Supplemental Material

Metaboric acid-catalyzed synthesis of cyclic carbonates from epoxides and CO_2

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General Information

Unless otherwise specified, all reagents and solvents are purchased from suppliers and used directly without further purification. Column chromatography was performed on silica gel (200-300 mesh) using petroleum ether/ethyl acetate as eluent. All ^{1}H NMR (400 MHz or 500MHz), ^{13}C NMR (101 MHz or 126 MHz) were recorded on Bruker AVANCE II-400 or Bruker AVANCE III-500 spectrometers (in $CDCl_3$ with TMS as internal standard). Melting points were recorded on a Novel X-4 spectrometer. Infrared spectroscopies were recorded on Nicolet 6700 Fourier transform infrared spectrometer. Mass spectroscopies were recorded on the LTQ Orbitrap XL mass spectrometer.

General synthesis procedure

The reaction was carried out in a 25 ml high-pressure reactor. VCHO (20 mmol), HBO_2 (0.25 mmol), and TBAB (0.6 mmol) were added to the reactor at room temperature. The reactor was purged with argon gas three times, followed by two purges with carbon dioxide. Then, the reactor was pressurized to 14 bar and heated in an oil bath at 140 °C for 5 hours. After the completion of the reaction, the reactor was cooled to room temperature followed by gradual release of the pressure inside the reactor. The cyclic carbonate product was separated and purified by silica gel column chromatography. The structure of the product was determined by ^{1}H NMR, ^{13}C NMR, IR and MS spectroscopy.

The characterization data of 2a-2s

The cyclic carbonates **2a**-**2s** are all known compounds, and the characterization data are consistent with previous reports.

5-Vinylhexahydrobenzo[d][1,3]dioxol-2-one (2a):[1] the ratio of two diastereoisomers is approximately 1:1, 93% yield, colorless oil, ^{1}H NMR (500 MHz, $CDCl_3$) δ 5.73 – 5.56 (m, 2H), 5.02 – 4.82 (m, 4H), 4.76 – 4.52 (m, 4H), 2.30 – 1.99 (m, 5H), 1.96 – 1.91 (m, 1H), 1.76 – 1.46 (m, 5H), 1.24-1.15 (m, 2H), 1.12– 1.04 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.1, 155.1, 141.2, 141.1, 114.0, 113.7, 76.0, 75.7, 75.6, 75.1, 36.1, 33.8, 33.4, 31.4, 26.6, 25.6, 25.5, 24.9. MS (ESI) calculated for $C_9H_{13}O_3$ $[M+H]^+$: 169.09; found: 168.96. IR (KBr, cm^{-1}) v = 3081, 2943, 2867, 1796, 1641, 1357, 1191, 1147, 1032, 918, 782, 732.

Hexahydrobenzo[d][1,3]dioxol-2-one (2b):[1] 63% yield, white solid, mp: 45 – 46 °C, ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.66 (td, J = 3.7, 1.9 Hz, 2H), 1.91 – 1.80 (m, 4H), 1.66 – 1.49 (m, 2H), 1.48 – 1.23 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.4, 75.8, 26.6, 19.0. MS (ESI) calculated for $C_7H_{11}O_3$ $[M+H]^+$: 143.07; found: 142.94. IR (KBr, cm^{-1}) v = 2945, 2869, 1800, 1453, 1352, 1308, 1252, 1208, 1166, 1137, 1103, 1030, 994, 953, 904, 856, 820, 782, 730, 706, 588, 560.

Tetrahydro-4H-cyclopenta[d][1,3]dioxol-2-one (2c):[1] 79% yield, white solid, mp: 42 – 43 °C, ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.18 – 5.01 (m, 2H), 2.22 – 2.05 (m, 2H), 1.84 – 1.61 (m, 4H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.5, 82.0, 33.1, 21.5. MS (ESI) calculated for $C_6H_9O_3$ $[M+H]^+$: 129.05; found: 128.98. IR (KBr, cm^{-1}) v = 3020, 2986, 2940,

2884, 2858, 2544, 2349, 1801, 1544, 1474, 1445, 1375, 1334, 1182, 1112, 1046, 928, 902, 863, 771, 698, 597, 579, 537.

Tetrahydrofuro[3,4-d][1,3]dioxol-2-one (2d):[1] 86% yield, white solid, mp: 86 – 87 °C, ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.22 – 5.18 (m, 2H), 4.28 – 4.20 (m, 2H), 3.57 – 3.53 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.6, 80.3, 73.0. MS (ESI) calculated for $C_5H_{10}NO_4$ $[M+NH_4]^+$: 148.06; found: 148.02. IR (KBr, cm^{-1}) ν = 3052, 3007, 2928, 2872, 1785, 1546, 1471, 1370, 1279, 1242, 1170, 1110, 1050, 928, 900, 842, 772, 689, 600, 433.

4-Methyl-1,3-dioxolan-2-one (2e):[2] 88% yield, colorless oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.87 – 4.79 (m, 1H), 4.55 – 4.51 (m, 1H), 4.01 – 3.97 (m, 1H), 1.45 (d, J = 6.3 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.2, 73.7, 70.7, 19.3. MS (ESI) calculated for $C_4H_7O_3$ $[M+H]^+$: 103.04; found: 102.93. IR (KBr, cm^{-1}) ν = 2992, 1790, 1483, 1388, 1352, 1184, 1119, 1074, 1052, 954, 850, 776, 712.

4-Ethyl-1,3-dioxolan-2-one (2f):[2] 88% yield, colorless oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.69 – 4.49 (m, 1H), 4.51 (t, J = 8.1 Hz, 1H), 4.09 – 4.05 (m, 1H), 1.91 – 1.69 (m, 2H), 1.02 (t, J = 7.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.2, 78.1, 69.1, 26.8, 8.4. MS (ESI) calculated for $C_5H_9O_3$ $[M+H]^+$: 117.05; found: 116.94. IR (KBr, cm^{-1}) ν = 2976, 2942, 2886, 1793, 1484, 1396, 1377, 1302, 1177, 1111, 1061, 981, 776, 718.

4-Vinyl-1,3-dioxolan-2-one (2g):[3] 70% yield, yellow oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.93 – 5.84 (m, 1H), 5.52 – 5.47 (m, 1H), 5.44 – 5.41 (m, 1H), 5.15 – 5.09 (m, 1H), 4.61 – 4.57 (m, 1H), 4.16 – 4.12 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.9, 132.2, 121.1, 77.4, 69.1. MS (ESI) calculated for $C_5H_7O_3$ $[M+H]^+$: 115.04; found: 114.86. IR (KBr, cm^{-1}) ν = 2993, 2923, 1804, 1482, 1434, 1386, 1328, 1173, 1073, 991, 945, 772, 724.

4-(Isopropoxymethyl)-1,3-dioxolan-2-one (2h):[2] 99% yield, yellow oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.81 – 4.74 (m, 1H), 4.47 (t, J = 8.3 Hz, 1H), 4.36 (dd, J = 8.3, 6.0 Hz, 1H), 3.67 – 3.56 (m, 3H), 1.17 – 1.10 (m, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.2, 75.4, 72.8, 67.1, 66.4, 21.8, 21.7. MS (ESI) calculated for $C_7H_{13}O_4$ $[M+H]^+$: 161.08; found: 160.96. IR (KBr, cm^{-1}) ν = 2975, 2932, 2874, 1800, 1479, 1392, 1337, 1173, 1085, 920, 775, 714.

4-(Butoxymethyl)-1,3-dioxolan-2-one (2i):[4] 81% yield, yellow oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.82 – 4.76 (m, 1H), 4.47 (t, J = 8.3 Hz, 1H), 4.37 (dd, J = 8.3, 6.0 Hz, 1H), 3.69 – 3.54 (m, 2H), 3.53 – 3.45 (m, 2H), 1.55 – 1.50 (m, 2H), 1.42 – 1.28 (m, 2H), 0.89 (t, J = 7.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.1, 75.3, 71.7, 69.6, 66.3, 31.5, 19.1, 13.8. MS (ESI) calculated for $C_8H_{15}O_4$ $[M+H]^+$: 175.10; found: 175.03. IR (KBr, cm^{-1}) ν = 2960, 2935, 2873, 1797, 1481, 1395, 1362, 1175, 1136, 1103, 1052, 957, 849, 774, 714.

4-(tert-Butoxymethyl)-1,3-dioxolan-2-one (2j):[5] 86% yield, colorless oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.77 – 4.71 (m, 1H), 4.44 (t, J = 8.3 Hz, 1H), 4.33 (dd, J = 8.3, 5.8 Hz, 1H), 3.58 (dd, J = 10.4, 4.0 Hz, 1H), 3.48 (dd, J = 10.4, 3.6 Hz, 1H), 1.15 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.3, 75.3, 73.7, 66.5, 61.2, 27.2. MS (ESI) calculated for $C_8H_{15}O_4$ $[M+H]^+$: 175.10; found:175.01. IR (KBr, cm^{-1}) ν = 2977, 2935, 2874, 1796, 1479, 1391, 1366, 1174, 1103, 1055, 1014, 884, 771, 713.

4-((Allyloxy)methyl)-1,3-dioxolan-2-one (2k):[2] 93% yield, colorless oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.85 – 5.76 (m, 1H), 5.26 – 5.11 (m, 2H), 4.81 – 4.76 (m, 1H), 4.45 (t, J = 8.4 Hz, 1H), 4.32 (dd, J = 8.4, 6.0 Hz, 1H), 4.01 – 3.97 (m, 2H), 3.64 (dd, J = 11.2, 3.2 Hz, 2H), 3.54 (dd, J = 11.2, 3.6 Hz, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.1, 133.8, 117.6, 75.3, 72.4, 68.9, 66.2. MS (ESI) calculated for $C_7H_{11}O_4$ $[M+H]^+$: 159.07; found: 159.00. IR (KBr, cm^{-1}) ν =

2987, 2922, 2866, 1793, 1480, 1394, 1361, 1173, 1105, 1049, 999, 931, 774, 714.

4-(Chloromethyl)-4-methyl-1,3-dioxolan-2-one (2l):[6] 88% yield, colorless oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.50 (d, J = 8.8 Hz, 1H), 4.15 (d, J = 8.8 Hz, 1H), 3.72 (d, J = 11.8 Hz, 1H), 3.59 (d, J = 11.8 Hz, 1H), 1.62 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.0, 81.9, 72.0, 48.6, 23.0. MS (ESI) calculated for $C_5H_8ClO_3$ $[M+H]^+$: 151.02; found:150.96. IR (KBr, cm^{-1}) v = 2986, 1805, 1453, 1481, 1393, 1298, 1159, 1065, 956, 769, 712, 584, 513.

4,4-Dimethyl-1,3-dioxolan-2-one (2m):[2] 83% yield, colorless oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.17 (s, 2H), 1.54 (s, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.6, 81.8, 75.4, 25.9. MS (ESI) calculated for $C_5H_9O_3$ $[M+H]^+$: 117.05; found: 116.91. IR (KBr, cm^{-1}) v = 2986, 2938, 2881, 1797, 1463, 1398, 1288, 1212, 1130, 1058, 988, 776, 709, 602, 553.

4-Phenyl-1,3-dioxolan-2-one (2n):[2] 79% yield, white solid, mp: 56 – 57 °C, ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 – 7.33 (m, 5H), 5.67 (t, J = 8.0 Hz, 1H), 4.79 (t, J = 8.4 Hz, 1H), 4.33 (t, J = 8.2 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.0, 135.9, 129.7, 129.2, 126.0, 78.1, 71.2. MS (ESI) calculated for $C_9H_9O_3$ $[M+H]^+$: 165.05; found: 165.00. IR (KBr, cm^{-1}) v = 2981, 2925, 1795, 1487, 1458, 1393, 1358, 1328, 1169, 1066, 960, 905, 759, 700, 577, 492.

4-(Phenoxymethyl)-1,3-dioxolan-2-one (2o):[2] 58% yield, white solid, mp: 99 – 100 °C, ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.32 – 7.29 (m, 2H), 7.03 – 7.00 (m, 1H), 6.96 – 6.89 (m, 2H), 5.04 – 4.99 (m, 1H), 4.60 (t, J = 8.4 Hz, 1H), 4.52 (dd, J = 8.4, 5.9 Hz, 1H), 4.23 (dd, J = 10.6, 4.0 Hz, 1H), 4.13 (dd, J = 10.6, 3.6 Hz, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 157.8, 154.8, 129.7, 122.0, 114.6, 74.2, 66.9, 66.2. MS (ESI) calculated for $C_{10}H_{10}NaO_4$ $[M+Na]^+$: 217.05; found: 217.05. IR (KBr, cm^{-1}) v = 2925, 2875, 1801, 1602, 1495, 1455, 1397, 1311, 1251, 1167, 1092, 1057, 1012, 759, 695, 507.

4-((Benzyloxy)methyl)-1,3-dioxolan-2-one (2p):[2] 84% yield, colorless oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 – 7.28 (m, 5H), 4.83 – 4.77 (m, 1H), 4.68 – 4.53 (m, 2H), 4.46 (t, J = 8.4 Hz, 1H), 4.37 (dd, J = 8.4, 6.0 Hz, 1H), 3.71 (dd, J = 11.0, 3.9 Hz, 1H), 3.61 (dd, J = 11.0, 3.7 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.2, 137.3, 128.6, 128.0, 127.7, 75.3, 73.6, 69.0, 66.3. MS (ESI) calculated for $C_{11}H_{12}NaO_4$ $[M+Na]^+$: 231.06; found: 231.05. IR (KBr, cm^{-1}) v = 3064, 3031, 2984, 2920, 2868, 1797, 1497, 1478, 1454, 1394, 1360, 1335, 1177, 1105, 1044, 911, 847, 773, 741, 700, 607, 463.

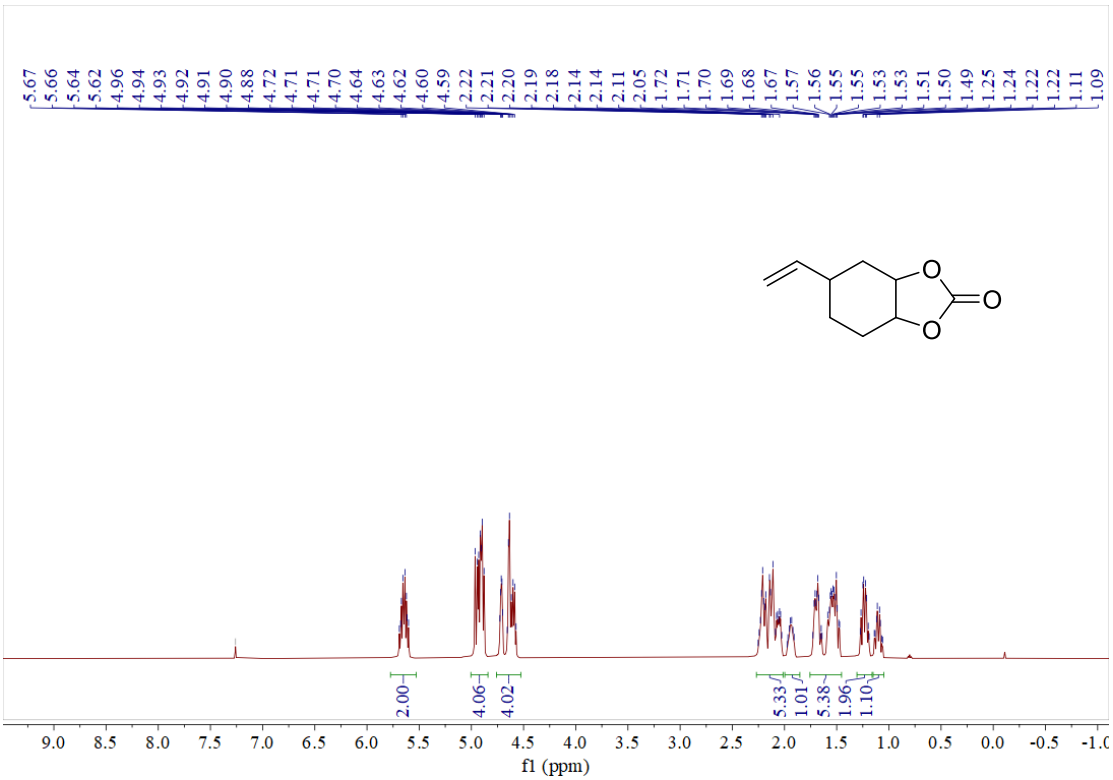
4-((*o*-Tolyloxy)methyl)-1,3-dioxolan-2-one (2q):[7] 85% yield, white solid, mp: 95 – 96 °C, ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.21 – 7.12 (m, 2H), 6.95 – 6.91 (m, 1H), 6.79 – 6.77 (m, 1H), 5.07 – 5.02 (m, 1H), 4.69 – 4.53 (m, 2H), 4.26 (dd, J = 10.6, 3.6 Hz, 1H), 4.13 (dd, J = 10.6, 3.1 Hz, 1H), 2.22 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.9, 155.0, 131.1, 127.0, 126.9, 121.6, 110.9, 74.4, 67.1, 66.3, 16.0. MS (ESI) calculated for $C_{11}H_{12}NaO_4$ $[M+Na]^+$: 231.06; found: 231.03. IR (KBr, cm^{-1}) v = 3064, 3018, 2985, 2926, 2879, 1779, 1601, 1499, 1456, 1402, 1293, 1248, 1172, 1126, 1104, 1042, 998, 853, 760, 716, 620, 441.

