Supporting Information

Chiral Phosphoric Acid Catalyzed Asymmetric Addition of Naphthols to *para*-Quinone Methides

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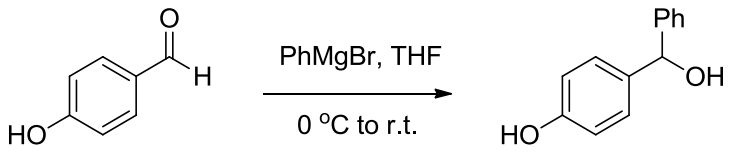
I. General Information

All air moisture sensitive reactions were conducted in oven-dried glassware under nitrogen atmosphere using dry solvents. Flash column chromatography was performed over silica gel (230-400 mesh) purchased from Qindao Puke Co., China. Anhydrous diethyl ether, dichloromethane, toluene, tetrahydrofuran and dimethylformamide were purified by Innovative® solvent purification system. Chloroform, cyclopentyl methyl ether (CPME) and methyl *tert*-butyl ether (MTBE) were purchased from Sigma-Aldrich and used as received. ^{1}H and ^{13}C NMR were collected on a Bruker AV 400 MHz NMR spectrometer using residue solvent peaks as an internal standard (^{1}H NMR: $CDCl_3$ at 7.26 ppm, acetone-d_6 at 2.06 ppm. ^{13}C NMR: $CDCl_3$ at 77.2 ppm, acetone-d_6 at 29.9 ppm).

II. Preparation of Substrates



1a

4-(Hydroxy(phenyl)methyl)phenol (1a). At 0 °C, to a solution of 4-hydroxybenzaldehyde (3.66 g, 30 mmol) in anhydrous THF (150 mL). was added PhMgBr (2.9 M solution in 2-methyltetrahydrofuran, 24 mL, 69.6 mmol) dropwise. The reaction mixture was then warmed to room temperature and stirred overnight. The reaction was quenched with a saturated aqueous NH_4Cl solution (50 mL). The aqueous layer was extracted with EtOAc (3×50 mL). The combined organic layers were washed with brine (150 mL), dried over anhydrous Na_2SO_4, and concentrated. The crude product was purified by recrystallization using EtOAc and hexanes to afford pure **1a** as white solid (5.04 g, 84% yield).

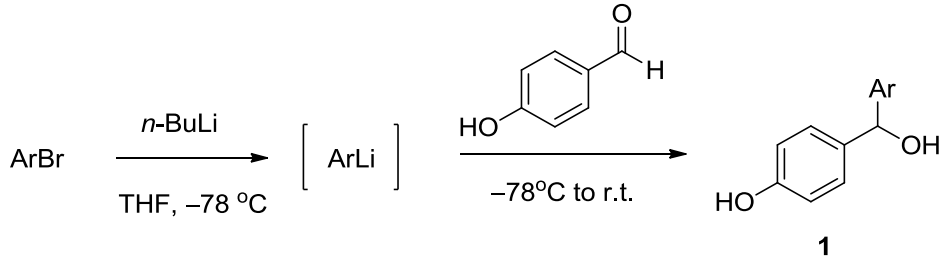
^{1}H NMR (400 MHz, acetone-d_6) δ 8.28 (br s, 1H), 7.41 (d, J = 7.6 Hz, 2H), 7.29 (t, J = 7.6 Hz, 2H), 7.24 – 7.18 (m, 3H), 6.78 (d, J = 8.8 Hz, 2H), 5.75 (s, 1H), 4.73 (br s, 1H).

^{13}C NMR (100 MHz, acetone-d_6) δ 157.3, 146.8, 137.5, 128.9, 128.7, 127.5, 127.2, 115.7, 75.9.

Compound **1a** is a known compound. Our characterization data match the literature data.[1]

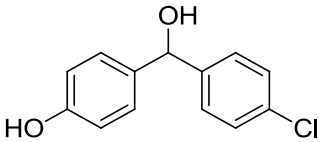
1. L. Diao and P. Wan, *Can. J. Chem.*, 2008, **86**, 105.

General Procedure A.



1

At −78 °C, to a solution of aryl bromide (11.5 mmol) in anhydrous THF (100 mL) was added *n*-BuLi (2.4 M solution in *n*-hexane, 5 mL, 12.0 mmol) dropwise. The mixture was allowed to stir at the same temperature for 30 min, then a solution of 4-hydroxybenzaldehyde (0.61 g, 5 mmol) in anhydrous THF (10 mL) was added dropwise. After addition, the reaction mixture was allowed to warm to room temperature and stirred overnight. Upon completion, the reaction was quenched by a saturated aqueous NH_4Cl solution (20 mL). The aqueous layer was extracted with EtOAc (3x30 mL). The combined organic layers were washed by brine (80 mL), dried over anhydrous Na_2SO_4, and concentrated. The crude product was purified by recrystallization using EtOAc and hexanes to afford the pure alcohol **1**.



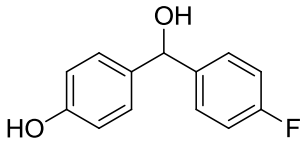
1b

4-((4-Chlorophenyl)(hydroxy)methyl)phenol (1b) was synthesized as a white solid according to the General Procedure A (0.78 g, 66% yield).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.31 (br s, 1H), 7.42 (d, J = 8.4 Hz, 2H), 7.33 (d, J = 8.4 Hz, 2H), 7.22 (d, J = 8.4 Hz, 2H), 6.80 (d, J = 8.4 Hz, 2H), 5.77 – 5.76 (m, 1H), 4.87 – 4.86 (m, 1H).

^{13}C NMR (100 MHz, acetone-d_6) δ 157.5, 145.8, 137.0, 132.7, 128.9, 128.8, 128.7, 115.8, 75.1.

Compound **1b** is a known compound. Our characterization data match the literature data.[2]



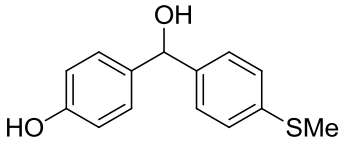
1c

4-((4-Fluorophenyl)(hydroxy)methyl)phenol (1c) was synthesized as a pale yellow solid according to the General Procedure A (0.67 g, 61% yield).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.25 (s, 1H), 7.41 (dd, J = 8.4, 5.6 Hz, 2H), 7.20 (d, J = 8.4 Hz, 2H), 7.07 – 7.03 (m, 2H), 6.77 (d, J = 8.4 Hz, 2H), 5.75 – 5.74 (m, 1H), 4.76 – 4.75 (m, 1H).

^{13}C NMR (100 MHz, acetone-d_6) δ 162.6 (d, $J_{C\text{-}F}$ = 241 Hz), 157.4, 143.1, 137.3, 129.1 (d, $J_{C\text{-}F}$ = 8 Hz), 128.7, 115.8, 115.4 (d, $J_{C\text{-}F}$ = 22 Hz), 75.2.

Compound **1c** is a known compound. Our characterization data match the literature data.[3]



1d

4-(Hydroxy(4-(methylthio)phenyl)methyl)phenol (1d) was synthesized as a white solid according to the General Procedure A (0.52 g, 42% yield).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.24 (br s, 1H), 7.34 (d, J = 7.6 Hz, 2H), 7.23 – 7.21 (m, 4H), 6.78 (d, J = 7.6 Hz, 2H), 5.72 (s, 1H), 4.68 – 4.67 (m, 1H), 2.47 (s, 3H).

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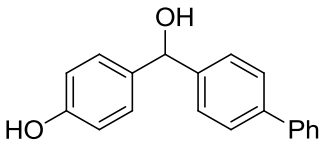
2. M. Kurosu and D. C. Crick, The Composition and Methods of Use of Electron Transport System Inhibitors. PCT/US2007/063122, September 13, 2007.
3. B. Margherita, B. Stefano, C. Silvano, D. Stefano and G. Giovanni, *Eur. J. Org. Chem.*, 2009, 4346.

^{13}C NMR (100 MHz, acetone-d_6) δ 156.4, 143.0, 136.6, 136.5, 127.8, 127.0, 126.1, 114.8, 74.5, 14.8.

IR (neat, cm^{-1}) 3381, 2129, 3046, 1507, 1169, 814.

HRMS (EI+) calculated for $C_{14}H_{14}O_2S$ [M^+]: 246.0715, found: 246.0715.



1e

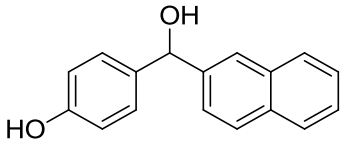
4-([1,1'-Biphenyl]-4-yl(hydroxy)methyl)phenol (1e) was synthesized as a white solid according to the General Procedure A (0.75 g, 54% yield).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.24 (br s, 1H), 7.63 (d, J = 7.6 Hz, 2H), 7.59 (d, J = 8.0 Hz, 2H), 7.49 (d, J = 8.0 Hz, 2H), 7.46 – 7.42 (m, 2H), 7.33 (t, J = 7.6 Hz, 1H), 7.26 (d, J = 8.4 Hz, 2H), 6.79 (d, J = 8.4 Hz, 2H), 5.80 – 5.79 (m, 1H), 4.73 – 4.72 (m, 1H).

^{13}C NMR (100 MHz, acetone-d_6) δ 146.2, 141.8, 140.3, 137.5, 129.8, 128.8, 128.1, 127.8, 127.7, 127.5, 115.8, 110.4, 75.7.

IR (neat, cm^{-1}) 3437, 1637, 1224, 817.

HRMS (EI+) calculated for $C_{19}H_{16}O_2$ [M^+]: 276.1150, found: 276.1149.



1f

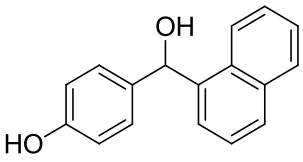
4-(Hydroxy(naphthalen-2-yl)methyl)phenol (1f) was synthesized as a white solid according to the General Procedure A (0.77 g, 62% yield).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.22 (s, 1H), 7.96 (s, 1H), 7.89 – 7.79 (m, 3H), 7.50 – 7.43 (m, 3H), 7.27 (d, J = 8.4 Hz, 2H), 6.78 (d, J = 8.8 Hz, 2H), 5.92 – 5.91 (m, 1H), 4.82 – 4.81 (m, 1H).

^{13}C NMR (100 MHz, acetone-d_6) δ 144.5, 137.3, 134.4, 133.7, 128.9 (2C), 128.8, 128.6, 128.5, 126.9, 126.4, 126.2, 125.3, 115.8, 76.0.

IR (neat, cm^{-1}) 3377, 3143, 3020, 1509, 1229, 821.

HRMS (EI+) calculated for $C_{17}H_{14}O_2$ [M^+]: 250.0994, found: 250.0999.



1g

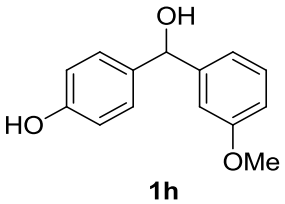
4-(Hydroxy(naphthalen-1-yl)methyl)phenol (1g) was synthesized as a white solid according to the General Procedure A (0.73 g, 58% yield).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.25 (br s, 1H), 8.12 (d, J = 8.4 Hz, 1H), 7.89 (d, J = 8.4 Hz, 1H), 7.81 (t, J = 8.8 Hz, 2H), 7.52 (t, J = 8.0 Hz, 1H), 7.45 – 7.38 (m, 2H), 7.24 (d, J = 8.8 Hz, 2H), 6.75 (d, J = 8.4 Hz, 2H), 6.46 – 6.45 (m, 1H), 4.82 – 4.81 (m, 1H).

^{13}C NMR (100 MHz, acetone-d_6) δ 157.4, 141.7, 136.7, 135.0, 131.7, 129.4, 129.4 (2C), 128.5, 126.4, 126.2, 125.5, 125.0, 115.8, 73.4.

IR (neat, cm^{-1}) 3410, 3024, 1512, 1234, 787.

HRMS (EI+) calculated for $C_{17}H_{14}O_2$ [M^+]: 250.0994, found: 250.0998.



1h

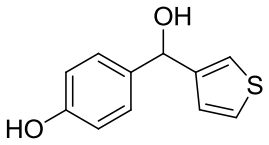
4-(Hydroxy(3-methoxyphenyl)methyl)phenol (1h) was synthesized as a pale yellow solid according to the General Procedure A (0.79 g, 69% yield).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.22 (s, 1H), 7.23 – 7.17 (m, 3H), 7.01 (br s, 1H), 6.94 (d, J = 7.6 Hz, 1H), 6.77 – 6.75 (m, 3H), 5.71 – 5.70 (m, 1H), 4.66 – 4.65 (m, 1H), 3.75 (s, 3H).

^{13}C NMR (100 MHz, acetone-d_6) δ 106.7, 157.4, 148.6, 137.5, 129.9, 128.7, 119.6, 115.7, 112.9, 112.8, 75.8, 55.4.

IR (neat, cm^{-1}) 3361, 2836, 1607, 1255, 834.

HRMS (EI+) calculated for $C_{14}H_{14}O_3$ [M^+]: 230.0943, found: 230.0940.



1i

4-(Hydroxy(thiophen-3-yl)methyl)phenol (1i) was synthesized as a pale yellow solid according to the General Procedure A (0.85 g, 65% yield).

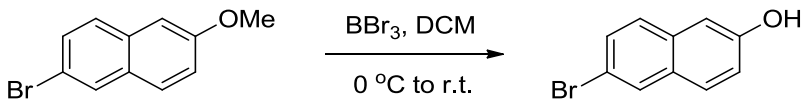
^{1}H NMR (400 MHz, acetone-d_6) δ 8.28 (br s, 1H), 7.33 – 7.32 (m, 1H), 7.24 – 7.22 (m, 3H), 6.99 (d, J = 5.2 Hz, 1H), 6.79 (d, J = 8.0 Hz, 2H), 5.79 – 5.78 (m, 1H), 4.70 – 4.69 (m, 1H).

^{13}C NMR (100 MHz, acetone-d_6) δ 157.4, 148.5, 137.0, 128.7, 127.6, 126.3, 121.2, 115.7, 72.7.

IR (neat, cm^{-1}) 3397, 3170, 1510, 1232, 998.

HRMS (EI+) calculated for $C_{11}H_{10}O_2S$ [M^+]: 206.0402, found: 206.0401.

III. Preparation of the 2-Naphthol Nucleophiles



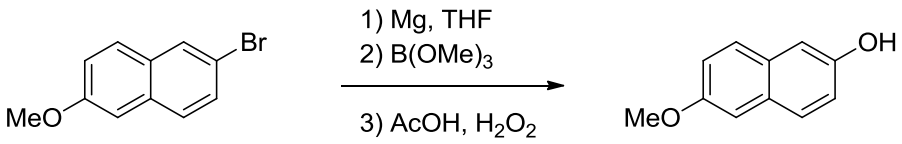
2b

6-Bromonaphthalen-2-ol.[4] At 0 °C, to a solution of 2-bromo-6- methoxynaphthalene (2.00 g, 8.44 mmol) in anhydrous DCM (15 mL) was added boron tribromide (1.0 M solution in dichloromethane, 8.5 mL, 8.5 mmol). The reaction mixture was warmed to room temperature and stirred for 1 h. Upon completion, the mixture was poured into iced water (10 mL). The layers were separated. The aqueous layer was extracted by DCM (2×10 mL). The combined organic layers were dried over anhydrous Na_2SO_4 and concentrated. The residue was purified by silica gel column chromatography (eluent: Et_2O/hexanes = 1:2) to afford pure **2b** as a white solid (1.42 g, 75% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 (s, 1H), 7.65 (d, *J* = 9.6 Hz, 1H), 7.55 – 7.47 (m, 2H), 7.13 – 7.11 (m, 2H), 5.25 (s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 153.8, 133.2, 130.2, 130.0, 129.9, 129.2, 128.2, 119.0, 117.3, 109.8.

Compound **2b** is a known compound. Our characterization data match the literature data.[4]



2c

6-Methoxynaphthalen-2-ol (2c).[5] Under N_2, to a suspension of magnesium turnings (0.36 g, 15.3 mmol) in anhydrous THF (10 mL) was added a solution of

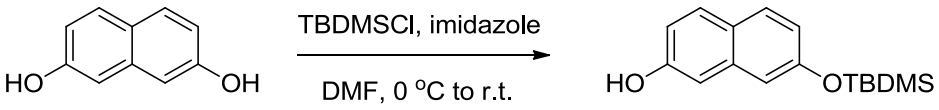
4. S. Grunder, R. Huber, S. Wu, C. Schönenberger, M. Calame and M. Mayor, *Eur. J. Org. Chem.*, 2010, 1434.
5. T. Mori, Y. H. Ko, K. Kim and Y. Inoue, *J. Org. Chem.*, 2006, **71**, 3232.

2-bromo-6-methoxynaphthalene (3.00 g, 12.7 mmol) in anhydrous THF (5 mL) dropwise at room temperature. A small piece of iodine was added to help initiate the reaction. The reaction mixture was heated to reflux for 30 min to complete the Grignard reagent formation. Another dried flask was charged with a solution of trimethylborate (1.53 mL, 14.0 mmol) in anhydrous THF (10 mL) and cooled to 0 °C, to which the above Grignard reagent was added dropwise. The reaction mixture was allowed to stir at 0 °C for 1 h. Upon completion, glacial acetic acid (1.1 mL, 19.1 mmol), hydrogen peroxide (35% aqueous solution, 4.0 mL), and water (1.2 mL) were sequentially added at 0 °C. The reaction mixture was stirred at the same temperature for 30 min. The resulting mixture was then extracted by Et_2O (3×30 mL). The combined organic layers were washed with brine (60 mL), dried over anhydrous Na_2SO_4, and concentrated. The residue was purified by silica gel column chromatography (eluent: Et_2O/hexanes = 1:2) to afford pure **2c** as a white solid (1.13 g, 51% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (d, *J* = 8.8 Hz, 1H), 7.58 (d, *J* = 9.2 Hz, 1H), 7.14 – 7.07 (m, 4H), 4.99 (br s, 1H), 3.90 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 156.3, 152.0, 130.0, 129.9, 128.7, 128.0, 119.5, 118.3, 109.9, 106.2, 55.5.

Compound **2c** is a known compound. Our characterization data match the literature data.[5]



2d

7-((*tert*-Butyldimethylsilyl)oxy)naphthalen-2-ol (2d).[6] At 0 °C, to a solution of naphthalene-2,7-diol (2.50 g, 15.6 mmol) and imidazole (1.06 g, 15.6 mmol) in anhydrous DMF (15 mL) was added *tert*-butyldimethylsilyl chloride (2.12 g, 14.1 mmol) in two portions. The reaction mixture was warmed to room temperature and

stirred for 2.5 h. Upon completion, the reaction was quenched by water (10 mL). The aqueous layer was extracted by Et_2O (3×20 mL). The combined organic layers were washed with brine (40 mL), dried over anhydrous Na_2SO_4, and concentrated. The residue obtained was purified by silica gel column chromatography (eluent: Et_2O/hexanes = 1:4) to afford pure **2d** as a pale yellow solid (1.54 g, 36% yield).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.61 (br s, 1H), 7.69 (d, J = 8.8 Hz, 2H), 7.12 (s, 2H), 7.02 (dd, J = 8.8, 2.0 Hz, 1H), 6.92 (dd, J = 8.8, 1.6 Hz, 1H), 1.04 (s, 9H), 0.27 (s, 6H).

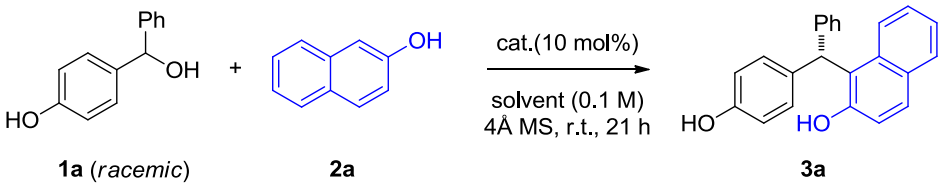
^{13}C NMR (100 MHz, acetone-d_6) δ 156.7, 154.8, 137.4, 130.1, 130.1, 125.3, 119.7, 117.2, 114.3, 108.9, 26.2, 18.9, -4.1.

Compound **2d** is a known compound. Our characterization data match the literature data.[6]

6. Y. Sekiguchi, 1-Naphthyl Alkylpiperidine Derivative, PCT/JP2007/069561, October 5, 2007.

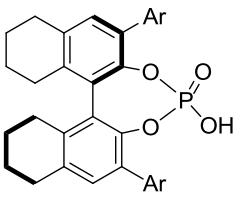
IV. Asymmetric Addition to *p*-Quinone Methides

Table S1. Reaction Condition Optimization[a]

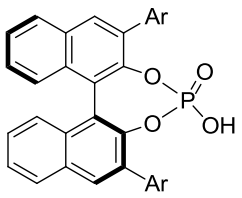


1a (*racemic*) **2a** **3a**

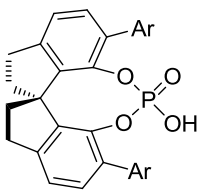
entry	cat.	solvent	yield (%)[b]	ee (%)[b]
1	(*R*)-**A1**	Et_2O	3	17
2	(*R*)-**A2**	Et_2O	55	64
3	(*S*)-**B1**	Et_2O	21	2
4	(*S*)-**B2**	Et_2O	83	38
5	(*S*)-**B3**	Et_2O	4	22
6	(*S*)-**C1**	Et_2O	2	32
7	(*S*)-**C2**	Et_2O	23	18
8	(*S*)-**C3**	Et_2O	57	76
9	(*S*)-**C3**	DCM	100	14
10	(*S*)-**C3**	$CHCl_3$	81	22
11	(*S*)-**C3**	toluene	90	14
12	(*S*)-**C3**	MTBE	29	24
13	(*S*)-**C3**	CPME	37	82
14[c]	(*S*)-**C3**	CPME	63	86
15[c,d]	(*S*)-**C3**	CPME	11	68
16[c,e]	(*S*)-**C3**	CPME	93	90
17[e,f]	(*S*)-**C3**	CPME	60	92



A1: Ar = 9-phenanthryl
A2: Ar = 9-anthryl



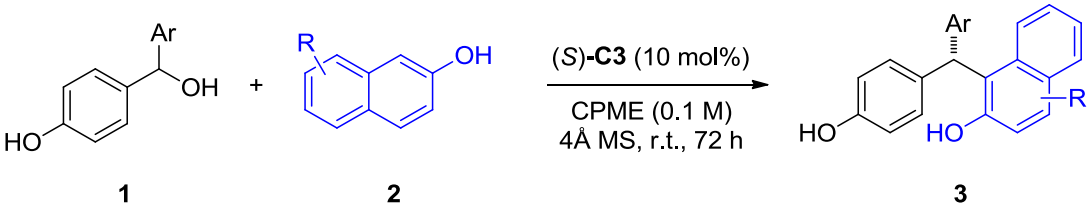
B1: Ar = TRIP
B2: Ar = 9-anthryl
B3: Ar = 9-phenanthryl



C1: Ar = TRIP
C2: Ar = 9-phenanthryl
C3: Ar = 9-anthryl

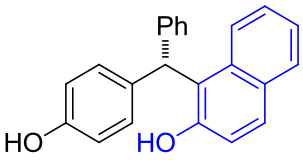
[a] Reaction scale: **1a** (0.1 mmol), **2a** (0.15 mmol), 4Å molecular sieves (20 mg), solvent (1 mL). [b] Yield was determined by ^{1}H NMR of the crude reaction mixture using CH_2Br_2 as internal standard. Ee value was determined by HPLC with a chiral column. [c] Run for 72 h. [d] Run without 4Å molecular sieves. [e] Run with 80 mg of molecular sieves. [f] Run with 5 mol% of catalyst for 144 h.

General Procedure B.



1 **2** **3**

At room temperature, a 4-mL vial was charged with a mixture of the alcohol **1** (0.2 mmol), the naphthol **2** (0.3 mmol), 4Å molecular sieves (160 mg), catalyst (*S*)-**C3** (5.7 mg, 10 mol%), and CPME (2 mL). The reaction mixture was stirred at room temperature for 72 h. Upon completion, the reaction mixture was purified by silica gel column chromatography to afford the desired product **3**.



3a

(*S*)-1-((4-Hydroxyphenyl)(phenyl)methyl)naphthalen-2-ol (3a) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a white solid (62.2 mg, 95% yield, 90% ee).

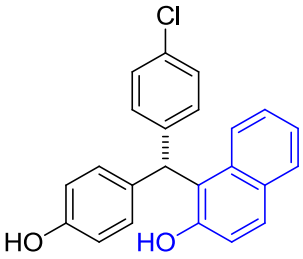
$[\alpha]_D^{24}$ = −30.5 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 4.66 min (minor), 5.55 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03 (d, *J* = 8.4 Hz, 1H), 7.83 (d, *J* = 8.0 Hz, 1H), 7.77 (d, *J* = 8.8 Hz, 1H), 7.45 (t, *J* = 8.0 Hz, 1H), 7.38 – 7.34 (m, 3H), 7.31 – 7.29 (m, 3H), 7.14 – 7.12 (m, 3H), 6.77 (d, *J* = 8.8 Hz, 2H), 6.39 (s, 1H), 5.93 (br s, 1H), 5.47 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 155.0, 152.8, 142.0, 133.5, 133.4, 130.4, 129.8, 129.8, 129.3, 129.1, 128.9, 127.3, 127.0, 123.4, 123.0, 120.5, 119.9, 116.2, 47.9.

IR (neat, cm^{-1}) 3481, 2977, 2877, 1512, 1251, 814.

HRMS (EI+) calculated for $C_{23}H_{18}O_2$ [M^+]: 326.1307, found: 326.1301.



3b

(*S*)-1-((4-Chlorophenyl)(4-hydroxyphenyl)methyl)naphthalen-2-ol (3b) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a red solid (50.4 mg, 90% yield, 93% ee).

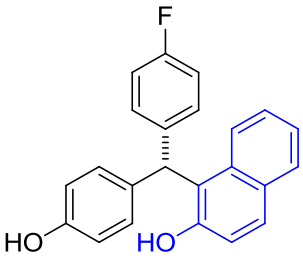
$[\alpha]_D^{24}$ = −42.6 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 4.47 min (minor), 5.22 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.96 (d, *J* = 8.0 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.76 (d, *J* = 8.8 Hz, 1H), 7.44 (t, *J* = 8.0 Hz, 1H), 7.36 (t, *J* = 7.2 Hz, 1H), 7.30 (d, *J* = 8.4 Hz, 2H), 7.22 (d, *J* = 8.0 Hz, 2H), 7.11 – 7.08 (m, 3H), 6.77 (d, *J* = 8.4 Hz, 2H), 6.34 (s, 1H), 5.90 (br s, 1H), 5.43 (s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 155.0, 152.6, 140.5, 133.4 (2C), 132.9, 130.5, 130.3, 130.0, 129.8, 129.2, 129.0, 127.1, 123.6, 123.0, 120.2, 119.8, 116.3, 47.2.

IR (neat, cm^{-1}) 3473, 3367, 3061, 2875, 1509, 1235, 812.

HRMS (EI+) calculated for $C_{23}H_{17}ClO_2$ [M^+]: 360.0917, found: 360.0908.



3c

(*R*)-1-((4-Fluorophenyl)(4-hydroxyphenyl)methyl)naphthalen-2-ol (3c) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a pale yellow solid (56.9 mg, 83% yield, 93% ee).

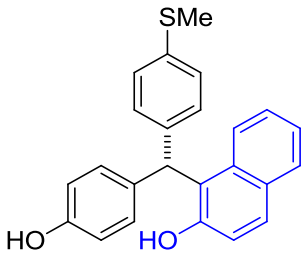
$[\alpha]_D^{24}$ = −88.0 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 4.52 min (minor), 5.41 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.99 (d, *J* = 8.4 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.79 (d, *J* = 8.8 Hz, 1H), 7.45 (t, *J* = 8.0 Hz, 1H), 7.38 (t, *J* = 7.6 Hz, 1H), 7.27 (t, *J* = 6.8 Hz, 2H), 7.13 – 7.10 (m, 3H), 7.05 (t, *J* = 8.4 Hz, 2H), 6.79 (d, *J* = 8.4 Hz, 2H), 6.36 (s, 1H), 5.59 (br s, 1H), 5.39 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.9 (d, $J_{C\text{-}F}$ = 245 Hz), 154.9, 152.6, 137.5 (d, $J_{C\text{-}F}$ = 3 Hz), 133.5 (d, $J_{C\text{-}F}$ = 31 Hz), 130.8, 130.7, 130.3, 130.0, 129.8, 129.0, 127.1, 123.6, 122.9, 120.4, 119.9, 116.3, 116.0 (d, $J_{C\text{-}F}$ = 21 Hz), 47.1.

IR (neat, cm^{-1}) 3384, 2976, 1504, 1224, 817.

HRMS (EI+) calculated for $C_{23}H_{17}FO_2$ [M^+]: 344.1213, found: 344.1203.



3d

(*R*)-1-((4-Hydroxyphenyl)(4-(methylthio)phenyl)methyl)naphthalen-2-ol (3d) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a red solid (64.8 mg, 87% yield, 73% ee).

$[\alpha]_D^{24}$ = +1.50 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 5.78 min (minor), 6.85 min (major).

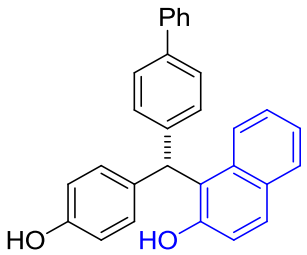
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.99 (d, *J* = 8.4 Hz, 1H), 7.81 (d, *J* = 8.0 Hz, 1H), 7.76 (d, *J* = 8.8 Hz, 1H), 7.44 (t, *J* = 7.6 Hz, 1H), 7.35 (t, *J* = 7.6 Hz, 1H), 7.24 – 7.19 (m, 4H), 7.12 –

7.10 (m, 3H), 6.75 (d, J = 8.4 Hz, 2H), 6.33 (s, 1H), 5.85 (br s, 1H), 5.49 (br s, 1H), 2.45 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 154.8, 152.6, 138.7, 137.2, 133.5, 133.4, 130.3, 129.8, 129.7, 129.6, 128.9, 127.2, 127.0, 123.5, 123.0, 120.4, 119.8, 116.2, 47.3, 15.8.

IR (neat, cm^{-1}) 3477, 2977, 1513, 1098, 815.

HRMS (EI+) calculated for $C_{24}H_{20}O_2S$ [M^+]: 372.1184, found: 372.1169.



3e

(*S*)-1-([1,1'-Biphenyl]-4-yl(4-hydroxyphenyl)methyl)naphthalen-2-ol (3e) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a red solid (80.9 mg, 100% yield, 90% ee).

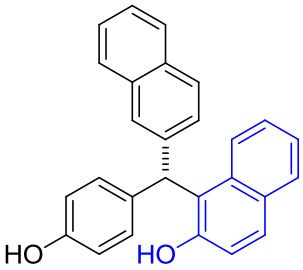
$[\alpha]_D^{24}$ = +24.7 (c = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 5.36 min (minor), 6.40 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 (d, J = 8.8 Hz, 1H), 7.84 (d, J = 8.0 Hz, 1H), 7.79 (d, J = 8.8 Hz, 1H), 7.62 – 7.58 (m, 4H), 7.49 – 7.44 (m, 3H), 7.39 – 7.36 (m, 4H), 7.18 – 7.14 (m, 3H), 6.80 (d, J = 8.4 Hz, 2H), 6.42 (s, 1H), 5.69 (br s, 1H), 5.49 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 155.0, 152.8, 141.0, 140.7, 140.1, 133.5 (2C), 130.4, 130.0, 129.8, 129.6, 129.0, 127.9, 127.5, 127.2, 127.1, 123.5, 123.0, 120.5, 119.9, 116.3 (2C), 47.6.

IR (neat, cm^{-1}) 3480, 3356, 2977, 1513, 1100, 738.

HRMS (EI+) calculated for $C_{29}H_{22}O_2$ [M^+]: 402.1620, found: 402.1623.



3f

(*R*)-1-((4-Hydroxyphenyl)(naphthalen-2-yl)methyl)naphthalen-2-ol (3f) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a red solid (63.6 mg, 84% yield, 86% ee).

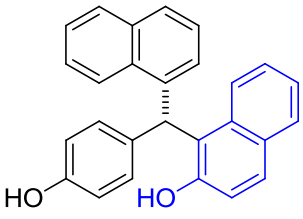
$[\alpha]_D^{24}$ = +35.6 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 5.14 min (minor), 6.02 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 (d, *J* = 8.4 Hz, 1H), 7.85 – 7.79 (m, 4H), 7.20 (d, *J* = 7.6 Hz, 1H), 7.65 (s, 1H), 7.49 – 7.43 (m, 4H), 7.36 (t, *J* = 7.6 Hz, 1H), 7.17 – 7.14 (m, 3H), 6.78 (d, *J* = 8.4 Hz, 2H), 6.53 (s, 1H), 5.81 (br s, 1H), 5.58 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 155.0, 153.0, 139.8, 133.7, 133.6, 133.3, 132.7, 130.6, 130.0, 129.8, 129.1, 128.9, 128.1, 127.8, 127.6, 127.4, 127.1, 126.5, 126.2, 123.5, 123.0, 120.2, 120.0, 116.3, 48.2.

IR (neat, cm^{-1}) 3478, 3413, 2977, 1512, 1099, 819.

HRMS (EI+) calculated for $C_{27}H_{20}O_2$ [M^+]: 376.1463, found: 376.1473.



3g

(*R*)-1-((4-Hydroxyphenyl)(naphthalen-1-yl)methyl)naphthalen-2-ol (3g) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a white solid (32.0 mg, 43% yield, 77% ee).

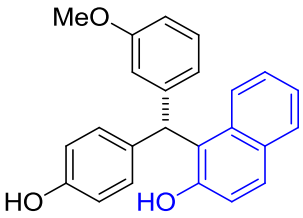
$[\alpha]_D^{24}$ = −28.0 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 4.62 min (major), 5.00 min (minor).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.97 – 7.92 (m, 2H), 7.86 – 7.83 (m, 3H), 7.77 (d, *J* = 8.8 Hz, 1H), 7.53 – 7.50 (t, *J* = 8.0 Hz, 1H), 7.44 – 7.34 (m, 4H), 7.22 (d, *J* = 7.2 Hz, 1H), 7.12 (d, *J* = 7.6 Hz, 2H), 7.04 (d, *J* = 8.8 Hz, 1H), 6.92 (s, 1H), 6.80 (d, *J* = 8.8 Hz, 2H), 5.53 (s, 1H), 5.08 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 155.0, 154.0, 138.2, 134.4, 134.2, 133.7, 133.3, 132.0, 130.8, 129.9, 129.2, 129.0, 128.7, 127.3, 127.2, 126.9, 126.3, 125.9, 124.1, 123.5, 122.7, 120.0, 119.6, 116.4, 45.7.

IR (neat, cm^{-1}) 3476, 3060, 2872, 1512, 1253, 786.

HRMS (EI+) calculated for $C_{27}H_{20}O_2$ [M^+]: 376.1463, found: 376.1464.



3h

(*S*)-1-((4-Hydroxyphenyl)(3-methoxyphenyl)methyl)naphthalen-2-ol (3h) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as an orange solid (55.2 mg, 77% yield, 79% ee).

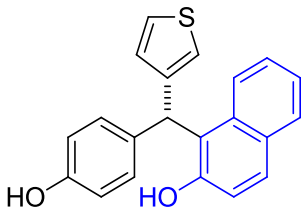
$[\alpha]_D^{24}$ = +12.3 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 6.20 min (minor), 6.64 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04 (d, *J* = 8.8 Hz, 1H), 7.83 (d, *J* = 8.0 Hz, 1H), 7.78 (d, *J* = 8.8 Hz, 1H), 7.47 (t, *J* = 7.6 Hz, 1H), 7.37 (t, *J* = 7.6 Hz, 1H), 7.29 (t, *J* = 8.0 Hz, 1H), 7.16 – 7.12 (m, 3H), 6.91 – 6.85 (m, 3H), 6.77 (d, *J* = 8.4 Hz, 2H), 6.36 (s, 1H), 5.84 (br s, 1H), 5.54 (br s, 1H), 3.75 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.2, 154.9, 152.8, 143.9, 133.5, 133.2, 130.4, 130.4, 129.8, 129.7, 128.9, 127.0, 123.4, 123.0, 121.5, 120.4, 119.9, 116.2, 150.1, 112.5, 55.4, 48.0.

IR (neat, cm^{-1}) 3476, 3357, 2977, 1513, 1262, 818.

HRMS (EI+) calculated for $C_{24}H_{20}O_3$ [M^+]: 356.1412, found: 356.1412.



3i

(*S*)-1-((4-Hydroxyphenyl)(thiophen-3-yl)methyl)naphthalen-2-ol (3i) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a brown solid (59.5 mg, 89% yield, 70% ee).

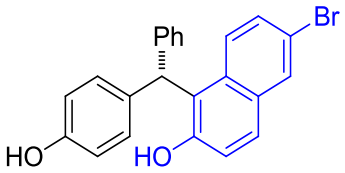
$[\alpha]_D^{24}$ = +41.5 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 4.91 min (minor), 5.61 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03 (d, *J* = 8.8 Hz, 1H), 7.85 (d, *J* = 8.0 Hz, 1H), 7.79 (d, *J* = 8.8 Hz, 1H), 7.48 (t, *J* = 8.0 Hz, 1H), 7.41 – 7.39 (m, 2H), 7.21 (d, *J* = 8.4 Hz, 2H), 7.16 (d, *J* = 8.8 Hz, 1H), 7.04 (d, *J* = 5.2 Hz, 1H), 6.95 (s, 1H), 6.78 (d, *J* = 8.0 Hz, 2H), 6.36 (s, 1H), 5.80 – 5.70 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 154.7, 152.7, 143.6, 133.5, 133.1, 129.9, 129.8, 129.7, 128.9, 128.6, 127.7, 127.0, 123.5, 123.4, 122.8, 119.9, 119.8, 116.1, 43.7.

IR (neat, cm^{-1}) 3473, 2977, 2874, 1512, 1099, 812.

HRMS (EI+) calculated for $C_{21}H_{16}O_2S$ [M^+]: 332.0871, found: 332.0877.



3j

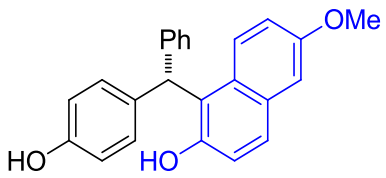
(*S*)-6-Bromo-1-((4-hydroxyphenyl)(phenyl)methyl)naphthalen-2-ol (3j) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a pale orange solid (65.1 mg, 80% yield, 92% ee). $[\alpha]_D^{24}$ = −32.4 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 4.30 min (minor), 4.86 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.97 (s, 1H), 7.87 (d, *J* = 9.2 Hz, 1H), 7.66 (d, *J* = 8.8 Hz, 1H), 7.49 (dd, *J* = 9.2, 1.6 Hz, 1H), 7.39 – 7.27 (m, 5H), 7.14 – 7.10 (m, 3H), 6.80 (d, *J* = 8.4 Hz, 2H), 6.33 (s, 1H), 5.70 (br s, 1H), 5.50 (s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 154.9, 153.0, 141.6, 133.3, 132.0, 131.0, 130.7, 130.4, 130.1, 129.4, 129.0, 128.9, 127.5, 125.0, 121.0, 120.8, 117.2, 116.3, 47.9.

IR (neat, cm^{-1}) 3476, 3382, 2977, 2869, 1512, 1098, 806.

HRMS (EI+) calculated for $C_{23}H_{17}BrO_2$ [M^+]: 404.0412, found: 404.0423.



3k

(*S*)-1-((4-Hydroxyphenyl)(phenyl)methyl)-6-methoxynaphthalen-2-ol (3k) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a red solid (57.6 mg, 81% yield, 83% ee).

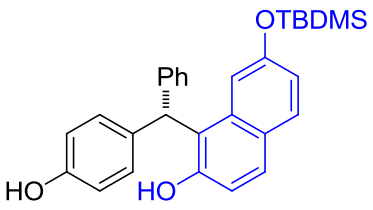
$[\alpha]_D^{24}$ = −28.0 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 6.22 min (minor), 7.60 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.95 (d, *J* = 9.2 Hz, 1H), 7.68 (d, *J* = 8.8 Hz, 1H), 7.38 – 7.35 (m, 2H), 7.32 – 7.28 (m, 3H), 7.18 – 7.11 (m, 5H), 6.78 (d, *J* = 8.4 Hz, 2H), 6.36 (s, 1H), 5.99 (br s, 1H), 5.36 (br s, 1H), 3.92 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 155.6, 154.8, 151.1, 142.0, 133.5, 130.7, 130.4, 129.2, 129.0, 128.7, 128.5, 127.2, 124.7, 121.0, 120.3, 119.0, 116.1, 107.4, 55.5, 48.0.

IR (neat, cm^{-1}) 3484, 3381, 2977, 2876, 1513, 1229, 732.

HRMS (EI+) calculated for $C_{24}H_{20}O_3$ [M^+]: 356.1412, found: 256.1407.



3l

(*S*)-7-((*tert*-Butyldimethylsilyl)oxy)-1-((4-hydroxyphenyl)(phenyl)methyl)naphthalen-2-ol (3l) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 1:2) as a red solid (73.0 mg, 80% yield, 91% ee).

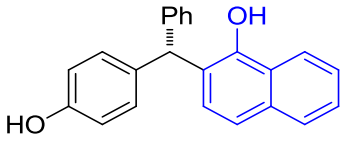
$[\alpha]_D^{24}$ = −36.4 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 5% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 5.83 min (minor), 6.43 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.72 – 7.69 (m, 2H), 7.39 – 7.36 (m, 3H), 7.32 – 7.31 (m, 3H), 7.14 (d, *J* = 8.4 Hz, 2H), 6.99 (d, *J* = 8.8 Hz, 2H), 6.78 (d, *J* = 8.4 Hz, 2H), 6.24 (s, 1H), 5.77 (br s, 1H), 5.45 (s, 1H), 1.01 (s, 9H), 0.16 (s, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 154.9, 154.5, 153.2, 142.1, 134.9, 133.6, 130.5, 130.3, 129.5, 129.3, 129.1, 127.3, 125.5, 119.3, 119.2, 117.6, 116.2, 115.6, 48.4, 25.9, 18.4, -4.3.

IR (neat, cm^{-1}) 3487, 3423, 2859, 1512, 1228, 838.

HRMS (EI+) calculated for $C_{29}H_{32}O_3Si$ [M^+]: 456.2121, found: 456.2127.



3m

(*S*)-2-((4-Hydroxyphenyl)(phenyl)methyl)naphthalen-1-ol (3m) was prepared according to General Procedure B (purified by column chromatography, eluent: Et_2O/hexanes = 2:3) as a red solid (50.2 mg, 77% yield, 61% ee).

$[\alpha]_D^{24}$ = −13.9 (*c* = 1.0, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® IC column; 10% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 6.38 min (major), 7.00 min (minor).

