General Methods.

The IR spectra were recorded on a JASCO FTIR-4100 Type A spectrometer using a NaCl cell. The ^{1}H NMR and ^{13}C NMR spectra were recorded using a JNM-EX 400 (400 MHz and 100 MHz) spectrometer. Chemical shifts were reported in ppm relative to $CHCl_3$ in $CDCl_3$ for ^{1}H NMR (δ = 7.26) and ^{13}C NMR (δ = 77.0) and CHD_2OH in CD_3OD for ^{1}H NMR (δ = 3.35) and ^{13}C NMR (δ = 49.3). Splitting patterns for ^{1}H NMR were designated as "s, d, t, q, m, dt, dd, and td". These symbols indicate "singlet, doublet, triplet, quartet, multiplet, doublettriplet, doubletdoublet, and tripletdoublet" respectively. All commercially obtained reagents were employed as received. Analytical TLC was carried out using pre-coated silica gel plates (Wako TLC Silicagel $70F_{254}$). Wakogel 60N 63-212 μm was used for column chromatography. Reversed-phase high performance liquid chromatography (HPLC) was carried out using HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm).

Ketone **3a** and **4a**

To a solution of 1-hexyne (0.109 mL, 0.957 mmol) in THF (5.0 mL) was added *n*BuLi (0.601 mL, 0.957 mmol, 1.59 M) at 0 °C to give **1a**. After 30 minutes, a solution of **2** (111 mg, 0.319 mmol) in THF (3.0 mL) was added. The mixture was stirred for 10 minutes at 0 °C, quenched with 0.390 mL of 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo*. The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (116 mg, 98%) of dichloro ketone **3a** and unsaturated ketone **4a** with ratio 85:15. For further purification, the partial (ca. 10.0 mg) of mixture products were separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **3a** as a colorless oil and **4a** as a colorless oil.

3a: IR (neat) 3019, 2960, 2936, 2214, 1726, 1683, 1647, 1215, 756, 699, 669 cm^{-1}; ^{1}H NMR (CD_3OD, 400 MHz) δ 0.94 (3H, t, *J* = 7.3 Hz), 1.46-1.81 (9H, m), 2.06-2.18 (1H, m), 2.48 (2H, t, *J* = 6.8 Hz), 3.51 (2H, t, *J* = 5.8 Hz), 4.35 (1H, td, *J* = 9.2, 2.4 Hz), 4.46 (1H, d, *J* = 8.8 Hz), 4.49 (2H, s), 7.24-7.33 (5H, m); ^{13}C NMR (CD_3OD, 100 MHz) δ 13.7, 19.2, 22.9, 23.4, 29.9, 30.7, 34.4, 61.6, 66.9, 70.8, 73.9, 78.8, 100.2, 128.6, 128.8, 129.3, 139.8, 179.8; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{20}H_{26}O_2Cl_2Na$ 391.1202; Found 391.1201.

4a: IR (neat) 3065, 3019, 2959, 2936, 2865, 2214, 1716, 1649, 1617, 1216, 759, 698, 667 cm^{-1}; ^{1}H NMR (CD_3OD, 400 MHz) δ 0.94 (3H, t, *J* = 7.3 Hz), 1.43-1.50 (2H, m), 1.46-1.66 (6H, m), 2.45-2.52 (4H, m), 3.51 (2H, t, *J* = 6.3 Hz), 4.49 (2H, s), 7.25-7.32 (5H, m), 7.46 (1H, t, *J* = 7.3 Hz); ^{13}C NMR (CD_3OD, 100 MHz) δ 13.8, 19.2, 23.0, 25.5, 30.3, 30.6, 30.8, 70.7, 73.9, 78.5, 98.6, 128.6, 128.8, 129.3, 136.1, 139.7, 149.3, 173.0; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for

$C_{20}H_{25}O_2ClNa$ 355.1435; Found 355.1438.

Ketone **3b**

To a solution of **2** (157 mg, 0.451 mmol) in THF (5.0 mL) was added *n*BuLi (**1b**) (0.427 mL, 0.680 mmol, 1.59 M) at −20 °C. The mixture was stirred for 30 minutes, quenched with 0.560 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo*. The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (155 mg, 98%) of dichloro ketone **3b** and unsaturated ketone **4b**. For further purification to obtain pure **3b**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **3b** as a colorless oil: IR (neat) 3063, 3029, 2957, 2933, 2868, 1729, 1495, 1454, 1103, 735, 698, 664 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 0.91 (3H, t, J = 7.3 Hz), 1.31-1.38 (2H, m), 1.53-1.79 (7H, m), 2.08-2.10 (1H, m), 2.64-2.75 (2H, m), 3.50 (2H, t, J = 5.8 Hz), 4.32 (1H, td, J = 9.2, 2.4 Hz), 4.49 (2H, s), 4.51 (1H, d, J = 8.7 Hz), 7.24-7.33 (5H, m); ^{13}C NMR (CD_3OD, 100 MHz) δ 14.1, 23.1, 23.3, 26.4, 29.9, 34.6, 40.7, 61.5, 64.3, 70.9, 73.9, 128.6, 128.8, 129.3, 139.7, 203.7; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{18}H_{26}O_2Cl_2Na$ 367.1202; Found 367.1202.

Ketone **3c**

To a solution of **2** (50.0 mg, 0.144 mmol) in THF (2.0 mL) was added PhLi (**1c**) (0.120 mL, 0.216 mmol, 1.80 M) at −20 °C. The mixture was stirred for 30 minutes, quenched with 0.200 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo*. The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (49.0 mg, 94%) of dichloro ketone **3c** and unsaturated ketone **4c**. For further purification to obtain pure **3c**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **3c** as a colorless oil: IR (neat) 3062, 3030, 2941, 2864, 1695, 1596, 1580, 1449, 1100, 738, 688, 663 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 1.27-1.93 (5H, m), 2.24-2.30 (1H, m), 3.53 (2H, t, J = 5.8 Hz), 4.50 (2H, s), 4.51 (1H, td, J = 9.2, 2.4 Hz), 5.53 (1H, d, J = 9.7 Hz), 7.24-7.33 (5H, m), 7.54 (2H, dd, J = 8.7, 7.8 Hz), 7.64-7.68 (1H, m), 8.05 (2H, dd, J = 7.3, 1.4 Hz); ^{13}C NMR (CD_3OD, 100 MHz) δ 23.3, 30.0, 34.5, 58.5, 61.4, 70.9, 73.9, 127.7, 128.6, 128.8, 129.3, 130.0, 135.3, 136.0, 139.7, 193.2; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{20}H_{22}O_2Cl_2Na$ 387.0889; Found 387.0888.

Ketone **3d**

To a solution of **2** (114 mg, 0.327 mmol) in THF (4.0 mL) was added CH_3MgBr (**1d**) (0.163 mL, 0.491 mmol, 3.00 M) at 0 °C. The mixture was stirred for 2 hours, quenched with 0.460 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (97.0 mg, 98%) of dichloro ketone **3d** and unsaturated ketone **4d**. For further purification to obtain pure **3d**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **3d** as a colorless oil: IR (neat) 3031, 2940, 2866, 1721, 1495, 1454, 1100, 739, 714, 698 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 1.53-1.80 (5H, m), 2.07-2.17 (1H, m), 2.31 (3H, s), 3.50 (2H, t, J = 5.8 Hz), 4.33 (1H, td, J = 9.2, 2.4 Hz), 4.49 (2H, s), 4.50 (1H, d, J = 7.3 Hz), 7.26-7.34 (5H, m); ^{13}C NMR (CD_3OD, 100 MHz) δ 23.4, 26.9, 29.9, 34.6, 61.6, 65.4, 70.9, 73.9, 128.6, 128.8, 129.3, 139.7, 201.4; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{15}H_{20}O_2Cl_2Na$ 325.0732; Found 325.0728.

Ketone **3e**

To a solution of **2** (131 mg, 0.376 mmol) in THF (4.0 mL) was added VinylMgCl (**1e**) (0.427 mL, 0.680 mmol, 1.35 M) at 0 °C. The mixture was stirred for 2 hours, quenched with 0.460 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (115 mg, 97%) of dichloro ketone **3e** and unsaturated ketone **4e**. For further purification to obtain pure **3e**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **3e** as a colorless oil: IR (neat) 3063, 3029, 2930, 2866, 1725, 1558, 1455, 1275, 1101, 714, 700, 667 cm^{-1}; ^1H NMR ($CDCl_3$, 400 MHz) δ 1.61-1.81 (5H, m), 2.13-2.17 (1H, m), 3.50 (2H, t, J = 5.8 Hz), 4.31 (1H, td, J = 9.2, 2.4 Hz), 4.49 (2H, s), 4.51 (1H, d, J = 8.8 Hz), 5.96 (1H, dd, J = 10.4, 0.9 Hz), 6.45 (1H, dd, J = 17.5, 0.9 Hz), 6.62 (1H, dd, J = 17.5, 10.2 Hz), 7.26-7.35 (5H, m); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 22.2, 29.1, 33.6, 59.7, 61.5, 69.8, 72.9, 127.5, 127.6, 128.3, 131.5, 132.1, 138.4, 190.7; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{16}H_{20}O_2Cl_2Na$ 337.0732; Found 337.0728.

Ketone **3f**

To a solution of **2** (110 mg, 0.315 mmol) in THF (5.0 mL) was added $n$$C_5H_{11}MgBr$ (**1f**) (0.236 mL, 0.473 mmol, 2.00 M) at 0 °C. The mixture was stirred for 2 hours, quenched with 0.390 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (109 mg, 96%) of dichloro ketone **3f** and unsaturated ketone **4f**. For further purification to obtain pure **3f**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **3f** as a colorless oil: IR (neat) 3064, 3031, 2931, 2862, 1730, 1558, 1455, 1274, 1101, 739, 698, 663 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 0.90 (3H, t, J = 6.8 Hz), 1.27-1.36 (4H, m), 1.53-1.79 (7H, m), 2.07-2.16 (1H, m), 2.63-2.74 (2H, m), 3.51 (2H, t, J = 5.8 Hz), 4.32 (1H, td, J = 9.2, 2.4 Hz), 4.49 (2H, s), 4.51 (1H, d, J = 9.3 Hz), 7.23-7.33 (5H, m); ^{13}C NMR (CD_3OD, 100 MHz) δ 14.3, 23.3, 23.5, 24.1, 29.9, 32.2, 34.6, 40.9, 61.5, 64.3, 70.9, 73.9, 128.6, 128.8, 129.3, 139.7, 203.7; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{19}H_{28}O_2Cl_2Na$ 381.1358; Found 381.1353.

Ketone **3g**

To a solution of **2** (111 mg, 0.319 mmol) in THF (4.0 mL) was added PhMgBr (**1g**) (0.159 mL, 0.478 mmol, 3.00 M) at 0 °C. The mixture was stirred for 4 hours, quenched with 0.390 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (111 mg, 96%) of dichloro ketone **3g** and unsaturated ketone **4g**. For further purification to obtain pure **3g**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **3g** as a colorless oil: IR (neat) 3063, 3030, 2939, 2865, 1695, 1596, 1580, 1449, 1273, 1100, 746, 688, 663 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 1.27-1.93 (5H, m), 2.24-2.30 (1H, m), 3.53 (2H, t, J = 5.8 Hz), 4.50 (2H, s), 4.51 (1H, td, J = 9.2, 2.4 Hz), 5.53 (1H, d, J = 9.7 Hz), 7.24-7.33 (5H, m), 7.54 (2H, dd, J = 8.7, 7.8 Hz), 7.64-7.68 (1H, m), 8.05 (2H, dd, J = 7.3, 1.4 Hz); ^{13}C NMR (CD_3OD, 100 MHz) δ 23.3, 30.0, 34.5, 58.5, 61.4, 70.9, 73.9, 127.7, 128.6, 128.8, 129.3, 130.0, 135.3, 136.0, 139.7, 193.2; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{20}H_{22}O_2Cl_2Na$ 387.0889; Found 387.0888.

Ketone **3h** and **4h**

To a solution of **2** (64.2 mg, 0.184 mmol) in THF (2.0 mL) was added HC≡CMgCl (**1h**) (0.553 mL, 0.277 mmol, 0.500 M) at 0 °C. The mixture was stirred for 4 hours, quenched with 0.230 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (52.0 mg, 90%) of dichloro ketone **3h** and unsaturated ketone **4h** with ratio 35:65. For further purification, the partial (ca. 10.0 mg) of mixture products were separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **3h** as a colorless oil and **4h** as a colorless oil.

3h: IR (neat) 3273, 3066, 2921, 2851, 2098, 1697, 1660, 1587, 1455, 1259, 1101, 909, 735, 698 cm^{-1}; ^1H NMR ($CDCl_3$, 400 MHz) δ 1.55-1.80 (5H, m), 2.10-2.16 (1H, m), 3.41 (1H, s), 3.50 (2H, t, *J* = 5.8 Hz), 4.31-4.32 (2H, m), 4.51 (2H, s), 7.25-7.35 (5H, m); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 22.1, 28.9, 33.3, 59.5, 64.8, 69.8, 72.9, 78.1, 82.5, 127.5, 127.6, 128.3, 138.4, 177.7; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{16}H_{18}O_2Cl_2Na$ 335.0576; Found 335.0581.

4h: IR (neat) 3251, 3064, 2925, 2855, 2096, 1717, 1659, 1614, 1455, 1233, 1101, 883, 733, 698 cm^{-1}; ^1H NMR ($CDCl_3$, 400 MHz) δ 1.67-1.70 (4H, m), 2.53 (2H, q, *J* = 7.3 Hz), 3.34 (1H, s), 3.51 (2H, t, *J* = 5.8 Hz), 4.51 (2H, s), 7.26-7.35 (5H, m), 7.46 (1H, t, *J* = 7.3 Hz); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 24.3, 29.3, 29.8, 69.6, 72.9, 78.5, 81.3, 127.5, 127.5, 128.3, 134.9, 138.3, 149.3, 171.1; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{16}H_{17}O_2ClNa$ 299.0809; Found 299.0801.

Amide **6**

To a solution of **2** (182 mg, 0.524 mmol) in THF (6.0 mL) was added *i*PrMgBr (**1i**) (1.07 mL, 0.786 mmol, 0.730 M) at 0 °C. The mixture was stirred for 4 hours, quenched with 0.650 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give unsaturated amide **6** (135 mg, 0.487 mmol, 93%) as a colorless oil: IR (neat) 3063, 3029, 2936, 2857, 1664, 1633, 1495, 1455, 1412, 1379, 1273, 1104, 997, 746, 737, 698 cm^{-1}; ^1H NMR ($CDCl_3$, 400 MHz) δ 1.54-1.60 (2H, m), 1.61-1.67 (2H, m), 2.25 (2H, q, *J* = 7.3 Hz), 3.23 (3H, s), 3.48 (2H, t, *J* = 6.3 Hz), 3.68 (3H, s), 4.49 (2H, s), 6.39 (1H, d, *J* = 15.6 Hz), 6.97 (1H, dt, *J* = 15.7, 6.8 Hz), 7.26-7.34 (5H, m); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 24.8, 29.1, 32.1, 32.7, 61.5, 69.8, 72.7, 118.7, 127.4, 127.5, 128.2, 138.3, 147.4, 166.8; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{16}H_{23}NO_3Na$ 300.1567; Found 300.1567.

Ketone **8a**

To a solution of 1-hexyne (0.083 mL, 0.722 mmol) in THF (4.0 mL) was added *n*BuLi (0.453 mL,

0.722 mmol, 1.59 M) at 0 °C to give **1a**. The mixture was cooled at −40 °C and added cold solution of **7** (84.0 mg, 0.241 mmol) in THF (3.0 mL), stirred for 10 minutes at −40 °C, quenched with 0.310 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (84.0 mg, 95%) of dichloro ketone **8a** and unsaturated ketone **4a**. For further purification to obtain pure **8a**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **8a** as a colorless oil: IR (neat) 3030, 2956, 2933, 2863, 2211, 1697, 1671, 1653, 1102, 771, 736, 698 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 0.75 (3H, t, *J* = 7.3 Hz), 1.25-1.46 (8H, m), 1.71 (2H, q, *J* = 7.3 Hz), 2.29 (2H, t, *J* = 6.8 Hz), 3.32 (2H, t, *J* = 5.8 Hz), 4.30 (2H, s), 4.49 (1H, td, *J* = 7.1, 3.4 Hz), 4.70 (1H, d, *J* = 3.4 Hz), 7.26-7.33 (5H, m); ^{13}C NMR (CD_3OD, 100 MHz) δ 13.7, 19.3, 22.9, 24.2, 29.9, 30.6, 36.6, 62.6, 70.8, 70.9, 73.9, 79.3, 101.1, 128.6, 128.8, 129.3, 139.7, 180.4; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{20}H_{26}O_2Cl_2Na$ 391.1202; Found 391.1203.

