Direct conversion of aromatic 1,3-dioxanes to hydroxypropyl esters with pyridinium hydrobromide perbromide and sodium acetate in water

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Supporting Information

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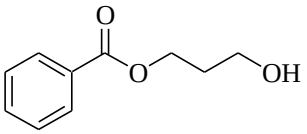
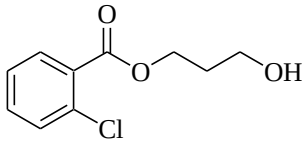
General Information:

IR spectra were recorded on a Perkin Elmer Spectrum One FT-IR spectrometer. ^{1}H and ^{13}C NMR spectra were recorded with a JEOL JNM-EX270 spectrometer at room temperature and the chemical shifts (δ) were given relative to internal standard $SiMe_4$ in $CDCl_3$.



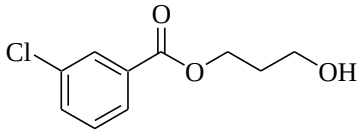
2

IR (KBr, cm^{-1}) 3420, 2961, 2890, 1716, 1602, 1584, 1452, 1390, 1358, 1316, 1278, 1177, 1120, 1070, 1052, 1027, 971, 927, 711. ^{1}H NMR($CDCl_3$) δ 2.01 (2H, quint, *J*=5.4 Hz), 3.77 (2H, t, *J*=5.4 Hz), 4.48 (2H, t, *J*=5.4 Hz), 7.43 (2H, t, *J*=8.1 Hz), 7.56 (1H, t, *J*=8.1 Hz), 8.03 (2H, d, *J*=8.1 Hz). ^{13}C NMR ($CDCl_3$) δ 31.80, 59.08, 61.79, 128.33, 129.54, 130.04, 132.99, 166.97.



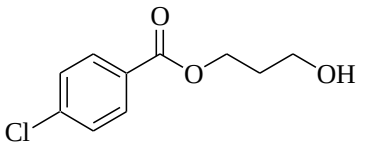
7a

IR (neat, cm^{-1}) 3401, 2961, 2892, 1727, 1592, 1571, 1472, 1436, 1389, 1358, 1295, 1253, 1163, 1138, 1123, 1051, 969, 924, 844, 792, 748, 719, 690, 649. ^{1}H NMR ($CDCl_3$) δ 2.02 (2H, quint, *J*=5.9 Hz), 3.80 (2H, t, *J*=5.9 Hz), 4.50 (2H, t, *J*=5.9 Hz), 7.28-7.34 (1H, m), 7.38-7.47 (2H, m), 7.82 (1H, dd, *J*=6.8, 2.0 Hz). ^{13}C NMR($CDCl_3$) δ 31.66, 59.28, 62.51, 126.59, 130.20, 131.05, 131.35, 132.56, 133.58, 166.16.



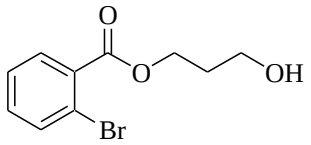
8a

IR (neat, cm^{-1}) 3401, 3072, 2961, 2889, 1722, 1597, 1574, 1471, 1427, 1390, 1358, 1325, 1292, 1259, 1133, 1085, 1073, 1052, 972, 930, 900, 860, 810, 748, 674, 656. ^{1}H NMR ($CDCl_3$) δ 2.04 (2H, quint, *J*=6.4 Hz) , 3.77 (2H, t, *J*=6.4 Hz), 4.50 (2H, t, *J*=6.4 Hz), 7.37 (1H, t, J=7.8 Hz), 7.53 (1H, dd, J=7.8 , 1.3 Hz), 7.92 (1H, dd, J=7.8, 1.3 Hz), 8.01 (1H, brs). ^{13}C NMR ($CDCl_3$) δ 31.79, 59.12, 62.19, 127.72, 129.66, 129.72, 131.86, 133.06, 134.57, 166.10.



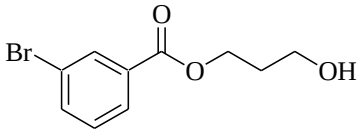
9a

IR (neat, cm^{-1}) 3416, 2960, 2888, 1720, 1595, 1488, 1469, 1402, 1359, 1325, 1275, 1172, 1121, 1105, 1092, 1052, 1015, 970, 926, 850, 759, 725, 685. ^{1}H NMR ($CDCl_3$) δ 2.01 (2H, quint, *J*=6.2 Hz), 3.77 (2H, t, *J*=6.2 Hz), 4.48 (2H, t, J=6.2 Hz), 7.41 (2H, d, *J*=8.6 Hz), 7.97 (2H, d, *J*=8.6 Hz). ^{13}C NMR ($CDCl_3$) δ 31.80, 59.10, 62.03, 128.53, 128.73, 130.96, 139.49, 166.09.



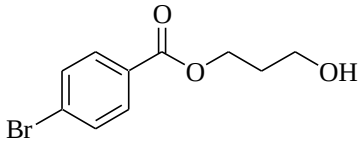
10a

IR (neat, cm^{-1}) 3404, 2961, 2890, 1728, 1590, 1566, 1469, 1432, 1388, 1357, 1293, 1254, 1137, 1113, 1045, 1029, 969, 924, 795, 744, 693, 643. ^{1}H NMR ($CDCl_3$) δ 2.03 (2H, quint, *J*=5.9 Hz), 3.81 (2H, t, *J*=5.9 Hz), 4.51 (2H, t, *J*=5.9 Hz), 7.29-7.40(2H, m), 7.66 (1H, dd, *J*=6.8, 2.0 Hz), 7.77 (1H, dd, *J*=6.8, 2.0 Hz). ^{13}C NMR ($CDCl_3$) δ 31.66, 59.28, 62.57, 121.49, 127.17, 131.24, 132.32, 132.56, 134.30, 166.63.



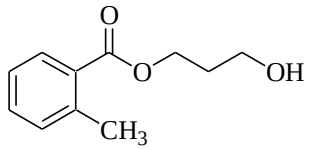
11a

IR (neat, cm^{-1}) 3405, 3069, 2960, 2889, 1721, 1593, 1569, 1471, 1424, 1390, 1358, 1325, 1291, 1259, 1165, 1128, 1101, 1067, 1051, 1000, 971, 928, 901, 854, 810, 746, 715, 672, 650. ^{1}H NMR ($CDCl_3$) δ 2.01 (2H, quint, *J*=6.4 Hz) , 3.78 (2H, t, *J*=6.4 Hz), 4.49 (2H, t, *J*=6.4 Hz), 7.32 (1H, t, *J*=7.8 Hz), 7.68 (1H, dd, J=7.8 , 1.3 Hz), 7.96 (1H, dd, *J*=7.8, 1.3 Hz), 8.16 (1H, brs). ^{13}C NMR($CDCl_3$) δ 31.80, 59.12, 62.19, 122.48, 128.19, 129.97, 132.59, 135.97, 165.60.



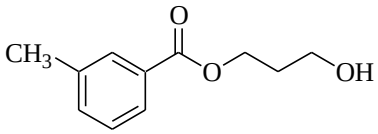
12a

IR (neat, cm^{-1}) 3415, 2959, 2887, 1720, 1590, 1483, 1398, 1359, 1325, 1273, 1173, 1120, 1104, 1068, 1051, 1012, 970, 926, 847, 756, 707, 683. ^{1}H NMR ($CDCl_3$) δ 2.00 (2H, quint, *J*=6.2 Hz), 3.77 (2H, t, *J*=6.2 Hz), 4.48 (2H, t, J=6.2 Hz), 7.58 (2H, d, *J*=8.6 Hz), 789 (2H, d, *J*=8.6 Hz). ^{13}C NMR ($CDCl_3$) δ 31.80, 59.12, 62.05, 128.15, 128.98, 131.10, 131.73, 166.21.



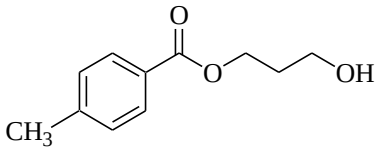
13a

IR (neat, cm^{-1}) 3412, 3068, 2962, 1717, 1602, 1576, 1488, 1457, 1440, 1383, 1357, 1294, 1258, 1143, 1081, 1052, 970, 926, 846, 738, 695, 663. ^{1}H NMR ($CDCl_3$) δ 2.00 (2H, quint, *J*=5.9 Hz), 2.59 (3H, s), 3.78 (2H, t, *J*=5.9 Hz), 4.47 (2H, t, *J*=5.9 Hz), 7.21-7.26 (2H, m), 7.40 (1H, t, *J*=8.1 Hz), 7.90 (1H, dd, *J*=8.1, 1.6 Hz). ^{13}C NMR ($CDCl_3$) δ 21.70, 31.91, 59.26, 61.51, 125.71, 130.51, 131.71, 132.03, 140.16, 167.99.



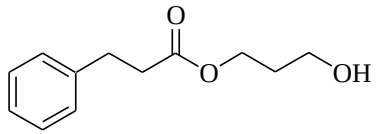
14a

IR (neat, cm^{-1}) 3414, 2959, 1717, 1608, 1590, 1457, 1386, 1357, 1280, 1201, 1111, 1083, 1051, 1001, 973, 932, 896, 814, 793, 745, 683, 670. ^{1}H NMR ($CDCl_3$) δ 2.00 (2H, quint, *J*=6.4 Hz) , 2.40 (3H, s), 3.77 (2H, t, *J*=6.4 Hz), 4.48 (2H, t, *J*=6.4 Hz), 7.29-7.38 (2H, m), 7.83 (1H, d, *J*=7.2 Hz), 7.84 (1H, brs). ^{13}C NMR ($CDCl_3$) δ 21.24, 31.93, 50.10, 59.21, 61.70, 126.73, 128.28, 130.04, 130.11, 133.80, 138.18, 167.18.



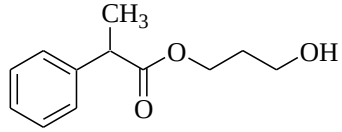
15a

IR (neat, cm^{-1}) 3419, 3036, 2959, 2888, 1715, 1612, 1577, 1509, 1455, 1407, 1389, 1358, 1310, 1277, 1208, 1178, 1112, 1052, 1020, 971, 927, 841, 754, 691, 637. ^{1}H NMR ($CDCl_3$) δ 2.00 (2H, quint, *J*=6.2 Hz), 2.40 (3H, s), 3.77 (2H, t, *J*=6.2 Hz), 4.37 (2H, t, *J*=6.2 Hz), 7.25 (2H, d, *J*=7.8 Hz), 7.92 (2H, d, *J*=7.8 Hz). ^{13}C NMR ($CDCl_3$) δ 21.63, 31.93, 59.17, 61.56, 127.31, 129.09, 129.61, 143.73, 167.09.



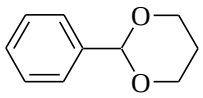
16a

IR (neat, cm^{-1}) 3429, 3086, 3063, 3028, 2959, 1732, 1604, 1496, 1454, 1419, 1392, 1363, 1294, 1261, 1179, 1163, 1077, 1055, 751, 700. ^{1}H NMR ($CDCl_3$) δ 1.83 (2H, m), ,2.65 (2H, t, *J*=8.1Hz), 2.95 (2H, t, *J*=8.1 Hz), 3.60 (2H, *J*=5.4 Hz), 4.22 (2H, t, *J*=5.4Hz), 7.18-7.32 (5H, m). ^{13}C NMR ($CDCl_3$) δ 30.92, 31.63, 35.81, 59.02, 61.32, 126.28, 128.25, 128.47, 140.32, 173.33.



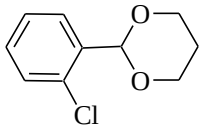
17a

IR (neat, cm^{-1}) 3445, 3087, 3062, 3029, 2975, 2936, 1732, 1601, 1584, 1495, 1453, 1377, 1328, 1264, 1203, 1170, 1096, 1064, 1032, 1009, 971, 931, 863, 815, 764, 735, 699. ^{1}H NMR ($CDCl_3$) δ 1.51 (3H, d, *J*=5.4 Hz), 1.80 (2H, quint, J=5.4 Hz), 3.55 (2H, t, *J*=5.4 Hz), 3.72 (1H, q, *J*=5.4 Hz), 4.22 (2H, m) , 7.24-7.36 (5H, m). ^{13}C NMR ($CDCl_3$) δ 18.30, 31.55, 45.49, 59.03, 61.72, 127.15, 127.36, 128.60, 140.39, 174.91.



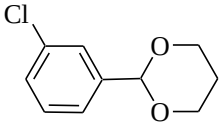
1

IR (neat, cm^{-1}) 3066, 3035, 2964, 2927, 2853, 2724, 1659, 1495, 1467, 1454, 1428, 1378, 1314, 1277, 1237, 1215, 1146, 1105, 1077, 1051, 1029, 1010, 990, 951, 909, 893, 869, 844, 749, 698, 640. ^{1}H NMR ($CDCl_3$) δ 1.43 (1H, brd, *J*=13.5 Hz), 2.20 (1H, m), 3.98 (2H, dd, *J*=13.5, 2.7 Hz), 4.26 (2H, t, *J*=10.8, 5.4 Hz), 5.50 (1H, s), 7.35 (3H, m), 7.48 (2H, dd, *J*=5.2, 2.7 Hz). ^{13}C NMR ($CDCl_3$) δ 25.72, 67.35, 101.60, 125.94, 128.21, 128.75, 138.66.



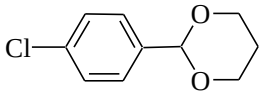
7

IR (neat, cm^{-1}) 3074, 2968, 2927, 2853, 2725, 1599, 1577, 1480, 1467, 1445, 1390, 1292, 1273, 1236, 1210, 1148, 1127, 1106, 1055, 1036, 1010, 991, 947, 928, 893, 862, 844, 757, 725, 710, 643. ^{1}H NMR ($CDCl_3$) δ 1.45 (1H, d, *J*=13.5 Hz), 2.24 (1H, m), 4.02 (2H, t, *J*=13.5Hz), 4.27 (2H, m), 5.83 (1H, s), 7.29 (3H, m), 7.70 (1H, dd, *J*=8.1, 2.7Hz). ^{13}C NMR ($CDCl_3$) δ 25.69, 67.59, 98.74, 126.93, 127.77, 129.32, 129.98, 132.57, 135.92.



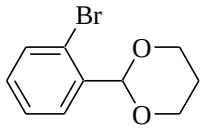
8

IR (neat, cm^{-1}) 2969, 2855, 1603, 1578, 1468, 1430, 1377, 1278, 1237, 1210, 1146, 1109, 1018, 996, 961, 873, 856, 785, 726, 686. ^{1}H NMR ($CDCl_3$) δ 1.45 (1H, d, *J*=13.5 Hz), 2.21 (1H, m), 3.97 (2H, t, *J*=13.5Hz), 4.26 (2H, m), 5.46 (1H, s), 7.31 (3H, m), 7.50 (1H, brs). ^{13}C NMR ($CDCl_3$) δ 25.62, 67.31, 100.49, 124.19, 126.33, 128.81, 129.48, 134.13, 140.55.



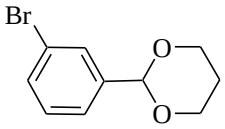
9

IR (neat, cm^{-1}) 3015, 2972, 2956, 2928, 2867, 1601, 1578, 1492, 1470, 1463, 1431, 1402, 1382, 1340, 1277, 1237, 1211, 1150, 1108, 1090, 1047, 1015, 992, 965, 945, 929, 898, 848, 808, 755, 723, 667, 638. ^{1}H NMR ($CDCl_3$) δ 1.43 (1H, d, *J*=13.5 Hz), 2.20 (1H, m), 3.96 (2H, t, *J*=13.5Hz), 4.24 (2H, m), 5.46 (1H, s), 7.33 (2H, d, *J*=8.1 Hz), 7.42 (2H, d, *J*=8.1 Hz). ^{13}C NMR ($CDCl_3$) δ 25.63, 67.32, 100.73, 127.45, 128.34, 134.49, 137.32.



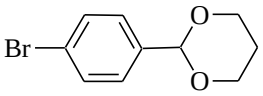
10

IR (neat, cm^{-1}) 3086, 2976, 2923, 2864, 1594, 1570, 1477, 1458, 1435, 1421, 1386, 1379, 1370, 1341, 1289, 1269, 1234, 1208, 1158, 1145, 1120, 1096, 1045, 1027, 1007, 988, 959, 948, 925, 894, 877, 863, 842, 761, 682, 642. ^{1}H NMR ($CDCl_3$) δ 1.43 (1H, d, *J*=13.5 Hz), 2.23 (1H, m), 4.01 (2H, t, *J*=13.5Hz), 4.27 (2H, m), 5.76 (1H, s), 7.18 (1H, t, *J*=8.1 Hz), 7.33 (1H, t, *J*=8.1 Hz), 7.52 (1H, d, *J*=8.1 Hz), 7.69 (1H, d, *J*=8.1 Hz). ^{13}C NMR ($CDCl_3$) δ 25.62, 67.50, 100.82, 122.23, 127.47, 128.00, 130.24, 132.52, 137.42.



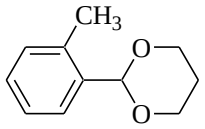
11

IR (neat, cm^{-1}) 2968, 2854, 1572, 1469, 1428, 1376, 1277, 1237, 1207, 1146, 1107, 1070, 1018, 993, 960, 894, 868, 853, 782, 706, 679, 640. ^{1}H NMR ($CDCl_3$) δ 1.43 (1H, d, *J*=13.5 Hz), 2.20 (1H, m), 3.96 (2H, t, *J*=13.5Hz), 4.25 (2H, m), 5.45 (1H, s), 7.22 (1H, t, *J*=8.1 Hz), 7.39 (1H, d, *J*=8,1 Hz), 7.45 (1H, d, *J*=8.1 Hz),), 7.65 (1H, brs). ^{13}C NMR ($CDCl_3$) δ 25.62, 67.32, 100.41, 122.31 124.67, 129.24, 129.77, 131.76, 140.77.



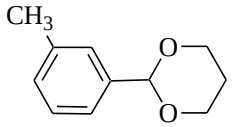
12

IR (neat, cm^{-1}) 2969, 2954, 2927, 2864, 1595, 1575, 1491, 1470, 1463, 1399, 1384, 1340, 1277, 1238, 1211, 1150, 1108, 1066, 1012, 991, 966, 944, 929, 898, 847, 804, 755, 638. ^{1}H NMR ($CDCl_3$) δ 1.42(1H, d, *J*=13.5 Hz), 2.19 (1H, m), 3.96 (2H, t, *J*=13.5Hz), 4.25 (2H, m), 5.44 (1H, s), 7.35 (2H, d, *J*=8.1 Hz), 7.48 (2H, d, *J*=8.1 Hz). ^{13}C NMR ($CDCl_3$) δ 25.62, 67.30, 100.73, 122.73, 127.76, 131.43, 137.72.



