

Supporting Information

Pt-Catalyzed Tandem 1,2-Acyloxy Migration/Intramolecular [3+2] Cycloaddition of Enynyl Esters

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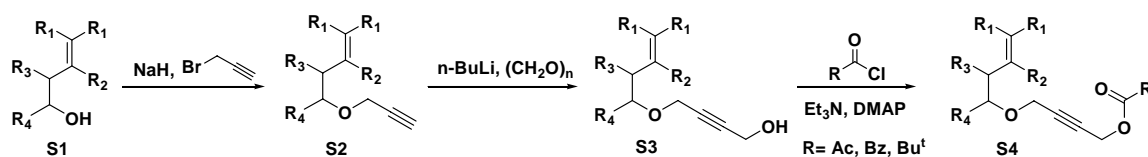
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General Information

All chemicals were used as received. Solvent THF and toluene was refluxed with Na, CH₂Cl₂ was refluxed with CaH₂ and freshly distilled prior to use. All reactions under standard conditions were monitored by thin-layer chromatography (TLC) on gel F254 plates. The silica gel (200-300 meshes) was used for column chromatography, and the distillation range of petroleum was 60-90 °C. ¹H and ¹³C NMR spectra were recorded on Bruker AM-400 MHz instrument, and spectral data were reported in ppm relative to tetramethylsilane (TMS) as internal standard. IR spectra were recorded on a Nicolet FT-170SX spectrometer. HRMS data were determined on a Bruker Daltonics APEXII 47e FT-ICR spectrometer.

General ProcedureA: Synthesis of 1a-m, and 1s.

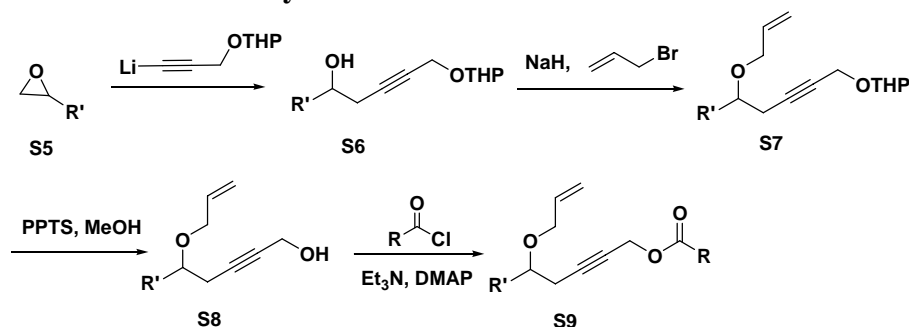


To a suspension 60% NaH (7.5 mmol, freshly pre-washed with dry hexane) in THF (10 mL) was added the alcohol **S1** (5 mmol) under Ar at 0 °C. The white suspension was slowly warmed to room temperature and stirred for 1 hour. The reaction mixture was then recooled to 0°C and 3-bromoprop-1-yne (10 mmol) was added dropwise, followed by tetrabutylammonium iodide (0.5 mmol). After the reaction mixture was stirred at room temperature for 12 hours. The mixture was quenched by addition of saturated aqueous ammonium chloride and extracted with diethyl ether (3 x 30 mL). The combined organic layers were washed with brine, dried over sodium sulfate and concentrated. The residue was purified by silica gel flash chromatography (PE:EtOAc = 50:1) to give propargyl ether **S2**.

To a stirred solution of the propargyl ether **S2** (2 mmol) in THF (40 mL) was added n-BuLi (3 mmol) under Ar at -78 °C. An hour later, paraformaldehyde (10 mmol)¹ was added in one portion and the mixture was slowly warmed to room temperature and stirred overnight. After addition of saturated aqueous ammonium chloride (1 mL), the solvent was removed under reduced pressure and the residue was dissolved in diethyl ether, washed with brine, dried over sodium sulfate and concentrated. The residue was purified by column chromatography (PE:EtOAc = 10:1) to afford the propargylic alcohol **S3**.

To a stirred solution of the propargylic alcohol **S3** (1 mmol) in dichloromethane (10 mL) was added triethylamine (3 mmol), acyl chloride (1.2 equivs.), and DMAP (0.1 mmol) at 0°C. The resultant mixture was stirred for 1 h at RT, then quenched by addition of water, washed with brine, dried over sodium sulfate. The solvent was removed under reduced pressure, and the residue was purified by column chromatography (PE:EtOAc = 20:1) to afford the corresponding product **S4**.

General Procedure B: the Synthesis of 1n-r.



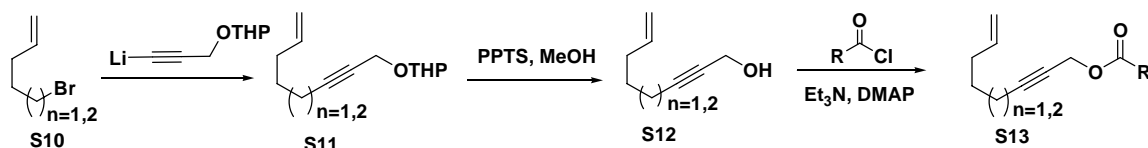
To a stirred solution of the tetrahydro-2-(prop-2-ynyloxy)-2H-pyran (8 mmol) in THF (20 ml) was added n-BuLi (7.5 mmol) under Ar at -78°C . 30 min later, the mixture was added the epoxide **S5** (5 mmol) in THF (5 ml) slowly, followed by $\text{BF}_3\cdot\text{Et}_2\text{O}$ (7.5 mmol). The mixture was slowly warmed to room temperature and then quenched by addition of saturated aqueous ammonium chloride (10 ml), extracted with diethyl ether, washed with brine, dried over sodium sulfate and concentrated. The residue was purified by column chromatography (PE:EtOAc = 10:1) to afford the alcohol **S6**.

To a suspension 60% NaH (4.5 mmol, freshly pre-washed with dry hexane) in THF (10 mL) was added the alcohol **S6** (3 mmol) under Ar at 0°C . The white suspension was slowly warmed to room temperature and stirred for 1 hour. The reaction mixture was then recooled to 0°C and allyl bromide (6 mmol) was added dropwise, followed by tetrabutylammonium iodide (0.3 mmol). After the reaction mixture was stirred at room temperature for 6 hours. The mixture was quenched by addition of saturated aqueous ammonium chloride and extracted with diethyl ether (3 x 30 mL). The combined organic layers were washed with brine, dried over sodium sulfate and concentrated. The residue was purified by silica gel flash chromatography (PE:EtOAc = 50:1) to give allyl ether **S7**.

To a stirred solution of the allyl ether **S7** (2 mmol) in MeOH (10 ml) was added PPTS (0.4 mmol) at RT. 3 hours later, the mixture was quenched by addition of saturated aqueous sodium bicarbonate, the solvent was removed under reduced pressure and the residue was dissolved in diethyl ether, washed with brine, dried over sodium sulfate and concentrated. The residue was purified by flash column chromatography (PE:EtOAc = 10:1) to afford the propargyl alcohol **S8**.

To a stirred solution of the propargylic alcohol **S8** (1 mmol) in dichloromethane (10 ml) was added triethylamine (3 mmol), acyl chloride (1.2 equivs.), and DMAP (0.1 mmol) at 0°C . The resultant mixture was stirred for 1 h at RT, then quenched by addition of water, washed with brine, dried over sodium sulfate. The solvent was removed under reduced pressure, and the residue was purified by column chromatography (PE:EtOAc = 20:1) to afford the corresponding product **S9**.

General Procedure C: the Synthesis of 1t, and 1u.

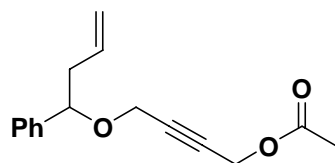


To a stirred solution of the tetrahydro-2-(prop-2-ynyloxy)-2H-pyran (5 mmol) in THF (2.5 ml) was added *n*-BuLi (5 mmol) under Ar at $-50\text{ }^{\circ}\text{C}$. An hour later, the mixture was added the bromide **S10** (6 mmol) in HMPA (2.5 ml). The mixture was slowly warmed to room temperature and stirred overnight. Then the reaction was quenched by addition of saturated aqueous ammonium chloride (10 ml), extracted with diethyl ether, washed with brine, dried over sodium sulfate and concentrated. The residue was purified by column chromatography (PE:EtOAc = 20:1) to afford the THP ether **S11**.

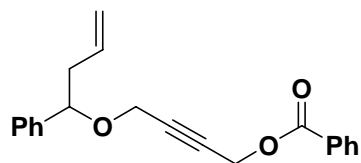
To a stirred solution of the THP ether **S11** (2 mmol) in MeOH (10 ml) was added PPTS (0.4 mmol) at RT. 3 hours later, the mixture was quenched by addition of saturated aqueous sodium bicarbonate, the solvent was removed under reduced pressure and the residue was dissolved in diethyl ether, washed with brine, dried over sodium sulfate and concentrated. The residue was purified by flash column chromatography (PE:EtOAc = 10:1) to afford the propargyl alcohol **S12**.

To a stirred solution of the propargylic alcohol **S12** (1 mmol) in dichloromethane (10 ml) was added triethylamine (3 mmol), acyl chloride (1.2 mmol), and DMAP (0.1 mmol) at 0°C . The resultant mixture was stirred for 1 h at RT, then quenched by addition of water, washed with brine, dried over sodium sulfate. The solvent was removed under reduced pressure, and the residue was purified by column chromatography (PE:EtOAc = 20:1) to afford the corresponding product **S13**.

^1H NMR and ^{13}C NMR spectra data of compounds 1a-u.

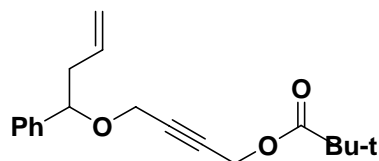


4-(1-phenylbut-3-enyloxy)but-2-ynyl acetate (1a): ^1H NMR (400 MHz, CDCl_3) δ ppm 7.35-7.28 (m, 5H), 5.82-5.72 (m, 1H), 5.67 (d, $J=17.6$ Hz, 1H), 5.32 (d, $J=10.8$ Hz, 1H), 4.71 (s, 2H), 4.50 (t, $J=6.8$ Hz, 1H), 4.15 (d, $J=16$ Hz, 1H), 3.92 (d, $J=16$ Hz, 1H), 2.66-2.59 (m, 1H), 2.48-2.42 (m, 1H), 2.10 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 170.1, 140.6, 134.4, 128.4, 127.9, 127.0, 117.0, 82.9, 80.7, 80.0, 55.8, 52.3, 42.1, 20.7.

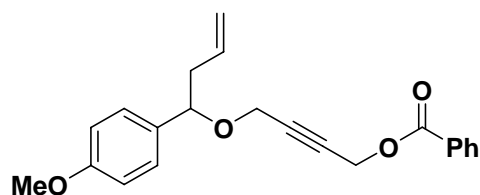


4-(1-phenylbut-3-enyloxy)but-2-ynyl benzoate (1b): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.06 (d, $J=7.8$ Hz, 2H), 7.55 (t, $J=7.8$ Hz, 1H), 7.43 (t, $J=7.8$ Hz, 2H), 7.34-7.24 (m, 5H), 5.79-5.73 (m, 1H), 5.07-4.99 (m, 2H), 4.95 (s, 2H), 5.20 (t, $J=6.8$ Hz, 1H), 4.16 (d, $J=16$ Hz, 1H), 3.93 (d,

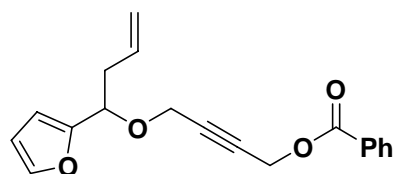
$J = 16$ Hz, 1H), 2.66-2.59 (m, 1H), 2.47-2.42 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 165.7, 140.5, 134.3, 133.1, 129.7, 129.4, 128.3, 128.3, 127.8, 126.9, 117.0, 83.0, 80.5, 80.1, 55.8, 52.7, 42.0.



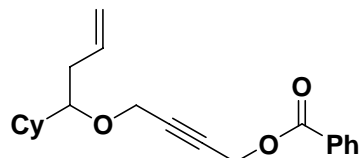
4-(1-phenylbut-3-enyloxy)but-2-ynyl pivalate (1c): ^1H NMR (400 MHz, CDCl_3) δ ppm 7.37-7.26 (m, 5H), 5.81-5.71 (m, 1H), 5.06 (d, $J = 18$ Hz, 1H), 5.02 (d, $J = 11.2$ Hz, 1H), 4.69 (s, 2H), 4.51 (t, $J = 6.8$ Hz, 1H), 4.14 (d, $J = 16$ Hz, 1H), 3.90 (d, $J = 16$ Hz, 1H), 2.66-2.58 (m, 1H), 2.48-2.41 (m, 1H), 1.23 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 177.7, 140.6, 134.4, 128.4, 127.9, 127.0, 117.0, 82.5, 80.5, 55.8, 52.3, 42.1, 38.7, 27.1.



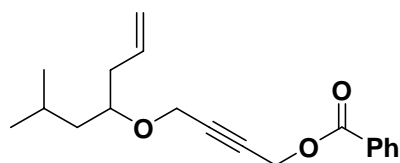
4-(1-(4-methoxyphenyl)but-3-enyloxy)but-2-ynyl benzoate (1d): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.08 (d, $J = 7.6$ Hz, 2H), 7.59 (t, $J = 7.6$ Hz, 1H), 7.43 (t, $J = 7.6$ Hz, 2H), 7.24 (d, $J = 8.4$ Hz, 2H), 6.88 (d, $J = 8.4$ Hz, 2H), 5.81-5.71 (m, 1H), 5.09-5.00 (m, 2H), 4.98 (s, 2H), 4.49 (t, $J = 6.8$ Hz, 1H), 4.15 (d, $J = 16$ Hz, 1H), 3.92 (d, $J = 16$ Hz, 1H), 3.80 (s, 3H), 2.68-2.60 (m, 1H), 2.48-2.41 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 165.7, 159.3, 134.5, 133.2, 132.4, 129.7, 129.5, 128.3, 128.2, 116.9, 113.8, 83.2, 80.1, 80.0, 55.5, 55.1, 52.7, 42.0.



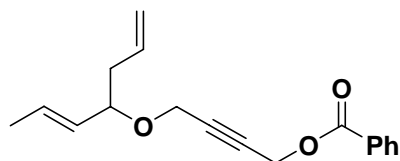
4-(1-(furan-2-yl)but-3-enyloxy)but-2-ynyl benzoate (1e): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.08 (d, $J = 7.6$ Hz, 2H), 7.59 (t, $J = 7.6$ Hz, 1H), 7.43 (t, $J = 7.6$ Hz, 2H), 7.40 (d, $J = 1.2$ Hz, 1H), 6.33 (d, $J = 1.2$ Hz, 2H), 5.81-5.71 (m, 1H), 5.13-5.02 (m, 2H), 4.97 (s, 2H), 4.58 (t, $J = 6.8$ Hz, 1H), 4.21 (d, $J = 16$ Hz, 1H), 4.05 (d, $J = 16$ Hz, 1H), 2.75-2.59 (m, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 165.8, 152.7, 142.6, 133.7, 133.2, 129.7, 129.5, 128.4, 117.3, 110.0, 109.0, 82.8, 80.3, 73.1, 55.8, 52.7, 38.2.



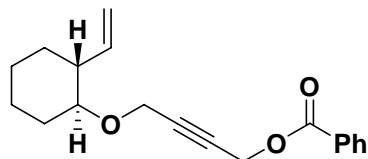
4-(1-cyclohexylbut-3-enyloxy)but-2-ynyl benzoate (1f): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.08 (d, $J = 7.6$ Hz, 2H), 7.59 (t, $J = 7.6$ Hz, 1H), 7.43 (t, $J = 7.6$ Hz, 2H), 5.90-5.81 (m, 1H), 5.11-5.03 (m, 2H), 4.23 (dd, $J = 15.6, 10.4$ Hz, 2H), 3.27-3.24 (m, 1H), 2.32-2.26 (m, 2H), 1.85-0.99 (m, 11H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 165.8, 135.2, 133.2, 129.7, 128.4, 116.7, 83.8, 82.9, 79.5, 55.8, 57.3, 52.8, 40.8, 35.1, 28.8, 28.4, 26.5, 26.3, 26.2.



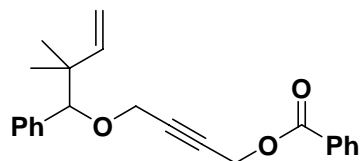
4-(6-methylhept-1-en-4-yloxy)but-2-ynyl benzoate (1g): $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 8.07 (d, $J = 7.6$ Hz, 2H), 7.57 (t, $J = 7.6$ Hz, 1H), 7.45 (t, $J = 7.6$ Hz, 2H), 5.88-5.77 (m, 1H), 5.11-5.04 (m, 2H), 4.97 (s, 2H), 4.24 (dd, $J = 24, 16$ Hz, 2H), 3.62-3.59 (m, 1H), 2.30-2.27 (m, 2H), 1.83-1.72 (m, 1H), 1.50-1.43 (m, 1H), 1.27-1.21 (m, 1H), 0.91 (d, $J = 6.8$ Hz, 6H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 165.8, 134.5, 133.2, 129.7, 128.3, 117.1, 83.7, 79.7, 76.3, 56.2, 52.7, 43.2, 38.2, 24.4, 23.2, 22.3.



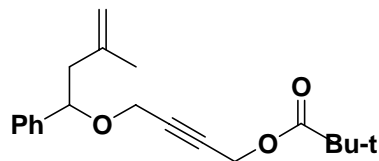
4-((E)-hepta-1,5-dien-4-yloxy)but-2-ynyl benzoate (1h): $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 8.07 (d, $J = 7.6$ Hz, 2H), 7.58 (t, $J = 7.6$ Hz, 1H), 7.45 (t, $J = 7.6$ Hz, 2H), 5.85-5.75 (m, 1H), 5.74-5.65 (m, 1H), 5.33-5.26 (dq, $J = 6.4, 1.6$ Hz, 1H), 5.11-5.03 (m, 2H), 4.97 (s, 2H), 4.12 (dd, $J = 20, 16$ Hz, 2H), 3.92-3.86 (m, 1H), 2.43-2.36 (m, 1H), 2.31-2.24 (m, 1H), 1.72 (d, $J = 6.4$ Hz, 3H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 165.8, 134.5, 133.2, 130.5, 130.2, 129.7, 128.8, 128.4, 116.8, 83.5, 79.7, 79.2, 55.1, 52.8, 39.9, 17.6.



4-(trans-2-vinylcyclohexyloxy)but-2-ynyl benzoate (1i): $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 8.07 (d, $J = 7.6$ Hz, 2H), 7.57 (t, $J = 7.6$ Hz, 1H), 7.45 (t, $J = 7.6$ Hz, 2H), 5.93-5.85 (m, 1H), 5.09-5.00 (m, 2H), 4.97 (s, 2H), 4.24 (dd, $J = 18, 16$ Hz, 2H), 3.23-3.17 (m, 1H), 2.12-2.06 (m, 2H), 1.76-1.21 (m, 7H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 165.8, 141.2, 133.2, 129.7, 128.3, 114.3, 83.8, 80.7, 79.5, 56.2, 52.8, 47.5, 31.2, 30.9, 24.9, 24.4.

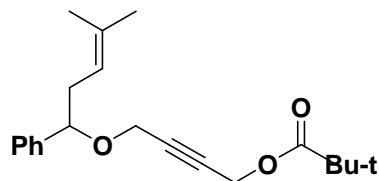


4-(2,2-dimethyl-1-phenylbut-3-enyloxy)but-2-ynyl benzoate (1j): $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 8.06 (d, $J = 7.8$ Hz, 2H), 7.55 (t, $J = 7.8$ Hz, 1H), 7.44 (t, $J = 7.8$ Hz, 2H), 7.30-7.22 (m, 5H), 5.94 (dd, $J = 17.6, 10.8$ Hz, 1H), 4.98-4.86 (m, 2H), 4.95 (s, 2H), 4.24 (s, 1H), 4.18 (d, $J = 16$ Hz, 1H), 3.86 (d, $J = 16$ Hz, 1H), 1.03 (s, 3H), 0.98 (s, 3H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 165.8, 144.9, 138.1, 133.2, 129.8, 129.6, 128.7, 128.4, 127.5, 127.4, 112.1, 87.7, 83.4, 80.0, 56.3, 52.8, 41.4, 24.1, 23.1.

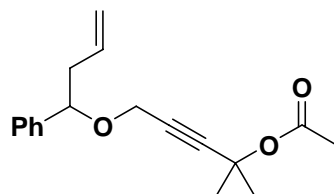


4-(3-methyl-1-phenylbut-3-enyloxy)but-2-ynyl pivalate (1k): $^1\text{H NMR}$ (400 MHz, CDCl_3) δ

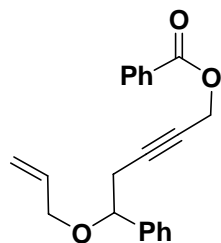
ppm 7.30-7.26 (m, 5H), 4.76 (d, $J = 16.0$ Hz, 2H), 4.69 (s, 2H), 4.69-4.65 (m, 1H), 4.15 (d, $J = 16.0$ Hz, 1H), 3.88 (d, $J = 16$ Hz, 1H), 2.60 (dd, $J = 14.4, 8.4$ Hz, 1H), 2.34 (dd, $J = 14.4, 5.6$ Hz, 1H), 1.75 (s, 3H), 1.23 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 177.6, 142.0, 141.0, 128.4, 127.8, 126.9, 112.7, 82.5, 80.5, 79.0, 55.6, 52.2, 46.1, 38.7, 27.0, 22.6.



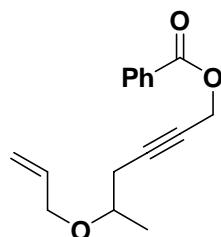
4-(4-methyl-1-phenylpent-3-enyloxy)but-2-ynyl pivalate (1l): ^1H NMR (400 MHz, CDCl_3) δ ppm 7.34-7.29 (m, 5H), 5.13-5.09 (m, 1H), 4.71 (s, 2H), 4.44 (t, $J = 6.8$ Hz, 1H), 4.15 (d, $J = 16$ Hz, 1H), 3.92 (d, $J = 16$ Hz, 1H), 2.60-2.53 (m, 1H), 2.43-2.36 (m, 1H), 1.67 (s, 3H), 1.50 (s, 3H), 1.24 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 177.7, 141.0, 133.8, 128.3, 127.7, 127.0, 119.8, 82.7, 81.0, 80.3, 55.9, 52.3, 38.7, 36.5, 27.1, 25.7, 17.8.



5-(1-phenylbut-3-enyloxy)-2-methylpent-3-yn-2-yl benzoate (1m): ^1H NMR (400 MHz, CDCl_3) δ ppm 7.32-7.26 (m, 5H), 5.84-5.74 (m, 1H), 5.09-5.01 (m, 2H), 4.58 (dd, $J = 7.2, 6.0$ Hz, 1H), 4.15 (d, $J = 16$ Hz, 1H), 3.91 (d, $J = 16$ Hz, 1H), 2.64-2.57 (m, 1H), 2.46-2.40 (m, 1H), 2.02 (s, 3H), 1.65 (s, 3H), 1.64 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 169.2, 140.9, 134.7, 128.3, 127.7, 127.0, 116.8, 87.2, 80.2, 79.9, 71.9, 55.9, 42.0, 28.9, 28.8, 21.9.

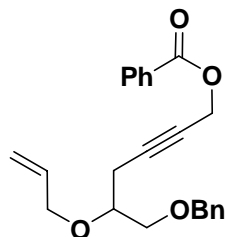


5-(allyloxy)-5-phenylpent-2-ynyl benzoate (1n): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.05 (d, $J = 7.6$ Hz, 2H), 7.55 (t, $J = 7.6$ Hz, 1H), 7.43 (t, $J = 7.6$ Hz, 2H), 7.35-7.25 (m, 5H), 5.91-5.85 (m, 1H), 5.26 (dd, $J = 17.2, 1.6$ Hz, 1H), 5.15 (dd, $J = 10.4, 1.6$ Hz, 1H), 4.87 (s, 2H), 4.49 (t, $J = 6.8$ Hz, 1H), 3.99-3.95 (m, 1H), 3.85-3.80 (m, 1H), 2.80-2.74 (m, 1H), 2.63-2.57 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 165.9, 140.7, 134.5, 133.1, 129.7, 128.3, 127.9, 126.7, 117.0, 84.0, 79.3, 75.9, 69.7, 53.1, 28.5.

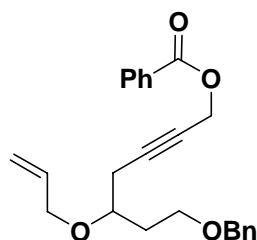


5-(allyloxy)hex-2-ynyl benzoate (1o): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.06 (d, $J = 7.2$ Hz, 2H), 7.55 (t, $J = 7.2$ Hz, 1H), 7.43 (t, $J = 7.2$ Hz, 2H), 5.95-5.85 (m, 1H), 5.27 (d, $J = 17.2$ Hz, 1H),

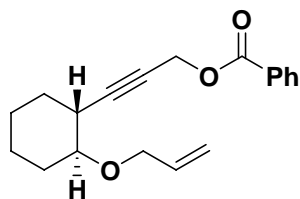
5.14 (d, $J = 10.4$ Hz, 1H), 4.92 (s, 2H), 4.02 (d, $J = 5.6$ Hz, 2H), 3.67-3.59 (m, 1H), 2.55-2.50 (m, 1H), 2.39-2.33 (m, 1H), 1.26 (d, $J = 6.0$, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 165.8, 134.9, 133.0, 129.6, 128.3, 116.6, 84.2, 75.7, 73.1, 69.7, 53.1, 26.3, 19.6.



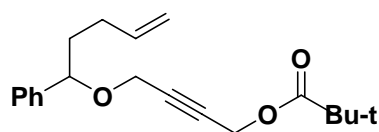
5-(allyloxy)-6-(benzyloxy)hex-2-ynyl benzoate (1p): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.06 (d, $J = 7.2$ Hz, 2H), 7.55 (t, $J = 7.2$ Hz, 1H), 7.43 (t, $J = 7.2$ Hz, 2H), 7.35-7.27 (m, 5H), 5.98-5.88 (m, 1H), 5.30 (d, $J = 17.2$ Hz, 1H), 5.18 (d, $J = 10.4$ Hz, 1H), 4.91 (s, 2H), 4.58 (s, 2H), 4.14 (d, $J = 5.6$ Hz, 1H), 3.75-3.70 (m, 1H), 3.66-3.59 (m, 2H), 2.64-2.52 (m, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 165.9, 138.1, 134.8, 133.1, 129.7, 128.3, 128.3, 127.6, 127.5, 117.1, 83.9, 76.1, 75.7, 73.4, 71.1, 71.0, 53.1, 21.9.



5-(allyloxy)-7-(benzyloxy)hept-2-ynyl benzoate (1q): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.06 (d, $J = 7.2$ Hz, 2H), 7.55 (t, $J = 7.2$ Hz, 1H), 7.43 (t, $J = 7.2$ Hz, 2H), 7.36-7.27 (m, 5H), 5.92-5.84 (m, 1H), 5.27 (dd, $J = 17.2, 1.6$ Hz, 1H), 5.18 (d, $J = 10.4, 1.6$ Hz, 1H), 4.93 (s, 2H), 4.52 (dd, $J = 17.6, 12$ Hz, 2H), 4.12-4.11 (m, 1H), 4.01-3.96 (m, 1H), 3.66-3.58 (m, 3H), 2.52-2.49 (m, 2H), 2.01-1.85 (m, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 165.9, 138.4, 134.9, 133.1, 129.7, 128.3, 127.6, 127.5, 116.9, 84.1, 75.8, 74.2, 72.9, 70.7, 66.5, 53.2, 34.5, 24.5.

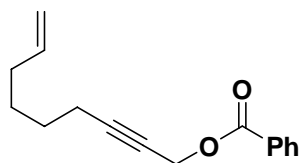


3-(trans-2-(allyloxy)cyclohexyl)prop-2-ynyl benzoate (1r): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.05 (d, $J = 7.6$ Hz, 2H), 7.54 (t, $J = 7.6$ Hz, 1H), 7.42 (t, $J = 7.6$ Hz, 2H), 5.96-5.86 (m, 1H), 5.27 (d, $J = 17.2$ Hz, 1H), 5.10 (d, $J = 10.4$ Hz, 1H), 4.93 (s, 2H), 4.10 (d, $J = 5.6$ Hz, 2H), 3.31-3.27 (m, 1H), 2.48 (br s, 1H), 1.97-1.95 (m, 2H), 1.69-1.60 (m, 2H), 1.48-1.23 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 165.7, 135.3, 132.9, 129.6, 128.2, 116.3, 89.5, 78.9, 75.1, 70.2, 53.2, 35.2, 30.3, 30.0, 23.8, 23.1.

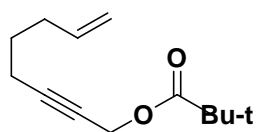


4-(1-phenylpent-4-enyloxy)but-2-ynyl pivalate (1s): ^1H NMR (400 MHz, CDCl_3) δ ppm 7.36-7.26 (m, 5H), 5.86-5.76 (m, 1H), 5.04-4.95 (m, 2H), 4.69 (s, 2H), 4.45 (dd, $J = 7.2, 5.6$ Hz,

2H), 4.12 (d, $J = 15.6$ Hz, 1H), 3.88 (d, $J = 15.6$ Hz, 1H), 2.17-2.05 (m, 2H), 1.99-1.90 (m, 1H), 1.78-1.69 (m, 1H), 1.23 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 177.7, 141.2, 138.0, 128.4, 127.8, 126.9, 114.8, 82.7, 80.3, 80.2, 55.8, 52.3, 38.7, 36.9, 29.9, 27.1.