Ketone **8b**

To a solution of **7** (54.0 mg, 0.155 mmol) in THF (2.0 mL) was added *n*BuLi (**1b**) (0.145 mL, 0.232 mmol, 1.59 M) at −40 °C. The mixture was stirred for 30 minutes, quenched with 0.200 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (51.0 mg, 95%) of dichloro ketone **8b** and unsaturated ketone **4b**. For further purification to obtain pure **8b**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **8b** as a colorless oil: IR (neat) 3063, 3030, 2956, 2933, 2865, 1717, 1540, 1455, 1397, 1100, 772, 737, 698 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 0.91 (3H, t, *J* = 7.3 Hz), 1.28-1.37 (2H, m), 1.49-1.66 (6H, m), 1.86 (2H, q, *J* = 6.8 Hz), 2.71 (2H, t, *J* = 7.3 Hz), 3.50 (2H, t, *J* = 5.8 Hz), 4.48 (2H, s), 4.54 (1H, td, *J* = 7.1, 3.4 Hz), 4.77 (1H, d, *J* = 3.4 Hz), 7.24-7.33 (5H, m); ^{13}C NMR (CD_3OD, 100 MHz) δ 14.2, 23.1, 24.2, 26.5, 29.9, 36.6, 40.7, 63.1, 69.6, 70.9, 73.9, 128.6, 128.8, 129.3, 139.7, 205.1; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{18}H_{26}O_2Cl_2Na$ 367.1202; Found 367.1200.

Ketone **4c**

To a solution of **7** (87.0 mg, 0.249 mmol) in THF (3.0 mL) was added PhLi (**1c**) (0.207 mL, 0.373 mmol, 1.80 M) at −20 °C. The mixture was stirred for 30 minutes, quenched with 0.310 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give unsaturated ketone **4c** (65.0 mg, 0.197 mmol, 78%) as a colorless oil: IR (neat) 3063, 3031, 2941, 2861, 1718, 1688, 1670, 1449, 1273, 1177, 713, 696, 666 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 1.34-1.66 (4H, m), 2.49 (2H, td, *J* = 7.3, 6.8 Hz), 3.50 (2H, t, *J* = 5.8 Hz), 4.47 (2H, s), 6.70 (1H, t, *J* = 7.3 Hz), 7.24-7.30 (5H, m), 7.47 (2H, dd, *J* = 8.7, 7.8 Hz), 7.57-7.61 (1H, m), 7.65 (2H, dd, *J* = 7.3, 1.4 Hz); ^{13}C NMR (CD_3OD, 100 MHz) δ 25.5, 30.3, 30.5, 70.8, 73.9, 128.6, 128.8, 129.3, 129.6, 130.3, 133.7, 134.1, 138.2, 139.7, 147.1, 191.9; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{20}H_{21}O_2ClNa$ 351.1122; Found 351.1123.

Ketone **8d**

To a solution of **7** (88.0 mg, 0.253 mmol) in THF (3.0 mL) was added CH_3MgBr (**1d**) (0.126 mL, 0.378 mmol, 3.00 M) at −20 °C. The mixture was stirred for 2 hours, quenched with 0.310 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (73.0 mg, 95%) of dichloro ketone **8d** and unsaturated ketone **4d**. For further purification to obtain pure **8d**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **8d** as a colorless oil: IR (neat) 3032, 2937, 2864, 1717, 1496, 1455, 1099, 1026, 737, 714, 699 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 1.40-1.55 (4H, m), 1.77-1.88 (2H, m), 2.24 (3H, s), 3.41 (2H, t, *J* = 5.8 Hz), 4.39 (2H, s), 4.46 (1H, td, *J* = 9.2, 2.4 Hz), 4.69 (1H, d, *J* = 2.9 Hz), 7.16-7.23 (5H, m); ^{13}C NMR (CD_3OD, 100 MHz) δ 24.2, 27.9, 29.9, 36.7, 62.8, 69.9, 70.9, 73.9, 128.6, 128.8, 129.3, 139.7, 202.9; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{15}H_{20}O_2Cl_2Na$ 325.0732; Found 325.0733.

Ketone **4e**

To a solution of **7** (71.4 mg, 0.205 mmol) in THF (3.0 mL) was added VinylMgCl (**1e**) (0.146 mL, 0.308 mmol, 2.10 M) at 0 °C. The mixture was stirred for 2 hours, quenched with 0.250 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo.* The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give unsaturated ketone **4e** (52.0 mg, 0.187 mmol, 90%) as a colorless oil: IR (neat) 3029, 2932, 2862, 1717, 1652, 1616, 1455, 1274, 1101, 714,

700 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 1.60-1.70 (4H, m), 2.42-2.52 (2H, m), 3.51 (2H, t, *J* = 5.8 Hz), 4.48 (2H, s), 5.84 (1H, dd, *J* = 10.4, 1.9 Hz), 6.31 (1H, dd, *J* = 16.8, 1.9 Hz), 7.11 (1H, dd, *J* = 17.5, 10.2 Hz), 7.18 (1H, t, *J* = 6.8 Hz), 7.25-7.32 (5H, m); ^{13}C NMR (CD_3OD, 100 MHz) δ 25.4, 30.3, 30.6, 70.8, 73.9, 128.6, 128.8, 129.3, 130.7, 131.9, 135.2, 139.7, 145.1, 185.7; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{16}H_{19}O_2ClNa$ 301.0965; Found 301.0959.

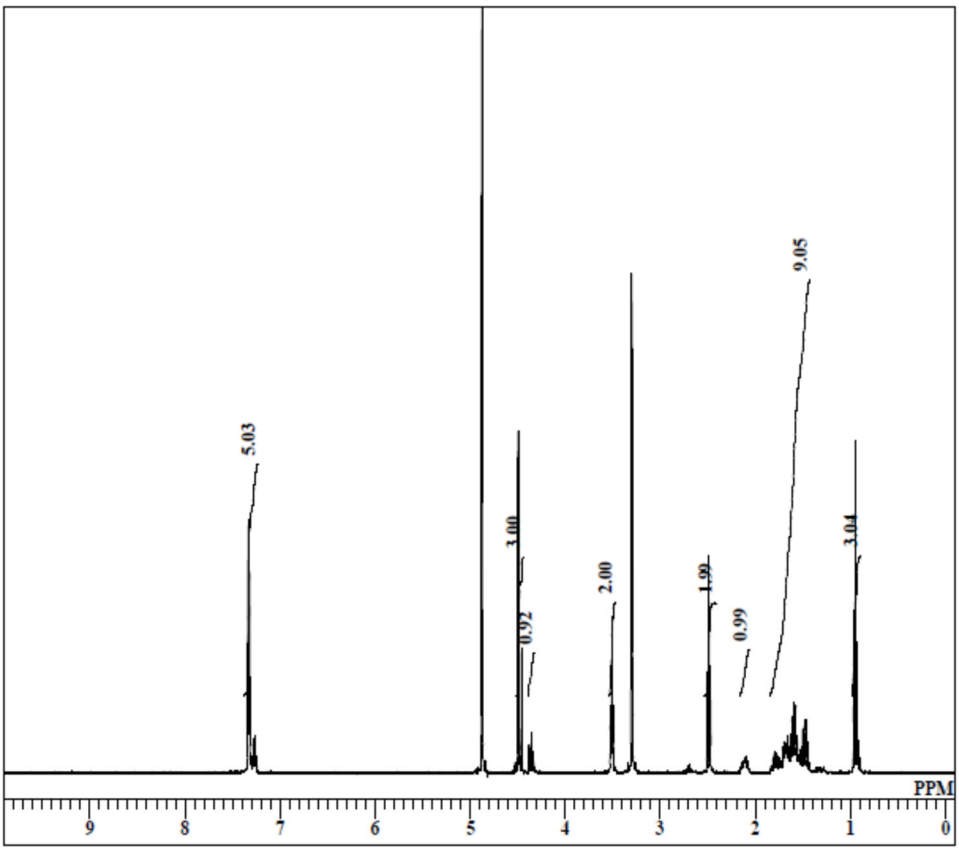
Ketone **8f**

To a solution of **7** (83.0 mg, 0.238 mmol) in THF (3.0 mL) was added $nC_5H_{11}MgBr$ (**1f**) (0.178 mL, 0.358 mmol, 2.00 M) at −20 °C. The mixture was stirred for 2 hours, quenched with 0.290 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo*. The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give a mixture (77.0 mg, 90%) of dichloro ketone **8f** and unsaturated ketone **4f**. For further purification to obtain pure **8f**, a partial (ca. 10.0 mg) of the mixture was separated by HPLC (NOMURA CHEMICAL, DEVELOSIL C30-UG 5 μm, ϕ8.0×250 mm, elution with H_2O:Acetonitrile = 80:20 to 0:100 gradiently for 90 min, 2 mL/min) to afford **8f** as a colorless oil: IR (neat) 3068, 3030, 2931, 2859, 1717, 1558, 1455, 1362, 1100, 772, 735, 697 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 0.90 (3H, t, *J* = 6.8 Hz), 1.27-1.34 (4H, m), 1.48-1.66 (6H, m), 1.87 (2H, q, *J* = 6.8 Hz), 2.70 (2H, t, *J* = 6.8 Hz), 3.50 (2H, t, *J* = 5.8 Hz), 4.48 (2H, s), 4.53 (1H, td, *J* = 6.8, 3.4 Hz), 4.76 (1H, d, *J* = 2.9 Hz), 7.24-7.33 (5H, m); ^{13}C NMR (CD_3OD, 100 MHz) δ 14.2, 23.5, 24.1, 24.2, 29.9, 32.2, 36.6, 40.9, 63.0, 69.6, 70.9, 73.9, 128.6, 128.8, 129.3, 139.8, 205.0; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{19}H_{28}O_2Cl_2Na$ 381.1358; Found 381.1358.

Ketone **4g**

To a solution of **7** (103 mg, 0.295 mmol) in THF (3.0 mL) was added PhMgBr (**1g**) (0.147 mL, 0.442 mmol, 3.00 M) at −20 °C. The mixture was stirred for 2 hours, quenched with 0.360 mL 4.00 M HCl in 1,4-dioxane then excess of H_2O, extracted with EtOAc, washed with brine, dried over Na_2SO_4, filtered and concentrated *in vacuo*. The residue was purified by silica gel column chromatography (EtOAc:Hexane = 2:98) to give unsaturated ketone **4g** (62.0 mg, 0.189 mmol, 74%) as a colorless oil: IR (neat) 3063, 3031, 2941, 2861, 1718, 1688, 1670, 1449, 1273, 1177, 713, 696, 666 cm^{-1}; ^1H NMR (CD_3OD, 400 MHz) δ 1.34-1.66 (4H, m), 2.49 (2H, q, *J* = 6.8 Hz), 3.50 (2H, t, *J* = 5.8 Hz), 4.47 (2H, s), 6.70 (1H, t, *J* = 7.3 Hz), 7.24-7.30 (5H, m), 7.47 (2H, dd, *J* = 8.7, 7.8 Hz), 7.57-7.61 (1H, m), 7.65 (2H, dd, *J* = 7.3, 1.4 Hz); ^{13}C NMR (CD_3OD, 100 MHz) δ 25.5, 30.3, 30.5, 70.8, 73.9, 128.6, 128.8, 129.3, 129.6, 130.3, 133.7, 134.1, 138.2, 139.7, 147.1,

191.9; HRMS (ESI) m/z: $[M + Na]^+$; Calcd for $C_{20}H_{21}O_2ClNa$ 351.1122; Found 351.1123.



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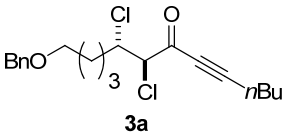

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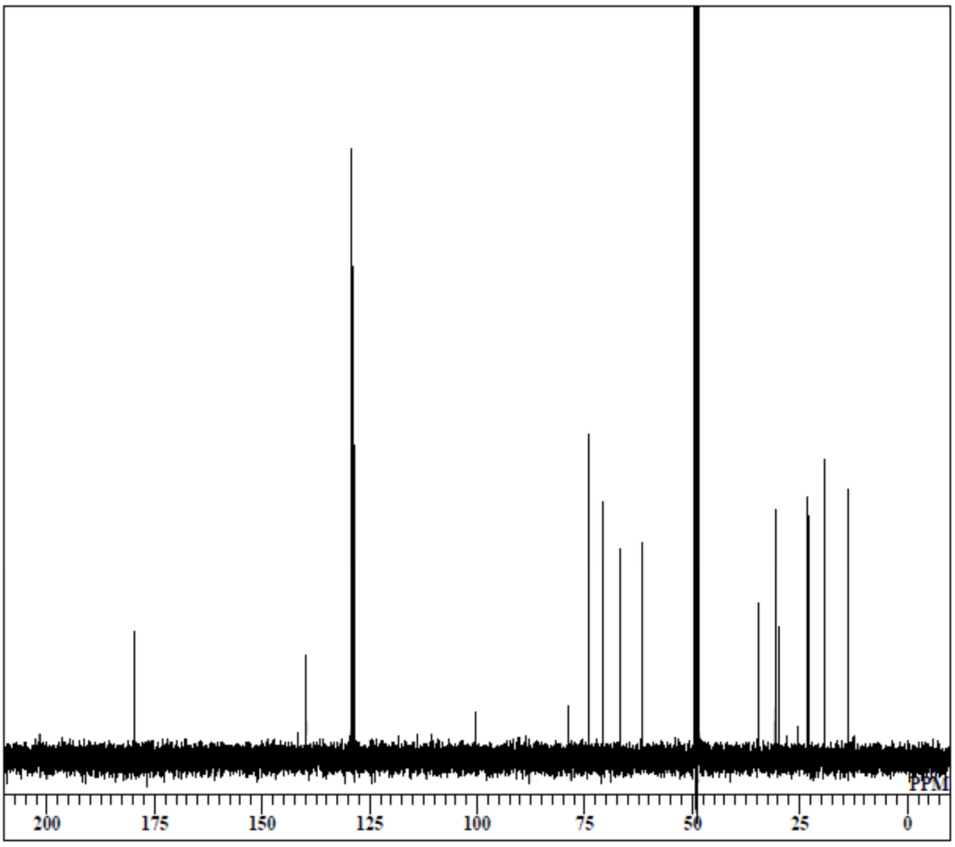

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PD	1.7920 sec
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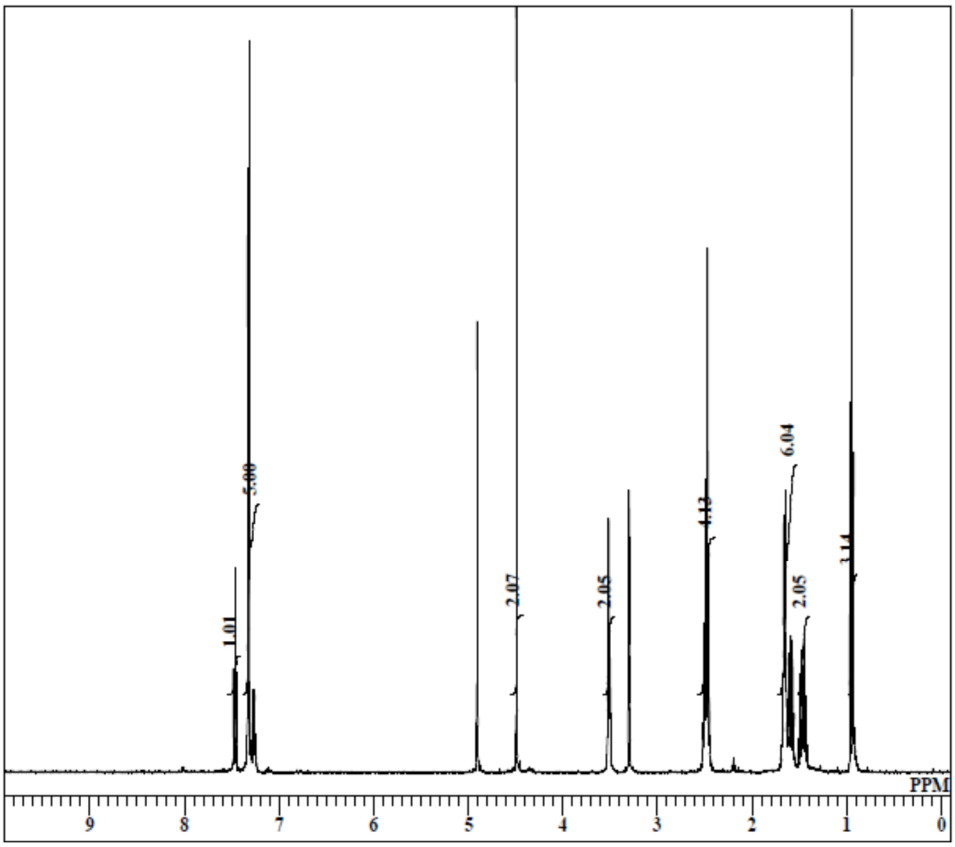
RGAIN	29



