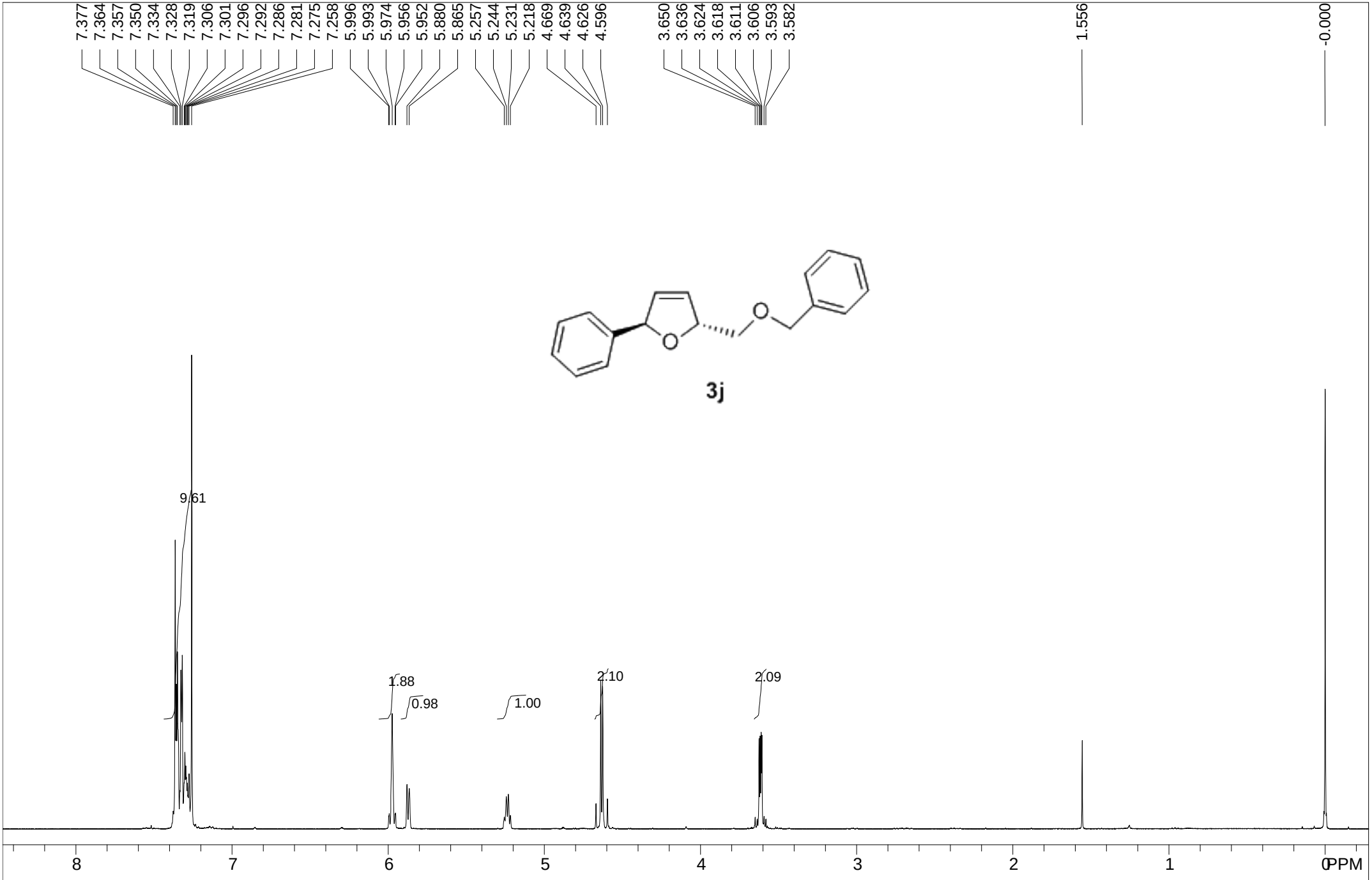


1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	8.232	24236016	773601	94.966	93.044
2	11.735	1284655	57832	5.034	6.956
Total		25520671	831433	100.000	100.000



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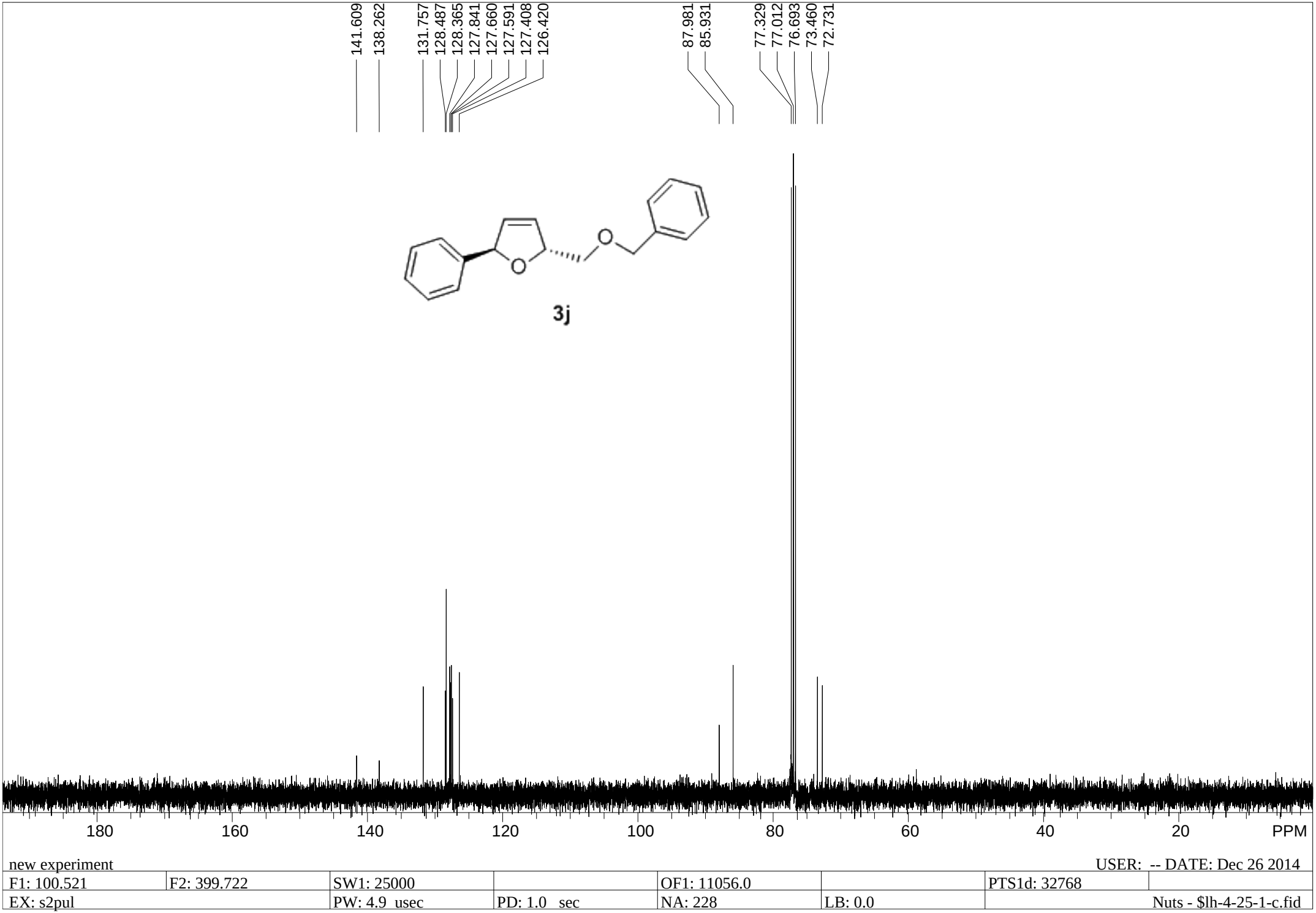
USER: -- DATE: Dec 26 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2797.8		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 12	LB: 0.0		Nuts - $lh-4-25-1-h.fid



new experiment USER: -- DATE: Dec 26 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.0		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 228	LB: 0.0		Nuts - $lh-4-25-1-c.fid

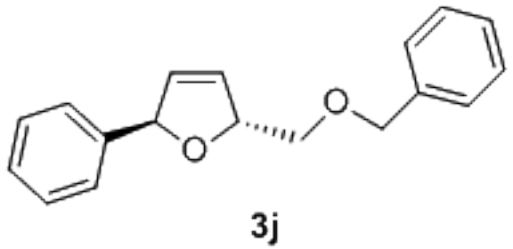
lh-4-25-1-2D

Sample Name:
lh-4-25-1-2D
Data Collected on:
OMC-NMR600-vnmrs600
Archive directory:
/home/omc/vnmrsys/data
Sample directory:
lh-4-25-1-2D_20141227_01
FidFile: NOESY_01

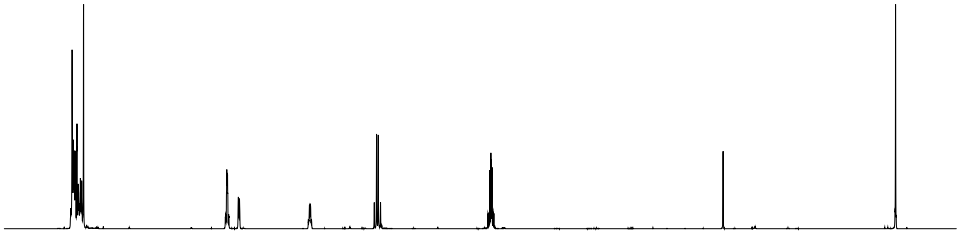
Pulse Sequence: NOESY
Solvent: cdcl3
Data collected on: Dec 27 2014

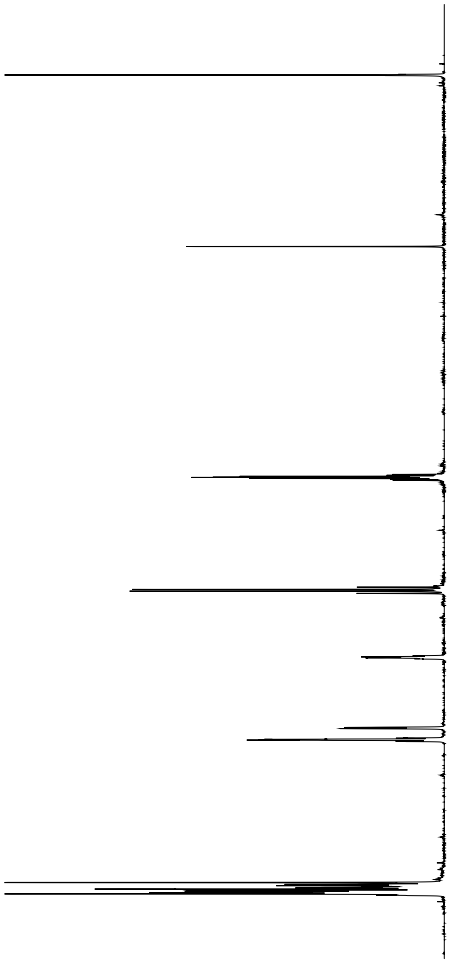
Temp. 25.0 C / 298.1 K
Operator: omc

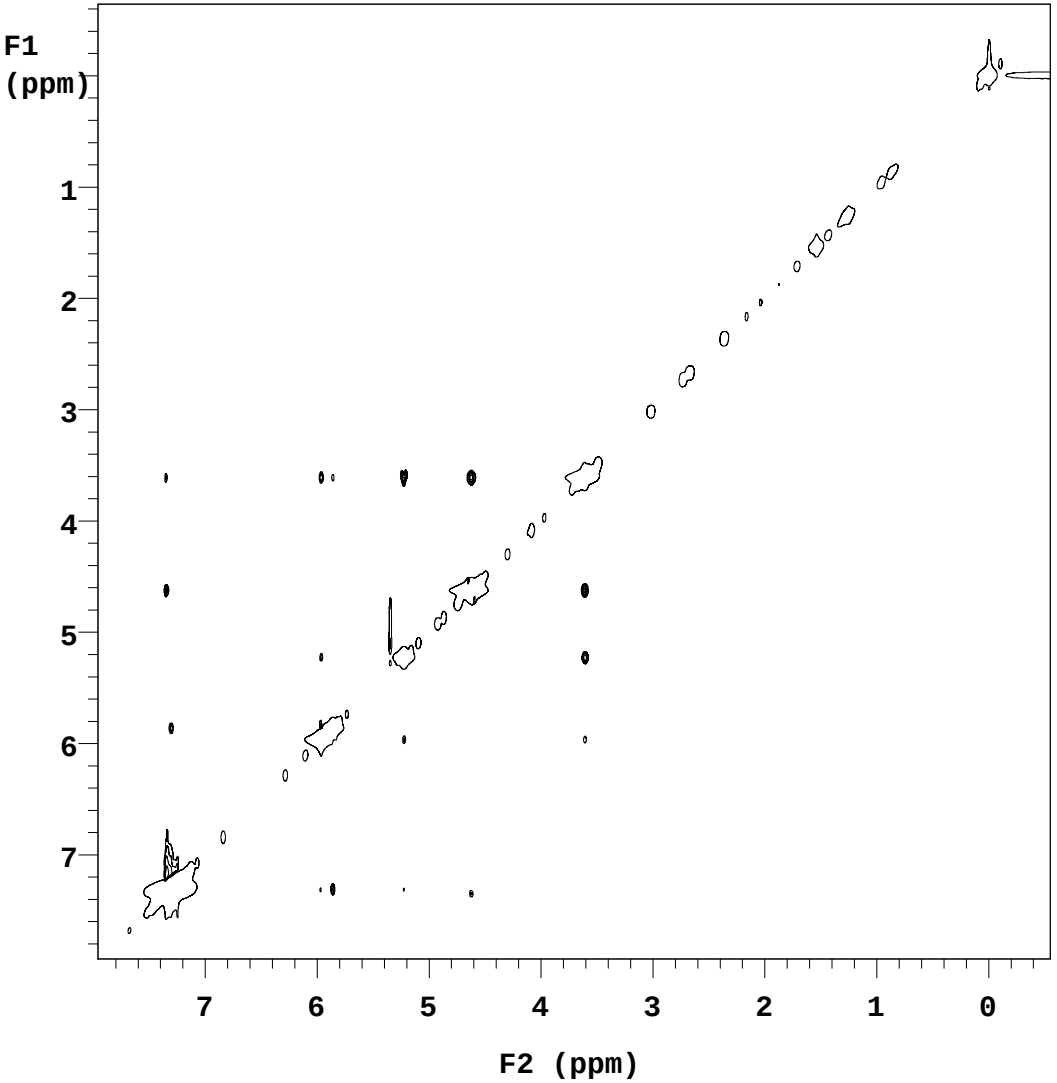
Relax. delay 1.500 sec
Acq. time 0.262 sec
Width 5868.5 Hz
2D Width 5868.5 Hz
16 repetitions
2 x 128 increments
OBSERVE H1, 599.7754542 MHz
DATA PROCESSING
Line broadening 4.0 Hz
Gauss apodization 0.049 sec
F1 DATA PROCESSING
Gauss apodization 0.012 sec
FT size 8192 x 8192
Total time 2 hr, 35 min



3j







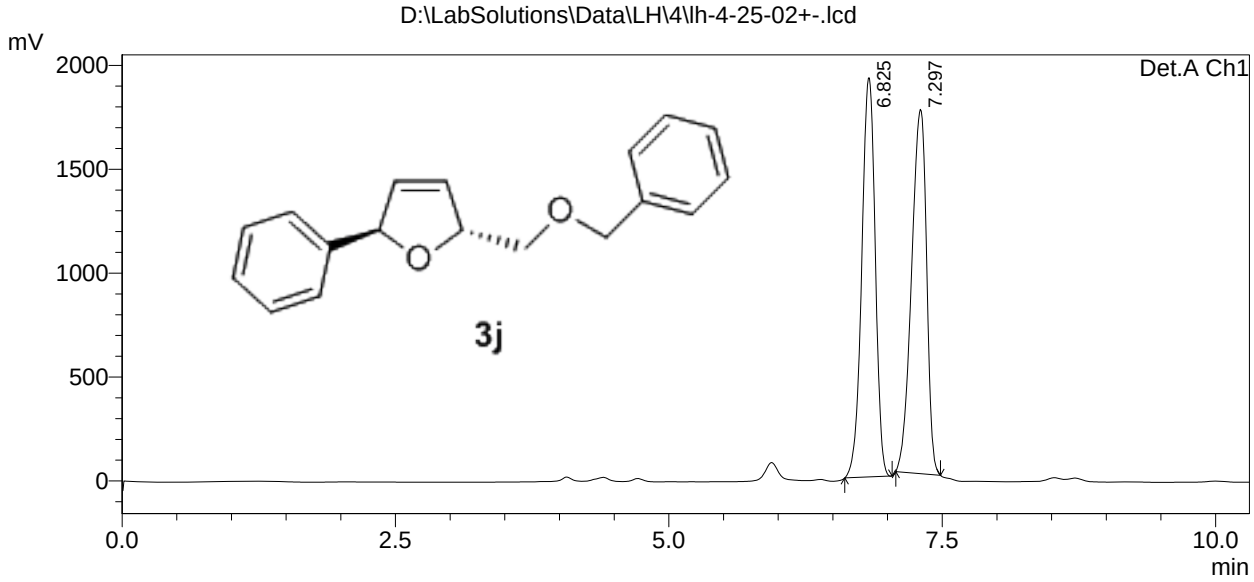
Plotname: --Not assigned--

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\4\lh-4-25-02+-.lcd

Acquired by	: Admin
Sample Name	: lh-4-25-02+-
Sample ID	: IA/90:10,0.7,214
Vail #	:
Injection Volume	: 1 uL
Data File Name	: lh-4-25-02+-.lcd
Method File Name	: 123.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2014-12-26 16:42:01
Data Processed	: 2013-12-25 20:58:09

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

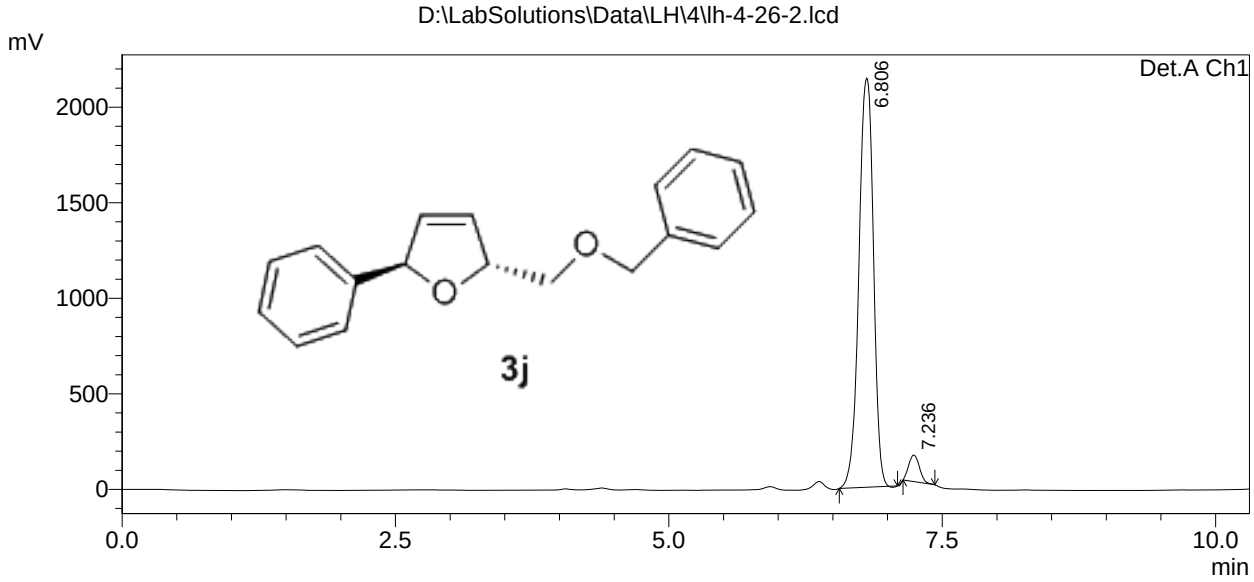
Peak#	Ret. Time	Area	Height	Area %	Height %
1	6.825	16463437	1920273	49.570	52.272
2	7.297	16749070	1753327	50.430	47.728
Total		33212507	3673601	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\4\lh-4-26-2.lcd

Acquired by	: Admin
Sample Name	: lh-4-26-2
Sample ID	: IA/90:10,0.7,214
Vail #	:
Injection Volume	: 1 uL
Data File Name	: lh-4-26-2.lcd
Method File Name	: 123.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2014-12-26 16:54:26
Data Processed	: 2014-12-26 17:04:45

