

A Click Approach to Chiral Dendronized Polyfluorene Derivatives

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1. General Experimental

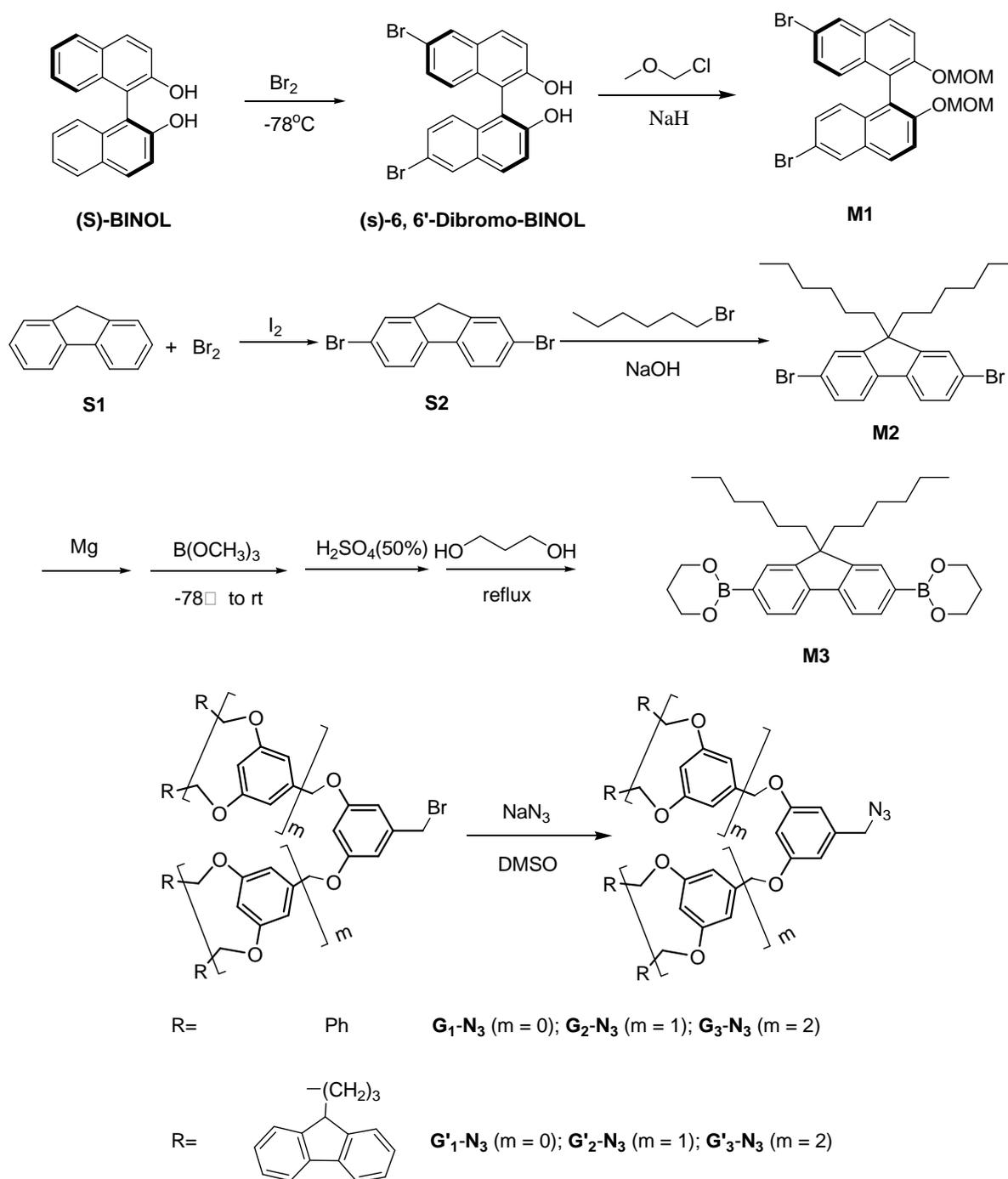
Materials. All chemicals were purchased from Acros or Aldrich and used as received without further purification. (*S*)-6,6'-Dibromo-2,2'-bis(methoxymethyl)-1,1'-dinaphthol (**M1**),^[1] 2,7-dibromo-9-fluorene (**S2**),^[2] 2,7-dibromo-9,9-dihexylfluorene (**M2**),^[2] 9,9-dihexylfluorene-2,7-bis(trimethylene boronate) (**M3**),^[2] Fréchet's dendritic bromides^[3] and azides (**G₁-N₃** ~ **G₃-N₃** and **G'₁-N₃** ~ **G'₃-N₃**)^[4] were synthesized according to the published methods. All reactions were carried out under dry nitrogen atmosphere. All solvents used were dried using standard, published methods and were distilled under nitrogen atmosphere before use.

Characterization. The ¹H and ¹³C NMR spectra were recorded on a BRUKER Model ADVANCE DPX 300 spectrometer (300 MHz ¹H and 75 MHz ¹³C) using tetramethylsilane as an internal standard. All signals are reported in parts per million unit (ppm). IR spectra were recorded on a JASCO FT/IR-480 plus fourier transform infrared spectrometer. Optical rotations were measured with Perkin-Elmer341 digital polarimeter in tetrahydrofuran (THF) with sodium D light at room temperature. Circular dichroism (CD) spectra were recorded on a JASCO J-810 spectropolarimeter. The gel permeation chromatography (GPC) measurements were performed on Waters 410 system with RI (refractive index) detector against polystyrene standards with THF as an eluent. The polymers were also measured through a multidetector GPC apparatus equipped with a Postnava PN 1011 pump, a 5- μ m mixed-bed C column (Polymer Lab), and a Precision PD 2100 detector system [including an RI detector, two-angle static laser light scattering (TALLS) detectors at 15 and 90 degree, and a dynamic laser light scattering detector] with THF as the eluent at a flow rate of 1mL/min at 25 °C. Electronic absorption spectra were obtained on a Shimadzu UV-vis spectrometer model UV-1601PC. Fluorescence emission spectra were recorded in THF at 293K with a Hitachi F4500 fluorescence spectrophotometer. Fluorescence quantum yields (Φ_F) of the samples in toluene were measured by using 9, 10-diphenylanthracene ($\Phi_F = 0.9$ in cyclohexane)^[5] as standard. The films on quartz used for PL measurements were prepared by spin-coating with 10 mg/mL toluene solution at 2000 rpm. TGA

(NETZSCH STA 409C) and DSC (Perkin-Elmer 7 series thermal analyzers) measurements were performed under nitrogen atmosphere at a heating rate of 10 °C/min, respectively.

2. Synthesis.

Scheme S1. Synthetic routes to the monomers and other reaction mediates



Synthesis of M1. Under nitrogen, to a solution of NaH (429 mg, 70 wt%, 12.5 mmol) in THF (30 mL) was slowly added (S)-6,6'-dibromo-1,1'-bi-2-naphthol (2.143 g, 4.9 mmol) at 0 °C. After 5 min, chloromethyl methyl ether (0.9 mL, 12.4 mmol) was added. The mixture was stirred at rt for 12 h. A small amount of water was then slowly added to quench the reaction and the mixture was extracted with ethyl acetate. The organic layer was washed with brine. After removal of solvent by rotary evaporation, the product was recrystallized from hexane to afford **M1** (2.271 g, 70%) as a white solid.

^1H NMR (300 MHz, CDCl_3): δ = 8.03 (d, J = 1.9 Hz, 2H, Ar-*H*), 7.86 (d, J = 9.1 Hz, 2H, Ar-*H*) 7.59 (d, J = 9.1 Hz, 2H, Ar-*H*), 7.29 (dd, J = 9.0 Hz, 2.0 Hz, 2H, Ar-*H*), 6.98 (d, J = 9.0 Hz, 2H, Ar-*H*), 5.09 (d, J = 6.9 Hz, 2H, OCH_2O), 4.98 (d, J = 6.9 Hz, 2H, OCH_2O), 3.15 (s, 6H, OCH_3).

^{13}C NMR (75 MHz, CDCl_3): δ = 153.0, 132.4, 130.9, 129.9, 129.7, 128.7, 127.2, 120.7, 118.1, 118.0, 95.0, 55.9.

Synthesis of S2. To a stirred solution of **S1** (20.058 g, 120 mmol) and I_2 (about 0.1 g) in CH_2Cl_2 (400 mL) was slowly added bromine (52.870 g, 334 mmol) in CH_2Cl_2 (100 mL) at room temperature. Because it is an exothermic reaction, any rapid addition of bromine should be avoided. The solution was stirred at room temperature for 24 h in the dark, and then aqueous Na_2SO_3 was added. Vigorous stirring was applied until the red color disappeared. The organic layer was separated, washed with water, NaHCO_3 aq and brine, and finally dried over anhydrous Na_2SO_4 . After the solvent was removed under reduced pressure, the product was purified by recrystallization from petroleum ether to yield a white crystalline product of **S2** (38.520 g, 99%).

^1H NMR (300 MHz, CDCl_3): δ = 7.65 (s, 2H, Ar-*H*), 7.59 (d, J = 8.1 Hz, 2H, Ar-*H*), 7.49 (d, J = 8.2 Hz, 2H, Ar-*H*), 3.85 (s, 2H).

^{13}C NMR (75 MHz, CDCl_3): δ = 144.8, 139.7, 130.1, 128.3, 121.2, 121.0, 36.6.

Synthesis of M2. A mixture of **S2** (38.520 g, 118 mmol) and tetrabutylammonium iodide (2.6 g) in DMSO (160 mL) and aqueous NaOH (80 mL, 50%, w/w) was purged with nitrogen. 1-Bromohexane

(80.360 g, 416 mmol) was then added to the mixture using a syringe. The resulting solution was stirred at 35 °C for 24 h before 160 mL of H₂O was added. The solution was then extracted with diethyl ether (2 x 200 mL). The combined organic layer was washed with brine and dried over anhydrous Na₂SO₄. After the solvent was removed under reduced pressure, the crude product was purified by column chromatography using petroleum ether as eluent to yield a colorless oil of **M2** (53.814 g, 80%).

¹H NMR (300 MHz, CDCl₃): δ = 7.52 (dd, J = 6.7 Hz, 1.9 Hz, 2H, Ar-*H*), 7.49 (s, 2H, Ar-*H*), 7.45 (dd, J = 6.7 Hz, 1.8 Hz, 2H, Ar-*H*), 1.94-1.86 (m, 4H), 1.13-1.03 (m, 12H), 0.78 (t, J = 7.0 Hz, 6H), 0.60-0.55 (m, 4H).

¹³C NMR (75 MHz, CDCl₃): δ = 152.6, 139.1, 130.2, 126.2, 121.5, 121.1, 55.7, 40.2, 31.5, 29.6, 23.7, 22.6, 14.0.

Synthesis of M3. In a two-necked flask was charged with **M2** (22.406 g, 46 mmol), magnesium turnings (2.295 g, 96 mmol) and dry THF (100 mL) under nitrogen. The reaction was initiated by the addition of minimal iodine. The resulting mixture was heated under reflux for 2 h and then added to a solution of trimethyl borate (14.340 g, 138 mmol) in dry THF (50 mL) which was already cooled to -78 °C. This reaction mixture was stirred at room temperature for 24 h. Then, H₂SO₄ (50 mL, 50 %) was added to the mixture carefully. The organic layer was separated and dried over anhydrous Na₂SO₄. Purification was performed by a silica gel column eluting with acetone/petroleum ether from 1/9 to 1/3 (v/v) to give the boric acid. Then, esterification was carried out by reacting the resulting boric acid with 1,3-propanediol (7.388 g, 97 mmol) in 150 mL toluene at refluxing temperature for 24 h. After the solvent was distilled, the residue was extracted with diethyl ether (200 mL). The solvent was evaporated to afford **M3** (12.666 g, 56%) as a white solid without further purification.

¹H NMR (300 MHz, CDCl₃): δ = 7.77-7.68 (m, 6H, Ar-*H*), 4.20 (t, J = 5.4 Hz, 8H), 2.13-2.05 (m, 4H), 2.02-1.97 (m, 4H), 1.12-1.05 (m, 12H), 0.75 (t, J = 7.0 Hz, 6H), 0.58-0.56 (m, 4H).

^{13}C NMR (75 MHz, CDCl_3): $\delta = 150.3, 143.5, 132.3, 127.9, 119.2, 62.0, 54.9, 40.4, 31.6, 29.8, 27.5, 23.7, 22.6, 14.0$.

General Procedure for the Synthesis of Dendritic Azides

A mixture of the corresponding dendronized bromide and NaN_3 in DMSO was heated to $55\text{ }^\circ\text{C}$ under nitrogen and stirred overnight. The reaction mixture was cooled, then poured into water, and extracted with dichloromethane. The combined organic layer was dried with anhydrous sodium sulfate and evaporated to dryness. The crude product was purified by flash column chromatography.

Preparation of $\text{G}_1\text{-N}_3$. $\text{G}_1\text{-Br}$ (1 g, 2.61 mmol) and NaN_3 (1.531g, 23.63 mmol) were used. The crude product was purified by a silica gel column chromatography eluting with CH_2Cl_2 /petroleum ether (1/2) to afford $\text{G}_1\text{-N}_3$ (0.782 g, 87%) as a white solid.

^1H NMR (300 MHz, CDCl_3): $\delta = 7.48\text{-}7.37$ (m, 10H, Ph-*H*), 6.64-6.60 (m, 3H, Ar-*H*), 5.07 (s, 4H, Ph CH_2O), 4.29 (s, 2H, Ar H_2N_3).

^{13}C NMR (75 MHz, CDCl_3): $\delta = 160.3, 137.7, 136.7, 128.7, 128.1, 127.6, 107.3, 101.9, 70.2, 54.9$.

IR (thin film): 3064, 3033, 2929, 2873, 2098 (ν_{N_3}), 1955, 1875, 1811, 1598, 1496, 1450, 1377, 1347, 1293, 1214, 1157, 1057, 986, 908, 835, 738, 698, 634.

Preparation of $\text{G}_2\text{-N}_3$. $\text{G}_2\text{-Br}$ (0.3 g, 0.37 mmol) and NaN_3 (0.145 g, 2.2 mmol) were used. The crude product was purified by a silica gel column chromatography eluting with CH_2Cl_2 /petroleum ether (1/2) to afford $\text{G}_2\text{-N}_3$ (0.232 g, 81%) as a white foam.

^1H NMR (300 MHz, CDCl_3): $\delta = 7.44\text{-}7.30$ (m, 20H, Ph-*H*), 6.68-6.54 (m, 9H, Ar-*H*), 5.04 (s, 8 H, Ph CH_2O), 4.98 (s, 4H, Ar CH_2O), 4.26 (s, 2H, Ar CH_2N_3).

^{13}C NMR (75 MHz, CDCl_3): $\delta = 160.2, 160.2, 139.1, 137.7, 136.8, 128.6, 128.0, 127.6, 107.2, 106.4, 101.9, 101.6, 70.1, 70.0, 54.8$.

IR (thin film): 3032, 2924, 2872, 2098 (ν_{N_3}), 1814, 1726, 1662, 1596, 1531, 1448, 1374, 1345, 1296, 1212, 1156, 1052, 833, 737, 698, 659, 634.

Preparation of G₃-N₃. G₃-Br (0.5 g, 0.3 mmol) and NaN₃ (0.177 g, 2.7 mmol) were used. The crude product was purified by a silica gel column chromatography eluting with CH₂Cl₂/petroleum ether (2/3) to afford G₃-N₃ (0.400 g, 82%) as a white foam.

¹H NMR (300 MHz, CDCl₃): δ = 7.42-7.30 (m, 40H, Ph-*H*), 6.68-6.54 (m, 21H, Ar-*H*), 5.02 (s, 16H, PhCH₂O), 4.96-4.92 (m, 12H, ArCH₂O), 4.23 (s, 2H, ArCH₂N₃). ¹³C NMR (75 MHz, CDCl₃): δ = 160.2, 160.2, 139.3, 139.2, 137.8, 136.9, 128.6, 128.3, 128.2, 128.0, 127.8, 127.6, 107.3, 106.5, 101.9, 101.7, 70.2, 70.1, 54.8.

IR (thin film): 3050, 2934, 2874, 2098 (ν_{N_3}), 1889, 1771, 1597, 1483, 1456, 1377, 1330, 1297, 1266, 1238, 1161, 1058, 928, 835, 750, 726, 617.

Preparation of G'₁-N₃. G'₁-Br (0.333 g, 0.5 mmol) and NaN₃ (0.302 g, 4.6 mmol) were used. The crude product was purified by a silica gel column chromatography eluting with CH₂Cl₂/petroleum ether (2/3) to afford G'₁-N₃ (0.231 g, 83%) as a white solid.

¹H NMR (300 MHz, CDCl₃): δ = 8.09 (d, J = 7.7 Hz, 4H, carbazole Ar-*H*), 7.48-7.39 (m, 8H, carbazole Ar-*H*), 7.25-7.19 (m, 4H, carbazole Ar-*H*), 6.38-6.31 (m, 3H, Ar-*H*), 4.39 (t, J = 7.0 Hz, 4H, ArOCH₂), 4.21 (s, 2H, CH₂N₃), 3.91 (t, J = 6.1 Hz, 4H, ArNCH₂), 2.13-2.03 (m, 4H, CH₂), 1.88-1.79 (m, 4H, CH₂).

¹³C NMR (75 MHz, CDCl₃): δ = 160.4, 140.4, 137.6, 125.7, 122.9, 120.4, 118.9, 108.6, 106.7, 101.1, 67.6, 54.8, 42.7, 27.0, 25.9.

IR (thin film): 3051, 2940, 2875, 2098 (ν_{N_3}), 1890, 1771, 1598, 1484, 1457, 1383, 1330, 1295, 1240, 1165, 1124, 1165, 1124, 1063, 999, 927, 835, 750, 725, 617.

Preparation of G'2-N3. G'2-Br (0.496 g, 0.37 mmol) and NaN₃ (0.145 g, 2.2 mmol) were used. The crude product was purified by a silica gel column chromatography eluting with CH₂Cl₂/petroleum ether (1/1) to afford G'2-N₃ (0.412 g, 86%) as a white foam.

¹H NMR (300 MHz, CDCl₃): δ = 8.08 (d, *J* = 7.7 Hz, 8H, carbazole Ar-*H*), 7.47-7.38 (m, 16H, carbazole Ar-*H*), 7.23-7.19 (m, 8H, carbazole Ar-*H*), 6.51-6.31 (m, 9H, Ar-*H*), 4.90 (s, 4H, ArCH₂O), 4.37 (t, *J* = 6.9 Hz, 8H, ArOCH₂), 4.22 (s, 2H, ArCH₂N₃), 3.89 (t, *J* = 5.9 Hz, 8H, ArNCH₂), 2.08-2.01 (m, 8H, CH₂), 1.83-1.78 (m, 8H, CH₂).

¹³C NMR (75 MHz, CDCl₃): δ = 160.3, 160.2, 140.4, 139.0, 137.7, 125.7, 122.9, 120.4, 118.9, 108.7, 107.2, 105.9, 101.9, 101.0, 70.1, 67.6, 54.8, 42.7, 27.0, 25.9.

IR (thin film): 3050, 2938, 2874, 2098 (ν_{N₃}), 1888, 1597, 1483, 1456, 1379, 1329, 1296, 1267, 1239, 1160, 1059, 928, 835, 749, 726, 620.

Preparation of G'3-N3. G'3-Br (0.5 g, 0.18 mmol) and NaN₃ (0.152 g, 2.3 mmol) were used. The crude product was purified by a silica gel column chromatography eluting with CH₂Cl₂ to afford G'3-N₃ (0.358 g, 73%) as a white foam.

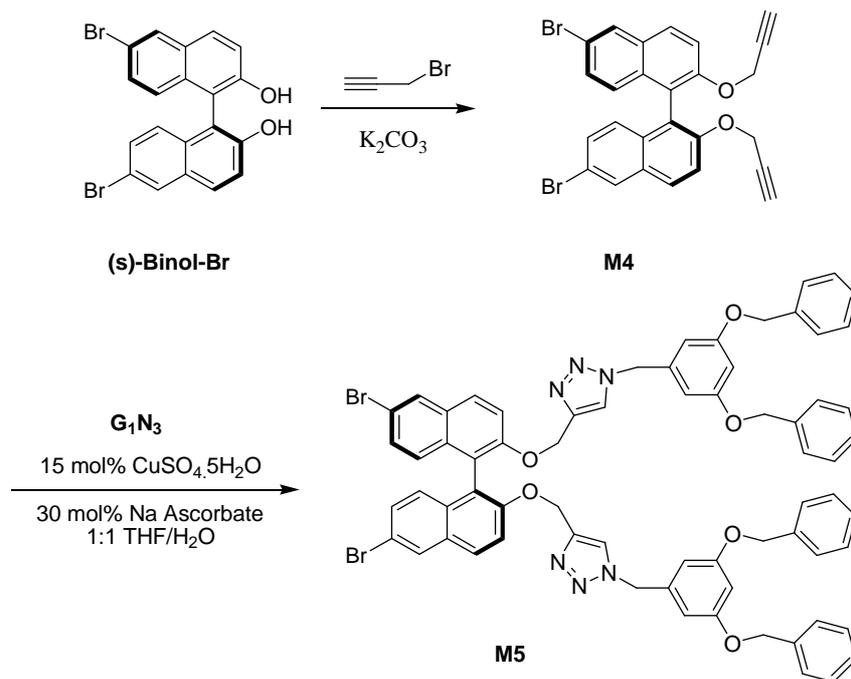
¹H NMR (300 MHz, CDCl₃): δ = 8.06 (d, *J* = 7.7 Hz, 16H, carbazole Ar-*H*), 7.45-7.35 (m, 32H, carbazole Ar-*H*), 7.22-7.17 (m, 16H, carbazole Ar-*H*), 6.64-6.29 (m, 21H, Ar-*H*), 4.89 (s, 12H, ArCH₂O), 4.32 (t, *J* = 7.0 Hz, 16H, ArOCH₂), 4.16 (s, 2H, CH₂N₃), 3.84 (t, *J* = 6.0 Hz, 16H, ArNCH₂), 2.06-1.96 (m, 16H, CH₂), 1.81-1.72 (m, 16H, CH₂).

¹³C NMR (75 MHz, CDCl₃): δ = 160.4, 160.3, 140.5, 139.2, 137.8, 126.2, 125.8, 123.0, 120.5, 119.3, 119.0, 108.8, 107.3, 106.6, 106.0, 102.0, 101.8, 101.0, 70.2, 67.6, 54.8, 42.7, 27.0, 25.9.

IR (thin film): 3050, 2397, 2874, 2098 (ν_{N₃}), 1890, 1770, 1597, 1483, 1456, 1377, 1330, 1297, 1265, 1268, 1161, 1058, 929, 835, 750, 727, 618.

Synthesis of Dendritic Model Monomer M5

Scheme S2.



Synthesis of M4. To a solution of (S)-6,6'-dibromo-BINOL (0.500 g, 1.1 mmol) and K₂CO₃ (0.932 g, 6.8 mmol) in acetone was added propargyl bromide (0.25 mL, 2.4 mmol). The mixture was refluxed for 12 h till the reaction was completed (monitored by TLC). After most of the solvent was evaporated under reduced pressure, water was added to the mixture. The aqueous layer was extracted with CH₂Cl₂ three times, and the combined organic layer was washed with brine and dried over anhydrous Na₂SO₄. Purification was performed by a silica gel column eluting with petroleum ether, and then AcOEt/petroleum ether (1/5) to afford **M4** (0.352 g, 60%) as a white solid.

¹H NMR (300 MHz, CDCl₃): δ = 8.03 (s, 2H, Ar-H), 7.89 (d, *J* = 9.0 Hz, 2H, Ar-H), 7.58 (d, *J* = 9.0 Hz, 2H, Ar-H), 7.28 (d, *J* = 9.2 Hz, 2H, Ar-H), 6.97 (d, *J* = 9.0 Hz, 2H, Ar-H), 4.67-4.55 (m, 4H, ArOCH₂), 2.40 (s, 2H, terminal alkyne CH)

¹³C NMR (75 MHz, CDCl₃): δ = 153.3, 132.3, 130.8, 129.9, 129.9, 128.7, 127.2, 120.1, 118.0, 116.7, 78.9, 75.6, 57.0.

Synthesis of M5. To a suspension of **M4** (0.2 g, 0.38 mmol) and G₁N₃ (0.266 g, 0.77 mmol) in a mixture of water (5 mL) and THF (5 mL) was added sodium ascorbate (26 mg, 30 mol%), and followed

by $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (30 mg, 15 mol%). The resulting solution was stirred for 5 h, and then extracted with diethyl ether. The combined organic layer was washed with brine and dried over anhydrous Na_2SO_4 . After the solvent was removed under reduced pressure, the crude product was purified by column chromatography using petroleum ether/ CH_2Cl_2 (1/2) as eluent to yield a white foam of **M5** (444 mg, 96%).

^1H NMR (300 MHz, CDCl_3): δ = 7.91 (d, J = 1.9 Hz, 2H, binaphthyl Ar-*H*), 7.74 (d, J = 9.0 Hz, 2H, binaphthyl Ar-*H*), 7.45-7.32 (m, 22H, 2H for binaphthyl Ar-*H* and 20H for dendron Ph-*H*), 7.20 (dd, J = 9.0 Hz, 2.0 Hz, 2H, binaphthyl Ar-*H*), 6.90 (d, J = 9.0 Hz, 2H, binaphthyl Ar-*H*), 6.61 (s, 4H, 2H for dendron Ar-*H* and 2H for *CH*), 6.36 (d, J = 2.1 Hz, 4H, dendron Ar-*H*), 5.24-5.12 (m, 4H, ArOCH_2), 5.10-5.06 (m, 4H, ArCH_2O), 4.96 (s, 8H, ArCH_2N).

^{13}C NMR (75 MHz, CDCl_3): δ = 160.4, 153.8, 144.7, 136.7, 136.4, 132.3, 130.5, 130.0, 129.8, 128.8, 128.7, 128.2, 127.6, 127.0, 122.5, 120.1, 117.7, 116.7, 107.1, 102.3, 70.2, 63.6, 54.0.

Preparation of Polyfluorene (PF). For comparison, PF was also synthesized. To a mixture of monomers **M1** (280 mg, 0.57 mmol), **M2** (290 mg, 0.57 mmol) in toluene (20 mL) was added Aliquate336, aqueous sodium carbonate (2 M, 12 mL) and $\text{Pd}(\text{PPh}_3)_4$ (13.0 mg) under nitrogen atmosphere. The reaction mixture was heated at 90 °C and stirred under nitrogen for 3-5 days. The mixture was poured into a stirred mixture of methanol and water (10:1, v/v) to precipitate the solid product. The product was collected by filtration and washed with methanol and water. Then the polymer was extracted by acetone in Soxhlet for 24 h and dried under vacuum at 50 °C, giving **PF** (280 mg, 76%) as a light yellow solid.

^1H NMR (300 MHz, CDCl_3): δ = 7.86-7.83 (br, m, 2H, Ar-*H*), 7.71-7.60 (br, m, 4H, Ar-*H*), 2.13 (br, 4H, CH_2), 1.14 (br, m, 12H, CH_2), 0.82-0.78 (br, m, 10H, CH_2 and CH_3).

^{13}C NMR (75 MHz, CDCl_3): δ = 151.8, 140.5, 140.0, 126.2, 121.5, 120.0, 55.3, 40.4, 31.5, 29.7, 23.9, 22.6, 14.0.

Preparation of PFMOM. A mixture of the respective monomers **M1** (0.355 g, 0.667 mmol, 1 equiv), **M2** (0.656 g, 1.333 mmol, 2 equiv), **M3** (1.0046 g, 2.000 mmol, 3 equiv), Aliquate336 (methyltrioctylammonium chloride, $\text{CH}_3\text{N}[(\text{CH}_2)_7\text{CH}_3]_2\text{Cl}$), toluene (25 mL), and aqueous potassium carbonate solution (2M, 12mL) were degassed, and then $\text{Pd}(\text{PPh}_3)_4$ (40.8 mg, 2 mol %) was added under nitrogen atmosphere. The reaction mixture was heated at 90 °C and stirred under nitrogen for 3 days. The mixture was poured into a stirred mixture of methanol and water (10:1, v/v) to precipitate the solid product. The solid was collected by filtration and washed with methanol and water. Then the polymer was extracted by acetone in Soxhlet for 24 h and dried under vacuum at 50 °C to afford brown solid (1.302 g, 96% yield).

^1H NMR (300 MHz, CDCl_3): δ = 8.20 (br, m, 0.4H, binaphthyl Ar-*H*), 8.10-8.07 (br, m, 0.4H, binaphthyl Ar-*H*), 7.84-7.82 (br, m, 2H, fluorene Ar-*H*), 7.68-7.61 (br, m, 4.8H, binaphthyl and fluorene Ar-*H*), 5.16-5.07 (br, m, 0.8H, ArOCH_2O), 3.25-3.19 (br, m, 1.2H, CH_2O), 2.17-2.11 (br, m, 4H, CH_2), 1.26-1.14 (br, m, 12H, CH_2), 0.80-0.78 (br, m, 10H, CH_2 and CH_3).

^{13}C NMR (75 MHz, CDCl_3): δ = 152.9, 151.8, 140.6, 140.0, 139.9, 137.3, 133.3, 130.3, 129.8, 128.8, 127.2, 126.2, 125.6, 121.6, 121.3, 120.0, 117.9, 95.5, 68.0, 55.9, 55.4, 40.4, 31.5, 29.7, 25.6, 23.9, 22.6, 14.0.

Preparation of PFOH. To a solution of **PFMOM** (1.302 g, 0.6 mmol for repeating unit) in CH_2Cl_2 (40 mL) was slowly added trifluoroacetic acid (TFA, 2.4 mL) at room temperature. The reaction mixture was stirred overnight, and then aqueous NaHCO_3 was added. The mixture was poured into a stirred mixture of methanol and water (5:1, v/v) to precipitate the solid product. The solid was collected by filtration and washed with methanol and water. Then the polymer was dried under vacuum at 50 °C to afford a fibroid gray solid (1.208 g, 96% yield).

^1H NMR (300 MHz, CDCl_3): δ = 8.21 (br, m, 0.4H, binaphthyl Ar-*H*), 8.13-8.11 (br, m, 0.4H, binaphthyl Ar-*H*), 7.83-7.77 (br, m, 2H, fluorene Ar-*H*), 7.68-7.61 (br, m, 4.4H, binaphthyl and fluorene

Ar-*H*), 7.50-7.47 (br, m, 0.4H, binaphthyl Ar-*H*), 7.35-7.33 (br, m, 0.4H, binaphthyl Ar-*H*), 5.22 (br, m, 0.4H, ArOH), 2.11 (br, m, 4H, CH₂), 1.26-1.14 (br, m, 12H, CH₂), 0.80-0.77 (br, m, 10H, CH₂ and CH₃).

¹³C NMR (75 MHz, CDCl₃): δ = 152.9, 151.8, 140.6, 140.0, 132.6, 131.8, 129.9, 127.4, 126.2, 124.9, 121.5, 120.0, 118.3, 110.9, 55.3, 40.4, 31.5, 29.7, 23.9, 22.6, 14.0.

Preparation of PFYNE. Under nitrogen, to a suspension of NaH (82.3 mg, 70 wt%, 2.4 mmol) in THF (25 mL) and DMF (5 mL) was slowly added **PFOH** (300 mg, 0.16 mmol for repeating unit) at 0 °C. After stirring for about 2 h, propargyl bromide (0.259 mL, 2.4 mmol) was slowly added. The mixture was stirred in dark at room temperature for more than 2 days. A small amount of water was then slowly added to quench the reaction. The mixture was poured into methanol to precipitate the solid product. The solid was collected by filtration and washed with methanol. The resulting solid was redissolved in a small amount of THF. After removing the gel-like insoluble material,* the solution was reprecipitated into methanol, affording the desired linear **PFYNE**. Then, the polymer was dried under vacuum at 50 °C to afford **PFYNE** as a gray solid (233 mg, 72% yield). [* The gel-like insoluble material might be cross-linked polymer due to the coupling reaction between the terminal alkyne groups under the reaction conditions. It was found that the light improved the formation of this gel-like material.]

¹H NMR (300 MHz, CDCl₃): δ = 8.19-8.10 (br, m, 0.8H, binaphthyl Ar-*H*), 7.83-7.81 (br, m, 2H, fluorene Ar-*H*), 7.67-7.61 (br, m, 4.8H, binaphthyl and fluorene Ar-*H*), 7.49-7.31 (br, m, 0.4H, binaphthyl Ar-*H*), 4.68 (br, m, 0.8H, binaphthyl ArOCH₂), 2.45 (br, m, 0.4H, CH), 2.26-2.04 (br, m, 4H, CH₂), 1.25-0.95 (br, m, 12H, CH₂), 0.79-0.77 (br, m, 10H, CH₂ and CH₃).

