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Supporting Information

Effect of Sodium Acetate in Atom Transfer Radical Addition of Polyhaloalkanes to Olefins

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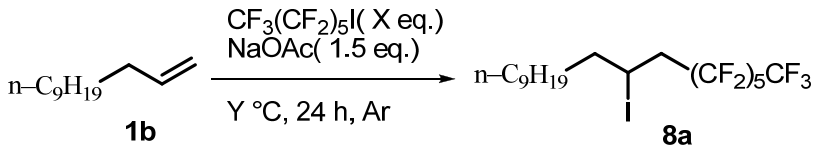
Contents

1. General information: All reactions were performed in oven-dried glassware. Dimethoxyethane (DME) and NaOAc were purchased from Wako Pure Chemical Industries, Ltd. and Tokyo Chemical Industry Co., Ltd. and they were used without further purification. Flash column chromatography was performed with Silica Gel 60 N (Kanto Chemical Co., Inc., 63–210 μm spherical, neutral). ^1H, ^{13}C and ^{19}F NMR spectra were recorded on JEOL ECS 400, AL 400 or ECA 500 spectrometer at room temperature in $CDCl_3$ as a solvent and an internal standard (^1H NMR: δ= 7.27; ^{13}C NMR: δ= 77.0) with tetramethylsilane as an internal standard and benzotrifluoride as an external standard (^{19}F NMR: δ= -63.72). IR spectra were recorded by Brucker FT-IR ALPHA. ESI high resolution mass spectra (HRMS) were measured by Shimazu hybrid IT-TOF mass spectrometer. Elemental analyses were carried out using J Science Labo JM10. Substrates (**1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h, 1j, 1k, 1l, 1m, 1n**) were commercially available. The substrate (**1i**) was prepared by the reported method[1].

2. General procedure

Typical procedure for the atom transfer radical addition (ATRA) of haloalkanes to olefins: After several vacuum/argon cycles to remove air from the reaction tube, the stirred mixture of the haloalkane (2 mmol), olefin (1 mmol) and NaOAc (1.5 mmol) in DME (1 mL) was heated at 100 °C using Chemist Plaza personal organic synthesizer (Shibata Scientific Technology, Ltd., Tokyo) for 12 h. The reaction mixture was extracted with diethyl ether and water (15 mL each, three times). The combined organic layers were dried with Na_2SO_4, and concentrated in vacuo. The resulting residue was purified by silicagel column chromatography using hexane/ diethyl ether as eluents. All products (**2-8**) were identified by comparison of spectral data with literature results or characterized by ^1H and ^{13}C NMR, IR and elemental analysis of HRMS.

3. Optimization of conditions using $CF_3(CF_2)_5I$ and 1b



Entry	$CF_3(CF_2)_5I$ (X eq.)	Y °C	Yield (%)[a]
1	2.0[b]	100	2
2	2.0	100	53
3	2.0	120	54
4	2.0	140	93
5	4.6	100	23

[a] Yield was determined by ^1H NMR using 1,4-dioxane as an internal standard. [b] The reaction was carried out in DME.

4. Spectroscopic data of substrates and products

2-Methyl-1-decene (1i)

^1H NMR spectrum of **1i** was identical to that of the reference 1

Colorless oil; ^1H NMR (400 MHz, $CDCl_3$): δ 4.71—4.67 (1H, br), 4.67—4.64 (1H, br), 2.00 (2H, t, J = 7.8 Hz), 1.71 (3H, s), 1.41 (2H, m), 1.28 (10H, s), 0.88 (3H, t, J = 6.4 Hz).

1-(2-Bromo-4,4,4-trichlorobutyl)benzene (2a)

Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.37—7.32 (2H, m), 7.30—7.24 (3H, m), 4.54—4.44 (1H, m), 3.48—3.41 (2H, m), 3.31 (1H, dd, *J* = 15.5, 5.0 Hz), 3.23 (1H, dd, *J* = 14.0, 8.5 Hz); ^{13}C NMR (125 MHz, $CDCl_3$): δ 137.3, 129.2, 128.6, 127.3, 97.1, 61.5, 48.4, 45.9; IR (ATR) cm^{-1}: 3029, 2929, 1602, 1497, 1455, 1424, 1194, 1159, 1082, 1030, 1013; elemental analysis calcd (%) for $C_{10}H_{10}BrCl_3$: C 37.95, H 3.19; found: C 37.81, H 3.20.

3-Bromo-1,1,1-trichlorotridecane (2b)

Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$): δ 4.36—4.29 (1H, m), 3.45 (1H, dd, *J* = 16.1, 5.0 Hz), 3.22 (1H, dd, *J* = 16.1, 5.0 Hz), 2.07—1.98 (1H, m), 1.98—1.89 (1H, m), 1.63—1.44 (2H, m), 1.43—1.12 (14H, m), 0.88 (3H, t, *J* = 7.0 Hz); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 97.2, 62.7, 49.2, 39.5, 31.9, 29.6, 29.5, 29.4, 29.3, 28.7, 27.2, 22.7, 14.1 IR (ATR) cm^{-1}: 2922, 2853, 1465, 1424, 1377, 1184, 1118, 1046; elemental analysis calcd (%) for $C_{13}H_{24}BrCl_3$: C 42.59; H 6.60. found: C 42.74; H 6.57.

1-(2-Bromo-4,4,4-trichlorobutyl)-4-methoxybenzene (2c)

Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.18 (2H, d, *J* = 7.2 Hz), 6.89 (2H, d, *J* = 7.2 Hz), 4.51—4.41 (1H, m), 3.81 (3H, s), 3.44 (1H, dd, *J* = 16.0, 5.6 Hz), 3.39—3.27 (2H, m), 3.20 (1H, dd, *J* = 14.6, 8.2 Hz); ^{13}C NMR (100 MHz, $CDCl_3$): δ 158.8, 130.4, 129.3, 113.9, 97.1, 61.3, 55.2, 48.8, 45.0; IR (ATR) cm^{-1}: 2933, 2835, 1612, 1584, 1511, 1464, 1440, 1302, 1246, 1177, 1109, 1034; elemental analysis calcd (%) for $C_{11}H_{12}BrCl_3$: C 38.13, H 3.49; found: C 38.26, H 3.44.

4-Bromo-6,6,6-trichlorohexyl acetate (2d)

Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$): δ 4.40—4.31 (1H, m), 4.13 (2H, t, *J* = 5.3 Hz), 3.48 (1H, dd, *J* = 16.0, 5.3 Hz), 3.23 (1H, dd, *J* = 16.0, 5.3 Hz), 2.20—2.11 (1H, m), 2.06 (3H, s), 2.05—1.93 (2H, m), 1.90—1.79 (1H, m); ^{13}C NMR (125 MHz, $CDCl_3$): δ 171.0, 96.9, 63.3, 62.5, 48.2, 35.9, 26.6, 20.9; IR (ATR) cm^{-1}: 2960, 1735, 1428, 1365, 1320, 1042; elemental analysis calcd (%) for $C_8H_{12}O_2BrCl_3$: C 29.43, H 3.71; found: C 29.39, H 3.64.

2-(7-bromo-9,9,9-trichlorononyl)oxirane (2e)

Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$): δ 4.36—4.29 (1H, m), 3.46 (1H, dd, *J* = 15.5, 5.0 Hz), 3.23 (1H, dd, *J* = 15.5, 5.0 Hz), 2.95—2.88 (1H, m), 2.76 (1H, dd, *J* = 4.8, 2.8 Hz), 2.47 (1H, dd, *J* = 4.8, 2.8 Hz), 2.09—1.99 (1H, m), 1.99—1.89 (1H, m), 1.65—1.44 (6H, m), 1.43—1.29 (4H, m); ^{13}C NMR (125 MHz, $CDCl_3$): δ 97.1, 62.5,

52.2, 49.0, 47.0, 39.4, 32.3, 29.1, 28.6, 27.1, 25.8; IR (ATR) cm^{-1}: 3044, 2929, 2857, 1463, 1428, 1259, 1184, 1116, 1044; elemental analysis calcd (%) for $C_{11}H_{18}BrCl_3$: C 37.48, H 5.15; found: C 37.69, H 5.13.

2-Bromo-4,4,4-trichlorobuthyl benzyl ether (2f)

Colorless oil; ^1H NMR (500 MHz, $CDCl_3$): δ 7.38—7.32 (4H, m), 7.32—7.27 (1H, m), 4.62 (1H, d, *J* = 12.0 Hz), 4.59 (1H, d, *J* = 12.0 Hz), 4.43—4.37 (1H, m), 3.82 (1H, dd, *J* = 10.8, 5.3 Hz), 3.74 (1H, dd, *J* = 10.8, 6.3 Hz), 3.49 (1H, dd, *J* = 16.0, 4.0 Hz), 3.27 (1H, dd, *J* = 16.0, 6.5 Hz); ^{13}C NMR (125 MHz, $CDCl_3$): δ 137.3, 128.5, 127.9, 127.7, 97.1, 73.2, 73.1, 58.8, 44.6; IR (ATR) cm^{-1}: 3031, 2862, 1496, 1453, 1414, 1362, 1206, 1163, 1119, 1094, 1071, 1028; elemental analysis calcd (%) for $C_{11}H_{12}OBrCl_3$: C 38.13, H 3.49; found: C 38.24, H 3.44.

3,6-Dibromo-1,1,1-trichlorohexane (2g)

Colorless oil; ^1H NMR (500 MHz, $CDCl_3$): δ 4.38—4.28 (1H, m), 3.49—3.45 (3H, m), 3.22 (1H, dd, *J* =10.5, 5.3 Hz), 2.34—2.22 (1H, m), 2.22—2.12 (1H, m), 2.11—2.00 (2H, m); ^{13}C NMR (125 MHz, $CDCl_3$): δ 96.8, 62.4, 47.7, 35.6, 32.3, 30.2; IR (ATR) cm^{-1}**:** 2962, 1439, 1258, 1198, 1126, 1046; elemental analysis calcd (%) for $C_6H_9Br_2Cl_3$: C 20.75, H 2.61; found: C 20.92, H 2.47.

(2-Bromo-4,4,4-trichlorobutyl)trimethylsilane (2h)

Colorless oil; ^1H NMR (400 MHz, $CDCl_3$): δ 3.83 (1H, dd, *J* = 5.6, 0.8 Hz), 3.20—3.17 (2H, m), 0.21 (9H, s); ^{13}C NMR (125 MHz, $CDCl_3$): δ 99.3, 57.8, 34.0, -3.1; IR (ATR) cm^{-1}: 2957, 1415, 1252, 1189, 1091, 1058, 1006; elemental analysis calcd (%) for: $C_6H_{12}BrCl_3Si$: C 24.14, H 4.05; found: C 24.00, H 3.82.

3-Bromo-1,1,1-trichloro-3-methylundecane (2i)

Colorless oil; ^1H NMR (500 MHz, $CDCl_3$) δ 3.58 (1H, d, *J* = 16.3 Hz), 3.54 (1H, d, *J* = 16.3 Hz), 2.17—2.08 (1H, m), 2.07 (3H, s), 2.04—1.96 (1H, m), 1.68—1.53 (2H, m), 1.38—1.20 (10H, m), 0.89 (3H, t, *J* = 6.8Hz); ^{13}C NMR (125 MHz, $CDCl_3$): δ 96.0, 68.8, 64.8, 45.6, 32.0, 31.8, 29.4 (2), 29.2, 26.1, 22.7, 14.1; IR (ATR) cm^{-1}: 2924, 2854, 1456, 1383, 1334, 1142, 1125, 1060, 1027; elemental analysis calcd (%) for $C_{12}H_{22}BrCl_3$: C 40.88, H 6.29; found: C 41.16, H 6.21.

1-(1-Bromo-3,3,3-trichloropropyl)benzene (2j)

^1H NMR spectrum of the product was identical to that of the reference 2.

Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.50—7.41 (2H, m), 7.41—7.28 (3H, m), 5.49—5.27 (1H, m), 3.87—3.67 (2H, m).

4-(1-Bromo-3,3,3-trichloropropyl)-1-chlorobenzene (2k)

Colorless solid; ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.39 (2H, d, *J* = 8.5 Hz), 7.33 (2H, d, *J* = 8.5 Hz), 5.34 (1H, dd, *J* = 8.0, 3.0 Hz), 3.76—3.66 (2H, m); ^{13}C NMR (125 MHz, $CDCl_3$): δ 139.1, 134.7, 129.2, 129.1, 96.2, 62.4, 46.4; IR (ATR) cm^{-1}: 2923, 2853, 1590, 1488, 1420, 1323, 1214, 1195, 1164, 1111, 1093, 1061, 1020, 1013; elemental analysis calcd (%) for $C_9H_7BrCl_4$: C 32.09, H 2.09; found: C 32.07, H 2.17; M.p. = 75—78 ºC.

1-Chloro-4-(1,2-dibromoethyl)benzene (3)

^{1}H NMR spectrum of the product was identical to that of the reference 3.

Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.41—7.31 (4H, m), 5.11 (1H, dd, *J* = 10.8, 4.8 Hz), 4.07 (1H, dd, *J* = 10.8, 4.8 Hz), 3.98 (1H, t, *J* = 10.8 Hz)

3,3-Dichloro-1-(4-methoxyphenyl)allyl acetate (4)

Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.31 (2H, d, *J* = 8.8 Hz), 6.91 (2H, d, *J* = 8.8 Hz), 6.47 (1H, d, *J* = 8.8 Hz), 6.17 (1H, d, *J* = 8.8 Hz), 3.81 (3H, s), 2.09 (3H, s); ^{13}C NMR (125 MHz, $CDCl_3$): δ 169.6, 159.8, 129.9, 128.2, 128.1, 124.4, 114.2, 72.6, 55.3, 21.1; IR (ATR) cm^{-1}: 3044, 3002, 2936, 2838, 1739, 1611, 1586, 1512, 1463, 1370, 1222, 1174, 1095, 1028; ESI-HRMS m/z: 273.0063 ($[M-H]^-$); Calcd for $C_{12}H_{11}O_3Cl_2$: 273.0091.

1,1,1,3-Tetrabromotridecane (5)

Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$): δ 4.23—4.17 (1H, m), 3.83 (1H, dd, *J* = 16.0, 9.8 Hz), 3.55 (1H, dd, *J* = 16.0 , 9.8 Hz), 2.11—2.02 (1H, m), 2.02—1.92 (1H, m), 1.66—1.55 (1H, m), 1.55—1.45 (1H, m), 1.44—1.18 (14H, m), 0.88 (3H, t, *J* = 7.0 Hz); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 66.9, 52.1, 39.7, 36.4, 31.9, 29.6, 29.5, 29.4, 29.3, 28.7, 27.3, 22.7, 14.2; IR (ATR) cm^{-1}: 2921, 2852, 1464, 1376, 1178, 1117, 1027; ESI-HRMS m/z: 496.8687 ($[M+H]^+$); Calcd for $C_{13}H_{25}Br_4$: 496.8684.

1,1,1,3-Tetrachlorotridecane (6)

Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$): δ 4.30—4.23 (1H, m), 3.27 (1H, dd, *J* = 15.8, 5.8 Hz), 3.13 (1H, dd, *J* = 15.8, 5.8 Hz), 2.01—1.79 (2H, m), 1.38—1.18 (16H, m),, 0.88 (3H, t, *J* = 7.0 Hz); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 97.0, 62.3, 57.8, 39.1, 31.9, 29.6, 29.5, 29.4, 29.3, 28.9, 26.0, 22.7, 14.1; IR (ATR) cm^{-1}: 2923, 2854, 1465,

1377, 1209, 1123, 1049; ESI-HRMS m/z: 343.0475 ($[M+Na]^+$); Calcd for $C_{13}H_{24}Cl_4Na$: 343.0524.

1,1,3-Tribromotridecane (7)

Colorless oil; ^1H NMR (400 MHz, $CDCl_3$): δ 5.95—5.83 (1H, m), 4.17—4.06 (1H, m), 2.86—2.72 (2H, m), 1.94—1.78 (2H, m), 1.39—1.21 (16H, m), 0.88 (3H, t, *J* = 6.8 Hz); ^{13}C NMR (100 MHz, $CDCl_3$): δ 54.4, 53.5, 43.6, 38.5, 31.9, 29.5 (2), 29.4, 29,.3, 28.9, 27.2, 22.7, 14.1; IR (ATR) cm^{-1}: 2922, 2852, 1464, 1417, 1377, 1215, 1160; ESI-HRMS m/z: 416.9428 ($[M-H]^-$); Calcd for $C_{13}H_{24}Br_3$: 416.9434.

1,1,1,2,2,3,3,4,4,5,5,6,6-Tridecafluoro-8-iodooctadecane (8a)

Colorless oil; ^1H NMR (400 MHz, $CDCl_3$): δ 4.39—4.28 (1H, m), 3.07—2.65 (2H, m), 1.91—1.66 (2H, m), 1.59—1.22 (16H, m), 0.88 (3H, t, *J* = 6.6 Hz); ^{19}F NMR (470 MHz, $CDCl_3$) δ: -81.7 (3F, m), -112.5—-113.1 (1F, m), -115.3—-115.9 (1F, m), -122.8 (2F, m), -123.8 (2F, m), -124.6 (2F, m), -127.1 (2F, m); IR (ATR) cm^{-1}: 2926, 2856, 1361, 1324, 1192, 1143; ESI-HRMS m/z: 615.0850 ($[M+H]^+$); Calcd for $C_{18}H_{25}F_{13}I$: 615.0788.

2-(9,9,10,10,11,11,12,12,13,13,14,14,14-tridecafluoro-7-iodotetradecyl)oxirane (8b)

Colorless oil; ^1H NMR (400 MHz, $CDCl_3$): δ 4.39—4.26 (1H, m), 3.01—2.64 (4H, m), 2.47 (1H, dd, *J* = 5.2 , 2.8 Hz), 1.90—1.67 (2H, m), 1.65—1.14 (10H, m); ^{19}F NMR (470 MHz, $CDCl_3$) δ: -81.8 (3F, m), -112.4—-113.0 (1F, m), -115.2—-115.8 (1F, m), -122.7 (2F, m), -123.8 (2F, m), -124.6 (2F, m), -127.1 (2F, m); IR (ATR) cm^{-1}: 2932, 2859, 1433, 1362, 1233, 1190, 1142, 1123; elemental analysis calcd (%) $C_{16}H_{18}OF_{13}I$ for: C 32.02, H 3.02; found: C 31.88, H 3.04.

3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluoro-1-iodooctyl) trimethylsilane (8c)

Colorless oil; ^1H NMR (100 MHz, $CDCl_3$): δ 3.21 (1H, dd, *J* = 10.2, 3.0 Hz), 2.74—2.56 (2H, m), 0.21 (9H, s); ^{19}F NMR (470 MHz, $CDCl_3$) δ: -81.7 (3F, m), -115.4—-115.5 (1F, m), -116.1—-116.2 (1F, m), -122.8 (2F, m), -123.8 (2F, m), -124.6 (2F, m), -127.1 (2F, m); IR (ATR) cm^{-1}: 2959, 1426, 1363, 1233, 1187, 1143, 1121, 1100, 1068, 1021; ESI-HRMS m/z: 544.9490 ($[M-H]^-$); Calcd for $C_{11}H_{11}F_{13}SiI$: 544.9473.

11-Bromo-1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodoundecane (8d)

Colorless oil; ^1H NMR (400 MHz, $CDCl_3$): δ 4.40—4.28 (1H, m), 3.51 (2H, m) , 3.05—2.69 (2H, m), 2.23—2.08 (1H, m), 2.08—1.84 (3H, m); ^{19}F NMR (470 MHz, $CDCl_3$) δ: -81.7 (3F, m), -112.3—-112.9 (1F, m), -115.3—-115.8 (1F, m), -122.7 (2F, m),

-123.8 (2F, m), -124.6 (2F, m), -127.1 (2F, m); IR (ATR) cm^{-1}: 2962, 1334, 1361, 1232, 1189, 1142, 1122; elemental analysis calcd (%) for $C_{11}H_9F_{13}BrI$: C 22.21, H 1.52; found: C 22.45, H 1.61.

16-Bromo-1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodohexadecane (8e)

Colorless oil; ^1H NMR (500 MHz, $CDCl_3$): δ 4.41—4.28 (1H, m), 3.41 (2H, t, J = 7.4 Hz), 3.02—2.68 (2H, m), 1.94—1.68 (4H, m), 1.55—1.23 (10H, m); ^{19}F NMR (470 MHz, $CDCl_3$) δ: -81.8 (3F, m), -112.5—-113.0 (1F, m), -115.3—-115.9 (1F, m),-122.8 (2F, m), -123.8 (2F, m), -124.6 (2F, m), -127.1 (2F, m); IR (ATR) cm^{-1}: 2930, 2857, 1463, 1360, 1233, 1190, 1143, 1122, 1065; elemental analysis calcd (%) for $C_{16}H_{19}F_{13}BrI$: C 28.89, H 2.88; found: C 29.07, H 2.79.

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5. References

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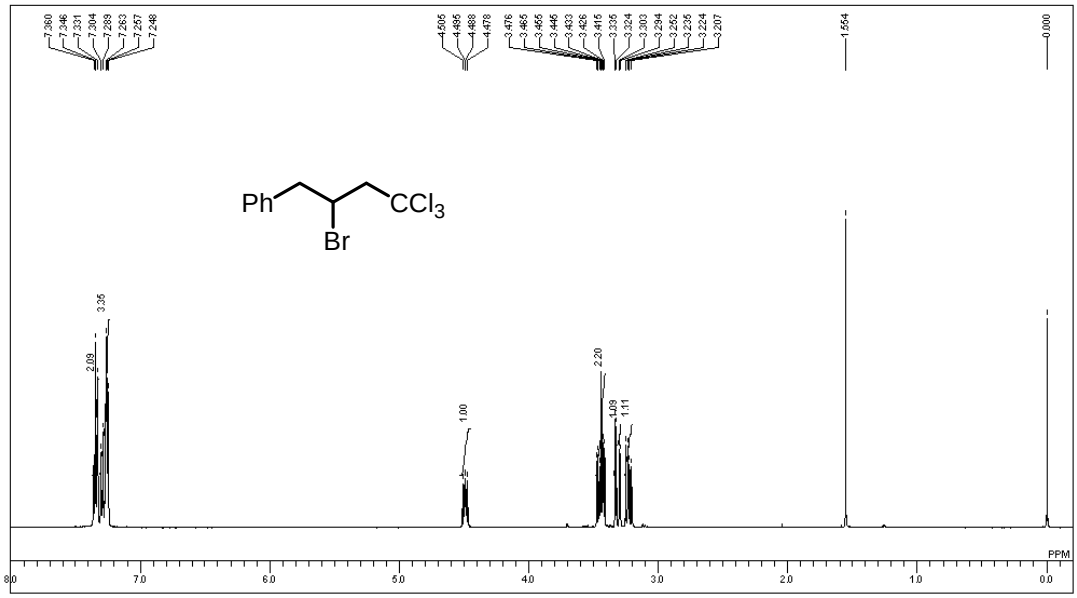
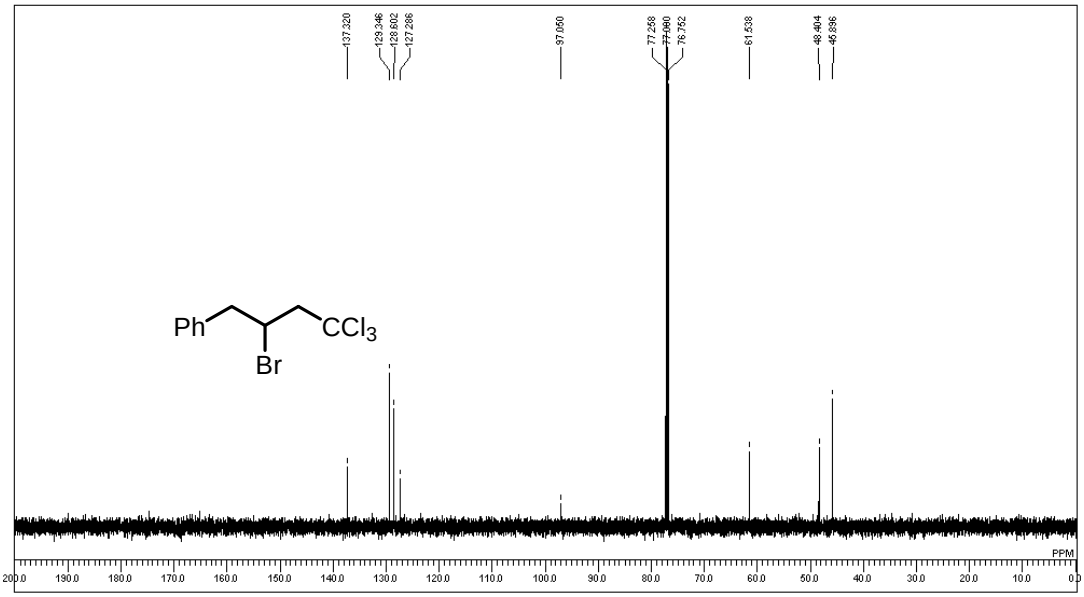
3) Qaseer, H. A, *Pol. J. Chem.* **2007**, *81*, 31.