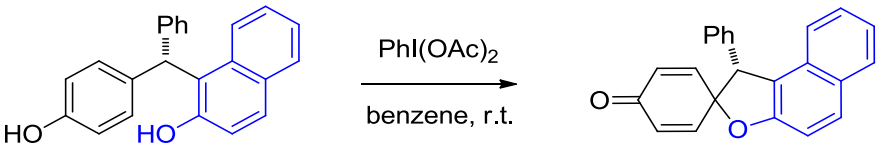
^{1}H NMR (400 MHz, acetone-d_6) δ 9.01 (s, 1H), 8.31 (d, *J* = 8.4 Hz, 1H), 8.26 (s, 1H), 7.99 (d, *J* = 8.0 Hz, 1H), 7.44 – 7.36 (m, 2H), 7.27 (t, *J* = 7.2 Hz, 2H), 7.19 (d, *J* = 7.2 Hz, 1H), 7.14 (d, *J* = 8.0 Hz, 2H), 6.97 (d, *J* = 8.4 Hz, 2H), 6.83 – 6.75 (m, 4H), 6.17 (s, 1H).

^{13}C NMR (100 MHz, acetone-d_6) δ 156.7, 153.0, 145.9, 136.0, 133.9, 132.4, 131.4, 130.4, 129.1, 128.4, 127.0, 126.9, 126.4, 125.2, 125.1, 123.5, 116.0, 108.0, 52.6.

IR (neat, cm^{-1}) 3327, 2977, 1513, 1259, 763.

HRMS (EI+) calculated for $C_{23}H_{18}O_2$ [M^+]: 326.1307, found: 326.1303.

V. Product Derivatization



3a **4**

(*R*)-1'-Phenyl-1'H-spiro[cyclohexa[2,5]diene-1,2'-naphtho[2,1-b]furan]-4-one (4). To a solution of **3a** (106.5 mg, 0.33 mmol) in benzene (3 mL) was added iodosobenzene diacetate (116.0 mg, 0.36 mmol). The reaction mixture was stirred at room temperature for 30 min. Upon completion, the mixture was purified by silica gel column chromatography (eluent: Et_2O/hexanes = 4:1) to afford pure **4** as a yellow solid (69.2 mg, 65% yield, 91% ee).

$[\alpha]_D^{24}$ = −364 (*c* = 0.10, CH_2Cl_2). HPLC analysis of the product: Daicel CHIRALPAK® AD-H column; 5% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 9.68 min (minor), 11.47 min (major).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.89 (d, *J* = 8.8 Hz, 2H), 7.36 – 7.30 (m, 3H), 7.28 – 7.24 (m, 5H), 7.13 (dd, *J* = 10.0, 2.8 Hz, 1H), 6.77 (br s, 1H), 6.52 (dd, *J* = 10.4, 3.2 Hz, 1H), 6.29 (dd, *J* = 10.0, 2.0 Hz, 1H), 6.03 (dd, *J* = 10.4, 1.6 Hz, 1H), 5.03 (s, 1H).

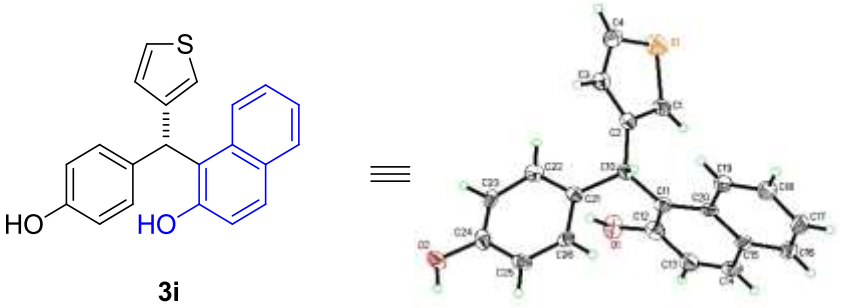
^{13}C NMR (100 MHz, $CDCl_3$) δ 185.5, 156.4, 147.5, 146.1, 137.5, 131.3, 130.8, 130.4, 129.1, 129.1, 129.0 (2C), 128.2, 127.7, 127.4, 123.8, 123.3, 120.1, 112.8, 85.3, 57.8.

IR (neat, cm^{-1}) 3424, 3060, 2926, 1673, 1257, 945.

HRMS (EI+) calculated for $C_{23}H_{16}O_2$ [M^+]: 324.1150, found: 324.1147.

VI. Determination of Product Absolute Stereochemistry

The absolute stereochemistry of product **3i** was determined by X-ray diffraction. The X-ray data have been deposited at the Cambridge Crystallographic Data Center (CCDC1455144). The stereochemistry of other products was assumed by analogy.



3i

Table S2. Crystal data and structure refinement for 3i.

Identification code	**3i**
Empirical formula	$C_{21}H_{16}O_2S$
Formula weight	332.40
Temperature/K	100.00(10)
Crystal system	orthorhombic
Space group	$P2_12_12_1$
a/Å	10.2816(3)
b/Å	10.4360(3)
c/Å	15.0467(5)
α/°	90
β/°	90
γ/°	90
Volume/Å^3	1614.50(8)
Z	4
ρ_{calc}g/cm^3	1.368
μ/mm^{-1}	1.852
F(000)	696.0
Crystal size/mm^3	0.3 × 0.1 × 0.05
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	10.316 to 133.932
Index ranges	$-11 \le h \le 12$, $-7 \le k \le 12$, $-17 \le l \le 17$
Reflections collected	8852
Independent reflections	2811 [R_{int} = 0.0261, R_{sigma} = 0.0272]

Data/restraints/parameters	2811/100/237
Completeness to theta = 66.5°	97.1%
Goodness-of-fit on F^2	1.000
Final R indexes [I>=2σ (I)]	$R_1 = 0.0570$, $wR_2 = 0.1486$
Final R indexes [all data]	$R_1 = 0.0585$, $wR_2 = 0.1502$
Largest diff. peak/hole / e $Å^{-3}$	0.63/-0.42
Flack parameter	0.056(14)

Table S3. Fractional Atomic Coordinates (×10^4) and Equivalent Isotropic Displacement Parameters (Å^2×10^3) for 3i. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	*x*	*y*	*z*	U(eq)
S1	1047.4(13)	8035.0(14)	2541.6(10)	52.1(4)
O1	2477(3)	3337(3)	3352(2)	41.5(8)
O2	5850(18)	3670(20)	6236(10)	43(3)
O2A	5610(50)	3660(50)	6180(20)	43(3)
C1	1853(4)	6570(5)	2393(3)	34.6(10)
C2	3042(4)	6640(4)	2883(3)	27.8(9)
C3	3211(4)	7834(4)	3323(3)	29.3(9)
C4	2225(5)	8685(4)	3197(3)	37.4(11)
C10	4062(4)	5590(4)	2852(3)	25.3(8)
C11	3687(4)	4508(4)	2228(3)	27.8(9)
C12	2962(4)	3466(4)	2496(3)	32.6(9)
C13	2658(5)	2434(4)	1930(3)	35.9(10)
C14	3071(4)	2444(4)	1074(3)	35.6(10)
C15	3789(4)	3502(4)	737(3)	29.4(9)
C16	4264(5)	3512(5)	-153(3)	37.1(10)
C17	4944(5)	4531(5)	-472(3)	39.0(11)
C18	5189(5)	5595(5)	78(3)	37.7(10)
C19	4785(4)	5600(4)	942(3)	32.3(9)
C20	4082(4)	4548(4)	1316(3)	26.8(8)
C21	4521(4)	5100(4)	3765(3)	24.9(8)
C22	3938(15)	5451(16)	4574(7)	29.5(15)
C22A	4100(40)	5580(40)	4563(15)	29.5(15)
C23	4469(10)	4892(6)	5351(7)	27.5(17)
C23A	4420(30)	5250(20)	5418(19)	27.5(17)
C24	5496(9)	4135(11)	5403(8)	32.2(19)
C24A	5150(30)	4180(30)	5360(20)	32.2(19)
C25	6056(19)	3750(20)	4613(10)	30.8(18)
C25A	5850(50)	3820(60)	4600(20)	30.8(18)

C26	5600(20)	4240(20)	3820(13)	26(2)
C26A	5480(50)	4170(60)	3770(30)	26(2)

Table S4. Anisotropic Displacement Parameters ($Å^2×10^3$) for 3i. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
S1	49.2(7)	58.5(8)	48.5(7)	3.4(6)	-5.7(6)	14.4(6)
O1	41.1(18)	48(2)	35.9(17)	1.9(15)	2.8(14)	-19.2(16)
O2	45(9)	39.1(18)	43(3)	4(2)	-18(3)	11(5)
O2A	45(9)	39.1(18)	43(3)	4(2)	-18(3)	11(5)
C1	31(2)	38(2)	34(2)	1.8(19)	1.7(18)	14.3(18)
C2	26.2(19)	30(2)	27.3(19)	5.3(16)	-1.1(16)	-1.6(16)
C3	28(2)	29(2)	30(2)	4.7(16)	6.7(17)	-5.2(16)
C4	52(3)	28(2)	33(2)	4.2(18)	18(2)	1(2)
C10	24.5(18)	23.8(18)	27.5(19)	2.7(14)	2.0(16)	-0.6(16)
C11	25.3(18)	26.4(19)	32(2)	0.7(16)	-1.8(16)	3.1(15)
C12	25.7(18)	33(2)	39(2)	3(2)	-5.2(19)	-4.0(17)
C13	35(2)	29(2)	44(3)	3.9(19)	-10(2)	-3.6(19)
C14	31(2)	27(2)	49(3)	-4.0(19)	-12(2)	4.2(17)
C15	27.8(19)	27.0(19)	33(2)	-3.8(17)	-8.9(17)	7.9(16)
C16	33(2)	42(2)	37(2)	-9.8(19)	-5.4(19)	12.8(19)
C17	39(2)	49(3)	30(2)	-6(2)	0.5(18)	12(2)
C18	38(2)	41(2)	34(2)	1.0(19)	5.7(19)	5.4(19)
C19	35(2)	30(2)	32(2)	1.8(17)	1.7(18)	4.6(18)
C20	25.8(18)	21.1(17)	33(2)	-0.4(15)	-4.4(16)	8.2(15)
C21	23.1(18)	23.3(17)	28.1(18)	3.8(15)	-0.9(15)	-2.3(15)
C22	24(4)	28(4)	36(2)	4(2)	7.6(19)	-2(3)
C22A	24(4)	28(4)	36(2)	4(2)	7.6(19)	-2(3)
C23	37(2)	26(5)	20(2)	-4(3)	0.7(19)	-13(4)
C23A	37(2)	26(5)	20(2)	-4(3)	0.7(19)	-13(4)
C24	32(6)	33(2)	32(2)	1.5(19)	-12(3)	-13(3)
C24A	32(6)	33(2)	32(2)	1.5(19)	-12(3)	-13(3)
C25	25(7)	26(3)	42(2)	-0.5(18)	-10(3)	3(3)
C25A	25(7)	26(3)	42(2)	-0.5(18)	-10(3)	3(3)
C26	26(4)	22(3)	30(3)	-6(2)	-2(2)	-2(4)
C26A	26(4)	22(3)	30(3)	-6(2)	-2(2)	-2(4)

Table S5. Bond Lengths for 3i.

Atom	Atom	Length/Å	Atom	Atom	Length/Å
S1	C1	1.753(5)	C15	C20	1.429(6)
S1	C4	1.702(6)	C16	C17	1.360(8)
O1	C12	1.387(6)	C17	C18	1.408(7)
O2	C24	1.394(8)	C18	C19	1.365(7)
O2A	C24A	1.424(15)	C19	C20	1.431(6)
C1	C2	1.429(6)	C21	C22	1.406(11)
C2	C3	1.422(6)	C21	C22A	1.37(2)
C2	C10	1.518(6)	C21	C26	1.428(12)
C3	C4	1.362(7)	C21	C26A	1.39(2)
C10	C11	1.519(6)	C22	C23	1.416(13)
C10	C21	1.539(5)	C22A	C23A	1.37(2)
C11	C12	1.379(6)	C23	C24	1.321(8)
C11	C20	1.431(6)	C23A	C24A	1.349(12)
C12	C13	1.408(7)	C24	C25	1.381(10)
C13	C14	1.357(7)	C24A	C25A	1.388(19)
C14	C15	1.421(7)	C25	C26	1.382(11)
C15	C16	1.425(7)	C25A	C26A	1.36(2)

Table S6. Bond Angles for 3i.

Atom	Atom	Atom	Angle/°	Atom	Atom	Atom	Angle/°
C4	S1	C1	94.9(2)	C18	C19	C20	121.7(4)
C2	C1	S1	107.1(4)	C15	C20	C11	120.2(4)
C1	C2	C10	122.6(4)	C15	C20	C19	117.0(4)
C3	C2	C1	113.0(4)	C19	C20	C11	122.9(4)
C3	C2	C10	124.2(4)	C22	C21	C10	123.7(8)
C4	C3	C2	114.5(4)	C22	C21	C26	116.3(12)
C3	C4	S1	110.5(3)	C22A	C21	C10	124(2)
C2	C10	C11	112.4(3)	C22A	C21	C26A	119(3)
C2	C10	C21	115.1(3)	C26	C21	C10	119.9(8)
C11	C10	C21	112.5(3)	C26A	C21	C10	117.1(19)
C12	C11	C10	122.8(4)	C21	C22	C23	116.3(14)
C12	C11	C20	117.2(4)	C21	C22A	C23A	131(4)
C20	C11	C10	120.0(4)	C24	C23	C22	127.1(11)
O1	C12	C13	114.1(4)	C24A	C23A	C22A	106(3)
C11	C12	O1	122.9(4)	C23	C24	O2	118.1(7)
C11	C12	C13	123.1(4)	C23	C24	C25	117.3(8)
C14	C13	C12	120.0(4)	C25	C24	O2	124.2(7)

C13	C14	C15	120.5(4)	C23A	C24A	O2A	115.7(16)
C14	C15	C16	121.2(4)	C23A	C24A	C25A	124(2)
C14	C15	C20	119.1(4)	C25A	C24A	O2A	115.9(15)
C16	C15	C20	119.6(4)	C24	C25	C26	119.4(10)
C17	C16	C15	120.9(4)	C26A	C25A	C24A	123(3)
C16	C17	C18	120.1(5)	C25	C26	C21	123.3(13)
C19	C18	C17	120.6(5)	C25A	C26A	C21	113(3)

Table S7. Torsion Angles for 3i.

A	B	C	D	Angle/°	A	B	C	D	Angle/°
S1	C1	C2	C3	-0.3(4)	C12	C11	C20	C19	177.0(4)
S1	C1	C2	C10	-174.7(3)	C12	C13	C14	C15	-1.2(7)
O1	C12	C13	C14	179.8(4)	C13	C14	C15	C16	178.1(4)
O2	C24	C25	C26	178(2)	C13	C14	C15	C20	0.7(6)
O2A	C24A	C25A	C26A	176(6)	C14	C15	C16	C17	179.6(4)
C1	S1	C4	C3	-0.8(3)	C14	C15	C20	C11	1.7(6)
C1	C2	C3	C4	-0.3(5)	C14	C15	C20	C19	-178.9(4)
C1	C2	C10	C11	1.9(5)	C15	C16	C17	C18	0.1(7)
C1	C2	C10	C21	-128.7(4)	C16	C15	C20	C11	-175.7(4)
C2	C3	C4	S1	0.7(5)	C16	C15	C20	C19	3.7(6)
C2	C10	C11	C12	-88.6(5)	C16	C17	C18	C19	2.1(7)
C2	C10	C11	C20	91.0(4)	C17	C18	C19	C20	-1.3(7)
C2	C10	C21	C22	8.4(8)	C18	C19	C20	C11	177.7(4)
C2	C10	C21	C22A	-2.1(16)	C18	C19	C20	C15	-1.7(6)
C2	C10	C21	C26	-171.6(14)	C20	C11	C12	O1	-177.4(4)
C2	C10	C21	C26A	-178(4)	C20	C11	C12	C13	3.2(6)
C3	C2	C10	C11	-171.8(4)	C20	C15	C16	C17	-3.0(6)
C3	C2	C10	C21	57.6(5)	C21	C10	C11	C12	43.3(5)
C4	S1	C1	C2	0.6(3)	C21	C10	C11	C20	-137.1(4)
C10	C2	C3	C4	174.0(4)	C21	C22	C23	C24	4.1(12)
C10	C11	C12	O1	2.2(6)	C21	C22A	C23A	C24A	-8(3)
C10	C11	C12	C13	-177.2(4)	C22	C21	C26	C25	1(3)
C10	C11	C20	C15	176.8(4)	C22	C23	C24	O2	-179.1(14)
C10	C11	C20	C19	-2.6(6)	C22	C23	C24	C25	-6(2)
C10	C21	C22	C23	178.9(5)	C22A	C21	C26A	C25A	2(6)
C10	C21	C22A	C23A	-179.8(17)	C22A	C23A	C24A	O2A	180(4)
C10	C21	C26	C25	-179.2(19)	C22A	C23A	C24A	C25A	23(5)
C10	C21	C26A	C25A	178(4)	C23	C24	C25	C26	5(3)
C11	C10	C21	C22	-122.1(7)	C23A	C24A	C25A	C26A	-28(8)

C11	C10	C21	C22A	-132.6(16)	C24	C25	C26	C21	-3(4)
C11	C10	C21	C26	57.9(15)	C24A	C25A	C26A	C21	12(8)
C11	C10	C21	C26A	52(4)	C26	C21	C22	C23	-1.2(13)
C11	C12	C13	C14	-0.8(7)	C26A	C21	C22A	C23A	-4(3)
C12	C11	C20	C15	-3.6(6)					

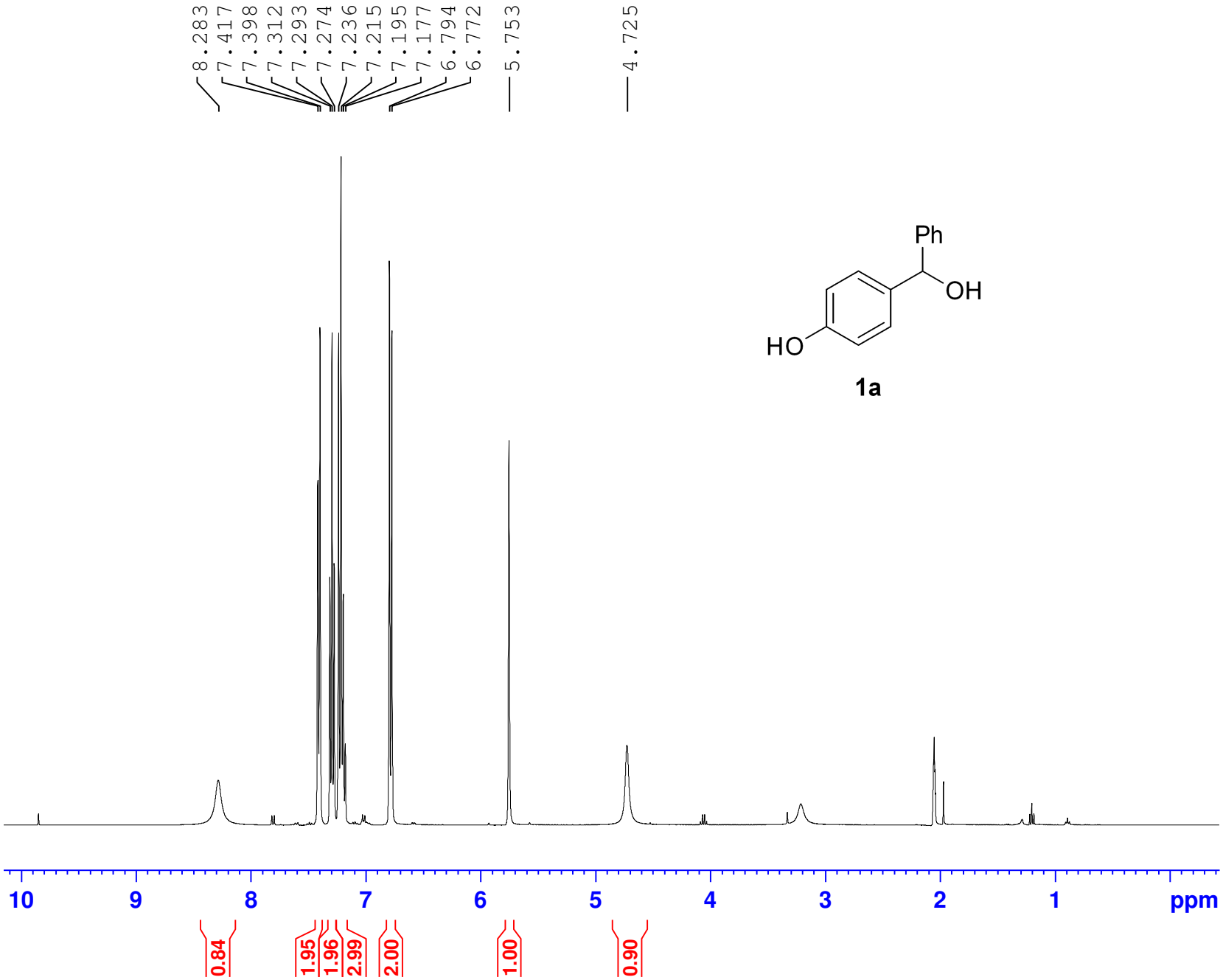
Table S8. Hydrogen Atom Coordinates (Å×10^4) and Isotropic Displacement Parameters (Å^2×10^3) for 3i.

Atom	*x*	*y*	*z*	U(eq)
H1	2940	3762	3705	62
H2	6377	3059	6174	64
H1A	1556	5863	2052	41
H3	3952	8022	3677	35
H4	2198	9524	3440	45
H10	4846	5996	2577	30
H13	2165	1731	2147	43
H14	2880	1738	696	43
H16	4104	2797	-528	44
H17	5255	4524	-1067	47
H18	5639	6316	-155	45
H19	4976	6322	1305	39
H22	3227	6031	4598	35
H22A	3481	6251	4516	35
H23	4040	5082	5894	33
H23A	4174	5680	5947	33
H25	6751	3147	4616	37
H25A	6611	3318	4677	37
H26	6021	3993	3285	31
H26A	5849	3811	3244	31

Table S9. Atomic Occupancy for 3i.

Atom	*Occupancy*	Atom	*Occupancy*	Atom	*Occupancy*
O2	0.7	O2A	0.3	C22	0.7
H22	0.7	C22A	0.3	H22A	0.3
C23	0.7	H23	0.7	C23A	0.3
H23A	0.3	C24	0.7	C24A	0.3
C25	0.7	H25	0.7	C25A	0.3

H25A	0.3	C26	0.7	H26	0.7		
C26A	0.3	H26A	0.3				

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PROCNO                 1

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DS                     2
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RG                 49.32
DW                62.400 usec
DE                 6.50 usec
TE                296.2 K
D1           1.00000000 sec
TD0                    1

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P1                 14.50 usec
PLW1         11.99499989 W

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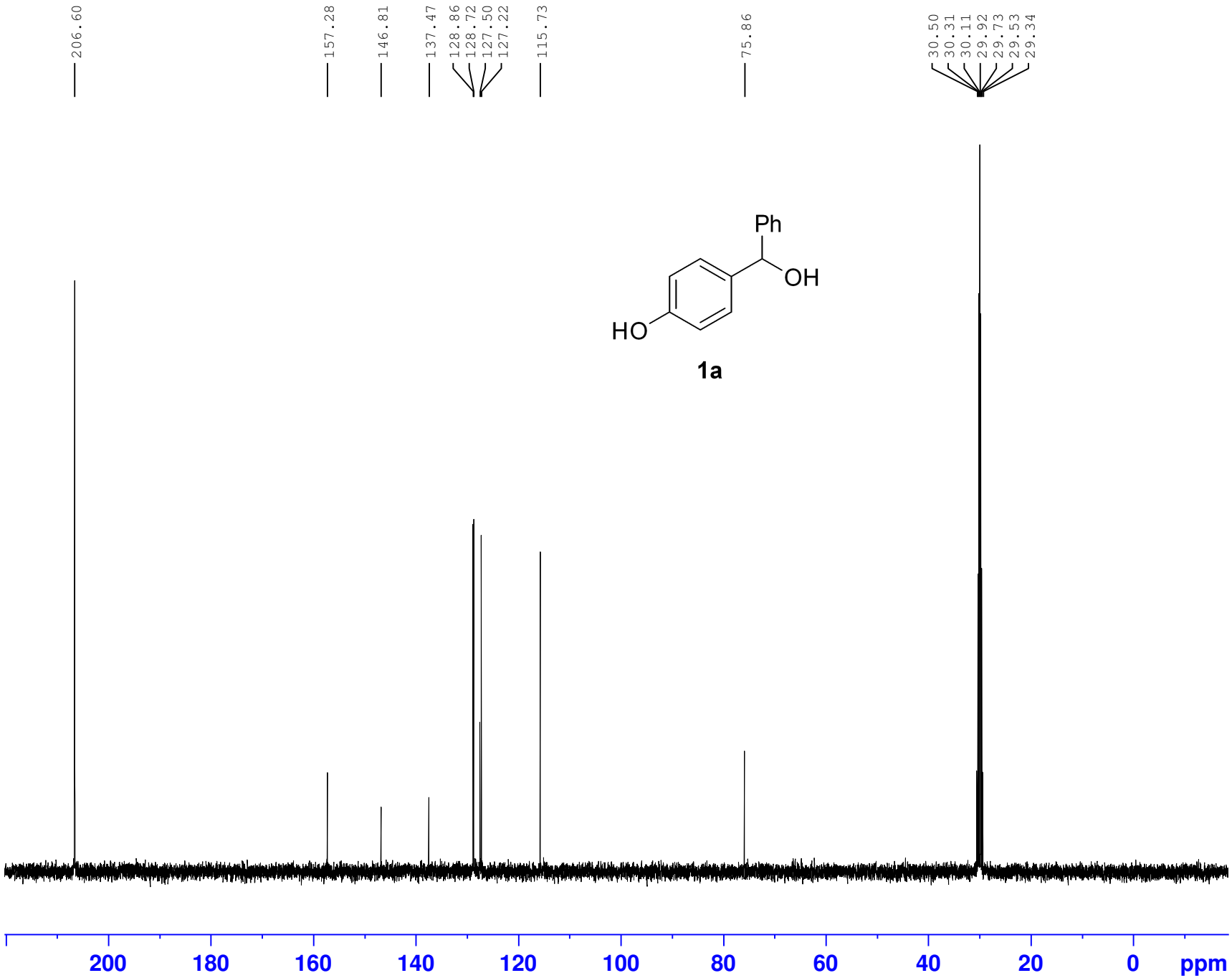


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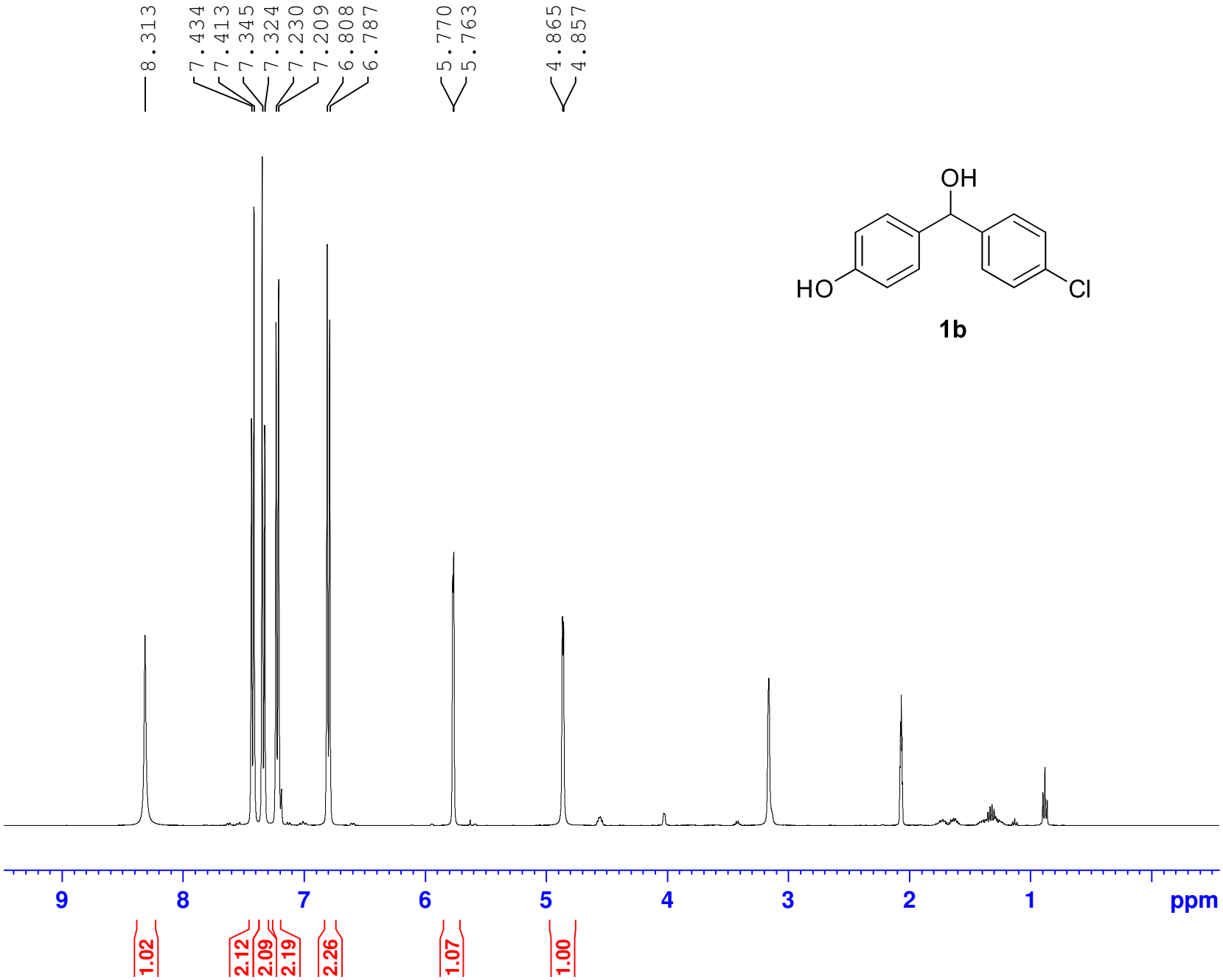
FIDRES          0.366798 Hz
AQ              1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                296.4 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2          waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6126797 MHz
WDW                  EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

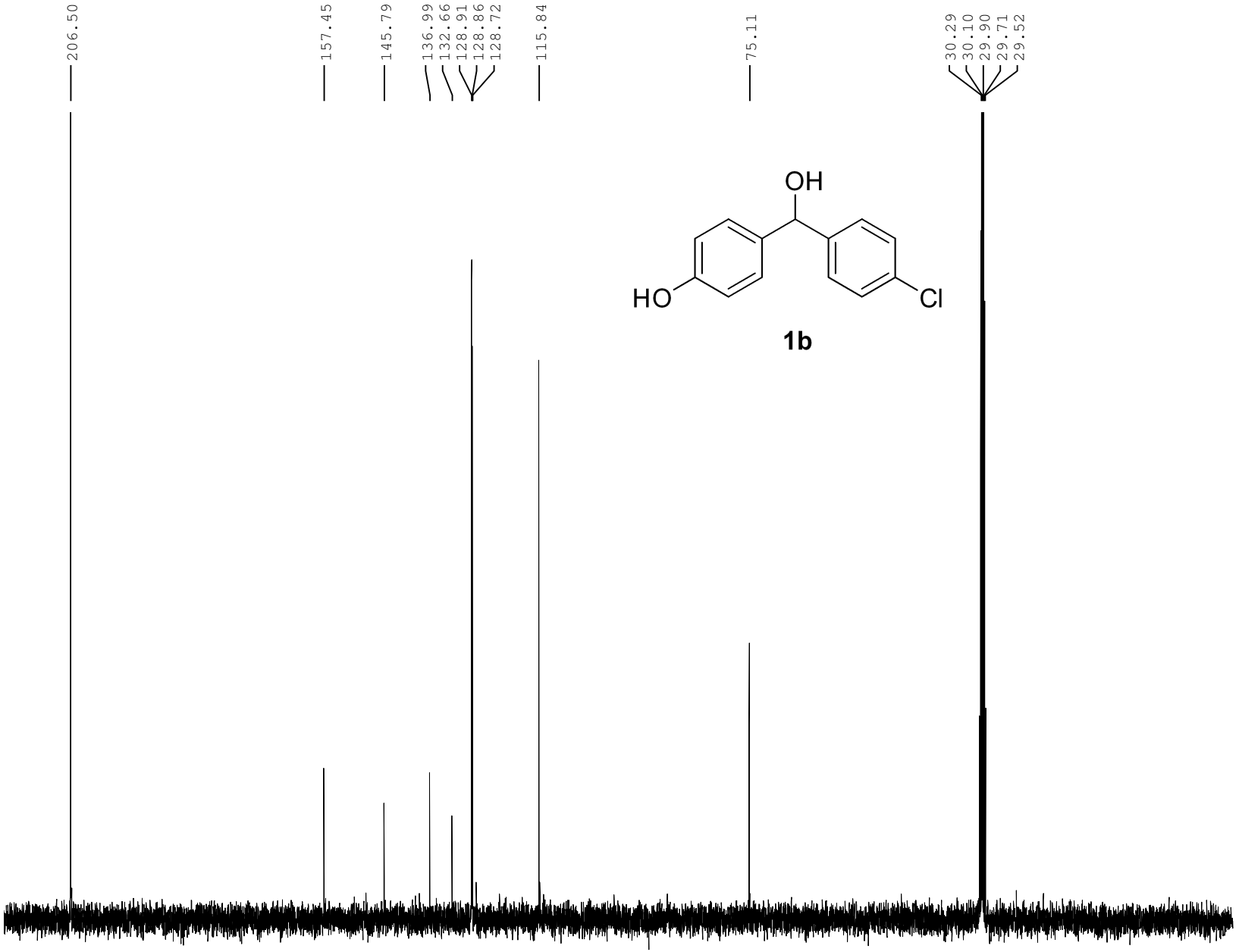



```
Current Data Parameters
NAME                  wong-296B
EXPNO                         1
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20150817
Time                      19.34
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                   zg30
TD                       65536
SOLVENT                Acetone
NS                             5
DS                             2
SWH                    8012.820 Hz
FIDRES                 0.122266 Hz
AQ                     4.0894465 sec
RG                        62.93
DW                        62.400 usec
DE                         6.50 usec
TE                        295.6 K
D1                   1.00000000 sec
TD0                            1

======== CHANNEL f1 ========
SFO1                 400.1324710 MHz
NUC1                         1H
P1                        14.50 usec
PLW1                11.99499989 W

F2 - Processing parameters
SI                         65536
SF                   400.1300000 MHz
WDW                           EM
SSB                0
LB                         0.30 Hz
GB                 0
PC                         1.00
```

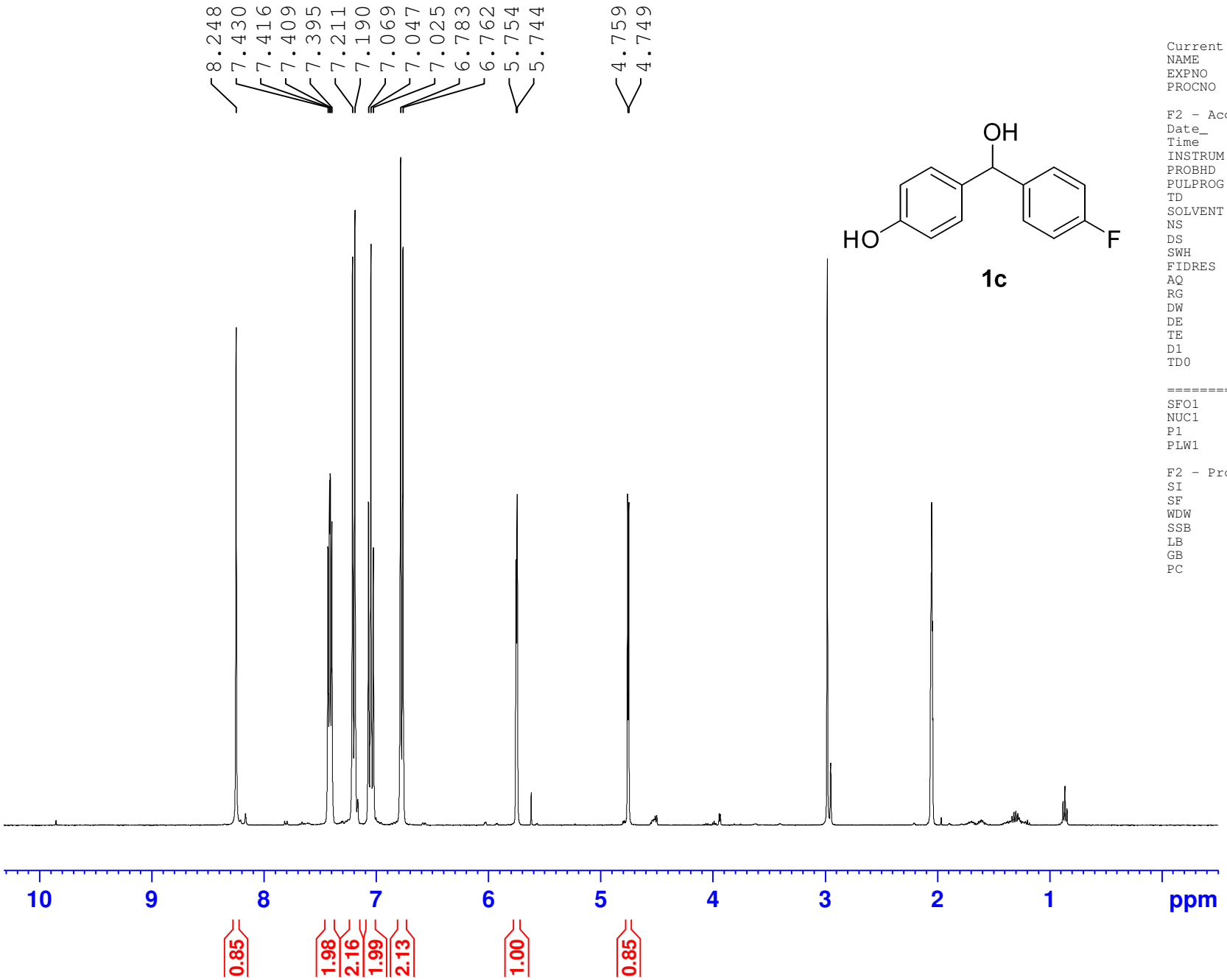



```
Current Data Parameters
NAME                  wong-296B
EXPNO                         1
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20150817
Time                      19.34
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                   zg30
TD                       65536
SOLVENT                Acetone
NS                             5
DS                             2
SWH                    8012.820 Hz
FIDRES                 0.122266 Hz
AQ                     4.0894465 sec
RG                        62.93
DW                        62.400 usec
DE                         6.50 usec
TE                        295.6 K
D1                    1.00000000 sec
TD0                            1

======== CHANNEL f1 ========
SFO1                400.1324710 MHz
NUC1                        1H
P1                        14.50 usec
PLW1                11.99499989 W

F2 - Processing parameters
SI                         65536
SF                  400.1300000 MHz
WDW                           EM
SSB                0
LB                         0.30 Hz
GB                 0
PC                         1.00
```

