Supplementary Information

Concise synthesis of chiral tfb ligands and their application to rhodium-catalyzed asymmetric arylation of aldehydes

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List of Supporting Information:

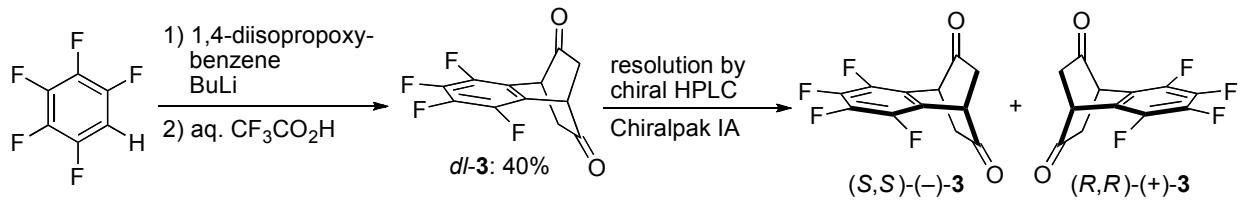
General

All anaerobic and moisture-sensitive manipulations were carried out with standard Schlenk techniques under predried nitrogen or glovebox techniques under argon. NMR spectra were recorded on a JEOL JNM LA-500 spectrometer (500 MHz for ^{1}H, 125 MHz for ^{13}C). Chemical shifts are reported in δ (ppm) referenced to an internal $SiMe_4$ standard or the residual peak of dichloromethane-d_2 ($CDHCl_2$, δ 5.32) for ^{1}H NMR, and chloroform-*d* (δ 77.00) for ^{13}C NMR. The following abbreviations are used; s, singlet, d, doublet, t, triplet, q, quartet, m, multiplet, br, broad. Optical rotations were measured on a JASCO P-2200 polarimeter. High-resolution mass spectra were obtained with a Bruker micrOTOF spectrometer. Preparative recycling gel permeation chromatography was performed with JAI LC-908 equipped with JAIGEL-1H and -2H using chloroform as eluent.

Materials

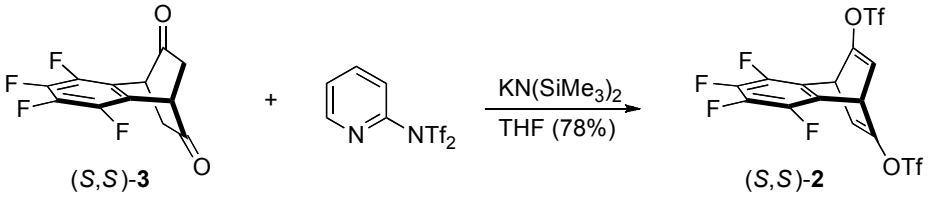
All solvents were deoxygenized by bubbling N_2. 1,4-Dioxane was distilled over benzophenone ketyl under N_2. Methanol was distilled over Mg turnings under N_2. CH_2Cl_2 were distilled over CaH_2 under N_2. 2-Propanol and *tert*-butyl alcohol were purchased and used as received. 1,4-Diisopropoxybenzne was purchased and distilled over CaH_2 under vacuum. Rhodium complex $[RhCl(C_2H_4)_2]_2$[1] and ligands, **1b**,[2] **1c**,[3] and (*R*,*R*)-Ph-bod*(**4**),[4] were prepared according to the reported procedures. The starting aldehydes were purchased and solid aldehydes were used as received. Liquid aldehydes were distilled under reduced pressure before use. Arylboronic acids **6s** [127972-00-3],[5] **6t** [23112-96-1],[6] and **6u** [5980-97-2][7] were prepared according to the reported procedures. Other arylboronic acids were purchased and used as received. Diarylmethanols except for **7an**, **7ap**, **7as**, **7at**, **7bu**, **7eu**, and **9** are reported compounds.

Preparation of chiral diene ligands



(1) R. Cramer, *Inorg. Synth.*, 1974, **15**, 14.
(2) T. Nishimura, M. Nagaosa and T. Hayashi, *Chem. Lett.* 2008, **37**, 860.
(3) T. Nishimura, Y. Yasuhara, M. Nagaosa and T. Hayashi, *Tetrahedron: Asymmetry,* 2008, **19**, 1778.
(4) (a) N. Tokunaga, Y. Otomaru, K. Okamoto, K. Ueyama, R. Shintani and T. Hayashi, *J. Am. Chem. Soc.,* 2004, **126**, 13584. (b) Y. Otomaru, K. Okamoto, R. Shintani and T. Hayashi, *J. Org. Chem*., 2005, **70**, 2503.
(5) C. J. Davies, A. Gregory, P. Griffith, T. Perkins, K. Singh and G. A. Solan, *Tetrahedron,* 2008, **64**, 9857.
(6) T. Fukuda, E. Sudo, K. Shimokawa and M. Iwao, *Tetrahedron*, 2008, **64**, 328.
(7) P. Wipf and J.-K. Jung, *J. Org. Chem.*, 2000, **65**, 6319.

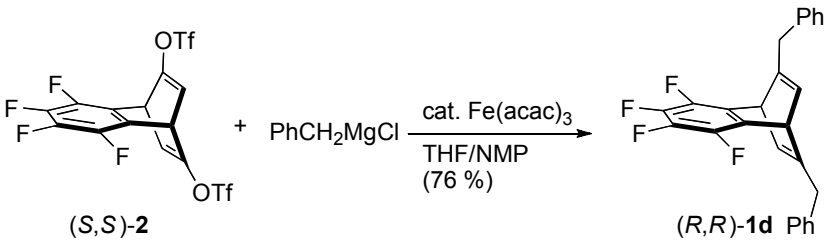
Compound 3 [27282-42-4]:[8] To a solution of pentafluorobenzene (1.68 g, 10.0 mmol) and 1,4-diisopropoxybenzene (30 mL) in hexane (20 mL) was slowly added BuLi (1.65 M in hexane, 6.1 mL, 10 mmol) at –20 °C with vigorous stirring over 15 min, and the mixture was stirred at this temperature for 1 h. Stirring was further continued at 0 °C for 6 h. After the mixture was warmed up to room temperature, it was filtered through a pad of Celite® eluted with hexane, and the filtrate was concentrated on a rotary evaporator. The residue was further concentrated under vacuum (120 °C, ca. 20 Pa) for removal of unreacted 1,4-isopropoxybenzene. The residue was dissolved in THF (20 mL) and 50% (v/v) aqueous trifluoroacetic acid (10 mL), and the mixture was stirred at room temperature for 6 h. Aqueous Na_2CO_3 was added for neutralization, and the mixture was extracted with Et_2O. The organic layer was washed with brine, dried over Na_2SO_4, filtered, and concentrated on a rotary evaporator. The crude product was chromatographed on silica gel with hexane/ethyl acetate (4/1) and further purified by GPC with chloroform to give diketone *dl*-**3** **(**1.04 g, 4.0 mmol, 40%**)** as a white solid. Optical resolution was carried out by use of a chiral stationary phase column [Chiralpak IA (2.0 cm I.D. × 25 cm), hexane/ethyl acetate = 3/2, flow 8 mL/min, t_1 = 10 min for (–)-**3**, t_2 = 14 min for (+)-**3**] to give both enantiomers (–)-**3** and (+)-**3**. An injection of 120 mg of *dl*-**3** in hexane/ethyl acetate (3/2) (4.5 mL) gave (–)-**3** and (+)-**3**, quantitatively. ^{1}H NMR ($CDCl_3$) δ 2.52 (dd, J = 19.1, 3.2 Hz, 2H), 2.75 (dd, J = 19.1, 2.4 Hz, 2H), 4.27 (dd, J = 3.2, 2.4 Hz, 2H); ^{13}C NMR ($CDCl_3$) δ 36.1 (2C), 46.1 (2C), 118.8–119.1 (m, 2C), 139.2–144.9 (m, 4C), 202.7 (2C). $[\alpha]^{20}_D$ –529 (*c* 1.00, $CHCl_3$) for (*S*,*S*)-**3**.



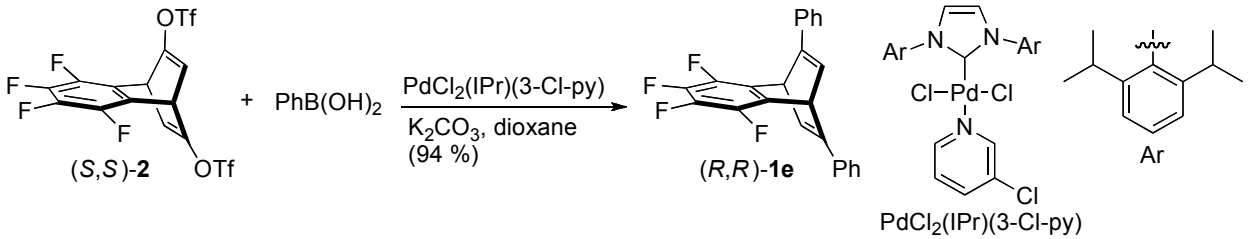
Compound 2: To a solution of diketone **3** (516 mg, 2.00 mmol) and *N*-(2-pyridyl)triflimide (1.72 g, 4.80 mmol) in THF (30 mL) was slowly added $KN(SiMe_3)_2$ (0.5 M in toluene, 9.2 mL, 4.6 mmol) at −78 °C over 1 h, and the mixture was stirred for further 30 min.[9] The mixture was quenched with aqueous NH_4Cl at −78 °C. The aqueous layer was extracted with Et_2O, and the combined organic layer was washed with brine, dried over $MgSO_4$, filtered, and concentrated on a rotary evaporator. The crude product was chromatographed on silica gel with hexane/ethyl acetate (97/3) to give **2** (816 mg, 1.56 mmol, 78%) as colorless oil. ^{1}H NMR ($CDCl_3$) δ 5.09 (dd, J = 6.7, 2.7 Hz, 2H), 6.80 (dd, J = 6.7, 2.7 Hz, 2H); ^{13}C NMR ($CDCl_3$) δ 43.5 (2C), 118.4 (q, $J_{F\text{-}C}$ = 321 Hz, 2C), 124.1 (2C), 126.6–126.9 (m, 2C), 137.3–143.7 (m, 4C), 163.9 (2C). HRMS (ESI-TOF) calcd for $C_{14}H_4F_4NaO_6S_2$ ($M+Na^+$) 544.9182, found 544.9164. $[\alpha]^{20}_D$

(8) (a) Hankinson, B and Heaney, H. *Tetrahedron Lett*., 1970, **16**, 1335. (b) P. C. Buxton, N. J. Hales, B. Hankinson, H. Heaney, S. V. Lay and R. P. Sharma, *J. Chem. Soc. Perkin Trans. 1*, 1974, 2681.
(9) K. Vandyck, B. Matthys, M. Willen, K. Robeyns, L. Van Meervelt and J. Van der Eycken, *Org. Lett.,* 2006, **8**, 363.

+4 (*c* 0.82, $CHCl_3$) for (*S*,*S*)-**2**.

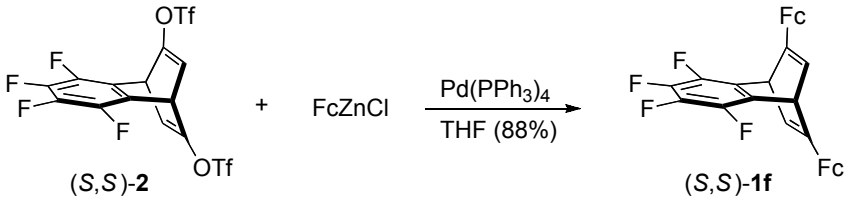


Compound 1d [1067879-52-0]:[3] To a solution of **2** (261 mg, 0.50 mmol), $Fe(acac)_3$ (8.8 mg, 0.025 mmol), and NMP (0.25 mL) in THF (5 mL) was added $PhCH_2MgCl$ (0.8 M in Et_2O, 2.5 mL, 2.0 mmol) at 0 °C over 10 min, and the mixture was stirred for 0.5 h.[10] Aqueous NH_4Cl was added, and the mixture was extracted with Et_2O. The organic layer was dried over $MgSO_4$, filtered, and concentrated on a rotary evaporator. The residue was subjected to column chromatography on silica gel with hexane to give Bn-tfb* **(1d) (**154 mg, 0.38 mmol, 76%).



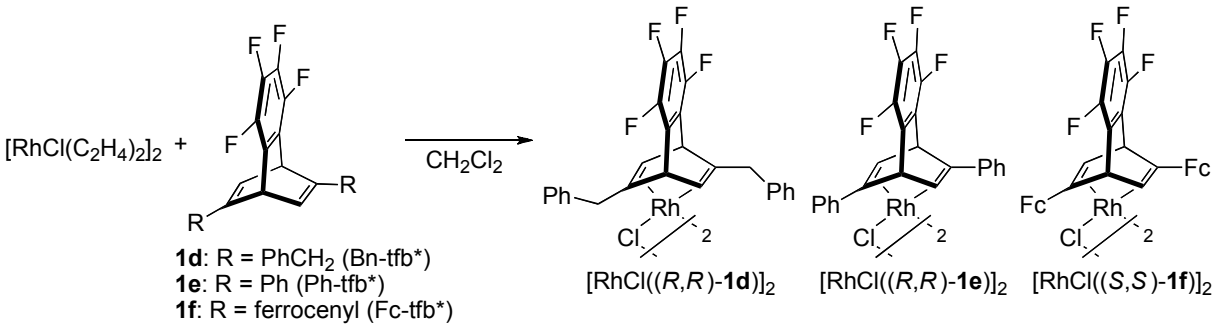
Compound 1e: A mixture of **2** (261 mg, 0.50 mmol), $PhB(OH)_2$ (244 mg, 2.00 mmol), $PdCl_2$(IPr)(3-chloropyridine)[11] (13.6 mg, 0.020 mmol), and K_2CO_3 (346 mg, 2.50 mmol) in dioxane (2 mL) was heated at 60 °C for 8 h. The mixture was passed through a short silica gel column with Et_2O/hexane (1/1), and it was concentrated on a rotary evaporator. The residue was subjected to column chromatography on silica gel with hexane to give Ph-tfb* **(1e) (**177 mg, 0.47 mmol, 94%). ^1H NMR ($CDCl_3$) δ 5.76 (d, *J* = 6.1 Hz, 2H), 7.03 (dd, *J* = 6.1, 2.0 Hz, 2H), 7.25–7.30 (m, 2H), 7.33–7.38 (m, 4H), 7.41–7.46 (m, 4H); ^{13}C NMR ($CDCl_3$) δ 44.2 (2C), 124.7 (4C), 128.1 (2C), 128.8 (4C), 129.3–129.8 (m, 2C), 132.8 (2C), 136.0 (2C), 136.3–142.9 (m, 4C), 153.3 (2C). HRMS (APCI-TOF) calcd for $C_{24}H_{14}F_4$ (M^+) 378.1026, found 378.1016. $[\alpha]^{20}_D$ +12 (*c* 1.18, $CHCl_3$) for (*R*,*R*)-**1e**.

(10) (a) B. Scheiper, M. Bonnekessel, H. Krause and A. Fürstner, *J. Org. Chem*., 2004, **69**, 3943. (b) G. Berthon-Gelloz and T. Hayashi, *J. Org. Chem.,* 2006, **71**, 8957.
(11) C. J. O'Brien, E. A. B. Kantchev, C. Valente, N. Hadei, G. A. Chass, A. Lough, A. C. Hopkinson and M. G. Organ, *Chem. –Eur. J.,* 2006, **12**, 4743.



Compound 1f: To a solution of ferrocene (3.57 g, 19.2 mmol) in THF (20 mL) was slowly added *t*-BuLi (1.77 M in pentane, 9.5 mL, 16.8 mmol) at –50 °C, and the mixture was allowed to warm to room temperature, and it was stirred for 2 h.[12] To the mixture was added $ZnCl_2$ (2.29 g, 16.8 mmol) in THF (10 mL), and the mixture was stirred at room temperature for 0.5 h. After the mixture was concentrated to ca. 30 mL under the flow of dry N_2, $Pd(PPh_3)_4$ (231 mg, 0.21 mmol) and ditriflate **2** (1.05 g, 2.01 mmol) in THF (5 mL) were added, and the mixture was stirred at 50 °C for 15 h. The mixture was poured into aqueous NH_4Cl, and it was extracted with Et_2O. The organic layer was dried over $MgSO_4$, filtered, and concentrated on a rotary evaporator. The crude product was subjected to column chromatography on silica gel with hexane/ethyl acetate (19/1) and further purified by GPC with chloroform to give Fc-tfb* **(1f) (**1.04 g, 1.76 mmol, 88%) as a red solid. ^{1}H NMR ($CDCl_3$) δ 4.10 (s, 10H), 4.30 (s, 4H), 4.42 (s, 4H), 5.33 (d, J = 5.6 Hz, 2H), 6.64 (d, J = 5.6 Hz, 2H); ^{13}C NMR ($CDCl_3$) δ 44.1 (2C), 65.3 (2C), 65.5 (2C), 68.7 (10C), 69.4 (2C), 69.5 (2C), 81.2 (2C), 126.7 (2C), 129.3–129.6 (m, 2C), 136.3–142.5 (m, 4C), 151.4 (2C). HRMS (ESI-TOF) calcd for $C_{32}H_{22}F_4Fe$ (M^+) 594.0352, found 594.0351. $[\alpha]^{20}_D$ +173 (*c* 0.50, $CHCl_3$) for (*S*,*S*)-**1f**.

Preparation of rhodium/chiral diene complexes



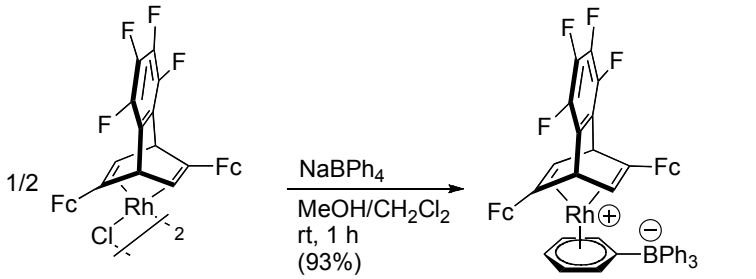
[RhCl((*R*,*R*)-1d)]$_2$: A mixture of (*R*,*R*)-Bn-tfb* (**1d**) (103 mg, 0.25 mmol) and $[RhCl(C_2H_4)_2]_2$ (54 mg, 0.14 mmol, 0.28 mmol of Rh) in CH_2Cl_2 (5 mL) was stirred at room temperature for 12 h. After concentration of the mixture, the residue was subjected to column chromatography on silica gel with hexane/ethyl acetate (9/1) to give the pure complex as a yellow solid (134 mg, 0.12 mmol, 98% yield). ^{1}H NMR ($CDCl_3$) δ 2.84 (d, J = 14.3 Hz, 4H), 3.58 (d, J = 14.3 Hz, 4H), 3.62 (d, J = 5.8 Hz, 4H), 5.32 (d, J = 5.8 Hz, 4H), 7.08–7.22 (m, 20H); ^{13}C NMR

(12) M. Enders, G. Kohl and H. Pritzkow, *J. Organomet. Chem*., 2001, **622**, 66.

($CDCl_3$) δ 41.7 (4C), 44.8 (d, $J_{F\text{-}C}$ = 3.1 Hz, 4C), 49.4 (d, $J_{Rh\text{-}C}$ = 11.4 Hz, 4C), 69.7 (d, $J_{Rh\text{-}C}$ = 12.4 Hz, 4C), 125.2–125.6 (m, 4C), 126.8 (4C), 128.5 (8C), 128.9 (8C), 136.1 (4C), 136.9–140.2 (m, 8C). HRMS (ESI-TOF) calcd for $C_{52}H_{36}Cl_3F_8Rh_2$ ($M+Cl^-$) 1122.9870, found 1122.9841. $[\alpha]^{20}_D$ +78 (*c* 0.26, $CHCl_3$) for [RhCl((*R*,*R*)-**1d**)]$_2$.

[RhCl((*R*,*R*)-1e)]$_2$: This compound was prepared by the reaction of (*R*,*R*)-Ph-tfb* (**1e**) (93 mg, 0.25 mmol) with [RhCl(C_2H_4)$_2$]$_2$ (53 mg, 0.14 mmol, 0.28 mmol of Rh) in CH_2Cl_2 (5 mL) at room temperature for 12 h. The crude product was purified by column chromatography on silica gel with $CHCl_3$/ethyl acetate (19/1) to give the pure complex (121 mg, 0.12 mmol, 95% yield) as a orange solid. ^{1}H NMR ($CDCl_3$) δ 3.59 (d, *J* = 6.1 Hz, 4H), 6.10 (d, *J* = 6.1 Hz, 4H), 7.35–7.42 (m, 12H), 7.54–7.60 (m, 8H); ^{13}C NMR ($CDCl_3$) δ 42.7 (d, $J_{F\text{-}C}$ = 3.6 Hz, 4C), 43.4 (d, $J_{Rh\text{-}C}$ = 11.4 Hz, 4C), 65.7 (d, $J_{Rh\text{-}C}$ = 10.9 Hz, 4C), 125.6–126.9 (m, 4C), 127.2 (8C), 128.5 (4C), 128.7 (8C), 136.9 (4C), 137.8–141.2 (m, 8C). HRMS (ESI-TOF) calcd for $C_{48}H_{28}Cl_2F_8NaRh_2$ ($M+Na^+$) 1054.9443, found 1054.9399. $[\alpha]^{20}_D$ −1118 (*c* 0.13, $CHCl_3$) for [RhCl((*R*,*R*)-**1e**)]$_2$.

[RhCl((*S*,*S*)-1f)]$_2$: This compound was prepared by the reaction of (*S*,*S*)-Fc-tfb* (**1f**) (297 mg, 0.50 mmol) with [RhCl(C_2H_4)$_2$]$_2$ (107 mg, 0.28 mmol, 0.55 mmol of Rh) in CH_2Cl_2 (10 mL) at room temperature for 12 h. The crude product was purified by column chromatography on silica gel with $CHCl_3$/ethyl acetate (19/1) to give the pure complex (352 mg, 0.24 mmol, 96%) as a red solid. ^{1}H NMR ($CDCl_3$) δ 3.13 (d, *J* = 5.7 Hz, 4H), 3.89 (s, 20H), 4.08 (br s, 4H), 4.27 (br s, 4H), 4.45 (br s, 4H), 4.79 (br s, 4H), 5.61 (d, *J* = 5.7 Hz, 4H); ^{13}C NMR ($CDCl_3$) δ 39.9 (d, $J_{Rh\text{-}C}$ = 11.4 Hz, 4C), 43.5 (4C), 65.5 (d, $J_{Rh\text{-}C}$ = 10.3 Hz, 4C), 67.8 (4C), 68.3 (4C), 69.4 (20C), 69.9 (4C), 70.2 (4C), 83.0 (br, 4C), 125.5–126.0 (m, 4C), 137.6–141.0 (m, 8C). HRMS (ESI-TOF) calcd for $C_{64}H_{44}Cl_3F_8Fe_4Rh_2$ ($M+Cl^-$) 1498.7903, found 1498.7956. $[\alpha]^{20}_D$ –831 (*c* 0.048, $CHCl_3$) for [RhCl((*S*,*S*)-**1f**)]$_2$.



[RhCl((*S*,*S*)-**1f**)]$_2$ Rh((*S*,*S*)-**1f**)[(η^6-C_6H_5)BPh_3]

Rh((*S*,*S*)-1f)[(η^6-C_6H_5)BPh_3]: To a solution of [RhCl((*S*,*S*)-**1f**)]$_2$ (29.3 mg, 0.020 mmol) in CH_2Cl_2 (1.0 mL) was added a solution of $NaBPh_4$ (16.4 mg, 0.048 mmol) in MeOH (1 mL). The mixture was stirred at room temperature for 1 h, and the solvent was removed under

vacuum. The residue was triturated with MeOH, and the mixture was filtered. The resulting solid was washed with MeOH and dried under vacuum to give the complex Rh((*S*,*S*)-**1f**)[(η^6-C_6H_5)BPh_3] (38.0 mg, 0.037 mmol, 93%). ^{1}H NMR (CD_2Cl_2) δ 3.23 (br s, 2H), 3.62 (s, 10 H), 3.72 (br s, 2H), 4.20 (br s, 2H), 4.34 (br s, 2H), 4.68 (br s, 2H), 5.02 (t, *J* = 6.3 Hz, 1H), 5.25 (d, *J* = 6.1 Hz, 2H), 5.62 (br s, 2H), 6.33 (d, *J* = 6.3 Hz, 1H), 6.88 (br s, 1H), 7.07 (t, *J* = 7.3 Hz, 3H), 7.21 (t, *J* = 7.3 Hz, 6H), 7.37 (d, *J* = 7.3 Hz, 6H). HRMS (ESI-TOF) calcd for $C_{56}H_{42}BF_4Fe_2NaRh$ ($M+Na^+$) 1039.0973, found 1039.0963. $[\alpha]^{20}_D$ –92 (*c* 0.12, $CHCl_3$). Orange crystals of Rh((*S*,*S*)-**1f**)[(η^6-C_6H_5)BPh_3] suitable for X-ray crystallographic analysis were obtained by recrystallization from CH_2Cl_2/MeOH. The ORTEP drawing of Rh((*S*,*S*)-**1f**)[(η^6-C_6H_5)BPh_3] is shown in Figure S1. The crystal structure has been deposited at the Cambridge Crystallographic Data Centre (deposition number: CCDC734763). The data can be obtained free of charge via www.ccdc.cam.ac.uk/data_request/cif. The crystal data are summarized in Tables S1–S3.

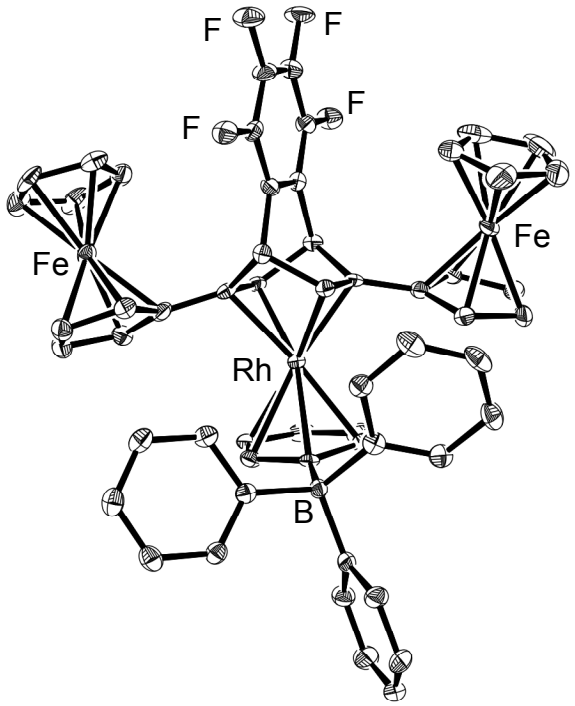


Figure S1. ORTEP illustration of Rh((*S*,*S*)-**1f**)[(η^6-C_6H_5)BPh_3] with thermal ellipsoids drawn at 50% probability level. The solvent molecule (CH_2Cl_2) and hydrogens are omitted for clarity. Crystal data for Rh((*S*,*S*)-**1f**)[(η^6-C_6H_5)BPh_3]·(CH_2Cl_2): $C_{57}H_{44}BCl_2F_4Fe_2Rh$, *Mw* = 1101.28, space group $P2_1$ (#4), *a* = 11.067(4) Å, *b* = 9.614(2) Å, *c* = 22.413(6) Å, β = 104.655(12)°, *V* = 2307.2(11) Å^3, *Z* = 2, D_{calcd} = 1.585 g/cm^3, *T* = 123 K, *R* = 0.0429 (I>2.00σ(I)), wR_2 = 0.1089, GOF = 1.056, Flack Parameter = –0.009(16), 22685 reflections measured, 10496 unique (R_{int} = 0.048).

The structure was solved by direct methods[13] and expanded using Fourier techniques.[14] The non-hydrogen atoms were refined anisotropically. Hydrogen atoms were refined using the riding model. The final cycle of full-matrix least-squares refinement on F^2 was based on 10496 observed reflections and 605 variable parameters and converged (largest parameter shift was 0.00 times its esd) with unweighted and weighted agreement factors of: $R_1 = 0.0429$, $wR_2 = 0.1089$.