6. ^{1}H, ^{13}C and ^{19}F NMR spectra of new products

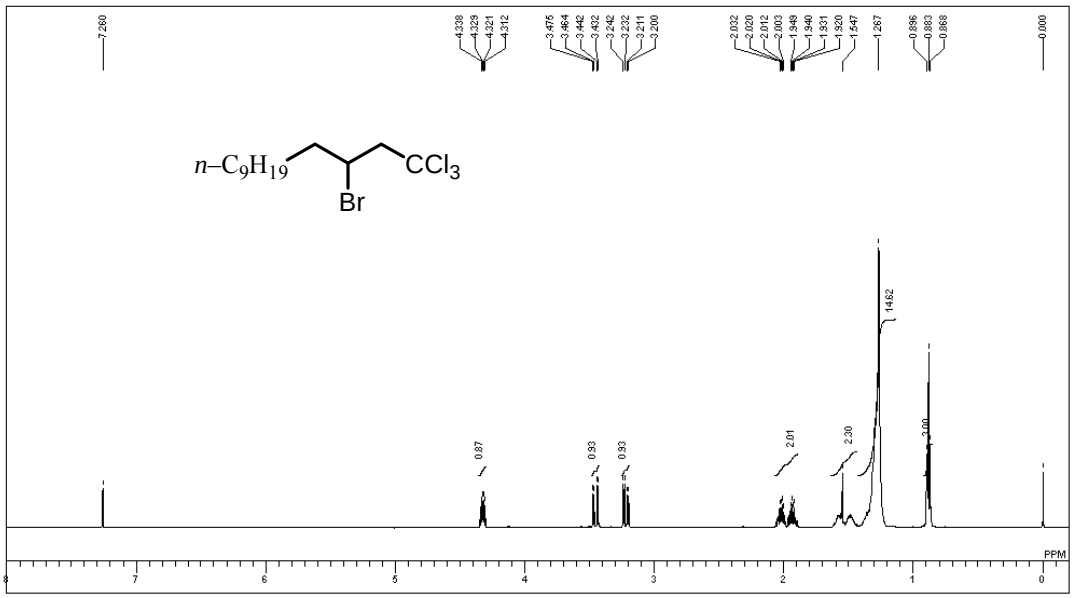
^{1}H NMR of 1-(2-bromo-4,4,4-trichlorobutyl)benzene **(2a)**



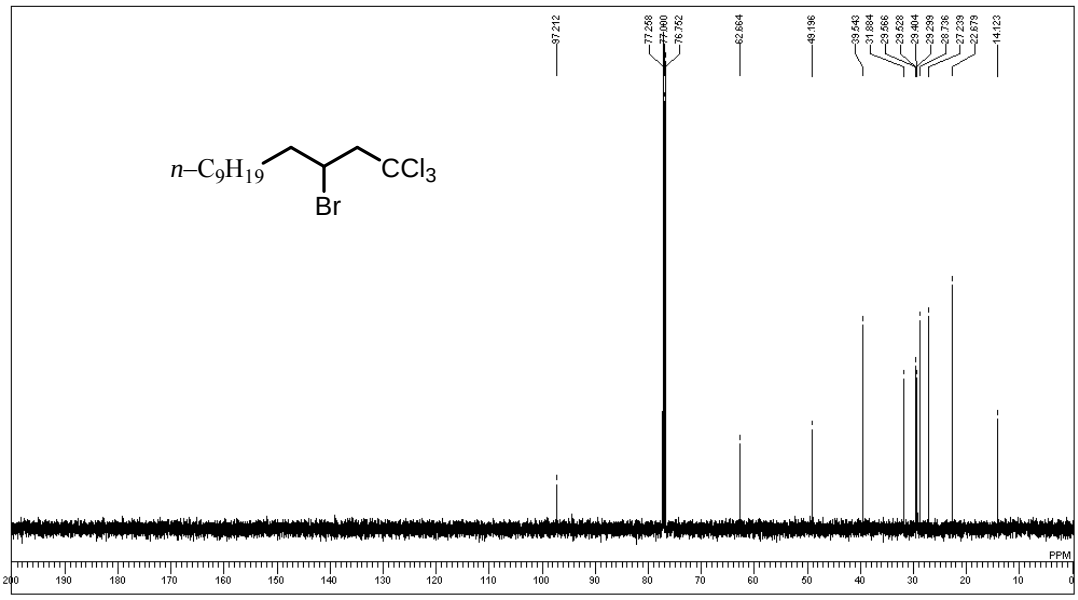
^{13}C NMR of 1-(2-bromo-4,4,4-trichlorobutyl)benzene (**2a**)



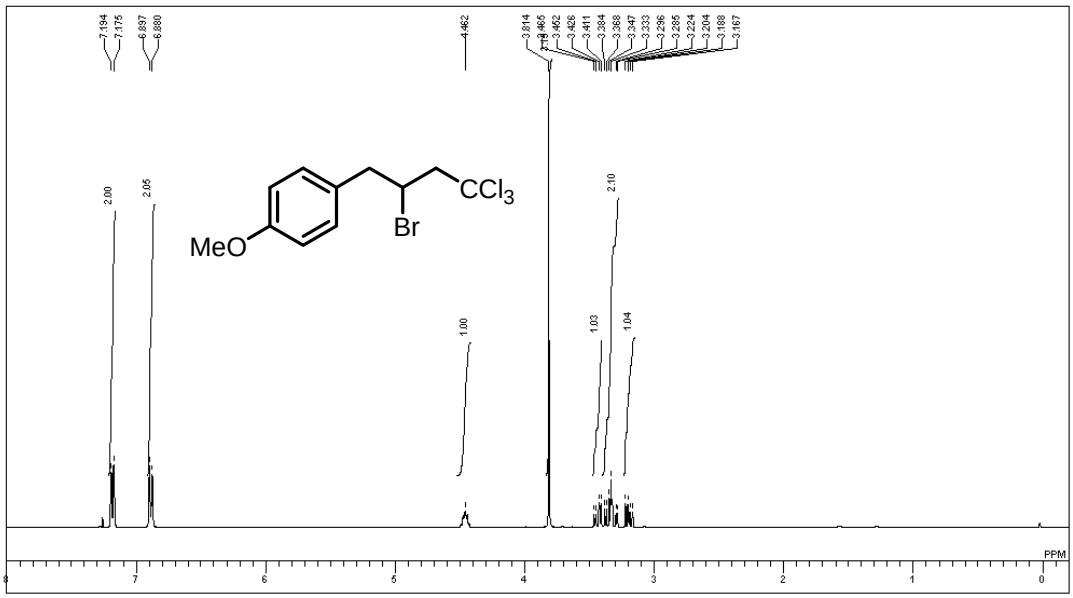
^{1}H NMR of 3-bromo-1,1,1-trichlorotridecane (**2b**)



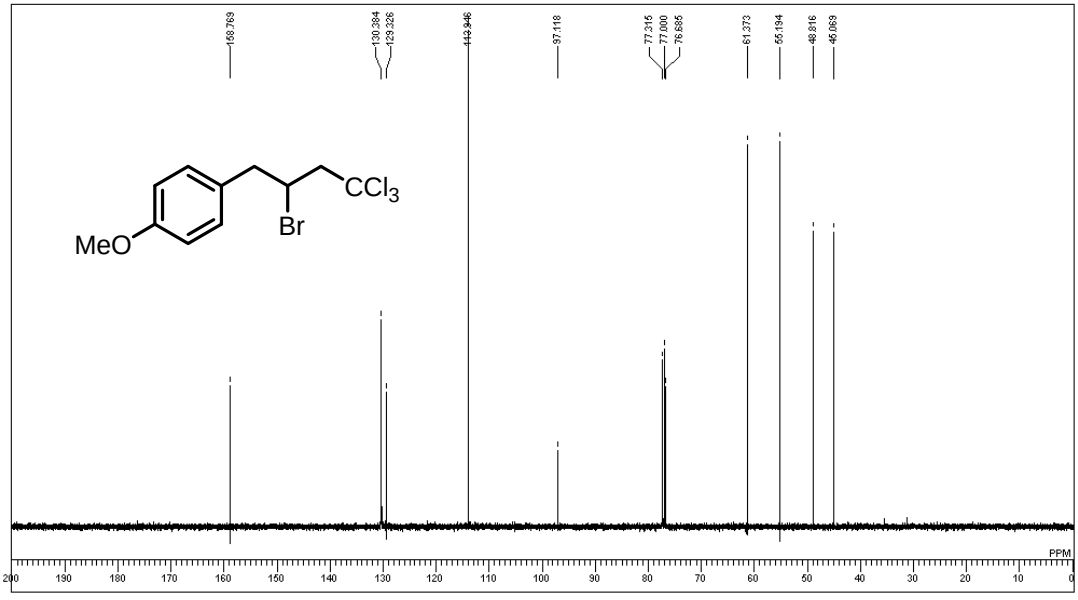
^{13}C NMR of 3-bromo-1,1,1-trichlorotridecane (**2b**)



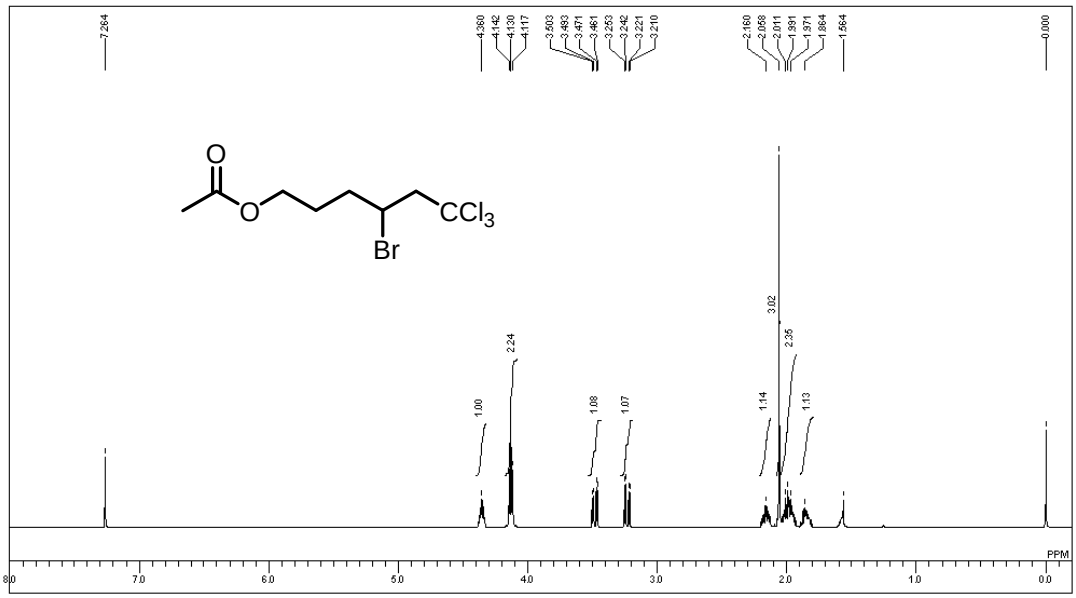
^{1}H NMR of 1-(2-bromo-4,4,4-trichlorobutyl)-4-methoxybenzene (**2c**)



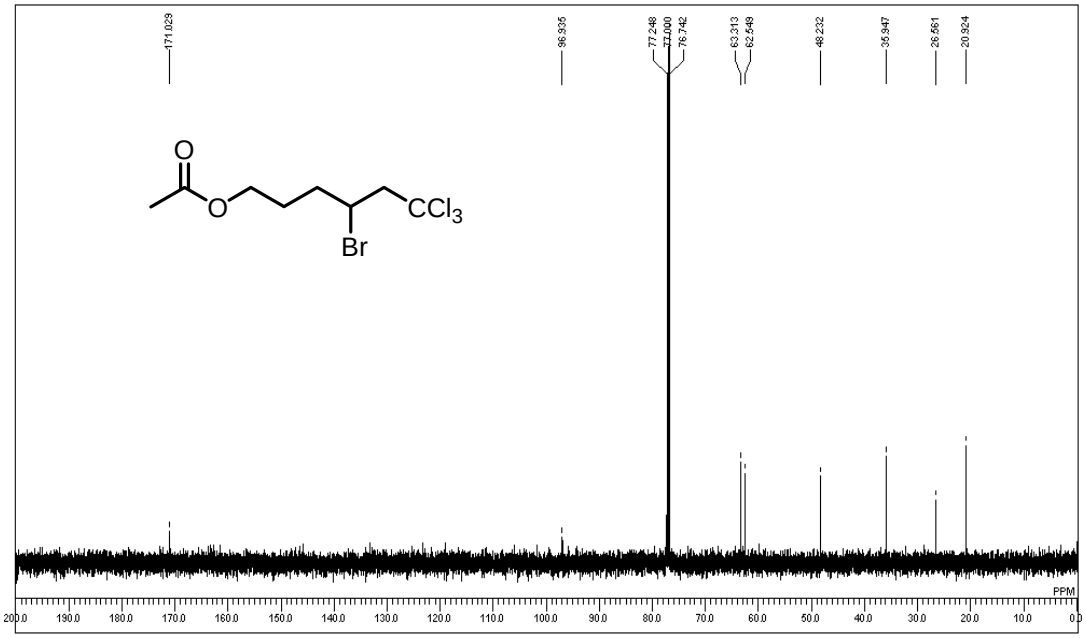
^{13}C NMR of 1-(2-bromo-4,4,4-trichlorobutyl)-4-methoxybenzene (**2c**)



