

Supporting Information

Mn(III)-BASED OXIDATIVE RADICAL RING-EXPANSION REACTION USING SQUARATE DERIVATIVES: SELECTIVE SYNTHESIS OF BIS(BUTANOLIDE)S AND THE ACETATE MONOMERS

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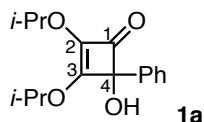
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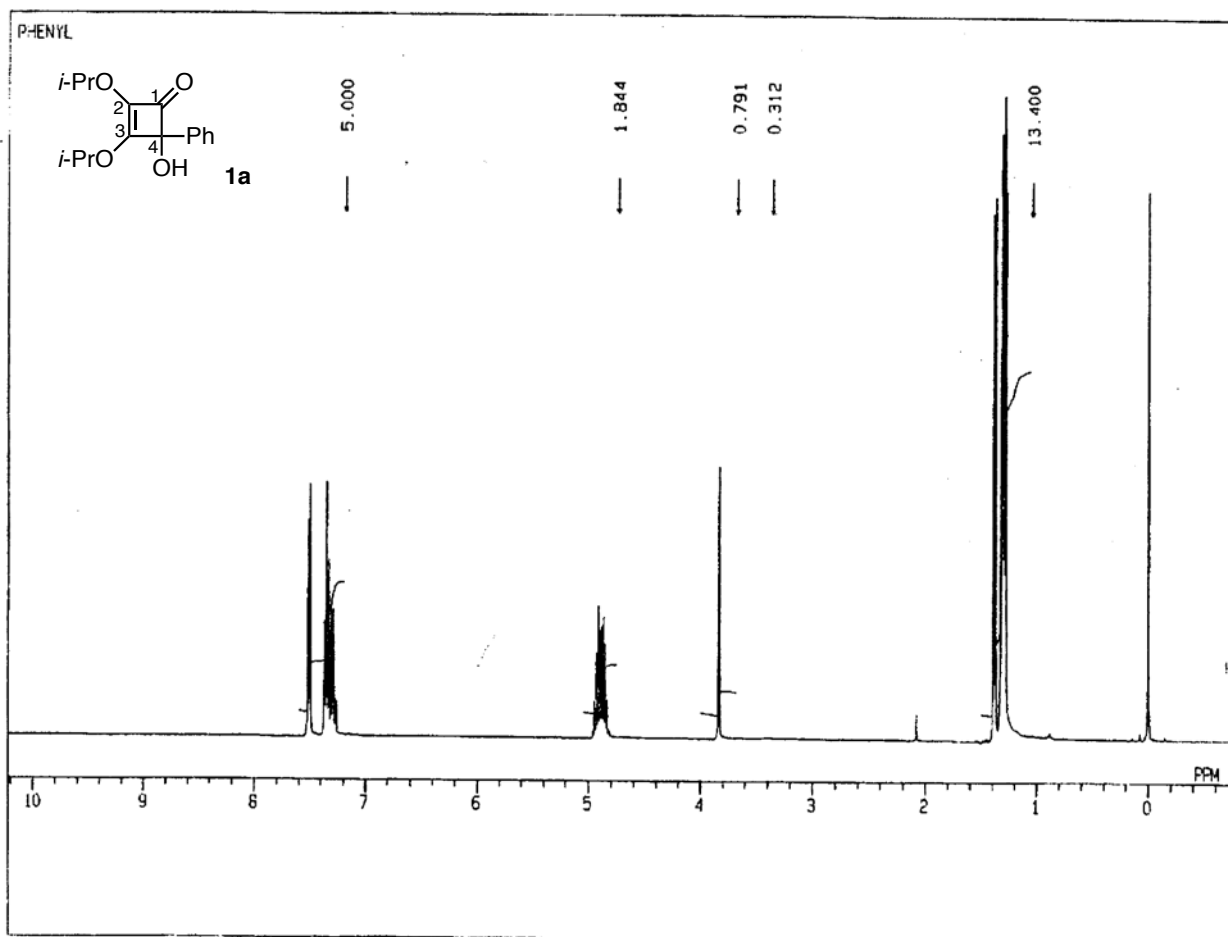
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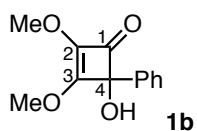
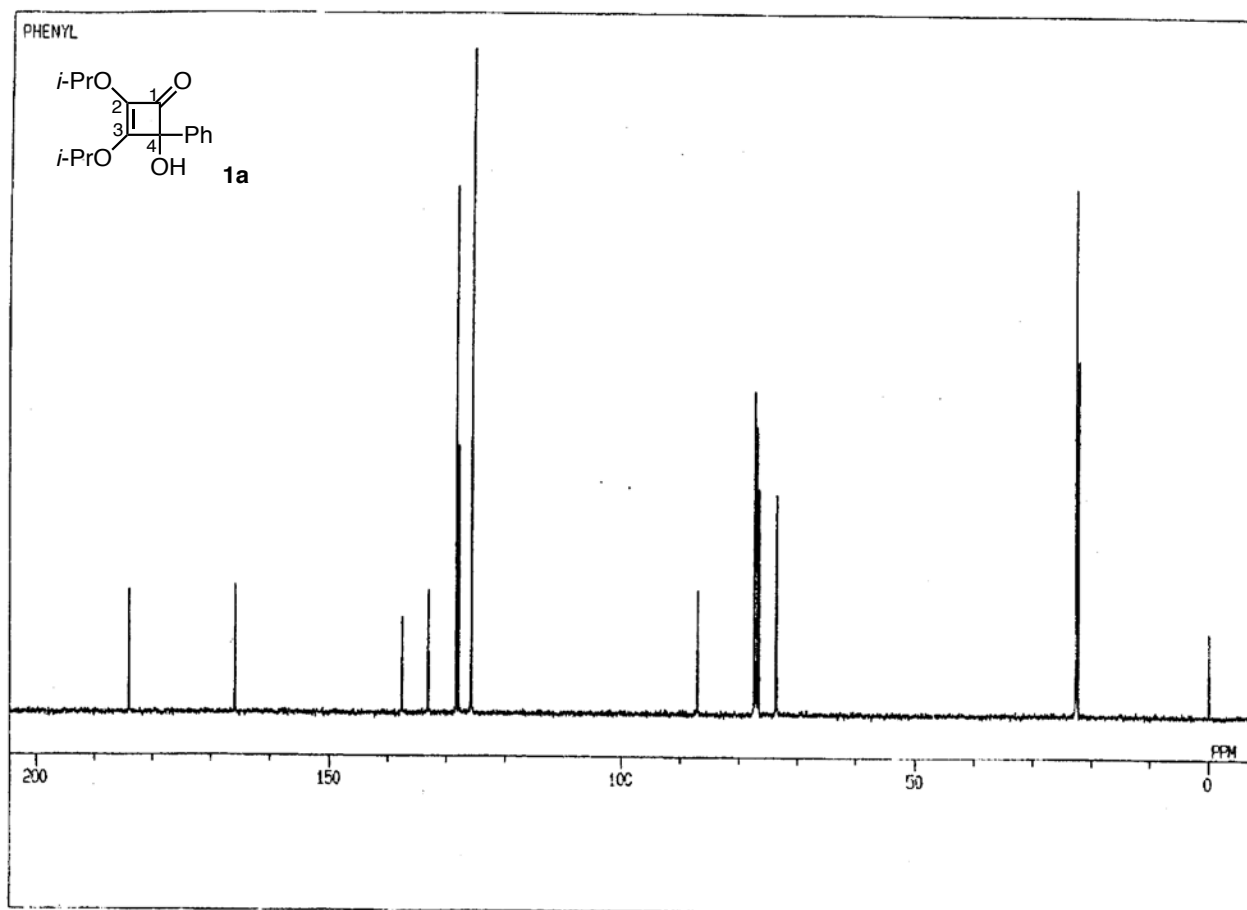
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Spectral Data, and ^1H and ^{13}C NMR spectra of the Starting Materials 1a-l.

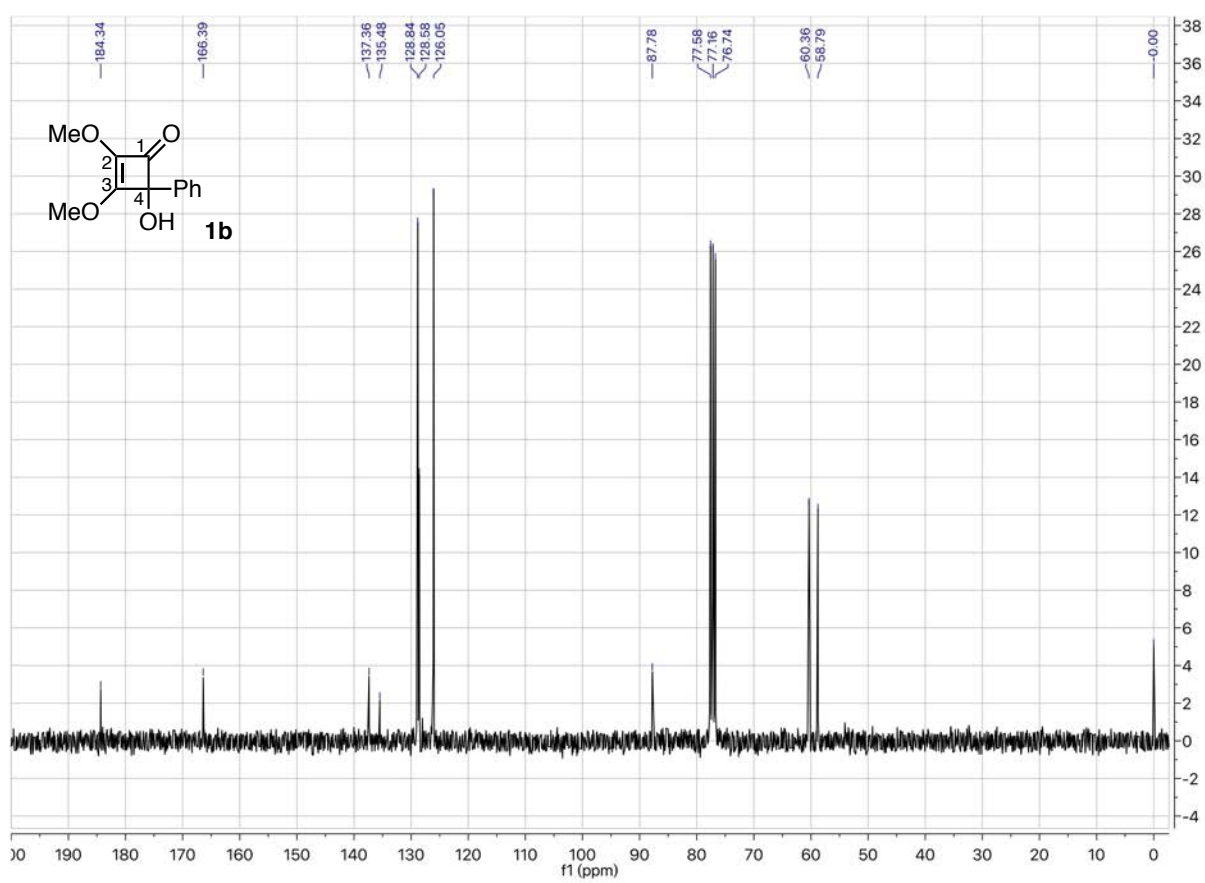
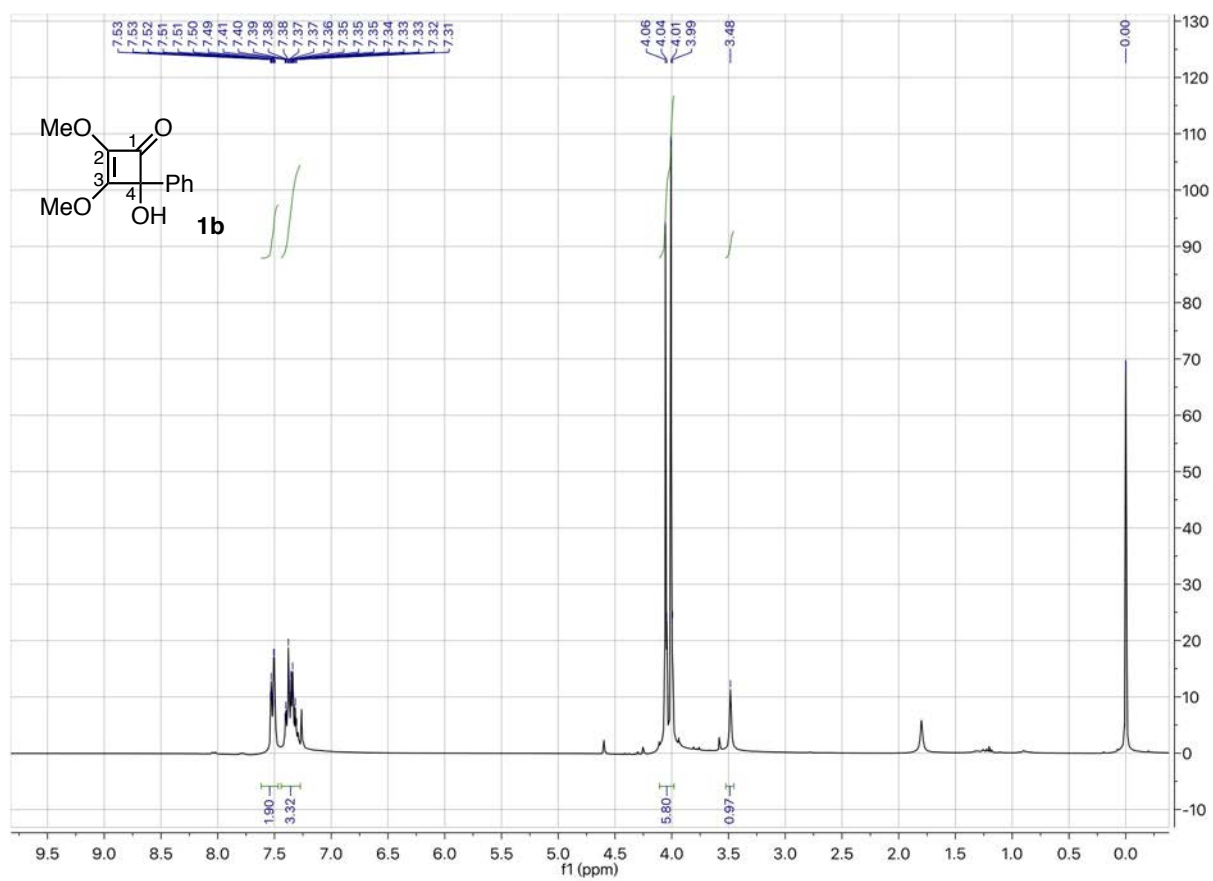


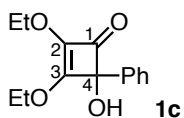
4-Hydroxy-2,3-diisopropoxy-4-phenylcyclobut-2-en-1-one (1a)^{9a}: yellowish oil; IR (CHCl_3) ν 3400 (OH), 1775 ($\text{C}=\text{O}$), 1625 ($>\text{C}=\text{C}<$); ^1H NMR (400 MHz, CDCl_3) δ 7.51-7.26 (5H, m, arom H), 4.94 (1H, sept, $J = 6.1$ Hz, $>\text{CH}-\text{O}$), 4.84 (1H, sept, $J = 6.1$ Hz, $>\text{CH}-\text{O}$), 3.83 (1H, s, OH), 1.39 (3H, d, $J = 6.1$ Hz, CH_3), 1.28 (3H, d, $J = 6.1$ Hz, CH_3), 1.26 (3H, d, $J = 6.1$ Hz, CH_3), 1.25 (3H, d, $J = 6.1$ Hz, CH_3); ^{13}C NMR (100 MHz, CDCl_3) δ 184.1 (C-1), 166.0 (C-3), 137.7 (C-2), 133.2 (arom C), 128.5 (2C), 128.0, 125.9 (2C) (arom CH), 87.2 (C-4), 77.5, 73.7 ($>\text{CH}-\text{O}$), 22.7 (2C), 22.5, 22.3 (CH_3).



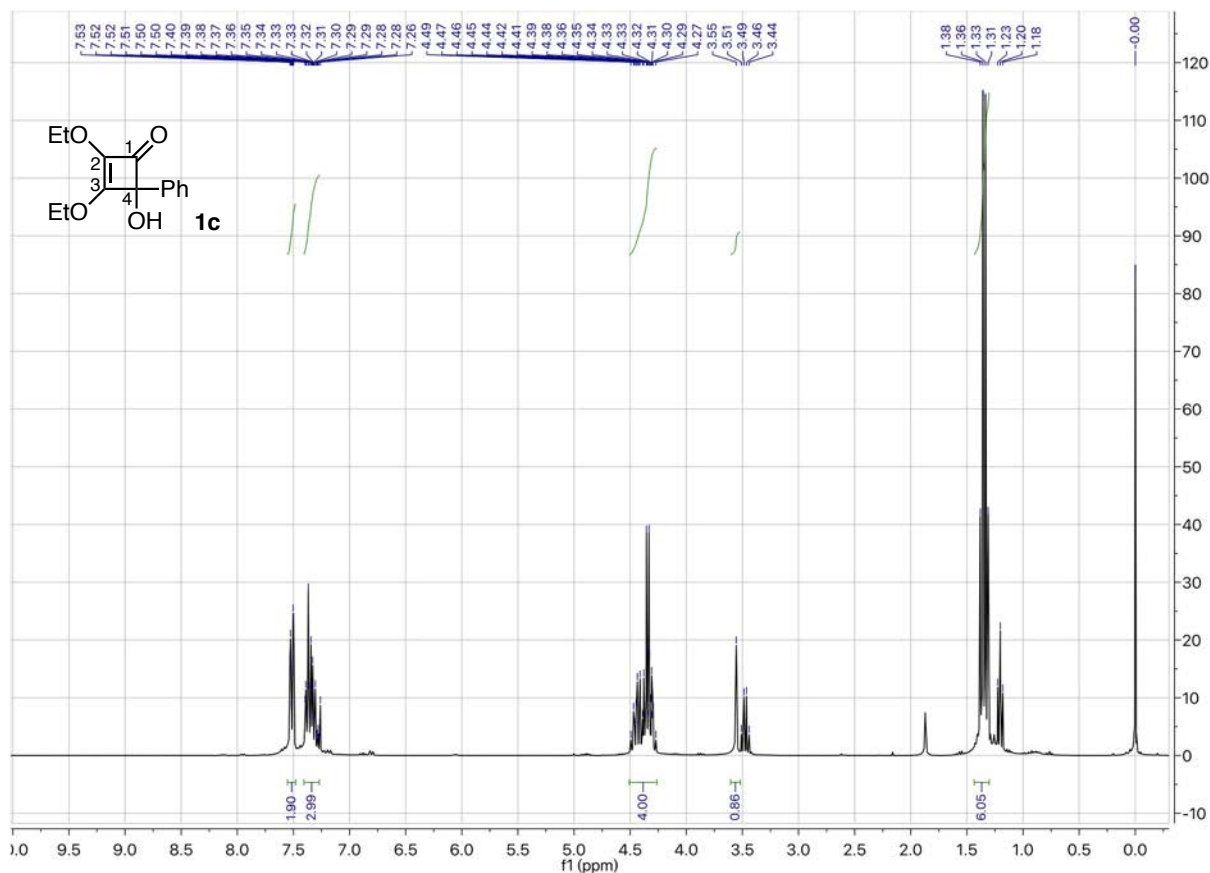


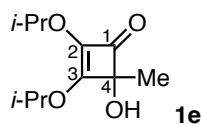
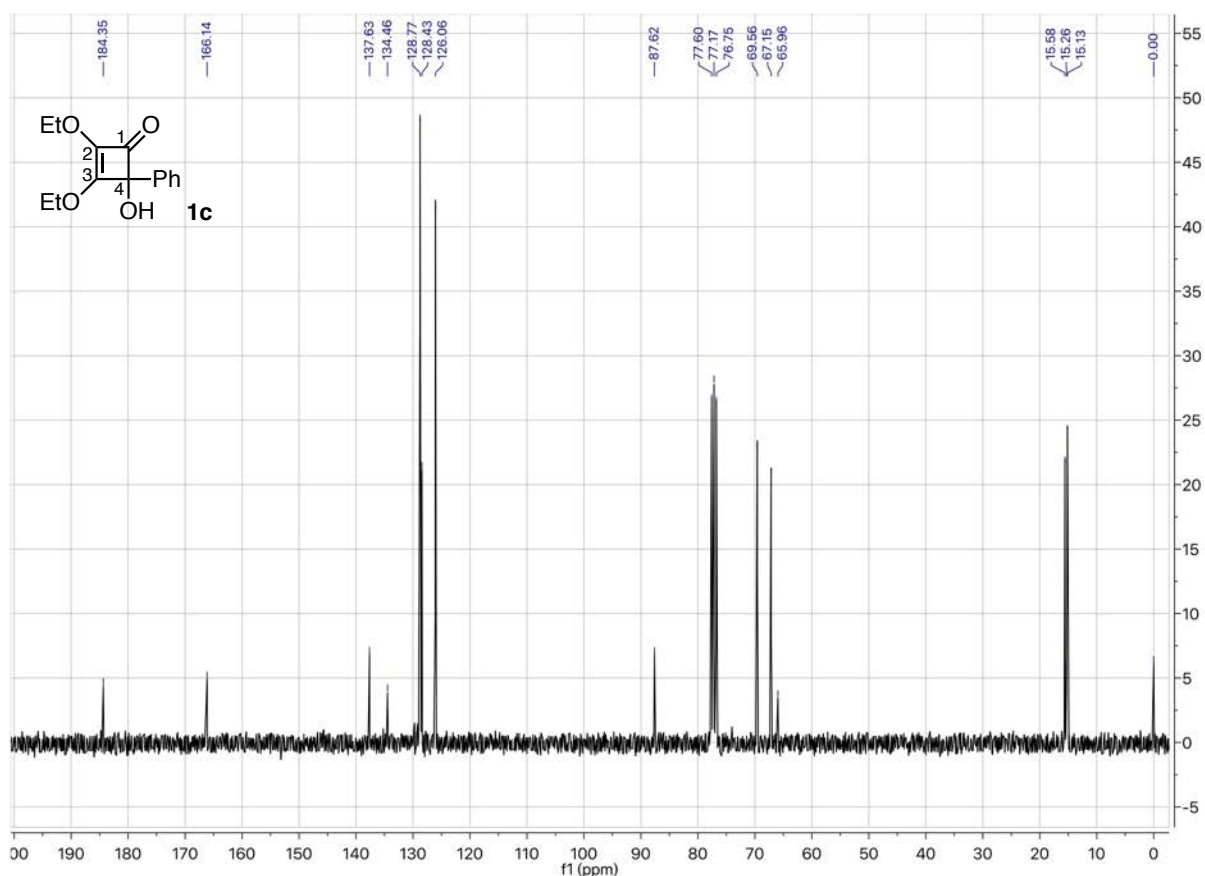
4-Hydroxy-2,3-dimethoxy-4-phenylcyclobut-2-en-1-one (1b): colorless microcrystals (from MnOH/jexane); mp 95-98 °C (lit,²² mp 96-98 °C); ¹H NMR (300 MHz, CDCl₃) δ 7.53-7.50 (2H, m, arom H), 7.40-7.31 (3H, m, arom H), 4.05 (3H, s, CH₃O), 4.00 (3H, s, CH₃O), 3.48 (1H, s, OH); ¹³C NMR (75 MHz, CDCl₃) δ 184.1 (C-1), 166.1 (C-3), 137.1 (C-2), 135.3 (arom C), 128.6 (2C), 128.4, 125.9 (2C) (arom CH), 87.6 (C-4), 60.3, 58.7 (CH₃O).



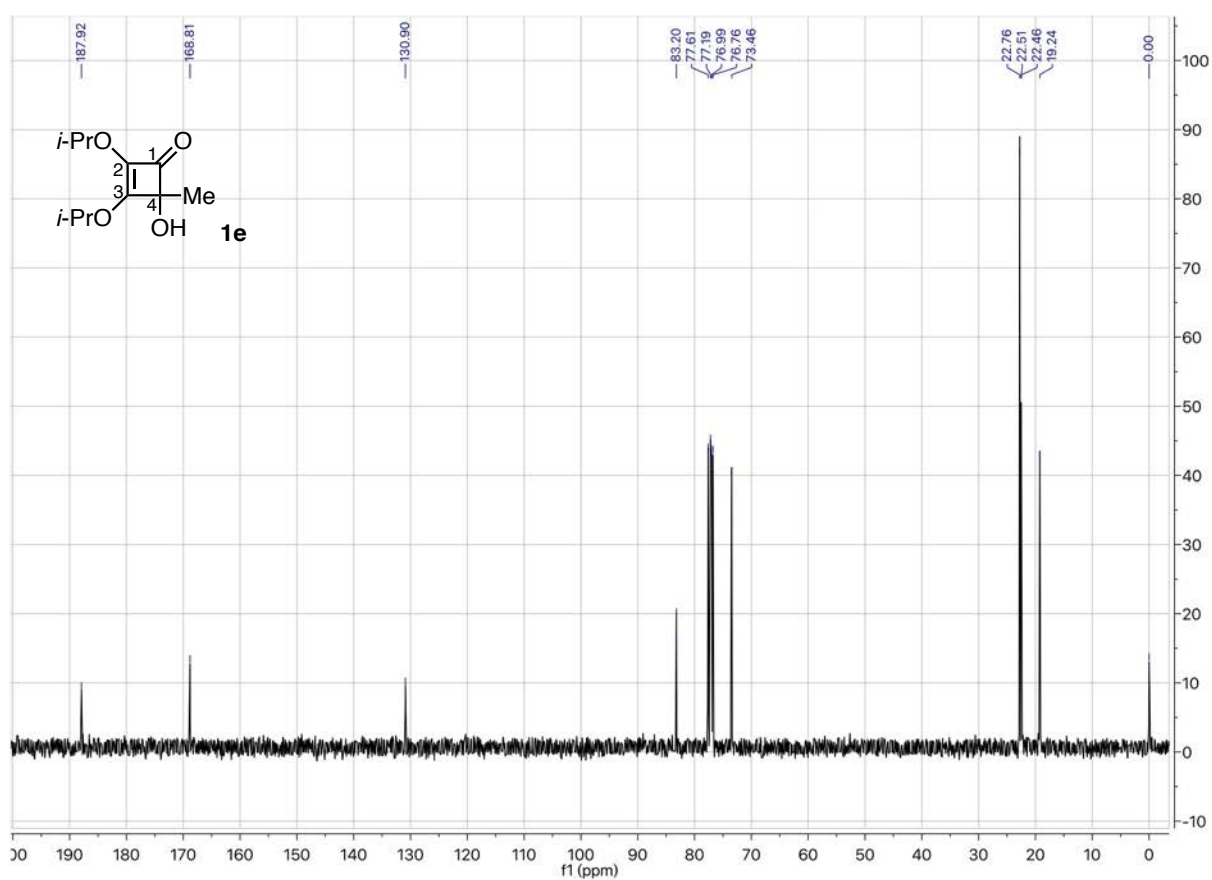
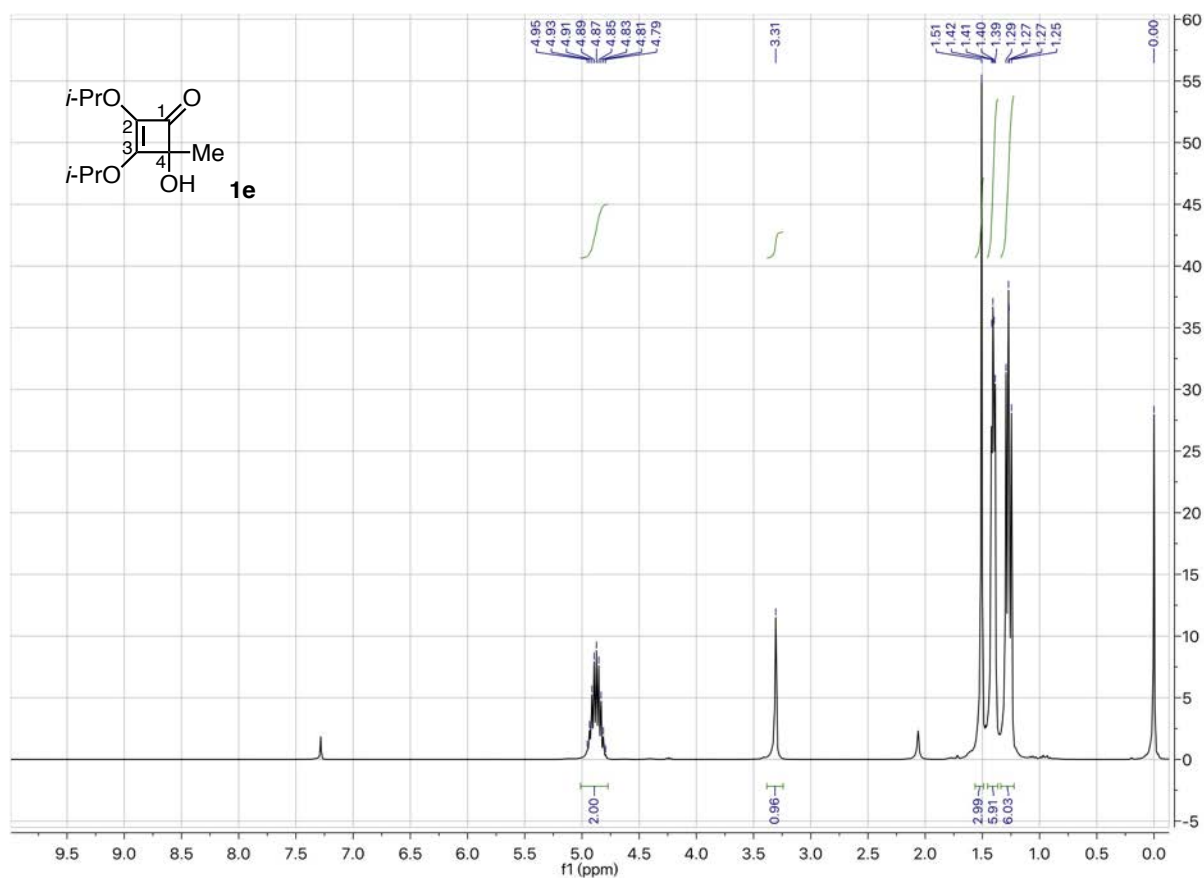


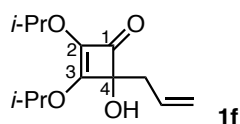
2,3-Diethoxy-4-hydroxy-4-phenylcyclobut-2-en-1-one (1c**)^{11a}**: yellowish oil; ^1H NMR (300 MHz, CDCl_3) δ 7.54–7.32 (5H, m, arom H), 4.42 (2H, q, $J = 6.0$ Hz, CH_2O), 4.35 (2H, q, $J = 6.0$ Hz, CH_2O), 3.55 (1H, s, OH), 1.36 (3H, t, $J = 6.0$ Hz, CH_3), 1.33 (3H, t, $J = 6.0$ Hz, CH_3); ^{13}C NMR (100 MHz, CDCl_3) δ 184.7 (C-1), 166.1 (C-3), 137.6 (C-2), 134.5 (arom C), 128.8 (2C), 128.4, 126.1 (2C) (arom CH), 87.6 (C-4), 66.9, 67.2 ($\text{CH}_2\text{-O}$), 15.6, 15.1 (CH_3).



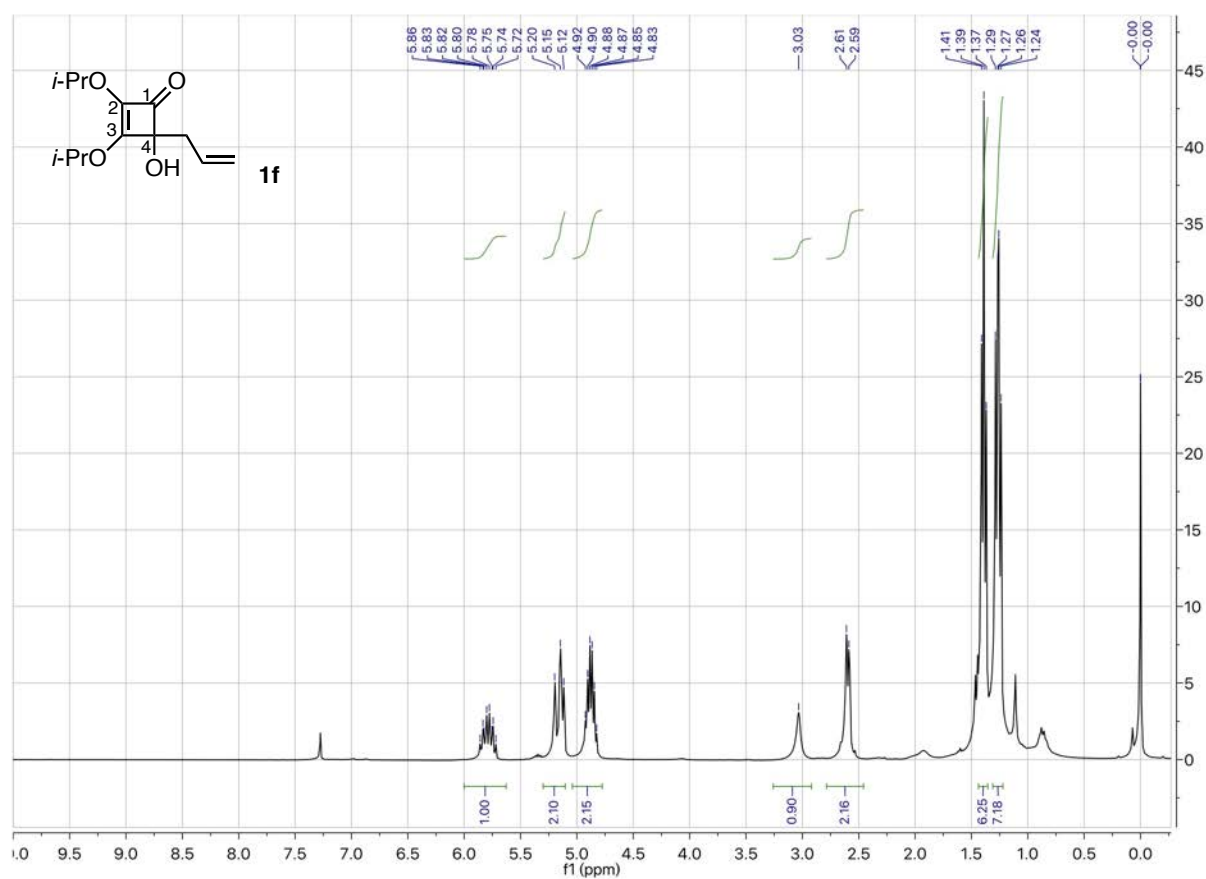


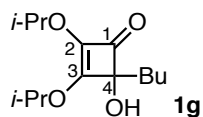
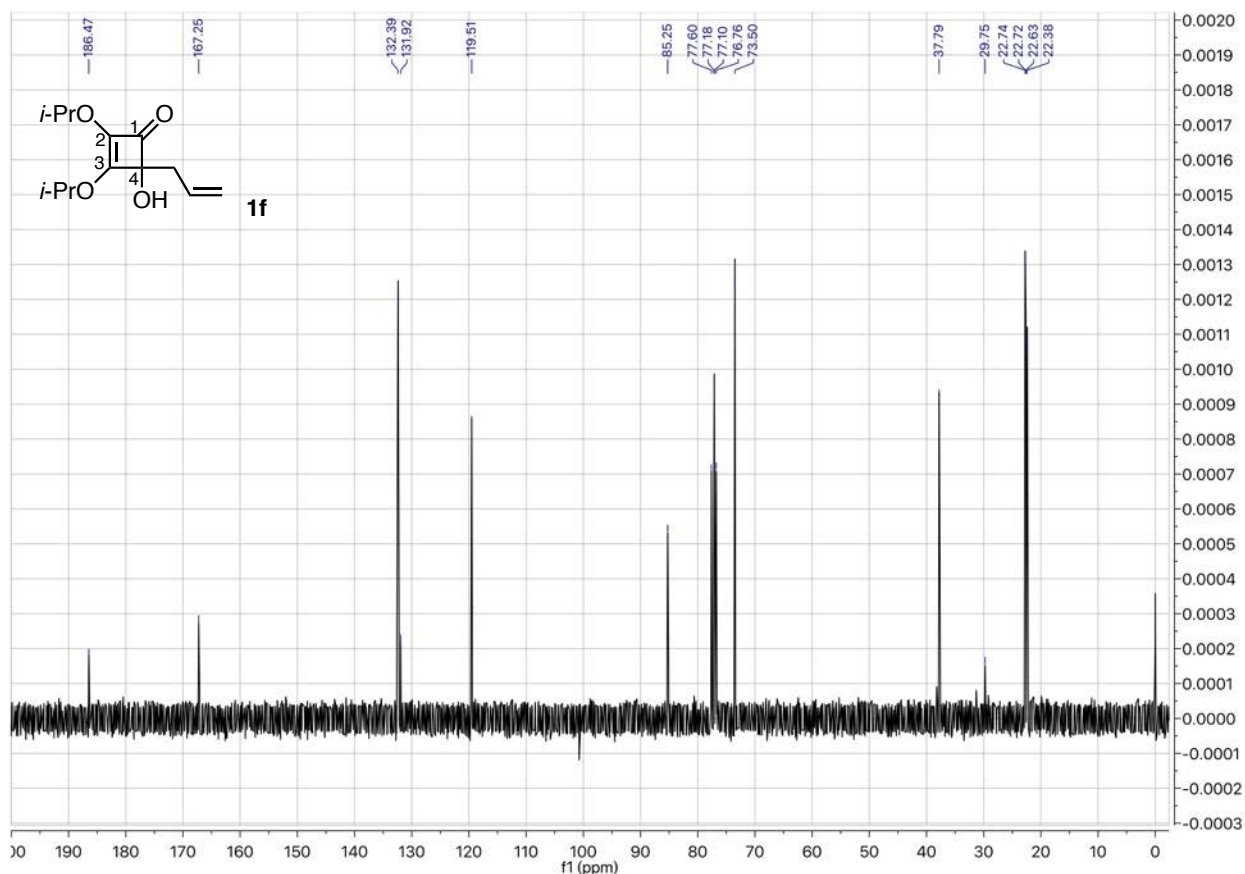
4-Hydroxy-2,3-diisopropoxy-4-methylcyclobut-2-en-1-one (1e)^{9a}: R_f = 0.35 (7:3 Et₂O/hexane v/v); yield 72%; colorless solid; mp 35-36 °C; IR (CHCl₃) ν 3370 (OH), 1766 (C=O), 1620 (>C=C<); ¹H NMR (300 MHz, CDCl₃) δ 4.88 (2H, sept, J = 6.1 Hz, >CH-O \times 2), 3.31 (1H, s, OH), 1.51 (3H, s, CH₃), 1.41 (3H, d, J = 6.1 Hz, CH₃), 1.40 (3H, d, J = 6.1 Hz, CH₃), 1.28 (3H, d, J = 6.1 Hz, CH₃), 1.26 (3H, d, J = 6.1 Hz, CH₃); ¹³C NMR (75 MHz, CDCl₃) δ 187.6 (C-1), 168.5 (C-2), 130.7 (C-3), 83.1 (C-4), 76.8, 73.2 (>CH-O), 22.7 (2C), 22.5, 22.4, 19.2 (CH₃).



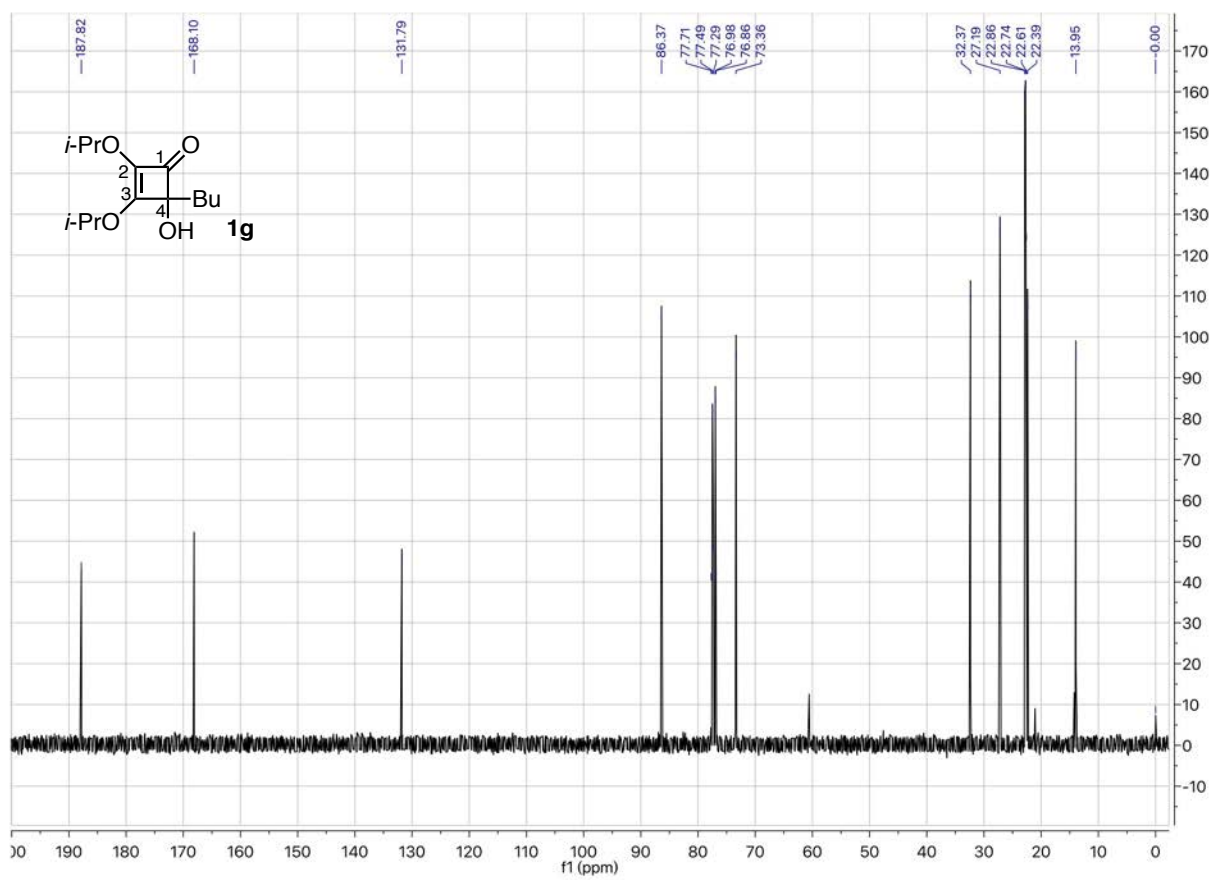
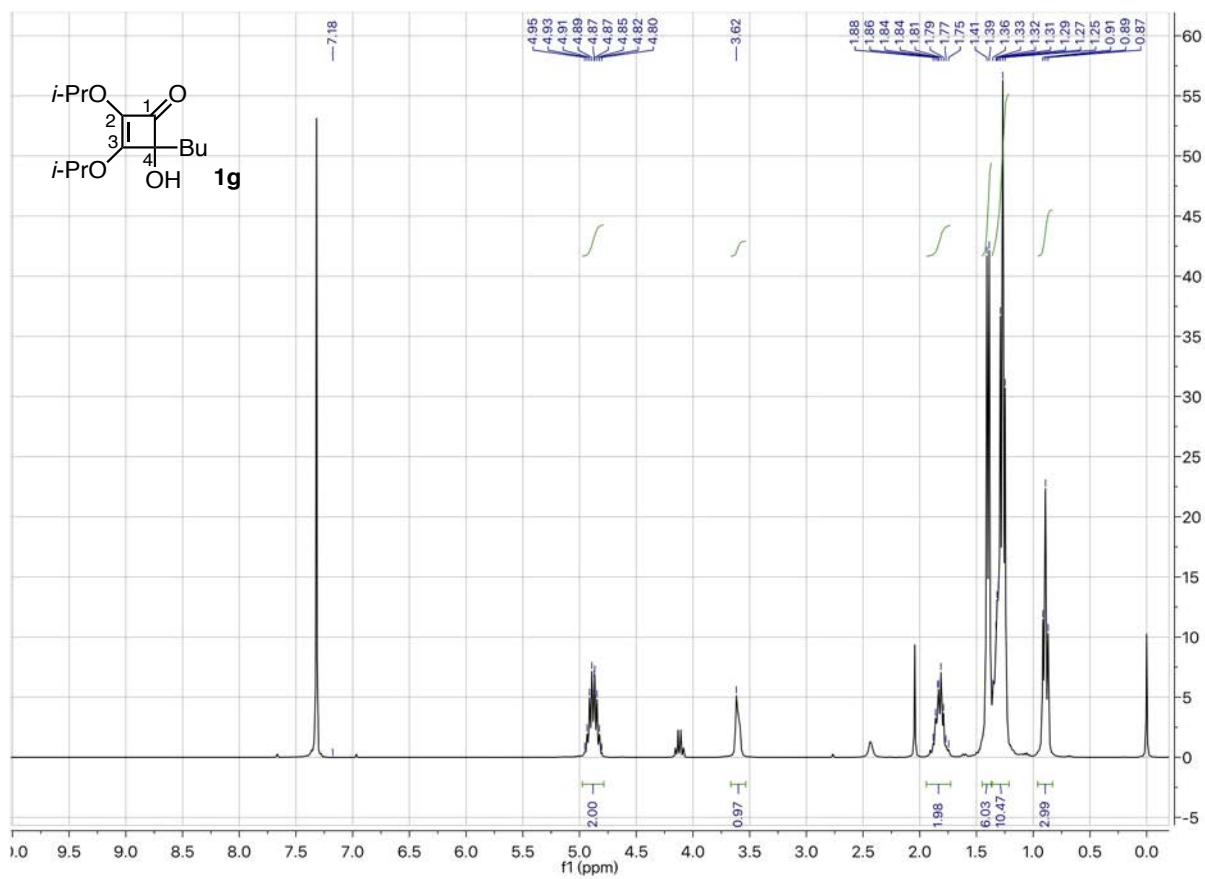


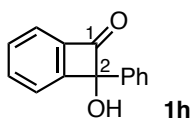
4-Allyl-4-hydroxy-2,3-diisopropoxycyclobut-2-en-1-one (1f): $R_f = 0.29$ (7:3 Et₂O/hexane v/v); yellow solid; mp 37-38 °C; IR (CHCl₃) ν 3373 (OH), 1767 (C=O), 1620 (>C=C<); ¹H NMR (300 MHz, CDCl₃) δ 5.86-5.72 (1H, m, -CH=), 5.17 (1H, d, $J = 17.1$ Hz, =CH_{trans}H_{cis}), 5.13 (1H, d, $J = 10.7$ Hz, =CH_{trans}H_{cis}), 4.88 (1H, sept, $J = 6.1$ Hz, >CH-O), 4.86 (1H, sept, $J = 6.1$ Hz, >CH-O), 3.03 (1H, s, OH), 2.60 (2H, d, $J = 6.4$ Hz, -CH₂-), 1.40 (3H, d, $J = 6.1$ Hz, CH₃), 1.38 (3H, d, $J = 6.1$ Hz, CH₃), 1.28 (3H, d, $J = 6.1$ Hz, CH₃), 1.25 (3H, d, $J = 6.1$ Hz, CH₃); ¹³C NMR (75 MHz, CDCl₃) δ 186.5 (C-1), 167.3 (C-3), 132.4 (-CH=), 131.9 (C-2), 119.5 (=CH₂), 85.3 (C-4), 77.1, 73.5 (>CH-O), 37.8 (-CH₂-), 22.74, 22.72, 22.6, 22.4 (CH₃).