The standard deviation of an observation of unit weight was 1.06. Unit weights were used. The maximum and minimum peaks on the final difference Fourier map corresponded to 2.34 and –1.14 $e^-/Å^3$, respectively. The absolute structure was deduced based on Flack parameter, –0.009(16), using 4903 Friedel pairs.[15]

Neutral atom scattering factors were taken from Cromer and Waber.[16] Anomalous dispersion effects were included in F_{calc};[17] the values for Δf' and Δf'' were those of Creagh and McAuley.[18] The values for the mass attenuation coefficients are those of Creagh and Hubbell.[19] All calculations were performed using the CrystalStructure[20] crystallographic software package except for refinement, which was performed using SHELXL-97.[21]

Table S1. Crystal data of Rh((*S*,*S*)-**1f**)[(η^6-C_6H_5)BPh_3]

Empirical Formula	$C_{57}H_{44}BF_4Fe_2RhCl_2$
Formula Weight	1101.28
Crystal Color, Habit	orange, prism
Crystal Dimensions	0.30 × 0.15 × 0.05 mm
Crystal System	monoclinic
Lattice Type	Primitive
Indexing Images	3 oscillations at 60.0 seconds
Detector Position	127.40 mm
Pixel Size	0.100 mm
Lattice Parameters	a = 11.067(4) Å
	b = 9.614(2) Å
	c = 22.413(6) Å
	b = 104.655(12) °
	V = 2307.2(11) $Å^3$
Space Group	$P2_1$ (#4)

13 SIR2004: M. C. Burla, R. Caliandro, M. Camalli, B. Carrozzini, G. L. Cascarano, L. De Caro, C. Giacovazzo, G. Polidori and R. Spagna (2005).
14 DIRDIF99: P. T.Beurskens, G. Admiraal, G. Beurskens, W. P. Bosman, R. de Gelder, R. Israel and J. M. M. Smits, (1999). The DIRDIF-99 program system, Technical Report of the Crystallography Laboratory, University of Nijmegen, The Netherlands.
15 H. D. Flack, *Acta Cryst*., 1983, **A39**, 876.
16 D. T. Cromer and J. T. Waber, "International Tables for X-ray Crystallography", Vol. IV, The Kynoch Press, Birmingham, England, Table 2.2 A (1974).
17 J. A. Ibers and W. C. Hamilton, Acta Crystallogr., 1964, **17**, 781.
18 D. C. Creagh and W. J. McAuley, "International Tables for Crystallography", Vol C, (A.J.C. Wilson, ed.), Kluwer Academic Publishers, Boston, Table 4.2.6.8, pages 219 (1992).
19 D. C. Creagh and J. H. Hubbell, "International Tables for Crystallography", Vol C, (A.J.C. Wilson, ed.), Kluwer Academic Publishers, Boston, Table 4.2.4.3, pages 200 (1992).
20 CrystalStructure 3.8: Crystal Structure Analysis Package, Rigaku and Rigaku Americas (2000-2007).
21 SHELX97: G. M. Sheldrick (1997).

Z value	2
D_{calc}	1.585 g/cm^3
F_{000}	1116.00
μ(MoKa)	11.445 cm^{-1}

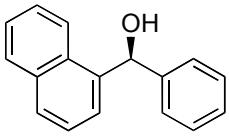
Table S2. Intensity measurements

Diffractometer	Rigaku RAXIS-RAPID
Radiation	MoKα (λ = 0.71075 Å) graphite monochromated
Detector Aperture	280 mm × 256 mm
Data Images	44 exposures
ω oscillation Range (χ=45.0, ϕ=0.0)	130.0–190.0°
Exposure Rate	360.0 sec./°
ω oscillation Range (χ=45.0, ϕ=180.0)	0.0–160.0°
Exposure Rate	360.0 sec./°
Detector Position	127.40 mm
Pixel Size	0.100 mm
$2\theta_{max}$	55.0°
No. of Reflections Measured	Total: 22685 Unique: 10496 (R_{int}= 0.041) Friedel pairs: 4903
Corrections	Lorentz-polarization Absorption (trans. factors: 0.482–0.944)

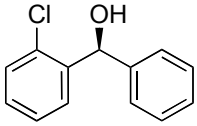
Table S3. Structure solution and refinement

Structure Solution	Direct Methods
Refinement	Full-matrix least-squares on F^2
Function Minimized	$\Sigma\, w\,(Fo^2 - Fc^2)^2$
Least Squares Weights	$w = 1/\,[\sigma^2(Fo^2) + (0.0532 \cdot P)^2 + 2.7630 \cdot P]$ where $P = (Max(Fo^2,0) + 2Fc^2)/3$
$2\theta_{max}$ cutoff	55.0°
Anomalous Dispersion	All non-hydrogen atoms
No. Observations (All reflections)	10496
No. Variables	605
Reflection/Parameter Ratio	17.35
Residuals: R (All reflections)	0.0471
Residuals: R_1 (I>2.00σ(I))	0.0429
Residuals: wR_2 (All reflections)	0.1089
Goodness of Fit Indicator	1.056
Flack Parameter (Friedel pairs = 4903)	–0.009(16)
Max Shift/Error in Final Cycle	0.002
Maximum peak in Final Diff. Map	2.34 e$^-$/Å^3
Minimum peak in Final Diff. Map	–1.14 e$^-$/Å^3

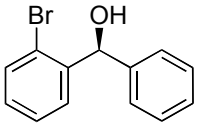
A typical procedure for rhodium-catalyzed asymmetric phenylation of aldehyde 1a (Table 2, entry 1). To a mixture of [RhCl((*S*,*S*)-Fc-tfb* (**1f**))]$_2$ (1.8 mg, 1.75 μmol, 2.5 μmol of Rh), phenylboronic acid (**6m**) (61.0 mg, 0.50 mmol), powdered KOH (25 mg, 0.38 mmol, assay; 85%, pellets) was added *tert*-butyl alcohol (1 mL), and the mixture was stirred at room temperature for 2 min. 1-Naphthaldehyde (**5a**) (39.0 mg, 0.25 mmol) was added to the mixture, and it was stirred at 30 °C for 3 h. The mixture was diluted with hexane, and it was passed through a short column of silica gel with Et_2O as eluent. After evaporation of the solvent, the residue was subjected to column chromatography on silica gel (hexane/ethyl acetate, 9/1) to give compound **7am** (55.6 mg, 0.24 mmol, 95%). The absolute configurations of known diarylmethanols **7** produced by use of (*S*,*S*)-Fc-tfb* (**1f**) were determined by comparison of its specific rotation and the retention time of the chiral HPLC analysis with those reported previously. For others, they were assigned by consideration of the stereochemical pathway.



Compound 7am (86% ee, (*S*); [1517-61-9] for (*S*)-**7am**):[22] The ee was measured by HPLC (Chiralcel OD-H column, flow 0.8 mL/min, hexane/2-propanol = 4/1, 224 nm, t_1 = 11.1 min (*S*), t_2 = 21.6 min (*R*)).

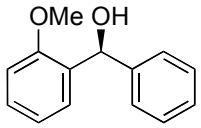


Compound 7bm (84% ee (*S*); [16071-25-3] for (*S*)-**7bm**):[23] The ee was measured by HPLC (Chiralcel OD-H column, flow 0.8 mL/min, hexane/2-propanol = 19/1, 224 nm, t_1 = 16.5 min (*R*), t_2 = 20.2 min (*S*)).

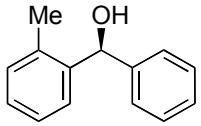


Compound 7cm (84% ee (*S*); [143880-86-8] for (*S*)-**7cm**):[24] The ee was measured by HPLC (Chiralcel OD-H column, flow 1.0 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 9.2 min (*R*), t_2 = 12.1 min (*S*)).

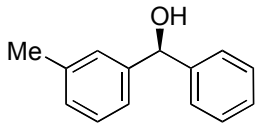
(22) H.-F. Duan, J.-H. Xie, W-J. Shi, Q. Zhang and Q.-L. Zhou, *Org. Lett*. 2006, **8**, 1479.
(23) X. Wu, X. Liu and G. Zhao, *Tetrahedron: Asymmetry*, 2005, **70**, 1093.
(24) J.-X. Ji, J. Wu, T. T.-L. Au-Yeung, C.-W. Yip, R. K. Haynes and A. S. C. Chan, *J. Org. Chem*., 2005, **70**, 1093.



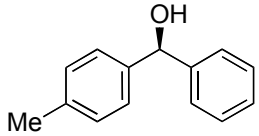
Compound 7dm (85% ee (*S*); [123436-08-8] for (*S*)-**7dm**):[25] The ee was measured by HPLC (Chiralcel OD-H column, flow 1.0 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 20.5 min (*S*), t_2 = 23.6 min (*R*)).



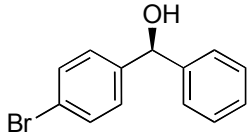
Compound 7em (86% ee (*S*); [1517-59-5] for (*S*)-**7em**):[26] The ee was measured by HPLC (Chiralcel OB-H column, flow 1.0 mL/min, hexane/2-propanol = 19/1, 224 nm, t_1 = 20.3 min (*R*), t_2 = 24.1 min (*S*)).



Compound 7fm (80% ee (*S*); [137474-27-2] for (*S*)-**7fm**):[17] The ee was measured by HPLC (Chiralcel OB-H column, flow 1.0 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 16.8 min (*R*), t_2 = 30.6 min (*S*)).

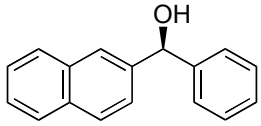


Compound 7gm (78% ee (*S*); [24218-12-0] for (*S*)-**7gm**):[15] The ee was measured by HPLC (Chiralcel OB-H column, flow 1.0 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 12.2 min (*R*), t_2 = 14.3 min (*S*)).

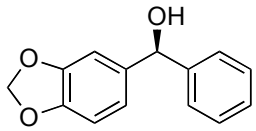


Compound 7hm (78% ee (*S*); [73773-07-6] for (*S*)-**7hm**):[17] The ee was measured by HPLC (Chiralcel OB-H column, flow 1.0 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 16.5 min (*R*), t_2 = 23.1 min (*S*)).

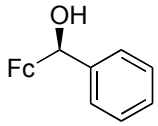
(25) M.-C. Wang, X.-D. Wang, X. Ding, Z.-K. Liu, *Tetrahedron*, 2008, **64**, 2559.
(26) J. Shannon, D. Bernier, D. Rawson and S. Woodward, *Chem. Commun*., 2007, 3945.



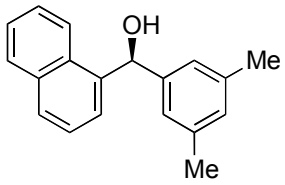
Compound 7im (82% ee (*S*); [99412-45-0] for (*S*)-**7im**):[14] The ee was measured by HPLC (Chiralcel OD-H column, flow 1.0 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 15.4 min (*S*), t_2 = 18.3 min (*R*)).



Compound 7jm (79% ee (*S*); [929214-02-8] for (*S*)-**7jm**):[16] The ee was measured by HPLC (Chiraldel OB-H column, flow 0.8 mL/min, hexane/2-propanol = 4/1, 224 nm, t_1 = 31.7 min (*R*), t_2 = 45.7 min (*S*)).

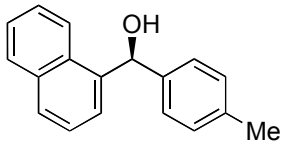


Compound 7km (85% ee (*S*); [57884-64-7] for (*R*)-**7km**):[27] The ee was measured by HPLC (Chiralcel OD-H column, flow 1.0 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 11.2 min (*R*), t_2 = 17.0 min (*S*)).

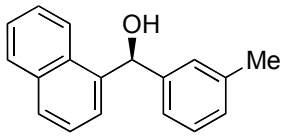


Compound 7an: The ee was measured by HPLC (Chiralcel OD-H column, flow 0.8 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 14.1 min (*S*), t_2 = 28.3 min (*R*)). $[\alpha]^{20}_{D}$ +34 (*c* 1.81, $CHCl_3$) for (*S*)-**7an** (87% ee). ^{1}H NMR ($CDCl_3$) δ 2.24 (s, 6H), 2.39 (br d, *J* = 2.6 Hz, 1H), 6.39 (d, *J* = 2.6 Hz, 1H), 6.88 (s, 1H), 6.98 (s, 2H), 7.36–7.47 (m, 3H), 7.61 (d, *J* = 7.1 Hz, 1H), 7.77 (d, *J* = 8.3 Hz, 1H), 7.80–7.86 (m, 1H), 7.97–8.02 (m, 1H); ^{13}C NMR ($CDCl_3$) δ 21.3, 73.5, 123.9, 124.4, 124.8, 125.3, 125.5, 1260, 128.2, 128.7, 129.3, 130.7, 133.8, 138.0, 138.9, 143.1. HRMS (ESI-TOF) calcd for $C_{19}H_{18}NaO$ ($M+Na^+$) 285.1250, found 281.1256.

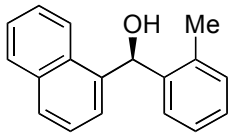
(27) R. J. Kloetzing, M. Lotz and P. Knochel, *Tetrahedron: Asymmetry*, 2003, **14**, 255.



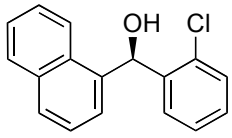
Compound 7ao (85% ee (*S*); [1002328-13-3] for (*S*)-**7ao**):[28] The ee was measured by HPLC (Chiralcel OD-H column, flow 1.0 mL/min, hexane/2-propanol = 4/1, 224 nm, t_1 = 8.1 min (*S*), t_2 = 16.6 min (*R*)).



Compound 7ap: The ee was measured by HPLC (Chiralcel OD-H column, flow 1.0 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 13.5 min (*S*), t_2 = 28.7 min (*R*)). $[\alpha]^{20}_{D}$ –34 (*c* 1.81, $CHCl_3$) for (*S*)-**7ap** (87% ee). ^{1}H NMR ($CDCl_3$) δ 2.27 (s, 3H), 2.47 (br s, 1H), 6.40 (s, 1H), 7.04 (d, *J* = 7.2 Hz, 1H), 7.10–7.20 (m, 3H), 7.35–7.46 (m, 3H), 7.58 (d, *J* = 7.2 Hz, 1H), 7.76 (d, *J* = 8.1 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.97 (d, *J* = 8.0 Hz, 1H); ^{13}C NMR ($CDCl_3$) δ 21.4, 73.5, 123.9, 124.1, 124.5, 125.3, 125.5, 126.0, 127.7, 128.31, 128.34, 128.4, 128.7, 130.7, 133.8, 138.1, 138.8, 143.0. HRMS (ESI-TOF) calcd for $C_{18}H_{16}NaO$ ($M+Na^+$) 271.1093, found 271.1090.

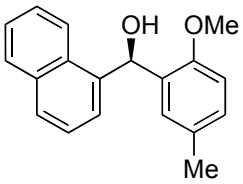


Compound 7aq (91% ee (*S*); [186407-92-1] for (*S*)-**7aq**):[29] The ee was measured by HPLC (Chiralcel OD-H column, flow 1.0 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 14.0 min (*S*), t_2 = 24.0 min (*R*)).

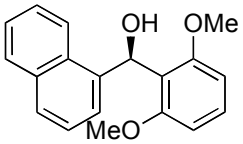


Compound 7ar (86% ee (*R*); [42074-40-8] for *rac*-**7ar**): The ee was measured by HPLC (Chiralcel OF column, flow 0.8 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 14.1 min (*S*), t_2 = 16.1 min (*R*)). $[\alpha]^{20}_{D}$ +30 (*c* 1.40, $CHCl_3$) for (*R*)-**7ar** (86% ee).

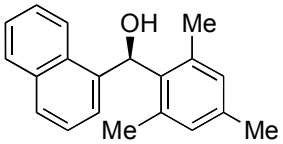
(28) F. Schmidt, J. Rudolph and C. Bolm, *Adv. Synth. Catal*., 2007, **349**, 703.
(29) N. M. Maier and G. Uray, *Chirality*, 1996, **8**, 496.



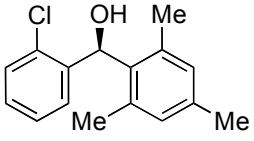
Compound 7as: The ee was measured by HPLC (Chiralcel OD-H column, flow 0.8 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 13.8 min (*R*), t_2 = 20.5 min (*S*)). $[\alpha]^{20}_D$ –15 (*c* 0.42, $CHCl_3$) for (*R*)-**7as** (85% ee). ^{1}H NMR ($CDCl_3$) δ 2.12 (s, 3H), 3.01 (br s, 1H), 3.87 (s, 3H), 6.79 (d, *J* = 2.2 Hz, 1H), 6.83 (s, 1H), 6.84 (d, *J* = 8.3 Hz, 1H), 7.04 (dd, *J* = 8.3, 2.2 Hz, 1H), 7.39–7.47 (m, 2H), 7.48 (d, *J* = 7.3 Hz, 1H), 7.64 (d, *J* = 7.1 Hz, 1H), 7.80 (d, *J* = 8.1 Hz, 1H), 7.82–7.88 (m, 1H), 7.98–8.04 (m, 1H); ^{13}C NMR ($CDCl_3$) δ 20.5, 55.6, 68.3, 110.5, 124.15, 124.18, 125.3, 125.4, 125.9, 128.0, 128.6, 128.9, 129.2, 130.0, 130.96, 131.00, 133.7, 138.2, 154.8. HRMS (ESI-TOF) calcd for $C_{19}H_{18}NaO_2$ ($M+Na^+$) 301.1199, found 301.1189.



Compound 7at: The ee was measured by HPLC (Chiralpak IA column, flow 0.8 mL/min, hexane/2-propanol = 4/1, 224 nm, t_1 = 10.0 min (*S*), t_2 = 13.1 min (*R*)). $[\alpha]^{20}_D$ –102 (*c* 0.93, $CHCl_3$) for (*R*)-**7at** (84% ee). ^{1}H NMR ($CDCl_3$) δ 3.79 (s, 6H), 4.55 (d, *J* = 11.6 Hz, 1H), 6.69 (d, *J* = 8.4 Hz, 2H), 7.06 (d, *J* = 11.6 Hz, 1H), 7.13 (d, *J* = 7.2 Hz, 1H), 7.28–7.35 (m, 2H), 7.52 (t, *J* = 7.0 Hz, 1H), 7.61 (dd, *J* = 7.0, 1.2 Hz, 1H), 7.78 (d, *J* = 8.5 Hz, 1H), 7.88 (d, *J* = 8.0 Hz, 1H), 8.63 (d, *J* = 8.4 Hz, 1H); ^{13}C NMR ($CDCl_3$) δ 55.7, 67.0, 104.5, 117.8, 124.0, 124.9, 125.3, 125.4, 125.9, 128.1, 128.4, 129.0, 132.1, 134.0, 138.4, 158.2. HRMS (ESI-TOF) calcd for $C_{19}H_{18}NaO_3$ ($M+Na^+$) 317.1148, found 317.1149.

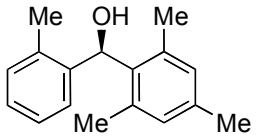


Compound 7au (94% ee (*R*); [186407-89-6] for (*R*)-**7au**):[20] The ee was measured by HPLC (Chiralpak AD-H column × 2, flow 0.5 mL/min, hexane/2-propanol = 19/1, 224 nm, t_1 = 50.2 min (*S*), t_2 = 53.6 min (*R*)).

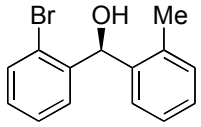


Compound 7bu: The ee was measured by HPLC (Chiralcel OD-H column, flow 0.8 mL/min,

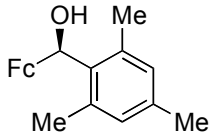
hexane/2-propanol = 9/1, 224 nm, t_1 = 7.5 min (*S*), t_2 = 9.1 min (*R*)). $[\alpha]^{20}_D$ +42 (*c* 0.96, $CHCl_3$) for (*S*)-**7bu** (94% ee). ^{1}H NMR ($CDCl_3$) δ 2.23 (s, 6H), 2.26 (s, 3H), 2.43 (br s, 1H), 6.34 (s, 1H), 6.83 (s, 2H), 7.16–7.24 (m, 2H), 7.30–7.36 (m, 1H), 7.42–7.47 (m, 1H); ^{13}C NMR ($CDCl_3$) δ 20.8, 21.0, 70.4, 126.4, 128.5, 129.0, 129.7, 130.1, 133.0, 134.0, 137.1, 137.3, 139.9. HRMS (ESI-TOF) calcd for $C_{16}H_{17}ClNaO$ ($M+Na^+$) 283.0860, found 283.0860.



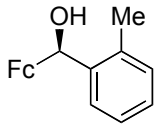
Compound 7eu: The ee was measured by HPLC (Chiralcel OD-H column, flow 0.8 mL/min, hexane/2-propanol = 4/1, 224 nm, t_1 = 7.4 min (*R*), t_2 = 9.8 min (*S*)). $[\alpha]^{20}_D$ +28 (*c* 0.99, $CHCl_3$) for (*R*)-**7eu** (93% ee). ^{1}H NMR ($CDCl_3$) δ 1.97 (br s, 1H), 2.19 (s, 3H), 2.20 (s, 6H), 2.26 (s, 3H), 6.23 (s, 1H), 6.83 (s, 2H), 7.09–7.18 (m, 3H), 7.33–7.36 (m, 1H); ^{13}C NMR ($CDCl_3$) δ 19.5, 20.8, 21.0, 70.9, 125.5, 126.8, 127.2, 130.2, 130.6, 135.2, 136.1, 136.9, 137.1, 140.2. HRMS (ESI-TOF) calcd for $C_{17}H_{20}NaO$ ($M+Na^+$) 263.1406, found 263.1407.



Compound 7cq (86% ee (*S*); [1029874-77-8] for *rac*-**7cq**): The ee was measured by HPLC (Chiralcel OD-H column, flow 0.8 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 13.9 min (*R*), t_2 = 34.3 min (*S*)). $[\alpha]^{20}_D$ –11 (*c* 2.10, $CHCl_3$) for (*S*)-**7cq** (86% ee).

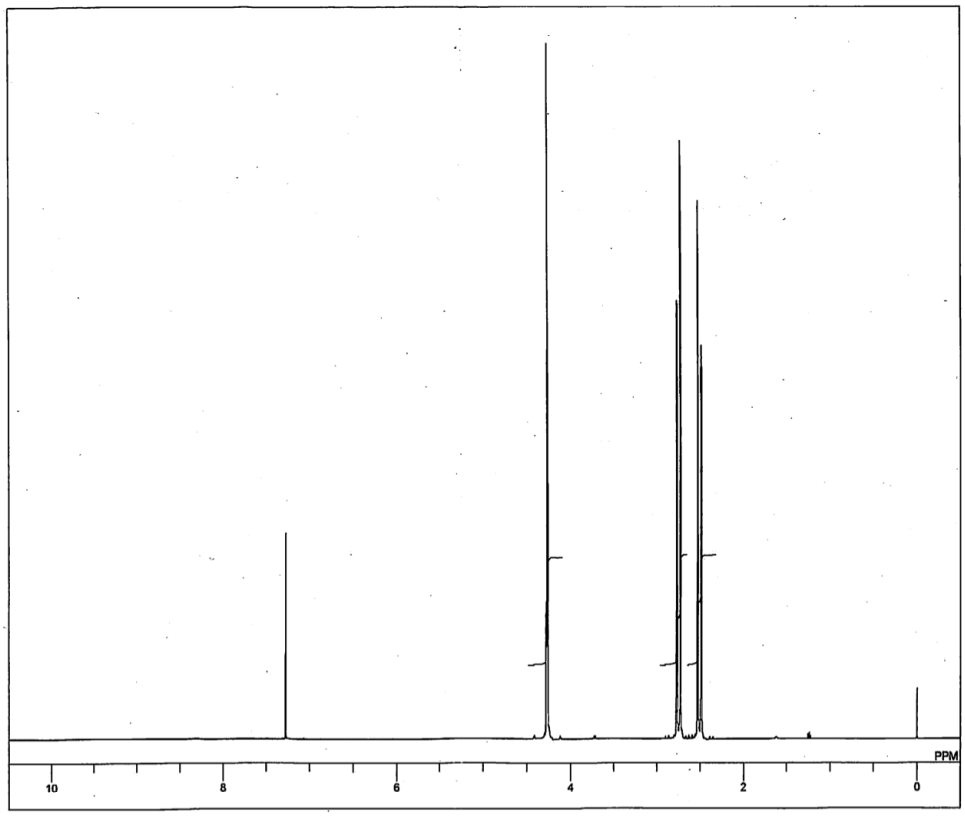


Compound 7ku (84% ee (*S*); [118034-73-4] for *rac*-**7ku**): The ee was measured by HPLC (Chiralcel OD-H column, flow 0.8 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 14.8 min (*S*), t_2 = 20.3 min (*R*)). $[\alpha]^{20}_D$ –172 (*c* 2.26, $CHCl_3$) for (*S*)-**7ku** (84% ee).



Compound 7kq (86% ee (*S*); [221527-96-4] for (*R*)-**7kq**):[18] The ee was measured by HPLC (Chiralcel OD-H column, flow 0.5 mL/min, hexane/2-propanol = 19/1, 224 nm, t_1 = 25.0 min (*R*), t_2 = 26.9 min (*S*)).

A procedure for rhodium-catalyzed asymmetric double arylation of isophthalaldehyde (8) (Scheme 4). A mixture of [RhCl((*S*,*S*)-Fc-tfb* (**1f**))]$_2$ (5.5 mg, 3.75 μmol, 7.5 μmol of Rh), mesitylboronic acid (**6u**) (123 mg, 0.75 mmol), isophthalaldehyde (**8**) (33.5 mg, 0.25 mmol), and aqueous KOH (1.5 M, 0.50 mL, 0.75 mmol) in *tert*-butyl alcohol (2.0 mL) was stirred at 30 °C for 6 h. The mixture was diluted with hexane, and it was passed through a short column of silica gel with Et_2O as eluent. After evaporation of the solvent, the residue was subjected to PTLC on silica gel (hexane/ethyl acetate, 2/1) to give compound **9** (70.5 mg, 0.19 mmol, 75%, *dl*/*meso* = 85/15). The ee was measured by HPLC (Chiralpak AS-H column, flow 0.8 mL/min, hexane/2-propanol = 9/1, 224 nm, t_1 = 8.3 min (*S*,*S*), t_2 = 17.1 min (*R*,*R*), (t = 10.4 min for *meso*-**9**)). *dl*-**9** (98% ee (*R*,*R*)): ^{1}H NMR ($CDCl_3$) δ 2.07 (br s, 2H), 2.20 (s, 12H), 2.27 (s, 6H), 6.30 (s, 2H), 6.83 (s, 4H), 7.00 (d, J = 7.0 Hz, 2H), 7.16 (t, J = 7.0 Hz, 1H), 7.46 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 20.5, 20.8, 71.0, 123.0, 123.8, 127.9, 129.9, 136.4, 136.9, 137.1, 143.2. HRMS (ESI-TOF) calcd for $C_{26}H_{30}NaO_2$ ($M+Na^+$) 397.2138, found 397.2131. *meso*-**9**: ^{1}H NMR ($CDCl_3$) δ 2.07 (br s, 2H), 2.20 (s, 12H), 2.27 (s, 6H), 6.30 (s, 2H), 6.82 (s, 4H), 7.00 (d, J = 7.0 Hz, 2H), 7.16 (t, J = 7.0 Hz, 1H), 7.40 (s, 1H).



