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## General Method and Materials

Chemical reagents and starting materials, unless otherwise noted, were purchased from commercial vendors and used without further purification. Most chemicals were from Sigma-Aldrich, except hafnium(IV) *tert*-butoxide was from Alfa Aesar. Anhydrous solvents were purchased from J. T. Baker, and purified by M. BRAUN solvent purification system (A2 alumina).

All epoxidation reactions were carried out in Fisherbrand™ 16×100 mm test tubes sealed with sleeve stoppers and PTFE tape. Fisherbrand™ 4×12 mm disposable PTFE stir bars were used. Reactions were monitored by thin-layer chromatography using Macherey-Nagel pre-coated silica gel glass plates (0.25 mm, UV<sub>254</sub> + UV<sub>366</sub> indicator) and visualized using UV light (254 nm) and Cerium-ammonium-molybdate stain. Flash chromatography was performed on silica gel (ZEOPrep 60 HYD 40-63 micron). Yields refer to chromatographically and spectrographically pure material, unless otherwise noted.

<sup>1</sup>H and <sup>13</sup>C NMR spectra were recorded on a Bruker DMX 500 spectrometer. Chemical shifts ( $\delta$  scale) are reported in ppm relative to tetramethylsilane. The proton spectra are reported as follows:  $\delta$  (multiplicity, coupling constant J, number of protons). Multiplicities are indicated as s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet) and br (broad). High-performance liquid chromatography was performed on a Varian ProStar Series equipped with a variable wavelength detector using chiral stationary phases (Chirapak AD-H, AS-H, IB, IC, ID; 0.46 cm × 25 cm) from Daicel. Infrared spectra were recorded as thin films on sodium chloride plates using a Nicolet 20 SXB FTIR spectrometer. High-resolution mass spectra were acquired from a Agilent 6224 Tof-MS with 1290 UHPLC. The X-ray diffraction data were collected at 100 K on a Bruker D8 VENTURE with PHOTON 100 CMOS detector system equipped with a Cu-target X-ray tube ( $\lambda = 1.54178 \text{ \AA}$ ).

Ligands (*R, R*)-**L1**, (*R, R*)-**L2** and (*S, S*)-**L2** were prepared according to previous literature.<sup>[1][2]</sup> Ligand (+)-diisopropyl L-tartrate and (-)-diisopropyl D-tartrate were obtained from Sigma-Aldrich.

## Derivation of the Kinetic Resolution Equation for Non-Racemic Mixture



Assume reaction starts with a known  $\frac{R_0}{S_0}$ , where  $R_0 > S_0$ , thus

$$ee_0 = \frac{(R_0 - S_0)}{(R_0 + S_0)}$$

$$\text{conversion}(c) = \frac{\text{total product}}{\text{total starting material}} = \frac{(R_0 - R) + (S_0 - S)}{(R_0 + S_0)}$$

$$ee = \frac{\text{product diff.}}{\text{total product}} = \frac{(R_p - S_p)}{(R_p + S_p)} = \frac{(R_0 - R) + (S_0 - S)}{(R_0 - R) + (S_0 - S)}$$

$S$  and  $R$  are expressed as a function of  $ee$ ,  $c$ ,  $R_0$  and  $S_0$ , and

$$R = \frac{(R_0 + S_0)(1 + c - ee \cdot c) + (R_0 - S_0)}{2}$$

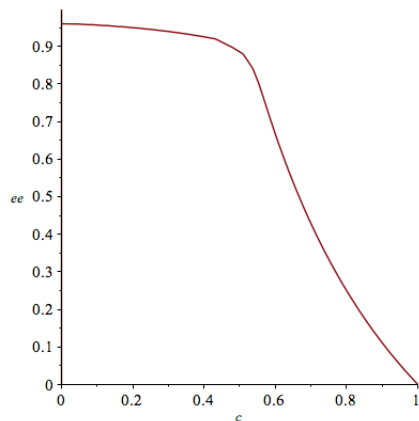
$$S = \frac{(R_0 + S_0)(1 + ee \cdot c - c) - (R_0 - S_0)}{2}$$

$$\text{selectivity} = \frac{\ln\left(\frac{R}{R_0}\right)}{\ln\left(\frac{S}{S_0}\right)}$$

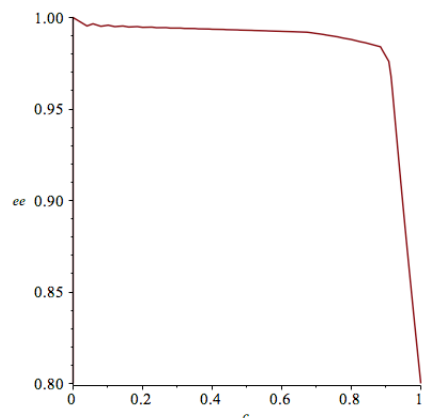
$$0 < c < 1$$

A plot of  $ee$  vs  $c$  is generated using Maplesoft, given the values of constants  $R_0$  and  $S_0$ , and  $selectivity$ .

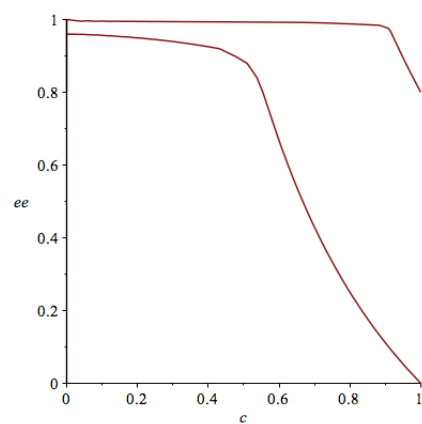
When  $R_0 = 0.5$ ,  $S_0 = 0.5$  and  $selectivity = 50$ ,  $ee_0 = 0$ . This is the standard scenario of a kinetic resolution of a racemic mixture, and the plot of  $ee$  vs  $c$  is depicted below.



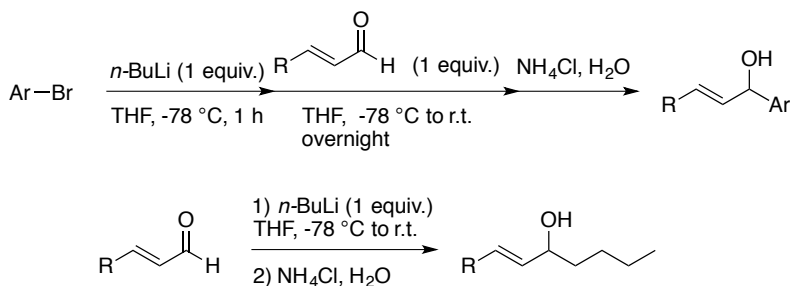
When  $R_0 = 0.9$ ,  $S_0 = 0.1$  and *selectivity* = 50,  $ee_0 = 0.8$ . This is the case when reaction proceeds with an unequal mixture of  $R_0$  and  $S_0$ .



Integrating the two plots above, one could see the advantage of running a kinetic resolution of non-racemic mixture.



## Preparation and Characterization of Secondary Allylic Alcohols 1-10

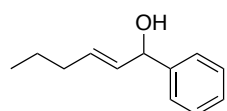


### Synthesis of substrates 1-3 and 6-10.

To a 100 ml flame-dried round-bottom flask of aryl bromide (20 mmol) in THF (20 ml) was purged with nitrogen and cooled to  $-78\text{ }^{\circ}\text{C}$  in an acetone/dry ice bath. *n*-BuLi (1.6 M in THF, 20 mmol) was added dropwise to the solution and stirred at  $-78\text{ }^{\circ}\text{C}$  for 1 hour. Aldehyde (20 mmol) in THF (20 ml) was then added and the reaction was slowly warmed up to room temperature and stirred overnight. The mixture was quenched with saturated  $\text{NH}_4\text{Cl}$  solution, extracted with diethyl ether and dried over sodium sulfate. The solvent was removed under reduced pressure to yield the crude product, which was purified using flash column chromatography (Hex:EtOAc=10 :1).

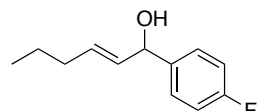
### Synthesis of substrates 4 and 5.

To a 100 ml flame-dried round-bottom flask of aldehyde (20 mmol) in THF (20 ml) at  $-78\text{ }^{\circ}\text{C}$  was slowly added *n*-BuLi (1.6 M in THF, 20 mmol) and maintained at this temperature for 1 h. The reaction was then warmed up to room temperature overnight and quenched with saturated  $\text{NH}_4\text{Cl}$  solution, extracted with diethyl ether and dried over sodium sulfate. The solvent was removed under reduced pressure, and the crude mixture was purified by flash column chromatography (Hex:EtOAc=10 :1).



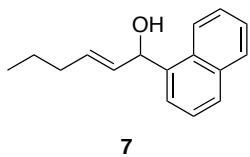
**2**

**2:** colorless oil. IR (film): 3345, 3085, 3062, 3029, 2958, 2929, 2872, 1493, 1453, 1379, 1338, 1193, 1192, 1072, 1030, 1005, 966, 914, 843, 757, 699, 634, 550  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.30-7.37 (m, 4 H), 7.22-7.26 (m, 1 H), 5.70-5.75 (m, 1 H), 5.61-5.66 (m, 1 H), 5.12 (d,  $J$ =6.65 Hz, 1 H), 2.23 (s, 1 H), 2.02 (q,  $J$ =7.08 Hz, 2 H), 1.40 (sext,  $J$ =7.37 Hz, 2 H), 0.89 (t,  $J$ =7.37 Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 143.6, 132.6, 132.6, 128.5 (2 C), 127.5, 126.3 (2 C), 75.2, 34.3, 22.3, 13.8 ppm. HRMS (ESI): calcd. for  $\text{C}_{12}\text{H}_{15}$  [ $\text{M}+\text{H}-\text{H}_2\text{O}$ ] $^+$ : 159.1168 found: 159.1173.

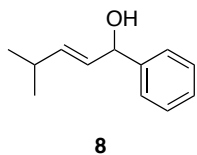


**6**

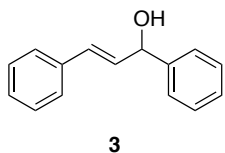
**6:** colorless oil. IR (film): 2243, 2960, 2930, 2873, 1604, 1509, 1464, 1412, 1379, 1223, 1156, 1086, 1042, 1013, 968, 866, 836, 586, 549  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.29-7.32 (m, 2 H), 6.98-7.02 (m, 2 H), 5.68-5.74 (m, 1 H), 5.57-5.62 (m, 1 H), 5.10 (d,  $J$ =6.80 Hz, 1 H), 2.33 (s, 1 H), 2.02 (q,  $J$ =7.15 Hz, 2 H), 1.40 (sext,  $J$ =7.38 Hz, 2 H), 0.89 (t,  $J$ =7.37 Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 162.2 (d,  $J$ =245 Hz, 1 C), 139.3 (d,  $J$ =3.08 Hz, 1 C), 132.8, 132.5, 127.9 (d,  $J$ =8.07 Hz, 2 C), 115.2 (d,  $J$ =21.3 Hz, 2 C), 74.6, 34.3, 22.3, 13.8 ppm. HRMS (ESI): calcd. for  $\text{C}_{12}\text{H}_{14}\text{F}$  [ $\text{M}+\text{H}-\text{H}_2\text{O}$ ] $^+$ : 177.1074 found: 177.1083.



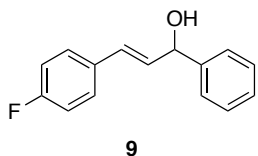
**7** : yellow oil. IR (film): 3335, 3049, 2957, 2928, 2871, 1597, 1510, 1456, 1436, 1395, 1378, 1260, 1228, 1165, 1092, 1074, 1049, 968, 798, 777, 734, 634, 570  $\text{cm}^{-1}$ ;  $^1\text{H NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 8.10-8.12 (m, 1 H), 7.81-7.83 (m, 1 H), 7.73-7.75 (m, 1 H), 7.58-7.60 (m, 1 H), 7.40-7.48 (m, 3 H), 5.77-5.82 (m, 3 H), 2.26 (s, 1 H), 1.97-2.01 (m, 2 H), 1.36 (sext,  $J=7.37$  Hz, 2 H), 0.85 (t,  $J=7.37$  Hz, 3 H) ppm;  $^{13}\text{C NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 139.0, 134.0, 133.1, 131.9, 130.7, 128.8, 128.3, 126.0, 125.6, 125.5, 124.0, 123.6 ppm. HRMS (ESI): calcd. for  $\text{C}_{16}\text{H}_{17}$   $[\text{M}+\text{H}-\text{H}_2\text{O}]^+$ : 209.1325 found: 209.1333.



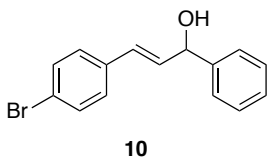
**8** : colorless oil. IR (film): 3351, 3062, 3029, 2959, 2929, 2869, 1666, 1493, 1465, 1451, 1383, 1364, 1305, 1221, 1193, 1102, 1059, 1007, 969, 915, 760, 699, 634, 547  $\text{cm}^{-1}$ ;  $^1\text{H NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.22-7.35 (m, 5 H), 5.68-5.72 (m, 1 H), 5.55-5.60 (m, 1 H), 5.10 (d,  $J=6.80$  Hz, 1 H), 2.45 (s, 1 H), 2.29 (oct,  $J=6.58$  Hz, 1 H), 0.99 (d,  $J=6.75$  Hz, 3 H), 0.98 (d,  $J=6.75$  Hz, 3 H) ppm;  $^{13}\text{C NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 143.5, 139.5, 129.5, 128.5 (2 C), 127.4, 126.3 (2 C), 75.2, 30.7, 22.3, 22.2 ppm. HRMS (ESI): calcd. for  $\text{C}_{12}\text{H}_{15}$   $[\text{M}+\text{H}-\text{H}_2\text{O}]^+$ : 159.1168 found: 159.1172.



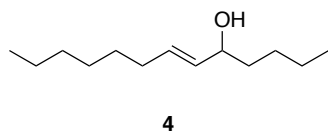
**3** : white solid. IR (film): 3340, 3059, 3082, 3027, 1600, 1494, 1449, 1391, 1300, 1191, 1092, 1067, 1009, 966, 915, 796, 745, 695, 638, 604, 544  $\text{cm}^{-1}$ ;  $^1\text{H NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.21-7.42 (m, 10 H), 6.66-6.69 (m, 1 H), 6.35-6.40 (m, 1 H), 5.37 (d,  $J=5.90$  Hz, 1 H), 2.10 (s, 1 H) ppm;  $^{13}\text{C NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 142.9, 136.7, 131.7, 130.7, 128.8 (2 C), 128.7 (2 C), 127.9, 126.7 (2 C), 126.5 (2 C), 75.3 ppm. HRMS (ESI): calcd. for  $\text{C}_{15}\text{H}_{13}$   $[\text{M}+\text{H}-\text{H}_2\text{O}]^+$ : 193.1012 found: 193.1008.



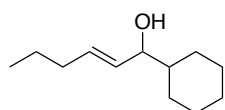
**9** : yellow oil. IR (film): 3335, 3030, 1601, 1559, 1540, 1508, 1455, 1418, 1228, 1158, 1070, 1013, 967, 857, 834, 763, 700, 668, 513  $\text{cm}^{-1}$ ;  $^1\text{H NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.26-7.41 (m, 7 H), 6.95-6.98 (m, 2 H), 6.58-6.62 (m, 1 H), 6.24-6.29 (m, 1 H), 5.32 (d,  $J=6.45$  Hz, 1 H), 2.36 (s, 1 H) ppm;  $^{13}\text{C NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 162.4 (d,  $J=247$  Hz, 1 C), 142.8, 132.8, 131.4, 129.3, 128.6 (2 C), 128.2 (d,  $J=8.02$  Hz, 2 C), 127.8, 126.4 (2 C), 115.5 (d,  $J=21.6$  Hz, 2 C), 74.9 ppm. HRMS (ESI): calcd. for  $\text{C}_{15}\text{H}_{12}\text{F}$   $[\text{M}+\text{H}-\text{H}_2\text{O}]^+$ : 211.0918 found: 211.0927.



**10** : white solid. IR (film): 3334, 3061, 3028, 1653, 1559, 1487, 1453, 1419, 1400, 1298, 1190, 1071, 1008, 967, 850, 818, 790, 762, 699, 658, 634, 559  $\text{cm}^{-1}$ ;  $^1\text{H NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.23-7.43 (m, 9 H), 6.61-6.64 (m, 1 H), 6.35-6.39 (m, 1 H), 5.37 (d,  $J=5.90$  Hz, 1 H), 2.06 (s, 1 H) ppm;  $^{13}\text{C NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 142.7, 135.6, 132.4, 131.8 (2 C), 129.4, 128.8 (2 C), 128.3 (2 C), 128.1, 126.5 (2 C), 121.7, 75.1 ppm. HRMS (ESI): calcd. for  $\text{C}_{15}\text{H}_{12}\text{Br}$   $[\text{M}+\text{H}-\text{H}_2\text{O}]^+$ : 271.0117 found: 271.0121.

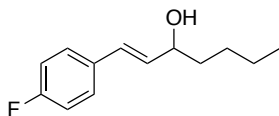


**4** : colorless oil. IR (film): 3341, 2957, 2927, 2857, 1467, 1378, 1005, 1025, 967, 727  $\text{cm}^{-1}$ ;  $^1\text{H NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 5.59-5.65 (m, 1 H), 5.42-5.47 (m, 1 H), 4.02 (q,  $J=6.71$  Hz, 1 H), 2.02 (q,  $J=7.08$  Hz, 2 H), 1.70 (s, 1 H), 1.23-1.59 (m, 15 H), 0.89 (q,  $J=7.28$  Hz, 6 H) ppm;  $^{13}\text{C NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 133.2, 132.2, 73.3, 37.2, 32.3, 31.8, 29.3, 28.9, 28.9, 27.8, 22.7, 22.7, 14.2 ppm. HRMS (ESI): calcd. for  $\text{C}_{13}\text{H}_{25}$   $[\text{M}+\text{H}-\text{H}_2\text{O}]^+$ : 181.1951 found: 181.1943.



11

**11**: colorless oil.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 5.55-.61 (m, 1 H), 5.42-5.47 (m, 1 H), 3.75 (t,  $J=7.00$  Hz, 1 H), 2.18 (s, 1 H), 1.99-2.04 (m, 2 H), 1.84-1.88 (m, 1 H), 1.70-1.75 (m, 2 H), 1.64-1.68 (m, 2 H), 1.35-1.42 (m, 3 H), 1.16-1.25 (m, 2 H), 0.94-1.00 (m, 2 H), 0.90 (t,  $J=7.37$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 132.5, 131.8, 77.6, 43.7, 34.4, 28.8, 28.8, 26.6, 26.2, 22.4, 13.6 ppm.



5

**5**: yellow oil.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.28-7.31 (m, 2 H), 6.95-6.98 (m, 2 H), 6.49 (d,  $J=15.90$  Hz, 1 H), 6.11 (dd,  $J=15.90, 6.80$  Hz, 1 H), 4.21-4.25 (m, 1 H), 3.05 (s, 1H), 1.55-1.66 (m, 2 H), 1.30-1.38 (m, 4 H), 0.89 (t,  $J=7.00$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 162.3 (d,  $J=247$  Hz, 1 C), 133.0, 132.5, 128.9, 128.0, 128.0 (d,  $J=7.97$  Hz, 2 C), 115.4 (d,  $J=21.6$  Hz, 2 C), 73.0, 37.1, 27.7, 22.7, 14.0 ppm.

## General Procedure for the Kinetic Resolution of Secondary Allylic Alcohols By Enantioselective Epoxidation

### Method a: Titanium-Tartrate Catalyzed Enantioselective Epoxidation

To a room temperature solution of substrate (1 mmol) and L-(+)-DIPT (28 mg, 0.12 mmol) in CH<sub>2</sub>Cl<sub>2</sub> (4 ml) was added activated 3 Å molecular sieves (30 wt % of substrate) and cooled to -20 °C for 10 min. Ti(OiPr)<sub>4</sub> (30 µl, 0.1 mmol) was added and stirred at -20 °C for 20-30 min. *tert*-Butyl hydroperoxide (127 µl, 0.7 mmol, ~5.5 M in decane) was added dropwise until 50 % conversion indicated by TLC analysis. The reaction was quenched with 6 ml of an aqueous solution (50 ml) of ammonia iron sulfate heptahydrate (16.5 g) and L-tartaric acid (5 g) at room temperature, and stirred vigorously until phase separation. The organic layer was dried over sodium sulfate and concentrated *in vacuo*. The product was purified by preparatory TLC (Hexane:EtOAc = 10:1). Procedure was similar to previous literature.<sup>[3]</sup>

### Method b: Titanium-Tartrate Catalyzed Enantioselective Epoxidation

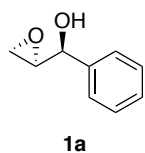
Similar to method A, except D-(-)-DIPT was used.

### Method c: Tungsten-BHA Catalyzed Asymmetric Epoxidation

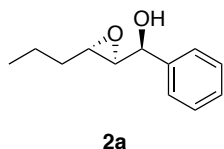
To a test tube was added substrate (0.4 mmol), (*R,R*)-**L2** (17 mg, 0.012 mmol), WO<sub>2</sub>(acac)<sub>2</sub> (4.1 mg, 0.01 mmol), NaCl (12 mg, 0.2 mmol) and CH<sub>2</sub>Cl<sub>2</sub> (4 ml). H<sub>2</sub>O<sub>2</sub> (30 wt %, 0.8 mmol) was added (solution turned from murky yellow to clear light yellow color after 10 min) and the reaction was stirred at room temperature for 24 hours. The mixture was diluted with CH<sub>2</sub>Cl<sub>2</sub>, dried over sodium sulfate and concentrated *in vacuo*. The crude product was purified using flash chromatography (Hexane:EtOAc = 10:1). The procedure was same as previous literature.<sup>[2]</sup>

### Method d: Hafnium-BHA Catalyzed Asymmetric Epoxidation

To a flame-dried test tube was added (*R,R*)-**L1** (0.055 mmol, 29.4 mg) and MgO (0.2 mmol, 8 mg). Hf(OtBu)<sub>4</sub> (0.05 mmol, 20.2 µl, fresh out of the glove box) was dissolved in toluene (2.5 ml) and added to the test tube with **L1**, and stirred at room temperature for 2 h. Substrate (1 mmol) in toluene (2.5 ml) was added to complex at room temperature and cooled to 0 °C, cumene peroxide (80 %, 1 mmol, 184 µl) was added at once and stirred at 0 °C until approximately 50 % conversion. The mixture was quenched with methanol, filtered over a plug of silica, and concentrated *in vacuo*. The residue was purified by flash chromatography (100 % CH<sub>2</sub>Cl<sub>2</sub>) to furnish the epoxide. The procedure was similar to previous literature.<sup>[4]</sup>



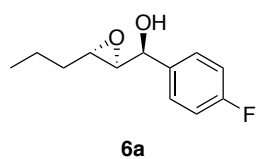
Asymmetric epoxidation, method a, 15 h. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ = 7.33-7.41 (m, 5 H), 4.94 (d, *J*=2.75 Hz, 1 H), 3.23-3.25 (m, 1 H), 2.96-2.98 (m, 1 H), 2.76-2.77 (m, 1 H), 2.30 (s, 1 H) ppm; <sup>13</sup>C NMR (126 MHz, CDCl<sub>3</sub>) δ = 139.5, 128.8 (2 C), 128.4, 126.5 (2 C), 70.8, 55.2, 43.6 ppm. HRMS (ESI): calcd. for C<sub>9</sub>H<sub>9</sub>O [M+H]<sup>+</sup> [-H<sub>2</sub>O]: 133.0648 found: 133.0649.



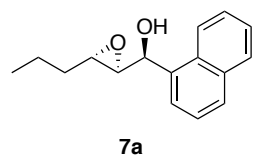
Asymmetric epoxidation: method a, 2 h, 50 % yield. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ = 7.31-7.38 (m, 5 H), 4.86 (d, *J*=3.05 Hz, 1 H), 3.16-3.18 (m, 1 H), 2.96-2.97 (m, 1 H), 2.46 (s, 1 H), 1.35-1.55 (m, 4 H), 0.87 (t, *J*=7.25 Hz, 3 H) ppm; <sup>13</sup>C NMR (126 MHz, CDCl<sub>3</sub>) δ = 139.8, 128.7 (2 C), 128.3, 126.5 (2 C), 71.1, 61.4, 55.2, 33.6, 19.4, 13.9 ppm. HRMS (ESI): calcd. for C<sub>12</sub>H<sub>16</sub> Na O<sub>2</sub> [M+Na]<sup>+</sup>: 215.1043 found:

215.1007.

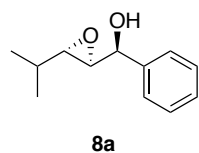




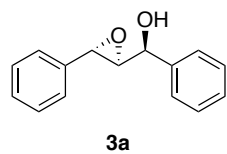
Asymmetric epoxidation: method a, 1 h, 43 % yield.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.34-7.37 (m, 2 H), 7.04-7.07 (m, 2 H), 4.84 (d,  $J=2.95$  Hz, 1 H), 3.13-3.16 (m, 1 H), 2.93-2.94 (m, 1 H), 2.54 (s, 1 H), 1.36-1.57 (m, 4 H), 0.88 (t,  $J=7.22$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 162.7 (d,  $J=246$  Hz, 1 C), 135.6, 128.2 (d,  $J=8.16$  Hz, 2 C), 115.6 (d,  $J=21.5$  Hz, 2 C) 70.6, 61.3, 55.2, 33.6, 19.4, 13.9 ppm. HRMS (ESI): calcd. for  $\text{C}_{15}\text{H}_{18}\text{NO}_2$   $[\text{M}+\text{H}]^+[-\text{H}_2\text{O}]$ : 193.1023 found: 193.1017.



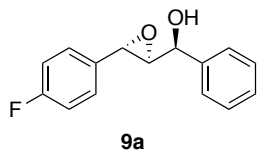
Asymmetric epoxidation: method a, 1 h, 39 % yield.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 8.09 (d,  $J=8.40$  Hz, 1 H), 7.87 (d,  $J=7.85$  Hz, 1 H), 7.81 (d,  $J=8.25$  Hz, 1 H), 7.64 (d,  $J=7.10$  Hz, 1 H), 7.46-7.54 (m, 3 H), 5.67 (d,  $J=2.50$  Hz, 1 H), 3.18-3.22 (m, 2 H), 2.68 (s, 1 H), 1.34-1.50 (m, 4 H), 0.82 (t,  $J=7.27$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 135.6, 133.9, 130.9, 129.0, 128.7, 126.4, 125.8, 125.6, 123.8, 123.1, 67.6, 60.9, 55.5, 33.6, 19.3, 13.8 ppm. HRMS (ESI): calcd. for  $\text{C}_{16}\text{H}_{19}\text{O}_2$   $[\text{M}+\text{H}]^+$ : 243.1380 found: 243.1381.



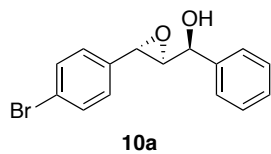
Asymmetric epoxidation: method a, 80 min, 52 % yield.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.29-7.39 (m, 5 H), 4.85 (d,  $J=2.45$  Hz, 1 H), 2.97-2.99 (m, 2 H), 2.53 (s, 1 H), 1.49-1.54 (m, 1 H), 0.99 (t,  $J=6.70$  Hz, 3 H), 0.85 (t,  $J=6.90$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 139.9, 128.7 (2 C), 128.3, 126.6 (2 C), 71.1, 60.6, 60.5, 30.1, 19.1, 18.4 ppm. HRMS (ESI): calcd. for  $\text{C}_{12}\text{H}_{17}\text{O}_2$   $[\text{M}+\text{H}]^+$ : 193.1223 found: 193.1201.



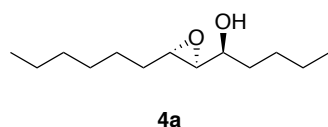
Asymmetric epoxidation: method a, 3 h, 48 % yield.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.24-7.38 (m, 10 H), 4.99 (s, 1 H), 4.14 (d,  $J=1.95$  Hz, 1 H), 3.28-3.29 (m, 1 H), 2.55 (d,  $J=2.05$  Hz, 1 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 139.3, 136.6, 128.8 (2 C), 128.6 (2 C), 128.5, 128.4, 126.7 (2 C), 125.9 (2 C), 71.3, 65.1, 55.1 ppm. HRMS (ESI): calcd. for  $\text{C}_{15}\text{H}_{14}\text{NaO}_2$   $[\text{M}+\text{Na}]^+$ : 249.0886 found: 249.0881.



Asymmetric epoxidation: method a, 80 min, 39 % yield.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 6.99-7.41 (m, 9 H), 5.00 (d,  $J=2.75$  Hz, 1 H), 4.12 (d,  $J=1.80$  Hz, 1 H), 3.25-3.26 (m, 1 H), 2.45 (s, 1 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 162.9 (d,  $J=247$  Hz, 1 C), 139.3, 132.4, 128.9 (2 C), 128.6, 127.6 (d,  $J=8.31$  Hz, 2 C), 126.7 (2 C), 115.7 (d,  $J=21.7$  Hz, 2 C), 71.3, 65.1, 54.6 ppm. HRMS (ESI): calcd. for  $\text{C}_{15}\text{H}_{13}\text{FNaO}_2$   $[\text{M}+\text{Na}]^+$ : 267.0792 found: 267.0806.

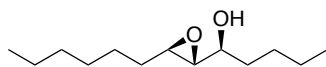


Asymmetric epoxidation: method a, 1 h, 33 % yield.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.30-7.41 (m, 7 H), 7.11 (d,  $J=8.40$  Hz, 2 H), 5.00 (s, 1 H), 4.09 (d,  $J=1.85$  Hz, 1 H), 3.22-3.23 (m, 1 H), 2.51 (s, 1 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 139.2, 135.8, 131.8 (2 C), 128.9 (2 C), 128.6, 127.5 (2 C), 126.6 (2 C), 122.3, 71.3, 65.2, 54.6 ppm. HRMS (ESI): calcd. for  $\text{C}_{15}\text{H}_{13}\text{BrNaO}_2$   $[\text{M}+\text{Na}]^+$ : 326.9991 found: 327.0046.



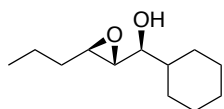
Asymmetric epoxidation: method a, 25 min, 44 % yield, 98:2 dr, major diastereomer *anti*-epoxy alcohol isolated for aminolysis.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 3.78-3.79 (m, 1 H), 2.98-3.01 (m, 1 H), 2.76-2.77 (m, 1

H), 2.00-2.01 (m, 1 H), 1.30-1.59 (m, 16 H), 0.87-0.94 (m, 6 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 68.6, 61.2, 55.1, 33.4, 31.9, 31.7, 29.2, 27.6, 26.1, 22.9, 22.7, 14.2, 14.1 ppm. HRMS (ESI): calcd. for  $\text{C}_{13}\text{H}_{27}\text{O}_2$   $[\text{M}+\text{H}]^+$ : 215.2006 found: 215.1987.



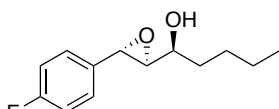
**4d**

Asymmetric epoxidation: method d, 15 h (0 °C) + 3 h (r.t.), 56 % yield, 1:2 dr, major diastereomer *syn*-epoxy alcohol isolated for aminolysis.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 3.44-3.45 (m, 1 H), 2.91-2.92 (m, 1 H), 2.72-2.74 (m, 1 H), 1.95 (m, 1 H), 1.55-1.58 (m, 4 H), 1.27-1.46 (m, 12 H), 0.87-0.93 (m, 6 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 71.6, 62.0, 57.2, 34.2, 31.9, 31.8, 29.2, 27.6, 26.1, 22.8, 22.7, 14.2, 14.1 ppm.



**11d**

Asymmetric epoxidation: method d, 24 h (r.t.), 49 % yield, 32:68 dr, major diastereomer *syn*-epoxy alcohol was isolated for aminolysis.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 3.59 (s, 1 H), 3.01-3.01 (m, 1 H), 2.82-2.83 (m, 1 H), 1.89 (s, 1 H), 1.14-1.76 (m, 14 H), 0.98 (t,  $J=7.17$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 72.5, 59.7, 55.0, 41.8, 33.8, 29.0, 28.4, 26.6, 26.3, 19.5, 14.1 ppm. HRMS (ESI): calcd. for  $\text{C}_{12}\text{H}_{23}\text{O}_2$   $[\text{M}+\text{H}]^+$ : 199.1693 found: 199.1675.



**5a**

Asymmetric epoxidation method a, 3 h, 49 % yield, 93:7 dr, major diastereomer *anti*-epoxy alcohol was isolated for aminolysis.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.23-7.26 (m, 2 H), 7.02-7.05 (m, 2 H), 3.93-3.95 (m, 1 H), 3.03-3.04 (m, 1 H), 2.12 (s, 1 H), 1.33-1.64 (m, 6 H), 0.91 (t,  $J=7.22$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 162.9 (d,  $J=247$  Hz, 1 C), 132.9, 127.5 (d,  $J=8.27$  Hz, 2 C), 115.6 (d,  $J=21.8$  Hz, 2 C), 68.6, 65.1, 54.2, 33.2, 27.5, 22.8, 14.1 ppm. HRMS (ESI): calcd. for  $\text{C}_{13}\text{H}_{18}\text{FO}_2$   $[\text{M}+\text{H}]^+$ : 225.1285 found: 225.1252.

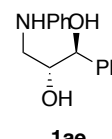
## General Procedure for the Kinetic Resolution of Secondary Epoxy-Alcohols By Tungsten-Catalyzed Asymmetric Ring-Opening

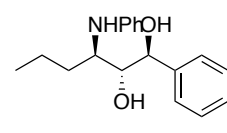
### Method e: Tungsten-Catalyzed Kinetic Resolution of Secondary Epoxy-Alcohols

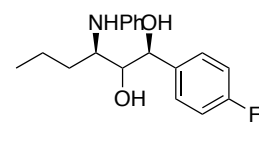
To a THF (2 ml) solution of substrate (0.15 mmol for all, except 0.2 mmol for **4d** and **11d**), W(OEt)<sub>6</sub> (4.5 mg, 0.01 mmol) and (*S,S*)-**L2** was added H<sub>2</sub>O<sub>2</sub> (2.2 μl, 0.02 mmol, 30 wt %) at stirred at 55 °C for 1.5 h. Amine (0.1 mmol) was added to reaction and it was stirred at 55 °C until completion. The product was purified using preparatory TLC (Hexane:EtOAc = 4:1). Procedure was similar to previous literature.<sup>[5]</sup>

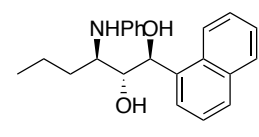
### Method f: Tungsten-Catalyzed Kinetic Resolution of Secondary Epoxy-Alcohols

Similar to method e, except (*R,R*)-**L2** was used.

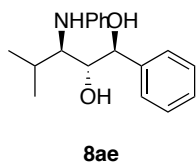
  
**1ae** Enantioselective aminolysis: method e, 24 h, **1ae** was isolated as a yellow oil (34 mg, 69 %). IR (film): 3391, 3054, 2922, 1603, 1502, 1452, 1432, 1320, 1257, 1061, 751, 694, 509 cm<sup>-1</sup>; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ = 7.31-7.38 (m, 5 H), 7.13-7.16 (m, 2 H), 6.71-6.74 (m, 1 H), 6.57-6.59 (m, 2 H), 4.85 (d, *J*=5.10 Hz, 1 H), 3.97-4.01 (m, 1 H), 3.96 (s, 1 H), 3.22-3.93 (m, 1 H), 3.14-3.18 (m, 1 H), 2.81 (s, 1 H), 2.51 (s, 1 H) ppm; <sup>13</sup>C NMR (126 MHz, CDCl<sub>3</sub>) δ = 148.2, 140.3, 129.4 (2 C), 128.8 (2 C), 128.3, 126.5 (2 C), 118.4, 113.8 (2 C), 76.0, 73.4, 45.5 ppm. HRMS (ESI): calcd. for C<sub>15</sub>H<sub>18</sub>NO<sub>2</sub> [M+H]<sup>+</sup>: 244.1332 found: 244.1332.

  
**2ae** Enantioselective aminolysis: method e, 48 h, **2ae** was isolated as a white solid (27.3 mg, 94 %). IR (film): 3402, 3054, 3029, 2957, 2930, 2871, 1601, 1504, 1453, 1431, 1379, 1318, 1260, 1181, 1154, 1102, 1035, 910, 749, 694, 624, 508 cm<sup>-1</sup>; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ = 7.31-7.39 (m, 5 H), 7.13-7.16 (m, 2 H), 6.69-6.72 (m, 1 H), 6.58-6.60 (m, 2 H), 4.71 (d, *J*=7.30 Hz, 1 H), 3.81-3.83 (m, 1 H), 3.67-3.69 (m, 1 H), 3.57 (s, 1 H), 2.88 (s, 1 H), 1.82 (s, 1 H), 1.76-1.77 (m, 1 H), 1.47-1.51 (m, 2 H), 1.32-1.33 (m, 1 H), 0.90 (t, *J*=7.27 Hz, 3 H) ppm; <sup>13</sup>C NMR (126 MHz, CDCl<sub>3</sub>) δ = 147.7, 141.3, 129.5 (2 C), 128.8 (2 C), 128.5, 127.2 (2 C), 117.9, 114.0 (2 C), 76.0, 75.5, 55.0, 32.3, 19.3, 14.4 ppm. HRMS (ESI): calcd. for C<sub>18</sub>H<sub>24</sub>NO<sub>2</sub> [M+H]<sup>+</sup>: 286.1802 found: 286.1797.

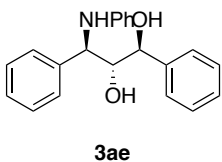
  
**6ae** Enantioselective aminolysis: method e, 24 h, **6ae** was isolated as a yellow oil (27.4 mg, 91 %). IR (film): 3400, 2958, 2931, 2871, 1602, 1509, 1467, 1431, 1380, 1317, 1224, 1156, 1035, 837, 786, 751, 693, 573 cm<sup>-1</sup>; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ = 7.33-7.36 (m, 2 H), 7.14-7.17 (m, 2 H), 7.02-7.05 (m, 2 H), 6.70-6.73 (m, 1 H), 6.58-6.60 (m, 2 H), 4.72 (d, *J*=7.20 Hz, 1 H), 3.76-3.78 (m, 1 H), 3.62 (m, 1 H), 3.56 (s, 1 H), 2.99 (s, 1 H), 1.87 (s, 1 H), 1.74-1.77 (m, 1 H), 1.45-1.52 (m, 2 H), 1.30-1.32 (m, 1 H), 0.89 (t, *J*=7.27 Hz, 3 H) ppm; <sup>13</sup>C NMR (126 MHz, CDCl<sub>3</sub>) δ = 162.8 (d, *J*=246 Hz, 1 C), 147.5, 137.1, 129.5 (2 C), 129.0 (d, *J*=8.07 Hz, 2 C), 118.2 (2 C), 115.6 (d, *J*=21.4 Hz, 2 C), 114.1 (2 C), 75.6, 75.4, 55.2, 32.5, 19.2, 14.3 ppm. HRMS (ESI): calcd. for C<sub>18</sub>H<sub>23</sub>FNO<sub>2</sub> [M+H]<sup>+</sup>: 304.1707 found: 304.1711.

  
**7ae** Enantioselective aminolysis: method e, 44 h, **7ae** was isolated as an orange oil (19.6 mg, 58 %). IR (film): 3402, 3051, 2957, 2929, 2870, 1601, 1503, 1462, 1431, 1319, 1260, 1180, 1154, 1036, 992, 909, 801, 780, 749, 693 cm<sup>-1</sup>; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ = 8.18-8.20 (m, 1 H), 7.86-7.88 (m, 1 H), 7.81 (d, *J*=8.25 Hz, 1 H), 7.69 (d, *J*=7.10 Hz, 1 H), 7.45-7.50 (m, 3 H), 7.08 (t, *J*=7.90 Hz, 2 H), 6.66 (t, *J*=7.32 Hz, 1 H), 6.51 (d, *J*=7.75 Hz, 2 H), 5.52 (d, *J*=7.65 Hz, 1 H), 4.14-4.17 (m, 1 H), 3.73-

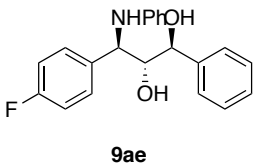
3.75 (m, 1 H), 1.84-1.90 (m, 1 H), 1.47-1.58 (m, 2 H), 1.29-1.38 (m, 1 H), 0.90 (t,  $J=7.25$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 147.7, 137.2, 134.0, 131.4, 129.4$  (2 C), 129.0, 128.9, 126.4, 125.9, 125.6, 124.8, 123.8, 117.8, 113.9 (2 C), 75.2, 73.3, 55.1, 31.9, 19.5, 14.3 ppm. HRMS (ESI): calcd. for  $\text{C}_{22}\text{H}_{26}\text{NO}_2$   $[\text{M}+\text{H}]^+$ : 336.1958 found: 336.1948.



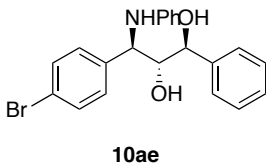
Enantioselective aminolysis: method e, 48 h, **8ae** was isolated as a yellow oil (4 mg, 14 %). IR (film): 3400, 3056, 3028, 2958, 2926, 2871, 1600, 1511, 1496, 1462, 1452, 1384, 1300, 1253, 1065, 1037, 748, 693  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta = 7.36$ -7.42 (m, 5 H), 7.16-7.20 (m, 2 H), 6.74-6.77 (m, 1 H), 6.65-6.67 (m, 2 H), 4.86 (d,  $J=6.25$  Hz, 1 H), 3.84-3.86 (m, 1 H), 3.47-3.49 (m, 1 H), 2.24-2.29 (m, 1 H), 0.99 (d,  $J=6.85$  Hz, 1 H), 0.94 (d,  $J=6.95$  Hz, 1 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 148.4, 140.8, 129.5$  (2 C), 128.8 (2 C), 128.5, 127.8 (2 C), 118.4, 114.5 (2 C), 76.8, 75.2, 61.6, 30.1, 20.8, 17.1 ppm. HRMS (ESI): calcd. for  $\text{C}_{18}\text{H}_{24}\text{NO}_2$   $[\text{M}+\text{H}]^+$ : 286.1802 found: 286.1794.



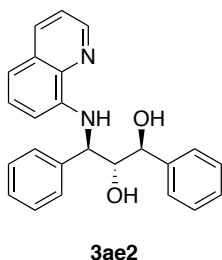
Enantioselective aminolysis: method e, 24 h, **3ae** was isolated as a yellow oil (32.7 mg, 81 %). IR (film): 3541, 3412, 3058, 3029, 2922, 1601, 1503, 1453, 1431, 1391, 1315, 1250, 1180, 1078, 1036, 910, 751, 733, 701, 668, 606, 648, 578  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta = 7.42$ -7.44 (m, 2 H), 7.31-7.34 (m, 7 H), 7.24-7.27 (m, 1 H), 7.06-7.09 (m, 2 H), 6.63-6.66 (m, 1 H), 6.53-6.55 (m, 2 H), 4.80 (d,  $J=4.80$  Hz, 1 H), 4.37 (d,  $J=7.75$  Hz, 1 H), 4.09 (dd,  $J=7.72, 4.77$  Hz, 1 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 146.7, 141.0, 139.1, 129.2$  (2 C), 128.8 (2 C), 128.6 (2 C), 128.6, 128.3 (4 C), 127.8, 127.4 (2 C), 118.0, 114.2, 77.0, 75.4, 59.2 ppm. HRMS (ESI): calcd. for  $\text{C}_{21}\text{H}_{22}\text{NO}_2$   $[\text{M}+\text{H}]^+$ : 320.1645 found: 320.1634.



Enantioselective aminolysis: method e, 24 h, **9ae** was isolated as a yellow oil (26.2 mg, 78 %). IR (film): 3400, 3053, 2922, 1601, 1509, 1503, 1452, 1432, 1315, 1222, 1157, 1089, 832, 750, 693  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta = 7.31$ -7.45 (m, 8 H), 7.00-7.10 (m, 4 H), 6.64-6.67 (m, 1 H), 6.53-6.55 (m, 2 H), 4.83 (dd,  $J=7.92, 4.42$  Hz, 1 H), 4.68 (d,  $J=8.05$  Hz, 1 H), 4.30 (dd,  $J=8.05, 2.70$  Hz, 1 H), 4.09 (dt,  $J=9.12, 4.09$  Hz, 1 H), 2.28 (d,  $J=3.05$  Hz, 1 H), 1.53 (d,  $J=4.80$  Hz, 1 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 162.4$  (d,  $J=246$  Hz, 1 C), 146.6, 140.9, 134.7, 130.0 (d,  $J=8.01$  Hz, 2 C), 129.3 (2 C), 129.0 (2 C), 128.8, 127.4 (2 C), 118.1, 115.4 (d,  $J=21.3$  Hz, 2 C), 114.1 (2 C), 77.0, 75.4, 58.3 ppm. HRMS (ESI): calcd. for  $\text{C}_{21}\text{H}_{21}\text{FNO}_2$   $[\text{M}+\text{H}]^+$ : 338.1551 found: 338.1545.

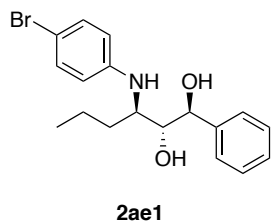


Enantioselective aminolysis: method e, 24 h, **10ae** was isolated as a white solid (31 mg, 78 %). IR (film): 3540, 3413, 3031, 2912, 1601, 1502, 1486, 1453, 1433, 1408, 1391, 1315, 1250, 1207, 1180, 1155, 1072, 1011, 909, 872, 847, 823, 793, 749, 734, 694, 613, 576  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta = 7.43$ -7.44 (m, 2 H), 7.29-7.34 (m, 7 H), 7.06-7.09 (m, 2 H), 6.64-6.67 (m, 1 H), 6.50-6.52 (m, 2 H), 4.80 (d,  $J=3.45$  Hz, 1 H), 4.69 (s, 1 H), 4.25 (d,  $J=8.10$  Hz, 1 H), 4.07 (dd,  $J=8.07, 4.07$  Hz, 1 H), 2.30 (s, 1 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 146.4, 140.8, 138.1, 131.6$  (2 C), 130.3 (2 C), 129.3 (2 C), 129.0 (2 C), 128.8, 127.4 (2 C), 121.6, 118.1, 114.0 (2 C), 76.9, 75.3, 58.3 ppm. HRMS (ESI): calcd. for  $\text{C}_{21}\text{H}_{21}\text{BrNO}_2$   $[\text{M}+\text{H}]^+$ : 398.0750 found: 398.0707.

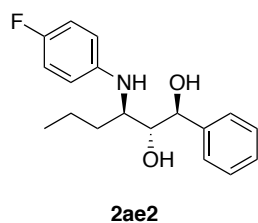


Enantioselective aminolysis: method e, 65 h, **3ae2** was isolated as a yellow oil (11 mg, 30 %). IR (film): 3396, 2923, 1653, 1576, 1540, 1519, 1479, 1456, 1379, 818, 790, 736, 702, 589  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta = 8.71$  (dd,  $J=4.17, 1.52$  Hz,

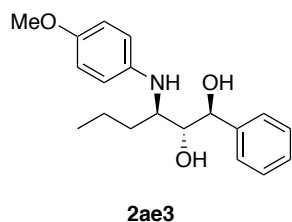
1 H), 8.03 (dd,  $J=8.25, 1.55$  Hz, 1 H), 7.53 (d,  $J=7.30$  Hz, 2 H), 7.21-7.39 (m, 10 H), 7.01 (d,  $J=7.90$  Hz, 1 H), 6.53 (d,  $J=7.45$  Hz, 1 H), 4.88 (m, 1H), 4.63 (d,  $J=7.25$  Hz, 1 H), 4.34 (dd,  $J=7.20, 5.40$  Hz, 1 H);  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 147.2, 143.2, 140.9, 139.9, 139.2, 138.7, 136.1, 128.7$  (2 C), 128.6 (2 C), 128.5, 128.4 (2 C), 127.8, 127.7, 127.5 (2 C), 121.5, 114.7, 106.8, 77.3, 75.3, 58.8 ppm. HRMS (ESI): calcd. for  $\text{C}_{24}\text{H}_{23}\text{N}_2\text{O}_2$   $[\text{M}+\text{H}]^+$ : 371.1754 found: 371.1726.



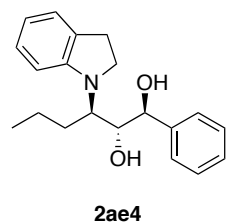
Enantioselective aminolysis: method e, 48 h, **2ae1** was isolated as a white solid (34.9 mg, 96 %). IR (film): 3407, 2957, 2928, 2871, 1594, 1495, 1454, 1400, 1318, 1294, 1257, 1179, 1097, 1074, 1035, 908, 813, 767, 733, 702, 556  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta = 7.33-7.38$  (m, 5 H), 7.20-7.22 (m, 2 H), 6.44-6.46 (m, 2 H), 4.71 (d,  $J=7.35$  Hz, 1 H), 3.81-3.82 (m, 1 H), 3.65 (m, 1 H), 2.47 (s, 1 H), 1.76-1.80 (m, 1 H), 1.46-1.53 (m, 2 H), 1.30-1.37 (m, 1 H), 0.91 (t,  $J=7.27$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 146.7, 141.1, 132.0$  (2 C), 128.8 (2 C), 128.5, 127.0 (2 C), 115.2 (2 C), 109.0, 75.6, 75.5, 54.4, 31.9, 19.3, 14.2 ppm. HRMS (ESI): calcd. for  $\text{C}_{18}\text{H}_{23}\text{BrNO}_2$   $[\text{M}+\text{H}]^+$  364.0907 found: 364.0916.



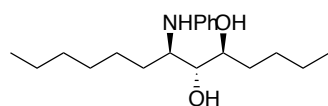
Enantioselective aminolysis: method e, 48 h, **2ae2** was isolated as a white solid (29.7 mg, 98 %). IR (film): 3400, 2958, 2931, 2871, 1510, 1453, 1316, 1220, 1155, 1035, 821, 766, 702, 509  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta = 7.32-7.38$  (m, 5 H), 6.84-6.87 (m, 2 H), 6.51-6.53 (m, 2 H), 4.70 (d,  $J=7.35$  Hz, 1 H), 3.77 (dd,  $J=7.07, 4.52$  Hz, 1 H), 3.57-3.59 (m, 1 H), 1.74-1.76 (m, 1 H), 1.46-1.51 (m, 2 H), 1.30-1.33 (m, 1 H), 0.90 (t,  $J=7.27$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 156.1$  (d,  $J=236$  Hz, 1 C), 144.0, 141.3, 128.8 (2 C), 128.5, 127.2 (2 C), 115.9 (d,  $J=22.2$  Hz, 2 C), 115.0 (d,  $J=7.38$  Hz, 2 C), 76.1, 75.4, 56.0, 32.3, 19.3, 14.3 ppm. HRMS (ESI): calcd. for  $\text{C}_{18}\text{H}_{23}\text{FNO}_2$   $[\text{M}+\text{H}]^+$ : 304.1707 found: 304.1656.



Enantioselective aminolysis: method e, 48 h, **2ae3** was isolated as a colorless oil (31 mg, 98 %). IR (film): 3405, 2956, 2871, 2833, 1512, 1453, 1409, 1238, 1180, 1149, 1100, 1038, 910, 821, 765, 734, 702, 518  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta = 7.30-7.40$  (m, 5 H), 6.75-6.76 (m, 2 H), 6.58-6.60 (m, 2H), 4.71 (d,  $J=7.30$  Hz, 1 H), 3.74-3.76 (m, 4 H), 3.54 (s, 1 H), 3.47 (m, 1 H), 3.30-3.31 (m, 1 H), 1.84 (d,  $J=4.35$  Hz, 1 H), 1.71-1.77 (m, 1 H), 1.43-1.52 (m, 2 H), 1.26-1.35 (m, 1 H), 0.88 (t,  $J=7.25$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 152.8, 141.5, 141.4, 128.7$  (2 C), 128.4, 127.3 (2 C), 116.0 (2 C), 115.1 (2 C), 76.6, 75.3, 57.2, 55.9, 32.7, 19.1, 14.4 ppm. HRMS (ESI): calcd. for  $\text{C}_{19}\text{H}_{26}\text{NO}_3$   $[\text{M}+\text{H}]^+$ : 316.1907 found: 316.1890.

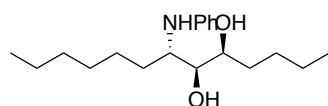


Enantioselective aminolysis: method e, 48 h, **2ae4** was isolated as a colorless oil (30.5 mg, 98 %). IR (film): 3410, 2956, 2929, 2870, 1606, 1490, 1475, 1461, 1454, 1402, 1329, 1263, 1193, 1024, 742, 702, 585, 543, 513  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta = 7.30-7.34$  (m, 5 H), 7.04 (d,  $J=7.10$  Hz, 1 H), 6.98 (t,  $J=7.67$  Hz, 1 H), 6.59 (t,  $J=7.30$  Hz, 1 H), 6.23 (d,  $J=7.90$  Hz, 1 H), 4.77 (dd,  $J=5.75, 2.95$  Hz, 1 H), 3.95 (q,  $J=5.78$  Hz, 1 H), 3.48-3.54 (m, 2 H), 3.43 (q,  $J=9.10$  Hz, 1 H), 3.05 (s, 1 H), 2.88-3.01 (m, 2 H), 1.80 (s, 1 H), 1.67-1.77 (m, 2 H), 1.15-1.31 (m, 2 H), 0.83 (t,  $J=7.35$  Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta = 151.4, 140.4, 129.3, 128.6$  (2 C), 128.4, 127.6 (2 C), 127.3, 124.6, 117.1, 107.1, 76.7, 76.1, 56.5, 47.3, 29.9, 28.5, 20.5, 14.4 ppm. HRMS (ESI): calcd. for  $\text{C}_{20}\text{H}_{26}\text{NO}_2$   $[\text{M}+\text{H}]^+$ : 312.1958 found: 312.1948.



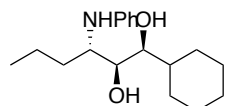
**4ae**

Enantioselective aminolysis: method e, 4 d. **4ae** was isolated as a colorless solid (10 mg, 33 % yield) IR (film): 3383, 2956, 2927, 2855, 1601, 1510, 1466, 1432, 1378, 1324, 1262, 1130, 1073, 992 747, 692  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.15-7.18 (m, 2 H), 6.69-6.72 (m, 1 H), 6.64-6.66 (m, 2 H), 3.65-3.72 (m, 2 H), 3.607-3.613 (m, 1 H), 2.02 (s, 1 H), 1.69-1.79 (m, 2 H), 1.58 (s, 1 H), 1.21-1.50 (m, 14 H), 0.91 (t,  $J$ =7.10 Hz, 3 H), 0.85 (t,  $J$ =6.82 Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 147.9, 129.6 (2 C), 117.9, 113.8 (2 C), 75.3, 73.1, 55.4, 33.3, 31.9, 30.1, 29.6, 27.9, 26.2, 22.9, 22.7, 14.2, 14.2 ppm. HRMS (ESI): calcd. for  $\text{C}_{19}\text{H}_{34}\text{NO}_2$   $[\text{M}+\text{H}]^+$ : 308.2584 found: 308.2596.



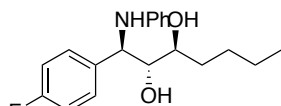
**4df**

Enantioselective aminolysis: method f ( $\text{W}(\text{OEt})_6/(\text{R},\text{R})\text{-L2}$  /  $\text{H}_2\text{O}_2$  / aniline / substrate = 0.2/0.24/0.2/1/2), 48 h. **4df** was isolated as a yellow oil (16 mg, 52 % yield).  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.15-7.18 (m, 2 H), 6.67-6.73 (m, 3 H), 3.75-3.78 (m, 1 H), 3.56-3.60 (m, 1 H), 3.49-3.50 (m, 1 H), 2.60 (s, 1 H), 1.21-1.60 (m, 17 H), 0.92 (t,  $J$ =7.05 Hz, 3 H), 0.85 (t,  $J$ =6.95 Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 148.4, 129.5 (2 C), 118.0, 113.9 (2 C), 74.1, 71.3, 57.0, 34.1, 31.8, 31.8, 29.5, 28.0, 26.3, 22.8, 22.7, 14.2, 14.2 ppm.



**11df**

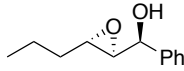
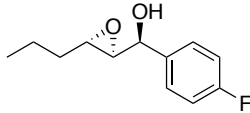
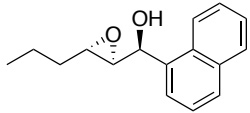
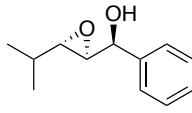
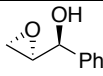
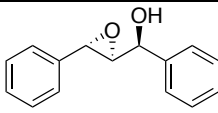
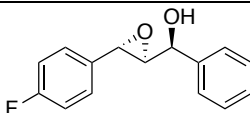
Enantioselective aminolysis: method f ( $\text{W}(\text{OEt})_6/(\text{R},\text{R})\text{-L2}$  /  $\text{H}_2\text{O}_2$  / aniline / substrate = 0.2/0.24/0.2/1/2), 48 h. **11df** was isolated as a yellow oil (10 mg, 35%). IR (film): 3393, 2922, 2851, 1601, 1501, 1450, 1033, 791, 745, 692  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.15-7.18 (m, 2 H), 6.68-6.73 (m, 3 H), 3.69 (m, 1 H), 3.59-3.63 (m, 1 H), 3.45-3.47 (m, 1 H), 2.63 (s, 1 H), 2.62 (s, 1 H), 1.00-1.93 (m, 14 H), 0.91 (t,  $J$ =7.30 Hz, 1 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 148.6, 129.5 (2 C), 118.0, 114.0 (2 C), 75.2, 71.1, 57.4, 40.9, 34.5, 29.6, 28.9, 26.5, 26.2, 26.1, 19.6, 14.3 ppm. HRMS (ESI): calcd. for  $\text{C}_{18}\text{H}_{30}\text{NO}_2$   $[\text{M}+\text{H}]^+$ : 292.2271 found: 292.2270.

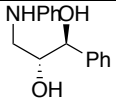
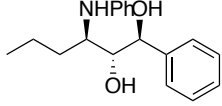
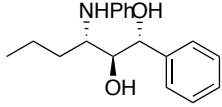
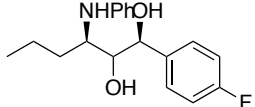
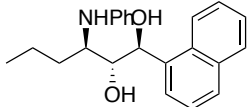
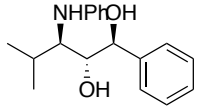
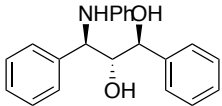
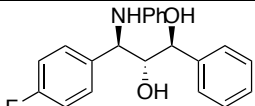
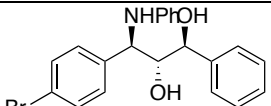


**5ae**

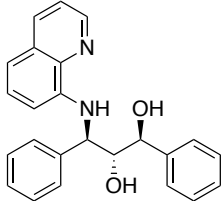
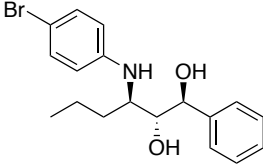
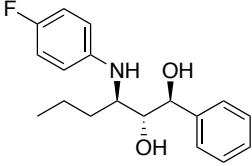
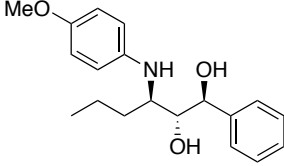
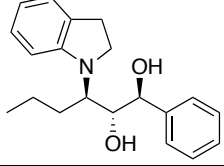
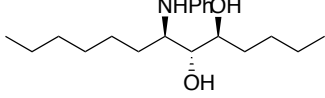
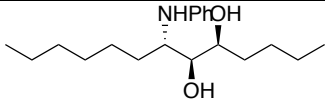
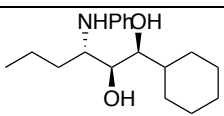
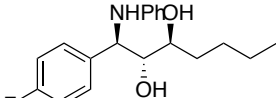
Enantioselective aminolysis: method e, 4 d. **5ae** was isolated as a yellow oil (12 mg, 38 %). IR (film): 3399, 2927, 2858, 1603, 1507, 1432, 1315, 1223, 1157, 1049, 840, 750, 693  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  = 7.40-7.43 (m, 2 H), 7.08-7.11 (m, 2 H), 7.01-7.04 (m, 2 H), 6.65-6.68 (m, 1 H), 6.55-6.56 (m, 2 H), 4.77 (d,  $J$ =4.45 Hz, 1 H), 3.79 (m, 1 H), 3.35-3.38 (m, 1 H), 1.66 (s, 1 H), 1.56 (s, 1 H), 1.42-1.48 (m, 2 H), 1.27-1.34 (m, 4 H), 0.89 (t,  $J$ =7.12 Hz, 3 H) ppm;  $^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  = 162.5 (d,  $J$ =246 Hz, 1 C), 146.6, 134.8, 129.7 (d,  $J$ =7.99 Hz, 2 C), 129.3 (2 C), 118.1, 115.8 (d,  $J$ =21.3 Hz, 2 C), 114.0 (2 C), 77.0, 73.1, 58.8, 33.4, 27.6, 22.9, 14.1 ppm. HRMS (ESI): calcd. for  $\text{C}_{19}\text{H}_{25}\text{FNO}_2$   $[\text{M}+\text{H}]^+$ : 318.1864 found: 318.1854.