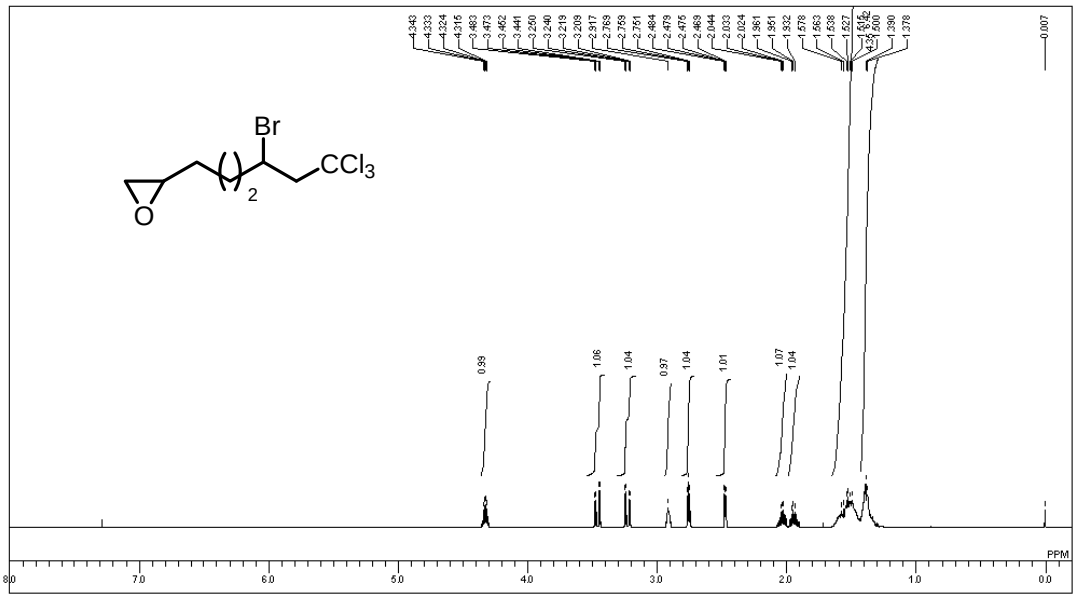
^{1}H NMR of 4-bromo-6,6,6-trichlorohexyl acetate (**2d**)



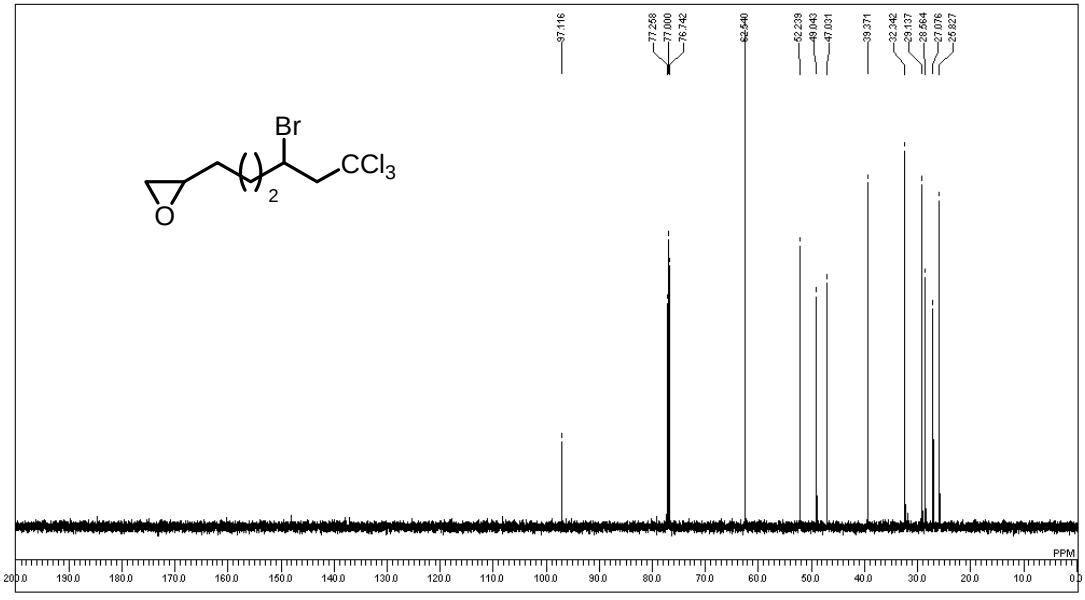
^{13}C NMR of 4-bromo-6,6,6-trichlorohexyl acetate (**2d**)



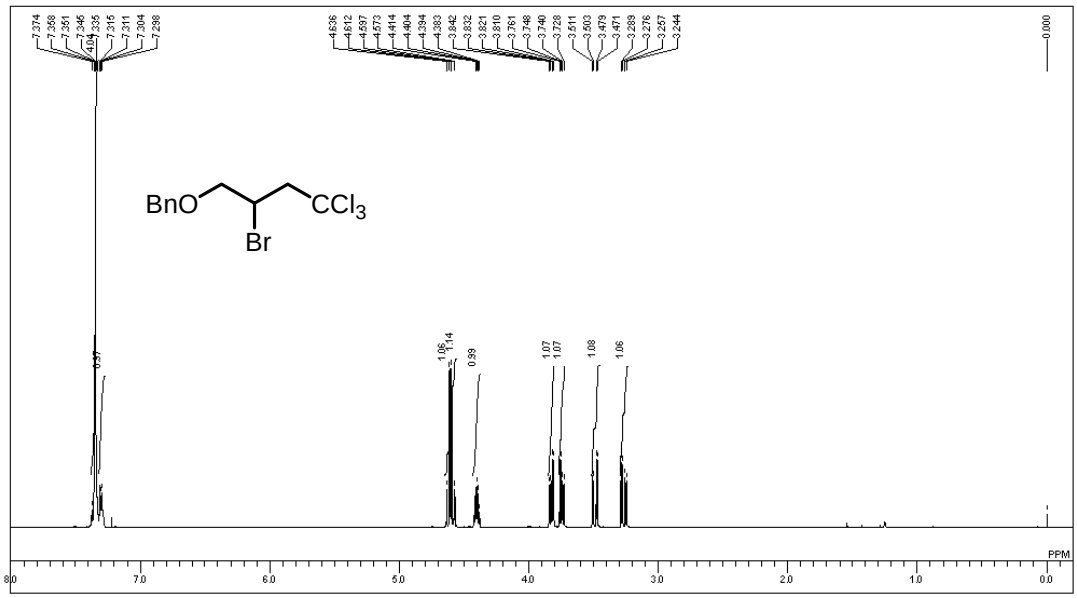
^{1}H NMR of 2-(7-Bromo-9,9,9-trichlorononyl)oxirane (**2e**)



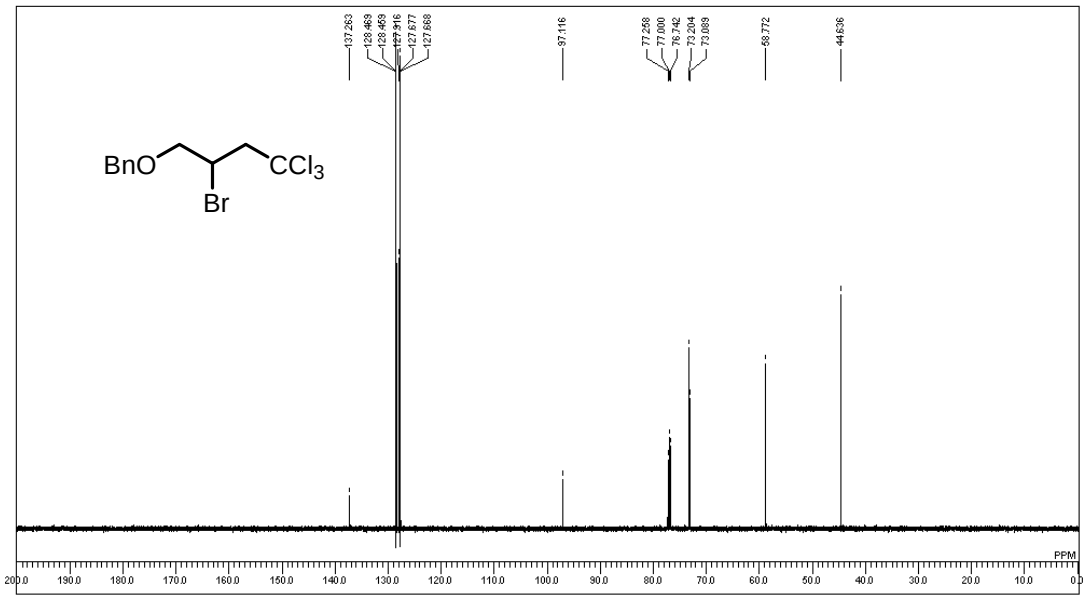
^{13}C NMR of 2-(7-Bromo-9,9,9-trichlorononyl)oxirane (**2e**)



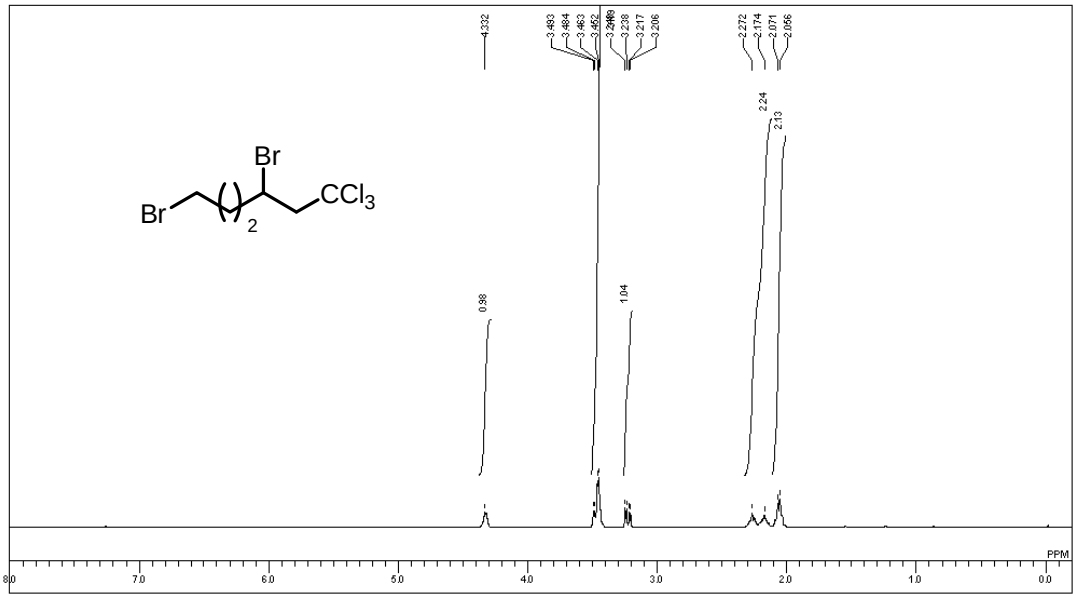
^{1}H NMR of 2-Bromo-4,4,4-trichlorobuthyl benzyl ether **(2f)**



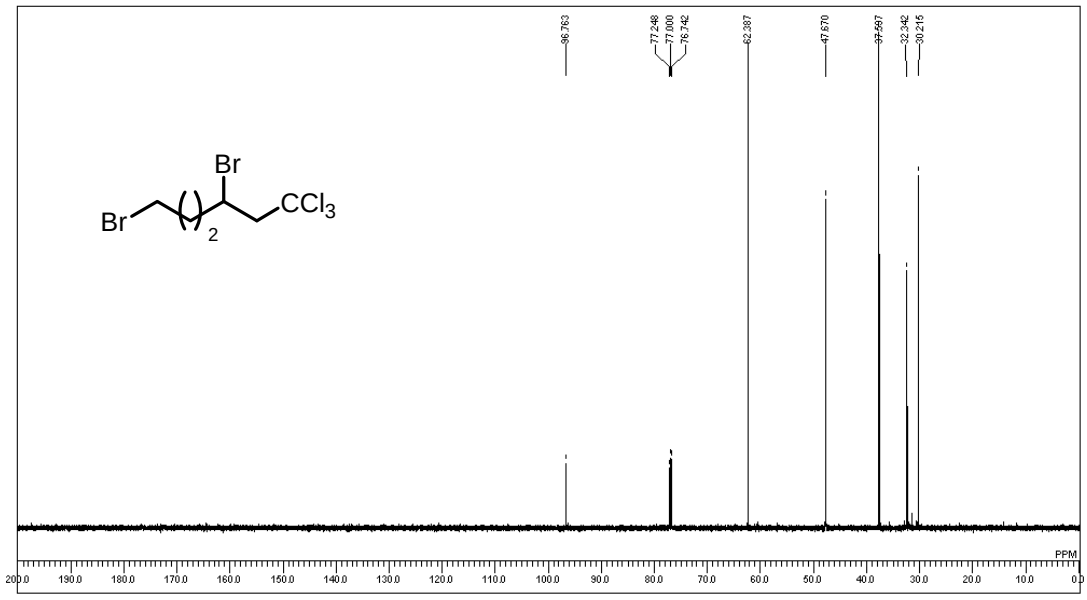
^{13}C NMR of 2-Bromo-4,4,4-trichlorobuthyl benzyl ether (**2f**)