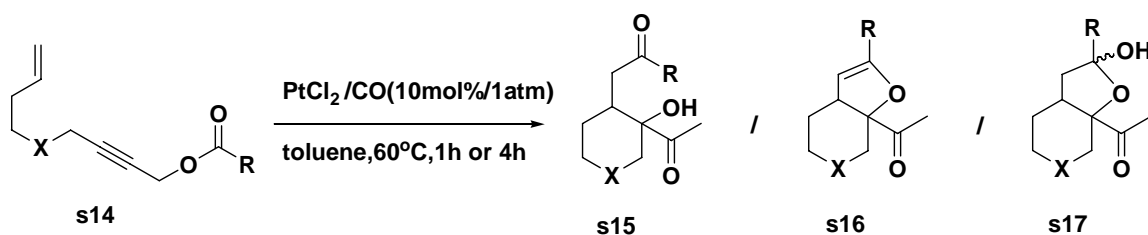


non-8-en-2-ynyl benzoate (1t): ^1H NMR (400 MHz, CDCl_3) δ ppm 8.08 (d, $J = 7.6$ Hz, 2H), 7.57 (t, $J = 7.6$ Hz, 1H), 7.45 (t, $J = 7.6$ Hz, 2H), 5.86-5.76 (m, 1H), 5.05-4.94 (m, 2H), 4.93 (s, 2H), 2.28-2.24 (m, 2H), 2.10-2.05 (m, 2H), 1.58-1.49 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 166.0, 138.5, 133.1, 129.7, 128.3, 114.6, 87.5, 74.2, 53.3, 33.2, 28.0, 27.8, 18.6.



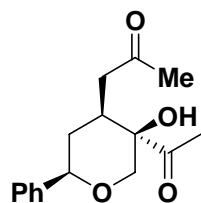
oct-7-en-2-ynyl pivalate (1u): ^1H NMR (400 MHz, CDCl_3) δ ppm 5.82-5.72 (m, 1H), 5.05-4.95 (m, 2H), 4.64 (s, 2H), 2.24-2.20 (m, 2H), 2.17-2.11 (m, 2H), 1.63-1.56 (m, 2H), 1.21 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 177.8, 137.7, 115.2, 86.7, 74.6, 52.7, 38.7, 32.6, 27.4, 27.0, 18.1.

General Procedure for the preparation of the [3+2] cycloaddition products.



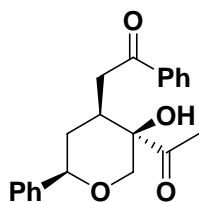
A suspension of the propargylic esters **1a-u** (0.15 mmol) and PtCl_2 (0.015 mmol) in toluene (1.5 ml) under CO (1 atm) at 60°C was stirred until the starting material disappeared (1h for **1a-k** and **1s-u**, 4h for **1n-1r**). After the mixture was stirred at RT under Air for another one hour, the suspension was directly loaded onto a silica gel column, elution with a 10:1 mixture of PE/EtOAc yielded the desired products.

Characterization data of the [3+2] cycloaddition products.

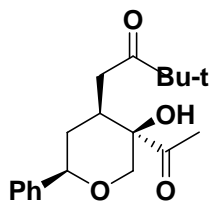


Compound 3a: solid, mp: 131°C ; ^1H NMR (400 MHz, CDCl_3) δ ppm 7.34-7.25 (m, 5H), 4.52 (dd, $J = 11.6, 2.0$ Hz, 1H), 3.92 (d, $J = 11.6$ Hz, 1H), 3.82 (d, $J = 11.6$ Hz, 1H), 3.73 (s, 1H), 2.91-2.84 (m, 1H), 2.40-2.27 (m, 2H), 2.31 (s, 3H), 2.08 (s, 3H), 1.94-1.89 (m, 1H), 1.64 (dd, $J = 25.6, 12.4$ Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm 210.9, 207.0, 141.4, 128.4, 127.8, 125.7, 79.6, 79.1, 73.5, 44.1, 36.0, 35.0, 30.5, 26.0; IR ν (cm^{-1}): 3464, 2984, 2938, 1740, 1708, 1373,

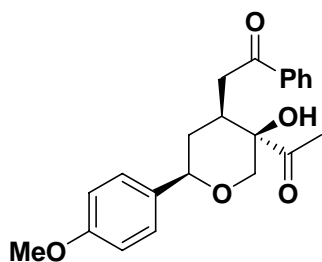
1242, 1046; **HRMS** (EIS) calcd. for $C_{16}H_{20}NaO_4$ $[M+Na]^+$: 299.1254, found 299.1251.



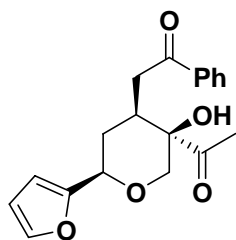
Compound 3b: solid, mp: 138-140°C; 1H NMR (400 MHz, $CDCl_3$) δ ppm 7.55 (d, $J = 7.6$ Hz, 2H), 7.44 (t, $J = 7.6$ Hz, 1H), 7.38 (t, $J = 7.6$ Hz, 2H), 7.35-7.24 (m, 5H), 4.56 (dd, $J = 11.6, 2.0$ Hz, 1H), 3.96 (d, $J = 11.6$ Hz, 1H), 3.86 (d, $J = 11.6$ Hz, 1H), 3.82 (s, 1H), 3.14-3.07 (m, 1H), 2.97 (dd, $J = 17.6, 8.4$ Hz, 1H), 2.77 (dd, $J = 17.6, 4.0$ Hz, 1H), 2.37 (s, 3H), 2.01-1.97 (m, 1H), 1.73 (dd, $J = 25.2, 12.0$ Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 210.9, 198.4, 141.3, 136.7, 133.4, 128.6, 128.4, 128.0, 127.8, 125.7, 79.7, 79.5, 73.6, 39.1, 36.5, 35.1, 26.1; **IR** ν (cm^{-1}): 3454, 2922, 2854, 1705, 1683, 1448, 1365, 1094, 756, 697; **HRMS** (EIS) calcd. for $C_{21}H_{22}NaO_4$ $[M+Na]^+$: 361.1410, found 361.1414.



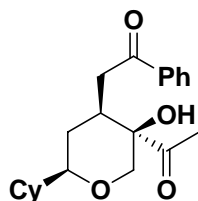
Compound 3c: solid, mp: 139-141°C; 1H NMR (400 MHz, $CDCl_3$) δ ppm 7.37-7.25 (m, 5H), 4.52 (dd, $J = 11.6, 2.0$ Hz, 1H), 3.94 (d, $J = 11.6$ Hz, 1H), 3.85 (d, $J = 11.6$ Hz, 1H), 3.80 (s, 1H), 2.95-2.88 (m, 1H), 2.50 (dd, $J = 18.0, 8.0$ Hz, 1H), 2.32 (s, 3H), 2.22 (dd, $J = 18.0, 4.0$ Hz, 1H), 1.85-1.80 (m, 1H), 1.63 (dd, $J = 25.2, 12.0$ Hz, 1H), 1.07 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 214.3, 210.7, 141.5, 128.3, 127.7, 125.7, 79.7, 79.3, 73.5, 44.2, 37.3, 36.0, 35.0, 26.1, 25.8; **IR** ν (cm^{-1}): 3458, 2963, 2927, 2867, 1703, 1364, 1095, 757, 700; **HRMS** (EIS) calcd. for $C_{19}H_{26}NaO_4$ $[M+Na]^+$: 341.1723, found 361.1420.



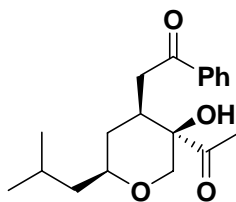
Compound 3d: solid, mp: 124-127°C; 1H NMR (400 MHz, $CDCl_3$) δ ppm 7.91 (d, $J = 7.2$ Hz, 2H), 7.56 (t, $J = 7.2$ Hz, 1H), 7.45 (t, $J = 7.2$ Hz, 2H), 7.31 (d, $J = 8.8$ Hz, 2H), 6.87 (d, $J = 8.8$ Hz, 2H), 4.51 (dd, $J = 11.6, 2.0$ Hz, 1H), 3.95 (d, $J = 11.6$ Hz, 1H), 3.85 (d, $J = 11.6$ Hz, 1H), 3.86-3.78 (m, 1H), 3.78 (s, 3H), 3.12-3.05 (m, 1H), 2.97 (dd, $J = 17.2, 8.4$ Hz, 1H), 2.78 (dd, $J = 17.2, 4.0$ Hz, 1H), 2.37 (s, 3H), 1.98-1.93 (m, 1H), 1.75 (dd, $J = 25.2, 12.0$ Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 211.0, 198.5, 159.2, 136.7, 133.5, 133.3, 128.6, 128.0, 127.1, 113.7, 79.5, 79.4, 73.6, 55.2, 39.1, 36.6, 34.9, 26.1; **IR** ν (cm^{-1}): 3460, 2935, 1704, 1683, 1514, 1247; **HRMS** (EIS) calcd. for $C_{22}H_{24}NaO_5$ $[M+Na]^+$: 391.1516, found 391.1512.



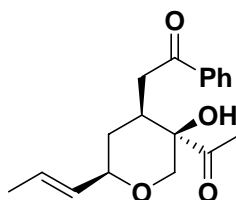
Compound 3e: solid, mp: 90-93°C; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.91 (d, $J = 7.6$ Hz, 2H), 7.56 (t, $J = 7.6$ Hz, 1H), 7.45 (t, $J = 7.6$ Hz, 2H), 7.36 (d, $J = 1.2$ Hz, 1H), 6.31 (m, 2H), 4.60 (dd, $J = 11.2, 2.8$ Hz, 1H), 3.90 (d, $J = 11.6$ Hz, 1H), 3.83 (s, 1H), 3.79 (d, $J = 11.6$ Hz, 1H), 3.04-3.01 (m, 1H), 2.97 (d, $J = 8.4$ Hz, 1H), 2.80 (d, $J = 13.6$ Hz, 1H), 2.33 (s, 3H), 2.04-1.94 (m, 2H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 210.9, 198.2, 153.2, 142.3, 136.6, 133.3, 128.6, 128.0, 110.1, 107.1, 79.4, 73.3, 72.7, 39.1, 36.1, 30.5, 26.2; **IR** ν (cm^{-1}): 3459, 2924, 2858, 2252, 1707, 1680, 1358, 1081, 1014, 989, 913, 752, 734, 692, 600; **HRMS** (EIS) calcd. for $\text{C}_{19}\text{H}_{20}\text{NaO}_5$ $[\text{M}+\text{Na}]^+$: 351.1203, found 351.1206.



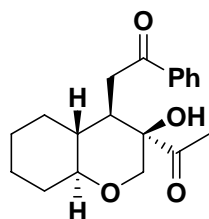
Compound 3f: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.90 (d, $J = 7.6$ Hz, 2H), 7.55 (t, $J = 7.6$ Hz, 1H), 7.44 (t, $J = 7.6$ Hz, 2H), 3.68 (d, $J = 1.6$ Hz, 2H), 3.66 (s, 1H), 3.22-3.17 (m, 1H), 2.93-2.71 (m, 3H), 2.29 (s, 3H), 1.94-1.91 (m, 1H), 1.74-1.63 (m, 5H), 1.42-1.32 (m, 2H), 1.20-1.15 (m, 3H), 0.98 (m, 2H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 211.1, 198.6, 136.7, 133.2, 128.6, 128.0, 82.0, 79.9, 73.4, 42.6, 39.4, 36.1, 30.1, 28.8, 28.5, 26.4, 26.0, 25.9; **IR** ν (cm^{-1}): 3464, 2925, 2852, 1706, 1685, 1448, 1357, 1288, 1217, 1099, 988, 755, 692; **HRMS** (EIS) calcd. for $\text{C}_{21}\text{H}_{28}\text{NaO}_4$ $[\text{M}+\text{Na}]^+$: 367.1880, found 367.1884.



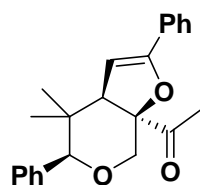
Compound 3g: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.91 (d, $J = 7.6$ Hz, 2H), 7.57 (t, $J = 7.6$ Hz, 1H), 7.46 (t, $J = 7.6$ Hz, 2H), 3.75 (d, $J = 11.6$ Hz, 1H), 3.69 (s, 1H), 3.68 (d, $J = 11.6$ Hz, 1H), 3.57-3.51 (m, 1H), 2.95-2.71 (m, 3H), 2.32 (s, 3H), 1.84-1.77 (m, 1H), 1.73-1.68 (m, 1H), 1.58-1.50 (m, 1H), 1.37 (dd, $J = 24.0, 11.2$ Hz, 1H), 1.23-1.16 (m, 1H), 0.89 (d, $J = 6.8$ Hz, 6H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 211.1, 198.6, 136.8, 133.3, 128.6, 128.1, 79.8, 76.0, 73.3, 44.9, 39.3, 36.2, 33.7, 26.0, 24.2, 23.2, 22.2; **IR** ν (cm^{-1}): 3463, 2954, 1704, 1684, 1448, 1362, 1094, 986, 754, 691; **HRMS** (EIS) calcd. for $\text{C}_{19}\text{H}_{26}\text{NO}_4$ $[\text{M}+\text{Na}]^+$: 341.1723, found 341.1729.



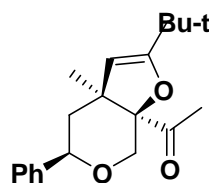
Compound 3h: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.91 (d, $J = 7.6$ Hz, 2H), 7.56 (t, $J = 7.6$ Hz, 1H), 7.45 (t, $J = 7.6$ Hz, 2H), 5.79-5.71 (m, 1H), 5.50 (dq, $J = 15.6, 6.4$ Hz, 1H), 3.98-3.93 (m, 1H), 3.79 (d, $J = 11.6$ Hz, 1H), 3.73 (s, 1H), 3.71 (d, $J = 11.6$ Hz, 1H), 2.97-2.89 (m, 2H), 2.74 (dd, $J = 20.8, 7.6$ Hz, 1H), 2.32 (s, 3H), 1.79-1.74 (m, 1H), 1.68 (d, $J = 6.4$ Hz, 3H), 1.49 (dd, $J = 24.8, 11.6$ Hz, 1H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 211.1, 198.5, 136.7, 133.3, 130.7, 128.6, 128.2, 128.1, 79.5, 78.2, 73.1, 39.2, 36.1, 33.2, 26.1, 17.7; **IR** ν (cm^{-1}): 3457, 2940, 2918, 2855, 1705, 1683, 1597, 1448, 1359, 1280, 1220, 1088, 971, 915, 754, 692; **HRMS** (EIS) calcd. for $\text{C}_{18}\text{H}_{22}\text{NaO}_4$ $[\text{M}+\text{Na}]^+$: 325.1410, found 325.1412.



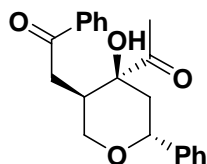
Compound 3i: semi-solid, mp: $\sim 80^\circ\text{C}$; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.91 (d, $J = 7.6$ Hz, 2H), 7.55 (t, $J = 7.6$ Hz, 1H), 7.44 (t, $J = 7.6$ Hz, 2H), 4.12 (br s, 1H), 3.88 (d, $J = 11.6$ Hz, 1H), 3.66 (d, $J = 11.6$ Hz, 1H), 3.22-3.16 (m, 1H), 3.01 (d, $J = 11.6$ Hz, 1H), 2.84-2.79 (m, 1H), 2.64 (dd, $J = 18.8, 4.0$ Hz, 1H), 2.28 (s, 3H), 1.98-1.94 (m, 1H), 1.79-1.76 (m, 1H), 1.65-1.62 (m, 1H), 1.50-0.89 (m, 6H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 210.5, 198.6, 136.3, 133.2, 128.5, 81.8, 80.9, 72.9, 42.7, 39.7, 37.4, 32.0, 28.3, 25.8, 25.5, 24.6; **IR** ν (cm^{-1}): 3459, 2931, 2858, 2249, 1707, 1687, 1597, 1448, 1359, 1096, 914, 773, 692; **HRMS** (EIS) calcd. for $\text{C}_{19}\text{H}_{25}\text{O}_4$ $[\text{M}+\text{H}]^+$: 317.1747, found 317.1745.



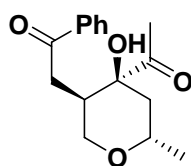
Compound 3j: solid, mp: $152\text{-}154^\circ\text{C}$; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.70 (d, $J = 6.8$ Hz, 2H), 7.42-7.23 (m, 8H), 5.50 (d, $J = 3.2$ Hz, 1H), 4.56 (d, $J = 13.2$ Hz, 1H), 4.15 (s, 1H), 3.85 (d, $J = 13.2$ Hz, 1H), 3.14 (d, $J = 3.2$ Hz, 1H), 2.21 (s, 3H), 0.85 (s, 3H), 0.74 (s, 3H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 214.3, 156.8, 138.0, 130.0, 129.0, 128.5, 127.7, 127.4, 127.2, 125.1, 99.6, 92.7, 85.5, 70.4, 53.7, 36.8, 26.5, 26.0, 16.7; **IR** ν (cm^{-1}): 2969, 1711, 1447, 1356, 1125, 1092, 755, 697; **HRMS** (EIS) calcd. for $\text{C}_{23}\text{H}_{25}\text{O}_3$ $[\text{M}+\text{H}]^+$: 349.1798, found 349.1803.



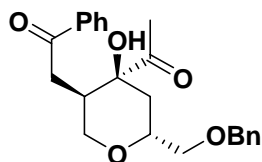
Compound 3k: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.34-7.22 (m, 5H), 4.58 (dd, $J = 8.8, 4.4$ Hz, 1H), 4.43 (s, 1H), 4.09 (dd, $J = 24.0, 12.8$ Hz, 2H), 2.30 (s, 3H), 1.96 (dd, $J = 14.0, 4.4$ Hz, 1H), 1.78 (dd, $J = 14.0, 8.8$ Hz, 1H), 1.16 (s, 9H), 1.11 (s, 3H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 211.9, 164.3, 143.0, 128.1, 127.1, 125.7, 104.7, 91.7, 74.0, 68.5, 46.3, 44.6, 31.9, 28.9, 27.7, 23.2; **IR** ν (cm^{-1}): 2963, 2930, 2868, 1708, 1656, 1455, 1356, 1129, 1071, 755, 702; **HRMS** (EIS) calcd. for $\text{C}_{20}\text{H}_{27}\text{O}_3$ $[\text{M}+\text{H}]^+$: 315.1955, found 315.1960.



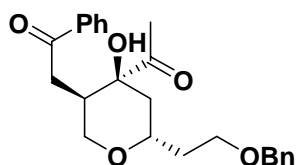
Compound 3n: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.55 (d, $J = 7.6$ Hz, 2H), 7.45 (t, $J = 7.6$ Hz, 1H), 7.38 (t, $J = 7.6$ Hz, 2H), 7.37-7.25 (m, 5H), 4.83 (dd, $J = 11.2, 2.0$ Hz, 1H), 4.28 (s, 1H), 4.06 (dd, $J = 11.2, 5.2$ Hz, 1H), 3.76 (dd, $J = 7.2$ Hz, 1H), 3.11-3.04 (m, 1H), 2.72 (d, $J = 5.6$ Hz, 1H), 2.33 (s, 3H), 2.13 (dd, $J = 12.8, 11.2$ Hz, 1H), 1.70 (dd, $J = 12.8, 2.0$ Hz, 1H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 210.6, 197.8, 141.8, 136.5, 133.4, 128.6, 128.4, 128.0, 127.6, 125.7, 78.7, 74.6, 68.2, 42.7, 35.6, 34.8, 23.9; **IR** ν (cm^{-1}): 3457, 2952, 2922, 2861, 1701, 1686, 1450, 1360, 1214, 1081, 756, 696; **HRMS** (EIS) calcd. for $\text{C}_{21}\text{H}_{22}\text{NaO}_4$ $[\text{M}+\text{Na}]^+$: 361.1410, found 361.1416.



Compound 3o: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.88 (d, $J = 7.6$ Hz, 2H), 7.56 (t, $J = 7.6$ Hz, 1H), 7.44 (t, $J = 7.6$ Hz, 2H), 4.16 (br s, 1H), 3.92-3.85 (m, 2H), 3.58 (dd, $J = 11.2$ Hz, 1H), 2.96-2.89 (m, 1H), 2.72-2.60 (m, 2H), 2.72 (d, $J = 5.6$ Hz, 1H), 2.34 (s, 3H), 1.84 (dd, $J = 12.8, 11.2$ Hz, 1H), 1.49 (dd, $J = 12.8, 2.0$ Hz, 1H), 1.23 (d, $J = 6.4$ Hz, 3H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 210.0, 197.9, 141.8, 136.6, 133.3, 128.6, 128.0, 78.6, 68.7, 67.8, 41.9, 35.6, 34.7, 23.9, 21.4; **IR** ν (cm^{-1}): 3455, 2970, 2932, 2869, 1702, 1687, 1597, 1358, 1124, 1058, 755, 691; **HRMS** (EIS) calcd. for $\text{C}_{16}\text{H}_{20}\text{NaO}_4$ $[\text{M}+\text{Na}]^+$: 299.1254, found 299.1250.

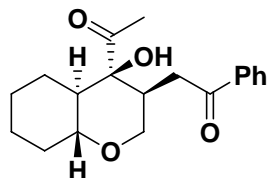


Compound 3p: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.88 (d, $J = 7.6$ Hz, 2H), 7.56 (t, $J = 7.6$ Hz, 1H), 7.45 (t, $J = 7.6$ Hz, 2H), 7.36-7.28 (m, 5H), 4.60 (s, 2H), 4.16 (s, 1H), 4.04-3.98 (m, 1H), 3.94 (dd, $J = 11.2, 5.2$ Hz, 1H), 3.61 (dd, $J = 11.2$ Hz, 1H), 3.52 (d, $J = 5.2$ Hz, 1H), 3.00-2.93 (m, 1H), 2.73-2.61 (m, 2H), 2.34 (s, 3H), 2.02 (dd, $J = 12.4, 11.6$ Hz, 1H), 1.46 (dd, $J = 12.8, 2.0$ Hz, 1H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 210.9, 197.8, 138.0, 136.5, 133.4, 128.6, 128.4, 128.0, 127.8, 127.7, 78.3, 73.5, 72.6, 71.8, 67.9, 36.8, 35.7, 34.8, 23.9; **IR** ν (cm^{-1}): 3454, 2921, 2862, 1703, 1686, 1597, 1451, 1359, 1103, 987, 752, 695; **HRMS** (EIS) calcd. for $\text{C}_{23}\text{H}_{30}\text{NO}_5$ $[\text{M}+\text{NH}_4]^+$: 400.2118, found 400.2122.

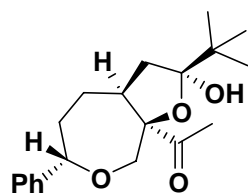


Compound 3q: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.88 (d, $J = 7.6$ Hz, 2H), 7.55 (t, $J = 7.6$

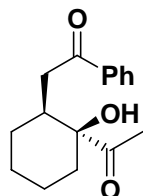
Hz, 1H), 7.43 (t, $J = 7.6$ Hz, 2H), 7.34-7.26 (m, 5H), 4.51 (s, 2H), 4.13 (br s, 1H), 3.95-3.83 (m, 2H), 3.61-3.52 (m, 3H), 2.95-2.88 (m, 1H), 2.65 (m, 2H), 2.31 (s, 3H), 1.90-1.73 (m, 3H), 1.49 (dd, $J = 13.2, 2.0$ Hz, 1H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 210.9, 197.9, 138.4, 136.6, 133.3, 128.6, 128.3, 128.0, 127.6, 127.5, 78.5, 72.9, 70.0, 67.7, 66.6, 40.4, 36.0, 35.8, 34.7, 23.9; **IR** ν (cm^{-1}): 3457, 2922, 2860, 1699, 1687, 1598, 1451, 1359, 1118, 751, 694; **HRMS** (EIS) calcd. for $\text{C}_{24}\text{H}_{28}\text{NaO}_5$ $[\text{M}+\text{Na}]^+$: 419.1829, found 419.1825.



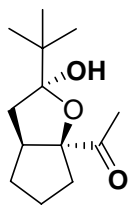
Compound 3r: solid, mp: 98-100°C; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.85 (d, $J = 7.6$ Hz, 2H), 7.51 (t, $J = 7.6$ Hz, 1H), 7.40 (t, $J = 7.6$ Hz, 2H), 4.01 (s, 1H), 3.82 (dd, $J = 10.8, 4.8$ Hz, 1H), 3.54 (dd, $J = 10.8$ Hz, 1H), 3.43-3.37 (m, 1H), 3.01-2.94 (m, 1H), 2.66-2.55 (m, 2H), 2.26 (s, 3H), 2.00-1.98 (m, 1H), 1.77-1.65 (m, 3H), 1.40-1.16 (m, 5H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 211.1, 197.6, 136.5, 133.2, 128.5, 127.9, 80.6, 75.1, 67.4, 46.9, 37.3, 34.8, 32.5, 25.2, 24.3, 23.9, 23.8; **IR** ν (cm^{-1}): 3459, 2933, 2859, 1689, 1597, 1449, 1358, 1260, 1113, 755, 691, 602; **HRMS** (EIS) calcd. for $\text{C}_{19}\text{H}_{28}\text{NO}_4$ $[\text{M}+\text{NH}_4]^+$: 334.2013, found 334.2015.



Compound 3s: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.37-7.24 (m, 5H), 4.42 (dd, $J = 10.8, 3.2$ Hz, 1H), 4.09 (d, $J = 13.6$ Hz, 1H), 3.90 (d, $J = 13.6$ Hz, 1H), 3.03-2.96 (m, 1H), 2.48 (t, $J = 12.0$ Hz, 1H), 2.38 (br s, 1H), 2.31 (s, 3H), 2.06 (dd, $J = 8.8, 2.8$ Hz, 1H), 2.08-1.90 (m, 3H), 1.70 (dd, $J = 12.0, 7.6$ Hz, 1H), 1.16 (s, 9H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 213.6, 143.4, 128.3, 127.2, 125.4, 110.3, 95.4, 87.4, 76.4, 41.8, 38.0, 35.4, 34.9, 26.4, 25.7, 25.3; **IR** ν (cm^{-1}): 3502, 2959, 2930, 2870, 1704, 1358, 1138, 1097, 1061, 937, 756, 700; **HRMS** (EIS) calcd. for $\text{C}_{20}\text{H}_{32}\text{NO}_4$ $[\text{M}+\text{NH}_4]^+$: 350.2326, found 350.2331.

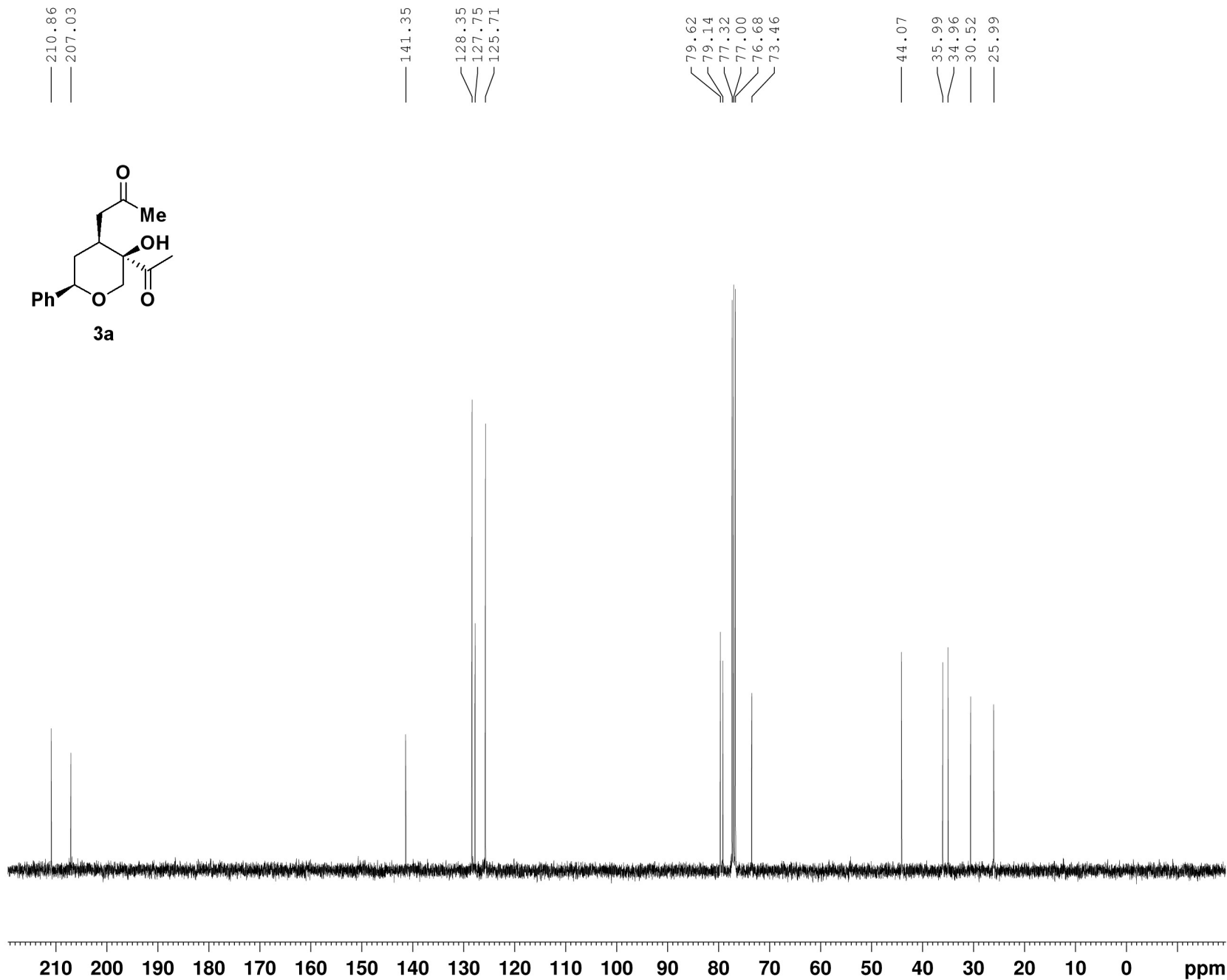
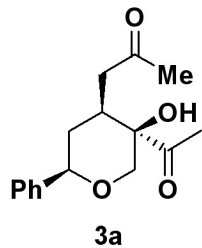


Compound 3t: oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 7.90 (d, $J = 7.6$ Hz, 2H), 7.55 (t, $J = 7.6$ Hz, 1H), 7.44 (t, $J = 7.6$ Hz, 2H), 3.96 (s, 1H), 2.92 (dd, $J = 17.6, 8.0$ Hz, 1H), 2.65-2.58 (m, 1H), 2.49 (dd, $J = 17.6, 3.6$ Hz, 1H), 2.28 (s, 3H), 1.83-1.43 (m, 8H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 213.0, 199.2, 137.1, 133.2, 128.5, 128.0, 80.4, 39.7, 37.4, 35.3, 28.2, 25.4, 23.9, 20.7; **IR** ν (cm^{-1}): 3468, 2934, 2858, 1699, 1686, 1597, 1447, 1361, 1211, 1119, 1008, 753, 691, 602; **HRMS** (EIS) calcd. for $\text{C}_{16}\text{H}_{21}\text{O}_3$ $[\text{M}+\text{H}]^+$: 261.1485, found 261.1488.



