

Supporting Information

An Efficient Protocol for the Stereoselective Construction of Multi-substituted
Fluorine-containing Alkenes.

A Palladium-catalyzed Bisstannylation of
Fluorinated Internal Alkynes

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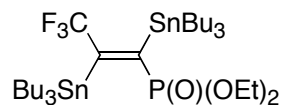
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Typical procedure for bisstannylation of 1-(4-chlorophenyl)-3,3,3-trifluoro-propyne

To a solution of 1-(4-chlorophenyl)-3,3,3-trifluoropropyne (0.051 g, 0.25 mmol) and Pd(*t*-BuNC)₂Cl₂ (0.002 g, 0.00625 mmol, 2.5 mol%) in THF (2.5 mL) was added a THF solution of hexabutylditin (0.176 g, 0.30 mmol) at room temperature. The reaction was stirred for 4 h at room temperature. The resulting mixture was then quenched with H₂O. The reaction mixture was extracted with Et₂O three times. The combined organic layers were dried over Na₂SO₄ and concentrated *in vacuo*. The residue was chromatographed on silica gel (hexane: EtOAc = 30 : 1) to afford the corresponding bisstannylated product (0.14 g, 0.17 mmol, 69% yield).

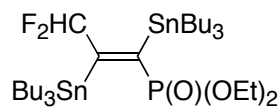
(*E*)-Diethyl 1,2-(tributylstannyl)-3,3,3-trifluoroprop-1-enylphosphonate (2a)



¹H NMR (CDCl₃) δ = 0.86 ~ 0.89 (m, 18H), 1.02 ~ 1.09 (m, 12H), 1.27 ~ 1.34 (m, 18H), 1.42 ~ 1.50 (m, 12H), 3.99 ~ 4.08 (m, 4H); ¹³C NMR (CDCl₃) δ = 13.1 (d, *J* = 2.8 Hz), 13.6, 13.7, 14.5, 16.4 (d, *J* = 6.5 Hz), 27.2, 27.4, 28.8, 28.9, 61.5 (d, *J* = 5.7 Hz), 126.4 (dq, *J* = 56.2, 275.7 Hz), 153.8 (qd, *J* = 9.1, 136.8 Hz), 169.0 (qd, *J* = 16.6, 32.3 Hz); ¹⁹F NMR (CDCl₃) δ = -58.8 (s, 3F); ³¹P NMR (CDCl₃) δ = 23.24 (m, 1P); IR (neat) 2956, 2920, 2871, 2854, 1463, 1376, 1228, 1137, 1117, 1053, 1028, 962, 876, 866, 849, 795, 745, 678, 637 cm⁻¹;

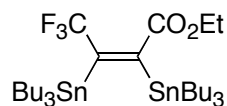
Anal. Calcd for C₃₁H₆₄F₃O₃PSn₂: C, 45.95; H, 7.96. Found: C, 45.87; H, 8.18.

(*E*)-Diethyl 1,2-(tributylstannyl)-3,3-difluoroprop-1-enylphosphonate (2b)



¹H NMR (CDCl₃) δ = 0.84 ~ 0.99 (m, 18H), 1.04 ~ 1.10 (m, 12H), 1.28 ~ 1.32 (m, 19H), 1.46 ~ 1.53 (m, 11H), 4.02 ~ 4.04 (m, 4H), 7.03 (t, *J* = 60.1 Hz, 1H); ¹³C NMR (CDCl₃) δ = 12.8, 13.4, 13.6, 16.3 (d, *J* = 6.0 Hz), 27.4 (d, *J* = 7.0 Hz), 29.0 (d, *J* = 8.0 Hz), 61.6 (d, *J* = 7.0 Hz), 114.6 (dt, *J* = 27.2, 249.7 Hz), 155.9 (td, *J* = 13.3, 94.3 Hz), 176.4 (dt, *J* = 18.2, 38.9 Hz); ¹⁹F NMR (CDCl₃) δ = -101.90 (dd, *J* = 59.8, 6.0 Hz, 2F); ³¹P NMR (CDCl₃) δ = 15.72 (m, 1P); IR (neat) 2959, 2871, 1525, 1464, 1376, 1237, 1163, 1101, 1024, 836, 672 cm⁻¹.

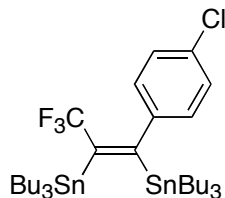
(*Z*)-Ethyl 2,3-bis(tributylstannyl)-3,3,3-trifluoro-2-propenoate (2c)



This compound was obtained as a diastereomeric mixture in a ratio of 82 : 18. The stereochemistry could not be determined on the basis of

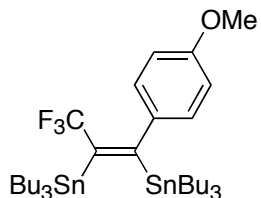
¹H NMR analysis. ¹H NMR (CDCl₃) δ = 0.86 ~ 1.57 (m, 54H), 4.16 (q, *J* = 6.8 Hz, 2H); ¹⁹F NMR (CDCl₃) δ = -55.9 (s, 3F).

(Z)-1,2-Bis(tributylstannyl)-1-(4-chlorophenyl)-3,3,3-trifluoropropene (2d)



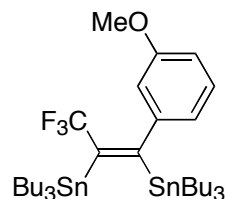
^1H NMR (CDCl_3) δ = 0.79 ~ 1.55 (m, 54H), 6.73 (d, J = 8.4 Hz, 2H), 7.21 (d, J = 8.4 Hz, 2H); ^{13}C NMR (CDCl_3) δ = 11.9 (d, J = 1.6 Hz), 12.1, 13.2, 13.3, 13.4, 13.5, 27.0, 27.1, 27.2, 28.1, 30.3, 124.5 (q, J = 281.0 Hz), 130.4, 145.5, 146.5 (q, J = 28.1 Hz), 172.5 (q, J = 7.5 Hz); ^{19}F NMR (CDCl_3) δ = -49.2 (s, 3F); IR (neat) 2957, 2871, 1481, 1463, 1377, 1227, 1180, 1135, 960, 864 cm^{-1} ; Anal. Calcd for $\text{C}_{33}\text{H}_{58}\text{ClF}_3\text{Sn}_2$: C, 50.51; H, 7.45. Found: C, 50.25; H, 7.67.

(Z)-1,2-Bis(tributylstannyl)-1-(4-methoxyphenyl)-3,3,3-trifluoropropene (2e)



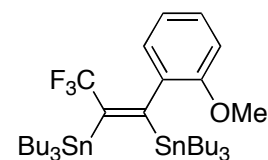
^1H NMR (CDCl_3) δ = 0.79 ~ 1.09 (m, 54H), 1.21 ~ 1.55 (m, 27H), 3.79 (s, 3H), 6.71 ~ 6.80 (m, 4H); ^{13}C NMR (CDCl_3) δ = 12.1 (d, J = 1.6 Hz), 12.2, 13.55, 13.64, 27.36, 27.42, 28.9, 29.0, 55.1, 113.0, 124.9 (q, J = 281.6 Hz), 125.7, 139.8, 146.3 (q, J = 28.1 Hz), 157.1, 174.4 (q, J = 7.4 Hz); ^{19}F NMR (CDCl_3) δ = -49.1 (s, 3F); IR (neat) 2957, 2871, 1730, 1604, 1501, 1464, 1377, 1281, 1228, 1184, 1131, 1039, 960, 833, 738 cm^{-1} .

(Z)-1,2-Bis(tributylstannyl)-1-(3-methoxyphenyl)-3,3,3-trifluoropropene (2f)



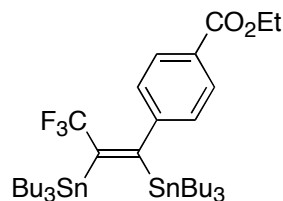
^1H NMR (CDCl_3) δ = 0.73 ~ 1.57 (m, 54H), 3.77 (s, 3H), 6.34 (s, 1H), 6.40 (d, J = 7.59 Hz, 1H), 6.63 (d, J = 7.59 Hz, 1H), 7.14 (t, J = 7.79 Hz, 1H); ^{13}C NMR (CDCl_3) δ = 12.5 (d, J = 1.7 Hz), 13.9, 14.0, 27.67, 27.72, 29.3, 55.4, 110.6, 125.3 (q, J = 281.9 Hz), 145.3 (q, J = 28.1 Hz), 149.1, 159.3, 174.0 (q, J = 7.4 Hz); ^{19}F NMR (CDCl_3) δ = -49.3 (s, 3F); IR (neat) 2956, 2871, 1595, 1464, 1131, 1051, 957, 795, 696 cm^{-1} ; Anal. Calcd for $\text{C}_{34}\text{H}_{61}\text{F}_3\text{OSn}_2$: C, 52.34; H, 7.88. Found: C, 51.94; H, 7.91.

(Z)-1,2-Bis(tributylstannyl)-1-(2-methoxyphenyl)-3,3,3-trifluoropropene (2g)



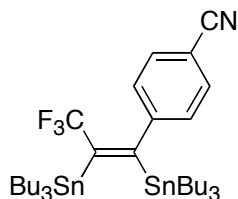
^1H NMR (CDCl_3) δ = 0.71 ~ 1.60 (m, 54H), 3.75 (s, 3H), 6.76 (t, J = 8.79 Hz, 2H), 6.87 (t, J = 7.39 Hz, 1H), 7.09 ~ 7.13 (m, 1H); ^{13}C NMR (CDCl_3) δ = 12.3 (d, J = 1.6 Hz), 12.6, 13.9, 14.0, 27.7, 27.8, 29.2, 29.2, 55.3, 109.8, 125.4 (q, J = 281.0 Hz), 136.7, 145.1 (q, J = 28.1 Hz), 153.7, 171.5 (q, J = 7.4 Hz); ^{19}F NMR (CDCl_3) δ = -50.4 (s, 3F); IR (neat) 2956, 2871, 1504, 1464, 1377, 1340, 1226, 1130, 1048, 939, 748 cm^{-1}

(Z)-1,2-Bis(tributylstannyl)-1-(4-ethoxycarbonylphenyl)-3,3,3-trifluoropropene (2h)



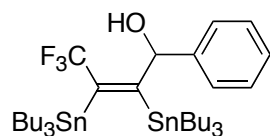
^1H NMR (CDCl_3) δ = 0.77 ~ 1.57 (m, 54H), 4.36 (q, J = 7.6 Hz, 2H), 6.86 (d, J = 8.0 Hz, 2H), 7.95 (d, J = 8.0 Hz, 2H); ^{13}C NMR (CDCl_3) δ = 12.2 (d, J = 1.7 Hz), 12.4, 13.5, 13.6, 14.3, 27.33, 27.34, 28.9, 74.6, 125.7 (q, J = 245.6 Hz), 145.7 (q, J = 28.5 Hz), 166.6, 173.0 (q, J = 7.5 Hz); ^{19}F NMR (CDCl_3) δ = -49.4 (s, 3F); IR (neat) 2957, 2855, 1929, 1719, 1604, 1561, 1464, 1418, 1377, 1340, 1281, 1107, 1021, 932, 769, 743, 595 cm^{-1} ; HRMS (FAB) calcd for (M+H) $\text{C}_{36}\text{H}_{64}\text{F}_3\text{O}_2\text{Sn}_2$: 823.2911, found 823.2901.

(Z)-1,2-Bis(tributylstannyl)-1-(4-cyanophenyl)-3,3,3-trifluoropropene (2i)



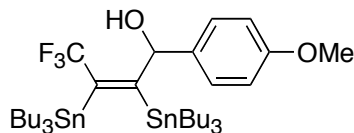
^1H NMR (CDCl_3) δ = 0.80 ~ 1.57 (m, 54H), 6.90 (d, J = 8.4 Hz, 2H), 7.53 (d, J = 8.4 Hz, 2H); ^{13}C NMR (CDCl_3) δ = 12.5 (d, J = 1.6 Hz), 12.8, 13.8, 13.9, 27.6, 29.2, 108.8, 119.4, 125.7, 127.9 (q, J = 286.0 Hz), 131.9, 147.3 (q, J = 28.9 Hz), 153.1, 172.0 (q, J = 7.4 Hz); ^{19}F NMR (CDCl_3) δ = -49.5 (s, 3F); IR (neat) 2957, 2922, 2871, 2227, 1600, 1493, 1463, 1377, 1226, 1168, 1101, 1019, 865, 771, 664 cm^{-1} ; HRMS (FAB) calcd for (M+H) $\text{C}_{34}\text{H}_{59}\text{F}_3\text{NSn}_2$: 776.2666, found 776.2659.

(Z)-2,3-Bis(Tributylstannyl)-1-phenyl-4,4,4-trifluoro-2-buten-1-ol (2l)



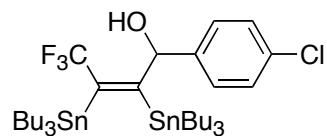
^1H NMR (CDCl_3) δ = 0.77 (t, J = 6.8 Hz, 15H), 0.89 (t, J = 7.2 Hz, 9H), 0.95 ~ 1.38 (m, 24H), 1.42 ~ 1.54 (m, 6H), 2.37 ~ 2.38 (m, 1H), 5.87 (s, 1H), 7.18 ~ 7.28 (m, 5H); ^{13}C NMR (CDCl_3) δ = 12.6 (d, J = 1.6 Hz), 13.4, 13.6, 13.7, 27.4, 27.5, 28.9, 29.0, 75.2 (d, J = 1.7 Hz), 125.4 (q, J = 281.9 Hz), 126.4, 127.1, 128.1, 140.8, 144.4 (q, J = 29.0 Hz), 178.4 (q, J = 6.6 Hz); ^{19}F NMR (CDCl_3) δ = -48.6 (s, 3F); IR (neat) 3616, 2956, 2923, 2871, 2854, 1542, 1494, 1464, 1377, 1213, 1129, 1102, 1043, 876, 750, 698 cm^{-1} ; HRMS (FAB) calcd for (M+Na) $\text{C}_{34}\text{H}_{61}\text{F}_3\text{ONaSn}_2$: 803.2585, found 803.2624.

(Z)-2,3-Bis(tributylstannyl)-1-(4-methoxyphenyl)-4,4,4-trifluoro-2-buten-1-ol (2n)



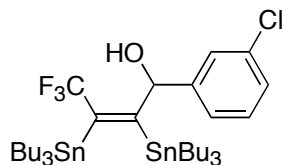
^1H NMR (CDCl_3) δ = 0.68 ~ 0.88 (m, 14H), 0.95 (t, J = 6.8 Hz, 9H), 1.07 ~ 1.61 (m, 31H), 2.40 (d, J = 4.0 Hz, 1H), 3.81 (s, 3H), 5.87 (s, 1H), 6.86 ~ 6.88 (m, 2H), 7.23 ~ 7.26 (m, 2H); ^{13}C NMR (CDCl_3) δ = 12.6 (d, J = 2.0 Hz), 13.4, 13.6, 13.7, 27.4, 27.5, 28.9, 29.0, 55.2, 74.9 (q, J = 1.6 Hz), 113.5, 125.4 (q, J = 281.8 Hz), 127.6, 133.0, 144.0 (q, J = 28.9 Hz), 158.8, 178.6 (q, J = 6.6 Hz); ^{19}F NMR (CDCl_3) δ = -48.7 (s, 3F); IR (neat) 3489, 2956, 2924, 2871, 2854, 1717, 1611, 1510, 1464, 1377, 1249, 1213, 1127, 1100, 1040, 849, 817 cm^{-1} .

(Z)-2,3-Bis(tributylstannyl)-1-(4-chlorophenyl)-4,4,4-trifluoro-2-buten-1-ol (2o)



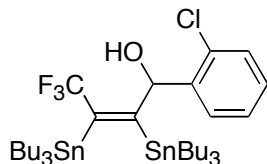
^1H NMR (CDCl_3) δ = 0.68 ~ 1.55 (m, 54H), 2.41 (d, J = 4.4 Hz, 1H), 5.86 (s, 1H), 7.24 (s, 1H), 7.31 (m, 4H); ^{13}C NMR (CDCl_3) δ = 12.6 (d, J = 1.6 Hz), 13.4, 13.6, 13.7, 27.4, 27.5, 28.9, 29.0, 74.7, 74.9 (d, J = 1.7 Hz), 125.3 (q, J = 281.9 Hz), 133.0, 139.2, 145.0 (q, J = 28.9 Hz), 177.7 (q, J = 5.8 Hz); ^{19}F NMR (CDCl_3) δ = -48.7 (s, 3F); IR (neat) 3615, 3477, 2956, 2854, 2323, 1904, 1545, 1490, 1420, 1377, 1340, 1212, 1181, 1015, 960, 849, 747 cm^{-1} ; HRMS (FAB) calcd for (M-H) $\text{C}_{34}\text{H}_{59}\text{ClF}_3\text{OSn}_2$: 813.2273, found 813.2295.

(Z)-2,3-bis(Tributylstannyl)-1-(3-chlorophenyl)-4,4,4-trifluoro-2-buten-1-ol (2p)



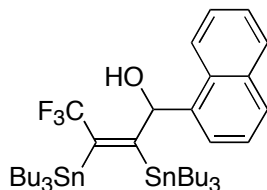
^1H NMR (CDCl_3) δ = 0.65 ~ 1.57 (m, 54H), 5.88 (s, 1H), 7.19 ~ 7.26 (m, 3H), 7.34 (s, 1H); ^{13}C NMR (CDCl_3) δ = 12.6 (d, J = 1.7 Hz), 13.3, 13.5, 13.7, 27.4, 27.5, 28.9, 29.0, 74.6, 125.3 (q, J = 281.9 Hz), 134.2, 142.9, 145.2 (q, J = 28.9 Hz), 177.5 (q, J = 5.8 Hz); ^{19}F NMR (CDCl_3) δ = -48.6 (s, 3F); IR (neat) 3615, 2957, 2854, 1597, 1464, 1377, 1261, 1212, 1179, 1130, 1043, 960, 783 cm^{-1} ; Anal. Calcd for $\text{C}_{34}\text{H}_{60}\text{ClF}_3\text{OSn}_2$: C, 50.12; H, 7.42. Found: C, 49.81; H, 7.56.

(Z)-2,3-Bis(tributylstannyl)-1-(2-chlorophenyl)-4,4,4-trifluoro-2-buten-1-ol (2q)



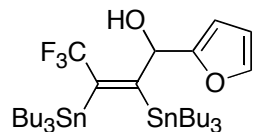
^1H NMR (CDCl_3) δ = 0.87 ~ 1.64 (m, 54H), 3.25 (d, J = 2.8 Hz, 1H), 6.03 (s, 1H), 7.25 ~ 7.31 (m, 3H), 7.42 ~ 7.45 (m, 1H); ^{13}C NMR (CDCl_3) δ = 12.3 (d, J = 1.7 Hz), 13.31, 13.34, 13.7, 27.0, 27.1, 28.7, 28.8, 73.2 (d, J = 1.7 Hz), 124.8 (q, J = 252.9 Hz), 129.6, 133.0, 139.7, 146.2 (q, J = 29.8 Hz), 176.6 (q, J = 5.8 Hz); ^{19}F NMR (CDCl_3) δ = -51.0 (s, 3F); IR (neat) 3686, 2956, 2854, 1572, 1465, 1376, 1260, 1216, 1102, 1017, 960, 845, 752 cm^{-1} ; Anal. Calcd for $\text{C}_{34}\text{H}_{60}\text{ClF}_3\text{OSn}_2$: C, 50.12; H, 7.42. Found: C, 49.81; H, 7.42.

(Z)-2,3-Bis(tributylstannyl)-1-naphthyl-4,4,4-trifluoro-2-buten-1-ol (2r)



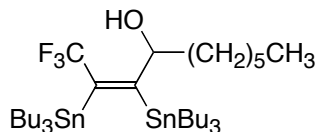
^1H NMR (CDCl_3) δ = 0.72 ~ 0.83 (m, 15H), 0.92 ~ 0.98 (m, 9H), 1.09 ~ 1.57 (m, 30H), 2.42 (s, 1H), 6.44 (s, 1H), 7.40 ~ 7.54 (m, 4H), 7.79 ~ 7.89 (m, 2H), 8.26 (d, J = 8.4 Hz, 1H); ^{13}C NMR (CDCl_3) δ = 12.6 (d, J = 1.7 Hz), 13.6, 13.7, 13.99, 27.4, 27.5, 29.0, 29.1, 73.7 (d, J = 1.7 Hz), 124.1, 124.6, 124.7, 125.4 (q, J = 280.1 Hz), 125.6, 126.2, 128.7, 128.9, 131.0, 134.2, 137.3, 145.6 (q, J = 29.7 Hz), 179.3 (q, J = 6.5 Hz); ^{19}F NMR (CDCl_3) δ = -50.3 (s, 3F); IR (neat) 3466, 3050, 2956, 2922, 2871, 2854, 1510, 1463, 1376, 1216, 1131, 1100, 998, 863, 781, 742, 663 cm^{-1} .

(Z)-2,3-Bis(tributylstannyl)-1-furyl-4,4,4-trifluoro-2-buten-1-ol (2s)



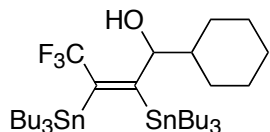
^1H NMR (CDCl_3) δ = 0.80 ~ 1.08 (m, 30H), 1.24 ~ 1.56 (m, 24H), 2.61 (d, J = 2.4 Hz, 1H), 5.81 (s, 1H), 6.00 (d, J = 3.2 Hz, 1H), 6.33 (s, 1H), 7.39 (s, 1H); ^{13}C NMR (CDCl_3) δ = 12.5 (d, J = 1.6 Hz), 13.4, 13.61, 13.64, 27.3, 27.5, 28.9, 29.0, 70.6 (d, J = 1.6 Hz), 107.0, 110.5, 125.3 (q, J = 281.0 Hz), 142.0, 145.3 (q, J = 29.8 Hz), 175.1 (q, J = 5.8 Hz); ^{19}F NMR (CDCl_3) δ = -49.8 (s, 3F); IR (neat) 3604, 2956, 2922, 2871, 2854, 1549, 1463, 1377, 1261, 1216, 1130, 1103, 960, 883, 732 cm^{-1} ; HRMS (FAB) calcd for ($\text{M}+\text{Na}$) $\text{C}_{32}\text{H}_{59}\text{F}_3\text{NaO}_2\text{Sn}_2$: 793.2416, found 793.2413.

(Z)-2,3-Bis(tributylstannyl)-1,1,1-trifluoro-2-decen-4-ol (2t)



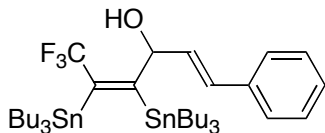
^1H NMR (CDCl_3) δ = 0.87 ~ 1.04 (m, 35H), 1.30 ~ 1.52 (m, 32H), 1.89 (d, J = 2.8 Hz, 1H), 4.71 (s, 1H); ^{13}C NMR (CDCl_3) δ = 12.6 (d, J = 1.6 Hz), 13.6, 13.7, 13.9, 14.1, 22.6, 25.6, 27.4, 27.6, 28.8, 29.3, 31.8, 75.4, 125.5 (q, J = 281.0 Hz), 141.3 (q, J = 29.0 Hz), 182.0 (q, J = 5.8 Hz); ^{19}F NMR (CDCl_3) δ = -49.0 (s, 3F); IR (neat) 3623, 3478, 2957, 2855, 1540, 1464, 1377, 1340, 1213, 1099, 865 cm^{-1} ; Anal. Calcd for $\text{C}_{34}\text{H}_{69}\text{F}_3\text{OSn}_2$: C, 51.80; H, 8.82. Found: C, 51.46; H, 8.88.

(Z)-2,3-Bis(tributylstannyl)-1-cyclohexyl-4,4,4-trifluoro-2-buten-1-ol (2u)



^1H NMR (CDCl_3) δ = 0.85 ~ 1.58 (m, 60H), 1.66 ~ 1.81 (m, 4H), 2.12 (d, J = 12.8 Hz, 1H), 4.35 (d, J = 9.2 Hz, 1H); ^{13}C NMR (CDCl_3) δ = 12.8 (d, J = 2.4 Hz), 13.6, 13.8, 26.17, 26.21, 26.4, 27.3, 27.6, 29.0, 29.2, 43.3, 73.3, 78.9, 125.2 (q, J = 282.7 Hz), 144.4 (q, J = 28.1 Hz), 180.9 (q, J = 5.7 Hz); ^{19}F NMR (CDCl_3) δ = -47.1 (s, 3F); IR (neat) 3620, 2956, 2924, 2871, 2854, 1536, 1464, 1377, 1260, 1209, 1159, 1104, 1019, 959, 864 cm^{-1} .

(Z)-2,3-Bis(tributylstannyl)-1,1,1-trifluoro-6-phenyl-2,5-hexadien-4-ol (2v)

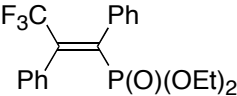


^1H NMR (CDCl_3) δ = 0.84 ~ 1.54 (m, 54H), 2.11 (d, J = 2.8 Hz, 1H), 5.50 (s, 1H), 6.16 (d, J = 12.3 Hz, 1H), 6.49 (d, J = 15.2 Hz, 1H), 7.30 (m, 5H); ^{13}C NMR (CDCl_3) δ = 12.7 (d, J = 1.7 Hz), 13.6, 13.9, 27.7, 27.9, 28.9, 29.1, 75.1, 125.4 (q, J = 281.8 Hz), 143.5 (q, J = 28.9 Hz), 178.1 (q, J = 6.5 Hz); ^{19}F NMR (CDCl_3) δ = -49.0 (s, 3F); IR (neat) 3584, 2956, 2871, 1495, 1463, 1376, 1212, 1101, 1019, 963, 865, 693 cm^{-1} ; HRMS (FAB) calcd for ($\text{M}+\text{Na}$) $\text{C}_{36}\text{H}_{63}\text{F}_3\text{NaOSn}_2$: 829.2781, found 829.2806.