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IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
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FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	_DEFAULT.ALS
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
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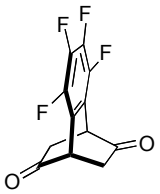
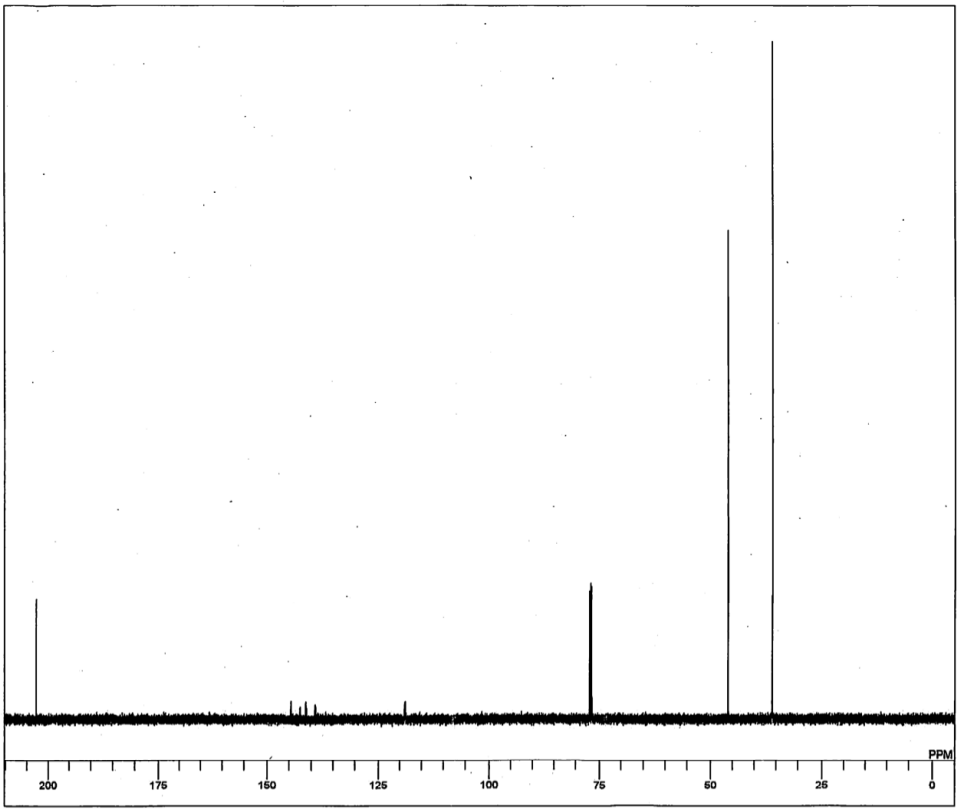
FILDF	
SLVNT	CDCL3
DATIM	Thu Apr 16 21:14:13 2009



3



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PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
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FLT	16950 Hz
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PD	1.0670 sec
ADBIT	16
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T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
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IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
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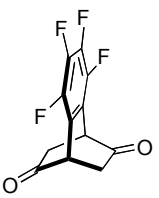
FILDF	
SLVNT	CDCL3
DATIM	Thu Apr 16 21:11:52 2009



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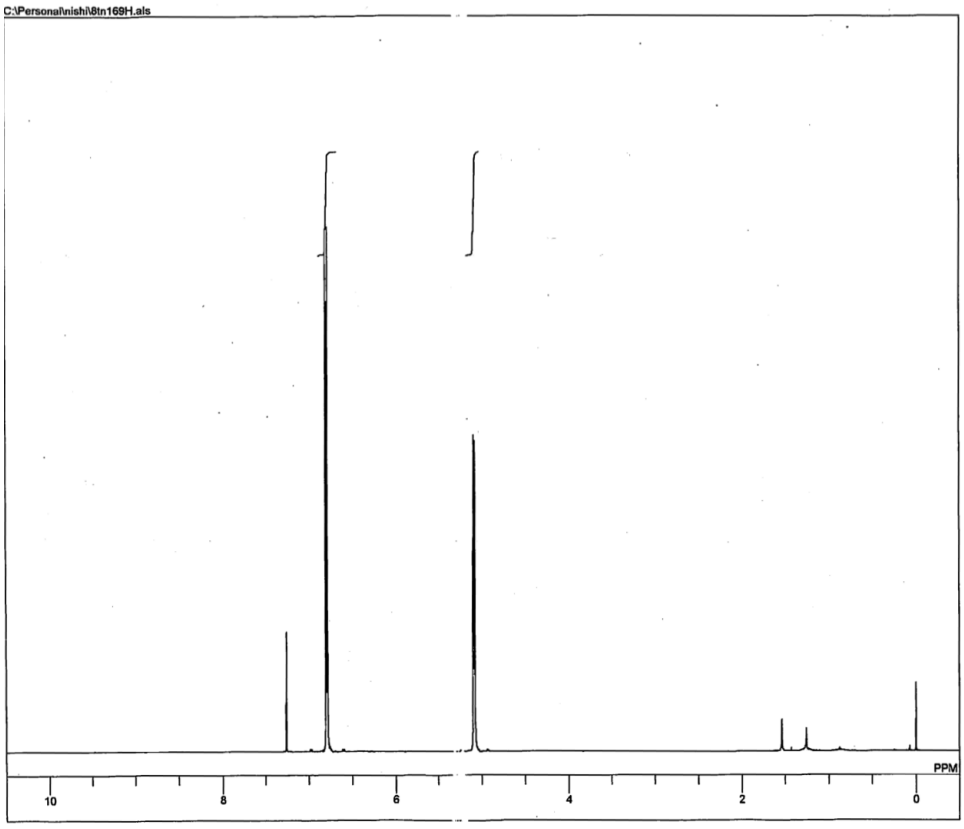

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IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
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ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	22
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T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	8tn169H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	21
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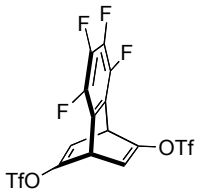
FILDF	
SLVNT	CDCL3
DATIM	Wed Nov 19 10:05:37 2008



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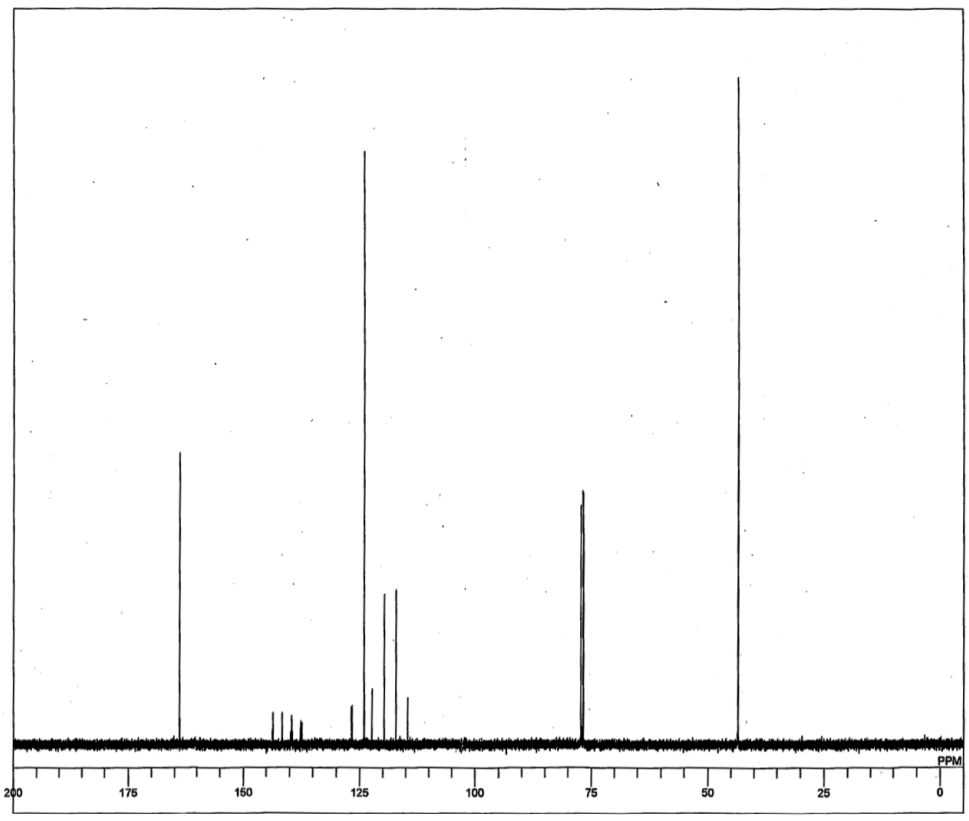

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DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
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IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	8tn169C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
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FILDF	
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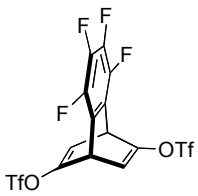
DATIM	Wed Nov 19 21:49:38 2008



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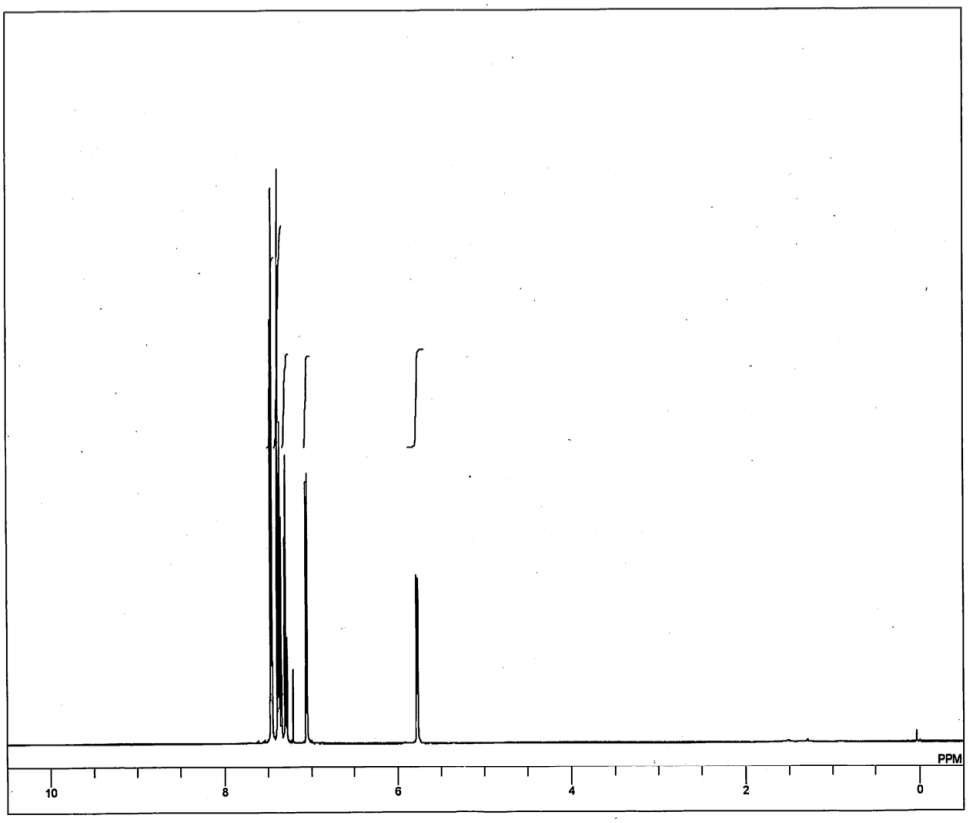

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SPO	65536
TIMES	8
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IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Ph-tfb.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
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FILDF	
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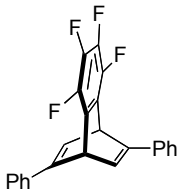
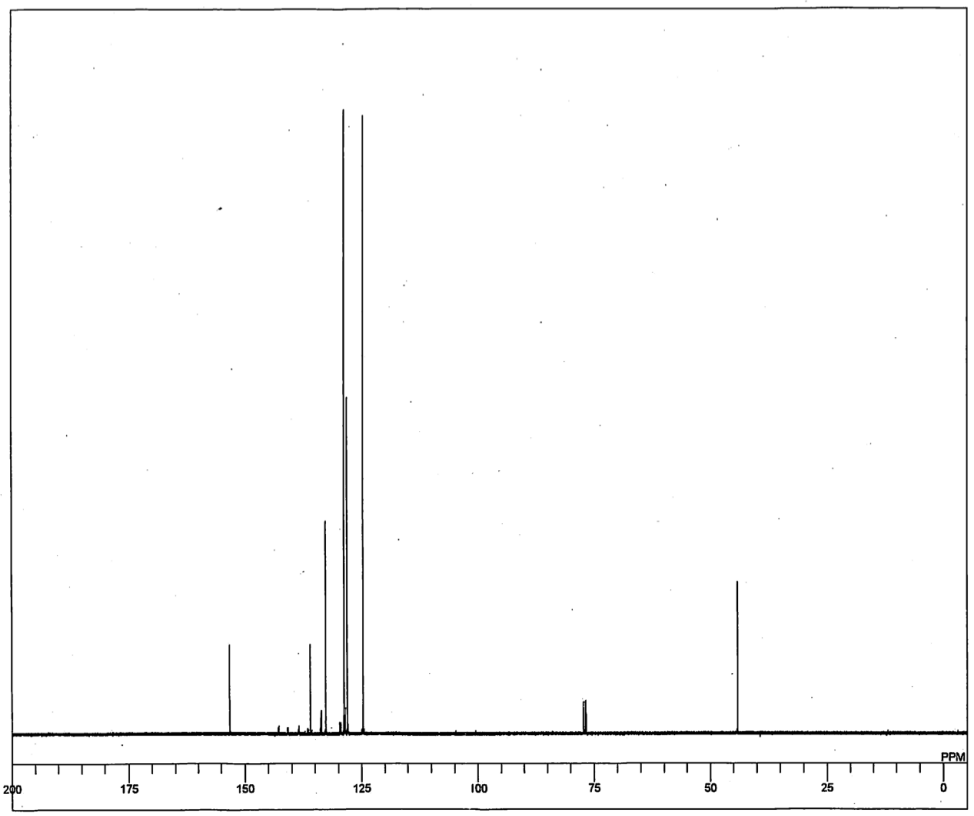
DATIM	Tue Apr 07 13:49:53 2009



1e



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OBFIN	143041.00 Hz
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DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16960 Hz
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RGAIN	28
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T4	100.00
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EXPCM	single pulse with bilevel decoupling
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IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Ph-tfbC.als
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LKSET	0.00 KHz
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LKLEV	200
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FILDF	
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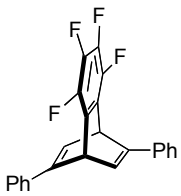
DATIM	Tue Apr 07 13:59:10 2009



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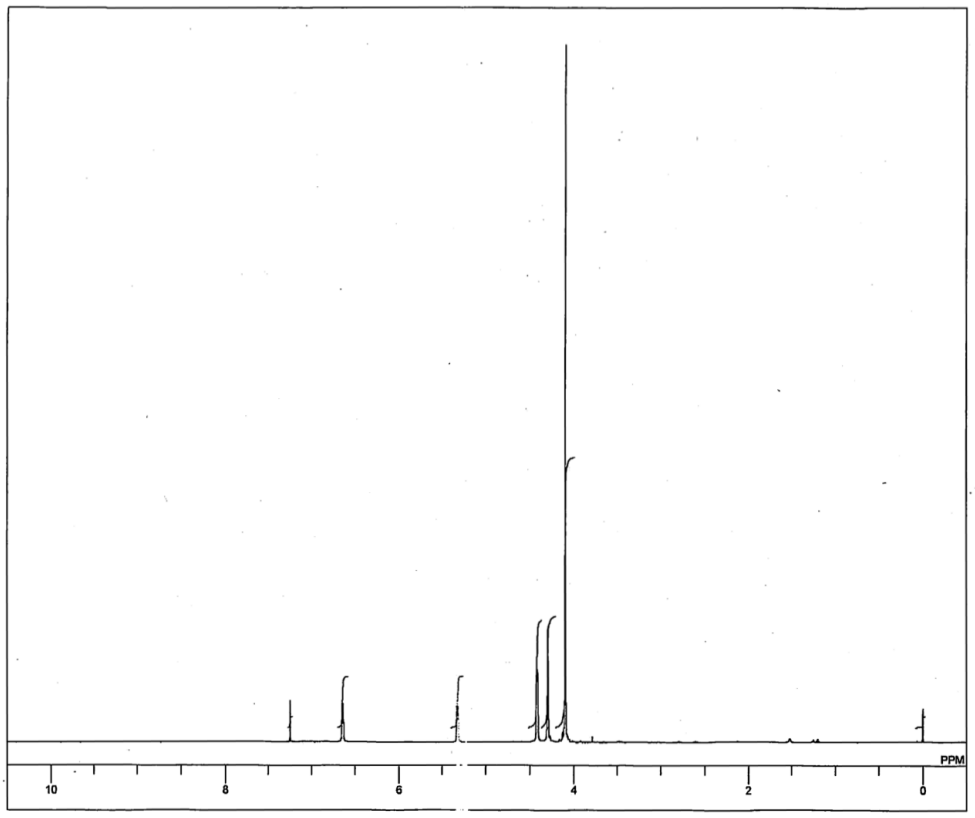

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OBFIN	128885.00 Hz
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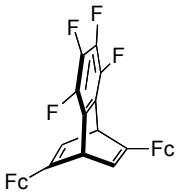
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Fc-tfb 1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	586
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon Feb 09 23:58:37 2009



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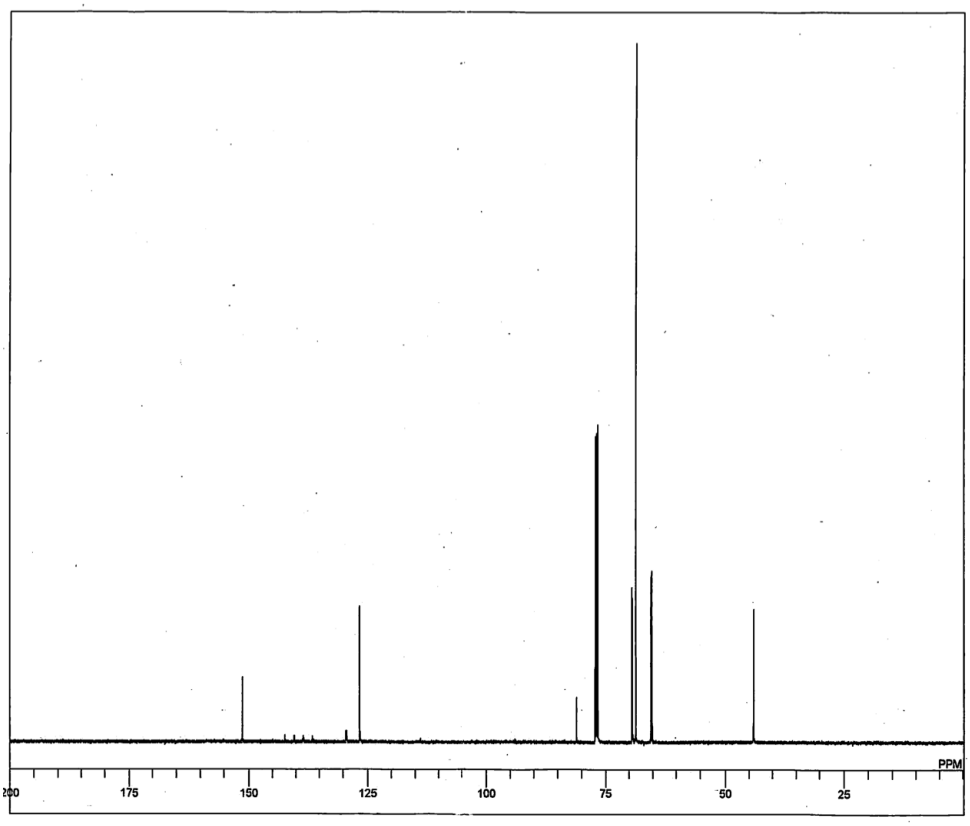

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OBFIN	143041.00 Hz
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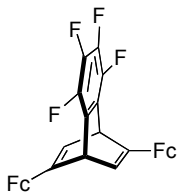
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 msec
POINT	32768
SPO	32768
TIMES	1024
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	30
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	Fc-tfb2bcm_E3_FT.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	574
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Feb 10 00:57:35 2009



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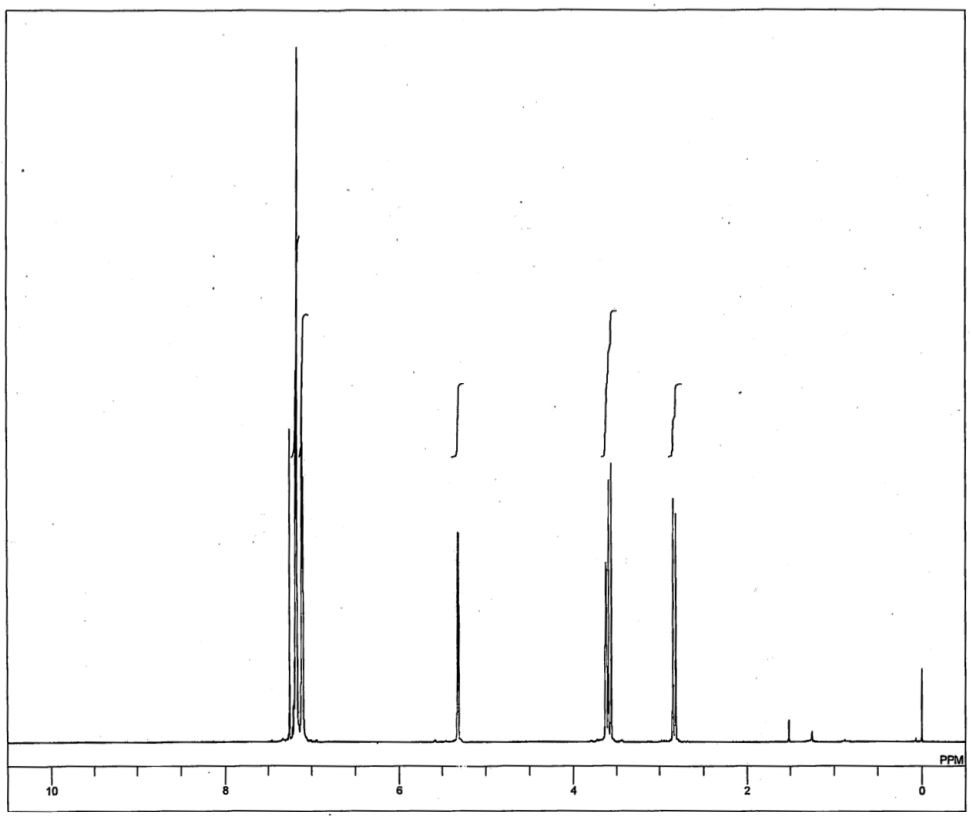

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OBFIN	128885.00 Hz
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DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	22
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	_DEFAULT.ALS
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
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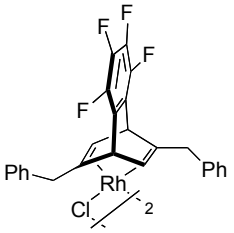
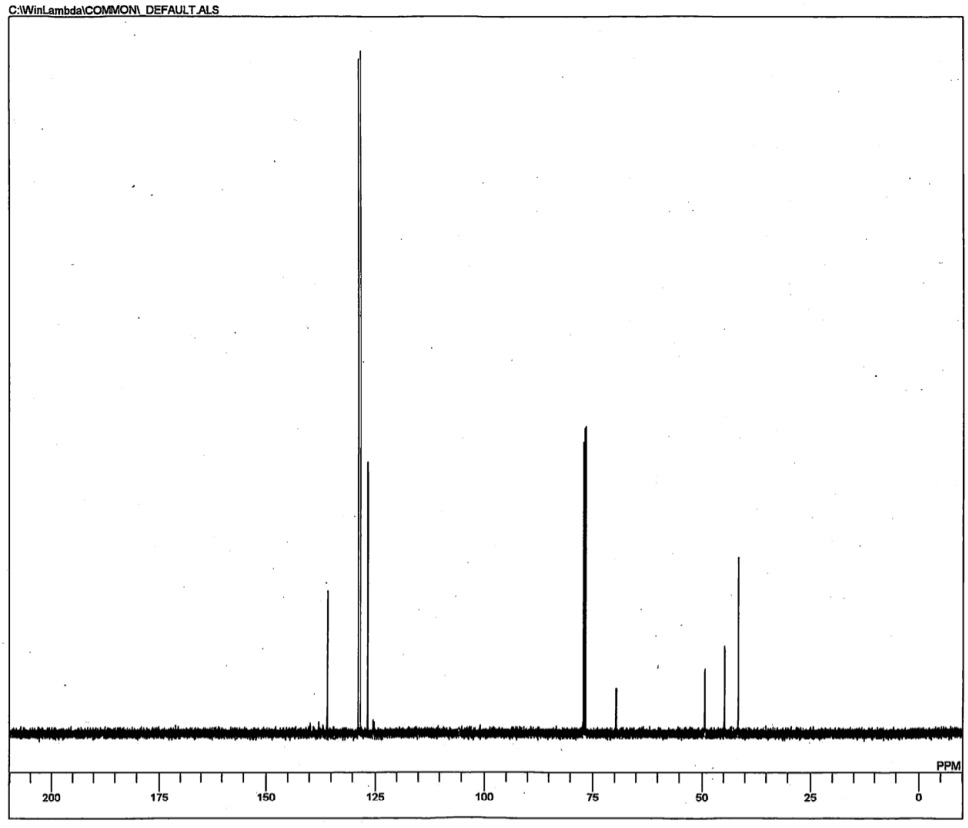
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri May 01 12:42:26 2009



$[RhCl((R,R)\text{-}\mathbf{1d})]_2$



MENUF	13C
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OBFIN	143041.00 Hz
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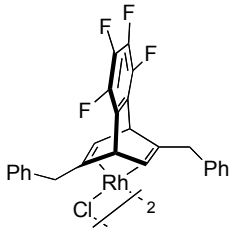
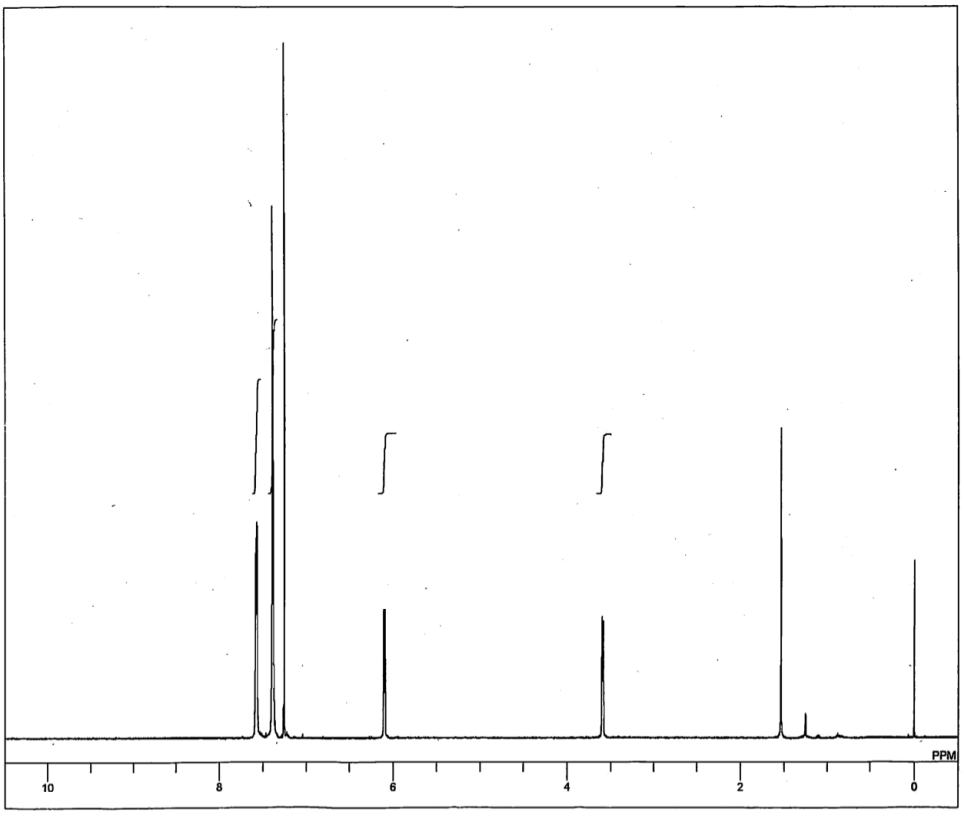
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	7200
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	_DEFAULT.ALS
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	956
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri May 01 12:38:51 2009