Compound 3u: solid, mp: 67-70°C; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ ppm 3.14 (m, 1H), 2.22 (s, 3H), 2.06-1.57 (m, 8H), 1.02 (s, 9H); $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ ppm 213.2, 112.0, 99.6, 44.8, 40.2, 38.1, 37.4, 34.0, 25.8, 25.0, 24.7; **IR** ν (cm^{-1}): 3442, 2957, 1704, 1356, 1045; **HRMS** (EIS) calcd. for $\text{C}_{14}\text{H}_{25}\text{O}_2$ $[\text{M}+\text{H}]^+$: 225.1849, found 225.1853.

Spectra.



```

NAME      zhenghuaiji0719-Ar
EXPNO     11
PROCNO    1
Date_     20090718
Time      18.02
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         100
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         2050
DW         20.800 usec
DE         6.50 usec
TE         297.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1      13C
P1         9.40 usec
PL1        -2.00 dB
PL1W       57.32743073 W
SFO1      100.6228298 MHz

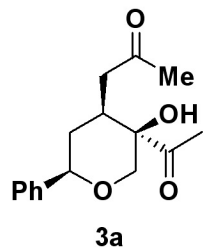
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===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2      90.00 usec
PL2        -2.00 dB
PL12       15.50 dB
PL13       15.50 dB
PL2W       18.19349861 W
PL12W      0.32353121 W
PL13W      0.32353121 W
SFO2      400.1316005 MHz
SI         32768
SF         100.6127729 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

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7.292
7.289
7.278
7.271
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7.254

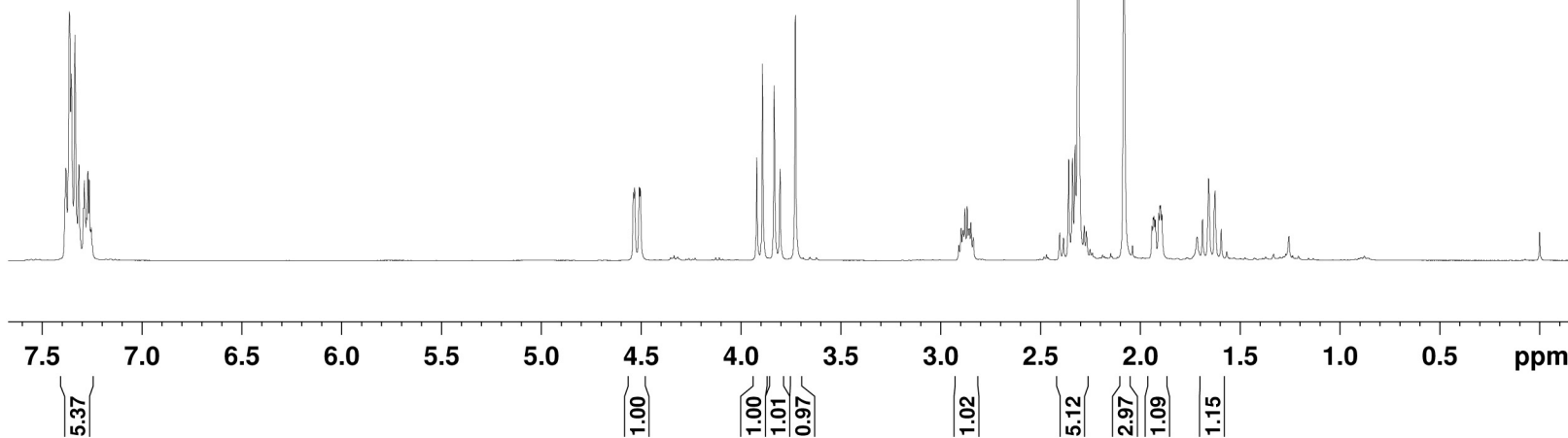


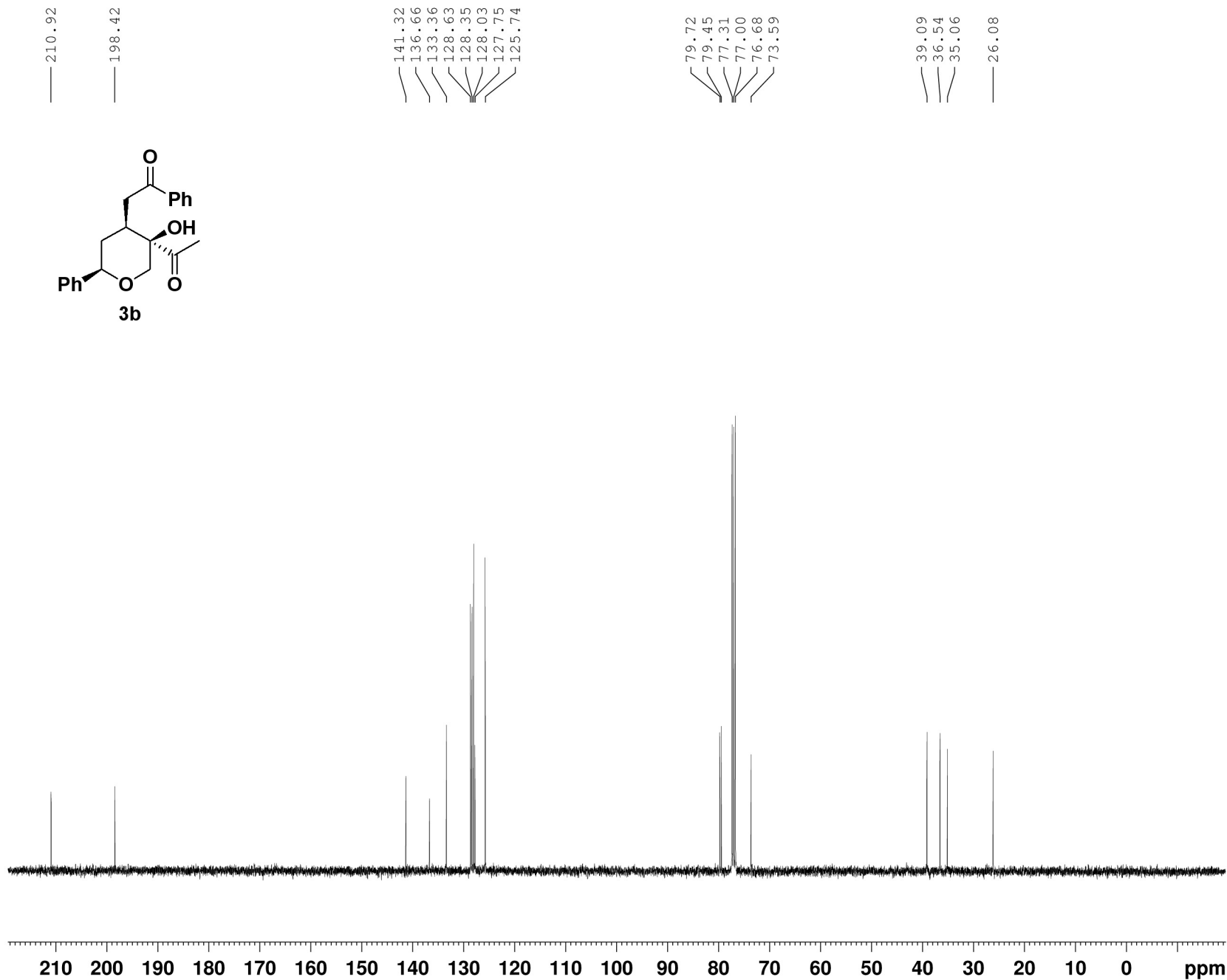
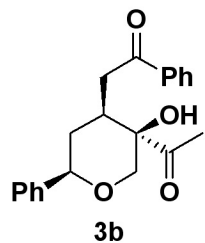
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2.856
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2.358
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1.625
1.594

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NAME zhenghuaiji0719-Ar
EXPNO 10
PROCNO 1
Date_ 20090718
Time 17.55
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 32
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 128
DW 60.800 usec
DE 6.50 usec
TE 296.6 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.60 usec
PL1 0.00 dB
PL1W 11.47932053 W
SFO1 400.1324710 MHz
SI 32768
SF 400.1300031 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00





```

NAME      zhenghuaiji0716-Bz-Pt
EXPNO     11
PROCNO    1
Date_     20090716
Time      19.46
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        128
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        2050
DW        20.800 usec
DE        6.50 usec
TE        294.3 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0       1

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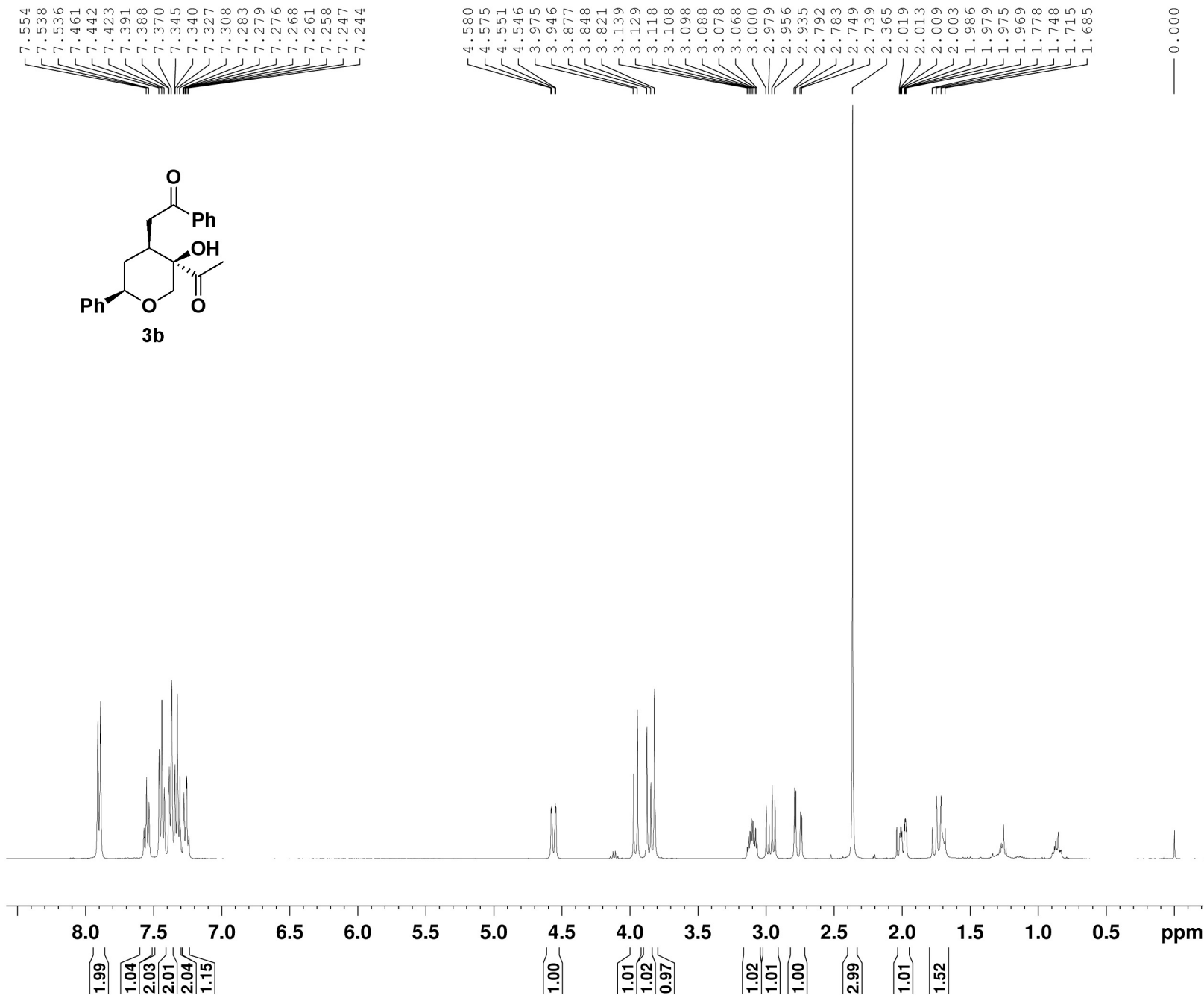
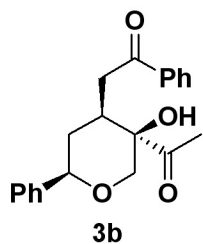
===== CHANNEL f1 =====
NUC1      13C
P1        9.40 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SFO1      100.6228298 MHz

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===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     90.00 usec
PL2       -2.00 dB
PL12      15.50 dB
PL13      15.50 dB
PL2W      18.19349861 W
PL12W     0.32353121 W
PL13W     0.32353121 W
SFO2      400.1316005 MHz
SI        32768
SF        100.6127736 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

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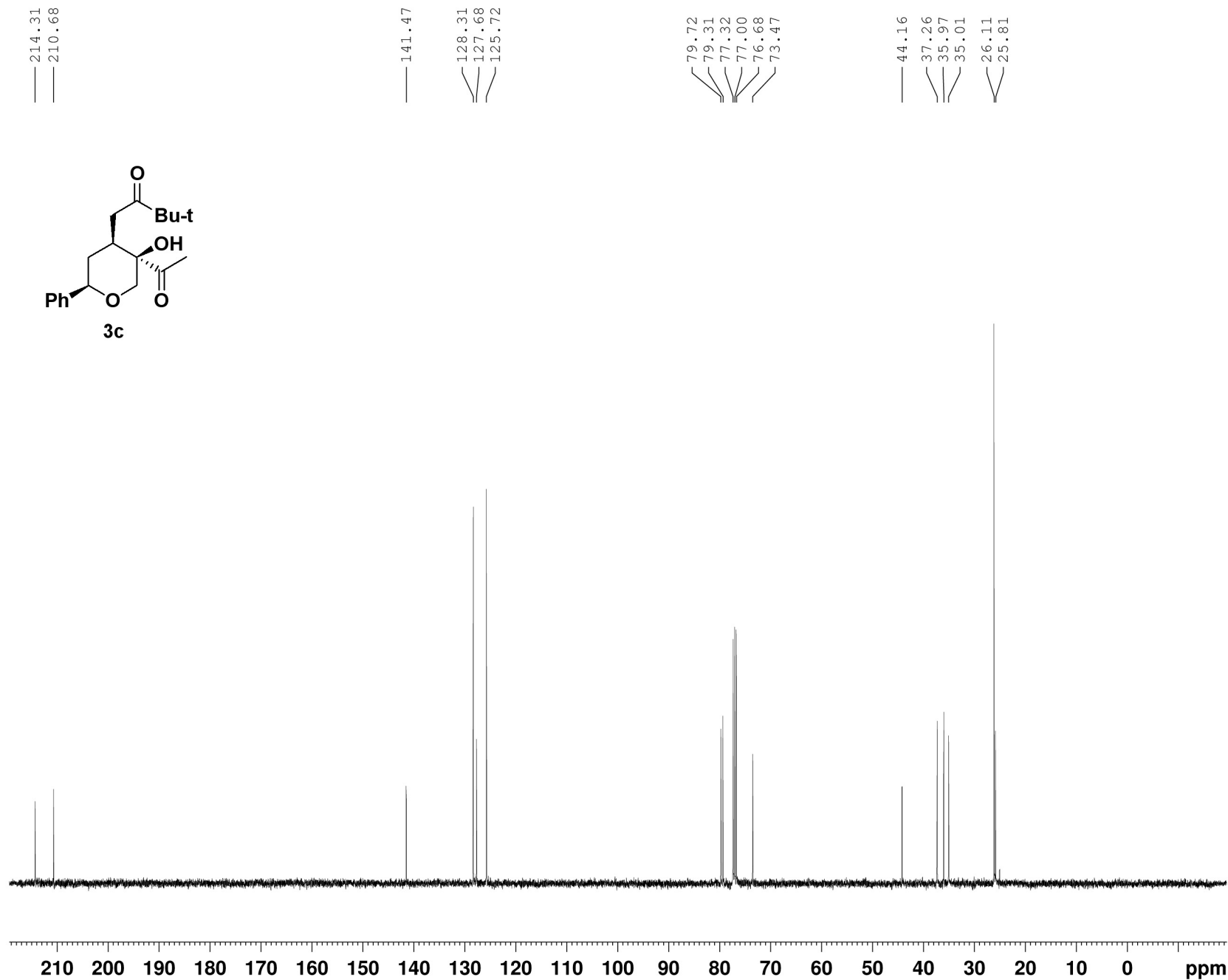
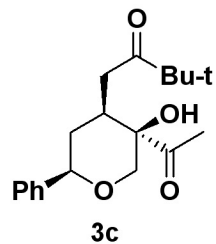


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NAME      zhenghuaiji0716-Bz-Pt
EXPNO     10
PROCNO    1
Date_     20090716
Time      19.37
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS        32
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        144
DW        60.800 usec
DE        6.50 usec
TE        293.5 K
D1        1.00000000 sec
TD0       1

===== CHANNEL f1 =====
NUC1      1H
P1        14.60 usec
PL1       0.00 dB
PL1W      11.47932053 W
SFO1      400.1324710 MHz
SI        32768
SF        400.1300056 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00

```



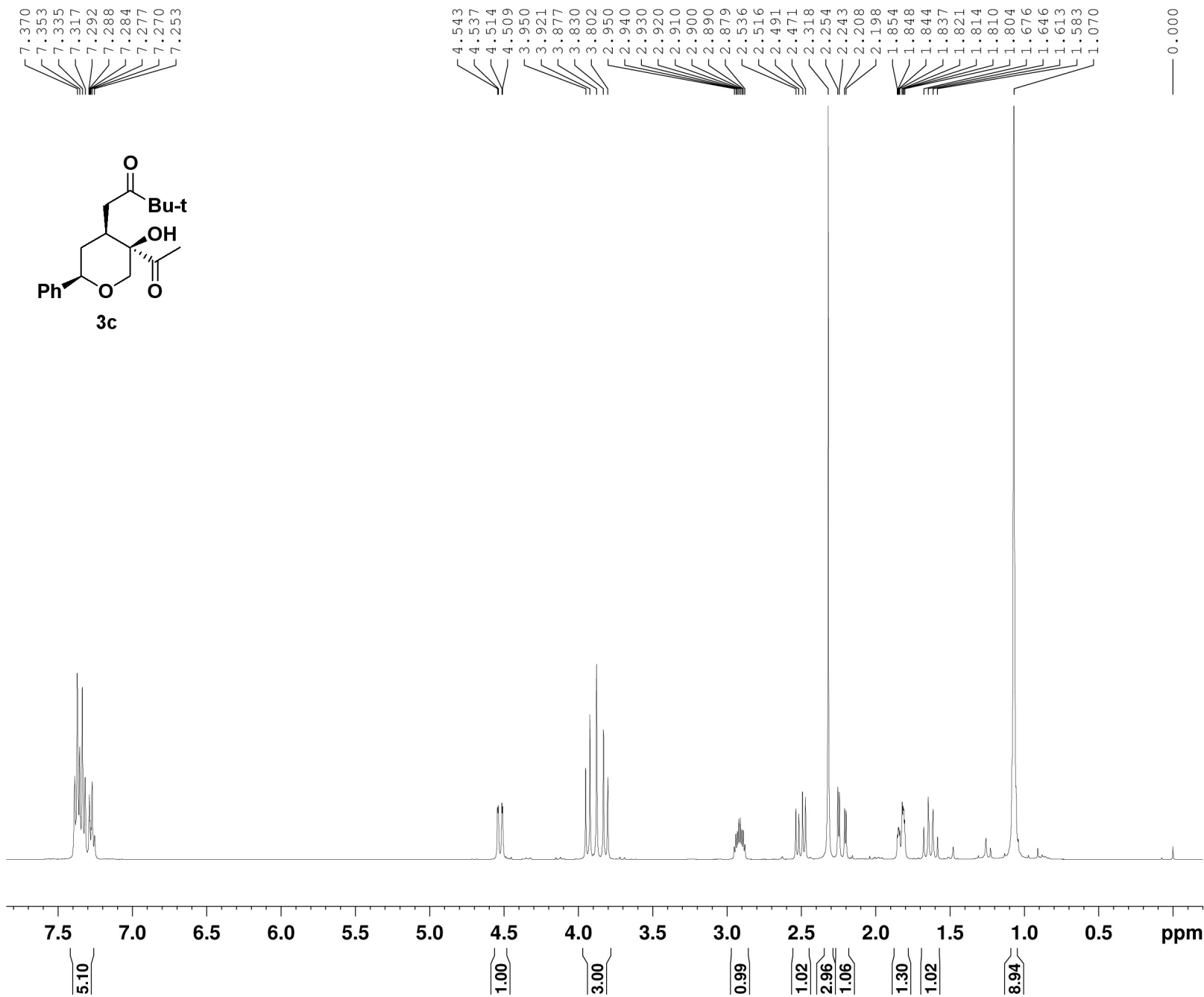
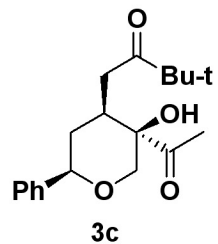
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NAME      zhenghuaiji0720-Piv-guanhuan
EXPNO     11
PROCNO    1
Date_     20090720
Time      15.13
INSTRUM   spect
PROBHD    5 mm FABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDC13
NS         64
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         2050
DW         20.800 usec
DE         6.50 usec
TE         294.2 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       13C
P1         9.40 usec
PL1        -2.00 dB
PL1W       57.32743073 W
SFO1       100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      90.00 usec
PL2        -2.00 dB
PL12       15.50 dB
PL13       15.50 dB
PL2W       18.19349861 W
PL12W      0.32353121 W
PL13W      0.32353121 W
SFO2       400.1316005 MHz
SI         32768
SF         100.6127766 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

```

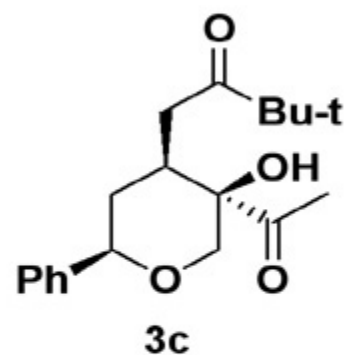



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NAME      zhenghuaiji0720-Piv-guanhuan
EXPNO     10
PROCNO    1
Date_     20090720
Time      15.08
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         64
DW         60.800 usec
DE         6.50 usec
TE         293.5 K
D1         1.00000000 sec
D1         1
TD0        1

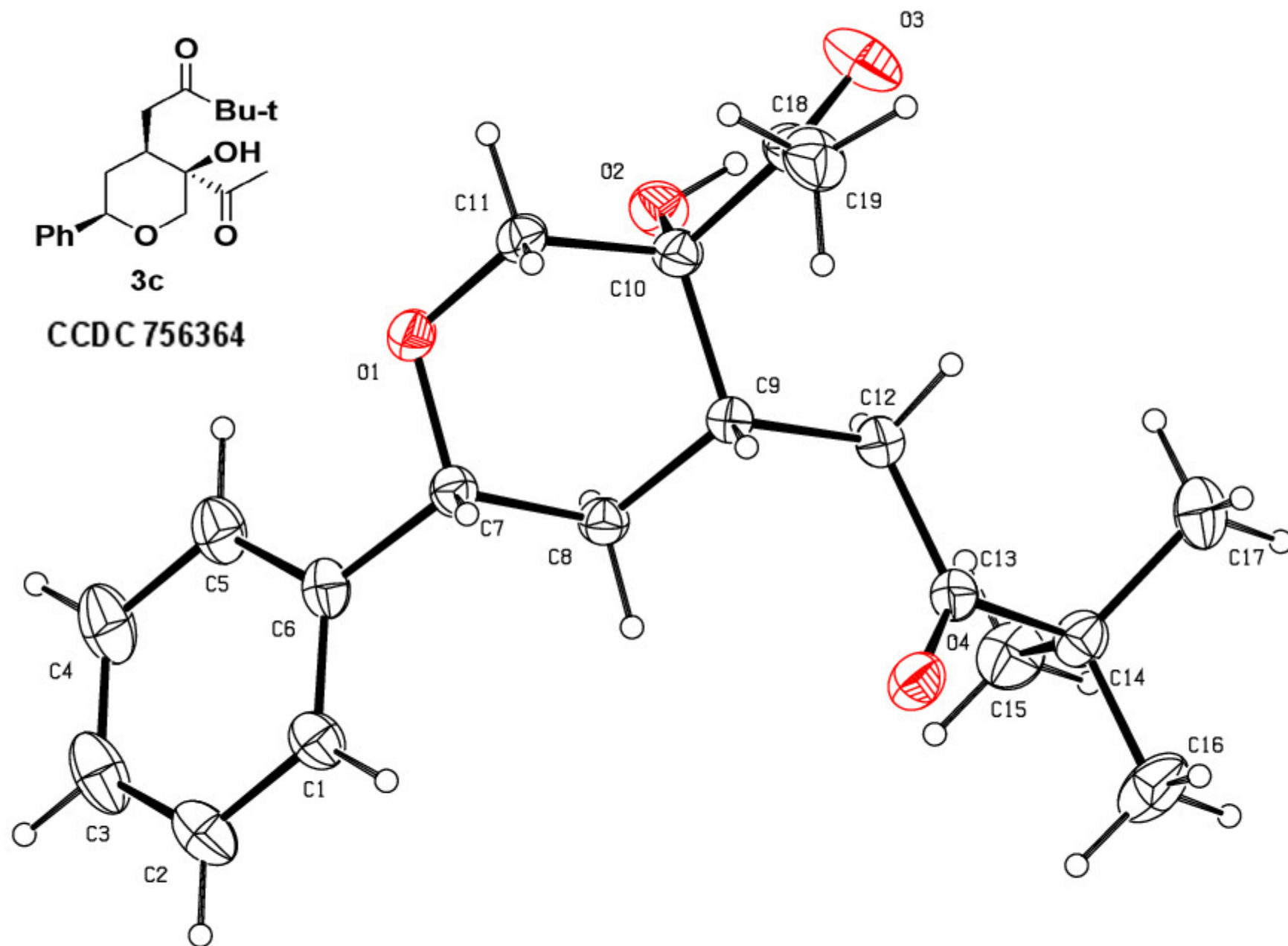
===== CHANNEL f1 =====
NUC1       1H
P1         14.60 usec
PL1        0.00 dB
PL1W       11.47932053 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300013 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