Typical procedure for the Stille coupling reaction of vinylstannane with iodobenzene

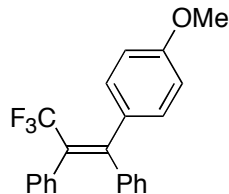
To a solution of $\text{Pd}(\text{PPh}_3)_4$ (0.058 g, 0.050 mmol, 20 mol%) in DMF (3.5 mL) were added (*E*)-diethyl 1,2-bis(tributylstannyl)-3,3,3-trifluoroprop-1-enylphosphonate **2a** (0.203 g, 0.25 mmol), CuI (20 mol%, 0.010 g, 0.050 mmol), and iodobenzene (0.070 mL, 0.60 mmol), and then the reaction mixture was heated to 70 °C. After stirred at 70 °C for 4 h, the reaction was quenched with NH_4Cl . The reaction mixture was extracted with Et_2O three times. The combined organic layers were dried over anhydrous Na_2SO_4 and concentrated in *vacuo*. The residue was chromatographed on silica gel (hexane: EtOAc = 1 : 1) to afford (*Z*)-diethyl 3,3,3-trifluoro-1,2-diphenylprop-1-enylphosphonate (0.043 g, 0.11 mmol, 46%).

(*Z*)-Diethyl 2-(trifluoromethyl)hex-1-enylphosphonate (**3a**)


 ^1H NMR (CDCl_3) δ = 0.91 (t, J = 7.2 Hz, 6H), 3.33 ~ 3.43 (m, 2H), 3.66 ~ 3.76 (m, 2H), 7.35 ~ 7.48 (m, 10H); ^{13}C NMR (CDCl_3) δ = 15.86 (d, J = 6.6 Hz), 62.45 (d, J = 6.6 Hz), 122.30 (dq, J = 30.6, 278.5 Hz), 127.86 (d, J = 2.5 Hz), 127.98 (d, J = 3.3 Hz), 128.43 (qd, J = 1.1, 4.9 Hz), 128.93, 129.61 (d, J = 1.6 Hz), 133.54 (d, J = 8.2 Hz), 134.89 (d, J = 4.9 Hz), 140.16 (q, J = 2.5 Hz), 141.66 (q, J = 28.9 Hz); ^{19}F NMR (CDCl_3) δ = -57.37 (s, 3F); ^{31}P NMR (CDCl_3) δ = 10.63 ~ 10.80 (m, 1P); IR (neat) 2984, 2322, 1495, 1445, 1304, 1250, 1175, 1126, 1054, 1024, 973, 751, 703 cm^{-1} ; HRMS (FAB) calcd for ($\text{M}+\text{H}$) $\text{C}_{19}\text{H}_{20}\text{F}_3\text{O}_3\text{P}$: 385.1182, found 385.1168.

(*Z*)-1-(4-Methoxyphenyl)-1,2-(diphenyl)-3,3,3-trifluoropropene (**3e**)

This is a known compound. 51% yield, ^1H NMR (CDCl_3) δ = 3.83 ~ 3.85 (m, 3H), 6.88 ~ 7.40 (m, 14H); ^{19}F NMR (CDCl_3) δ = -56.18 (s, 3F).



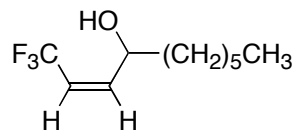
The Stille coupling reaction of vinylstannane **2e** with diphenyliodonium chloride

The bisstannylated adduct **2e** (0.20 g, 0.25 mmol) and diphenyliodonium chloride (190 mg, 0.60 mmol) was dissolved in DMF (2 mL) under argon at room temperature. $\text{Pd}(\text{PPh}_3)_4$ (58 mg, 0.050 mmol) and CuI (75 mg, 0.38 mmol) were then added. The mixture was stirred at roomtemperature and monitored by TLC for the disappearance of the starting organostannane. The reaction mixture was diluted with CH_2Cl_2 (15 mL), filtered and stirred with 20% of aqueous KF (10 mL) for 30 min before being dried and concentrated. The residue was purified by silica gel column chromatography to give the corresponding coupling product **3e** in 75% yield (66 mg, 0.19 mmol).

Destannylation of (Z)-2,3-bis(tributylstannyl)-1,1,1-trifluoro-2-decen-4-ol

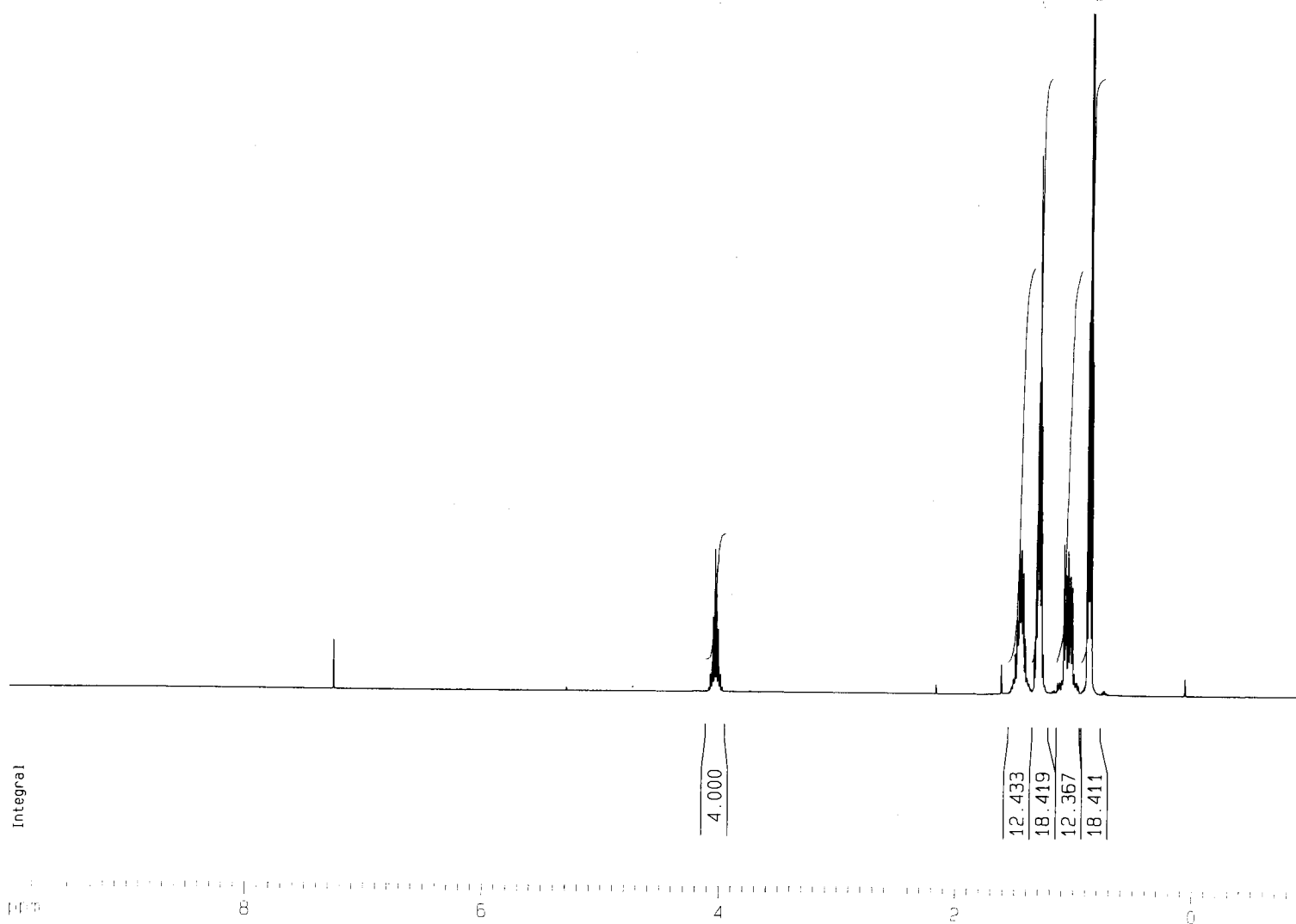
To a solution of (Z)-2,3-bis(tributylstannyl)-1,1,1-trifluoro-2-decen-4-ol **2t** (0.198 g, 0.50 mmol) in MeCN (10 mL) was added HCl aq. (35%, 1.0 mL) at room temperature. The reaction was stirred for 1.5 h at room temperature. The resulting mixture was neutralized with NaHCO₃ aq. (20 mL of sat. and 10 mL of water) and extracted with AcOEt (2 × 30 mL). After addition of DBU (2 mL), the extract was stirred for 10 min, passed through short silica gel column, and evaporated. The residue was chromatographed on silica gel (hexane: EtOAc = 10 : 1) to afford the corresponding of (Z)-1,1,1-trifluoro-2-decen-4-ol (0.25 mmol, 49%).

(Z)-1,1,1-Trifluoro-2-decen-4-ol (**4t**)



¹H NMR (CDCl₃) δ = 0.88 (t, *J* = 6.40 Hz, 3H), 1.28 ~ 1.61 (m, 9H), 1.60 ~ 1.65 (m, 1H), 1.89 (s, 1H), 4.63 (s, 1H), 5.62 (dq, *J* = 11.6, 8.8 Hz, 1H), 5.96 (dd, *J* = 9.4, 11.6 Hz, 1H); ¹³C NMR (CDCl₃) δ = 14.3, 22.9, 25.2, 29.3, 32.0, 37.0, 68.0, 118.5 (q, *J* = 22.9 Hz), 123.2 (q, *J* = 271.2 Hz), 144.9 (q, *J* = 5.0 Hz); ¹⁹F NMR (CDCl₃) δ = -58.2 (d, *J* = 8.8 Hz, 3F); IR (neat) 3347, 2932, 2860, 1672, 1418, 1280, 1216, 1129, 1044 cm⁻¹.

sample



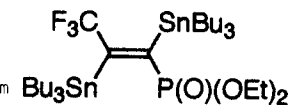
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PROCNO 1

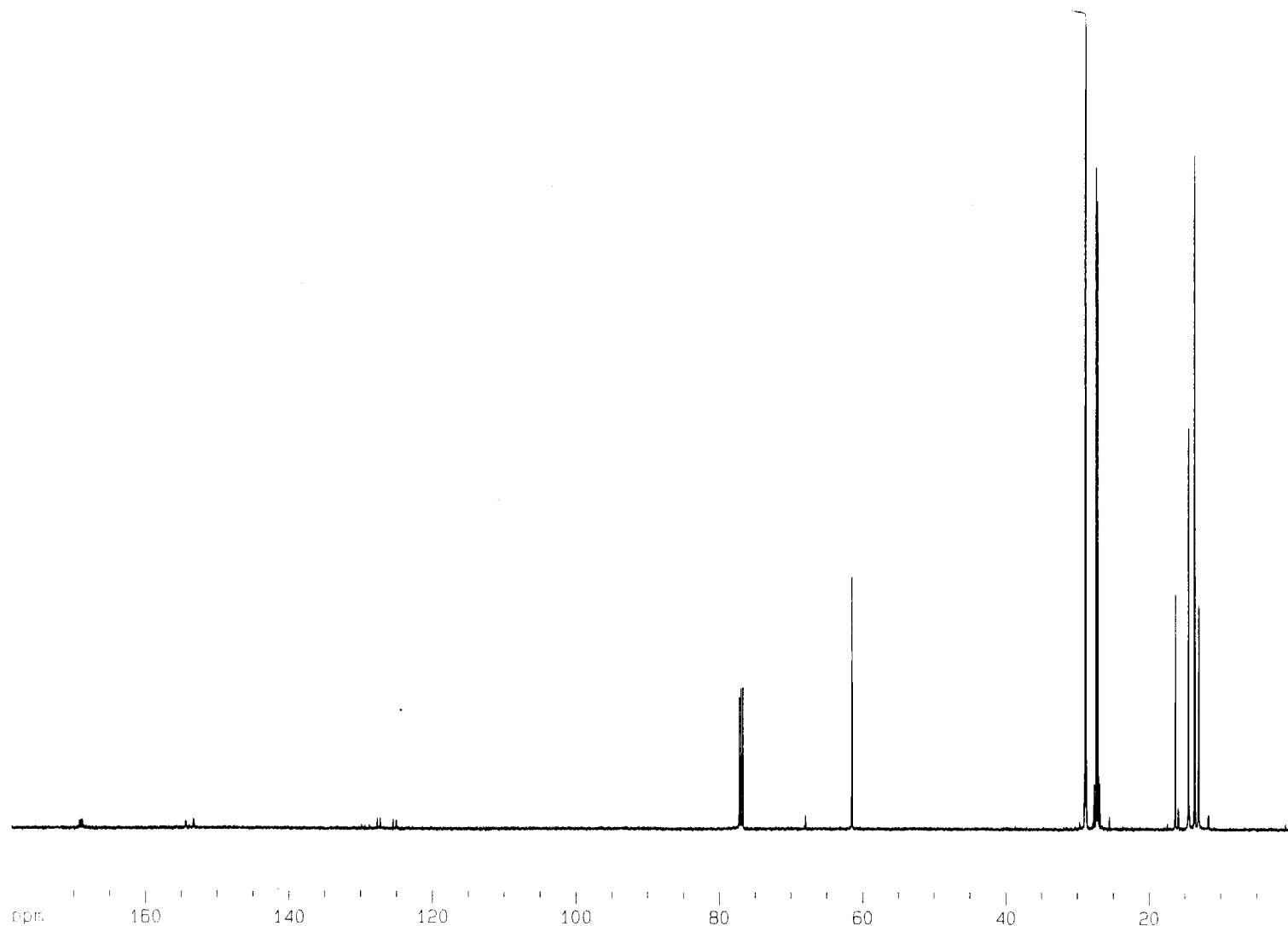
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Time 19.54
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SOLVENT CDCl3
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DS 2
SWH 10330.578 Hz
FIDRES 0.157632 Hz
AQ 3.1719923 sec
RG 57
DW 48.400 usec
DE 6.00 usec
TE 295.9 K
D1 1.00000000 sec
MCREST 0.00000000 sec
MCWRK 0.01500000 sec

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NUC1 1H
P1 10.00 usec
PL1 -6.00 dB
SF01 500.1330885 MHz

F2 - Processing parameters
SI 32768
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WDW EM
SSB 0
LB 0.30 Hz
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PC 1.00

1D NMR plot parameters
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CY 11.75 cm
F1P 10.000 ppm
F1 5001.30 Hz
F2P -1.000 ppm
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HZCM 275.07150 Hz/cm





Current Data Parameters
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 EXPNO 1
 PROCNO 1

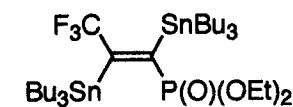
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 FIDRES 0.458222 Hz
 AQ 1.0912244 sec
 RG 3649.1
 DW 16.650 usec
 DE 6.00 usec
 TE 293.8 K
 D1 0.50000000 sec
 d11 0.03000000 sec
 MCREST 0.00000000 sec
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===== CHANNEL f1 =====
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 SF01 125.7703643 MHz

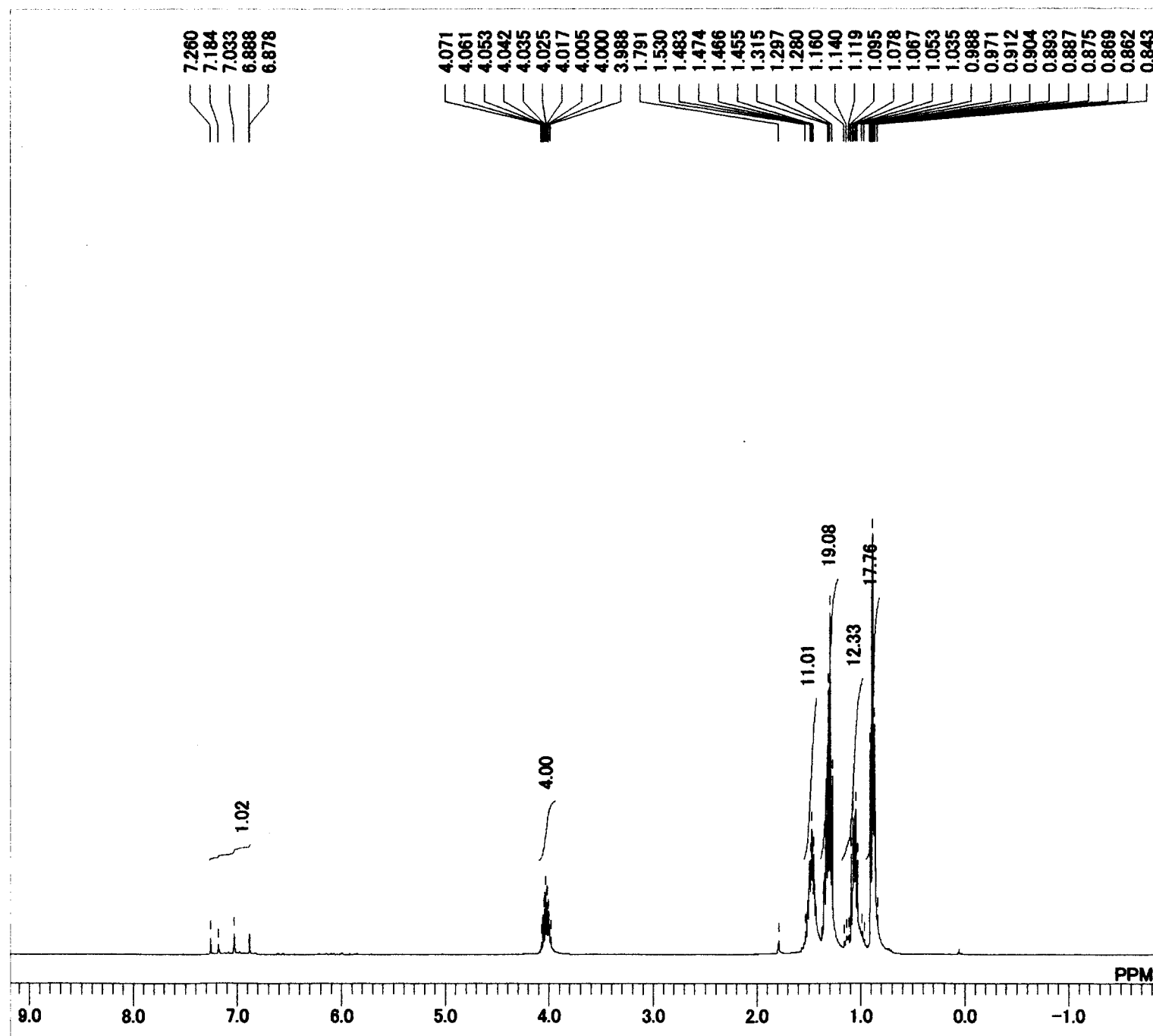
===== CHANNEL f2 =====
 CPDPRG2 waltz16
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 PCPD2 100.00 usec
 PL2 -6.00 dB
 PL12 17.00 dB
 PL13 19.00 dB
 SF02 500.1320005 MHz

F2 - Processing parameters
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 GB 0
 PC 1.40

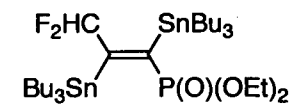
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 F2P -1.242 ppm
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 PPMCM 8.99660 ppm/cm
 HZCM 1131.39197 Hz/cm



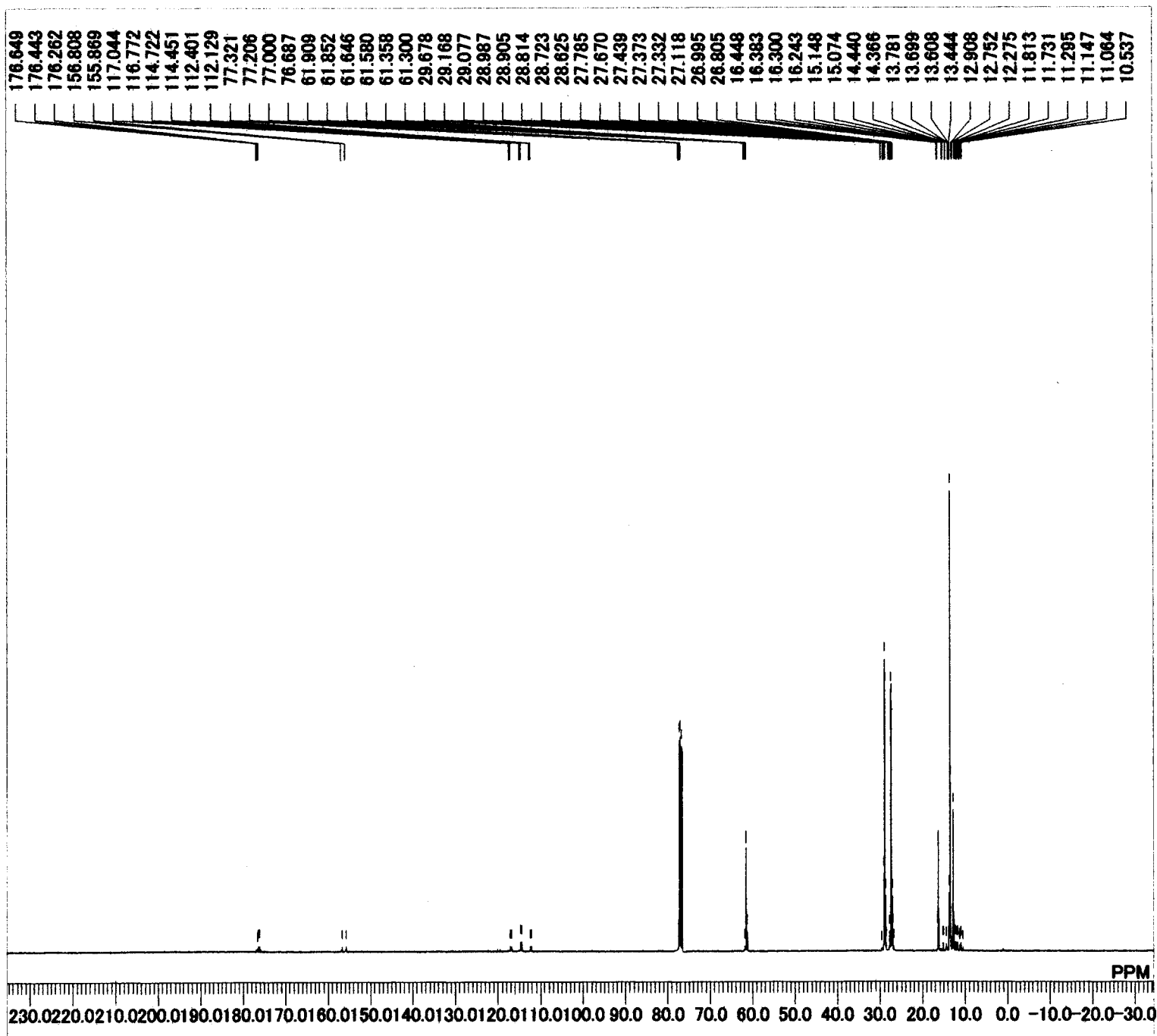
CF2H-PO(OEt)2-Sn 1H



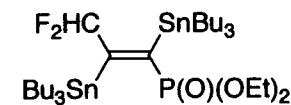
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 DEADT 72.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 9
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PT
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 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF2H-PO(OEt)2-Sn 1H 7.15.als
 SF TH5ATFG2
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 FILDC
 FILDF



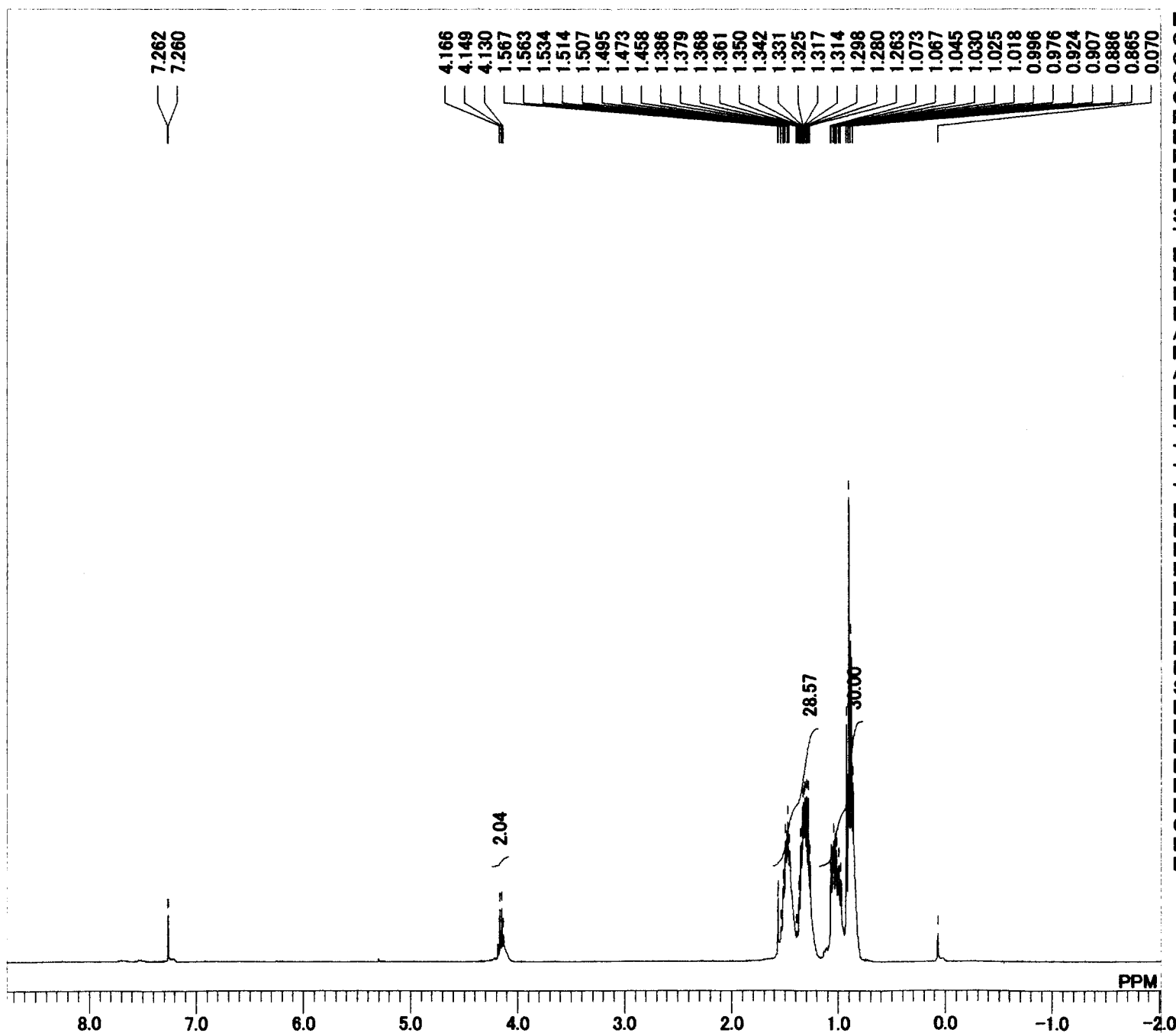
CF2H-PO(OEt)2-Sn 13C 8.4



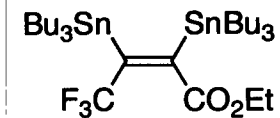
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IWT 1.0000 msec
POINT 32768
SPO 32768
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DUMMY 1
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DELAY 14.80 usec
ACQTM 1.2083 sec
PD 1.7920 sec
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T2 0.00
T3 90.00
T4 100.00
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EXPCM Bilevel.complete.decoupling.Set_IRRF
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IFR 399.65 MHz
IRSET 124.00 KHz
IRFIN 10500.00 Hz
IRRPW 45 usec
IRATN 511
DFILE CF2H-PO(OEt)2-Sn 13C 8.4.als
SF TH5ATFG2
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LKLEV 180
LGAIN 23
LKPHS 250
LKSIG 803
CSPED 13 Hz
FILDC
FILDF