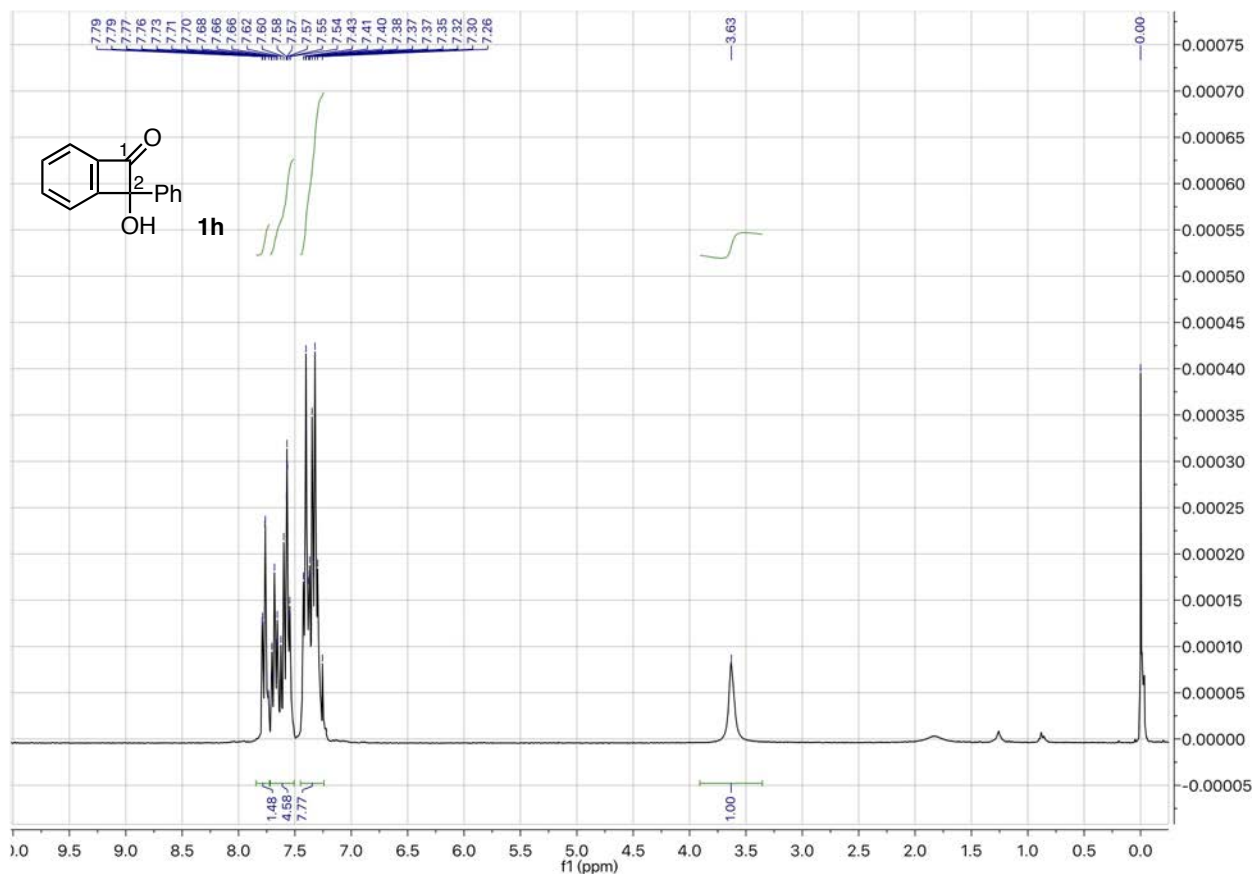


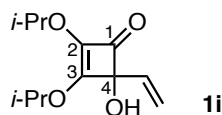
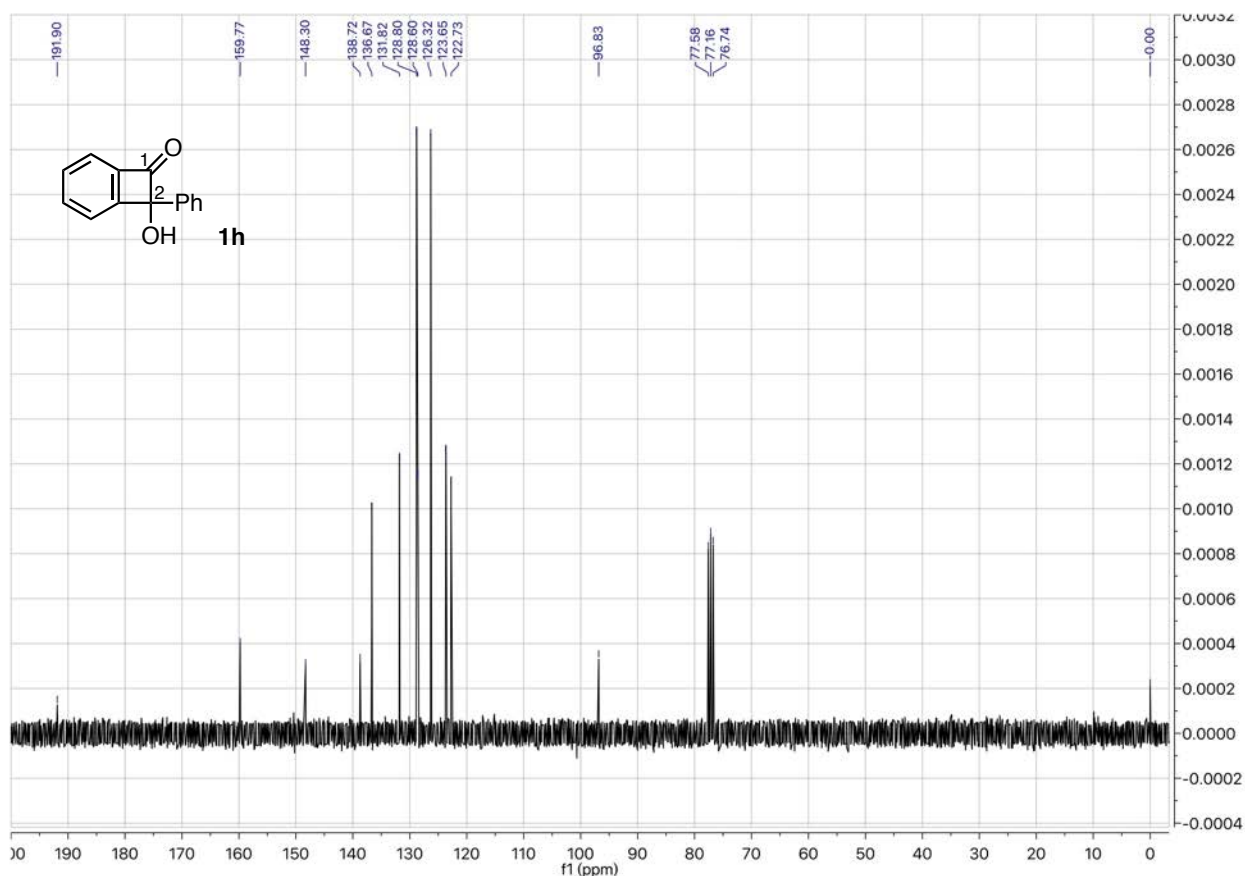
4-Butyl-4-hydroxy-2,3-diisopropoxycyclobut-2-en-1-one (1g)^{9a}: $R_f = 0.15$ (CHCl_3); yield 83%; yellow oil; IR (CHCl_3) ν 3370 (OH), 1765 (C=O), 1616 ($>\text{C}=\text{C}<$); ^1H NMR (300 MHz, CDCl_3) δ 4.89 (1H, sept, $J = 6.1$ Hz, $>\text{CH}-\text{O}$), 4.86 (1H, sept, $J = 6.1$ Hz, $>\text{CH}-\text{O}$), 3.62 (1H, s, OH), 1.88-1.75 (2H, m, $-\text{CH}_2-$), 1.41 (6H, d, $J = 6.1$ Hz, $\text{CH}_3 \times 2$), 1.27 (3H, d, $J = 6.1$ Hz, CH_3), 1.26 (3H, d, $J = 6.1$ Hz, CH_3), 1.39-1.28 (4H, m, $-\text{CH}_2- \times 2$), 0.89 (3H, t, $J = 6.9$ Hz, CH_3); ^{13}C NMR (75 MHz, CDCl_3) δ 187.8 (C-1), 168.1 (C-3), 131.8 (C-2), 86.4 (C-4), 76.99, 73.4 ($>\text{CH}-\text{O}$), 32.4, 27.2, 22.9 ($-\text{CH}_2-$), 22.7 (2C), 22.6, 22.4, 13.95 (CH_3).



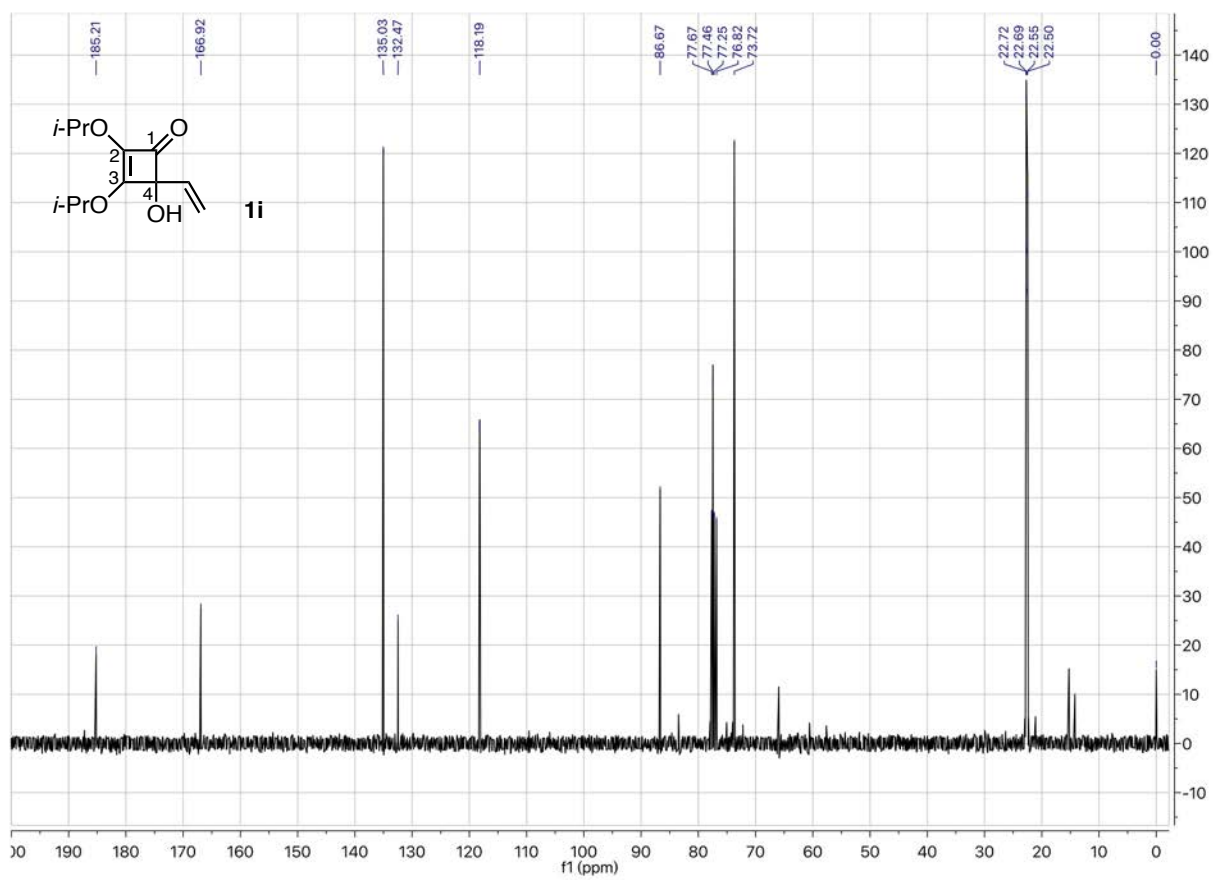
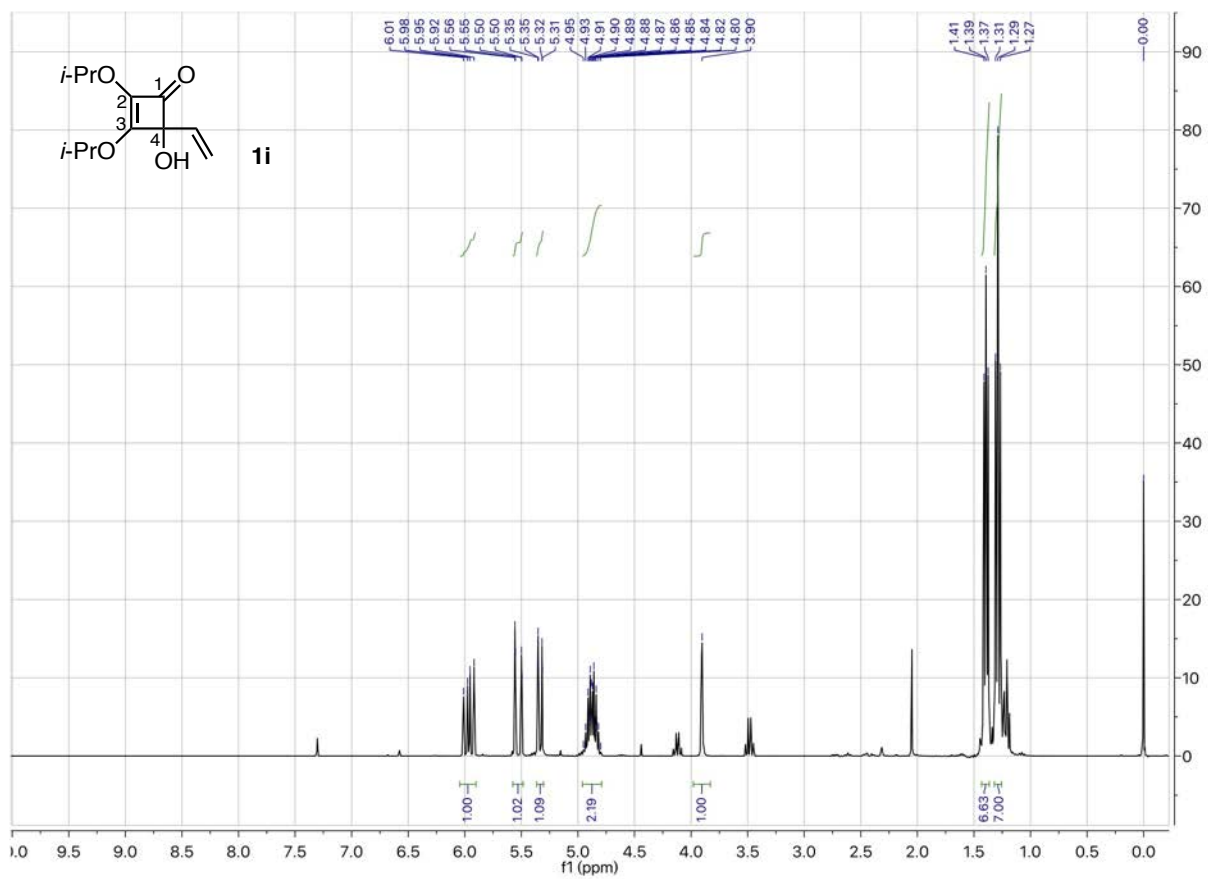


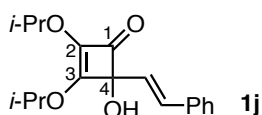
2-Hydroxy-2-phenylbenzocyclobuten-1(2*H*)-one (1h)¹⁸: $R_f = 0.09$ (CHCl_3); colorless microcrystals (from CHCl_3 /hexane); mp 102-103 °C; IR (KBr) ν 3400-3200 (OH), 1760 ($>\text{C}=\text{O}$); ^1H NMR (300 MHz, CDCl_3) δ 7.79-7.73 (1H, m, arom H), 7.70-7.54 (3H, m, arom H), 7.43-7.30 (5H, m, arom H), 3.63 (1H, s, OH); ^{13}C NMR (75 MHz, CDCl_3) δ 191.9 ($>\text{C}=\text{O}$), 159.8, 148.3, 138.7 (arom C), 136.7, 131.8, 128.8, 128.6, 126.3, 123.7, 122.7 (arom CH), 96.8 ($\text{C}-\text{OH}$).



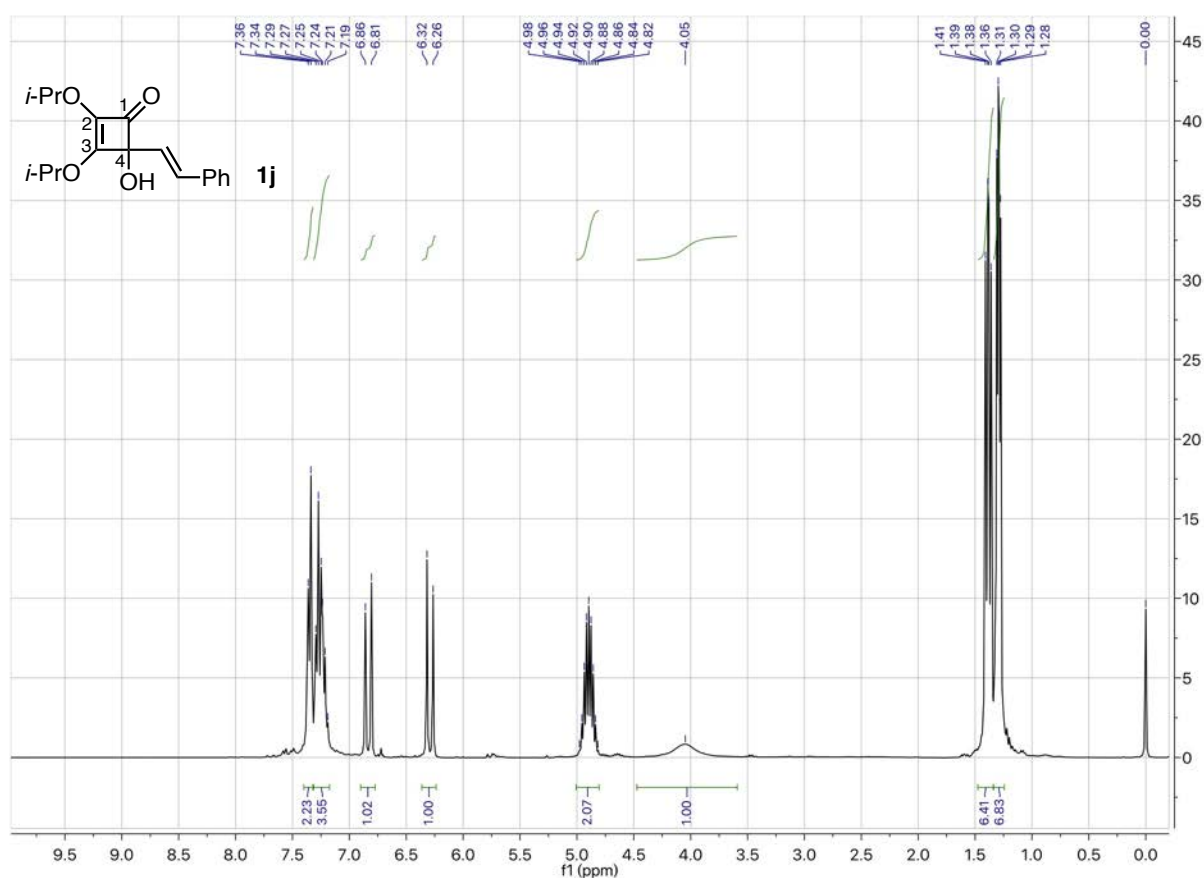


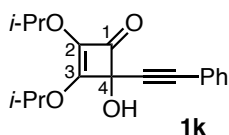
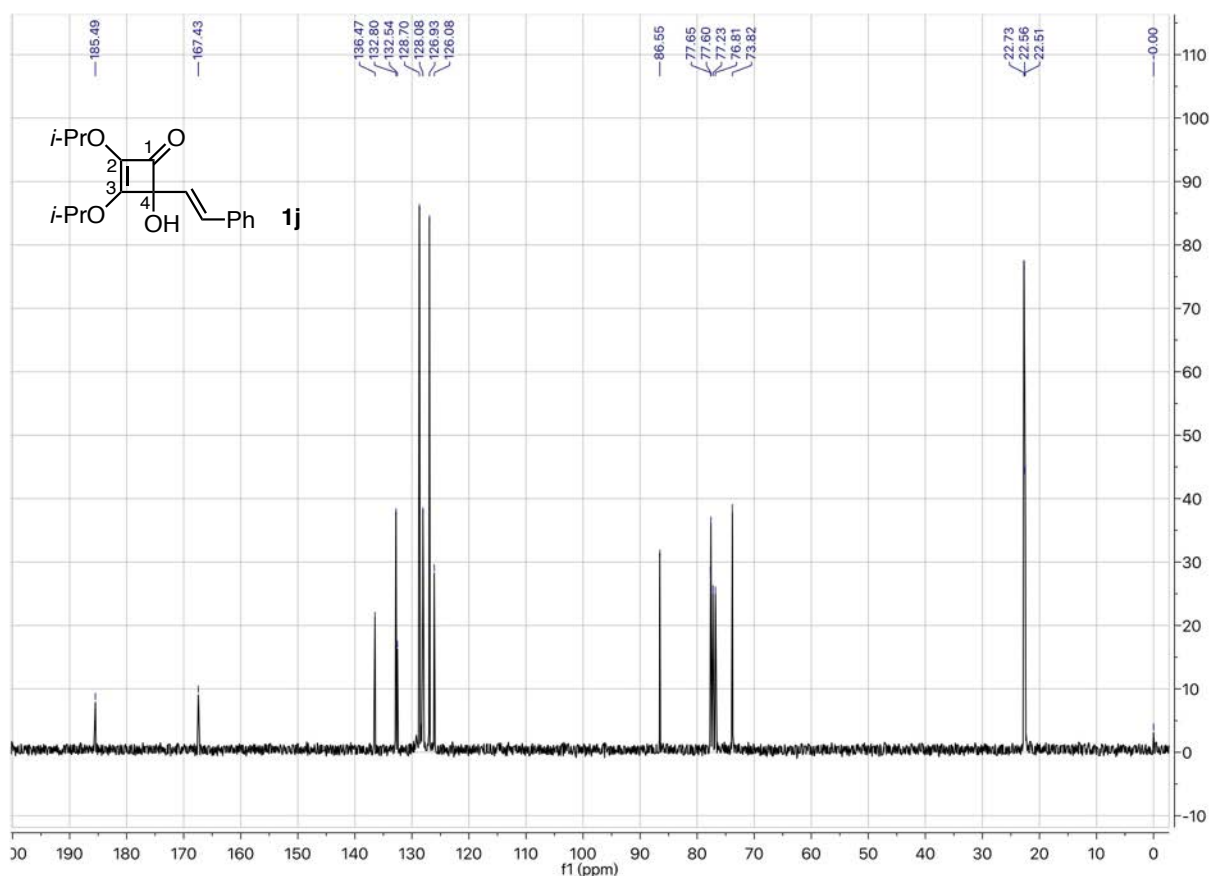
4-Hydroxy-2,3-diisopropoxy-4-vinylcyclobut-2-en-1-one (1i)²⁵: $R_f = 0.47$ (7:3 Et₂O/hexane v/v); yield 60%; yellow oil; IR (CHCl₃) ν 3375 (OH), 1768 (C=O), 1619 (>C=C<); ¹H NMR (300 MHz, CDCl₃) δ 5.97 (1H, dd, $J = 17.3, 10.7$ Hz, -CH=), 5.53 (1H, dd, $J = 17.3, 0.9$ Hz, =CH_{trans}H_{cis}), 5.34 (1H, dd, $J = 10.7, 0.9$ Hz, =CH_{trans}H_{cis}), 4.95-4.80 (2H, m, >CH-O), 3.90 (1H, s, OH), 1.40 (3H, d, $J = 6.1$ Hz, CH₃), 1.38 (3H, d, $J = 6.1$ Hz, CH₃), 1.30 (3H, d, $J = 6.1$ Hz, CH₃), 1.28 (3H, d, $J = 6.1$ Hz, CH₃); ¹³C NMR (75 MHz, CDCl₃) δ 185.2 (C-1), 166.9 (C-3), 135.0 (-CH=), 132.5 (C-2), 118.2 (=CH₂), 86.7 (C-4), 77.5, 73.7 (>CH-O), 22.7, 22.69, 22.55, 22.5 (CH₃).



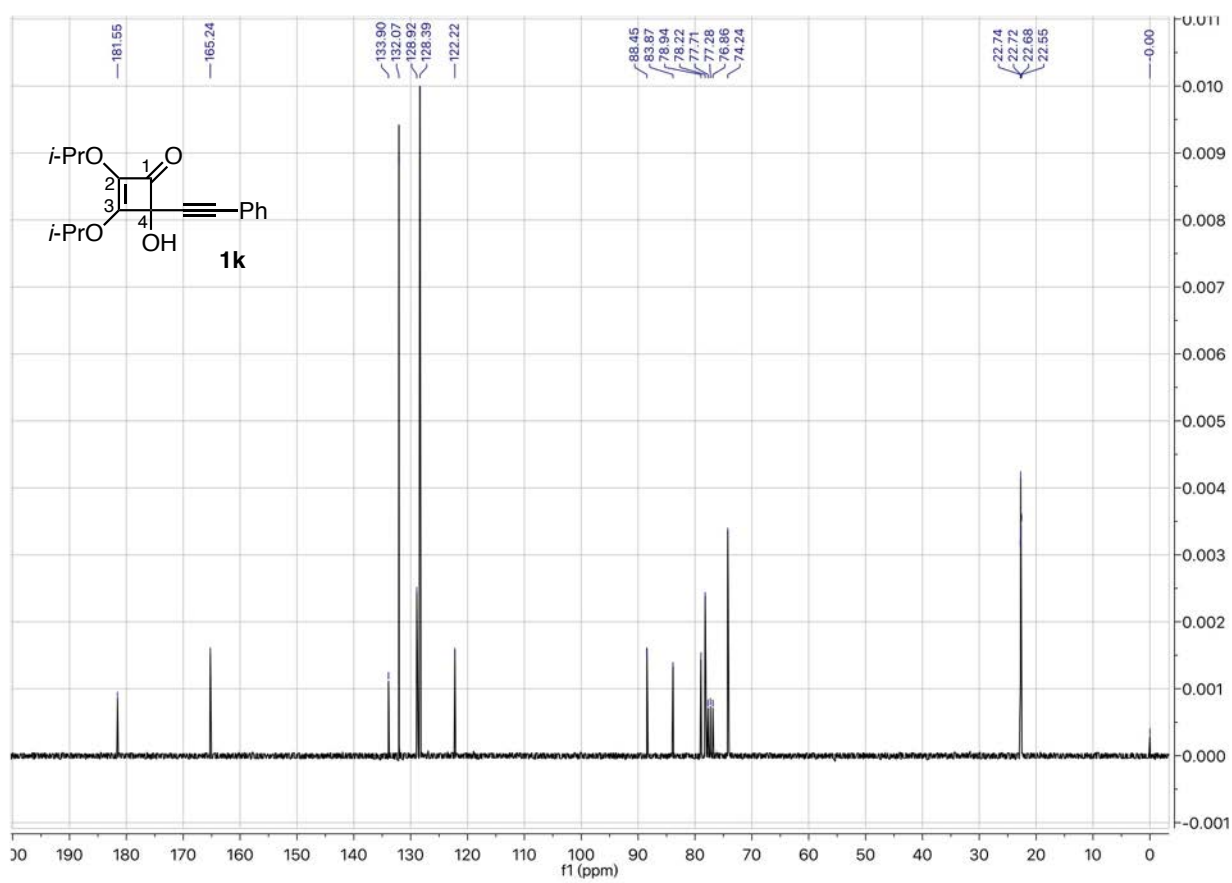
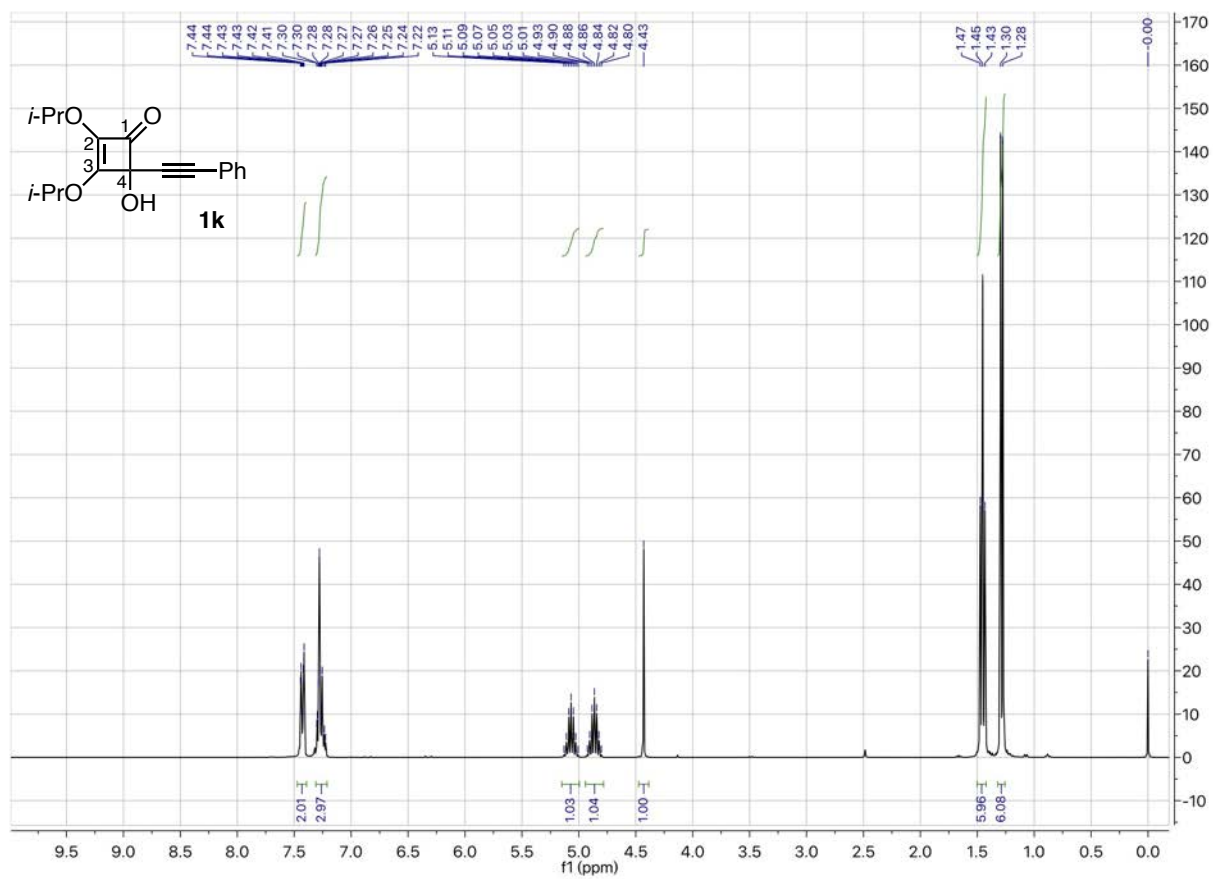


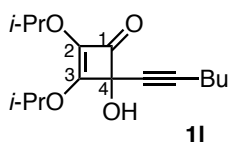
(*E*)-4-Hydroxy-2,3-diisopropoxy-4-styrylcyclobut-2-en-1-one (1j): $R_f = 0.55$ (7:3 Et₂O/hexane v/v); yellow solid; mp 83-85 °C; IR (CHCl₃) ν 3362 (OH), 1767 (C=O), 1618 (>C=C<); ¹H NMR (300 MHz, CDCl₃) δ 7.36-7.33 (2H, m, arom H), 7.29-7.21 (3H, m, arom H), 6.83 (1H, d, $J = 16.2$ Hz, -CH=), 6.29 (1H, d, $J = 16.2$ Hz, -CH=), 4.89 (2H, sept, $J = 6.1$ Hz, >CH-O $\times 2$), 4.05 (1H, s, OH), 1.40 (3H, d, $J = 6.1$ Hz, CH₃), 1.37 (3H, d, $J = 6.1$ Hz, CH₃), 1.30 (3H, d, $J = 6.1$ Hz, CH₃), 1.29 (3H, d, $J = 6.1$ Hz, CH₃); ¹³C NMR (75 MHz, CDCl₃) δ 185.4 (C-1), 167.4 (C-3), 136.5 (C-2), 132.8 (-CH=), 132.5 (arom C), 128.7 (2C) (arom CH), 128.1 (arom CH), 126.9 (2C) (arom CH), 126.1 (-CH=), 86.6 (C-4), 77.7, 73.8 (>CH-O), 22.7 (2C), 22.6, 22.4 (CH₃).



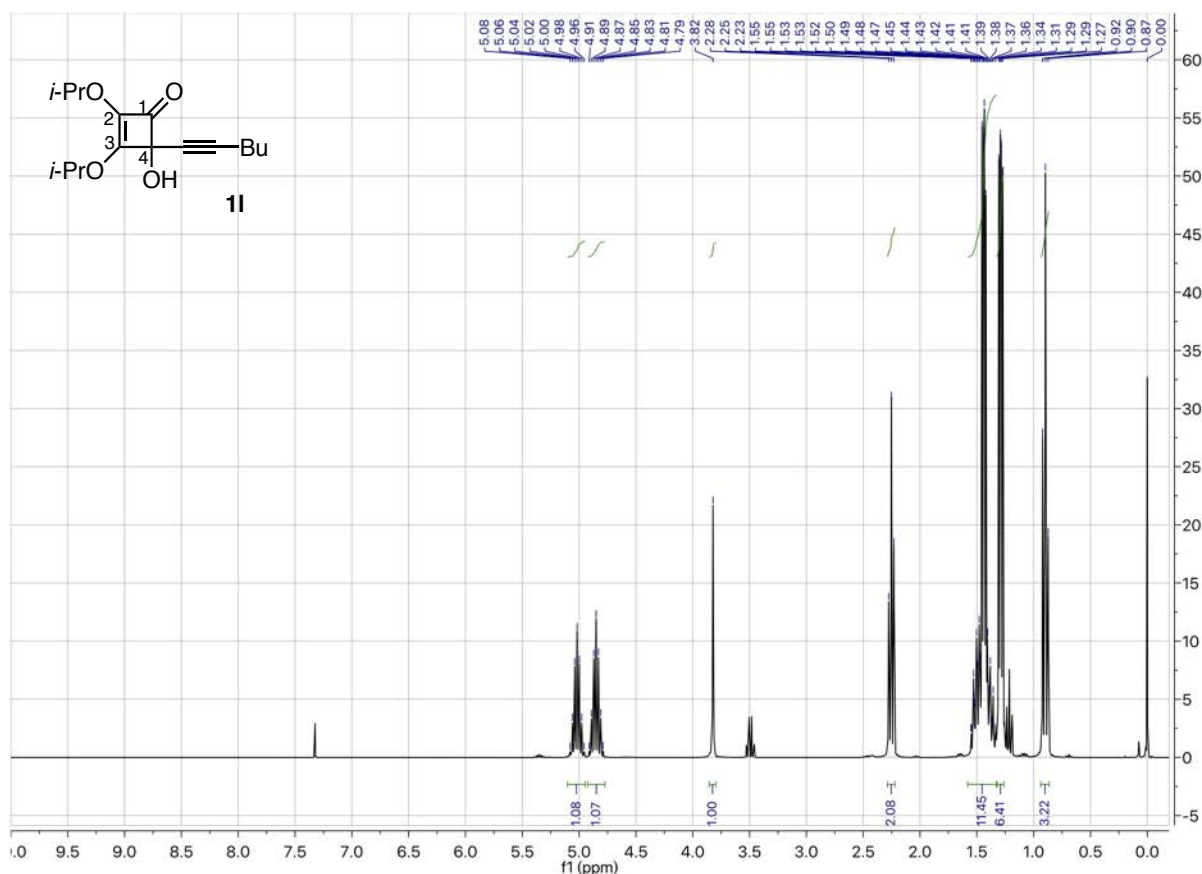


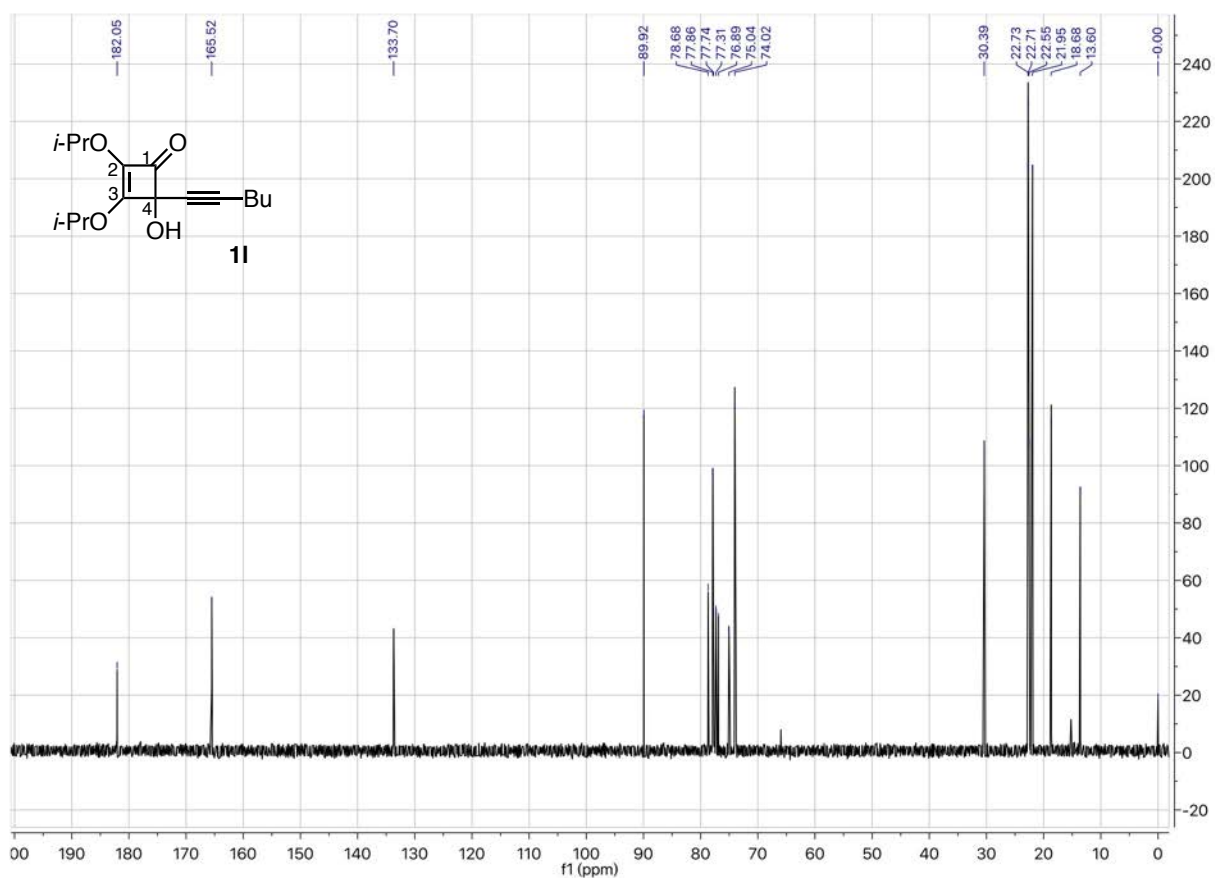
4-Hydroxy-2,3-diisopropoxy-4-(phenylethynyl)cyclobut-2-en-1-one (**1k**)^{9a}: R_f = 0.49 (7:3 Et₂O/hexane v/v); yellow microcrystals (from Et₂O-hexane); mp 104-105 °C (lit,^{5b} mp 73-7 °C from CH₂Cl₂-hexane); IR (CHCl₃) ν 3306 (OH), 2226 (C \equiv C), 1774 (C=O), 1626 (>C=C<); ¹H NMR (300 MHz, CDCl₃) δ 7.44-7.41 (2H, m, arom H), 7.30-7.22 (3H, m, arom H), 5.07 (1H, sept, J = 6.1 Hz, >CH-O), 4.86 (1H, sept, J = 6.1 Hz, >CH-O), 4.43 (1H, s, OH), 1.46 (3H, d, J = 6.1 Hz, CH₃), 1.44 (3H, d, J = 6.1 Hz, CH₃), 1.28 (6H, d, J = 6.1 Hz, CH₃ \times 2); ¹³C NMR (75 MHz, CDCl₃) δ 181.6 (C-1), 165.2 (C-3), 133.9 (C-2), 132.1 (2C), 128.9, 128.4 (2C) (arom CH), 122.2 (arom C), 88.5 (C-4), 83.9 (C \equiv C), 78.9 (C \equiv C), 78.2, 74.2 (>CH-O), 22.74, 22.72, 22.68, 22.55 (CH₃).



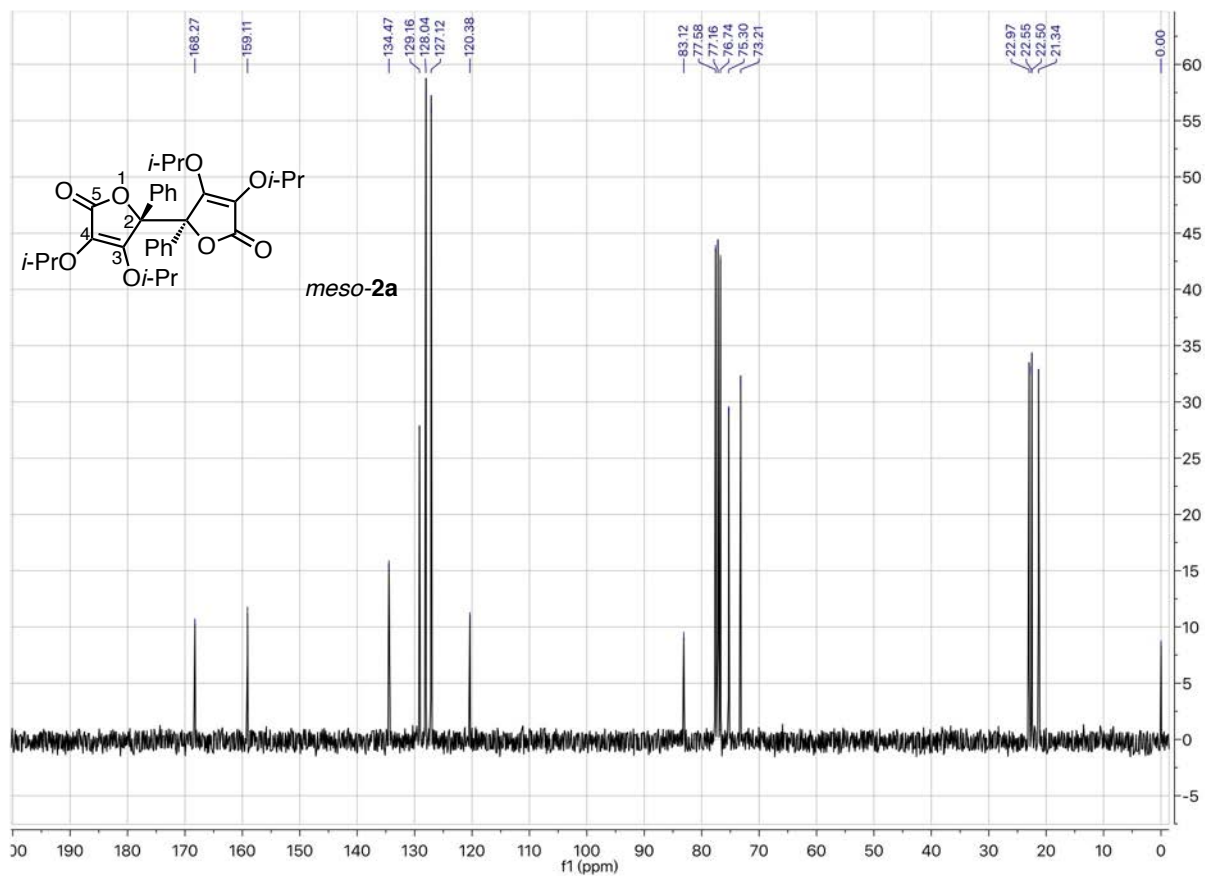
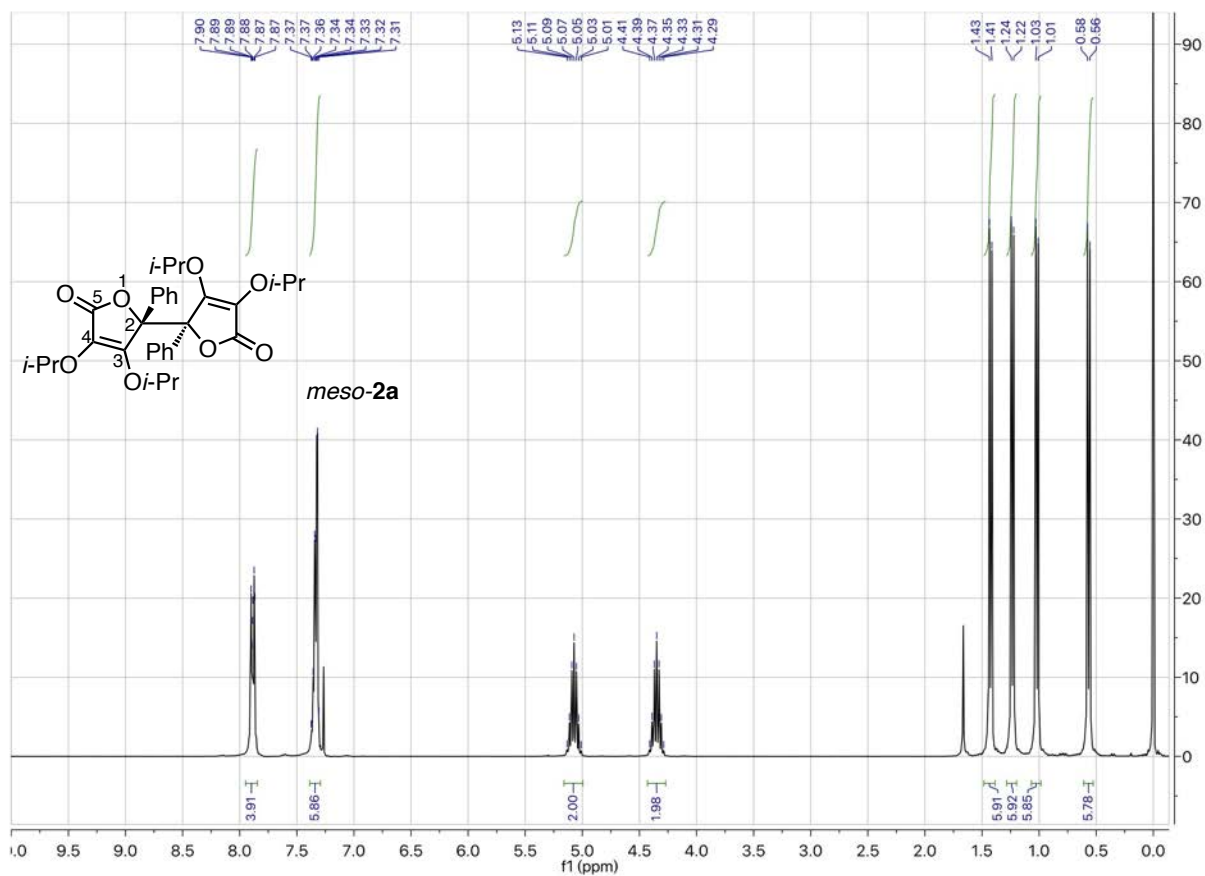


4-(Hex-1-yn-1-yl)-4-hydroxy-2,3-diisopropoxycyclobut-2-en-1-one (11)^{9a}: $R_f = 0.20$ (CHCl_3); yield 98%; colorless oil; IR (CHCl_3) ν 3342 (OH), 2233 ($\text{C}\equiv\text{C}$), 1774 ($\text{C}=\text{O}$), 1614 ($>\text{C}=\text{C}<$); ^1H NMR (300 MHz, CDCl_3) δ 5.02 (1H, sept, $J = 6.1$ Hz, $>\text{CH}-\text{O}$), 4.85 (1H, sept, $J = 6.1$ Hz, $>\text{CH}-\text{O}$), 3.82 (1H, s, OH), 2.25 (2H, t, $J = 7.0$ Hz, $-\text{CH}_2-$), 1.55-1.33 (4H, m, $-\text{CH}_2-$ $\times 2$), 1.44 (3H, d, $J = 6.1$ Hz, CH_3), 1.43 (3H, d, $J = 6.1$ Hz, CH_3), 1.30 (3H, d, $J = 6.1$ Hz, CH_3), 1.28 (3H, d, $J = 6.1$ Hz, CH_3), 0.90 (3H, t, $J = 7.0$ Hz, CH_3); ^{13}C NMR (75 MHz, CDCl_3) δ 182.1 (C-1), 165.5 (C-3), 133.7 (C-2), 89.9 (C-4), 78.7 ($\text{C}\equiv\text{C}$), 77.9 ($>\text{CH}-\text{O}$), 75.0 ($\text{C}\equiv\text{C}$), 74.0 ($>\text{CH}-\text{O}$), 30.4 ($-\text{CH}_2-$), 22.73 (2C), 22.71, 22.6 (CH_3), 22.0, 18.7 ($-\text{CH}_2-$), 13.6 (CH_3).