## HPLC Data

Epoxides		Conditions
	<b>2a</b>	HPLC (Chiralpak IB): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 11.6 min (major diastereomer, major enantiomer), 12.9 min (major diastereomer, minor enantiomer), 14.0 and 16.3 min (minor diastereomer)
	<b>2b</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 10.9 min (major diastereomer, minor enantiomer), 13.0 min (major diastereomer, major enantiomer), 18.0 and 24.0 min (minor diastereomer)
	<b>2c</b>	HPLC (Chiralpak AS-H): Condition: Isopropanol/Hexane = 10:90, flow rate = 0.75 mL/min; result: 12.6 min (major diastereomer, minor enantiomer), 16.5 min (major diastereomer, major enantiomer), 18.8 min (minor diastereomer)
	<b>2d</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 1.31 min (major diastereomer, minor enantiomer), 19.0 min (major diastereomer, major enantiomer), 22.4 min (minor diastereomer)
	<b>2e</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 18.9 min (major diastereomer, minor enantiomer), 25.0 min (major diastereomer, major enantiomer), 31.9 min (minor diastereomer)
	<b>3a</b>	HPLC (Chiralpak AD-H): Condition: Isopropanol/Hexane = 10:90, flow rate = 0.75 mL/min; result: 15.7 min (major diastereomer, minor enantiomer), 19.6 min (major diastereomer, major enantiomer), 21.1 and 22.2 min (minor diastereomer)
	<b>9a</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 15.5 min (major diastereomer, minor enantiomer), 21.7 min (major diastereomer, major enantiomer), 25.3 and 34.3 min (minor diastereomer)

Aminodiols		Conditions
	<b>1ae</b>	HPLC (Chiralpak IC): Condition: Hexane/Isopropanol = 10:90, flow rate = 0.5 mL/min; result: 24.5 and 30.1 min (minor diastereomer), 32.6 min (major diastereomer, minor enantiomer), 35.8 min (major diastereomer, major enantiomer)
	<b>2ae</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 17.2 min (major diastereomer, minor enantiomer), 18.3 min (major diastereomer, major enantiomer), 23.3 min (minor diastereomer)
	<b>2bf</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 17.1 min (major diastereomer, major enantiomer), 18.7 min (major diastereomer, minor enantiomer), 23.4 min (minor diastereomer)
	<b>6ae</b>	HPLC (Chiralpak ID): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 24.9 min (major diastereomer, minor enantiomer), 26.1 min (minor diastereomer), 32.8 (major diastereomer, major enantiomer)
	<b>7ae</b>	HPLC (Chiralpak AD-H): Condition: Isopropanol/Hexane = 2:8, flow rate = 0.75 mL/min; result: 16.1 min (major diastereomer, minor enantiomer), 26.1 min (minor diastereomer), 32.8 (major diastereomer, major enantiomer)
	<b>8ae</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 16.7 min (major diastereomer, minor enantiomer), 18.5 min (minor diastereomer), 30.1 min (major diastereomer, major enantiomer)
	<b>3ae</b>	HPLC (Chiralpak AD-H): Condition: Isopropanol/Hexane = 2:8, flow rate = 0.75 mL/min; result: 14.5 min (major diastereomer, minor enantiomer), 16.3 and 25.3 min (minor diastereomer), 30.9 min (major diastereomer, major enantiomer)
	<b>9ae</b>	HPLC (Chiralpak AS-H): Condition: Isopropanol/Hexane = 2:8, flow rate = 0.5 mL/min; result: 16.3 min (major diastereomer, major enantiomer), 20.6 min (major diastereomer, minor enantiomer), 23.8 and 30.0 min (minor diastereomer)
	<b>10ae</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 15.6 min (major diastereomer, minor enantiomer), 19.7 min (major diastereomer, major enantiomer), 22.5 and 25.4 min (minor diastereomer)



	<b>3ae2</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 3:7, flow rate = 0.5 mL/min; result: 12.2 min (major diastereomer, minor enantiomer), 14.5 min (major diastereomer, major enantiomer), 15.7 and 26.1 min (minor diastereomer)
	<b>2ae1</b>	HPLC (Chiralpak IB): Condition: Isopropanol/Hexane = 1:9, flow rate = 0.5 mL/min; result: 20.6 (major diastereomer, minor enantiomer), 21.4 (minor diastereomer), 22.8 (major diastereomer, major enantiomer), 27.5 (minor diastereomer)
	<b>2ae2</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 13.5 min (major diastereomer, minor enantiomer), 14.7 min (major diastereomer, major enantiomer), 17.4 and 20.1 min (minor diastereomer)
	<b>2ae3</b>	HPLC (Chiralpak AD-H): Condition: Isopropanol/Hexane = 2:8, flow rate = 0.5 mL/min; result: 20.3 min (major diastereomer, major enantiomer), 22.3 (major diastereomer, minor enantiomer), 24.0 and 37.5 (minor diastereomer)
	<b>2ae4</b>	HPLC (Chiralpak AD-H): Condition: Isopropanol/Hexane = 1:9, flow rate = 0.75 mL/min; result: 13.3 min (major diastereomer, major enantiomer), 14.5 (major diastereomer, minor enantiomer), 15.3 and 18.6 (minor diastereomer)
	<b>4ae</b>	HPLC (Chiralpak AS-H): Condition: Isopropanol/Hexane = 6:94, flow rate = 0.4 mL/min; result: 16.0 min (major enantiomer), 19.6 min (minor enantiomer)
	<b>4df</b>	HPLC (Chiralpak AS-H): Condition: Isopropanol/Hexane = 6:94, flow rate = 0.4 mL/min; result: 21.3 min (major enantiomer), 23.1 min (minor enantiomer)
	<b>11df</b>	HPLC (Chiralpak AD-H): Condition: Isopropanol/Hexane = 1:9, flow rate = 0.5 mL/min; result: 22.4 min (major enantiomer), 24.3 min (minor enantiomer)
	<b>5ae</b>	HPLC (Chiralpak IC): Condition: Isopropanol/Hexane = 5:95, flow rate = 0.75 mL/min; result: 10.3 min (minor enantiomer), 12.5 min (major enantiomer)

## Determination of Absolute Stereochemistry of **2ae** by X-ray Crystallography

**Crystal growth of C<sub>18</sub>H<sub>23</sub>NO<sub>2</sub>:** Lan Luo (prof. Yamamoto's group).

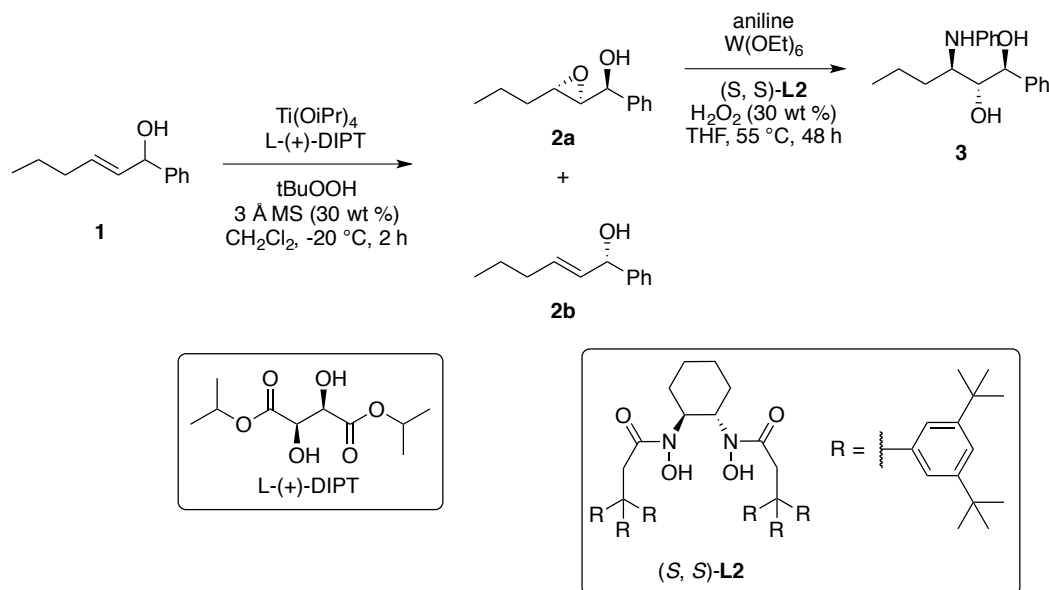
**Data collected:** Alexander S. Filatov, 02/11/2015 (X-ray Laboratory, Searle B013, Department of Chemistry, the University of Chicago, Chicago, IL).

**Report prepared:** Alexander S. Filatov, 02/12/2015 (X-ray Laboratory, Searle B013, Department of Chemistry, the University of Chicago, Chicago, IL).

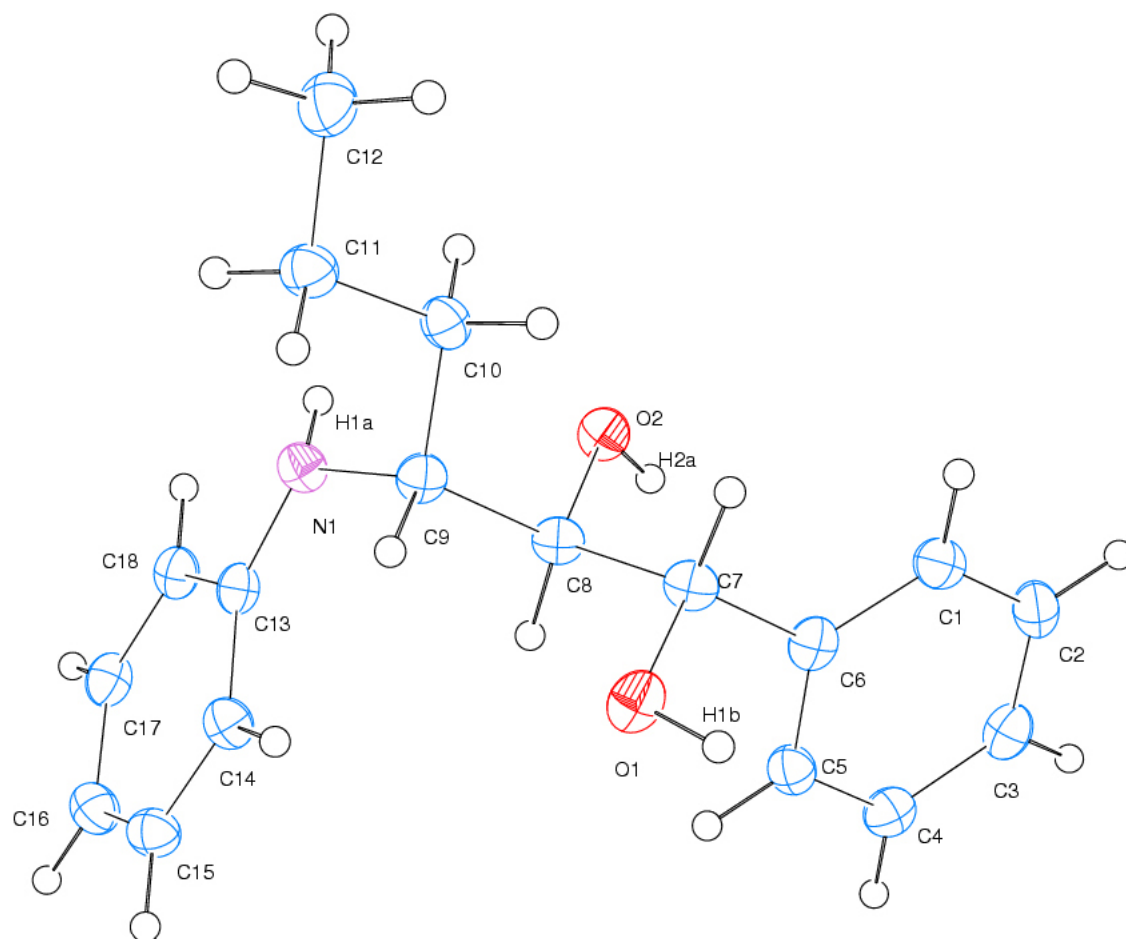
**General information:** A colorless plate (0.06 x 0.18 x 0.38 mm) was mounted on a Dual-Thickness MicroMount<sup>™</sup> (MiTeGen) with 30 μm sample aperture using grease to hold the crystal. The diffraction data were measured at 100 K on a Bruker D8 VENTURE with PHOTON 100 CMOS detector system equipped with a Cu-target X-ray tube ( $\lambda = 1.54178 \text{ \AA}$ ). Data reduction and integration were performed with the Bruker APEX2 software package (Bruker AXS, version 2014.9-0, 2014). Data were corrected for absorption effects using the numerical scaling as implemented in SADABS (Bruker AXS, version 2014/4, 2014, part of Bruker APEX2 software package). The structure was solved by SHELXT (Sheldrick, G. M. *Acta Cryst.* **2015**, *A71*, 3-8) and refined by full-matrix least-squares procedure using Bruker SHELXTL (version 6.14) software package (XL refinement program version 2014/7, Sheldrick, G. M. *Acta Cryst.* **2008**, *A64*, 112-122; Sheldrick, G. M. *Acta Cryst.* **2015**, *C71*, 3-8). Crystallographic data and details of the data collection and structure refinement are listed in Table 1.

**Specific details for structure refinement:** All elements were refined anisotropically and hydrogen atoms were included in idealized positions for structure factor calculations except hydrogen atoms attached to O and N atoms. These H atoms were located at the difference Fourier map and their coordinates were allowed to be freely refined while their thermal parameters were constrained to be 1.2 or 1.5 times of the  $U_{eq}$  value of the N or O atoms, respectively. All structures are drawn with thermal ellipsoids at 40% probability.

### Scheme

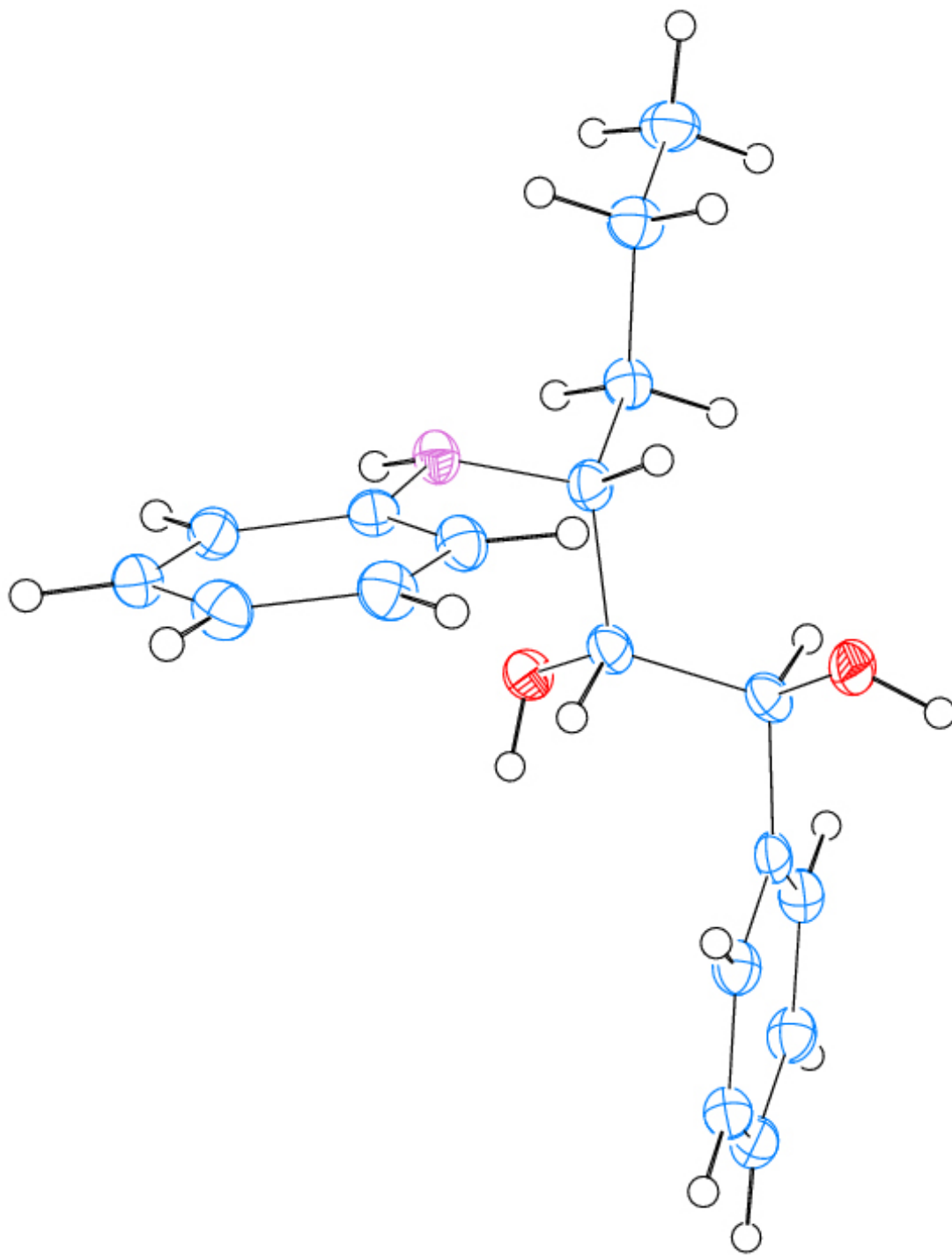


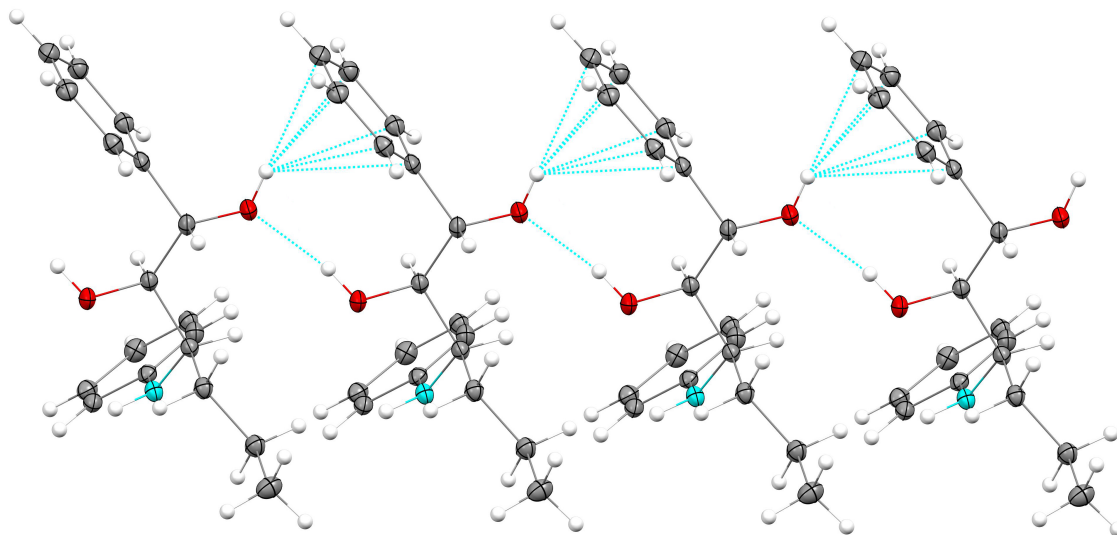
The configuration of **2b** was determined by Chiral HPLC to be *S* and compared with literature value<sup>1</sup>. Since the configuration of this stereocenter was not changed, the absolute configuration of the compound **3** can be identified as (1*S*,2*R*,3*R*)-1-phenyl-3-(phenylamino)hexane-1,2-diol.



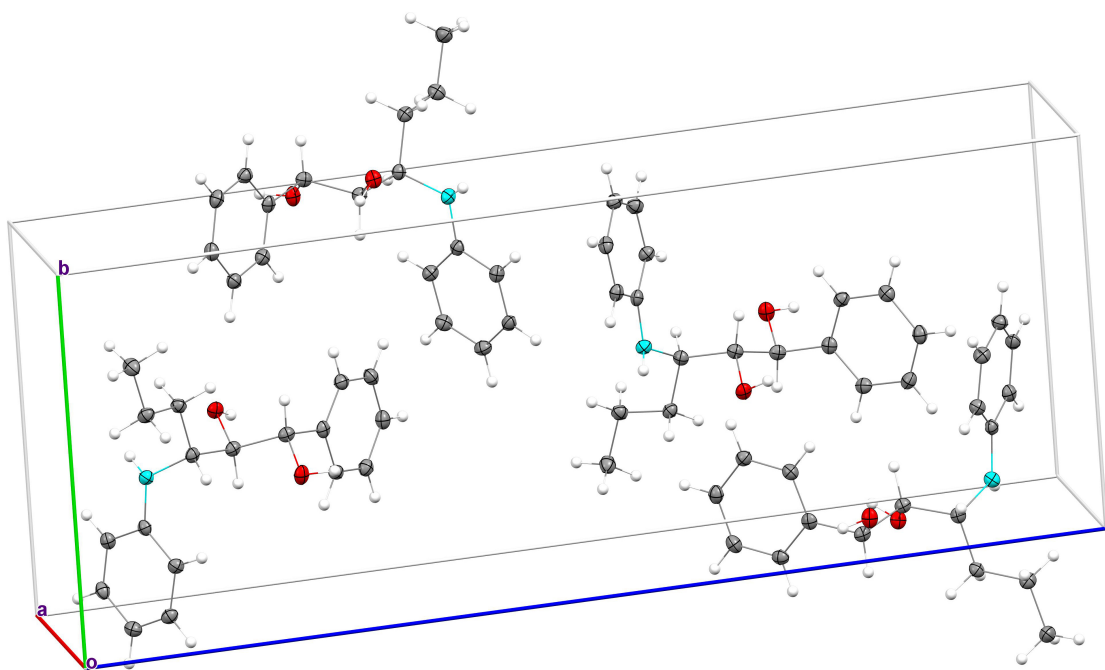
Thermal ellipsoids drawing with atoms labeling

<sup>1</sup> *J. Am. Chem. Soc.*, **2006**, *128* (46), pp 14808–14809





1D chain along [100] direction based on O-H...O and O-H...p intermolecular binding



Packing diagram showing unit cell content

Table 1. Crystal data and structure refinement for 0055\_Lan.

Identification code	0055_Lan	
Empirical formula	C <sub>18</sub> H <sub>23</sub> NO <sub>2</sub>	
Formula weight	285.37	
Temperature	100(2) K	
Wavelength	1.54178 Å	
Crystal system	Orthorhombic	
Space group	P2 <sub>1</sub> 2 <sub>1</sub> 2 <sub>1</sub>	
Unit cell dimensions	a = 5.2823(3) Å	α = 90°.
	b = 10.7630(7) Å	β = 90°.
	c = 27.6349(17) Å	γ = 90°.
Volume	1571.14(17) Å <sup>3</sup>	
Z	4	
Density (calculated)	1.206 Mg/m <sup>3</sup>	
Absorption coefficient	0.615 mm <sup>-1</sup>	
F(000)	616	
Crystal size	0.380 x 0.180 x 0.060 mm <sup>3</sup>	
Theta range for data collection	3.198 to 66.519°.	
Index ranges	-6 ≤ h ≤ 5, -12 ≤ k ≤ 9, -26 ≤ l ≤ 32	
Reflections collected	10178	
Independent reflections	2739 [R(int) = 0.0744]	
Completeness to theta = 66.519°	99.2 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.753 and 0.561	
Refinement method	Full-matrix least-squares on F <sup>2</sup>	
Data / restraints / parameters	2739 / 0 / 206	
Goodness-of-fit on F <sup>2</sup>	1.087	
Final R indices [I > 2σ(I)]	R1 = 0.0510, wR2 = 0.1063	
R indices (all data)	R1 = 0.0661, wR2 = 0.1134	
Absolute structure parameter	0.3(3)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.177 and -0.175 e.Å <sup>-3</sup>	

$$R_{\text{int}} = \frac{\sum |F_o^2 - \langle F_o^2 \rangle|}{\sum |F_o^2|}$$

$$R1 = \frac{\sum ||F_o| - |F_c||}{\sum |F_o|}$$

$$wR2 = \left[ \frac{\sum [w (F_o^2 - F_c^2)^2]}{\sum [w (F_o^2)^2]} \right]^{1/2}$$

$$\text{Goodness-of-fit} = \left[ \frac{\sum [w (F_o^2 - F_c^2)^2]}{(n-p)} \right]^{1/2}$$

Table 2. Atomic coordinates ( $\times 10^4$ ) and equivalent isotropic displacement parameters ( $\text{\AA}^2 \times 10^3$ ) for 0055\_Lan.  $U(\text{eq})$  is defined as one third of the trace of the orthogonalized  $U^{ij}$  tensor.

	x	y	z	$U(\text{eq})$
C(1)	1745(6)	4164(4)	7821(1)	29(1)
C(2)	9(7)	4396(4)	8187(1)	32(1)
C(3)	-625(7)	5611(4)	8299(1)	33(1)
C(4)	497(7)	6592(4)	8054(1)	30(1)
C(5)	2208(7)	6345(4)	7686(1)	28(1)
C(6)	2844(6)	5131(3)	7564(1)	26(1)
C(7)	4530(6)	4881(4)	7131(1)	26(1)
C(8)	3185(6)	5257(4)	6660(1)	25(1)
C(9)	4715(6)	5049(3)	6196(1)	25(1)
C(10)	5191(7)	3688(3)	6074(1)	27(1)
C(11)	7128(7)	3528(4)	5669(1)	31(1)
C(12)	7622(8)	2186(4)	5538(1)	37(1)
C(13)	3239(6)	6932(4)	5746(1)	25(1)
C(14)	4989(7)	7742(3)	5947(1)	27(1)
C(15)	4808(7)	9008(3)	5859(1)	30(1)
C(16)	2885(7)	9490(4)	5580(1)	31(1)
C(17)	1094(7)	8685(4)	5388(1)	30(1)
C(18)	1256(6)	7430(4)	5466(1)	28(1)
N(1)	3439(5)	5643(3)	5788(1)	26(1)
O(1)	6827(4)	5605(3)	7149(1)	32(1)
O(2)	886(4)	4567(3)	6615(1)	29(1)

Table 3. Bond lengths [Å] and angles [°] for 0055\_Lan.

C(1)-C(6)	1.387(5)	C(2)-C(3)-C(4)	120.4(4)
C(1)-C(2)	1.388(5)	C(2)-C(3)-H(3)	119.8
C(1)-H(1)	0.9500	C(4)-C(3)-H(3)	119.8
C(2)-C(3)	1.386(5)	C(5)-C(4)-C(3)	119.4(4)
C(2)-H(2)	0.9500	C(5)-C(4)-H(4)	120.3
C(3)-C(4)	1.387(5)	C(3)-C(4)-H(4)	120.3
C(3)-H(3)	0.9500	C(4)-C(5)-C(6)	121.1(4)
C(4)-C(5)	1.386(5)	C(4)-C(5)-H(5)	119.5
C(4)-H(4)	0.9500	C(6)-C(5)-H(5)	119.5
C(5)-C(6)	1.391(5)	C(1)-C(6)-C(5)	118.6(3)
C(5)-H(5)	0.9500	C(1)-C(6)-C(7)	121.1(3)
C(6)-C(7)	1.516(5)	C(5)-C(6)-C(7)	120.1(3)
C(7)-O(1)	1.443(4)	O(1)-C(7)-C(6)	111.7(3)
C(7)-C(8)	1.537(5)	O(1)-C(7)-C(8)	106.0(3)
C(7)-H(7)	1.02(4)	C(6)-C(7)-C(8)	110.5(3)
C(8)-O(2)	1.429(4)	O(1)-C(7)-H(7)	111(2)
C(8)-C(9)	1.533(5)	C(6)-C(7)-H(7)	109(2)
C(8)-H(8)	1.05(4)	C(8)-C(7)-H(7)	109(2)
C(9)-N(1)	1.461(4)	O(2)-C(8)-C(9)	107.3(3)
C(9)-C(10)	1.524(5)	O(2)-C(8)-C(7)	109.3(3)
C(9)-H(9)	1.0000	C(9)-C(8)-C(7)	115.3(3)
C(10)-C(11)	1.526(5)	O(2)-C(8)-H(8)	110(2)
C(10)-H(10A)	0.9900	C(9)-C(8)-H(8)	110(2)
C(10)-H(10B)	0.9900	C(7)-C(8)-H(8)	105(2)
C(11)-C(12)	1.512(5)	N(1)-C(9)-C(10)	109.1(3)
C(11)-H(11A)	0.9900	N(1)-C(9)-C(8)	109.8(3)
C(11)-H(11B)	0.9900	C(10)-C(9)-C(8)	114.3(3)
C(12)-H(12A)	0.9800	N(1)-C(9)-H(9)	107.8
C(12)-H(12B)	0.9800	C(10)-C(9)-H(9)	107.8
C(12)-H(12C)	0.9800	C(8)-C(9)-H(9)	107.8
C(13)-C(14)	1.387(5)	C(9)-C(10)-C(11)	112.3(3)
C(13)-N(1)	1.397(5)	C(9)-C(10)-H(10A)	109.1
C(13)-C(18)	1.407(5)	C(11)-C(10)-H(10A)	109.1
C(14)-C(15)	1.387(5)	C(9)-C(10)-H(10B)	109.1
C(14)-H(14)	0.9500	C(11)-C(10)-H(10B)	109.1
C(15)-C(16)	1.376(5)	H(10A)-C(10)-H(10B)	107.9
C(15)-H(15)	0.9500	C(12)-C(11)-C(10)	113.6(3)
C(16)-C(17)	1.388(5)	C(12)-C(11)-H(11A)	108.9
C(16)-H(16)	0.9500	C(10)-C(11)-H(11A)	108.9
C(17)-C(18)	1.372(5)	C(12)-C(11)-H(11B)	108.9
C(17)-H(17)	0.9500	C(10)-C(11)-H(11B)	108.9
C(18)-H(18)	0.9500	H(11A)-C(11)-H(11B)	107.7
N(1)-H(1A)	0.89(4)	C(11)-C(12)-H(12A)	109.5
O(1)-H(1B)	0.88(4)	C(11)-C(12)-H(12B)	109.5
O(2)-H(2A)	0.87(4)	H(12A)-C(12)-H(12B)	109.5
C(6)-C(1)-C(2)	121.0(4)	C(11)-C(12)-H(12C)	109.5
C(6)-C(1)-H(1)	119.5	H(12A)-C(12)-H(12C)	109.5
C(2)-C(1)-H(1)	119.5	H(12B)-C(12)-H(12C)	109.5
C(3)-C(2)-C(1)	119.5(4)	C(14)-C(13)-N(1)	122.7(3)
C(3)-C(2)-H(2)	120.3	C(14)-C(13)-C(18)	118.5(3)
C(1)-C(2)-H(2)	120.3	N(1)-C(13)-C(18)	118.7(3)
		C(15)-C(14)-C(13)	120.0(3)
		C(15)-C(14)-H(14)	120.0
		C(13)-C(14)-H(14)	120.0
		C(16)-C(15)-C(14)	121.3(3)
		C(16)-C(15)-H(15)	119.4



C(14)-C(15)-H(15)	119.4
C(15)-C(16)-C(17)	118.8(4)
C(15)-C(16)-H(16)	120.6
C(17)-C(16)-H(16)	120.6
C(18)-C(17)-C(16)	120.8(4)
C(18)-C(17)-H(17)	119.6
C(16)-C(17)-H(17)	119.6
C(17)-C(18)-C(13)	120.5(3)
C(17)-C(18)-H(18)	119.7
C(13)-C(18)-H(18)	119.7
C(13)-N(1)-C(9)	122.3(3)
C(13)-N(1)-H(1A)	112(2)
C(9)-N(1)-H(1A)	113(2)
C(7)-O(1)-H(1B)	107(3)
C(8)-O(2)-H(2A)	107(3)

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Symmetry transformations used to generate equivalent atoms:

Table 4. Anisotropic displacement parameters ( $\text{\AA}^2 \times 10^3$ ) for 0055\_Lan. The anisotropic displacement factor exponent takes the form:  $-2\pi^2 [ h^2 a^{*2} U^{11} + \dots + 2 h k a^* b^* U^{12} ]$

	U <sup>11</sup>	U <sup>22</sup>	U <sup>33</sup>	U <sup>23</sup>	U <sup>13</sup>	U <sup>12</sup>
C(1)	28(2)	28(2)	31(2)	1(2)	-5(2)	1(2)
C(2)	31(2)	37(3)	29(2)	7(2)	0(2)	-3(2)
C(3)	29(2)	42(3)	26(2)	0(2)	-2(2)	2(2)
C(4)	28(2)	32(2)	30(2)	-2(2)	-3(2)	3(2)
C(5)	25(2)	29(2)	29(2)	3(2)	-2(2)	-3(2)
C(6)	17(2)	35(2)	26(2)	2(2)	-6(1)	1(2)
C(7)	18(2)	28(2)	32(2)	-1(2)	0(1)	0(2)
C(8)	19(2)	27(2)	30(2)	-2(2)	-2(2)	0(1)
C(9)	21(2)	29(2)	26(2)	0(2)	-3(1)	-1(2)
C(10)	24(2)	27(2)	29(2)	3(2)	0(2)	-2(2)
C(11)	28(2)	31(2)	34(2)	-3(2)	2(2)	-4(2)
C(12)	43(2)	35(3)	34(2)	1(2)	7(2)	8(2)
C(13)	24(2)	30(2)	22(2)	2(2)	4(2)	1(2)
C(14)	22(2)	29(2)	31(2)	2(2)	0(2)	-1(2)
C(15)	26(2)	31(2)	35(2)	-2(2)	0(2)	-4(2)
C(16)	32(2)	27(2)	35(2)	3(2)	3(2)	1(2)
C(17)	30(2)	33(3)	26(2)	2(2)	0(2)	8(2)
C(18)	23(2)	35(3)	26(2)	2(2)	1(1)	0(2)
N(1)	21(2)	28(2)	29(2)	2(1)	-2(1)	-2(1)
O(1)	19(1)	49(2)	29(1)	-2(1)	-3(1)	-3(1)
O(2)	19(1)	38(2)	31(1)	-1(1)	1(1)	-5(1)

Table 5. Hydrogen coordinates ( $\times 10^4$ ) and isotropic displacement parameters ( $\text{\AA}^2 \times 10^{-3}$ ) for 0055\_Lan.

	x	y	z	U(eq)
H(1)	2186	3331	7745	35
H(2)	-738	3726	8360	39
H(3)	-1835	5774	8546	39
H(4)	96	7425	8138	36
H(5)	2959	7015	7515	33
H(7)	4920(70)	3960(30)	7117(13)	31
H(8)	2780(70)	6210(40)	6702(13)	30
H(9)	6397	5462	6238	31
H(10A)	3576	3296	5976	32
H(10B)	5806	3254	6368	32
H(11A)	6517	3972	5378	37
H(11B)	8742	3917	5770	37
H(12A)	8145	1728	5828	56
H(12B)	8968	2145	5295	56
H(12C)	6073	1816	5407	56
H(14)	6312	7430	6146	33
H(15)	6035	9553	5994	36
H(16)	2784	10358	5521	38
H(17)	-260	9009	5200	36
H(18)	20	6891	5330	33
H(1A)	2010(70)	5270(30)	5705(13)	31
H(1B)	7450(80)	5530(40)	7445(15)	48
H(2A)	-220(80)	4910(40)	6809(14)	44

Table 6. Torsion angles [°] for 0055\_Lan.

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C(6)-C(1)-C(2)-C(3)	-0.3(5)
C(1)-C(2)-C(3)-C(4)	-1.2(5)
C(2)-C(3)-C(4)-C(5)	1.8(5)
C(3)-C(4)-C(5)-C(6)	-0.9(5)
C(2)-C(1)-C(6)-C(5)	1.2(5)
C(2)-C(1)-C(6)-C(7)	-173.7(3)
C(4)-C(5)-C(6)-C(1)	-0.5(5)
C(4)-C(5)-C(6)-C(7)	174.3(3)
C(1)-C(6)-C(7)-O(1)	-133.5(3)
C(5)-C(6)-C(7)-O(1)	51.7(4)
C(1)-C(6)-C(7)-C(8)	108.7(4)
C(5)-C(6)-C(7)-C(8)	-66.1(4)
O(1)-C(7)-C(8)-O(2)	179.6(3)
C(6)-C(7)-C(8)-O(2)	-59.2(4)
O(1)-C(7)-C(8)-C(9)	58.6(4)
C(6)-C(7)-C(8)-C(9)	179.9(3)
O(2)-C(8)-C(9)-N(1)	68.2(4)
C(7)-C(8)-C(9)-N(1)	-169.8(3)
O(2)-C(8)-C(9)-C(10)	-54.8(4)
C(7)-C(8)-C(9)-C(10)	67.2(4)
N(1)-C(9)-C(10)-C(11)	67.7(4)
C(8)-C(9)-C(10)-C(11)	-169.0(3)
C(9)-C(10)-C(11)-C(12)	-179.5(3)
N(1)-C(13)-C(14)-C(15)	174.6(3)
C(18)-C(13)-C(14)-C(15)	-2.0(5)
C(13)-C(14)-C(15)-C(16)	1.2(6)
C(14)-C(15)-C(16)-C(17)	0.4(5)
C(15)-C(16)-C(17)-C(18)	-1.1(5)
C(16)-C(17)-C(18)-C(13)	0.3(5)
C(14)-C(13)-C(18)-C(17)	1.2(5)
N(1)-C(13)-C(18)-C(17)	-175.5(3)
C(14)-C(13)-N(1)-C(9)	27.5(5)
C(18)-C(13)-N(1)-C(9)	-155.9(3)
C(10)-C(9)-N(1)-C(13)	-165.9(3)
C(8)-C(9)-N(1)-C(13)	68.1(4)

---

Symmetry transformations used to generate equivalent atoms:

Table 7. Hydrogen bonds for 0055\_Lan [ $\text{\AA}$  and  $^\circ$ ].

D-H...A	d(D-H)	d(H...A)	d(D...A)	$\angle(\text{DHA})$
O(2)-H(2A)...O(1)#1	0.87(4)	1.97(4)	2.833(3)	169(4)

Symmetry transformations used to generate equivalent atoms:

#1  $x-1,y,z$

## References

- [1] W. Zhang, A. Basak, Y. Kosugi, Y. Hoshino, H. Yamamoto, *Angew. Chemie Int. Ed.* **2005**, *44*, 4389–4391.
- [2] C. Wang, H. Yamamoto, *J. Am. Chem. Soc.* **2014**, *136*, 1222–1225.
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- [4] J. L. Olivares-Romero, Z. Li, H. Yamamoto, *J. Am. Chem. Soc.* **2013**, *135*, 3411–3.
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7.339  
7.335  
7.321  
7.317  
7.308  
7.305  
7.261  
7.258  
7.254  
7.249  
7.244  
7.239  
7.231  
5.739  
5.726  
5.721  
5.708  
5.695  
5.661  
5.659  
5.657  
5.648  
5.646  
5.644  
5.629  
5.615  
5.613  
5.125  
5.112  
2.037  
2.023  
2.008  
1.994  
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1.423  
1.409  
1.394  
1.379  
1.365  
0.905  
0.890  
0.875

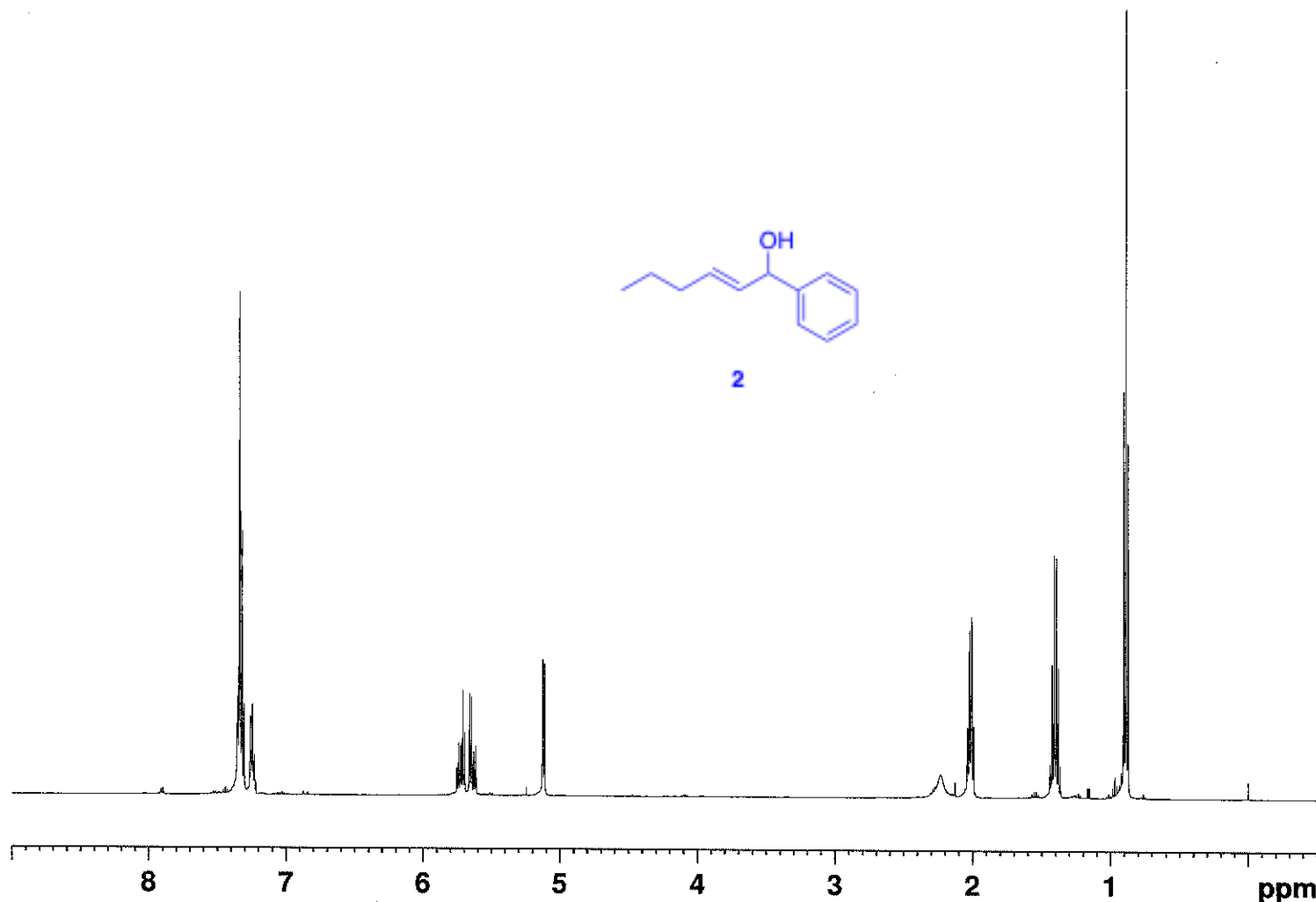
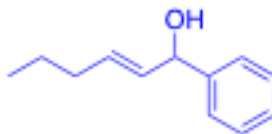


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126.259

—75.228

—34.329

—22.322

—13.760



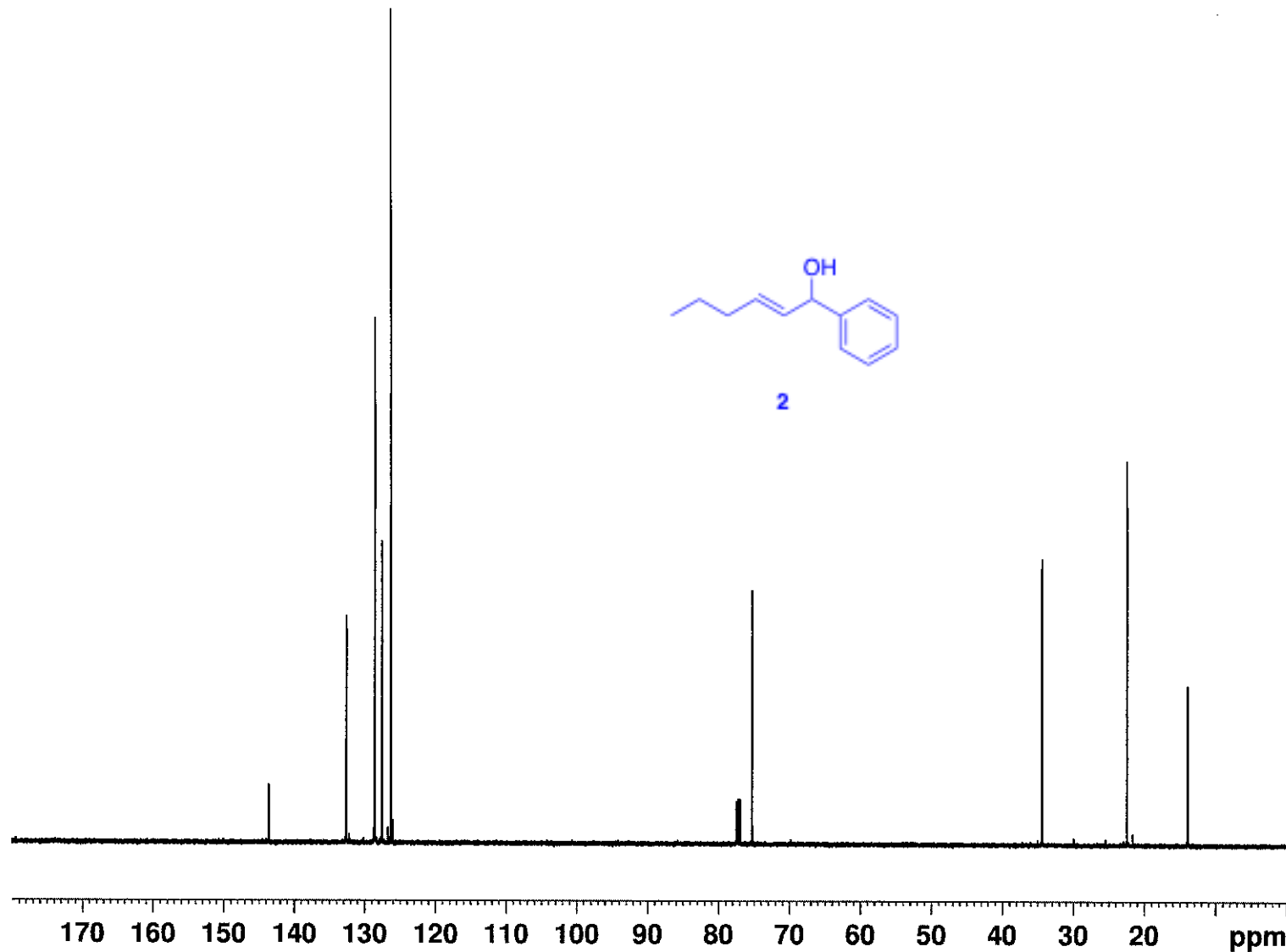
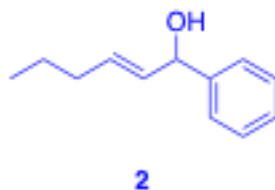
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PULPROG zgdc  
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FIDRES 0.166670 Hz  
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TE 298.2 K  
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NUC1 13C  
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PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

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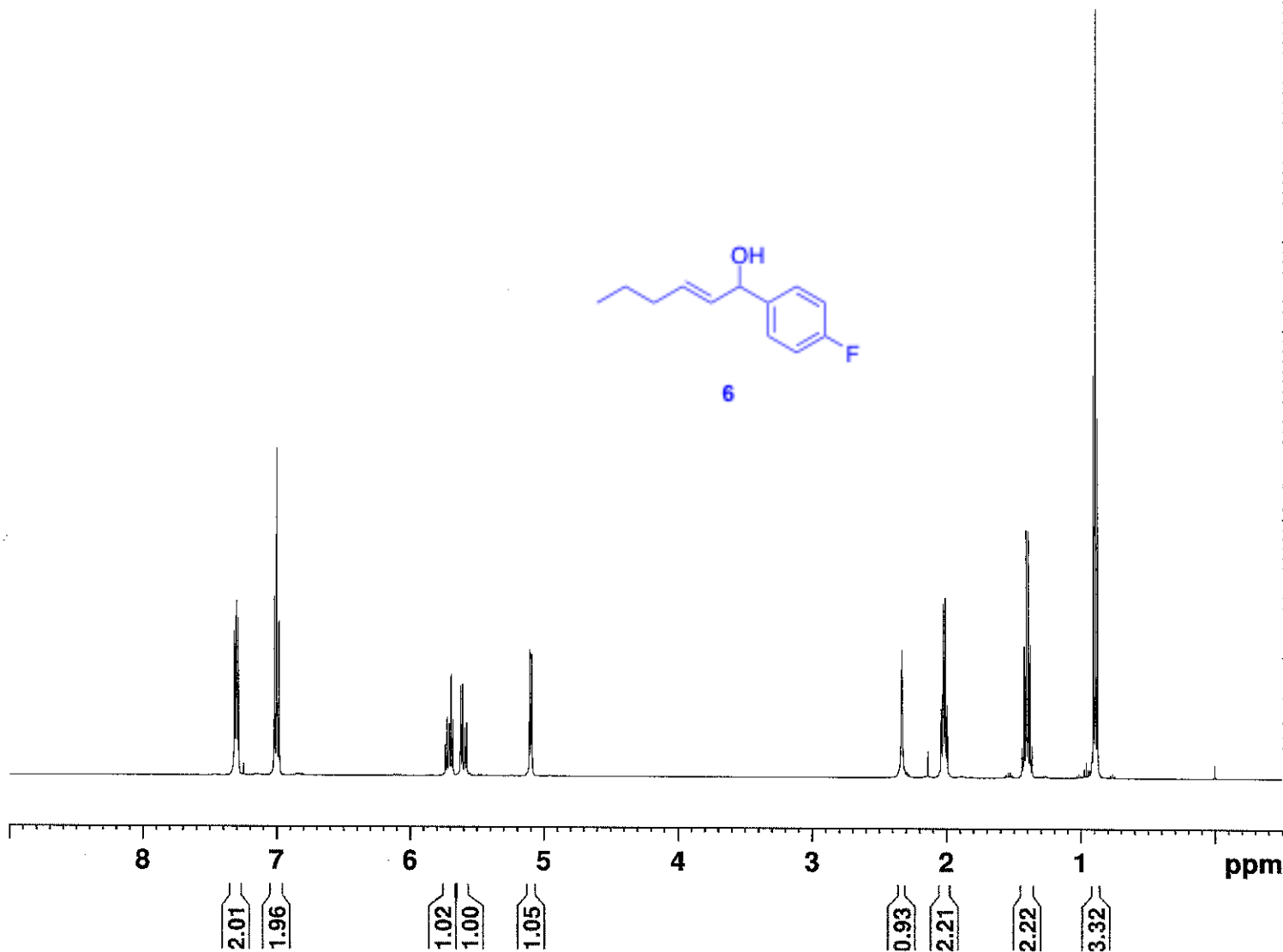
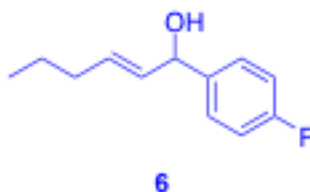
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7.004  
7.000  
6.996  
6.983  
5.736  
5.723  
5.706  
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5.679  
5.622  
5.619  
5.610  
5.608  
5.605  
5.591  
5.589  
5.580  
5.577  
5.575  
5.104  
5.091  
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2.037  
2.023  
2.009  
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1.437  
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1.393  
1.378  
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0.876



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< 132.802  
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< 115.165

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— 34.294

— 22.297

— 13.756



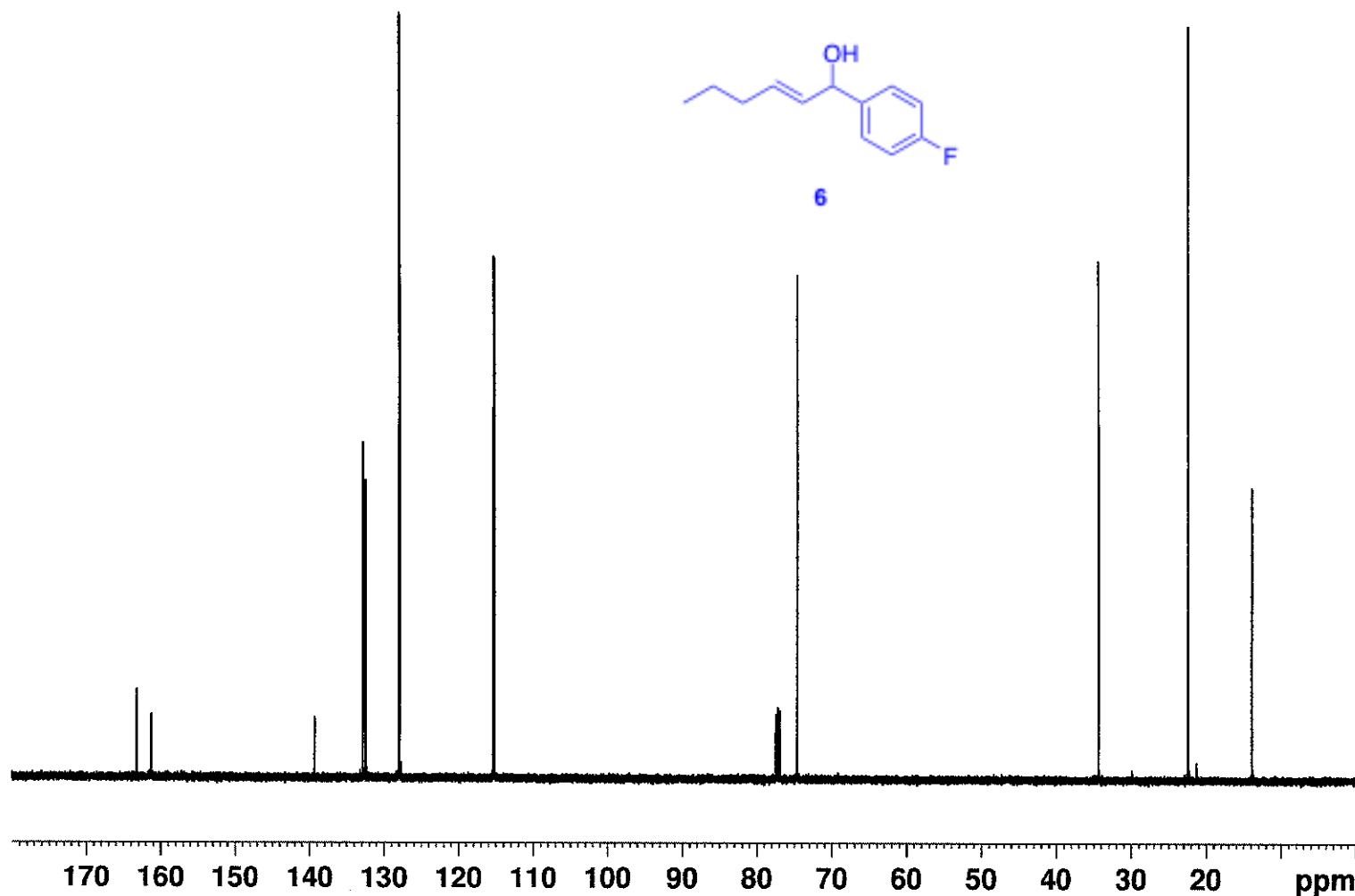
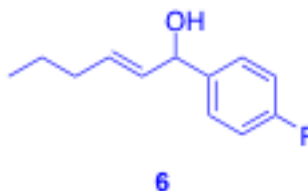
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FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
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DE 6.50 usec  
TE 297.5 K  
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D11 0.03000000 sec  
TD0 1

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SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

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NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
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SF 125.6924019 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



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8.102  
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7.815  
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7.734  
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7.467  
7.463  
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7.447  
7.441  
7.438  
7.435  
7.428  
7.420  
7.418  
7.404  
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5.795  
5.793  
5.789  
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2.001  
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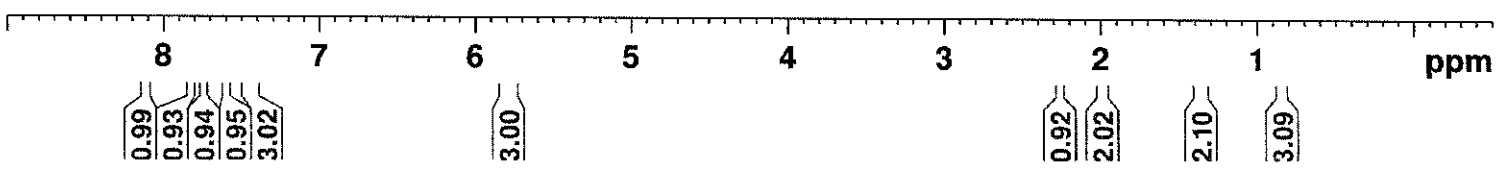
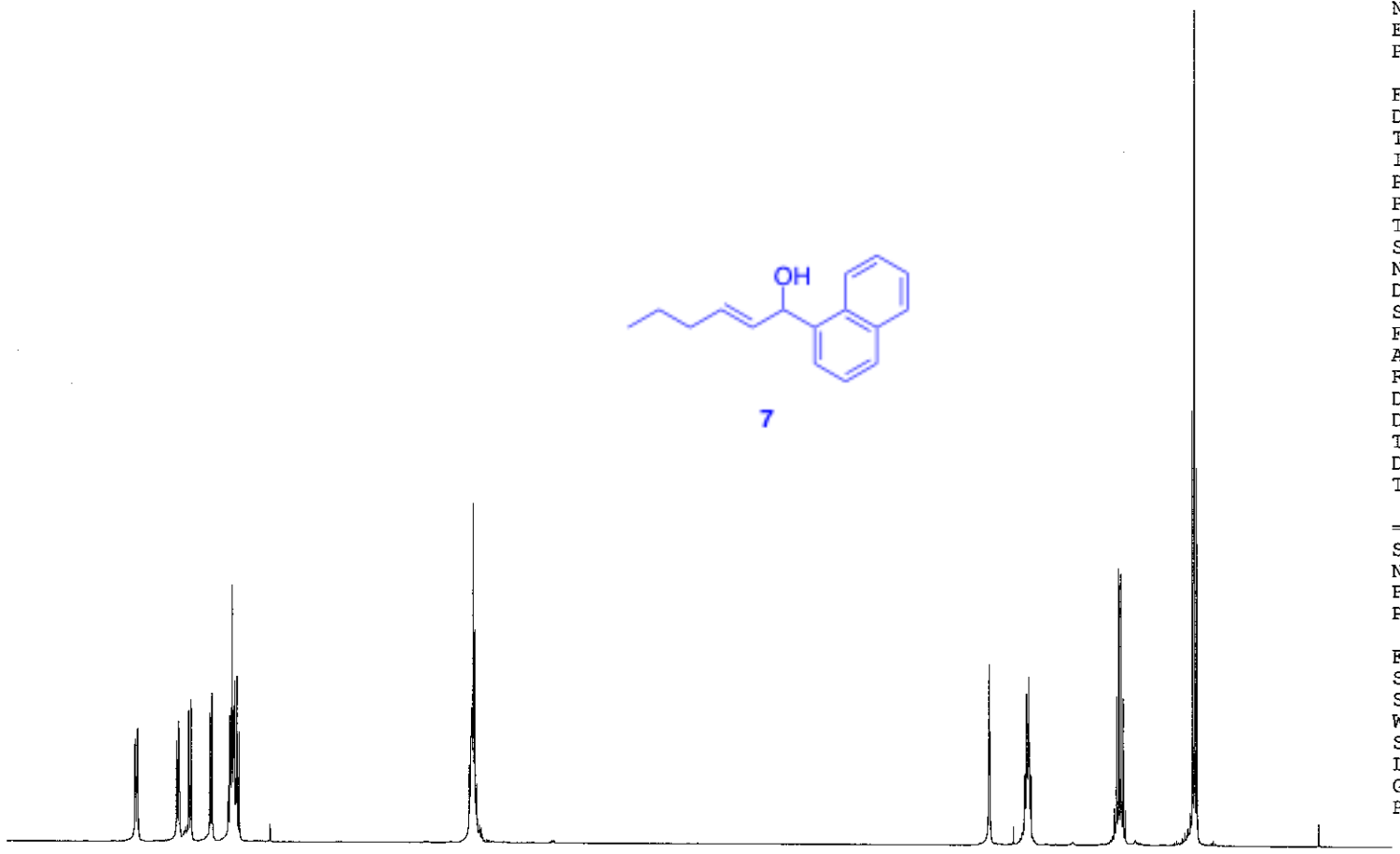
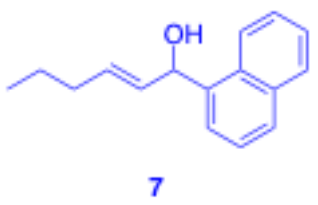


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SOLVENT CDC13  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 6.6  
DW 50.000 usec  
DE 6.50 usec  
TE 297.3 K  
D1 5.0000000 sec  
TD0 1

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NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

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SF 499.8700459 MHz  
WDW EM  
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LB 0.30 Hz  
GB 0  
PC 1.00



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 131.906  
 130.722  
 128.826  
 128.265  
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 125.524  
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 123.593

— 72.236

— 34.389

— 22.306

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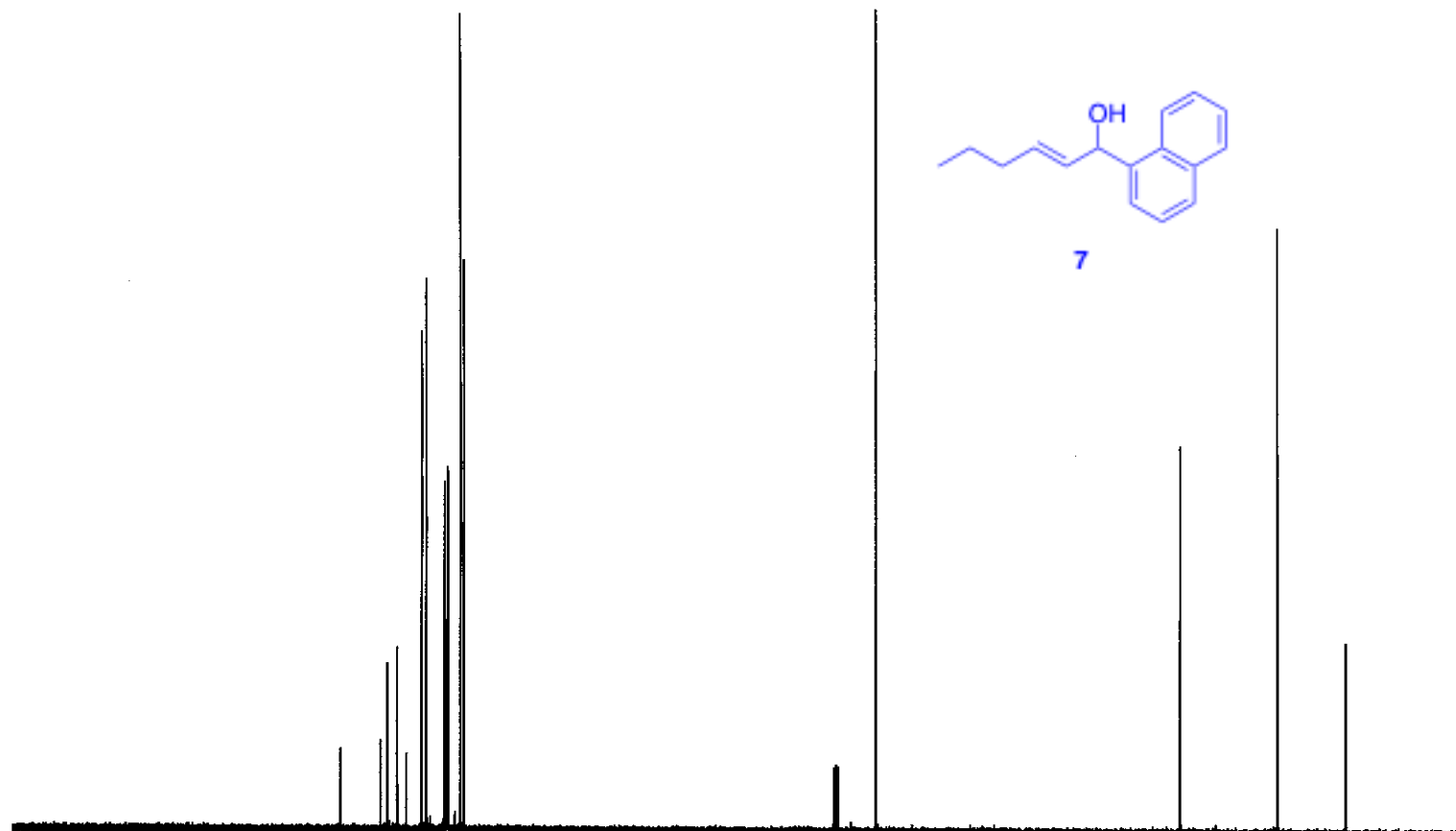
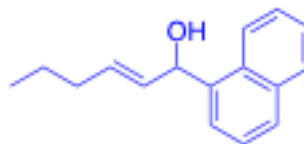
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 NS 27  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.6 K  
 D1 3.00000000 sec  
 D11 0.03000000 sec  
 TD0 1

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 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
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 SF 125.6924082 MHz  
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 SSB 0  
 LB 0.30 Hz  
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 PC 1.40