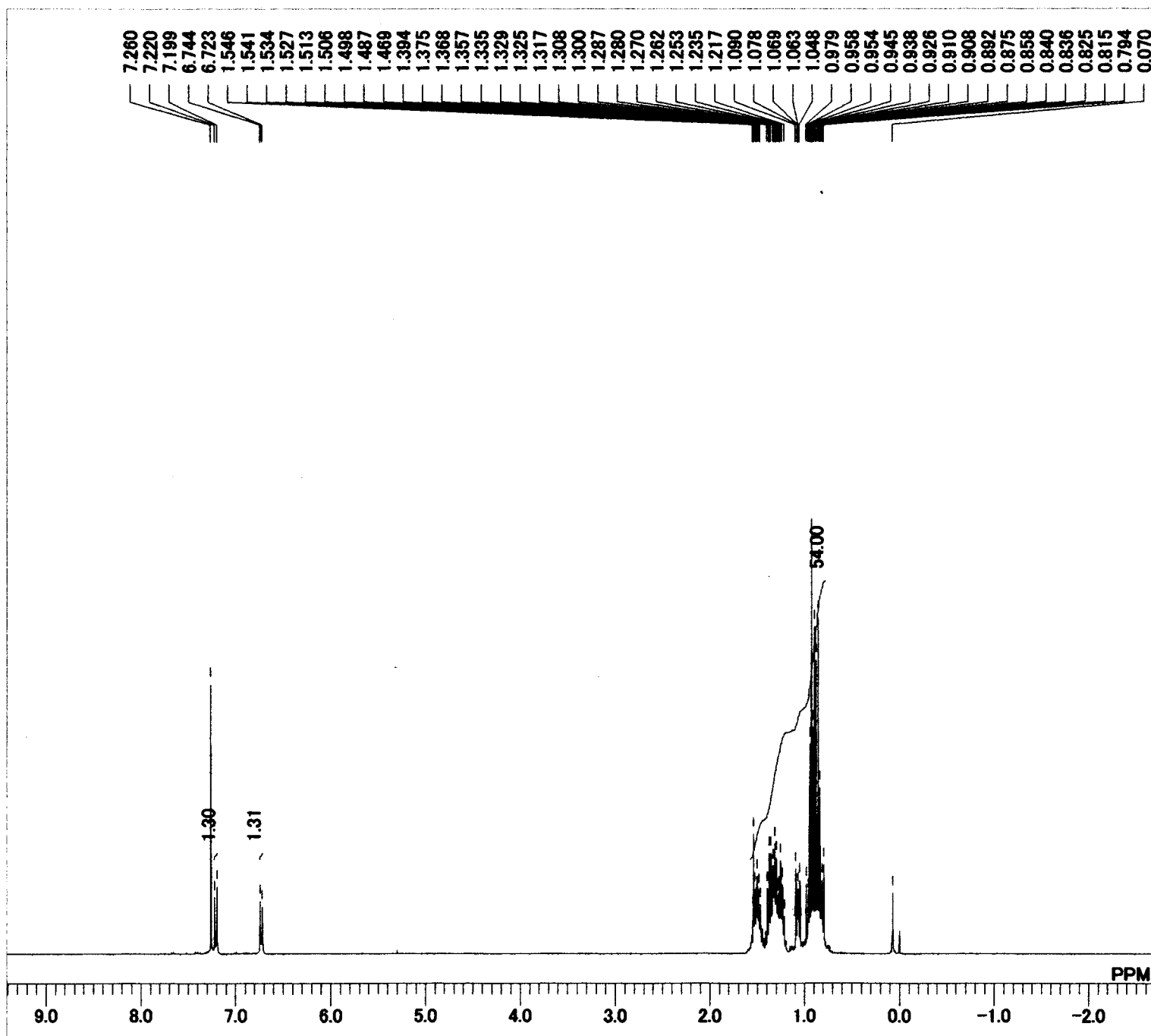
CF₃-CO₂Et-Sn 1H



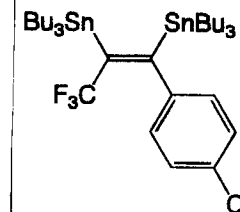
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 DEADT 72.10 usec
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 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
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 FILDC
 FILDF



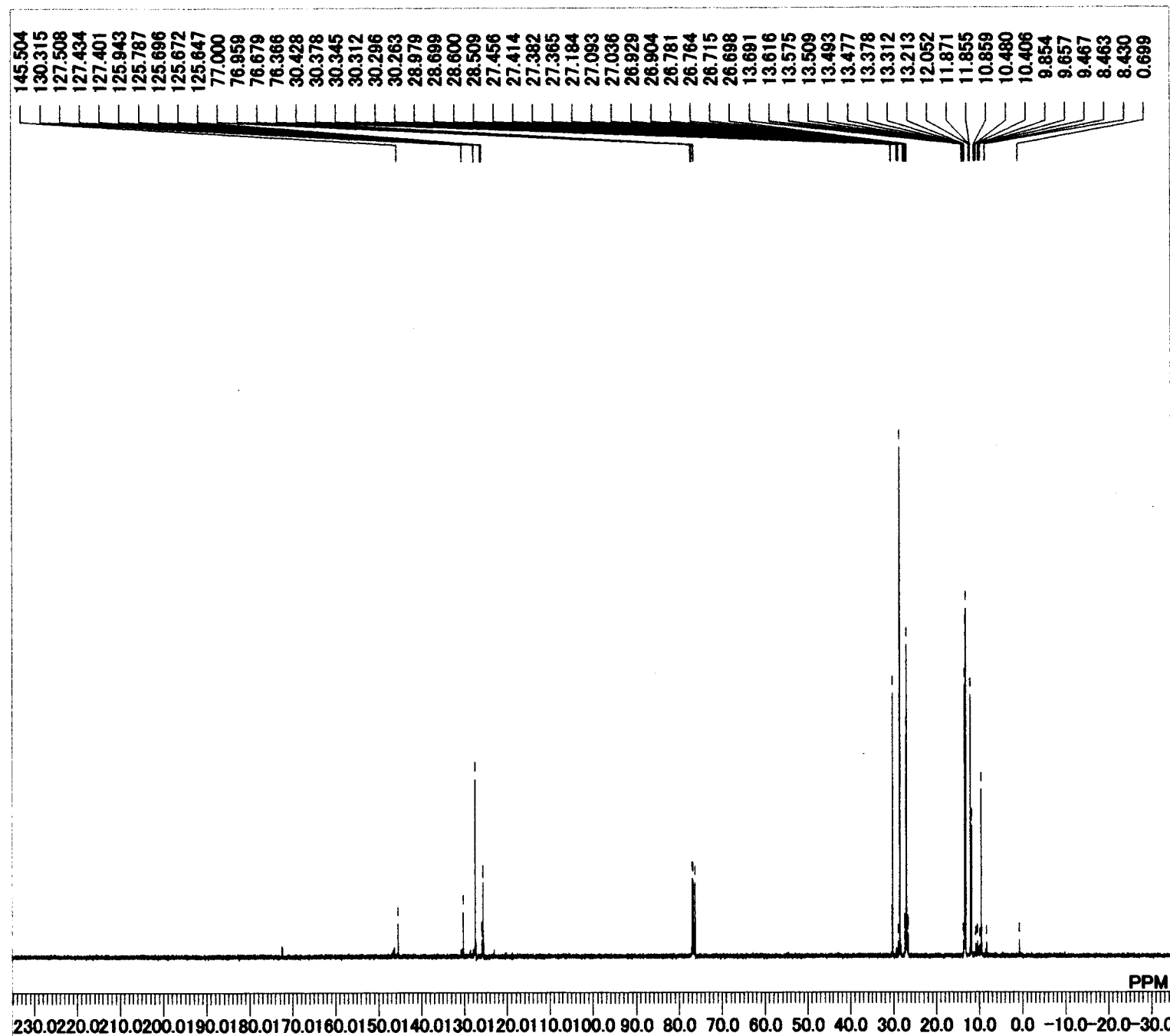
CF3-PH-p-Cl-Sn(1H)



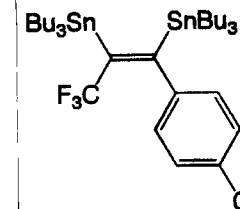
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 SPO 16384
 TIMES 8
 DUMMY 1
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 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 21
 LKPHS 231
 LKSIG 648
 CSPED 13 Hz
 FILDC
 FILDF



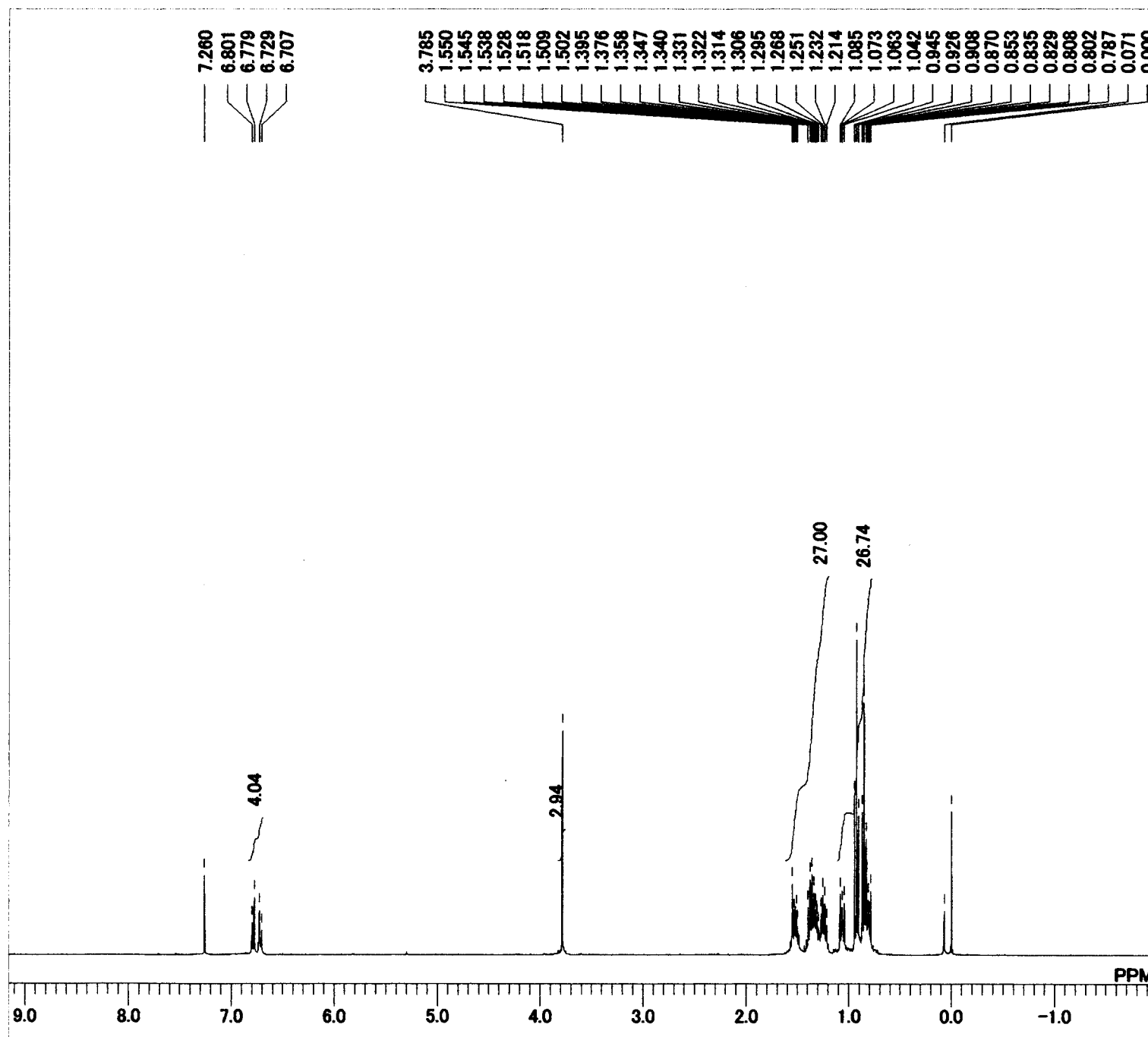
CF3-PH-p-Cl-Sn(13C)



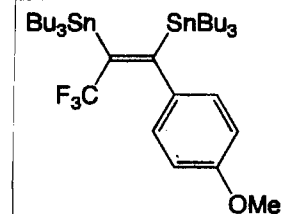
MENUF 13C
OBNUC 13C
OFR 100.40 MHz
OBSET 125.00 KHz
OBFIN 10500.00 Hz
PW1 6.00 usec
DEADT 19.10 usec
PREDL 0.20000 msec
IWT 1.0000 msec
POINT 32768
SPO 32768
TIMES 512
DUMMY 1
FREQU 27118.64 Hz
FLT 13550 Hz
DELAY 14.80 usec
ACQTM 1.2083 sec
PD 1.7920 sec
ADBIT 16
RGAIN 24
BF 0.10 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD BCM
EXPCM Bilevel.complete.decoupling.Set_IRRF
IRNUC 1H
IFR 399.65 MHz
IRSET 124.00 KHz
IRFIN 10500.00 Hz
IRRPW 45 usec
IRATN 511
DFILE CF3-PH-p-Cl-Sn(13C).als
SF TH5ATFG2
LKSET 61.60 KHz
LKFIN 79.0 Hz
LKLEV 180
LGAIN 26
LKPHS 231
LKSIG 1189
CSPED 13 Hz
FILDC
FILDF



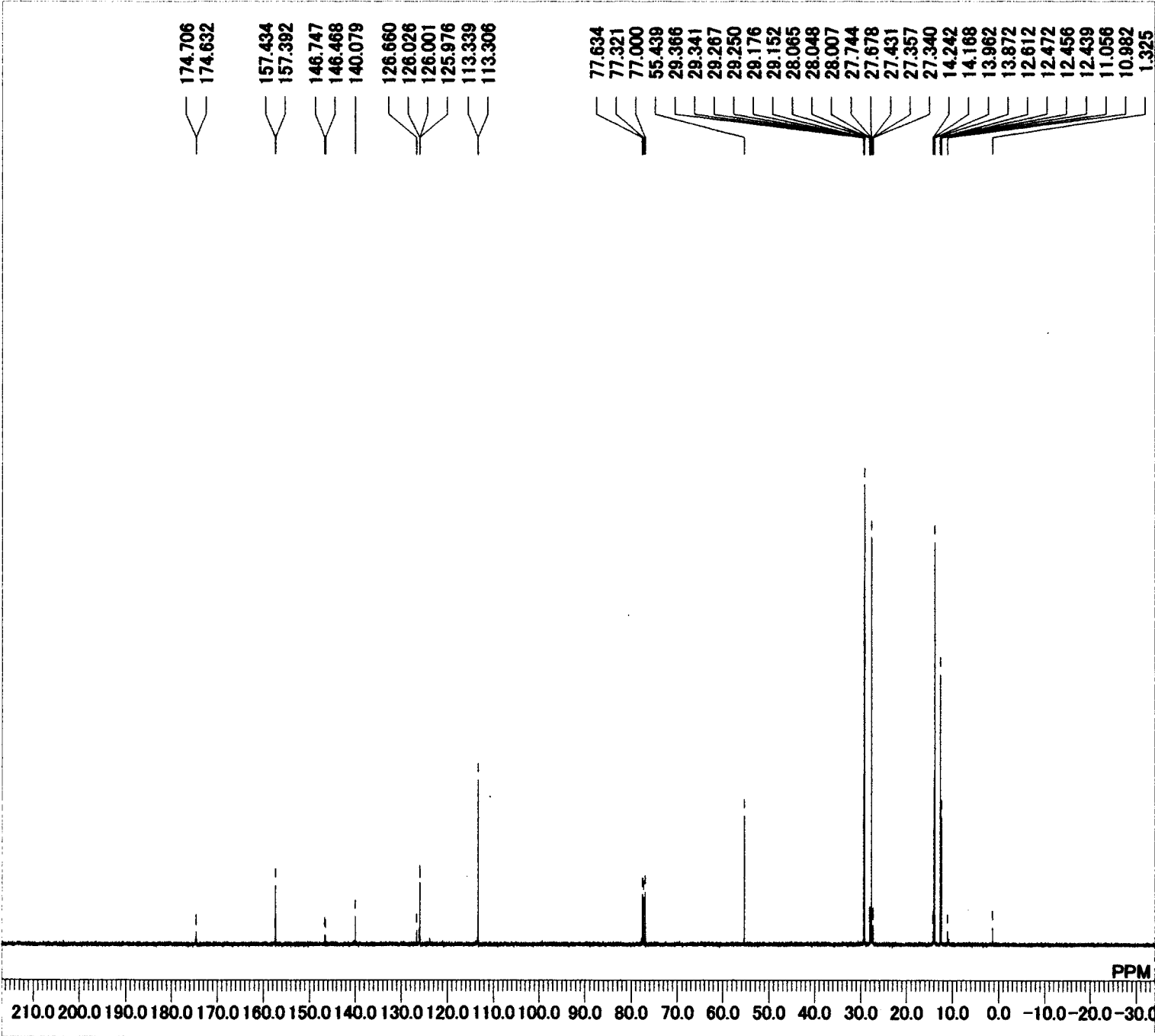
CF3-ph-OMe-Sn(1H)



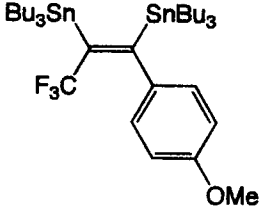
MENUF	1H
OBNUC	1H
OFR	399.65 MHz
OBSET	135.40 KHz
OBFIN	24.90 Hz
PW1	5.80 usec
DEADT	72.10 usec
PREDL	0.20000 msec
IWT	1.0000 msec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7992.01 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	2.0501 sec
PD	4.9500 sec
ADBIT	16
RGAIN	14
BF	0.10 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	NON
EXPCM	NON:Single.coupled:PW1_ACQTM_PI
IRNUC	1H
IFR	399.65 MHz
IRSET	136.90 KHz
IRFIN	97.50 Hz
IRRPW	45 usec
IRATN	511
DFILE	CF3-ph-OMe-Sn(1H).als
SF	TH5ATFG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	23
LKPHS	231
LKSIG	1021
CSPED	14 Hz
FILDC	
FILDF	



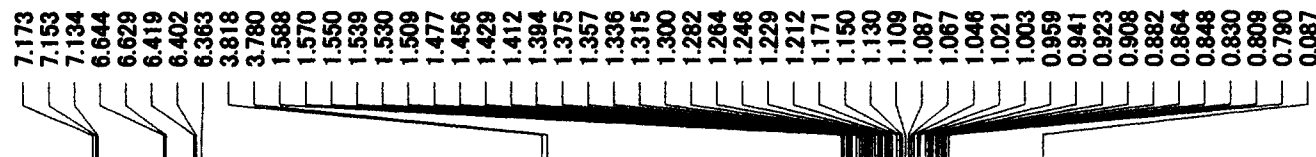
CF3-ph-OMe-Sn(13C)



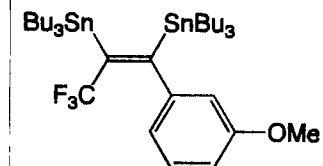
MENUF 13C
OBNUC 13C
OFR 100.40 MHz
OBSET 125.00 KHz
OBFIN 10500.00 Hz
PW1 6.00 usec
DEADT 19.10 usec
PREDL 0.20000 msec
IWT 1.0000 msec
POINT 32768
SPO 32768
TIMES 256
DUMMY 1
FREQU 27118.64 Hz
FLT 13550 Hz
DELAY 14.80 usec
ACQTM 1.2083 sec
PD 1.7920 sec
ADBIT 16
RGAIN 24
BF 0.10 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD BCM
EXPCM Bilevel.complete.decoupling.Set_IRRF
IRNUC 1H
IFR 399.65 MHz
IRSET 124.00 KHz
IRFIN 10500.00 Hz
IRRPW 45 usec
IRATN 511
DFILE CF3-ph-OMe-Sn(13C).als
SF TH5ATFG2
LKSET 61.60 KHz
LKFIN 79.0 Hz
LKLEV 180
LGAIN 25
LKPHS 231
LKSIG 1245
CSPED 10 Hz
FILDC
FILDF



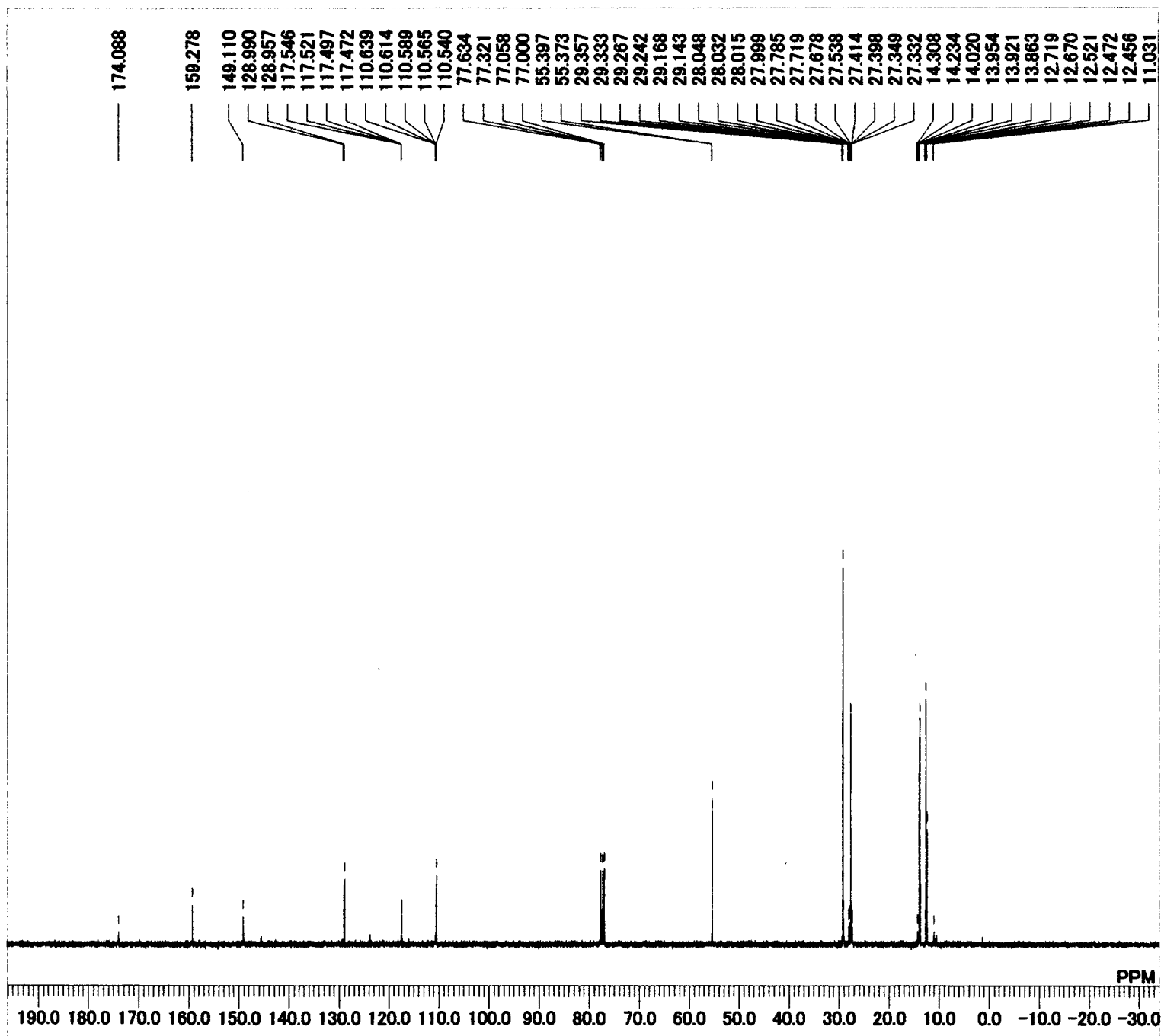
CF3-ph-m-OMe-Sn(1H)