<Chromatogram>

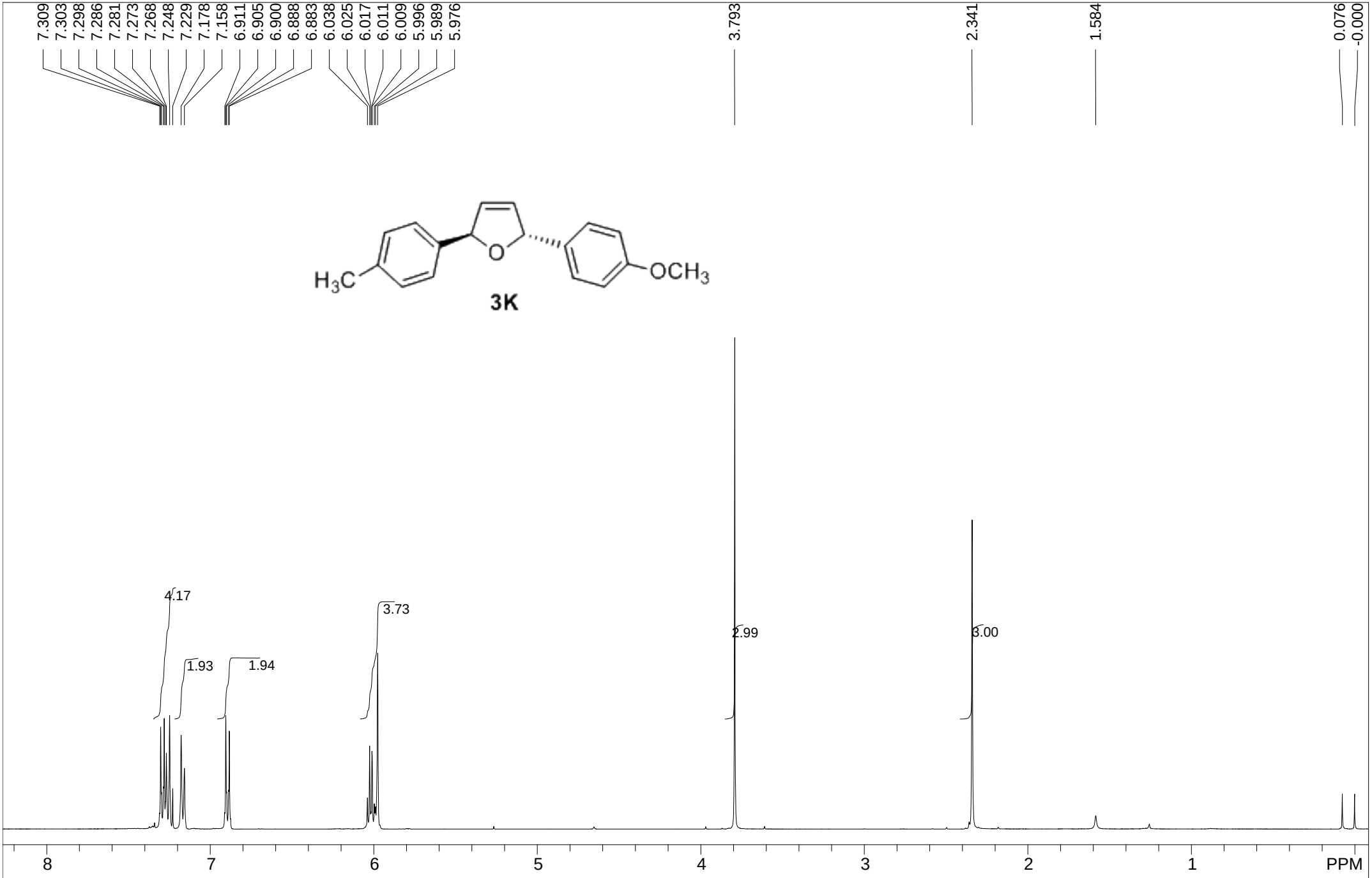


1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	6.806	19792022	2142343	95.437	93.920
2	7.236	946217	138695	4.563	6.080
Total		20738239	2281038	100.000	100.000



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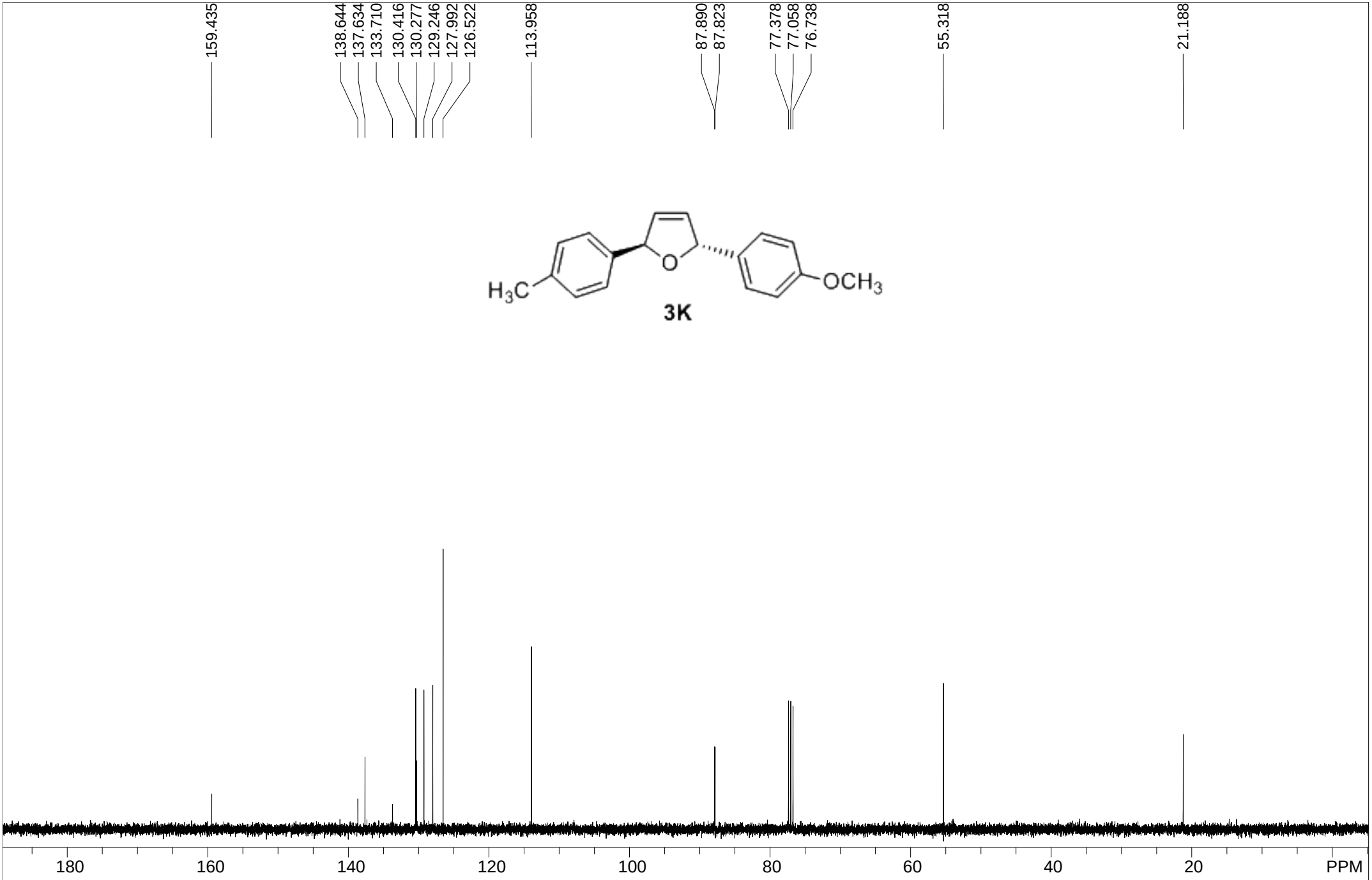
USER: -- DATE: Oct 11 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2786.4		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-3-2-1-h.fid



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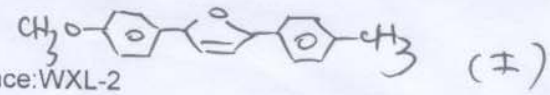
USER: -- DATE: Oct 11 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 40	LB: 0.0		Nuts - $lh-3-2-1-c.fid

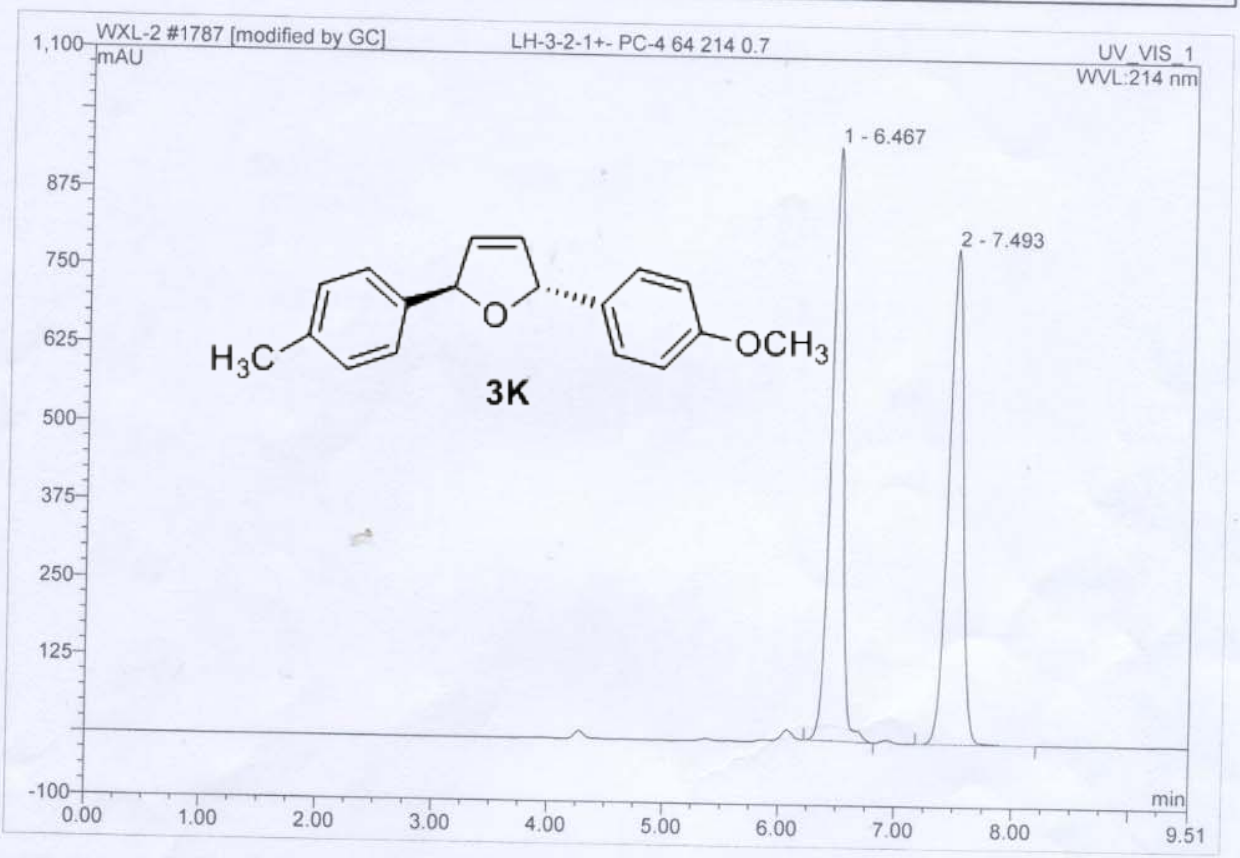


(±)

8-87

1787 LH-3-2-1+- PC-4 64 214 0.7

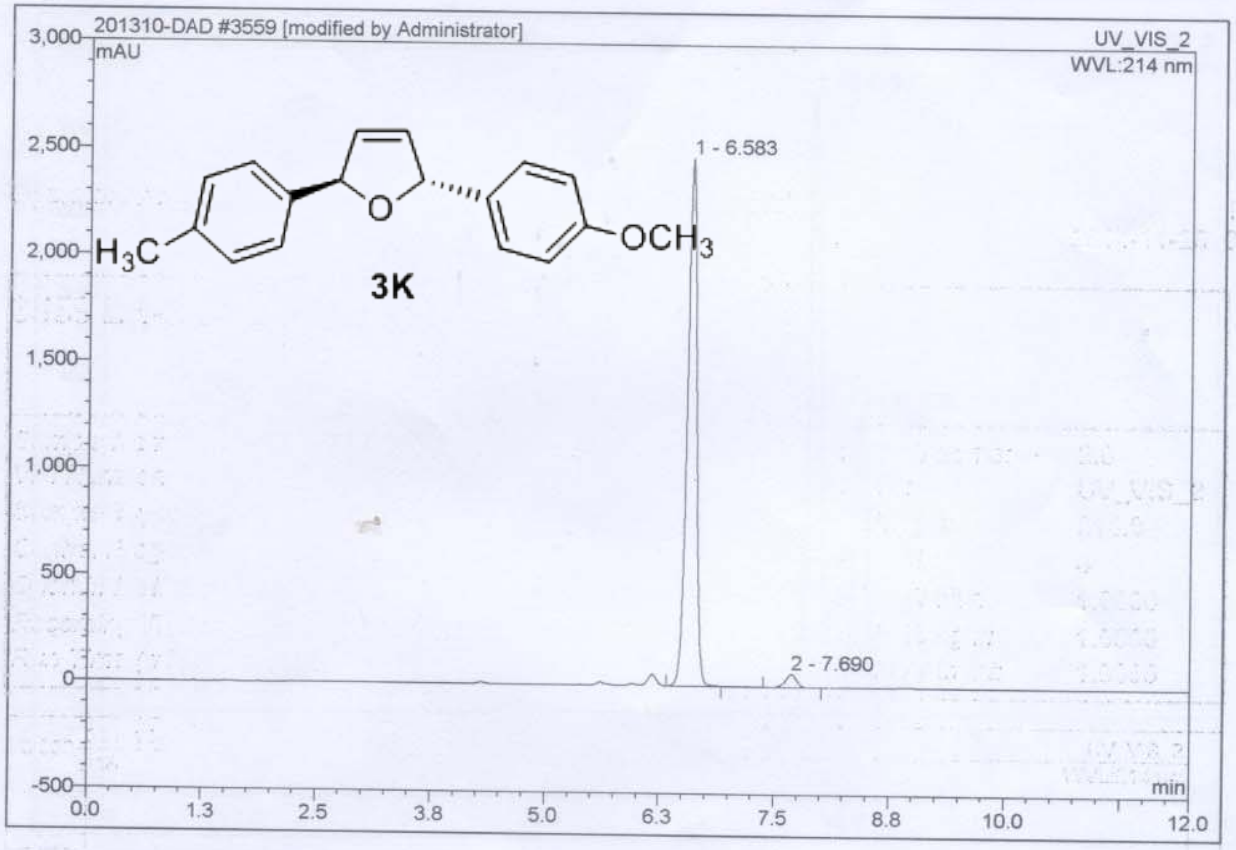
Sample Name:	**LH-3-2-1+- PC-4 64 214 0.7**	*Injection Volume:*	**5.0**
Vial Number:	**RD3**	*Channel:*	**UV_VIS_1**
Sample Type:	**unknown**	*Wavelength:*	**214**
Control Program:	**WXL-2014**	*Bandwidth:*	**n.a.**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014/10/13 18:00**	*Sample Weight:*	**1.0000**
Run Time (min):	**9.51**	*Sample Amount:*	**1.0000**



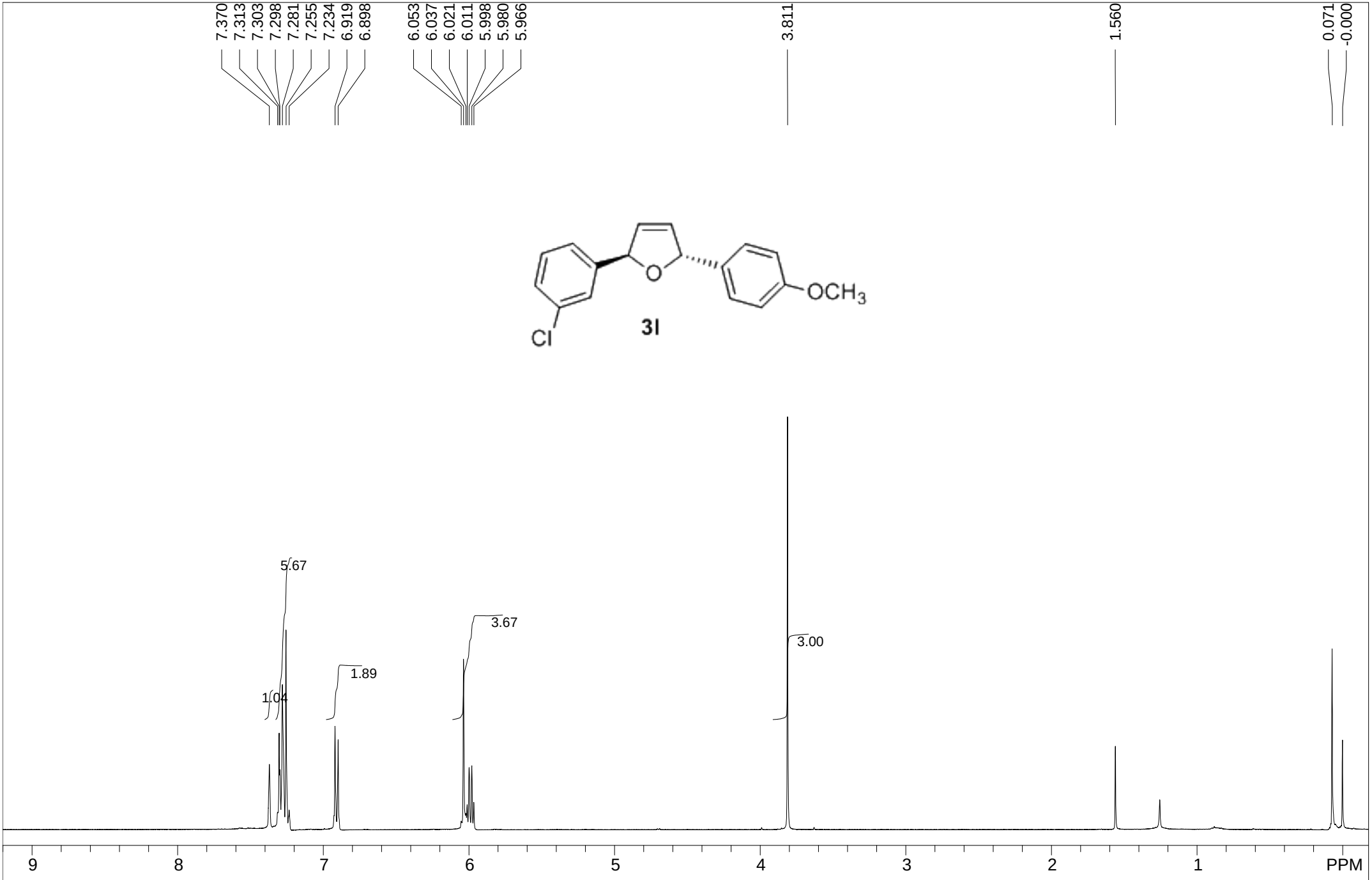
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	6.47	n.a.	954.943	116.597	50.24	n.a.	BMB*
2	7.49	n.a.	794.158	115.469	49.76	n.a.	BMB*
Total:			1749.101	232.066	100.00	0.000	

3559 LH-3-84-2 PC-4 64 214 0.7

Sample Name:	LH-3-84-2 PC-4 64 214 0.7	*Injection Volume:*	2.0
Vial Number:	BC5	*Channel:*	UV_VIS_2
Sample Type:	unknown	*Wavelength:*	214.0
Control Program:	test-dad2	*Bandwidth:*	4
Quantif. Method:	WXL	*Dilution Factor:*	1.0000
Recording Time:	2014-11-26 17:21	*Sample Weight:*	1.0000
Run Time (min):	12.00	*Sample Amount:*	1.0000



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	6.58	n.a.	2468.713	294.327	97.12	n.a.	BMB*
2	7.69	n.a.	60.430	8.713	2.88	n.a.	BMB*
Total:			2529.143	303.040	100.00	0.000	



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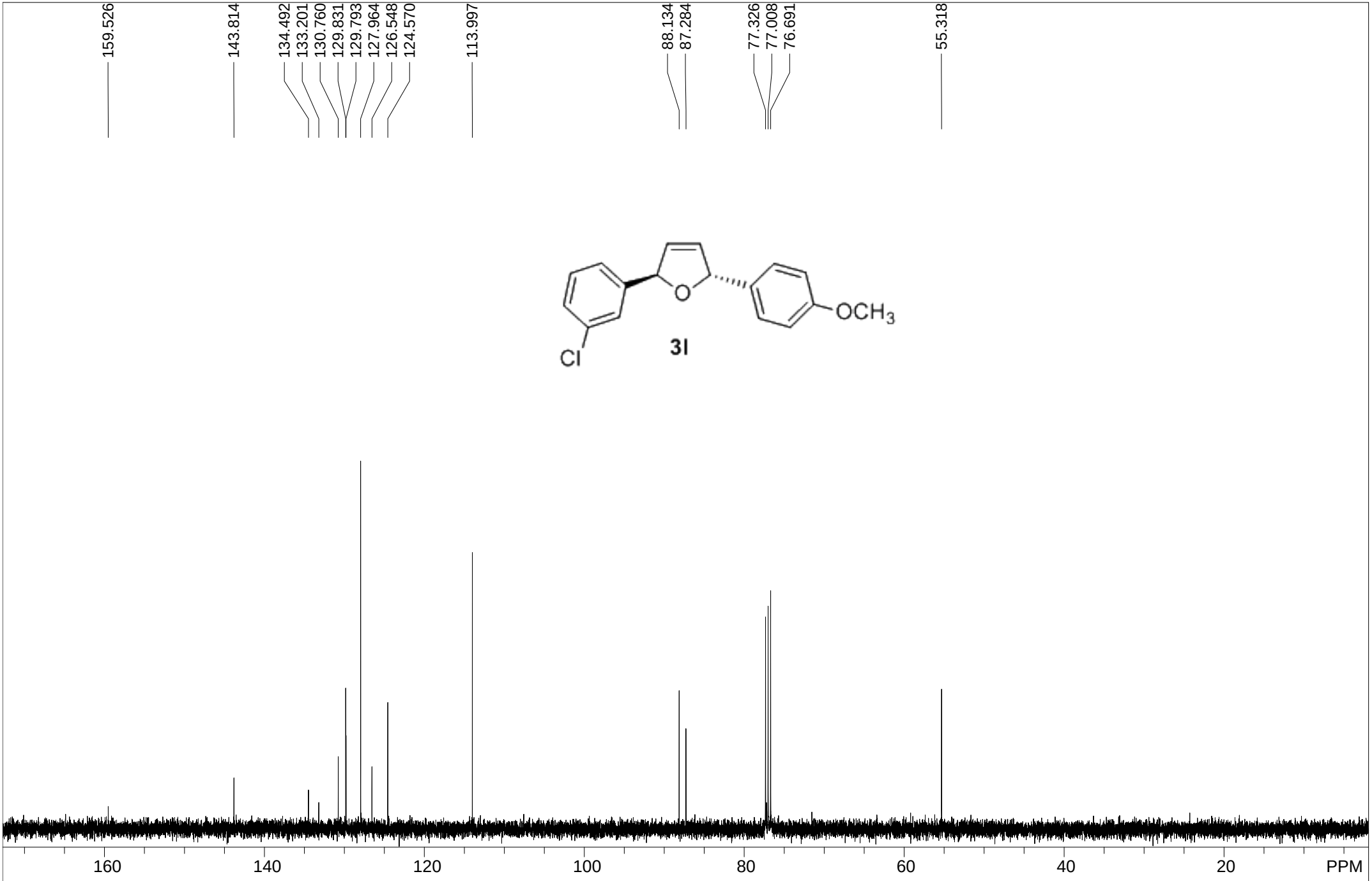
USER: -- DATE: Oct 13 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2796.9		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-100-1-h.fid



