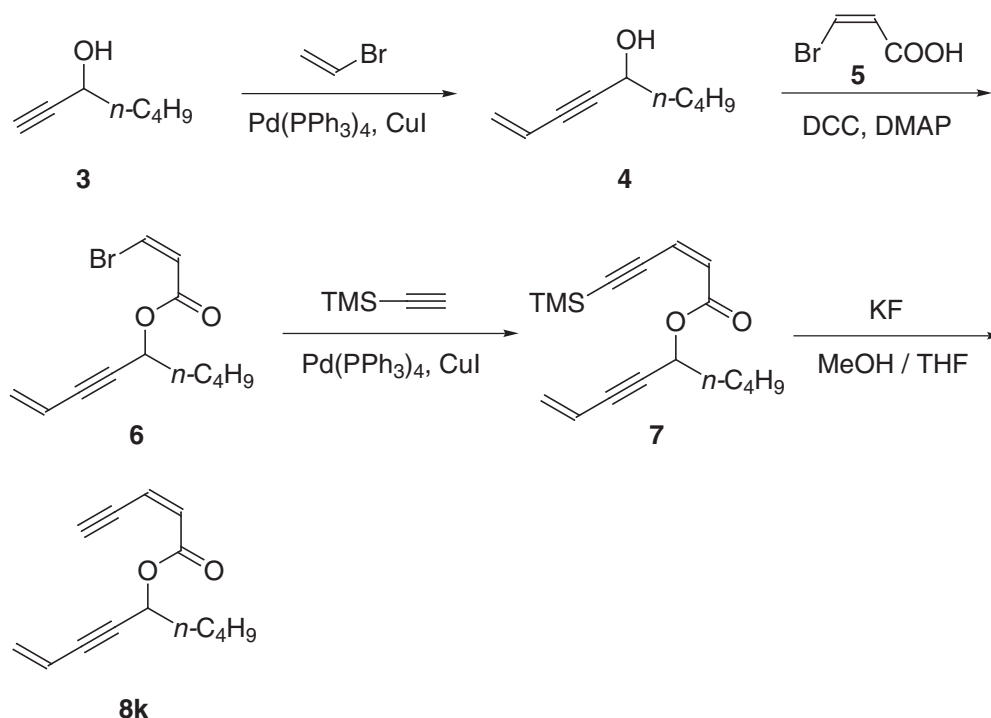


## Supporting Information

Preparation of Bis-Enynes **8a-f**, **8j-k**, **18a-c**, **20**. A Representative Procedure.  
Scheme S1

**1-Nonen-3-yn-5-ol (4).** To a mixture of  $\text{Pd}(\text{PPh}_3)_4$  (99 mg, 0.086 mmol) and  $\text{CuI}$  (98 mg, 0.51 mmol) were added  $\text{Et}_2\text{NH}$  (20 mL) and 1-heptyn-3-ol **3** (4.7 mL, 37 mmol) under an argon atmosphere at room temperature. The reaction mixture was cooled with water bath, and vinyl bromide in THF (1.0 M, 47 mL, 47 mmol) was added. After 5 min, the water bath was removed and the reaction mixture was stirred at room temperature for 1.5 h. The mixture was poured into ice water, and extracted with  $\text{Et}_2\text{O}$ . The organic layer was washed with 2 N HCl aq. and dried over  $\text{MgSO}_4$ . Evaporation of the solvent gave an oil, which was further purified by silica gel column chromatography (hexane : AcOEt = 10 : 1) to give **4** (4.5 g, 89%): yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 5.80 (ddd,  $J = 17.6, 11.0, 1.6$  Hz, 1H), 5.62 (dd,  $J = 17.5, 2.2$  Hz, 1H), 5.46 (dd,  $J = 10.9, 2.3$  Hz, 1H), 4.46 (m, 1H), 1.75-1.62 (m, 3H), 1.48-1.28 (m, 4H), 0.90 (dd,  $J = 7.2, 7.2$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 127.1, 116.6, 90.9, 83.3, 62.7, 37.4, 27.2, 22.3, 13.9; IR (neat) 3335, 3101, 3047, 3013, 2959, 2934, 2862, 2222, 1468, 1412, 1161, 1030, 1009  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_9\text{H}_{14}\text{O}$ : 138.1044. Found: 138.1040.

**1-Butyl-4-penten-2-ynyl (Z)-3-bromo-2-propenoate (6).** To a mixture of (Z)-3-bromo-2-propenoic acid **5**<sup>1</sup> (4.5 g, 30 mmol) and DMAP (0.37 g, 3.0 mmol) were added  $\text{CH}_2\text{Cl}_2$  (30 mL) and a  $\text{CH}_2\text{Cl}_2$  (10 mL) solution of **4** (4.2 g, 30 mmol) under an argon atmosphere at room temperature. The reaction mixture was cooled to 0 °C, and DCC (7.4 g, 36 mmol) was added and the mixture was stirred for 5 min. After stirring for additional 1 h at room temperature, the reaction mixture was filtered with celite and the residue was washed with  $\text{Et}_2\text{O}$ . The organic layer was washed with 0.5 N HCl aq. and saturated  $\text{NaHCO}_3$  aq., and dried over  $\text{MgSO}_4$ . Evaporation of the solvent gave an oil, which was further purified by silica gel column chromatography (hexane : AcOEt = 30 : 1) to give **6** (6.8 g, 84%): colorless oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 7.02 (d,  $J = 8.5$  Hz,

1H), 6.62 (d,  $J = 8.3$  Hz, 1H), 5.80 (ddd,  $J = 17.5, 10.9, 1.7$  Hz, 1H), 5.65 (dd,  $J = 17.5, 2.5$  Hz, 1H), 5.57 (ddd,  $J = 6.6, 6.6, 1.0$  Hz, 1H), 5.49 (dd,  $J = 10.9, 2.4$  Hz, 1H), 1.85-1.75 (m, 2H), 1.48 –1.24 (m, 4H), 0.90 (dd,  $J = 7.2, 7.2$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 162.7, 127.9, 124.0, 122.2, 116.3, 86.7, 84.1, 64.8, 34.4, 27.1, 22.1, 13.8; IR (neat) 3074, 3049, 3013, 2957, 2934, 2864, 2149, 1736, 1612, 1333, 1204, 1159  $\text{cm}^{-1}$ ; Anal. Calcd for  $\text{C}_{12}\text{H}_{15}\text{BrO}_2$ : C, 53.15; H, 5.58. Found: C, 53.41; H, 5.70.

**1-Butyl-4-penten-2-ynyl (Z)-5-trimethylsilyl-2-penten-4-ynoate (7).** To a mixture of  $\text{Pd}(\text{PPh}_3)_4$  (300 mg, 0.26 mmol) and  $\text{CuI}$  (100 mg, 0.52 mmol) were added  $\text{Et}_3\text{N}$  (40 mL), a THF (20 mL) solution of **6** (5.4 g, 20 mmol), and (trimethylsilyl)acetylene (3.4 mL, 24 mmol) under an argon atmosphere at room temperature. The reaction mixture was stirred for 1 h. Then the mixture was poured into ice water, and extracted with  $\text{Et}_2\text{O}$ . The organic layer was washed with 0.5 N HCl aq., and dried over  $\text{MgSO}_4$ . Evaporation of the solvent gave an oil, which was further purified by silica gel column chromatography (hexane : AcOEt = 50 : 1) to give **7** (5.3 g, 92%): yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.16 (d,  $J = 11.7$  Hz, 1H), 6.07 (d,  $J = 11.7$  Hz, 1H), 5.79 (ddd,  $J = 17.5, 10.9, 1.8$  Hz, 1H), 5.67-5.56 (m, 2H), 5.48 (dd,  $J = 10.9, 2.4$  Hz, 1H), 1.85-1.78 (m, 2H), 1.46-1.28 (m, 4H), 0.90 (dd,  $J = 7.2, 7.2$  Hz, 3H), 0.22 (s, 9H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 163.3, 128.8, 127.7, 123.2, 116.5, 108.8, 100.6, 87.2, 83.9, 64.5, 34.5, 27.1, 22.2, 13.9, -0.4; IR (neat) 3015, 2959, 2934, 2864, 2151, 1736, 1717, 1607, 1252, 1161, 1034  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{17}\text{H}_{24}\text{O}_2\text{Si}$ : 288.1544. Found: 288.1553.

**1-Butyl-4-penten-2-ynyl (Z)-2-penten-4-ynoate (8k):** To a mixture of KF (1.5 g, 26 mmol) in MeOH (40 mL) was slowly added a THF (20 mL) solution of **7** (3.8 g, 13 mmol) at 0 °C under an argon atmosphere and the mixture was kept stirring for 40 min. The mixture was poured into water, and extracted with  $\text{Et}_2\text{O}$ . The organic layer was washed with saturated brine, and dried over  $\text{MgSO}_4$ . Evaporation of the solvent gave an oil, which was further purified by silica gel column chromatography (hexane : AcOEt = 50 : 1) to give **8k** (2.8 g, 98%): yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.21 (d,  $J = 11.5$  Hz, 1H), 6.14 (dd,  $J = 11.5, 2.4$  Hz, 1H), 5.79 (ddd,  $J = 17.5, 10.9, 1.6$  Hz, 1H), 5.64 (dd,  $J = 17.4, 2.3$  Hz, 1H), 5.57 (ddd,  $J = 6.6, 6.6, 1.5$  Hz, 1H), 5.48 (dd,  $J = 10.7, 2.4$  Hz, 1H), 3.62 (d,  $J = 2.2$  Hz, 1H), 1.87-1.75 (m, 2H), 1.51-1.28 (m, 4H), 0.90 (dd,  $J = 7.2, 7.2$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 163.2, 130.2, 127.9, 122.7, 116.4, 89.7, 86.9, 84.0, 79.5, 64.8, 34.4, 27.1, 22.2, 13.9; IR (neat) 3292, 3101, 3080, 3032, 3013, 2959, 2934, 2864, 1732, 1611, 1541, 1508, 1458, 1398, 1277, 1221, 1165  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{14}\text{H}_{16}\text{O}_2$ : 216.1149. Found: 216.1140.

**4-Penten-2-ynyl (Z)-2-penten-4-ynoate (8a):** yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.24 (dd,  $J = 11.6, 0.8$  Hz, 1H), 6.17 (dd,  $J = 11.5, 2.5$  Hz, 1H), 5.80 (dddd,  $J = 17.6, 10.7, 1.8, 1.8$  Hz, 1H), 5.67 (dd,  $J = 17.6, 2.5$  Hz, 1H), 5.52 (dd,  $J = 10.8, 2.6$  Hz, 1H), 4.89 (d,  $J = 1.8$  Hz, 2H), 3.65 (dd,  $J = 2.4, 0.8$  Hz, 1H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 163.5, 129.6, 128.4, 123.2, 116.2, 90.0, 85.3, 83.2, 79.4, 52.8; IR (neat) 3287, 2943, 2235, 2098, 1732, 1653, 1614, 1558, 1506, 1456, 1435, 1404, 1362, 1281, 1221, 1167, 1040, 1024  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{10}\text{H}_8\text{O}_2$ : 160.0524. Found: 160.0560.

**4-Penten-2-ynyl (Z)-2-undecen-4-ynoate (8b):** brown oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.19 (ddd,  $J = 11.4, 2.4, 2.4$  Hz, 1H), 6.04 (d,  $J = 11.3$  Hz, 1H), 5.80 (dddd,  $J = 17.6, 10.6, 1.8, 1.8$  Hz, 1H), 5.66 (dd,  $J = 17.6, 2.6$  Hz, 1H), 5.51 (dd,  $J = 10.7, 2.5$  Hz, 1H), 4.86 (d,  $J = 1.9$  Hz, 2H), 2.43 (ddd,  $J = 7.0, 7.0, 2.3$  Hz, 2H), 1.63-1.26 (m, 8H), 0.87 (dd,  $J = 6.9, 6.9$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 164.0, 128.2, 126.2, 125.3, 116.3, 105.4, 85.1, 83.6, 77.6, 52.4, 31.3, 28.6, 28.3, 22.5, 20.1, 14.0; IR (neat) 3101,

3013, 2955, 2932, 2858, 2239, 2208, 1732, 1716, 1609, 1456, 1431, 1412, 1362, 1277, 1229, 1209, 1163, 1040, 1020  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{16}\text{H}_{20}\text{O}_2$ : 244.1462. Found: 244.1463; Anal. Calcd for  $\text{C}_{16}\text{H}_{20}\text{O}_2$ : C, 78.65; H, 8.25. Found: C, 78.58; H, 8.48.

**4-Penten-2-ynyl (Z)-5-phenyl-2-penten-4-ynoate (8c)**: yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 7.59-7.53 (m, 2H), 7.35-7.28 (m, 3H), 6.41 (d,  $J = 11.3$  Hz, 1H), 6.15 (d,  $J = 11.3$  Hz, 1H), 5.80 (dddd,  $J = 17.5, 10.9, 1.8, 1.8$  Hz, 1H), 5.66 (dd,  $J = 17.6, 2.5$  Hz, 1H), 5.51 (dd,  $J = 10.8, 2.5$  Hz, 1H), 4.92 (d,  $J = 1.6$  Hz, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 163.9, 132.2, 129.3, 128.4, 128.3, 126.9, 124.1, 122.4, 116.3, 102.1, 86.2, 85.3, 83.5, 52.7; IR (neat) 3101, 3080, 3057, 3034, 3015, 2961, 2937, 2872, 2855, 2235, 2199, 1730, 1715, 1609, 1489, 1443, 1412, 1362, 1281, 1266, 1207, 1163, 1030  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{16}\text{H}_{12}\text{O}_2$ : 236.0837. Found: 236.0812.

**4-Penten-2-ynyl (Z)-6-hydroxy-2-hexen-4-ynoate (8d)**: brown oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.22 (ddd,  $J = 11.5, 1.8, 1.8$  Hz, 1H), 6.14 (d,  $J = 11.5$  Hz, 1H), 5.81 (dddd,  $J = 17.4, 10.8, 1.8, 1.8$  Hz, 1H), 5.68 (dd,  $J = 17.6, 2.5$  Hz, 1H), 5.53 (dd,  $J = 10.7, 2.6$  Hz, 1H), 4.87 (d,  $J = 1.8$  Hz, 2H), 4.49 (s, 2H), 2.03 (s, 1H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 163.9, 128.5, 127.4, 124.1, 116.1, 101.2, 85.3, 83.2, 82.0, 52.8, 51.5; IR (neat); 3449, 3101, 3044, 3013, 2928, 2856, 2235, 2201, 1717, 1609, 1435, 1410, 1362, 1277, 1229, 1169, 1119, 1018  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{11}\text{H}_{10}\text{O}_3$ : 190.0630. Found: 190.0629.

**4-Methyl-4-penten-2-ynyl (Z)-2-penten-4-ynoate (8e)**: pale yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.24 (dd,  $J = 11.5, 0.6$  Hz, 1H), 6.16 (dd,  $J = 11.5, 2.4$  Hz, 1H), 5.33 (s, 1H), 5.26 (dd,  $J = 1.6, 1.6$  Hz, 1H), 4.89 (s, 2H), 3.63 (dd,  $J = 2.4, 0.8$  Hz, 1H), 1.87 (dd,  $J = 1.1, 1.1$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 163.4, 129.7, 125.8, 123.1, 123.0, 89.9, 87.8, 81.5, 79.3, 52.7, 23.0; IR (neat) 3288, 3098, 2932, 2856, 2233, 2118, 1732, 1612, 1404, 1362, 1281, 1221, 1167  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{11}\text{H}_{10}\text{O}_2$ : 174.0680. Found: 174.0668.

**4-Methyl-4-penten-2-ynyl (Z)-2-octen-4-ynoate (8f)**: brown oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.19 (ddd,  $J = 11.3, 2.4, 2.4$  Hz, 1H), 6.05 (d,  $J = 11.3$  Hz, 1H), 5.32 (s, 1H), 5.25 (dddd,  $J = 1.6, 1.6, 1.6, 1.6$  Hz, 1H), 4.86 (s, 2H), 2.42 (ddd,  $J = 7.1, 7.1, 2.2$  Hz, 2H), 1.87 (dd,  $J = 1.2, 1.2$  Hz, 3H), 1.61 (dddd,  $J = 7.3, 7.3, 7.3, 7.3$  Hz, 2H), 1.01 (dd,  $J = 7.4, 7.4$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 163.9, 126.3, 125.9, 125.1, 122.9, 105.0, 87.6, 81.9, 77.7, 52.5, 23.1, 22.0, 21.8, 13.5; IR (neat) 3098, 2964, 2936, 2874, 2235, 2208, 1732, 1609, 1433, 1412, 1362, 1339, 1277, 1229, 1209, 1163, 1088, 1030, 1011  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{14}\text{H}_{16}\text{O}_2$ : 216.1149. Found: 216.1129.

**1-Phenyl-4-penten-2-ynyl (Z)-2-penten-4-ynoate (8j)**: yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 7.56-7.53 (m, 2H), 7.40-7.31 (m, 3H), 6.66 (d,  $J = 1.4$  Hz, 1H), 6.22 (dd,  $J = 11.7$  Hz, 1H), 6.15 (dd,  $J = 11.5, 2.4$  Hz, 1H), 5.84 (ddd,  $J = 17.5, 10.9, 1.7$  Hz, 1H), 5.70 (dd,  $J = 17.5, 2.4$  Hz, 1H), 5.53 (dd,  $J = 10.7, 2.4$  Hz, 1H), 3.63 (d,  $J = 2.4$  Hz, 1H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 162.9, 136.7, 129.9, 129.0, 128.6, 128.5, 127.8, 123.2, 116.2, 90.1, 85.9, 85.8, 79.4, 66.2; IR (neat) 3287, 3090, 3067, 3036, 3013, 2973, 2941, 2228, 2098, 1732, 1611, 1495, 1456, 1398, 1313, 1273, 1219, 1171, 1151, 1001  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{16}\text{H}_{12}\text{O}_2$ : 236.0837. Found: 236.0844.

**5-Hexen-3-ynyl (Z)-2-penten-4-ynoate (18a)**: pale yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.22 (dd,  $J = 11.5, 0.6$  Hz, 1H), 6.14 (dd,  $J = 11.6, 2.5$  Hz, 1H), 5.75 (dddd,  $J = 17.5, 10.9, 2.1, 2.1$  Hz, 1H), 5.57 (dd,  $J = 17.5, 2.2$  Hz, 1H), 5.41 (dd,  $J = 10.9, 2.4$  Hz, 1H), 4.28 (dd,  $J = 6.9, 6.9$  Hz, 2H), 3.61 (dd,  $J = 2.4, 0.8$  Hz, 1H), 2.69 (ddd,  $J = 6.9, 6.9, 2.0$  Hz, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 164.0, 130.3, 126.5, 122.5, 117.1, 89.5,

86.1, 80.7, 79.4, 62.5, 19.7; IR (neat) 3285, 3099, 3045, 3011, 2964, 2910, 2230, 2098, 1732, 1614, 1404, 1286, 1227, 1177, 1013  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{11}\text{H}_9\text{O}_2$  ( $\text{M}^+ - \text{H}$ ): 173.0602. Found: 173.0599.

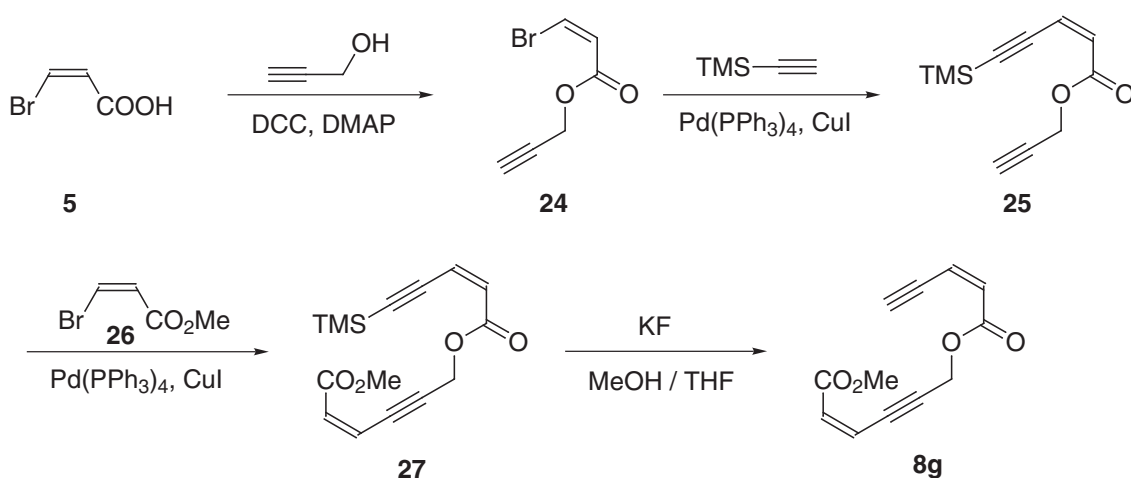
**5-Hexen-3-ynyl (Z)-2-octen-4-ynoate (18b):** brown oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.16 (ddd,  $J = 11.5, 2.3, 2.3$  Hz, 1H), 6.03 (d,  $J = 11.5$  Hz, 1H), 5.75 (dddd,  $J = 17.6, 10.8, 2.0, 2.0$  Hz, 1H), 5.56 (dd,  $J = 17.6, 2.1$  Hz, 1H), 5.40 (dd,  $J = 10.8, 2.3$  Hz, 1H), 4.25 (dd,  $J = 7.0, 7.0$  Hz, 2H), 2.67 (ddd,  $J = 7.0, 7.0, 1.7$  Hz, 2H), 2.42 (ddd,  $J = 7.1, 7.1, 2.4$  Hz, 2H), 1.60 (dddd,  $J = 7.3, 7.3, 7.3, 7.3, 7.3$  Hz, 2H), 1.01 (dd,  $J = 7.4, 7.4$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 164.5, 126.8, 126.4, 124.6, 117.1, 104.6, 86.2, 80.6, 77.8, 62.1, 22.0, 21.8, 19.8, 13.5; IR (neat) 3099, 3011, 2964, 2936, 2905, 2874, 2833, 2259, 2208, 1728, 1609, 1456, 1414, 1381, 1339, 1277, 1231, 1173, 1119, 1070, 1013  $\text{cm}^{-1}$ ; Anal. Calcd for  $\text{C}_{14}\text{H}_{16}\text{O}_2$ : C, 77.75; H, 7.46. Found: C, 77.65; H, 7.59.

**5-Hexen-3-ynyl (Z)-5-phenyl-2-penten-4-ynoate (18c):** colorless oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 7.54-7.50 (m, 2H), 7.36-7.29 (m, 3H), 6.38 (d,  $J = 11.5$  Hz, 1H), 6.14 (d,  $J = 11.3$  Hz, 1H), 5.73 (dddd,  $J = 17.5, 10.9, 2.0, 2.0$  Hz, 1H), 5.55 (dd,  $J = 17.5, 2.4$  Hz, 1H), 5.39 (dd,  $J = 10.9, 2.4$  Hz, 1H), 4.30 (dd,  $J = 7.0, 7.0$  Hz, 2H), 2.70 (ddd,  $J = 7.0, 7.0, 1.8$  Hz, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 164.4, 132.0, 129.2, 128.3, 127.5, 126.5, 123.5, 122.5, 117.0, 101.7, 86.3, 86.1, 80.7, 62.3, 19.8; IR (neat) 3099, 3080, 3057, 3011, 2961, 2907, 2230, 2201, 1724, 1609, 1489, 1443, 1412, 1337, 1286, 1265, 1209, 1169, 1070, 1015  $\text{cm}^{-1}$ ; Anal. Calcd for  $\text{C}_{17}\text{H}_{14}\text{O}_2$ : C, 81.58; H, 5.64. Found: C, 81.46; H, 5.80.

**6-Hepten-4-ynyl (Z)-2-penten-4-ynoate (20):** pale yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.19 (d,  $J = 11.7$  Hz, 1H), 6.12 (dd,  $J = 11.5, 2.4$  Hz, 1H), 5.74 (dddd,  $J = 17.5, 10.9, 2.1, 2.1$  Hz, 1H), 5.54 (dd,  $J = 17.5, 2.2$  Hz, 1H), 5.38 (dd,  $J = 10.9, 2.2$  Hz, 1H), 4.27 (dd,  $J = 6.1, 6.1$  Hz, 2H), 3.60 (d,  $J = 2.4$  Hz, 1H), 2.43 (ddd,  $J = 7.0, 7.0, 2.0$  Hz, 2H), 1.90 (dddd,  $J = 6.6, 6.6, 6.6, 6.6$  Hz, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 164.3, 130.6, 125.9, 122.0, 117.3, 89.2, 80.0, 79.5, 63.3, 27.6, 16.1; IR (neat) 3287, 3099, 3044, 3009, 2961, 2899, 2845, 2228, 2098, 1728, 1614, 1404, 1288, 1223, 1178  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{12}\text{H}_{12}\text{O}_2$ : 188.0837. Found: 188.0783.

### Preparation of Bis-Enynes **8g-i**, **18d**. A Representative Procedure.

#### Scheme S2



**2-Propynyl (Z)-3-bromo-2-propenoate (24).** To a mixture of (Z)-3-bromo-2-propenoic acid **5** (10.5 g, 70 mmol) and DMAP (0.86 g, 7.0 mmol) were added  $\text{CH}_2\text{Cl}_2$  (90 mL) and 2-propyn-1-ol (4.4 mL, 77 mmol) under an argon atmosphere at room

temperature. The reaction mixture was cooled to 0 °C, and DCC (17.3 g, 84 mmol) was added and the mixture was stirred for 5 min. After stirring for additional 45 min at room temperature, the reaction mixture was filtered with celite and the residue was washed with Et<sub>2</sub>O. The organic layer was washed with 0.5 N HCl aq. and saturated NaHCO<sub>3</sub> aq., and dried over MgSO<sub>4</sub>. Evaporation of the solvent gave an oil, which was further purified by silica gel column chromatography (hexane : AcOEt = 30 : 1) to give **23** (11.2 g, 84%): colorless oil; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) 7.08 (d, *J* = 8.3 Hz, 1H), 6.65 (d, *J* = 8.5 Hz, 1H), 4.77 (d, *J* = 2.4 Hz, 2H), 2.49 (dd, *J* = 2.5, 2.5 Hz, 1H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) 162.8, 123.3, 123.2, 77.1, 75.2, 52.1; IR (neat) 3296, 3078, 3053, 2945, 2129, 1732, 1614, 1435, 1371, 1333, 1275, 1205, 1159, 1024 cm<sup>-1</sup>; Anal. Calcd for C<sub>6</sub>H<sub>5</sub>BrO<sub>2</sub>: C, 38.13; H, 2.67. Found: C, 38.33; H, 2.78.

**2-Propynyl (Z)-5-trimethylsilyl-2-penten-4-ynoate (25).** To a mixture of Pd(PPh<sub>3</sub>)<sub>4</sub> (150 mg, 0.13 mmol) and CuI (50 mg, 0.26 mmol) were added THF (6 mL), Et<sub>3</sub>N (20 mL) and (trimethylsilyl)acetylene (7.0 mL, 50 mmol). Then a THF (4 mL) solution of **24** (1.9 g, 10 mmol) was added for 1 h under an argon atmosphere at room temperature. The reaction mixture was stirred for additional 30 min at this temperature. Then the mixture was poured into ice water, and extracted with Et<sub>2</sub>O. The organic layer was washed with 0.5 N HCl aq. and dried over MgSO<sub>4</sub>. Evaporation of the solvent gave an oil, which was further purified by silica gel column chromatography (hexane : AcOEt = 30 : 1) to give **25** (1.3 g, 63%): colorless oil; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) 6.19 (d, *J* = 11.5 Hz, 1H), 6.10 (d, *J* = 11.5 Hz, 1H), 4.76 (d, *J* = 2.4 Hz, 2H), 2.46 (dd, *J* = 2.5 Hz, 1H), 0.23 (s, 9H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) 163.5, 128.1, 123.9, 109.4, 100.4, 77.5, 75.0, 51.9, -0.4; IR (neat) 3294, 3078, 3034, 2961, 2901, 2151, 2131, 1736, 1717, 1607, 1404, 1279, 1252, 1221, 1161, 1042 cm<sup>-1</sup>; Anal. Calcd for C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>Si: C, 64.04; H, 6.84. Found: C, 64.12; H, 6.96.

**Methyl (Z)-3-bromo-2-propenoate (26)** was prepared according to the literature.<sup>1</sup>

**(Z)-5-Methoxycarbonyl-4-penten-2-ynyl (Z)-5-trimethylsilyl-2-penten-4-ynoate (27).** To a mixture of Pd(PPh<sub>3</sub>)<sub>4</sub> (45 mg, 0.039 mmol) and CuI (15 mg, 0.078 mmol) were added Et<sub>3</sub>N (6 mL) and a THF (2 mL) solution of **25** (0.62 g, 3.0 mmol) and methyl (Z)-3-bromo-2-propenoate **26** (0.58 g, 3.6 mmol) under an argon atmosphere at room temperature. The reaction mixture was stirred for 40 min. Then the mixture was poured into ice water, and extracted with Et<sub>2</sub>O. The organic layer was washed with 0.5 N HCl aq. and dried over MgSO<sub>4</sub>. Evaporation of the solvent gave an oil, which was further purified by silica gel column chromatography (hexane : AcOEt = 10 : 1) to give **27** (0.54 g, 63%): brown oil; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) 6.21-6.10 (m, 4H), 5.00 (d, *J* = 1.4 Hz, 2H), 3.75 (s, 3H), 0.22 (s, 9H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) 164.8, 163.4, 129.0, 128.1, 124.0, 122.1, 109.4, 100.4, 95.0, 82.9, 52.6, 51.5, -0.5; IR (neat) 3078, 3032, 2957, 2901, 2856, 2214, 2149, 1732, 1718, 1609, 1439, 1404, 1360, 1279, 1252, 1232, 1198, 1163, 1038 cm<sup>-1</sup>; Anal. Calcd for C<sub>15</sub>H<sub>18</sub>O<sub>4</sub>Si: C, 62.04; H, 6.25. Found: C, 61.87; H, 6.36.

**(Z)-5-Methoxycarbonyl-4-penten-2-ynyl (Z)-2-penten-4-ynoate (8g).** To a mixture of KF (0.20 g, 3.4 mmol) in MeOH (6 mL) was slowly added a THF (4 mL) solution of **27** (0.49 g, 1.7 mmol) at 0 °C under an argon atmosphere and the mixture was kept stirring for 40 min. The mixture was poured into water, and extracted with Et<sub>2</sub>O. The organic layer was washed with saturated brine, and dried over MgSO<sub>4</sub>. Evaporation of the solvent gave an oil, which was further purified by silica gel column chromatography (hexane : AcOEt = 7 : 1) to give **8g** (0.29 g, 77%): white solid, mp

97.7-98.3°C;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.27-6.10 (m, 4H), 5.00 (d,  $J = 1.2$  Hz, 2H), 3.75 (s, 3H), 3.67 (d,  $J = 2.4$  Hz, 1H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 164.7, 163.2, 129.4, 129.0, 123.3, 122.1, 94.7, 90.2, 83.0, 79.2, 52.7, 51.5; IR (KBr) 3258, 3084, 2997, 2951, 2212, 2097, 1728, 1716, 1616, 1560, 1441, 1402, 1360, 1232, 1213, 1178  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{11}\text{H}_7\text{O}_2$  ( $\text{M}^+ - \text{CH}_3$ ): 203.0344. Found: 203.0327.

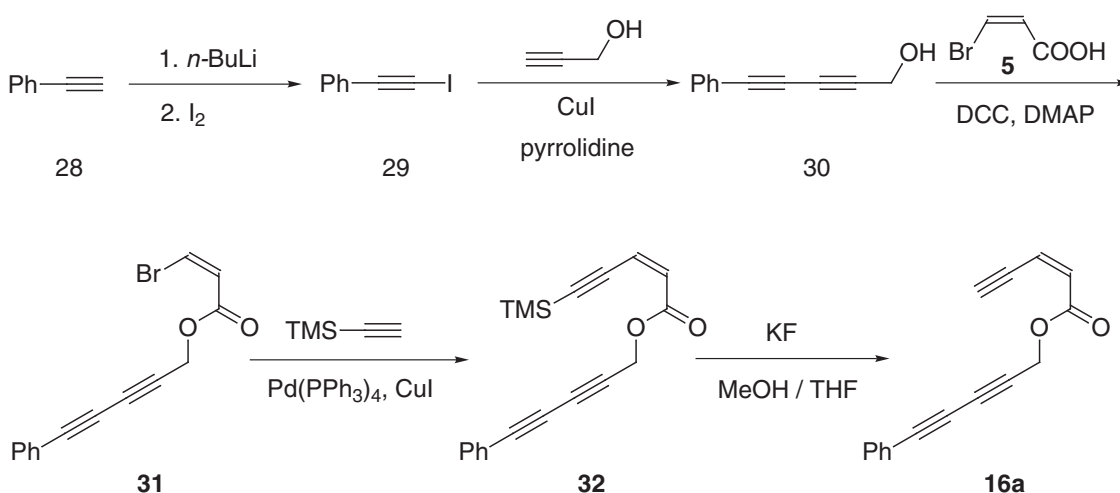
**(Z)-5-Methoxycarbonyl-4-penten-2-ynyl (Z)-2-octen-4-ynoate (8h)**: brown oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.23-6.05 (m, 4H), 4.98 (d,  $J = 1.4$  Hz, 2H), 3.75 (s, 3H), 2.42 (ddd,  $J = 7.1, 7.1, 2.4$  Hz, 2H), 1.60 (dddd,  $J = 7.3, 7.3, 7.3, 7.3, 7.3$  Hz, 2H), 1.01 (dd,  $J = 7.4, 7.4$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 164.8, 163.7, 128.9, 125.9, 125.4, 122.1, 105.2, 95.2, 82.8, 77.7, 52.4, 51.4, 22.0, 21.7, 13.4; IR (neat) 3080, 3020, 2966, 2907, 2874, 2245, 2208, 1732, 1609, 1437, 1410, 1360, 1279, 1232, 1197, 1161  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{15}\text{H}_{16}\text{O}_4$ : 260.1048. Found: 260.1051.

**(E)-6,6,7,7,8,8,9,9,10,10,11,11,11-Tridecafluoro-4-undecen-2-ynyl (Z)-2-octen-4-ynoate (8i)**: colorless oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.30 (ddd,  $J = 15.9, 2.1, 2.1$  Hz, 1H), 6.22 (ddd,  $J = 11.5, 2.4, 2.4$  Hz, 1H), 6.11 (ddd,  $J = 15.7, 12.0, 12.0$  Hz, 1H), 6.05 (d,  $J = 11.3$  Hz, 1H), 4.90 (s, 2H), 2.42 (ddd,  $J = 7.0, 7.0, 2.4$  Hz, 2H), 1.61 (dddd,  $J = 7.5, 7.3, 7.3, 7.3, 7.1$  Hz, 2H), 1.01 (dd,  $J = 7.4, 7.4$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 163.6, 127.6 (dd,  $J_{\text{C-F}} = 22.6, 22.6$  Hz), 125.7, 125.6, 123.5-106.9 (m), 120.0 (dd,  $J_{\text{C-F}} = 11.3, 11.3$  Hz), 105.4, 90.9, 81.3, 77.8, 51.9, 22.2, 21.9, 13.5; IR (neat) 3074, 3040, 2968, 2939, 2878, 2210, 1734, 1641, 1609, 1431, 1414, 1364, 1240, 1202, 1167, 1146, 1121, 1067, 1032  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{19}\text{H}_{13}\text{F}_{13}\text{O}_2$ : 520.0707. Found: 520.0688.

**(Z)-6-Methoxycarbonyl-5-hexen-3-ynyl (Z)-2-penten-4-ynoate (18d)**: yellow solid, mp 46.5-47.5°C;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 6.25-6.04 (m, 4H), 4.33 (dd,  $J = 6.9, 6.9$  Hz, 2H), 3.73 (s, 3H), 3.62 (d,  $J = 2.0$  Hz, 1H), 2.84 (ddd,  $J = 6.8, 6.8, 2.0$  Hz, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 165.0, 163.9, 130.2, 127.9, 123.4, 122.5, 98.7, 89.6, 79.4, 78.8, 62.1, 51.4, 20.4; IR (KBr) 3294, 3092, 3038, 2959, 2905, 2214, 2097, 1720, 1605, 1439, 1406, 1238, 1192, 1128  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{13}\text{H}_{11}\text{O}_4$  ( $\text{M}^+ - \text{H}$ ): 231.0657. Found: 231.0669.

### Preparation of Enyne-Diynes 16. A Representative Procedure.

#### Scheme S3



**5-Phenyl-2,4-pentadiyn-1-ol (30)** was prepared according to the literature.<sup>2</sup>

**5-Phenyl-2,4-pentadiynyl (Z)-3-bromo-2-propenoate (31)**. To a mixture of (Z)-3-bromo-2-propenoic acid **5** (1.8 g, 12 mmol) and DMAP (0.15 g, 1.2 mmol) were added

CH<sub>2</sub>Cl<sub>2</sub> (5.3 mL) and a CH<sub>2</sub>Cl<sub>2</sub> (10 mL) solution of 5-phenyl-2,4-pentadiyn-1-ol **30** (1.9 g, 12 mmol) under an argon atmosphere at room temperature. The reaction mixture was cooled to 0 °C, and DCC (2.9 g, 14 mmol) was added and the mixture was stirred for 5 min. After stirring for additional 35 min at room temperature, the reaction mixture was filtered with celite and the residue was washed with Et<sub>2</sub>O. The organic layer was washed with 0.5 N HCl aq. and saturated NaHCO<sub>3</sub> aq. and dried over MgSO<sub>4</sub>. Evaporation of the solvent gave a solid, which was further purified by silica gel column chromatography (hexane : AcOEt = 20 : 1) to give **31** (1.3 g, 38%): yellow solid, mp 63.5-64.2 °C; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) 7.49-7.46 (m, 2H), 7.39-7.20 (m, 3H), 7.09 (d, *J* = 8.5 Hz, 1H), 6.66 (d, *J* = 8.5 Hz, 1H), 4.91 (s, 2H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) 162.8, 132.7, 129.5, 128.4, 123.3, 121.1, 79.0, 75.6, 73.0, 71.6, 52.7; IR (KBr) 3082, 3065, 3049, 2928, 2251, 2224, 1732, 1686, 1655, 1609, 1578, 1560, 1541, 1508, 1491, 1437, 1373, 1337, 1204, 1165, 1070, 1024 cm<sup>-1</sup>; HMRS Calcd for C<sub>14</sub>H<sub>9</sub>BrO<sub>2</sub>: 287.9786. Found: 287.9795.

**5-Phenyl-2,4-pentadiynyl (Z)-5-trimethylsilyl-2-penten-4-ynoate (32).** To a mixture of Pd(PPh<sub>3</sub>)<sub>4</sub> (30 mg, 0.026 mmol) and CuI (10 mg, 0.052 mmol) were added Et<sub>3</sub>N (4 mL), a THF (1 mL) solution of **31** (0.29 g, 1.0 mmol), and (trimethylsilyl)acetylene (0.21 mL, 1.5 mmol) under an argon atmosphere at room temperature. The reaction mixture was stirred for 3.5 h. Then the mixture was poured into ice water, and extracted with Et<sub>2</sub>O. The organic layer was washed with 0.5 N HCl aq. and dried over MgSO<sub>4</sub>. Evaporation of the solvent gave a solid, which was further purified by silica gel column chromatography (hexane : AcOEt = 50 : 1) to give **32** (0.19 g, 63%): yellow solid, mp 43.2-44.2 °C; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) 7.49-7.45 (m, 2H), 7.39-7.27 (m, 3H), 6.21 (d, *J* = 11.7 Hz, 1H), 6.10 (d, *J* = 11.7 Hz, 1H), 4.91 (s, 2H), 0.24 (s, 9H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) 163.4, 132.6, 129.4, 128.4, 128.0, 124.0, 121.1, 109.6, 100.4, 78.8, 76.0, 73.1, 71.4, 52.5, -0.4; IR (KBr) 3084, 3065, 3038, 2957, 2928, 2901, 2864, 2251, 2224, 2147, 1730, 1605, 1489, 1443, 1402, 1364, 1250, 1223, 1161, 1034 cm<sup>-1</sup>; Anal. Calcd for C<sub>19</sub>H<sub>18</sub>O<sub>2</sub>Si: C, 74.47; H, 5.92. Found: C, 74.35; H, 6.02.

**5-Phenyl-2,4-pentadiynyl (Z)-2-penten-4-ynoate (16a).** To a mixture of KF (62 mg, 1.1 mmol) in MeOH (1.3 mL) was slowly added a THF (1.3 mL) solution of **32** (111 mg, 0.36 mmol) at 0 °C under an argon atmosphere and the mixture was kept stirring for 45 min. The mixture was poured into water, and extracted with Et<sub>2</sub>O. The organic layer was washed with saturated brine, and dried over MgSO<sub>4</sub>. Evaporation of the solvent gave a solid, which was further purified by silica gel column chromatography (hexane : AcOEt = 20 : 1) to give **16a** (43 mg, 51%): white solid, mp 86.2-87.7 °C; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) 7.49-7.46 (m, 2H), 7.39-7.27 (m, 3H), 6.24 (d, *J* = 11.9 Hz, 1H), 6.18 (dd, *J* = 11.5, 2.2 Hz, 1H), 4.91 (s, 2H), 3.66 (d, *J* = 2.2 Hz, 1H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) 163.2, 132.6, 129.5, 129.3, 128.4, 123.5, 121.1, 90.2, 79.3, 78.8, 75.8, 73.0, 71.4, 52.6; IR (KBr) 3269, 3055, 3038, 2930, 2255, 2225, 2093, 1728, 1686, 1611, 1491, 1441, 1402, 1367, 1223, 1175, 1119, 1072, 1026, 1003 cm<sup>-1</sup>; HMRS Calcd for C<sub>16</sub>H<sub>10</sub>O<sub>2</sub>: 234.0680. Found: 234.0700.

**5-Phenyl-2,4-pentadiynyl (Z)-2-octen-4-ynoate (16b):** yellow solid, mp 32.5-33.5 °C; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) 7.49-7.45 (m, 2H), 7.38-7.27 (m, 3H), 6.21 (ddd, *J* = 11.5, 2.4, 2.4 Hz, 1H), 6.05 (d, *J* = 11.3 Hz, 1H), 4.89 (s, 2H), 2.43 (ddd, *J* = 7.1, 7.1, 2.4 Hz, 2H), 1.62 (dddd, *J* = 7.3, 7.3, 7.3, 7.3, 7.3 Hz, 2H), 1.02 (dd, *J* = 7.4, 7.4 Hz, 3H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) 163.8, 132.6, 129.4, 128.4, 125.9, 125.6, 121.1, 105.5,

78.6, 77.8, 76.1, 73.1, 71.2, 52.3, 22.0, 21.8, 13.5; IR (KBr) 3080, 3065, 3036, 2963, 2934, 2909, 2874, 2831, 2249, 2208, 1732, 1607, 1491, 1412, 1364, 1275, 1231, 1207, 1155, 1117  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{19}\text{H}_{16}\text{O}_2$ : 276.1149. Found: 276.1153.

**6-Vinyl-4,5-dihydro-3H-benzo[c]oxepin-1-one (21).** A mixture of  $\text{Pd}(\text{PPh}_3)_4$  (140 mg, 0.12 mmol) and DPPF (130 mg, 0.32 mmol) in dry toluene (595 mL) in 1 L flask was kept at 100 °C. To this mixture was slowly added a toluene (5 mL) solution of **20** (56 mg, 0.30 mmol) for 5 h with syringe pump. After stirring for additional 1.5 h, toluene was evaporated and the resulting mixture was passed through a short silica gel column chromatography (hexane and  $\text{Et}_2\text{O}$ ). The residue was further purified by silica gel column chromatography (hexane :  $\text{AcOEt}$  = 10 : 1) to give **21** (12 mg, 22%): yellow oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 7.63-7.57 (m, 2H), 7.31 (dd,  $J$  = 7.7, 7.7 Hz, 1H), 6.99 (dd,  $J$  = 17.3, 11.1 Hz, 1H), 5.63 (dd,  $J$  = 17.3, 1.0 Hz, 1H), 5.40 (dd, 11.1, 1.2 Hz, 1H), 4.12 (dd,  $J$  = 6.2, 6.2 Hz, 2H), 2.94 (dd,  $J$  = 7.1, 7.1 Hz, 2H), 2.07 (dddd,  $J$  = 7.1, 6.9, 6.5, 6.4 Hz, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 172.5, 136.5, 134.2, 133.6, 132.7, 130.3, 129.3, 127.2, 118.1, 66.2, 27.4, 24.3; IR (neat) 3067, 2961, 2926, 2878, 2856, 1722, 1470, 1285, 1259, 1182, 1111, 1059  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{12}\text{H}_{12}\text{O}_2$ : 188.0837. Found: 188.0835.

#### Synthesis of 3-*n*-Butylphthalide.

**3-Butyl-4-formylphthalide (22).** Into a methanol (15 mL) solution of **9k** (520 mg, 2.4 mmol) at -78 °C was bubbled a stream of  $\text{O}_3$  in  $\text{O}_2$  until the solution became blue and this color maintained for 2 min. The reaction was purged with  $\text{O}_2$  until the blue color disappeared, then dimethyl sulfide (1.0 mL) was added. The mixture warmed to room temperature with stirring. Then the mixture was poured into water, and extracted with  $\text{Et}_2\text{O}$ . The organic layer was washed with water, dried over  $\text{Na}_2\text{SO}_4$ , and evaporated to give **22** (500 mg, 96%): yellow solid, mp 51.0-51.8 °C;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 10.13 (s, 1H), 8.12 (d,  $J$  = 7.5 Hz, 1H), 8.11 (d,  $J$  = 7.5 Hz, 1H), 7.75 (dd,  $J$  = 7.6, 7.6 Hz, 1H), 5.92 (dd,  $J$  = 7.8, 2.3 Hz, 1H), 2.31-2.23 (m, 1H), 1.72-1.60 (m, 1H), 1.53-1.24 (m, 4H), 0.86 (dd,  $J$  = 7.0, 7.0 Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 190.8, 169.2, 149.9, 138.3, 131.1, 130.6, 129.8, 127.8, 82.7, 32.8, 27.0, 22.1, 13.7; IR (neat) 3069, 3034, 2959, 2932, 2862, 2743, 1757, 1701, 1595, 1350, 1265, 1223, 1086, 1045, 1003  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{13}\text{H}_{14}\text{O}_3$ : 218.0942. Found: 218.0943.

**3-Butylphthalide (23).** To a mixture of  $\text{RhCl}(\text{PPh}_3)_3$  (460 mg, 0.50 mmol) in toluene (1.0 mL) was added a toluene (1.0 mL) solution of **22** (110 mg, 0.50 mmol) at room temperature. Then the mixture was stirred at 120 °C for 1 h. The mixture was passed through a short silica gel column chromatography (hexane and  $\text{Et}_2\text{O}$ ). The residue was further purified by silica gel column chromatography (hexane :  $\text{EtOAc}$  = 10 : 1) to give **23** (75 mg, 78%): colorless oil;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ) 7.88 (d,  $J$  = 7.7 Hz, 1H), 7.65 (dd,  $J$  = 7.5, 7.5 Hz, 1H), 7.50 (dd,  $J$  = 7.6, 7.6 Hz, 1H), 7.41 (d,  $J$  = 7.7 Hz, 1H), 5.46 (dd,  $J$  = 7.8, 3.9 Hz, 1H), 2.09-1.97 (m, 1H), 1.81-1.69 (m, 1H), 1.53-1.29 (m, 4H), 0.89 (dd,  $J$  = 7.1, 7.1 Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ) 170.6, 150.1, 133.9, 129.0, 126.2, 125.7, 121.7, 81.4, 34.4, 26.8, 22.4, 13.8; IR (neat) 3069, 3057, 3032, 2957, 2934, 2872, 1763, 1466, 1286, 1213, 1063  $\text{cm}^{-1}$ ; HMRS Calcd for  $\text{C}_{12}\text{H}_{14}\text{O}_2$ : 190.0993. Found: 190.0995.

#### References

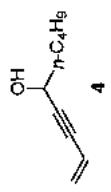
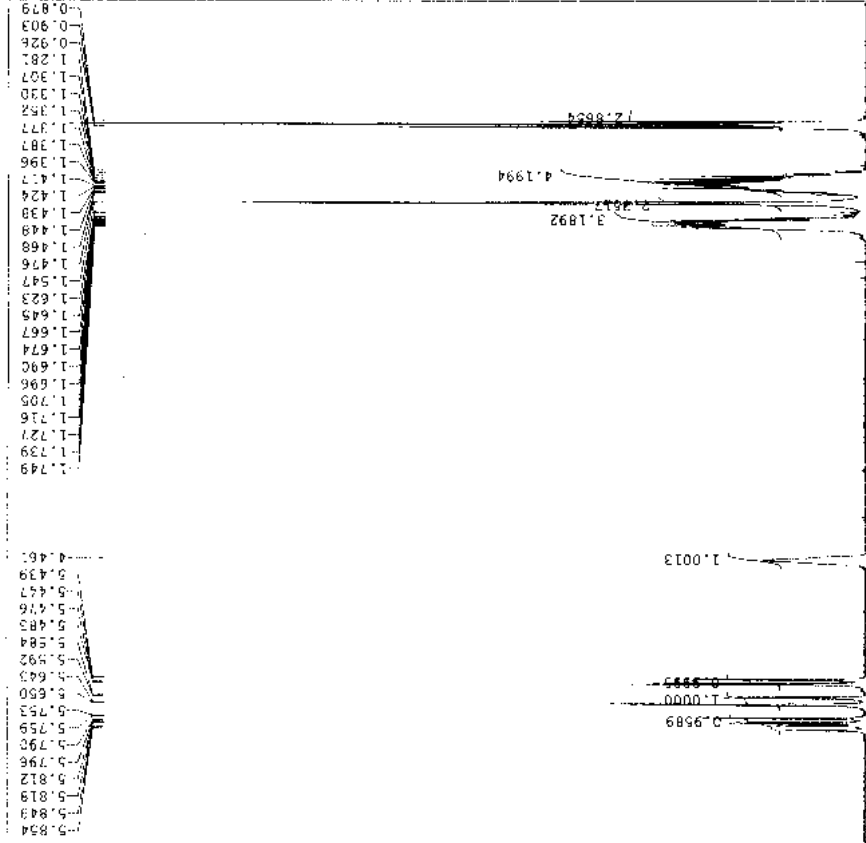
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- (2) Alami, M.; Ferri, F. *Tetrahedron. Lett.* **1996**, *37*, 2763-2766.