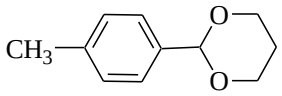
13

IR (neat, cm^{-1}) 3029, 2964, 2927, 2851, 2724, 1609, 1489, 1464, 1428, 1394, 1377, 1345, 1277, 1236, 1186, 1147, 1121, 1098, 1051, 1036, 1010, 988, 960, 947, 926, 893, 865, 848, 790, 755, 722, 643. ^{1}H NMR ($CDCl_3$) δ 1.43 (1H, d, *J*=13.5 Hz), 2.23 (1H, m), 2.39 (3H, s), 3.97 (2H, t, *J*=13.5Hz), 4.26 (2H, m), 5.60 (1H, s), 7.12-7.24 (3H, m), 7.57 (1H, dd, *J*=5.4, 2.7 Hz). ^{13}C NMR ($CDCl_3$) δ 18.73, 25.74, 67.46, 100.13, 125.78, 125.80, 128.59, 130.34, 135.55, 136.46.



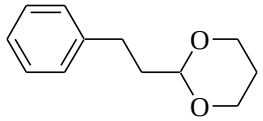
14

IR (neat, cm^{-1}) 2964, 2923, 2852, 2723, 1613, 1467, 1428, 1377, 1277, 1237, 1163, 1146, 1106, 1026, 999, 960, 934, 900, 860, 793, 767, 698. ^{1}H NMR ($CDCl_3$) δ 1.43 (1H, d, *J*=13.5 Hz), 2.23 (1H, m), 2.35 (3H, s), 3.97 (2H, t, *J*=13.5Hz), 4.26 (2H, m), 5.47 (1H, s), 7.14 (1H, m), 7.25 (2H, m), 7.32 (1H, brs). ^{13}C NMR ($CDCl_3$) δ 21.34, 25.73, 67.36, 101.75, 123.06, 126.48, 128.14, 129.51, 137.93, 138.56.



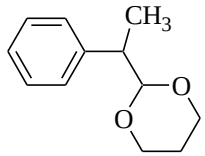
15

IR (neat, cm^{-1}) 2964, 2925, 2852, 2724, 1619, 1519, 1468, 1428, 1379, 1311, 1277, 1237, 1218, 1178, 1153, 1104, 1021, 990, 947, 926, 893, 872, 849, 810, 777. ^{1}H NMR ($CDCl_3$) δ 1.42 (1H, d, *J*=13.5 Hz), 2.20 (1H, m), 2.33 (3H, s), 3.96 (2H, t, *J*=13.5Hz), 4.24 (2H, m), 5.46 (1H, s), 7.15 (2H, d, *J*=8.1 Hz), 7.35 (2H, d, *J*=8.1 Hz). ^{13}C NMR ($CDCl_3$) δ 21.18, 25.72, 67.30, 101.66, 125.82, 128.84, 135.87, 138.43.



16

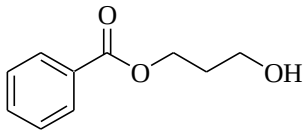
IR (neat, cm^{-1}) 3085, 3062, 3026, 2959, 2928, 2851, 2730, 2664, 1603, 1496, 1469, 1455, 1430, 1404, 1378, 1286, 1258, 1240, 1216, 1195, 1133, 1087, 1031, 1004, 970, 947, 926, 910, 884, 851, 814, 748, 700. ^{1}H NMR ($CDCl_3$) δ 1.33 (1H, d, *J*=13.5 Hz), 1.91 (2H, m), 2.09 (1H, m), 2.72 (2H, t, *J*=8.1 Hz), 3.74 (2H, t, *J*=13.5 Hz), 4.11 (2H, m), 4.51 (1H, t, *J*=5.4 Hz), 7.18-7.30 (5H, m). ^{13}C NMR ($CDCl_3$) δ 25.81, 30.07, 36.60, 66.84, 101.42, 125.77, 128.32, 128.42, 141.69.



17

IR (neat, cm^{-1}) 3086, 3062, 3029, 2967, 2934, 2850, 2728, 1600, 1494, 1453, 1429, 1379, 1265, 1238, 1216, 1144, 1101, 1026, 1008, 975, 919, 892, 858, 762, 700. ^{1}H NMR ($CDCl_3$) δ 1.26-1.31 (4H, m), 2.04 (1H, m), 2.92 (1H, quint, *J*=5.4 Hz), 3.70 (2H, q *J*=13.5 Hz), 4.07 (2H, m), 4.58 (1H, d, *J*=5.4 Hz), 7.20-7.32 (5H, m). ^{13}C NMR ($CDCl_3$) δ 16.13, 25.77, 44.75, 67.02, 67.05, 104.94, 126.33, 128.14, 142.92.

^{1}H NMR ($CDCl_3$, 270.05 MHz)



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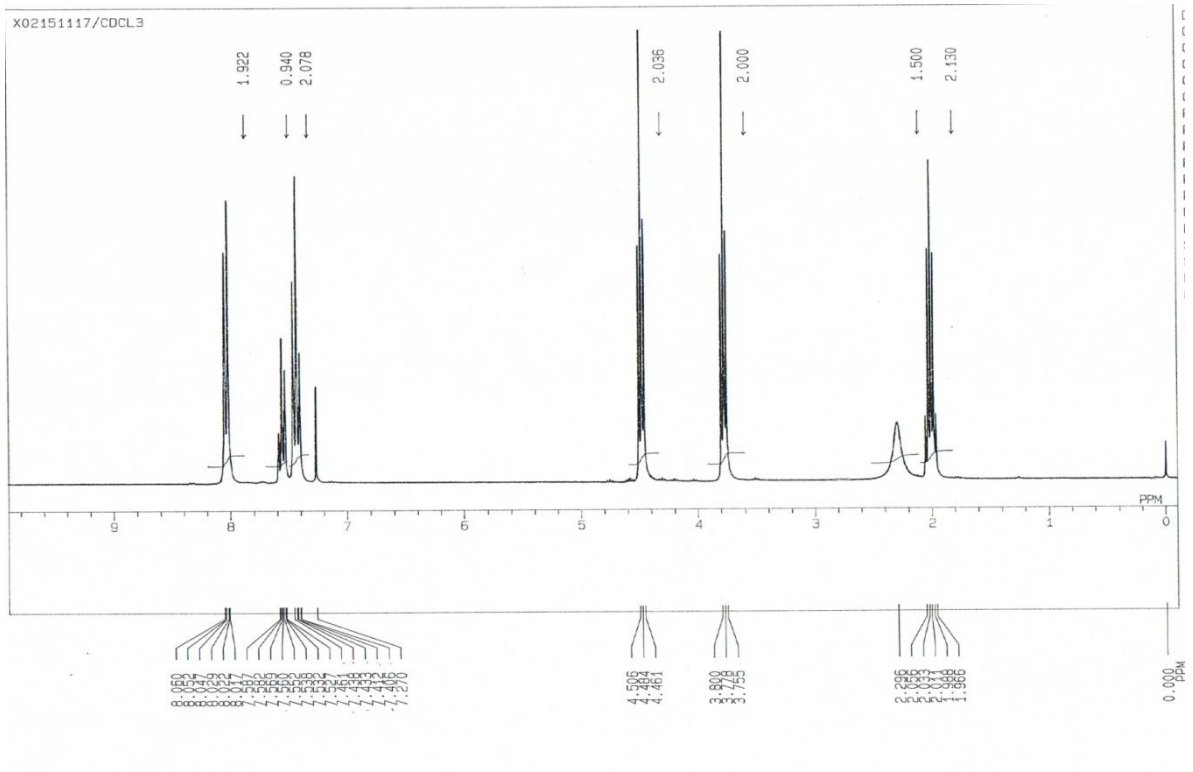
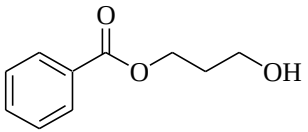


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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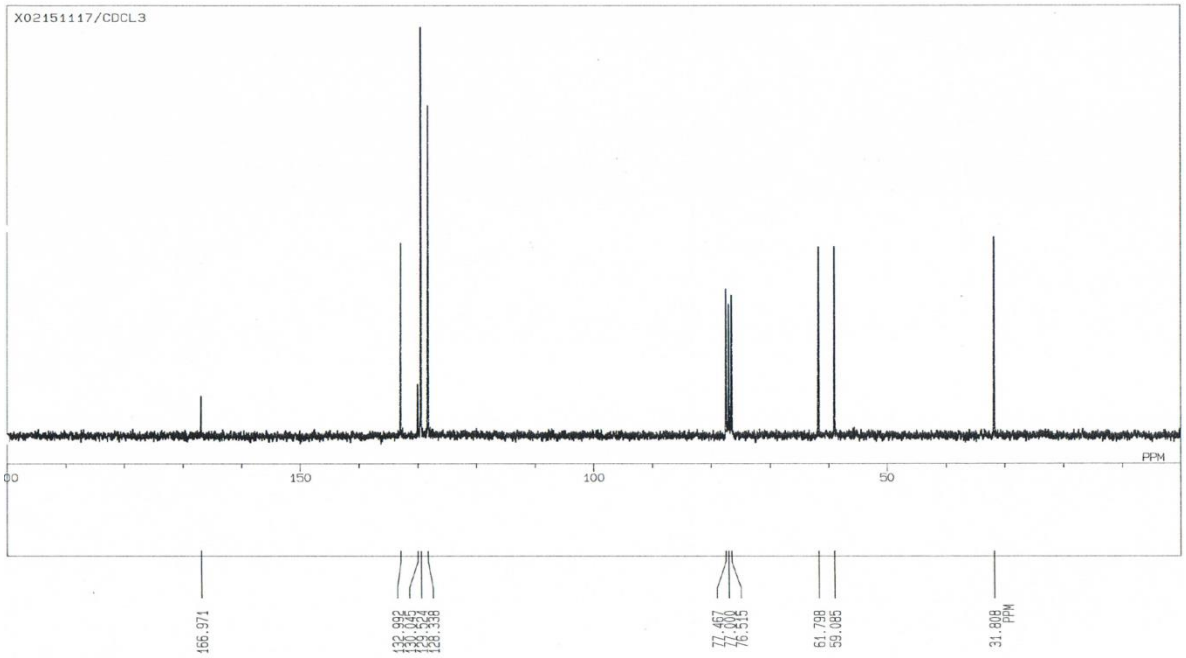
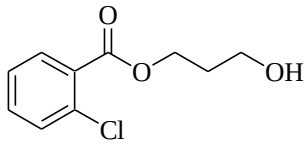


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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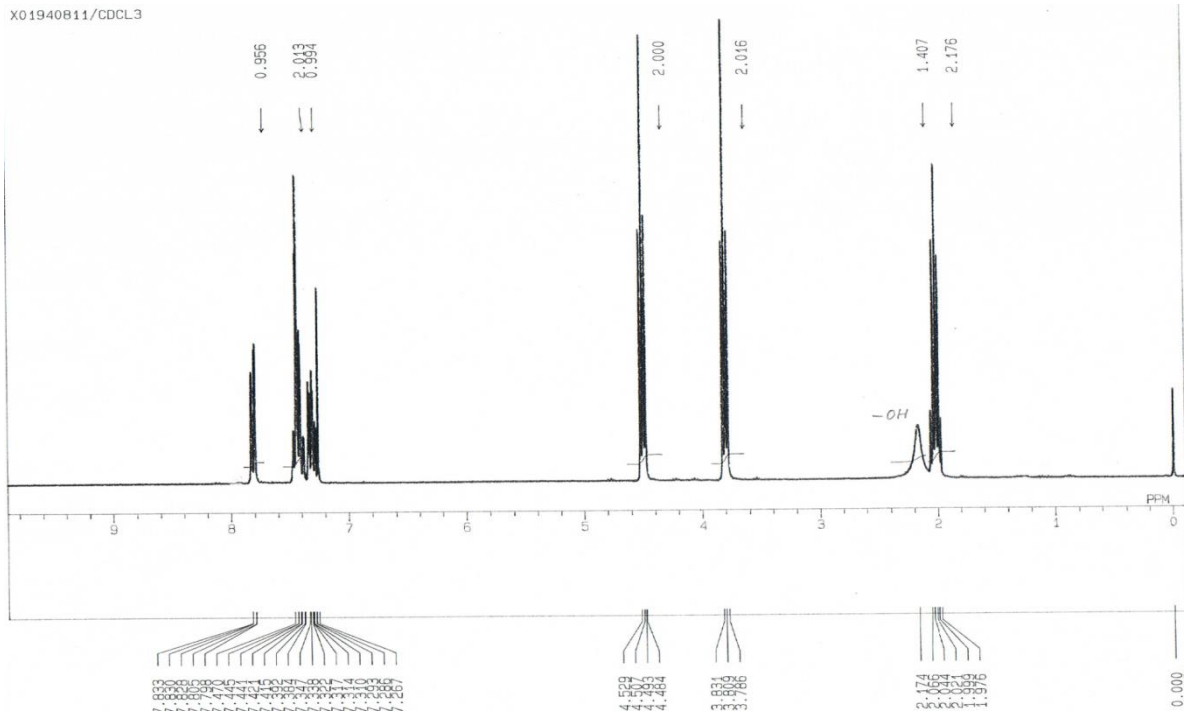
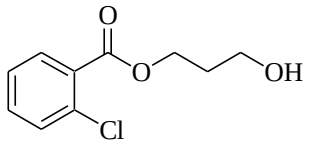


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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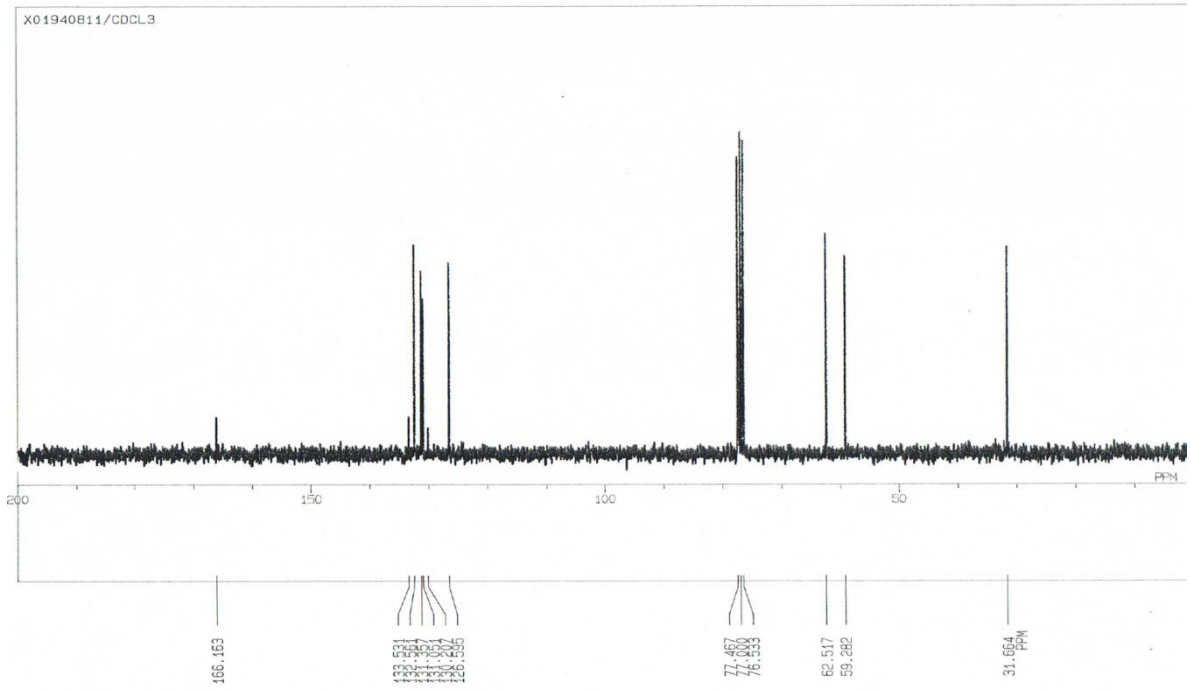
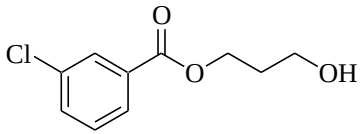
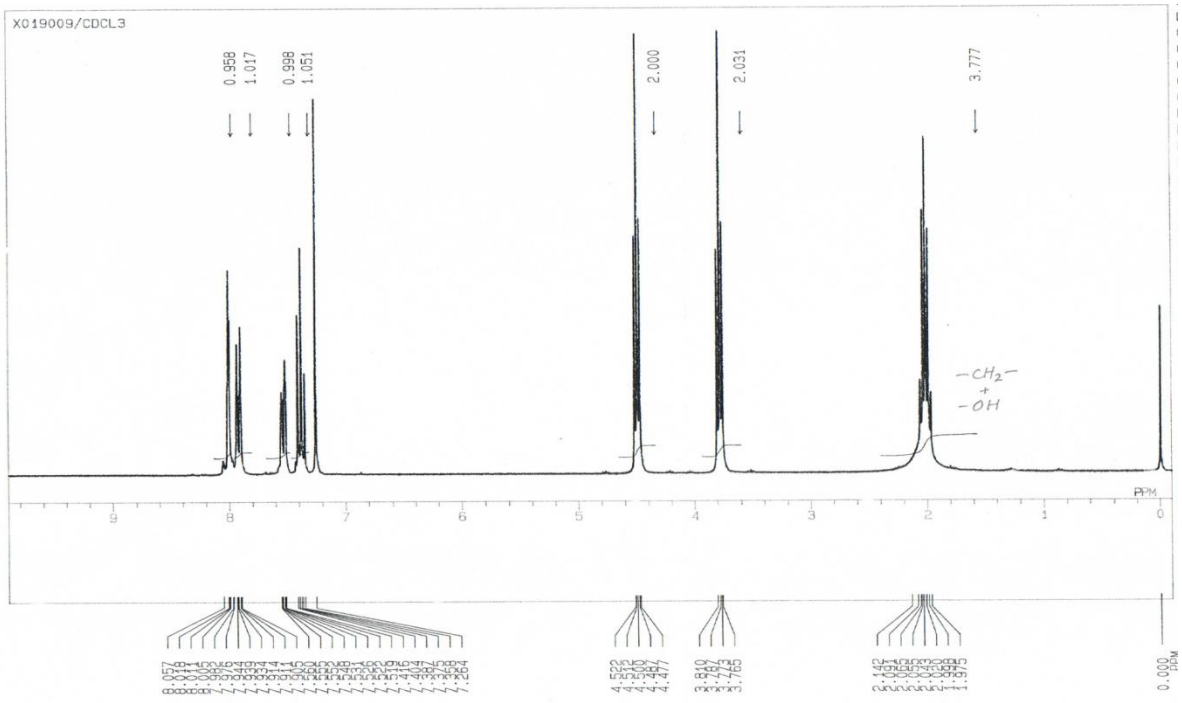


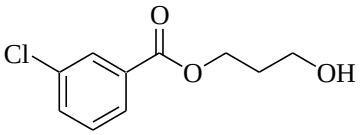
^{1}H NMR ($CDCl_3$, 270.05 MHz)



8a



^{13}C NMR ($CDCl_3$, 67.80 MHz)



