Supporting Information

Oxidative Palladium(II) Catalysis: A Highly Efficient and Chemoselective Cross Coupling Method for Carbon-Carbon Bond Formation under Base-Free and Nitrogenous-Ligand Conditions

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General Experimental Conditions. DMF, DMA, THF, acetonitrle, and toluene were used in anhydrous forms, which were purchased from Aldrich chemical. ^{1}H NMR spectra were recorded at 250, 300, and 400 MHz. ^{13}C NMR spectra were recorded at 63, 75.5, and 100 MHz. Thin-layer chromatography (TLC) was performed using commercially prepared 60 mesh silica gel plates visualized with short-wavelength UV light (254 nm). Silica gel 60 (9385, 230-400 mesh) was used for column chromatography. The reported yields are isolated yields and are the average of two runs. All commercially available reagents such as boronic acids and olefins were used as received from Aldrich and Acros chemical. In addition, the use of oxygen in conjunction with metals can lead to explosive mixtures, and care should be exercised especially when scaling up although we have not encountered any dangerous incidents during the oxidative palladium(II) catalysis reactions.

(*1E*)-2-Hex-1-enyl-4,4,5,5-tetramethyl-[1,3,2]dioxaborolane (1): To a stirred solution of 1-hexyne (1 g, 12.2 mmol), was cautiously added catechol borane (1.4 ml, 13.4 mmol) under a N_2 atmosphere, and the resulting mixture was maintained at 70 °C for 2 hours with stirring. After cooled to room temperature, the reaction was diluted with THF (30 mL) prior to the addition of pinacol (1.7 g, 14.6 mmol). The resulting reaction mixture was stirred for 3 hours at room temperature, diluted with EtOAc (30 mL) and washed with water followed by saturated brine. The separated organic layer was dried over anhydrous Na_2SO_4, filtered and reduced *in vacuo* to give an oil, which was column chromatographed eluting with 10% EtOAc in hexanes to afford **1** (78%) as colorless oil: ^{1}H NMR (250 MHz, $CDCl_3$) δ=6.61 (dt, *J* = 6.5, 17.9 Hz, 1 H), 5.40 (d, *J* = 17.9 Hz, 1 H), 2.13 (dt, *J* = 6.5, 6.6 Hz, 2 H), 1.27-1.41 (m, 4 H), 1.24 (s, 12 H), 0.86 (t, *J* = 6.9 Hz, 3 H).

General procedure A for the coupling reaction with pinacolboronic ester and olefin in the absence of base (Base Free Conditions): To a solution of olefin (1.5 mmol) in *N*,*N*-dimethylacetamide (2.5 mL, C = 0.2 M), was added pinacolboronic ester (0.5 mmol) followed by a single addition of $Pd(OAc)_2$ (0.025 mmol). The reaction flask was fitted with an oxygen balloon. The resulting reaction was stirred for 6 hours at 50 ^{o}C, diluted with ethyl acetate (20 mL), and washed with water (2 X 10 mL). The separated organic layer was dried over anhydrous Na_2SO_4 and filtered. The filtrate was concentrated *in vacuo*, and subjected to flash chromatography affording a cross-coupling compound.

(*2E,4E*)-Nona-2,4-dienoic acid *tert*-butyl ester (2): Following the general procedure **A**, cross coupling reaction of boronic ester **1** with *tert*-butyl acrylate afforded diene **2** (95%): ^{1}H NMR (250 MHz, $CDCl_3$) δ= 7.13 (dd, *J* = 25.4, 15.4 Hz, 1 H), 6.10 (m, 2 H), 5.68 (d, *J* = 15.4 Hz, 1 H), 2.12 (m, 2 H), 1.45 (s, 9 H), 1.32 (m, 4 H), 0.87 (t, *J* = 6.9 Hz, 3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 166.7, 144.1, 144.0, 128.3, 121.0, 80.0, 32.6, 30.8, 28.1, 22.2, 13.8.;Anal. calcd for $C_{13}H_{22}O_2$: C 74.24, H 10.54, found: C 74.23, H 10.54.

(*1E,3E*)-Octa-1,3-dienyl-benzene (9): Following the general procedure **A**, cross coupling reaction of boronic ester **1** with styrene afforded diene **9** (88%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.27 (m, 5 H, Ph), 6.73 (dd, *J* = 15.6, 10.3 Hz, 1 H), 6.41 (d, *J* = 15.6 Hz, 1 H), 6.18 (dd, *J* = 15.1, 10.3 Hz, 1 H), 5.80 (dt, *J* = 15.1, 7.5 Hz, 1 H), 2.12 (m, 2 H), 1.34 (m, 4 H), 0.88 (t, *J* = 6.9 Hz, 3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 137.6, 136.0, 130.4, 129.9, 129.4, 128.5, 127.0, 126.1, 32.6, 31.4, 22.3, 14.0; Anal. calcd for $C_{14}H_{18}$: C 90.26, H 9.74, found: C 90.25, H 9.75.

(*2E,4E)*-Nona-2,4-dienyloxymethyl-benzene (10): Following the general procedure **A**, cross coupling reaction of boronic ester **1** with allyl benzyl ether afforded diene **10** (87%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.28 (m, 5 H, Ph), 6.21 (dd, *J* = 15.2, 10.5 Hz, 1 H), 6.03 (dd, *J* = 15.2, 10.2 Hz, 1 H), 5.68 (m, 2 H), 4.48 (s, 2 H), 4.02 (d, *J* = 6.3 Hz, 2 H), 2.11 (m, 2 H), 1.31 (m, 4 H), 0.87 (t, *J* = 6.8 Hz, 3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 138.3, 135.7, 133.5, 129.4, 128.3, 127.8, 127.5, 126.8, 71.9, 70.6, 32.3, 31.3, 22.2, 13.9; Anal. calcd for $C_{16}H_{22}O$: C 83.43, H 9.65, found: C 83.39, H 9.67.

(*2E,4E)- and (2Z,4E)*-Nona-2,4-dienenitrile (11): Following the general procedure **A**, cross coupling reaction of boronic ester **1** with acrylonitrile afforded an inseparable mixture of (*2E,4E)*- and (*2Z,4E*)-diene **10** (78%, 2*E,4E*:2*Z,4E*=3:2). For (*2E,4E*): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 6.84 (m, 1 H), 6.04-6.21 (m, 2 H), 5.21 (d, *J* = 16.0 Hz, 1 H), 2.18 (m, 2 H), 1.34 (m, 4 H), 0.88 (t, *J* = 7.0 Hz, 3 H). For (*2Z,4E*): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 6.77 (dd, *J* = 10.9, 10.9 Hz, 1 H), 6.47-6.58 (m, 1 H), 6.04-6.21 (m, 1 H), 5.07 (d, *J* =10.9 Hz, 1 H), 2.18 (m, 2 H), 1.34 (m, 4 H), 0.89 (t, *J* = 7.0 Hz, 3 H); Anal. calcd for $C_9H_{13}N$: C 79.95, H 9.69, N 10.36, found: C 79.95, H 9.70, N 10.35

(*2E,4E)*-2-Methyl-nona-2,4-dienoic acid *tert*-butyl ester (12): Following the general procedure **A**, cross coupling reaction of boronic ester **1** with *tert*-butyl methacrylate afforded diene **12** (90%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.04 (d, *J* = 11.3 Hz, 1 H), 6.29 (dd, *J* = 14.8, 11.4 Hz, 1 H), 5.92 (m, 1 H), 2.18 (m, 2 H), 1.85 (s, 3 H), 1.46 (s, 9 H), 1.33 (m, 4 H), 0.88 (t, *J* = 7.0 Hz,3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 167.9, 142.5, 137.8, 126.5, 126.1, 79.9, 32.9, 31.1, 28.1, 22.2, 13.8, 12.5; Anal. calcd for $C_{14}H_{24}O_2$: C 74.95, H 10.78, found: C 74.89, H 10.68

(*2E,4E*)-3-Methyl-nona-2,4-dienoic acid ethyl ester (13): Following the general procedure **A**, cross coupling reaction of boronic ester **1** with ethyl crotonate afforded diene **12** (89%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 6.08 (m, 1 H), 5.66 (s, 1 H), 4.13 (q, 2 H, *J* = 7.2 Hz), 2.24 (s, 3 H), 2.15 (m, 2 H), 1.31 (m, 4 H), 1.25 (t, *J* = 7.2 Hz, 3 H), 0.87 (t, *J* = 7.0 Hz, 3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 167.9, 142.5, 137.8, 126.5, 126.1, 79.9, 32.9, 31.1, 22.2, 14.3, 13.9, 13.8; Anal. calcd for $C_{12}H_{20}O_2$: C 73.43, H 10.27, found: C 73.41, H 10.28.

(*1E,3E*)-(1-Methyl-octa-1,3-dienyl)-benzene and (*3E*)-(1-Methylene-oct-3-enyl)-benzene (14): Following the general procedure **A**, cross coupling reaction of boronic ester **1** with a-methylstyrene afforded an inseparable mixture of dienes **14** (50%, ***14a***(*1E,3E*) : ***14b***(*3E*) = 1 : 2.8). ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.21- 7.45 (m, 5 H, Ph), 6.42 (for *14a*, m), 5.84 (for *14a*, m), 5.49 (for *14b*, m), 5.34 (for *14b*, br s), 5.07 (for *14b*, d, *J* = 1.4 Hz), 2.14 (for *14a*, s), 1.99 (m, 2 H), 1.29 (m, 4 H), 0.88 (m, 3 H).

(*1E,3E*)- and (*1Z,3E*)-(2-Methyl-octa-1,3-dienyl)-benzene (15): Following the general procedure **A**, cross coupling reaction of boronic ester **1** with *trans*-b-methylstyrene afforded an inseparable mixture of dienes **15** (52%, (*1E,3E):(1Z,3E*) = 6:1): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.24 (m, 5 H, Ph), 6.57 (for *(1Z,3E)*, d, *J* = 15.7 Hz) and 6.22 (for (*1E,3E*), dd, *J* = 15.5, 1.1 Hz), 6.40 (for (*1E,3E*), s) and 6.33 (for (*1Z,3E*), s), 5.77 (dt, *J* = 15.5, 7.1 Hz, 2 H), 2.15 (m, 2 H), 1.97 (d, *J* = 1.1 Hz, 3 H), 1.35 (m, 4 H), 0.89 (t, *J* = 7.0 Hz, 3 H).

(*2E,4E*)-6-(*tert*-Butyl-diphenyl-silanyloxy)-hexa-2,4-dienoic acid *tert*-butyl ester (18): Following the general procedure **A**, cross coupling reaction of boronic ester **17**, prepared from propargyl alcohol through TBDPS protection, hydroboration with catechol borane, and pinacol esterification, with *tert*-butyl acrylate afforded diene **18** (92%): ^{1}H NMR (250 MHz,

$CDCl_3$) δ = 7.65-7.34 (m, 10 H, Ph), 7.19 (dd, *J* = 15.3, 11.4 Hz, 1 H), 6.46 (dd, 15.2, 11.4 Hz, 1 H), 6.10 (dt, *J* = 15.2, 2.4 Hz, 1 H), 4.29 (d, *J* = 2.4 Hz, 2 H), 1.47 (s, 9 H), 1.04 (s, 9 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 166.5, 143.0, 140.6, 135.4, 133.2, 129.7, 127.7, 126.8, 122.7, 80.2, 63.6, 28.1, 26.7, 19.2.

(*2E,4E*)-7-Hydroxy-octa-2,4-dienoic acid *tert*-butyl ester (20): Following the general procedure **A**, cross coupling reaction of boronic ester **19**, prepared from 4-pentyn-2-ol through TMS protection, hydroboration with catechol borane, and pinacol esterification, with *tert*-butyl acrylate afforded diene **20** (81%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.14 (dd, *J* = 15.3, 10.5 Hz, 1 H), 6.20 (dd, *J* = 15.1, 10.5 Hz, 1 H), 6.06 (dt, *J* = 15.1, 7.0 Hz, 1 H), 5.73 (d, *J* = 15.3 Hz, 1 H), 3.88 (m, 1 H), 2.30 (m, 2 H), 1.46 (s, 9 H), 1.20 (d, *J* = 6.2 Hz, 3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 166.4, 143.2, 138.8, 131.1, 122.2, 80.2, 67.1, 42.6, 28.1, 23.0; Anal. calcd for $C_{12}H_{20}O_3$: C 67.89, H 9.50, found: C 67.71, H 9.54

2-Isopropenyl pinacol boronic ester (21): Following the known procedure,[25] isopropenyl bromide was converted to 2-isopropenyl boronic acid, which was treated pinacol affording a corresponding pinacol boronic ester **21**: ^{1}H NMR (250 MHz, $CDCl_3$) δ = 5.7 (br s, 1 H), 5.61 (br s, 1 H), 1.79 (dd, *J* = 1.31, 1.26 Hz, 3 H), 1.25 (s, 12 H).

(*2E*)-4-Methyl-penta-2,4-dienoic acid *tert*-butyl ester (22): Following the general procedure **A**, cross coupling reaction of boronic ester **21** with *tert*-butyl acrylate afforded diene **22** (86%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.24 (d, *J* = 15.7 Hz, 1 H), 5.78 (d, *J* = 15.7 Hz, 1 H), 5.28 (m, 2 H), 1.85 (s, 3 H), 1.48 (s, 9 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 166.5, 145.9, 140.5, 123.6, 120.6, 80.3, 46.3, 30.9, 28.1, 18.1; Anal. calcd for $C_{10}H_{16}O_2$: C 71.39, H 9.59, found: C 71.41, H 9.62

***trans*-2-phenyvinyl pinacol boronic ester (23):** Pinacol was added to a solution of commercially available *trans*-2-phenyl boronic acid in THF at room temperature. After stirred for 3 hours, the reaction mixture was concentrated *in vacuo* and chromatographed on silica gel to afford pinacol boronic ester compound **23** as colorless oil in quantitative yield: ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.24-7.49 (m, 6 H), 6.15 (d, *J* = 18.4 Hz, 1 H), 1.30 (s, 12 H); ^{13}C-NMR (63 MHz, $CDCl_3$) δ = 149.5, 137.4, 128.9, 127.1, 83.4, 24.8.

(*2E,4E*)-5-Phenyl-penta-2,4-dienoic acid *tert*-butyl ester (24): Following the general procedure **A**, cross coupling reaction of boronic ester **23** with *tert*-butyl acrylate afforded diene **24** (81%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.21-7.39 (m, 6 H), 6.77 (m, 2 H), 5.85 (d, *J* = 15.2 Hz, 1 H), 1.44 (s, 9 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 166.4, 143.5, 139.7, 136.1, 128.9, 128.8, 127.1, 126.3, 123.3, 80.3, 28.2; Anal. calcd for $C_{15}H_{19}O_2$: C 78.23, H 7.88, found: C 78.34, H 7.82

(*1Z*)-2-Hex-1-enyl-4,4,5,5-tetramethyl-[1,3,2]dioxaborolane (25):[25] A two neck flask was charged with $[Rh(cod)Cl_2]_2$ (43 mg, 0.015 eq) and then flushed with nitrogen. Cyclohexane, P(*i*-Pr)$_3$ (67 mL. 0.06 eq.), TEA (0.82 mL, 1 eq.), and catechol borane (0.65 mL, 5.8 mmol) were successively added and the mixture was stirred for 30 minutes at room temperature. 1-Hexyne (0.58 g, 1.2 eq.) was added and the reaction mixture was stirred for 4 hours at room temperature. After addition of pinacol (1.0 g, 1.5 eq.), the resulting reaction mixture was stirred for additional 12 hours, concentrated *in vacuo* and chromatographed on silica gel to give *cis*-pinacol boronic ester **25** as colorless oil; ^{1}H NMR (250 MHz, $CDCl_3$) δ = 6.40 (dt, *J* = 13.4, 6.6 Hz, 1 H), 5.30 (dt, *J* = 13.4, 1.1 Hz, 1 H), 2.38 (m, 2 H), 1.31 (m, 4 H), 1.24 (s, 12 H), 0.87 (t, *J* = 7.0 Hz, 3 H).

(*2E,4Z*)-Nona-2,4-dienoic acid *tert*-butyl ester (26): Following the general procedure **A**, cross coupling reaction of boronic ester **25** with *tert*-butyl acrylate afforded diene **26** (91%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 7.50 (ddd, *J* = 15.3, 11.5, 0.7 Hz, 1 H), 6.06 (dd, *J* = 11.0, 10.9 Hz, 1 H), 5.79 (m, 1 H), 5.77 (d, *J* = 15.3 Hz, 1 H), 2.25 (m, 2 H), 1.46 (s, 9 H), 1.34 (m, 4 H), 0.89 (t, *J* = 7.0 Hz, 3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 166.8, 141.0, 138.5, 126.3, 122.9, 80.1, 31.5, 28.1, 27.9, 22.3, 13.9.

General procedure B for the coupling reaction with pinacolboronic ester and olefin in the presence of 1,10-phenanthroline as a ligand: To a premixed solution of palladium acetate (0.025 mole) and 1,10-phenanthroline as a ligand (0.028 mmol) in DMF (2.5 mL) for 30 minutes, were added olefin (1.5 mmol) and pinacolboronic ester (0.5 mmol). The reaction flask was fitted with an oxygen balloon and the reaction mixture was stirred at room temperature for 12 hours, then diluted with ethyl acetate (20 mL), and washed with water and brine (2 X 10 mL). The separated organic layer was dried over anhydrous Na_2SO_4 and filtered. The filtrate was concentrated *in vacuo* and the residue was chromatographed on silica gel to give a cross-coupled product.

(*3E,5E*)-Deca-3,5-dien-2-one (27): Following the general procedure **B**, cross coupling reaction of boronic ester **1** with methyl vinyl ketone afforded diene **27** (88%). ^{1}H NMR (250 MHz, $CDCl_3$) δ= 7.01 (m, 1 H), 6.10 (m, 2 H), 5.96 (d, *J* = 15.5 Hz, 1 H), 2.17 (s, 3H), 2.11 (m, 2 H), 1.30 (m, 4 H), 0.82 (t, *J* = 7.0 Hz, 3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 198.9, 145.8, 144.1, 128.8, 128.7, 32.8, 30.7, 27.1, 22.2, 13.8; Anal. calcd for $C_{10}H_{16}O$: C 78.90, H 10.59, found: C 78.89, H 10.60.

(*E*)-*tert*-Butyl 3-phenylpropenoate (28): Following the general procedure **B**, cross coupling reaction of phenylboronic acid with *tert*-butyl acrylate afforded **28** (87%): ^{1}H NMR (300 MHz, $CDCl_3$) δ = 7.58 (d, *J* = 16.0 Hz, 1 H), 7.50 (m, 2H), 7.37 (m, 3H), 6.37 (d, *J* = 16.0 Hz, 1 H), 1.54 (s, 9 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 166.3, 143.5, 134.6, 129.9, 128.7, 127.9, 120.1, 80.4, 28.1; Anal. calcd for $C_{13}H_{16}O_2$: C 76.44, H 7.90, found: C 76.43, H 7.92

(*E*)-4-Phenylbut-3-en-2-one (33): Following the general procedure **B**, cross coupling reaction of phenylboronic acid with methyl vinyl ketone afforded **33** (71%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.54 (m, 2 H), 7.50 (d, *J* = 10.3 Hz, 1 H), 7.40 (m, 3 H), 6.72 (d, *J* = 10.2 Hz, 1 H), 2.39 (s, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 198.7, 143.7, 134.6, 130.7, 129.2, 128.5, 127.4, 27.7; Anal. calcd for $C_{10}H_{10}O$: C 82.16, H 6.89, found: C 82.08, H 6.92

(*E*)-Cinnamamide (34): Following the general procedure **B**, cross coupling reaction of phenylboronic acid with acrylamide afforded **34** (64%): ^{1}H NMR 300 MHz, $CDCl_3$) δ = 7.64 (d, *J* = 15.7 Hz, 1 H), 7.52 (m, 2 H), 7.38 (m, 3 H), 6.46 (d, *J* = 15.7 Hz, 1 H), 5.57 (br, 2 H); ^{13}C NMR (75.5 MHz, $CDCl_3$) δ = 167.8, 142.5, 134.4, 129.9, 128.8, 127.9, 119.4; Anal. calcd for C_9H_9NO: C 73.45, H 6.16, N 9.52, found: C 73.37, H 6.18, N 9.49.

(*E*)-1,2-Diphenylethene (35): Following the general procedure **B**, cross coupling reaction of phenylboronic acid with styren afforded **35** (85%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.51 (d, *J* = 4.75 Hz, 4 H), 7.35 (t, *J* = 5.0 Hz, 4 H), 7.24 (m, 2 H), 7.10 (s, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 137.5, 128.9, 128.8, 127.8, 126.7; Anal. calcd for $C_{14}H_{12}$: C 93.29, H 6.71, found: C 92.97, H 6.85

Cinnamonitrile (36): Following the general procedure **B**, cross coupling reaction of phenylboronic acid with acrylnitrile afforded **36** (84%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.41 (m, 6 H), 5.86 (d, *J* = 10.5 Hz, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 150.8, 133.7, 131.4, 129.3, 127.5, 118.3, 96.5; Anal. calcd for C_9H_7N: C 83.69, H 5.46, N 10.84, found: C 83.65, H 5.52, N 10.82

1-[(Cinnamyl-oxy) methyl] benzene (37): Following the general procedure **B**, cross coupling reaction of phenylboronic acid with allylic benzyl ether afforded **37** (78%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 4.21 (d, *J* = 4.2 Hz, 2H), 4.58 (s, 2H), 6.35 (td, *J* = 4.5 Hz, 12.0 Hz, 1H), 6.64 (d, *J* = 12.0 Hz, 1H), 7.25 - 7.35 (m, 10H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 70.6, 72.1, 126.5, 126.7, 128.1, 128.6, 132.4, 136.7, 138.5

***tert*-Butyl 2-benzylacrlate (38):** Following the general procedure **B**, cross coupling reaction of phenylboronic acid with *tert*-butyl methacrylate afforded **38** (85%; coupled:migrated = 1:1.4): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.35 (m, 2 H), 7.22 (m, 3 H), 6.14 (s, 1 H), 5.34 (d, *J* = 0.75 Hz, 1 H), 3.57 (s, 2 H), 1.41 (s, 9 H).

(*E*)-Ethyl 3-phenylbut-2-enoate (39): Following the general procedure **B**, cross coupling reaction of phenylboronic acid with ethyl crotonate afforded **39** (82%): ^{1}H NMR (300 MHz, $CDCl_3$) δ = 7.49 (m, 2 H), 7.37 (m, 3 H), 6.13 (q, *J* = 1.25 Hz, 1 H), 4.21 (q, *J* = 7.25 Hz, 2 H), 2.57 (d, *J* = 1.5 Hz, 3 H), 1.31 (t, *J* = 7.25 Hz, 3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 166.8, 155.4, 142.2, 128.9, 128.4, 126.2, 117.1, 59.8, 17.9, 14.3; Anal. calcd for $C_{12}H_{14}O_2$: C 75.76, H 7.42, found: C 75.77, H 7.45

General procedure C for the coupling reaction with arylboronic acid and olefin in the presence of 2,9-dimethyl-phenanthroline as a ligand: To a premixed solution of palladium acetate (0.025 mole) and 2,9-dimethyl-phenanthroline as a ligand (0.028 mmol) in DMF (2.5 mL) for 30 minutes, were added olefin (1.5 mmol) and arylboronic acid (0.5 mmol). The reaction flask was fitted with an oxygen balloon and the reaction mixture was stirred at room temperature for 12 hours, then diluted with ethyl acetate (20 mL), and washed with water and brine (2 X 10 mL). The separated organic layer was dried over anhydrous Na_2SO_4 and filtered. The filtrate was concentrated *in vacuo* and the residue was chromatographed on silica gel to give a cross-coupled product.

(*E*)-*tert*-Butyl 3-(4-methoxyphenyl) acrylate (31): Following the general procedure **C**, cross coupling reaction of 4-methoxyphenyl boronic acid with *tert*-butyl acrylate afforded **31** (61%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.52 (d, *J* = 16.0 Hz, 1 H), 7.43 (d, *J* = 8.4 Hz, 1H), 6.86 (d, *J* = 8.4 Hz, 1 H), 6.22 (d, *J* = 16.0 Hz, 1 H), 3.81 (s, 3 H), 1.51 (s, 9 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 166.9, 161.3, 143.4, 129.7, 127.6, 117.9, 114.4, 80.4, 55.5, 28.4; Anal. calcd for $C_{14}H_{18}O_3$: C 71.77, H 7.74, found: C 71.78, H 7.74

(*E*)-*tert*-Butyl 3-(3-acetylphenyl) acrylate (32): Following the general procedure **C**, cross coupling reaction of 3-acetyl phenylboronic acid with *tert*-butyl acrylate afforded **32** (72%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 8.05 (s, 1 H), 7.91 (d, *J* = 7.6 Hz, 1 H), 7.66 (d, *J* = 7.6 Hz, 1 H), 7.52 (d, *J* = 16.4 Hz, 1 H), 7.45 (t, *J* = 8Hz, 1 H), 6.42 (d, *J* = 16 Hz, 1 H), 2.60 (s, 3 H), 1.51 (s, 9 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 197.7, 166.1, 142.5, 137.8, 135.4, 132.3, 129.7, 129.3, 127.7, 121.8, 81.0, 28.3, 26.8; Anal. calcd for $C_{15}H_{18}O_3$: C 73.15, H 7.37, found: C 73.13, H 7.39

(*E*)-*tert*-Butyl 3-(4-dimethylamino phenyl) acrylate (40): Following the general procedure **C**, cross coupling reaction of 4-(dimethylamino)phenylboronic acid with *tert*-butyl acrylate afforded phenyl olefin **40** (94%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.50 (d, *J* = 16.0 Hz, 1 H), 7.38 (d, *J* = 8.8 Hz, 2 H), 6.64 (d, *J* = 8.8 Hz, 2 H), 6.13 (d, *J* = 16.0 Hz, 1 H), 2.98 (s, 6 H), 1.50 (s, 9 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 167.5, 151.7, 144.2, 129.7, 122.7, 114.8, 112.0, 79.9, 40.3, 28.5; Anal. calcd for $C_{15}H_{21}NO_2$: C 72.84, H 8.56, N 5.66, found: C 72.85, H 8.54, N 5.67.