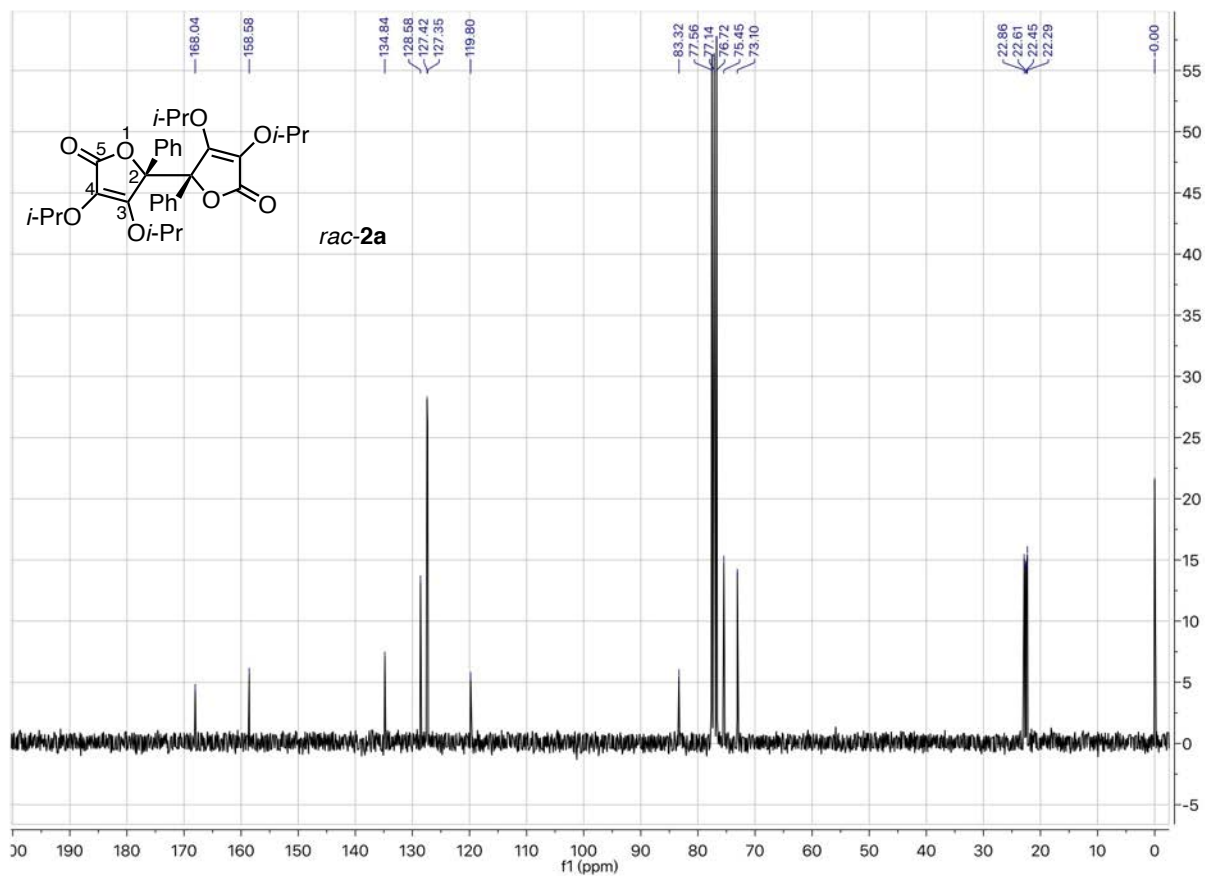
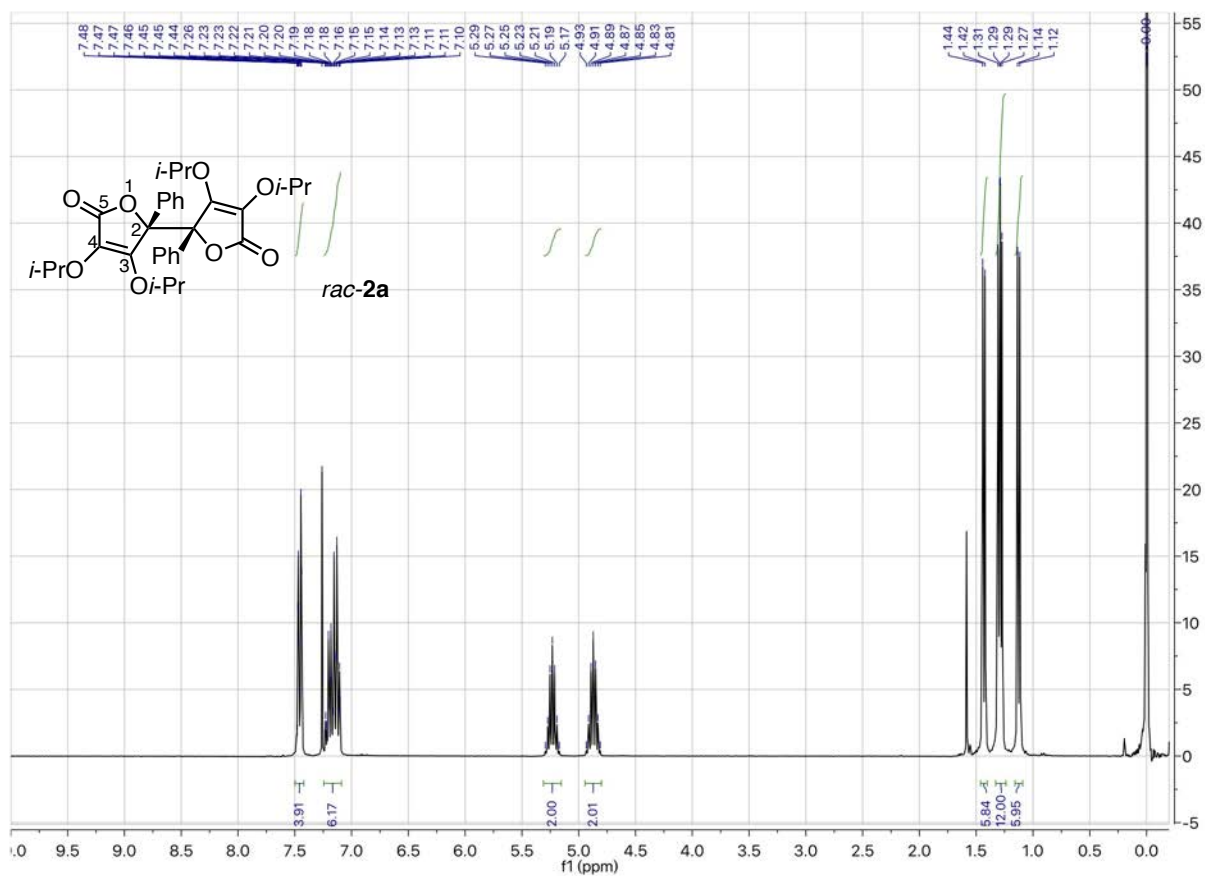




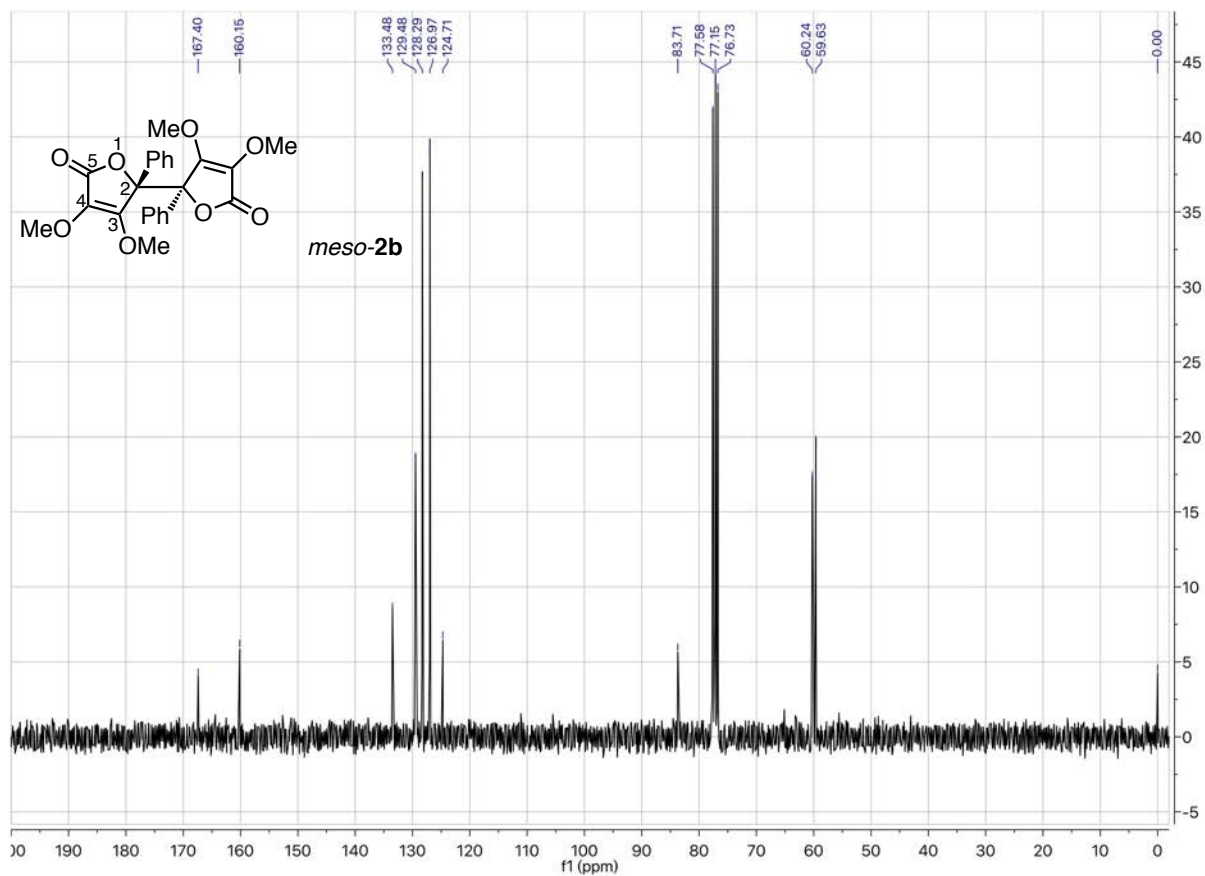
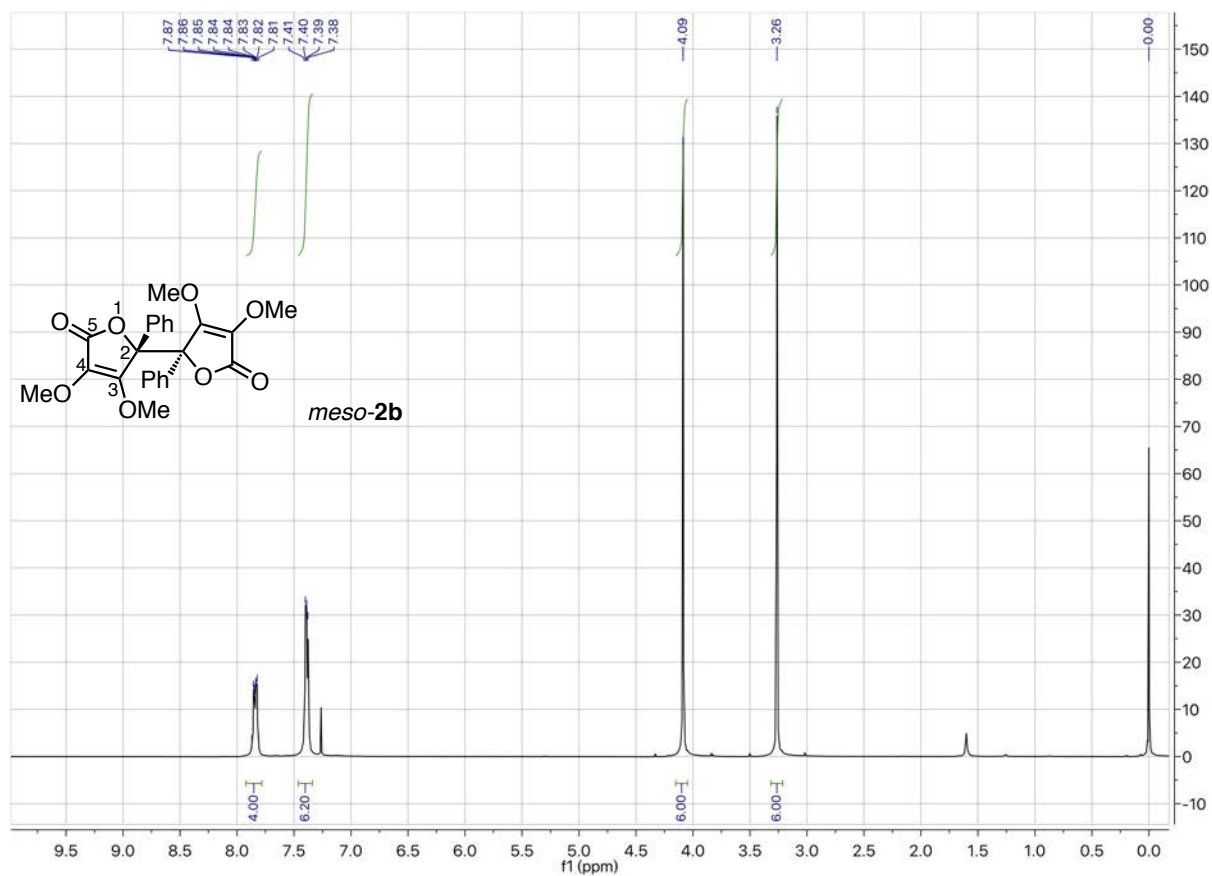
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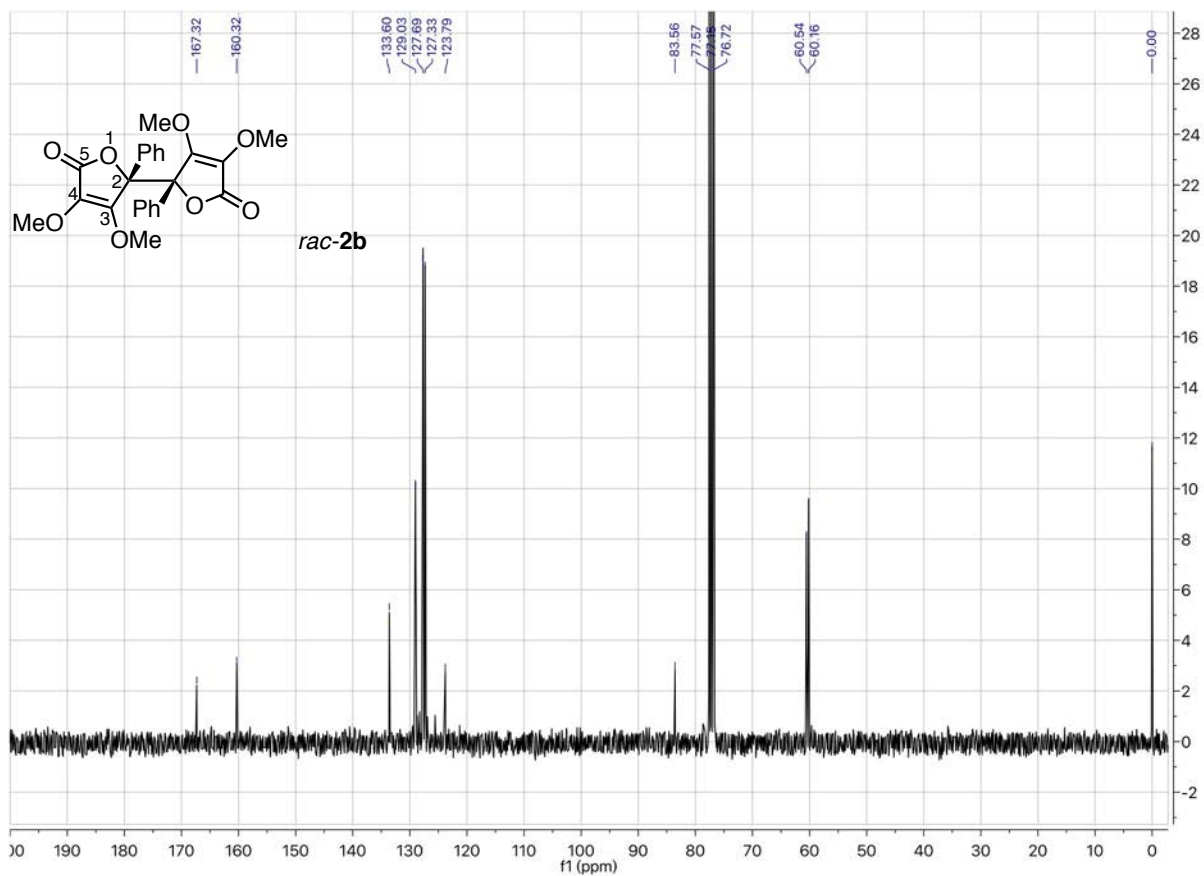
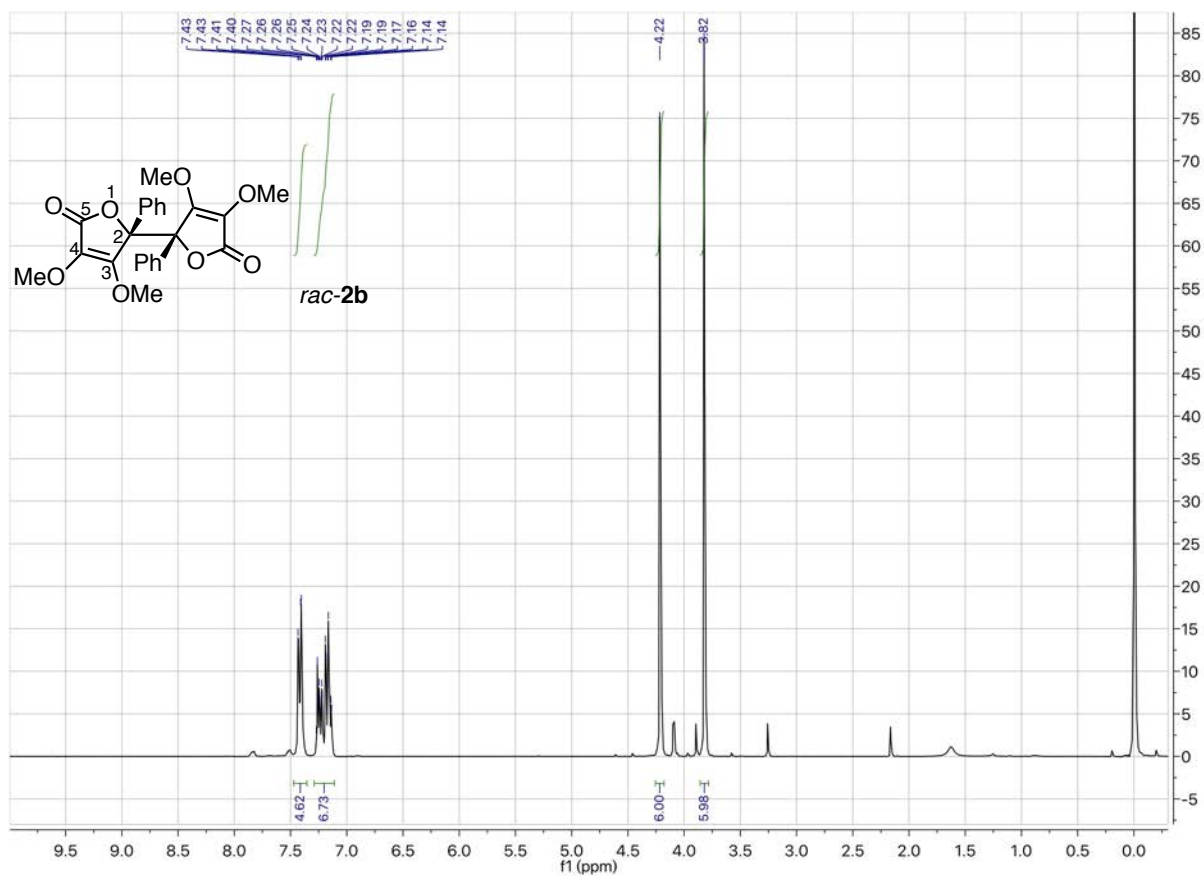
***rac*-3,3',4,4'-Tetraisopropoxy-2,2'-diphenyl-[2,2'-bifuran]-5,5'(*2H,2'H*)-dione (*rac*-2a):**



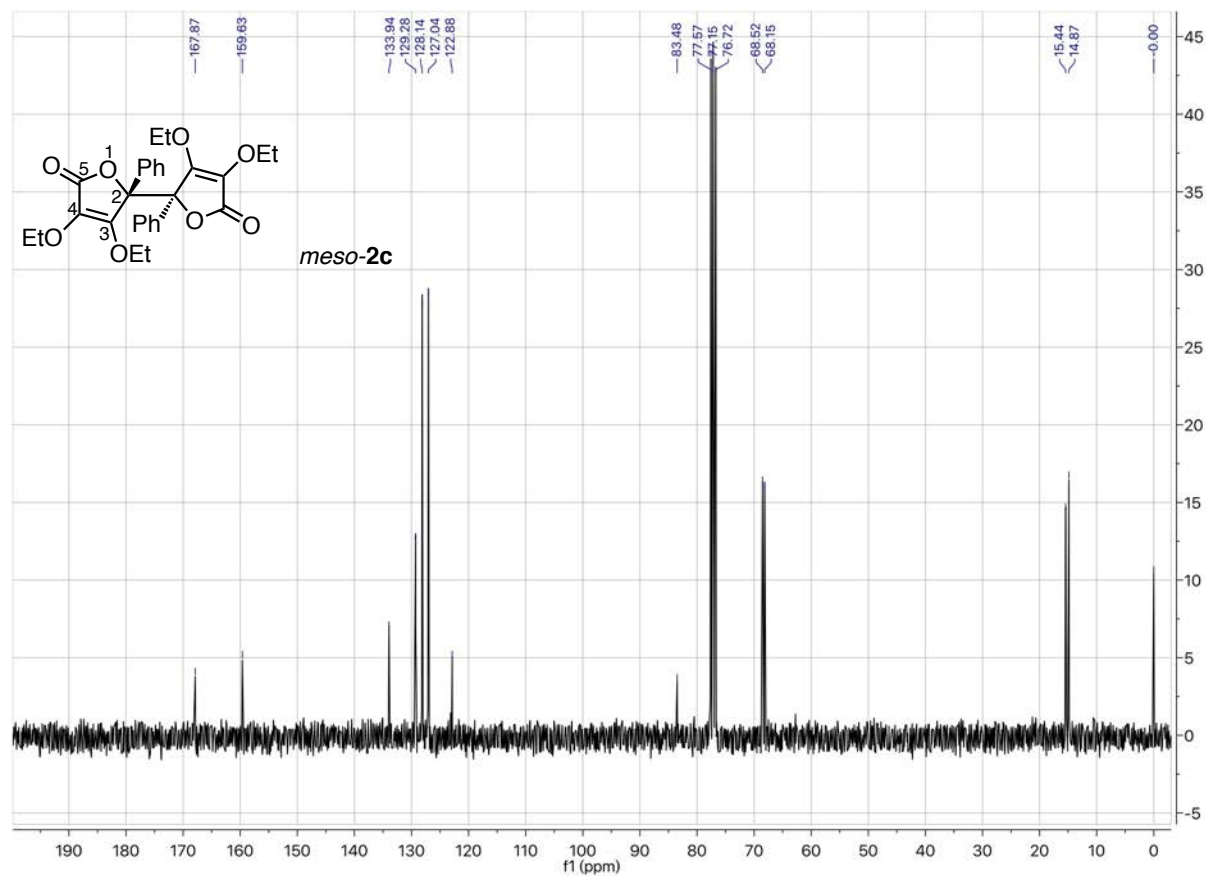
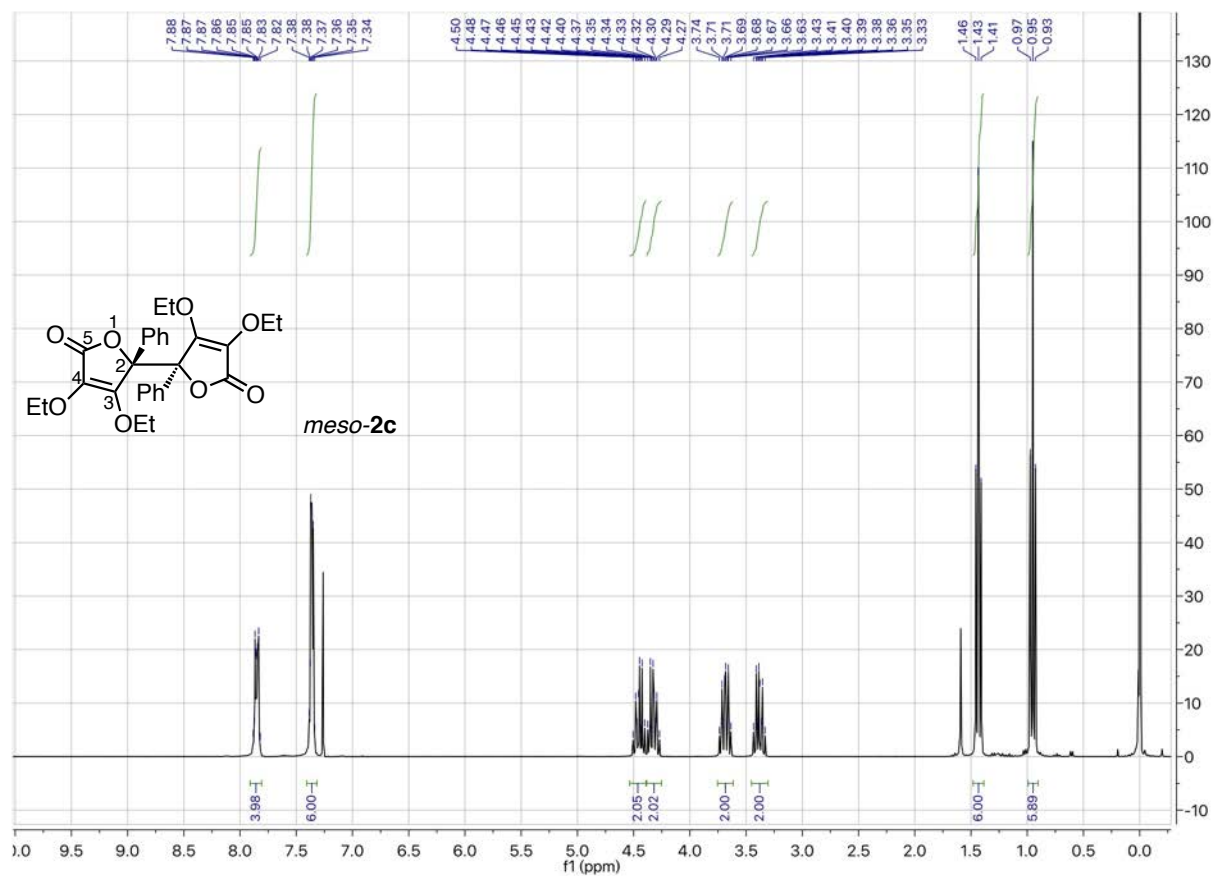
***meso*-3,3',4,4'-Tetramethoxy-2,2'-diphenyl-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*meso*-2b):**



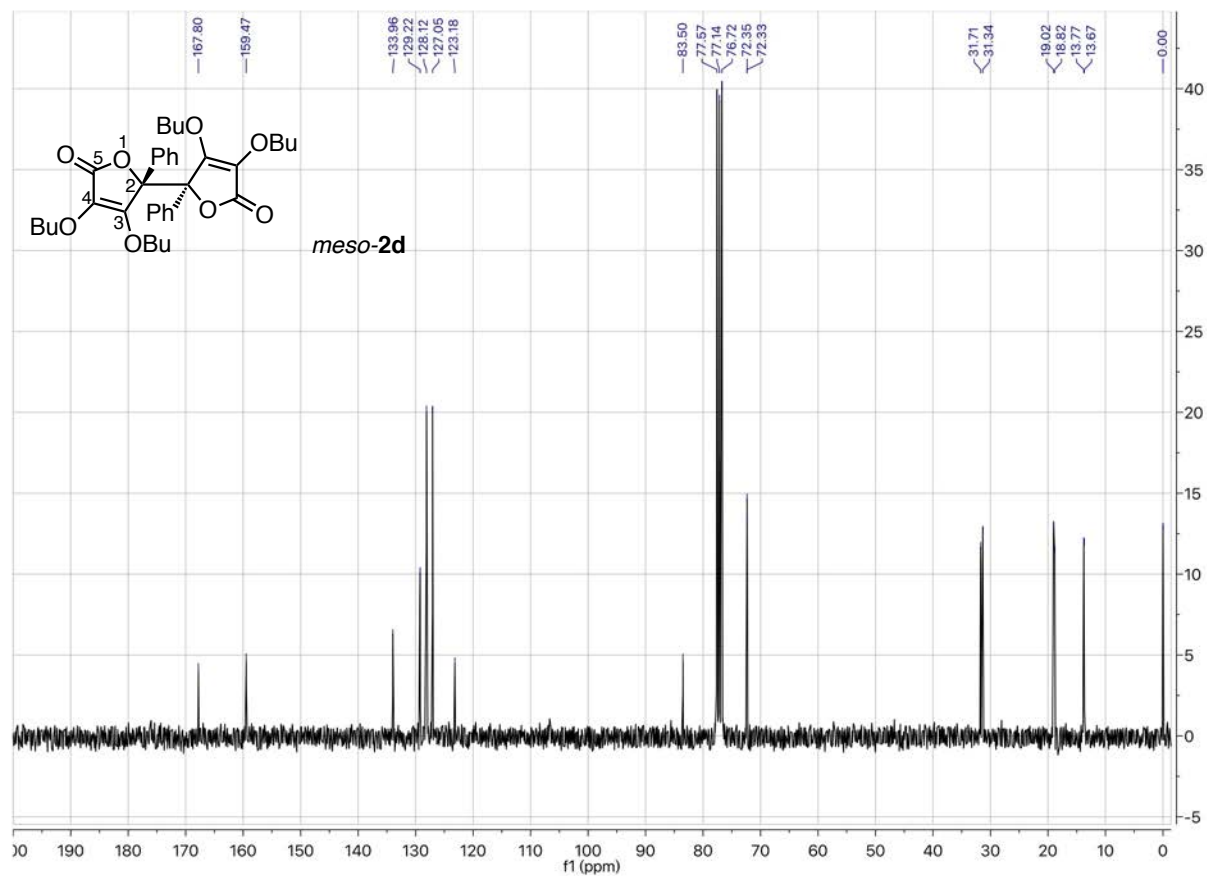
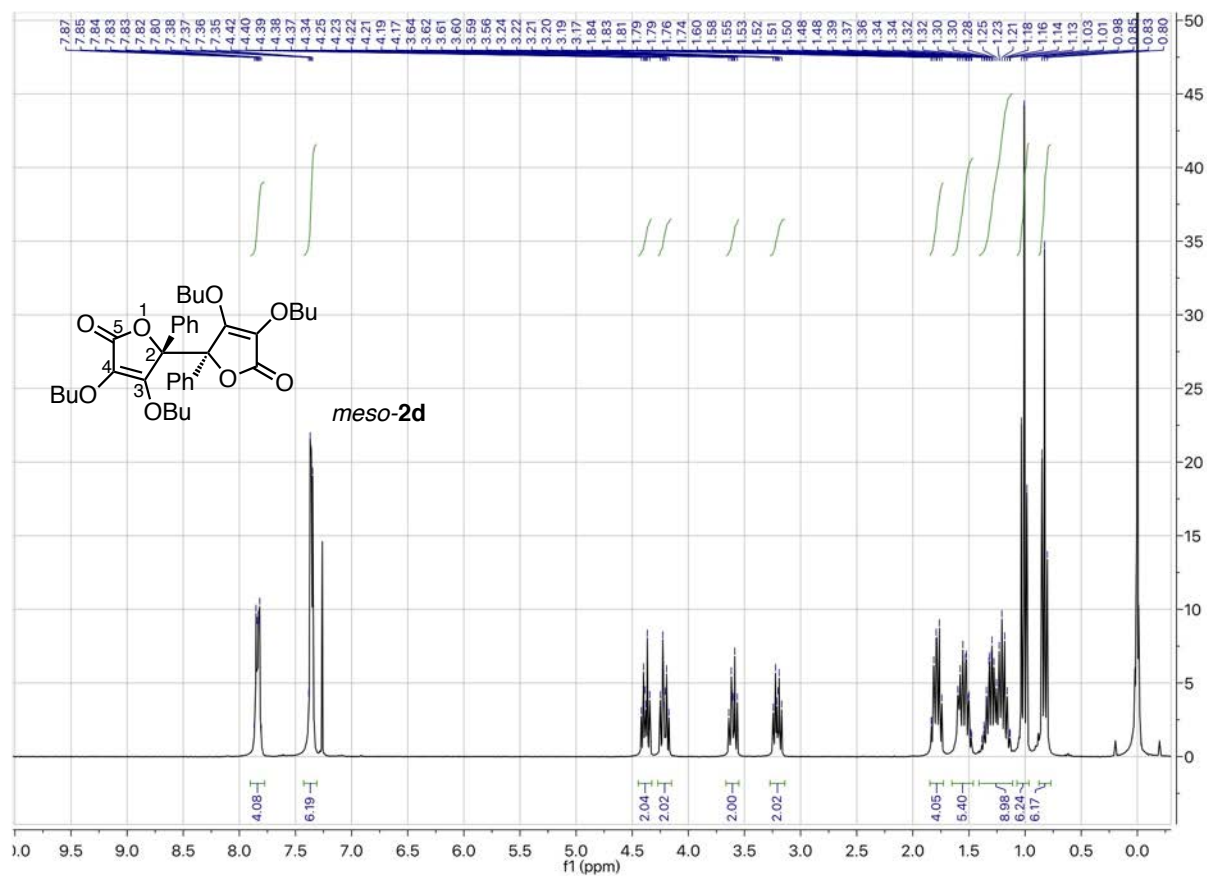
***rac*-3,3',4,4'-Tetramethoxy-2,2'-diphenyl-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*rac*-2b):**

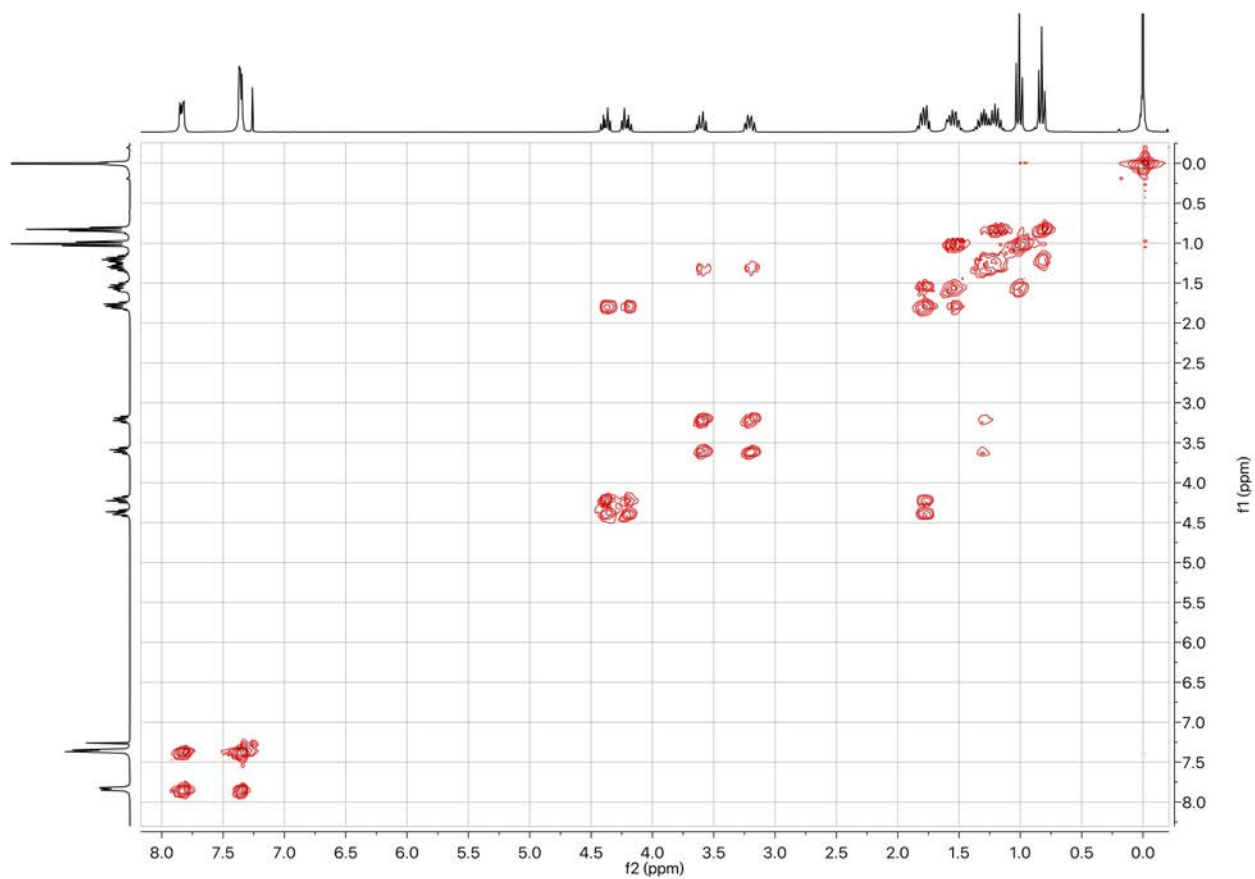
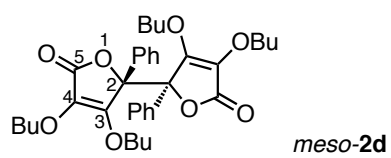


***meso*-3,3',4,4'-Tetraethoxy-2,2'-diphenyl-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*meso*-2c):**

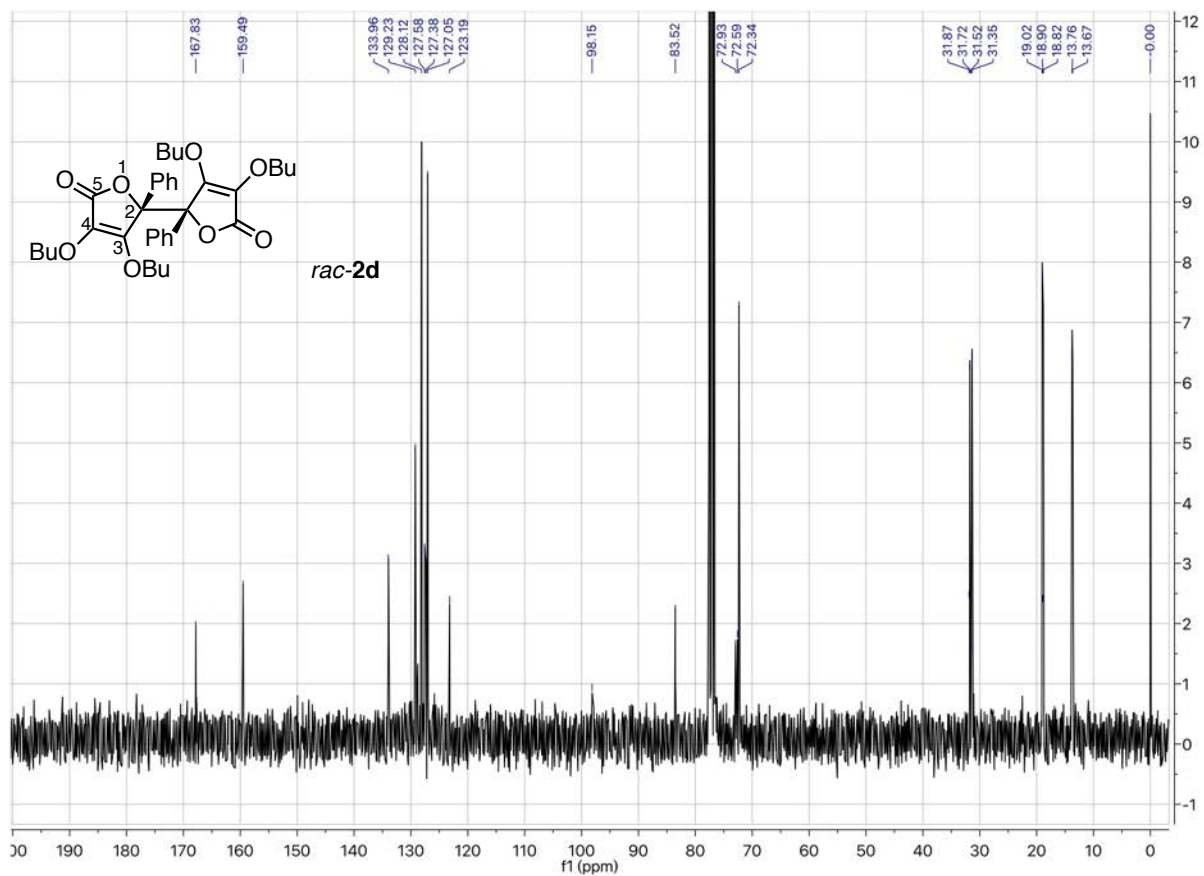
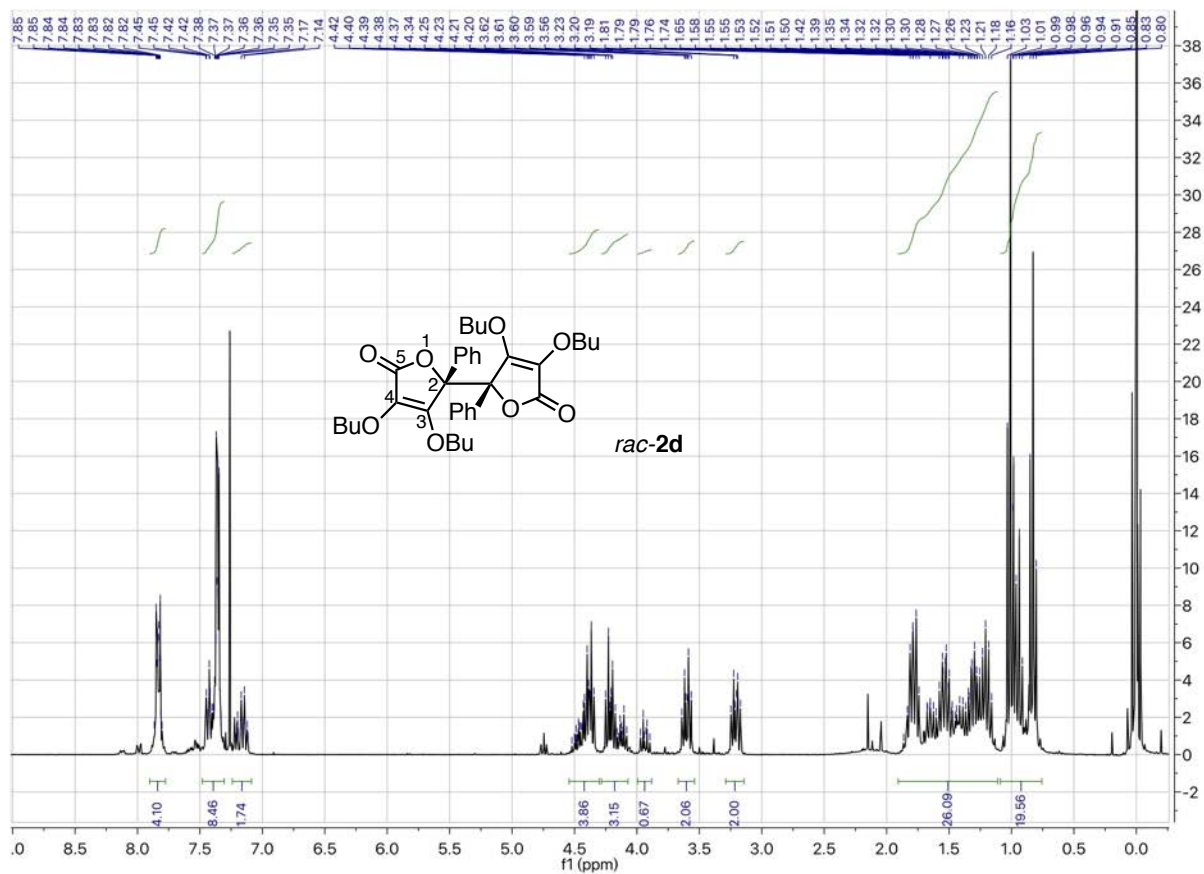


***meso*-3,3',4,4'-Tetrabutoxy-2,2'-diphenyl-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*meso*-2d):**

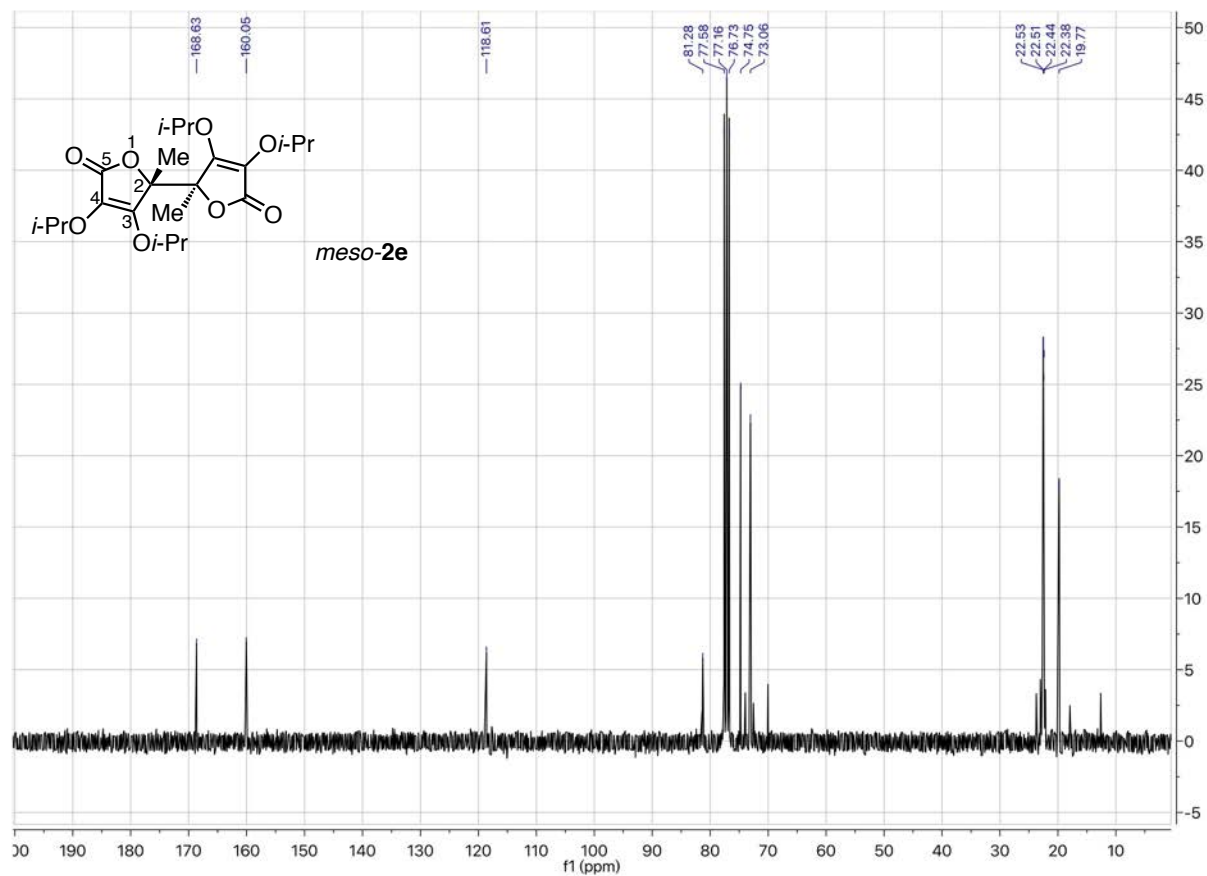
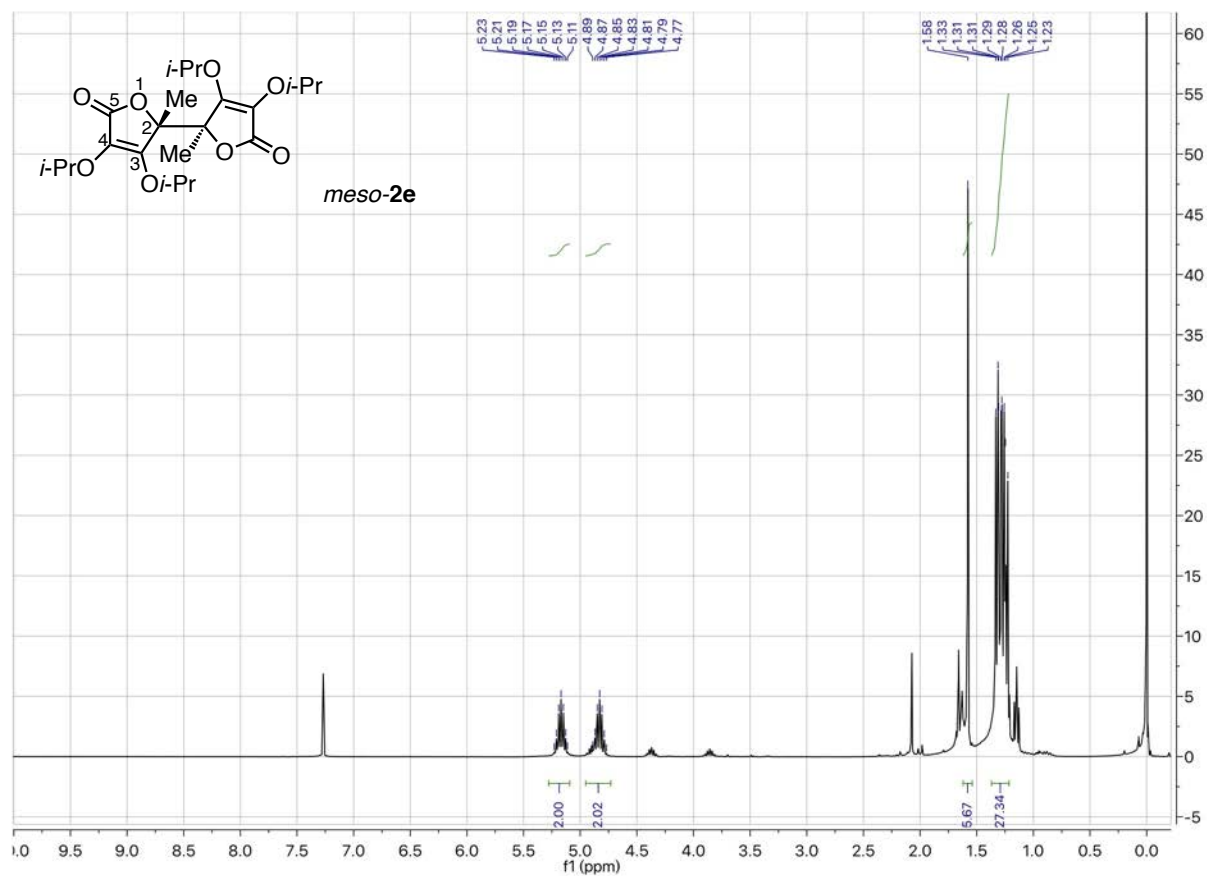