¹³C NMR (75 MHz, CDCl₃): δ = 151.8, 140.5, 140.0, 137.3, 132.3, 126.2, 121.5, 120.6, 120.0, 79.3, 75.3, 57.4, 55.3, 40.4, 31.5, 29.7, 23.8, 22.6, 14.0.

IR (thin film): 3305 (ν_{=C-H}), 2925, 2855, 2123 (ν_{C=C}), 1892, 1596, 1459, 1372, 1340, 1273, 1220, 1141, 1094, 1054, 938, 886, 815, 751, 669, 629.

General procedure for the synthesis of PFG₂ and PFG₃

The corresponding dendritic azide **G_m-N₃** and **PFYNE** were dissolved in THF (1 mL per about 20 mg of reaction mixture). To this solution, a little amount of water was added while stirring vigorously at 25 °C. Sodium ascorbate (10 mol%) and CuSO₄·5H₂O (5 mol%) were then added to the reaction mixture from freshly prepared aqueous solutions (1.0 M). The reaction mixture was stirred for 1 day (**PFG₂**) or 2 days (**PFG₃**). The crude product was evaporated to dryness and washed with water for times. The dendronized polymer was precipitated into hexane from THF for several times to remove excess dendritic azide.

Preparation of PFG₂. **G₂-N₃** (23.0 mg, 0.030 mmol) and **PFYNE** (30.0 mg, 0.015 mmol) were used to afford a yellow solid (46.7 mg, 87% yield). $[\alpha]_D^{20} = + 110.2$ (*c* 0.27 THF)

¹H NMR (300 MHz, CDCl₃): $\delta = 8.21$ -8.11 (br, m, 0.8H, binaphthyl Ar-*H*), 7.83 (br, m, 2H, fluorene Ar-*H*), 7.67 (br, m, 5.2H, 4H for fluorene and 1.2H binaphthyl Ar-*H*), 7.35-7.30 (br, m, 8H, dendron Ph-*H*), 6.84 (br, m, 0.4H, triazole CH), 6.69 – 6.35 (br, m, 3.6 H, dendron Ar-*H*), 5.29-4.80 (br, m, 6.4H, 0.8H for binaphthyl ArOCH₂, 0.8H for ArCH₂N and 4.8H for ArCH₂O), 2.32-1.91 (br, m, 4H, CH₂), 1.12 (br, m, 12H, CH₂), 0.79 (br, m, 10H, CH₂ and CH₃).

¹³C NMR (100 MHz, CDCl₃): $\delta = 160.0, 151.7, 140.4, 139.8, 136.6, 128.4, 127.8, 127.4, 126.0, 121.4, 119.8, 106.2, 101.4, 69.9, 55.2, 40.2, 31.3, 29.5, 23.7, 22.4, 13.9$.

IR (thin film): 3063, 3032, 2952, 2926, 2855, 1733, 1596, 1496, 1457, 1375, 1342, 1295, 1252, 1216, 1157, 1049, 884, 815, 736, 696, 631.

Preparation of PFG₃. **G₃-N₃** (48.3 mg, 0.030 mmol) and **PYNE** (30.0 mg, 0.015 mmol) were used to afford a yellow solid (43.7 mg, 75% yield). $[\alpha]_D^{20} = + 72.0$ (*c* 0.25 THF)

¹H NMR (300 MHz, CDCl₃): $\delta = 8.06$ -8.04 (br, m, 0.8H, binaphthyl Ar-*H*), 7.93-7.83 (br, m, 2H, fluorene Ar-*H*), 7.67-7.55 (br, m, 5.2H, 4H for fluorene and 1.2H binaphthyl Ar-*H*), 7.31-7.06 (br, m, 16H, dendron Ph-*H*), 6.91 (br, m, 0.4H, triazole CH), 6.61 (br, m, 4.8H, dendron Ar-*H*), 6.50 (br, m,

2.8H, dendron Ar-*H*), 6.38 – 6.31 (br, m, 0.8 H, dendron Ar-*H*), 5.10-4.86 (br, m, 12.8H, 0.8H for binaphthyl ArOCH₂, 0.8H for ArCH₂N and 11.2H for ArCH₂O), 2.17-2.09 (br, m, 4H, CH₂), 1.13 (br, m, 12H, CH₂), 0.79-0.72 (br, m, 10H, CH₂ and CH₃).

¹³C NMR (100 MHz, CDCl₃): δ = 160.1, 160.0, 151.8, 140.0, 139.2, 136.7, 128.5, 128.0, 127.6, 126.2, 121.5, 106.4, 101.5, 70.0, 68.0, 55.3, 31.5, 29.7, 25.6, 23.9, 22.6, 14.0.

IR (thin film): 3033, 2926, 2859, 1954, 1886, 1599, 1455, 1373, 1335, 1217, 1155, 1049, 823, 740, 696, 628.

General procedure for the synthesis of PFG' and PFG'₃

The corresponding dendritic azide **G'_m-N₃** and **PFYNE** were dissolved in THF (1 mL per about 20 mg of reaction mixture). To this solution, bromotris(triphenylphosphine) copper(I) (10 mol% related to dendritic azide) and N,N-diisopropylethylamine (1 eqv. to dendritic azide) were then added while stirring vigorously. The reaction mixture was heated at 35 °C and stirred under nitrogen for 2 days. The crude product was evaporated to dryness and washed with water for several times. The dendronized polymer was precipitated into hexane from THF for times to remove excess dendritic azide.

Preparation of PFG'₂. **G'₂-N₃** (39.2 mg, 0.030 mmol) and **PFYNE** (30.0 mg, 0.015 mmol) were used to afford a gray solid (56.7 mg, 82% yield). $[\alpha]_D^{20} = +56.8$ (*c* 0.25 THF).

¹H NMR (300 MHz, CDCl₃): δ = 8.13-8.03 (br, m, 4H, 3.2H for dendron carbazole Ar-*H* and 0.8H for binaphthyl Ar-*H*), 7.90-7.83 (br, m, 2H, fluorene Ar-*H*), 7.67 (br, m, 5.2H, 4H for fluorene and 1.2H binaphthyl Ar-*H*), 7.40-7.31 (br, m, 6.4H, carbazole Ar-*H*), 7.17 (br, m, 3.2H, carbazole Ar-*H*), 6.44-6.27 (br, m, 4H, 0.4H for triazole CH and 3.6H for dendron Ar-*H*), 5.01-4.77 (br, m, 3.2H, 0.8H for binaphthyl ArOCH₂, 0.8H for dendron ArCH₂N and 1.6H for ArCH₂O), 4.37-4.27 (br, m, 3.2H, dendron ArOCH₂), 3.89-3.79 (br, m, 3.2H, carbazole ArNCH₂), 2.22-1.96 (br, m, 7.2H, 4H for fluorene CH₂ and 3.2H for dendron CH₂), 1.71 (br, m, 3.2H, dendron CH₂), 1.25-0.93 (br, m, 12H, fluorene CH₂), 0.79-0.71 (br, m, 10H, fluorene CH₂ and CH₃).

^{13}C NMR (100 MHz, CDCl_3): $\delta = 160.2, 151.8, 140.5, 140.3, 126.1, 126.1, 125.6, 122.8, 120.3, 118.8, 108.6, 105.8, 67.4, 55.3, 31.4, 29.6, 25.8, 25.8, 22.5, 14.0$.

IR (thin film): 3052, 2925, 2857, 1890, 1598, 1457, 1376, 1332, 1240, 1159, 1055, 885, 817, 747, 617.

Preparation of PFG'3. **G'3-N₃** (31.8 mg, 0.0149 mmol) and **PFYNE** (15.0 mg, 0.0074 mmol) were used to afford a gray solid (36.5 mg, 78% yield). $[\alpha]_{\text{D}}^{20} = +36.0$ (*c* 0.26 THF)

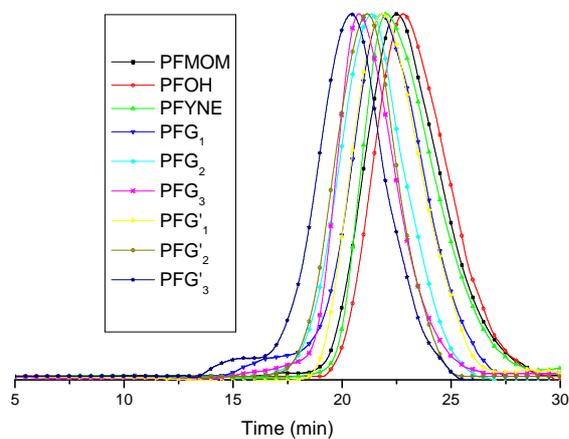
^1H NMR (300 MHz, CDCl_3): $\delta = 8.07\text{-}7.99$ (br, m, 7.2H, 6.4H for dendron carbazole Ar-*H* and 0.8H for binaphthyl Ar-*H*), 7.84 (br, m, 2H, fluorene Ar-*H*), 7.68 (br, m, 5.2H, 4H for fluorene and 1.2H binaphthyl Ar-*H*), 7.49-7.29 (br, m, 12.8H, carbazole Ar-*H*), 7.14 (br, m, 6.4H, carbazole Ar-*H*), 6.60 (br, m, 2H, 0.4H for triazole *CH* and 1.6H for dendron Ar-*H*), 6.50-6.42 (br, m, 5.2H, dendron Ar-*H*), 6.22 (br, m, 1.6H, dendron Ar-*H*), 4.81 (br, m, 6.4H, 0.8H for binaphthyl ArOCH_2 , 0.8H for dendron ArCH_2N and 4.8H for ArCH_2O), 4.19 (br, m, 6.4H, dendron ArOCH_2), 3.70 (br, m, 6.4H, carbazole ArNCH_2), 2.04-1.88 (br, m, 10.4H, 4H for fluorene CH_2 and 6.4H for dendron CH_2), 1.64 (br, m, 6.4H, dendron CH_2), 1.19-1.00 (br, m, 12H, fluorene CH_2), 0.88-0.69 (br, m, 10H, fluorene CH_2 and CH_3).

^{13}C NMR (75 MHz, CDCl_3): $\delta = 160.2, 140.3, 139.1, 131.8, 127.4, 125.6, 122.8, 120.3, 118.8, 108.6, 101.8, 105.9, 70.2, 67.5, 55.3, 42.6, 31.5, 29.7, 26.9, 25.7, 23.9, 22.5, 14.0$.

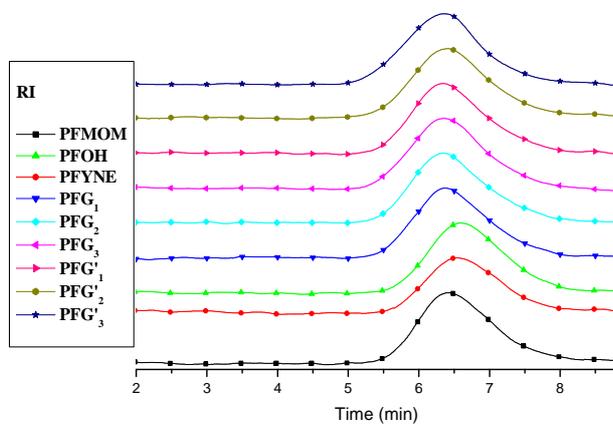
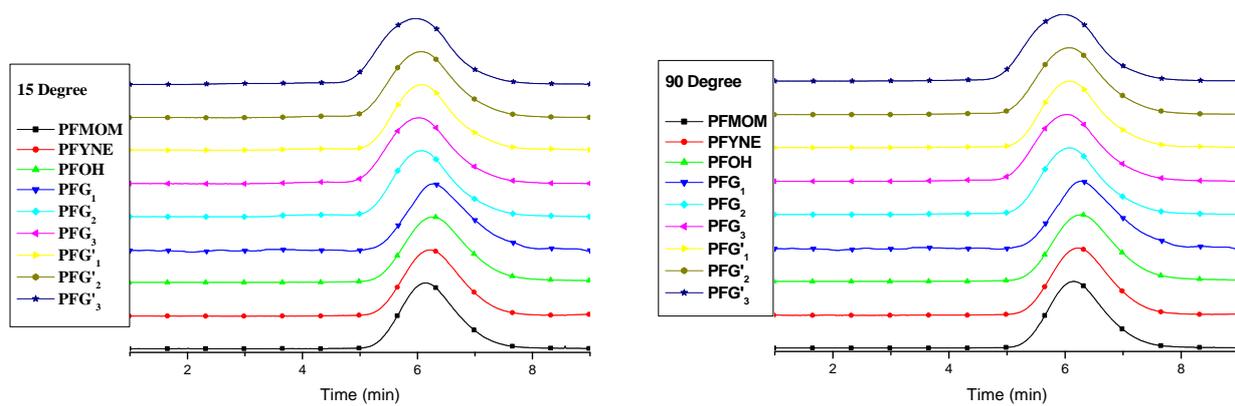
IR (thin film): 3051, 2952, 2926, 2870, 2855, 1888, 1696, 1596, 4184, 1453, 1377, 1346, 1326, 1296, 1238, 1190, 1165, 1154, 1120, 1058, 1022, 1002, 927, 884, 833, 815, 749, 723, 623, 617.

3. Physical Properties of Copolymers

Figure S1. GPC elution traces of the copolymers: (a) normalized RI GPC trace; (b) normalized TALLS-RI GPC trace



(a)



(b)

Table. Molecular Weights of the Copolymers Determined by GPC with RI and LS-Detection

Polymers	RI GPC			TALLS-RI GPC			
	Mn x 10 ⁻⁴	Mw x 10 ⁻⁴	PDI	Mn x 10 ⁻⁴	Mw x 10 ⁻⁴	PDI	Pw
PFMOM	7.30	12.30	1.7	5.00	6.60	1.3	32
PFOH	6.40	10.50	1.7	3.90	6.20	1.6	32
PFYNE	9.00	16.70	1.8	5.20	6.80	1.3	34
PFG₁	9.20	17.20	1.8	5.80	9.40	1.6	34
PFG₂	11.40	19.00	1.6	8.50	11.70	1.4	33
PFG₃	13.50	20.60	1.5	11.80	17.40	1.4	33
PFG'₁	10.20	17.14	1.6	7.90	10.30	1.3	32
PFG'₂	13.10	20.90	1.6	10.90	15.80	1.5	34
PFG'₃	13.80	23.80	1.7	14.40	23.30	1.6	32

Figure S2. TGA curves of the copolymers (Heating rate:10 K/min from 100 °C to 800 °C in nitrogen)

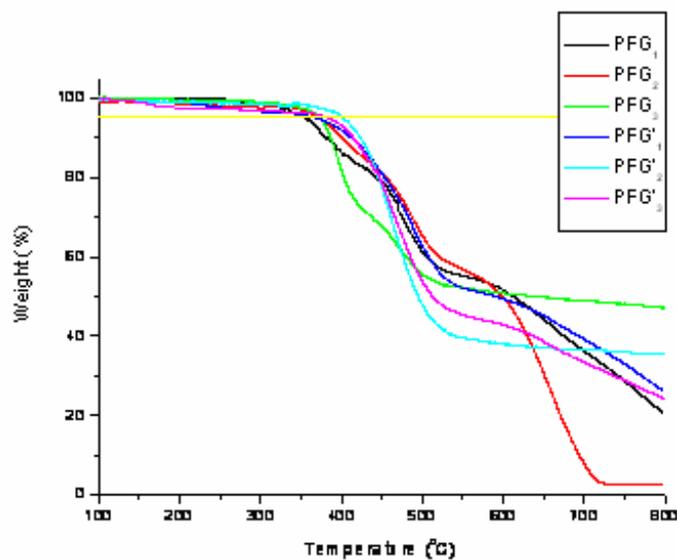
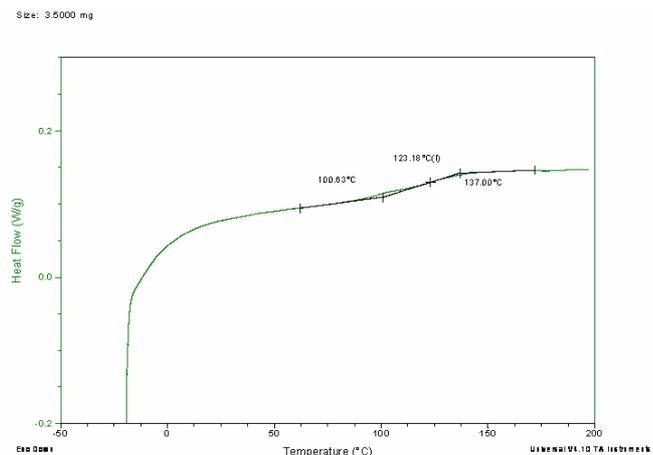
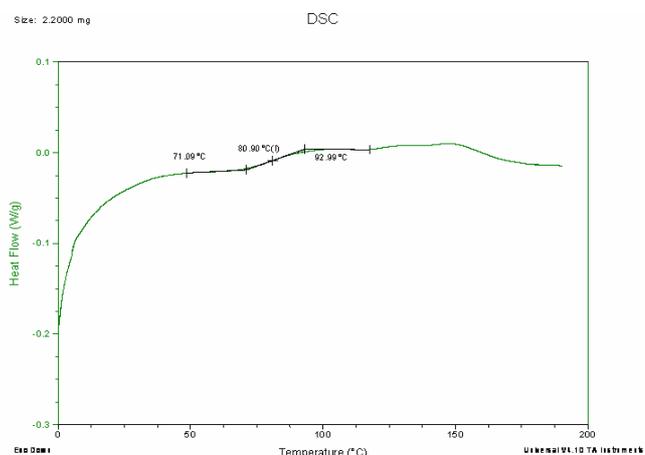


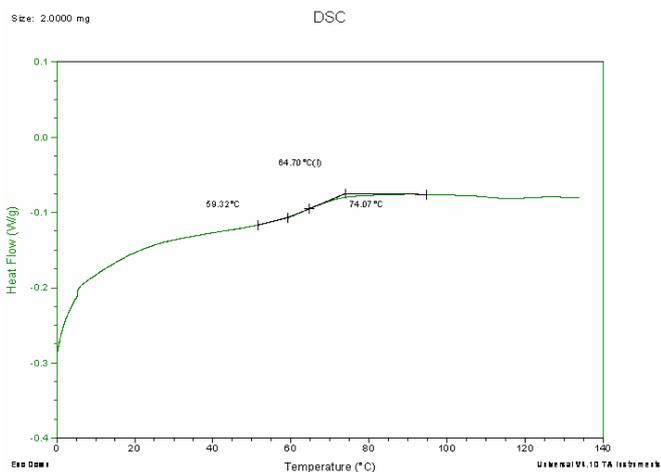
Figure S3. DSC curves of the copolymers (Second-heating DSC curves of the copolymers with a heating rate of 10 K/min in nitrogen).



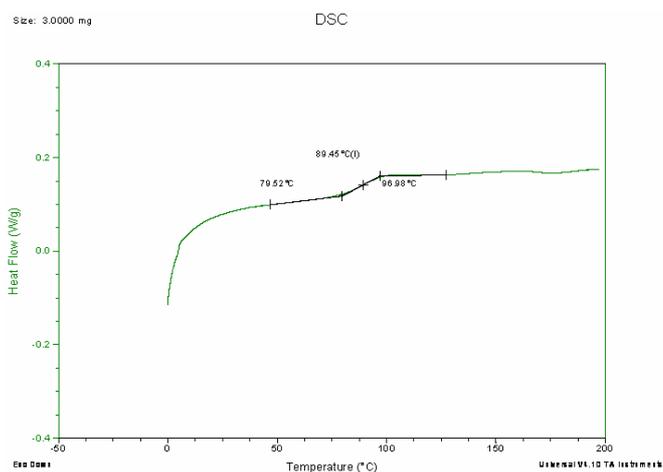
PFG₁



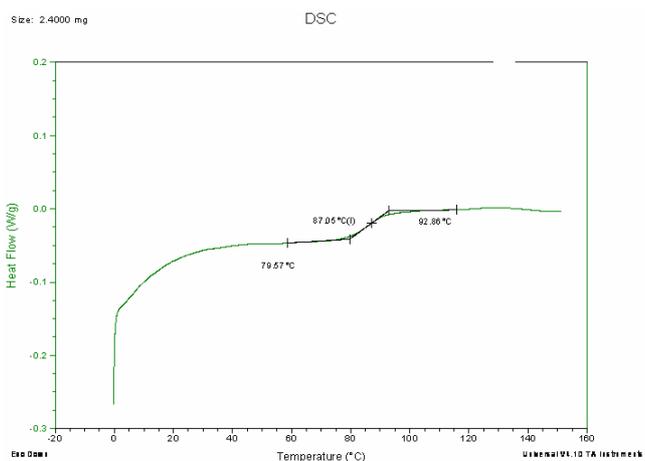
PFG₂



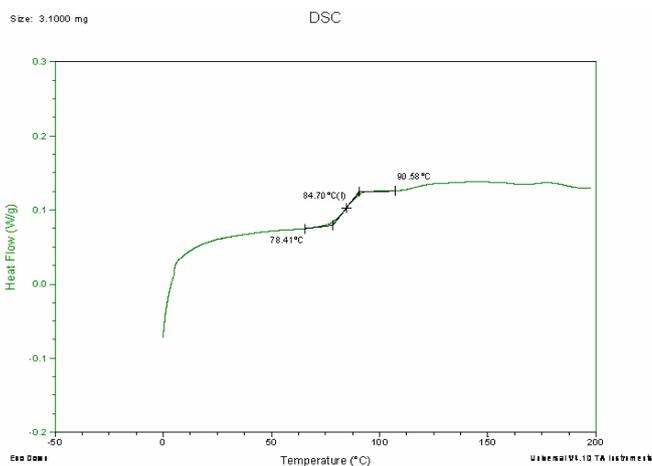
PFG₃



PFG'₁



PFG'₂



PFG'₃

4. Optical Properties of Copolymers.

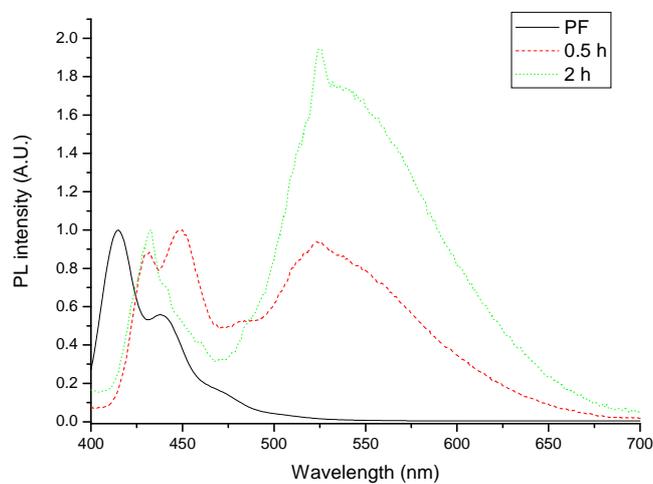


Figure S4. Photoluminescent spectra of **PF** in solid films after thermal annealing at 200 °C for 0.5 h in air and 2 h in air.

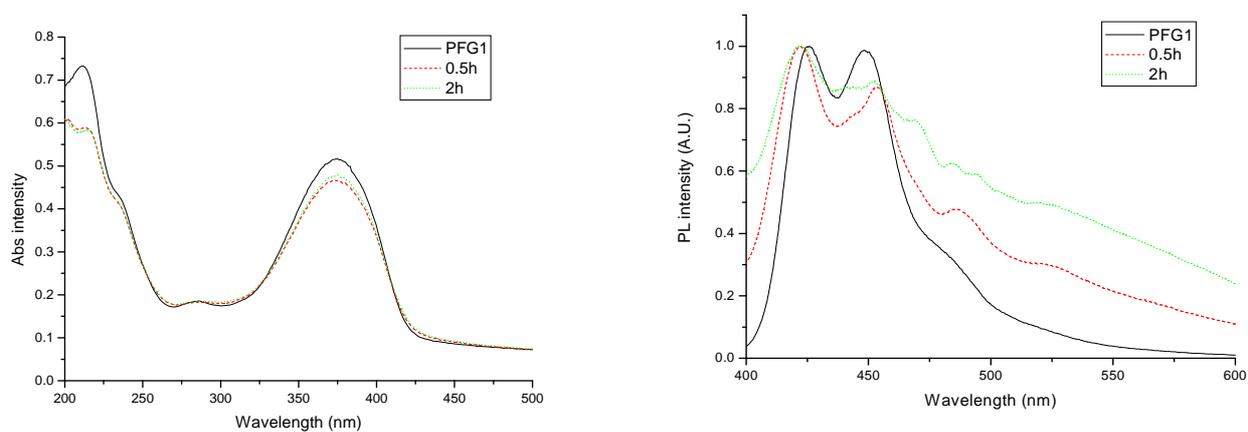


Figure S5. UV-vis absorption and Photoluminescent spectra of **PFG₁** in solid films after thermal annealing at 200 °C for 0.5 h in air and 2 h in air.

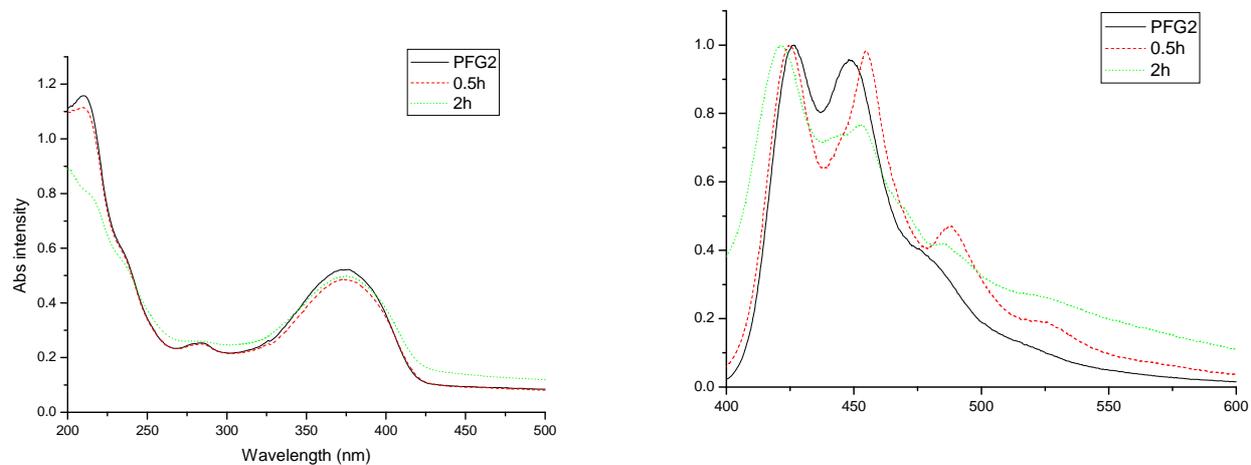


Figure S6. UV-vis absorption and Photoluminescent spectra of **PFG₂** in solid films after thermal annealing at 200 °C for 0.5h in air and 2h in air

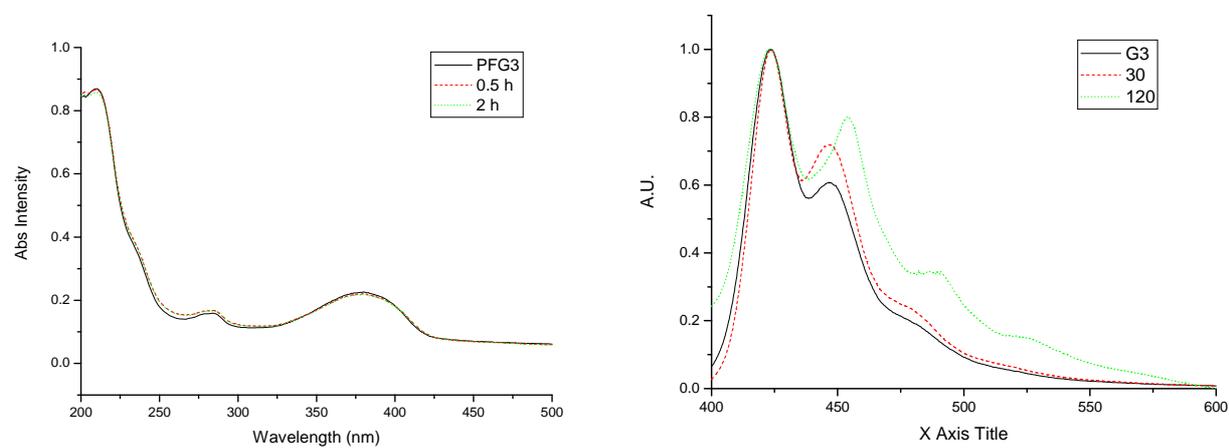


Figure S7. UV-vis absorption and Photoluminescent spectra of **PFG₃** in solid films after thermal annealing at 200 °C for 0.5 h in air and 2 h in air.

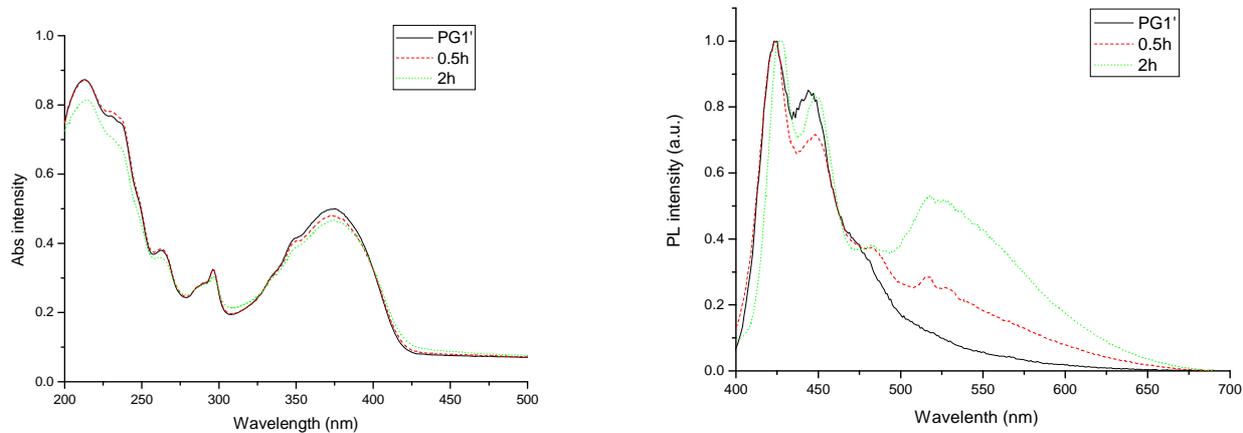


Figure S8. UV-vis absorption and Photoluminescent spectra of **PFG'1** in solid films after thermal annealing at 200 °C for 0.5 h in air and 2 h in air

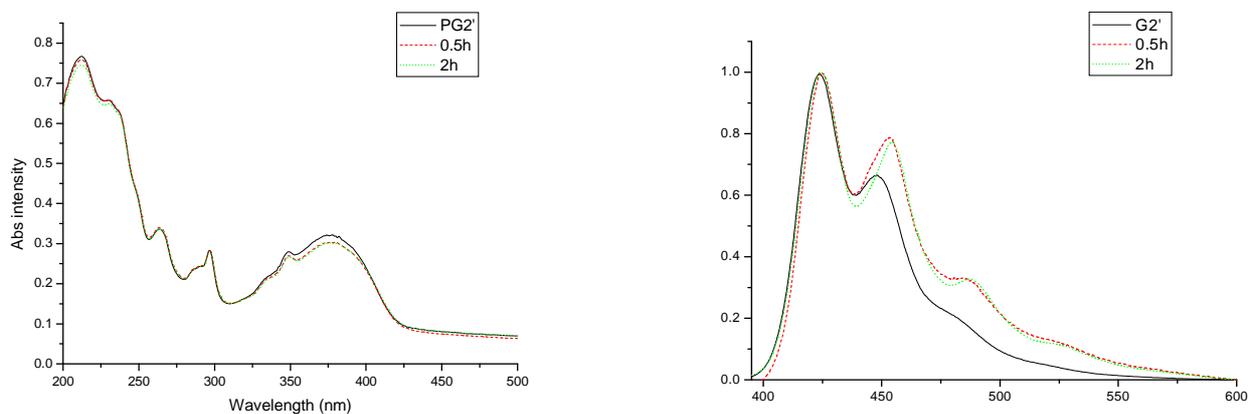


Figure S9. UV-vis absorption and Photoluminescent spectra of **PFG'2** in solid films after thermal annealing at 200 °C for 0.5 h in air and 2 h in air.