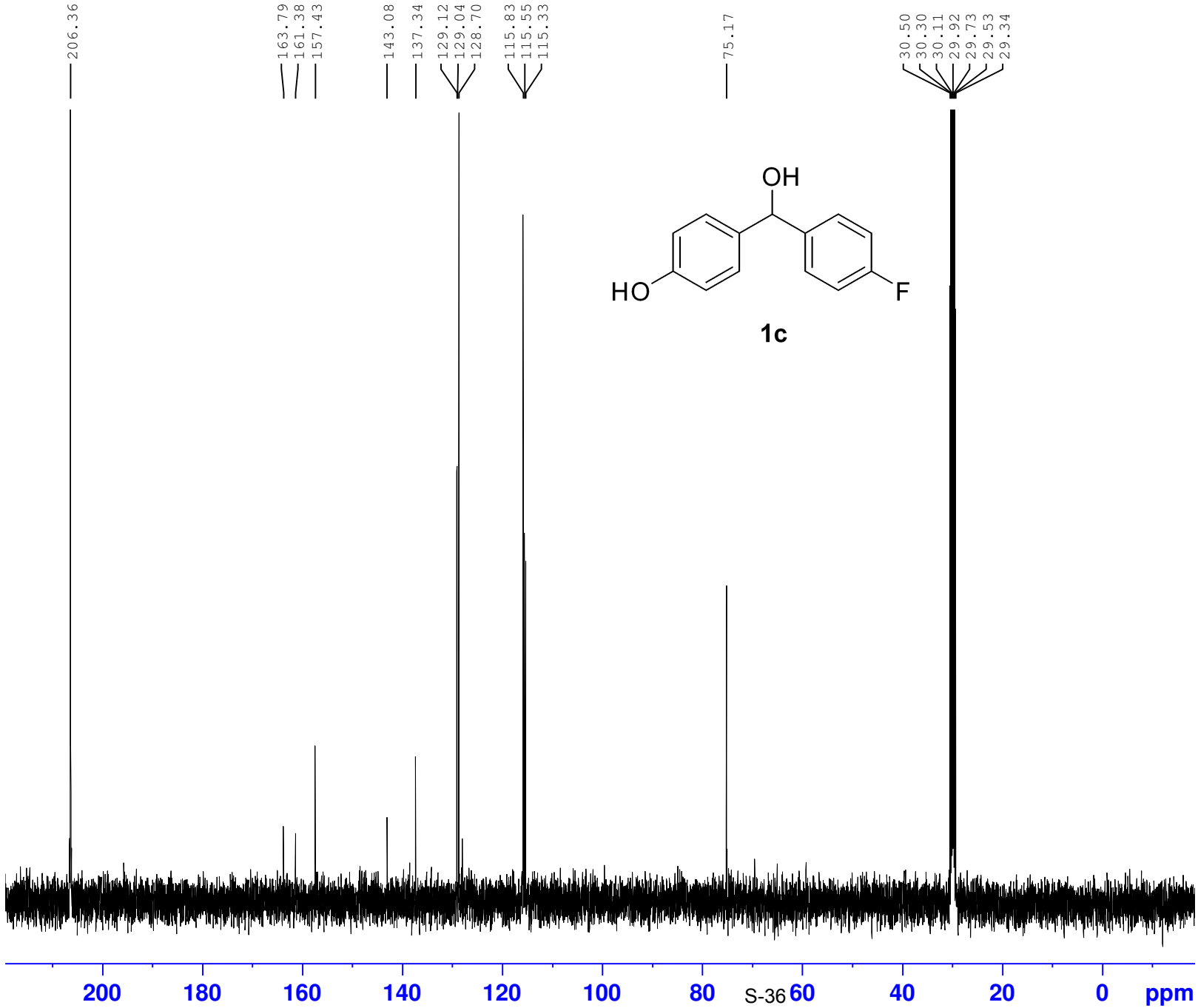



```
Current Data Parameters
NAME          wong-300B
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20150820
Time              15.52
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT         Acetone
NS                    5
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                103.52
DW                62.400 usec
DE                 6.50 usec
TE                295.8 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                 1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                65536
SF           400.1300063 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

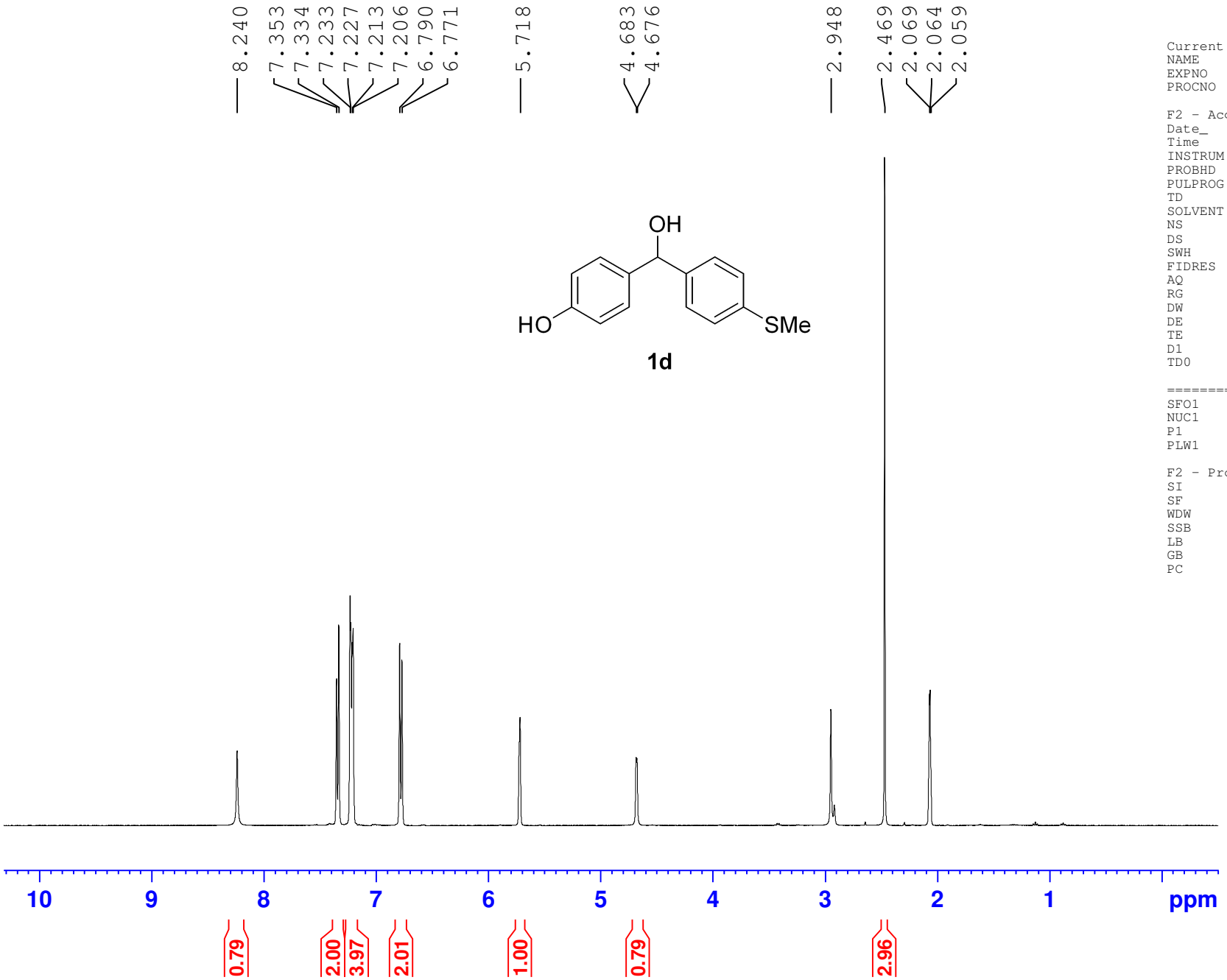



```
Current Data Parameters
NAME                  wong-300B
EXPNO                         1
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20150820
Time                      15.52
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                   zg30
TD                       65536
SOLVENT                Acetone
NS                             5
DS                             2
SWH                    8012.820 Hz
FIDRES                 0.122266 Hz
AQ                     4.0894465 sec
RG                        103.52
DW                        62.400 usec
DE                         6.50 usec
TE                        295.8 K
D1                     1.00000000 sec
TD0                            1

======== CHANNEL f1 ========
SFO1                 400.1324710 MHz
NUC1                          1H
P1                        14.50 usec
PLW1                11.99499989 W

F2 - Processing parameters
SI                            65536
SF                   400.1300063 MHz
WDW                           EM
SSB                0
LB                        0.30 Hz
GB                 0
PC                        1.00
```

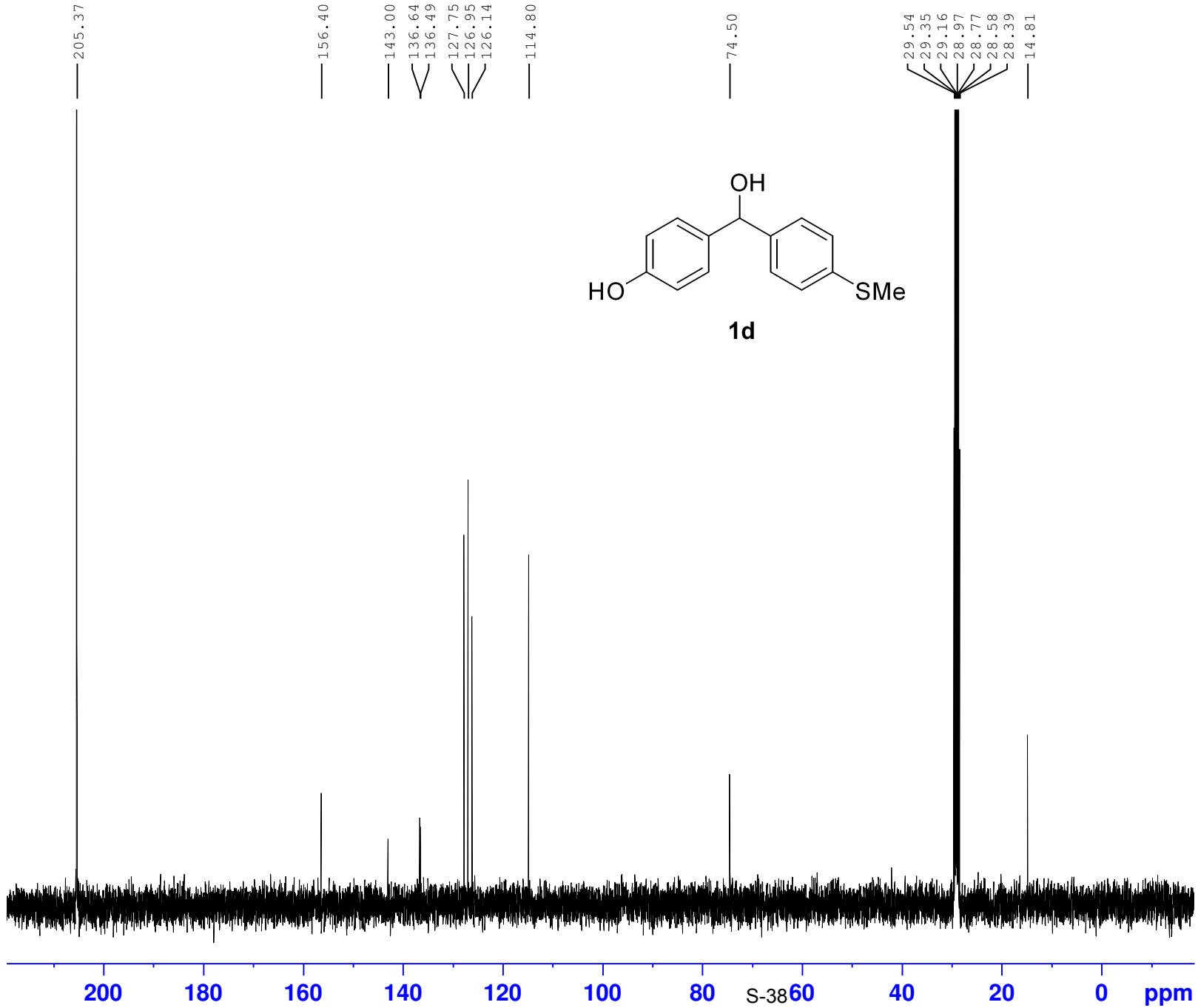



```
Current Data Parameters
NAME          wong-298B
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20150819
Time              15.27
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT         Acetone
NS                    6
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                112.31
DW                62.400 usec
DE                 6.50 usec
TE                296.1 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                 1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                65536
SF           400.1300000 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

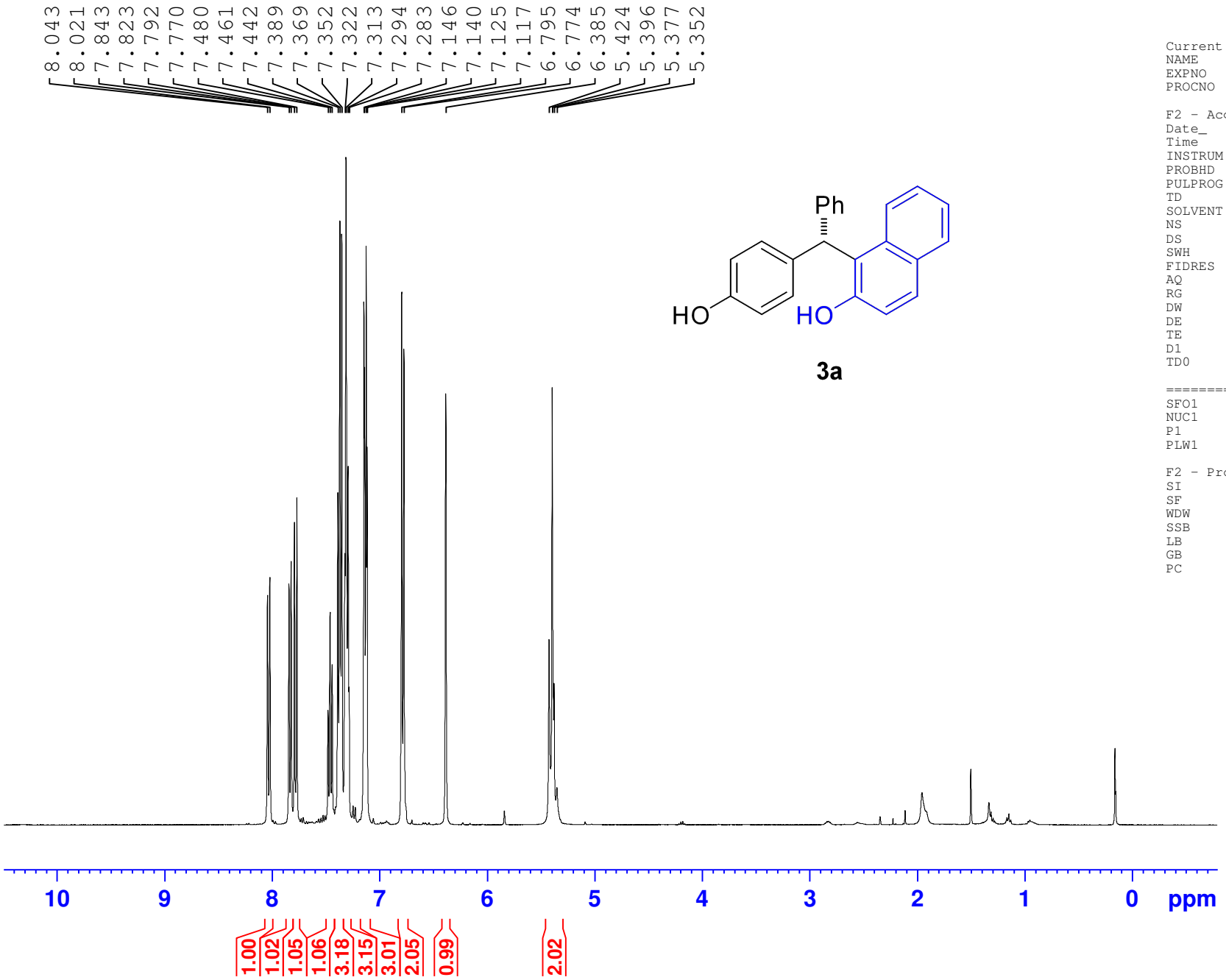



```
Current Data Parameters
NAME          wong-298B
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20150819
Time              15.27
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT         Acetone
NS                    6
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                112.31
DW                62.400 usec
DE                 6.50 usec
TE                296.1 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                1H
P1                14.50 usec
PLW1        11.99499989 W

F2 - Processing parameters
SI                65536
SF          400.1300000 MHz
WDW                 EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

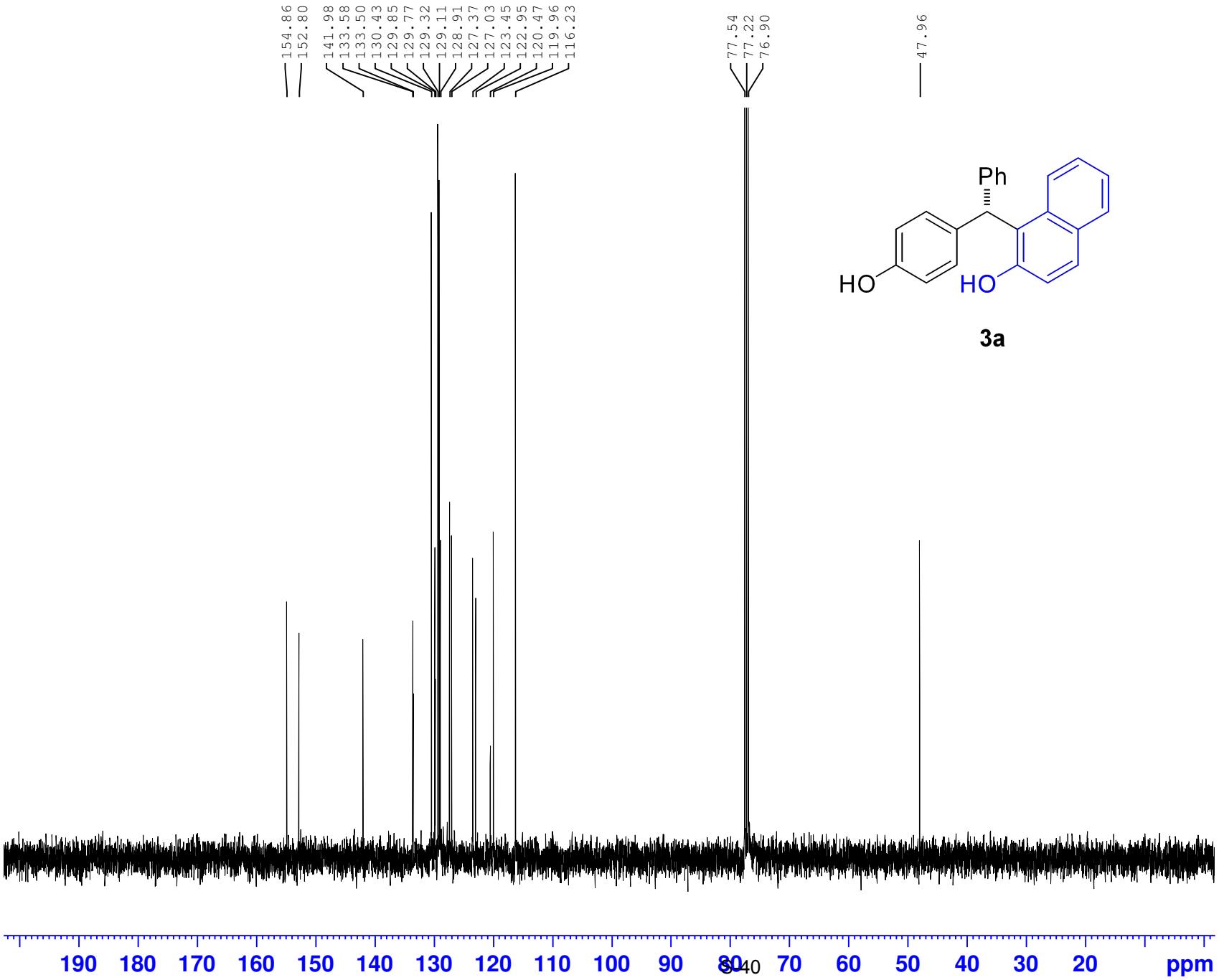



```
Current Data Parameters
NAME                  pft-3a
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_              20151211
Time                  17.18
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                       10
DS                        2
SWH                8012.820 Hz
FIDRES                0.122266 Hz
AQ                 4.0894465 sec
RG                    54.81
DW                    62.400 usec
DE                     6.50 usec
TE                    296.2 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                      1H
P1                    14.50 usec
PLW1              11.99499989 W

F2 - Processing parameters
SI                        65536
SF               400.1300000 MHz
WDW                       EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```

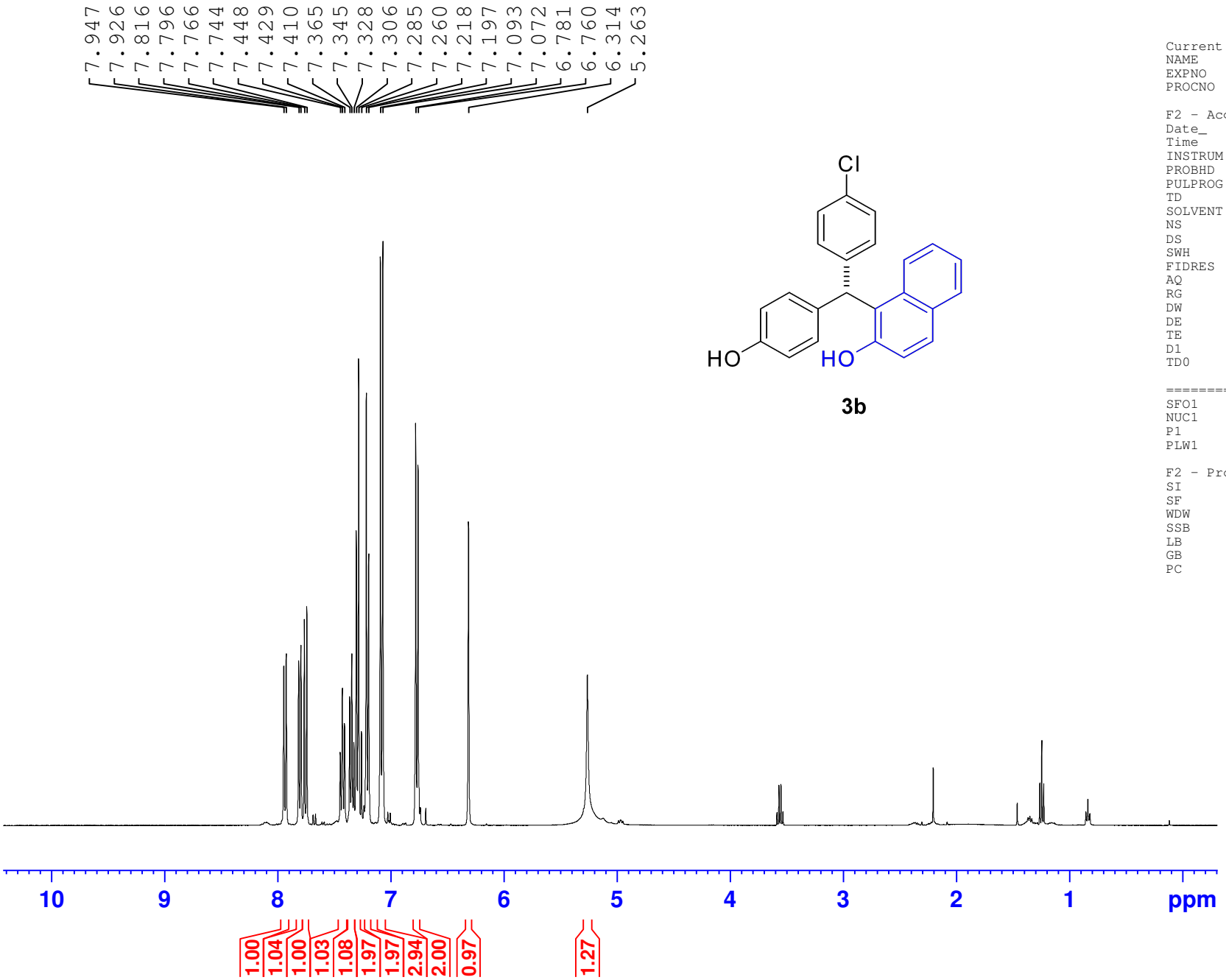



```
Current Data Parameters
NAME                  pft-3a
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_              20151211
Time                  17.18
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                       10
DS                        2
SWH                8012.820 Hz
FIDRES             0.122266 Hz
AQ                 4.0894465 sec
RG                    54.81
DW                    62.400 usec
DE                     6.50 usec
TE                    296.2 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                     1H
P1                    14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                    65536
SF               400.1300000 MHz
WDW                      EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```

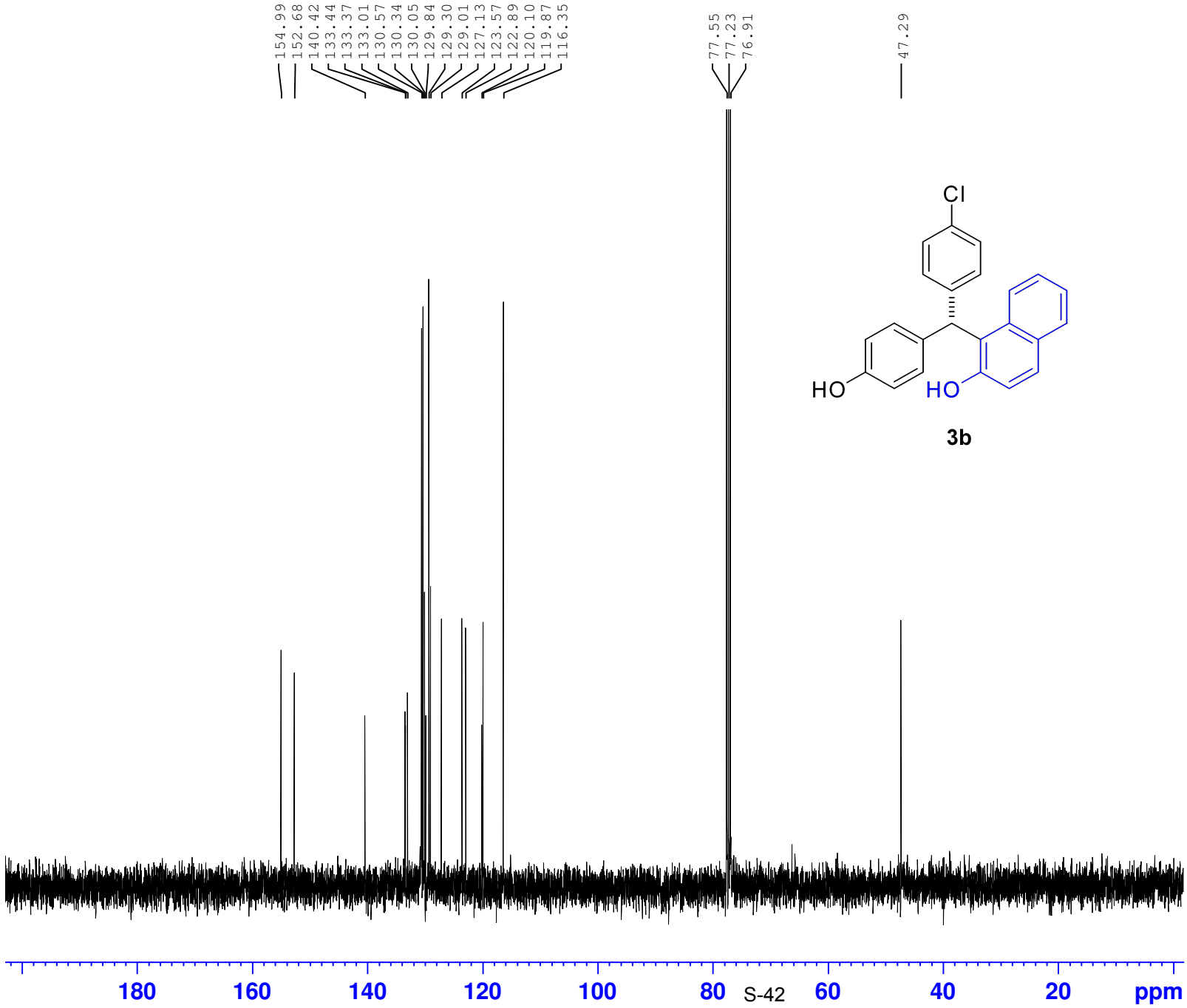



```
Current Data Parameters
NAME                  pdt-3b
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_               20151211
Time                   15.51
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                         5
DS                         2
SWH                8012.820 Hz
FIDRES                0.122266 Hz
AQ                 4.0894465 sec
RG                     62.93
DW                     62.400 usec
DE                      6.50 usec
TE                     296.4 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                     14.50 usec
PLW1            11.99499989 W

F2 - Processing parameters
SI                        65536
SF               400.1300091 MHz
WDW                       EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```



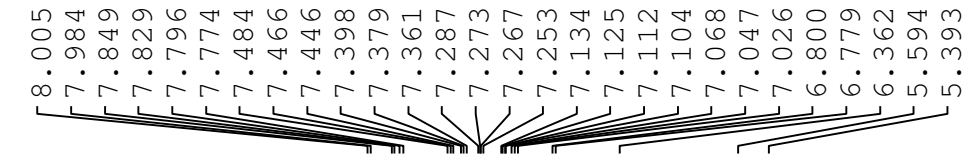
3b

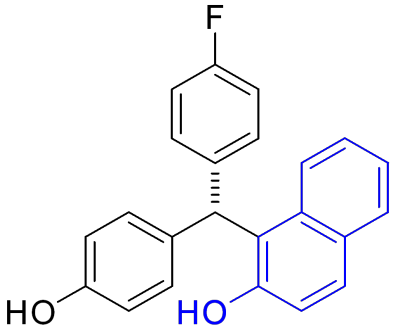

```
Current Data Parameters
NAME                  pdt-3b
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_              20151211
Time                  15.51
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        5
DS                        2
SWH                8012.820 Hz
FIDRES            0.122266 Hz
AQ                4.0894465 sec
RG                    62.93
DW                  62.400 usec
DE                   6.50 usec
TE                  296.4 K
D1             1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1          400.1324710 MHz
NUC1                    1H
P1                  14.50 usec
PLW1          11.99499989 W

F2 - Processing parameters
SI                    65536
SF            400.1300091 MHz
WDW                     EM
SSB       0
LB                   0.30 Hz
GB        0
PC                    1.00
```





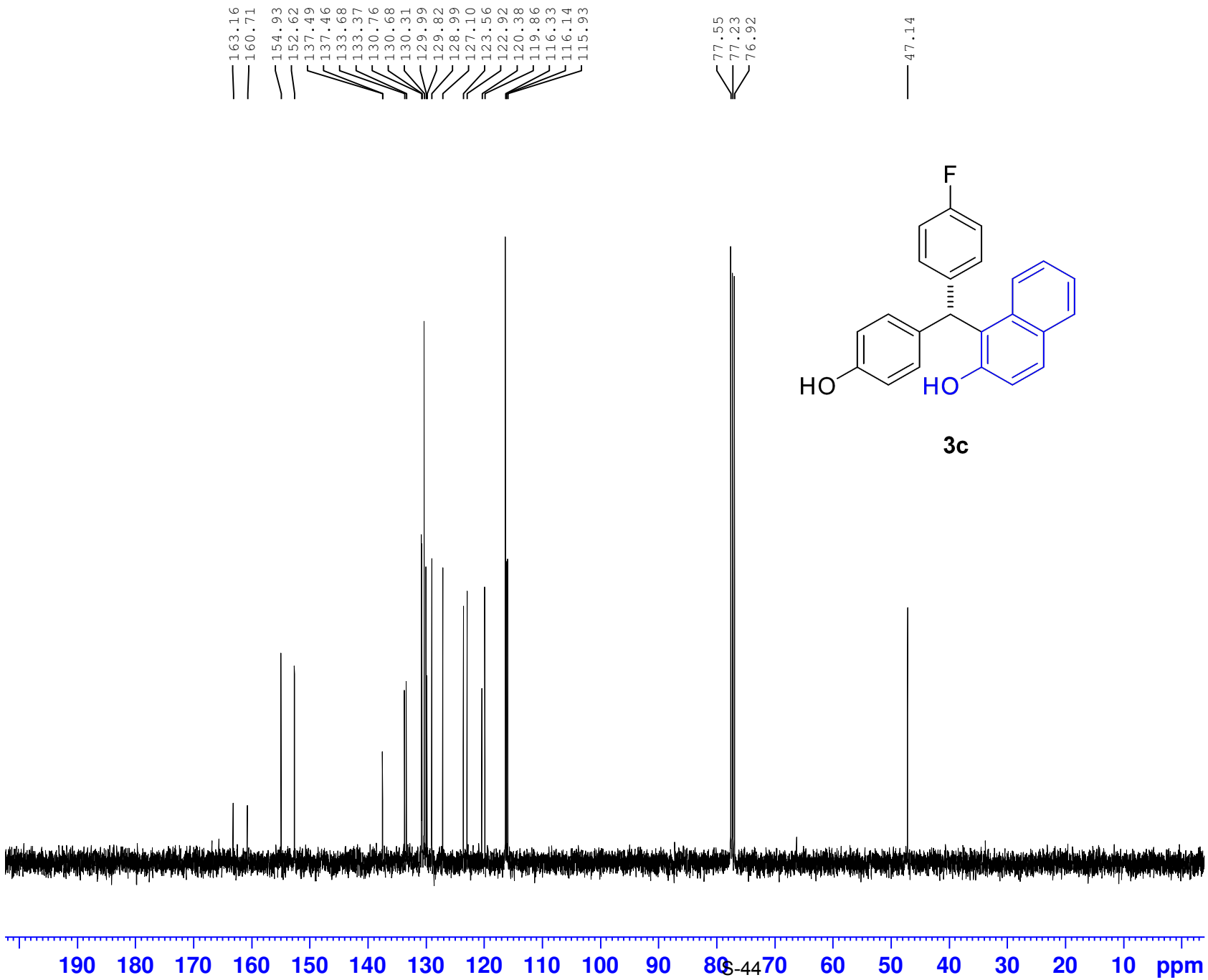
3c


```
Current Data Parameters
NAME          wong-315C
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20150907
Time              17.54
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    5
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                39.46
DW               62.400 usec
DE                6.50 usec
TE               296.3 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                 1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                65536
SF           400.1300000 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

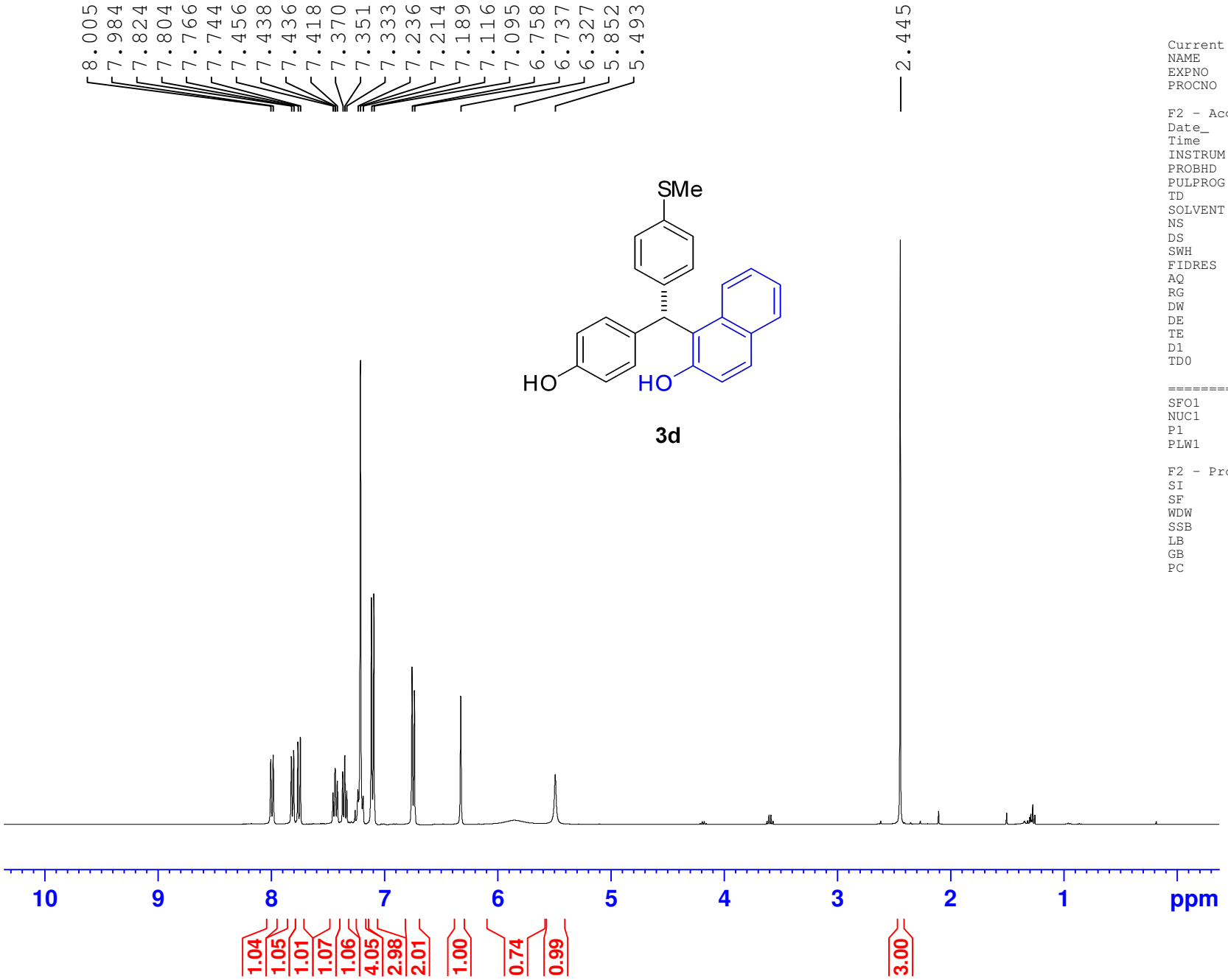


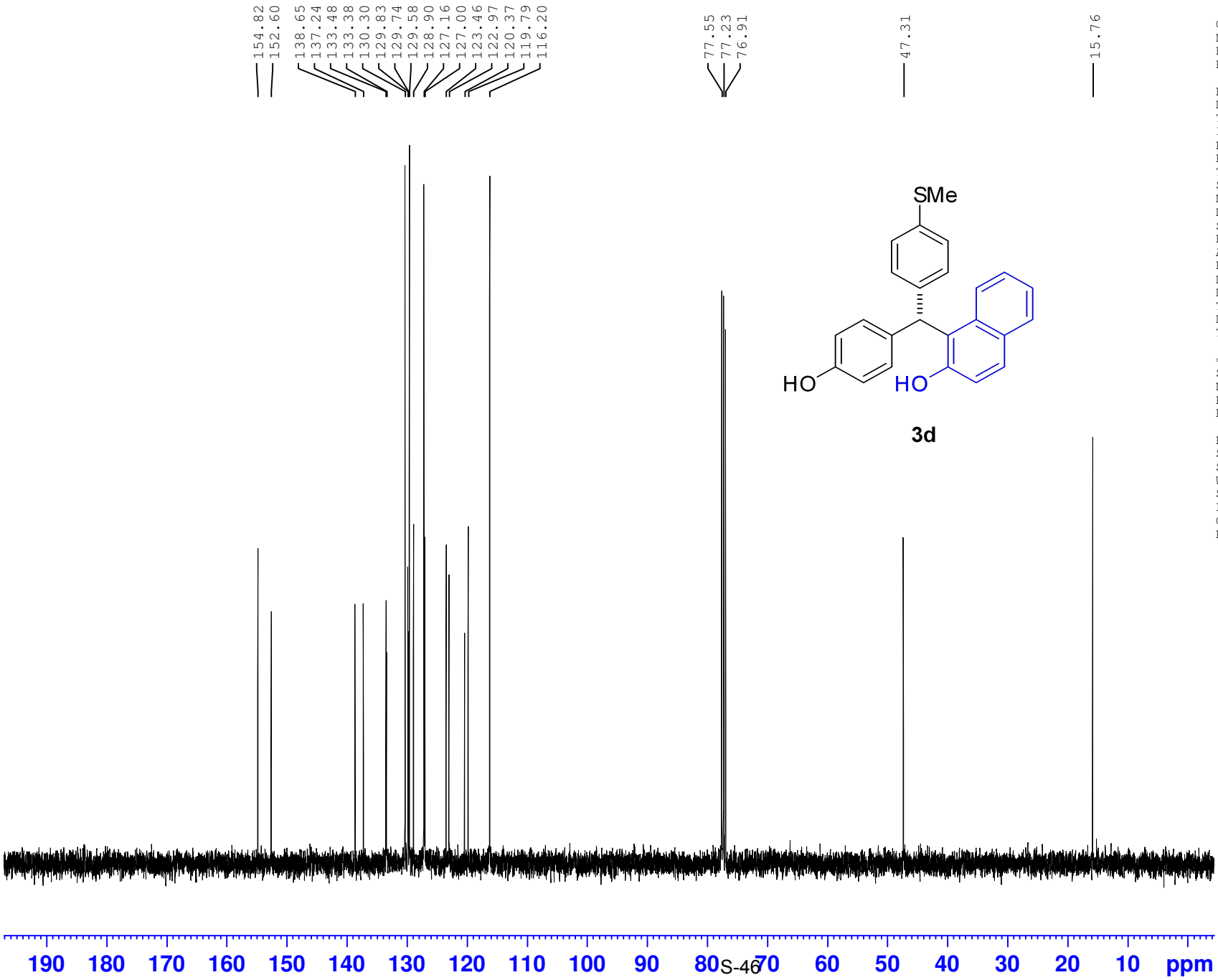

```
Current Data Parameters
NAME           wong-315C
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20150907
Time               17.54
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     5
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 39.46
DW                62.400 usec
DE                 6.50 usec
TE                296.3 K
D1             1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300000 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```


8.005
7.984
7.824
7.804
7.766
7.744
7.456
7.438
7.436
7.418
7.370
7.351
7.333
7.236
7.214
7.189
7.116
7.095
6.758
6.737
6.327
5.852
5.493
2.445
SMe
HO
HO
3d
Current Data Parameters
NAME wong-315A
EXPNO 1
PROCNO 1
F2 - Acquisition Parameters
Date_ 20150907
Time 17.39
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 6
DS 2
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894465 sec
RG 27.78
DW 62.400 usec
DE 6.50 usec
TE 296.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
SFO1 400.1324710 MHz
NUC1 1H
P1 14.50 usec
PLW1 11.99499989 W
F2 - Processing parameters
SI 65536
SF 400.1300087 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
10
9
8
7
6
5
4
3
2
1
ppm
1.04
1.05
1.01
1.07
1.06
4.05
2.98
2.01
1.00
0.74
0.99
3.00

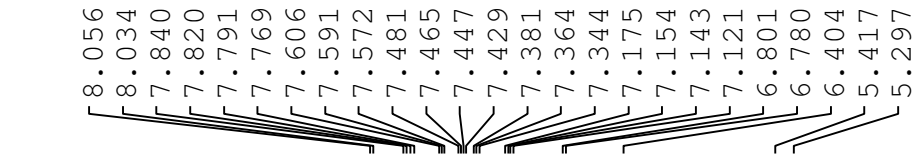


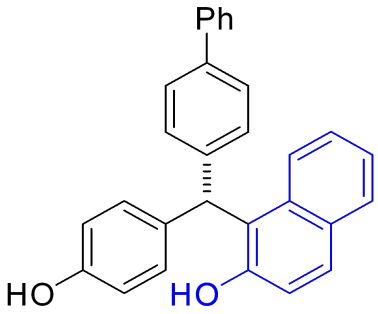

```
Current Data Parameters
NAME                 wong-315A
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150907
Time                     17.39
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                          6
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894465 sec
RG                       27.78
DW                     62.400 usec
DE                      6.50 usec
TE                     296.2 K
D1                1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1              400.1324710 MHz
NUC1                        1H
P1                     14.50 usec
PLW1              11.99499989 W

F2 - Processing parameters
SI                      65536
SF                400.1300087 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```





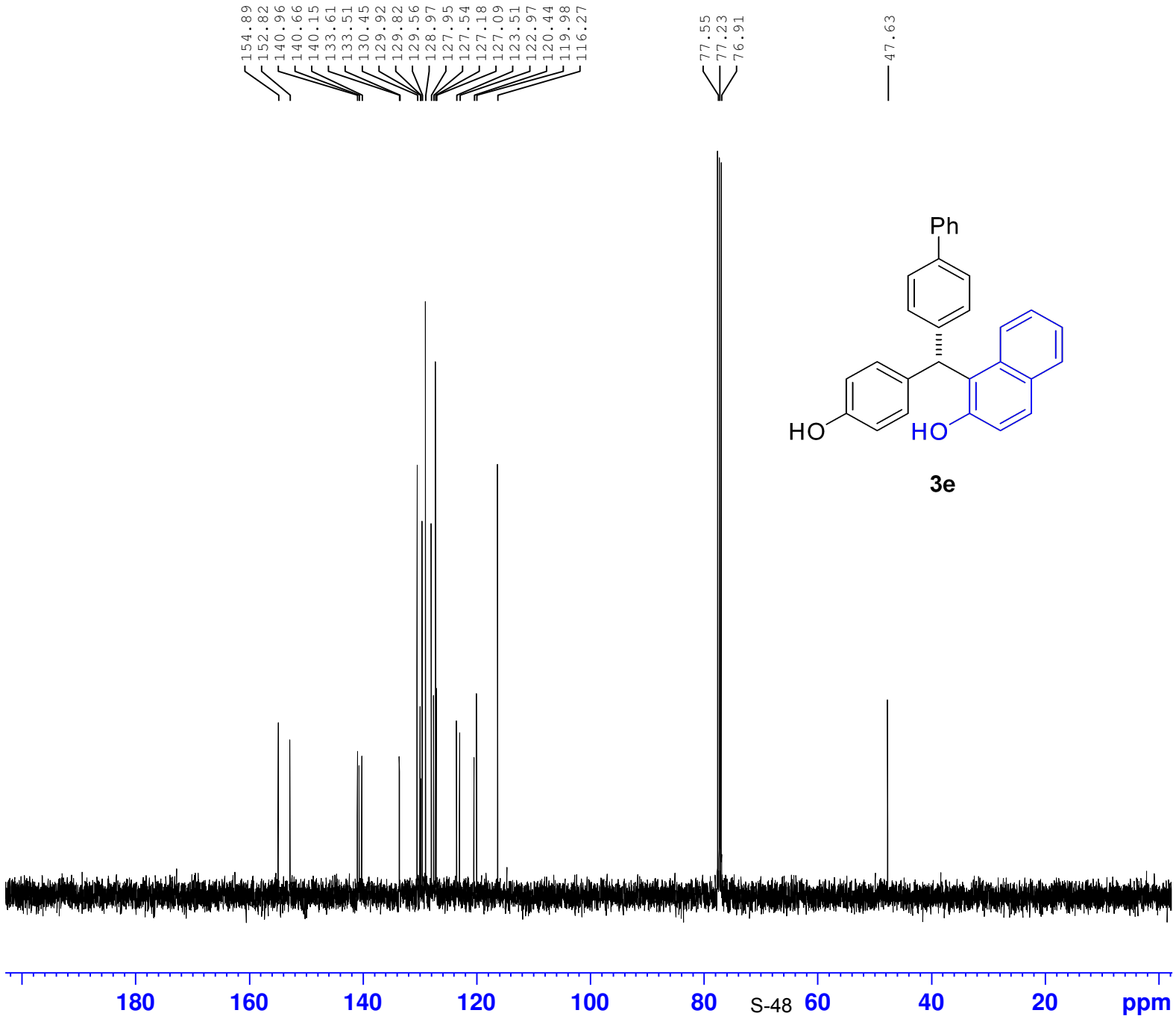
3e