$[RhCl((R,R)\text{-}\mathbf{1d})]_2$



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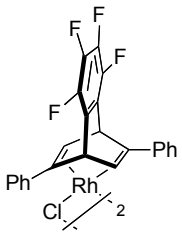
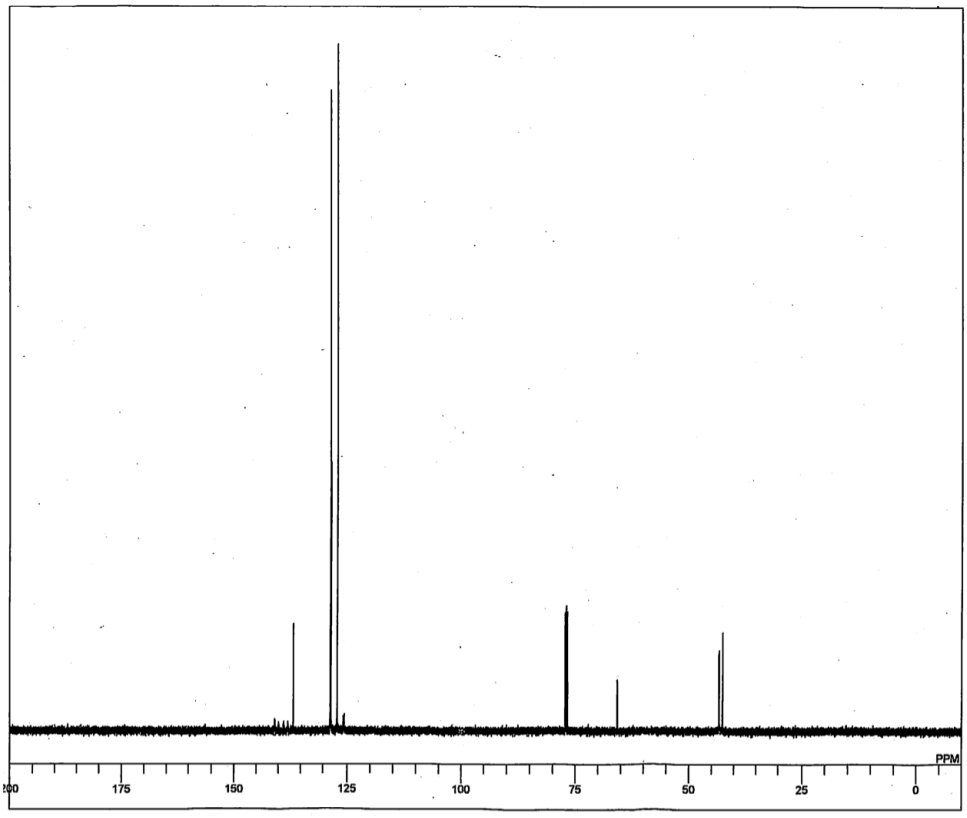
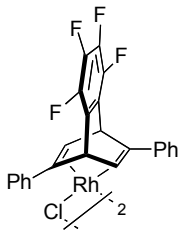
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	26
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	_DEFAULT.ALS
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1036
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 07 08:48:19 2009



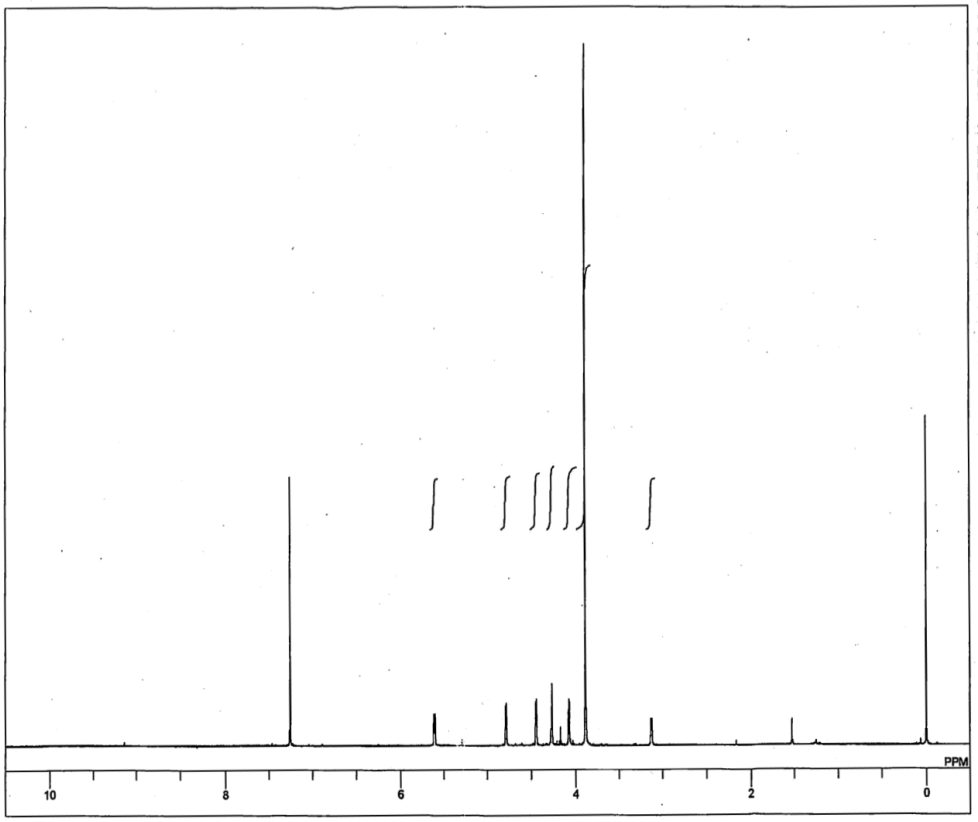
[RhCl((*R*,*R*)-**1e**)]



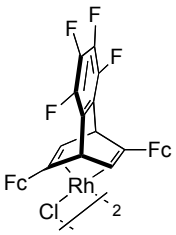
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn118C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	21
LKPHS	353
LKSIG	807
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Apr 16 18:46:25 2009



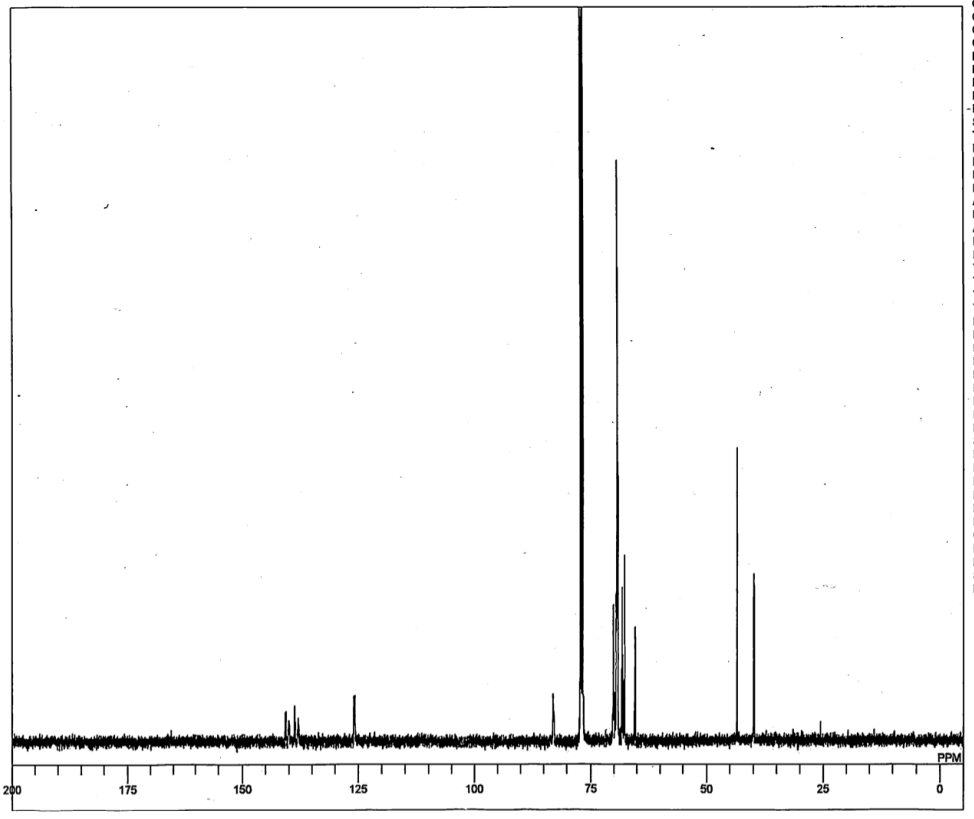
[RhCl((*R*,*R*)-**1e**)]$_2$



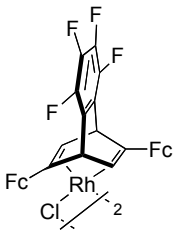
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	27
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	2hk081 column.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	620
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Feb 19 10:26:55 2009



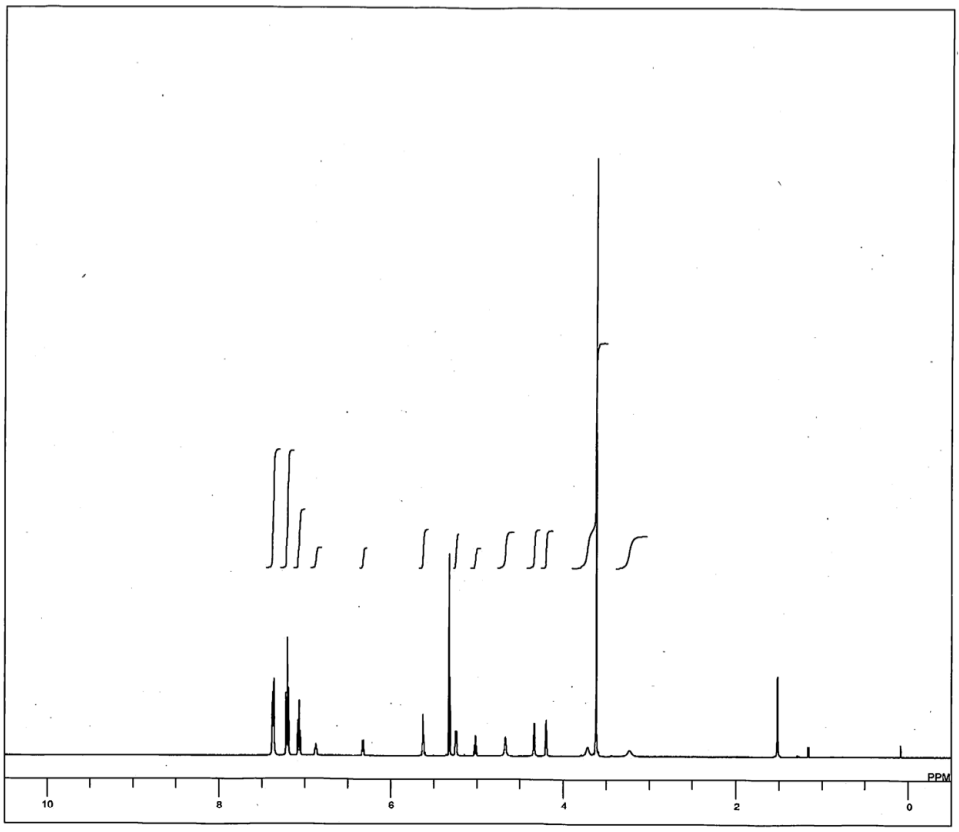
$[RhCl((S,S)\text{-}\mathbf{1f})]_2$



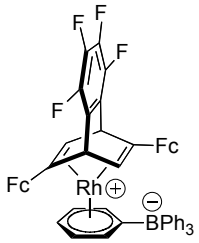
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 msec
POINT	32768
SPO	32768
TIMES	8192
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	30
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	[RhCl(Fc-tfb)]22bcm_E4_FT.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	447
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Feb 17 06:07:59 2009



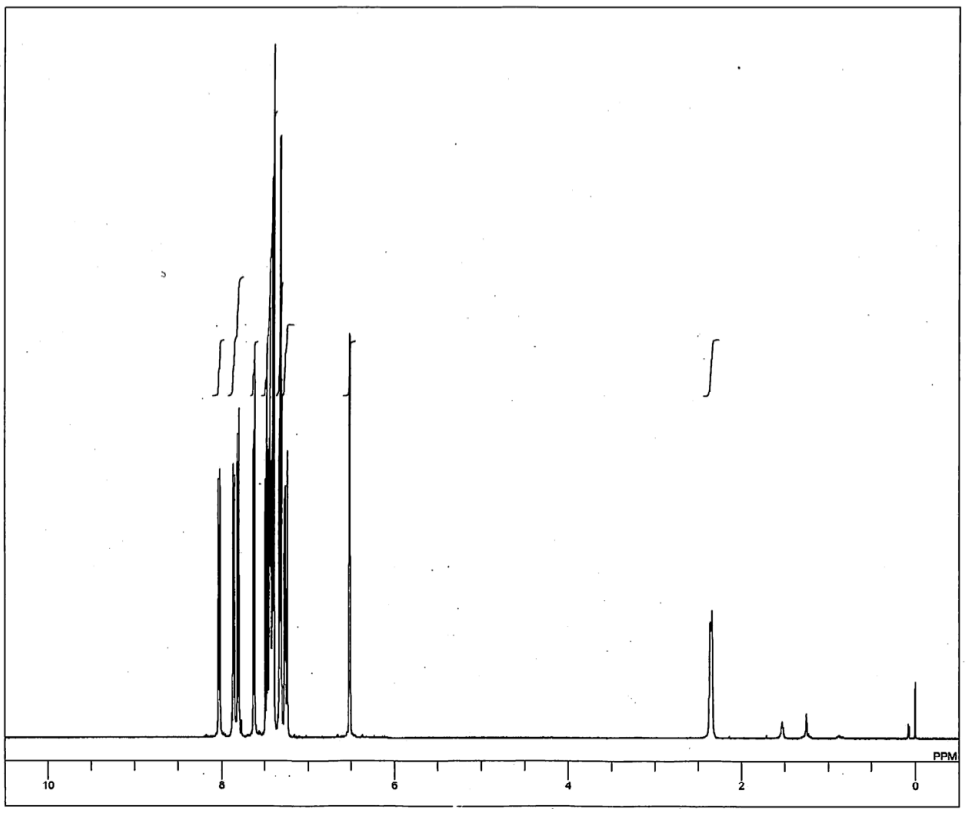
$[RhCl((S,S)\text{-}\mathbf{1f})]_2$



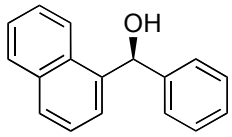
DATIM	Mon May 11 17:20:02 2009
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	24
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	RhFctfbBPh4.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26787.0 Hz
LKLEV	180
LGAIN	20
LKPHS	353
LKSIG	1535
CSPED	14 Hz
FILDC	
FILDF	



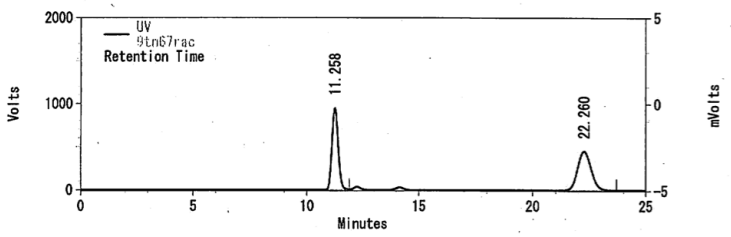
Rh((*S*,*S*)-**1f**)[(η^6-C_6H_5)BPh_3]



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn67H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	970
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 19 09:16:39 2009

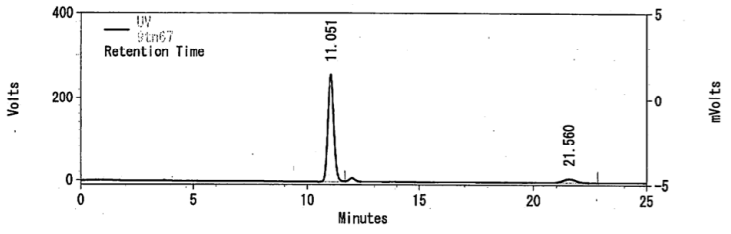


7am



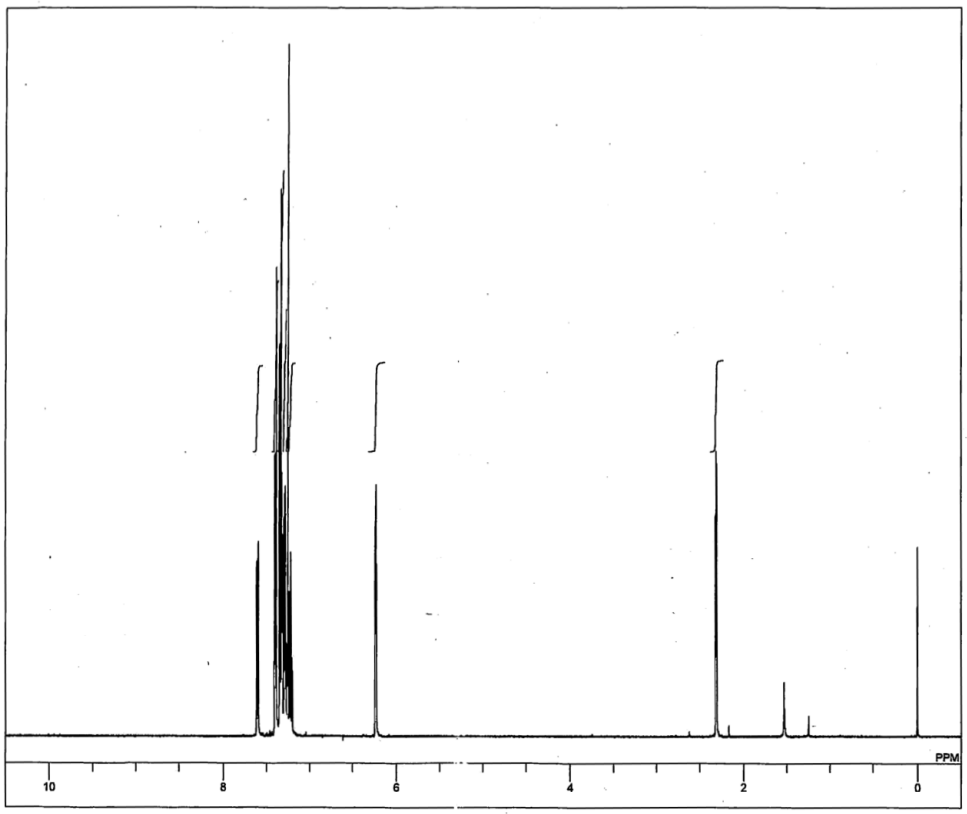
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	11.258	18124235	49.520	944467
2	22.260	18475896	50.480	448150
Totals		36600131	100.000	1392617

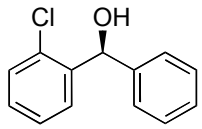


UV Results

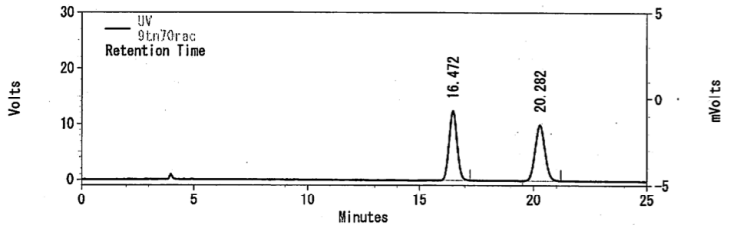
Pk #	Retention Time	Area	Area Percent	Height
1	11.051	4737454	93.005	258311
2	21.560	356322	6.995	9006
Totals		5093776	100.000	267317



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	25
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn70.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1013
CSPED	15 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 19 12:08:32 2009

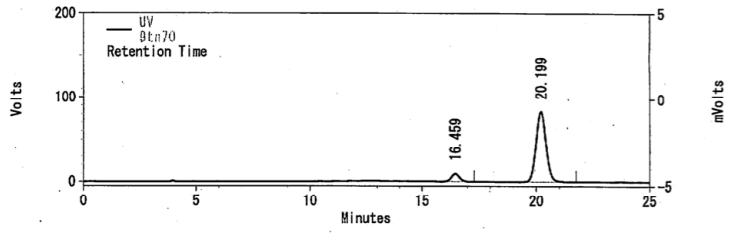


7bm



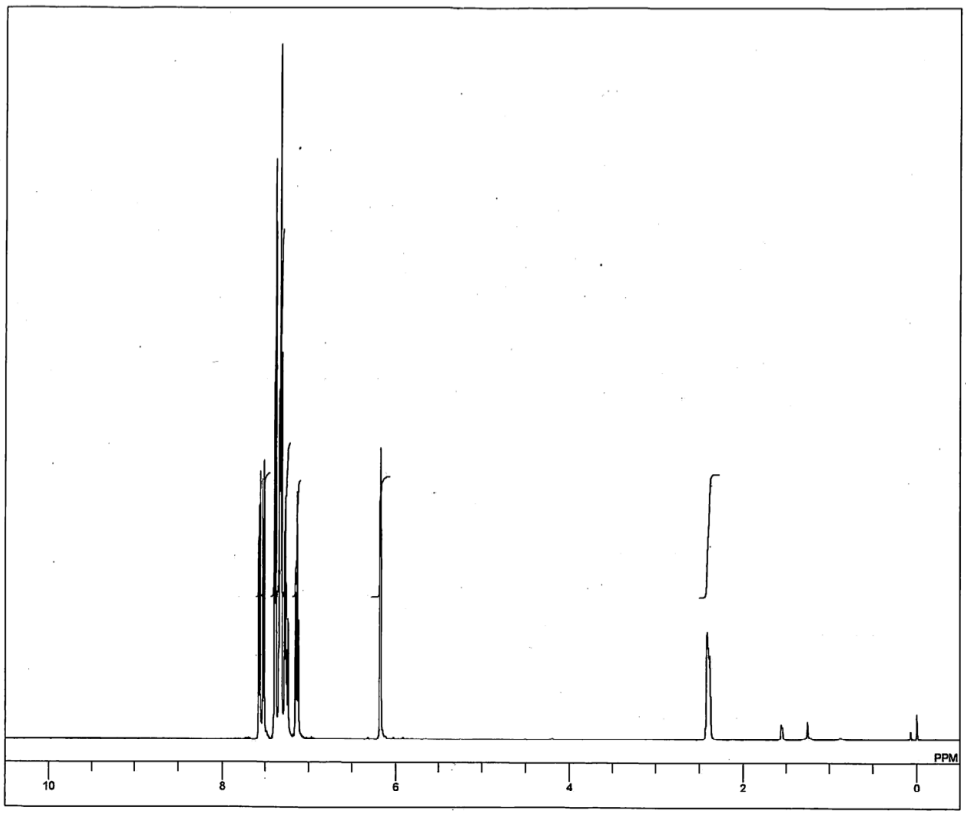
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	16.472	300307	49.999	12378
2	20.282	300322	50.001	10013
Totals		600629	100.000	22391

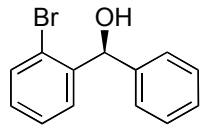


UV Results

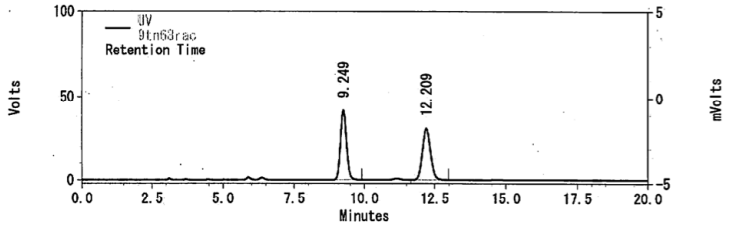
Pk #	Retention Time	Area	Area Percent	Height
1	16.459	222990	8.132	9163
2	20.199	2519267	91.868	82649
Totals		2742257	100.000	91812



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	6.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	20
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn68H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	773
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 19 09:22:34 2009

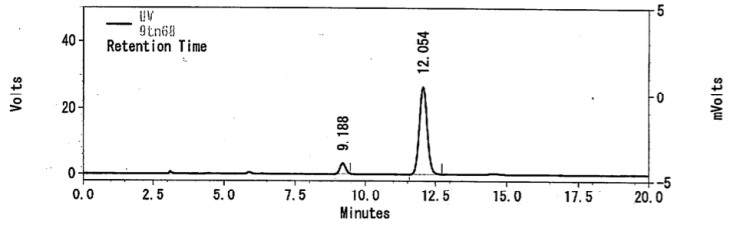


7cm



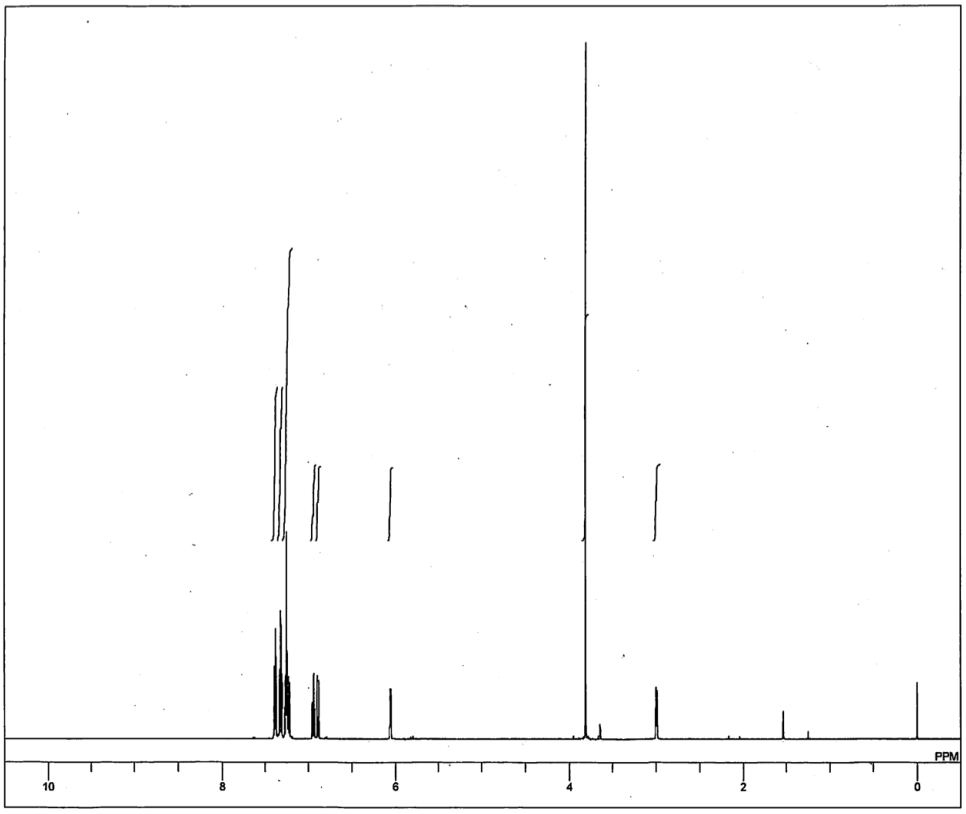
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	9.249	618466	49.953	41627
2	12.209	619638	50.047	30933
Totals		1238104	100.000	72560

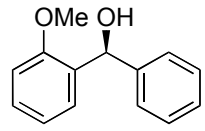


UV Results

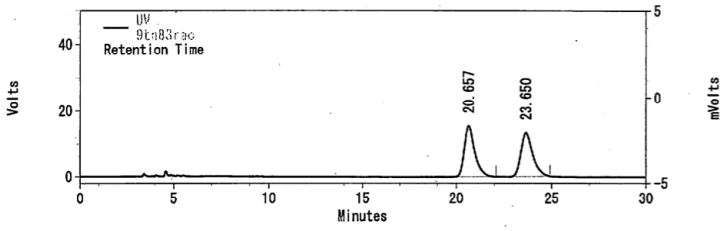
Pk #	Retention Time	Area	Area Percent	Height
1	9.188	44792	7.863	3222
2	12.054	524887	92.137	26611
Totals		569679	100.000	29833



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	25
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn71.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LKGAIN	22
LKPHS	353
LKSIG	1117
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 19 12:11:02 2009