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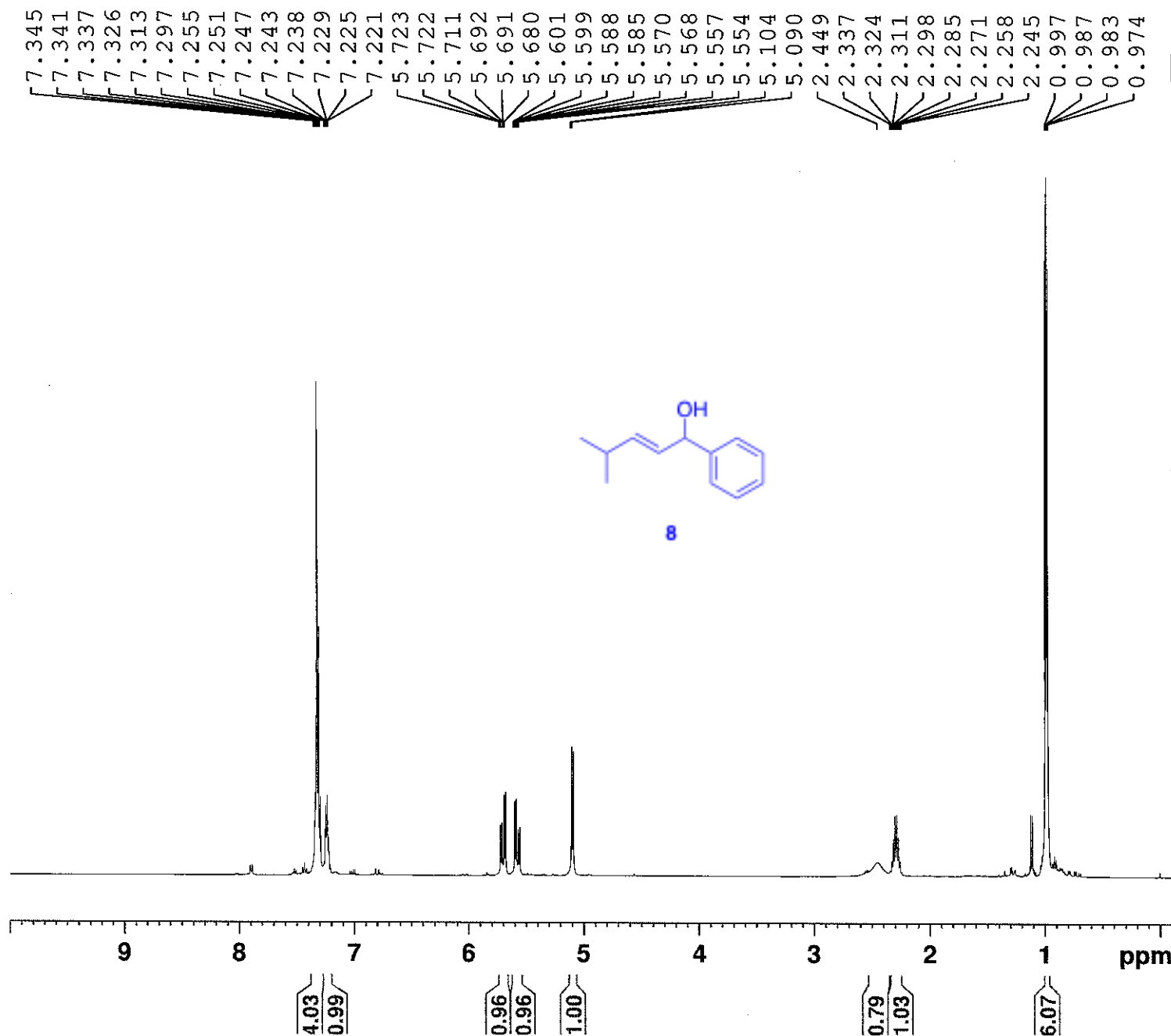


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PROCNO 1

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PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 5.21  
DW 50.000 usec  
DE 6.50 usec  
TE 297.1 K  
D1 5.0000000 sec  
TDO 1

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NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

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SF 499.8700371 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



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— 128.455  
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— 126.260

— 75.197

— 30.713  
— 22.262  
— 22.236



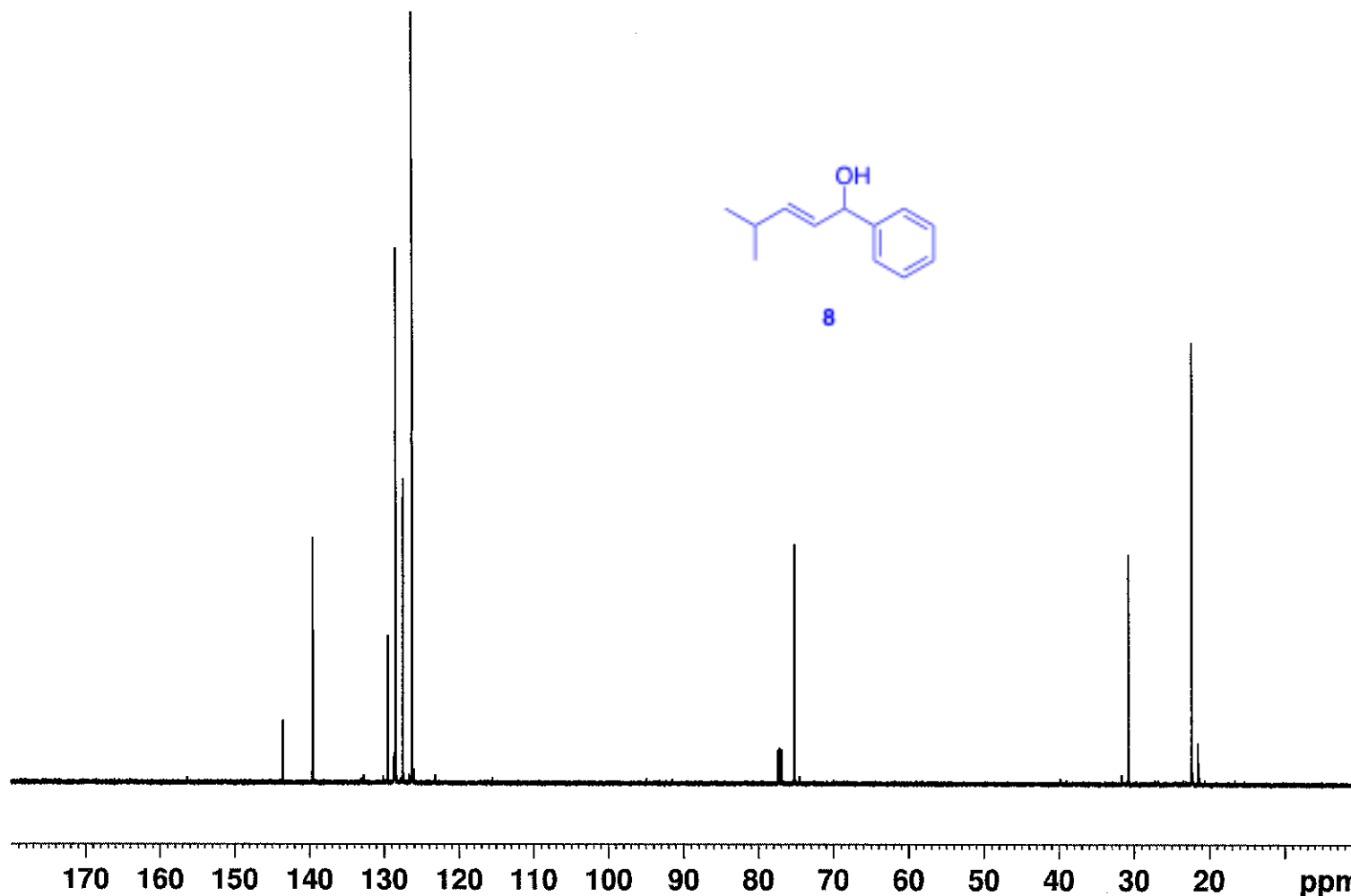
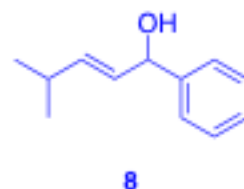
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FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
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DE 6.50 usec  
TE 297.6 K  
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D11 0.03000000 sec  
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==== CHANNEL f1 =====  
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NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
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NUC2 1H  
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PLW2 19.00000000 W  
PLW12 0.29688001 W

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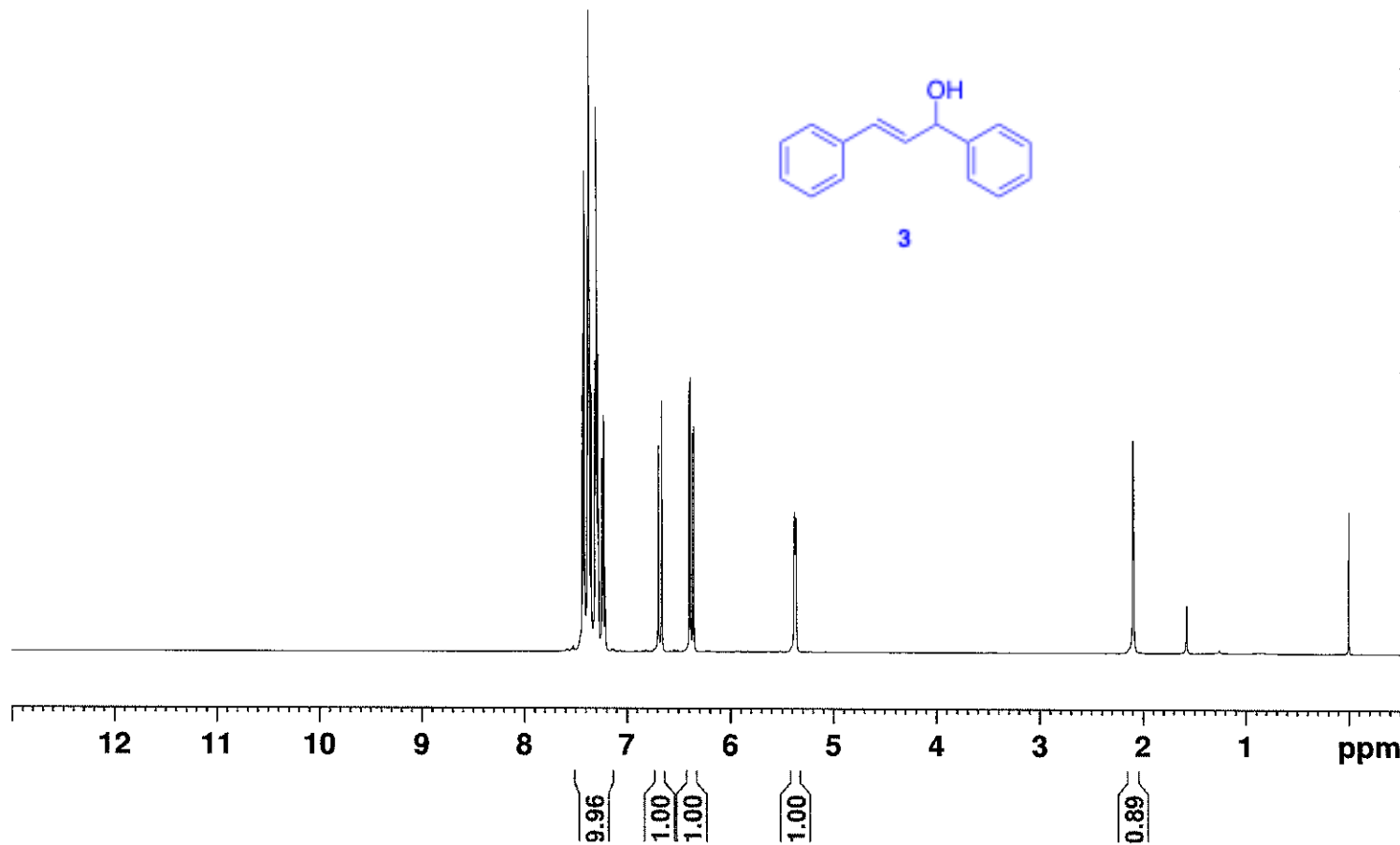
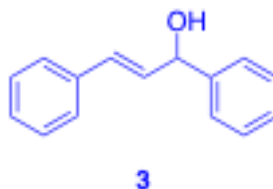
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PULPROG zg  
TD 59998  
SOLVENT CDCl3  
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DE 6.50 usec  
TE 297.4 K  
D1 5.00000000 sec  
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P1 10.75 usec  
PLW1 18.25000000 W

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SF 499.8700238 MHz  
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LB 0.30 Hz  
GB 0  
PC 1.00

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7.308  
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7.302  
7.298  
7.295  
7.291  
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7.282  
7.276  
7.274  
7.245  
7.242  
7.240  
7.236  
7.232  
7.228  
7.224  
7.216  
7.213  
7.211  
6.694  
6.662  
6.399  
6.386  
6.367  
6.354  
5.378  
5.366  
2.097





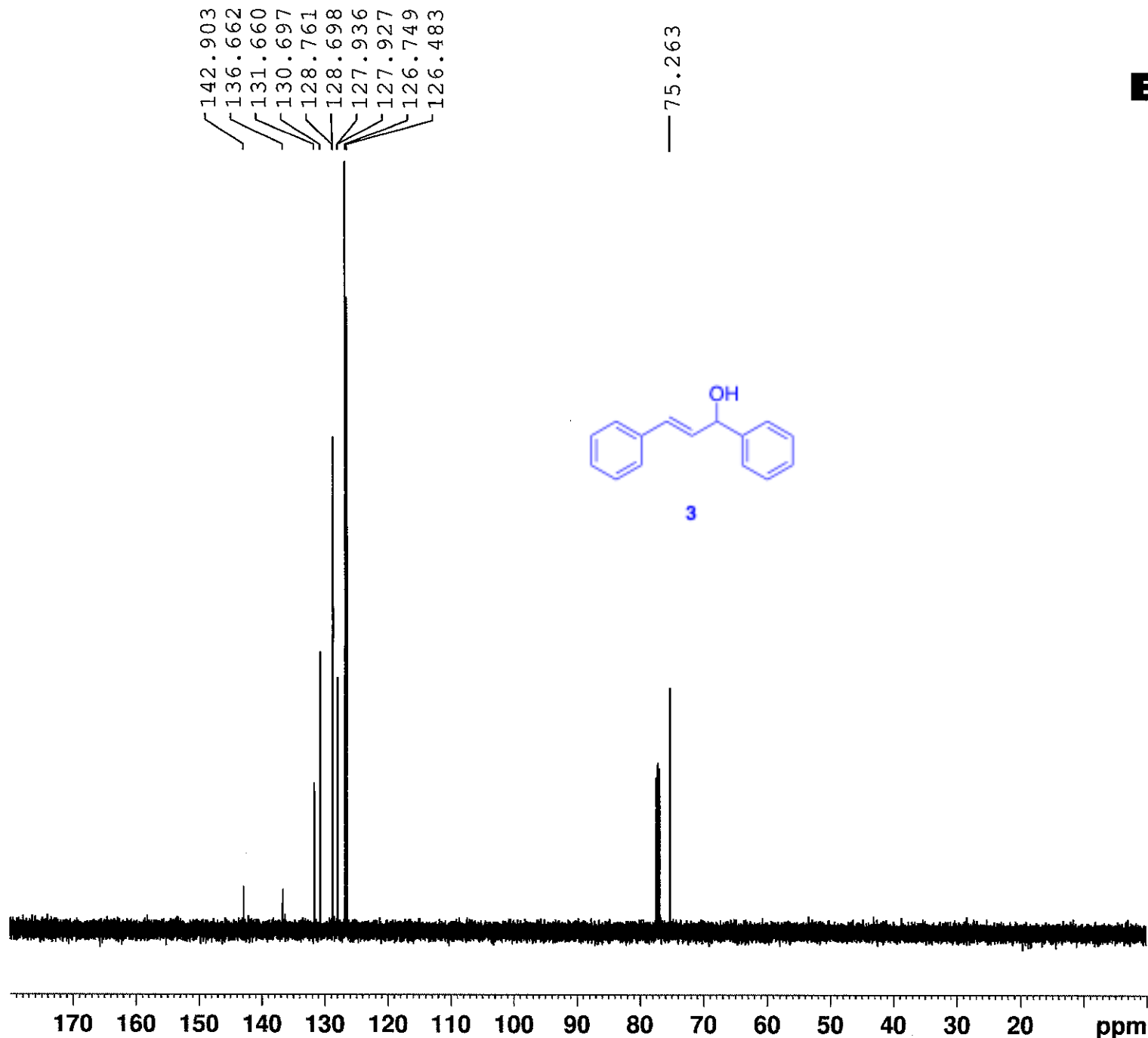
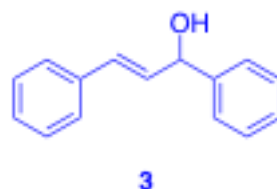
Current Data Parameters  
NAME Lan\_20150406\_B6203\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150406  
Time 19.53  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDCl3  
NS 29  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.5 K  
D1 3.00000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923991 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40





7.403  
7.401  
7.387  
7.363  
7.359  
7.349  
7.346  
7.333  
7.322  
7.316  
7.312  
7.305  
7.299  
7.294  
7.292  
7.288  
7.280  
7.276  
7.269  
7.266  
7.263  
6.982  
6.964  
6.947  
6.616  
6.584  
6.285  
6.272  
6.253  
6.240  
5.326  
5.313  
2.362

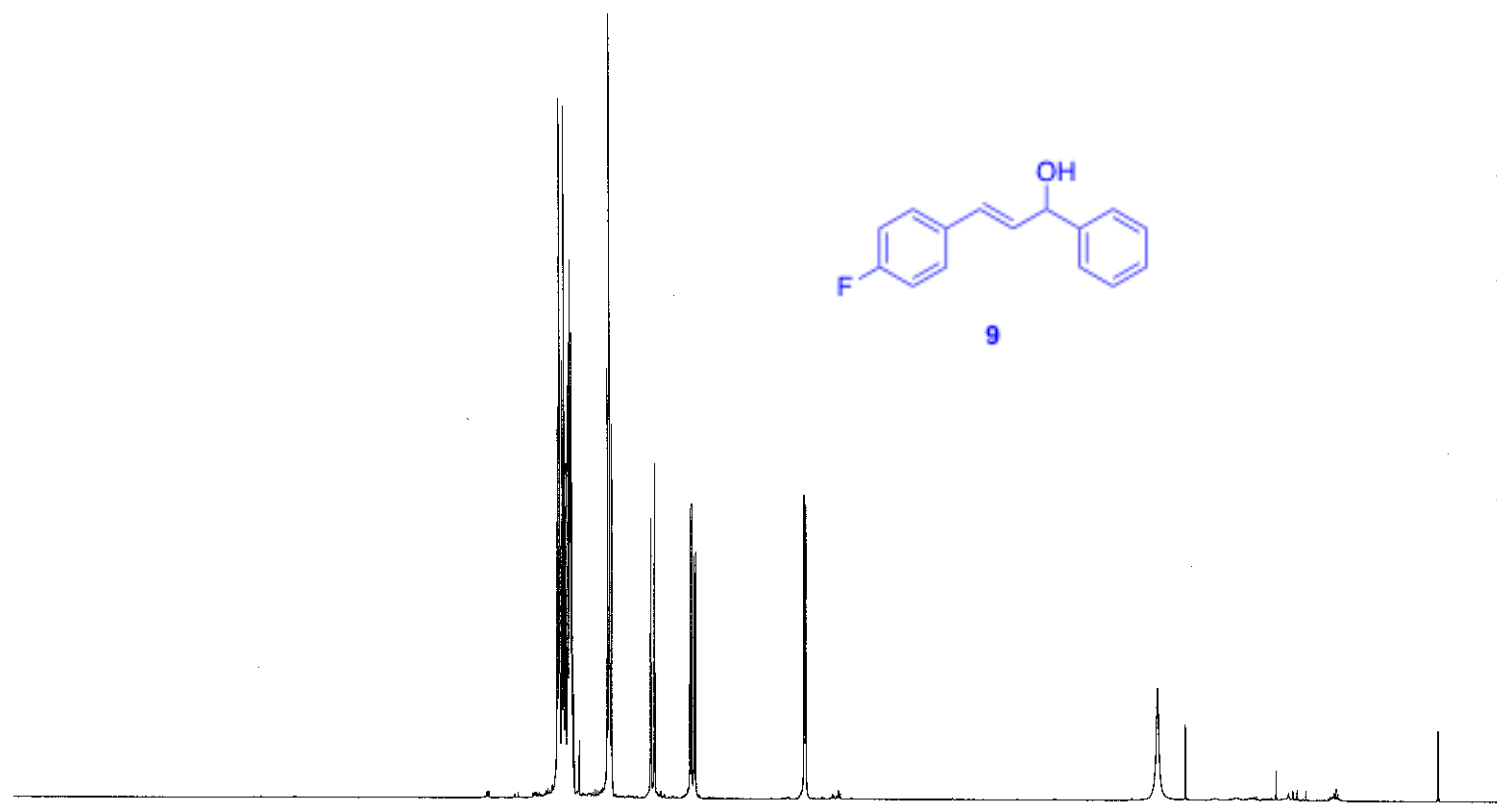
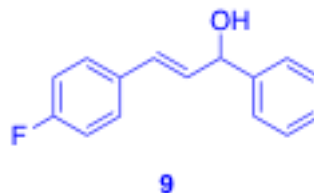


Current Data Parameters  
NAME Lan\_20150406\_B6095  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150406  
Time 18.24  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDC13  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 15.35  
DW 50.000 usec  
DE 6.50 usec  
TE 296.9 K  
D1 5.0000000 sec  
TDO 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700325 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



11 10 9 8 7 6 5 4 3 2 1 ppm

6.97 1.97 1.00 1.01 0.99 0.84

163.378  
161.413

142.827  
132.775  
131.412  
129.255  
128.635  
128.200  
128.136  
127.796  
126.389  
115.552  
115.380

74.939



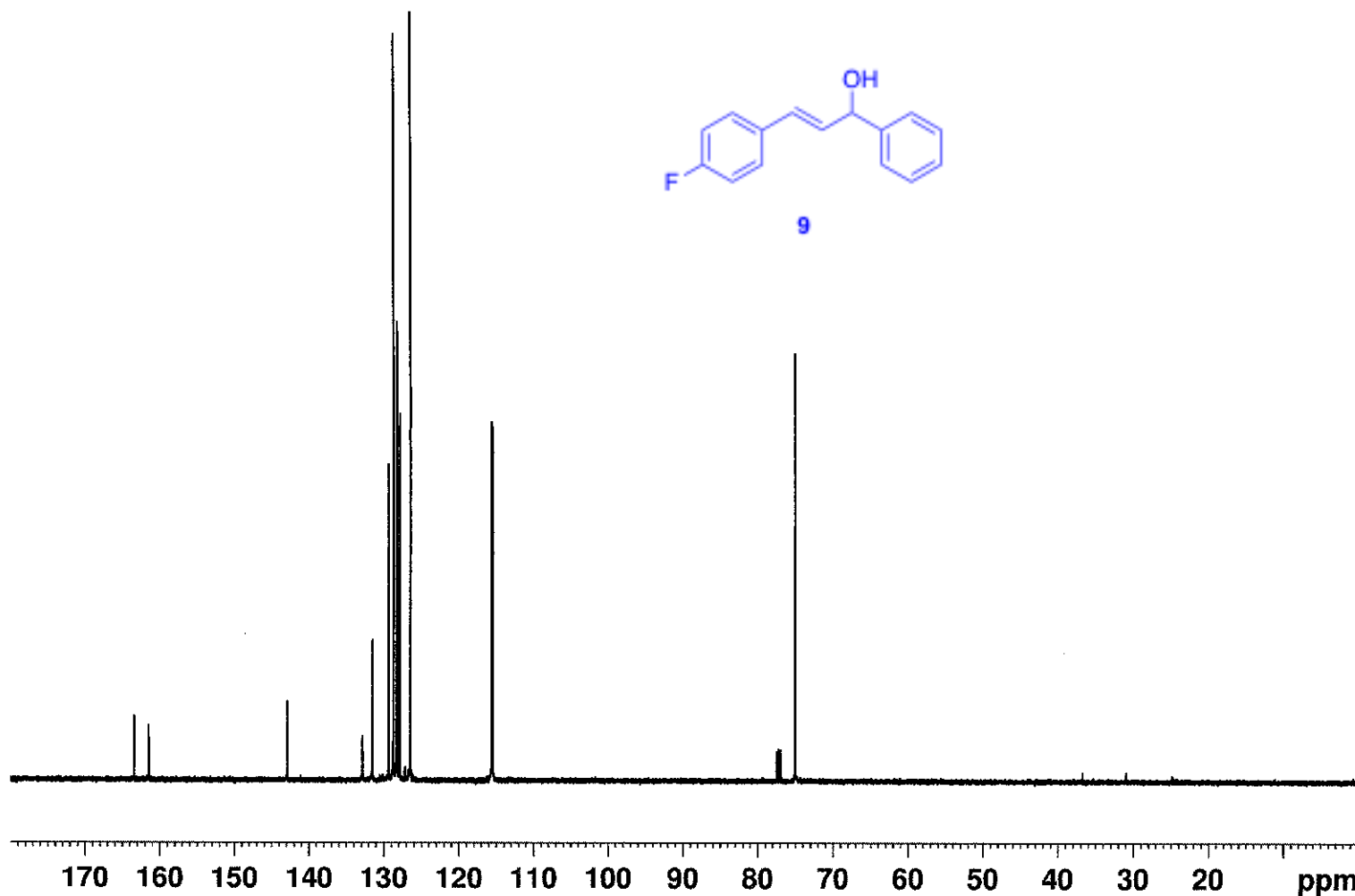
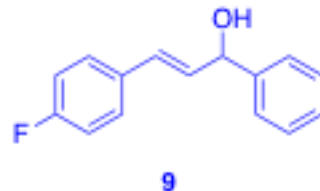
Current Data Parameters  
NAME Lan\_20150406\_B6095\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150406  
Time 16.59  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 32  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.7 K  
D1 3.0000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6924186 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



7.429  
7.425  
7.412  
7.391  
7.387  
7.377  
7.374  
7.361  
7.323  
7.320  
7.317  
7.310  
7.306  
7.302  
7.292  
7.253  
7.249  
7.245  
7.235  
7.232  
7.227  
6.643  
6.611  
6.394  
6.381  
6.362  
6.349  
5.380  
5.368

— 2.060

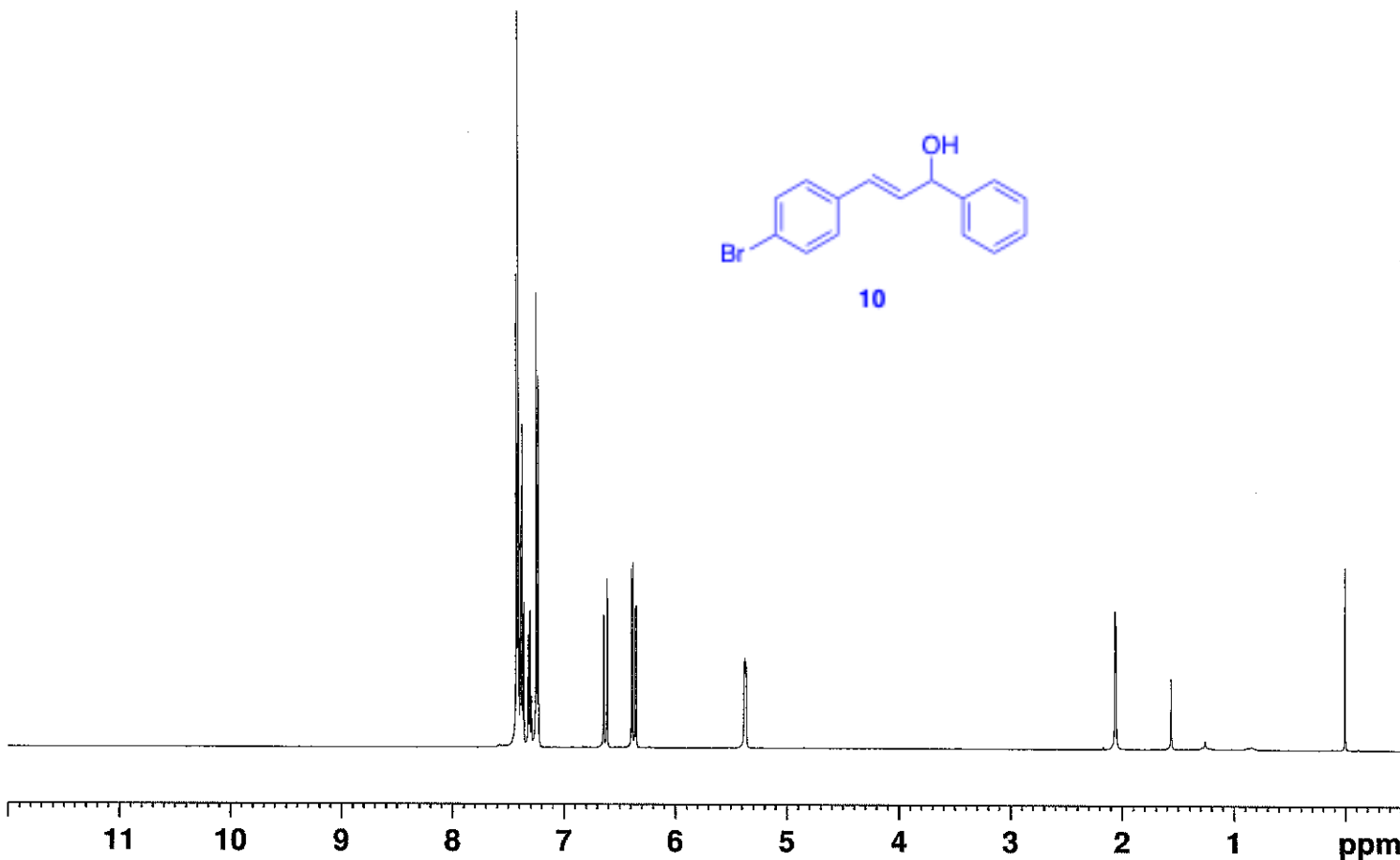
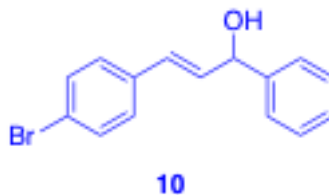


Current Data Parameters  
NAME Lan\_20150406\_B6165  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150406  
Time 18.30  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 44.57  
DW 50.000 usec  
DE 6.50 usec  
TE 296.9 K  
D1 5.00000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700155 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



8.83  
1.00  
1.02  
1.01

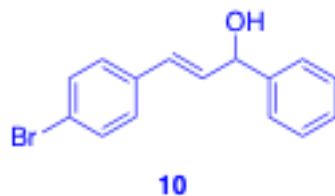
142.677  
 135.637  
 132.428  
 131.805  
 129.360  
 128.834  
 128.257  
 128.076  
 126.474  
 121.680

—75.108



Current Data Parameters  
 NAME Lan\_20150406\_B6165\_C  
 EXPNO 1  
 PROCNO 1

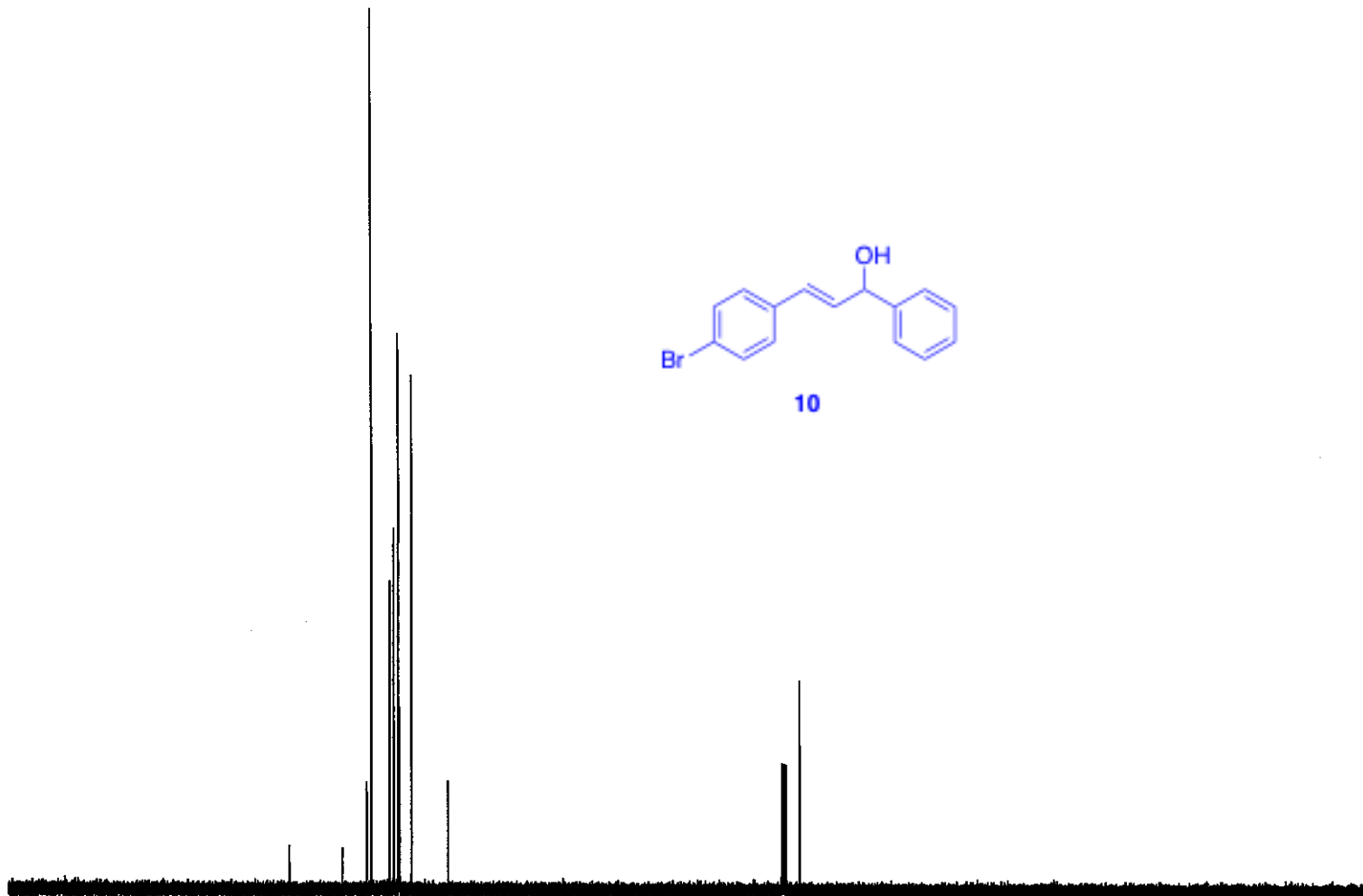
F2 - Acquisition Parameters  
 Date\_ 20150406  
 Time 15.53  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDCl3  
 NS 32  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.7 K  
 D1 3.0000000 sec  
 D11 0.03000000 sec  
 TD0 1



==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

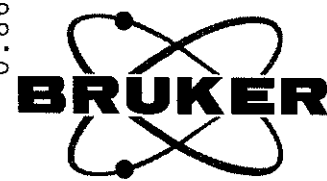
==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923983 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40



170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

5.636  
5.634  
5.619  
5.617  
5.605  
5.604  
5.469  
5.466  
5.464  
5.455  
5.452  
5.449  
5.436  
5.421  
4.028  
4.015  
2.041  
2.028  
2.013  
1.999  
1.702  
1.541  
1.378  
1.366  
1.359  
1.352  
1.346  
1.341  
1.337  
1.331  
1.327  
1.319  
1.304  
1.293  
1.291  
1.278  
1.273  
1.263  
1.257  
1.253  
0.912  
0.898  
0.883  
0.869



Current Data Parameters  
NAME Lan\_20150406\_B5299  
EXPNO 1  
PROCNO 1

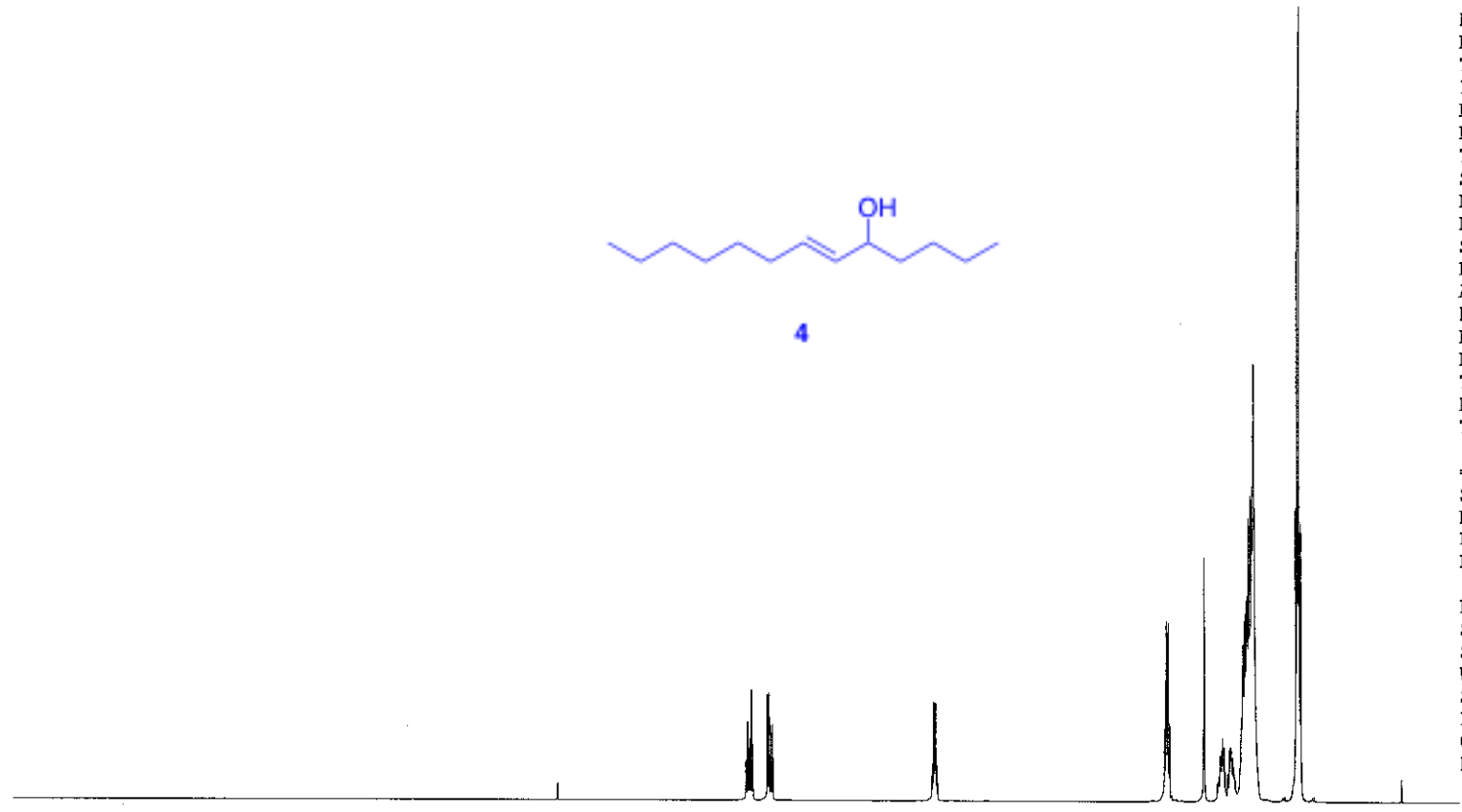
F2 - Acquisition Parameters  
Date\_ 20150406  
Time 20.01  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDC13  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 4.57  
DW 50.000 usec  
DE 6.50 usec  
TE 297.4 K  
D1 5.0000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700011 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



4



11 10 9 8 7 6 5 4 3 2 1 ppm

0.97  
0.97  
1.00  
2.05  
0.89  
15.10  
6.16

133.235  
132.187

73.288

37.157  
32.296  
31.809  
29.280  
28.939  
28.929  
27.790  
22.742  
22.727  
14.150



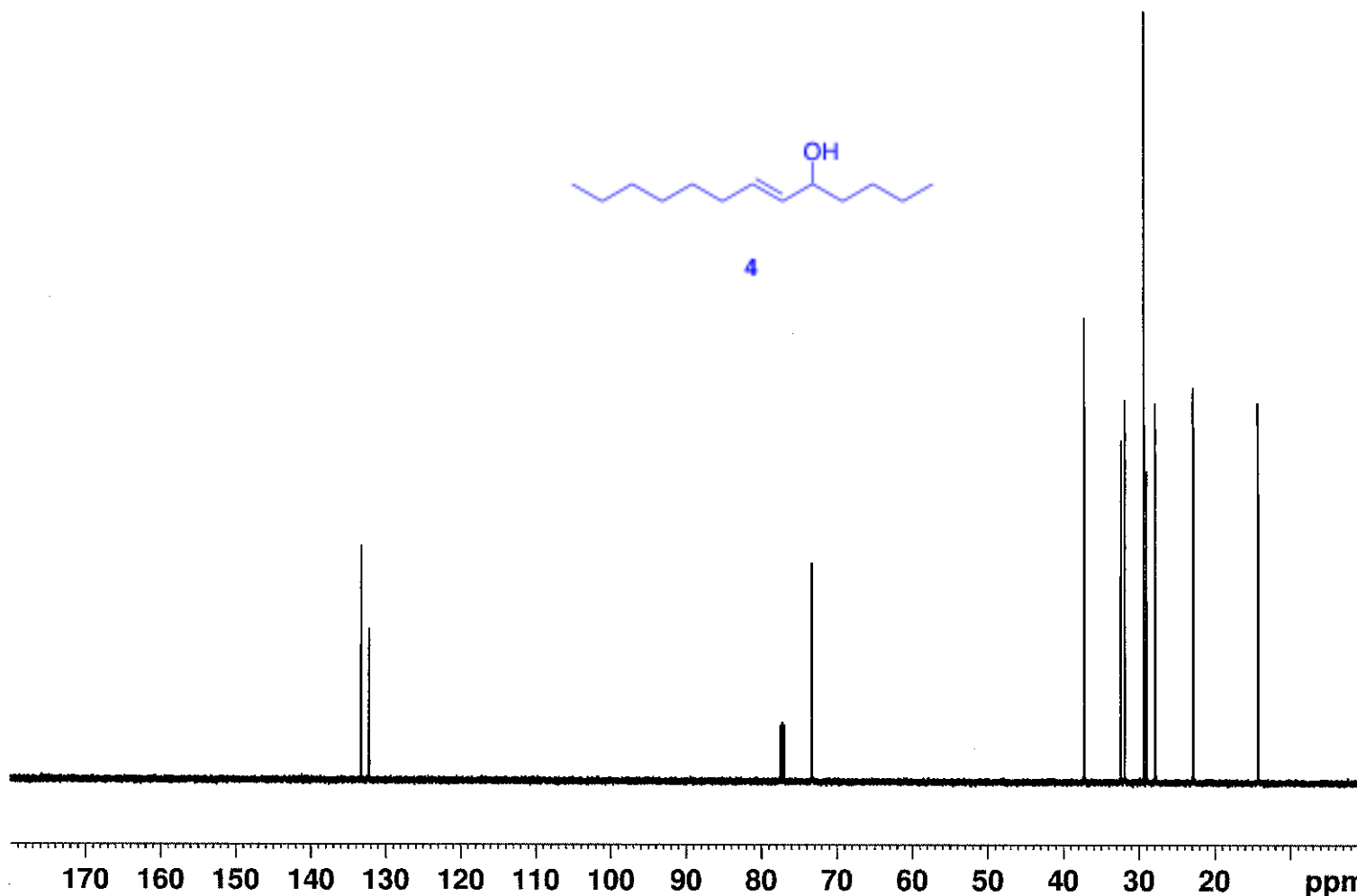
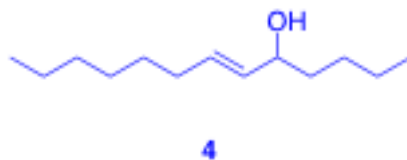
Current Data Parameters  
NAME Lan\_20150406\_B5299\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150406  
Time 20.07  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 25  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.5 K  
D1 3.0000000 sec  
D11 0.0300000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923969 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



5.597  
5.580  
5.566  
5.553  
5.467  
5.464  
5.461  
5.452  
5.449  
5.446  
5.433  
5.418  
3.764  
3.750  
3.736  
2.031  
2.015  
2.001  
1.987  
1.869  
1.847  
1.755  
1.732  
1.706  
1.654  
1.650  
1.646  
1.421  
1.407  
1.392  
1.377  
1.364  
1.236  
1.217  
1.199  
1.164  
1.140  
0.973  
0.960  
0.953  
0.942  
0.916  
0.901  
0.886

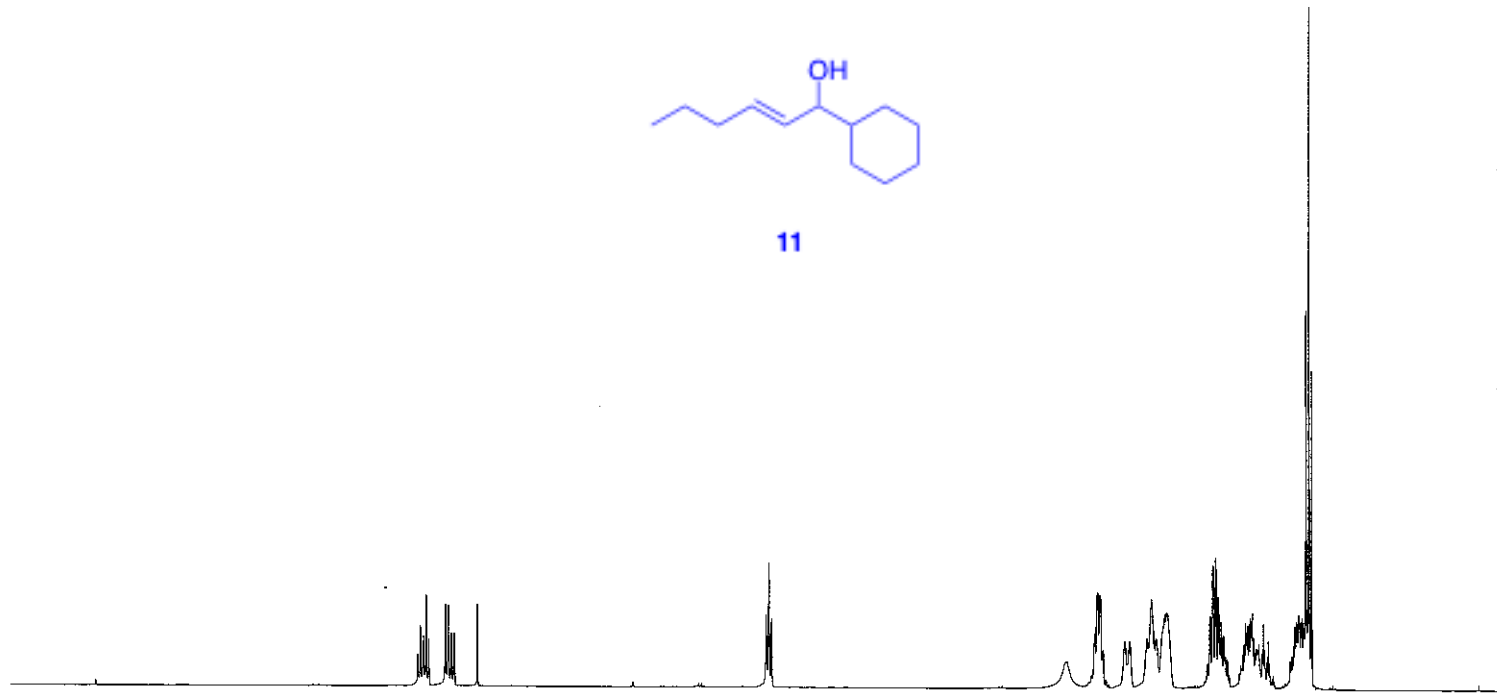
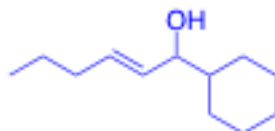


Current Data Parameters  
NAME Lan\_20150716\_B6167  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150716  
Time 20.54  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 2.8  
DW 50.000 usec  
DE 6.50 usec  
TE 296.2 K  
D1 5.0000000 sec  
TDO 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8699841 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 ppm

0.98 0.98 1.00 0.94 2.01 1.05 2.20 2.12 3.17 2.19 2.09 3.17

132.542  
131.776

77.626

43.707  
34.379  
28.806  
28.782  
26.602  
26.192  
26.124  
22.407  
13.642



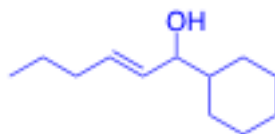
Current Data Parameters  
NAME Lan\_20150716\_B6167\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150716  
Time 21.04  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 69  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.9 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1

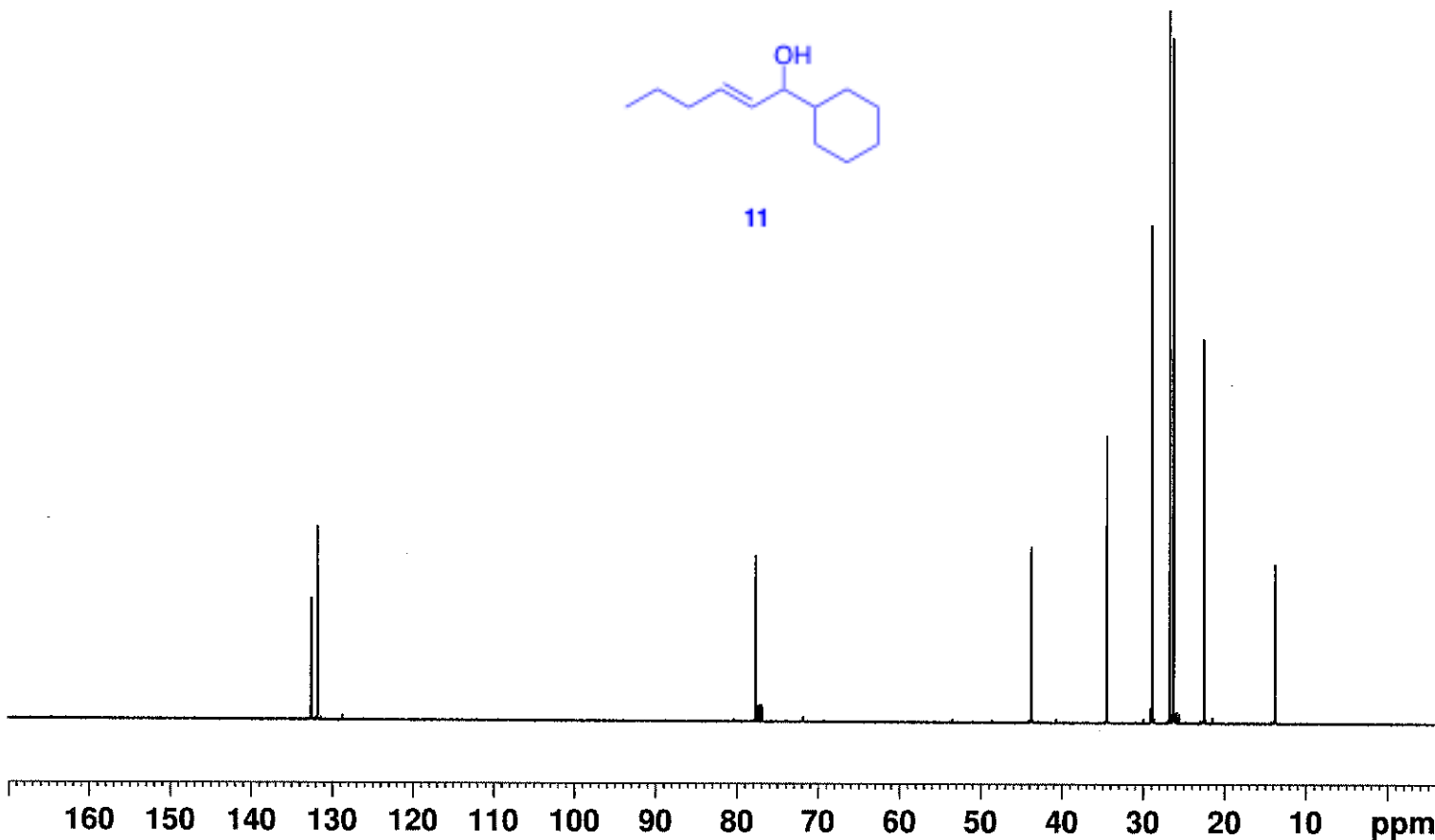
==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6924053 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



11





7.310  
7.299  
7.293  
7.282  
6.984  
6.967  
6.949  
6.506  
6.474  
6.134  
6.120  
6.102  
6.088  
4.249  
4.235  
4.222  
4.209  
1.647  
1.644  
1.641  
1.631  
1.627  
1.620  
1.617  
1.606  
1.594  
1.582  
1.575  
1.568  
1.562  
1.380  
1.376  
1.372  
1.369  
1.365  
1.349  
1.335  
1.325  
1.315  
1.304  
1.299  
0.907  
0.893

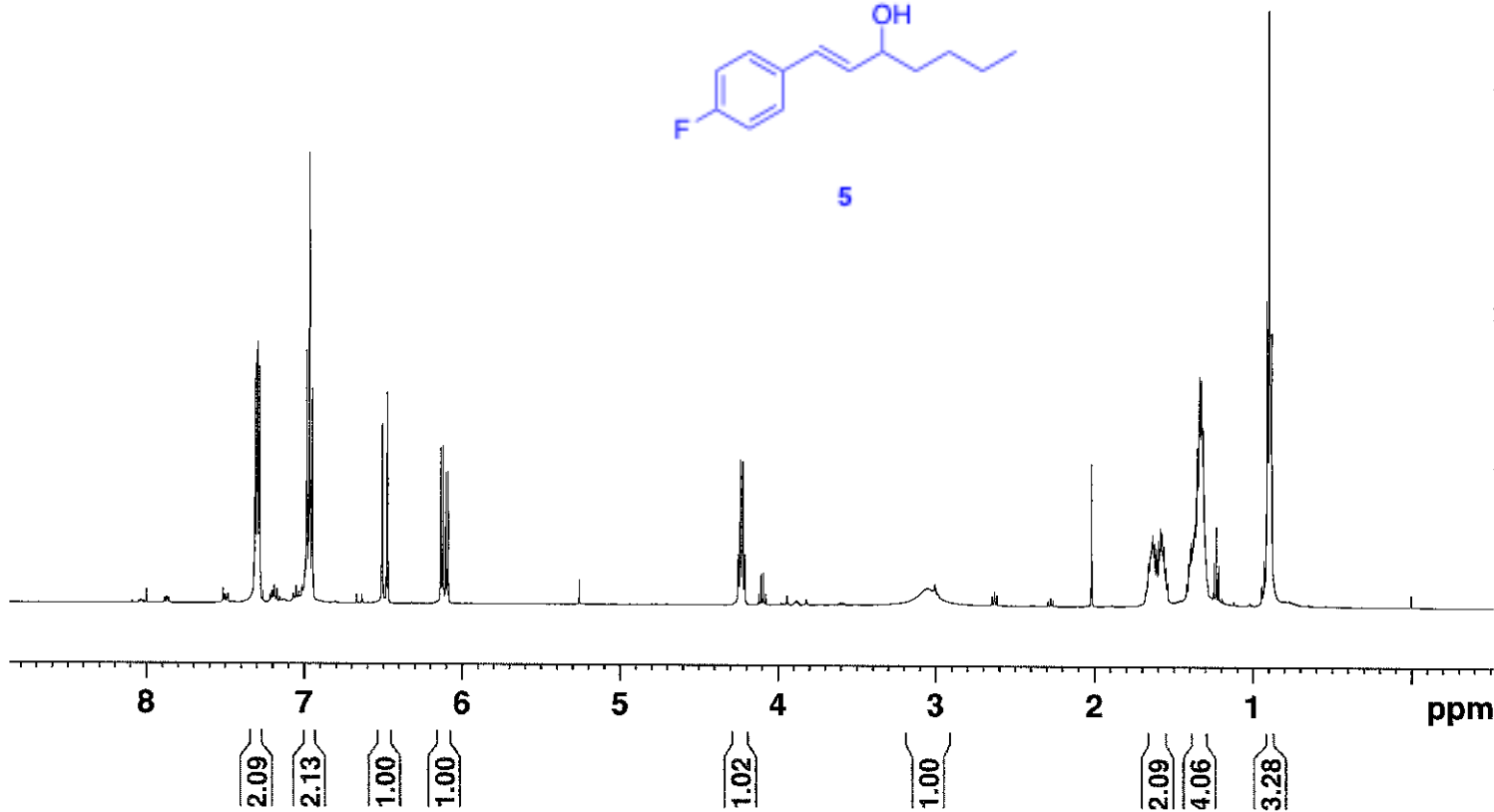
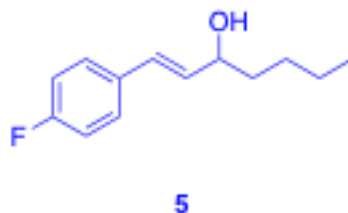


Current Data Parameters  
 NAME Lan\_20150716\_B6093  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150716  
 Time 20.34  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zg  
 TD 59998  
 SOLVENT CDC13  
 NS 8  
 DS 0  
 SWH 10000.000 Hz  
 FIDRES 0.166672 Hz  
 AQ 2.9999001 sec  
 RG 3.89  
 DW 50.000 usec  
 DE 6.50 usec  
 TE 295.9 K  
 D1 5.00000000 sec  
 TDO 1

===== CHANNEL f1 =====  
 SFO1 499.8730869 MHz  
 NUC1 1H  
 P1 10.75 usec  
 PLW1 18.25000000 W

F2 - Processing parameters  
 SI 65536  
 SF 499.8700113 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00



< 163.299  
< 161.336

< 133.034  
< 132.452  
< 128.942  
< 127.990  
< 127.927  
< 115.522  
< 115.350

— 72.961

— 37.117

— 27.651

— 22.668

— 14.027



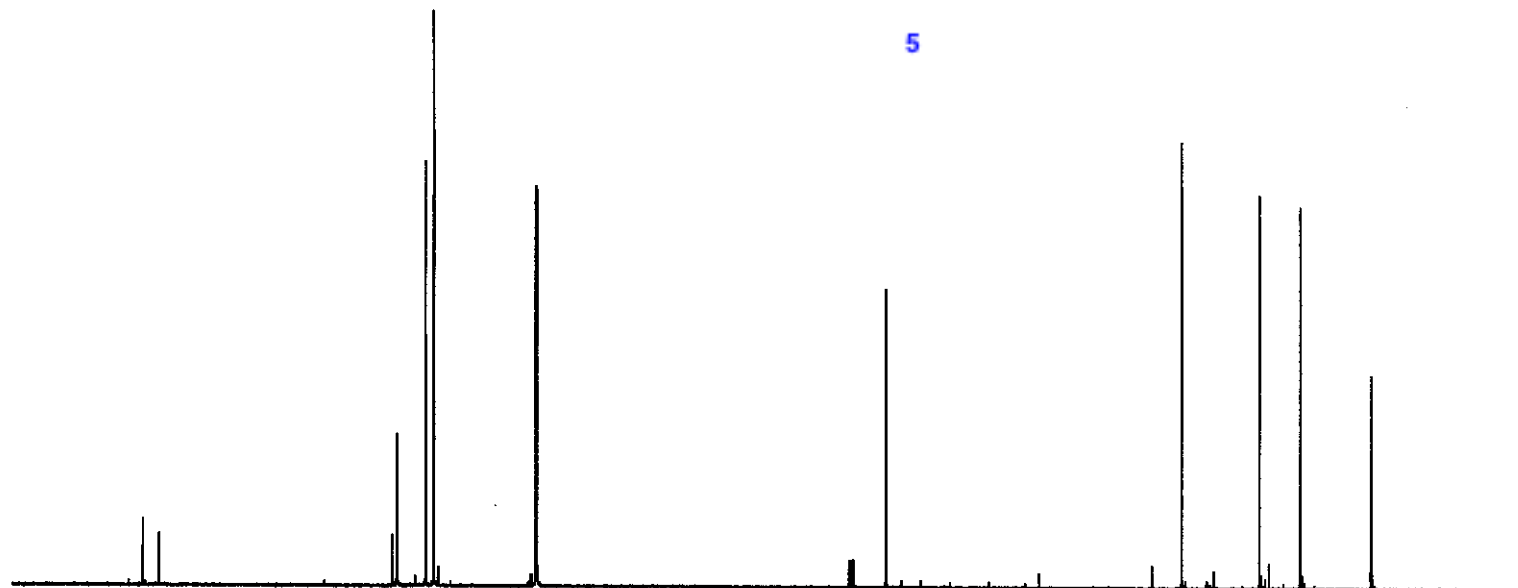
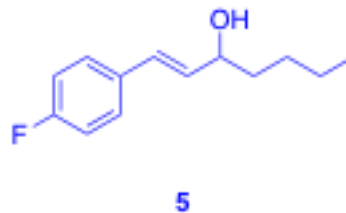
Current Data Parameters  
NAME Lan\_20150716\_B6093\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150716  
Time 20.44  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDCl3  
NS 75  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.2 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6924085 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

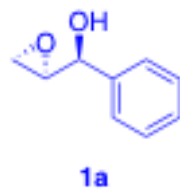
7.408  
7.396  
7.382  
7.367  
7.349  
7.344  
7.338  
7.332

4.940  
4.935  
3.245  
3.239  
3.237  
3.231  
3.226  
2.977  
2.972  
2.967  
2.962  
2.773  
2.764  
2.755  
2.296