```
Current Data Parameters
NAME                  pdt-3e
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_              20151211
Time                  15.57
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        6
DS                        2
SWH                8012.820 Hz
FIDRES             0.122266 Hz
AQ                 4.0894465 sec
RG                    49.32
DW                    62.400 usec
DE                     6.50 usec
TE                    296.4 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1           400.1324710 MHz
NUC1                     1H
P1                    14.50 usec
PLW1           11.99499989 W

F2 - Processing parameters
SI                    65536
SF             400.1300090 MHz
WDW                      EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```

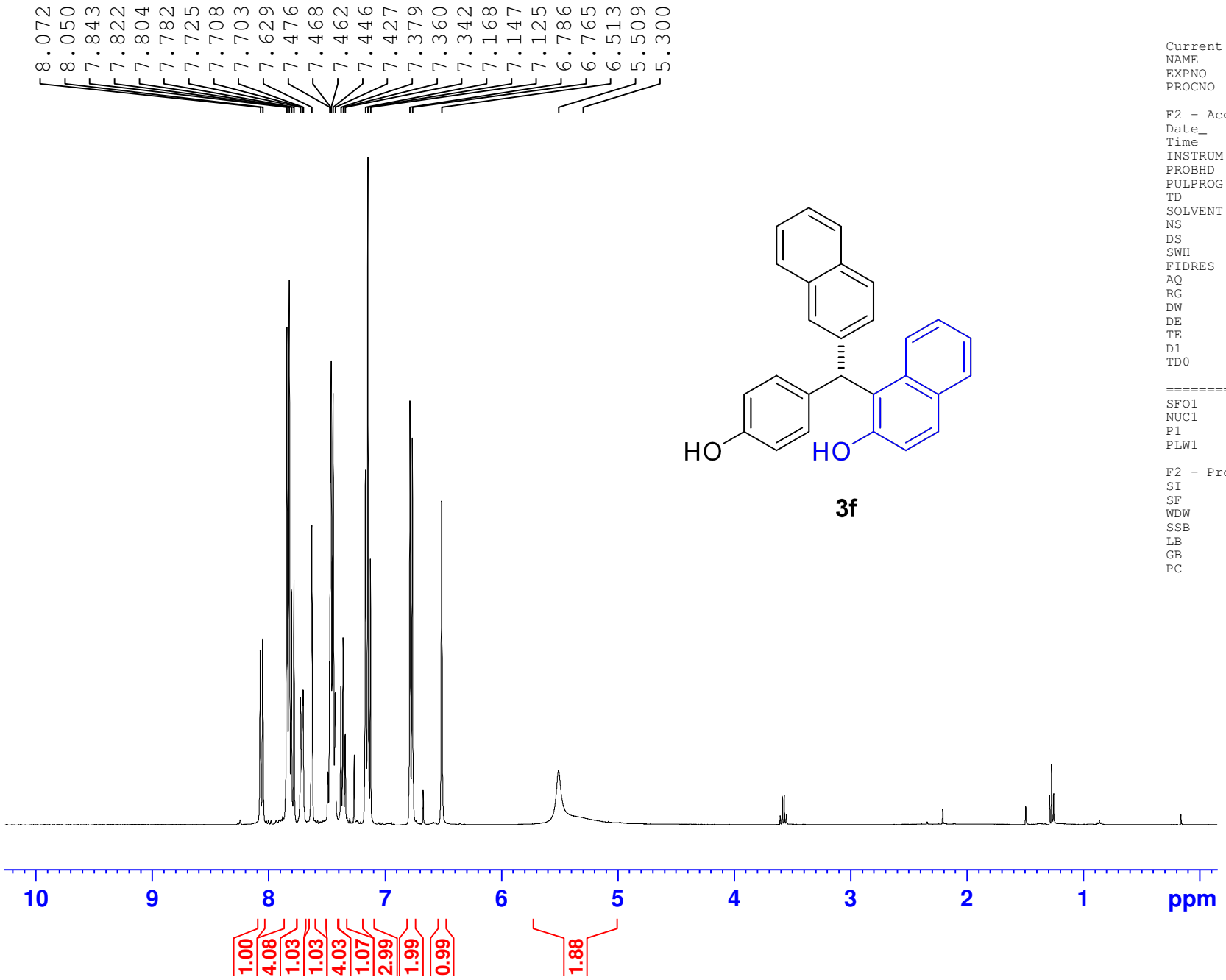



```
Current Data Parameters
NAME                  pdt-3e
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_              20151211
Time                  15.57
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        6
DS                        2
SWH                8012.820 Hz
FIDRES            0.122266 Hz
AQ                4.0894465 sec
RG                     49.32
DW                  62.400 usec
DE                   6.50 usec
TE                   296.4 K
D1              1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1           400.1324710 MHz
NUC1                     1H
P1                    14.50 usec
PLW1           11.99499989 W

F2 - Processing parameters
SI                    65536
SF             400.1300090 MHz
WDW                      EM
SSB       0
LB                    0.30 Hz
GB        0
PC                    1.00
```

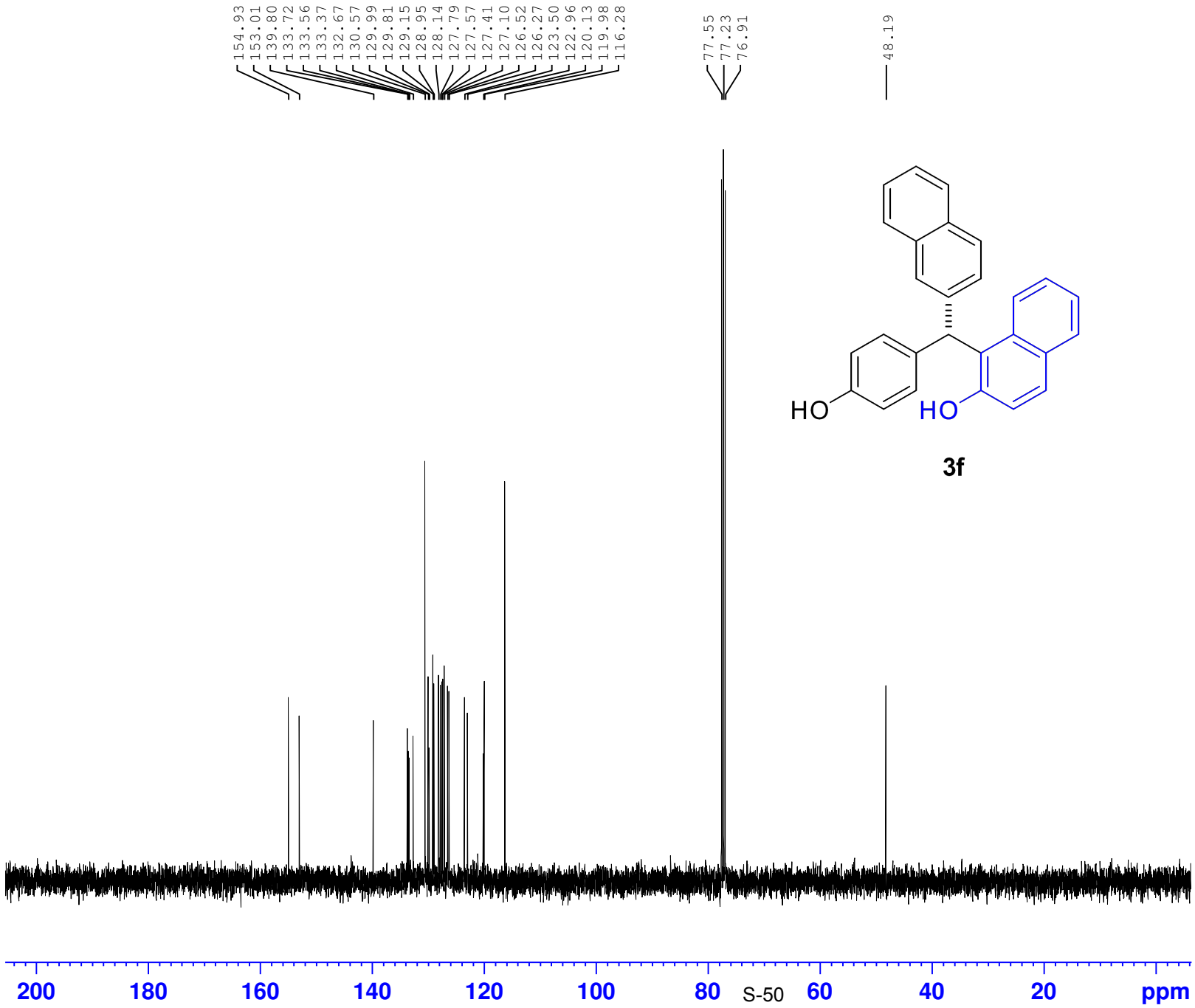



```
Current Data Parameters
NAME                  pdt-3f
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_              20151211
Time                  16.04
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        9
DS                        2
SWH                8012.820 Hz
FIDRES                0.122266 Hz
AQ                 4.0894465 sec
RG                    49.32
DW                    62.400 usec
DE                     6.50 usec
TE                    296.3 K
D1                 1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                     1H
P1                    14.50 usec
PLW1              11.99499989 W

F2 - Processing parameters
SI                    65536
SF               400.1300074 MHz
WDW                      EM
SSB          0
LB                    0.30 Hz
GB           0
PC                    1.00
```

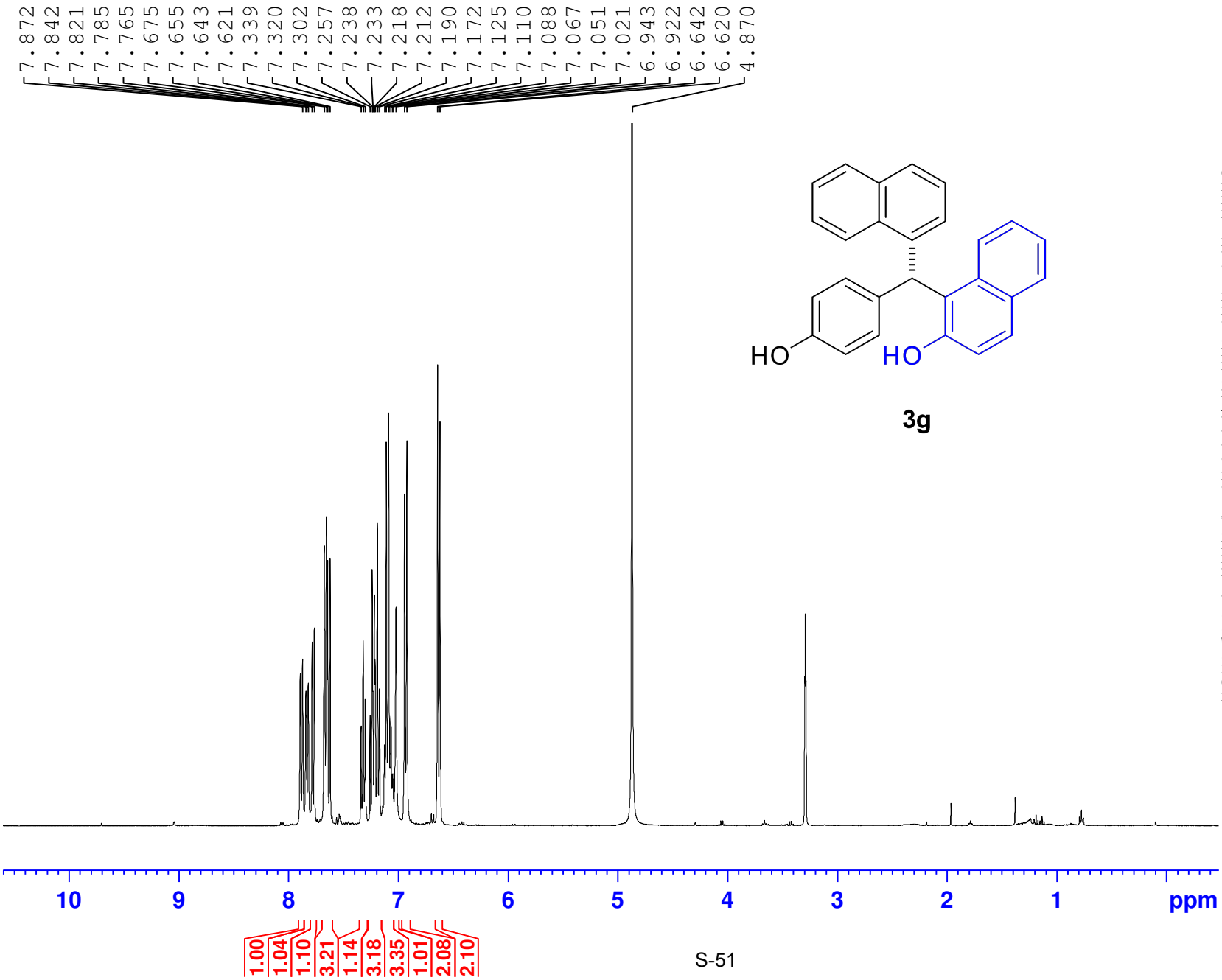



```
Current Data Parameters
NAME                 pdt-3f
EXPNO                     1
PROCNO                    1

F2 - Acquisition Parameters
Date_             20151211
Time                 16.04
INSTRUM              spect
PROBHD    5 mm PABBO BB/
PULPROG               zg30
TD                   65536
SOLVENT              CDCl3
NS                       9
DS                       2
SWH               8012.820 Hz
FIDRES               0.122266 Hz
AQ                4.0894465 sec
RG                   49.32
DW                   62.400 usec
DE                    6.50 usec
TE                   296.3 K
D1              1.00000000 sec
TD0                      1

======== CHANNEL f1 ========
SFO1            400.1324710 MHz
NUC1                    1H
P1                   14.50 usec
PLW1           11.99499989 W

F2 - Processing parameters
SI                   65536
SF              400.1300074 MHz
WDW                     EM
SSB         0
LB                    0.30 Hz
GB          0
PC                    1.00
```

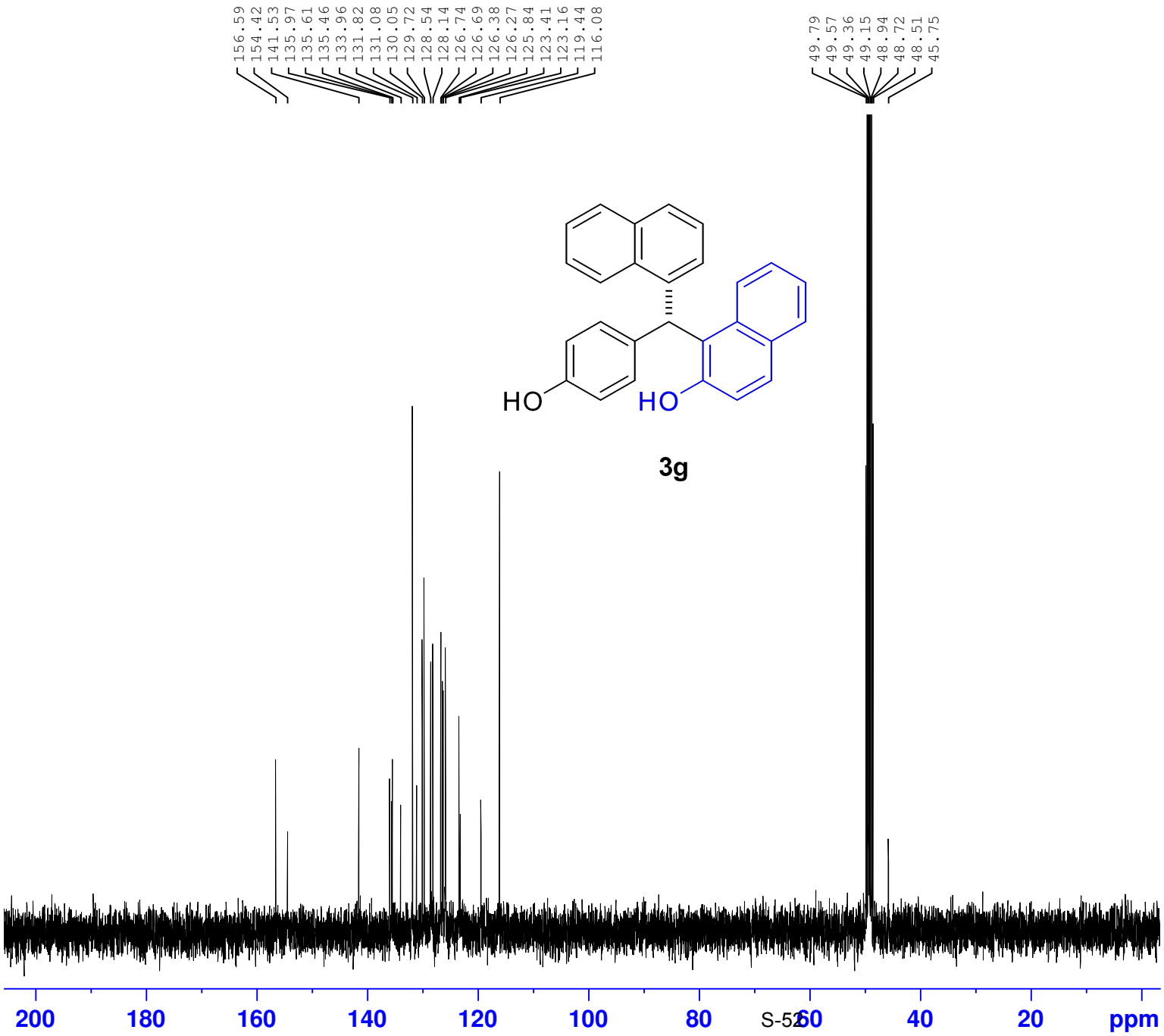



```
Current Data Parameters
NAME                  pdt-3g
EXPNO                      3
PROCNO                     1

F2 - Acquisition Parameters
Date_               20160106
Time                   16.05
INSTRUM                spect
PROBHD   5 mm DUL 13C-1
PULPROG                zg30
TD                    65536
SOLVENT                MeOD
NS                        6
DS                        2
SWH                8012.820 Hz
FIDRES             0.122266 Hz
AQ                 4.0894465 sec
RG                     82.92
DW                    62.400 usec
DE                     6.50 usec
TE                    296.4 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                     14.30 usec
PLW1              9.10000038 W

F2 - Processing parameters
SI                    65536
SF               400.1300154 MHz
WDW                       EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```

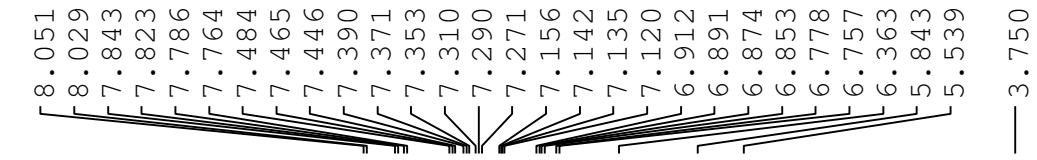


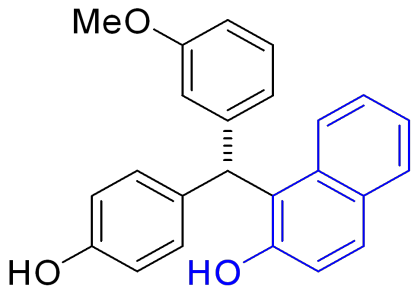

```
Current Data Parameters
NAME                 pdt-3g
EXPNO                     3
PROCNO                    1

F2 - Acquisition Parameters
Date_              20160106
Time                  16.05
INSTRUM               spect
PROBHD    5 mm DUL 13C-1
PULPROG                zg30
TD                    65536
SOLVENT                MeOD
NS                        6
DS                        2
SWH               8012.820 Hz
FIDRES               0.122266 Hz
AQ                4.0894465 sec
RG                    82.92
DW                   62.400 usec
DE                    6.50 usec
TE                   296.4 K
D1             1.00000000 sec
TD0                       1

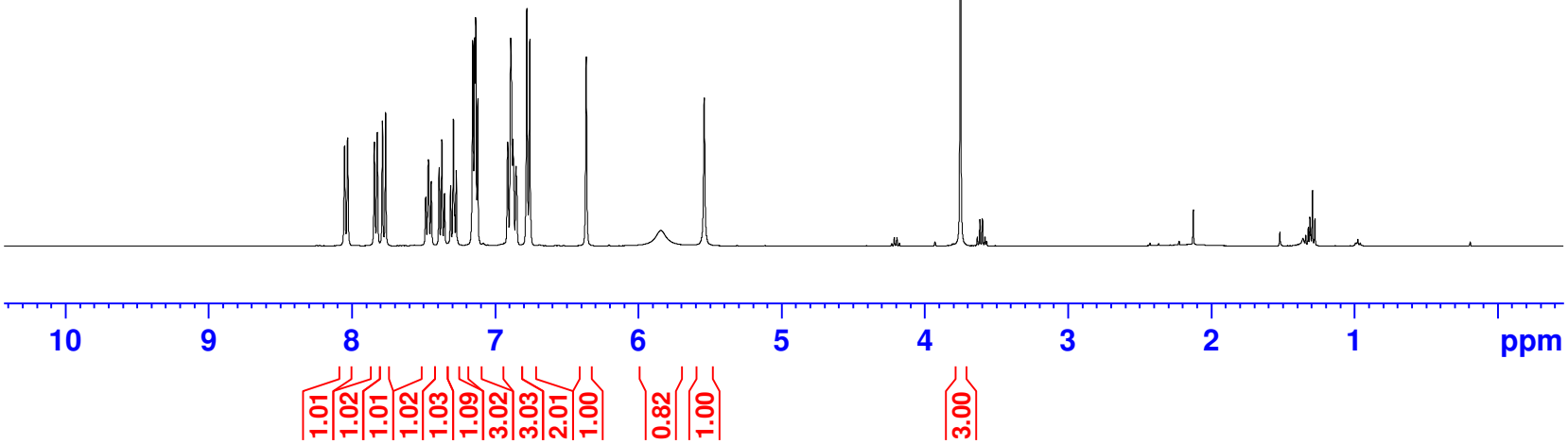
======== CHANNEL f1 ========
SFO1           400.1324710 MHz
NUC1                    1H
P1                   14.30 usec
PLW1            9.10000038 W

F2 - Processing parameters
SI                    65536
SF             400.1300154 MHz
WDW                     EM
SSB          0
LB                    0.30 Hz
GB           0
PC                    1.00
```

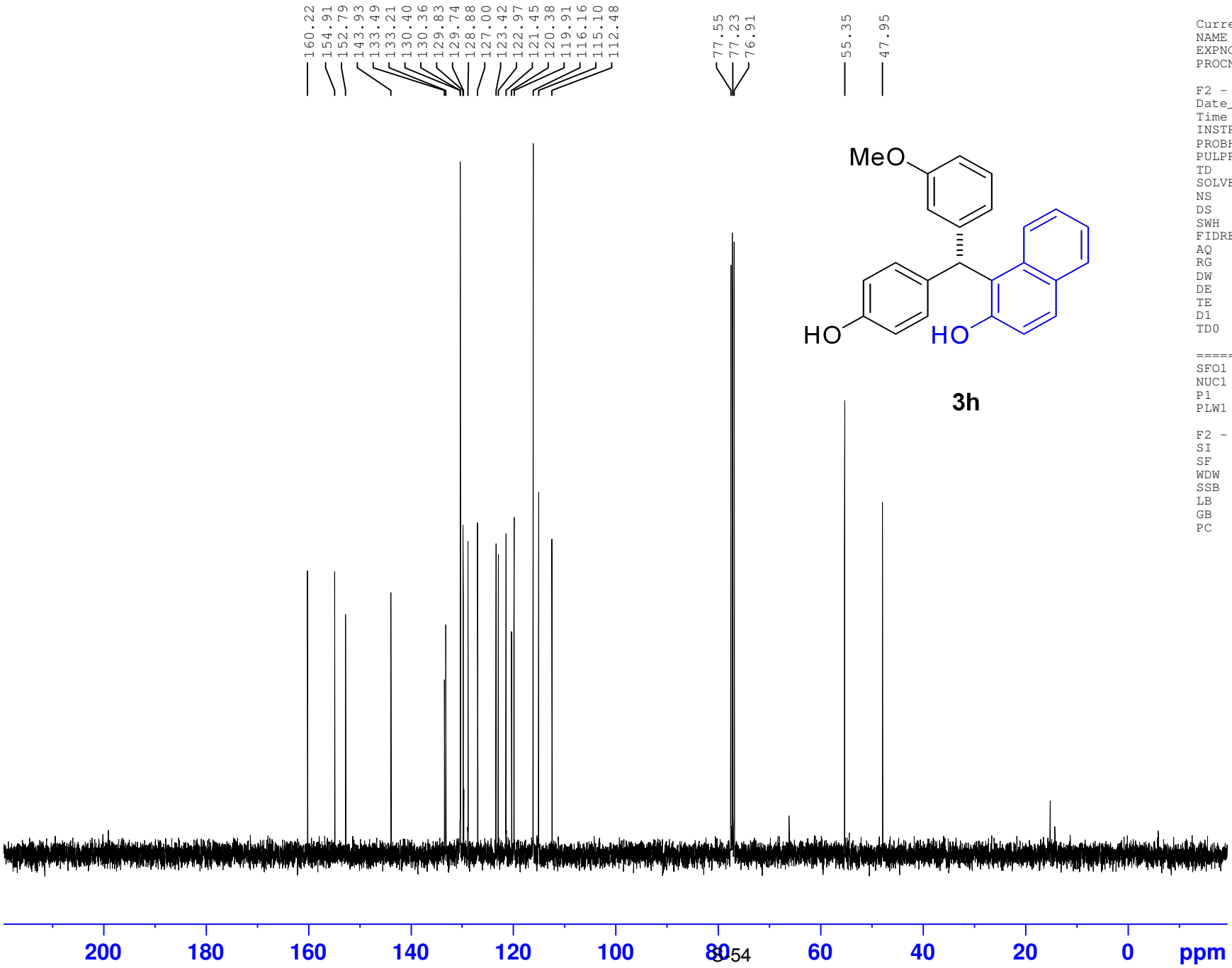




3h




```
Current Data Parameters
NAME          wong-315B
EXPNO                 1
PROCNO                1
F2 - Acquisition Parameters
Date_          20150907
Time              17.49
INSTRUM         spect
PROBHD   5 mm PABBO BB/
PULPROG         zg30
TD             65536
SOLVENT           CDCl3
NS                   16
DS                    2
SWH           8012.820 Hz
FIDRES        0.122266 Hz
AQ            4.0894465 sec
RG                 71.4
DW              62.400 usec
DE               6.50 usec
TE              296.2 K
D1            1.00000000 sec
TD0                   1
======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                1H
P1               14.50 usec
PLW1        11.99499989 W
SI                65536
SF01        400.1300087 MHz
WDW                EM
SSB                   0
LB                 0.30 Hz
GB                    0
PC                 1.00
```

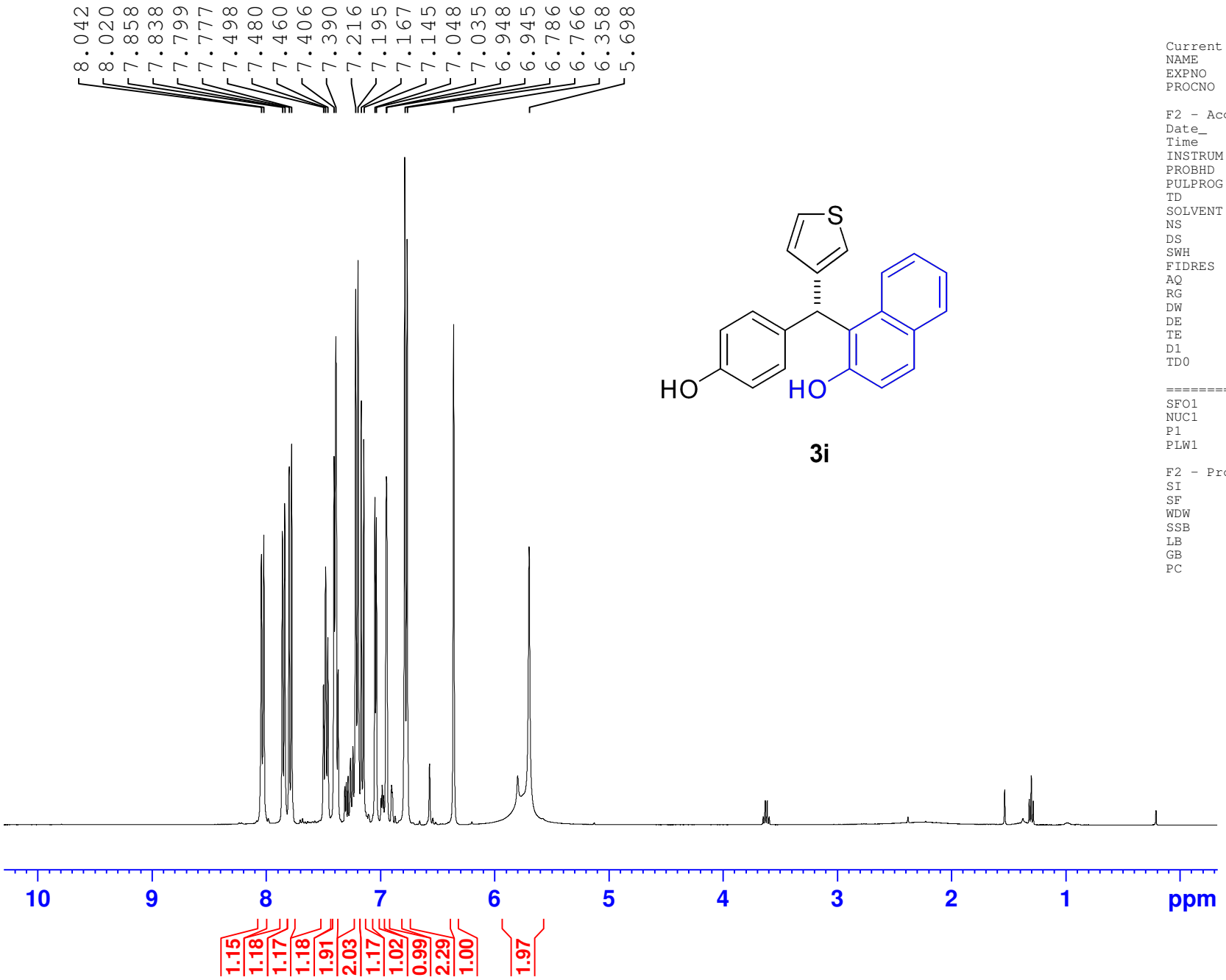



```
Current Data Parameters
NAME          wong-315A
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20150907
Time              17.39
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    6
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                27.78
DW               62.400 usec
DE                6.50 usec
TE                296.2 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                 1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                65536
SF           400.1300087 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

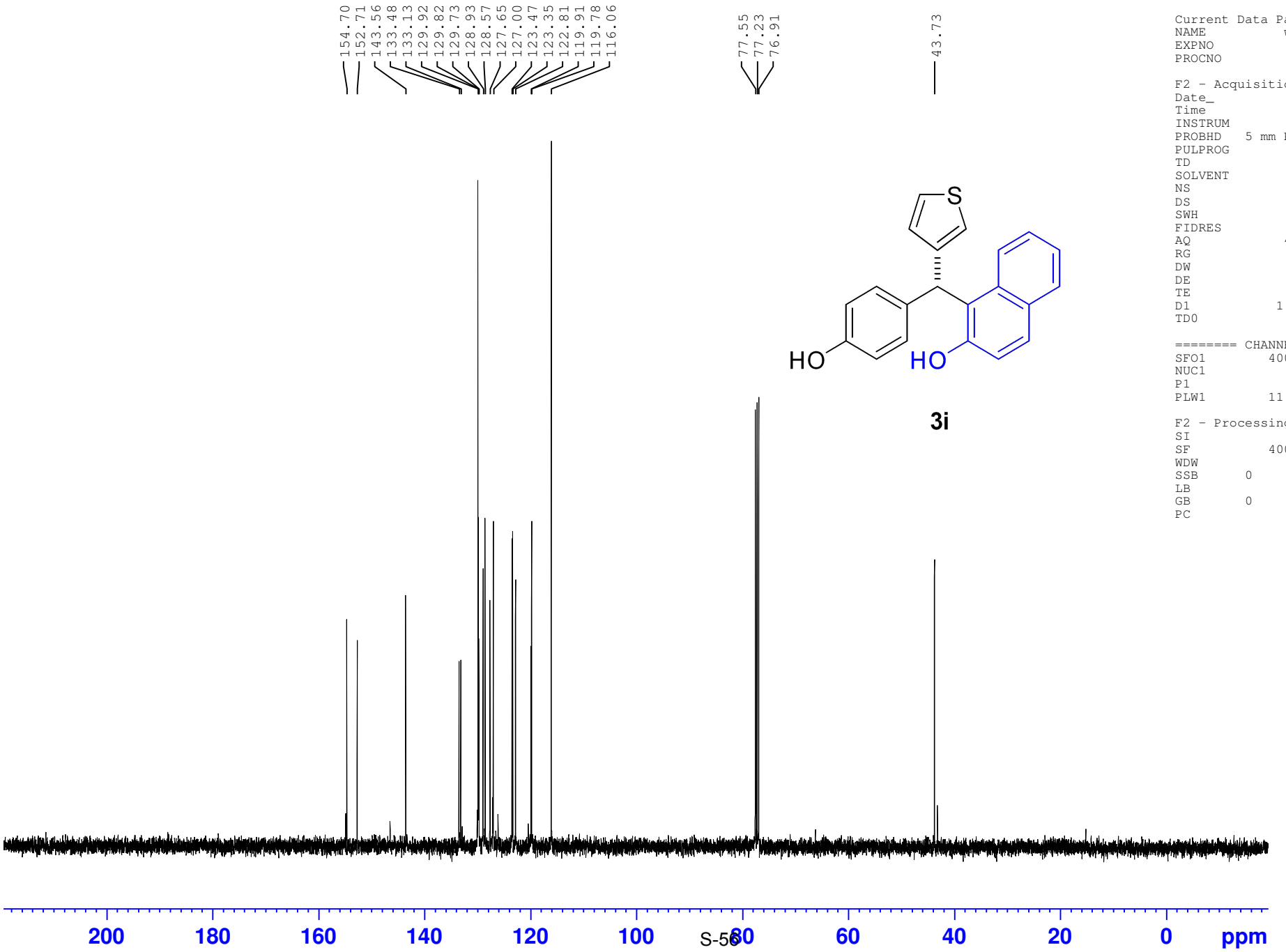



```
Current Data Parameters
NAME          wong-317B
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20150908
Time              17.05
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    7
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                34.77
DW               62.400 usec
DE                6.50 usec
TE                295.9 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                 1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                65536
SF           400.1300000 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

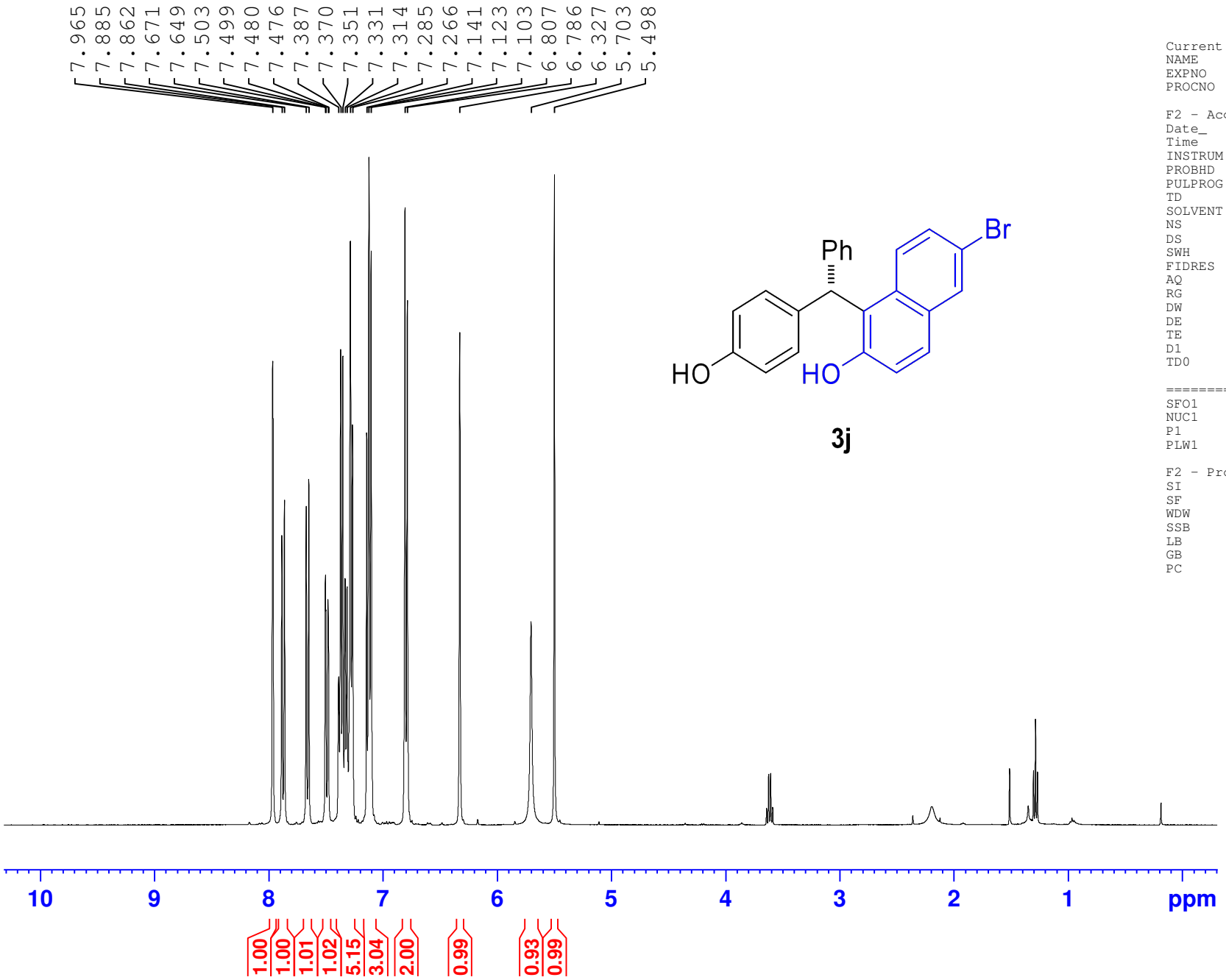



```
Current Data Parameters
NAME                  wong-317B
EXPNO                         1
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20150908
Time                      17.05
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                   zg30
TD                       65536
SOLVENT                  CDCl3
NS                            7
DS                            2
SWH                    8012.820 Hz
FIDRES                 0.122266 Hz
AQ                     4.0894465 sec
RG                        34.77
DW                       62.400 usec
DE                        6.50 usec
TE                       295.9 K
D1                    1.00000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                400.1324710 MHz
NUC1                        1H
P1                       14.50 usec
PLW1                11.99499989 W

F2 - Processing parameters
SI                       65536
SF                  400.1300000 MHz
WDW                         EM
SSB          0
LB                        0.30 Hz
GB           0
PC                        1.00
```

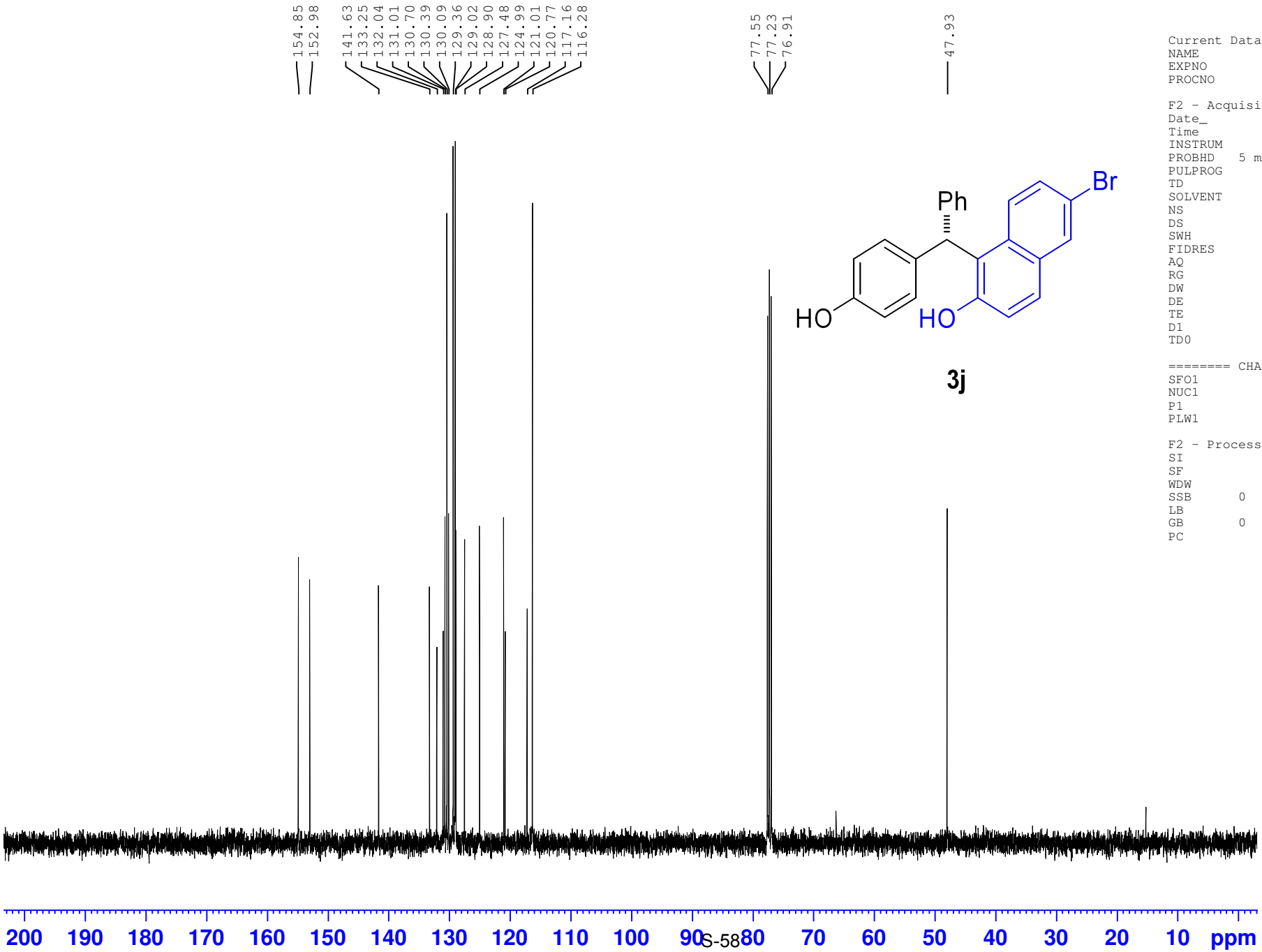