4-((4-Methoxyphenoxy)methyl)-1,3-dioxolan-2-one (2r):[6] 49% yield, white solid, mp: 99 – 100 °C, ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.84 (s, 4H), 5.02 – 4.97 (m, 1H), 4.60 (t, J = 8.4 Hz, 1H), 4.52 (dd, J = 8.4, 5.9 Hz, 1H), 4.18 (dd, J = 10.6, 4.2 Hz, 1H), 4.09 (dd, J = 10.6, 3.6 Hz, 1H), 3.77 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.7, 152.0, 115.8, 114.8, 74.4, 67.8, 66.2, 55.7. MS (ESI) calculated for $C_{11}H_{12}NaO_5$ $[M+Na]^+$: 247.06; found: 247.03. IR (KBr, cm^{-1}) v = 2968, 2939, 2846, 1789, 1509, 1446, 1394, 1311, 1236, 1183, 1090, 1027, 869, 825, 777, 754, 717, 522.

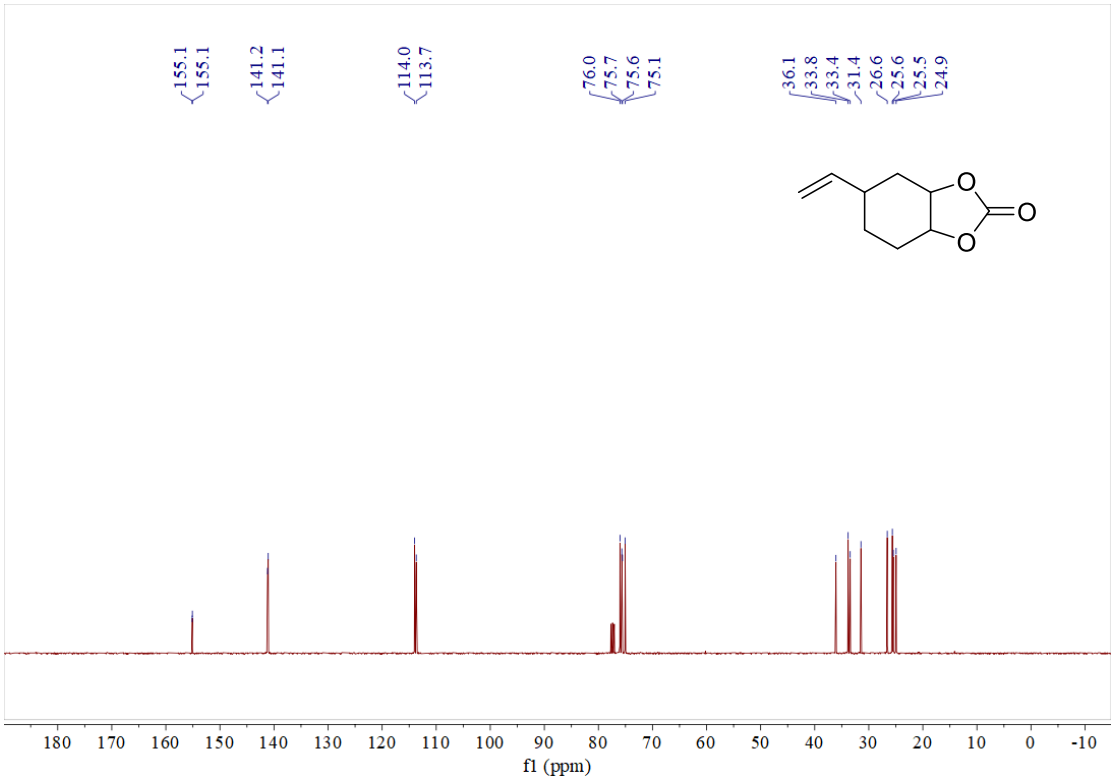
4-((2-Methoxyphenoxy)methyl)-1,3-dioxolan-2-one (2s):[7] 58% yield, white solid, mp: 72 – 73 °C, ^{1}H NMR (400

MHz, $CDCl_3$) δ 7.05 – 6.97 (m, 1H), 6.96 – 6.85 (m, 3H), 5.02 – 4.96 (m, 1H), 4.65 – 4.48 (m, 2H), 4.30 – 4.11 (m, 2H), 3.83 (s, 3H).^{13}C NMR (101 MHz, $CDCl_3$) δ 154.9, 150.4, 147.5, 123.4, 121.0, 116.6, 112.6, 74.7, 69.3, 66.3, 55.9. MS (ESI) calculated for $C_{11}H_{12}NaO_5$ $[M+Na]^+$: 247.06; found: 247.03. IR (KBr, cm^{-1}) ν = 3080, 3013, 2968, 2917, 2886, 2839, 1782, 1590, 1509, 1453, 1398, 1329, 1257, 1223, 1180, 1153, 1125, 1081, 1050, 1026, 1009, 954, 868, 773, 751, 594, 469.

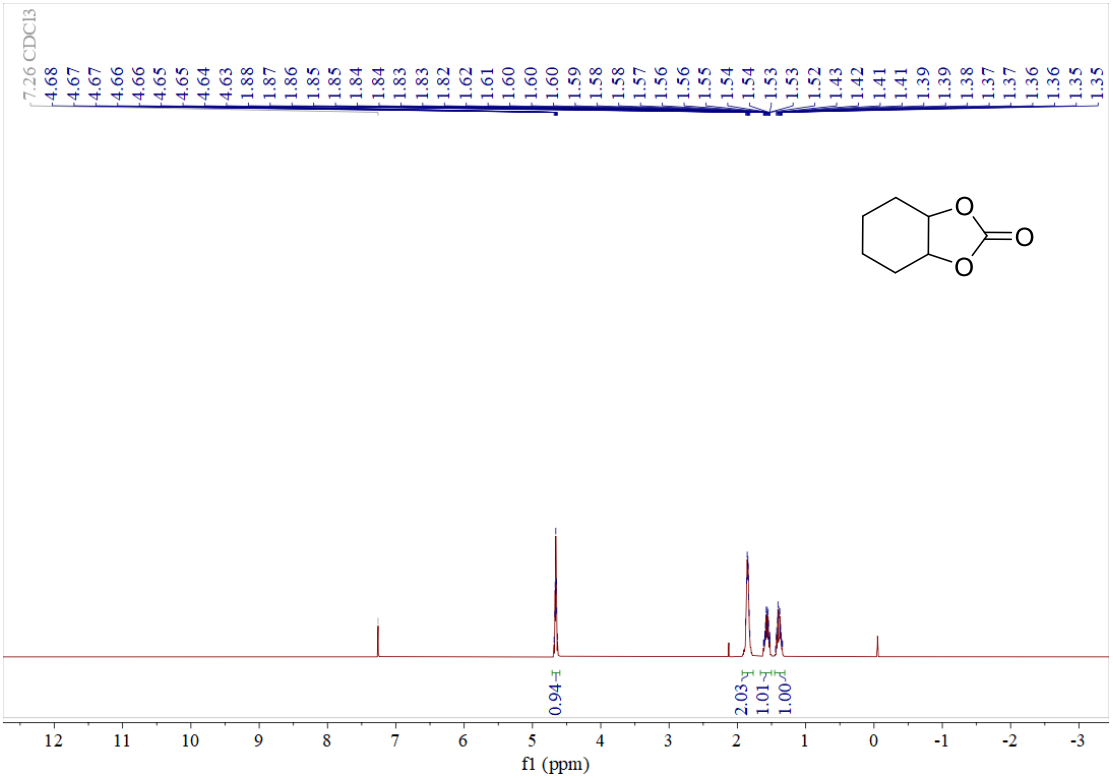
^{1}H NMR and ^{13}C NMR spectra of 2a-2s



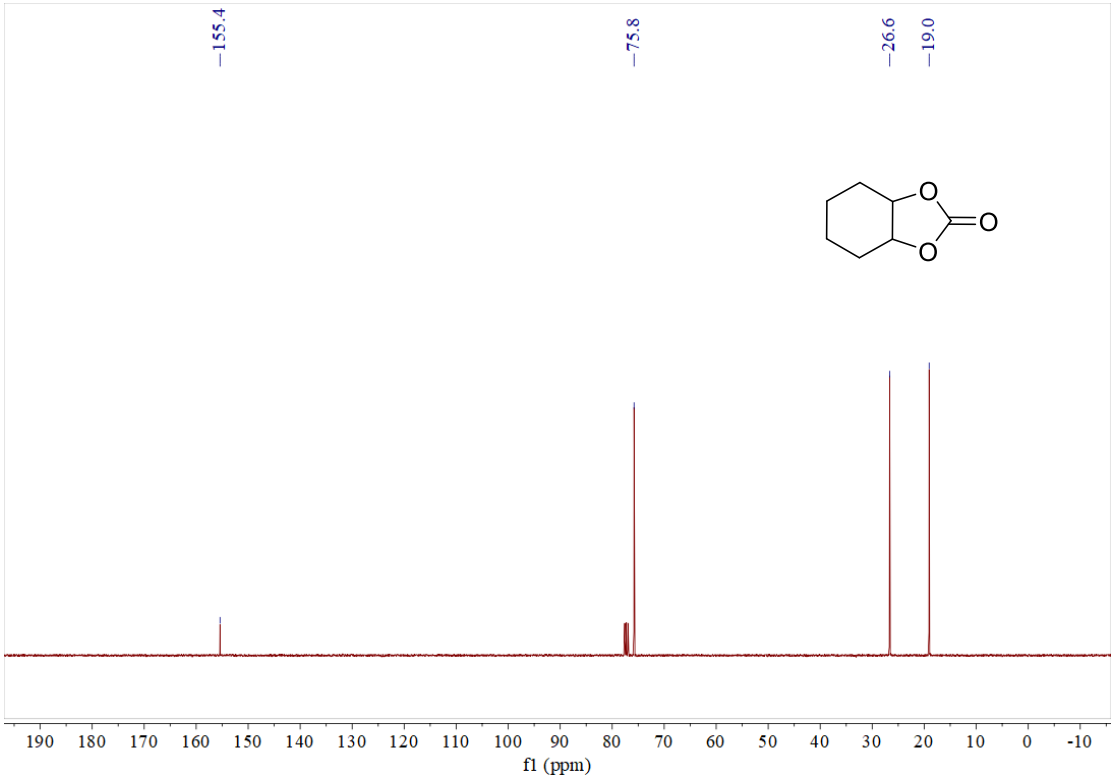
^{1}H NMR (500 MHz, $CDCl_3$) of 5-vinylhexahydrobenzo[d][1,3]dioxol-2-one (**2a**)



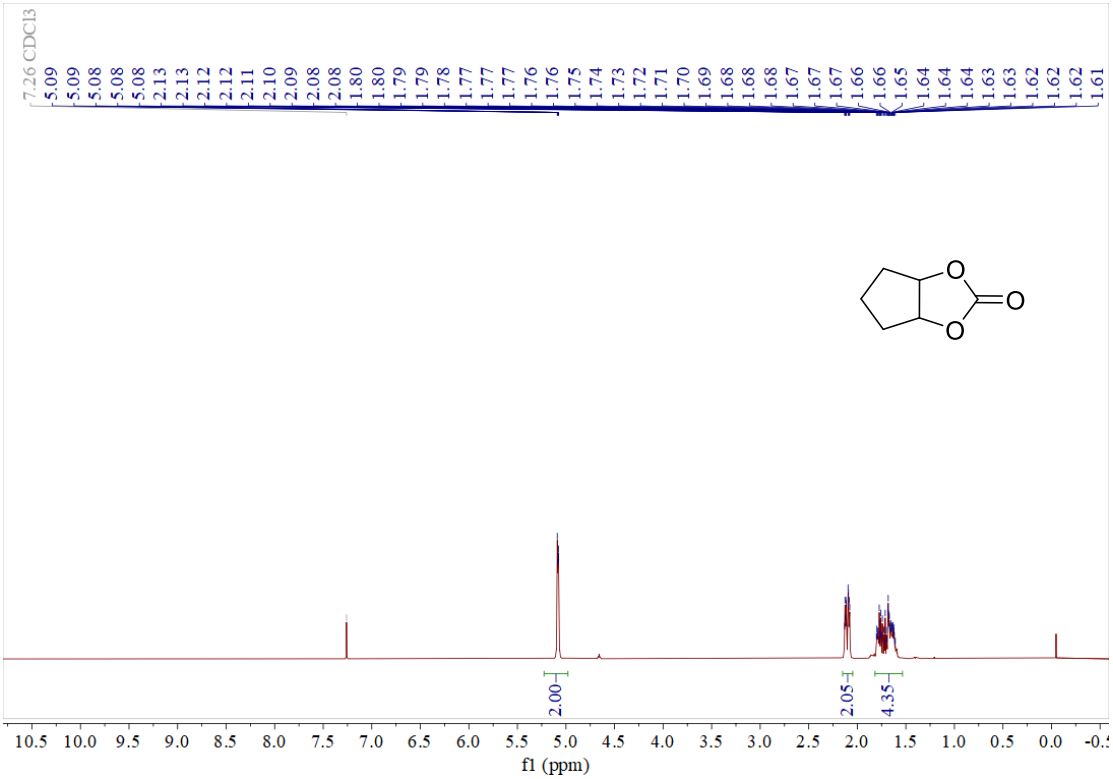
^{13}C NMR (101 MHz, $CDCl_3$) of 5-vinylhexahydrobenzo[d][1,3]dioxol-2-one (**2a**)