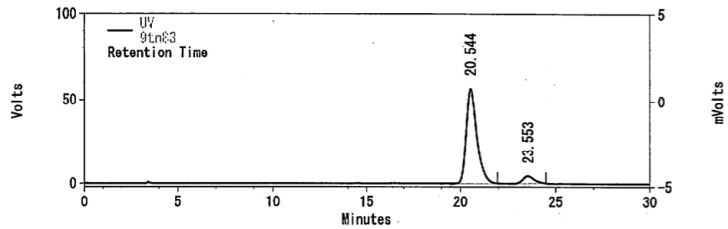


7dm



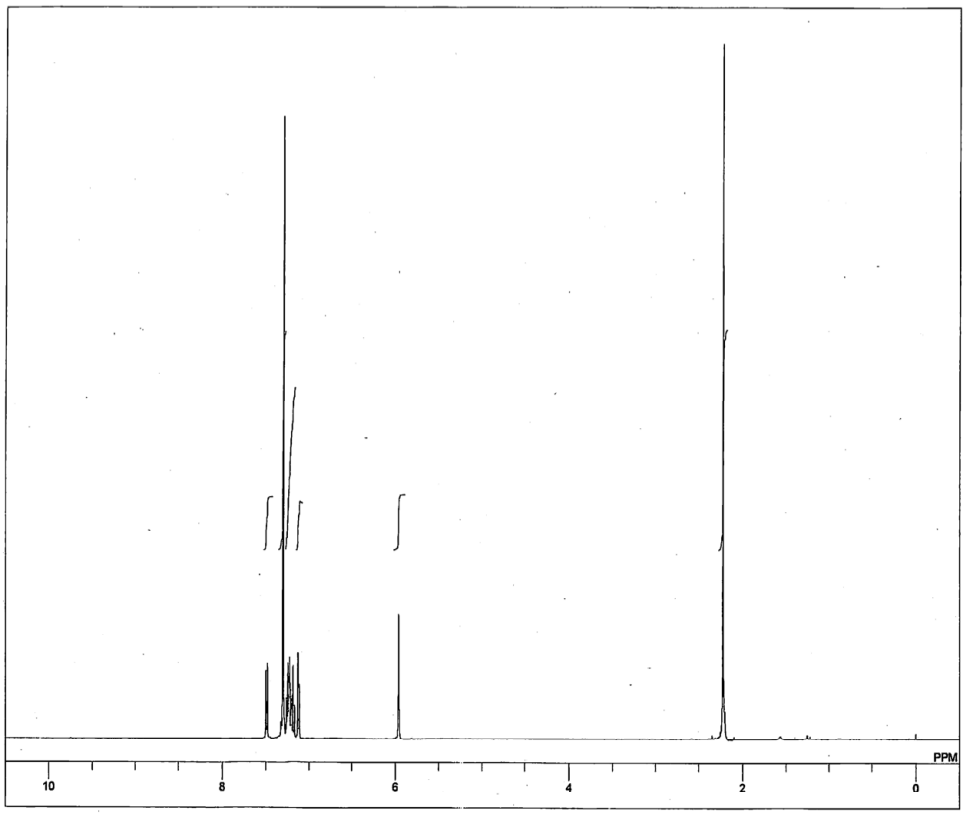
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	20.657	588957	50.840	15504
2	23.650	569488	49.160	13344
Totals		1158445	100.000	28848

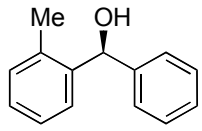


UV Results

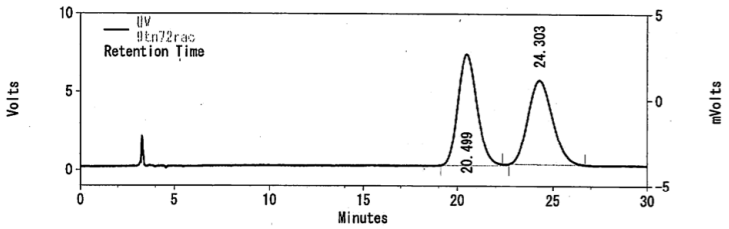
Pk #	Retention Time	Area	Area Percent	Height
1	20.544	2209736	92.409	56393
2	23.553	181518	7.591	4452
Totals		2391254	100.000	60845



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	18
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn72.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	21
LKPHS	353
LKSIG	795
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 19 17:13:40 2009

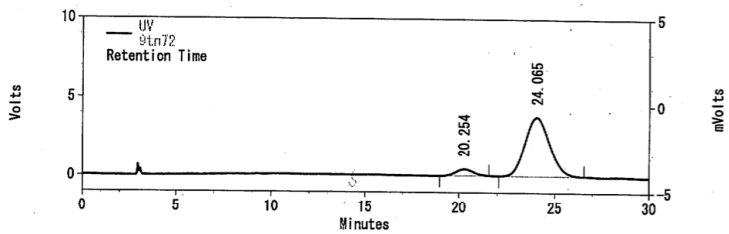


7em



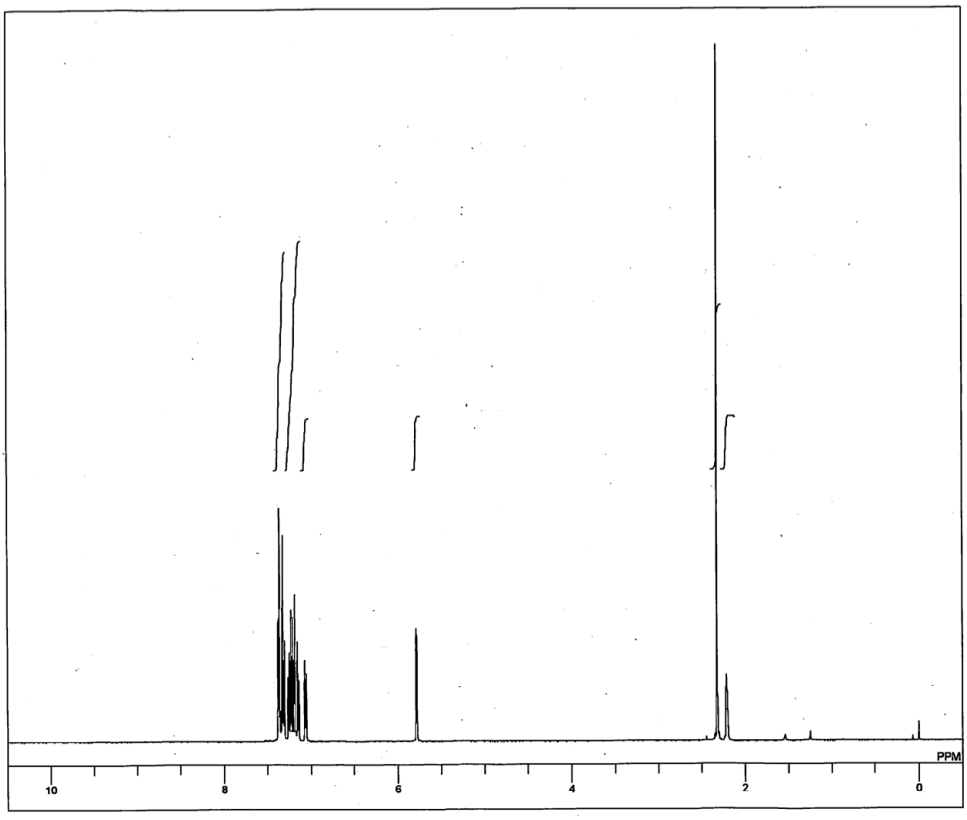
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	20.499	497741	50.643	7109
2	24.303	485104	49.357	5397
Totals		982845	100.000	12506

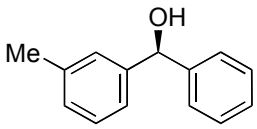


UV Results

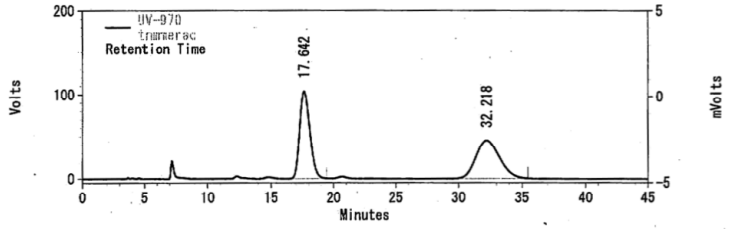
Pk #	Retention Time	Area	Area Percent	Height
1	20.254	26171	7.155	422
2	24.065	339617	92.845	3767
Totals		365788	100.000	4189



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	20
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn88.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1033
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 26 15:00:03 2009

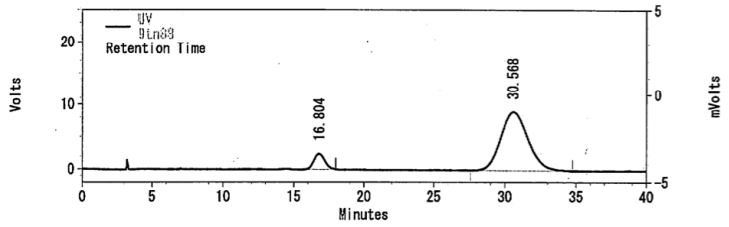


7fm



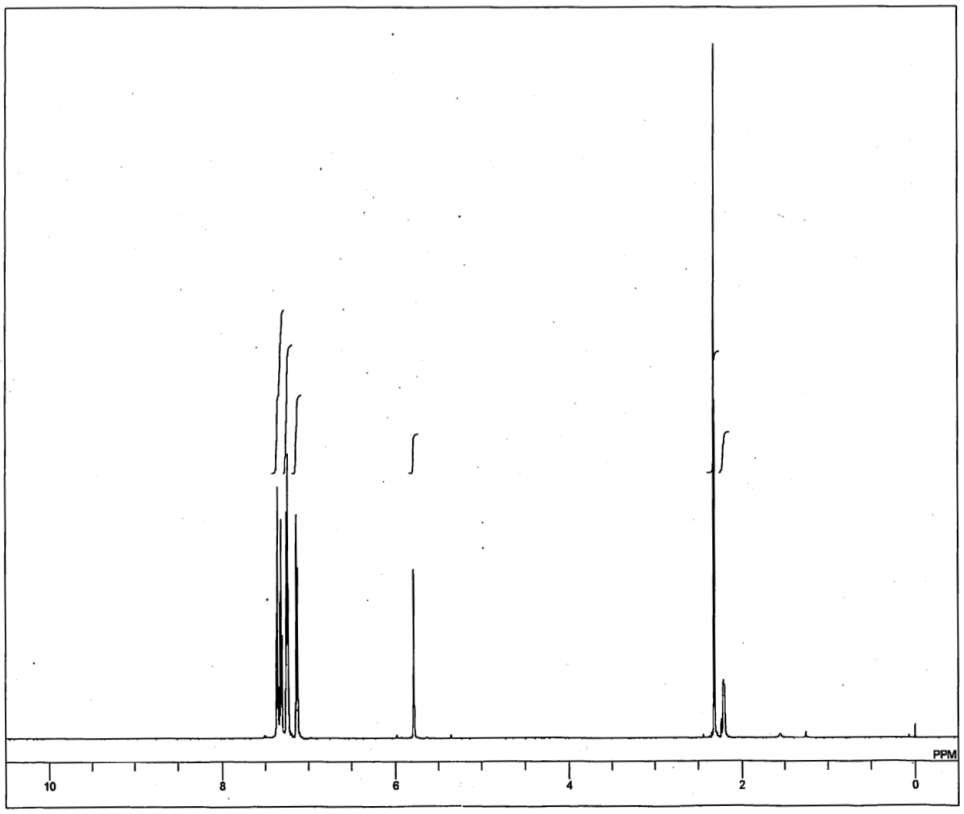
UV-970 Results

Pk #	Retention Time	Area	Area Percent	Height
1	17.642	5833444	49.967	103789
2	32.218	5841156	50.033	45059
Totals		11674600	100.000	148848

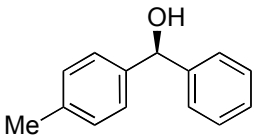


UV Results

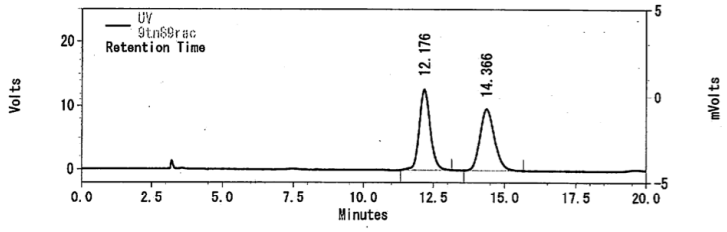
Pk #	Retention Time	Area	Area Percent	Height
1	16.804	130212	9.759	2396
2	30.568	1203997	90.241	9048
Totals		1334209	100.000	11444



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	19
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRFW	50 usec
IRATN	511
DFILE	9tn89.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1021
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 26 15:04:11 2009

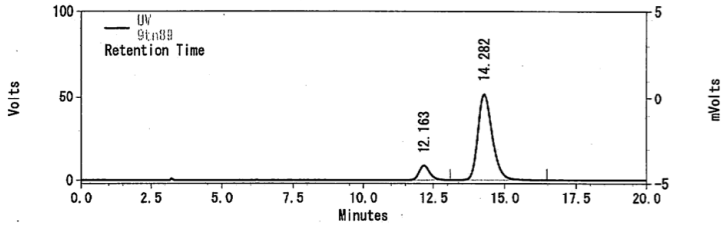


7gm



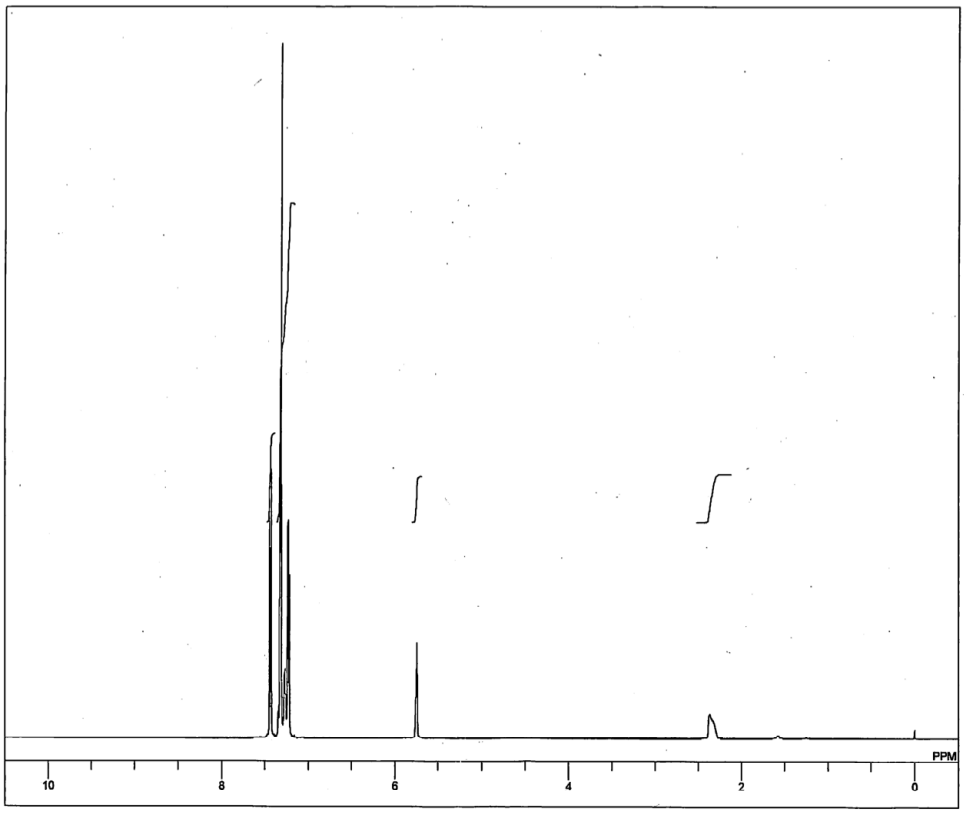
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	12.176	347046	50.384	12759
2	14.366	341760	49.616	9679
Totals		688806	100.000	22438

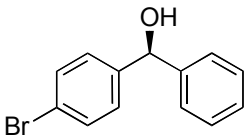


UV Results

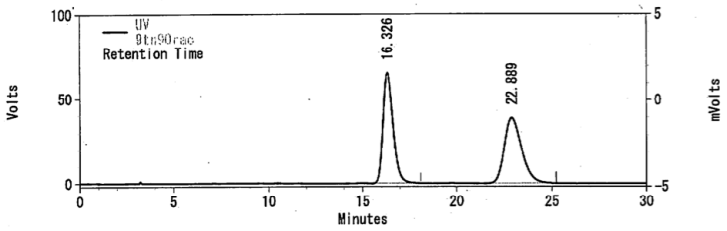
Pk #	Retention Time	Area	Area Percent	Height
1	12.163	229114	11.226	8658
2	14.282	1811822	88.774	51590
Totals		2040936	100.000	60248



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	19
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn90.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	862
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 26 15:09:57 2009

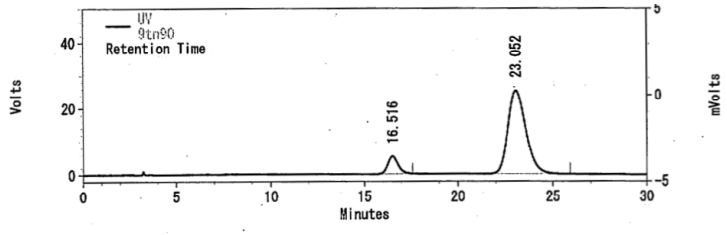


7hm



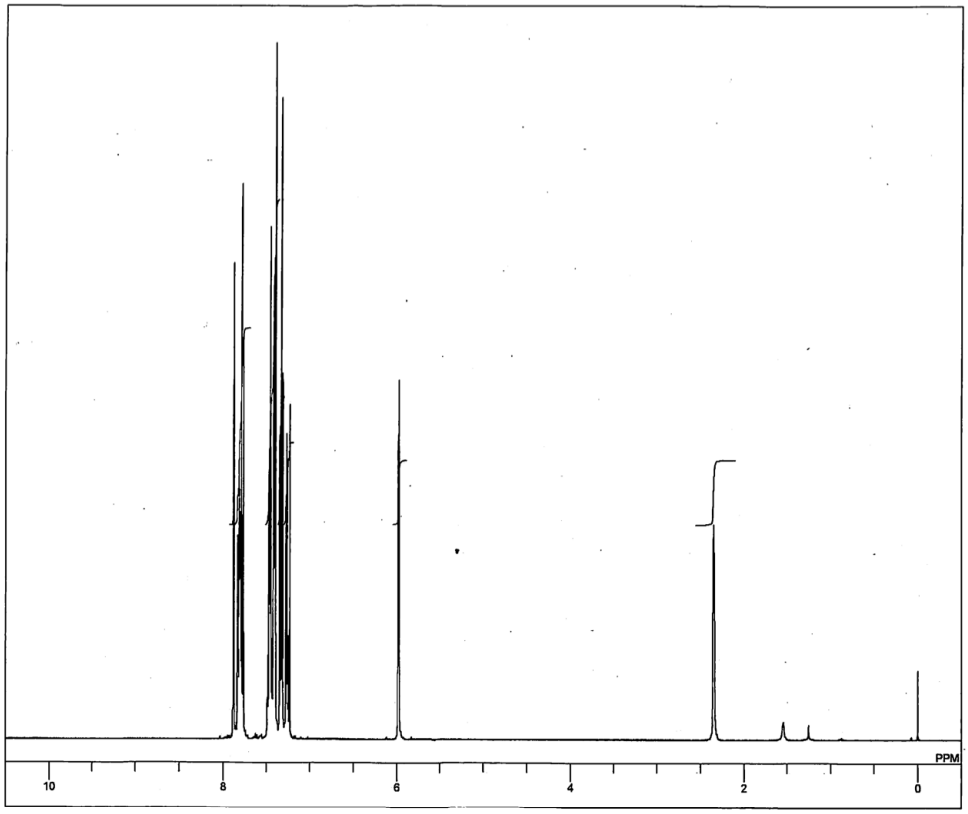
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	16.326	2457003	49.976	65126
2	22.889	2459392	50.024	38575
Totals		4916395	100.000	103701

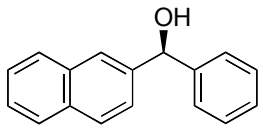


UV Results

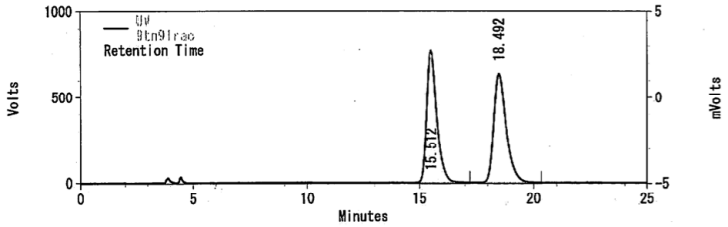
Pk #	Retention Time	Area	Area Percent	Height
1	16.516	201250	10.887	5200
2	23.052	1647289	89.113	25238
Totals		1848539	100.000	30438



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn91.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1017
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 26 15:14:09 2009

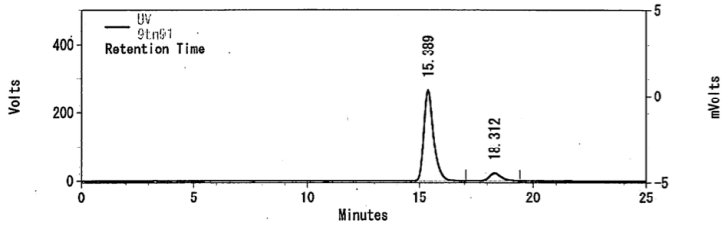


7im



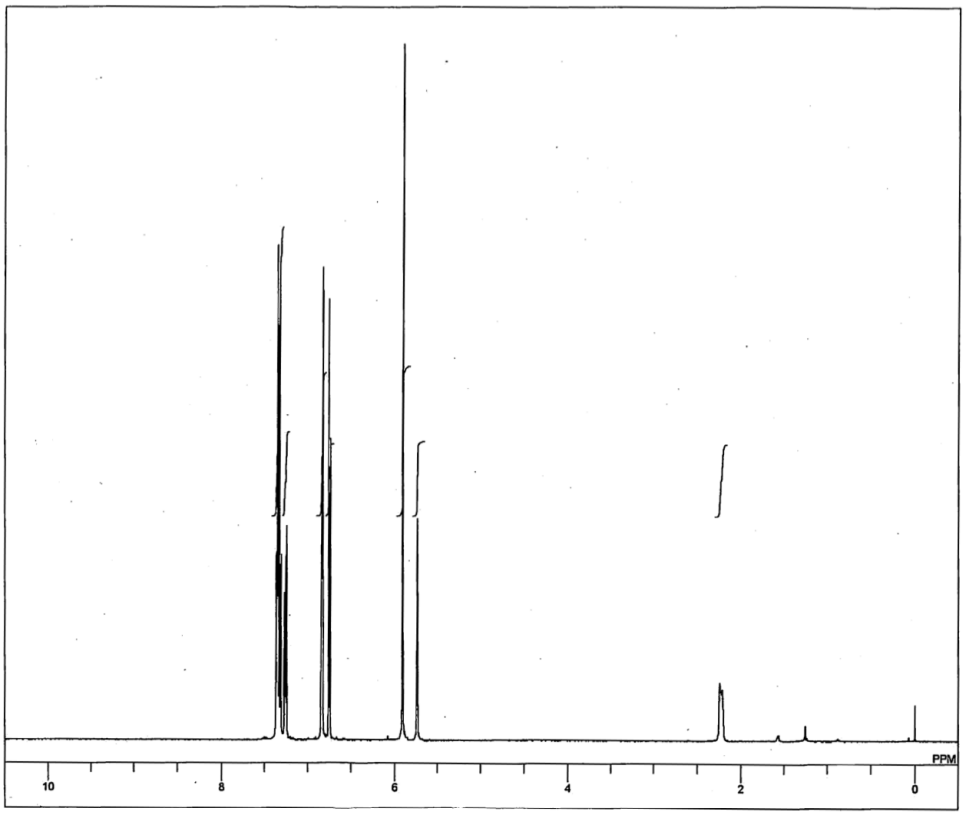
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	15.512	23801548	49.898	772284
2	18.492	23898415	50.102	636768
Totals		47699963	100.000	1409052

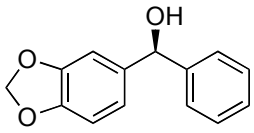


UV Results

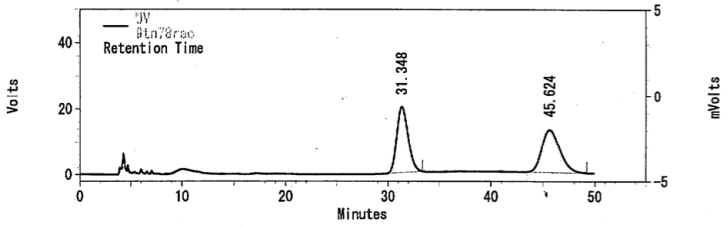
Pk #	Retention Time	Area	Area Percent	Height
1	15.389	7992211	91.038	265659
2	18.312	786778	8.962	22228
Totals		8778989	100.000	287887



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn78.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	21
LKPHS	353
LKSIG	786
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon Mar 23 17:37:36 2009

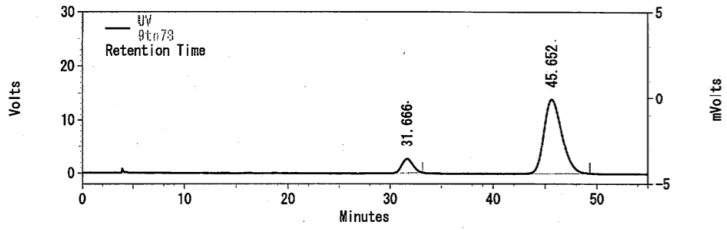


7jm



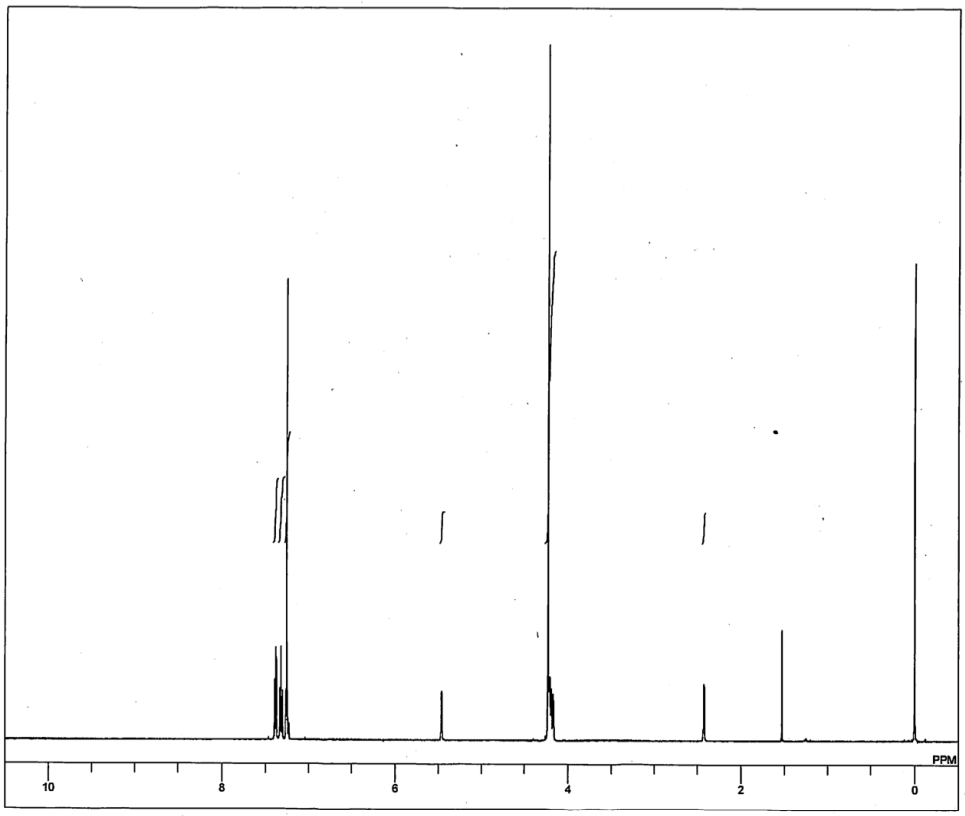
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	31.348	1545581	49.397	20003
2	45.624	1583328	50.603	13075
Totals		3128909	100.000	33078