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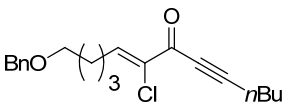

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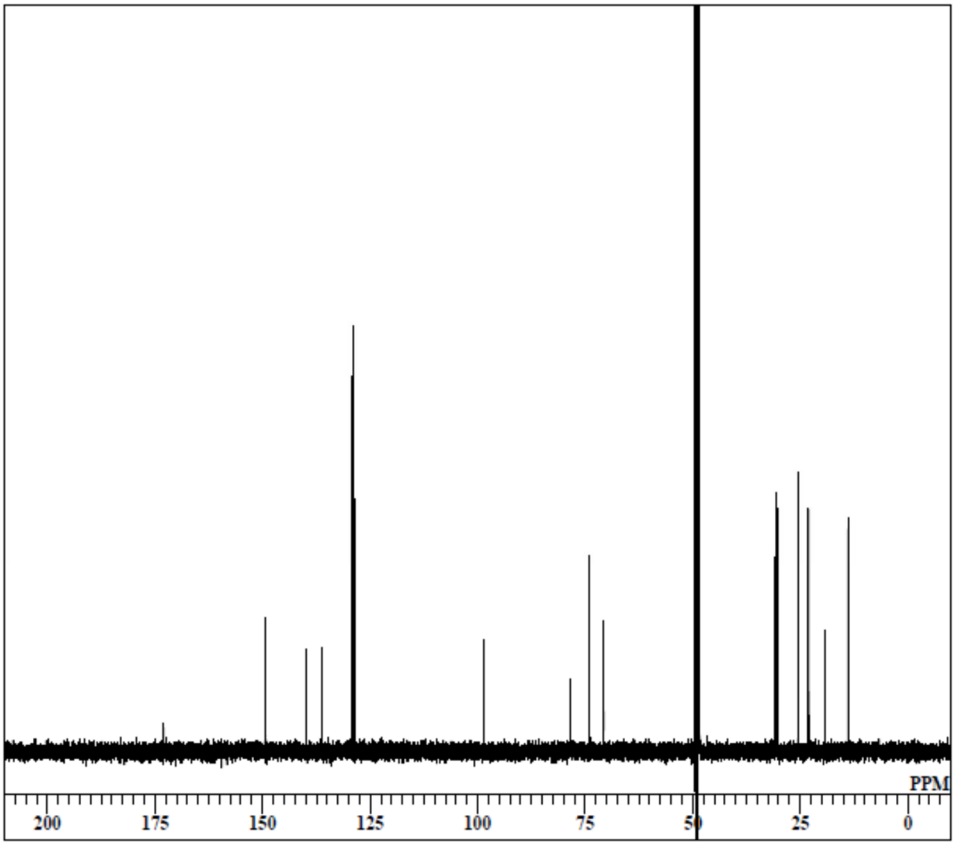

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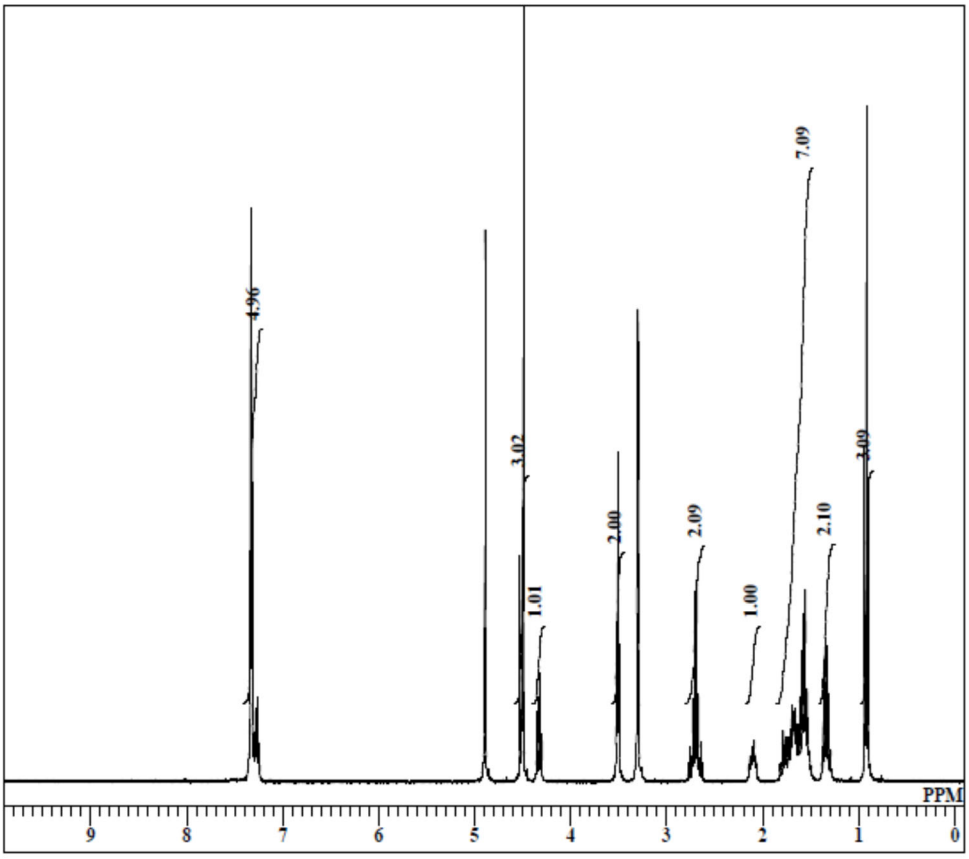
RGAIN	28



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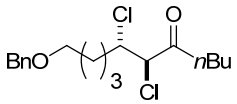

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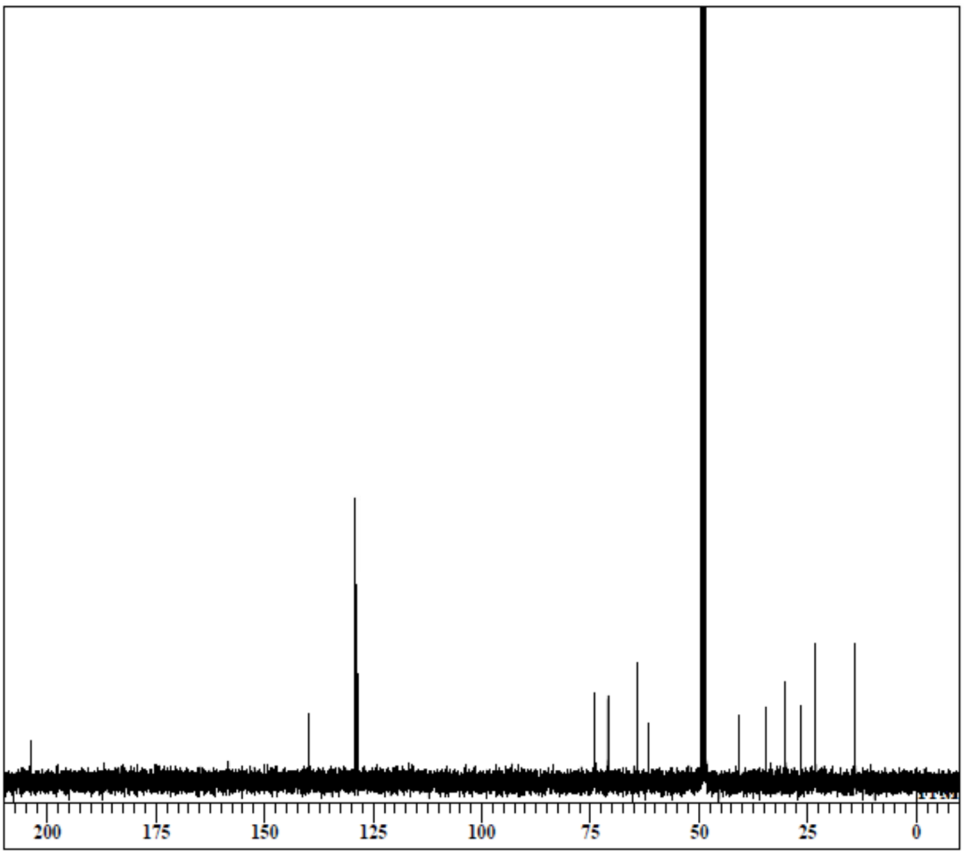

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PD	1.7920 sec
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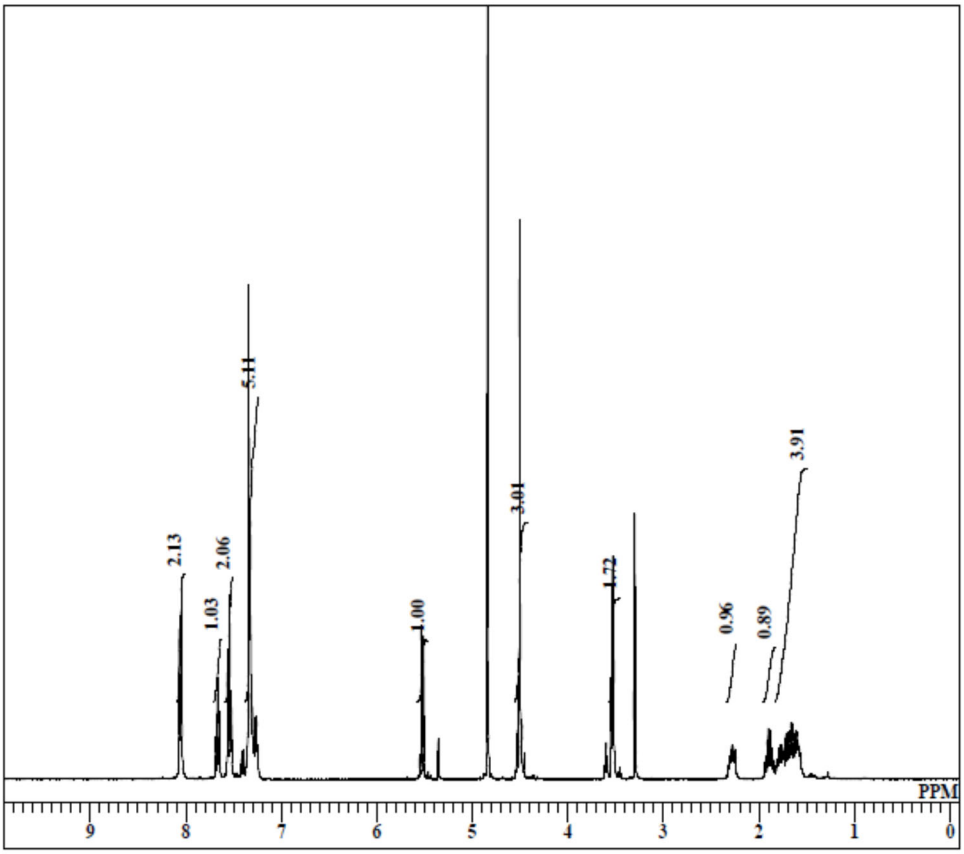
IRNUC	1H
CTEMP	15.5 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.10 Hz
RGAIN	28



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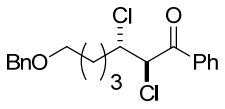

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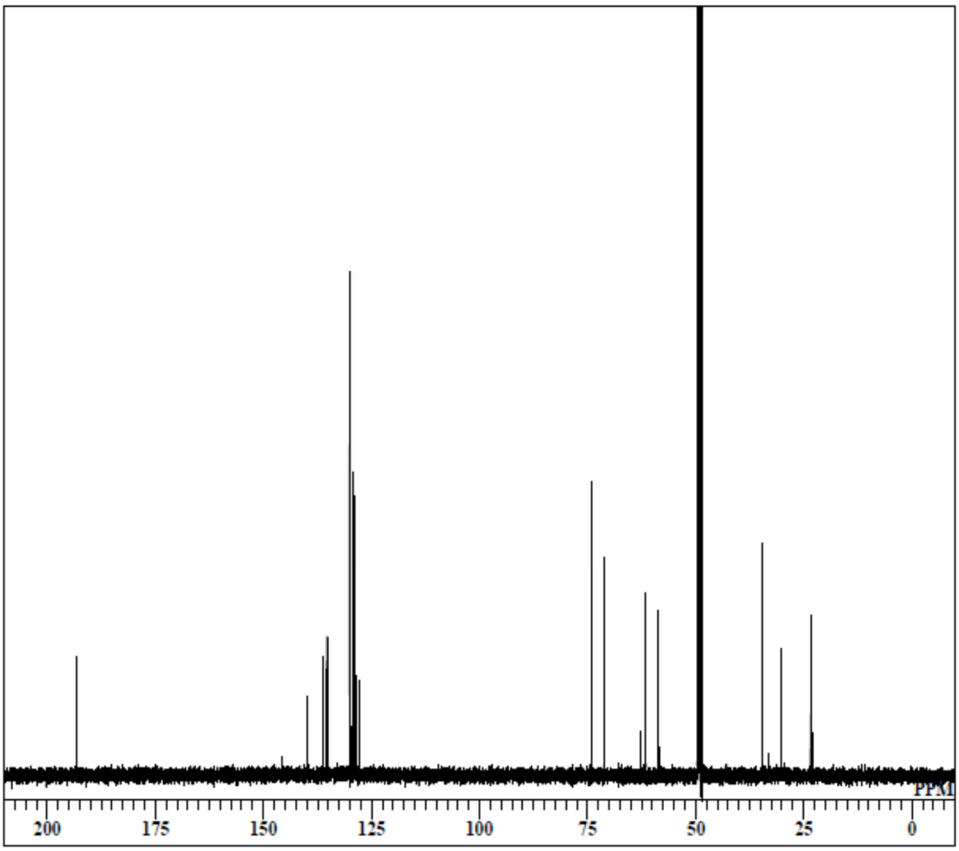