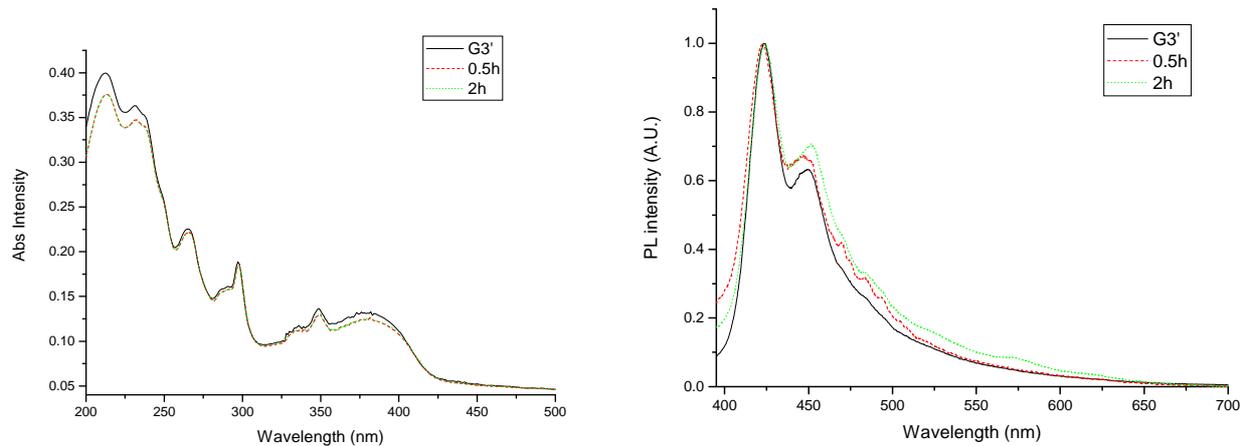
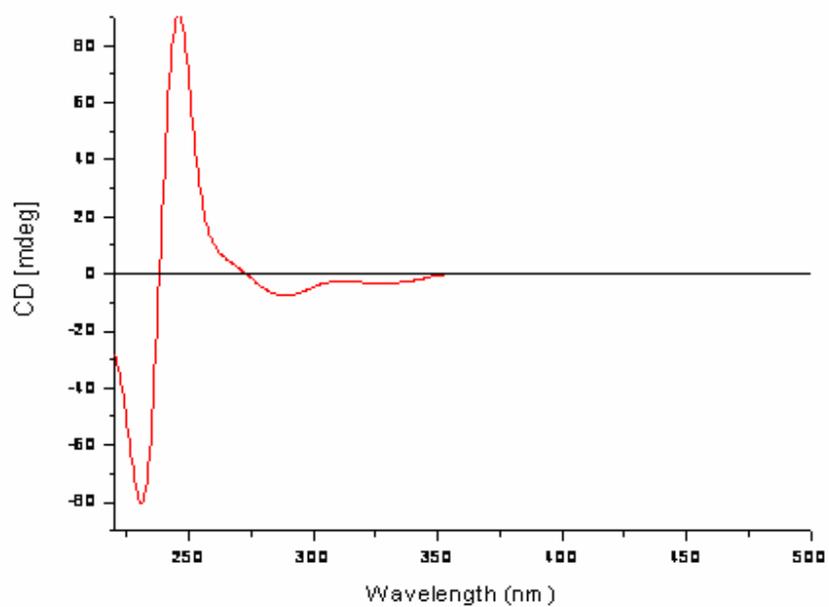


Figure S11. UV-vis absorption and Photoluminescent spectra of **PFG'3** in solid films after thermal annealing at 200 °C for 0.5 h in air and 2 h in air

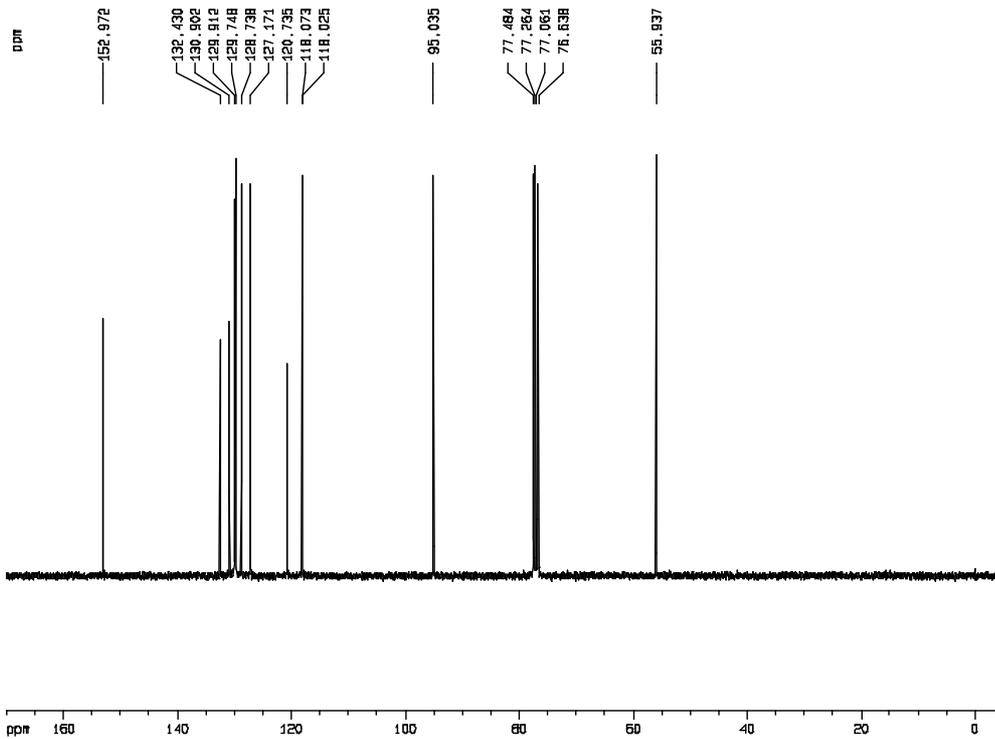
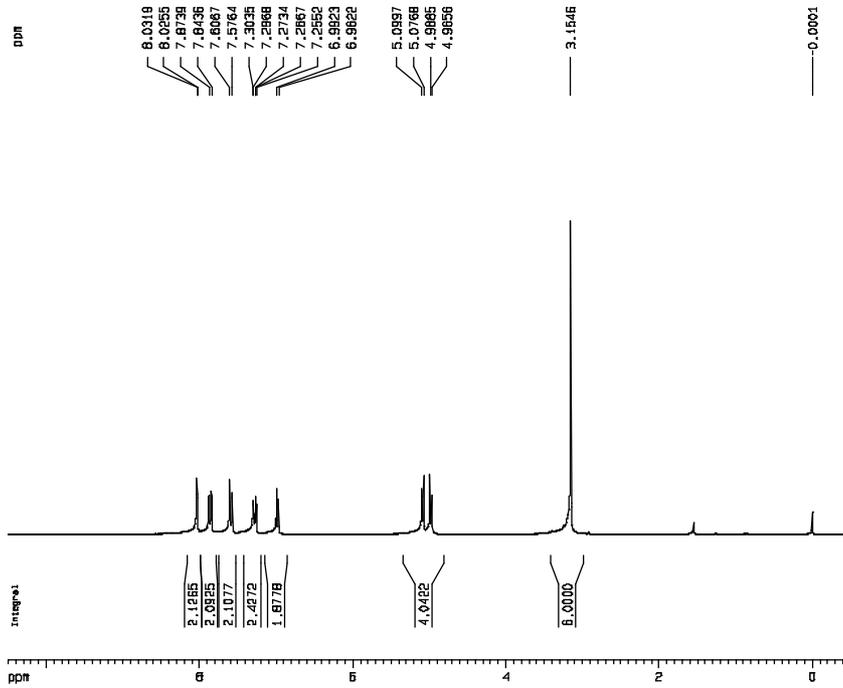
5. CD Spectra of Dendritic Monomer

Figure S12. CD spectra of the dendritic monomer **M5** (10^{-5} M in THF)

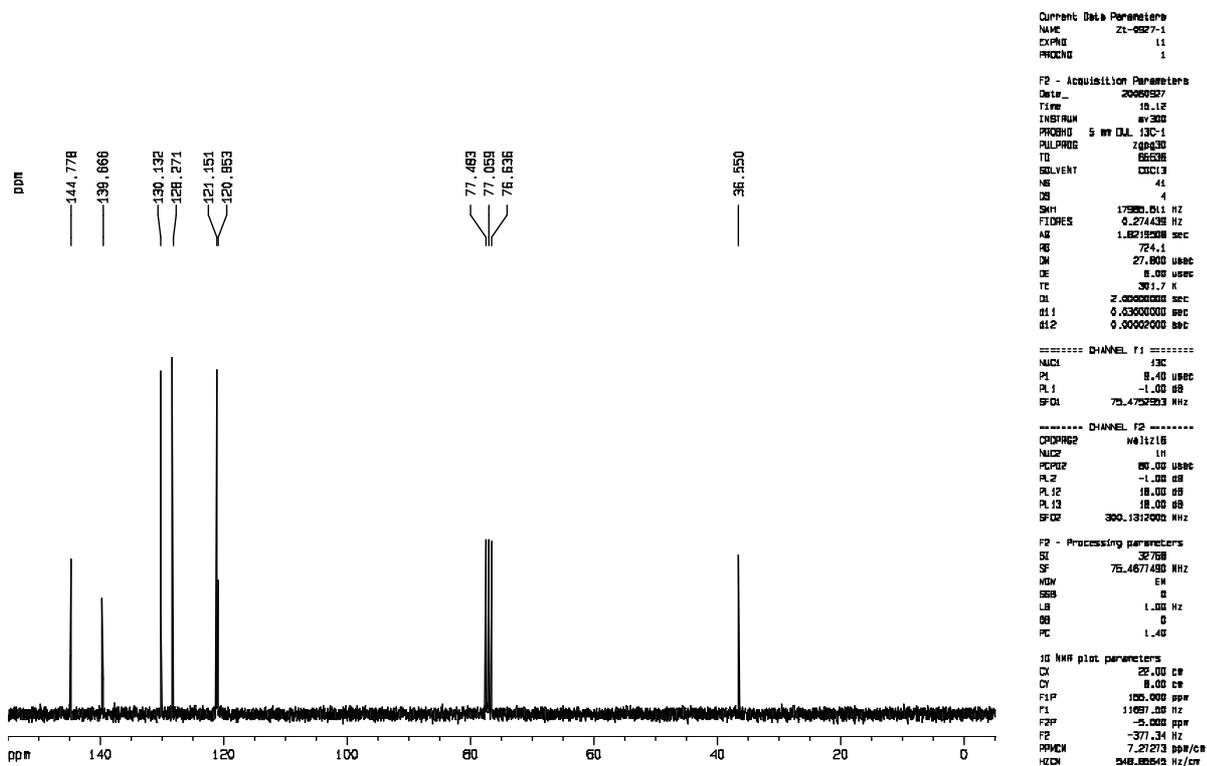
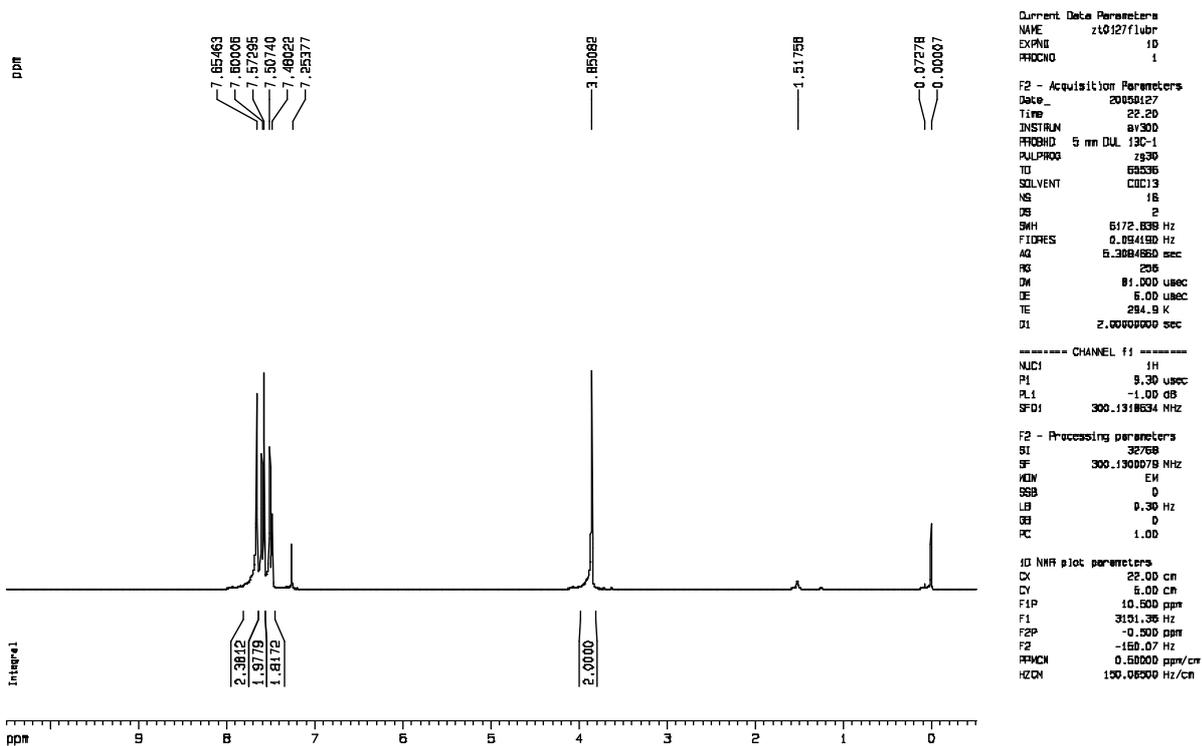


6. NMR and IR Spectra of Monomers and Copolymers

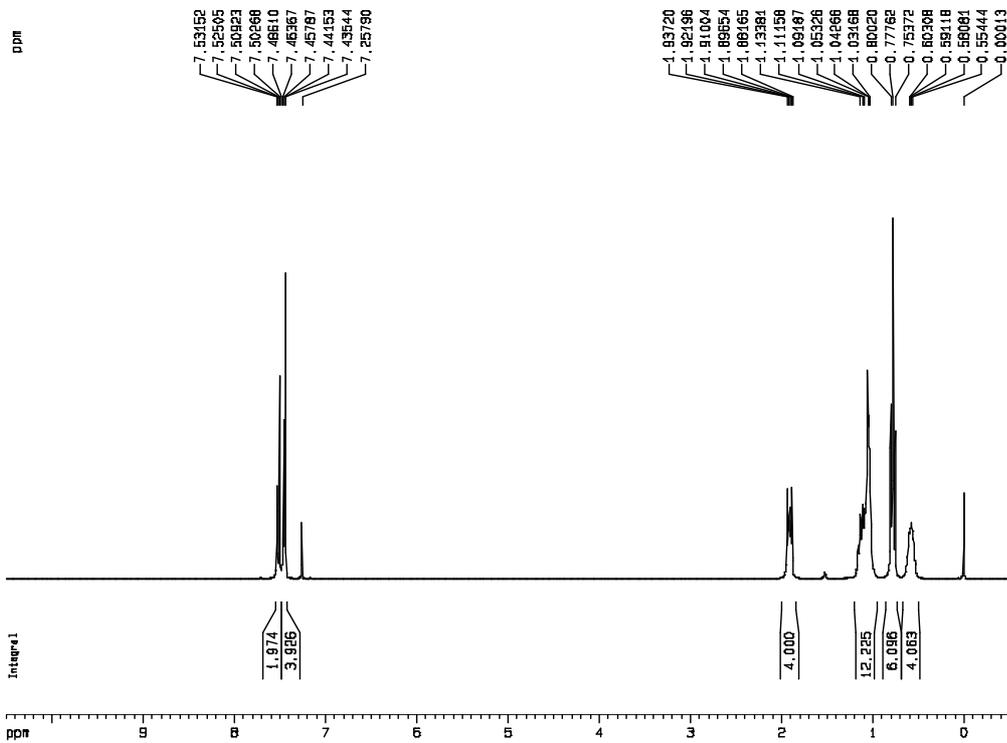
Monomer M1



Compound of S2



Monomer M2



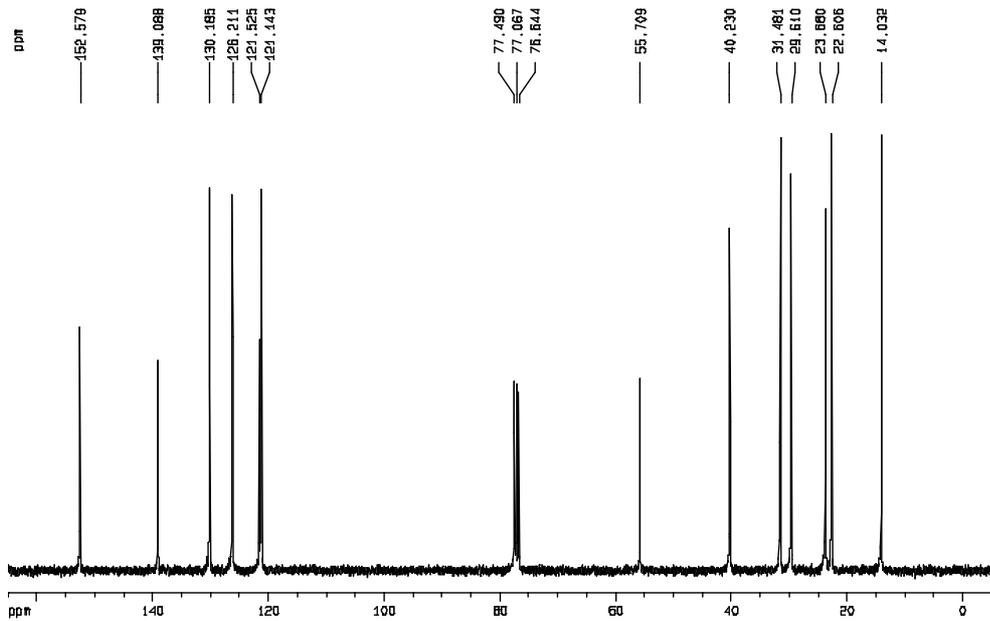
Current Data Parameters
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 PROCNO 1

F2 - Acquisition Parameters
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 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SWH 6172.839 Hz
 FIDRES 0.094190 Hz
 AQ 6.3084660 sec
 RG 181
 DM 81.000 usec
 DE 8.00 usec
 TE 295.0 K
 D1 2.0000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1310634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300069 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
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 CY 8.00 cm
 F1P 10.500 ppm
 F1 3131.36 Hz
 F2P -0.500 ppm
 F2 -150.07 Hz
 RFMCM 0.50000 ppm/cm
 HZCM 150.05000 Hz/cm



Current Data Parameters
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 PROCNO 1

F2 - Acquisition Parameters
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 TD 65536
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 DS 4
 SWH 17089.811 Hz
 FIDRES 0.274436 Hz
 AQ 1.8219208 sec
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 DM 27.800 usec
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 TE 873.2 K
 D1 2.0000000 sec
 d11 0.5300000 sec
 d12 0.5000000 sec

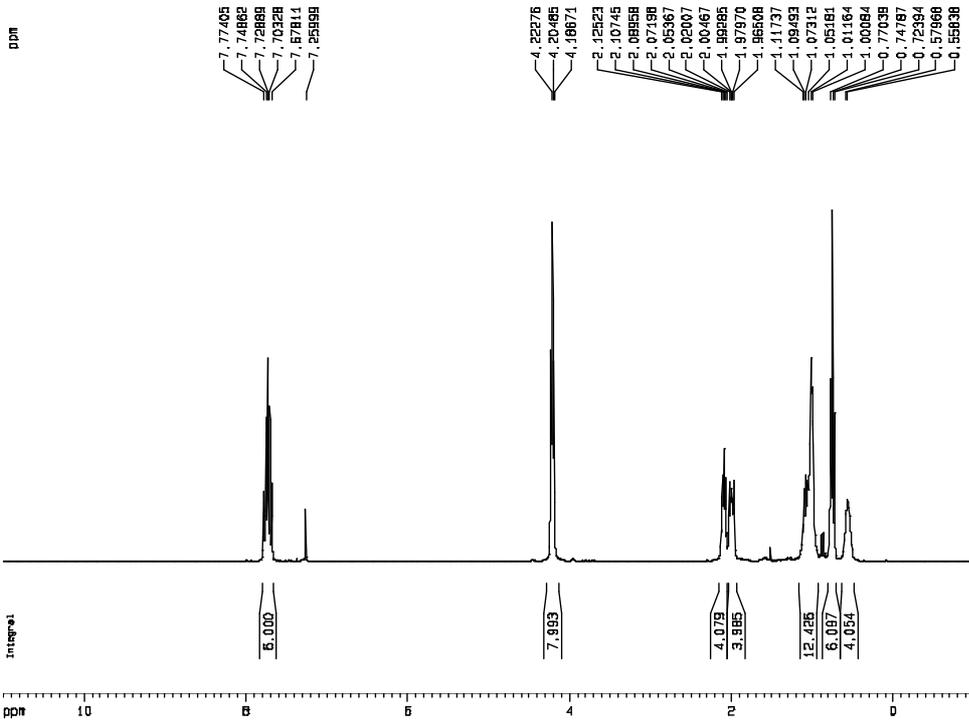
===== CHANNEL F1 =====
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 SFO1 76.4752853 MHz

===== CHANNEL F2 =====
 CPDPRG2 waltz16
 NUC2 1H
 FPCP2 80.00 usec
 PL2 -1.00 dB
 PL12 18.00 dB
 PL13 18.00 dB
 SFO2 300.1312006 MHz

F2 - Processing parameters
 SI 32768
 SF 76.4671480 MHz
 MDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 25.00 cm
 CY 10.00 cm
 F1P 165.000 ppm
 F1 12402.18 Hz
 F2P -5.000 ppm
 F2 -377.34 Hz
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 HZCM 589.15806 Hz/cm

Monomer M3



Current Data Parameters
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 PROCNO 1

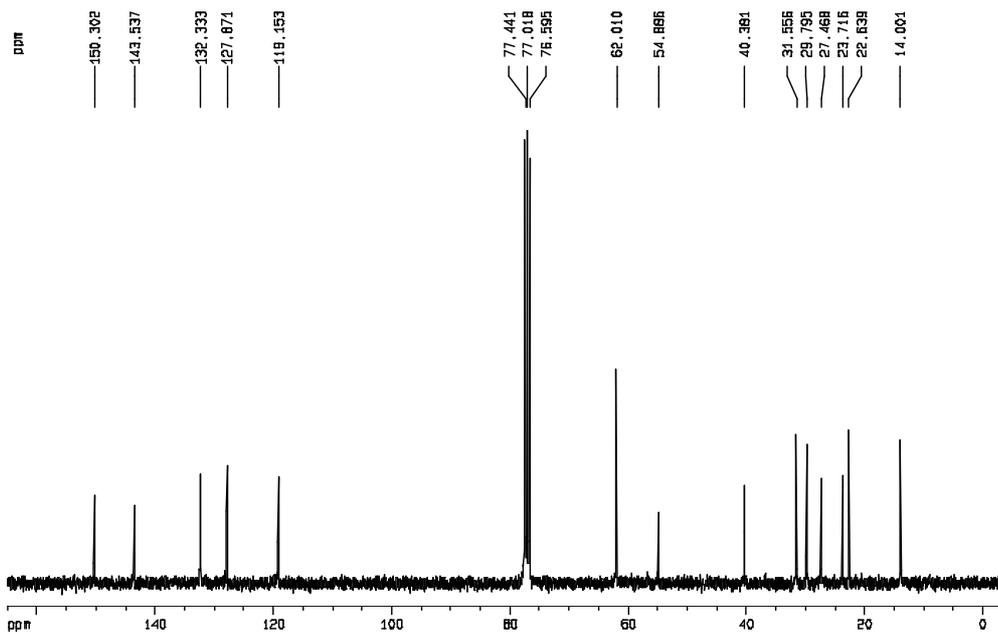
F2 - Acquisition Parameters
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 TD 65536
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 DS 2
 SWH 6172.836 Hz
 FIDRES 0.054180 Hz
 AQ 5.3084660 sec
 RG 143.7
 DM 81.000 usec
 DE 5.00 usec
 TE 301.5 K
 D1 2.0000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
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 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 8.00 cm
 F1P 11.000 ppm
 F1 3301.43 Hz
 F2P -1.000 ppm
 F2 -300.13 Hz
 PRMCH 0.84546 ppm/cm
 HZCM 163.76728 Hz/cm

dinbromicester



Current Data Parameters
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 EXPNO 11
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20060718
 Time 21:30
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 PROBRID 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 667
 DS 4
 SWH 17982.814 Hz
 FIDRES 0.274436 Hz
 AQ 1.8219208 sec
 RG 1024
 DM 27.800 usec
 DE 8.00 usec
 TE 313.2 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 d12 0.0000000 sec

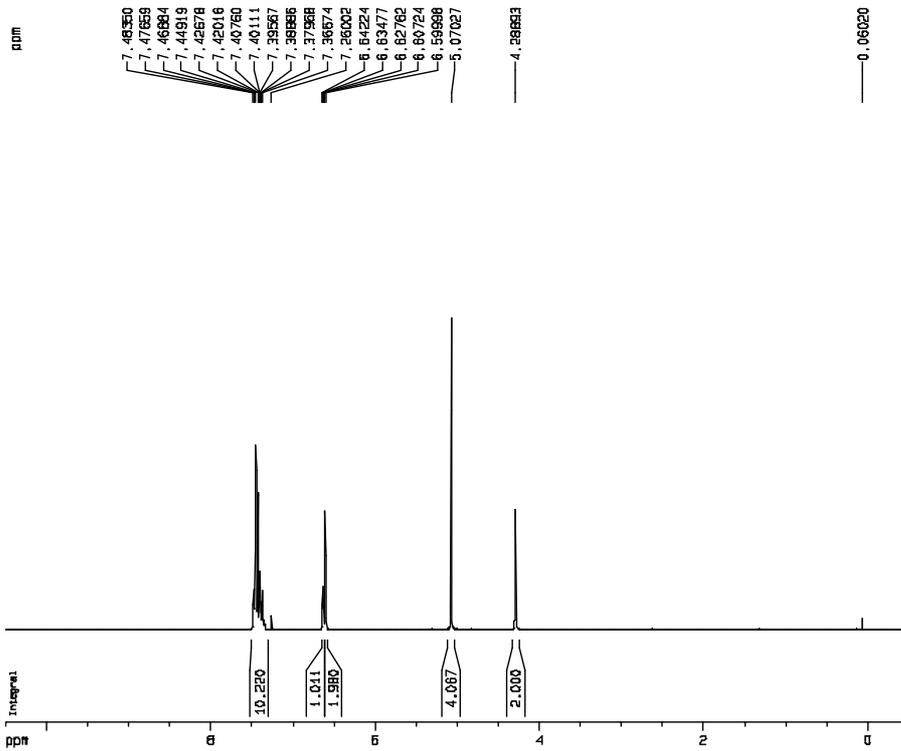
----- CHANNEL f1 -----
 NUC1 13C
 P1 8.40 usec
 PL1 -1.00 dB
 SFO1 75.4752563 MHz

----- CHANNEL f2 -----
 CPDPRG2 waltz16
 NUC2 1H
 PCPDZ 80.00 usec
 PL2 -1.00 dB
 PL12 18.00 dB
 PL13 18.00 dB
 SFO2 300.1312006 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677480 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 22.00 cm
 CY 10.00 cm
 F1P 165.000 ppm
 F1 12422.18 Hz
 F2P -5.000 ppm
 F2 -377.34 Hz
 PRMCH 7.72727 ppm/cm
 HZCM 589.16588 Hz/cm

Dendron G₁N₃



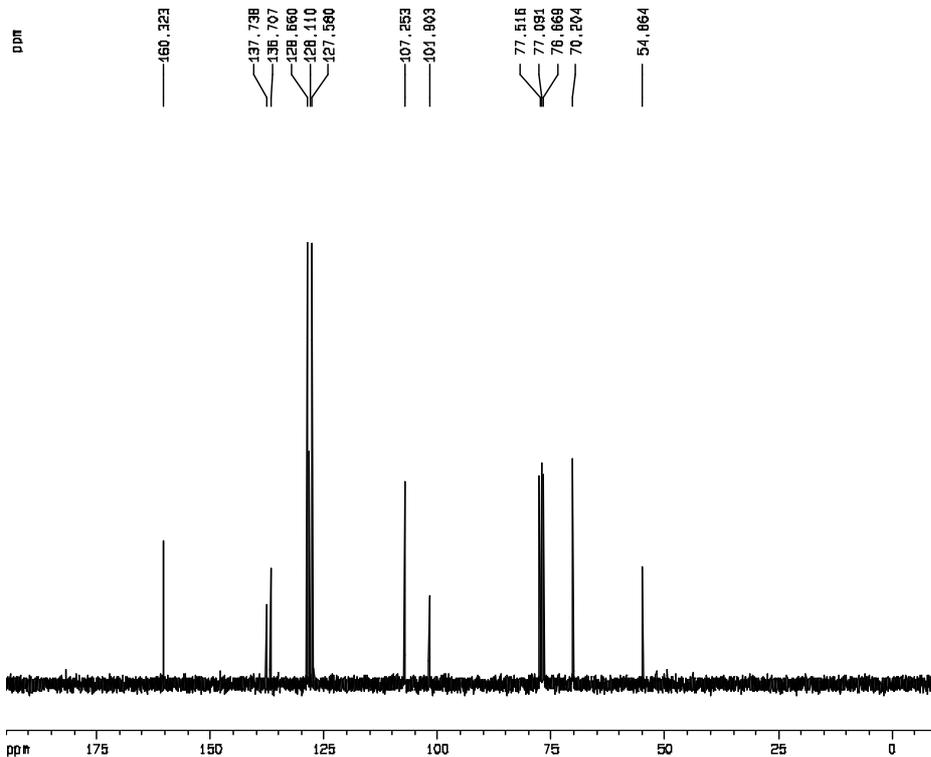
Current Data Parameters
 NAME Z10622861N3
 EXPNO 10
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20060302
 Time 20.28
 INSTRUM av300
 PROBRD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SMIH 6172.838 Hz
 FIDRES 0.094180 Hz
 AQ 5.3084650 sec
 RG 181.8
 DM 81.000 usec
 DE 6.00 usec
 TE 296.9 K
 D1 2.00000000 sec

==== CHANNEL f1 =====
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1310634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300062 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 7.00 cm
 F1P 10.500 ppm
 F1 3131.36 Hz
 F2P -0.500 ppm
 F2 -160.06 Hz
 PRCM 0.55000 ppm/cm
 HZCM 180.07100 Hz/cm



Current Data Parameters
 NAME Z161h3
 EXPNO 11
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070309
 Time 13.28
 INSTRUM av300
 PROBRD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 44
 DS 4
 SMIH 17880.811 Hz
 FIDRES 0.274438 Hz
 AQ 1.8218208 sec
 RG 455.1
 DM 27.800 usec
 DE 8.00 usec
 TE 299.1 K
 D1 2.00000000 sec
 d11 0.43000000 sec
 d12 0.00000000 sec

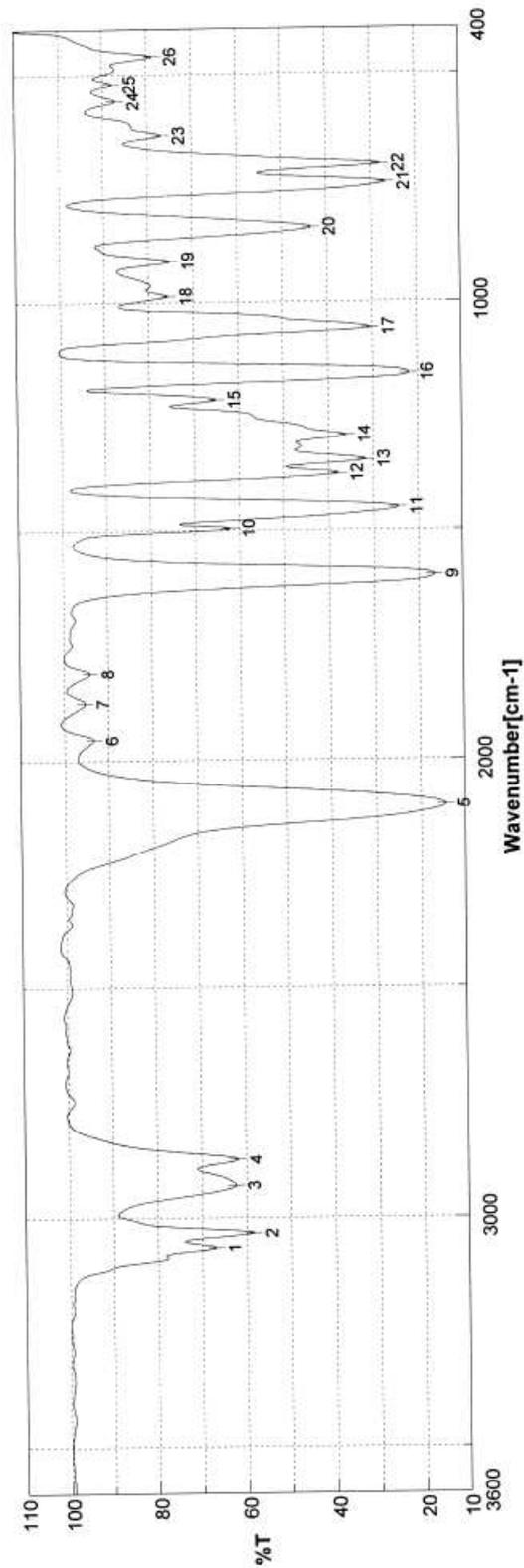
==== CHANNEL f1 =====
 NUC1 13C
 P1 8.40 usec
 PL1 -1.00 dB
 SFO1 76.4732923 MHz