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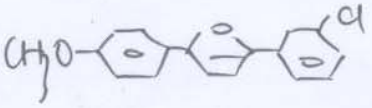
USER: -- DATE: Oct 13 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 156	LB: 0.0		Nuts - $lh-2-100-1-c.fid

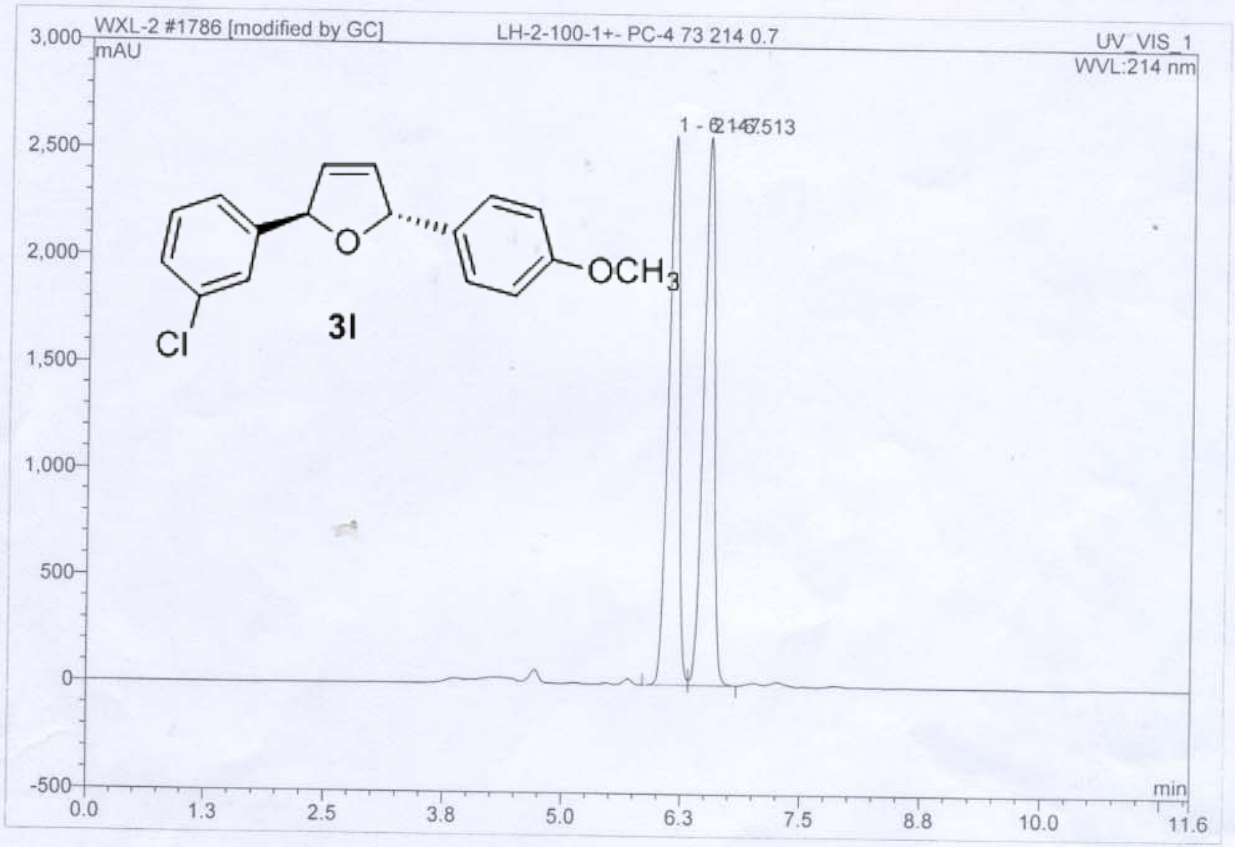


(I)

90-91

1786 LH-2-100-1+- PC-4 73 214 0.7

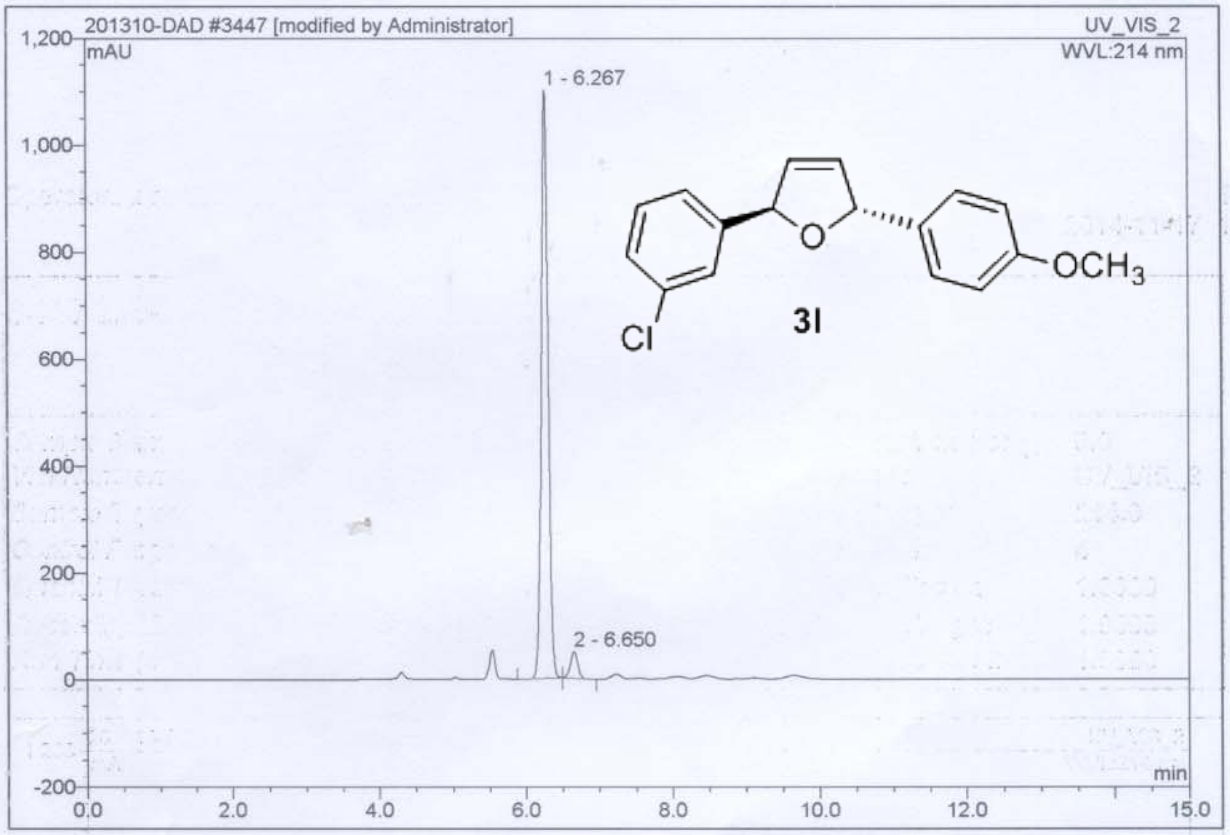
Sample Name:	**LH-2-100-1+- PC-4 73 214 0.7**	*Injection Volume:*	**8.0**
Vial Number:	**RD2**	*Channel:*	**UV_VIS_1**
Sample Type:	**unknown**	*Wavelength:*	**214**
Control Program:	**WXL-2014**	*Bandwidth:*	**n.a.**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014/10/13 18:46**	*Sample Weight:*	**1.0000**
Run Time (min):	**11.56**	*Sample Amount:*	**1.0000**



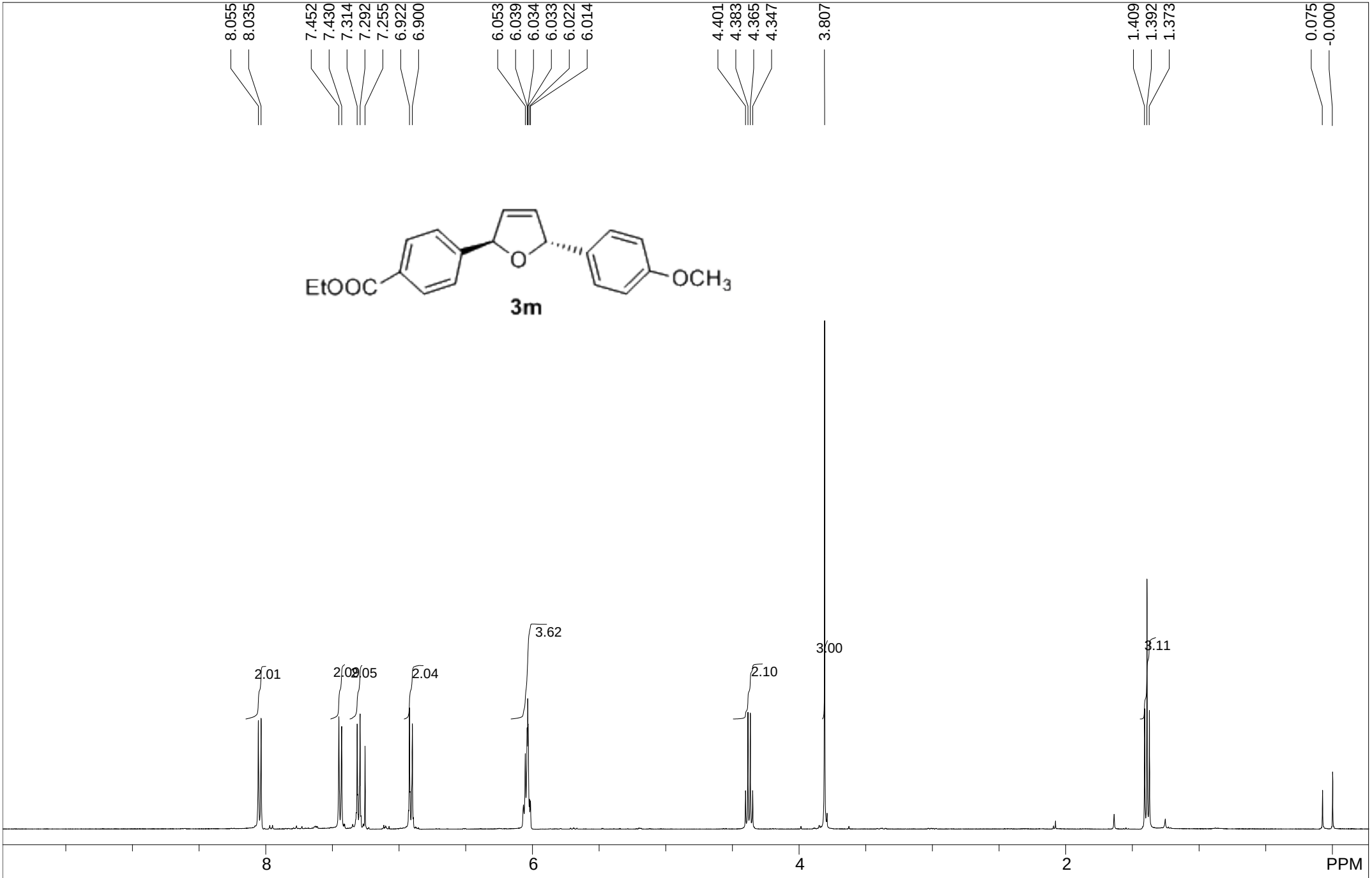
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	6.15	n.a.	2577.535	346.074	49.96	n.a.	BM
2	6.51	n.a.	2574.600	346.594	50.04	n.a.	MB*
Total:			5152.135	692.669	100.00	0.000	

3447 LH-3-62-2 PC-4 73 214 0.7

Sample Name:	**LH-3-62-2 PC-4 73 214 0.7**	*Injection Volume:*	**5.0**
Vial Number:	**GC1**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-14 16:21**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.09**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	6.27	n.a.	1101.202	120.059	95.37	n.a.	BMb*
2	6.65	n.a.	49.978	5.828	4.63	n.a.	bMB*
Total:			1151.180	125.887	100.00	0.000	



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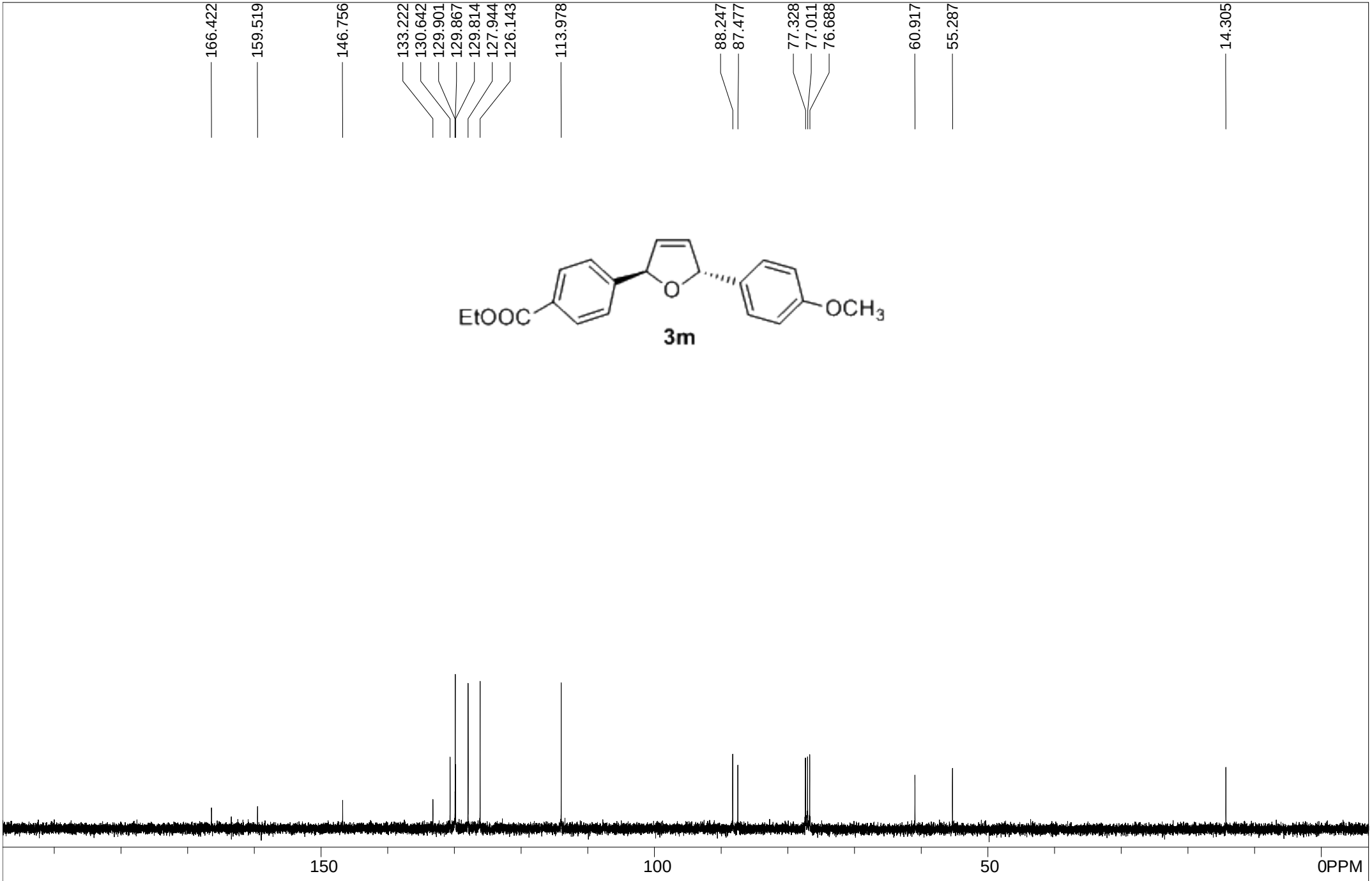
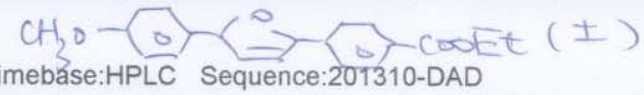
USER: -- DATE: Dec 3 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2796.7		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-3-96-1-h.fid



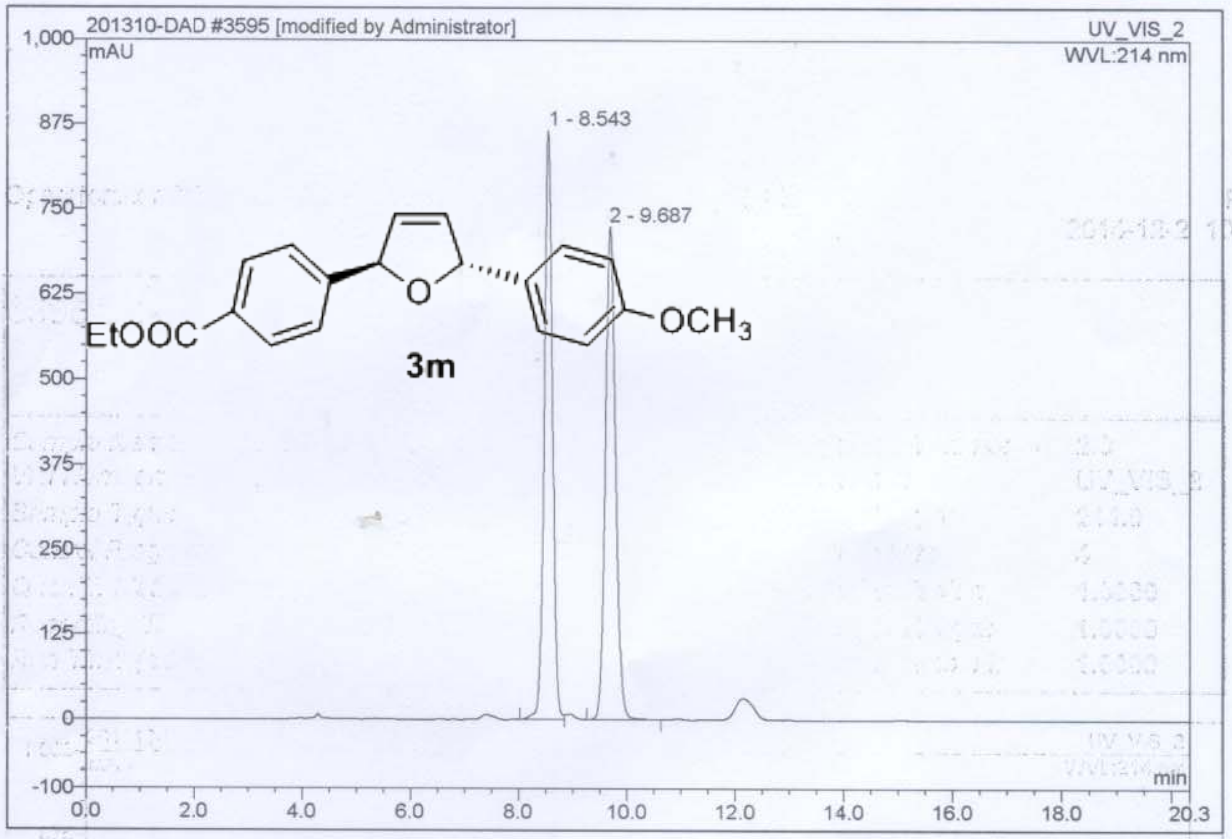
Std carbon;blank line USER: -- DATE: Dec 3 2014

F1: 100.598	F2: 400.031	SW1: 24510		OF1: 10561.6		PTS1d: 32768	
EX: s2pul		PW: 4.1 usec	PD: 1.0 sec	NA: 120	LB: 0.0		Nuts - $lh-3-96-1-c.fid