(*E*)-*tert*-Butyl 3-(4-acetylphenyl) acrylate (41): Following the general procedure **C**, cross coupling reaction of 4-acetylphenyl boronic acid with *tert*-butyl acrylate afforded **41** (71%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.95 (d, *J* = 8.5 Hz, 2 H), 7.59 (d, *J* = 16.0 Hz, 1 H), 7.57 (d, *J* = 8.5 Hz, 2 H), 6.45 (d, *J* = 16.0 Hz, 1 H), 2.60 (s, 3 H), 1.53 (s, 9 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 197.3, 165.7, 141.9, 139.0, 137.7, 128.7, 127.9, 122.7, 80.9, 28.1, 26.6; Anal. calcd for $C_{15}H_{18}O_3$: C 73.15, H 7.37, found: C 73.14, H 7.38

(*E*)-*tert*-Butyl 3-(4-nitrophenyl) acrylate (42): Following the general procedure **C**, cross coupling reaction of 4-nitrophenyl boronic acid with *tert*-butyl acrylate afforded **42** (57%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 8.23 (d, *J* = 9.0 Hz, 2 H), 7.65 (d, *J* = 8.5 Hz, 2 H), 7.59 (d, *J* = 16.0 Hz, 1 H), 6.48 (d, *J* = 16.0 Hz, 1 H), 1.54 (s, 9 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 164.8, 140.9, 140.5, 130.0, 128.4, 124.5, 124.1, 81.3, 28.1; Anal. calcd for $C_{13}H_{15}NO_4$: C 62.64, H 6.07, N 5.62, found: C 62.63, H 6.09, N 5.62.

(*E*)-*tert*-Butyl 3-(4-cyanophenyl) acrylate (43): Following the general procedure **C**, cross coupling reaction of 4-cyanophenyl boronic acid with *tert*-butyl acrylate afforded **43** (69%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.65 (d, *J* = 8.2 Hz, 2 H), 7.58 (d, *J* = 8.2 Hz, 2 H), 7.56 (d,

J = 15.8 Hz, 1 H), 6.44 (d, *J* = 16.0 Hz, 1 H), 1.53 (s, 9 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.3, 141.0, 139.0, 132.5, 131.6, 128.2, 123.8, 113.0, 81.2, 28.1; Anal. calcd for $C_{14}H_{15}NO_2$: C 73.34, H 6.59, N 6.11, found: C 73.33, H 6.60, N 6.10

(*E*)-*tert*-Butyl 3-o-tolylacrylate (44): Following the general procedure **C**, cross coupling reaction of *o*-toludylboronic acid with *tert*-butyl acrylate afforded **44** (84%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.87 (d, *J* = 16.0 Hz, 1 H), 7.52 (d, *J* = 7.2 Hz, 1 H), 7.22 (m, 3 H), 6.27 (d, *J* = 15.6 Hz, 1 H), 2.41 (s, 3 H), 1.52 (s, 9 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 166.8, 141.4, 137.7, 133.7, 130.9, 129.9, 126.5, 126.4, 121.3, 80.7, 28.4, 13.9; Anal. calcd for $C_{14}H_{18}O_2$: C 77.03, H 8.31, O 14.66, found: C 77.01, H 8.31

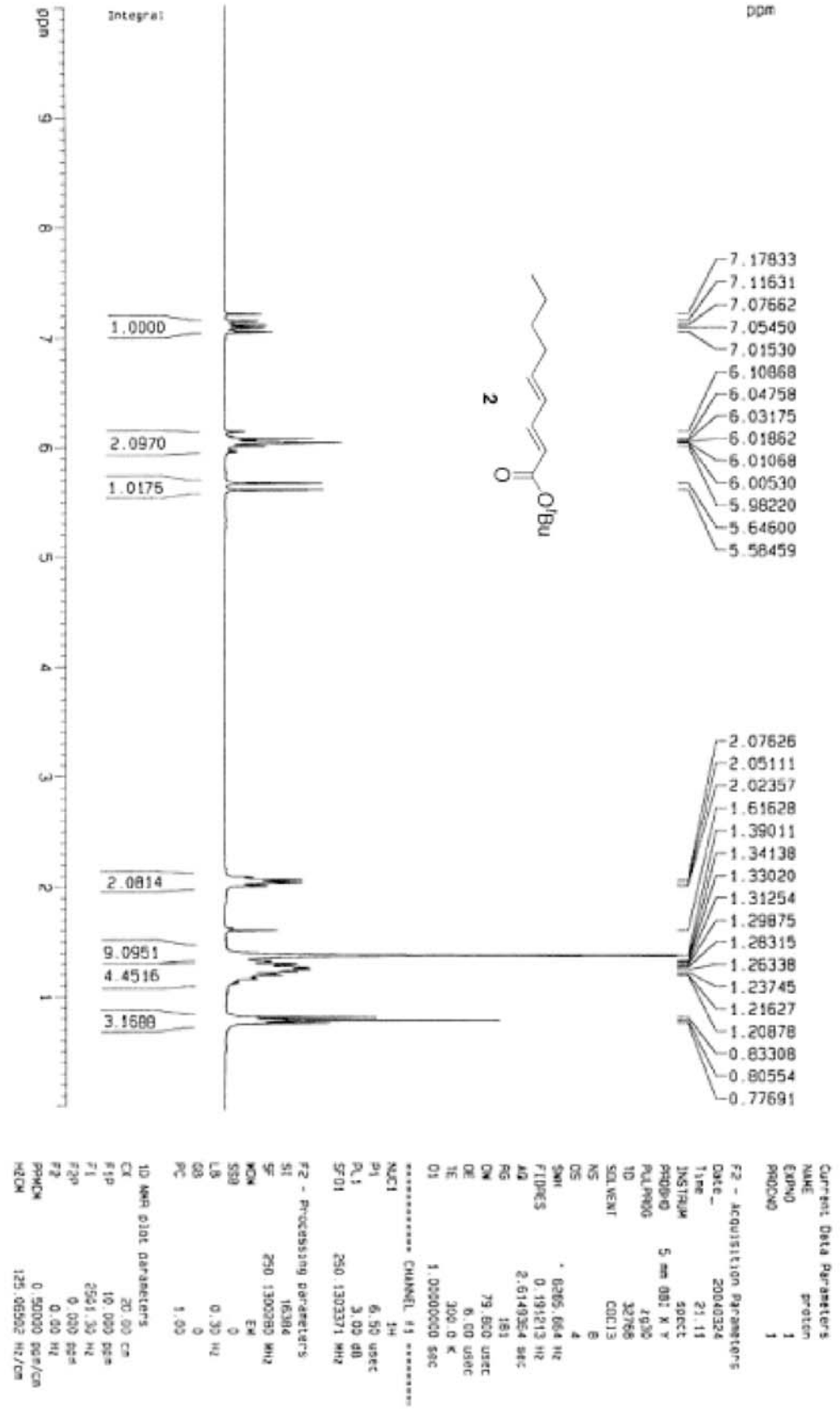
(2*E*)-2-Propenoic acid, 3-[1-(phenylsulfonyl)-1H-indol-3-yl]-1,1-dimethylethyl ester (45): Following the general procedure **C**, cross coupling reaction of 1-(Phenylsolfonyl)-3-indoleboronic acid with *tert*-butyl acrylate afforded phenyl olefin **45** (63%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.99 (d, *J* = 8.4 Hz, 1 H), 7.89 (d, *J* = 7.6 Hz, 2 H), 7.80 (s, 1 H), 7.79 (d, *J* = 8.8 Hz, 1 H), 7.66 (d, *J* = 16.0 Hz, 1 H), 7.55 (t, *J* = 7.6 Hz, 1 H), 7.45 (t, 8.0 Hz, 2 H), 7.36 (t, *J* = 7.6 Hz, 1 H), 7.31 (t, *J* = 7.6 Hz, 1 H), 6.44 (d, *J* = 16.0 Hz, 1 H), 1.52 (s, 9 H).

(2*E*)-2-Propenoic acid, 3-[1-(phenylsulfonyl)-1H-indol-2-yl]-1,1-dimethylethyl ester (46): Following the general procedure **C**, cross coupling reaction of 1-(phenylsulfonyl)-2-indolboronic acid with *tert*-butyl acrylate afforded phenyl olefin **46** (49%) at room temperature under molecular oxygen.; ^{1}H NMR (400 MHz, $CDCl_3$) δ = 8.24 (d, *J* = 16.0 Hz, 1H), 8.21 (d, *J* =8.4 Hz, 1H), 7.74 (d, *J* = 7.2 Hz, 2H), 7.52 – 7.25 (m, 6H), 6.93 (s, 1H), 6.28 (d, *J* = 16.0 Hz, 1H), 1.55 (s, 9H).

(*1E*)-3-Hex-1-enyl-cyclohex-2-enone (47): Following the general procedure **A**, cross coupling reaction of boronic ester **1** with cyclohexenone afforded diene **44** (37%). Following the general procedure **B**, cross coupling reaction of boronic ester **1** with cyclohexenone afforded diene **47** for 2 hours (82%): ^{1}H NMR (250 MHz, $CDCl_3$) δ = 6.19 (m, 2 H), 5.85 (s, 1 H), 2.41 (m, 4 H), 2.16 (m, 2 H), 2.00 (m, 2 H), 1.35 (m, 4 H), 0.89 (t, *J* = 7.0 Hz, 3 H); ^{13}C NMR (63 MHz, $CDCl_3$) δ = 200.5, 157.7, 139.2, 131.3, 126.4, 37.7, 32.9, 31.0, 25.0, 22.3, 22.2, 13.9; Anal. calcd for $C_{12}H_{18}O$: C 80.85, H 10.18, found: C 80.82, H 10.19

(1*E*)-3-Phenyl-cyclohex-2-enone (48): Following the general procedure **B**, cross coupling reaction of phenylboronic acid with cyclohexenone afforded **48** (81%): ^{1}H NMR (300 MHz, $CDCl_3$) δ = 2.14 (q, *J* = 6.8 Hz, 2 H), 2.47 (t, *J* = 6.8 Hz, 2 H), 2.76 (t, *J* = 5.6 Hz, 2H), 6.40 (s, 1H), 7.39 (m, 3H), 7.52 (m, 2H); ^{13}C NMR (75.5 MHz, $CDCl_3$) δ = 199.9, 159.8, 138.6, 130.0, 128.7, 126.0, 125.3, 115.4, 37.1, 28.0, 22.7; Anal. calcd for $C_{12}H_{12}O$: C 83.69, H 7.02, found: C 83.69, H 7.05

(*E*)-*tert*-Butyl 3-(4-iodophenyl) acrylate (51): Following the general procedure **C**, cross coupling reaction of 4-iodophenylboronic acid with *tert*-butyl acrylate afforded phenyl olefin **51** (81%): ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.70 (d, *J* = 8.2 Hz, 2 H), 7.48 (d, *J* = 16.0 Hz, 1 H), 7.22 (d, *J* = 8.2 Hz, 2 H), 6.35 (d, *J* = 16.0 Hz, 1 H), 1.52 (s, 9 H); ^{13}C NMR (75.5 MHz, $CDCl_3$) δ = 166.0, 142.2, 138.0, 134.1, 129.4, 120.9, 96.0, 80.1, 28.1; Anal. calcd for $C_{13}H_{15}IO_2$: C 47.29, H 4.58, I 38.44, found: C 47.32, H 4.59, I 38.35.



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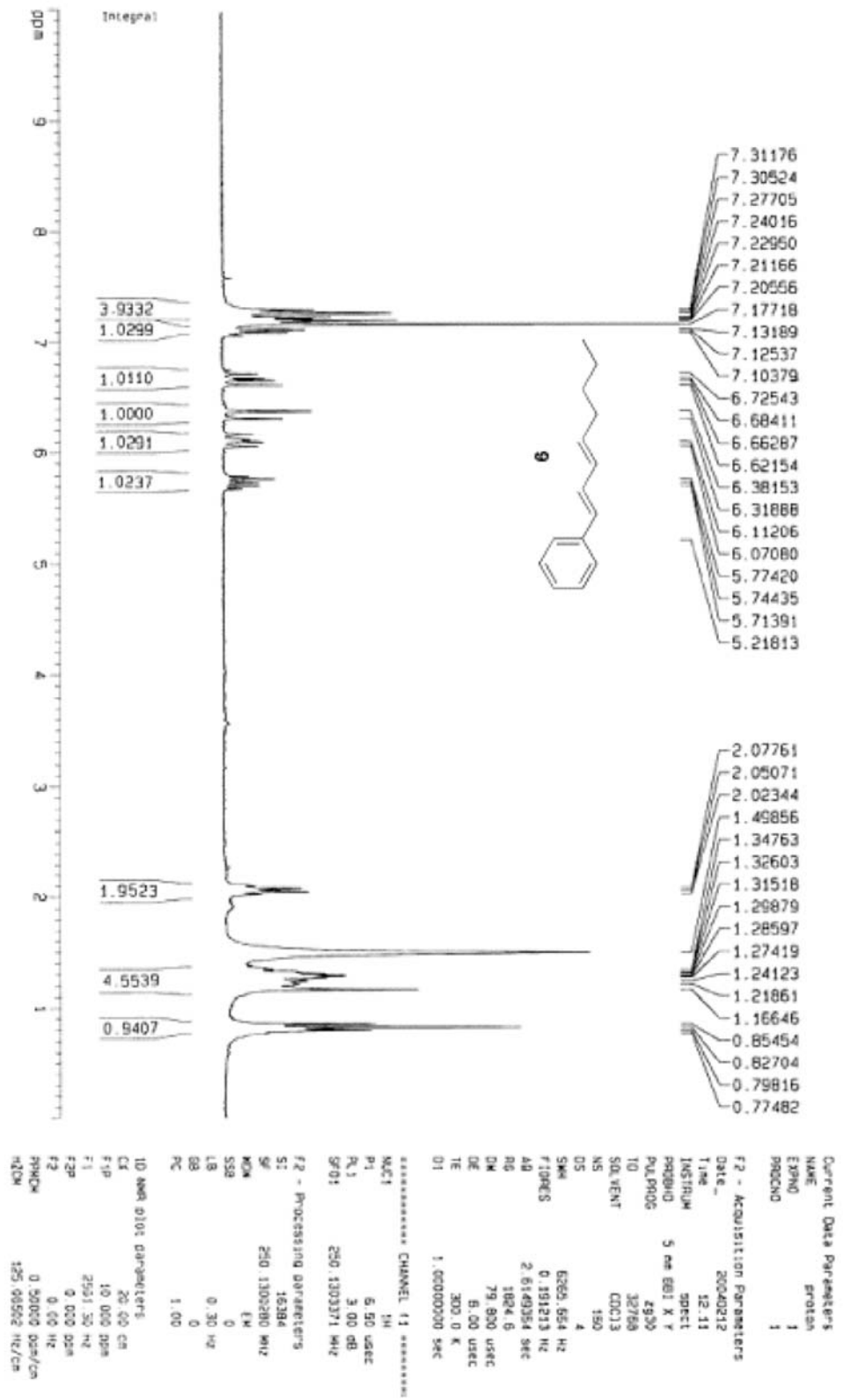
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PROCNO
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Time
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PULPROG
TD
SOLVENT
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SWH
FIDRES
AQ
RG
DW
DE
TE
D1
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PL1
SFO1
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SF
WDW
SSB
LB
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PC
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F1
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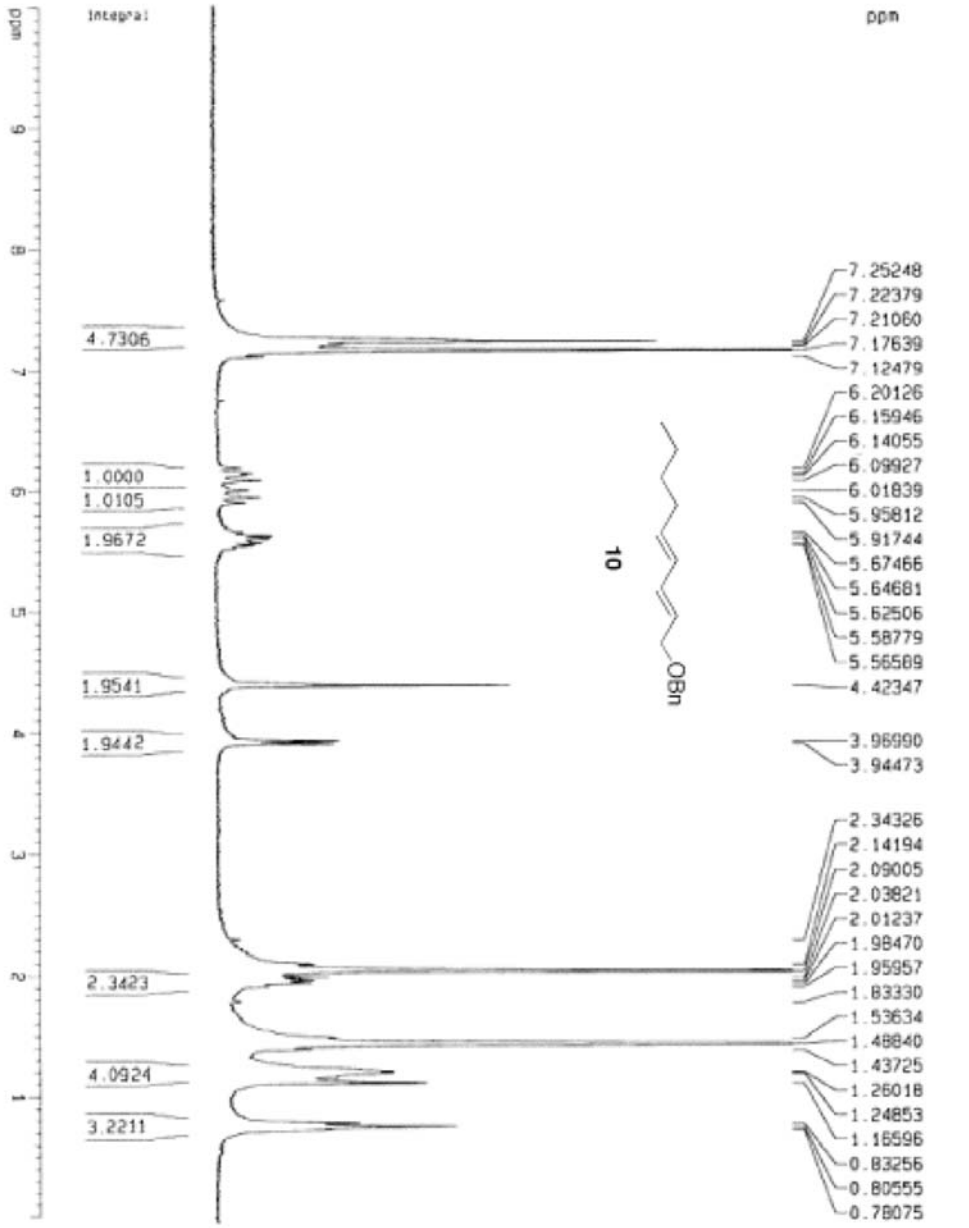


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PROCNO 1

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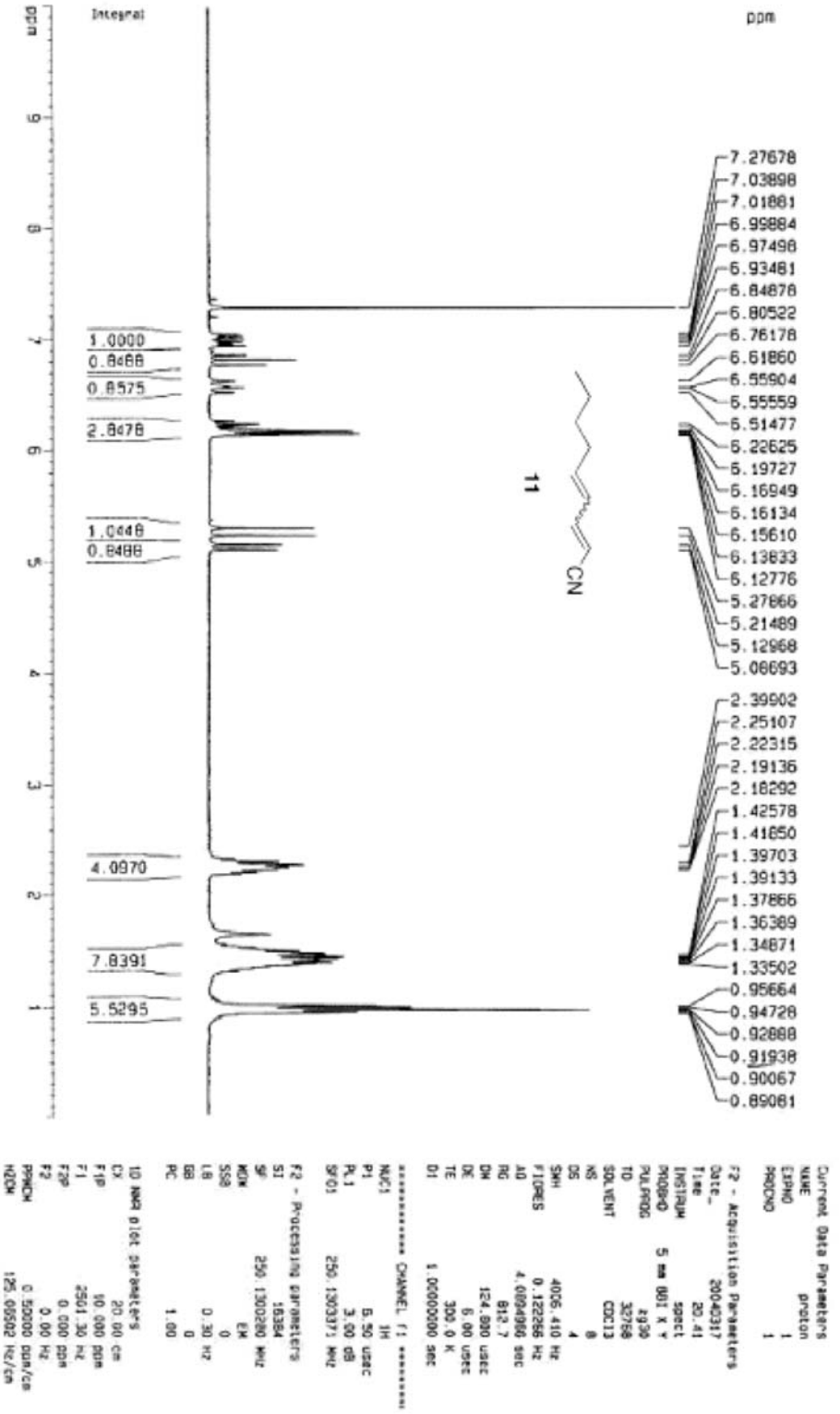


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PROCNO                     1

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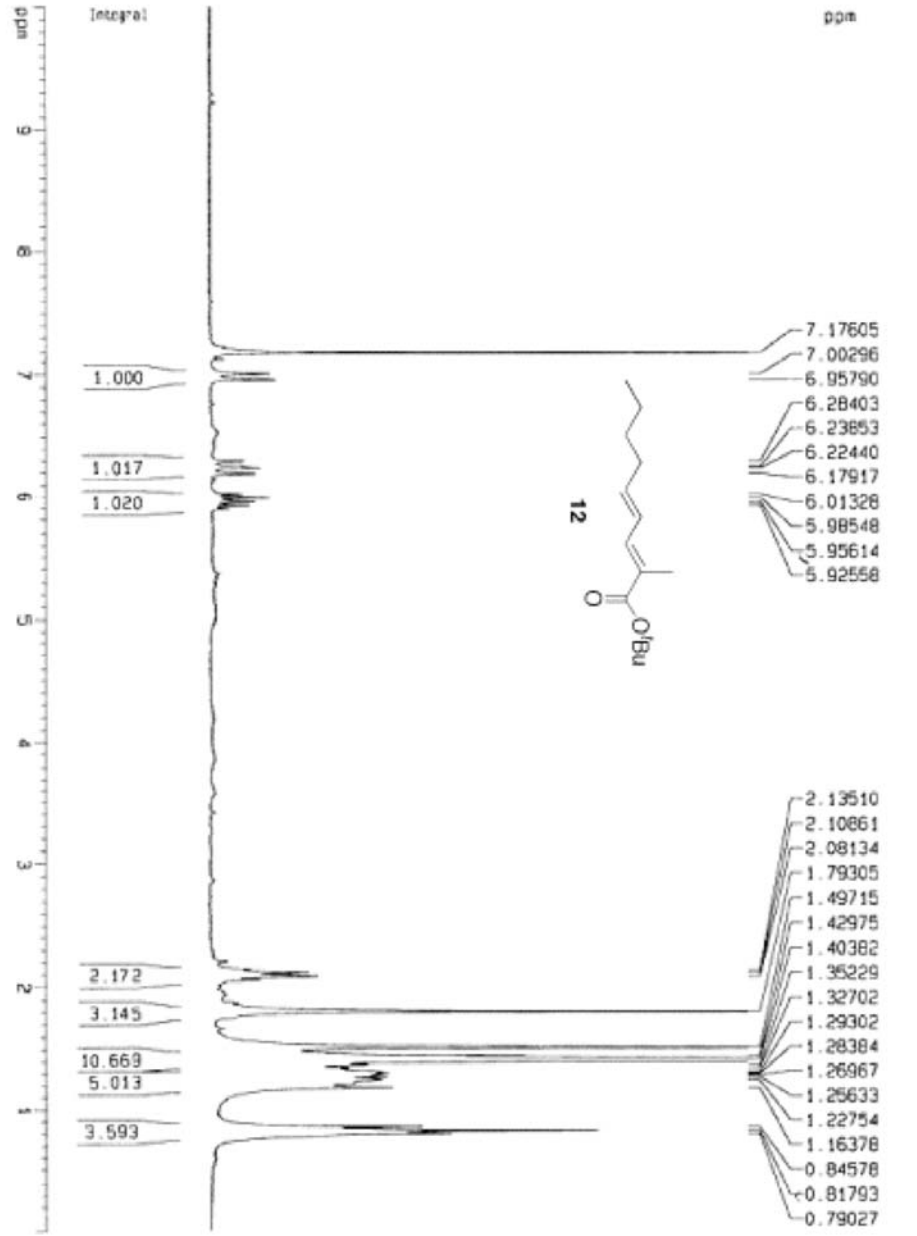