==== CHANNEL f2 =====
 CDPH62 wj1z18
 NUC2 1H
 P1P2 80.00 usec
 PL2 -1.00 dB
 PL12 18.00 dB
 PL13 18.00 dB
 SFO2 300.1310634 MHz

F2 - Processing parameters
 SI 32768
 SF 76.4677480 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 20.00 cm
 CY 10.00 cm
 F1P 130.000 ppm
 F1 14718.21 Hz
 F2P -754.68 Hz
 F2 10.25000 ppm/cm
 HZCM 773.54448 Hz/cm

GIN3

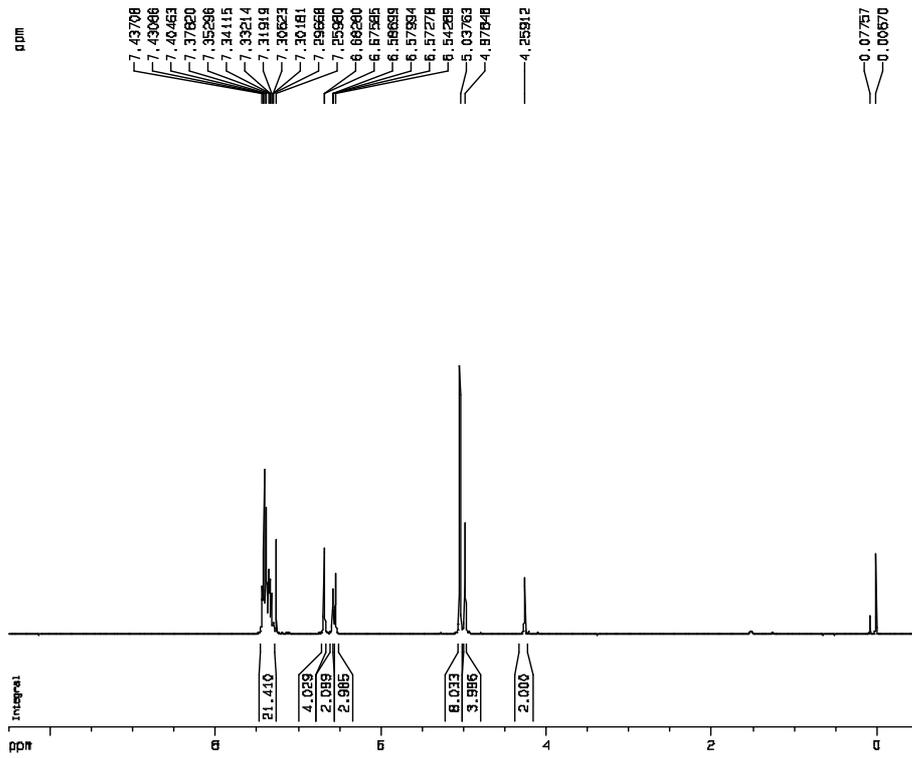


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 10:50
 Operator Memory#3
 File Name
 Sample Name
 Comment

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 12:31

No.	cm-1	%T	No.	cm-1	%T	No.	cm-1	%T
1	3064.33	66.9356	3	2929.34	62.3932	4	2873.42	61.904
6	1954.5	93.2205	8	1810.33	94.0507	9	1597.73	16.5148
11	1450.21	24.4666	13	1347.03	31.7629	14	1293.04	36.0765
16	1157.08	21.9488	18	986.411	75.6583	19	908.308	75.1619
21	737.639	26.8434	23	633.511	76.9382	24	557.327	87.0981
26	459.939	78.6621				25	520.686	
						26	412.9	
						27	398.1	
						28	385.1	
						29	373.1	
						30	361.1	
						31	349.1	
						32	337.1	
						33	325.1	
						34	313.1	
						35	301.1	
						36	289.1	
						37	277.1	
						38	265.1	
						39	253.1	
						40	241.1	
						41	229.1	
						42	217.1	
						43	205.1	
						44	193.1	
						45	181.1	
						46	169.1	
						47	157.1	
						48	145.1	
						49	133.1	
						50	121.1	
						51	109.1	
						52	97.1	
						53	85.1	
						54	73.1	
						55	61.1	
						56	49.1	
						57	37.1	
						58	25.1	
						59	13.1	
						60	1.1	

Dendron G₂N₃



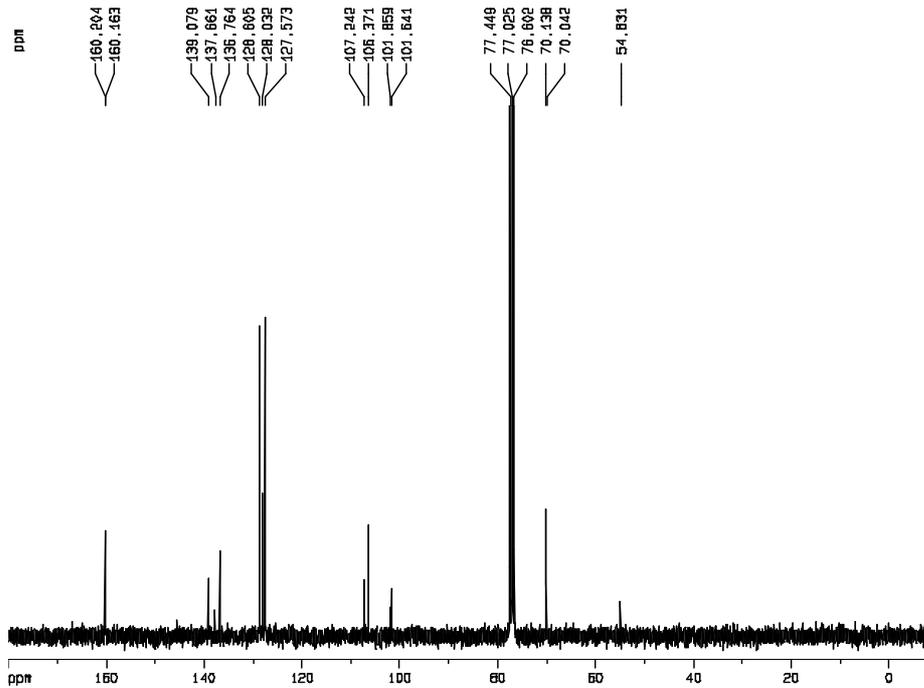
Current Data Parameters
 NAME Z162N3
 EXPNO 10
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20060406
 Time 21.53
 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SWH 6172.838 Hz
 FIDRES 0.054180 Hz
 AQ 6.3084860 sec
 RG 287.4
 DM 81.000 uSBC
 DE 5.00 uSBC
 TE 298.7 K
 D1 2.0000000 sec

==== CHANNEL f1 =====
 NUC1 1H
 P1 9.30 uSBC
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300664 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 6.00 cm
 F1P 10.500 ppm
 F1 3151.36 Hz
 F2P -0.500 ppm
 F2 -160.06 Hz
 PPMCN 0.56000 ppm/cm
 HZCN 160.07100 Hz/cm



Current Data Parameters
 NAME Z162N3
 EXPNO 11
 PROCNO 1

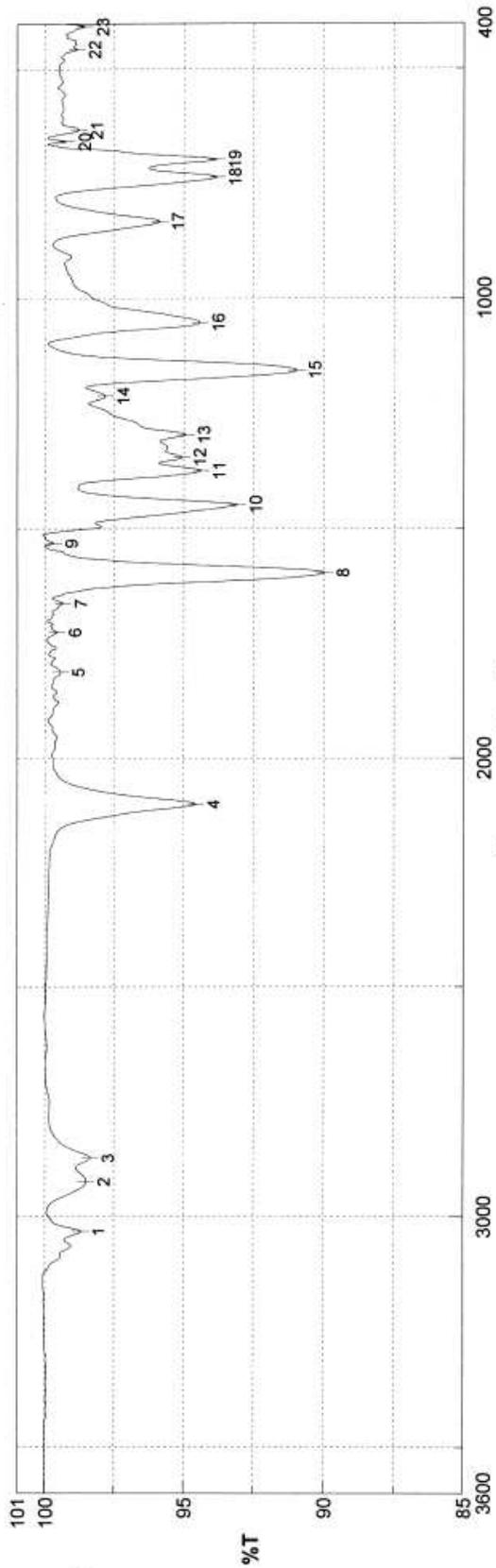
F2 - Acquisition Parameters
 Date_ 20060406
 Time 21.56
 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 434
 DS 4
 SWH 17980.811 Hz
 FIDRES 0.274438 Hz
 AQ 1.8278580 sec
 RG 8182
 DM 27.800 uSBC
 DE 8.00 uSBC
 TE 298.8 K
 D1 2.0000000 sec
 D11 0.0300000 sec
 D12 0.0000000 sec

==== CHANNEL f1 =====
 NUC1 13C
 P1 8.40 uSBC
 PL1 -1.00 dB
 SFO1 75.4756333 MHz

==== CHANNEL f2 =====
 CHOPPR2 w01z116
 NUC2 1H
 PCPRG2 80.00 uSBC
 PL12 -1.00 dB
 PL13 18.00 dB
 PL14 18.00 dB
 SFO2 300.1312000 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677480 MHz
 MDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 20.00 cm
 CY 20.00 cm
 F1P 100.000 ppm
 F1 12504.20 Hz
 F2P -10.000 ppm
 F2 -754.68 Hz
 PPMCN 9.56000 ppm/cm
 HZCN 716.54388 Hz/cm



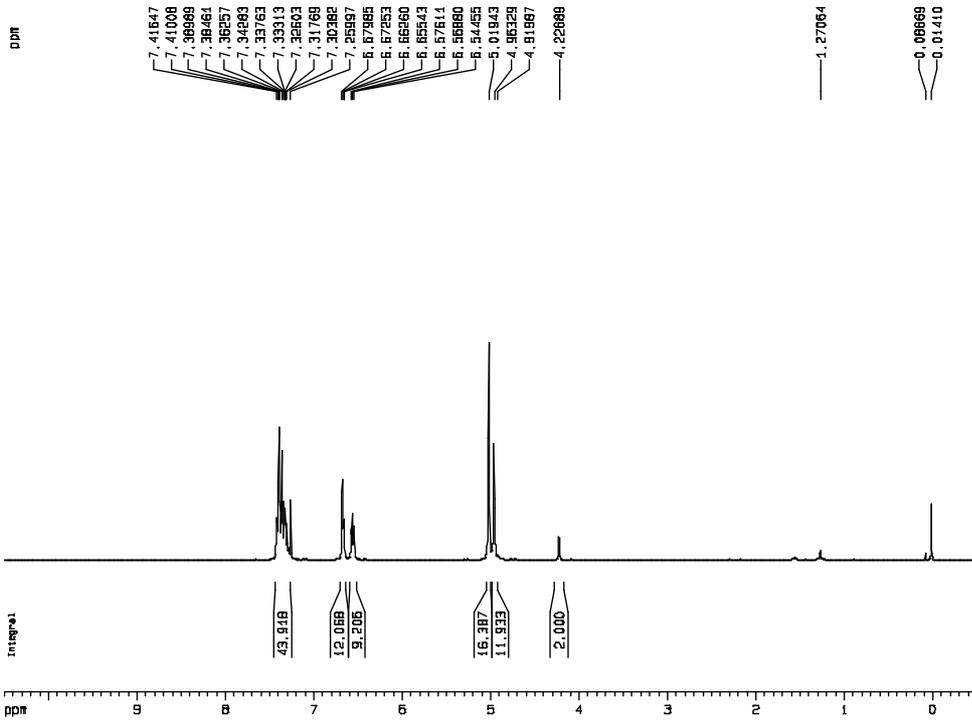
Wavenumber[cm-1]

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 13:58

Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 10:42
 Operator
 File Name Memory#6
 Sample Name
 Comment

No.	cm-1	%T									
1	3031.55	98.693	2	2923.56	98.4982	3	2872.45	98.3535	4	2098.17	94.5807
6	1725.98	99.5545	7	1662.34	95.3503	8	1595.81	89.9721	9	1531.2	99.6831
11	1374.03	94.3877	12	1345.11	95.0698	13	1295.93	94.926	14	1212.04	97.8203
16	1051.98	94.4125	17	833.098	95.8535	18	736.674	93.815	19	698.105	93.8216
21	633.501	98.7753	22	456.082	98.949	23	405.942	98.5578	20	658.571	99.2064
									5	1813.72	99.4344
									10	1448.28	93.0807
									15	1156.12	90.9766

Dendron G₃N₃



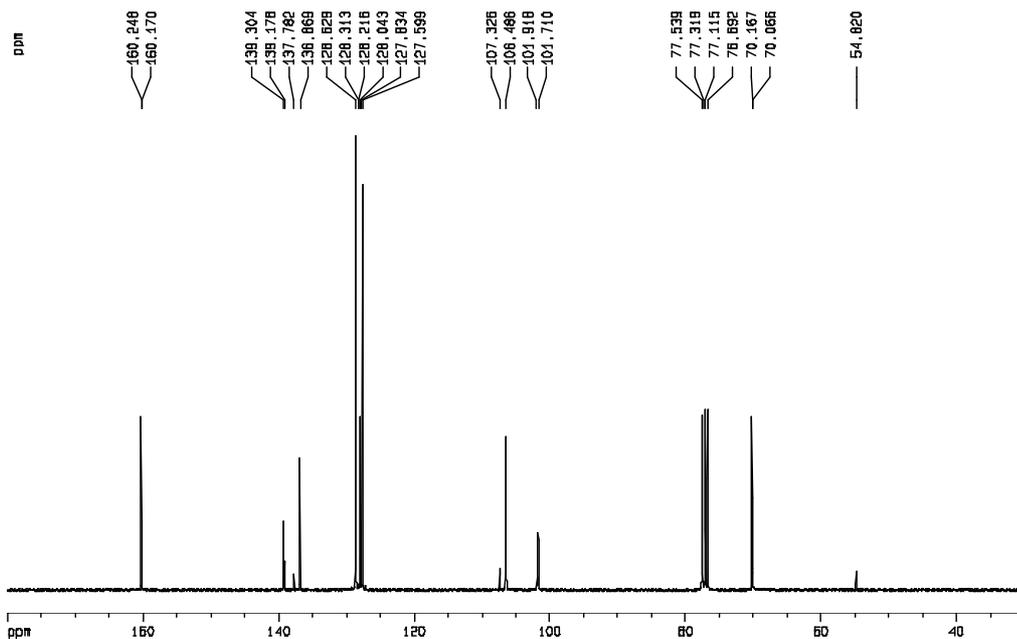
Current Data Parameters
 NAME Z163N3-2
 EXPNO 10
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070410
 Time 8.05
 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 8
 DS 8
 SWH 8882.805 Hz
 FIDRES 0.137219 Hz
 AQ 3.6438515 sec
 RG 322.5
 DM 85.600 usec
 DE 6.00 usec
 TE 300.3 K
 D1 5.00000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1310063 MHz
 MDV EM
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 6.00 cm
 F1P 10.500 ppm
 F1 3131.36 Hz
 F2P -0.500 ppm
 F2 -168.07 Hz
 PRMCH 0.50000 ppm/cm
 HZCH 150.00000 Hz/cm



Current Data Parameters
 NAME Z163N3-2
 EXPNO 31
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070411
 Time 11.23
 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 4
 DS 4
 SWH 17280.811 Hz
 FIDRES 0.274438 Hz
 AQ 1.8219508 sec
 RG 287.4
 DM 27.800 usec
 DE 8.00 usec
 TE 297.4 K
 D1 2.00000000 sec
 d11 0.03000000 sec
 d12 0.00000000 sec

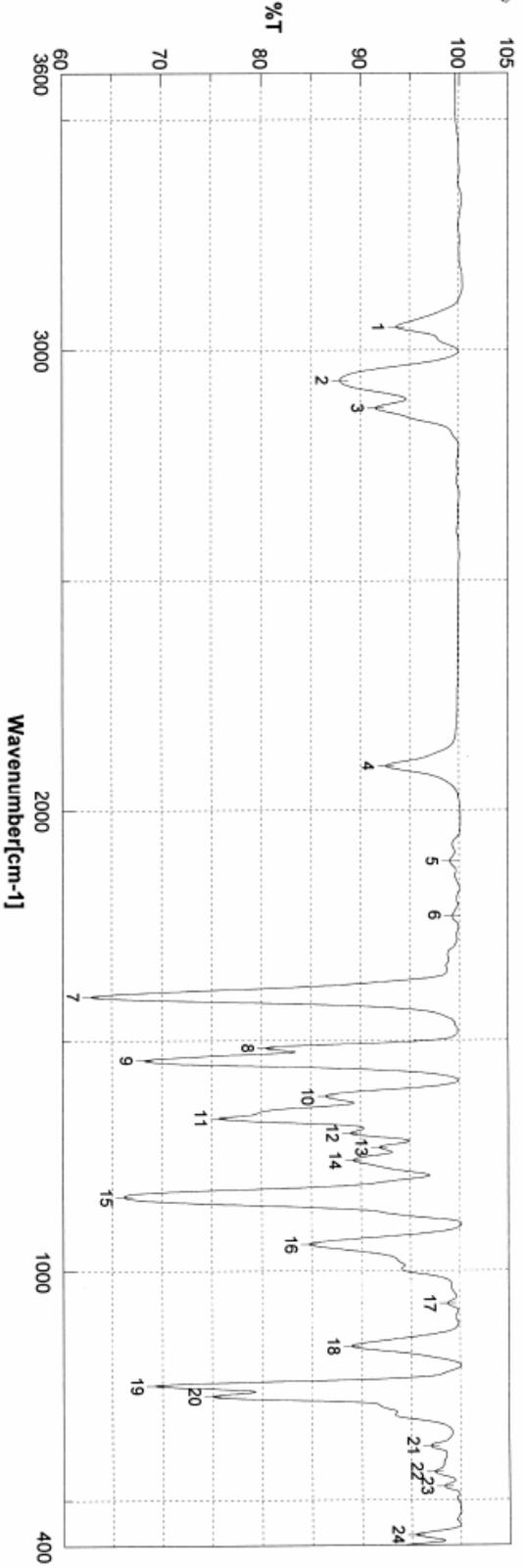
----- CHANNEL f1 -----
 NUC1 13C
 P1 8.40 usec
 PL1 -1.00 dB
 SFO1 75.4753783 MHz

----- CHANNEL f2 -----
 CHDRFC2 wa1z16
 NUC2 1H
 PCPDR2 80.00 usec
 PL2 -1.00 dB
 PL3C 18.00 dB
 PL3 18.00 dB
 SFO2 300.1312000 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677480 MHz
 MDV EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 22.00 cm
 CY 10.00 cm
 F1P 180.000 ppm
 F1 13004.20 Hz
 F2P 30.000 ppm
 F2 2254.03 Hz
 PRMCH 0.81818 ppm/cm
 HZCH 514.20288 Hz/cm

G3113

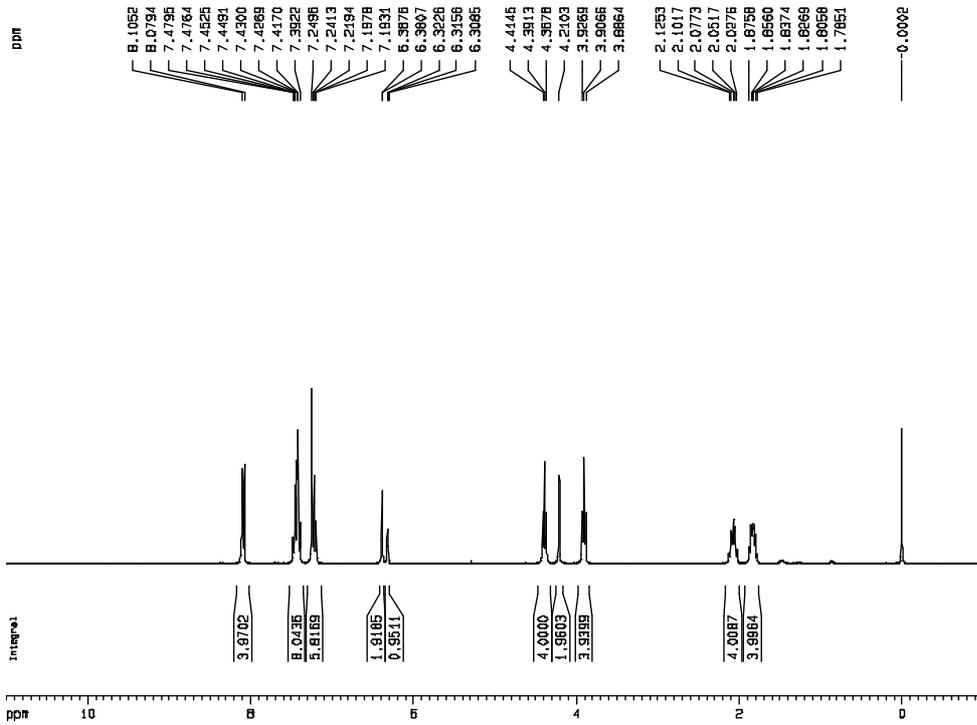


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 10:55
 Operator
 File Name Memory#4
 Sample Name
 Comment

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:07

No. cm-1	%T						
1 3049.87	93.6266	2 2934.16	87.9446	3 2874.38	91.5302	4 2098.17	92.585
6 1771.3	99.3091	7 1596.77	62.8807	8 1482.99	80.4548	9 1455.99	68.2409
11 1329.68	75.7026	12 1296.89	88.9198	13 1266.04	91.8743	14 1238.08	89.2174
16 1057.76	84.7379	17 927.593	98.751	18 835.026	88.967	19 750.174	69.2652
21 617.109	96.9956	22 561.184	97.3565	23 529.364	98.3896	24 422.334	95.4108
						5 1888.93	99.0826
						10 1376.93	86.4326
						15 1160.94	66.199
						20 726.068	75.0092

Dendron G₁N₃



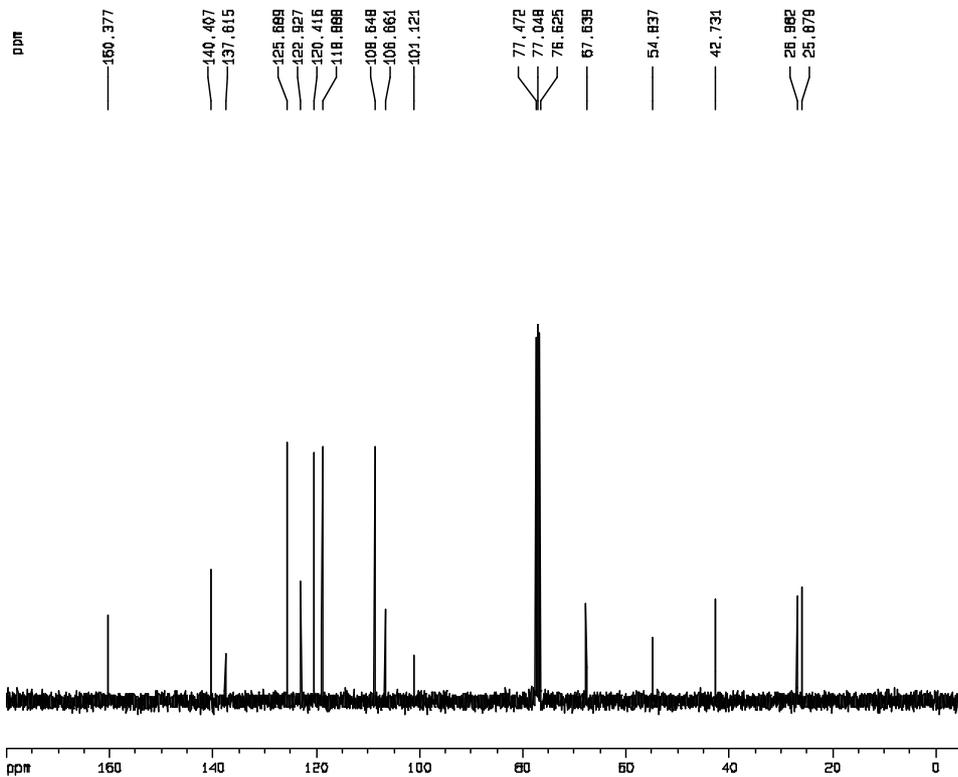
Current Data Parameters
 NAME ZLG1N3
 EXPNO 20
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070306
 Time 22.22
 INSTRUM av300
 PROBD 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 6
 DS 6
 SSIH 8992.805 Hz
 FIDRES 0.137218 Hz
 AQ 3.6438615 sec
 RG 574.7
 DM 85.600 usec
 DE 6.00 usec
 TE 299.3 K
 D1 5.0000000 sec

==== CHANNEL f1 =====
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300892 MHz
 MDW EM
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 4.00 cm
 F1P 11.000 ppm
 F1 3301.43 Hz
 F2P -1.000 ppm
 F2 -300.13 Hz
 FPCW 0.54545 ppm/cm
 HZCN 163.79728 Hz/cm



Current Data Parameters
 NAME ZLG1N3
 EXPNO 40
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070309
 Time 23.87
 INSTRUM av300
 PROBD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 4
 DS 4
 SSIH 17993.511 Hz
 FIDRES 0.274439 Hz
 AQ 1.8219308 sec
 RG 574.7
 DM 27.800 usec
 DE 6.00 usec
 TE 299.3 K
 D1 2.0000000 sec
 D11 0.0350000 sec
 D12 0.0002000 sec

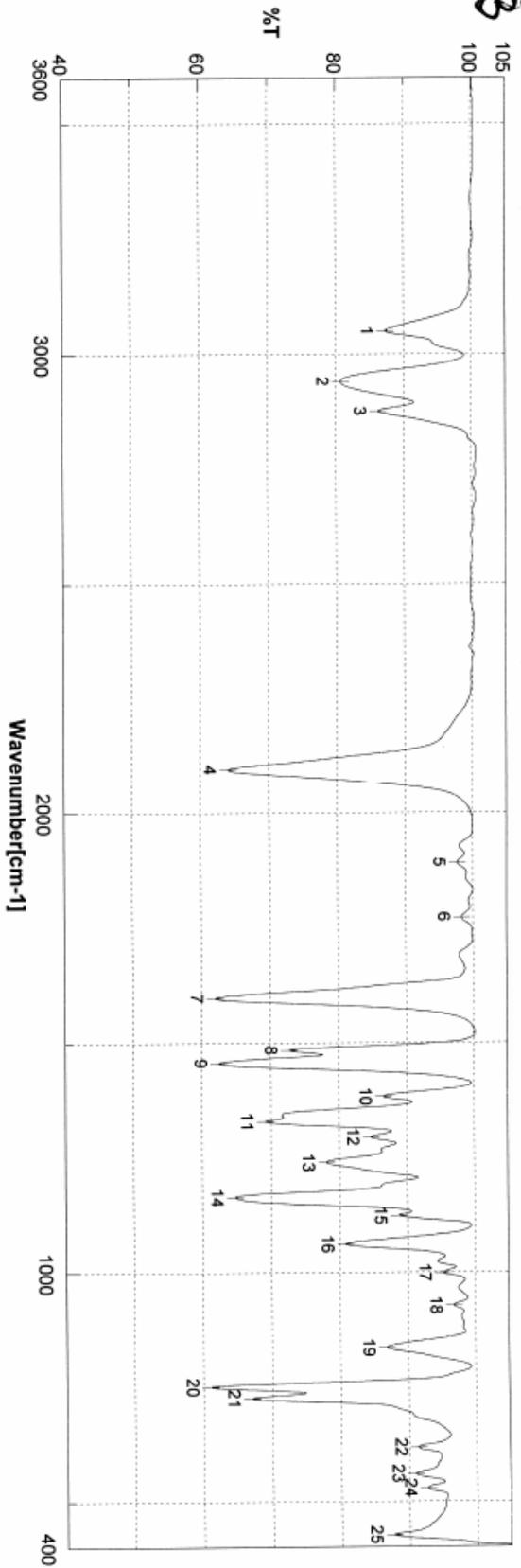
==== CHANNEL f1 =====
 NUC1 13C
 P1 8.40 usec
 PL1 -1.00 dB
 SFO1 75.4759283 MHz

==== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPDZ 80.00 usec
 PL2 -1.00 dB
 PL12 18.00 dB
 PL13 18.00 dB
 SFO2 300.1312088 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677480 MHz
 MDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 20.00 cm
 CY 8.00 cm
 F1P 182.000 ppm
 F1 13009.250 Hz
 F2P -5.000 ppm
 F2 -377.34 Hz
 FPCW 9.26000 ppm/cm
 HZCN 698.07888 Hz/cm

G17N3

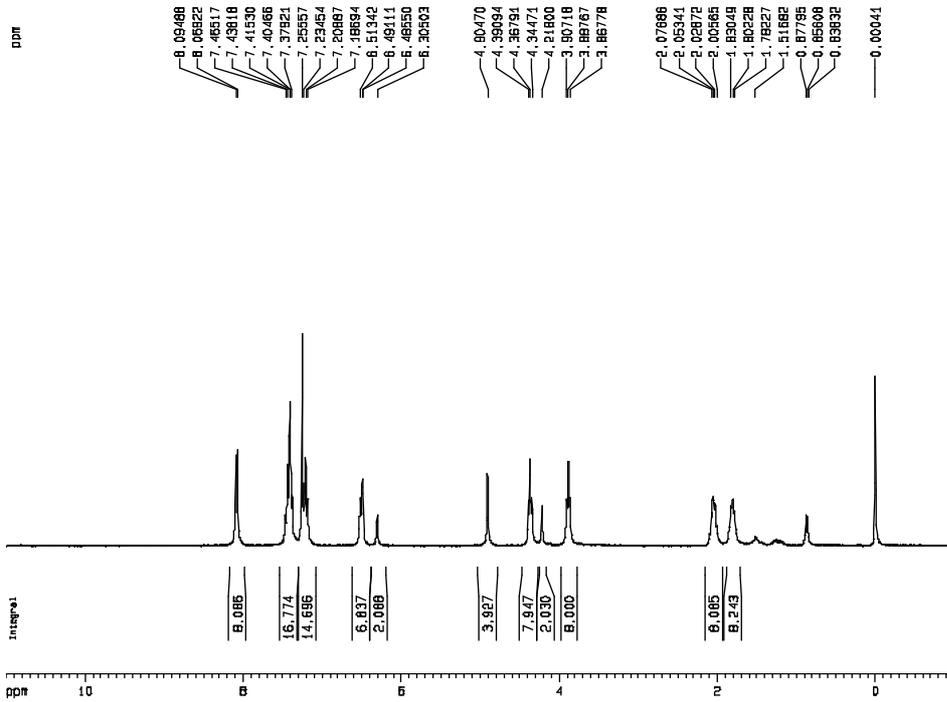


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 11:00
 Operator
 File Name
 Sample Name
 Comment