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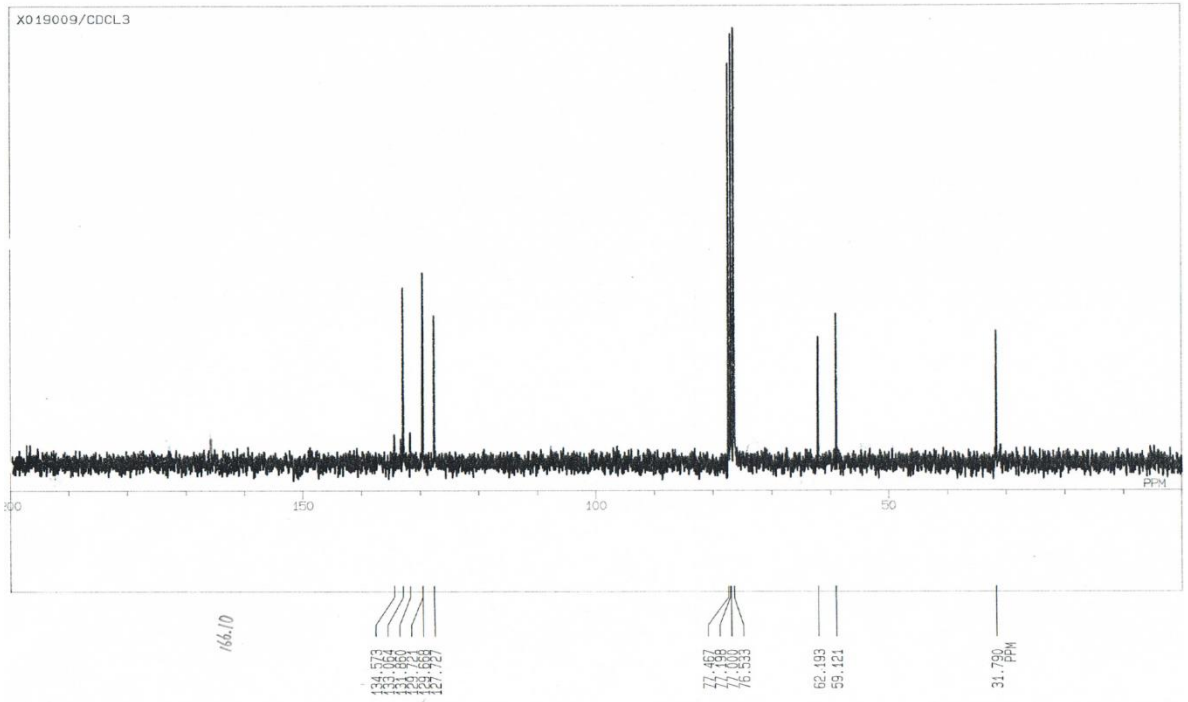
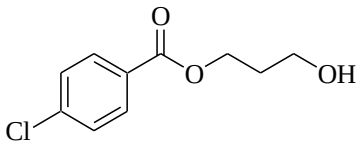


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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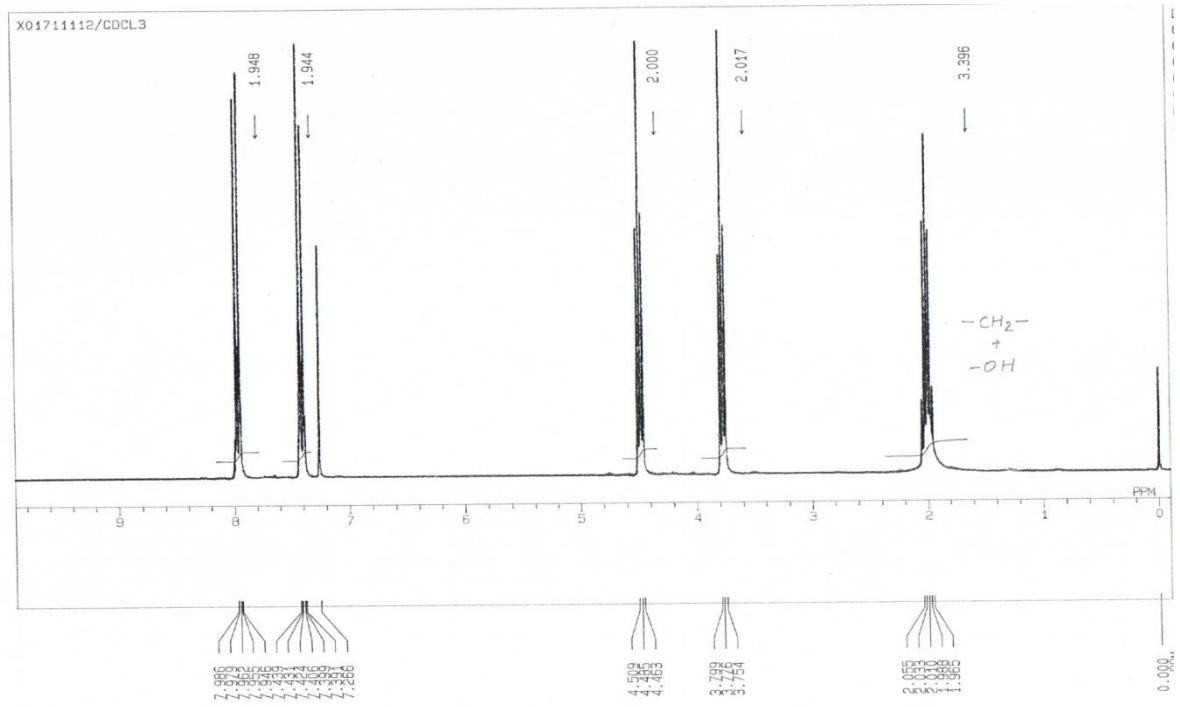
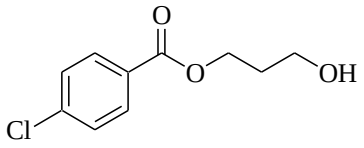


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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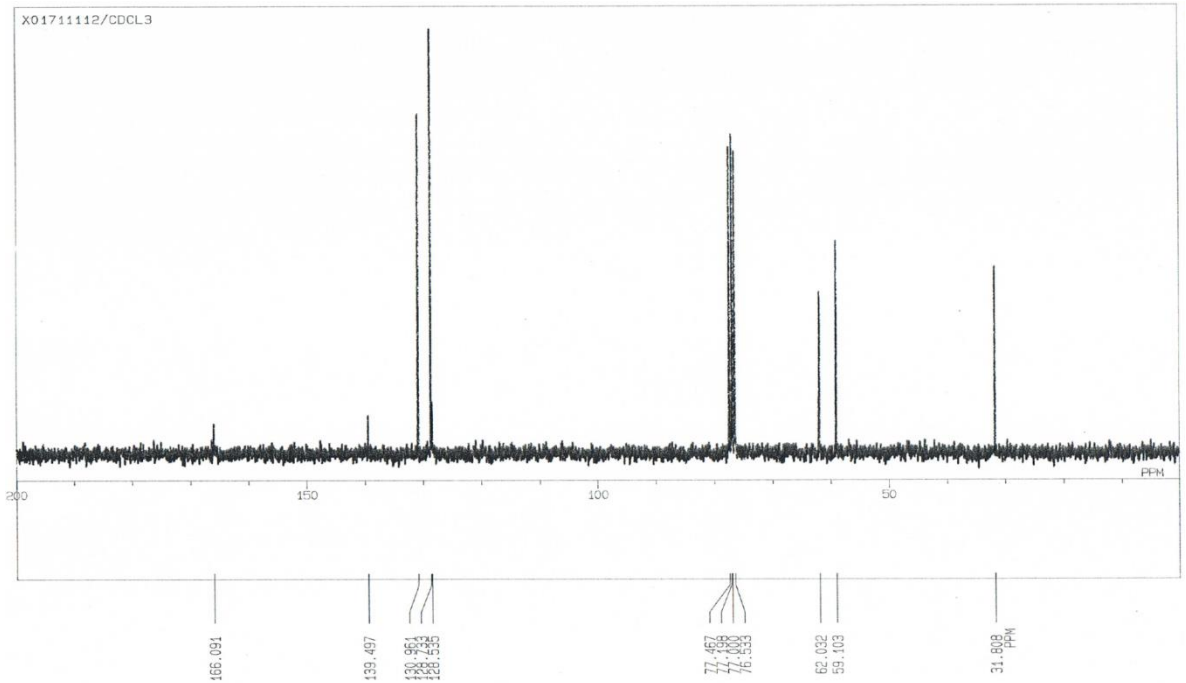
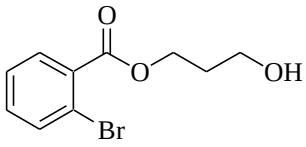


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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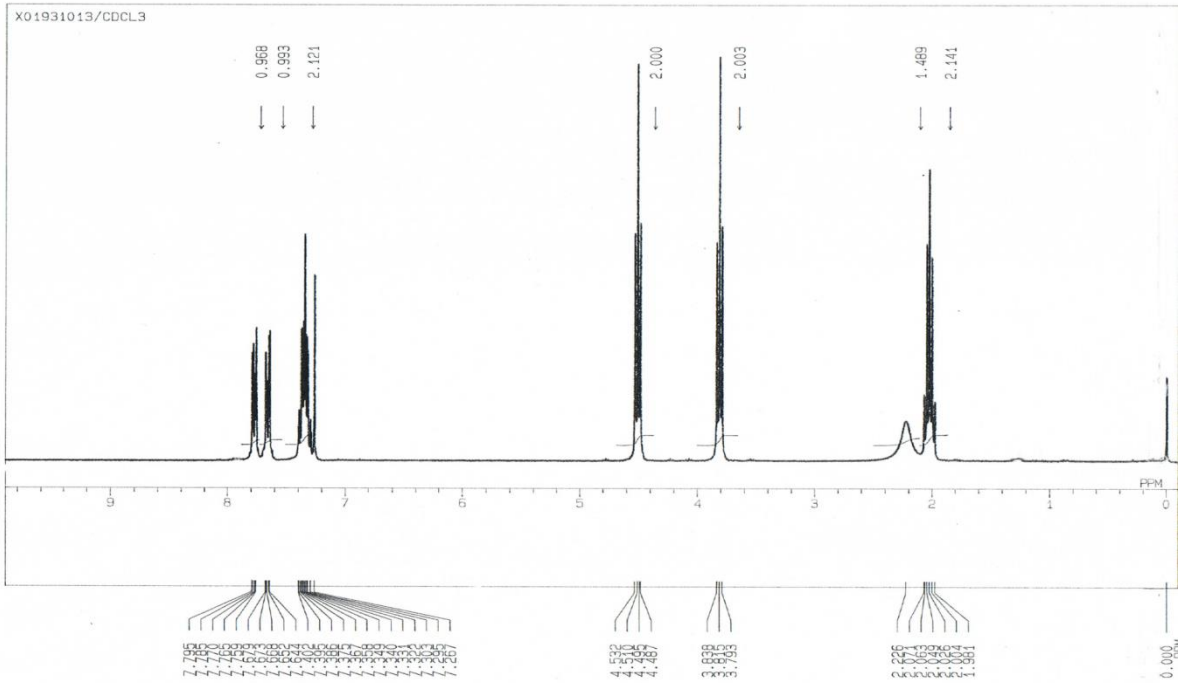
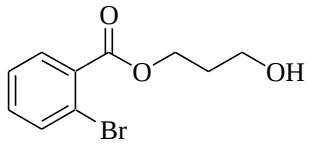


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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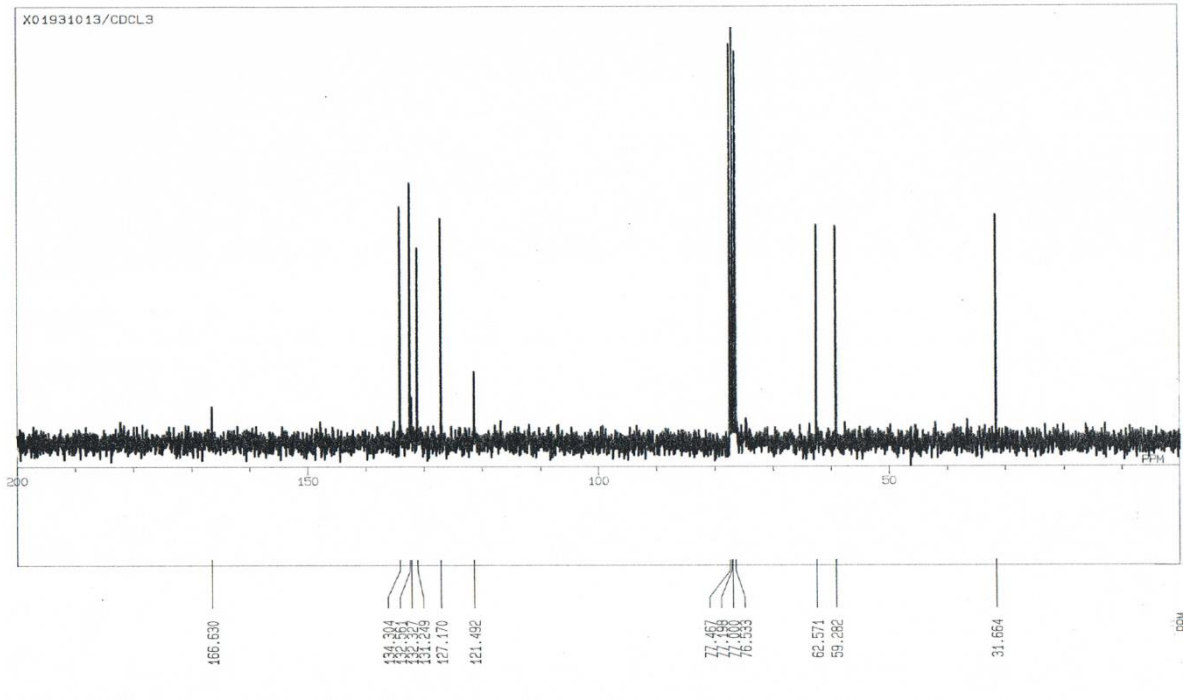
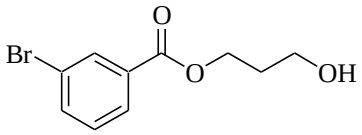


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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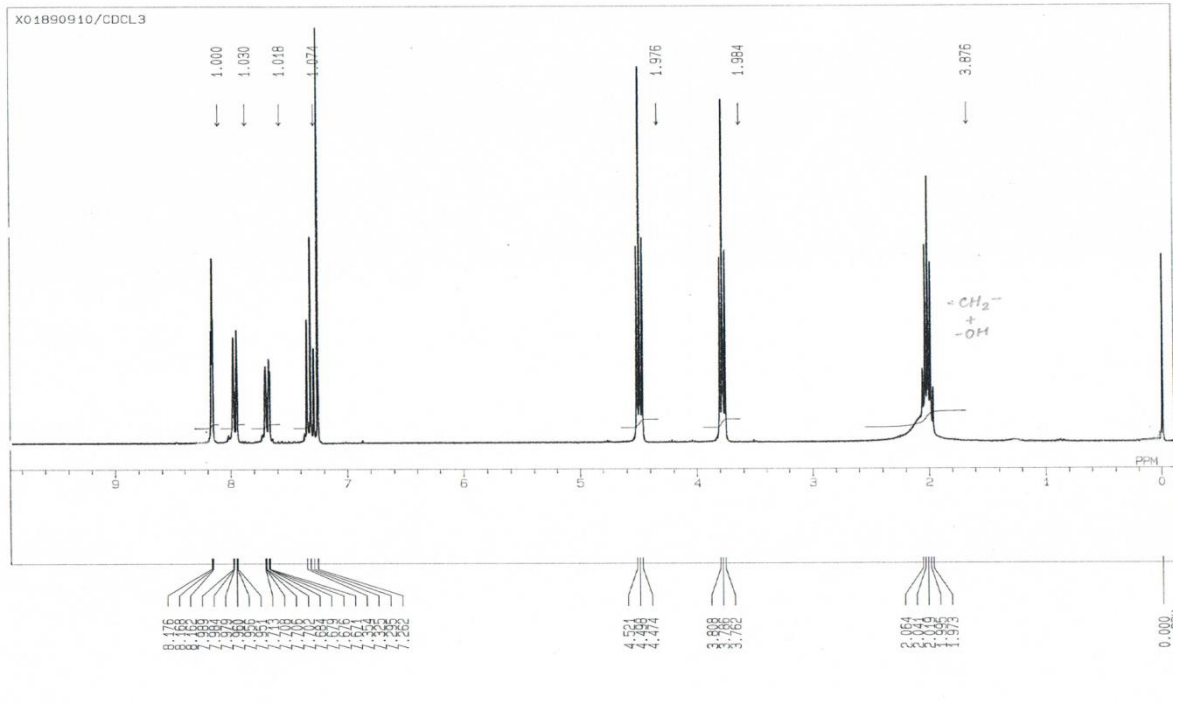
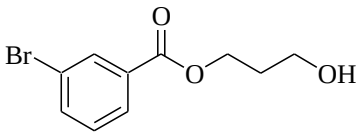


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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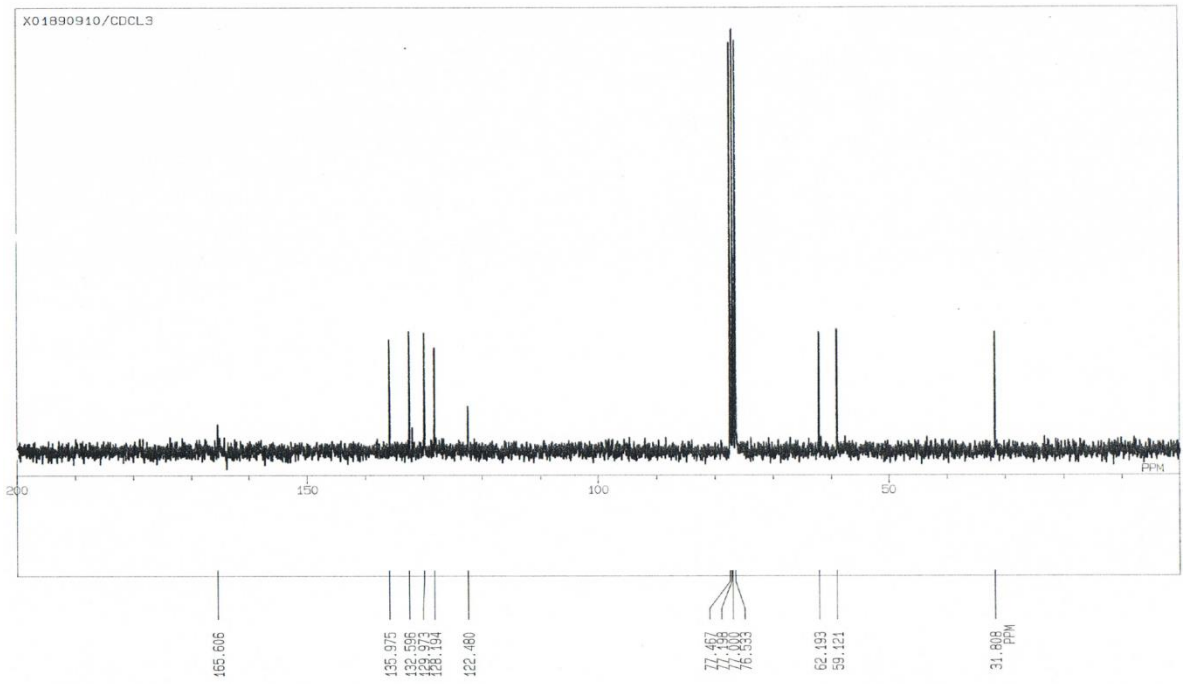
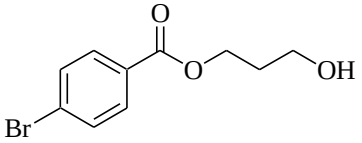