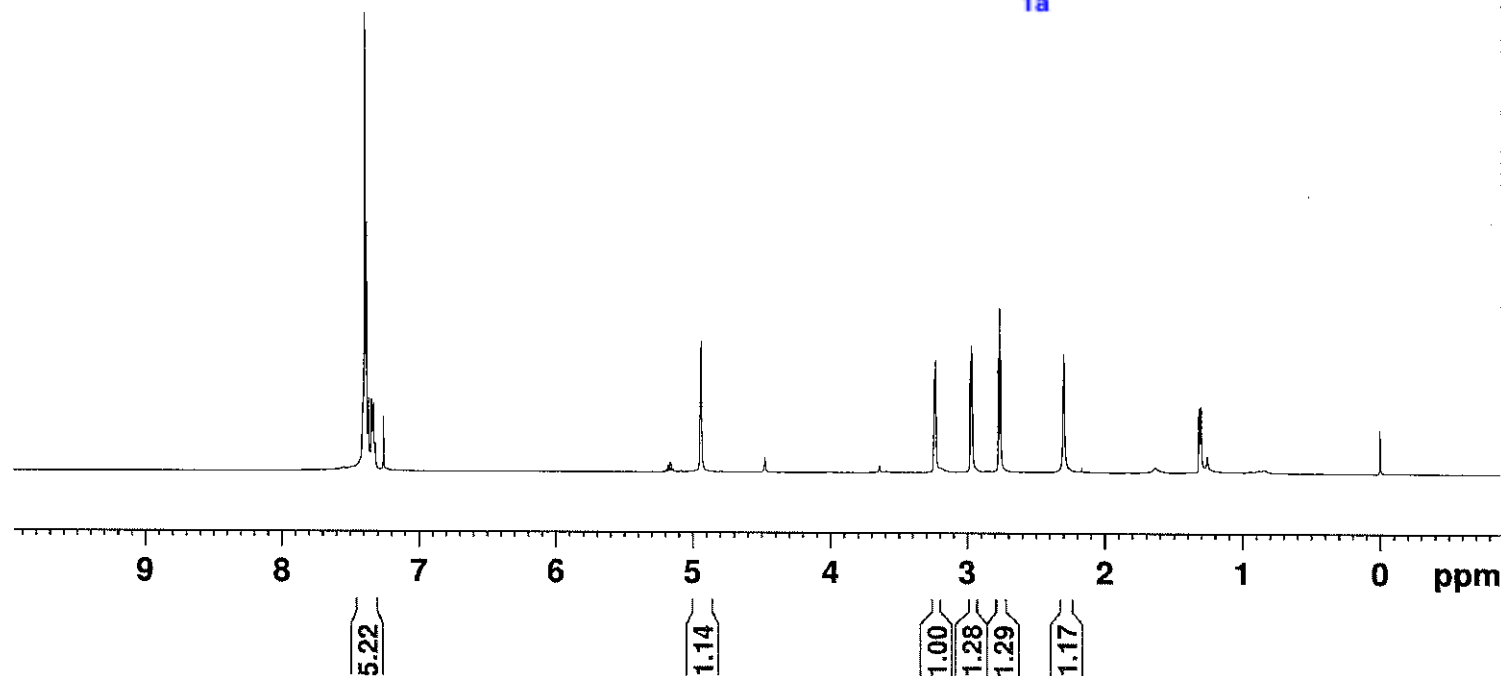
Current Data Parameters  
NAME Lan\_20150921\_B6051\_1  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150921  
Time 18.30  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 44.57  
DW 50.000 usec  
DE 6.50 usec  
TE 297.0 K  
D1 3.00000000 sec  
TD0 1



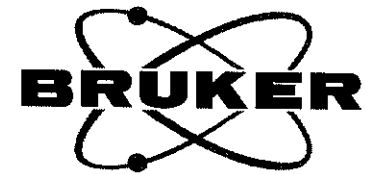
==== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700136 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



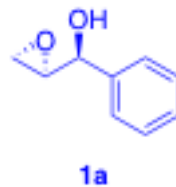
—139.488  
—128.754  
—128.426  
—126.539

—70.831  
—55.181  
—43.635



Current Data Parameters  
NAME Lan\_20150921\_B6051\_1\_C  
EXPNO 1  
PROCNO 1

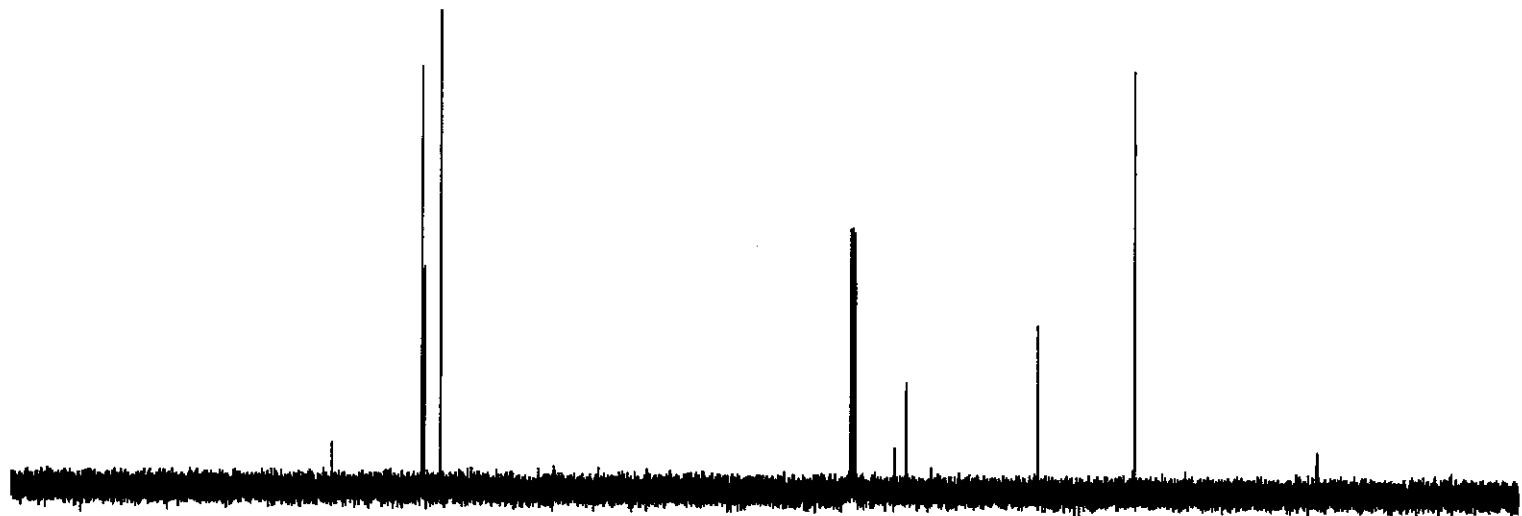
F2 - Acquisition Parameters  
Date\_ 20150921  
Time 18.45  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDCl3  
NS 16  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.1 K  
D1 2.0000000 sec  
D11 0.0300000 sec  
TD0 1



==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.0000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923972 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

7.377  
7.371  
7.367  
7.355  
7.351  
7.350  
7.332  
7.326  
7.322  
7.319  
7.314  
4.860  
4.853  
3.182  
3.174  
3.165  
3.160  
2.974  
2.969  
2.963  
2.462  
1.545  
1.542  
1.539  
1.526  
1.483  
1.472  
1.461  
1.456  
1.450  
1.441  
1.430  
1.427  
1.416  
1.413  
1.410  
1.385  
1.380  
1.371  
1.367  
1.353  
0.889  
0.875  
0.860

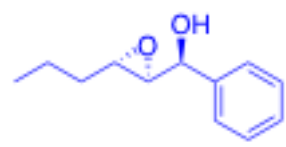


Current Data Parameters  
 NAME Lan\_20150915\_B6089  
 EXPNO 1  
 PROCNO 1

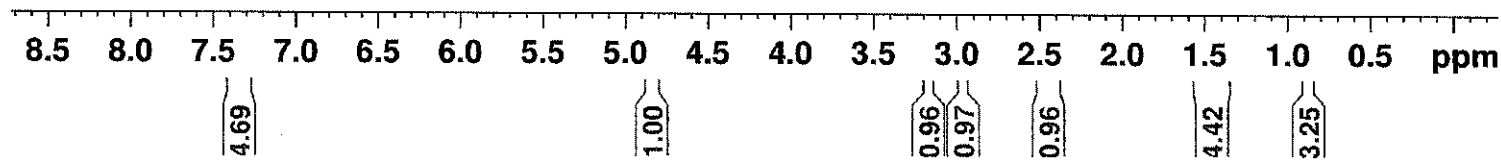
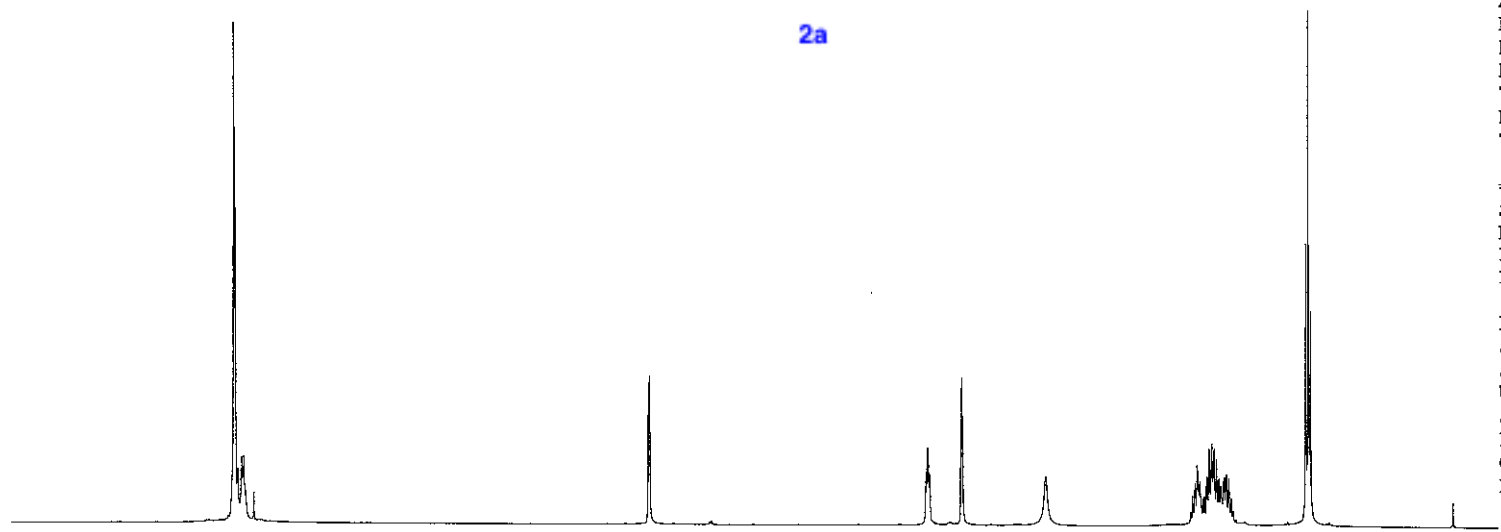
F2 - Acquisition Parameters  
 Date\_ 20150915  
 Time 21.36  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zg  
 TD 59998  
 SOLVENT CDCl3  
 NS 8  
 DS 0  
 SWH 10000.000 Hz  
 FIDRES 0.166672 Hz  
 AQ 2.9999001 sec  
 RG 22.37  
 DW 50.000 usec  
 DE 6.50 usec  
 TE 297.2 K  
 D1 5.0000000 sec  
 TD0 1

===== CHANNEL f1 =====  
 SFO1 499.8730869 MHz  
 NUC1 1H  
 P1 10.75 usec  
 PLW1 18.25000000 W

F2 - Processing parameters  
 SI 65536  
 SF 499.8700146 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00



2a



—139.831  
128.694  
128.290  
126.521

—71.117  
—61.422  
—55.179

—33.604  
—19.364  
—13.884



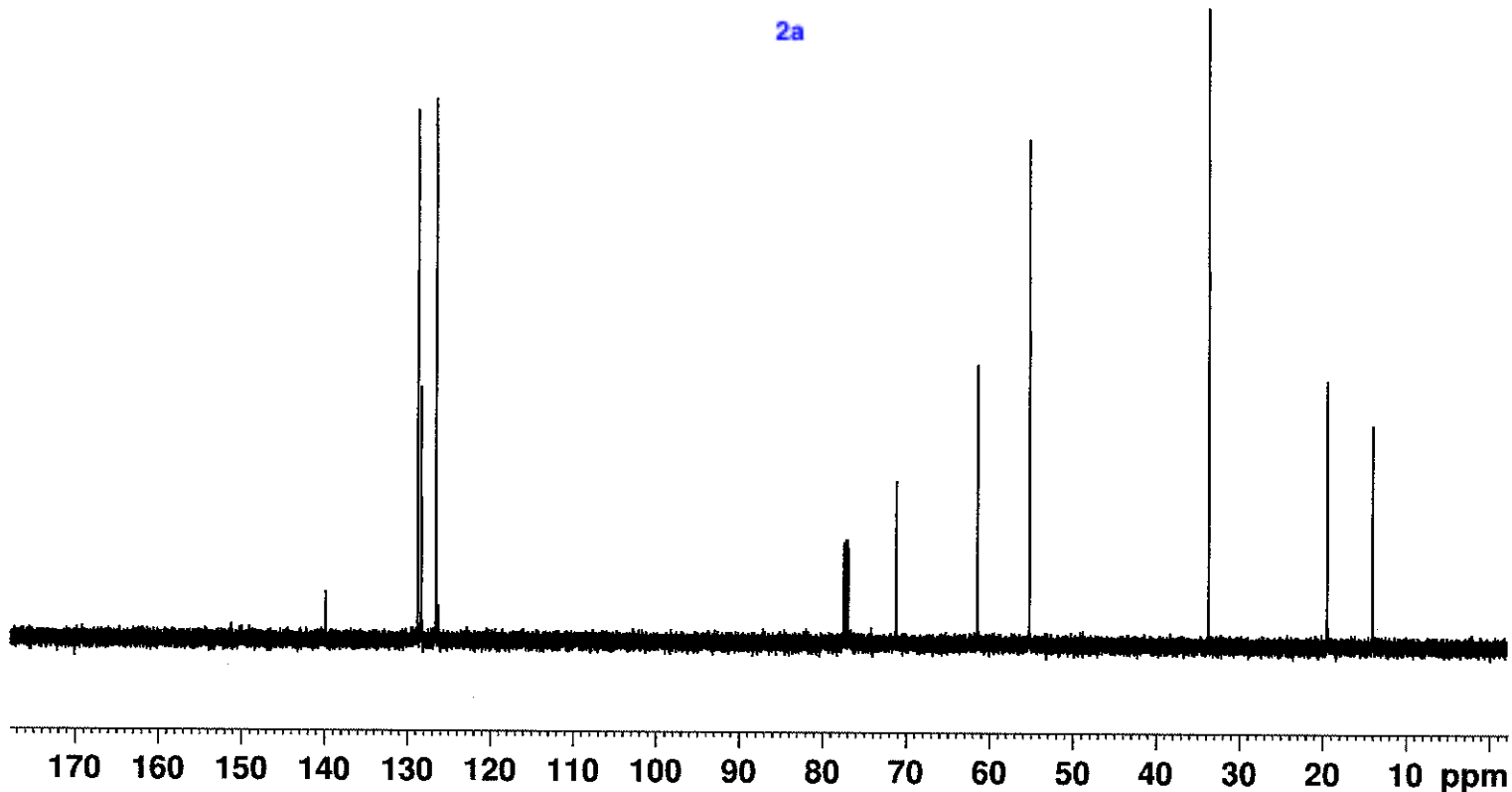
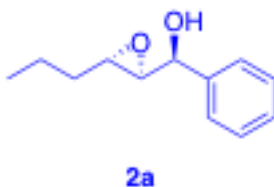
Current Data Parameters  
NAME Lan\_20150915\_B6089\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150915  
Time 21.42  
INSTRUM spect  
PROBHD 5 mm PABBO BE/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 29  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.4 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923987 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40





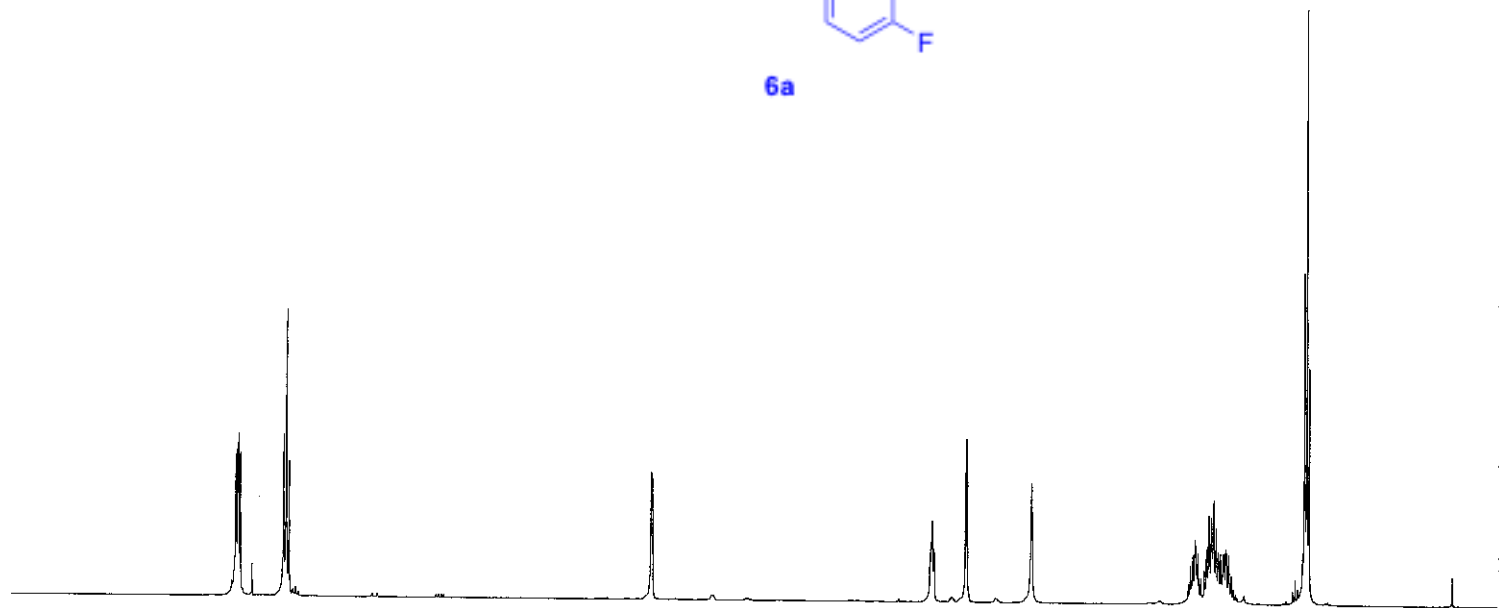
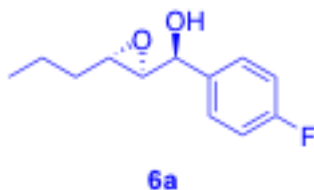
Current Data Parameters  
NAME Lan\_20150914\_B6065  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150914  
Time 21.30  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 19.64  
DW 50.000 usec  
DE 6.50 usec  
TE 295.8 K  
D1 5.0000000 sec  
TD0 1

==== CHANNEL f1 =====  
SF01 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700092 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

7.365  
7.361  
7.354  
7.351  
7.348  
7.337  
7.074  
7.061  
7.057  
7.039  
4.842  
4.836  
3.155  
3.151  
3.143  
3.133  
3.128  
2.942  
2.935  
2.930  
2.542  
1.565  
1.553  
1.550  
1.547  
1.535  
1.479  
1.468  
1.453  
1.447  
1.440  
1.428  
1.425  
1.414  
1.411  
1.400  
1.381  
1.375  
1.367  
1.363  
1.362  
0.894  
0.880  
0.866



8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 ppm

1.98 1.88 1.07 0.99 1.00 0.92 4.28 3.36

< 163.696  
< 161.737

— 135.646  
< 128.224  
< 128.160

< 115.664  
< 115.493

— 70.574  
— 61.325  
— 55.206

— 33.550  
— 19.351  
— 13.873



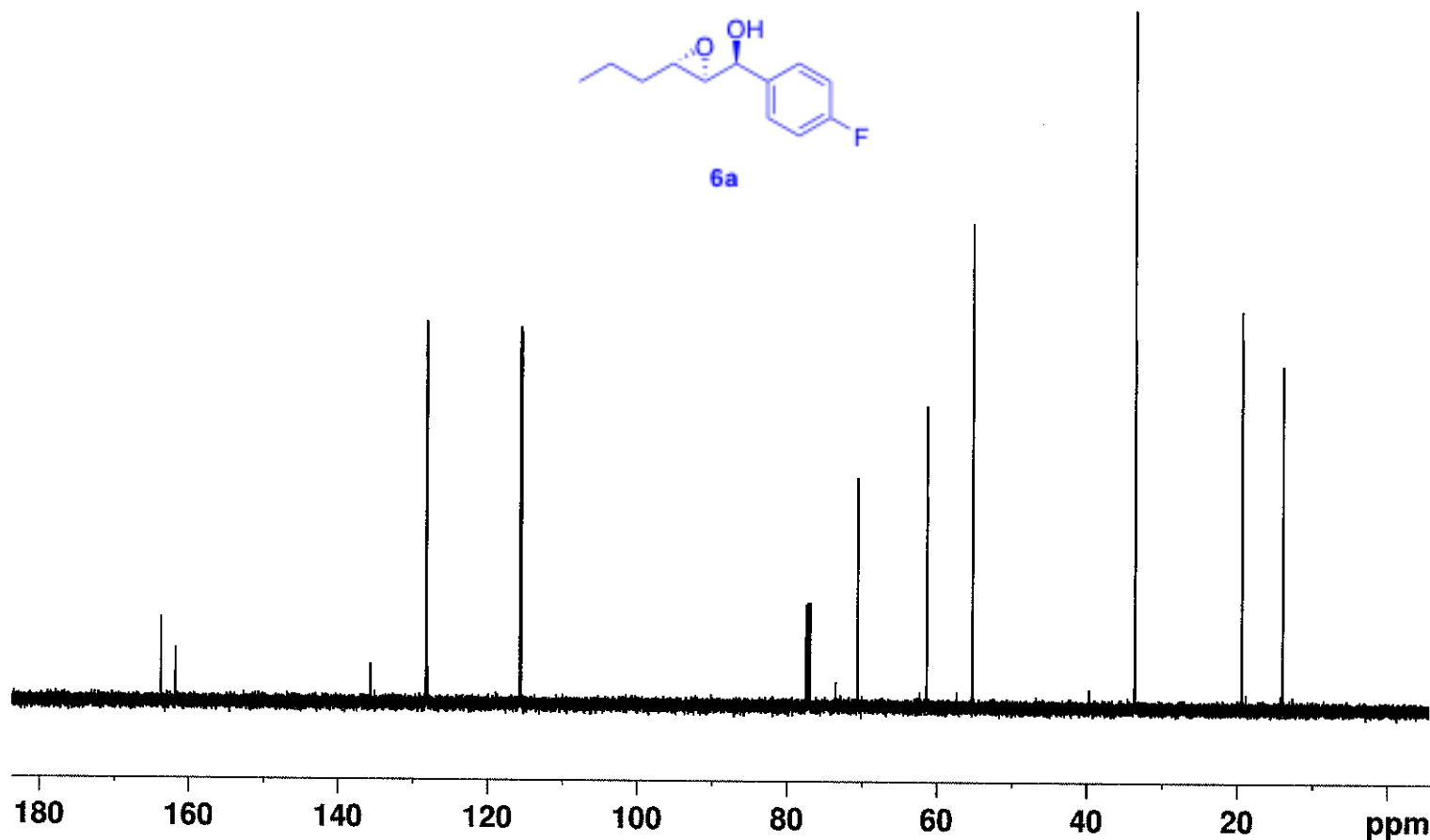
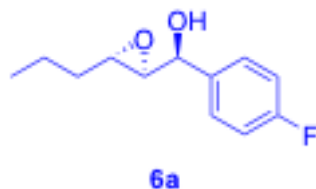
Current Data Parameters  
NAME Lan\_20150914\_B6065\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150914  
Time 21.43  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 35  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.4 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923972 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40







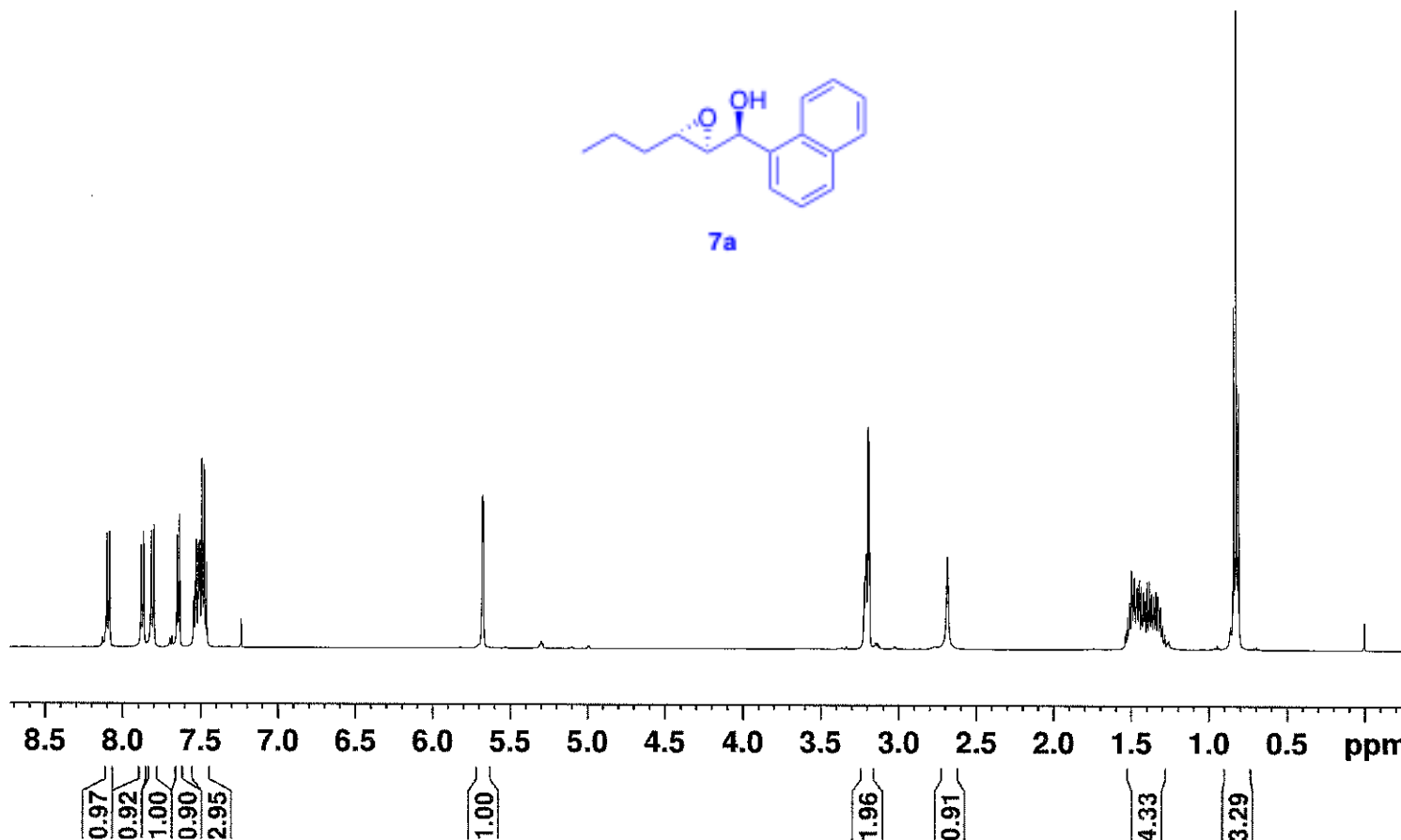
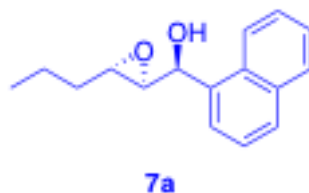
Current Data Parameters  
NAME Lan\_20150914\_B6067  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150914  
Time 21.58  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDC13  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 16.71  
DW 50.000 usec  
DE 6.50 usec  
TE 296.0 K  
D1 5.00000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700240 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

8.099  
8.082  
7.879  
7.864  
7.861  
7.814  
7.798  
7.648  
7.634  
7.529  
7.526  
7.523  
7.513  
7.510  
7.505  
7.502  
7.490  
7.475  
7.459  
5.675  
5.670  
3.216  
3.205  
3.199  
3.192  
3.187  
3.182  
2.683  
1.495  
1.489  
1.477  
1.460  
1.456  
1.446  
1.444  
1.434  
1.419  
1.395  
1.381  
1.367  
1.338  
0.836  
0.821  
0.806



135.555  
133.857  
130.948  
129.015  
128.655  
126.433  
125.784  
125.608  
123.812  
123.098

—67.637  
—60.866  
—55.528

—33.583

—19.313  
—13.838



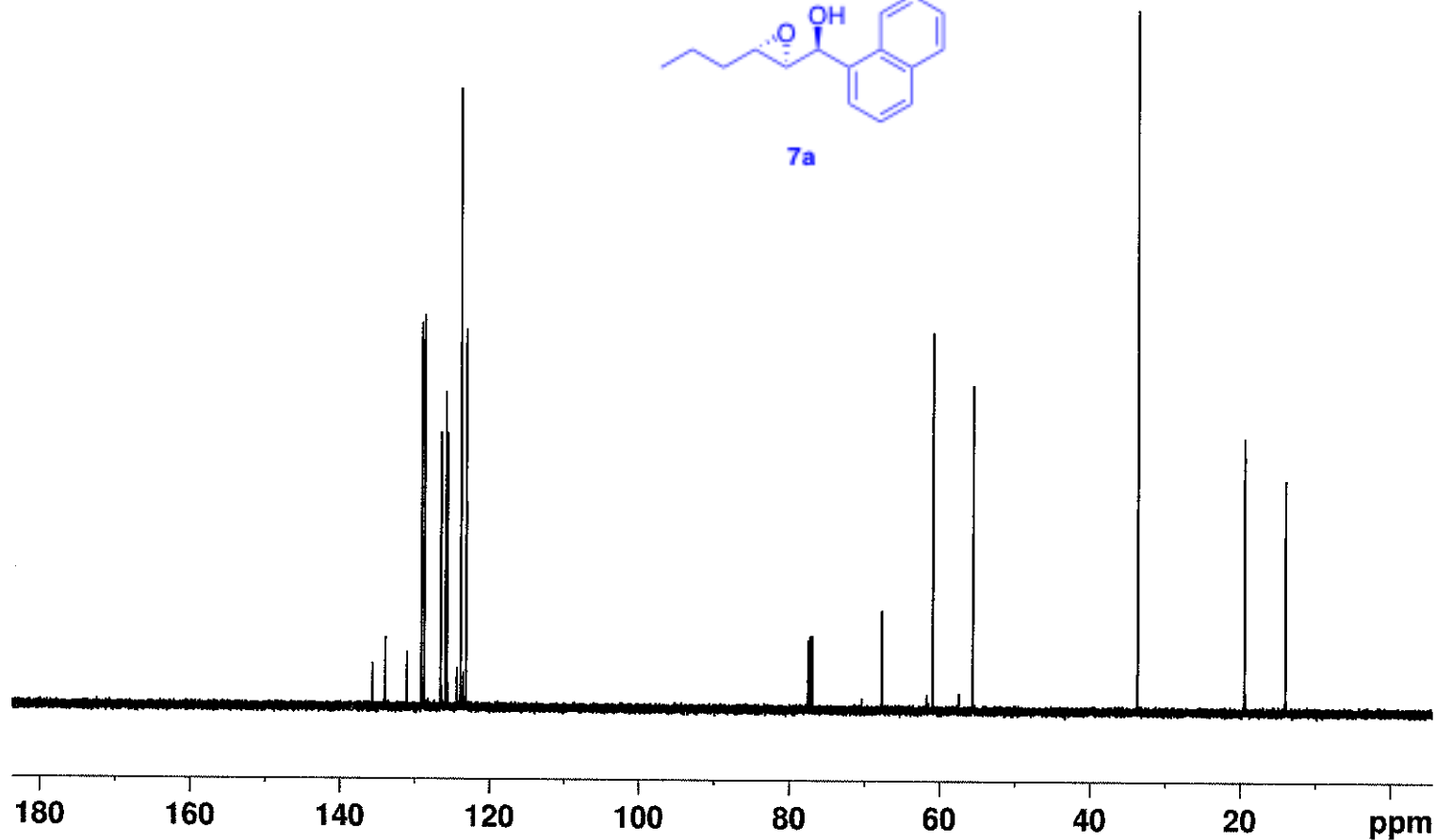
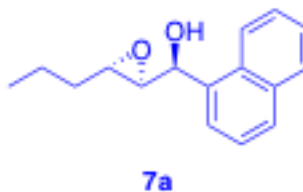
Current Data Parameters  
NAME Lan\_20150914\_B6067\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150914  
Time 22.06  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 69  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.6 K  
D1 2.0000000 sec  
D11 0.0300000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6924021 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



7.385  
7.374  
7.369  
7.363  
7.350  
7.348  
7.346  
7.339  
7.329  
7.323  
7.318  
7.315  
7.311  
7.304  
7.300  
7.294

4.849  
4.844

2.991  
2.986  
2.978  
2.973  
2.525  
1.540  
1.526  
1.512  
1.499  
1.485  
1.001  
0.988  
0.858  
0.844

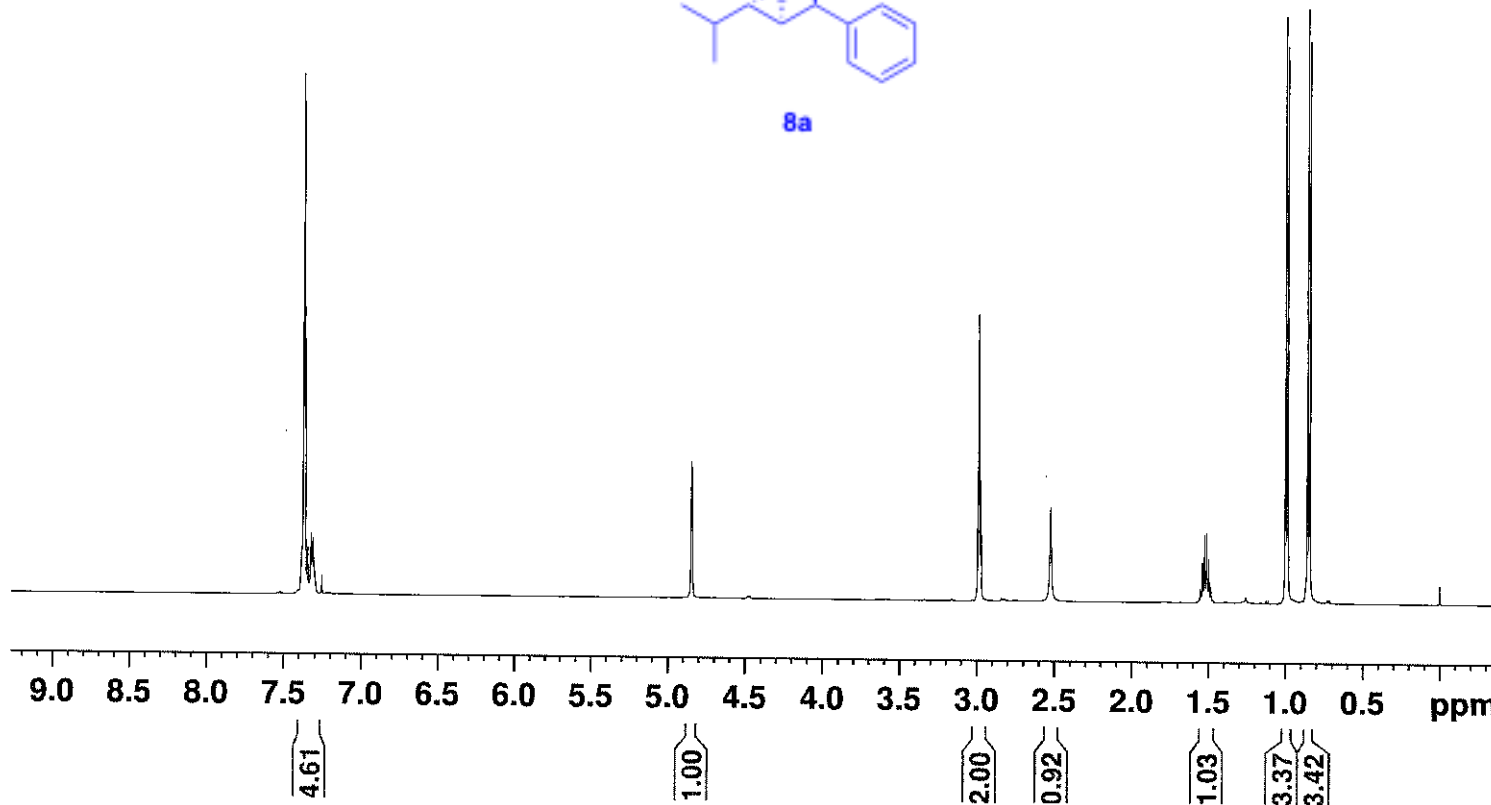
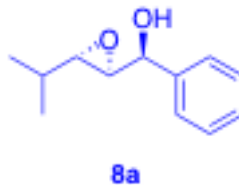


Current Data Parameters  
NAME Lan\_20150914\_B6125  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150914  
Time 22.13  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 15.35  
DW 50.000 usec  
DE 6.50 usec  
TE 296.2 K  
D1 5.0000000 sec  
TD0 1

===== CHANNEL f1 =====  
SF01 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700147 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



—139.890  
128.661  
128.301  
126.577

—71.115  
60.629  
60.475

—30.127  
19.145  
18.405



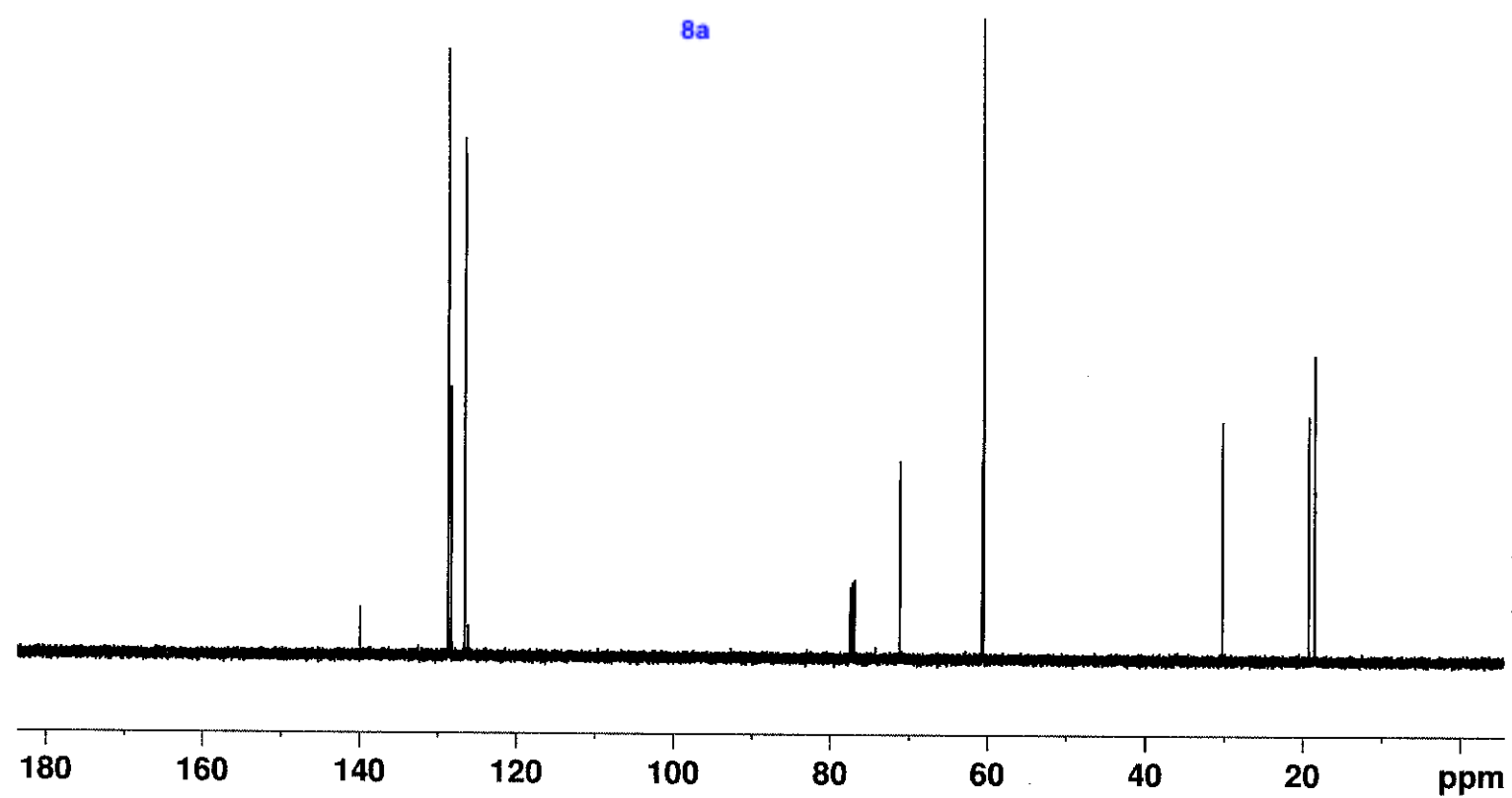
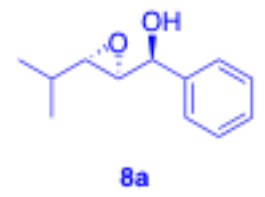
Current Data Parameters  
NAME Lan\_20150914\_B6125\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150914  
Time 22.19  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 26  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.3 K  
D1 2.0000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6924008 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



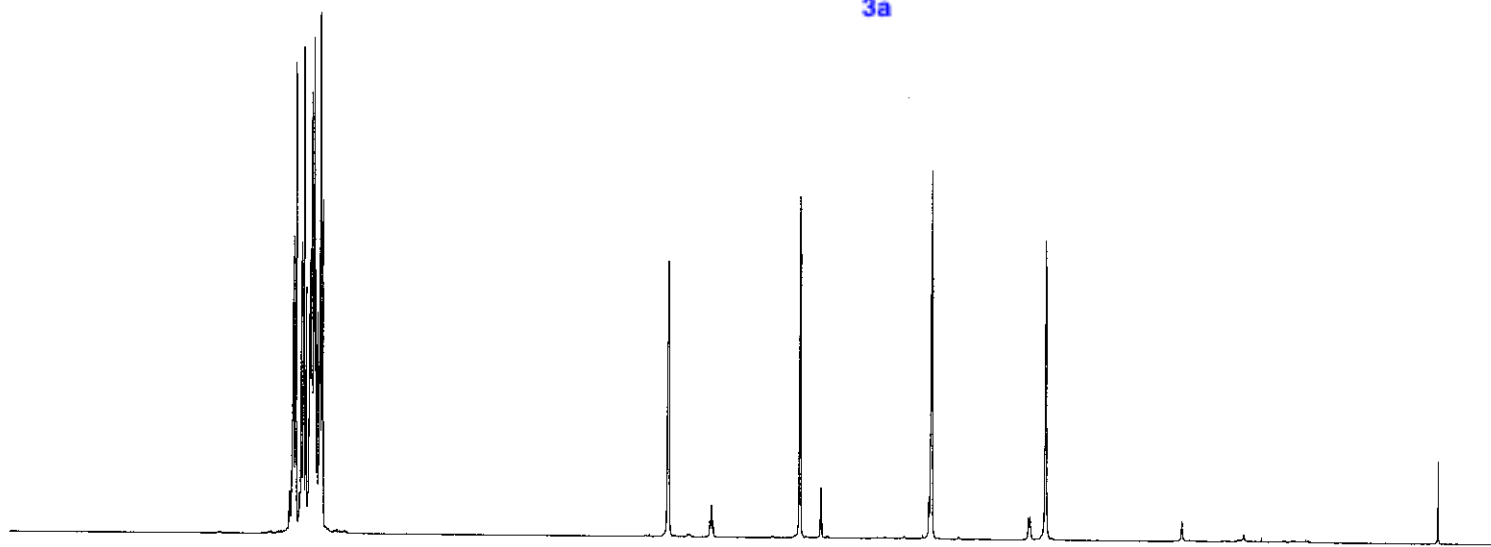
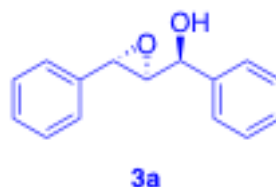
7.415  
7.377  
7.363  
7.360  
7.348  
7.325  
7.322  
7.319  
7.312  
7.308  
7.298  
7.293  
7.288  
7.285  
7.275  
7.260  
7.257  
7.244  
7.241  
4.989

4.138  
4.134  
3.290  
3.286  
3.285  
3.280  
2.549  
2.544



Current Data Parameters  
NAME Lan\_20150915\_B5303  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150915  
Time 18.43  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 28.76  
DW 50.000 usec  
DE 6.50 usec  
TE 296.1 K  
D1 5.0000000 sec  
TD0 1



==== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700242 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 ppm

9.86

1.00

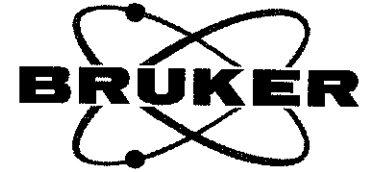
0.94

0.98

0.84

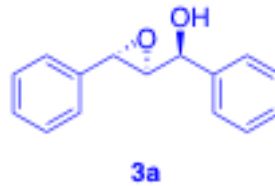
139.321  
 136.641  
 128.826  
 128.621  
 128.507  
 128.434  
 126.699  
 125.876

—71.302  
 —65.099  
 —55.105



Current Data Parameters  
 NAME Lan\_20150915\_B5303\_C  
 EXPNO 1  
 PROCNO 1

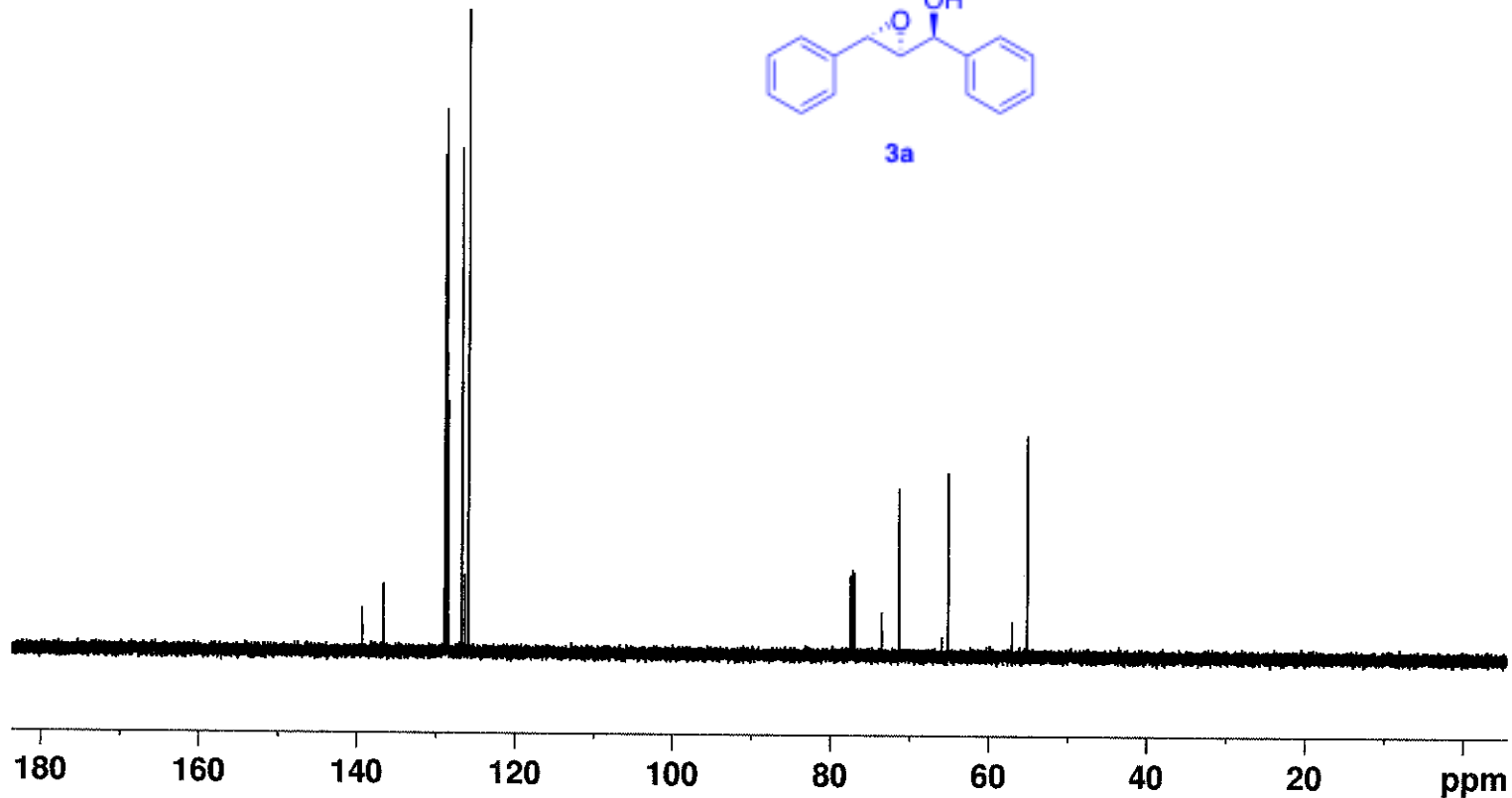
F2 - Acquisition Parameters  
 Date\_ 20150915  
 Time 18.49  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 12  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 296.2 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TD0 1



==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6924009 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40





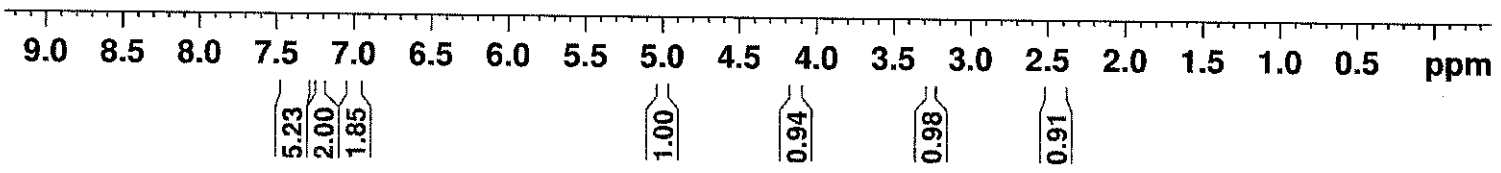
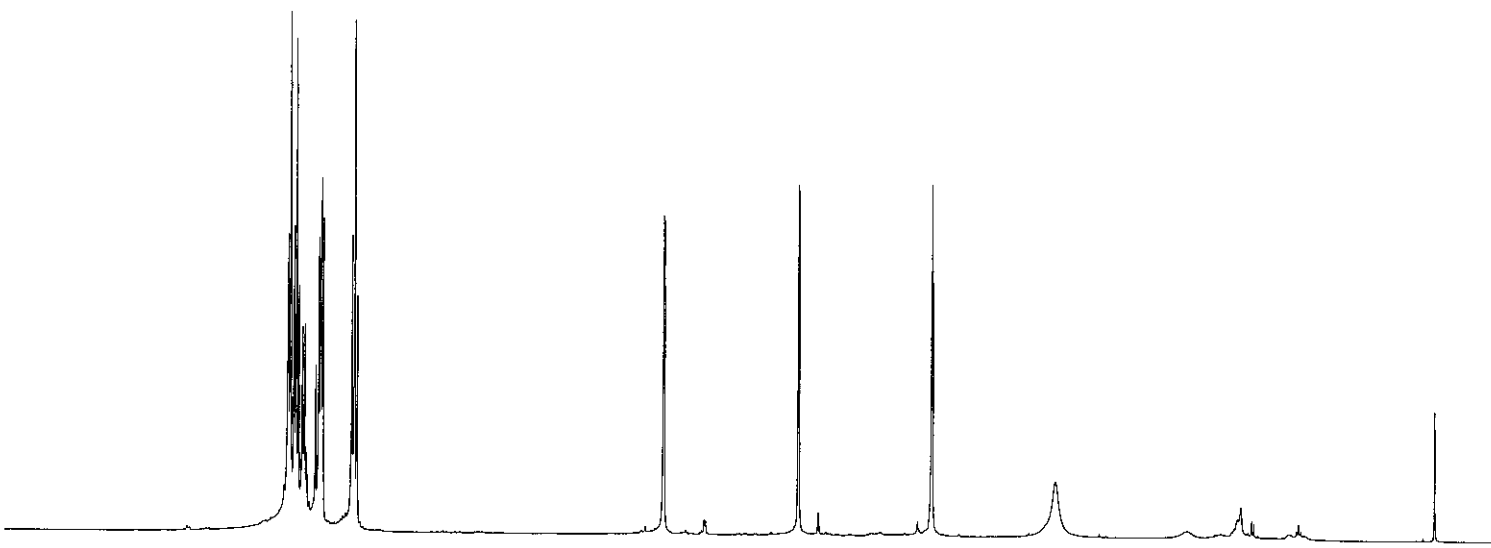
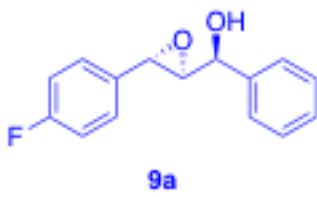
Current Data Parameters  
NAME Lan\_20150915\_B6111  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150915  
Time 21.17  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 37.92  
DW 50.000 usec  
DE 6.50 usec  
TE 296.7 K  
D1 5.0000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700157 MHz  
WDW EM  
SSB 0  
LB 0 0.30 Hz  
GB 0  
PC 1.00

7.433  
7.430  
7.416  
7.394  
7.392  
7.378  
7.375  
7.363  
7.339  
7.324  
7.234  
7.223  
7.216  
7.210  
7.206  
7.020  
7.002  
6.985  
4.999  
4.993  
4.122  
4.118  
3.261  
3.256  
3.255  
3.250  
2.452



163.895  
161.931

139.267  
132.401  
128.890  
128.598  
127.620  
127.554  
126.669  
115.739  
115.566

71.293  
65.073  
54.600



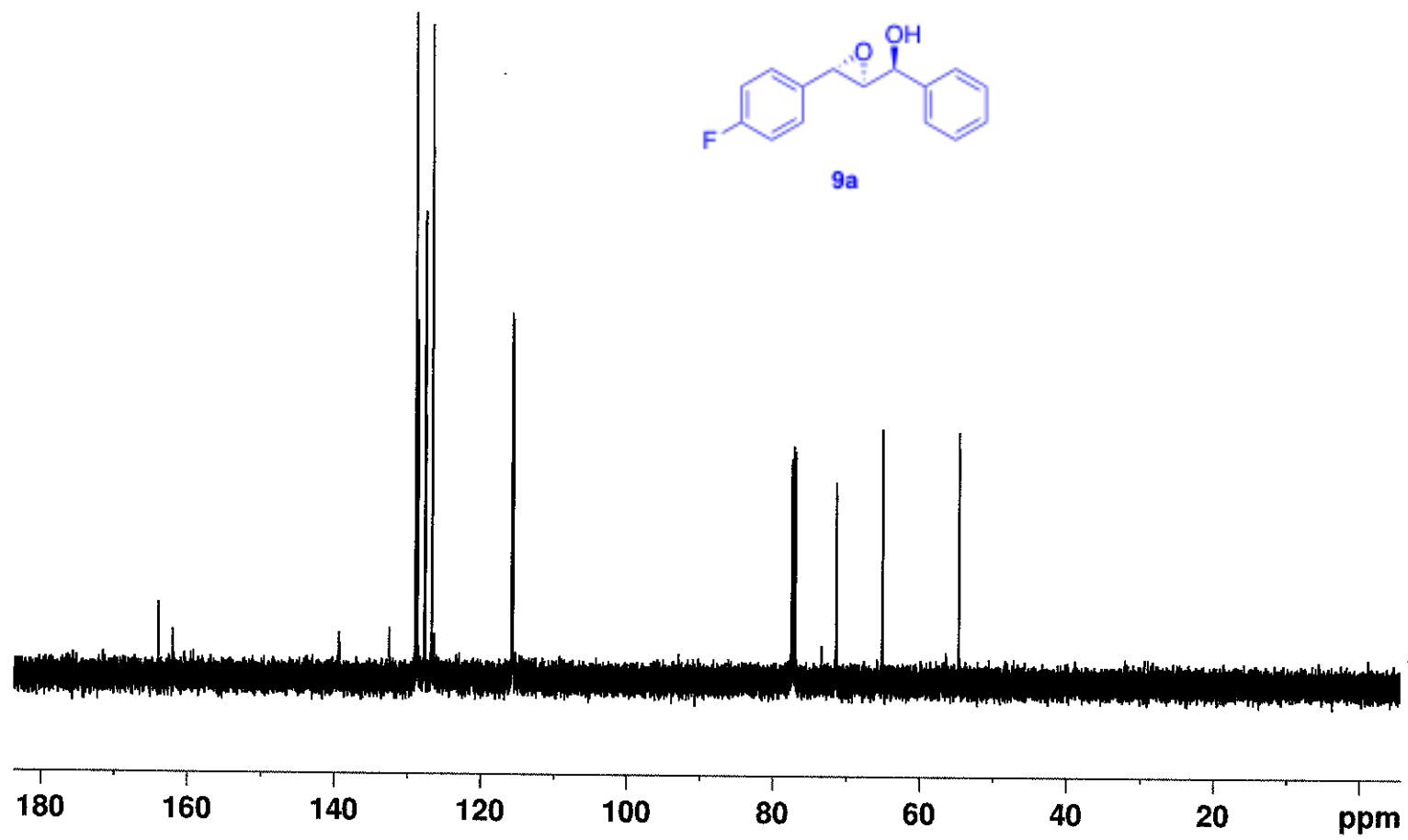
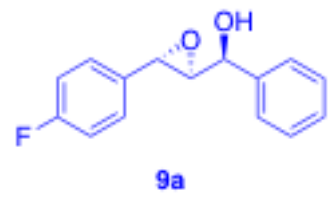
Current Data Parameters  
NAME Lan\_20150915\_B6111\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150915  
Time 21.23  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDCl3  
NS 91  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.1 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923958 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40





7.416  
7.412  
7.398  
7.385  
7.383  
7.379  
7.369  
7.366  
7.354  
7.335  
7.332  
7.329  
7.323  
7.318  
7.313  
7.307  
7.304  
7.121  
7.104  
4.974

4.088  
4.084

3.230  
3.226  
3.220

2.512

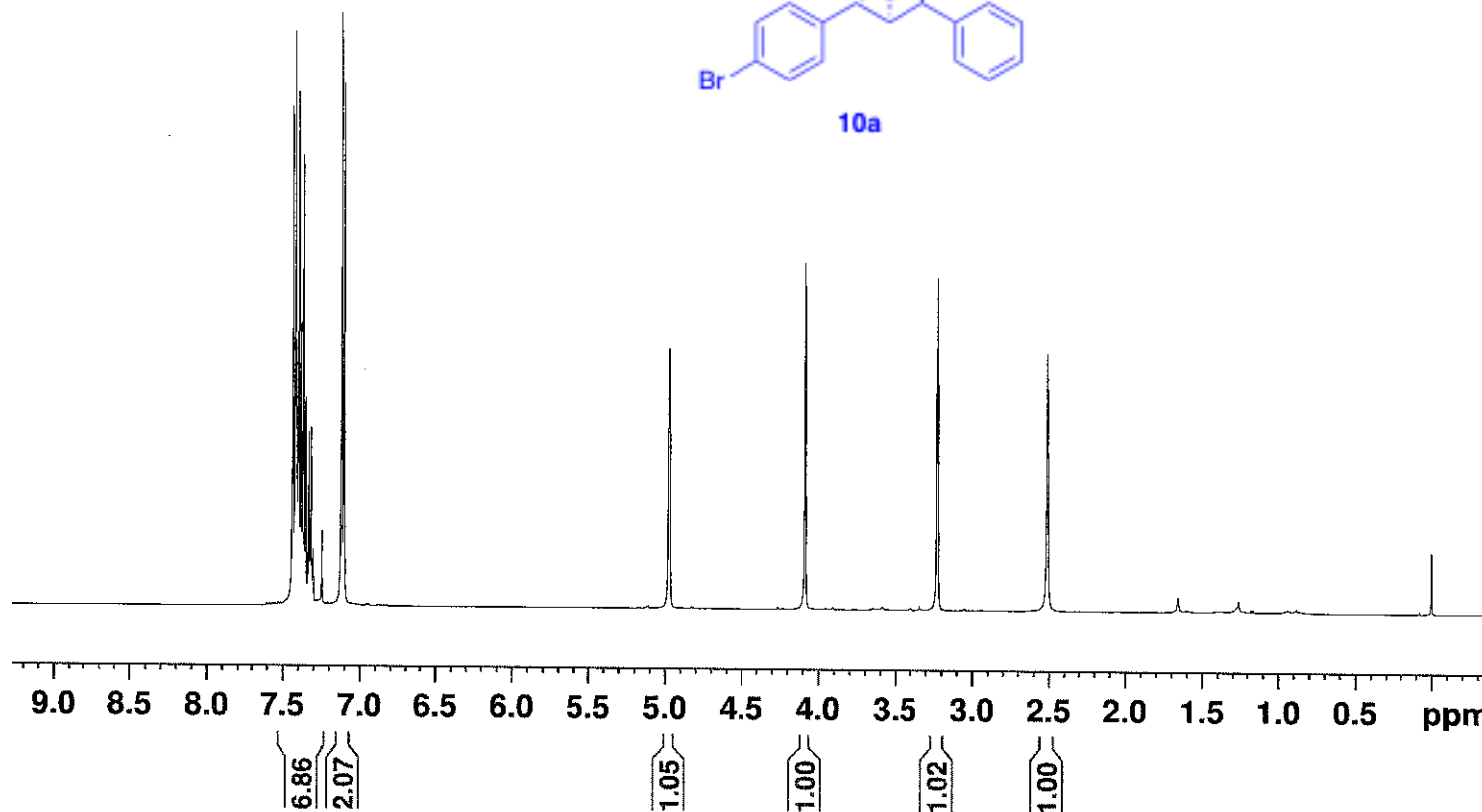
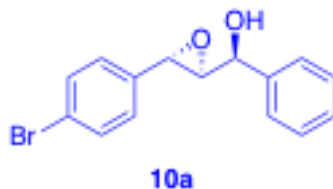


Current Data Parameters  
NAME Lan\_20150915\_B6173  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150915  
Time 17.38  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 28.76  
DW 50.000 usec  
DE 6.50 usec  
TE 295.7 K  
D1 5.0000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700186 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



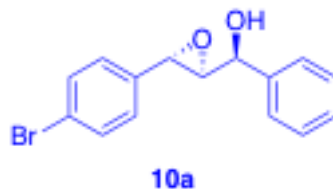
139.219  
135.795  
131.778  
128.878  
128.601  
127.492  
126.620  
122.334