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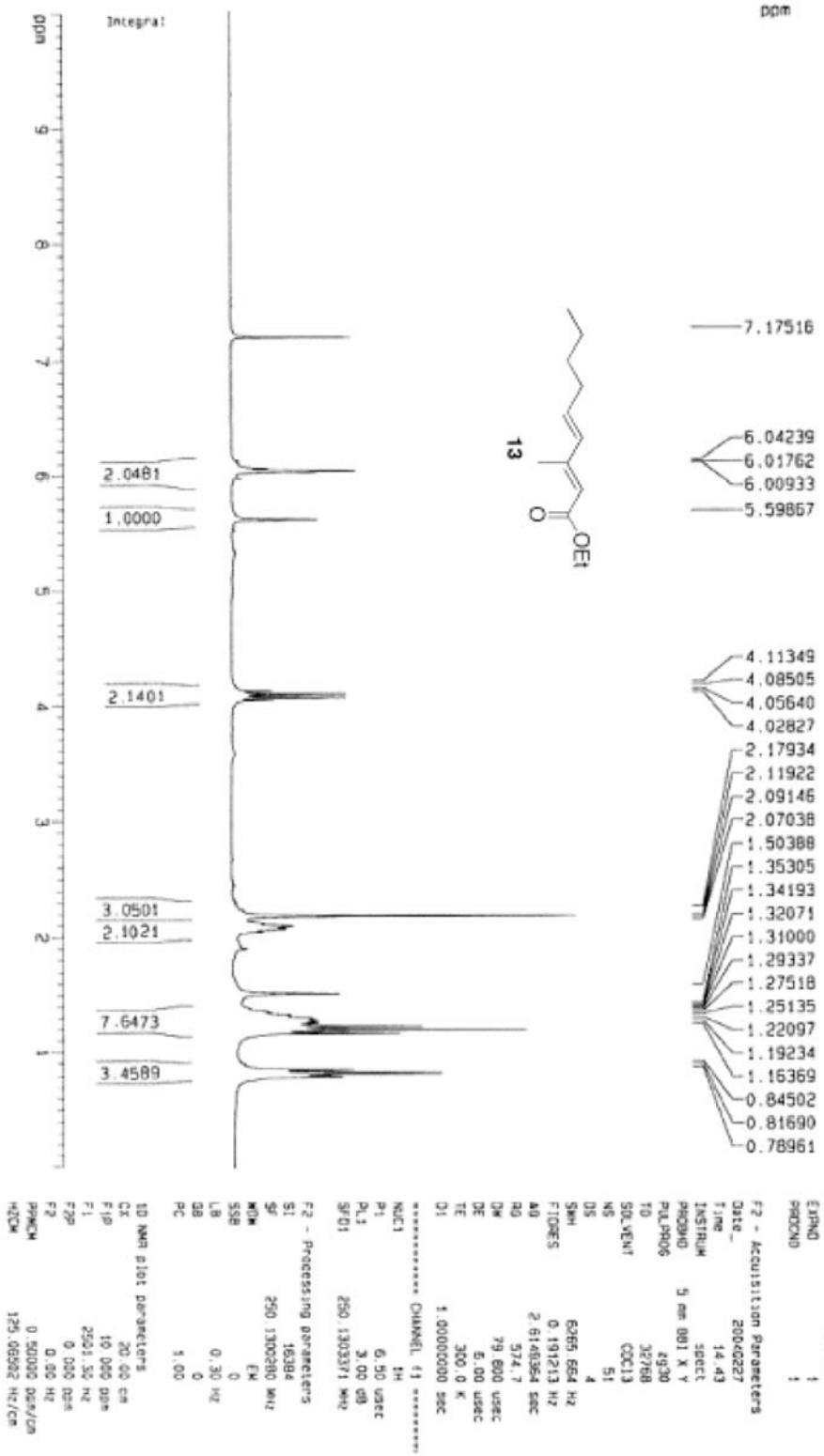

Current Data Parameters
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EXPNO
PROCNO

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TD
SOLVENT
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SWH
FIDRES
AQ
RG
DW
DE
TE
D1

======== CHANNEL f1 ========
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P1
PL1
SF01

F2 - Processing parameters
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SF
WDW
SSB
LB
GB
PC

1D NMR plot parameters
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F2P
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F2
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HZCM

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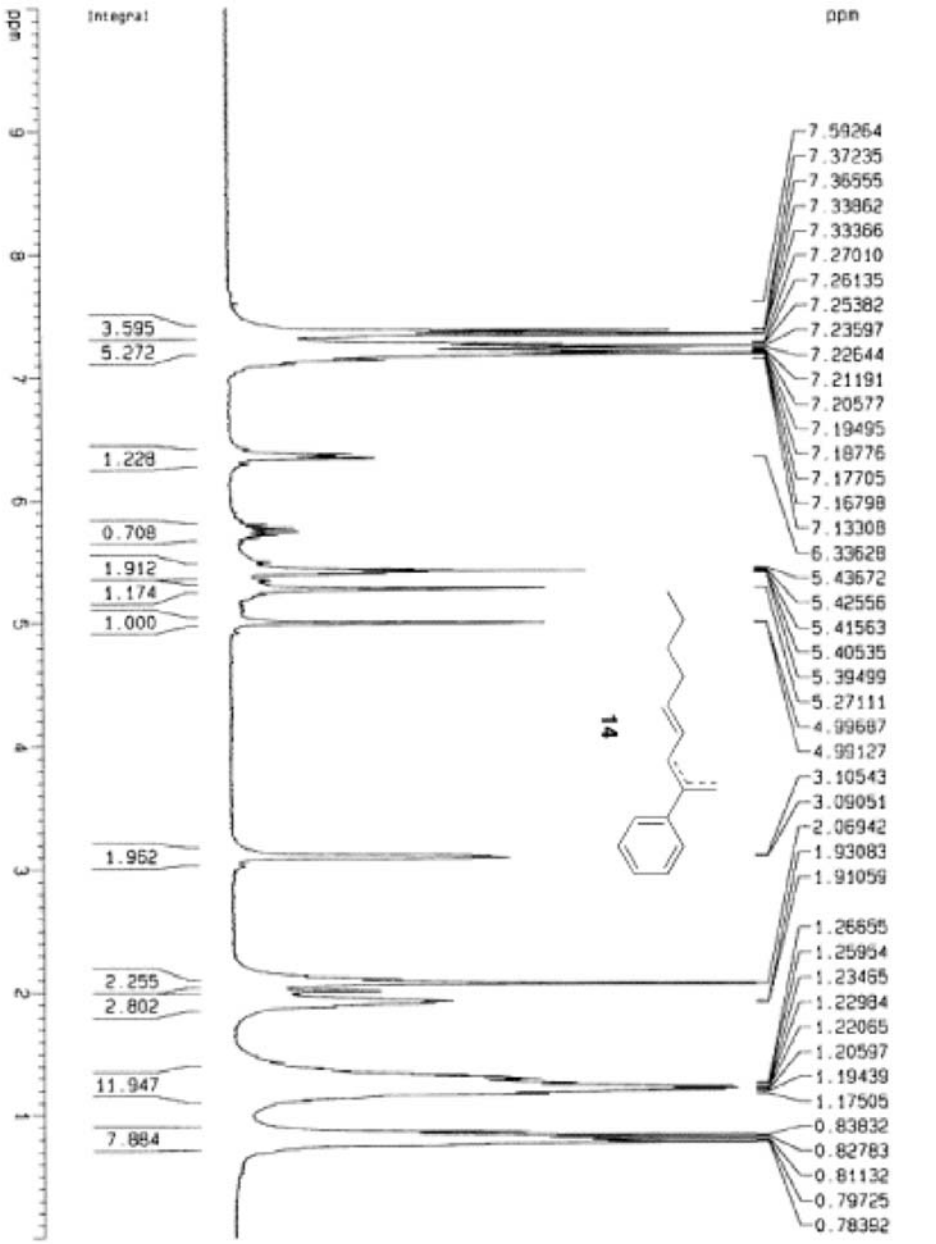


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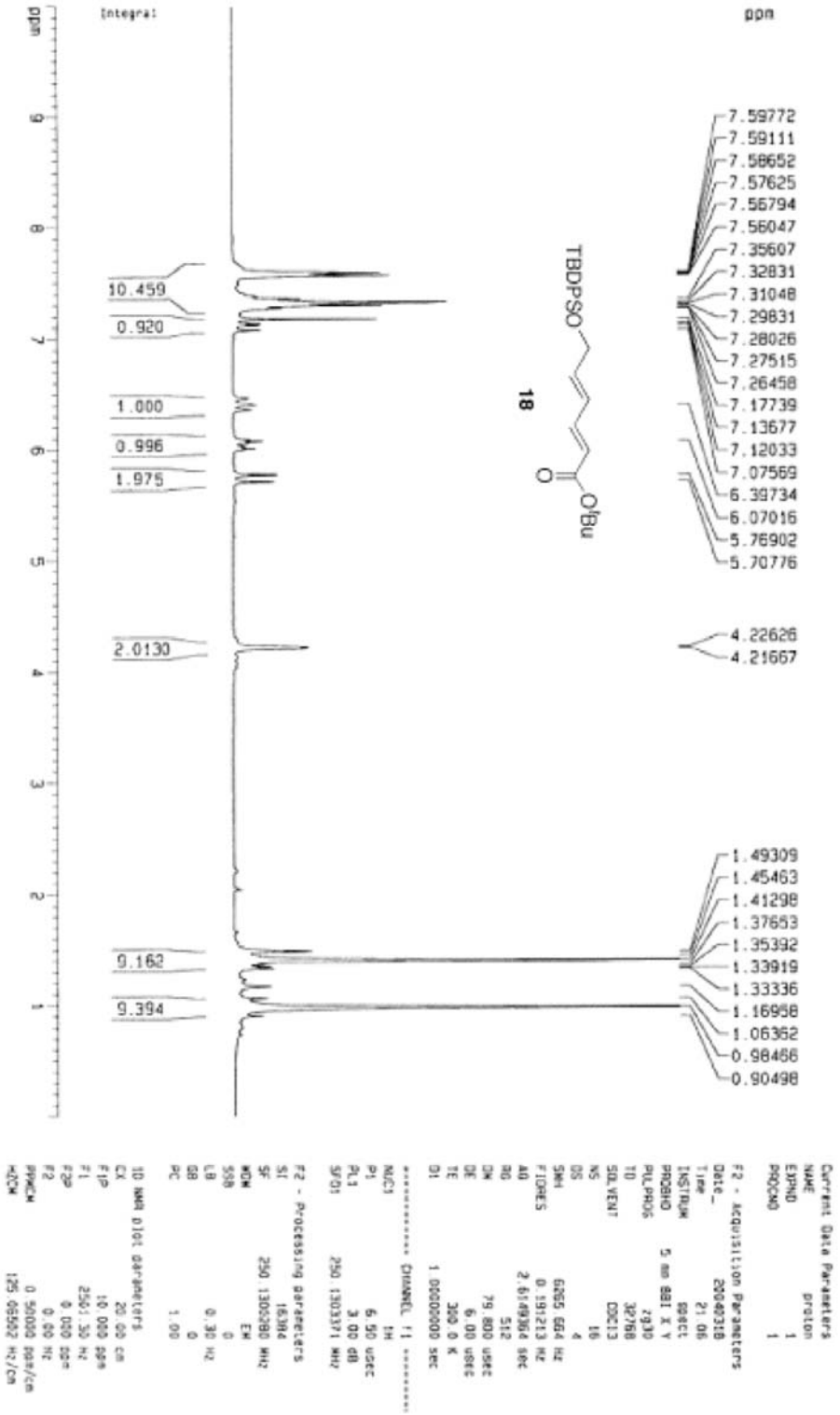

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PROCNO 1

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0.01464
7.17730
7.13315
7.09100
7.07187
7.02963
6.14280
6.10052
6.05387
6.02577
5.99583
5.70202
5.64057
3.83642
3.81225
2.26907
2.25994
2.24557
2.23171
2.22242
2.20309
1.52861
1.39811
1.35123
1.16346
1.14610
1.12144
OH
O
O
tBu
20
Current Data Parameters
NAME
EXPNO
PROCNO
F2 - Acquisition Parameters
Date_
Time
INSTRUM
PROBHD 5 mm BBI X Y
PULPROG
TD
SOLVENT
NS
DS
SWH
FIDRES
AQ
RG
DW
DE
TE
D1
======== CHANNEL f1 ========
NUC1
P1
PL1
SFO1
F2 - Processing parameters
SI
SF
WDW
SSB
LB
GB
PC
1D NMR plot parameters
CX
F1P
F1
F2P
F2
PPMCM
HZCM

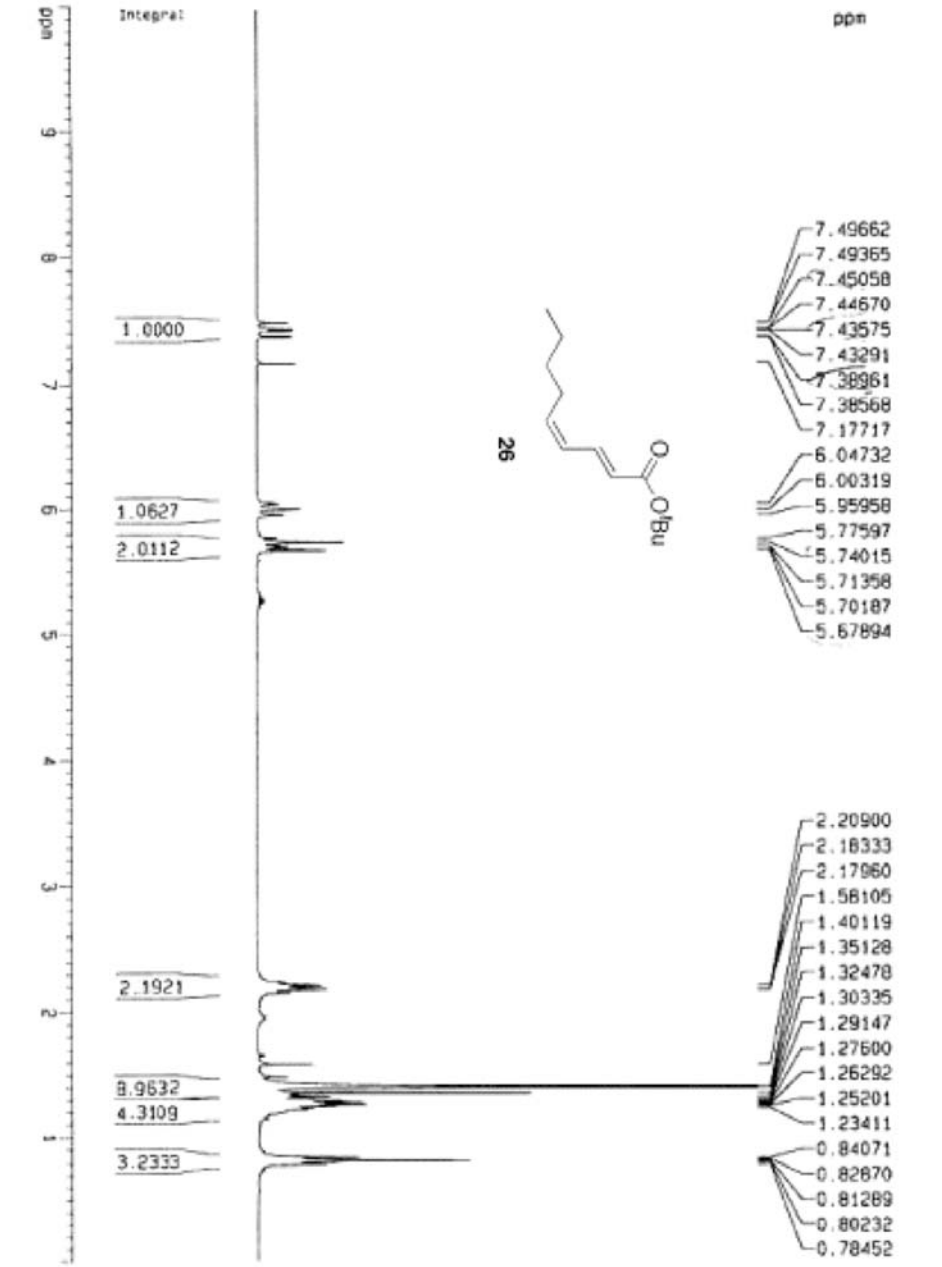
ppm
166.417
143.222
138.780
131.134
122.218
80.159
77.476
76.968
76.459
67.117
42.623
28.100
24.783
24.717
24.518
22.991
OH
O
O
tBu
20

```
Current Data Parameters
NAME                  protan
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_              20040513
Time                  12.33
INSTRUM                spect
PROBHD     5 mm BBI X Y
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                       32
DS                        4
SWH               6365.664 Hz
FIDRES               0.194213 Hz
AQ                2.5149364 sec
RG                      512
DW                79.600 usec
DE                 6.00 usec
TE                 300.0 K
D1                1.00000000 sec

======== CHANNEL f1 ========
NUC1                      1H
P1                     6.50 usec
PL1                    3.00 dB
SFO1          250.1303371 MHz

F2 - Processing parameters
SI                       16384
SF            250.1300080 MHz
WDW                      EM
SSB                       0
LB                     0.30 Hz
GB                        0
PC                     1.00

1D NMR plot parameters
CX                    20.00 cm
FSP                   10.000 ppm
F1                  2501.50 Hz
FP0                   0.000 ppm
F2                    0.00 Hz
PPMCM              0.50000 ppm/cm
HZCM             125.06502 Hz/cm
```

```
Current Data Parameters
NAME                  carbon
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_              20040527
Time                   9.37
INSTRUM                spect
PROBHD     5 mm BBI X Y
PULPROG                zgpg30
TD                     32768
SOLVENT                CDCl3
NS                       209
DS                         2
SWH                15243.902 Hz
FIDRES              0.465207 Hz
AQ                  1.0748404 sec
RG                      6502
DW                     32.800 usec
DE                      6.00 usec
TE                     300.0 K
D12                 0.00002000 sec
PL13                  32.00 dB
D1                  3.00000000 sec
CPDPRG2                waltz16
PCPD2                 130.00 usec
SFO2               250.1310005 MHz
NUC2                       1H
PL2                    3.00 dB
PL12                  30.00 dB
P1                    12.50 usec
SFO1               62.9015074 MHz
NUC1                      13C
PL1                    0.00 dB
D11                 0.03000000 sec

F2 - Processing parameters
SI                     32768
SF                 62.8952559 MHz
WDW                       EM
SSB                        0
LB                   2.00 Hz
GB                         0
PC                      1.40

1D NMR plot parameters
                      20.00 cm
                    200.000 ppm
                  12579.65 Hz
                      0.000 ppm
                      0.00 Hz
                     10.00000 ppm/cm
                    628.952588 Hz/cm
```

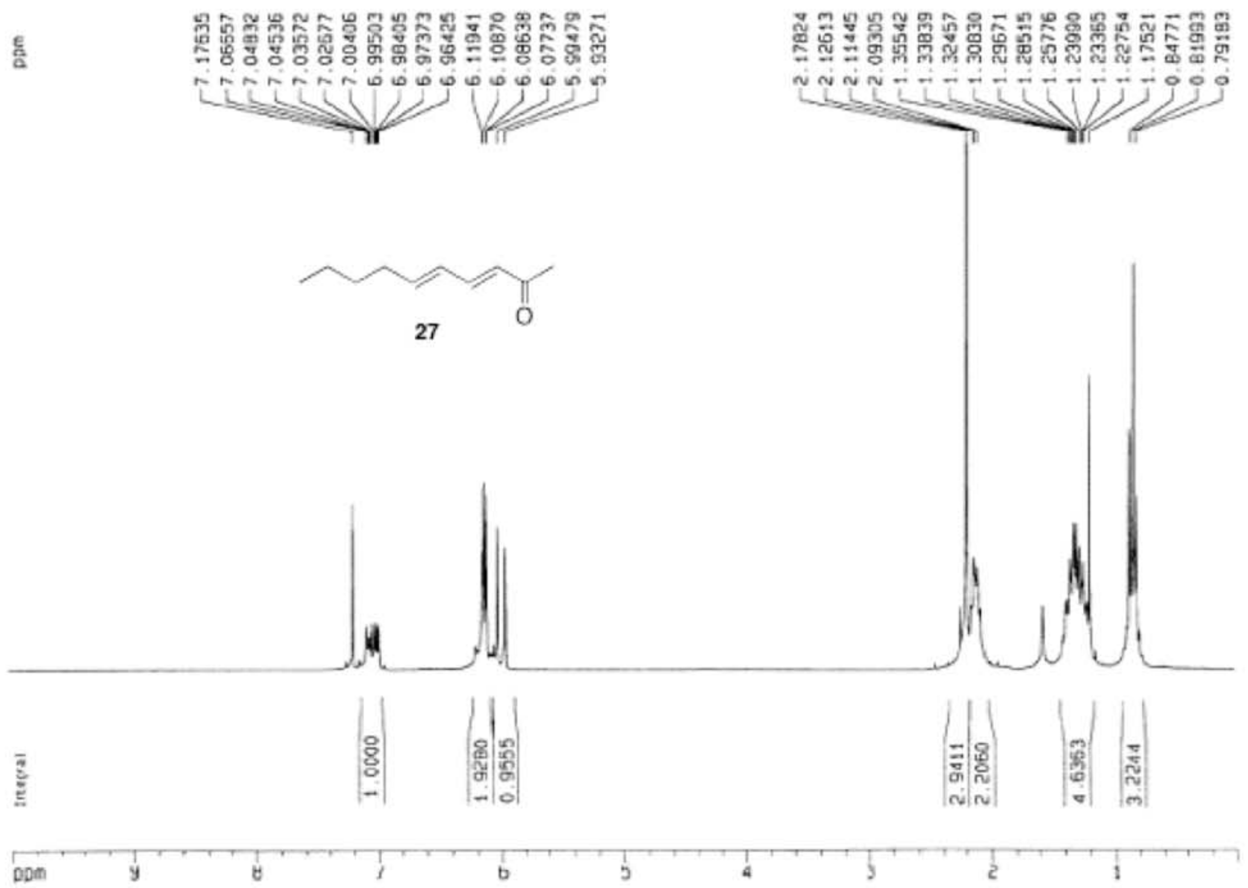
ppm
Integral
6.3837
1.9984
1.0000
9.1844
ppm
7.39370
7.38714
7.36081
7.35628
7.32346
7.30634
7.29708
7.28198
7.27151
7.26396
7.24105
7.23511
7.22126
7.20865
6.78644
6.77056
6.76091
5.87579
5.81521
24
O
O'Bu
2.08235
1.48879
1.43708
1.38638
Current Data Parameters
NAME proton
EXPNO 1
PROCNO 1
F2 - Acquisition Parameters
Date_ 20040308
time 19.16
INSTRUM spect
PROBHD 5 mm BBI X Y
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 32
DS 4
SWH 6289.654 Hz
FIDRES 0.191213 Hz
AQ 2.6149384 sec
RG 128
DW 79.800 usec
DE 6.00 usec
TE 300.0 K
D1 1.00000000 sec
======== CHANNEL f1 ========
NUC1 1H
P1 6.50 usec
PL1 3.00 dB
SFO1 250.1303371 MHz
F2 - Processing parameters
SI 16384
SF 250.1300286 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
1D NMR plot parameters
CX 20.00 cm
F1P 10.000 ppm
F1 2501.30 Hz
F2P 0.000 ppm
F2 0.00 Hz
PPMCM 0.50000 ppm/cm
HZCM 125.06502 Hz/cm

ppm
166.379
143.505
139.697
136.102
128.850
128.751
127.075
126.301
123.312
80.248
77.553
77.042
76.535
28.160
24
O
O'Bu
ppm
180
160
140
120
100
80
60
40
20




```
Current Data Parameters
NAME                  profon
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_              20040324
Time                   14 34
INSTRUM                spect
PROBHD     5 mm BBI 1 H
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                        8
DS                        4
SWH               6265.664 Hz
FIDRES            0.191213 Hz
AQ                2.6149364 sec
RG                      181
DW                79.800 usec
DE                 6.00 usec
TE                 300.0 K
D1                1.00000000 sec

======== CHANNEL f1 ========
NUC1                    1H
P1                   6.50 usec
PL1                  3.00 dB
SFO1          250.1303371 MHz

F2 - Processing parameters
SI                    16384
SF          250.1300280 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00

1D NMR plot parameters
CX                  20.00 cm
FP                  10.000 ppm
F1                2501.30 Hz
F2P                 0.000 ppm
F2                  0.00 Hz
PPMCM              0.50000 ppm/cm
HZCM             125.06502 Hz/cm
```

ppm
166.760
140.994
138.526
126.344
122.905
80.141
77.492
76.985
76.477
31.479
28.114
27.872
22.259
13.865
26
O
O'Bu



Current Data Parameters
NAME proton
EXPNO 1
PROCNO 1

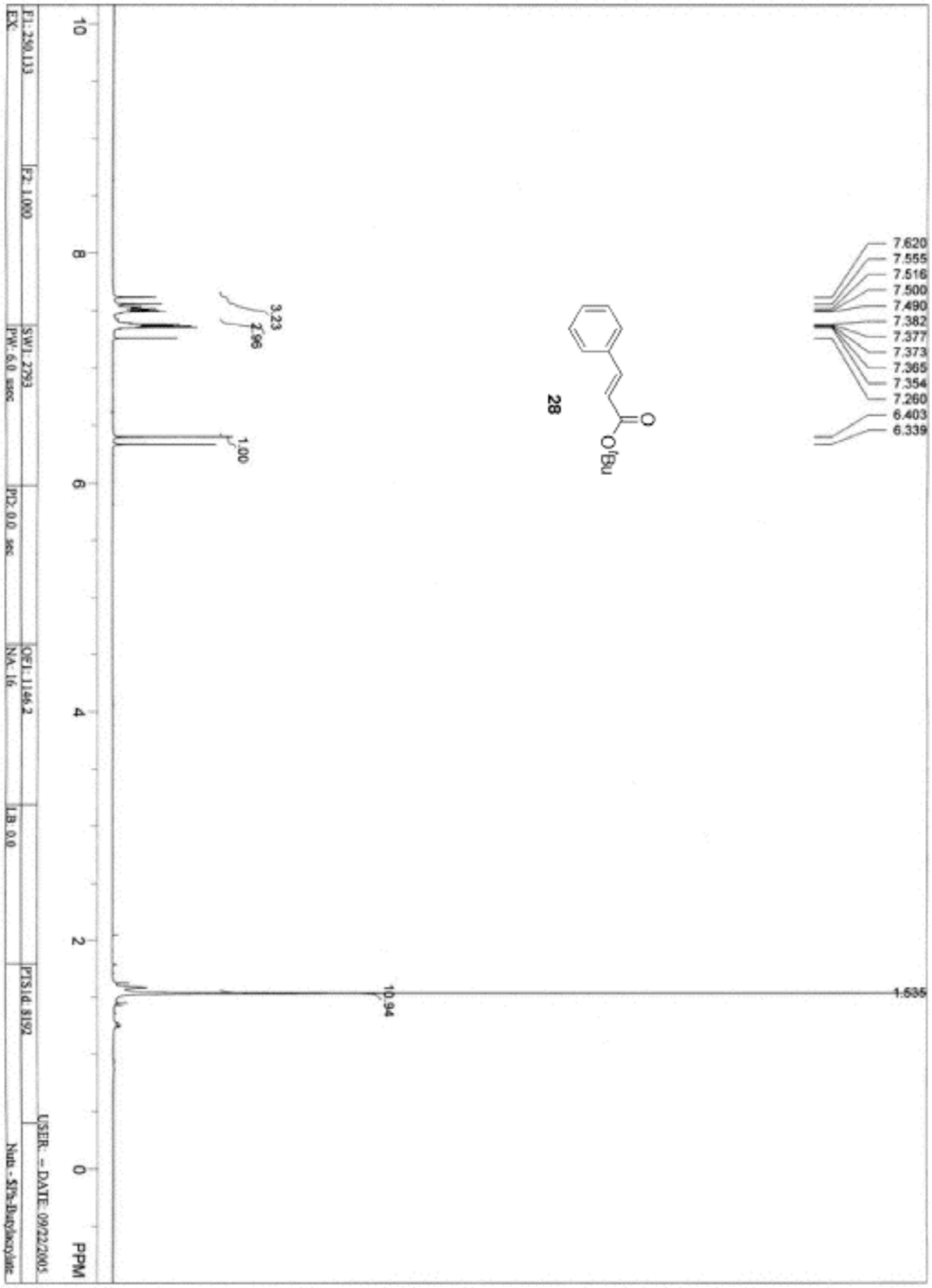
F2 - Acquisition Parameters
Date_ 20040413
Time 12.33
INSTRUM spect
PROBHD 5 mm BBI X Y
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 37
DS 4
SWH 6265.664 Hz
FIDRES 0.191213 Hz
AQ 2.6149364 sec
RG 512
DW 79.800 usec
DE 6.00 usec
TE 300.0 K
D1 1.00000000 sec