3595 LH-3-96-2+- PC-4 64 214 0.7

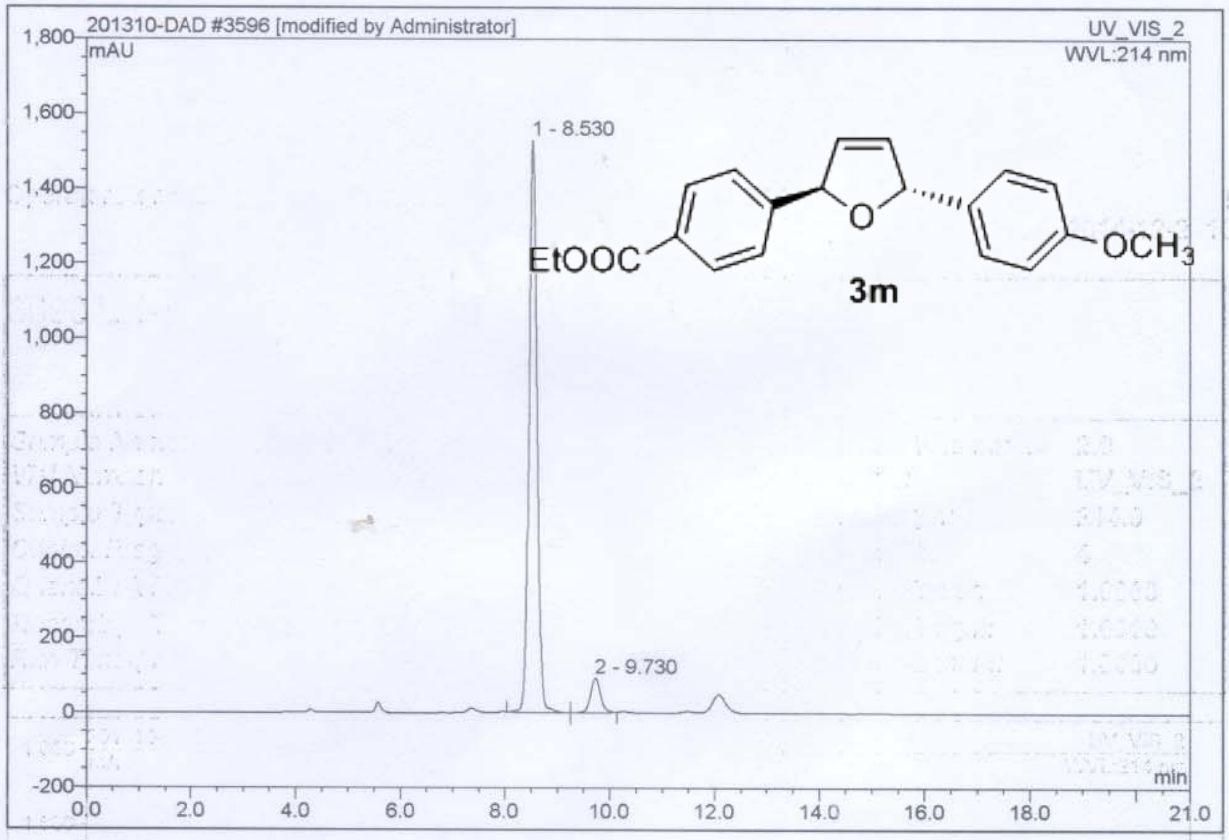
Sample Name:	**LH-3-96-2+- PC-4 64 214 0.7**	*Injection Volume:*	**2.0**
Vial Number:	**BC1**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad4**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-12-2 21:20**	*Sample Weight:*	**1.0000**
Run Time (min):	**20.33**	*Sample Amount:*	**1.0000**



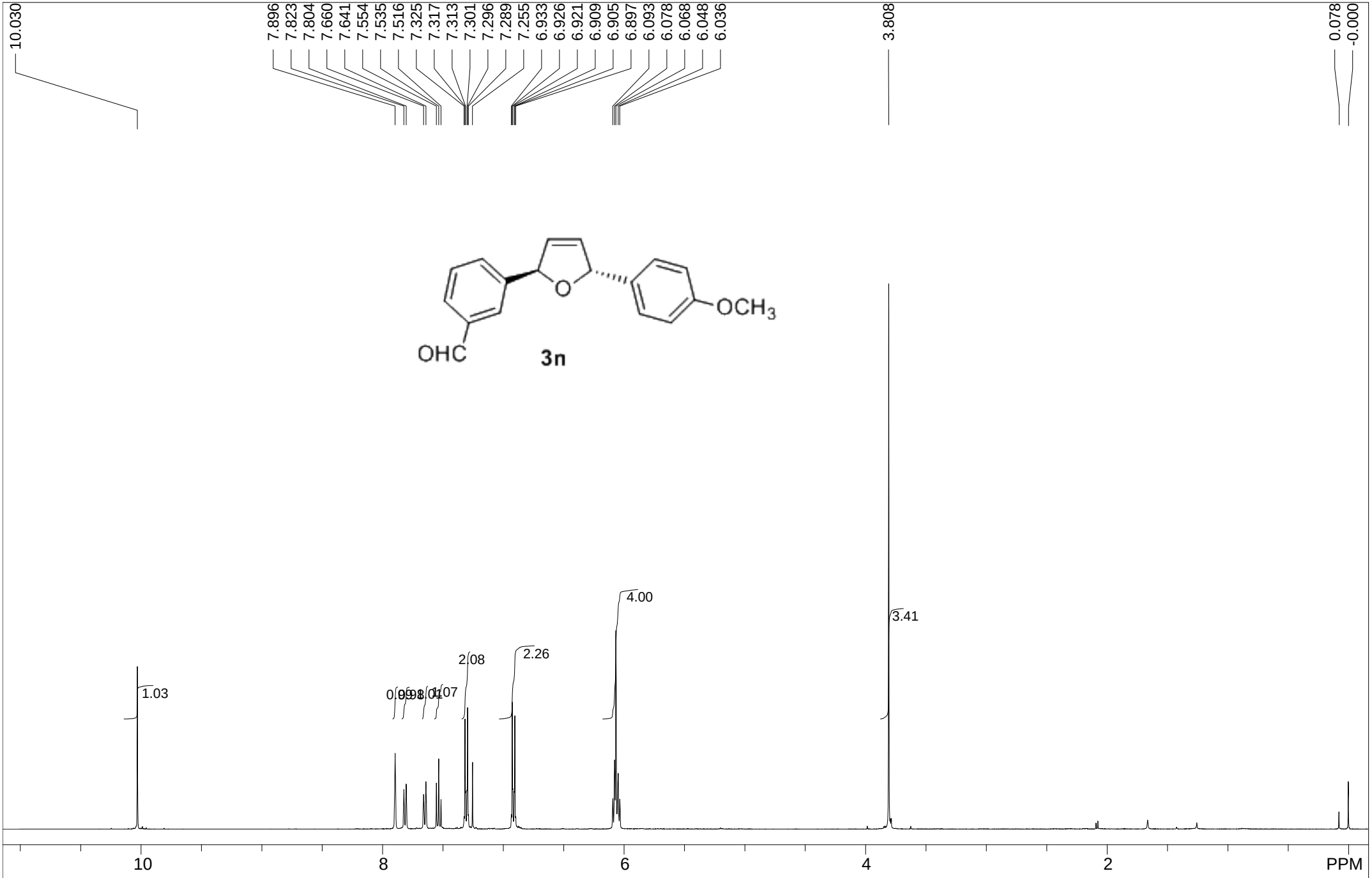
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	8.54	n.a.	866.135	155.156	49.41	n.a.	BM *
2	9.69	n.a.	724.087	158.873	50.59	n.a.	BMB
Total:			1590.222	314.029	100.00	0.000	

3596 LH-3-96-2 PC-4 64 214 0.7

Sample Name:	**LH-3-96-2 PC-4 64 214 0.7**	*Injection Volume:*	**2.0**
Vial Number:	**BC2**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad4**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-12-2 21:43**	*Sample Weight:*	**1.0000**
Run Time (min):	**21.02**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	8.53	n.a.	1527.719	274.891	93.26	n.a.	BMb*
2	9.73	n.a.	90.495	19.873	6.74	n.a.	bMB*
Total:			1618.213	294.764	100.00	0.000	



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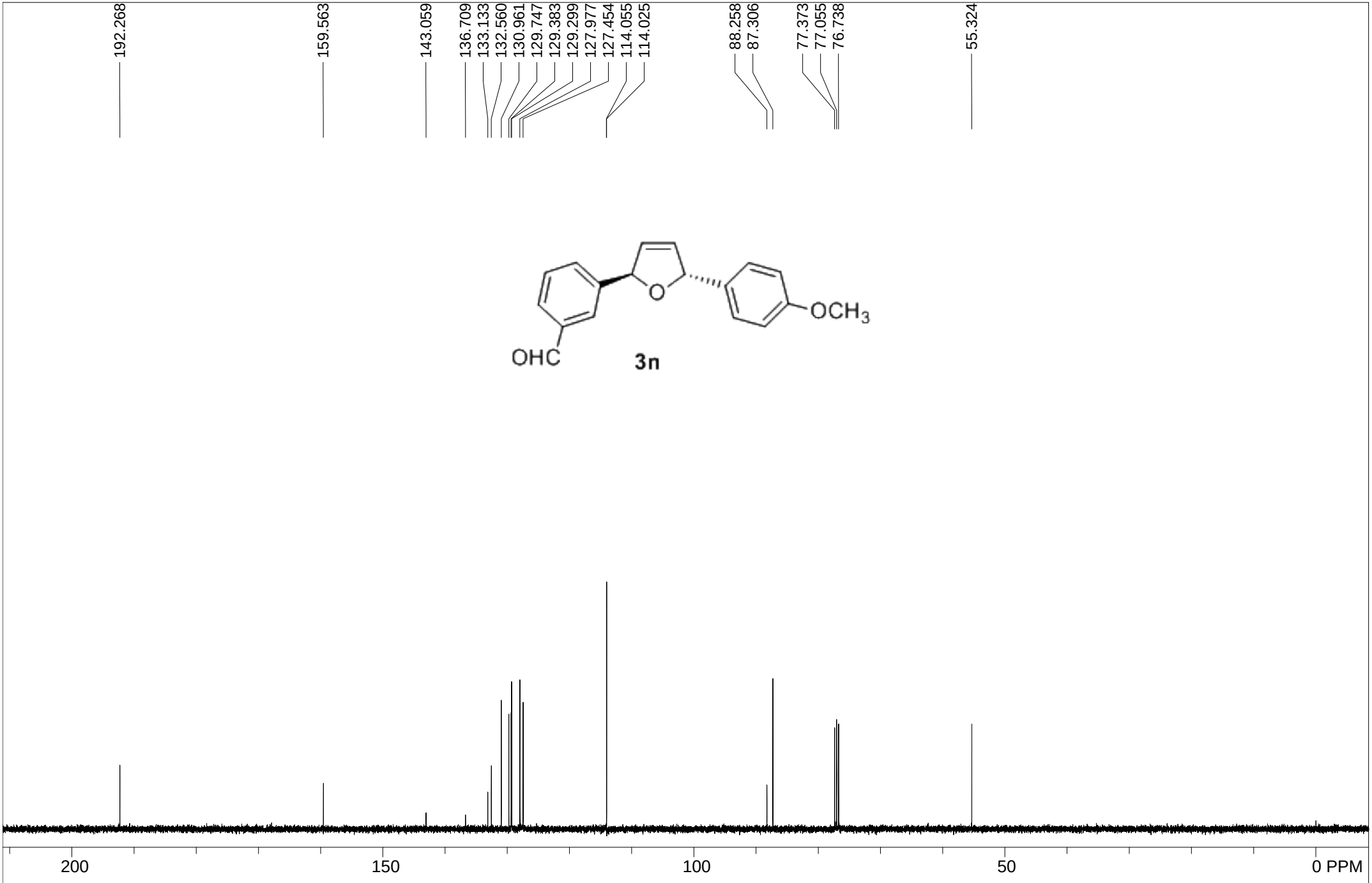
USER: -- DATE: Dec 9 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2796.7		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-4-6-1-h.fid

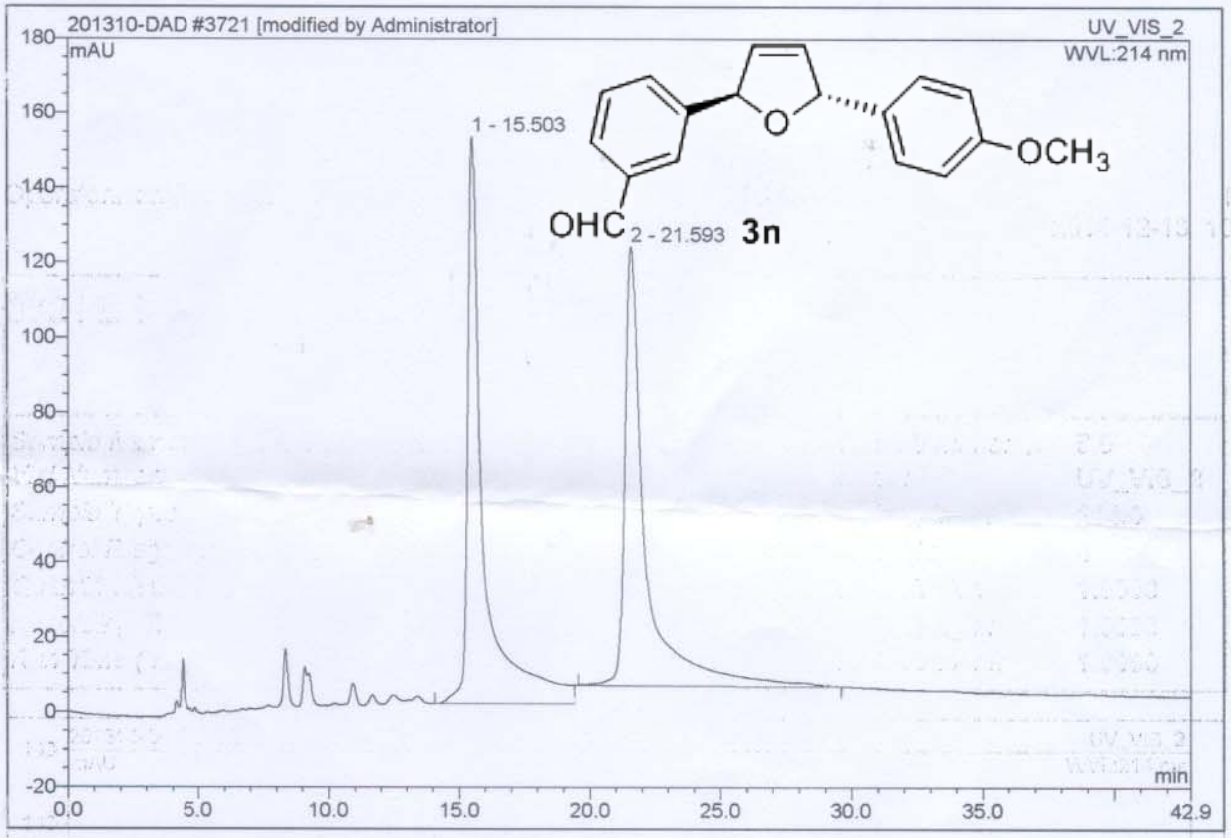


new experiment USER: -- DATE: Dec 9 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.0		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 120	LB: 0.0		Nuts - $lh-4-6-1-c.fid

3721 LH-4-7-2+- OD-H 82 214 0.7

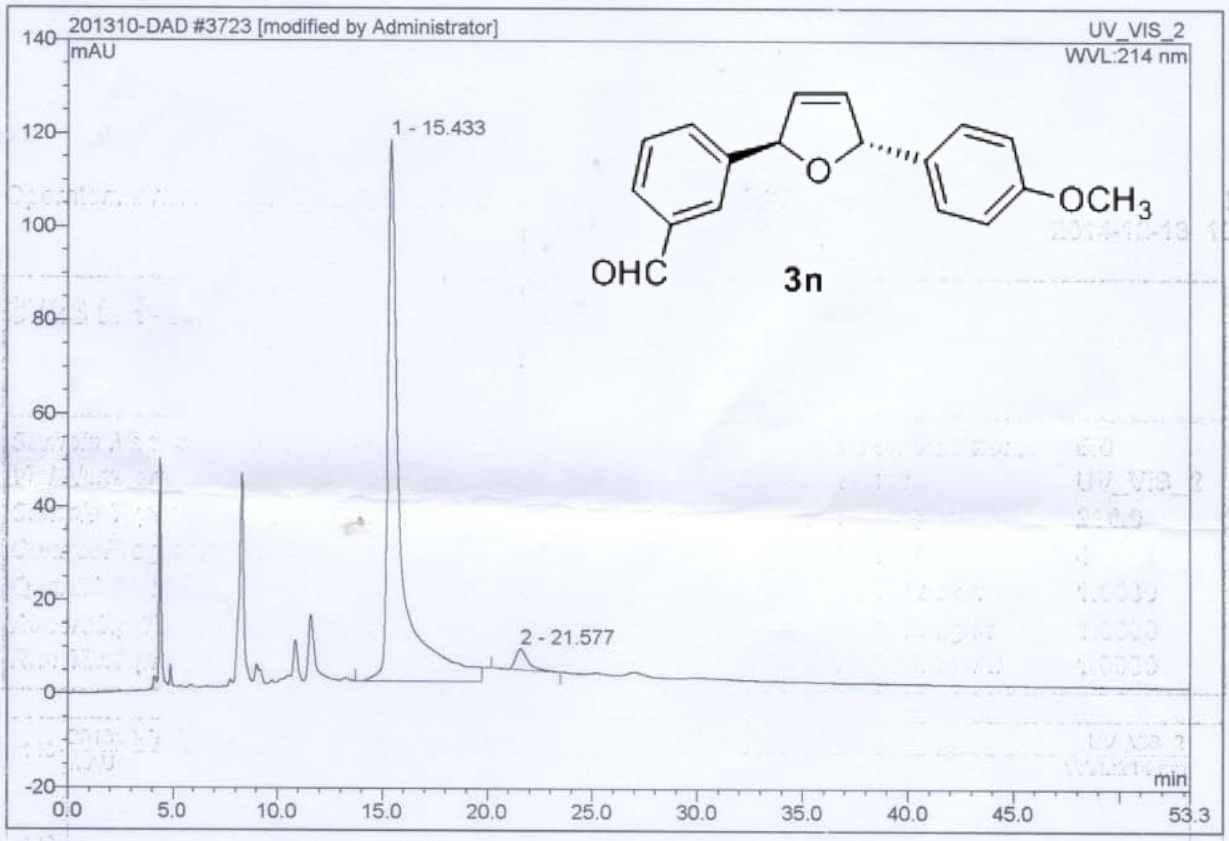
Sample Name:	**LH-4-7-2+- OD-H 82 214 0.7**	*Injection Volume:*	**5.0**
Vial Number:	**BE5**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad4**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-12-12 20:12**	*Sample Weight:*	**1.0000**
Run Time (min):	**42.88**	*Sample Amount:*	**1.0000**



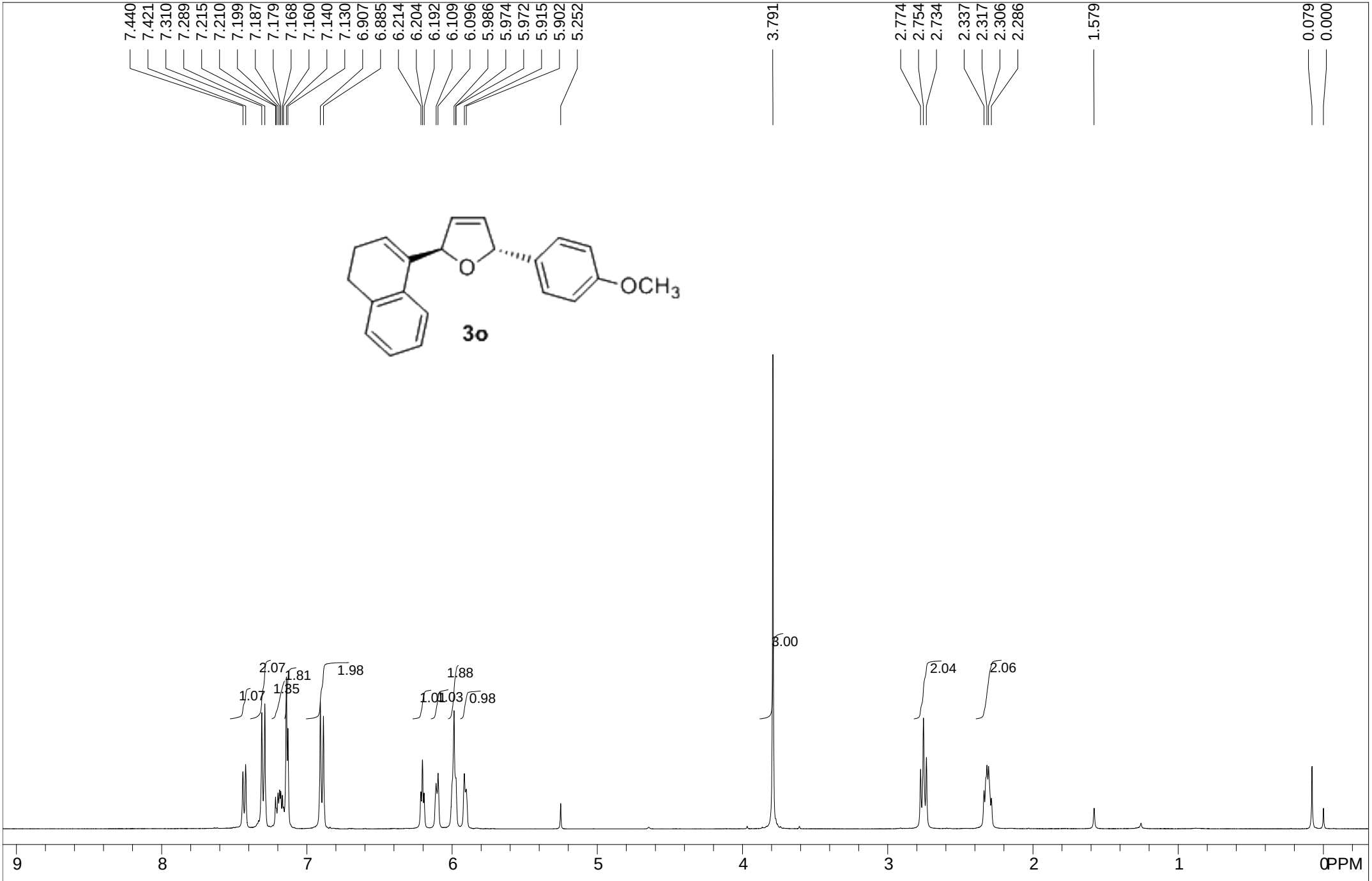
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	15.50	n.a.	151.691	107.132	49.92	n.a.	BM *
2	21.59	n.a.	117.212	107.476	50.08	n.a.	BMB*
Total:			268.903	214.608	100.00	0.000	