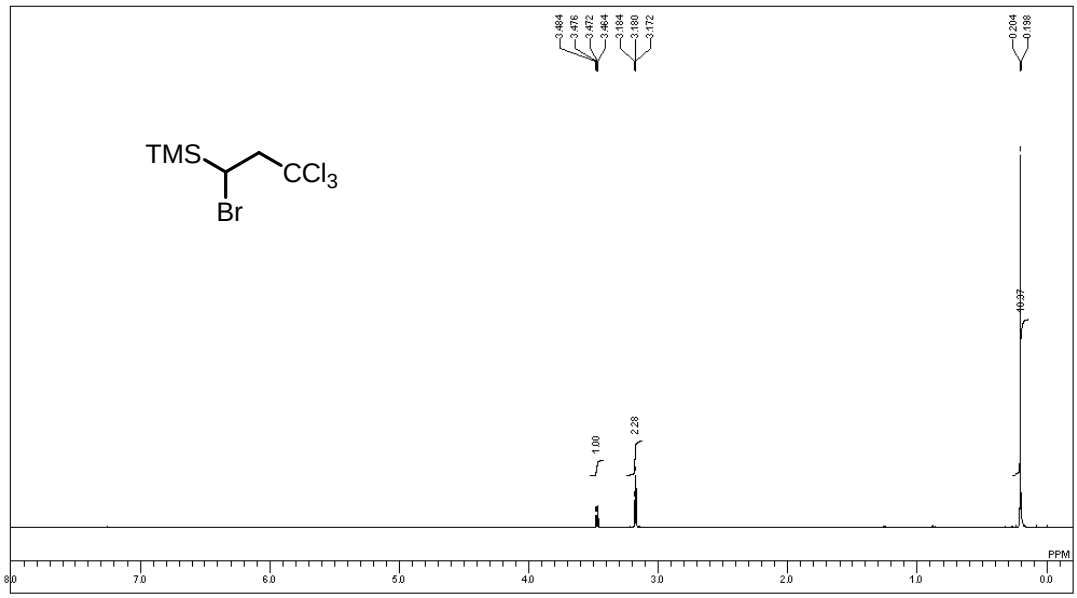
^{1}H NMR of 3,6-Dibromo-1,1,1-trichlorohexane (**2g**)



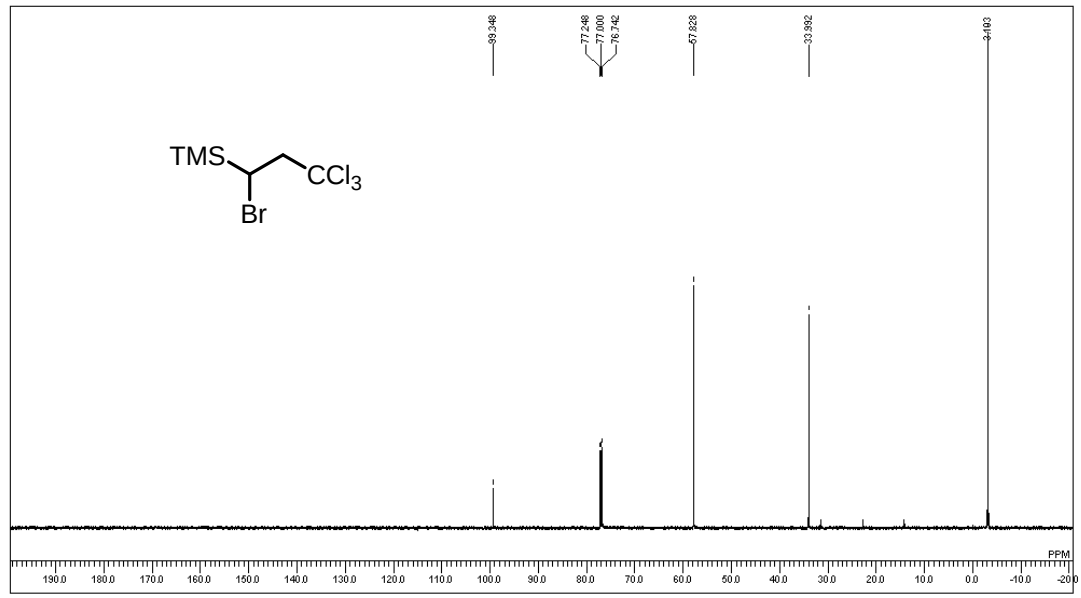
^{13}C NMR of 3,6-Dibromo-1,1,1-trichlorohexane (**2g**)



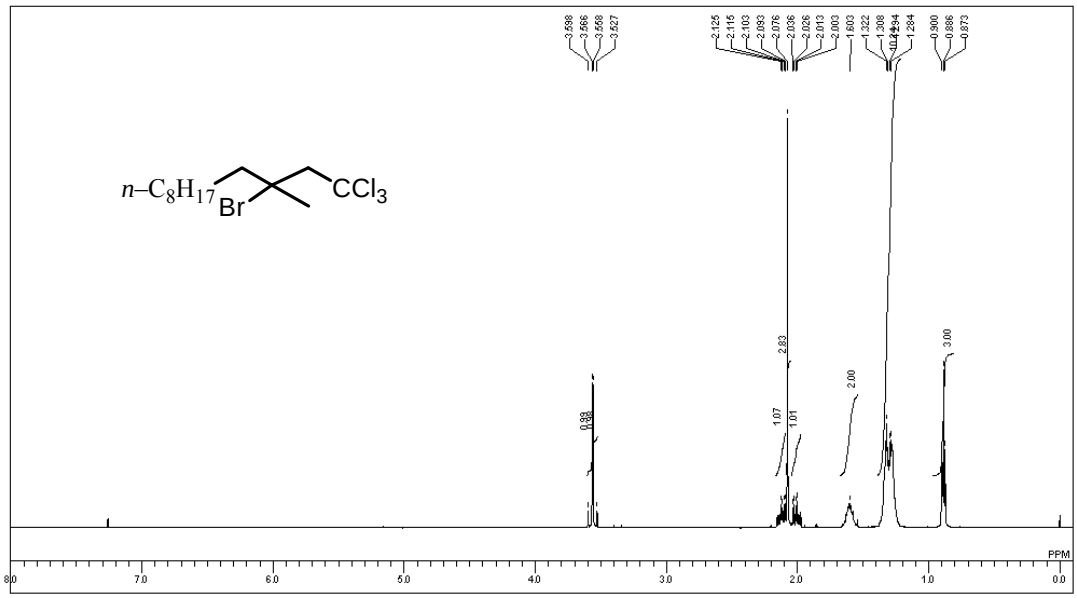
^{1}H NMR of (2-bromo-4,4,4-trichlorobutyl)trimethylsilane (**2h**)



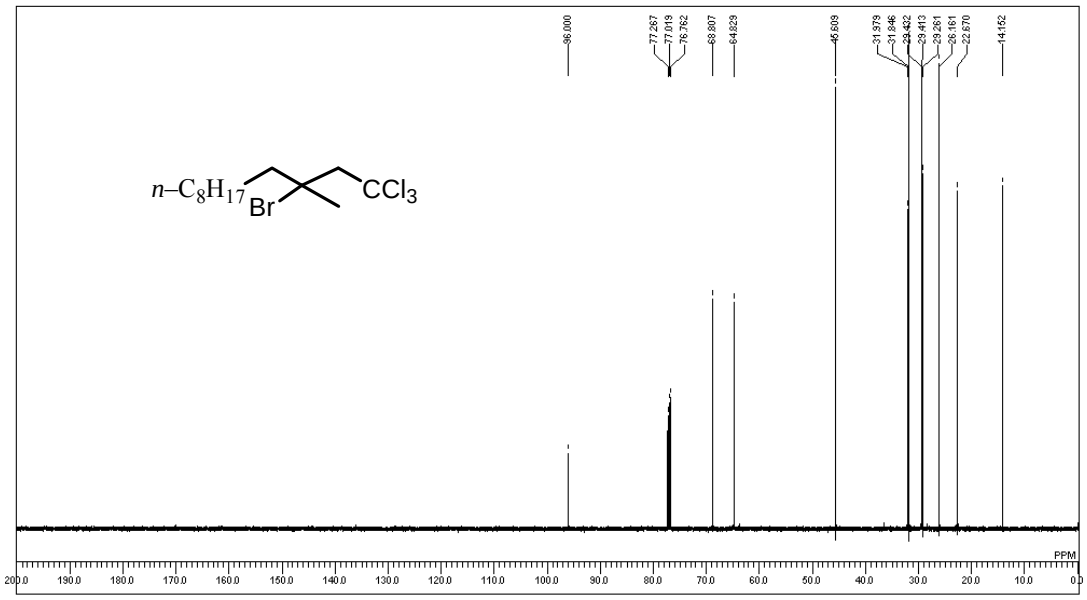
^{13}C NMR of (2-bromo-4,4,4-trichlorobutyl)trimethylsilane (**2h**)



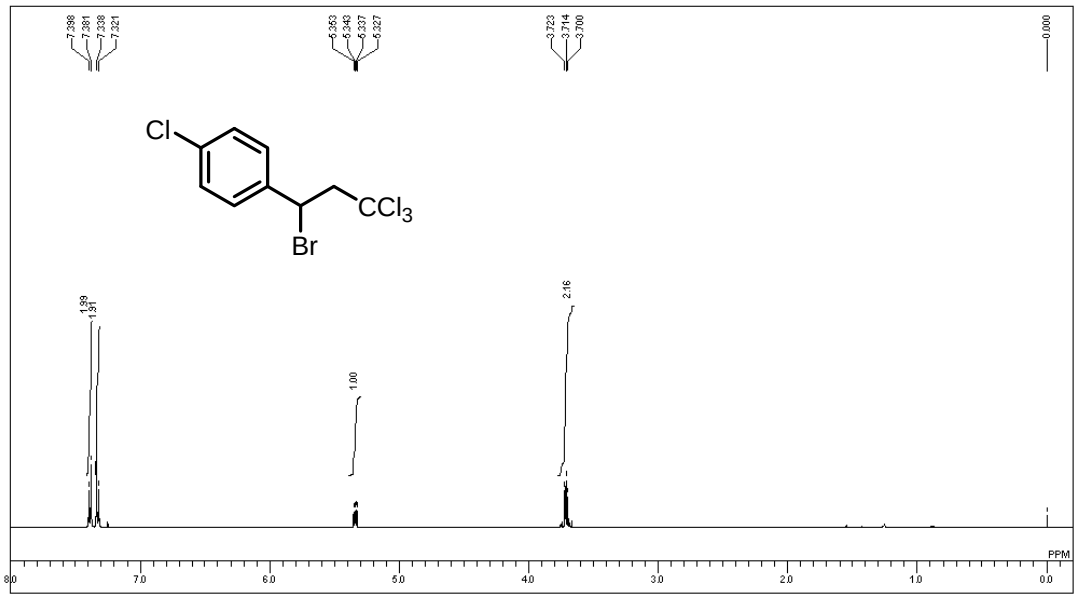
^{1}H NMR of 3-bromo-1,1,1-trichloro-3-methylundecane (**2i**)



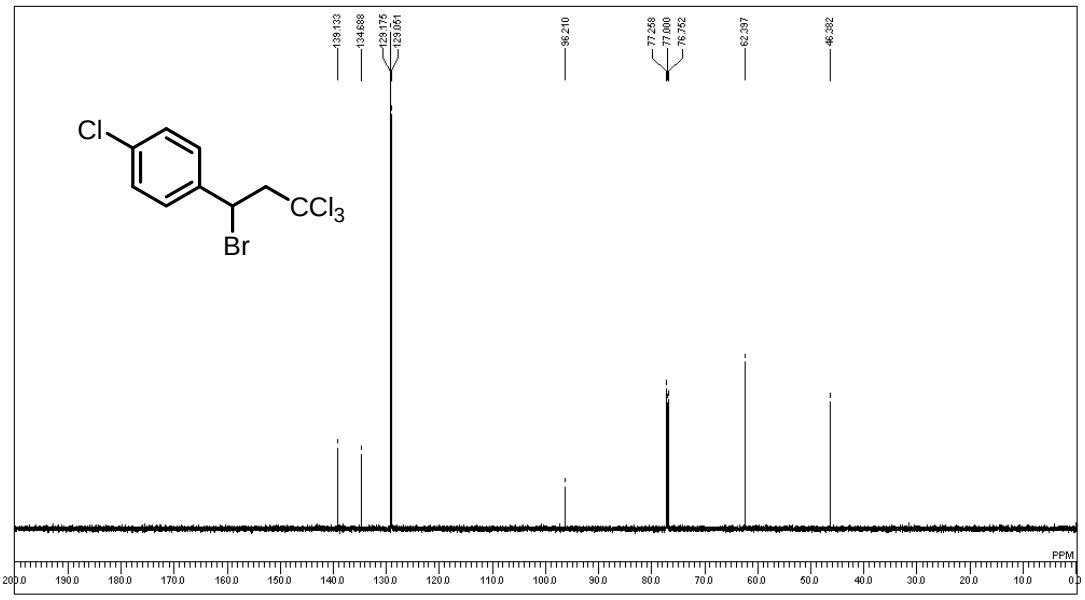
^{13}C NMR of 3-bromo-1,1,1-trichloro-3-methylundecane (**2i**)