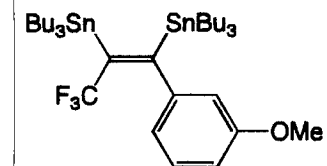
MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.80 usec
 DEADT 72.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 7
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PL
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-ph-m-OMe-Sn(1H).als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 23
 LKPHS 249
 LKSIG 544
 CSPED 14 Hz
 FILDC
 FILDF



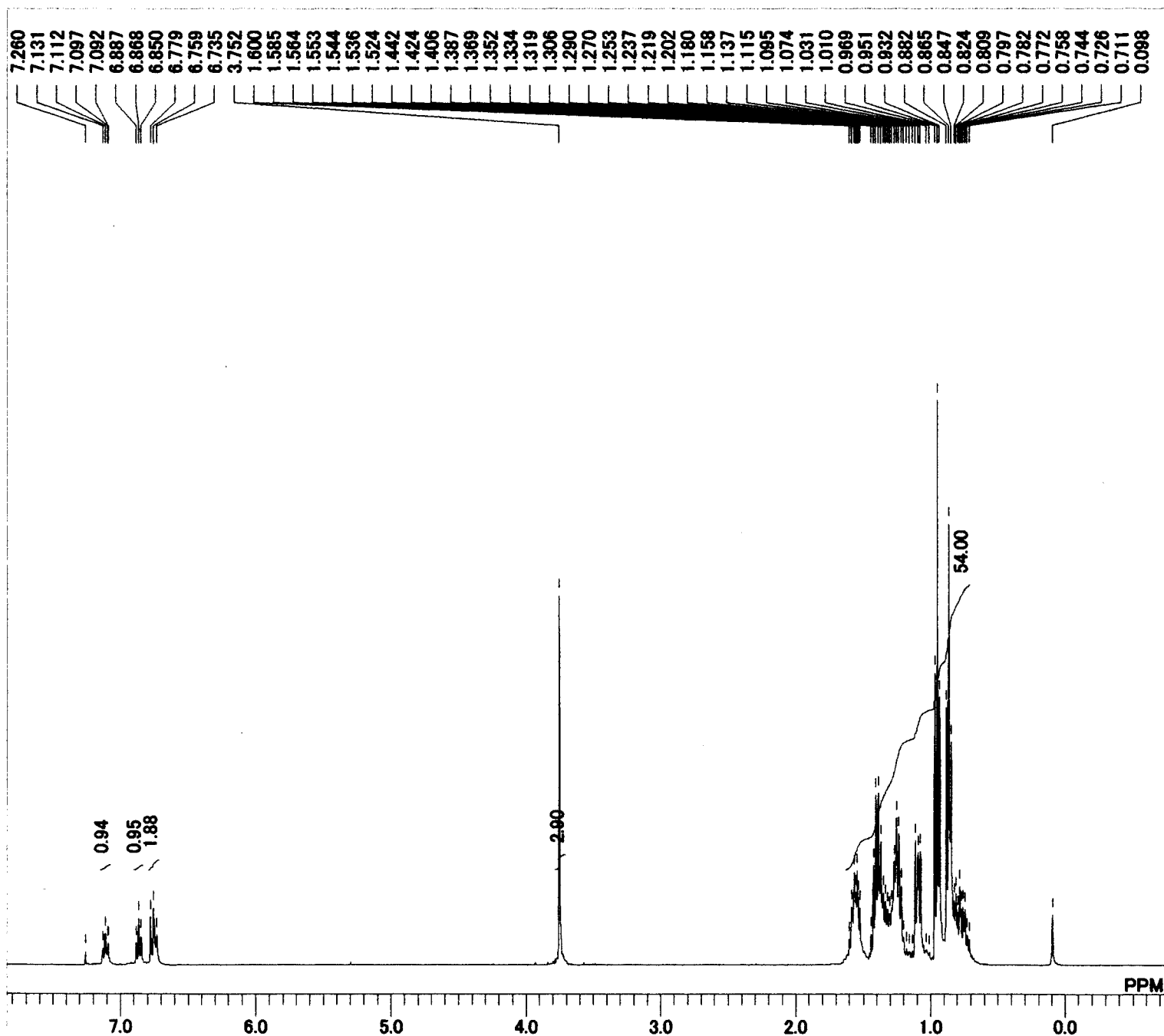
CF3-ph-m-OMe-Sn(13C)



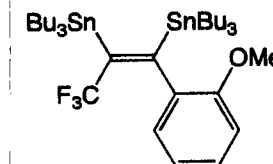
MENUF 13C
 OBNUC 13C
 OFR 100.40 MHz
 OBSET 125.00 KHz
 OBFIN 10500.00 Hz
 PW1 6.00 usec
 DEADT 19.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 32768
 SPO 32768
 TIMES 256
 DUMMY 1
 FREQU 27118.64 Hz
 FLT 13550 Hz
 DELAY 14.80 usec
 ACQTM 1.2083 sec
 PD 1.7920 sec
 ADBIT 16
 RGAIN 25
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD BCM
 EXPCM Bilevel.complete.decoupling.Set_IRRF
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 124.00 KHz
 IRFIN 10500.00 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE _DEFAULT.ALS
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 23
 LKPHS 249
 LKSIG 538
 CSPED 14 Hz
 FILDC
 FILDF



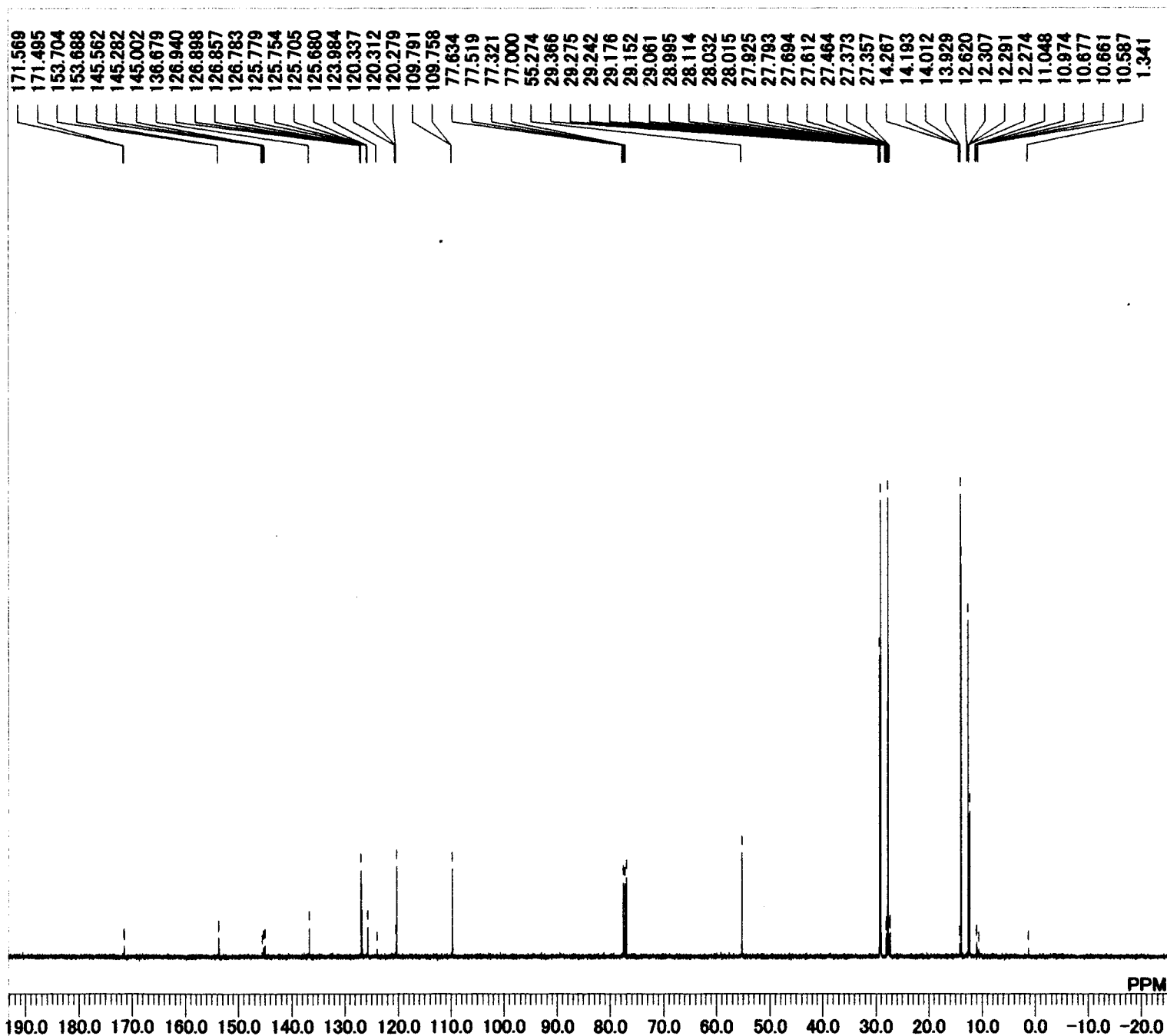
CF3-ph-o-OMe-Sn(1H)



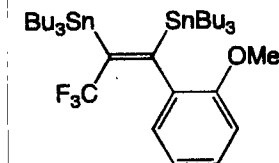
MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.80 usec
 DEADT 72.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 6
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PC
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-ph-o-OMe-Sn(1H)Rxn.183.als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 24
 LKPHS 231
 LKSIG 1065
 CSPED 10 Hz
 FILDC
 FILDF



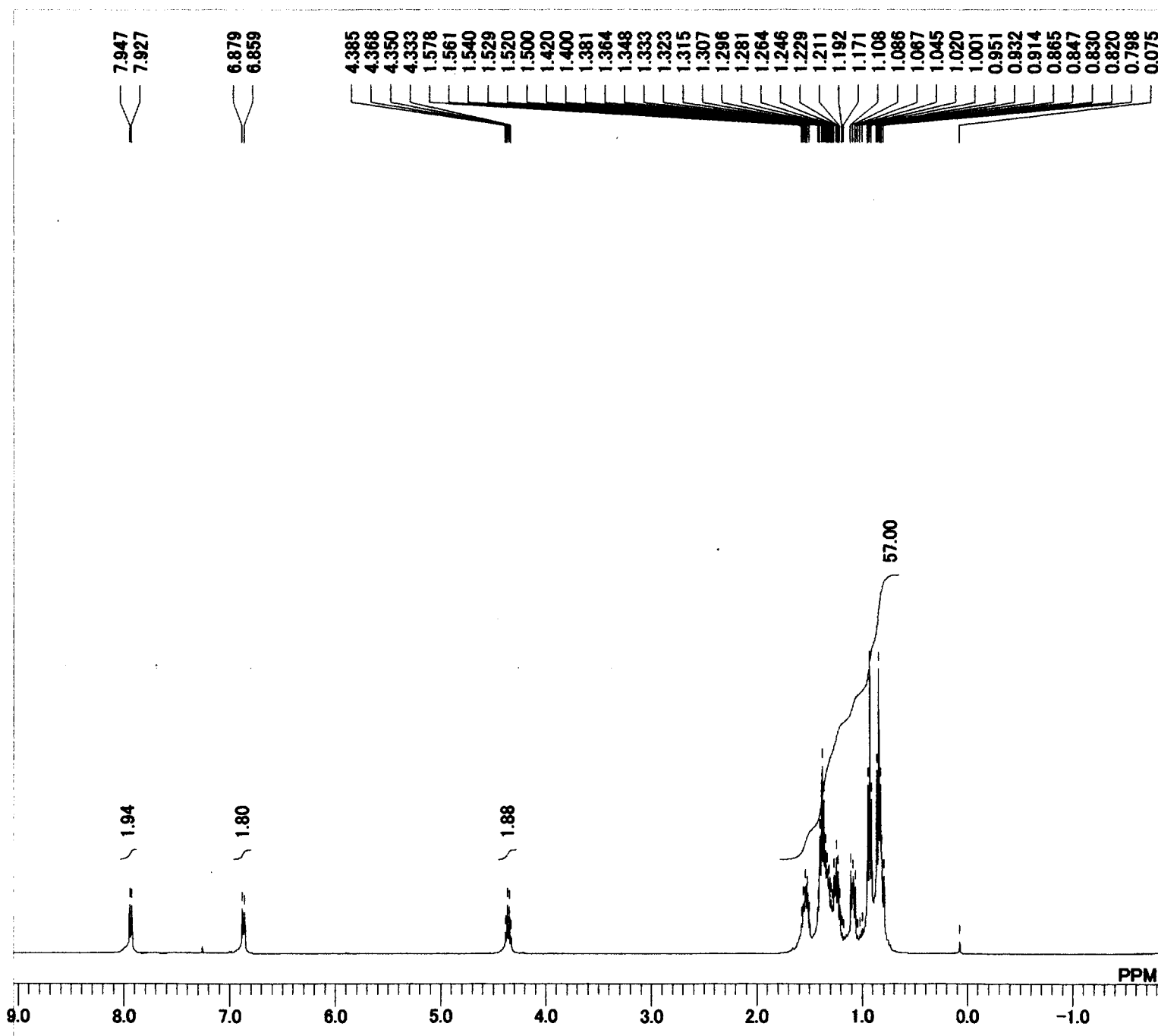
CF₃-ph-o-OMe-Sn(13C)



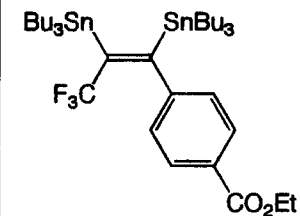
MENUF 13C
OBNUC 13C
OFR 100.40 MHz
OBSET 125.00 KHz
OBFIN 10500.00 Hz
PW1 6.00 usec
DEADT 19.10 usec
PREDL 0.20000 msec
IWT 1.0000 msec
POINT 32768
SPO 32768
TIMES 256
DUMMY 1
FREQU 27118.64 Hz
FLT 13550 Hz
DELAY 14.80 usec
ACQTM 1.2083 sec
PD 1.7920 sec
ADBIT 16
RGAIN 25
BF 0.10 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD BCM
EXPCM Bilevel.complete.decoupling.Set_IRRF
IRNUC 1H
IFR 399.65 MHz
IRSET 124.00 KHz
IRFIN 10500.00 Hz
IRRPW 45 usec
IRATN 511
DFILE CF3-ph-o-OMe-Sn(13C)Rxn.183.als
SF TH5ATFG2
LKSET 61.60 KHz
LKFIN 79.0 Hz
LKLEV 180
LGAIN 24
LKPHS 231
LKSIG 1061
CSPED 10 Hz
FILDC
FILDF



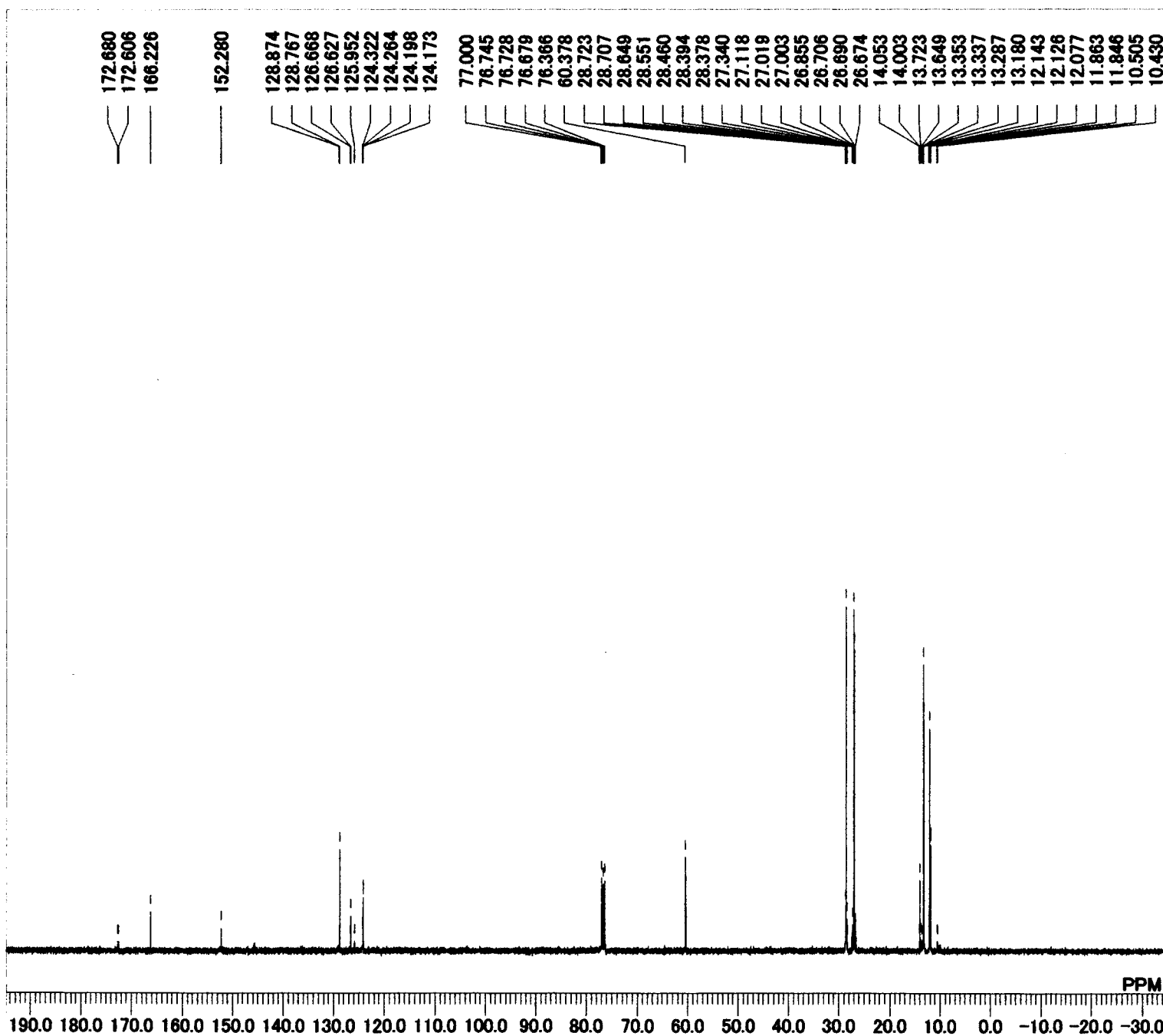
CF3-ph-p-CO2Et-Sn(1H)



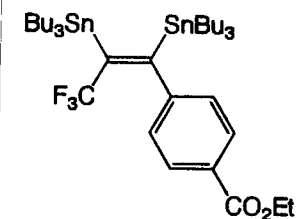
MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.80 usec
 DEADT 72.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 7
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PI
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE _DEFAULT.ALS
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 24
 LKPHS 249
 LKSIG 628
 CSPED 11 Hz
 FILDC
 FILDF



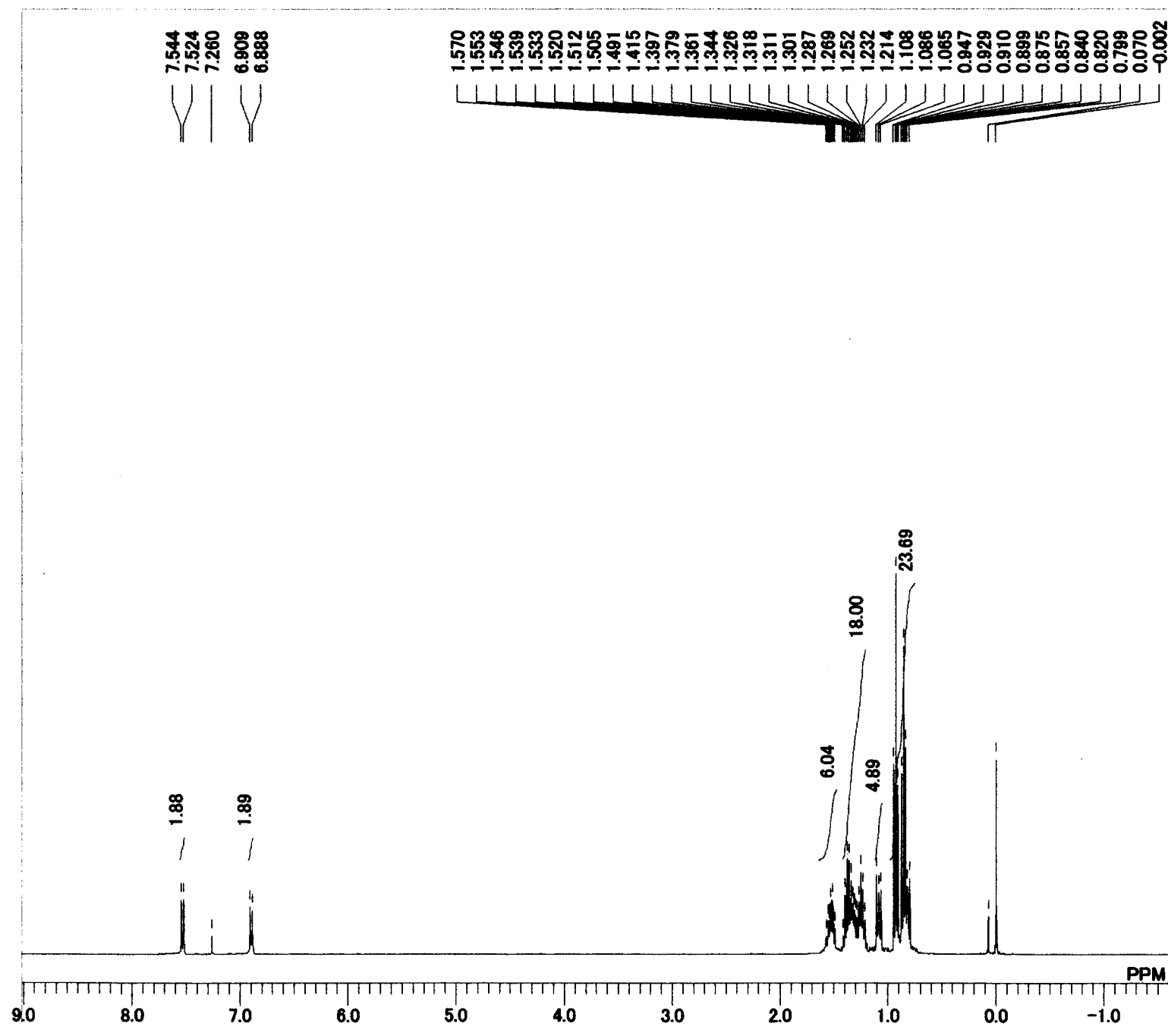
CF3-ph-p-CO2Et-Sn(13C)



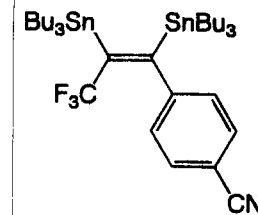
MENUF 13C
 OBNUC 13C
 OFR 100.40 MHz
 OBSET 125.00 KHz
 OBFIN 10500.00 Hz
 PW1 6.00 usec
 DEADT 19.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 32768
 SPO 32768
 TIMES 256
 DUMMY 1
 FREQU 27118.64 Hz
 FLT 13550 Hz
 DELAY 14.80 usec
 ACQTM 1.2083 sec
 PD 1.7920 sec
 ADBIT 16
 RGAIN 25
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD BCM
 EXPCM Bilevel.complete.decoupling:Set_IRRF
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 124.00 KHz
 IRFIN 10500.00 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-ph-p-CO2Et-Sn (13C).als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 24
 LKPHS 249
 LKSIG 628
 CSPED 12 Hz
 FILDG
 FILDF



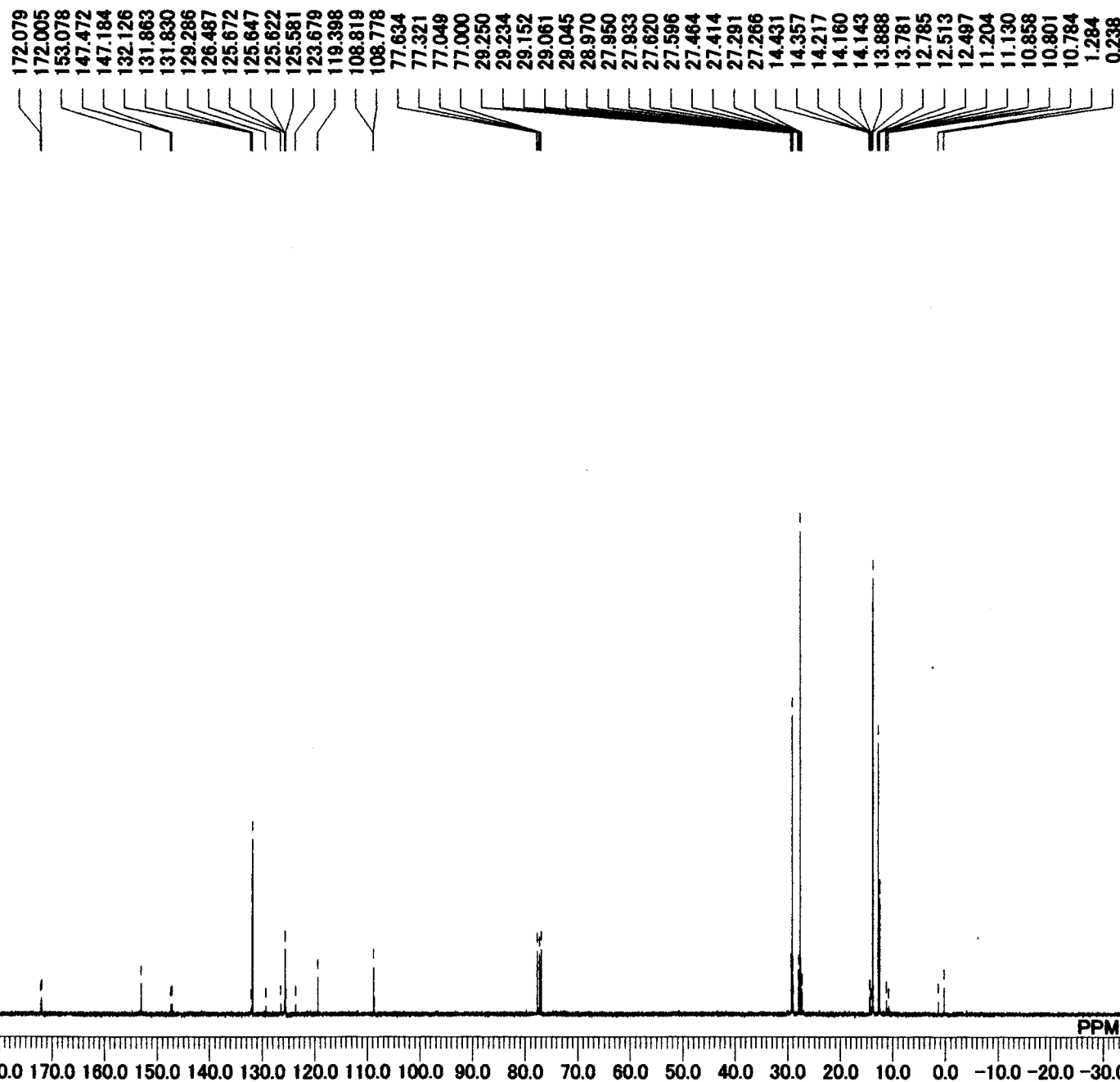
CF3-ph-p-CN(1H)