```
Current Data Parameters
NAME          wong-358A
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20151102
Time              17.10
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    5
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                34.77
DW               62.400 usec
DE                6.50 usec
TE               296.2 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                1H
P1                14.50 usec
PLW1        11.99499989 W

F2 - Processing parameters
SI                65536
SF          400.1300000 MHz
WDW                 EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

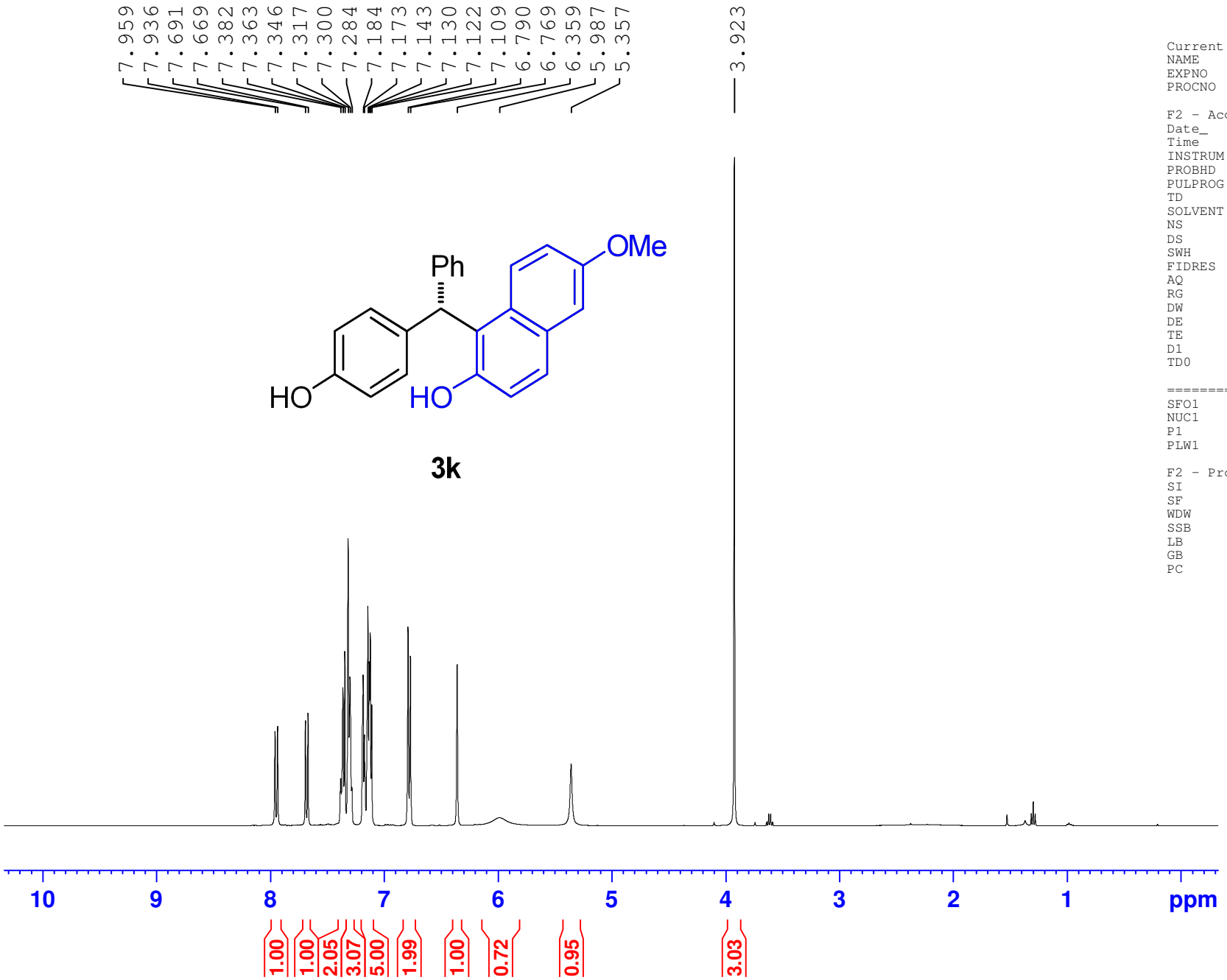



```
Current Data Parameters
NAME                 wong-358A
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_               20151102
Time                   17.10
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                         5
DS                         2
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     34.77
DW                    62.400 usec
DE                     6.50 usec
TE                    296.2 K
D1                  1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                    14.50 usec
PLW1            11.99499989 W

F2 - Processing parameters
SI                     65536
SF               400.1300000 MHz
WDW                       EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```

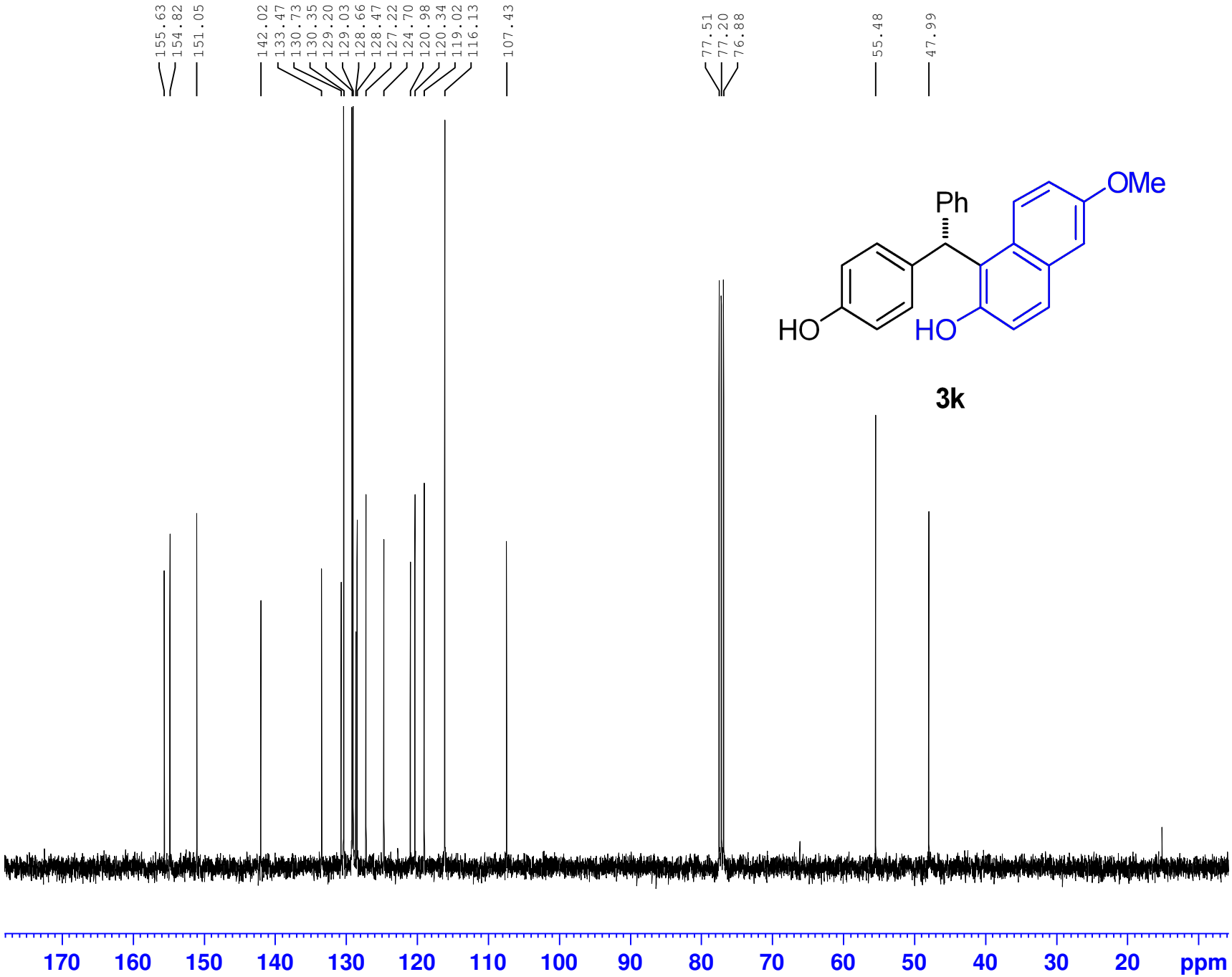



```
Current Data Parameters
NAME          wong-363A
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20151103
Time              17.08
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                   10
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                31.55
DW               62.400 usec
DE                6.50 usec
TE                296.1 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                 1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                65536
SF           400.1300000 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```



3k

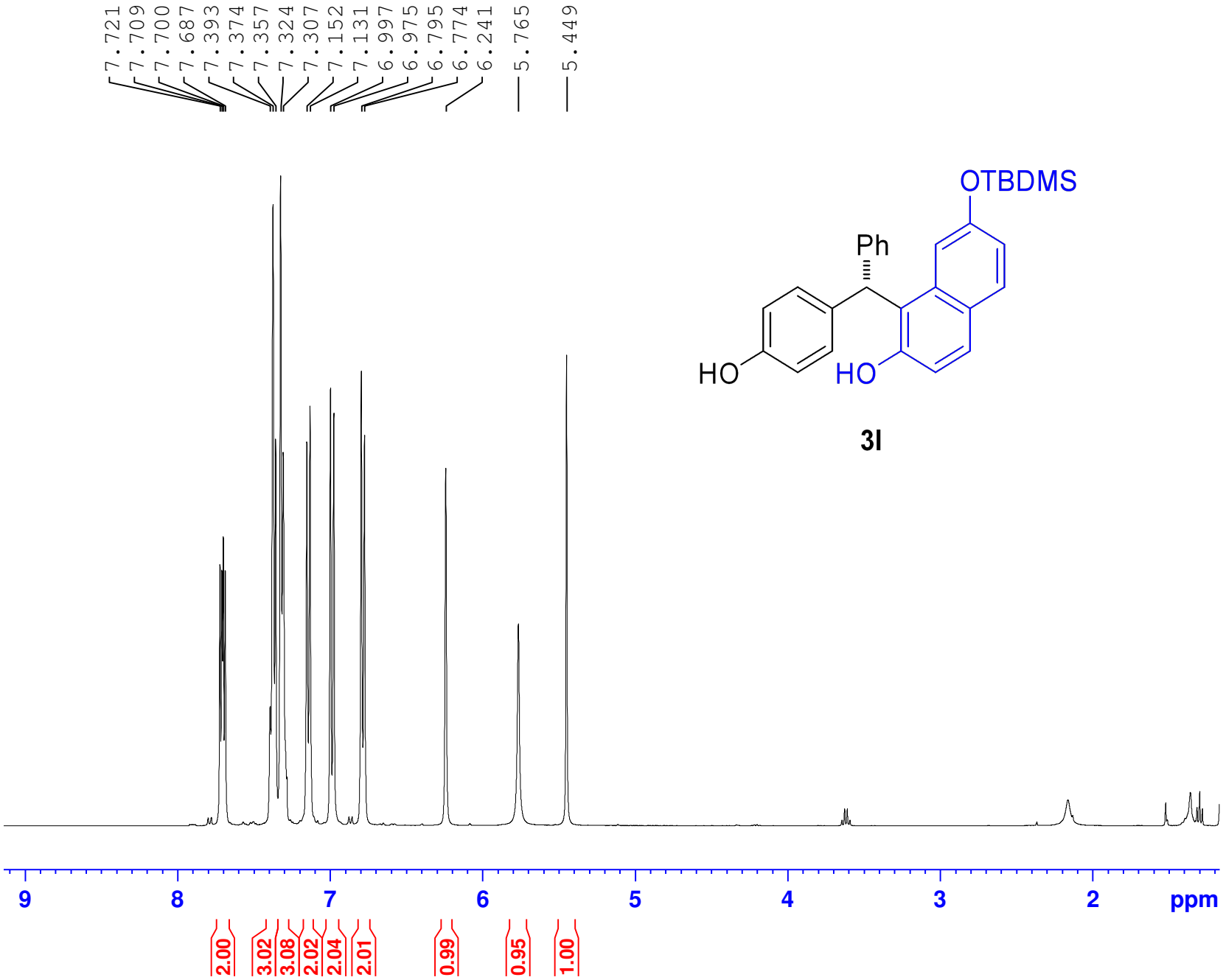
```
Current Data Parameters
NAME          wong-363A
EXPNO                 2
PROCNO                1

F2 - Acquisition Parameters
Date_          20151103
Time              17.11
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD                65536
SOLVENT           CDCl3
NS                   20
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               296.7 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6127667 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

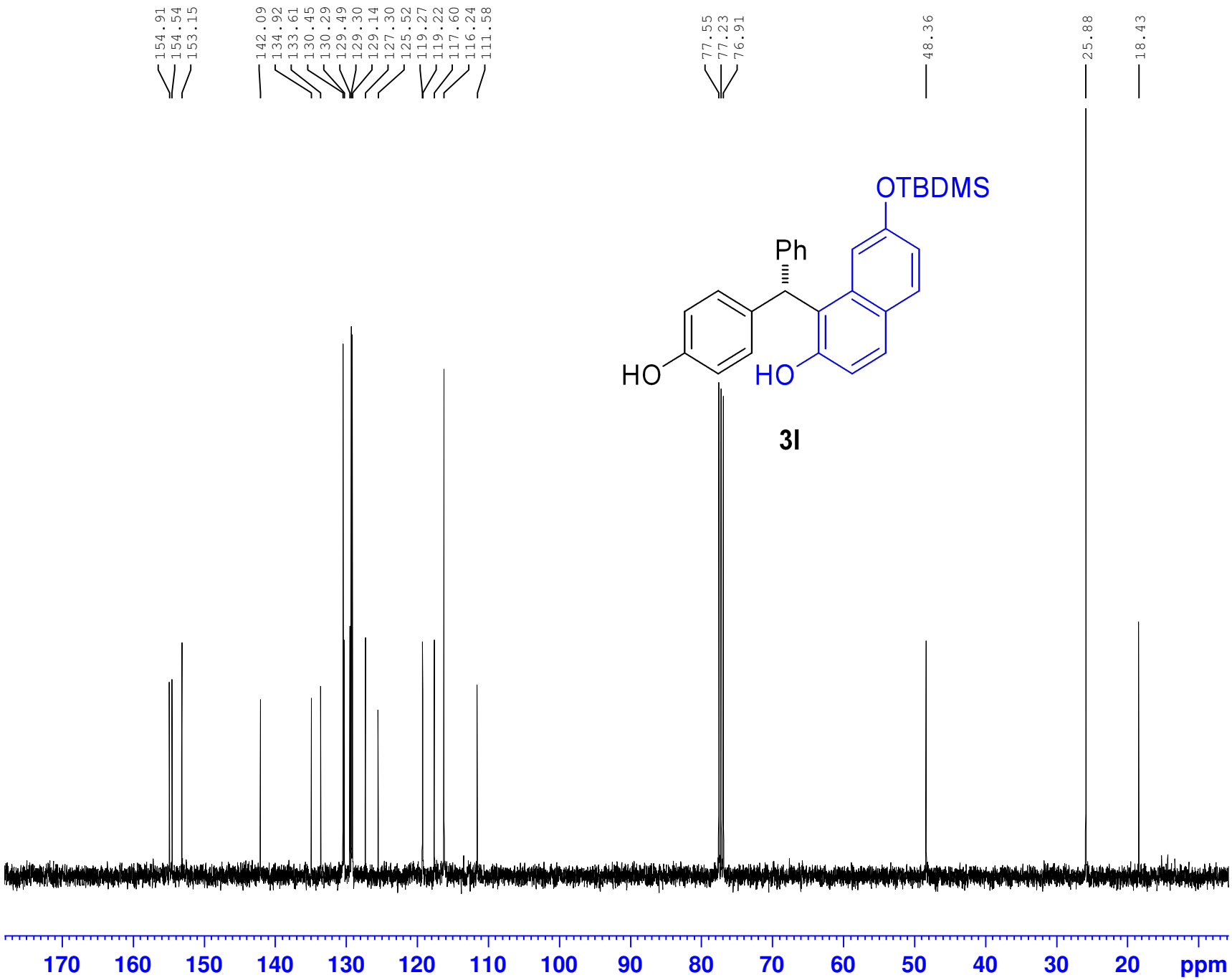



```
Current Data Parameters
NAME          wong-365A
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20151104
Time              17.23
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    7
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                22.47
DW               62.400 usec
DE                6.50 usec
TE                296.0 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                1H
P1                14.50 usec
PLW1        11.99499989 W

F2 - Processing parameters
SI                65536
SF          400.1300000 MHz
WDW                 EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```



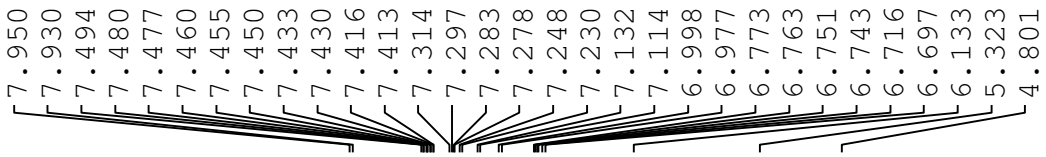

```
Current Data Parameters
NAME          wong-365A
EXPNO                 2
PROCNO                1

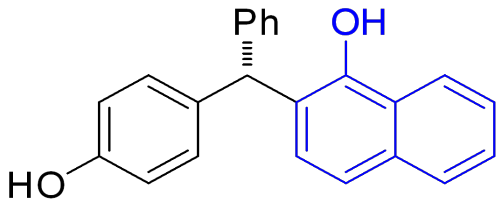
F2 - Acquisition Parameters
Date_          20151104
Time              17.26
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD                65536
SOLVENT           CDCl3
NS                   15
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               296.6 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                 32768
SF          100.6127593 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```





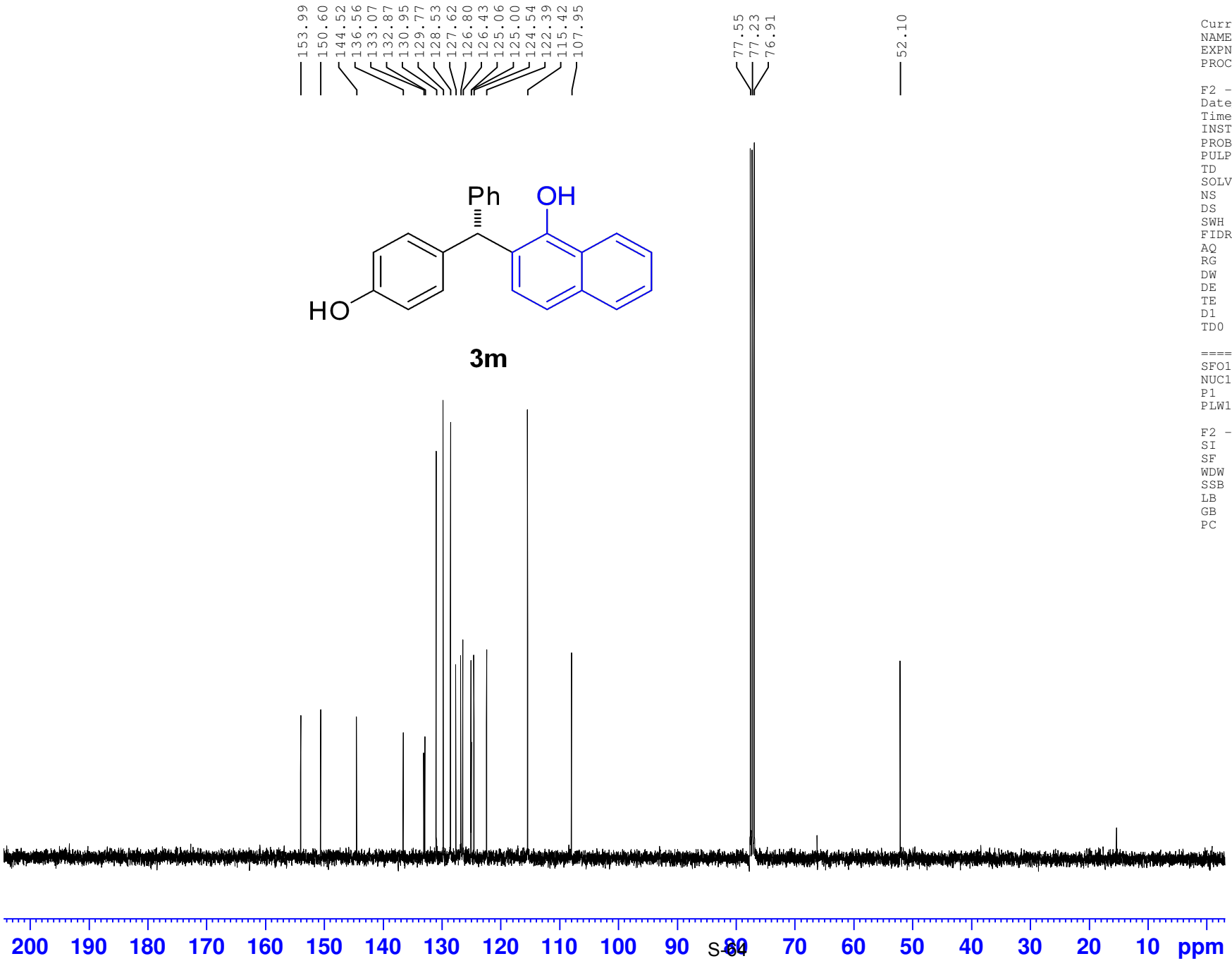
3m


```
Current Data Parameters
NAME                  pdt-3m
EXPNO                      3
PROCNO                     1

F2 - Acquisition Parameters
Date_               20160106
Time                   16.13
INSTRUM                spect
PROBHD    5 mm DUL 13C-1
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                         5
DS                         2
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     187.77
DW                     62.400 usec
DE                      6.50 usec
TE                     296.5 K
D1                  1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1           400.1324710 MHz
NUC1                      1H
P1                     14.30 usec
PLW1            9.10000038 W

F2 - Processing parameters
SI                        65536
SF              400.1300000 MHz
WDW                       EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

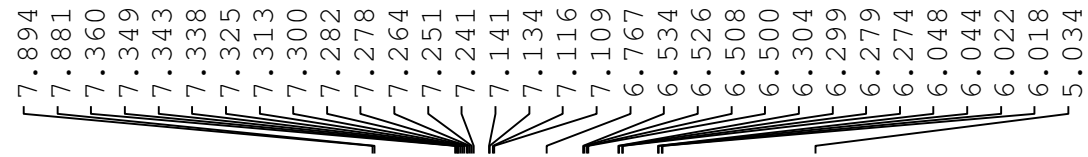


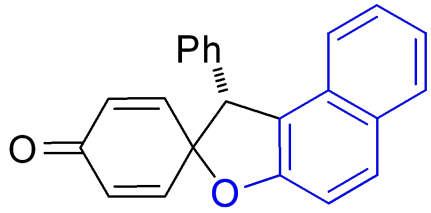
Current Data Parameters
NAME pft-3m
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20151211
Time 17.32
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 7
DS 2
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894465 sec
RG 88.84
DW 62.400 usec
DE 6.50 usec
TE 296.3 K
D1 1.00000000 sec
TD0 1

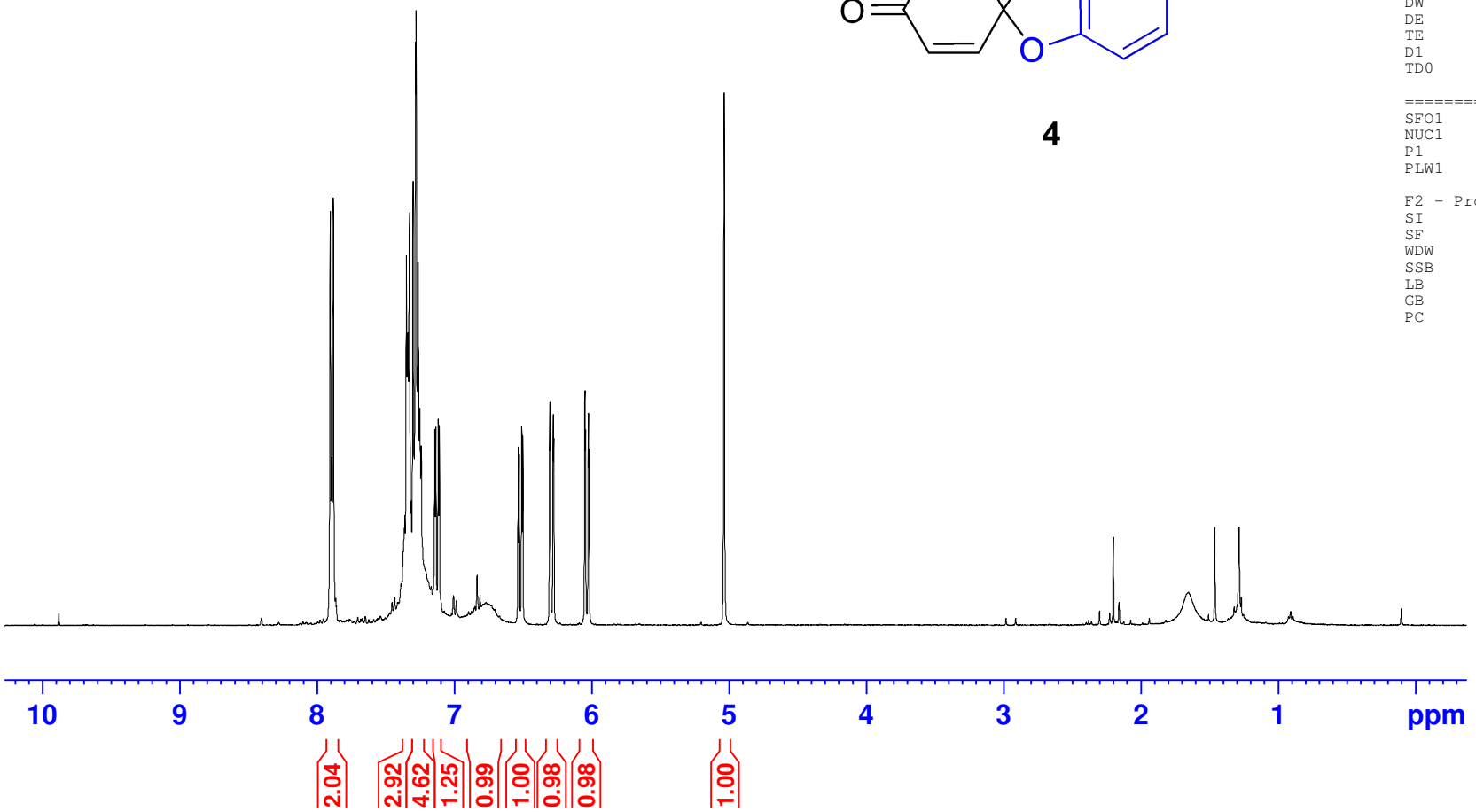
======== CHANNEL f1 ========
SFO1 400.1324710 MHz
NUC1 1H
P1 14.50 usec
PLW1 11.99499989 W

F2 - Processing parameters
SI 65536
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00





4

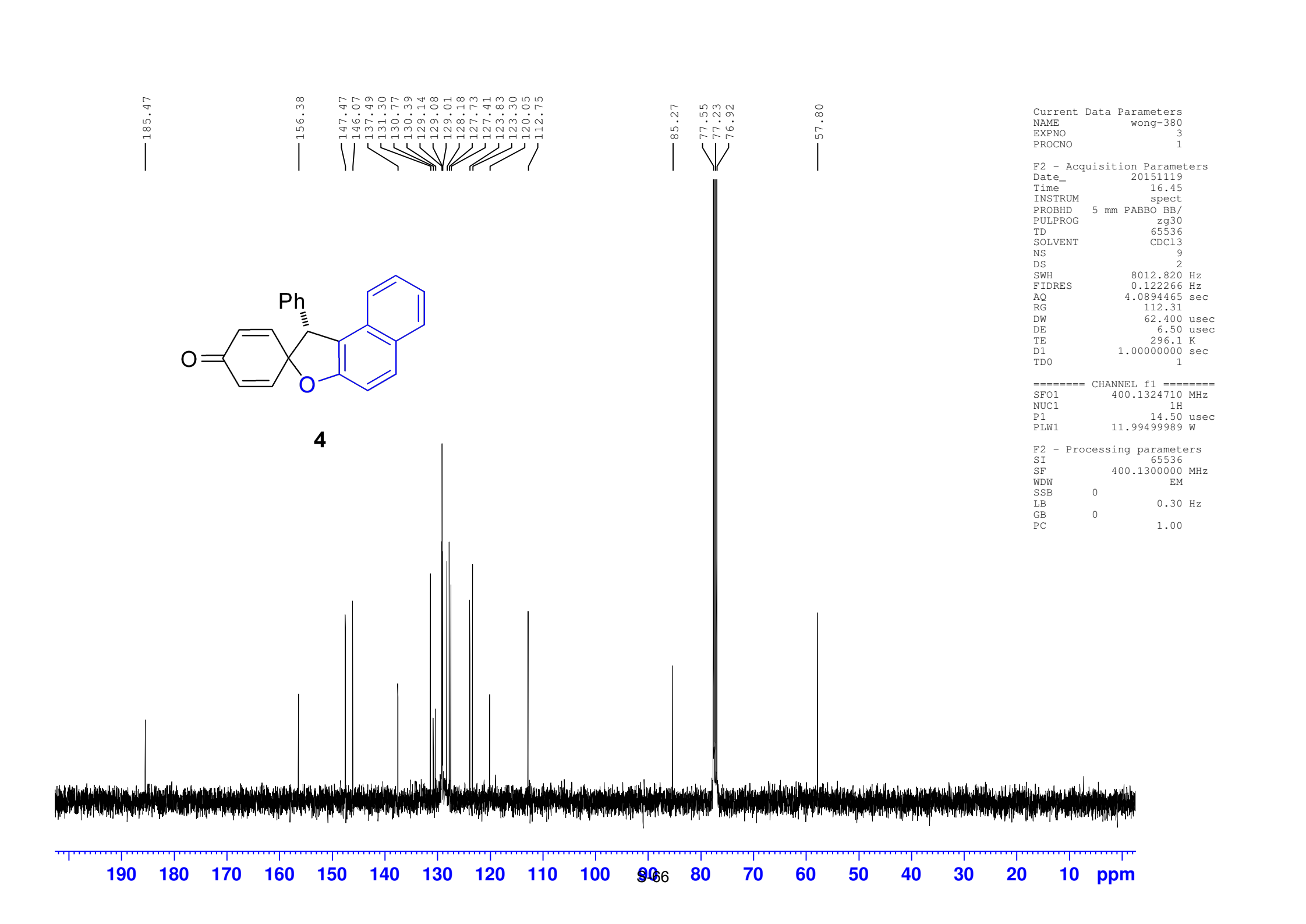



```
Current Data Parameters
NAME            wong-380
EXPNO                  3
PROCNO                 1

F2 - Acquisition Parameters
Date_           20151119
Time               16.45
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     9
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ             4.0894465 sec
RG                112.31
DW                62.400 usec
DE                 6.50 usec
TE                296.1 K
D1           1.00000000 sec
TD0                    1

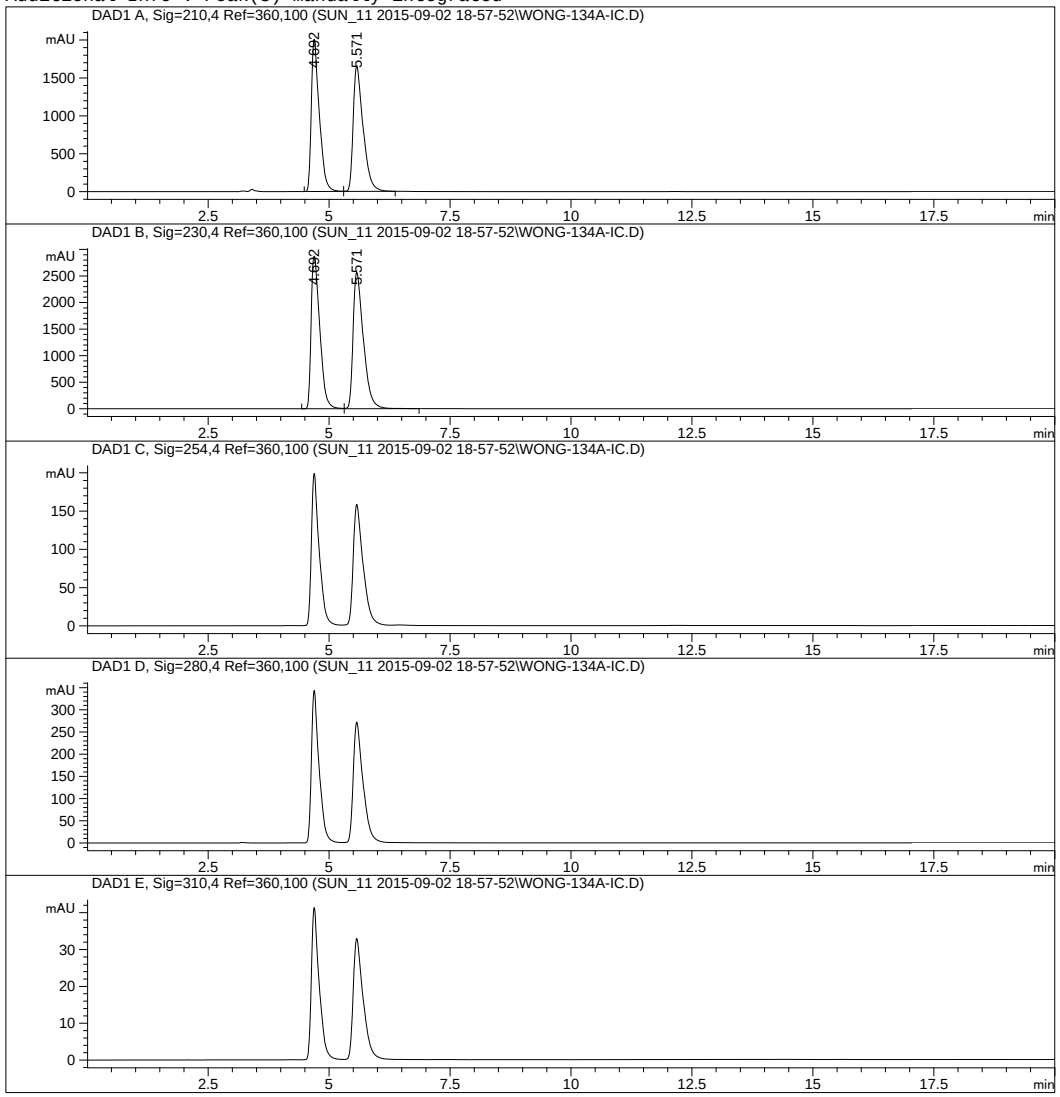
======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300000 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```


185.47
156.38
147.47
146.07
137.49
131.30
130.77
130.39
129.14
129.08
129.01
128.18
127.73
127.41
123.83
123.30
120.05
112.75
85.27
77.55
77.23
76.92
57.80
Ph
O
O
4
Current Data Parameters
NAME wong-380
EXPNO 3
PROCNO 1
F2 - Acquisition Parameters
Date_ 20151119
Time 16.45
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 9
DS 2
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894465 sec
RG 112.31
DW 62.400 usec
DE 6.50 usec
TE 296.1 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
SFO1 400.1324710 MHz
NUC1 1H
P1 14.50 usec
PLW1 11.99499989 W
F2 - Processing parameters
SI 65536
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134A-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :   9
Acq. Instrument : Instrument 1                  Location : Vial 84
Injection Date  : 9/2/2015 10:09:19 PM               Inj :   1
                                              Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\DATA\SUN_11 2015-07-10 15-30-17\IC-15-10.M
Last changed    : 9/4/2015 7:39:42 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134A-IC.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.692 BV    0.1675 2.30167e4  2011.59680  49.3733
   2   5.571 VB    0.2081 2.36010e4  1657.40051  50.6267

Totals :                  4.66177e4  3668.99731



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.692 VV    0.1847 3.56314e4  2872.11426  48.4428
   2   5.571 VB    0.2164 3.79220e4  2565.74414  51.5572

Totals :                  7.35534e4  5437.85840

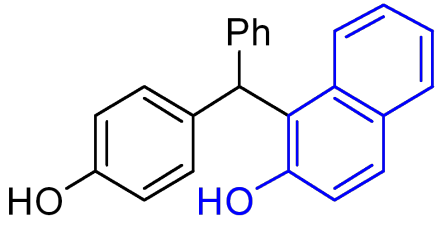


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

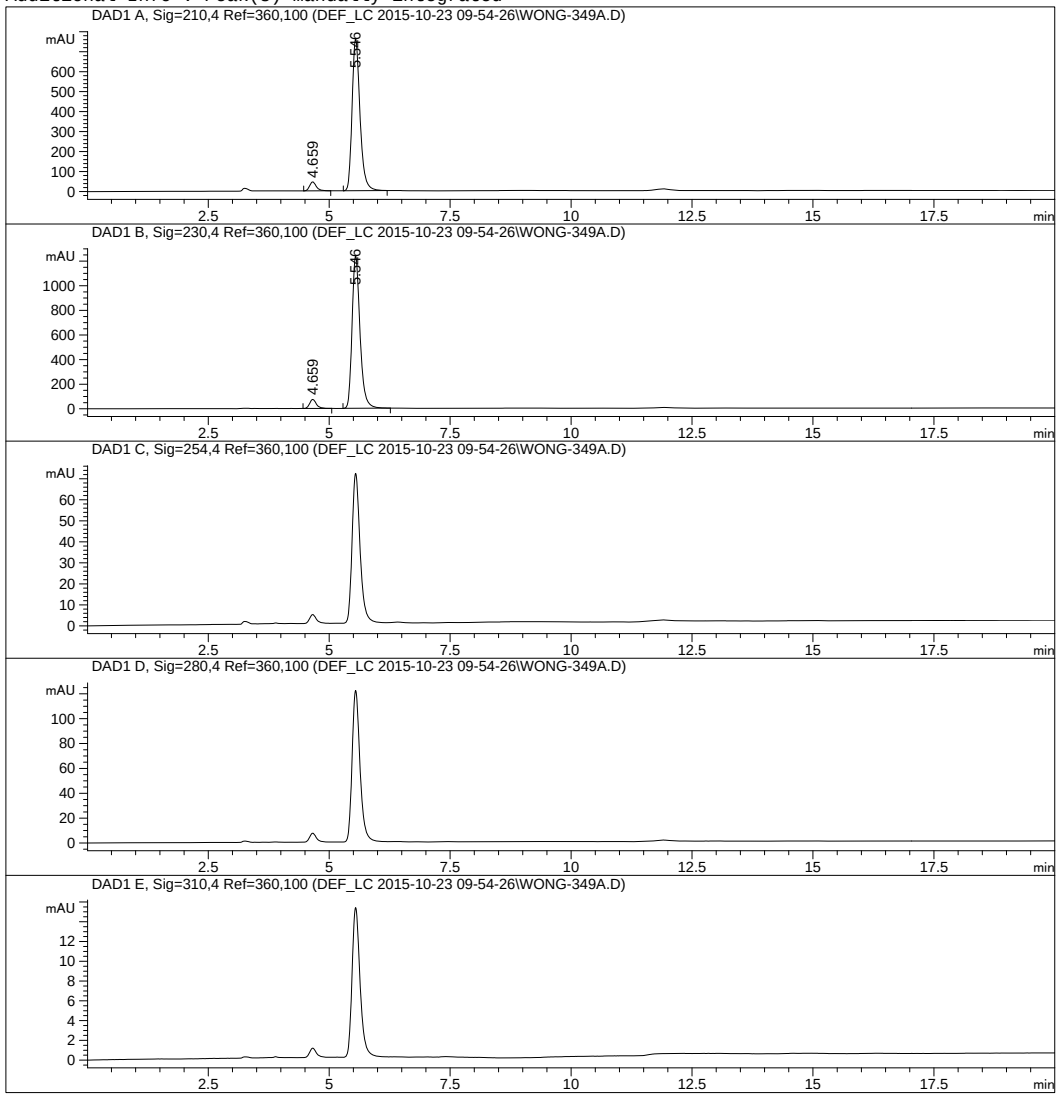
==========================================================================
                        *** End of Report ***
```



3a (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349A.D
Sample Name:

```
==================================================================
Acq. Operator   :                          Seq. Line :  15
Acq. Instrument : Instrument 1              Location : Vial 91
Injection Date  : 10/23/2015 1:43:09 PM          Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 3.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/22/2015 7:09:27 PM
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349A.D
Sample Name:

```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.659 BB    0.1465  433.71402   44.98679   4.7919
   2   5.546 BB    0.1745 8617.25391  758.89105  95.2081

Totals :                   9050.96793  803.87784



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.659 BB    0.1480  706.80554   73.64970   4.7902
   2   5.546 BB    0.1746 1.40483e4  1235.83728  95.2098