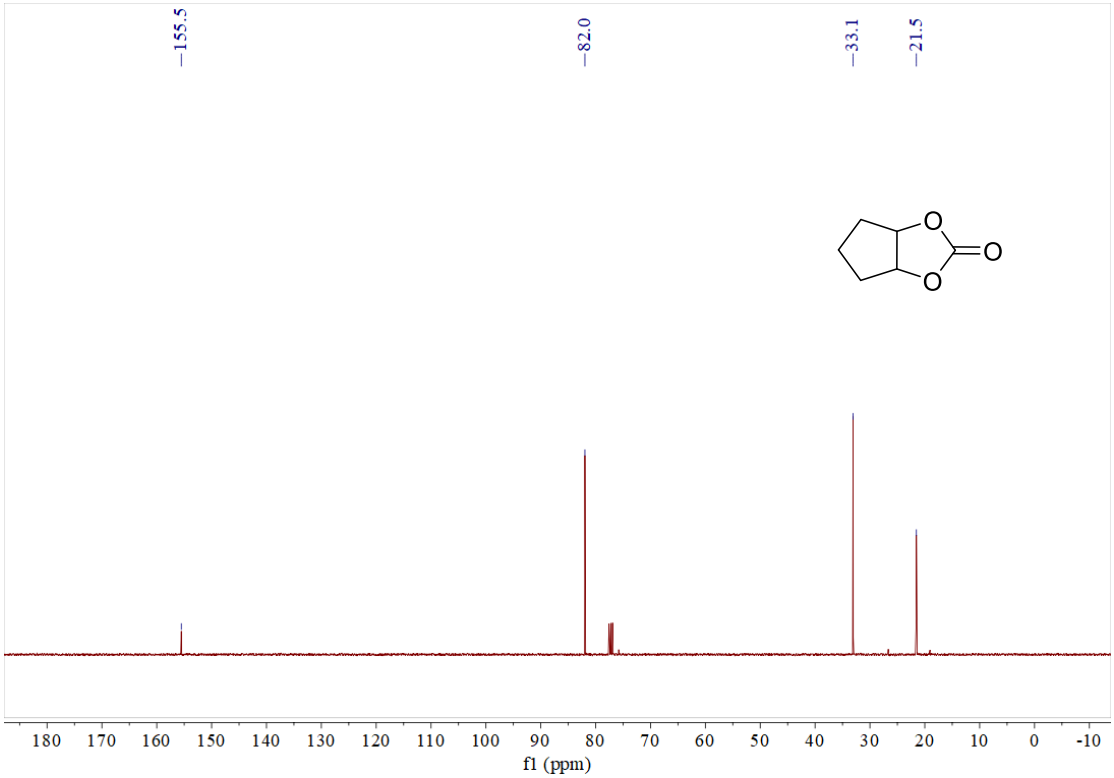
^{1}H NMR (400 MHz, $CDCl_3$) of hexahydrobenzo[d][1,3]dioxol-2-one (**2b**)



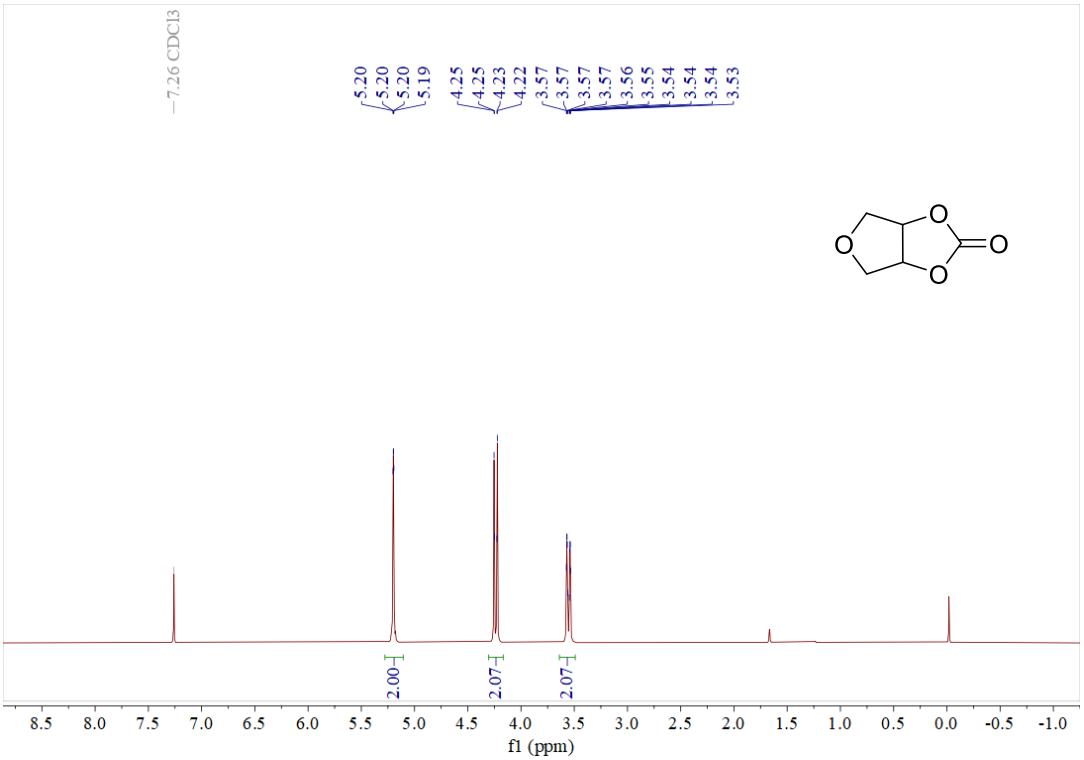
^{13}C NMR (101 MHz, $CDCl_3$) of hexahydrobenzo[d][1,3]dioxol-2-one (**2b**)



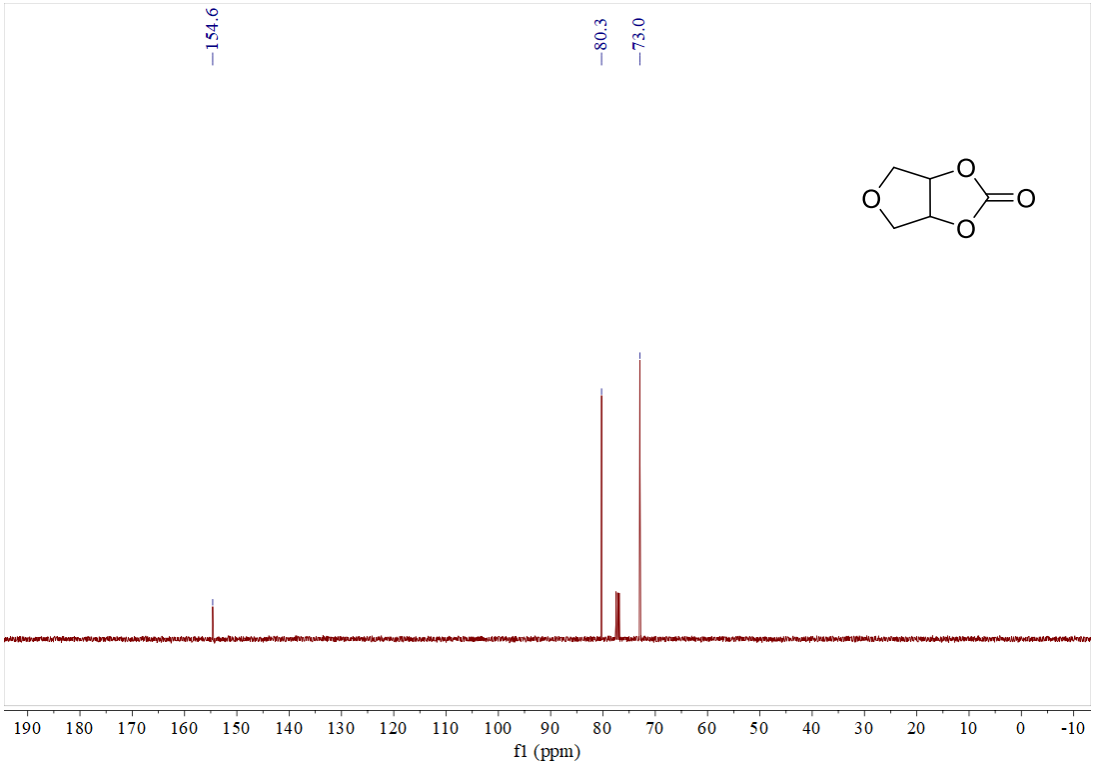
^{1}H NMR (400 MHz, $CDCl_3$) of tetrahydro-4H-cyclopenta[d][1,3]dioxol-2-one (**2c**)



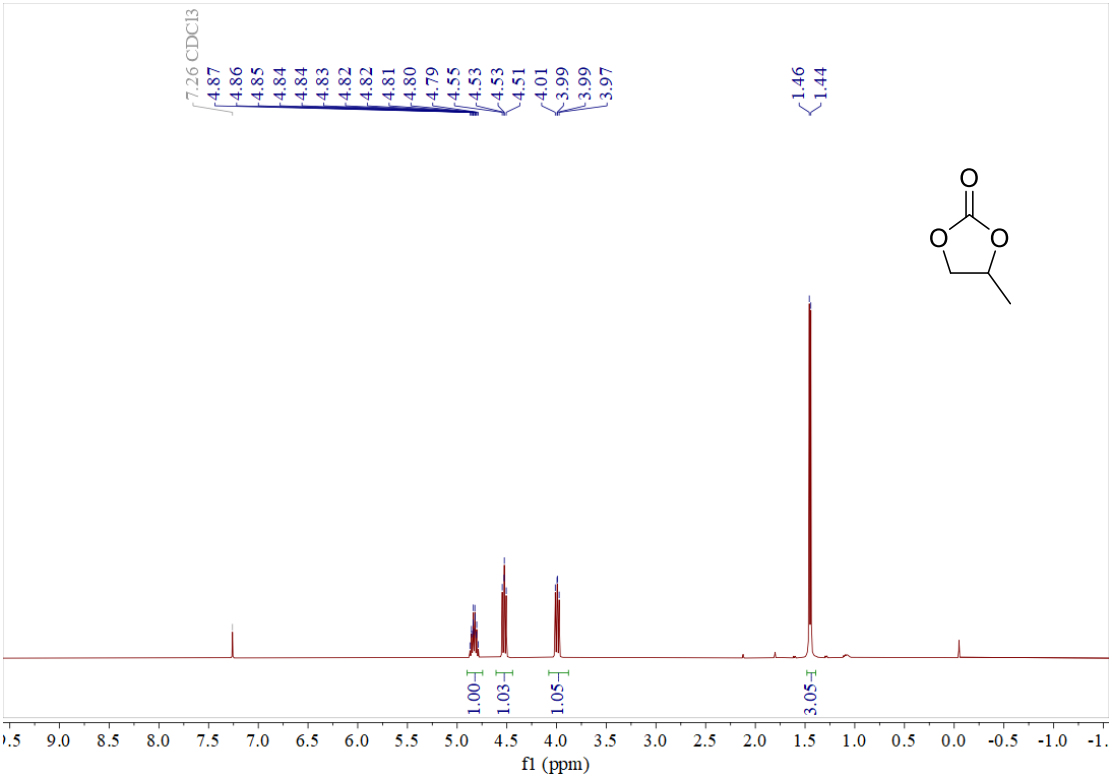
^{13}C NMR (101 MHz, $CDCl_3$) of tetrahydro-4H-cyclopenta[d][1,3]dioxol-2-one (**2c**)



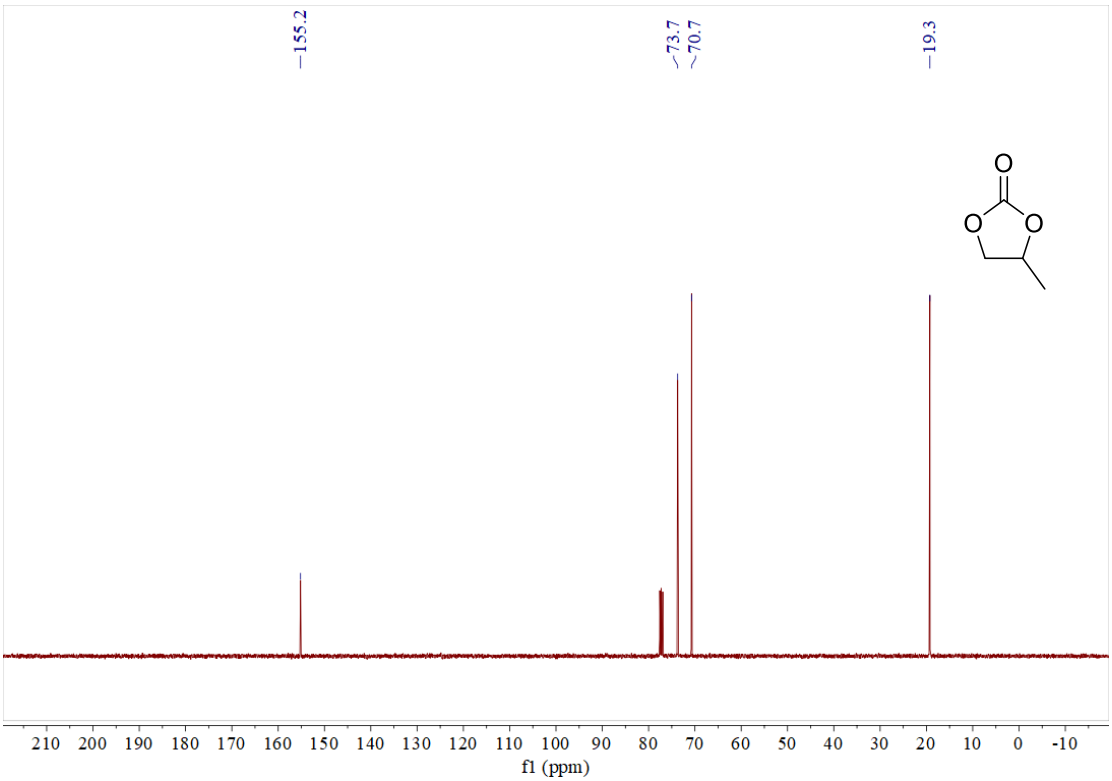
^{1}H NMR (400 MHz, $CDCl_3$) of tetrahydrofuro[3,4-d][1,3]dioxol-2-one (**2d**)



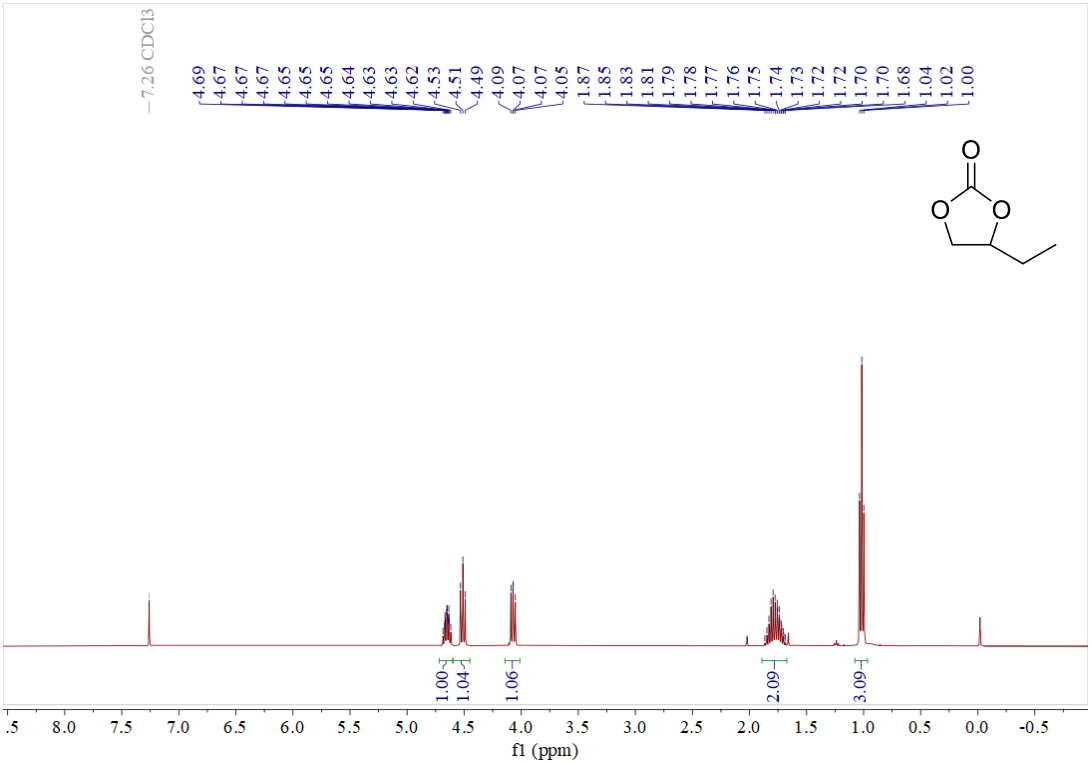
^{13}C NMR (101 MHz, $CDCl_3$) of tetrahydrofuro[3,4-d][1,3]dioxol-2-one (**2d**)