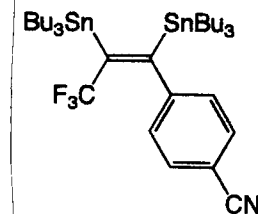
MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.80 usec
 DEADT 72.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 9
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PC
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-ph-p-CN-Sn(1H).als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 22
 LKPHS 255
 LKSIG 776
 CSPED 11 Hz
 FILDC
 FILDF

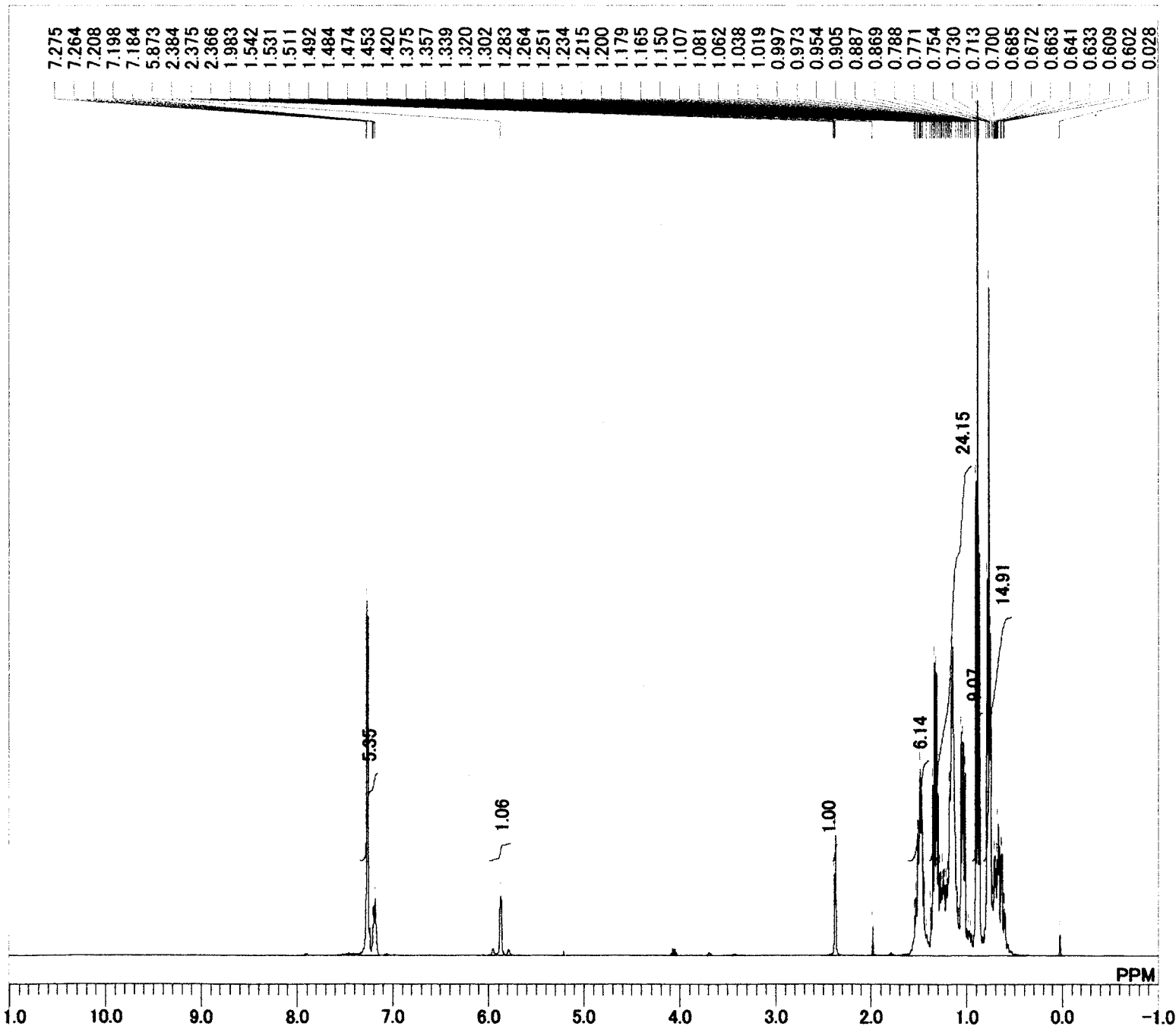


CF3-ph-p-CN-Sn(13C)

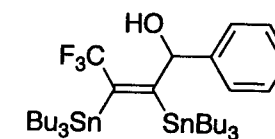


MENUF 13C
 OBNUC 13C
 OFR 100.40 MHz
 OBSET 125.00 KHz
 OBFIN 10500.00 Hz
 PW1 6.00 usec
 DEADT 19.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 32768
 SPO 32768
 TIMES 256
 DUMMY 1
 FREQU 27118.64 Hz
 FLT 13550 Hz
 DELAY 14.80 usec
 ACQTM 1.2083 sec
 PD 1.7920 sec
 ADBIT 16
 RGAIN 24
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD BCM
 EXPCM Bilevel.complete.decoupling.Set_IRRF
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 124.00 KHz
 IRFIN 10500.00 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-ph-p-CN-Sn(13C).als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 24
 LKPHS 255
 LKSIG 1007
 CSPED 14 Hz
 FILDC
 FILDF



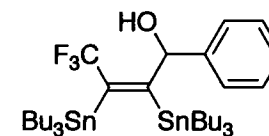


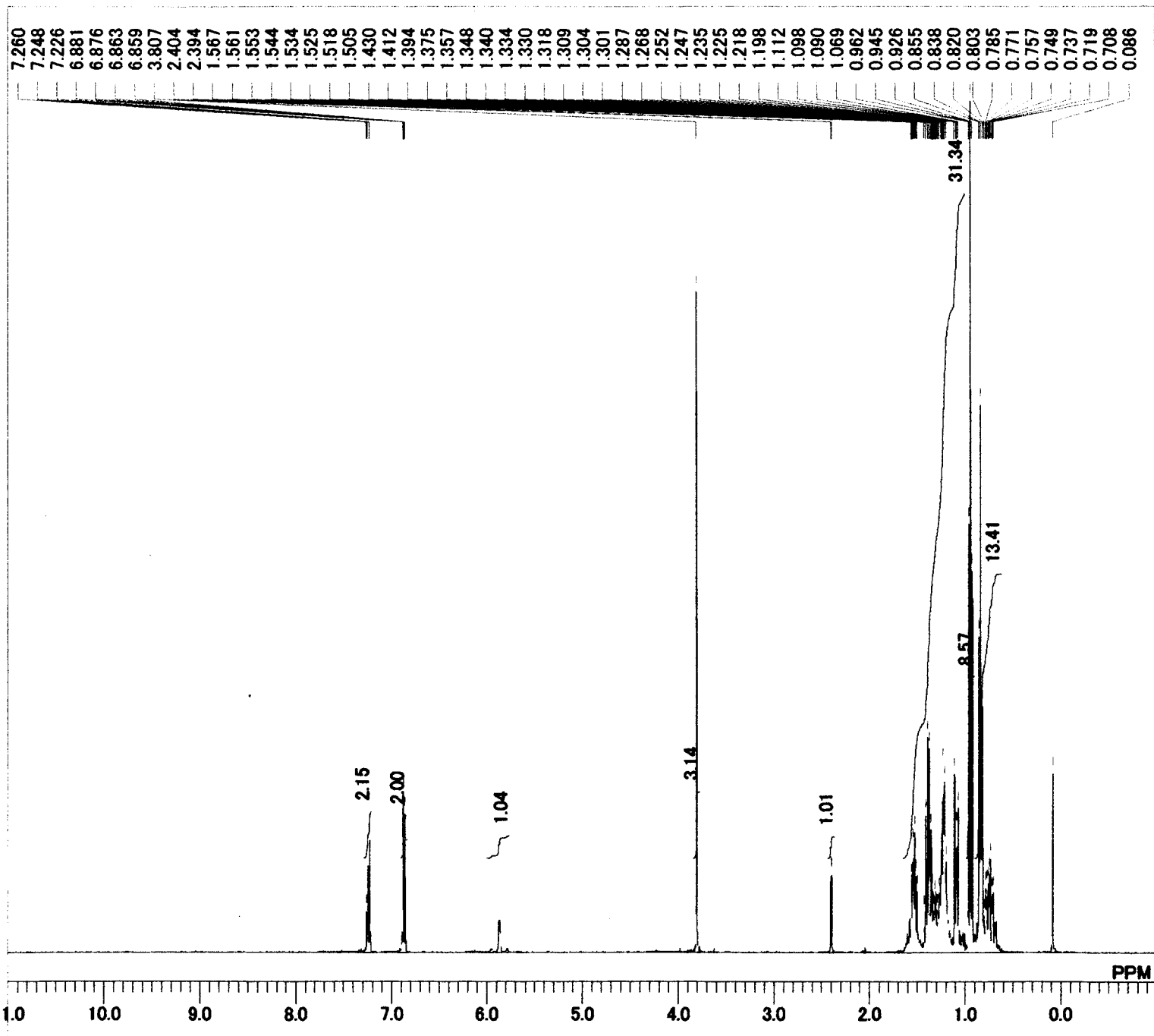
MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.20 usec
 DEADT 72.40 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 6
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 100.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PD:
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE _DEFAULT.ALS
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 24
 LKPHS 219
 LKSIG 846
 CSPED 12 Hz
 FILDC
 FILDF



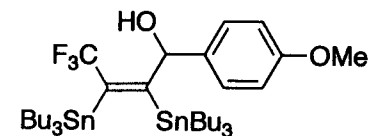
178.484
178.419
178.353
178.295
144.837
144.558
144.269
143.981
140.787
129.607
128.076
127.129
126.800
126.413
123.992
121.185
77.321
77.198
77.000
76.679
75.156
75.139
29.135
29.036
28.987
28.946
28.896
28.814
27.843
27.826
27.719
27.703
27.489
27.373
27.143
27.126
27.036
15.024
14.950
14.341
14.324
14.267
14.250
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12.604
11.739
11.665
10.982
10.966
10.900

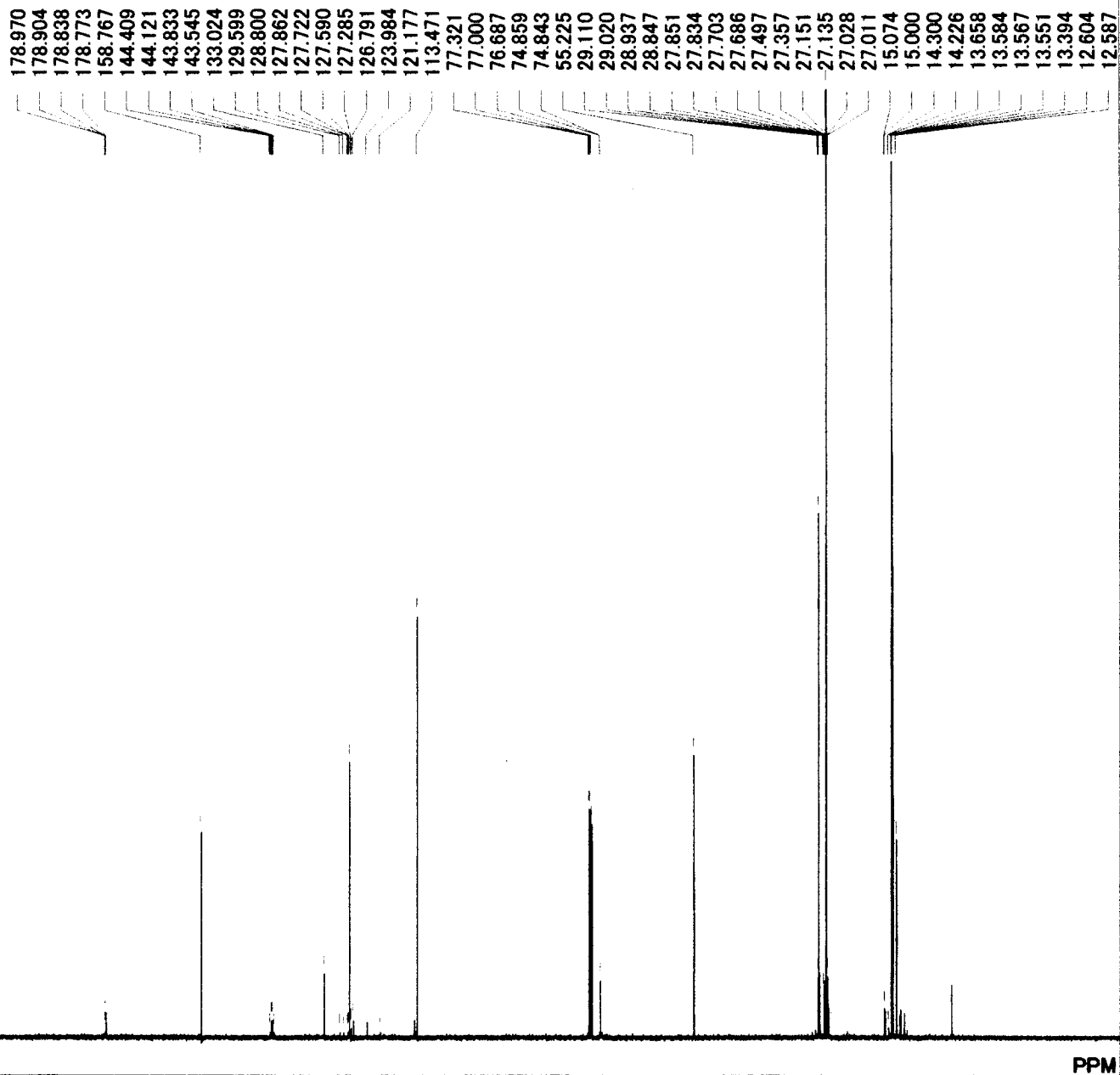
MENUF 13C
OBNUC 13C
OFR 100.40 MHz
OBSET 125.00 KHz
OBFIN 10500.00 Hz
PW1 6.00 usec
DEADT 19.10 usec
PREDL 0.20000 msec
IWT 1.0000 msec
POINT 32768
SPO 32768
TIMES 2000
DUMMY 1
FREQU 27118.64 Hz
FLT 13550 Hz
DELAY 14.80 usec
ACQTM 1.2083 sec
PD 1.7920 sec
ADBIT 16
RGAIN 23
BF 0.10 Hz
T1 0.00
T2 0.00
T3 100.00
T4 100.00
EXMOD BCM
EXPCM Bilevel.complete.decoupling: Set_IRRP1
IRNUC 1H
IFR 399.65 MHz
IRSET 124.00 KHz
IRFIN 10500.00 Hz
IRRPW 45 usec
IRATN 511
DFILE _DEFAULT.ALS
SF TH5ATFG2
LKSET 61.60 KHz
LKFIN 79.0 Hz
LKLEV 180
LGAIN 24
LKPHS 219
LKSIG 829
CSPED 13 Hz
FILDC
FILDF



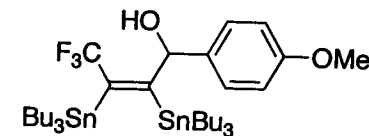


MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.20 usec
 DEADT 72.40 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 8
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PD:
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE 071003-propargyl-1H-nama.als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 23
 LKPHS 219
 LKSIG 991
 CSPED 12 Hz
 FILDC
 FILDF

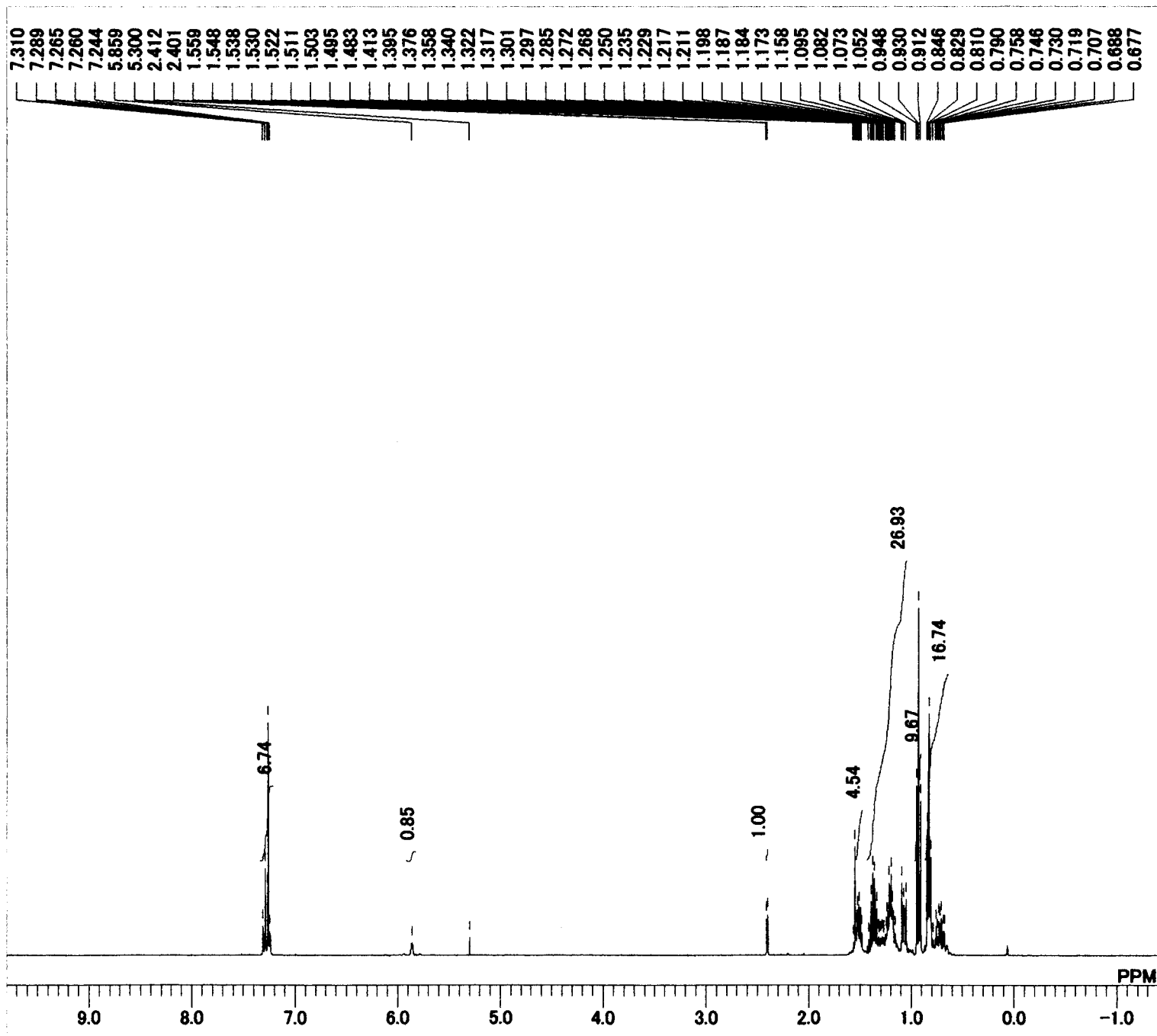




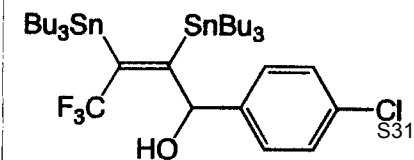
MENUF 13C
 OBNUC 13C
 OFR 100.40 MHz
 OBSET 125.00 KHz
 OBFIN 10500.00 Hz
 PW1 6.00 usec
 DEADT 19.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 32768
 SPO 32768
 TIMES 1024
 DUMMY 1
 FREQU 27118.64 Hz
 FLT 13550 Hz
 DELAY 14.80 usec
 ACQTM 1.2083 sec
 PD 1.7920 sec
 ADBIT 16
 RGAIN 24
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD BCM
 EXPCM Bilevel.complete.decoupling: Set_IRRP1
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 124.00 KHz
 IRFIN 10500.00 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE 071003-propargyl-13C-nama.als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 23
 LKPHS 219
 LKSIG 1010
 CSPED 12 Hz
 FILDC
 FILDF



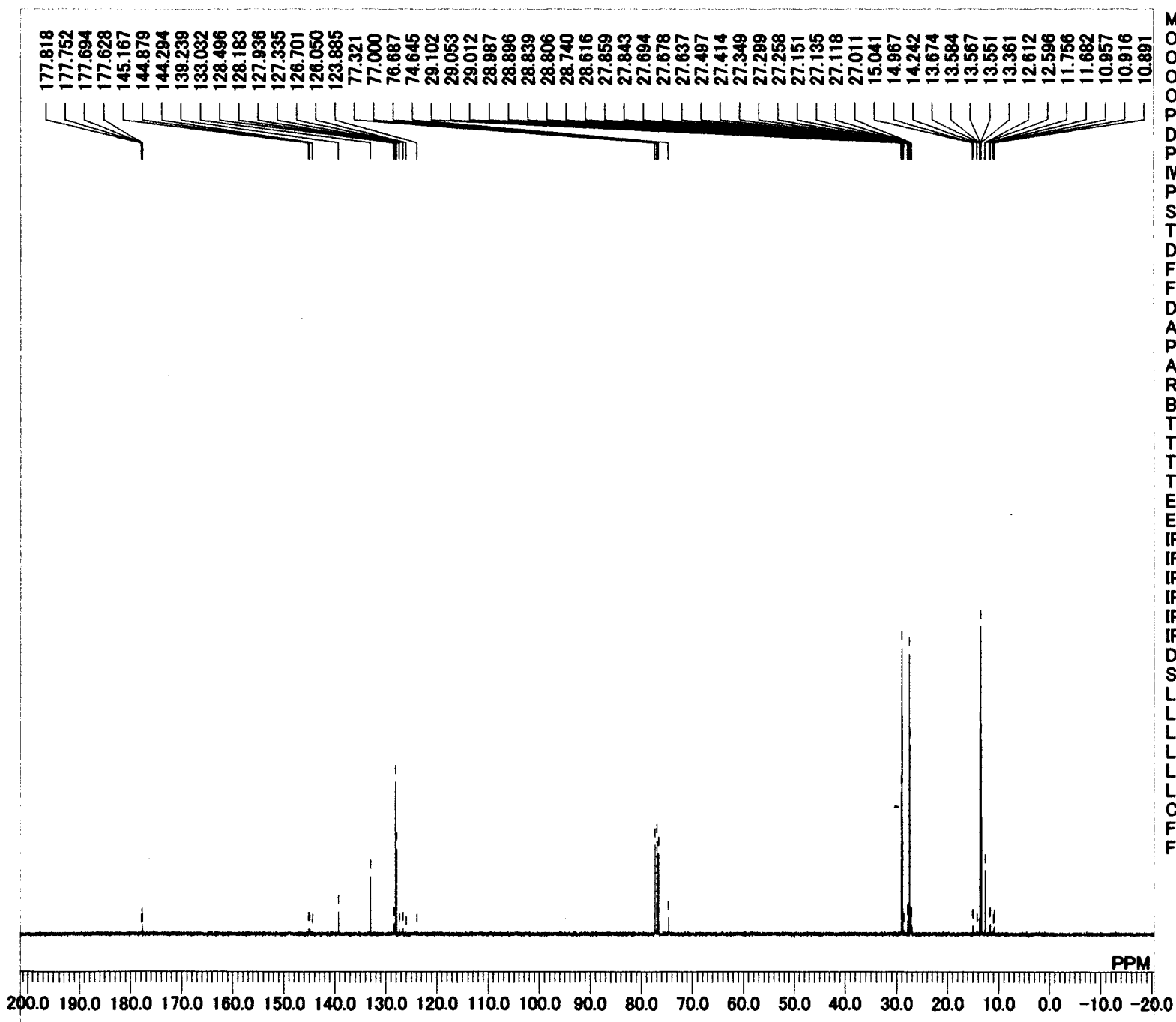
CF3-ph-p-Cl-OH-Sn(1H)