Totals :                   1.47551e4  1309.48698

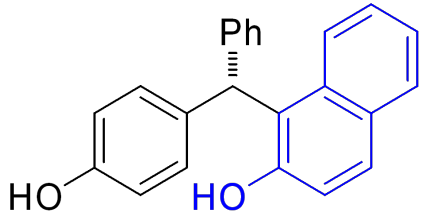


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

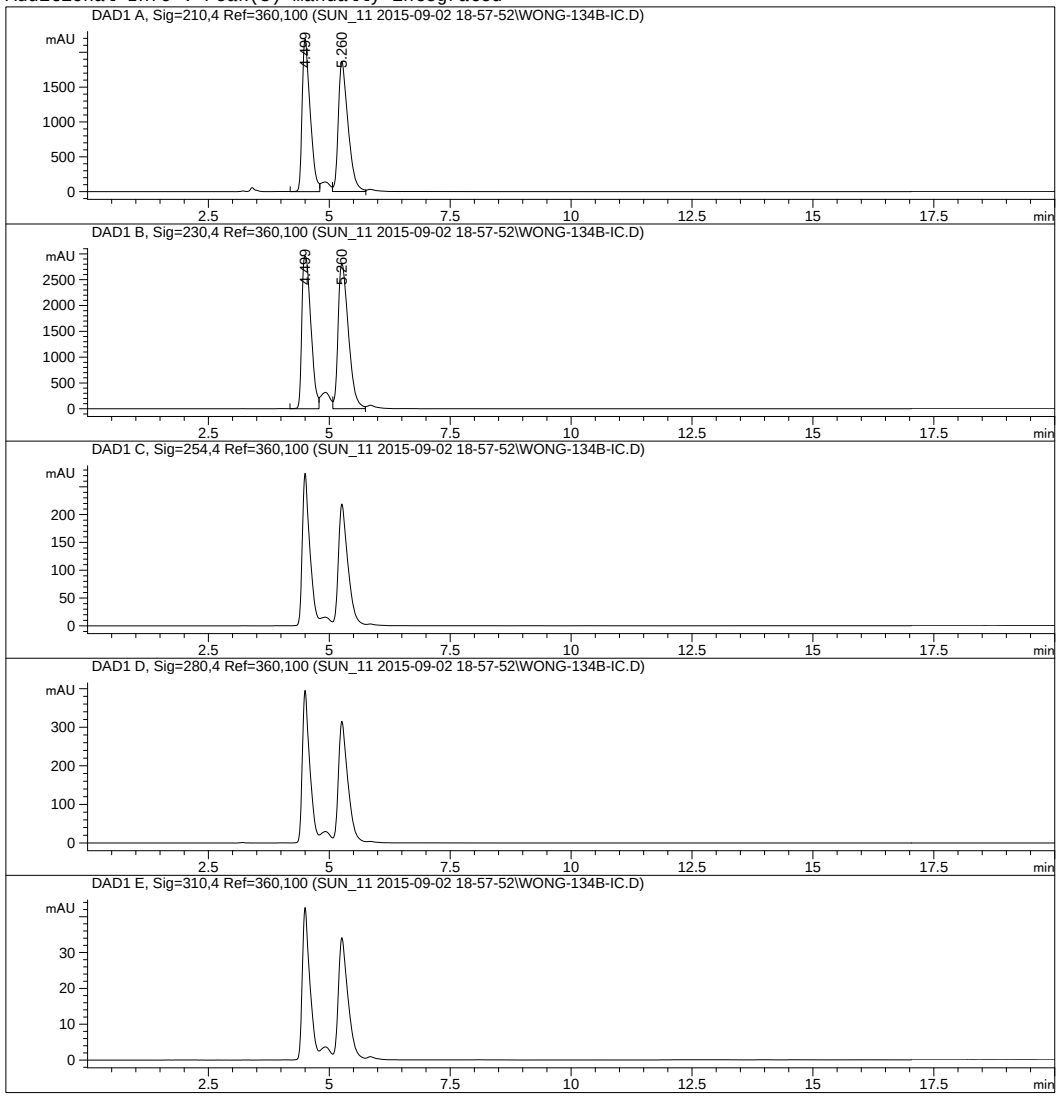
==================================================================
                        *** End of Report ***
```



3a (*enantioenriched*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134B-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                                Seq. Line :  10
Acq. Instrument : Instrument 1                    Location : Vial 85
Injection Date  : 9/2/2015 10:30:42 PM                 Inj :   1
                                                 Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\DATA\SUN_11 2015-07-10 15-30-17\IC-15-10.M
Last changed    : 9/4/2015 7:39:42 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134B-IC.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.499 VV    0.1696 2.50710e4  2188.96582  49.0129
   2   5.260 VV    0.2053 2.60808e4  1862.97729  50.9871

Totals :                  5.11518e4  4051.94312



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.499 VV    0.1941 3.80191e4  2954.60913  47.6841
   2   5.260 VV    0.2217 4.17121e4  2801.89233  52.3159

Totals :                  7.97312e4  5756.50146

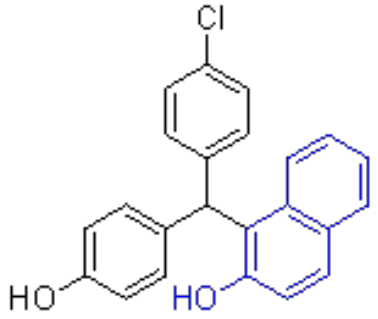


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

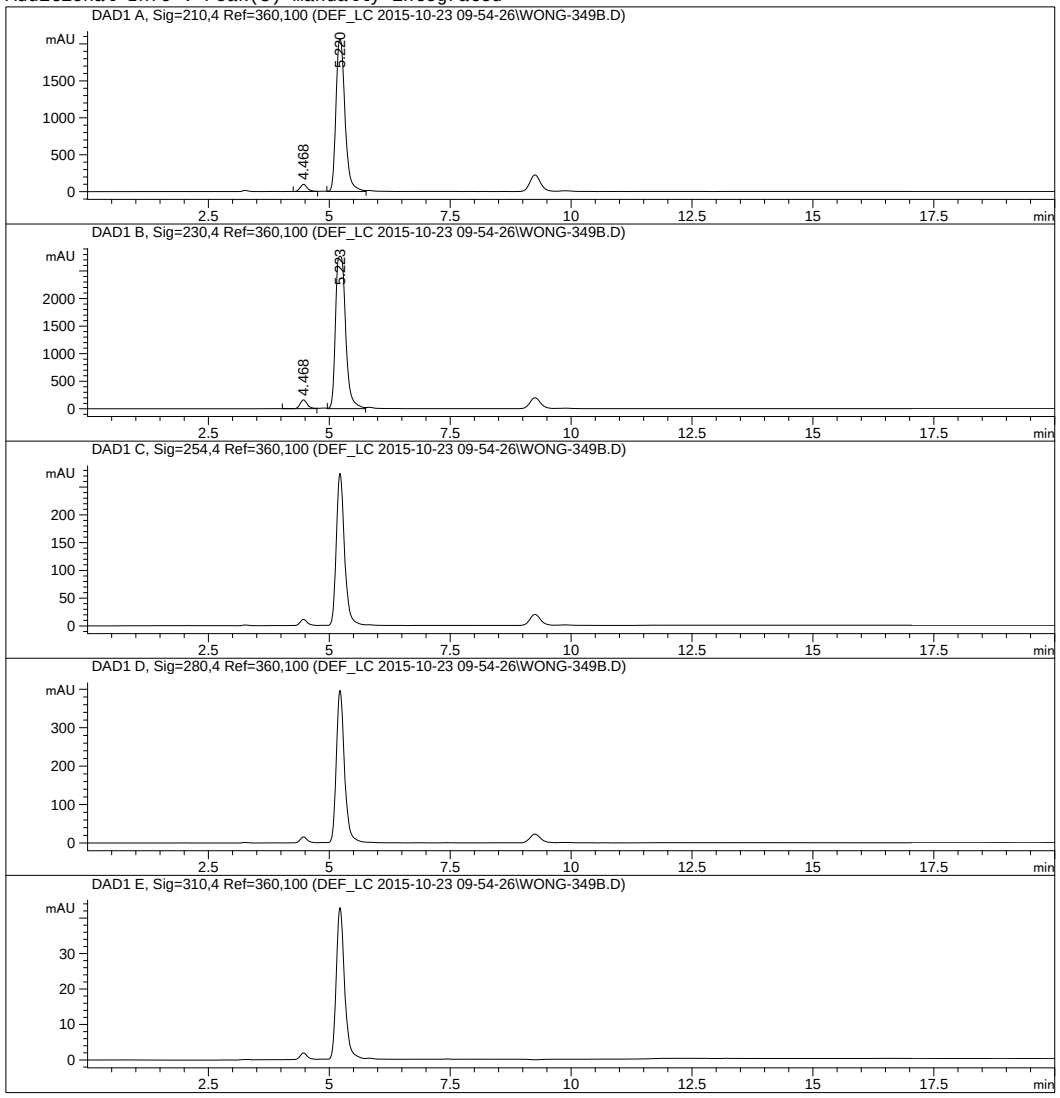
==========================================================================
                        *** End of Report ***
```



3b (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349B.D
Sample Name:

```
==========================================================================
Acq. Operator   :                                Seq. Line :  16
Acq. Instrument : Instrument 1                    Location : Vial 92
Injection Date  : 10/23/2015 2:04:12 PM              Inj :   1
                                                 Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 3.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/22/2015 7:09:27 PM
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349B.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.468 BV    0.1580  998.73578   97.13004   3.6285
   2   5.220 VV    0.2001 2.65260e4  2061.61890  96.3715

Totals :                   2.75247e4  2158.74893



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.468 VV    0.1590 1668.34497  160.85501   4.0033
   2   5.223 VV    0.2248 4.00059e4  2765.05444  95.9967

Totals :                   4.16742e4  2925.90945

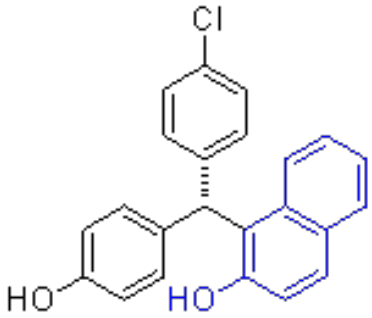


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

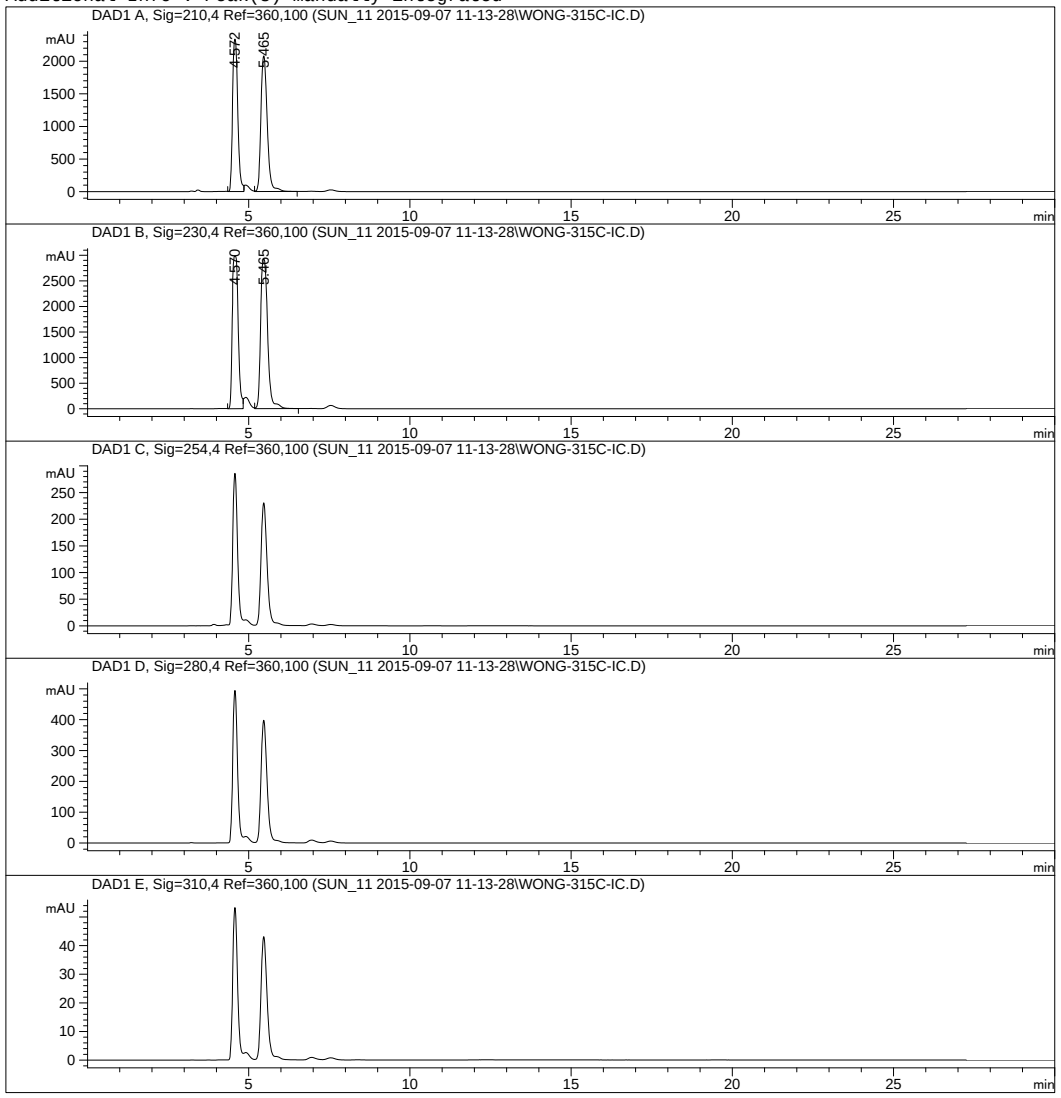
==========================================================================
                        *** End of Report ***
```



3b (*enantioenriched*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-07 11-13-28\WONG-315C-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                          Seq. Line :  34
Acq. Instrument : Instrument 1              Location : Vial 86
Injection Date  : 9/8/2015 1:45:21 AM            Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-07 11-13-28\IC-10-30.M
Last changed    : 9/20/2012 10:28:31 AM
Analysis Method : C:\CHEM32\1\DATA\SUN_11 2015-07-10 15-30-17\IC-15-40.M
Last changed    : 9/9/2015 1:34:22 PM
Additional Info : Peak(s) manually integrated
```




```
==========================================================================
                        Fraction Information
==========================================================================
==========================================================================
```


Data File C:\CHEM32\1\DATA\SUN_11 2015-09-07 11-13-28\WONG-315C-IC.D
Sample Name:

```
No Fractions found.
==========================================================================
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.572 VV    0.1789 2.62335e4  2337.96021  48.0447
   2   5.465 VB    0.2152 2.83688e4  2078.90088  51.9553

Totals :                  5.46024e4  4416.86108



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.570 VV    0.2025 3.79411e4  2980.07617  46.2366
   2   5.465 VB    0.2382 4.41174e4  2920.84888  53.7634

Totals :                  8.20585e4  5900.92505

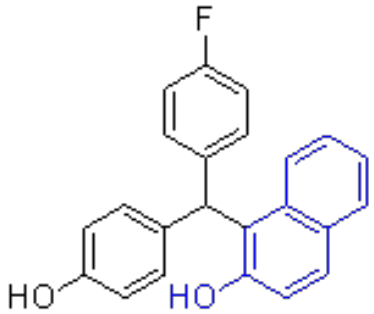


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

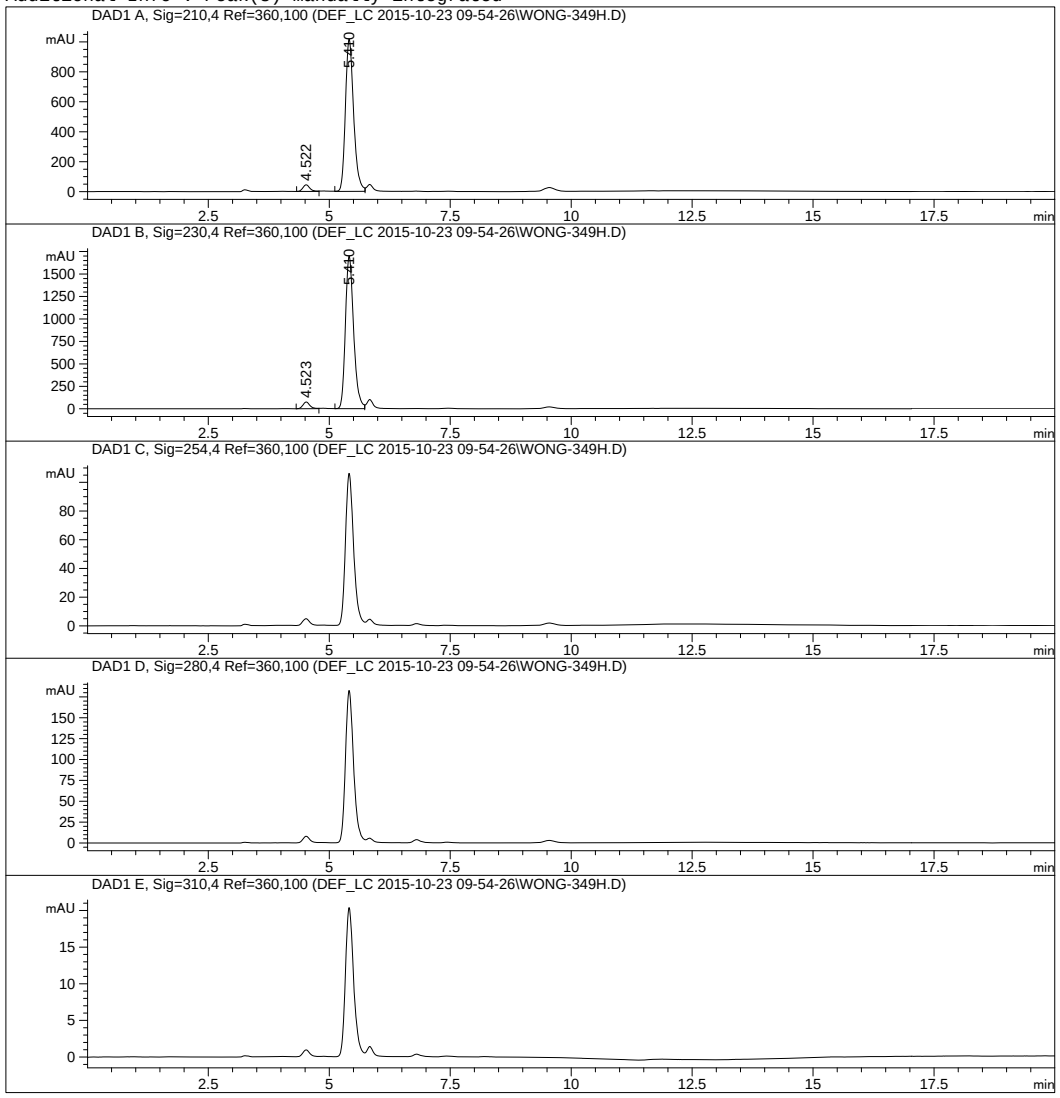
==========================================================================
                        *** End of Report ***
```



3c (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349H.D
Sample Name:

```
==========================================================================
Acq. Operator   :                                Seq. Line :  20
Acq. Instrument : Instrument 1                    Location : Vial 97
Injection Date  : 10/23/2015 3:29:21 PM               Inj :   1
                                                 Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 3.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/22/2015 7:09:27 PM
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349H.D
Sample Name:

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.522 BV    0.1557  447.23593   44.32333   3.6098
   2   5.410 VV    0.1790 1.19423e4  1016.87775  96.3902

Totals :                   1.23895e4  1061.20107



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.523 BV    0.1553  750.62000   74.63385   3.6195
   2   5.410 VV    0.1814 1.99874e4  1696.66370  96.3805

Totals :                   2.07380e4  1771.29755

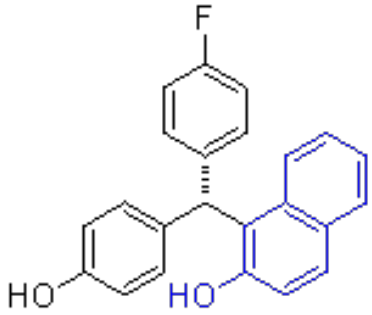


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

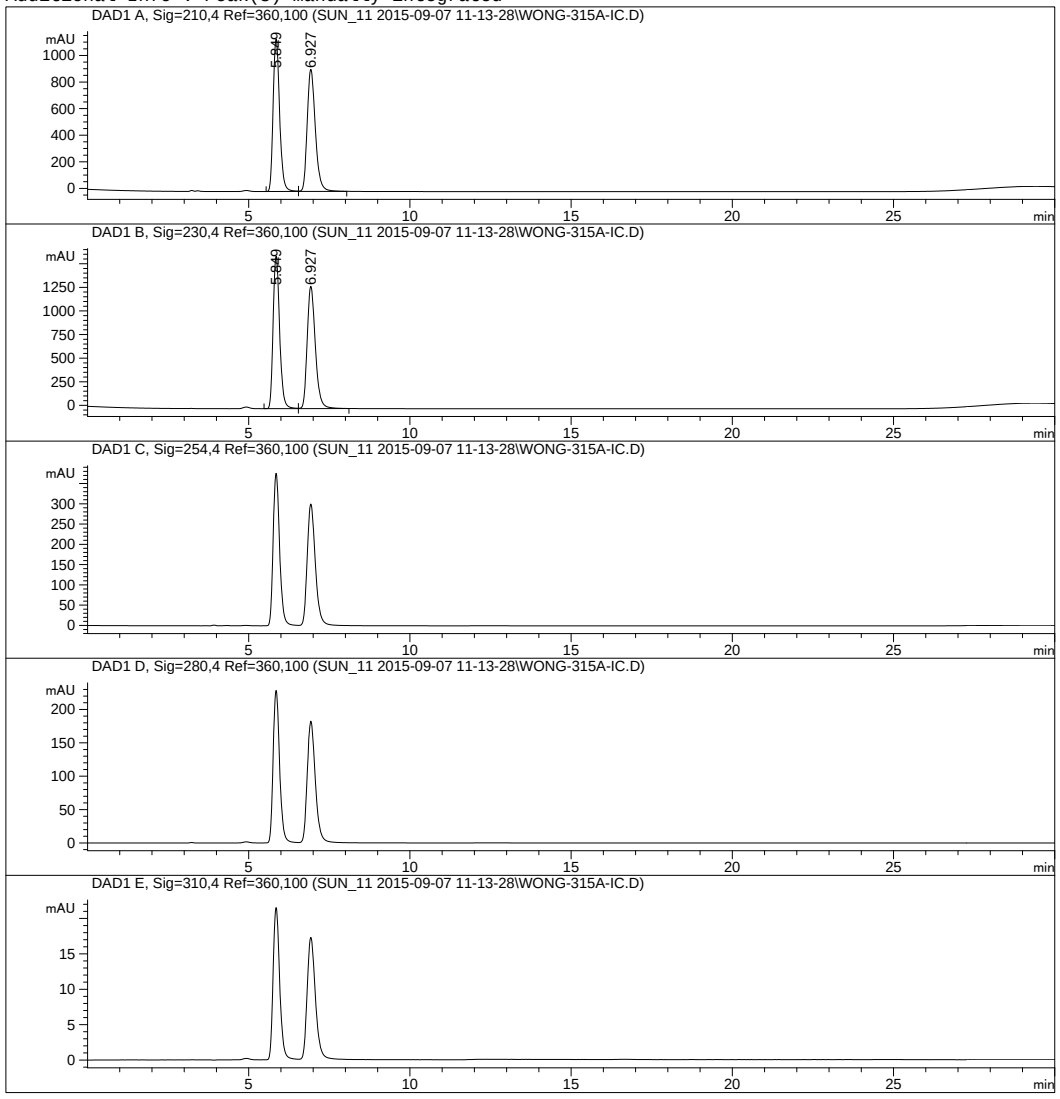
==========================================================================
                          *** End of Report ***
```



3c (*enantioenriched*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-07 11-13-28\WONG-315A-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :  32
Acq. Instrument : Instrument 1                  Location : Vial 84
Injection Date  : 9/8/2015 12:42:50 AM               Inj :   1
                                              Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-07 11-13-28\IC-10-30.M
Last changed    : 9/20/2012 10:28:31 AM
Analysis Method : C:\CHEM32\1\DATA\SUN_11 2015-07-10 15-30-17\IC-15-10.M
Last changed    : 9/4/2015 7:39:42 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\SUN_11 2015-09-07 11-13-28\WONG-315A-IC.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.849 BV    0.2189 1.60111e4  1146.74377  49.7735
   2   6.927 VB    0.2733 1.61568e4   918.24786  50.2265

Totals :                  3.21680e4  2064.99164



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.849 BV    0.2191 2.25701e4  1614.78516  49.7375
   2   6.927 VB    0.2736 2.28083e4  1294.43372  50.2625

Totals :                  4.53785e4  2909.21887

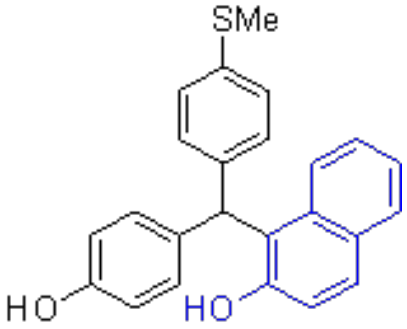


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

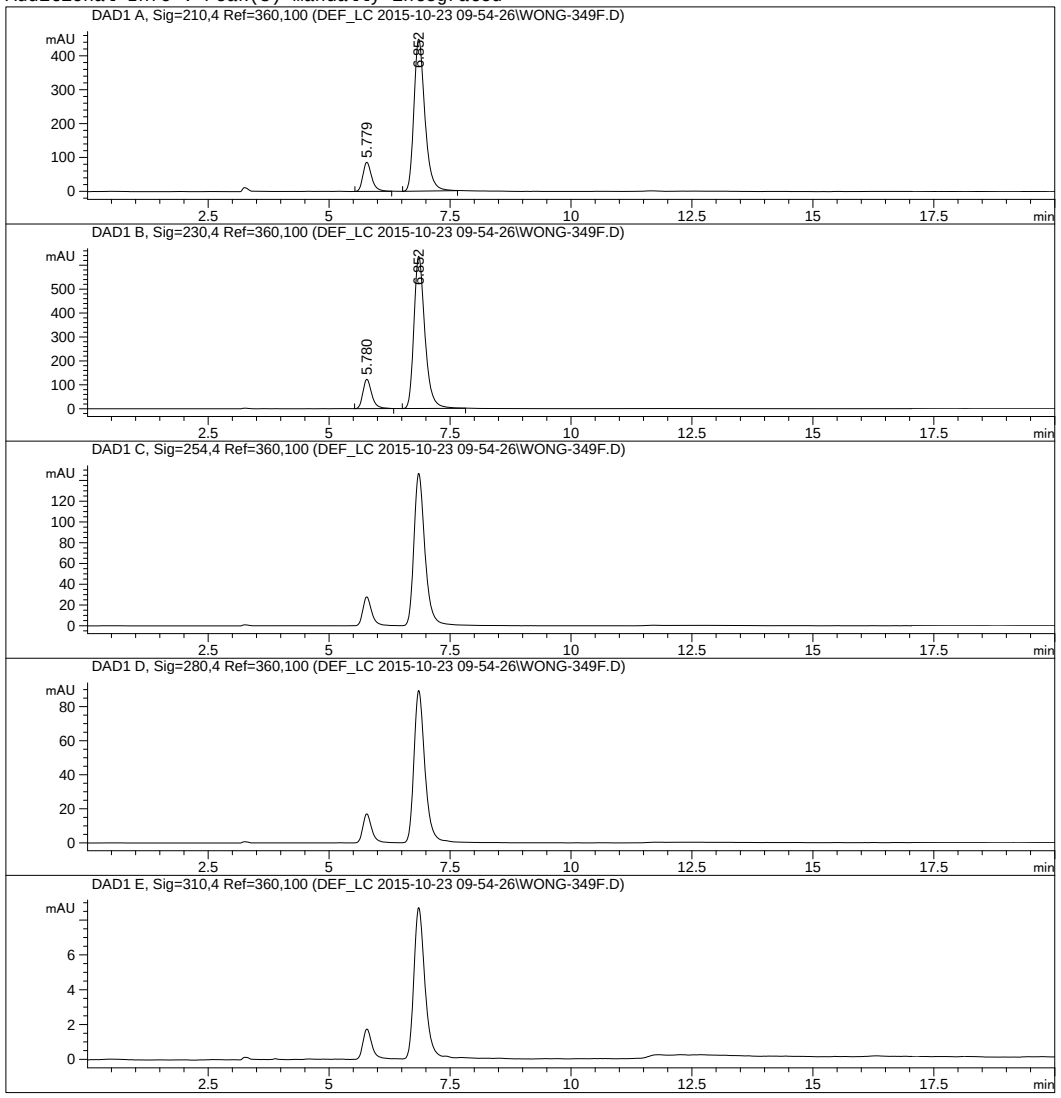
==========================================================================
                        *** End of Report ***
```



3d (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349F.D
Sample Name:

```
==========================================================================
Acq. Operator   :                          Seq. Line :  19
Acq. Instrument : Instrument 1              Location : Vial 95
Injection Date  : 10/23/2015 3:07:57 PM          Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 3.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/22/2015 7:09:27 PM
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349F.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.779 BB    0.1938 1088.24585   85.92117  13.4267
   2   6.852 BB    0.2385 7016.86426  448.62634  86.5733

Totals :                   8105.11011  534.54752



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.780 BB    0.1946 1563.02234  122.73933  13.5051
   2   6.852 BB    0.2395 1.00106e4   636.54486  86.4949

Totals :                   1.15736e4   759.28419

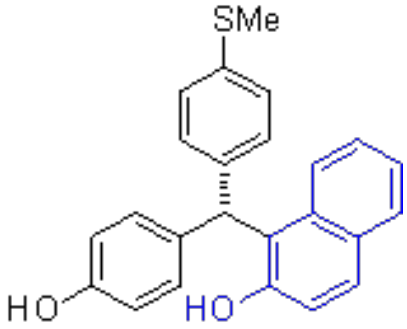


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

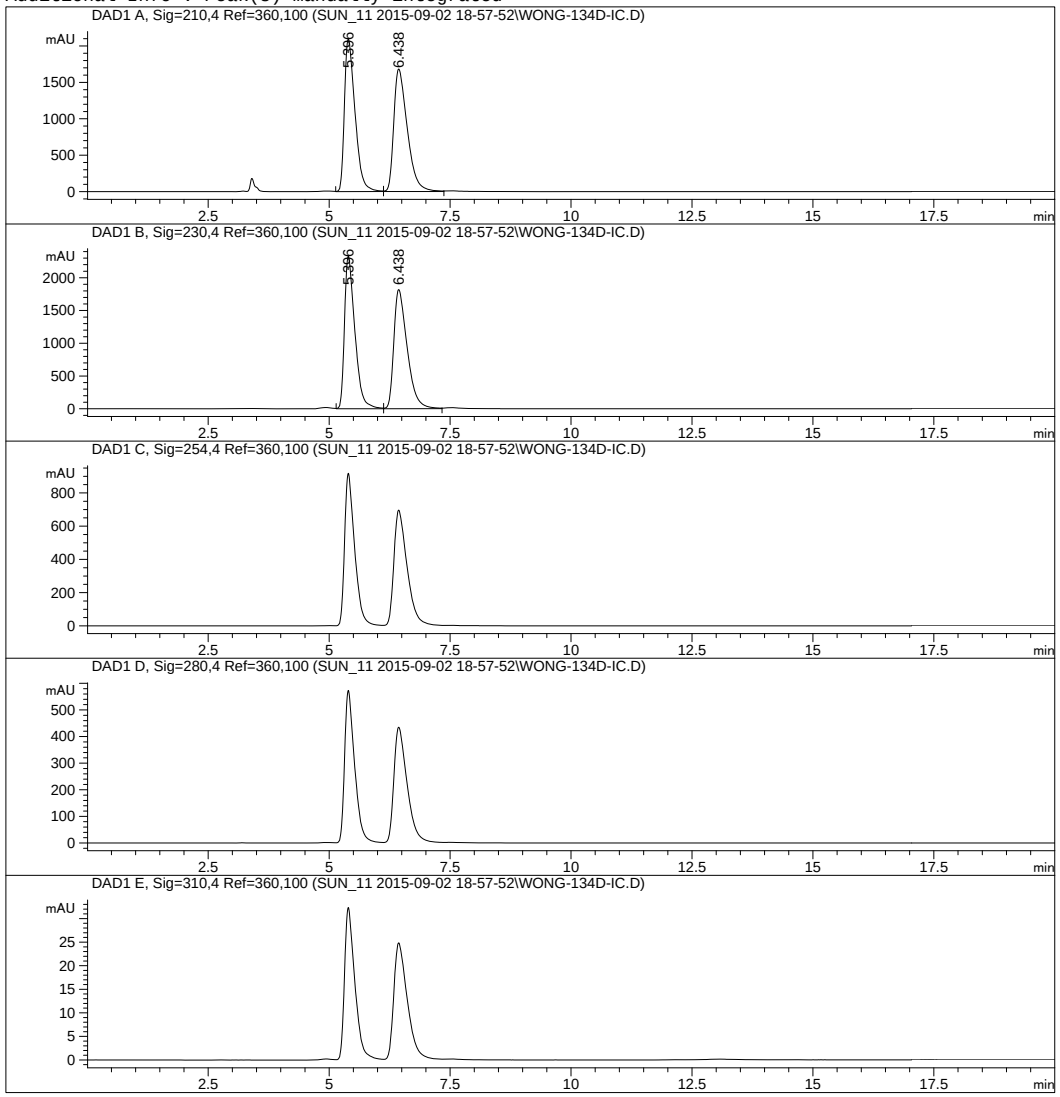
==========================================================================
                        *** End of Report ***
```



3d (*enantioenriched*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134D-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :  12
Acq. Instrument : Instrument 1                  Location : Vial 87
Injection Date  : 9/2/2015 11:12:51 PM               Inj :   1
                                               Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\DATA\SUN_11 2015-07-10 15-30-17\IC-15-10.M
Last changed    : 9/4/2015 7:39:42 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134D-IC.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.396 VV    0.2254 3.18678e4  2095.98022  49.3893
   2   6.438 VV    0.2924 3.26558e4  1683.12085  50.6107

Totals :                  6.45236e4  3779.10107



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.396 VV    0.2191 3.45811e4  2330.07886  49.7985
   2   6.438 VV    0.2876 3.48609e4  1819.08301  50.2015

Totals :                  6.94420e4  4149.16187

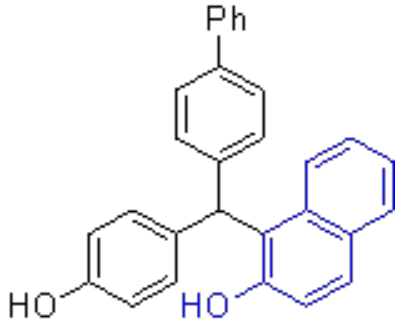


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

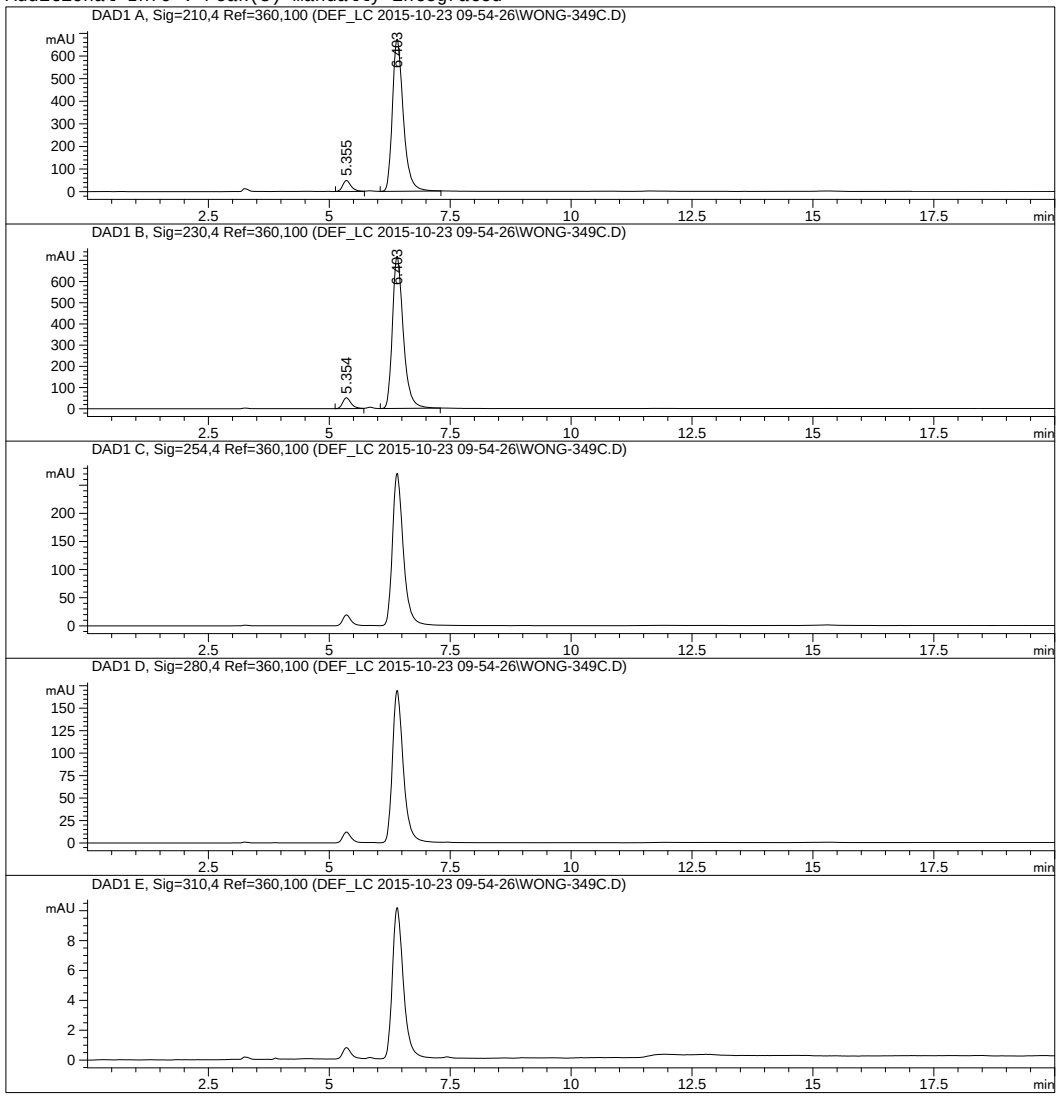
==========================================================================
                        *** End of Report ***
```



3e (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349C.D
Sample Name:

```
==================================================================
Acq. Operator   :                          Seq. Line :  17
Acq. Instrument : Instrument 1              Location : Vial 93
Injection Date  : 10/23/2015 2:25:48 PM          Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 3.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/22/2015 7:09:27 PM
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349C.D
Sample Name:

```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.355 BV    0.1856  588.40637   48.46855   5.2910
   2   6.403 VB    0.2365 1.05324e4   673.25806  94.7090

Totals :                   1.11208e4   721.72660



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.354 BV    0.1854  620.92804   51.24849   5.2607
   2   6.403 VB    0.2358 1.11823e4   717.53735  94.7393

Totals :                   1.18032e4   768.78584

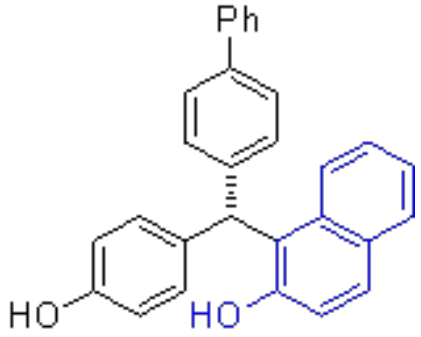


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

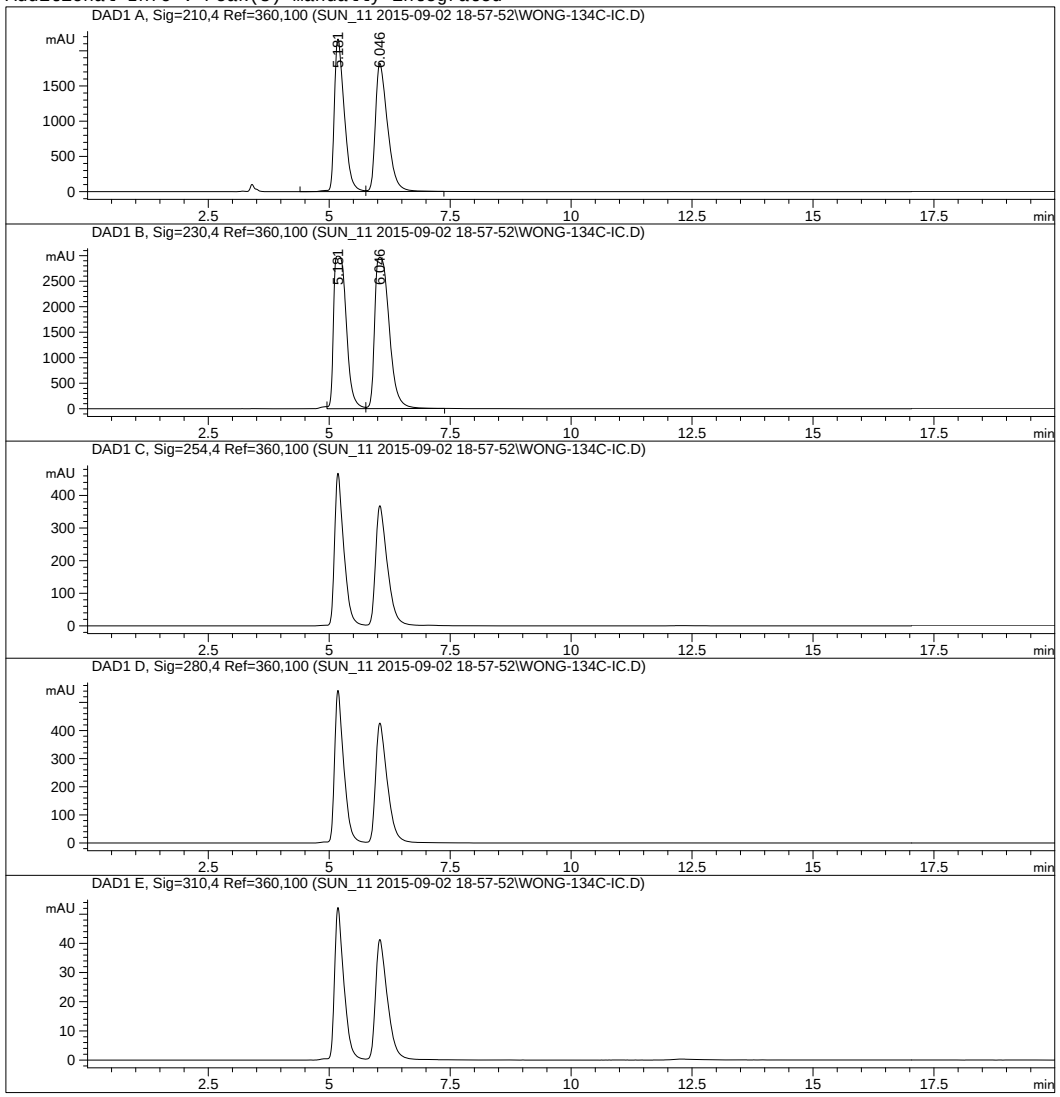
==================================================================
                        *** End of Report ***
```