— 71.277  
— 65.160  
— 54.590



Current Data Parameters  
NAME Lan\_20150915\_B6173\_C  
EXPNO 1  
PROCNO 1

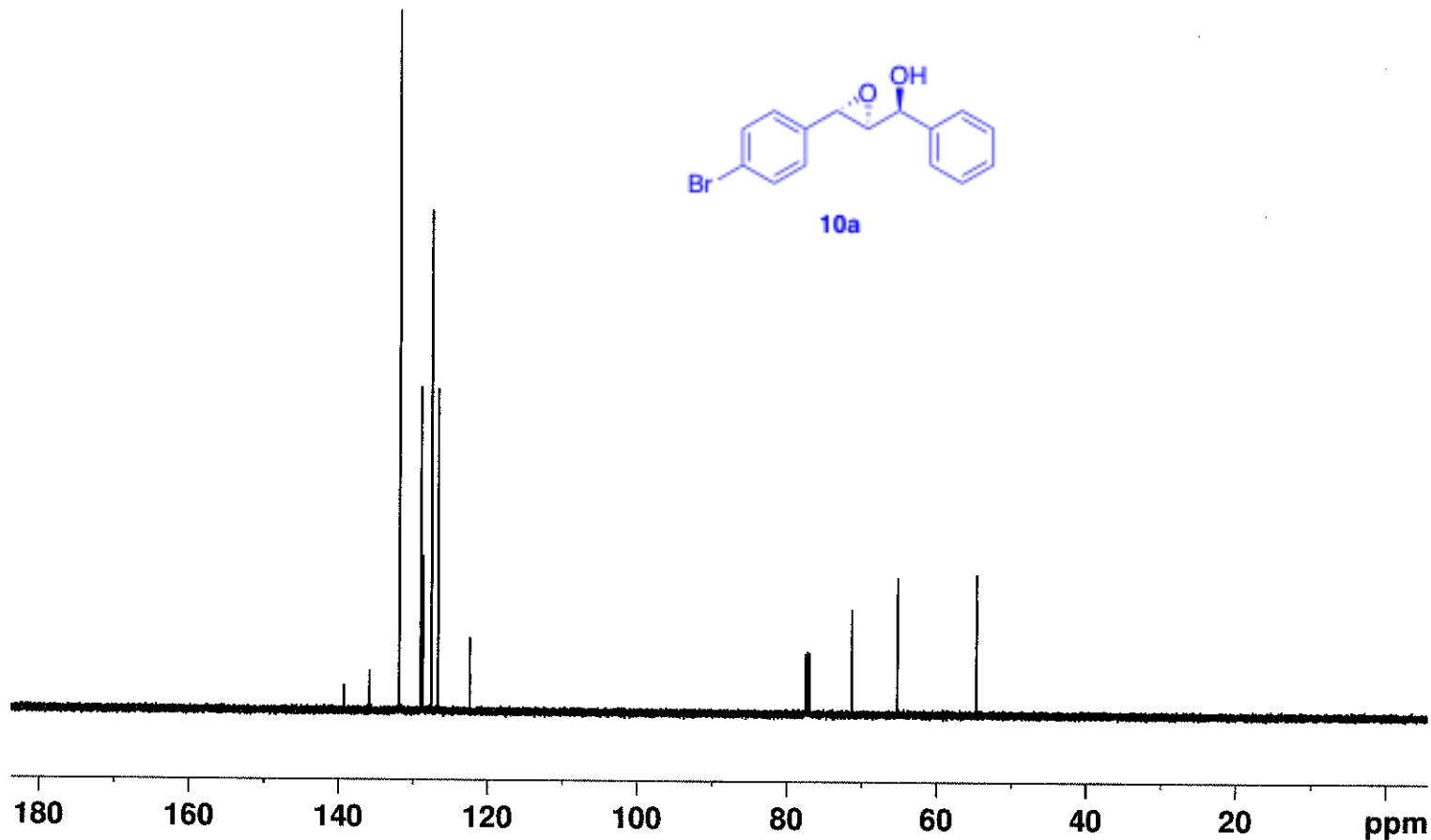
F2 - Acquisition Parameters  
Date\_ 20150915  
Time 17.47  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 71  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.5 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1



==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923986 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40

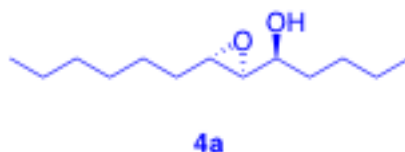


3.788  
3.783  
3.011  
3.006  
3.000  
2.995  
2.988  
2.984  
2.769  
2.763  
2.757  
2.005  
2.002  
1.587  
1.568  
1.547  
1.519  
1.492  
1.470  
1.458  
1.431  
1.399  
1.374  
1.360  
1.328  
1.303  
1.295  
0.935  
0.921  
0.906



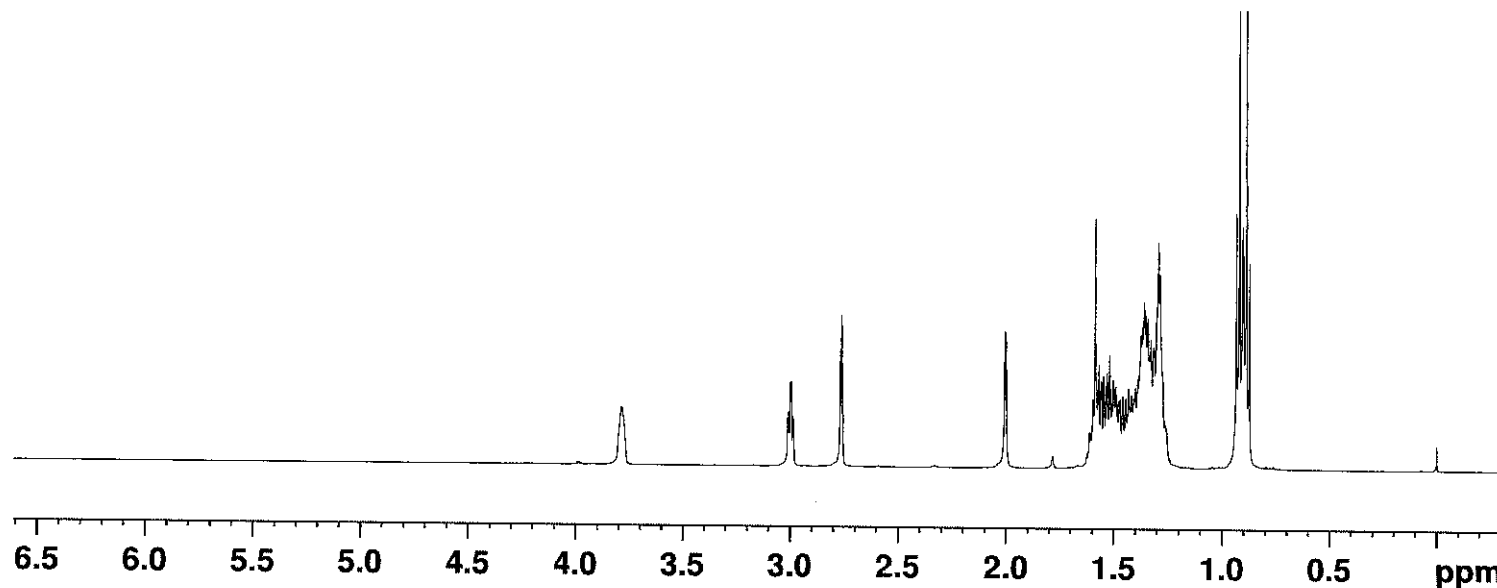
Current Data Parameters  
NAME Lan\_20150916\_B6295anti  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150916  
Time 17.22  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDC13  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 11.05  
DW 50.000 usec  
DE 6.50 usec  
TE 296.1 K  
D1 5.00000000 sec  
TD0 1



==== CHANNEL f1 =====  
SF01 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700042 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



1.00

0.97

0.95

1.06

16.27

6.19



Current Data Parameters  
NAME Lan\_20150916\_B6295anti\_C  
EXPNO 1  
PROCNO 1

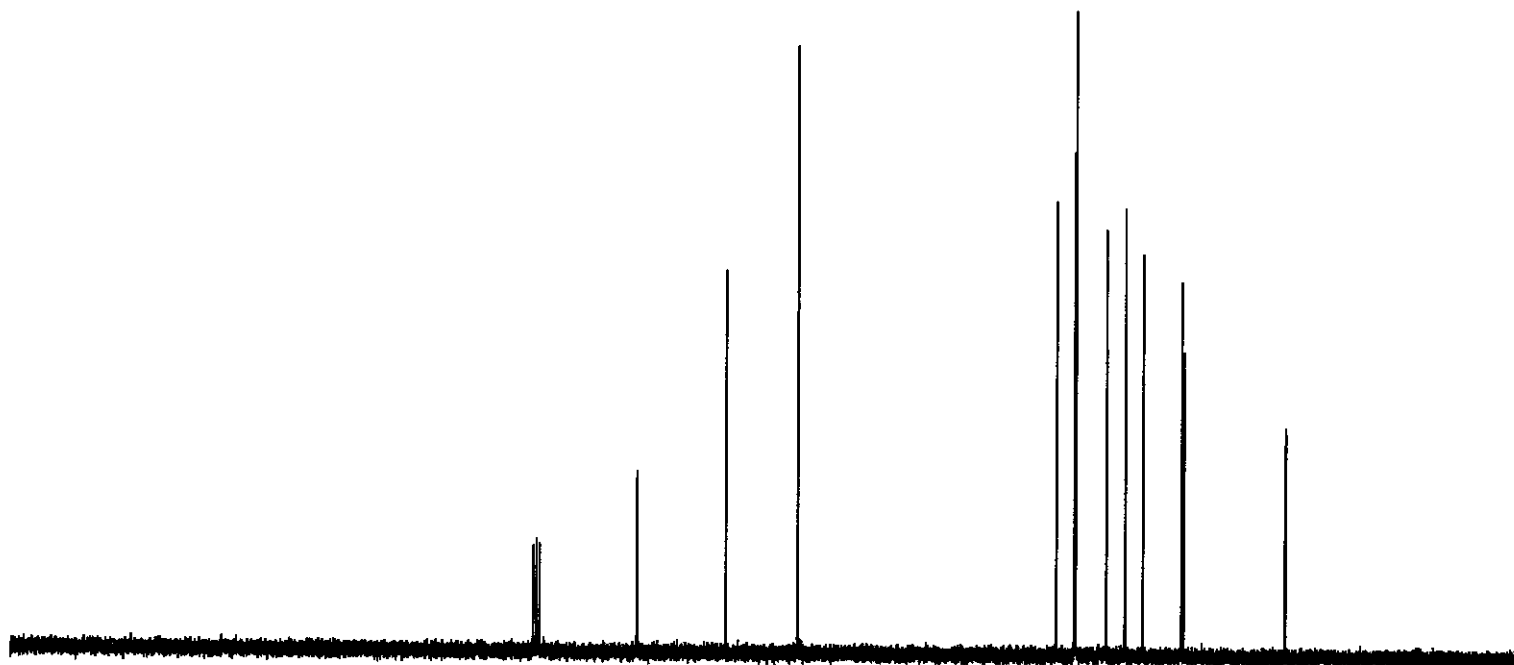
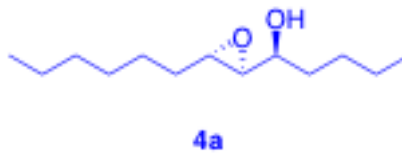
F2 - Acquisition Parameters  
Date\_ 20150916  
Time 17.26  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDCl3  
NS 26  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.3 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TDO 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923961 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40

—68.632  
—61.150  
—55.112  
33.369  
31.854  
31.748  
29.183  
27.596  
26.112  
22.870  
22.680  
14.173  
14.109



110 100 90 80 70 60 50 40 30 20 10 ppm

3.454  
3.443  
3.440  
2.916  
2.909  
2.905  
2.737  
2.732  
2.726  
2.722  
1.951  
1.584  
1.571  
1.566  
1.561  
1.559  
1.554  
1.551  
1.548  
1.546  
1.456  
1.441  
1.433  
1.428  
1.379  
1.370  
1.364  
1.357  
1.354  
1.345  
1.343  
1.340  
1.327  
1.315  
1.312  
1.302  
1.294  
1.287  
1.274  
0.932  
0.918  
0.903  
0.889  
0.874

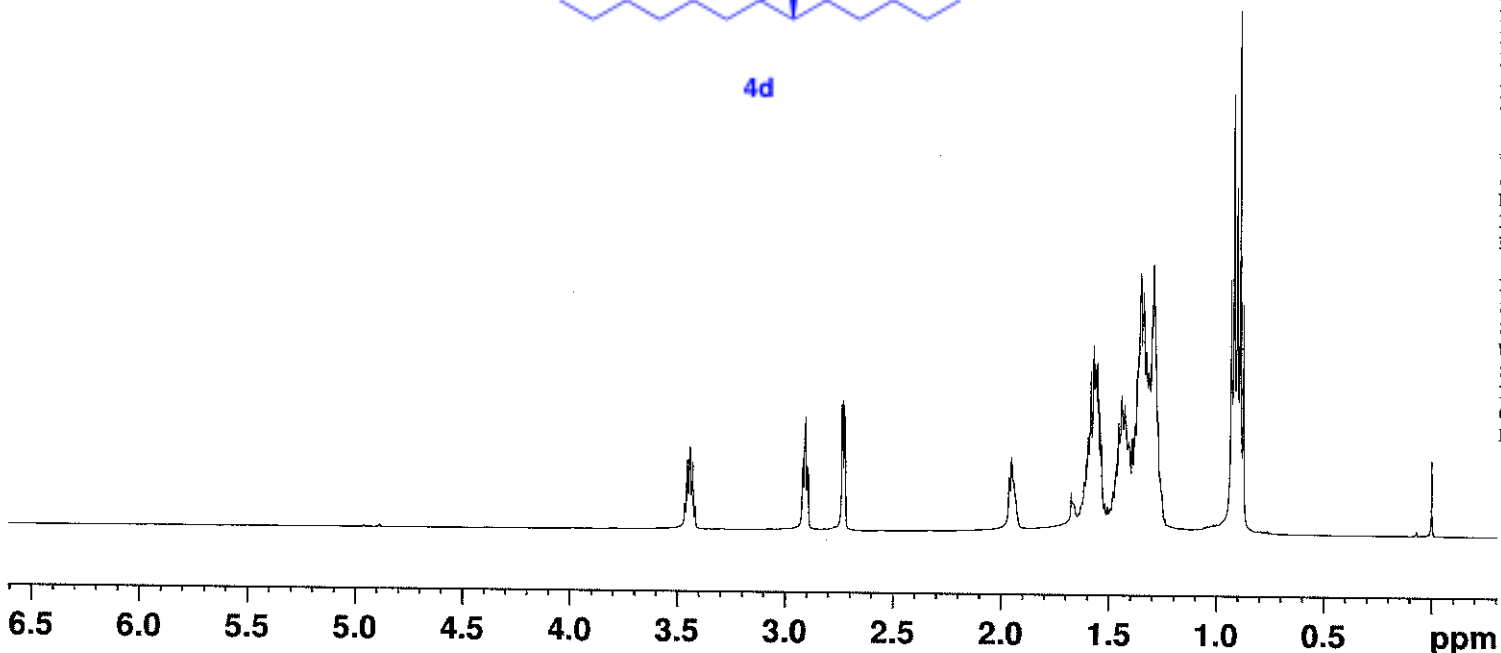
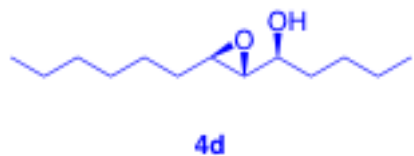


Current Data Parameters  
NAME Lan\_20150916\_B6295syn  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150916  
Time 17.07  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 25.24  
DW 50.000 usec  
DE 6.50 usec  
TE 295.9 K  
D1 5.00000000 sec  
TDO 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700082 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



1.00  
0.98  
0.95  
1.19  
4.16  
12.40  
6.06



Current Data Parameters  
NAME Lan\_20150916\_B6295syn\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters

Date\_ 20150916  
Time 17.15  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 40  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.3 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1

=====  
CHANNEL f1  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

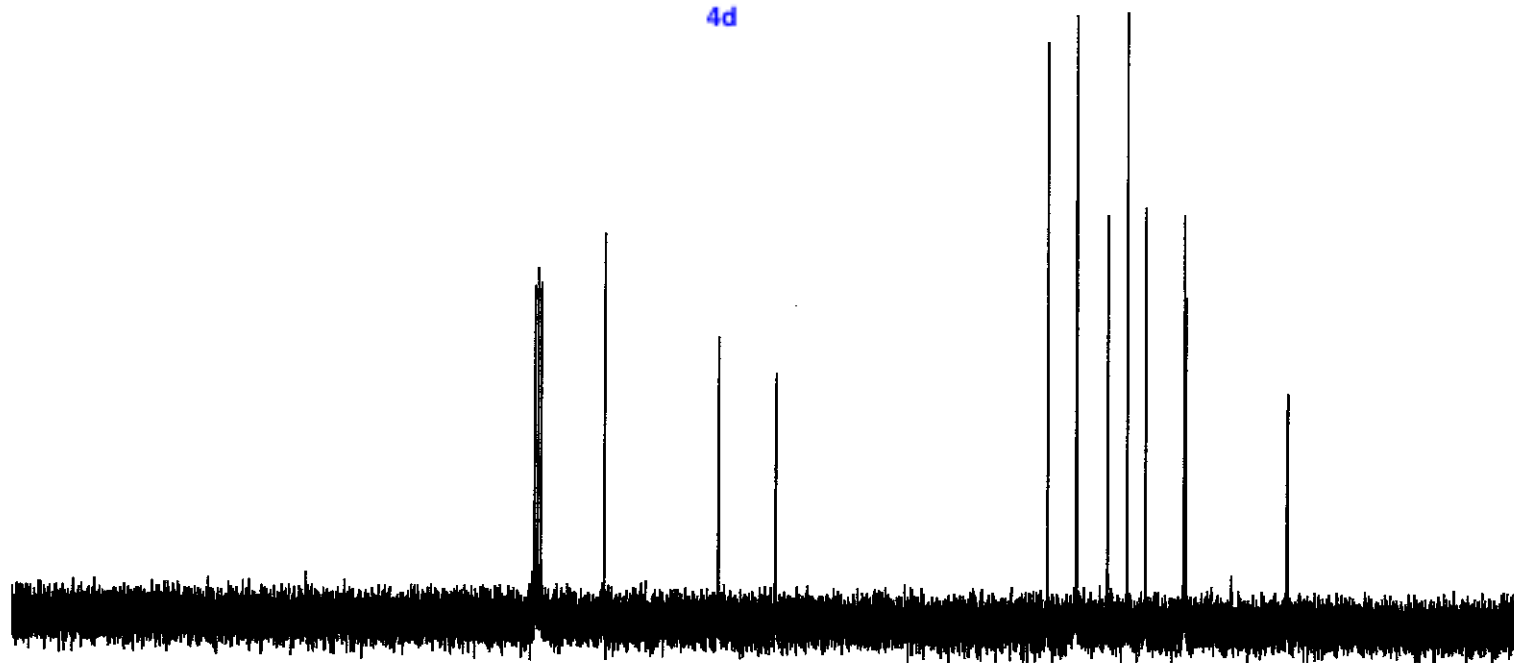
=====  
CHANNEL f2  
SFO2 499.8724993 MHz  
NUC2 1H  
CDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923948 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40

— 71.561  
— 61.950  
— 57.155  
34.244  
31.867  
31.798  
29.223  
27.583  
26.053  
22.823  
22.692  
14.201  
14.136



4d



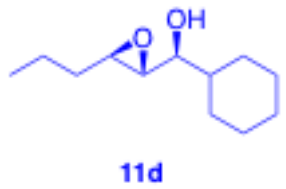
110 100 90 80 70 60 50 40 30 20 10 ppm

3.590  
3.013  
3.009  
2.827  
2.822  
2.816  
1.894  
1.789  
1.782  
1.777  
1.757  
1.566  
1.552  
1.548  
1.542  
1.539  
1.532  
1.527  
1.517  
1.515  
1.512  
1.506  
1.501  
1.495  
1.482  
1.467  
1.263  
1.253  
1.244  
1.238  
1.232  
1.218  
1.212  
1.205  
1.200  
1.194  
1.182  
1.176  
1.168  
1.144  
1.138  
0.990  
0.976  
0.961



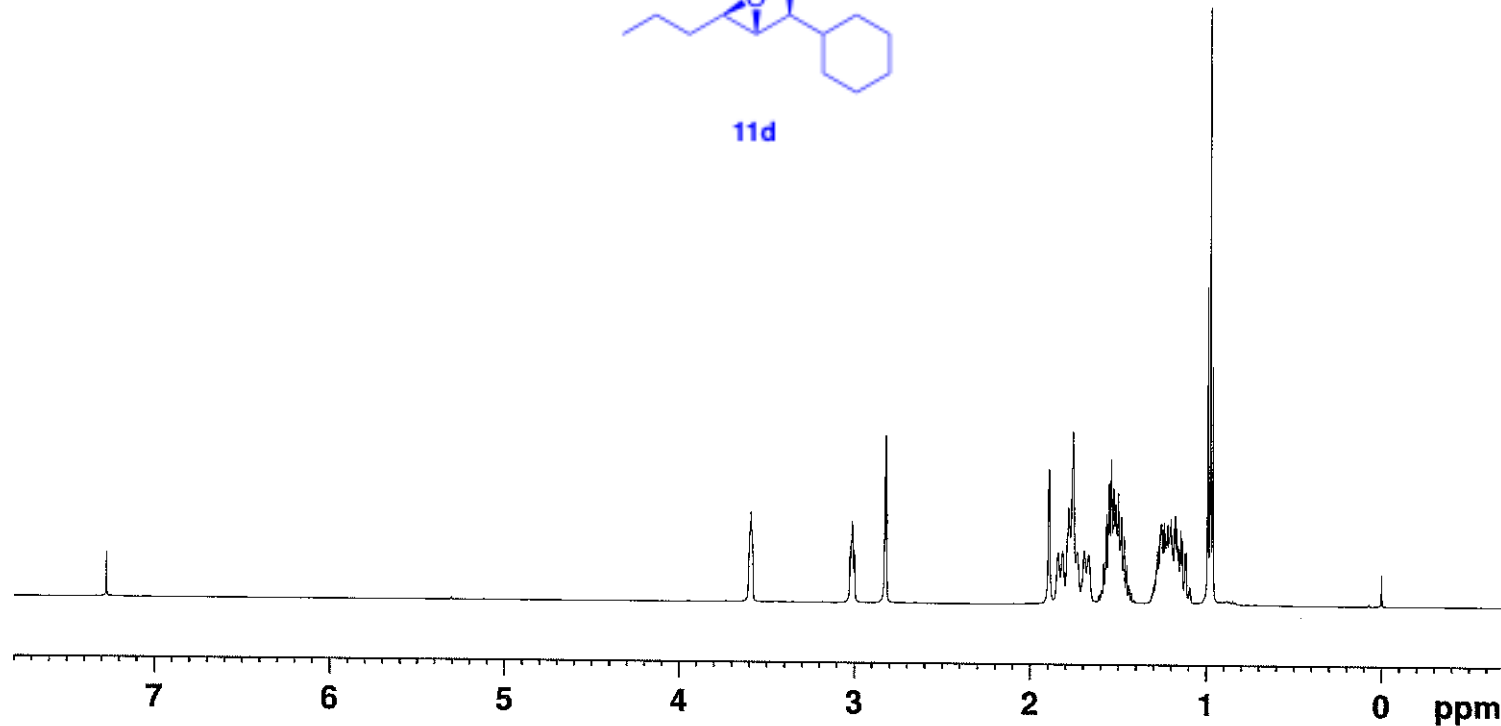
Current Data Parameters  
 NAME Lan\_20150916\_B8005  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150916  
 Time 15.48  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zg  
 TD 59998  
 SOLVENT CDCl3  
 NS 8  
 DS 0  
 SWH 10000.000 Hz  
 FIDRES 0.166672 Hz  
 AQ 2.9999001 sec  
 RG 19.64  
 DW 50.000 usec  
 DE 6.50 usec  
 TE 295.9 K  
 D1 5.00000000 sec  
 TD0 1



===== CHANNEL f1 =====  
 SFO1 499.8730869 MHz  
 NUC1 1H  
 P1 10.75 usec  
 PLW1 18.25000000 W

F2 - Processing parameters  
 SI 65536  
 SF 499.8700057 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00





Current Data Parameters  
NAME Lan\_20150916\_B8005\_C  
EXPNO 1  
PROCNO 1

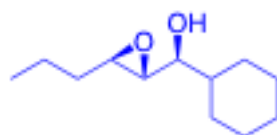
F2 - Acquisition Parameters  
Date\_ 20150916  
Time 15.56  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 46  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.4 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

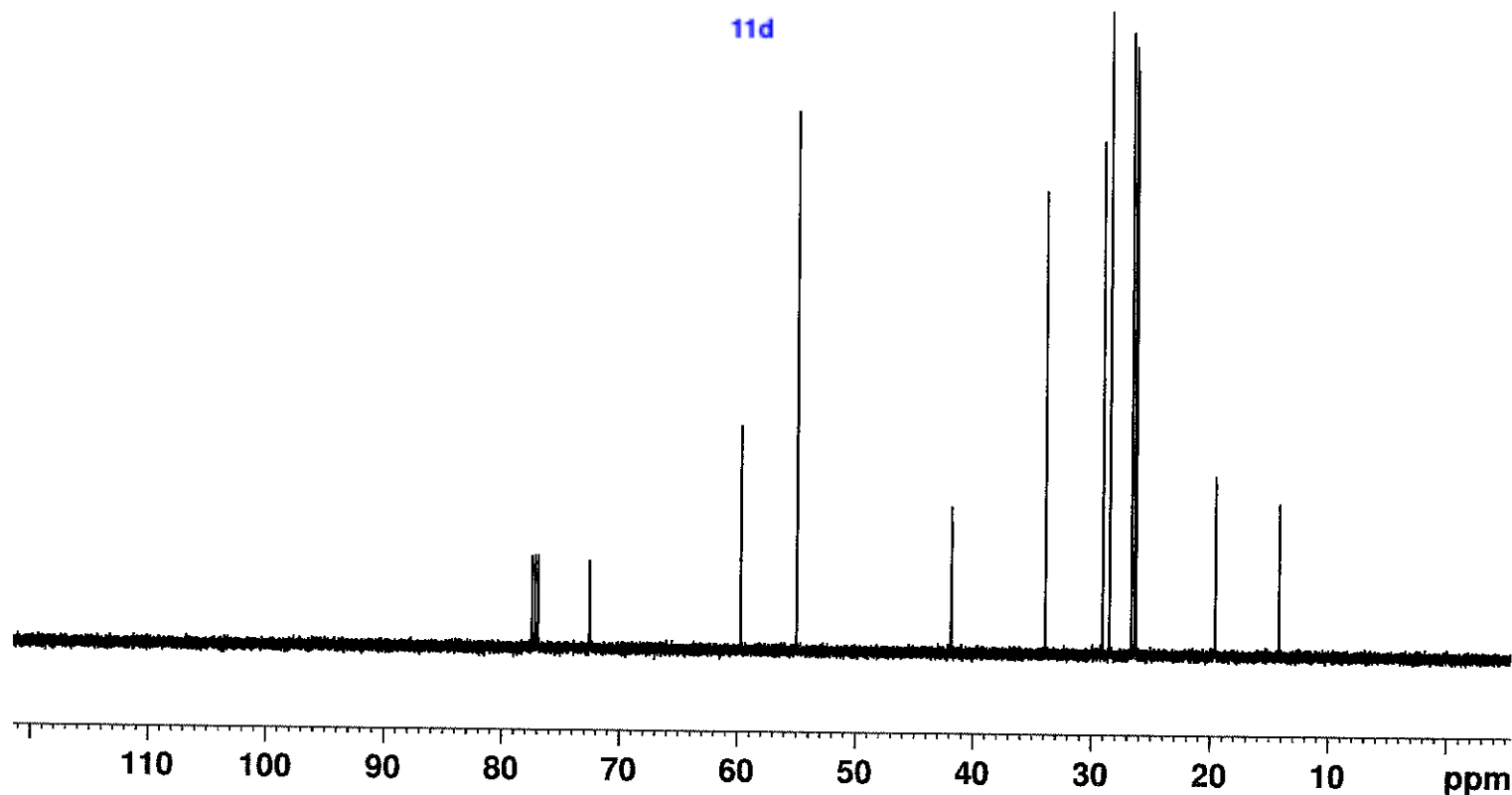
==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923948 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40

—72.534  
—59.694  
—54.957  
  
—41.820  
33.832  
28.998  
28.415  
26.573  
26.324  
26.213  
19.502  
—14.085



11d



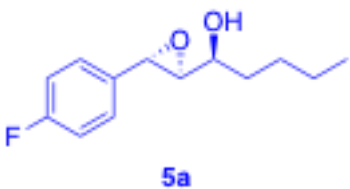


7.258  
7.254  
7.247  
7.241  
7.234  
7.230  
7.053  
7.036  
7.018  
3.950  
3.947  
3.935  
3.927  
3.041  
3.036  
3.031  
2.116  
1.644  
1.635  
1.625  
1.623  
1.614  
1.599  
1.583  
1.579  
1.573  
1.563  
1.502  
1.486  
1.428  
1.416  
1.408  
1.397  
1.392  
1.380  
1.371  
1.366  
1.356  
1.342  
1.339  
1.325  
0.927  
0.912  
0.898



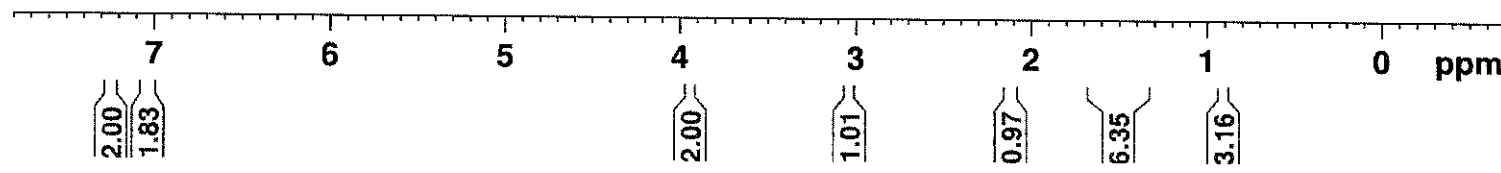
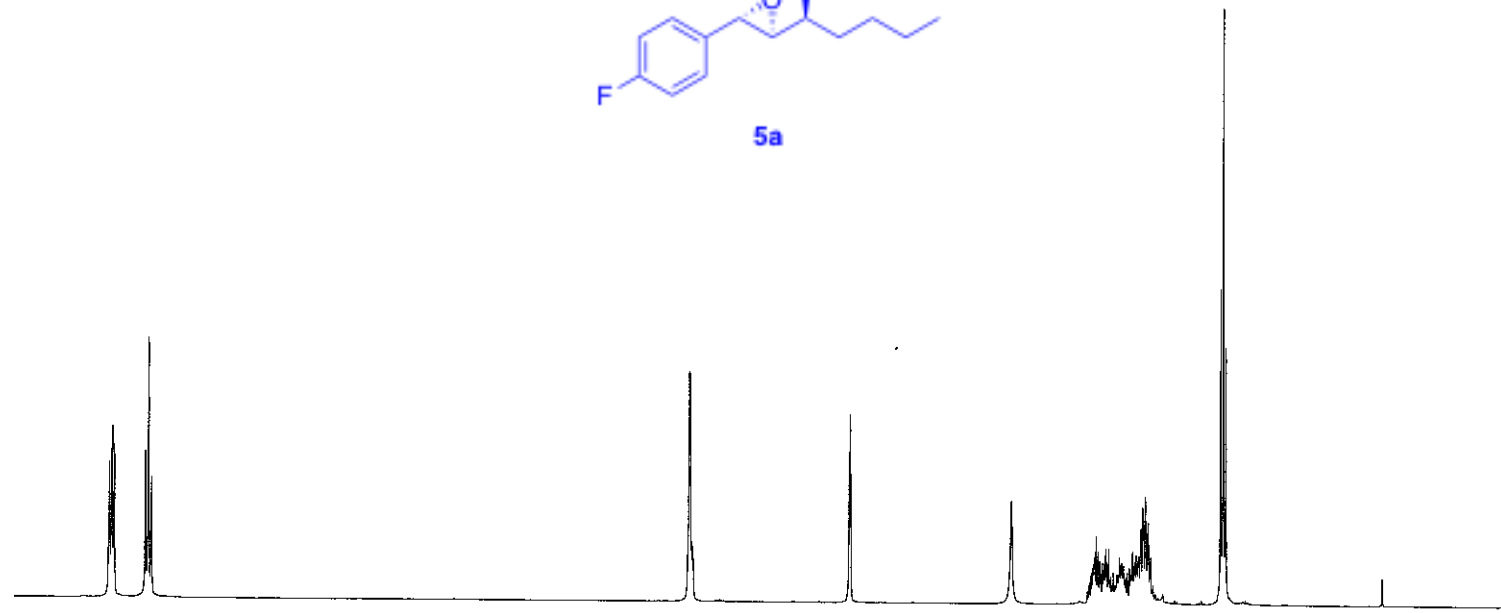
Current Data Parameters  
NAME Lan\_20150916\_B6299  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150916  
Time 15.34  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 19.64  
DW 50.000 usec  
DE 6.50 usec  
TE 295.9 K  
D1 5.00000000 sec  
TD0 1



==== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700100 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



163.842  
161.880

132.855  
127.514  
127.448  
115.724  
115.550

68.609  
65.092  
54.227

33.194  
27.525  
22.837  
14.099



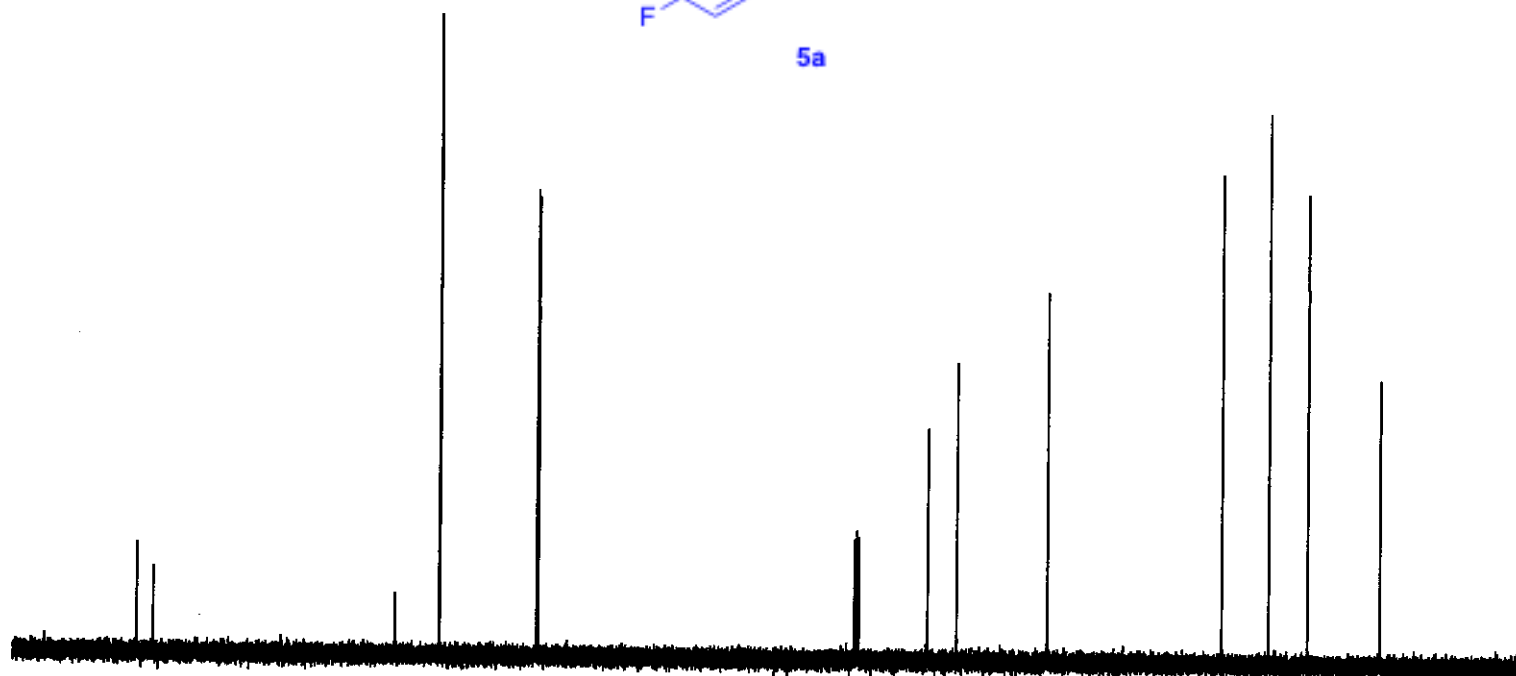
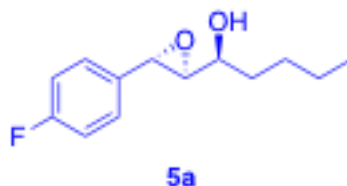
Current Data Parameters  
NAME Lan\_20150916\_B6299\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150916  
Time 15.41  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 22  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.1 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG12 waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923969 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm



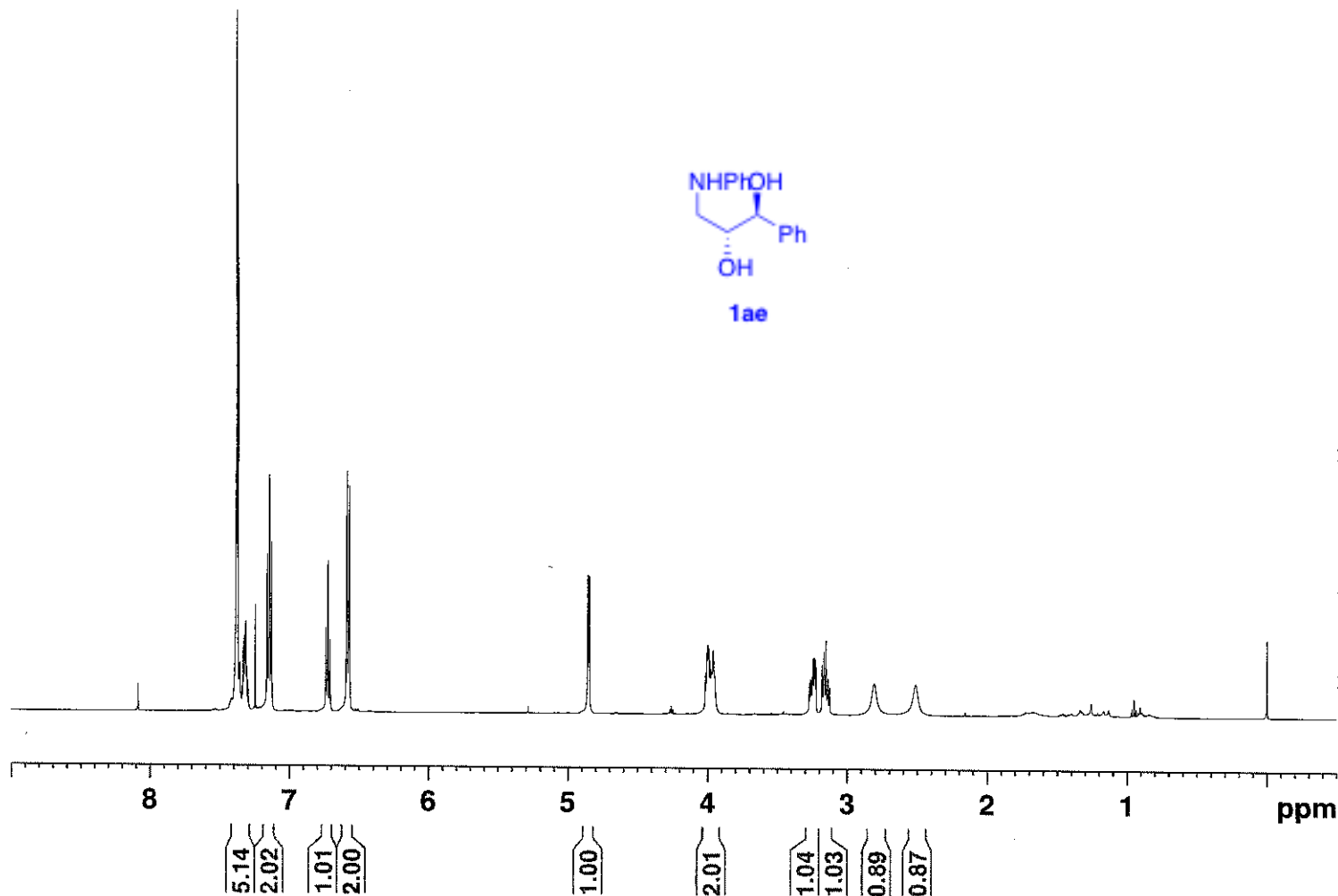
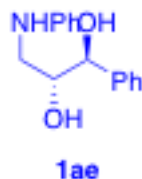
Current Data Parameters  
NAME Lan\_20150407\_B6039  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150407  
Time 21.08  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 29.95  
DW 50.000 usec  
DE 6.50 usec  
TE 297.3 K  
D1 10.00000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700179 MHz  
WDW EM  
SSB 0  
LB 0 0.30 Hz  
GB 0  
PC 1.00

7.384  
7.375  
7.363  
7.360  
7.358  
7.334  
7.327  
7.325  
7.322  
7.316  
7.312  
7.308  
7.164  
7.149  
7.147  
7.132  
6.741  
6.726  
6.712  
6.590  
6.574  
4.858  
4.848  
4.014  
4.004  
3.998  
3.991  
3.981  
3.973  
3.961  
3.950  
3.263  
3.257  
3.249  
3.244  
3.237  
3.231  
3.223  
3.179  
3.167  
3.164  
3.153  
3.141  
3.138



—148.232  
—140.306  
—129.390  
—128.799  
—128.252  
—126.475  
—118.386  
—113.796

—76.000  
—73.392

—45.463



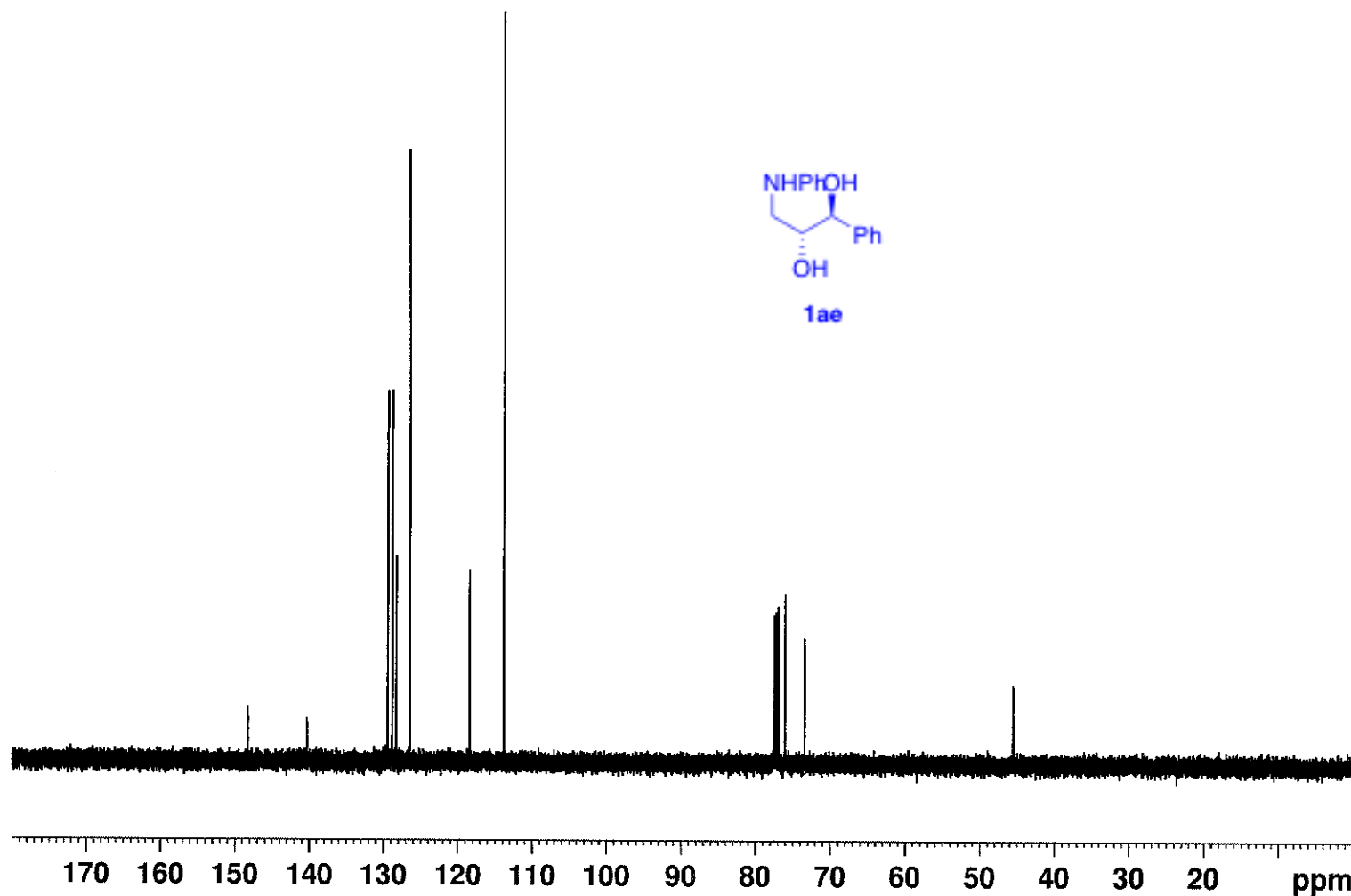
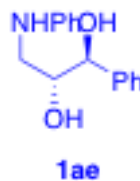
Current Data Parameters  
NAME Lan\_20150407\_B6039\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150407  
Time 21.20  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 40  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.6 K  
D1 3.0000000 sec  
D11 0.03000000 sec  
TDO 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923965 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



7.388  
7.384  
7.370  
7.368  
7.352  
7.337  
7.328  
7.324  
7.320  
7.317  
7.311  
7.164  
7.150  
7.147  
7.133  
6.717  
6.702  
6.688  
6.597  
6.581  
4.716  
4.702  
3.828  
3.819  
3.813  
3.805  
3.686  
3.677  
3.668  
1.769  
1.763  
1.757  
1.505  
1.499  
1.495  
1.490  
1.485  
1.477  
1.466  
1.333  
1.319  
0.910  
0.896  
0.881

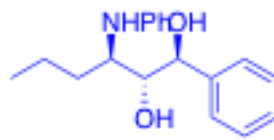


Current Data Parameters  
NAME Lan\_20150407\_B6101  
EXPNO 1  
PROCNO 1

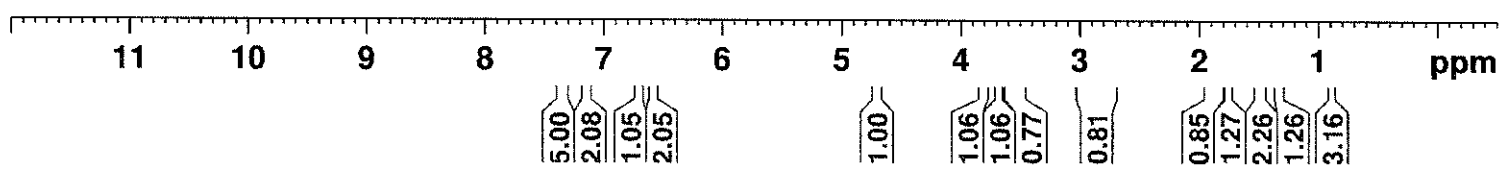
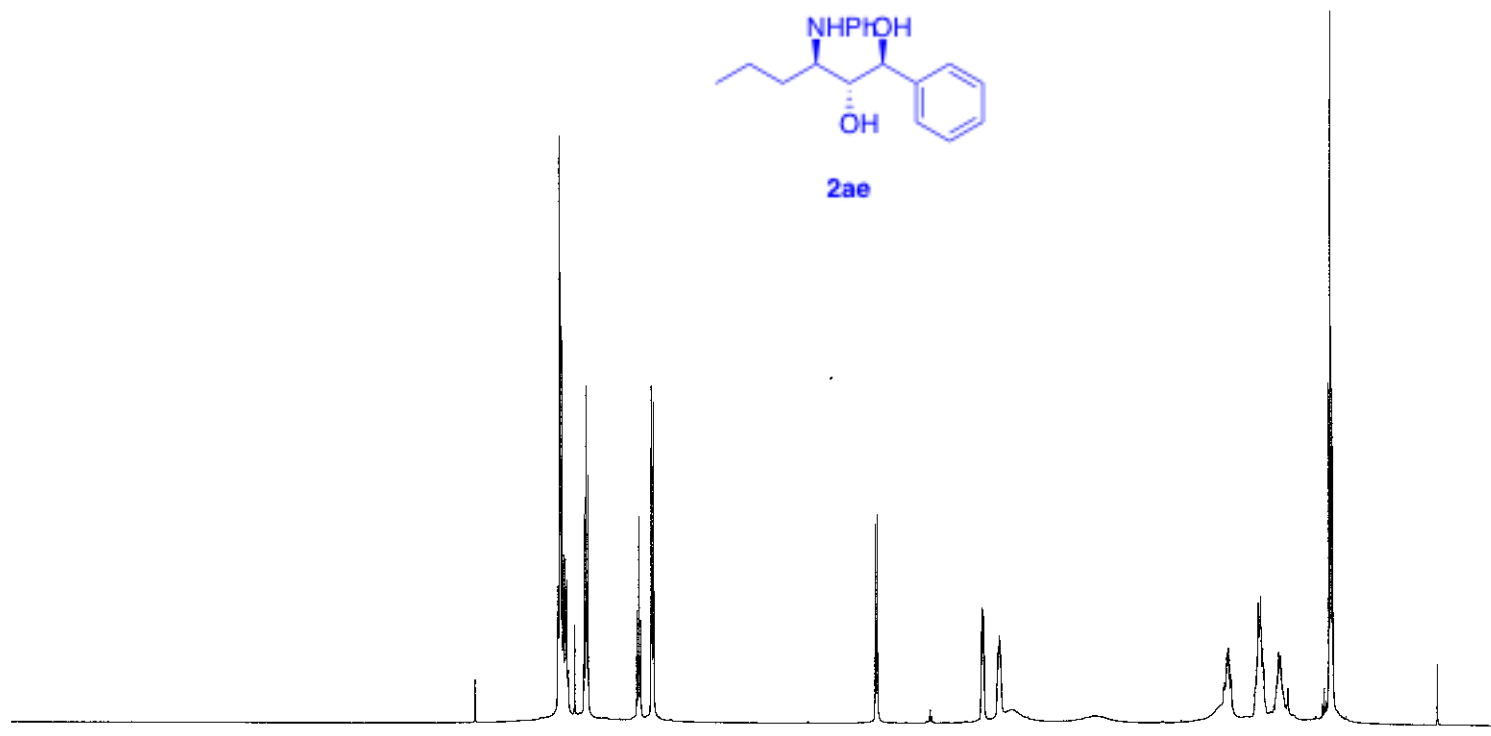
F2 - Acquisition Parameters  
Date\_ 20150407  
Time 20.48  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDC13  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 25.24  
DW 50.000 usec  
DE 6.50 usec  
TE 297.0 K  
D1 10.0000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700203 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



2ae



—147.683  
—141.337  
129.484  
128.792  
128.470  
127.245  
—117.929  
—114.032

<76.006  
<75.537

—55.003

—32.305

—19.334  
—14.353



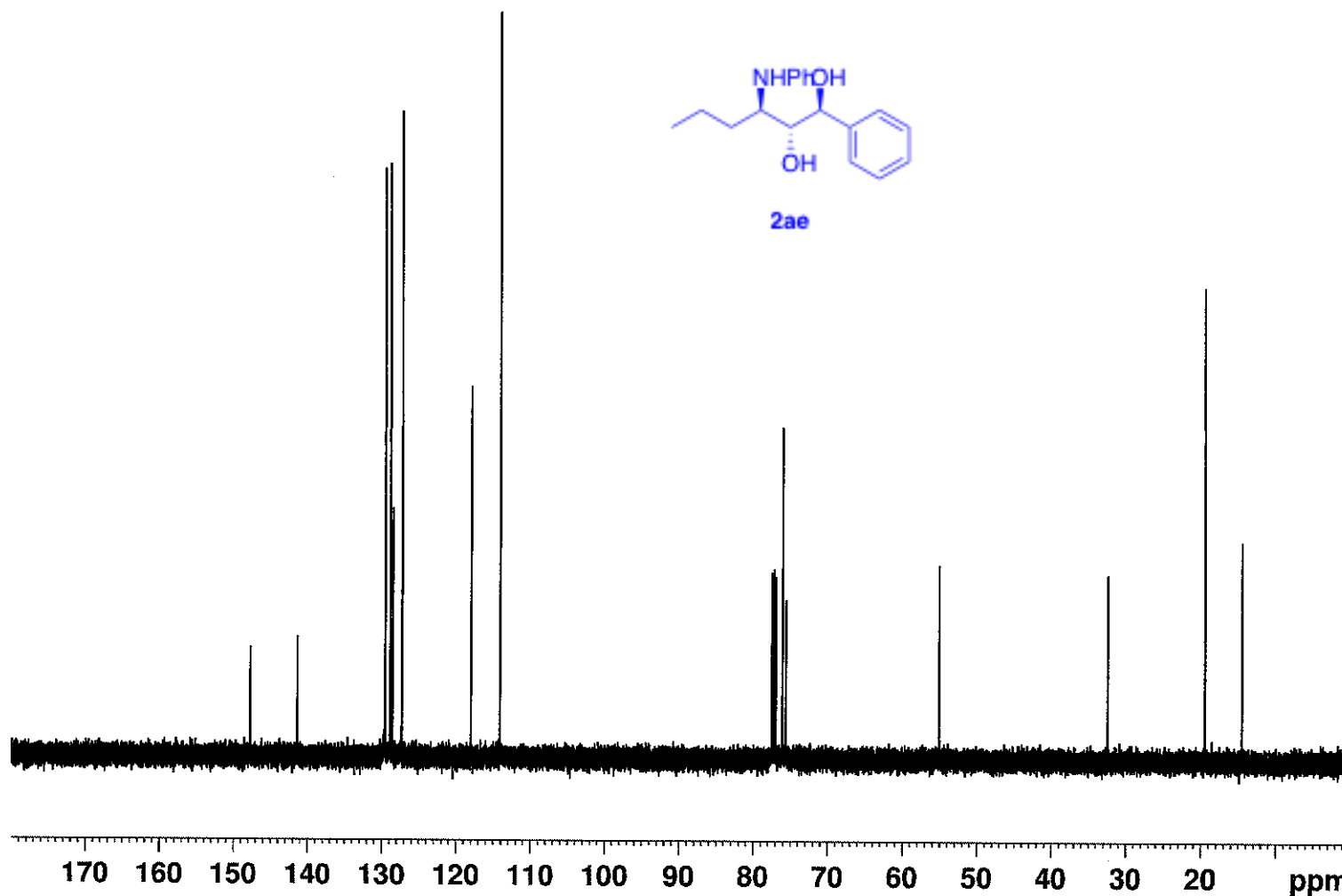
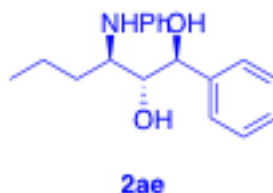
Current Data Parameters  
NAME Lan\_20150407\_B6101\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150407  
Time 21.00  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 32  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.7 K  
D1 3.00000000 sec  
D11 0.03000000 sec  
TDO 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923972 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40

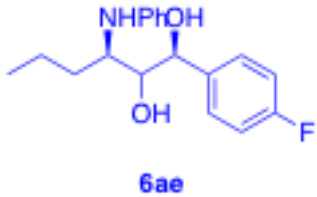


7.360  
7.349  
7.344  
7.332  
7.173  
7.158  
7.156  
7.141  
7.052  
7.035  
7.017  
6.733  
6.719  
6.704  
6.599  
6.583  
4.725  
4.710  
3.782  
3.773  
3.768  
3.759  
3.622  
1.768  
1.761  
1.755  
1.749  
1.742  
1.516  
1.506  
1.497  
1.492  
1.487  
1.478  
1.468  
1.458  
1.453  
1.320  
1.312  
1.307  
1.299  
0.903  
0.889  
0.874



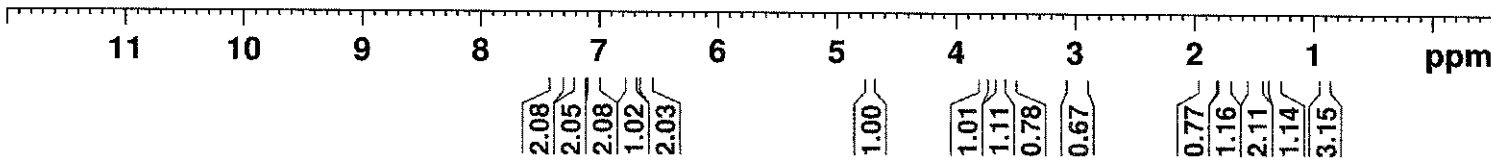
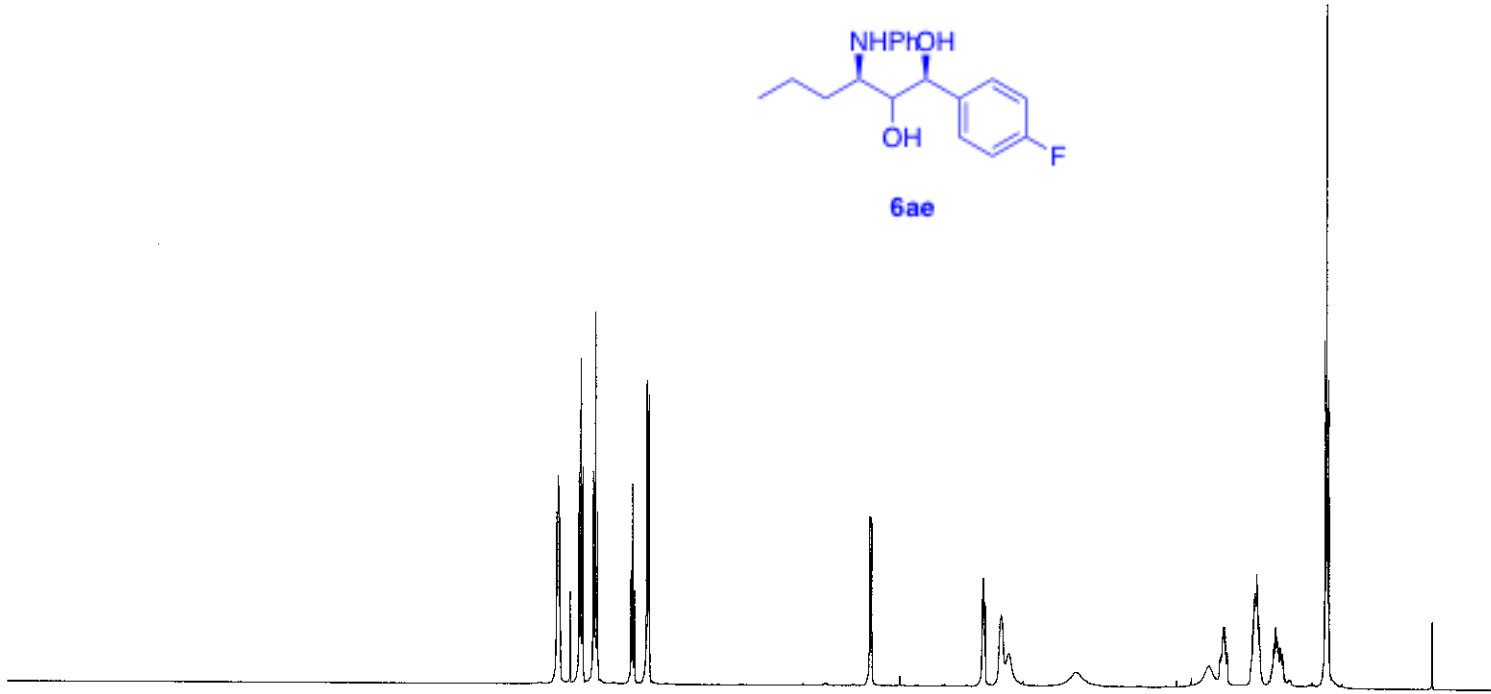
Current Data Parameters  
NAME Lan\_20150408\_B6097  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150408  
Time 19.59  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 25.24  
DW 50.000 usec  
DE 6.50 usec  
TE 296.9 K  
D1 10.0000000 sec  
TD0 1



===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700178 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



163.734  
161.779

147.549

137.090  
129.522  
128.996  
128.932  
118.154  
115.676  
115.506  
114.103

75.564  
75.421

55.183

32.472

19.199  
14.328



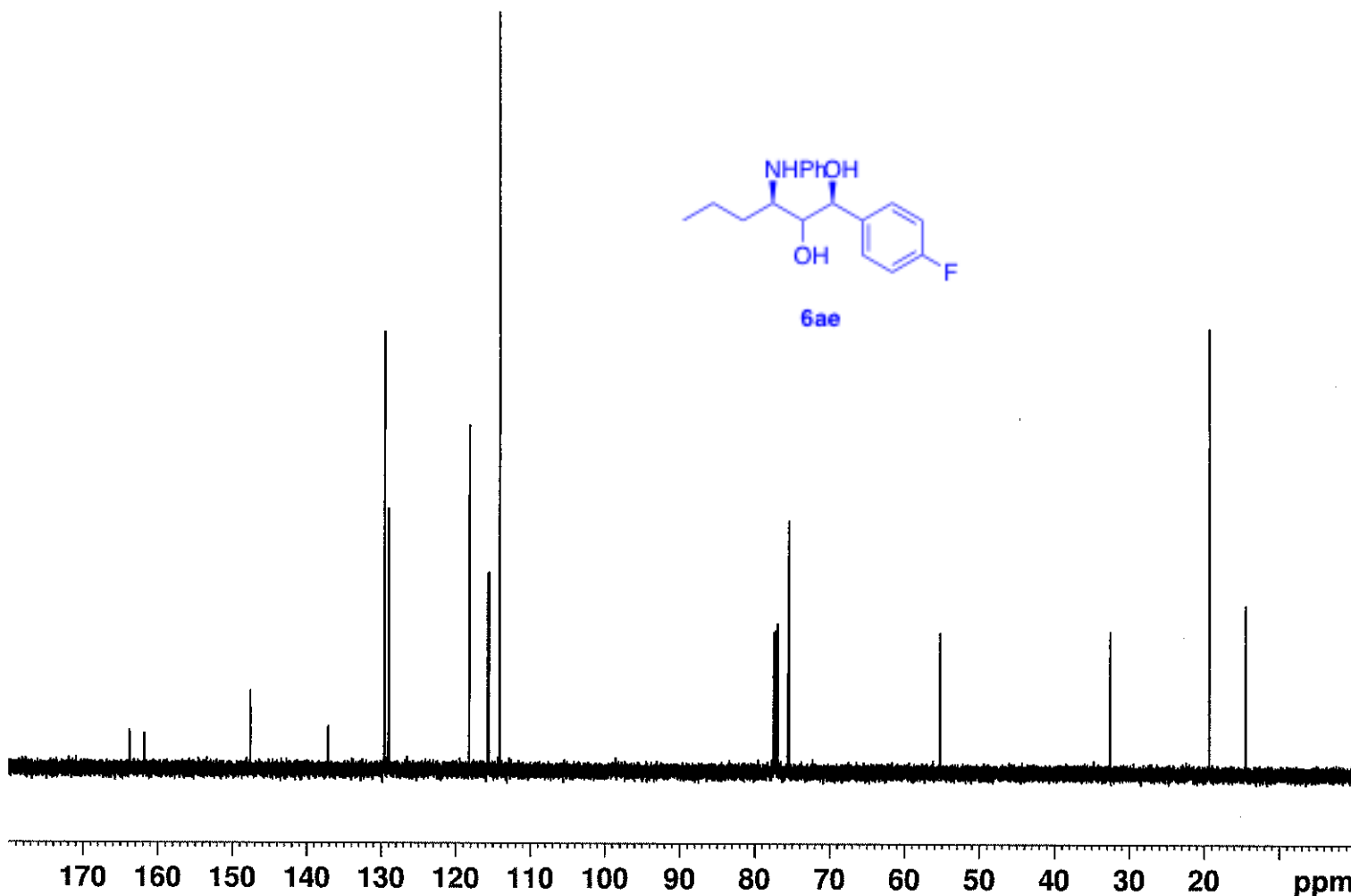
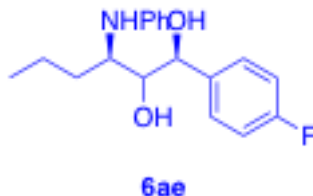
Current Data Parameters  
NAME Lan\_20150408\_B6097\_C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150408  
Time 20.06  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDC13  
NS 59  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.5 K  
D1 3.00000000 sec  
D11 0.03000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923966 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