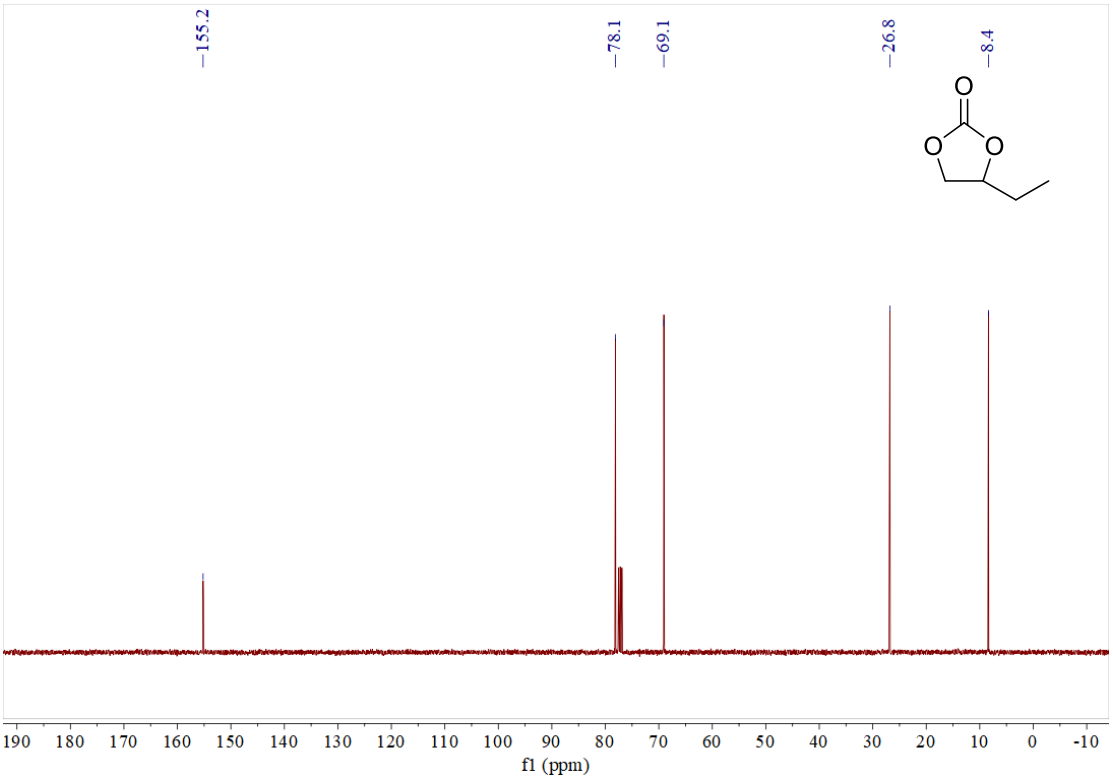
^{1}H NMR (400 MHz, $CDCl_3$) of 4-methyl-1,3-dioxolan-2-one (**2e**)



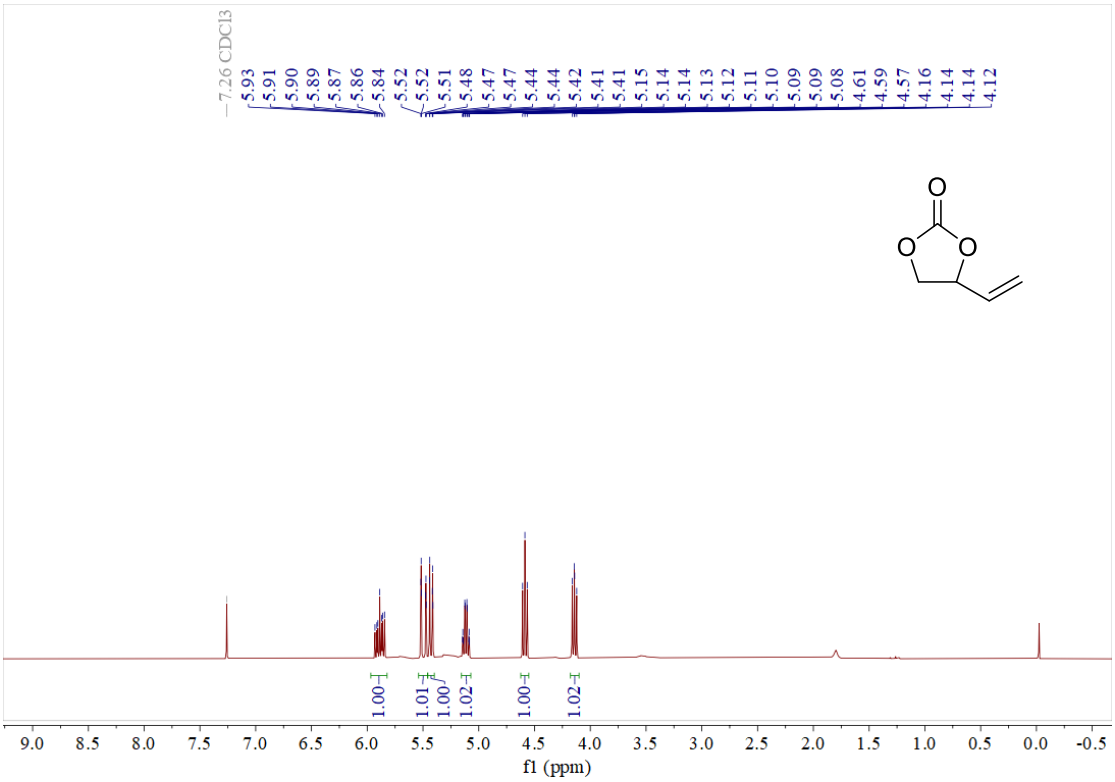
^{13}C NMR (101 MHz, $CDCl_3$) of 4-methyl-1,3-dioxolan-2-one (**2e**)



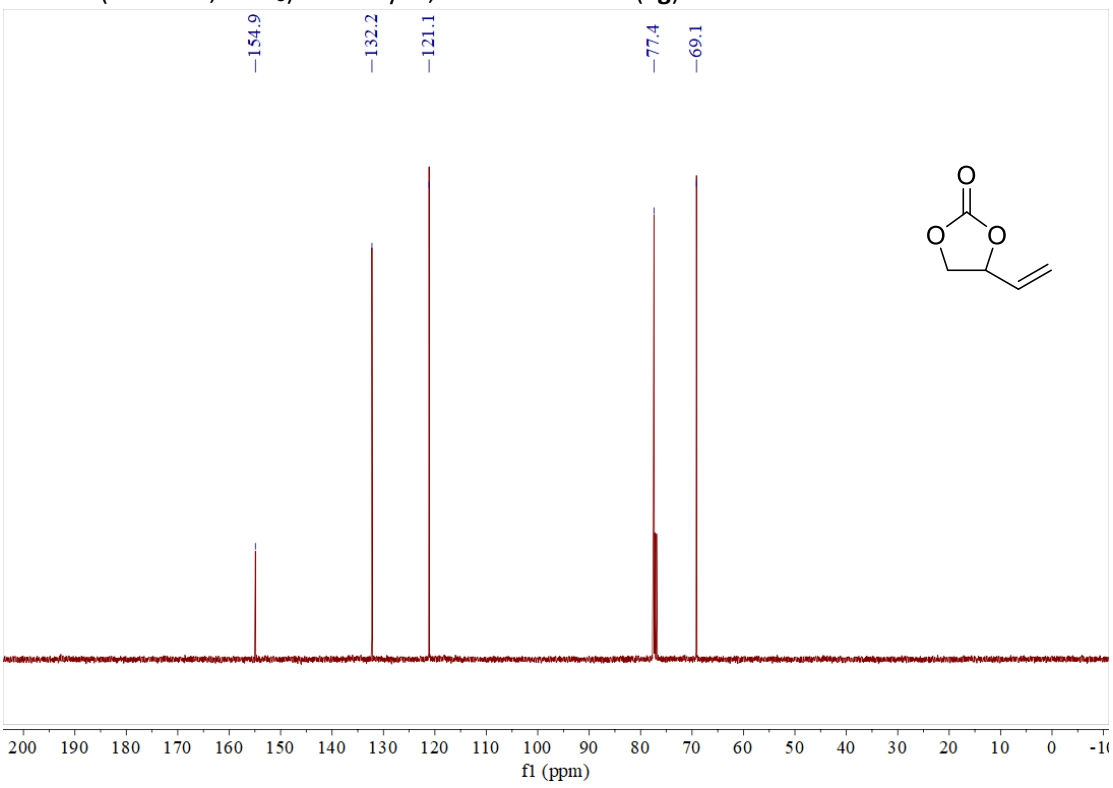
^{1}H NMR (400 MHz, $CDCl_3$) of 4-ethyl-1,3-dioxolan-2-one (**2f**)



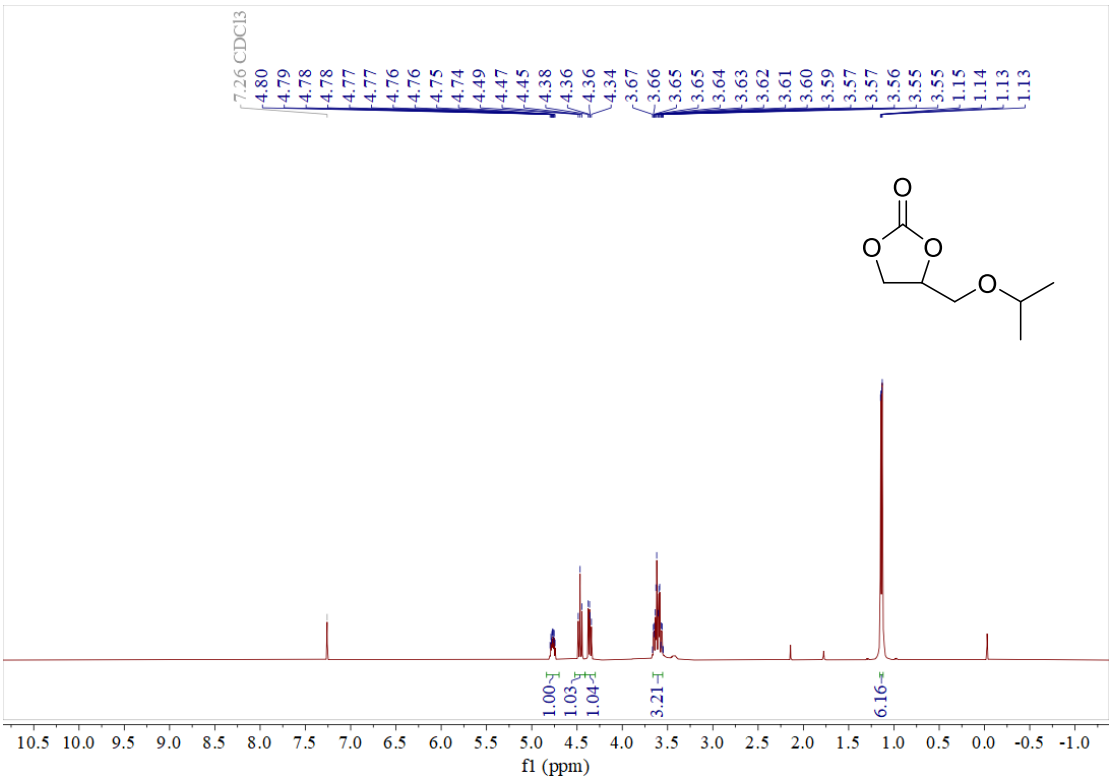
^{13}C NMR (101 MHz, $CDCl_3$) of 4 -ethyl-1,3-dioxolan-2-one (**2f**)



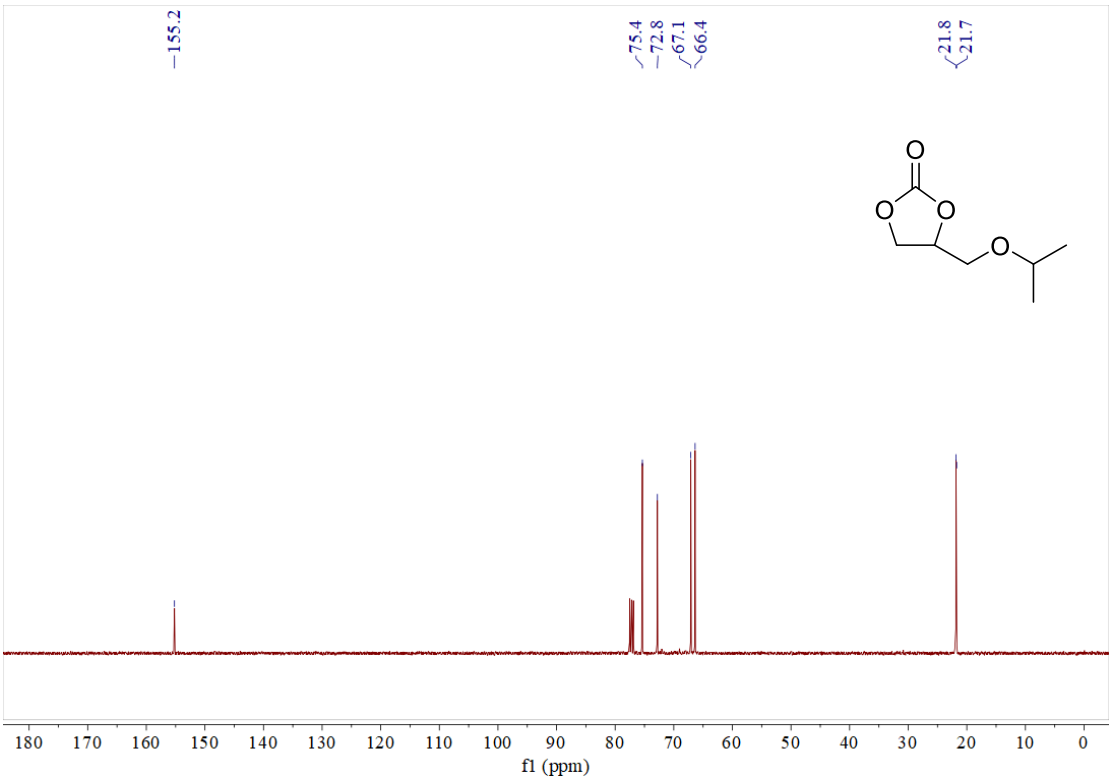
^{1}H NMR (400 MHz, $CDCl_3$) of 4-vinyl-1,3-dioxolan-2-one (**2g**)