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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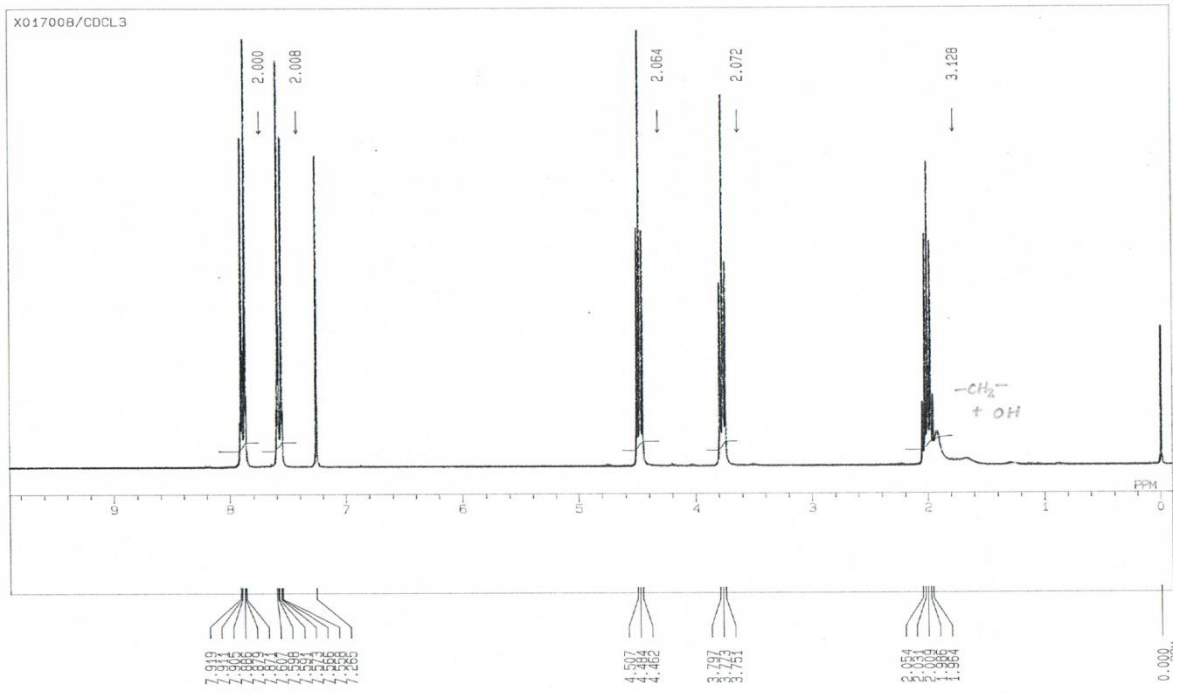
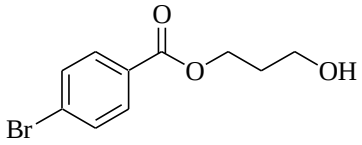


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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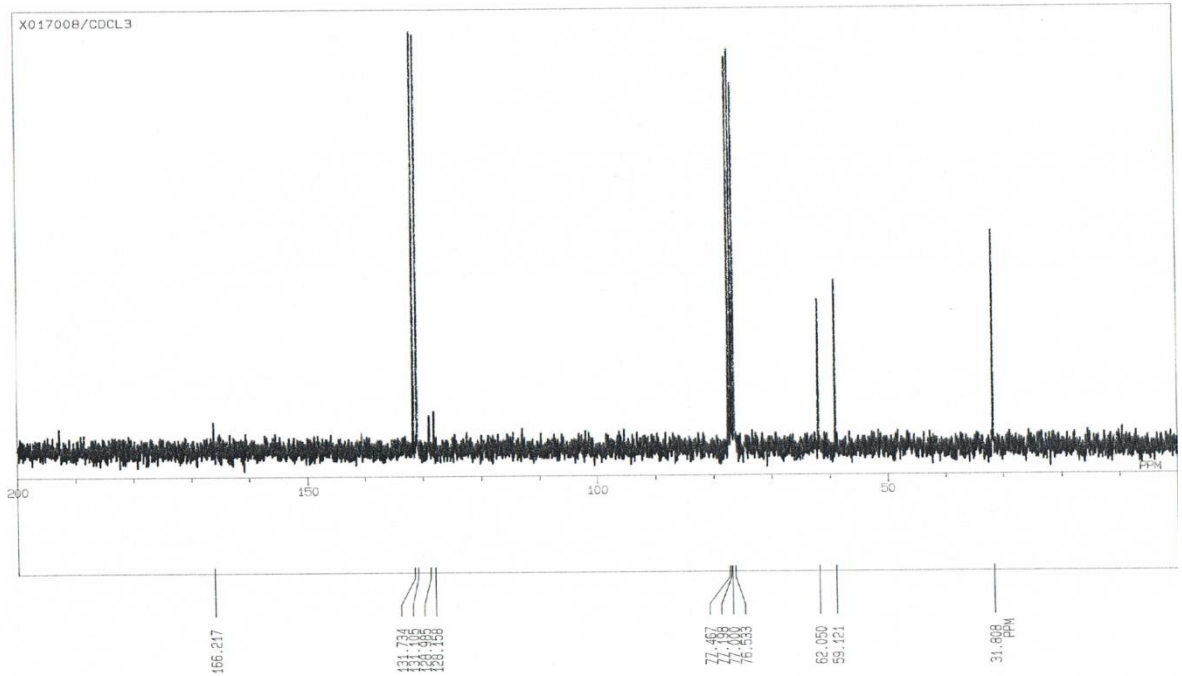
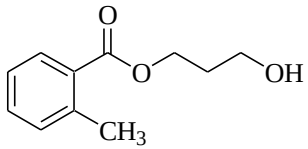


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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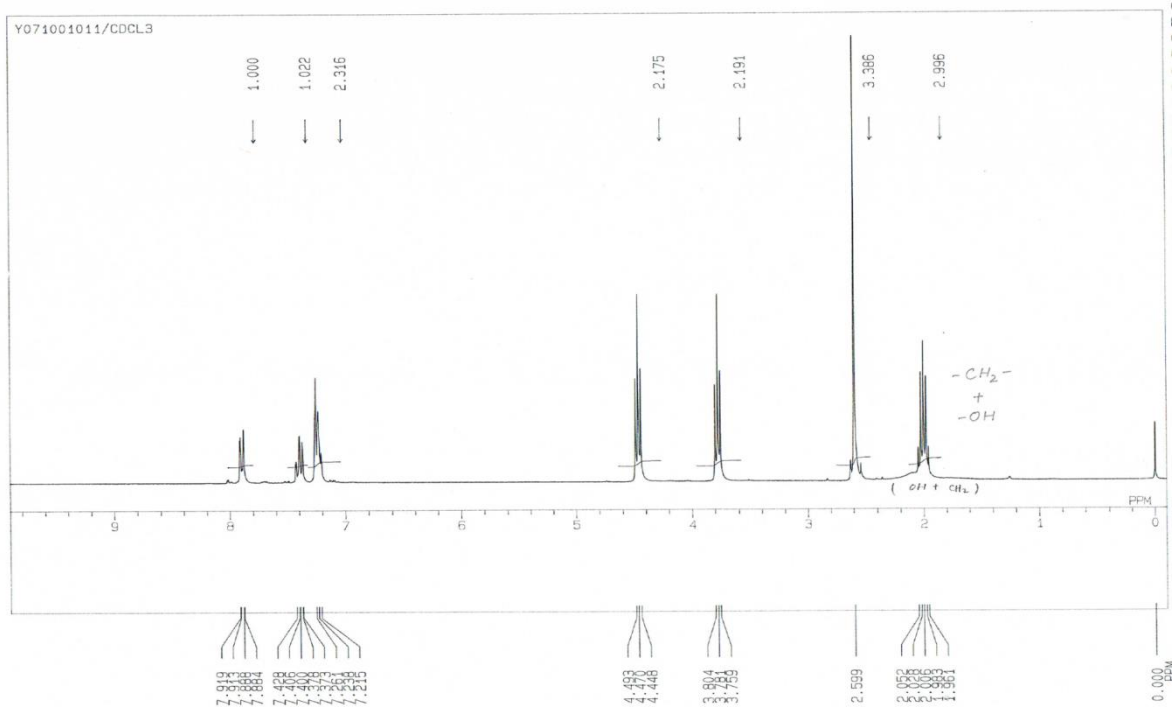
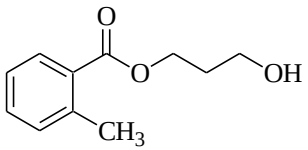


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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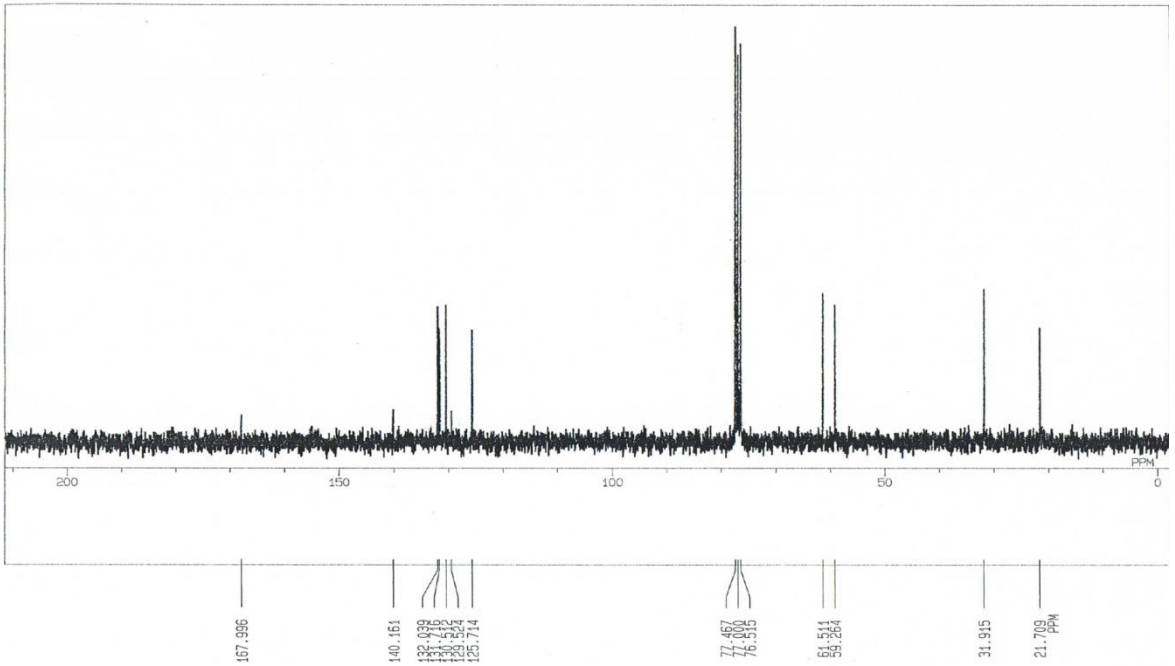
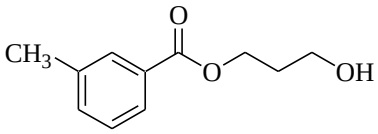


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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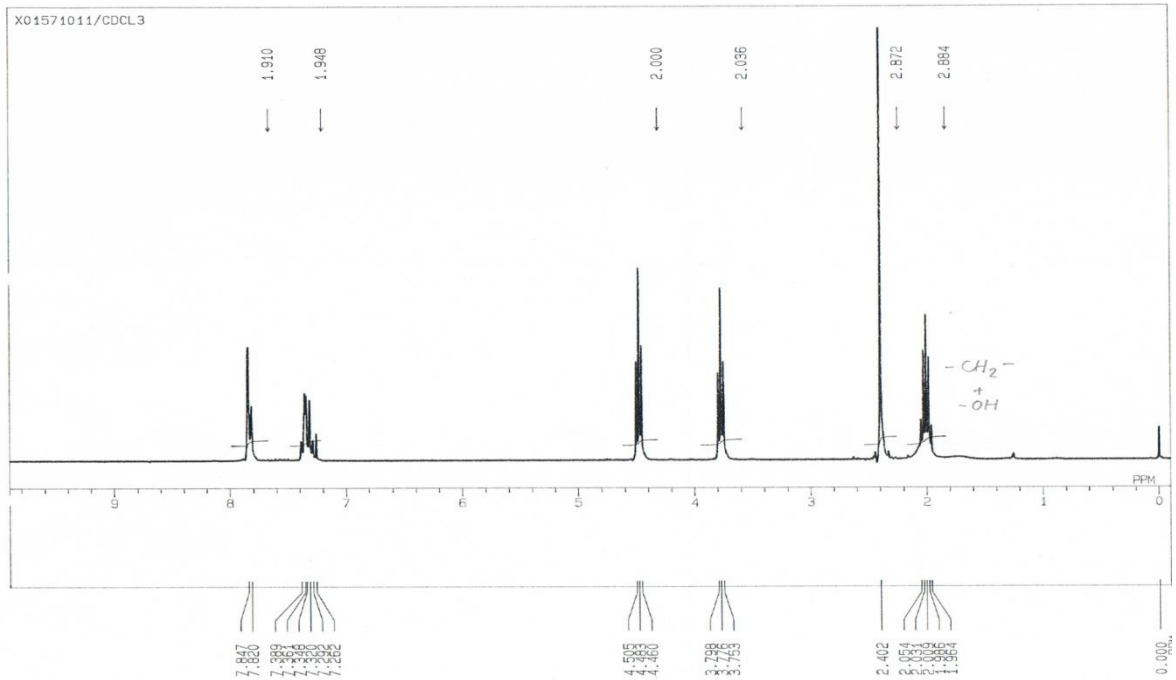
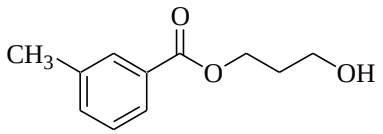


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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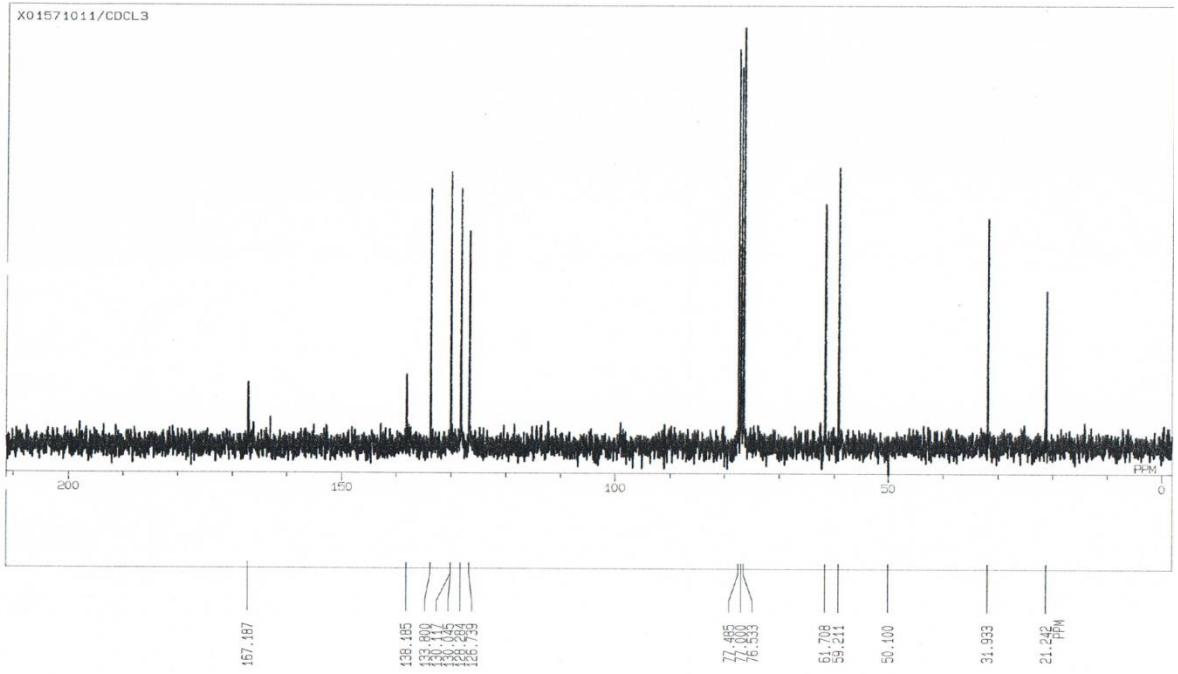
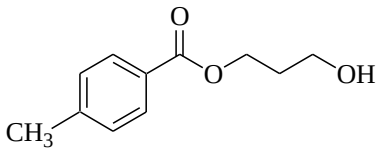


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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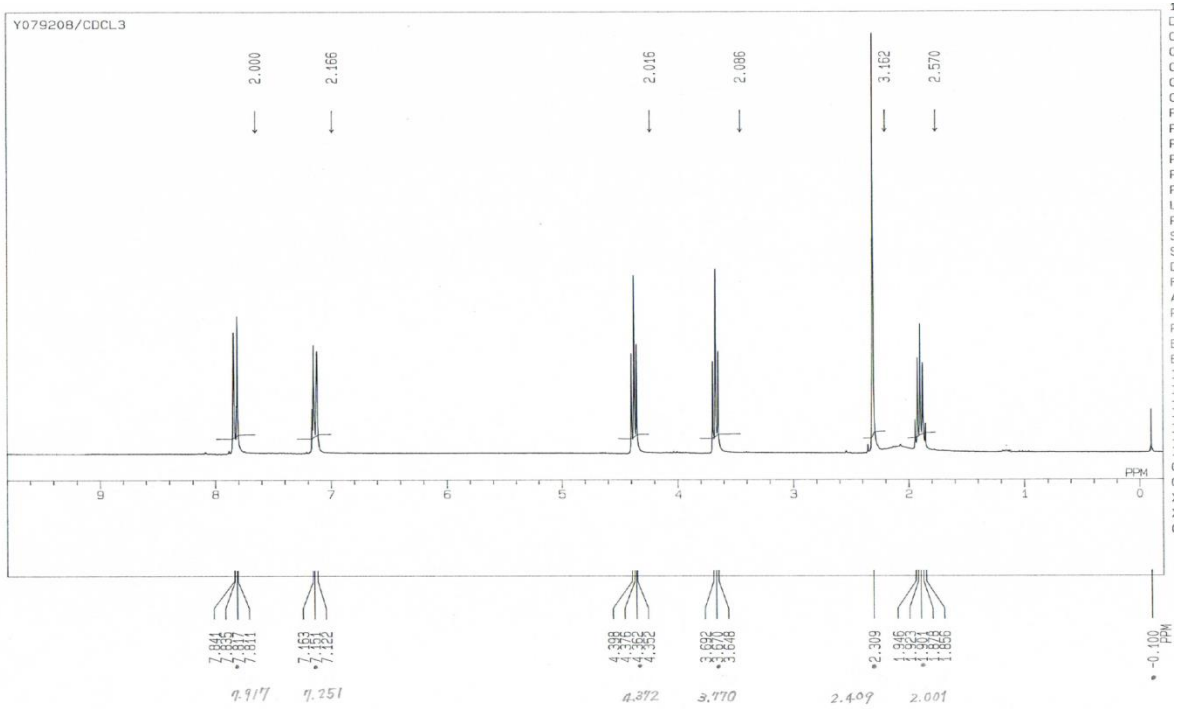
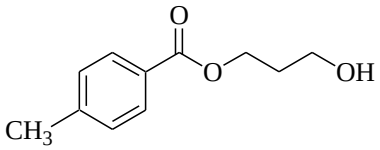