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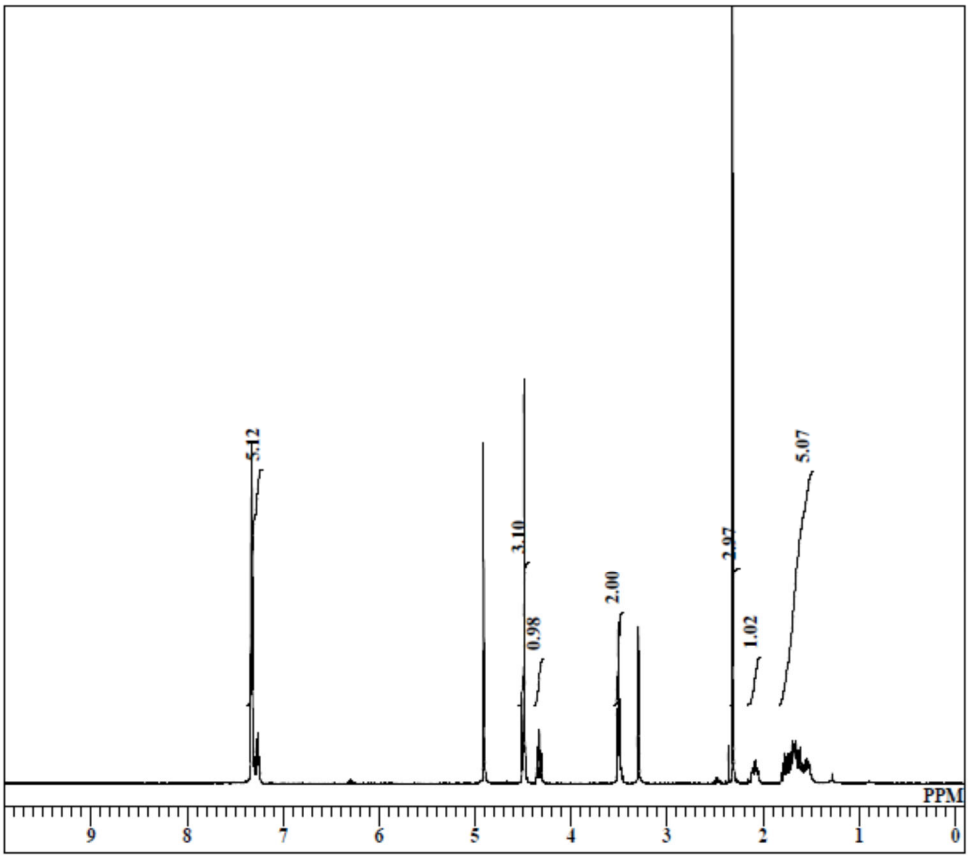
RGAIN	29



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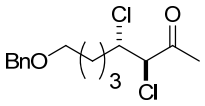
RGAIN	21



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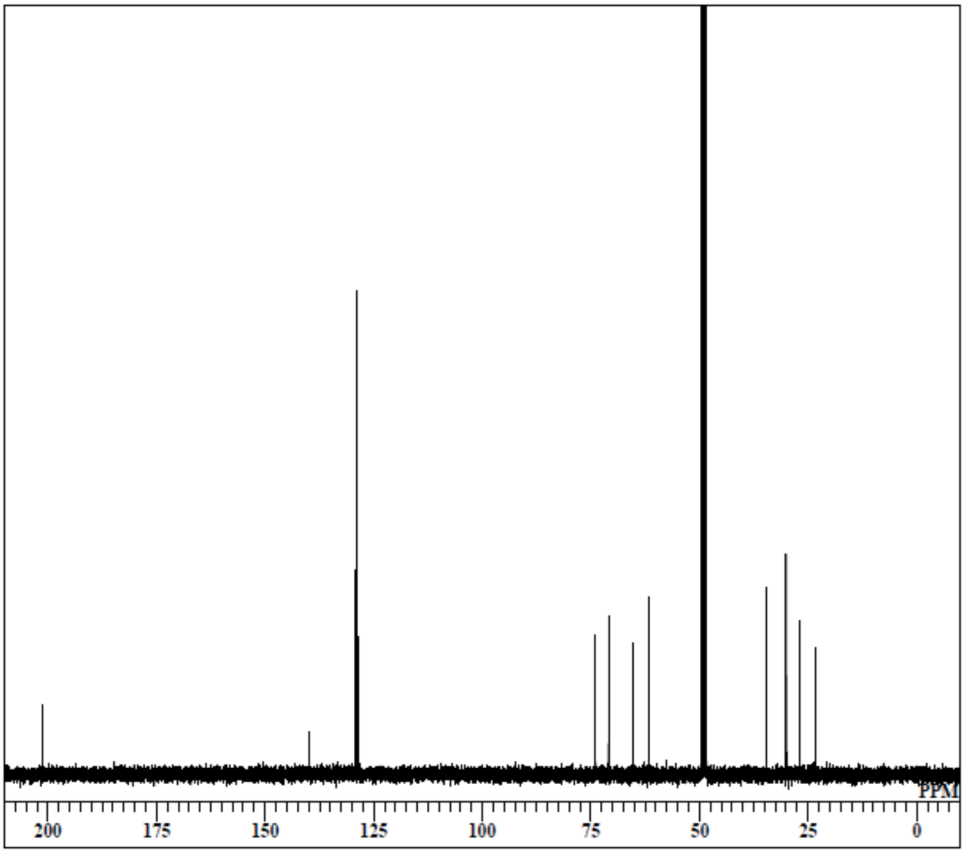

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PD	1.7920 sec
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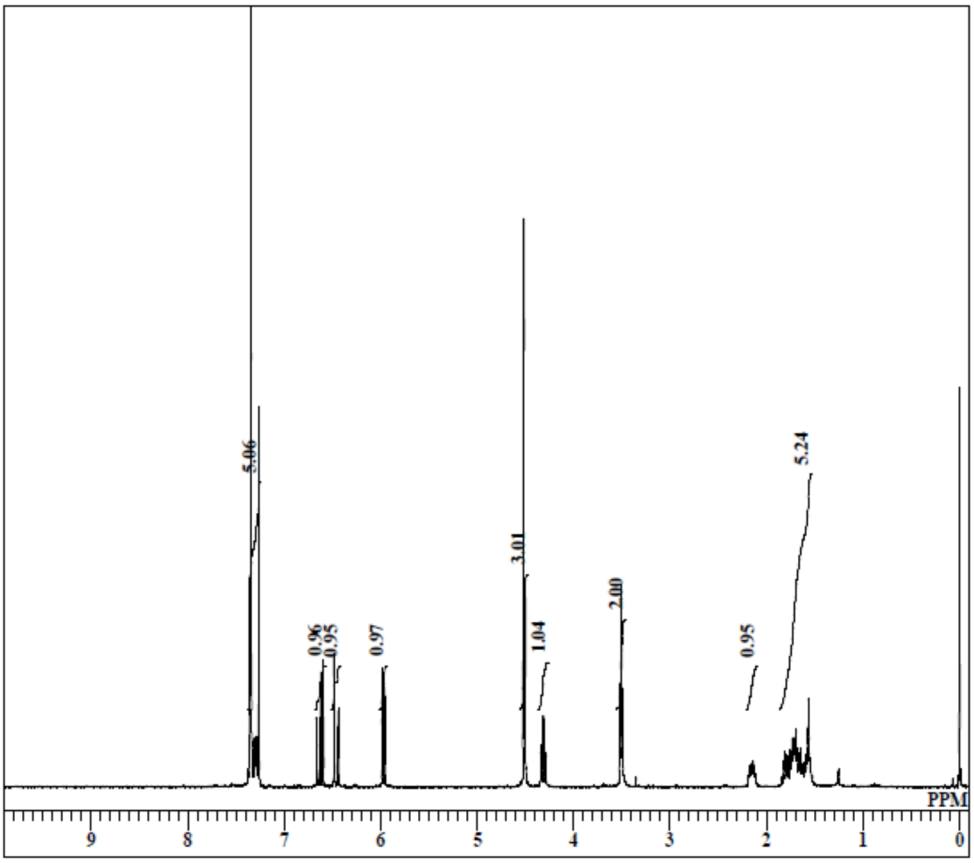
RGAIN	28



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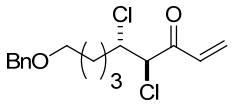
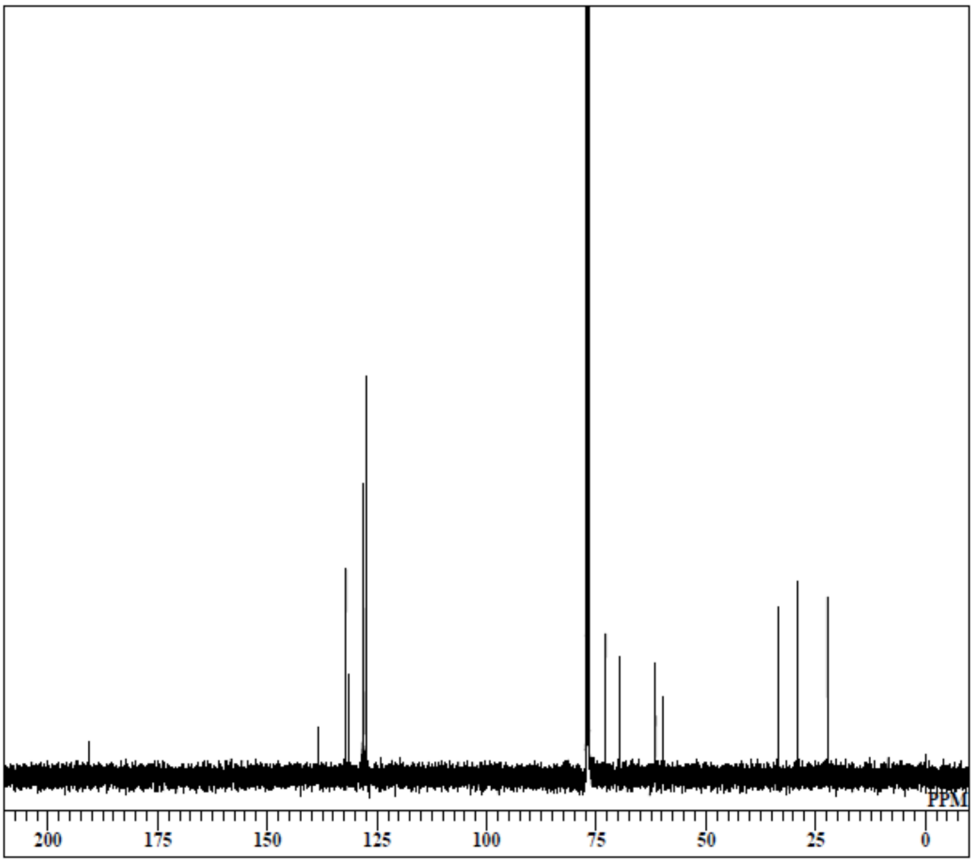
RGAIN	23



3e



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FREQU	27118.64 Hz
SCANS	2400
ACQTM	1.2083 sec
PD	1.7920 sec
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IRNUC	1H
CTEMP	15.8 c
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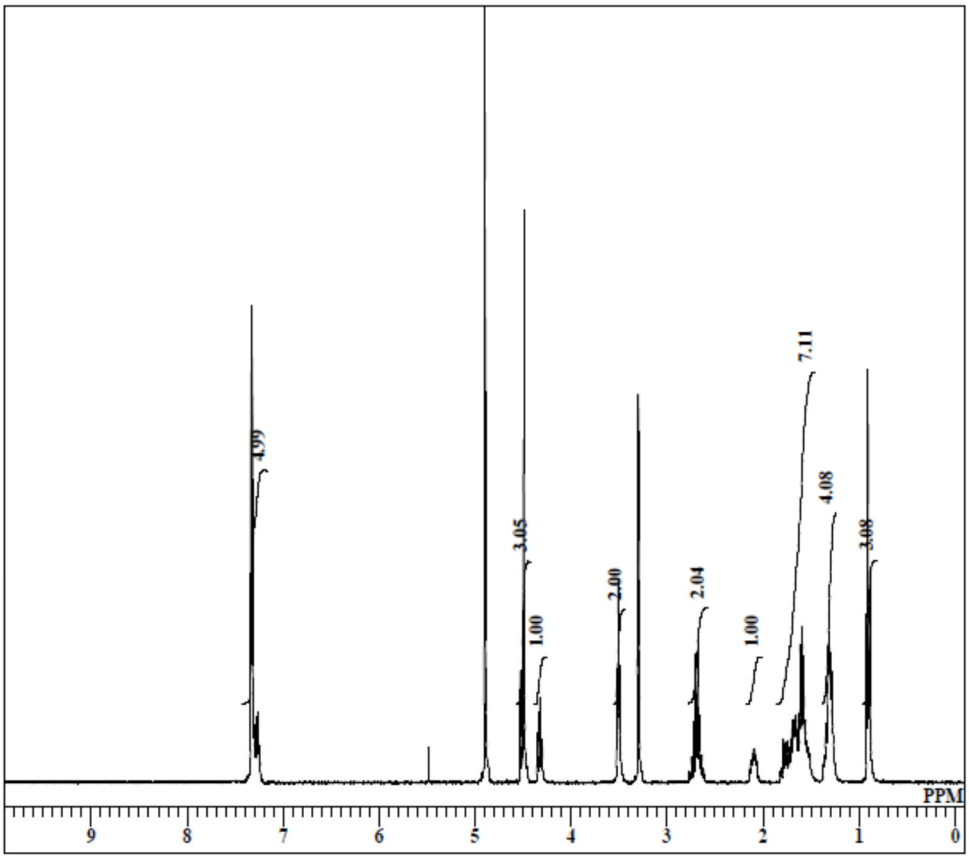

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SCANS	8
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PD	4.9500 sec
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CTEMP	17.2 c
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EXREF	3.30 ppm
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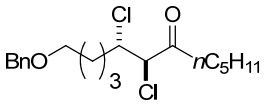
RGAIN	21



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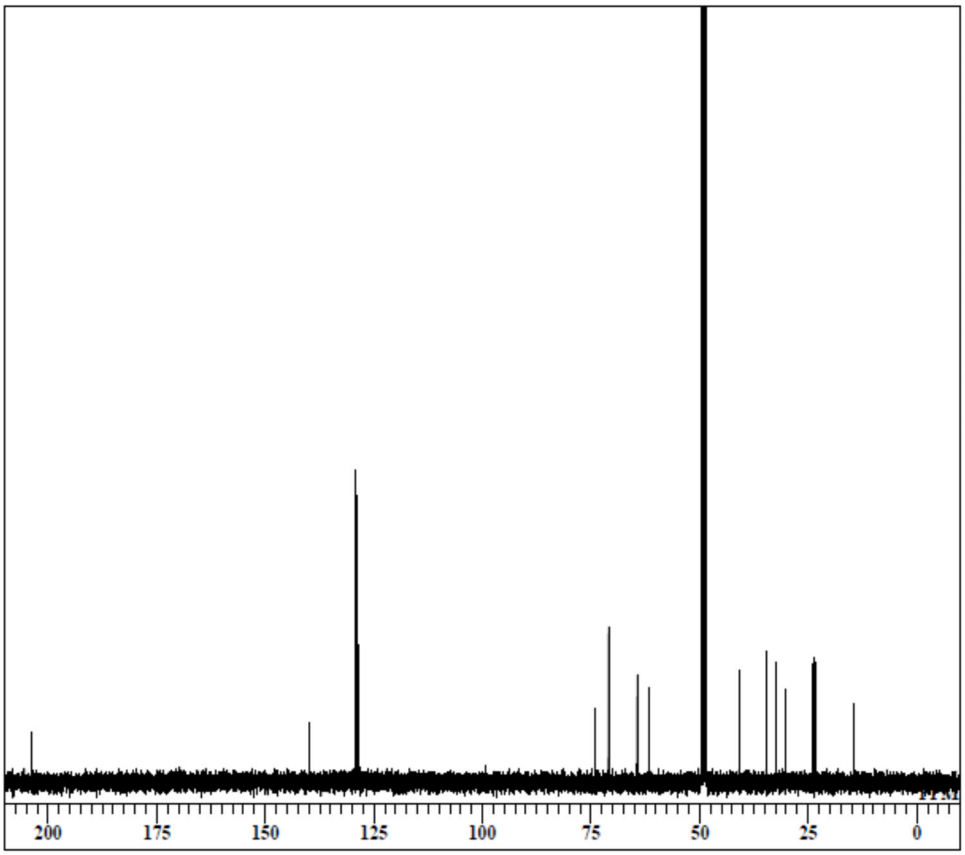