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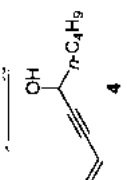
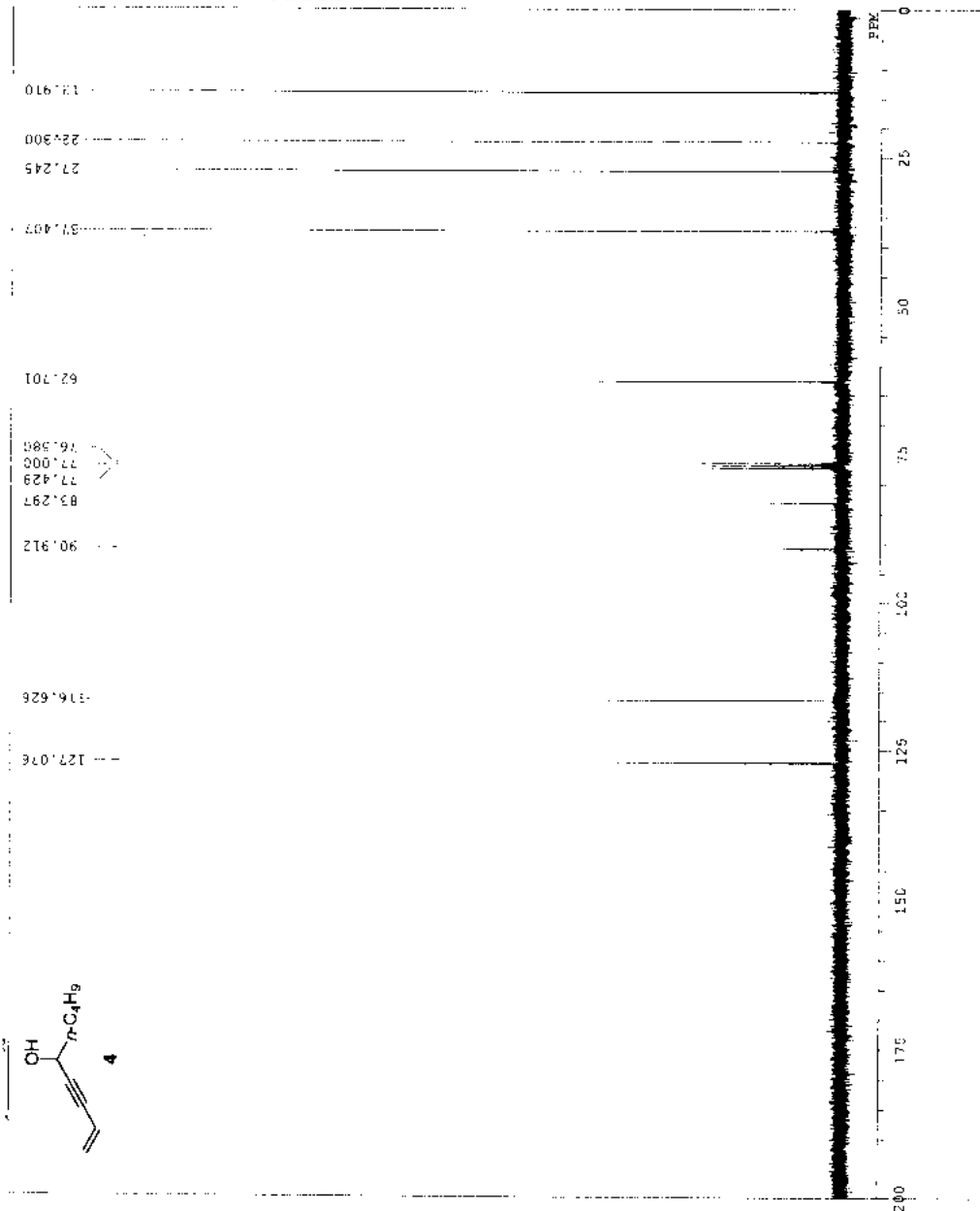
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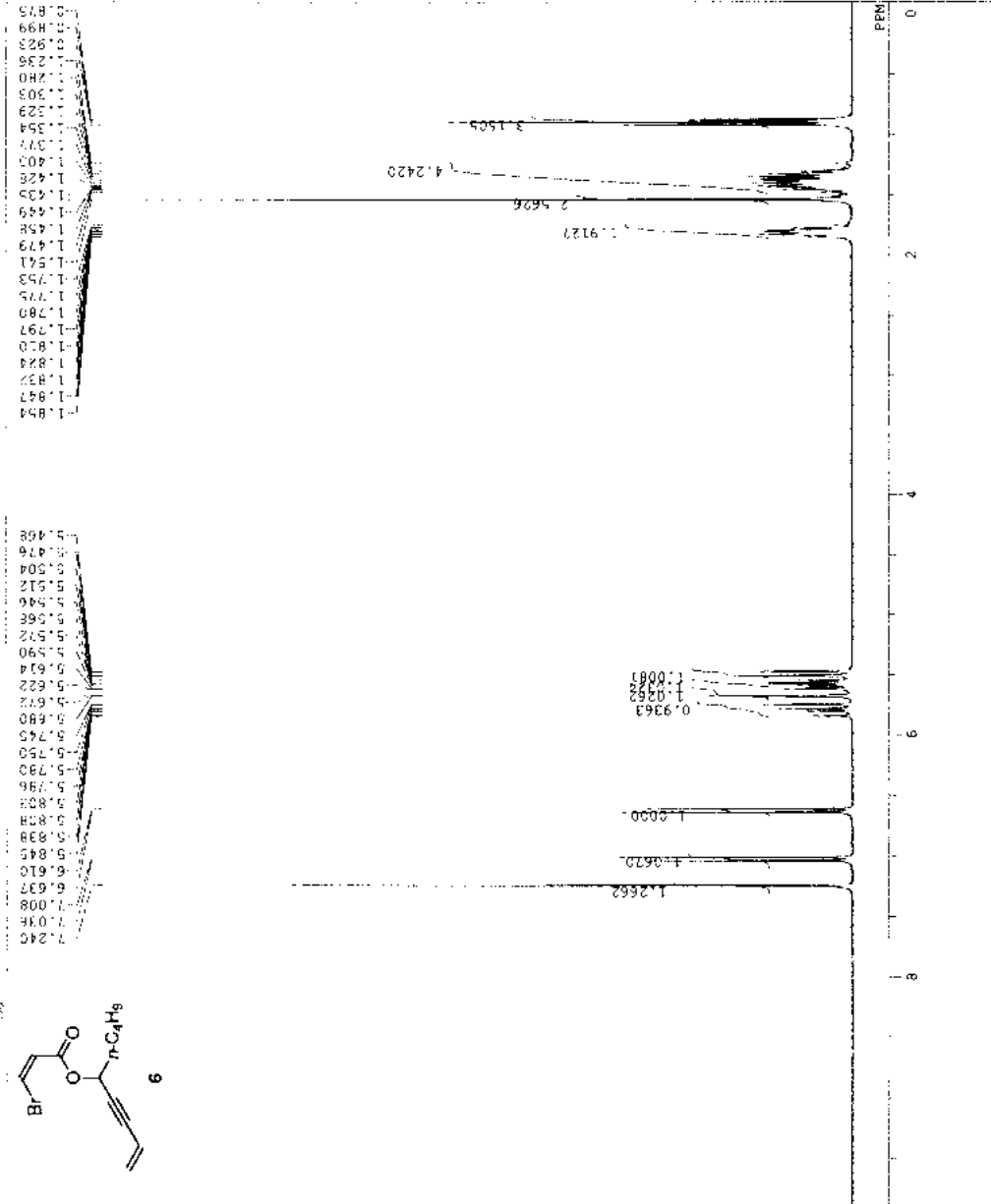


PPM

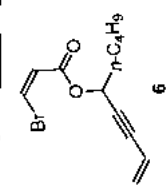
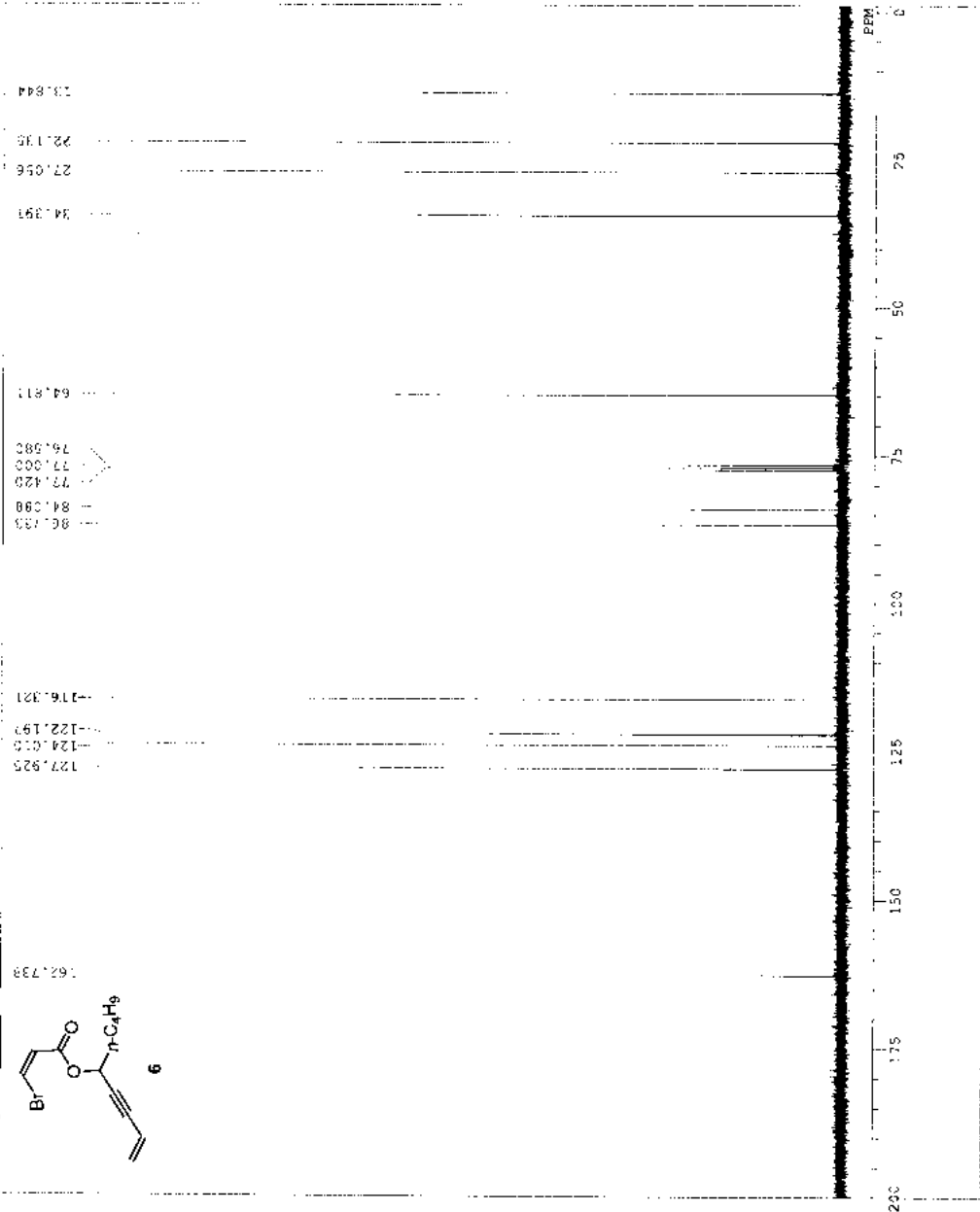
FILE C:\AW\40495\404952  
 COMPT T2647\_01.D  
 DATEM Tue Oct 09 13:23:1  
 OPEROR LSC  
 EXPRID B04  
 OBSERQ 75.45 MHz  
 OBSST 124.00 KHz  
 OBSFL 1842.0 Hz  
 POINT 32769  
 FREQU 20488.1 Hz  
 SCANS 129  
 ACQTM 1.606 SEC  
 PR 1.394 SEC  
 PWA 4.0 US  
 TRNDIC 1V  
 CTMP 22.4 C  
 SLYNE C00L3  
 EXPRF 77.00 ppm  
 PF 0.13 Hz  
 RGAIN 24



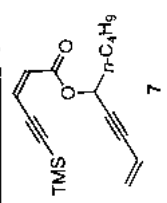
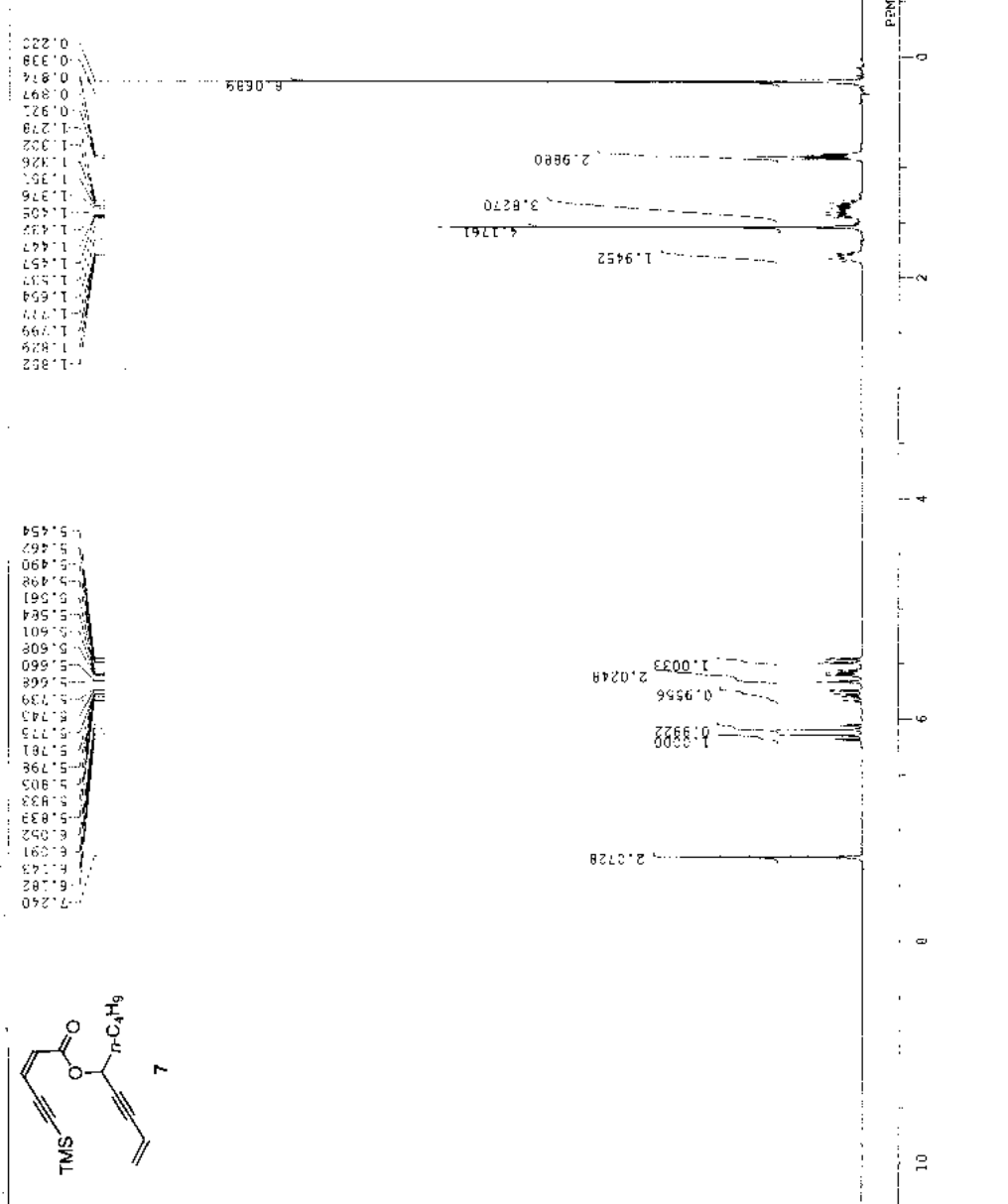
C:\NMR\1995\COMMC  
 COMMENT 76688 arylure-brom  
 DATE TIME 04/05/95 11:34:  
 DENUC IE  
 EXMOD NON  
 DEPRO 300.40 MHZ  
 QRES 120.00 MHZ  
 QFRES 1250.0 HZ  
 POINT 16384  
 FREQ 3300.3 HZ  
 SCANS 6  
 ACQIM 4.964 SEC  
 PD 1.551 SEC  
 PUL 5.13 US  
 ERUC IH 72.1 C  
 CTEMP  
 SIVMT CDCL4  
 EXREF 7.24 ppm  
 BF 0.13 HZ  
 RGAIN 21



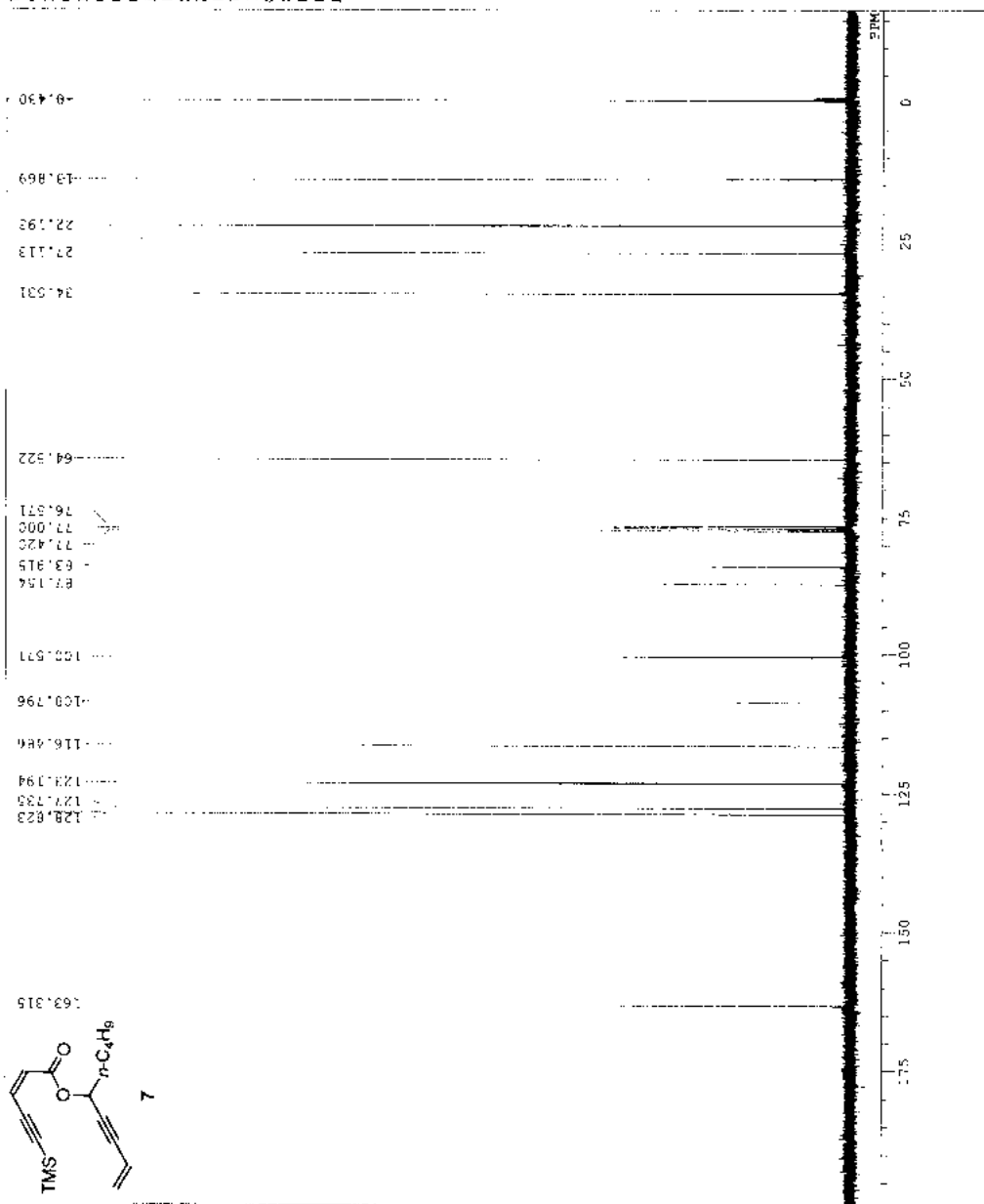
C:\WINRM95\1.2\AK  
 COMNT 2K668 ethyne-brom.  
 DATIY Tue Oct 09 17:46:  
 ORNUJ :3C  
 EXMGC: PCM  
 CBFRQ 75.45 MHz  
 CBSET 124.33 KHz  
 OBFIN 1849.0 Hz  
 POLNE 32.768  
 FREQO 204087.1 Hz  
 SCANS 128  
 ACQTM 1.406 sec  
 ED 1.394 sec  
 PW 4.0 us  
 IRNUC IR  
 CTEMP 23.3 C  
 SLVNT CDCL3  
 EXREF 77.00 ppm  
 BF 0.13 Hz  
 RGAIN 24



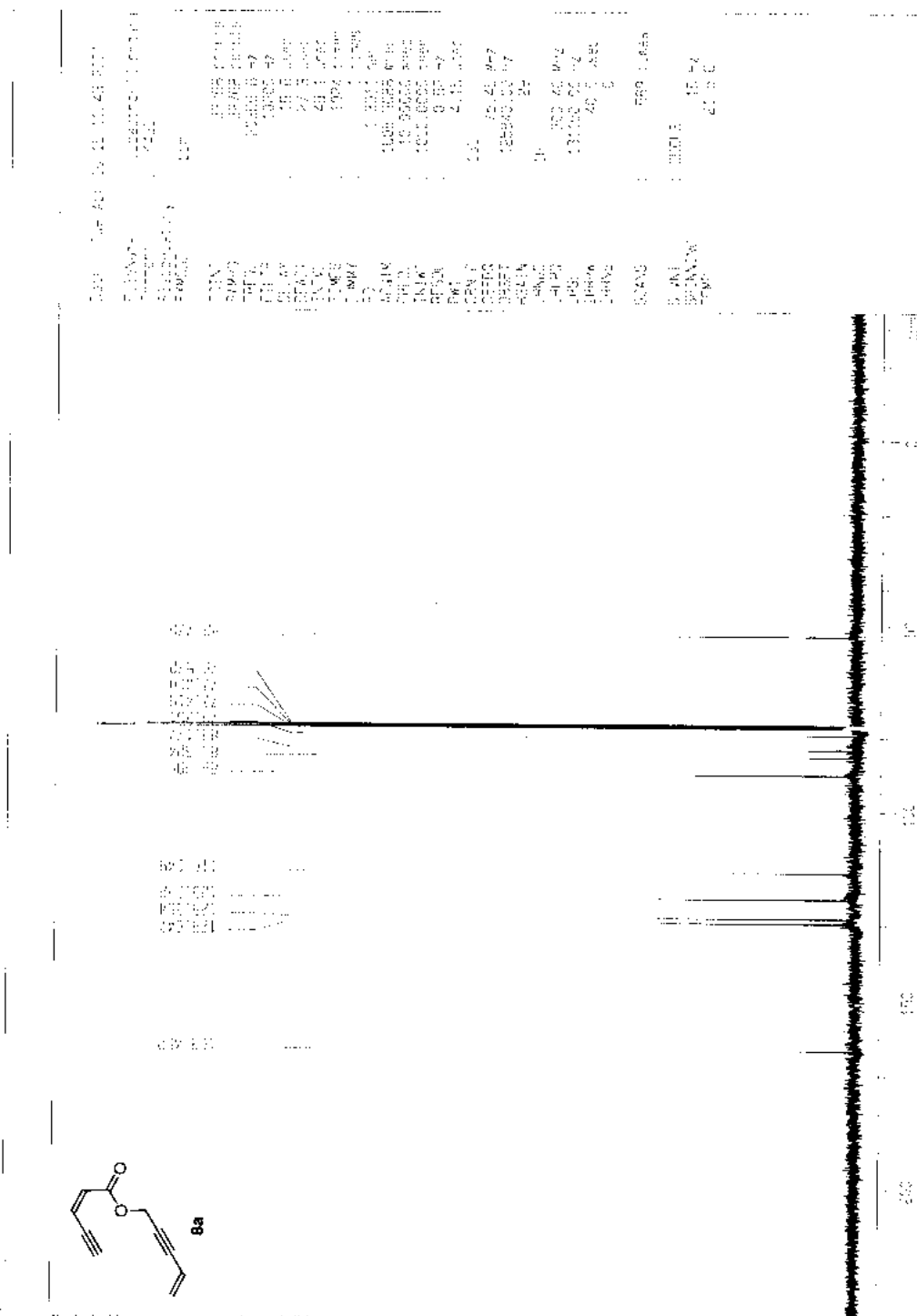
C:\WINNMR95\COMMO  
 TR689 enyne1-TMS-  
 wed Oct 10 14:52:  
 NAME TP  
 COMPO NON  
 ORFREQ 300.40 MHz  
 ORSOL 130.50 MHz  
 ORPUL 1150.00 Hz  
 POINT 16384  
 FREQC 3000.0 Hz  
 SCANS 8  
 ACQTM 4.964 sec  
 PD 1.551 sec  
 PUL 5.3 us  
 TRNOC 1R  
 CTEMP 23.5 C  
 SUNT CDCL3  
 EXREF 7.24 PPM  
 RF 0.13 Hz  
 RGAIN 22



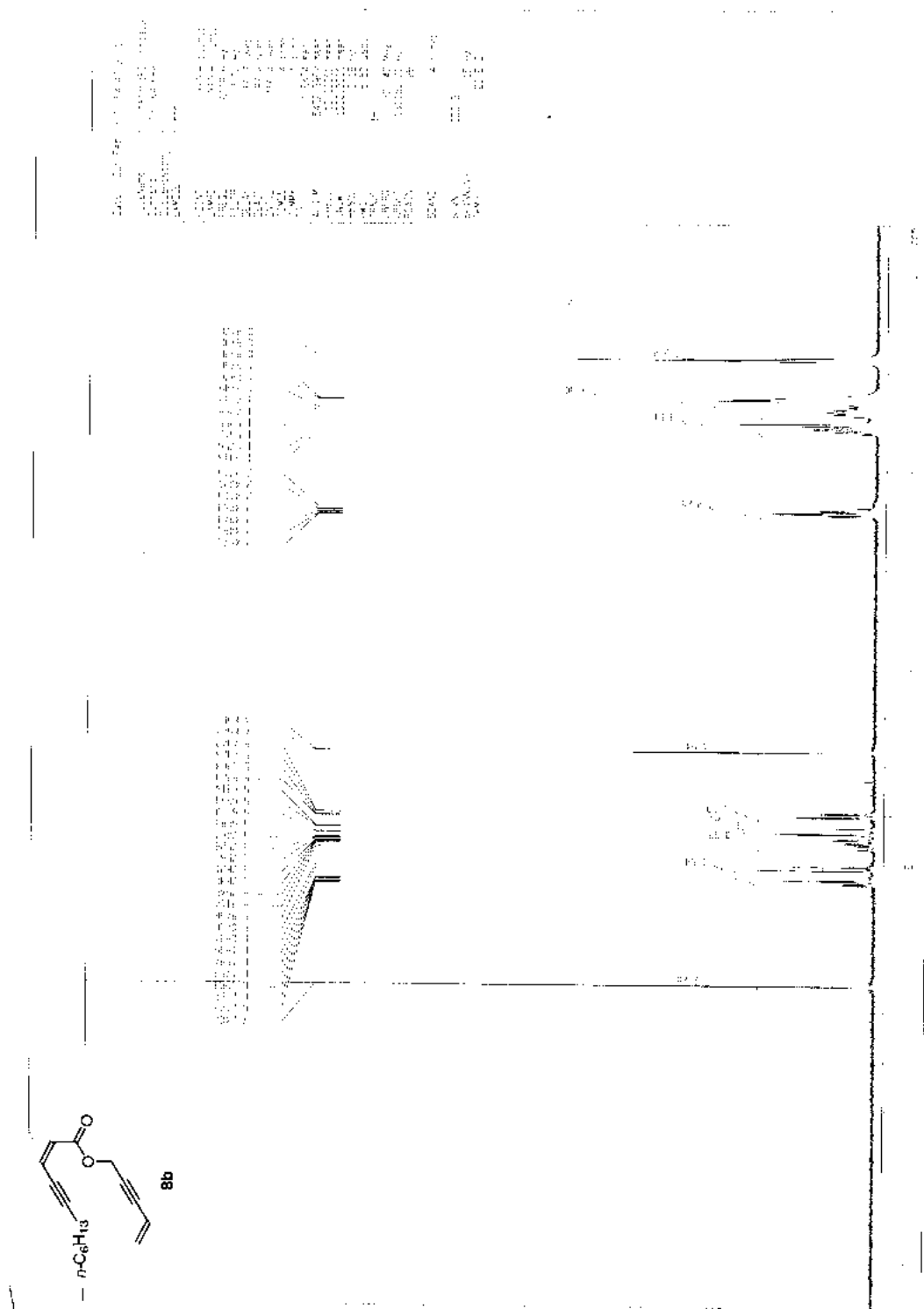
FILE: C:\WINNMR95\COMMO  
 COMMC TK689 enymaj-TMS-  
 DACTIM Wed Oct 10 13:17:  
 OBSJC 13C  
 EXMOD BDM  
 OBSRO 95.45 MHz  
 OBSFEI 124.00 RBZ  
 OBSFIN 18401.6 HZ  
 POINT 32768  
 PRESC 20488.1 HZ  
 SCANS 257  
 ACQTM 1.606 sec  
 PC 1.394 sec  
 TW1 4.0 us  
 IRNUC 1U  
 CTEMP 23.3 C  
 STVNT CMC13  
 EXREF 77.00 Ppm  
 BF 0.13 HZ  
 RGAIN 23

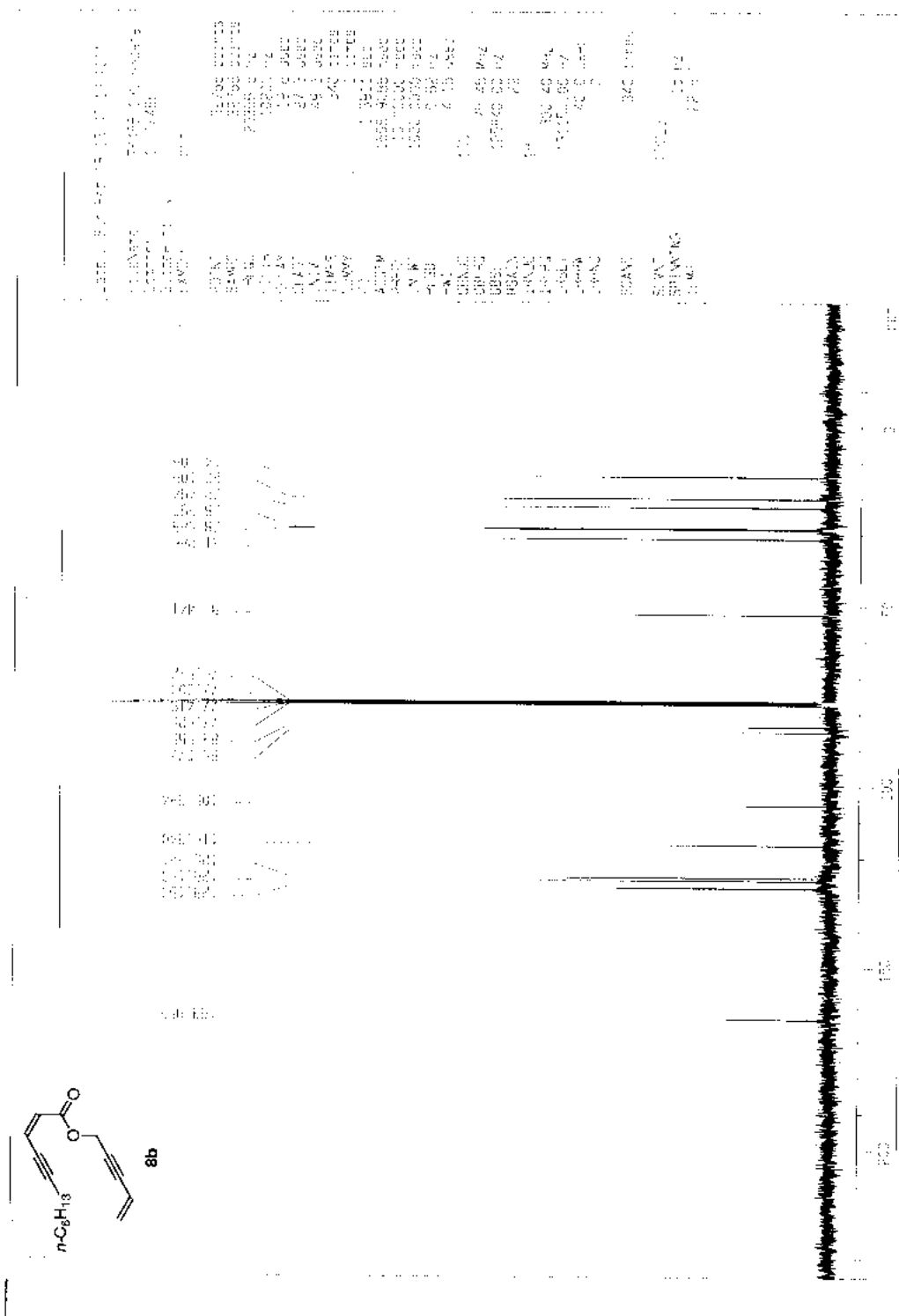




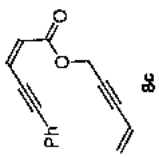
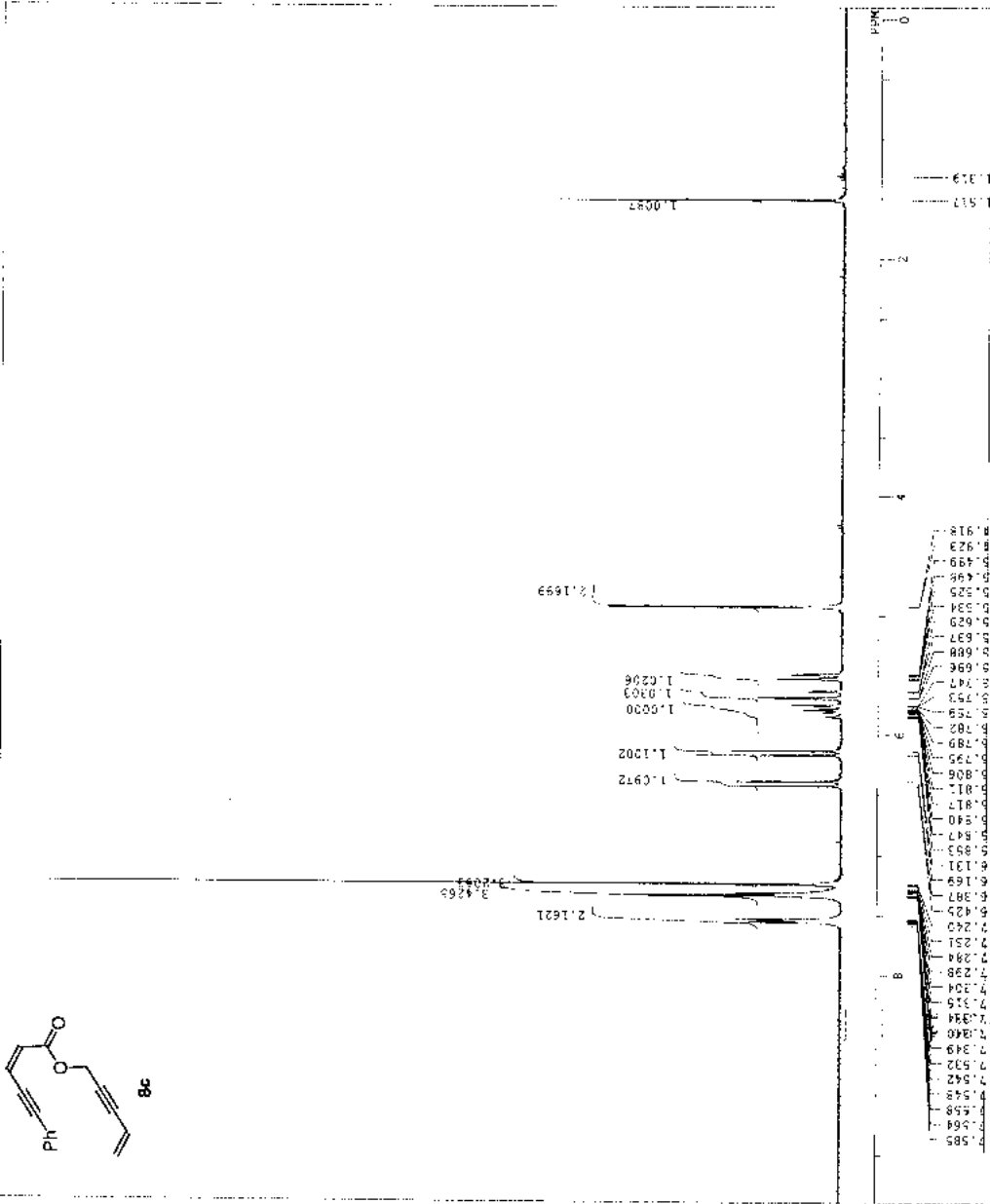


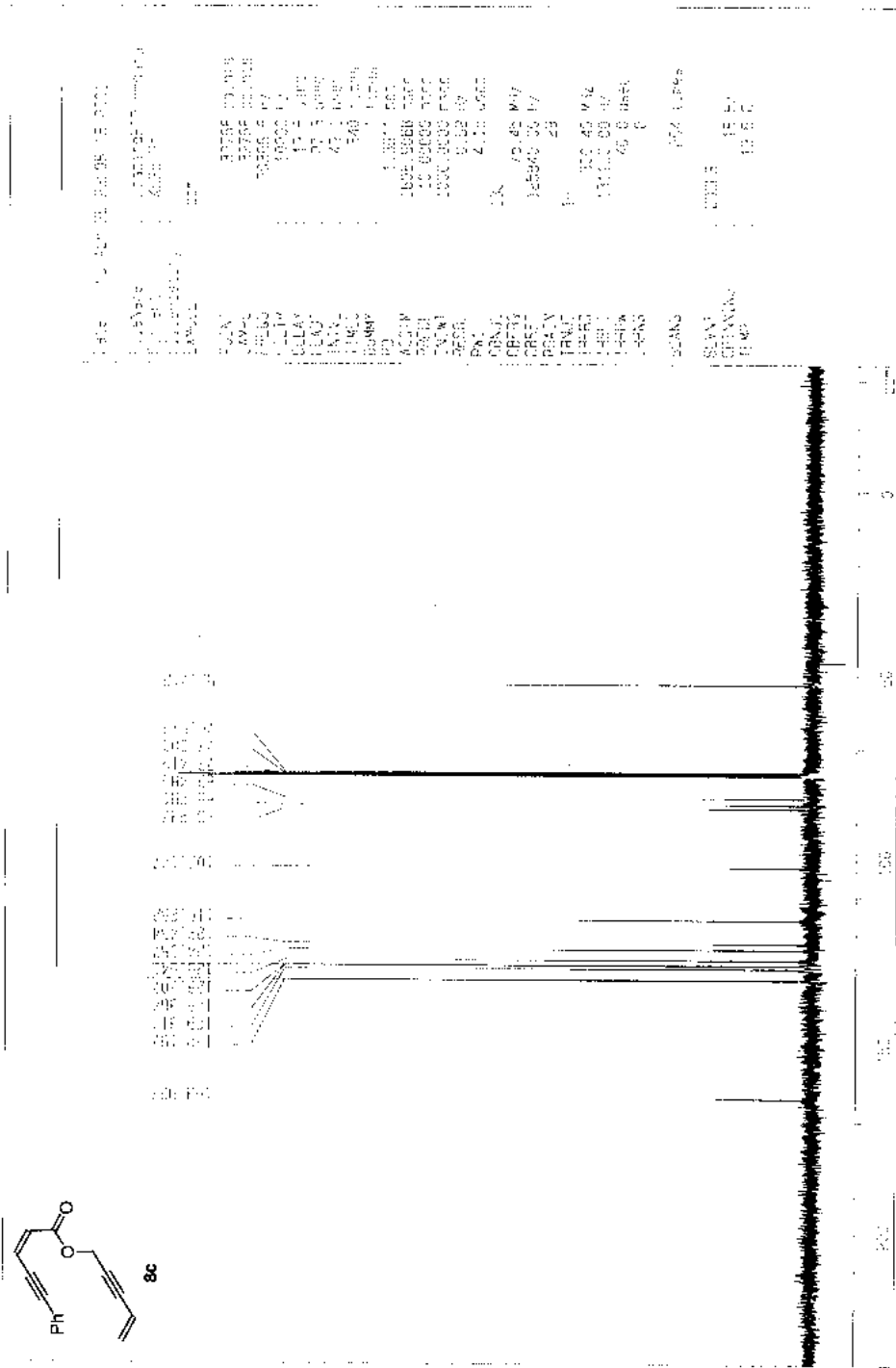
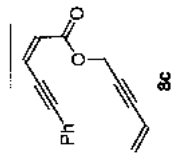




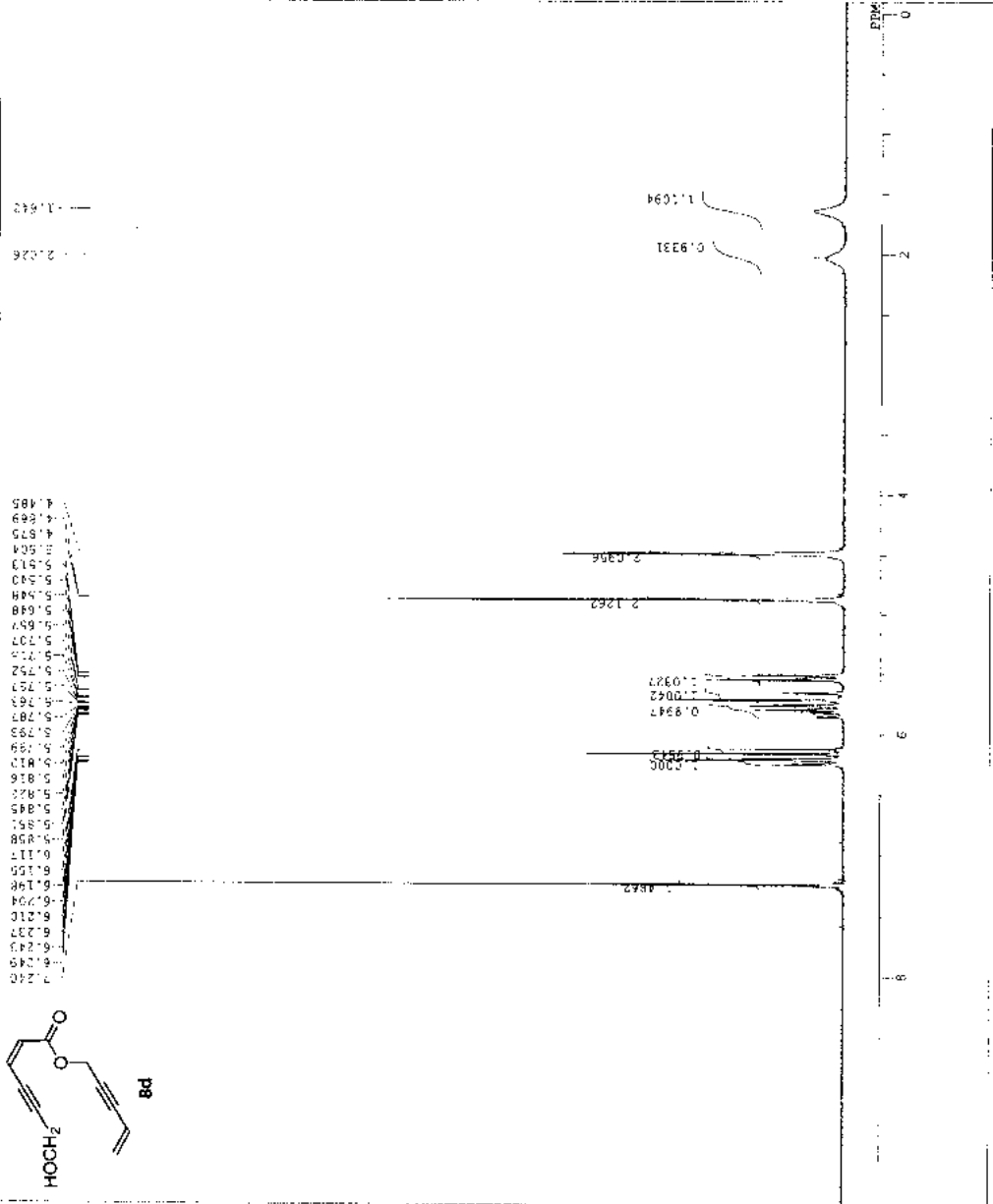


DP116 C:\WINNBS5\ACQ\H01A  
 COUNT 16075 PR  
 DATEM Tue May 01 21:25:49  
 OPERC DR  
 EXMOD N08  
 CHPRC 300.40 MHz  
 CRSELT 130.00 KHz  
 CSFIN 1150.0 Hz  
 POINT 16384  
 FREQ0 3300.3 Hz  
 SCANS 8  
 ACQTM 4.764 sec  
 P2 1.551 sec  
 PW 5.3 us  
 IRNUC 1H 24.1 C  
 TEMPC  
 SVMT C0CL3  
 EXREF 7.24 ppm  
 DF 0.12 Hz  
 RGAIN 25





FILE: C:\WINNER91\21\KAWI  
COMB: T1659 evdye1\_01.b.s.  
DATE: Sat May 26 14:42:57  
CONTC: 1H  
CONTC: 1H  
CONTC: MOX  
ORBIT: 300.40 MHz  
ORBIT: 170.00 KHz  
ORBIT: 1150.0 Hz  
PRT: 10384  
PRG2: 3300.3 Hz  
SIC: 8  
AQU: 4.964 sec  
P: 1.55 sec  
PW: 5.3 us  
IRNUC: 1H  
CTEMP: 19.9 C  
SIVNT: CUXLS  
EXREF: 7.24 ppm  
RF: 0.12 Hz  
RGAIN: 22

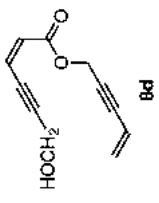
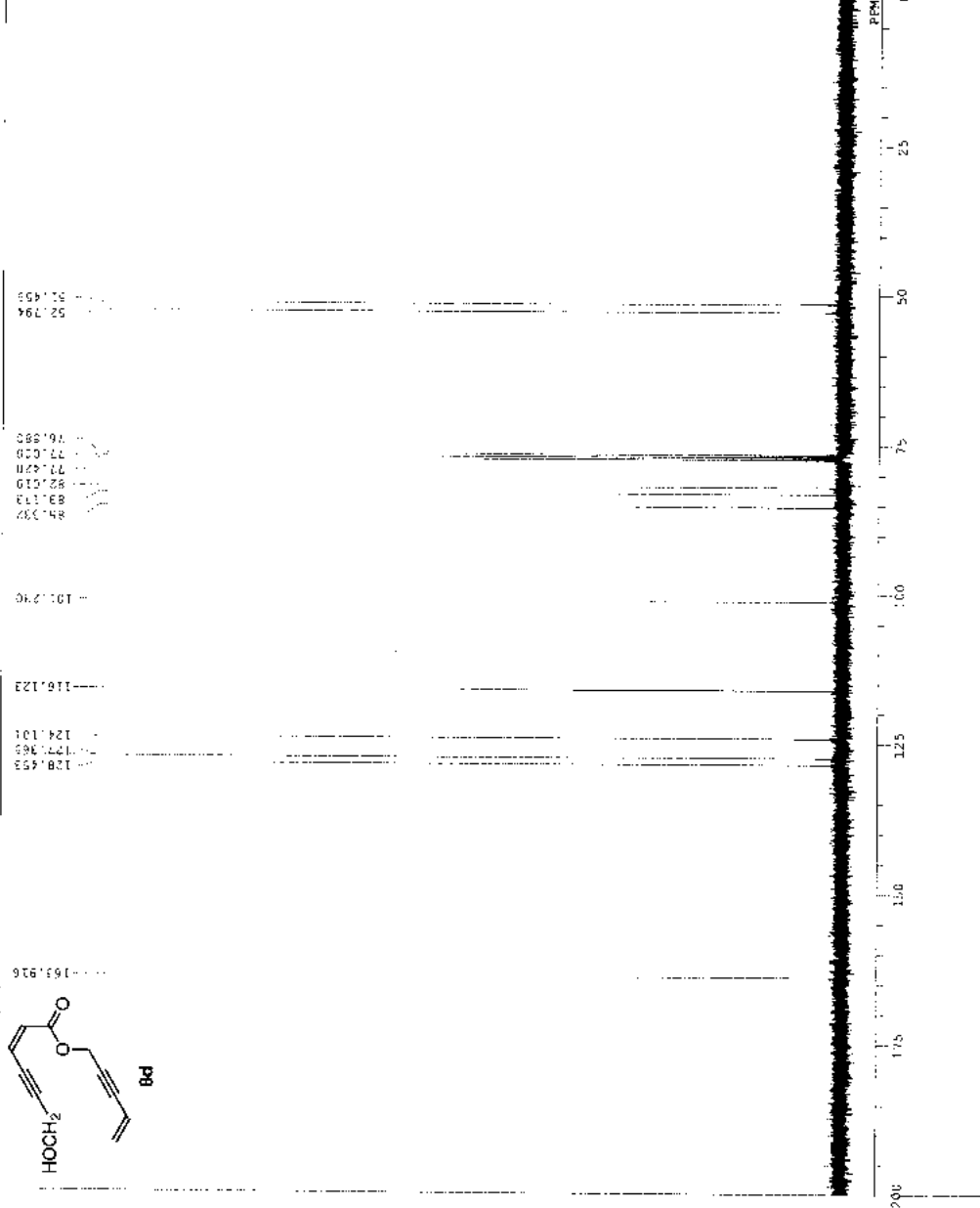


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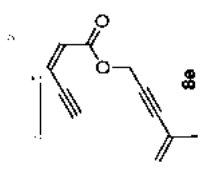
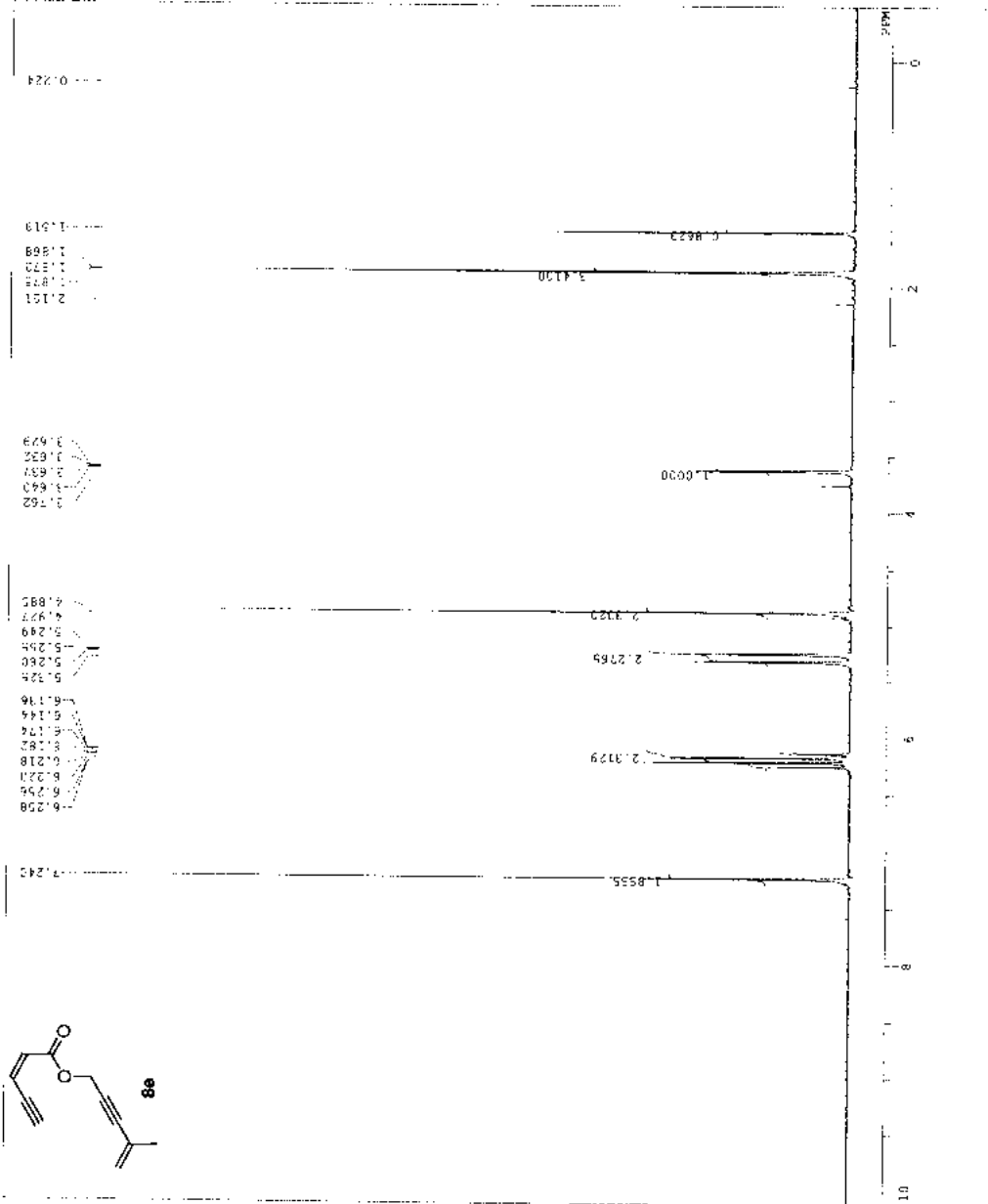
C:\NMR99\COMCRV
COMMT TRES enyrol-OH-bis-
LATIM Sat May 26 15:06:00
ORNDG 130
KORNOE BCM
F5.45 MEI
124.00 KBZ
1840.0 Hz
J2768
POINT 20408.1 Hz
FRQOU 381
SCANS 1-606 SEC
ACQTM 1.394 SEC
2D 4.0 HA
EVI
:RNDG IR
CTEMP 19.9 C
SLVOT CUX13
EXPEF 77.00 PPM
RF 0.12 Hz
965A1N 24
    
```

```

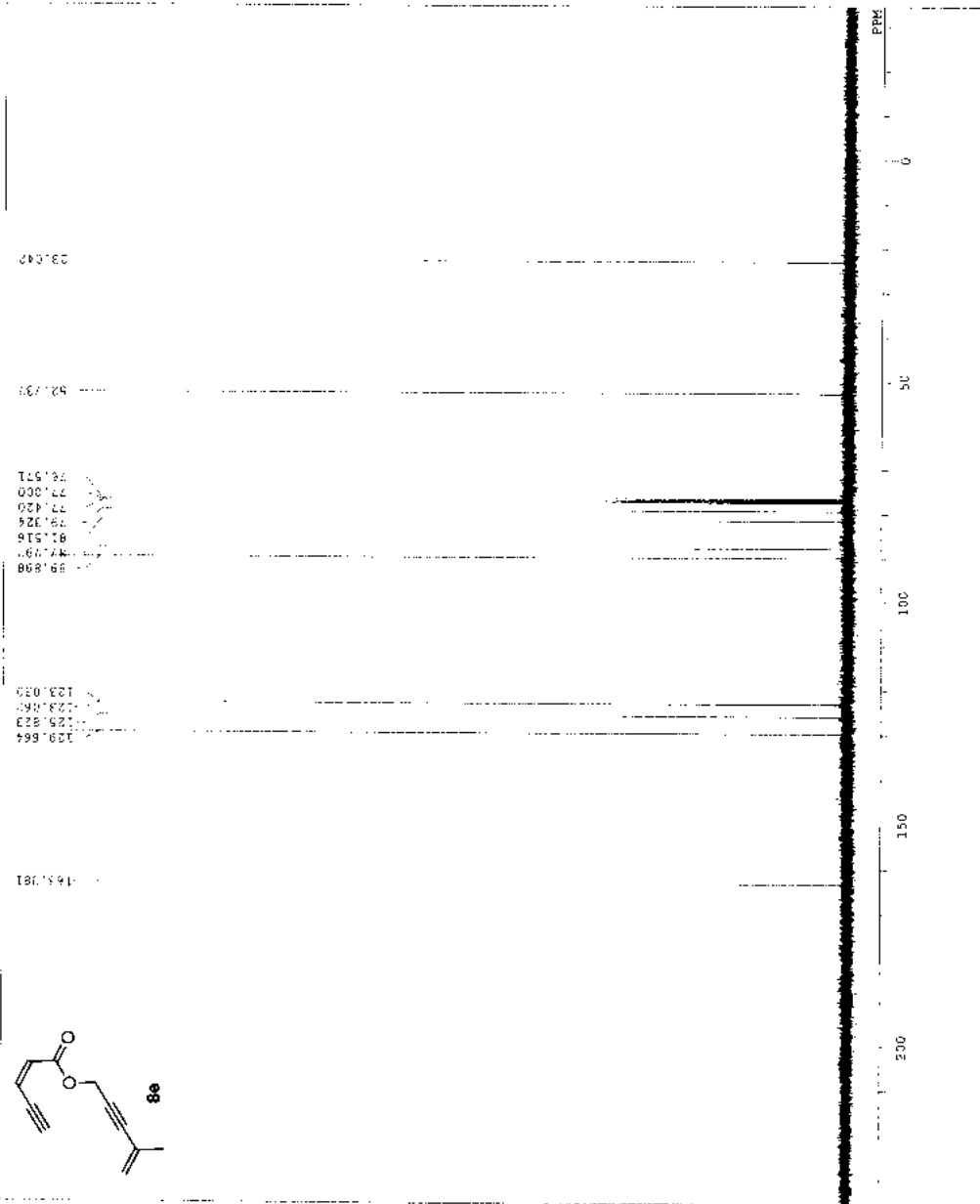
DF:1LF
CMT:
LATIM
ORNDG
KORNOE
F5.45
124.00
1840.0
J2768
POINT
FRQOU
SCANS
ACQTM
2D
EVI
:RNDG
CTEMP
SLVOT
EXPEF
RF
965A1N
    