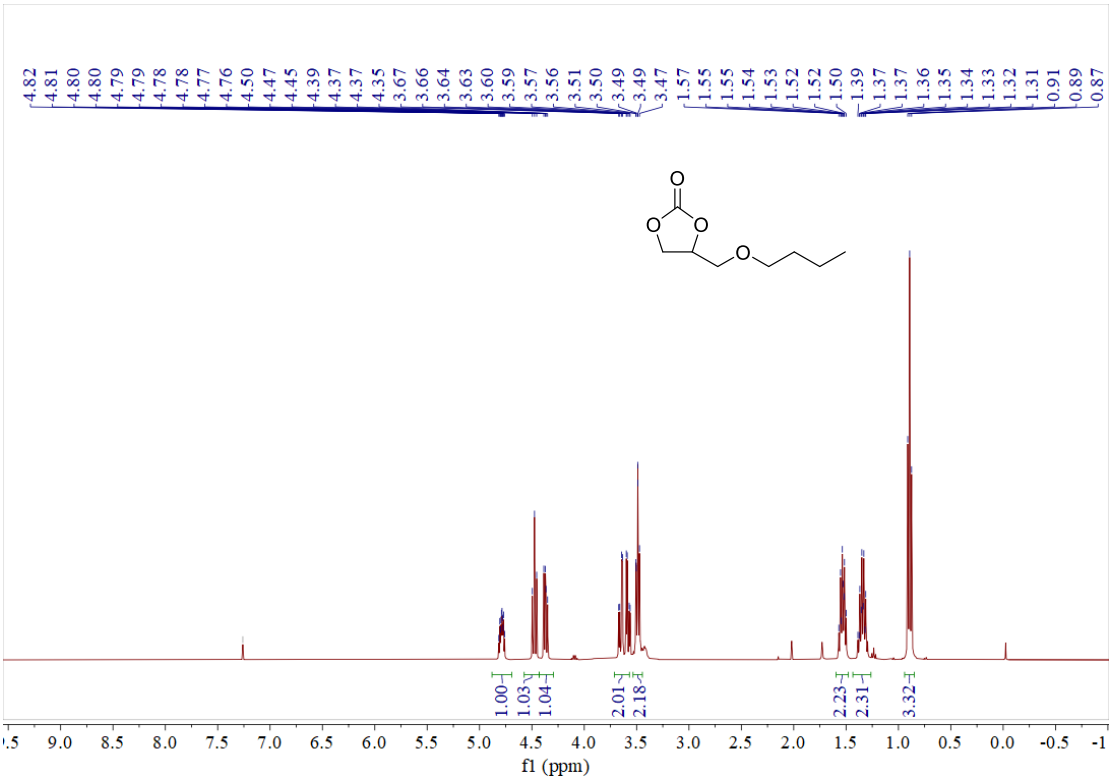
^{13}C NMR (101 MHz, $CDCl_3$) of 4-vinyl-1,3-dioxolan-2-one (**2g**)



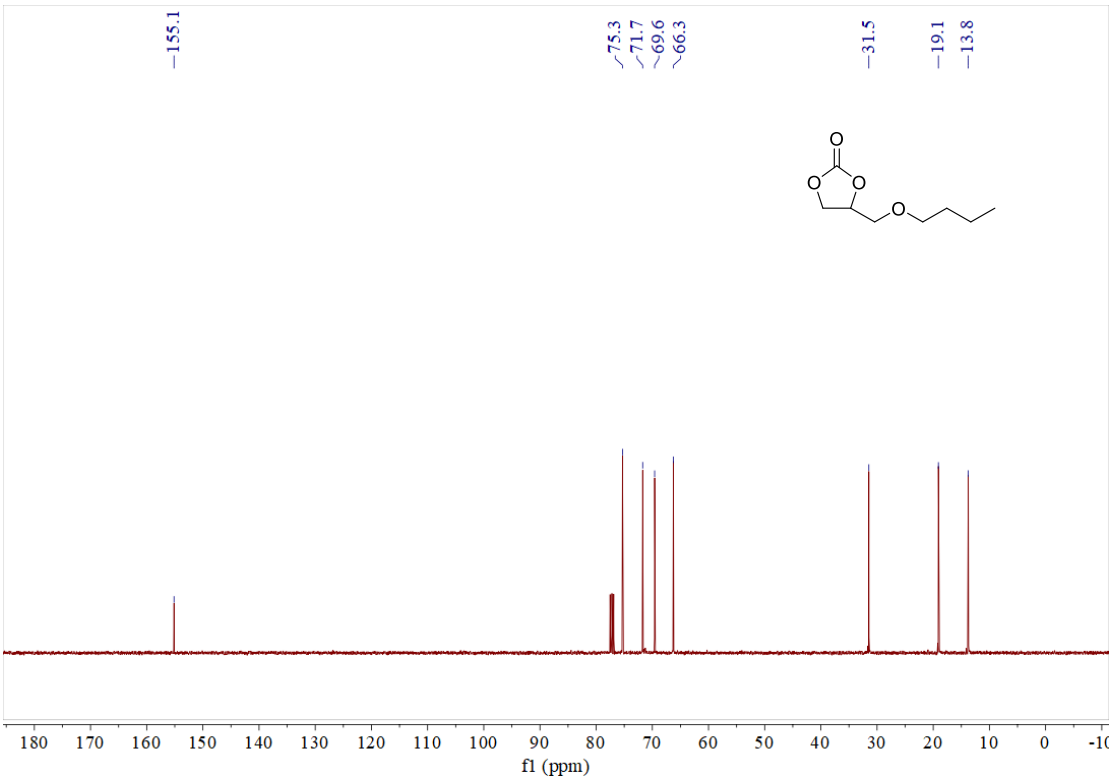
^{1}H NMR (400 MHz, $CDCl_3$) of 4-(isopropoxymethyl)-1,3-dioxolan-2-one (**2h**)



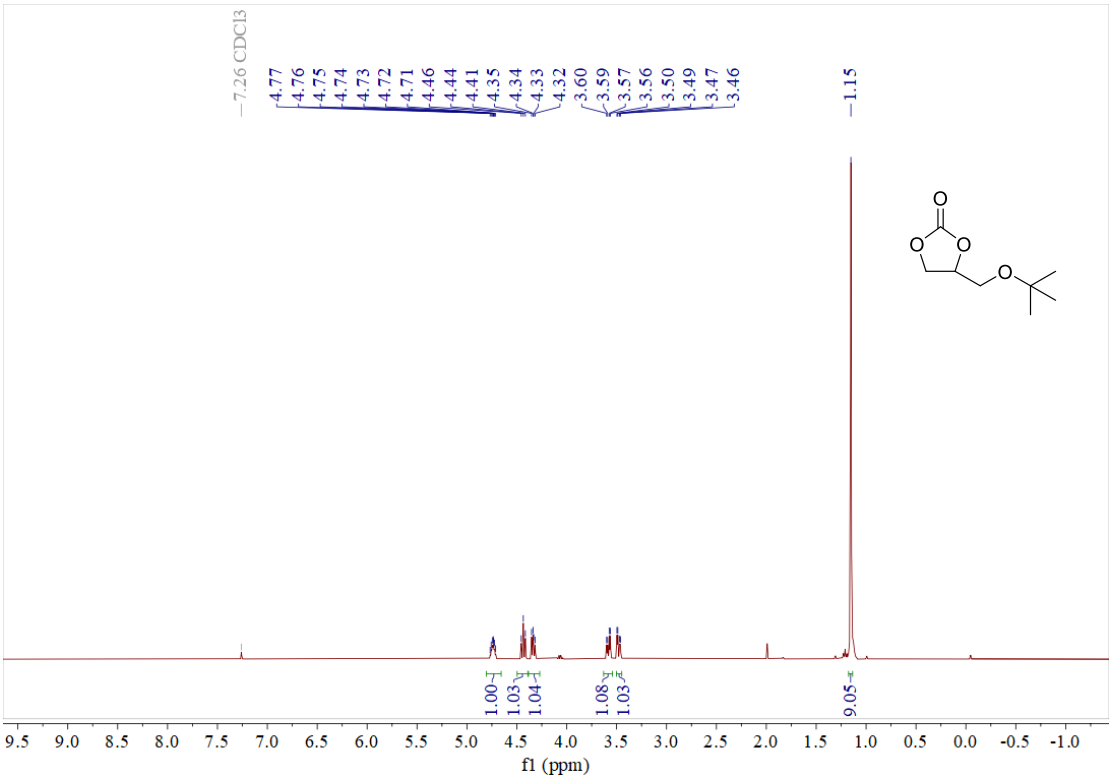
^{13}C NMR (101 MHz, $CDCl_3$) of 4-(isopropoxymethyl)-1,3-dioxolan-2-one (**2h**)



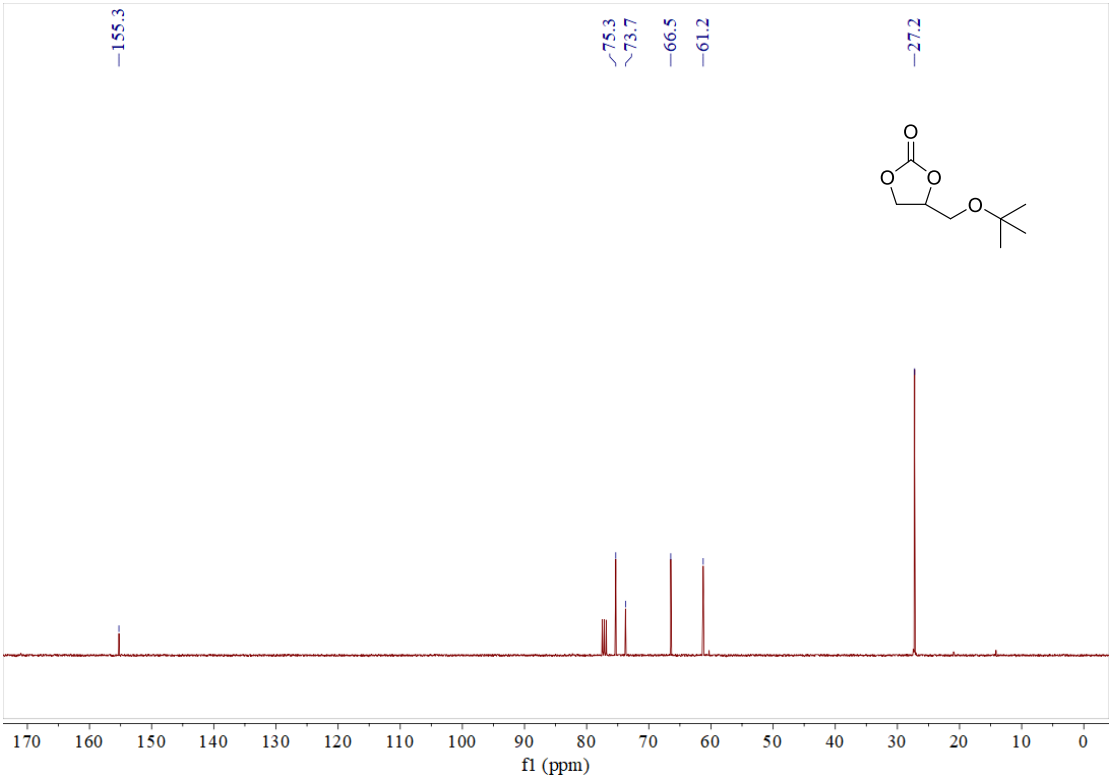
^{1}H NMR (400 MHz, $CDCl_3$) of 4-(butoxymethyl)-1,3-dioxolan-2-one (**2i**)



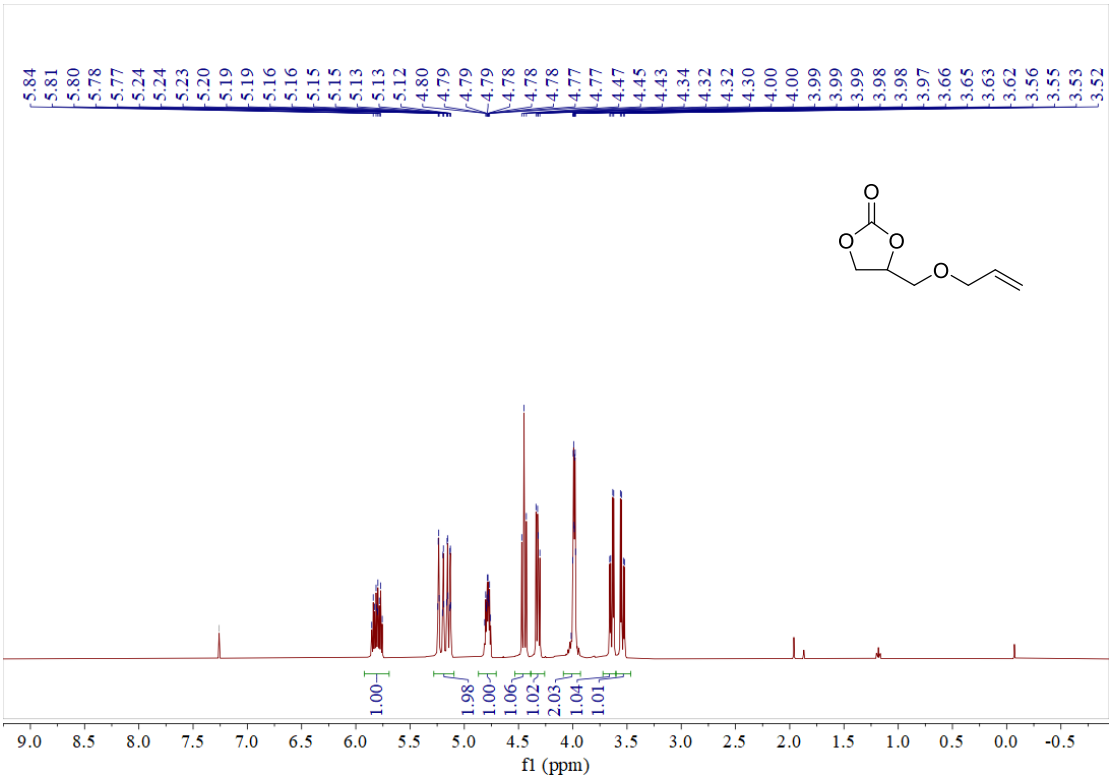
^{13}C NMR (101 MHz, $CDCl_3$) of 4-(butoxymethyl)-1,3-dioxolan-2-one (**2i**)



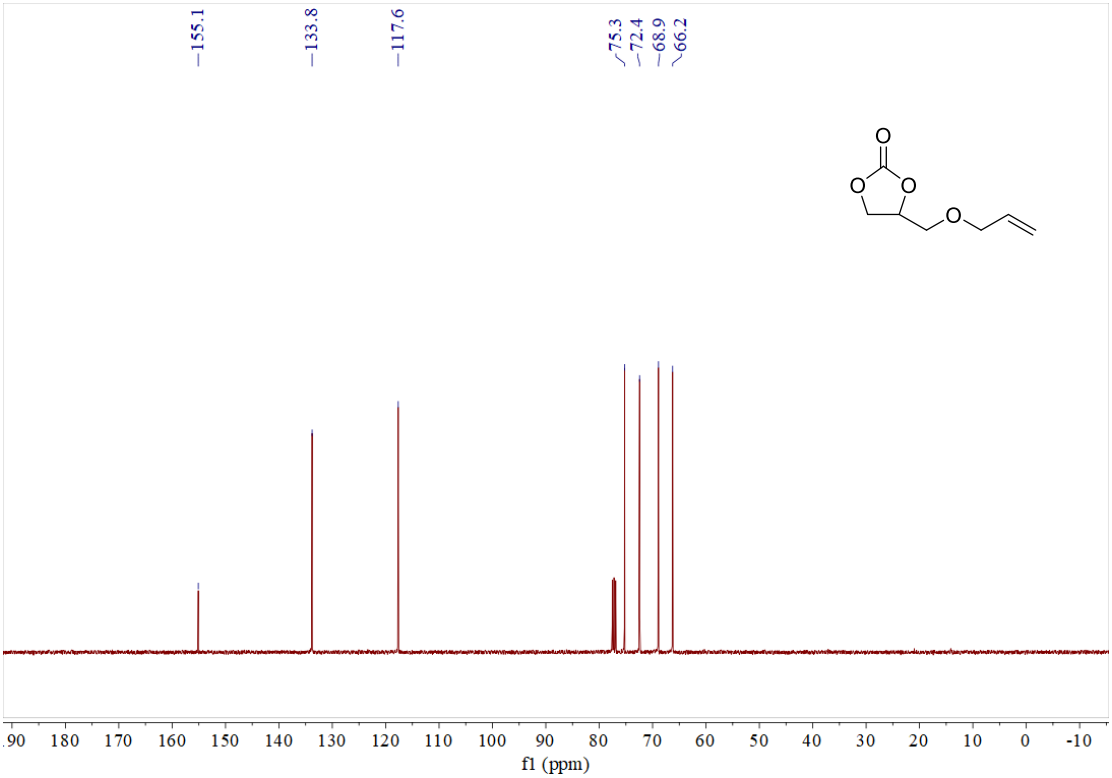
^{1}H NMR (400 MHz, $CDCl_3$) of 4-(tert-butoxymethyl)-1,3-dioxolan-2-one (**2j**)