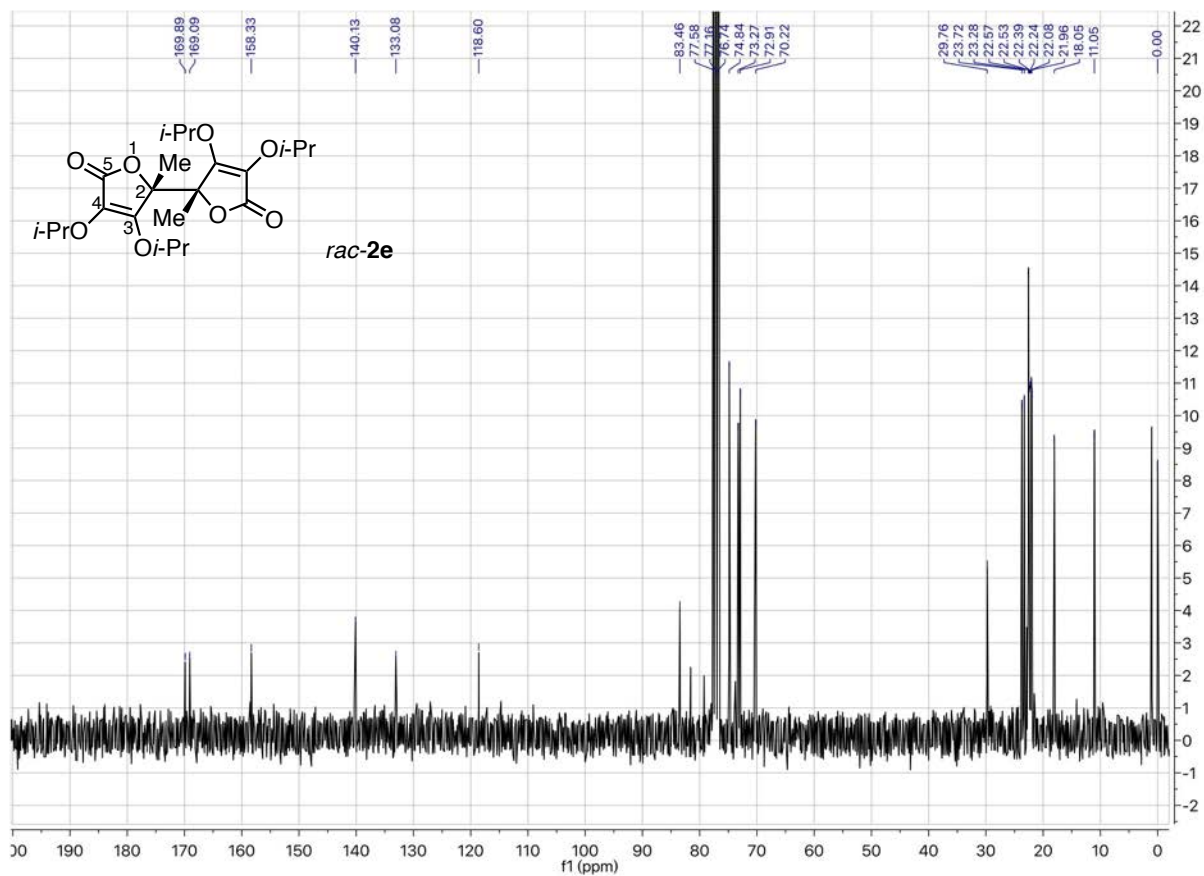
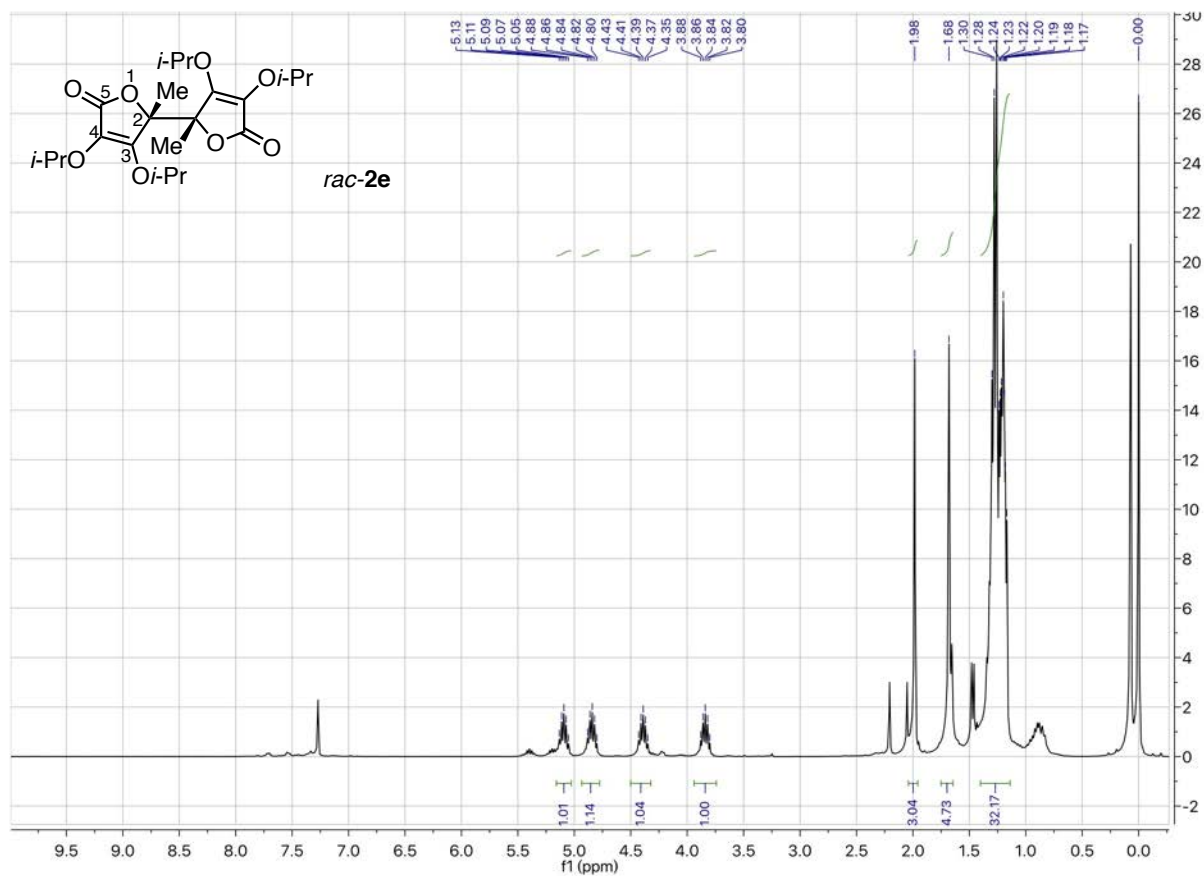
***rac*-3,3',4,4'-Tetrabutoxy-2,2'-diphenyl-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*rac*-2d):**



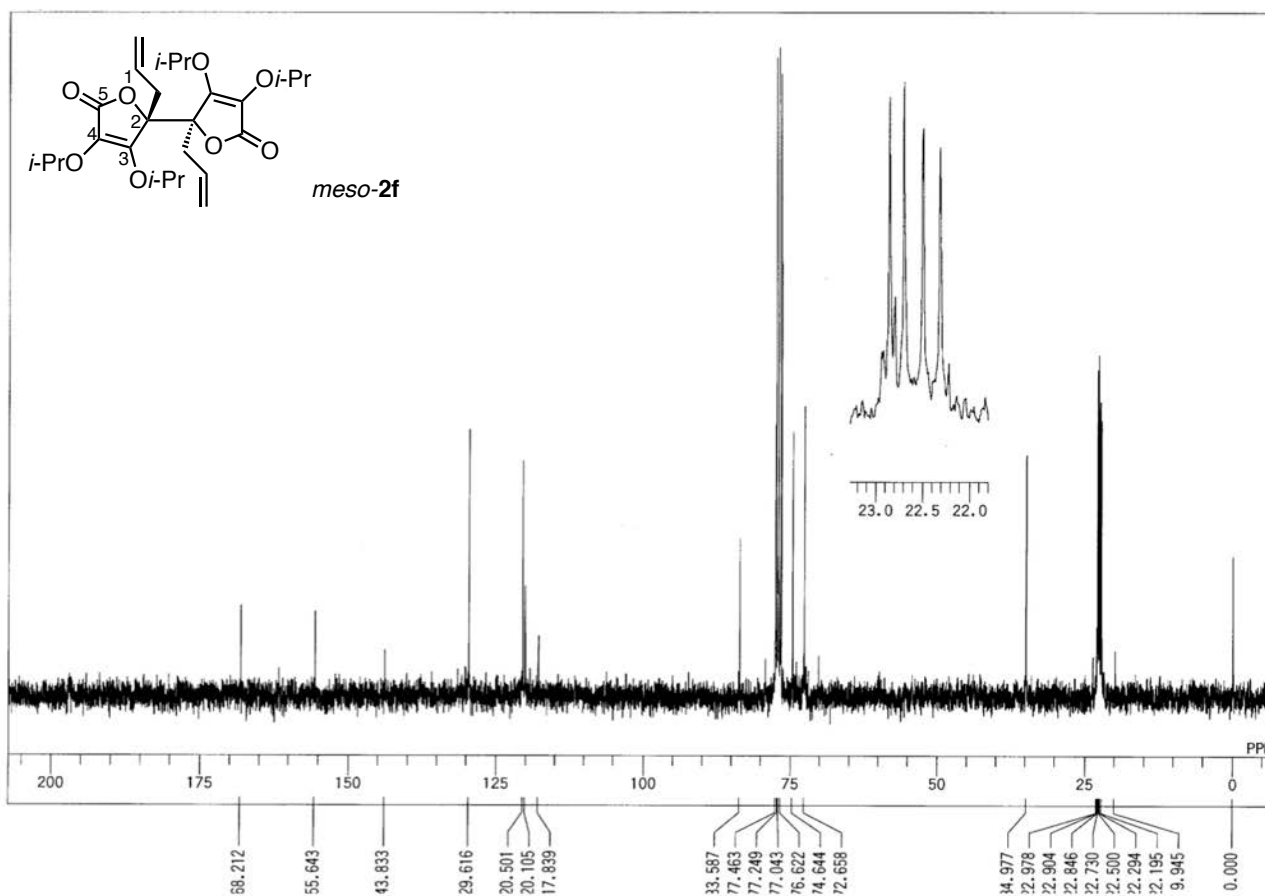
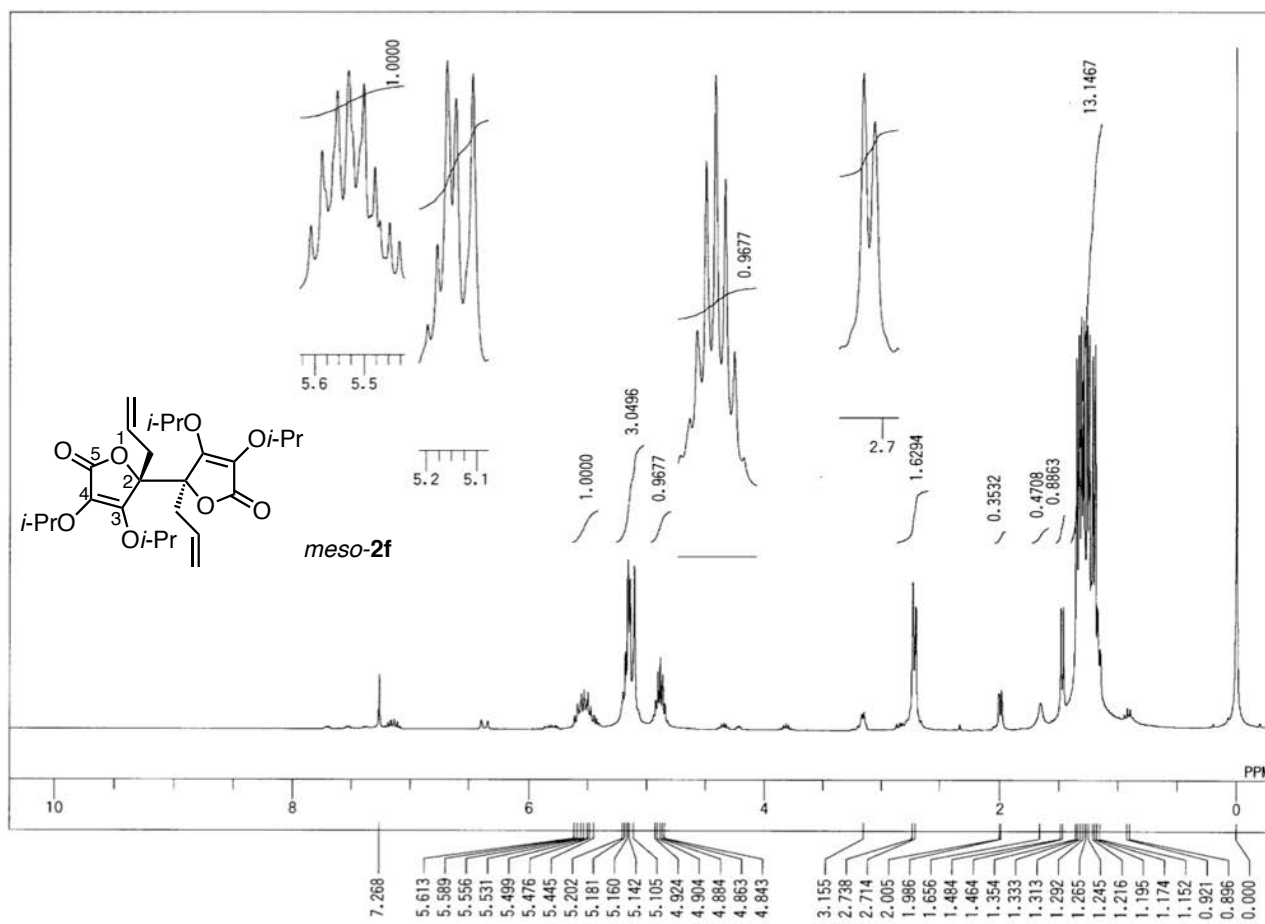
***meso*-3,3',4,4'-Tetraisopropoxy-2,2'-dimethyl-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*meso*-2e):**



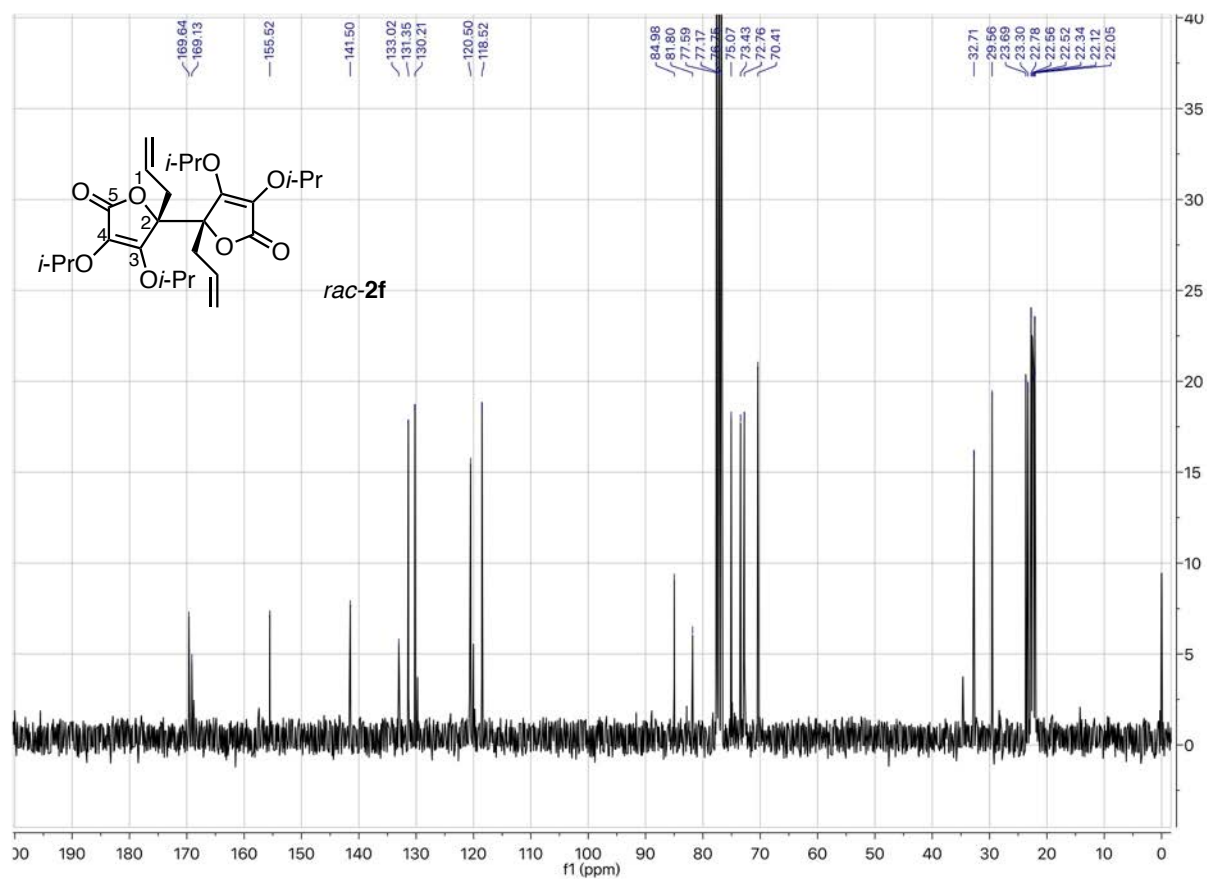
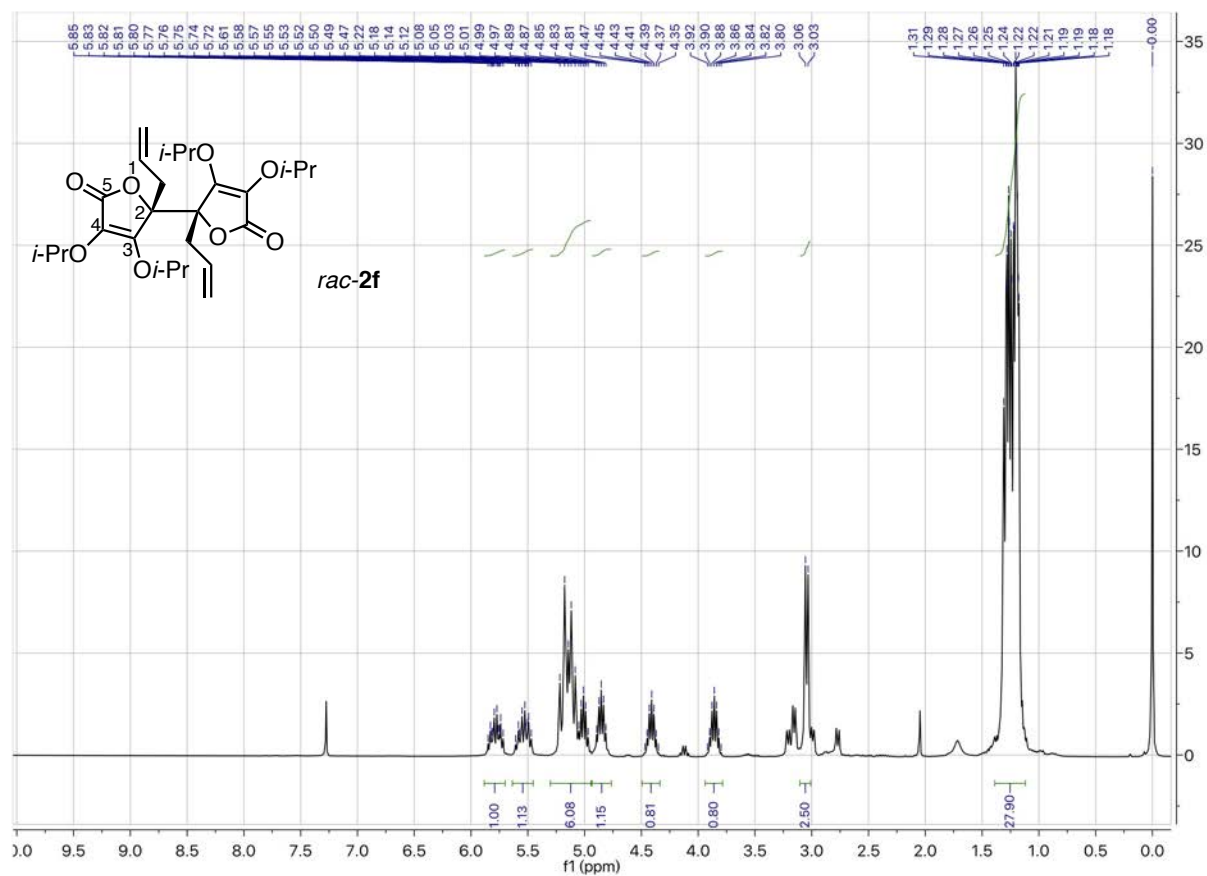
***rac*-3,3',4,4'-Tetraisopropoxy-2,2'-dimethyl-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*rac*-2*e*):**



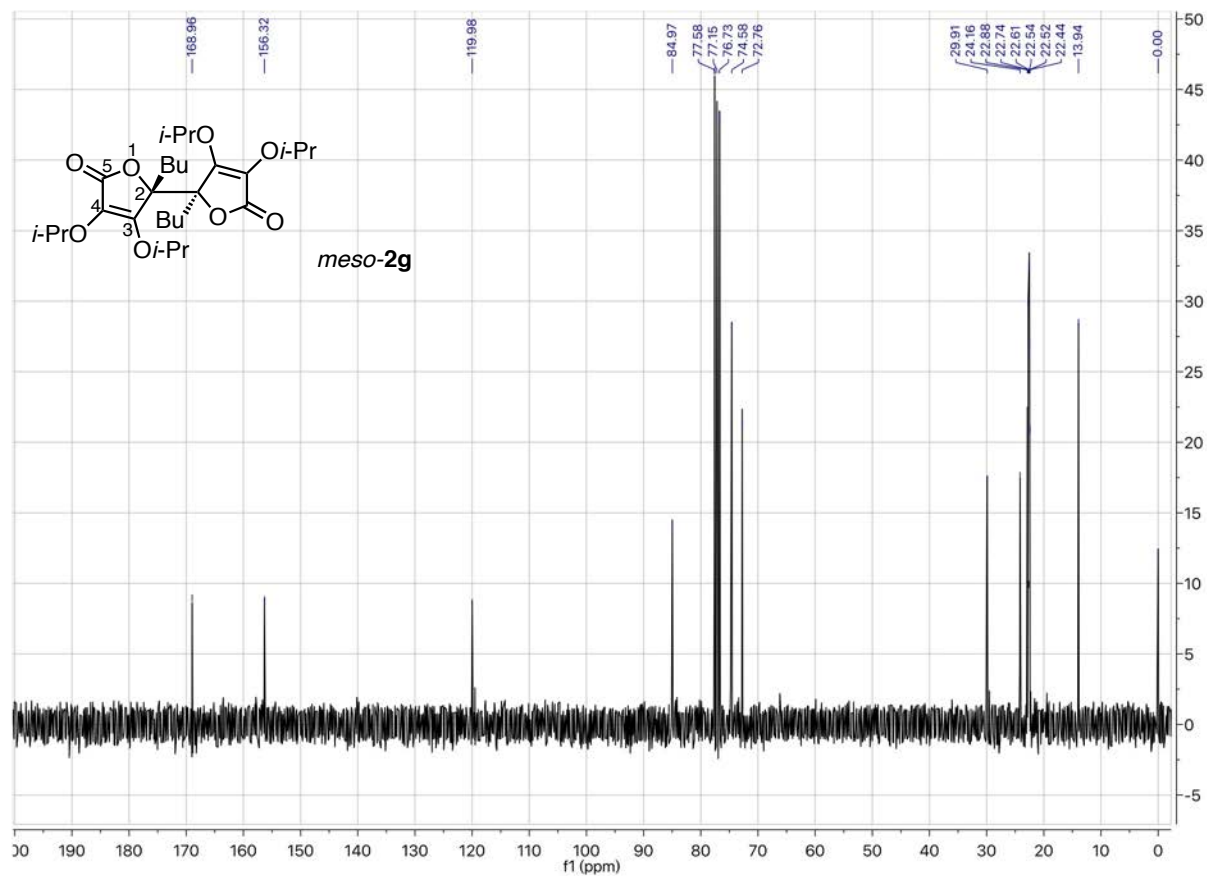
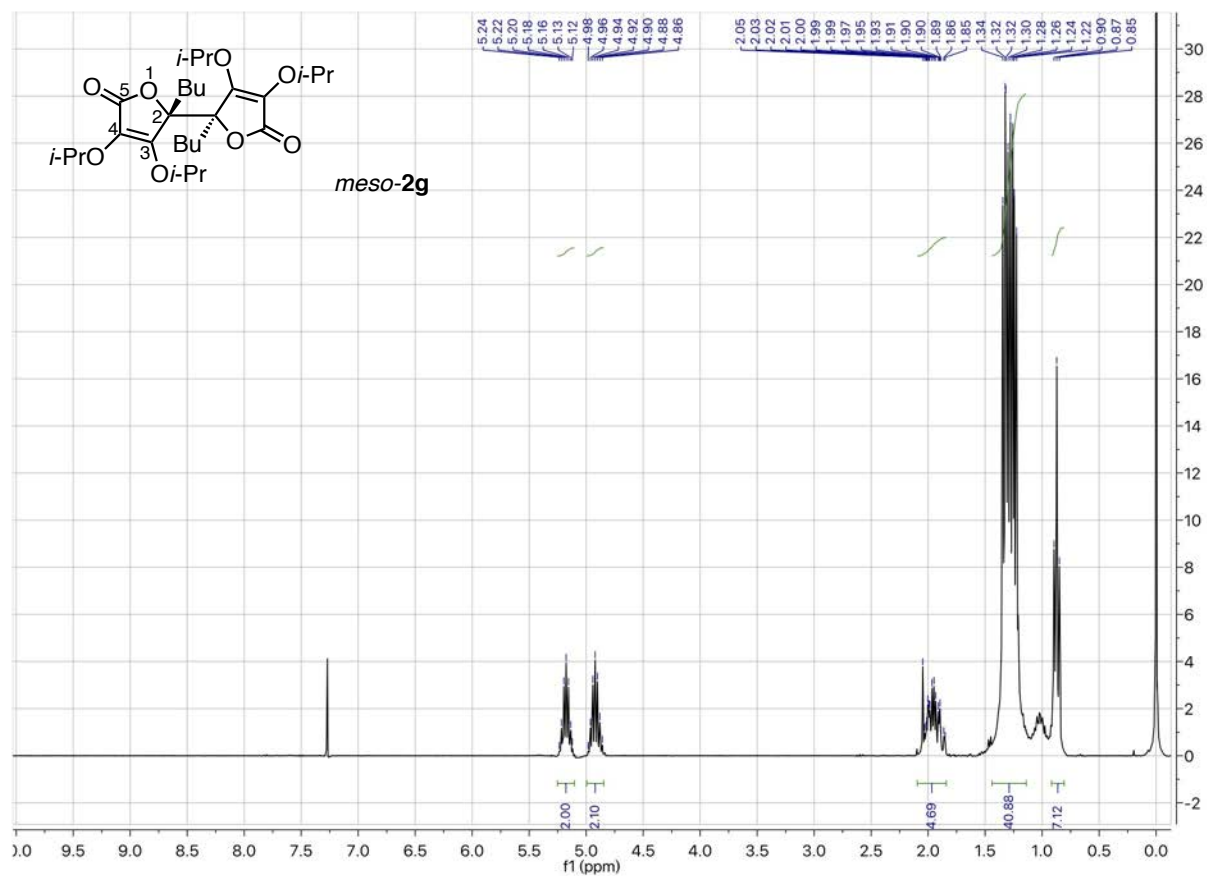
***meso*-2,2'-Diallyl-3,3',4,4'-tetraisopropoxy-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*meso*-2f):**



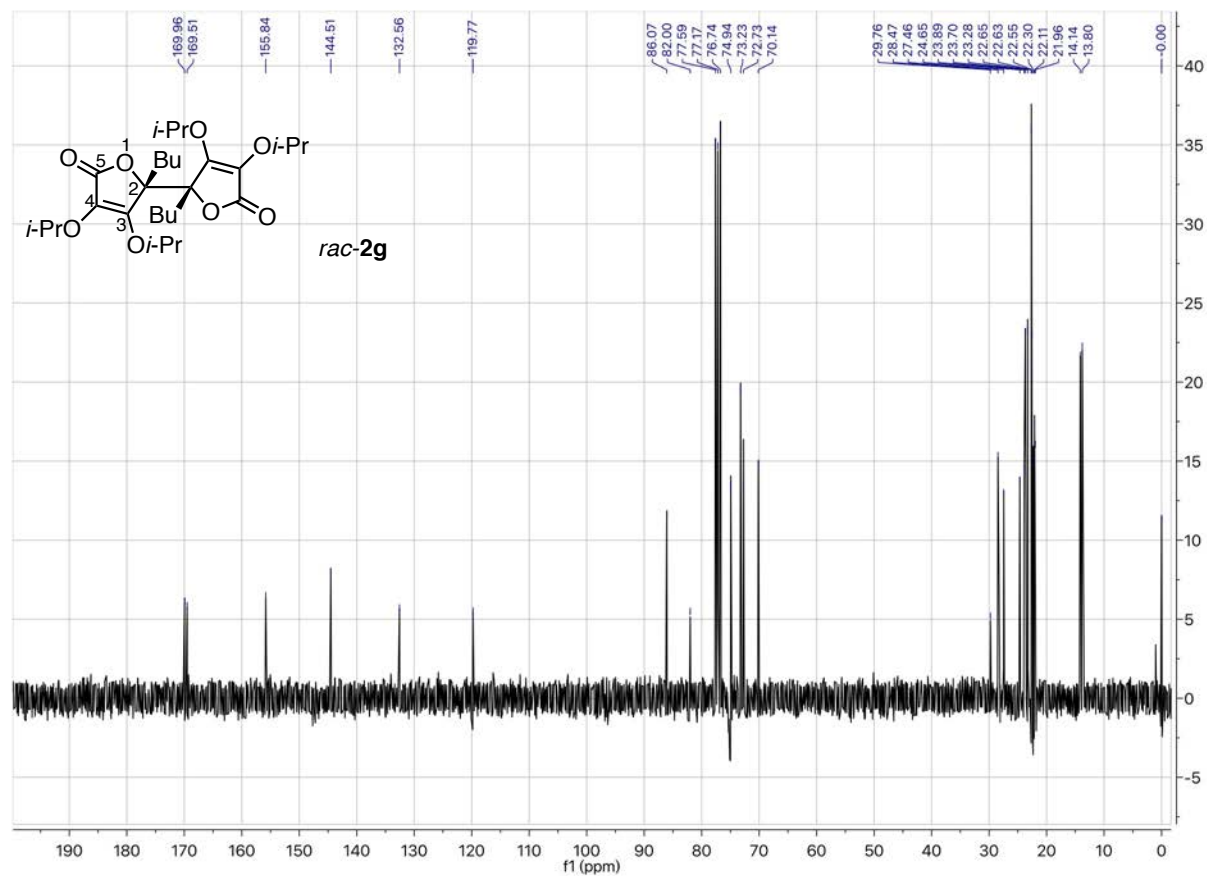
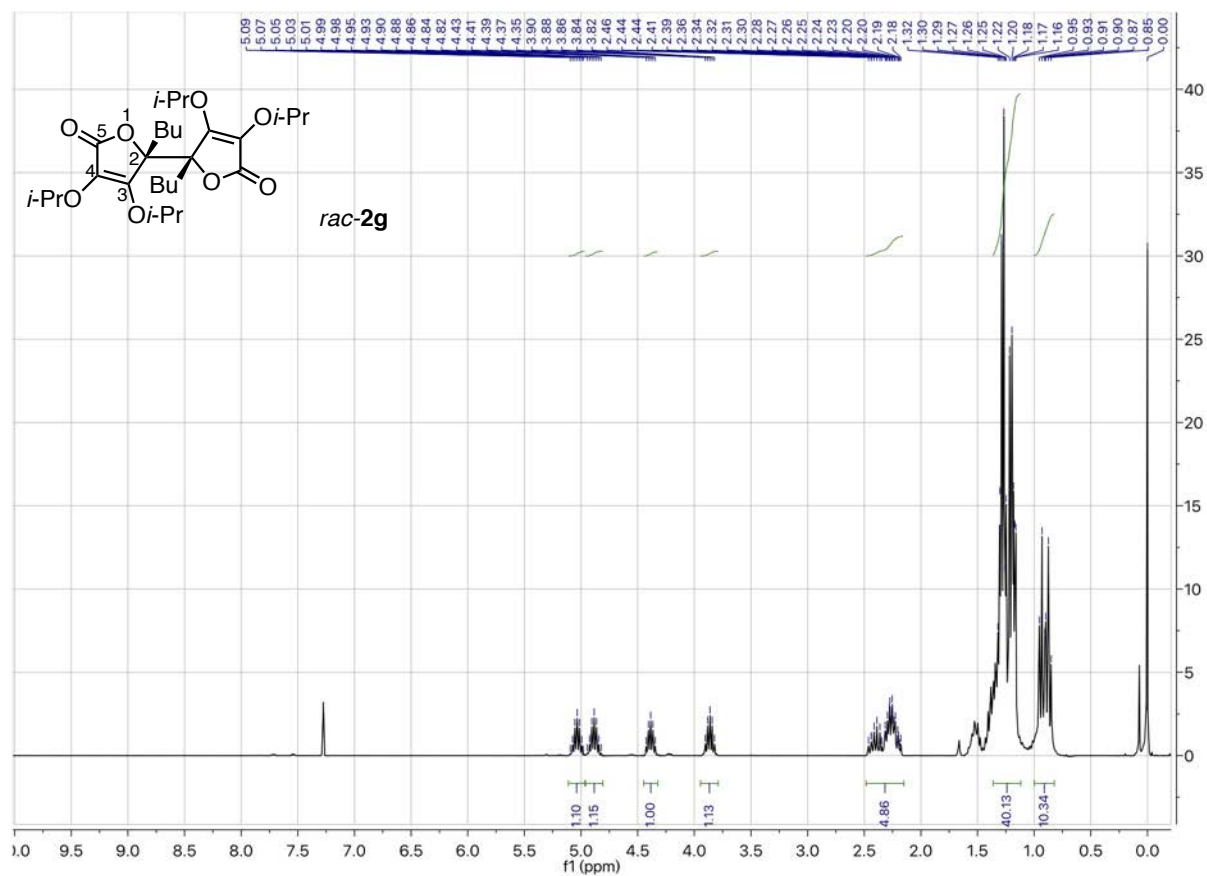
***rac*-2,2'-Diallyl-3,3',4,4'-tetraisopropoxy-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*rac*-2f):**



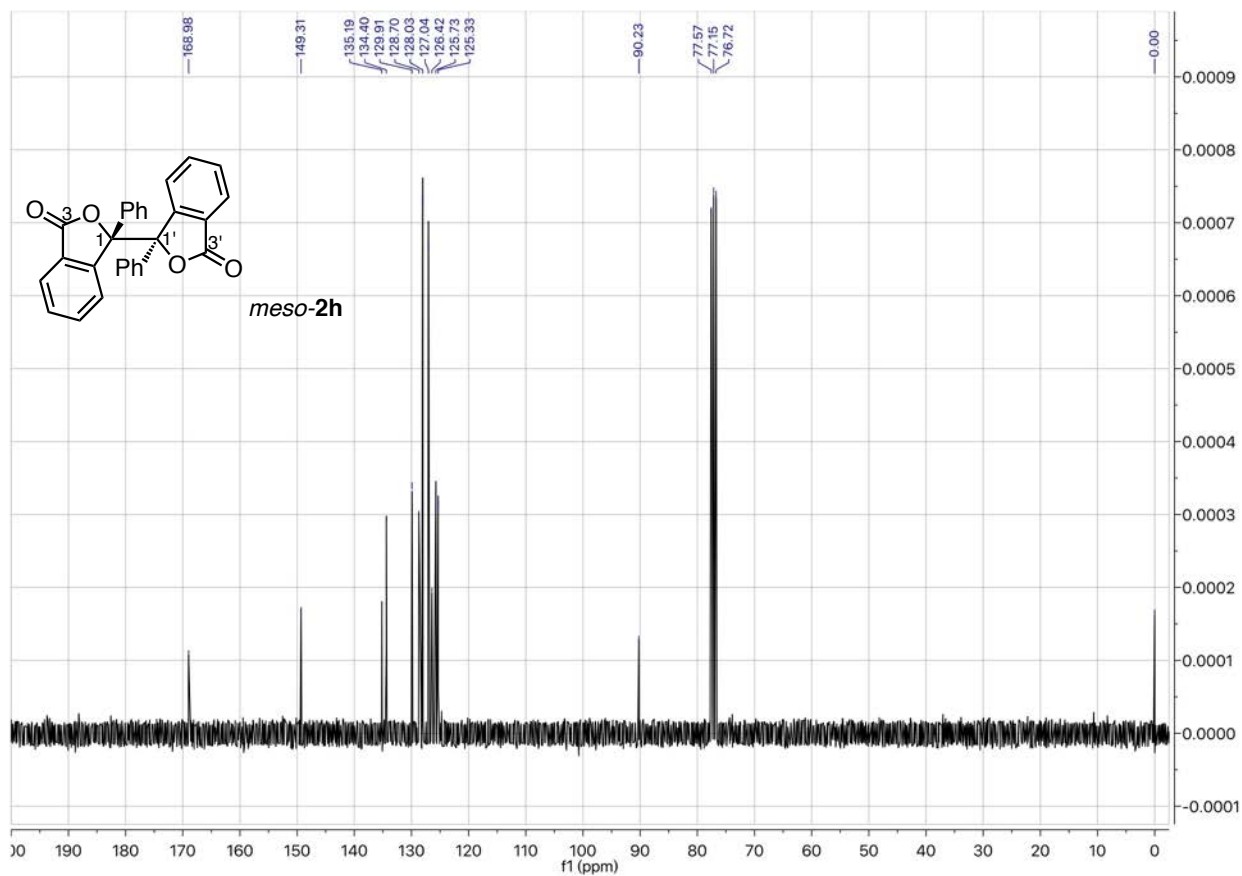
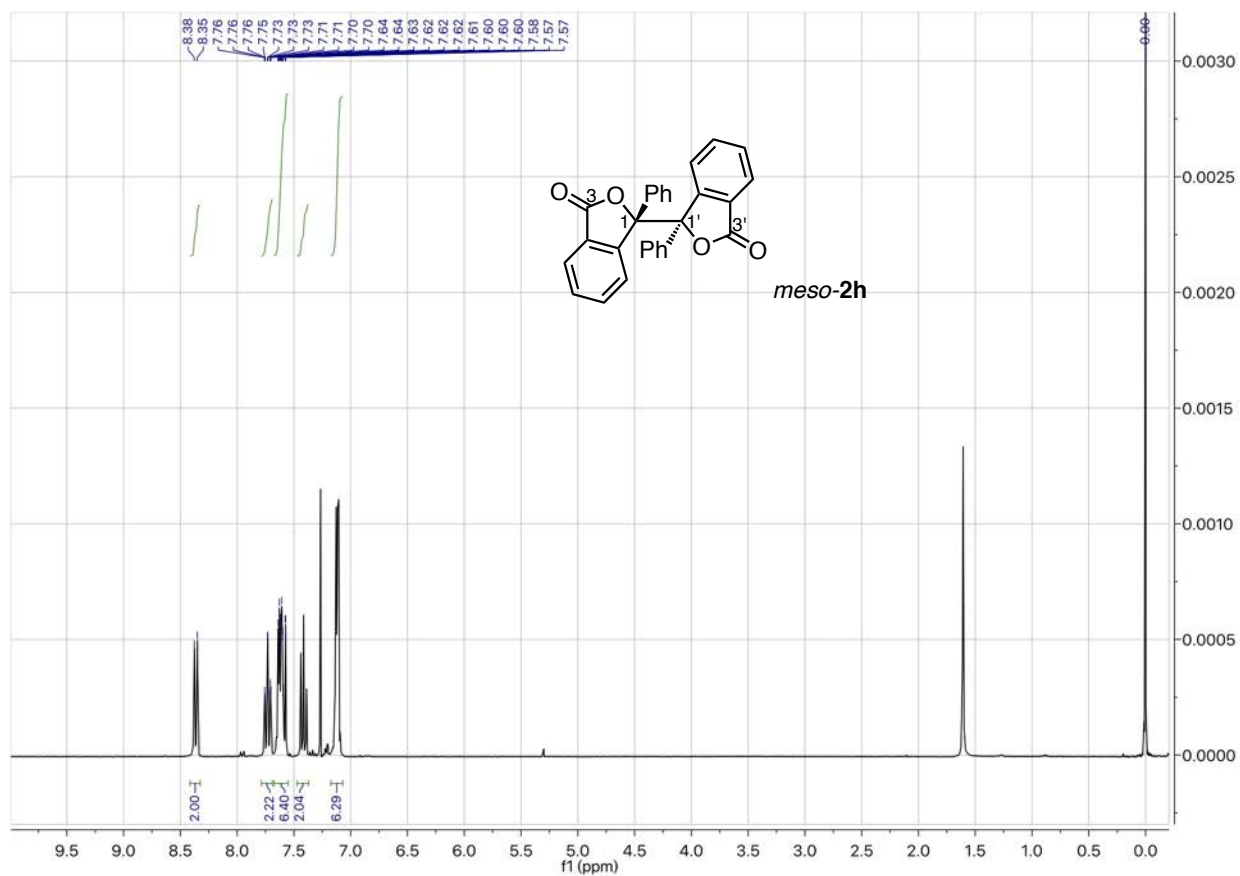
***meso*-2,2'-dibutyl-3,3',4,4'-tetraisopropoxy-[2,2'-bifuran]-5,5'(2*H*,2'*H*)-dione (*meso*-2*g*):**



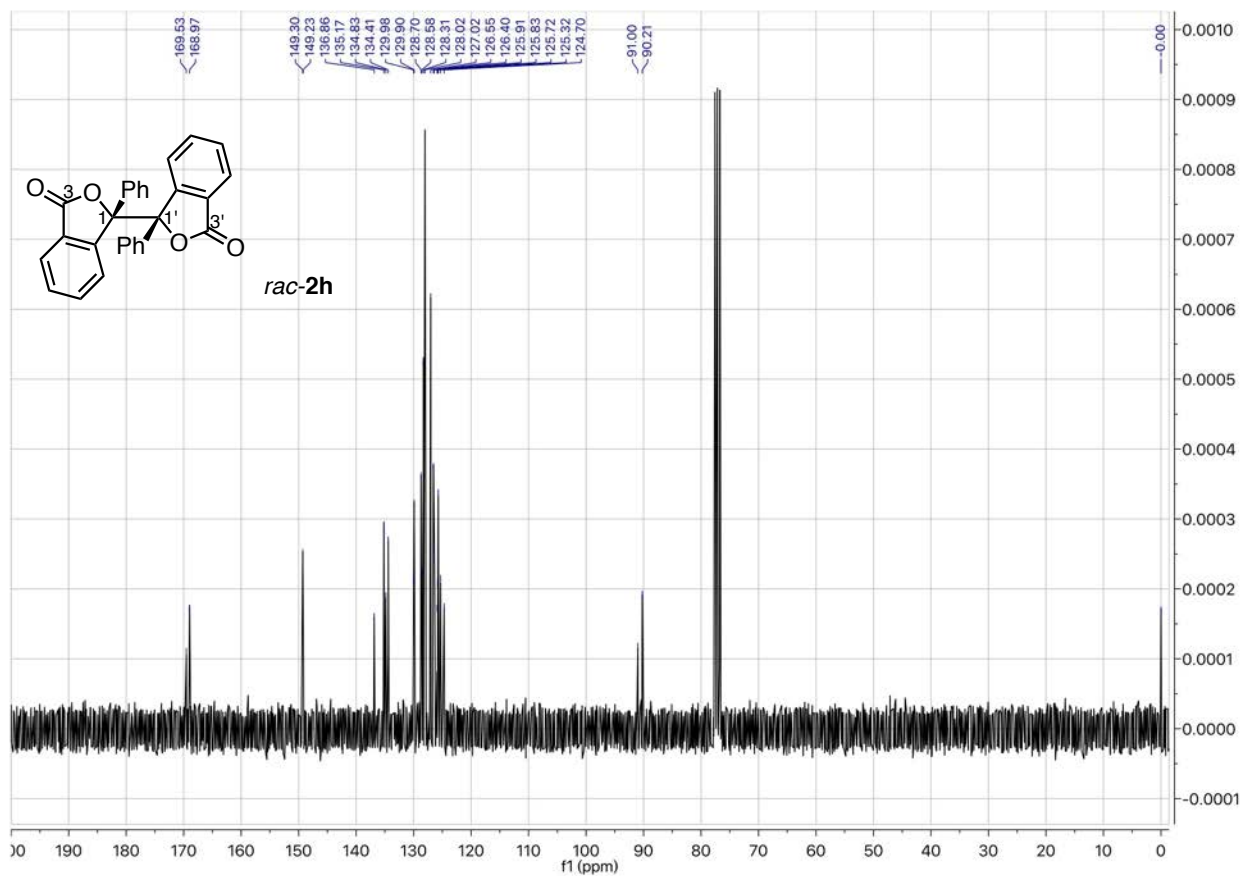
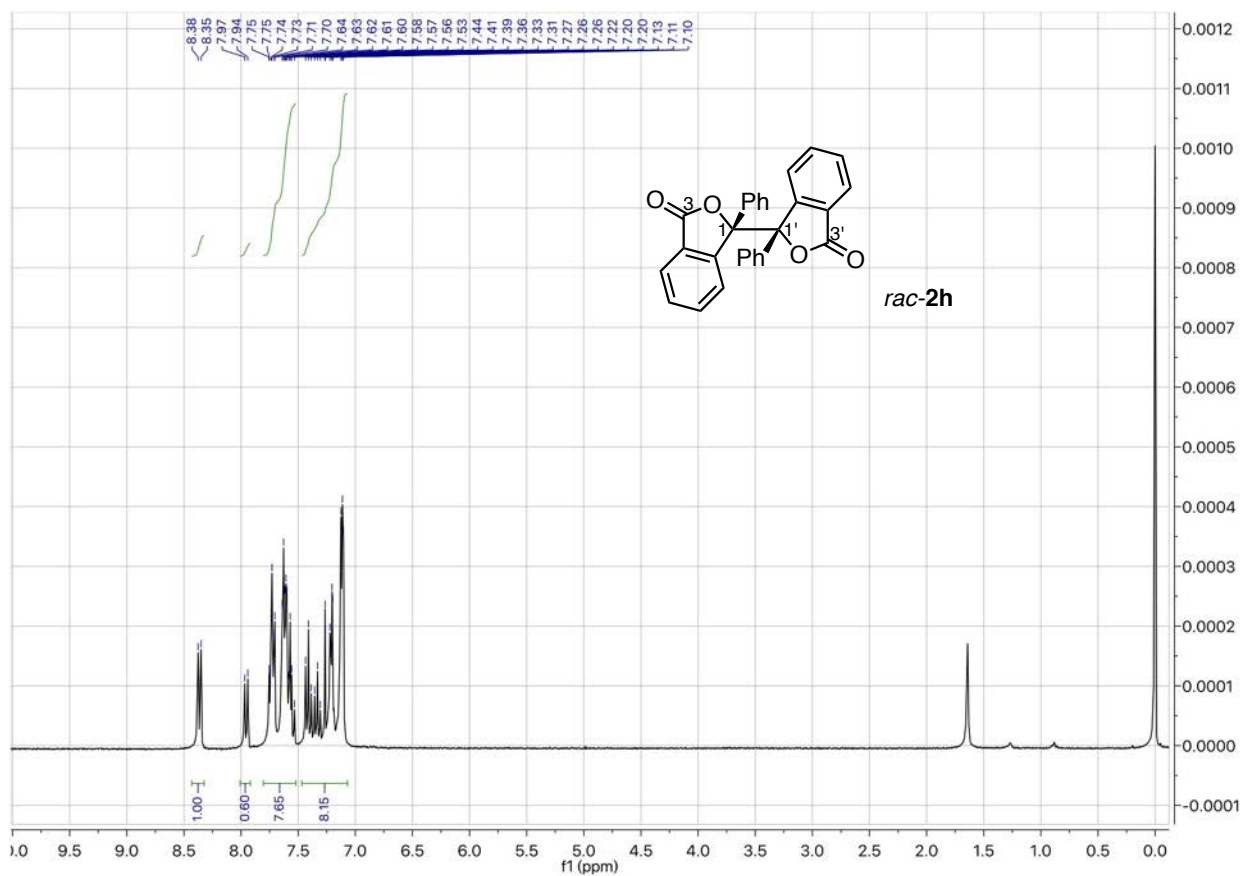
***rac*-2,2'-dibutyl-3,3',4,4'-tetraisopropoxy-[2,2'-bifuran]-5,5'(*2H,2'H*)-dione (*rac*-2g):**