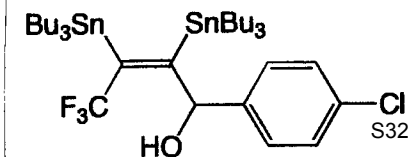
MENUF 1H
OBNUC 1H
OFR 399.65 MHz
OBSET 135.40 KHz
OBFIN 24.90 Hz
PW1 5.20 usec
DEADT 72.40 usec
PREDL 0.20000 msec
IWT 1.0000 msec
POINT 16384
SPO 16384
TIMES 8
DUMMY 1
FREQU 7992.01 Hz
FLT 4000 Hz
DELAY 50.00 usec
ACQTM 2.0501 sec
PD 4.9500 sec
ADBIT 16
RGAIN 17
BF 0.10 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD NON
EXPCM NON:Single.coupled:PW1_ACQTM_PI
IRNUC 1H
IFR 399.65 MHz
IRSET 136.90 KHz
IRFIN 97.50 Hz
IRRPW 45 usec
IRATN 511
DFILE CF3-p-Cl-Sn(1H).als
SF TH5ATFG2
LKSET 61.60 KHz
LKFIN 79.0 Hz
LKLEV 180
LGAIN 21
LKPHS 219
LKSIG 709
CSPED 13 Hz
FILDC
FILDF



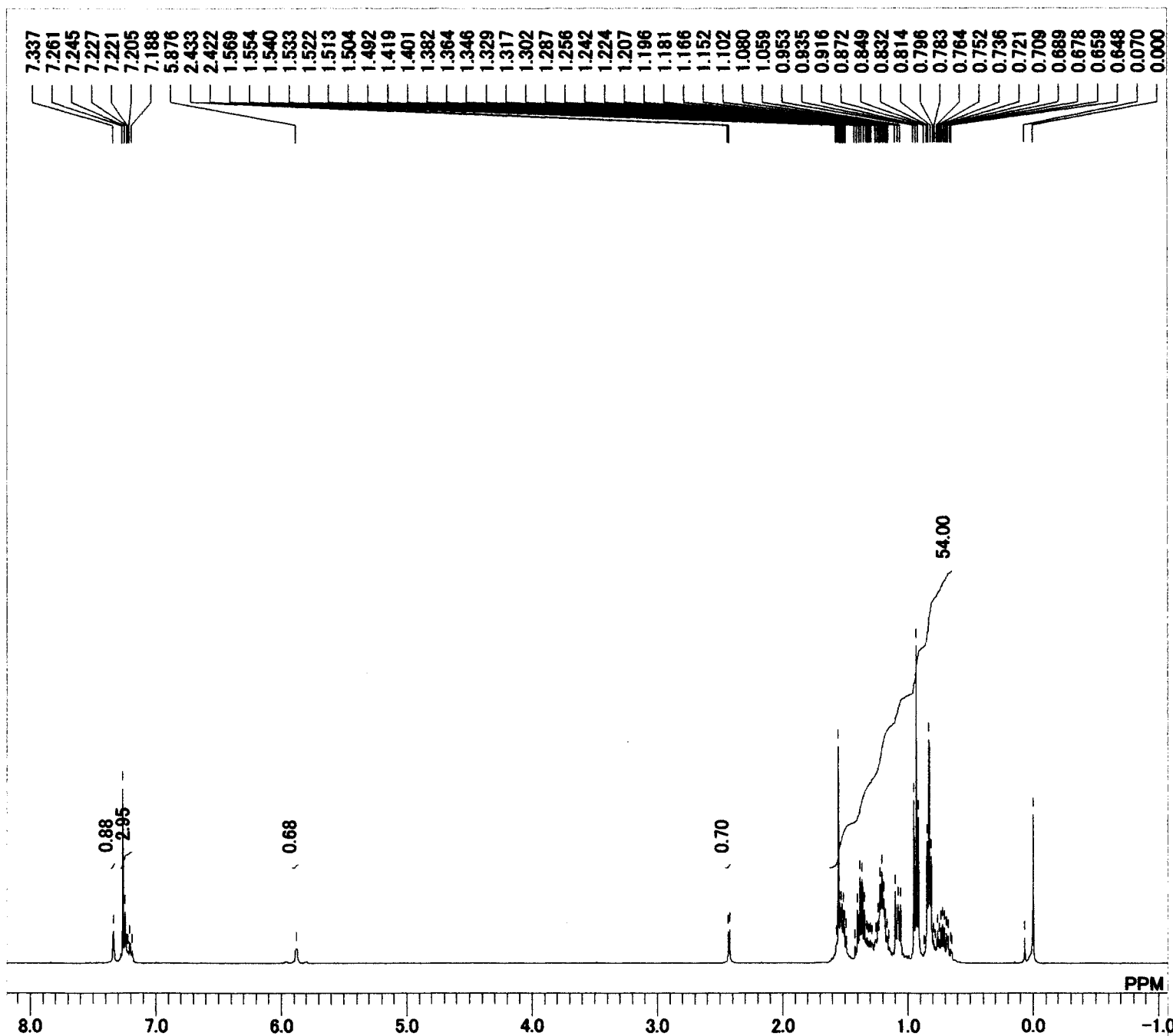
CF3-ph-p-Cl-OH-Sn(13C)



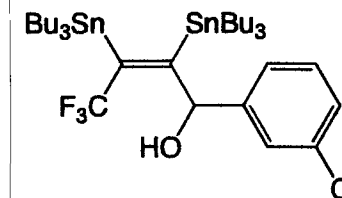
MENUF 13C
 OBNUC 13C
 OFR 100.40 MHz
 OBSET 125.00 KHz
 OBFIN 10500.00 Hz
 PW1 6.00 usec
 DEADT 19.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 32768
 SPO 32768
 TIMES 512
 DUMMY 1
 FREQU 27118.64 Hz
 FLT 13550 Hz
 DELAY 14.80 usec
 ACQTM 1.2083 sec
 PD 1.7920 sec
 ADBIT 16
 RGAIN 25
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD BCM
 EXPCM Bilevel.complete.decoupling:Set_IRRF
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 124.00 KHz
 IRFIN 10500.00 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-p-Cl-Sn(13C).als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 22
 LKPHS 219
 LKSIG 822
 CSPED 13 Hz
 FILDC
 FILDF



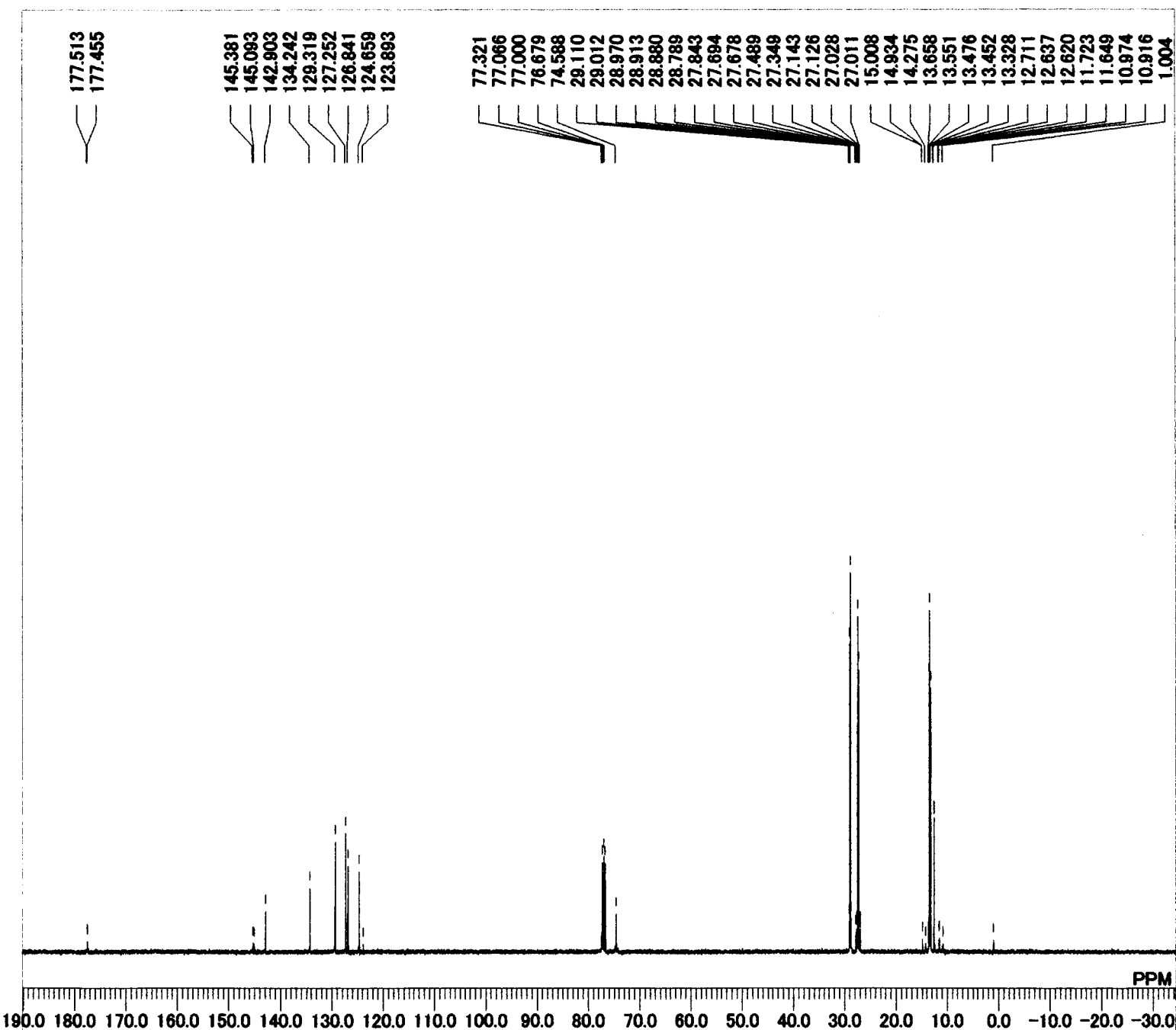
CF3-ph-m-Cl-OH-Sn(1H)



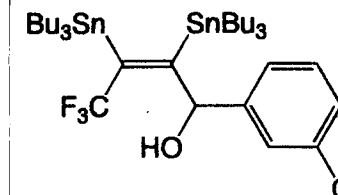
MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.80 usec
 DEADT 72.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 17
 BF 0.60 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PI
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-ph-m-Cl-OH-Sn(1H).als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 23
 LKPHS 231
 LKSIG 1053
 CSPED 10 Hz
 FILDC
 FILDF



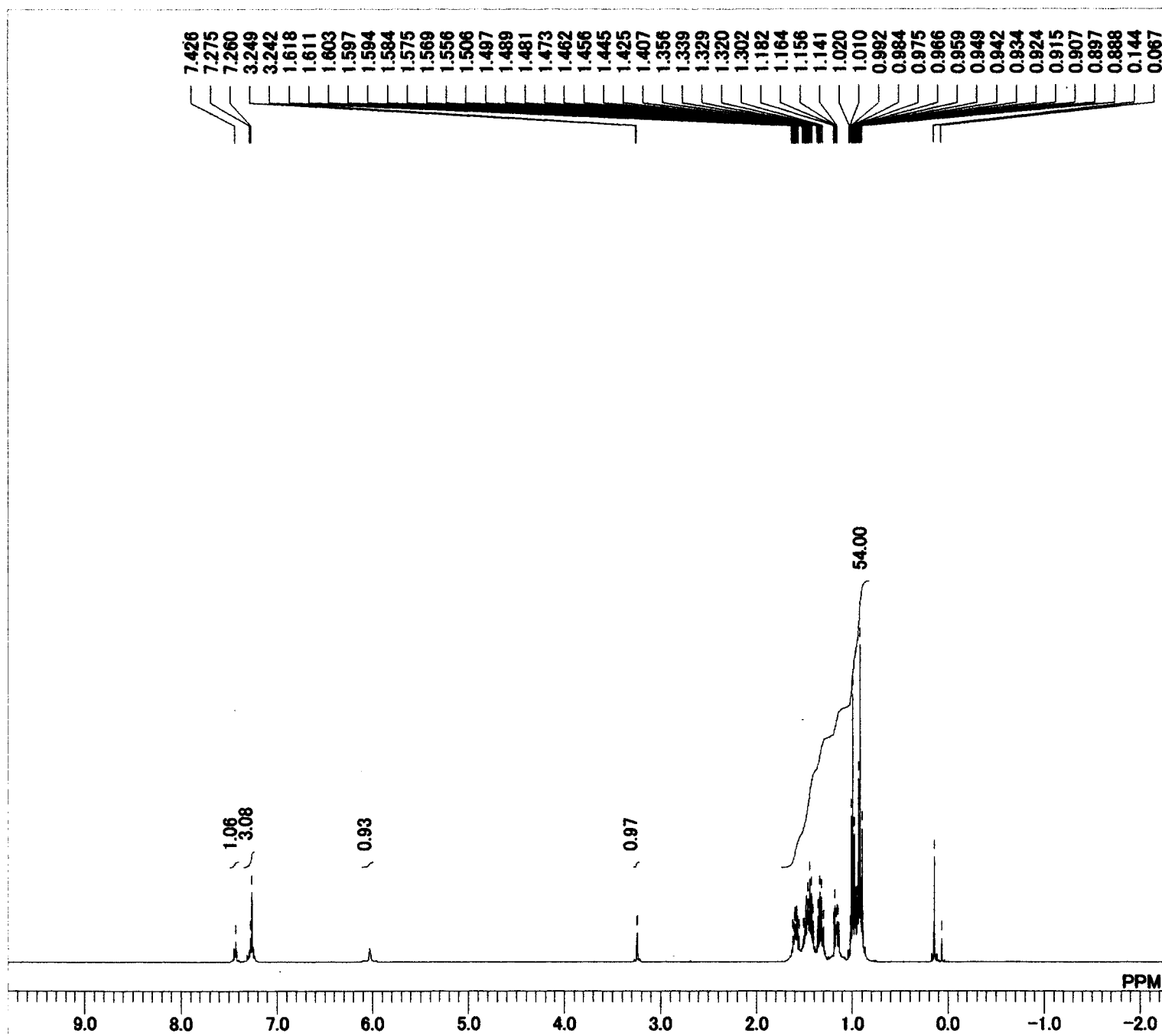
CF3-ph-m-Cl-OH-Sn(13C)



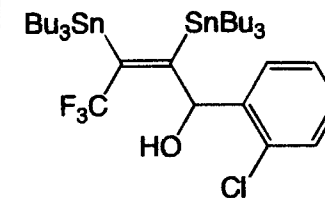
MENUF 13C
 OBNUC 13C
 OFR 100.40 MHz
 OBSET 125.00 KHz
 OBFIN 10500.00 Hz
 PW1 6.00 usec
 DEADT 19.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 32768
 SPO 32768
 TIMES 256
 DUMMY 1
 FREQU 27118.64 Hz
 FLT 13550 Hz
 DELAY 14.80 usec
 ACQTM 1.2083 sec
 PD 1.7920 sec
 ADBIT 16
 RGAIN 25
 BF 0.60 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD BCM
 EXPCM Bilevel.complete.decoupling.Set_IRRF
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 124.00 KHz
 IRFIN 10500.00 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-ph-m-Cl-OH-Sn(13C).als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 23
 LKPHS 231
 LKSIG 707
 CSPED 13 Hz
 FILDC
 FILDF



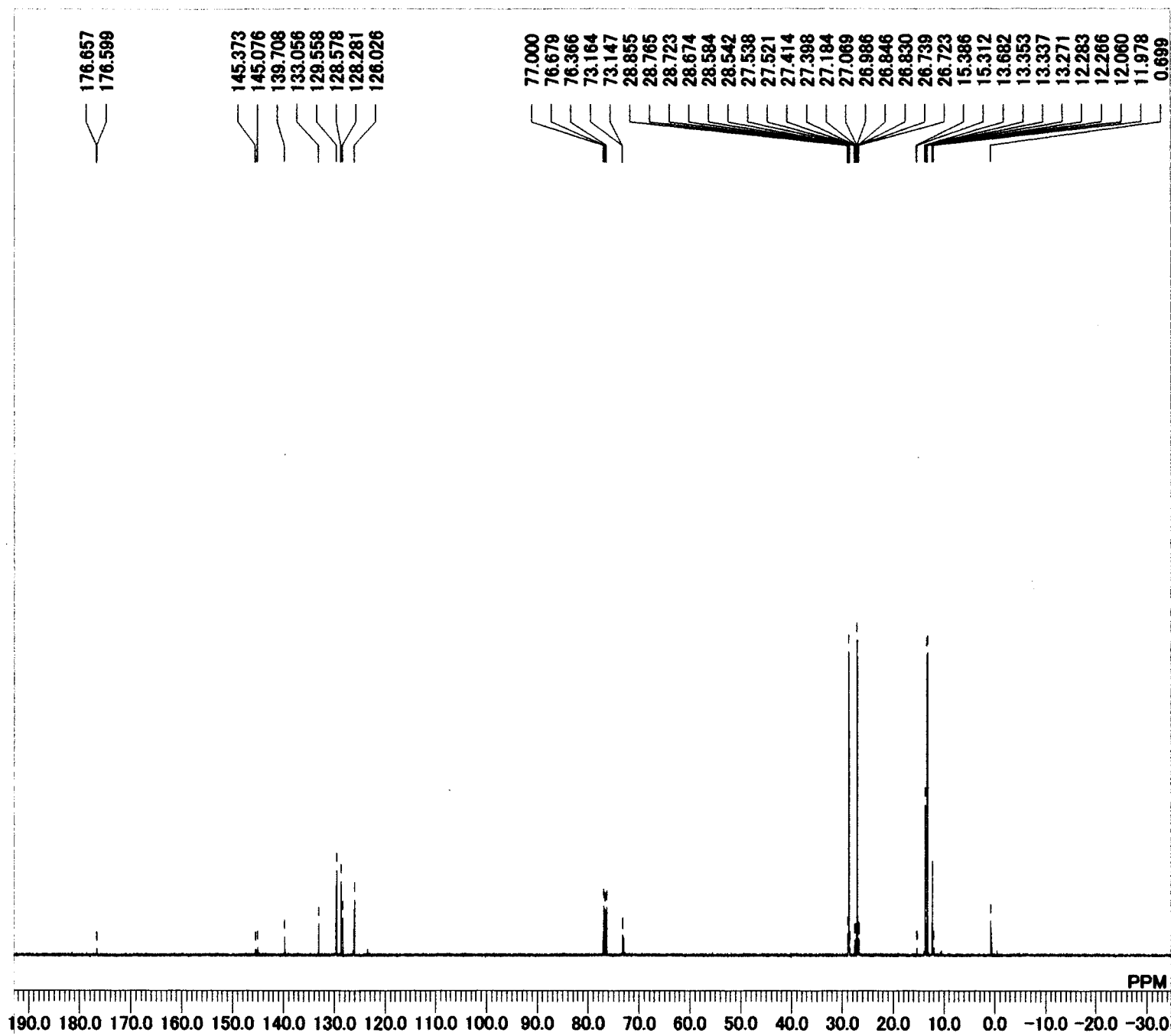
CF3-ph-o-Cl-OH-Sn(1H)



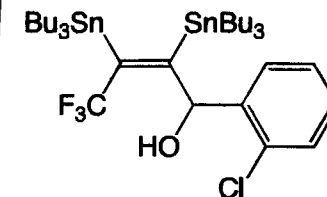
MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.80 usec
 DEADT 72.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 6
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PI
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-ph-o-Cl-Sn(1H) Rxn.176.als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 22
 LKPHS 250
 LKSIG 676
 CSPED 11 Hz
 FILDC
 FILDF

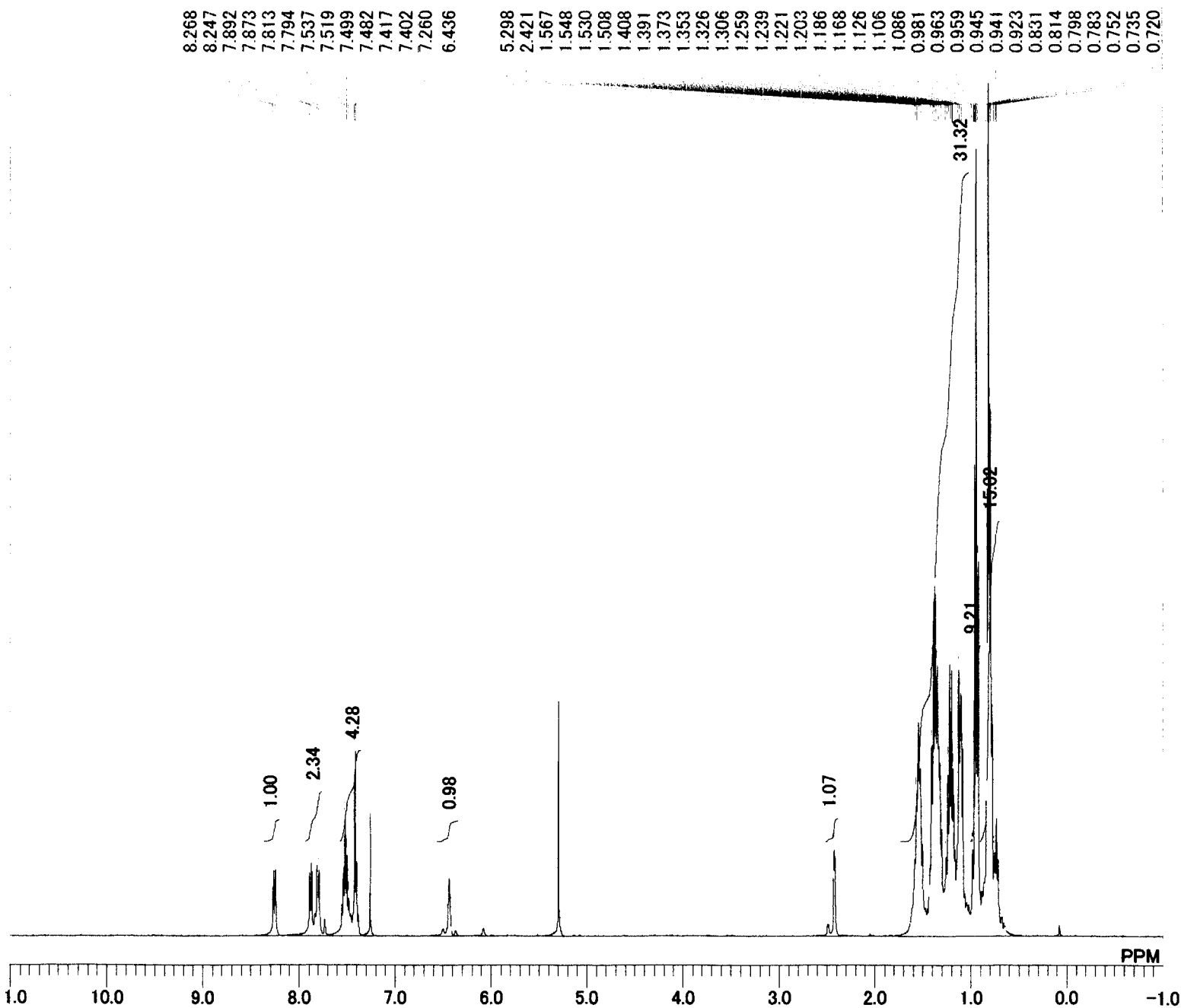


CF3-ph-o-Cl-OH-Sn(13C)

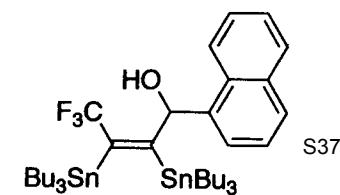


MENUF 13C
 OBNUC 13C
 OFR 100.40 MHz
 OBSET 125.00 KHz
 OBFIN 10500.00 Hz
 PW1 6.00 usec
 DEADT 19.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 32768
 SPO 32768
 TIMES 256
 DUMMY 1
 FREQU 27118.64 Hz
 FLT 13550 Hz
 DELAY 14.80 usec
 ACQTM 1.2083 sec
 PD 1.7920 sec
 ADBIT 16
 RGAIN 24
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD BCM
 EXPCM Bilevel.complete.decoupling:Set_IRRF
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 124.00 KHz
 IRFIN 10500.00 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-ph-o-Cl-Sn(13C) Rxn.176.als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 22
 LKPHS 250
 LKSIG 666
 CSPED 11 Hz
 FILDC
 FILDF





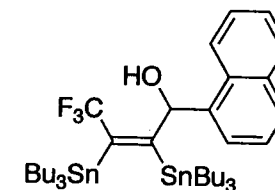
MENUF	1H
OBNUC	1H
OFR	399.65 MHz
OBSET	135.40 KHz
OBFIN	24.90 Hz
PW1	5.20 usec
DEADT	72.40 usec
PREDL	0.20000 msec
IWT	1.0000 msec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7992.01 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	2.0501 sec
PD	4.9500 sec
ADBIT	16
RGAIN	11
BF	0.10 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	NON
EXPCM	NON:Single.coupled:PW1_ACQTM_PD:
IRNUC	1H
IFR	399.65 MHz
IRSET	136.90 KHz
IRFIN	97.50 Hz
IRRPW	45 usec
IRATN	511
DFILE	DEFAULT.ALS
SF	TH5ATFG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	24
LKPHS	219
LKSIG	753
CSPED	11 Hz
FILDC	
FILDF	