3e (*enantioenriched*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134C-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :  11
Acq. Instrument : Instrument 1                  Location : Vial 86
Injection Date  : 9/2/2015 10:51:47 PM               Inj :   1
                                              Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\DATA\SUN_11 2015-07-10 15-30-17\IC-15-10.M
Last changed    : 9/4/2015 7:39:42 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134C-IC.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.181 BV    0.2095 3.07333e4  2166.79102  49.2166
   2   6.046 VB    0.2593 3.17117e4  1819.55103  50.7834

Totals :                  6.24450e4  3986.34204



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.181 VV    0.2895 5.41664e4  2988.02808  46.9224
   2   6.046 VB    0.3254 6.12719e4  2960.93481  53.0776

Totals :                  1.15438e5  5948.96289

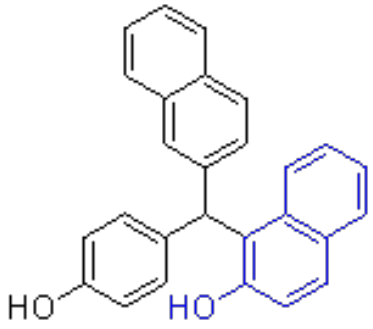


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

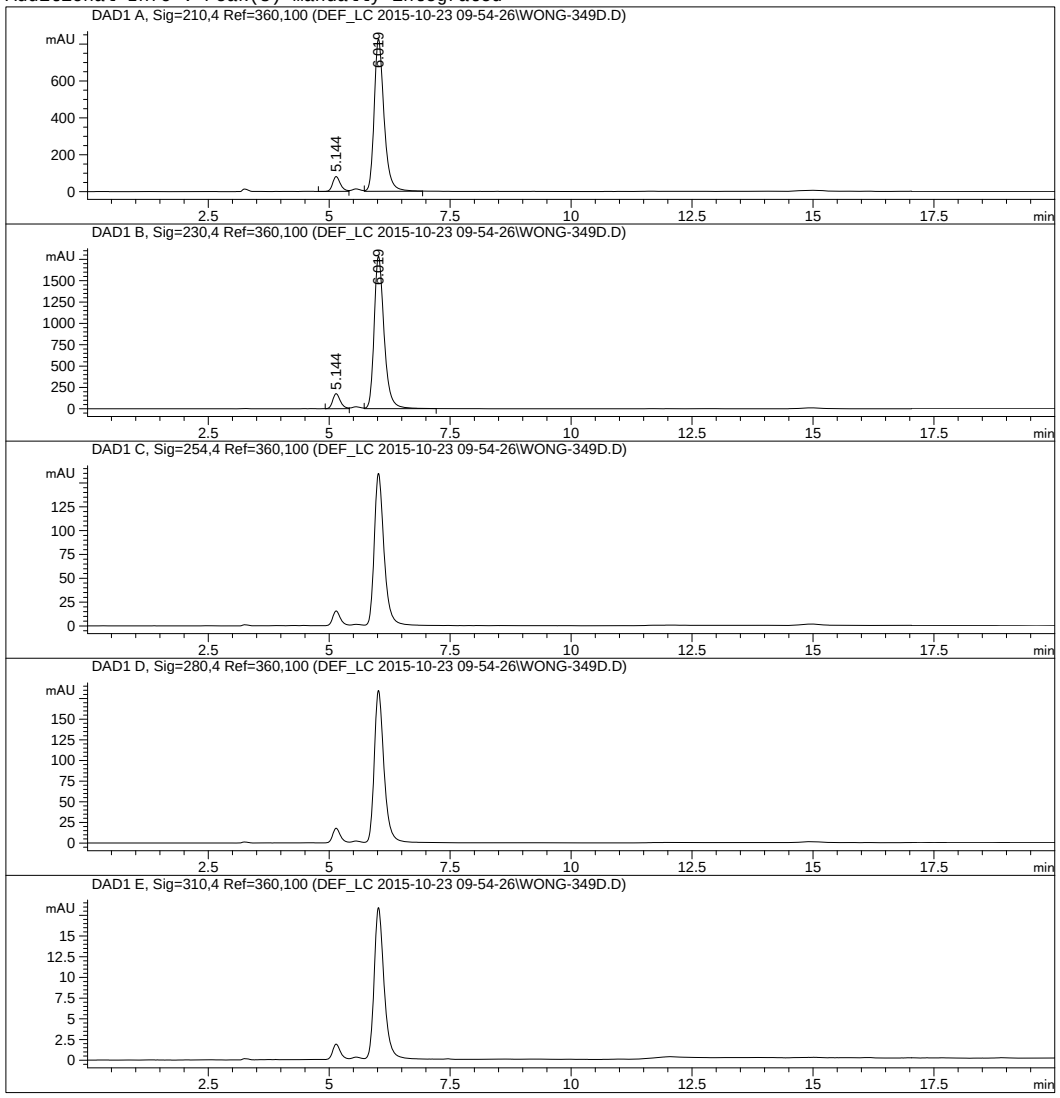
==========================================================================
                        *** End of Report ***
```



3f (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349D.D
Sample Name:

```
==================================================================
Acq. Operator   :                          Seq. Line :  18
Acq. Instrument : Instrument 1              Location : Vial 94
Injection Date  : 10/23/2015 2:46:52 PM          Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 3.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/22/2015 7:09:27 PM
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-349D.D
Sample Name:

```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.144 VV    0.1690  889.70758   80.49339   7.1195
   2   6.019 VB    0.2142 1.16070e4   824.72351  92.8805

Totals :                   1.24967e4   905.21690



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.144 BV    0.1688 1951.20227  176.72867   7.1329
   2   6.019 VB    0.2161 2.54036e4  1784.83789  92.8671

Totals :                   2.73548e4  1961.56656

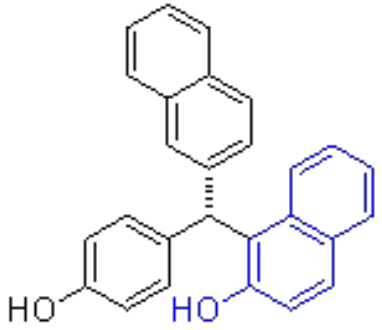


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

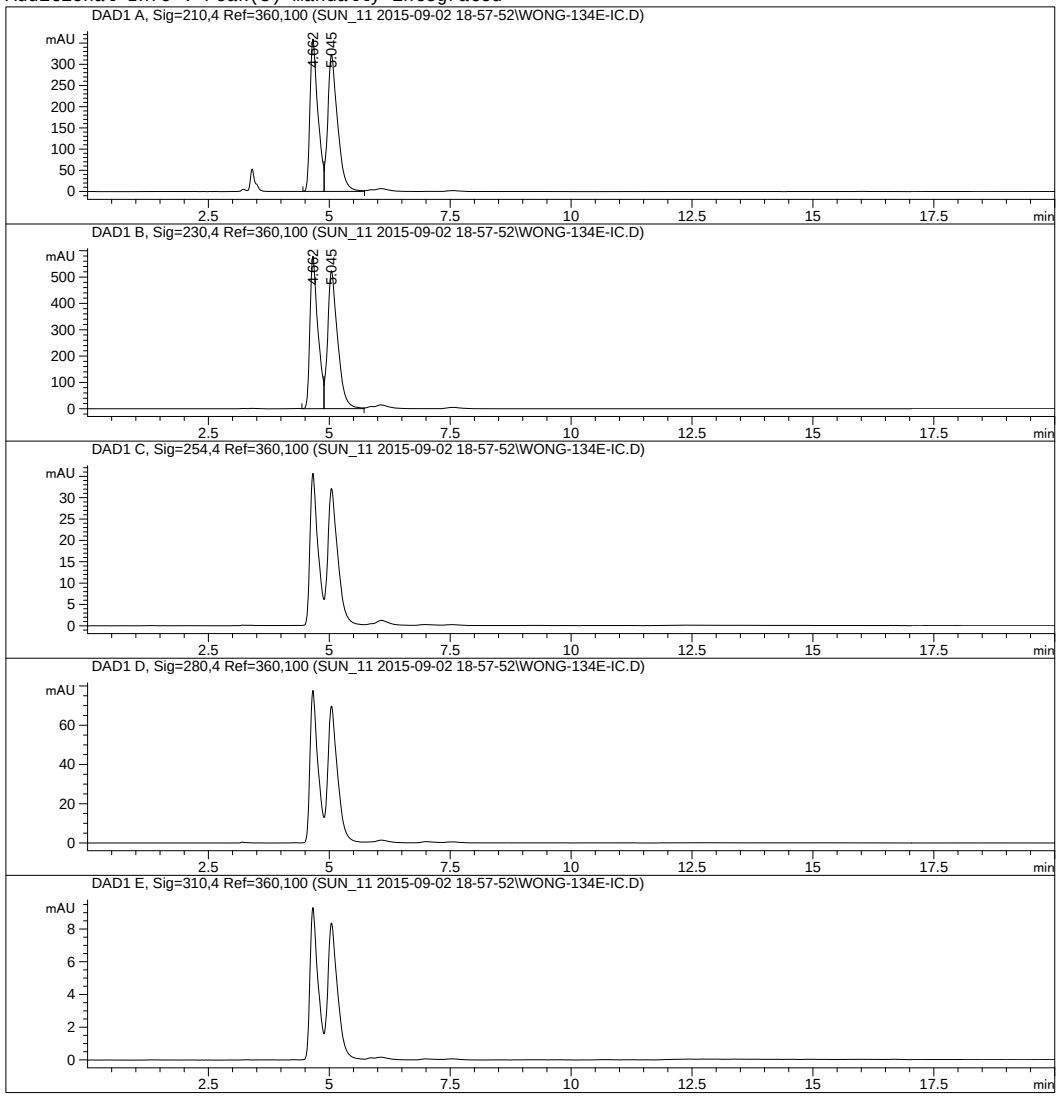
==================================================================
                        *** End of Report ***
```



3f(*enantioenriched*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134E-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :  13
Acq. Instrument : Instrument 1                  Location : Vial 88
Injection Date  : 9/2/2015 11:34:03 PM               Inj :   1
                                               Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/26/2015 2:13:29 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```




```
==========================================================================
                        Fraction Information
==========================================================================
```


Data File C:\CHEM32\1\DATA\SUN_11 2015-09-02 18-57-52\WONG-134E-IC.D
Sample Name:

```
==========================================================================
No Fractions found.
==========================================================================
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.662 BV    0.1654 4046.06738  359.27405  47.0730
   2   5.045 VB    0.2027 4549.23682  322.18607  52.9270

Totals :                   8595.30420  681.46011



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.662 BV    0.1665 6574.58154  578.96704  46.7687
   2   5.045 VV    0.2046 7483.06836  523.90753  53.2313

Totals :                   1.40576e4  1102.87457

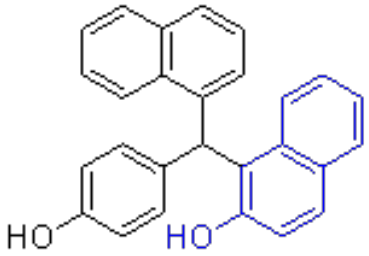


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

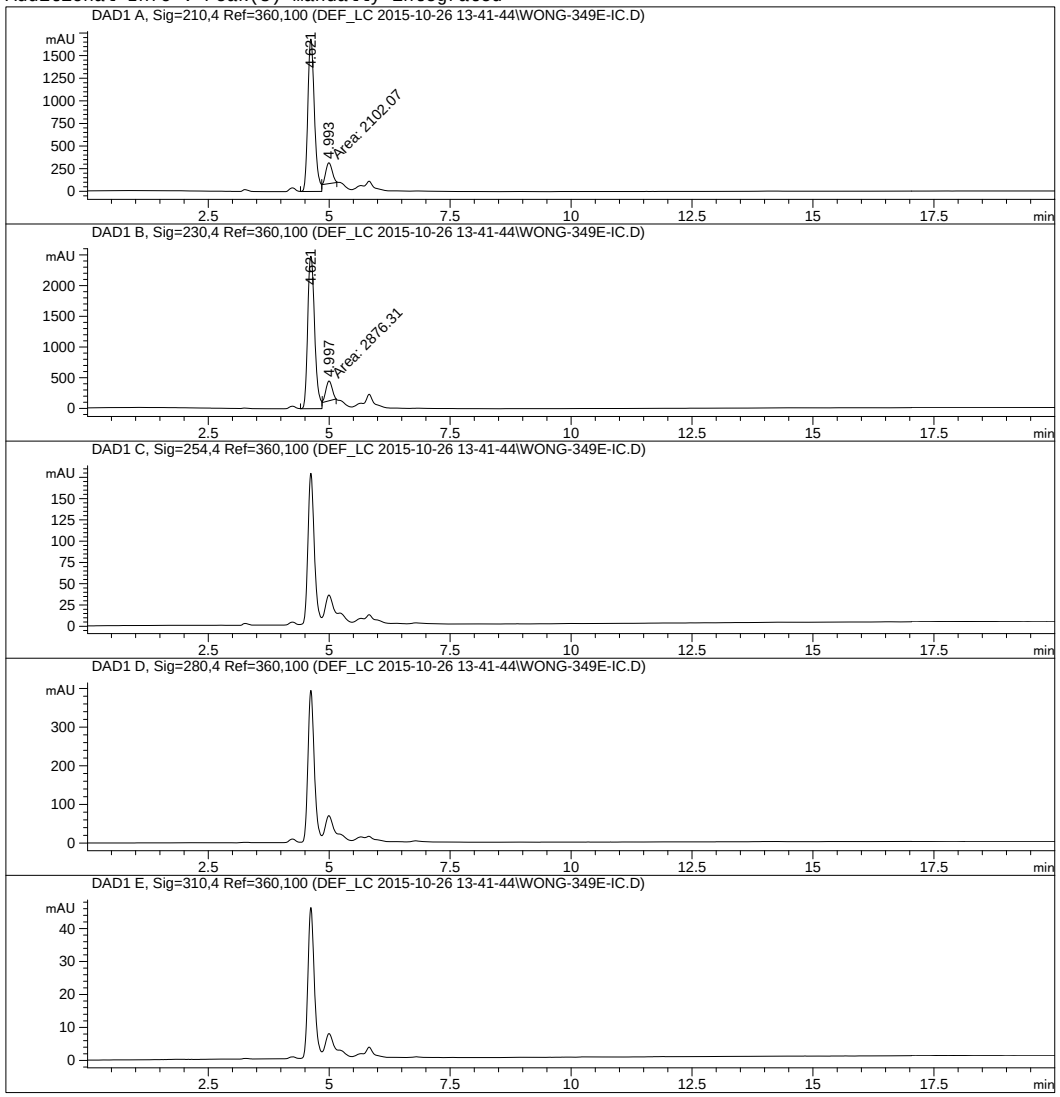
==========================================================================
                        *** End of Report ***
```



3g (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-26 13-41-44\WONG-349E-IC.D
Sample Name:

```
==================================================================
Acq. Operator   :                          Seq. Line :   8
Acq. Instrument : Instrument 1              Location : Vial 90
Injection Date  : 10/26/2015 4:22:34 PM          Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 3.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-10-26 13-41-44\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/26/2015 2:13:29 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-26 13-41-44\WONG-349E-IC.D
Sample Name:

```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.621 VV    0.1461 1.59149e4  1686.60571  88.3328
   2   4.993 MM    0.1516 2102.06787  231.11214  11.6672

Totals :                  1.80170e4  1917.71785



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.621 VV    0.1557 2.46303e4  2484.33960  89.5432
   2   4.997 MM    0.1480 2876.31323  323.82138  10.4568

Totals :                  2.75066e4  2808.16098

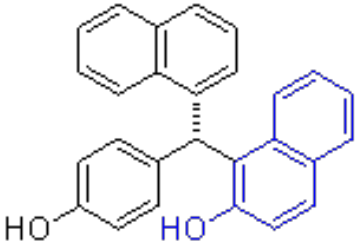


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

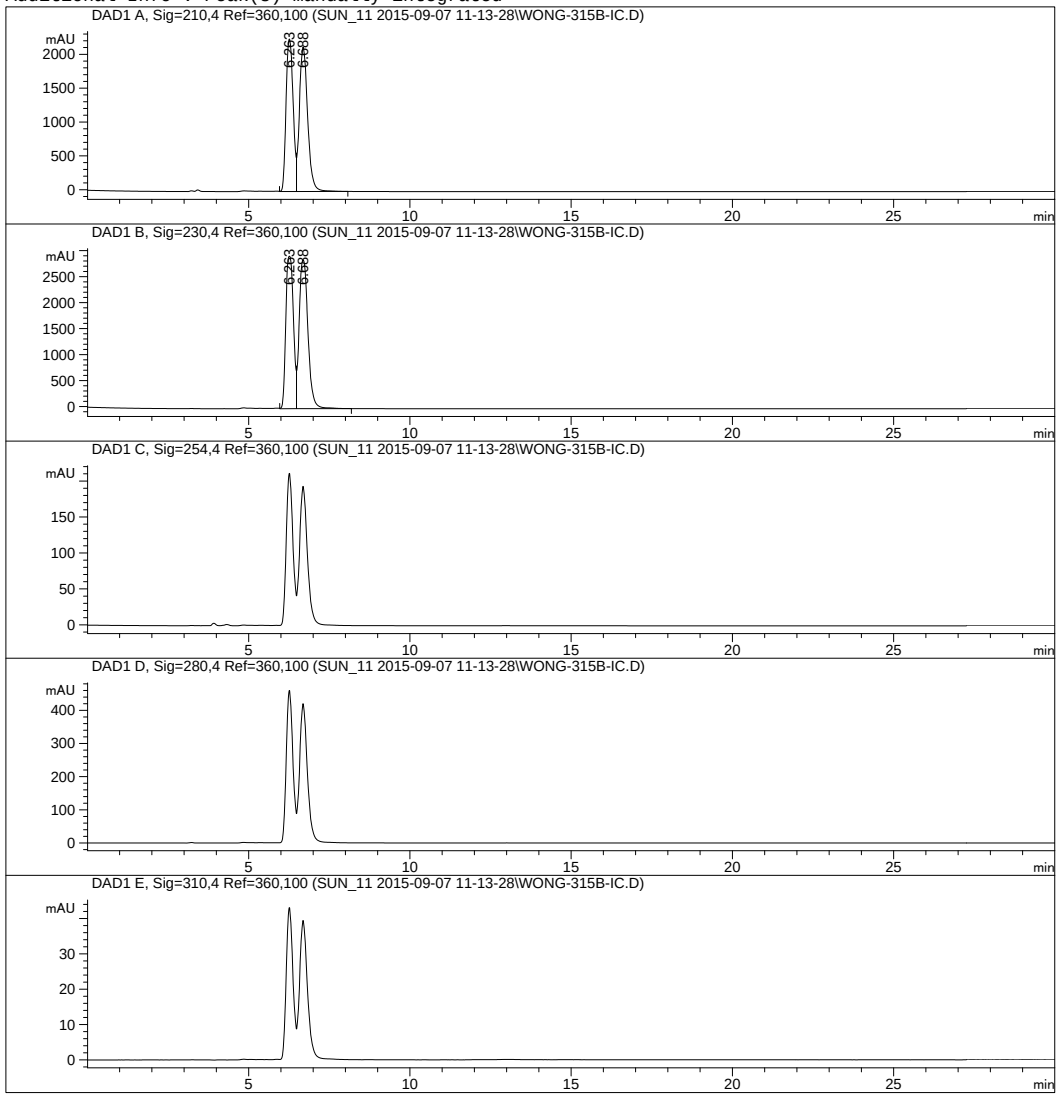
==================================================================
                        *** End of Report ***
```



3g (*enantioenriched*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-07 11-13-28\WONG-315B-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :  33
Acq. Instrument : Instrument 1                  Location : Vial 85
Injection Date  : 9/8/2015 1:14:18 AM               Inj :   1
                                               Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-07 11-13-28\IC-10-30.M
Last changed    : 9/20/2012 10:28:31 AM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/26/2015 2:13:29 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```




```
==========================================================================
                          Fraction Information
==========================================================================
```


Data File C:\CHEM32\1\DATA\SUN_11 2015-09-07 11-13-28\WONG-315B-IC.D
Sample Name:

```
==========================================================================
No Fractions found.
==========================================================================
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.263 VV    0.2417 3.42965e4  2252.24585  47.3836
   2   6.688 VB    0.2760 3.80841e4  2136.32520  52.6164

Totals :                  7.23806e4  4388.57104



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.263 VV    0.2596 4.76828e4  2933.60840  46.9202
   2   6.688 VB    0.2916 5.39425e4  2865.79761  53.0798

Totals :                  1.01625e5  5799.40601

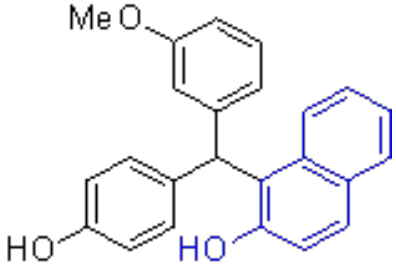


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

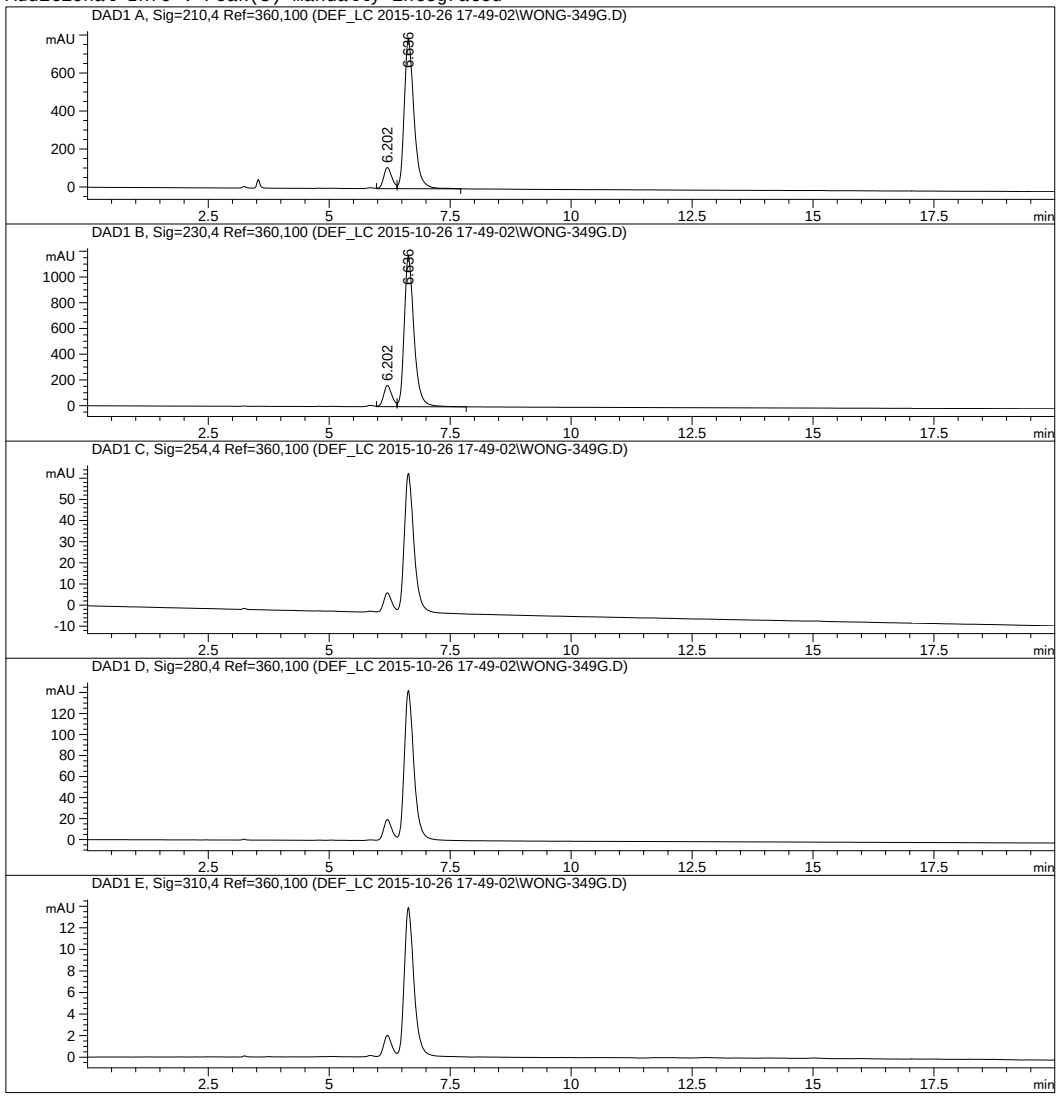
==========================================================================
                        *** End of Report ***
```



3h (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-26 17-49-02\WONG-349G.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :   4
Acq. Instrument : Instrument 1                  Location : Vial 96
Injection Date  : 10/26/2015 6:43:53 PM              Inj :   1
                                              Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-10-26 17-49-02\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/26/2015 2:13:29 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-26 17-49-02\WONG-349G.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.202 VV    0.1803 1298.45288  111.13402  10.5532
   2   6.636 VB    0.2130 1.10054e4   787.53760  89.4468

Totals :                   1.23039e4   898.67162



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.202 VV    0.1810 1936.41553  164.92564  10.5963
   2   6.636 VB    0.2129 1.63381e4  1170.01599  89.4037

Totals :                   1.82745e4  1334.94164

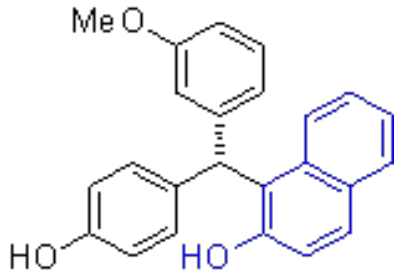


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

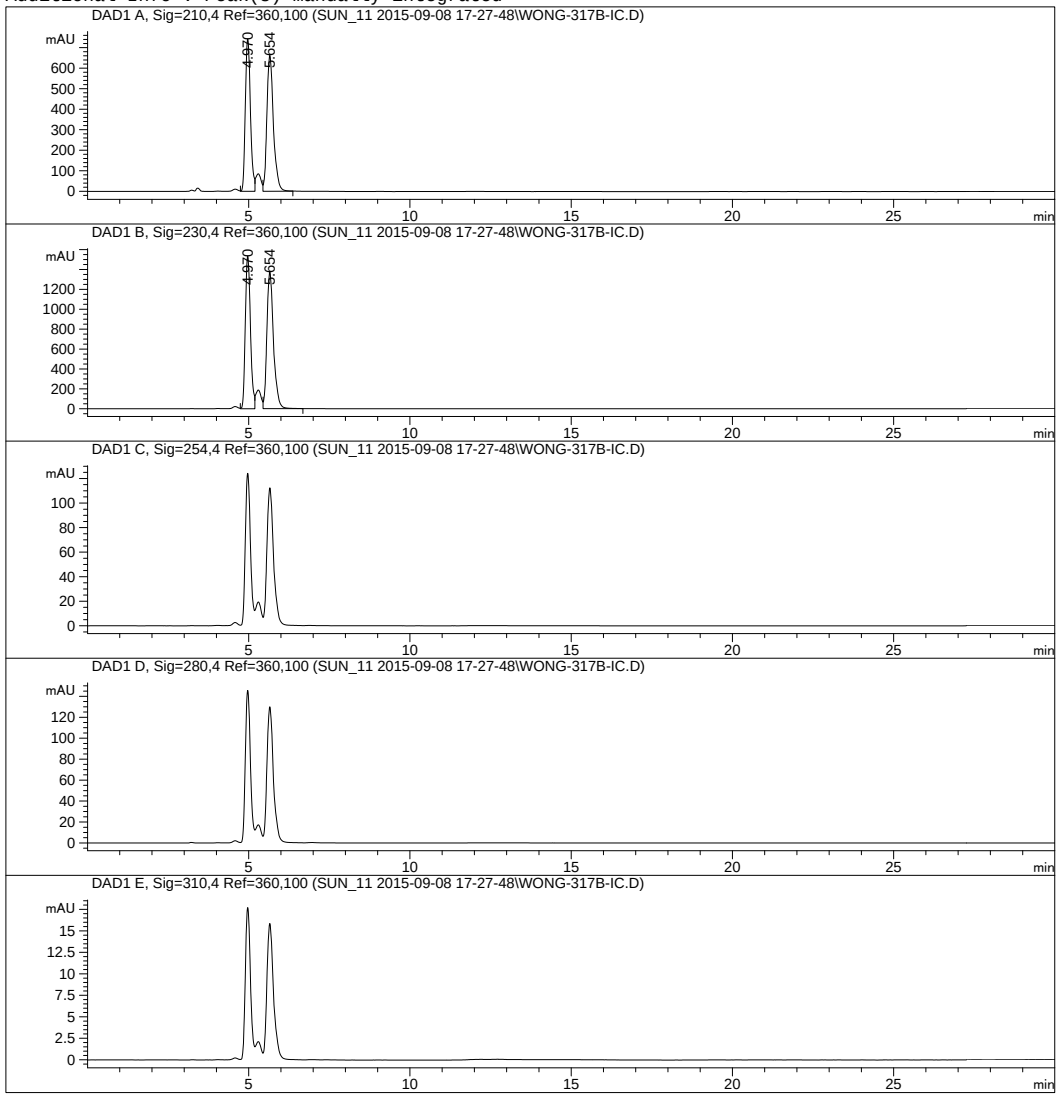
==========================================================================
                        *** End of Report ***
```



3h (*enantioenriched*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-08 17-27-48\WONG-317B-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :   9
Acq. Instrument : Instrument 1                  Location : Vial 98
Injection Date  : 9/8/2015 8:19:23 PM               Inj :   1
                                               Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-08 17-27-48\IC-10-30.M
Last changed    : 9/8/2015 7:47:27 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\DATA\SUN_11 2015-07-10 15-30-17\IC-15-40.M
Last changed    : 9/9/2015 1:34:22 PM
Additional Info : Peak(s) manually integrated
```




```
==========================================================================
                        Fraction Information
==========================================================================
```


Data File C:\CHEM32\1\DATA\SUN_11 2015-09-08 17-27-48\WONG-317B-IC.D
Sample Name:

```
==========================================================================
No Fractions found.
==========================================================================
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.970 VV    0.1724 8166.22949  741.73889  46.7686
   2   5.654 VB    0.2158 9294.70898  661.96478  53.2314

Totals :                  1.74609e4  1403.70367



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.970 VV    0.1730 1.69460e4  1532.99207  46.4774
   2   5.654 VB    0.2177 1.95147e4  1373.76929  53.5226

Totals :                  3.64607e4  2906.76135

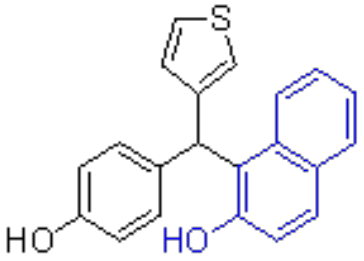


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

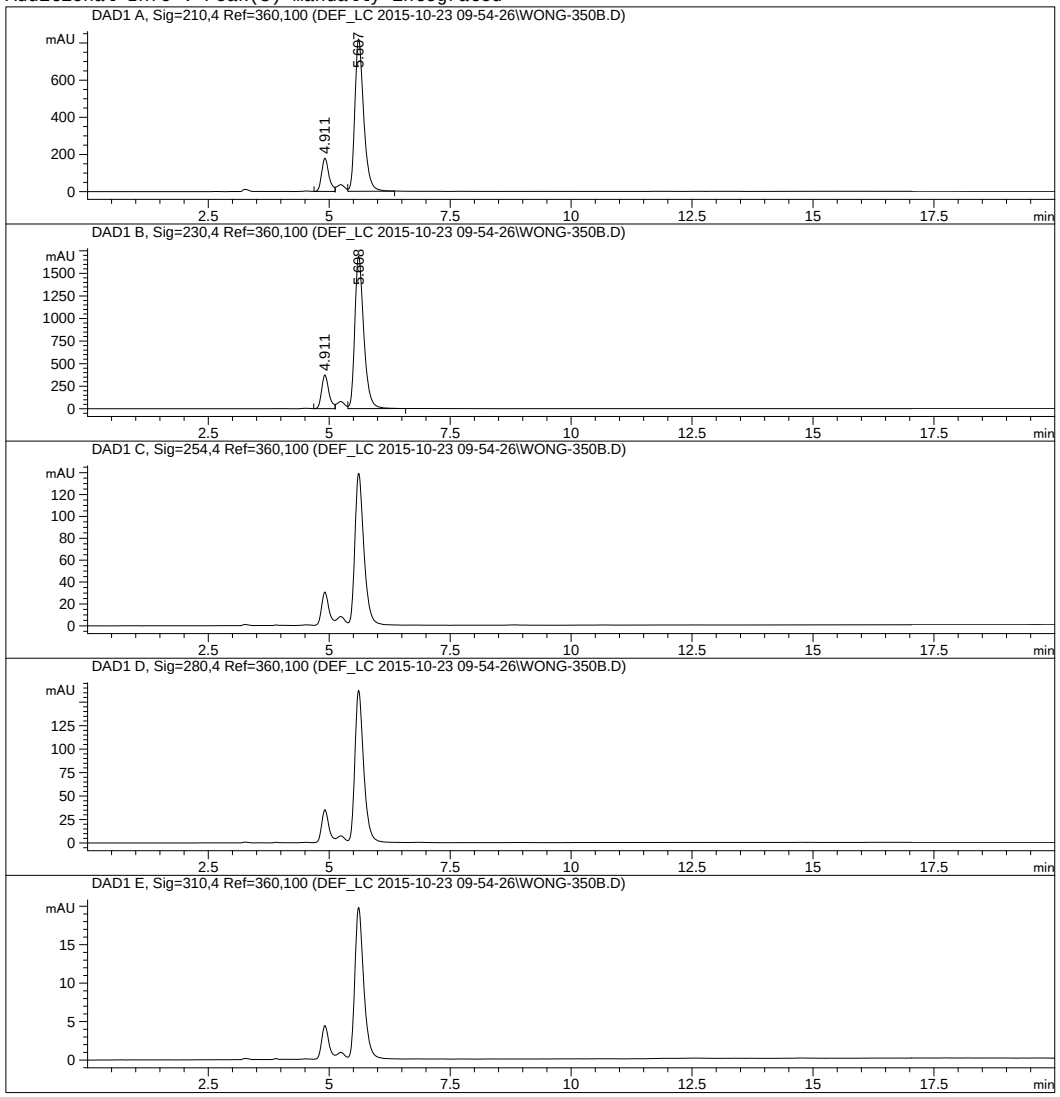
==========================================================================
                        *** End of Report ***
```



3i (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-350B.D
Sample Name:

```
==========================================================================
Acq. Operator   :                                Seq. Line :  61
Acq. Instrument : Instrument 1                    Location : Vial 87
Injection Date  : 10/24/2015 7:49:53 AM                Inj :   1
                                                 Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 3.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\IC-01-40.M
Last changed    : 10/26/2015 2:13:29 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-10-23 09-54-26\WONG-350B.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.911 VV    0.1570 1853.84094  178.78249  15.1505
   2   5.607 VB    0.1917 1.03823e4   820.07587  84.8495

Totals :                  1.22361e4   998.85835



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.911 VV    0.1569 3875.93311  373.97034  15.1631
   2   5.608 VB    0.1937 2.16856e4  1690.26367  84.8369

Totals :                  2.55615e4  2064.23401

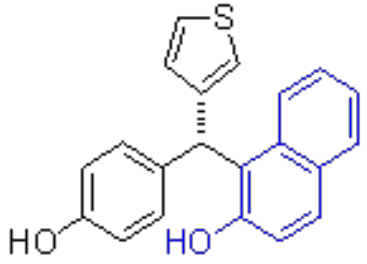


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

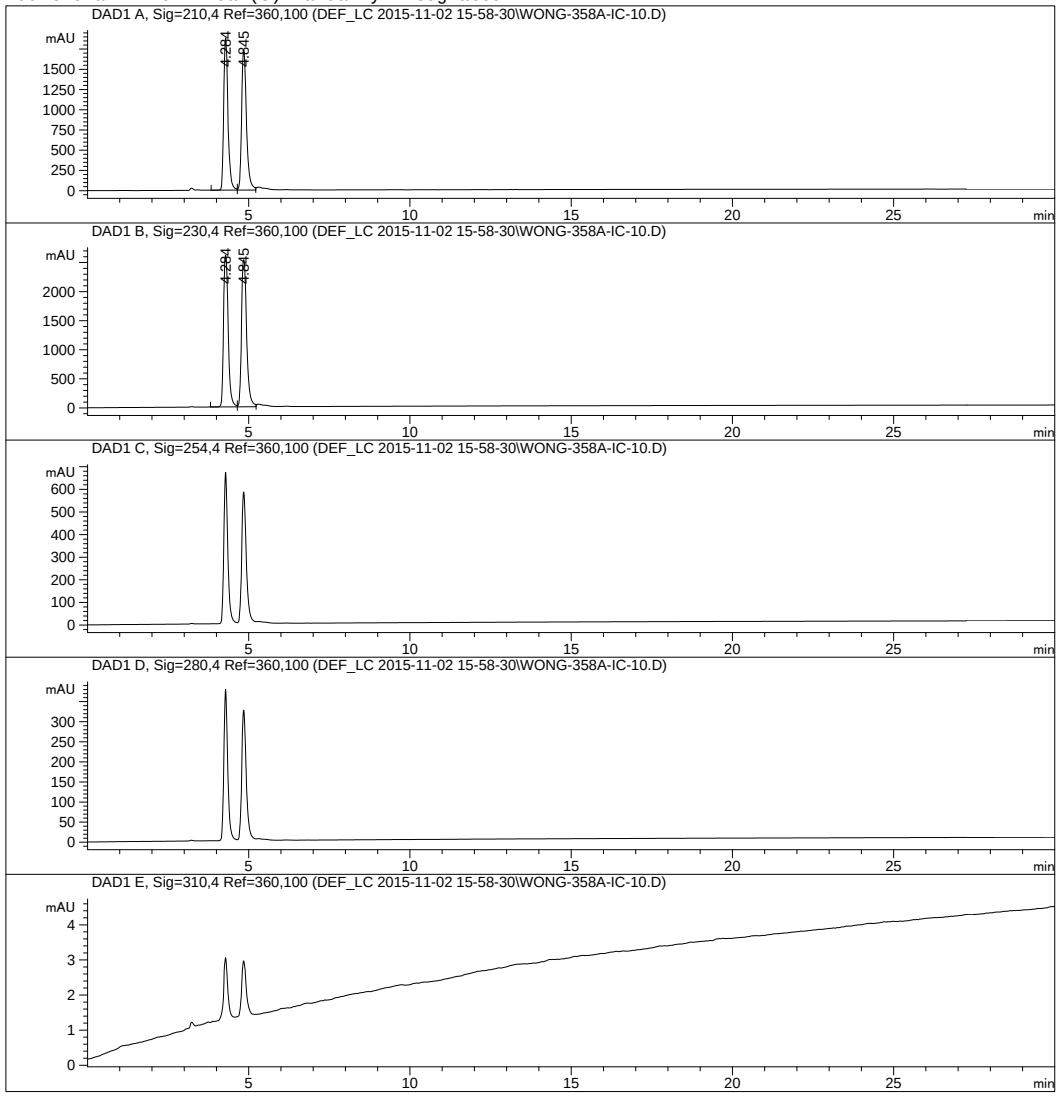
==========================================================================
                        *** End of Report ***
```



3i (*enantioenriched*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-02 15-58-30\WONG-358A-IC-10.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :  18
Acq. Instrument : Instrument 1                  Location : Vial 81
Injection Date  : 11/2/2015 9:15:19 PM               Inj :   1
                                              Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 2.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-11-02 15-58-30\IC-10-30.M
Last changed    : 11/2/2015 9:14:26 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\AD-01-10.M
Last changed    : 11/3/2015 1:56:45 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-02 15-58-30\WONG-358A-IC-10.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.284 BV    0.1408 1.72064e4  1879.46704  48.8020
   2   4.845 VV    0.1615 1.80511e4  1733.94702  51.1980

Totals :                  3.52575e4  3613.41406



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.284 BV    0.1566 2.60725e4  2609.60864  48.3432
   2   4.845 VV    0.1705 2.78596e4  2530.24268  51.6568

Totals :                  5.39321e4  5139.85132

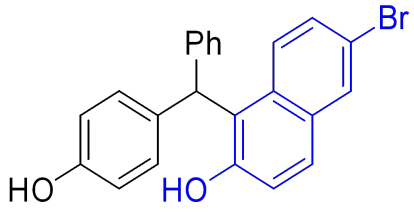


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

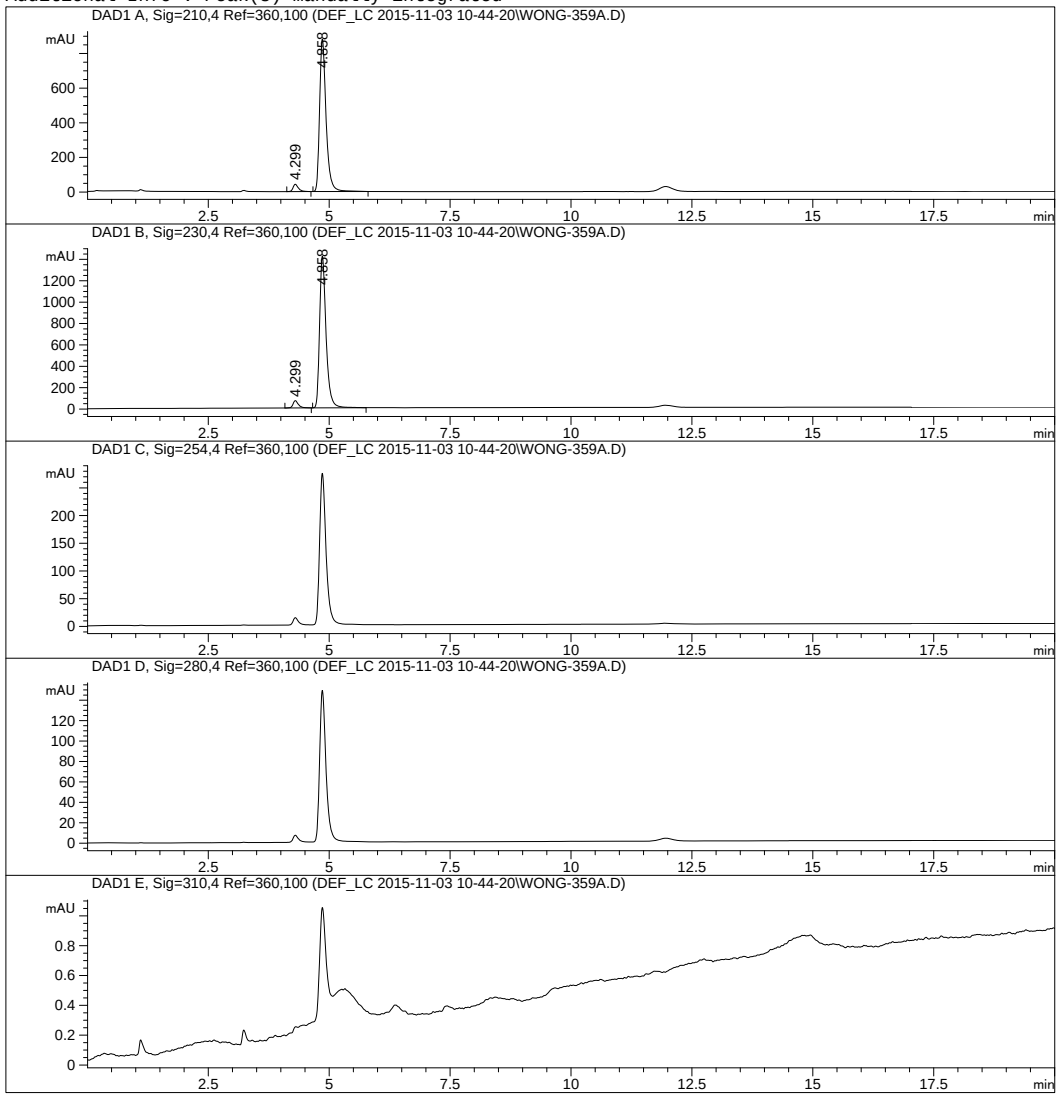
==========================================================================
                        *** End of Report ***
```