```



2F116 C:\AW\8555\521\KAW  
 CONNT 28536-2  
 DA-TM Wed Apr 25 10:35:39  
 INSTR: J4  
 EXMSD: NMR  
 OPERNO 306.40 MHz  
 OBSF1 330.60 MHz  
 OBSF2 1150.0 Hz  
 POINT 16384  
 ZPRG0 3300.3 Hz  
 SUGAR5 B  
 SUGAR6  
 SUGAR7 4.964 sec  
 F2 1.551 sec  
 F3 5.3 us  
 TRAC0 1H  
 CTEMP 24.6 C  
 SLUNT C12CLJ  
 EXREF 7.24 ppm  
 BF 0.13 Hz  
 RGAIN 23

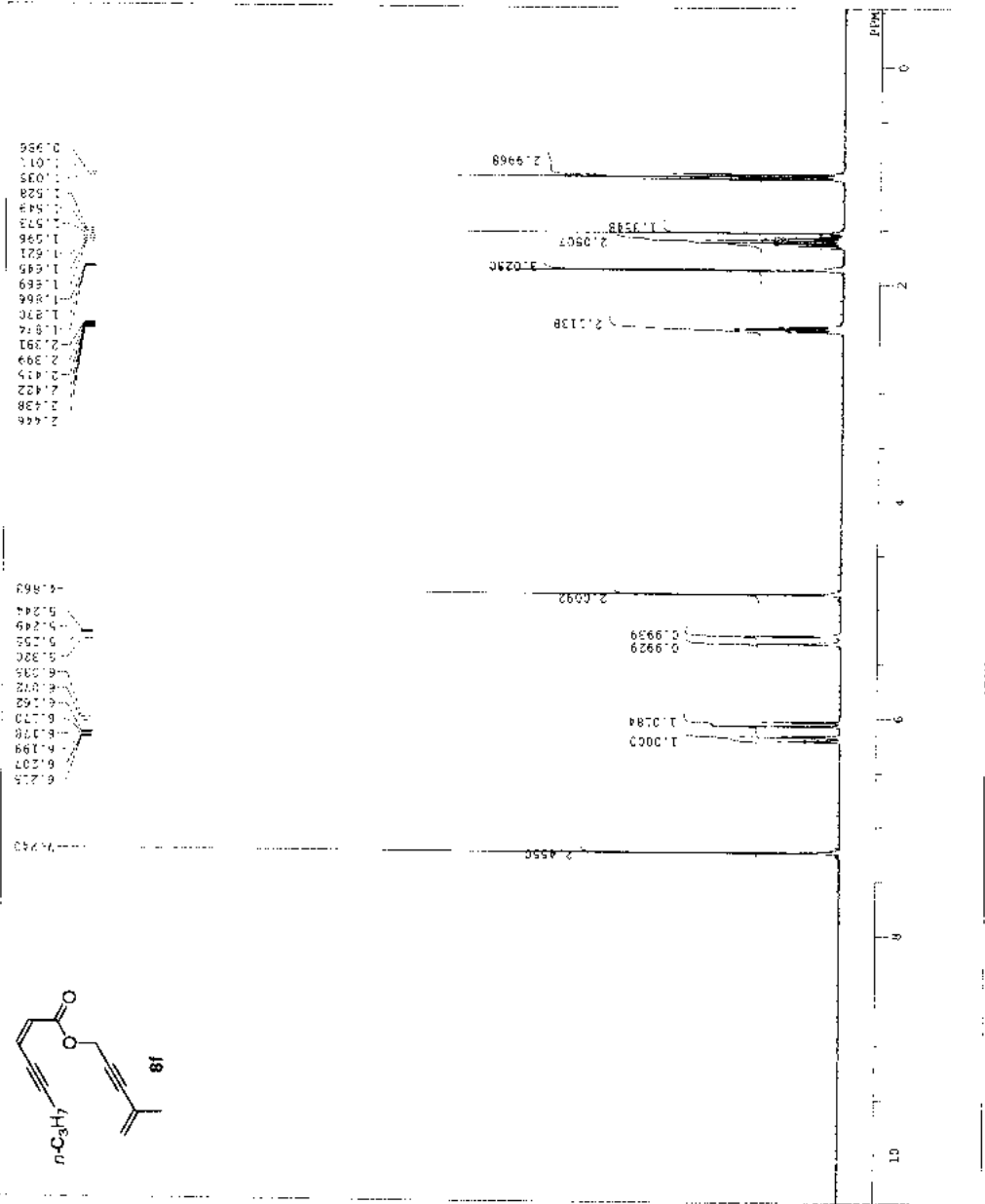


C:\VINTAGE\MSDCHEM\A  
 COM1C 78048 609062-224  
 DACTIM Tue May 15 16:20:03  
 BRAND 135  
 EXHAID 8CM  
 OPERQ 75.45 MHz  
 OBSEI 124.00 MHz  
 OBSEI 1840.0 Hz  
 POLIN 32768  
 PREOQ 200DE J Hz  
 SCANS 256  
 ACQTM 1.506 sec  
 DO 1.394 sec  
 PWT 4.0 us  
 JRNOC 1E 22.1 G  
 CTRMP CXC-3  
 SLOWT 77.00 ppm  
 EXRESF 0.13 Hz  
 BF 34  
 NGAJIN

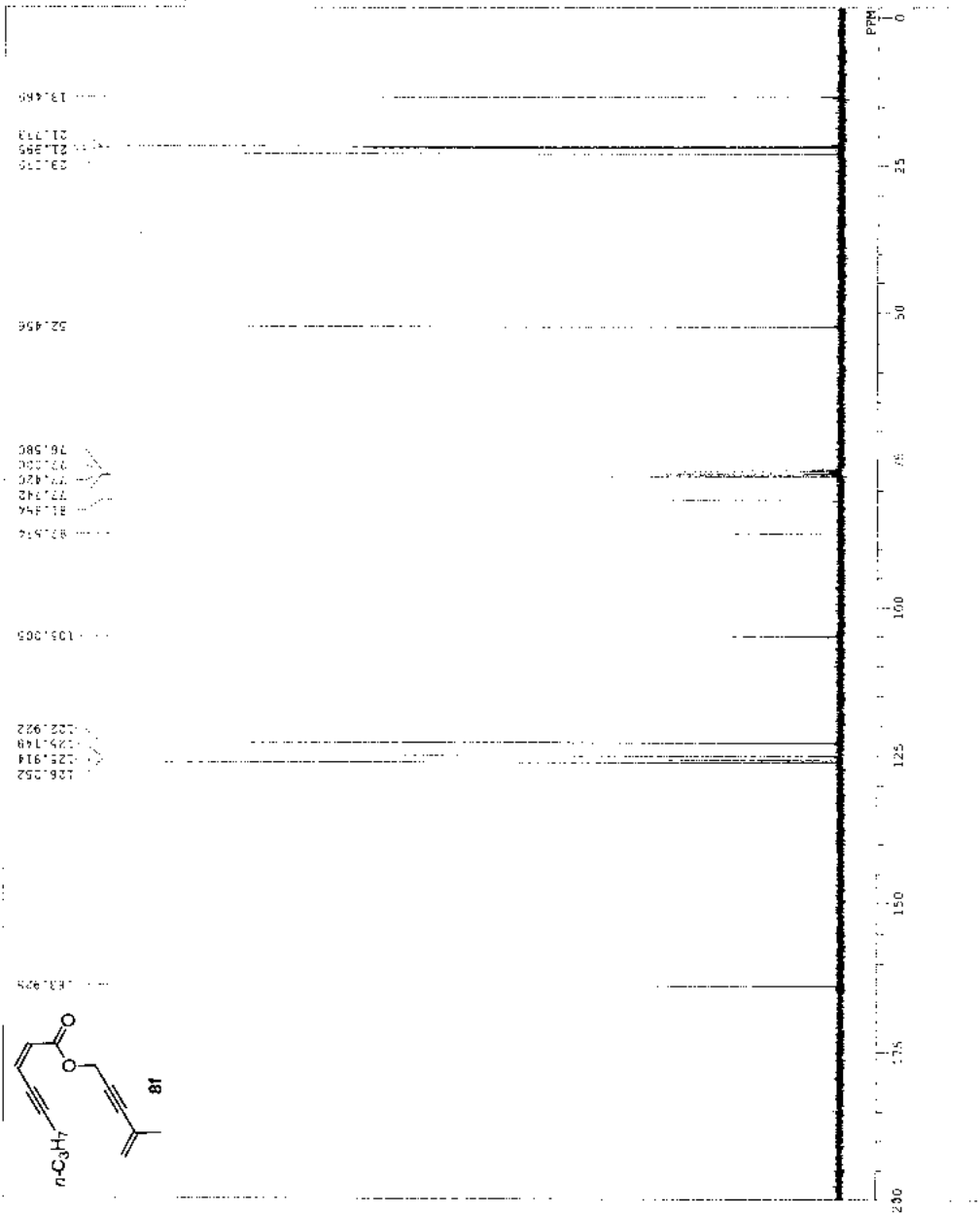




FILE: C:\WINNMR95\2112041  
 COM1: TMS54.000001-Pr-ethyl  
 DATE: Wed May 23 14:19:32  
 C13: 1B  
 P1: KCN  
 FREQ: 300.40 MHz  
 OBS: 130.00 KEZ  
 OBS: 1150.15 Hz  
 P1: 16384  
 P2: 3100.3 Hz  
 S: B  
 ACCUM: 4.964 sec  
 PD: 1.551 sec  
 P1: 5.3 US  
 J1: 1B  
 C13: 21.3 C  
 SLV: C13-3  
 EXPT: 7.24 min  
 RF: 0.12 Hz  
 RGAIN: 23

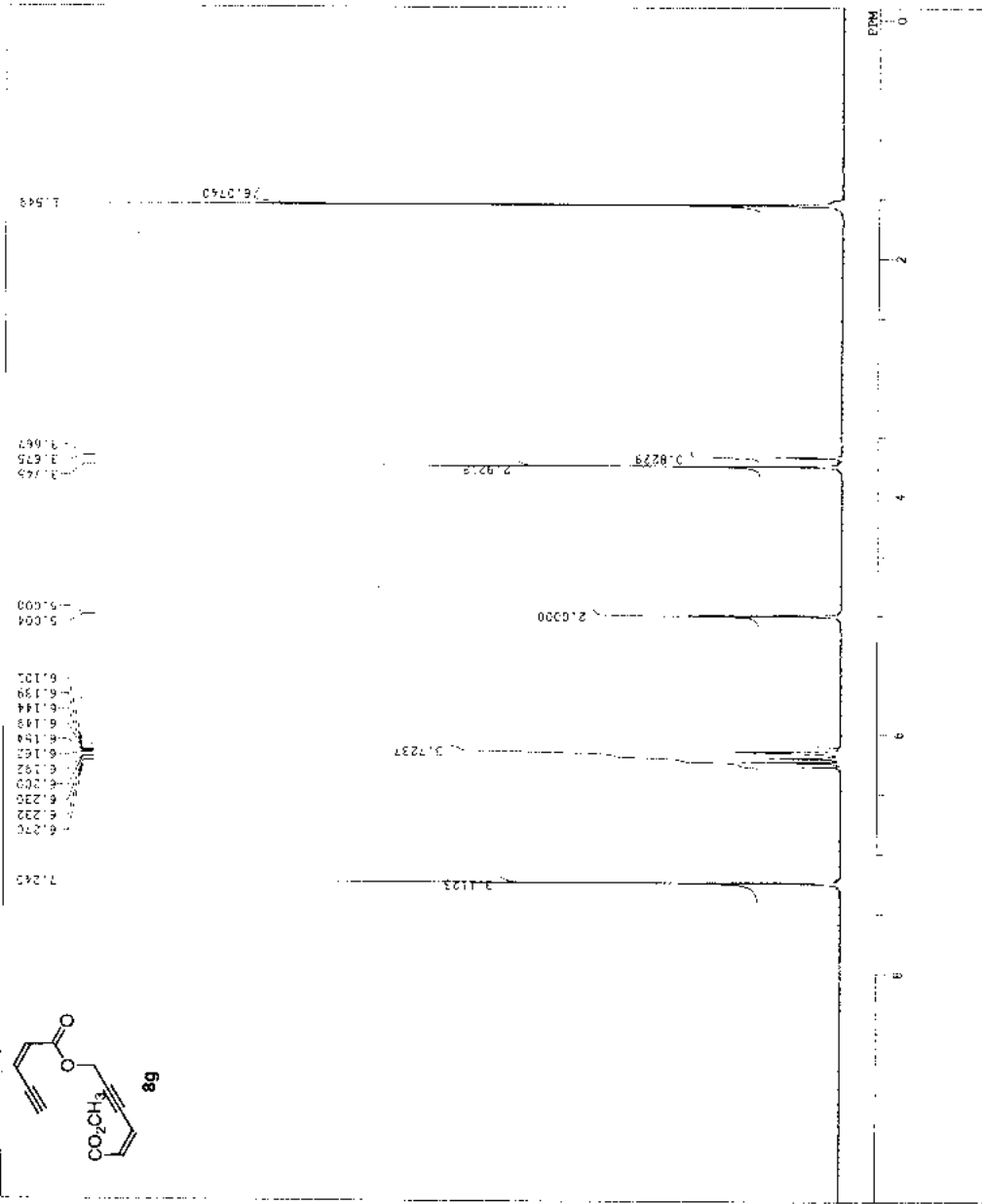


DIR: C:\WINNMR95\COMMON\  
 COMMENT TR354 methyl pr enyn  
 DATE: Wed May 23 14:40:58  
 ORNDC 13  
 NAME: BCM  
 OBSFRQ 75.45 MHz  
 OBSSET 124.00 MHz  
 OFFSET 1840.0 Hz  
 POINT 32768  
 PRFREQ 20408.1 Hz  
 SCANS 161  
 ACQTIM 1.806 sec  
 PD 1.394 sec  
 PUL 4.0 us  
 TRUJC 13  
 TRUJPC 21.4 C  
 STRAP  
 SCAVT SIX13  
 EXREF 77.00 ppm  
 BF 0.12 Hz  
 RGAIN 24

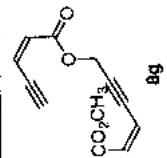
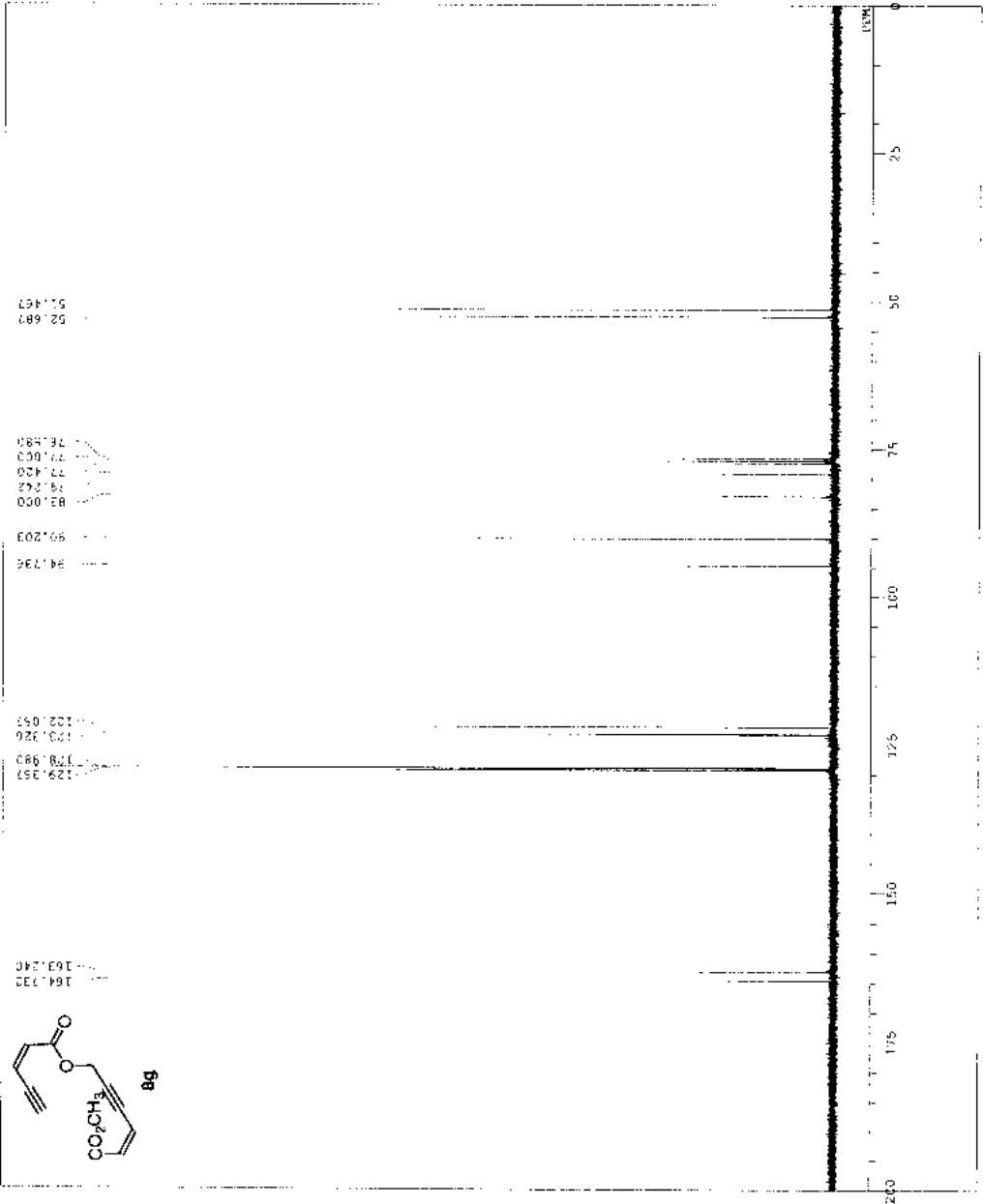


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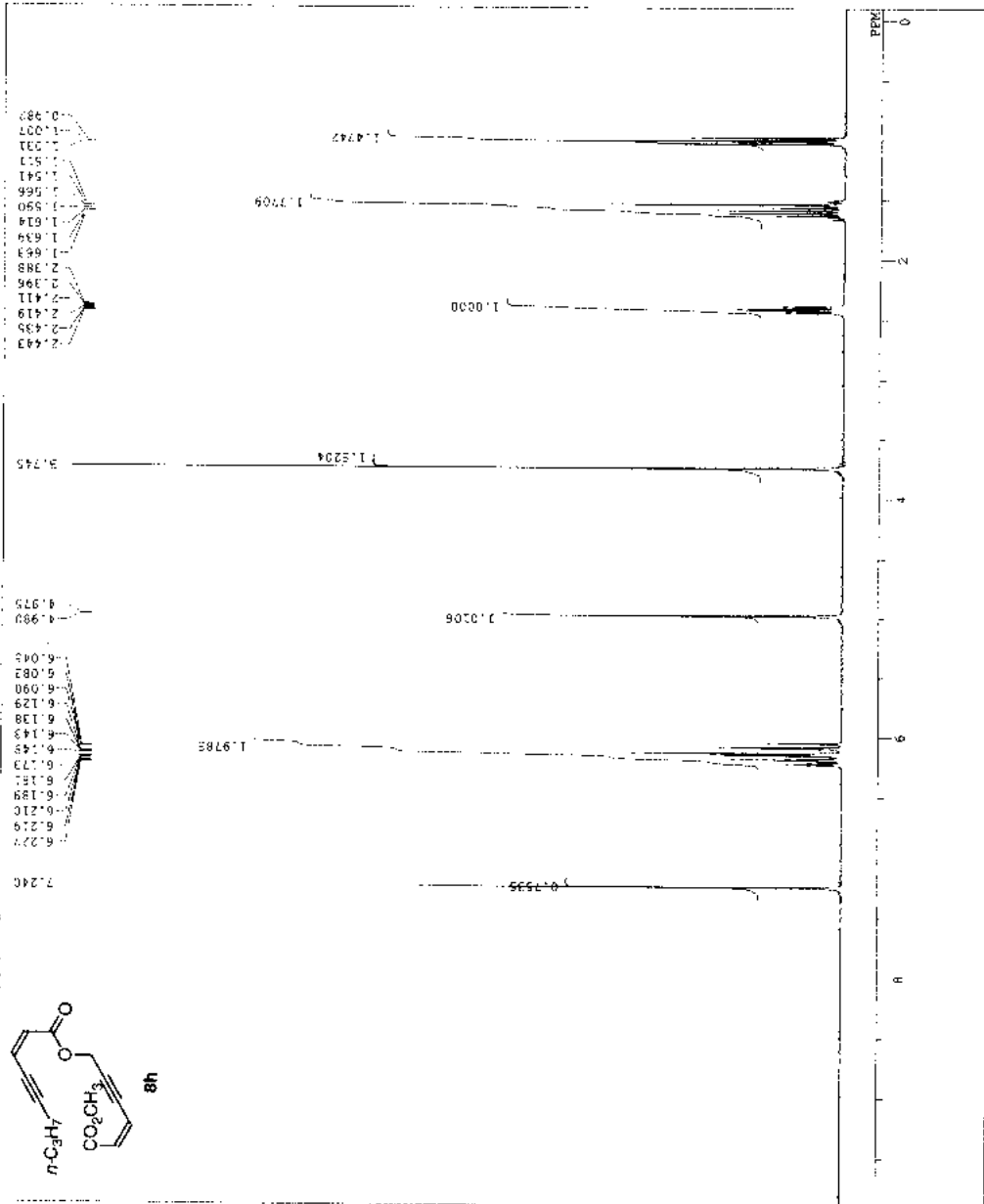
DFILE C:\MINNREGE\COMMON\
COMMIT TR575 original-R-ethylm
DATE/TM Thu Jun 14 12:23:05
OBNUC 1H
EXMOC NOM
ORFRQ 300.46 MHz
GBSCT 130.00 KHz
GBF2N 1150.0 Hz
POINT 16784
FREQU 3300.3 Hz
SCANS 8
ACQTM 4.964 sec
SD 1.551 sec
SWH 5.3 us
IRNUC 1H
IRTC 13.7 C
CTEMP
SOLVT DMF-D3
EXREL 7.24 ppm
BF 0.13 Hz
RGAIN 24
    
```



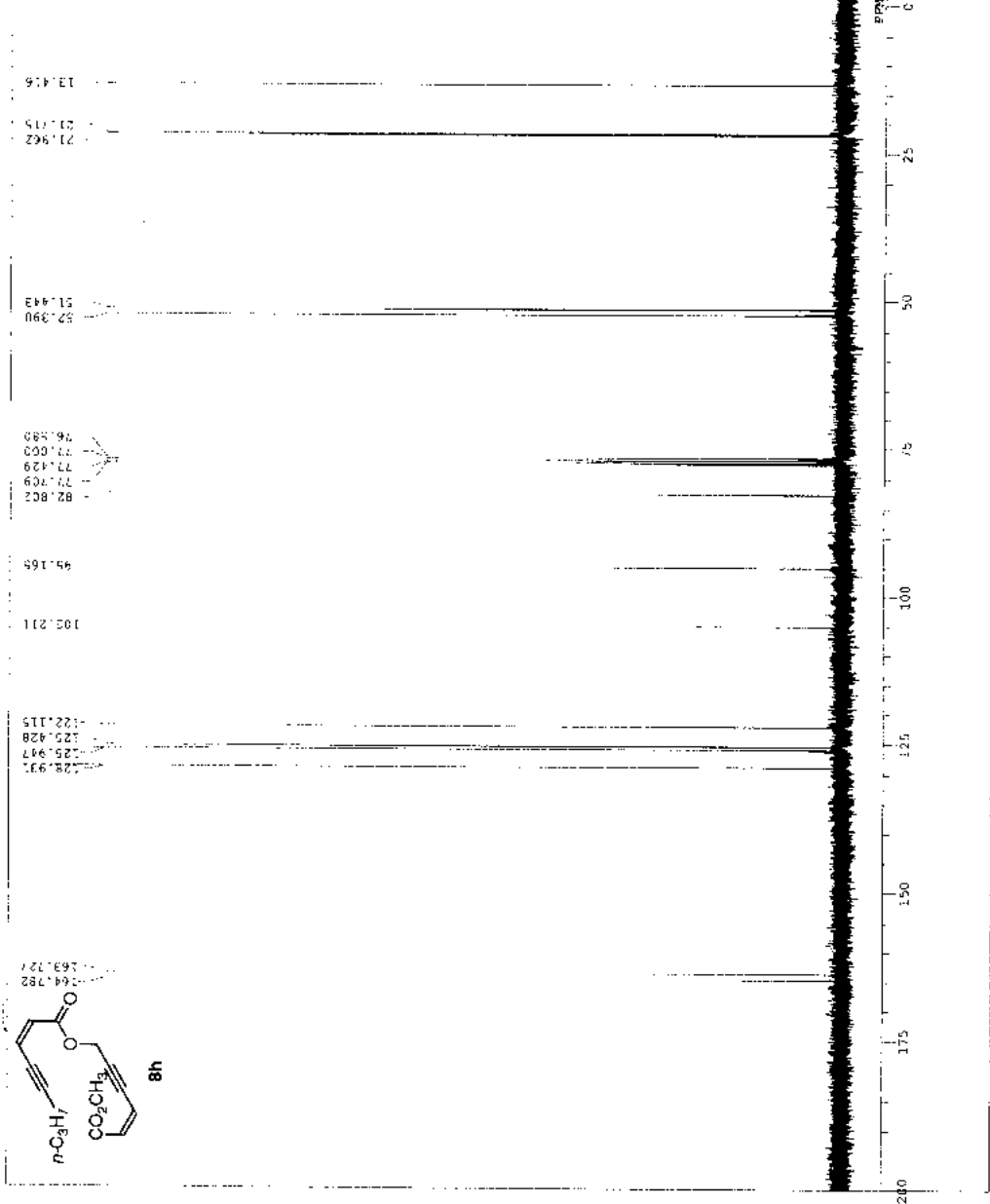
DFILE C:\WINNERS\COMMON\  
 : COMMENT TR575 enyrol-H-001a  
 : DATE# Thu Jan 14 16:41:30  
 : OBCC 120  
 : EXMOD BCM  
 : OBFRQ 75.45 MHz  
 : OBSET 124.00 MHz  
 : OBSFIN 3840.0 Hz  
 : POINT 32768  
 : FREQU 29408.1 Hz  
 : SCANS 257  
 : ACQTM 1.606 sec  
 : ED 1.394 sec  
 : 201 4.0 ea  
 : 4RMOC 1H  
 : CTEMP 20.3 C  
 : SLVNT CFC13  
 : EXWET 77.00 ppm  
 : BF 0.13 Hz  
 : RGAIN 24



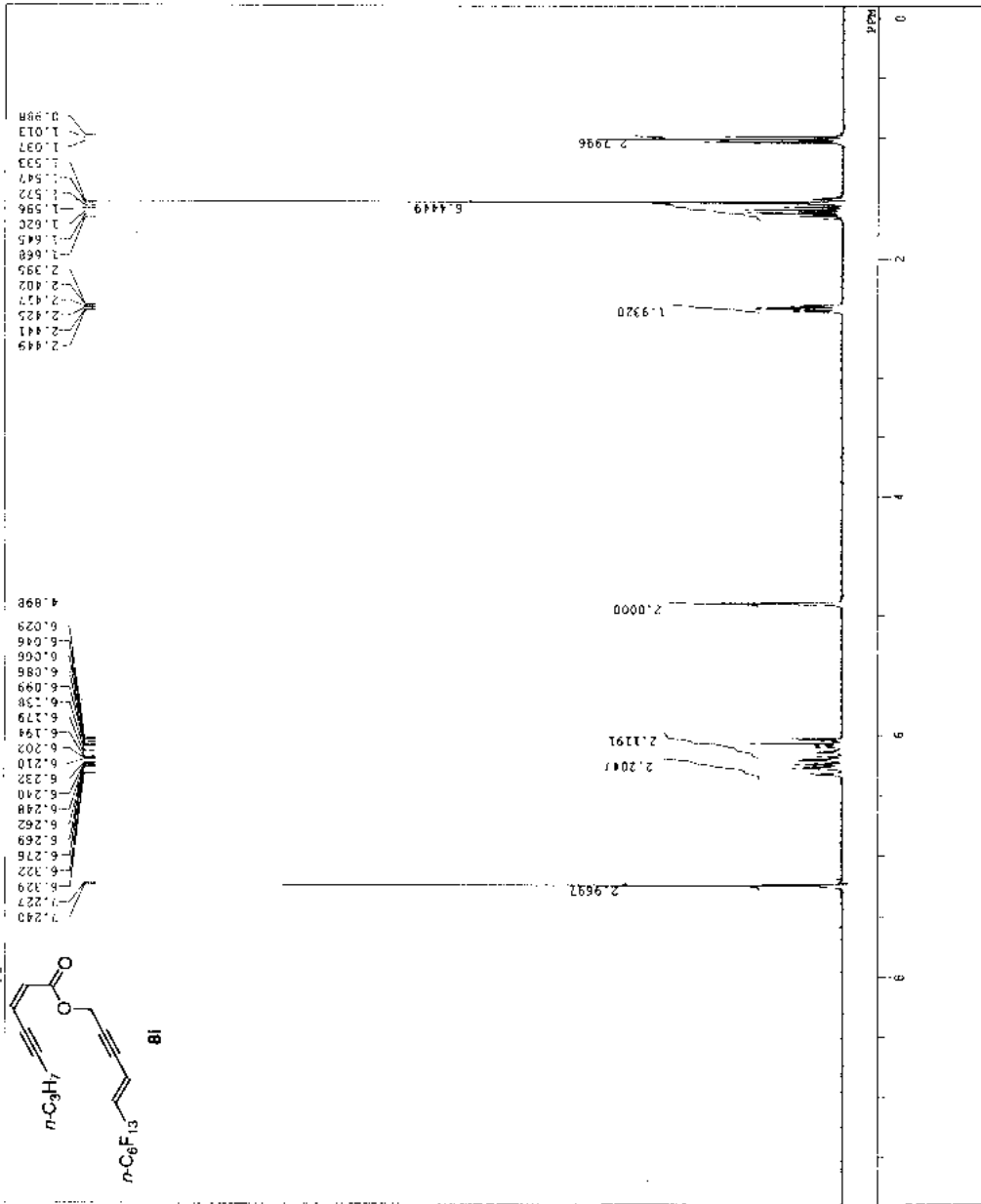
FILE C:\M\NMR95\COMB51  
 COMMENT TMS96 5-ethyl-1,7-  
 DATE Wed Jul 04 19:43:23  
 ORNDC LF  
 EXMSD NCH  
 OBTRC 300.40 MHz  
 OBSST 130.00 KHz  
 OBSFN 1150.0 Hz  
 POINT 8638  
 FREQU 3300.3 Hz  
 SCANS 8  
 ACQTN 4.161 sec  
 P2 5.551 sec  
 PW1 5.3 dB  
 IRNDC LF  
 CTMPE 22.5 C  
 SLVNT CDCl3  
 EXREN 7.24 ppm  
 BF 0.13 Hz  
 RGAIN 23



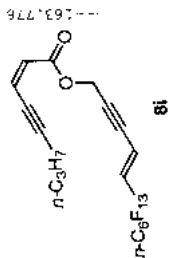
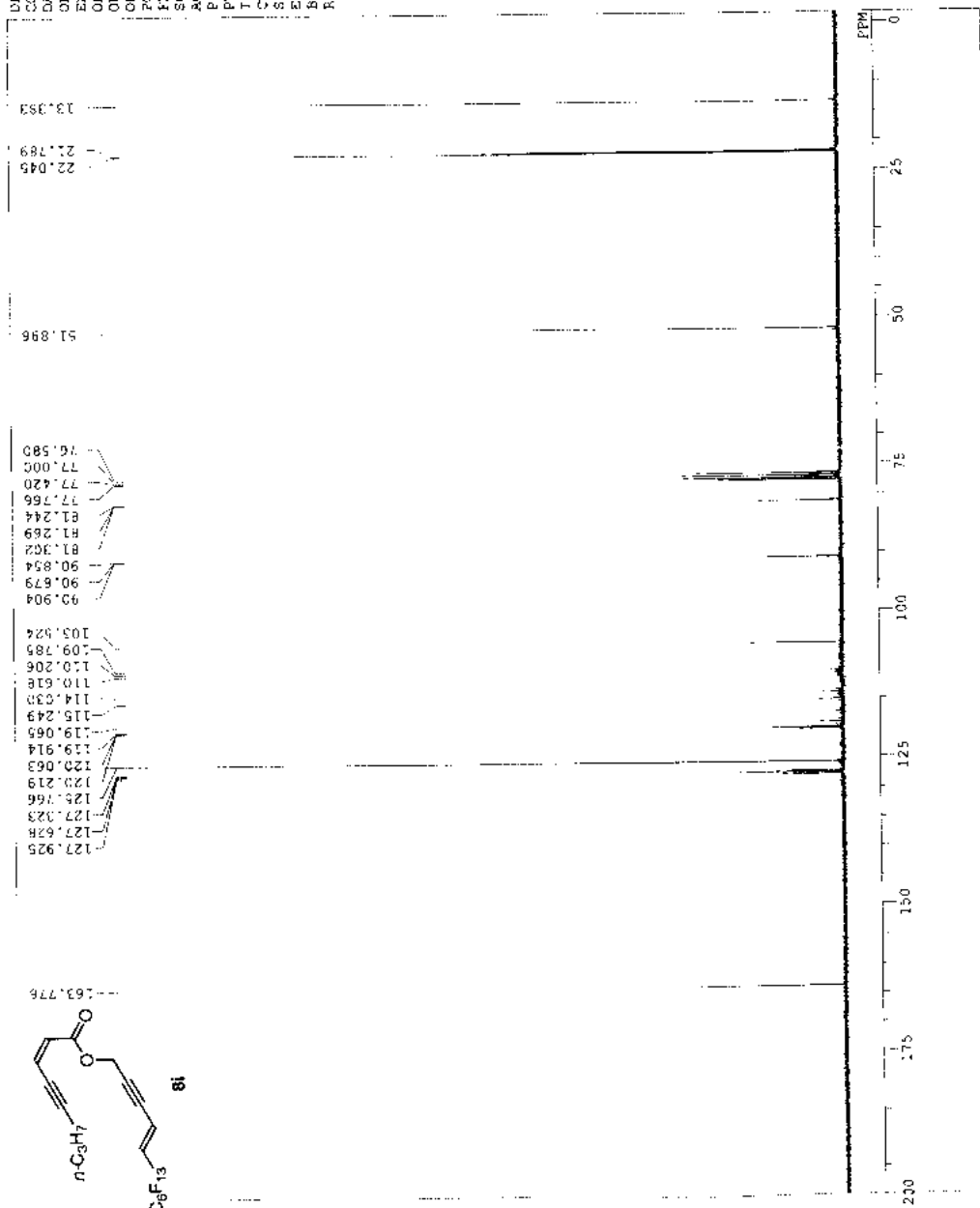
FILE C:\NMR95\CONEX\1  
 CONV 7859F epycal-PT-001  
 DATE Wed Jul 04 20:04:23  
 P3 C  
 EXACT BCM  
 FREQ 75.45 MHz  
 OBSER 24.00 MHz  
 ORBIN -840.0 Hz  
 POINT 12768  
 PRSQ 2040H-1 Hz  
 SCANS 338  
 ACQTM 1.606 sec  
 PD 1.134 sec  
 PW 4.0 us  
 IPRNUC 1H  
 CTEMP 23.0 C  
 SOLVT CDCl3  
 EXPRF 77.00 ppm  
 BF 0.13 Hz  
 RGAIN 24



DFTL3 C:\WINNRS95\COM\20A  
 COMPT 25607 enyal-pr-pvp  
 DATEM Wed Jul 11 15:25:08  
 OBNSC 15  
 EXMOC NGT  
 OBSRC 300.40 MHz  
 OBSRT 130.00 KHz  
 OBSIN 1150.0 Hz  
 POINT 16384  
 FREQU 3300.3 Hz  
 SCANS 8  
 ACQTM 4.564 sec  
 PD 1.551 sec  
 PW1 5.3 us  
 IRMOC LH 22.4 C  
 CTEMP  
 SLVNT CDCl3 7.34 ppm  
 EXREF  
 SF 0.13 Hz  
 RGAIN 24

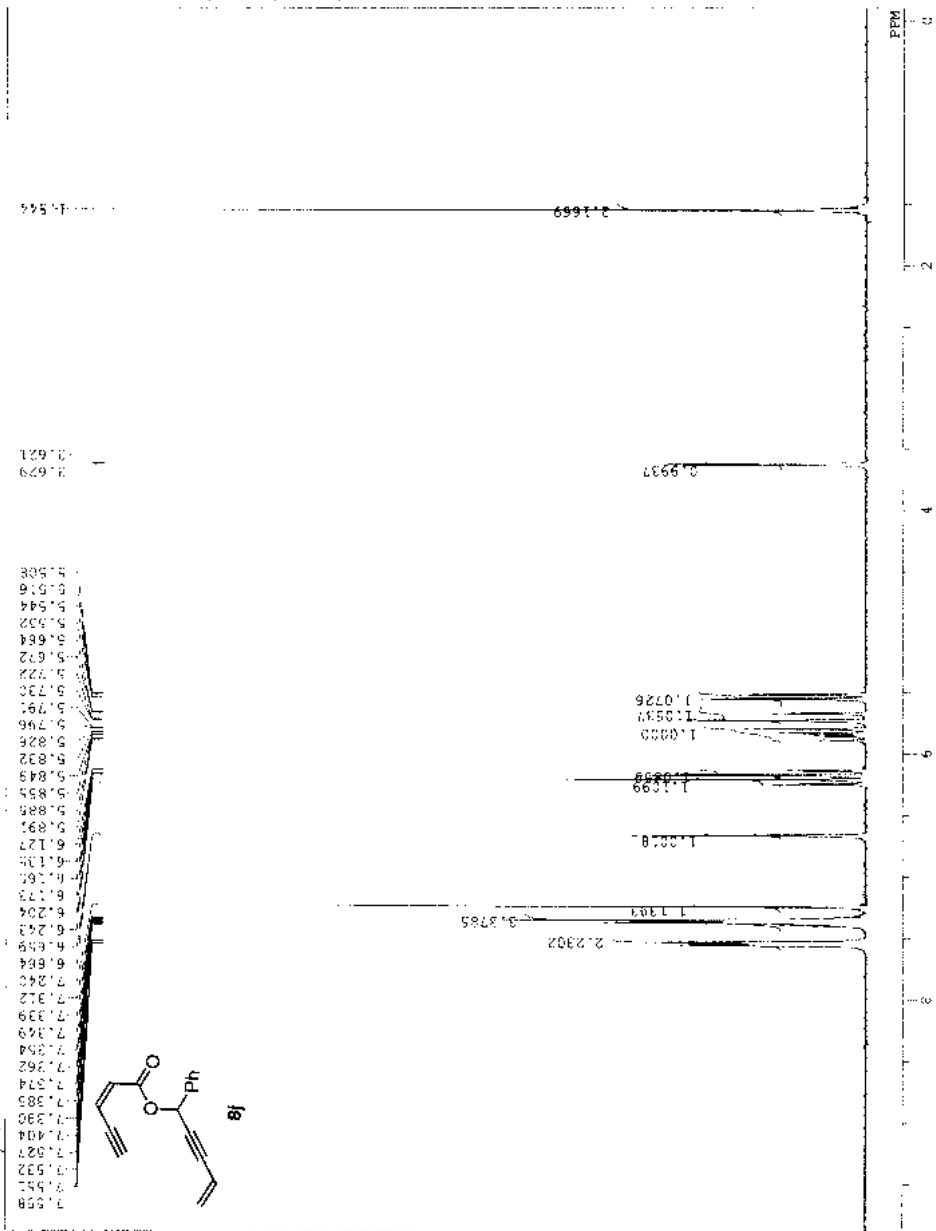


C:\MINI295\121\K  
 COMMENT: 7K607 esyval-F1-u  
 DATE: Wed Jul 11 16:16:  
 OPER: 13C  
 EXMOC: BCM  
 OBSFQ: 75.45 MHz  
 OBSFI: 124.00 KHz  
 ZOLIN: 1843.0 Hz  
 37768  
 23468.1 Hz  
 SCANS: 653  
 ACQTH: 1.606 sec  
 EC: 1.194 sec  
 4.0 us  
 PRNUC: 1h  
 TEMPE: 22.1 c  
 SLVNC: COCL2  
 EXRES: 77.00 ppm  
 BF: 0.13 Hz  
 RGAIN: 24



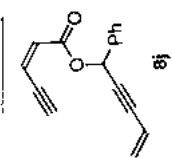
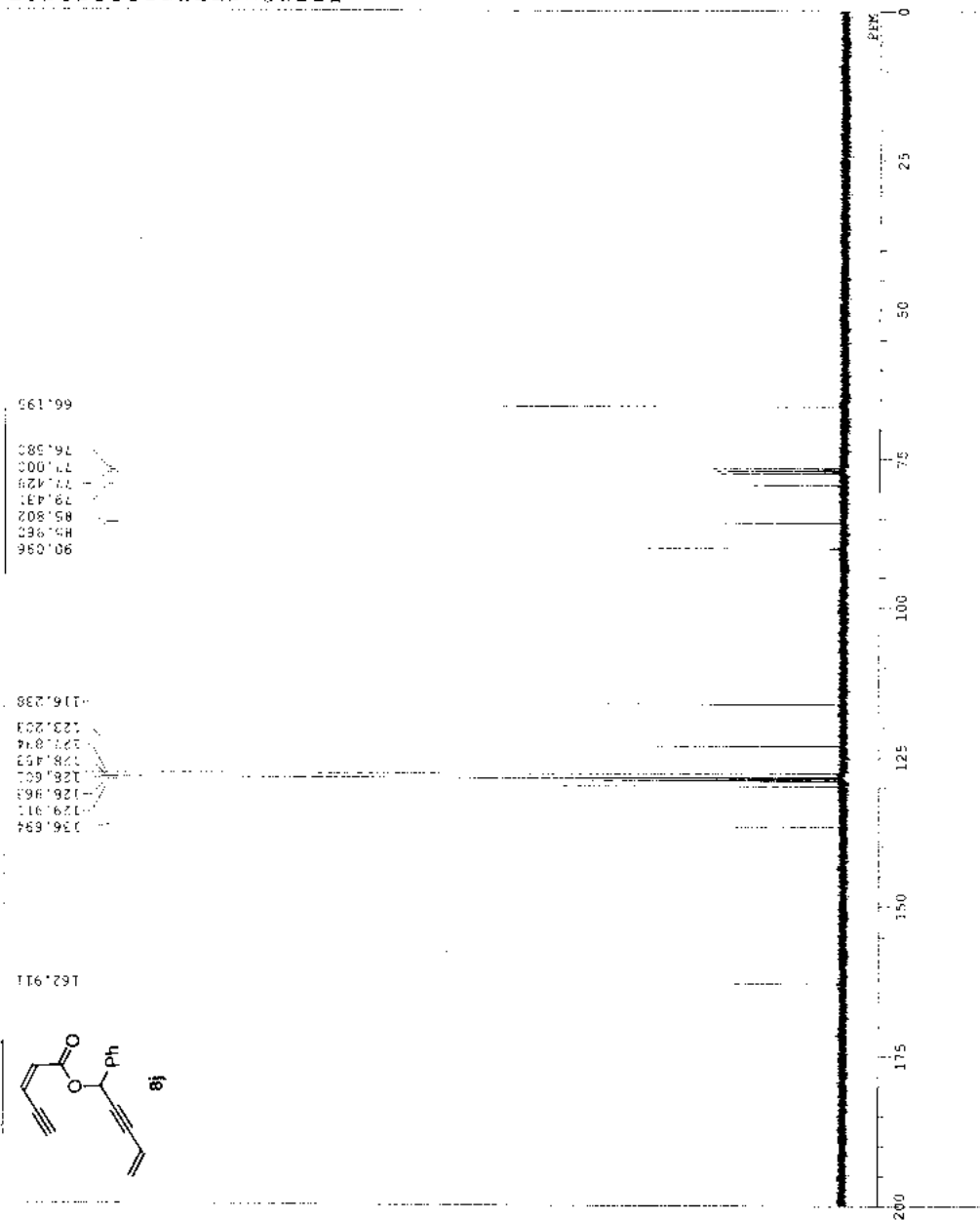


FILE C:\WINNMR6\CDK040  
 COMST TR044 enyne-PL-ep  
 DATEM Thu Aug 30 16:55:  
 NAME L:  
 EXMO NON  
 ORGNO 300.40 MHz  
 ORSET 130.00 MHz  
 ORPIN 12.5010 Hz  
 POINT 15384  
 FREQU 335073 Hz  
 SCANS 8  
 ACQTM 4.984 sec  
 PD 1.561 sec  
 PW1 5.3 us  
 IRMOC 1K  
 CTEMP 21.0 C  
 SLYNF CDCL3  
 EXPEF 7.24 ppm  
 BF 0.15 Hz  
 RGAIN 23

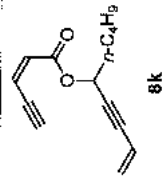
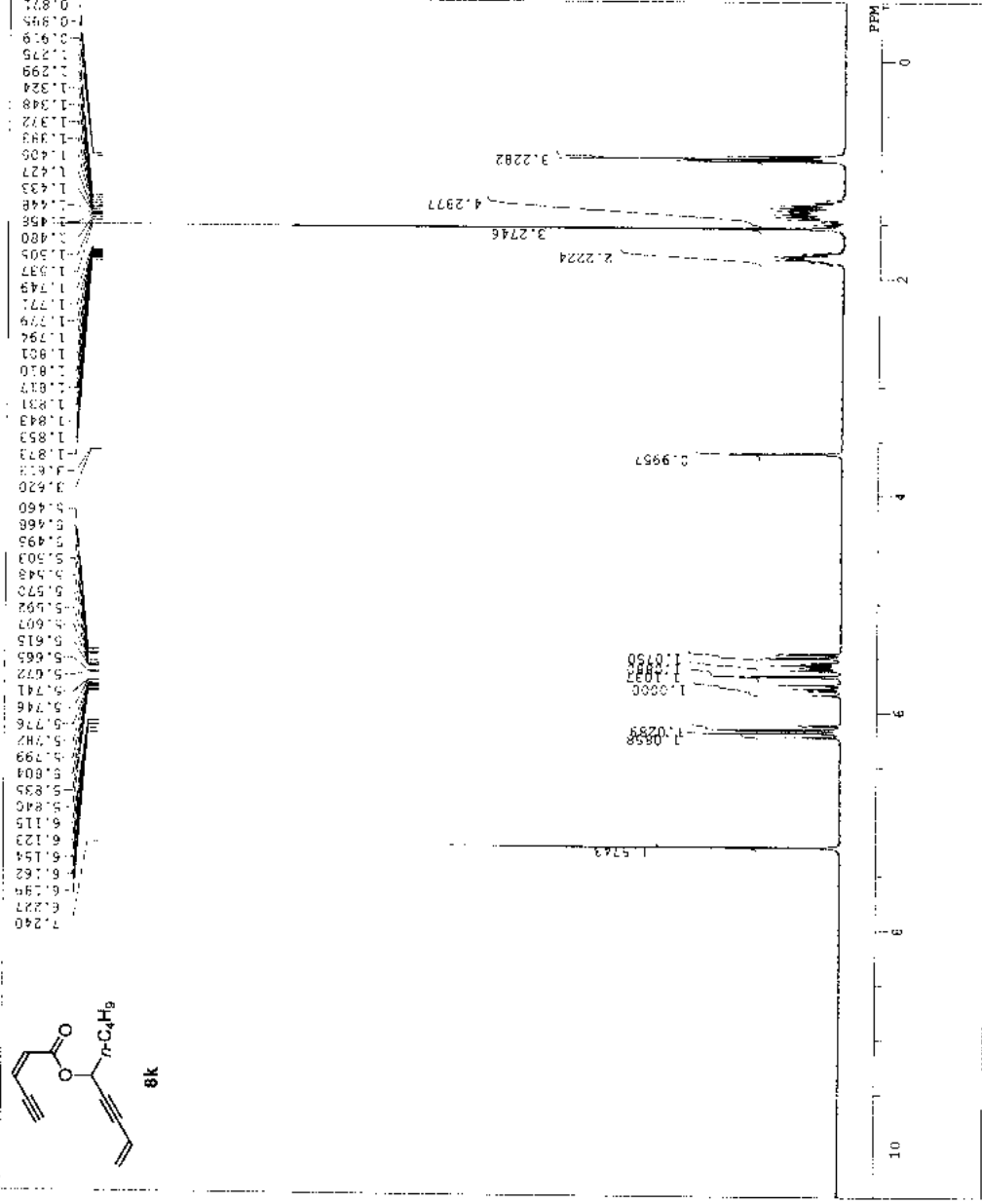


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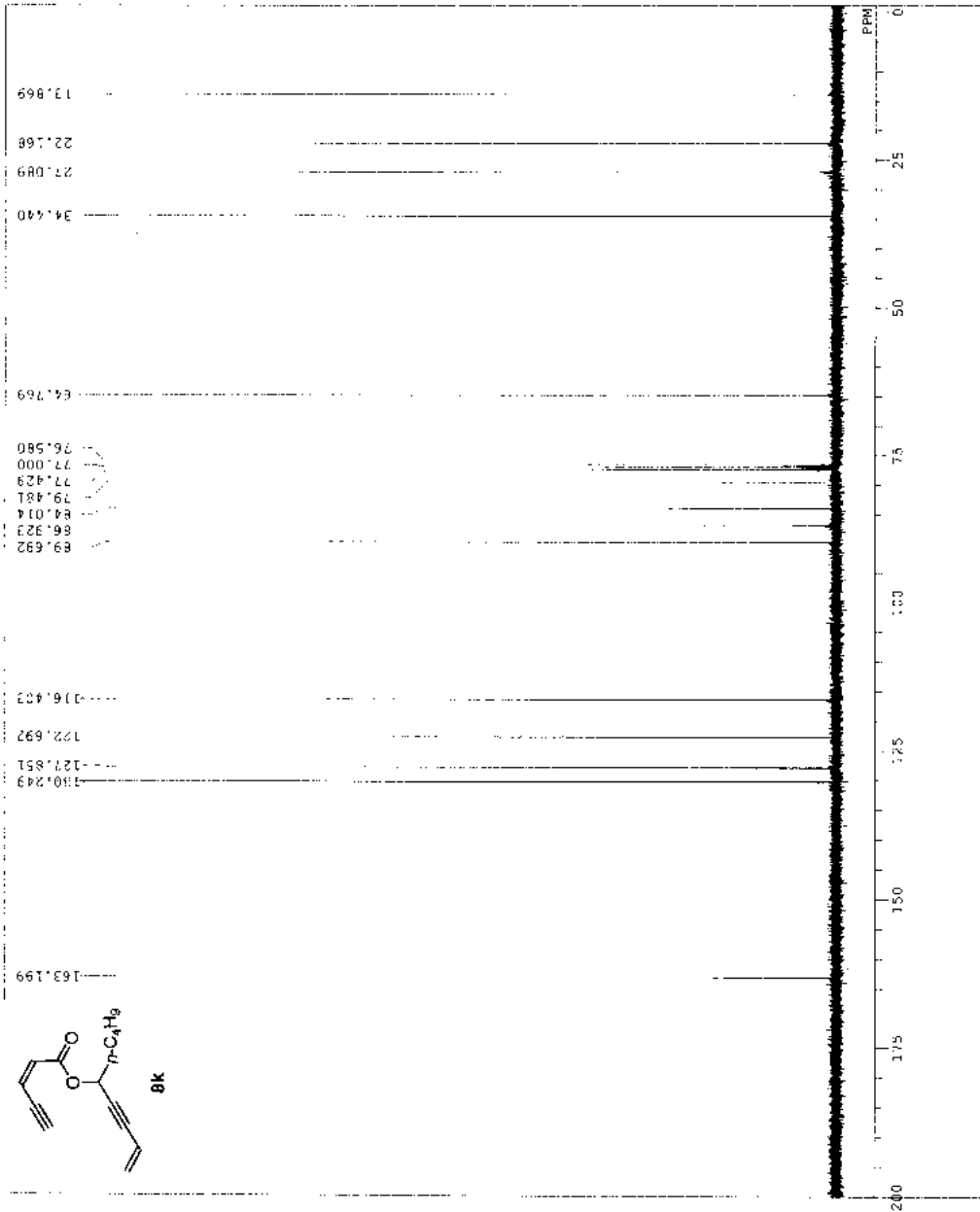
FILE C:\MINI95\COMMO
COMP 1K644 4byte-EL-en
DATEM Thu Aug 30 17:10:
LABNO 13C
EXMCD ROM
OBFRO 75.45 MHz
OBFET 124.20 MHz
OBFEN 840.0 Hz
POLT 32.768
PREFG 2000000 Hz
SCANS 257
ACQTE 1.606 sec
PC 1.384 sec
PWI 4.0 us
IRNUC EI
CTEMP 21.7 C
SIVNT COSY
EXRFE 77.00 ppm
BF 0.13 Hz
RGAIN 75
    
```



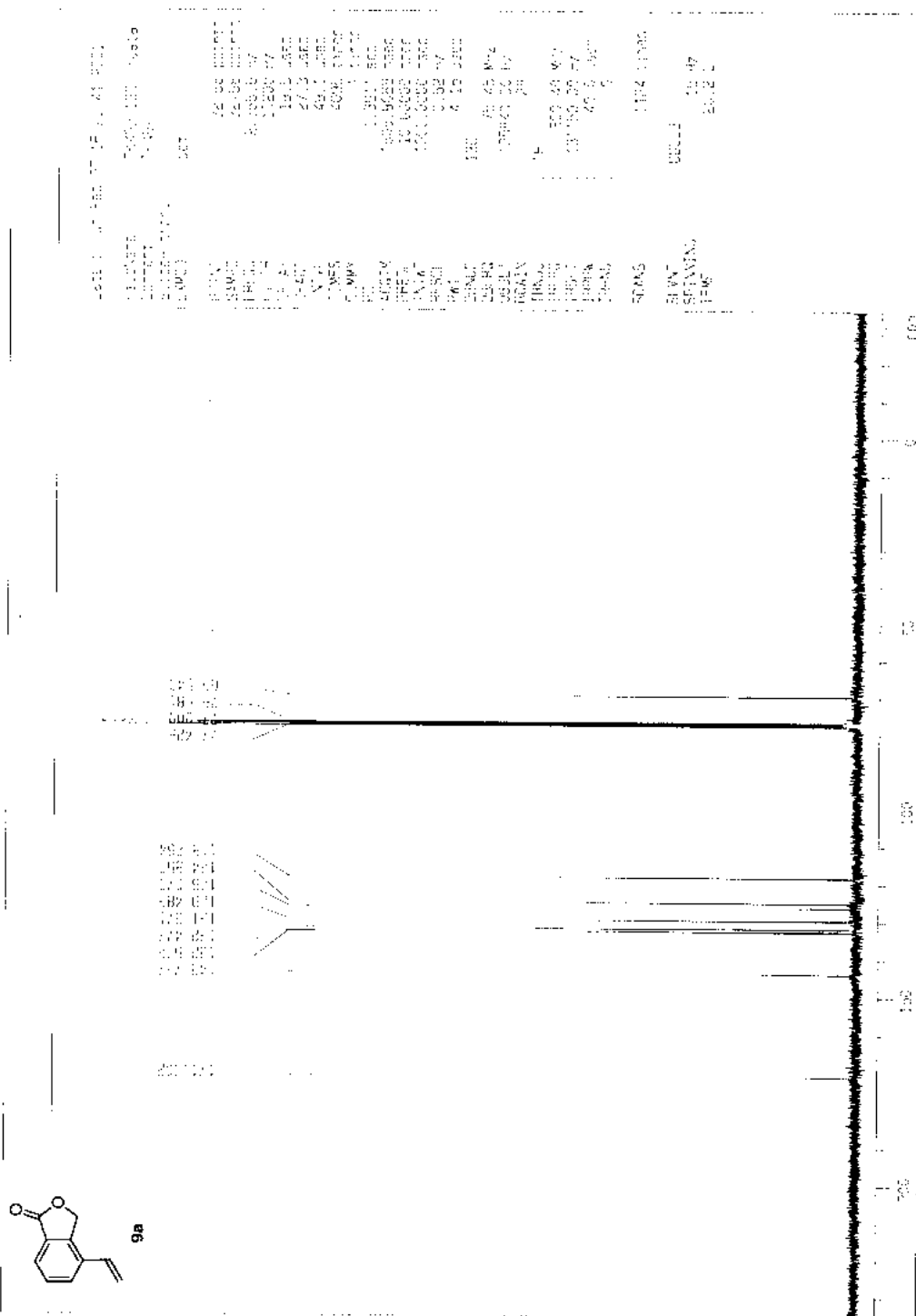
C:\WINNER95\COMMO  
 TR690 cryae-H-Bu  
 Thu Oct 11 12:41:  
 1H  
 EXH00 1H  
 300.140 MHz  
 130.00 MHz  
 11500.0 Hz  
 1.6384 Hz  
 3300.13 Hz  
 4.964 sec  
 1.551 sec  
 5.13 us  
 1H  
 23.5 C  
 CDCl3  
 7.24 FIDR  
 0.12 Hz  
 22  
 RGATN



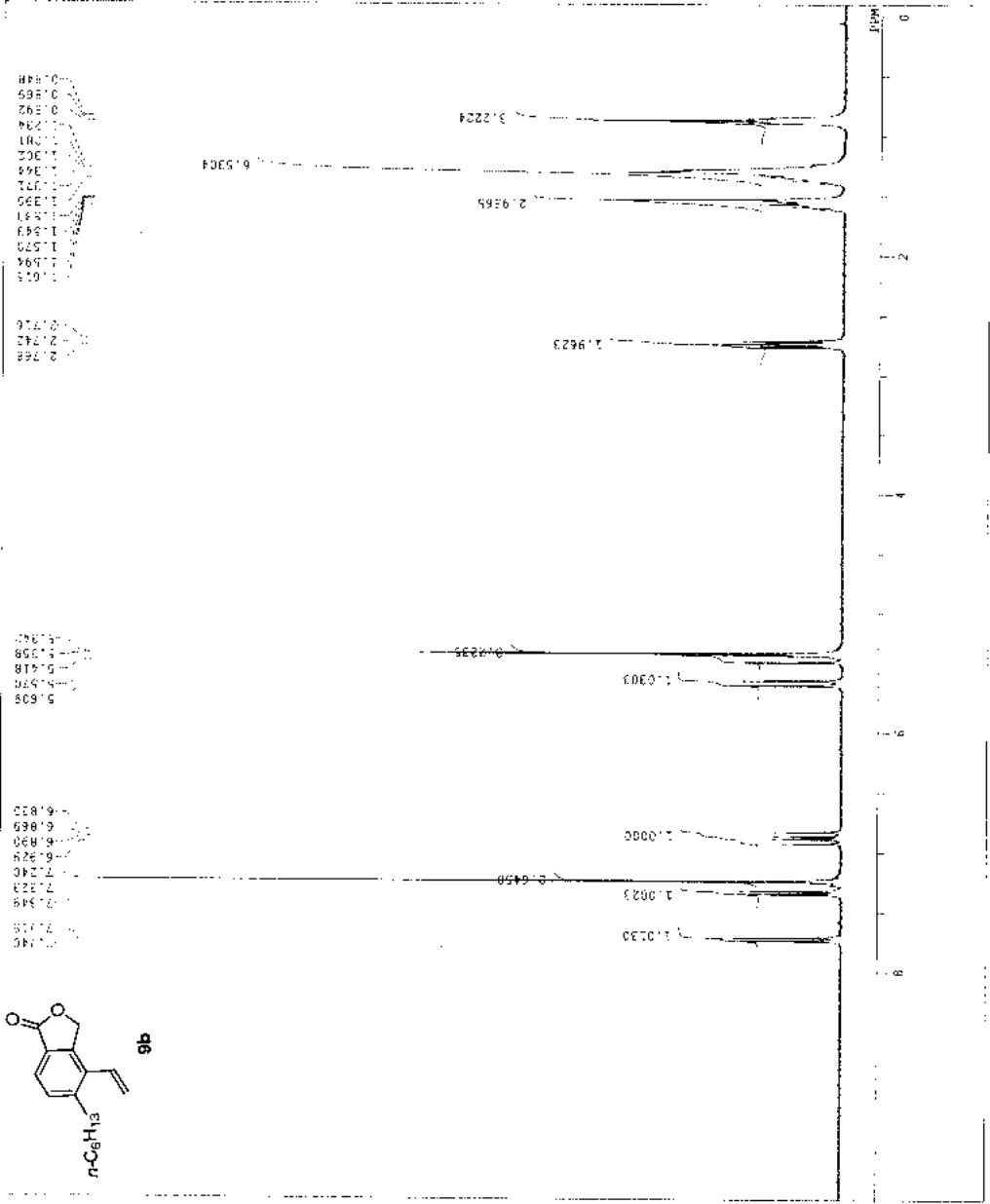
DFTJE C:\MENMR95\COMMO  
 COMRE TX66C ethylac-R-BL  
 DATIM Thu Oct 11 13:03:  
 CURVC 13C  
 EXMOD BOM  
 OBSRO 75.45 MHz  
 OBSFT 124.00 MHz  
 OBSFN 1840.0 Hz  
 POINT 32768  
 PRQOJ 234087.1 Hz  
 SCANS 301  
 ACQTM 1.606 sec  
 PD 1.394 sec  
 PW1 4.0 us  
 IRXVC 1H  
 CTMP 23.7 C  
 SOLVT CDCL3  
 EXREF 77.50 ppm  
 BF 0.12 Hz  
 RGAIN 26





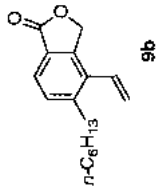
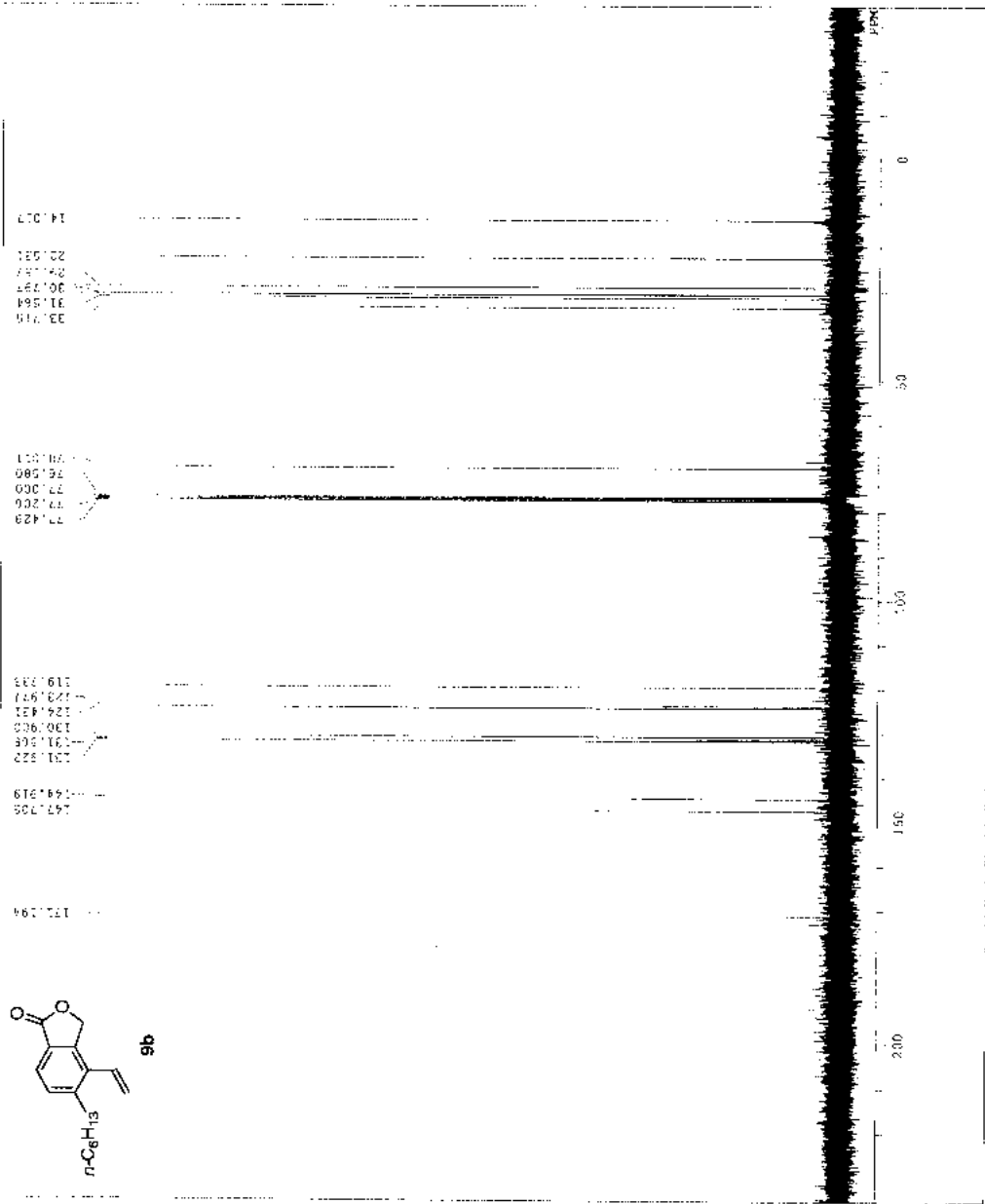


FILE C:\WINNERS\521\RAW  
 COMPC TR077-2 Hex-benz  
 DATEM Wed May 02 15:06:09  
 ORBUC LR  
 EXMOP NON  
 ONPRQ 300.40 MHz  
 OBSLOT 130.60 MHz  
 OBSF IN 1150.0 Hz  
 POINT 16384  
 PRSQU 3300.3 Hz  
 SCANS 8  
 ACQTM 4.964 sec  
 PU 1.551 sec  
 5.13 us  
 PVI  
 -SOLC III 22.9 C  
 CTMPC  
 SLVNT CDCl3  
 EXREF 7.24 PPM  
 W 3.12 Hz  
 REAIN 23



```

NAME      C:\WINNMR05\5211\KAW
COMMENT   TMS37 Rec-Benz
LUAZIM    Wed May 12 11:33:27
CINUC     13C
EXNOC     BOM
OBFRQ     75.45 MHz
ORFET     124.00 kHz
ORFIN     1840.0 Hz
DOLINT    32768
FREQ0     20403.1 Hz
SCANS     401
ACQTM     1.606 sec
PD         1.394 sec
PWL        4.0 us
THRU      11
CTEKF     23.6 s
SOLVENT   CDCl3
EXREF     77.00 ppm
RF         0.12 Hz
RGAIN     24
    
```



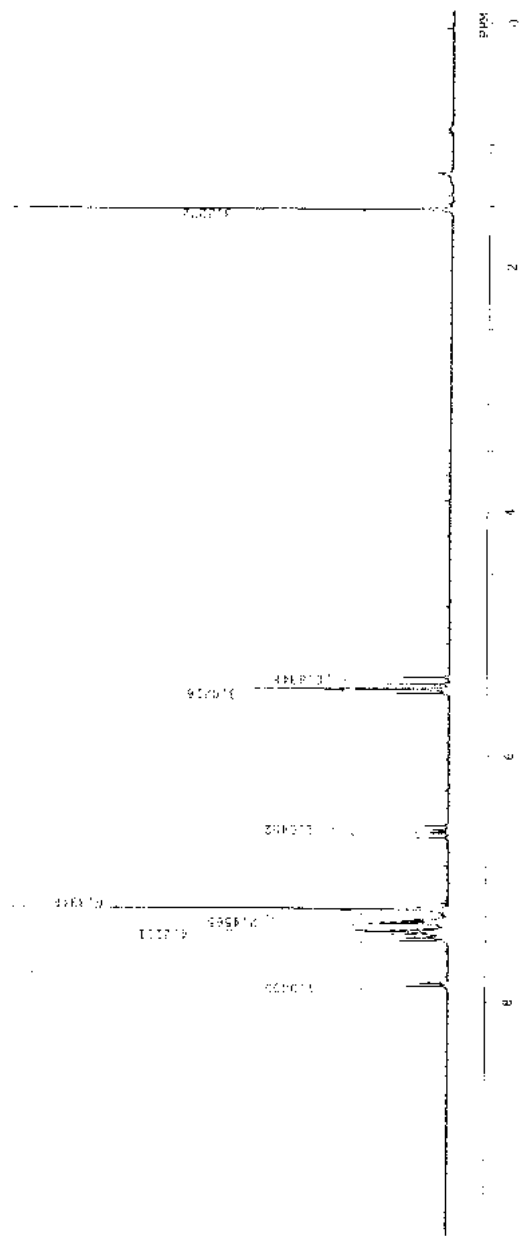
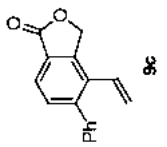


FILE C:\MSDCHEM\95\COMMON\  
 COMPT TMS-29 29-benz  
 DATE Thu May 03 14:29:09  
 NAME JH  
 EXAMID NON  
 QRESQ 300.40 MHz  
 QRESF 130.00 KHz  
 QRESL 1150.0 Hz  
 POINT 16384  
 PRGPR 3300.3 Hz  
 SCANS 8  
 ACQTM 4.964 sec  
 PD 1.551 sec  
 PUL 5.3 08  
 1RNJC 1H 21.5 C  
 CTEMP  
 SLANT 03013  
 EXRF 7.24 ppm  
 BF 0.12 Hz  
 RGAIN 25

L2011

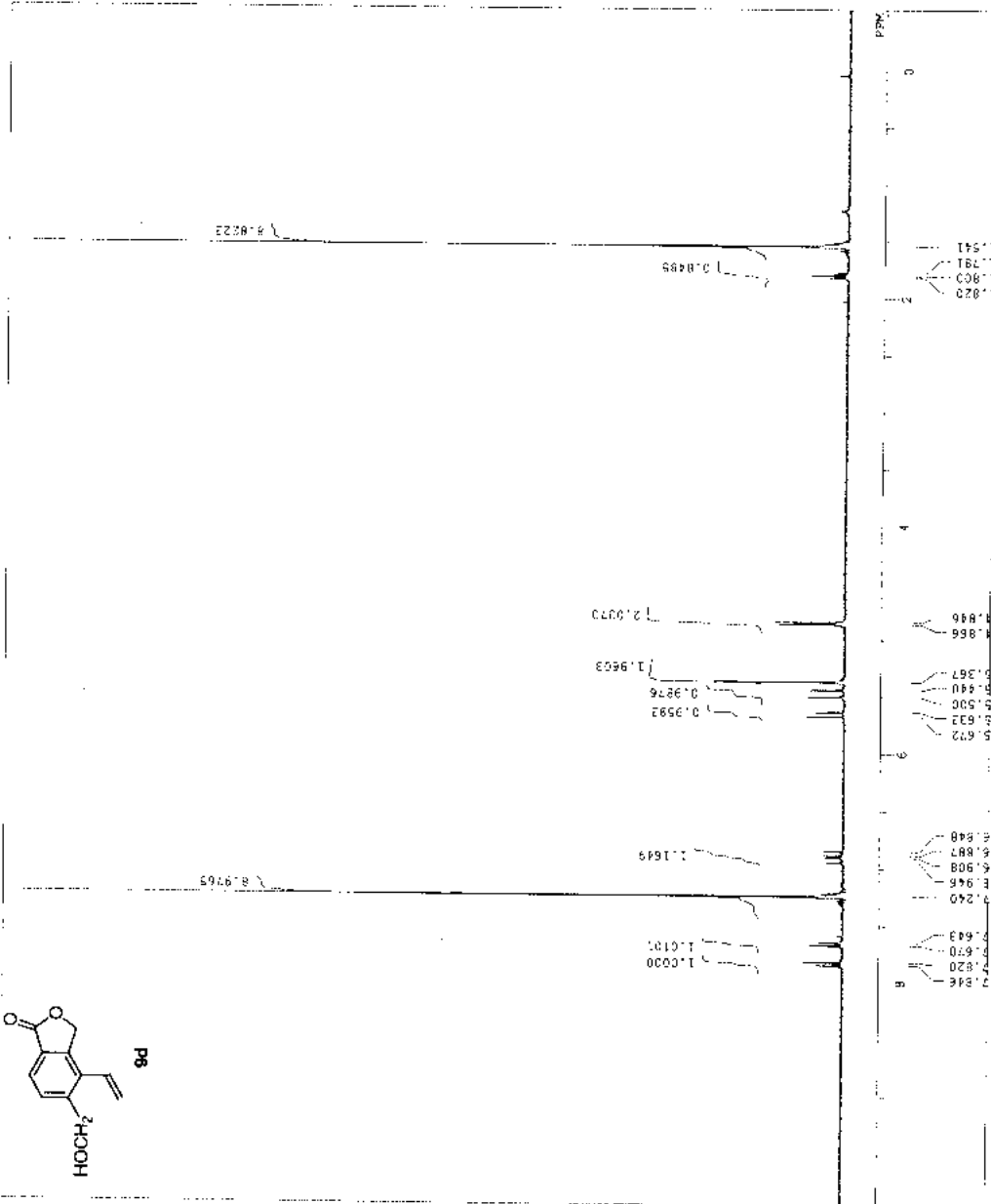
91.15  
 91.14  
 91.13  
 91.12

152.18  
 152.17  
 152.16  
 152.15  
 152.14  
 152.13  
 152.12  
 152.11  
 152.10  
 152.09  
 152.08  
 152.07  
 152.06  
 152.05  
 152.04  
 152.03  
 152.02  
 152.01  
 151.99  
 151.98  
 151.97  
 151.96



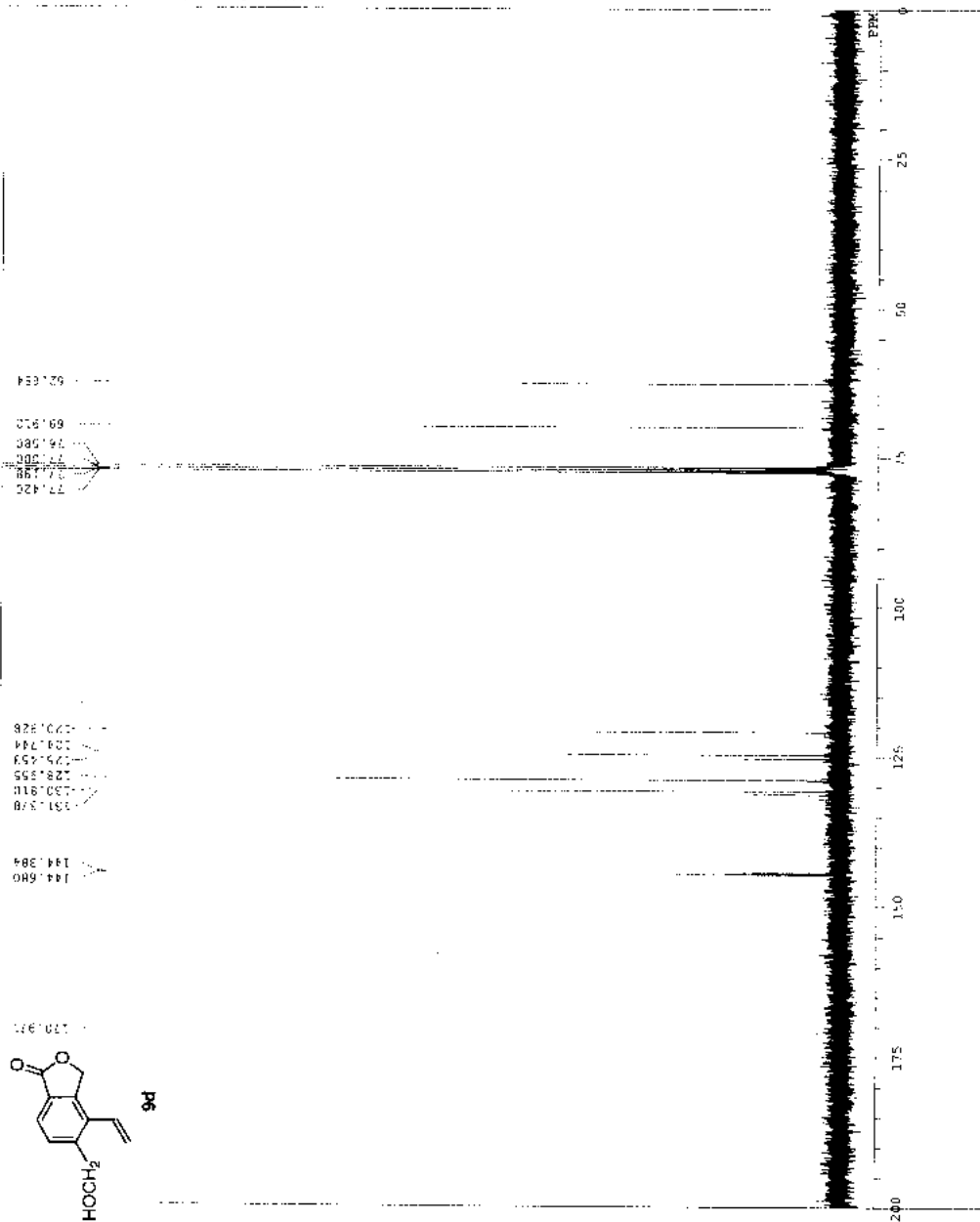


PROFILE C:\WINNMR5\COMMON\A  
 CONVY TK360 6Hz-800M1-05  
 DATE: Tue May 29 21:10:47  
 ORNUC 1H  
 EXPRO NON  
 QUPRO 300.40 MHz  
 QRESPT 130.00 kHz  
 QDELTA 1156.0 Hz  
 POCNTE 1.6384  
 FREQ02 3700.3 Hz  
 SCANS 8  
 ACQTM 4.964 sec  
 PD 1.551 sec  
 FWH 5.3 us  
 IRNUC 1H  
 CTMPC 18.6 C  
 SLVNC CCL4  
 EXGEE 7.24 dBm  
 RF 6.13 Hz  
 RGAIN 25

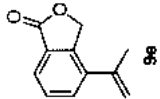
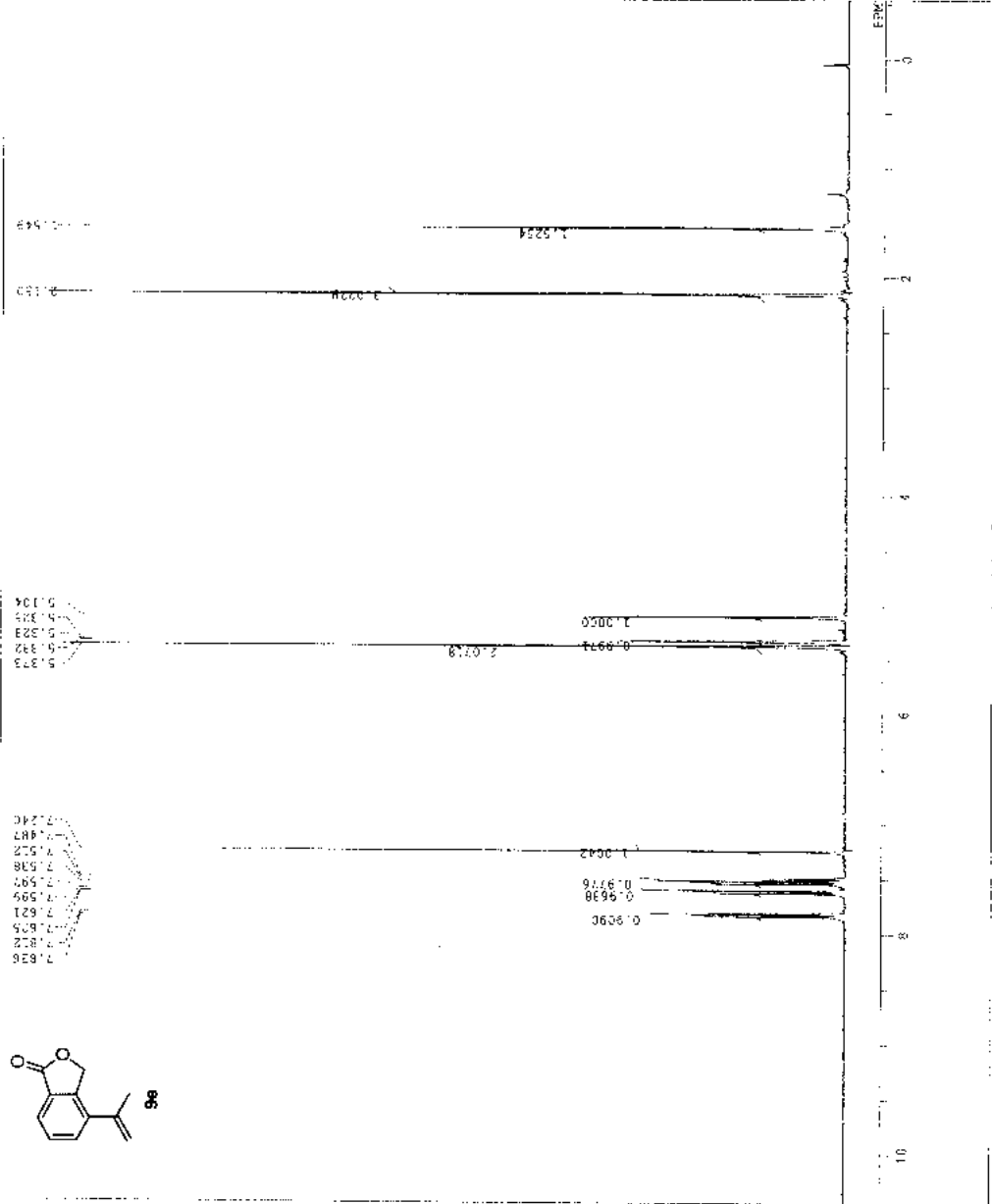


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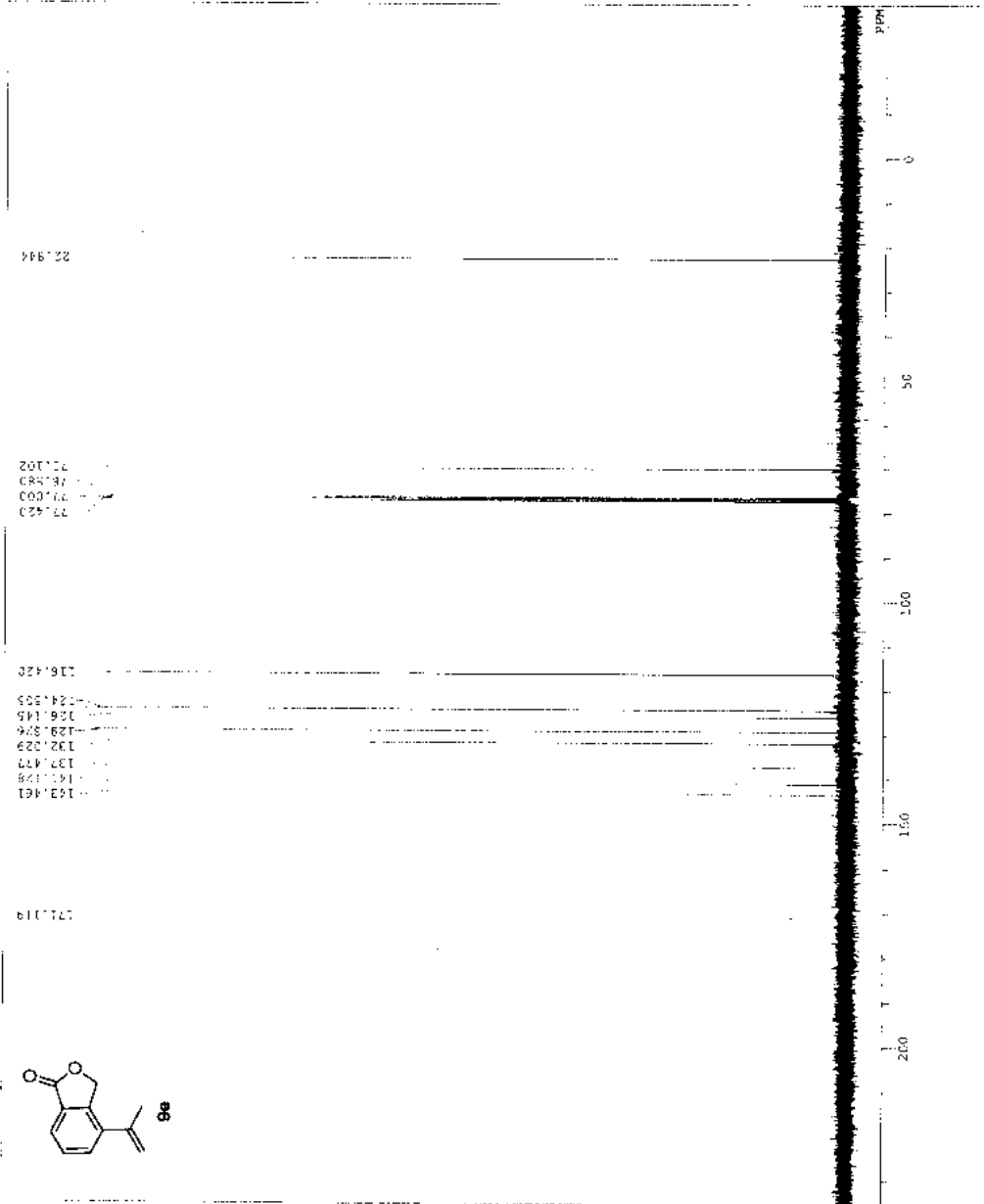
:DFILE C:\WINNMR85\COMMON
:CONNT TR-60 Benz-ethyl-ol
:DATEM Wed May 30 12:44:33
:OBNUC 13C
:EXMUD BCM
:PROBQ 75.45 MHZ
:ORPRT 124.00 KHz
:OBSFN 1840.0 Hz
:POLYI 32768
:PRF00 20480.1 Hz
:SCANS 1284
:ACQTM 1.606 sec
:TD 1.394 sec
:SW 4.0 us
:IRNUC 1H
:CTRMP 20.0 C
:SLVNT CDCl3
:EXBLF 77.00 ppm
:BF 0.13 Hz
:RGAIN 24
    
```



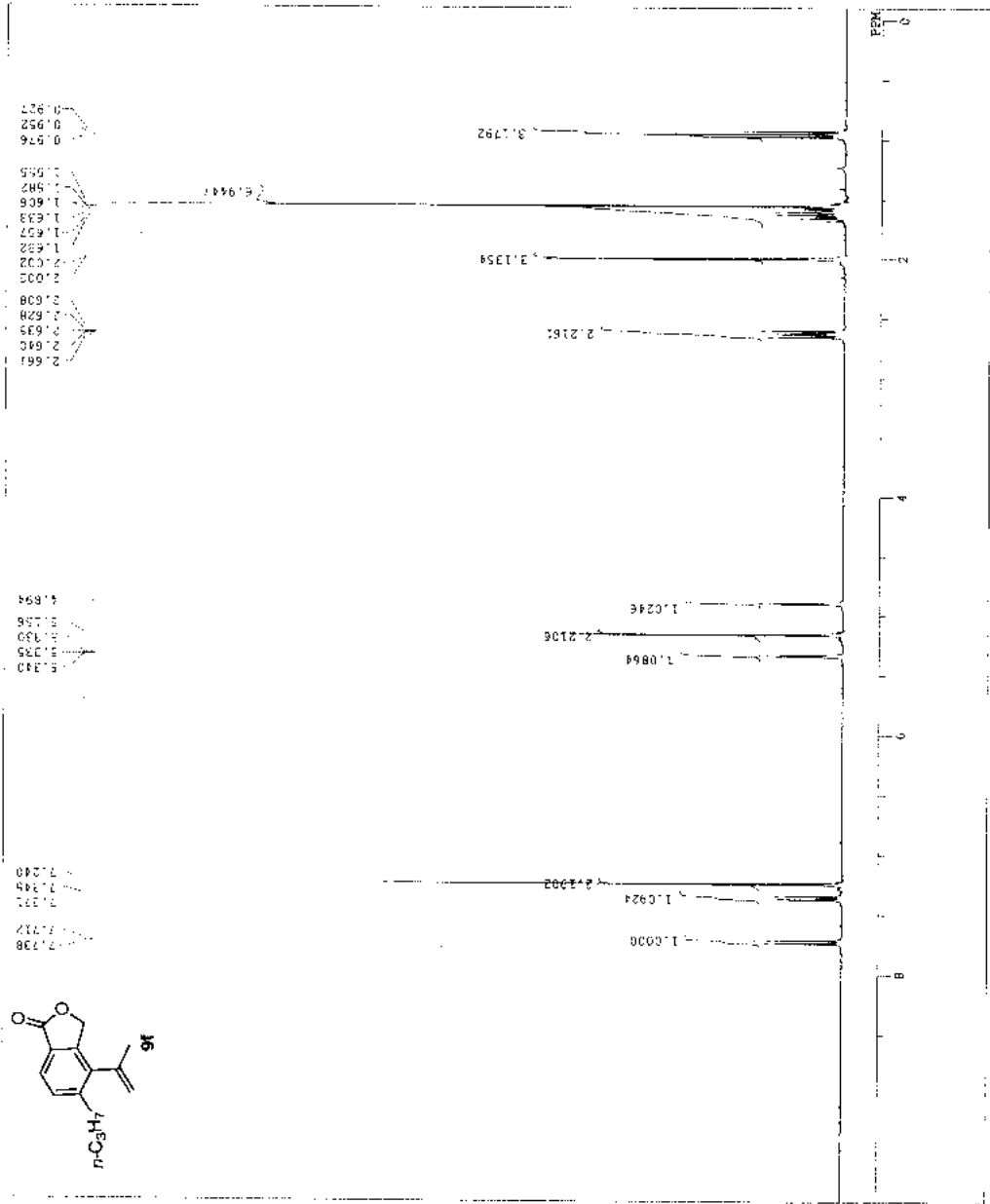
D:\WINNERS\COMMON\1\K145 Nonz-cryae2-2  
 Thu May 15 09:38:16  
 1H  
 OBNDUC  
 1H  
 MON  
 300.40 MHz  
 140.00 KHz  
 1150.0 Hz  
 16364  
 3300.3 Hz  
 8  
 4.964 sec  
 1.551 sec  
 5.3 us  
 27.3 C  
 DE  
 CDCl3  
 7.24 ppm  
 0.13 Hz  
 21



UP-15 C:\NMR\94\121\9402  
 COMPT T6545 Hzx 40960-21  
 DATEM Tue May 25 10:04:14  
 CHMPC 13C  
 EXMWD 30M  
 OBSRG 75.45 MHz  
 OBSRT 324.00 kHz  
 OBSFN 5840.0 Hz  
 POINT 32768  
 PH000 20480 1 Hz  
 SCANS 600  
 ACQTM 1.806 sec  
 TD 1.394 sec  
 PH1 4.0 us  
 PPRNG \*F  
 CTMPP 25.7 C  
 SLOTT C0013  
 EXREF 77.00 ppm  
 RF 0.13 Hz  
 RGAIN 24



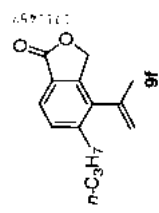
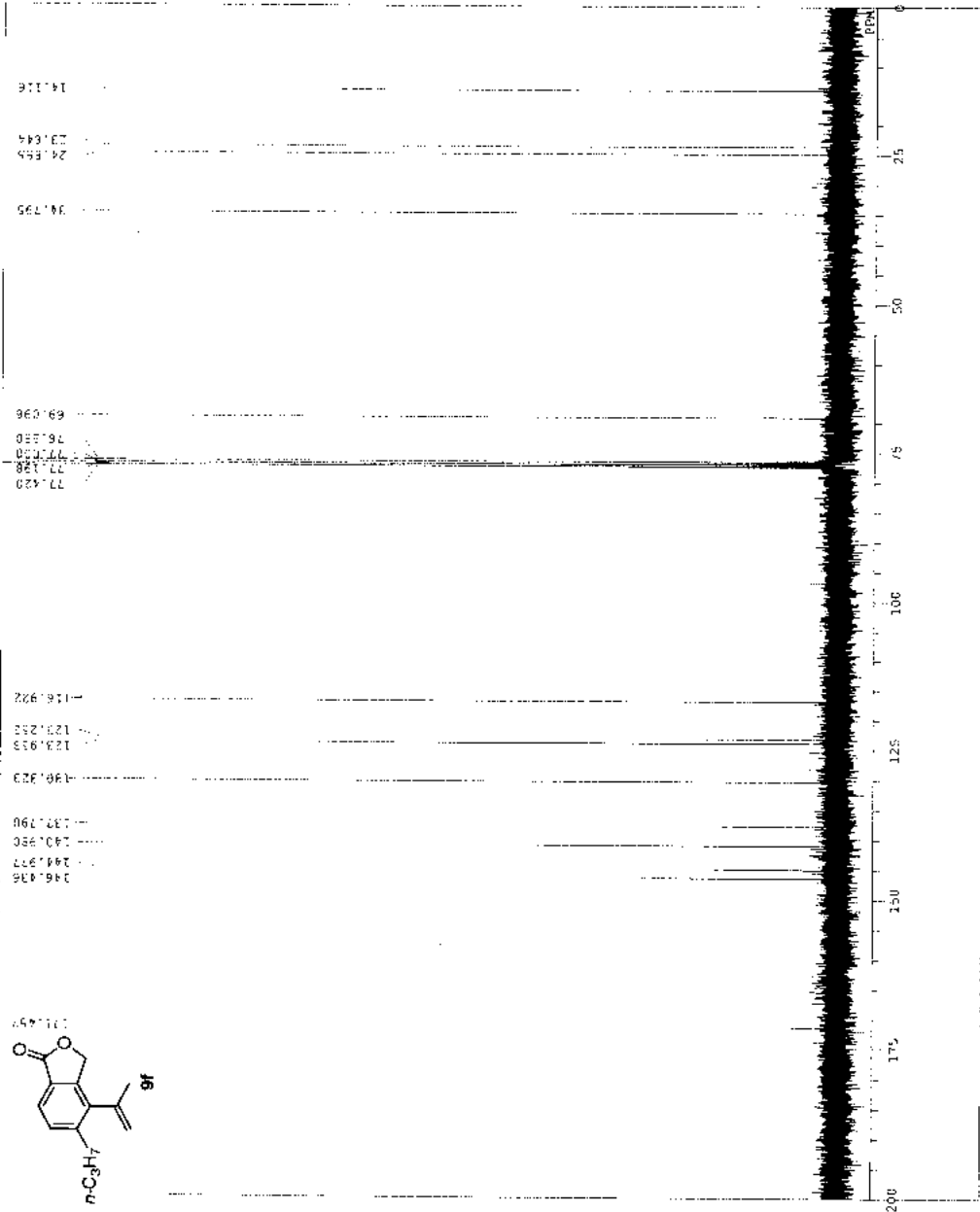
DATE: C:\WINNMR3\521\KAW  
 COMPT C:\56 benz-ethyl-1-f  
 CALIB Wed Jul 26 17:01:10  
 GBNUC 1H  
 P2MNO ROM  
 QBERQ 300.40 MHz  
 QBERT 133.00 REZ  
 QBFIN :150.0 HZ  
 POINT 16784  
 FREQU 3100.1 Hz  
 SCANS 8  
 ACQTM 4.964 sec  
 FD 1.451 sec  
 PUL 5.3 us  
 IRNUC 1H  
 CTEMP 19.5 C  
 SLVMT CDCl3  
 SXHFX 7.24 ppm  
 BF 0.13 Hz  
 RGAIN 2.1



D:\FILE C:\WINNERS\COMMON\  
 COMPT 78556 602-clyonol-7  
 DATEM Wed Jun 06 17:35:15  
 QRMDC 13C  
 QRMDC BCH

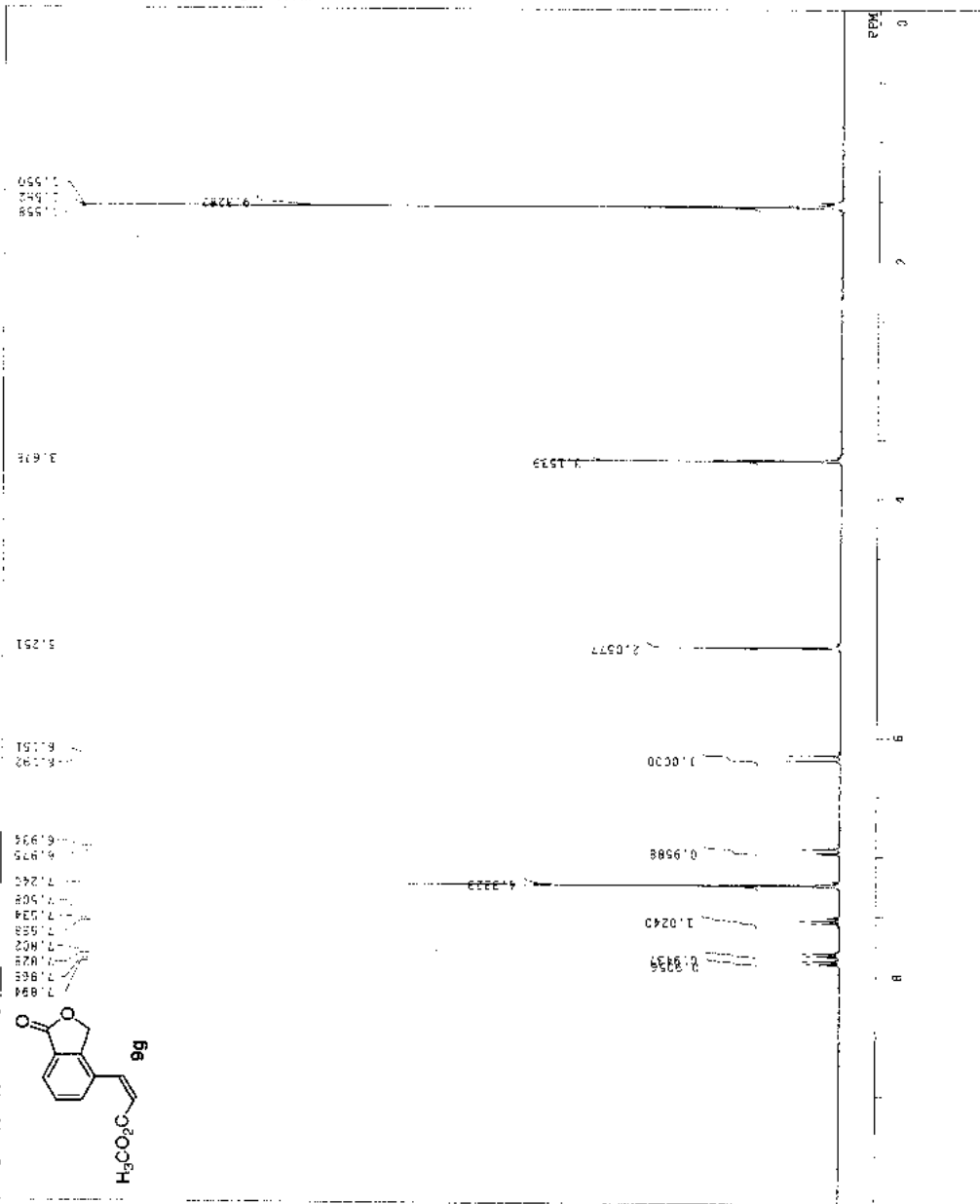
75.45 MHz  
 174.00 MHz  
 1840.0 Hz  
 32765  
 20408.1 Hz  
 801  
 1.606 sec  
 1.394 sec  
 4.0 Hz  
 PM1  
 19.5 E  
 77.60 ppm  
 0.13 Hz  
 24

QMRSQ  
 QMSET  
 QMFIN  
 POINT  
 PREDI  
 SCANS  
 ACQTM  
 PD  
 PM1  
 QRMDC 1H  
 QRMDC 13C  
 QMDC 13C  
 EXREF  
 BP  
 RGAIN



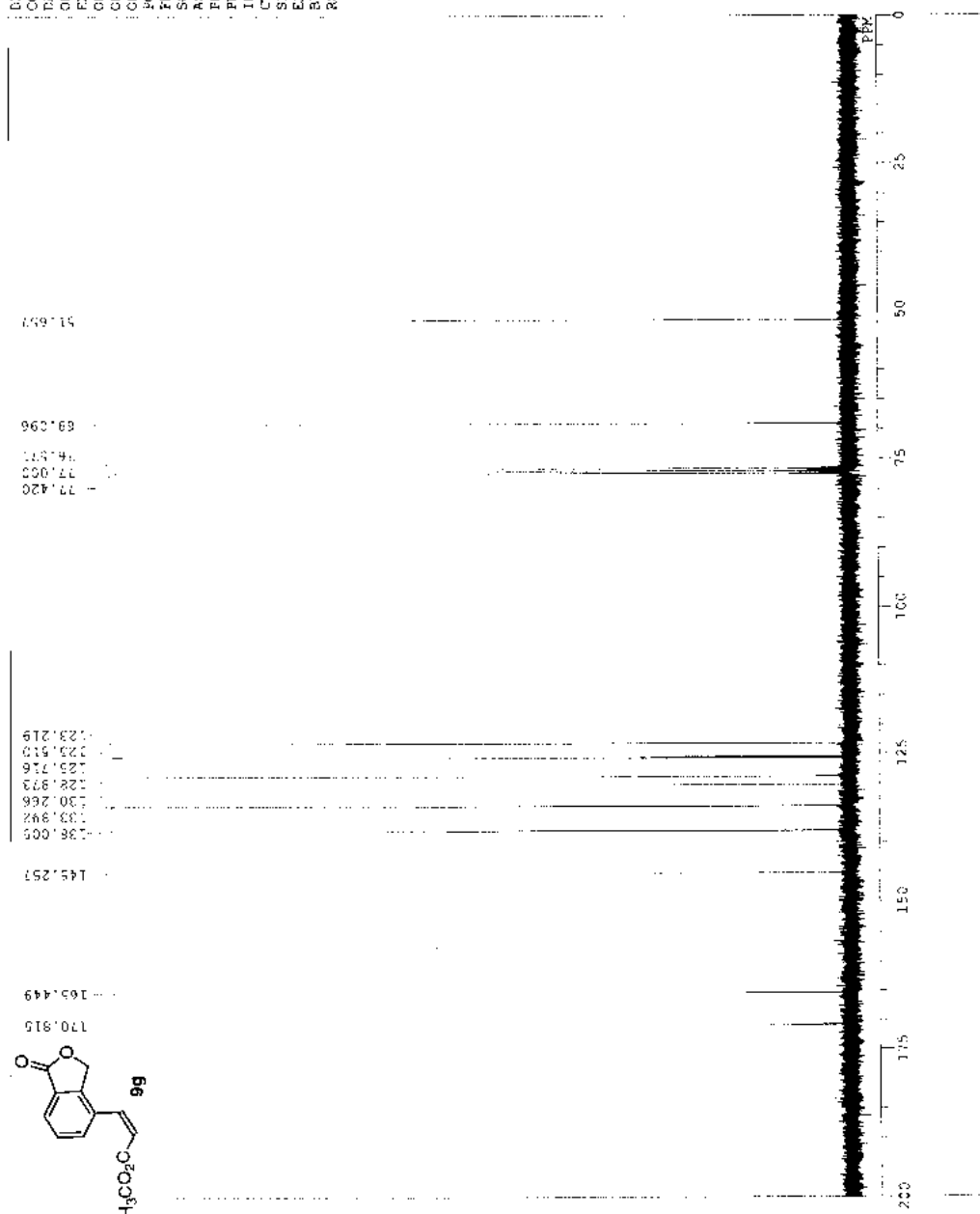


FILE C:\WINNMR35\COMMON\   
 COMNT TK575 benz-coumarin-H   
 DATIM Thu Nov 14 23:25:35   
 OBWDC 1H   
 EXPROD NON   
 OBSFRO 300.40 MHz   
 OBSSET 130.00 KHz   
 OBSFIN 1150.0 Hz   
 POINT 16384   
 FREQU 3300.3 Hz   
 SCANS 8   
 ACQTM 4.364 sec   
 PD 1.351 sec   
 EWI 5.1 us   
 -FNUC 1H   
 CTEMP 18.7 C   
 ELVNT CDCL3   
 EXLEN 7.24 ppm   
 RF 0.13 Hz   
 RGAEN 24

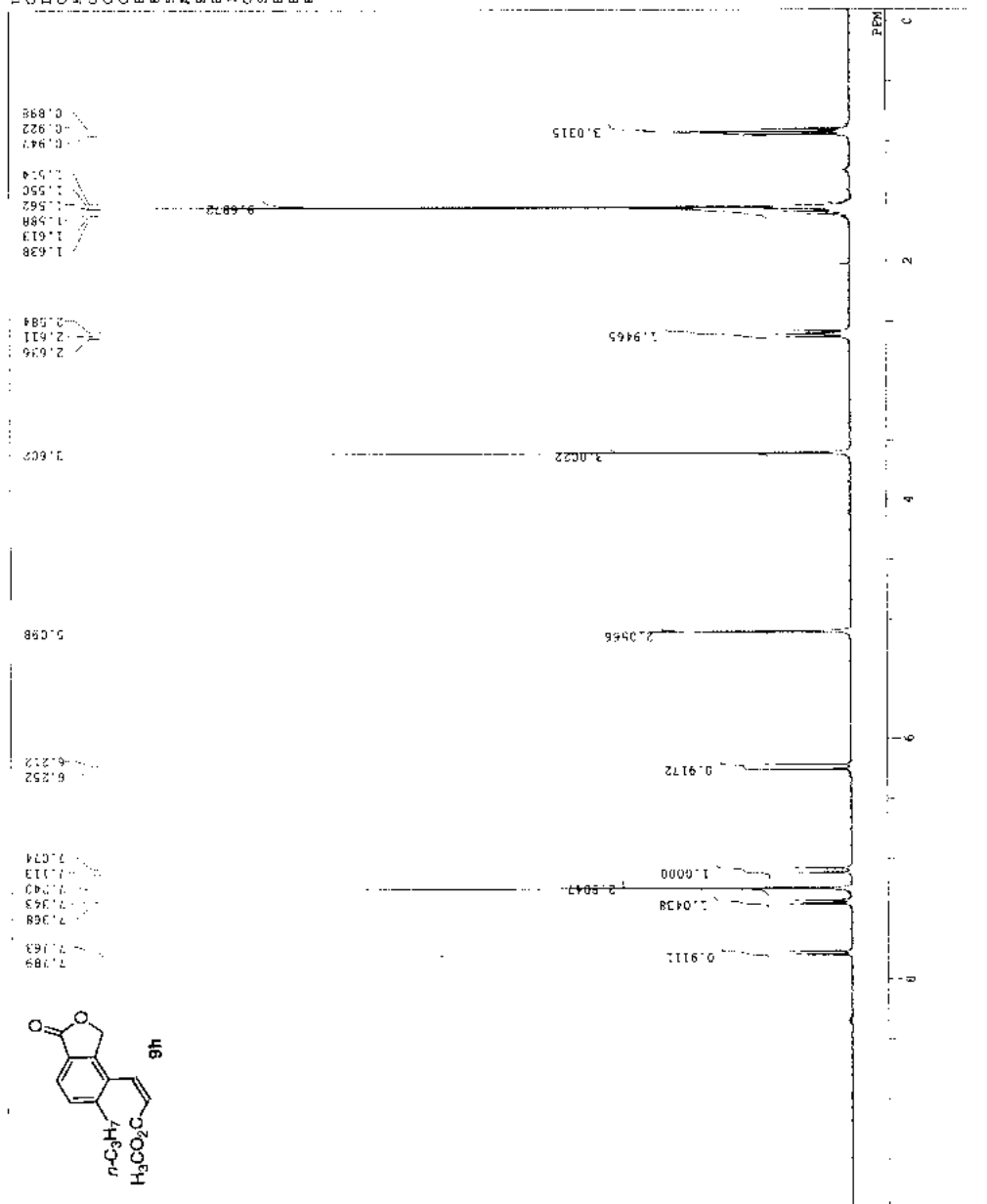


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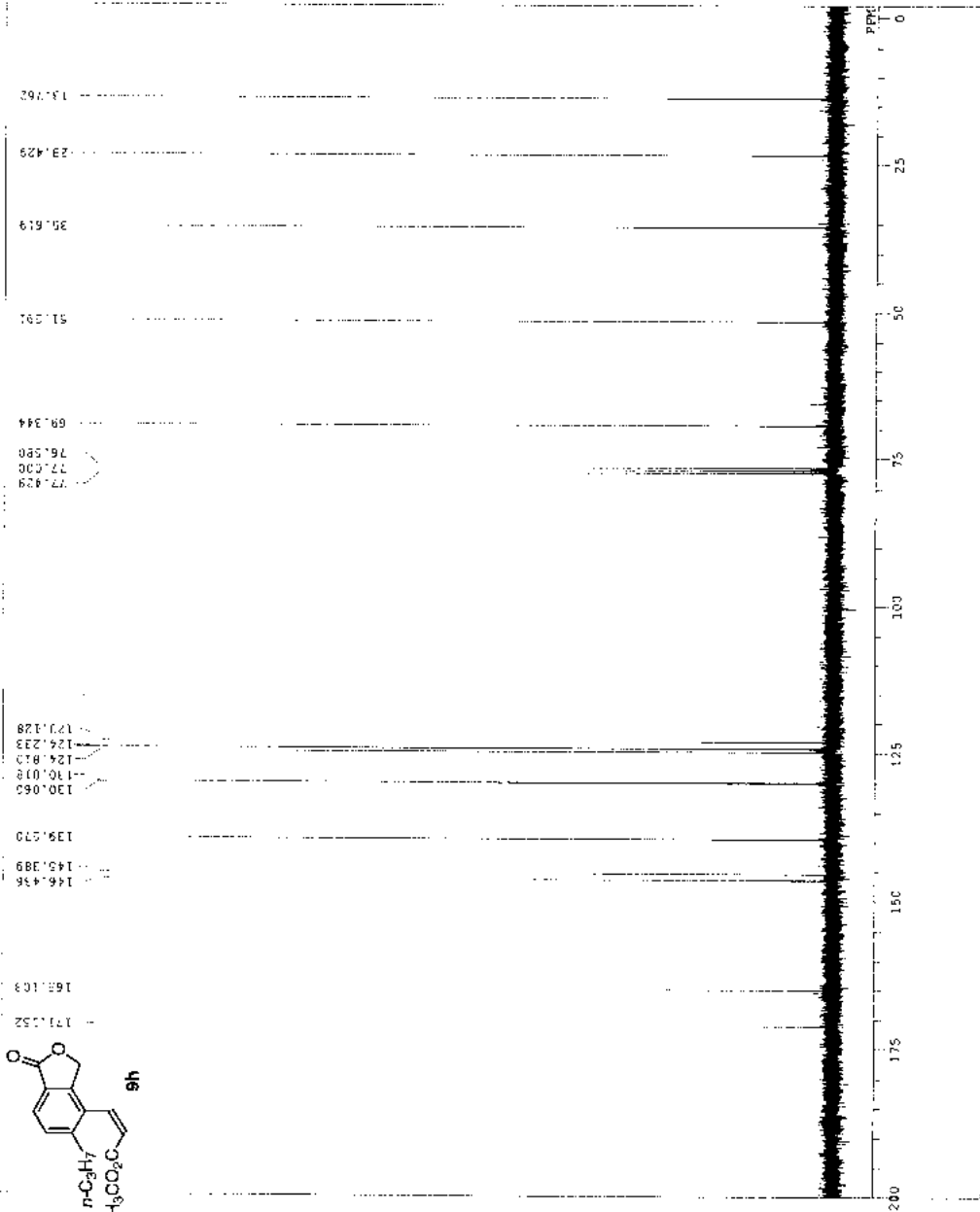
DETCR C:\MSDCHEM\950521\2
COMPT 1K576 benz-ethyl
DATEM F-1 Jan 15 00:12:
OBINDC 13C
EXMDCR 50M 75.45 MHz
GBREI 124.00 KHz
GBSTN 1640.0 Hz
FOLNT 32768
FREQU 200.081 Hz
SCANS 257
ACQTY 1.606 sec
PD 1.384 sec
PWL 4.0 us
IRNUC 1H
CTEMP 19.5 C
SLVNT CUXCL3
EXREF 77.00 ppm
BF 0.13 Hz
RGAIN 24
    
```



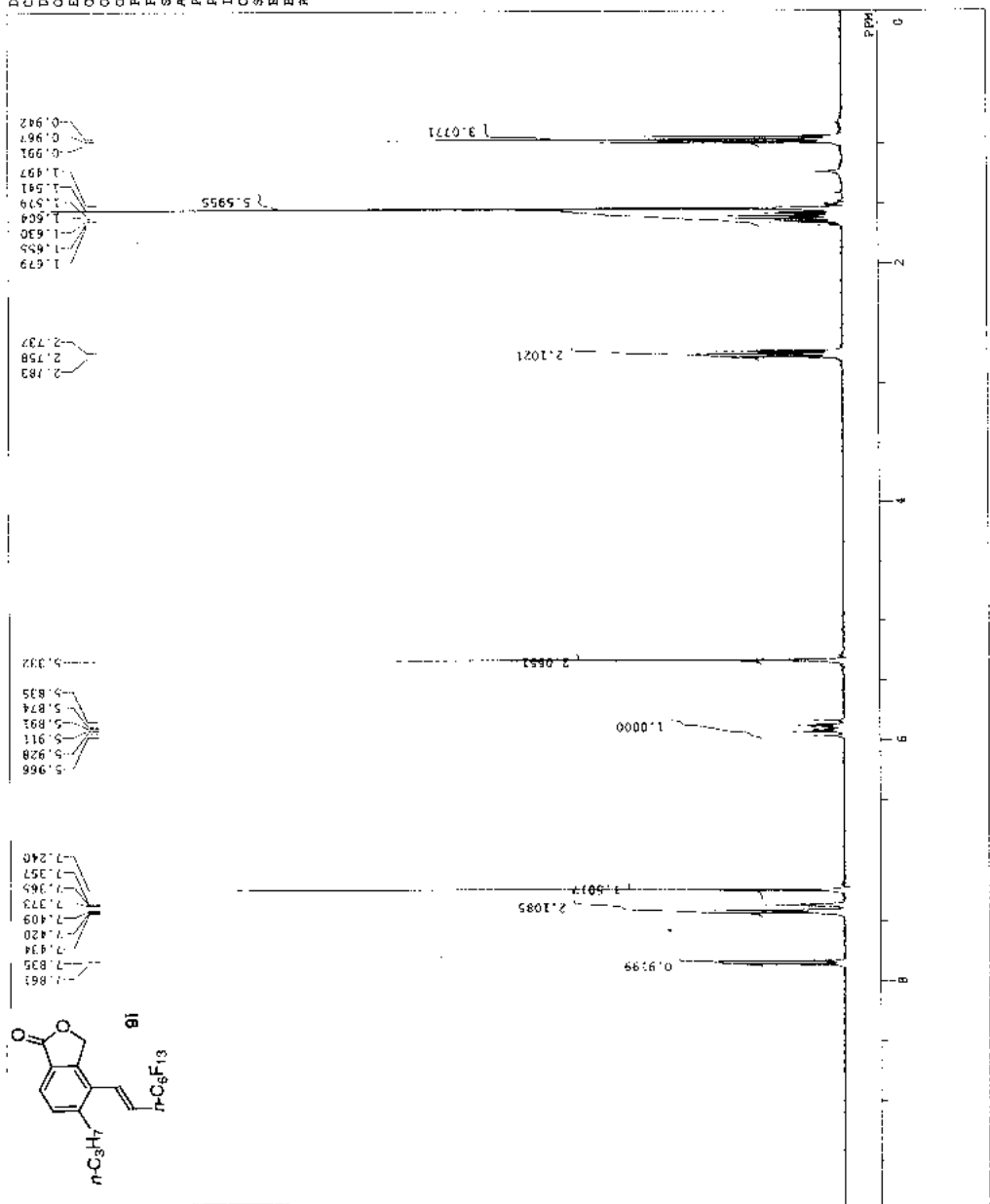
FILE: C:\NMR\95\COMMON\  
 COMPT: TMS-1-benzothiyne-1-P  
 DATE\_: JUL 95 15:21:23  
 OBNUC :H  
 EXMOLD :NON  
 ORPRO :300.40 MHz  
 OBSET :130.00 KHz  
 OBFIN :1500.0 Hz  
 POINT :-6364  
 PRFQC :3300.3 Hz  
 STENS :U  
 ACQTM :4.964 sec  
 PD :1.561 sec  
 PW1 :5.2 usec  
 PRNUC :1H  
 CTBKP :22.4 C  
 SLVNT :CDCL3  
 EXREF :7.24 PPM  
 BP :5.13 Hz  
 RGAIN :24



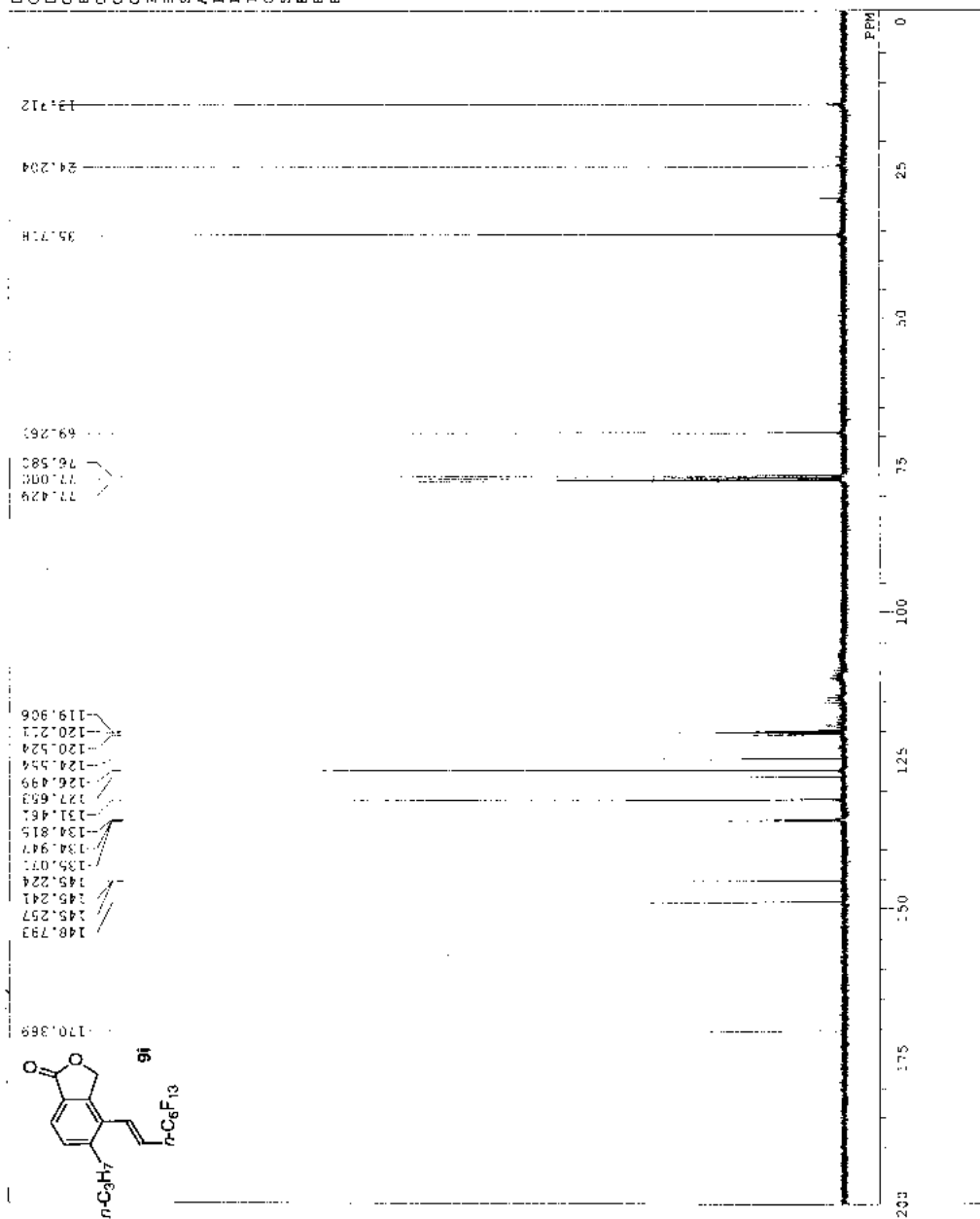
FILE C:\WINRES5\COMMON  
 COMPT IR591 Benz-cyanid-P  
 SOLTM Thu Jul 05 16:15:52  
 SBRJC 13C  
 P2MGC BCM  
 OBSFRQ 75.45 MHz  
 OBSSET 124.00 KHZ  
 OBSLIN 1440.0 Hz  
 POINT 32768  
 FREQC 20408.1 Hz  
 SCANS 320  
 ACQUIS 1.606 sec  
 PC 1.394 sec  
 EM 4.0 us  
 TRMDC 1F  
 CTMPC 23.4 g  
 SLMAT CMC63  
 EXSEF 77.00 PPM  
 BF 8.32 Hz  
 RGAIN 25



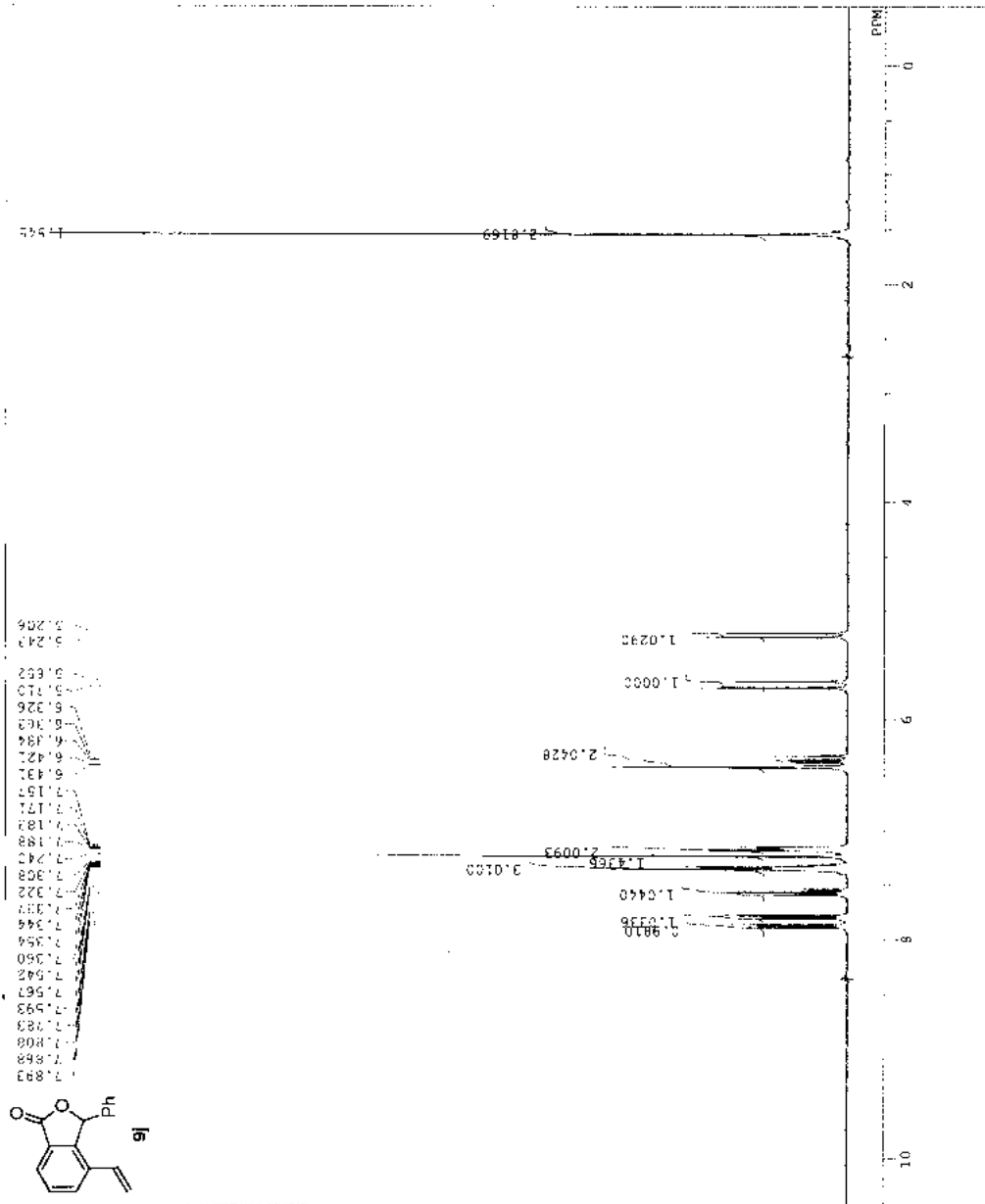
DFT-E C:\WINNER95\COMMON\  
 COMB1 TR610 benz-erysml-P-  
 DACTM FRI Jul 13 20:44:54  
 OBNDIC 1H  
 EXPRD NOM 300.40 MHz  
 ORSER 130.00 MHz  
 OBSF1 1:50.0 Hz  
 POINT 16394  
 FREQ0 3300.3 Hz  
 SCANS 6  
 ACQTM 4.864 sec  
 PU 1.501 sec  
 PU 5.3 US  
 LBNDIC 1H 24.4 C  
 CTDRP CDG23  
 SLVNT CDG23 7.24 ppm  
 EXREF 0.13 Hz  
 BT 23  
 AGAIN



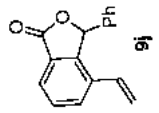
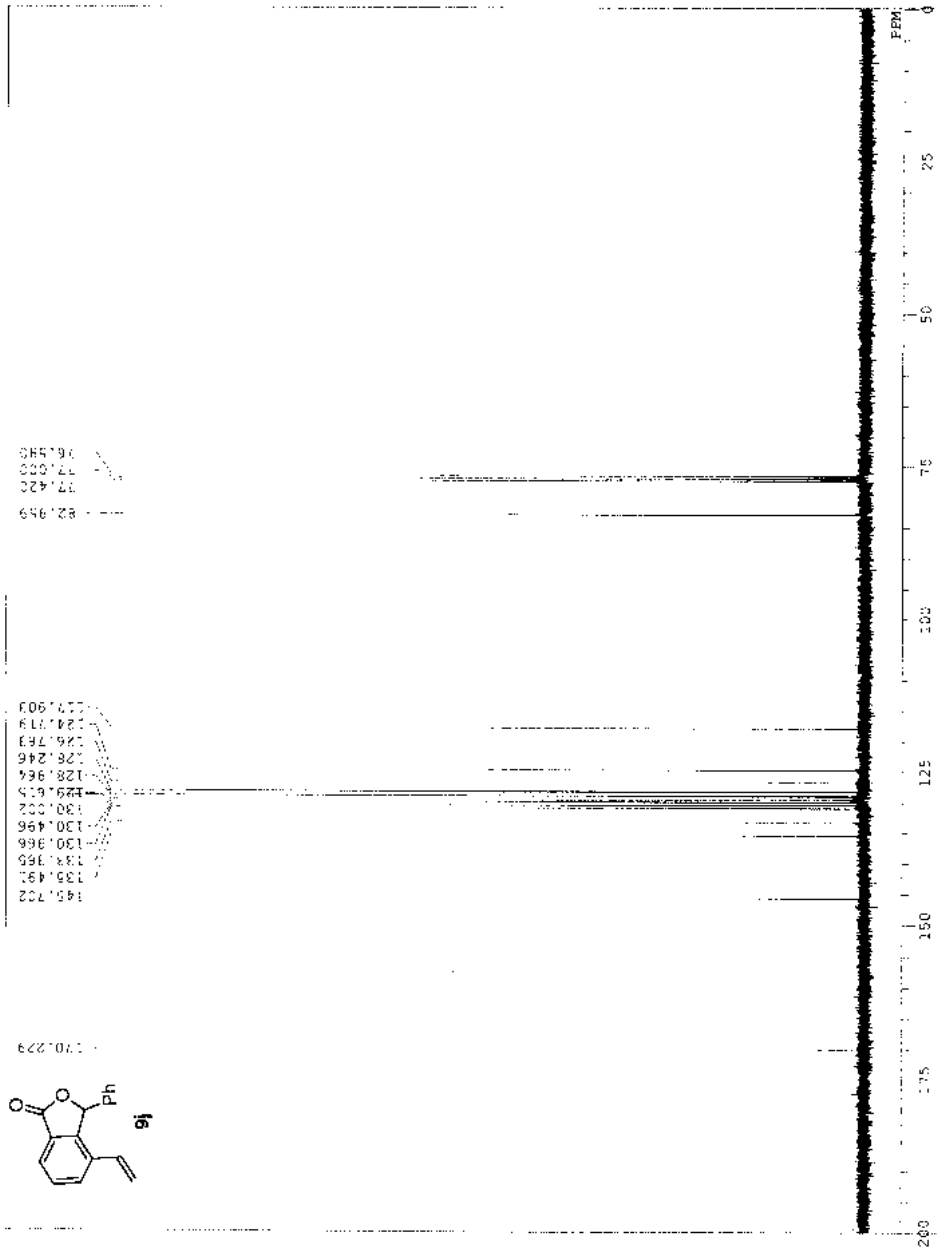
FILE C:\WINNMR95\521\K  
 CONNT C1610 benz-ethyl-  
 DATIM Mon Jul 31 15:11:1  
 GBNTC 2.0  
 EXMOD BCM  
 CBFRQ 75.45 MHz  
 CBSET 124.00 KHz  
 CBFIN 1840.0 Hz  
 POINT 32768  
 FREQC 20406.1 Hz  
 SCANS 4109  
 ACQTH 1.606 sec  
 PD 1.354 sec  
 FWI 4.0 us  
 TRUNC 1H  
 CTEMP 20.3 C  
 SOLVT CDCL3  
 EXPRF 77.00 PPM  
 RF 0.13 Hz  
 RGAIN 24



DT11: C:\NMR95\00AP0  
 COMPT 18540 benz-oleyn-  
 DATIM Thu Aug 30 17:34:  
 OBSVC IH  
 EXMOD NON  
 OBSFO 300.40 MHz  
 OBSST 130.00 MHz  
 OBSIN 1150.0 Hz  
 POINT 1.6184  
 FREQ 3500.3 Hz  
 SCANS 6  
 ACQIM 4.964 sec  
 PD 1.551 sec  
 PFI 5.3 us  
 IRNUC 1H  
 CTEMP 22.2 C  
 SLVNT CDCl3  
 EXREF 7.24 ppm  
 QF 0.13 Hz  
 RGAIN 24

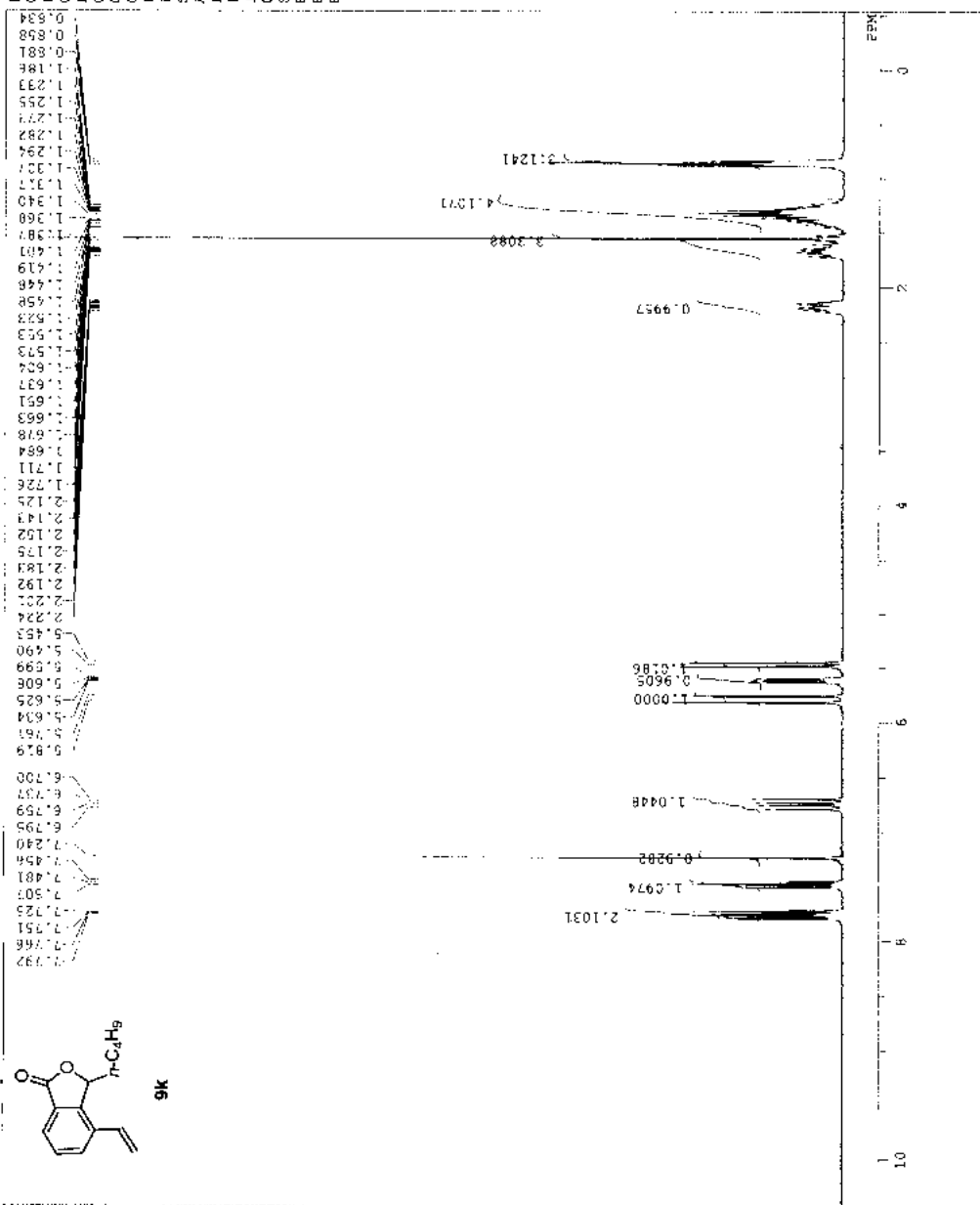


DFILE: C:\WINNER95\COMBO.  
 CONNT: TR645 beta.Pn  
 DATIM: Mon Sep 03 09:46:  
 CURNUC: 15C  
 EXMUD: BUN  
 QUNRO: 19.75 MHz  
 ORSET: 124.60 kHz  
 ORBEIN: 1840.0 Hz  
 POINT: 32768  
 FREQU: 204081.1 Hz  
 SCANS: 888  
 ACQTM: 2.656 sec  
 PD: 1.354 sec  
 PW: 4.0 US  
 IRNVC: 1H  
 CTEMP: 20.5 C  
 SLVNT: CCL4  
 EXMDF: 77.00 ppmr  
 RF: 0.13 Ez  
 RGAIN: 25

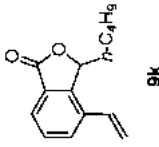
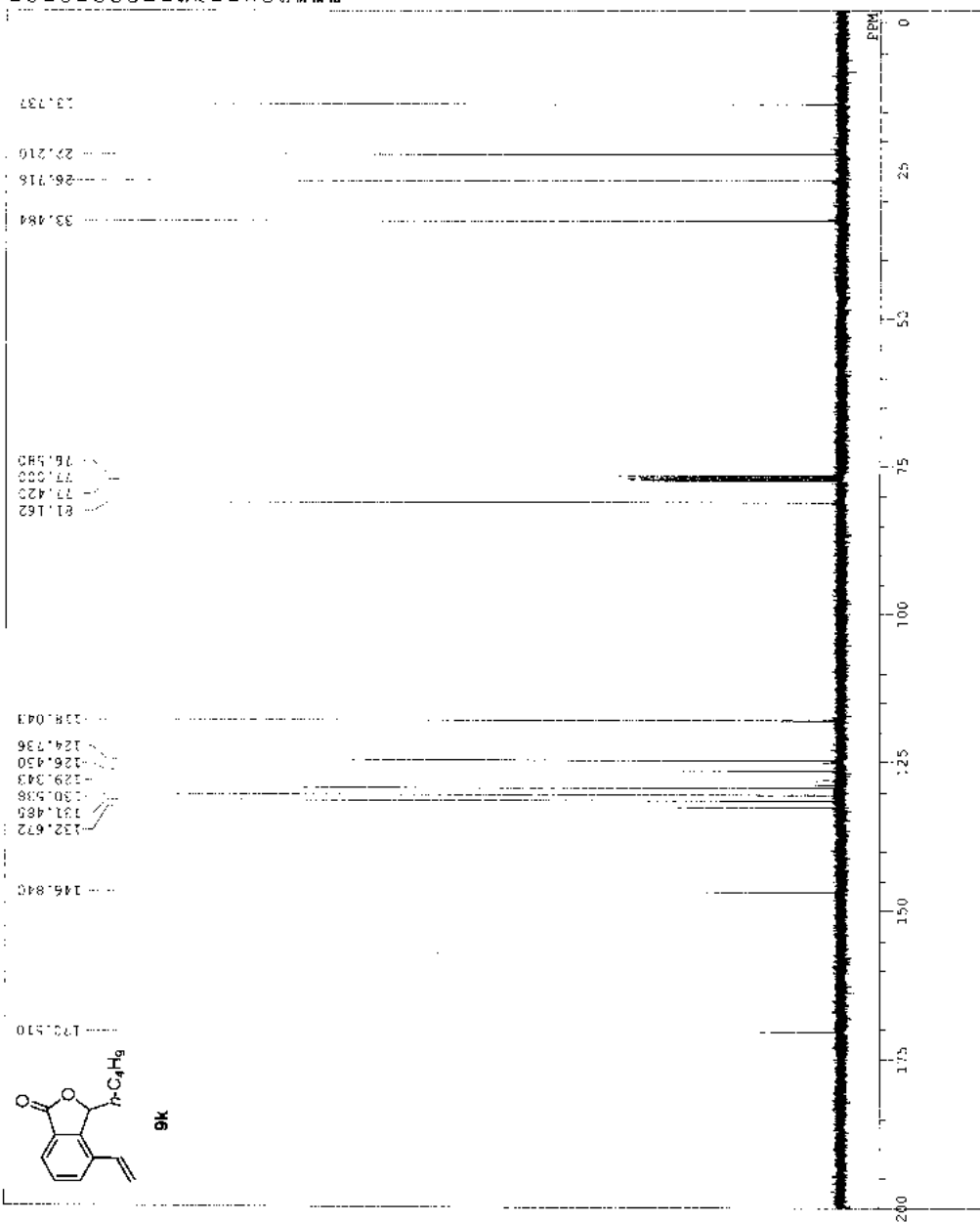




C:\WINNMR95\CONSID  
 CKANT TR691 benz enyne  
 DATE: 11-11-94  
 TIME: 11:54  
 QMVIC LH  
 EXMOD NUN  
 OBSERQ 300.40 MHz  
 OBSSET 130.00 MHz  
 OBSFID 1150.0 Hz  
 POINT 16364  
 FREQU 3300.13 Hz  
 SCANS 8  
 ACQTM 4.984 sec  
 PD 1.551 sec  
 PW 5.3 uS  
 LNSVC LH  
 CTIMP 23.5 C  
 SLART CUCLE3  
 EXREF 7.24 ppm  
 BF 5.13 Hz  
 RGAIN 21



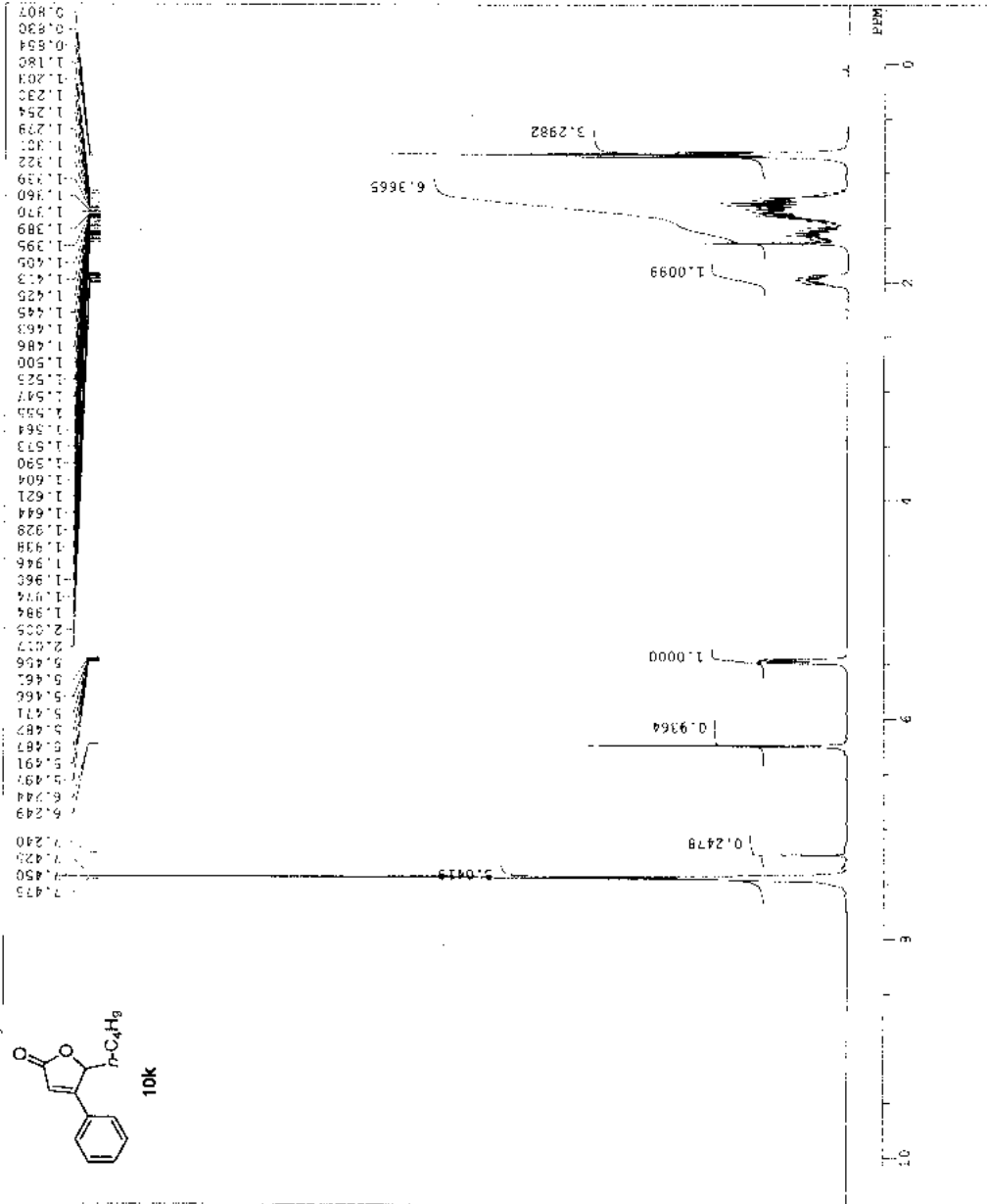
C:\WINMR95\CO900  
 COMPT TK691 borz crv1e  
 CNAME Top Oct 11 19:28  
 ORNTRC 1HC  
 FXMOD BCM  
 OBSERQ 15.45 MRZ  
 OBSSET 124.00 KEZ  
 OBFIN 1040.0 Hz  
 POINT 32766  
 FREQU 20408.1 Hz  
 SCANS 257  
 ACQEM 1.606 sec  
 PD 1.394 sec  
 PW 4.0 us  
 TRMVC 1H  
 TEMPC 23.1 C  
 SOLVENT CDCL3 77.50 ppm  
 EXREF 0.13 Hz  
 BF 24  
 RGAIN



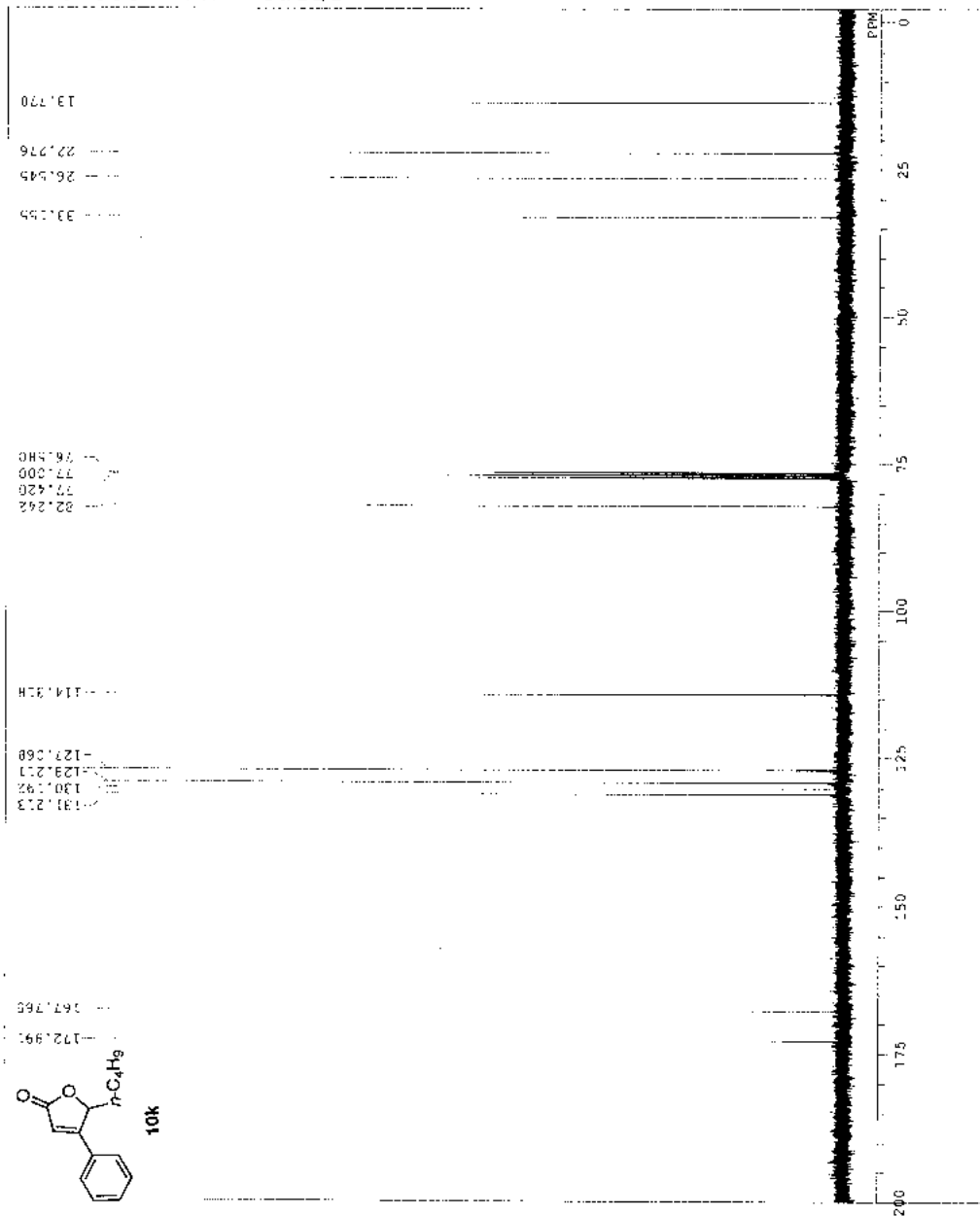
C:\WINN95\521\K  
 PK691\_benz2\_reate  
 FT: OCT 12 08:49:  
 1H  
 OBNUC 1H  
 EXMGC NON

300.40 MPZ  
 130.00 KHZ  
 1150.0 Hz  
 36364  
 3300.13 Hz  
 SCANS 8  
 ACQIM 4.964 sec  
 PD 1.55 sec  
 PW 5.3 us  
 IRMUC 1H  
 CTMPL 24.1 C  
 STMT C00L3  
 EXREF 7.24 ppm  
 BF 0.13 Hz  
 RGAIN 15

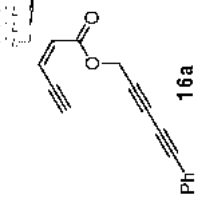
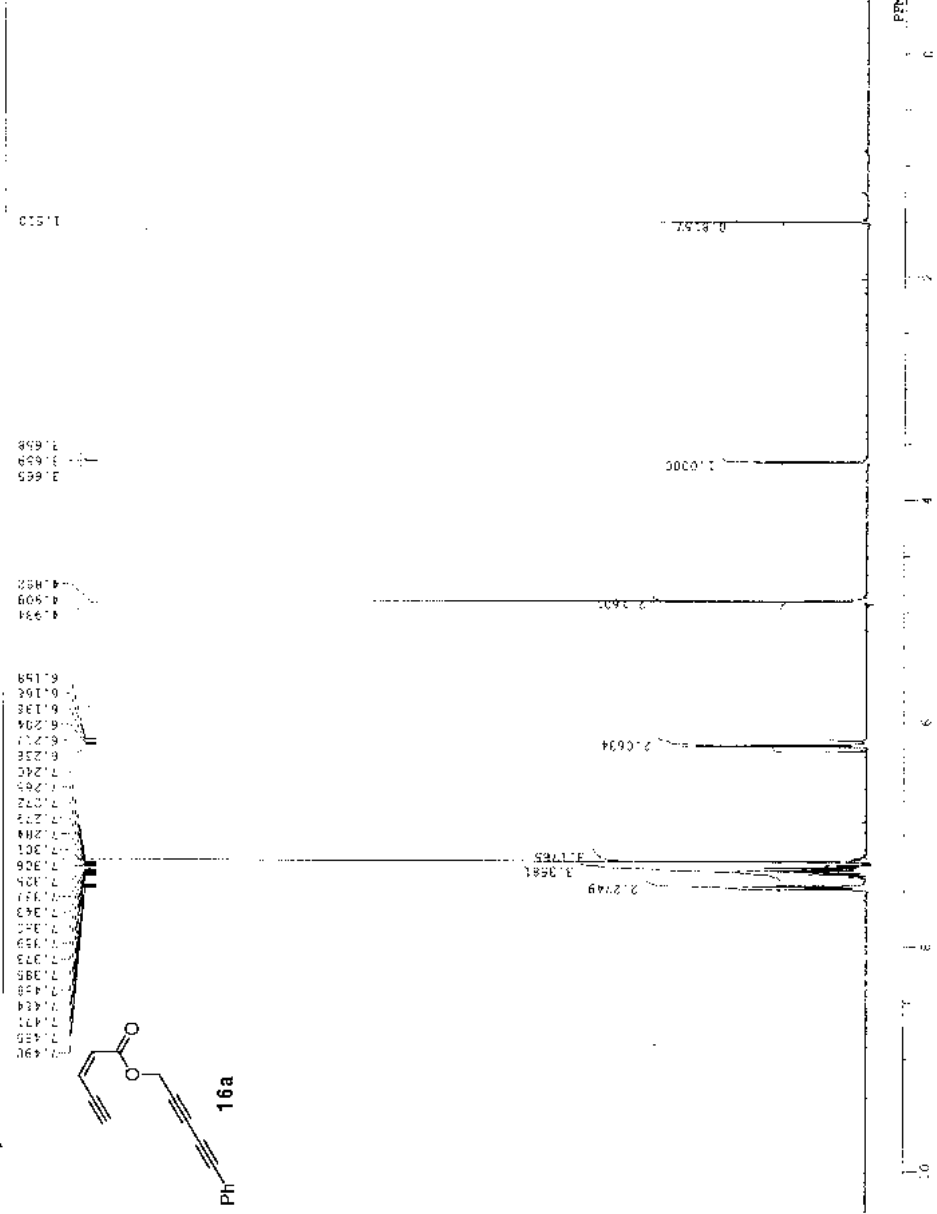
DF:LF  
 COMNT  
 DACTM  
 OBNUC 1H  
 EXMGC NON  
 OBREF  
 OBREF  
 POINT  
 FREQ  
 SCANS  
 ACQIM  
 PD  
 PW  
 IRMUC  
 CTMPL  
 STMT  
 EXREF  
 BF  
 RGAIN



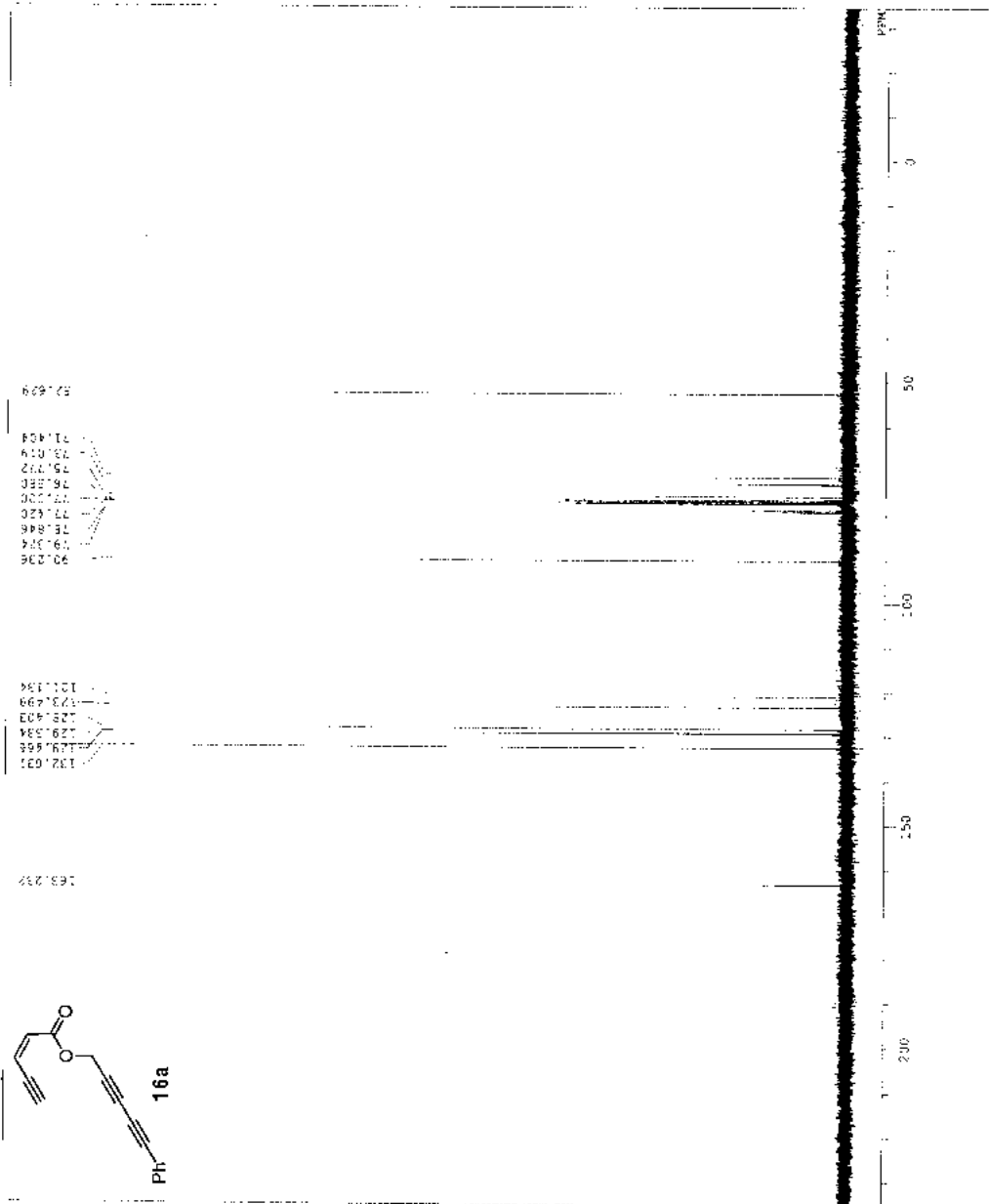
DF11E C:\MINISMR95\COORNG  
 COMMT TK691-7  
 DATIM Sat Nov 25 18:03:  
 CHNUC 1.5C  
 EXANGD BOM  
 QBERQ 75.45 MHz  
 QBBET 124.00 kHz  
 QUELN 1840.0 Hz  
 POINT 32768  
 FREQU 20408.1 Hz  
 SCANS 556  
 ACQTM 1.606 sec  
 PD 1.394 sec  
 PW 4.0 us  
 TRNDU 1H  
 CTEMP 22.7 C  
 SLENT CUCUJ  
 EXREF 77.00 ppm  
 BF 5.13 Hz  
 RGAIN 24



2F1LE C:\WIN98\MSDOS\521\56W  
COMMIT 79548 gny-c-d.yne  
DATEM Thu May 17 14:09:07  
SUNDEC 1R  
EXMOD NON  
OBFRO 300.40 MHz  
OBFET 130.00 KHz  
OBFIN 1150.0 Hz  
PCINT 16384  
PBOJ 1300.0 Hz  
SCANS 8  
AQTIM 4.364 sec  
P2 1.551 sec  
PWA 5.3 us  
FRANC III 26.5 C  
CTDHP  
SLOVT CDCL3  
EXREF 7.24 ppm  
Sf 3.13 Hz  
GAIN 24

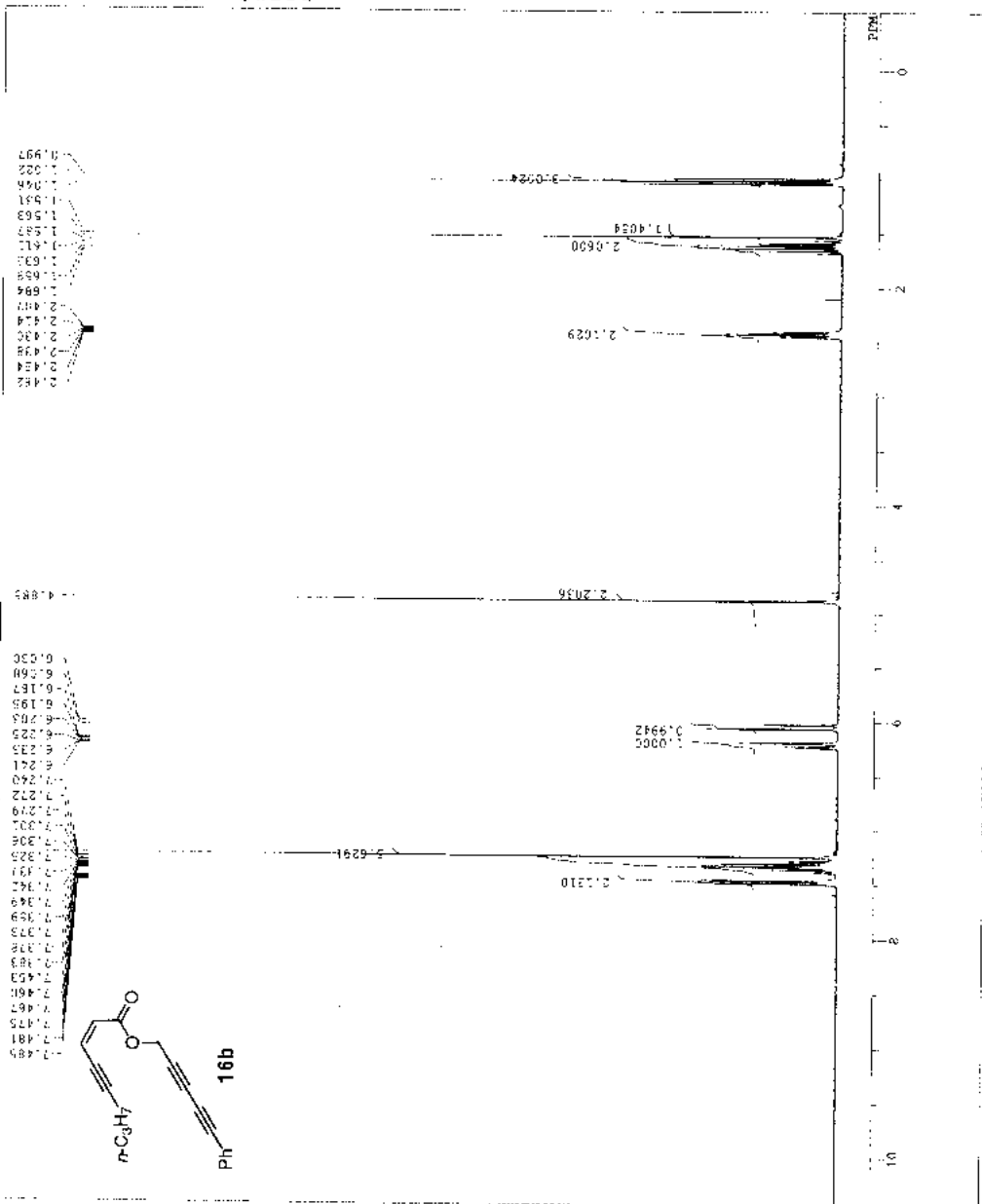


DT112 C:\NMR99\5\COMPO\A  
 CONNT TR349 enyne-diyne  
 DATIM Thu May 17 15:13:18  
 QBRUC 13C  
 EXMOD 9CM  
 :PREFSQ 75.45 MHz  
 :SBSZC 124.00 kHz  
 :QSF1N 184.00 Hz  
 :FOF1N 32768  
 :FREQC 20400.1 Hz  
 :SCANS 257  
 :ACQTM 1.606 sec  
 :PD 1.394 sec  
 :PUL 4.0 us  
 :PULPR 1H  
 :IRPRG 26.4 c  
 :SLEWT 6X4.3  
 :EXREF 77.00 ppm  
 :RF 0.13 Hz  
 :RGAIN 24



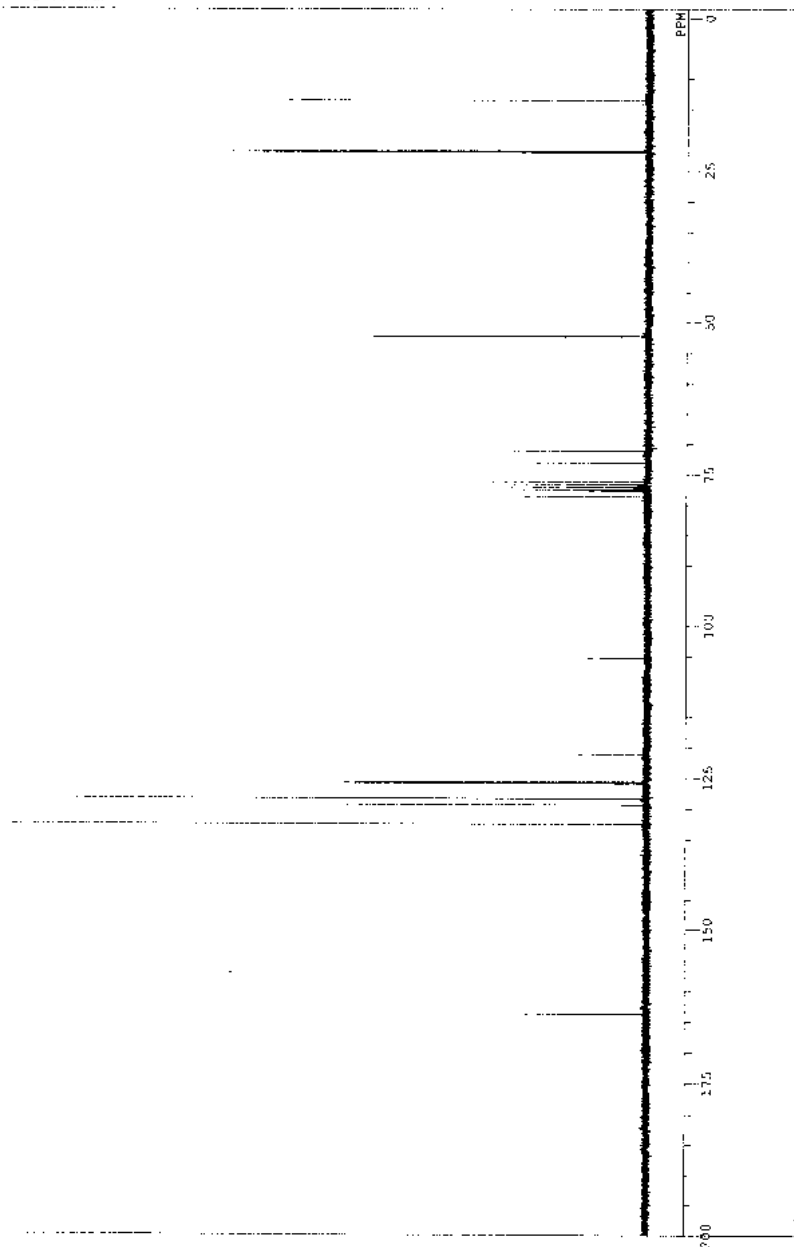
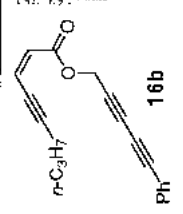
DATE: CIVTIRREPS\5216001  
 COMMENT: TK550-PR-05100-d-lym  
 DATUM: Tue May 22 17:32:14  
 OPERATOR: JH  
 SAMPLE: MOK

CHANNEL: 300.40 MHz  
 OFFSET: 170.05 KHz  
 OFFSET: 1150.0 Hz  
 POINT: 16384  
 FREQ2: 3300.3 JHz  
 SCANS: 8  
 ACQTH: 4.964 sec  
 PD: 1.551 sec  
 PW: 5.73 us  
 LUNG: 1H  
 CTRP: 20.2 c  
 SWHT: C2013  
 EXRF: 7.74 ppm  
 UP: 0.13 Hz  
 RGRAN: 22



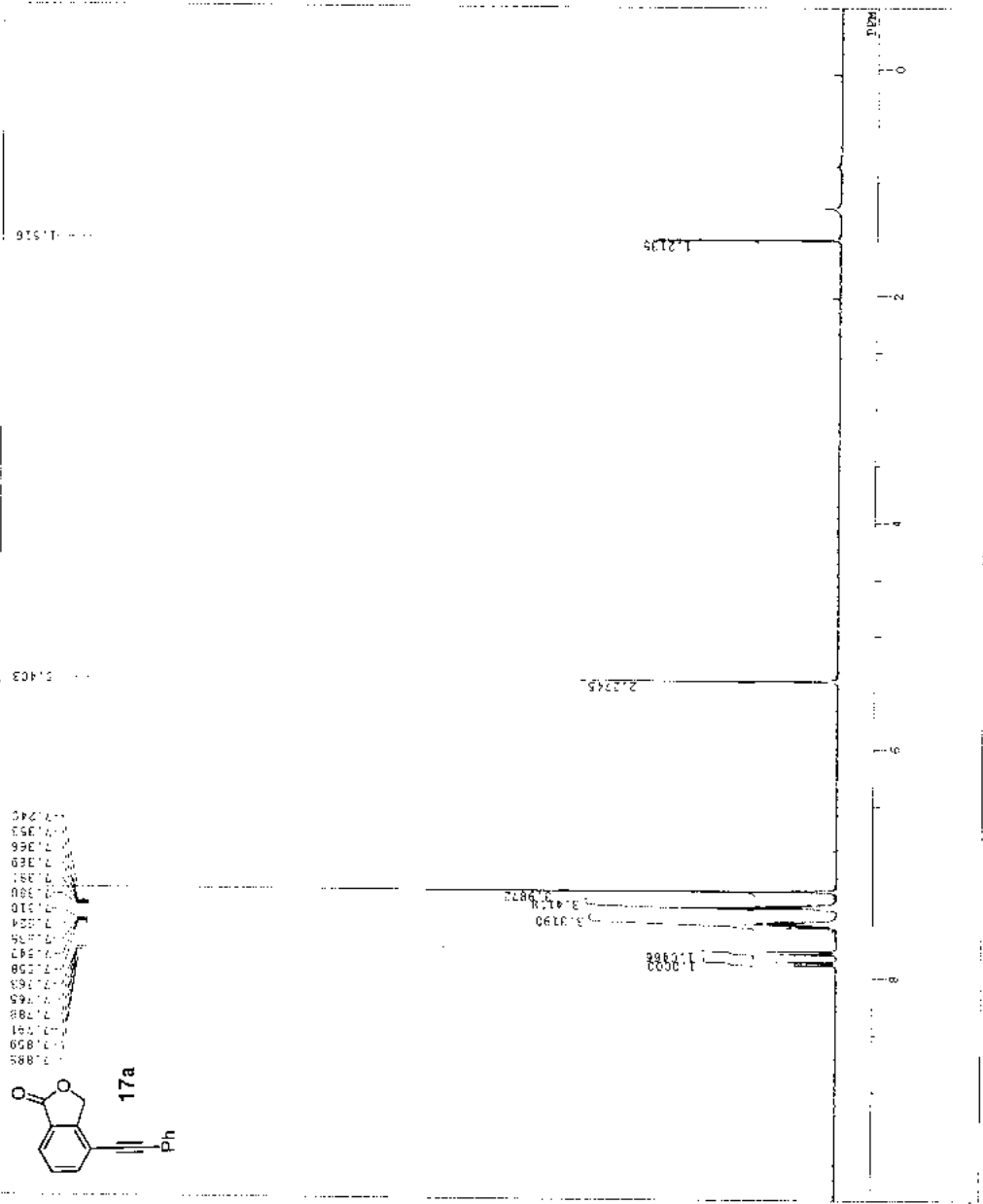
DTLE C:\WINNMR95\COMONS  
 COMST TP555-PT-COYte-d51.m  
 AQT04 Tue May 22 17:48:05  
 QNAME 13:  
 EXMOC BOM  
 OBORG 75.43 MHz  
 CHSET 124.00 KHZ  
 CHYTN 1040.0 HZ  
 32768  
 YGINT 20408.1 Hz  
 FREQC 256  
 SCANS 1.606 sec  
 ACQTM 1.394 sec  
 PW3 4.0 LB  
 INUC 1H  
 CTEMP 20.6 c  
 SLVNT CDCL3  
 EXREF 77.03 ppm  
 IN 0.13 Hz  
 SGA2N 24

13.523  
 22.515  
 52.041  
 71.035  
 76.032  
 76.156  
 76.593  
 76.900  
 77.420  
 77.756  
 78.646  
 105.491  
 121.136  
 125.617  
 126.873  
 128.287  
 129.409  
 132.582  
 163.751

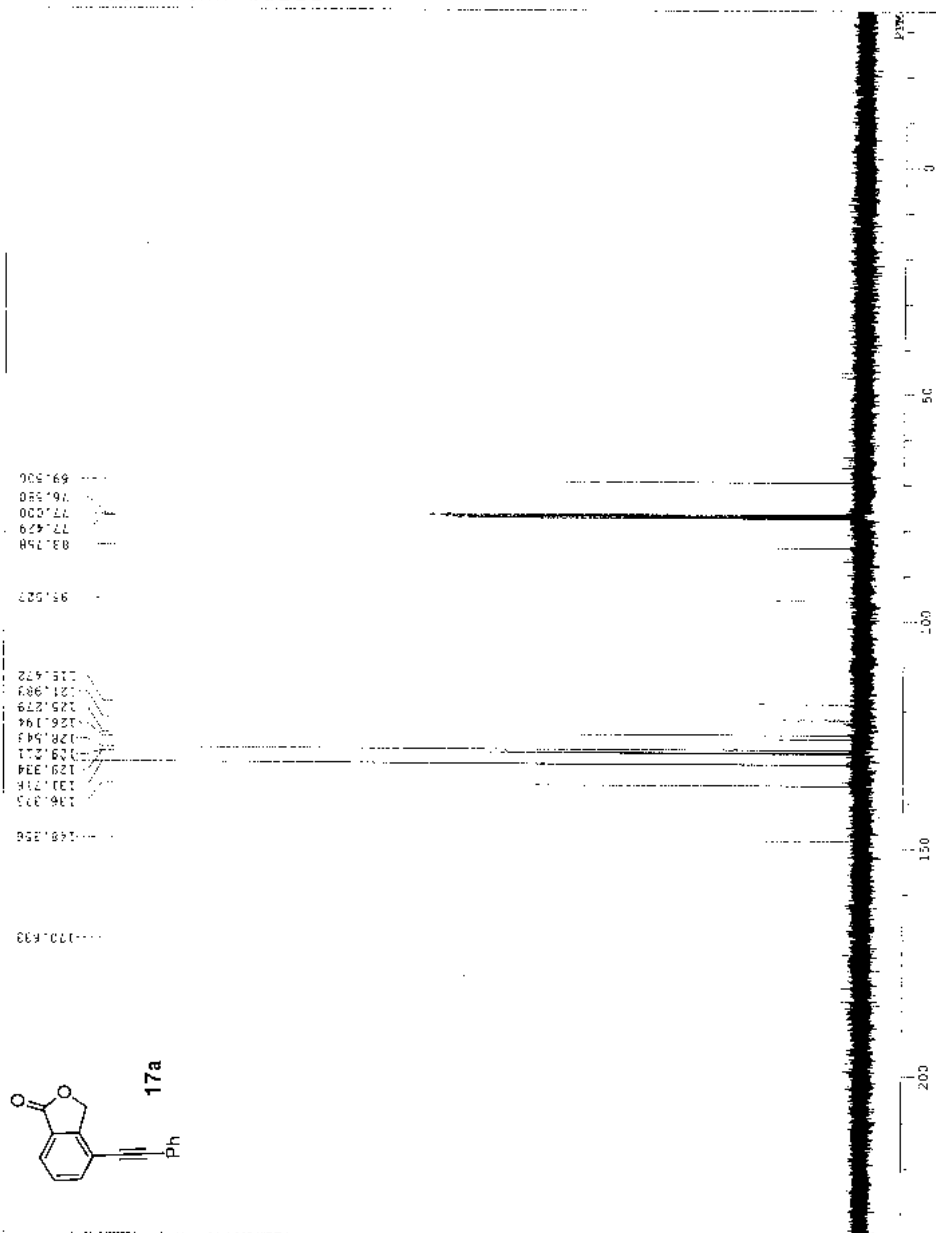




BELLE U:\NINWERS\COMMON\  
 COMPT TR350 engwell-glyne  
 DATE1 Tue May 17 21:55:21  
 CHAN1C 2H  
 EXPR00 F04  
 QURE30 306.40 MHz  
 QRES1 130.00 KHz  
 OFELN 156.00 Hz  
 PRFMT 16084  
 PRCO0 3500.13 Hz  
 SCANS 8  
 ACQTH 4.864 sec  
 PD 1.351 sec  
 FWD 5.108  
 S-MWC 1H 25.7 C  
 CTIMP  
 S-MWT CDCI3 7.24 ppm  
 EXREF 0.13 Hz  
 RGAIN 25

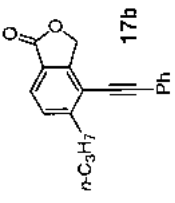
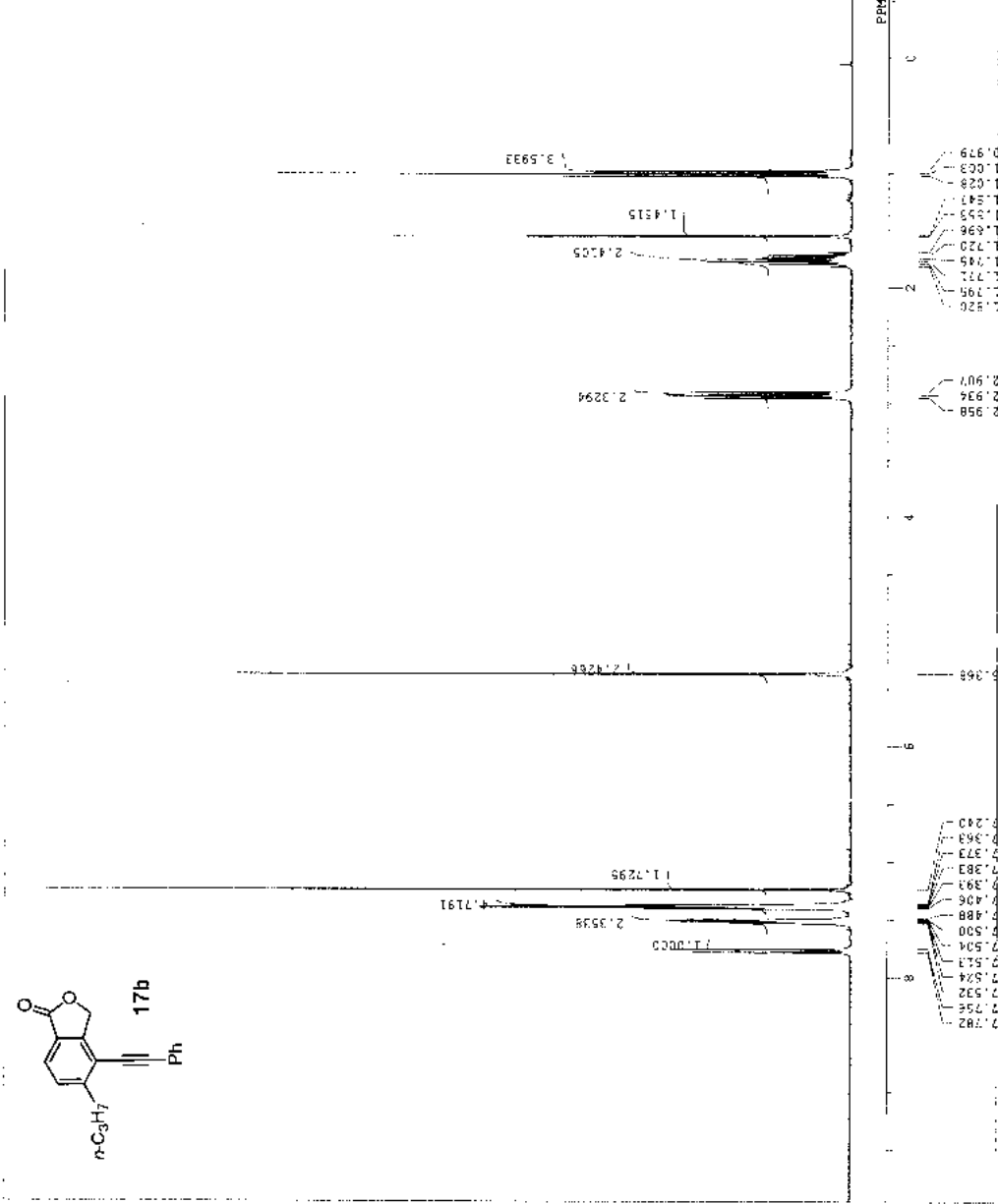


DELE C:\WIN95\BIN\521\NMR4  
 CONST 12550 Herz crysnet-d  
 DATEM Thu May 17 22:38:09  
 DRNG 13C  
 R2NM00 8CM  
 OBSF0 75.45 MHz  
 OBSF1 124.00 MHz  
 OBSF2 1840.0 Hz  
 POINT 32768  
 PRG01 20408.1 Hz  
 SCANS 512  
 ACQTM 1.606 sec  
 PD 1.394 sec  
 PUL 4.000  
 LRM0C 1H  
 CTMPC 23.5 C  
 SOLVT CHCL3  
 EXPRY 77.00 PRM  
 BF 0.13 Hz  
 RGAIN 25

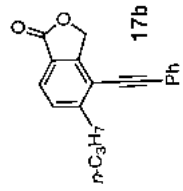
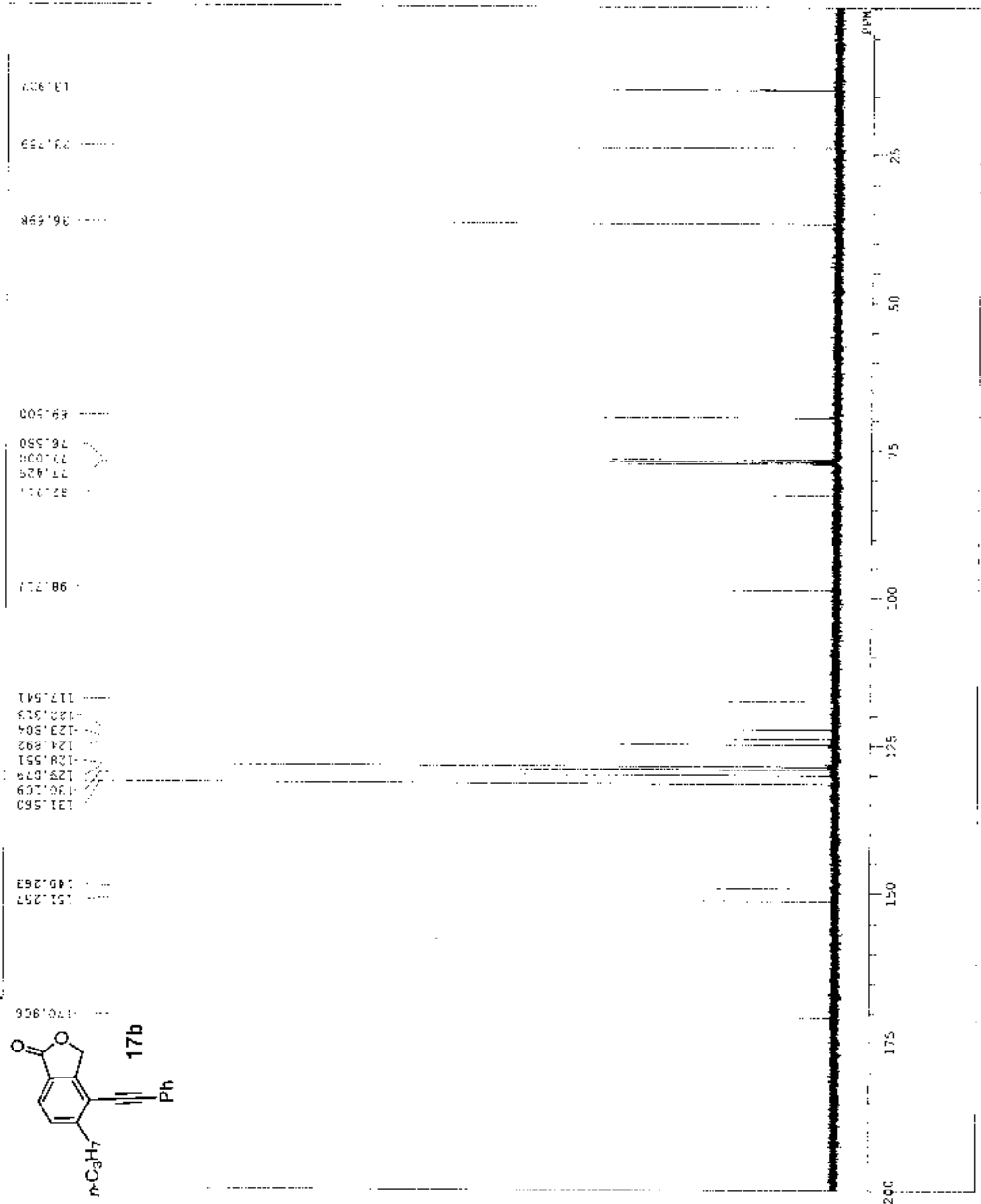


DP11E C:\WINNERS\COMMON\  
L00001 TK5E7 benz-eynu-2E  
The May 24 19:20:41

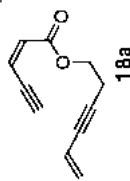
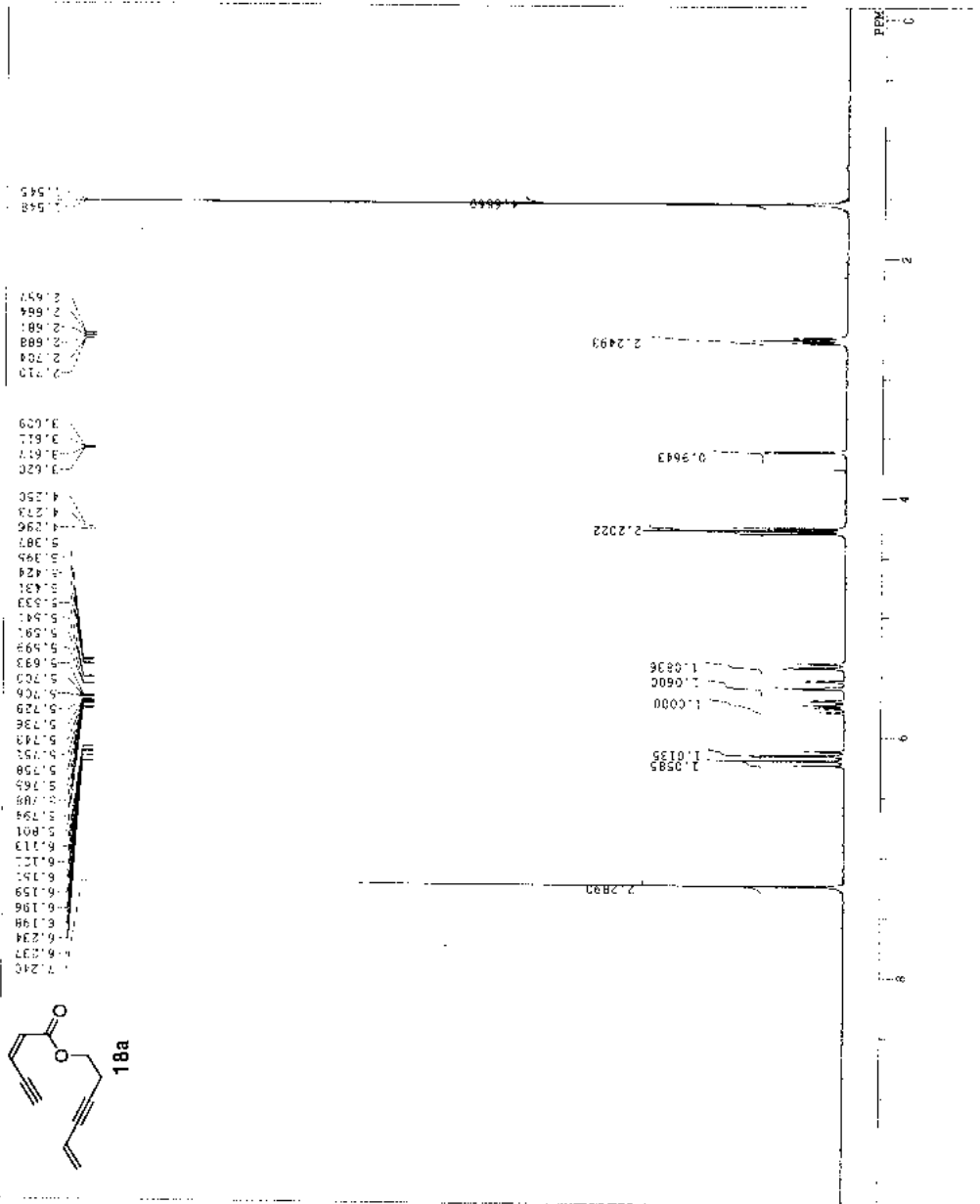
ORNDIC 1H  
EXPOC: NON  
OBSFREQ 300.40 MHz  
OBSSET 130.00 MHz  
OBSF1N 1150.0 Hz  
PULST 163B4  
PULPRO 3300.3 Hz  
SCANS 8  
ACQTM 4.264 sec  
PU 1.551 sec  
PWL 5.3 us  
IRNOC 14 19.0 C  
STEPS  
SLOTT CIRCLE 7.24 ppm  
EXREE 0.13 Hz  
BF 21  
RGAIN



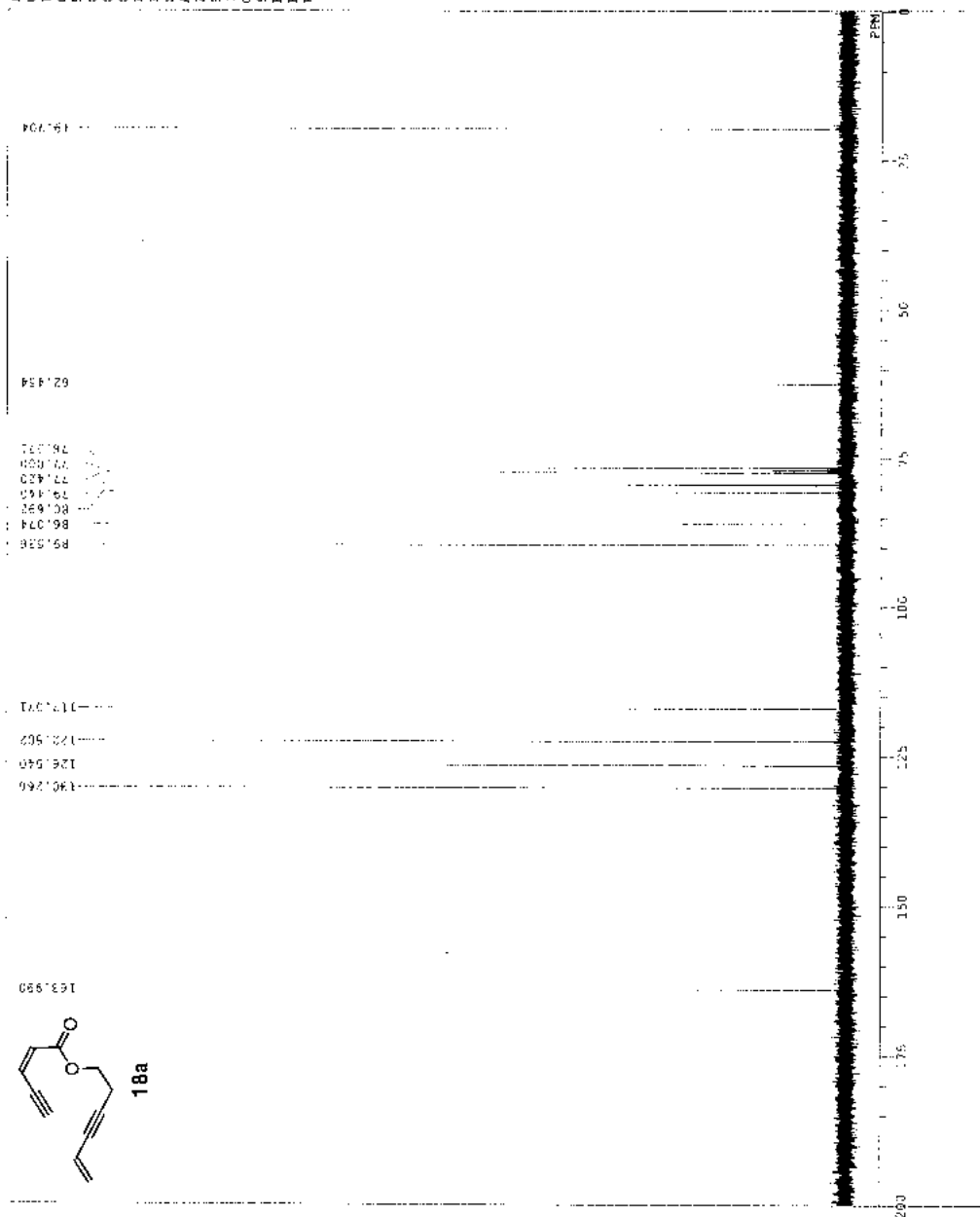
FILE: C:\WINNMR\DATA\17700001  
 COMPT: TR5571 bezh-analyse-PC  
 DAYTIM: Fri May 25 09:00:11  
 QMNUM: 15C  
 EXMNO: 80K  
 OBFREQ: 75.45 MHz  
 OBSET: 124.00 MHz  
 OFREQ: 1840.0 MHz  
 PCINT: 32768  
 FREQ0: 20408.1 MHz  
 SCANS: 512  
 ACQTH: 1.606 sec  
 PD: 1.194 sec  
 PM1: 4.0 dB  
 IRNHZ: 1H  
 CTEMP: 25.9 C  
 SLVNT: CDCL3  
 EXREF: 71.00 ppm  
 BF: 0.13 Hz  
 RGAIN: 25



DFLLZ U:\WINNMR95\COMBONV  
 CONST TFS0J six-normal-001  
 DATUM Wed Jun 06 09:16:10  
 SENSUC 1H  
 EXMOD NCM  
 OBSERQ 300.40 MHz  
 OBSFQ 130.00 KHz  
 ORPFTN 1150.0 Hz  
 PCINT 16384  
 FREQU 3300.3 Hz  
 SCANS 8  
 ACQTM 4.964 SEC  
 PD 1.551 SEC  
 PW 5.7 US  
 IRMUU: 1H 19.7 C  
 SLVMT CDCl3  
 XREF 7.24 ppm  
 BE 0.13 Hz  
 RGAIN 24



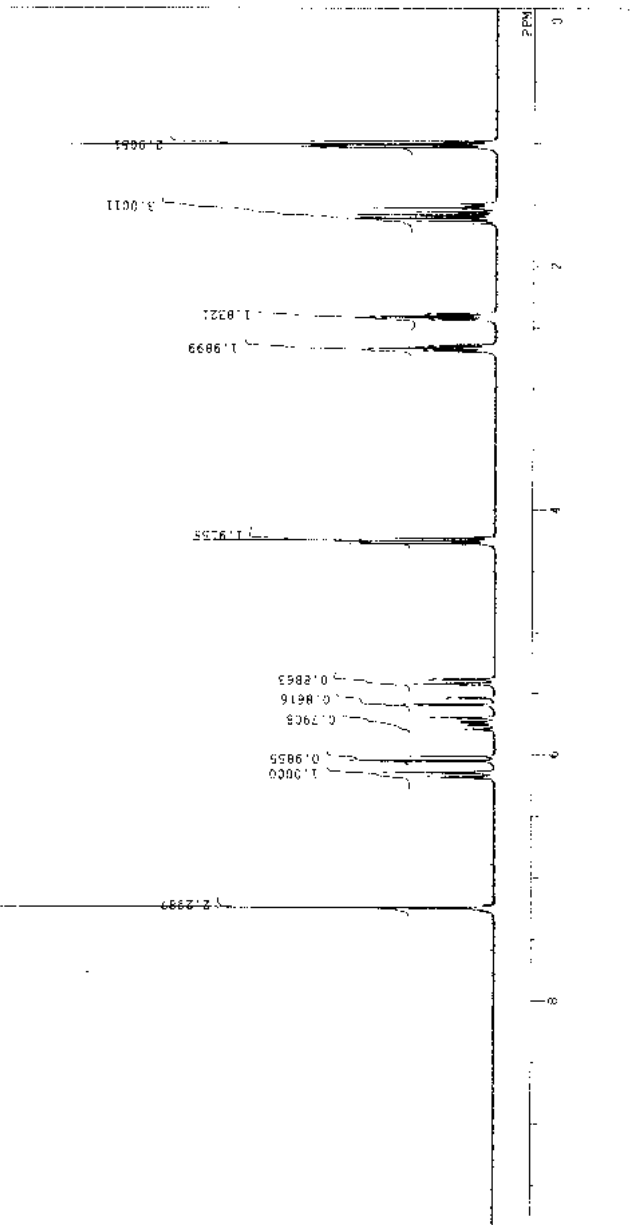
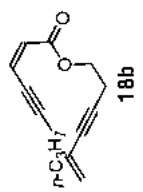
NAME: CALVINNEVA/COCAINE  
 COUNT: 14561  
 FILE: 316-113-0122  
 DATE: MON JUN 04 12:13:37  
 TIME: 12:13  
 OPERATOR: NCV  
 CHANNEL: 75.45 MHz  
 OBSERVE: 124.00 MHz  
 CRYSTAL: 154.00 MHz  
 PULPROG: zgpg30  
 FREQ: 200.00 MHz  
 SWH: 51.2 MHz  
 RES: 1.566 kHz  
 AQC: 1.294 sec  
 RG: 20  
 SFO: 4.0 MHz  
 DDC1: -RMC 1R  
 DDC2: 21.3 C  
 CTUNE: 0  
 STUNE: 0  
 EXREF: 17.00 ppm  
 BF: 0.13 MHz  
 RGAIN: 24



DT112 C:\WINNMR\EX\CONSON\  
 COMET TRSRT 81X-PY01-Pr  
 DNAME Thu Jun 07 17:16:14  
 OBSCD IH  
 EXNOCD NOK  
 ORPRQ 300.46 MHz  
 ORSFT 130.00 KHz  
 ORSTW 1.50.0 03  
 POINT 3.6B34  
 FREQU 33000.3 Hz  
 SCANS 0  
 ACQTM 4.964 sec  
 ED 1.051 sec  
 PD 3.3 us  
 PRNUC 1E 21.3 C  
 CTGHP U  
 SNAME C12CL3  
 EXREF 7.24 ppm  
 REF 0.113 Hz  
 RGAIN 25

2.898  
 2.891  
 2.874  
 2.67  
 2.67  
 2.651  
 2.644  
 2.442  
 2.434  
 2.419  
 2.411  
 2.395  
 2.388  
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 1.619  
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 1.528  
 1.046  
 1.019  
 0.987

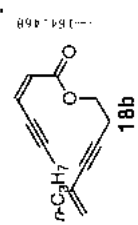
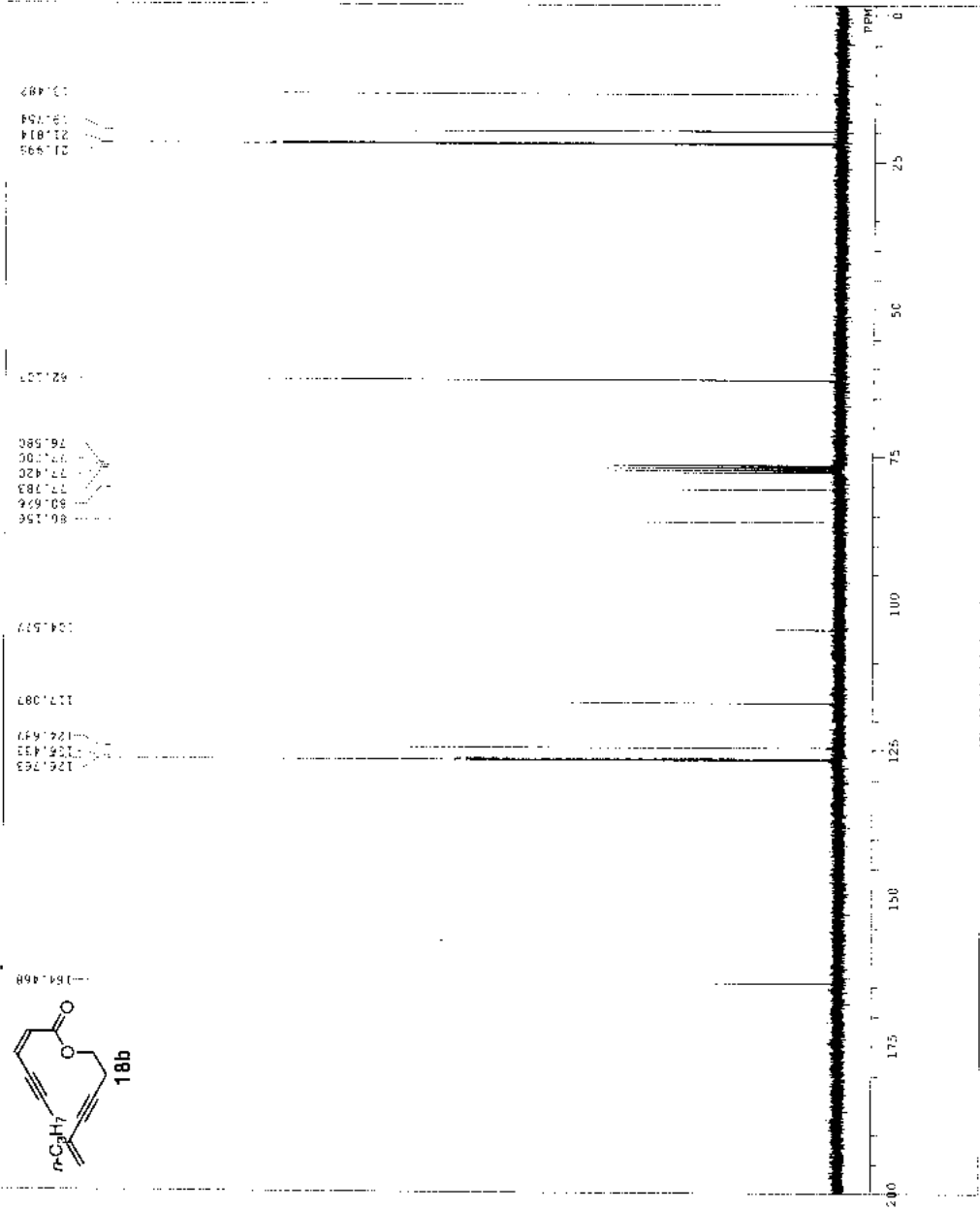
4.226  
 4.213  
 4.203  
 5.281  
 5.309  
 5.418  
 5.426  
 5.528  
 5.538  
 5.585  
 5.596  
 5.592  
 5.692  
 5.699  
 5.726  
 5.729  
 5.735  
 5.742  
 5.753  
 5.757  
 5.764  
 5.788  
 5.794  
 5.800  
 5.803  
 5.851  
 5.86  
 5.864  
 6.122  
 6.144  
 6.152  
 6.174  
 6.182  
 6.190  
 6.190



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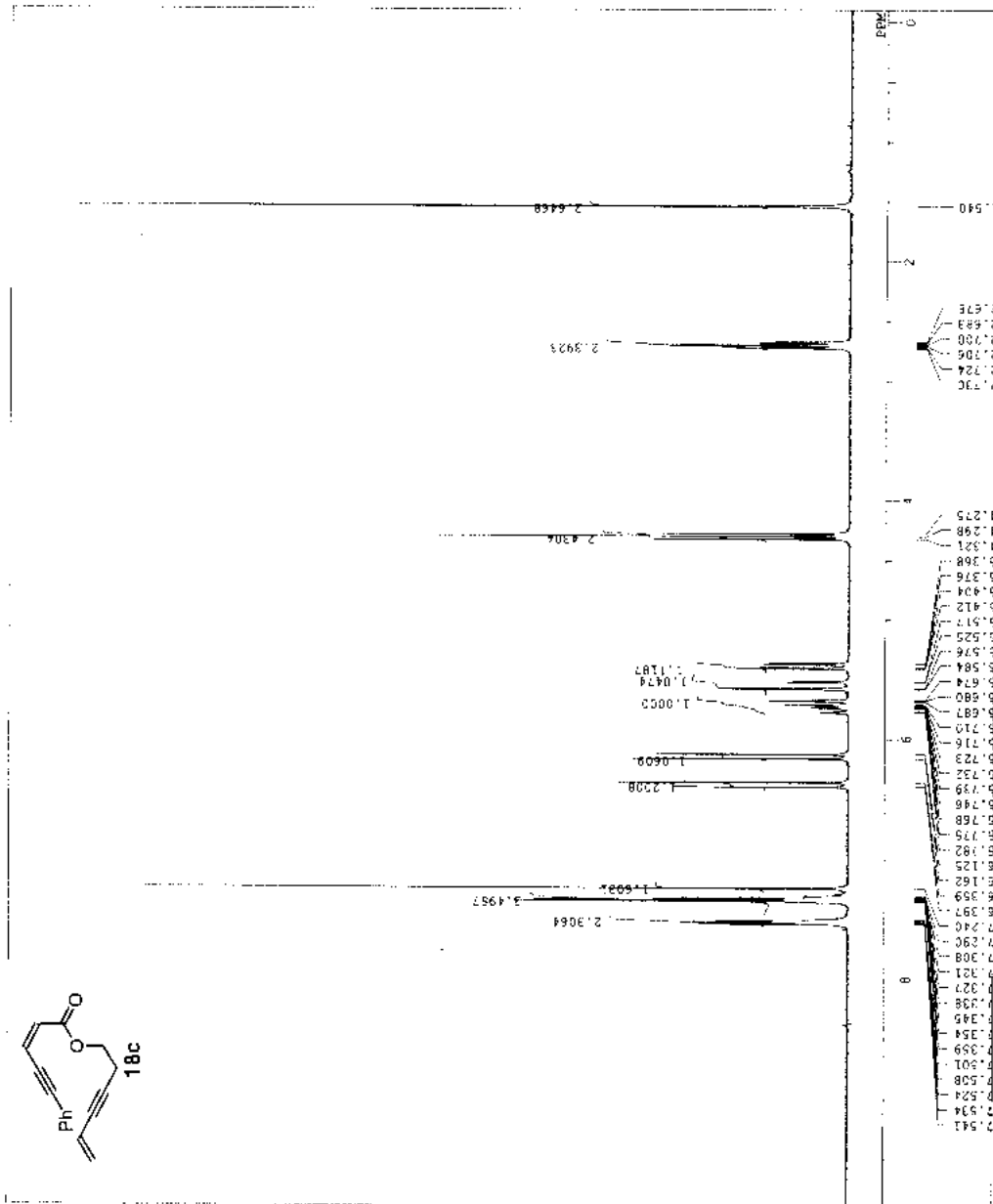
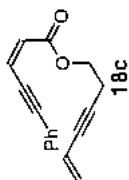
D7112 C:\MSDCHEM\COMMON\
EXPST TRK7 SIX-ethyl-Pe-
DATEM Thu Jan 07 13:03:49
ORNOZ 13C
SWMOC B0K
SOPRO 75.45 MHz
SBSLE 124.00 MHz
GRTLN 1840.0 Hz
FOLINZ 32768
SFREQC 20408.1 Hz
ACRANG 257
ACQTIM 1.506 sec
PC 1.794 sec
PWZ 4.0 us
TRMOC 1H 22.2 C
CTMMP
SLVRT C13K1.3 77.00 ppm
EXREF 0.13 Hz
RGAIN 24
    
```

176.753  
 175.431  
 124.637  
 124.577  
 117.087  
 104.577  
 86.156  
 80.656  
 78.183  
 17.420  
 17.305  
 17.190  
 76.580  
 62.127  
 21.998  
 21.814  
 19.754  
 12.489

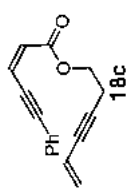
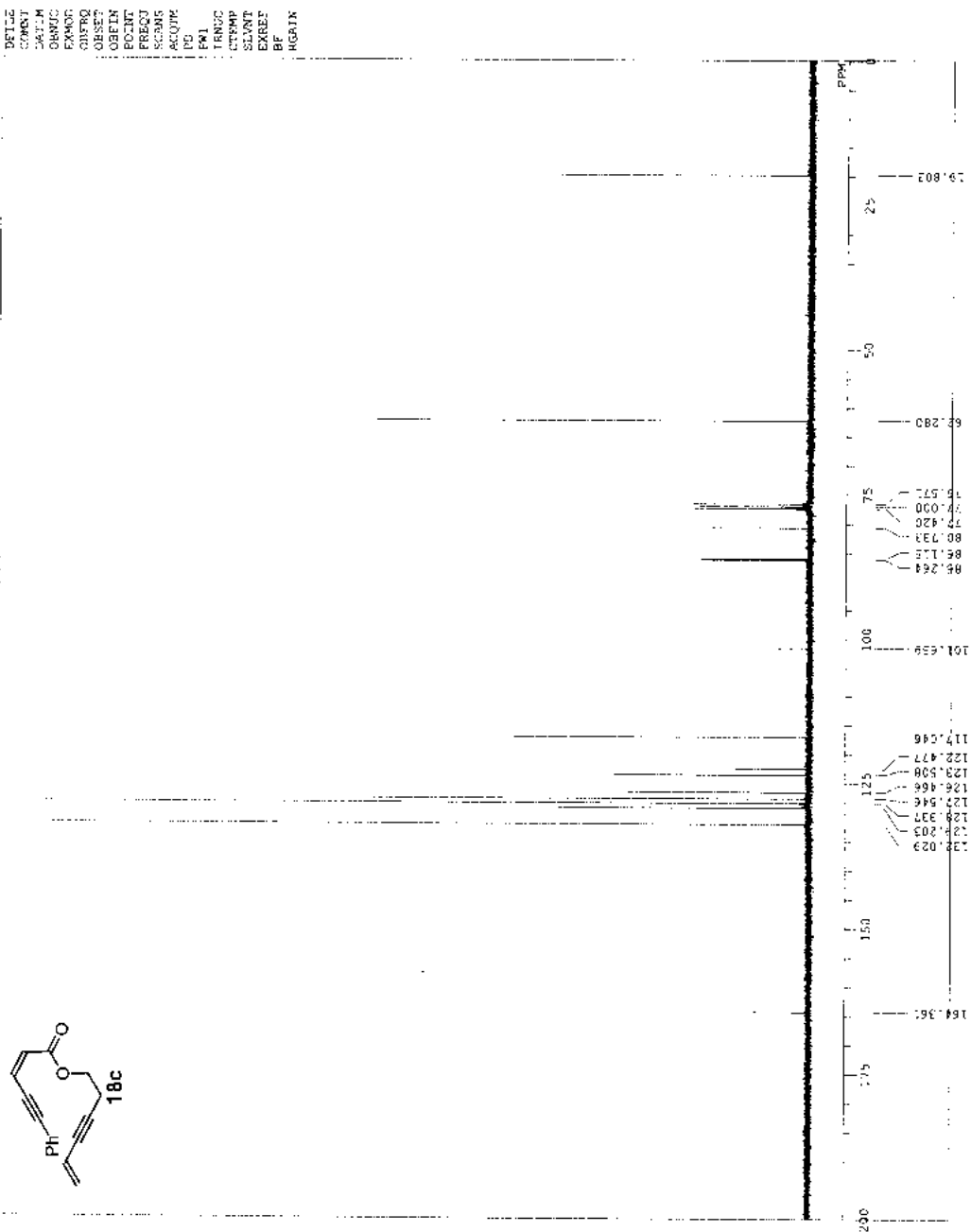




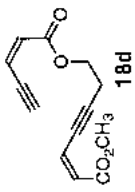
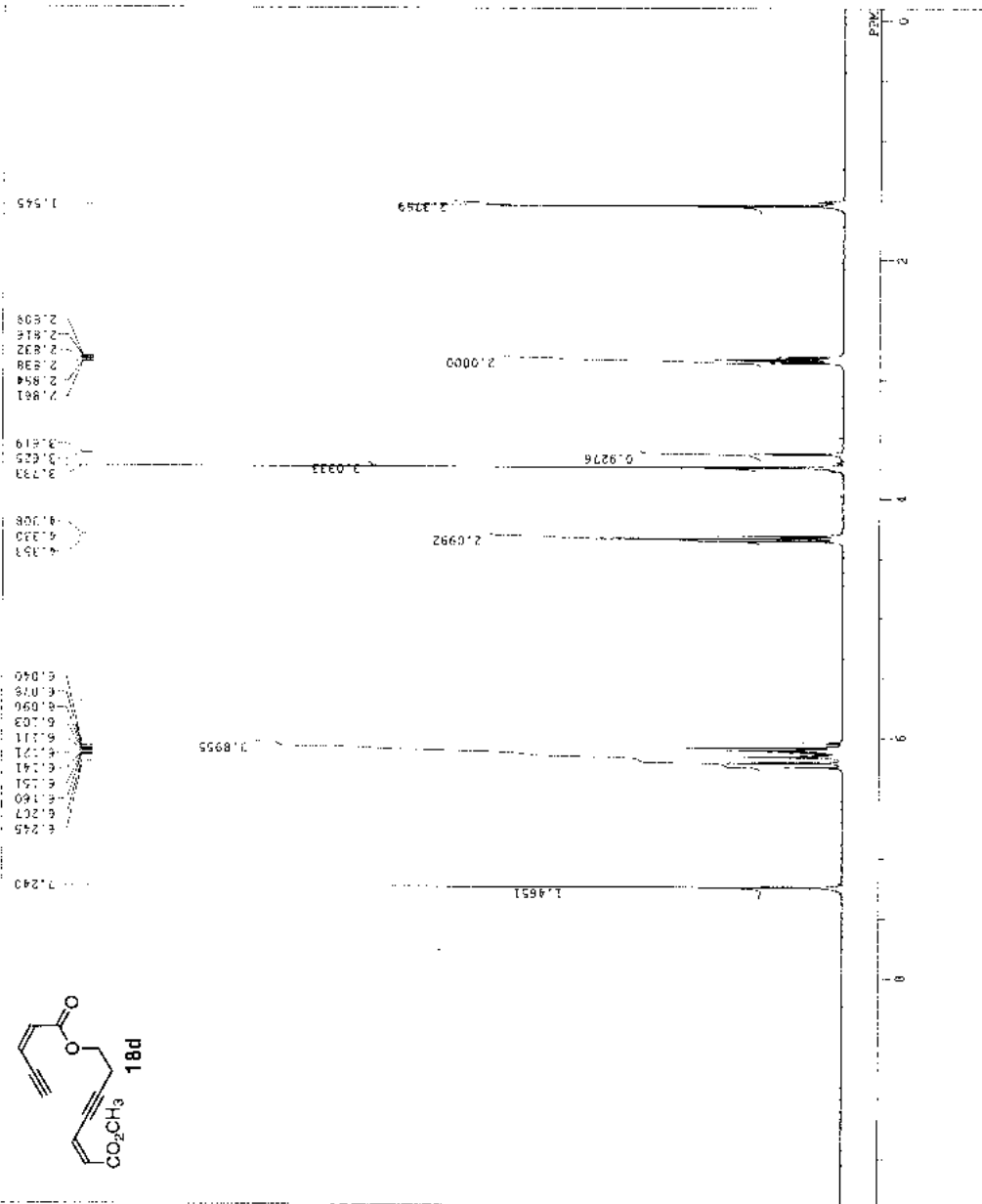
FILE C:\WINNMR94\COMPOX  
 COMPT I6570.sx enyde1-ph  
 DATIM Mon Jul 11 13:08:51  
 CHNUC J1  
 EXMOD NMR  
 OPERO 300.40 MHz  
 OBSRT 130.00 MHz  
 OFRN 1150.0 Hz  
 POINT -6.84  
 FREQ0 33001.3 Hz  
 SCANS 8  
 ACQTM 4.968 sec  
 PD 1.551 sec  
 PM1 5.3 us  
 LAMUC 1H  
 TEMPE 21.7 C  
 SOLVT CDCl3  
 STVNT CDC13 7.24 ppm  
 FARRF 0.13 Hz  
 BT  
 RGAIN 23



DE122 C:\WINNERS\COMMON\  
 COMBT 76570 8A8-01941-TH  
 DATE: Mon Jun 11 13:50:15  
 OBNO: 13C  
 EXNO: 625  
 CHFRQ 75.45 MHz  
 OBSFQ 124.00 MHz  
 OBSIN 1840.0 Hz  
 POINT 32768  
 PREQT 20408.1 Hz  
 SCANS 257  
 ACQTM 1.606 sec  
 PD 1.394 sec  
 PW1 4.0 us  
 TRNGC 1H 21.6 C  
 CTMPP  
 SLANT C12L3  
 EXREF 77.00 ppm  
 BF 0.13 Hz  
 NGAIN 25

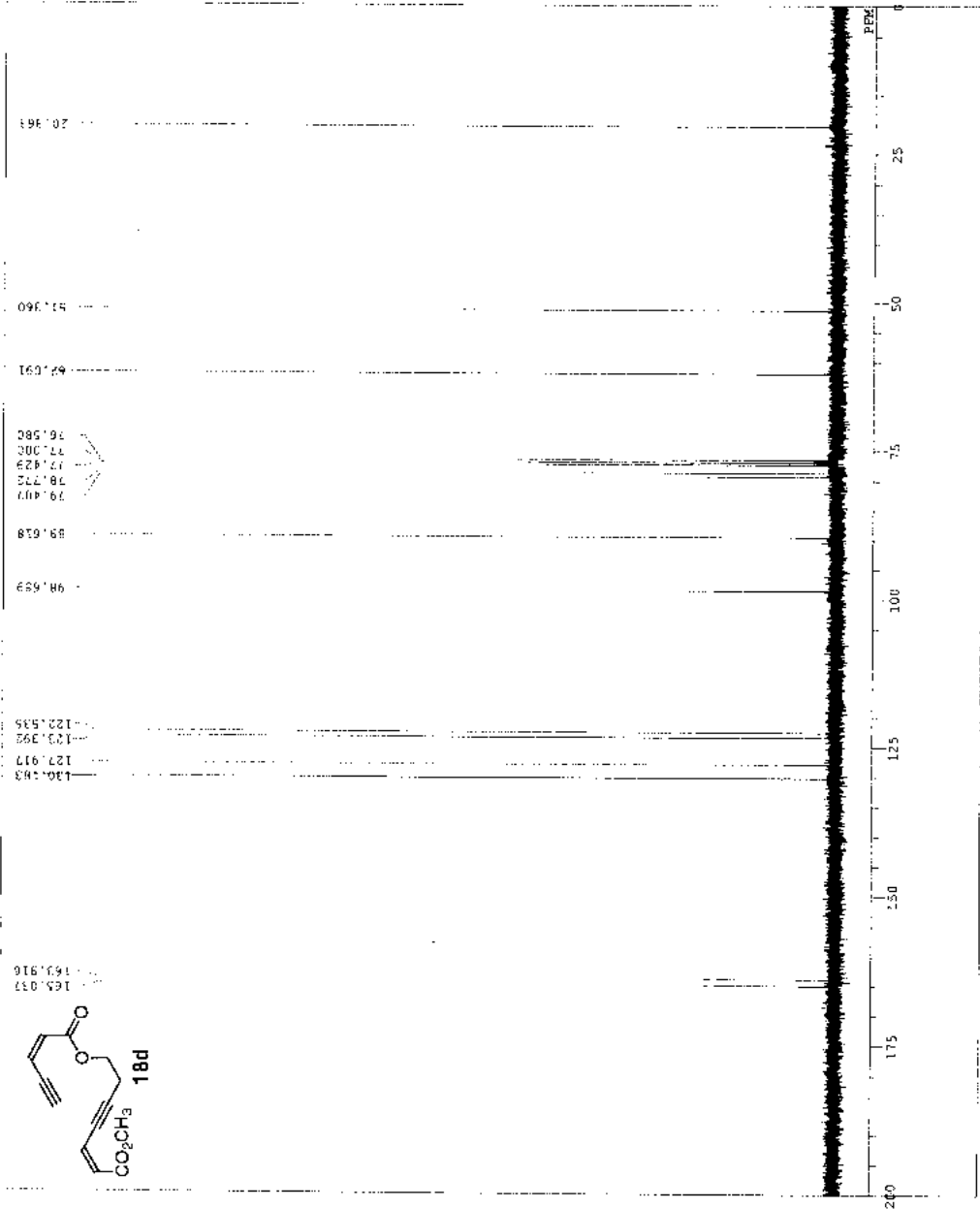


DPLEK C:\WINNMR9\COMPOV\  
COMPT T6586 six-ethyl-1-  
DATE Thu Jun 28 12:30:15  
CNAME 1H  
SOLMOD NON  
SOLPRO 300.140 MHz  
OBSETO 170.00 MHz  
OBSFREQ 1146.0 Hz  
POINT 16384  
PRTQID 3300.3 Hz  
SCANS 8  
ACQVM 4.964 sec  
PD 1.551 sec  
PWL 5.3 us  
JRNOC 1E  
CTEMP 21.3 C  
SOLVNT (CDCl3)  
EXREF 7.24 ppm  
RF 0.13 Hz  
RGAIN 23

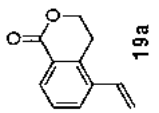
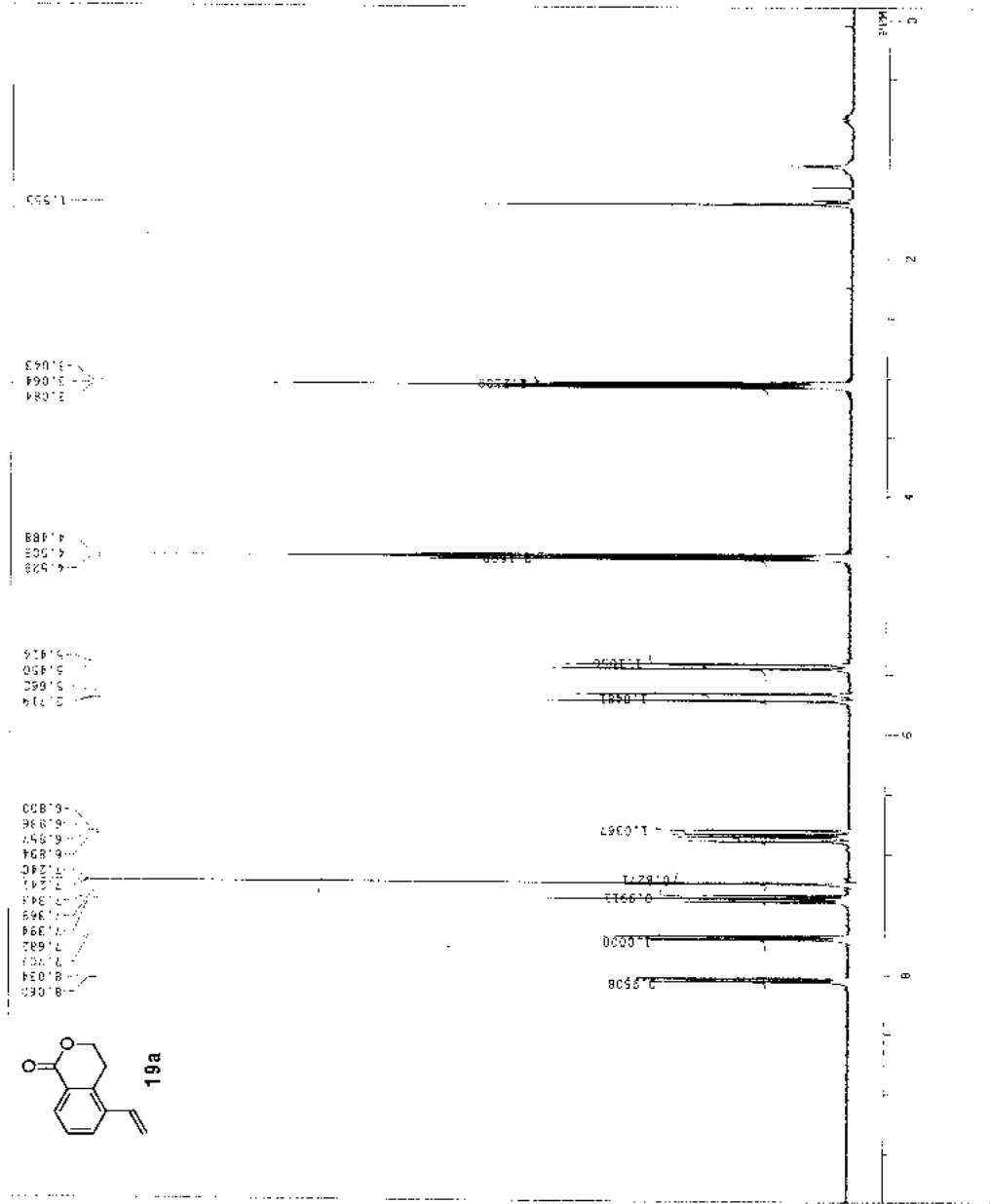


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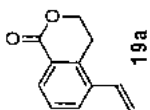
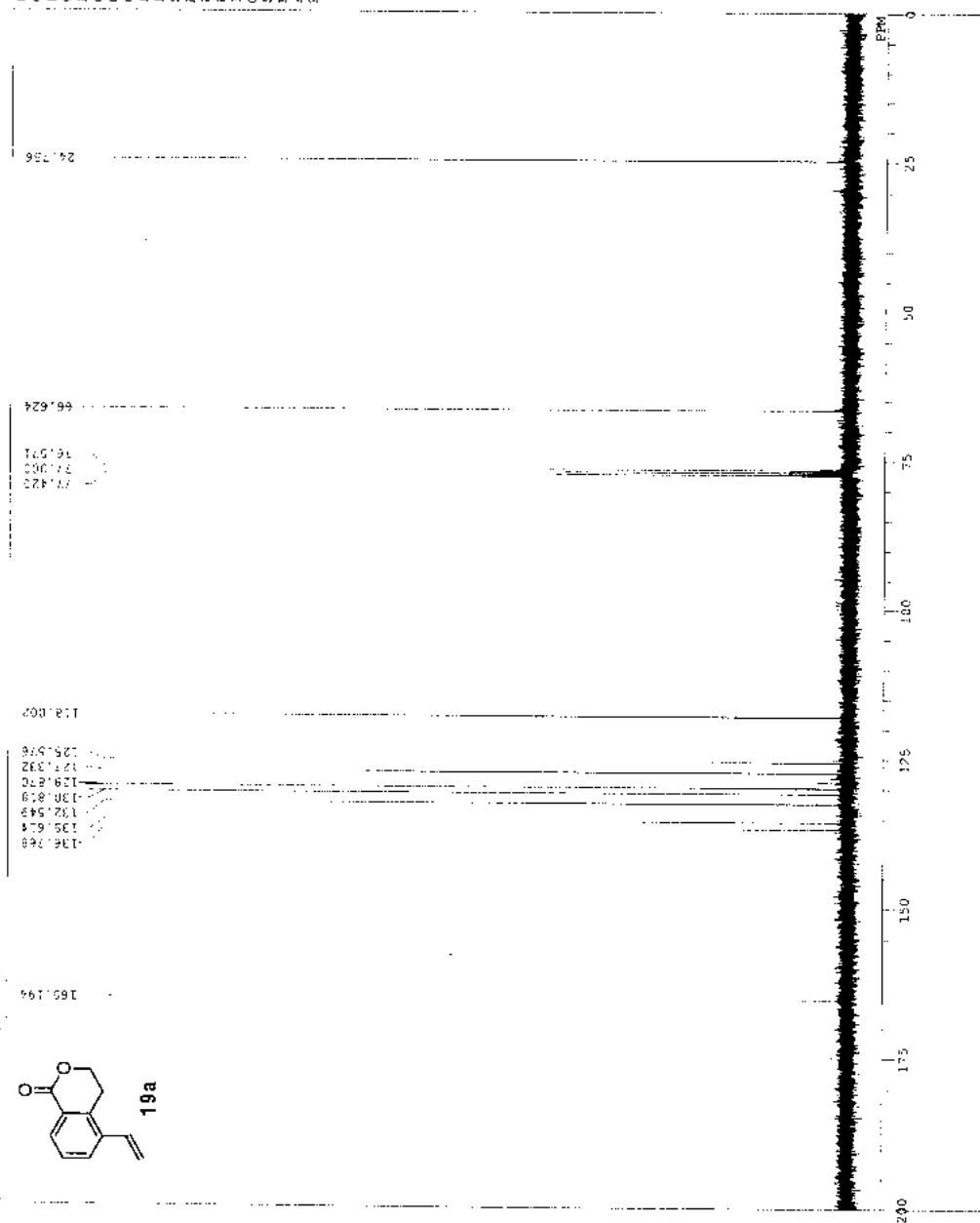
DFT14: C:\NMR\0695\COMPOX
COMP: 08588 818-epoxide-3-4
DATE: Thu Jun 28 12:56:29
ORNUC :AC
EXMCTD BCM
OHPRQ 75.45 MHz
OBSET 124.00 MHz
OBFIN 1340.0 Hz
POINT 32768
FR300 20408.1 Hz
SCANS 357
ACQTM 1.606 sec
ZD 1.394 sec
PWL 4.0 us
--RNOC 2H
CTIMP 21.9 G
SIVNT C101.3
EXREF 17.00 ppm
PF 0.15 Hz
RGAIN 24
  
```



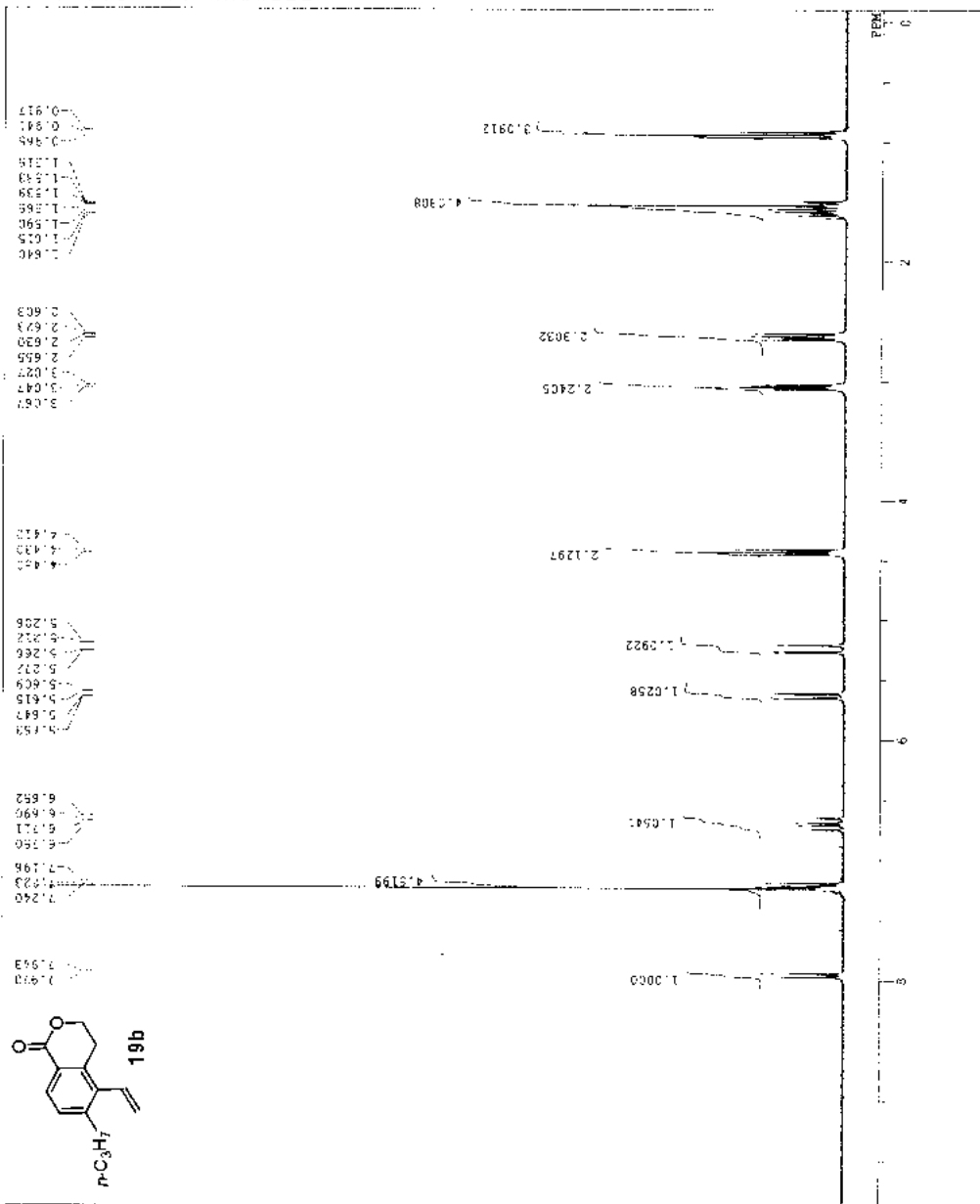
01116 C:\NMR\83\ACR0001  
 70564 91X-Benz-normz  
 Mon Jun 04 20:31:24  
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 2.0000000000000000  
 3.0000000000000000  
 4.0000000000000000  
 5.0000000000000000  
 6.0000000000000000  
 7.0000000000000000  
 8.0000000000000000  
 9.0000000000000000  
 10.0000000000000000  
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 100.0000000000000000



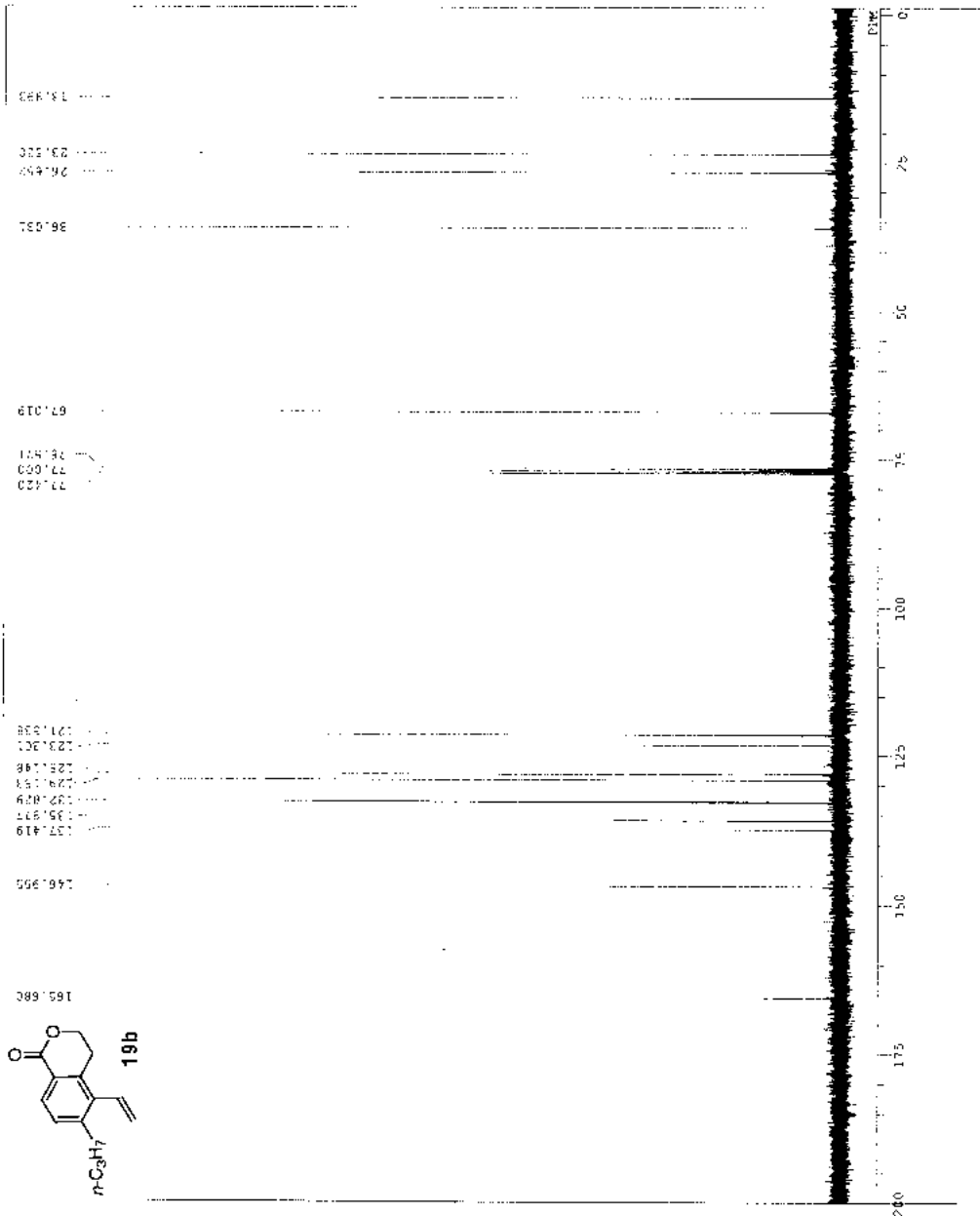
DP-116 C:\NMR\95\521\K2M4  
 CQ00C 18264 six 600z-norm  
 PACTM Tue Jun 05 09:00:17  
 NUC1: 13C  
 EXWID: 80K  
 OBSFQ 75.45 MHz  
 OBSRT 124.00 MHz  
 OBSF1 1640.0 Hz  
 PULPT 32.768  
 PRG00 23456.1 Hz  
 SCANS 757  
 ACQTM 1.616 sec  
 PD 1.194 sec  
 PM 4.0 us  
 EXNUM: 1# 21.2 G  
 CTBMP  
 SLOWI CDCL3  
 EXREF 77.00 ppm  
 SF 6.12 Hz  
 RGAIN 24



C:\NMR\1993\COMMON\  
 :COMPT 74568 s14-2x1z-enyph  
 :Y11 run 08 11:49:20  
 :SOLVENT CDCL3  
 :INSTRUM spect  
 :PROBHD 5mm QNP 1H  
 :PULPROG zgpg30  
 :TD 65536  
 :SFO 300.13  
 :AQ 4.364 sec  
 :RG 1.551 sec  
 :SD 5.3 us  
 :PC 1  
 :IRPRG1 1H  
 :IRPRG2 21.0 C  
 :C12PRG1 zgpg30  
 :SOLVENT CDCL3  
 :EXPTNT 7.24 ppm  
 :BF 0.13 Hz  
 :RGAIN 25

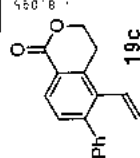
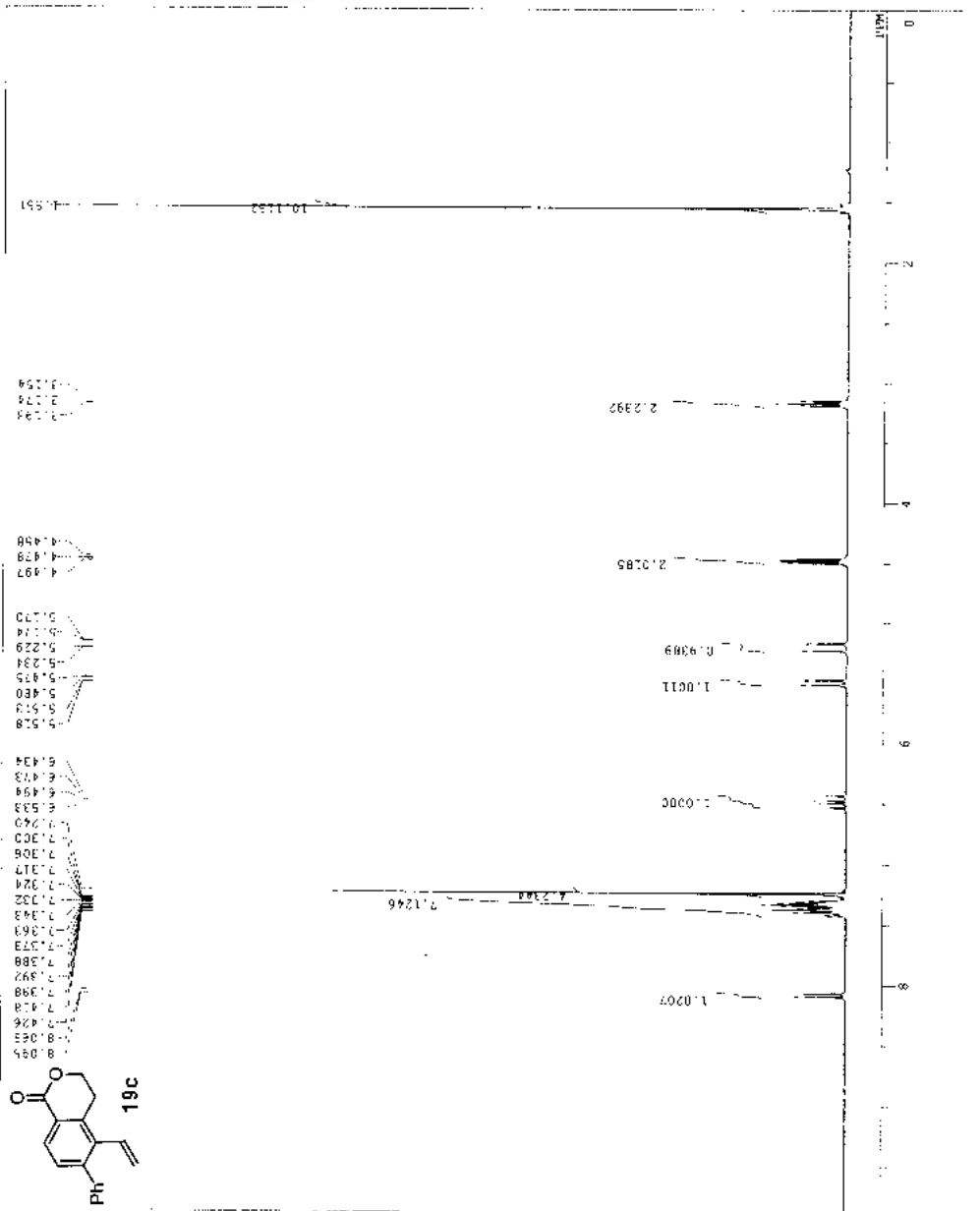


FTIR C:\NMR\DATA\COMPOUN...  
 COMPT TK068 5:2 benz acety...  
 DATALM F11 Jun 08 14:25:45  
 OBRCO 1JC  
 EXPOSU 3CM  
 OBSFRQ 75.45 MHz  
 OBSSET 124.00 MHz  
 OBSF1N 340.0 Hz  
 PULST 32760  
 PRFQD 20400.1 Hz  
 ACQUIS 1.280  
 ACQTH 1.506 sec  
 ED 1.354 sec  
 SWH 4.0 MHz  
 CHRGU 1H 21.1 C  
 CTUNG 1.000  
 SLANG CDCL3  
 EXREF 75.00 ppm  
 RP 0.10 Hz  
 RGAIN 25



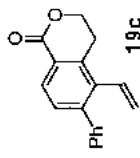
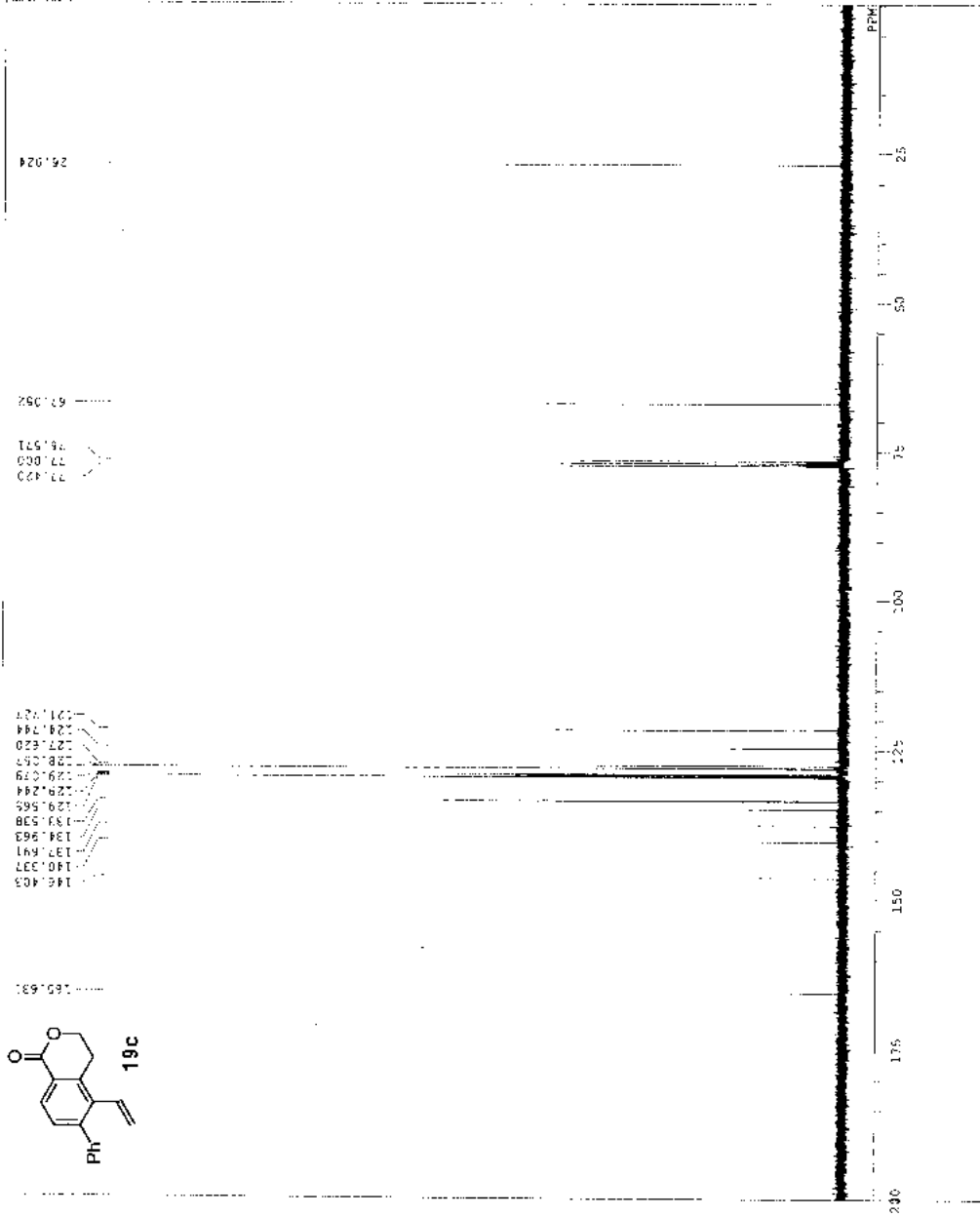


FILE C:\FTIR\95\COMMON\  
CONNT T6572 SIX 6002-C19C  
DATEI Mon Jun 18 18:47:15  
ORHDC 1H  
EXPRO NON  
OBTRQ 300.40 MHz  
OBSET 138.00 MHz  
OBFIN -150.0 Hz  
POINT 163B4  
FREQD 3300.3 Hz  
SCANS 8  
ACQTM 4.964 sec  
PD 3.501 sec  
PMT 5.3 us  
-RNUC 1H  
CTEMP 19.7 C  
SIVNT CDCL3  
EXREF 7.24 ppm  
HF 0.13 Hz  
RGAIN 23

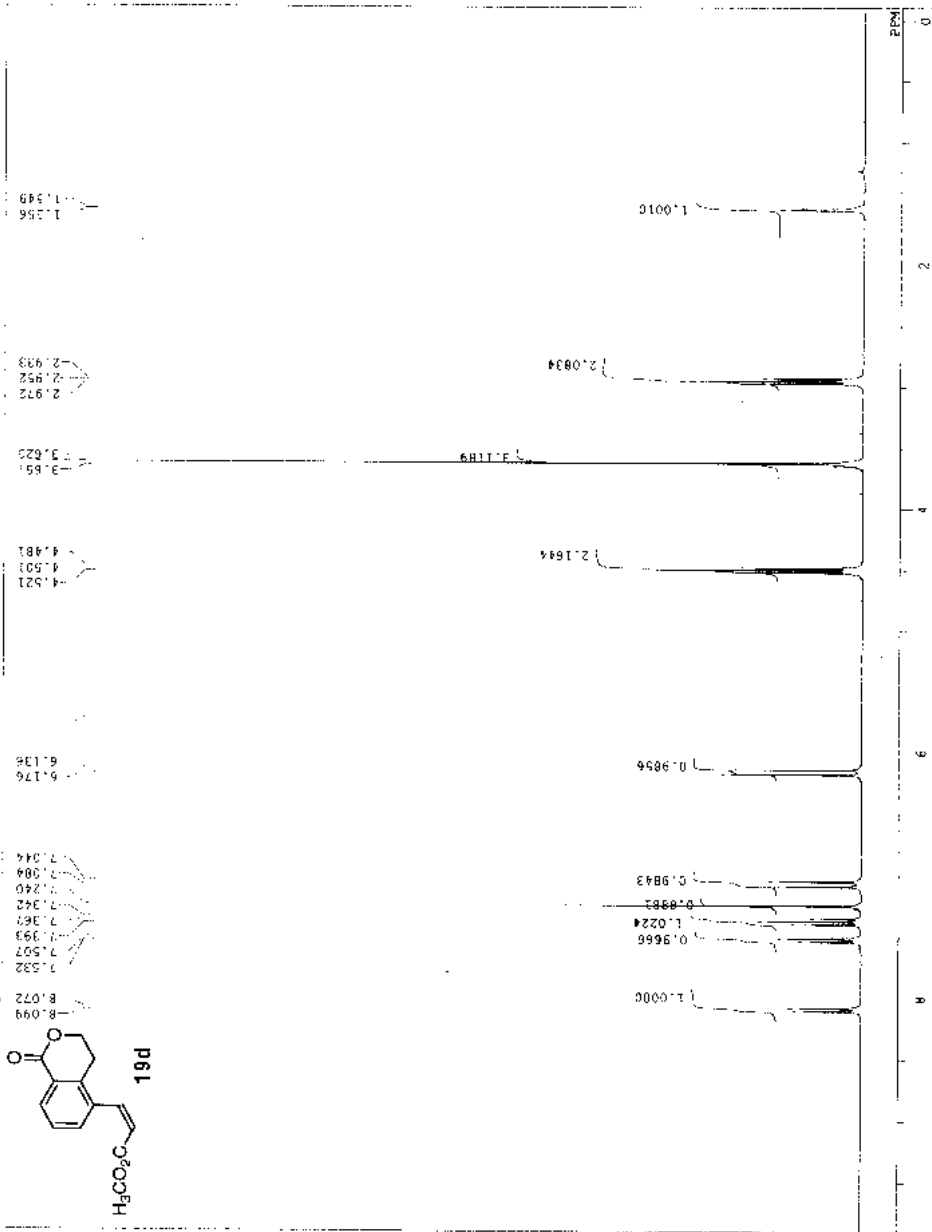


C:\MTRM95\COMMON\1  
 COUNT 1K272 414-benz\_0510  
 Mon Aug 15 19:11:33  
 DATE 17C  
 CHANNEL BCM  
 OBSERV 75.45 MHz  
 OBSSET 124.00 MHz  
 OBSPIN 1846.0 Hz  
 POINT 32768  
 FREQ0 20408.1 Hz  
 SCANS 457  
 ACQTIM 1.606 SEC  
 PD 1.394 SEC  
 PW 4.0 USEC  
 PRNDL 1H  
 CTEMP 20.3 C  
 STVNT CCLD3  
 EXREF 77.00 PPM  
 BF 0.19 Hz  
 SGAIN 24

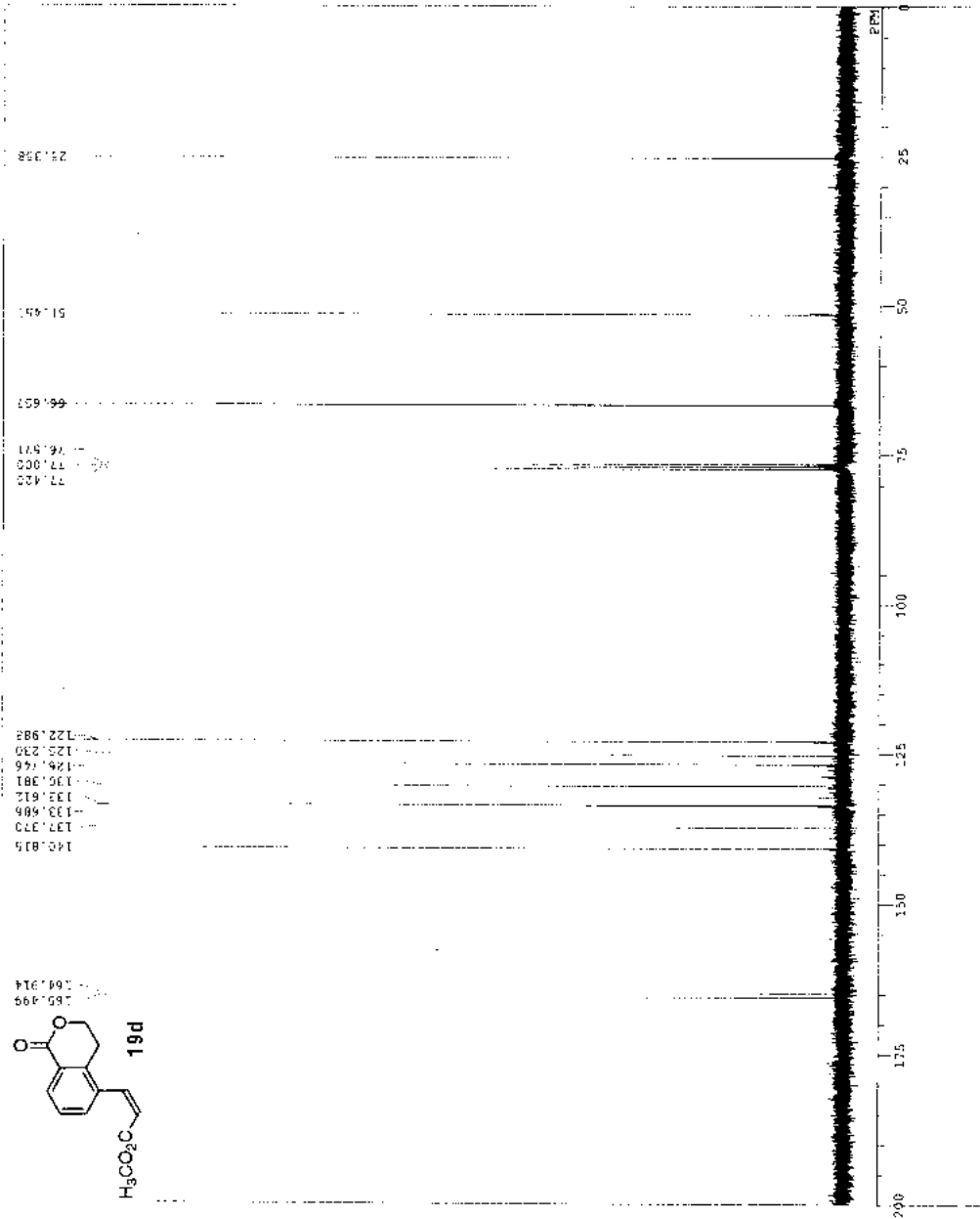
D:114  
 DATIM  
 CHANNEL  
 EXREF  
 OBSERV  
 OBSSET  
 OBSPIN  
 POINT  
 FREQ0  
 SCANS  
 ACQTIM  
 PD  
 PW  
 PRNDL  
 CTEMP  
 STVNT  
 EXREF  
 BF  
 SGAIN



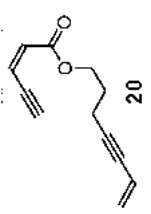
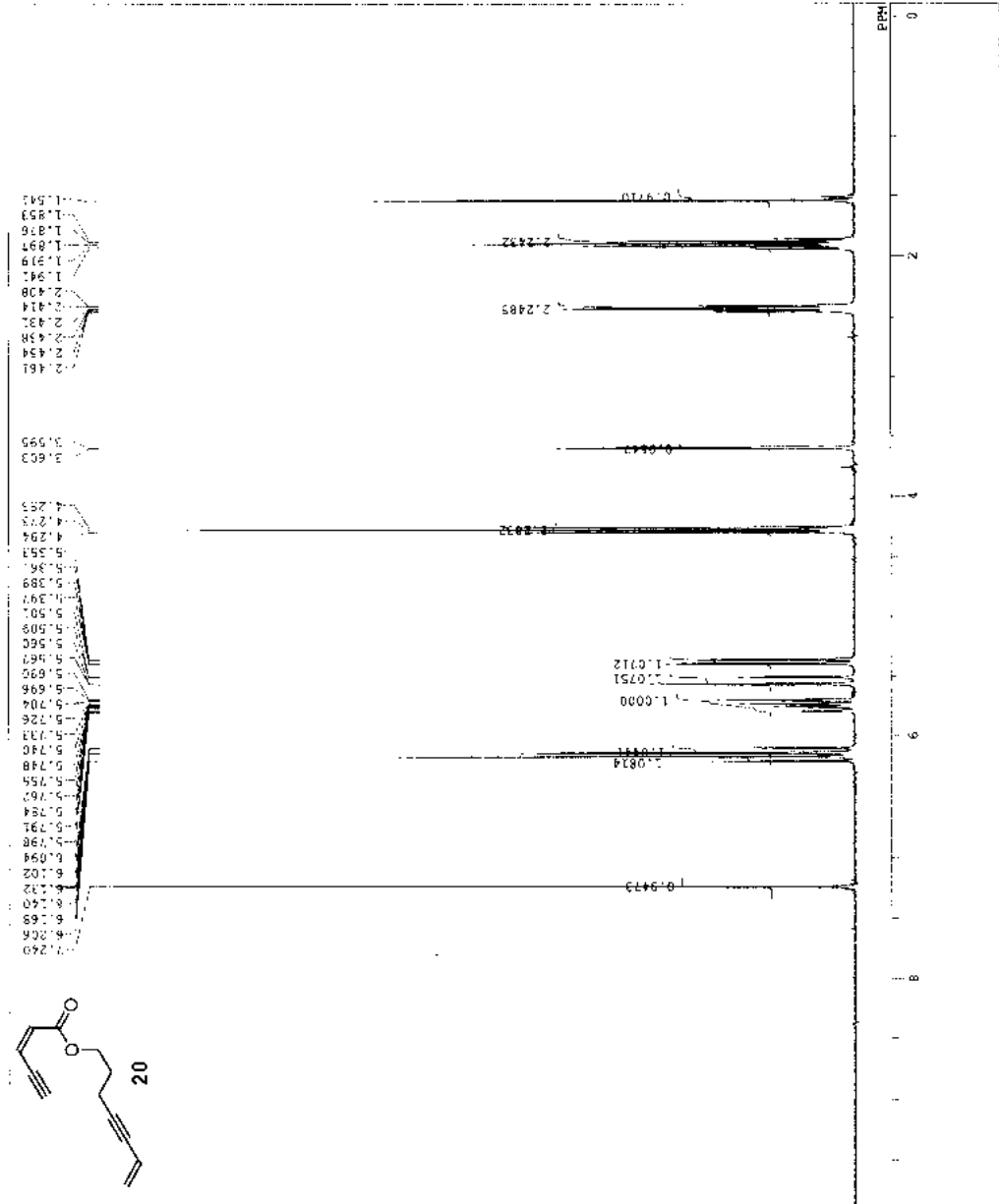
19136 C:\WINNERS\COMMON\  
 COMST 76589 benz-6ix-609h  
 DATEM Tue Jul 03 12:16:18  
 CHANNEL 1H  
 EXMNOI MOE  
 FREQO 300.40 MHz  
 OBSRT 130.00 MHz  
 OBSFL 1150.0 Hz  
 POINT 16354  
 PRMOC 3300.3 Hz  
 SUPRS 8  
 ACQTM 4.964 sec  
 PD 1.551 sec  
 PKI 5.3 us  
 IRANGC III  
 CTMPP 21.5 C  
 SVANT C12L3  
 EXREF 7.24 ppm  
 BF 0.13 Hz  
 RGAIN 21



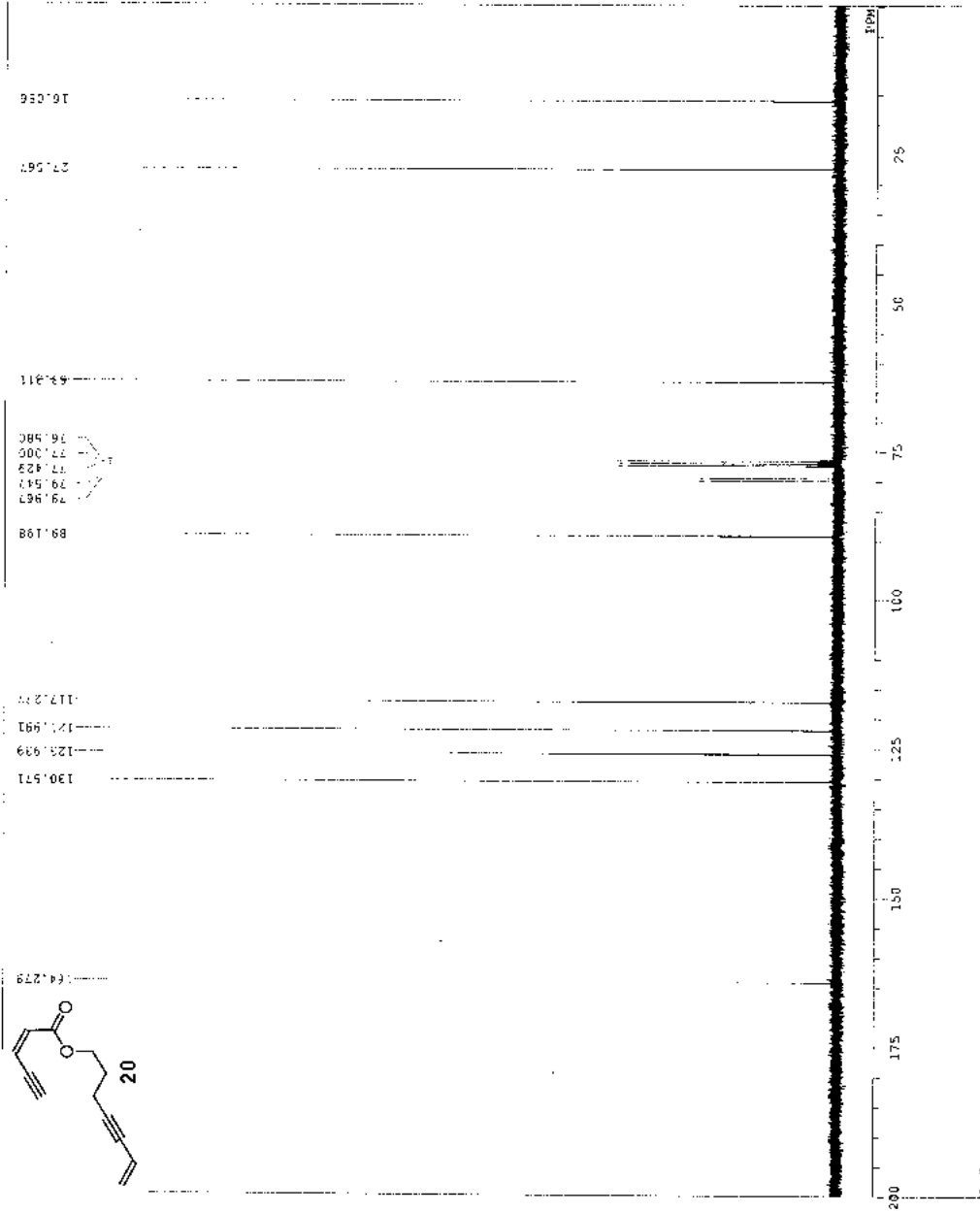
DETILE C:\WINNMR5\COMMON\A  
 COMNT TR583 benz-six-nyox  
 DATUM 5:1 Jun 29 17:55:03  
 OBNUC 13C  
 EXMNO BOM  
 OBFRQ 75.45 MHz  
 OBPRG 124.00 KHz  
 OBPRN 1640.3 Hz  
 POINT 32768  
 PRELU 20408.1 Hz  
 SCANS 281  
 ACQTM 1.606 sec  
 PR 1.394 sec  
 PW 4.0 us  
 IRMCC 1H  
 CTIME 22.4 C  
 SOLVT CUC13  
 EXREF 77.00 ppm  
 SF 0.13 Hz  
 RGAIN 24



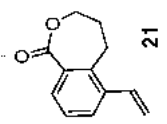
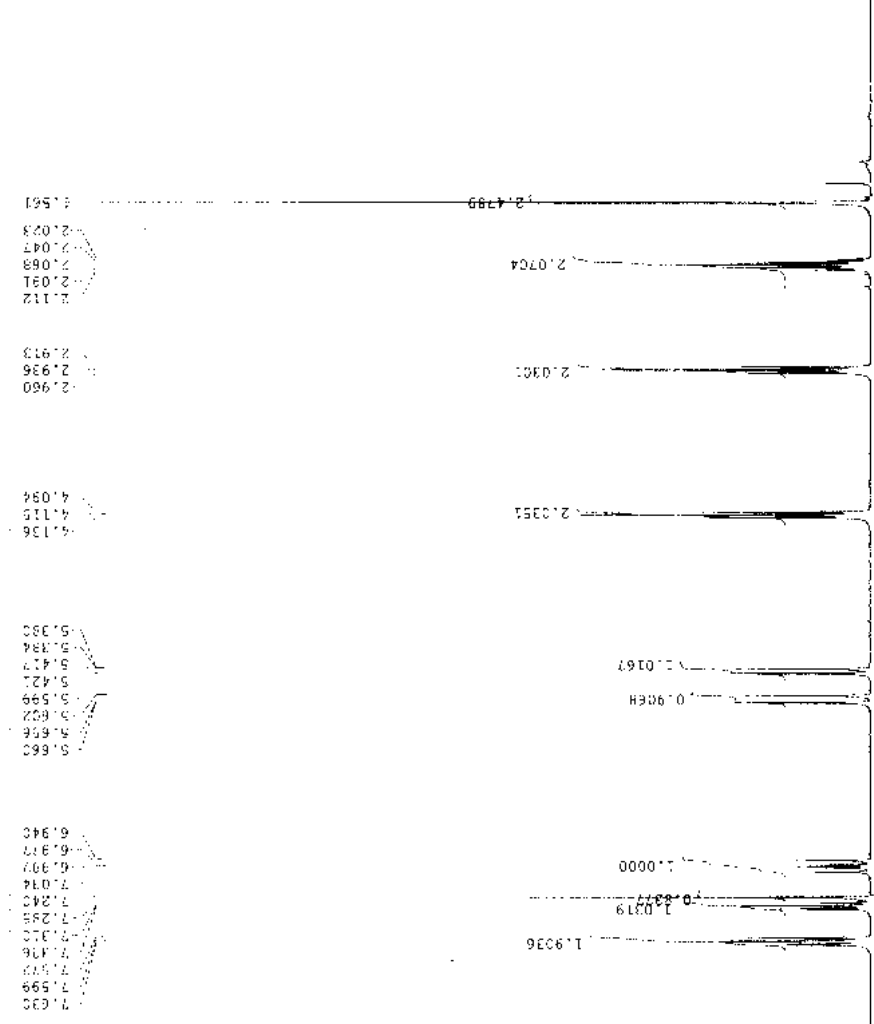
FILE C:\WINNMR9\1\COMPAK\  
 COMP1 TK601.T 100MHz  
 LQ101K Mon Jul 09 17:49:42  
 ORNUC 1F  
 EXMUL NCM  
 EXMRO 330.45 MHz  
 OBSKT 130.00 MHz  
 OBSIN 1150.0 Hz  
 POINT 16384  
 FREQI 3300.3 Hz  
 SCANS 8  
 ACQTM 4.964 sec  
 PR 1.553 sec  
 PW 5.3 us  
 TRNUC 2R  
 CTEMP 20.5 C  
 SOLVT CACLI3  
 SUMP 7.24 ppm  
 RXREF 0.13 Hz  
 RF 23  
 RGAIN



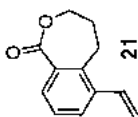
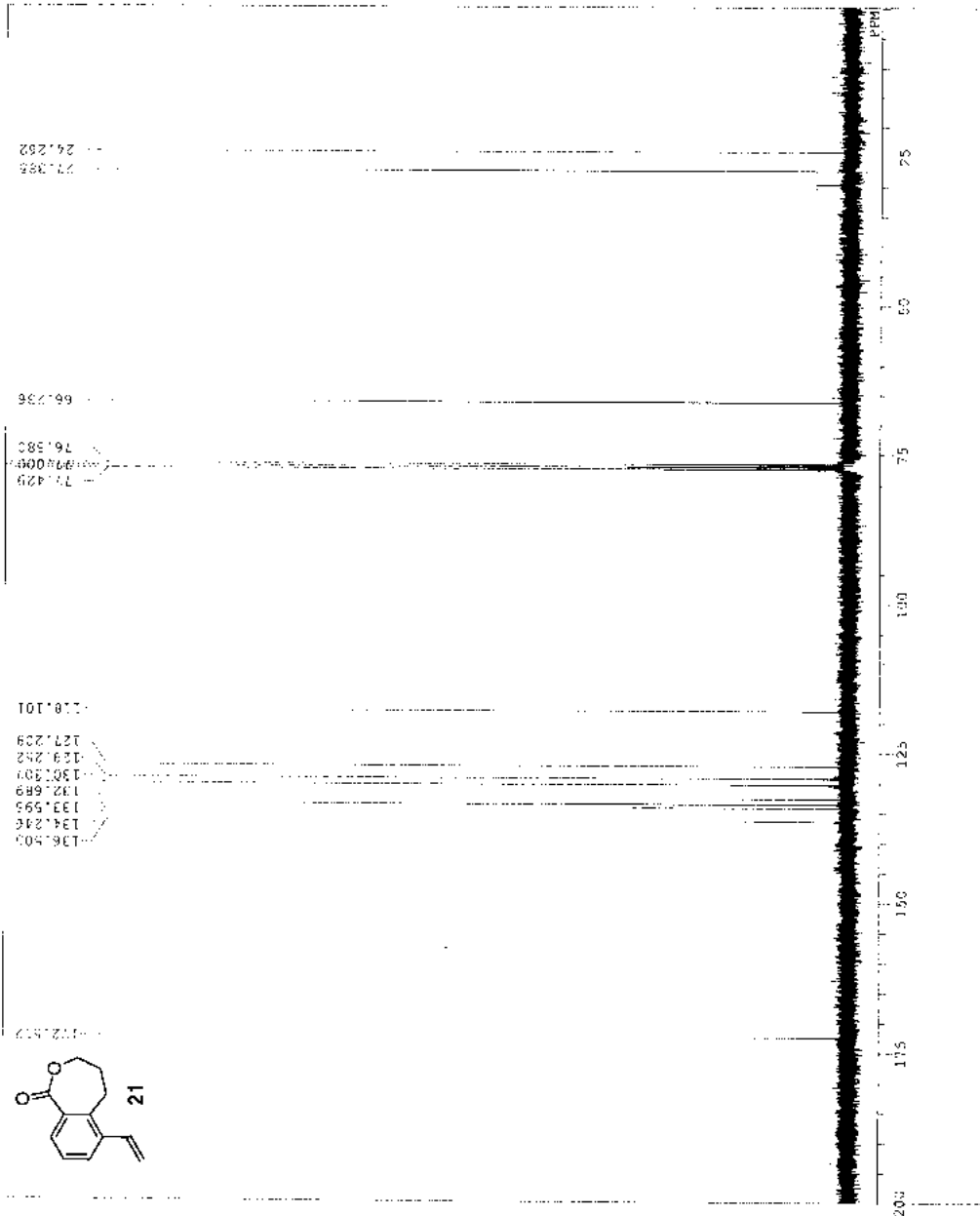
FILE: C:\WINNERS\COMBAY\  
 COMPT 76601 7-Normal-H  
 DATE: Mon Jul 09 17:19:49  
 CRUDC 13C  
 PRMOD BPM  
 CONFO 75.45 MHz  
 OBSER 174.00 KHz  
 OBSFN 184.00 Hz  
 POINT 32768  
 PREGU 20405.1 Hz  
 SCANS 257  
 ACQTM 1.606 sec  
 ED 1.394 sec  
 PWL 4.0 us  
 TRMUC 1H  
 CTMPC 21.5 C  
 SLVNT C12CL3  
 EXREF 77.00 ppm  
 BF 0.23 Hz  
 RGAIN 25



CPVTNRMR5ACOMMO  
 COMPT TR606-1 seven  
 DATM Thu Jul 26 20:12:  
 ORNOC 1H  
 EXMOC NCM  
 CPFRQ 300.60 MHz  
 CQEST 150.00 MHz  
 CQF1K 150.00 Hz  
 FOLNT 16384  
 FRZOC 3300.3 Hz  
 SCZKS 8  
 ACQTM 4.964 sec  
 PD 1.551 sec  
 PVI 5.3 05  
 IRRUC 1H  
 STMP 27.8 C  
 SLVNT CCl4  
 EXREF 7.26 ppm  
 BF 5.13 Hz  
 RGAIN 22

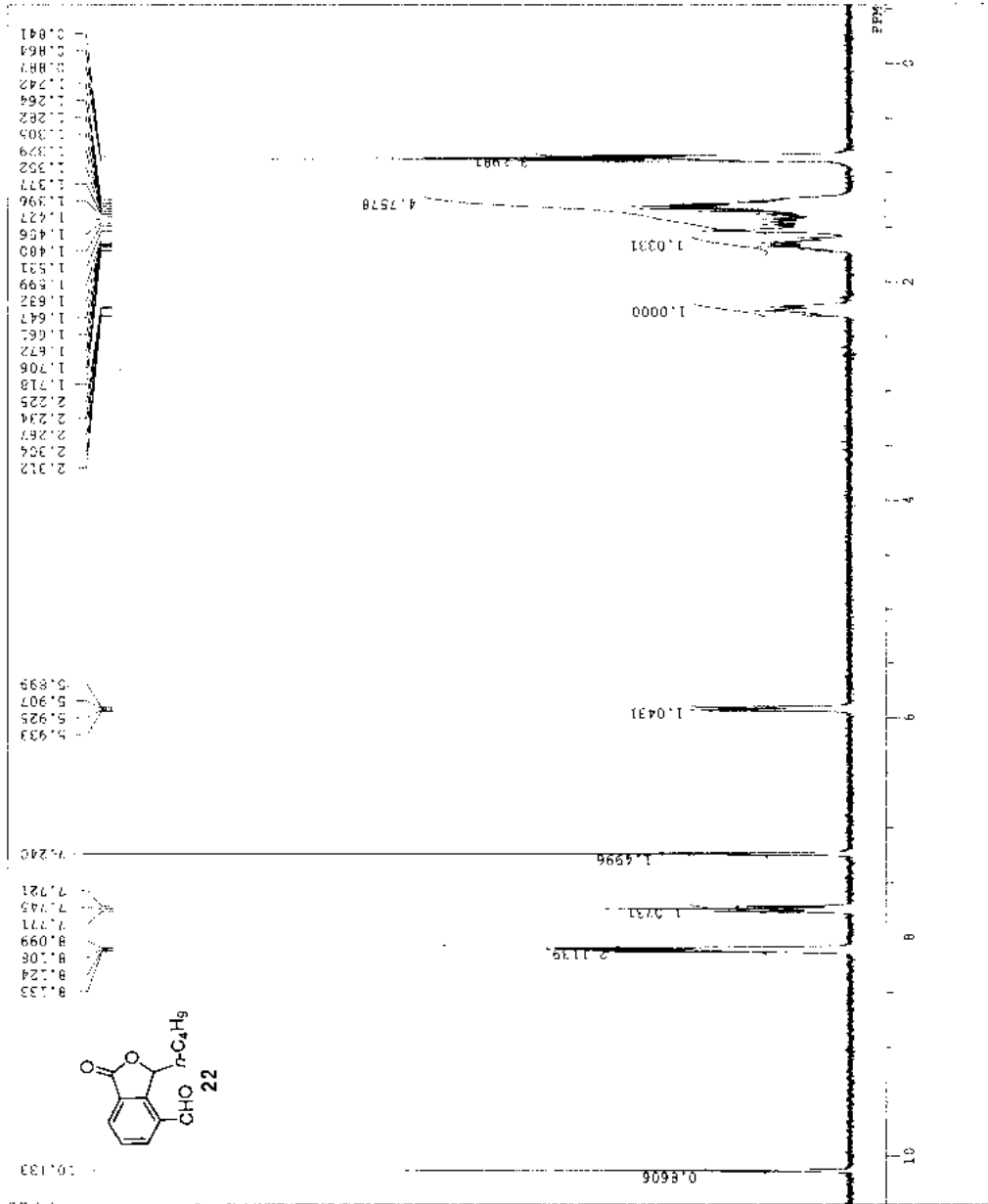


DFILE C:\WINNMR5A\COMB0  
 COMPT CR628 sever-bch2  
 DATIM Sat Jul 28 07:01:  
 OBRUC 13C  
 EXMOC BFM  
 OBRQC /n.45 MHz  
 OBRFT 124.00 KHZ  
 OBRFLN 1840.0 HZ  
 POINT 32168  
 FREQU 20466.1 Hz  
 SCANS 2048  
 ACQTM 1.606 sec  
 PD 1.394 sec  
 PW1 4.0 us  
 FSRNIC 1F  
 CTEMP 20.3 C  
 SLVNT CDCl3  
 EXREF 77.00 PPM  
 BY C. L. H.  
 R5AIN 24

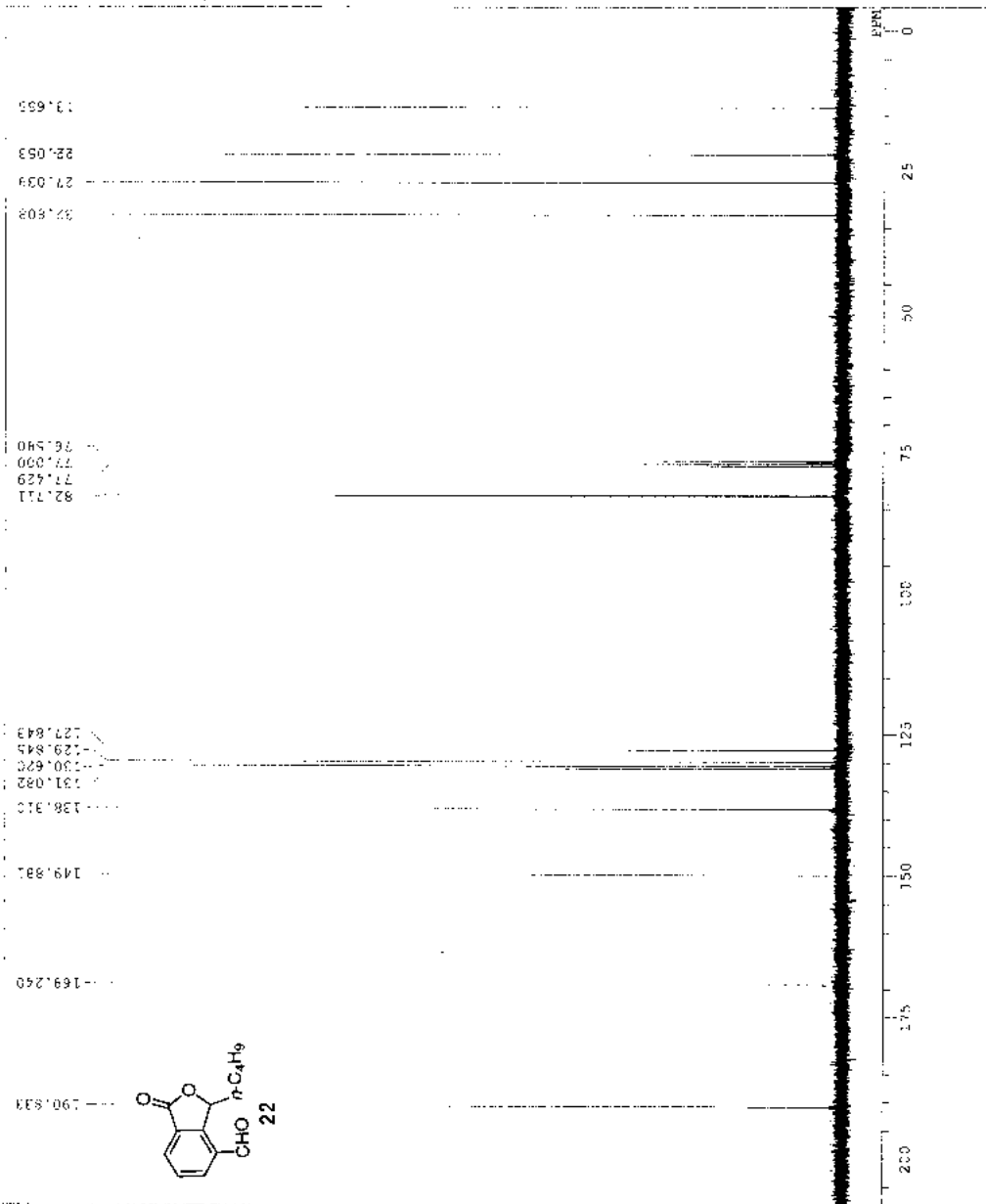




C:\WINNMR95\COMMON  
 COMPT TKYOH aldehyde  
 DATIM Thu Oct 18 15:20:  
 ORNUC 1H  
 EXMOD NON  
 ORPRO 300.40 MHz  
 ORSET 130.90 KHz  
 ORFTN 1150.0 Hz  
 PGLRT 16334  
 FREQU 3300.13 Hz  
 SCANS 8  
 ACQTY 4.964 sec  
 PB 1.55 sec  
 PW1 5.3 us  
 IRNUC 1H  
 CTEMP 22.3 C  
 SIVNT CDCl3  
 EXREF 7.24 ppm  
 BF 0.12 Hz  
 RGATN 24



CPDLE C:\WINNMR95\321\X  
 COMPT TR708 B1-a-dehyd  
 DATEM Thu Oct 18 15:29:  
 LOGNVC 13C  
 EXMOD BCM  
 OBSFRQ 75.45 MHz  
 OBSSET 124.00 kHz  
 OBSFID 1846.0 Hz  
 POINT 32769  
 FREQC 200091.1 Hz  
 SCANS 129  
 ACQTM 1.606 sec  
 FID 1.394 sec  
 FWH 4.0 us  
 IRNUC 1H  
 TEMPC 23.4 C  
 SOLVENT CClCl3  
 EXREF 77.00 ppm  
 RF 0.12 Hz  
 AGAIN 25

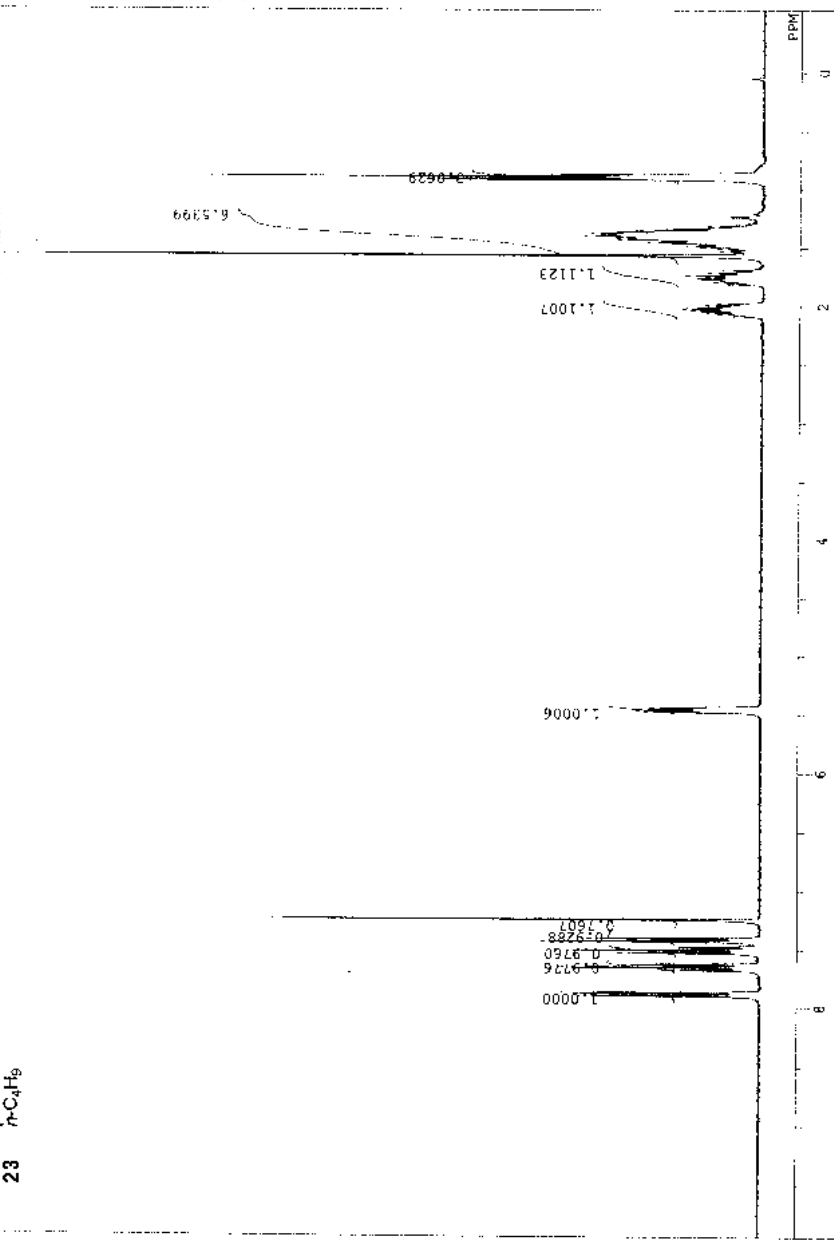
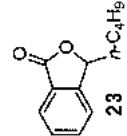


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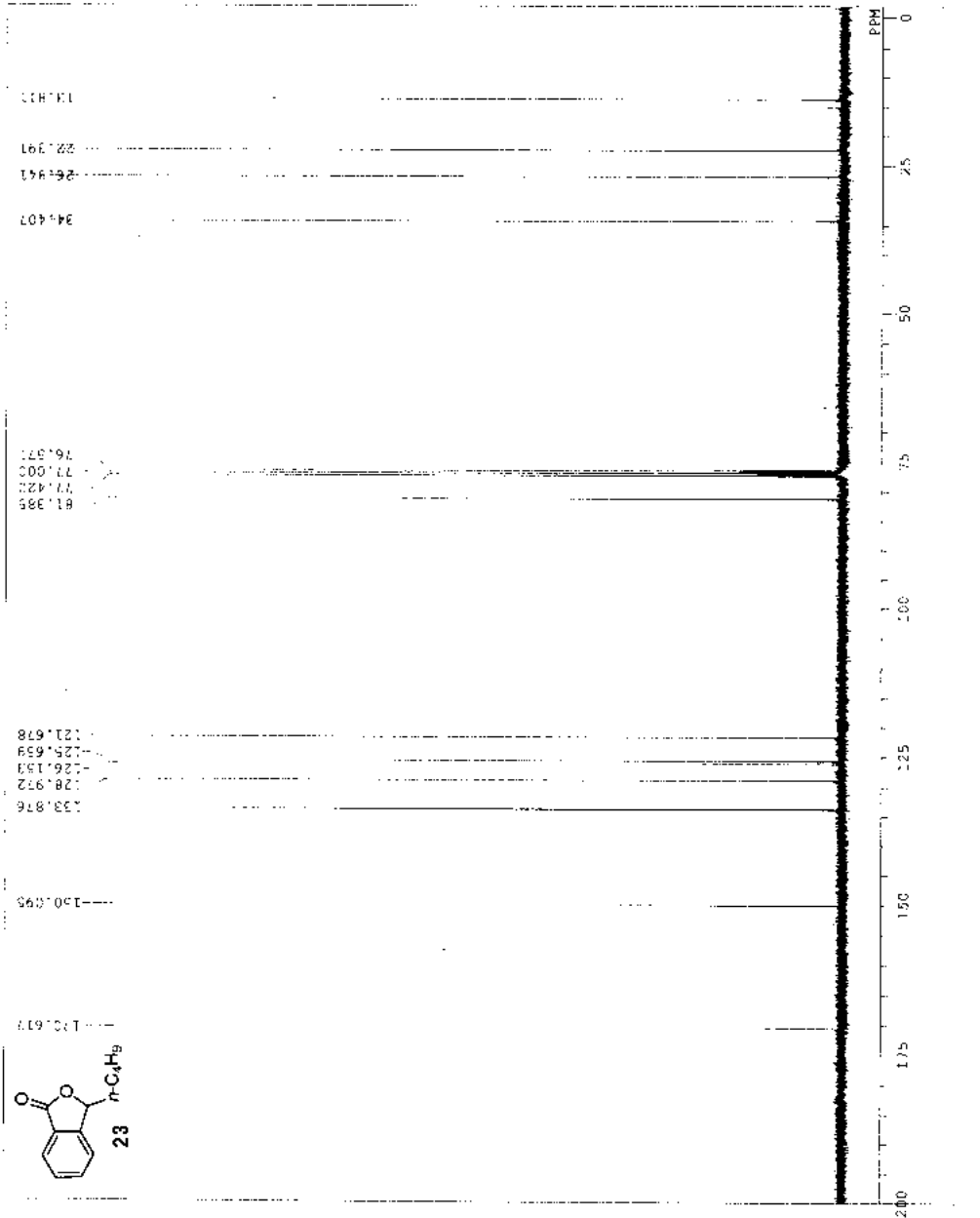
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 PROCN: 1150.0 Hz  
 POINT: 16384  
 FREQ: 3300.3 Hz  
 SCANS: 8  
 ACQTY: 4.964 sec  
 PD: 1.551 sec  
 PUL: 5.3 us  
 INJ: 1H  
 TRND: 22.0 C  
 CTEMP: 7.24 ppm  
 SEINT: 0.12 Hz  
 EXPRE: 21  
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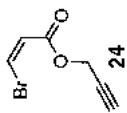
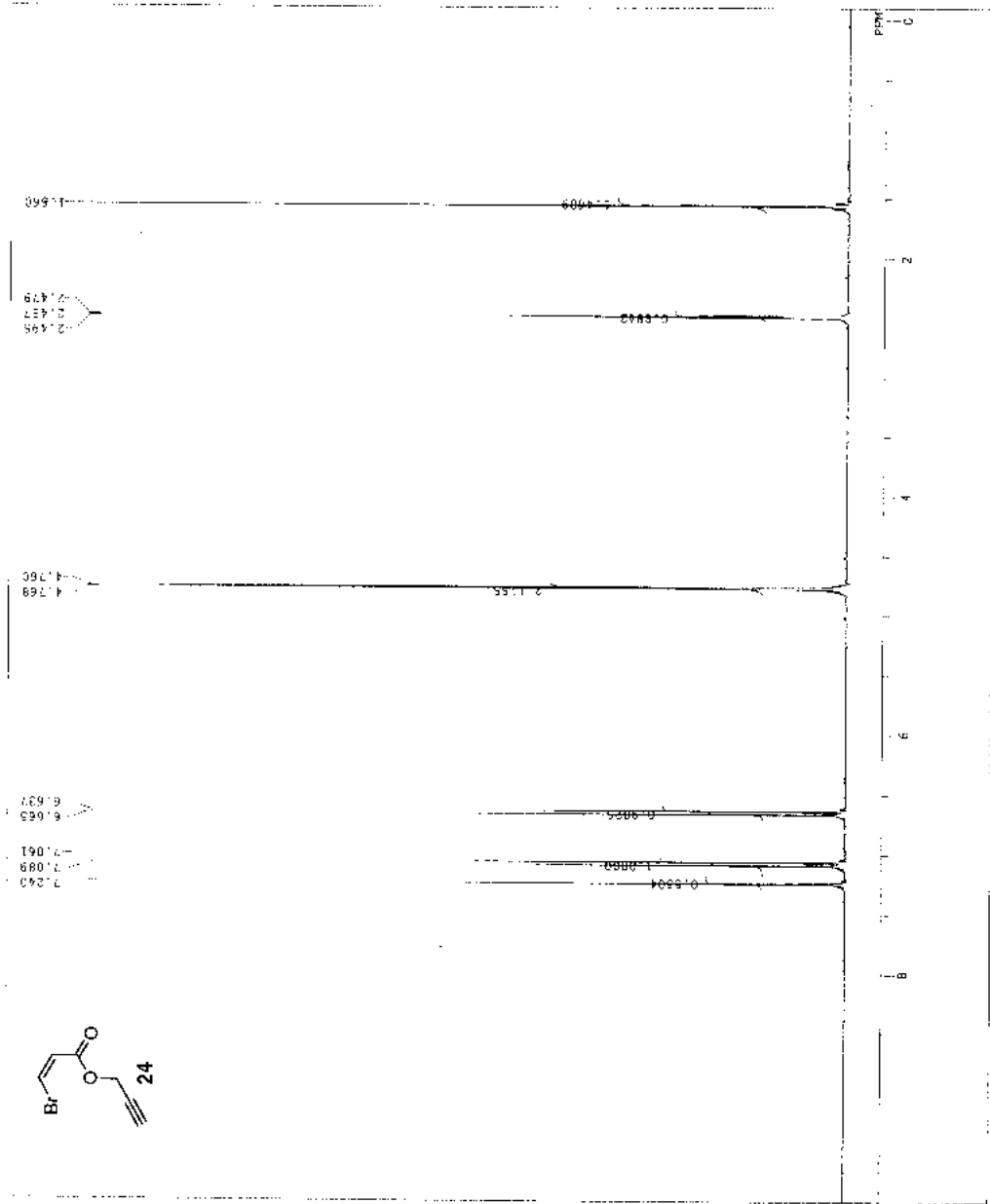
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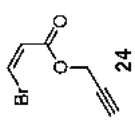
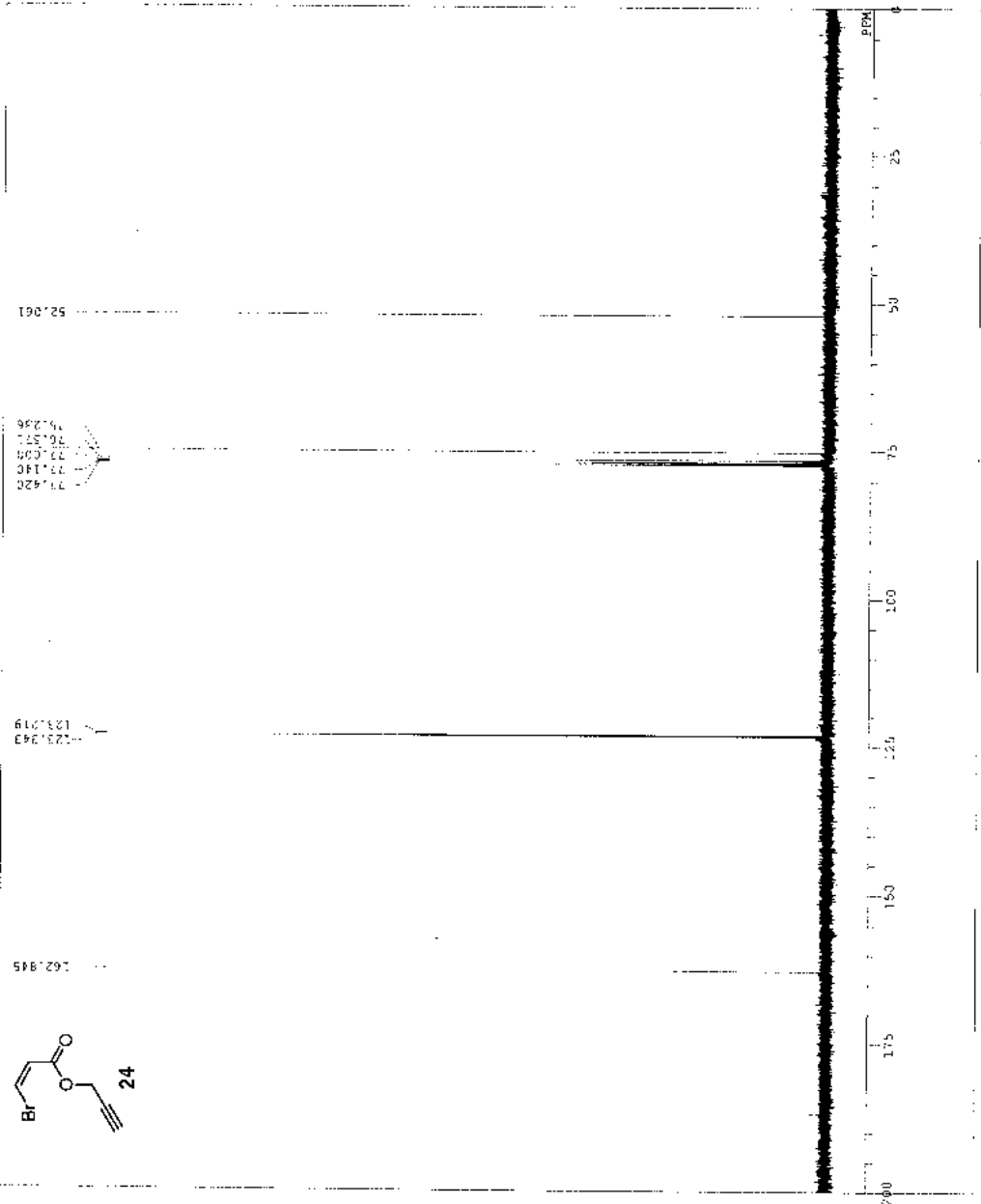
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 I OBFRC 75.45 MHz  
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 I OBFEN 1640.0 FZ  
 I POLNE 32168  
 I FREQJ 20468.1 Hz  
 I SCANS 2740  
 I ACQTM 1.606 sec  
 I PD 1.394 sec  
 I PW1 4.0 us  
 I IRNUC 1H  
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 I SLVNT CDCL3  
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 I BF 0.13 Hz  
 I RGAIN 24



I:FILE C:\VIBR\90\13\00001  
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 QBFIN 1150.0 Hz  
 POCNT 6384  
 PRMWT 3300.3 Hz  
 SCENS 8  
 ACQTM 4.964 sec  
 PD 1.551 sec  
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 IUNIC 11  
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 EXREF 7.24 ppm  
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 RGAIN 21



CPDTE C:\WINNBS95\COMMON  
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 Date: Jun 05 16:55:15  
 GBMUC 13C  
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 OBSST -24.00 kHz  
 SBFJN -840.0 Hz  
 POINT 32768  
 FREQ0 20408.1 Hz  
 SCANS 257  
 ACQTM 1.806 sec  
 PD 1.394 sec  
 PW1 4.0 IS  
 IRNUC 1R 20.2 C  
 CTENP CDCL3  
 SLANT CDCL3 77.00 ppm  
 EXSPT BF 0.13 Hz  
 RGAIN 24



52.261

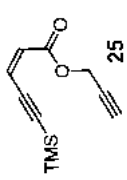
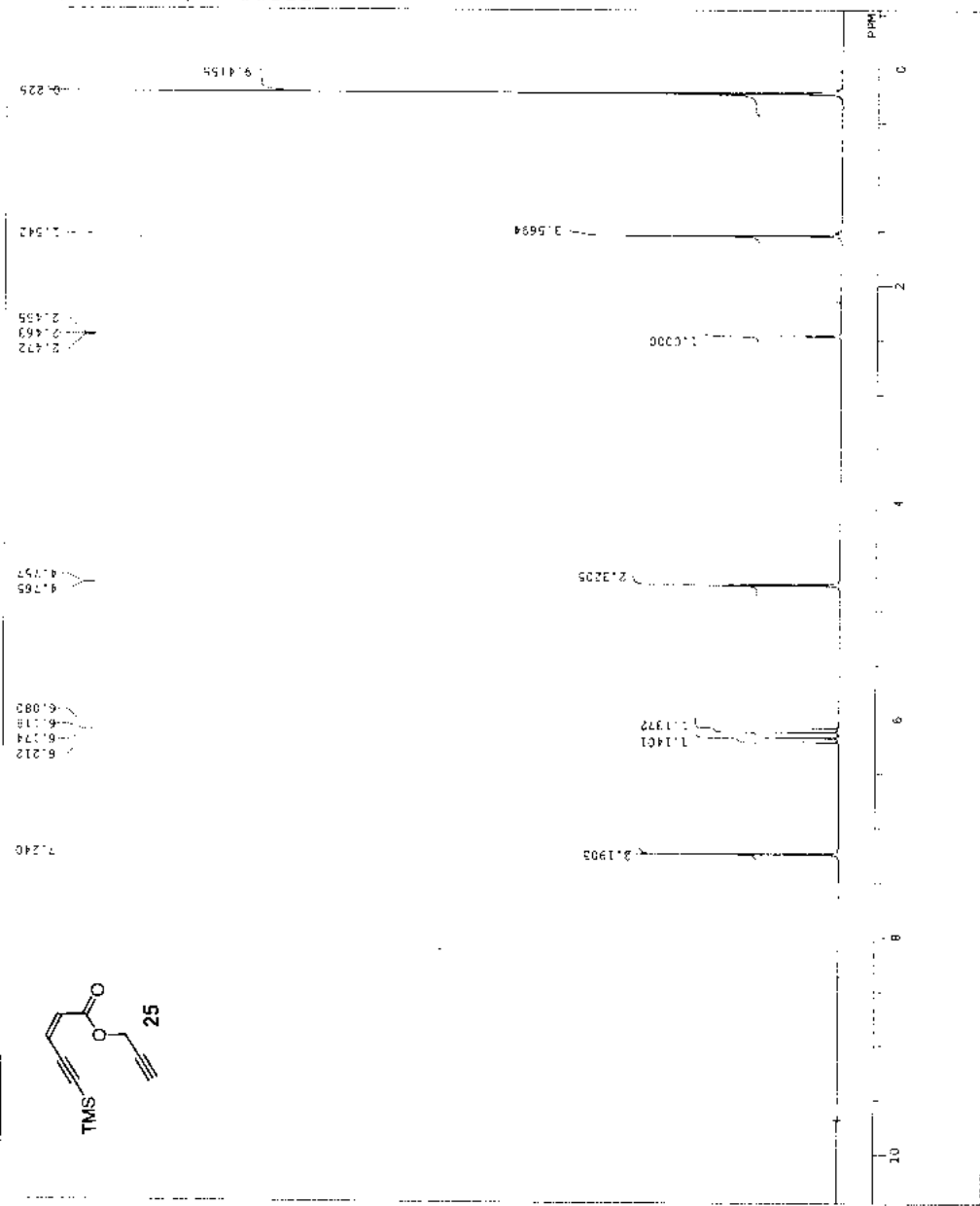
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77.140  
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123.243

162.945

200 175 150 125 100 75 50 25 0 PPM

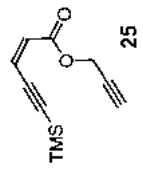
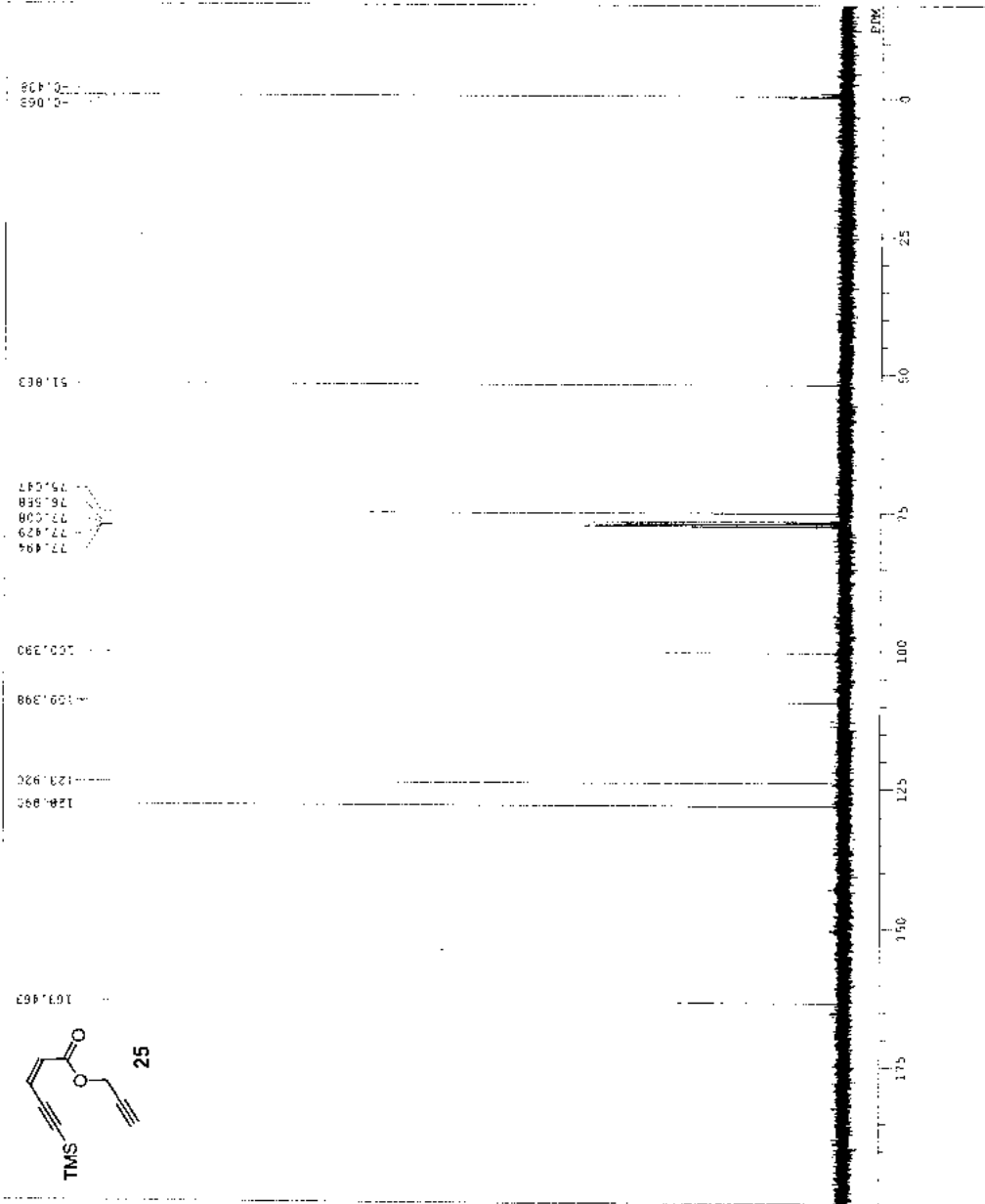
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 EXMOD NS  
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 PRFTK 1150.0 Hz  
 PULP 16384  
 ESLEQ 3300.3 Hz  
 SCANS 8  
 ACQTM 4.964 sec  
 PC 1.551 sec  
 PM 5.3 us  
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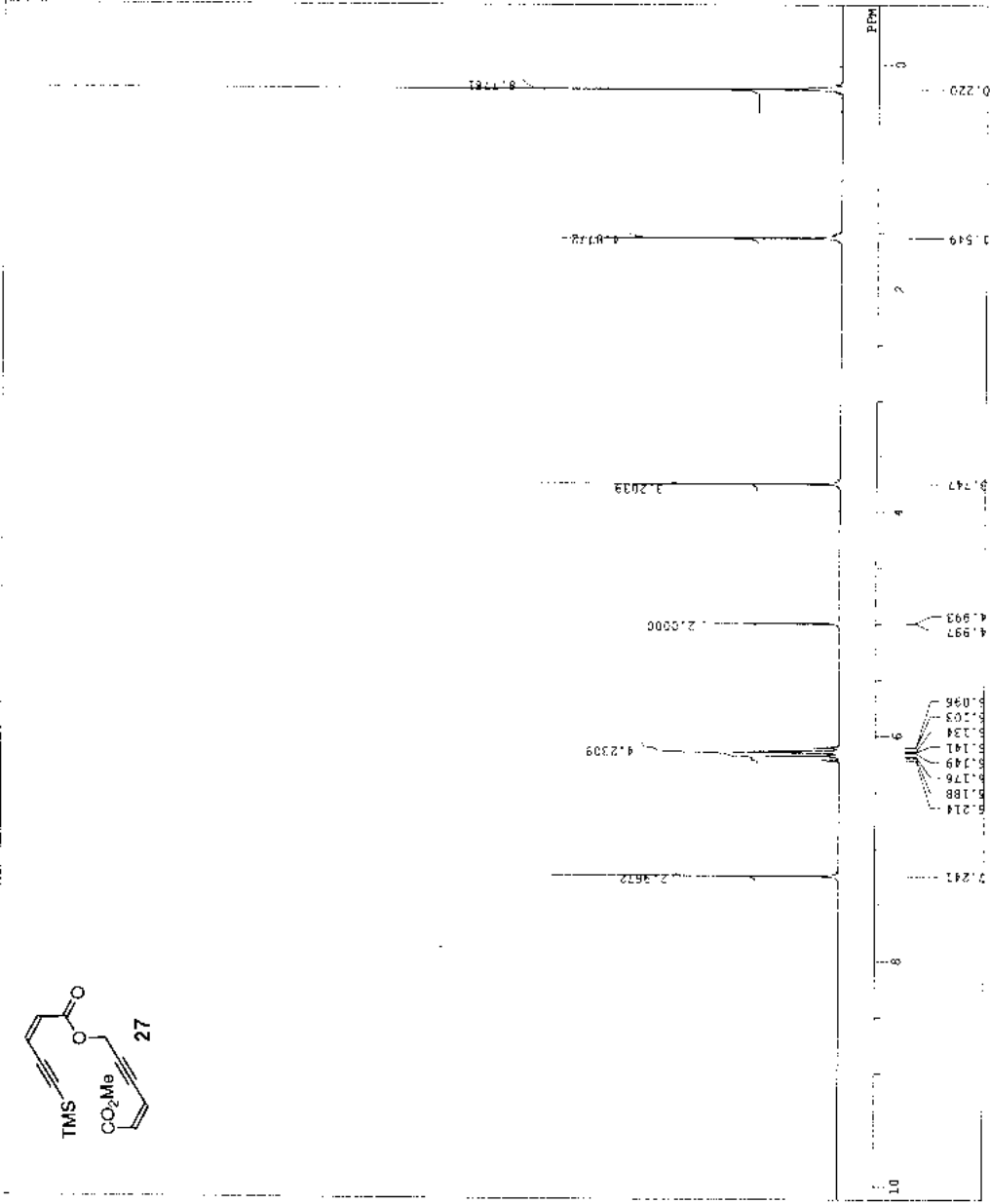
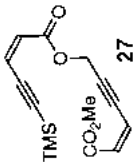
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ONSRT 124.00 kHz
OBSFN 1840.0 Hz
POINT 32768
FREQU 20408.1 Hz
SCANS 257
ACQTM 1.506 sec
SOLV 1.394 sec
FWD 4.0 us
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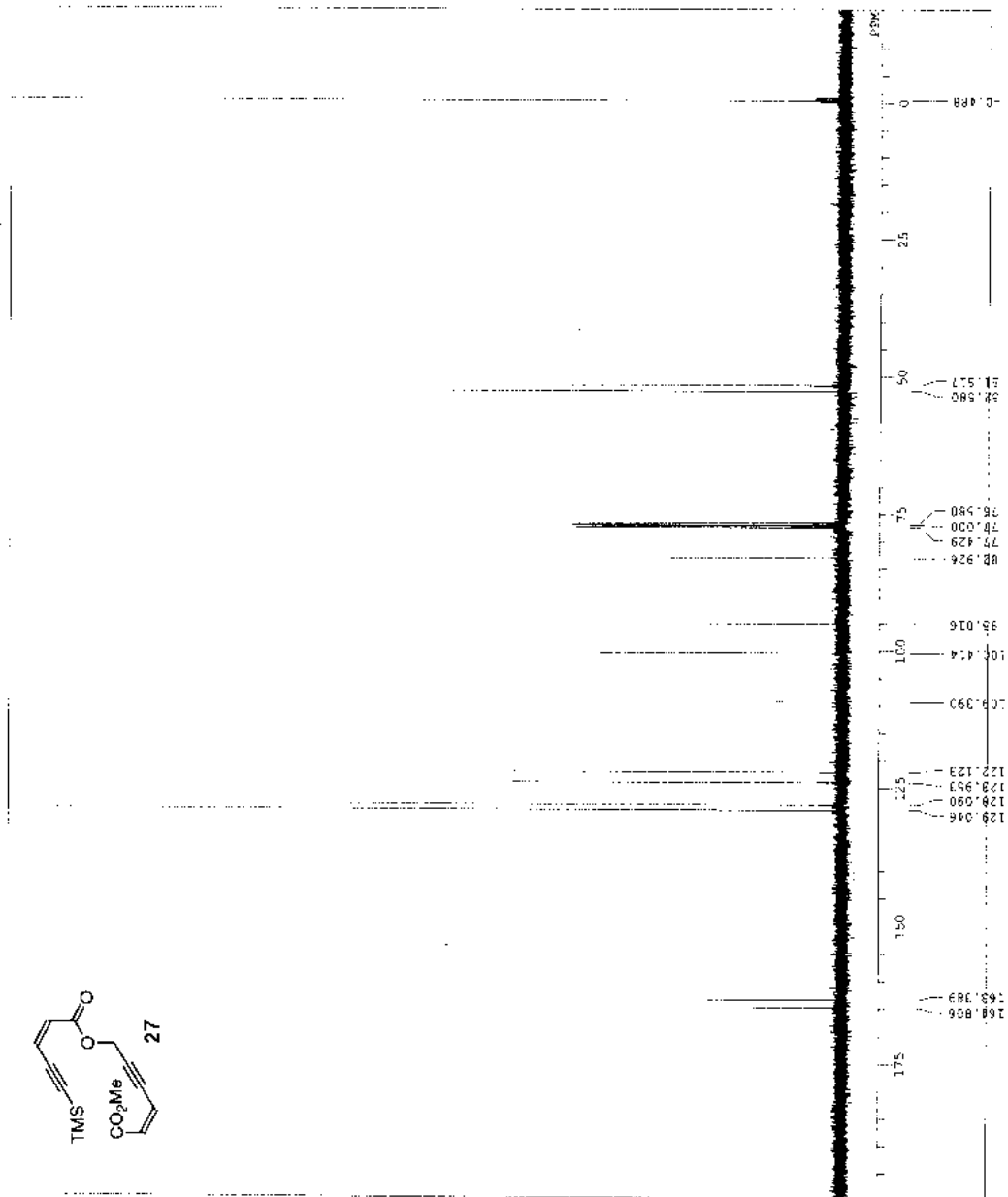
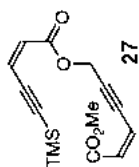




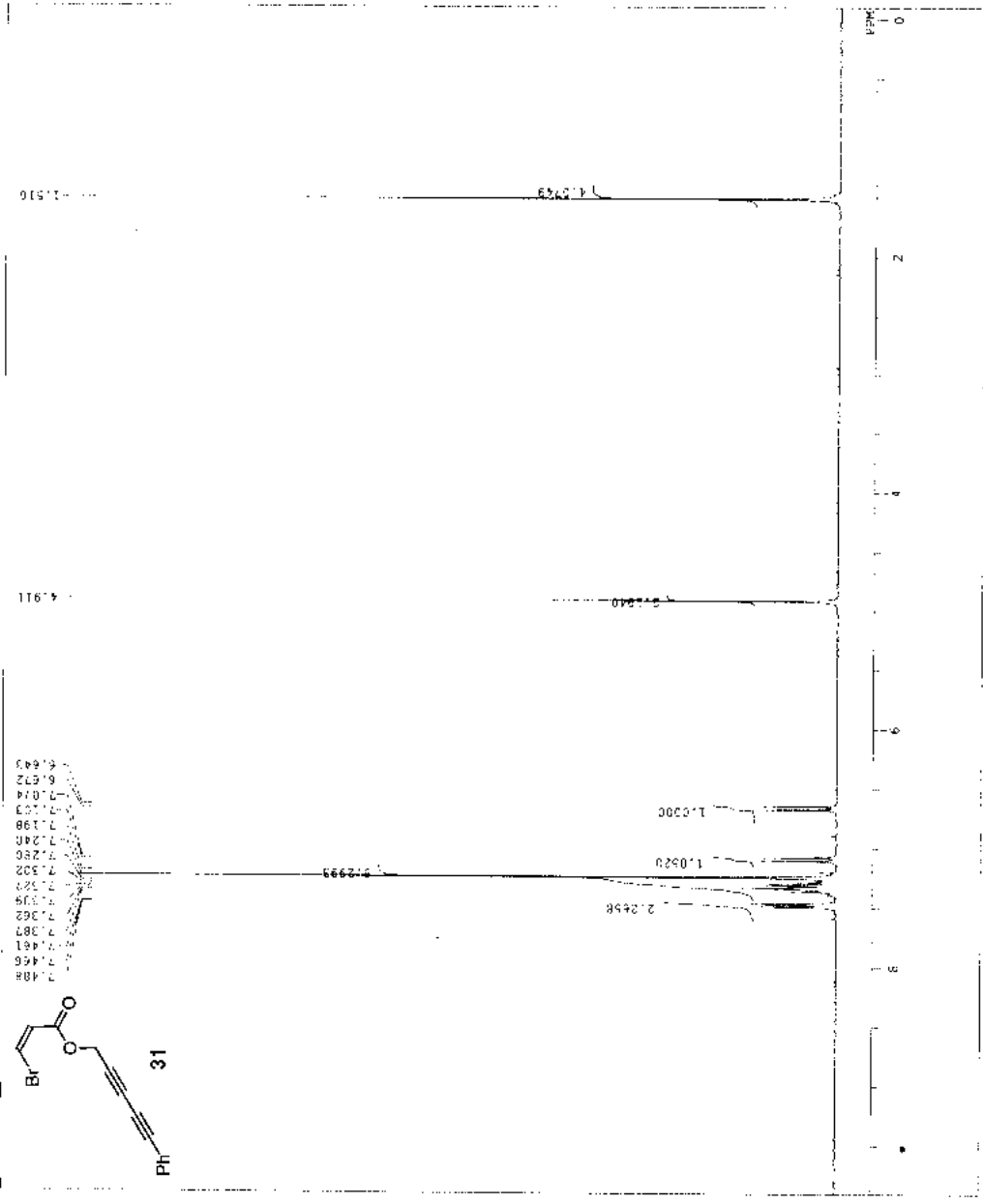
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 BRBET 130.60 kHz  
 BRFIN 1150.0 Hz  
 PCNT 16384  
 PRGC 3300.3 Hz  
 SCANS 6  
 ACQTM 4.964 sec  
 EC 1.551 sec  
 5.3 us  
 UH 19.0 S  
 CHRG UH  
 CTBAP CACLS  
 S-VNT CACLS  
 EXREF 7.24 ppm  
 RP 0.13 Hz  
 RGAIN 23



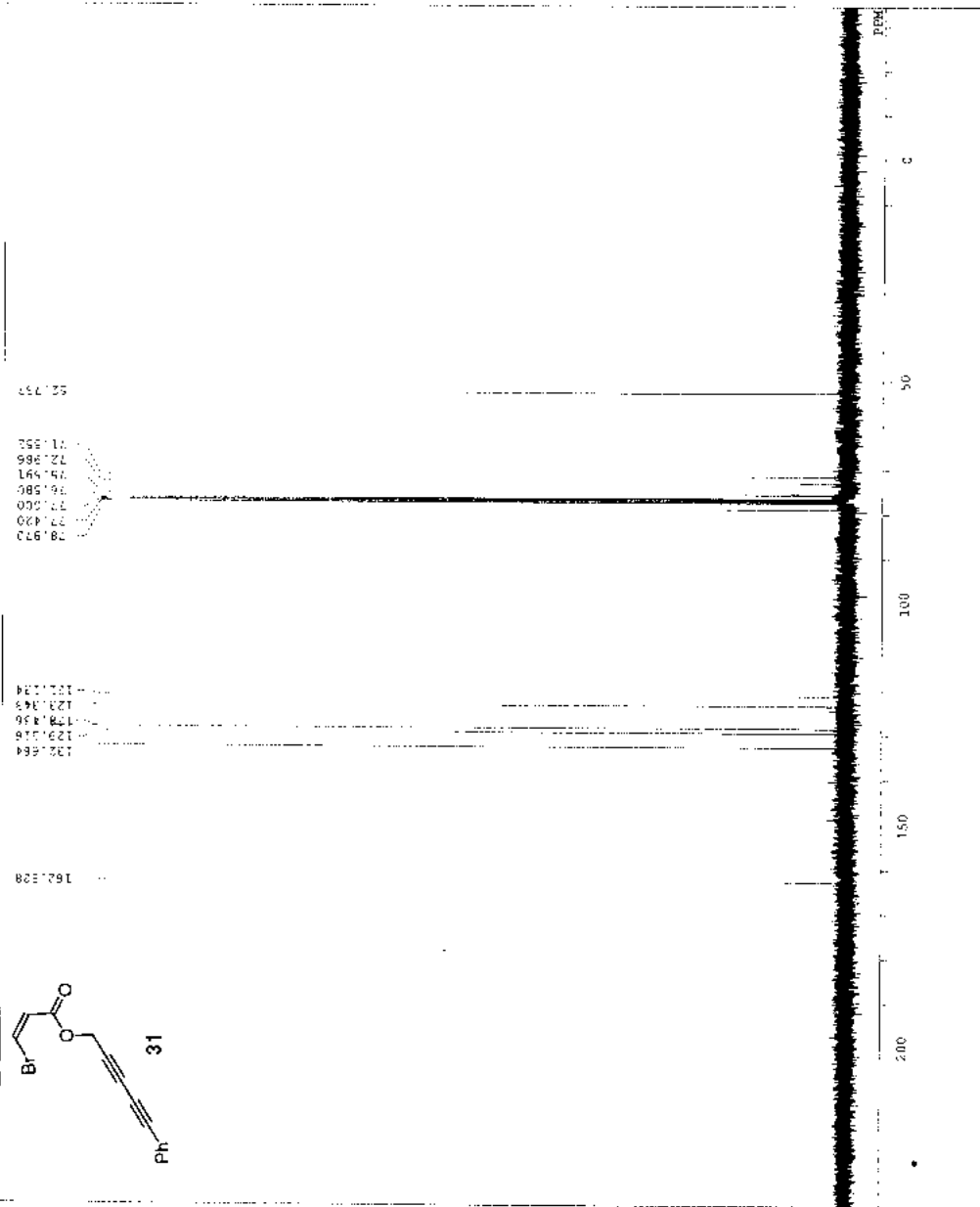
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 :ORNUC 13:  
 :EXMOLD BC8  
 :OBFREQ 75.45 MHz  
 :ORSECT 124.00 KHz  
 :ORHETX 1646.0 Hz  
 :POLINT 32768  
 :FREQDC 200000.1 Hz  
 :SFRMS 297  
 :ACQTM 1.806 sec  
 :PC 1.394 sec  
 :PWL 4.0 usec  
 :IRNUC 1H  
 :CTEMP 19.6 c  
 :S.WRT C1013  
 :EXREF 77.00 ppm  
 :SE 0.13 Hz  
 :RGAIN 24



SITE: C:\WINNERS\COMPCN\TMS42-2  
 DATE: Thu May 10 17:43:33  
 INSTR: IRNOC IH  
 EXHIB: 26  
 RGRIN: 76  
 NAME: BF  
 SOLV: CH2CL2  
 TEMP: 25.3 C  
 IRNOC: IH  
 PUL: 5.3 us  
 PD: 1.551 sec  
 ACQTY: 4.964 sec  
 SCANS: 8  
 FREQ: 230.3 MHz  
 PC-INT: 16384  
 OBSF: 1150.3 Hz  
 QRES: 130.00 Hz  
 CQRES: 300.40 MHz

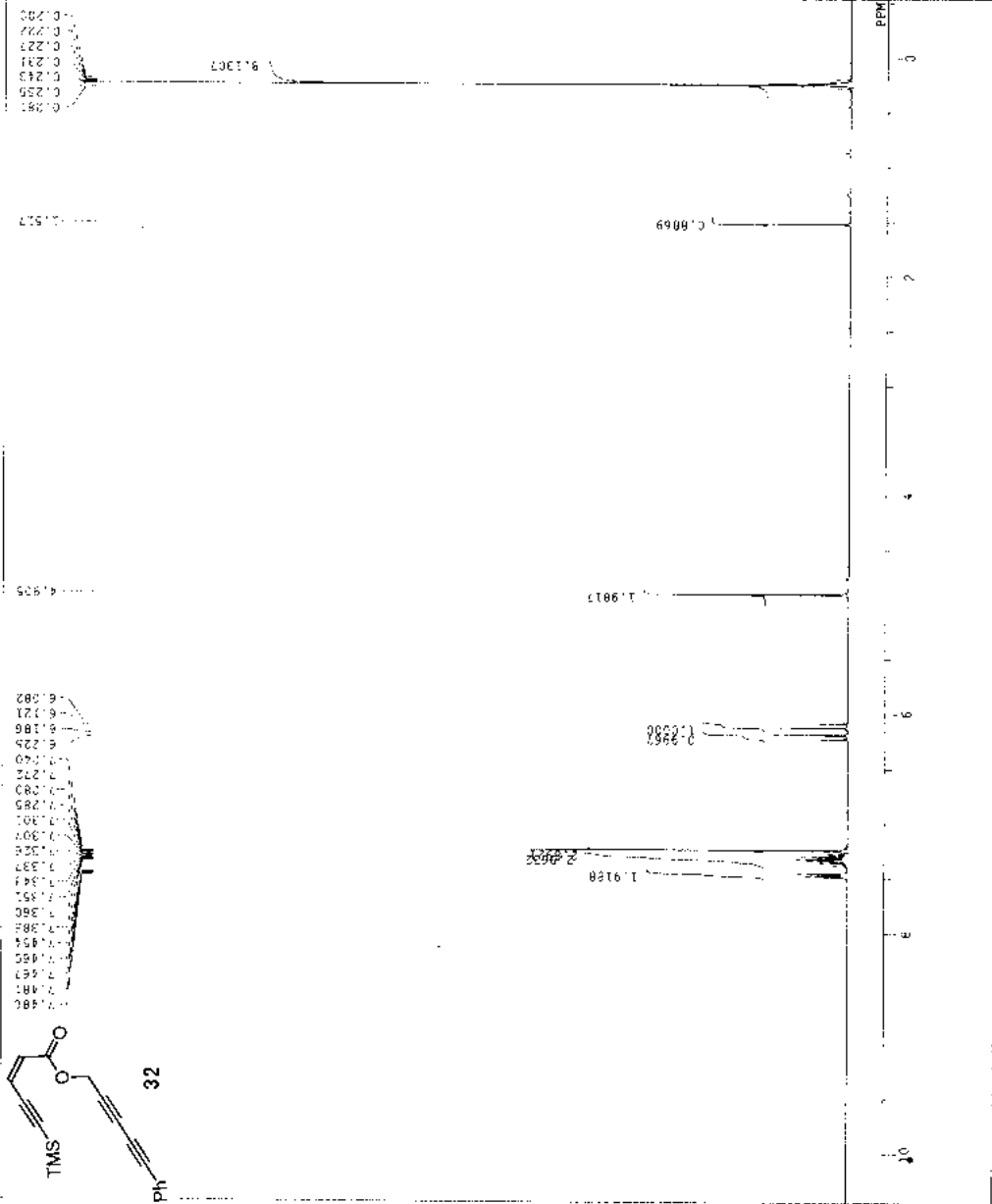


251.6 C:\NTNMR93\009600A\  
 COMET The May 18 16:17:29  
 ORBIT 13C  
 GPROG 13C  
 EXMOD RCH  
 CHFXQ 75.45 MHz  
 CHSE 124.00 KHz  
 OBFIN 1840.0 Hz  
 PCINT 32768  
 PREQ 20408.1 Hz  
 SCANS 513  
 ACQTM 1.606 sec  
 PD 1.394 sec  
 PW 4.0 us  
 TRIGC 1H  
 CTEMP 25.9 C  
 SLANT CCLD3  
 EXREF 77.00 PPM  
 BF 0.50 Hz  
 RGAIN 25



C:\M\11069\ASCOMP\05  
 COMPT TR547 TMS-silyne  
 WAC May 16 19:20:31  
 CBNUC 1H  
 EXHOC NOX  
 OBFRQ 500.40 MHz  
 OBSET 130.00 KHz  
 CBIN 1.50 C Hz  
 POINT 16384  
 FREQ 3300.3 Hz  
 SCANS 8  
 ACQTM 4.964 sec  
 P1 1.551 sec  
 P2 5.3 us  
 IH 23.9 C  
 CTIMP 7.24 ppm  
 EXSEL RF 5.12 Hz  
 RGAIN 23

DTILE  
 COMPT  
 DATIM  
 CBNUC  
 EXHOC  
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 OBSET  
 CBIN  
 POINT  
 FREQ  
 SCANS  
 ACQTM  
 P1  
 P2  
 IH  
 CTIMP  
 EXSEL  
 RF  
 RGAIN



UNFILE C:\WINNERS\COMMON\   
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 TIME 2:10   
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 GATED 124.00 KHz   
 GAIN 1845.0 Hz   
 SOLAR 204000.1 Hz   
 EXCISE 1.206 sec   
 ACQUIS 1.806 sec   
 PULP 1.334 sec   
 PA 4.000 sec   
 RANGE 1H   
 TEMPI 25.1 C   
 STAMP   
 START CUCLE 77.00 PPM   
 XREF 0.12 Hz   
 RF 74   
 RECALC