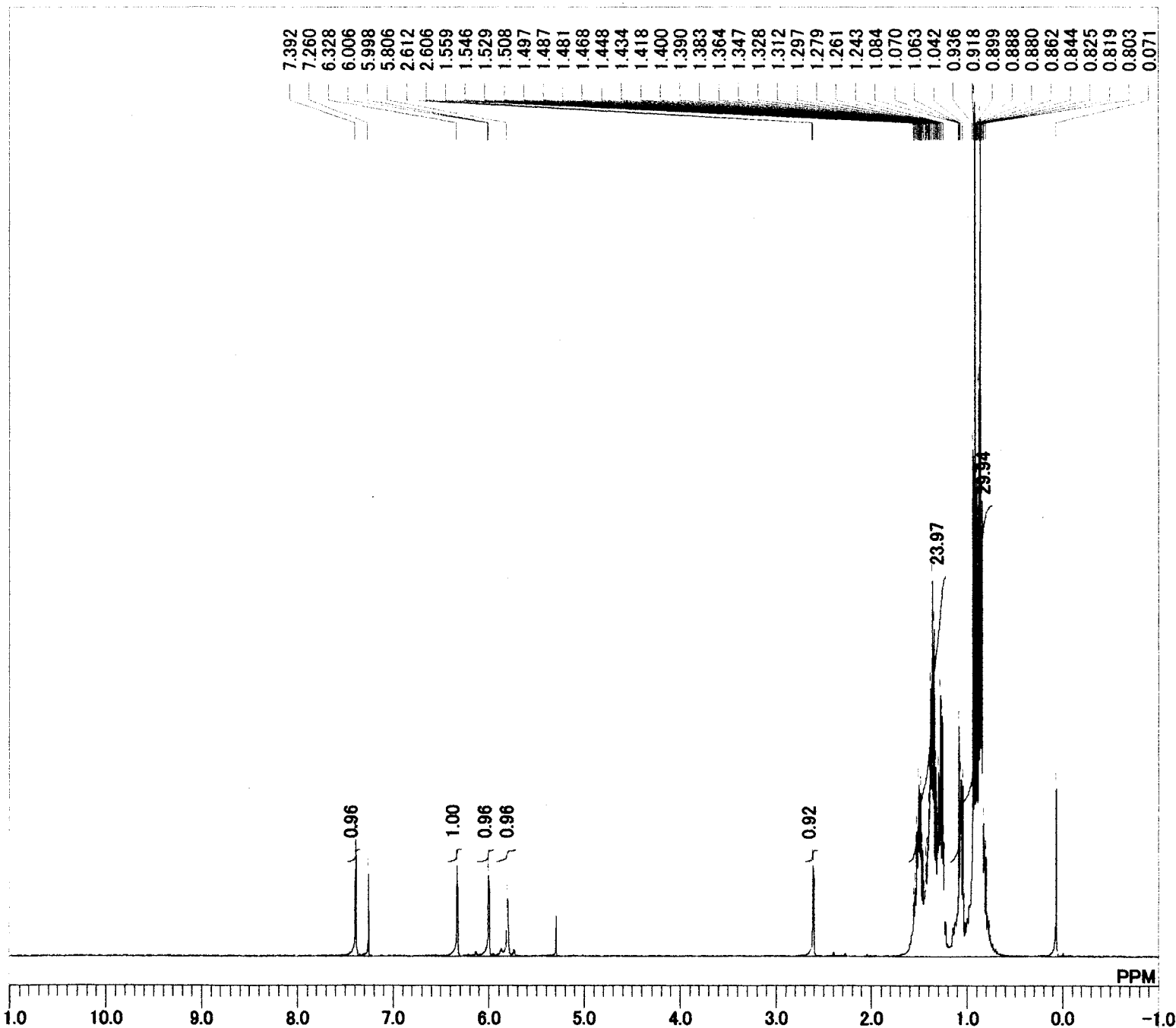
179.365
179.300
179.234
145.710
145.414
145.126
137.305
134.160
130.990
129.566
128.924
128.726
126.758
126.174
125.614
124.741
124.585
124.050
123.959
121.152

77.321
77.000
76.687
73.658
73.641
53.413
29.135
29.045
28.970
28.880
28.789
27.810
27.793
27.736
27.719
27.456
27.390
27.118
27.102
27.044
13.888
13.691
13.559
12.596
12.579

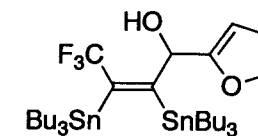
MENUF 13C
OBNUC 13C
OFR 100.40 MHz
OBSET 125.00 KHz
OBFIN 10500.00 Hz
PW1 6.00 usec
DEADT 19.10 usec
PREDL 0.20000 msec
IWT 1.0000 msec
POINT 32768
SPO 32768
TIMES 100000
DUMMY 1
FREQU 27118.64 Hz
FLT 13550 Hz
DELAY 14.80 usec
ACQTM 1.2083 sec
PD 1.7920 sec
ADBIT 16
RGAIN 24
BF 0.10 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD BCM
EXPCM Bilevel.complete.decoupling.Set_IRRP1
IRNUC 1H
IFR 399.65 MHz
IRSET 124.00 KHz
IRFIN 10500.00 Hz
IRRPW 45 usec
IRATN 511
DFILE 080125-naph-ditin-13C!!!!!!!!!!!!.als
SF TH5ATFG2
LKSET 61.60 KHz
LKFIN 79.0 Hz
LKLEV 180
LGAIN 24
LKPHS 219
LKSIG 749
CSPED 11 Hz
FILDC
FILDF

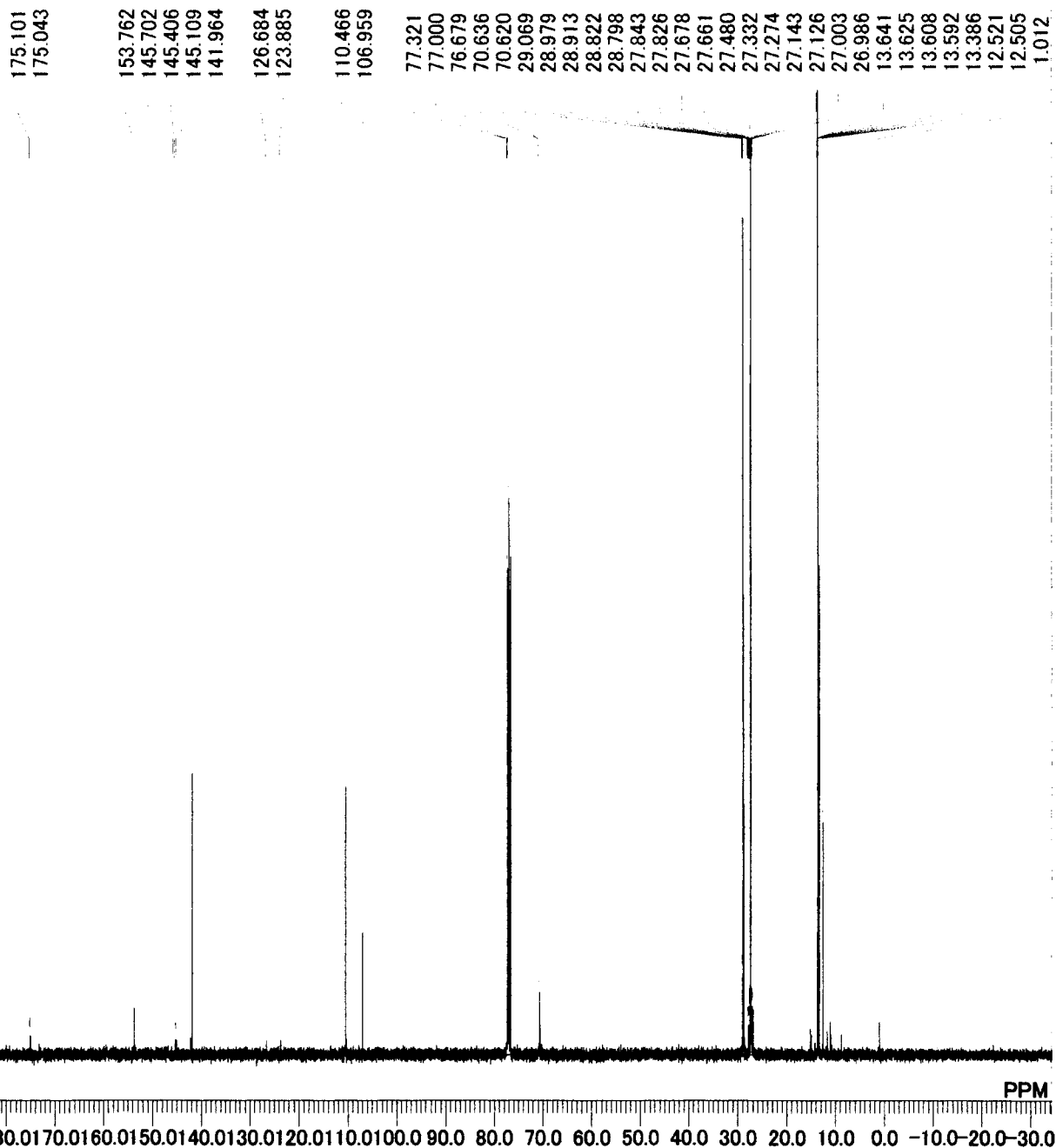


S38

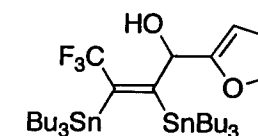


MENUF	1H
OBNUC	1H
OFR	399.65 MHz
OBSET	135.40 KHz
OBFIN	24.90 Hz
PW1	5.20 usec
DEADT	72.40 usec
PREDL	0.20000 msec
IWT	1.0000 msec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7992.01 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	2.0501 sec
PD	4.9500 sec
ADBIT	16
RGAIN	11
BF	0.10 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	NON
EXPCM	NON:Single.coupled:PW1_ACQTM_PD:
IRNUC	1H
IFR	399.65 MHz
IRSET	136.90 KHz
IRFIN	97.50 Hz
IRRPW	45 usec
IRATN	511
DFILE	DEFAULT.ALS
SF	TH5ATFG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	25
LKPHS	219
LKSIG	1141
CSPED	12 Hz
FILDC	
FILDF	

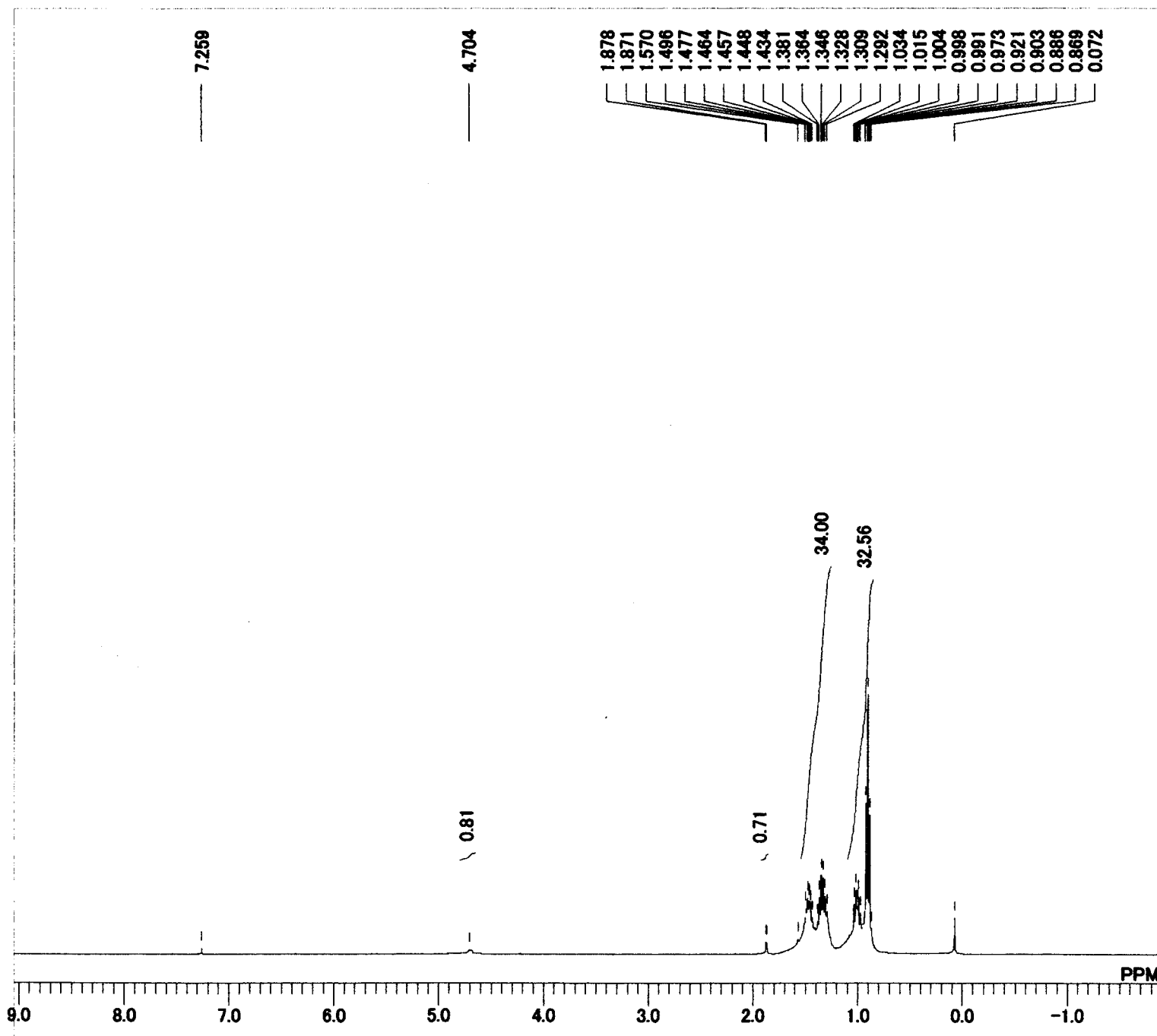




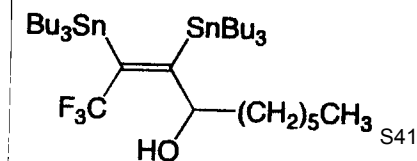
MENUF	13C
OBNUC	13C
OFR	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
PW1	6.00 usec
DEADT	19.10 usec
PREDL	0.20000 msec
IWT	1.0000 msec
POINT	32768
SPO	32768
TIMES	1500
DUMMY	1
FREQU	27118.64 Hz
FLT	13550 Hz
DELAY	14.80 usec
ACQTM	1.2083 sec
PD	1.7920 sec
ADBIT	16
RGAIN	25
BF	0.10 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	BCM
EXPCM	Bilevel.complete.decoupling: Set_IRRP1
IRNUC	1H
IFR	399.65 MHz
IRSET	124.00 KHz
IRFIN	10500.00 Hz
IRRPW	45 usec
IRATN	511
DFILE	DEFAULT.ALS
SF	TH5ATFG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	25
LKPHS	219
LKSIG	1139
CSPED	13 Hz
FILDC	
FILDF	



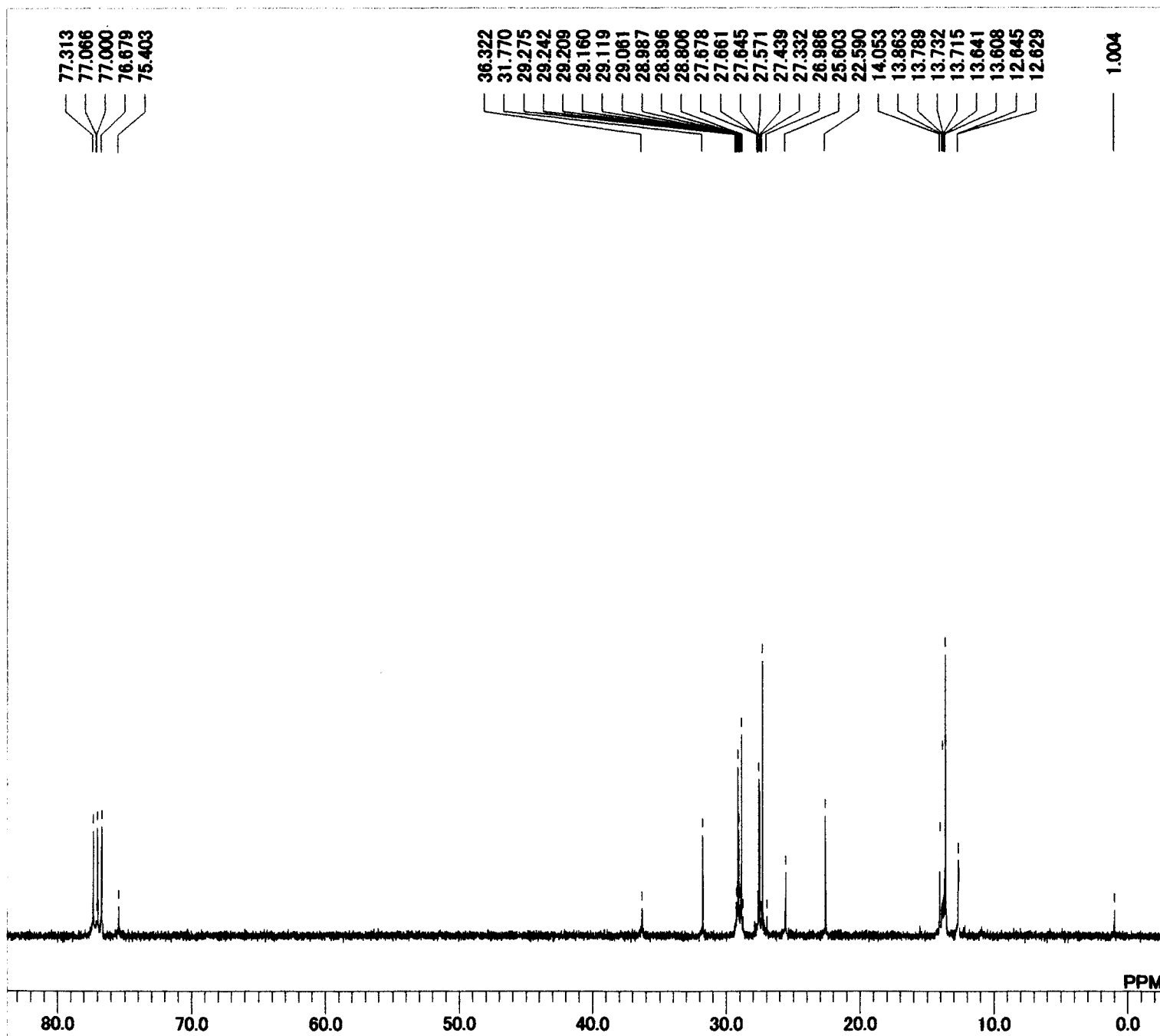
CF3-n-hexane-OH-Sn (1H)



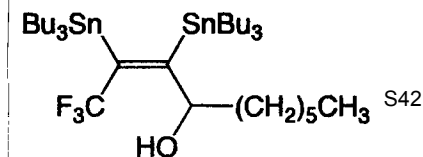
MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.80 usec
 DEADT 72.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 8
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PI
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE CF3-n-hexane-Sn (1H).als
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 25
 LKPHS 249
 LKSIG 834
 CSPED 14 Hz
 FILDC
 FILDF

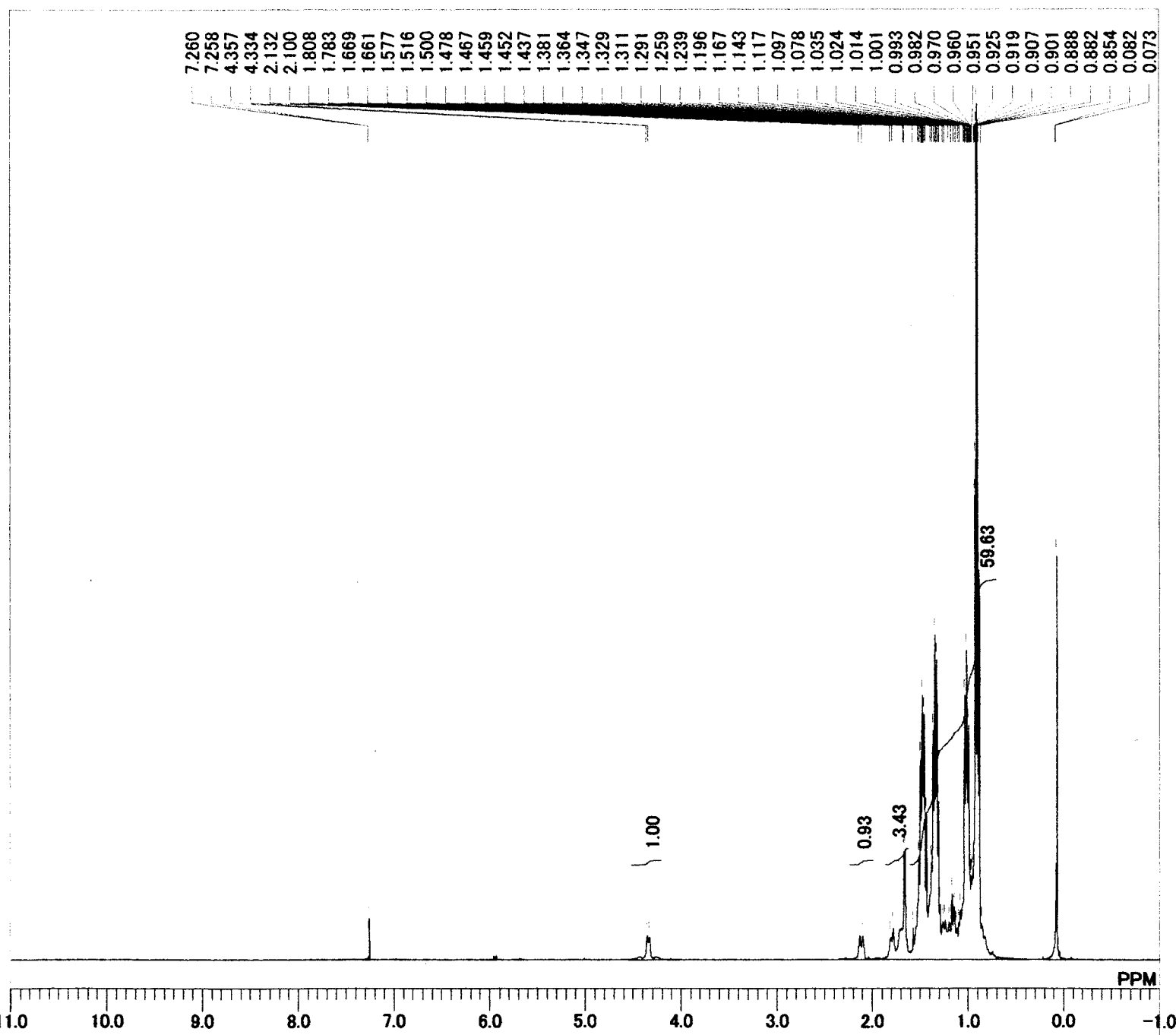


CF3-n-hexane-OH-Sn (13C)

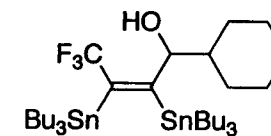


MENUF 13C
 OBNUC 13C
 OFR 100.40 MHz
 OBSET 125.00 KHz
 OBFIN 10500.00 Hz
 PW1 6.00 usec
 DEADT 19.10 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 32768
 SPO 32768
 TIMES 256
 DUMMY 1
 FREQU 27118.64 Hz
 FLT 13550 Hz
 DELAY 14.80 usec
 ACQTM 1.2083 sec
 PD 1.7920 sec
 ADBIT 16
 RGAIN 25
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD BCM
 EXPCM Bilevel.complete.decoupling:Set_IRRF
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 124.00 KHz
 IRFIN 10500.00 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE _DEFAULT.ALS
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 25
 LKPHS 249
 LKSIG 825
 CSPED 11 Hz
 FILDC
 FILDF





MENUF	1H
OBNUC	1H
OFR	399.65 MHz
OBSET	135.40 KHz
OBFIN	24.90 Hz
PW1	5.20 usec
DEADT	72.40 usec
PREDL	0.20000 msec
IWT	1.0000 msec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7992.01 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	2.0501 sec
PD	4.9500 sec
ADBIT	16
RGAIN	8
BF	0.10 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	NON
EXPCM	NON:Single.coupled:PW1_ACQTM_PD:
IRNUC	1H
IFR	399.65 MHz
IRSET	136.90 KHz
IRFIN	97.50 Hz
IRRPW	45 usec
IRATN	511
DFILE	071217-Cy-ditin-1H.als
SF	TH5ATFG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	23
LKPHS	219
LKSIG	615
CSPED	14 Hz
FILDC	
FILDF	



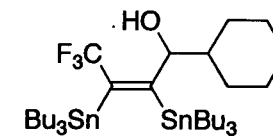
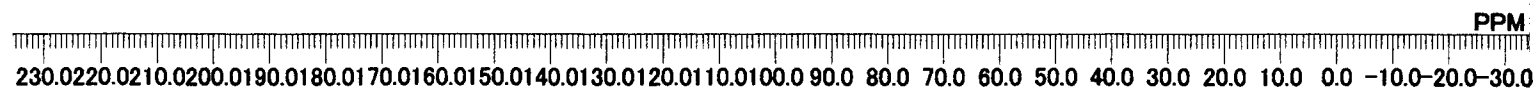
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180.921
180.864
180.798