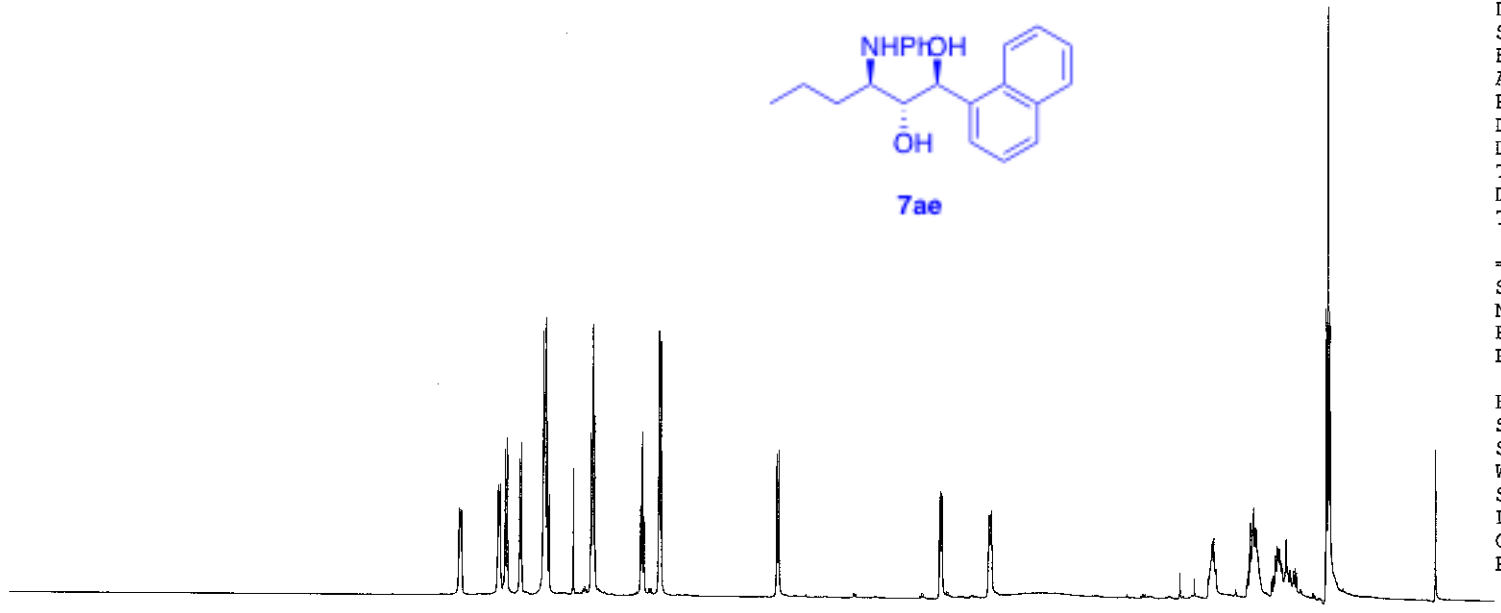
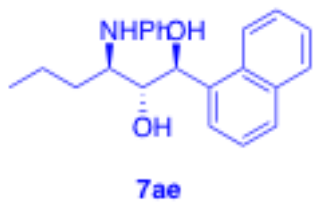


8.202  
8.190  
8.183  
7.877  
7.870  
7.866  
7.862  
7.858  
7.815  
7.798  
7.693  
7.679  
7.495  
7.489  
7.483  
7.481  
7.476  
7.463  
7.447  
7.095  
7.080  
7.063  
6.677  
6.662  
6.648  
6.521  
6.505  
5.525  
5.510  
4.165  
4.158  
4.150  
4.143  
3.751  
3.732  
1.555  
1.536  
1.528  
1.516  
1.513  
1.507  
0.919  
0.905  
0.890



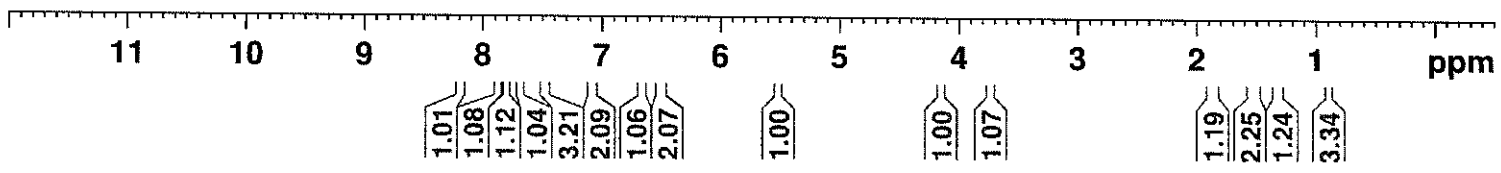
Current Data Parameters  
 NAME Lan\_20150404\_B6099  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150404  
 Time 11.14  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zg  
 TD 59998  
 SOLVENT CDCl3  
 NS 8  
 DS 0  
 SWH 10000.000 Hz  
 FIDRES 0.166672 Hz  
 AQ 2.9999001 sec  
 RG 28.76  
 DW 50.000 usec  
 DE 6.50 usec  
 TE 297.0 K  
 D1 10.0000000 sec  
 TD0 1



===== CHANNEL f1 =====  
 SFO1 499.8730869 MHz  
 NUC1 1H  
 P1 10.75 usec  
 PLW1 18.2500000 W

F2 - Processing parameters  
 SI 65536  
 SF 499.8700203 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00



147.686  
 137.225  
 134.029  
 131.355  
 129.432  
 129.013  
 128.909  
 126.415  
 125.937  
 125.563  
 124.783  
 123.806  
 117.779  
 113.916

75.151  
 73.259

55.063

31.933

19.540  
 14.346



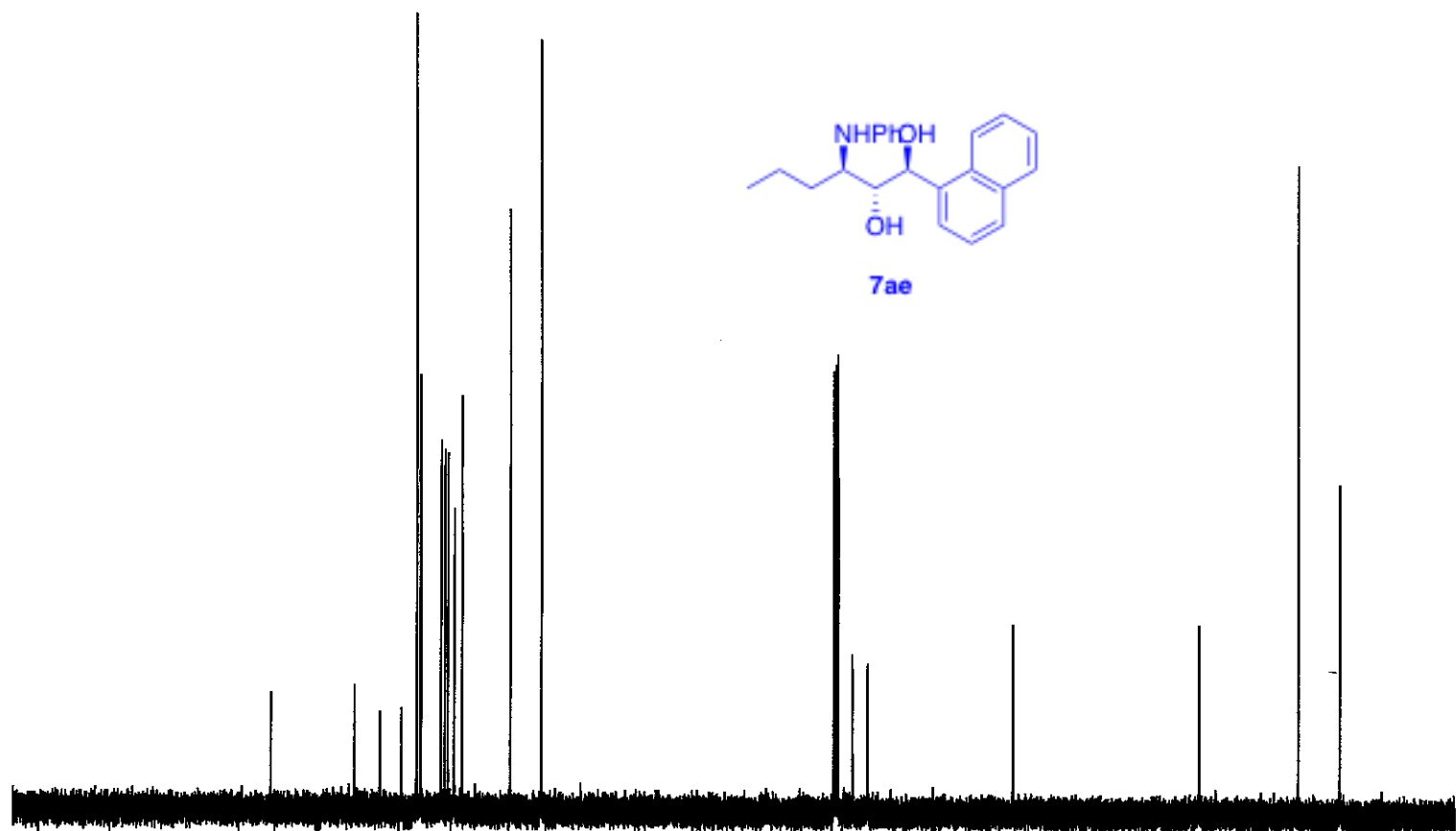
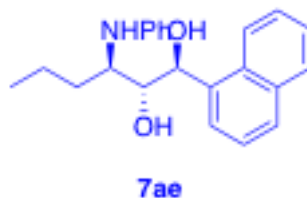
Current Data Parameters  
 NAME Lan\_20150404\_B6099\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150404  
 Time 11.28  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 89  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.6 K  
 D1 3.0000000 sec  
 D11 0.03000000 sec  
 TD0 1

==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.0000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923956 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40



170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

7.422  
7.418  
7.414  
7.403  
7.395  
7.388  
7.384  
7.373  
7.369  
7.365  
7.364  
7.356  
7.195  
7.181  
7.178  
7.164  
6.766  
6.752  
6.737  
6.666  
6.665  
6.649  
6.648  
4.864  
4.852  
3.862  
3.849  
3.836  
3.489  
3.481  
3.474  
3.466  
2.292  
2.285  
2.278  
2.271  
2.264  
2.257  
2.251  
2.244  
1.001  
0.987  
0.947  
0.933

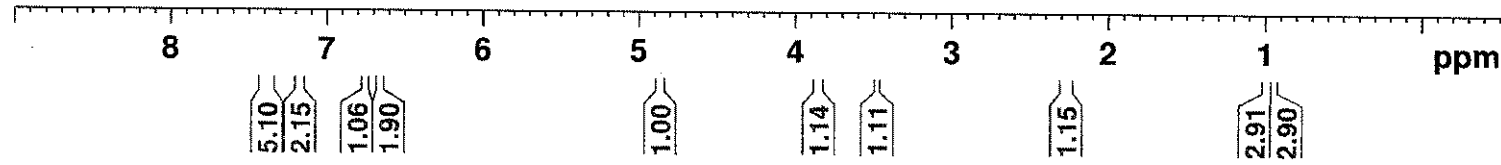
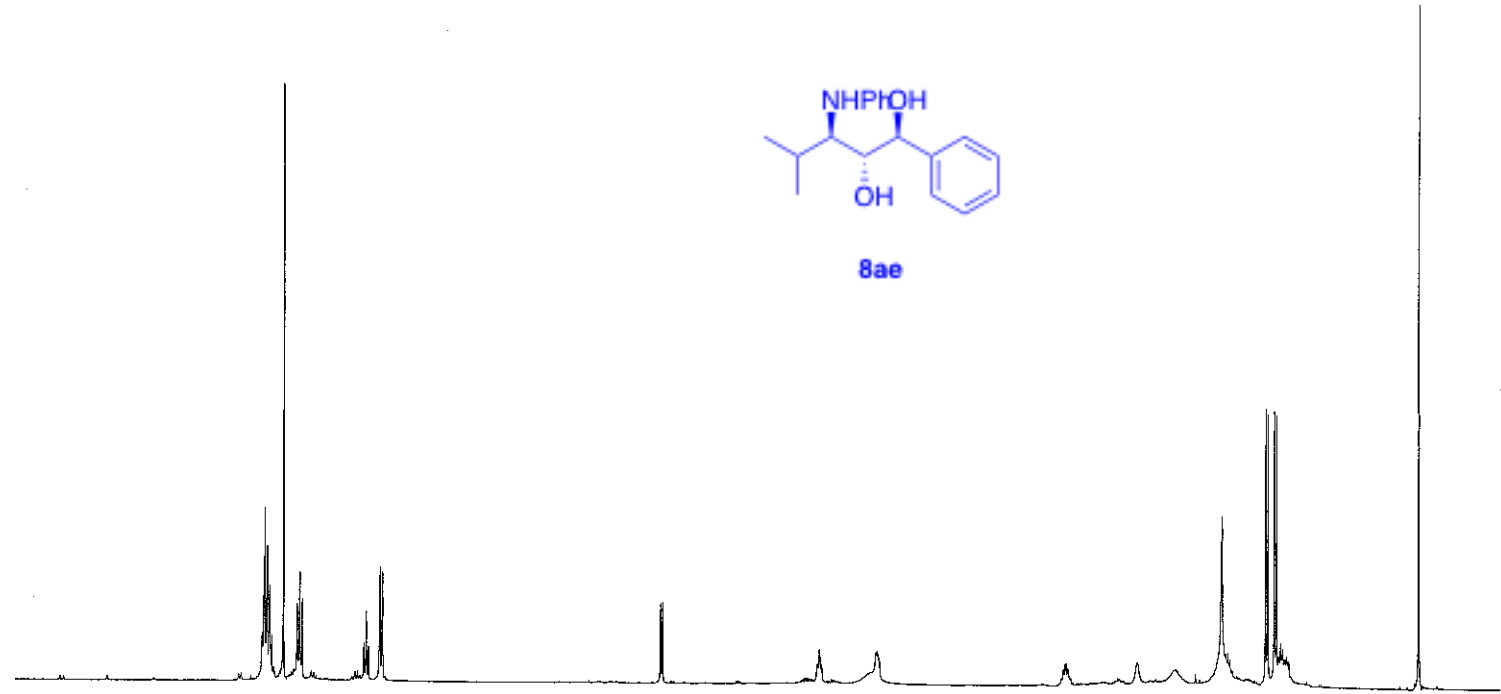
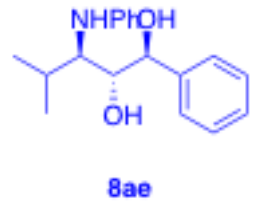


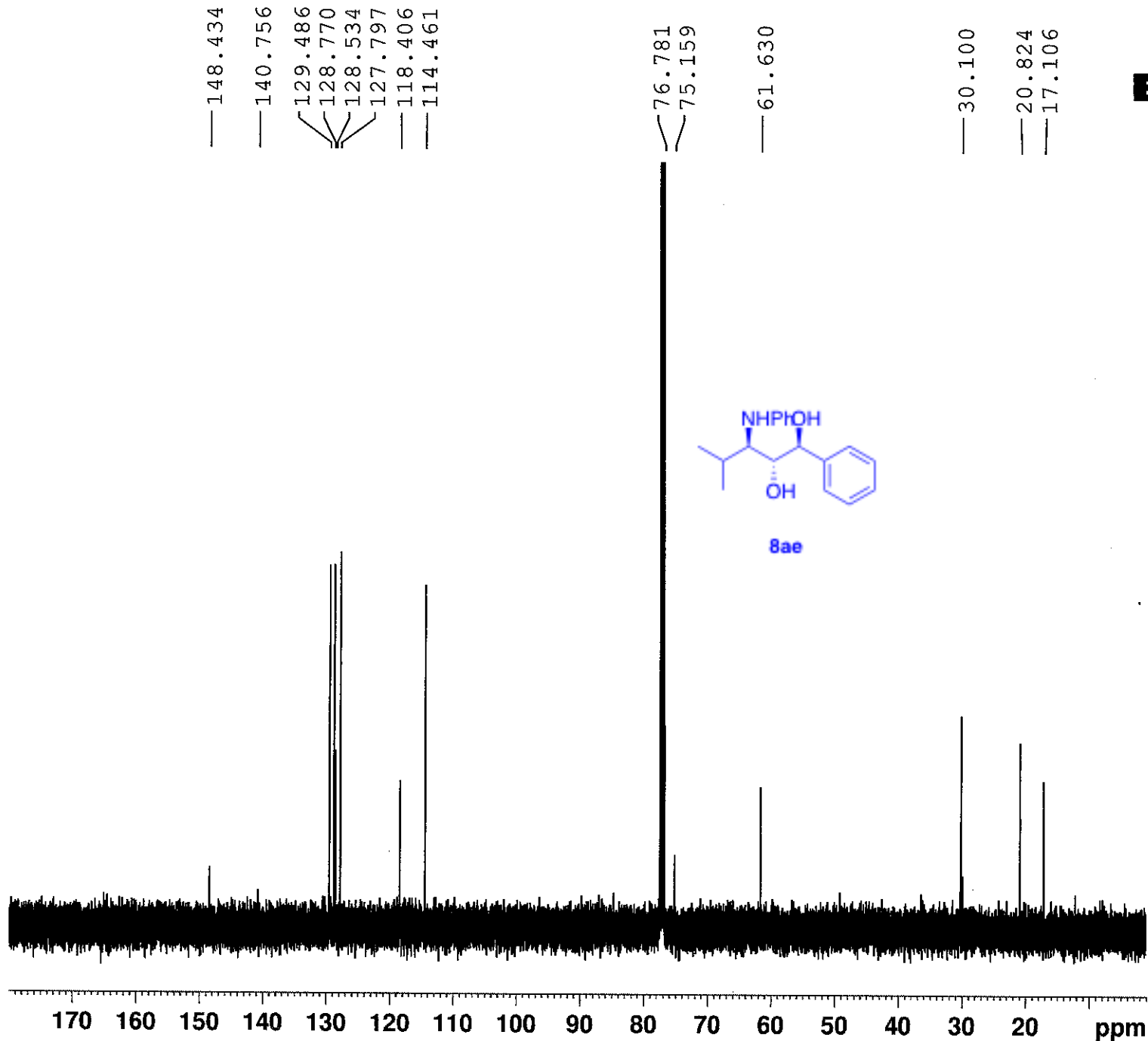
Current Data Parameters  
NAME Lan\_20150404\_B6143  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150404  
Time 19.33  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 56.75  
DW 50.000 usec  
DE 6.50 usec  
TE 297.2 K  
D1 10.0000000 sec  
TDO 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700000 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00





Current Data Parameters  
 NAME Lan\_20150404\_B6143\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150404  
 Time 19.43  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 344  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.6 K  
 D1 3.0000000 sec  
 D11 0.03000000 sec  
 TD0 1

==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.0000000 W  
 PLW12 0.29688001 W

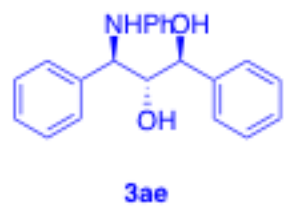
F2 - Processing parameters  
 SI 1048576  
 SF 125.6923910 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40

7.439  
7.424  
7.340  
7.336  
7.334  
7.326  
7.322  
7.313  
7.310  
7.274  
7.259  
7.244  
7.087  
7.072  
7.070  
7.055  
6.658  
6.643  
6.628  
6.547  
6.545  
6.530  
4.801  
4.791  
4.374  
4.358  
4.103  
4.094  
4.088  
4.078



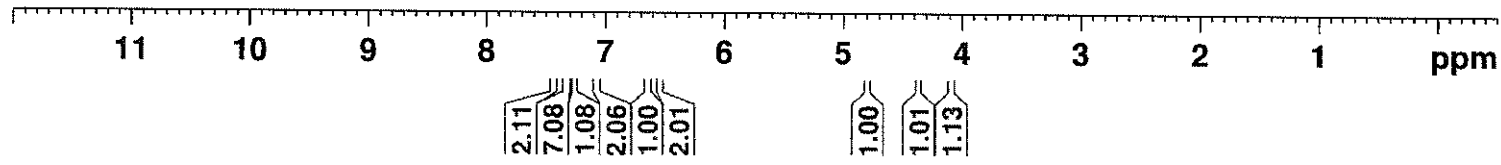
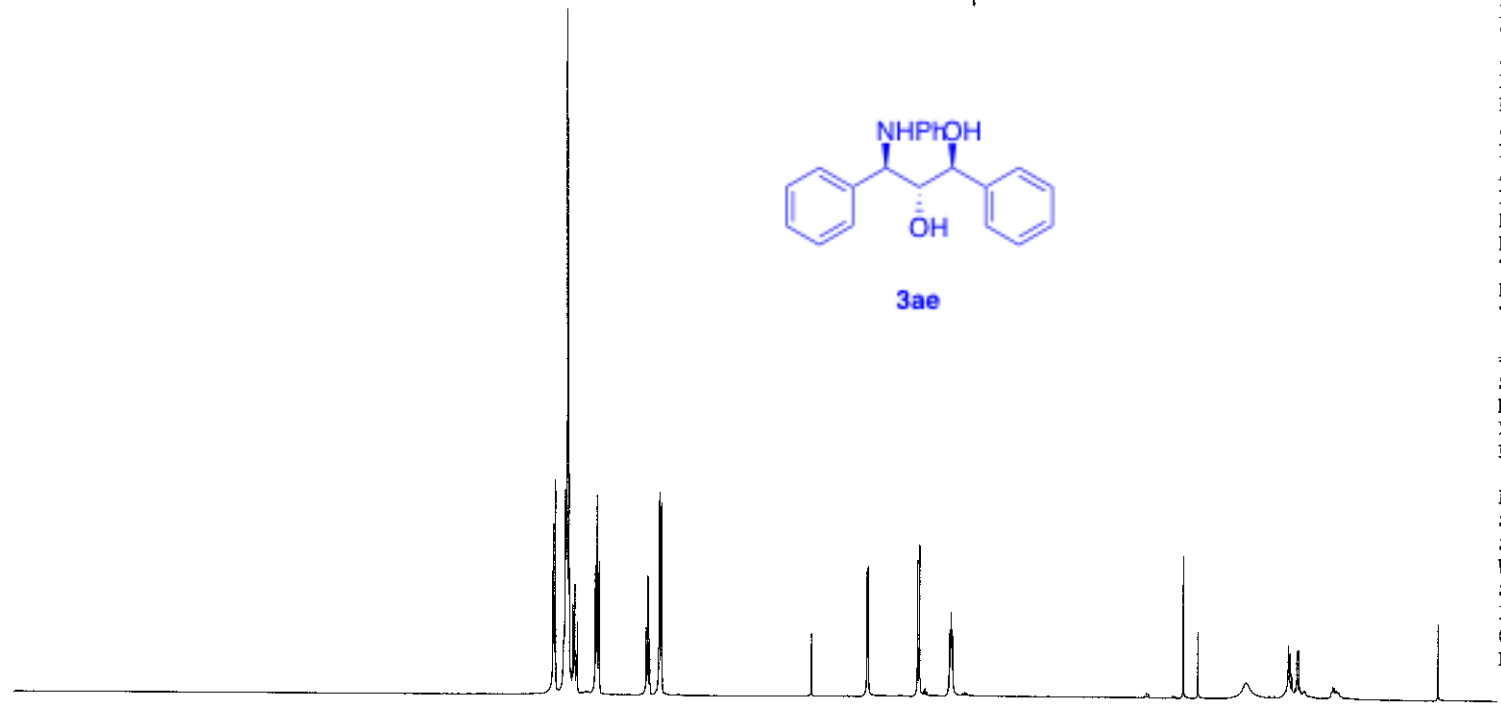
Current Data Parameters  
 NAME Lan\_20150404\_B5247  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150404  
 Time 20.24  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zg  
 TD 59998  
 SOLVENT CDCl3  
 NS 8  
 DS 0  
 SWH 10000.000 Hz  
 FIDRES 0.166672 Hz  
 AQ 2.9999001 sec  
 RG 25.24  
 DW 50.000 usec  
 DE 6.50 usec  
 TE 297.7 K  
 D1 10.0000000 sec  
 TD0 1



===== CHANNEL f1 =====  
 SF01 499.8730869 MHz  
 NUC1 1H  
 P1 10.75 usec  
 PLW1 18.2500000 W

F2 - Processing parameters  
 SI 65536  
 SF 499.8700233 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00



146.702  
 141.019  
 139.052  
 129.248  
 128.811  
 128.649  
 128.605  
 128.343  
 127.781  
 127.386  
 117.991  
 114.153

77.037  
 75.407

59.204



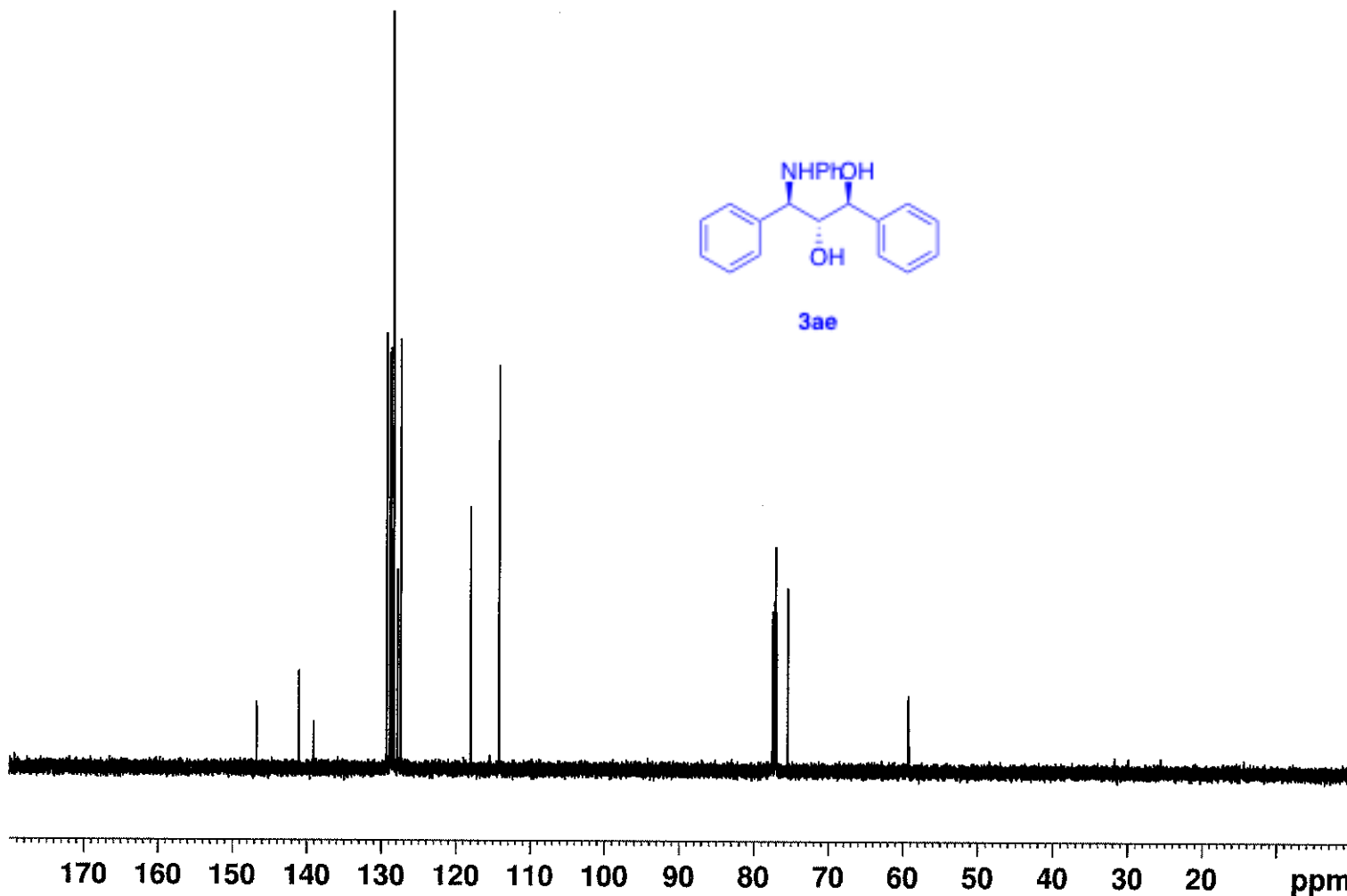
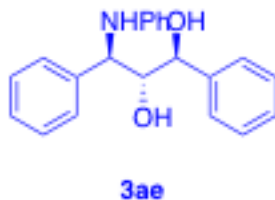
Current Data Parameters  
 NAME Lan\_20150404\_B5247\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150404  
 Time 20.39  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 63  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.8 K  
 D1 3.00000000 sec  
 D11 0.03000000 sec  
 TD0 1

==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923978 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40

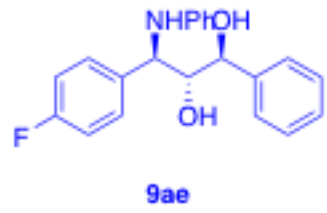


7.448  
7.444  
7.437  
7.431  
7.424  
7.420  
7.373  
7.371  
7.361  
7.357  
7.347  
7.337  
7.329  
7.323  
7.103  
7.088  
7.086  
7.071  
7.036  
7.018  
7.001  
6.672  
6.658  
6.643  
6.546  
6.544  
6.529  
6.527  
4.838  
4.831  
4.689  
4.310  
4.305  
4.294  
4.289  
4.110  
4.101  
4.093  
4.091  
4.084  
2.285  
2.279  
1.536  
1.527



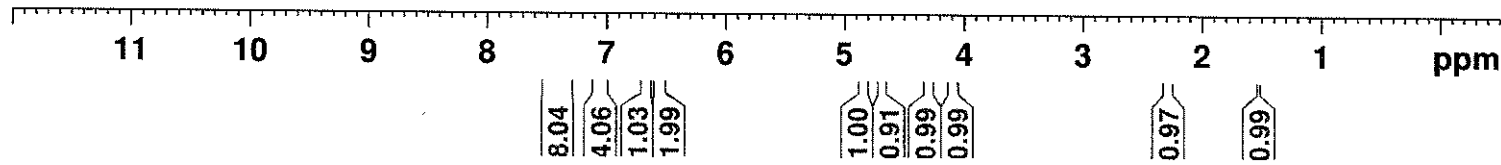
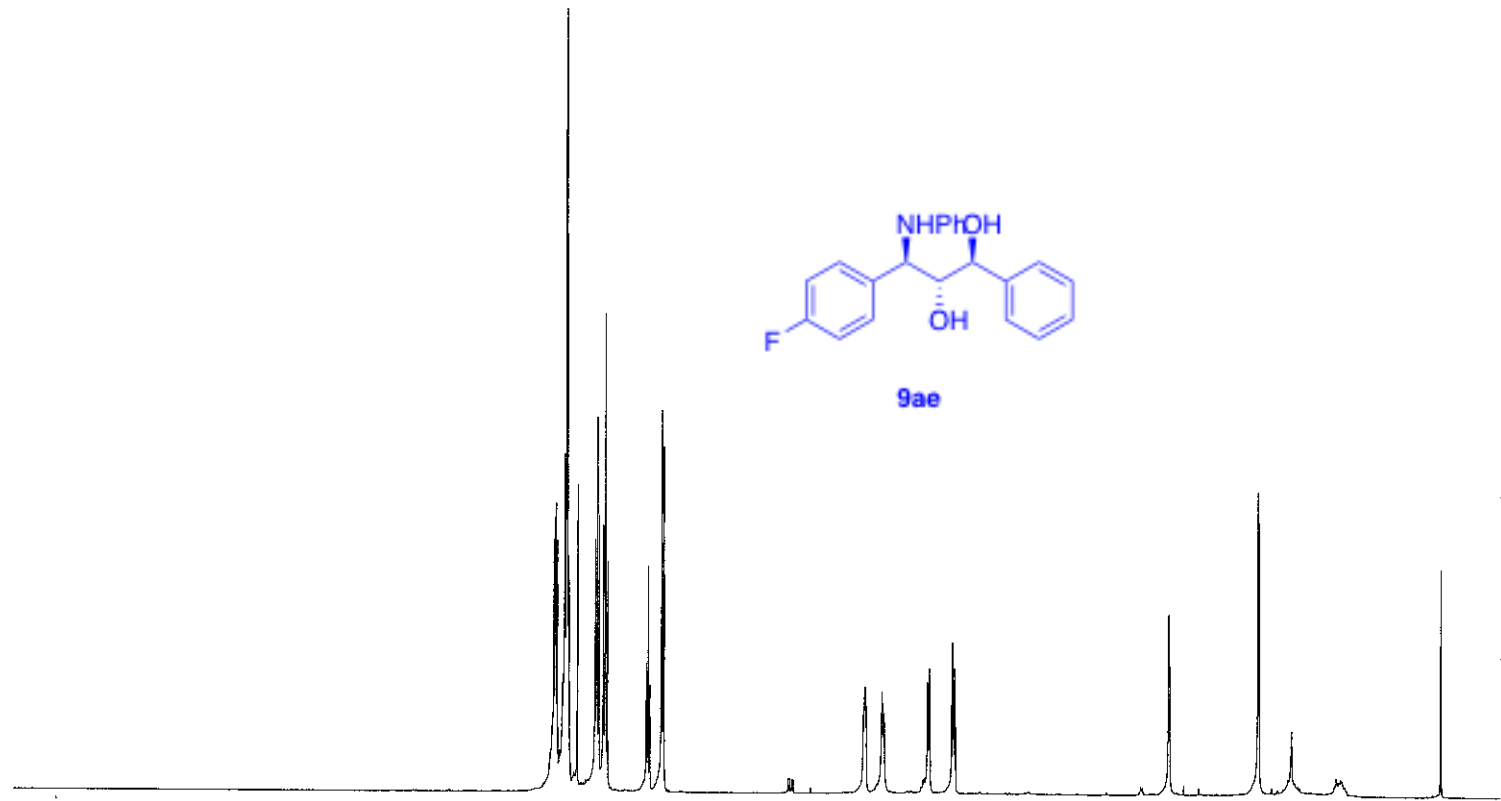
Current Data Parameters  
NAME Lan\_20150407\_B6221  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150407  
Time 20.39  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 44.57  
DW 50.000 usec  
DE 6.50 usec  
TE 297.0 K  
D1 10.0000000 sec  
TD0 1



===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700164 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



163.382  
 161.429  
 146.587  
 140.904  
 134.748  
 130.064  
 130.000  
 129.312  
 128.968  
 128.824  
 127.379  
 118.065  
 115.534  
 115.365  
 114.071

77.026  
 75.415

58.324



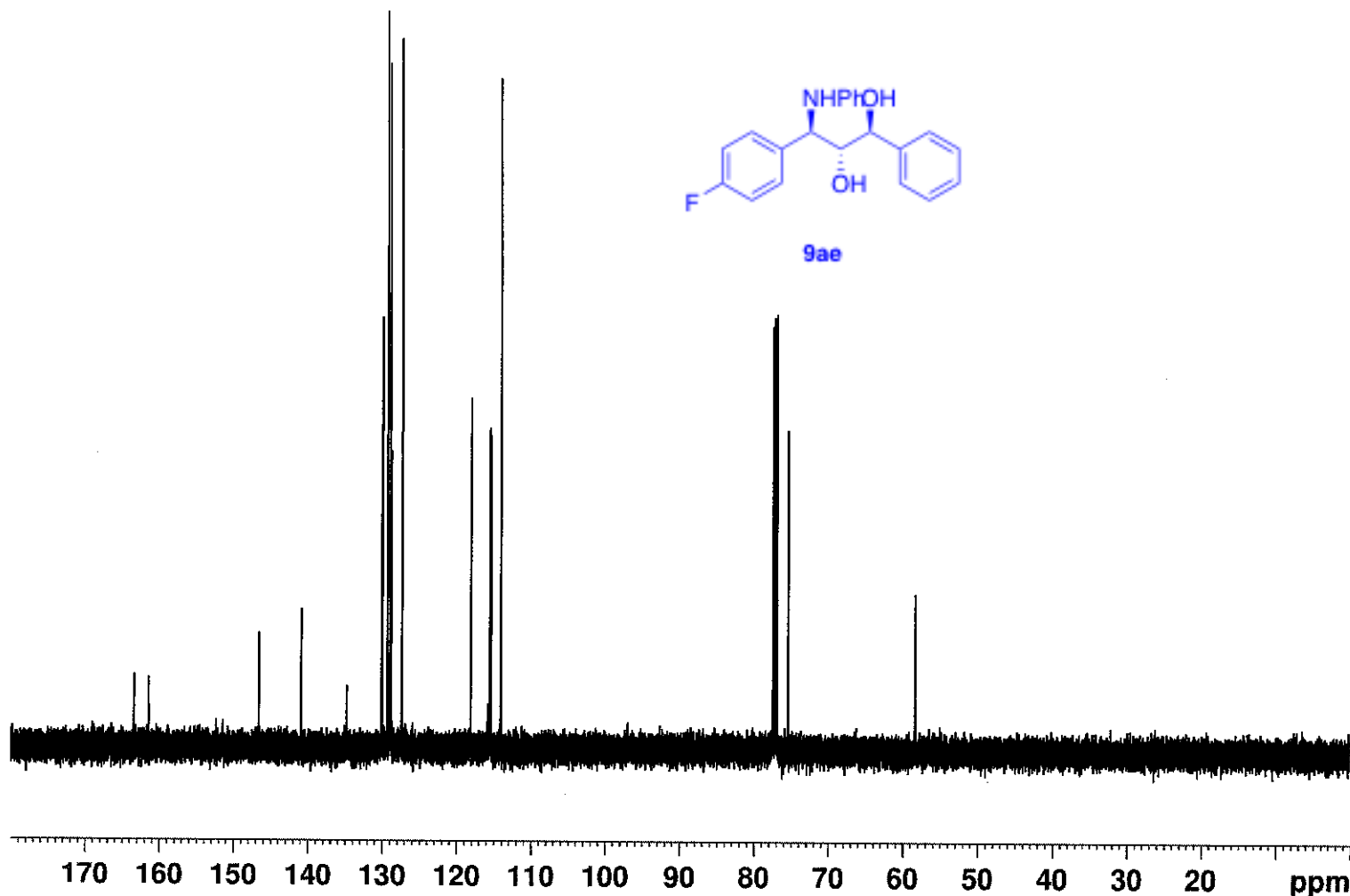
Current Data Parameters  
 NAME Lan\_20150407\_B6221\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150407  
 Time 19.30  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 ID 187496  
 SOLVENT CDC13  
 NS 146  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.4 K  
 D1 3.00000000 sec  
 D11 0.03000000 sec  
 TD0 1

===== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

===== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923926 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40





7.334  
7.329  
7.323  
7.317  
7.309  
7.305  
7.300  
7.294  
7.094  
7.079  
7.077  
7.062  
6.669  
6.655  
6.640  
6.523  
6.522  
6.507  
4.801  
4.794  
4.685  
4.262  
4.246  
4.078  
4.069  
4.061  
4.053

— 2.300

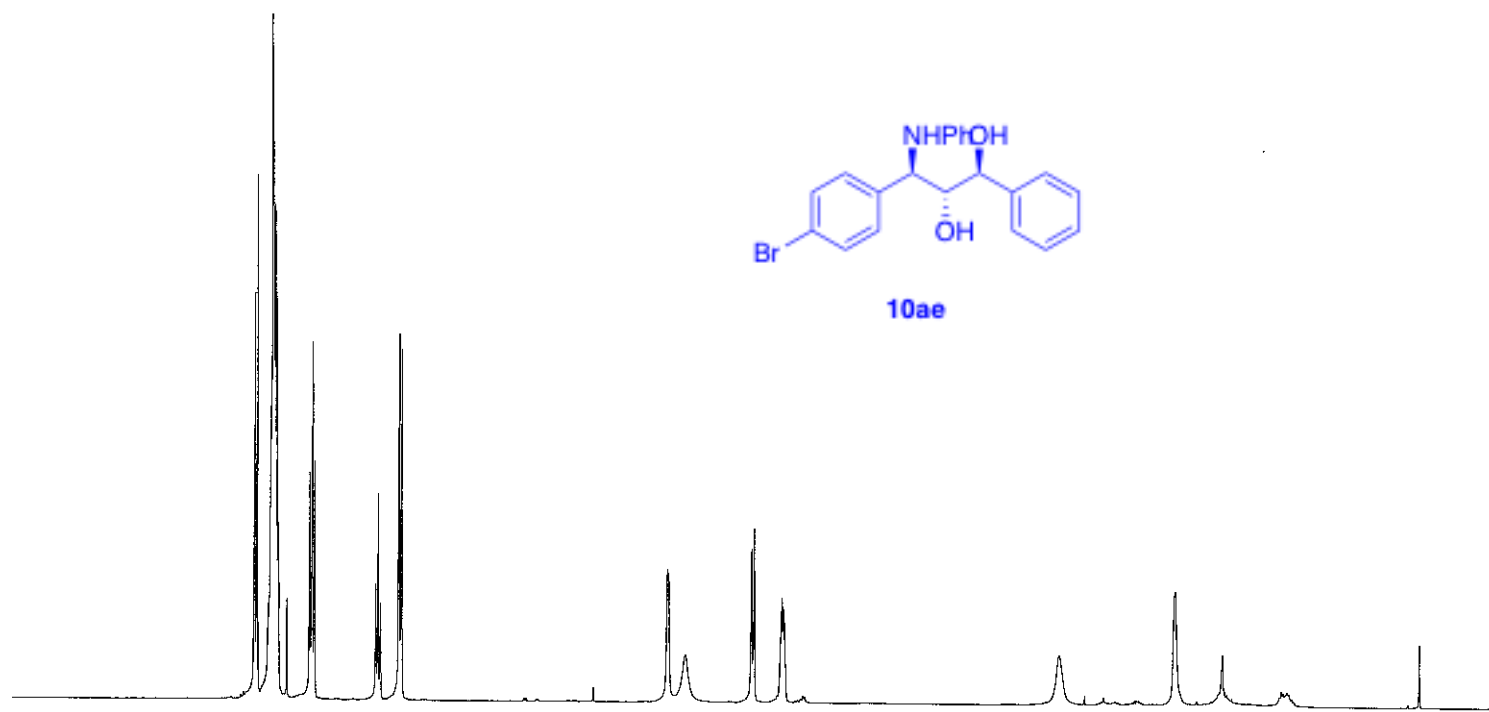


Current Data Parameters  
NAME Lan\_20150407\_B6195  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150407  
Time 19.07  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 28.76  
DW 50.000 usec  
DE 6.50 usec  
TE 297.4 K  
D1 10.0000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700227 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



2.05  
7.15  
2.02  
1.00  
2.02

1.00  
0.79  
1.00  
0.98

0.89

146.429  
 140.794  
 138.147  
 131.618  
 130.265  
 129.316  
 128.957  
 128.836  
 127.369  
 121.585  
 118.098  
 114.008

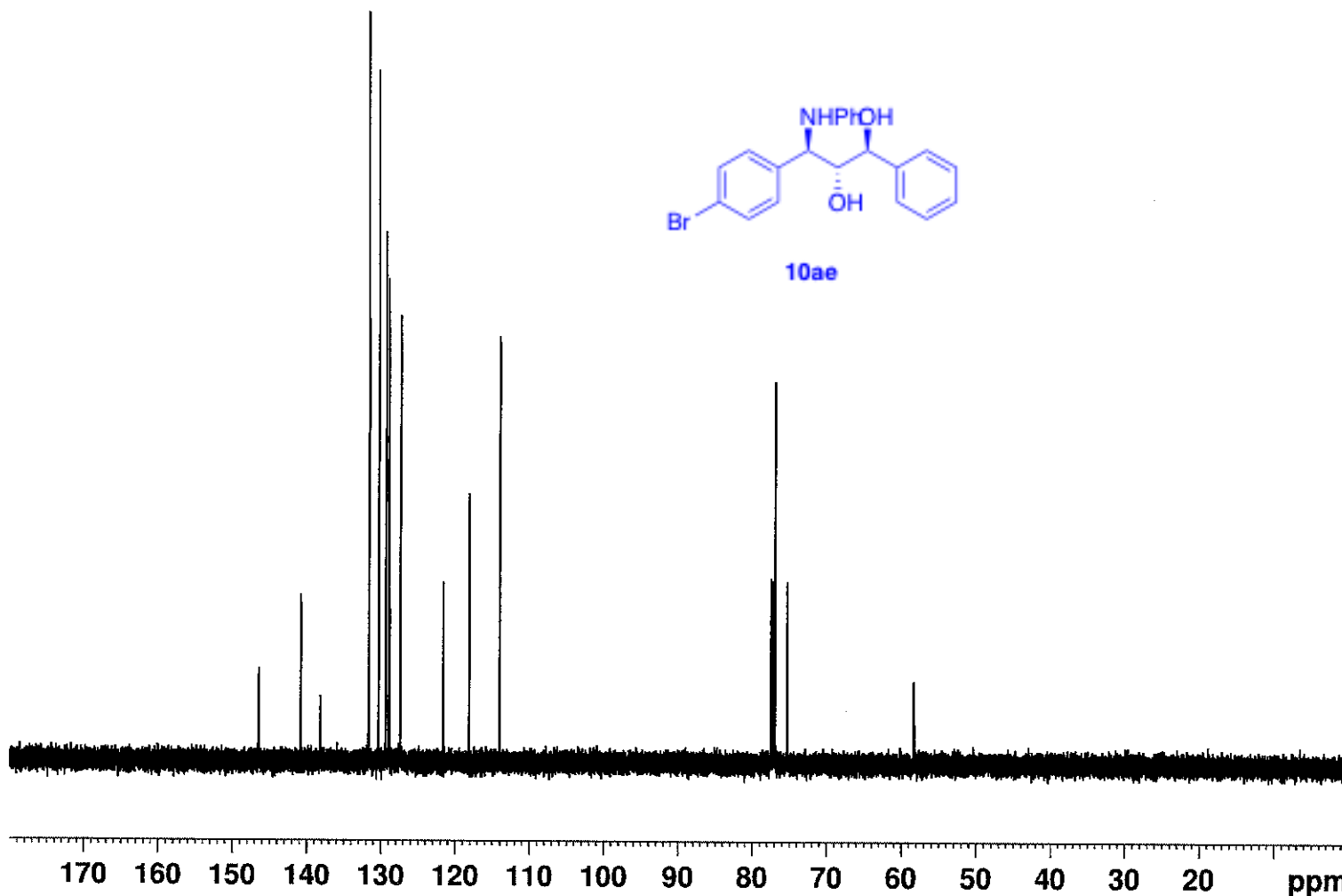
76.892  
 75.264

58.299



Current Data Parameters  
 NAME Lan\_20150407\_B6195\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150407  
 Time 19.14  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 41  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.5 K  
 D1 3.0000000 sec  
 D11 0.03000000 sec  
 TD0 1



==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923982 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40

8.714  
8.711  
8.705  
8.702  
8.037  
8.034  
8.021  
8.018  
7.539  
7.525  
7.385  
7.382  
7.368  
7.360  
7.352  
7.343  
7.331  
7.318  
7.315  
7.302  
7.291  
7.287  
7.268  
7.237  
7.221  
7.205  
7.017  
7.001  
6.541  
6.526  
4.879  
4.634  
4.620  
4.349  
4.339  
4.335  
4.324



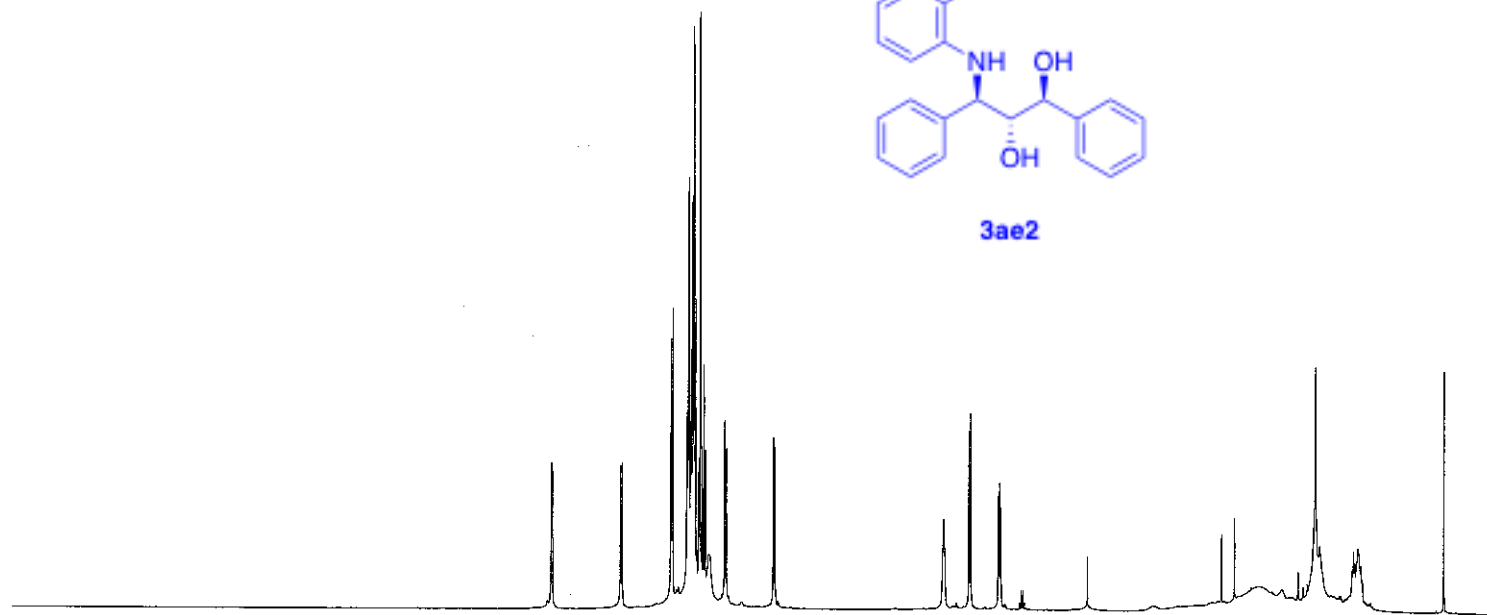
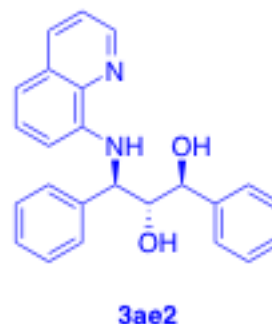
Current Data Parameters  
NAME Lan\_20150507\_B6265  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters

Date\_ 20150507  
Time 16.45  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 51.11  
DW 50.000 usec  
DE 6.50 usec  
TE 295.8 K  
D1 10.00000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700134 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



13 12 11 10 9 8 7 6 5 4 3 2 1 ppm

0.98  
0.99  
1.93  
8.40  
1.65  
1.02  
1.01  
1.01  
1.00  
1.07

147.174  
 143.212  
 140.870  
 139.903  
 139.152  
 138.684  
 136.109  
 128.732  
 128.597  
 128.493  
 128.422  
 127.788  
 127.738  
 127.544  
 121.469  
 114.659  
 106.750

77.338  
 75.322

58.834



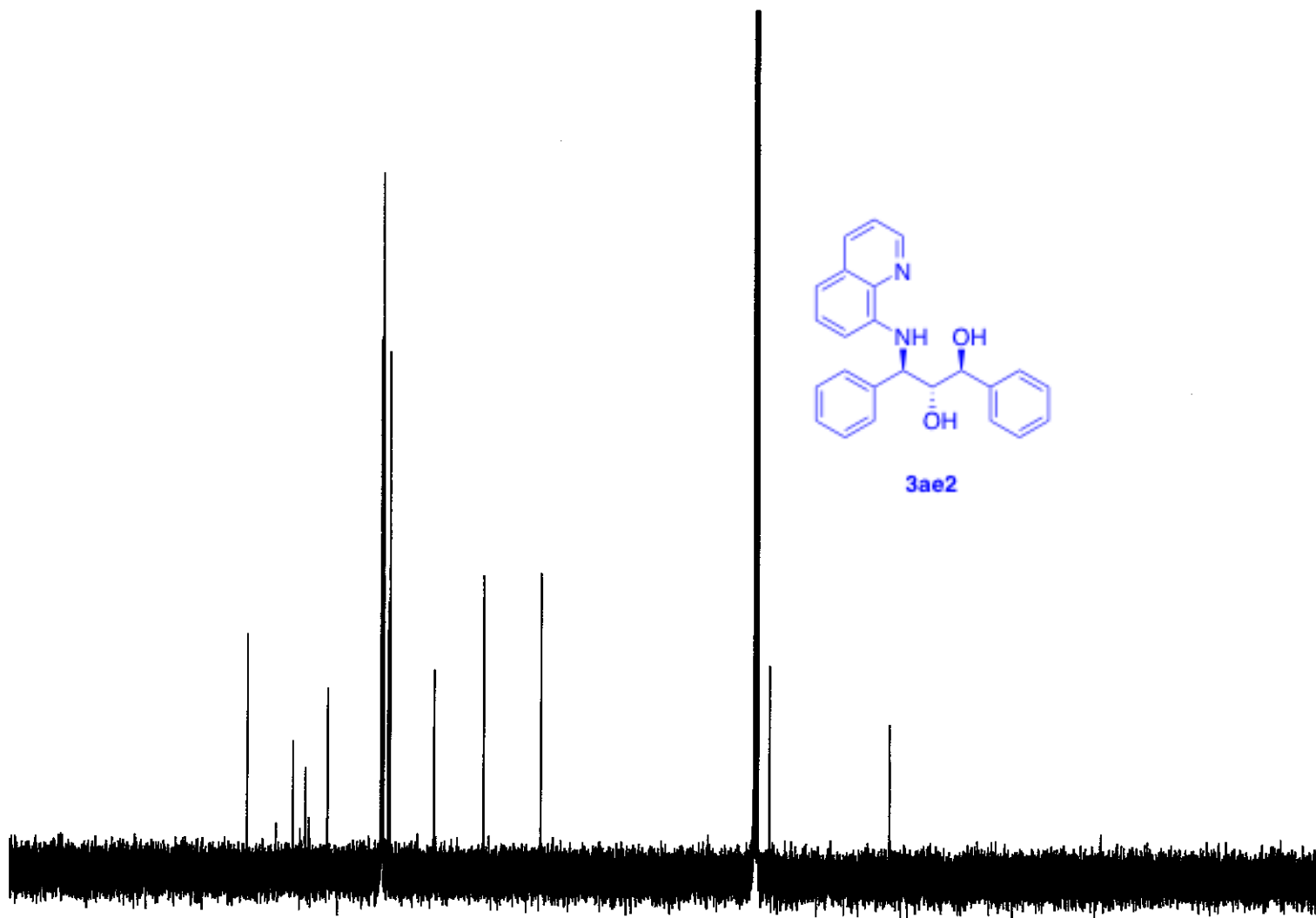
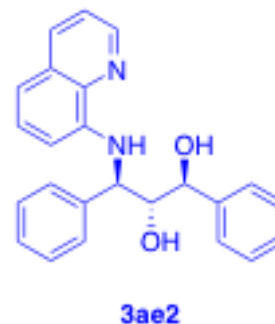
Current Data Parameters  
 NAME Lan\_20150507\_B6265\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150507  
 Time 17.01  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 193  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 296.6 K  
 D1 3.00000000 sec  
 D11 0.03000000 sec  
 TD0 1

==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923930 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40



170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

7.379  
7.372  
7.369  
7.354  
7.346  
7.340  
7.333  
7.329  
7.220  
7.202  
6.455  
6.438

4.719  
4.704  
3.822  
3.809  
3.650  
2.474  
1.801  
1.792  
1.770  
1.760  
1.533  
1.524  
1.519  
1.509  
1.500  
1.495  
1.489  
1.476  
1.471  
1.462  
1.371  
1.346  
1.338  
1.331  
1.324  
1.317

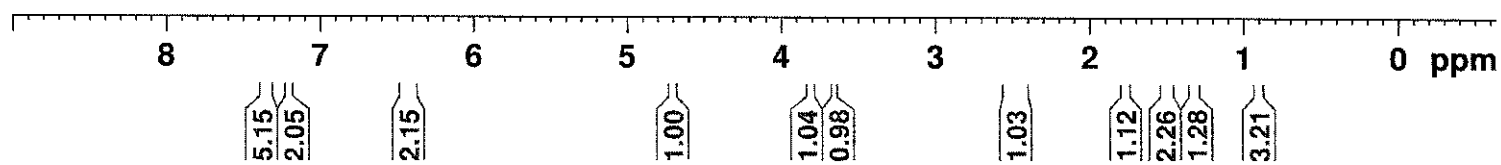
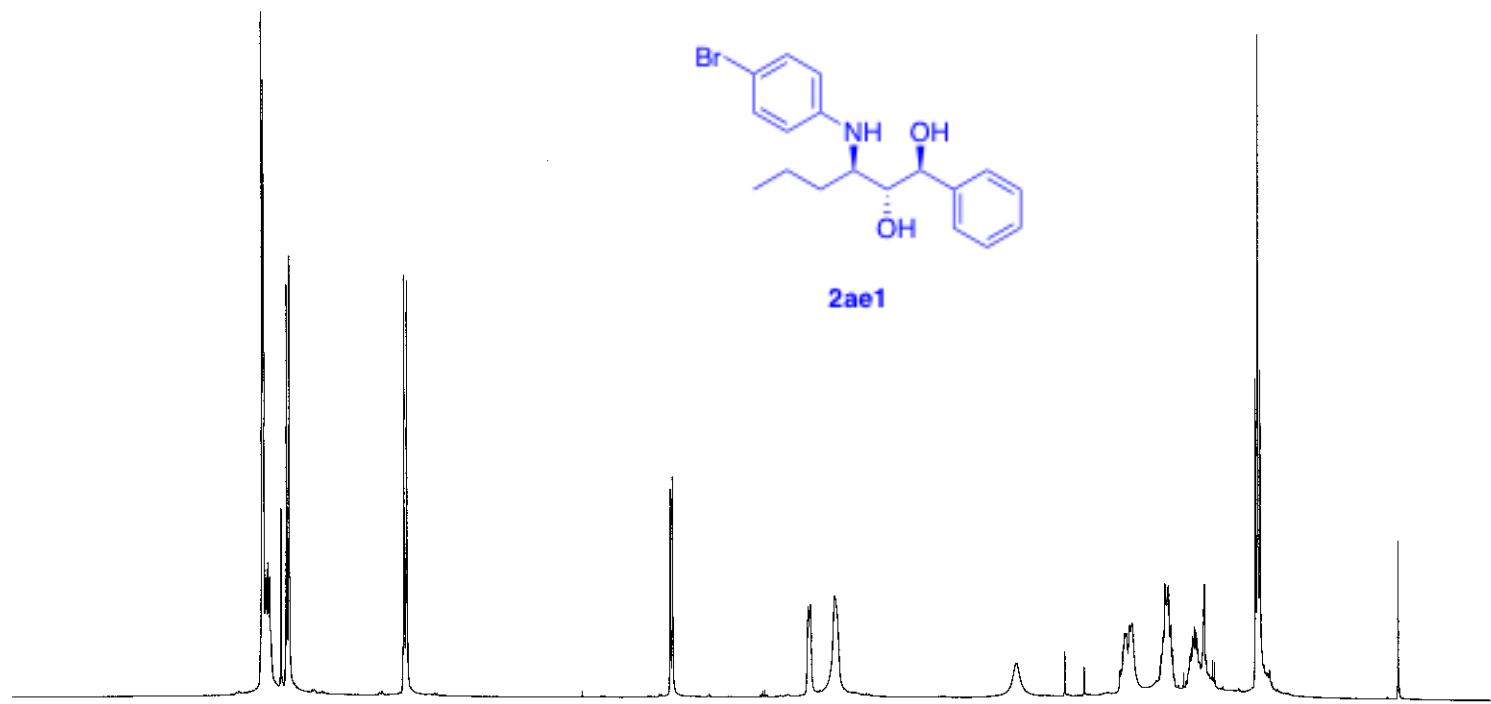
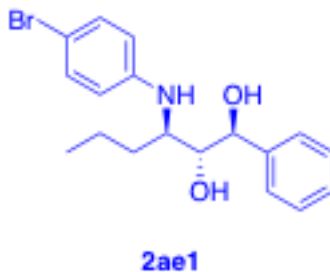


Current Data Parameters  
NAME Lan\_20150405\_B6153  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150405  
Time 18.47  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 35.92  
DW 50.000 usec  
DE 6.50 usec  
TE 297.5 K  
D1 10.00000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700144 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



—146.695  
—141.091  
132.030  
128.766  
128.494  
127.038  
—115.198  
—108.999

<75.612  
<75.548

—54.449

—31.875

—19.330  
—14.187



Current Data Parameters  
NAME Lan\_20150405\_B6153\_C  
EXPNO 1  
PROCNO 1

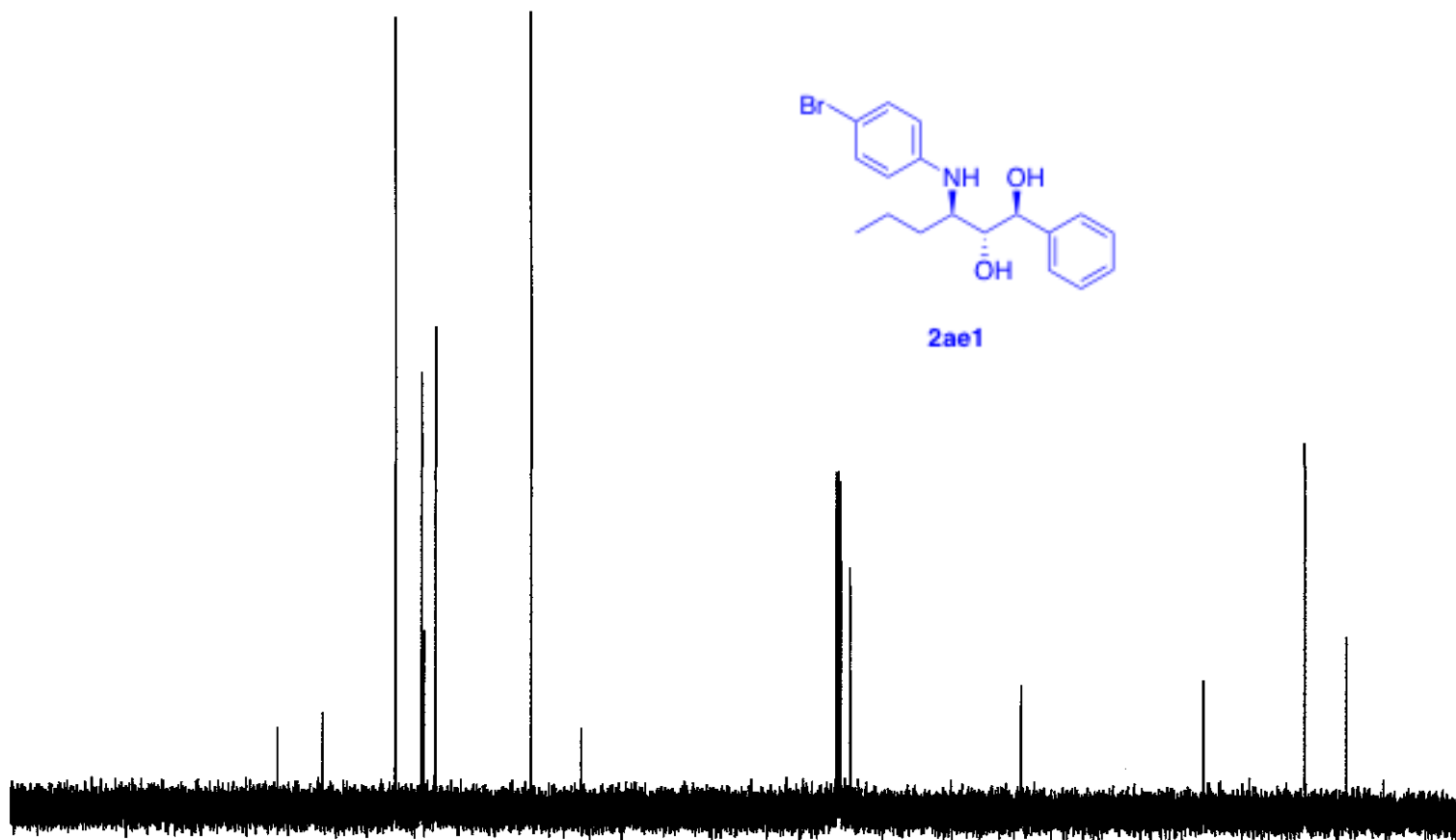
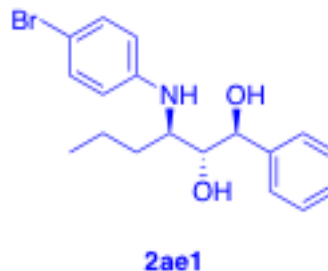
F2 - Acquisition Parameters