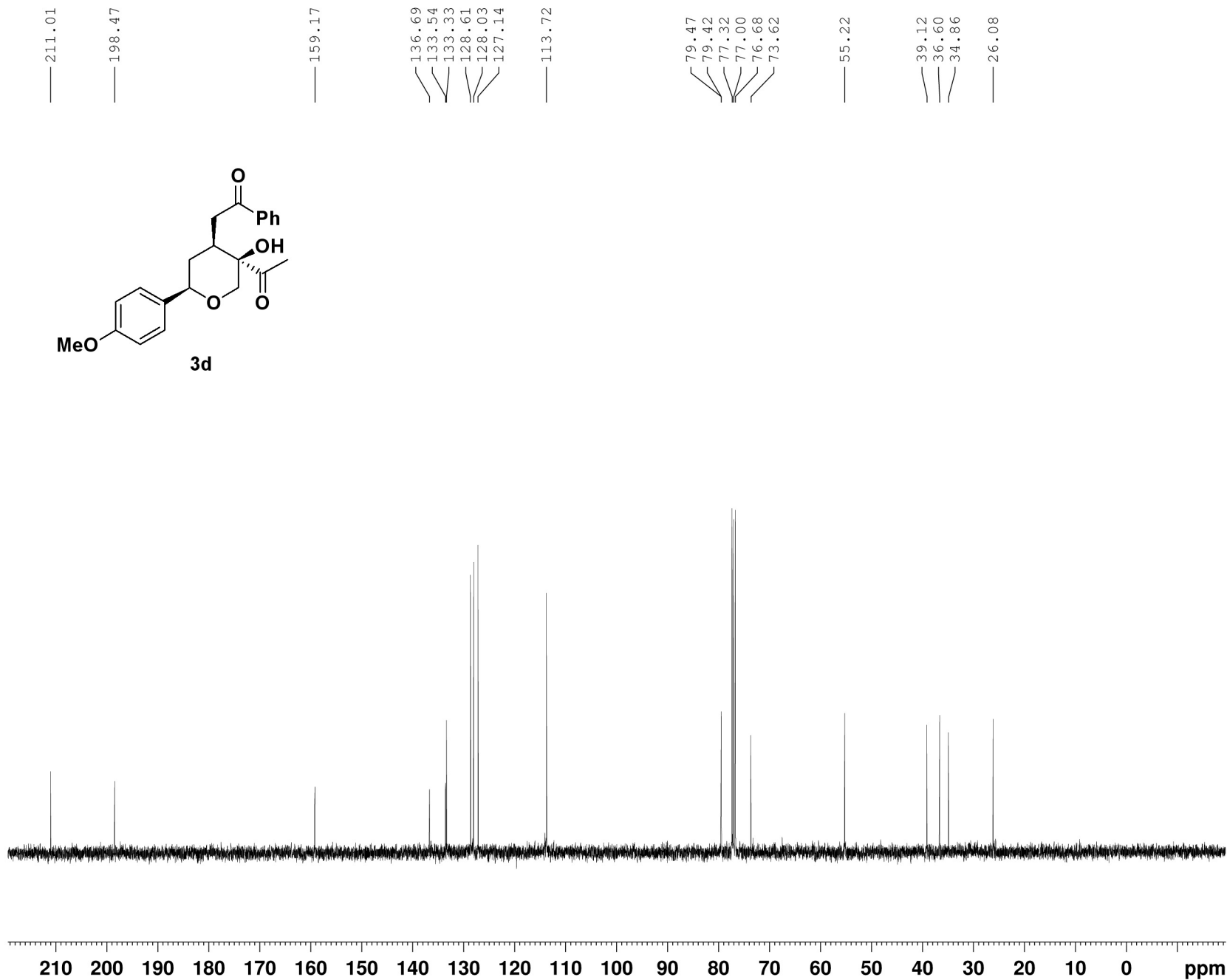
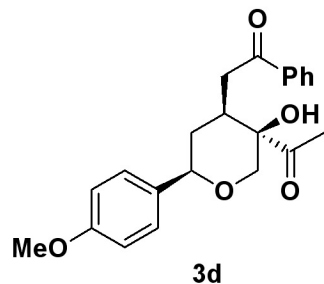
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3c

CCDC 756364





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NAME      zhenghuaiji0902
EXPNO     11
PROCNO    1
Date_     20090902
Time      12.59
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zgpg30
TD         65536
SOLVENT    CDCl3
NS         32
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         114
DW         20.800 usec
DE         6.50 usec
TE         296.4 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

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===== CHANNEL f1 =====
NUC1      13C
P1        9.70 usec
PL1       -2.00 dB
PL1W      56.13311005 W
SFO1      100.6228298 MHz

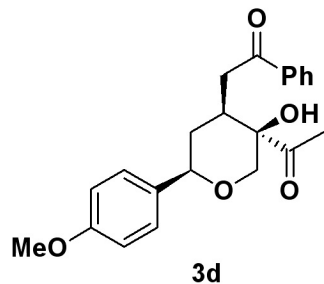
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -2.10 dB
PL12      13.90 dB
PL13      13.90 dB
PL2W      17.72104263 W
PL12W     0.44513249 W
PL13W     0.44513249 W
SFO2      400.1316005 MHz
SI        32768
SF        100.6127740 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

```

7.920
7.902
7.899
7.579
7.561
7.543
7.468
7.449
7.430
7.319
7.297
7.270
6.877
6.855

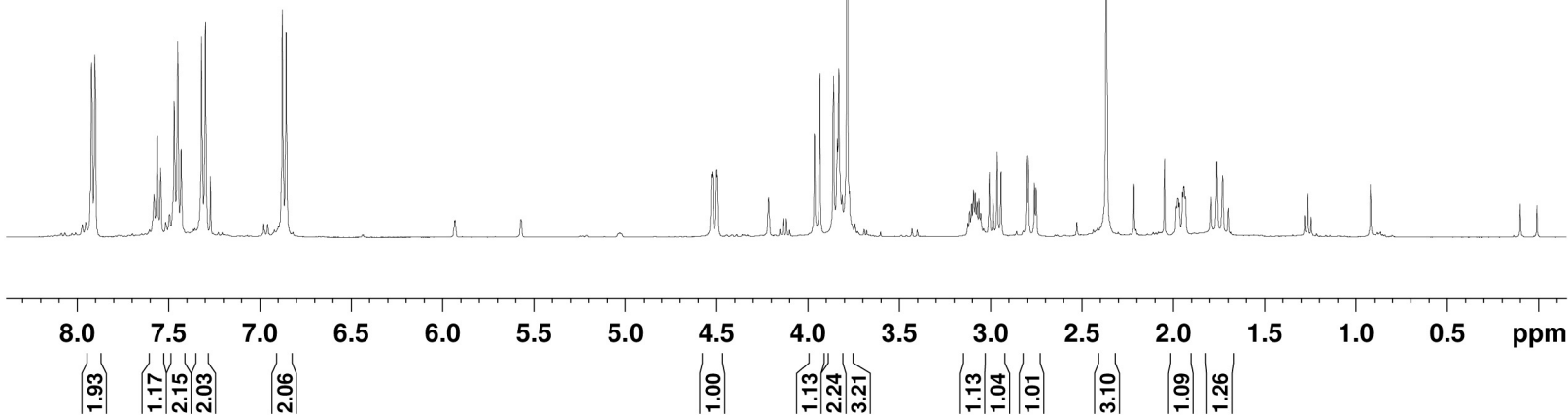


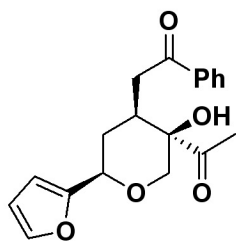
4.527
4.523
4.499
4.494
3.963
3.934
3.859
3.839
3.830
3.784
3.124
3.114
3.103
3.093
3.083
3.073
3.063
3.053
3.006
2.985
2.963
2.942
2.802
2.793
2.759
2.749
2.365
1.983
1.977
1.973
1.967
1.949
1.943
1.940
1.934
1.792
1.762
1.729
1.699

— 0.009

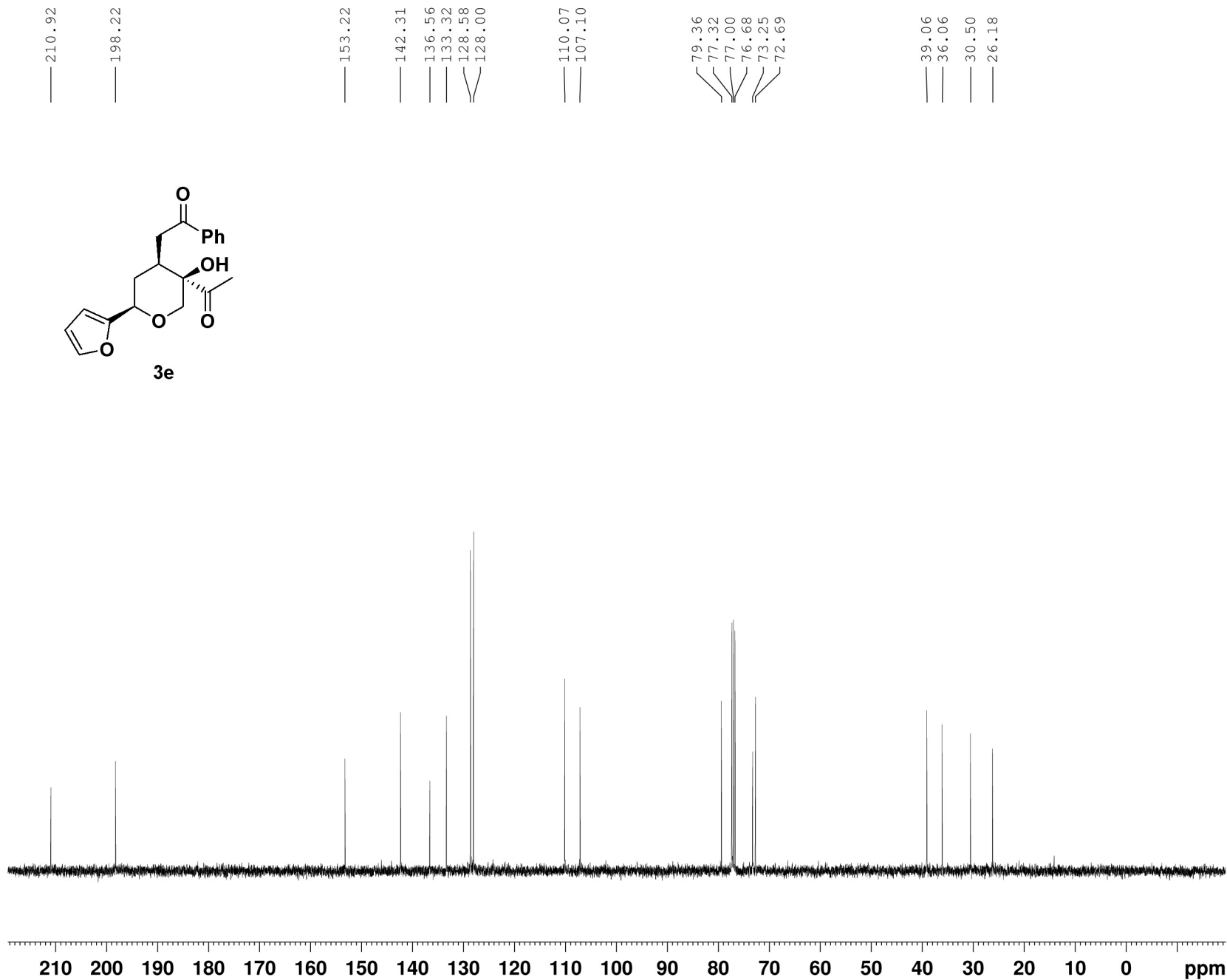
NAME zhenghuaiji0902
EXPNO 10
PROCNO 1
Date_ 20090902
Time 12.55
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 80.6
DW 60.800 usec
DE 6.50 usec
TE 295.1 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.70 usec
PL1 -1.00 dB
PL1W 13.75590801 W
SFO1 400.1324710 MHz
SI 32768
SF 400.1300010 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00





3e

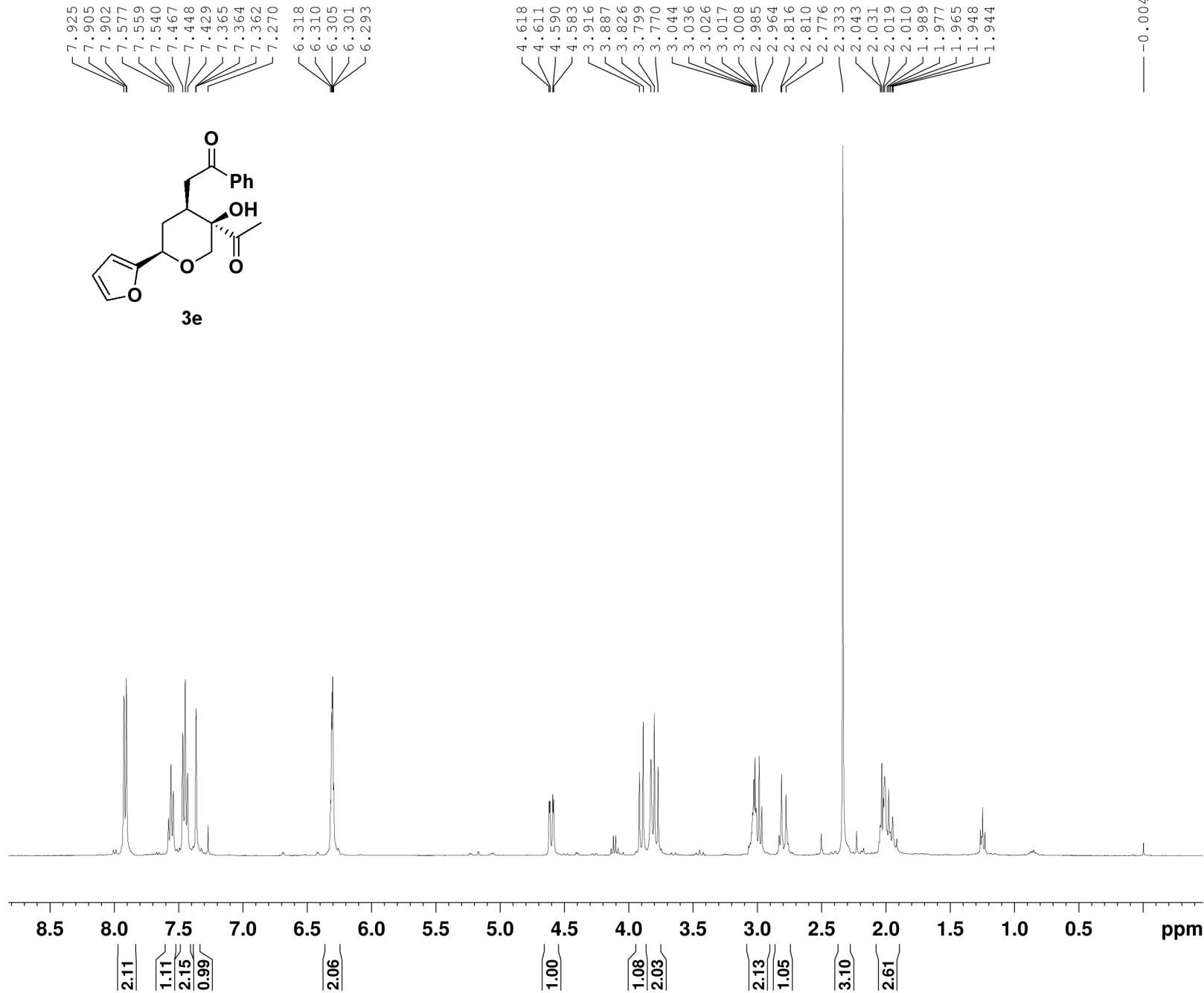


```

NAME      zhenghuaij10828-Funan-Bz-guanhuan
EXPNO     11
PROCNO    1
Date_     20090829
Time      4.37
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS         32
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         2050
DW         20.800 usec
DE         6.50 usec
TE         294.9 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       13C
P1         9.40 usec
PL1        -2.00 dB
PL1W       57.32743073 W
SFO1       100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      90.00 usec
PL2         -2.00 dB
PL12       15.50 dB
PL13       15.50 dB
PL2W       18.19349861 W
PL12W      0.32353121 W
PL13W      0.32353121 W
SFO2       400.1316005 MHz
SI         32768
SF         100.6127780 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
FC         1.40
  
```

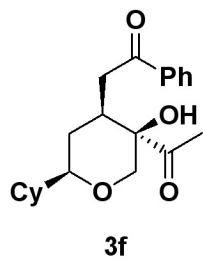


```

NAME      zhenghuaiji0828-Funan-Bz-guanhuan
EXPNO     10
PROCNO    1
Date_     20090829
Time      4.34
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zg30
TD         65536
SOLVENT    CDCl3
NS         8
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         64
DW         60.800 usec
DE         6.50 usec
TE         294.1 K
DL         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         12.00 usec
PL1        -3.00 dB
PL1W       22.90425682 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300006 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

```



— 211.13

— 198.55

— 136.72

— 133.21

— 128.55

— 128.01

— 82.04

— 79.86

— 77.32

— 77.00

— 76.68

— 73.36

— 42.62

— 39.40

— 36.14

— 30.12

— 28.77

— 28.53

— 26.40

— 26.03

— 25.90

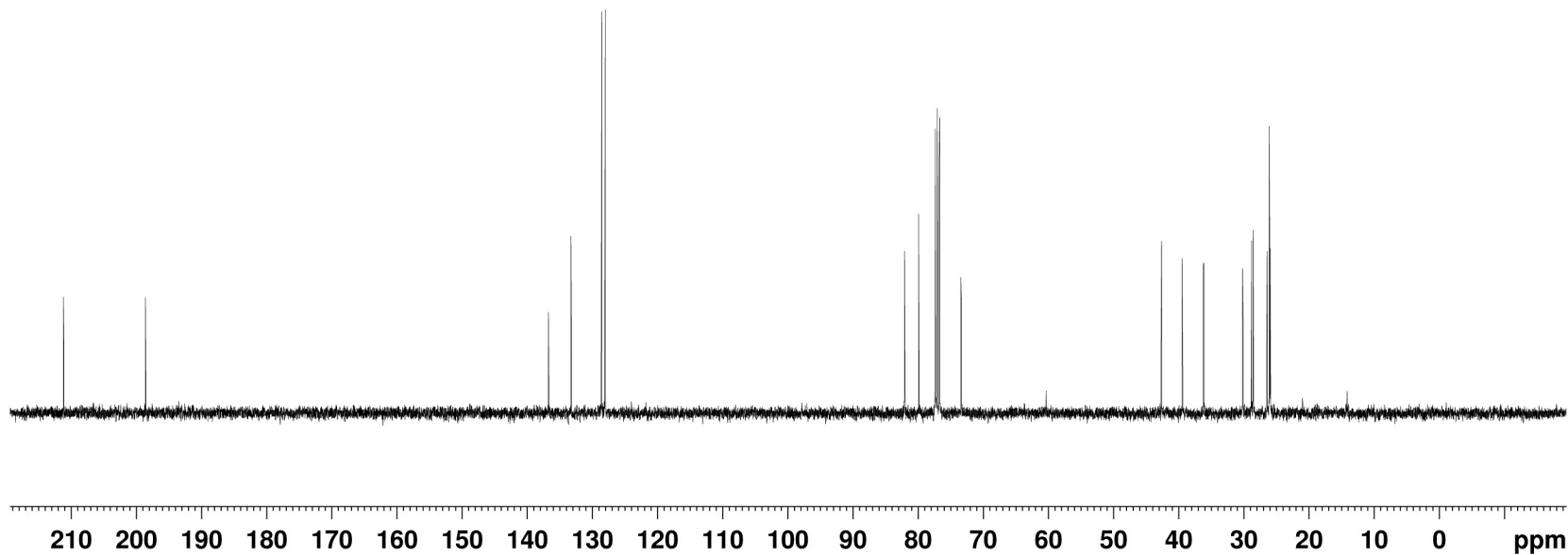
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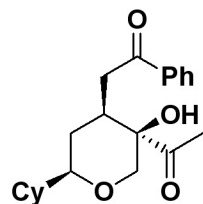
NAME      zhenghuaiji0820-Cy6-Bz-guanhuanxiadian
EXPNO     1
PROCNO    1
Date_     20090820
Time      23.00
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zgpg30
TD         65536
SOLVENT    CDCl3
NS         32
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         2050
DW         20.800 usec
DE         6.50 usec
TE         296.7 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       13C
P1         9.40 usec
PL1        -2.00 dB
PL1W       57.32743073 W
SFO1       100.6228298 MHz

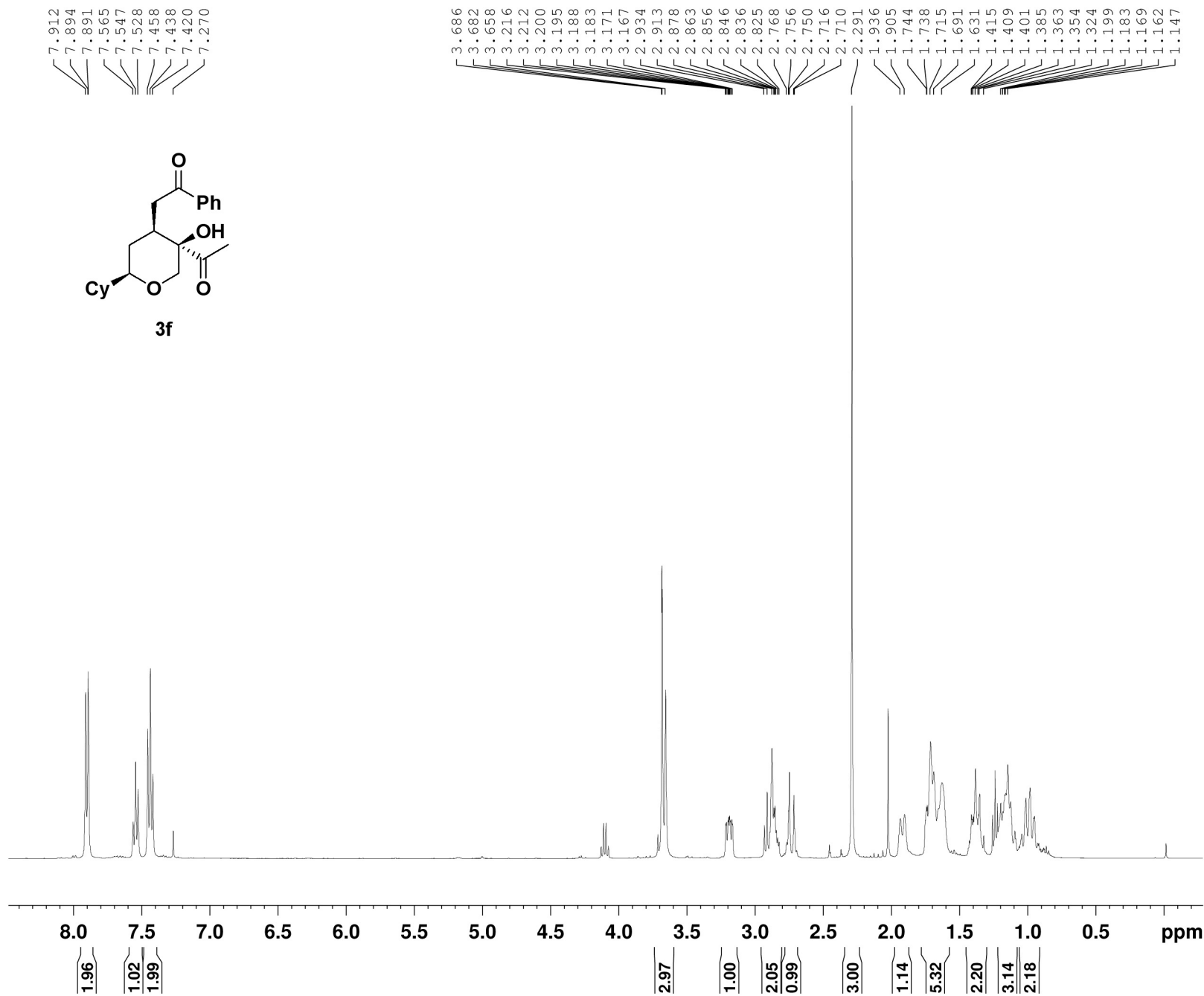
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      90.00 usec
PL2        -2.00 dB
PL12       15.50 dB
PL13       15.50 dB
PL2W       18.19348861 W
PL12W      0.32353121 W
PL13W      0.32353121 W
SFO2       400.1316005 MHz
SI         32768
SF         100.6127758 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

```





3f

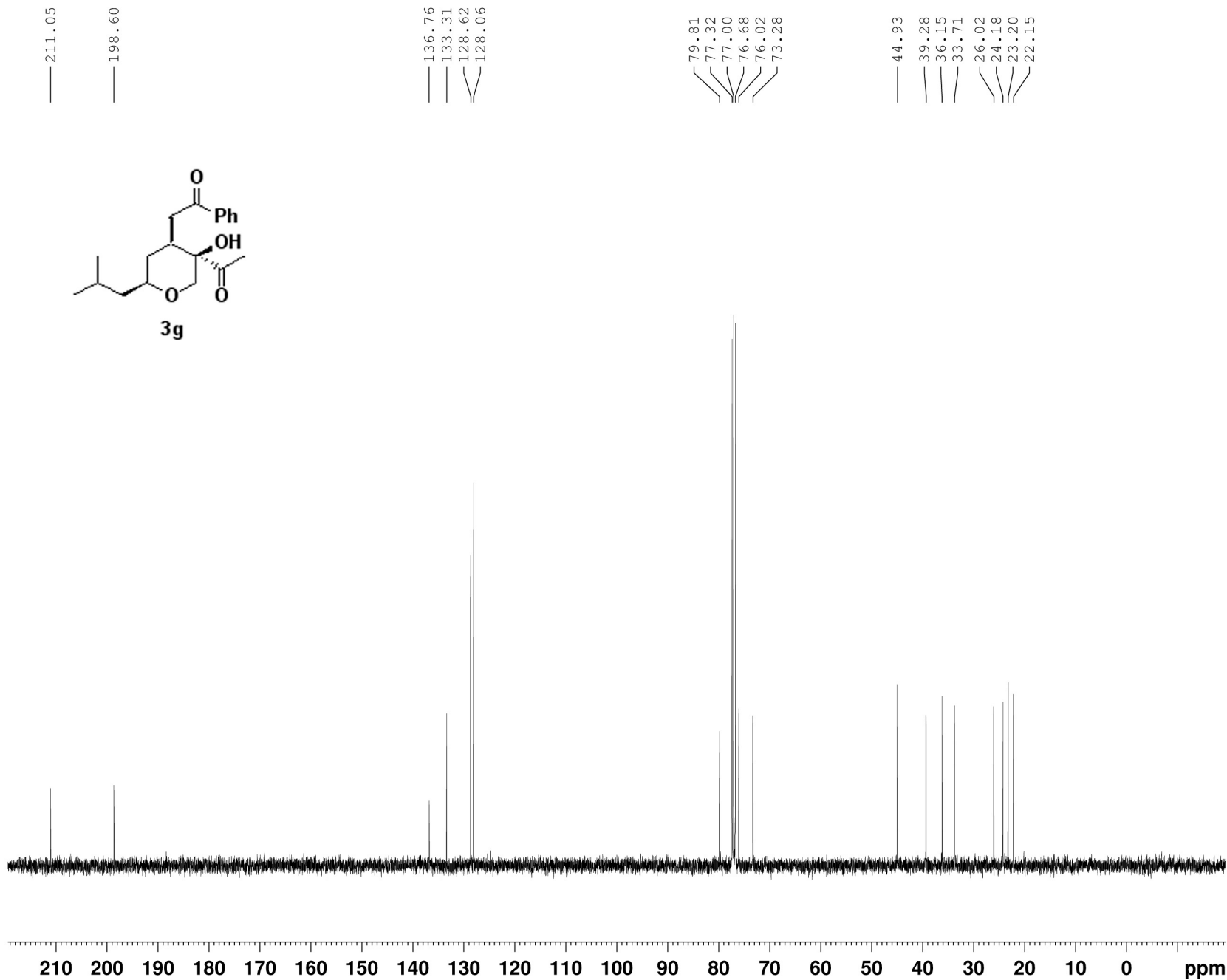
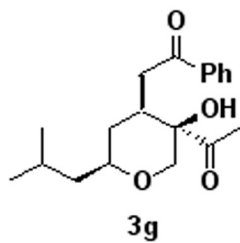


```

NAME      zhenghuaiji0820-Cy6-Bz-guanhuanxiadian
EXPNO     10
PROCNO    1
Date_     20090820
Time      22.57
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zg30
TD         65536
SOLVENT    CDCl3
NS         10
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         57
DW         60.800 usec
DE         6.50 usec
TE         296.1 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         12.00 usec
PL1        -3.00 dB
PL1W       22.90425682 W
SFO1       400.1324719 MHz
SI         32768
SF         400.1300007 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