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 12:35

No. cm-1	%T								
1 3050.83	87.2594	2 2939.95	80.6803	3 2875.34	86.1924	4 2098.17	64.0582	5 1889.9	97.6394
6 1771.3	98.2851	7 1597.73	61.9633	8 1483.96	72.6911	9 1456.96	62.4875	10 1382.71	86.5093
11 1329.68	69.2025	12 1294.97	84.6427	13 1240	78.1127	14 1164.79	64.7782	15 1124.3	88.6756
16 1062.59	80.8439	17 998.946	95.1723	18 926.628	96.768	19 835.026	86.8176	20 750.174	61.0173
21 725.104	67.0171	22 617.109	91.4236	23 560.22	90.942	24 528.4	92.7612	25 426.191	87.6631

Dendron G₂N₃



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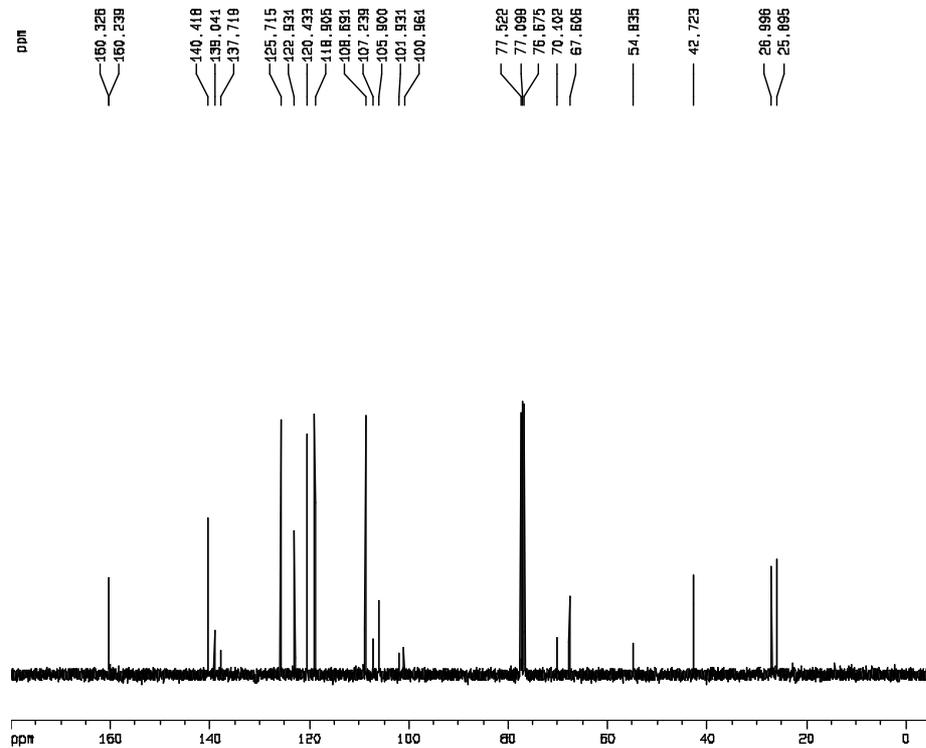
Current Data Parameters
NAME      Z162**
EXPNO    1
PROCNO   1

F2 - Acquisition Parameters
Date_    20070318
Time     11.42
INSTRUM  av300
PROBHD   5 mm DUL 13C-1
PULPROG  zg30
TD        65536
SOLVENT  CDCl3
NS        15
DS        0
SMH       8882.805 Hz
FIDRES    0.137219 Hz
AQ        3.6438615 sec
RG        374.7
DM        35.800 usec
DE        6.00 usec
TE        297.5 K
D1        0.0000000 sec

===== CHANNEL f1 =====
NUC1      1H
P1        9.30 usec
PL1       -1.00 dB
SFO1      300.1318634 MHz

F2 - Processing parameters
SI        32768
SF        300.1308075 MHz
WDW       EM
SSB       0
LB        0.35 Hz
GB        0
PC        1.00

1D NMR plot parameters
CX        22.00 cm
CY        6.00 cm
F1P       11.000 ppm
F1        3301.43 Hz
F2P       -1.000 ppm
F2        -300.13 Hz
PRACHN    0.54545 ppm/cm
HZCN      163.78728 Hz/cm
    
```



```

Current Data Parameters
NAME      Z162**
EXPNO    1
PROCNO   1

F2 - Acquisition Parameters
Date_    20070318
Time     9.84
INSTRUM  av300
PROBHD   5 mm DUL 13C-1
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        125
DS        4
SMH       17980.811 Hz
FIDRES    0.274438 Hz
AQ        1.8218200 sec
RG        287.4
DM        27.800 usec
DE        6.00 usec
TE        297.4 K
D1        2.0000000 sec
d11       0.0300000 sec
d12       0.0002000 sec

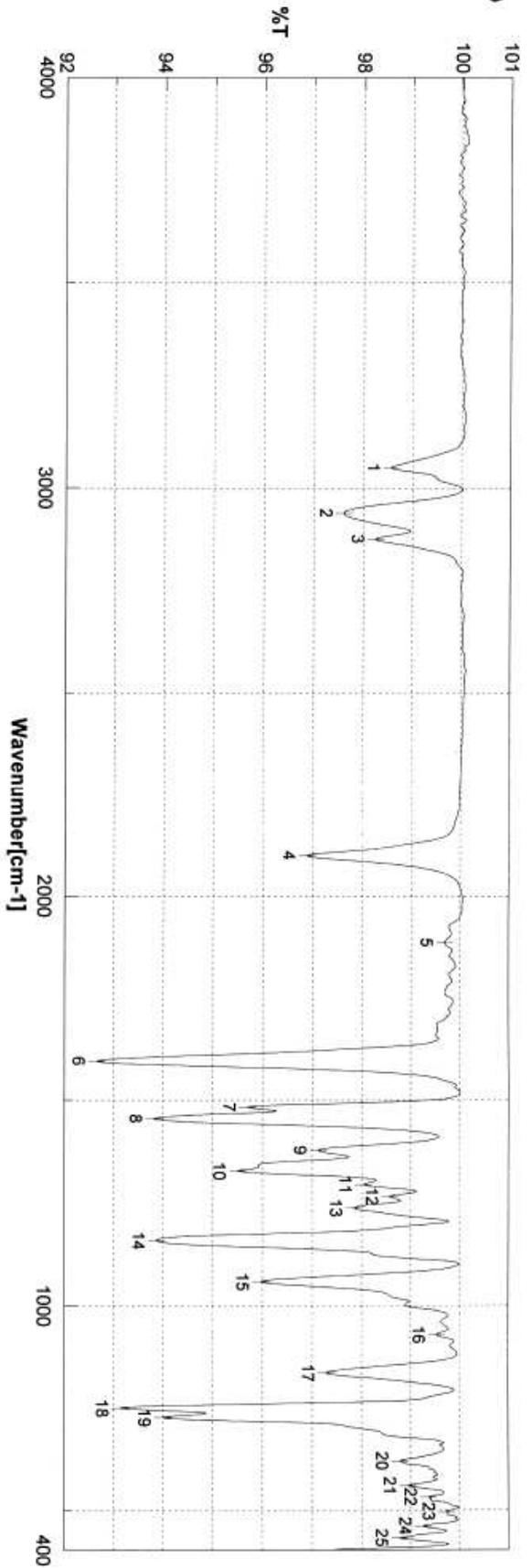
===== CHANNEL f1 =====
NUC1      13C
P1        9.40 usec
PL1       -1.00 dB
SFO1      75.4752923 MHz

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2      1H
PCPD2    60.00 usec
PL2       -1.00 dB
PL12     18.00 dB
PL13     18.00 dB
SFO2     300.1312000 MHz

F2 - Processing parameters
SI        32768
SF        75.4677486 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

1D NMR plot parameters
CX        21.00 cm
CY        6.00 cm
F1P       180.000 ppm
F1        13004.208 Hz
F2P       -9.000 ppm
F2        -371.34 Hz
PRACHN    9.25000 ppm/cm
HZCN      698.07688 Hz/cm
    
```

G2'N3

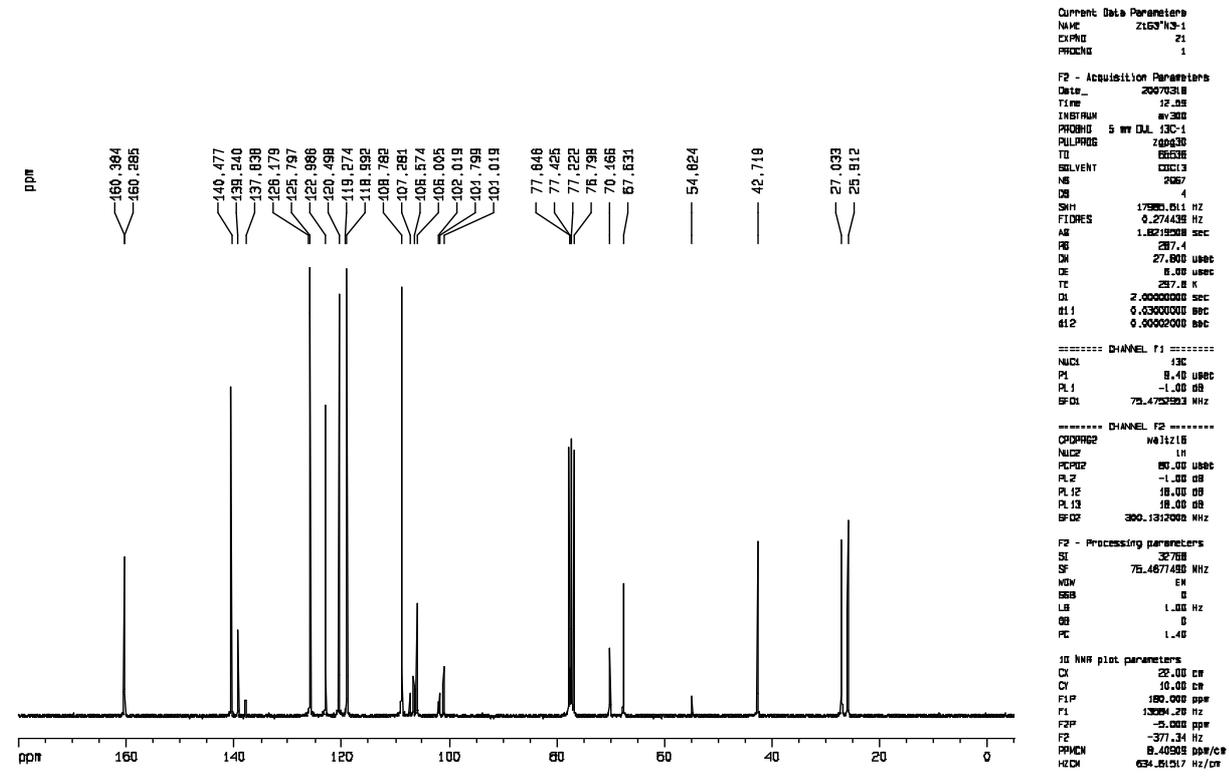
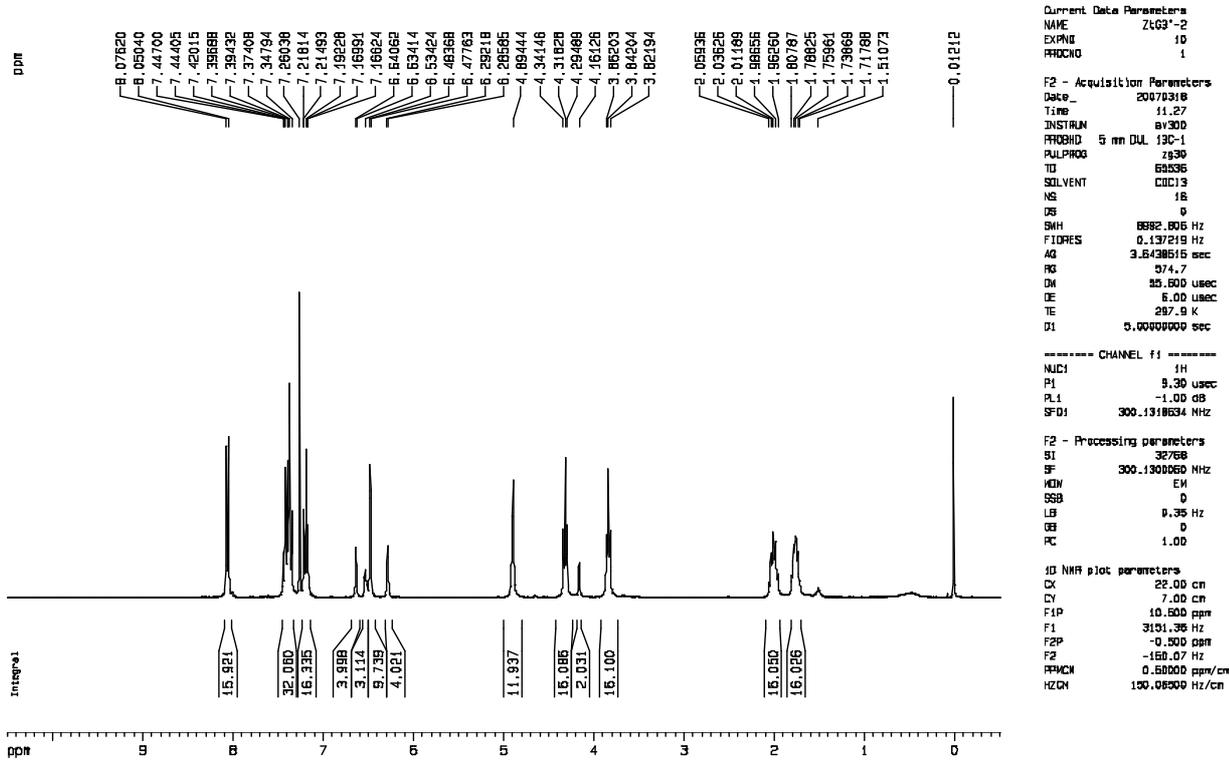


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 11:04
 Operator
 File Name Memory#5
 Sample Name
 Comment

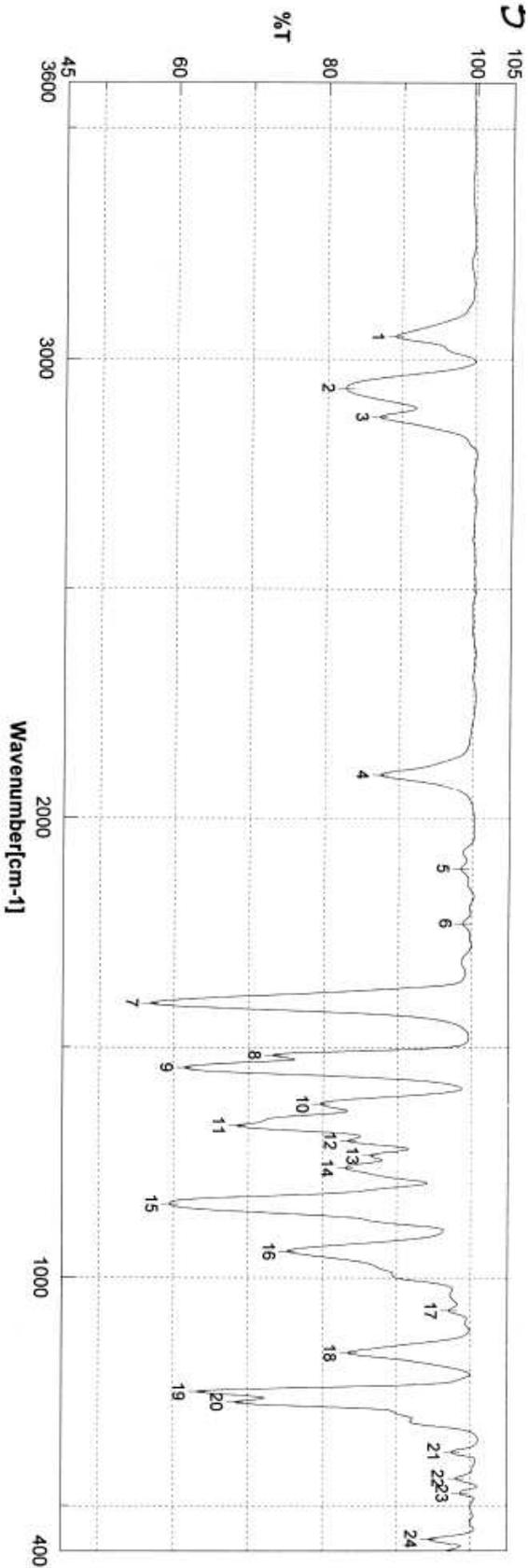
Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:03

No.	cm-1	%T									
1	3049.87	98.5645	2	2938.02	97.6026	3	2874.38	98.2499	4	2098.17	96.8834
6	1596.77	92.6591	7	1482.99	95.6985	8	1455.99	93.8136	9	1378.85	97.1238
11	1295.93	98.0388	12	1267	98.5774	13	1239.04	97.8467	14	1159.97	93.8692
16	927.593	99.5248	17	835.026	97.283	18	749.209	93.1419	19	726.068	93.9938
21	559.255	98.9394	22	531.293	99.3577	23	495.616	99.7299	24	459.939	99.2471
									25	430.048	99.6819
											95.498
											95.9664
											98.7773
											98.7732

Dendron G₃N₃



533'ND

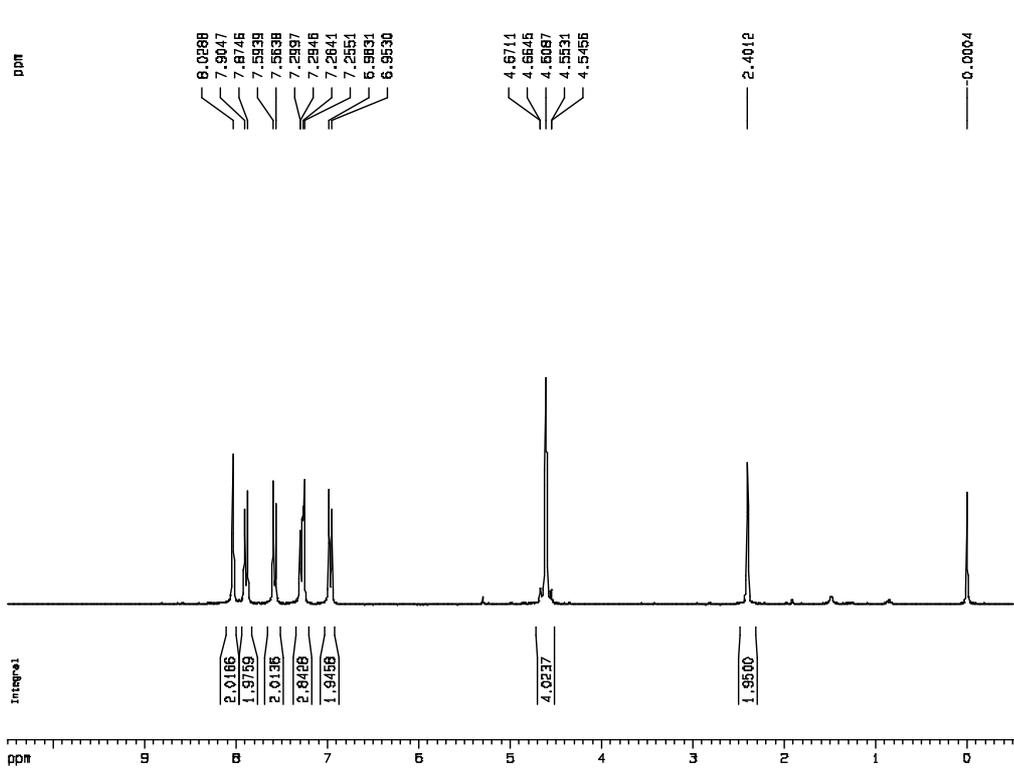


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 11:09
 Operator
 File Name Memory#3
 Sample Name
 Comment

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:10

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6	1770.33	98.7939	7	1596.77	56.8033	8	1482.99	73.2043	9	1455.99	61.4341	10	1376.93	79.6334
11	1329.68	68.469	12	1296.89	83.3775	13	1265.07	86.3914	14	1238.08	83.0048	15	1160.94	59.4945
16	1057.76	75.2323	17	928.557	97.0148	18	835.026	83.4294	19	750.174	63.2162	20	727.032	68.3124
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Monomer M4



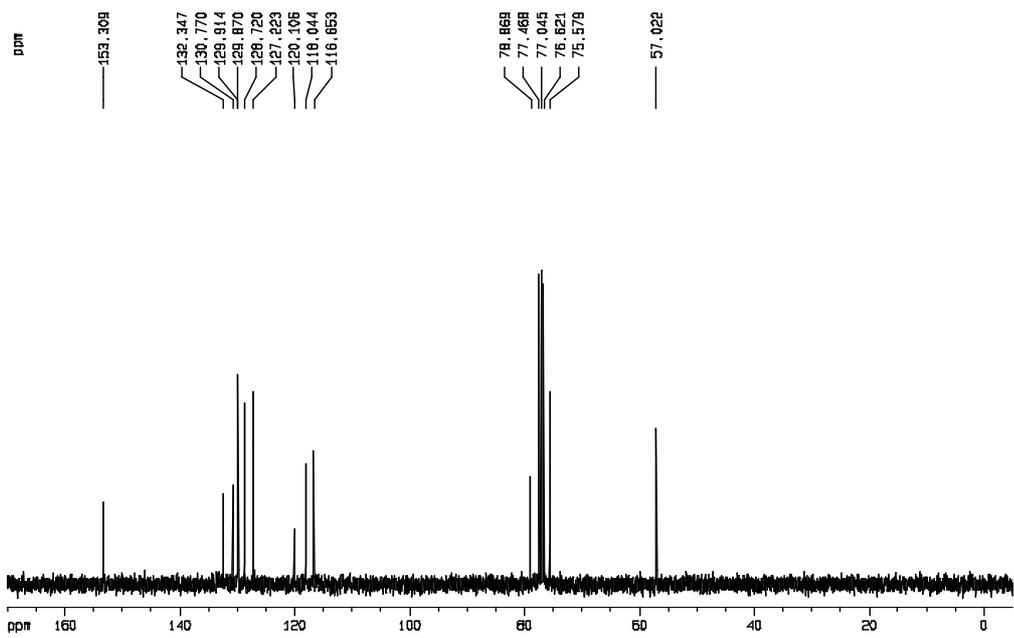
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 PROCNO 1

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 PULPROG zgpg30
 TD 65536
 FIDRES 0.137219 Hz
 AQ 3.6438515 sec
 RG 374.7
 DM 35.600 usec
 DE 5.00 usec
 TE 297.1 K
 D1 0.0000000 sec

==== CHANNEL f1 =====
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318534 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300078 MHz
 MDW EM
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 5.00 cm
 F1P 10.500 ppm
 F1 3181.35 Hz
 F2P -0.500 ppm
 F2 -150.07 Hz
 RFMCM 0.50000 ppm/cm
 HZCM 150.08500 Hz/cm



Current Data Parameters
 NAME Z4BinolCC
 EXPNO 21
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070417
 Time 11.34
 INSTRUM av300
 PROBNM 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 FIDRES 0.274438 Hz
 AQ 1.8218289 sec
 RG 455.1
 DM 27.800 usec
 DE 6.00 usec
 TE 297.2 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 d12 0.0000000 sec

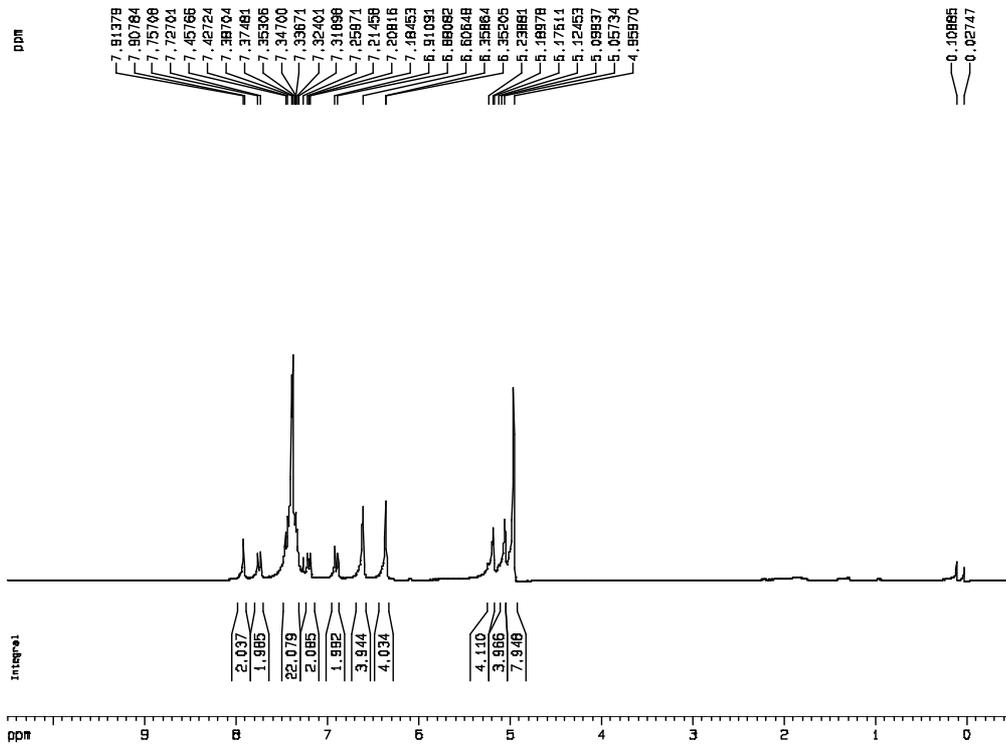
==== CHANNEL f1 =====
 NUC1 13C
 P1 8.40 usec
 PL1 -1.00 dB
 SFO1 75.4733583 MHz

==== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPDZ 89.00 usec
 PLZ -1.00 dB
 PL12 18.00 dB
 PL13 18.00 dB
 SFO2 300.1317000 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677480 MHz
 MDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 22.00 cm
 CY 7.00 cm
 F1P 170.000 ppm
 F1 12828.82 Hz
 F2P -5.000 ppm
 F2 -377.34 Hz
 RFMCM 7.56455 ppm/cm
 HZCM 600.31182 Hz/cm

Dendritic monomer M5



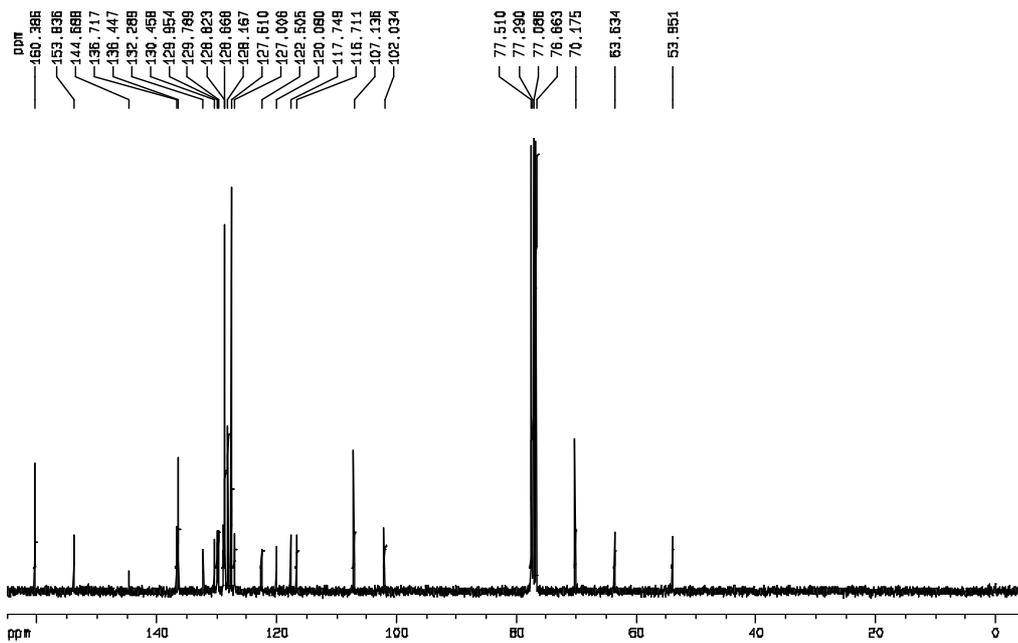
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 PULPROG zg30
 TD 65536
 FIDRES 0.137219 Hz
 AQ 3.6438615 sec
 RG 114
 DM 95.600 usec
 DE 5.00 usec
 TE 299.4 K
 D1 0.0000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 10.60 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300057 MHz
 MDW 0
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 5.00 cm
 F1P 10.000 ppm
 F1 3181.36 Hz
 F2P -0.500 ppm
 F2 -150.07 Hz
 RFMCM 0.50000 ppm/cm
 HZCM 150.06300 Hz/cm



Current Data Parameters
 NAME Ztclickeam01
 EXPNO 30
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070726
 Time 12.18
 INSTRUM av300
 PROBHD 5 mm DUL 19C-1
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 4
 SWH 17890.811 Hz
 FIDRES 0.274438 Hz
 AQ 1.8218200 sec
 RG 10321.3
 DM 27.800 usec
 DE 8.00 usec
 TE 299.5 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 d12 0.0000000 sec

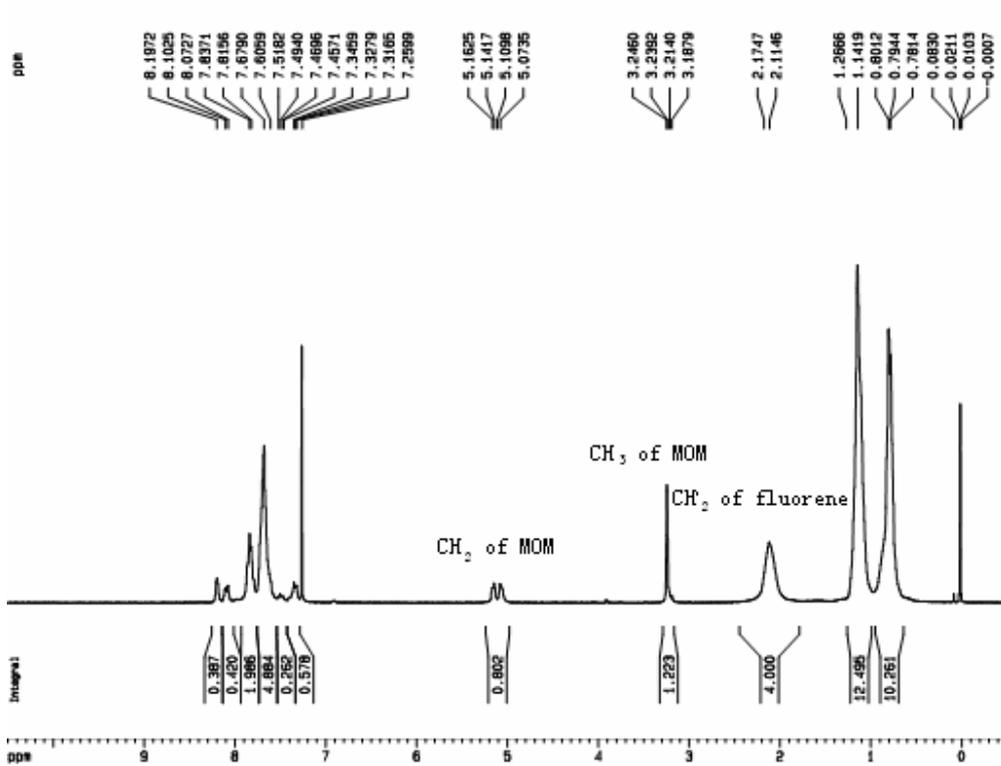
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 NUC1 13C
 P1 14.20 usec
 PL1 -5.00 dB
 SFO1 75.4752823 MHz

----- CHANNEL f2 -----
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.00 dB
 PL12 16.50 dB
 PL13 18.00 dB
 SFO2 300.1312000 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677480 MHz
 MDW 0
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 22.00 cm
 CY 10.00 cm
 F1P 180.000 ppm
 F1 12482.118 Hz
 F2P -0.500 ppm
 F2 -377.34 Hz
 RFMCM 7.72727 ppm/cm
 HZCM 283.19582 Hz/cm

Polymer PFMOM



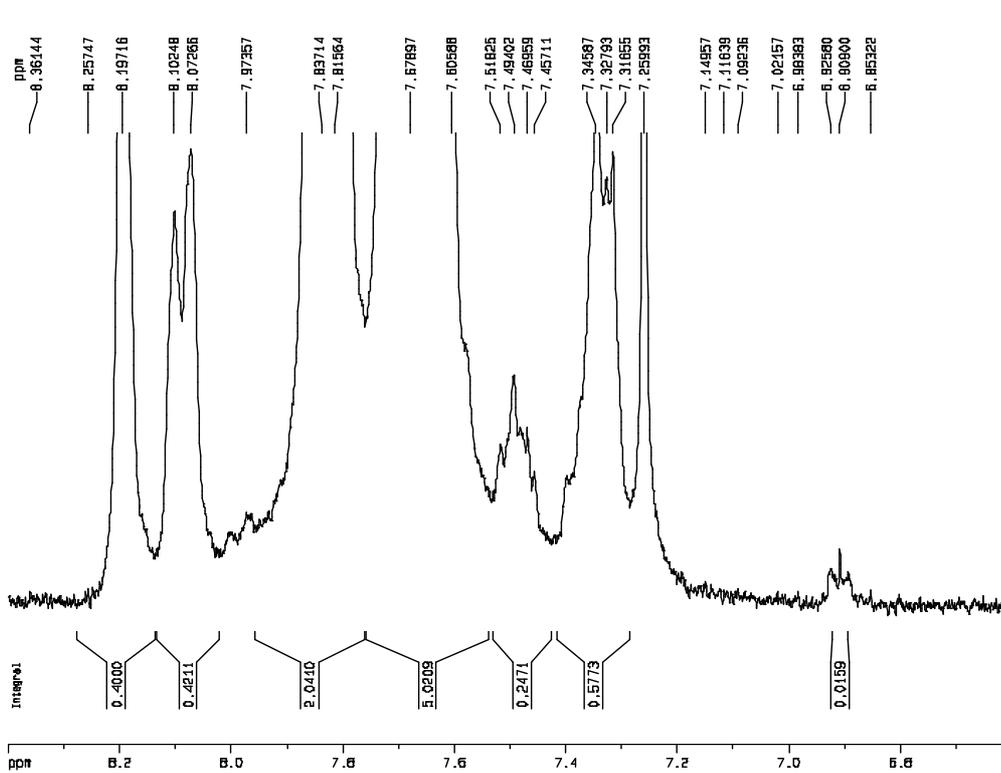
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 EXPNO 20
 PROCNO 1

F2 - Acquisition Parameters
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 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 12
 DS 2
 SWH 6172.839 Hz
 FIDRES 0.084190 Hz
 AQ 5.3084680 sec
 RG 228.1
 DM 81.000 usec
 DE 6.00 usec
 TE 301.3 K
 D1 2.0000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300064 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

ID NMR plot parameters
 CX 22.00 cm
 CY 200.00 cm
 F1P 10.500 ppm
 F1 3081.36 Hz
 F2P -0.500 ppm
 F2 -100.07 Hz
 PPMH 0.50000 ppm/cm
 HZCM 150.00000 Hz/cm



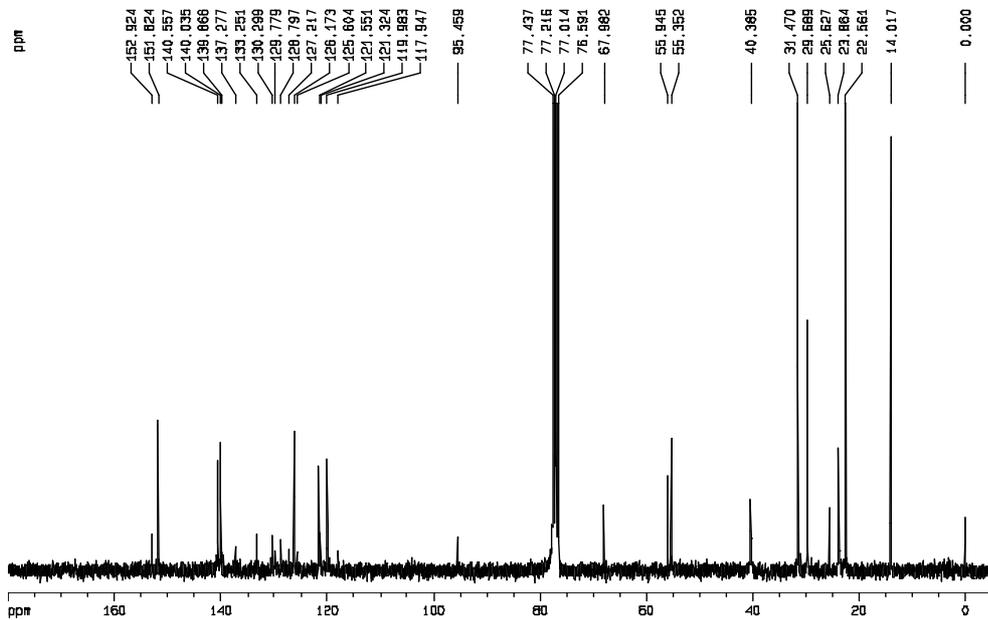
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 EXPNO 20
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20060909
 Time 15.25
 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 12
 DS 2
 SWH 6172.839 Hz
 FIDRES 0.084190 Hz
 AQ 5.3084680 sec
 RG 228.1
 DM 81.000 usec
 DE 6.00 usec
 TE 301.3 K
 D1 2.0000000 sec

----- CHANNEL f1 -----
 NUC1 13C
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300064 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

ID NMR plot parameters
 CX 22.00 cm
 CY 200.00 cm
 F1P 8.400 ppm
 F1 2921.09 Hz
 F2P 6.500 ppm
 F2 1980.86 Hz
 PPMH 0.08182 ppm/cm
 HZCM 24.33609 Hz/cm



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Current Data Parameters
NAME      zjvo4841140K
EXPNO    10
PROCNO   1

F2 - Acquisition Parameters
Date_    20060510
Time     7.28
INSTRUM  mv300
PROBHD   5 mm QNP 13C-1
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        6720
DS        4
SFO      175.8011 MHz
FIDRES   0.274439 Hz
AQ        1.8219008 sec
RG         724.1
DM         27.900 usec
DE         8.00 usec
TE        302.1 K
D1         2.0000000 sec
d11        0.0300000 sec
d12        0.0002000 sec

===== CHANNEL f1 =====
NUC1       13C
P1         8.40 usec
PL1        -1.00 dB
SFO1      75.475993 MHz

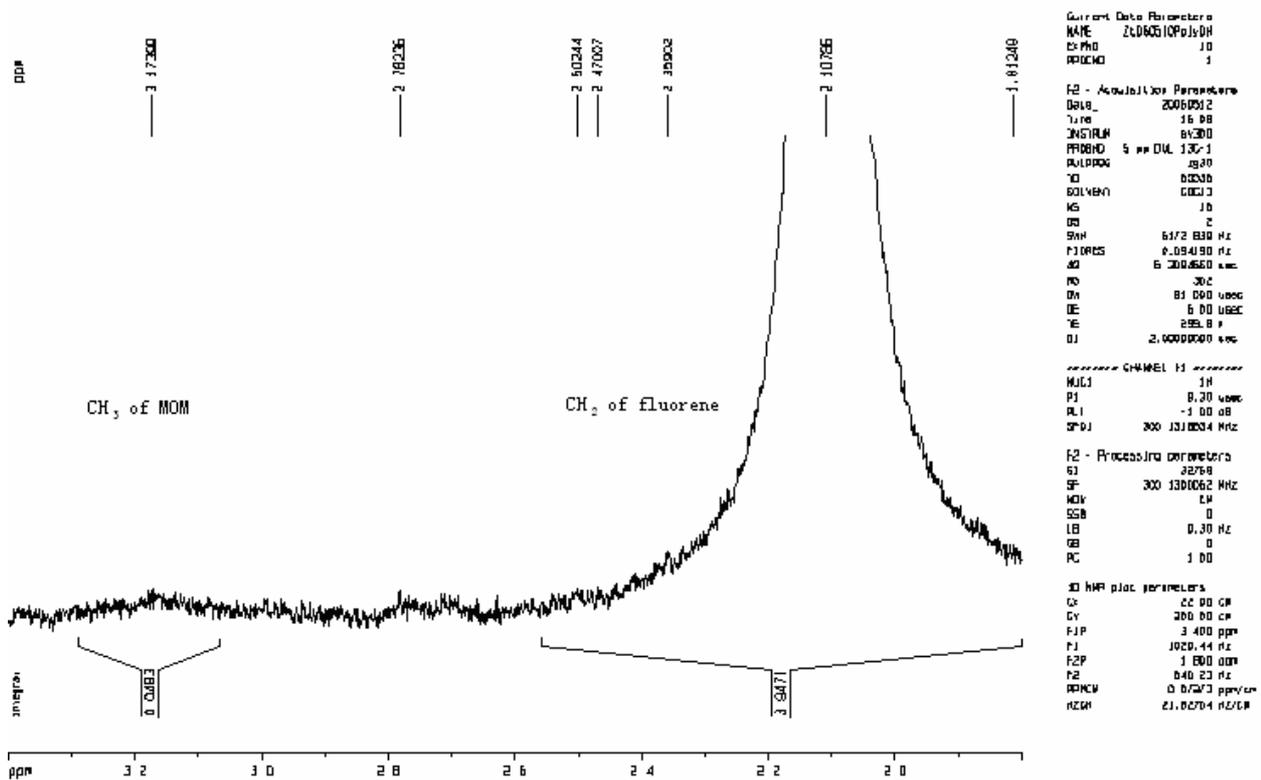
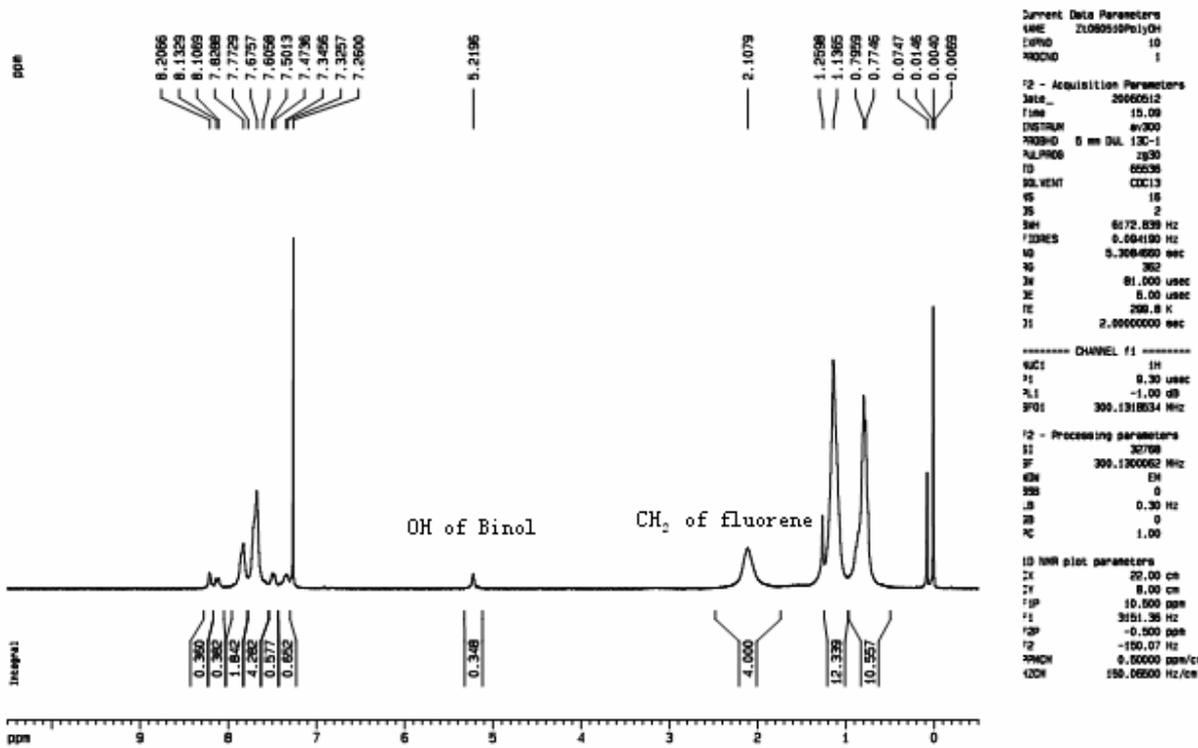
===== CHANNEL f2 =====
CPDPRG2   Mv1216
NUC2       1H
PCPD2     80.00 usec
PL2        -1.00 dB
PL12       18.00 dB
PL13       18.00 dB
SFO2      300.1312000 MHz

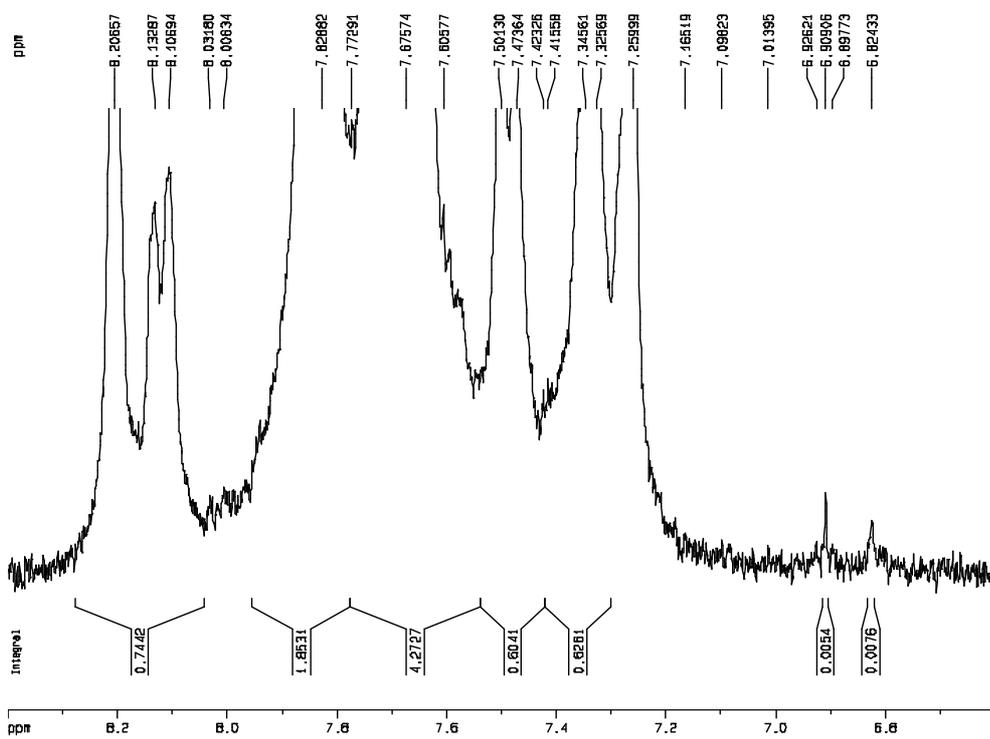
F2 - Processing parameters
SI         32768
SF         75.4677483 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

1D NMR plot parameters
CX         22.00 cm
CY         60.00 cm
F1P        180.000 ppm
F2         13000.200 Hz
F3P        -2.000 ppm
F2         -371.34 Hz
PP4MCH     8.40909 ppm/cm
H2CH       634.15117 Hz/cm