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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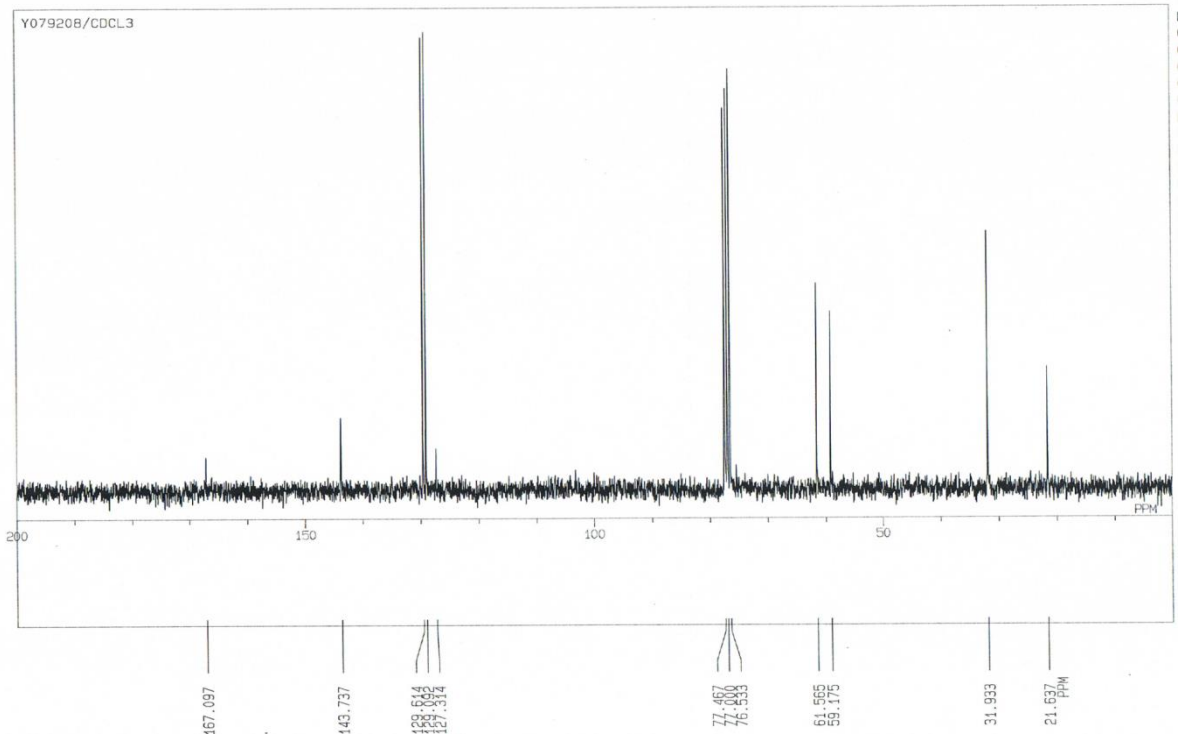
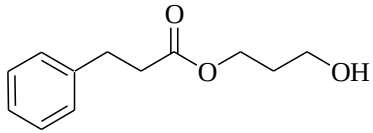


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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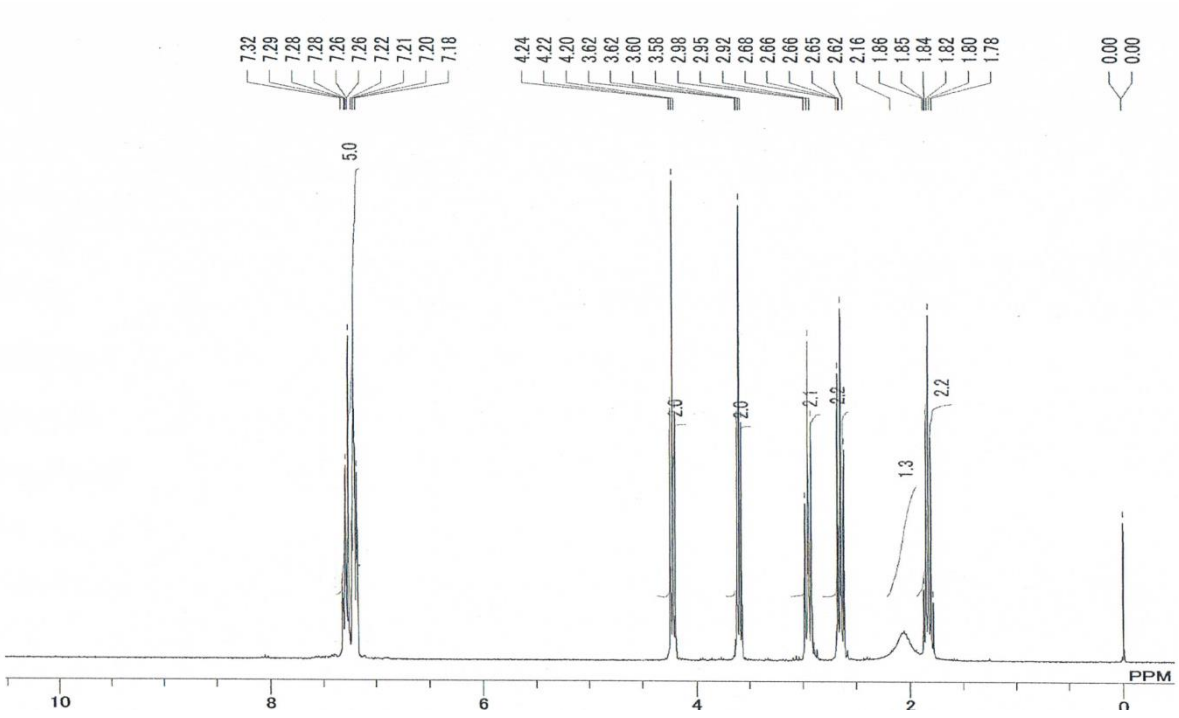
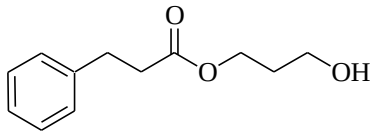


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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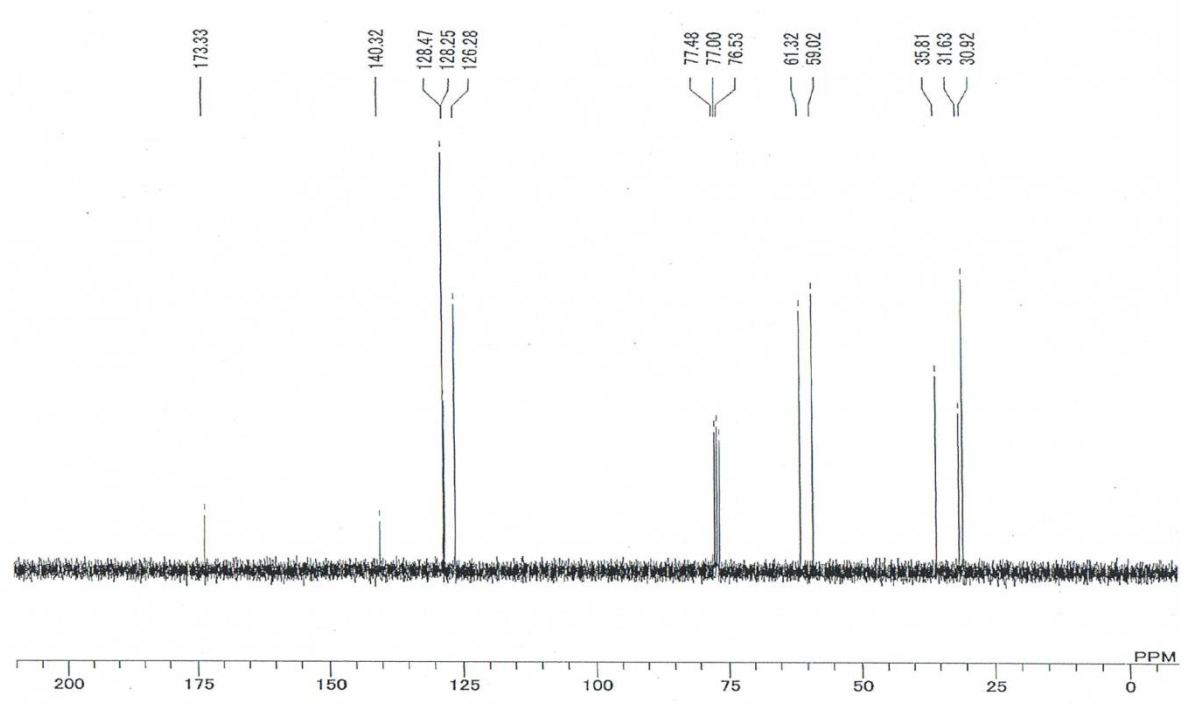
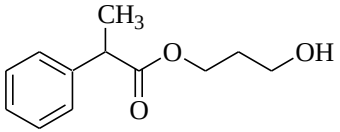


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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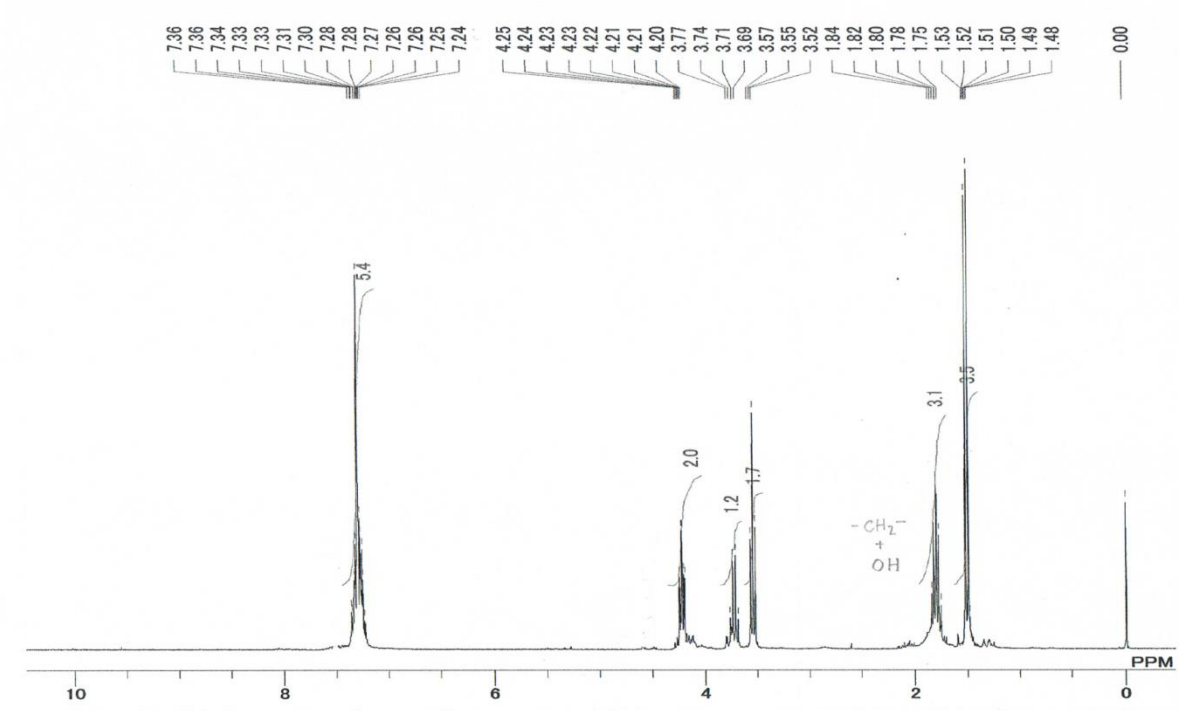
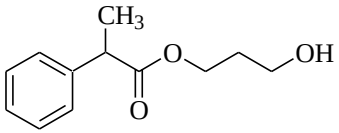


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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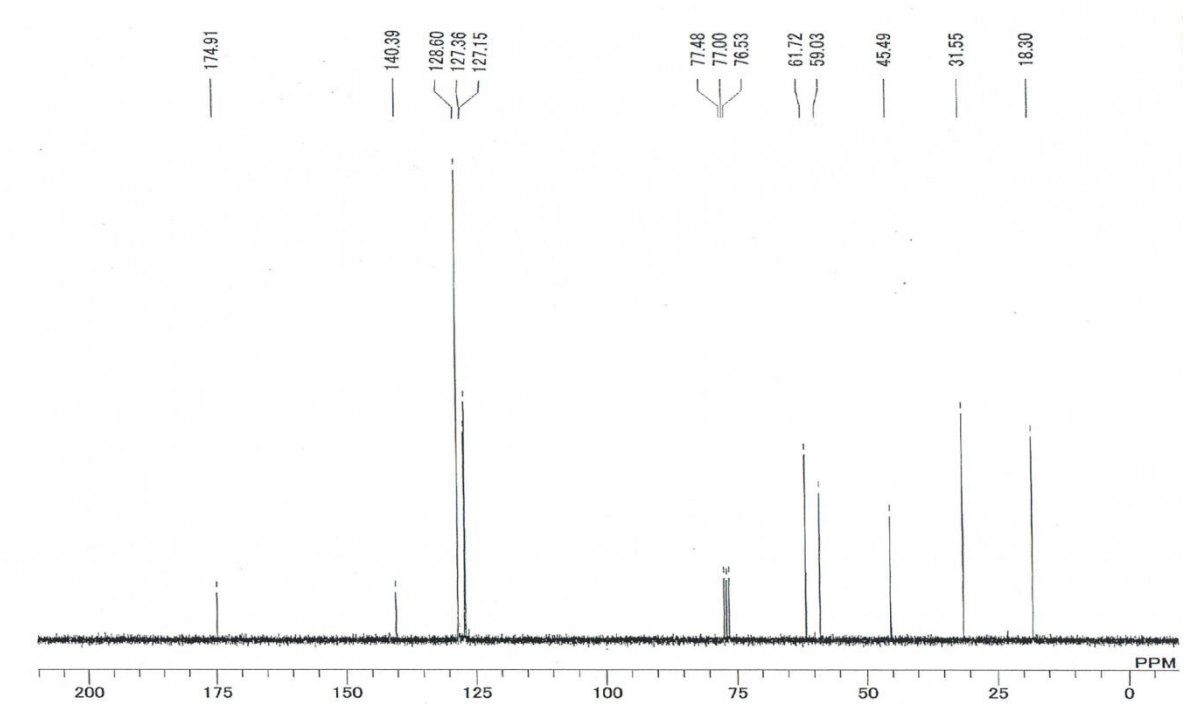
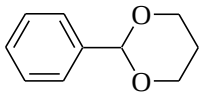


^{1}H NMR ($CDCl_3$, 270.05 MHz)



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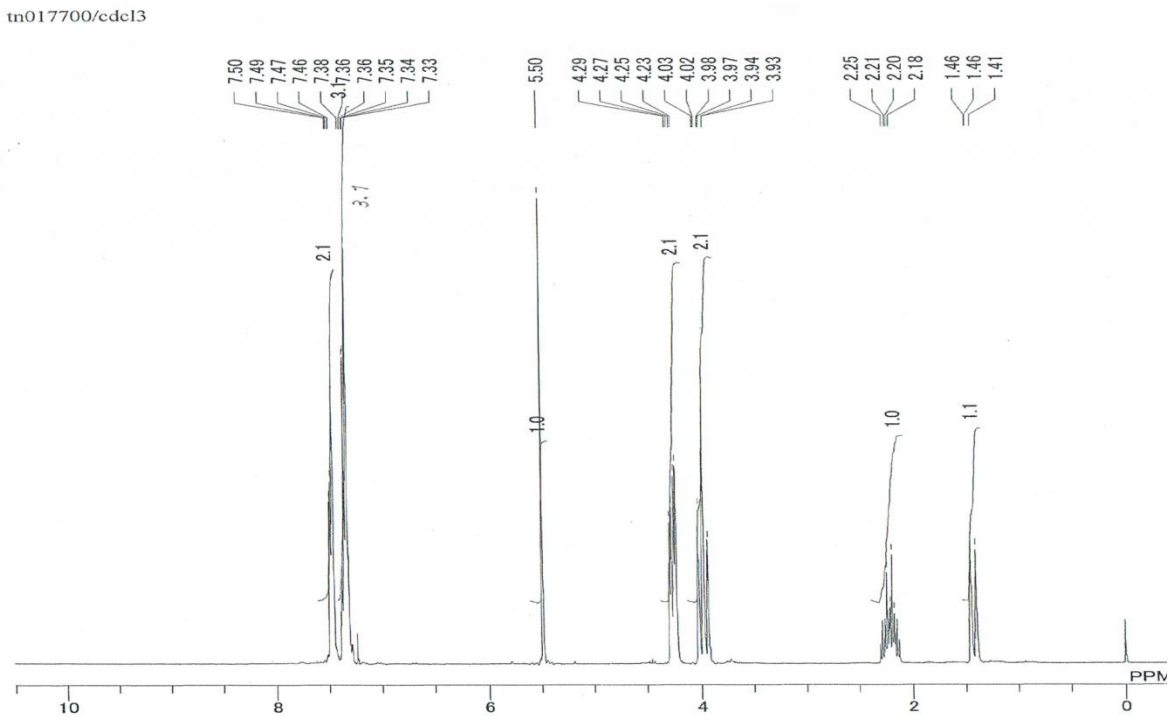
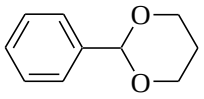


^{13}C NMR ($CDCl_3$, 67.80 MHz)