```

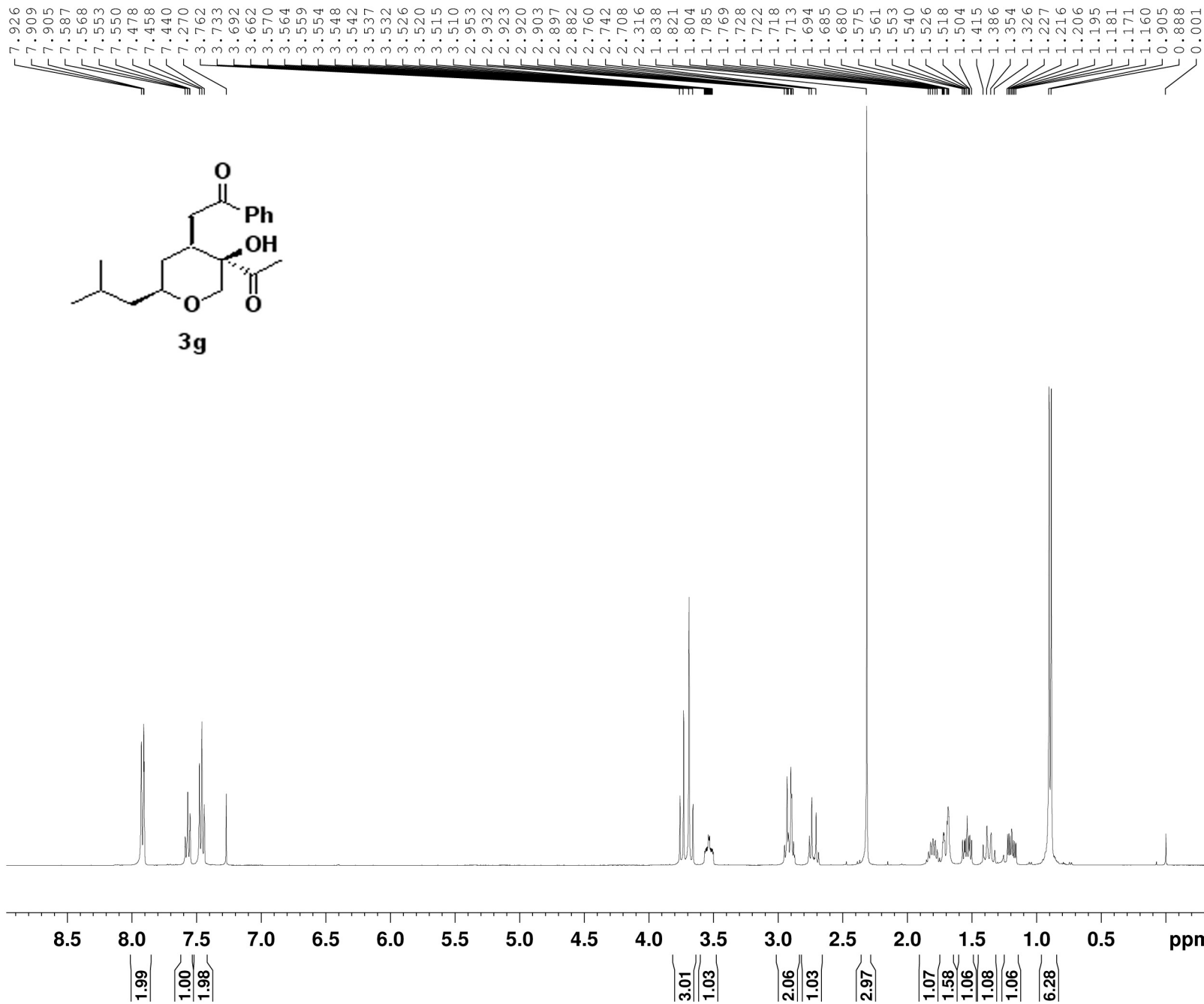
```

NAME      zhenghuaiji0910-yiwuquan-Bz-guanhuan
EXPNO     1
PROCNO    1
Date_     20090911
Time      9.16
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        64
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        645
DW        20.800 usec
DE        6.50 usec
TE        295.8 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0       1

===== CHANNEL f1 =====
NUC1      13C
P1        9.70 usec
PL1       -2.00 dB
PL1W      56.13111005 W
SFO1      100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -2.10 dB
PL12      13.90 dB
PL13      13.90 dB
PL1W      17.72104263 W
PL12W     0.44513249 W
PL13W     0.44513249 W
SFO2      400.1316005 MHz
SI        32768
SF        100.6127707 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

```

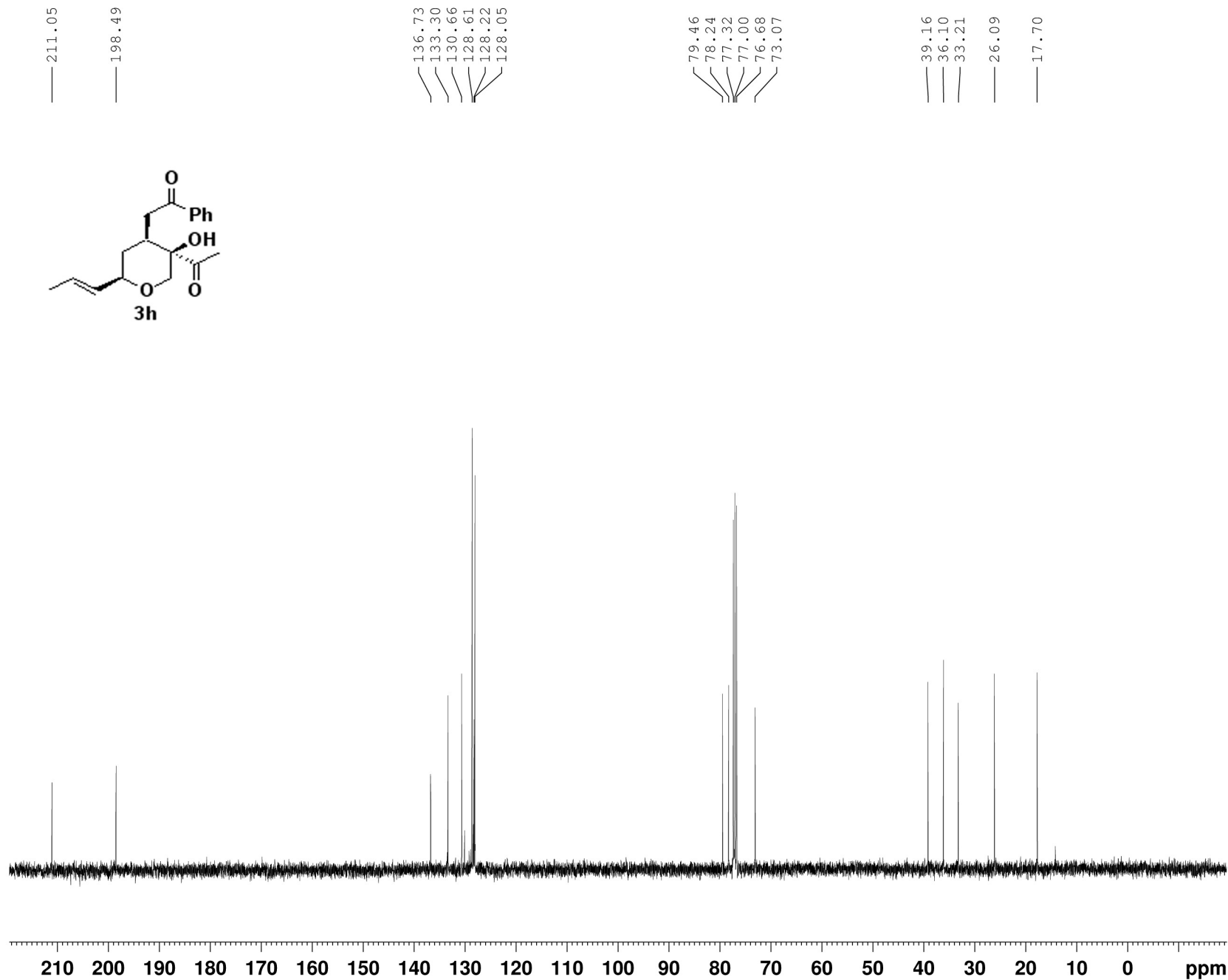
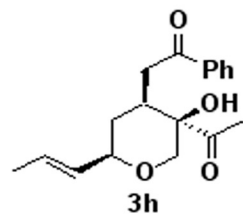


```

NAME      zhenghuaij10910-yiwuquan-Bz-guanhuan
EXPNO     10
PROCNO    1
Date_     20090911
Time      5.11
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zg30
TD         65536
SOLVENT    CDCl3
NS         16
DS         2
SWH         8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         101
DW         60.800 usec
DE         6.50 usec
TE         294.6 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         14.70 usec
PL1        -1.00 dB
PL1W       13.75590801 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300011 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

```

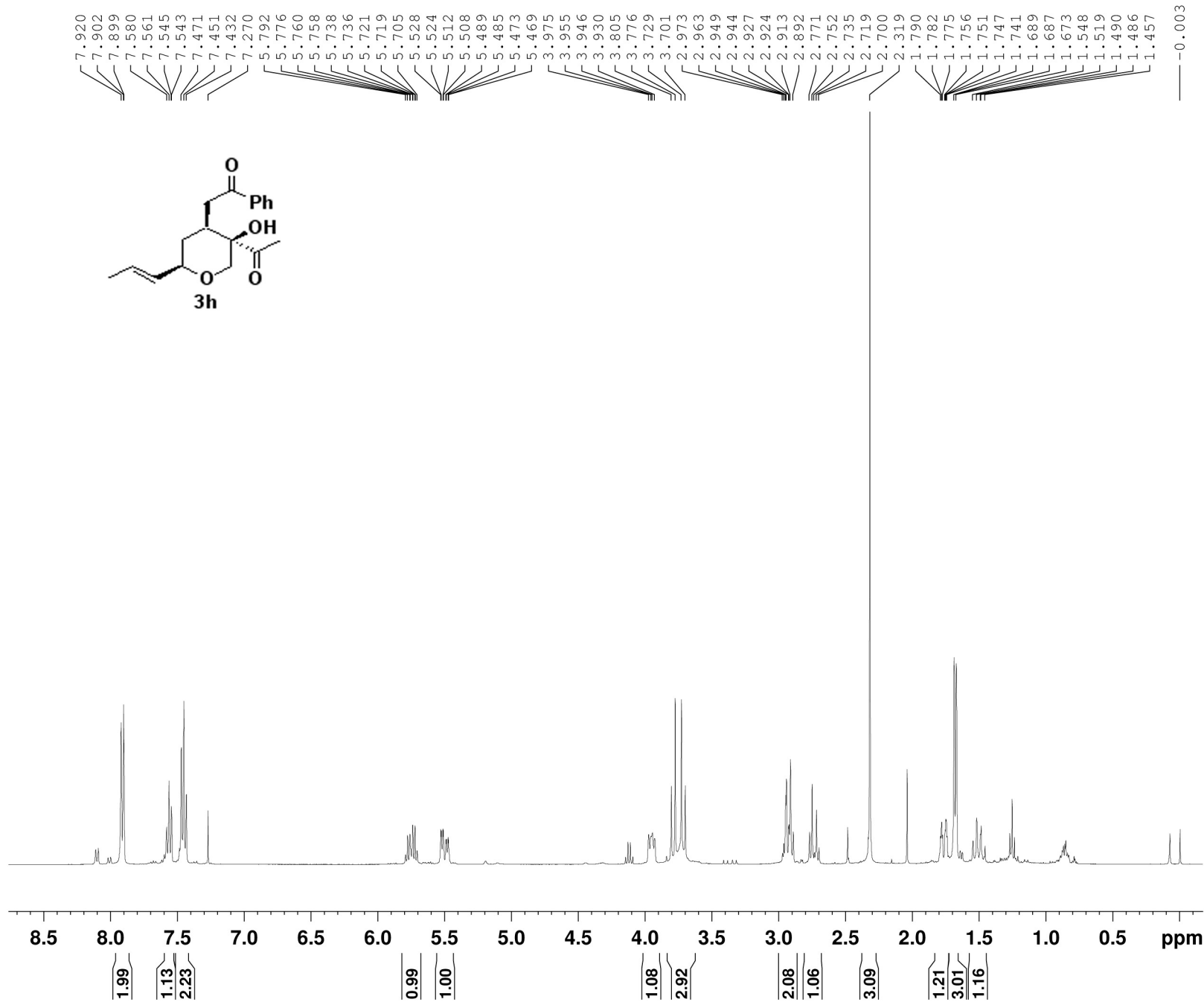


```

NAME          zhenghuaiji0904-badouquan-Bz-guanhuan
EXPNO         1
PROCNO        1
Date_         20090904
Time          21.12
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDC13
NS            64
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            161
DW            20.800 usec
DE            6.50 usec
TE            297.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          13C
P1            9.70 usec
PL1           -2.00 dB
PL1W          56.13311005 W
SFO1          100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -2.10 dB
PL12          13.90 dB
PL13          13.90 dB
PL2W          17.72104263 W
PL12W         0.44513249 W
PL13W         0.44513249 W
SFO2          400.1316005 MHz
SI            32768
SF            100.6127722 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

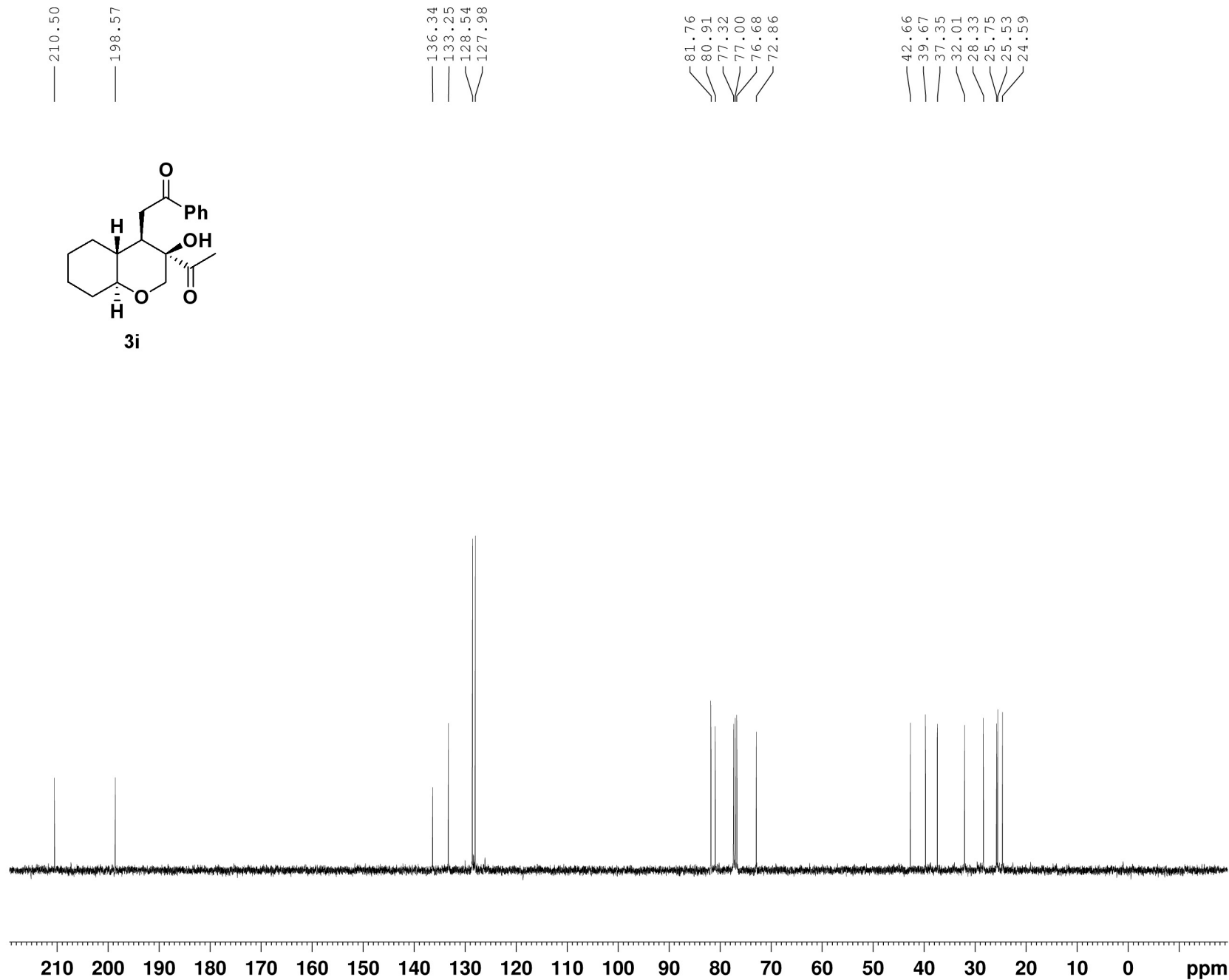


```

NAME      zhenghuaij10904-badouquan-Bz-guanhuan
EXPNO     10
PROCNO    1
Date_     20090904
Time      20.30
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG          90.5
DM         60.800 usec
DE         6.50 usec
TE         295.6 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         14.70 usec
PL1        -1.00 dB
PL1W       13.75590801 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300010 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

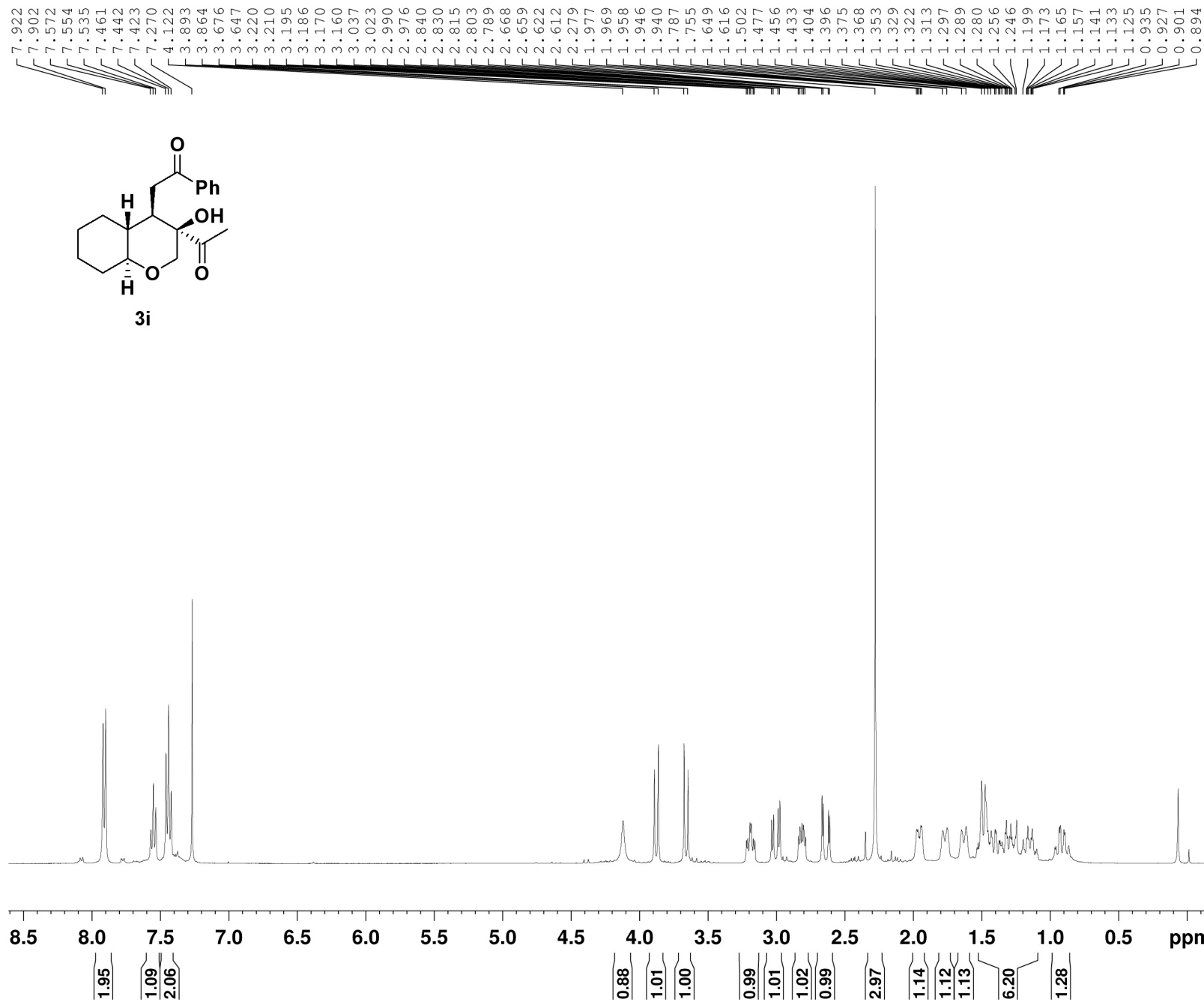
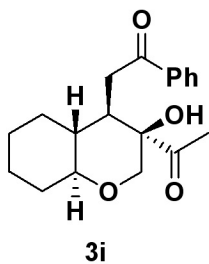
```



```
NAME zhenghuaij10829-Cyqlachuan6-Bz-guanhuan
EXPNO 11
PROCNO 1
Date_ 20090829
Time 23.22
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
ID 65536
SOLVENT CDCl3
NS 32
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 101
DW 20.800 usec
DE 6.50 usec
TE 296.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 -2.00 dB
PL1W 56.1331005 W
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -2.10 dB
PL12 13.90 dB
PL13 13.90 dB
PL2W 17.72104263 W
PL12W 0.44513249 W
PL13W 0.44513249 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6127780 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
```

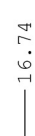
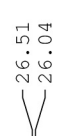
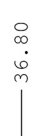
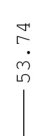
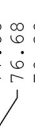
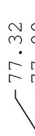
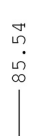
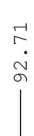
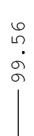
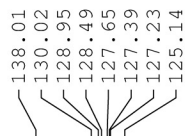
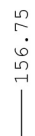
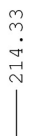


```

NAME      zhenghuaiji0829-Cyclacuan6-Bz-guanhuan-H
EXPNO     1
PROCNO    1
Date_     20090830
Time      3.36
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         8
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         57
DW         60.800 usec
DE         6.50 usec
TE         294.9 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         14.70 usec
PL1        -1.00 dB
PL1W       13.75590801 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300010 MHz
WDW         EM
SSB         0
LB         0.30 Hz
GB         0
PC         1.00

```



```

NAME          zhenghuiji023-Pzhuangji1j1-Bz-guanhuanzhonglan1
EXPNO         11
PROCNO        1
Date_         20090823
Time          19:20
INSTRUM       spect
PROBHD        5 mm PABBO
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
DS            4
SWH            24034.461 Hz
F2RES         0.16679 Hz
AQ            1.3631988 sec
RG            2500
WDW            20.880 usec
SSB            6.50 usec
GB            294.8 K
TE            2.00000000 sec
D1            0.03000000 sec
D11           0.00
===== CHANNEL f1 =====
NUC1           13C
P1            2.40 usec
PL1           -2.50 dB
PL1W          57.32743073 Hz
SFO1          100.6261805 MHz
===== CHANNEL f2 =====
CPROG2        waltz16
NUC2           1H
PCPG2         90.00 usec
PL2           0.00 dB
PL12          15.50 dB
PL13          15.50 dB
PL1W          18.19349861 MHz
PL2W          0.32333121 MHz
PL3W          0.32333121 MHz
PL13W         405.1316855 MHz
SFO2          400.137688 MHz
SF            32768
NUC            1H
P1            0.6127784 MHz
PL            0.00 dB
PLW           1.00 dB
SSB           0
GB            0
SC            1.40

```

7.709
7.692
7.416
7.399
7.380
7.365
7.348
7.329
7.299
7.288
7.263
7.254
7.242
7.229

5.503
5.495

4.572
4.539

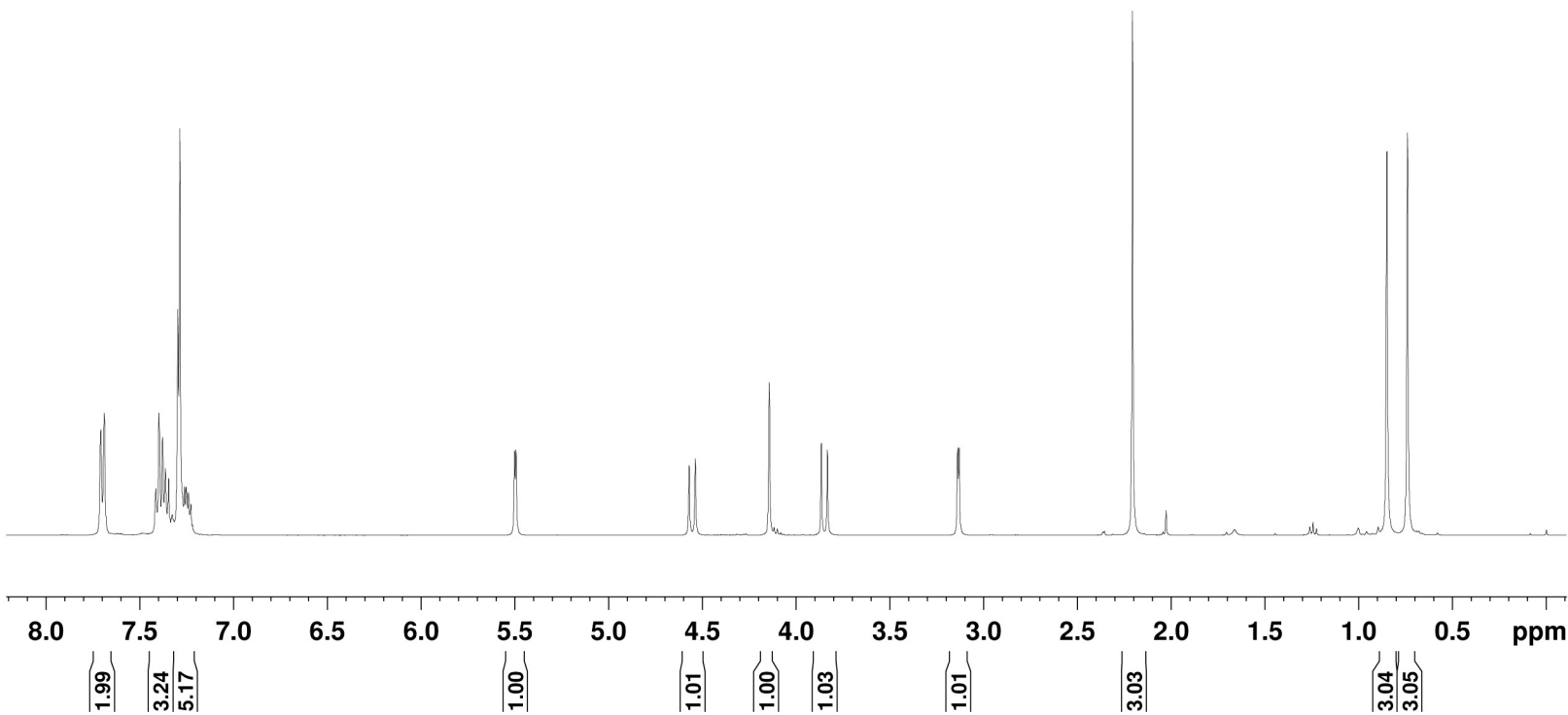
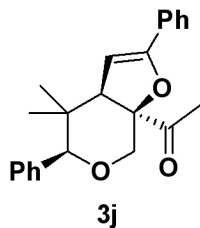
4.145

3.867
3.834

3.140
3.132

2.208

0.851
0.741

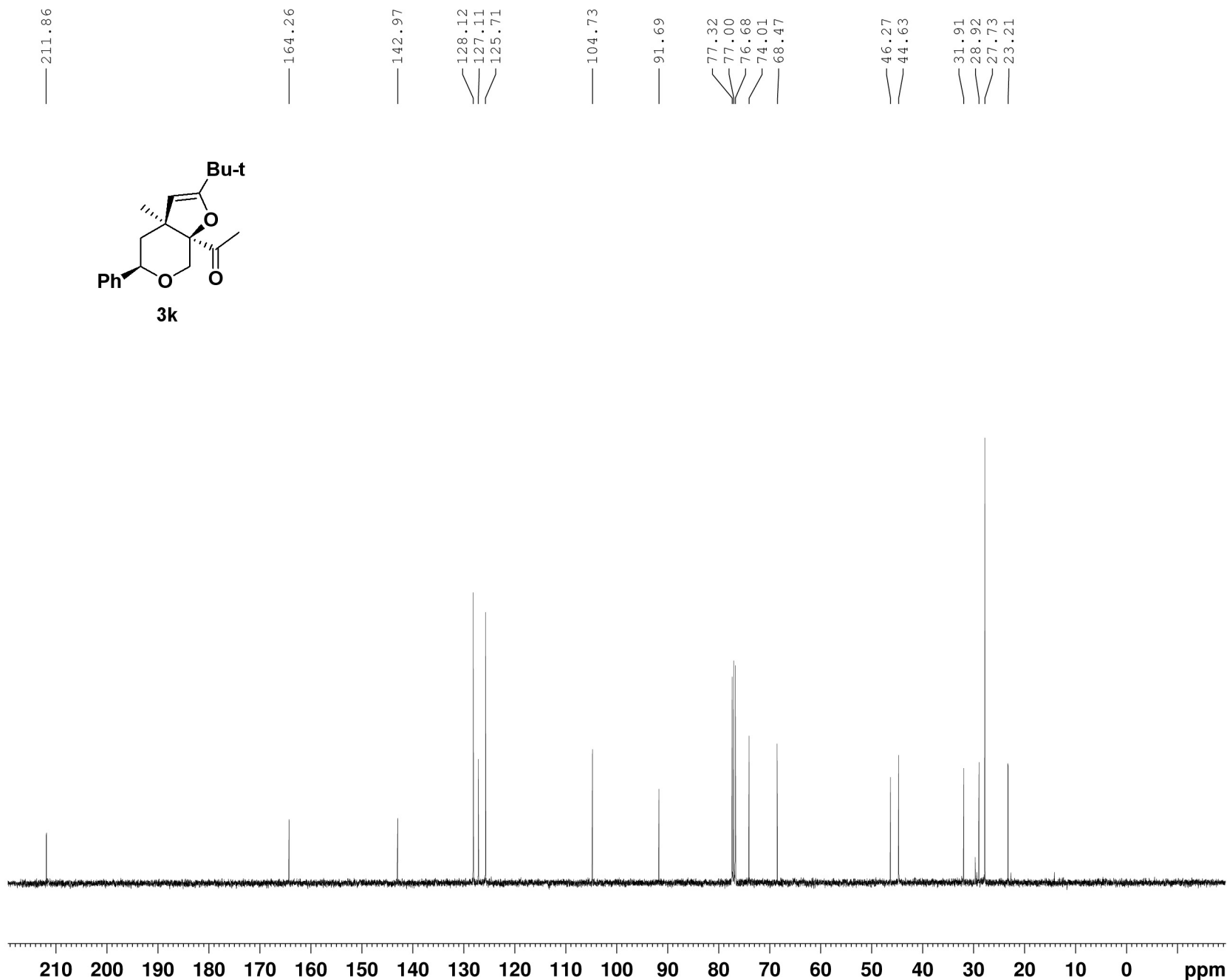
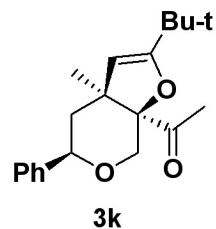