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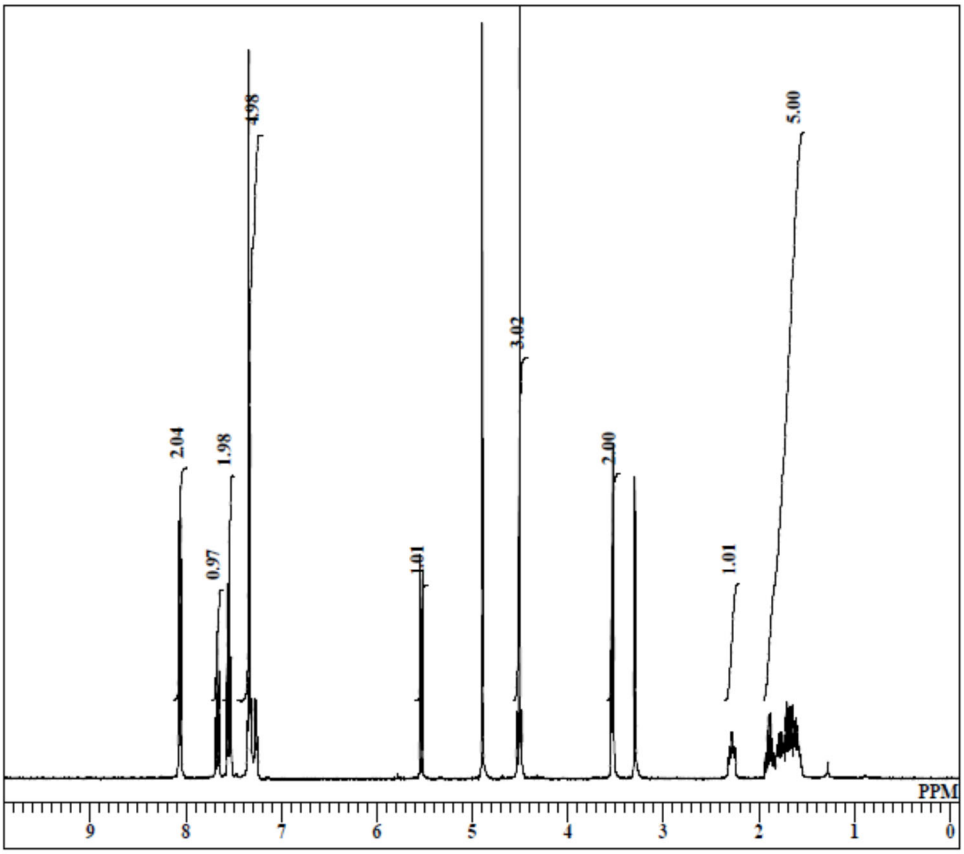
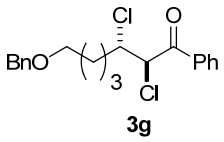
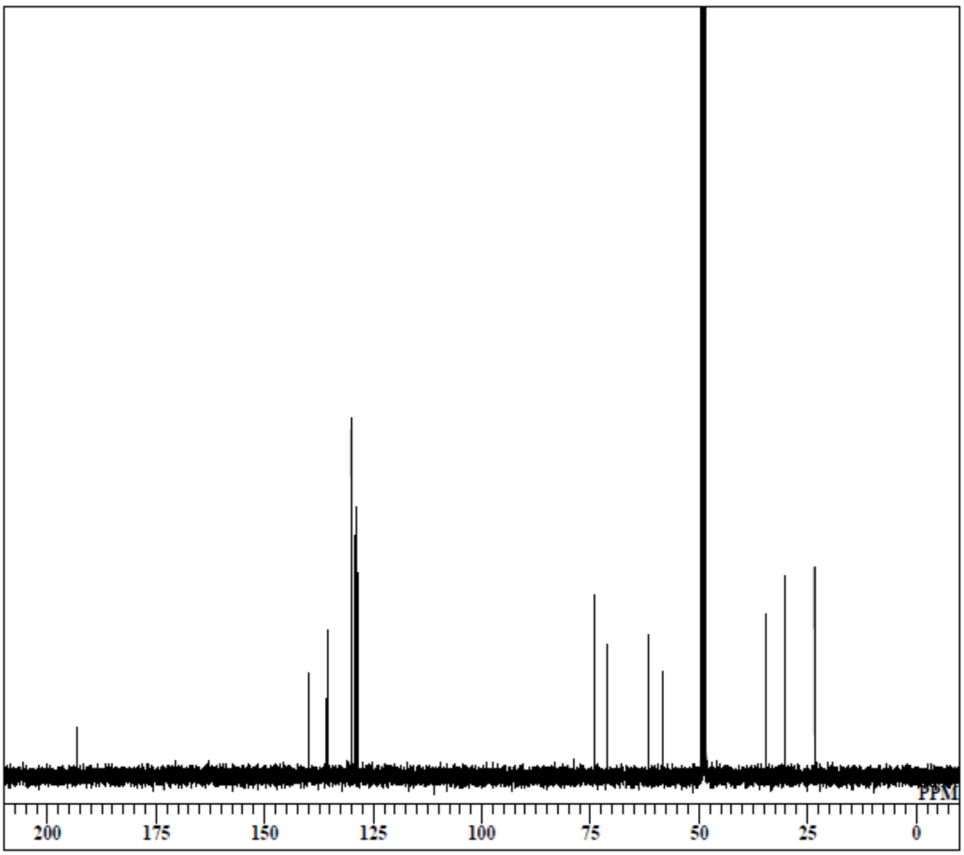
SCANS	2500
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	15.8 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.10 Hz
RGAIN	28



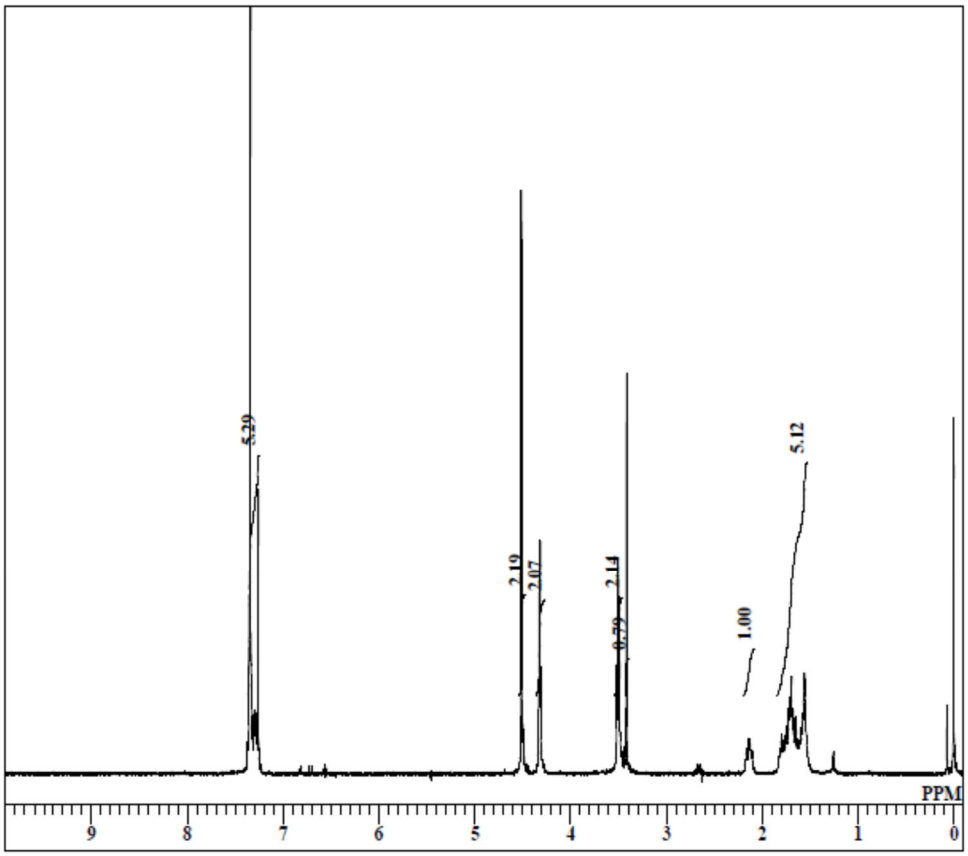
DFILE	20210117 AntiCl-Phenyl-1H.:
COMNT	20210117 AntiCl-Phenyl-1H
DATIM	Sun Jan 17 15:59:52 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	8
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	17.4 c
SLVNT	CD3OD
EXREF	3.30 ppm
BF	0.12 Hz
RGAIN	21



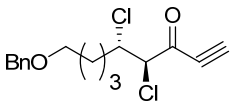
3g



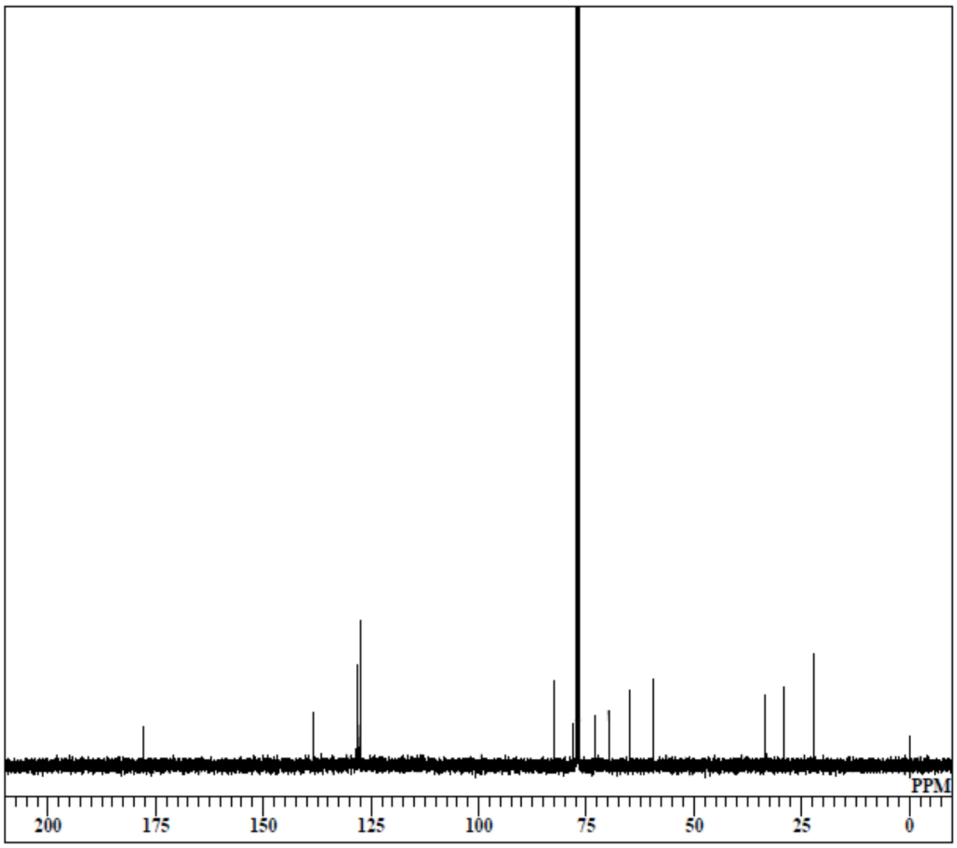
DFILE	20210117 AntiCl-Phenyl-13C
COMNT	20210117 AntiCl-Phenyl-13C
DATIM	Sun Jan 17 17:21:08 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	1536
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	14.9 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.12 Hz
RGAIN	28



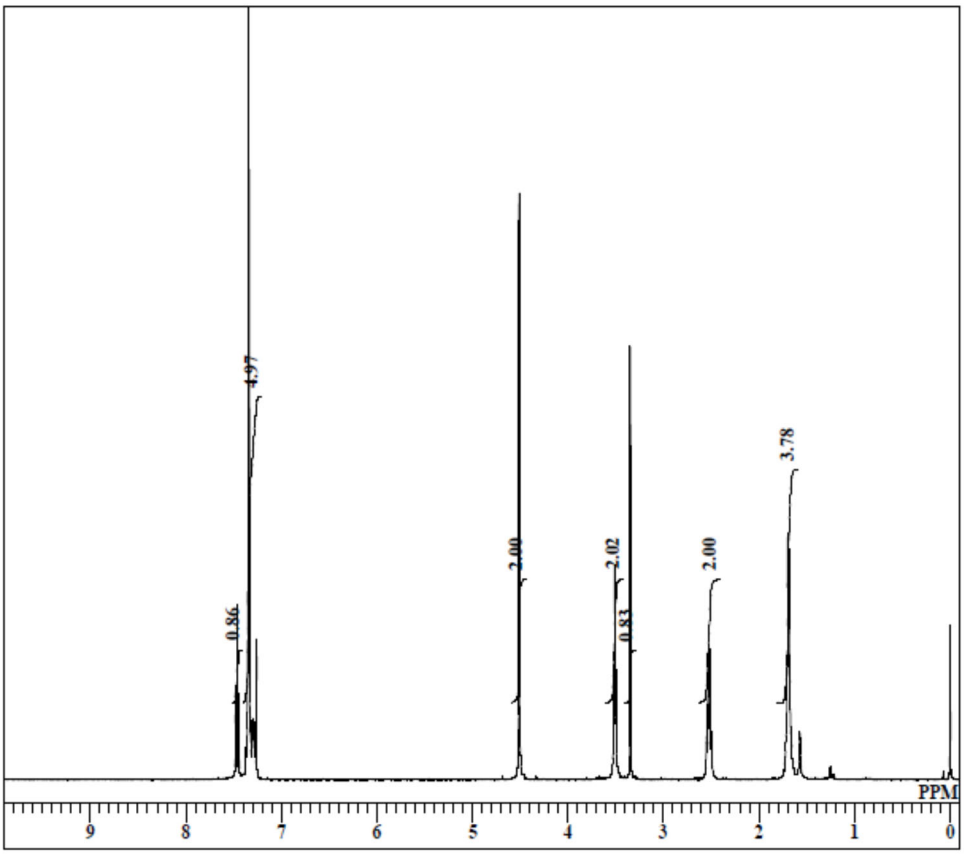
DFILE	20210620 AntiCl-ethynyl 1H.
COMNT	20210620 AntiCl-ethynyl 1H
DATIM	Sun Jun 20 21:10:32 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	4
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	22.1 c
SLVNT	CDCL3
EXREF	0.00 ppm
BF	0.10 Hz
RGAIN	24



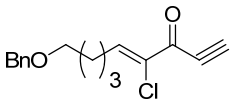
3h



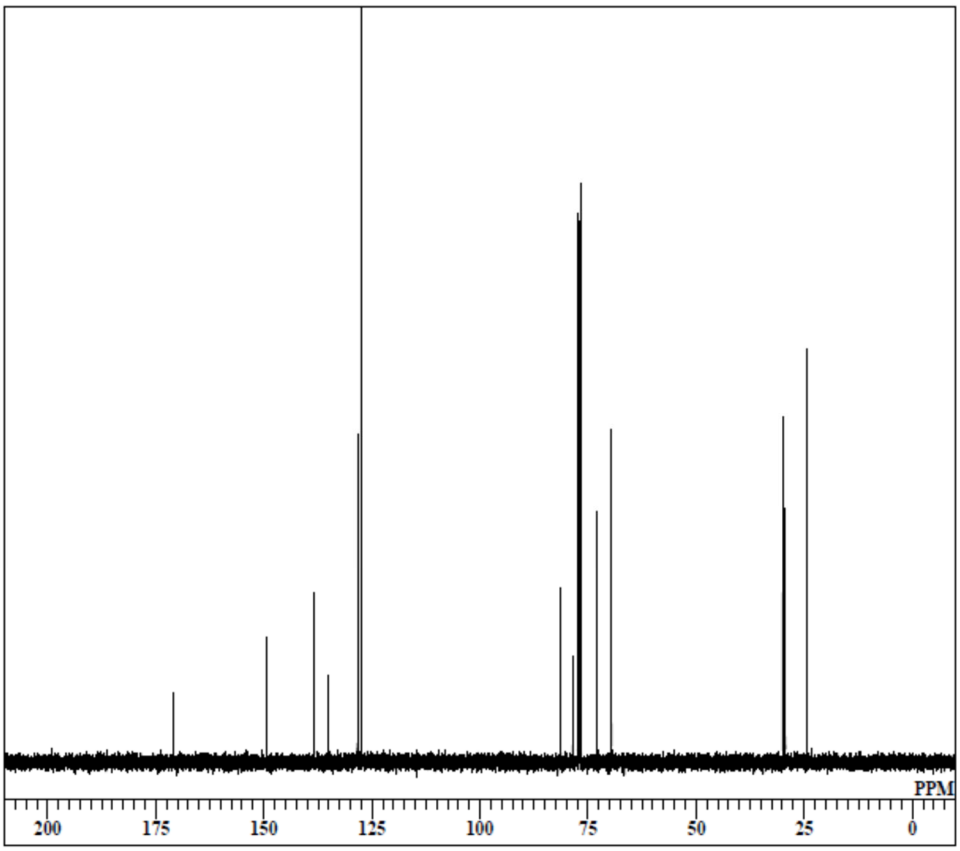
DFILE	20210620 AntiCl-ethynyl-13C.
COMNT	20210620 AntiCl-ethynyl-13C
DATIM	Tue Jun 22 00:22:19 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	5400
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	21.3 c
SLVNT	CDCL3
EXREF	77.00 ppm
BF	0.10 Hz
RGAIN	29