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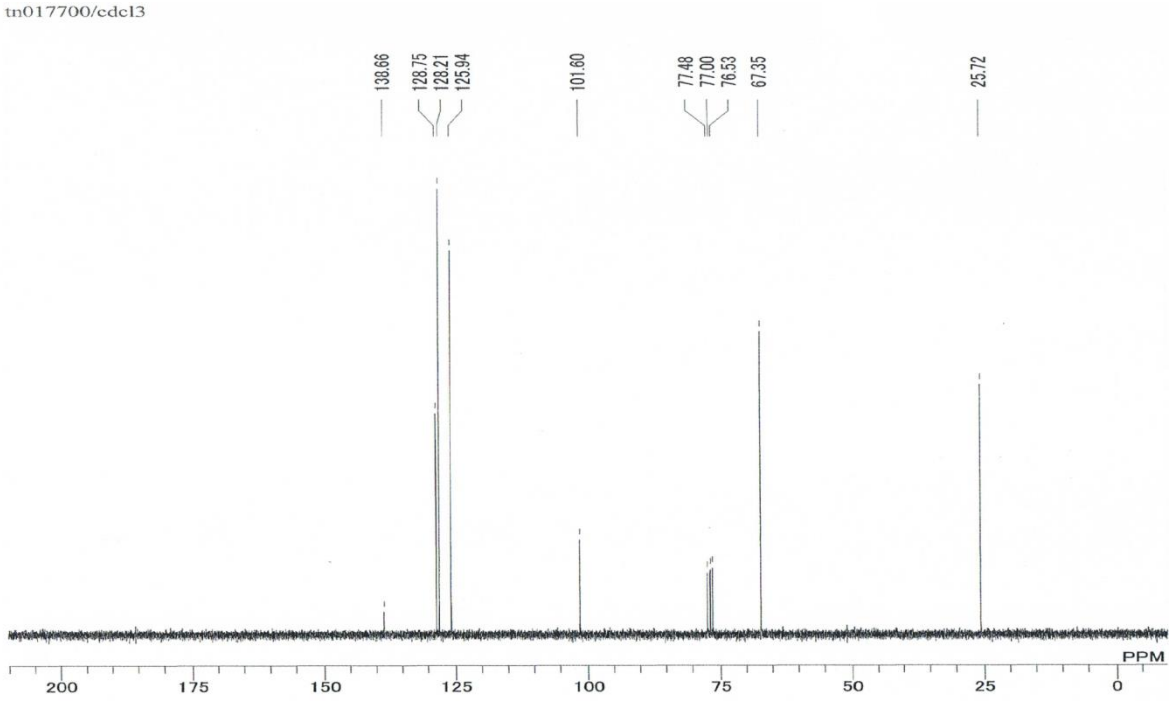

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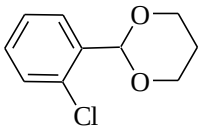

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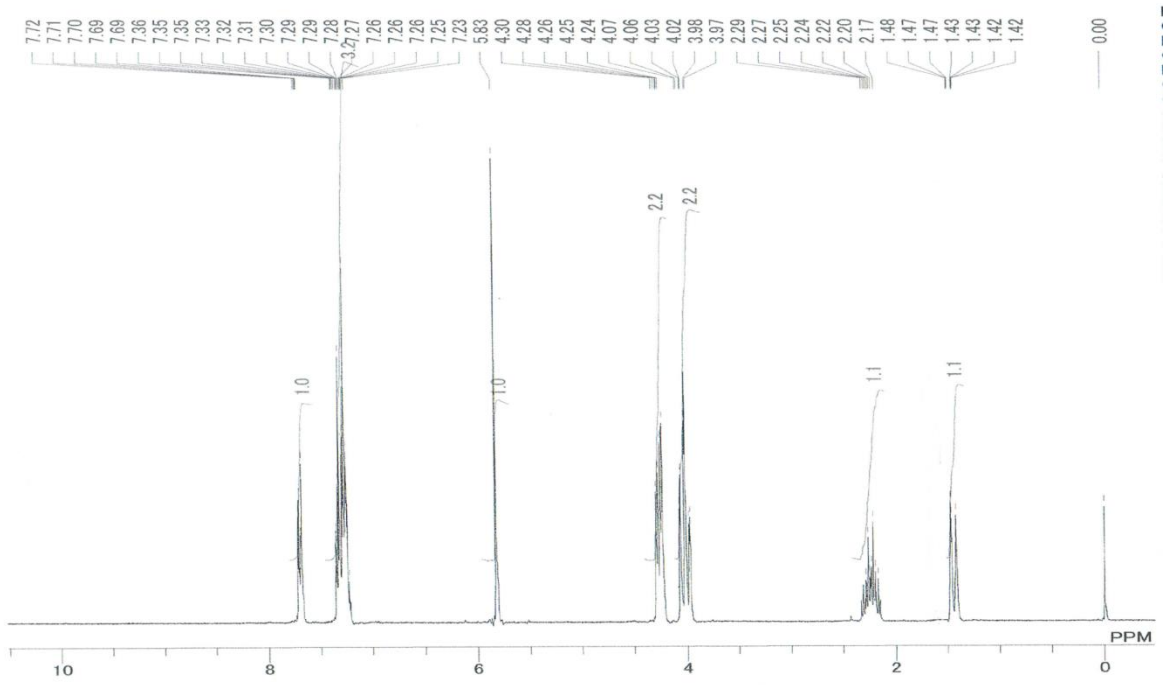

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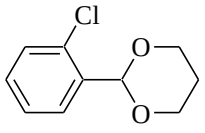

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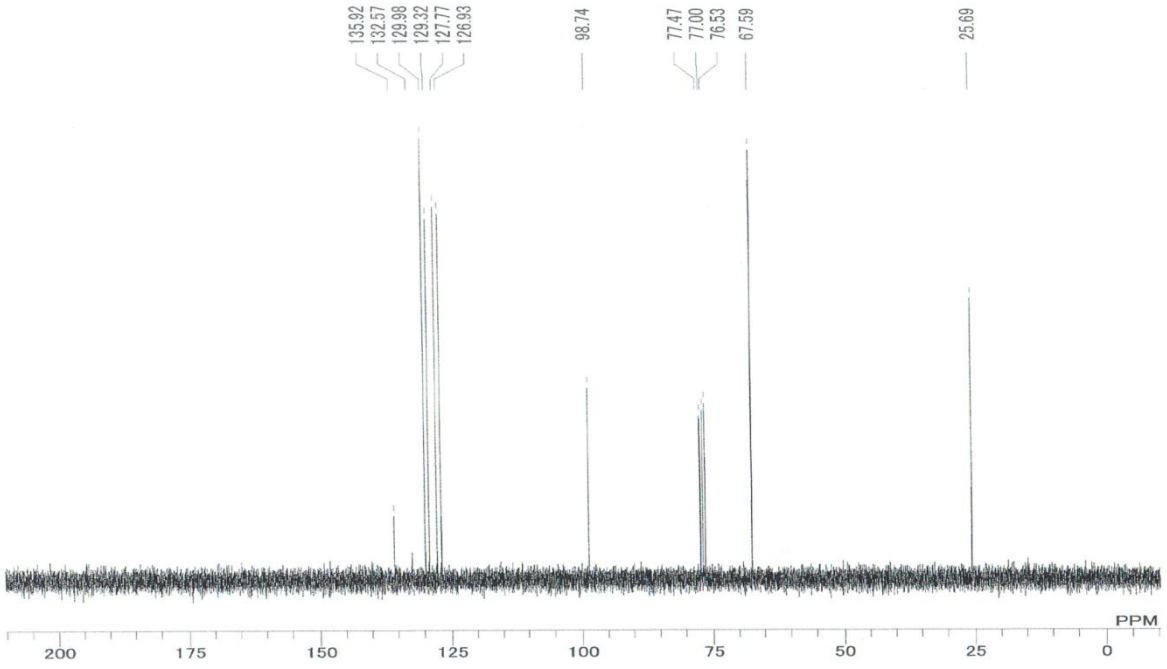

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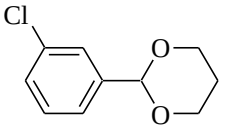

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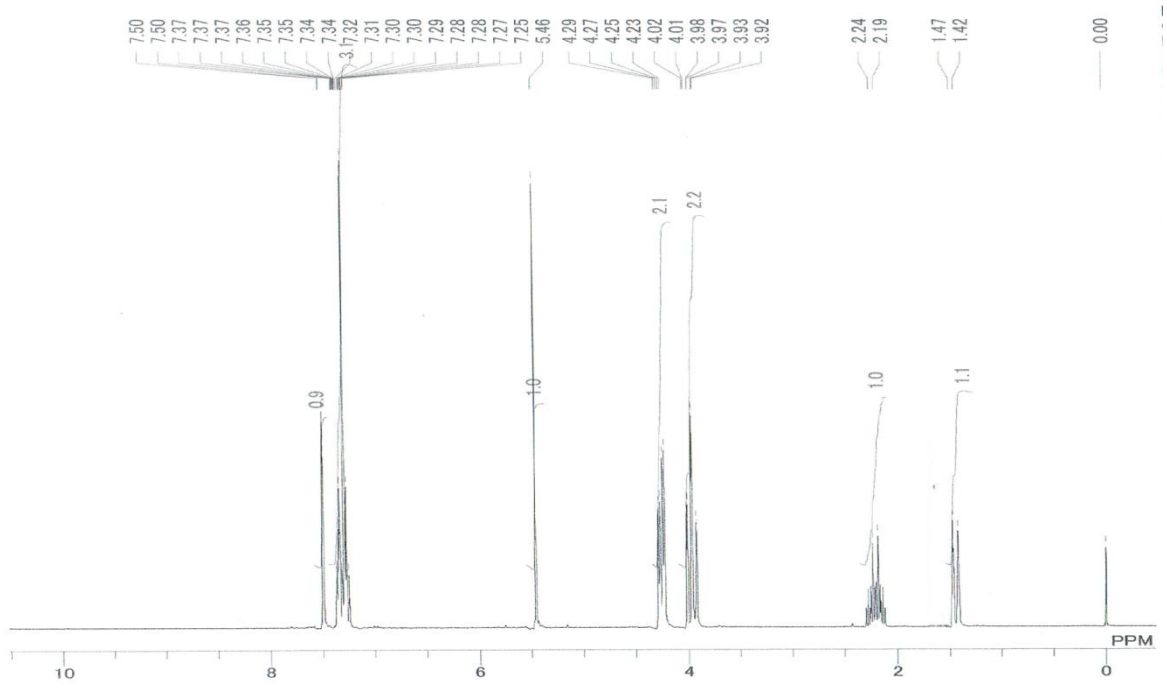

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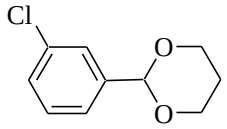

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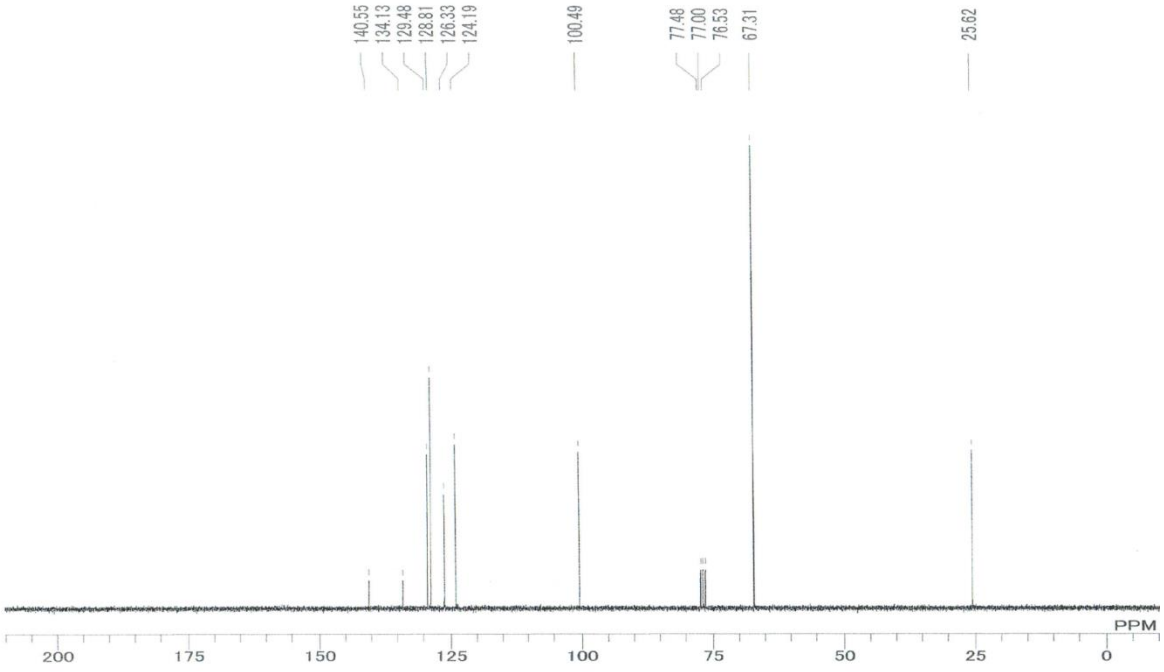

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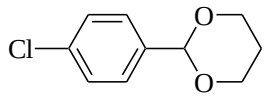

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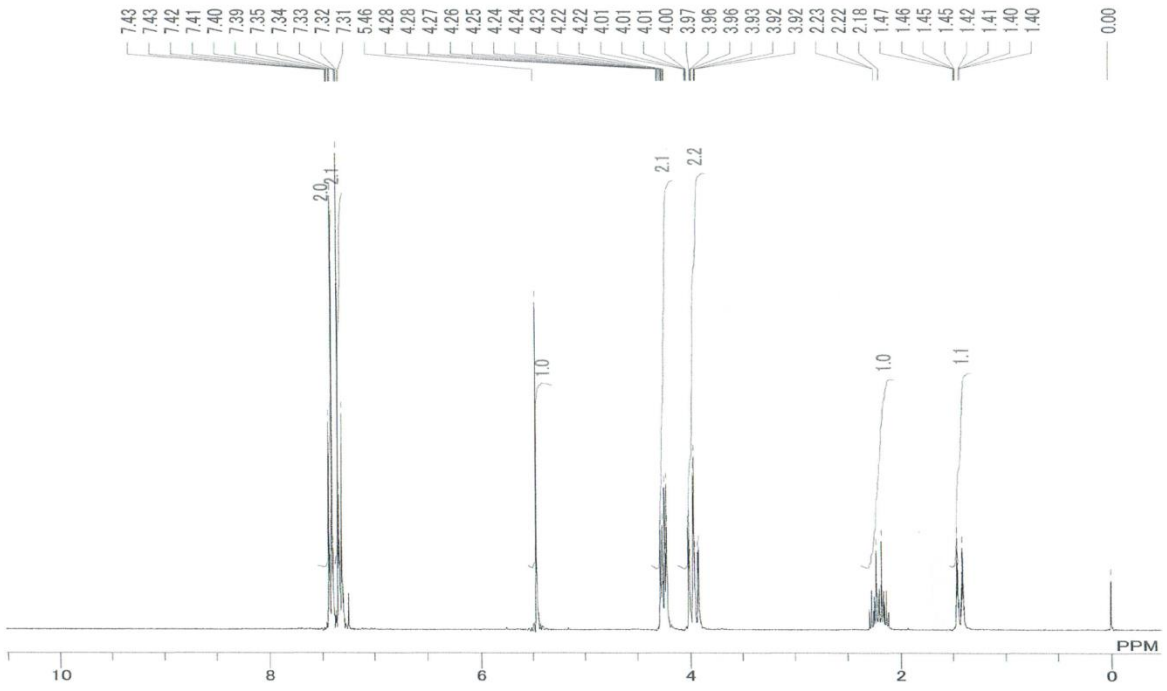

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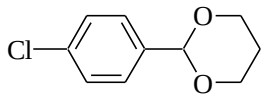

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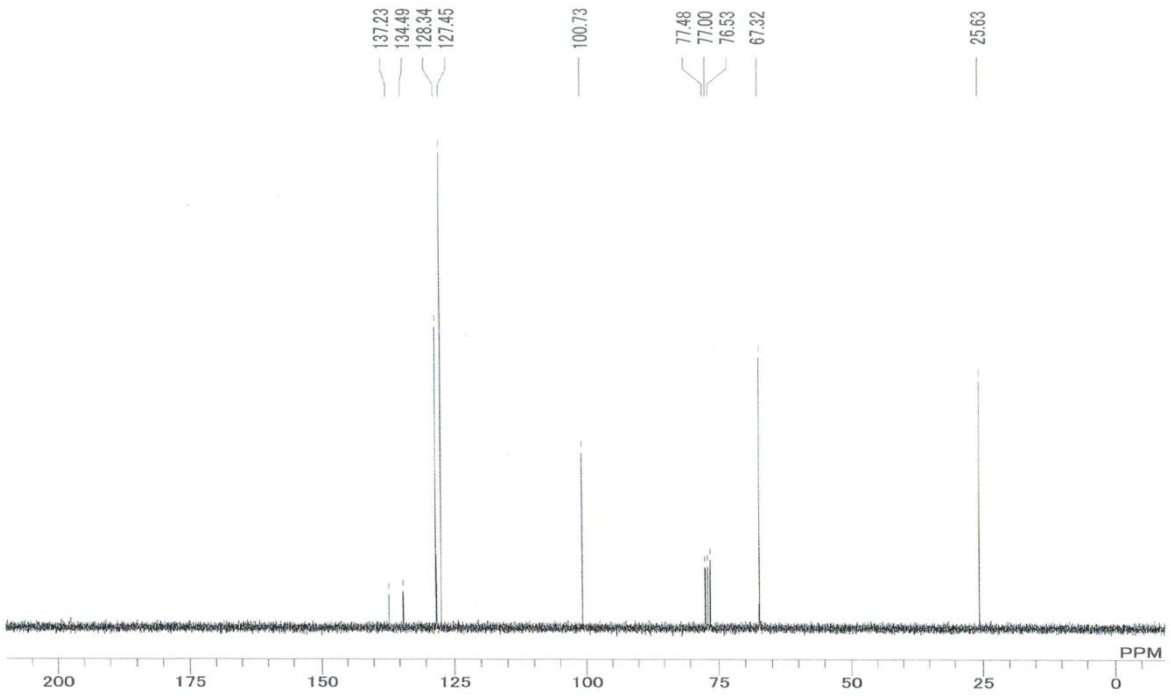

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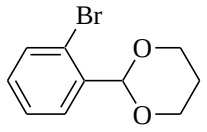