```

Polymer PFOH





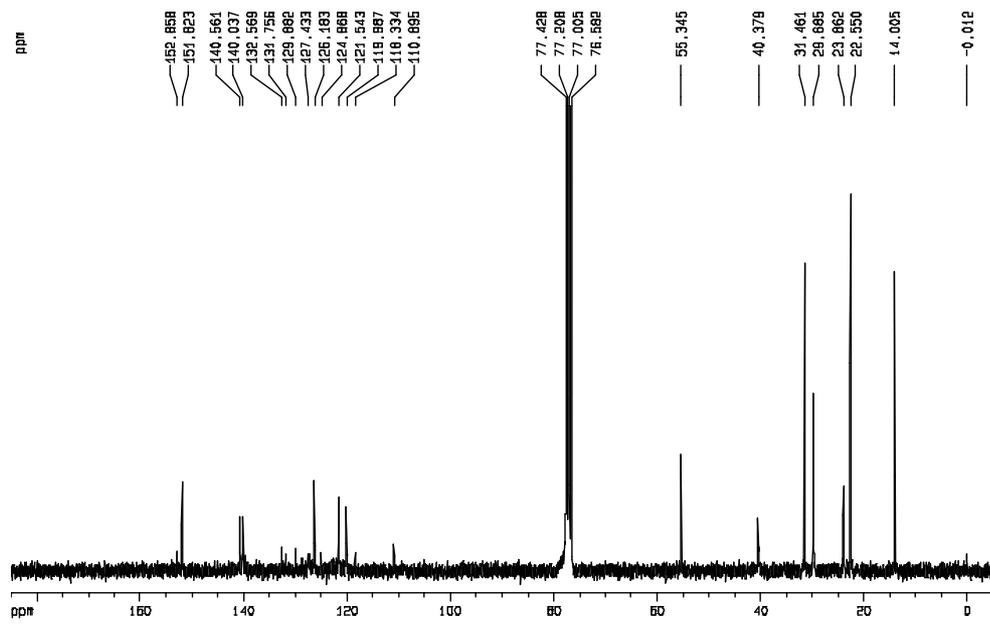
Current Data Parameters
 NAME Zr(OEt)2
 EXPNO 10
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20060512
 Time 15.09
 INSTRUM av300
 PROBRD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 FIDRES 0.094190 Hz
 AQ 5.3884860 sec
 RG 302
 DM 81.300 usec
 DE 5.00 usec
 TE 299.9 K
 D1 2.0000000 sec

==== CHANNEL f1 =====
 NUC1 1H
 P1 9.30 usec
 PL1 1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300062 MHz
 MDW EM
 SGB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 300.00 cm
 F1P 8.400 ppm
 F1 2921.09 Hz
 F2P 6.600 ppm
 F2 1980.86 Hz
 PRMCH 0.00192 ppm/cm
 HZCN 24.00609 Hz/cm



Current Data Parameters
 NAME Zr(OEt)2
 EXPNO 10
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070213
 Time 18.31
 INSTRUM av300
 PROBRD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 FIDRES 0.274428 Hz
 AQ 1.821928 sec
 RG 645.1
 DM 27.800 usec
 DE 6.00 usec
 TE 299.9 K
 D1 2.0000000 sec
 D12 0.0000000 sec
 D12 0.0000000 sec

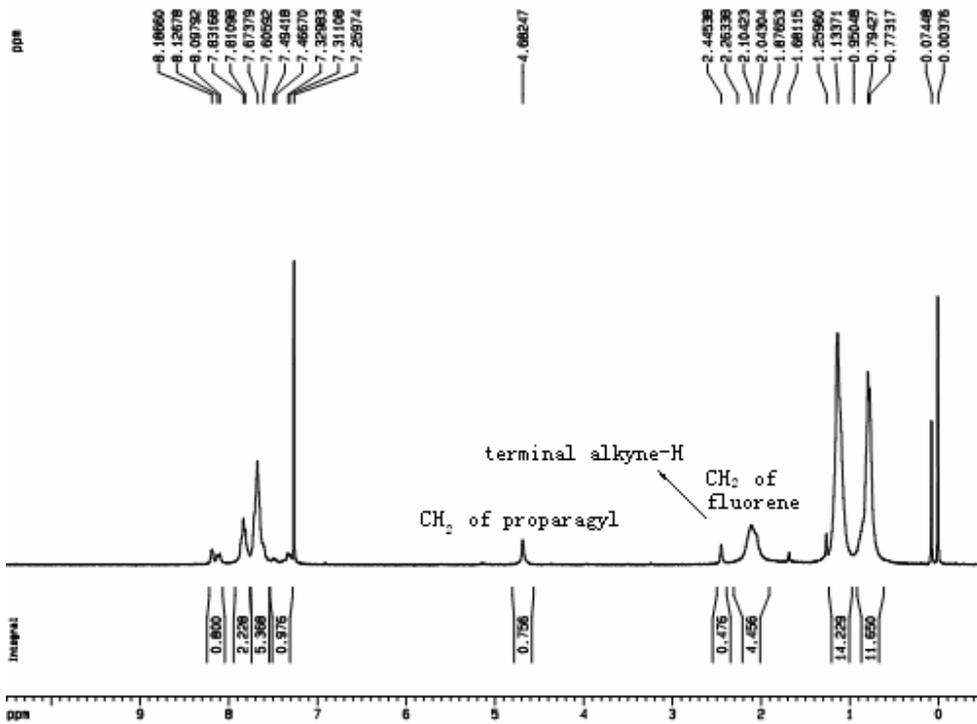
==== CHANNEL F1 =====
 NUC1 13C
 P1 8.40 usec
 PL1 -1.00 dB
 SFO1 75.4752933 MHz

==== CHANNEL F2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPDZ 80.00 usec
 PL2 -1.00 dB
 PL3 18.00 dB
 PL13 18.00 dB
 SFO2 300.1317000 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677480 MHz
 MDW EM
 SGB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 22.00 cm
 CY 48.00 cm
 F1P 180.000 ppm
 F1 13801.003 Hz
 F2P -5.000 ppm
 F2 -377.34 Hz
 PRMCH 8.63838 ppm/cm
 HZCN 651.76657 Hz/cm

Polymer PFYNE

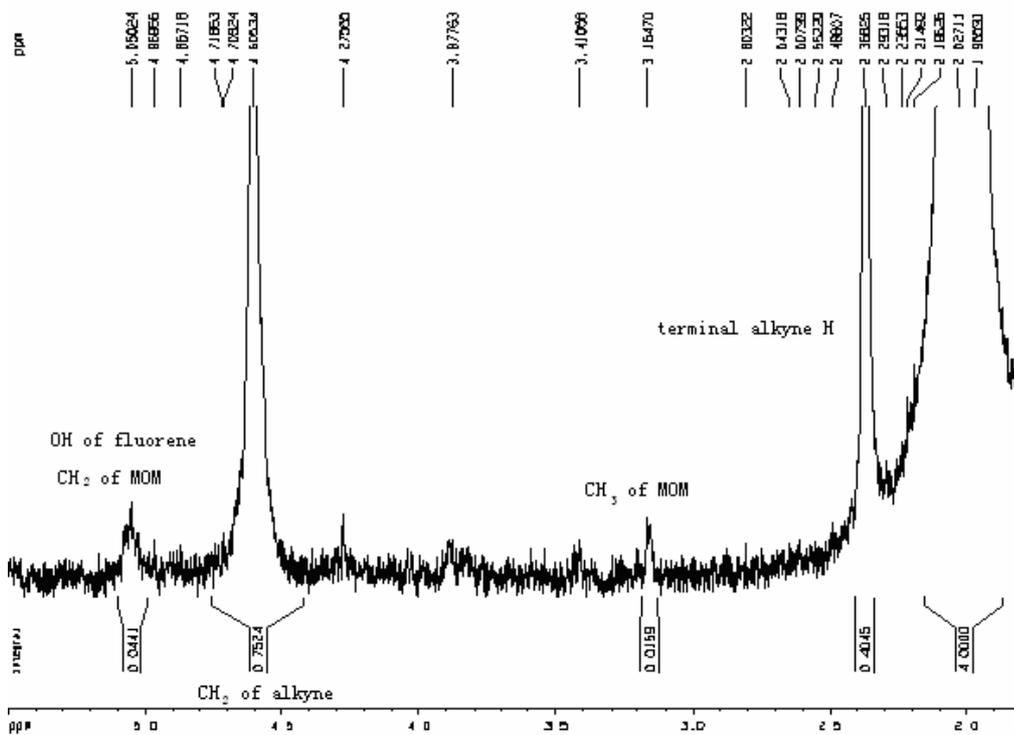


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 NAME 21ko.78
 EXPNO 30
 PROCNO 1
 F2 - Acquisition Parameters
 DATE_ 20080820
 TIME 10.25
 INSTRUM spect
 PROBHD 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SWH 8172.830 Hz
 FIDRES 0.094100 Hz
 AQ 0.3984860 sec
 RG 382
 DR 81.000 usec
 DE 6.00 usec
 TE 298.0 K
 D1 2.0000000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1300634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300634 MHz
 MDW EM
 SGB 0
 LB 0.30 Hz
 GB 0
 DC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 7.00 cm
 F1P 10.200 ppm
 F1 3181.36 Hz
 F2P -0.500 ppm
 F2 -150.07 Hz
 PRMC 0.00000 ppm/cm
 KZCN 180.00000 Hz/cm

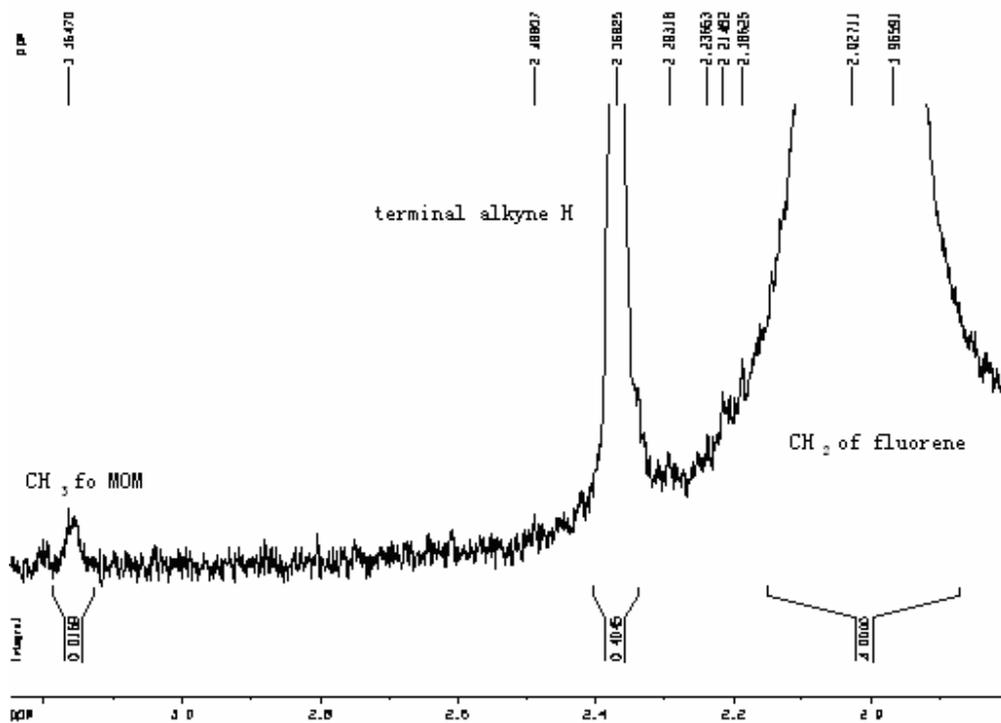


Current Data Parameters
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 EXPNO 30
 PROCNO 1
 F2 - Acquisition Parameters
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 PROBHD 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SWH 8172.830 Hz
 FIDRES 0.094100 Hz
 AQ 0.3984860 sec
 RG 382
 DR 81.000 usec
 DE 6.00 usec
 TE 298.0 K
 D1 2.0000000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1300634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300634 MHz
 MDW EM
 SGB 0
 LB 0.30 Hz
 GB 0
 DC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 300.00 cm
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 F1 3180.72 Hz
 F2P 1.800 ppm
 F2 140.23 Hz
 PRMC 0.00000 ppm/cm
 KZCN 50.47542 Hz/cm



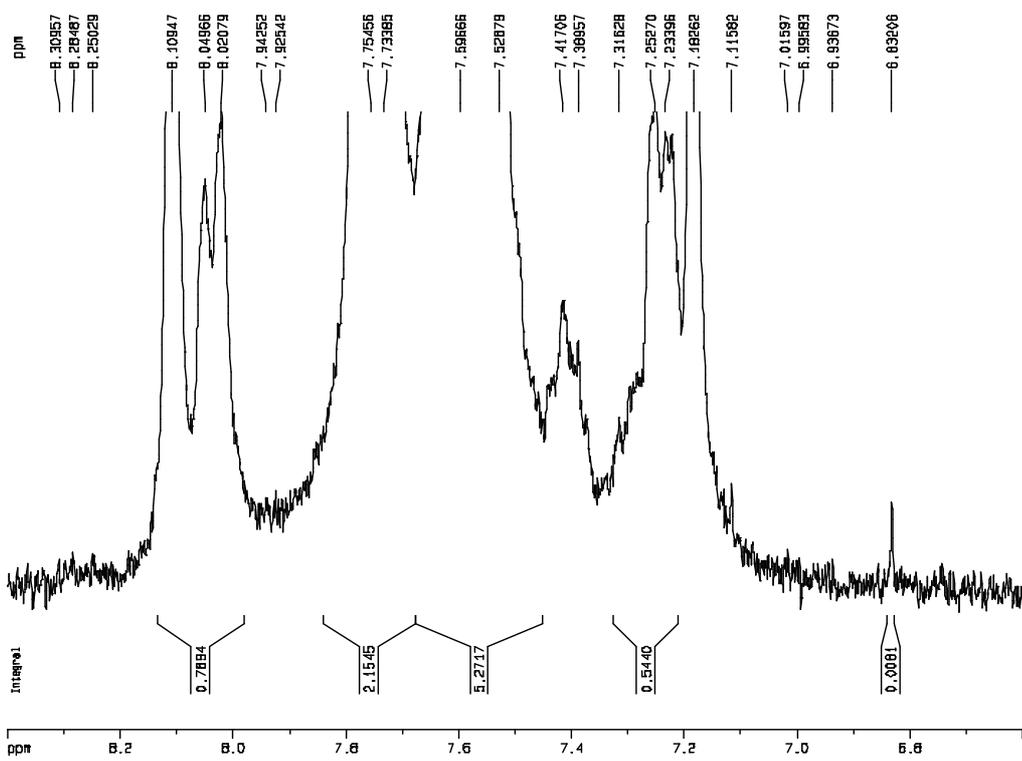
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 TIME 15.26
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 PULPROG zgpg
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SMH 6172.838 Hz
 FIDRES 0.154189 Hz
 AQ 5.3184660 sec
 RG 302
 DM 81.000 usec
 DE 6.00 usec
 TE 289.0 K
 D1 2.00000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1310034 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300236 MHz
 KM EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

3D NMR plot parameters
 CX 22.00 cm
 CY 300.00 cm
 F1P 0.400 ppm
 F1 2921.09 Hz
 F2P 0.600 ppm
 F2 1980.86 Hz
 RFMCN 0.08182 ppm/cm
 HZCN 24.59609 Hz/cm



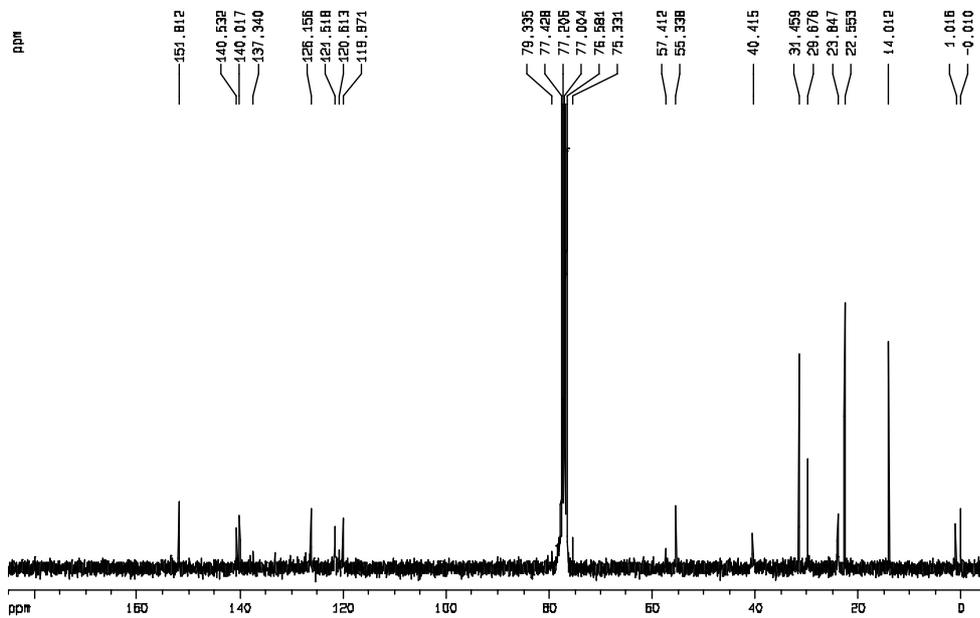
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 PROCNO 1