3723 LH-4-7-2 OD-H 82 214 0.7

Sample Name:	**LH-4-7-2 OD-H 82 214 0.7**	*Injection Volume:*	**5.0**
Vial Number:	**BA3**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad4**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-12-13 10:21**	*Sample Weight:*	**1.0000**
Run Time (min):	**53.29**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	15.43	n.a.	115.856	80.897	96.38	n.a.	BM *
2	21.58	n.a.	4.506	3.034	3.62	n.a.	BMB*
Total:			120.363	83.931	100.00	0.000	



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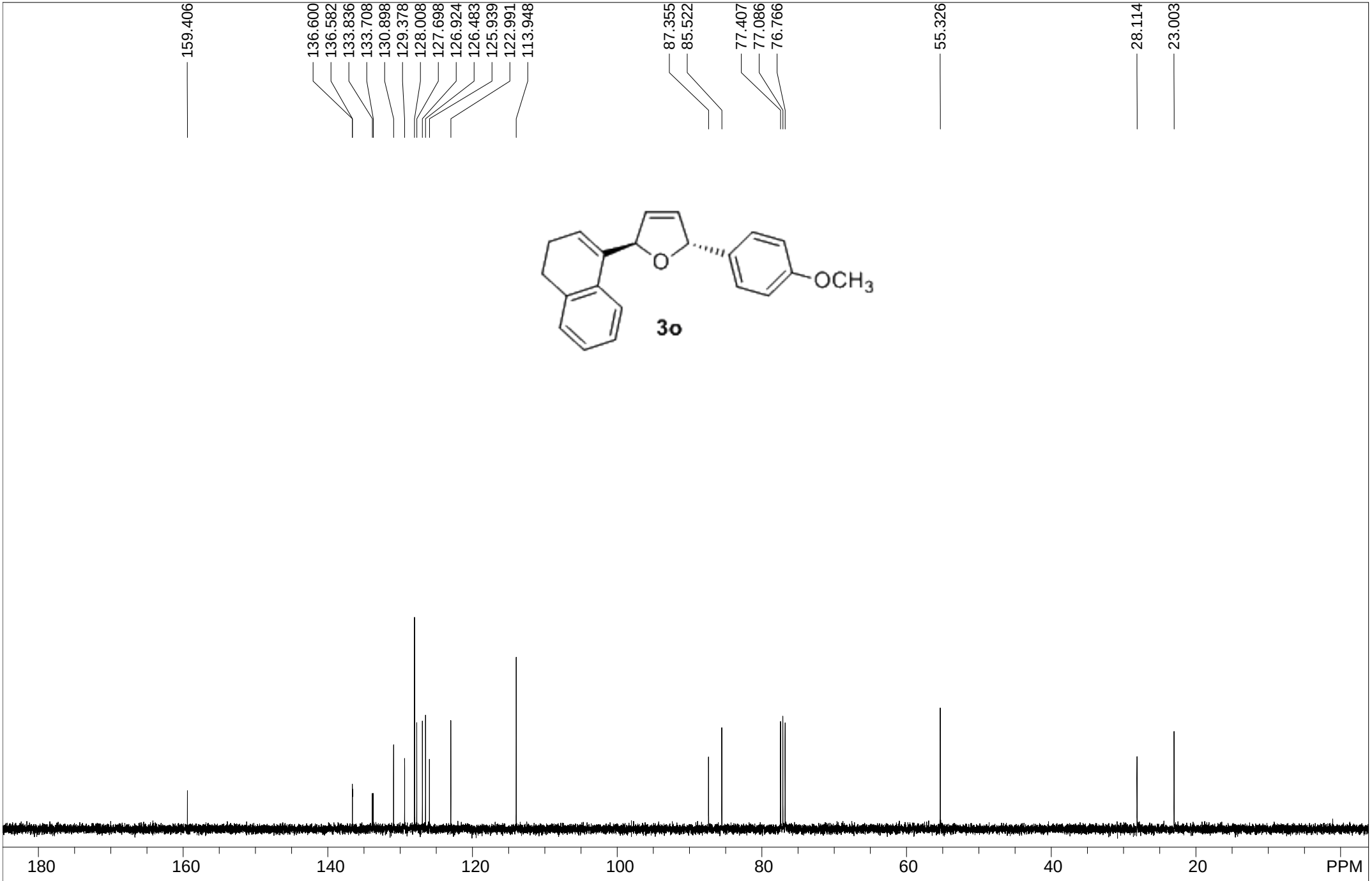
USER: -- DATE: Oct 11 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2780.9		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-98-1-h.fid



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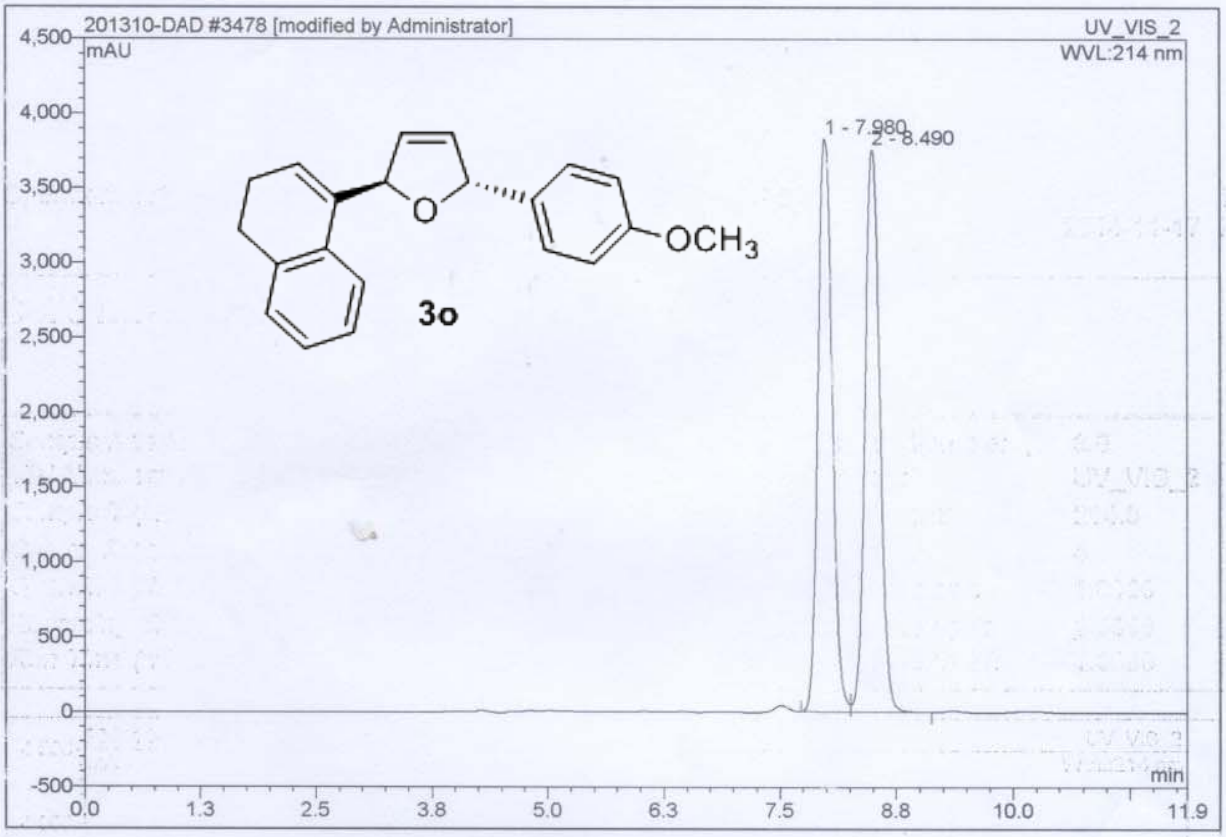
USER: -- DATE: Oct 11 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 32	LB: 0.0		Nuts - $lh-2-98-1-c.fid

3478 LH-3+- PC-4 91 214 0.7

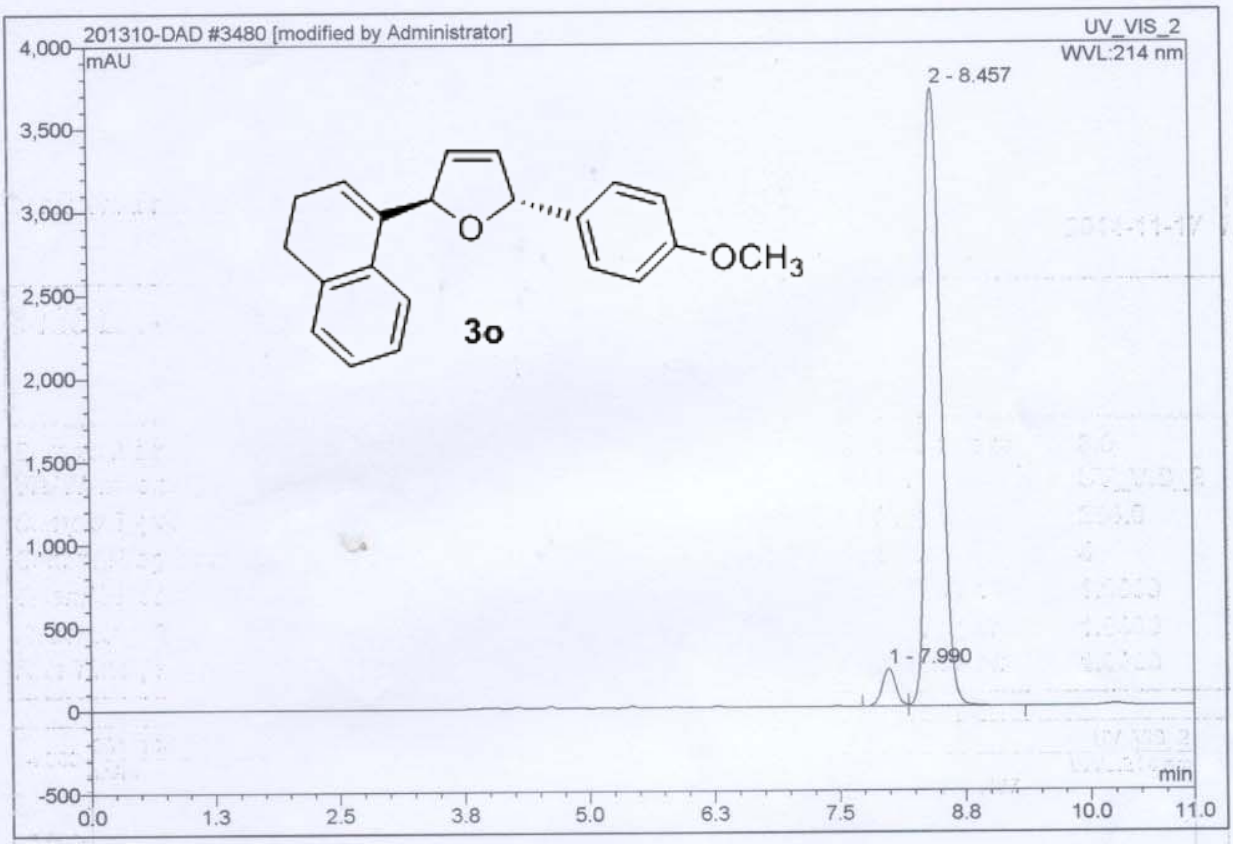
Sample Name:	**LH-3+- PC-4 91 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**GA2**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-17 17:48**	*Sample Weight:*	**1.0000**
Run Time (min):	**11.86**	*Sample Amount:*	**1.0000**



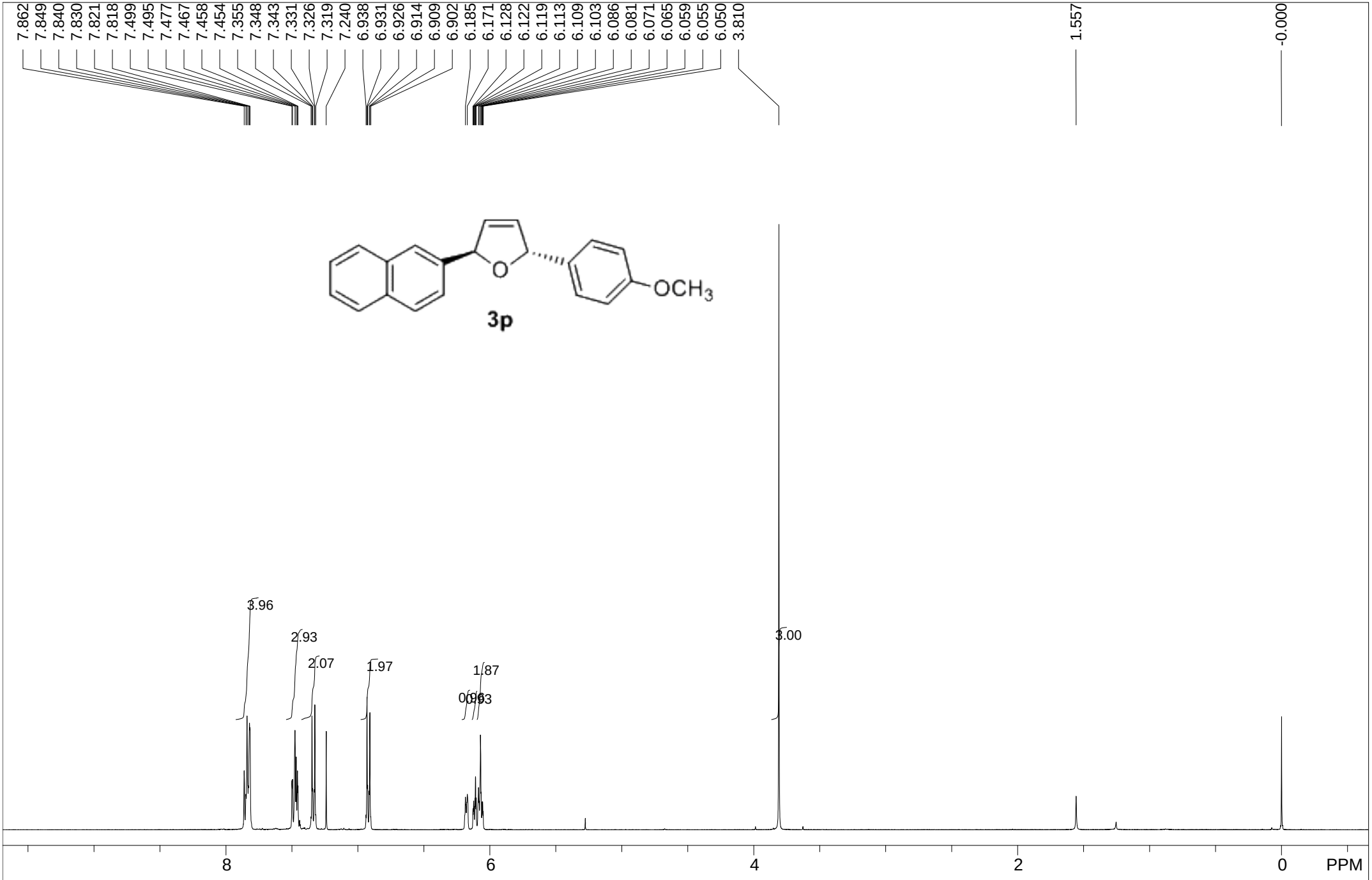
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	7.98	n.a.	3831.153	688.216	49.78	n.a.	BM
2	8.49	n.a.	3760.404	694.250	50.22	n.a.	MB
Total:			7591.557	1382.465	100.00	0.000	

3480 LH-3-61-2 PC-4 91 214 0.7

Sample Name:	**LH-3-61-2 PC-4 91 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**GD2**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-17 19:14**	*Sample Weight:*	**1.0000**
Run Time (min):	**11.02**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	7.99	n.a.	230.520	36.557	4.94	n.a.	BM *
2	8.46	n.a.	3720.884	703.205	95.06	n.a.	MB*
Total:			3951.404	739.762	100.00	0.000	



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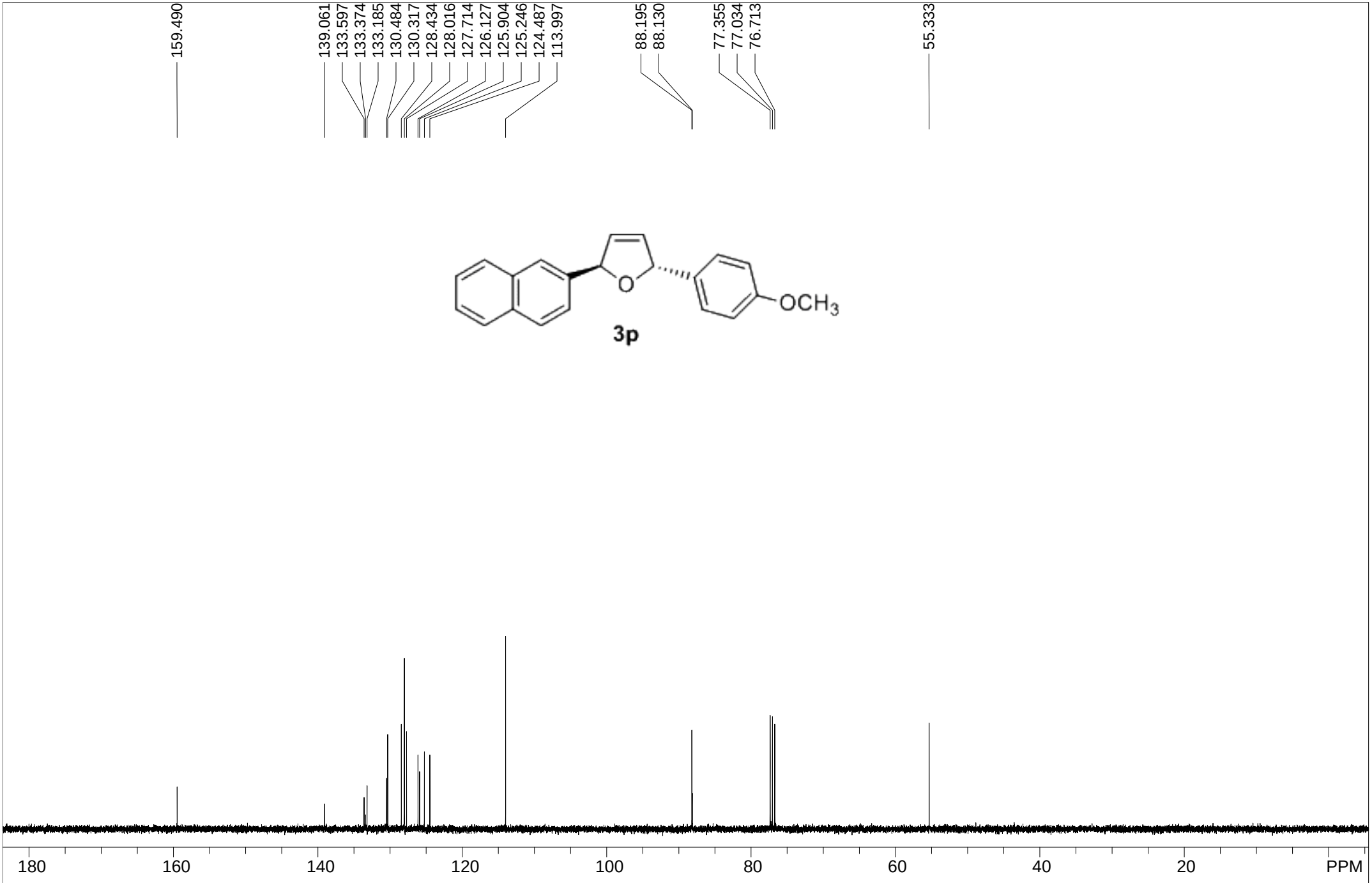
USER: -- DATE: Oct 14 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2790.6		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-2-99-1-h.fid



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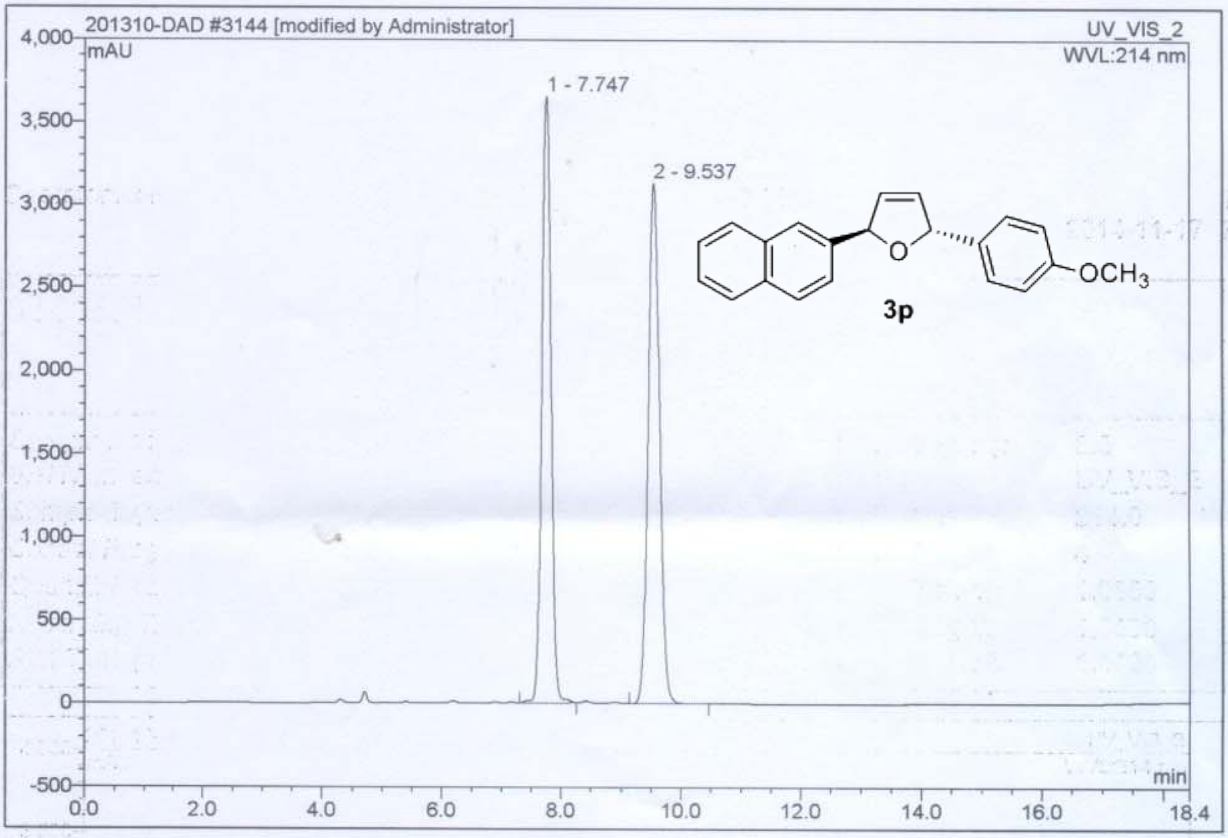
USER: -- DATE: Oct 14 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 120	LB: 0.0		Nuts - $lh-2-99-1-c.fid