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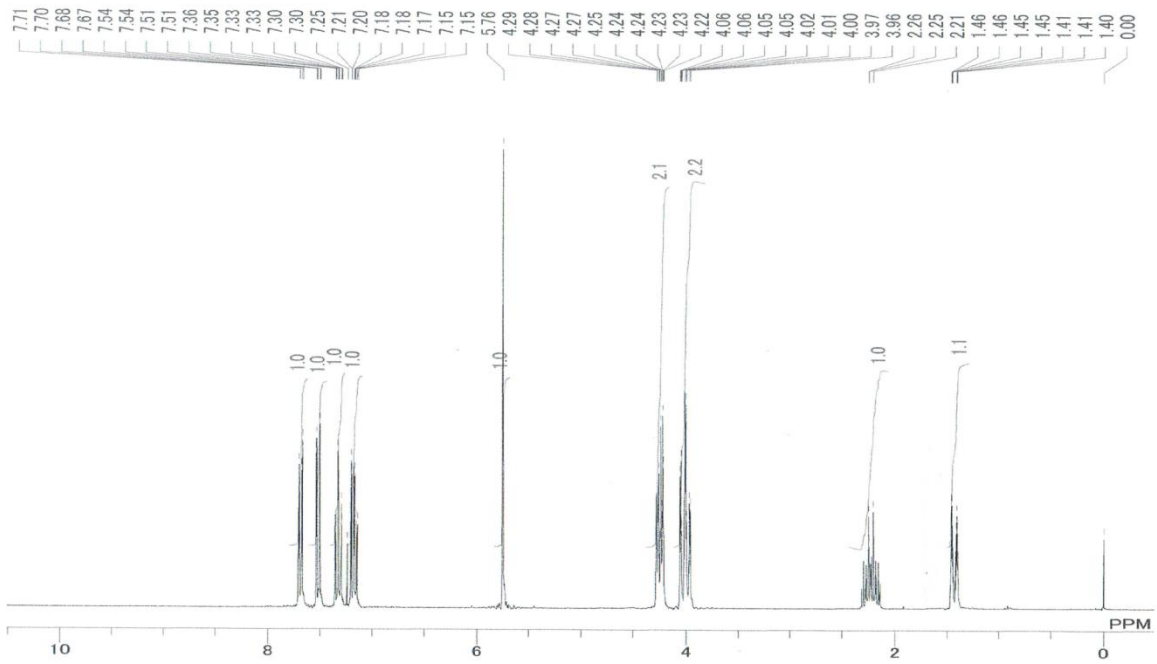

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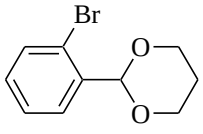

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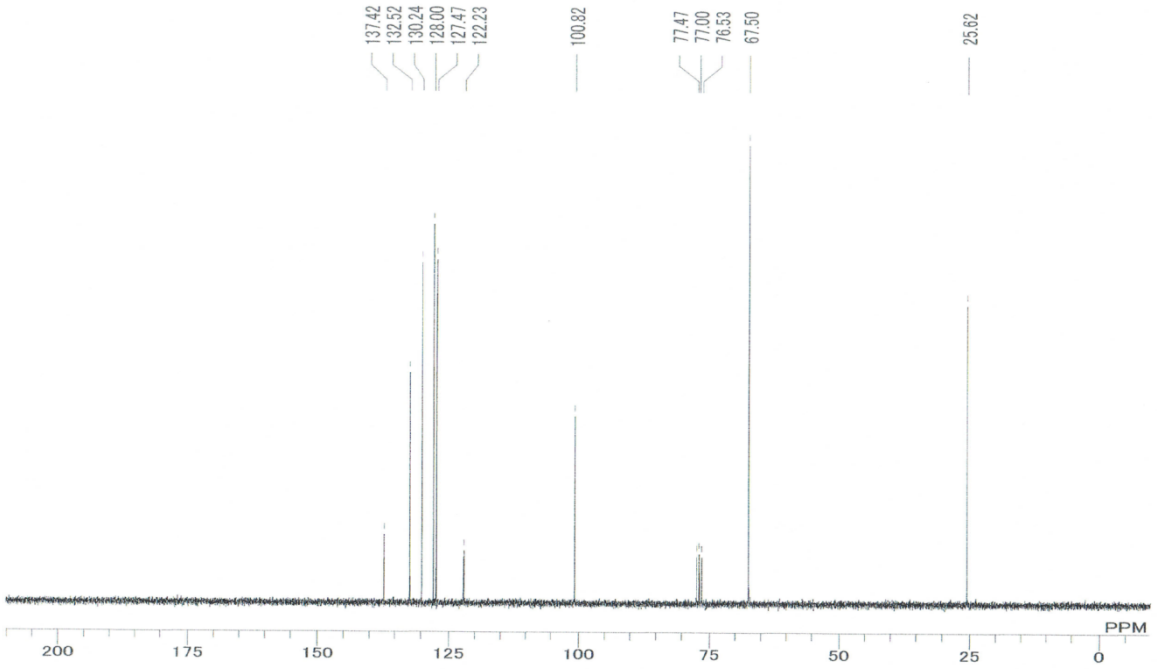

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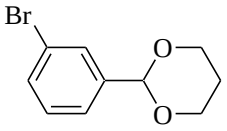

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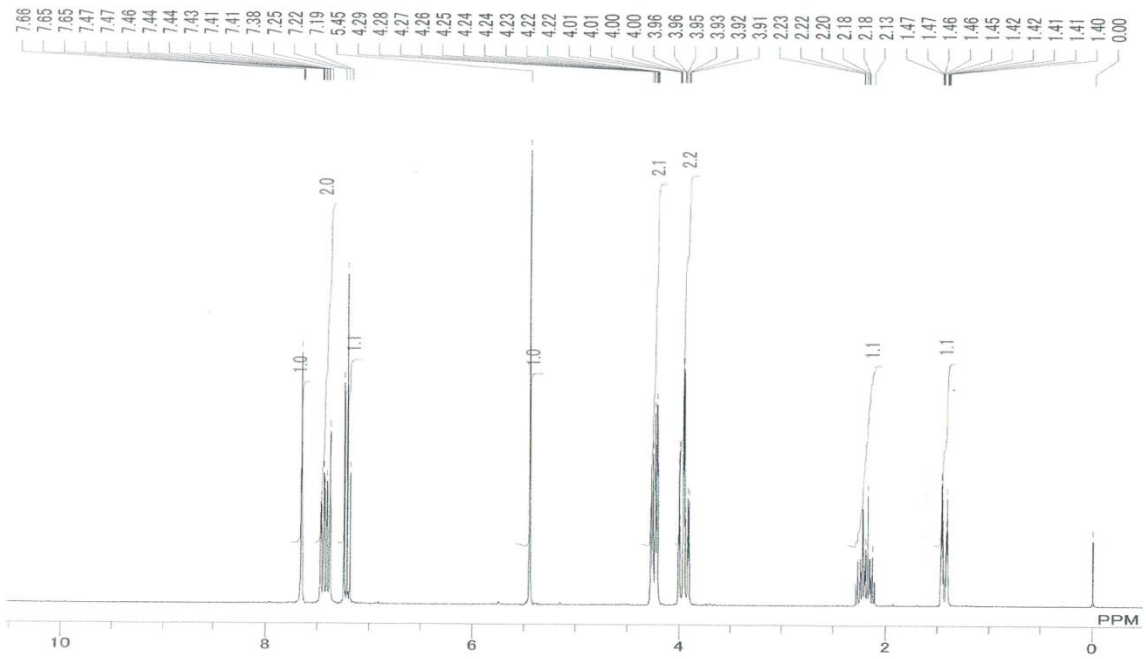

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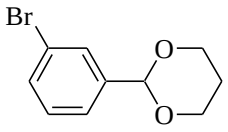

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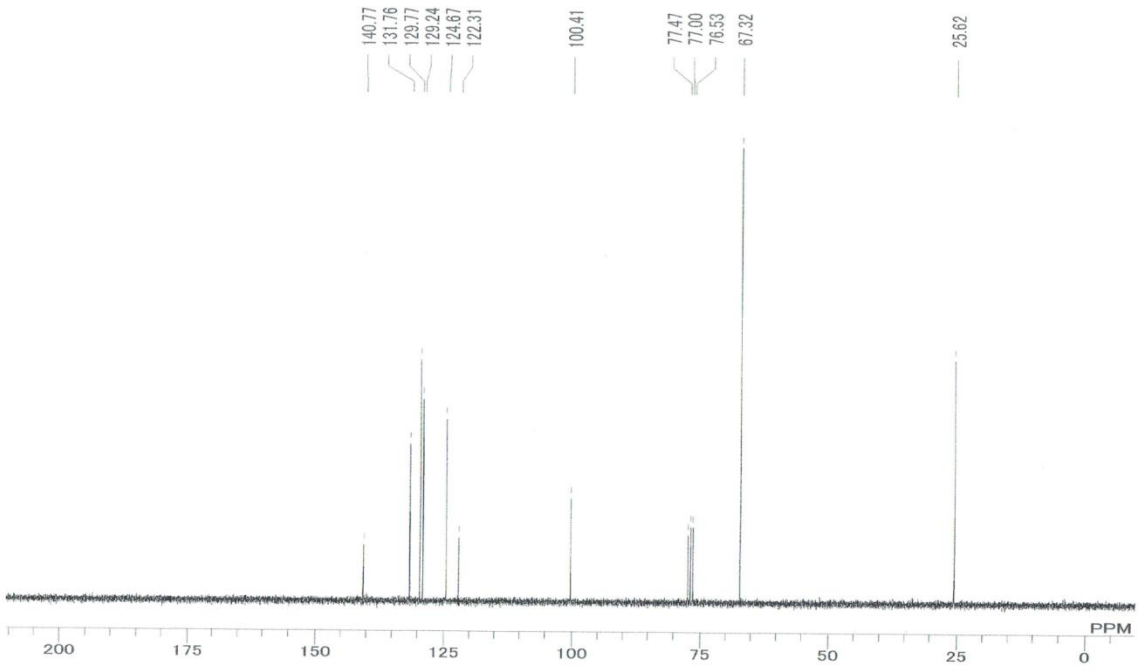

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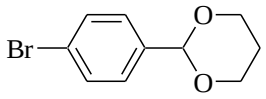

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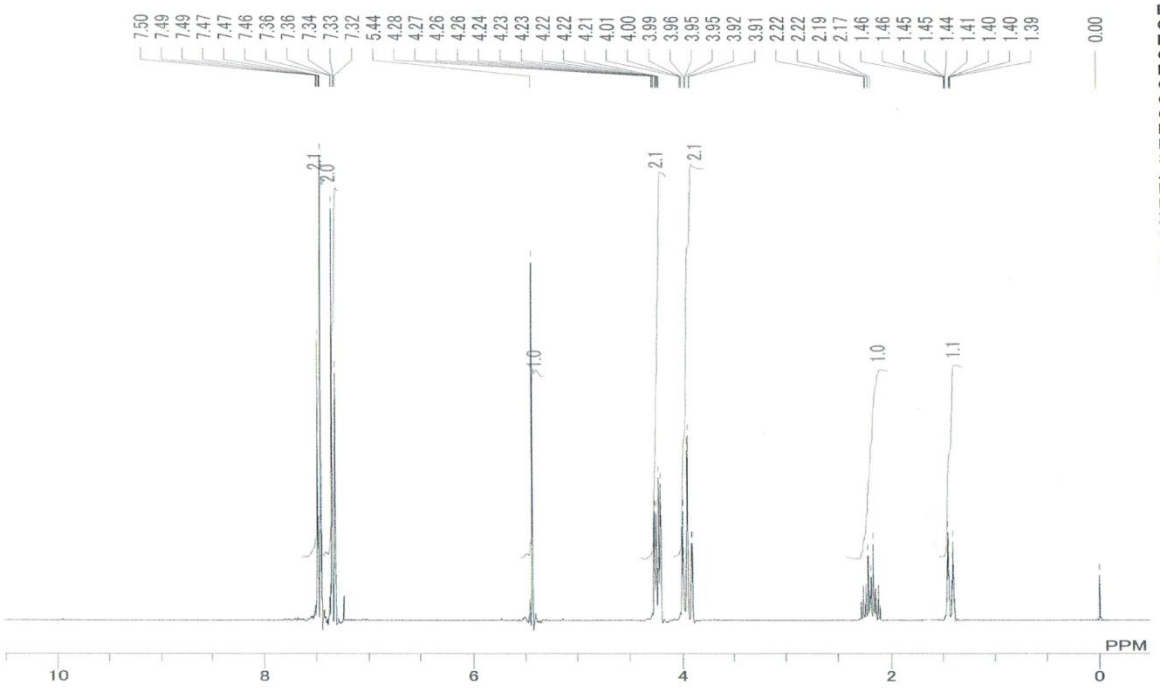

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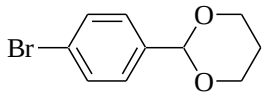

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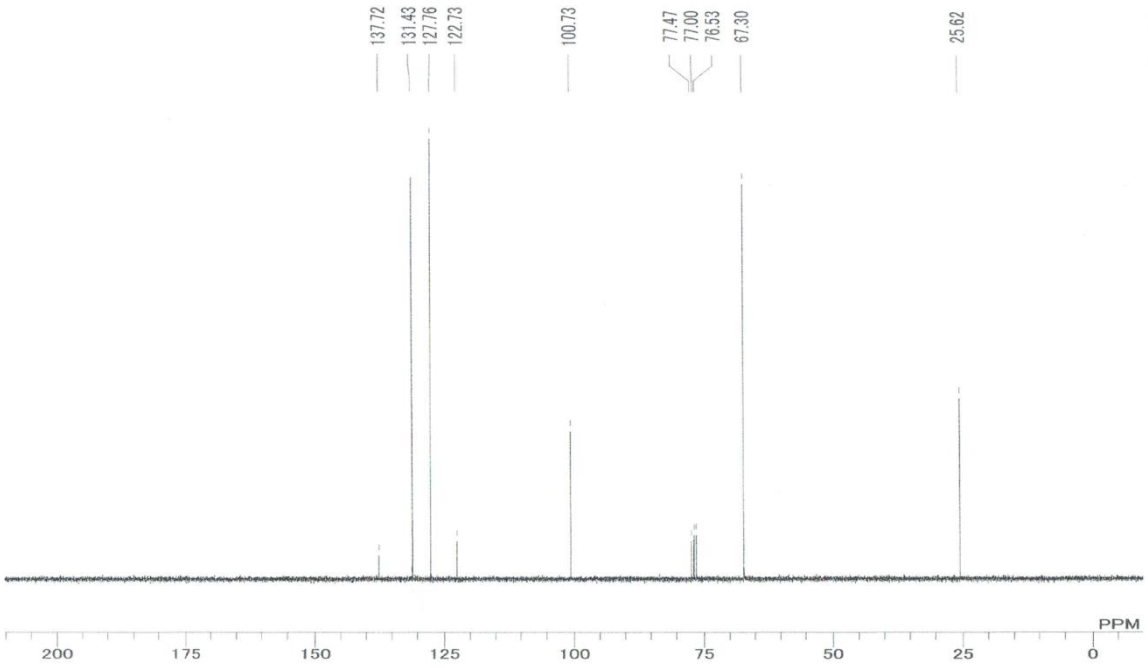

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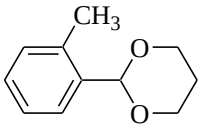

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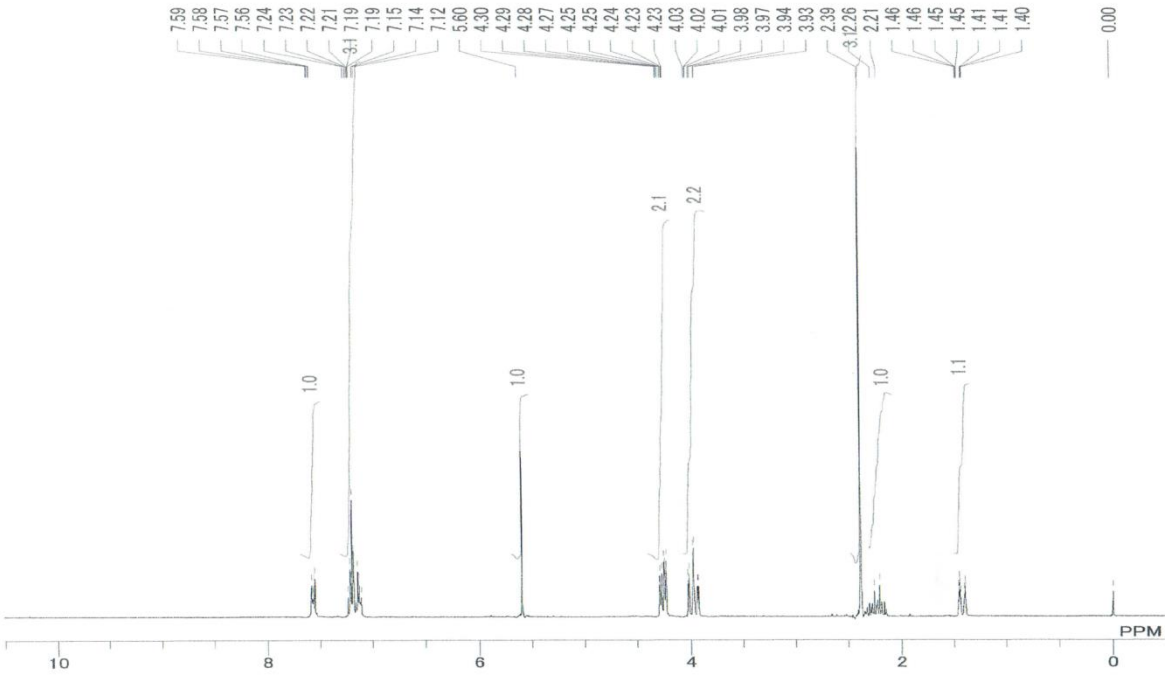

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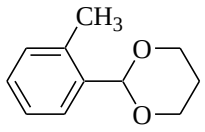

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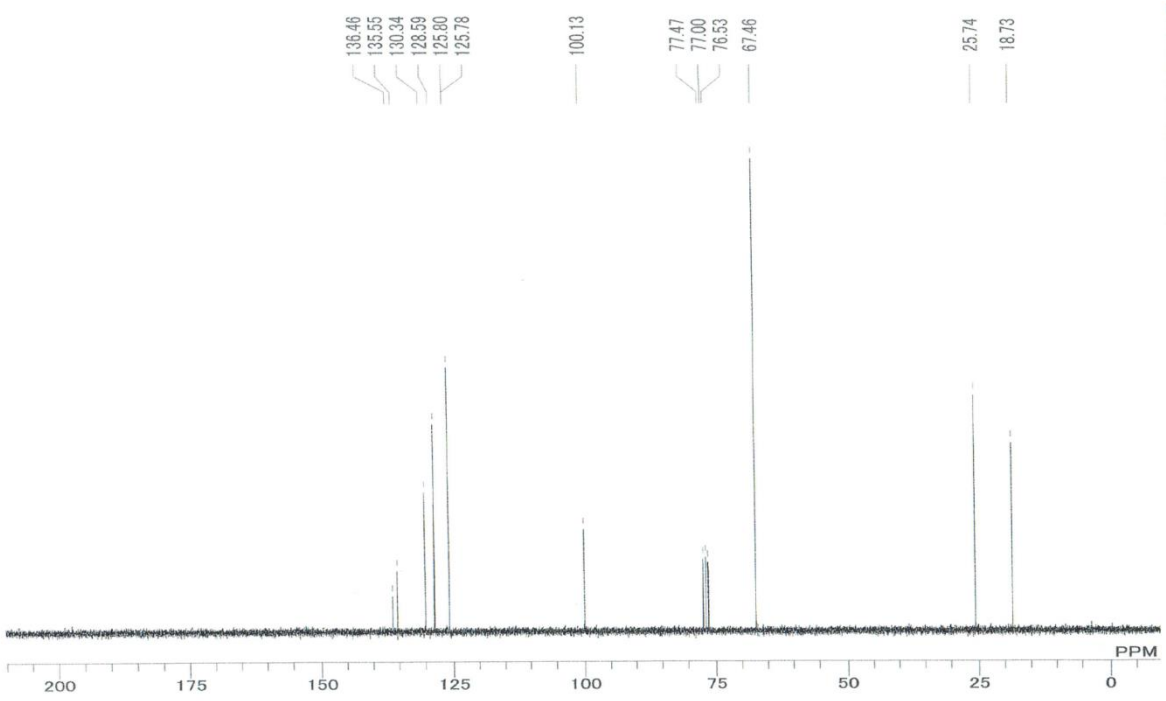