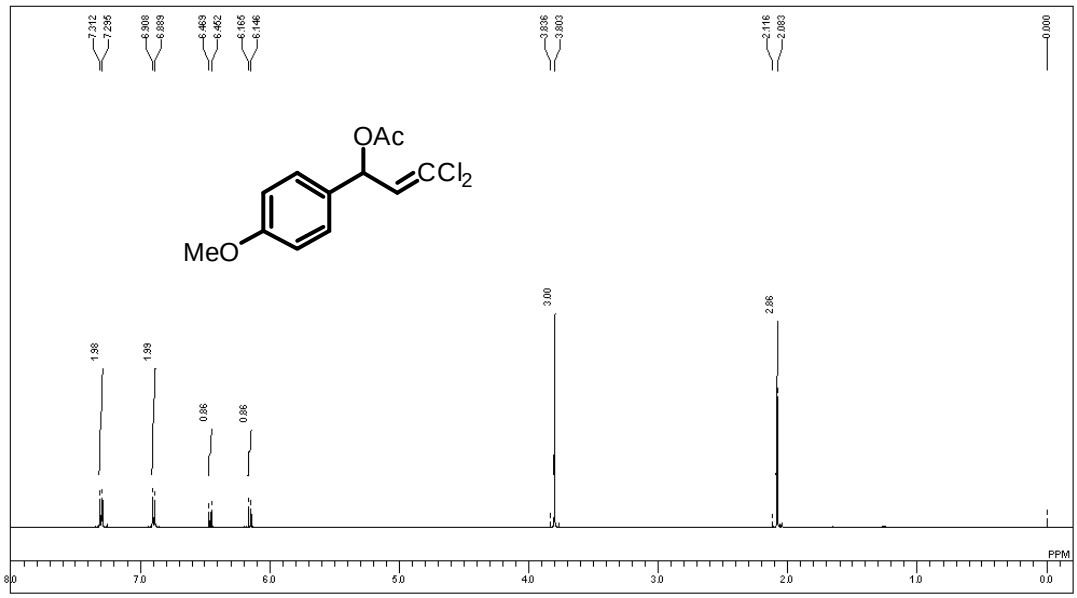
^{1}H NMR of 4-(1-Bromo-3,3,3-trichloropropyl)-1-chlorobenzene (**2k**)



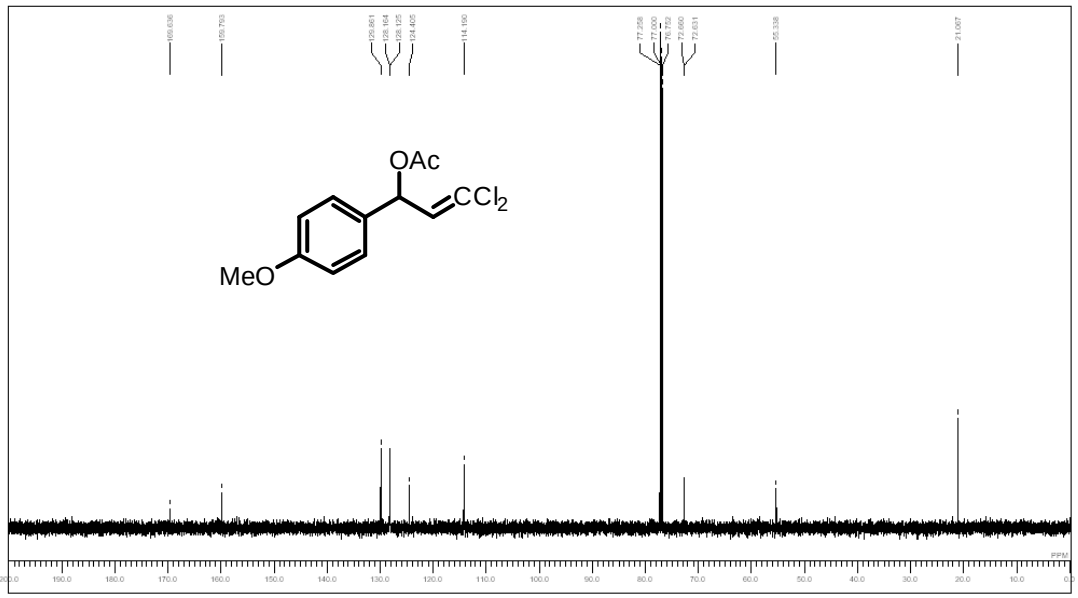
^{13}C NMR of 4-(1-Bromo-3,3,3-trichloropropyl)-1-chlorobenzene (**2k**)



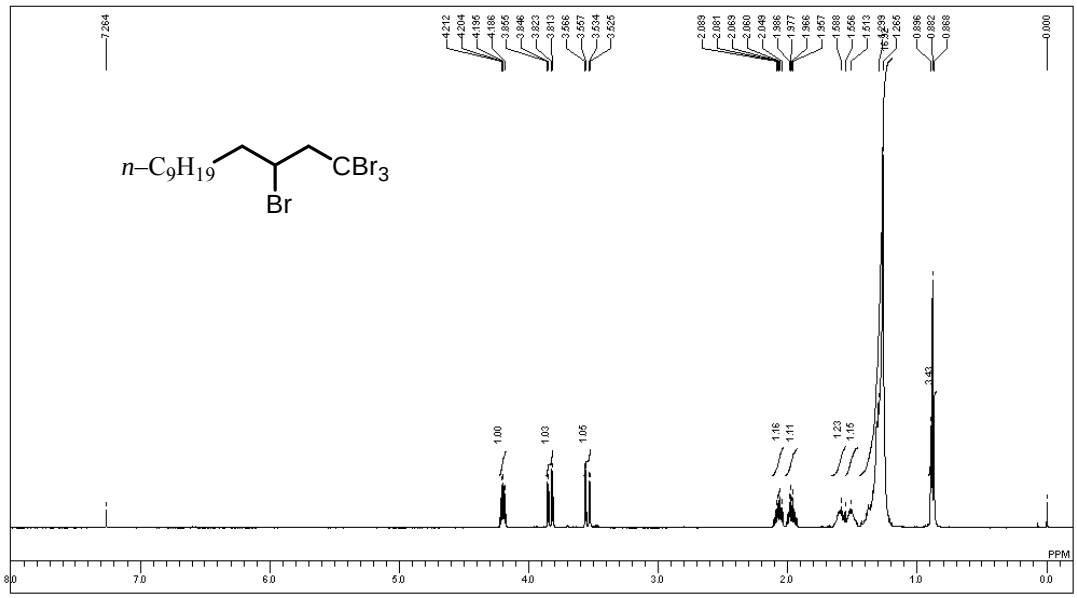
^{1}H NMR of 3,3-dichloro-1-(4-methoxyphenyl)allyl acetate **(4)**



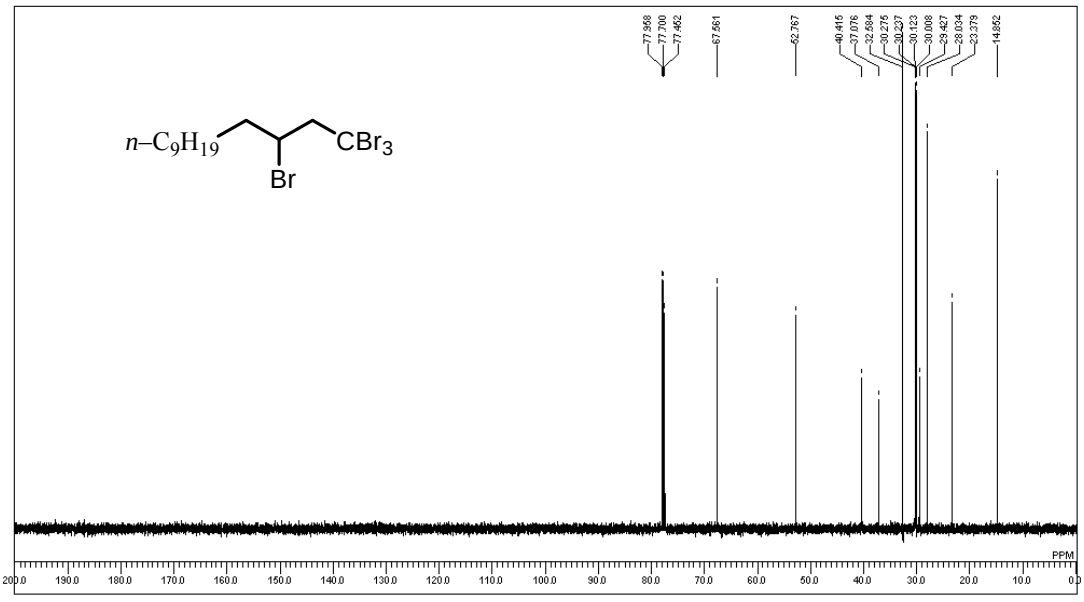
^{13}C NMR of 3,3-dichloro-1-(4-methoxyphenyl)allyl acetate **(4)**



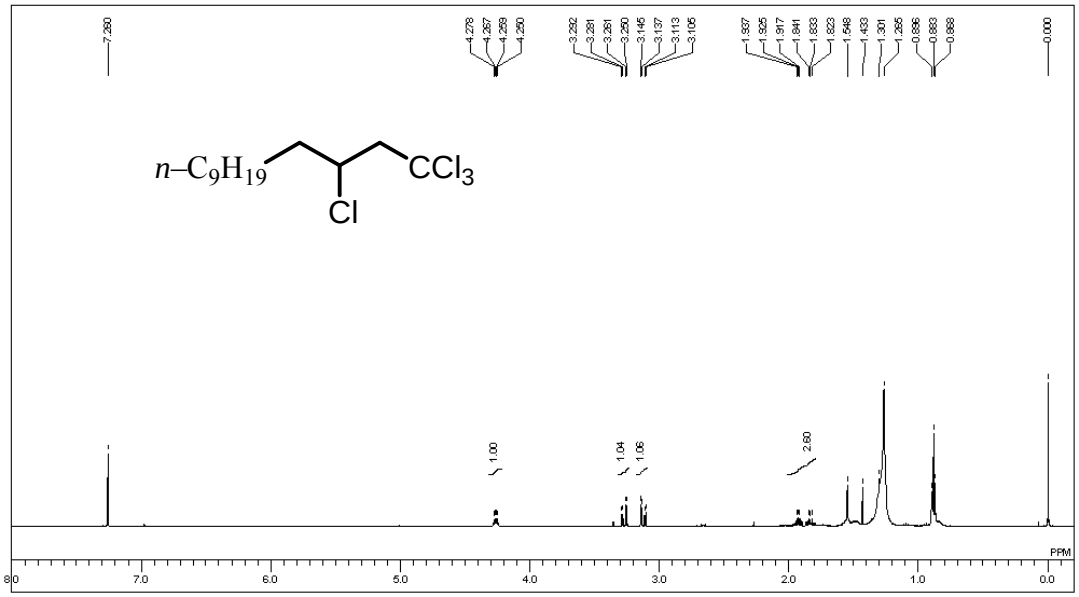
^{1}H NMR of 1,1,1,3-tetrabromotridecane **(5)**



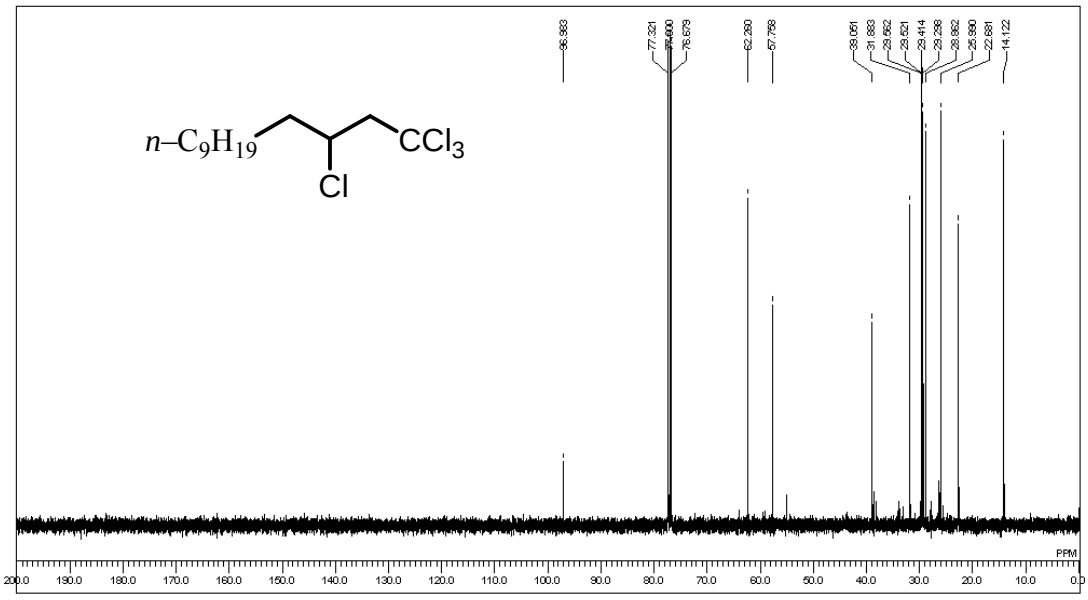
^{13}C NMR of 1,1,1,3-tetrabromotridecane (**5)**