3144 LH-2-99-1-+- PC-4 64 214 0.7

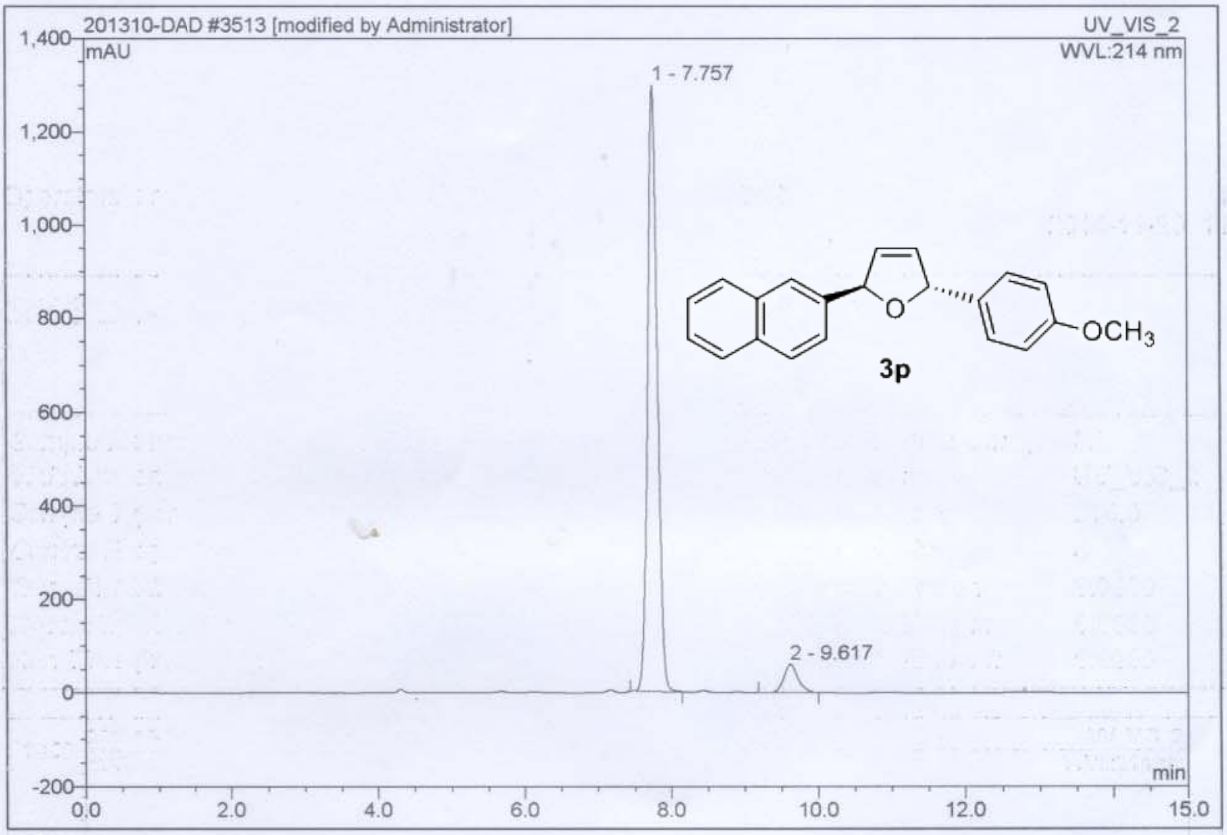
Sample Name:	**LH-2-99-1-+- PC-4 64 214 0.7**	*Injection Volume:*	**8.0**
Vial Number:	**GB7**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-10-15 10:26**	*Sample Weight:*	**1.0000**
Run Time (min):	**18.43**	*Sample Amount:*	**1.0000**



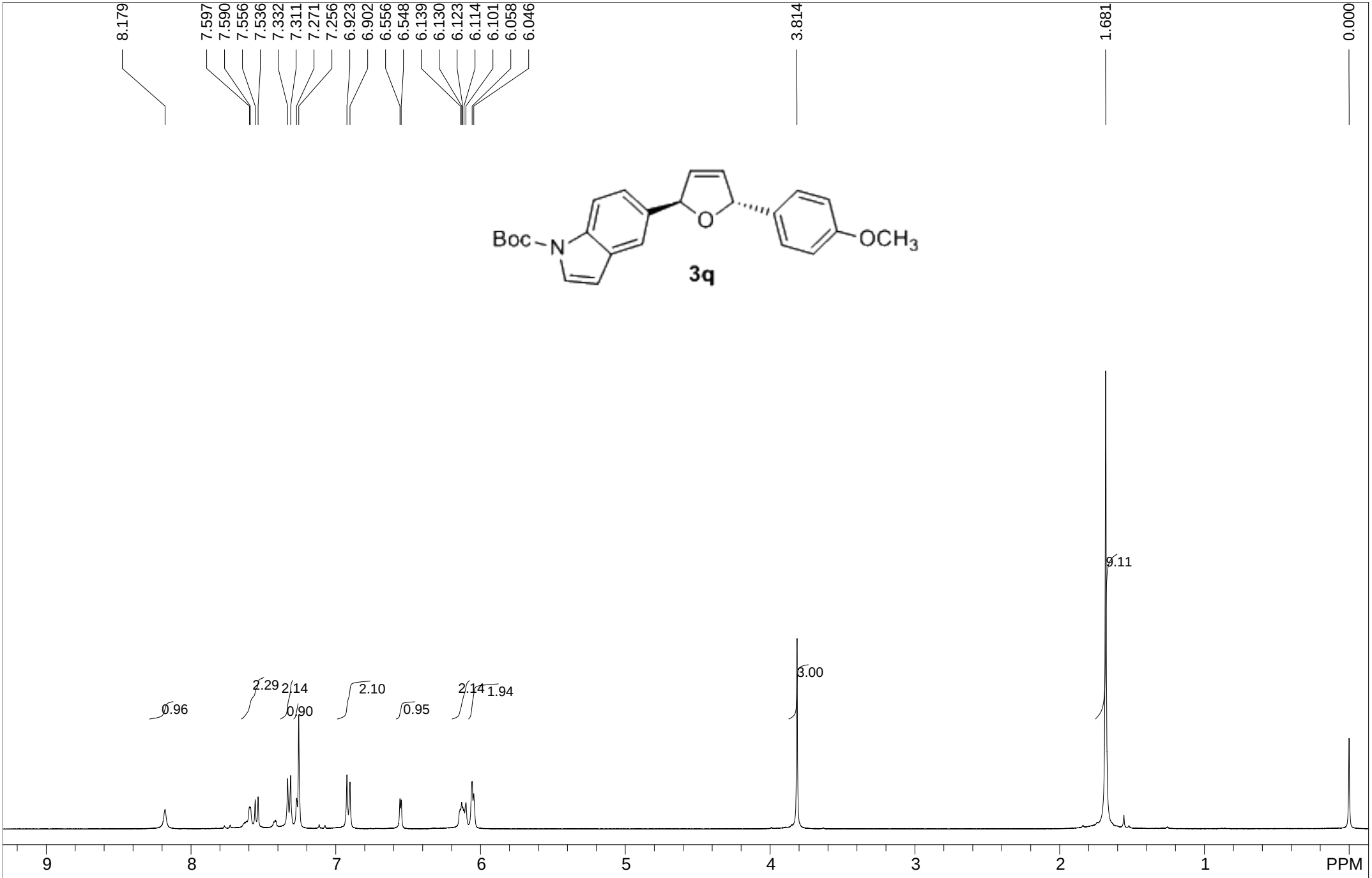
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	7.75	n.a.	3656.922	661.539	48.56	n.a.	BMB*
2	9.54	n.a.	3140.391	700.832	51.44	n.a.	BMB
Total:			6797.313	1362.371	100.00	0.000	

3513 LH-3-74-2 PC-4 982 214 0.7

Sample Name:	**LH-3-74-2 PC-4 982 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**RC6**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-19 22:34**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	7.76	n.a.	1296.012	199.610	93.57	n.a.	BMB*
2	9.62	n.a.	60.712	13.713	6.43	n.a.	BMB*
Total:			1356.725	213.324	100.00	0.000	



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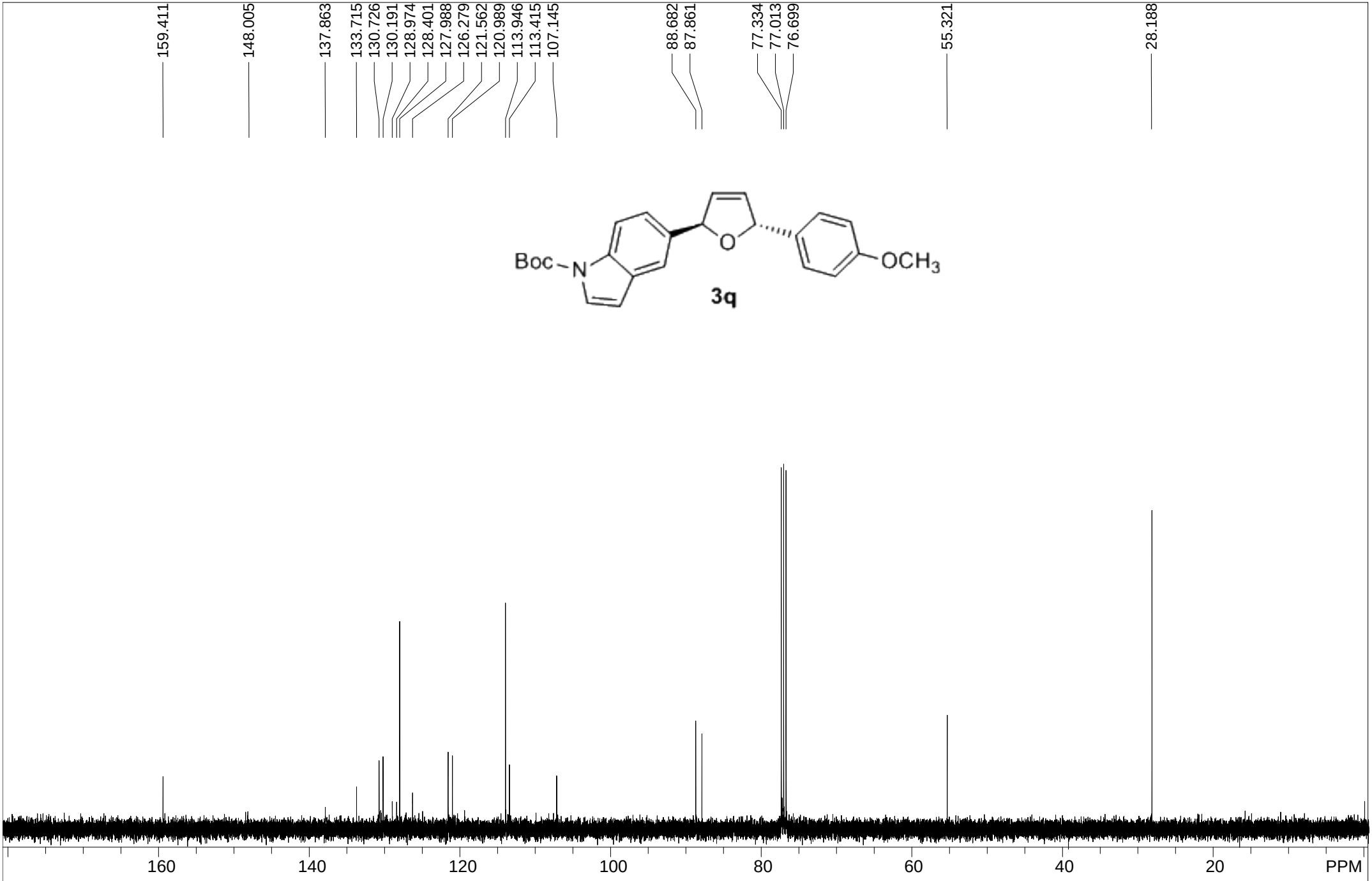
F1: 400.031	F2: 100.597	SW1: 6510		OF1: 2405.7		PTS1d: 32768
EX: s2pul		PW: 10.6 usec	PD: 1.0 sec	NA: 8	LB: 0.0	Nuts - $lh-3-93-01-h.fid



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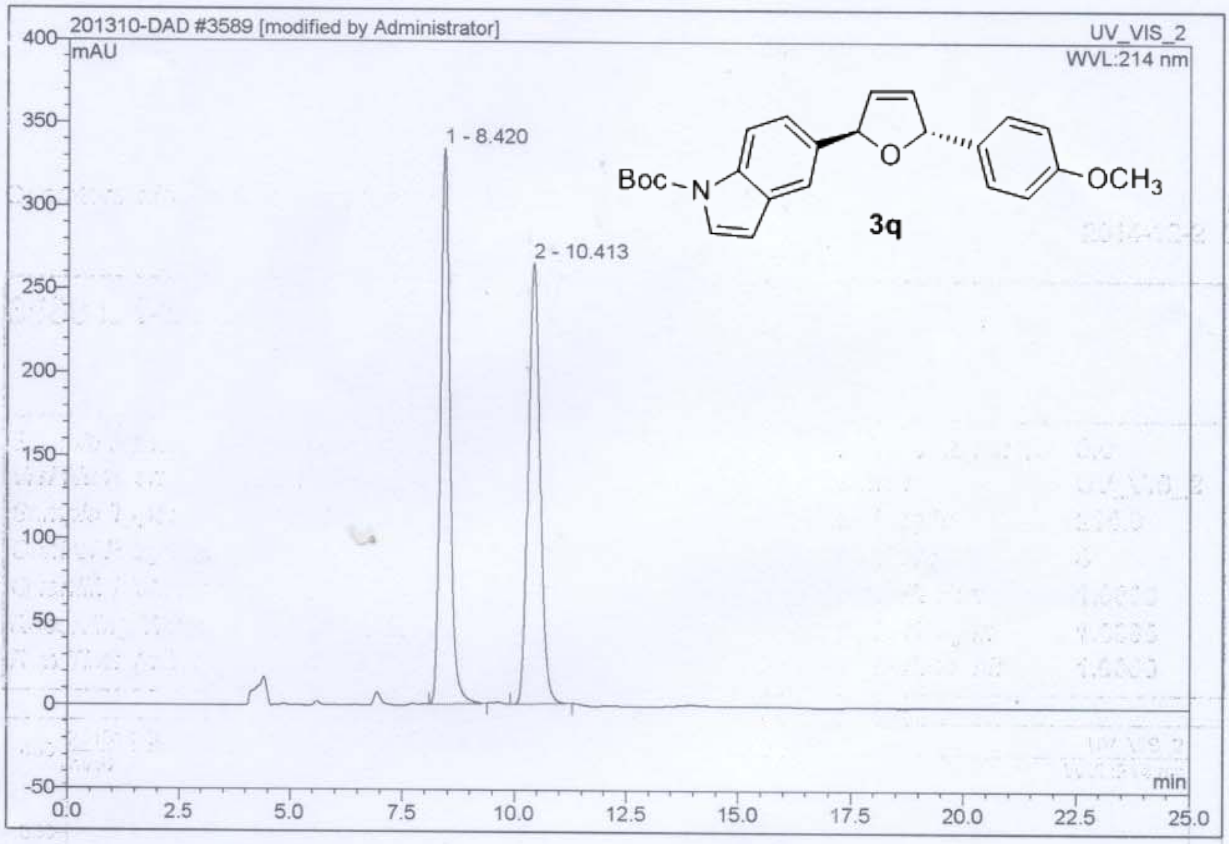
USER: -- DATE: Dec 1 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 65536	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 200	LB: 0.0		Nuts - $lh-3-93-01-c.fid

3589 LH-3-94-2+- OD-H 82 214 0.7

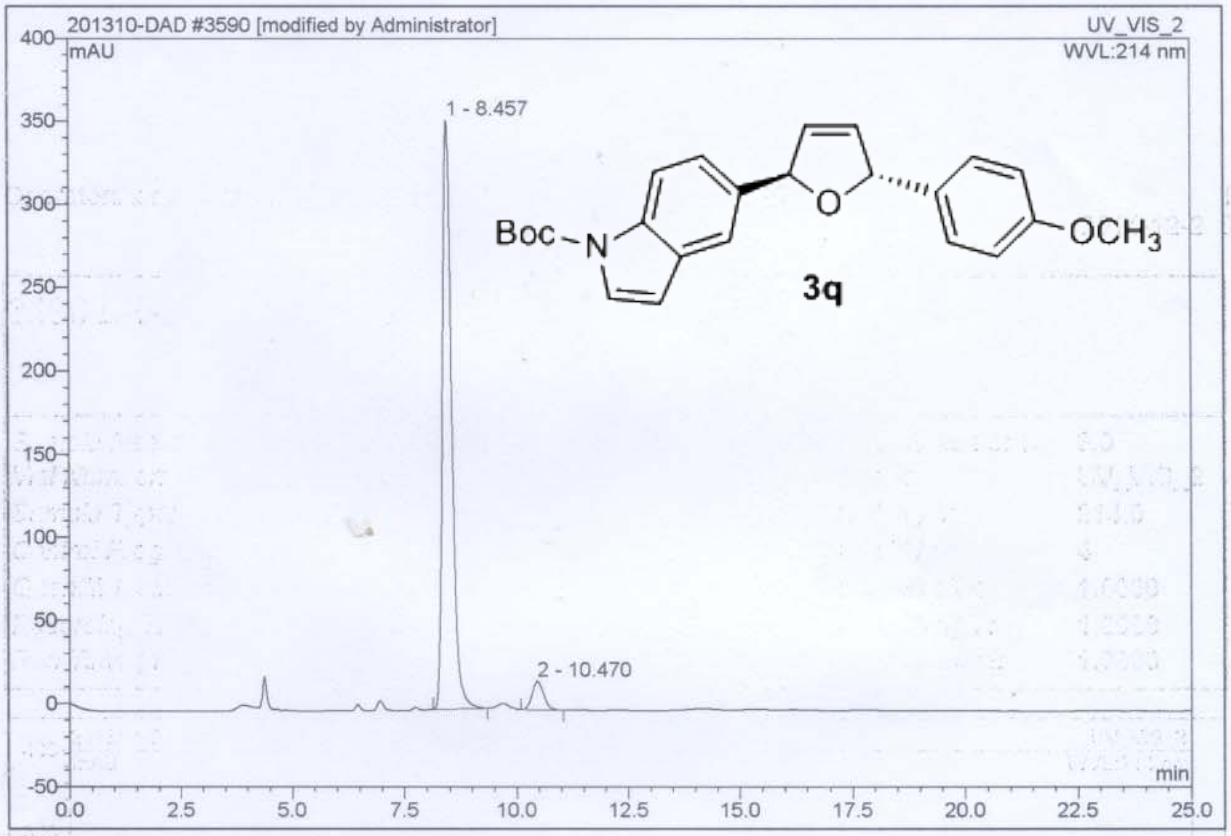
Sample Name:	**LH-3-94-2+- OD-H 82 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**BE1**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad4**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-12-1 22:40**	*Sample Weight:*	**1.0000**
Run Time (min):	**25.00**	*Sample Amount:*	**1.0000**



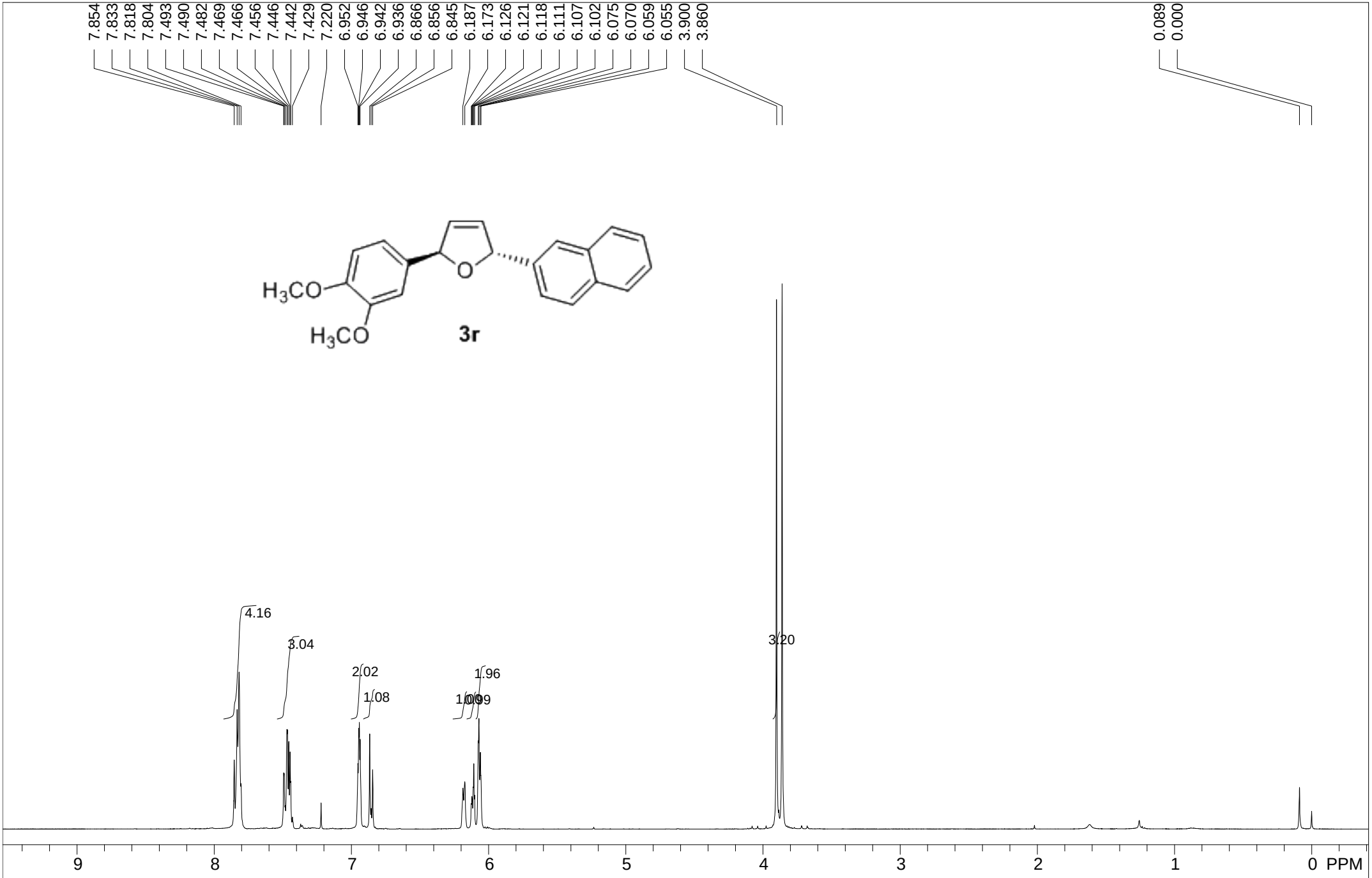
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	8.42	n.a.	334.161	82.530	50.02	n.a.	BMB*
2	10.41	n.a.	265.038	82.464	49.98	n.a.	BMB*
Total:			599.199	164.994	100.00	0.000	