```

NAME      zhenghua1j10823-Phuangjiaji-Hz-guanhuanzhongdian
EXPNO     1
PROCNO    1
Date_     20090823
Time      17.16
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zgpg30
TD          65536
SOLVENT    CDCl3
NS          8
DS          2
SWH         8223.685 Hz
FIDRES     0.123483 Hz
AQ          3.9846387 sec
RG          50.8
DW          60.800 usec
DE          6.20 usec
TE          304.2 K
D3          1.00000000 sec
TD0         1

----- CHANNEL f1 -----
NUC1       13
P1          12.00 usec
PL1         0.00 dB
PL1W        22.90425682 W
SFO1        400.1324710 MHz
Z1          17.768
SF          400.1300174 MHz
WDW          EM
SSB          0
LB          0.30 Hz
GB          0
PC          1.00

```

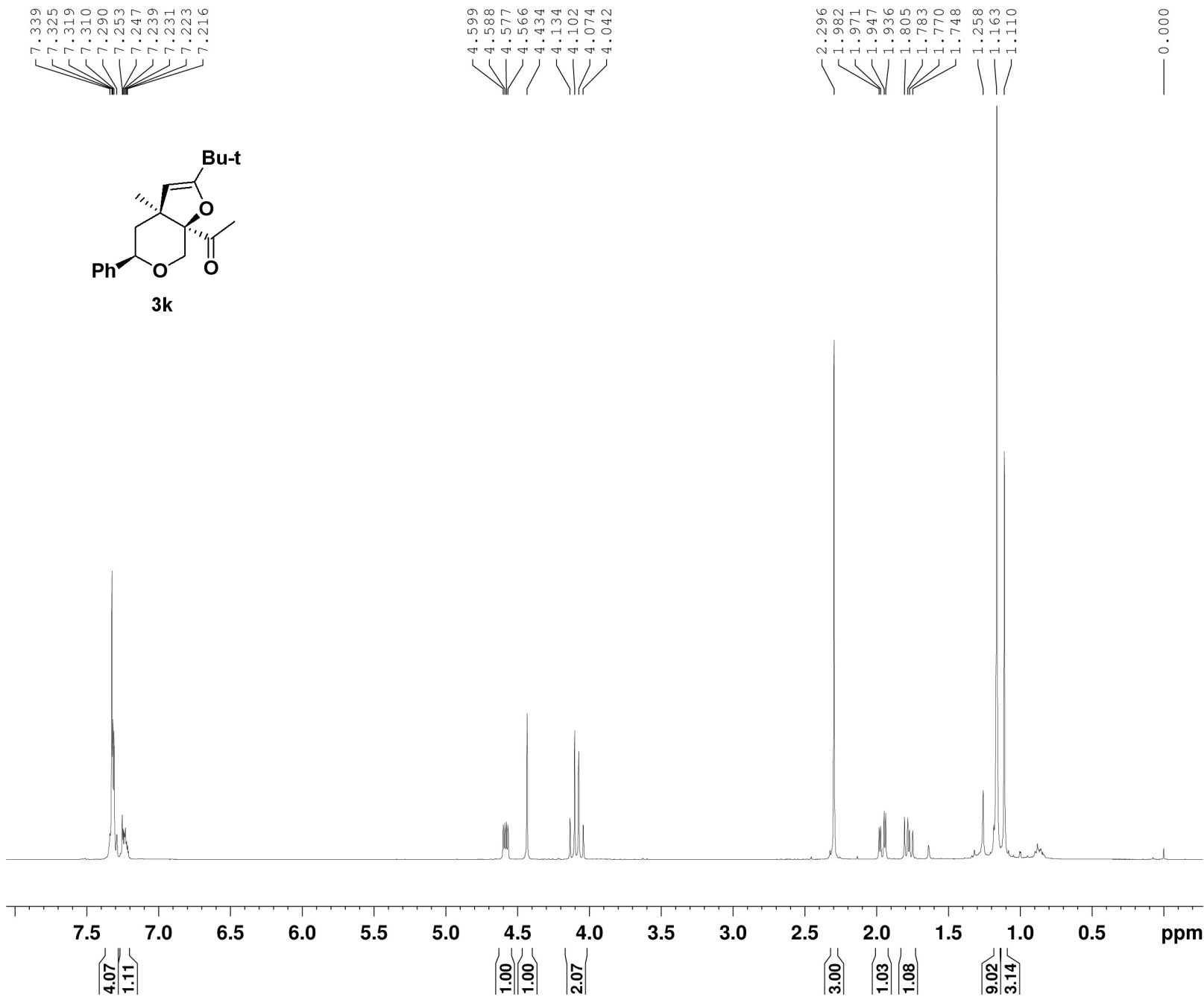
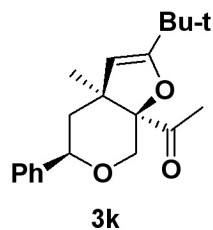
```

NAME          zhenghuaiji0725-dw2-Piv-guanhuan
EXPNO         11
PROCNO        1
Date_         20090725
Time          14.39
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            64
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            90.5
DW            20.800 usec
DE            6.50 usec
TE            296.6 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          13C
P1            9.70 usec
PL1           -2.00 dB
PL1W          56.13311005 W
SFO1          100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -2.10 dB
PL12          13.90 dB
PL13          13.90 dB
PL2W          17.72104263 W
PL12W         0.44513249 W
PL13W         0.44513249 W
SFO2          400.1316005 MHz
SI            32768
SF            100.6127714 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40

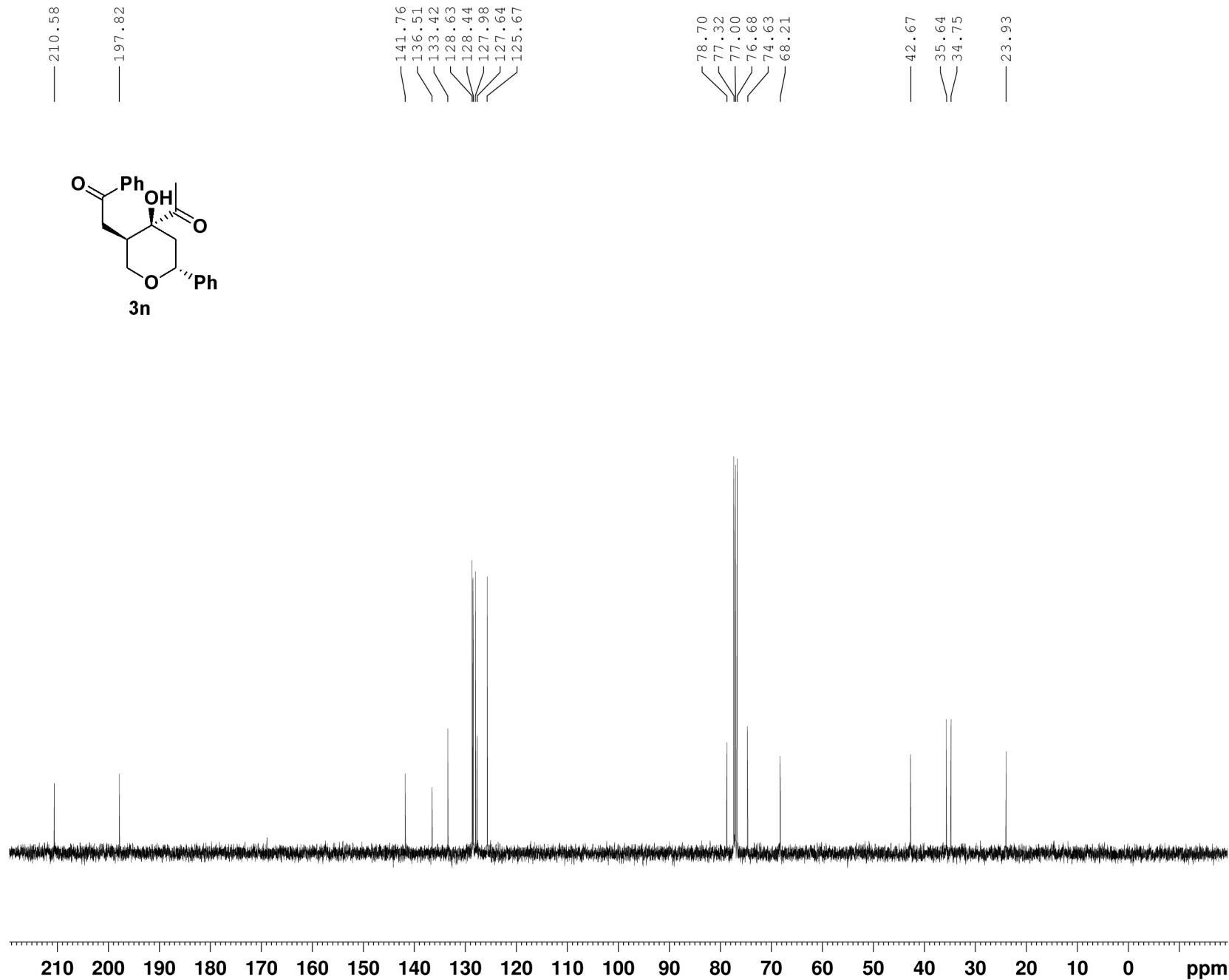
```



```

NAME      zhenghuaij10725-dw2-Piv-guanhuan
EXPNO     10
PROCNO    1
Date_     20090725
Time      14.33
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         64
DW         60.800 usec
DE         6.50 usec
TE         295.4 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         14.70 usec
PL1        -1.00 dB
PL1W       13.75590801 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300076 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```

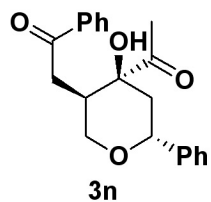


```
NAME zhenghuaiji0823-Phixibingji-Ba-guanhuanxidian2mg
EXPNO 1
PROCNO 1
Date_ 20090824
Time 1.24
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 32
DS 4
SWH 24038.461 Hz
FIDRES 0.166798 Hz
AQ 1.3631988 sec
RG 2050
SW 20.800 usec
DE 6.50 usec
TE 294.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0

===== CHANNEL f1 =====
NUC1 13C
P1 9.40 usec
PL1 -2.00 dB
PL1W 57.32743073 W
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -2.00 dB
PL2W 15.50 dB
PL13 15.50 dB
PL1W 18.19349861 W
PL12W 0.32353121 W
PL13W 0.32353121 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6127740 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
```

7.551
7.548
7.471
7.452
7.433
7.404
7.401
7.383
7.371
7.366
7.353
7.334
7.301
7.297
7.293
7.285
7.279
7.273
7.262
7.254



4.848
4.843
4.820
4.815

4.283
4.079
4.066
4.051
4.039
3.789
3.761
3.733
3.107
3.093
3.079
3.065
3.051
3.038
2.732
2.718
2.331
2.159
2.130
2.126
2.098
1.735
1.729
1.702
1.697

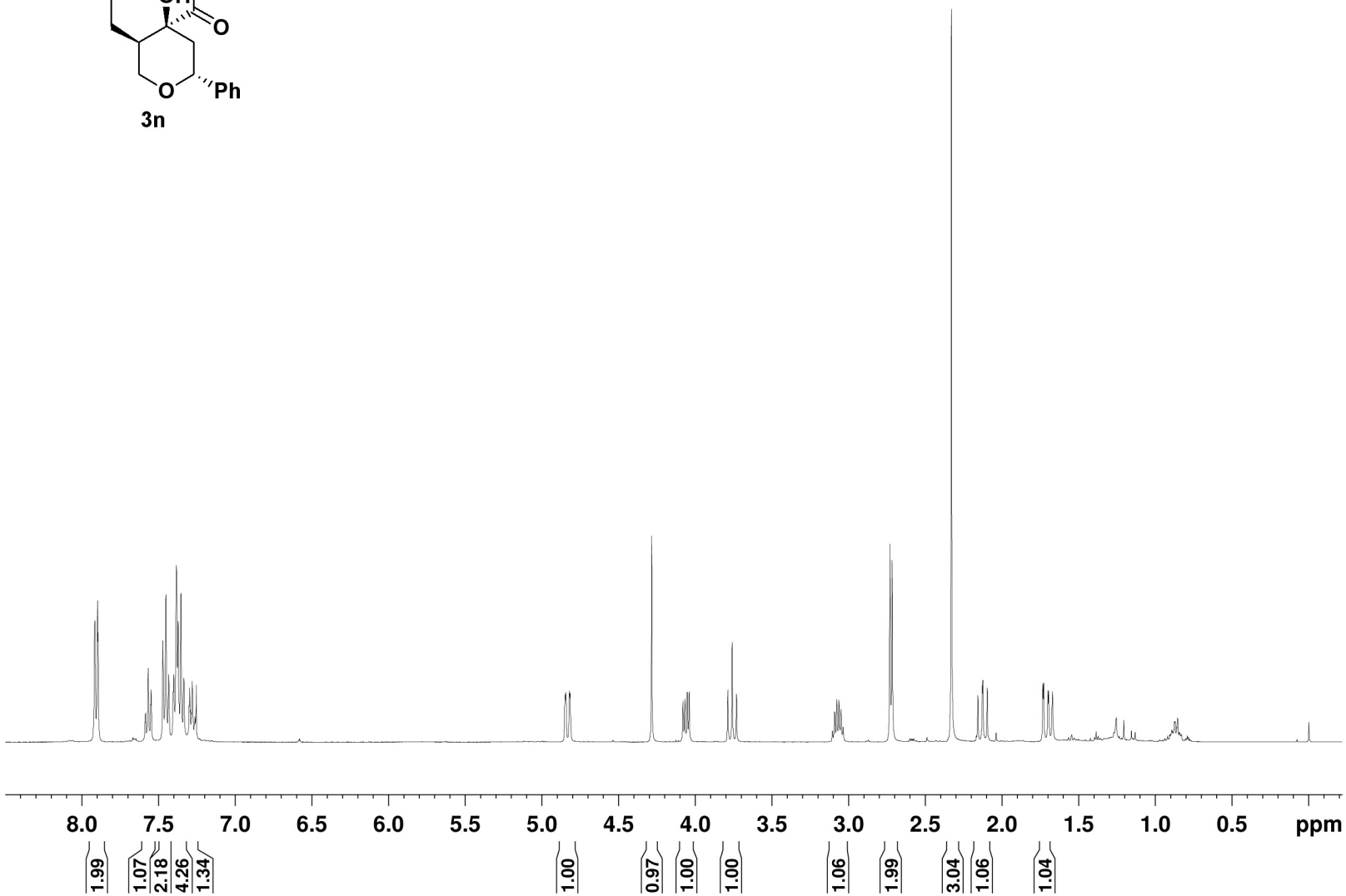
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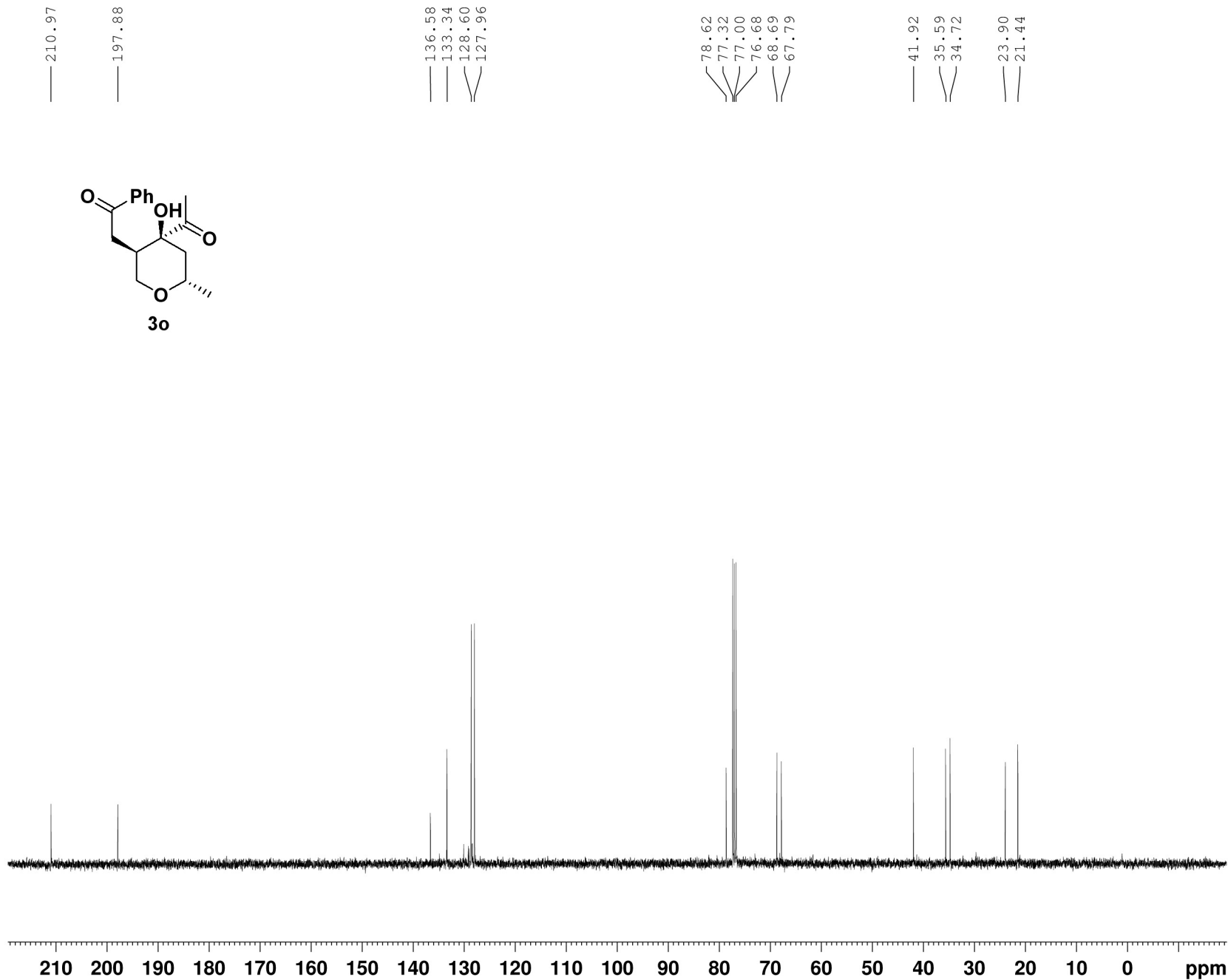
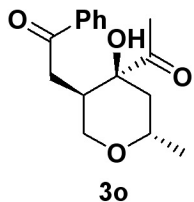
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NAME      zhenghuaij10823-Phaibingji-Bz-guanhuanxidian27mg
EXPNO     1
PROCNO    1
Date_     20090824
Time      1.21
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zg30
TD         65536
SOLVENT    CDCl3
NS         8
DS         2
SWH        8223.685 Hz
FIDRES     0.123483 Hz
AQ         3.9846387 sec
RG         161
DW         60.800 usec
DE         4.50 usec
TE         293.2 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         12.00 usec
PL1        -3.00 dB
PL1W       22.90456650 Hz
SF01       400.1324710 MHz
ST         32768
SF         400.1300075 MHz
WDW        RM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

```





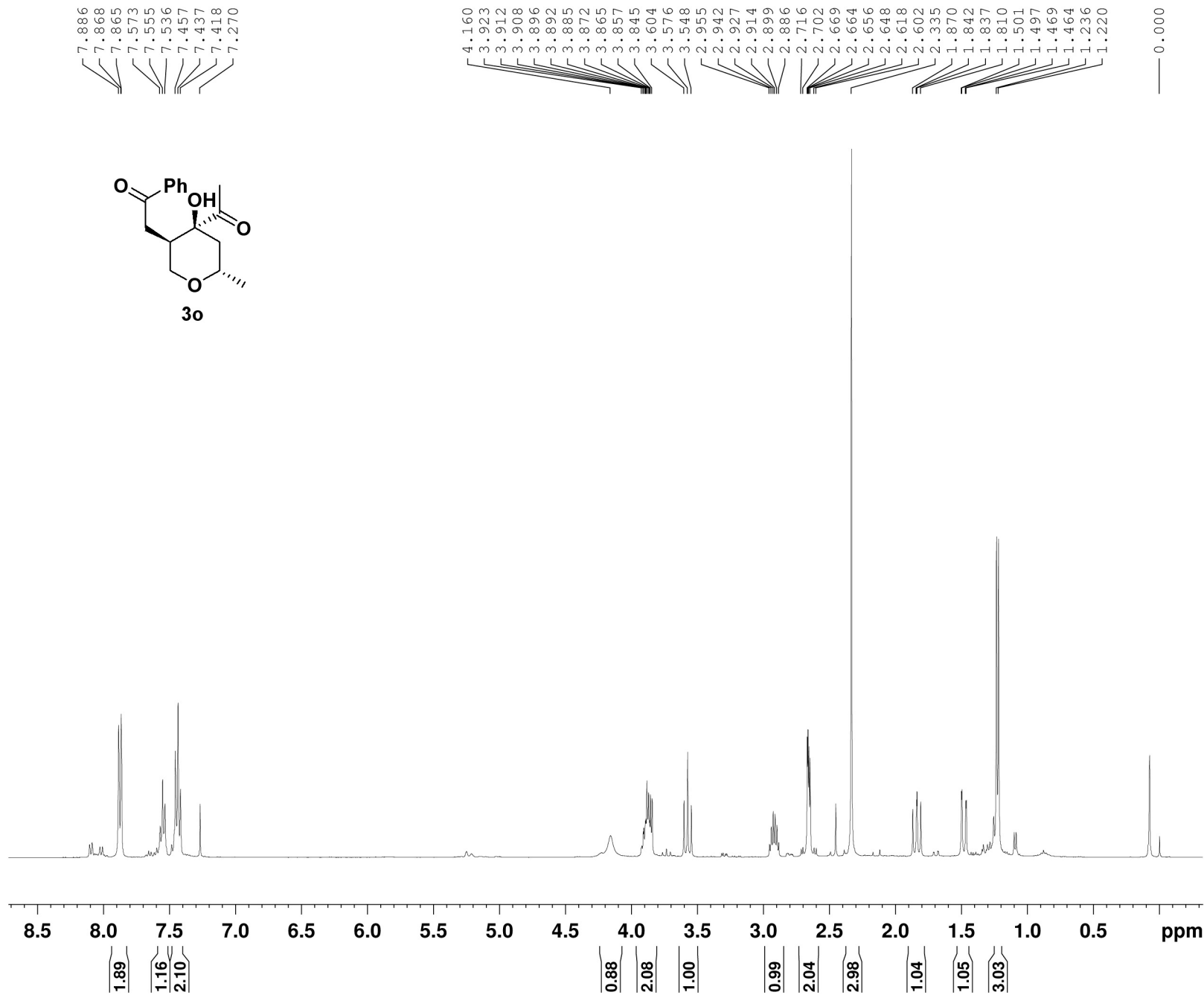
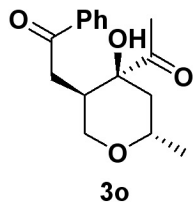
```

NAME      zhenghuaiji0831-jiajixibingji-Bz-guanhuan
EXPNO     11
PROCNO    1
Date_     20090831
Time      14.52
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zgpg30
TD         65536
SOLVENT    CDCl3
NS         64
DS         4
SWH         24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         101
DW         20.800 usec
DE         5.50 usec
TE         296.4 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

----- CHANNEL f1 -----
NUC1       13C
P1         9.70 usec
PL1        -2.00 dB
PL1W       56.1331005 W
SFO1       100.6228298 MHz

----- CHANNEL f2 -----
CPDPRG2    waltz16
NUC2       1H
PCPD2      80.00 usec
PL2        -2.10 dB
PL12       13.90 dB
PL13       13.90 dB
PL2W       17.72104263 W
PL12W      0.44513249 W
PL13W      0.44513249 W
SFO2       400.1316005 MHz
SI         32768
SF         100.6127711 MHz
WCM        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

```



```

NAME      zhenghuaiji0831-jiajixibingji-Br-guanhuan
EXPNO     10
PROCNO    1
Date_     20090831
Time      14.46
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         90.5
SW         60.800 usec
DE         6.50 usec
TE         295.1 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         14.70 usec
PL1        -1.00 dB
PL1W       13.75590801 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300010 MHz
WDW         EM
SSB         0
LB         0.30 Hz
GB         0
PC         1.60
  
```

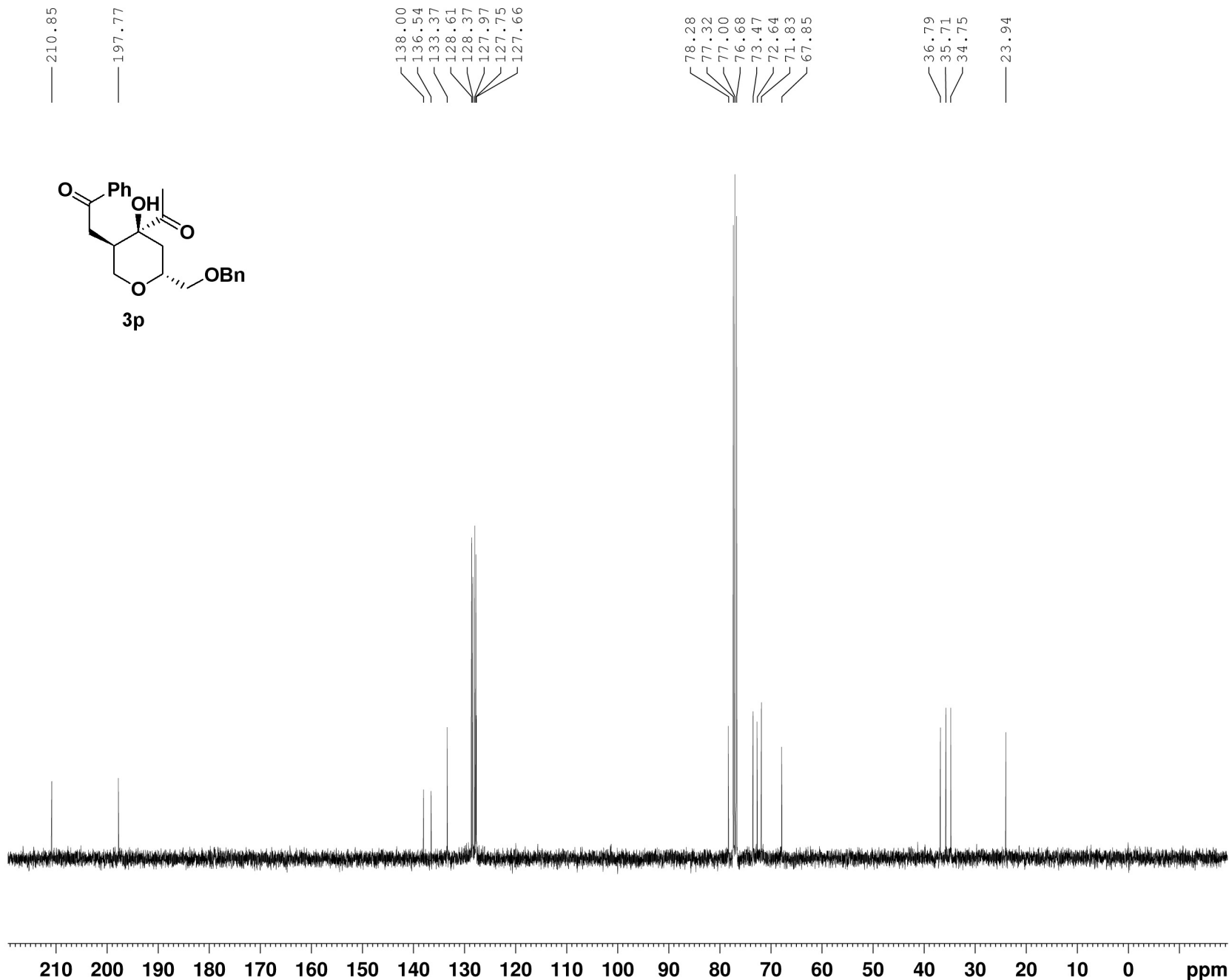
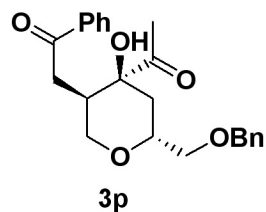
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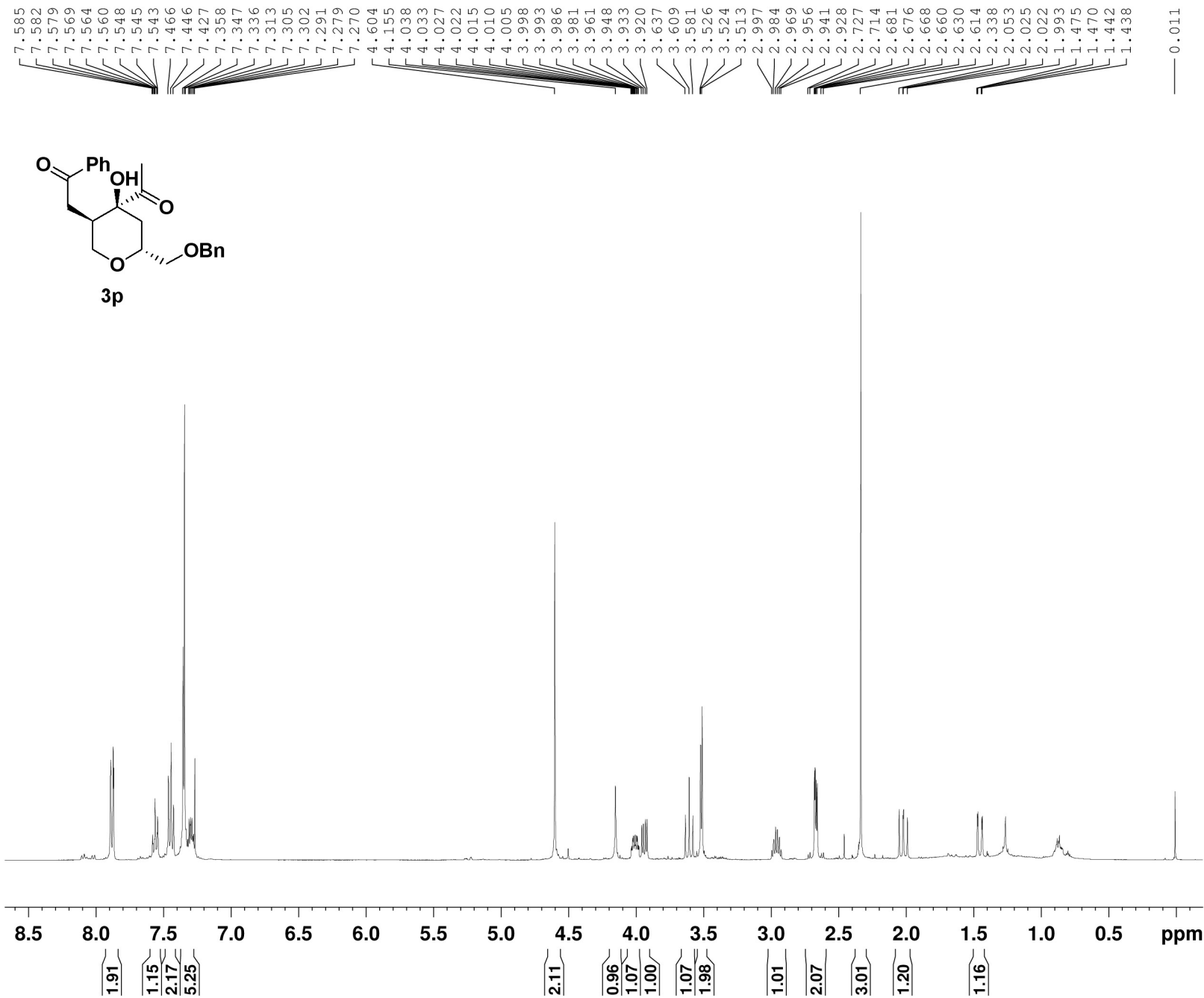
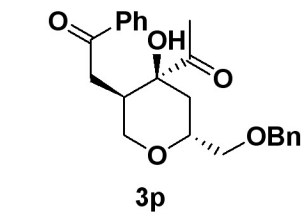
NAME      zhenghuaij10906-CH2OBn-Bz-guanhuan
EXPNO     11
PROCNO    1
Date_     20090907
Time      11.28
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         100
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         645
DW         20.800 usec
DE         6.50 usec
TE         295.7 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       13C
P1         9.70 usec
PL1        -2.00 dB
PL1W       56.13311005 W
SFO1       100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      80.00 usec
PL2        -2.10 dB
PL12       13.90 dB
PL13       13.90 dB
PL2W       17.72104263 W
PL12W      0.44513249 W
PL13W      0.44513249 W
SFO2       400.1316005 MHz
SI         32768
SF         100.6127714 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