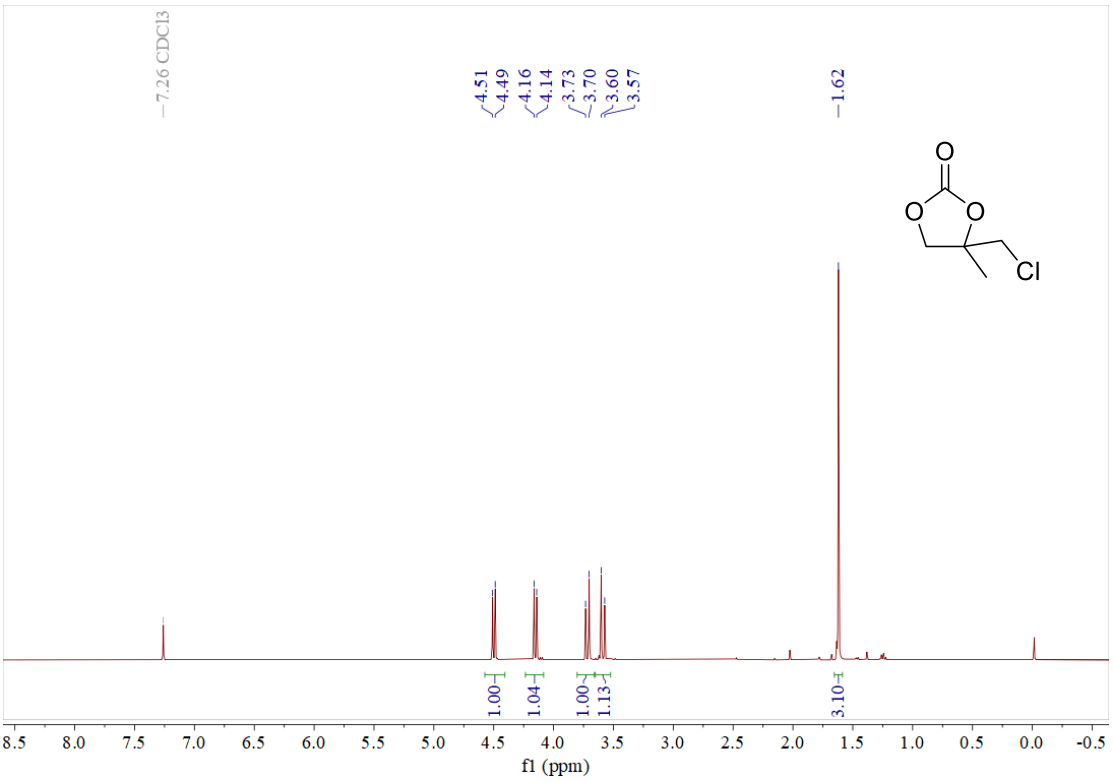
^{13}C NMR (101 MHz, $CDCl_3$) of 4-(tert-butoxymethyl)-1,3-dioxolan-2-one (**2j**)



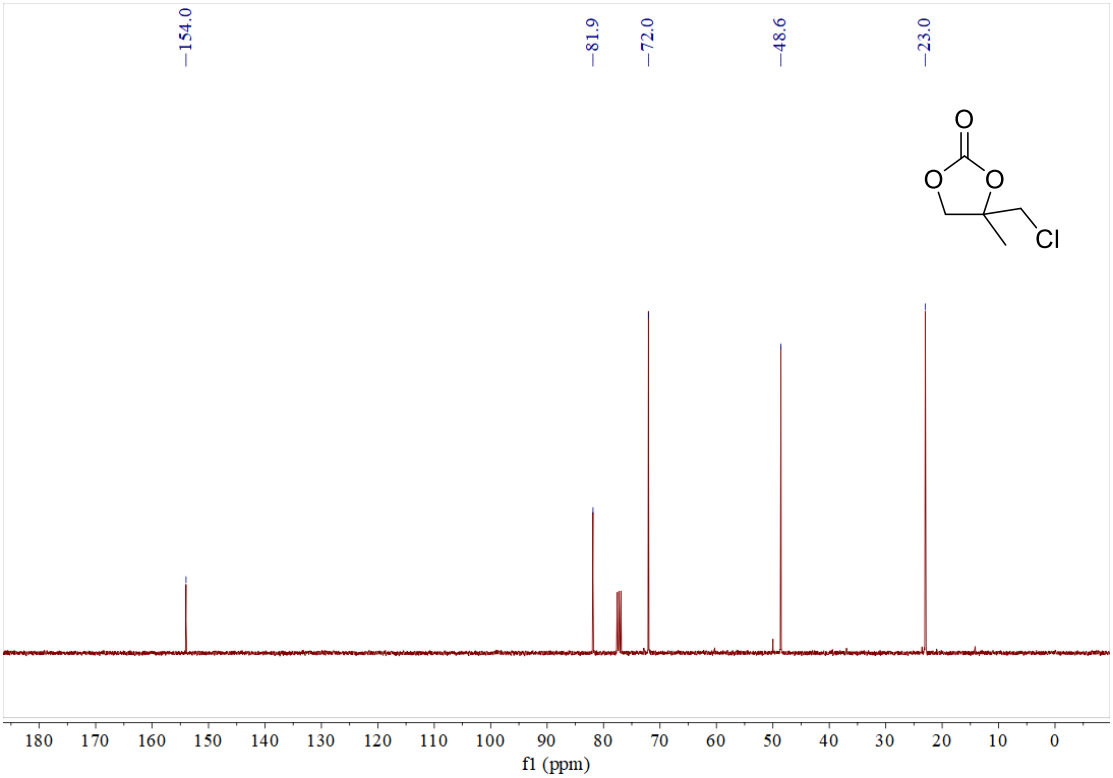
^{1}H NMR (400 MHz, $CDCl_3$) of 4-((allyloxy)methyl)-1,3-dioxolan-2-one (**2k**)



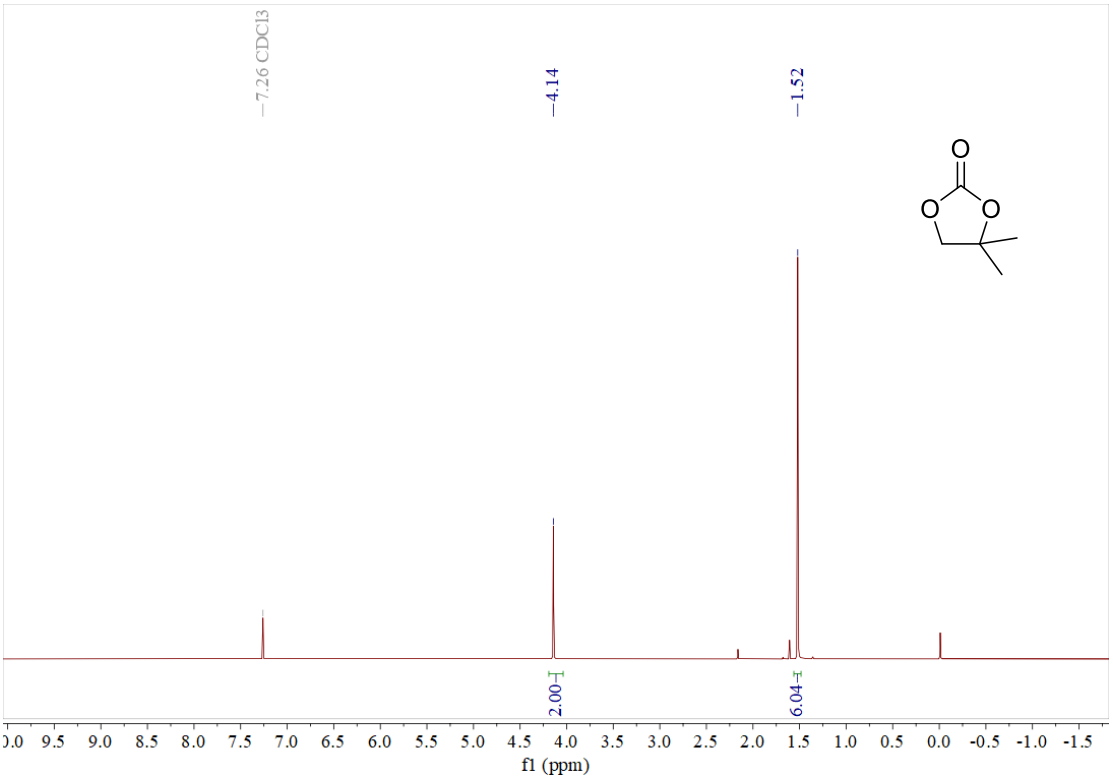
^{13}C NMR (101 MHz, $CDCl_3$) of 4-((allyloxy)methyl)-1,3-dioxolan-2-one (**2k**)



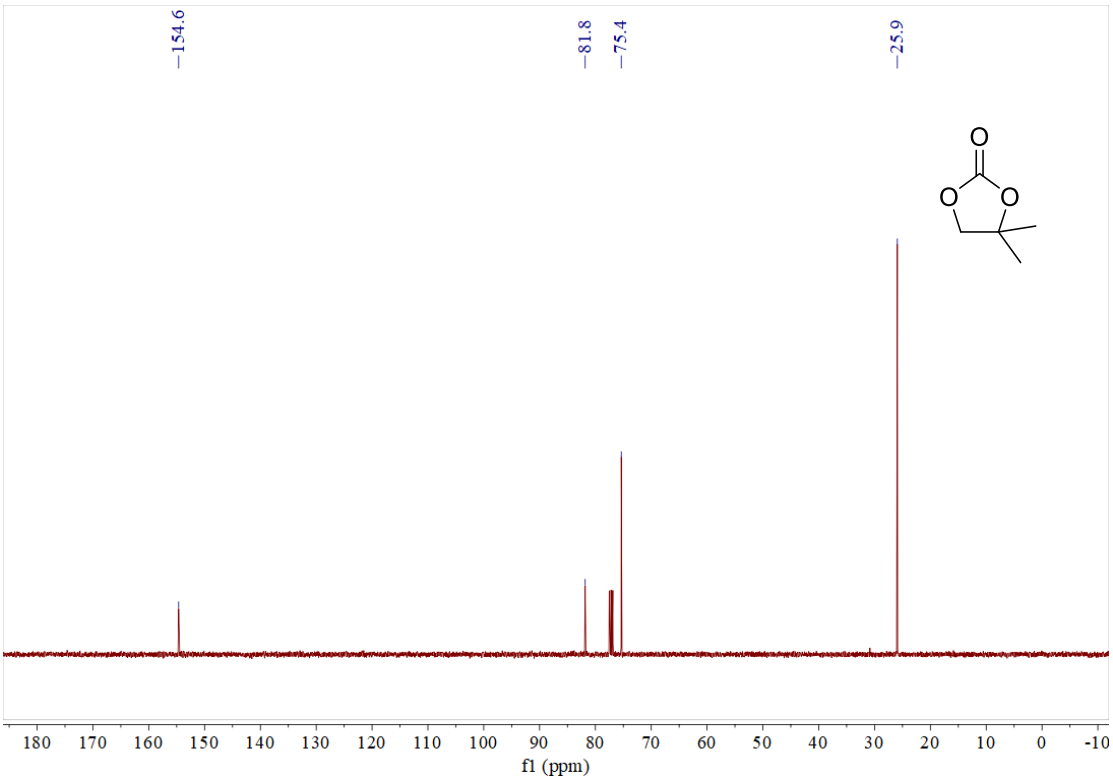
^{1}H NMR (400 MHz, $CDCl_3$) of 4-(chloromethyl)-4-methyl-1,3-dioxolan-2-one (**2l**)



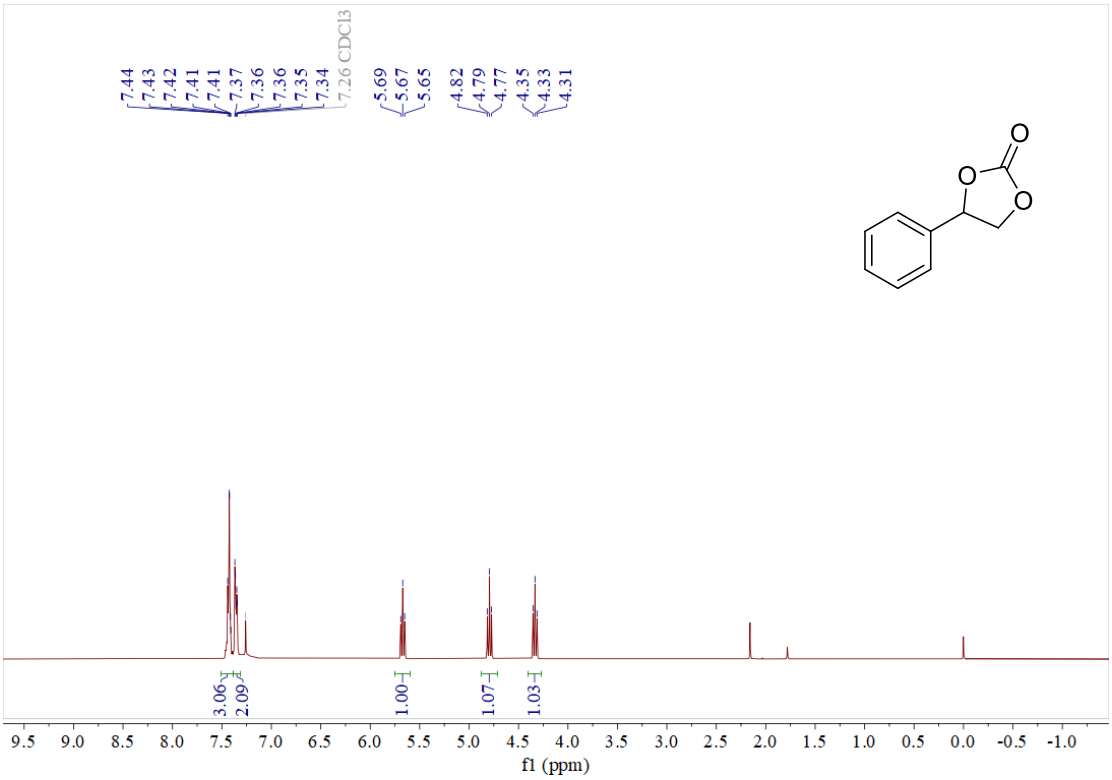
^{13}C NMR (101 MHz, $CDCl_3$) of 4-(chloromethyl)-4-methyl-1,3-dioxolan-2-one (**2l**)