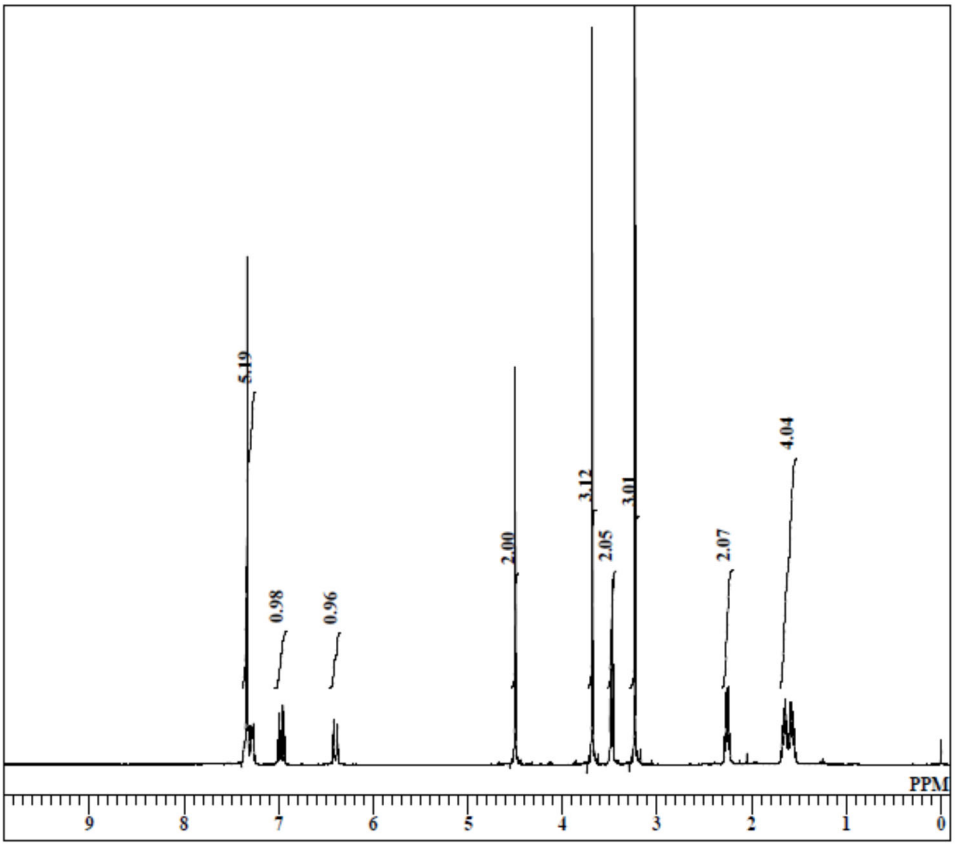
DFILE	20210529 AntiCl-Ethynyl 1H
COMNT	20210529 AntiCl-Ethynyl 1H
DATIM	Sun May 30 19:16:38 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	8
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	22.7 c
SLVNT	CDCL3
EXREF	0.00 ppm
BF	0.10 Hz
RGAIN	21



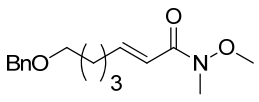
4h



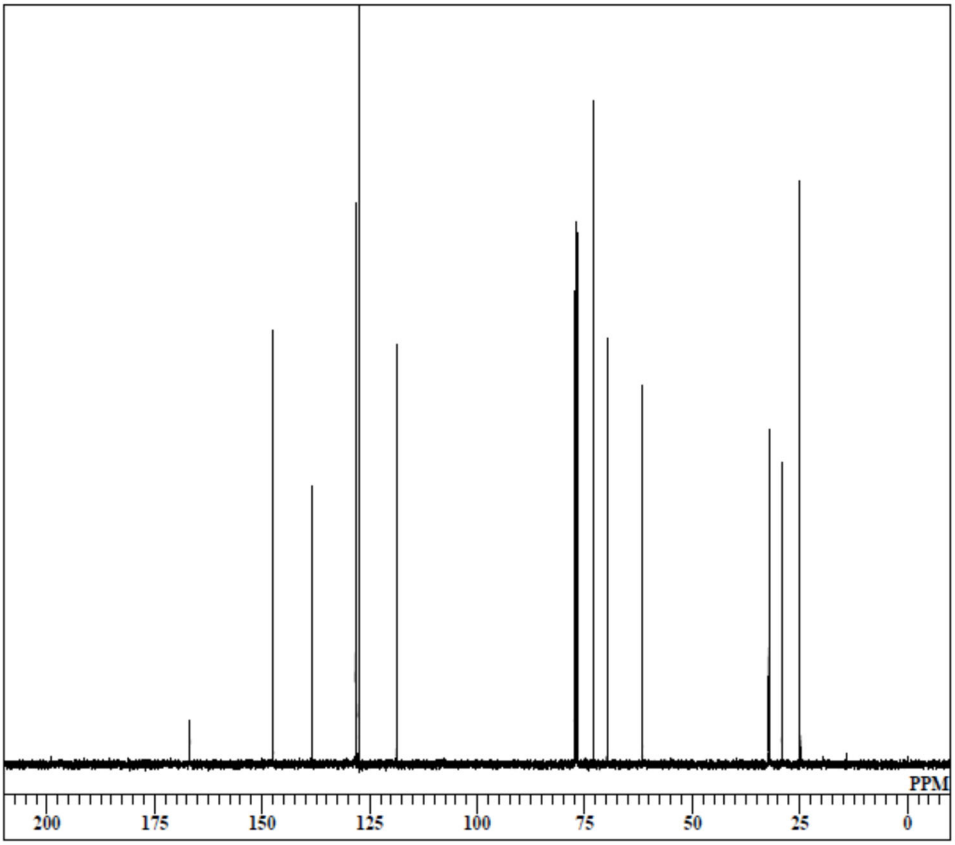
DFILE	20210529 AntiCl-Ethynyl 13 C
COMNT	20210529 AntiCl-Ethynyl 13C
DATIM	Sat May 29 15:59:43 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	700
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	20.9 c
SLVNT	CDCL3
EXREF	77.00 ppm
BF	0.10 Hz
RGAIN	29



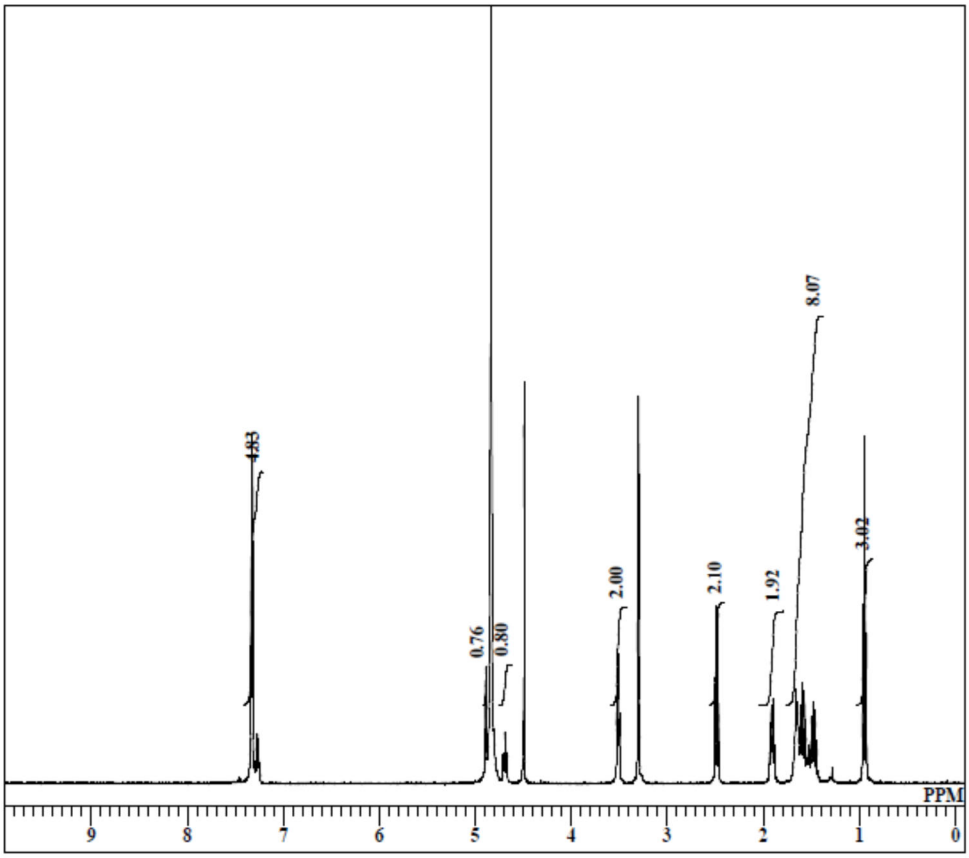
DFILE	20210107 AntiCl-iPrMgBr-1H.
COMNT	20210107 AntiCl-iPrMgBr-1H
DATIM	Thu Jan 07 14:02:20 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	4
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	16.4 c
SLVNT	CDCL3
EXREF	0.00 ppm
BF	0.12 Hz
RGAIN	14



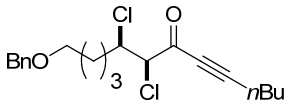
6



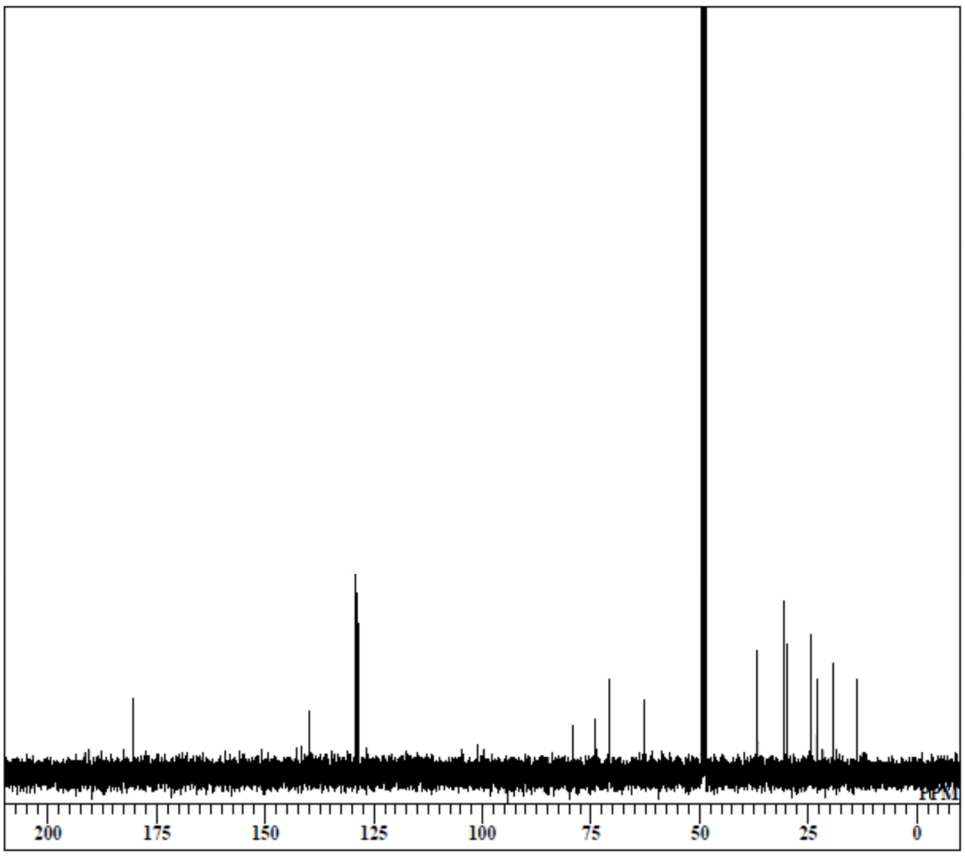
DFILE	20210107 AntiCl-iPrMgBr-13C
COMNT	20210107 AntiCl-iPrMgBr-13C
DATIM	Thu Jan 07 20:37:55 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	2400
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	13.9 c
SLVNT	CDCL3
EXREF	77.00 ppm
BF	0.12 Hz
RGAIN	28



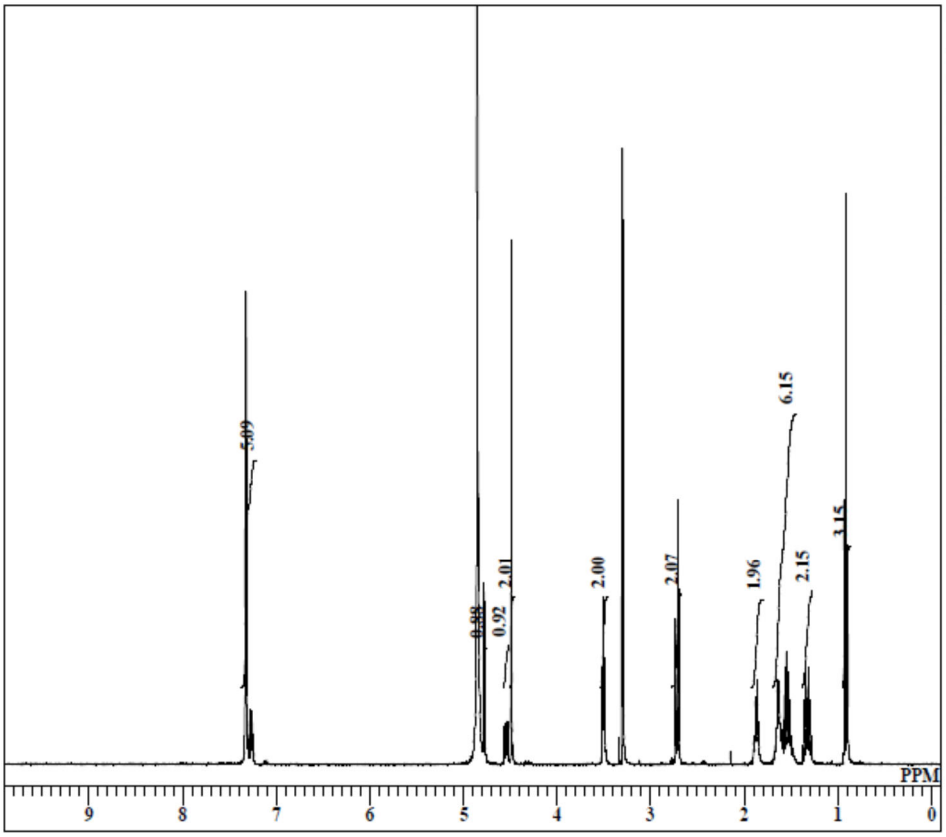
DFILE	20210203 SynCl-Hex 1H.als
COMNT	20210203 SynCl-Hex 1H
DATIM	Wed Feb 03 20:08:36 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	8
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	24.0 c
SLVNT	CD3OD
EXREF	3.30 ppm
BF	0.00 Hz
RGAIN	20