F2 - Acquisition Parameters
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 INSTRUM spect
 PROBD 5 mm DUL 13C-1
 PULPROG zgpg
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SMH 6172.838 Hz
 FIDRES 0.094150 Hz
 AQ 5.3084660 sec
 RG 302
 DM 81.000 usec
 DE 6.00 usec
 TE 289.0 K
 D1 2.00000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1310034 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300236 MHz
 KM EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

3D NMR plot parameters
 CX 22.00 cm
 CY 300.00 cm
 F1P 0.400 ppm
 F1 2921.09 Hz
 F2P 0.600 ppm
 F2 1980.86 Hz
 RFMCN 0.08182 ppm/cm
 HZCN 24.59609 Hz/cm



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Current Data Parameters
NAME      zt-pt-7E
EXPNO    11
PROCNO   1

F2 - Acquisition Parameters
Date_    20090828
Time     8.31
INSTRUM  mv300
PROBHD   5 mm QNP 13C-1
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        6182
DS        4
SFO1     17500.011 Hz
FIDRES   0.274428 Hz
AQ        1.8219596 sec
RG        1250.2
DM        27.800 usec
DE        8.80 usec
TE        300.2 K
D1        2.0000000 sec
d11       0.0300000 sec
d12       0.0002000 sec

===== CHANNEL F1 =====
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P1        1.00 usec
PL1       -1.00 dB
SFO1     75.4732993 MHz

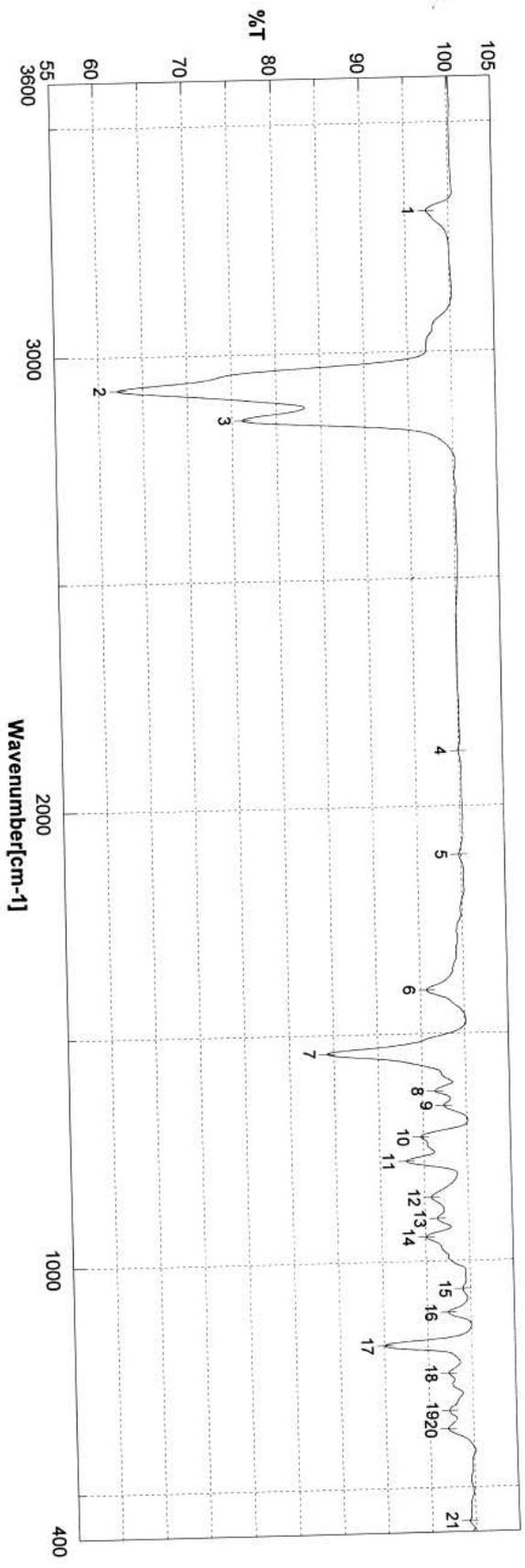
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ORPROG2  waltz16
NUC2      1H
PCPDZ    60.00 usec
PL2       -1.00 dB
PL12     18.00 dB
PL18     18.00 dB
SFO2     300.1312902 MHz

F2 - Processing parameters
SI        32768
SF        75.4671480 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

1D NMR plot parameters
CX        25.00 cm
CY        80.00 cm
F1P       180.000 ppm
F1        12691.822 Hz
F2P       -5.000 ppm
F2        -377.34 Hz
PPMCH    8.263258 ppm/Hz
HZCH     851.78857 Hz/cm

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PF1N7E

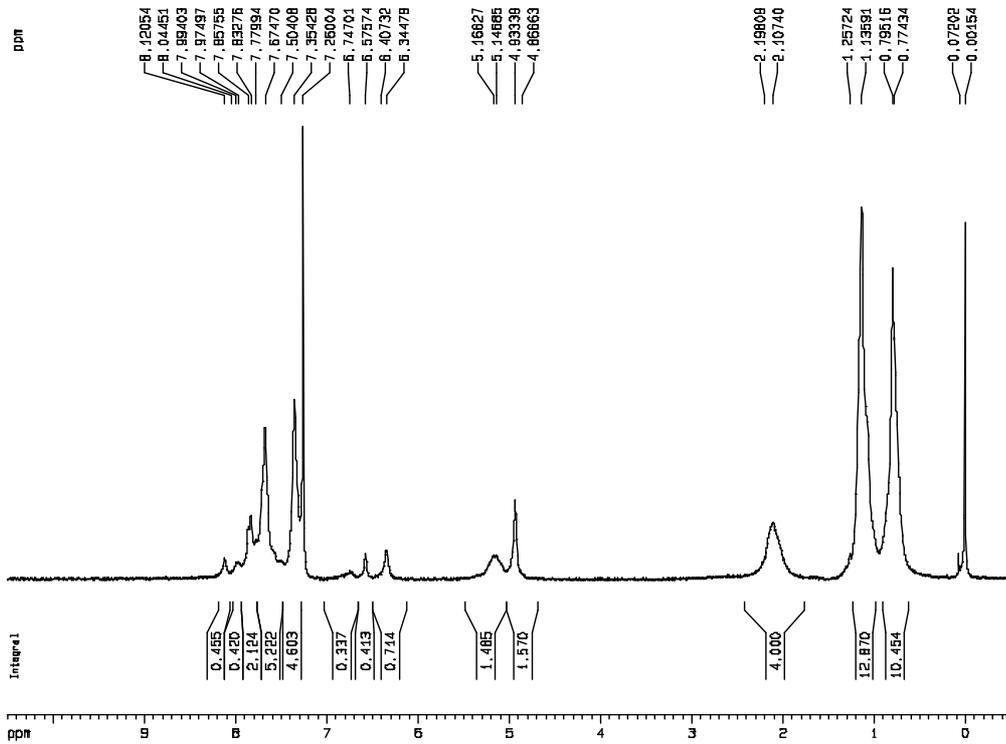


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 Gain Auto (2)
 Date/Time 2007-5-30 11:16
 Operator
 File Name
 Sample Name
 Comment

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:42

No.	cm-1	%T									
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6	1595.81	95.7201	7	1458.89	84.2285	8	1372.1	96.4414	9	1340.28	97.4238
11	1219.76	92.9806	12	1140.69	96.7799	13	1094.4	96.4044	14	1053.91	95.0512
16	886.131	97.4324	17	814.777	90.0608	18	751.138	97.2668	19	669.178	97.3016
21	424.263	99.2499							5	1891.83	99.7555
									10	1272.79	94.7029
									15	938.199	99.1099
									20	628.68	97.0863

Polymer PFG₁



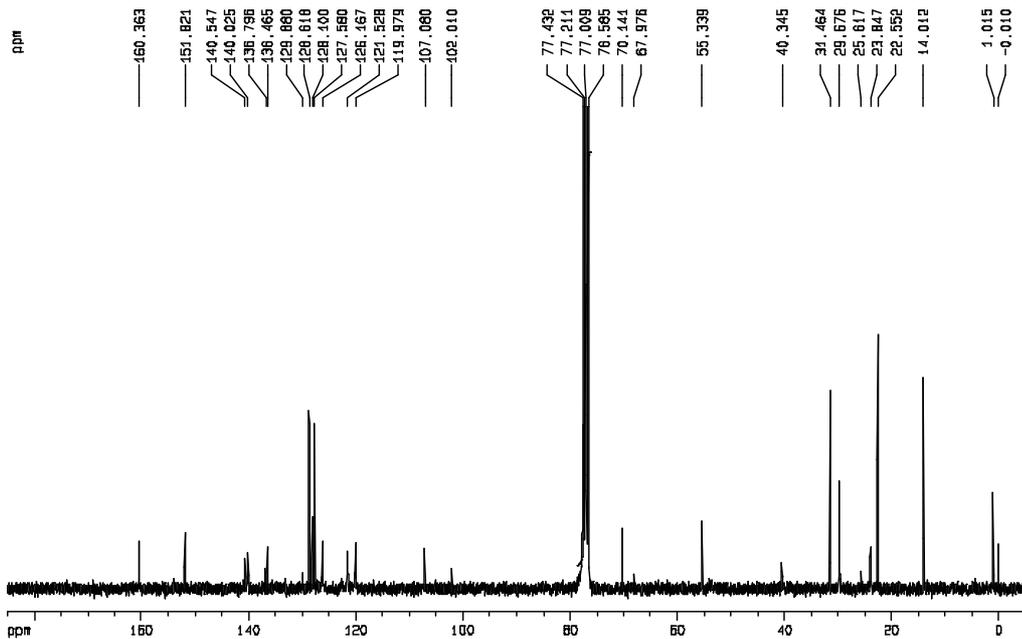
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 PULPROG zg30
 TD 65536
 SOLVENT CUC13
 NS 16
 DS 2
 SWH 6172.839 Hz
 FIDRES 0.094190 Hz
 AQ 6.3084660 sec
 RG 287.4
 DM 01.000 usec
 DE 8.00 usec
 TE 295.7 K
 D1 2.0000000 sec

==== CHANNEL f1 =====
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300058 MHz
 WDW EM
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 18.00 cm
 F1P 10.500 ppm
 F1 3151.36 Hz
 F2P -0.500 ppm
 F2 -150.07 Hz
 PPMCN 0.58000 ppm/cm
 HZCN 150.08500 Hz/cm



Current Data Parameters
 NAME Z1-C113K-61
 EXPNO 11
 PROCNO 1

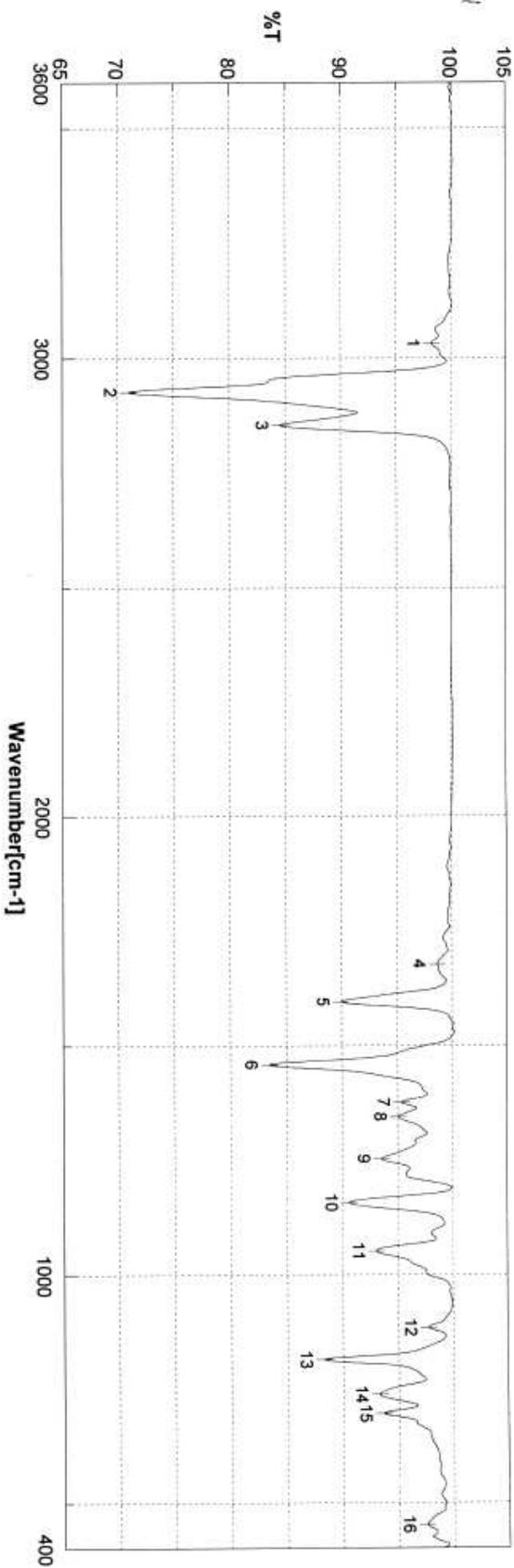
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 Time 7.48
 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 SOLVENT CUC13
 NS 4
 DS 4
 SWH 17982.811 Hz
 FIDRES 0.274438 Hz
 AQ 1.8218200 sec
 RG 287.4
 DM 27.800 usec
 DE 8.00 usec
 TE 293.4 K
 D1 2.0000000 sec
 D11 0.0300000 sec
 D12 0.0000000 sec

==== CHANNEL F1 =====
 NUC1 13C
 P1 8.40 usec
 PL1 -1.00 dB
 SFO1 75.4752823 MHz

==== CHANNEL F2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PPRG2 89.00 usec
 PL2 -1.00 dB
 PL12 18.00 dB
 PL13 18.00 dB
 SFO2 300.1312000 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677480 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 22.00 cm
 CY 18.00 cm
 F1P 105.000 ppm
 F1 13291.83 Hz
 F2P -5.000 ppm
 F2 -377.34 Hz
 PPMCN 0.53538 ppm/cm
 HZCN 651.78887 Hz/cm

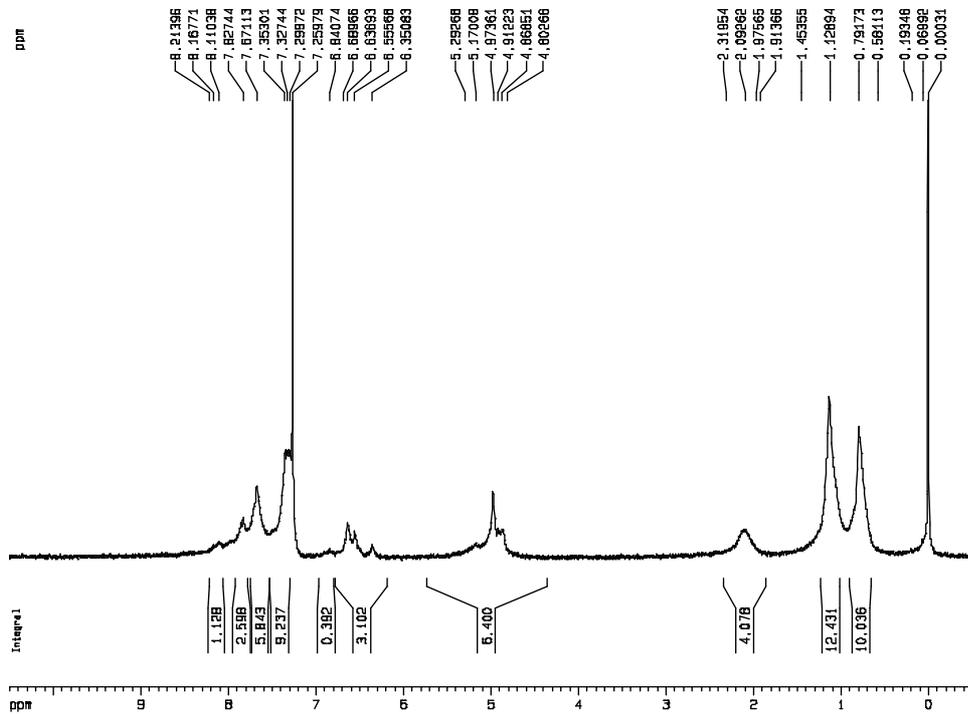


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 11:24
 Operator
 File Name
 Sample Name Memory#4
 Comment

Resolution 4 cm-1
 Apodization Ccsine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:13

No.	cm-1	%T												
1	3031.55	98.2184	2	2926.45	70.9771	3	2854.13	84.5431	4	1677.77	98.6387	5	1596.77	89.9177
6	1457.92	83.4685	7	1375	95.3593	8	1344.14	95.0594	9	1252.54	93.5349	10	1158.04	90.5937
11	1051.98	93.0227	12	884.202	97.725	13	814.777	88.2948	14	738.603	93.2582	15	697.141	93.6313
16	452.225	97.4922												

Polymer PFG₂



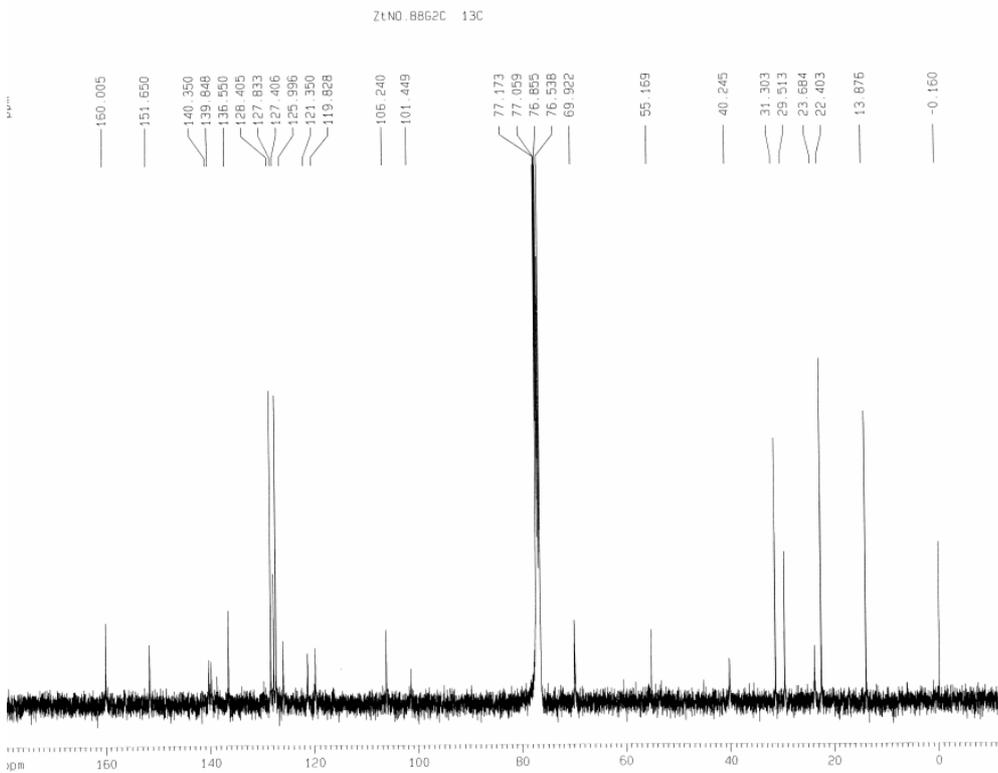
Current Data Parameters
 NAME ZLN0.8862
 EXPNO 20
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070204
 Time 11.58
 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SMH 6172.839 Hz
 FIDRES 0.054189 Hz
 AQ 5.3084660 sec
 RG 426.1
 DM 81.000 usec
 DE 6.00 usec
 TE 295.0 K
 D1 2.0000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300682 MHz
 MDW EN
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 18.00 cm
 F1P 10.500 ppm
 F1 3181.36 Hz
 F2P -0.500 ppm
 F2 -158.07 Hz
 RFCHM 0.50000 ppm/cm
 HZCM 150.08500 Hz/cm



ZLN0.8862C 13C

Current Data Parameters
 NAME hou-13C
 EXPNO 13
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070225
 Time 11.35
 INSTRUM av400
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 12288
 DS 0
 SMH 23980.814 Hz
 FIDRES 0.365918 Hz
 AQ 1.3664756 sec
 RG 13004
 DM 20.850 usec
 DE 6.00 usec
 TE 294.6 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 DELTA 1.89999998 sec
 MCREST 0.0000000 sec
 MCWRR 0.0150000 sec

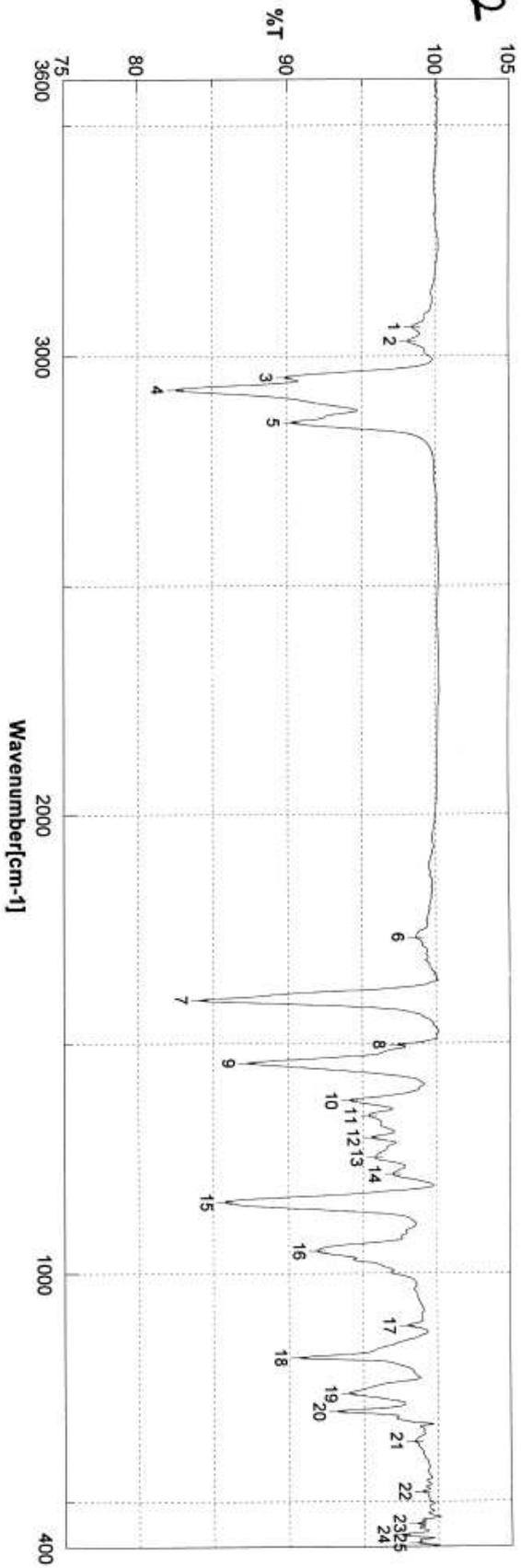
----- CHANNEL f1 -----
 NUC1 13C
 P1 6.30 usec
 PL1 -6.00 dB
 SFO1 100.6282298 MHz

----- CHANNEL f2 -----
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 16.00 dB
 PL13 17.00 dB
 SFO2 400.1318005 MHz

F2 - Processing parameters
 SI 32768
 SF 100.6127861 MHz
 MDW EN
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 23.00 cm
 CY 9.00 cm
 F1P 180.070 ppm
 F1 18117.39 Hz
 F2P -11.467 ppm
 F2 -1193.75 Hz
 RFCHM 8.32773 ppm/cm
 HZCM 837.87634 Hz/cm

PF-62

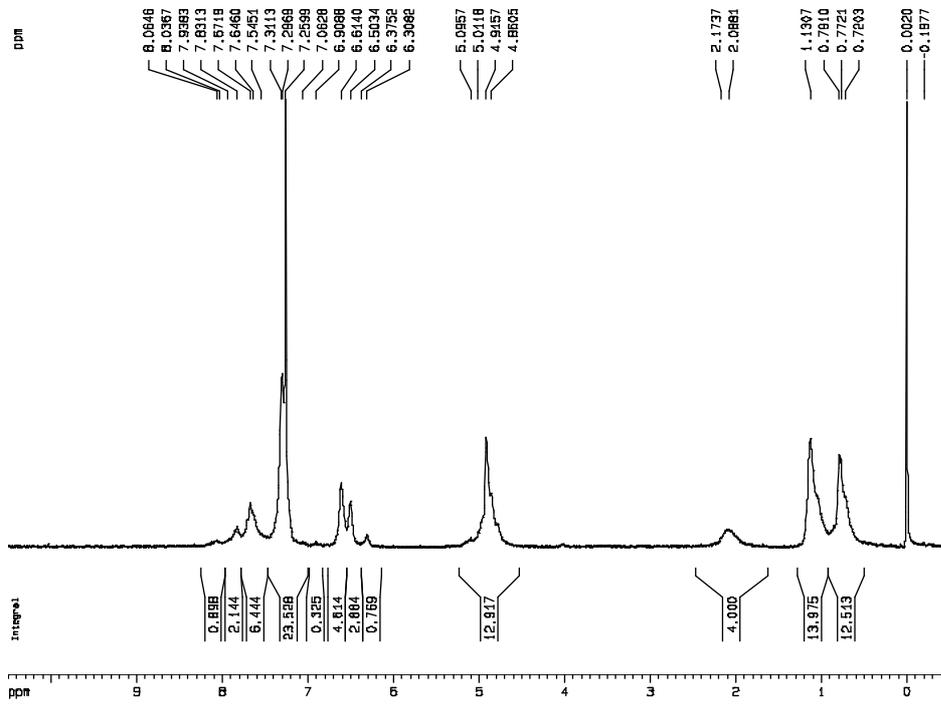


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 11:41
 Operator Memory#3
 File Name
 Sample Name
 Comment

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:20

No.	cm-1	%T									
1	3063.37	98.416	2	3031.55	98.1289	3	2952.48	89.8072	4	2926.45	82.5533
6	1732.73	98.624	7	1595.81	84.0749	8	1496.49	97.3513	9	1456.96	87.2261
11	1342.21	95.4086	12	1294.97	95.5692	13	1251.58	95.7928	14	1215.9	96.9996
16	1049.09	91.8973	17	884.202	97.9727	18	814.777	90.6631	19	735.71	94.0113
21	630.609	98.3997	22	520.686	98.9371	23	450.297	98.5778	24	426.191	97.4922
									5	2855.1	90.2852
									10	1375	94.1165
									15	1157.08	85.727
									20	696.177	93.2079
									25	407.871	98.5809

Polymer PFG₃



Current Data Parameters
 NAME ZtNo.B9
 EXPNO 30
 PROCNO 1

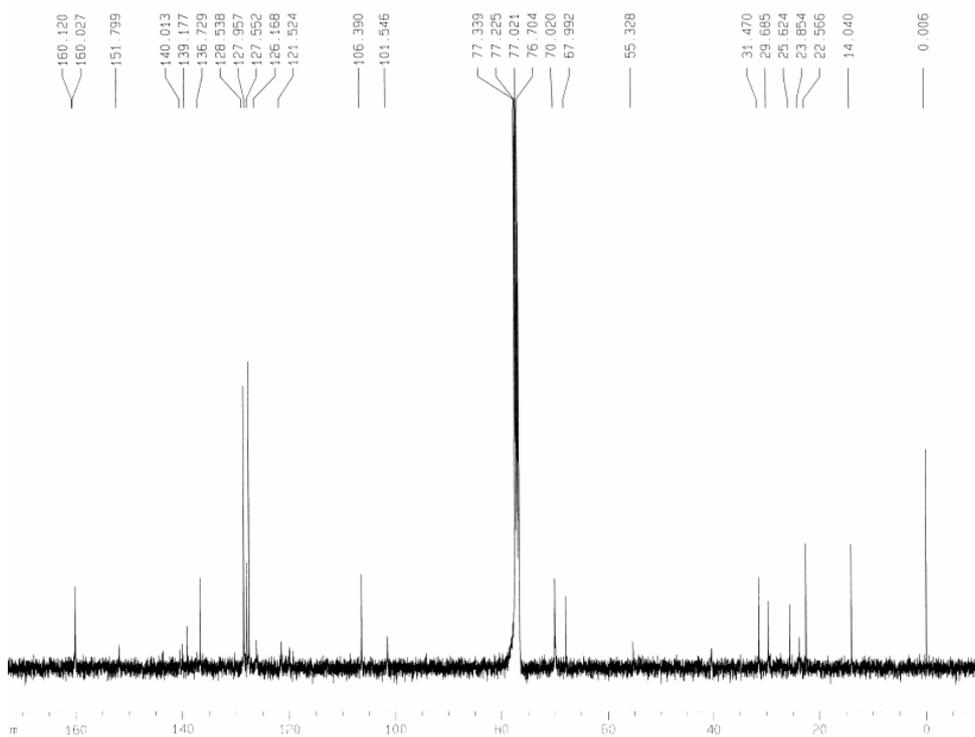
F2 - Acquisition Parameters
 Date_ 20070307
 Time 18.25
 INSTRUM av300
 PROBDI 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 TO 69536
 SOLVENT CDCl3
 NS 15
 DS 0
 SWH 8882.806 Hz
 FIDRES 0.137219 Hz
 AQ 3.6428515 sec
 RG 874.7
 DM 55.600 usec
 DE 6.00 usec
 TE 298.4 K
 D1 5.00000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300633 MHz
 MDV EM
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 18.00 cm
 F1P 10.500 ppm
 F1 3191.36 Hz
 F2P -0.500 ppm
 F2 -160.67 Hz
 FWHM 0.58000 ppm/cm
 HZCM 100.08000 Hz/cm

ZtNoB9G3C 13C



Current Data Parameters
 NAME hou-13C
 EXPNO 17
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070226
 Time 17.12
 INSTRUM av400
 PROBDI 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 15494
 DS 0
 SWH 23980.814 Hz
 FIDRES 0.365918 Hz
 AQ 1.3664756 sec
 RG 10240
 DM 20.850 usec
 DE 6.00 usec
 TE 294.9 K
 D1 2.00000000 sec
 S11 0.03000000 sec
 DELTA 1.89999998 sec
 WCREST 0.00000000 sec
 MCMRK 0.01500000 sec

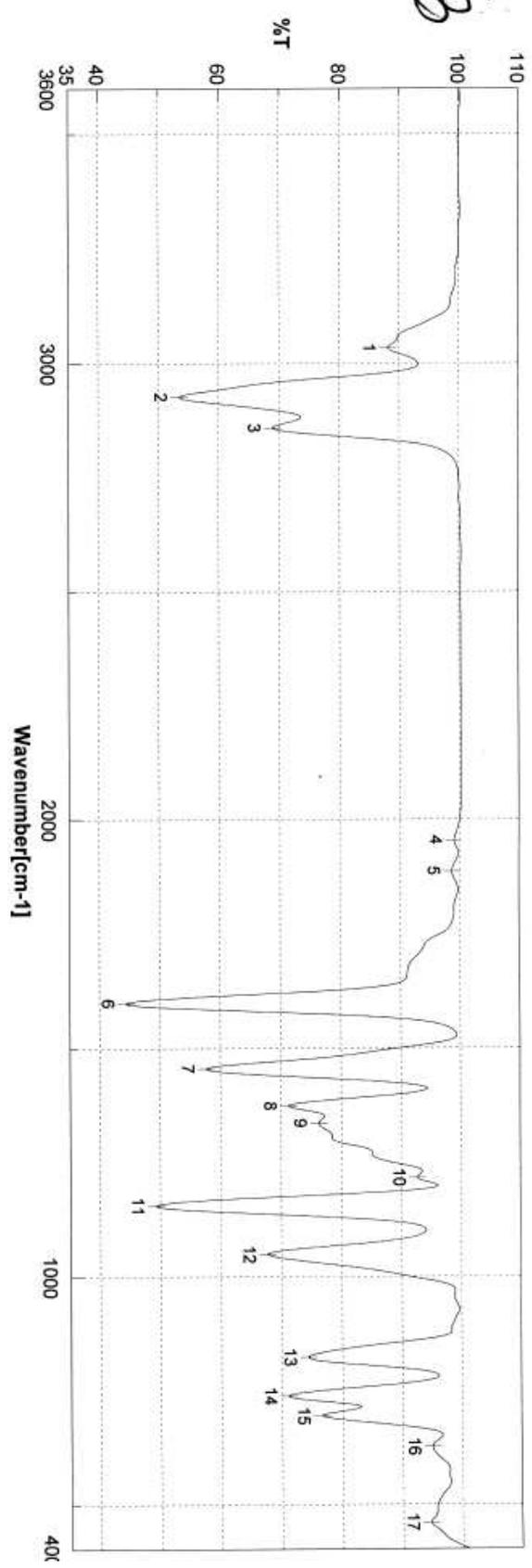
----- CHANNEL f1 -----
 NUC1 13C
 P1 6.30 usec
 PL1 -6.00 dB
 SFO1 100.6228298 MHz