============ CHANNEL f1 ========
NUC1 1H
P1 6.50 usec
PL1 3.00 dB
SFO1 250.1303371 MHz

F2 - Processing parameters
SI 16384
SF 250.1300280 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

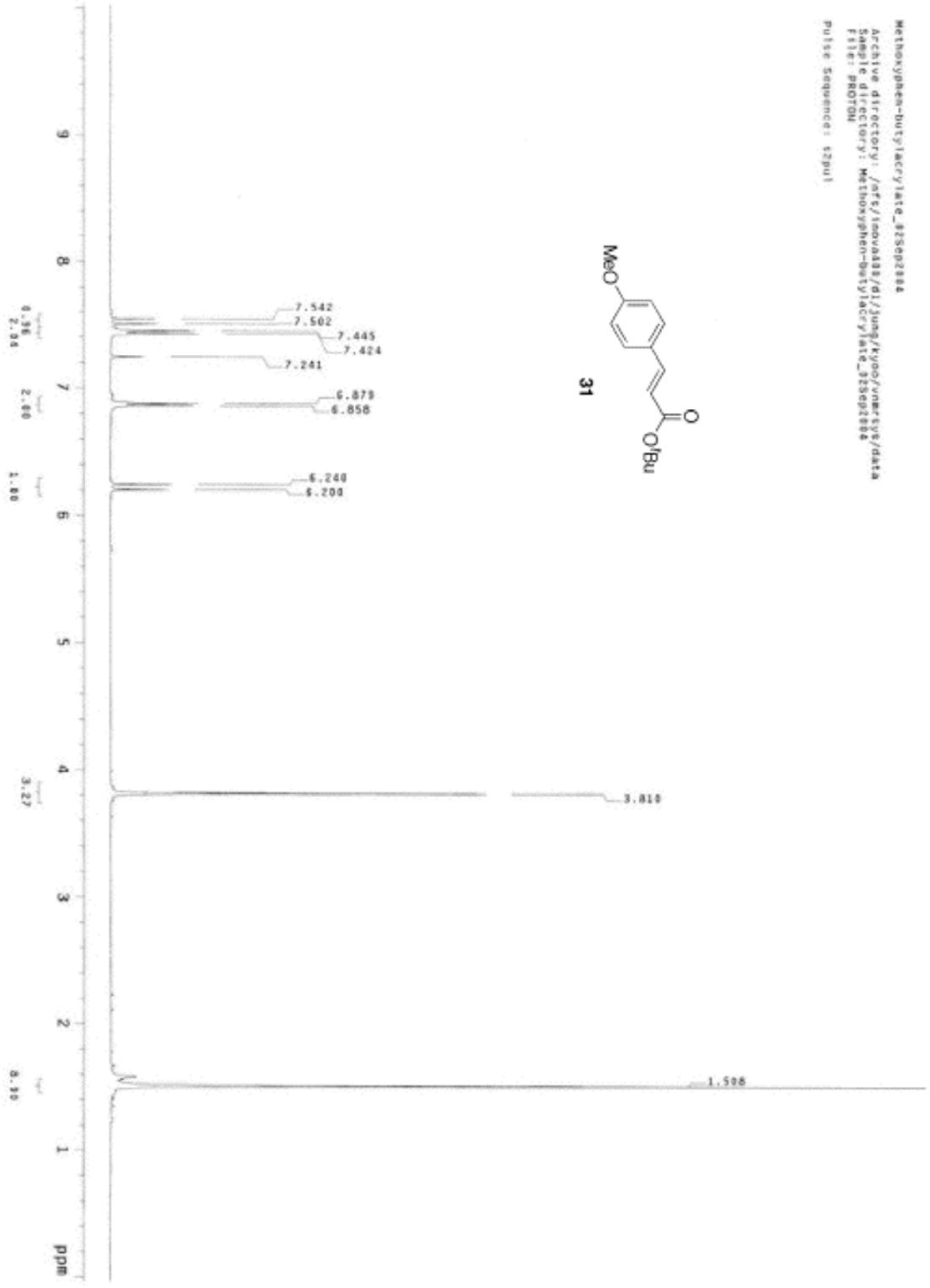
1D NMR plot parameters
CX 20.00 cm
F1P 10.000 ppm
F1 2501.30 Hz
F2P 0.000 ppm
F2 0.00 Hz
PPMCM 0.50000 ppm/cm
HZCM 125.06502 Hz/cm

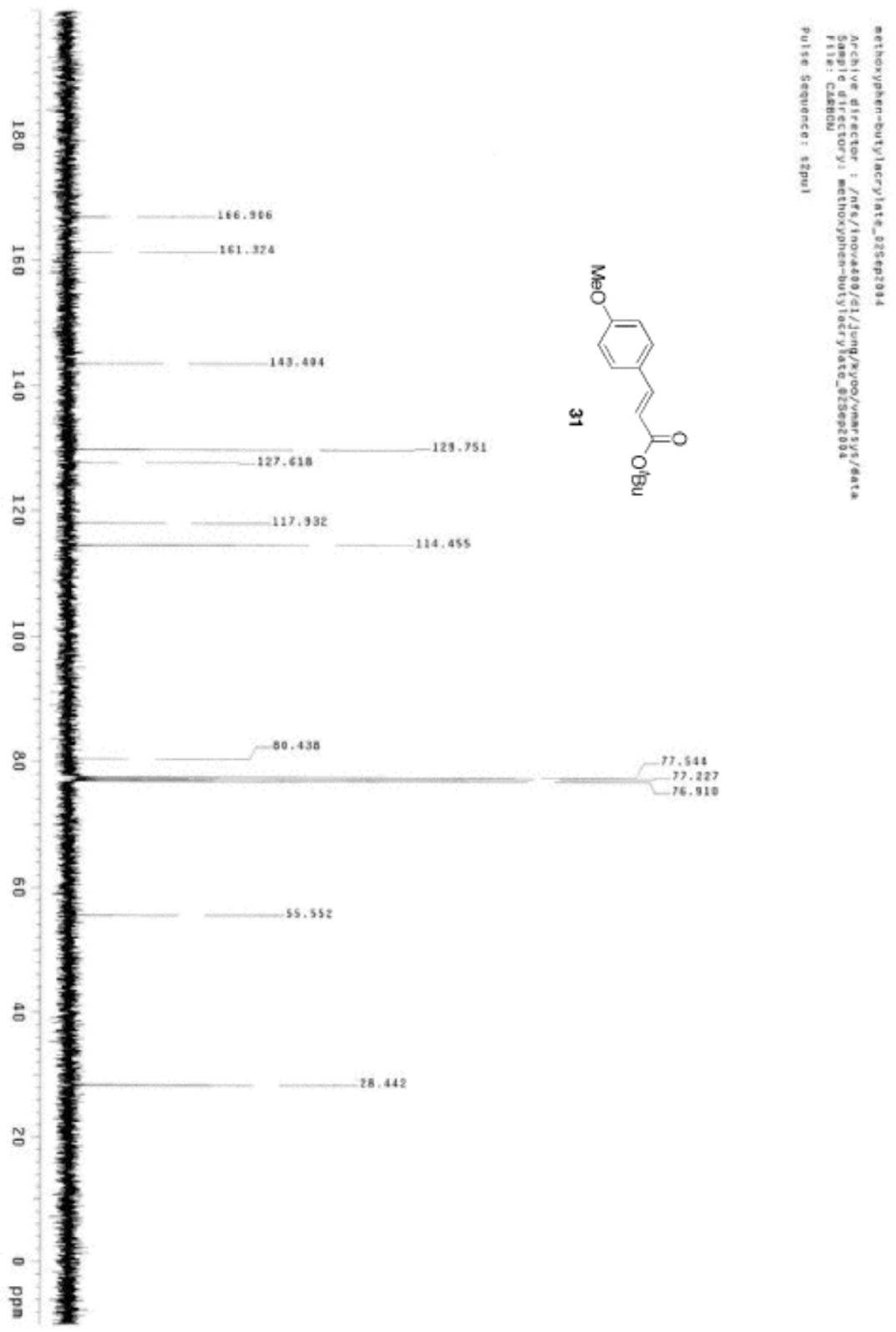
ppm
198.880
145.855
144.115
128.742
128.686
77.500
76.993
76.484
32.784
30.746
27.080
22.195
13.835
27
O
Current Data Parameters
NAME carbon
EXPNO 1
PROCNO 1
F2 - Acquisition Parameters
Date_ 20040316
Time 19.25
INSTRUM spect
PROBHD 5 mm BB I X
PULPROG zgdc30
TD 128368
SOLVENT CDCl3
NS 196
DS 4
SWH 13227.514 Hz
FIDRES 0.402832 Hz
AQ 1.2386804 sec
RG 5595.2
DW 37.800 usec
DE 6.00 usec
TE 300.8 K
D1 3.00000000 sec
D11 0.03000000 sec
D12 0.00002000 sec
CHANNEL f1
NUC1 13C
P1 12.50 usec
PL1 0.00 dB
SFO1 60.9015035 MHz
CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 120.00 usec
PL2 3.00 dB
PL12 20.00 dB
PL13 22.00 dB
SFO2 250.1315005 MHz
F2 - Processing parameters
SI 32768
SF 62.5025008 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
1D NMR plot parameters
CX 20.00 cm
FIP 220.000 ppm
F1 12519.05 Hz
FIP 0.000 ppm
F2 0.00 Hz
PPMCM 10.00000 ppm/cm
HZCM 628.95451 Hz/cm

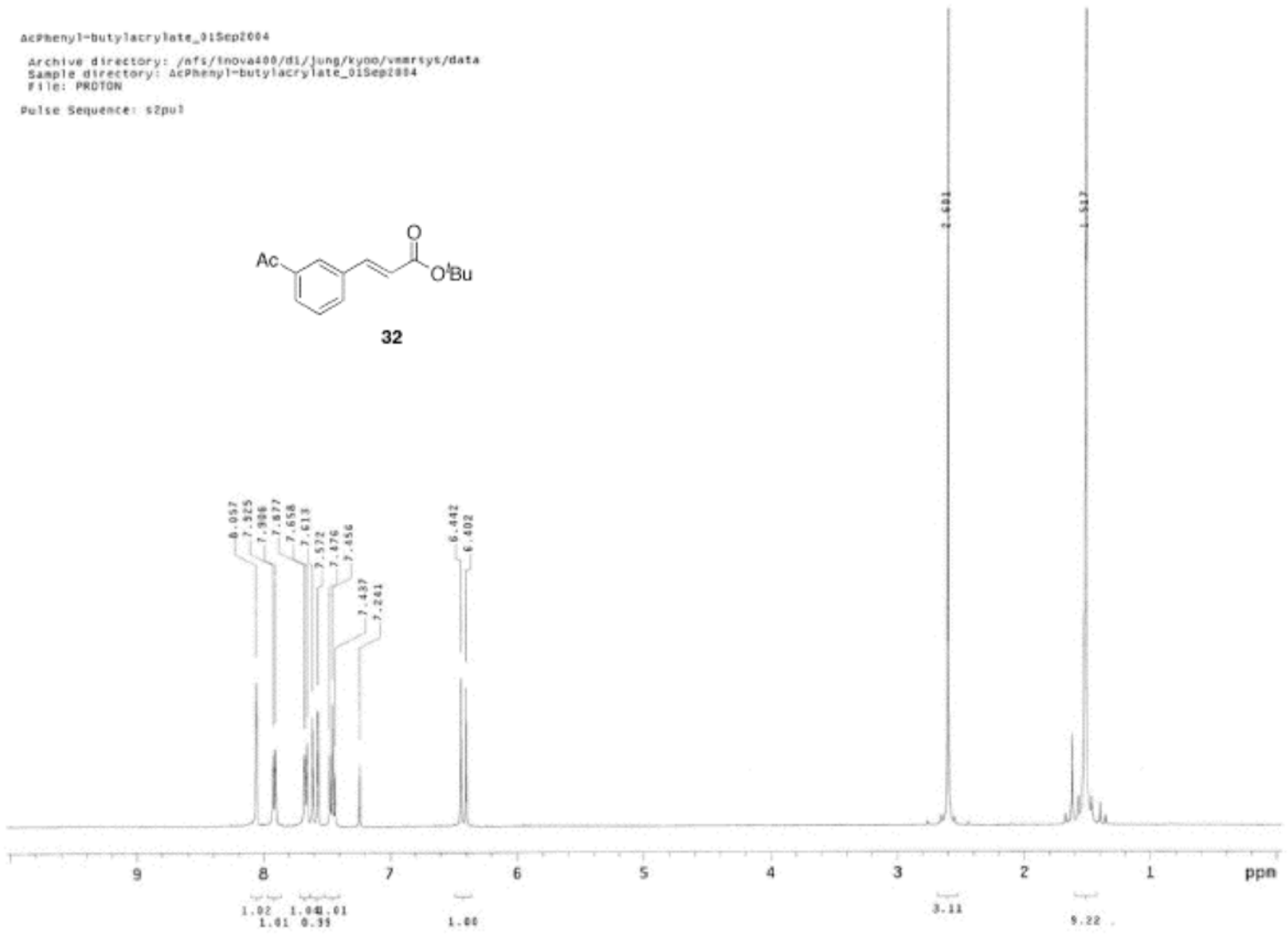


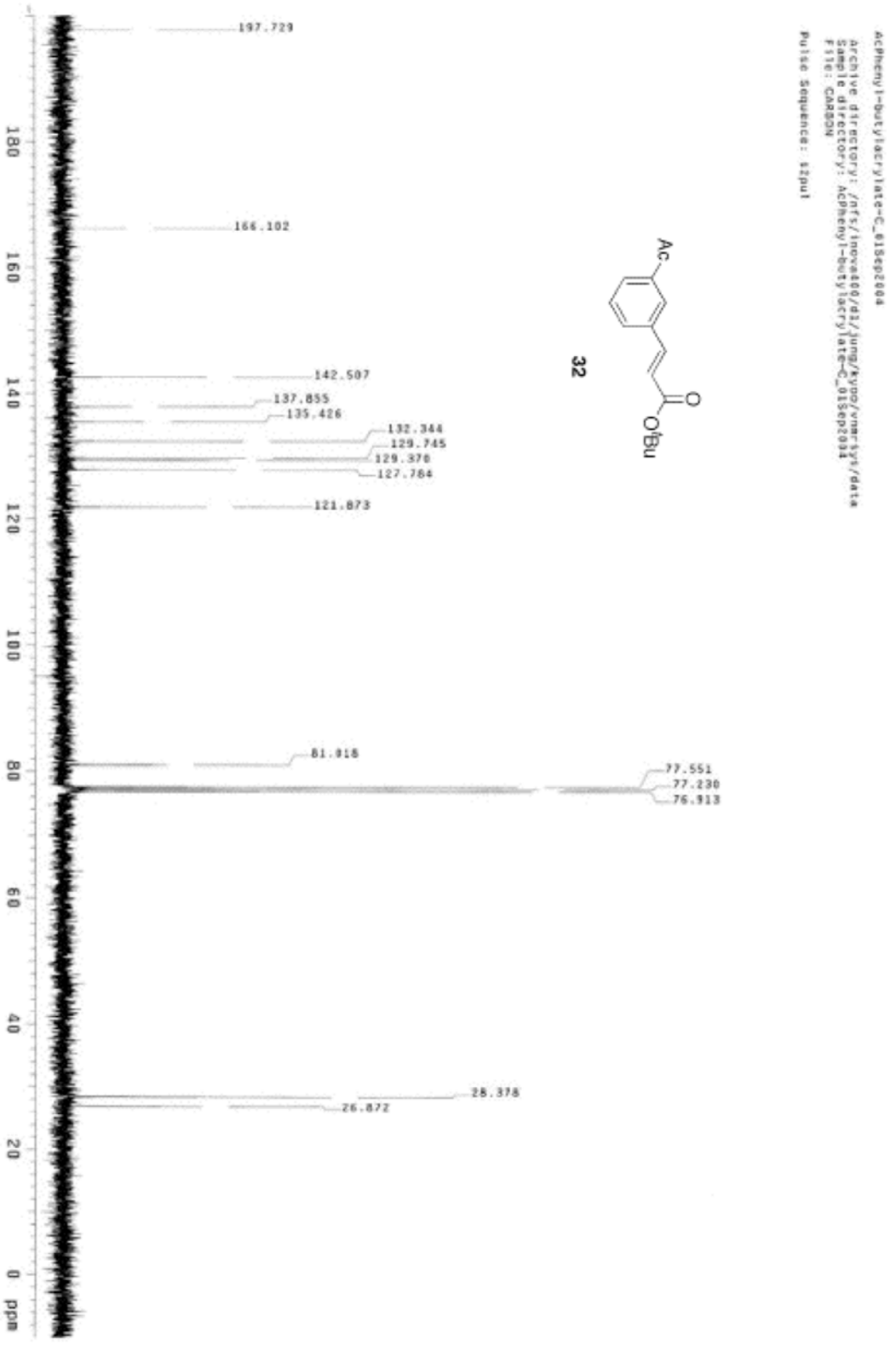
28
O
O^tBu
7.620
7.555
7.516
7.500
7.490
7.382
7.377
7.373
7.365
7.354
7.260
6.403
6.339
1.535
3.23
2.96
1.00
10.94
10
8
6
4
2
0
PPM
F1: 250.133
F2: 1.000
SW1: 2793
PW: 6.0 usec
PD: 0.0 sec
OF1: 1146.2
NA: 16
LB: 0.0
PTS1d: 8192
USER: -- DATE: 09/22/2005
EX:

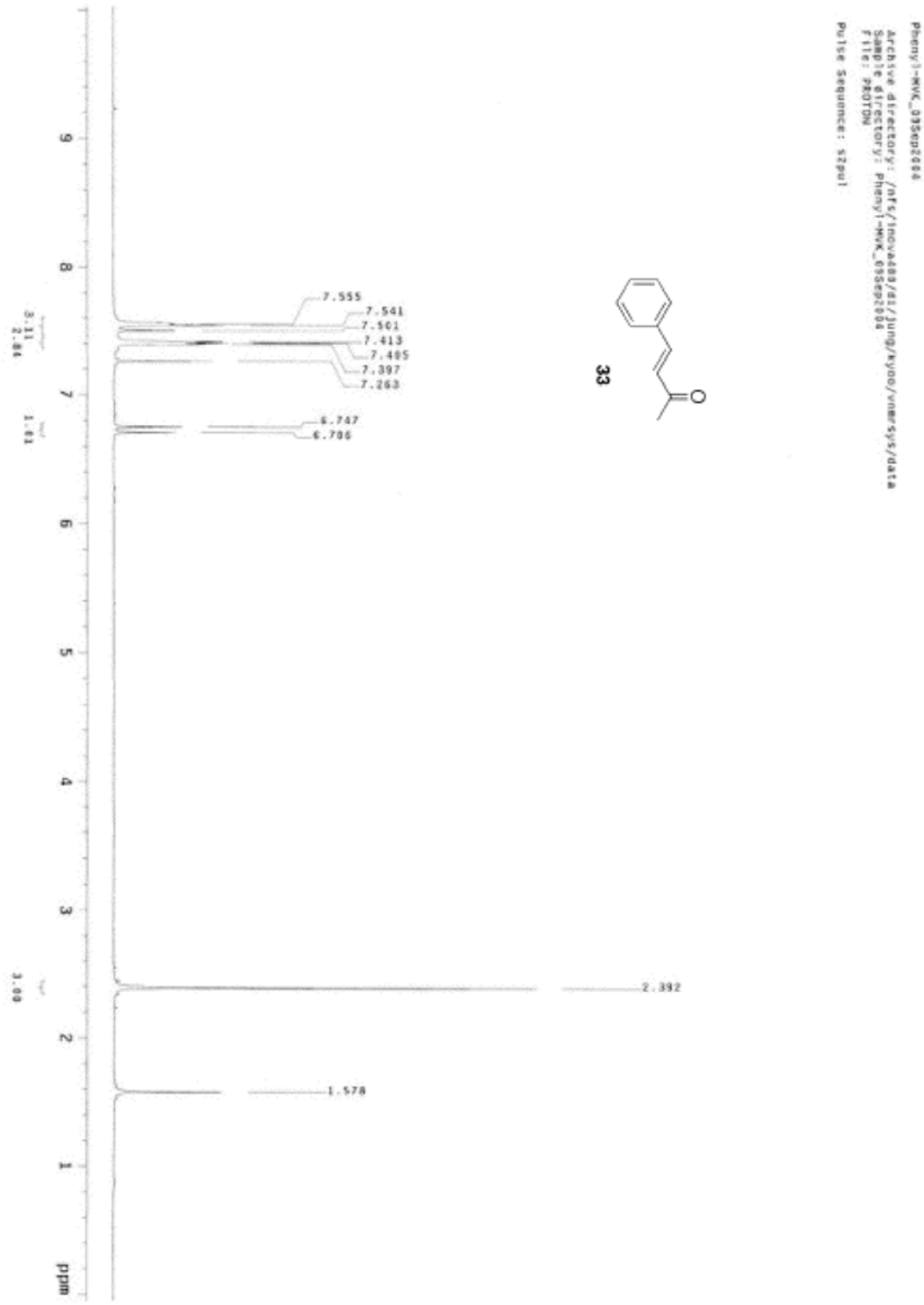
ppm
166.311
143.510
134.622
129.919
128.777
127.916
120.143
80.472
77.488
76.980
76.472
28.152
28
O
O'Bu

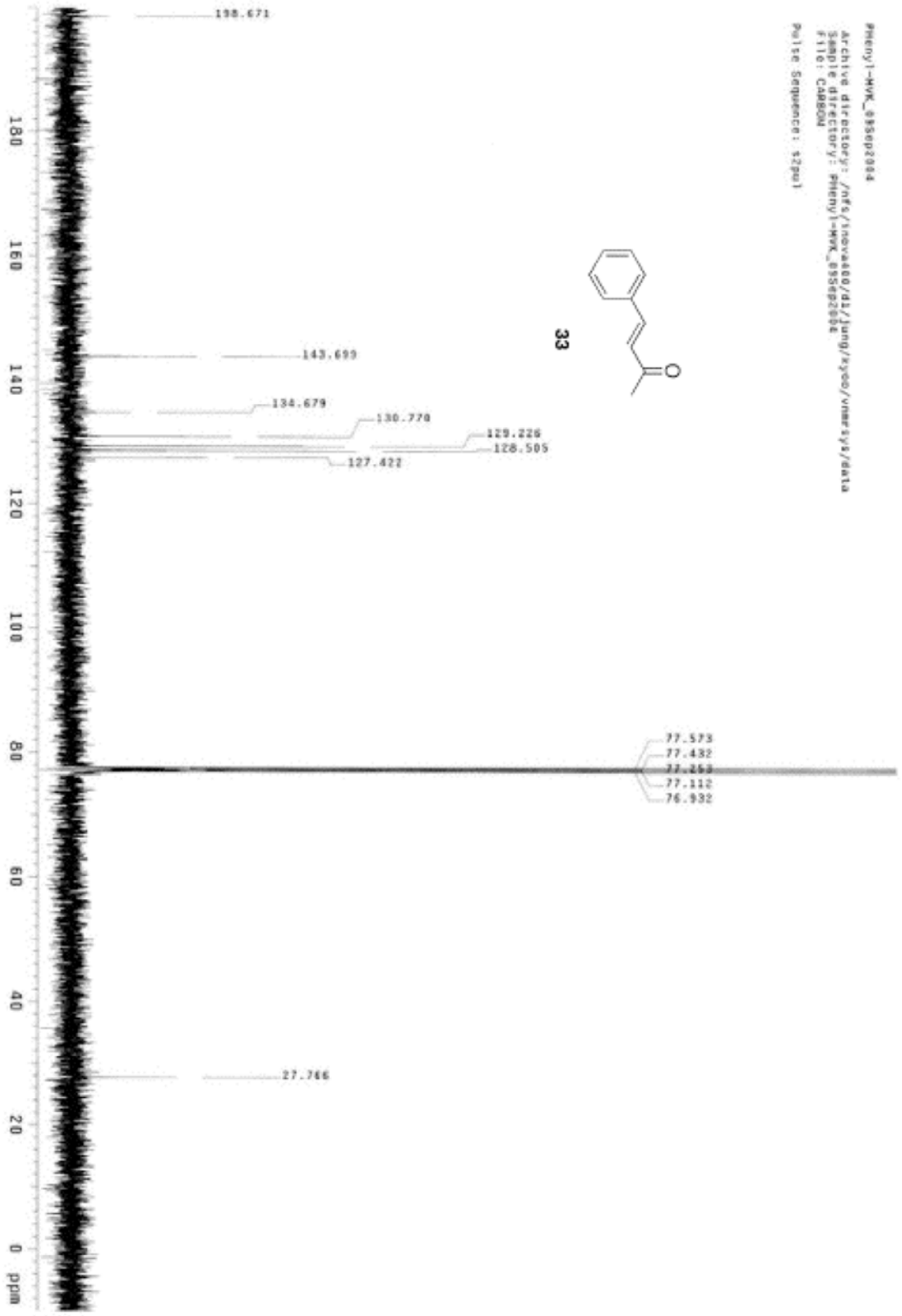

Methoxyphen-butylacrylate_02Sep2004
Archive directory: /ofs/inova400/d1/jung/kyoo/vnmrsys/data
Sample directory: Methoxyphen-butylacrylate_02Sep2004
File: PROTON
Pulse Sequence: s2pul
MeO
O
O'Bu
31
7.542
7.502
7.445
7.424
7.241
6.879
6.858
6.240
6.208
3.819
1.508
ppm