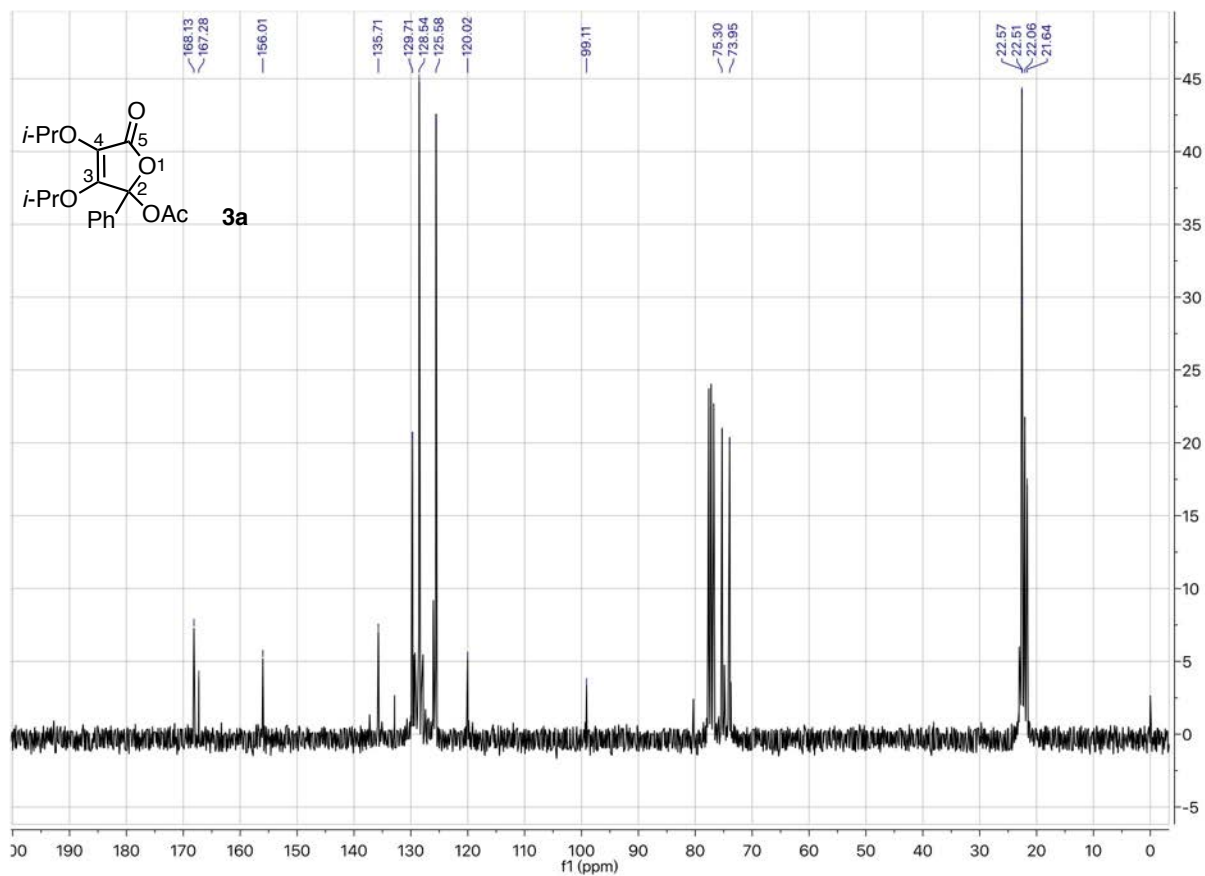
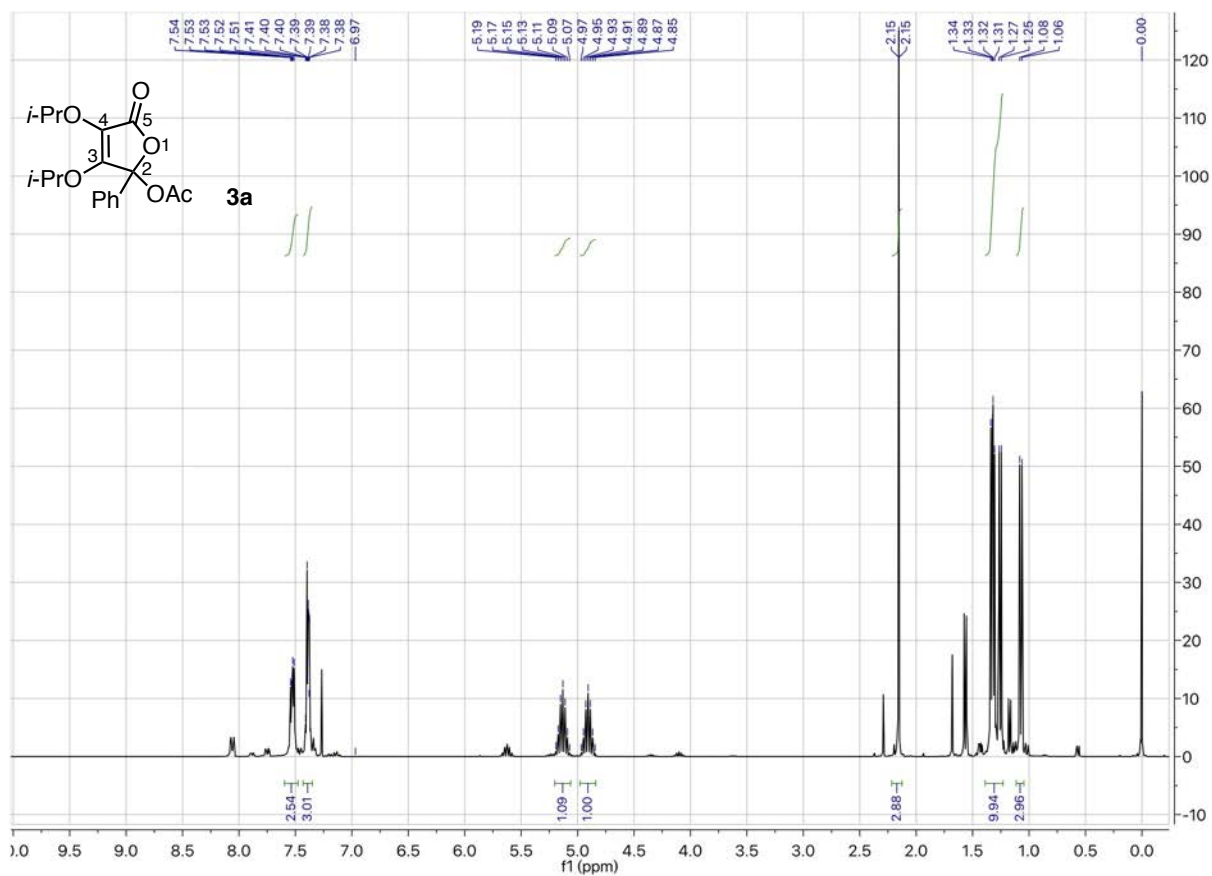
***meso*-1,1'-Diphenyl-[1,1'-biisobenzofuran]-3,3'(1*H*,1'*H*)-dione (*meso*-2h):**



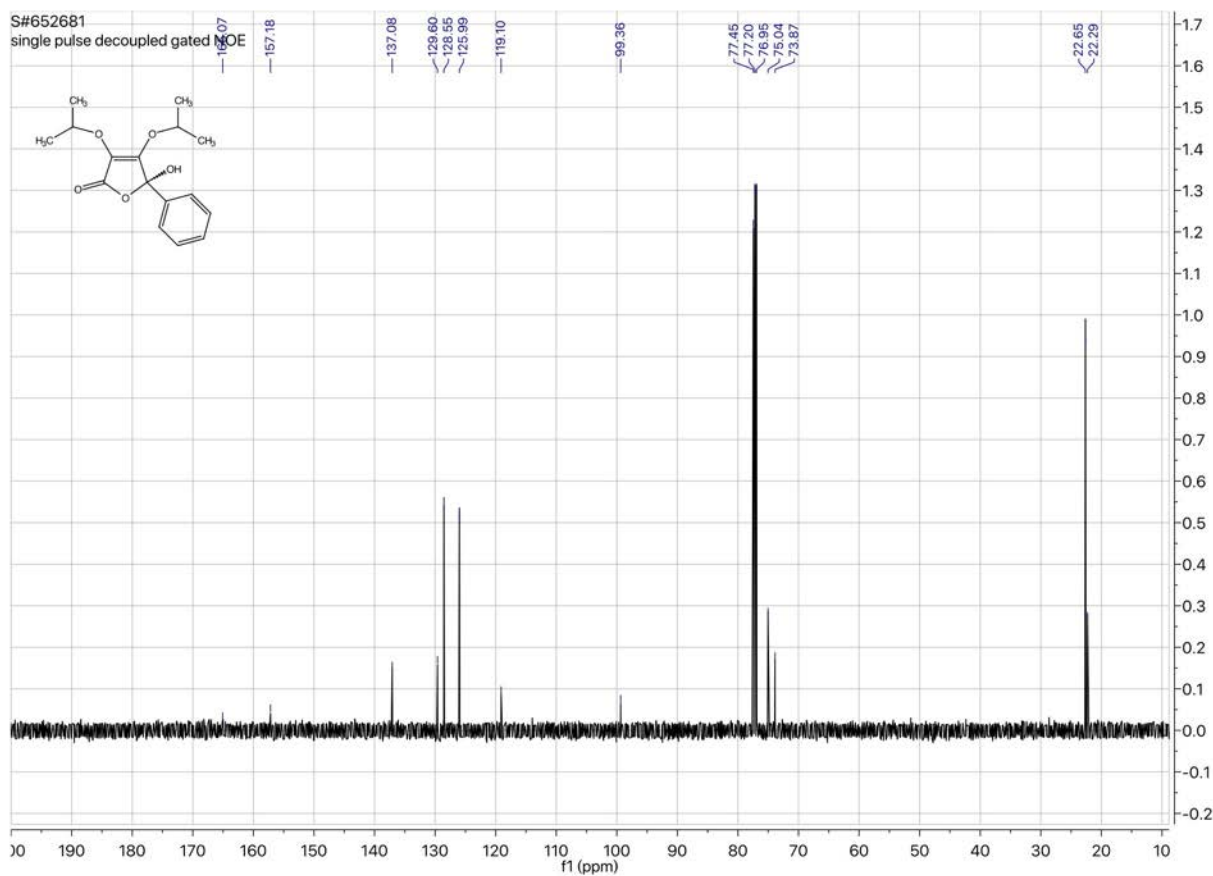
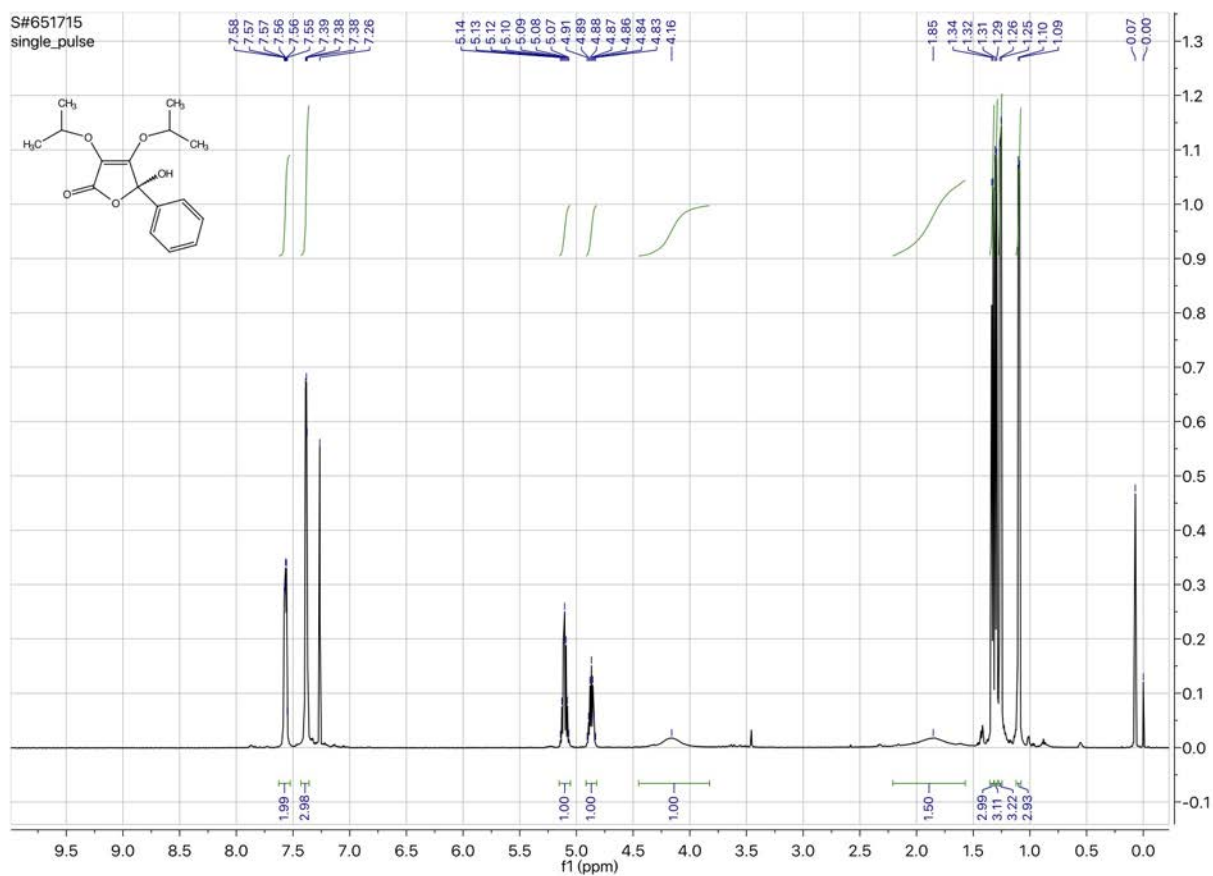
***rac*-1,1'-Diphenyl-[1,1'-biisobenzofuran]-3,3'-(1*H*,1'*H*)-dione (*rac*-2h)¹⁹:**



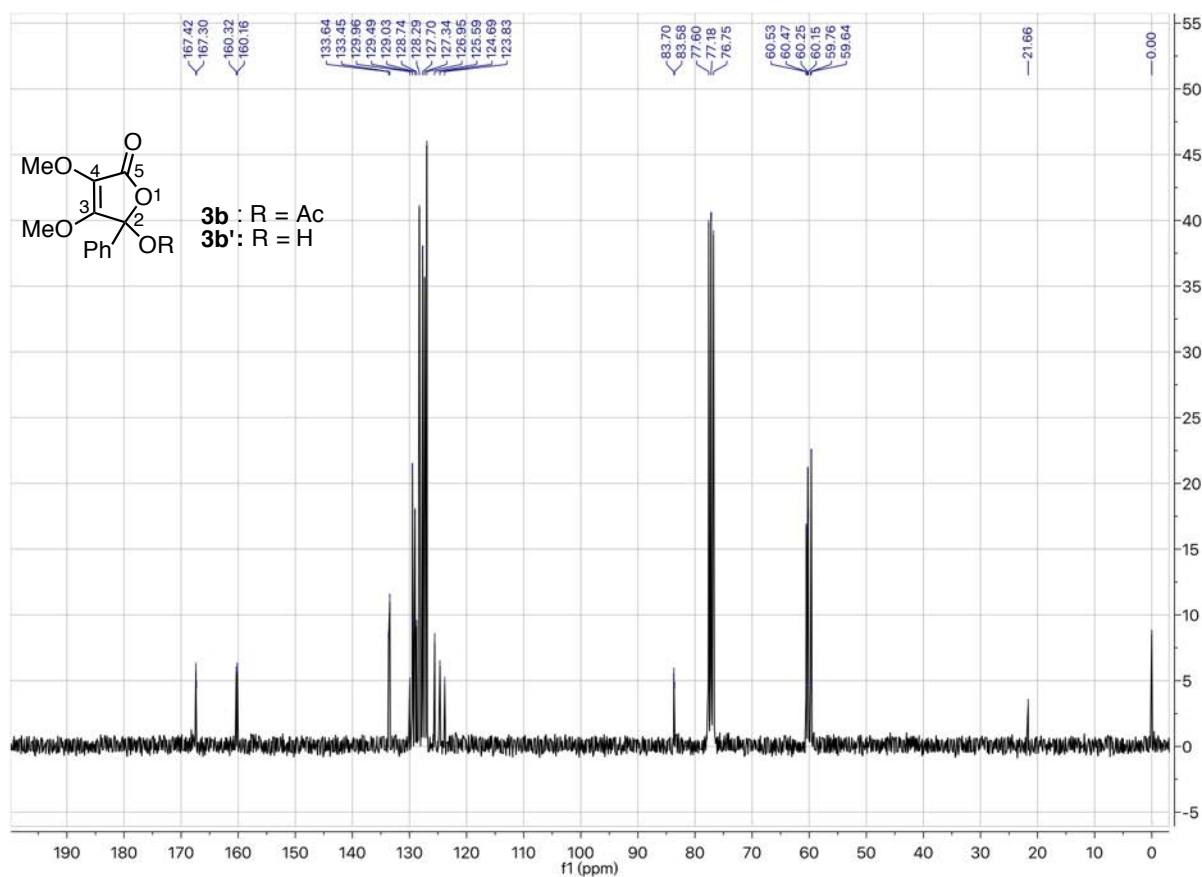
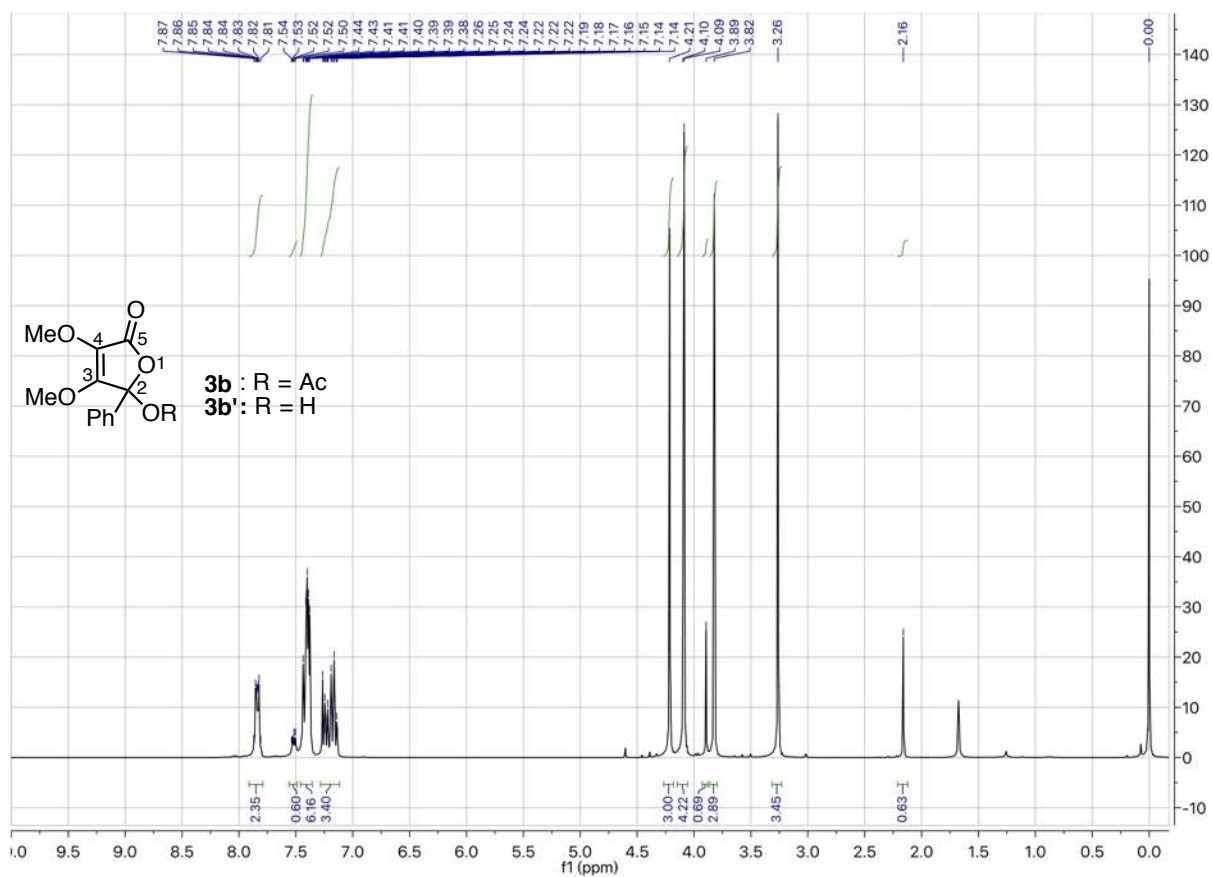
3,4-Diisopropoxy-5-oxo-2-phenyl-2,5-dihydrofuran-2-yl acetate (3a):



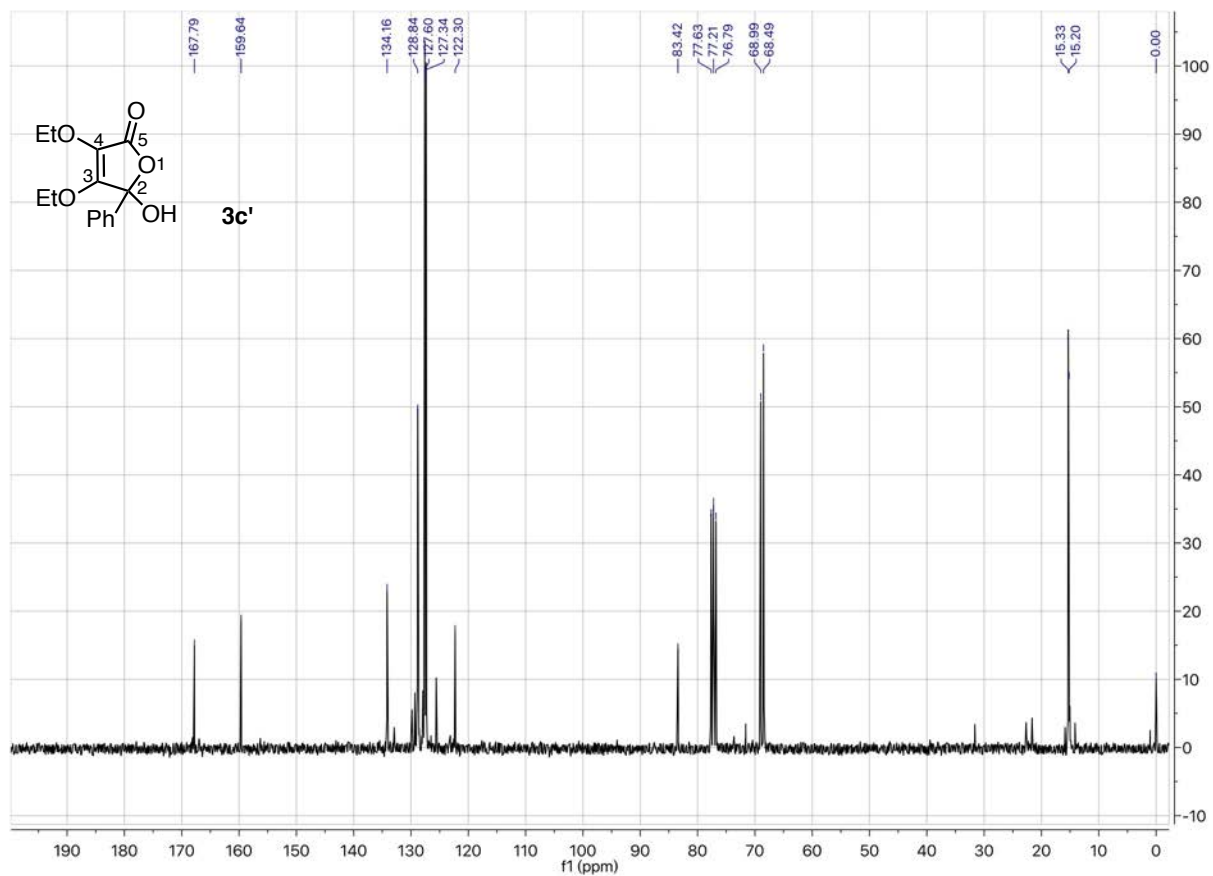
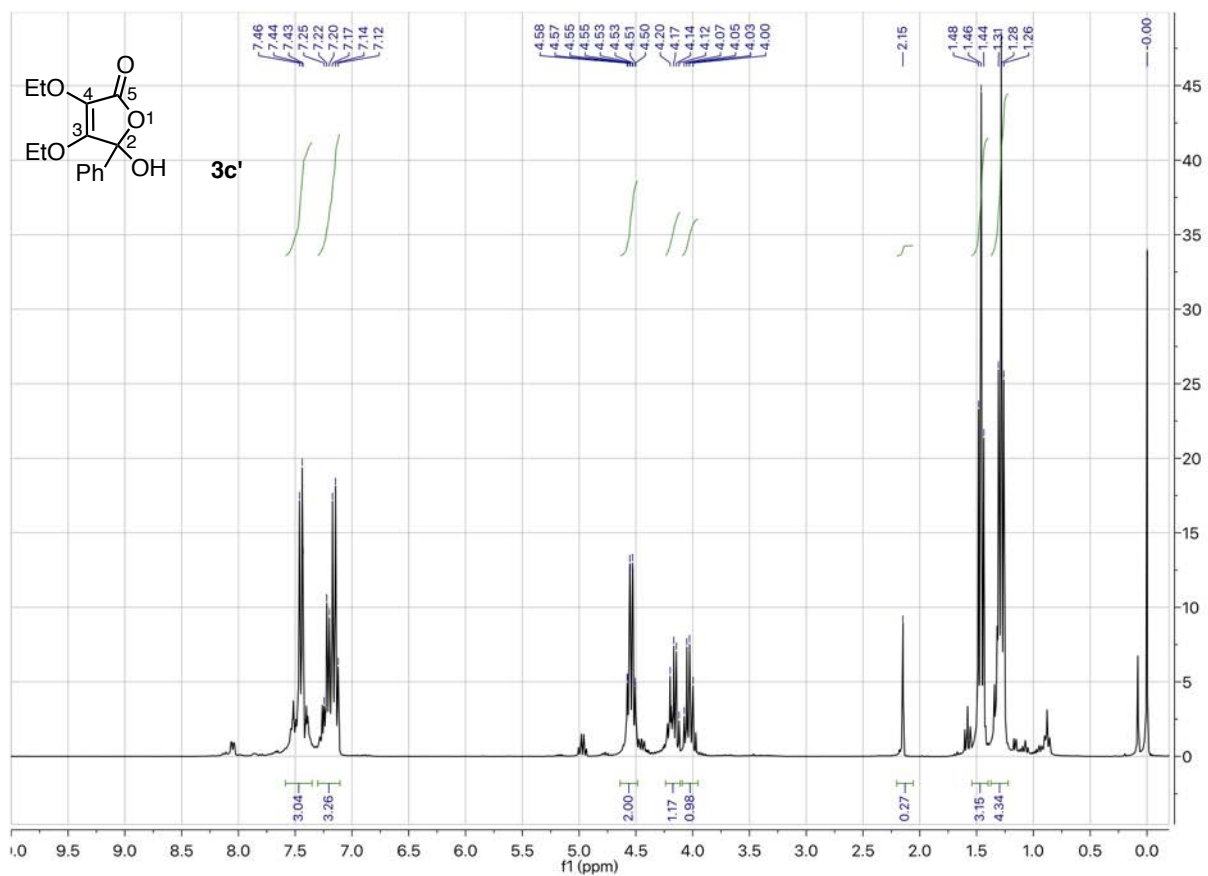
5-Hydroxy-3,4-diisopropoxy-5-phenylfuran-2(5H)-one (3a'):



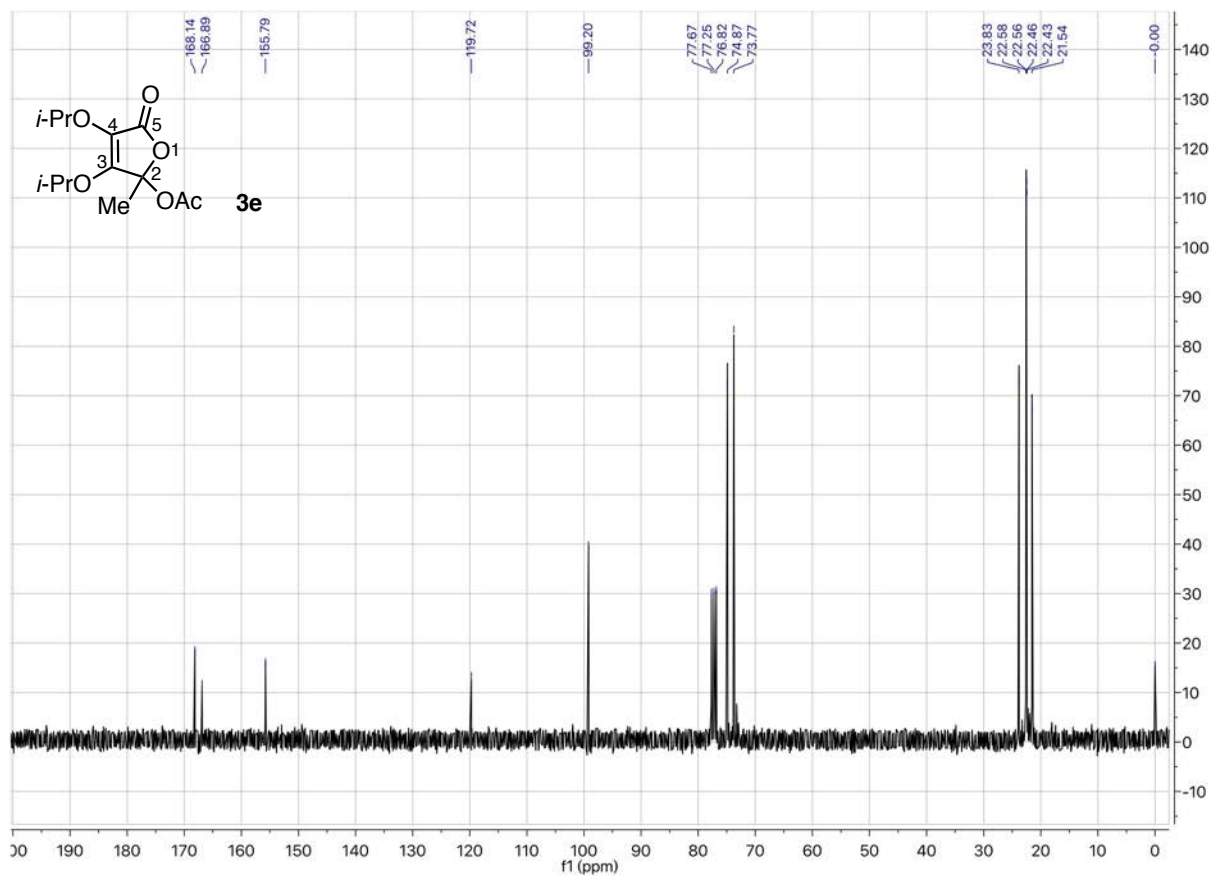
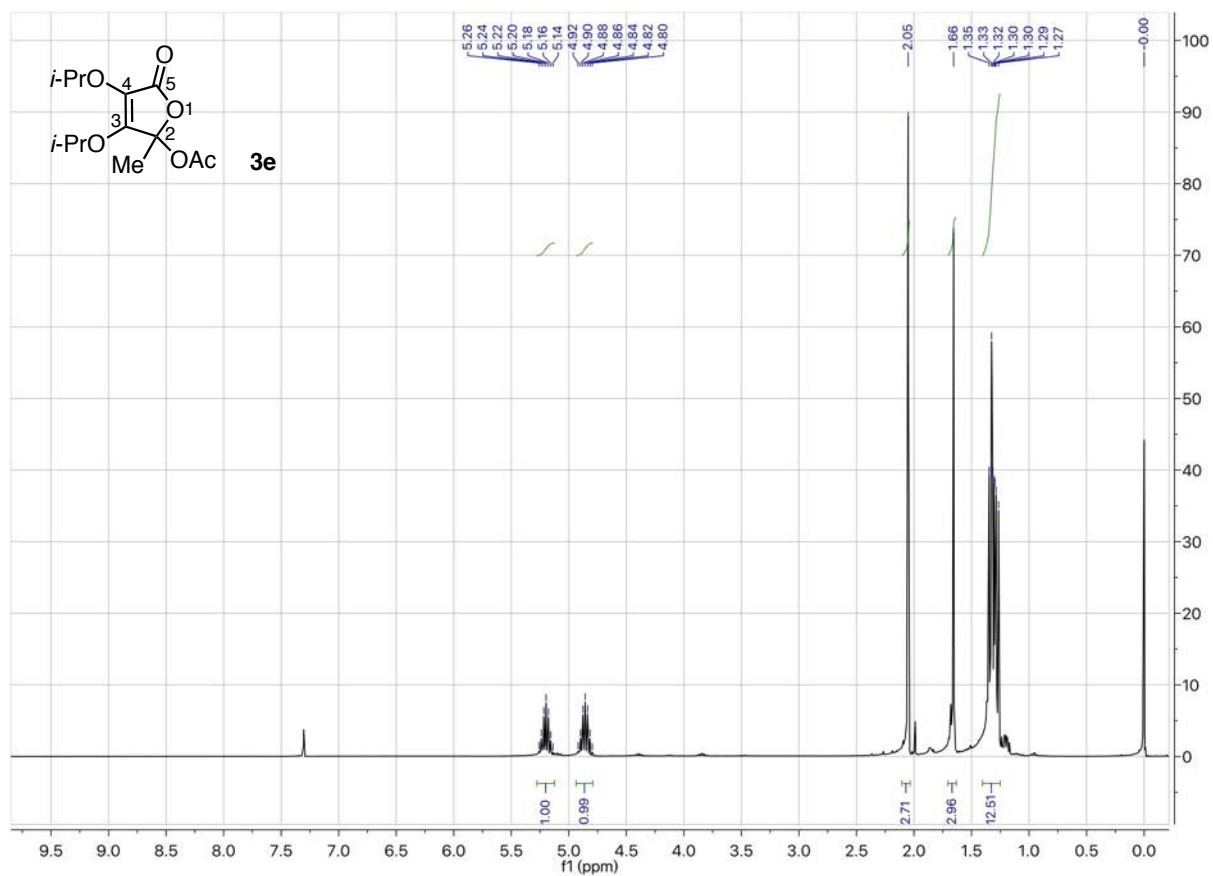
A Mixture of 3,4-Dimethoxy-5-oxo-2-phenyl-2,5-dihydrofuran-2-yl acetate (3b) and 5-Hydroxy-3,4-dimethoxy-5-phenylfuran-2(5H)-one (3b')^{11a,11c,22}:



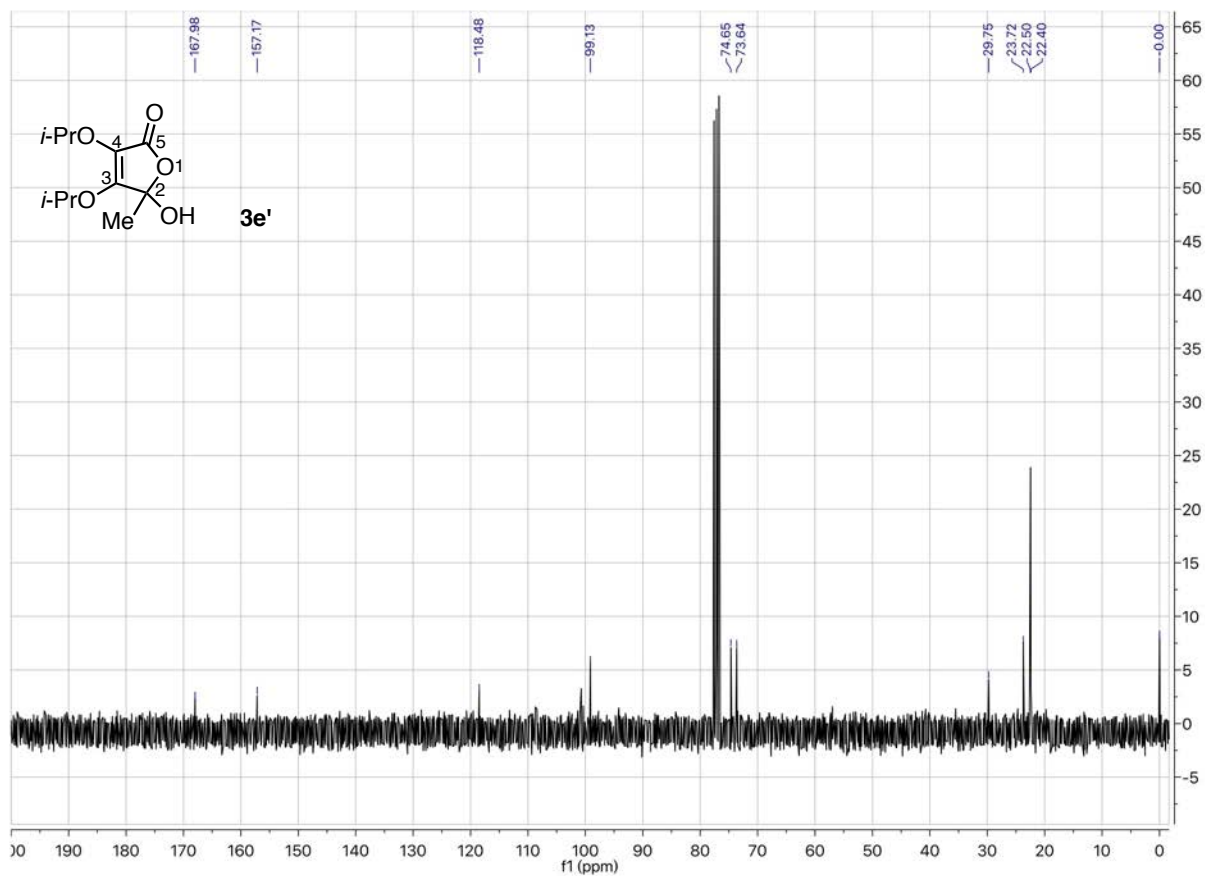
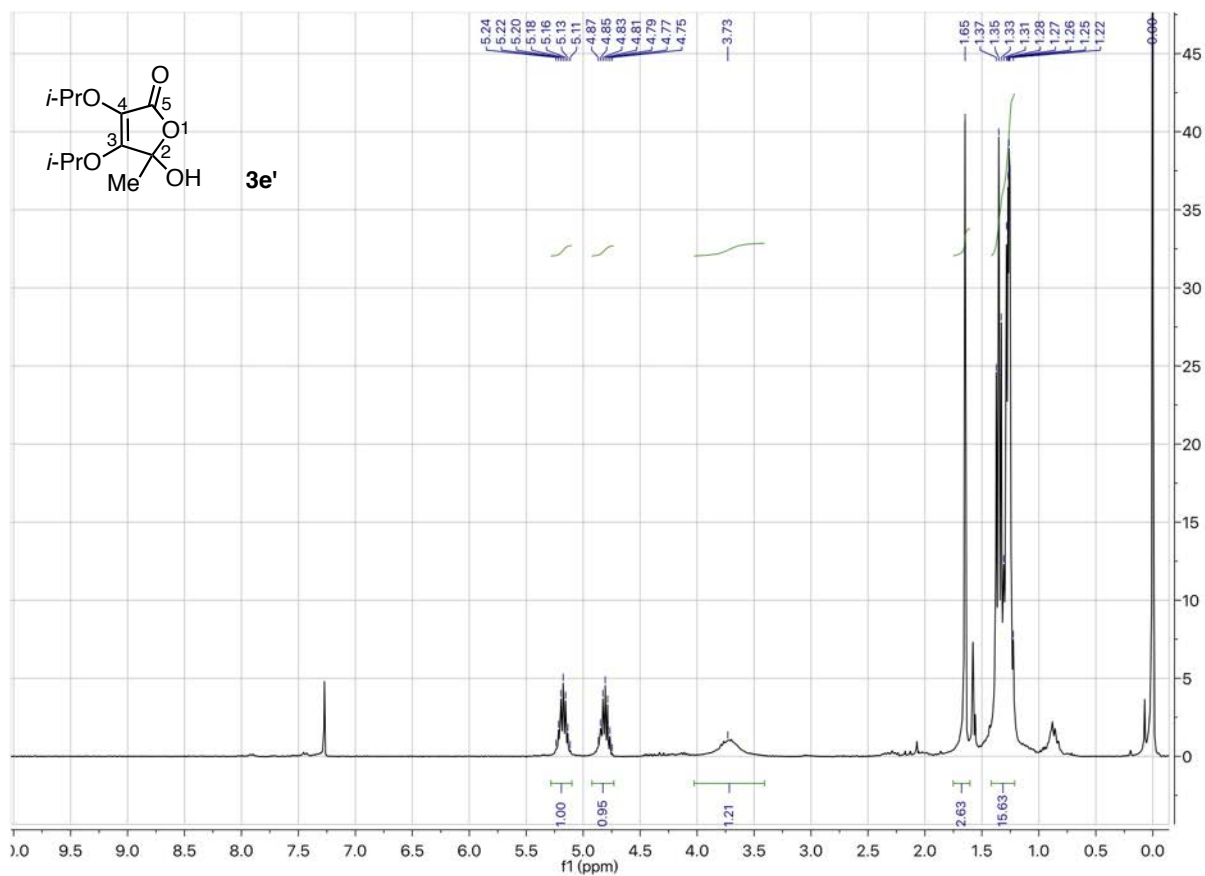
3,4-Diethoxy-5-hydroxy-5-phenylfuran-2(5H)-one (3c') ^{11a,11c}:



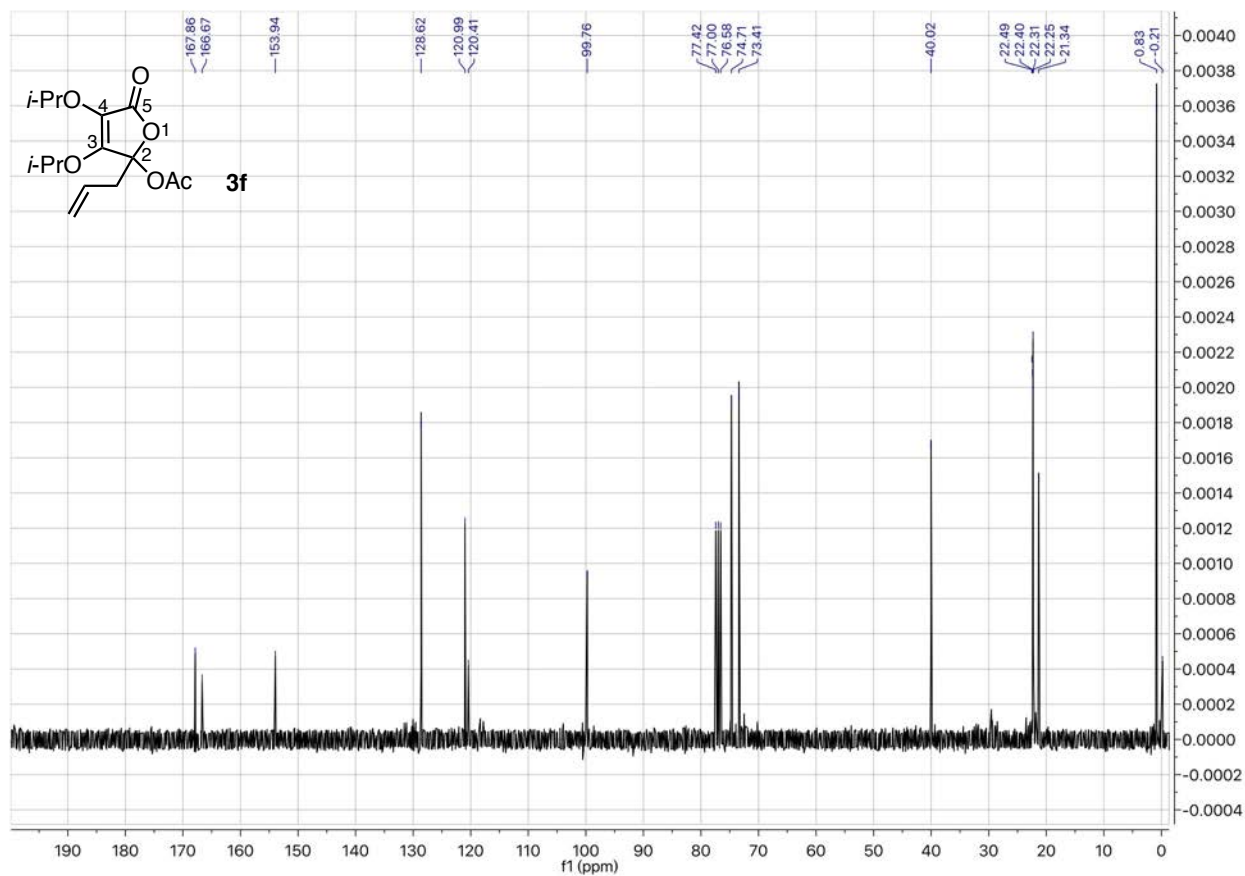
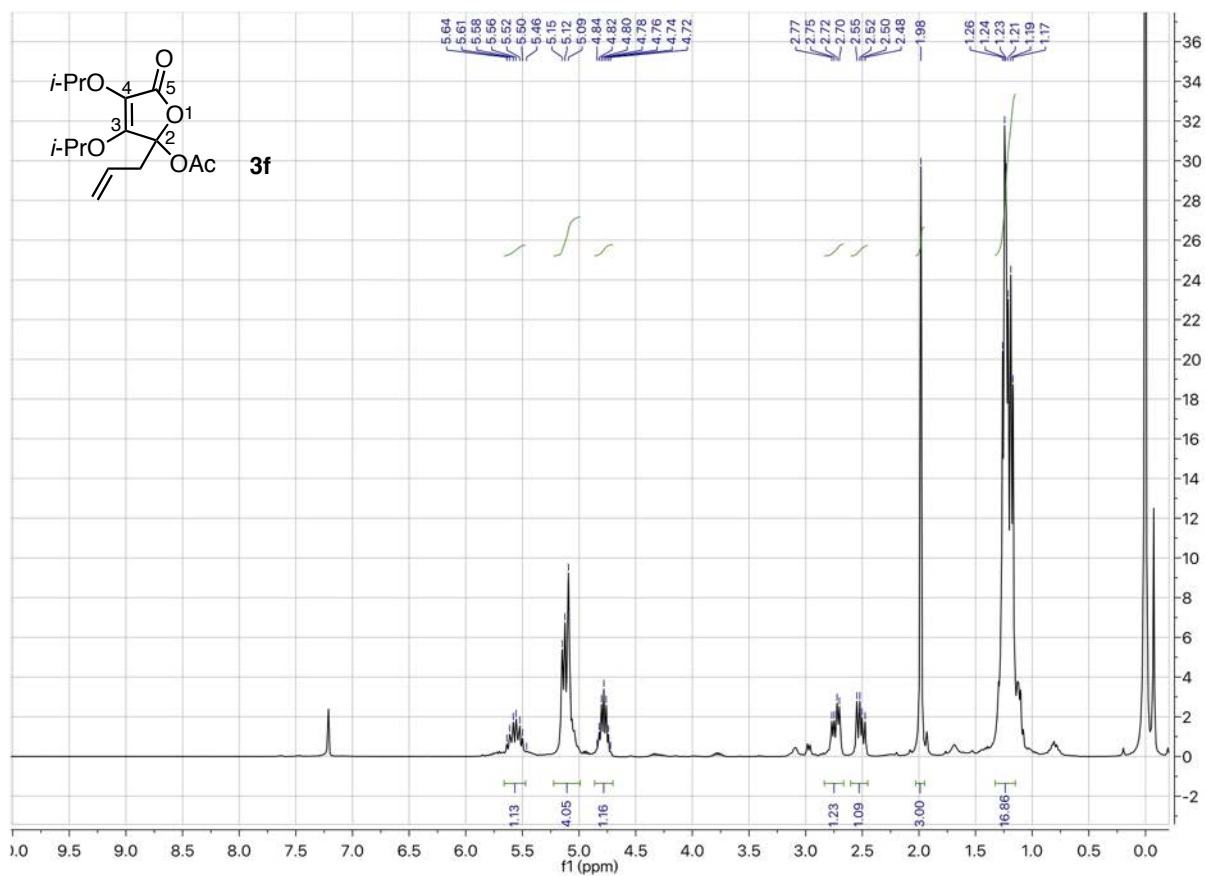
3,4-Diisopropoxy-2-methyl-5-oxo-2,5-dihydrofuran-2-yl acetate (3e):