----- CHANNEL f2 -----
 CPDPRG2 waltz16
 NUC2 1H
 P2P2 80.00 usec
 PL2 -4.00 dB
 PL12 16.00 dB
 PL13 17.00 dB
 SFO2 400.1316005 MHz

F2 - Processing parameters
 SI 32768
 SF 100.6127690 MHz
 MDV EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 22.00 cm
 CY 7.00 cm
 F1P 175.464 ppm
 F1 17853.93 Hz
 F2P -111.058 ppm
 F2 -1112.62 Hz
 FWHM 8.47830 ppm/cm
 HZCM 853.82496 Hz/cm

FIG 3

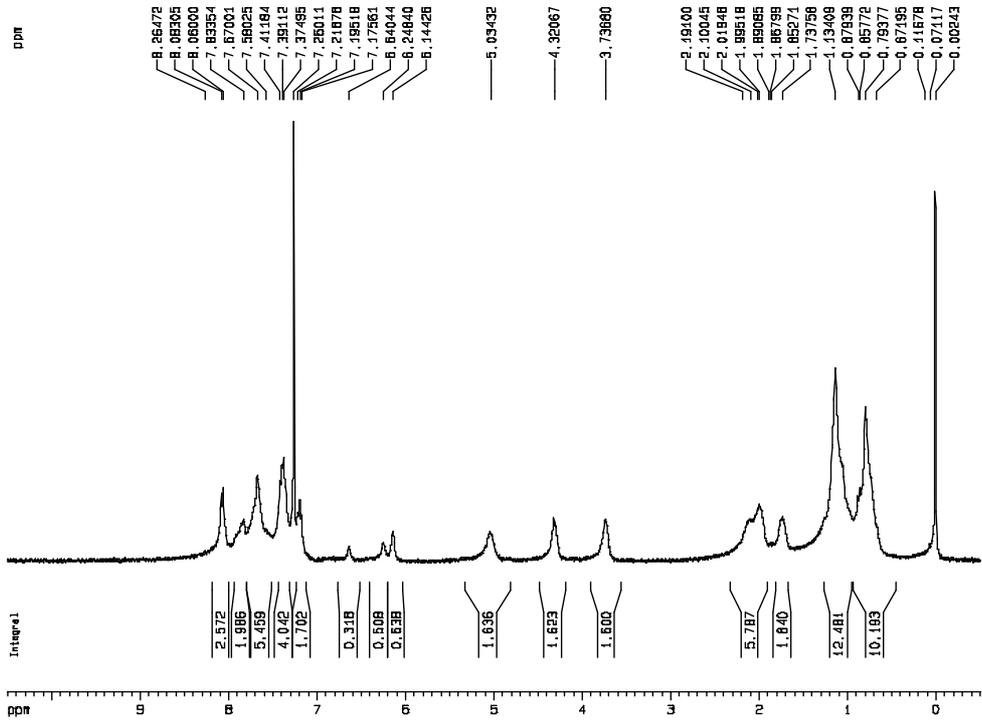


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 12:01
 Operator
 File Name Memory#8
 Sample Name
 Comment

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:35

No.	cm-1	%T												
1	3033.48	88.0899	2	2926.45	53.4413	3	2858.95	68.9011	4	1953.54	99.0724	5	1886.04	98.6633
6	1598.7	44.4132	7	1455.03	57.6804	8	1373.07	71.26	9	1335.46	76.2266	10	1216.86	92.6793
11	1155.15	49.2782	12	1049.09	67.714	13	823.455	74.3931	14	739.567	71.1055	15	696.177	76.5661
16	627.716	94.9496	17	459.939	94.6838									

Polymer PFG₁

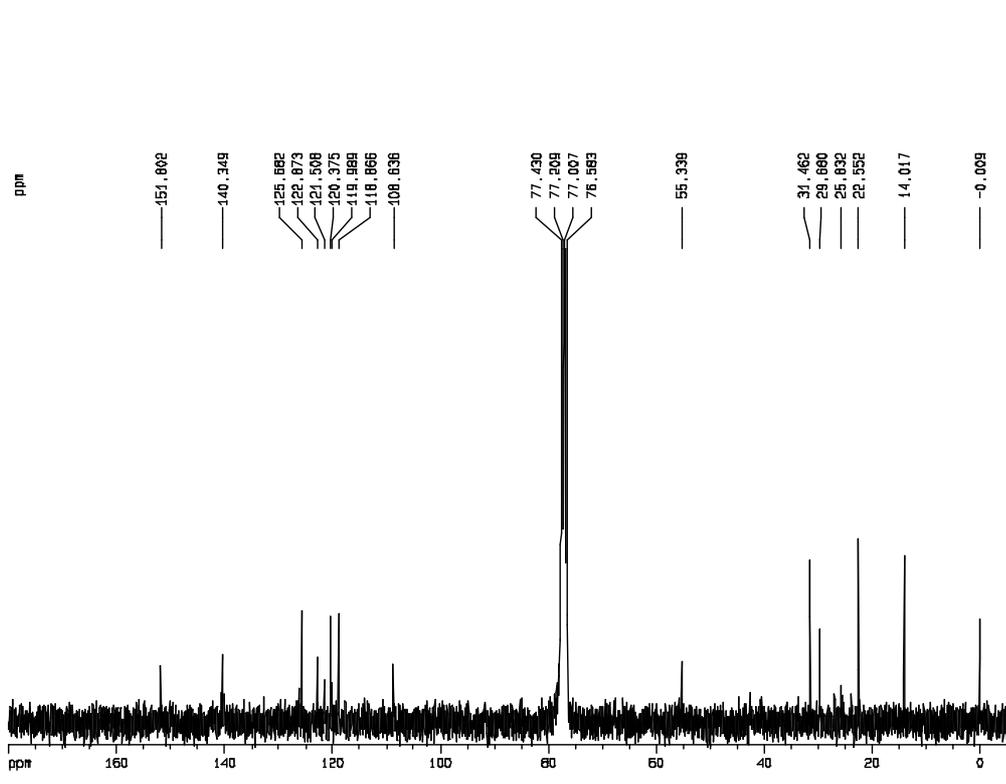


Current Data Parameters
 NAME ZtNo.2861'
 EXPNO 10
 PROCNO 1
 F2 - Acquisition Parameters
 Date_ 20070204
 Time 12.16
 INSTRUM av300
 PROBHD 5 mm QNP 13C-1
 PULPROG zg30
 TO 68036
 SOLVENT CDCl3
 NS 16
 DS 2
 SFO 6172.839 Hz
 FIDRES 0.094190 Hz
 AQ 5.3084860 sec
 RG 322.0
 DM 81.000 usec
 DE 6.00 usec
 TE 295.6 K
 D1 2.00000000 sec

==== CHANNEL f1 =====
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1308950 MHz
 MDW EM
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 10.00 cm
 F1P 10.500 ppm
 F1 3101.35 Hz
 F2P -0.500 ppm
 F2 -168.07 Hz
 PRMCM 0.50000 ppm/cm
 HZCM 100.00000 Hz/cm



Current Data Parameters
 NAME Zt14061'
 EXPNO 11
 PROCNO 1
 F2 - Acquisition Parameters
 Date_ 20070118
 Time 23.42
 INSTRUM av300
 PROBHD 5 mm QNP 13C-1
 PULPROG zgpg30
 TO 66306
 SOLVENT CDCl3
 NS 6233
 DS 4
 SFO 17620.811 Hz
 FIDRES 0.274438 Hz
 AQ 1.8219308 sec
 RG 812.3
 DM 27.800 usec
 DE 6.00 usec
 TE 284.7 K
 D1 2.00000000 sec
 D11 0.63000000 sec
 D12 0.30000000 sec

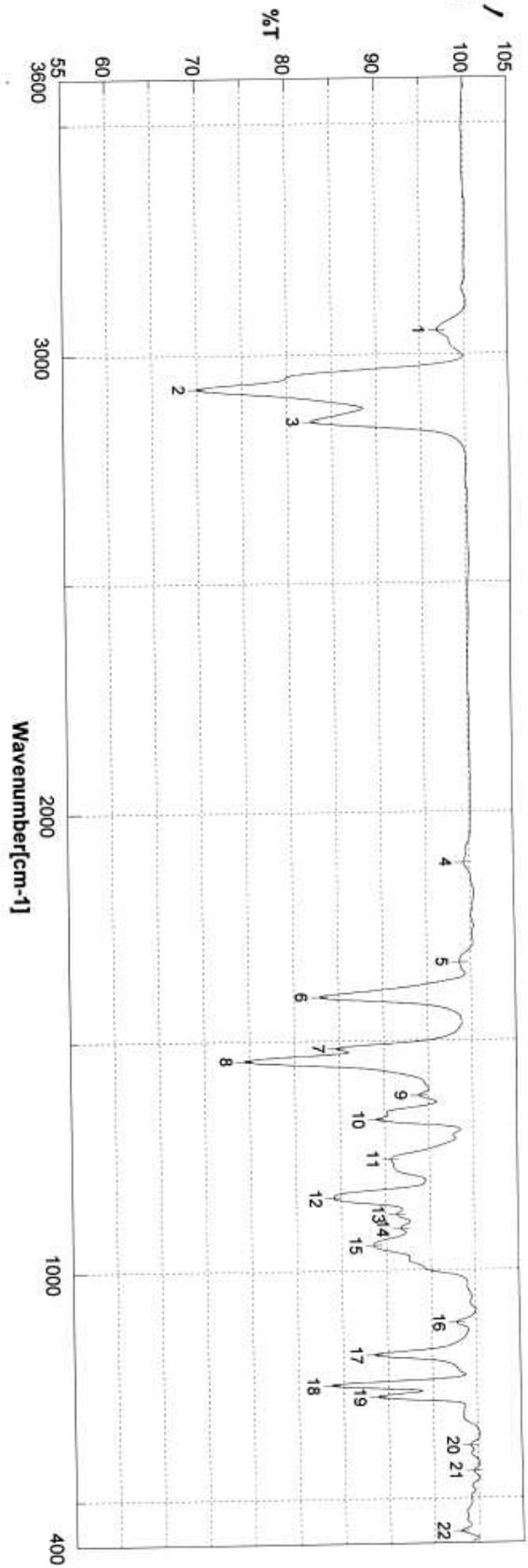
==== CHANNEL F1 =====
 NUC1 13C
 P1 8.40 usec
 PL1 -1.00 dB
 SFO1 75.4732923 MHz

==== CHANNEL F2 =====
 CPDPRG2 waltz16
 NUC2 1H
 P2PZ 85.00 usec
 PL2 -1.00 dB
 PL12 18.00 dB
 PL13 18.00 dB
 SFO2 300.1312000 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677480 MHz
 MDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 22.00 cm
 CY 10.00 cm
 F1P 180.000 ppm
 F1 13004.20 Hz
 F2P -5.000 ppm
 F2 -371.34 Hz
 PRMCM 8.40000 ppm/cm
 HZCM 634.61517 Hz/cm

Fig 1

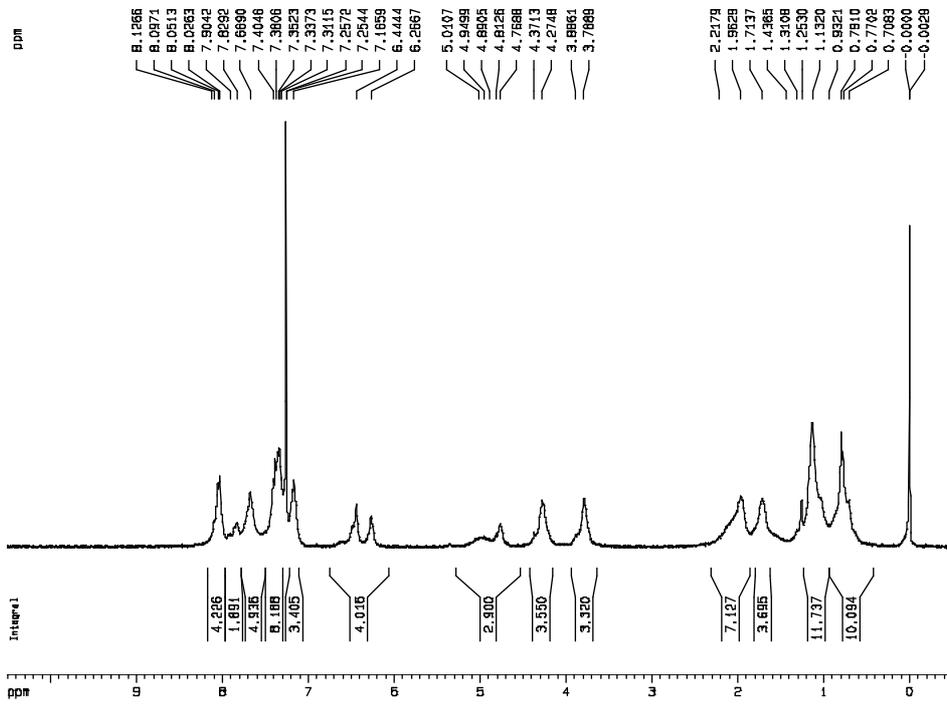


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 11:34
 Operator
 File Name Memory#4
 Sample Name
 Comment

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:16

No.	cm-1	%T									
1	3051.8	96.8978	2	2926.45	69.9582	3	2854.13	82.6169	4	1887.97	99.2829
6	1596.77	82.8307	7	1482.99	84.6827	8	1457.92	74.3942	9	1380.78	93.898
11	1242.9	90.5997	12	1159.01	84.1376	13	1123.33	91.1681	14	1092.48	91.6481
16	884.202	97.8105	17	814.777	88.487	18	749.209	83.5996	19	724.139	88.7979
21	559.255	99.4678	22	426.191	97.9648				5	1671.02	98.699
									10	1329.68	89.0582
									15	1055.84	88.5706
									20	616.145	99.1722

Polymer PFG₂



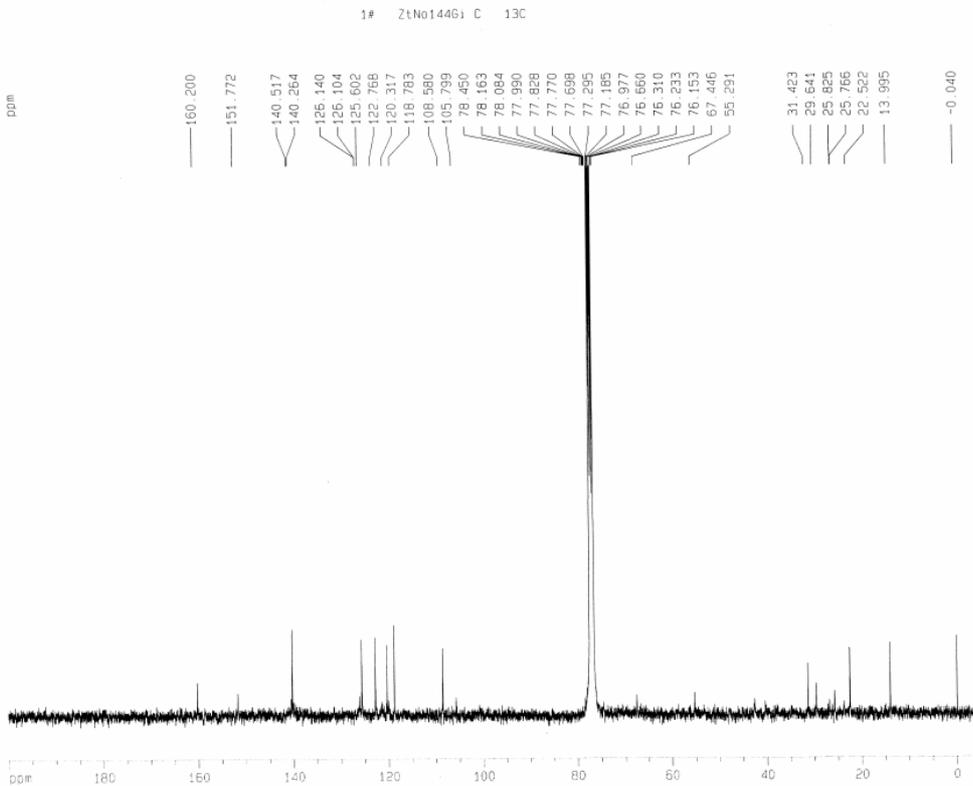
Current Data Parameters
 NAME ZWg.14462
 EXPNO 40
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070123
 Time 8.25
 INSTRUM av300
 PROBHD 5 mm QNP 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 15
 DS 2
 SWH 6172.838 Hz
 FIDRES 0.054190 Hz
 AQ 6.3084660 sec
 RG 382.0
 DM 81.000 usec
 DE 6.00 usec
 TE 293.2 K
 D1 2.0000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.130072 MHz
 MDW EM
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 10.00 cm
 F1P 10.800 ppm
 F1 3101.36 Hz
 F2P -158.07 Hz
 F2 0.50000 ppm/cm
 HZCM 190.08900 Hz/cm



Current Data Parameters
 NAME hou-13C
 EXPNO 6
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070219
 Time 17.25
 INSTRUM av400
 PROBHD 5 mm BBO BB-1H
 PULPROG zg1930
 TD 65536
 SOLVENT CDCl3
 NS 20480
 DS 0
 SWH 25062.656 Hz
 FIDRES 0.382426 Hz
 AQ 1.3074933 sec
 RG 10240
 DM 19.950 usec
 DE 6.00 usec
 TE 294.2 K
 D1 2.0000000 sec
 D11 0.0300000 sec
 MCREST 0.0000000 sec
 MCMK 0.0150000 sec

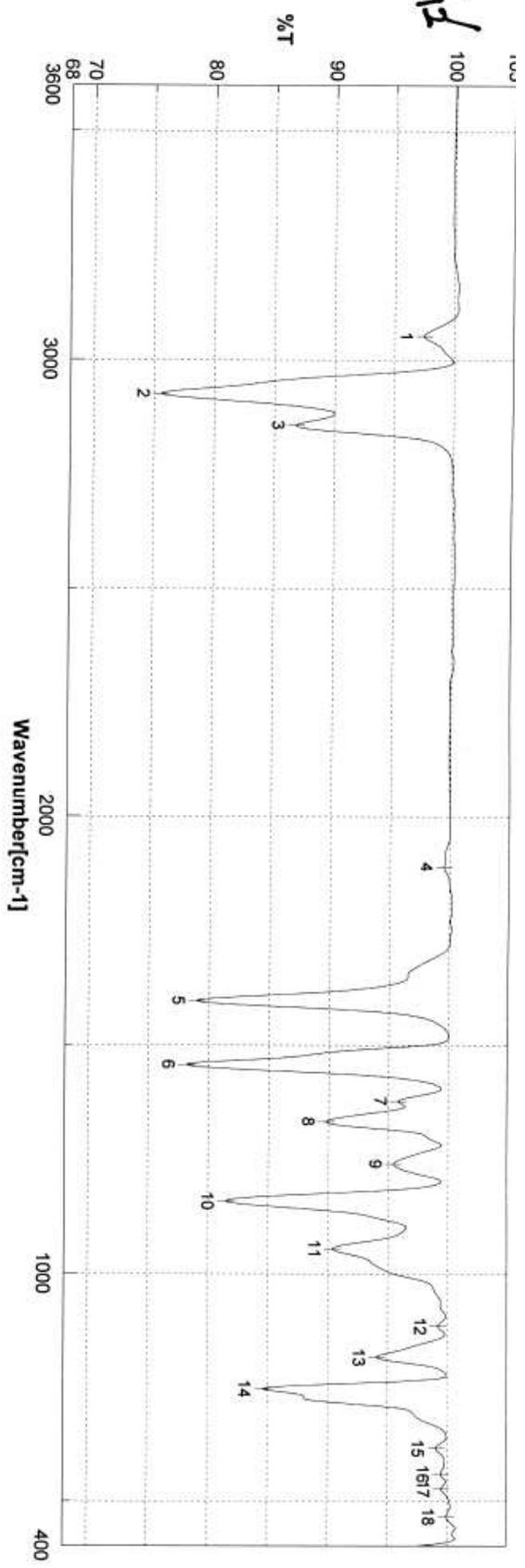
----- CHANNEL f1 -----
 NUC1 13C
 P1 6.30 usec
 PL1 -6.00 dB
 SFO1 100.6227297 MHz

----- CHANNEL f2 -----
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 16.00 dB
 SFO2 400.1333975 MHz

F2 - Processing parameters
 SI 32768
 SF 100.6127744 MHz
 MDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 0.10

1D NMR plot parameters
 CX 22.00 cm
 CY 200.00 cm
 F1P 200.000 ppm
 F1 20122.55 Hz
 F2P -5.000 ppm
 F2 -503.06 Hz
 HZCM 9.31818 ppm/cm
 HZCM 937.52808 Hz/cm

PHGF

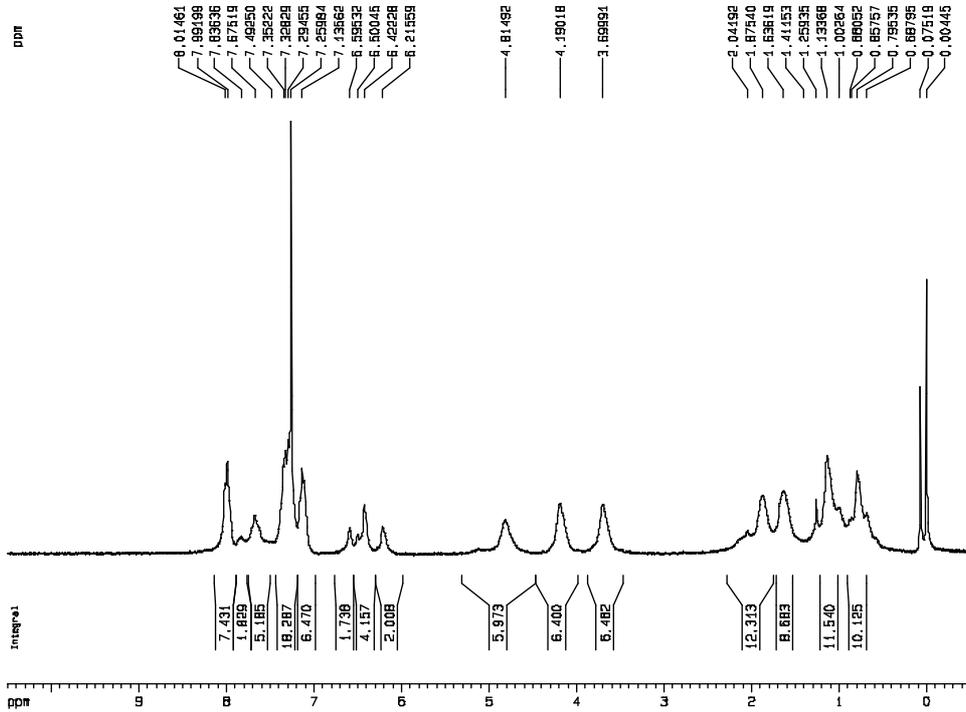


Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 11:55
 Operator Memory#5
 File Name
 Sample Name
 Comment

Resolution 4 cm-1
 Apodization Casine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:27

No.	cm-1	%T												
1	3051.8	97.4619	2	2925.48	75.5797	3	2857.02	86.7696	4	1889.9	99.5278	5	1597.73	78.9686
6	1456.96	78.1545	7	1375.96	95.8069	8	1331.61	89.7863	9	1240	95.4249	10	1159.01	81.4843
11	1054.87	90.3614	12	889.166	99.2204	13	816.706	94.0916	14	747.281	84.6046	15	617.109	99.0444
16	561.184	99.4644	17	527.436	99.5173	18	466.725	99.9389						

Polymer PFG₃



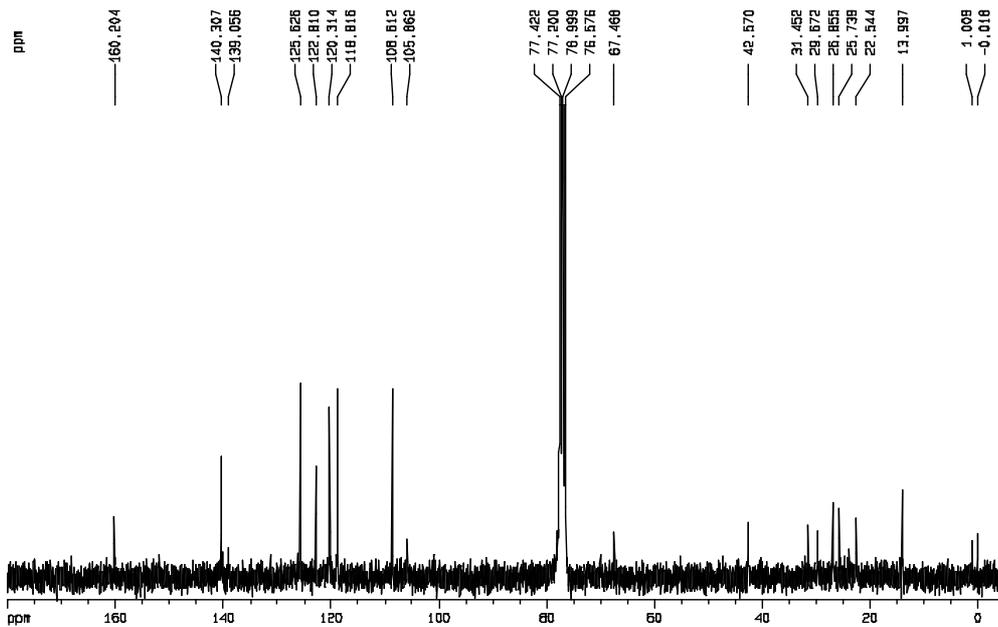
Current Data Parameters
 NAME ZtNo.17783'A
 EXPNO 20
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070307
 Time 18.33
 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zg30
 TD 65536
 SOLVENT CUC13
 NS 16
 DS 8
 SMH 8882.805 Hz
 FIDRES 0.137219 Hz
 AQ 3.6428615 sec
 RG 382
 DM 85.600 usec
 DE 6.00 usec
 TE 298.5 K
 D1 5.0000000 sec

----- CHANNEL f1 -----
 NUC1 1H
 P1 9.30 usec
 PL1 -1.00 dB
 SFO1 300.1318634 MHz

F2 - Processing parameters
 SI 32768
 SF 300.1300653 MHz
 MDW EN
 SSB 0
 LB 0.35 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 22.00 cm
 CY 10.00 cm
 F1P 10.500 ppm
 F1 3181.36 Hz
 F2P -0.500 ppm
 F2 -150.07 Hz
 PPMCN 0.50000 ppm/cm
 HZCN 150.08500 Hz/cm



Current Data Parameters
 NAME Zt17783'AD7
 EXPNO 11
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070310
 Time 7.40
 INSTRUM av300
 PROBHD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 65536
 SOLVENT CUC13
 NS 7888
 DS 4
 SMH 17880.811 Hz
 FIDRES 0.271428 Hz
 AQ 1.8219200 sec
 RG 485.1
 DM 27.800 usec
 DE 6.00 usec
 TE 298.2 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 d12 0.0000200 sec

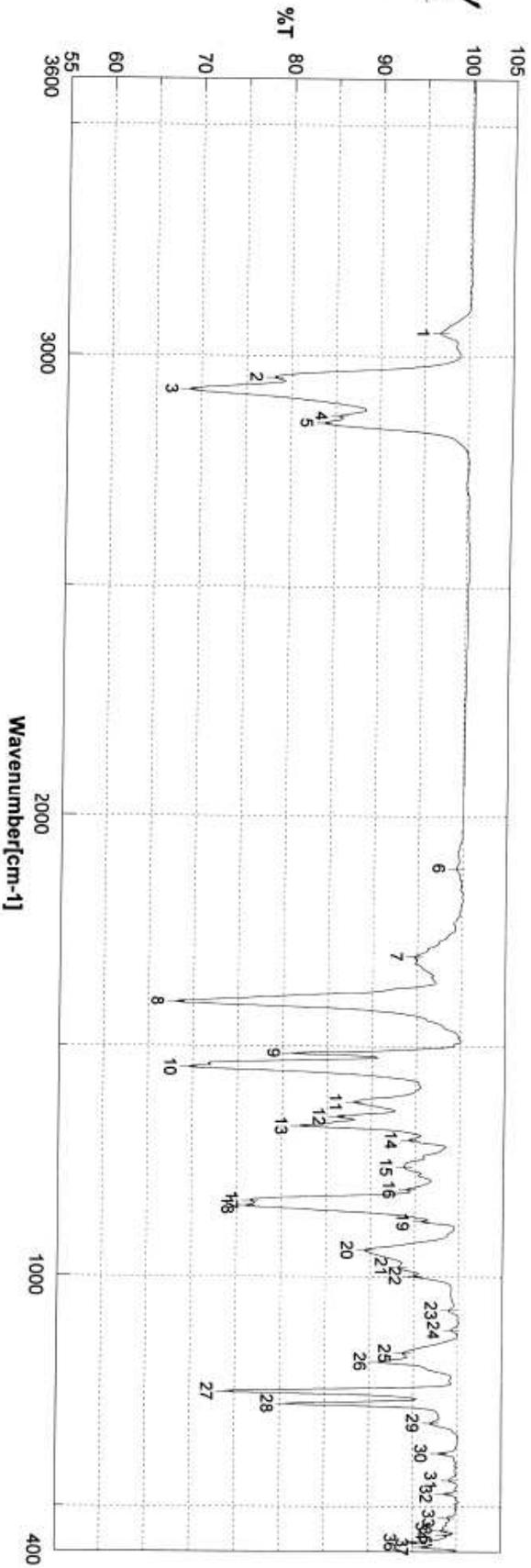
----- CHANNEL F1 -----
 NUC1 13C
 P1 8.40 usec
 PL1 -1.00 dB
 SFO1 75.4752993 MHz

----- CHANNEL F2 -----
 CHOPR2 N01z15
 NUC2 1H
 PPR2 80.00 usec
 PL2 -1.00 dB
 PL12 18.00 dB
 PL13 18.00 dB
 SFO2 300.1312002 MHz

F2 - Processing parameters
 SI 32768
 SF 75.4677489 MHz
 MDW EN
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 22.00 cm
 CY 100.00 cm
 F1P 180.000 ppm
 F1 13089.28 Hz
 F2P -5.000 ppm
 F2 -377.34 Hz
 PPMCN 8.40500 ppm/cm
 HZCN 634.81917 Hz/cm

PF63



Accumulation 16
 Zero Filling ON
 Gain Auto (2)
 Date/Time 2007-5-30 12:06
 Operator
 File Name
 Sample Name
 Comment Memory#6

Resolution 4 cm-1
 Apodization Cosine
 Scanning Speed Auto (2 mm/sec)
 Update 2007-5-30 14:38

No.	cm-1	%T												
1	3050.83	96.7415	2	2952.48	78.0981	3	2926.45	68.6744	4	2869.56	85.3959	5	2855.1	83.7534
6	1887.97	99.2832	7	1696.09	94.6185	8	1595.81	67.9966	9	1483.96	80.9853	10	1453.1	69.4989
11	1376.93	87.998	12	1346.07	86.1212	13	1325.82	81.9393	14	1295.93	94.2499	15	1238.08	93.7378
16	1189.86	94.0864	17	1164.79	76.5016	18	1154.19	76.0459	19	1120.44	95.6686	20	1057.76	89.3951
21	1022.09	93.2861	22	1001.84	94.8397	23	926.628	98.9339	24	884.202	99.2278	25	833.098	93.7333
26	814.777	90.998	27	749.209	73.885	28	723.175	80.6245	29	682.677	96.9567	30	617.109	97.8931
31	558.291	99.0613	32	528.4	98.5479	33	475.367	98.845	34	447.404	98.1456	35	437.762	98.5502
36	421.37	94.5367	37	410.763	95.8953									

7. References

- [1] H. Kitajima, Y. Aoki, K. Ito and T. Katsuki, *Chem. Lett.*, **1995**, 1113.
- [2] W. L. Yu, J. Pei, Y. Cao, W. Huang and A. J. Heeger, *Chem. Chem.*, **1999**, 1837.
- [3] [3a] C. J. Hawker and J. M. J. Fréchet, *J. Am. Chem. Soc.*, **1990**, *112*, 7638-7647; [3b] C. Xia and R. C. Advincula, *Chem. Mater.*, **2001**, *13*, 1682.
- [4] A. Desal, N. Atkinson, F. Rivera, J. R., W. Devonport, I. Rees, S. E. Branz, C. J. Hawker, *J. Polym. Sci. Part A: Polym. Chem.*, **2000**, *38*, 1033.
- [5] S. Hamai, F. Hirayama, *J. Phys. Chem.*, **1983**, *87*, 83.