3590 LH-3-94-2 OD-H 82 214 0.7

Sample Name:	**LH-3-94-2 OD-H 82 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**BD1**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad4**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-12-1 23:06**	*Sample Weight:*	**1.0000**
Run Time (min):	**25.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	8.46	n.a.	354.045	84.441	94.20	n.a.	BMB*
2	10.47	n.a.	17.243	5.202	5.80	n.a.	BMB
Total:			371.288	89.642	100.00	0.000	



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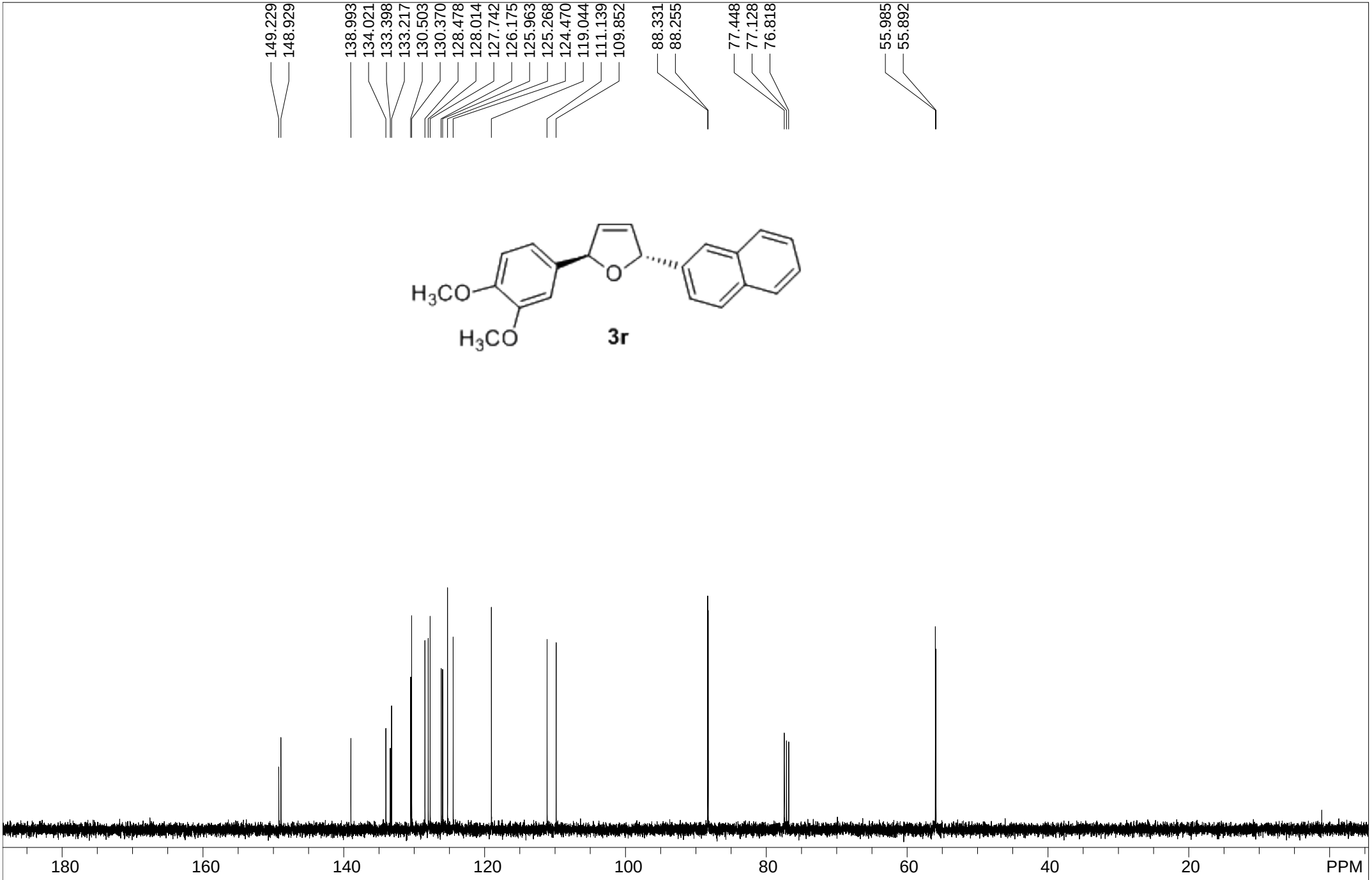
USER: -- DATE: Oct 9 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2783.1		PTS1d: 32768
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 12	LB: 0.0	Nuts - $lh-2-95-1-h-400M.fid



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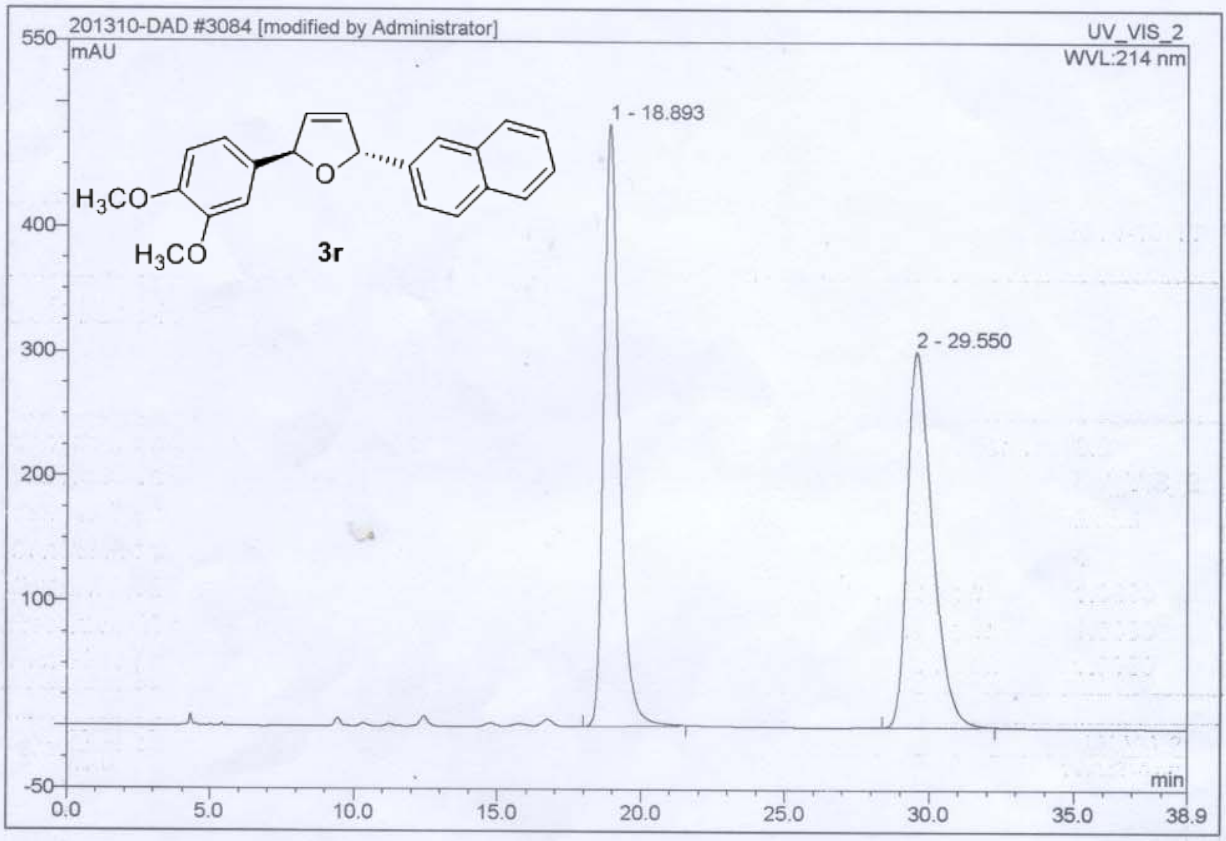
USER: -- DATE: Oct 9 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.1		PTS1d: 32768
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 56	LB: 0.0	Nuts - $lh-2-95-1-c-400M.fid

3084 LH-2-95-1 PC-4 64 214 0.7

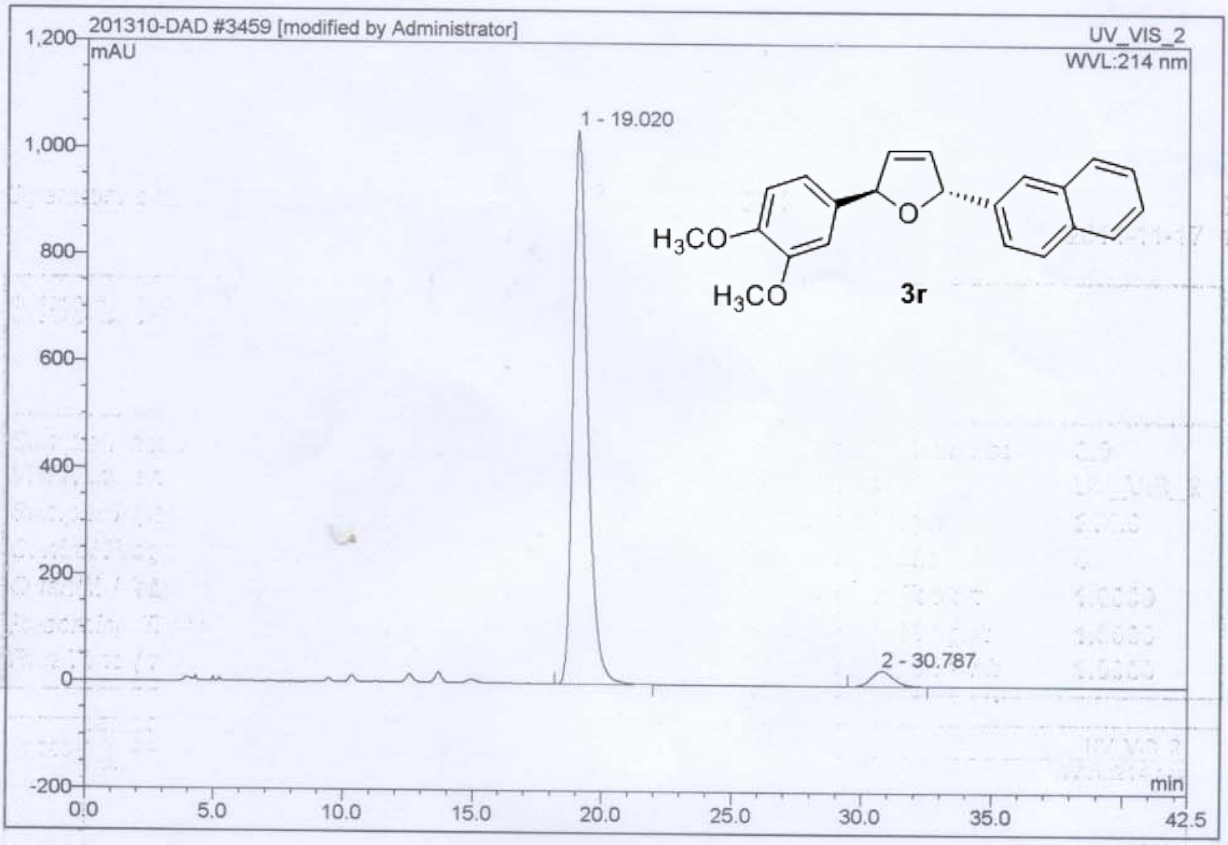
Sample Name:	**LH-2-95-1 PC-4 64 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**BD6**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-10-10 12:38**	*Sample Weight:*	**1.0000**
Run Time (min):	**38.88**	*Sample Amount:*	**1.0000**



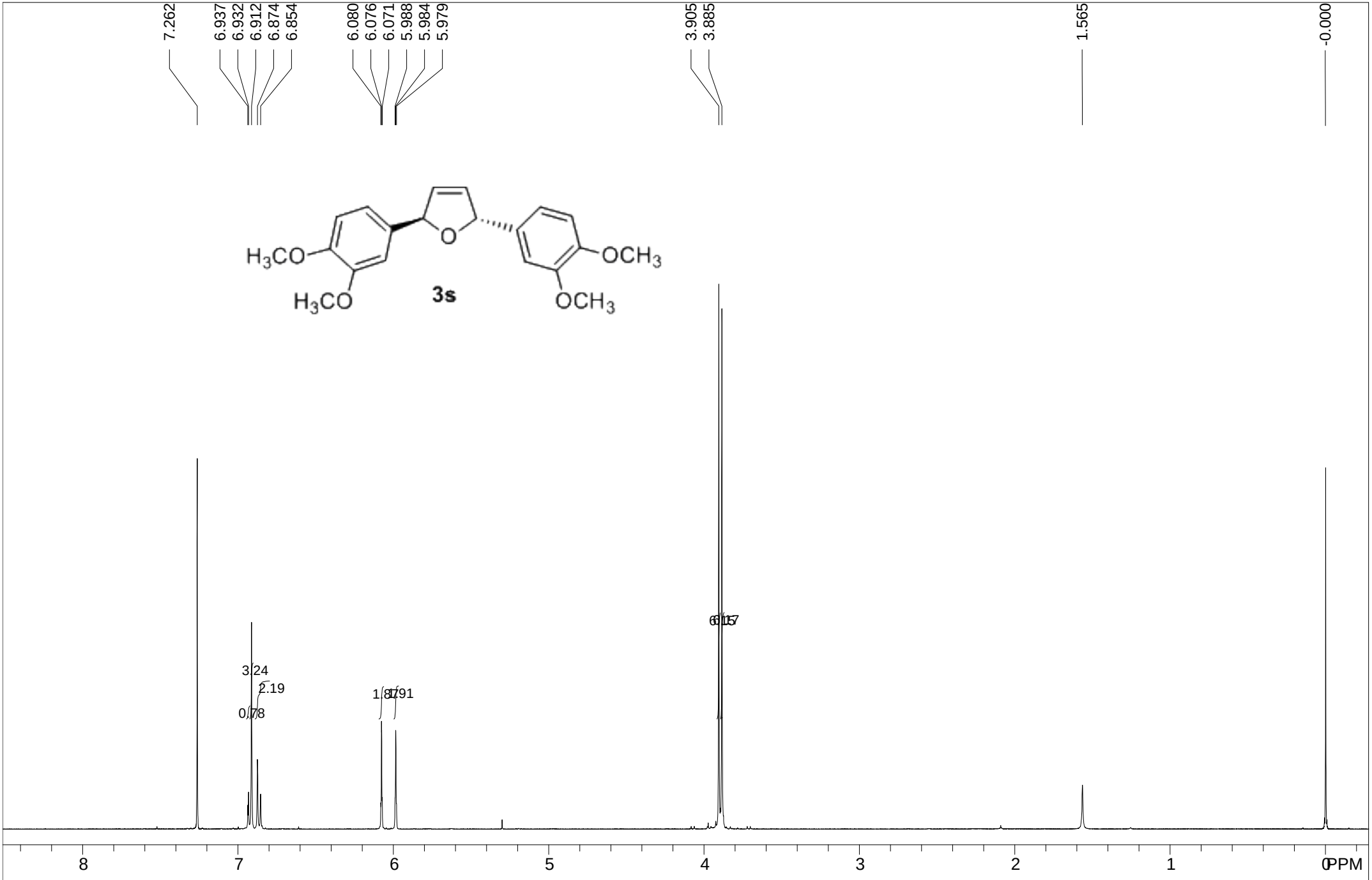
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	18.89	n.a.	482.358	305.767	50.09	n.a.	BMB
2	29.55	n.a.	301.102	304.719	49.91	n.a.	BMB
Total:			783.460	610.486	100.00	0.000	

3459 LH-3-65-2 PC-4 64 214 0.7

Sample Name:	**LH-3-65-2 PC-4 64 214 0.7**	*Injection Volume:*	**3.0**
Vial Number:	**GB2**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad4**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-14 17:35**	*Sample Weight:*	**1.0000**
Run Time (min):	**42.47**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	19.02	n.a.	1037.317	684.515	95.95	n.a.	BMB
2	30.79	n.a.	28.889	28.907	4.05	n.a.	BMB
Total:			1066.206	713.422	100.00	0.000	



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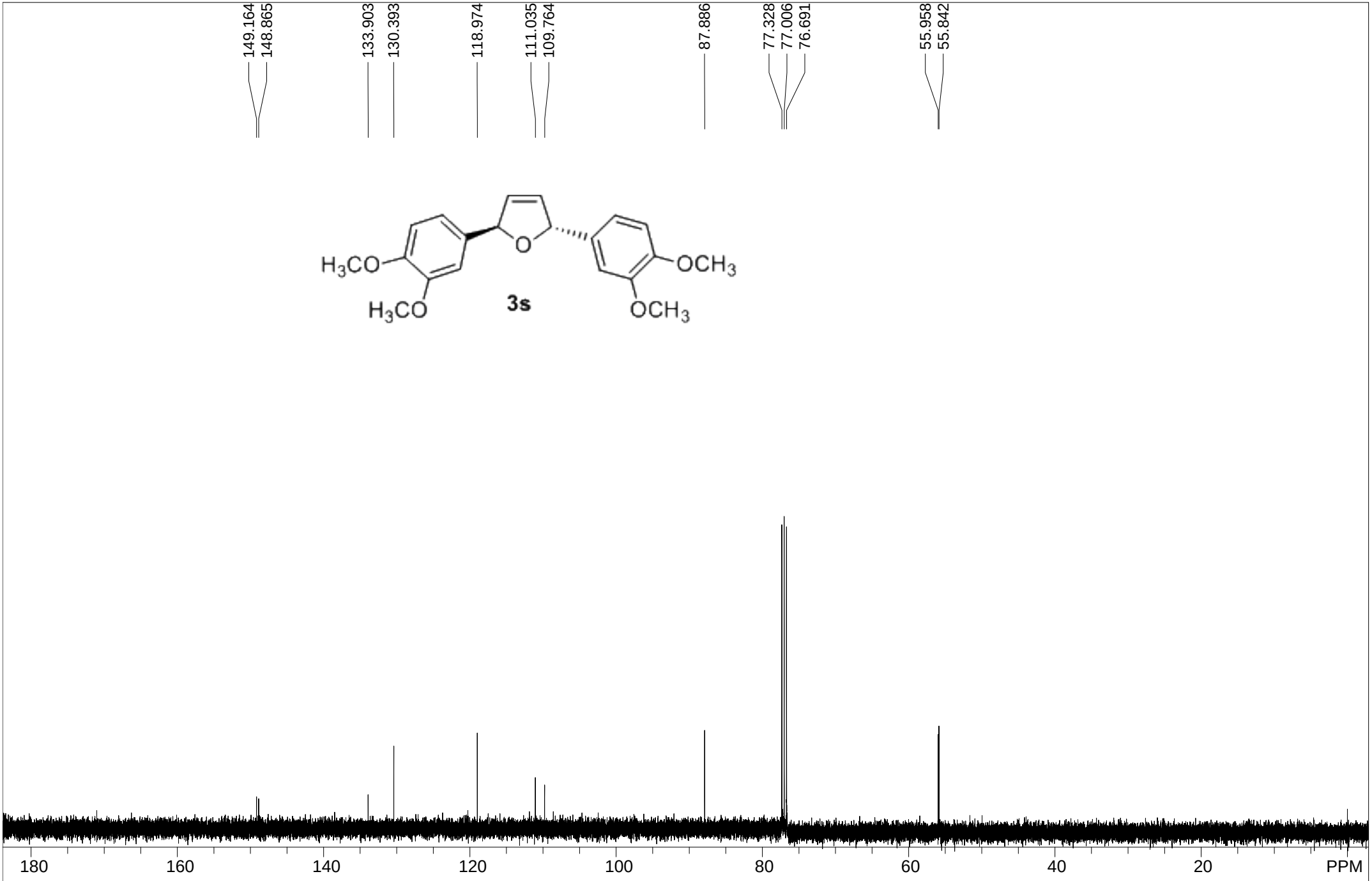
USER: -- DATE: Oct 31 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2799.4		PTS1d: 32768	
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 8	LB: 0.0		Nuts - $lh-3-38-1-h.fid