Date\_ 20150405  
Time 18.15  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zgdc  
TD 187496  
SOLVENT CDCl3  
NS 56  
DS 0  
SWH 31250.000 Hz  
FIDRES 0.166670 Hz  
AQ 2.9999361 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.9 K  
D1 3.00000000 sec  
D11 0.03000000 sec  
TDO 1

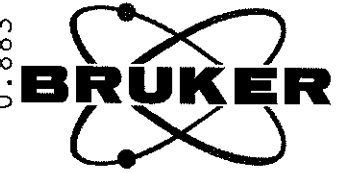
==== CHANNEL f1 =====  
SFO1 125.7049802 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 72.83999634 W

==== CHANNEL f2 =====  
SFO2 499.8724993 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 19.00000000 W  
PLW12 0.29688001 W

F2 - Processing parameters  
SI 1048576  
SF 125.6923937 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.40



170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm



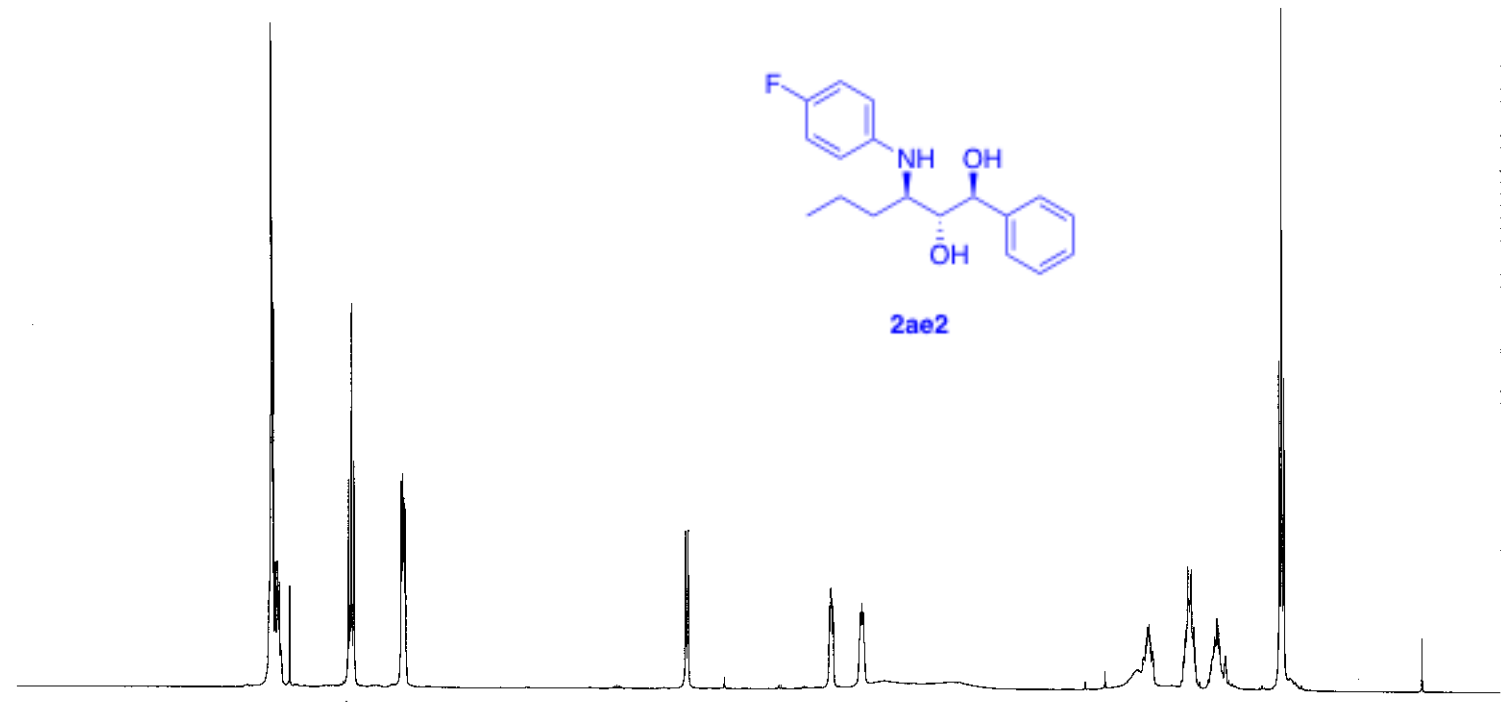
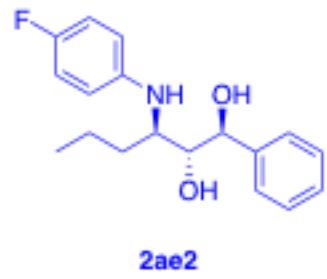
Current Data Parameters  
NAME Lan\_20150507\_B6155  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150507  
Time 15.05  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 22.37  
DW 50.000 usec  
DE 6.50 usec  
TE 295.7 K  
D1 10.0000000 sec  
TD0 1

==== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.2500000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700165 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

7.382  
7.370  
7.358  
7.342  
7.335  
7.330  
7.324  
7.317  
6.874  
6.856  
6.839  
6.534  
6.526  
6.517  
6.508  
4.707  
4.692  
3.786  
3.777  
3.772  
3.763  
3.588  
3.579  
3.571  
1.763  
1.756  
1.750  
1.744  
1.737  
1.513  
1.507  
1.498  
1.491  
1.483  
1.475  
1.465  
1.459  
1.325  
1.311  
1.305  
1.298  
0.912  
0.897  
0.883



5.13  
2.01  
2.02  
1.00  
1.02  
1.08  
1.15  
2.14  
1.26  
3.19

< 157.076  
 < 155.201  
 < 143.944  
 < 141.293  
 < 128.818  
 < 128.520  
 < 127.222  
 < 115.969  
 < 115.792  
 < 115.065  
 < 115.006

< 76.064  
 < 75.421

— 55.996

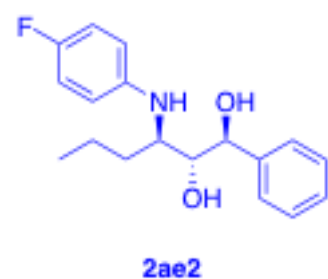
— 32.289

— 19.315  
 — 14.331



Current Data Parameters  
 NAME Lan\_20150507\_B6155\_C  
 EXPNO 1  
 PROCNO 1

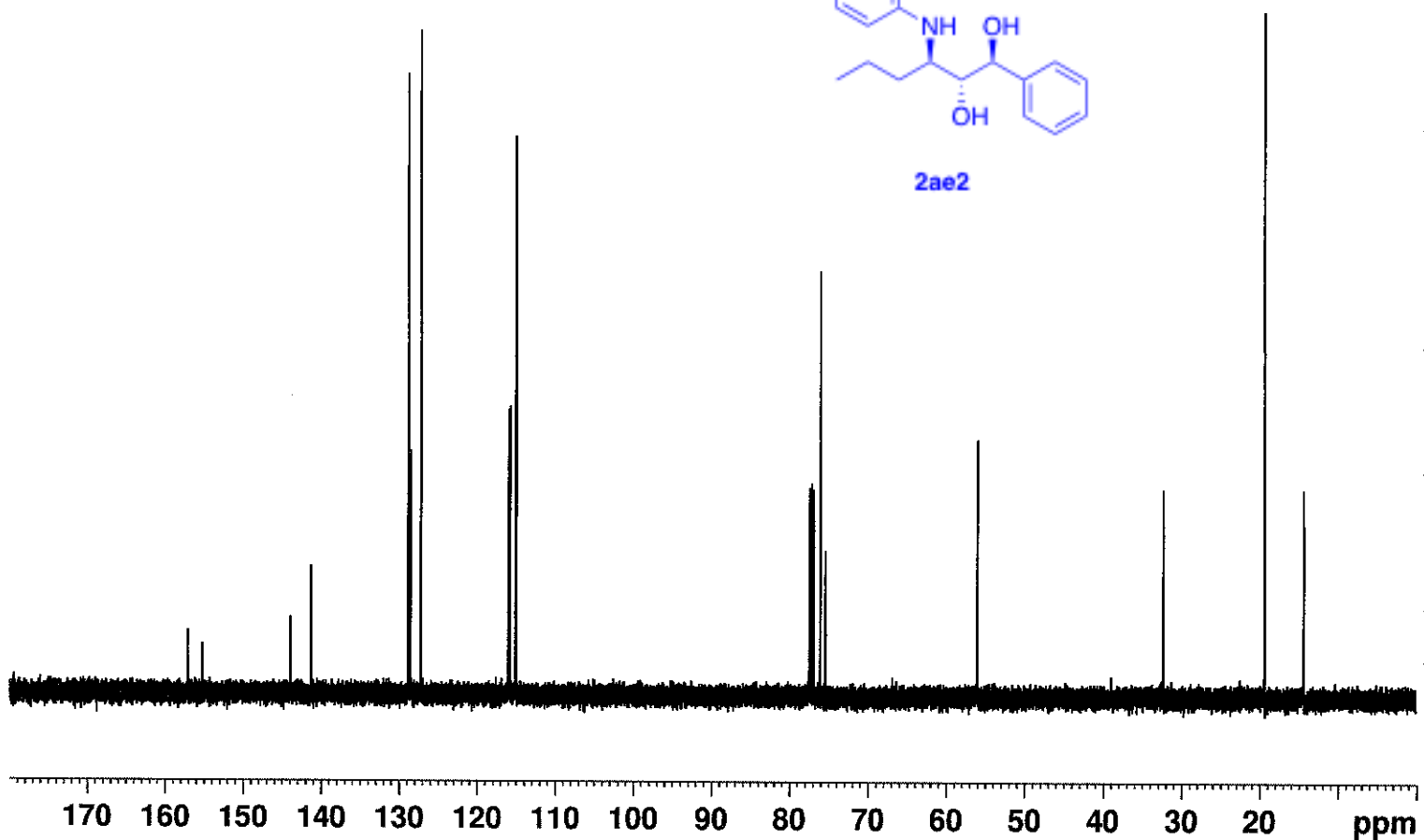
F2 - Acquisition Parameters  
 Date\_ 20150507  
 Time 15.15  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDCl3  
 NS 51  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 296.2 K  
 D1 3.00000000 sec  
 D11 0.03000000 sec  
 TD0 1



===== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

===== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923974 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40







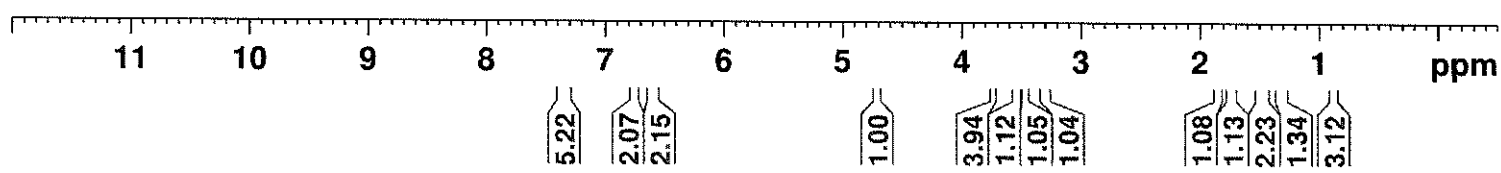
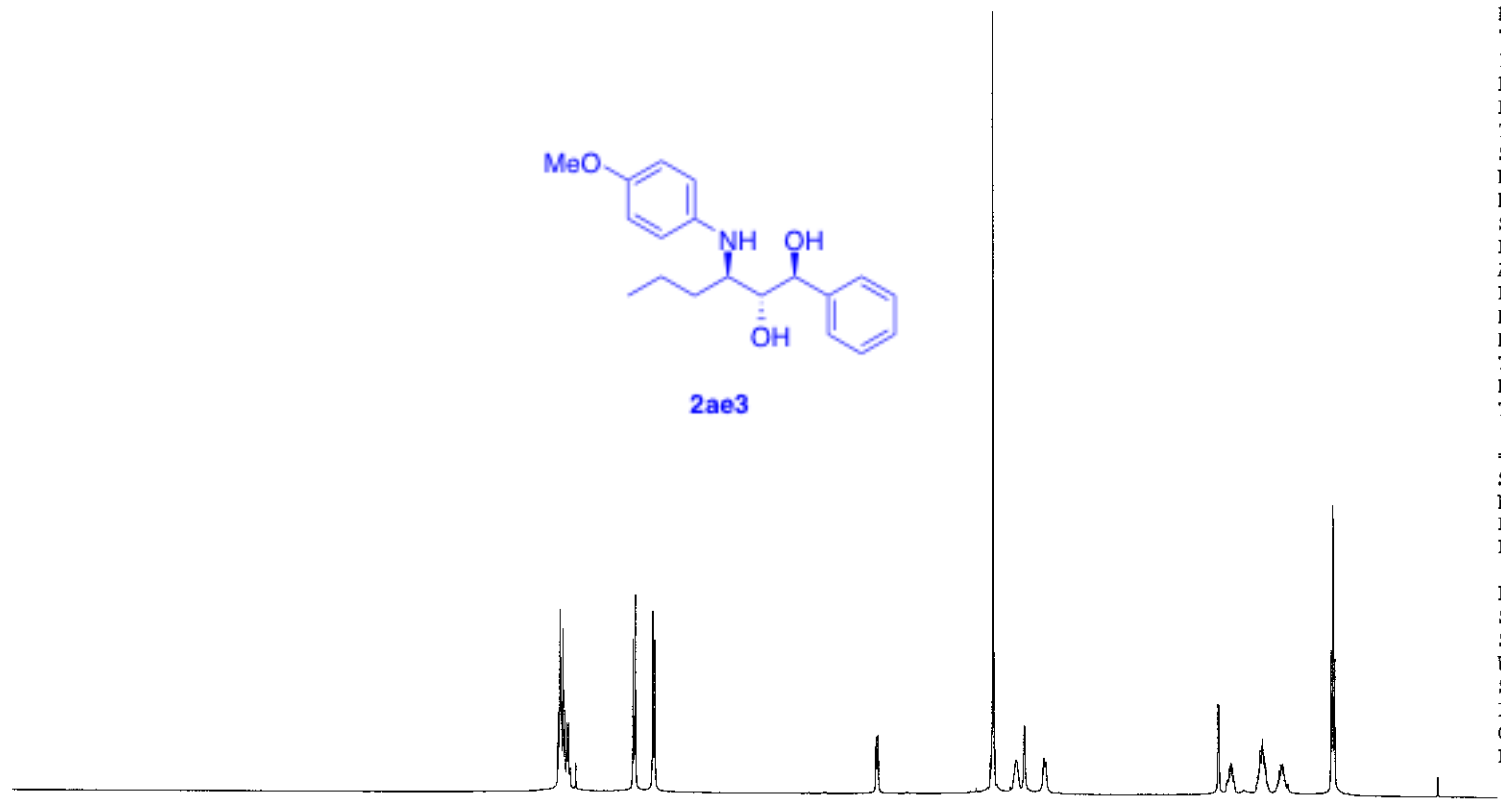
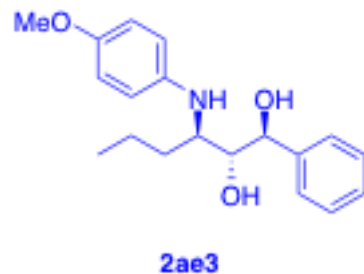
Current Data Parameters  
NAME Lan\_20150408\_B6161  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150408  
Time 20.18  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDC13  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 22.37  
DW 50.000 usec  
DE 6.50 usec  
TE 297.2 K  
D1 10.00000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700173 MHz  
WDW EM  
SSB 0  
LB 0 0.30 Hz  
GB 0  
PC 1.00

7.395  
7.380  
7.370  
7.356  
7.341  
7.324  
7.316  
7.310  
7.297  
6.765  
6.747  
6.600  
6.582  
4.718  
4.703  
3.757  
3.736  
3.543  
3.472  
3.311  
3.293  
1.846  
1.838  
1.749  
1.742  
1.737  
1.729  
1.503  
1.494  
1.487  
1.479  
1.473  
1.462  
1.456  
1.447  
1.334  
1.320  
1.311  
1.306  
1.299  
1.294  
0.896  
0.882  
0.867



— 152.800  
 < 141.497  
 < 141.378  
 < 128.749  
 < 128.406  
 < 127.315  
 < 115.987  
 < 115.077

< 76.582  
 < 75.269

< 57.217  
 < 55.881

— 32.671

— 19.090  
 — 14.366



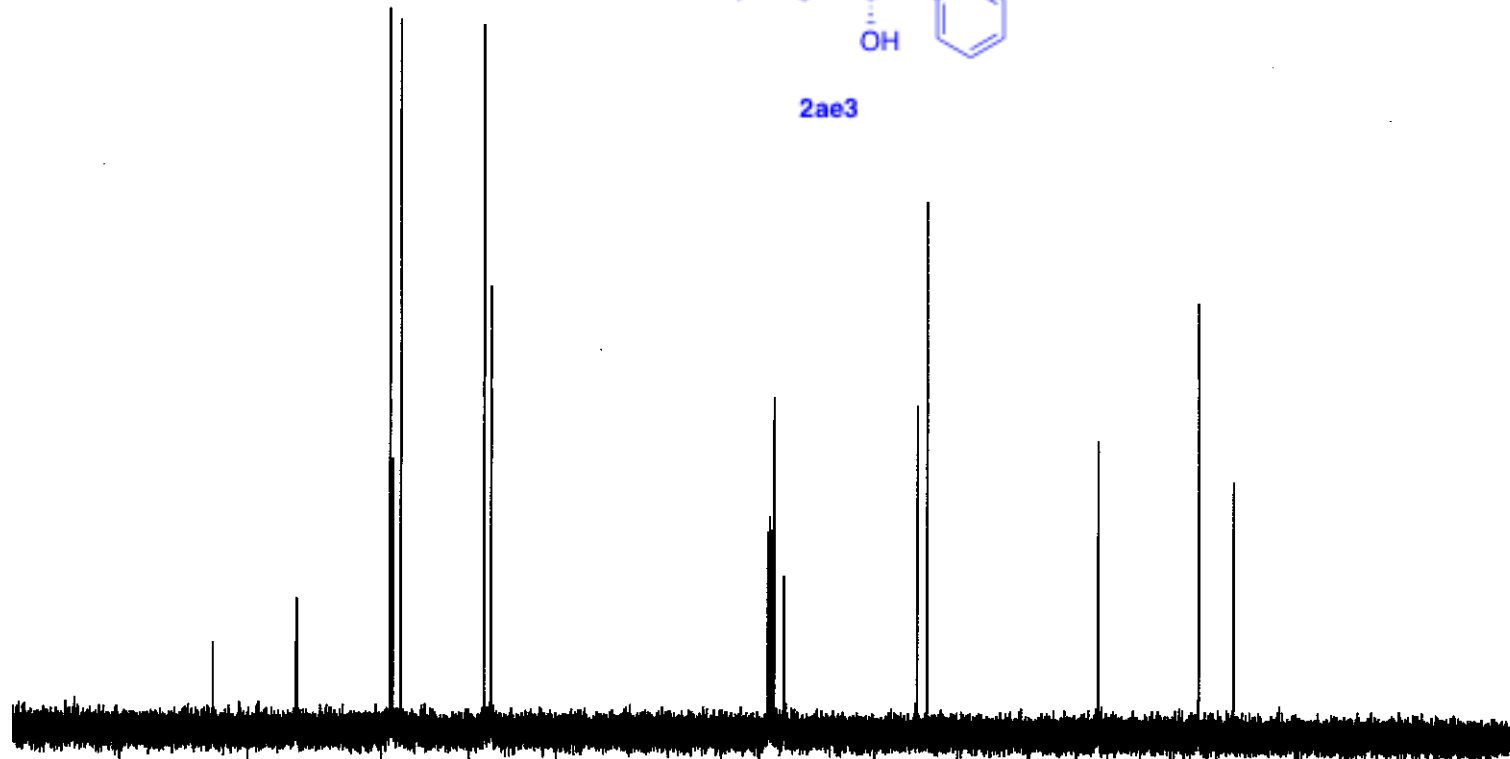
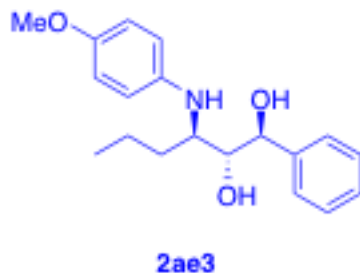
Current Data Parameters  
 NAME Lan\_20150408\_B6161\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150408  
 Time 20.30  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 33  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.5 K  
 D1 3.0000000 sec  
 D11 0.03000000 sec  
 TD0 1

==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923977 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40



160 140 120 100 80 60 40 20 0 ppm

7.338  
7.333  
7.329  
7.323  
7.320  
7.315  
7.303  
7.048  
7.034  
6.998  
6.982  
6.967  
6.609  
6.594  
6.580  
6.243  
6.227  
4.783  
4.777  
4.771  
4.765  
3.953  
3.943  
3.525  
3.514  
3.508  
3.496  
3.441  
3.423  
3.050  
3.047  
2.975  
2.956  
2.948  
2.931  
1.797  
1.735  
1.728  
1.724  
1.716  
1.705  
0.845  
0.830  
0.816



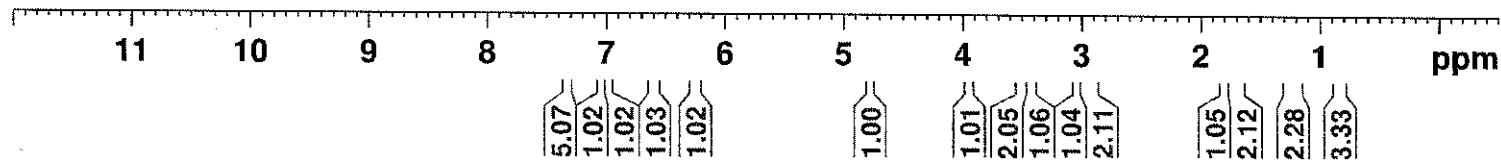
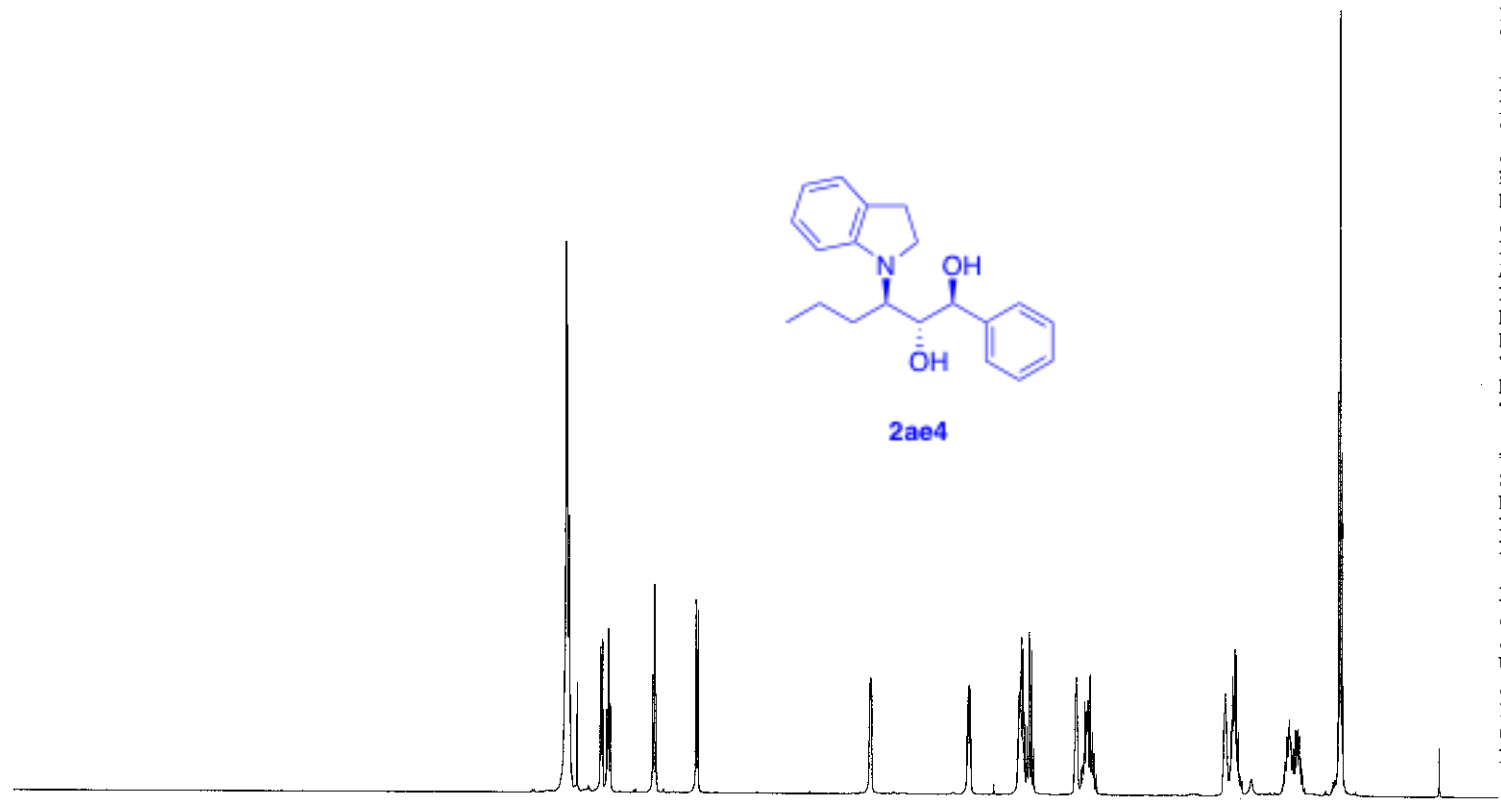
Current Data Parameters  
 NAME Lan\_20150408\_B6163  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150408  
 Time 20.38  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zg  
 TD 59998  
 SOLVENT CDCl3  
 NS 8  
 DS 0  
 SWH 10000.000 Hz  
 FIDRES 0.166672 Hz  
 AQ 2.9999001 sec  
 RG 25.24  
 DW 50.000 usec  
 DE 6.50 usec  
 TE 297.2 K  
 D1 10.0000000 sec  
 TD0 1



==== CHANNEL f1 =====  
 SFO1 499.8730869 MHz  
 NUC1 1H  
 P1 10.75 usec  
 PLW1 18.25000000 W

F2 - Processing parameters  
 SI 65536  
 SF 499.8700188 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00



—151.449  
 /140.416  
 /129.290  
 /128.639  
 /128.357  
 /127.618  
 /127.283  
 /124.638  
 /117.116  
 —107.147

<76.701  
 <76.103

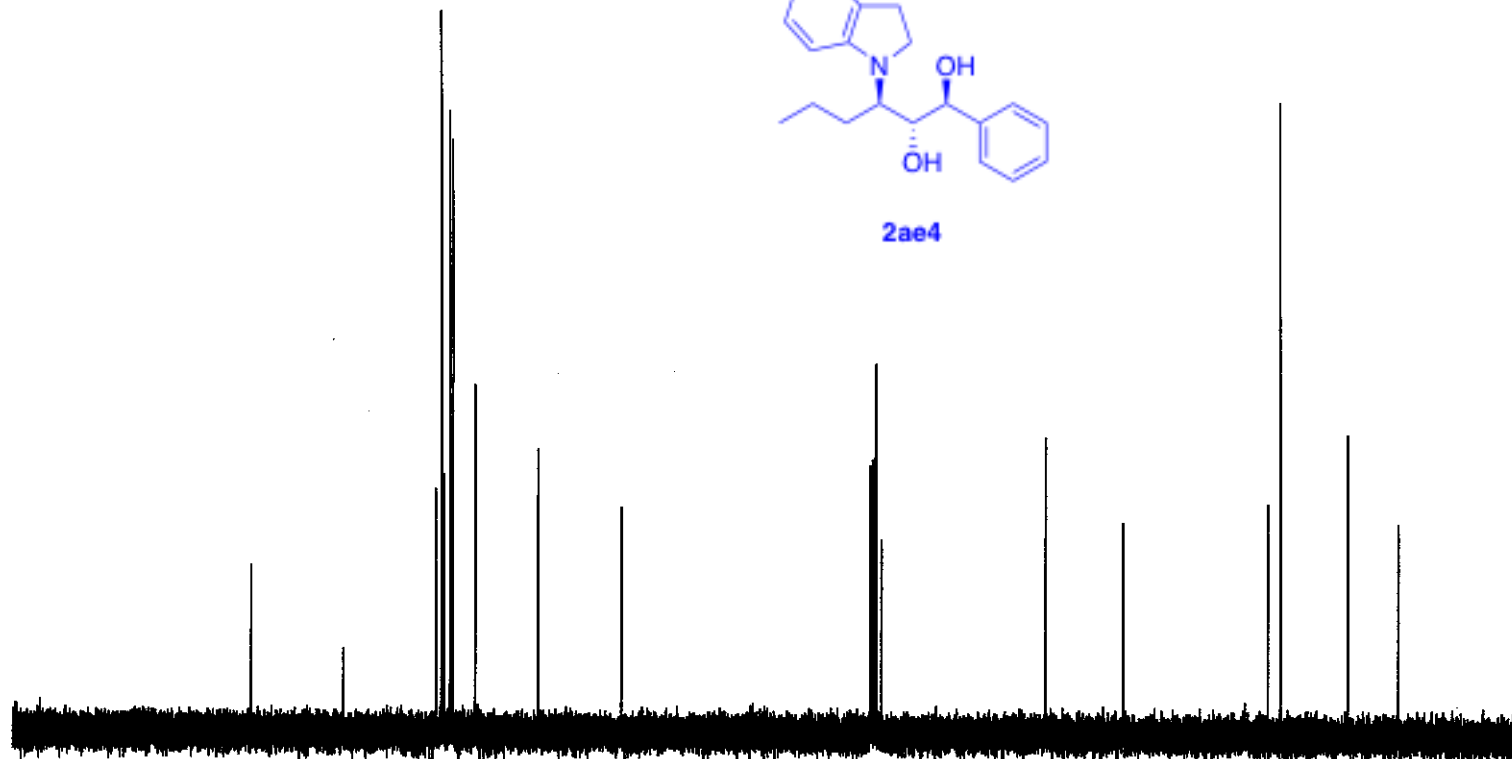
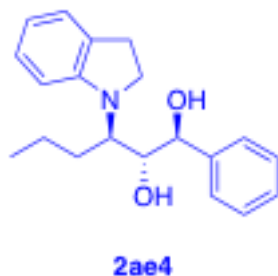
—56.493  
 —47.257

<29.931  
 <28.468  
 —20.459  
 —14.408



Current Data Parameters  
 NAME Lan\_20150408\_B6163\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150408  
 Time 20.44  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDCl3  
 NS 33  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.4 K  
 D1 3.0000000 sec  
 D11 0.03000000 sec  
 TDO 1



==== CHANNEL f1 =====  
 SF01 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SF02 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923975 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40

170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm



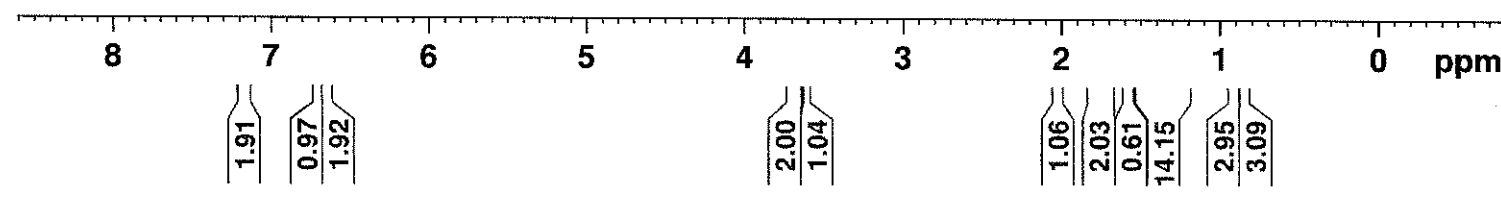
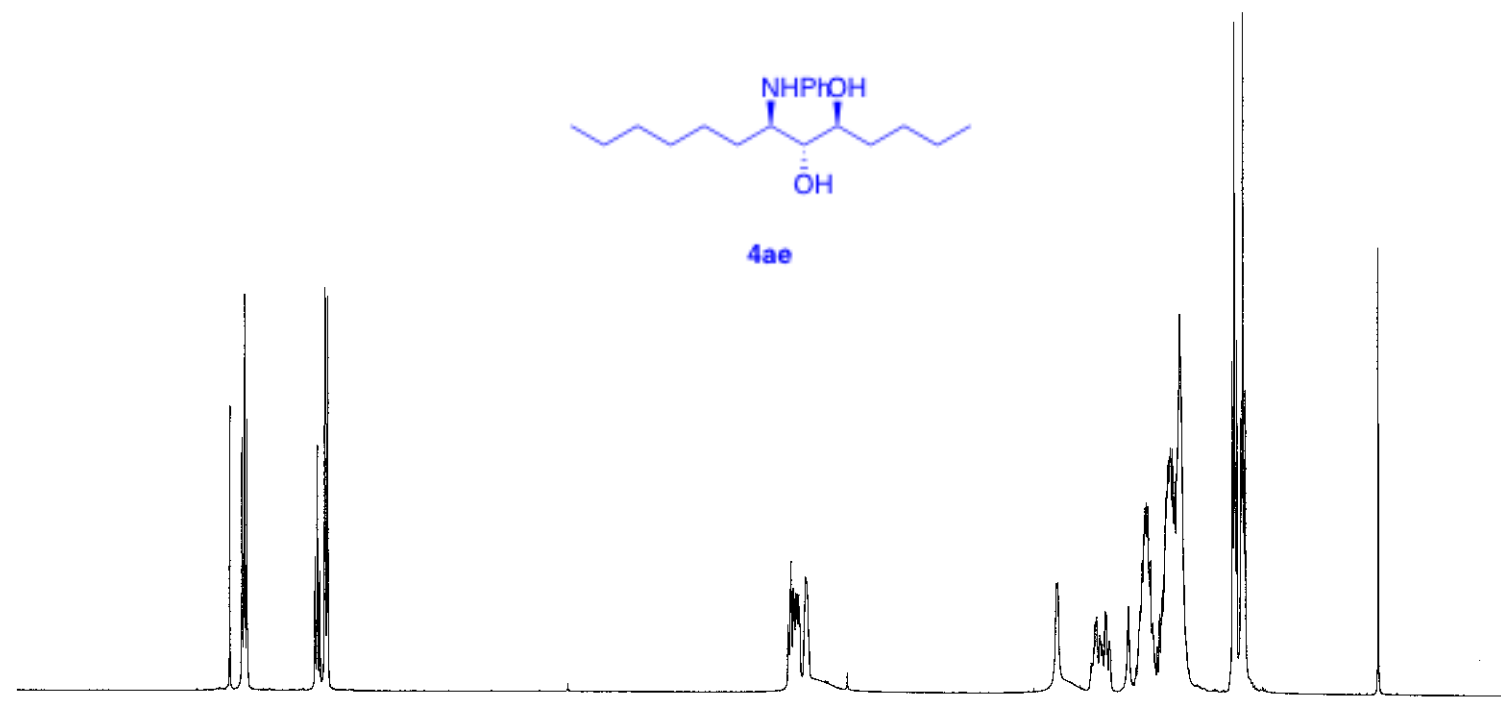
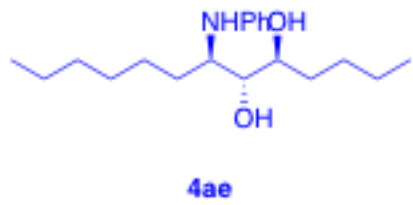
Current Data Parameters  
 NAME Lan\_20150721\_B6269  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150721  
 Time 18.07  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zg  
 ID 59998  
 SOLVENT CDC13  
 NS 8  
 DS 0  
 SWH 10000.000 Hz  
 FIDRES 0.166672 Hz  
 AQ 2.9999001 sec  
 RG 44.57  
 DW 50.000 usec  
 DE 6.50 usec  
 TE 296.0 K  
 D1 10.00000000 sec  
 TD0 1

===== CHANNEL f1 =====  
 SFO1 499.8730869 MHz  
 NUC1 1H  
 P1 10.75 usec  
 PLW1 18.25000000 W

F2 - Processing parameters  
 SI 65536  
 SF 499.8700122 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

7.182  
7.167  
7.165  
7.150  
6.720  
6.705  
6.691  
6.659  
6.657  
6.642  
3.708  
3.704  
3.690  
3.685  
3.674  
3.666  
3.613  
3.607  
2.022  
1.489  
1.480  
1.471  
1.463  
1.454  
1.445  
1.436  
1.355  
1.353  
1.342  
1.339  
1.334  
1.329  
1.326  
1.313  
1.300  
1.284  
1.254  
1.243  
0.921  
0.907  
0.892  
0.868  
0.854  
0.840

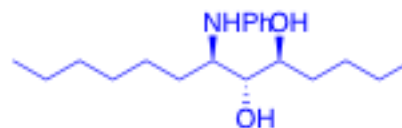


—147.906  
 —129.554  
 —117.875  
 —113.824  
 —75.343  
 —73.108  
 —55.350  
 33.333  
 31.926  
 30.147  
 29.599  
 27.880  
 26.249  
 22.875  
 22.749  
 14.182  
 14.171



Current Data Parameters  
 NAME Lan\_20150721\_B6269\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150721  
 Time 18.14  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 523  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 296.0 K  
 D1 2.0000000 sec  
 D11 0.03000000 sec  
 TD0 1



4ae

===== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

===== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923911 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40



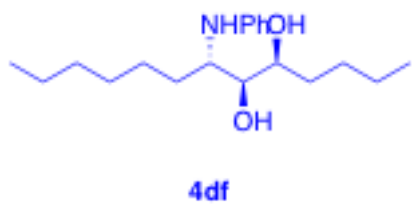
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

7.184  
7.169  
7.167  
7.152  
6.728  
6.713  
6.698  
6.689  
6.687  
6.671  
3.588  
3.571  
3.501  
3.496  
1.601  
1.590  
1.583  
1.570  
1.561  
1.555  
1.418  
1.408  
1.404  
1.389  
1.381  
1.373  
1.359  
1.352  
1.345  
1.331  
1.294  
1.281  
1.276  
1.268  
1.255  
1.246  
1.239  
1.215  
0.937  
0.923  
0.909  
0.868  
0.855  
0.841



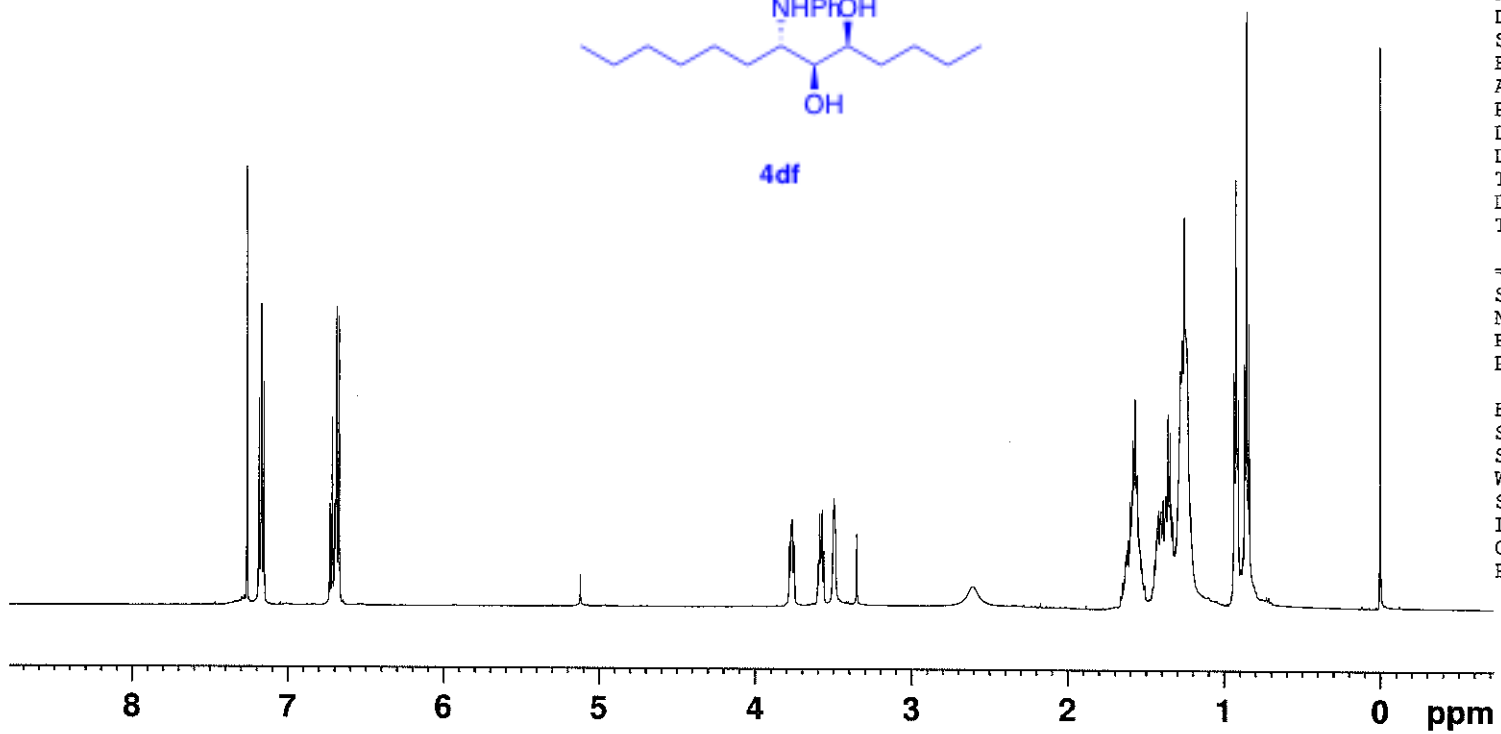
Current Data Parameters  
 NAME Lan\_20150721\_B6303  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150721  
 Time 19.23  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zg  
 TD 59998  
 SOLVENT CDC13  
 NS 8  
 DS 0  
 SWH 10000.000 Hz  
 FIDRES 0.166672 Hz  
 AQ 2.9999001 sec  
 RG 44.57  
 DW 50.000 usec  
 DE 6.50 usec  
 TE 296.2 K  
 D1 10.0000000 sec  
 TD0 1



==== CHANNEL f1 =====  
 SFO1 499.8730869 MHz  
 NUC1 1H  
 P1 10.75 usec  
 PLW1 18.2500000 W

F2 - Processing parameters  
 SI 65536  
 SF 499.8700120 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00



1.98  
2.89  
1.00  
1.01  
1.03  
1.04  
3.30  
14.01  
3.01  
3.25

—148.396

—129.534

—118.013

—113.922

—74.107

—71.263

—57.029

34.138

31.841

31.792

29.493

28.010

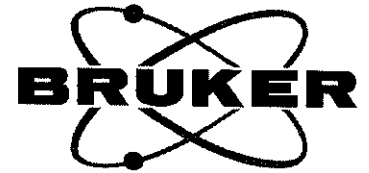
26.322

22.830

22.716

14.166

14.160



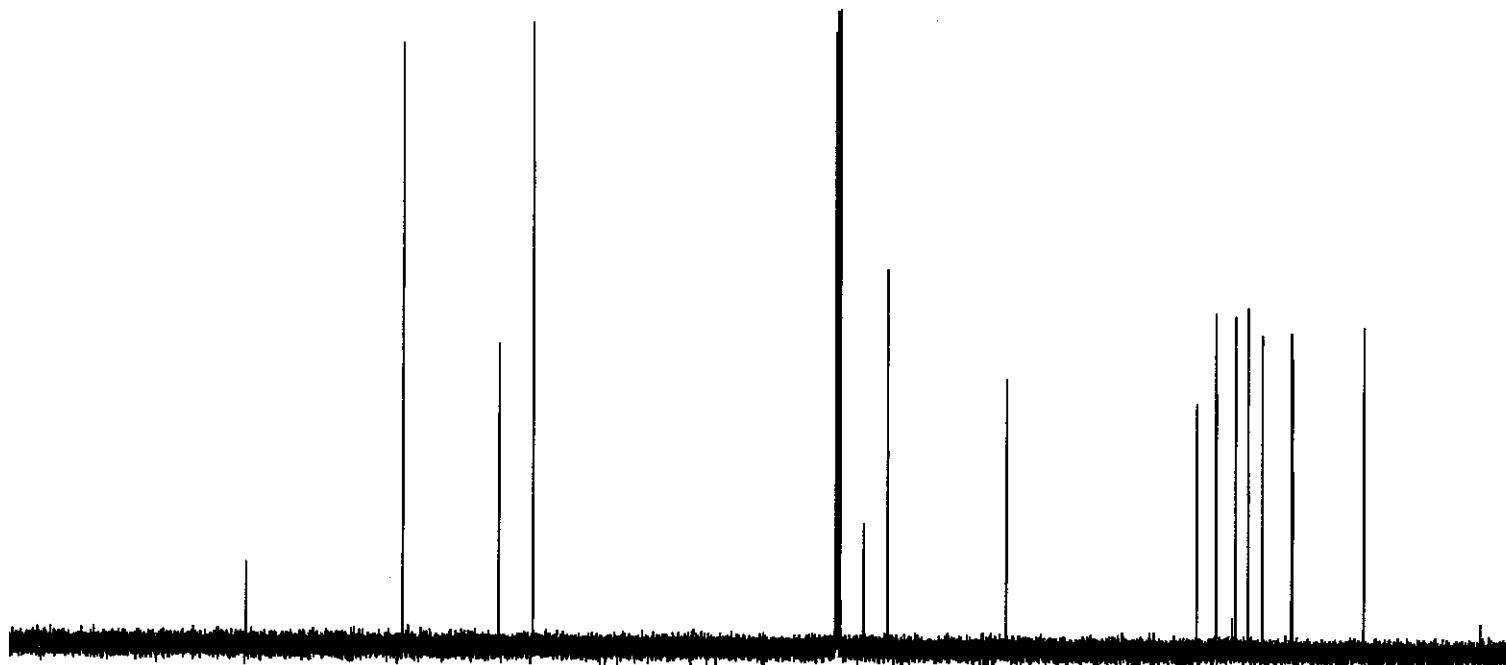
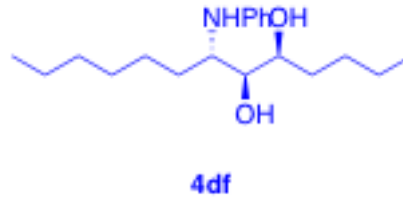
Current Data Parameters  
 NAME Lan\_20150721\_B6303\_C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150721  
 Time 19.34  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 344  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 296.9 K  
 D1 2.0000000 sec  
 D11 0.03000000 sec  
 TD0 1

==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923913 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40



170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm





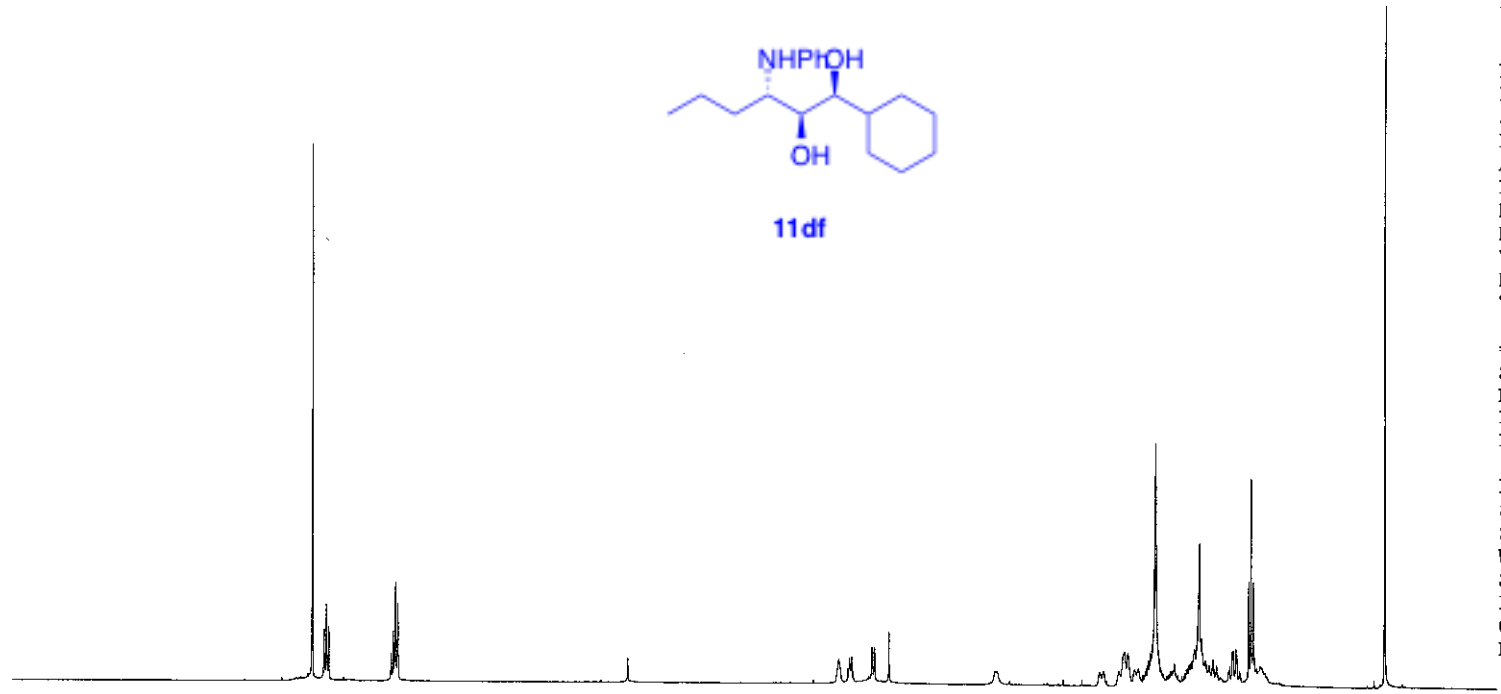
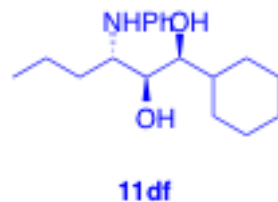
Current Data Parameters  
NAME Lan\_20150717\_B8009  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20150717  
Time 18.11  
INSTRUM spect  
PROBHD 5 mm PABBO BB/  
PULPROG zg  
TD 59998  
SOLVENT CDCl3  
NS 8  
DS 0  
SWH 10000.000 Hz  
FIDRES 0.166672 Hz  
AQ 2.9999001 sec  
RG 62.78  
DW 50.000 usec  
DE 6.50 usec  
TE 296.1 K  
D1 10.0000000 sec  
TD0 1

===== CHANNEL f1 =====  
SFO1 499.8730869 MHz  
NUC1 1H  
P1 10.75 usec  
PLW1 18.25000000 W

F2 - Processing parameters  
SI 65536  
SF 499.8700112 MHz  
WDW EM  
SSB 0  
LB 0 0.30 Hz  
GB 0  
PC 1.00

7.182  
7.167  
7.165  
7.150  
6.728  
6.713  
6.698  
6.683  
3.691  
3.620  
3.614  
3.604  
3.466  
3.463  
3.451  
3.448  
3.352  
1.772  
1.765  
1.758  
1.739  
1.666  
1.423  
1.327  
1.321  
1.313  
1.307  
1.289  
1.213  
1.210  
1.193  
1.187  
1.169  
1.162  
1.156  
1.137  
1.048  
1.030  
1.024  
1.006  
0.999  
0.920  
0.905  
0.891



9 8 7 6 5 4 3 2 1 0 ppm

1.77  
2.50

1.00  
1.07  
1.02

0.96

1.02  
3.92  
1.94  
4.04  
2.16  
2.00  
3.02

—148.551

—129.528

—118.027

—113.953

—75.162

—71.132

—57.432

—40.897

—34.494

—29.567

—28.859

—26.535

—26.203

—26.140

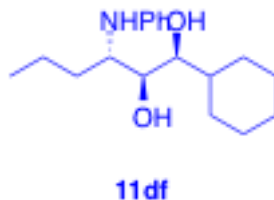
—19.645

—14.311



Current Data Parameters  
 NAME Lan\_20150717\_B8009\_C  
 EXPNO 1  
 PROCNO 1

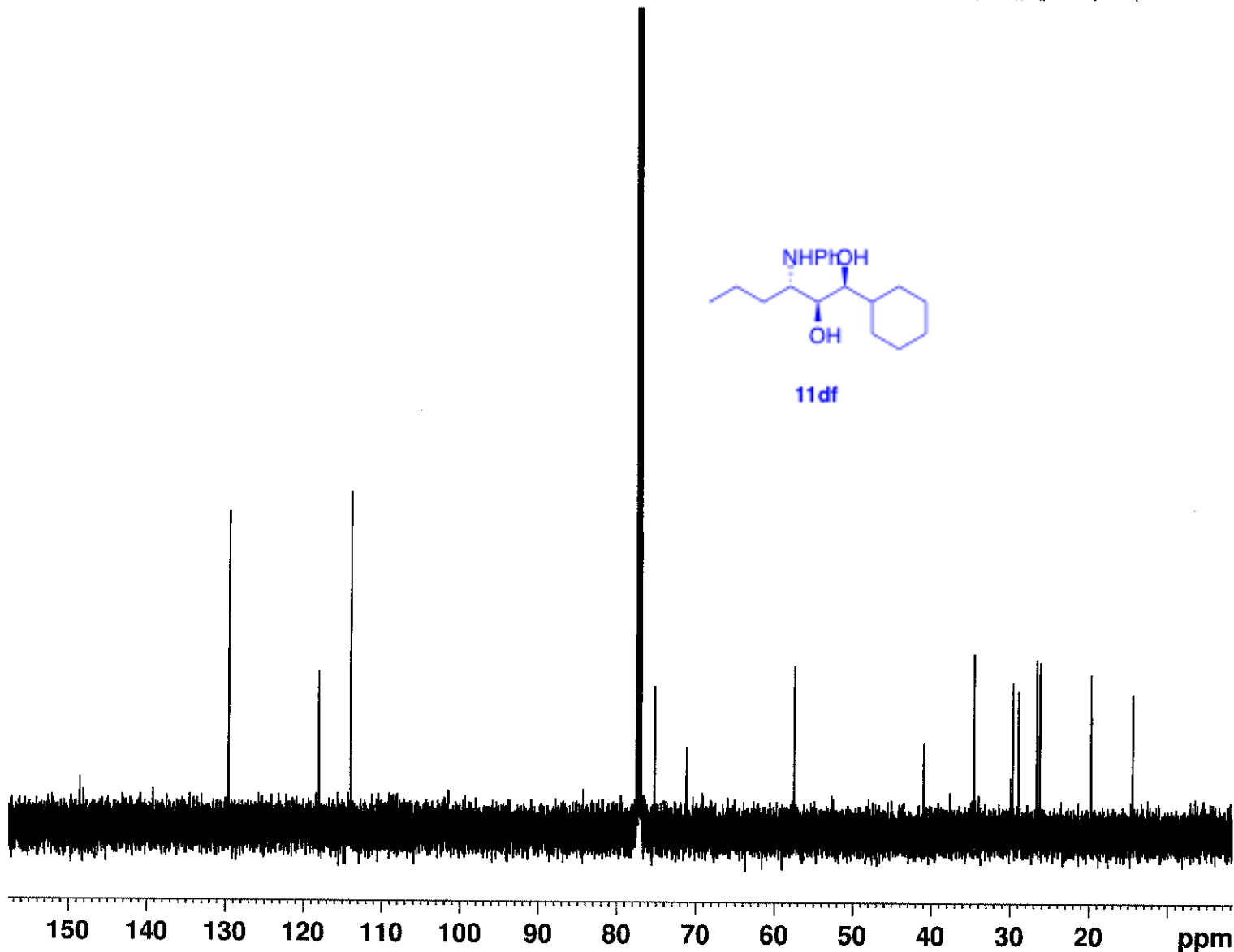
F2 - Acquisition Parameters  
 Date\_ 20150717  
 Time 18.53  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 656  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.6 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TD0 1



==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923908 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40



7.425  
7.414  
7.408  
7.397  
7.107  
7.092  
7.090  
7.075  
7.044  
7.027  
7.010  
6.677  
6.663  
6.648  
6.563  
6.547  
4.772  
4.763  
3.787  
3.383  
3.377  
3.366  
3.362  
3.350  
3.345  
1.660  
1.558  
1.484  
1.472  
1.463  
1.455  
1.443  
1.434  
1.425  
1.340  
1.326  
1.312  
1.309  
1.295  
1.284  
1.270  
0.901  
0.887  
0.872

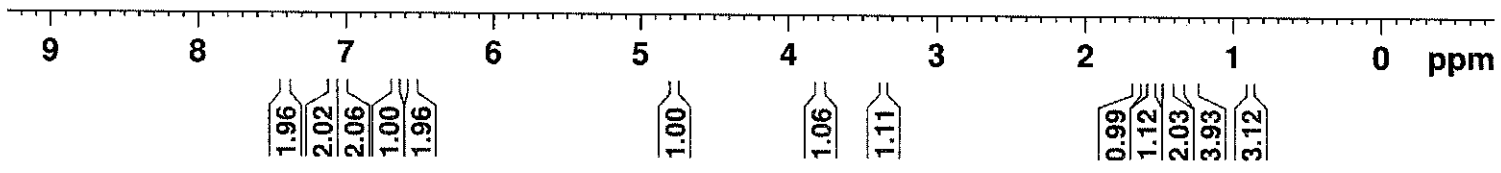
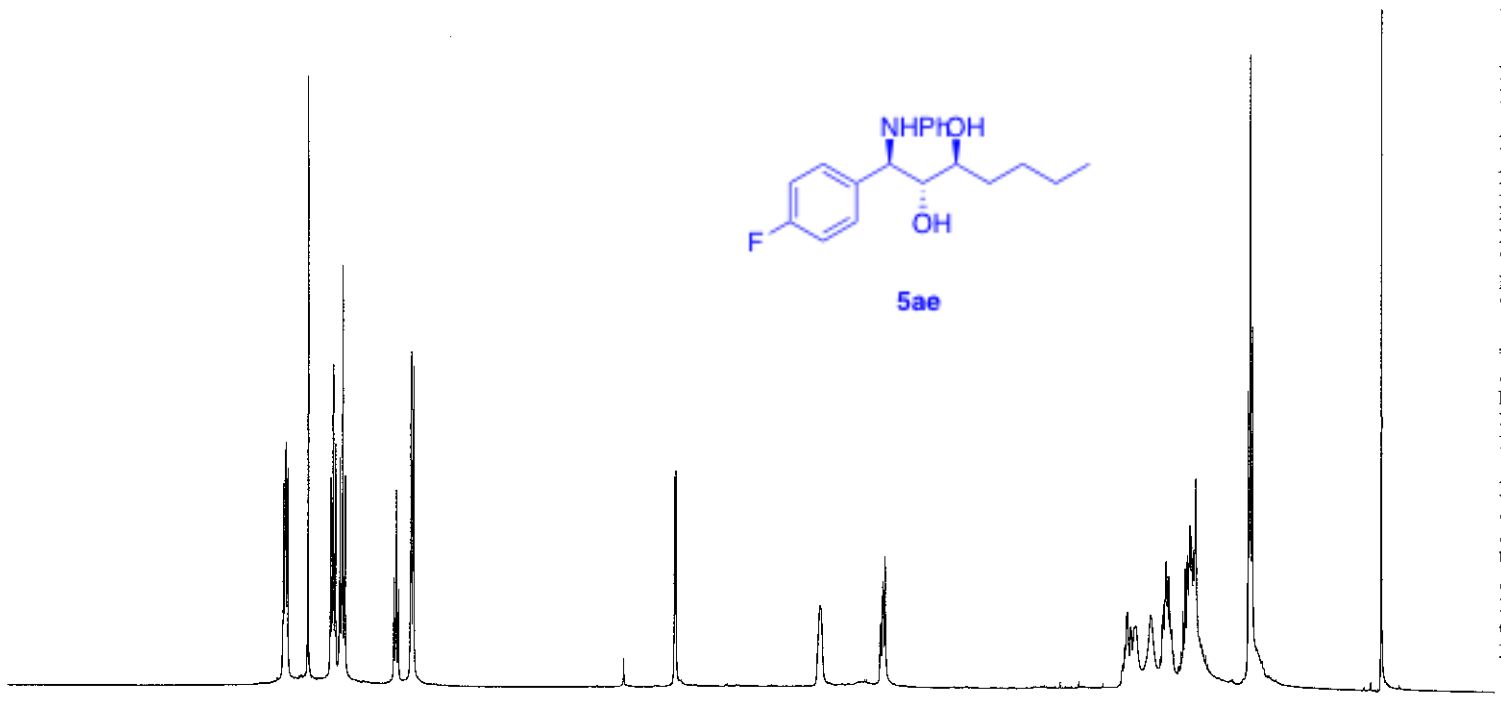
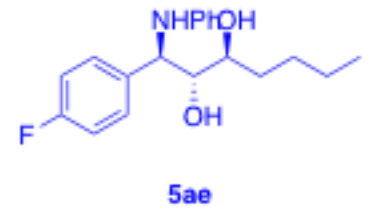


Current Data Parameters  
 NAME Lan\_20150717\_B8007  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20150717  
 Time 19.25  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zg  
 TD 59998  
 SOLVENT CDCl3  
 NS 8  
 DS 0  
 SWH 10000.000 Hz  
 FIDRES 0.166672 Hz  
 AQ 2.9999001 sec  
 RG 62.78  
 DW 50.000 usec  
 DE 6.50 usec  
 TE 296.7 K  
 D1 10.0000000 sec  
 TD0 1

==== CHANNEL f1 =====  
 SFO1 499.8730869 MHz  
 NUC1 1H  
 P1 10.75 usec  
 PLW1 18.25000000 W

F2 - Processing parameters  
 SI 65536  
 SF 499.8700126 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00