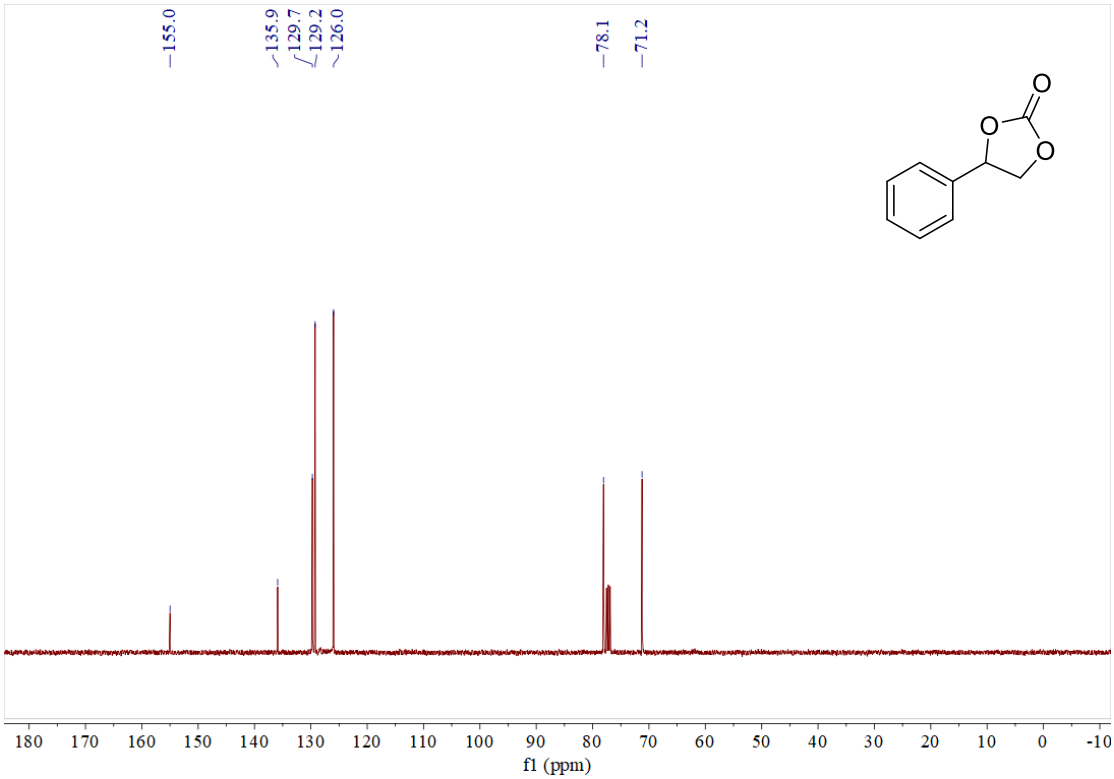
^{1}H NMR (400 MHz, $CDCl_3$) of 4,4-dimethyl-1,3-dioxolan-2-one (**2m**)



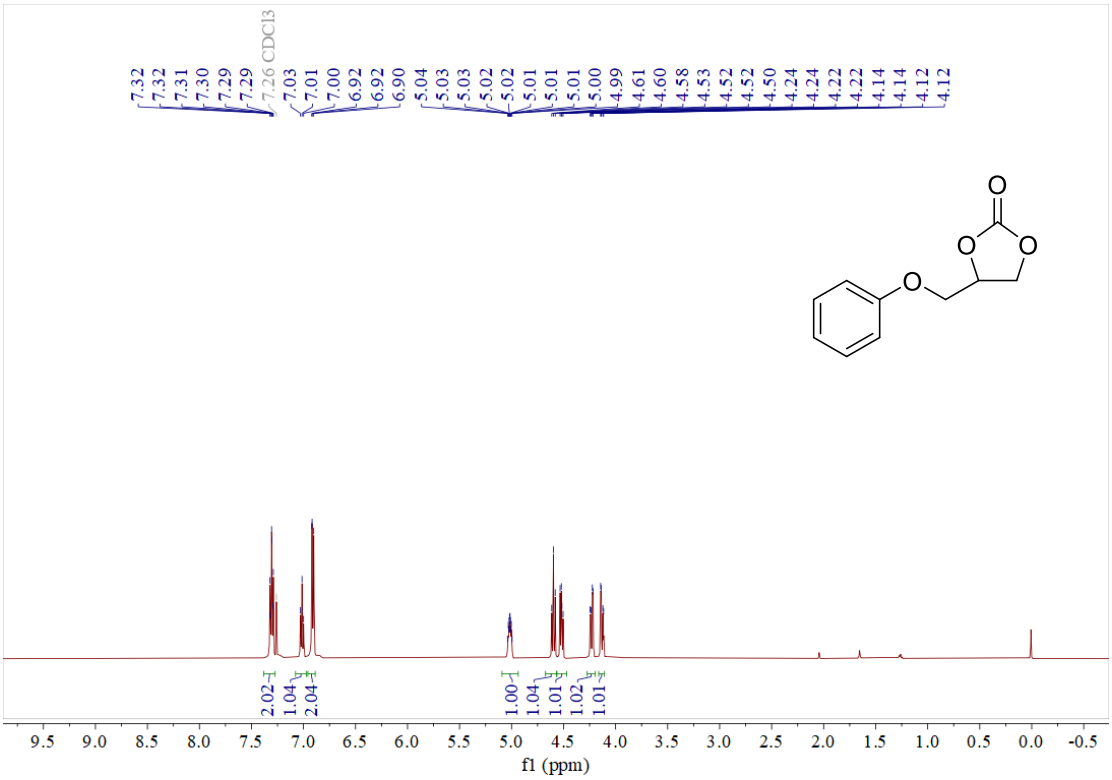
^{13}C NMR (101 MHz, $CDCl_3$) of 4,4-dimethyl-1,3-dioxolan-2-one (**2m**)



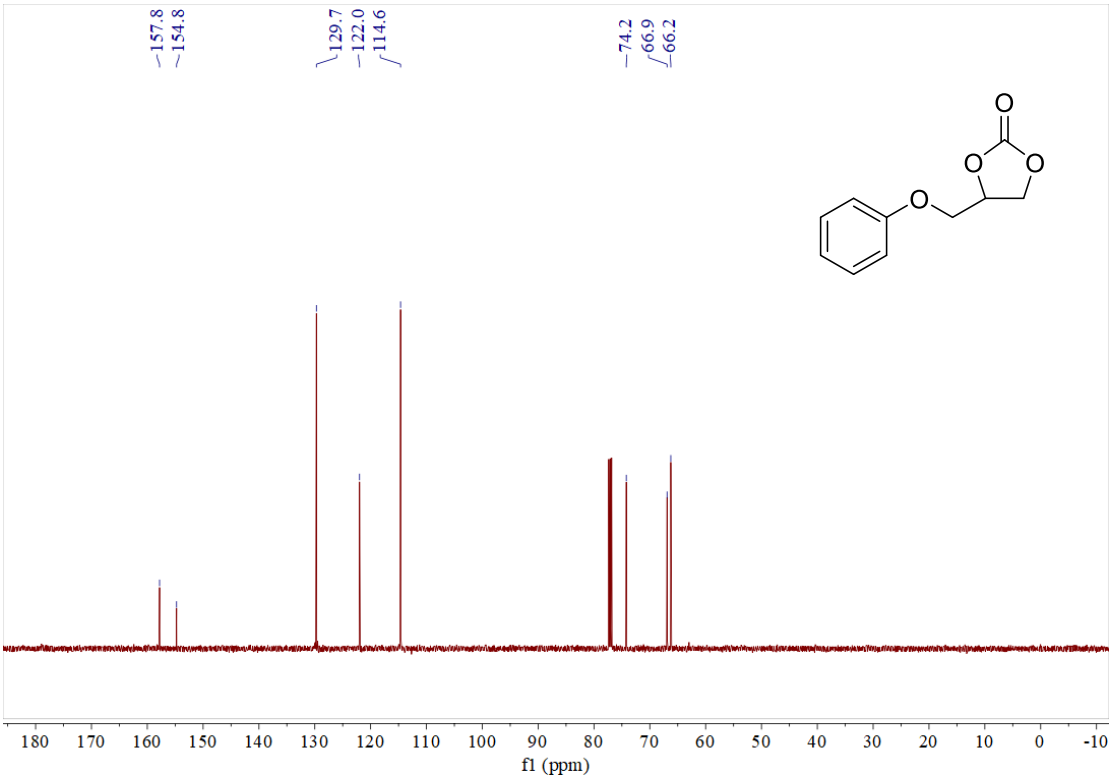
^{1}H NMR (400 MHz, $CDCl_3$) of 4-phenyl-1,3-dioxolan-2-one (**2n**)



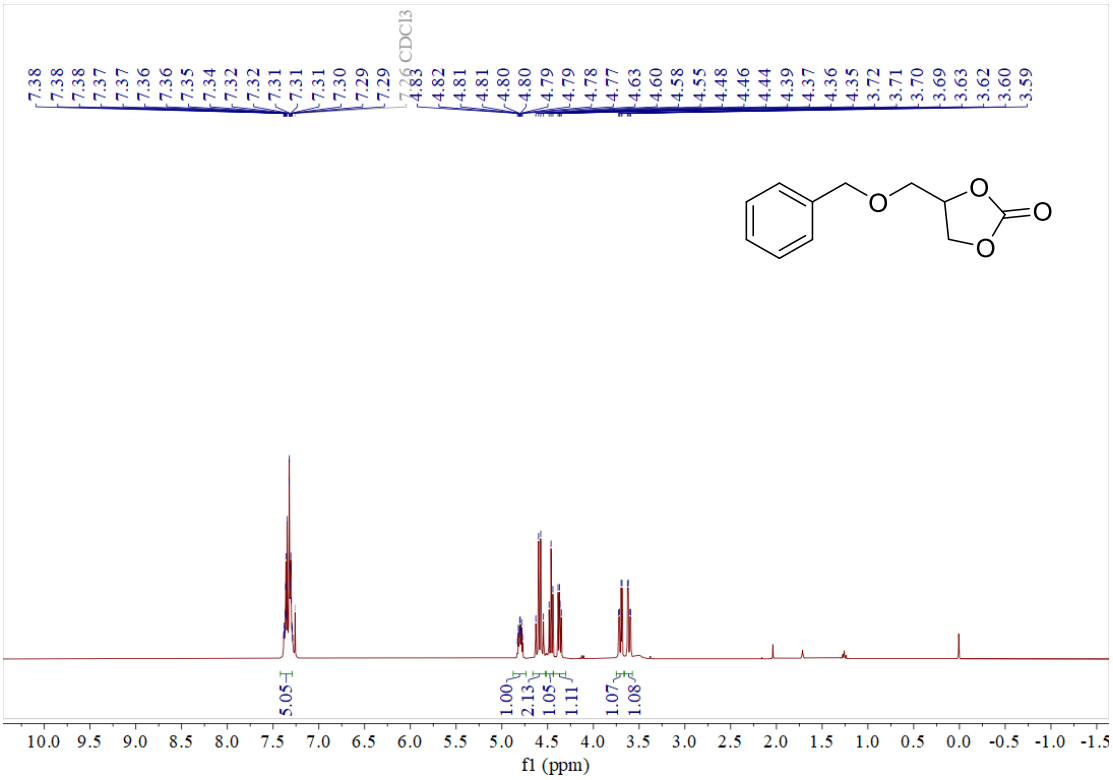
^{13}C NMR (101 MHz, $CDCl_3$) of 4-phenyl-1,3-dioxolan-2-one (**2n**)



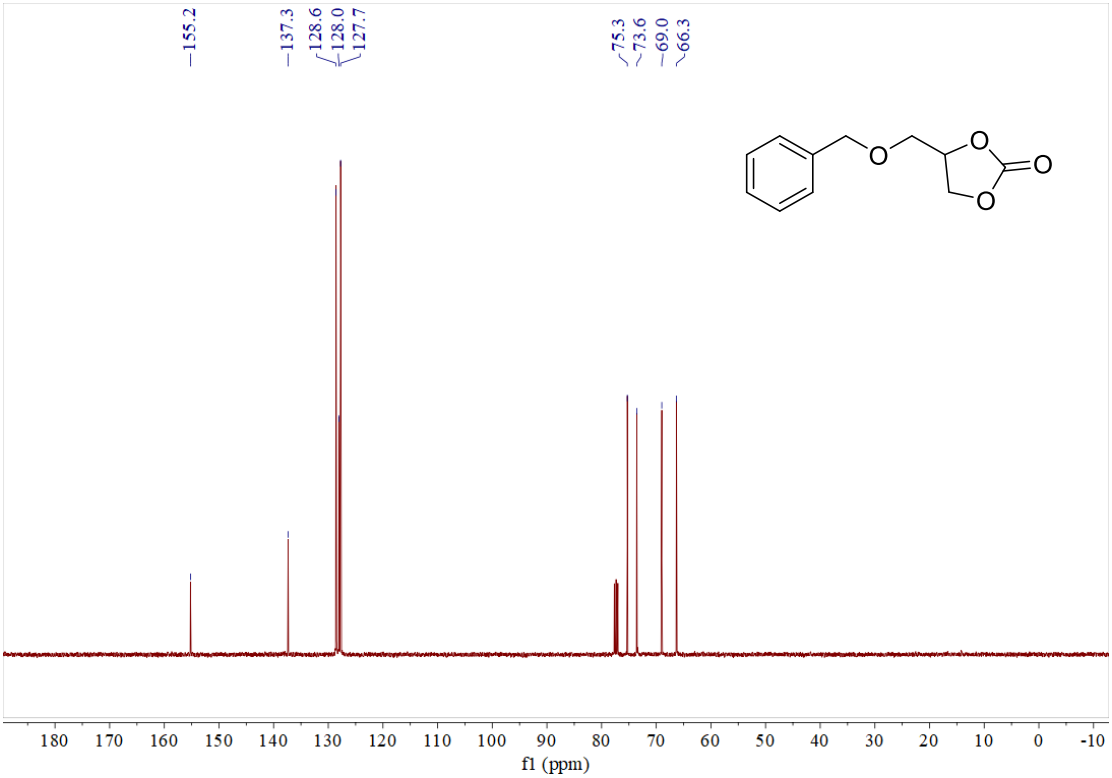
^{1}H NMR (500 MHz, $CDCl_3$) of 4-(phenoxymethyl)-1,3-dioxolan-2-one (**2o**)



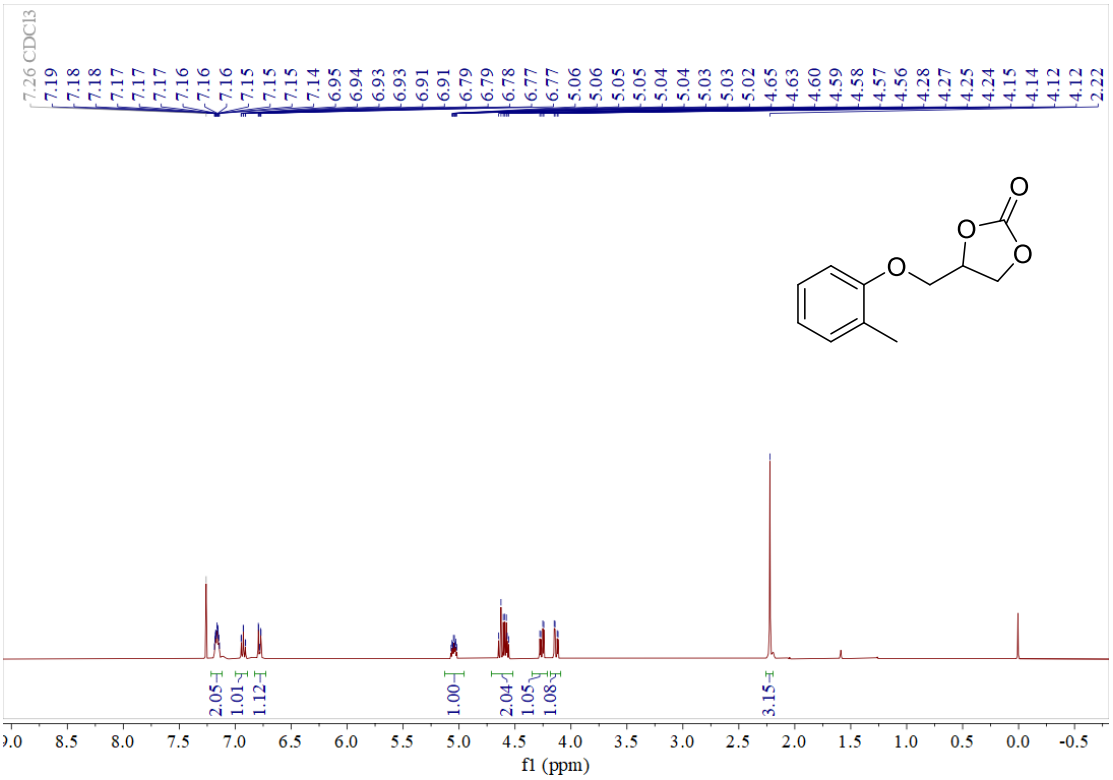
^{13}C NMR (126 MHz, $CDCl_3$) of 4-(phenoxymethyl)-1,3-dioxolan-2-one (**2o**)