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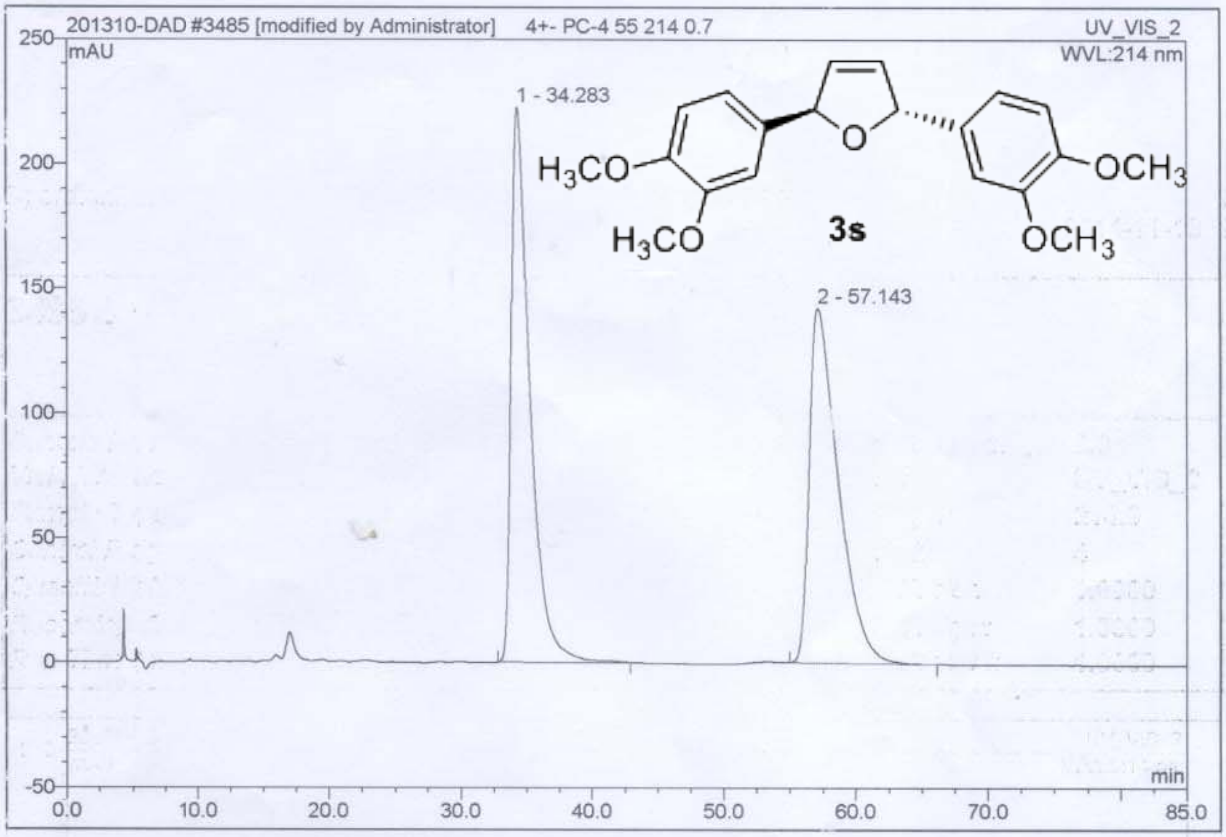
USER: -- DATE: Oct 31 2014

F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11061.1		PTS1d: 65536	
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 96	LB: 0.0		Nuts - $lh-3-38-1-c.fid

(±)

3485 4+- PC-4 55 214 0.7

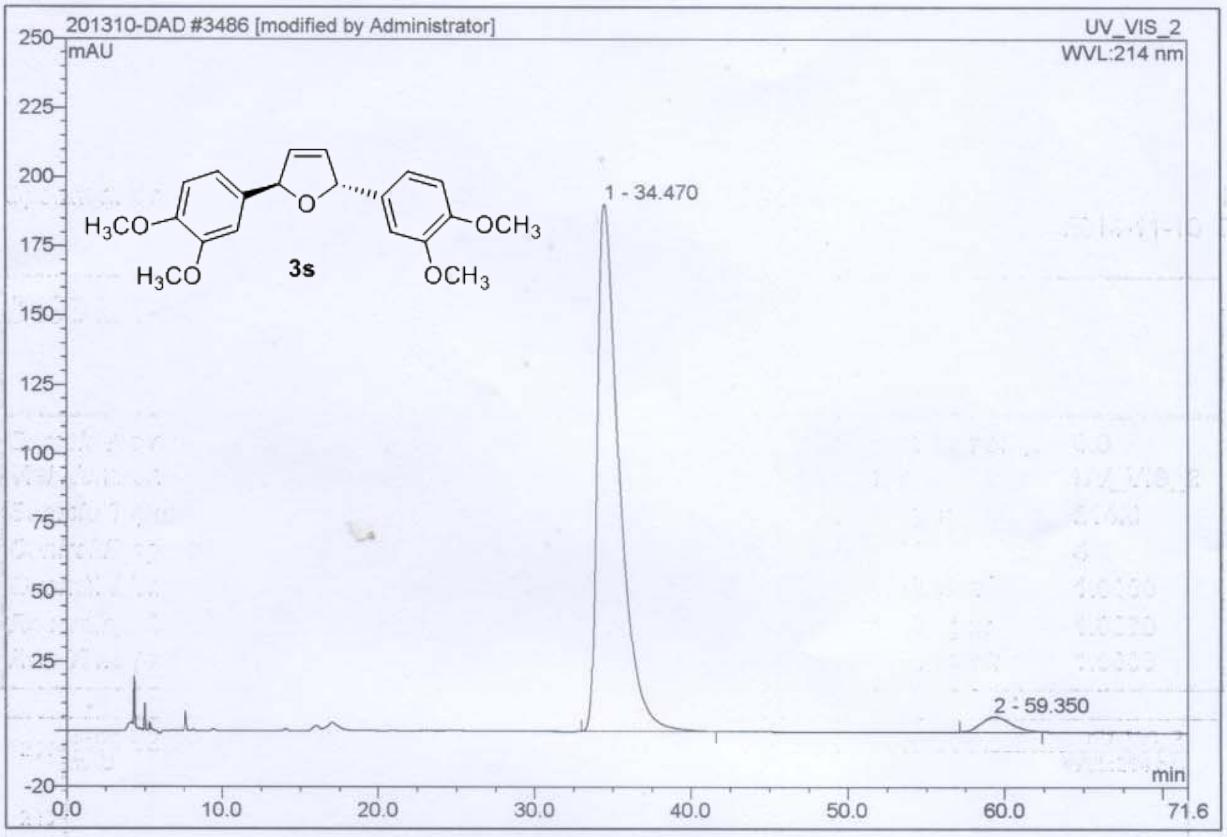
Sample Name:	**4+- PC-4 55 214 0.7**	*Injection Volume:*	**6.0**
Vial Number:	**GB1**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-18 11:00**	*Sample Weight:*	**1.0000**
Run Time (min):	**85.00**	*Sample Amount:*	**1.0000**



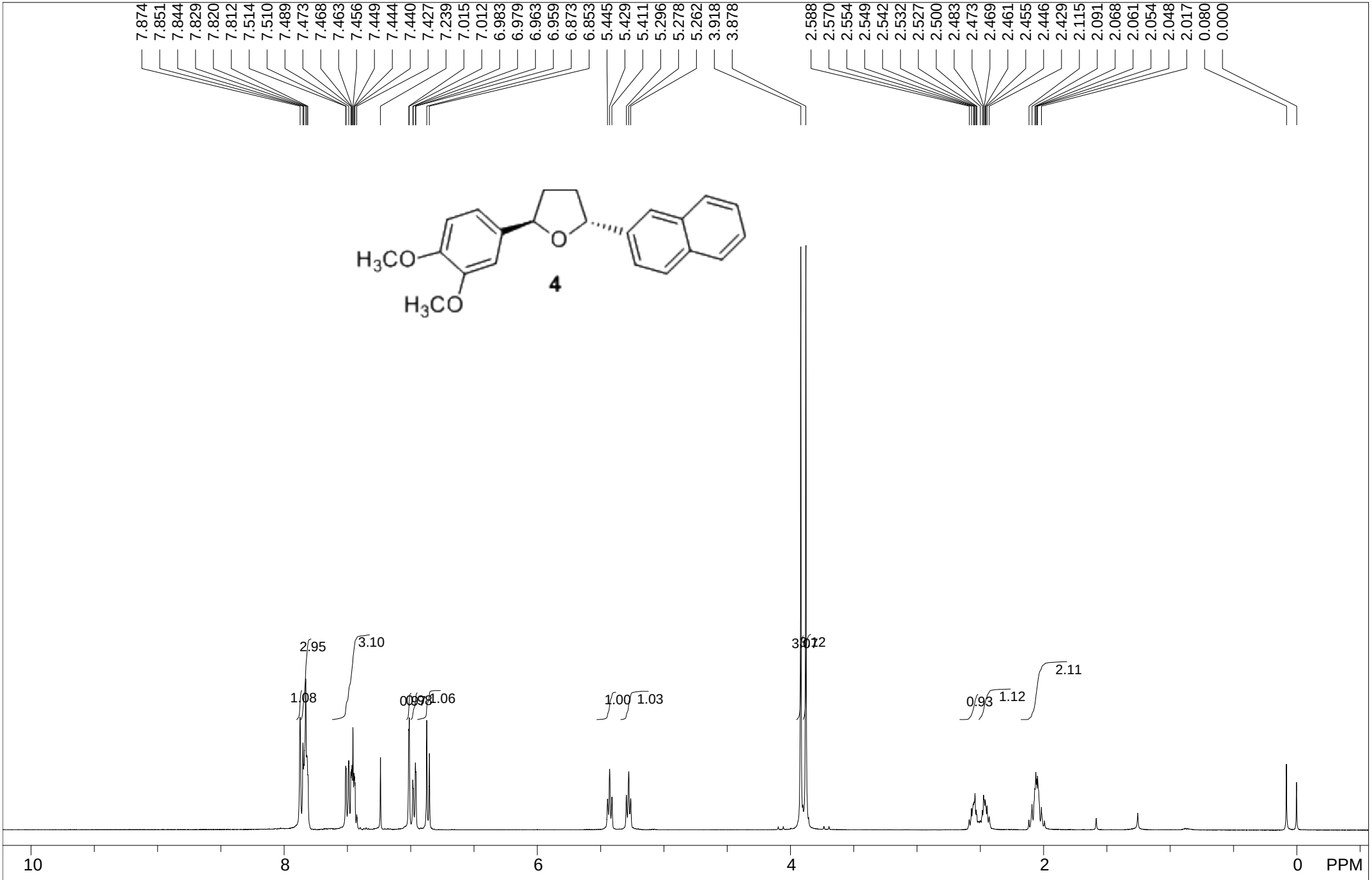
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	34.28	n.a.	222.878	367.872	50.27	n.a.	BMB*
2	57.14	n.a.	142.328	363.982	49.73	n.a.	BMB*
Total:			365.207	731.854	100.00	0.000	

3486 LH-3-64-2 PC-4 55 214 0.7

Sample Name:	**LH-3-64-2 PC-4 55 214 0.7**	*Injection Volume:*	**6.0**
Vial Number:	**GC1**	*Channel:*	**UV_VIS_2**
Sample Type:	**unknown**	*Wavelength:*	**214.0**
Control Program:	**test-dad2**	*Bandwidth:*	**4**
Quantif. Method:	**WXL**	*Dilution Factor:*	**1.0000**
Recording Time:	**2014-11-18 12:26**	*Sample Weight:*	**1.0000**
Run Time (min):	**71.56**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	34.47	n.a.	190.396	309.223	96.17	n.a.	BMB*
2	59.35	n.a.	5.511	12.311	3.83	n.a.	BMB*
Total:			195.908	321.534	100.00	0.000	



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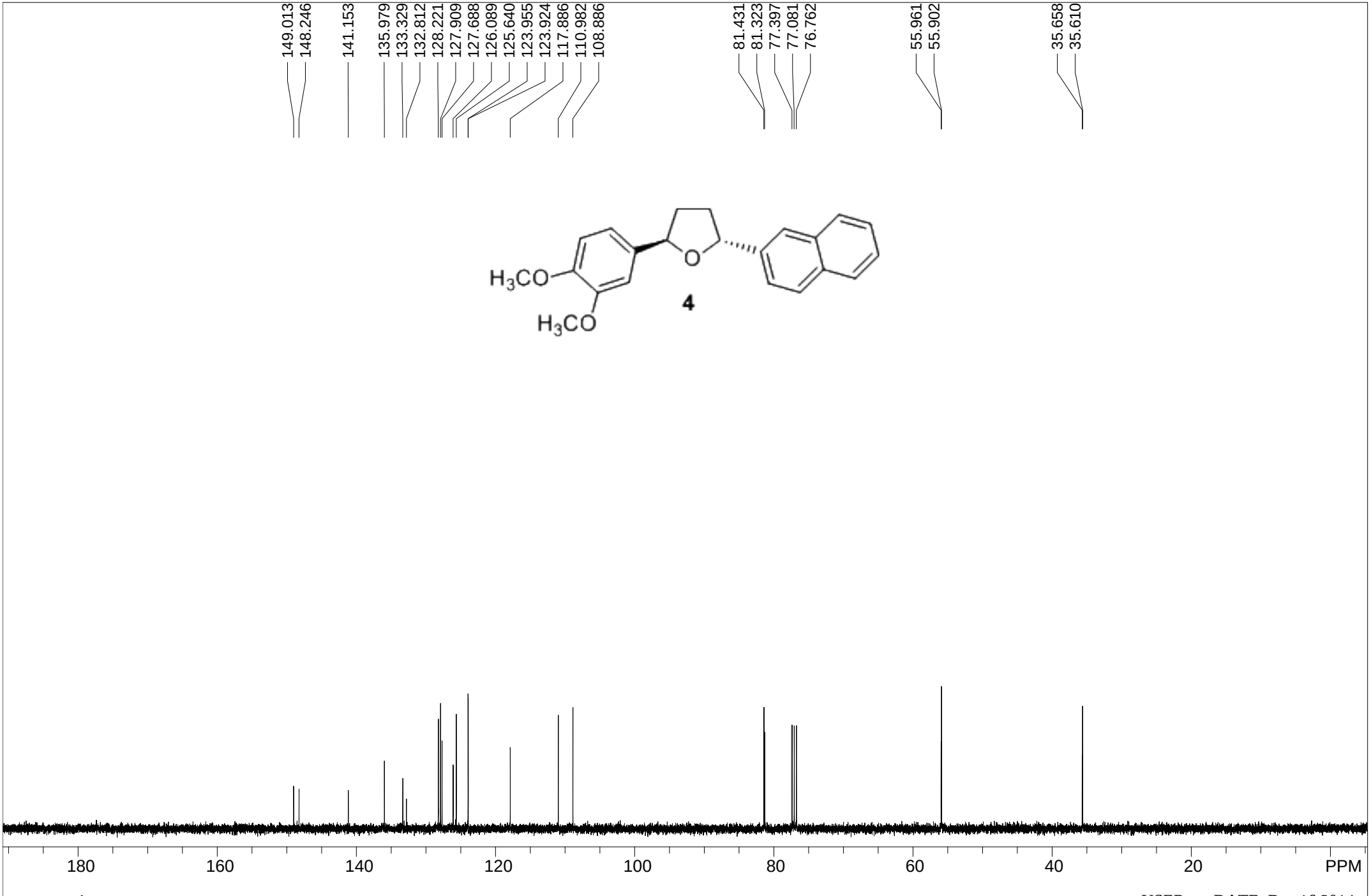
USER: -- DATE: Dec 16 2014

F1: 399.723	F2: 100.519	SW1: 7184		OF1: 2790.3		PTS1d: 32768
EX: s2pul		PW: 4.4 usec	PD: 1.0 sec	NA: 12	LB: 0.0	Nuts - $lh-4-13-1-h-400m.fid



new experiment USER: -- DATE: Dec 16 2014

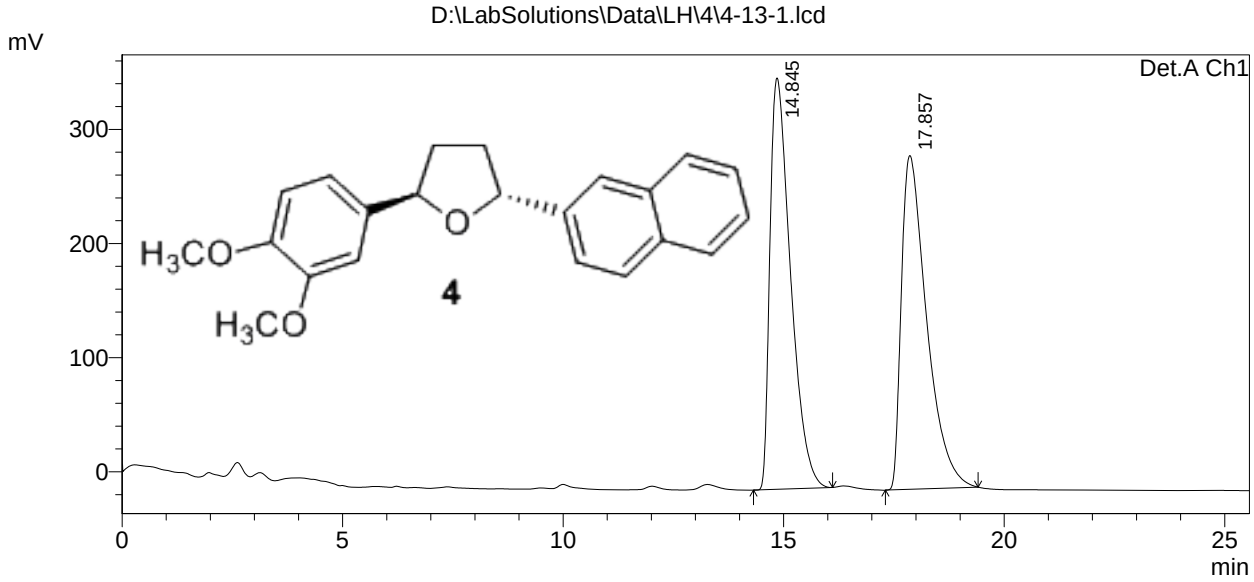
F1: 100.521	F2: 399.722	SW1: 25000		OF1: 11056.0		PTS1d: 32768
EX: s2pul		PW: 4.9 usec	PD: 1.0 sec	NA: 80	LB: 0.0	Nuts - $lh-4-13-1-c-400m.fid

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\4\4-13-1.lcd

Acquired by	: Admin
Sample Name	: 4-13-1
Sample ID	: OD-H,70/30,0.7,214
Vail #	: 0
Injection Volume	: 10 uL
Data File Name	: 4-13-1.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-12-15 16:02:35
Data Processed	: 2013-12-15 16:28:09

<Chromatogram>



1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	14.845	11699861	360502	50.090	55.214
2	17.857	11657943	292417	49.910	44.786
Total		23357804	652919	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

D:\LabSolutions\Data\LH\4\4-10-1.lcd

Acquired by	: Admin
Sample Name	: 4-10-1
Sample ID	: OD-H,70/30,0.7,214
Vail #	: 0
Injection Volume	: 800 uL
Data File Name	: 4-10-1.lcd
Method File Name	: 1234.lcm
Batch File Name	:
Report File Name	: Default.lcr
Data Acquired	: 2013-12-15 16:28:46
Data Processed	: 2013-12-15 16:54:09

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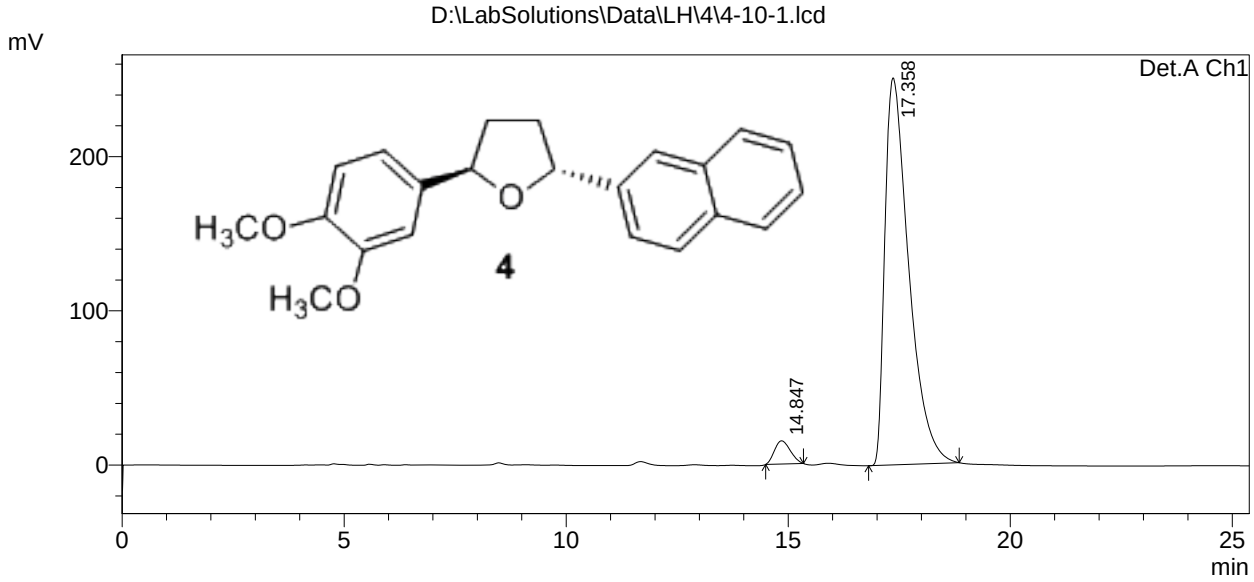

1 Det.A Ch1/214nm

PeakTable

Detector A Ch1 214nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	14.847	373577	15064	3.827	5.661
2	17.358	9387631	251038	96.173	94.339
Total		9761209	266102	100.000	100.000