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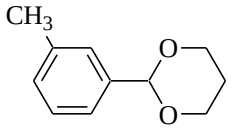

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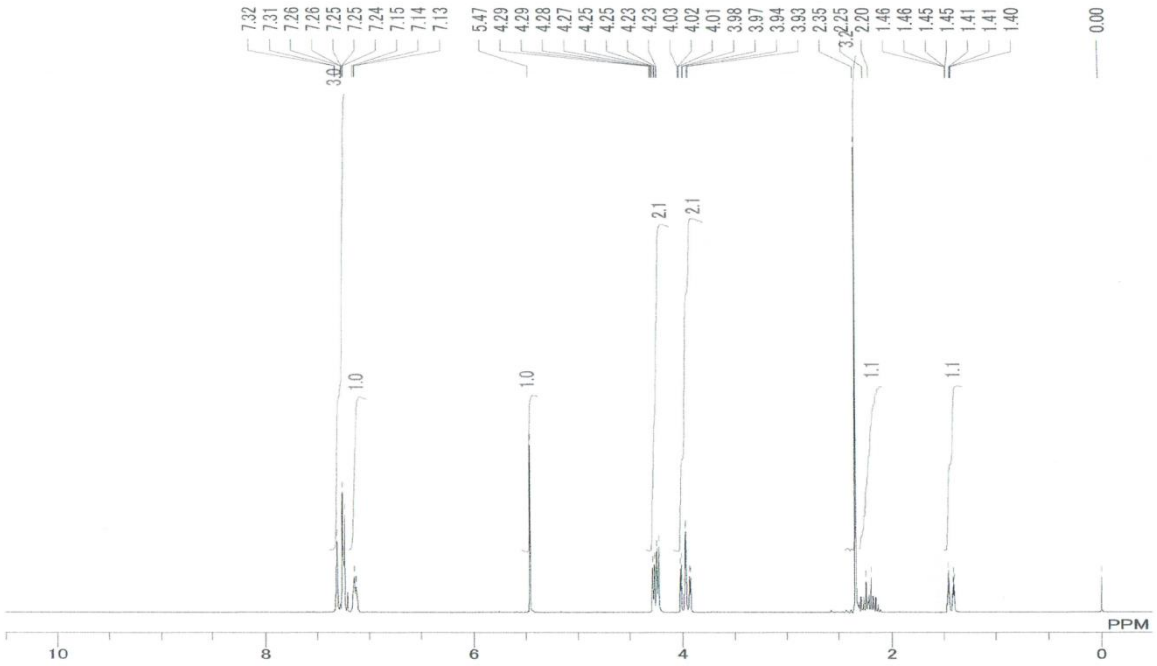

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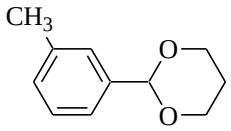

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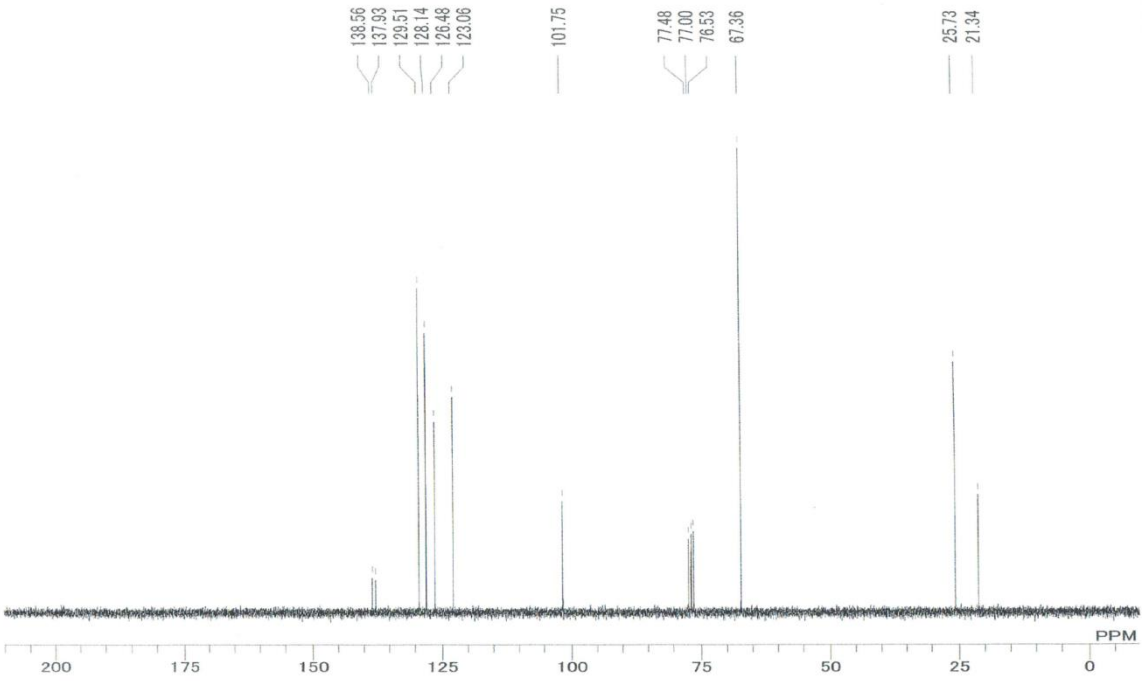

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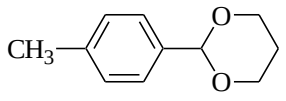

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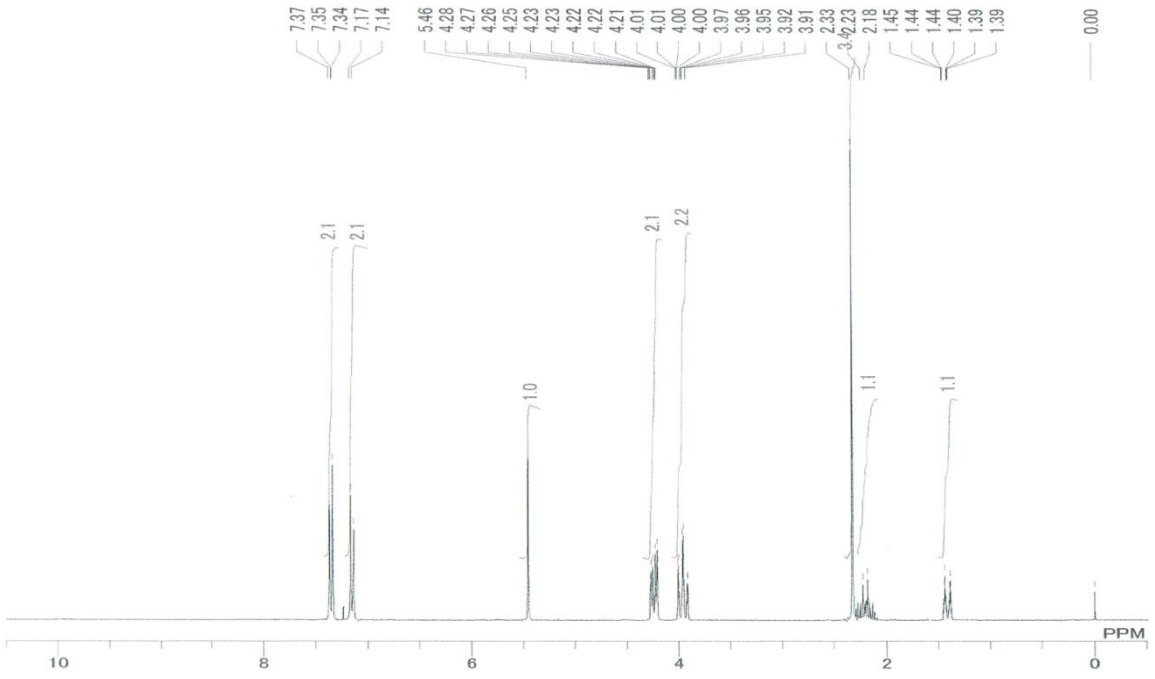

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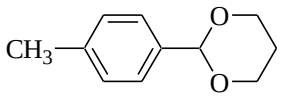

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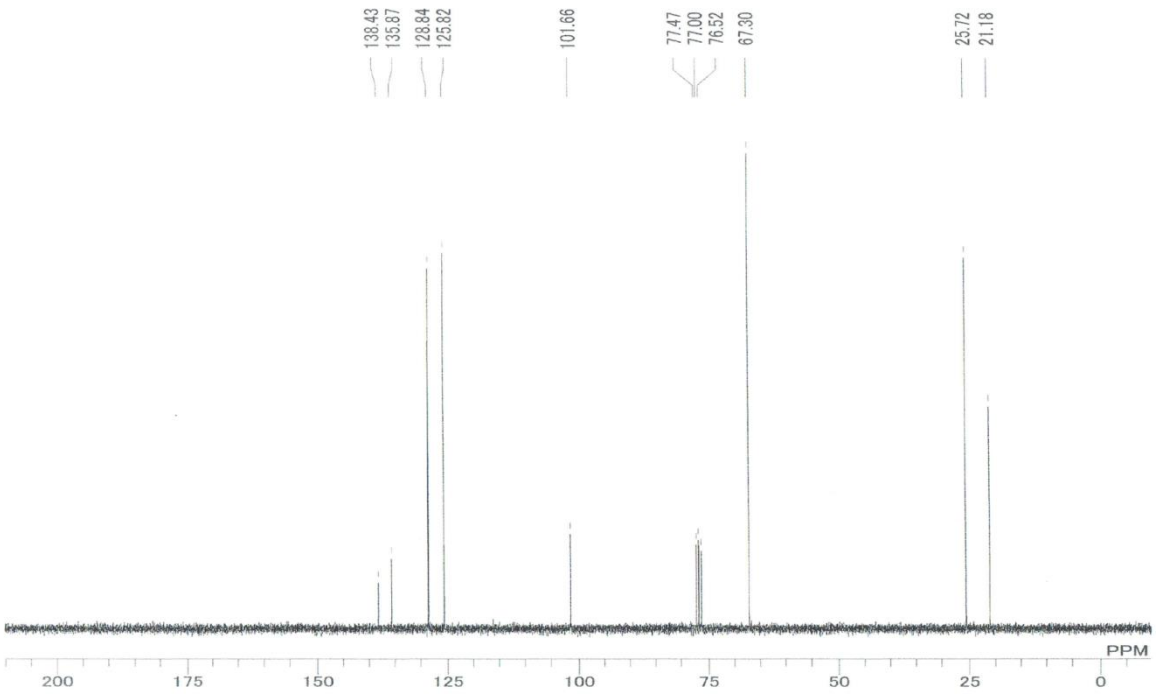

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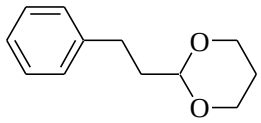

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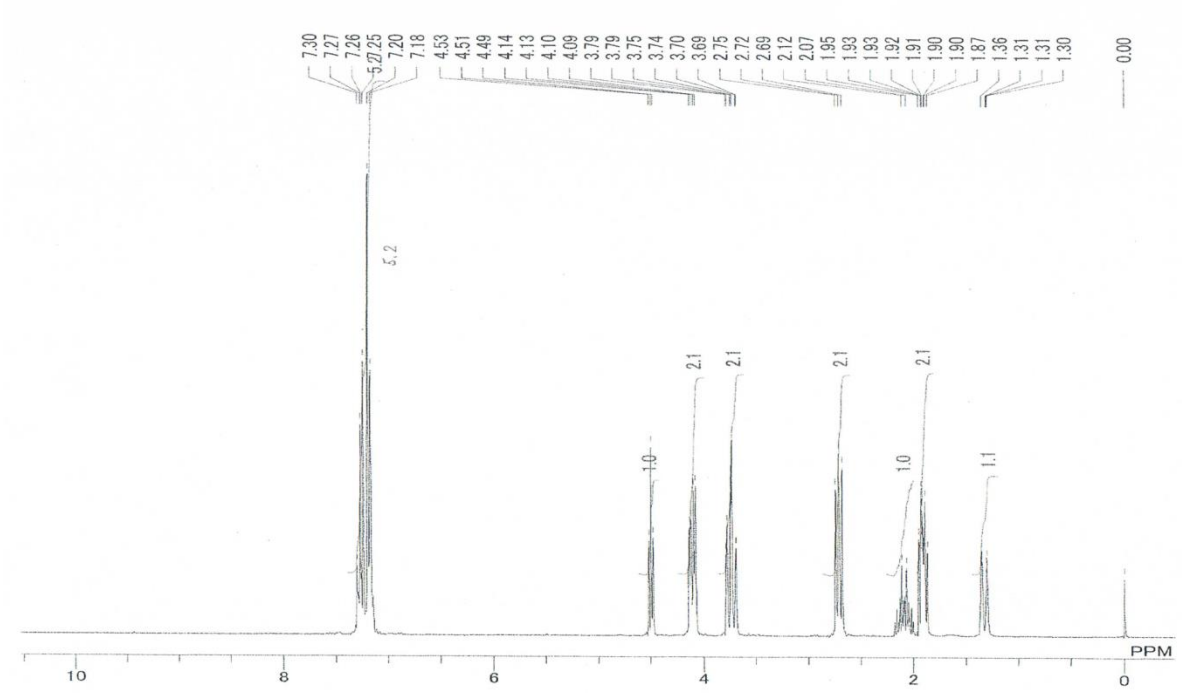
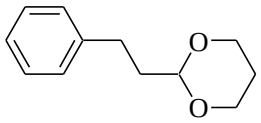


^{13}C NMR($CDCl_3$, 67.80 MHz)



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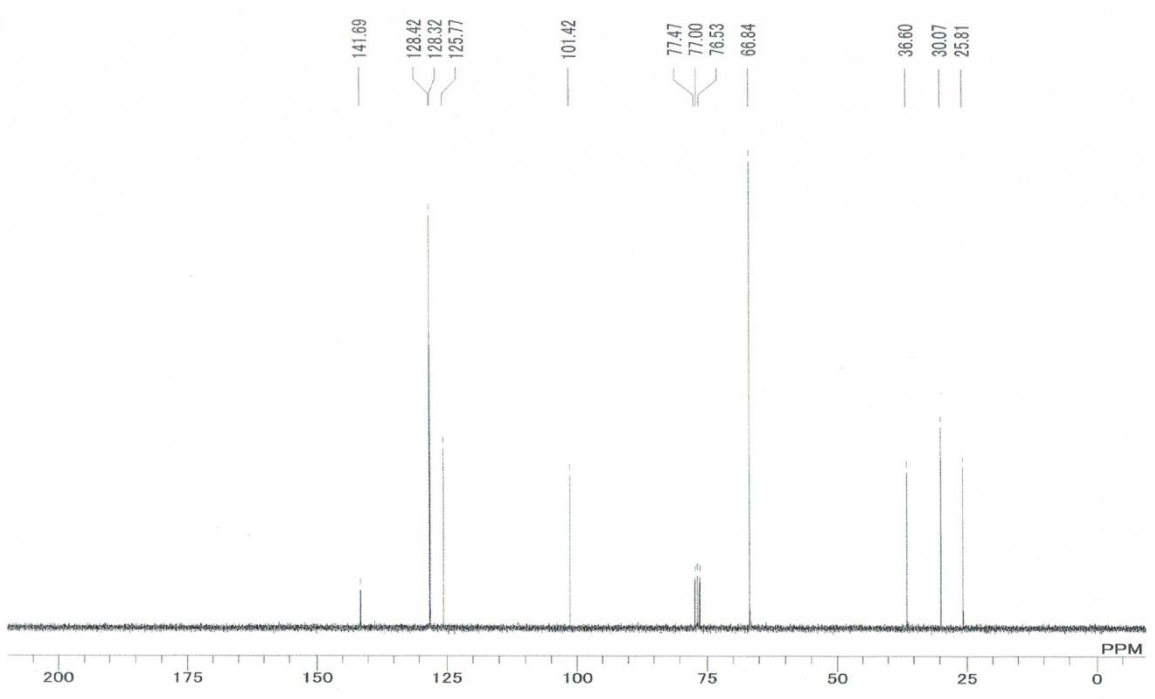

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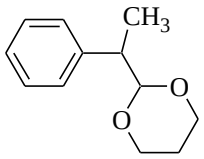

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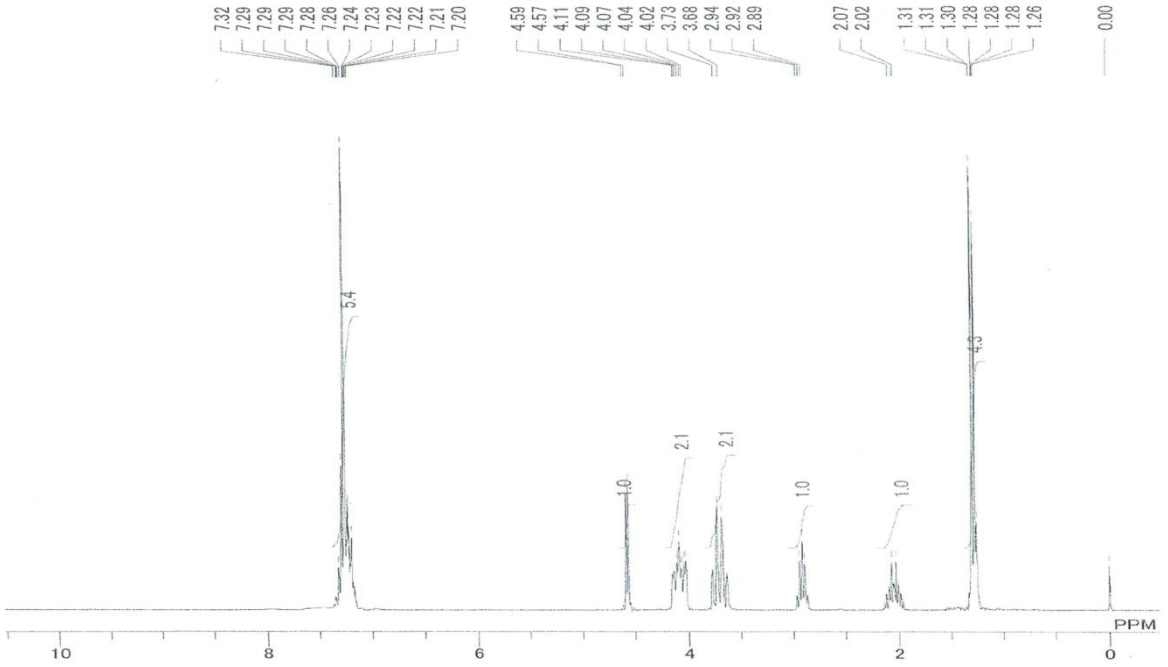

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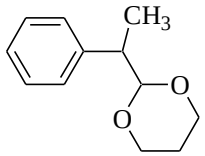

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