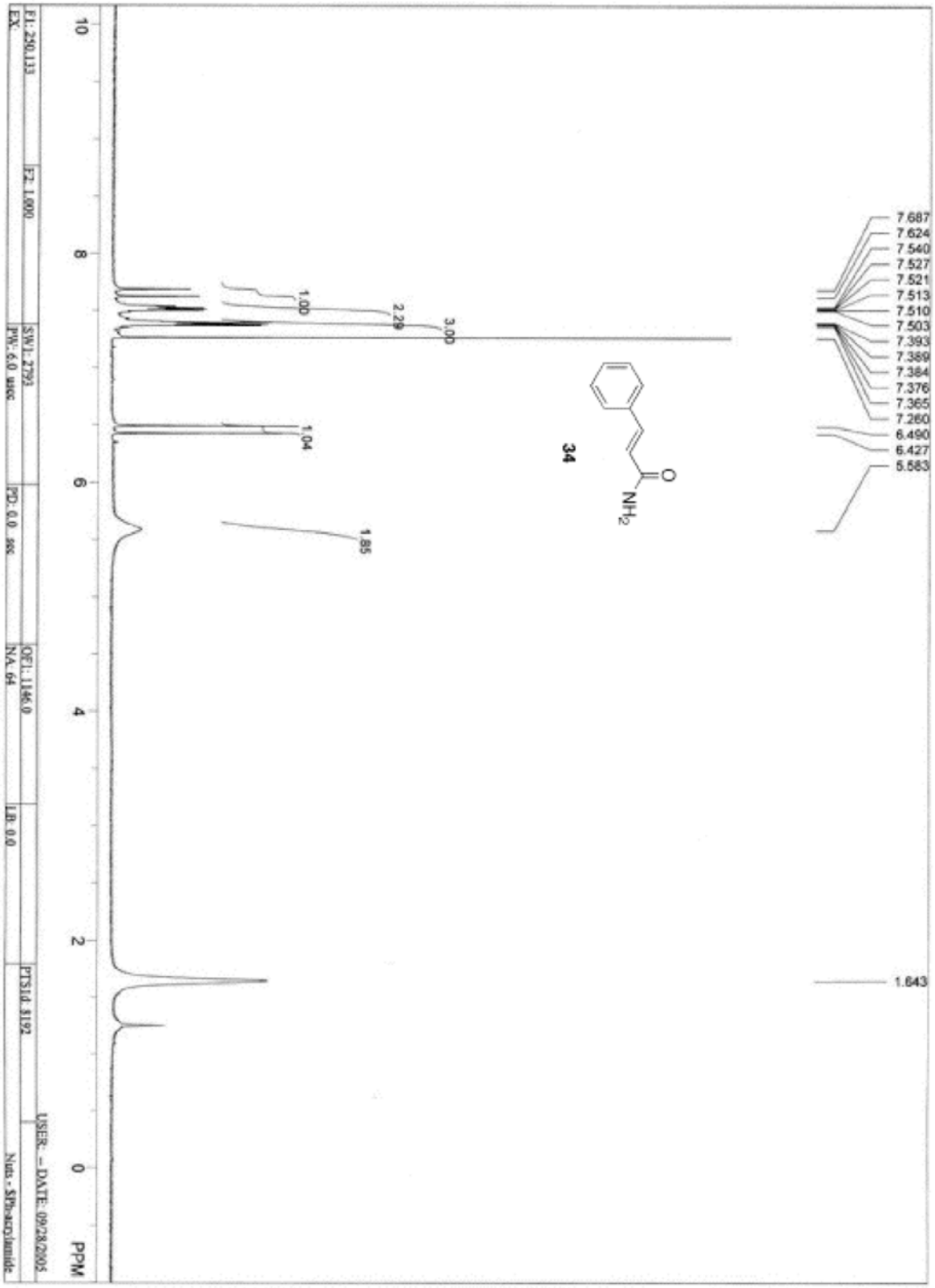

methoxyphen-butylacrylate_02Sep2004
Archive directory : /nfs/inova400/cl/jung/kyoo/vnmrsys/data
Sample directory: methoxyphen-butylacrylate_02Sep2004
File: CARBON
Pulse Sequence: s2pul
MeO
O
O
tBu
31
166.986
161.324
143.494
129.751
127.618
117.932
114.455
80.438
77.544
77.227
76.910
55.552
28.442
180
160
140
120
100
80
60
40
20
0 ppm

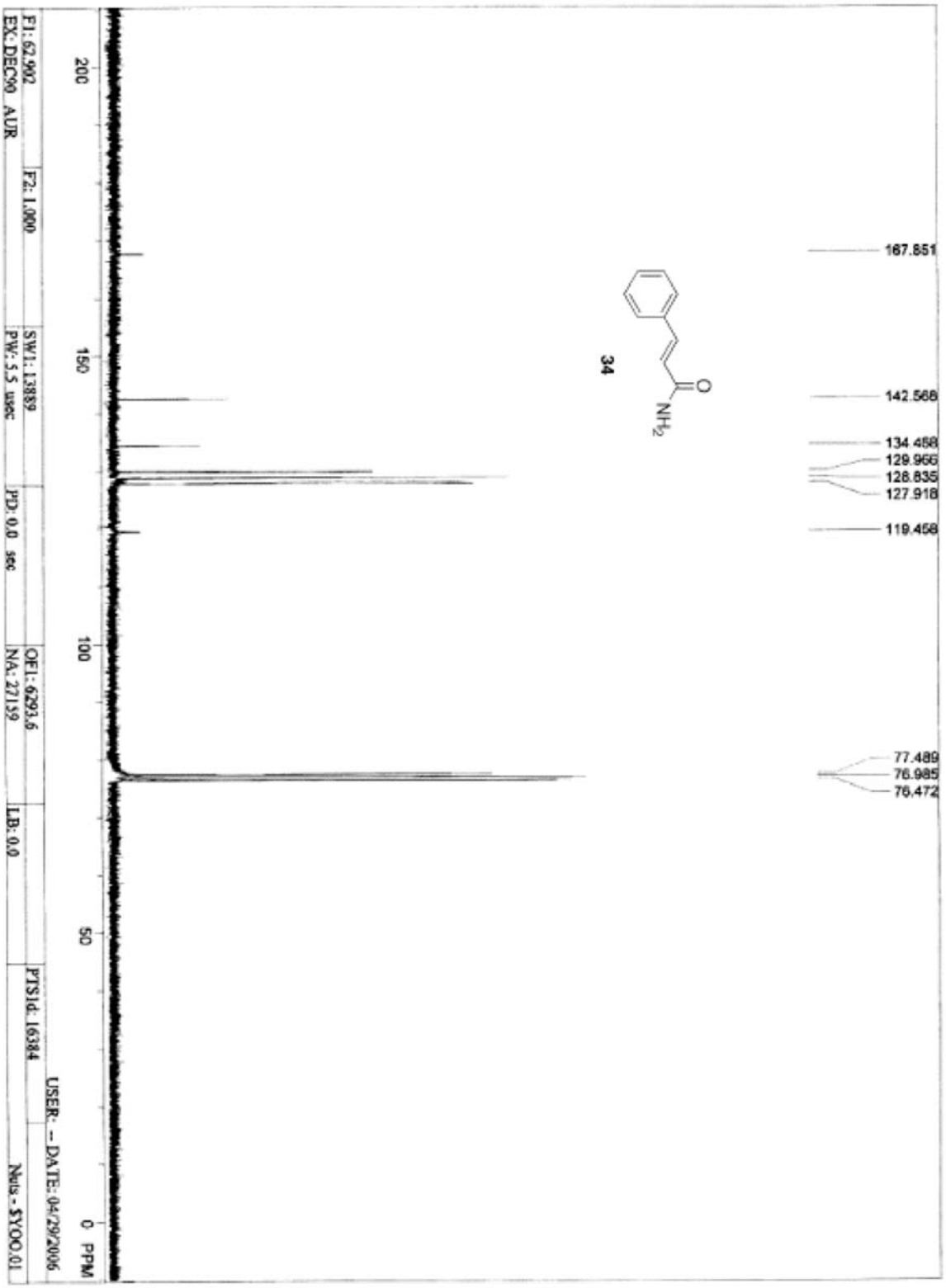

AcPhenyl-butylacrylate_01Sep2004
Archive directory: /nfs/inova400/d1/jung/kyoo/vnmrsys/data
Sample directory: AcPhenyl-butylacrylate_01Sep2004
File: PROTON
Pulse Sequence: s2pul
Ac
O
O
tBu
32
8.057
7.925
7.906
7.877
7.658
7.613
7.572
7.476
7.456
7.437
7.261
6.442
6.402
2.681
1.517
9
8
7
6
5
4
3
2
1
ppm
1.02
1.01
1.04
0.99
1.01
1.00
3.11
9.22


AcPhenyl-butylacrylate-C_01Sep2004
Archive directory: /nfs/inova600/d2/jung/kyoo/vnmrsys/data
Sample directory: AcPhenyl-butylacrylate-C_01Sep2004
File: CARBON
Pulse Sequence: s2pul
197.729
166.102
142.507
137.855
135.426
132.344
129.745
129.376
127.764
121.873
81.918
77.551
77.230
76.913
28.378
26.872
Ac
O
O
tBu
32
180
160
140
120
100
80
60
40
20
0
ppm


Phenyl-MVK_03Sep2004
Archive directory: /nfs/inova600/ml/jung/kyoo/vnmrsys/data
Sample directory: Phenyl-MVK_03Sep2004
File: PROTON
Pulse Sequence: s2pul
7.555
7.541
7.501
7.413
7.405
7.397
7.263
6.747
6.706
2.392
1.578
3.11
2.86
1.01
3.00
33
O
9
8
7
6
5
4
3
2
1
ppm


Phenyl-MVK_05Sep2004
Archive directory: /nfs/inova600/dl/jung/ryoo/vnmrsys/data
Sample directory: Phenyl-MVK_05Sep2004
File: CARBON4
Pulse Sequence: s2pul
198.671
143.699
134.679
130.770
129.226
128.505
127.422
77.573
77.432
77.112
76.932
27.766
33
O
180
160
140
120
100
80
60
40
20
0
ppm

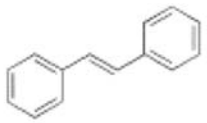

7.687
7.624
7.540
7.527
7.521
7.513
7.510
7.503
7.393
7.389
7.384
7.376
7.365
7.260
6.490
6.427
5.583
1.643
1.00
2.29
3.00
1.04
1.85
34
O
NH2
10
8
6
4
2
0
PPM
F1: 290.133
F2: 1.000
SW1: 2793
PW: 6.0 usec
PD: 0.0 sec
OF1: 1146.0
NA: 64
LB: 0.0
PTS1d: 8192
USER: -- DATE: 09/28/2005
Nuts - SPh-acrylamide


167.851
142.568
134.458
129.966
128.835
127.918
119.458
77.489
76.985
76.472
34
O
NH2
200
150
100
50
0 PPM
F1: 62.992
F2: 1.000
SW1: 13889
PW: 5.5 usec
PD: 0.0 sec
OF1: 6293.6
NA: 27159
LB: 0.0
PTS1d: 16384
USER: -- DATE: 04/29/2006
EX: DEC90_AUR
Nuts - $YOO.01

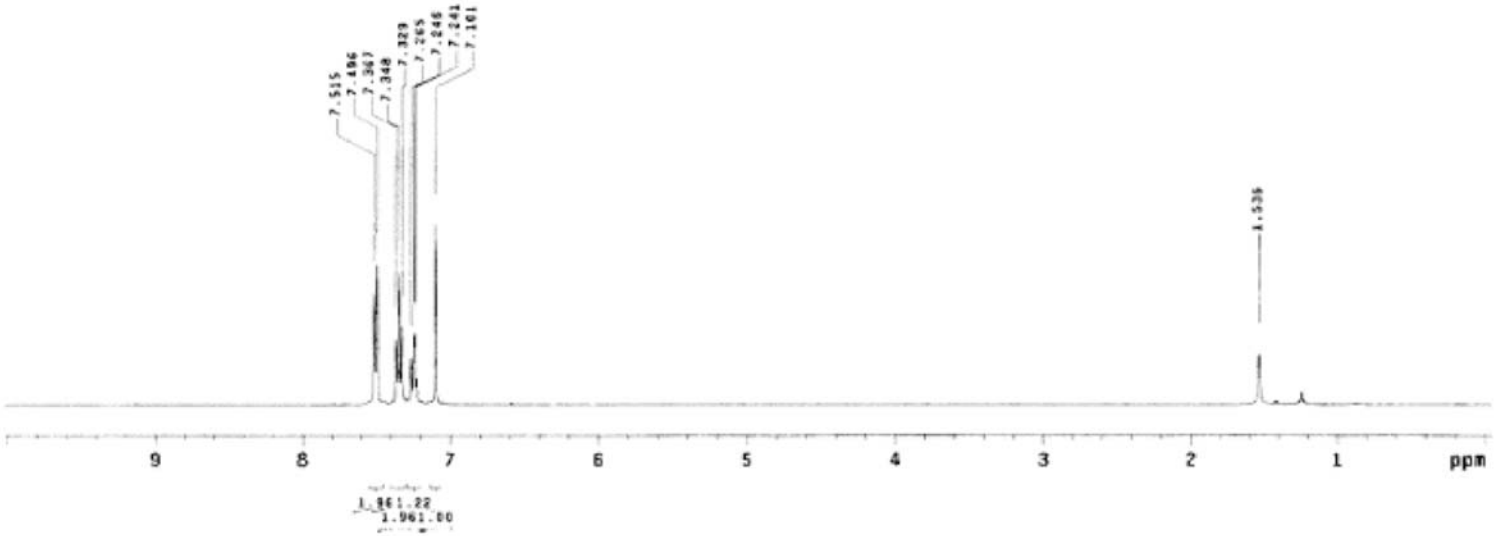
PHenyl-styren_02Sep2004

Archive directory: /nfs/inova600/dl/jung/kyoo/vnmrsys/data
Sample directory: PHenyl-styren_02Sep2004
File: PROTON

Pulse Sequence: s2pul



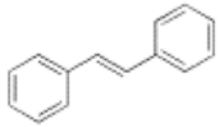
35



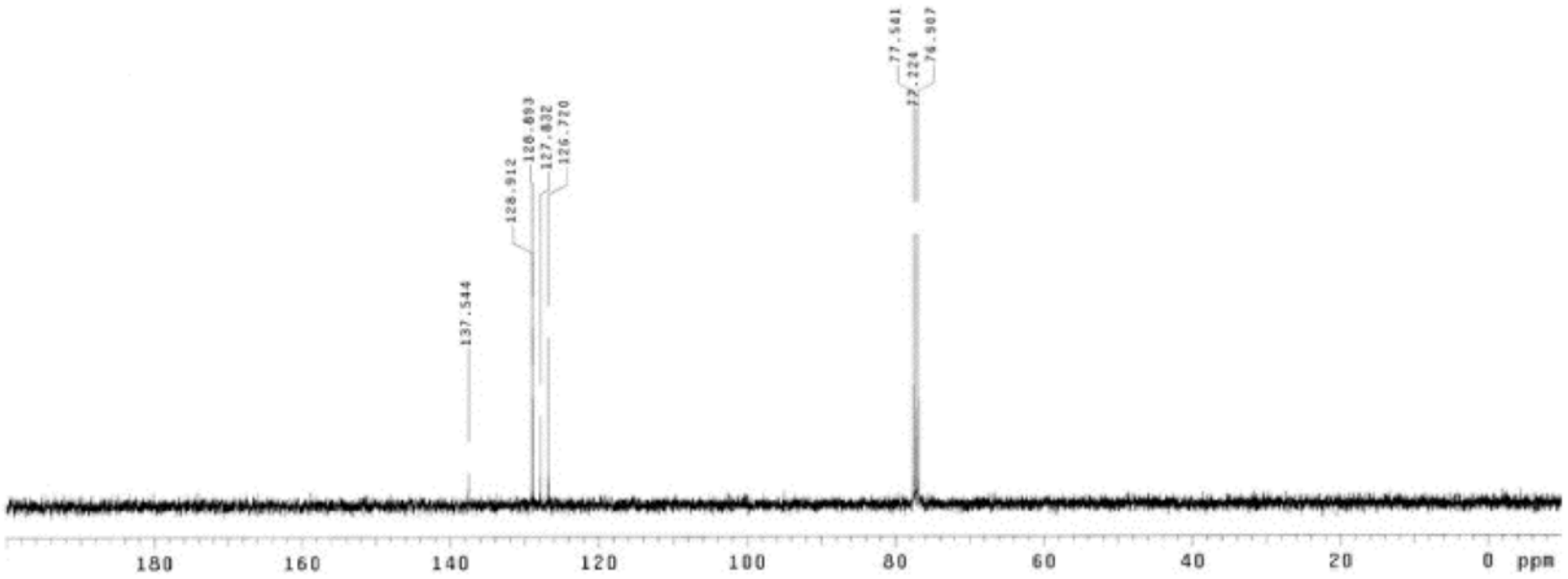
Phenyl-styrenC_02Sep2004

Archive directory: /nfs/inova400/dl/jung/kyoo/vnmrsys/data
Sample directory: Phenyl-styrenC_02Sep2004
File: CARBON

Pulse Sequence: s2pul



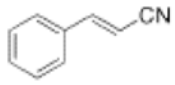
35



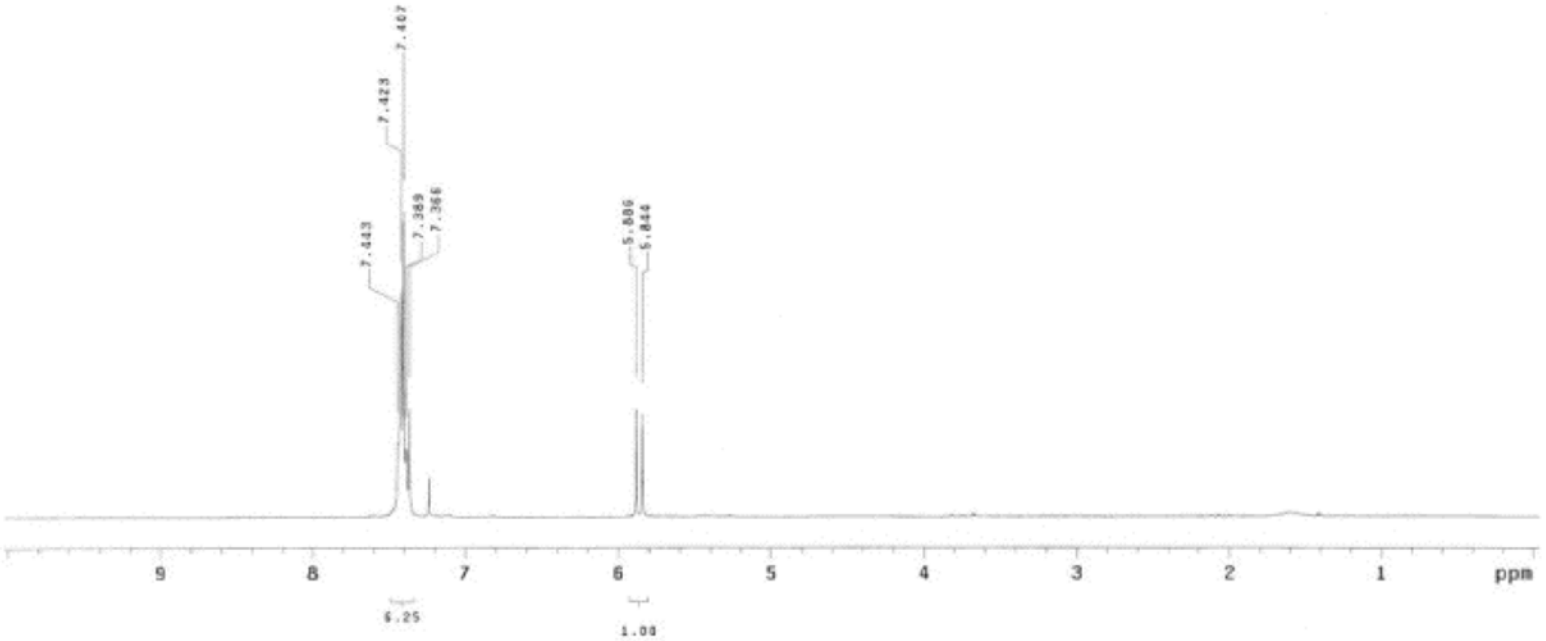
Aryl-acrylCN_01Sep2004

Archive directory: /nfs/inova400/d1/jung/kyoo/vnmrsys/data
Sample directory: Aryl-acrylCN_01Sep2004
File: PROTON

Pulse Sequence: s2pul



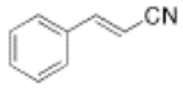
36



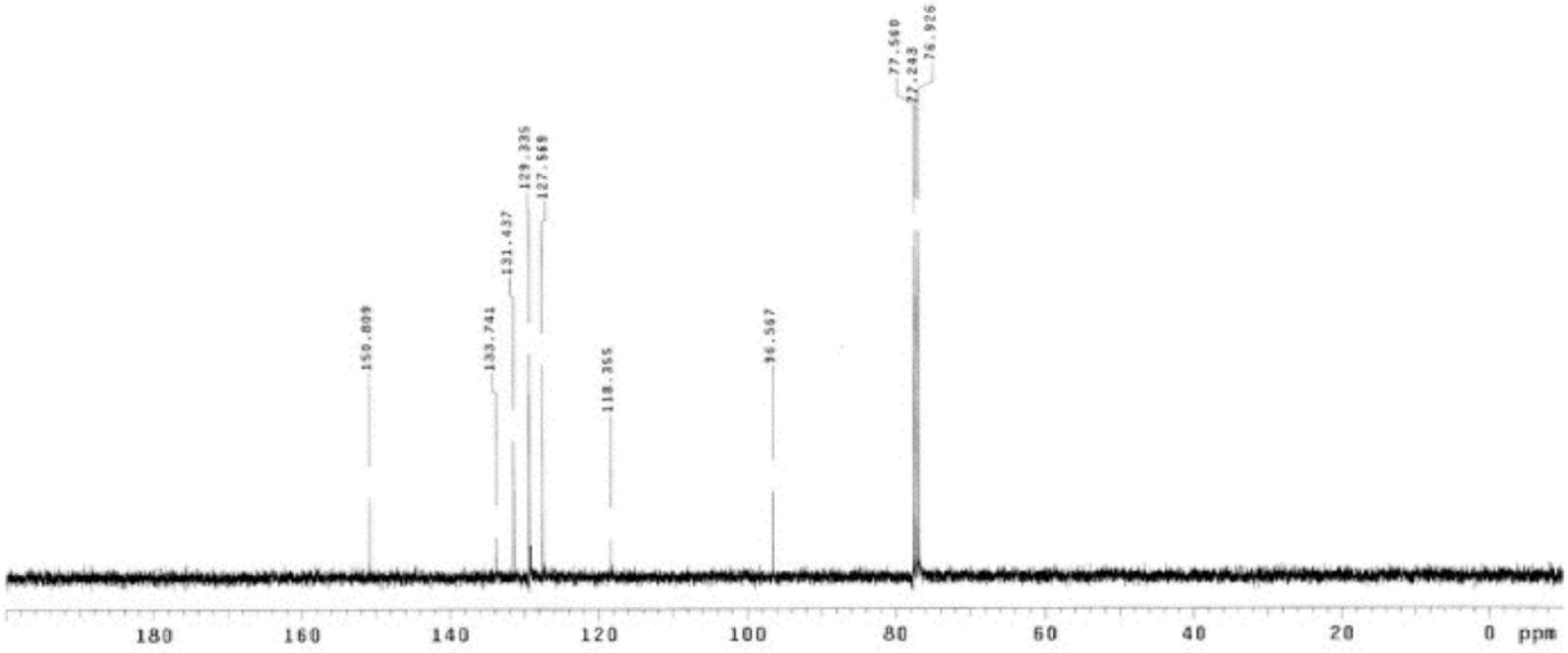
Aryl-acrylCN_C_01Sep2004

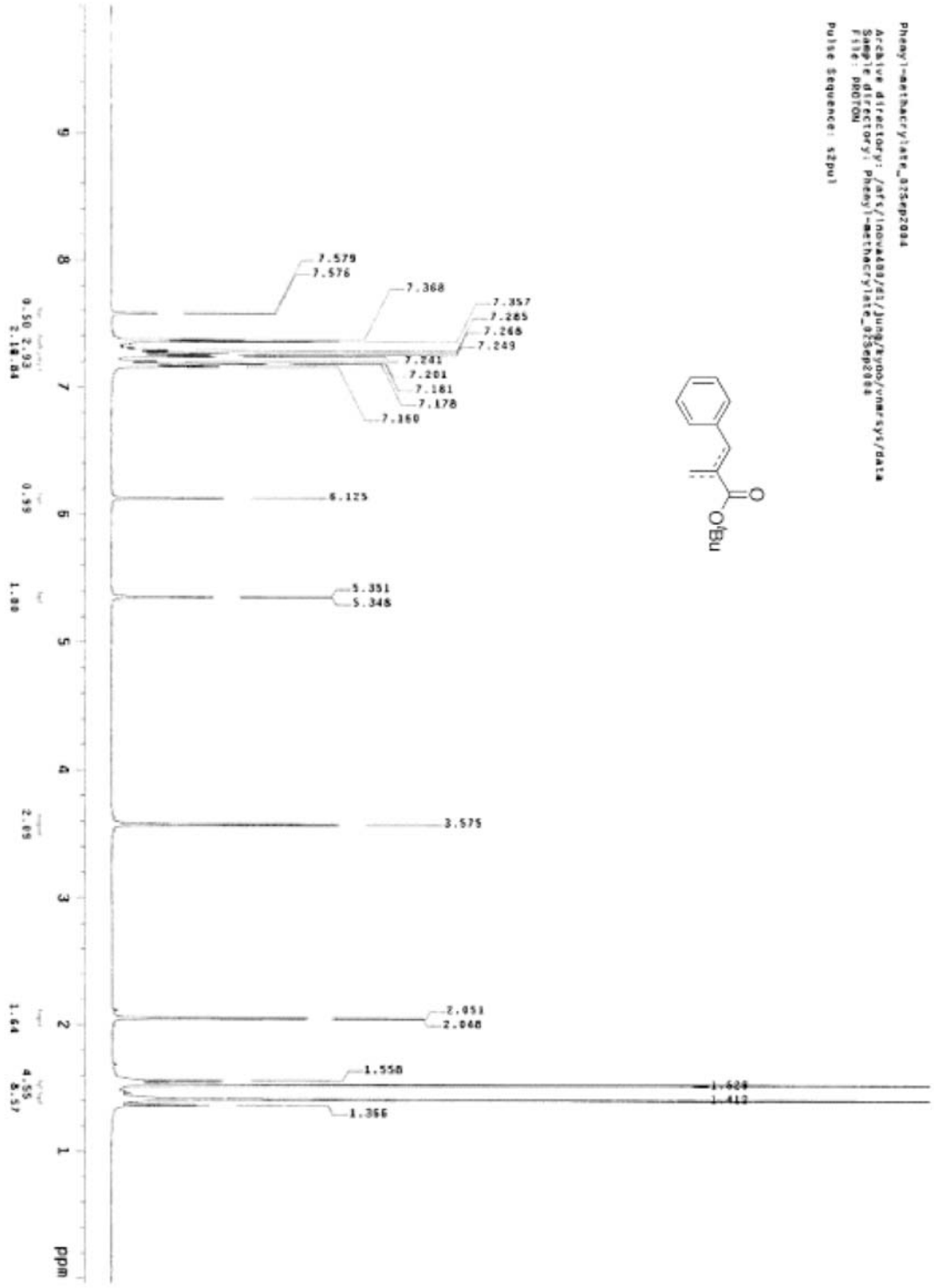
Archive directory: /nfs/inova400/d1/jung/kyoo/vnmrsys/data
Sample directory: Aryl-acrylCN_C_01Sep2004
File: CARBON