—146.637

<134.815

<129.767

<129.703

<129.342

<118.135

<115.845

<115.675

<114.036

—76.987

—73.071

—58.810

—33.364

—27.628

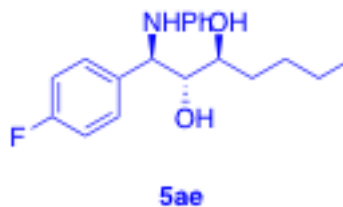
—22.853

—14.131



Current Data Parameters  
 NAME Lan\_20150717\_B8007\_C  
 EXPNO 1  
 PROCNO 1

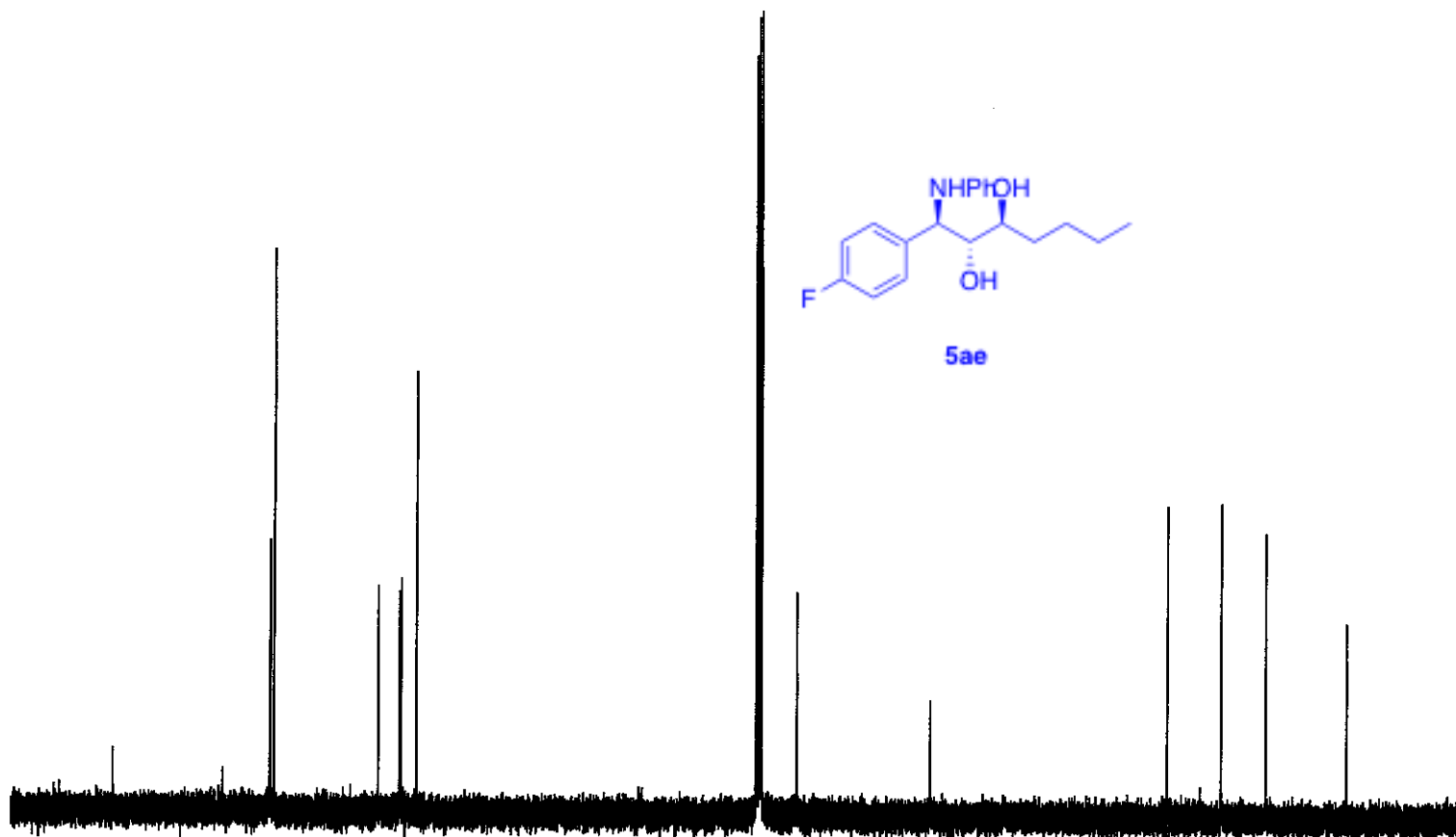
F2 - Acquisition Parameters  
 Date\_ 20150717  
 Time 20.10  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB/  
 PULPROG zgdc  
 TD 187496  
 SOLVENT CDC13  
 NS 876  
 DS 0  
 SWH 31250.000 Hz  
 FIDRES 0.166670 Hz  
 AQ 2.9999361 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 298.7 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TD0 1



==== CHANNEL f1 =====  
 SFO1 125.7049802 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 72.83999634 W

==== CHANNEL f2 =====  
 SFO2 499.8724993 MHz  
 NUC2 1H  
 CPDPRG[2] waltz16  
 PCPD2 80.00 usec  
 PLW2 19.00000000 W  
 PLW12 0.29688001 W

F2 - Processing parameters  
 SI 1048576  
 SF 125.6923910 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.40

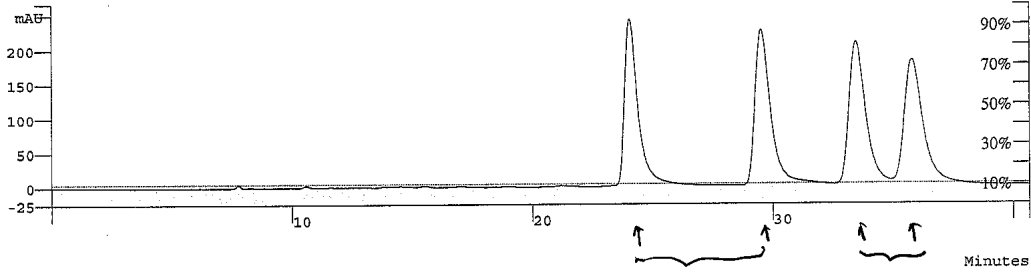


150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

# HPLC Chromatograms

Data File: c:\star\1-16-15 3;32;38 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B5207\_rac+rac  
 Operator (Inj): IC, iPrOH/Hex=1:9, FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 10%\_0.5ml.mth  
 Run Time (min): 40.693  
 Workstation:  
 Instrument (Inj): Varian Star #1

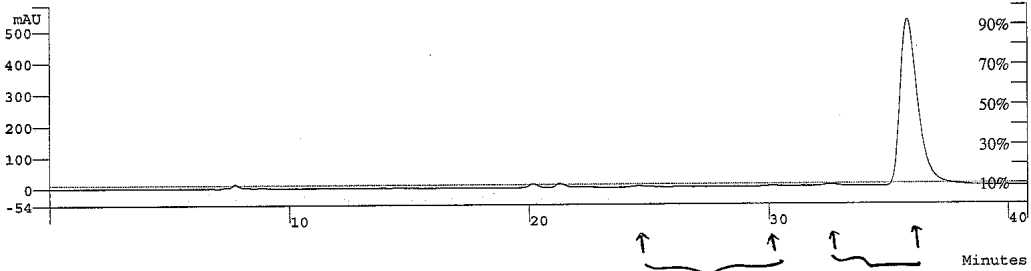
Operator (Calc):  
 Calc Date: 01/16/15 04:16:52 PM  
 Times Calculated: 2  
 Calculation Method: c:\windows\temp\~1-16-15 3;32;38 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



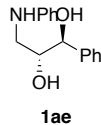
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		25.0983	24.040	0.000	48623556	0.00	BB	33.7		0
2		25.5755	29.507	0.000	49547992	0.00	BB	39.3		0
3		24.8864	33.427	0.000	48212876	0.00	BB	43.4		0
4		24.4398	35.773	0.000	47347740	0.00	BB	46.5		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>193732176</b>					

Data File: c:\star\1-16-15 4;17;30 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6039\_Ti(L)+W(S)  
 Operator (Inj): IC, iPrOH/Hex=1:9, FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 10%\_0.5ml.mth  
 Run Time (min): 40.827  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 01/16/15 05:02:02 PM  
 Times Calculated: 4  
 Calculation Method: c:\windows\temp\~1-16-15 4;17;30 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A

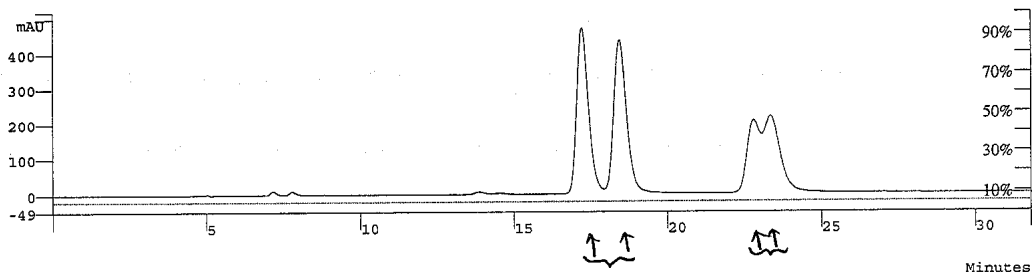


Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		0.2800	24.547	0.000	398810	0.00	BB	28.9		0
2		0.1862	30.147	0.000	265262	0.00	BB	32.3		0
3		0.2359	32.573	0.000	336013	0.00	BB	21.7		0
4		99.2978	35.773	0.000	141428528	0.00	BB	46.4		0
<b>Totals</b>		<b>99.9999</b>		<b>0.000</b>	<b>142428608</b>					



Data File: c:\star\1-28-15 5:59:17 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6079\_rac+rac  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Run Time (min): 31.840  
 Workstation:  
 Instrument (Inj): Varian Star #1

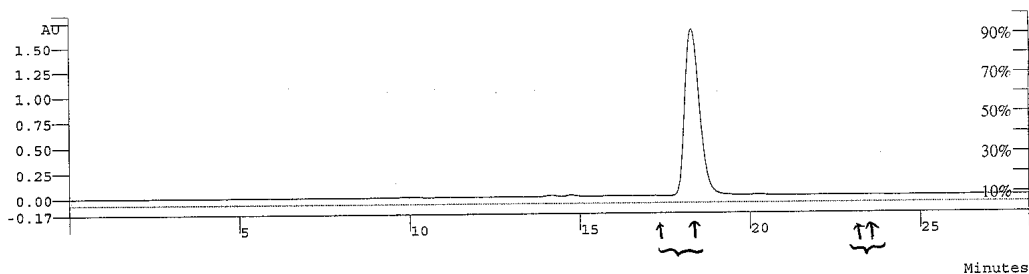
Operator (Calc):  
 Calc Date: 01/28/15 06:32:24 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~1-28-15 5:59:17 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



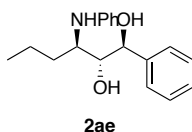
Peak No	Peak Name	Result (%)	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		31.9587	17.213	0.000	61281116	0.00	BB	24.3		0
2		30.9963	18.440	0.000	59435848	0.00	BB	25.5		0
3		37.0450	23.347	0.000	71034160	0.00	BB	65.9		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>191751120</b>					

Data File: c:\star\1-31-15 4:08:31 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6081\_Ti(L)+W(S,S)  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Run Time (min): 28.213  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 01/31/15 04:40:22 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~1-31-15 4:08:31 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A

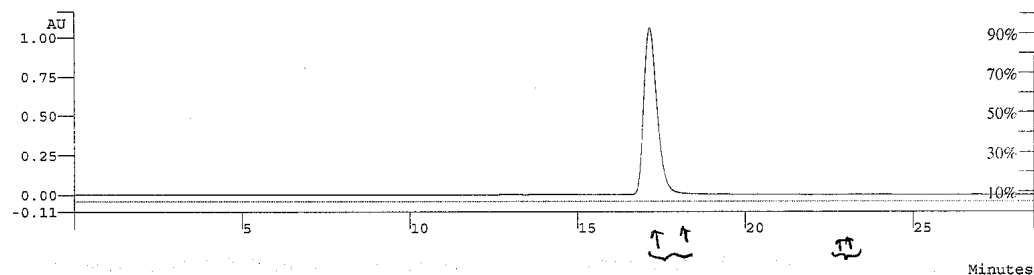


Peak No	Peak Name	Result (%)	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		0.0483	17.160	0.000	122217	0.00	BB	13.5		0
2		99.8829	18.280	0.000	252486272	0.00	BB	27.7		0
3		0.0687	23.320	0.000	173717	0.00	BB	24.7		0
<b>Totals</b>		<b>99.9999</b>		<b>0.000</b>	<b>252782208</b>					

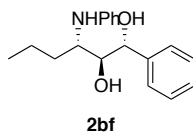


Data File: c:\star\1-31-15 4:38:25 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6101\_Ti(D)+W(R,R)  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 In Time (min): 28.640  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 01/31/15 05:15:15 PM  
 Times Calculated: 16  
 Calculation Method: c:\windows\temp\~1-31-15 4:38:25 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A

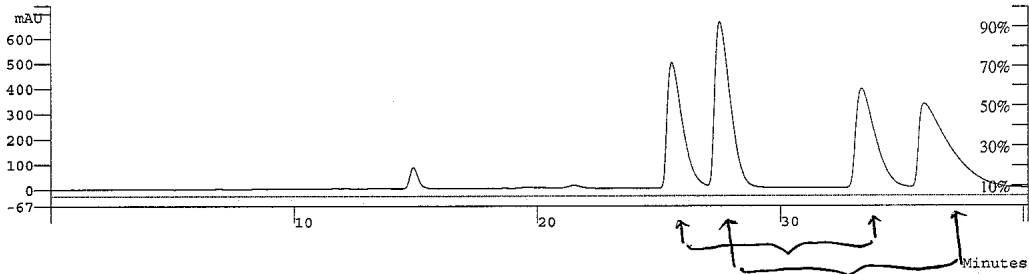


Peak No	Peak Name	Result (%)	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		99.9243	17.133	0.000	148680608	0.00	BB	25.4		0
2		0.0171	18.733	0.000	25398	0.00	BB	0.0		0
3		0.0587	23.427	0.000	87304	0.00	BB	21.7		0
<b>Totals</b>		<b>100.0001</b>		<b>0.000</b>	<b>148793312</b>					



Data File: c:\star\1-29-15 5:57:06 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6073\_rac+rac  
 Operator (Inj): ID, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Run Time (min): 40.213  
 Workstation:  
 Instrument (Inj): Varian Star #1

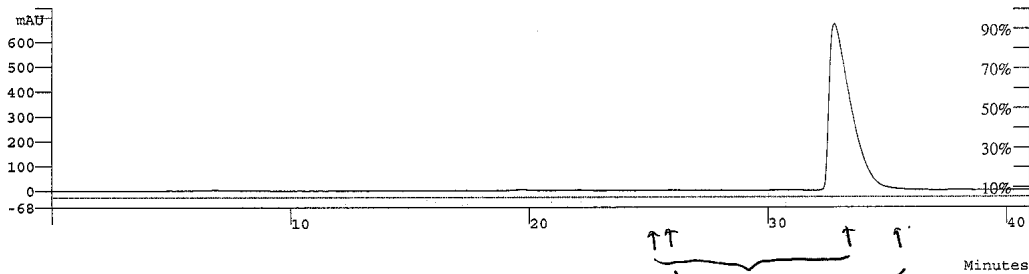
Operator (Calc):  
 Calc Date: 01/29/15 06:39:22 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~1-29-15 5:57:06 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



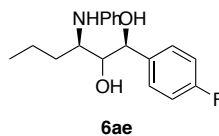
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		21.4068	25.533	0.000	107920968	0.00	BB	39.8		0
2		28.0996	27.480	0.000	141662352	0.00	BB	40.0		0
3		21.5864	33.320	0.000	108826552	0.00	BB	50.9		0
4		28.9073	35.907	0.000	145734528	0.00	BB	77.0		0
<b>Totals</b>		<b>100.0001</b>		<b>0.000</b>	<b>504144416</b>					

Data File: c:\star\1-29-15 6:41:29 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6097\_Ti(L)+W(S,S)  
 Operator (Inj): ID, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Run Time (min): 40.987  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 01/29/15 07:30:04 PM  
 Times Calculated: 5  
 Calculation Method: c:\windows\temp\~1-29-15 6:41:29 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



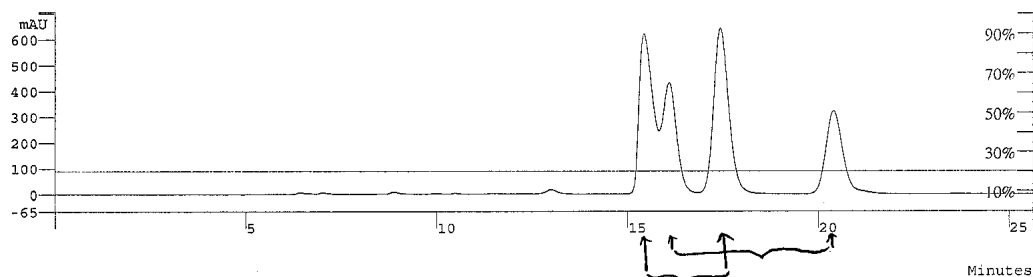
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		0.0184	24.920	0.000	39843	0.00	BB	25.6		0
2		0.0766	26.067	0.000	166012	0.00	BB	33.0		0
3		99.9050	32.760	0.000	216518832	0.00	BB	57.0		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>216724688</b>					





Data File: c:\star\1-31-15 8:50:44 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6075\_rac+rac  
 Operator (Inj): AD-H, iPrOH/Hex=2:8, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 20%\_0.75ml.mth  
 Run Time (min): 25.653  
 Workstation:  
 Instrument (Inj): Varian Star #1

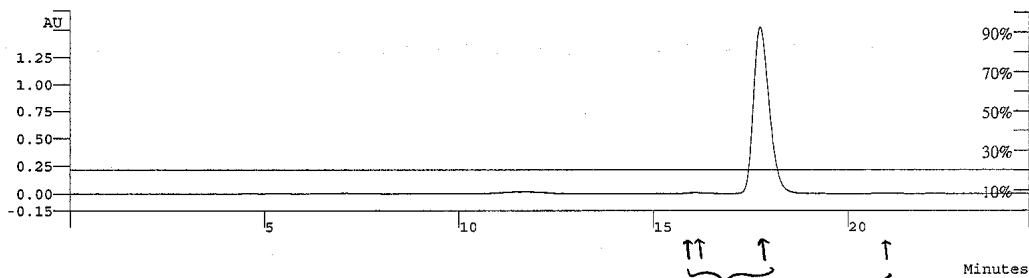
Operator (Calc):  
 Calc Date: 02/02/15 07:03:18 PM  
 Times Calculated: 2  
 Calculation Method: c:\windows\temp\~2-2-15 6:18:25 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



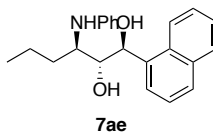
Peak No	Peak Name	Result (%)	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		49.8843	15.427	0.000	135710368	0.00	BB	25.5		0
2		31.9281	17.427	0.000	86860528	0.00	BB	24.8		0
3		18.1875	20.387	0.000	49479132	0.00	BB	27.5		0
<b>Totals</b>		<b>99.9999</b>		<b>0.000</b>	<b>272050016</b>					

Data File: c:\star\2-2-15 7:21:39 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6099\_Ti(L)+W(S,S)  
 Operator (Inj): AD-H, iPrOH/Hex=2:8, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 20%\_0.75ml.mth  
 Run Time (min): 24.693  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 02/02/15 07:49:50 PM  
 Times Calculated: 2  
 Calculation Method: c:\windows\temp\~2-2-15 7:21:39 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A

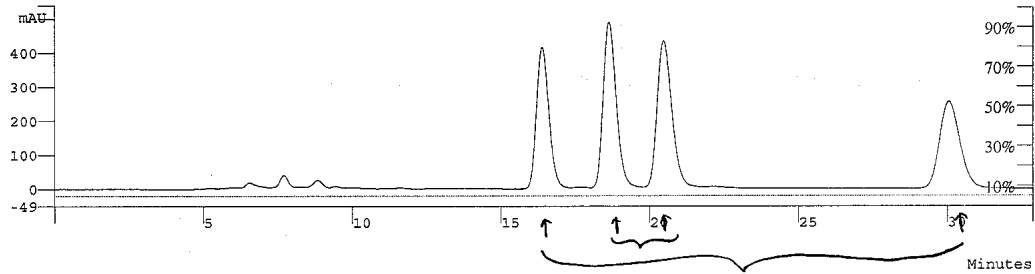


Peak No	Peak Name	Result (%)	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		0.3196	16.067	0.000	701760	0.00	BB	21.1		0
2		99.4820	17.747	0.000	218422640	0.00	BB	25.8		0
3		0.1984	21.000	0.000	435562	0.00	BB	25.0		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>219559968</b>					



Data File: c:\star\2-16-15 3;55;26 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6135\_rac+rac  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Run Time (min): 32.907  
 Workstation:  
 Instrument (Inj): Varian Star #1

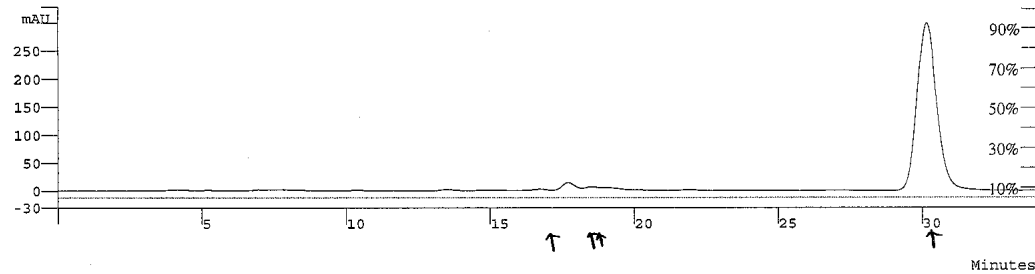
Operator (Calc):  
 Calc Date: 02/16/15 04:30:06 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~2-16-15 3;55;26 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



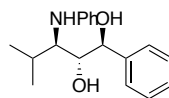
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		22.4219	16.387	0.000	61268648	0.00	BB	27.1		0
2		27.5499	18.627	0.000	75280960	0.00	BB	28.1		0
3		27.3876	20.467	0.000	74837592	0.00	BB	31.7		0
4		22.6406	30.040	0.000	61866192	0.00	BB	44.2		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>273253376</b>					

Data File: c:\star\2-16-15 4;30;36 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6143\_Ti(L)+W(S,S)  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Run Time (min): 34.000  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 02/16/15 05:07:57 PM  
 Times Calculated: 3  
 Calculation Method: c:\windows\temp\~2-16-15 4;30;36 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A

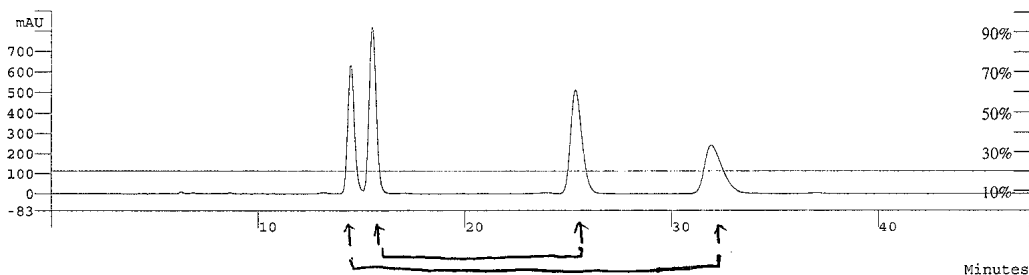


Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		0.3140	16.733	0.000	229130	0.00	BB	24.8		0
2		0.2794	18.520	0.000	203884	0.00	BB	21.4		0
3		99.4065	30.120	0.000	72528952	0.00	BB	43.6		0
<b>Totals</b>		<b>99.9999</b>		<b>0.000</b>	<b>72961968</b>					



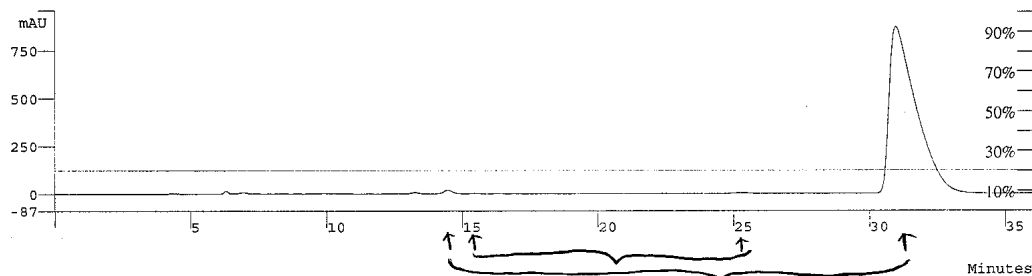
8ae

Data File: c:\star\11-20-14 1;37:34 pm -1.run Operator (Calc):  
 Channel: 1 = 254.00 nm RESULTS Calc Date: 11/20/14 04:14:06 PM  
 Sample ID: B5233\_rac Times Calculated: 1  
 Operator (Inj): AD-H, iPrOH/Hex=2:8, FR=0.75 Calculation Method: c:\windows\temp\~11-20-14 3;17:30  
 Injection Date: Instrument (Calc): Varian Star #1  
 Injection Method: c:\star\lan\standard 20%\_0.75ml.mth Run Mode: Analysis  
 Run Time (min): 47.360 Peak Measurement: Peak Area  
 Workstation: Calculation Type: Percent  
 Instrument (Inj): Varian Star #1 Calibration Level: N/A  
 Verification Tolerance: N/A

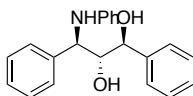


Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		20.9943	14.467	0.000	71008656	0.00	BB	20.9		0
2		28.0079	15.507	0.000	94730736	0.00	BB	21.8		0
3		29.7512	25.347	0.000	100627064	0.00	BB	36.0		0
4		21.2467	31.907	0.000	71862464	0.00	BB	54.7		0
<b>Totals</b>		<b>100.0001</b>		<b>0.000</b>	<b>338228928</b>					

Data File: c:\star\11-20-14 3;17:30 pm -1.run Operator (Calc):  
 Channel: 1 = 254.00 nm RESULTS Calc Date: 11/20/14 04:22:01 PM  
 Sample ID: B5247\_Ti(L)+W(S,S) Times Calculated: 1  
 Operator (Inj): AD-H, iPrOH/Hex=2:8, FR=0.75 Calculation Method: c:\windows\temp\~11-20-14 3;17:30  
 Injection Date: Instrument (Calc): Varian Star #1  
 Injection Method: c:\star\lan\standard 20%\_0.75ml.mth Run Mode: Analysis  
 Run Time (min): 36.053 Peak Measurement: Peak Area  
 Workstation: Calculation Type: Percent  
 Instrument (Inj): Varian Star #1 Calibration Level: N/A  
 Verification Tolerance: N/A



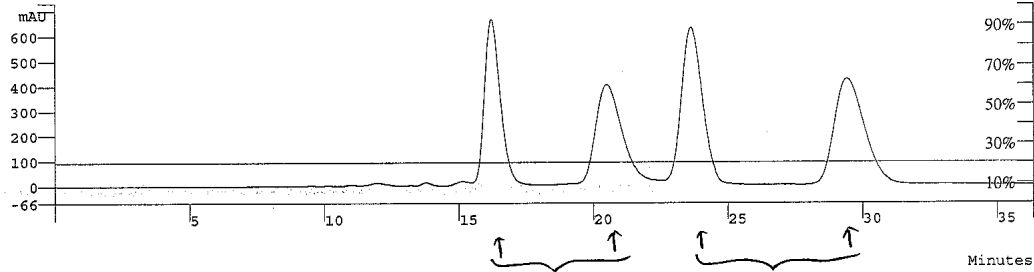
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		0.5991	14.467	0.000	1850051	0.00	BB	18.6		0
2		0.0589	16.280	0.000	181911	0.00	BB	19.2		0
3		0.2228	25.267	0.000	688066	0.00	BB	33.0		0
4		99.1192	30.947	0.000	306080800	0.00	BB	63.1		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>308800832</b>					



3ae

Data File: c:\star2-17-15 1;23;22 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6115\_rac+rac  
 Operator (Inj): AS-H, iPrOH/Hex=2:8, FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 20%\_0.5ml.mth  
 Run Time (min): 36.373  
 Workstation:  
 Instrument (Inj): Varian Star #1

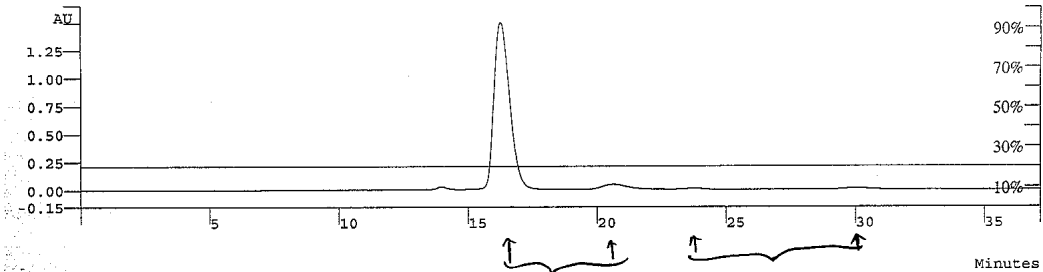
Operator (Calc):  
 Calc Date: 02/17/15 02:01:02 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~2-17-15 1;23;22 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



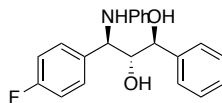
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		22.2775	16.200	0.000	134810880	0.00	BB	37.5		0
2		21.8296	20.493	0.000	132100840	0.00	BB	62.2		0
3		27.9268	23.640	0.000	168997456	0.00	BB	50.3		0
4		27.9662	29.400	0.000	169235792	0.00	BB	73.3		0
<b>Totals</b>		<b>100.0001</b>		<b>0.000</b>	<b>605144960</b>					

Data File: c:\star2-17-15 2;01;21 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6145\_Ti(L)+W(S,S)  
 Operator (Inj): AS-H, iPrOH/Hex=2:8, FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 20%\_0.5ml.mth  
 Run Time (min): 37.200  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 02/17/15 02:40:04 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~2-17-15 2;01;21 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



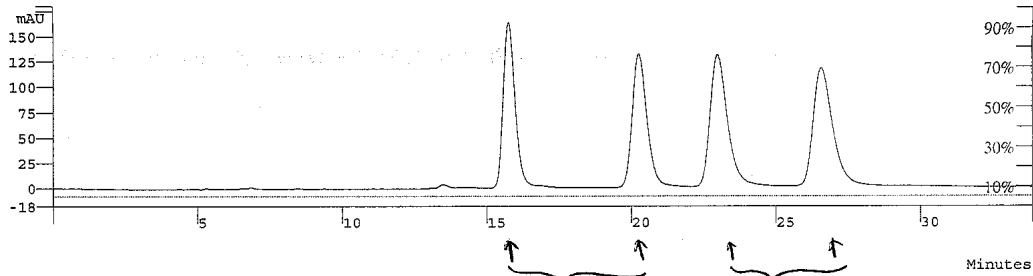
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		97.2227	16.253	0.000	319858848	0.00	BB	39.2		0
2		1.9307	20.627	0.000	6351976	0.00	BB	39.8		0
3		0.3440	23.773	0.000	1131722	0.00	BB	31.0		0
4		0.5026	30.013	0.000	1653584	0.00	BB	41.5		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>328996096</b>					



9ae

Data File: c:\star\3-5-15 4:01:34 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6179\_rac+rac  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Run Time (min): 33.893  
 Workstation:  
 Instrument (Inj): Varian Star #1

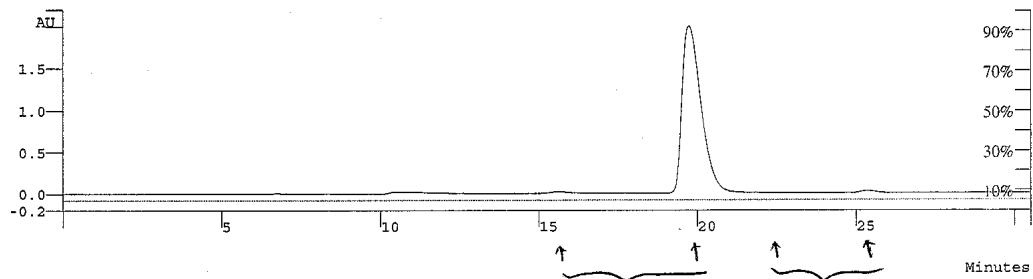
Operator (Calc):  
 Calc Date: 03/05/15 04:38:40 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~3-5-15 4:01:34 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



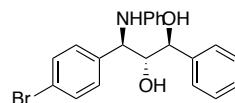
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		23.1161	15.747	0.000	23471788	0.00	BB	26.2		0
2		23.1387	20.253	0.000	23494790	0.00	BB	32.7		0
3		26.7864	22.973	0.000	27198646	0.00	BB	37.6		0
4		26.9588	26.547	0.000	27373626	0.00	BB	42.2		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>101538848</b>					

Data File: c:\star\3-9-15 2;11;48 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6195\_Ti(L)+W(S,S)  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Run Time (min): 30.533  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 03/09/15 02:47:02 PM  
 Times Calculated: 4  
 Calculation Method: c:\windows\temp\~3-9-15 2;11;48 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



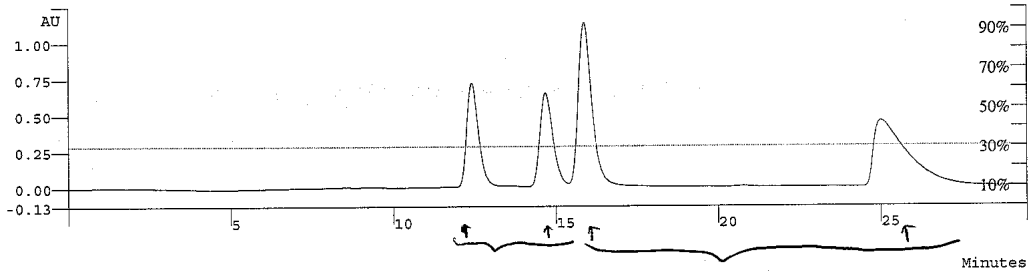
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		0.1669	15.613	0.000	709598	0.00	BB	15.8		0
2		99.6454	19.720	0.000	423536480	0.00	BB	38.5		0
3		0.0046	22.520	0.000	19410	0.00	BB	7.3		0
4		0.1830	25.373	0.000	778024	0.00	BB	12.5		0
<b>Totals</b>		<b>99.9999</b>		<b>0.000</b>	<b>425043520</b>					



10ae

Data File: c:\star\4-27-15 4:59:29 pm -1.run  
 Channel: 2 = 225.00 nm RESULTS  
 Sample ID: B6257\_rac+rac  
 Operator (Inj): IC, iPrOH/Hex=3:7, FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 30%\_0.5ml.mth  
 Run Time (min): 29.520  
 Workstation:  
 Instrument (Inj): Varian Star #1

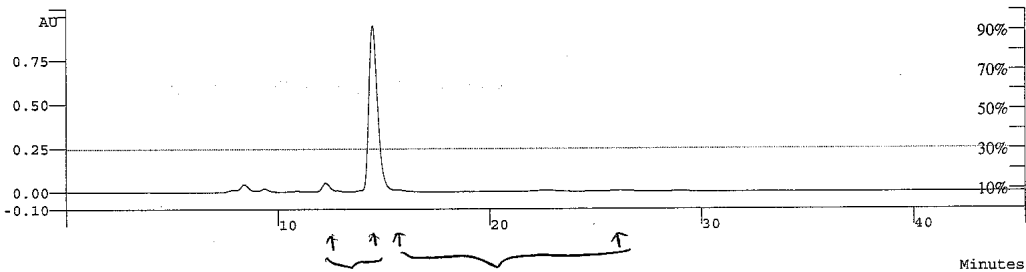
Operator (Calc):  
 Calc Date: 04/27/15 05:31:54 PM  
 Times Calculated: 3  
 Calculation Method: c:\windows\temp\~4-27-15 4:59:29 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



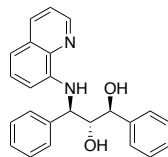
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		17.8667	12.413	0.000	88310664	0.00	BB	23.0		0
2		17.8553	14.680	0.000	88254688	0.00	BB	25.7		0
3		32.3890	15.880	0.000	160091216	0.00	BB	25.9		0
4		31.8890	25.000	0.000	157619840	0.00	BB	64.2		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>494276416</b>					

Data File: c:\star\4-27-15 5:32:29 pm -1.run  
 Channel: 2 = 225.00 nm RESULTS  
 Sample ID: B6265\_Ti(L)+W(S)  
 Operator (Inj): IC, iPrOH/Hex=3:7, FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 30%\_0.5ml.mth  
 Run Time (min): 45.307  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 04/27/15 06:22:48 PM  
 Times Calculated: 4  
 Calculation Method: c:\windows\temp\~4-27-15 5:32:29 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



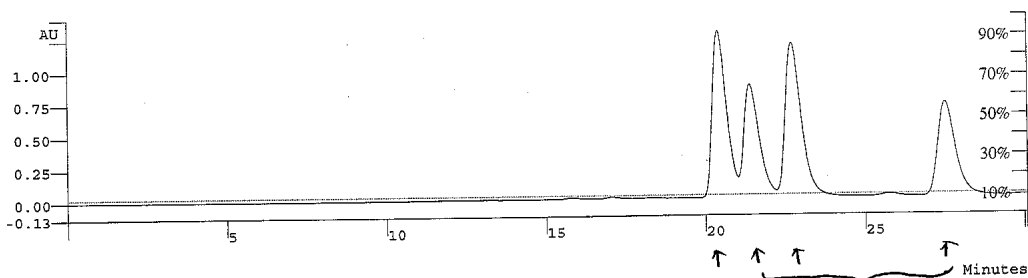
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		1.8313	12.227	0.000	2520500	0.00	BB	14.3		0
2		97.2593	14.467	0.000	133864400	0.00	BB	25.9		0
3		0.1447	15.667	0.000	199182	0.00	BB	2.9		0
4		0.7647	26.093	0.000	1052506	0.00	BB	43.1		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>137636592</b>					



3ae2

Data File: c:\star\2-20-15 4:58:45 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6147\_rac+rac  
 Operator (Inj): IB  
 Injection Date:  
 Injection Method: c:\star\lan\standard 10%\_0.5ml.mth  
 Run Time (min): 30.107  
 Workstation:  
 Instrument (Inj): Varian Star #1

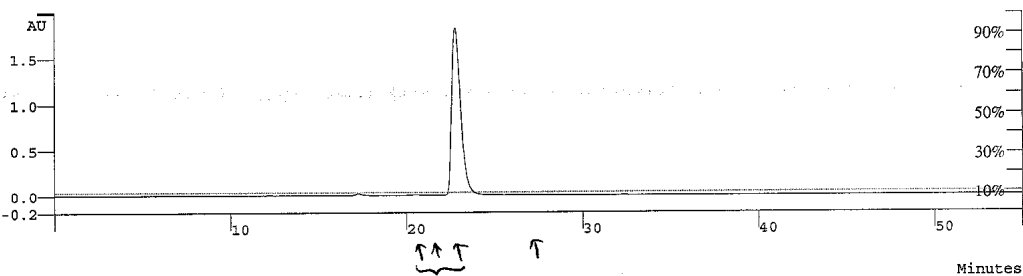
Operator (Calc):  
 Calc Date: 02/20/15 05:30:03 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~2-20-15 4:58:45 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



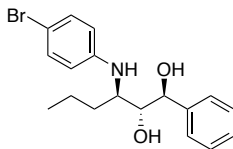
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		29.1302	20.387	0.000	172309296	0.00	BB	29.1		0
2		14.1574	21.373	0.000	83742992	0.00	BB	23.4		0
3		32.7919	22.680	0.000	193968800	0.00	BB	30.6		0
4		23.9206	27.507	0.000	141494080	0.00	BB	35.1		0
<b>Totals</b>		<b>100.0001</b>		<b>0.000</b>	<b>591515136</b>					

Data File: c:\star\2-25-15 4:33:01 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6153\_Ti(L)+W(S,S)  
 Operator (Inj): IB, iPrOH/Hex=1:9, FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 10%\_0.5ml.mth  
 Run Time (min): 55.013  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 02/25/15 05:32:10 PM  
 Times Calculated: 2  
 Calculation Method: c:\windows\temp\~2-25-15 4:33:01 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



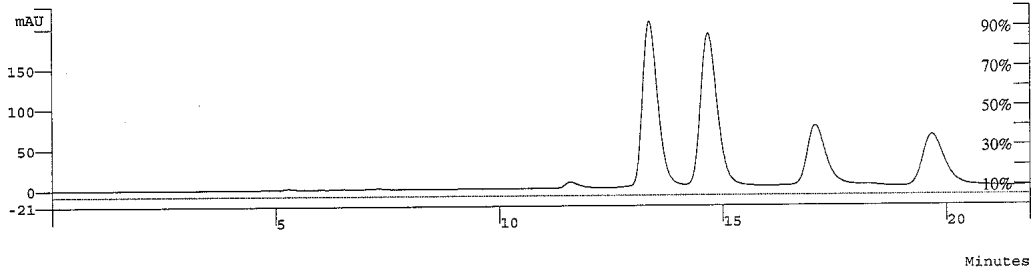
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		0.1768	20.573	0.000	592482	0.00	BB	25.0		0
2		99.8232	22.760	0.000	334603168	0.00	BB	32.8		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>335195648</b>					



2ae1

Data File: c:\star\2-17-15 12:37:13 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6149\_rac+rac  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Injection Time (min): 21.893  
 Workstation:  
 Instrument (Inj): Varian Star #1

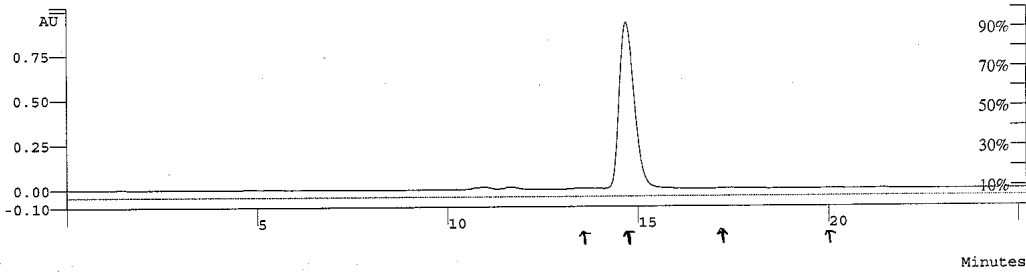
Operator (Calc):  
 Calc Date: 02/17/15 01:02:12 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~2-17-15 12:37:13  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



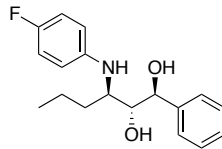
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		34.7445	13.373	0.000	24434754	0.00	BB	21.8		0
2		34.9763	14.680	0.000	24597800	0.00	BB	23.6		0
3		14.9323	17.053	0.000	10501462	0.00	BB	26.0		0
4		15.3469	19.667	0.000	10792987	0.00	BB	30.9		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>70327000</b>					

Data File: c:\star\2-20-15 2;42;17 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6155\_Ti(L)+W(S,S)  
 Operator (Inj): IC, iPrH/Hex=5:95, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth  
 Injection Time (min): 25.227  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 02/20/15 03:11:03 PM  
 Times Calculated: 3  
 Calculation Method: c:\windows\temp\~2-20-15 2;42;17 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		0.2336	13.533	0.000	305566	0.00	BB	21.6		0
2		99.4988	14.680	0.000	130149392	0.00	BB	25.6		0
3		0.1784	17.400	0.000	233421	0.00	BB	23.4		0
4		0.0891	20.147	0.000	116577	0.00	BB	22.0		0
<b>Totals</b>		<b>99.9999</b>		<b>0.000</b>	<b>130804960</b>					

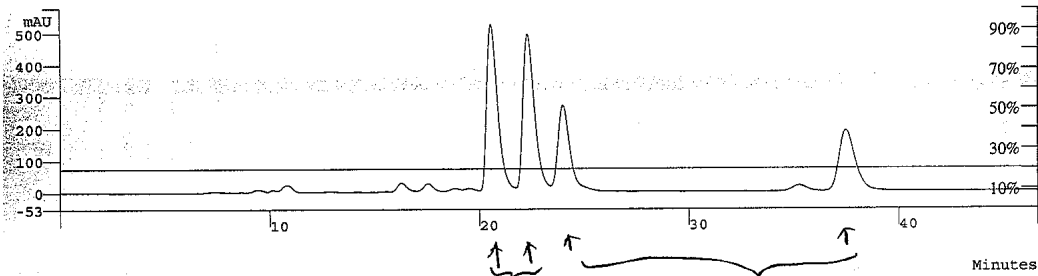


2ae2



Data File: c:\star\2-25-15 6:58:54 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6157\_rac+rac  
 Operator (Inj): AD-H, iPrOH/Hex=2:8, FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 20%\_0.5ml.mth  
 Run Time (min): 46.667  
 Workstation:  
 Instrument (Inj): Varian Star #1

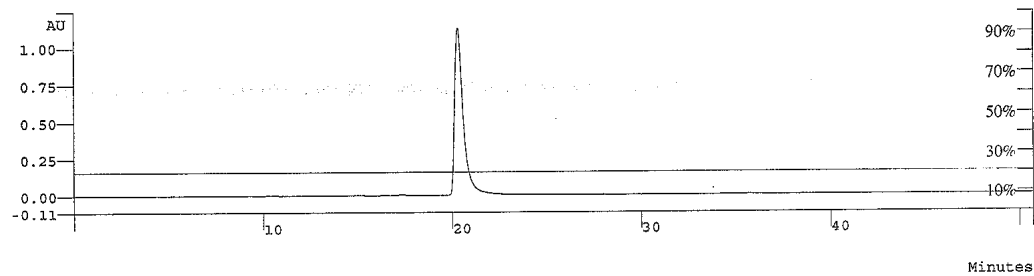
Operator (Calc):  
 Calc Date: 02/25/15 07:50:21 PM  
 Times Calculated: 6  
 Calculation Method: c:\windows\temp\~2-25-15 6:58:54 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



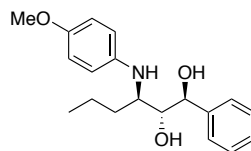
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		37.2175	20.547	0.000	90539472	0.00	BB	32.8		0
2		35.0896	22.280	0.000	85362936	0.00	BB	34.2		0
3		14.5842	23.987	0.000	35479124	0.00	BB	30.8		0
4		13.1087	37.480	0.000	31889580	0.00	BB	38.8		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>243271104</b>					

Data File: c:\star\2-26-15 4:38:54 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6161\_Ti(L)+W(S,S)  
 Operator (Inj): AD-H, iPrOH/Hex=2:8, FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 20%\_0.5ml.mth  
 Run Time (min): 50.747  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 02/26/15 05:36:30 PM  
 Times Calculated: 10  
 Calculation Method: c:\windows\temp\~2-26-15 4:38:54 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



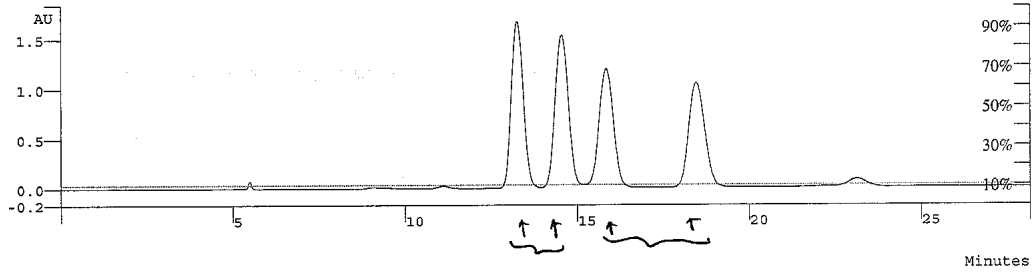
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		100.0000	20.280	0.000	181259680	0.00	BB	27.2		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>181259680</b>					



2ae3

Data File: c:\star\2-24-15 3;22;07 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6159\_rac+rac  
 Operator (Inj): AD-H, iPrOH/Hex=1:9, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\chuan\standard 10% 0.75 ml.mth  
 Run Time (min): 28.187  
 Workstation:  
 Instrument (Inj): Varian Star #1

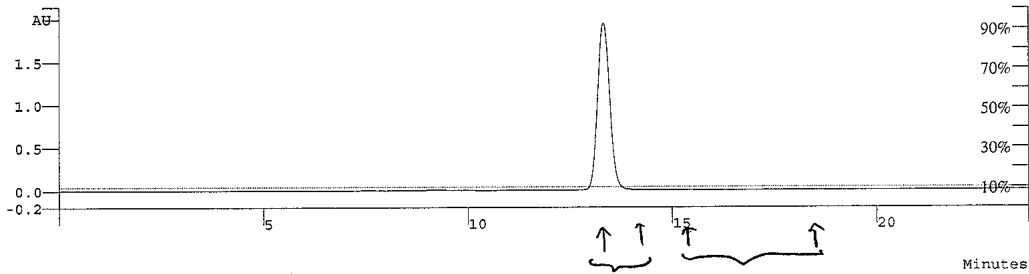
Operator (Calc):  
 Calc Date: 02/24/15 03:51:33 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~2-24-15 3;22;07 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



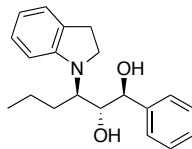
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		27.2154	13.240	0.000	206342352	0.00	BB	23.1		0
2		27.2808	14.547	0.000	206838272	0.00	BB	25.6		0
3		22.7360	15.827	0.000	172379792	0.00	BB	27.1		0
4		22.7678	18.467	0.000	172621136	0.00	BB	30.6		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>758181504</b>					

Data File: c:\star\2-24-15 4;48;54 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6163\_Ti(L)+W(S,S)  
 Operator (Inj): AD-H, iPrOH/Hex=1:9, FR=0.75  
 Injection Date:  
 Injection Method: c:\star\chuan\standard 10% 0.75 ml.mth  
 Run Time (min): 23.733  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 02/24/15 05:38:00 PM  
 Times Calculated: 4  
 Calculation Method: c:\windows\temp\~2-24-15 4;48;54 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



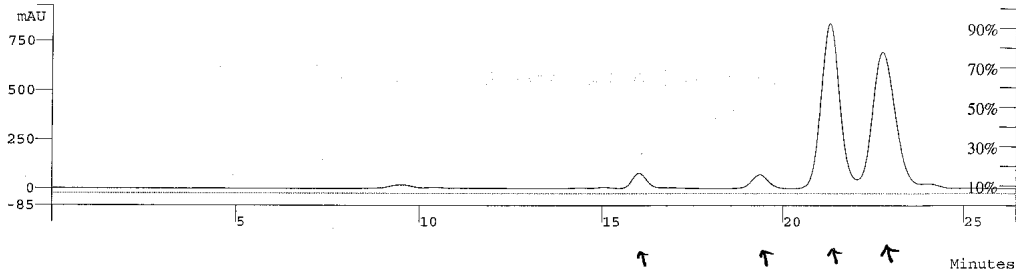
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		99.8897	13.320	0.000	205554688	0.00	BB	19.3		0
2		0.0060	14.547	0.000	12435	0.00	BB	4.0		0
3		0.0559	15.320	0.000	115011	0.00	BB	12.0		0
4		0.0484	18.627	0.000	99629	0.00	BB	19.3		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>205781760</b>					



2ae4

Data File: c:\star\7-20-15 1;56;28 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B5251\_rac+rac  
 Operator (Inj): AS-H, iPrOH/Hex=6:94, FR=0.4  
 Injection Date:  
 Injection Method: c:\star\lan\standard 6%\_0.4ml.mth  
 Run Time (min): 26.427  
 Workstation:  
 Instrument (Inj): Varian Star #1

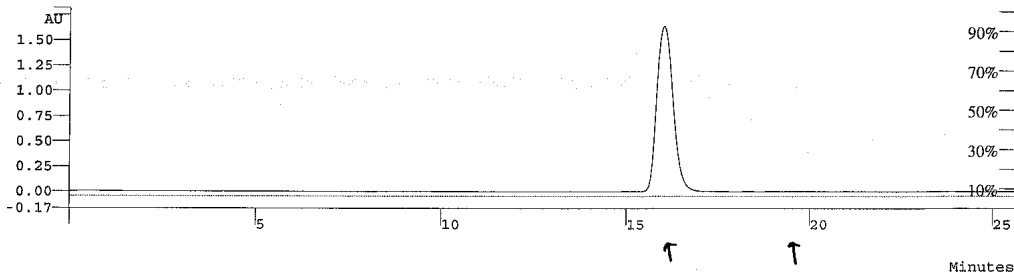
Operator (Calc):  
 Calc Date: 07/20/15 03:11:39 PM  
 Times Calculated: 2  
 Calculation Method: c:\windows\temp\~7-20-15 1;56;28 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



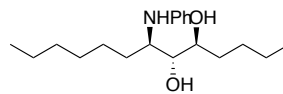
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		3.4601	16.013	0.000	10582829	0.00	BB	26.0		0
2		3.5673	19.347	0.000	10910850	0.00	BB	28.7		0
3		46.8159	21.267	0.000	143189152	0.00	BB	32.8		0
4		46.1567	22.707	0.000	141172944	0.00	BB	38.6		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>305855776</b>					

Data File: c:\star\7-20-15 5;17;27 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6269\_Ti(L)+W(S,S)  
 Operator (Inj): AS-H, iPrOH/Hex=6:94, FR=0.4  
 Injection Date:  
 Injection Method: c:\star\lan\standard 6%\_0.4ml.mth  
 Run Time (min): 25.627  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 07/20/15 05:46:44 PM  
 Times Calculated: 3  
 Calculation Method: c:\windows\temp\~7-20-15 5;17;27 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



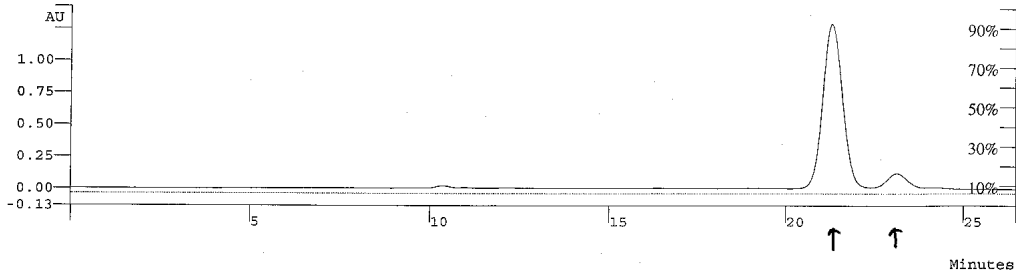
Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		99.9822	16.040	0.000	262232432	0.00	BB	29.0		0
2		0.0178	19.613	0.000	46643	0.00	BB	21.1		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>262279072</b>					



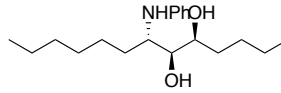
4ae

Data File: c:\star\7-20-15 4;25;37 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6303\_Hf(R,R)+W(R,R)  
 Operator (Inj): AS-H, iPrOH/Hex=6:94, FR=0.4  
 Injection Date:  
 Injection Method: c:\star\lan\standard 6%\_0.4ml.mth  
 Run Time (min): 26.453  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 07/20/15 04:55:59 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~7-20-15 4;25;37 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



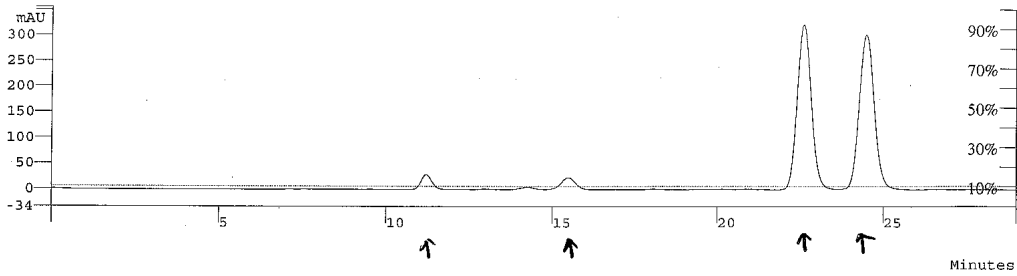
Peak No	Peak Name	Result (%)	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		95.6432	21.267	0.000	249218080	0.00	BB	35.5		0
2		4.3568	23.080	0.000	11352630	0.00	BB	25.6		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>260570704</b>					



4df

Data File: c:\star\7-16-15 7;24;00 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B6181\_rac+rac  
 Operator (Inj): AD-H, iPrOH/Hex=1:9,FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 10%\_0.5ml.mth  
 Run Time (min): 29.040  
 Workstation:  
 Instrument (Inj): Varian Star #1

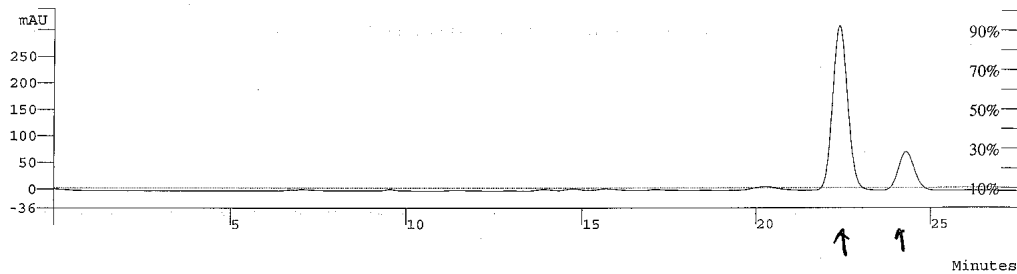
Operator (Calc):  
 Calc Date: 07/16/15 07:54:17 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~7-16-15 7;24;00 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A



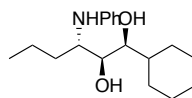
Peak No	Peak Name	Result (%)	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		2.9095	11.187	0.000	2995055	0.00	BB	19.8		0
2		3.0884	15.480	0.000	3179250	0.00	BB	26.1		0
3		47.0541	22.600	0.000	48438364	0.00	BB	27.2		0
4		46.9481	24.467	0.000	48329244	0.00	BB	28.8		0
<b>Totals</b>		<b>100.0001</b>		<b>0.000</b>	<b>102941912</b>					

Data File: c:\star\7-16-15 5;11;46 pm -1.run  
 Channel: 1 = 254.00 nm RESULTS  
 Sample ID: B8009\_Hf(R,R)+W(R,R)  
 Operator (Inj): AD-H, iPrOH/Hex=1:9,FR=0.5  
 Injection Date:  
 Injection Method: c:\star\lan\standard 10%\_0.5ml.mth  
 Run Time (min): 27.520  
 Workstation:  
 Instrument (Inj): Varian Star #1

Operator (Calc):  
 Calc Date: 07/16/15 05:41:55 PM  
 Times Calculated: 1  
 Calculation Method: c:\windows\temp\~7-16-15 5;11;46 pm  
 Instrument (Calc): Varian Star #1  
 Run Mode: Analysis  
 Peak Measurement: Peak Area  
 Calculation Type: Percent  
 Calibration Level: N/A  
 Verification Tolerance: N/A

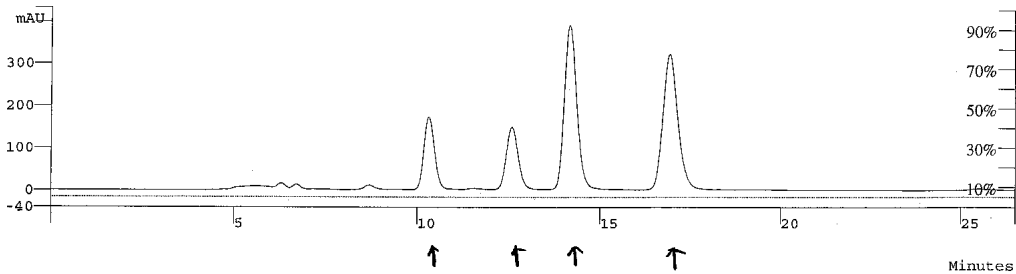


Peak No	Peak Name	Result (%)	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		83.9265	22.387	0.000	47328368	0.00	BB	27.9		0
2		16.0735	24.280	0.000	9064257	0.00	BB	25.7		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>56392624</b>					



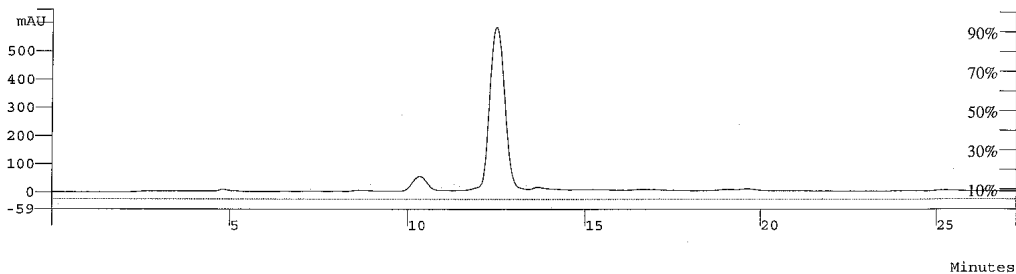
11df

Data File: c:\star\7-16-15 6:33:29 pm -1.run Operator (Calc):  
 Channel: 1 = 254.00 nm RESULTS Calc Date: 07/16/15 07:01:40 PM  
 Sample ID: B6113\_rac+rac Times Calculated: 1  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75 Calculation Method: c:\windows\temp\~7-16-15 6:33:29 pm  
 Injection Date: Instrument (Calc): Varian Star #1  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth Run Mode: Analysis  
 Run Time (min): 26.480 Peak Measurement: Peak Area  
 Workstation: Calculation Type: Percent  
 Instrument (Inj): Varian Star #1 Calibration Level: N/A  
 Verification Tolerance: N/A

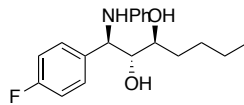


Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		13.2683	10.307	0.000	16791260	0.00	BB	18.5		0
2		12.5839	12.573	0.000	15925203	0.00	BB	20.4		0
3		37.0870	14.173	0.000	46934392	0.00	BB	21.8		0
4		37.0608	16.947	0.000	46901292	0.00	BB	26.6		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>126552144</b>					

Data File: c:\star\7-16-15 5:58:31 pm -1.run Operator (Calc):  
 Channel: 1 = 254.00 nm RESULTS Calc Date: 07/16/15 06:27:58 PM  
 Sample ID: B8007\_Ti(L)+W(S,S) Times Calculated: 3  
 Operator (Inj): IC, iPrOH/Hex=5:95, FR=0.75 Calculation Method: c:\windows\temp\~7-16-15 5:58:31 pm  
 Injection Date: Instrument (Calc): Varian Star #1  
 Injection Method: c:\star\lan\standard 5%\_0.75ml.mth Run Mode: Analysis  
 Run Time (min): 27.280 Peak Measurement: Peak Area  
 Workstation: Calculation Type: Percent  
 Instrument (Inj): Varian Star #1 Calibration Level: N/A  
 Verification Tolerance: N/A



Peak No	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Rel Ret Time	Sep. Code	Width 1/2 (sec)	Status Codes	Group
1		4.3719	10.333	0.000	3875561	0.00	BB	20.9		0
2		95.6281	12.493	0.000	84771648	0.00	BB	27.9		0
<b>Totals</b>		<b>100.0000</b>		<b>0.000</b>	<b>88647208</b>					



5ae