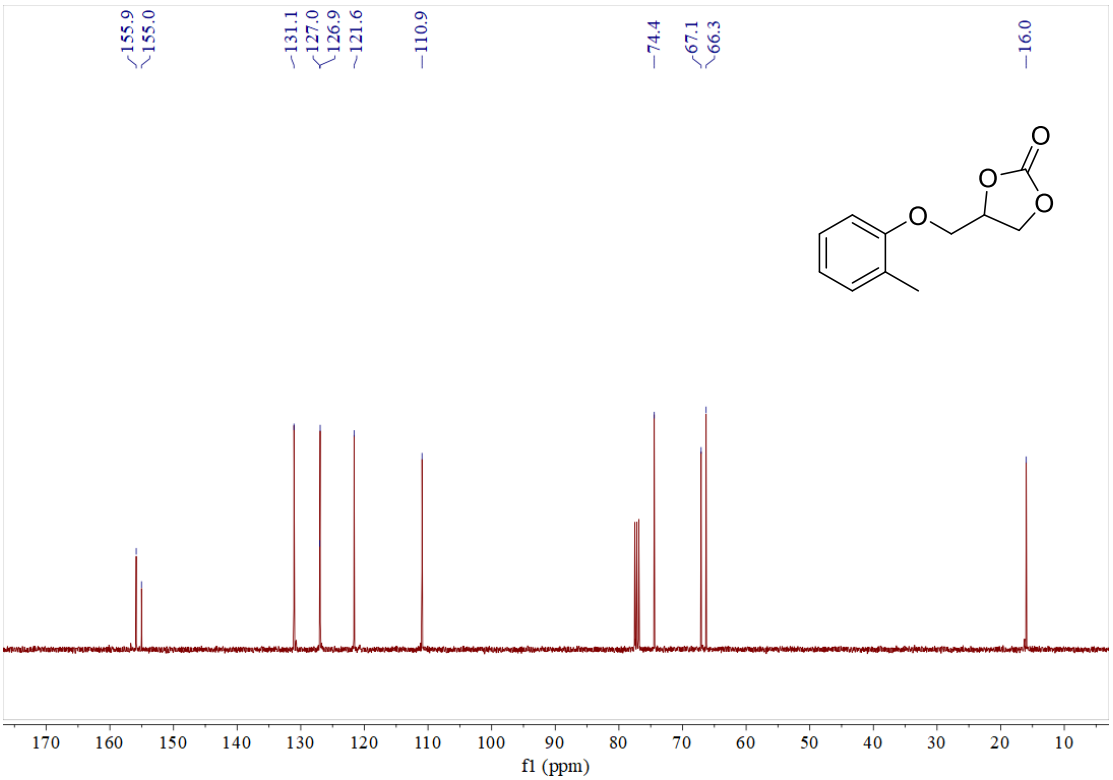
^{1}H NMR (400 MHz, $CDCl_3$) of 4-((benzyloxy)methyl)-1,3-dioxolan-2-one (**2p**)



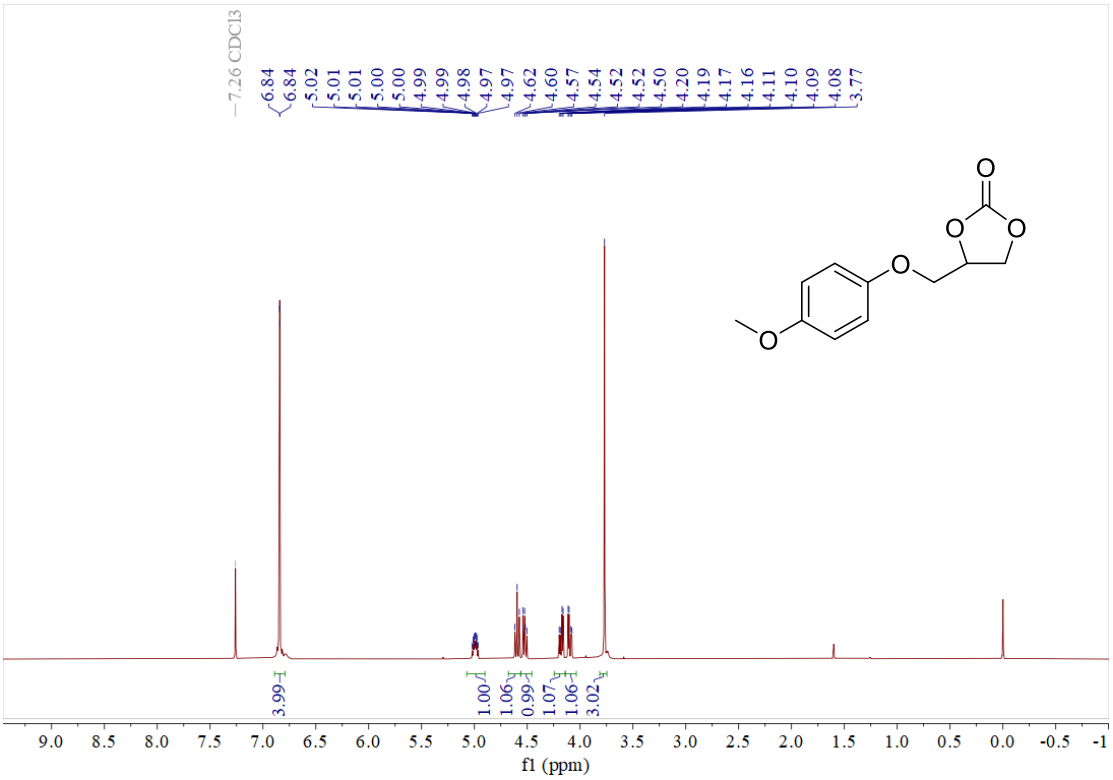
^{13}C NMR (101 MHz, $CDCl_3$) of 4-((benzyloxy)methyl)-1,3-dioxolan-2-one (**2p**)



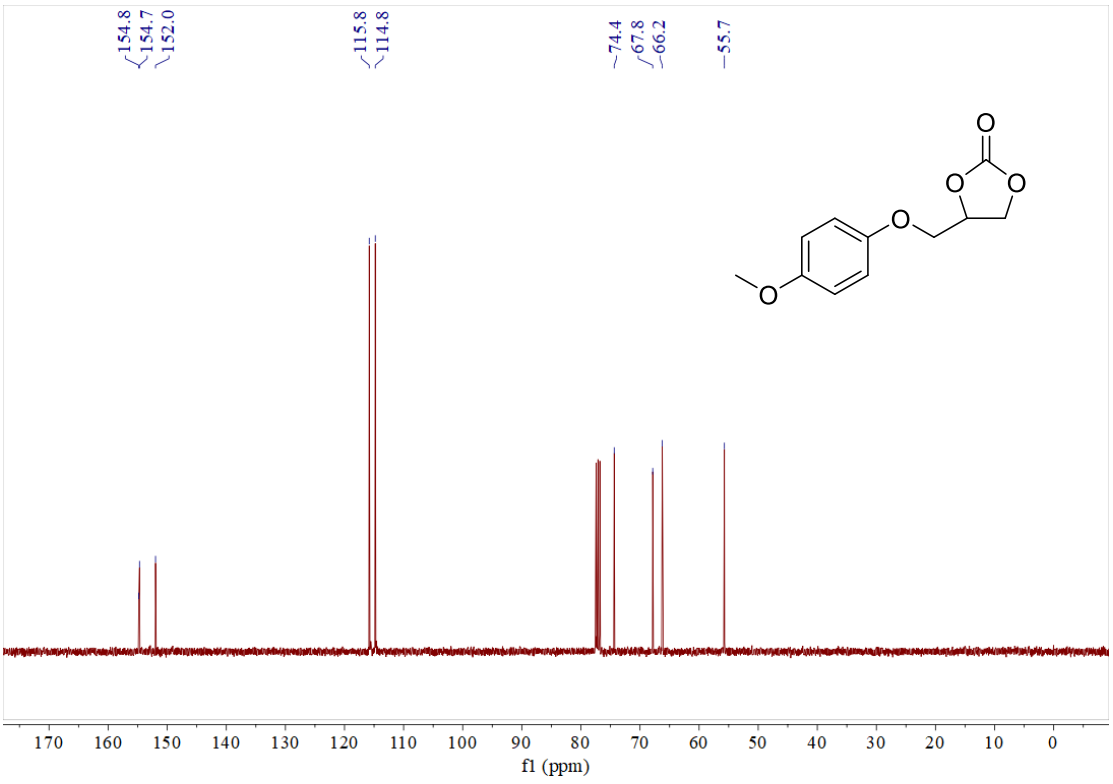
^{1}H NMR (400 MHz, $CDCl_3$) of 4-((o-tolyloxy)methyl)-1,3-dioxolan-2-one (**2q**)



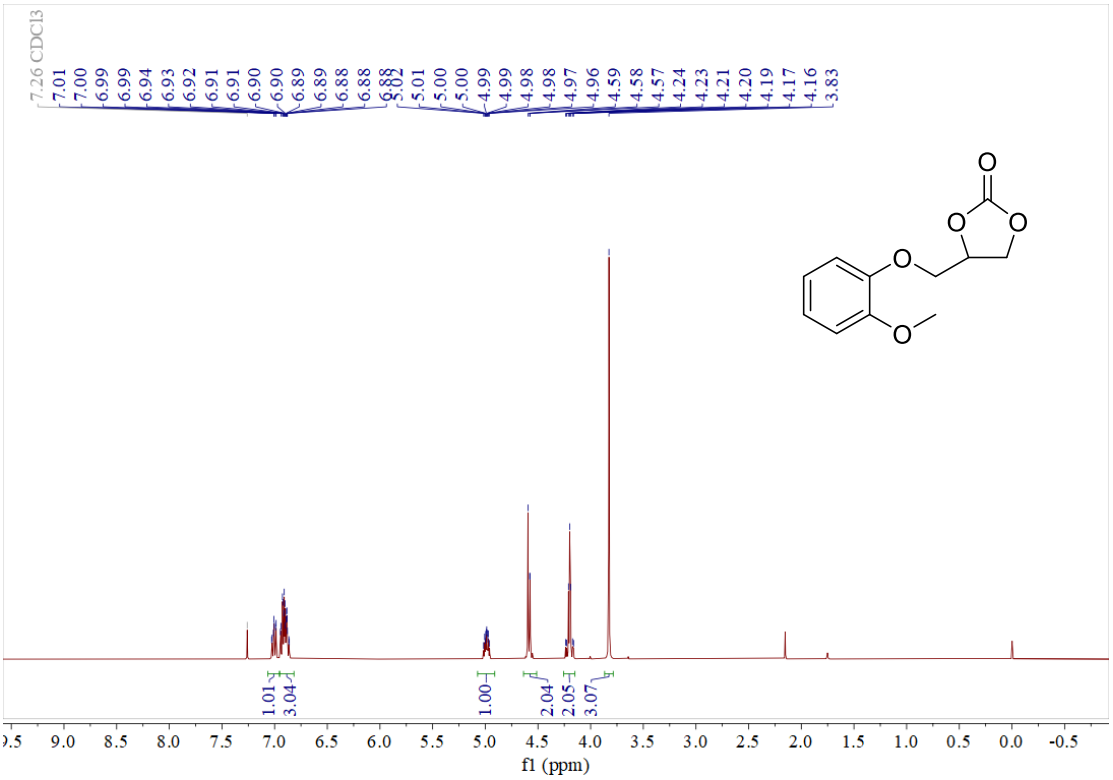
^{13}C NMR (101 MHz, $CDCl_3$) of 4-((o-tolyloxy)methyl)-1,3-dioxolan-2-one (**2q**)



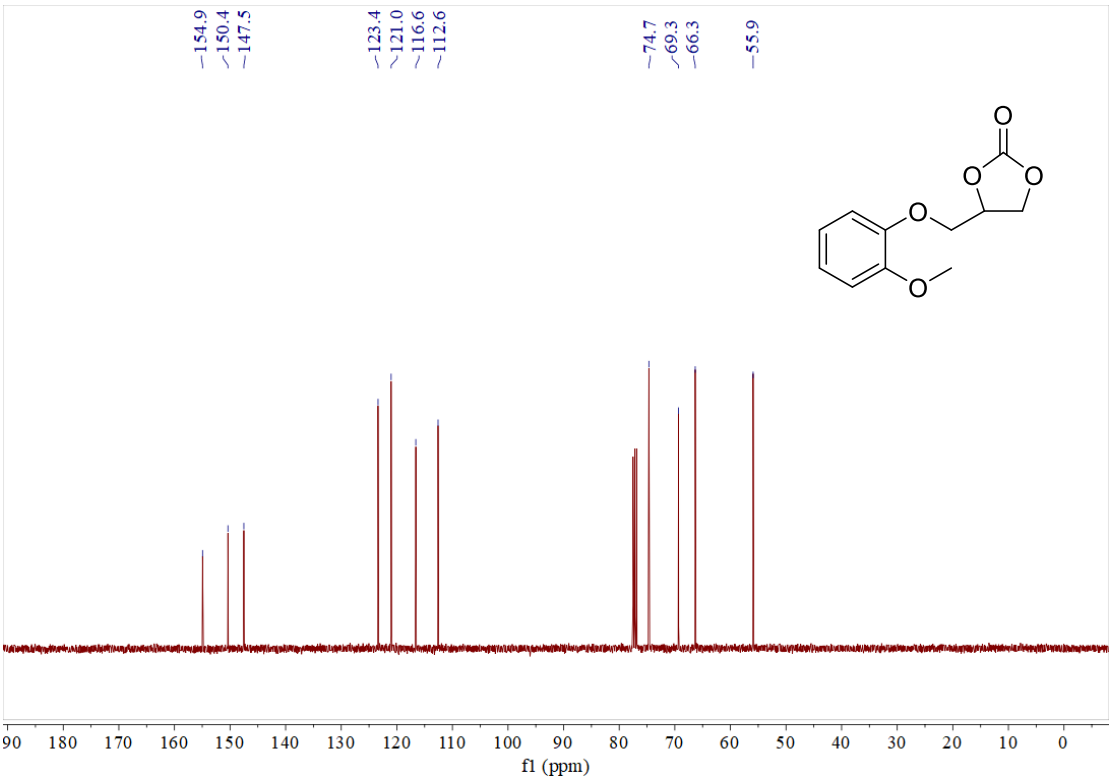
^{1}H NMR (400 MHz, $CDCl_3$) of 4-((4-methoxyphenoxy)methyl)-1,3-dioxolan-2-one (**2r**)



^{13}C NMR (101 MHz, $CDCl_3$) of 4-((4-methoxyphenoxy)methyl)-1,3-dioxolan-2-one (**2r**)



^{1}H NMR (400 MHz, $CDCl_3$) of 4-((2-methoxyphenoxy)methyl)-1,3-dioxolan-2-one (**2s**)



^{13}C NMR (101 MHz, $CDCl_3$) of 4-((2-methoxyphenoxy)methyl)-1,3-dioxolan-2-one (**2s**)

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