3j (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-03 10-44-20\WONG-359A.D
Sample Name:

```
==========================================================================
Acq. Operator   :                                Seq. Line :  46
Acq. Instrument : Instrument 1                    Location : Vial 82
Injection Date  : 11/4/2015 1:35:30 AM                 Inj :   1
                                                 Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-11-03 10-44-20\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\AD-01-10.M
Last changed    : 11/4/2015 3:25:36 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-03 10-44-20\WONG-359A.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.299 BB    0.1160  326.62158   42.33492   3.8237
   2   4.858 BB    0.1408 8215.31152  880.99805  96.1763

Totals :                   8541.93311  923.33297



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.299 BB    0.1174  535.58661   68.36449   3.9000
   2   4.858 BB    0.1405 1.31975e4  1418.93408  96.1000

Totals :                   1.37331e4  1487.29858

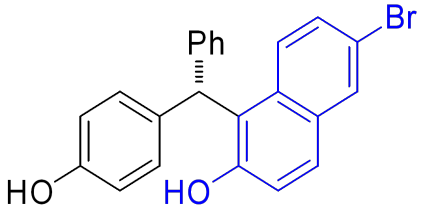


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

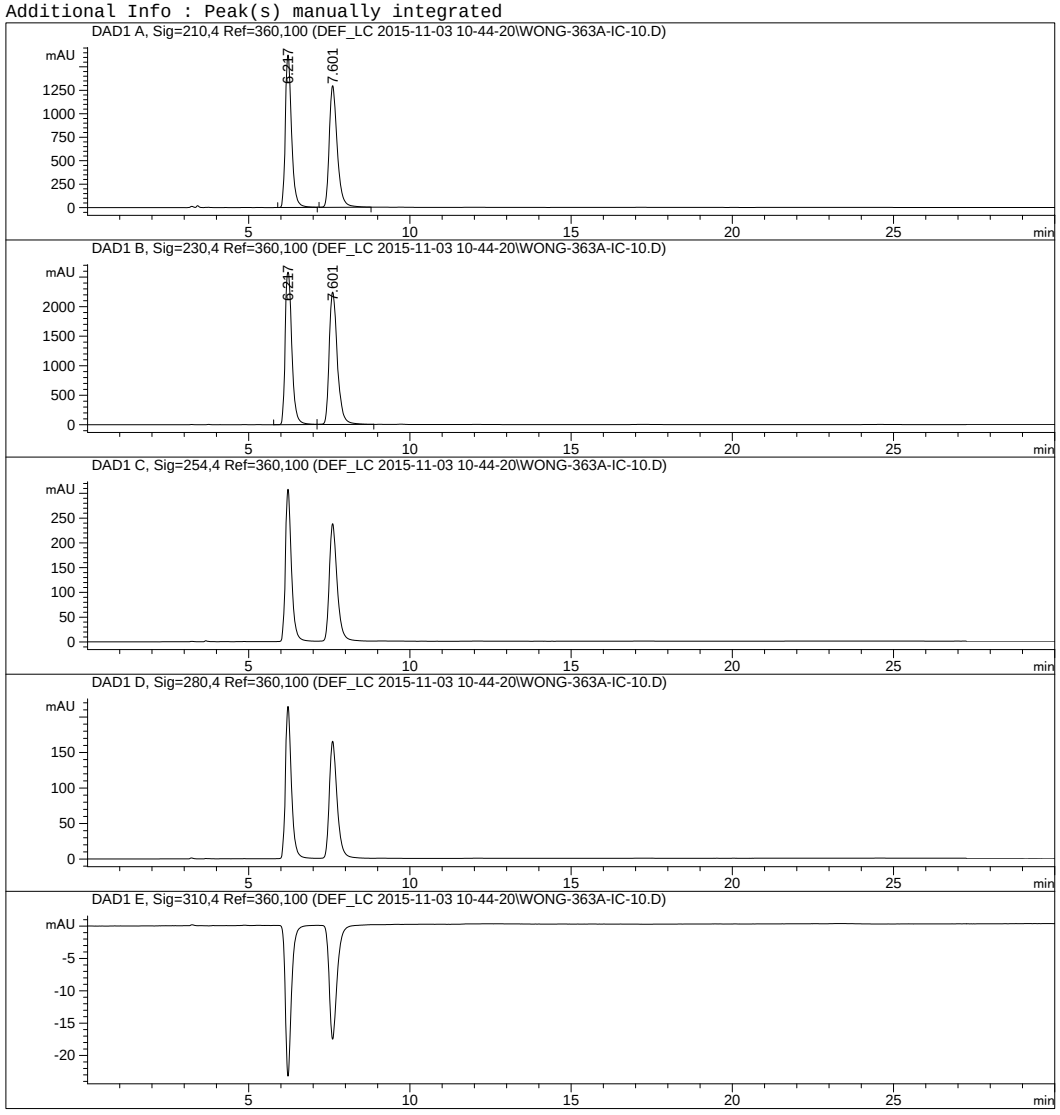
==========================================================================
                        *** End of Report ***
```



3j (*enantioenriched*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-03 10-44-20\WONG-363A-IC-10.D
Sample Name:

```
==========================================================================
Acq. Operator   :                          Seq. Line :  47
Acq. Instrument : Instrument 1              Location : Vial 83
Injection Date  : 11/4/2015 1:56:34 AM           Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 2.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-11-03 10-44-20\IC-10-30.M
Last changed    : 11/4/2015 1:55:45 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\AD-01-10.M
Last changed    : 11/4/2015 3:25:36 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-03 10-44-20\WONG-363A-IC-10.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.217 BB    0.2038 2.16930e4  1624.86572  49.3895
   2   7.601 BB    0.2621 2.22293e4  1295.84741  50.6105

Totals :                  4.39223e4  2920.71313



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.217 BV    0.2217 3.70977e4  2581.36084  48.5136
   2   7.601 VB    0.2690 3.93709e4  2240.32007  51.4864

Totals :                  7.64686e4  4821.68091

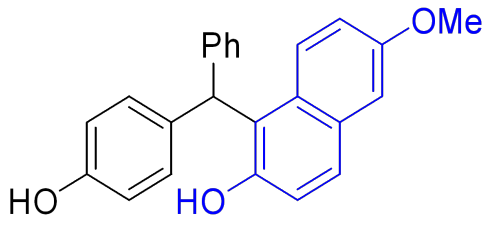


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

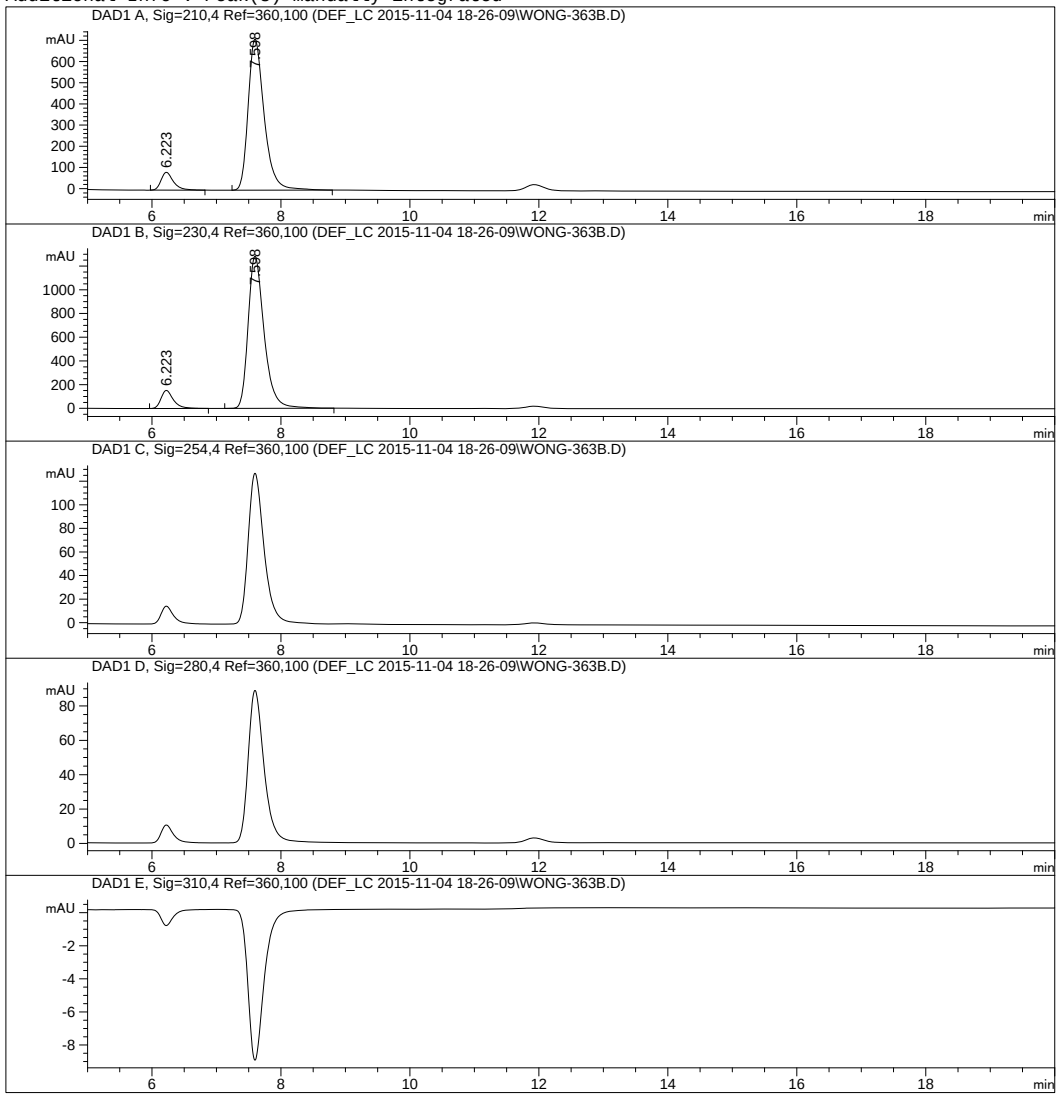
==========================================================================
                        *** End of Report ***
```



3k (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-04 18-26-09\WONG-363B.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :  82
Acq. Instrument : Instrument 1                  Location : Vial 85
Injection Date  : 11/6/2015 2:54:29 AM               Inj :   1
                                              Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 2.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-11-04 18-26-09\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\AD-01-10.M
Last changed    : 11/6/2015 9:07:04 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-04 18-26-09\WONG-363B.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.223 BB    0.2020 1127.74255   84.33185   8.3832
   2   7.598 BB    0.2616 1.23247e4   713.17029  91.6168

Totals :                   1.34524e4   797.50214



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.223 BB    0.2021 2041.37952  152.56450   8.4368
   2   7.598 BB    0.2613 2.21547e4  1284.21191  91.5632

Totals :                   2.41961e4  1436.77641

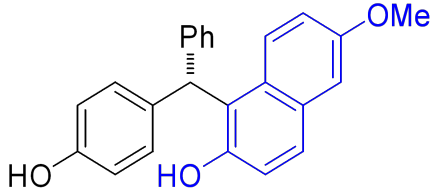


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

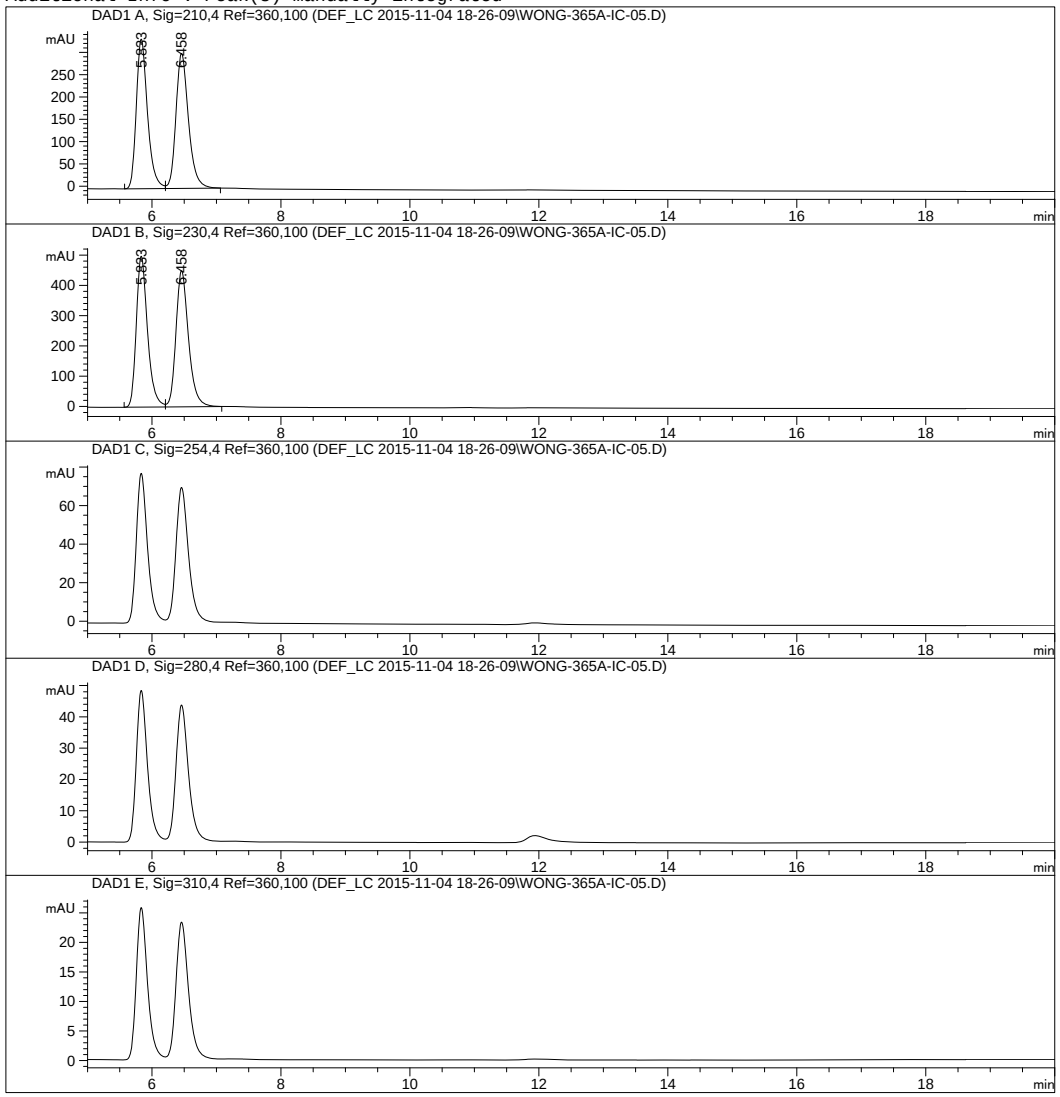
==========================================================================
                        *** End of Report ***
```



3k (*enantioenriched*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-04 18-26-09\WONG-365A-IC-05.D
Sample Name:

```
==========================================================================
Acq. Operator   :                                Seq. Line :  72
Acq. Instrument : Instrument 1                    Location : Vial 84
Injection Date  : 11/6/2015 12:02:25 AM              Inj :   1
                                                 Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-11-04 18-26-09\IC-05-30.M
Last changed    : 8/23/2012 1:59:23 PM
Analysis Method : C:\CHEM32\1\METHODS\AD-01-10.M
Last changed    : 11/6/2015 9:07:04 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-04 18-26-09\WONG-365A-IC-05.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.833 BV    0.1849 4050.47656  335.49789  49.7308
   2   6.458 VB    0.2058 4094.32349  302.71909  50.2692

Totals :                   8144.80005  638.21698



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.833 BV    0.1849 6023.57520  498.64417  49.7496
   2   6.458 VB    0.2058 6084.20410  449.69058  50.2504

Totals :                   1.21078e4   948.33475

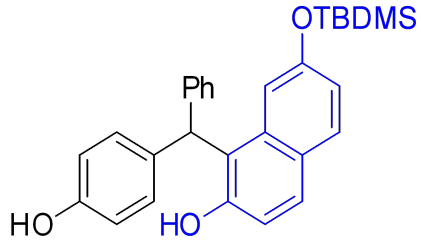


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

==========================================================================
                        *** End of Report ***
```

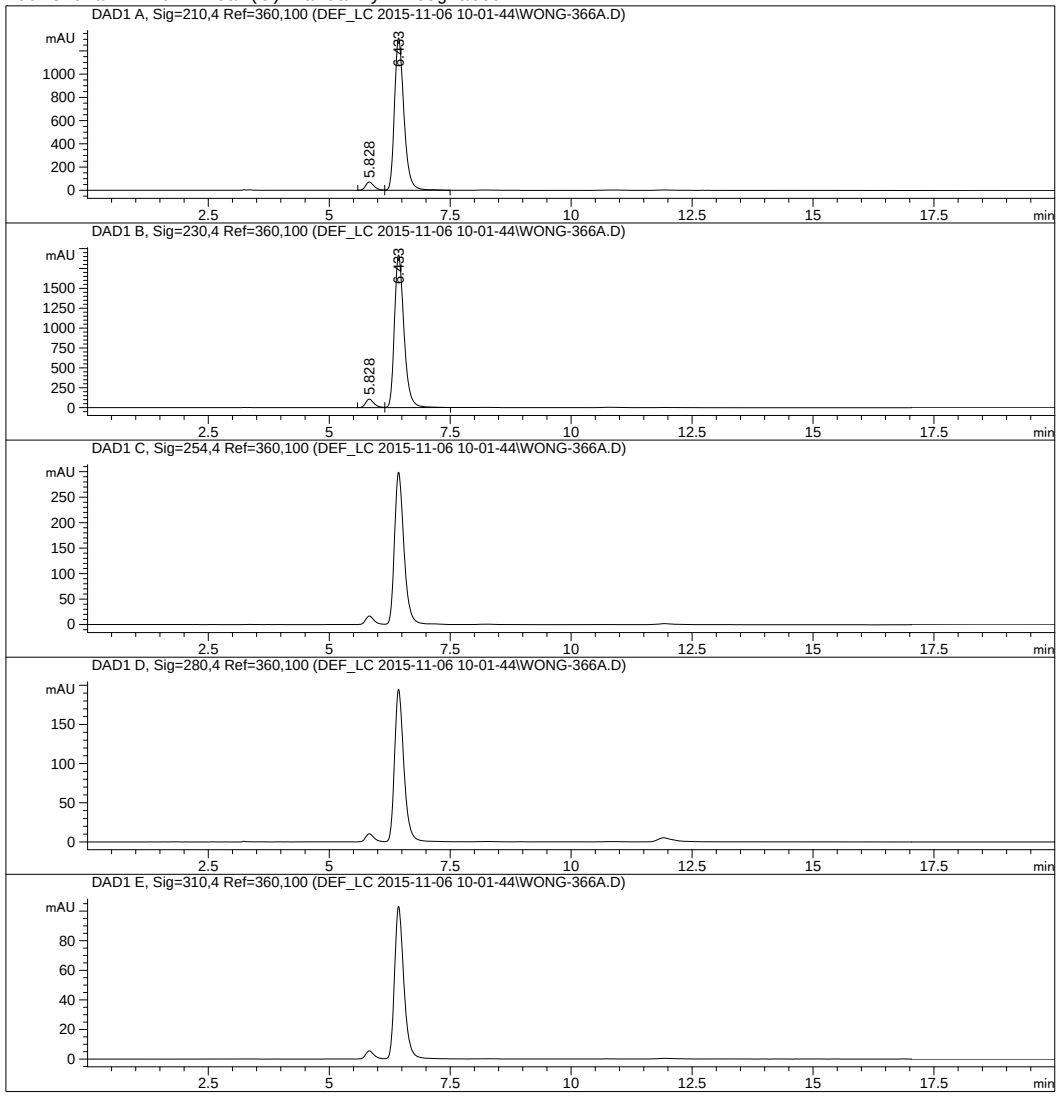


3l (*racemic*)

Instrument 1 11/6/2015 2:22:49 PM

Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-06 10-01-44\WONG-366A.D
Sample Name:

```
==================================================================
Acq. Operator   :                          Seq. Line :  35
Acq. Instrument : Instrument 1              Location : Vial 86
Injection Date  : 11/6/2015 10:55:43 PM          Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-11-06 10-01-44\IC-05-20.M
Last changed    : 11/6/2015 10:54:52 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\AD-01-10.M
Last changed    : 11/9/2015 2:42:51 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-06 10-01-44\WONG-366A.D
Sample Name:

```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.828 BV    0.1848  864.34723   71.59573   4.6397
   2   6.433 VB    0.2061 1.77650e4  1310.97266  95.3603

Totals :                  1.86293e4  1382.56839



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   5.828 BV    0.1847 1286.89551  106.72919   4.6866
   2   6.433 VB    0.2112 2.61720e4  1918.49707  95.3134

Totals :                  2.74589e4  2025.22626

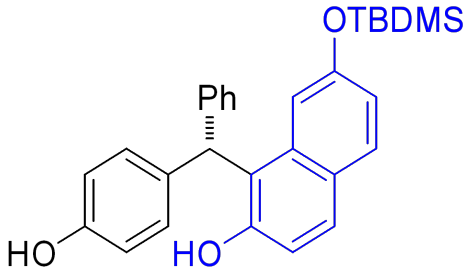


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

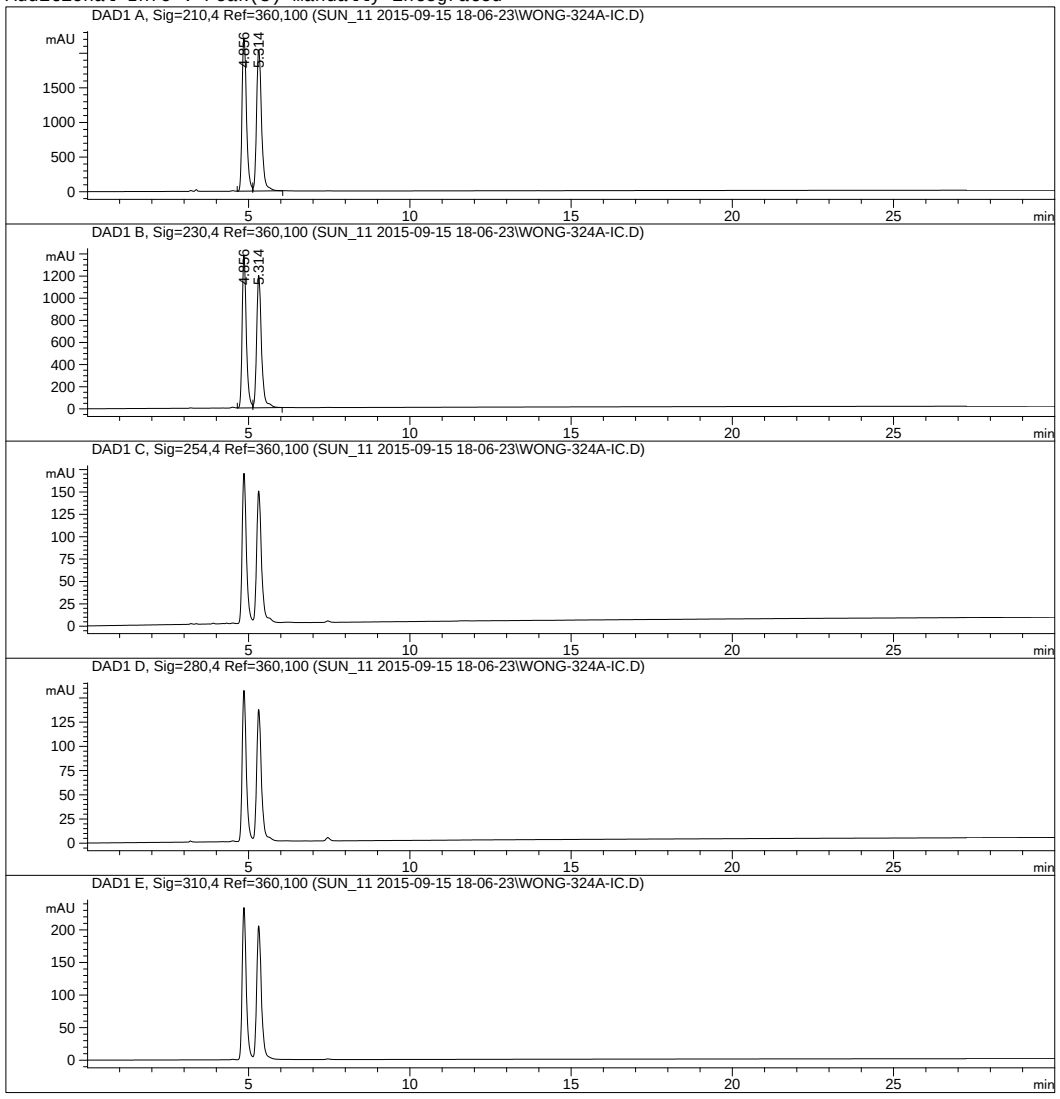
==================================================================
                        *** End of Report ***
```



3l (*enantioenriched*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-09-15 18-06-23\WONG-324A-IC.D
Sample Name:

```
==========================================================================
Acq. Operator   :                          Seq. Line :  25
Acq. Instrument : Instrument 1              Location : Vial 84
Injection Date  : 9/16/2015 2:20:12 AM           Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-09-15 18-06-23\IC-10-30.M
Last changed    : 9/16/2015 2:19:21 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\DATA\SUN_11 2015-09-10 09-42-40\AD-05-15.M
Last changed    : 7/8/2015 4:31:16 PM
Additional Info : Peak(s) manually integrated
```




```
==========================================================================
                        Fraction Information
==========================================================================
```


Data File C:\CHEM32\1\DATA\SUN_11 2015-09-15 18-06-23\WONG-324A-IC.D
Sample Name:

```
==========================================================================
No Fractions found.
==========================================================================
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.856 VV    0.1498 2.10647e4  2197.91040  48.8275
   2   5.314 VB    0.1662 2.20764e4  2040.40527  51.1725

Totals :                  4.31410e4  4238.31567



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   4.856 VV    0.1359 1.22220e4  1371.75317  49.5689
   2   5.314 VB    0.1573 1.24346e4  1196.25159  50.4311

Totals :                  2.46567e4  2568.00476

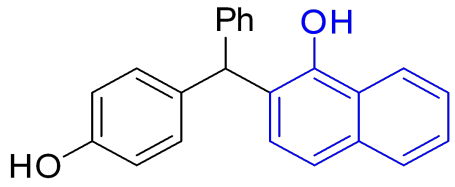


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

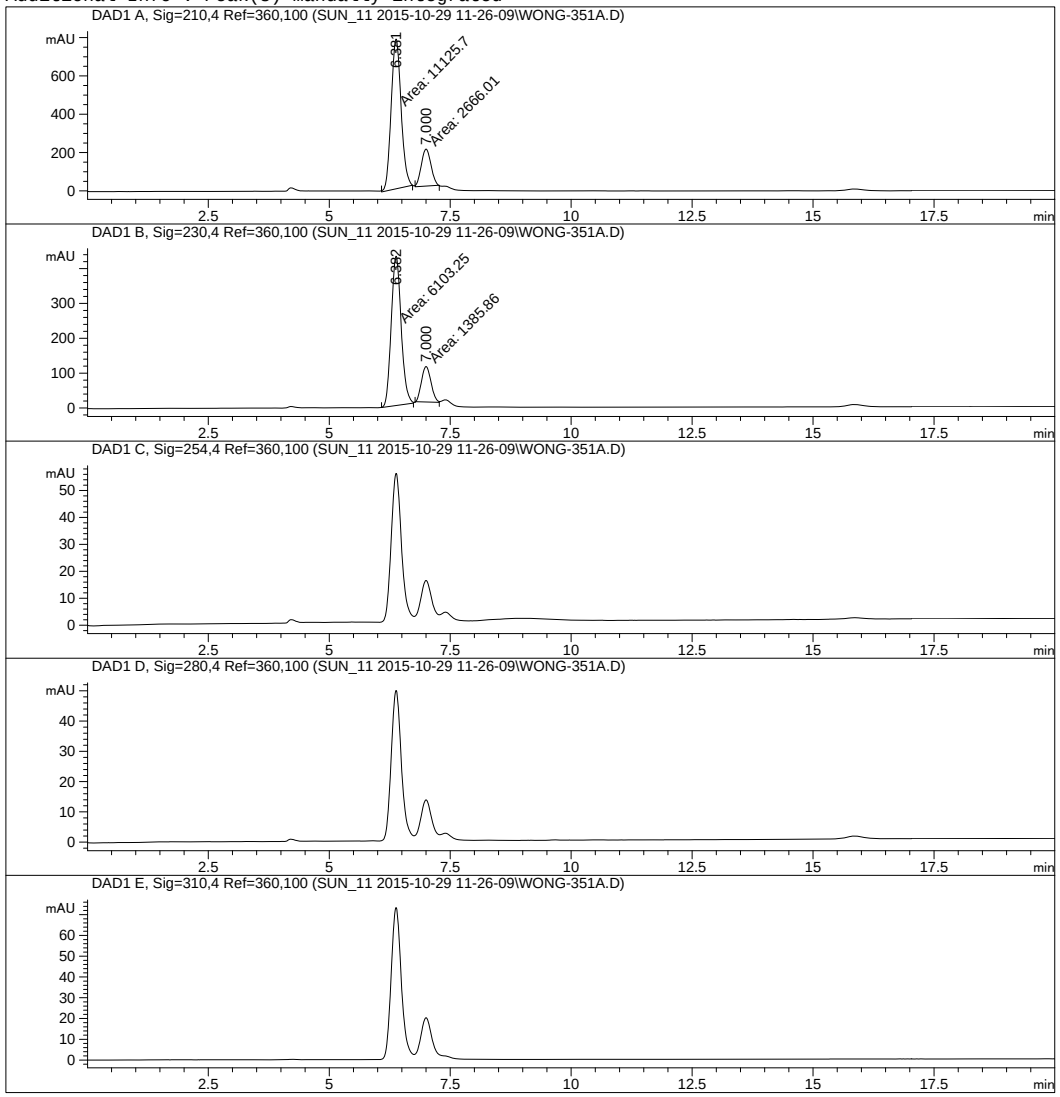
==========================================================================
                        *** End of Report ***
```



3m (*racemic*)

Data File C:\CHEM32\1\DATA\SUN_11 2015-10-29 11-26-09\WONG-351A.D
Sample Name:

```
==================================================================
Acq. Operator   :                          Seq. Line :  24
Acq. Instrument : Instrument 1              Location : Vial 93
Injection Date  : 10/29/2015 7:01:21 PM          Inj :   1
                                          Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 3.000 µl
Acq. Method     : C:\CHEM32\1\DATA\SUN_11 2015-10-29 11-26-09\IC-10-20.M
Last changed    : 4/9/2015 2:14:11 PM
Analysis Method : C:\CHEM32\1\METHODS\AD-10-15.M
Last changed    : 10/30/2015 1:38:41 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\SUN_11 2015-10-29 11-26-09\WONG-351A.D
Sample Name:

```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.381 MM    0.2372 1.11257e4   781.65979  80.6695
   2   7.000 MM    0.2299 2666.00537  193.25757  19.3305

Totals :                  1.37917e4   974.91736



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.382 MM    0.2373 6103.25293  428.66376  81.4950
   2   7.000 MM    0.2270 1385.85706  101.76293  18.5050

Totals :                  7489.10999  530.42669

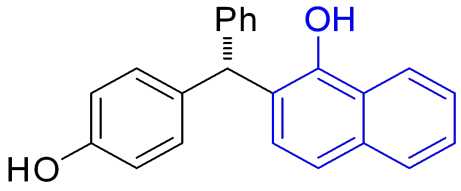


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

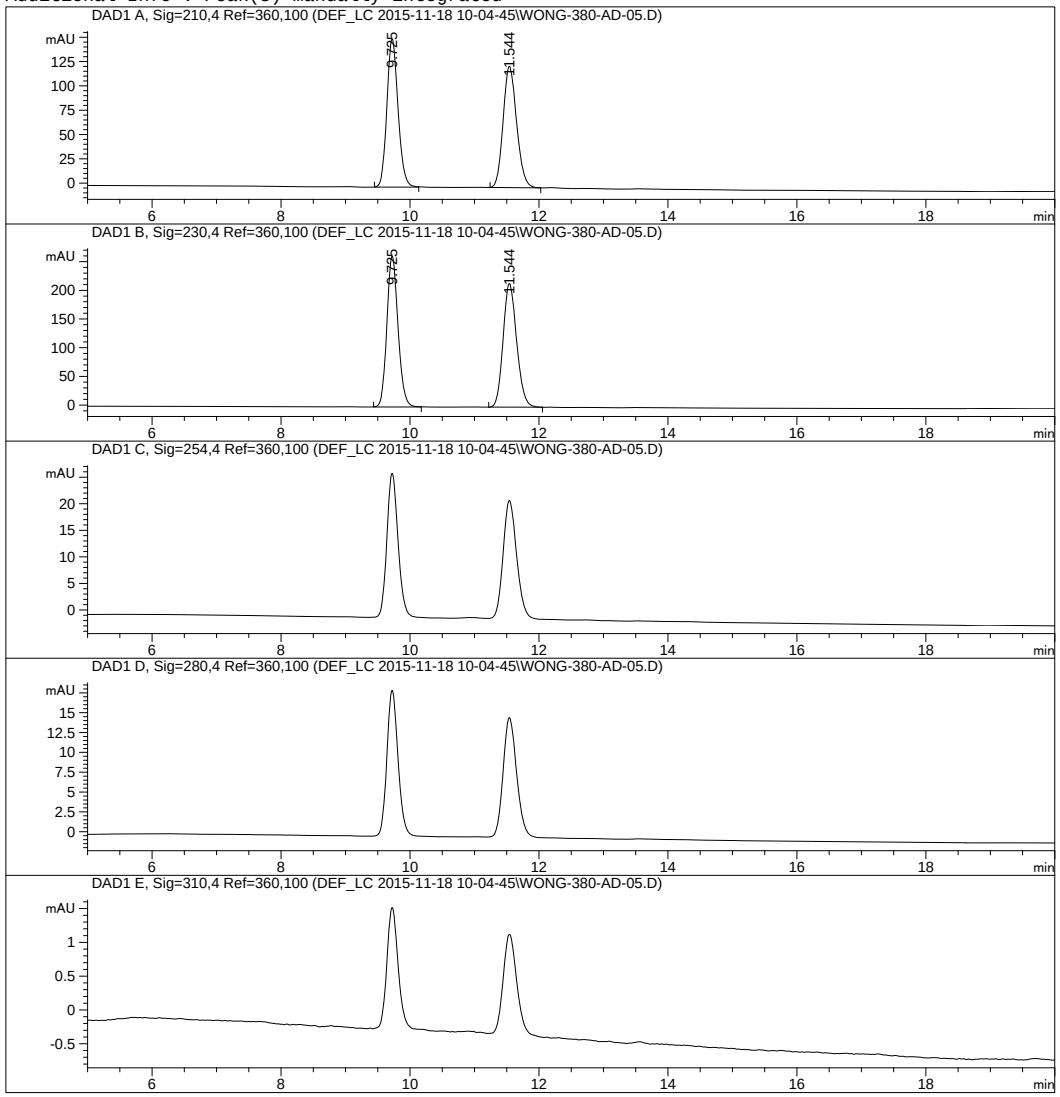
==================================================================
                        *** End of Report ***
```



3m (*enantioenriched*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-18 10-04-45\WONG-380-AD-05.D
Sample Name:

```
==========================================================================
Acq. Operator   :                                Seq. Line :  45
Acq. Instrument : Instrument 1                    Location : Vial 87
Injection Date  : 11/19/2015 2:40:09 AM               Inj :   1
                                                 Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 1.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-11-18 10-04-45\AD-05-30.M
Last changed    : 8/31/2012 5:22:01 PM
Analysis Method : C:\CHEM32\1\METHODS\AD-01-10.M
Last changed    : 11/19/2015 2:32:48 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-18 10-04-45\WONG-380-AD-05.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.725 BB    0.1840 1828.25989  152.31488  50.1667
   2  11.544 BB    0.2258 1816.10620  124.78046  49.8333

Totals :                  3644.36609  277.09534



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.725 BB    0.1840 3153.90918  262.86566  50.0883
   2  11.544 BB    0.2261 3142.79028  215.50046  49.9117

Totals :                  6296.69946  478.36612

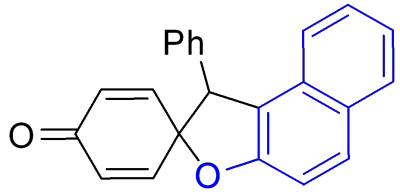


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

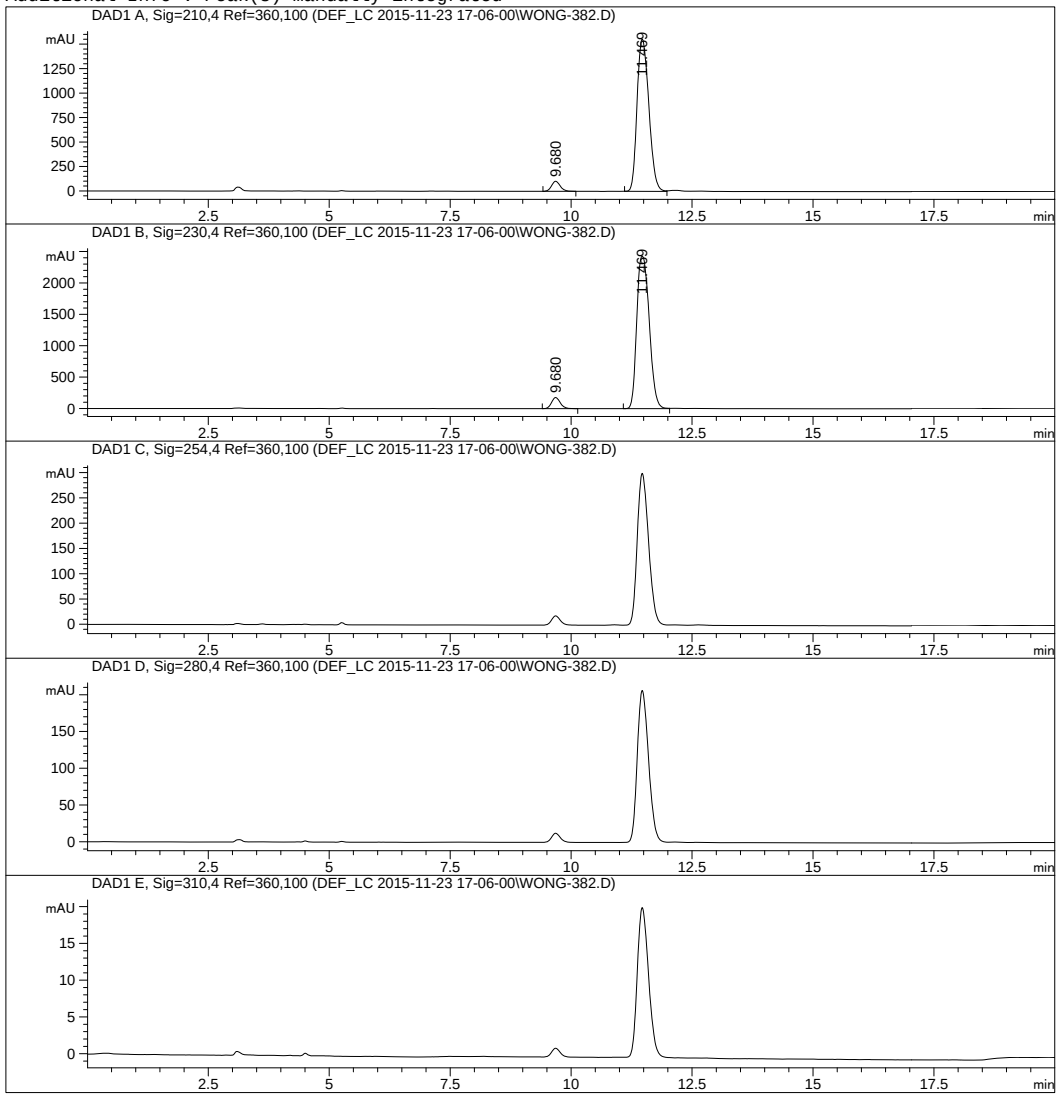
==========================================================================
                        *** End of Report ***
```



4 (*racemic*)

Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-23 17-06-00\WONG-382.D
Sample Name:

```
==========================================================================
Acq. Operator   :                              Seq. Line :   2
Acq. Instrument : Instrument 1                  Location : Vial 90
Injection Date  : 11/23/2015 5:19:30 PM              Inj :   1
                                               Inj Volume : 5.000 µl
Different Inj Volume from Sequence !     Actual Inj Volume : 10.000 µl
Acq. Method     : C:\CHEM32\1\DATA\DEF_LC 2015-11-23 17-06-00\AD-05-20.M
Last changed    : 10/14/2015 3:51:32 PM
Analysis Method : C:\CHEM32\1\METHODS\AD-01-10.M
Last changed    : 11/23/2015 9:49:20 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Data File C:\CHEM32\1\DATA\DEF_LC 2015-11-23 17-06-00\WONG-382.D
Sample Name:

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=210,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.680 BB    0.1927 1271.50232  102.54669   4.5955
   2  11.469 BV    0.2699 2.63967e4  1556.21265  95.4045

Totals :                  2.76682e4  1658.75934



Signal 2: DAD1 B, Sig=230,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.680 BB    0.1937 2219.31641  177.65663   4.8558
   2  11.469 VV    0.2849 4.34855e4  2428.70557  95.1442

Totals :                  4.57049e4  2606.36220

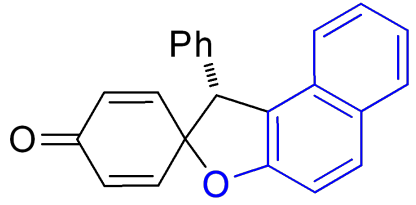


Signal 3: DAD1 C, Sig=254,4 Ref=360,100


Signal 4: DAD1 D, Sig=280,4 Ref=360,100


Signal 5: DAD1 E, Sig=310,4 Ref=360,100

==========================================================================
                        *** End of Report ***
```



4 (*enantioenriched*)