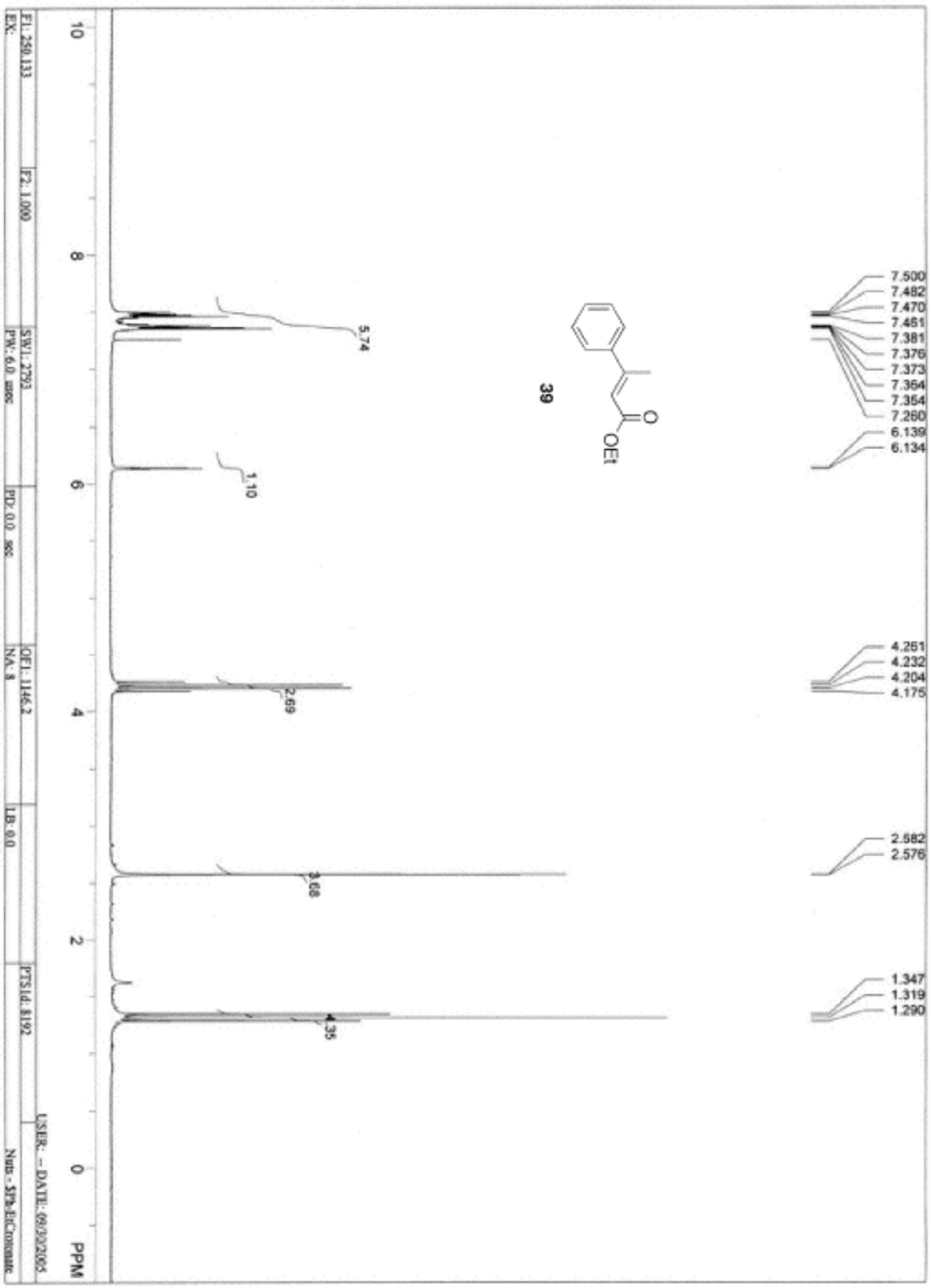
Pulse Sequence: s2pul



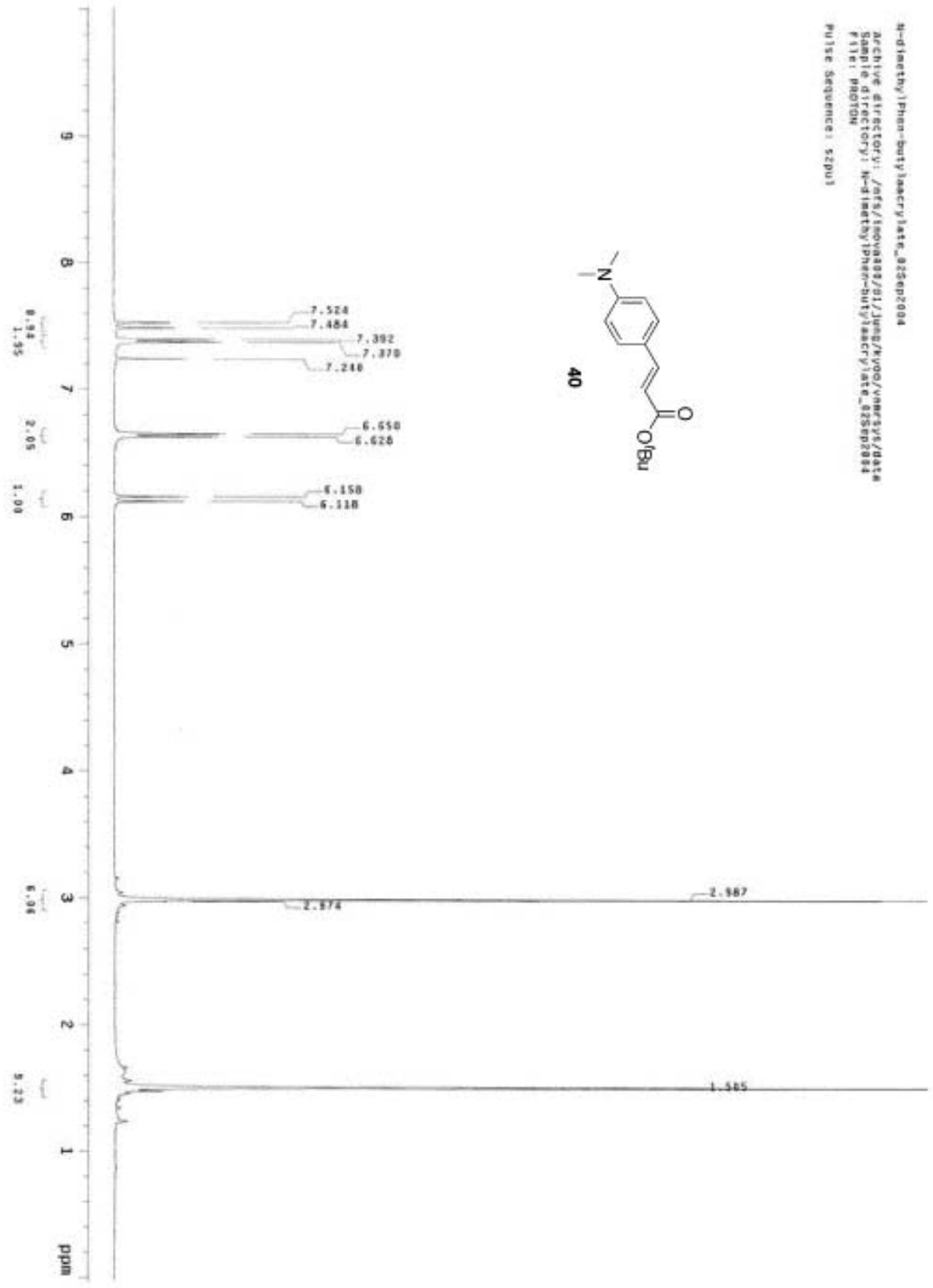
36

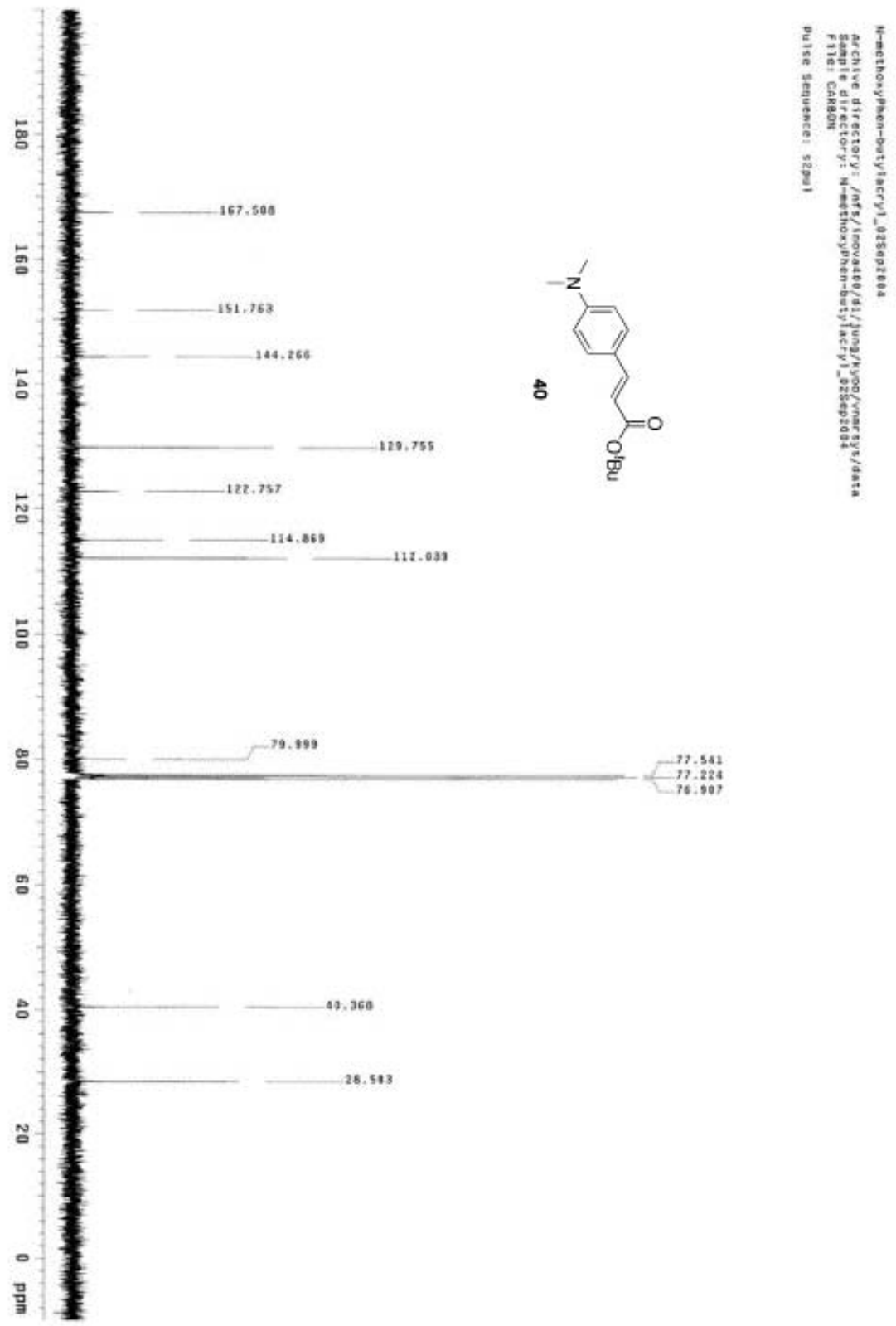


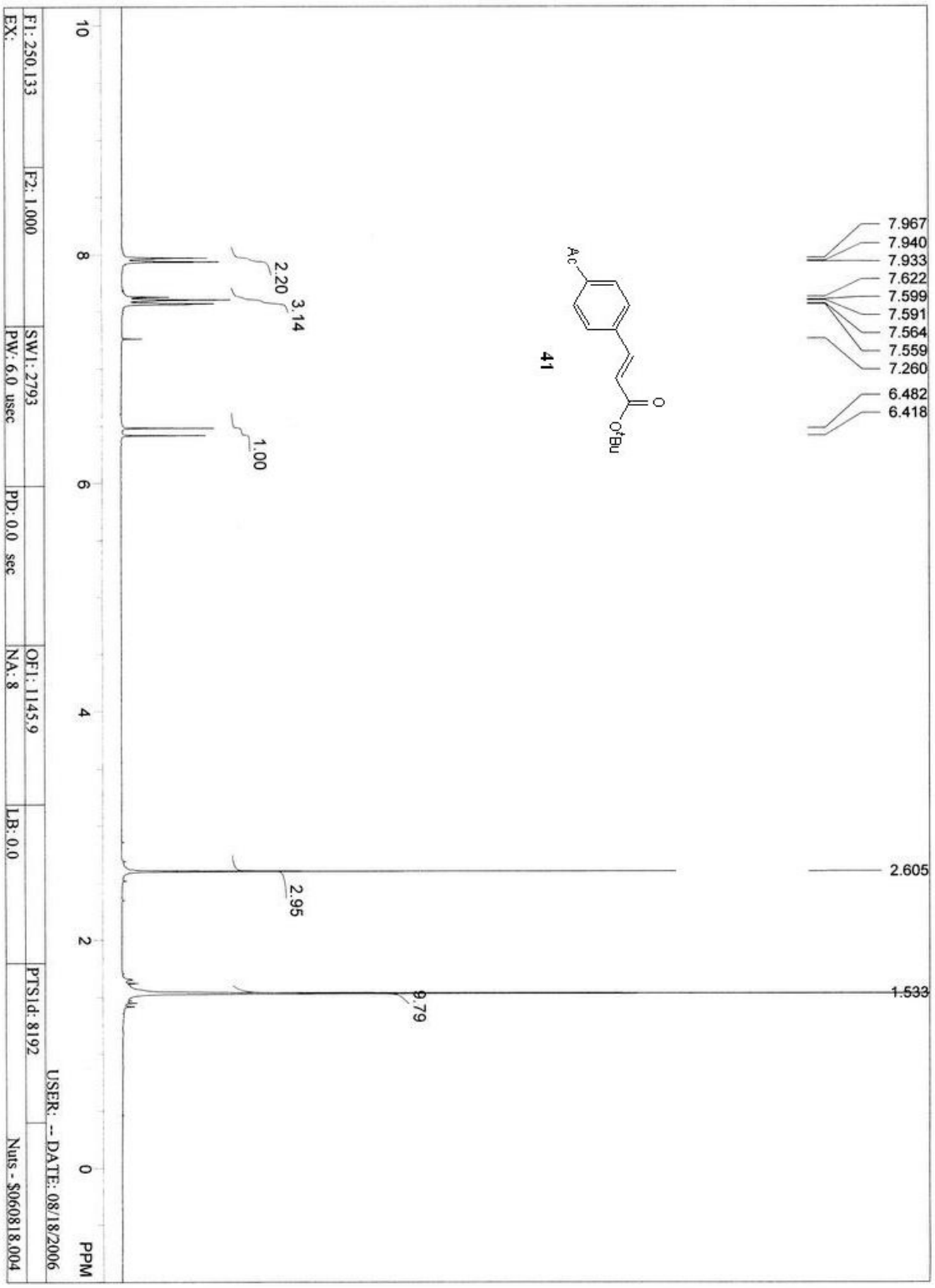

Phenyl-methacrylate_07Sep2004
Archive directory: /afs/inova400/d1/jung/kypo/vnmrsys/data
Sample directory: Phenyl-methacrylate_07Sep2004
File: PROTON
Pulse Sequence: s2pul
7.579
7.576
7.368
7.357
7.285
7.268
7.249
7.241
7.201
7.181
7.178
7.160
6.125
5.351
5.348
3.575
2.051
2.048
1.558
1.628
1.412
1.366
O
O
tBu
ppm

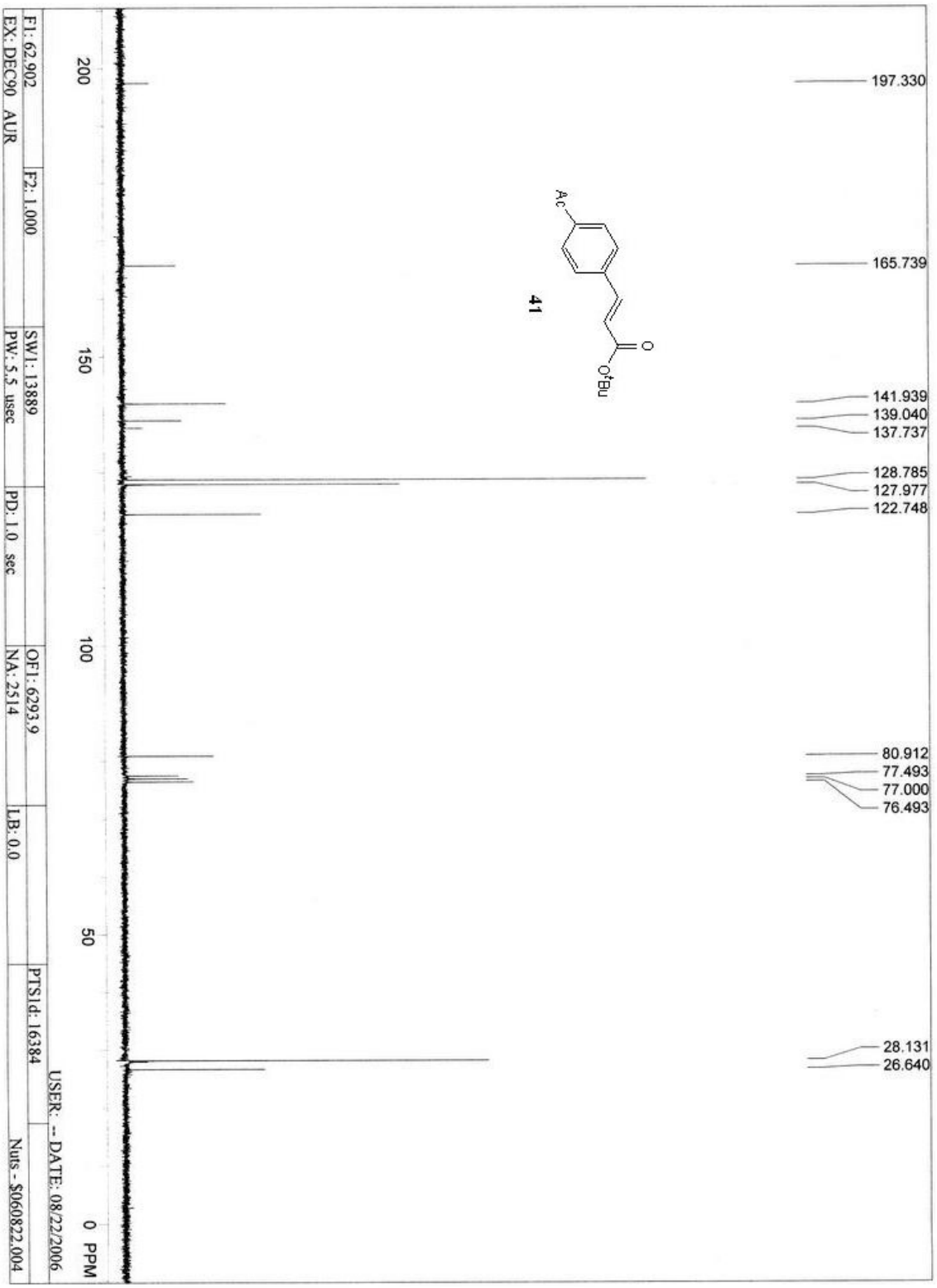

7.500
7.482
7.470
7.461
7.381
7.376
7.373
7.364
7.354
7.260
6.139
6.134
4.261
4.232
4.204
4.175
2.582
2.576
1.347
1.319
1.290
5.74
1.10
2.69
3.68
4.35
39
O
OEt
PPM

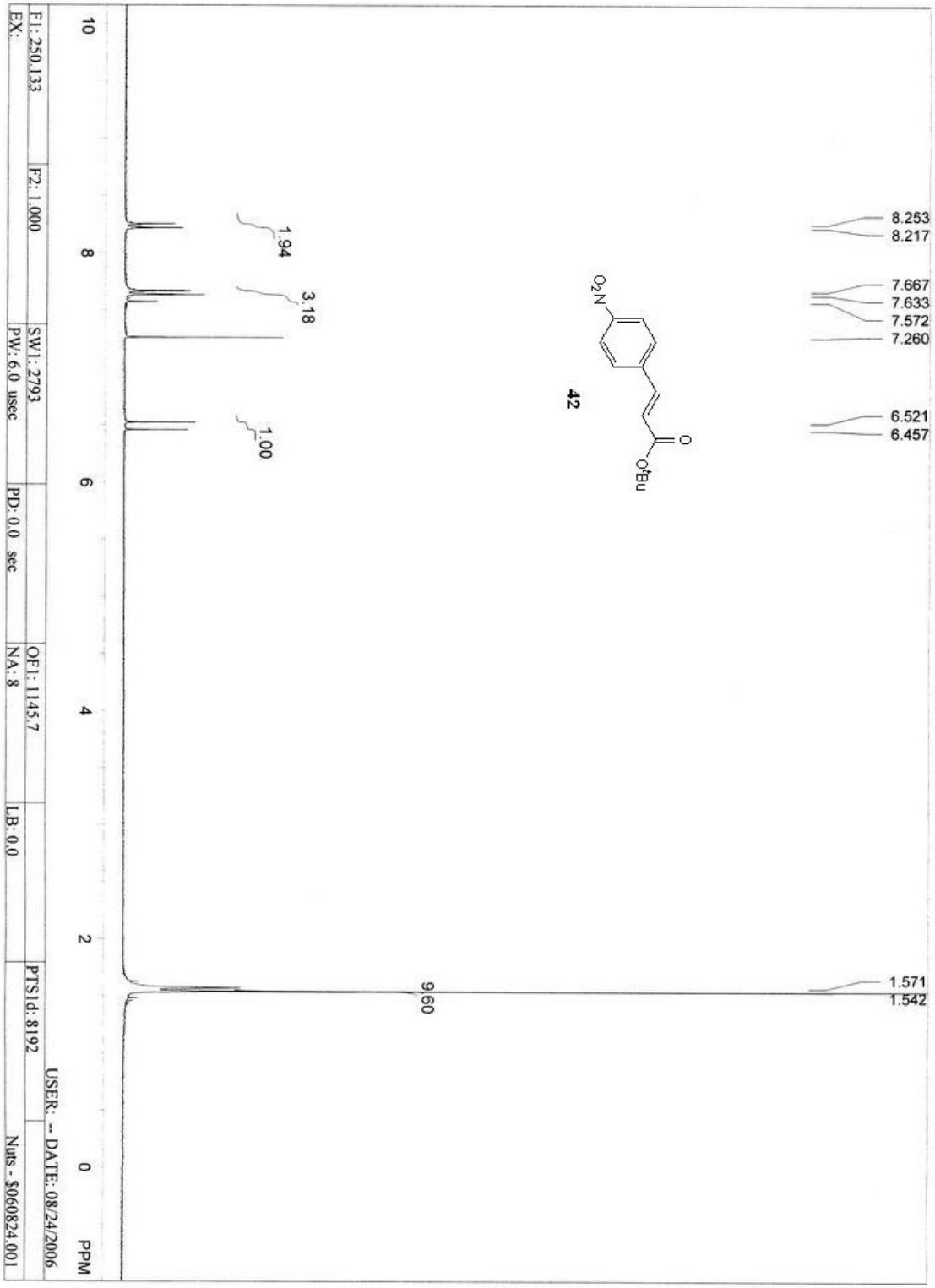
166.644
155.467
142.205
128.925
128.444
126.261
117.151
77.492
76.984
76.475
59.800
17.906
14.305
39
OEt
O
O

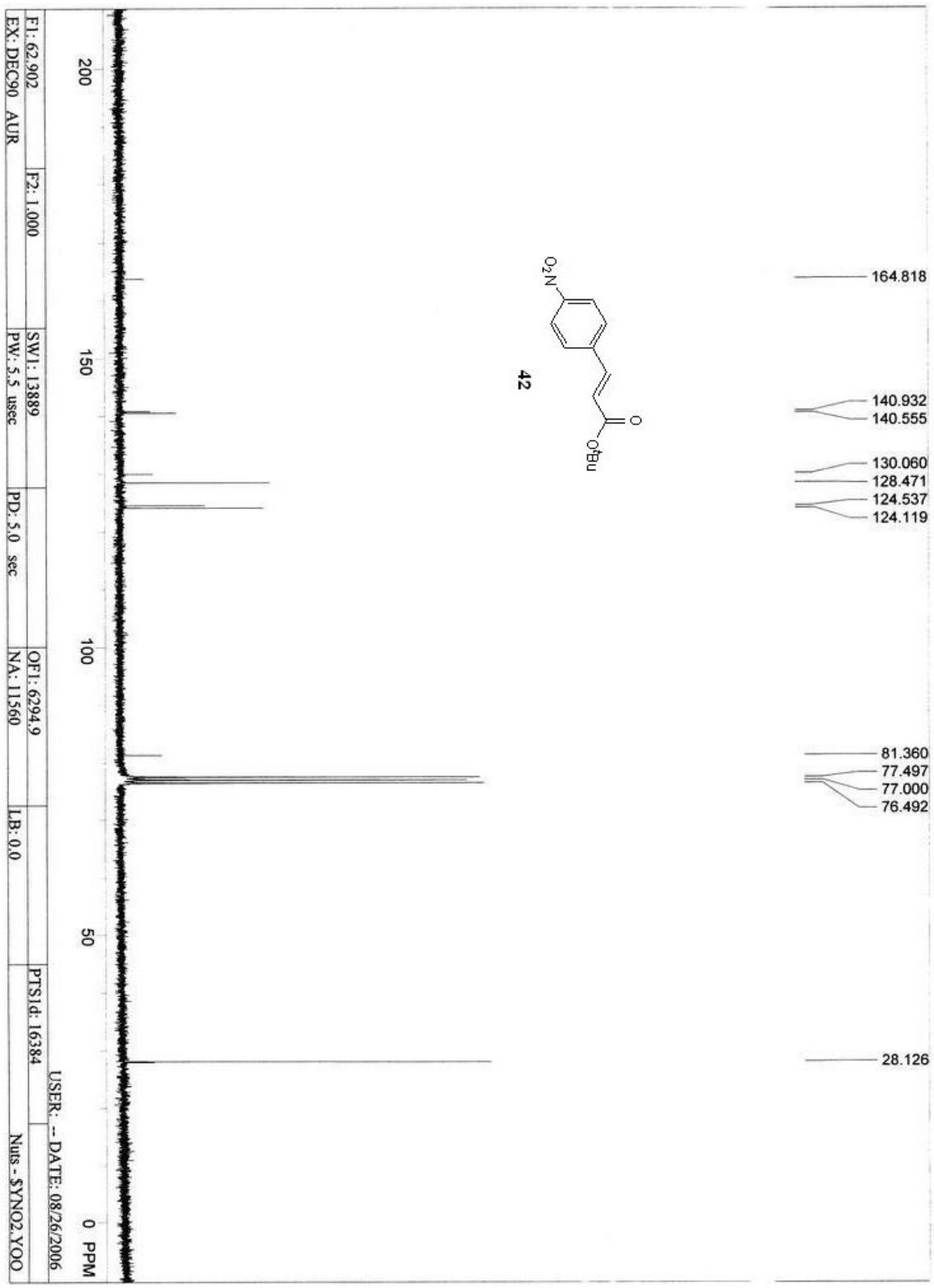

N-dimethylPhen-butylaacrylate_02Sep2004
Archive directory: /ofs/inova400/81/jwnb/kyoo/vnmrsys/data
Sample directory: N-dimethylPhen-butylaacrylate_02Sep2004
File: PROTON
Pulse Sequence: szpul
40
7.524
7.484
7.392
7.370
7.248
6.650
6.620
6.158
6.118
2.987
2.574
1.565
8.94
1.95
2.05
1.00
6.04
9.23
ppm