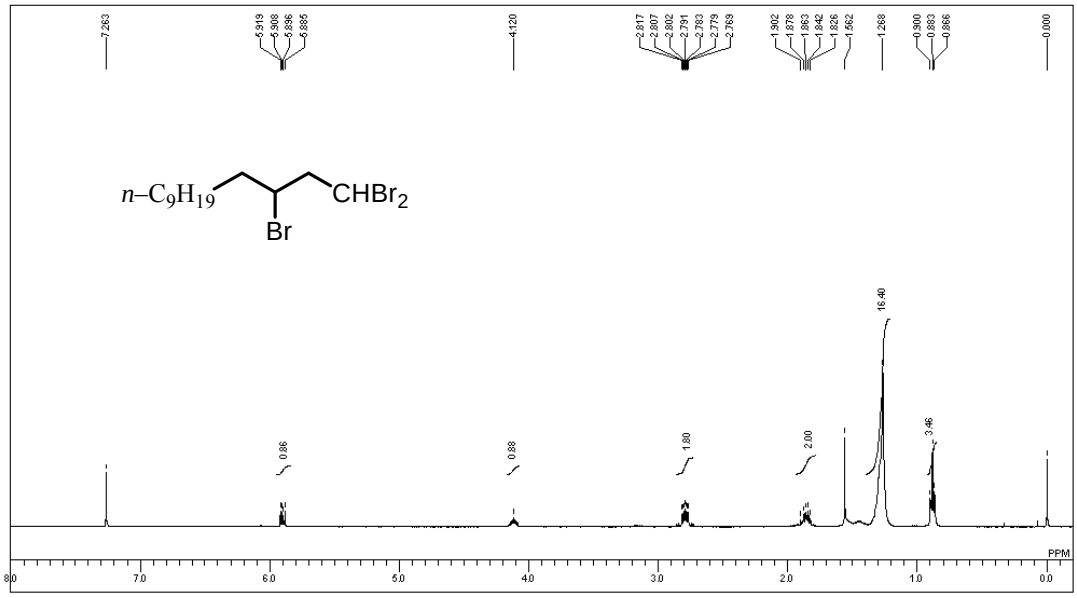
^{1}H NMR of 1,1,1,3-Tetrachlorotridecane **(6)**



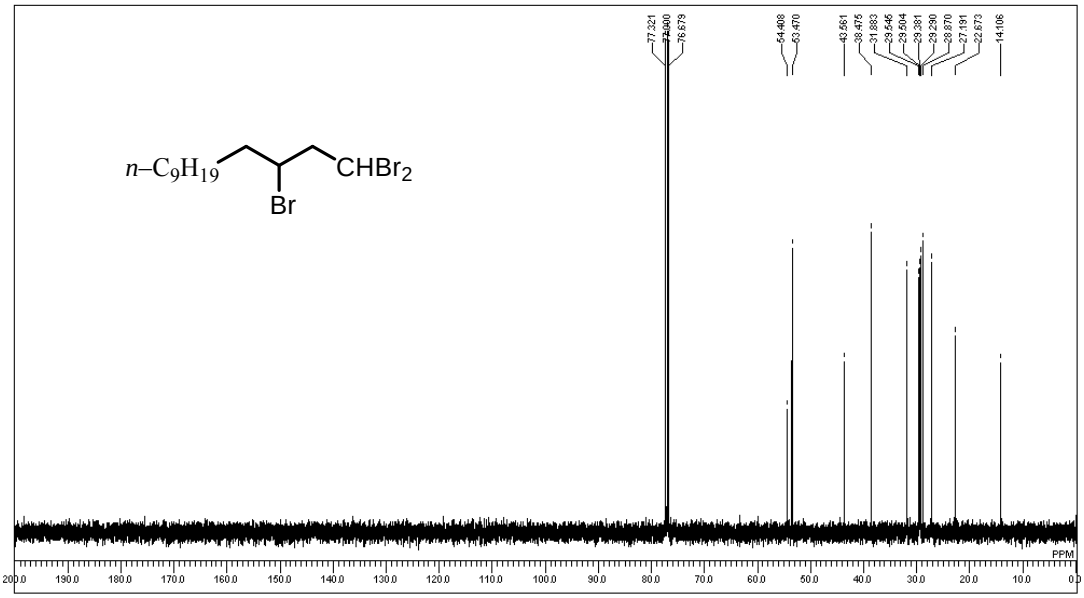
^{13}C NMR of 1,1,1,3-Tetrachlorotridecane (**6)**



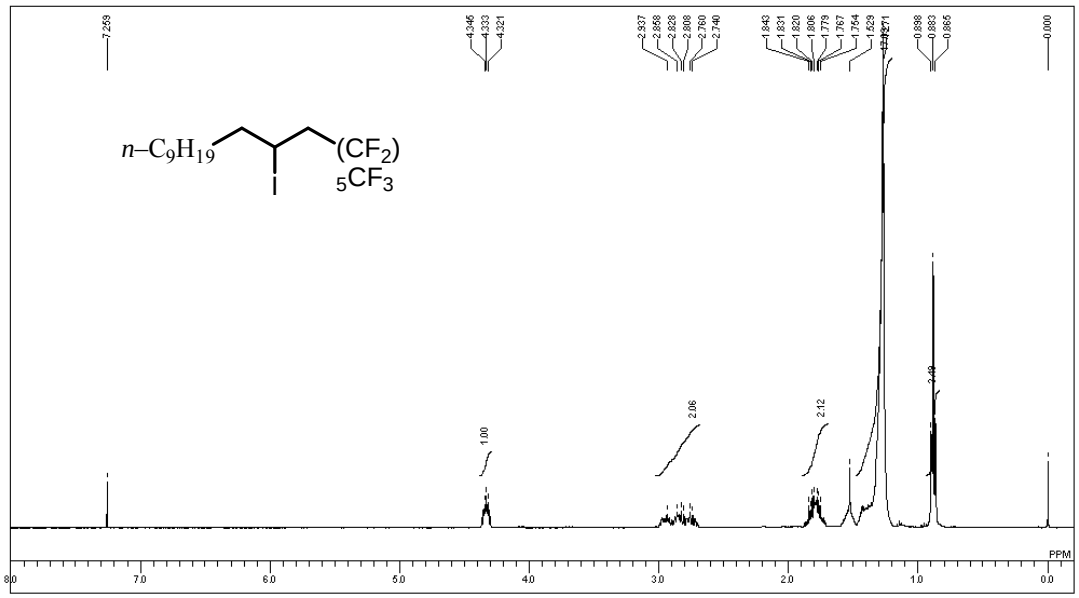
^{1}H NMR of 1,1,3-tribromotridecane **(7)**



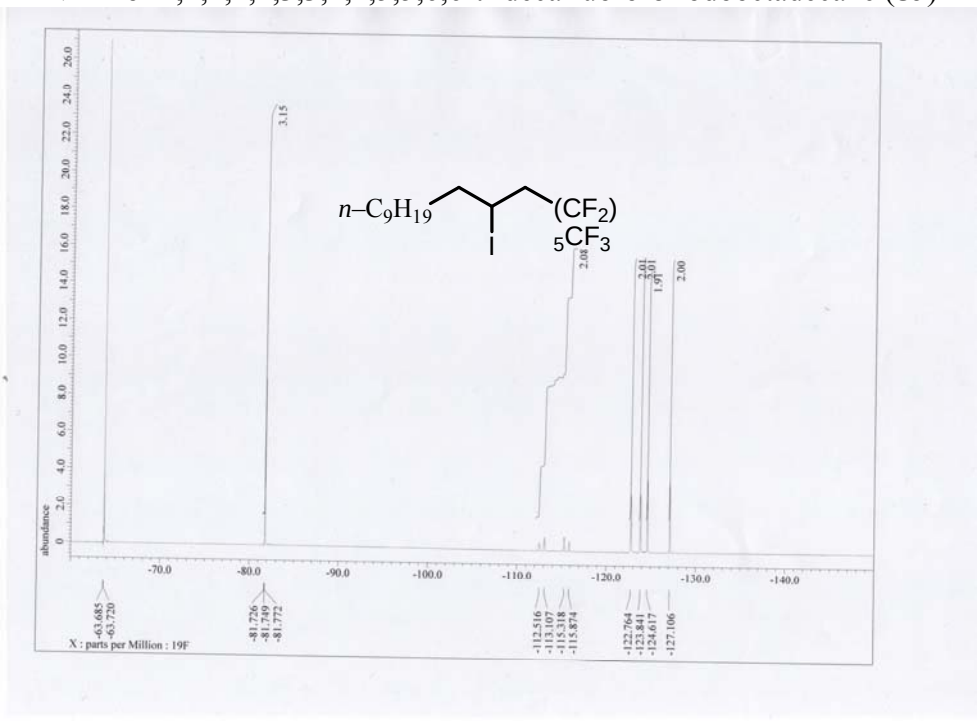
^{13}C NMR of 1,1,3-tribromotridecane **(7)**



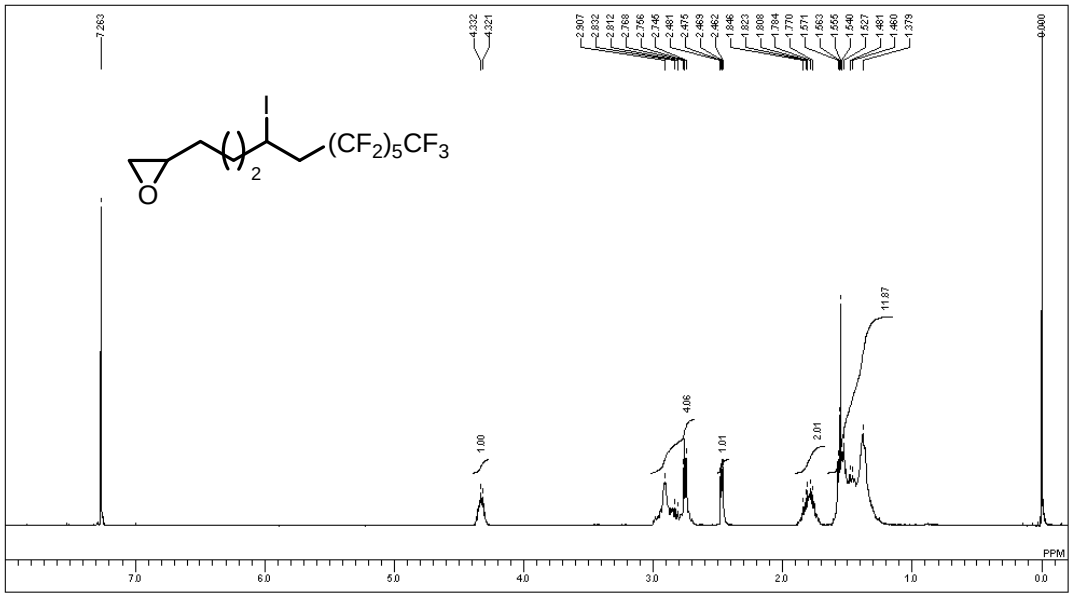
^{1}H NMR of 1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodooctadecane **(8a)**



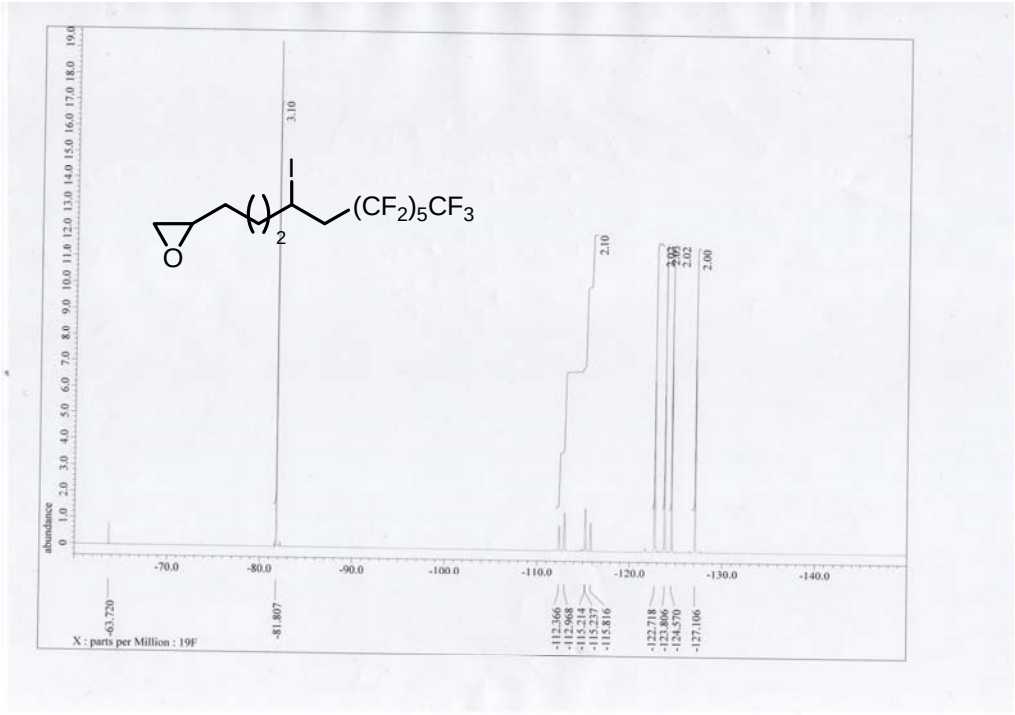
^{19}F NMR of 1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodooctadecane (**8a**)



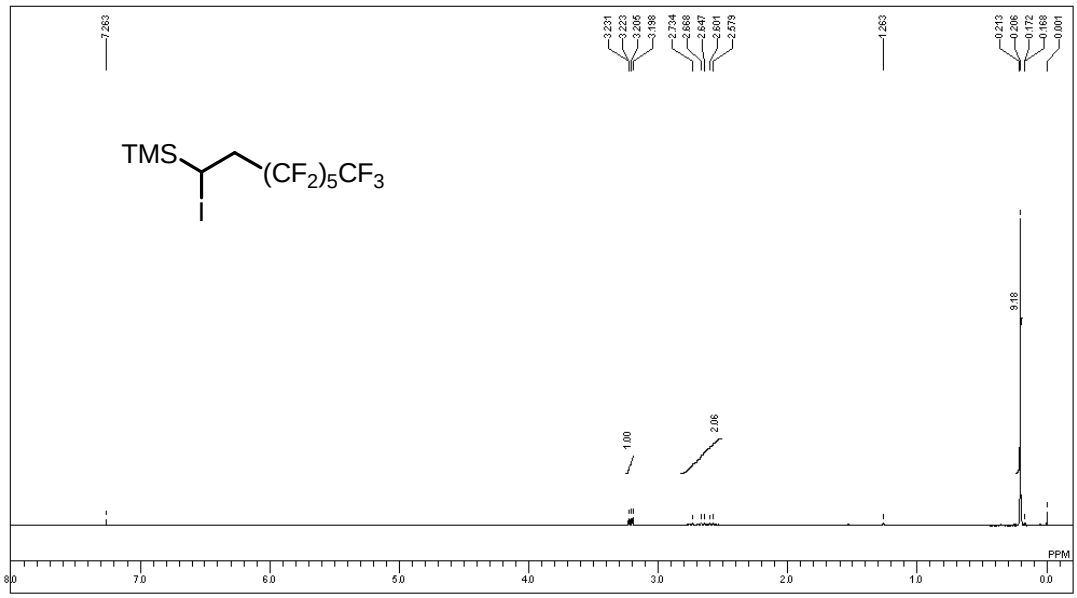
^{1}H NMR of
2-(9,9,10,10,11,11,12,12,13,13,14,14,14-tridecafluoro-7-iodotetradecyl)oxirane (**8b**)



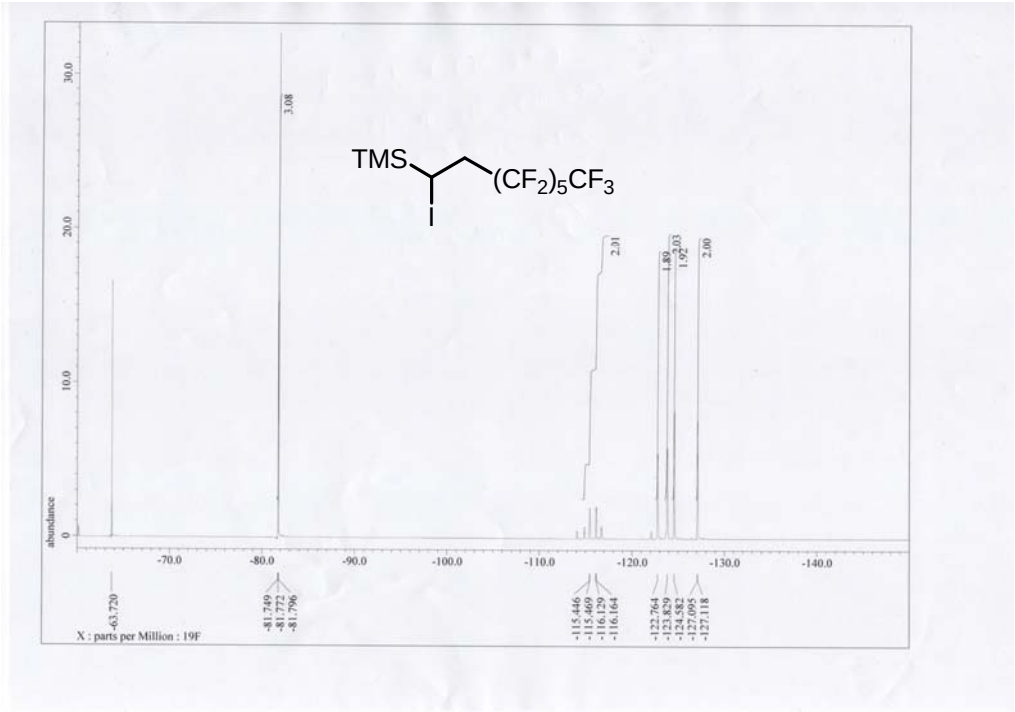
^{19}F NMR of (**8b**)
2-(9,9,10,10,11,11,12,12,13,13,14,14,14-tridecafluoro-7-iodotetradecyl)oxirane (**8b**)



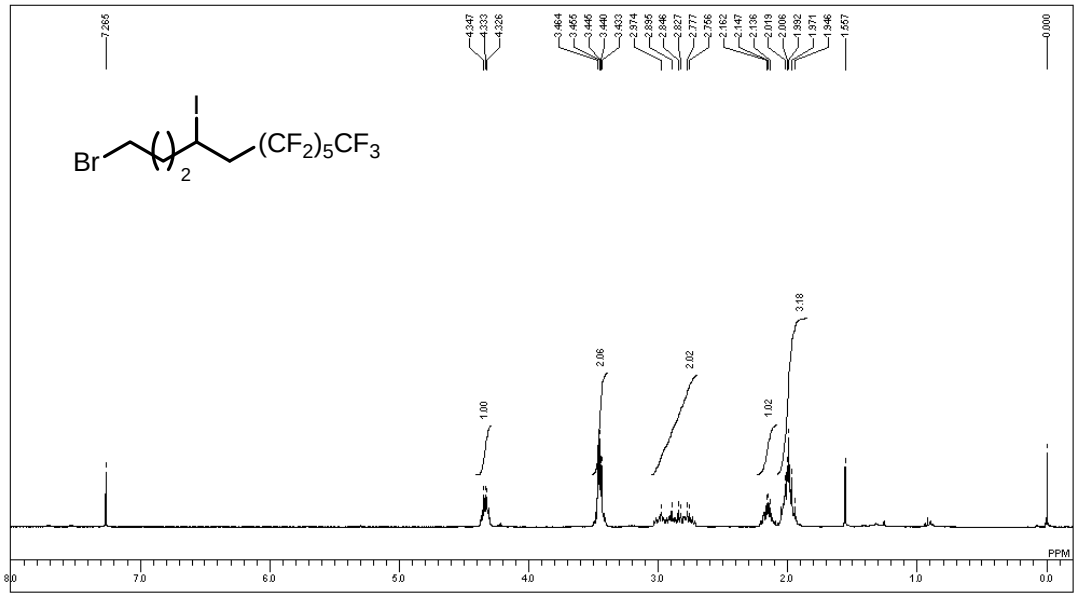
^{1}H NMR of 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-1-iodooctyl) trimethylsilane **(8c)**



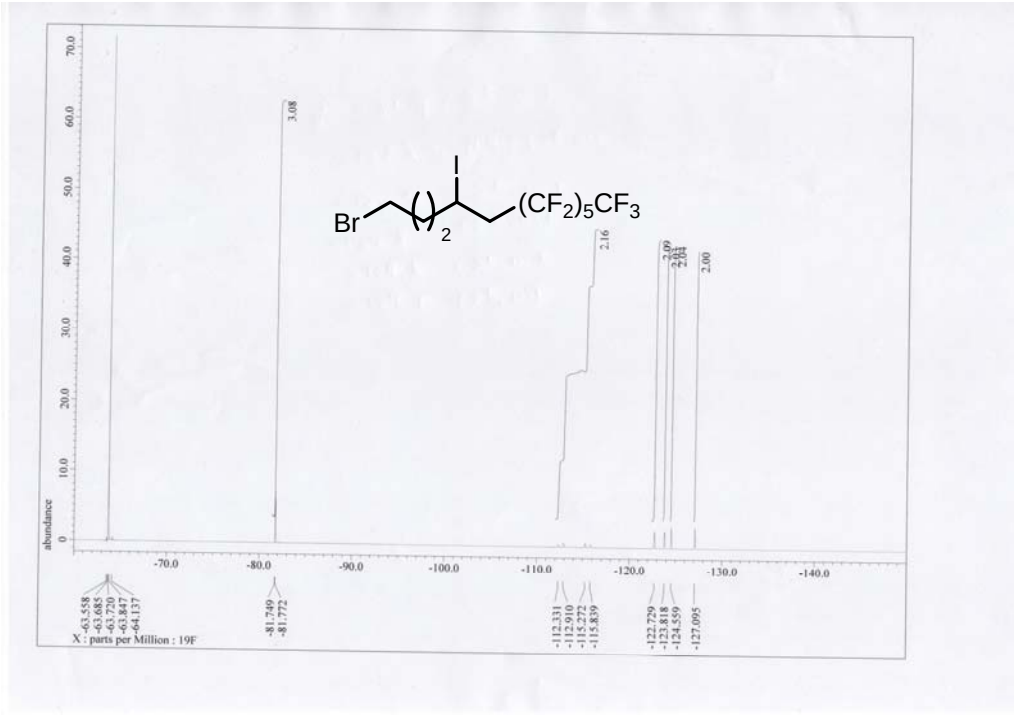
^{19}F NMR of 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-1-iodooctyl) trimethylsilane **(8c)**



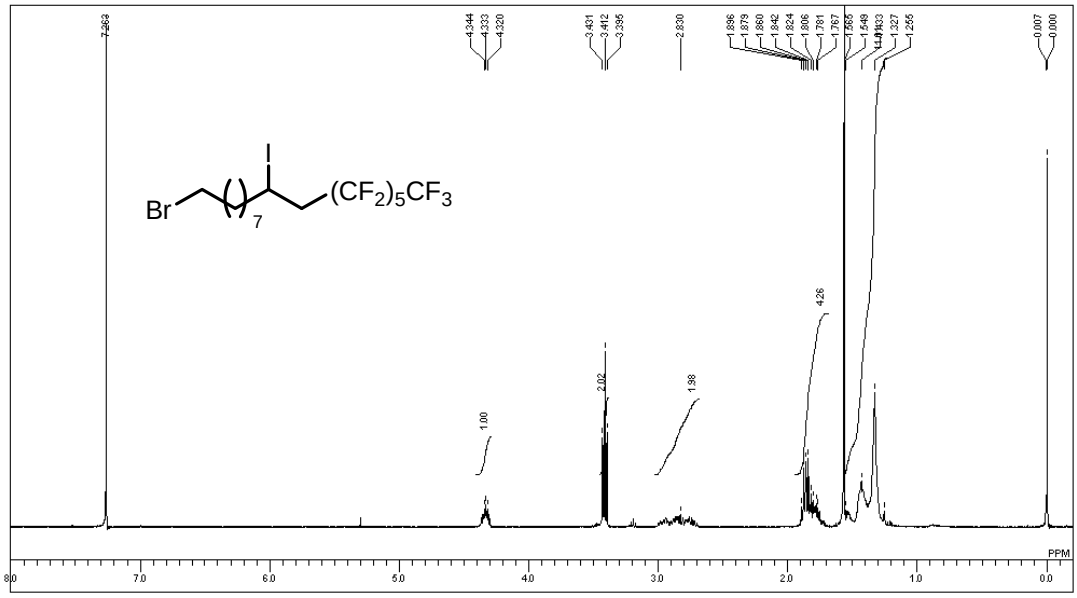
^{1}H NMR of 11-bromo-1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodoundecane **(8d)**



^{19}F NMR of 11-bromo-1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodoundecane **(8d)**



^{1}H NMR of 16-bromo-1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodohexadecane **(8e)**



^{19}F NMR of 16-bromo-1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodohexadecane **(8e)**