```



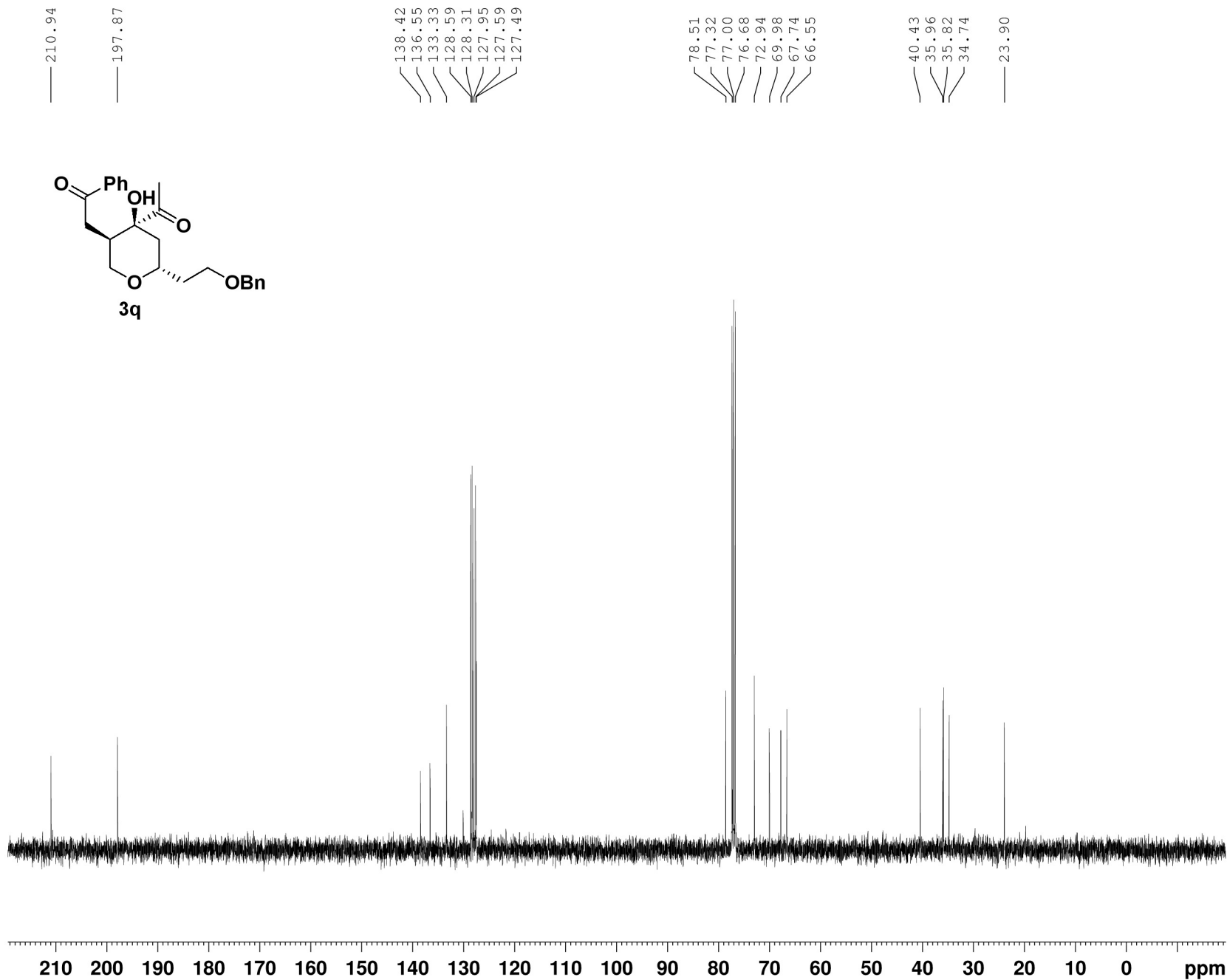
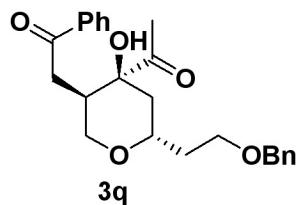


```

NAME      zhenghuaij10906-CH2OBn-Bz-guanhuan
EXPNO     10
PROCNO    1
Date_     20090907
Time      11.20
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS        20
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        114
DW        60.800 usec
DE        6.50 usec
TE        294.2 K
D1        1.00000000 sec
TD0       1

===== CHANNEL f1 =====
NUC1      1H
P1        14.70 usec
PL1       -1.00 dB
PL1W      13.75590801 W
SFO1      400.1324710 MHz
SI        32768
SF        400.1300008 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00

```

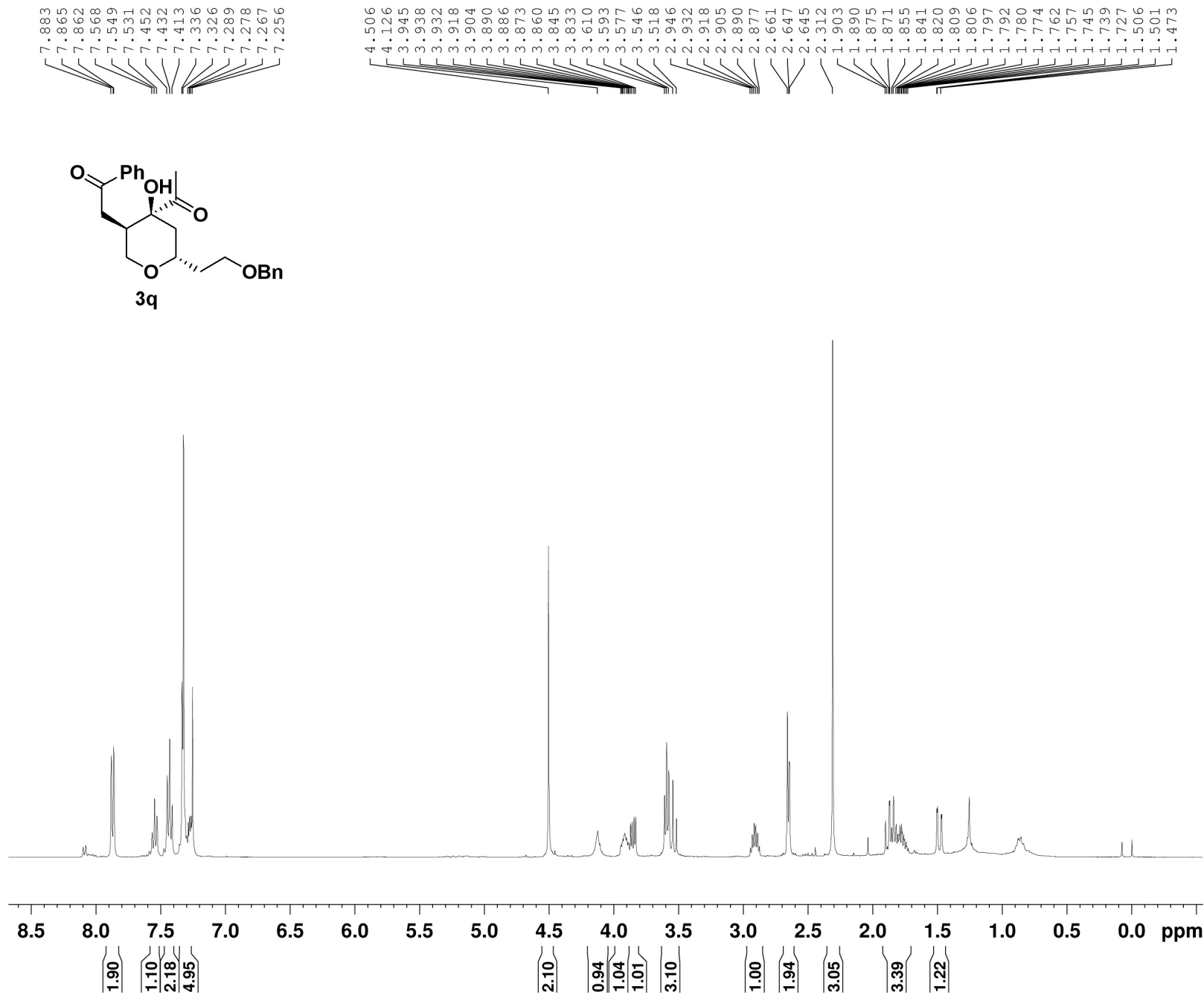
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NAME          zhenghuaiji0906-CH2CH2OBn-Bz-guanhuan
EXPNO         1
PROCNO        1
Date_         20090906
Time          15.33
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDC13
NS            32
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            2050
DW            20.800 usec
DE            6.50 usec
TE            295.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          13C
P1            9.40 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SFO1          100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         90.00 usec
PL2           -2.00 dB
PL12          15.50 dB
PL13          15.50 dB
PL2W          18.19349861 W
PL12W         0.32353121 W
PL13W         0.32353121 W
SFO2          400.1316005 MHz
SI            32768
SF            100.6127744 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40

```



```

NAME      zhenghuaij10906-CH2CH2OBn-Bz-guanhuan
EXPNO     10
PROCNO    1
Date_     20090906
Time      15.30
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         8
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         90.5
DW         60.800 usec
DE         6.50 usec
TE         294.5 K
D1         1.00000000 sec
TDO        1

===== CHANNEL f1 =====
NUC1       1H
P1         12.00 usec
PL1        -1.00 dB
PL1W       22.90425682 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300069 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
FC         1.00

```

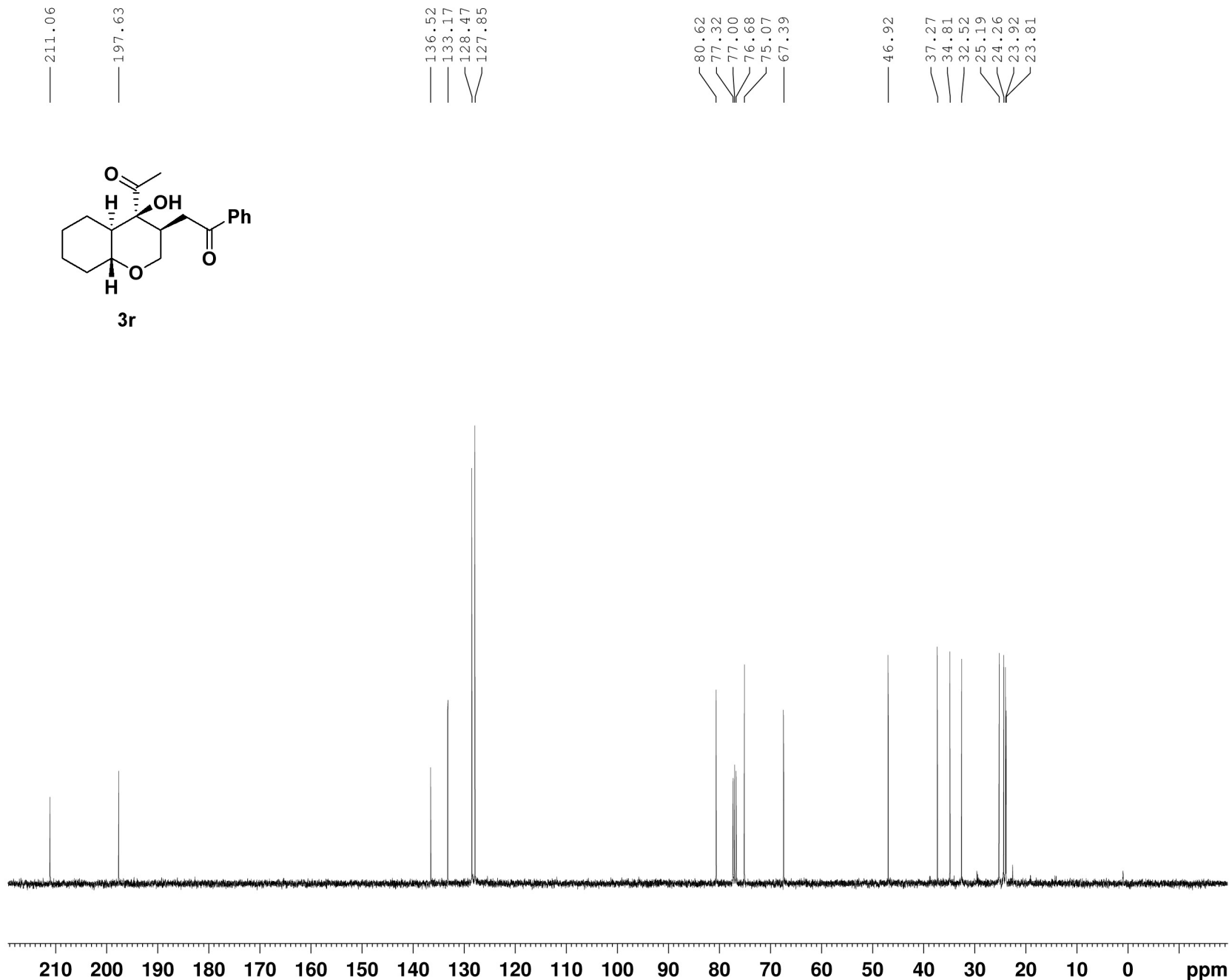
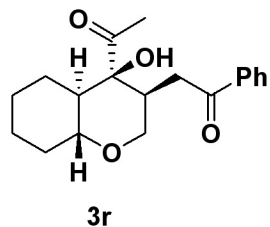
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NAME zhenghuaiji0903-Cybinghuanxibingji-Bz-guanhuan
EXPNO 1
PROCNO 1
DATA_ 20090904
Time 5.09
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 32
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 144
SW 20.800 usec
DE 6.50 usec
TE 295.9 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

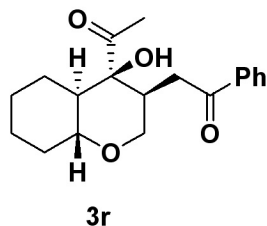
----- CHANNEL f1 -----
NUC1 13C
P1 9.70 usec
PL1 -2.00 dB
PL1W 56.13311005 W
SFO1 100.6228298 MHz

----- CHANNEL f2 -----
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -2.10 dB
PL12 13.90 dB
PL13 13.90 dB
PL2W 17.72104263 W
PL12W 0.44513249 W
PL13W 0.44513249 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6127795 MHz
WEN EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

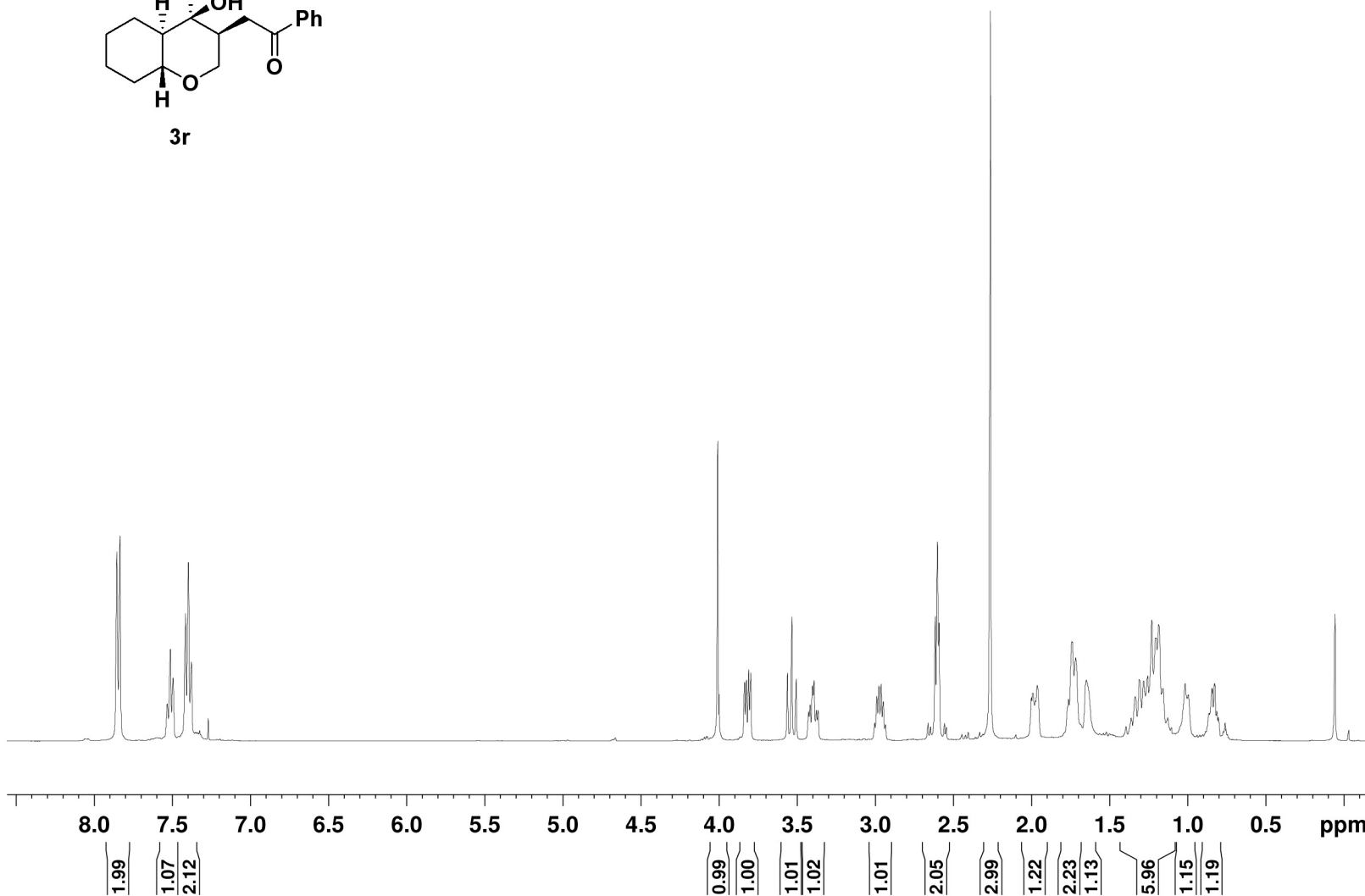
```



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7.835
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7.512
7.496
7.494
7.415
7.397
7.377
7.270



4.008
3.839
3.827
3.812
3.799
3.563
3.536
3.508
3.429
3.419
3.404
3.394
3.379
3.368
3.005
2.993
2.979
2.965
2.952
2.937
2.664
2.648
2.618
2.605
2.592
2.559
2.546
2.264
2.003
1.993
1.976
1.965
1.765
1.744
1.720
1.652
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1.364
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1.258
1.232
1.206
1.187
1.161

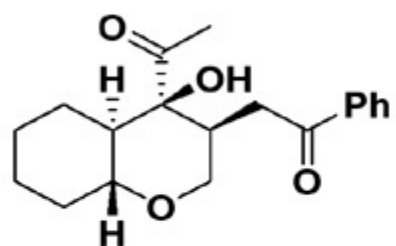


```

NAME      zhenghuaiji0903-Cybinghuanxibingji-Bz-quanuan
EXPNO     1
PROCNO    1
Date_     20090904
Time      5.05
INSTRUM    spect
PROBHD     5 mm F4BBO BB-
PULPROG    zg30
TD         65536
SOLVENT    CDCl3
NS         2
DS         2
SWH         8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         32
RW         60.800 usec
DE         6.90 usec
TE         299.1 K
D1         1.00000000 sec
TD0        1

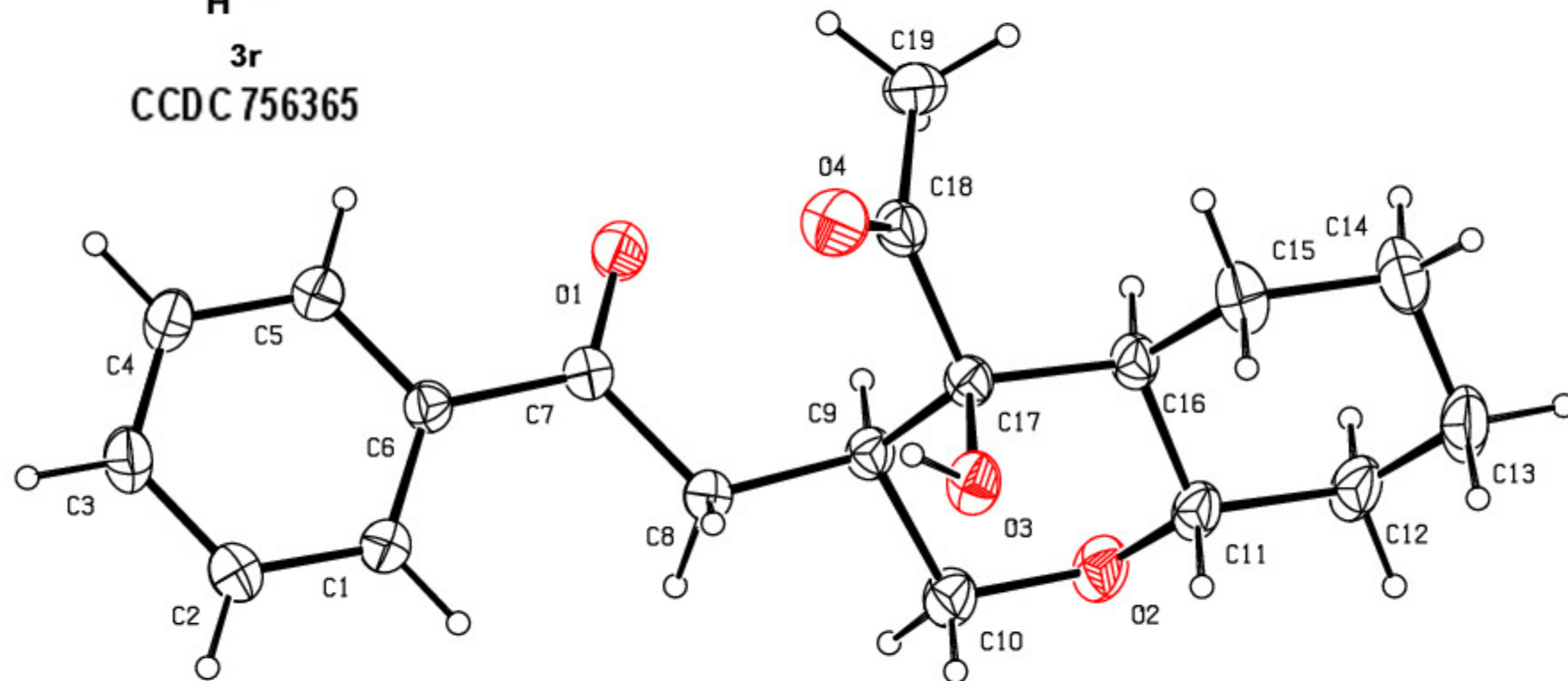
===== CHANNEL f1 =====
NUC1       1H
P1         14.70 usec
PL1        -1.00 dB
PL12       13.75590801 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300003 MHz
RGX        DM
SSB         0
LB         0.30 Hz
GB         0
PC         1.00

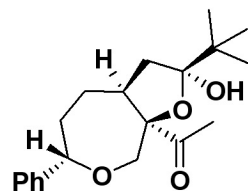
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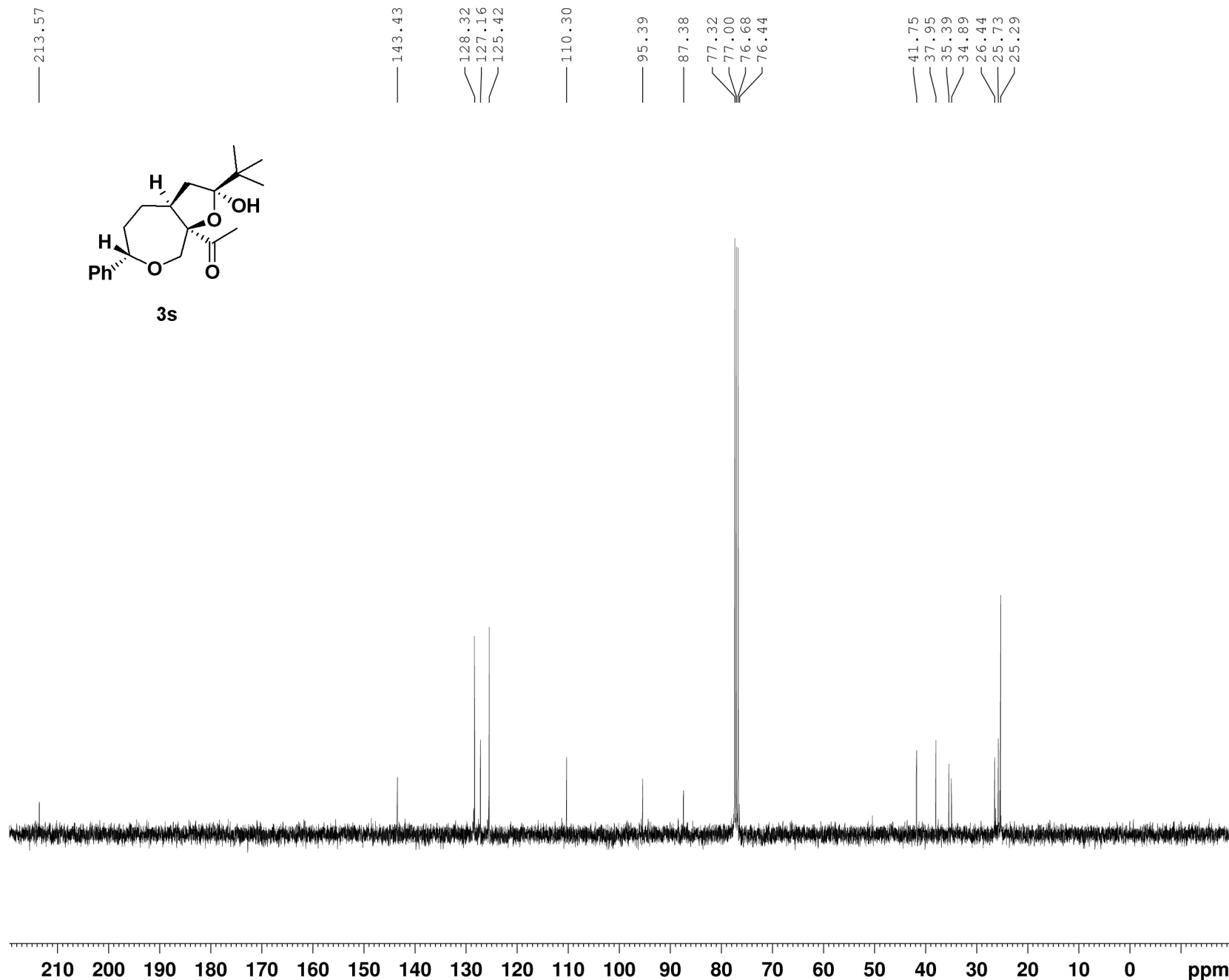
3r

CCDC 756365





3s



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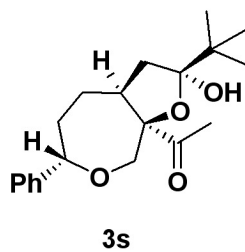
NAME zhenghuaij1091228-Ph7-Piv-guanhuan
EXPNO 11
PROCNO 1
Date_ 20091128
Time 18.42
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 64
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 2050
DW 20.800 usec
DE 6.50 usec
TE 294.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.40 usec
PL1 -2.00 dB
PL1W 57.32743073 W
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -2.00 dB
PL12 15.50 dB
PL13 15.50 dB
PL2W 18.19349861 W
PL12W 0.32353121 W
PL13W 0.32353121 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6127707 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