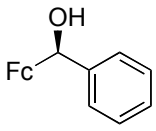


UV Results

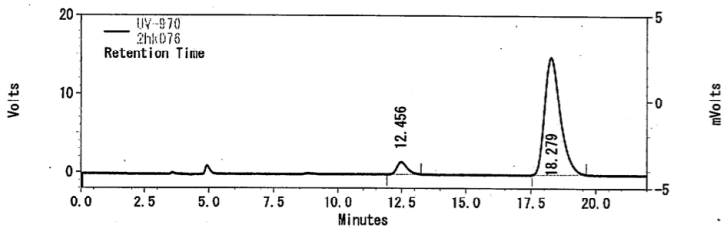
Pk #	Retention Time	Area	Area Percent	Height
1	31.666	198386	10.625	2632
2	45.652	1668762	89.375	13847
Totals		1867148	100.000	16479



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	27
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	2hk076 column.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	669
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed Feb 25 18:56:06 2009

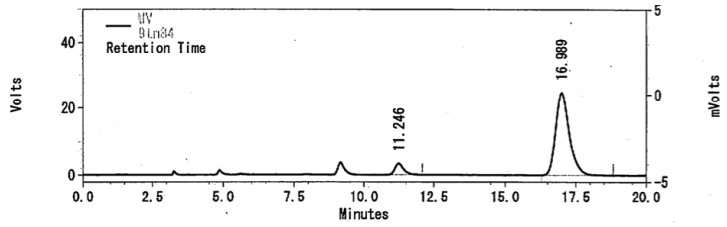


7km



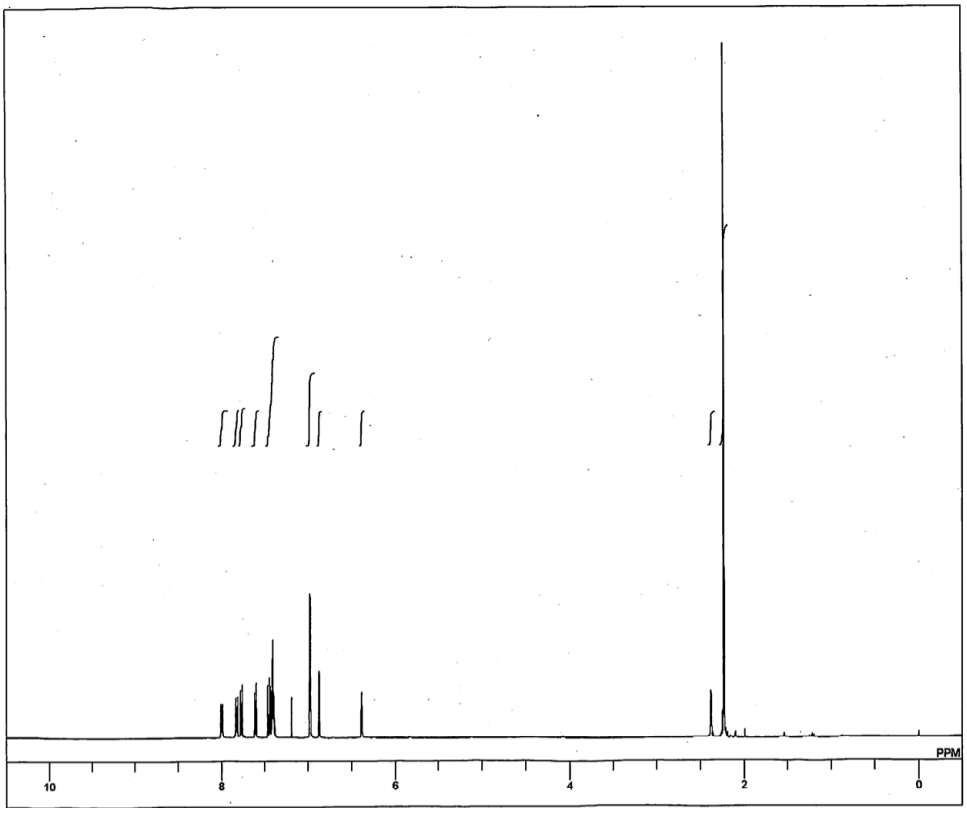
UV-970 Results

Pk #	Retention Time	Area	Area Percent	Height
1	12.456	44595	6.657	1583
2	18.279	625270	93.343	14904
Totals		669865	100.000	16487

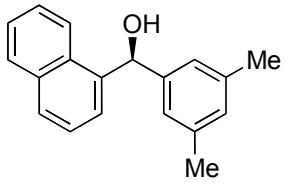


UV Results

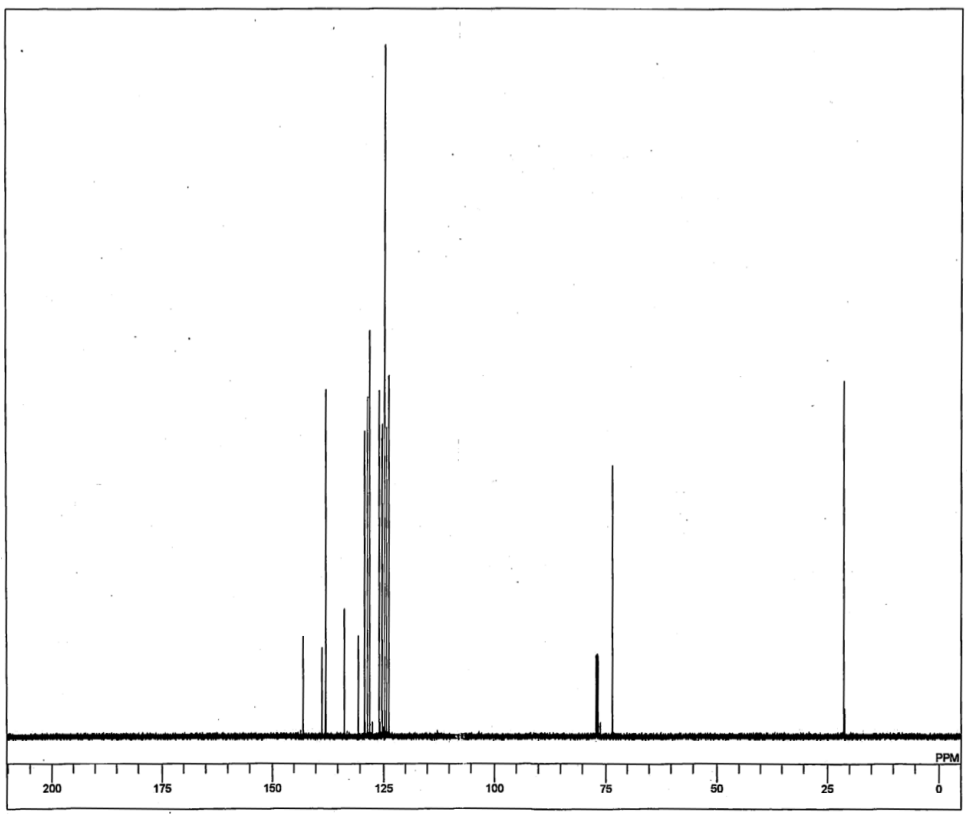
Pk #	Retention Time	Area	Area Percent	Height
1	11.246	69602	7.720	3259
2	16.989	832005	92.280	24639
Totals		901607	100.000	27898



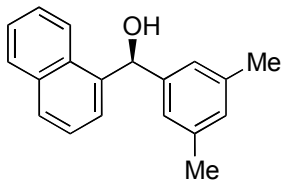
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	16
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	2hk116.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1005
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 14 20:14:13 2009



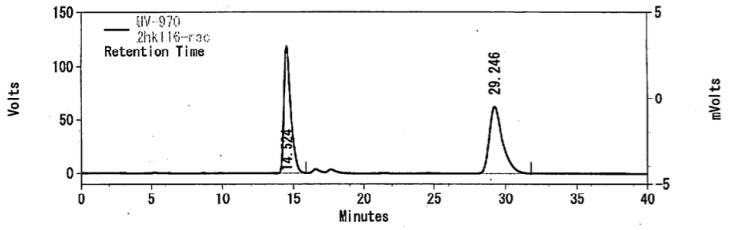
7an



MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	29
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	2hk116C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	979
CSPED	12 Hz
FILDC	
FILD	
SLVI	
DATI	

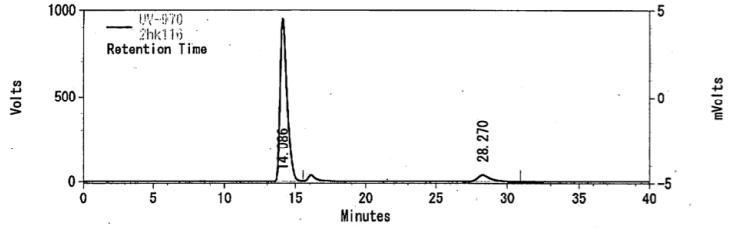


7an



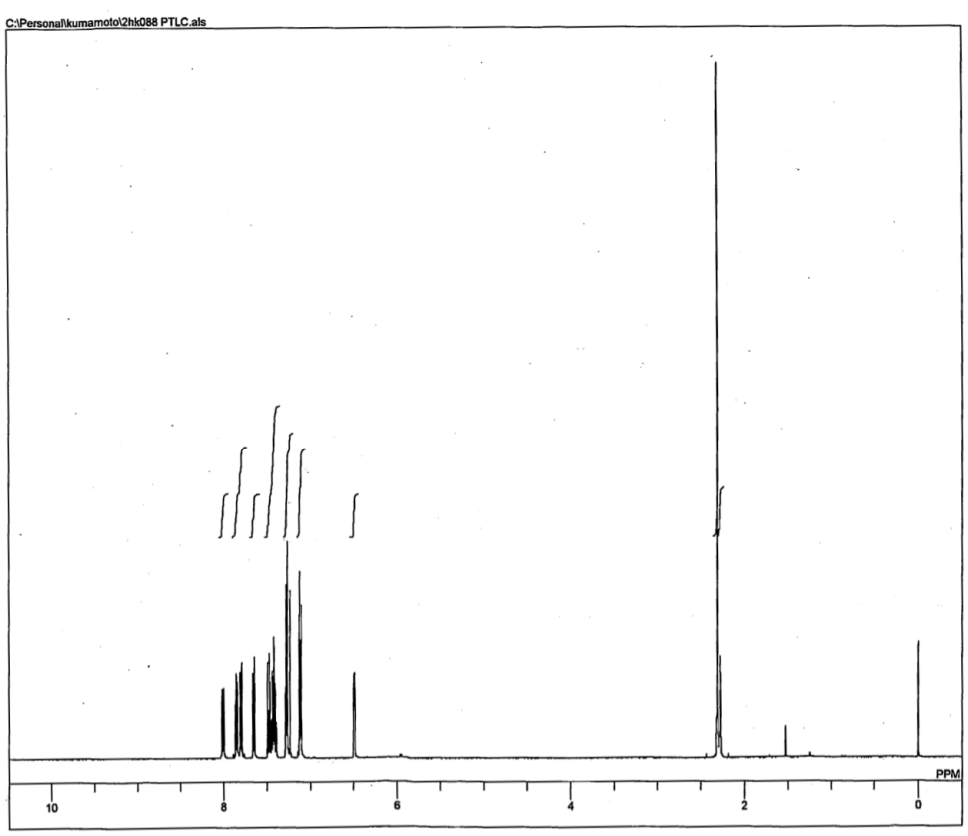
UV-970 Results

Pk #	Retention Time	Area	Area Percent	Height
1	14.524	3973561	49.909	119358
2	29.246	3987999	50.091	62539
Totals		7961560	100.000	181897

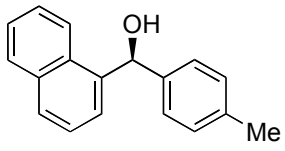


UV-970 Results

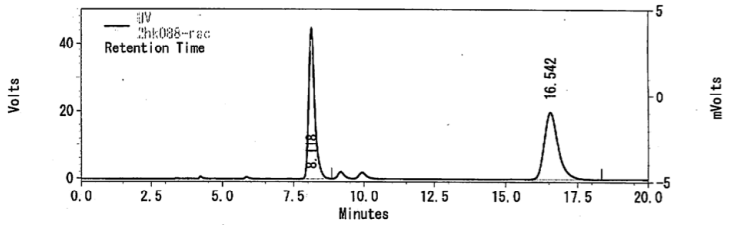
Pk #	Retention Time	Area	Area Percent	Height
1	14.086	32313623	93.334	949064
2	28.270	2307780	6.666	37757
Totals		34621403	100.000	986821



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	23
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	2hk088 PTLC.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LKGAIN	19
LKPHS	353
LKSIG	560
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed Mar 04 09:54:39 2009

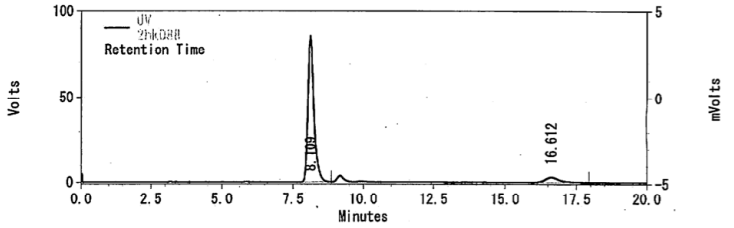


7ao



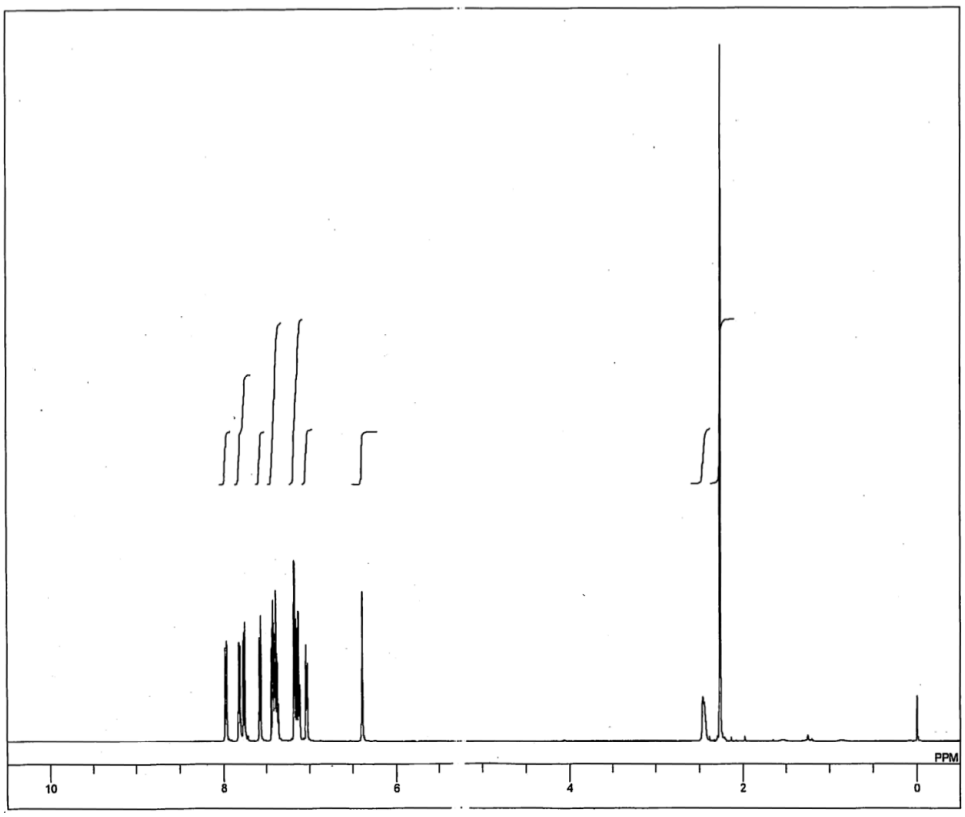
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	8.118	668140	49.781	44648
2	16.542	674007	50.219	19930
Totals		1342147	100.000	64578

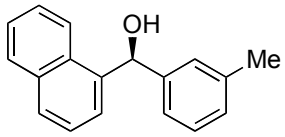


UV Results

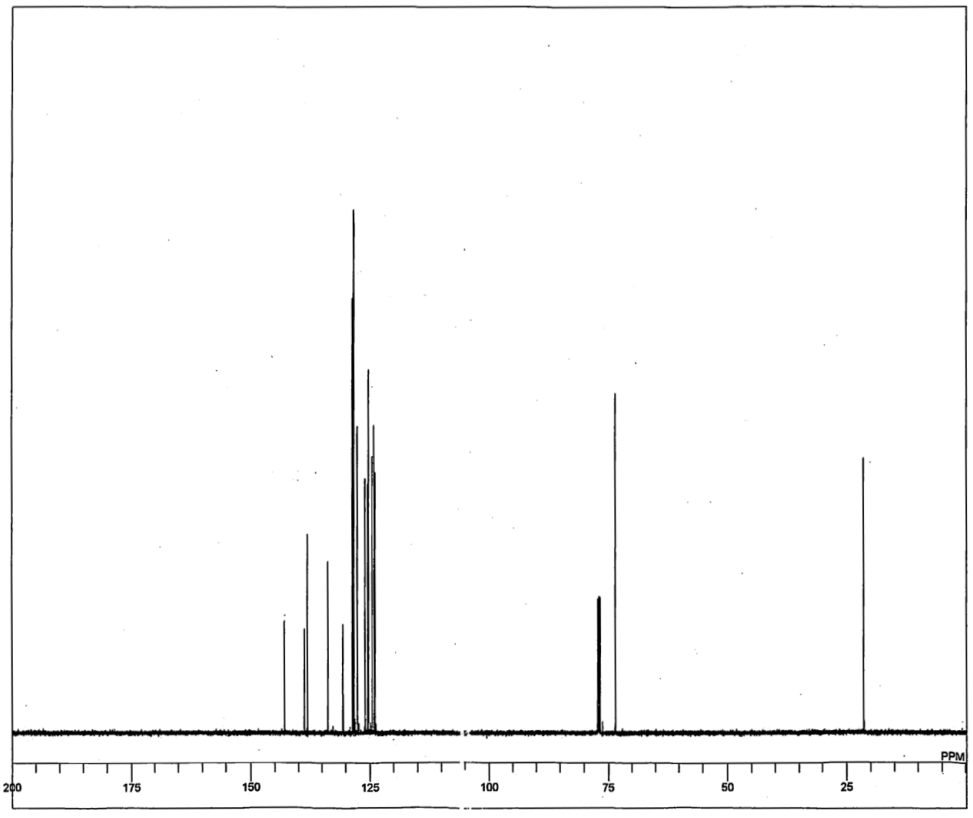
Pk #	Retention Time	Area	Area Percent	Height
1	8.109	1290058	92.602	85263
2	16.612	103056	7.398	3049
Totals		1393114	100.000	88312



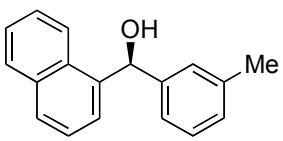
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	16
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	2hk112 PTLC 1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	21
LKPHS	353
LKSIG	622
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat Mar 21 14:10:37 2009



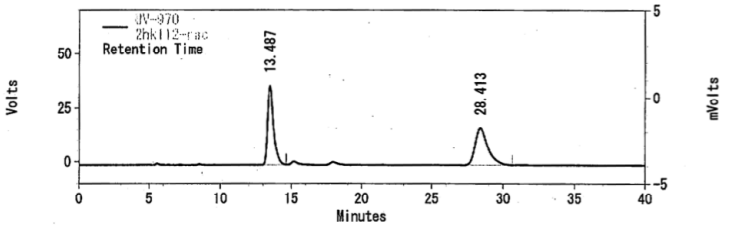
7ap



MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 msec
POINT	32768
SPO	32768
TIMES	720
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	2hk112 13C2bcm_E3.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	21
LKPHS	353
LKSIG	622
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat Mar 21 14:45:38 2009

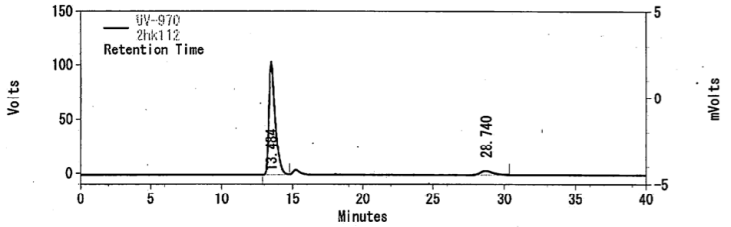


7ap



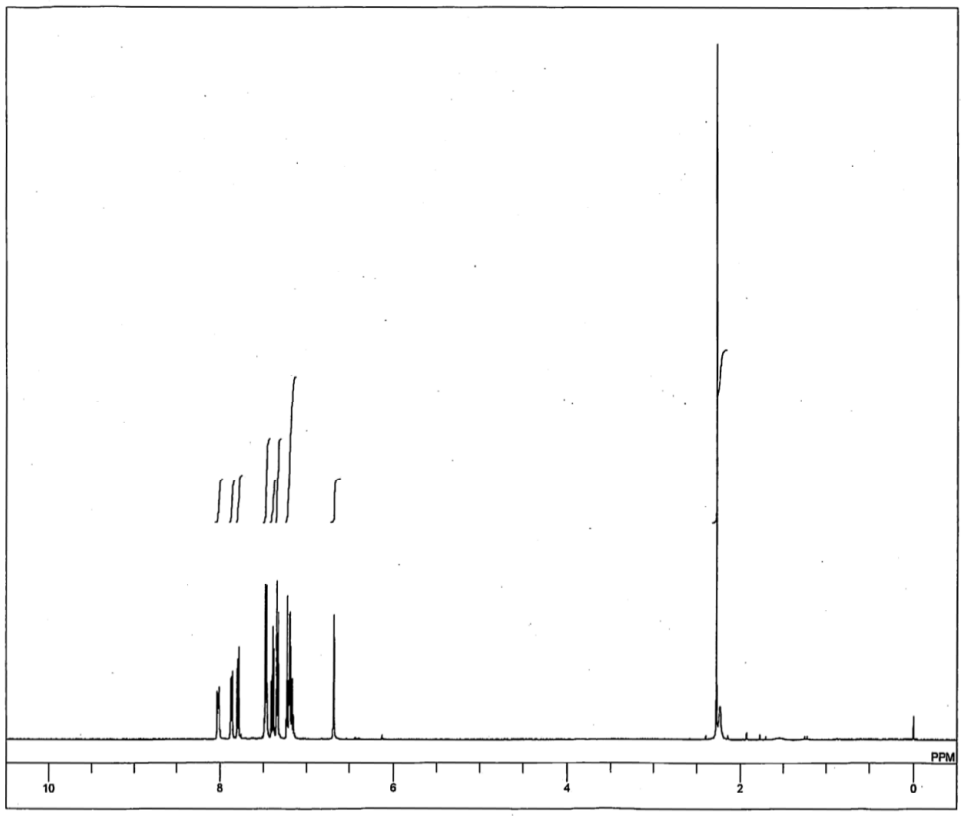
UV-970 Results

Pk #	Retention Time	Area	Area Percent	Height
1	13.487	1075126	50.196	36684
2	28.413	1066725	49.804	17389
Totals		2141851	100.000	54073

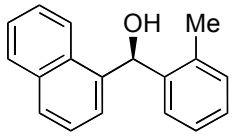


UV-970 Results

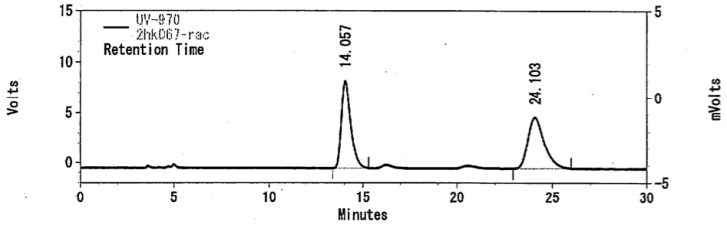
Pk #	Retention Time	Area	Area Percent	Height
1	13.484	3240014	93.303	103997
2	28.740	232558	6.697	3817
Totals		3472572	100.000	107814



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	20
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	_DEFAULT.ALS
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	21
LKPHS	353
LKSIG	849
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Apr 14 19:49:54 2009

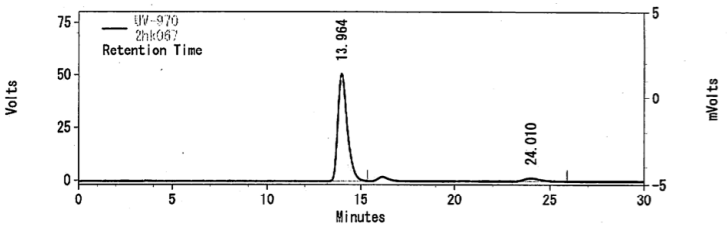


7aq



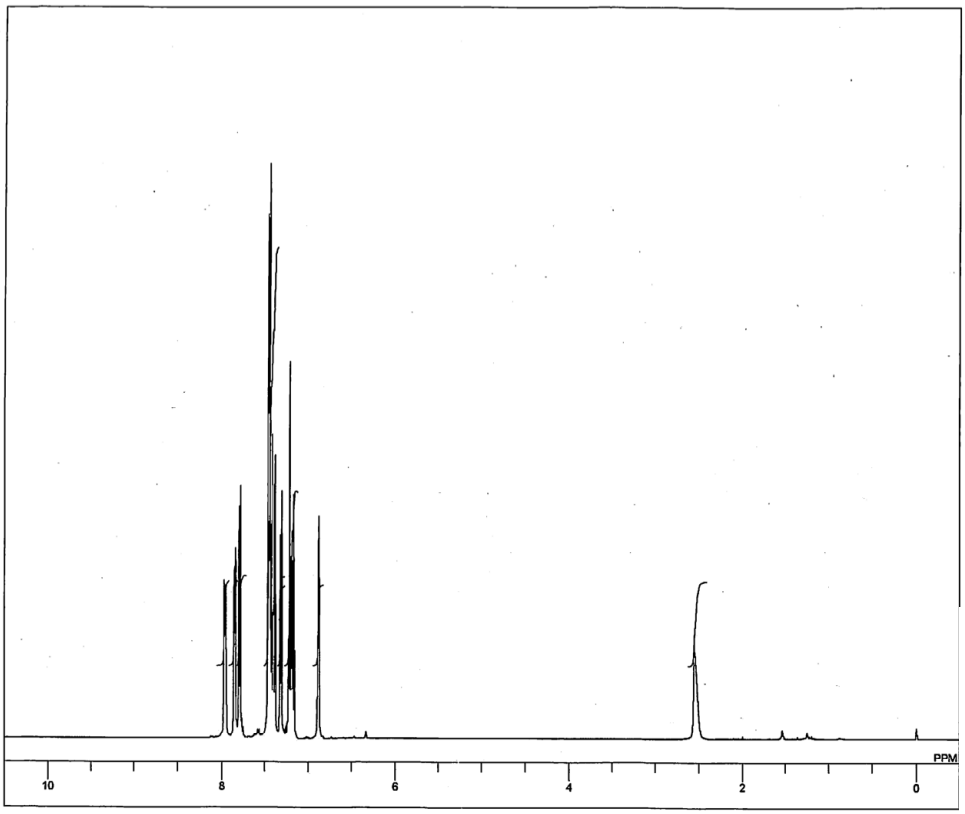
UV-970 Results

Pk #	Retention Time	Area	Area Percent	Height
1	14.057	306542	49.933	8723
2	24.103	307370	50.067	5142
Totals		613912	100.000	13865

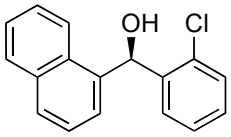


UV-970 Results

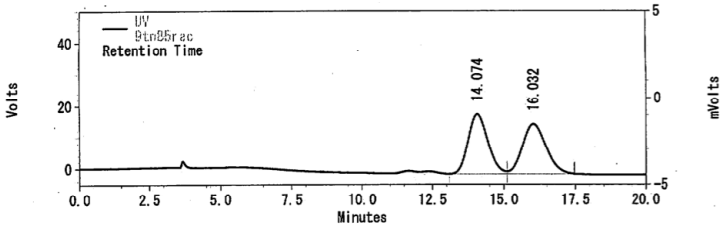
Pk #	Retention Time	Area	Area Percent	Height
1	13.964	1776580	95.400	50707
2	24.010	85666	4.600	1492
Totals		1862246	100.000	52199