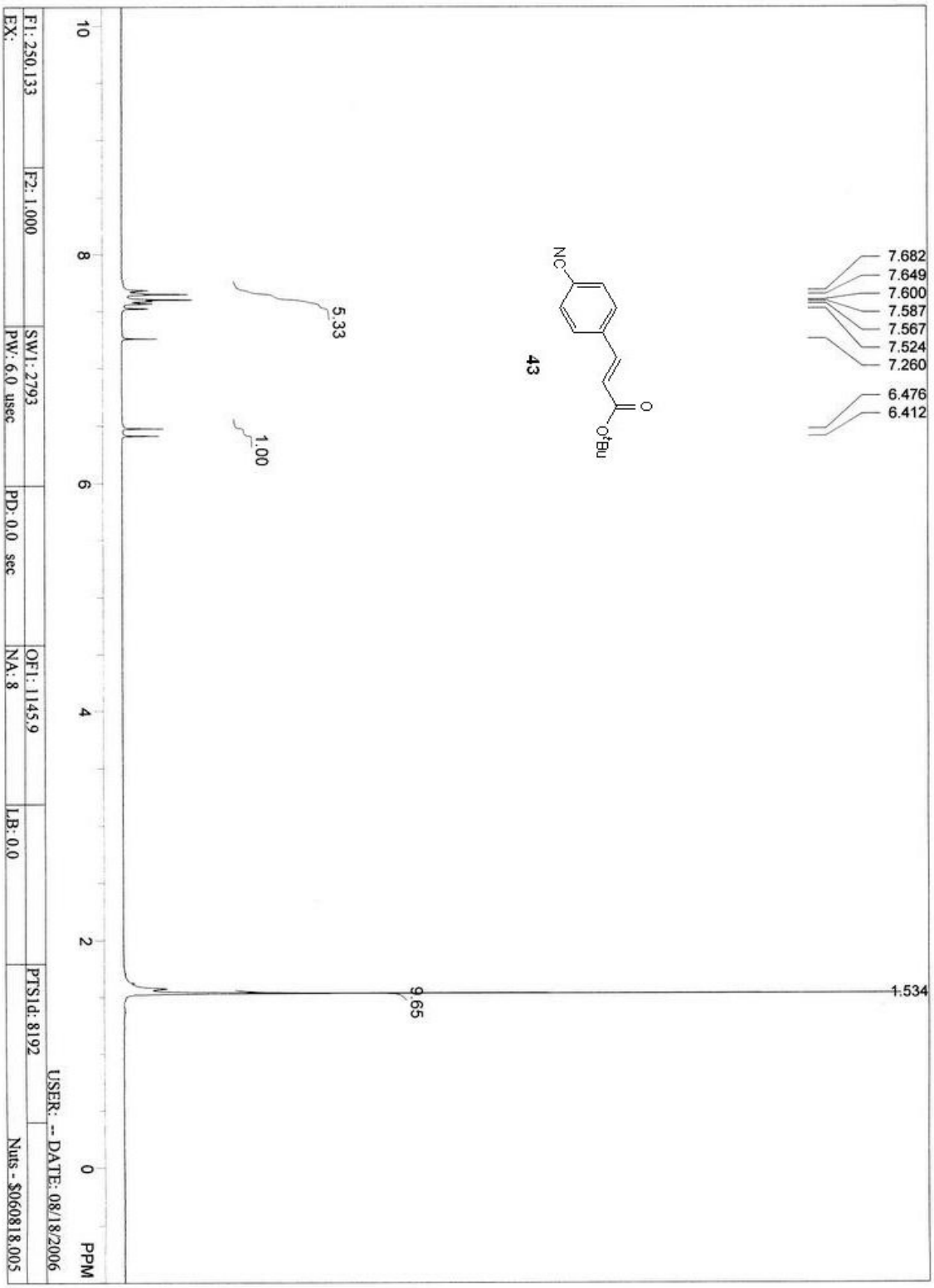

N-methoxyPhen-butylacryl_02Sep2004
Archive directory: /nfs/inova400/di/jung/kyoo/vnmrsys/data
Sample directory: N-methoxyPhen-butylacryl_02Sep2004
File: CARBON
Pulse Sequence: s2pul
40
O
O
tBu
167.508
151.763
144.266
129.755
122.757
114.869
112.039
79.999
77.541
77.224
76.907
40.360
28.583
180
160
140
120
100
80
60
40
20
0
ppm

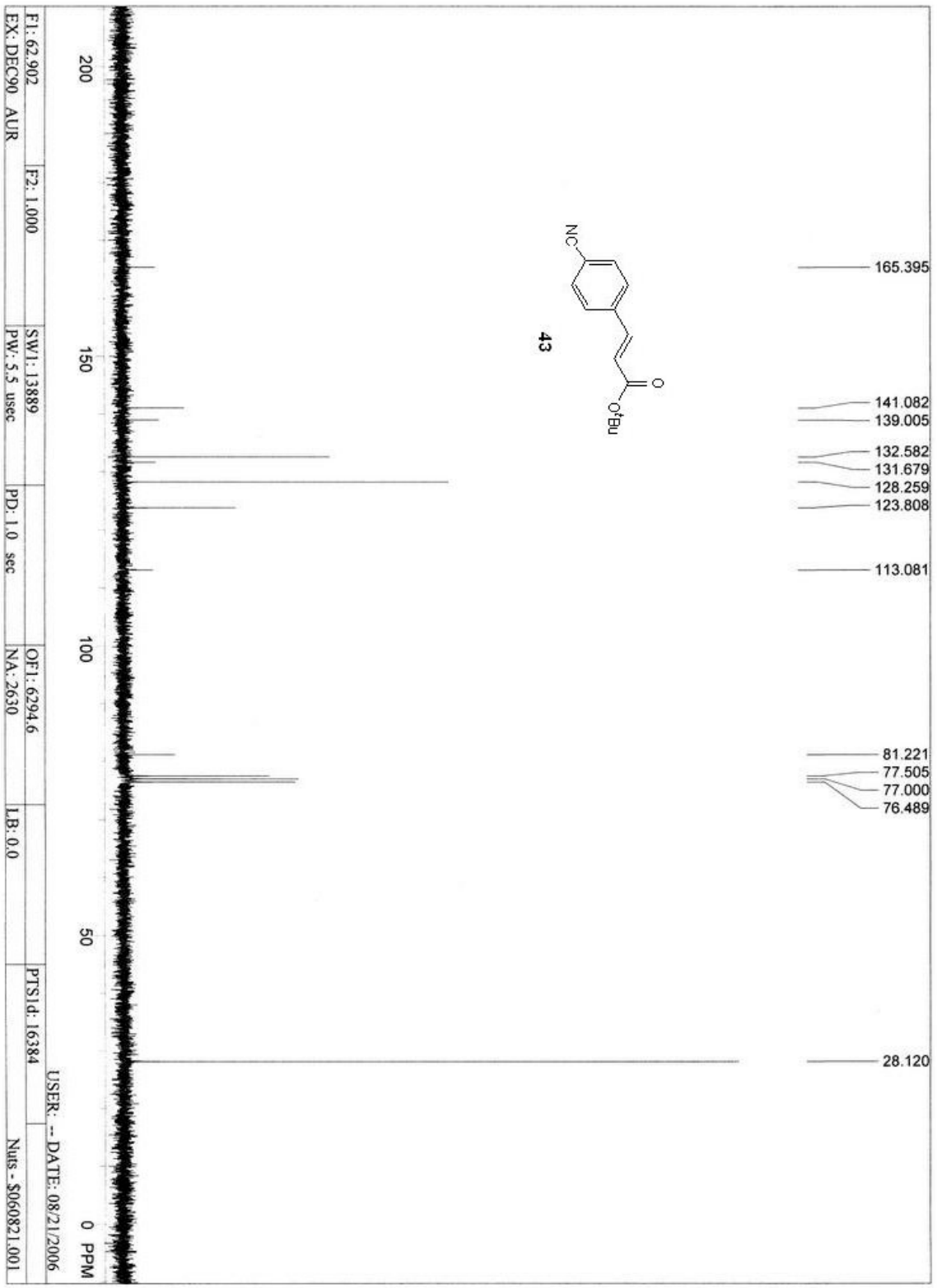

7.967
7.940
7.933
7.622
7.599
7.591
7.564
7.559
7.260
6.482
6.418
2.605
1.533
2.95
9.79
2.20
3.14
1.00
Ac
O
O
tBu
41
10
8
6
4
2
0
PPM
F1: 250.133
F2: 1.000
SW1: 2793
PW: 6.0 usec
PD: 0.0 sec
OF1: 1145.9
NA: 8
LB: 0.0
PTS1d: 8192
USER: -- DATE: 08/18/2006
EX:
Nuts - $060818.004

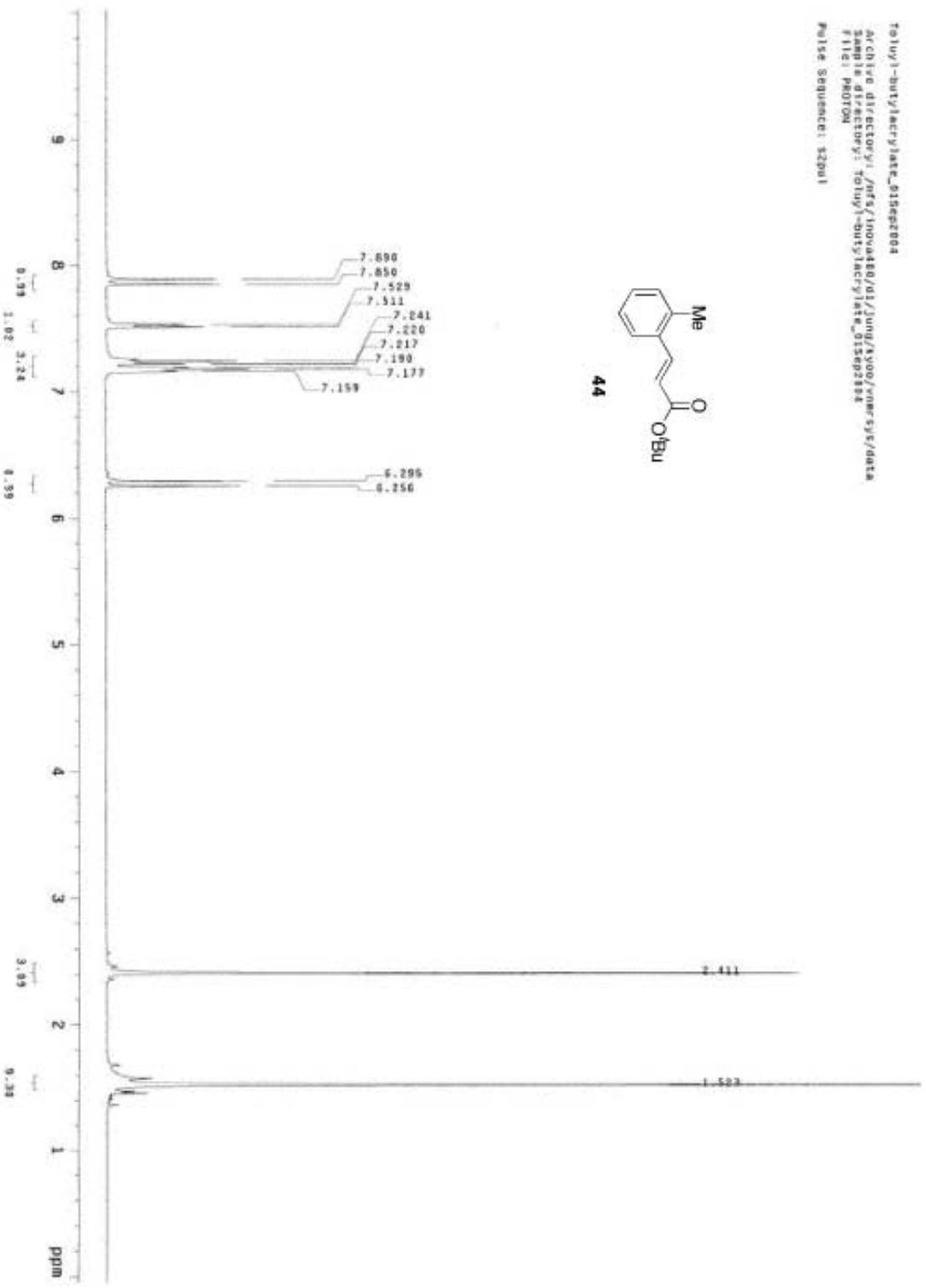

197.330
165.739
141.939
139.040
137.737
128.785
127.977
122.748
80.912
77.493
77.000
76.493
28.131
26.640
Ac
O
OtBu
41
200
150
100
50
0 PPM
EX: DEC90 AUR
F1: 62.902
F2: 1.000
PW: 5.5 usec
SW1: 13889
PD: 1.0 sec
OF1: 6293.9
NA: 2514
LB: 0.0
PTS1d: 16384
USER: -- DATE: 08/22/2006
Nuts - $060822.004

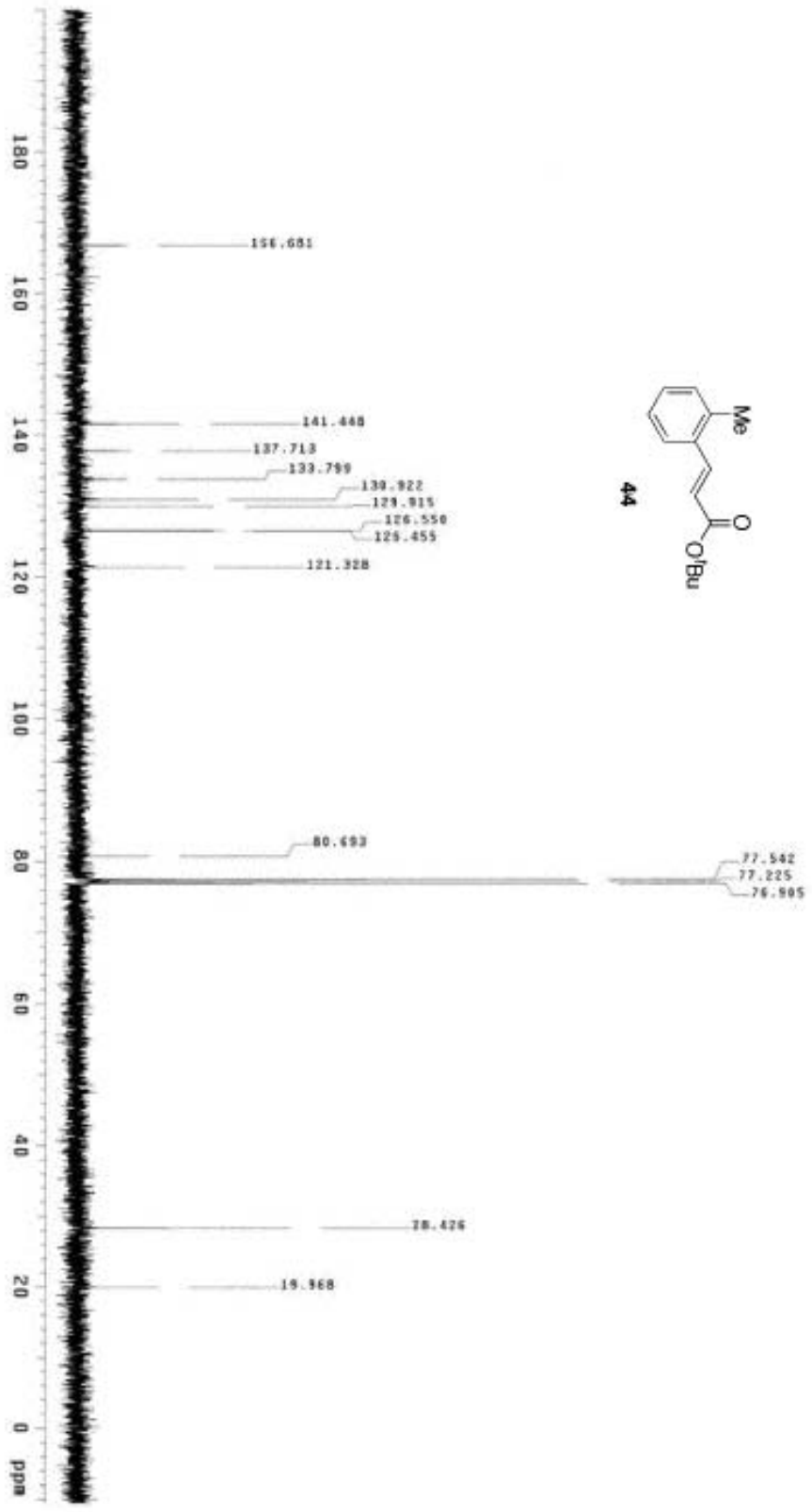

8.253
8.217
7.667
7.633
7.572
7.260
6.521
6.457
1.571
1.542
9.60
1.94
3.18
1.00
42
10
8
6
4
2
0
PPM
USER: -- DATE: 08/24/2006
F1: 250.133
F2: 1.000
SW1: 2793
OF1: 1145.7
PTS1d: 8192
EX:
PW: 6.0 usec
PD: 0.0 sec
NA: 8
LB: 0.0
Nuts - $060824.001

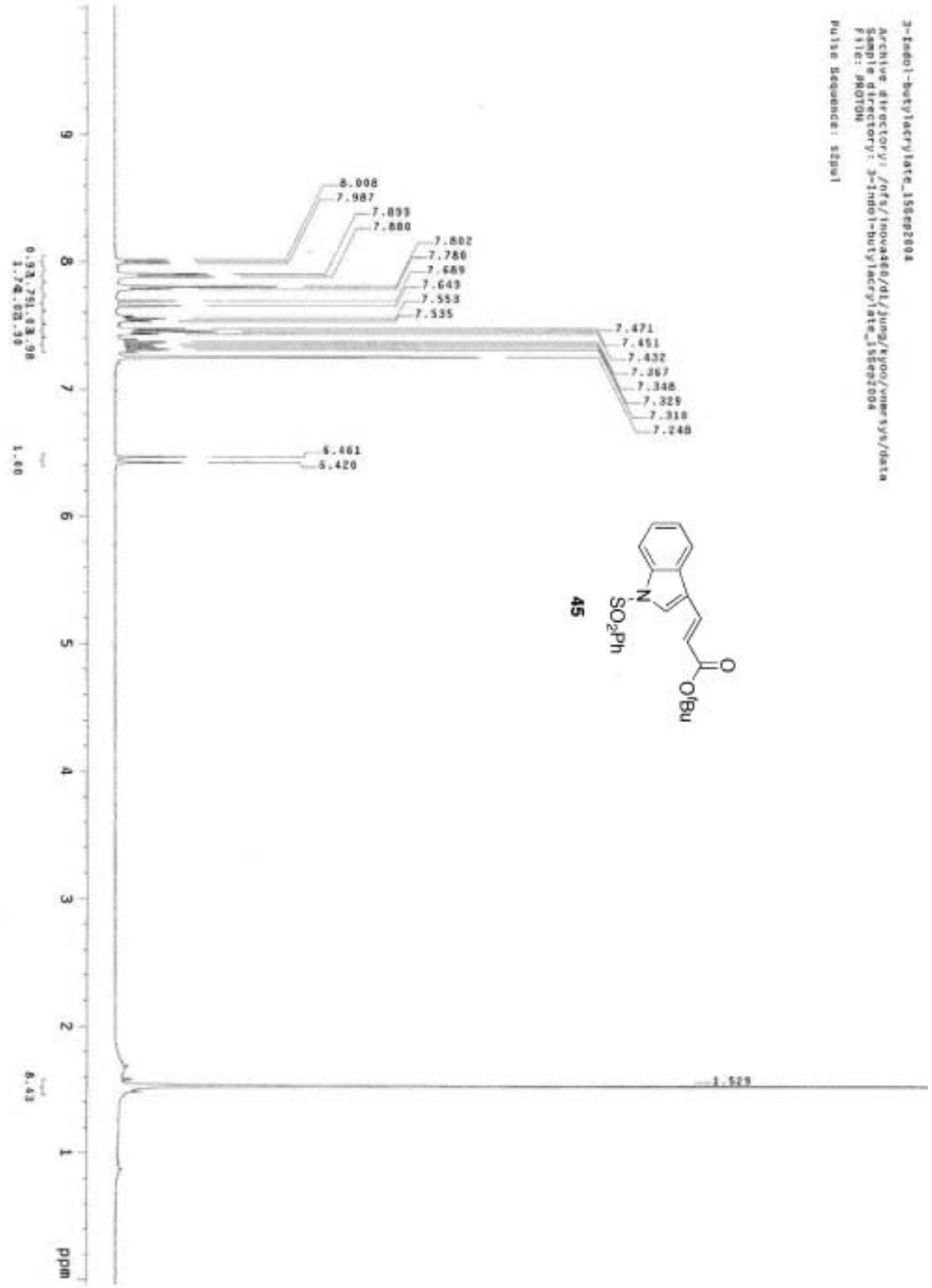

164.818
140.932
140.555
130.060
128.471
124.537
124.119
81.360
77.497
77.000
76.492
28.126
42
200
150
100
50
0 PPM
EX: DEC90 AUR
F1: 62.902
F2: 1.000
SW1: 13889
PW: 5.5 usec
PD: 5.0 sec
OF1: 6294.9
NA: 11560
LB: 0.0
PTS1d: 16384
USER: -- DATE: 08/26/2006
Nuts - $YNO2.YOO

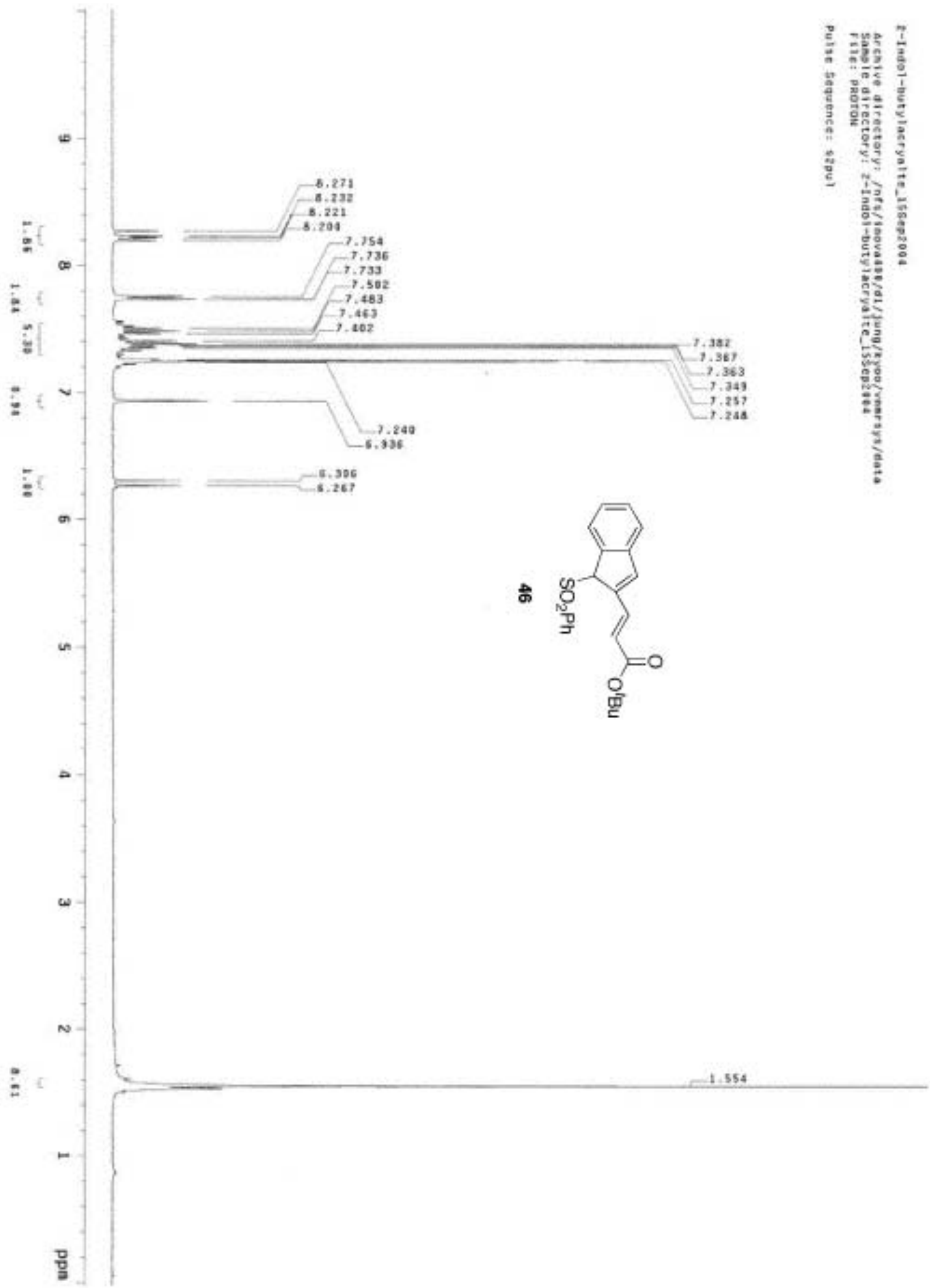

7.682
7.649
7.600
7.587
7.567
7.524
7.260
6.476
6.412
5.33
1.00
9.65
1.534
43
NC
O
O
tBu
10
8
6
4
2
0
PPM
F1: 250.133
F2: 1.000
SW1: 2793
OF1: 1145.9
PTS1d: 8192
USER: -- DATE: 08/18/2006
EX:
PW: 6.0 usec
PD: 0.0 sec
NA: 8
LB: 0.0
Nuts - $060818.005