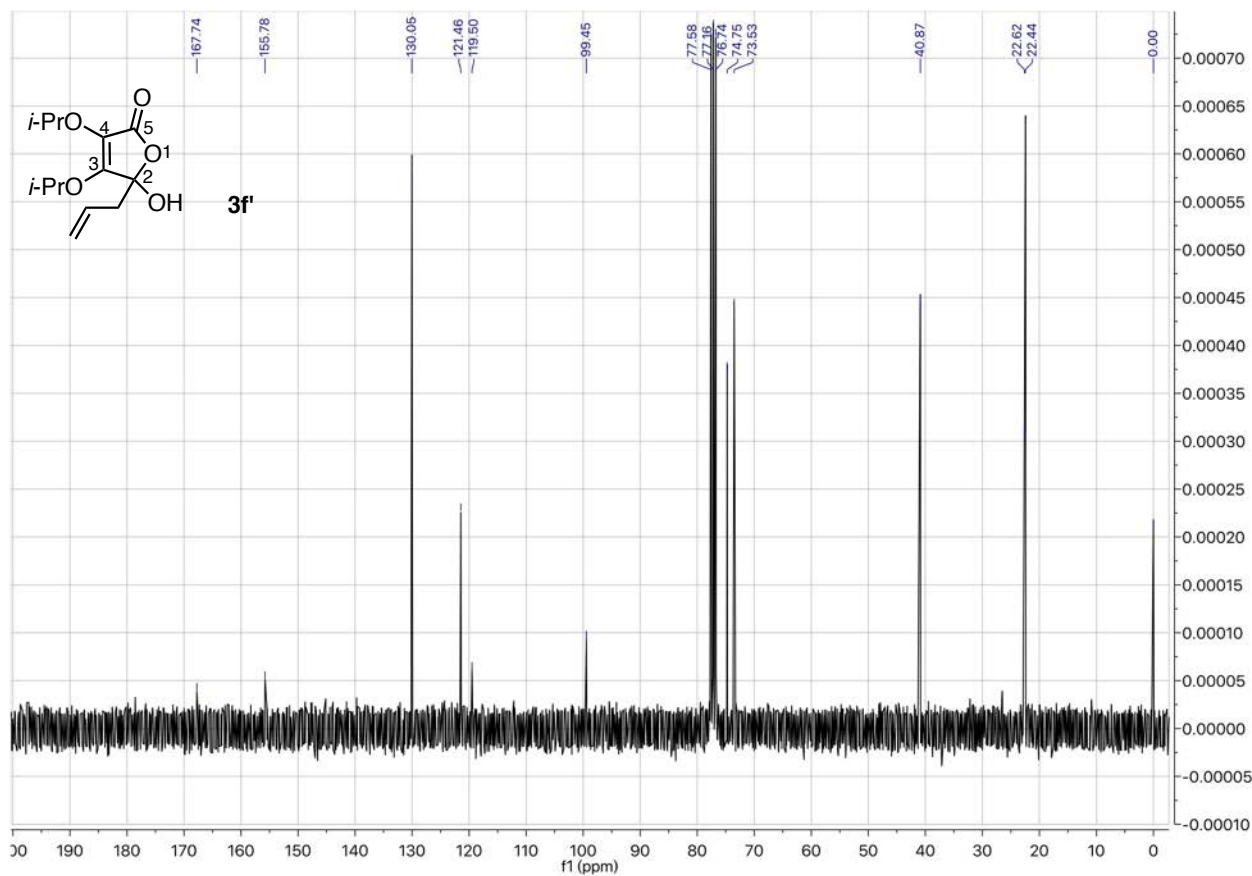
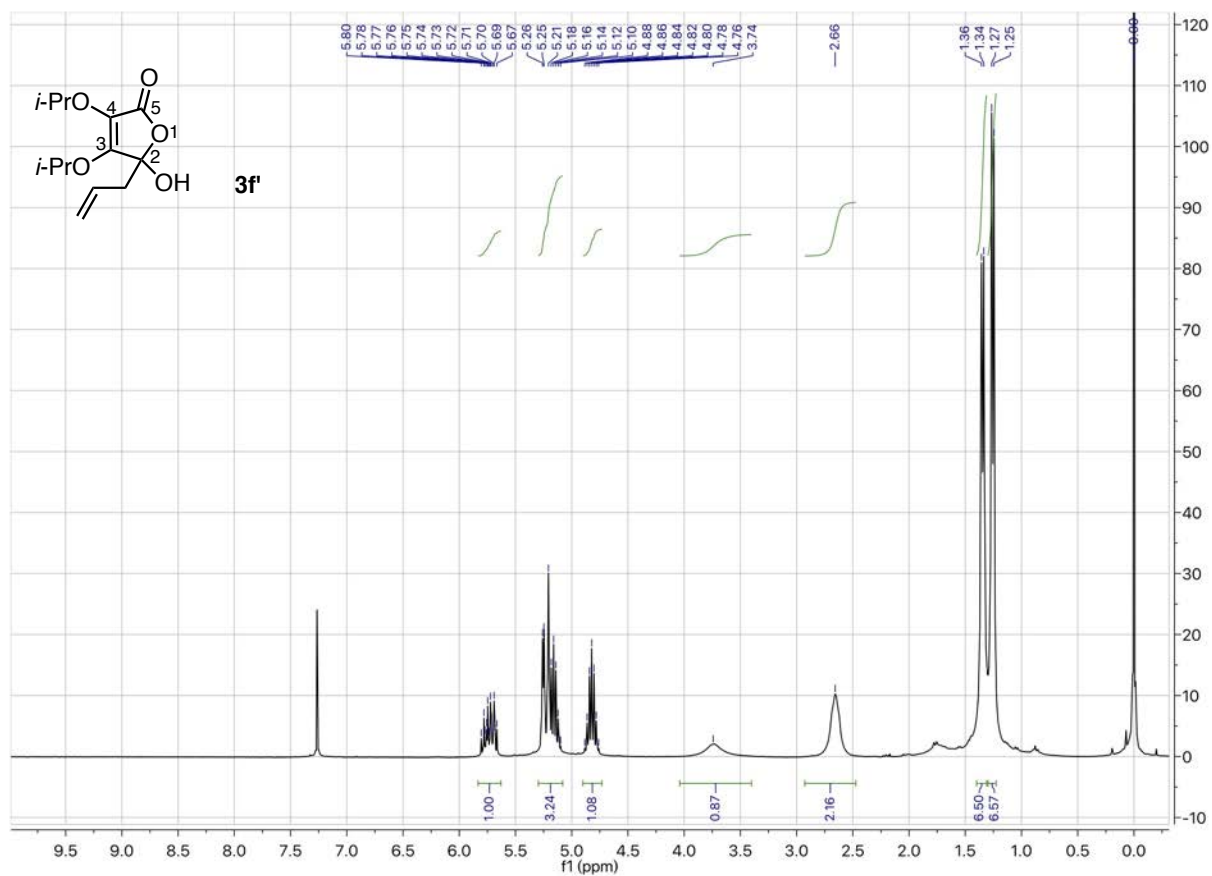
5-Hydroxy-3,4-diisopropoxy-5-methylfuran-2(5H)-one (3e'):



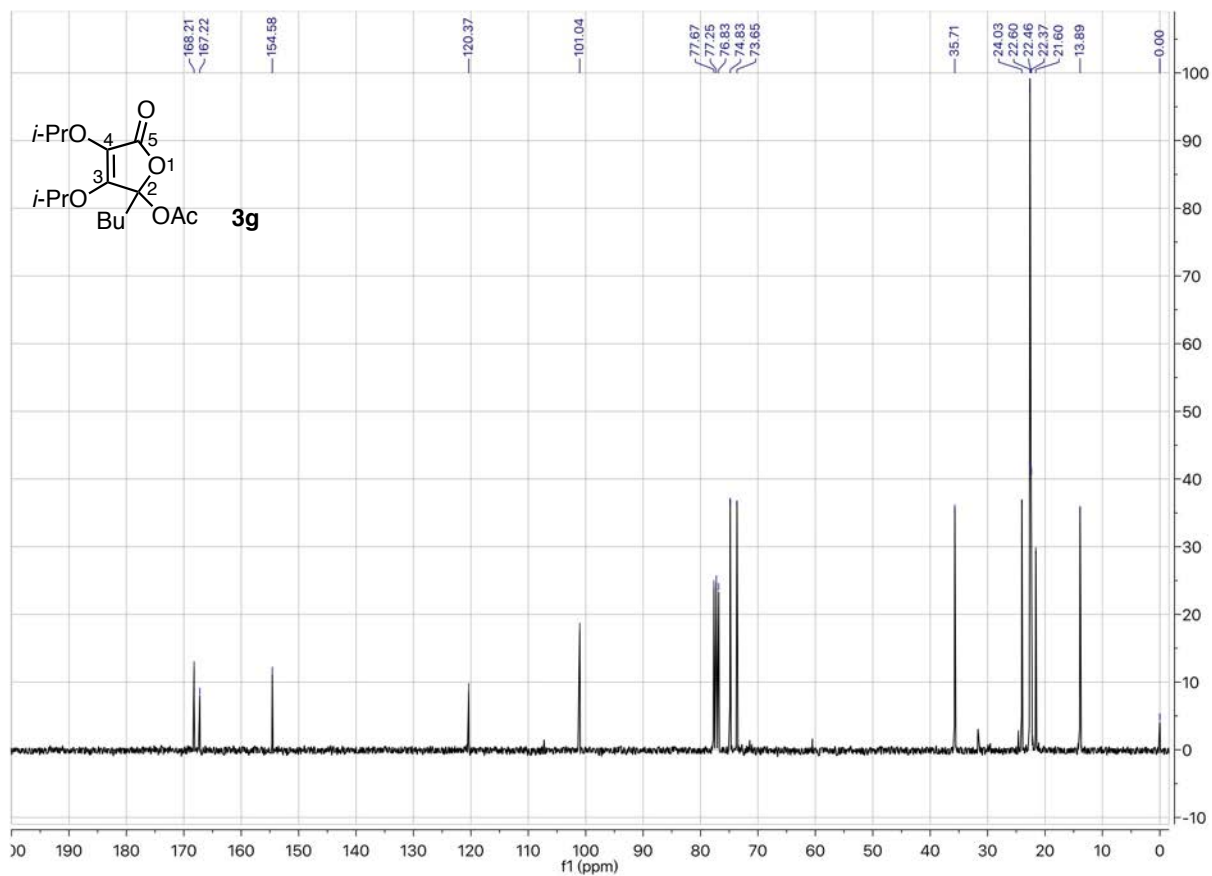
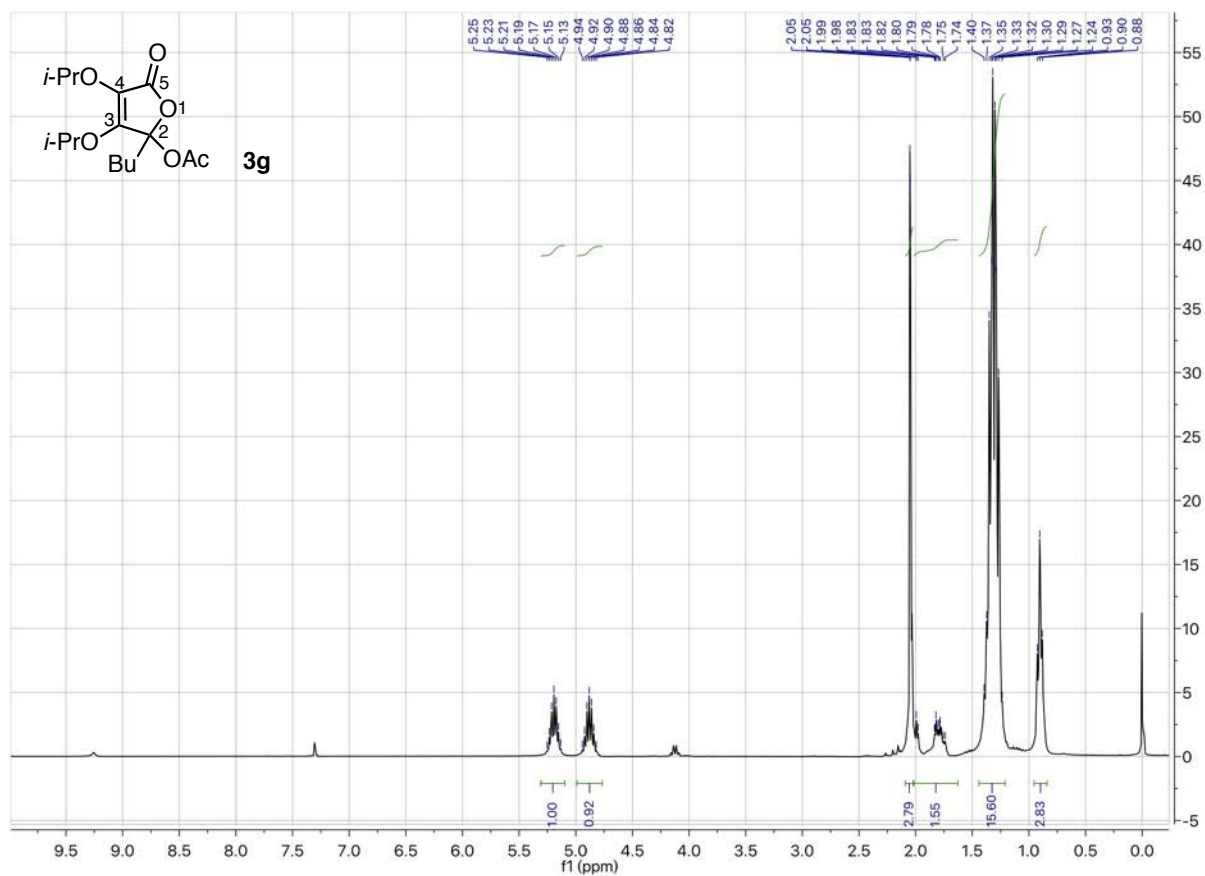
2-Allyl-3,4-diisopropoxy-5-oxo-2,5-dihydrofuran-2-yl acetate (3f):



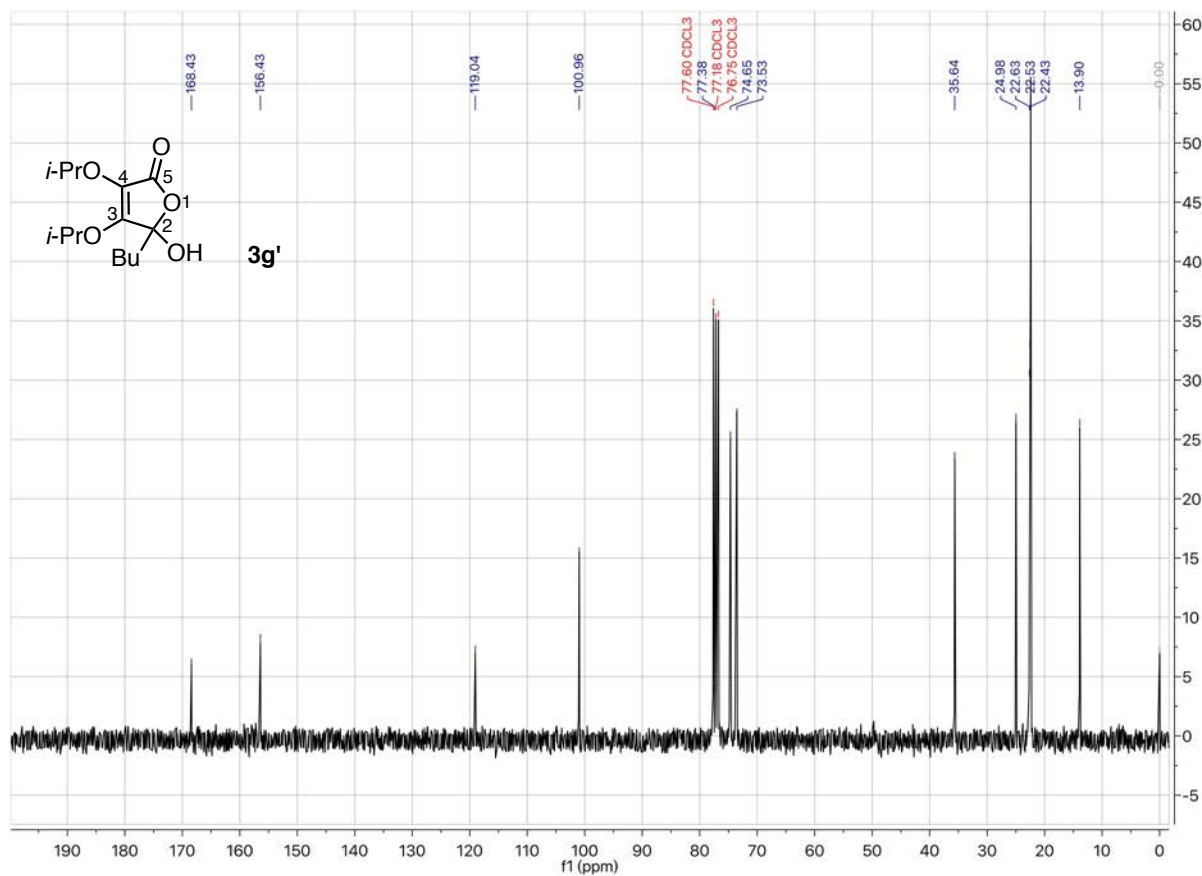
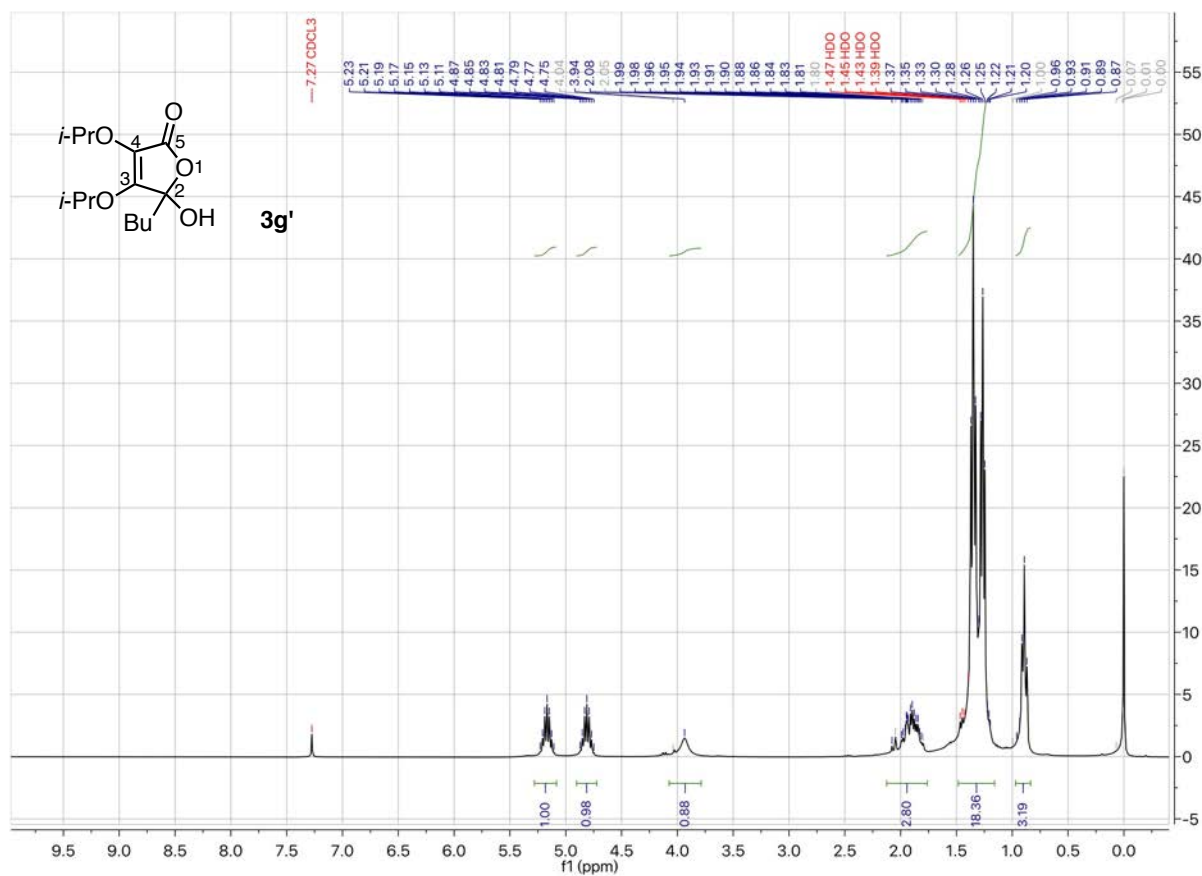
5-Allyl-5-hydroxy-3,4-diisopropoxyfuran-2(5H)-one (3f'):



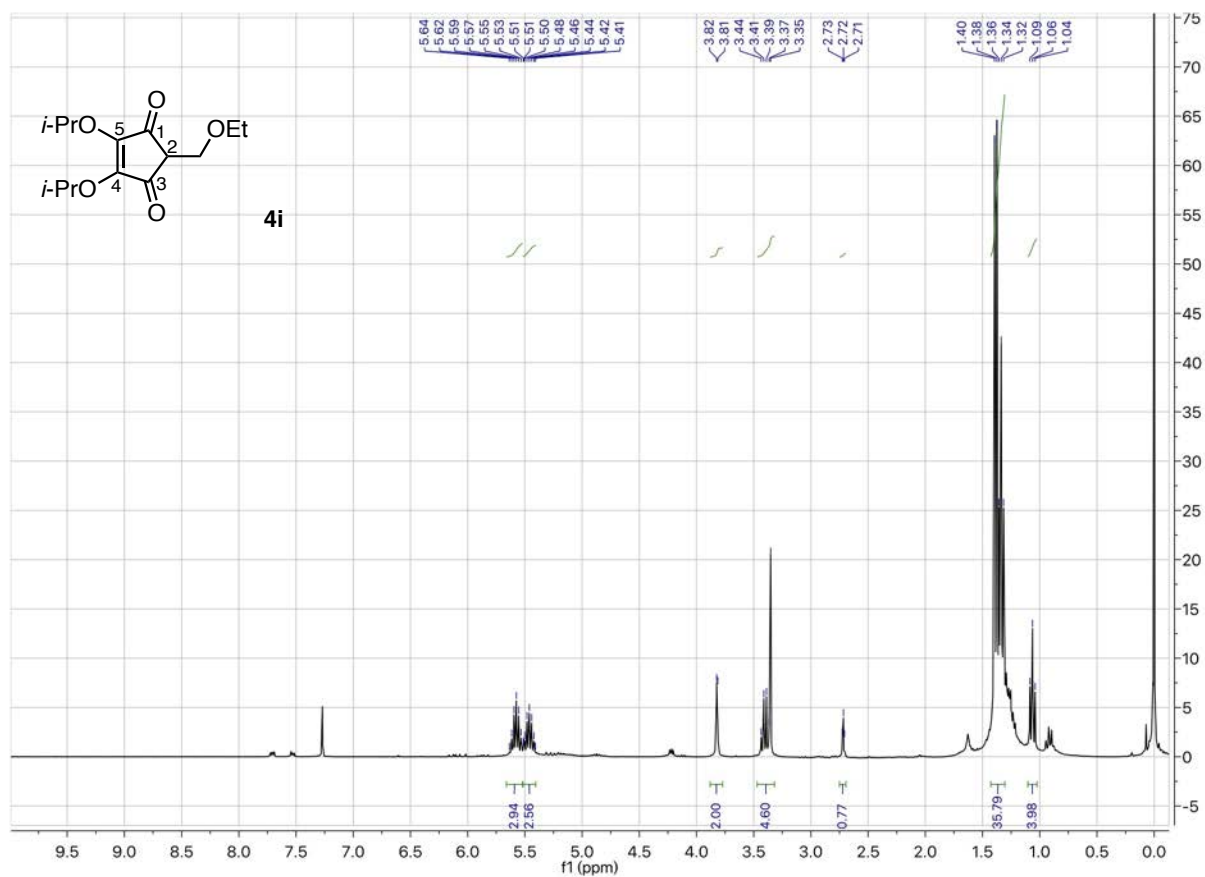
2-Butyl-3,4-diisopropoxy-5-oxo-2,5-dihydrofuran-2-yl acetate (3g):



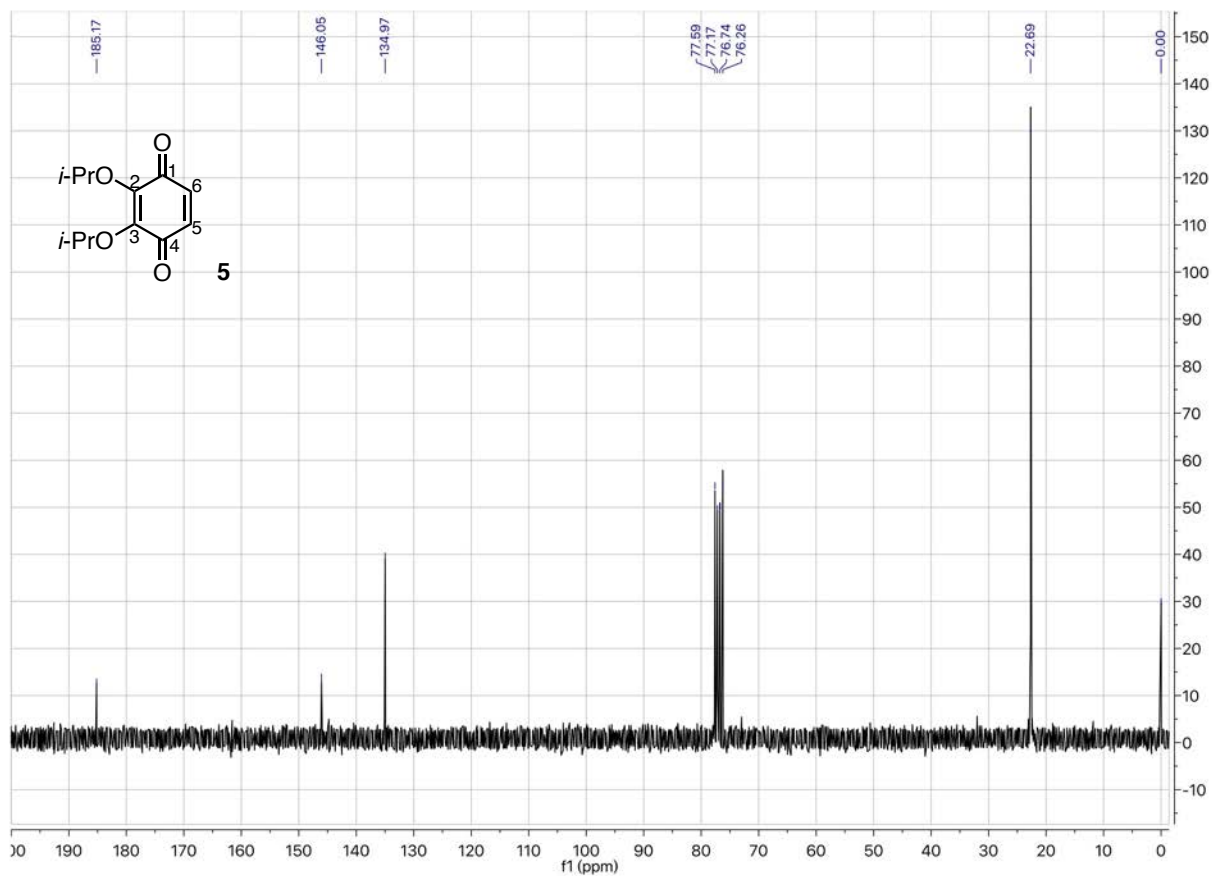
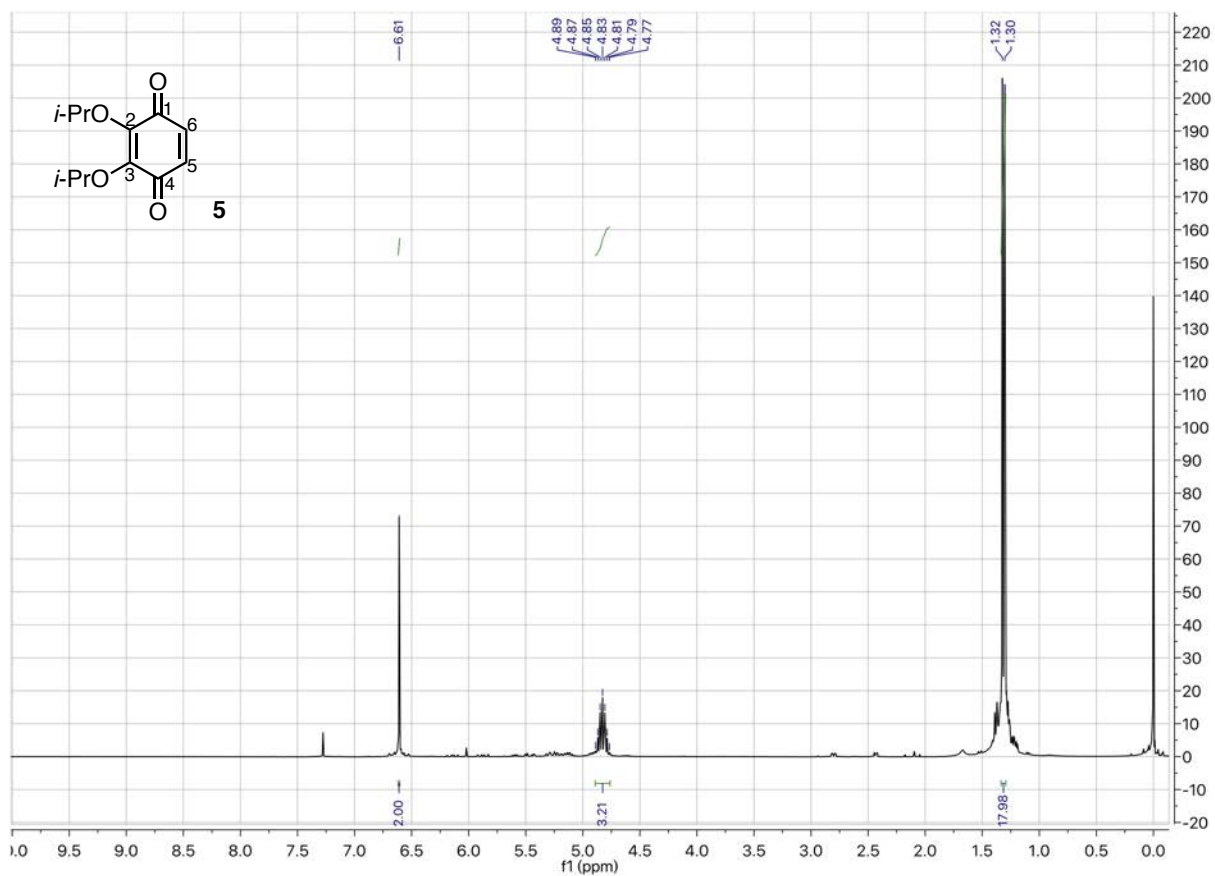
5-Butyl-5-hydroxy-3,4-diisopropoxyfuran-2(5H)-one (3g')



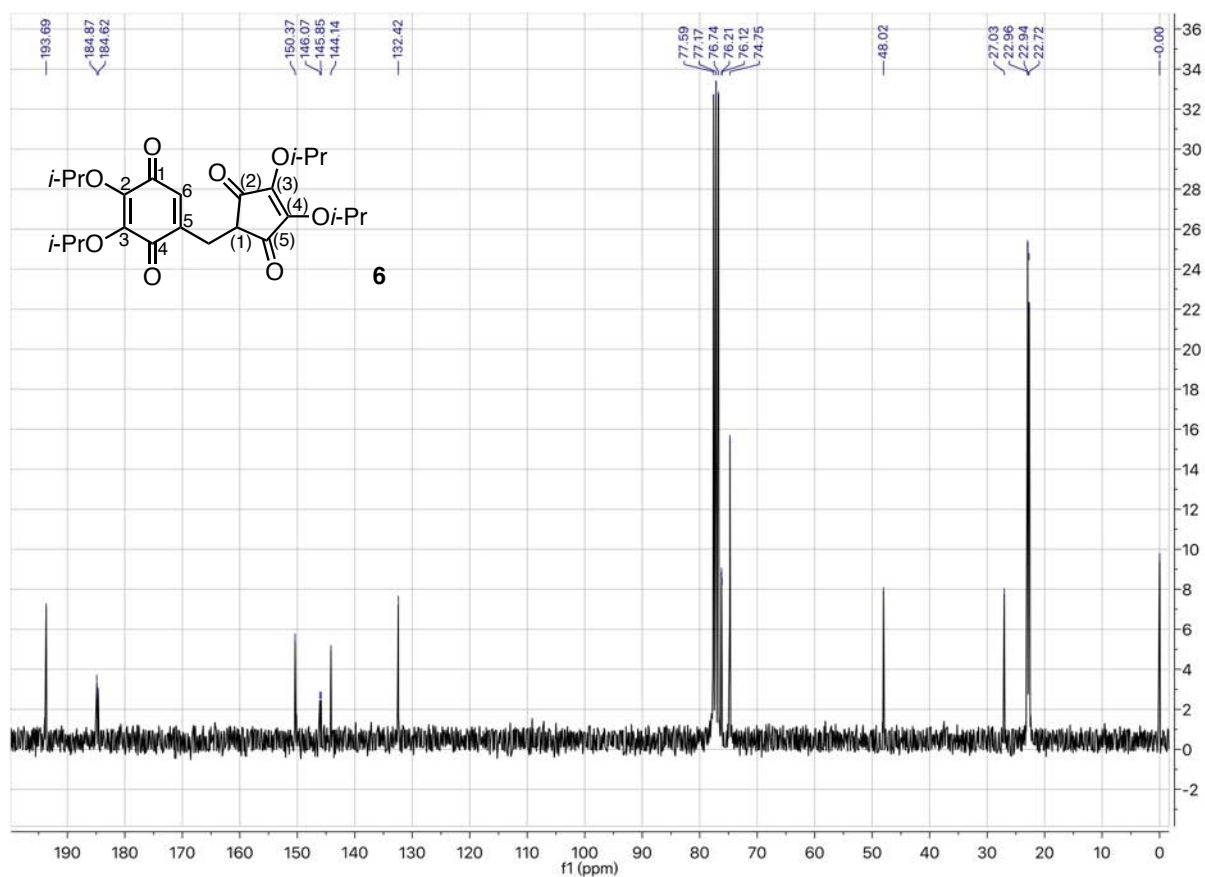
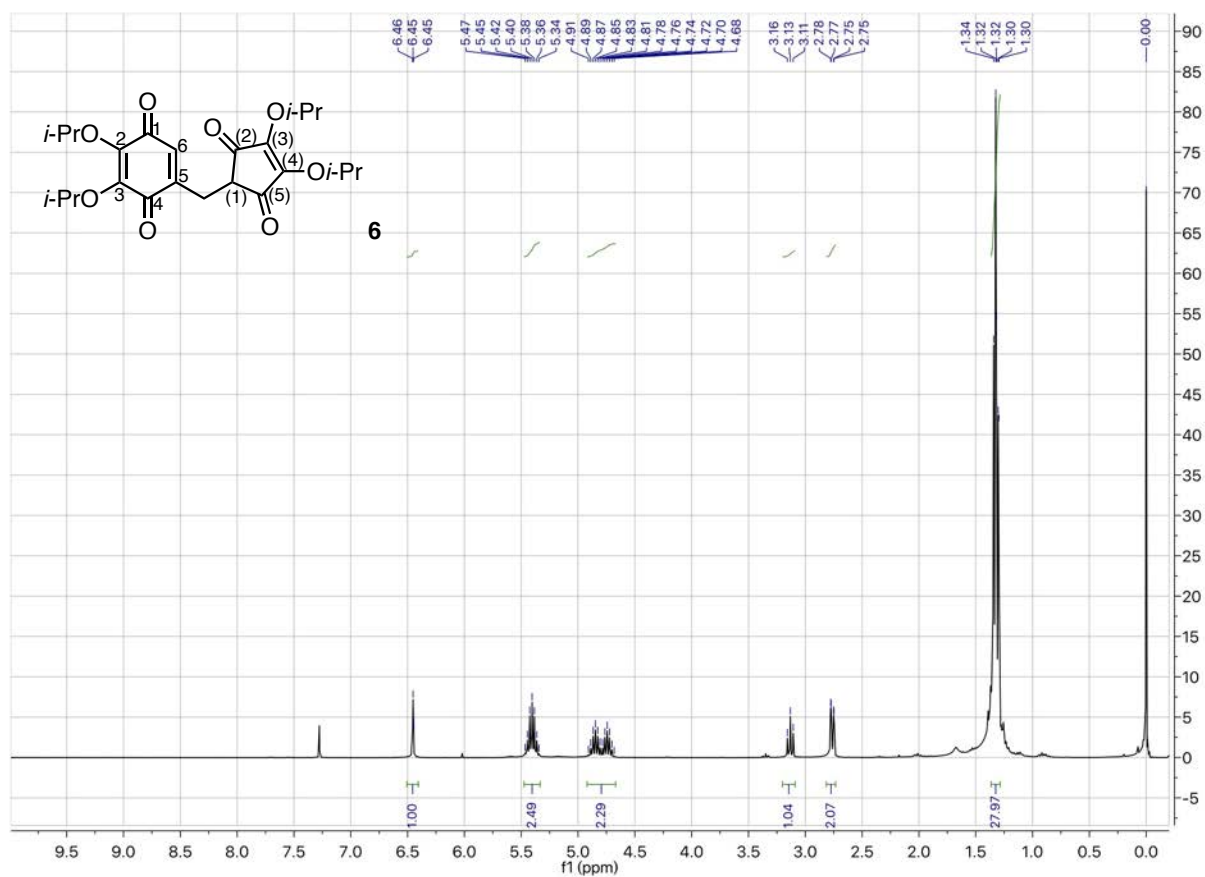
2-(Ethoxymethyl)-4,5-diisopoxycyclopent-4-ene-1,3-dione (4i):



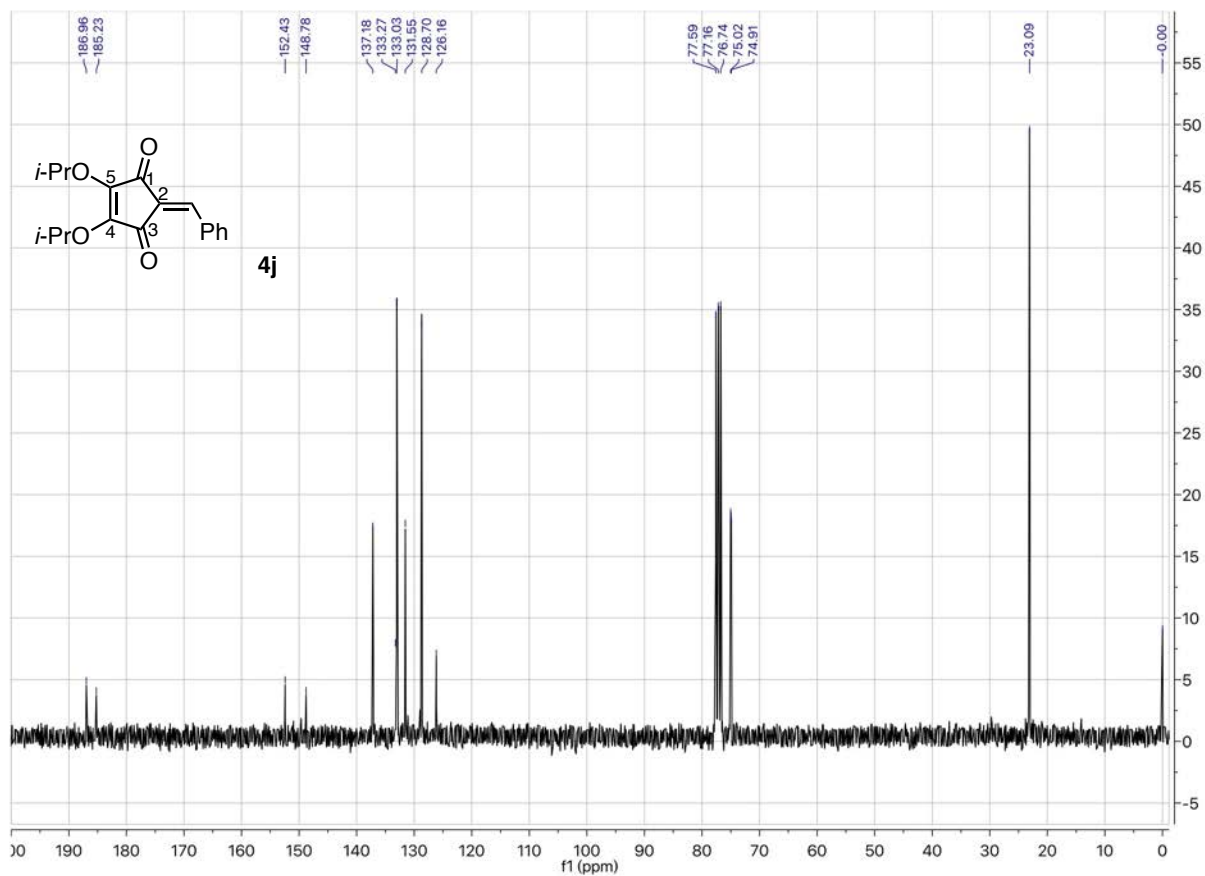
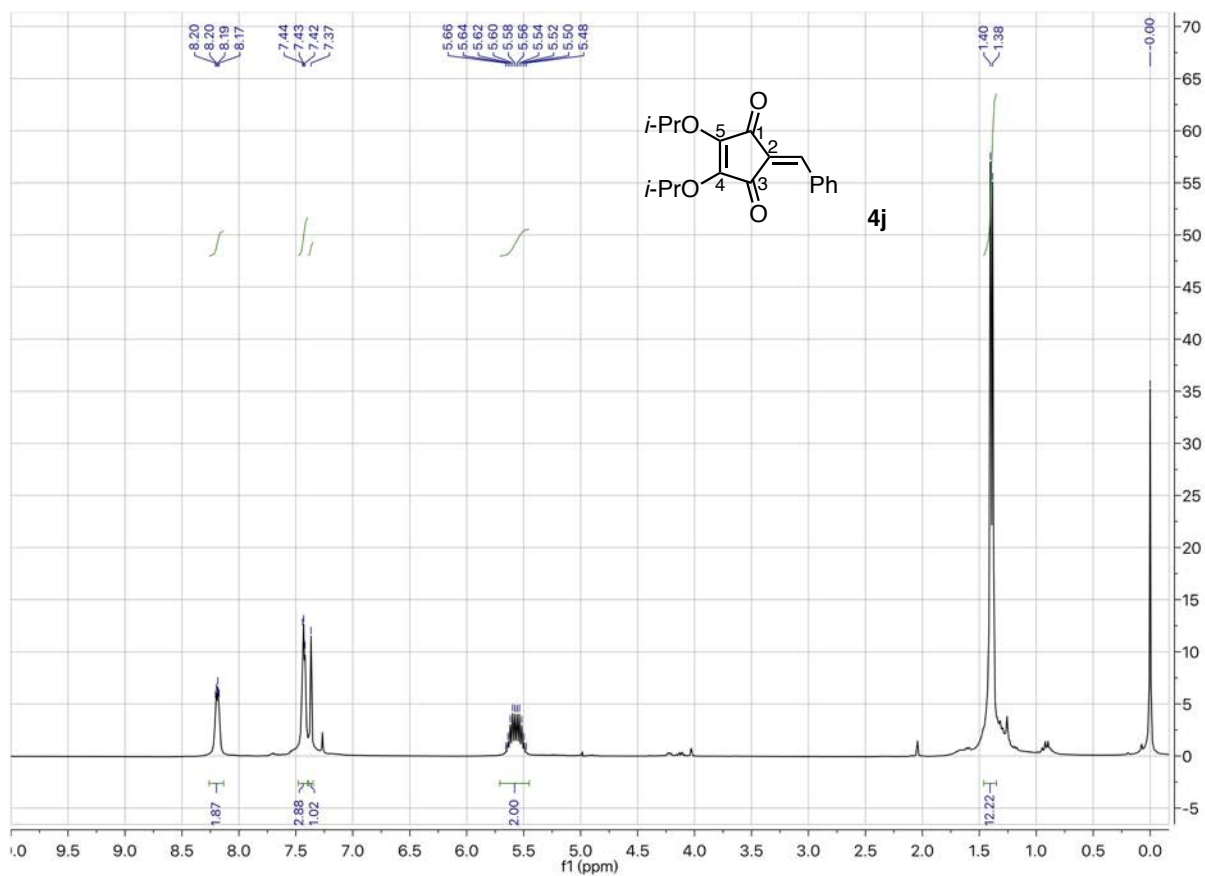
2,3-Diisopropoxycyclohexa-2,5-diene-1,4-dione (5)³⁰:

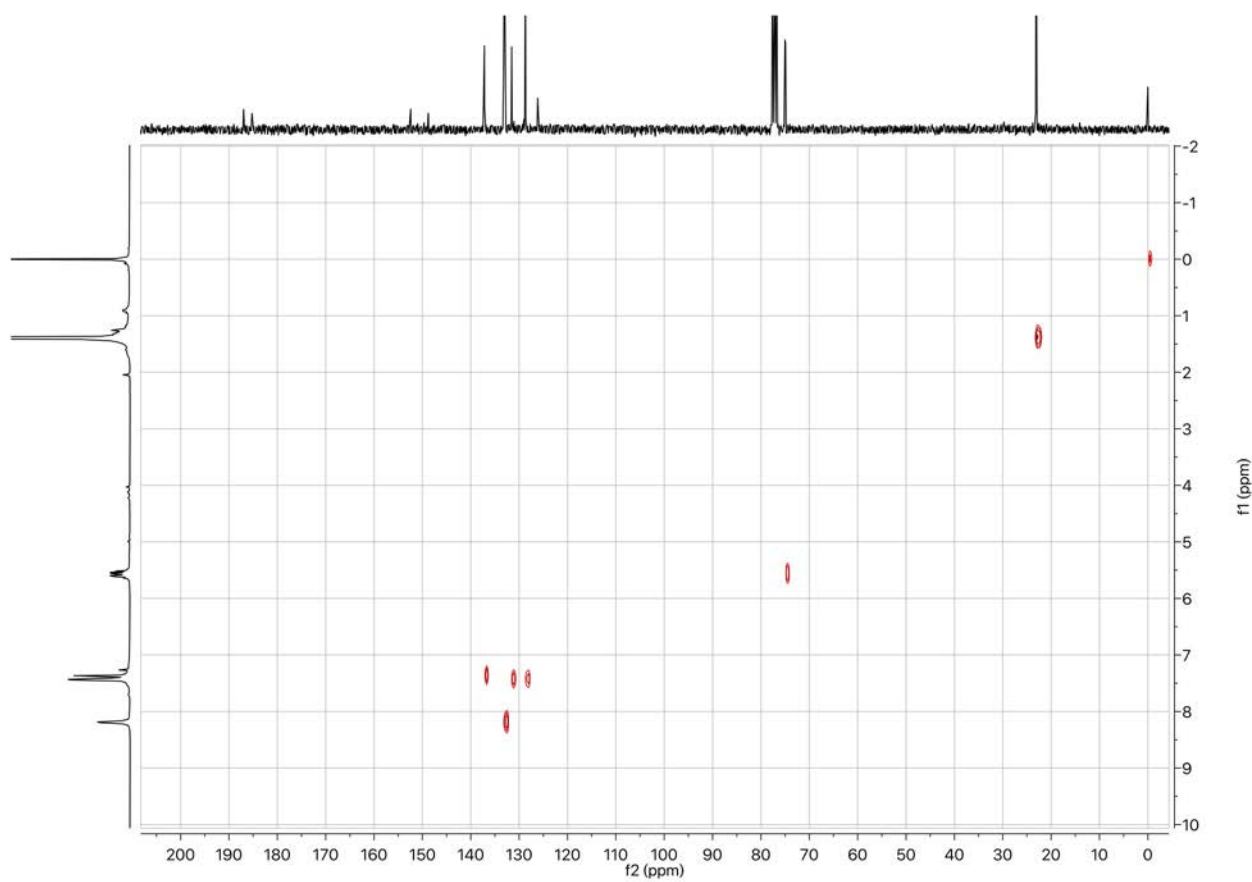
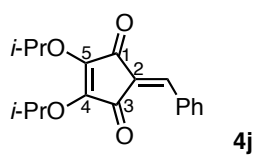