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	19
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn59.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	800
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon Mar 16 15:01:57 2009

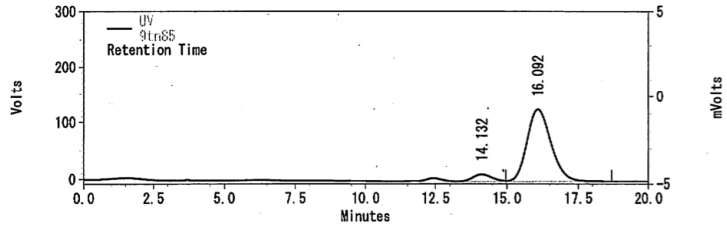


7ar



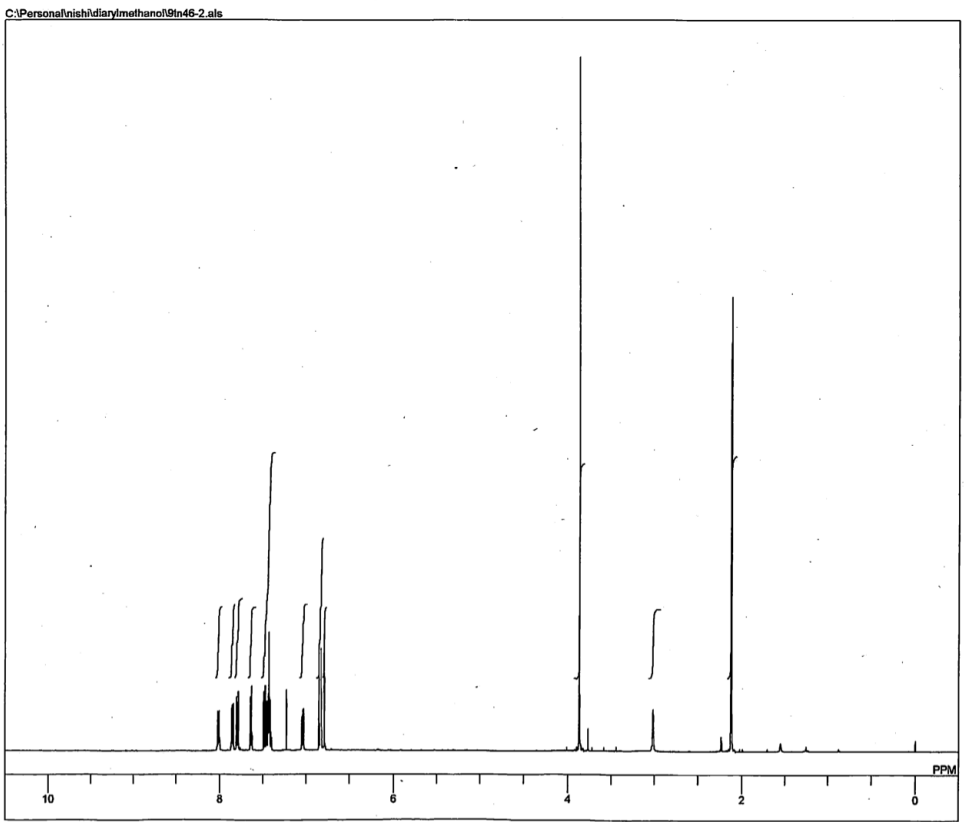
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	14.074	911273	50.079	19048
2	16.032	908415	49.921	15873
Totals		1819688	100.000	34921

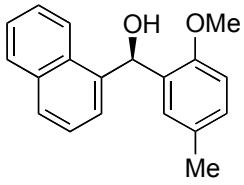


UV Results

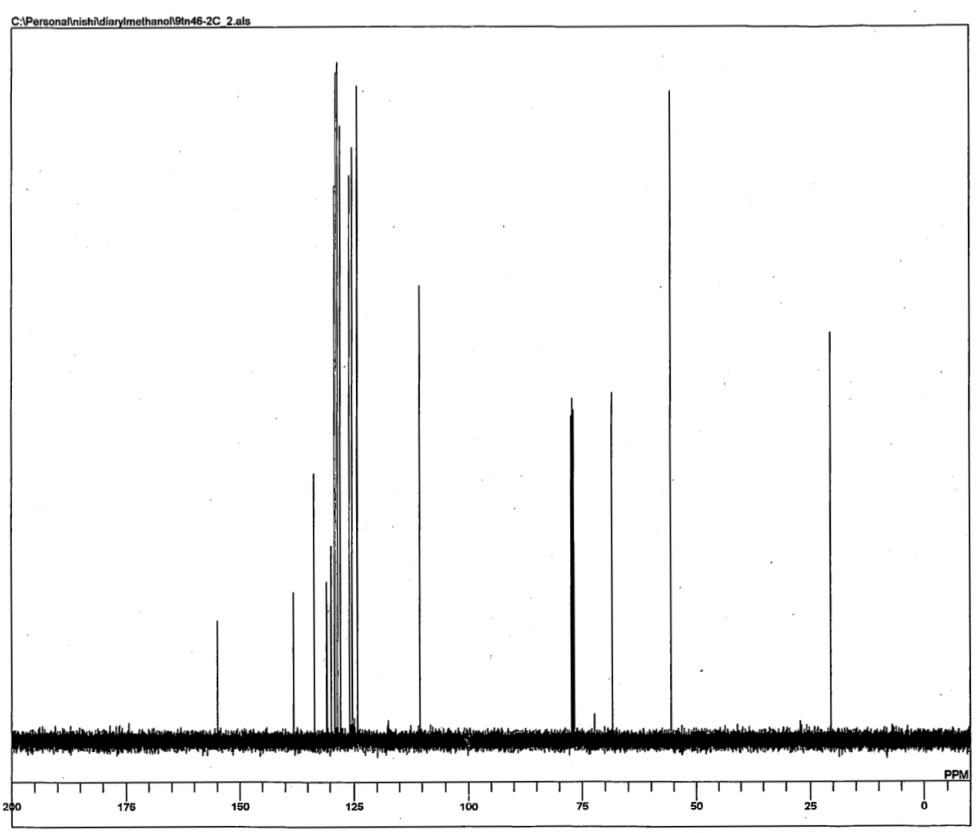
Pk #	Retention Time	Area	Area Percent	Height
1	14.132	571207	7.196	12300
2	16.092	7367130	92.804	126593
Totals		7938337	100.000	138893



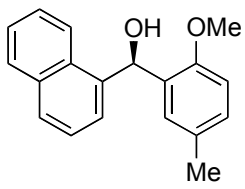
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn46-2.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1051
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Mar 06 11:02:31 2009



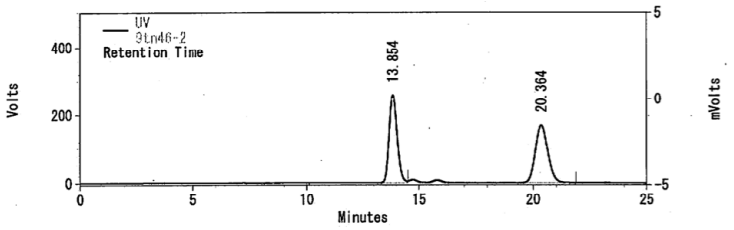
7as



MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn46-2C_2.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1035
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Mar 06 11:15:17 2009

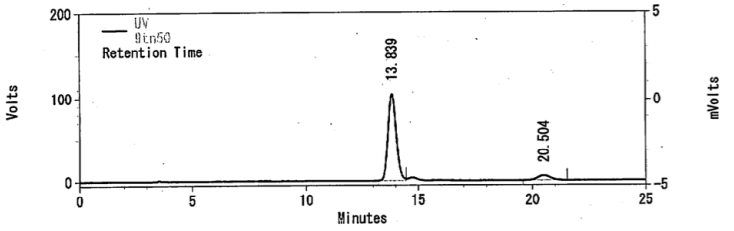


7as



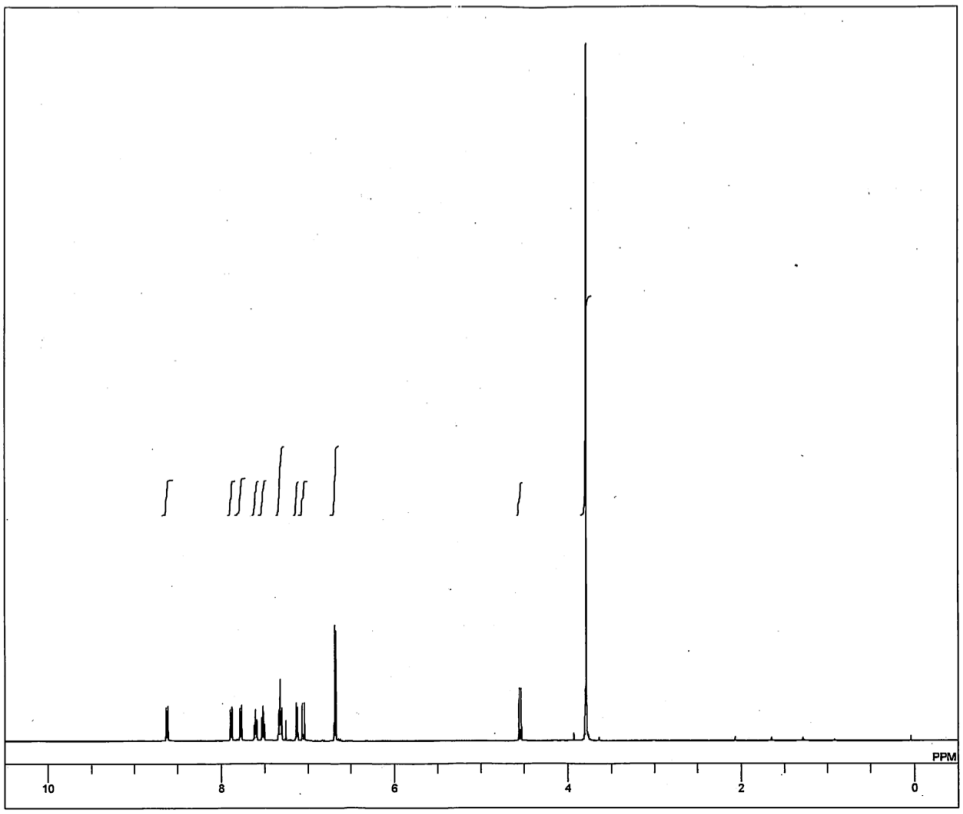
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	13.854	6383724	49.970	257864
2	20.364	6391302	50.030	168719
Totals		12775026	100.000	426583

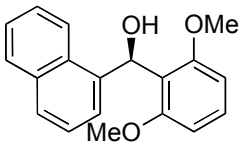


UV Results

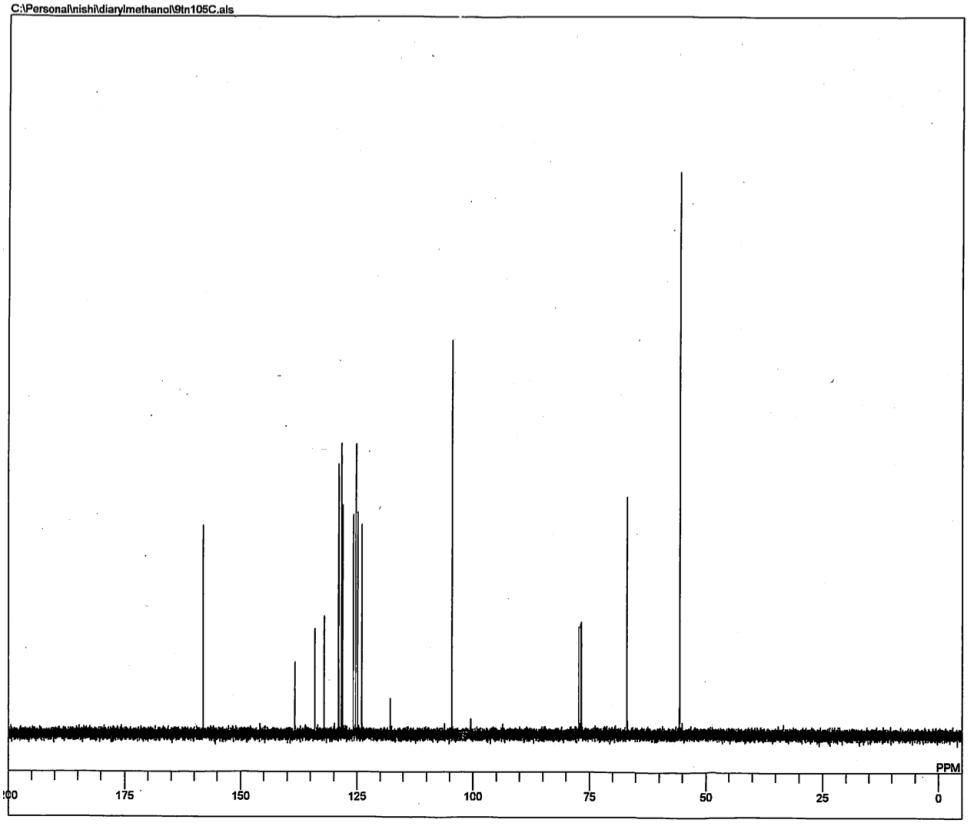
Pk #	Retention Time	Area	Area Percent	Height
1	13.839	2621961	92.289	103629
2	20.504	219077	7.711	5649
Totals		2841038	100.000	109278



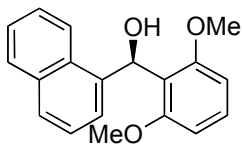
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	19
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn105.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	840
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Apr 02 11:03:45 2009



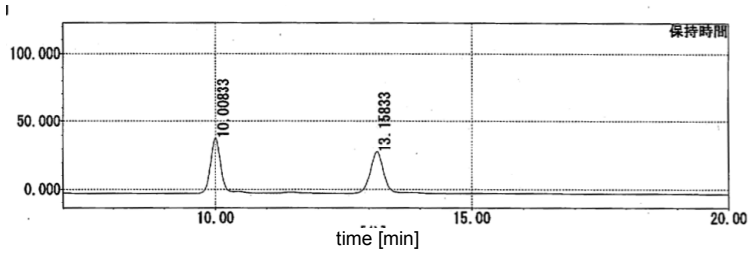
7at



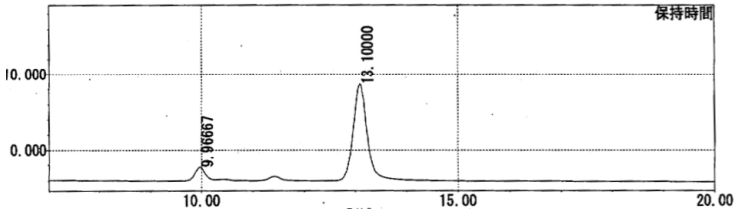
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn105C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	835
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Apr 02 11:09:06 2009



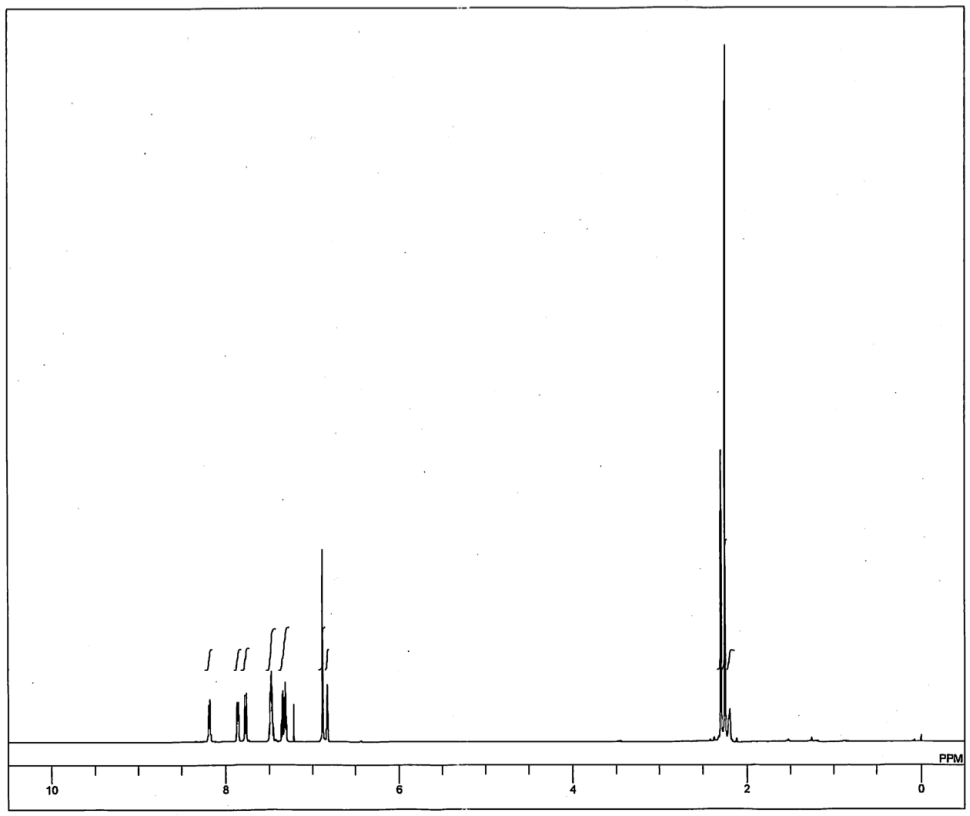
7at



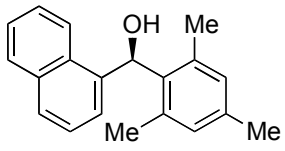
peak#	retention time	area	area (%)	height
1	10.008	528.23	49.408	40.344
2	13.158	540.990	50.592	30.629



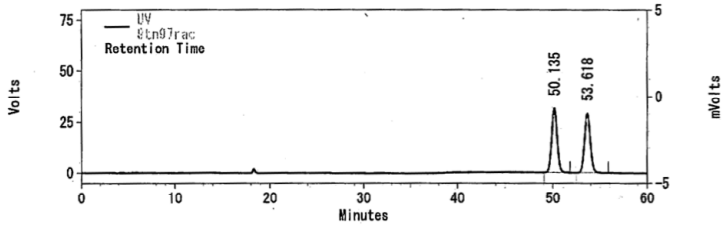
peak#	retention time	area	area (%)	height
1	9.967	21.673	8.153	1.653
2	13.100	244.153	91.847	12.654



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	18
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn97.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	860
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Apr 03 15:08:35 2009

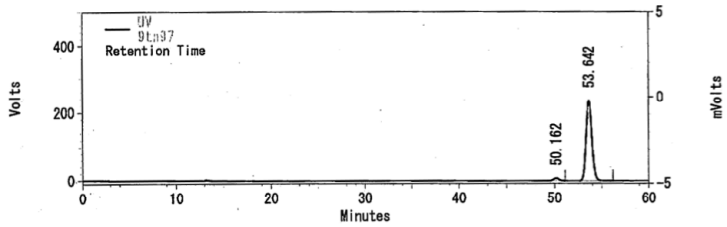


7au



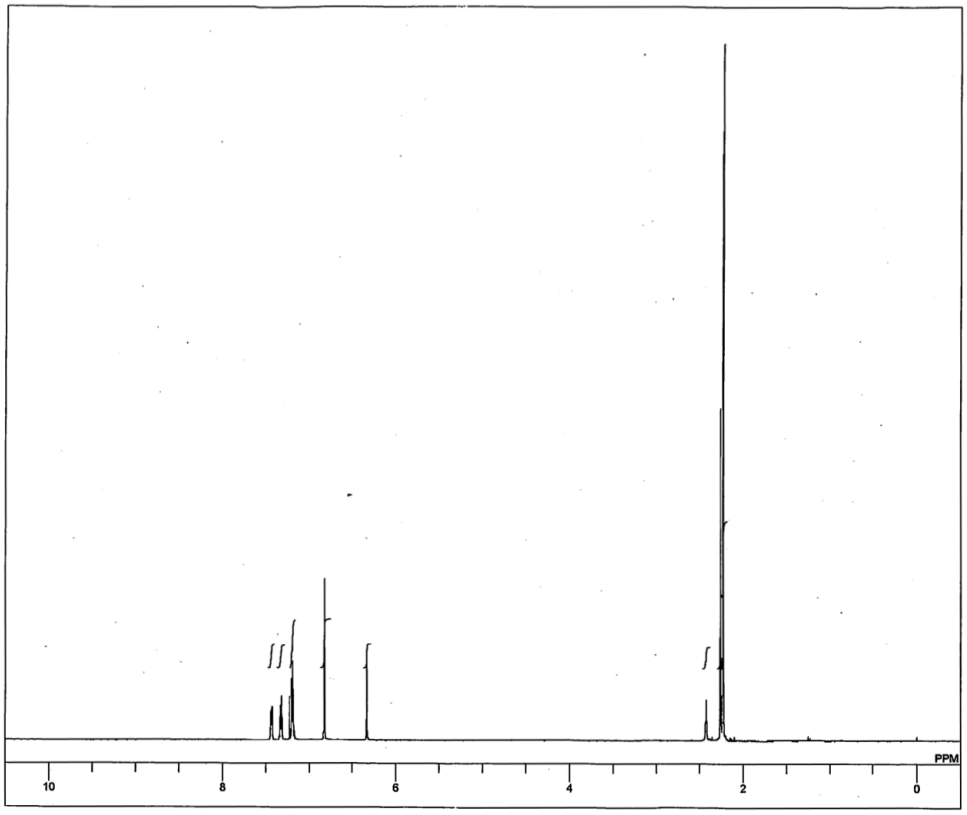
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	50.135	1246422	50.523	31546
2	53.618	1220617	49.477	29028
Totals		2467039	100.000	60574

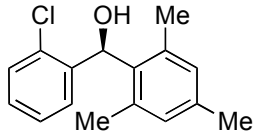


UV Results

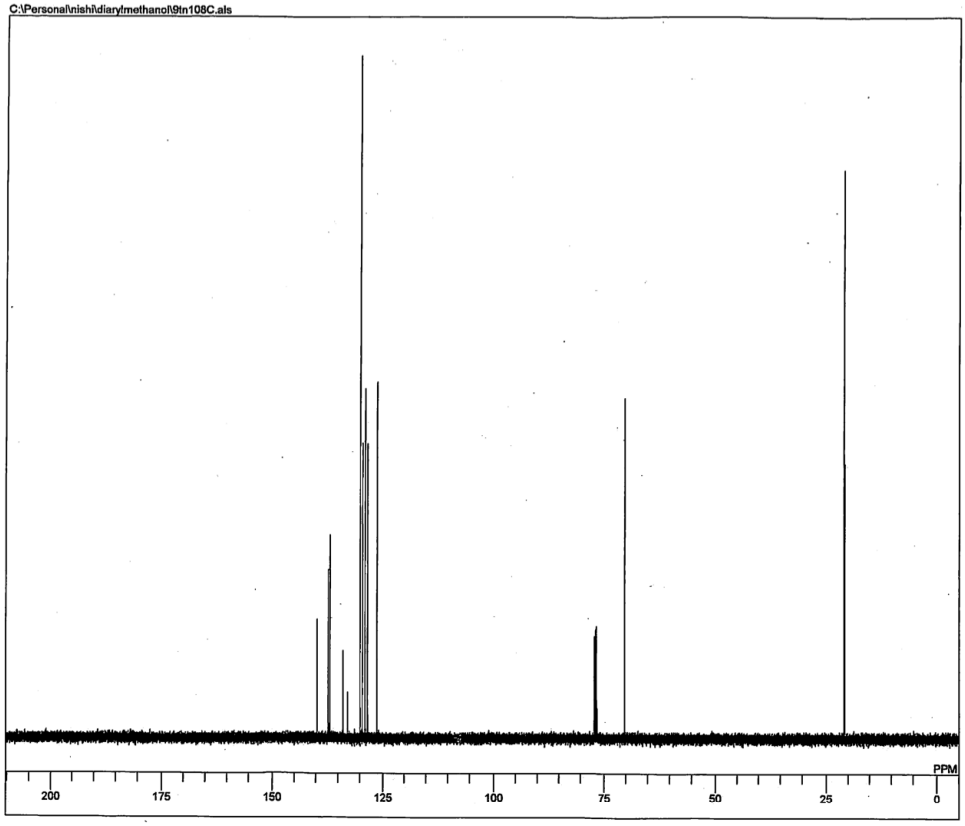
Pk #	Retention Time	Area	Area Percent	Height
1	50.162	314701	3.049	8097
2	53.642	10007874	96.951	236890
Totals		10322575	100.000	244987



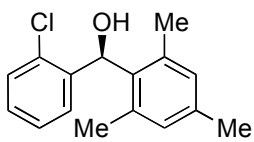
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	16
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn108H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	952
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Apr 03 16:46:51 2009



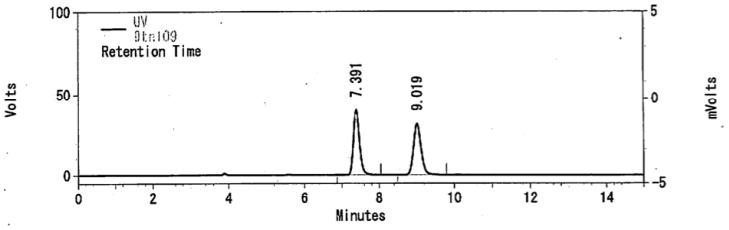
7bu



MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn108C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	928
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Apr 03 16:52:55 2009

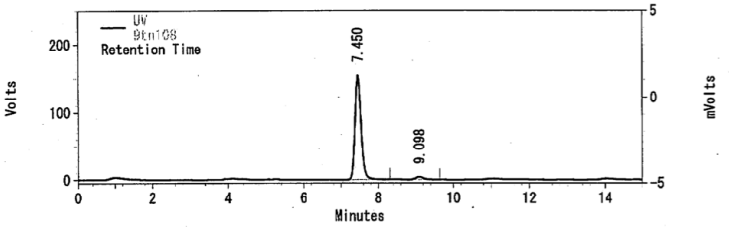


7bu



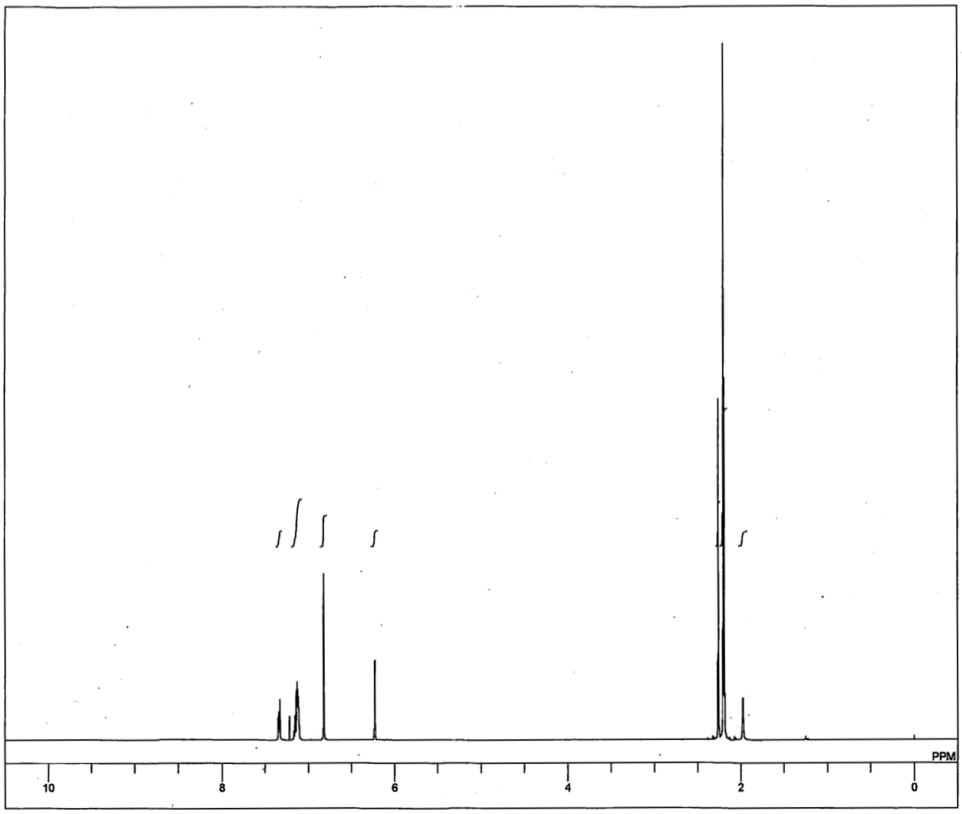
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	7.391	444768	50.021	40060
2	9.019	444394	49.979	31700
Totals		889162	100.000	71760

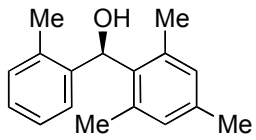


UV Results

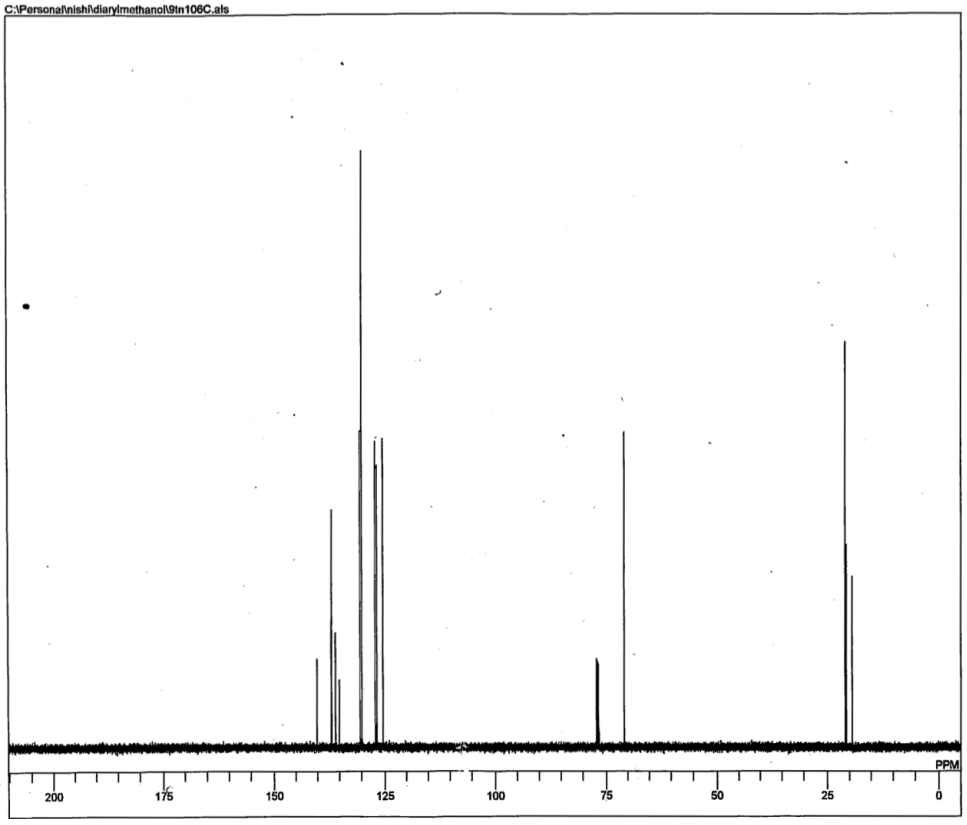
Pk #	Retention Time	Area	Area Percent	Height
1	7.450	1755486	96.803	153832
2	9.098	57985	3.197	3981
Totals		1813471	100.000	157813



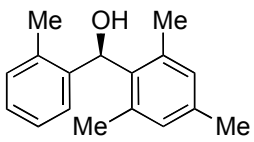
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	17
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn106.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	974
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Apr 03 15:14:31 2009



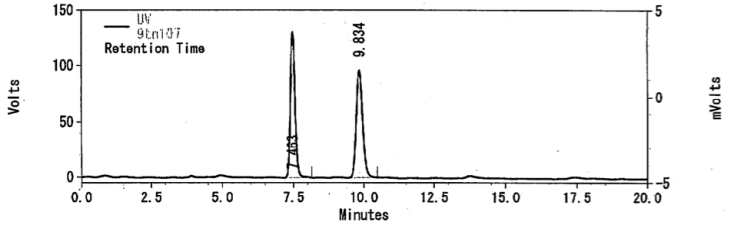
7eu



MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	29
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn106C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	968
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Apr 03 15:19:23 2009

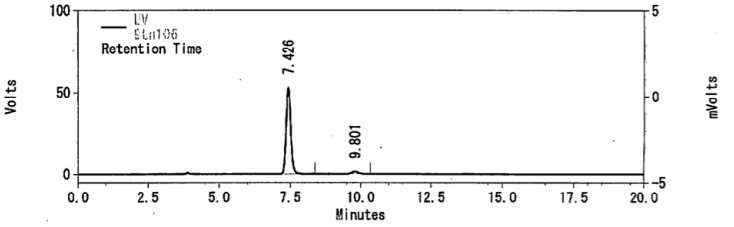


7eu



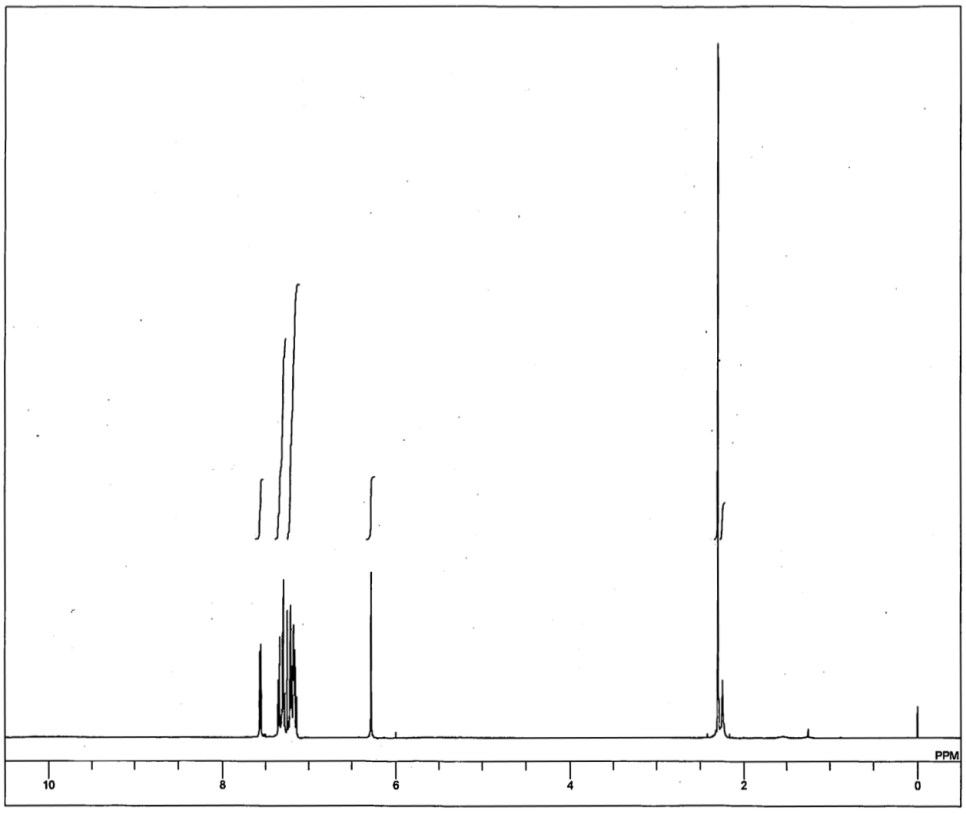
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	7.463	1487383	49.509	130638
2	9.834	1516872	50.491	96108
Totals		3004255	100.000	226746

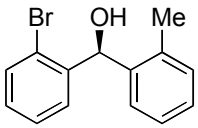


UV Results

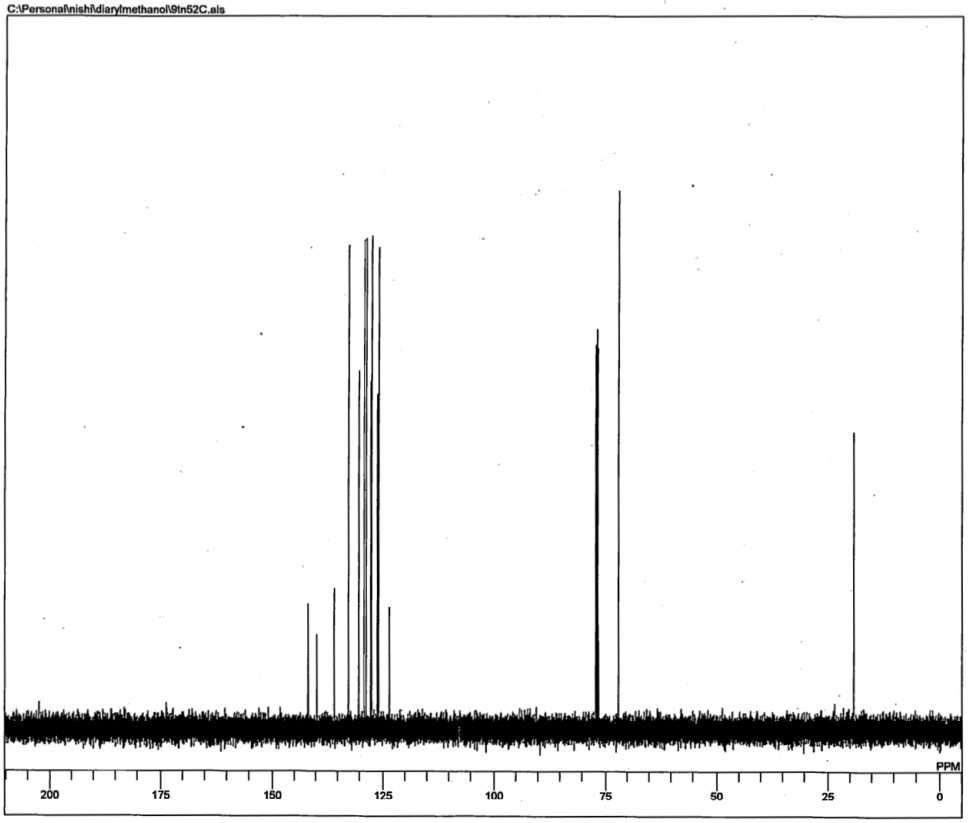
Pk #	Retention Time	Area	Area Percent	Height
1	7.426	595091	96.540	52616
2	9.801	21327	3.460	1351
Totals		616418	100.000	53967



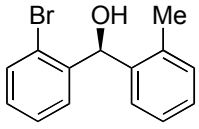
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	22
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn52.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	21
LKPHS	353
LKSIG	749
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Mar 10 13:56:31 2009



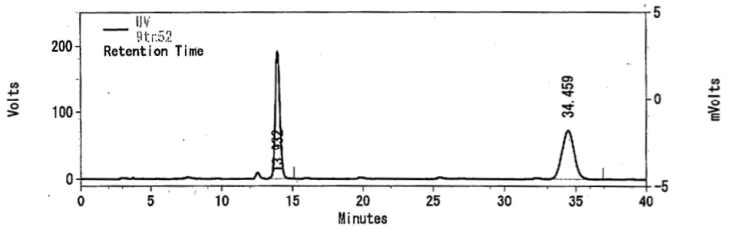
7cq



MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn52C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	21
LKPHS	353
LKSIG	757
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Mar 10 14:07:09 2009

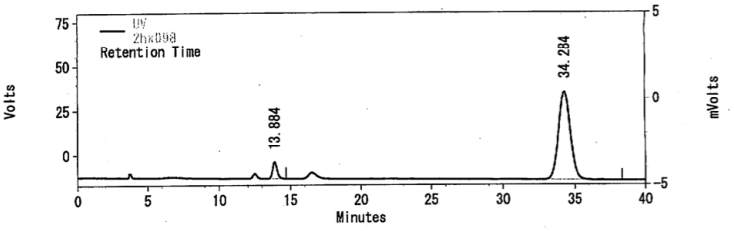


7cn



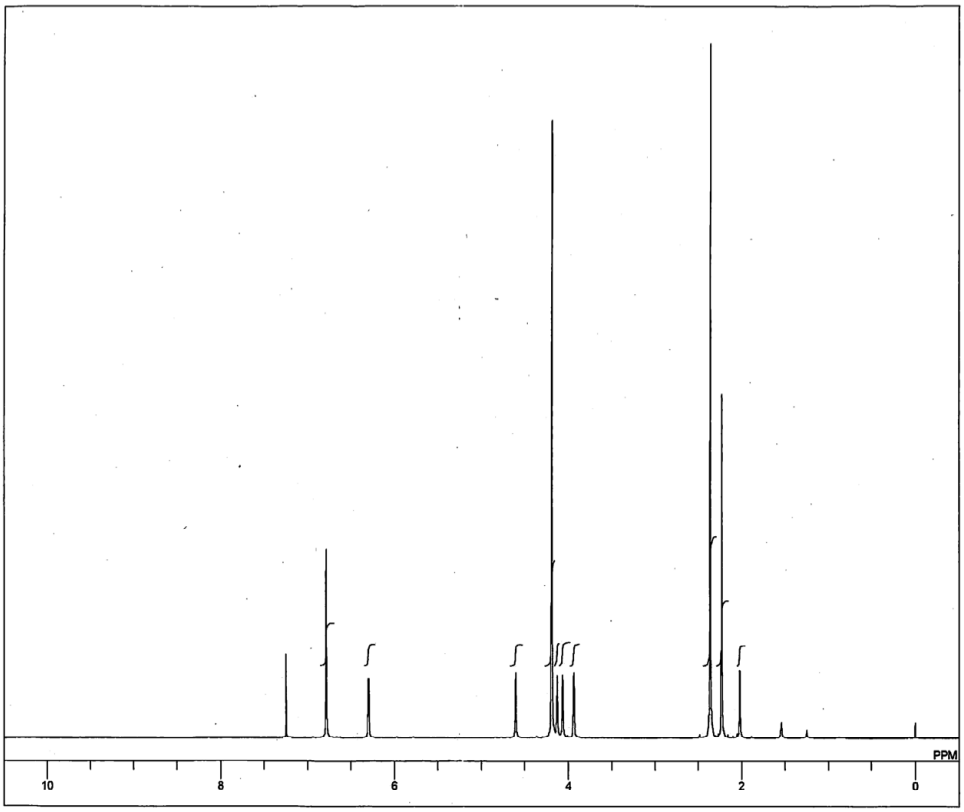
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	13.932	4313807	50.275	191016
2	34.459	4266613	49.725	72367
Totals		8580420	100.000	263383

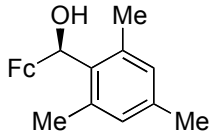


UV Results

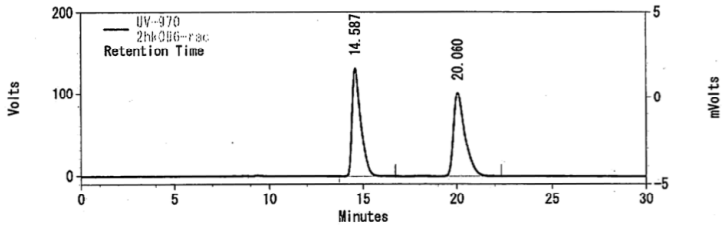
Pk #	Retention Time	Area	Area Percent	Height
1	13.884	208952	6.776	9288
2	34.284	2874861	93.224	49663
Totals		3083813	100.000	58951



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn47-2.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	795
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 05 21:12:27 2009

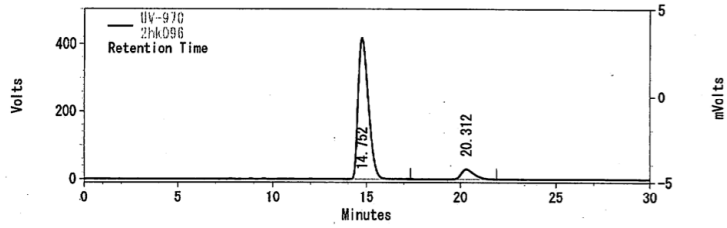


7ku



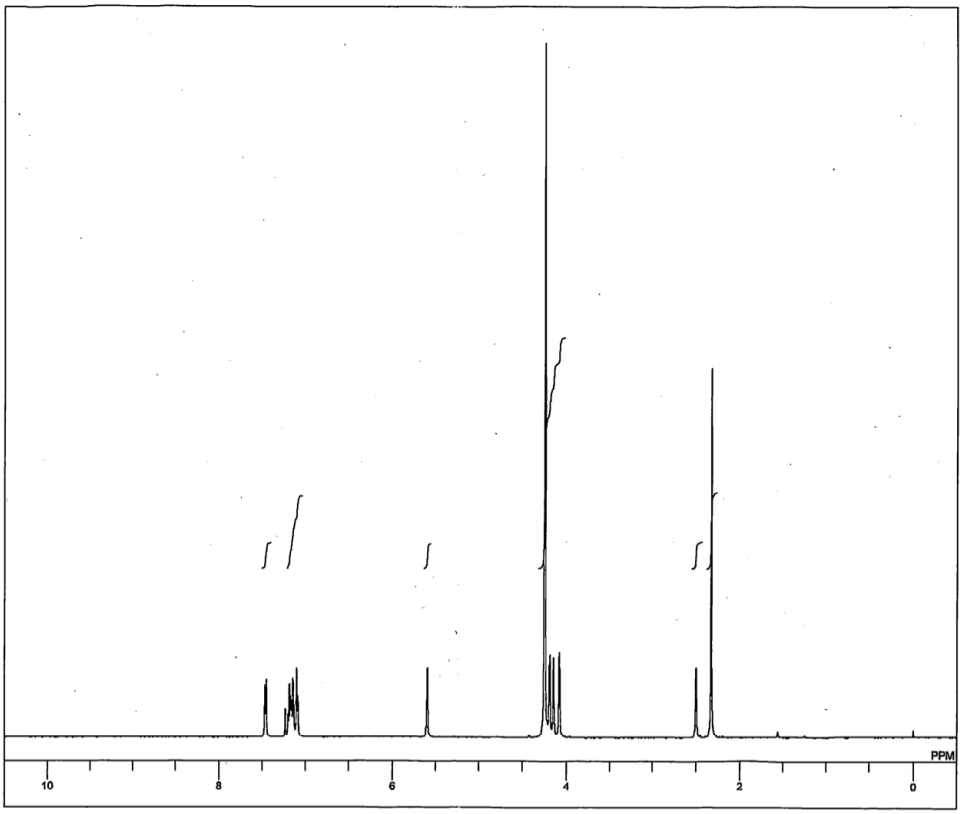
UV-970 Results

Pk #	Retention Time	Area	Area Percent	Height
1	14.587	4175911	49.955	131179
2	20.060	4183446	50.045	101162
Totals		8359357	100.000	232341

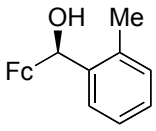


UV-970 Results

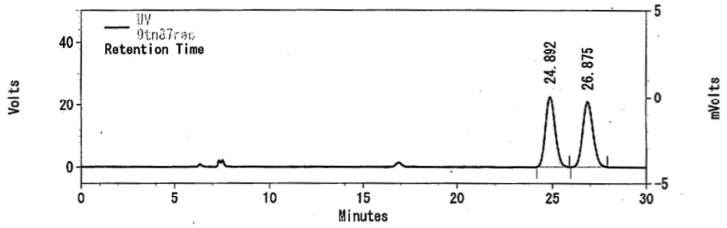
Pk #	Retention Time	Area	Area Percent	Height
1	14.752	15877362	92.067	417018
2	20.312	1368141	7.933	29373
Totals		17245503	100.000	446391



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	19
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn87.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	850
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Mar 26 18:09:25 2009

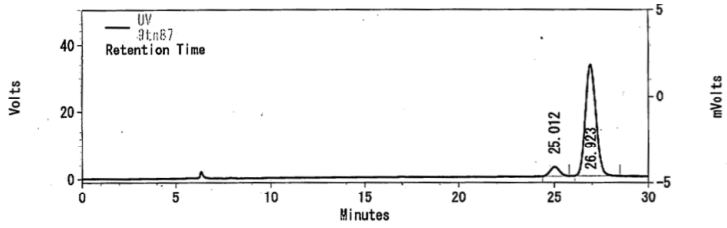


7kq



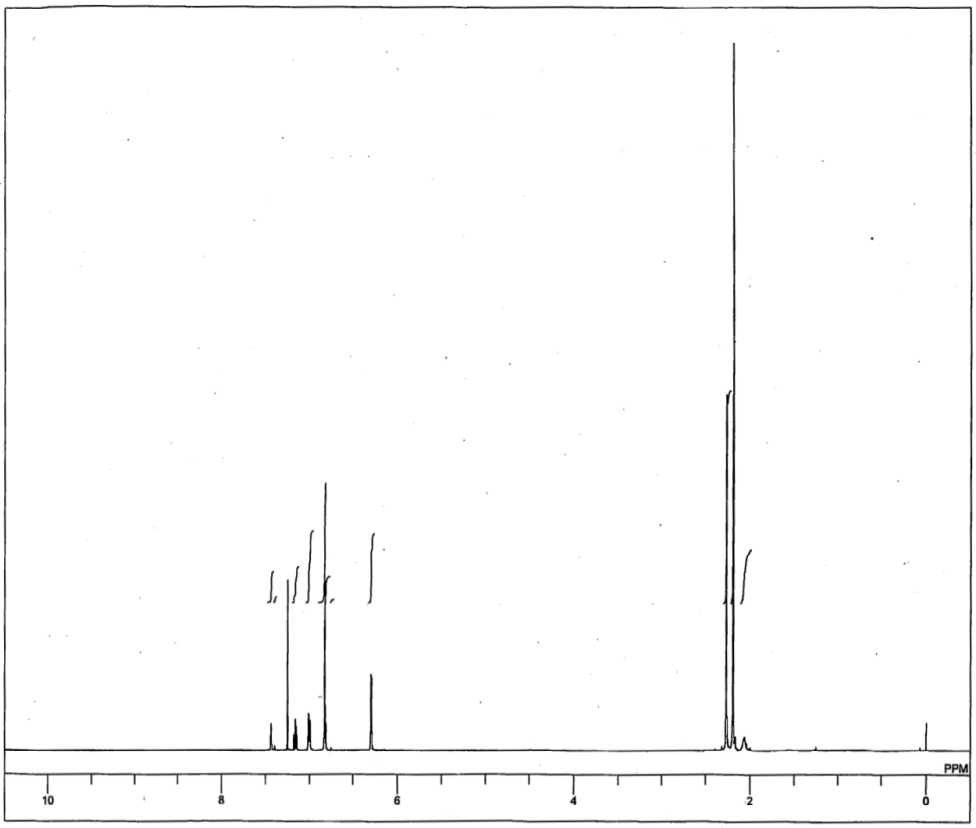
UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	24.892	791776	50.012	22644
2	26.875	791392	49.988	20772
Totals		1583168	100.000	43416

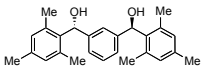


UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	25.012	93498	6.834	2725
2	26.923	1274718	93.166	32921
Totals		1368216	100.000	35646



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	22
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	9tn170.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	713
CSPED	10 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 28 19:00:14 2009



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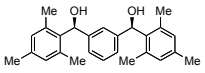

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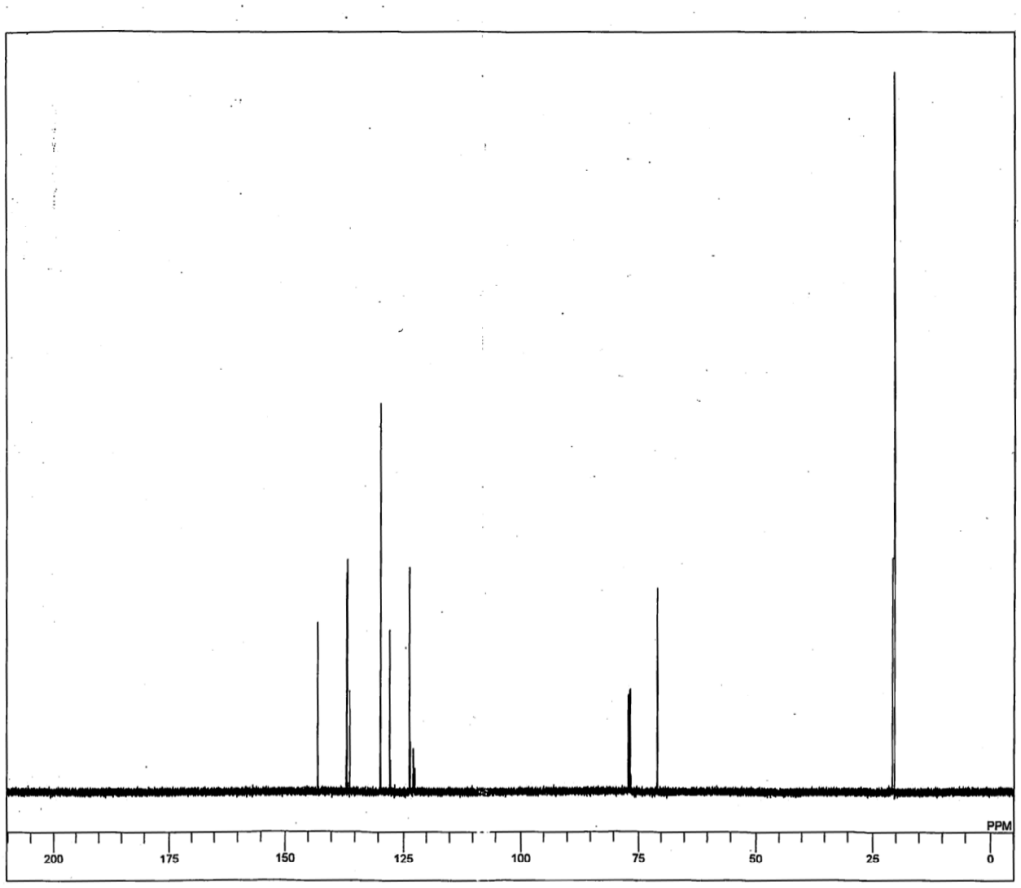
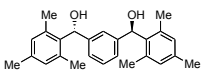
9



MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	720
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	_DEFAULT.ALS
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	598
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 28 19:12:07 2009



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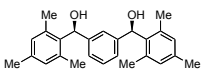
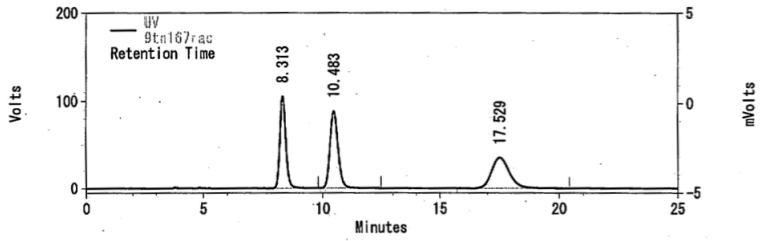


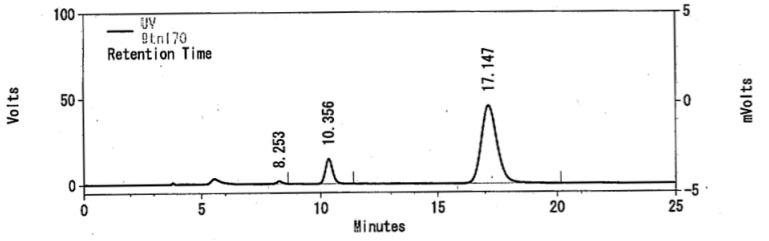
(minor)

9



UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	8.313	1803917	31.557	105014
2	10.483	2117642	37.045	88164
3	17.529	1794899	31.399	34923
Totals		5716458	100.000	228101



UV Results

Pk #	Retention Time	Area	Area Percent	Height
1	8.253	24206	0.991	1570
2	10.356	315934	12.930	14499
3	17.147	2103357	86.080	45402
Totals		2443497	100.000	61471