```

7.368
7.354
7.335
7.317
7.309
7.293
7.270
7.254
7.247
7.242
7.237

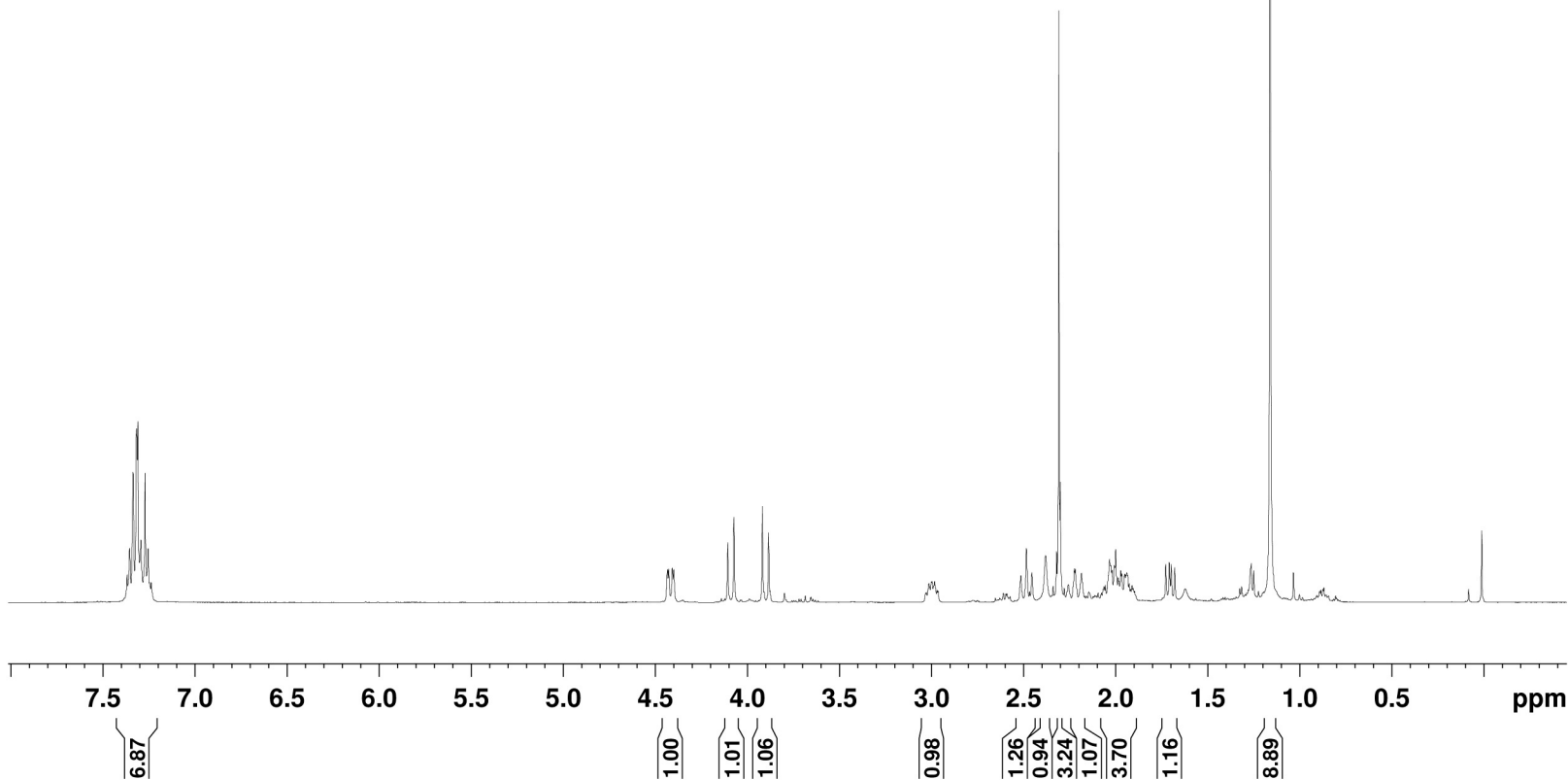


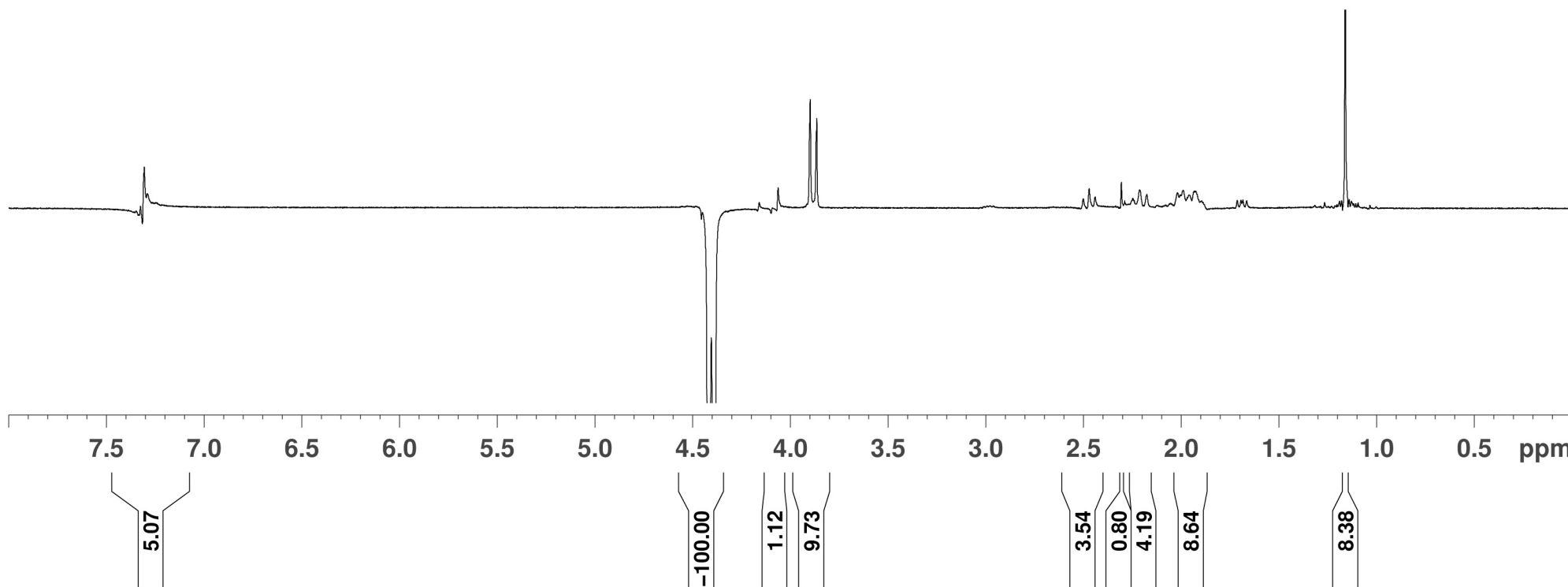
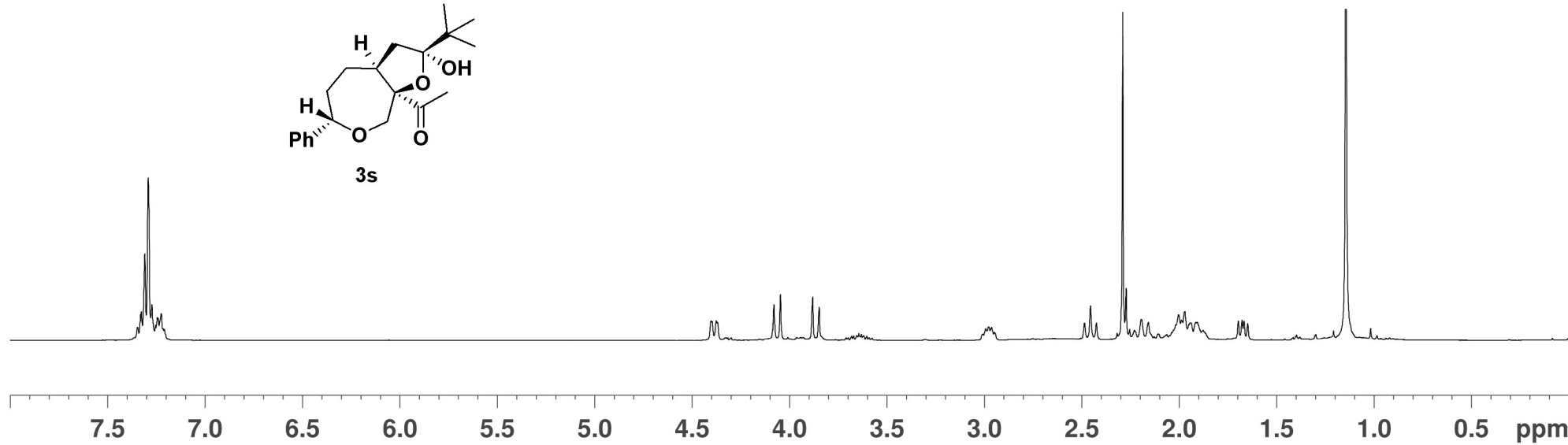
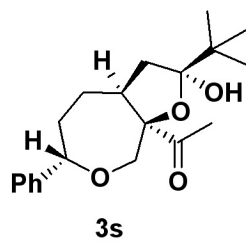
4.434
4.426
4.407
4.399
4.106
4.072
3.918
3.884
3.032
3.027
3.013
2.996
2.983
2.969
2.964
2.514
2.484
2.454
2.380
2.308
2.223
2.218
2.185
2.077
2.062
2.055
2.032
2.026
2.019
2.006
1.999
1.985
1.971
1.966
1.949
1.939
1.934
1.926
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1.910
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1.727
1.708
1.697
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1.160
0.011

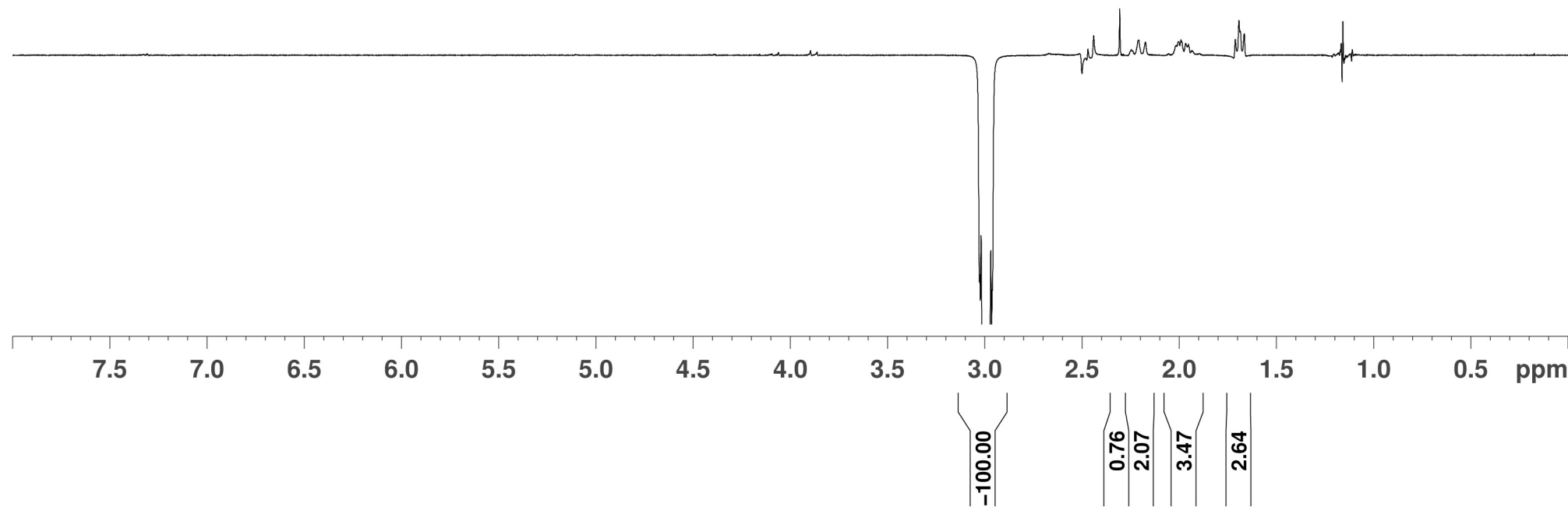
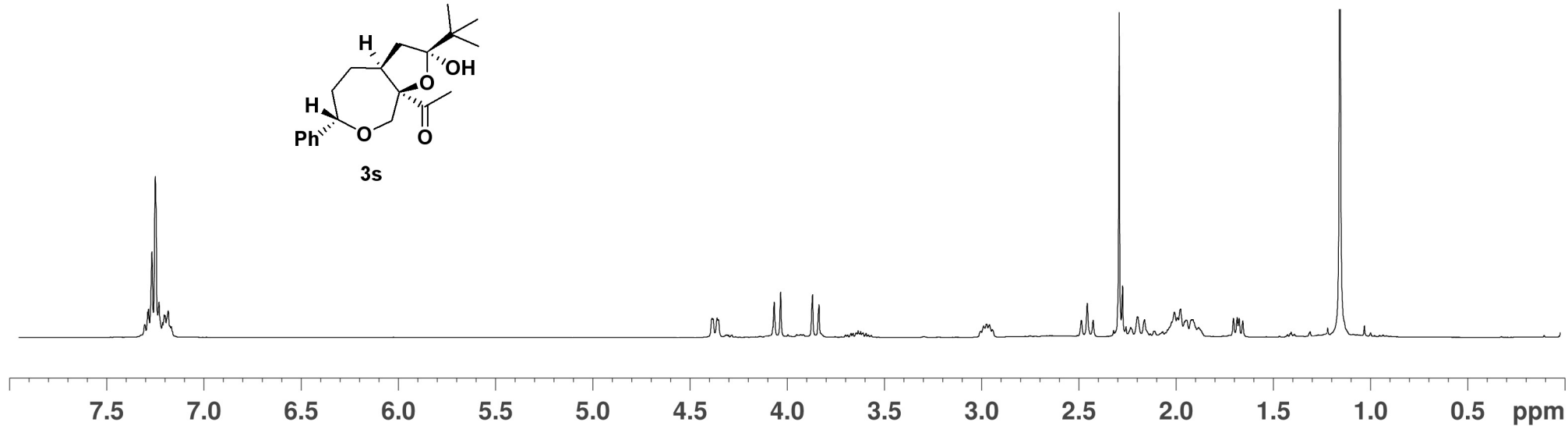
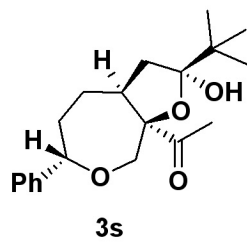
```

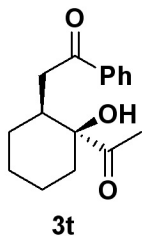
NAME      zhenghuaij1091228-Ph7-Piv-guanhuan
EXPNO     10
PROCNO    1
Date_     20091128
Time      18.37
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         293.5 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         12.00 usec
PL1        -3.00 dB
PL1W       22.90425682 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300012 MHz
WDW         EM
SSB         0
LB         0.30 Hz
GB         0
PC         1.00
  
```









— 213.01

— 199.20

— 137.07
— 133.15
— 128.53
— 128.00

— 80.39
— 77.32
— 77.00
— 76.68

— 39.69
— 37.35
— 35.30
— 28.19
— 25.44
— 23.90
— 20.68

```

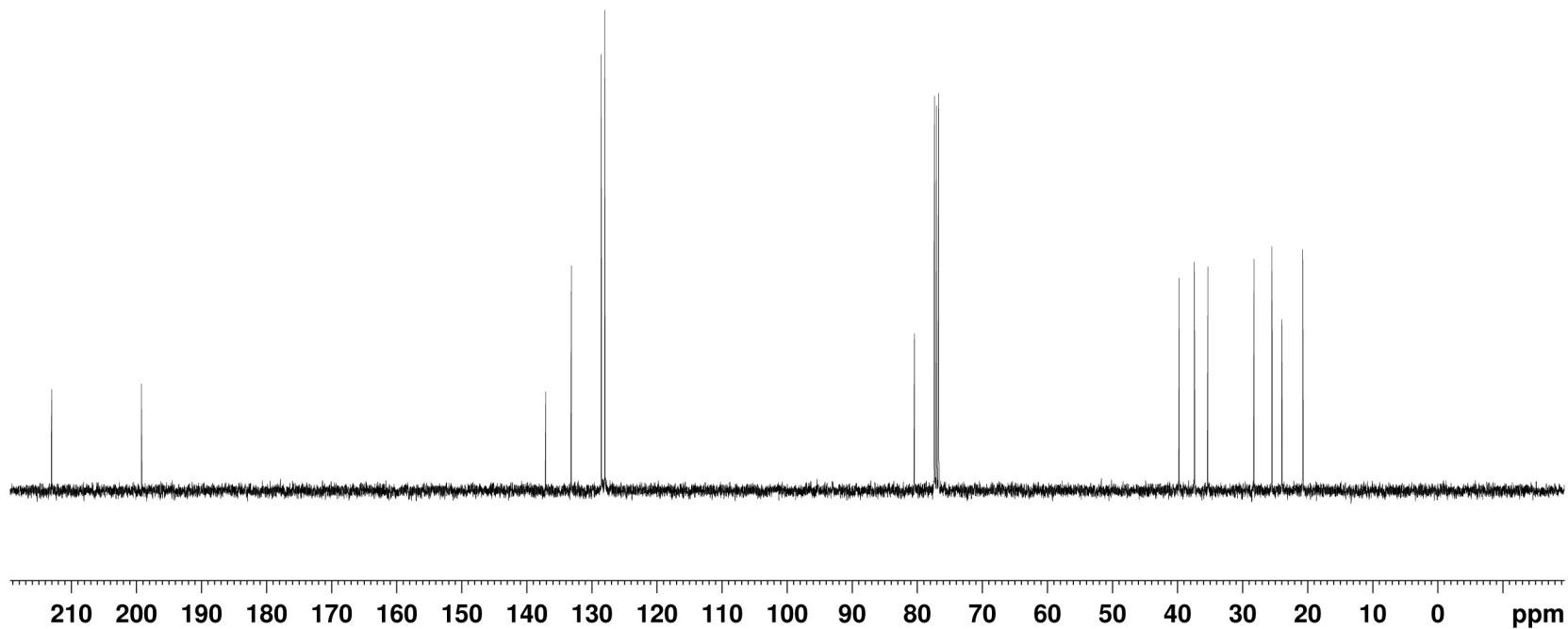
NAME      zhenghuaiji0819-C6-Bz-guanhuan
EXPNO     11
PROCNO    1
Date_     20090820
Time      9.44
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDC13
NS        64
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        2050
DW        20.800 usec
DE        6.50 usec
TE        296.4 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0       1
  
```

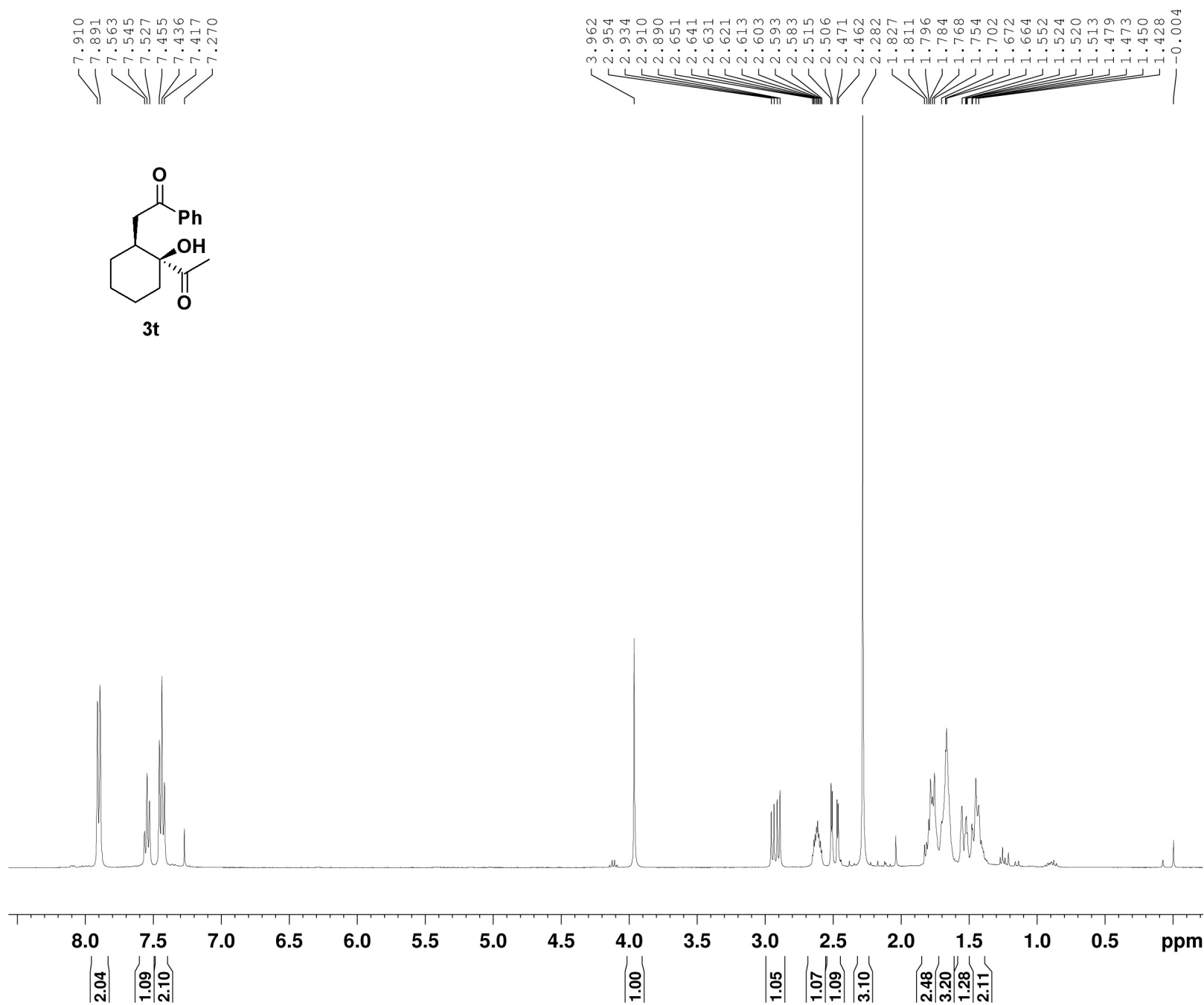
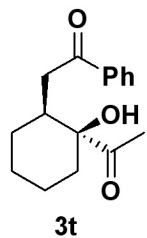
```

===== CHANNEL f1 =====
NUC1      13C
P1        9.40 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SFO1      100.6228298 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     90.00 usec
PL2       -2.00 dB
PL12      15.50 dB
PL13      15.50 dB
PL2W      18.19349861 W
PL12W     0.32353121 W
PL13W     0.32353121 W
SFO2      400.1316005 MHz
S1        32768
SF        100.6127725 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
FC        1.40
  
```





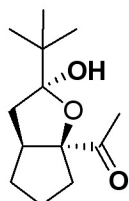
```

NAME      zhenghuaiji0819-C6-Bz-guanhuan
EXPNO     10
PROCNO    1
Date_     20090820
Time      9.39
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zg30
TD         65536
SOLVENT    CDC13
NS         16
DS         2
SWH         8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         144
DW         60.800 usec
DE         6.50 usec
TE         295.7 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         12.00 usec
PL1        -3.00 dB
PL1W       22.90425682 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300007 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

```

— 213.18



3u

— 111.98

— 99.59

77.32
77.00
76.68

44.81
40.19
38.10
37.36
34.04
25.82
25.02
24.71

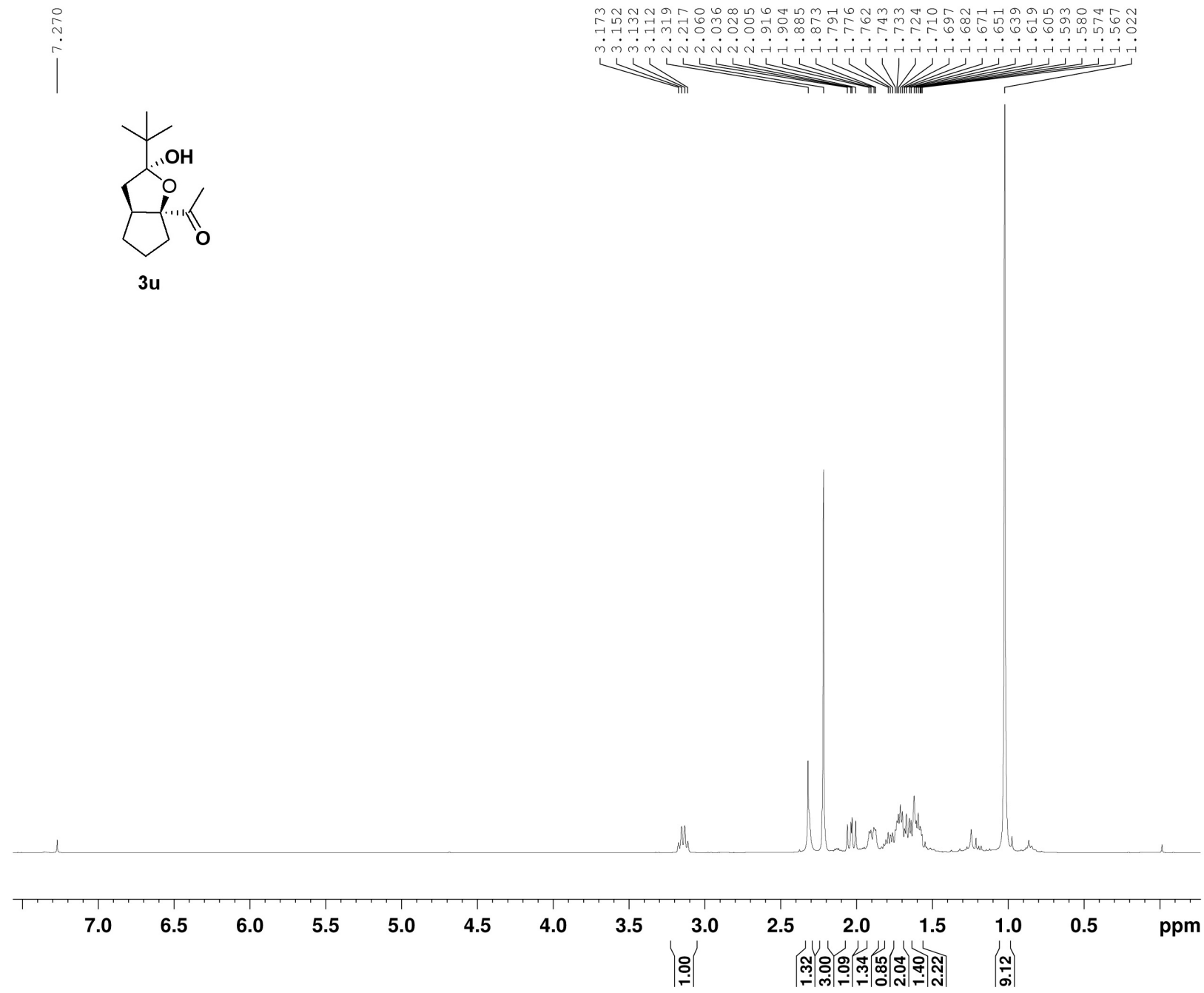
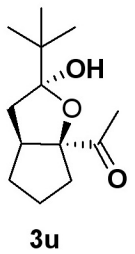


```
NAME      zhenghuaiji0809-C5-Fiv-guanhuanxiadian
EXPNO     11
PROCNO    1
Date_     20090809
Time      15.39
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         128
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         2050
DW         20.800 usec
DE         6.50 usec
TE         294.6 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       13C
P1         9.40 usec
PL1        -2.00 dB
PL1W       57.32743073 W
SFO1       100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      90.00 usec
PL2        2.00 dB
PL12       15.50 dB
PL13       15.50 dB
PL2W       18.19349861 W
PL12W      0.32353121 W
PL13W      0.32353121 W
SFO2       400.1316005 MHz
SI         32768
SF         100.6127718 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
```

— 7.270



3.173
3.152
3.132
3.112
2.319
2.217
2.060
2.036
2.028
2.005
1.916
1.904
1.885
1.873
1.791
1.776
1.762
1.743
1.733
1.724
1.710
1.697
1.682
1.671
1.651
1.639
1.619
1.605
1.593
1.580
1.574
1.567
1.022

```
NAME      zhenghuaiji0809-C5-Piv-guanhuanxiadian
EXPNO     10
PROCNO    1
Date_     20090809
Time      15.30
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         32
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         57
DW         60.800 usec
DE         6.50 usec
TE         293.2 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         12.00 usec
PL1        -3.00 dB
PL1W       22.90425682 W
SFO1       400.1324719 MHz
SI         32768
SF         400.1300005 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
```