144.566
144.286
143.998
129.451
126.635
123.819
121.004

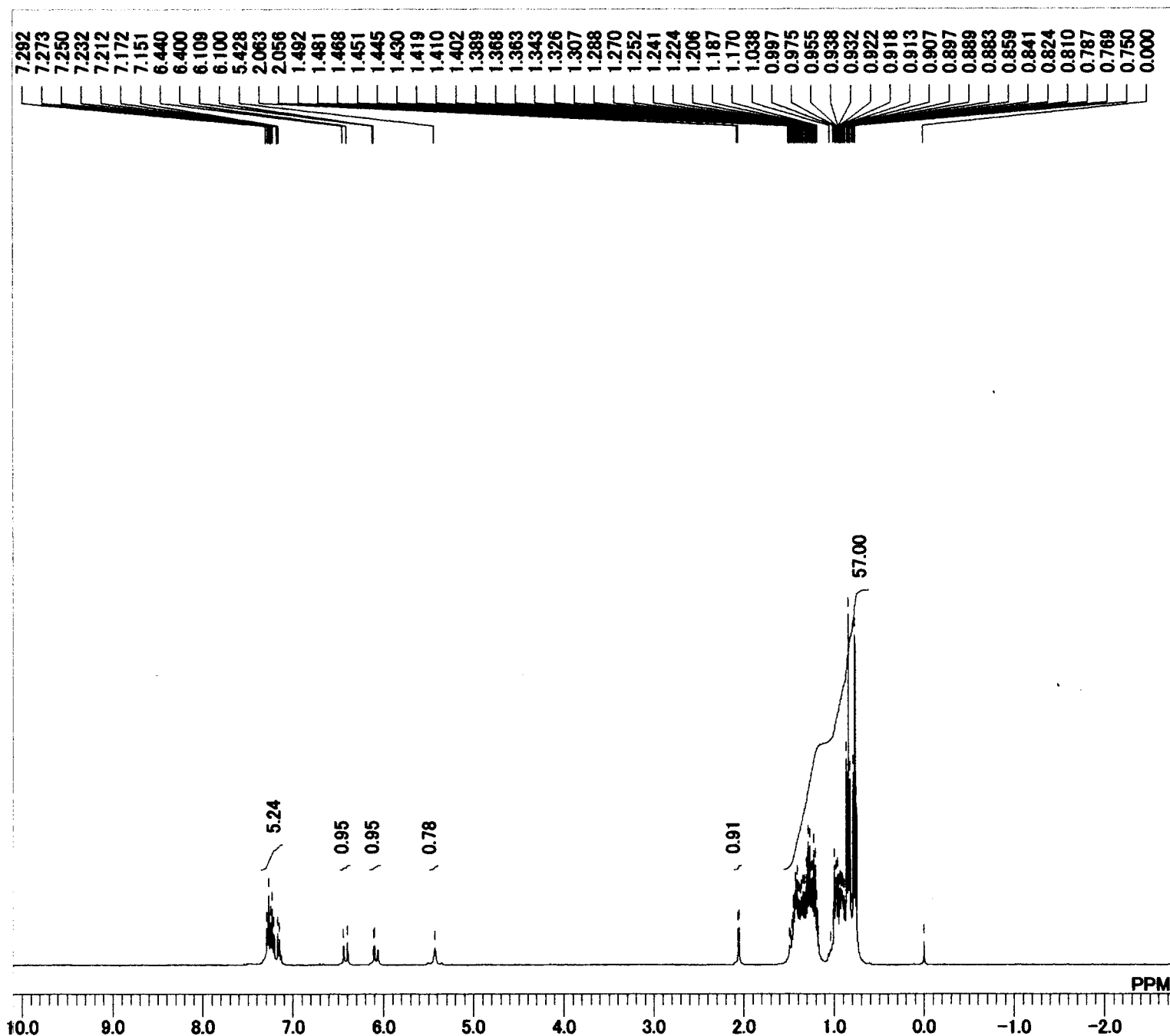
78.902
77.313
77.000
76.679
73.262

43.336
29.160
28.970
27.587
27.332
26.443
26.212
26.171
13.781
13.633
12.760
12.736
1.004

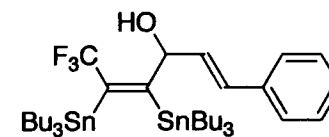
MENUF	13C
OBNUC	13C
OFR	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
PW1	6.00 usec
DEADT	19.10 usec
PREDL	0.20000 msec
IWT	1.0000 msec
POINT	32768
SPO	32768
TIMES	1470
DUMMY	1
FREQU	27118.64 Hz
FLT	13550 Hz
DELAY	14.80 usec
ACQTM	1.2083 sec
PD	1.7920 sec
ADBIT	16
RGAIN	25
BF	0.10 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	BCM
EXPCM	Bilevel.complete.decoupling.Set_IRRP1
IRNUC	1H
IFR	399.65 MHz
IRSET	124.00 KHz
IRFIN	10500.00 Hz
IRRPW	45 usec
IRATN	511
DFILE	_DEFAULT.ALS
SF	TH5ATFG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	24
LKPHS	219
LKSIG	1060
CSPED	13 Hz
FILDC	
FILDF	



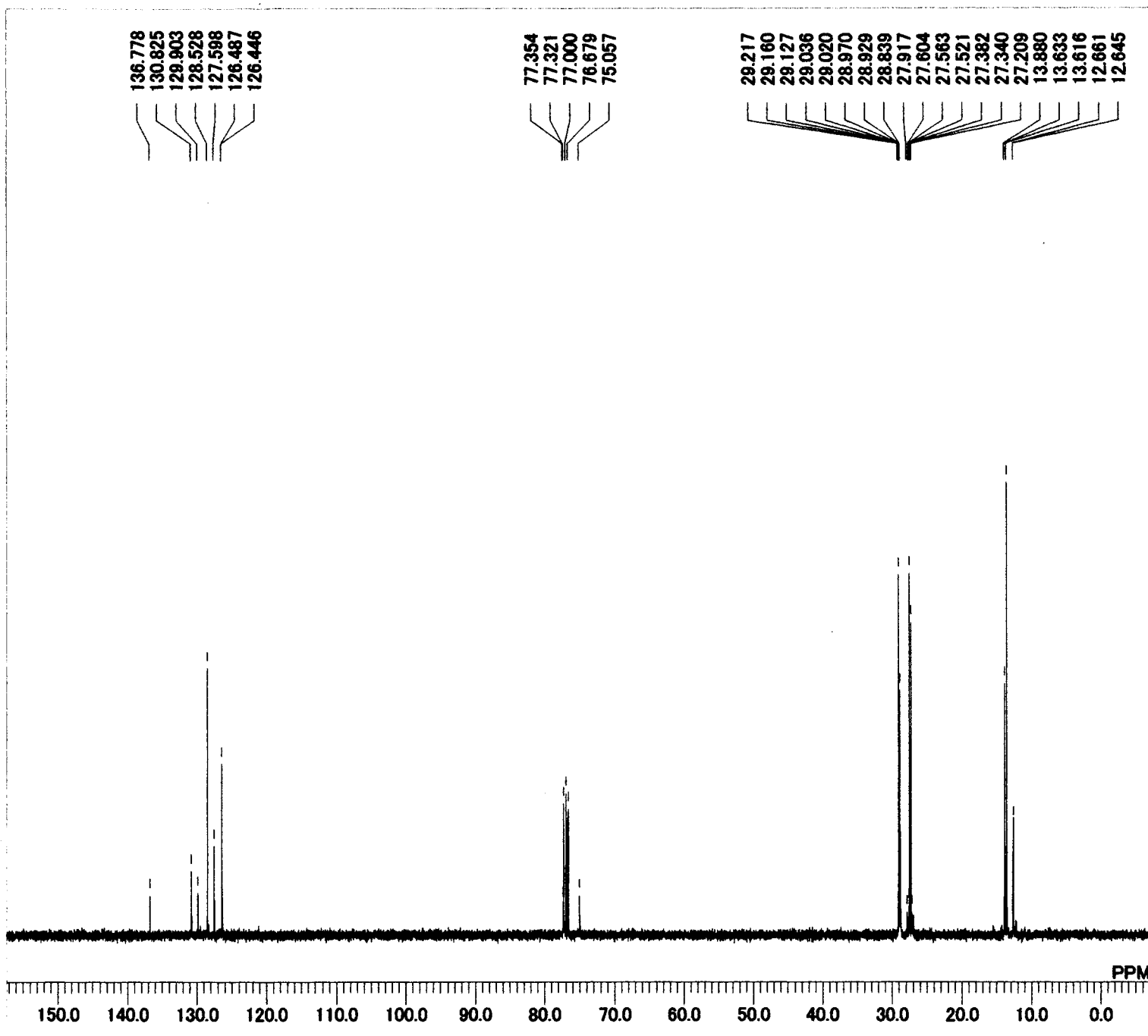
CF3-cynnam-OH-Sn(1H)



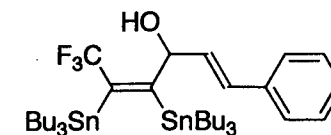
MENUF 1H
OBNUC 1H
OFR 399.65 MHz
OBSET 135.40 KHz
OBFIN 24.90 Hz
PW1 5.80 usec
DEADT 72.10 usec
PREDL 0.20000 msec
IWT 1.0000 msec
POINT 16384
SPO 16384
TIMES 8
DUMMY 1
FREQU 7992.01 Hz
FLT 4000 Hz
DELAY 50.00 usec
ACQTM 2.0501 sec
PD 4.9500 sec
ADBIT 16
RGAIN 9
BF 0.10 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD NON
EXPCM NON:Single.coupled:PW1_ACQTM_PL
IRNUC 1H
IFR 399.65 MHz
IRSET 136.90 KHz
IRFIN 97.50 Hz
IRRPW 45 usec
IRATN 511
DFILE _DEFAULT.ALS
SF TH5ATFG2
LKSET 61.60 KHz
LKFIN 79.0 Hz
LKLEV 180
LGAIN 23
LKPHS 249
LKSIG 608
CSPED 15 Hz
FILDC
FILDF

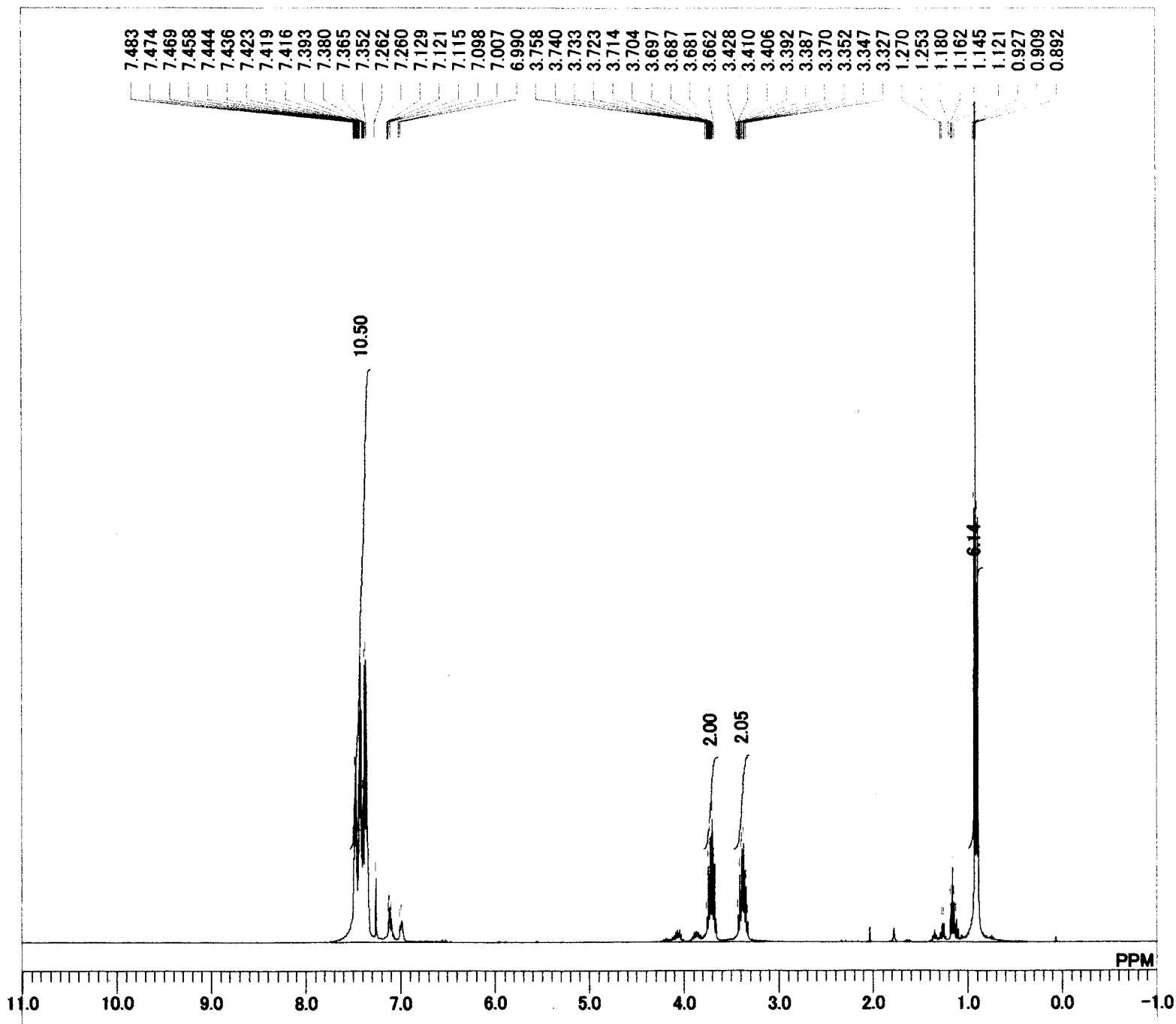


CF3-cynnam-OH-Sn(13C)

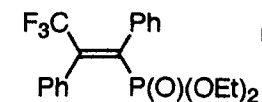


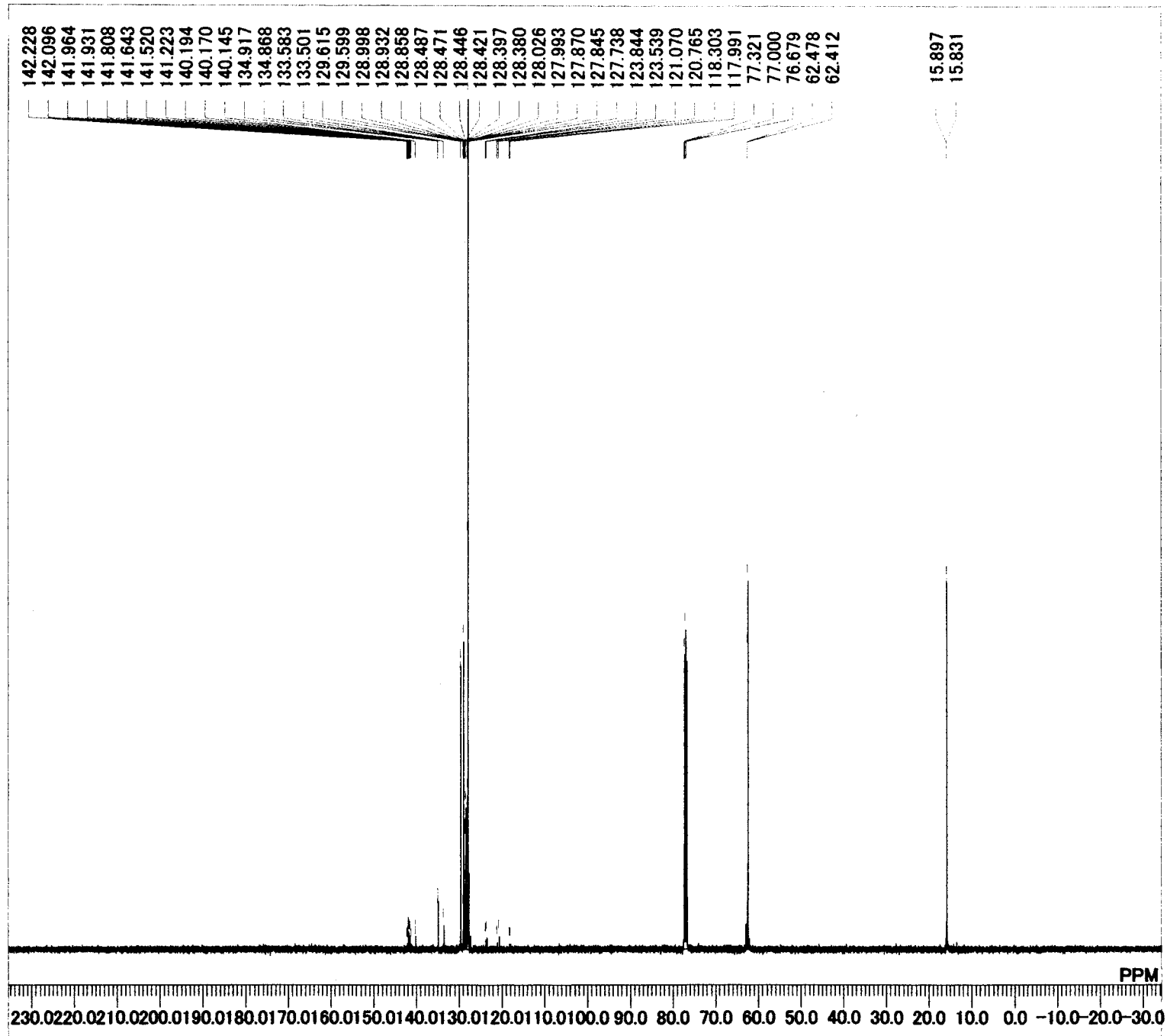
MENUF	13C
OBNUC	13C
OFR	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
PW1	6.00 usec
DEADT	19.10 usec
PREDL	0.20000 msec
IWT	1.0000 msec
POINT	32768
SPO	32768
TIMES	256
DUMMY	1
FREQU	27118.64 Hz
FLT	13550 Hz
DELAY	14.80 usec
ACQTM	1.2083 sec
PD	1.7920 sec
ADBIT	16
RGAIN	25
BF	0.10 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	BCM
EXPCM	Bilevel.complete.decoupling.Set_IRRF
IRNUC	1H
IFR	399.65 MHz
IRSET	124.00 KHz
IRFIN	10500.00 Hz
IRRPW	45 usec
IRATN	511
DFILE	DEFAULT.ALS
SF	TH5ATFG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	23
LKPHS	249
LKSIG	606
CSPED	10 Hz
FILDC	
FILDF	



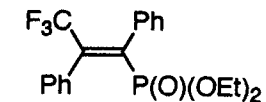


MENUF 1H
 OBNUC 1H
 OFR 399.65 MHz
 OBSET 135.40 KHz
 OBFIN 24.90 Hz
 PW1 5.20 usec
 DEADT 72.40 usec
 PREDL 0.20000 msec
 IWT 1.0000 msec
 POINT 16384
 SPO 16384
 TIMES 8
 DUMMY 1
 FREQU 7992.01 Hz
 FLT 4000 Hz
 DELAY 50.00 usec
 ACQTM 2.0501 sec
 PD 4.9500 sec
 ADBIT 16
 RGAIN 13
 BF 0.10 Hz
 T1 0.00
 T2 0.00
 T3 90.00
 T4 100.00
 EXMOD NON
 EXPCM NON:Single.coupled:PW1_ACQTM_PD:
 IRNUC 1H
 IFR 399.65 MHz
 IRSET 136.90 KHz
 IRFIN 97.50 Hz
 IRRPW 45 usec
 IRATN 511
 DFILE DEFAULT.ALS
 SF TH5ATFG2
 LKSET 61.60 KHz
 LKFIN 79.0 Hz
 LKLEV 180
 LGAIN 25
 LKPHS 219
 LKSIG 997
 CSPED 10 Hz
 FILDC
 FILDF

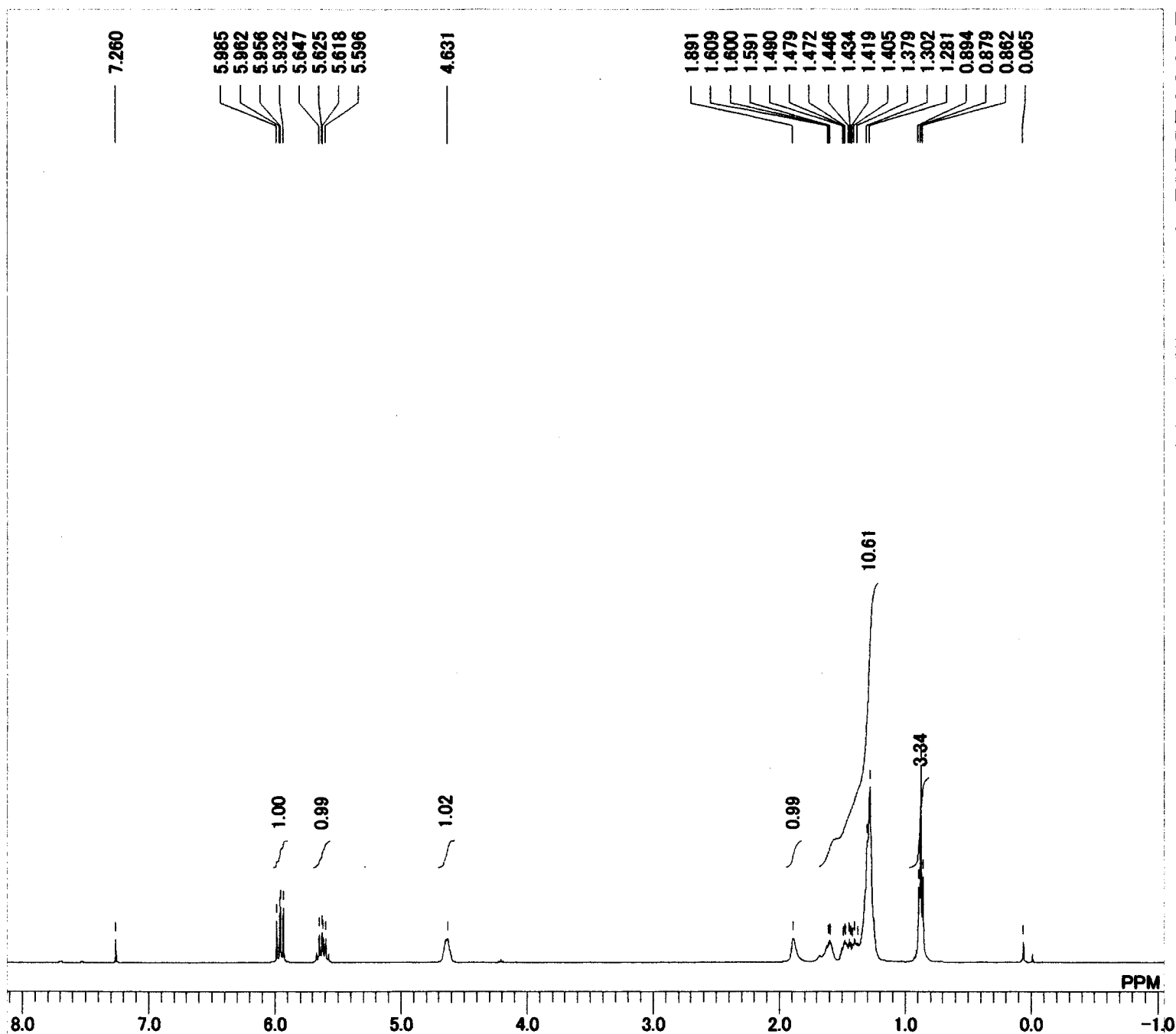




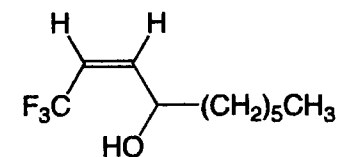
MENUF	13C
OBNUC	13C
OFR	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
PW1	6.00 usec
DEADT	19.10 usec
PREDL	0.20000 msec
IWT	1.0000 msec
POINT	32768
SPO	32768
TIMES	2560
DUMMY	1
FREQU	27118.64 Hz
FLT	13550 Hz
DELAY	14.80 usec
ACQTM	1.2083 sec
PD	1.7920 sec
ADBIT	16
RGAIN	25
BF	0.10 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	BCM
EXPCM	Bilevel.complete.decoupling.Set_IRRP1
IRNUC	1H
IFR	399.65 MHz
IRSET	124.00 KHz
IRFIN	10500.00 Hz
IRRPW	45 usec
IRATN	511
DFILE	_DEFAULT.ALS
SF	TH5ATFG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	25
LKPHS	219
LKSIG	1041
CSPED	10 Hz
FILDC	
FILDF	



CF3-n-hexan-OH-H(1H)



MENUF	1H
OBNUC	1H
OFR	399.65 MHz
OBSET	135.40 KHz
OBFIN	24.90 Hz
PW1	5.80 usec
DEADT	72.10 usec
PREDL	0.20000 msec
IWT	1.0000 msec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7992.01 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	2.0501 sec
PD	4.9500 sec
ADBIT	16
RGAIN	12
BF	0.10 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	NON
EXPCM	NON:Single.coupled:PW1_ACQTM_PC
IRNUC	1H
IFR	399.65 MHz
IRSET	136.90 KHz
IRFIN	97.50 Hz
IRRPW	45 usec
IRATN	511
DFILE	CF3-n-hexan-OH-H(1H).als
SF	TH5ATFG20
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	22
LKPHS	250
LKSIG	617
CSPED	12 Hz
FILDC	
FILDF	



CF3-n-hexan-OH-H(13C)

144.986
144.936
144.887
144.837

124.503
121.802
118.962
118.625
118.287
117.941

77.634
77.321
77.000
76.951
67.960

37.030
31.984
29.324
25.159
22.854
14.333

MENUF 13C
OBNUC 13C
OFR 100.40 MHz
OBSET 125.00 KHz
OBFIN 10500.00 Hz
PW1 6.00 usec
DEADT 19.10 usec
PREDL 0.20000 msec
IWT 1.0000 msec
POINT 32768
SPO 32768
TIMES 256
DUMMY 1
FREQU 27118.64 Hz
FLT 13550 Hz
DELAY 14.80 usec
ACQTM 1.2083 sec
PD 1.7920 sec
ADBIT 16
RGAIN 25
BF 0.10 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD BCM
EXPCM Bilevel.complete.decoupling.Set_IRRF
IRNUC 1H
IFR 399.65 MHz
IRSET 124.00 KHz
IRFIN 10500.00 Hz
IRRPW 45 usec
IRATN 511
DFILE CF3-n-hexan-OH-H(13C).als
SF TH5ATFG20
LKSET 61.60 KHz
LKFIN 79.0 Hz
LKLEV 180
LGAIN 22
LKPHS 250
LKSIG 616
CSPED 12 Hz
FILDC
FILDF