5-((3,4-Diisopropoxy-2,5-dioxocyclopent-3-en-1-yl)methyl)-2,3-diisopropoxycyclohexa-2,5-diene-1,4-dione (6):

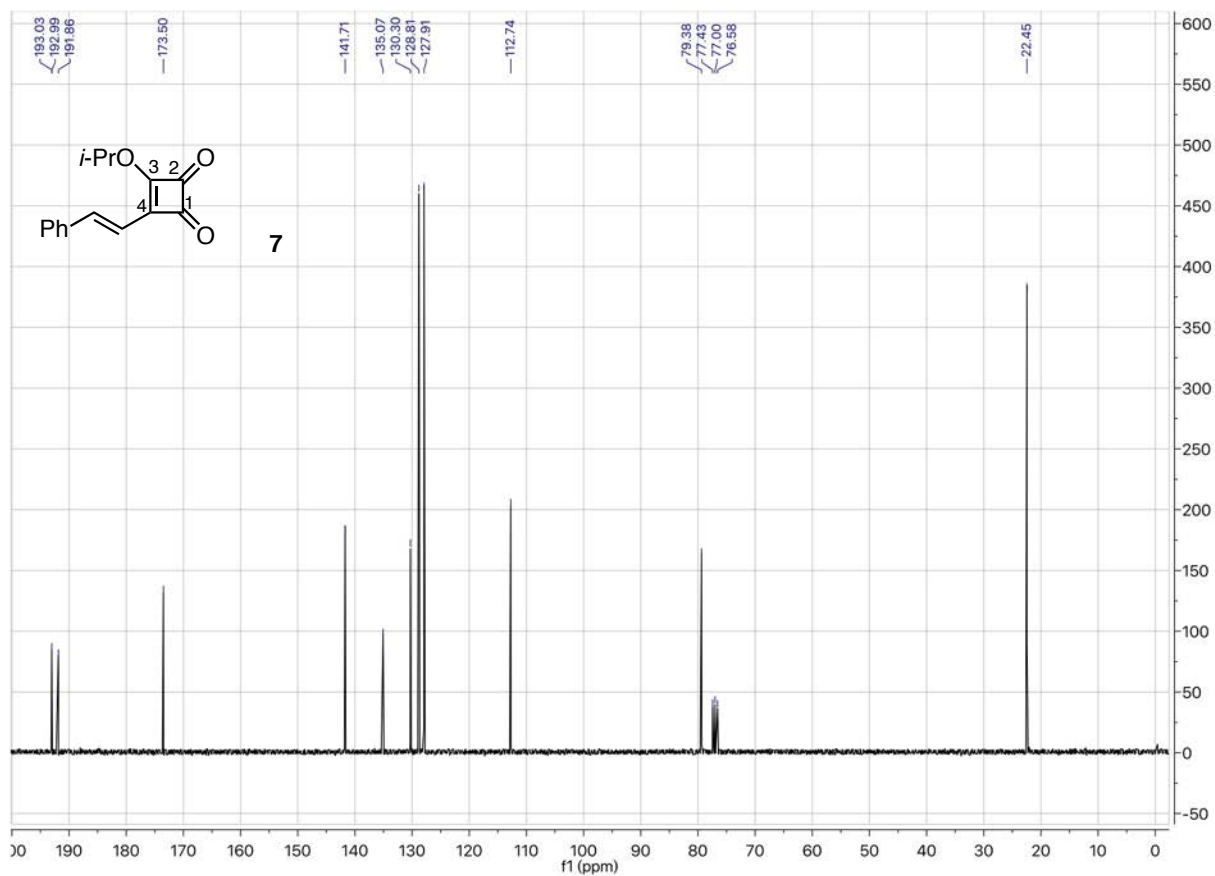
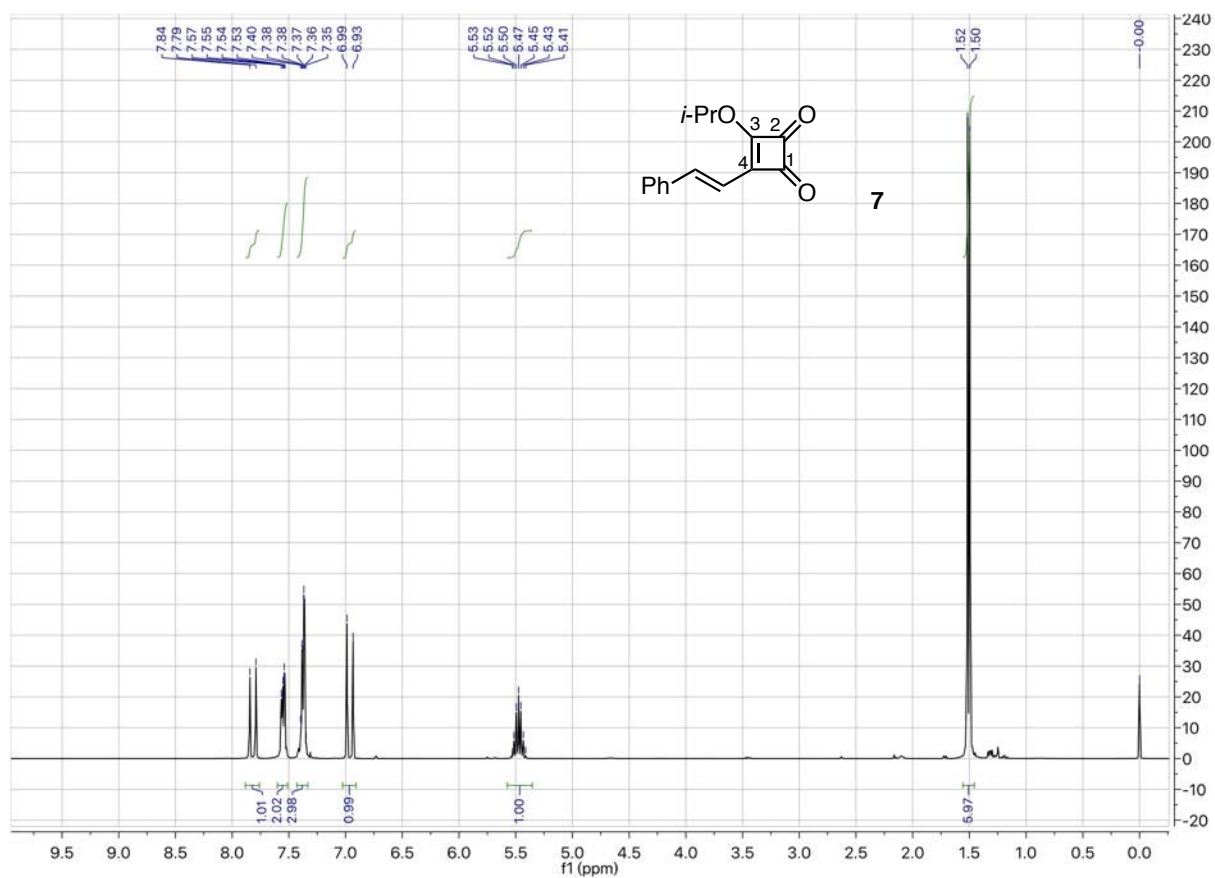


2-Benzylidene-4,5-diisopropoxycyclopent-4-ene-1,3-dione (4j):

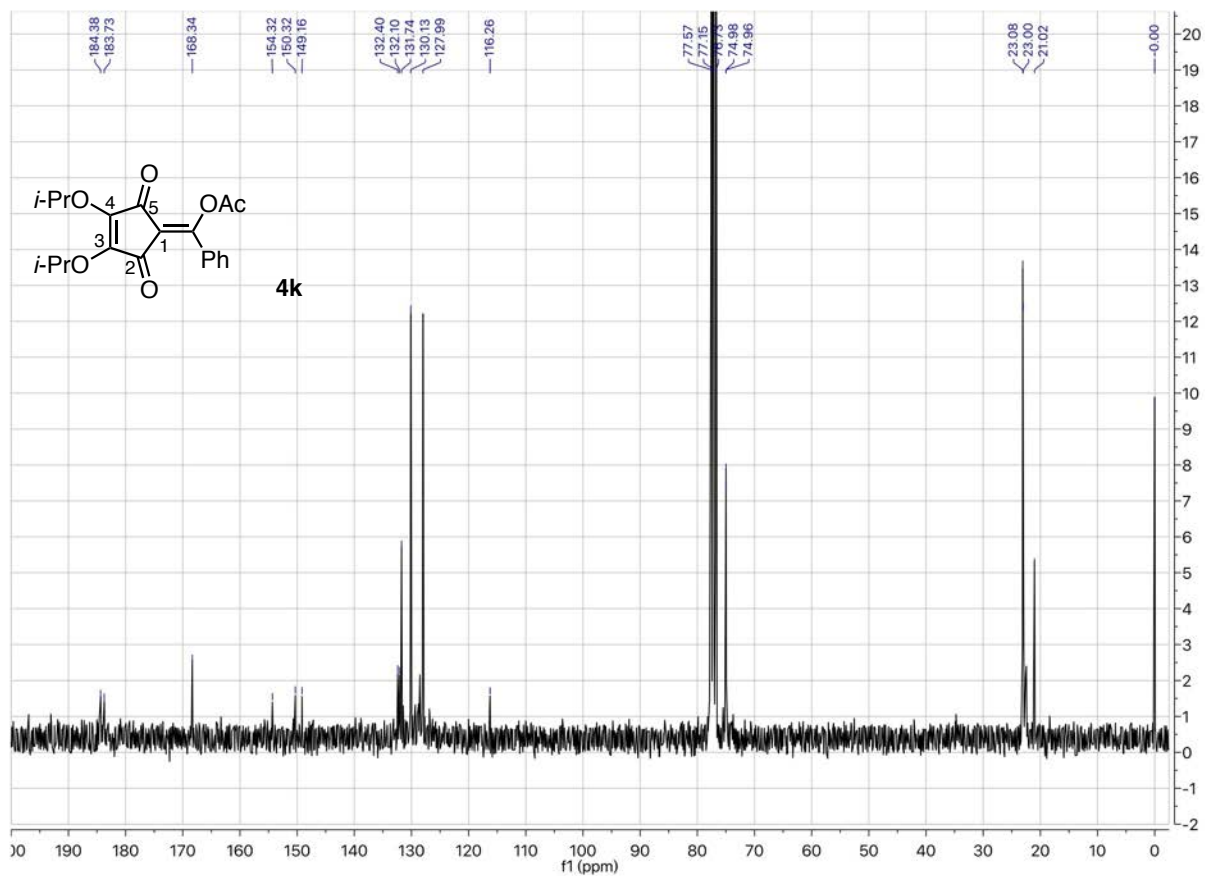
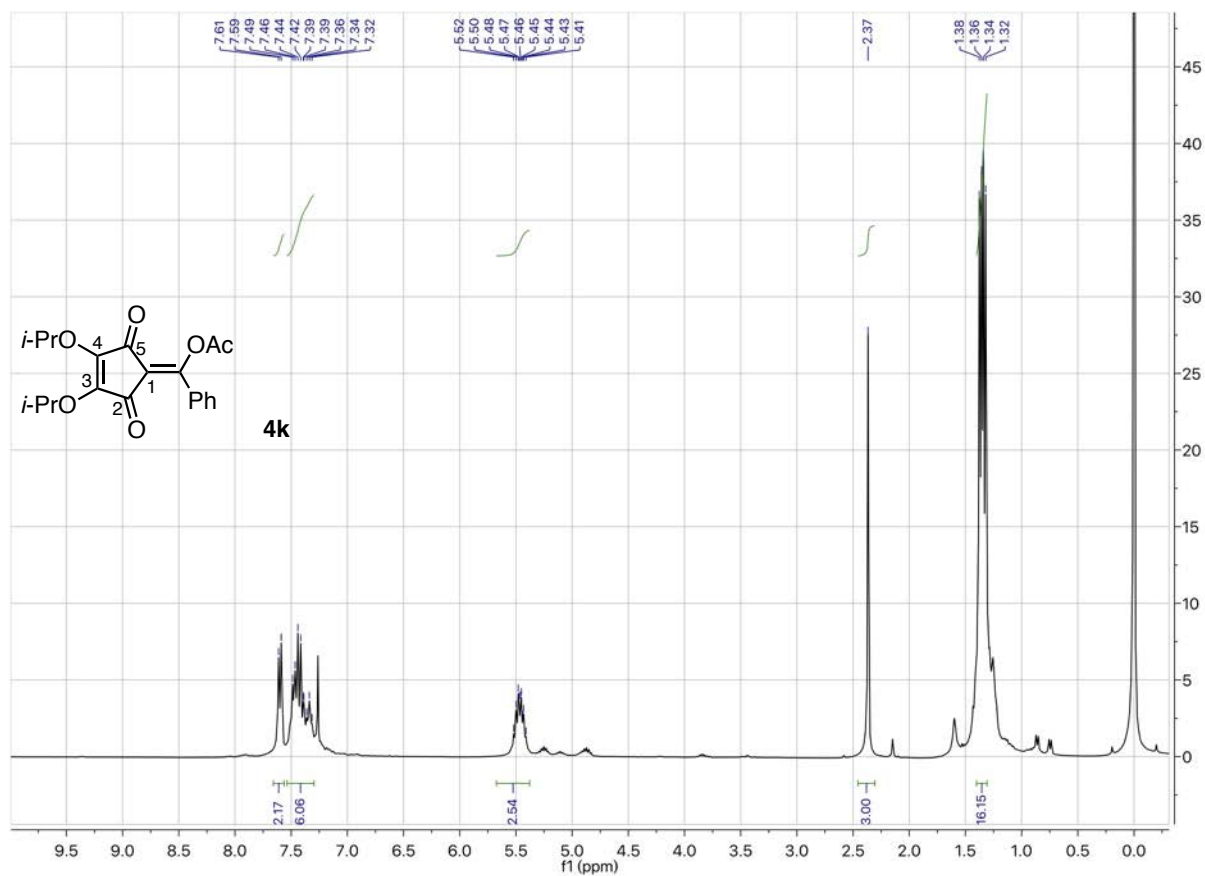




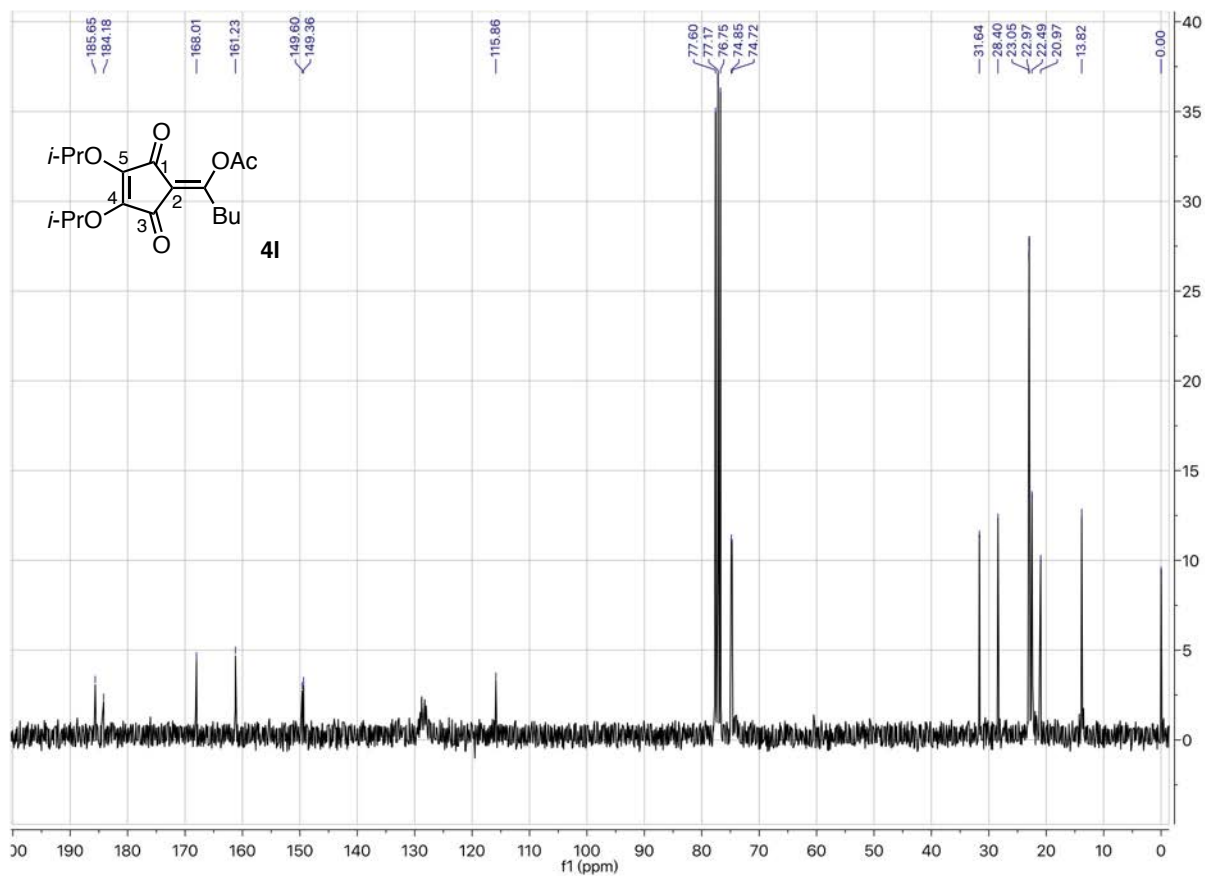
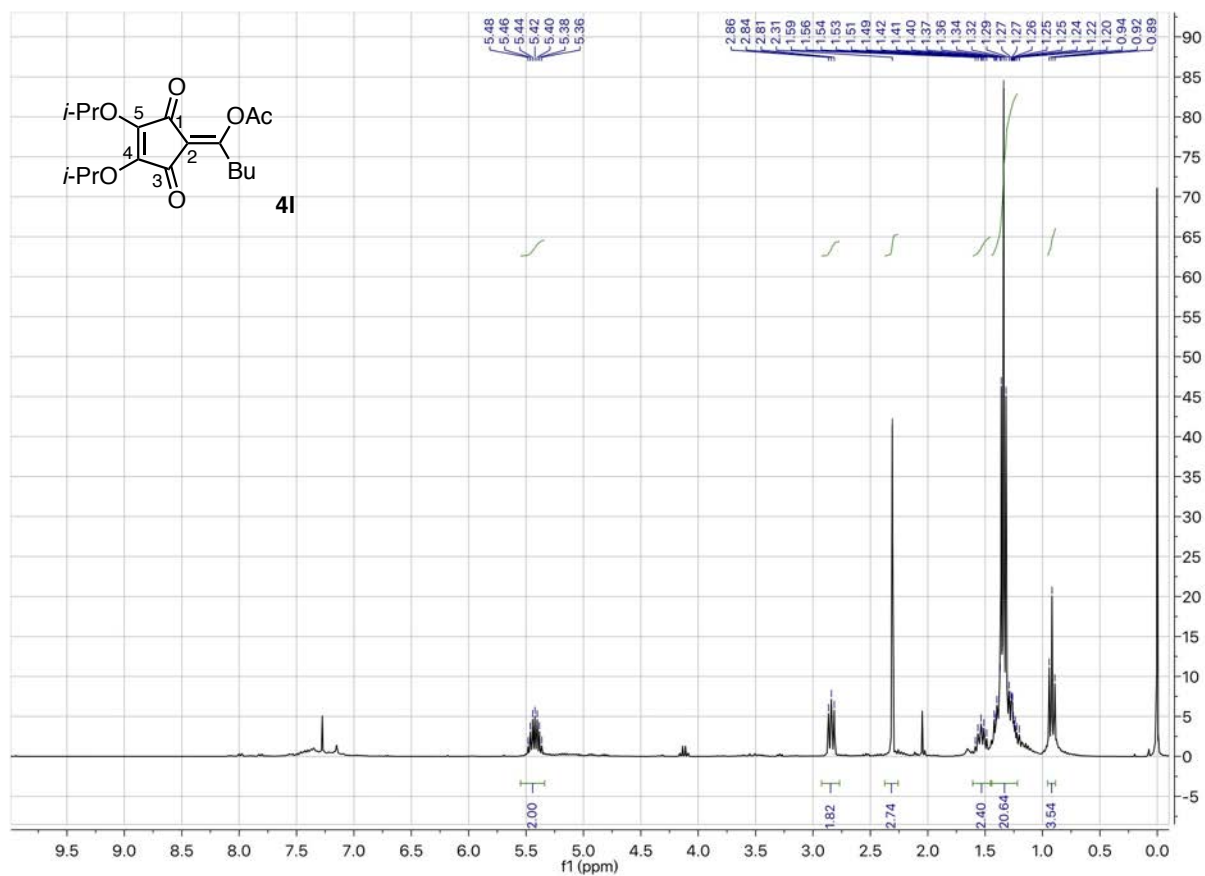
(*E*)-3-Isopropoxy-4-styrylcyclobut-3-ene-1,2-dione (7)³¹:



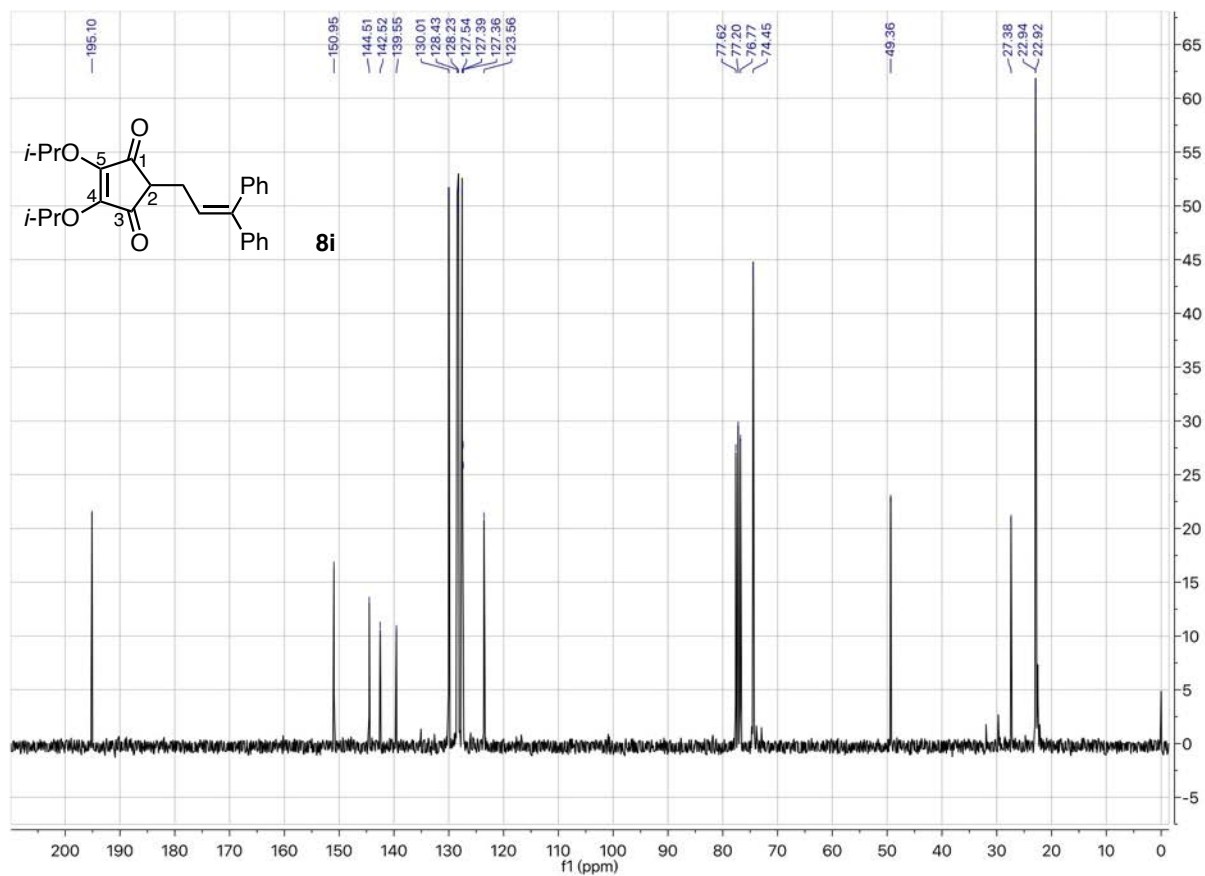
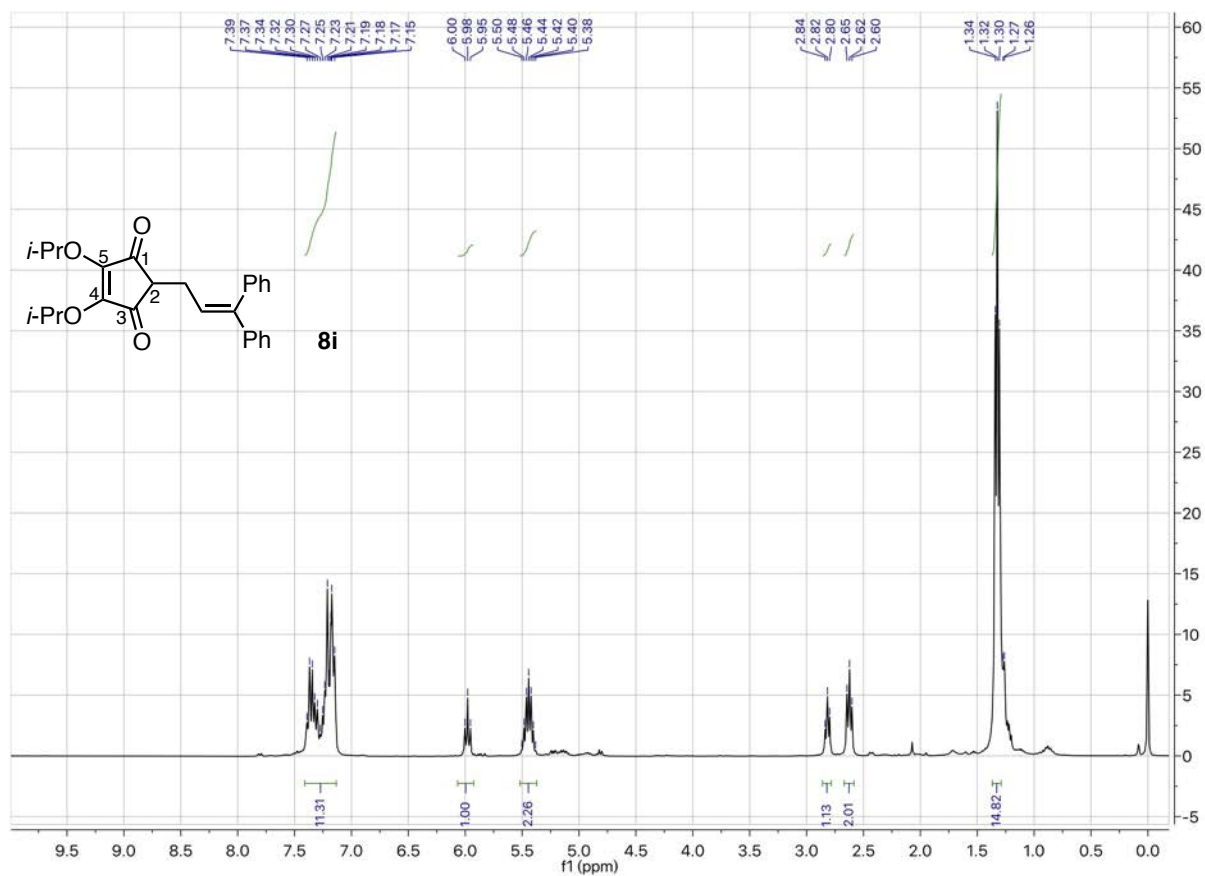
(3,4-Diisopropoxy-2,5-dioxocyclopent-3-en-1-ylidene)(phenyl)methyl acetate (4k):



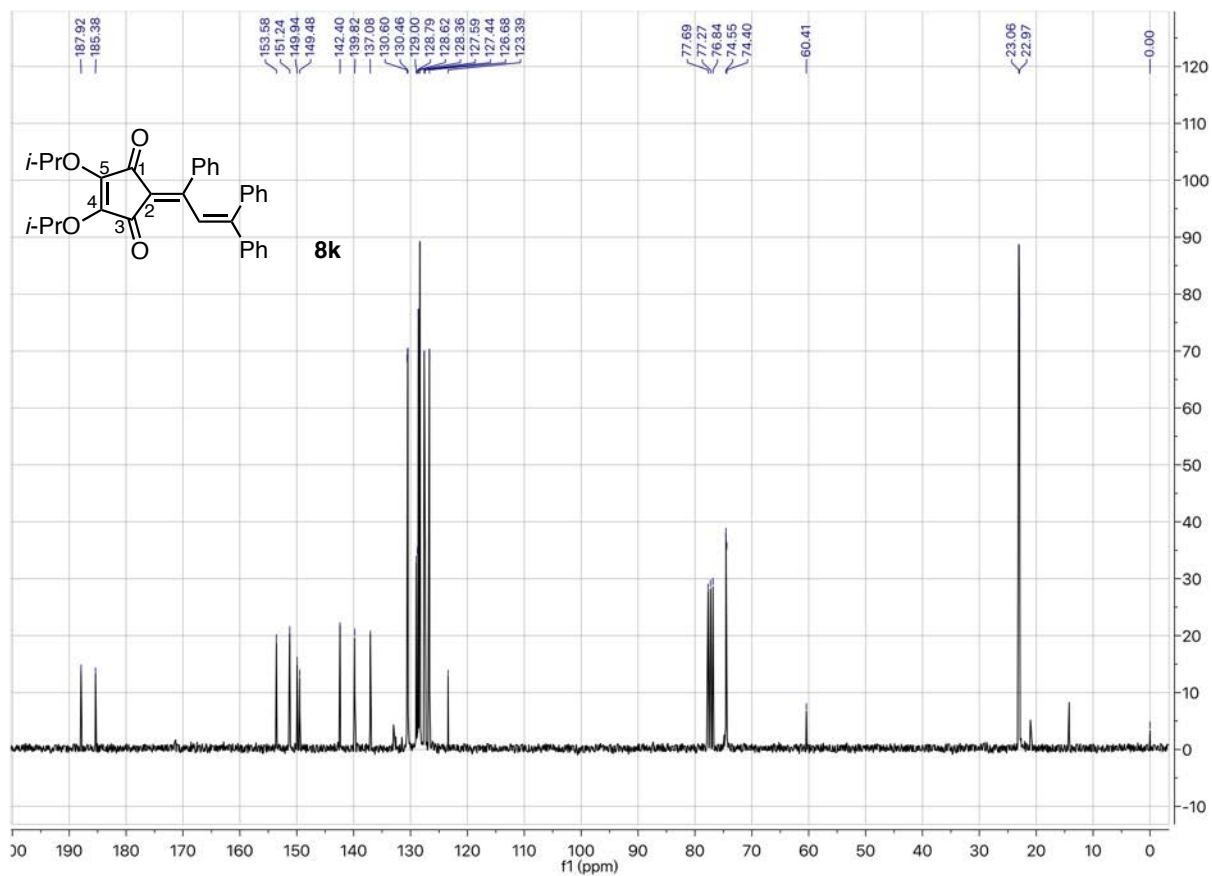
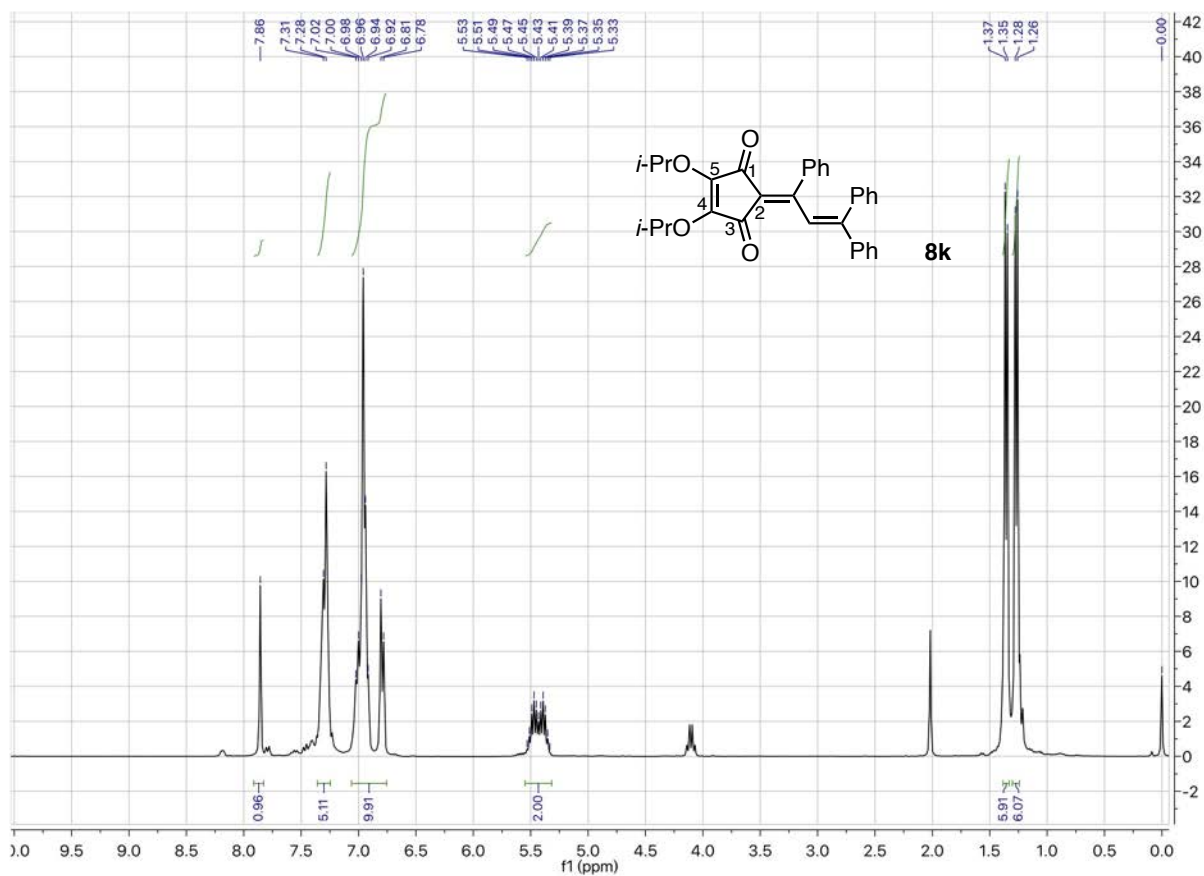
1-(3,4-Diisopropoxy-2,5-dioxocyclopent-3-en-1-ylidene)pentyl acetate (4I):

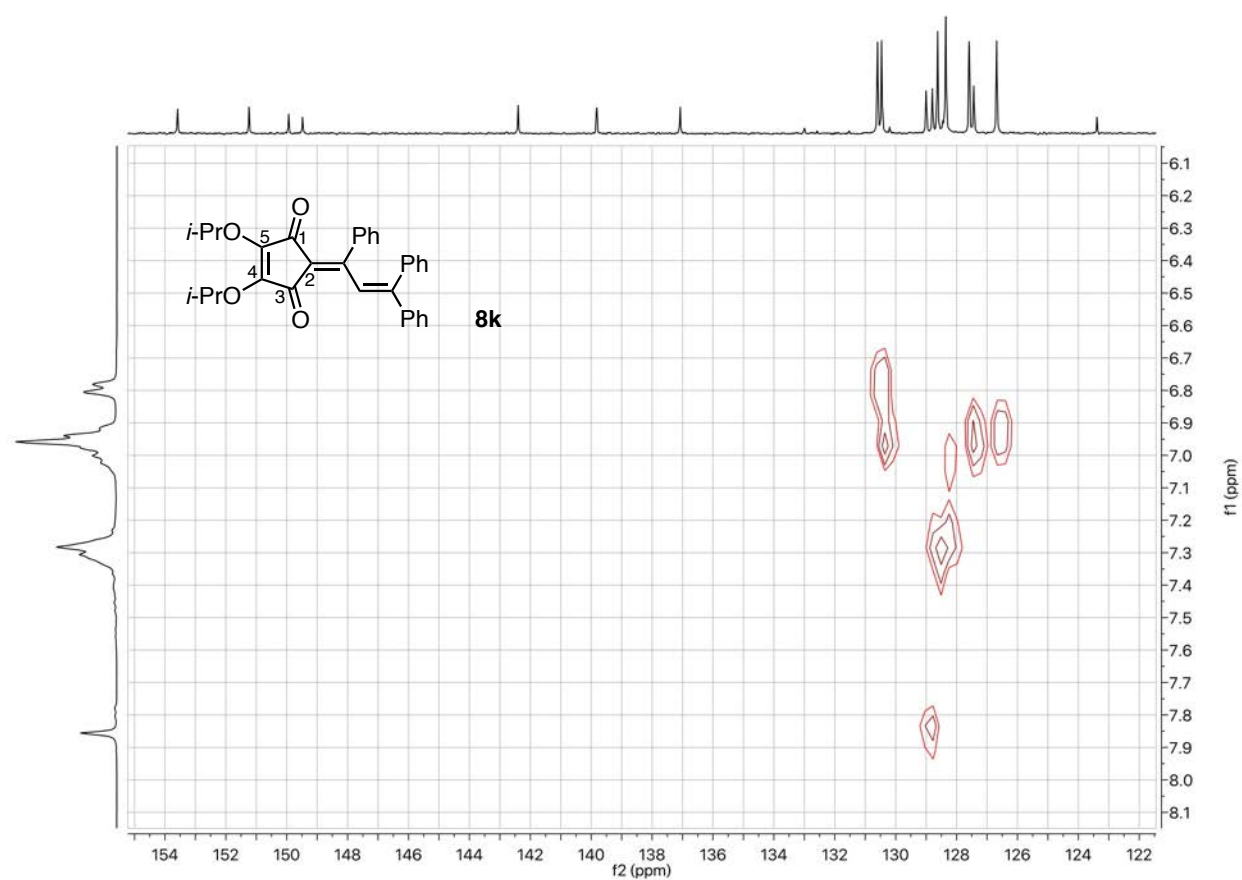
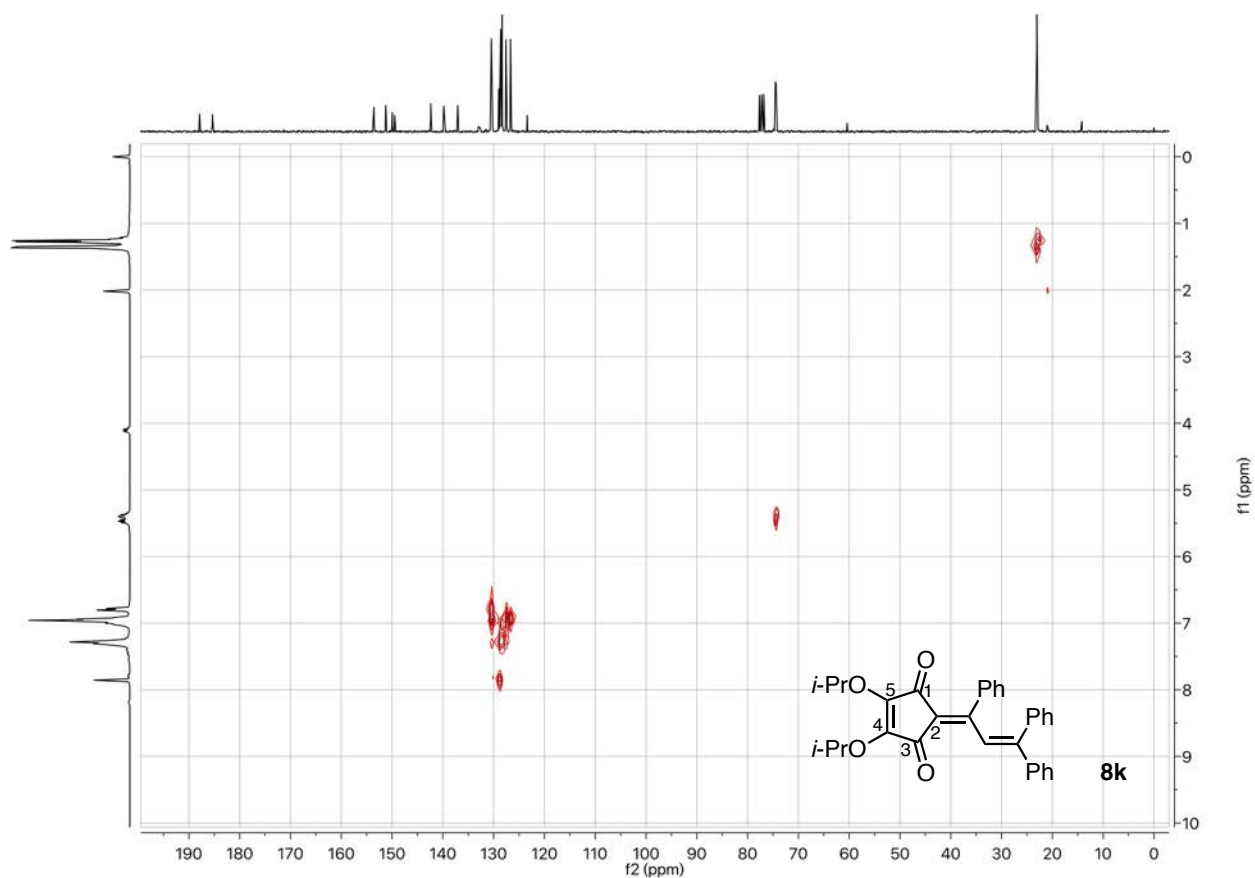


2-(3,3-diphenylallyl)-4,5-diisopropoxycyclopent-4-ene-1,3-dione (8i):

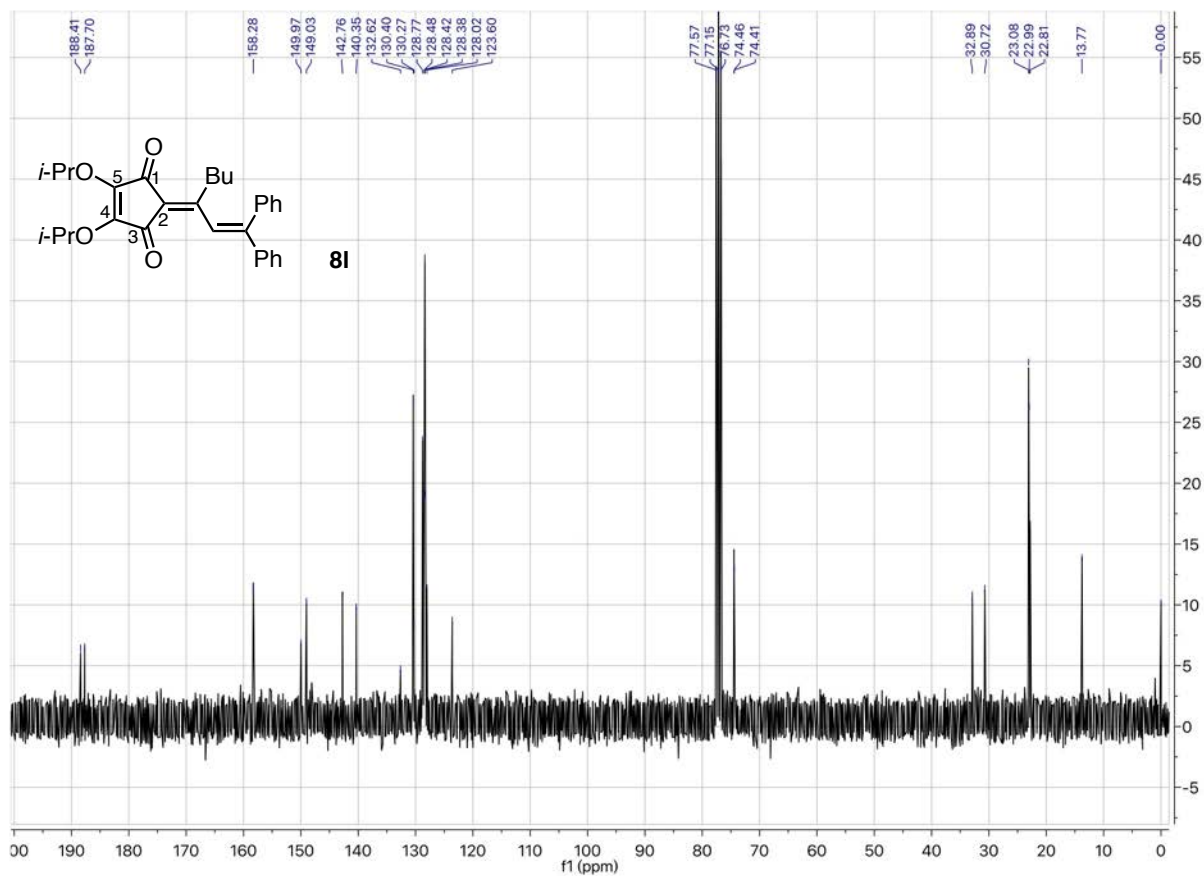
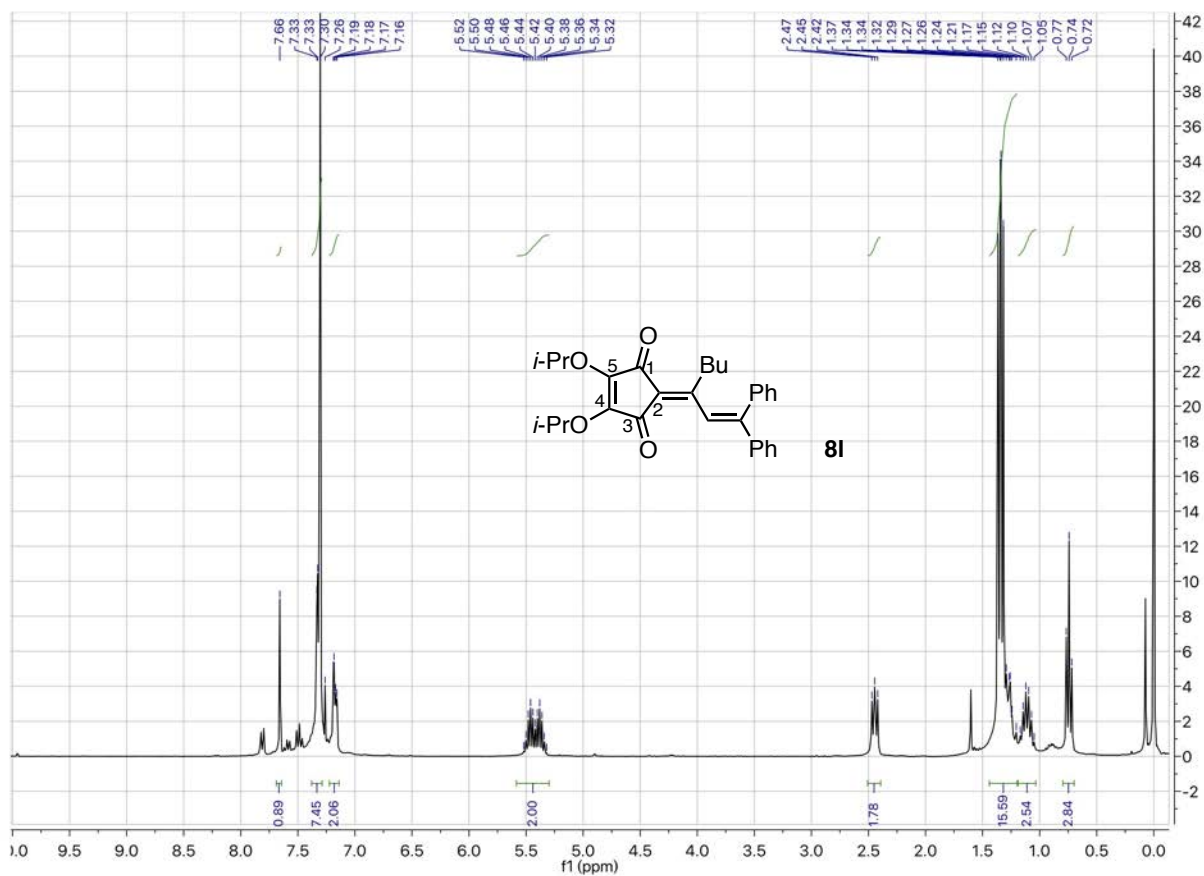