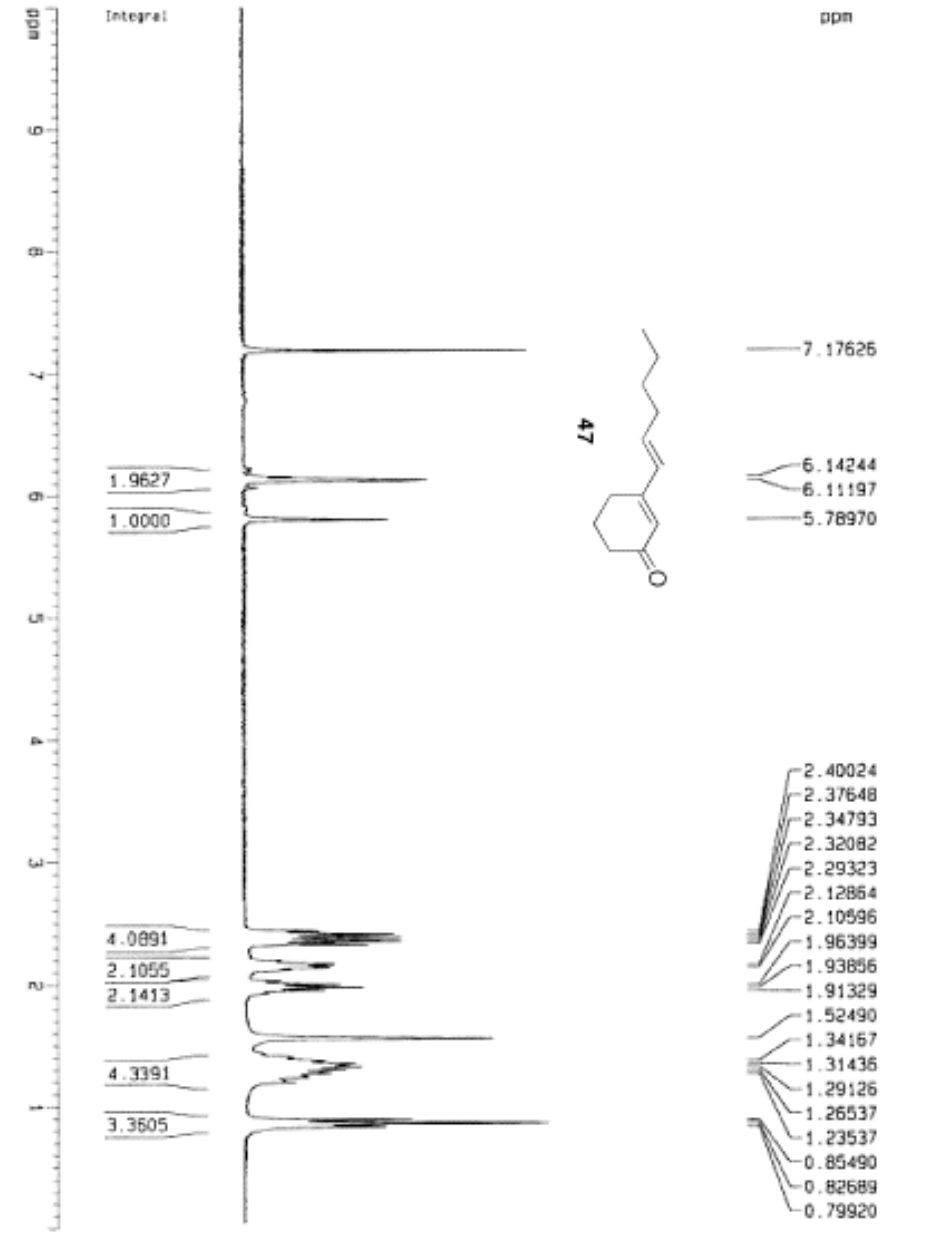

NC
O
O^{t}Bu
43
165.395
141.082
139.005
132.582
131.679
128.259
123.808
113.081
81.221
77.505
77.000
76.489
28.120
200
150
100
50
0 PPM
F1: 62.902
F2: 1.000
SW1: 13889
OF1: 6294.6
PTS1d: 16384
EX: DEC90_AUR
PW: 5.5 usec
PD: 1.0 sec
NA: 2630
LB: 0.0
USER: -- DATE: 08/21/2006
Nuts - $060821.001


Tolyl-butylacrylate_01Sep2004
Archive directory: /nfs/inova400/dl/jung/kyoo/nmrsys/data
Sample directory: Tolyl-butylacrylate_01Sep2004
File: PROTON
Pulse Sequence: s2pul
Me
O
OtBu
44
7.890
7.850
7.529
7.511
7.241
7.220
7.217
7.190
7.177
7.159
6.295
6.256
2.411
1.523
ppm


Tolyl-butylacrylate_C_01Sep2004
Archive directory: /nfs/inova600/d1/jung/kyoo/vnmrsys/data
Sample directory: Tolyl-butylAcrylate_C_01Sep2004
File: CARBON
Pulse Sequence: s2pul
156.681
141.448
137.713
133.799
130.922
129.915
126.550
126.455
121.328
80.693
77.542
77.225
76.905
28.426
19.968
Me
O
O'Bu
44
180
160
140
120
100
80
60
40
20
0
ppm


3-Indol-butylacrylate_15Sep2004
Archive directory: /nfs/inova400/dl/jung/kyoo/vnmrsys/data
Sample directory: 3-Indol-butylacrylate_15Sep2004
File: PROTON
Pulse Sequence: s2pul
8.008
7.987
7.899
7.880
7.802
7.780
7.689
7.649
7.553
7.535
7.471
7.451
7.432
7.367
7.348
7.329
7.310
7.248
6.461
6.420
1.529
45
SO2Ph
O
O
tBu
ppm


File: PROTON
Pulse Sequence: s2pul
46
SO2Ph
OtBu
ppm



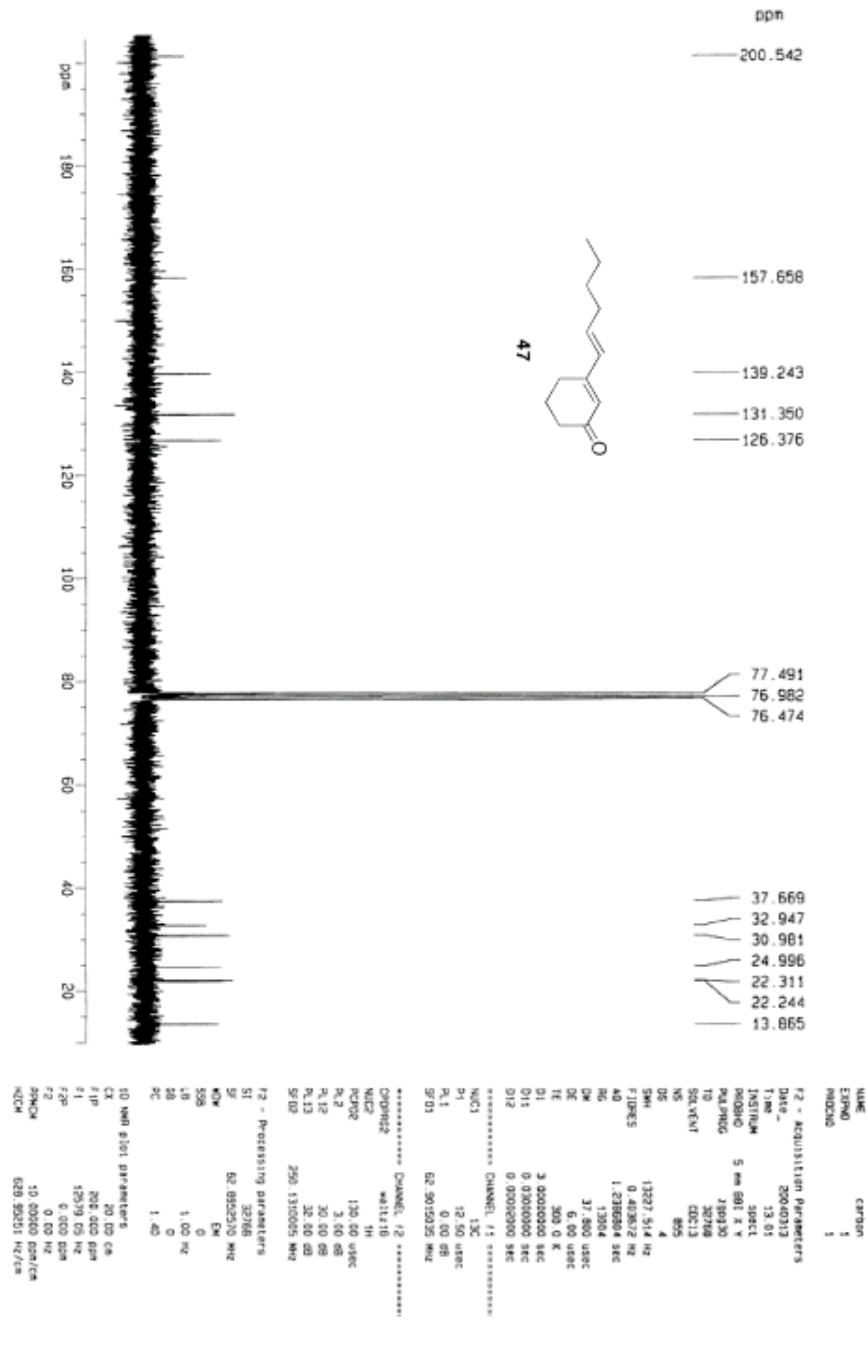
Current Data Parameters
NAME proton
EXPNO 1
PROCNO 1

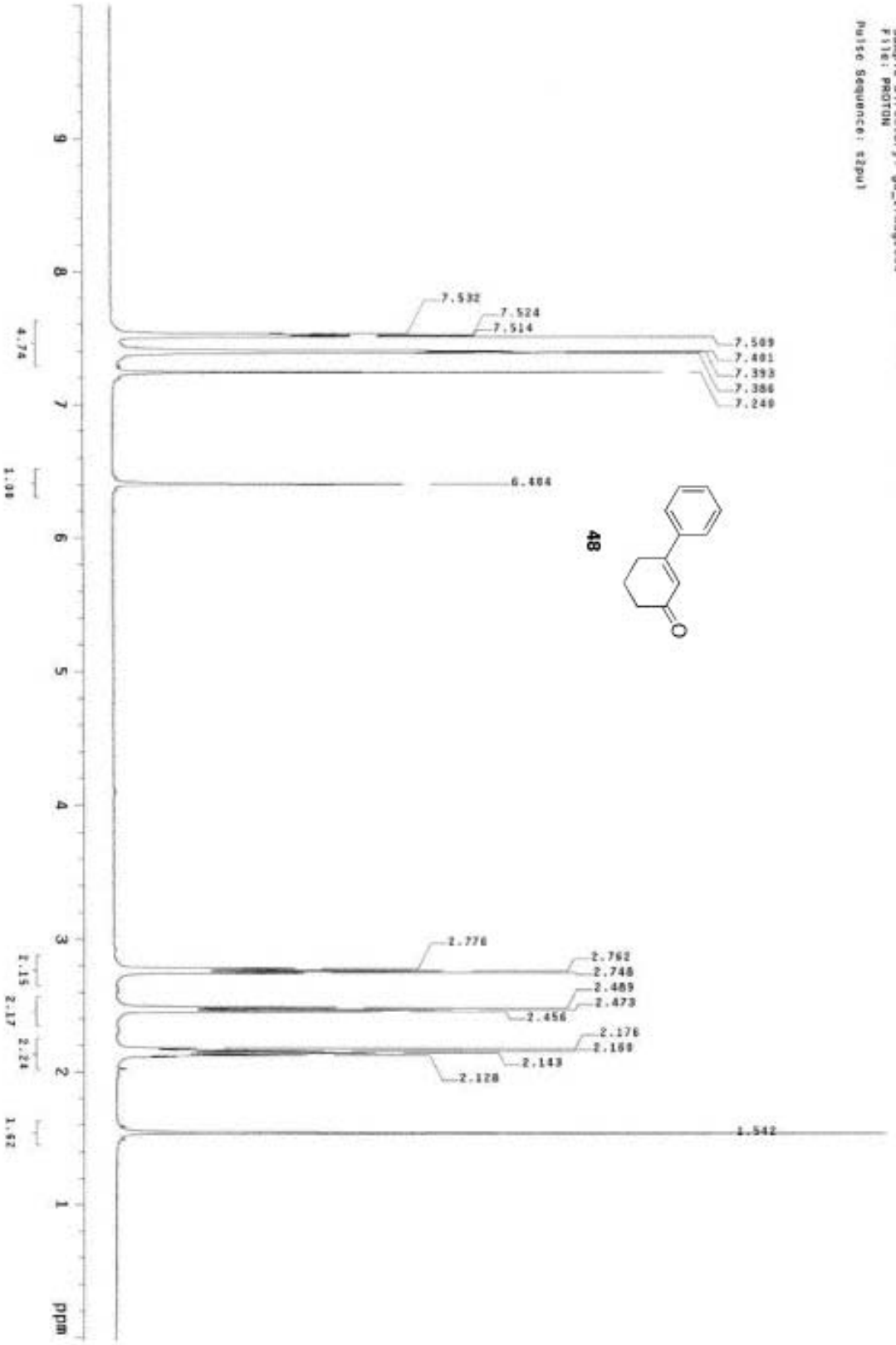
F2 - Acquisition Parameters
Date_ 20040216
Time 13.05
INSTRUM spect
PROBHD 5 mm BBI X Y
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 6
DS 4
SWH 6965.664 Hz
FIDRES 0.191213 Hz
AQ 2.6149384 sec
RG 574.7
DW 78.800 usec
DE 6.00 usec
TE 300.0 K
D1 1.00000000 sec

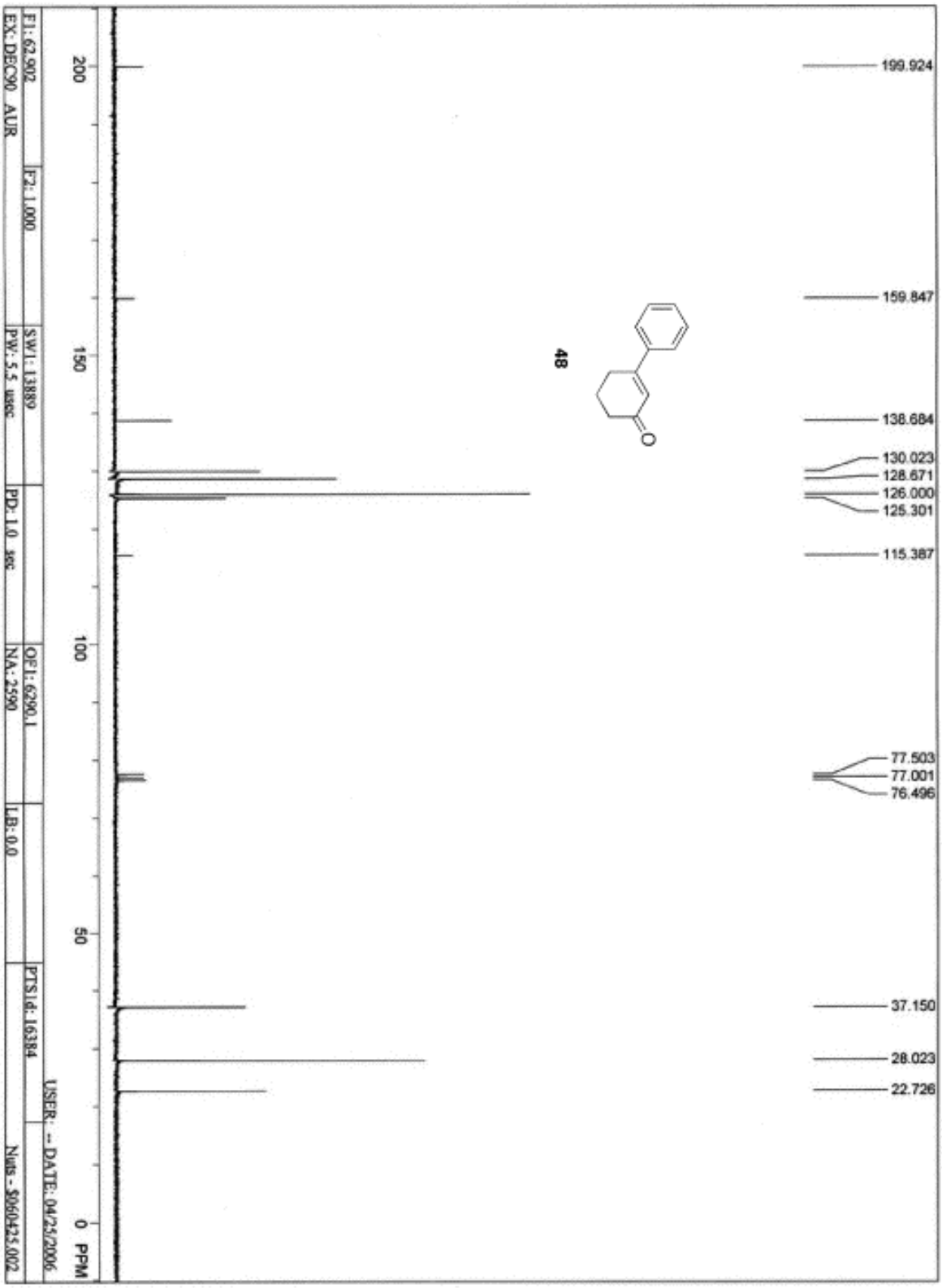
======== CHANNEL f1 ========
NUC1 1H
P1 6.50 usec
PL1 3.00 dB
SFO1 250.1323371 MHz

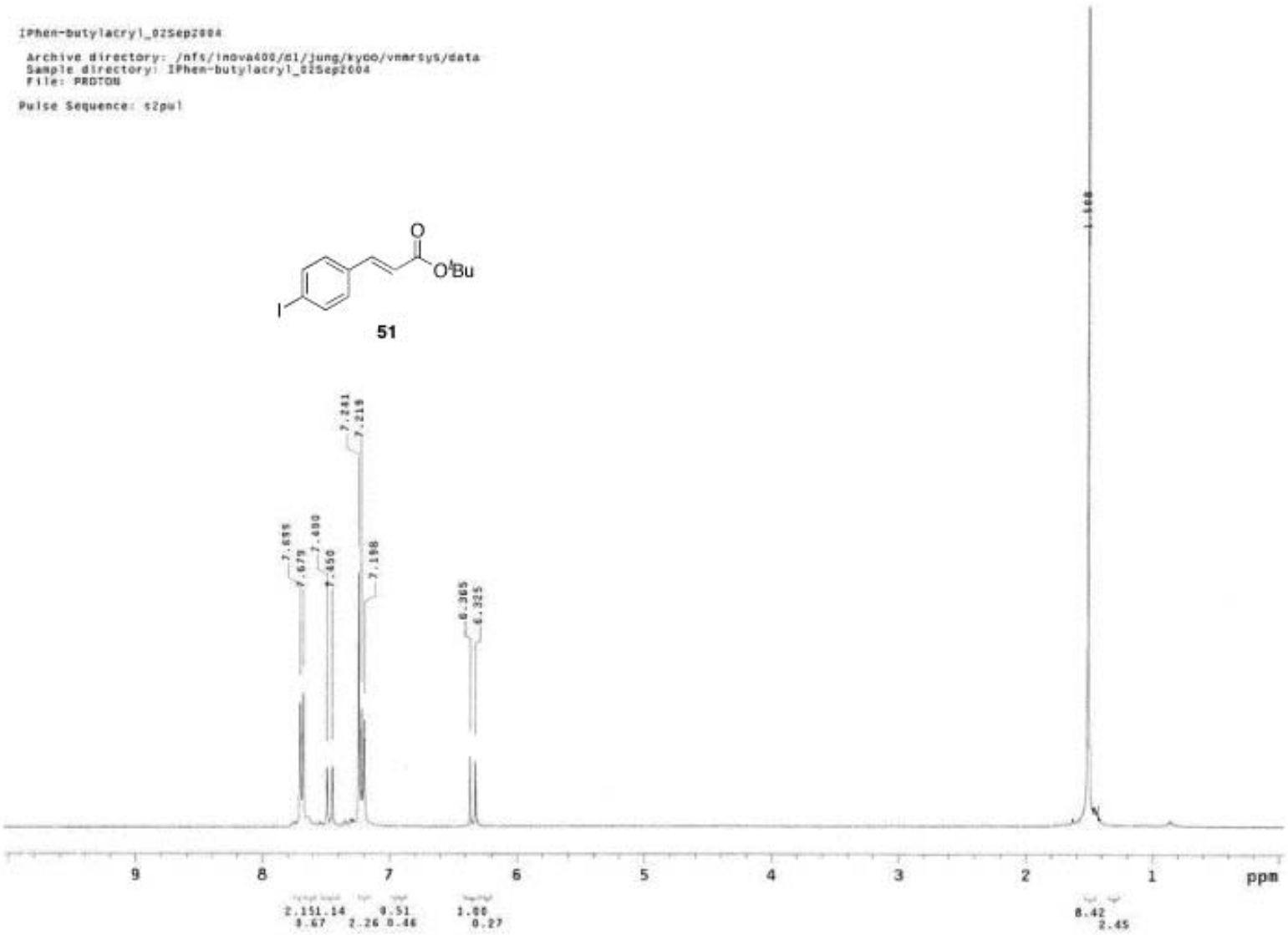
F2 - Processing parameters
SI 15384
SF 250.1300280 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

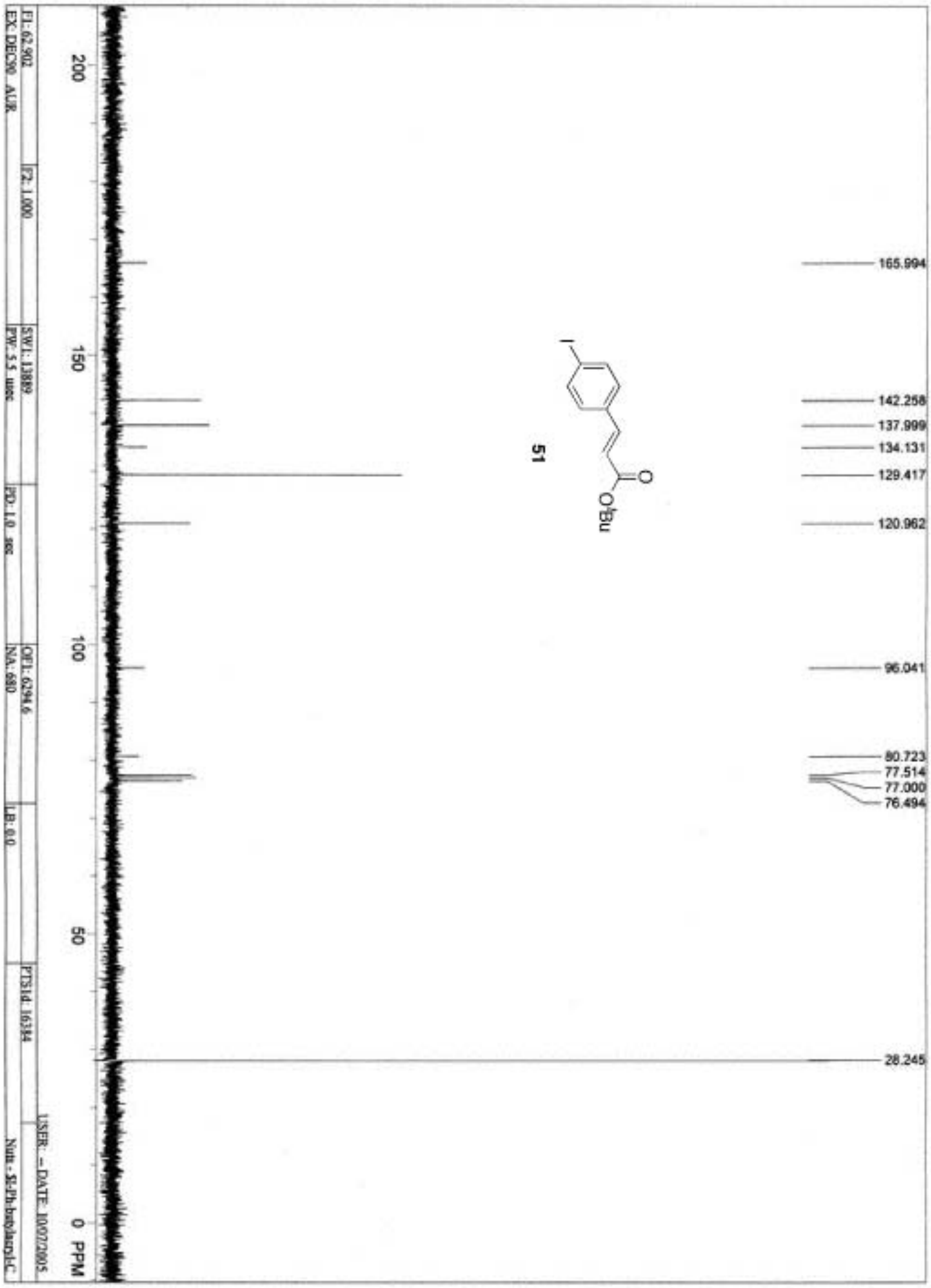
1D NMR plot parameters
CX 20.00 cm
F1P 10.000 ppm
F1 2501.32 Hz
F2P 0.000 ppm
F2 0.00 Hz
PPMCM 0.50000 ppm/cm
HZCM 125.06502 Hz/cm


47
ppm
200.542
157.658
139.243
131.350
126.376
77.491
76.982
76.474
37.669
32.947
30.981
24.996
22.311
22.244
13.865


gu_17Aug2004
Archive directory: /nfs/inova400/d1/jung/cyboon/vnmrsys/data
Sample directory: gu_17Aug2004
File: PROTON
Pulse Sequence: s2pul
7.532
7.524
7.514
7.509
7.401
7.393
7.386
7.249
6.404
2.776
2.762
2.748
2.469
2.473
2.456
2.176
2.169
2.143
2.128
1.542
4.74
1.08
2.15
2.17
2.24
1.62
48
O
ppm


199.924
159.847
138.684
130.023
128.671
126.000
125.301
115.387
77.503
77.001
76.496
37.150
28.023
22.726
48
O
200
150
100
50
0 PPM
EX: DEC90_AUR
F1: 62.902
F2: 1.000
PW: 5.5 usec
SW1: 13889
PD: 1.0 sec
OF1: 6290.1
NA: 2590
LB: 0.0
PTS1d: 16384
USER: -- DATE: 04/25/2006
Nuts - 3060425.002


IPhen-butylacryl_02Sep2004
Archive directory: /nfs/inova400/cl/jung/kyoo/vnmrsys/data
Sample directory: IPhen-butylacryl_02Sep2004
File: PROTON
Pulse Sequence: s2pul
O
O
tBu
I
51
7.655
7.679
7.490
7.450
7.241
7.219
7.198
6.365
6.325
1.468
9
8
7
6
5
4
3
2
1
ppm
2.15
1.14
0.67
2.26
0.51
0.46
1.00
0.27
8.42
2.45


165.994
142.258
137.999
134.131
129.417
120.962
96.041
80.723
77.514
77.000
76.494
28.245
51
O
OᵗBu
I
200
150
100
50
0 PPM
SW1: 13889
PW: 5.5 usec
PD: 1.0 sec
OF1: 6294.6
NA: 680
LB: 0.0
PTS1d: 16384
USER: -- DATE: 10/07/2005
F2: 1.000
EX: DEC90 AUR