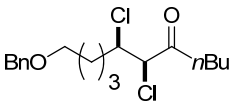
8a



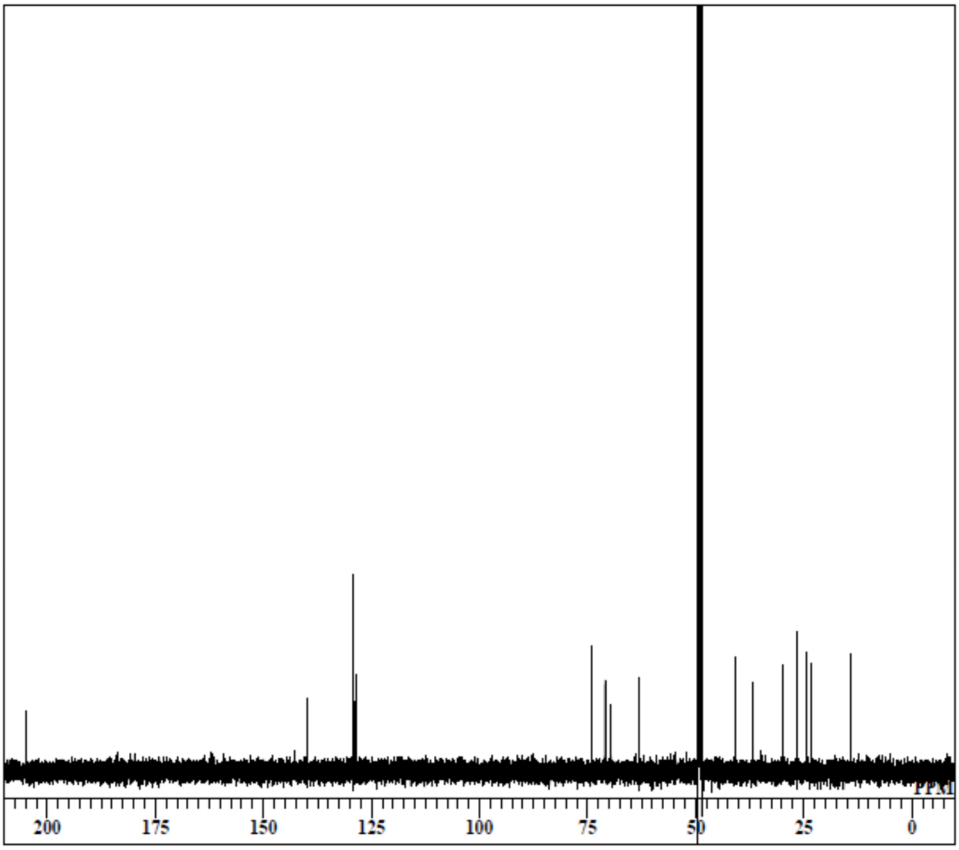
DFILE	20210203 SynCl-Hex 13C.als
COMNT	20210203 SynCl-Hex 13C
DATIM	Wed Feb 03 22:15:47 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	2400
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	21.7 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.00 Hz
RGAIN	29



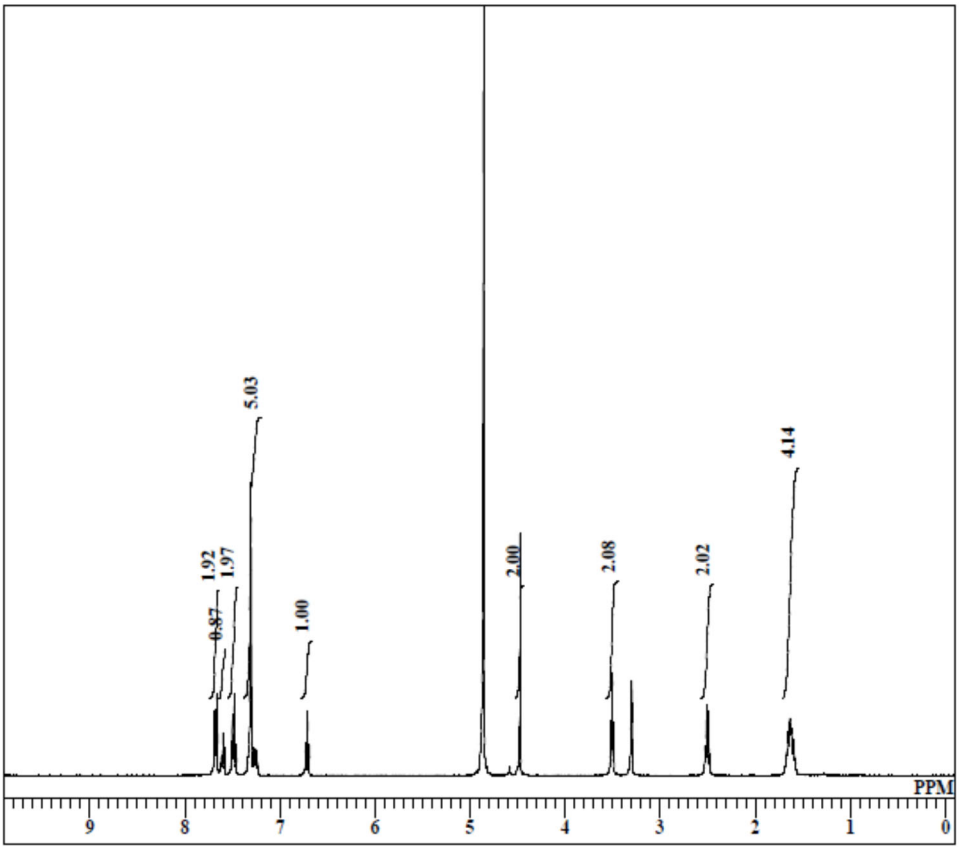
DFILE	20210202 SynCl-nBu1.als
COMNT	20210202 SynCl-nBu
DATIM	Tue Feb 02 18:15:38 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	8
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	22.0 c
SLVNT	CD3OD
EXREF	3.30 ppm
BF	0.00 Hz
RGAIN	20



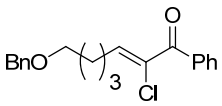
8b



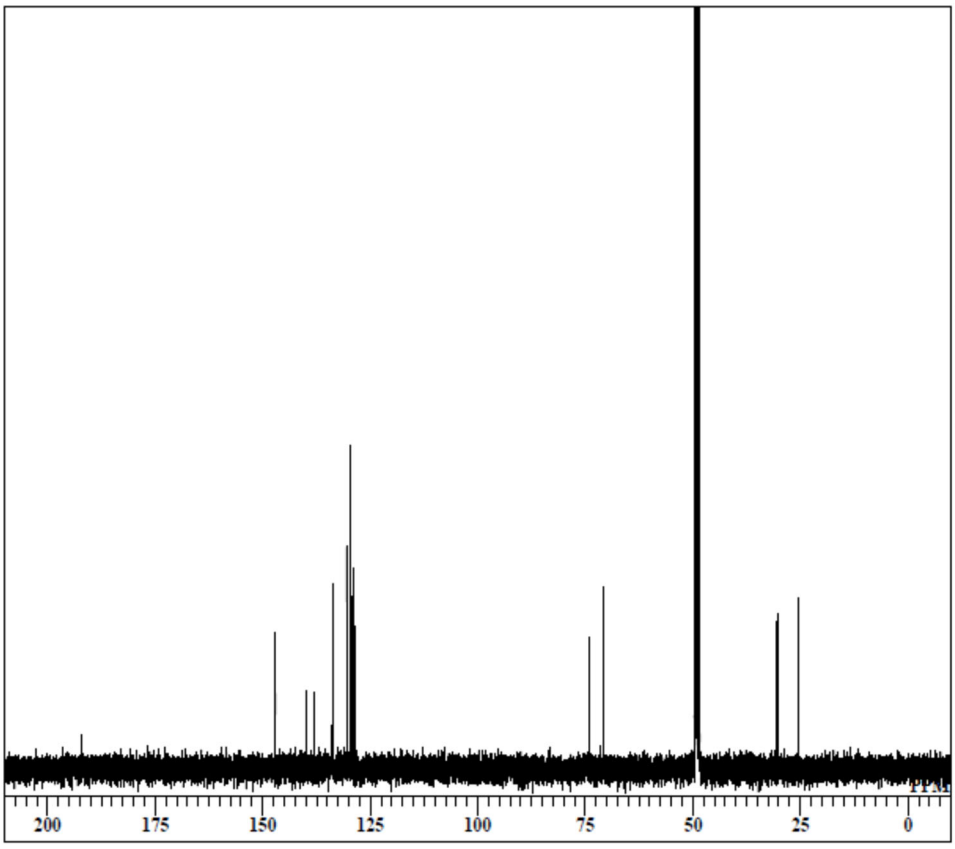
DFILE	20210202 SynCl-nBu13C1.als
COMNT	20210202 SynCl-nBu13C
DATIM	Tue Feb 02 20:21:04 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	2400
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	21.6 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.00 Hz
RGAIN	29



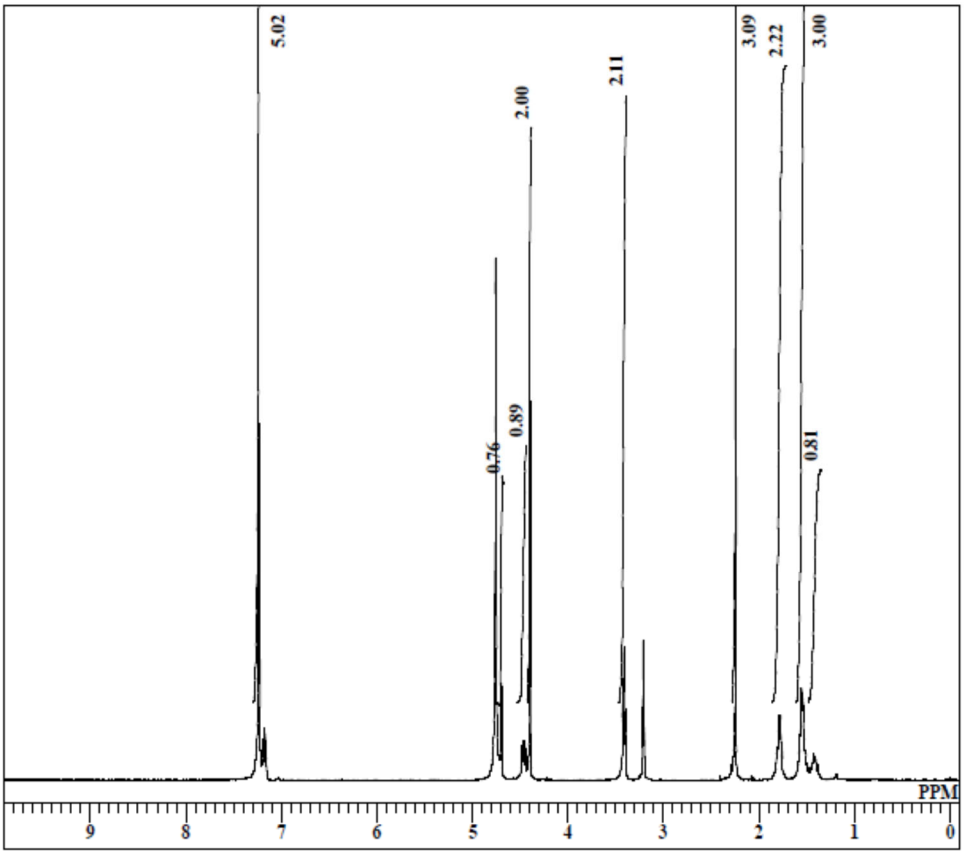
DFILE	20210208 SynCl Ph-Li 1H.als
COMNT	20210208 SynCl Ph-Li 1H
DATIM	Mon Feb 08 11:54:11 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	8
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	22.0 c
SLVNT	CD3OD
EXREF	3.30 ppm
BF	0.12 Hz
RGAIN	18



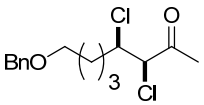
4c



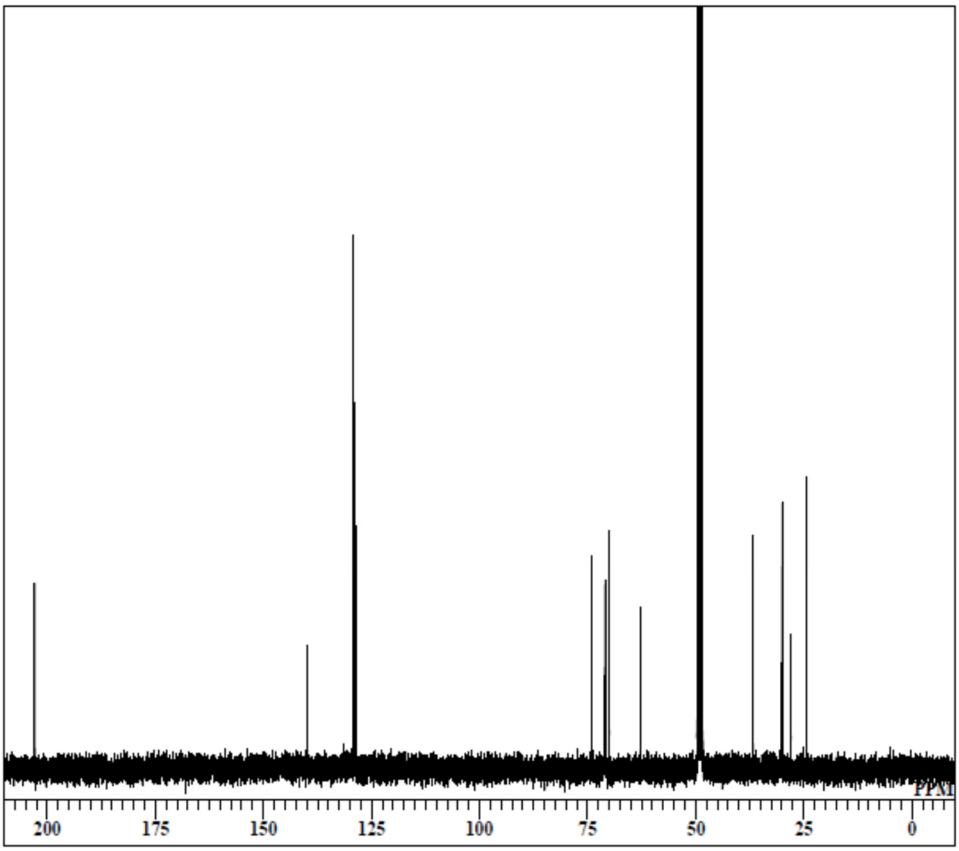
DFILE	20210208 SynCl Ph-Li 13C.als
COMNT	20210208 SynCl Ph-Li 13C
DATIM	Mon Feb 08 22:52:23 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	2500
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	22.0 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.12 Hz
RGAIN	29



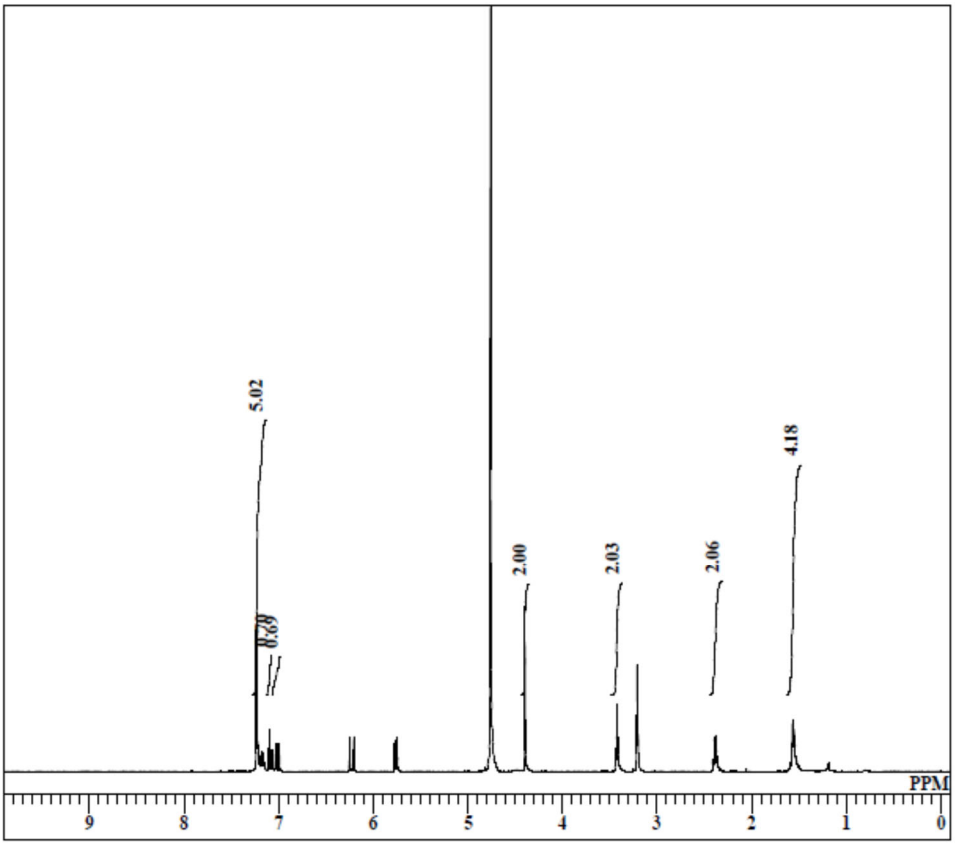
DFILE	20210205 SynCl-Methyl- 1H..
COMNT	20210205 SynCl-Methyl 1H
DATIM	Fri Feb 05 16:13:44 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	8
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	22.6 c
SLVNT	CD3OD
EXREF	0.00 ppm
BF	0.12 Hz
RGAIN	19



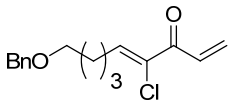
8d



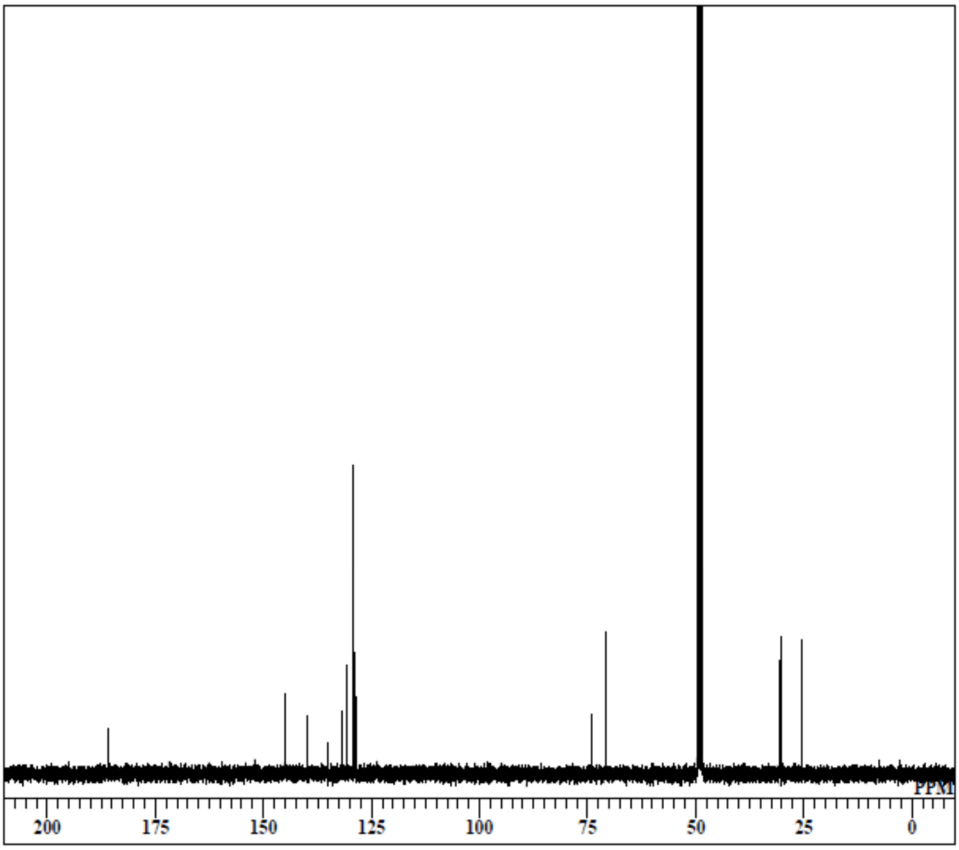
DFILE	20210205 SynCl-Methyl- 13C..
COMNT	20210205 SynCl-Methyl- 13C
DATIM	Fri Feb 05 19:59:13 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	2400
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	21.9 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.12 Hz
RGAIN	29



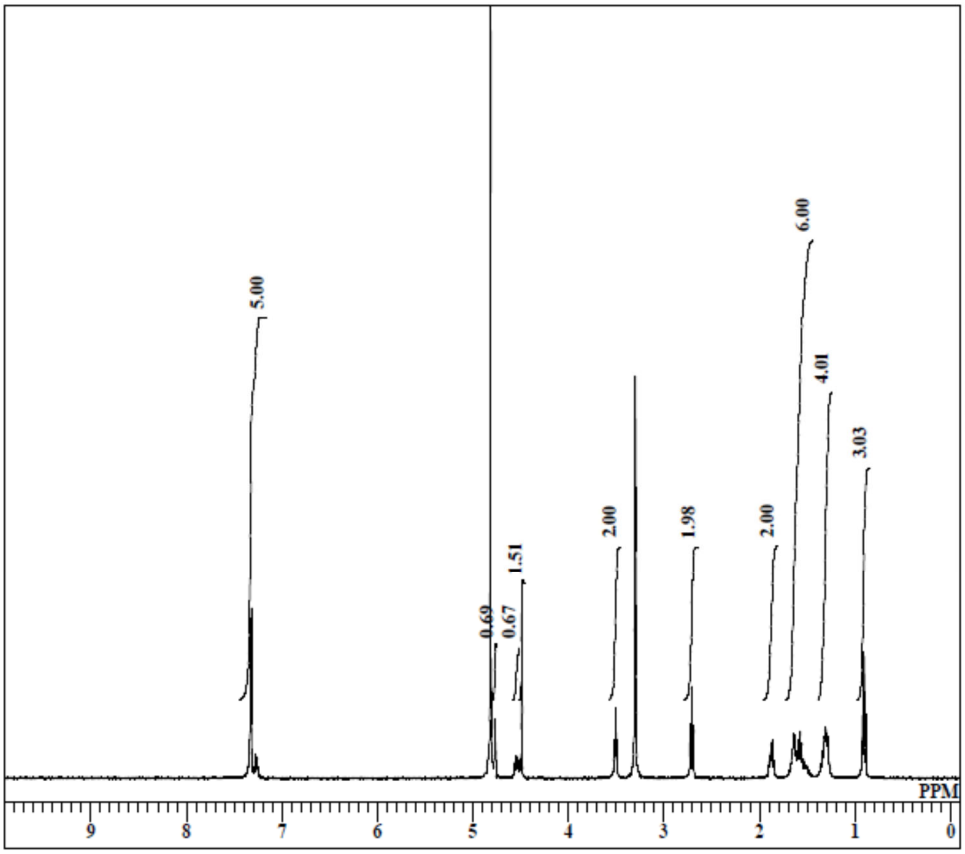
DFILE	20210206 SynCl-VinylMgX 1H
COMNT	20210208 SynCl Vinyl-Li 1H
DATIM	Mon Feb 08 11:40:06 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	8
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	22.7 c
SLVNT	CD3OD
EXREF	0.00 ppm
BF	0.12 Hz
RGAIN	20



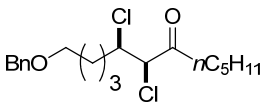
4e



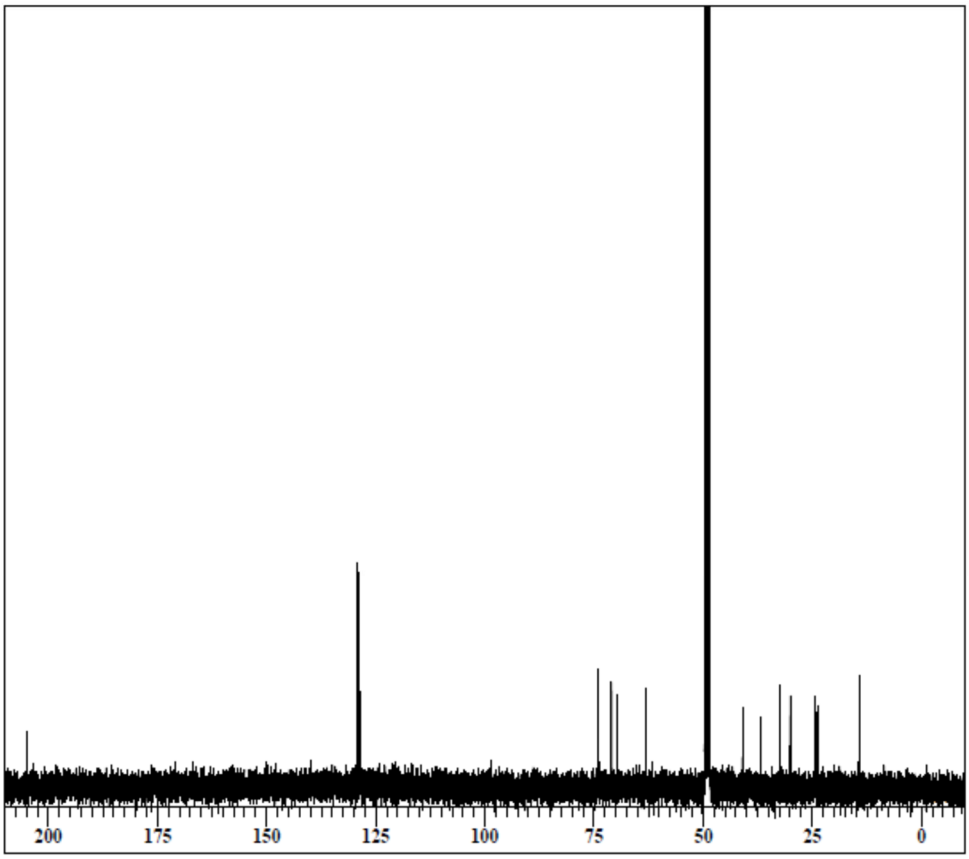
DFILE	20210206 SynCl-VinylMgX 13
COMNT	20210206 SynCl-VinylMgX 13
DATIM	Mon Feb 08 20:16:10 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	3000
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	22.0 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.12 Hz
RGAIN	29



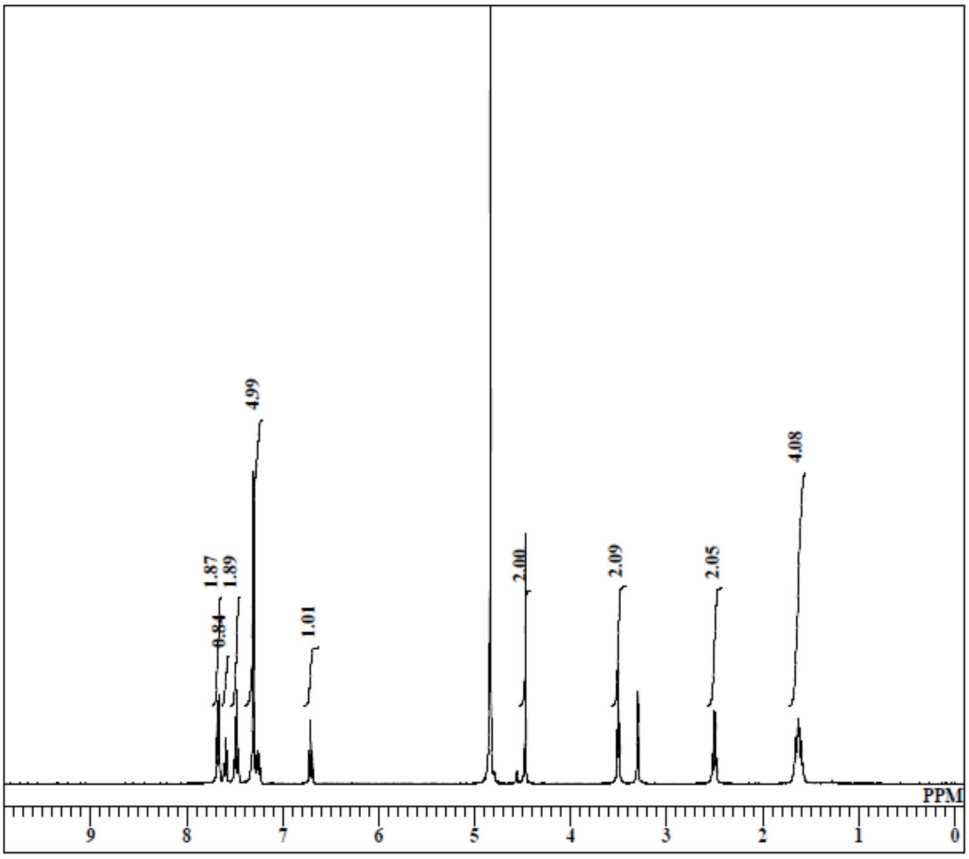
DFILE	20210223 SynCl-PentylMgX
COMNT	20210223 SynCl-PentylMgX
DATIM	Tue Feb 23 21:10:22 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	8
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	26.2 c
SLVNT	CD3OD
EXREF	3.30 ppm
BF	0.10 Hz
RGAIN	24



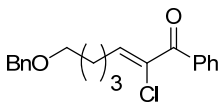
8f



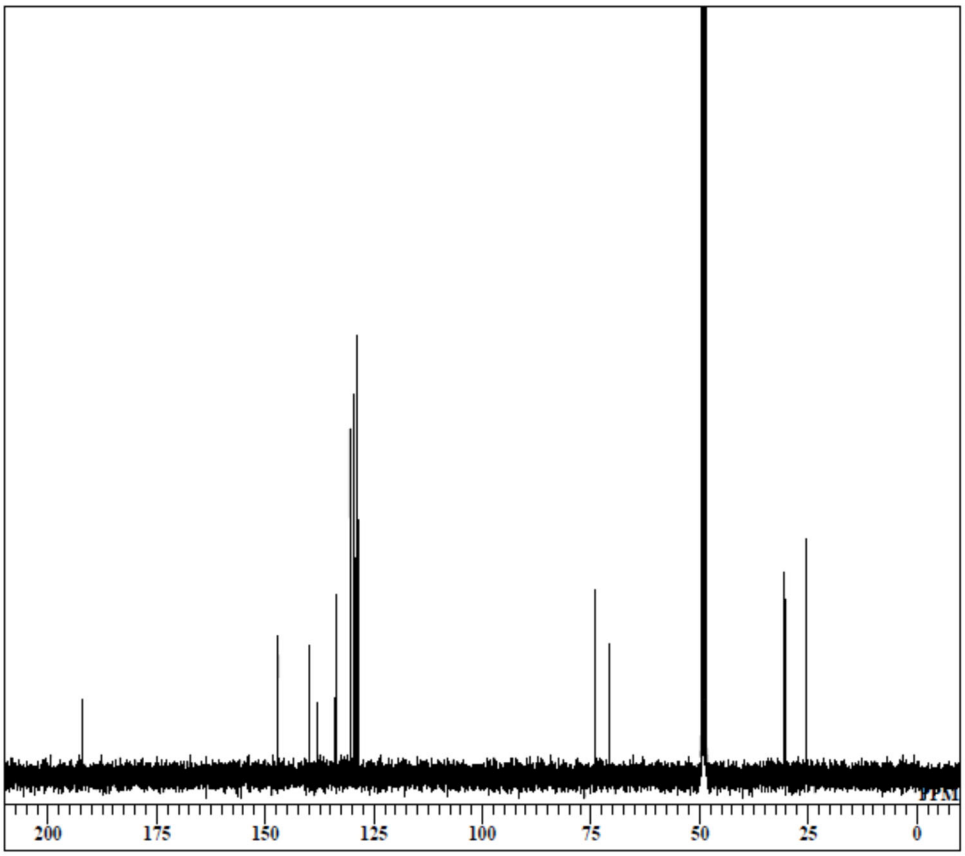
DFILE	20210223 SynCl-PentylMgX
COMNT	20210223 SynCl-PentylMgX
DATIM	Wed Feb 24 05:37:53 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	10000
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	22.8 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.10 Hz
RGAIN	29



DFILE	20210207 SynCl PhMgX 1H.
COMNT	20210207 SynCl-PhMgX 1H
DATIM	Sun Feb 07 19:36:34 2021
OBNUC	1H
EXMOD	NON
OBFRQ	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
POINT	16384
FREQU	7992.01 Hz
SCANS	8
ACQTM	2.0500 sec
PD	4.9500 sec
PW1	6.00 usec
IRNUC	1H
CTEMP	24.1 c
SLVNT	CD3OD
EXREF	3.30 ppm
BF	0.12 Hz
RGAIN	18



4g



DFILE	20210207 SynCl PhMgX 13C
COMNT	20210207 SynCl PhMgX 13C
DATIM	Sun Feb 07 21:46:12 2021
OBNUC	13C
EXMOD	BCM
OBFRQ	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
POINT	32768
FREQU	27118.64 Hz
SCANS	2500
ACQTM	1.2083 sec
PD	1.7920 sec
PW1	5.00 usec
IRNUC	1H
CTEMP	22.4 c
SLVNT	CD3OD
EXREF	49.00 ppm
BF	0.12 Hz
RGAIN	29