4,5-Diisopropoxy-2-(1,3,3-triphenylallylidene)cyclopent-4-ene-1,3-dione (8k):

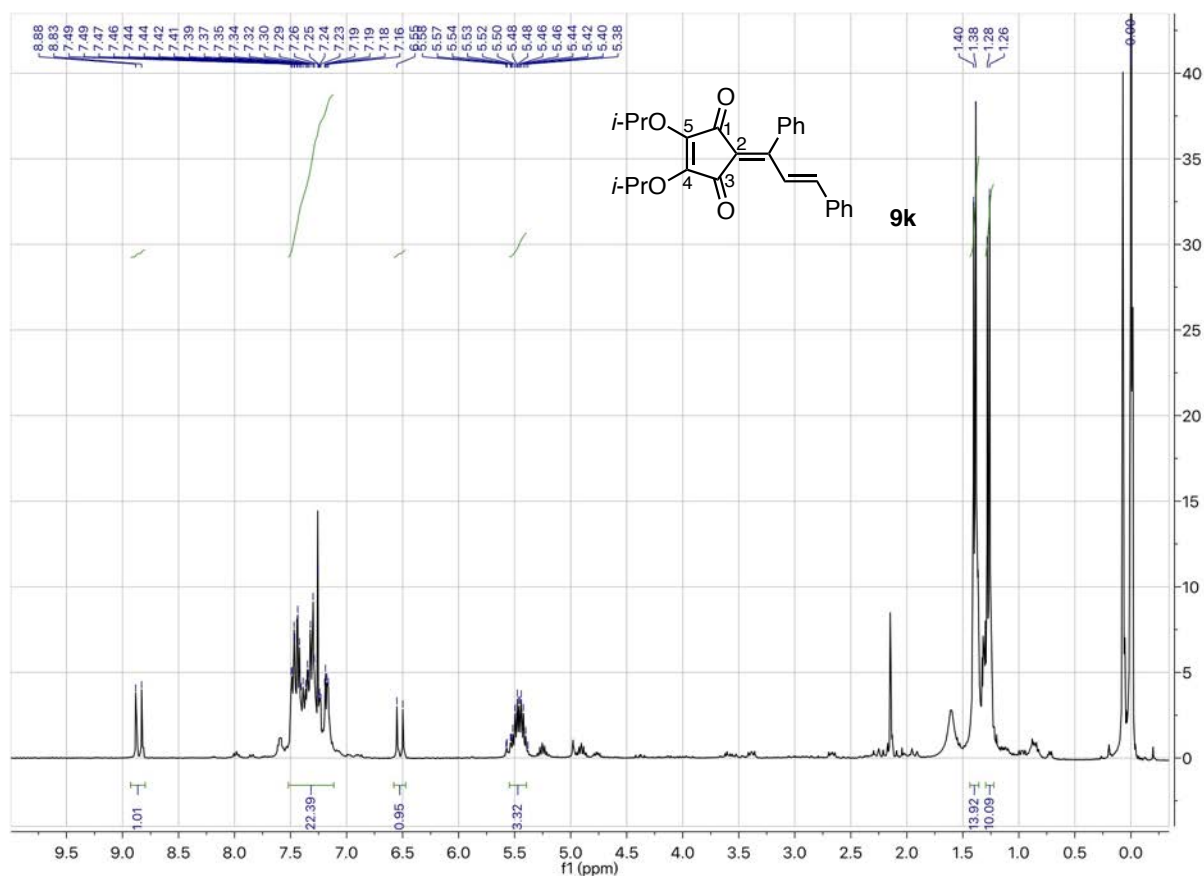




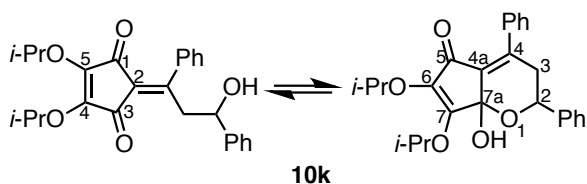
2-(1,1-Diphenylhept-1-en-3-ylidene)-4,5-diisopropoxycyclopent-4-ene-1,3-dione (8I):

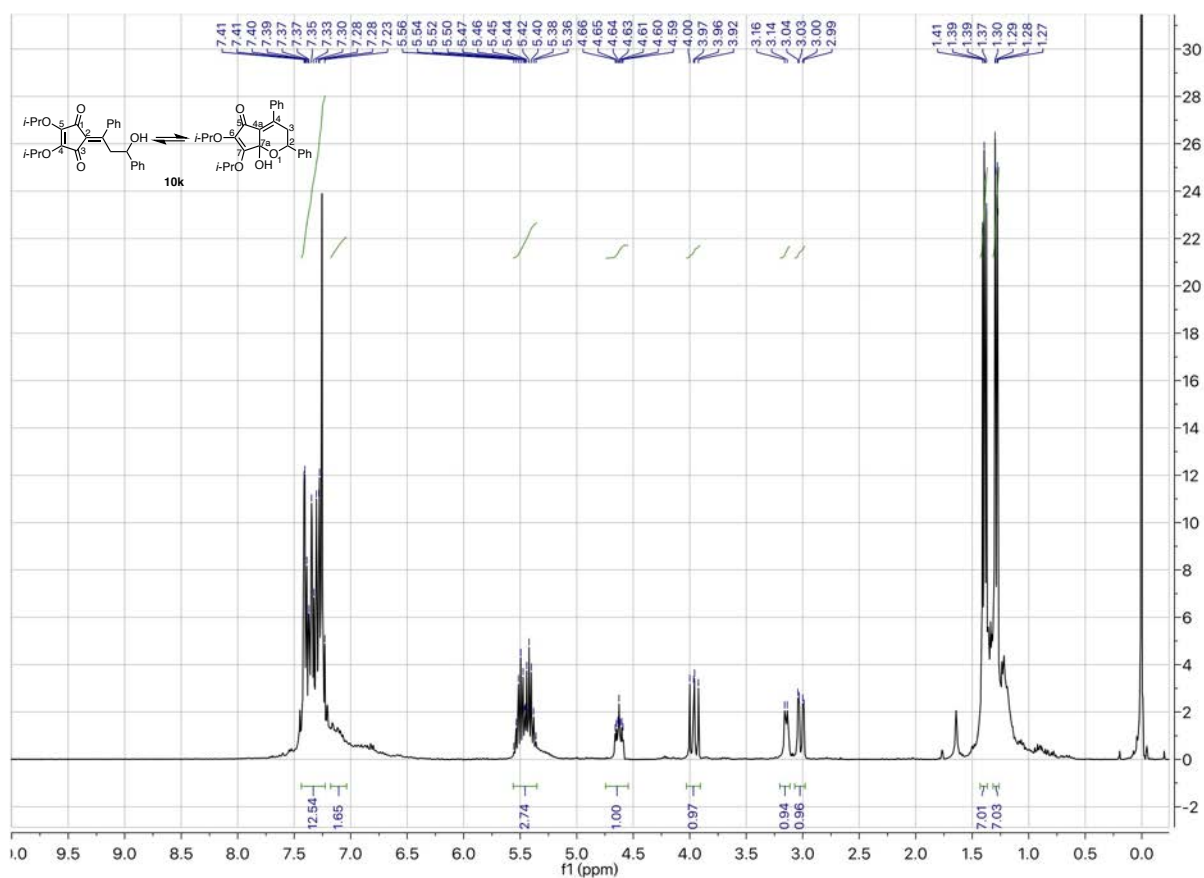


(E)-2-(1,3-Diphenylallylidene)-4,5-diisopropoxycyclopent-4-ene-1,3-dione (9k):

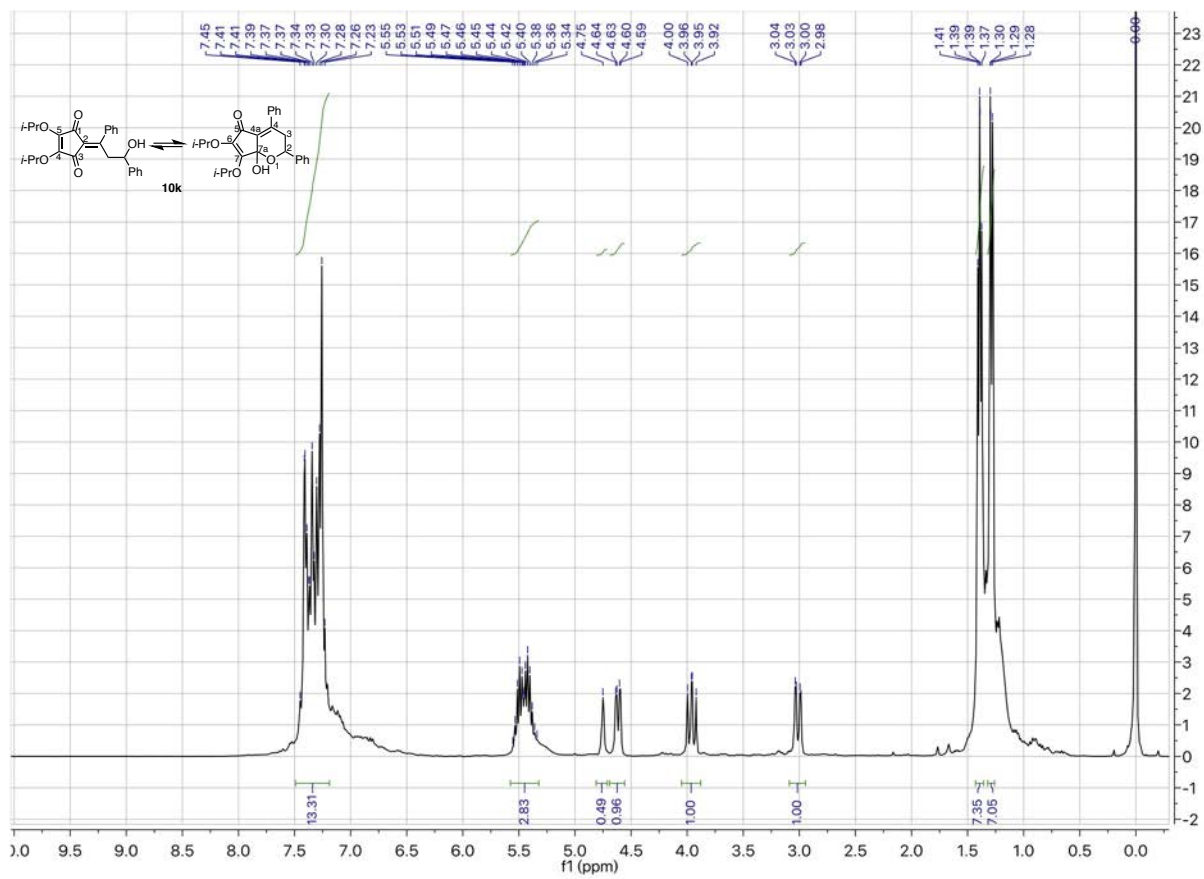


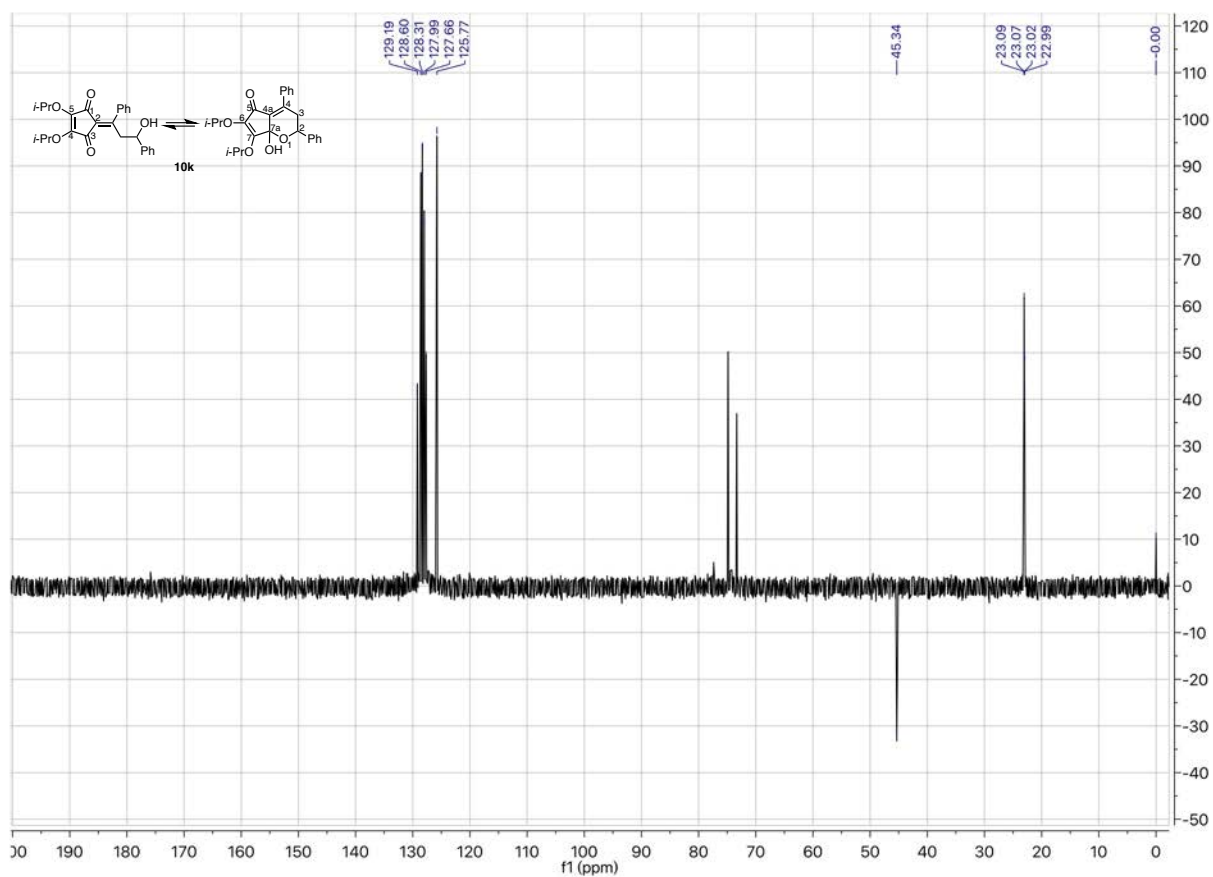
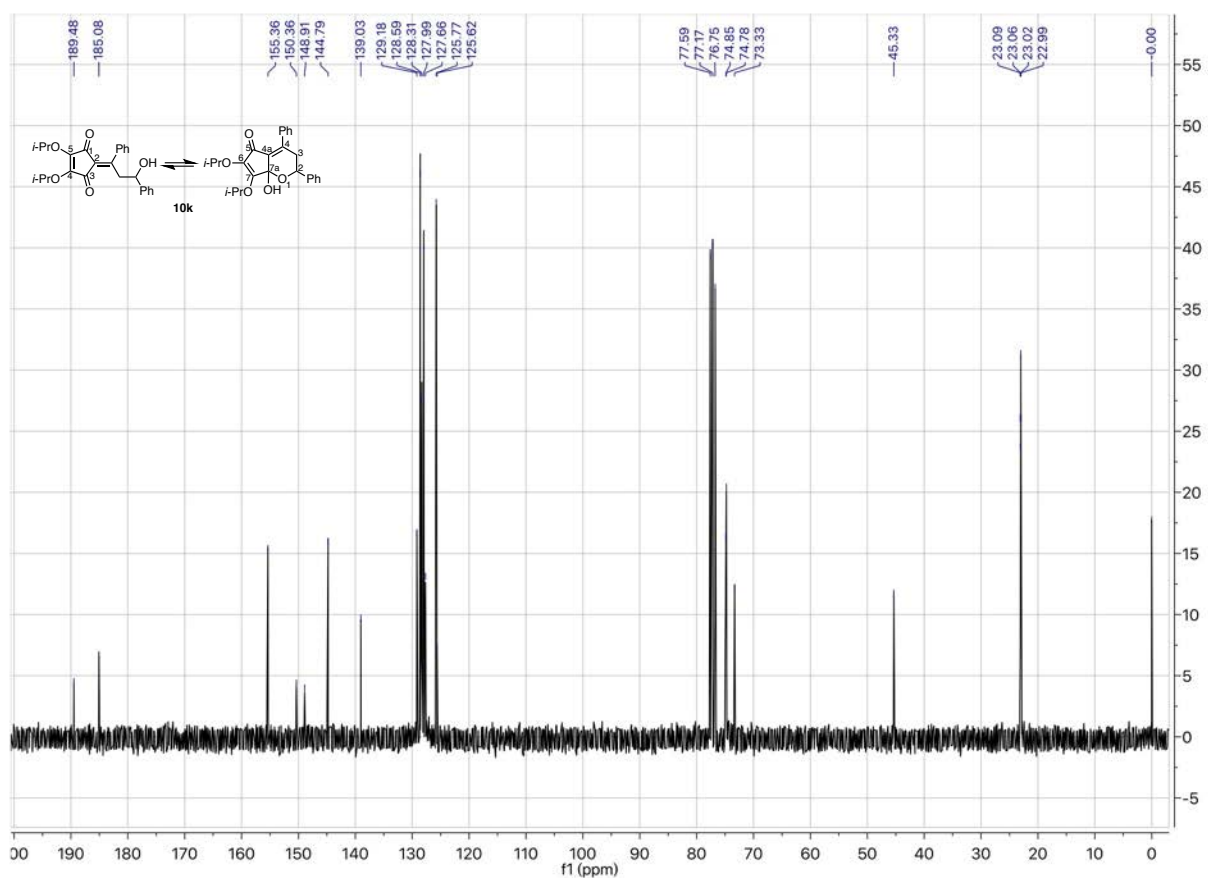
An equilibrium mixture of 2-(3-hydroxy-1,3-diphenylpropylidene)-4,5-diisopropoxycyclopent-4-ene-1,3-dione and 7a-hydroxy-6,7-diisopropoxy-2,4-diphenyl-3,7a-dihydrocyclopenta[b]pyran-5(2H)-one (10k):



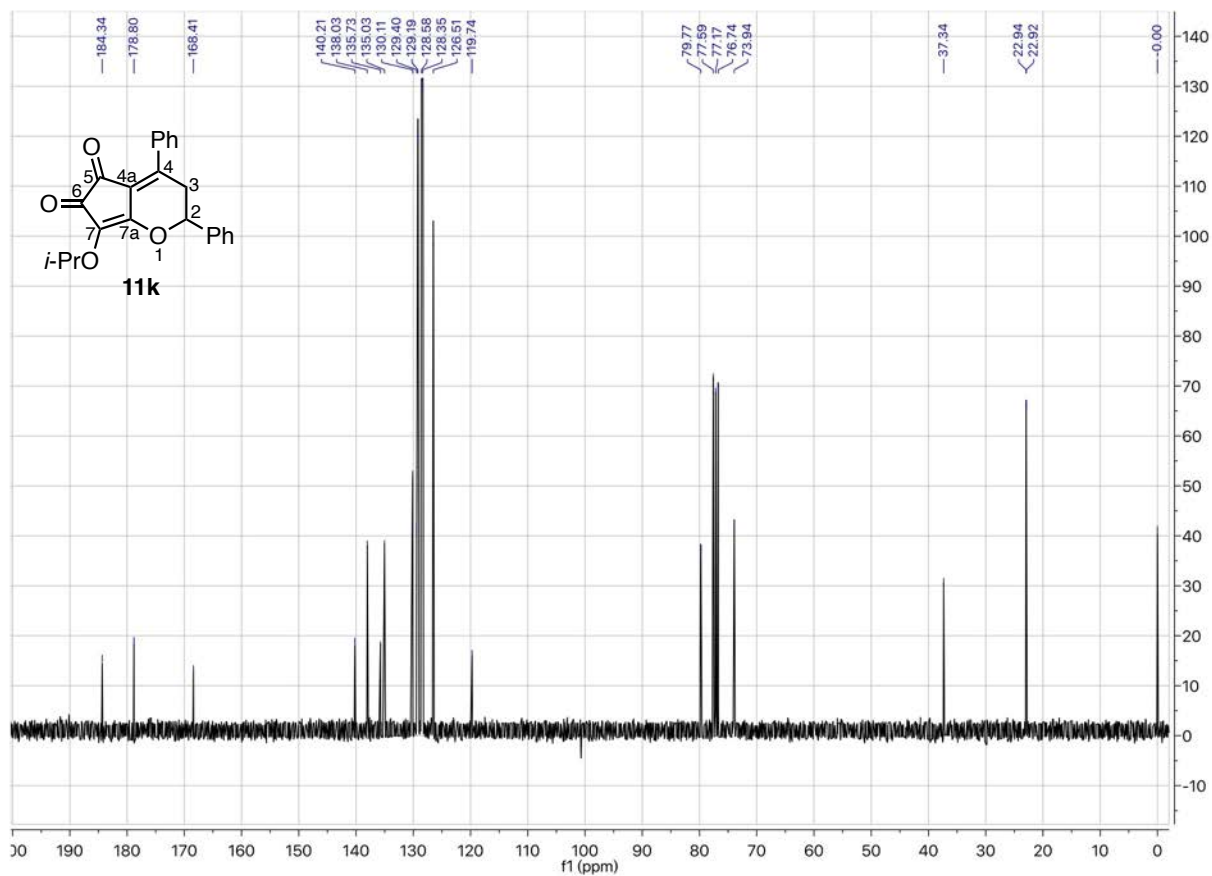
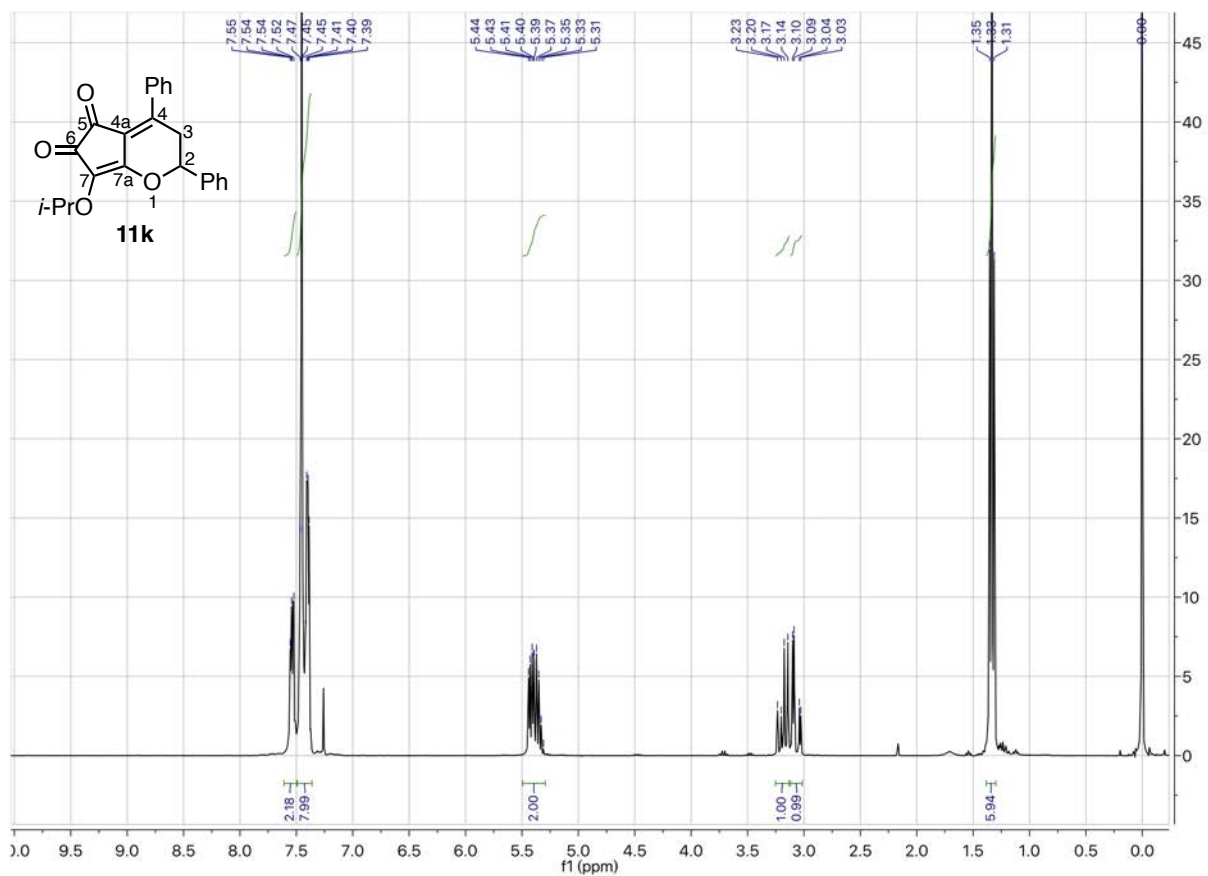


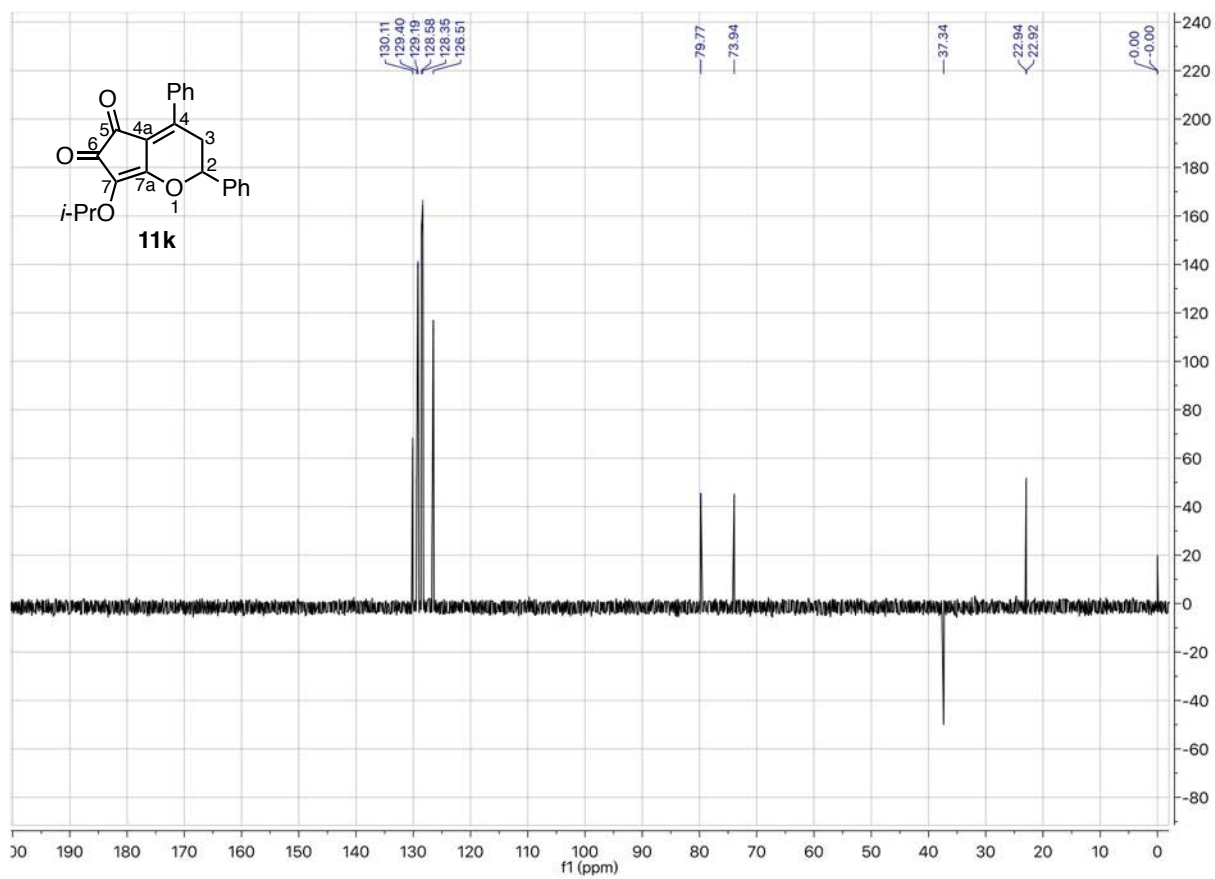
D₂O Exchange Experiment of 10k:



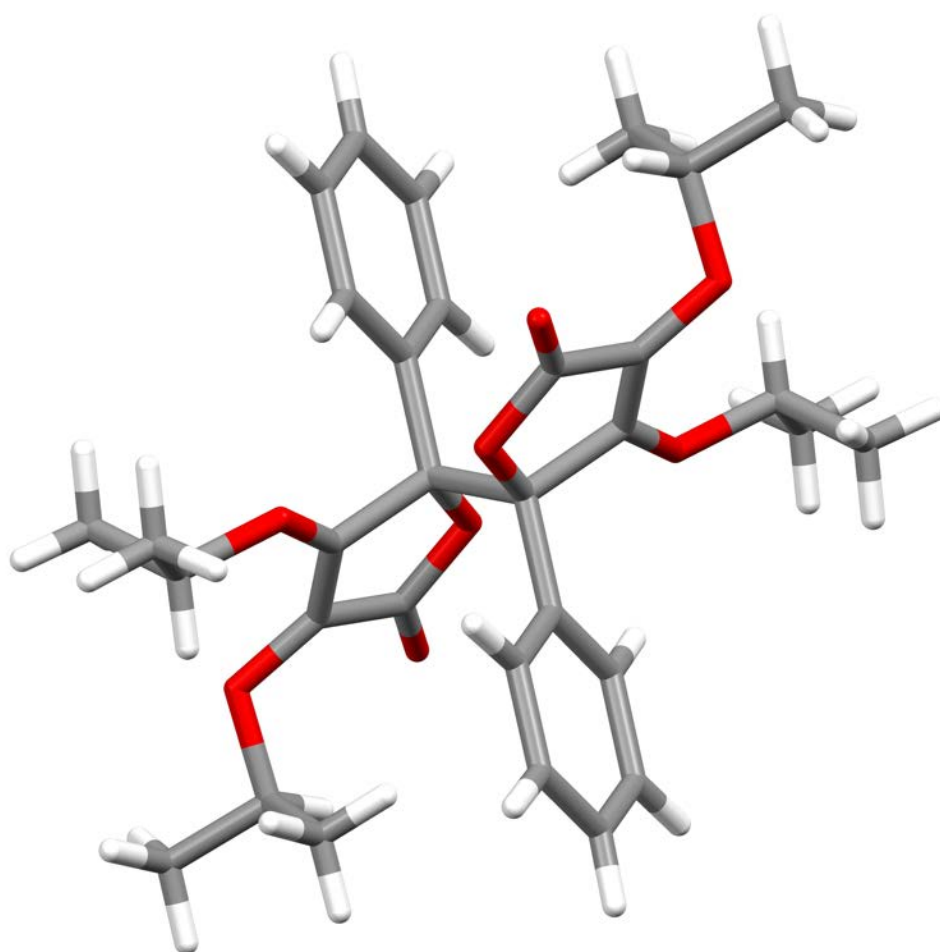
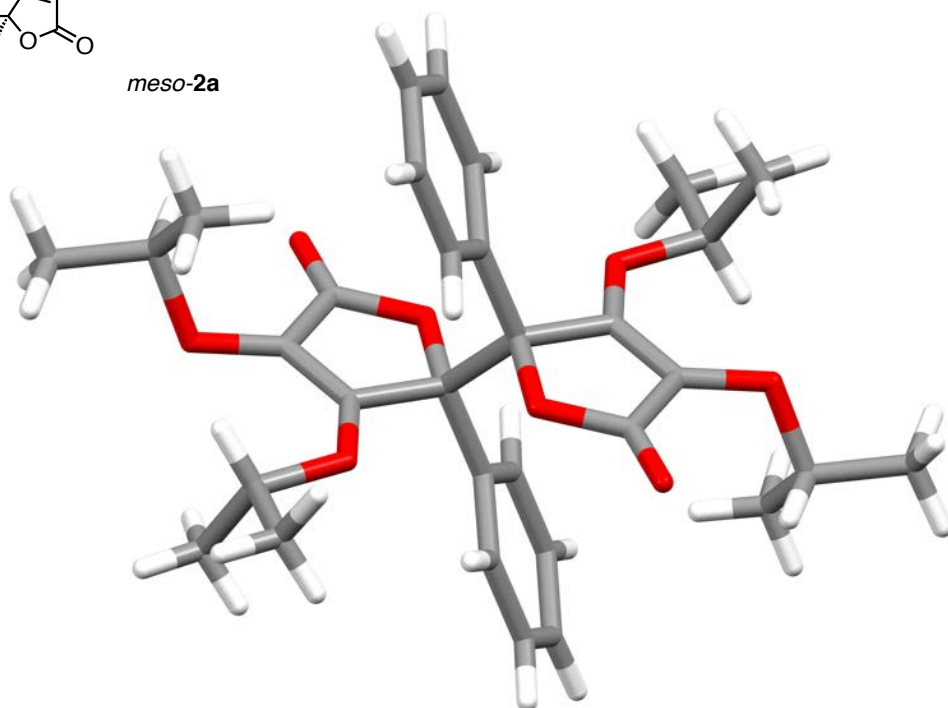
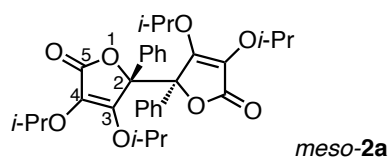


7-Isopropoxy-2,4-diphenyl-2,3-dihydrocyclopenta[*b*]pyran-5,6-dione (11k):

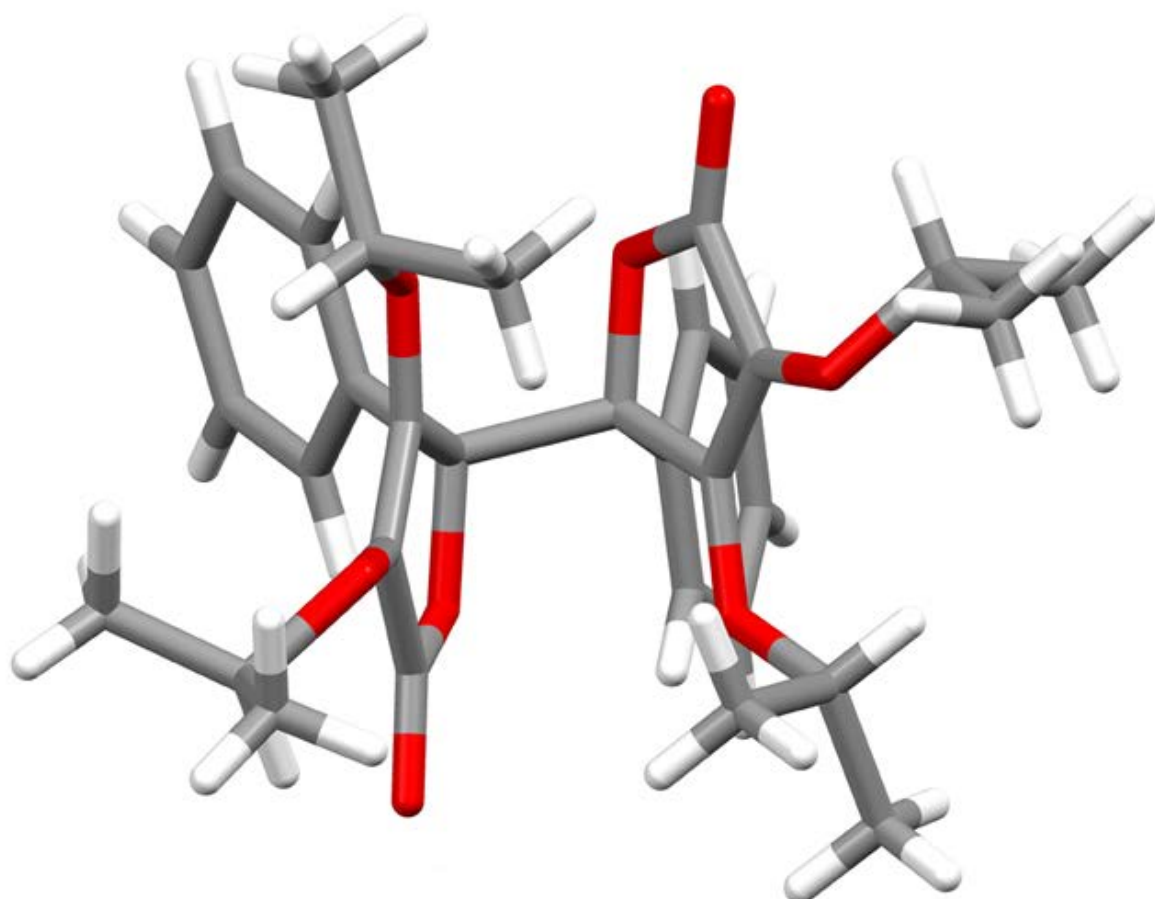
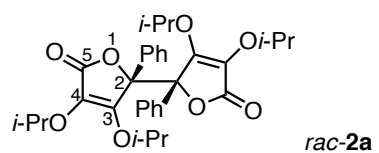


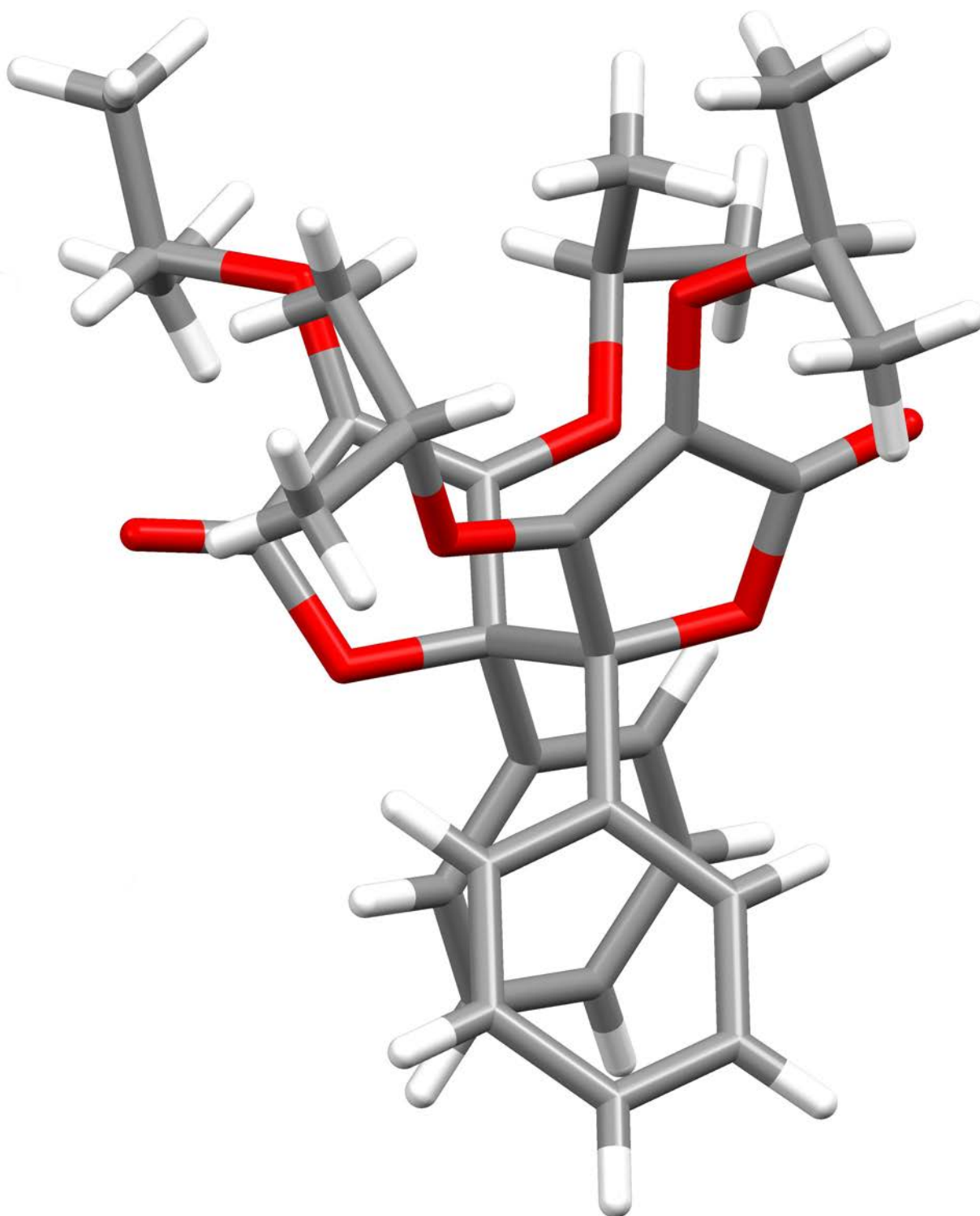
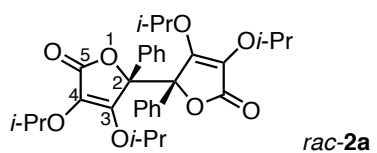


X-ray Crystal Structure of *meso*-2a:

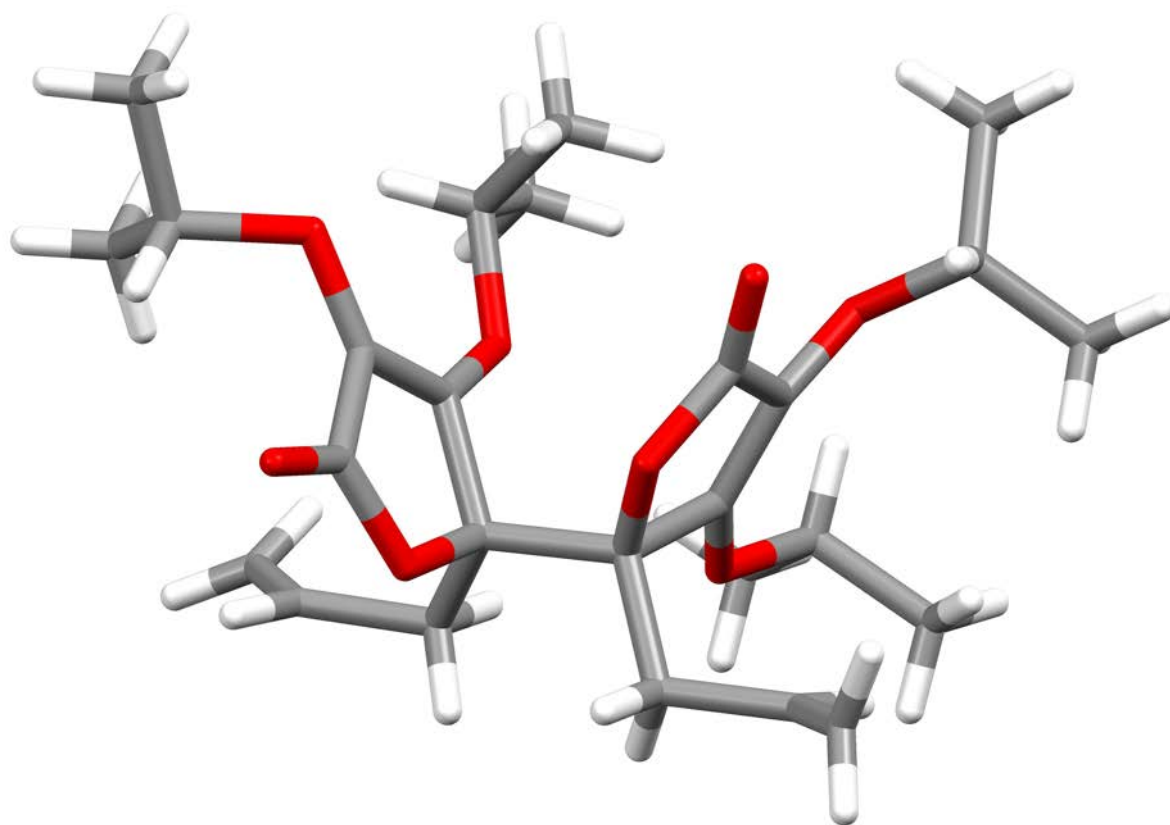
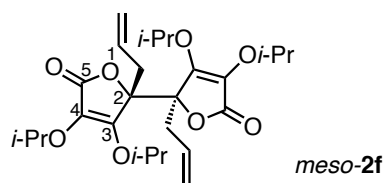


X-ray Crystal Structure of *rac*-2a:

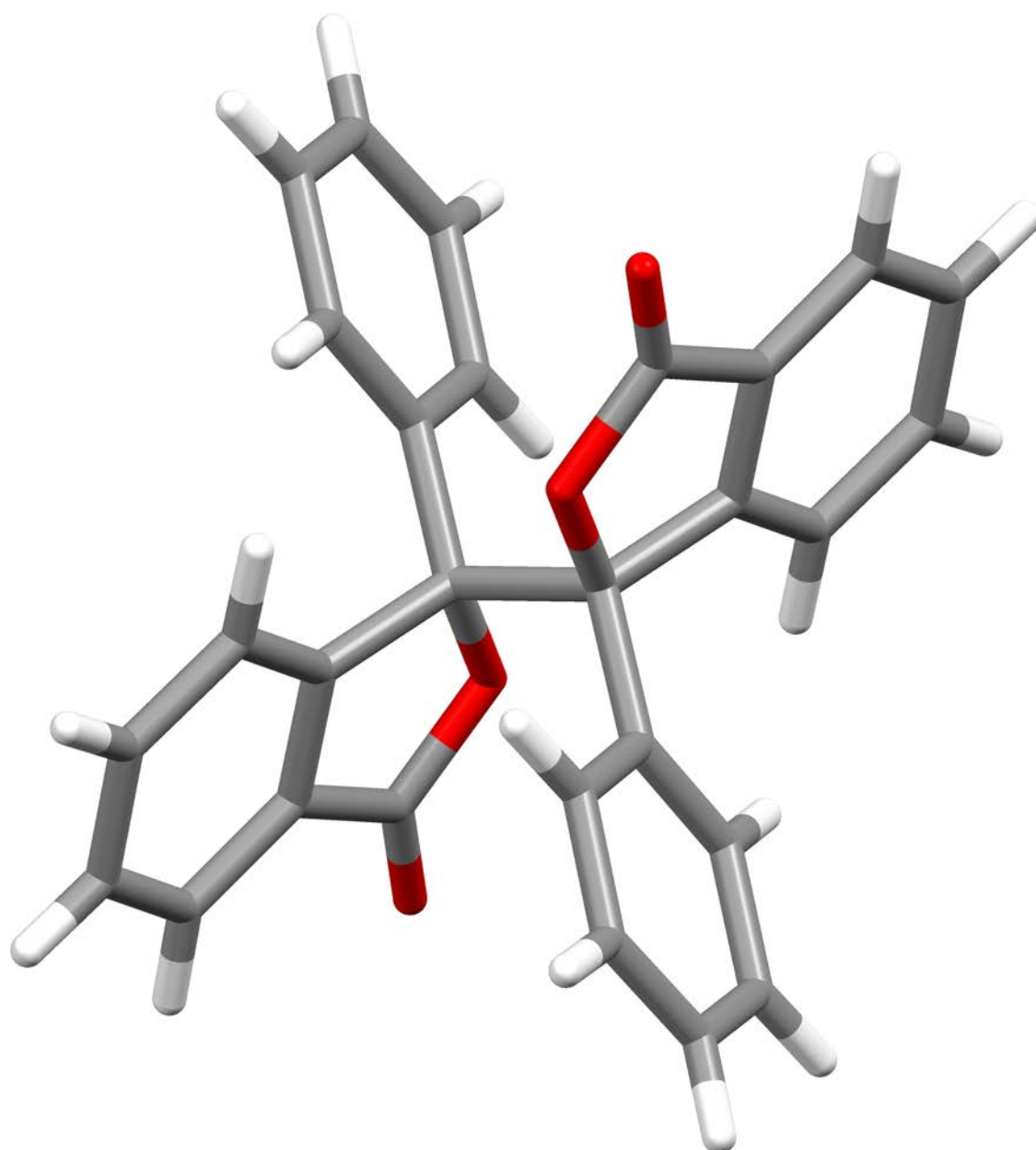
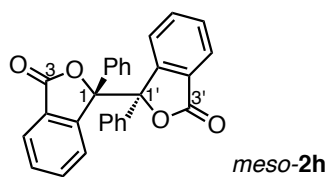




X-ray Crystal Structure of *meso*-2f:



X-ray Crystal Structure of *meso*-2h:



X-ray Crystal Structure of 8i:

