Electronic Supplementary Material (ESI) for Chemical Communications.

Supporting Information

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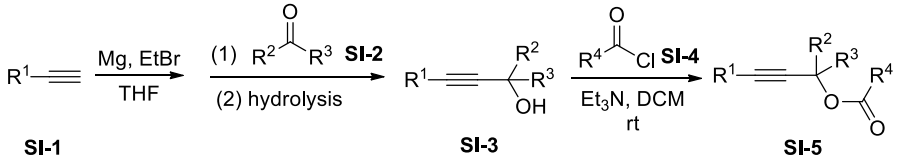
I. General Information

Organic solvents (Aldrich) were used without further purification. Purifications of reactions productswere carried out by flash chromatography using Merck silica gel (40-63 μm). ^{1}H NMR (400 MHz),^{13}C NMR (100 MHz) were measured on a BruckerAvance 400 MHz spectrometer. Chemical shifts arereported in parts per million (ppm, δ) downfield from residual solvents peaks and coupling constantsare reported as Hertz (Hz). Splitting patterns are designated as singlet (s), doublet (d), triplet (t), ….Splitting patterns that could not be interpreted or easily visualized are designated as multiplet (m).Electrospray mass spectra were obtained using an ESI/TOF Mariner Mass Spectrometer. Unlessotherwise noted, all other commercially available reagents and solvents were used without furtherpurification.

II. The GeneralSyntheticProcedure and Analytical Data forPropargylic Acetates (Path a)

Propargylic alcohols (Path a)**SI-3**were prepared throughalkynylgrignard reagentwith aldehydesor ketones **SI-2**. Esterification of **SI-3** gave Propargylic acetates**SI-5**.

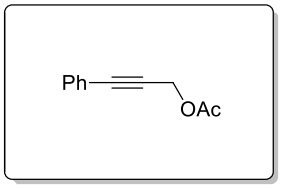


General Procedure:

Drops of ethyl bromide wereadded to Mg (72.9 mg, 3.0 mmol) in 2 mL anhydrous THF under N_2 condition, heating by blower to initiate the reaction. The rest of ethyl bromide (326.9 mg, 3.0 mmol) was dissolved in3 mL THF and added drop by drop.Keep stirringfor 1 hour at room temperatureuntil none Mg left. The terminal alkyne**SI-1**(2.7 mmol) was added with constant pressure and the solution turned from light brown to brown. The mixture was stirred atr.t.for 30 min after the **SI-2** (2.7 mmol) was added. Hydrochloric acid (5 mL, 1 mol/L) was dropwise added to quench the reaction.The mixture was extracted by EA(30 mL x 3).Desired propargylicalcohols**SI-3**were synthesized with further purified by flash chromatography.

Dropwise adding acyl chloride**SI-4** (3.0 mmol) to the mixture of **SI-3** (1.5 mmol), triethylamine (303.6 mg, 3.0 mmol) and DCM (4.0 mL). Stirring the solution rapidly for 10 minutes and quenched by 10 mL water. The mixture was extracted by EA (30 mL x 3)and washed with an aqueous solution of $NaCl_{sat}$(30 mL x 3).The organic part was dried over Na_2SO_4, evaporated and purified by flash chromatography. The purified propargylic acetates**SI-5** were dried by vacuum.

Analytical Data:



$C_{11}H_{10}O_2$

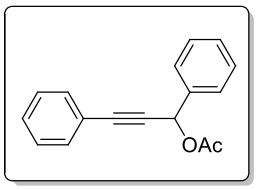
MW: 174.07 g.mol^{-1}

Yellow liquid

Yield: 82%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.47-7.45 (m, 2H), 7.36-7.29 (m, 3H), 4.91 (s, 2H), 2.14 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 170.4, 131.9, 128.8, 128.3, 122.1, 86.5, 82.9, 52.9, 20.9.



$C_{17}H_{14}O_2$

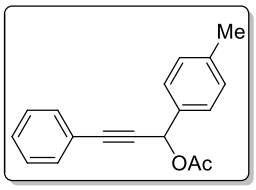
MW: 250.10 g.mol^{-1}

Colourless liquid

Yield: 81%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.62-7.60 (m, 2H), 7.45-7.48 (m, 2H), 7.44-7.38 (m, 3H), 7.35-7.32 (m, 3H), 6.70 (s, 1H), 2.14 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 169.9, 137.1, 132.0, 129.0, 128.9, 128.7, 128.3, 127.9, 122.1, 87.1, 85.5, 66.1, 21.2.



$C_{18}H_{16}O_2$

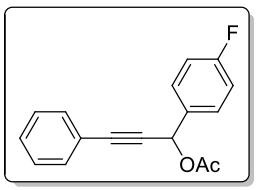
MW: 264.12 g.mol^{-1}

Colourless liquid

Yield: 43.7%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm): 7.51-7.47 (m, 4H), 7.34-7.29 (m, 3H), 7.22 (d, *J* = 8.0 Hz, 2H), 6.67 (s, 1H), 2.38 (s, 3H), 2.12 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):170.0, 139.0, 134.3, 131.9, 129.4, 128.8, 128.3, 127.9, 122.2, 86.9, 85.8, 66.0, 21.3, 21.2.



$C_{17}H_{13}FO_2$

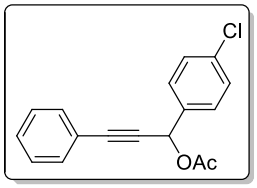
MW: 286.09 g.mol^{-1}

Colourless liquid

Yield: 55.2%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.59 (dd,*J* = 8.4 Hz,*J* = 5.2 Hz, 2H), 7.48 (dd,*J* = 7.2 Hz,*J* = 1.6 Hz, 2H), 7.35-7.30 (m, 3H), 7.09 (t, *J* = 8.86 Hz, 2H), 6.67 (s, 1H), 2.13 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):169.9, 163.0 (d, *J* = 246.6 Hz), 133.1 (d, *J* = 3.2 Hz), 131.9, 129.8 (d, *J* = 8.4 Hz), 129.0, 128.4, 121.9, 115.6 (d, *J* = 21.7 Hz), 87.2, 85.3, 65.4, 21.2.



$C_{17}H_{13}ClO_2$

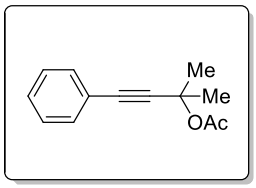
MW: 284.04 g.mol^{-1}

Colourless liquid

Yield: 93%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.54 (dt, *J* = 8.4Hz, *J* = 2.0Hz, 2H), 7.48 (dd, *J* = 7.6 Hz, *J* = 1.6 Hz, 2H), 7.38 (dt, *J* = 8.8 Hz, *J* = 2.4 Hz, 2H),7.35-7.30 (m, 3H), 6.67 (s, 1H), 2.14 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 169.8, 135.8, 134.9, 131.9, 129.2, 129.0, 128.9, 128.4, 121.9, 87.4, 85.1, 65.4, 21.1.



$C_{13}H_{14}O_2$

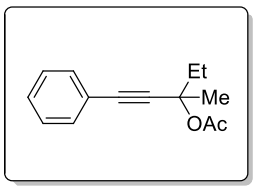
MW: 202.10 g.mol^{-1}

Colourless liquid

Yield: 28.8%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.43-7.42 (m, 2H), 7.30-7.28 (m, 3H), 2.05 (s, 3H), 1.75 (s, 6H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):169.4, 131.8, 128.3, 128.2, 122.6, 90.2, 84.0, 72.5, 29.1, 22.1.



$C_{14}H_{16}O_2$

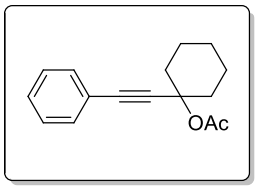
MW: 216.12 g.mol^{-1}

Yellow liquid

Yield: 16.2%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm): 7.45-7.42 (m, 2H), 7.31-7.28 (m, 3H), 2.05, (s, 3H), 2.09-1.87 (m, 2H), 1.74 (s, 3H), 1.08 (t, *J* = 7.6, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 169.5, 131.9, 131.8, 128.3, 128.2, 122.7, 89.3, 85.0, 76.2, 34.6, 26.1, 22.1, 8.7.



$C_{16}H_{18}O_2$

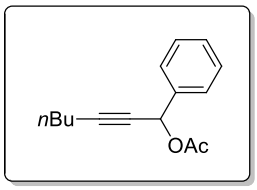
MW: 242.13 g.mol^{-1}

Yellow liquid

Yield: 16.2 %

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.46-7.43 (m, 2H), 7.31- 7.28 (m, 3H), 2.24-2.21 (m, 2H), 2.07 (s, 3H), 1.93-1.87 (m, 2H), 1.70-1.64 (m, 4H), 1.58-1.55 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):169.3, 131.9, 128.2, 122.8, 89.2, 86.2, 53.5, 37.2, 25.3, 22.8, 22.1.



$C_{15}H_{18}O_2$

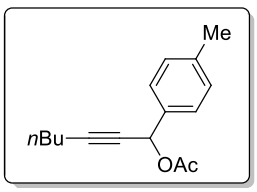
MW: 230.13 g.mol^{-1}

Colourlessliquid

Yield: 71.1%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.54-7.51 (m, 2H), 7.40-7.34 (m, 3H), 6.46 (t, *J* = 2.0 Hz, 1H), 2.27 (td,*J* = 7.2 Hz, *J* = 2.0 Hz, 2H), 2.10 (s, 3H), 1.55-1.49 (m, 2H), 1.44-1.38 (m, 2H), 0.91 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):167.0, 137.7, 128.8, 128.6, 127.7, 88.4, 66.1, 30.5, 22.2, 21.2, 18.6, 13.6.



$C_{16}H_{20}O_2$

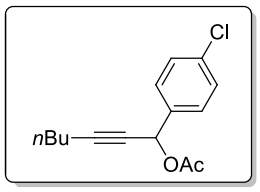
MW: 244.15 g.mol^{-1}

Colourless liquid

Yield: 57.6%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.41 (d, *J* = 8.0 Hz, 2H), 7.18 (d, *J* = 8.0 Hz, 2H), 6.42 (t, *J* = 2.0 Hz, 1H), 2.35 (s, 3H), 2.27 (td, *J* = 6.8 Hz, *J* = 2.0 Hz, 2H), 2.08 (s, 3H), 1.54-1.48 (m, 2H), 1.43-1.38 (m, 2H), 0.91 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 167.0, 138.7, 134.8, 129.2, 127.7, 88.2, 66.0, 30.5, 22.0, 21.2,21.2, 18.6, 13.6.



$C_{15}H_{17}ClO_2$

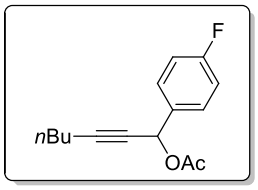
MW: 264.09 g.mol^{-1}

Colourless liquid

Yield: 47.1%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm): 7.45 (d, *J* = 8.4 Hz, 2H), 7.34 (d, *J* = 8.4 Hz, 2H), 6.41 (t, *J* = 2.0 Hz, 1H), 2.27 (td, *J* = 6.8 Hz, *J* = 2.0 Hz, 2H), 2.09 (s, 3H), 1.54-1.48 (m, 2H), 1.43-1.37 (m, 2H), 0.91 (t, *J* = 7.6 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):169.8, 136.3, 134.7, 129.1, 128.8, 88.8, 65.4, 30.4, 22.0, 21.1, 18.5, 13.6.



$C_{15}H_{17}FO_2$

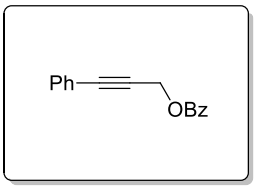
MW: 248.12 g.mol^{-1}

Colourless liquid

Yield: 53%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm): 7.52-7.48 (m, 2H), 7.05 (t, *J* = 8.8 Hz, 2H), 6.43 (t, *J* = 2.0 Hz, 1H), 2.27 (td, *J* = 6.8 Hz, *J* = 2.0 Hz, 2H), 2.08 (s, 3H), 1.54-1.49 (m, 2H), 1.43-137 (m, 2H), 0.91 (t, *J* = 7.6 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):169.9, 162.9 (d, *J* = 246.2 Hz), 133.7 (d, *J* = 3.2 Hz), 129.7 (d, *J* = 8.3 Hz), 115.5 (d, *J* = 21.6), 88.6, 65.4, 30.5, 22.0, 21.2, 18.5, 13.6.



$C_{16}H_{12}O_2$

MW:236.08 $g.mol^{-1}$

Yellow liquid

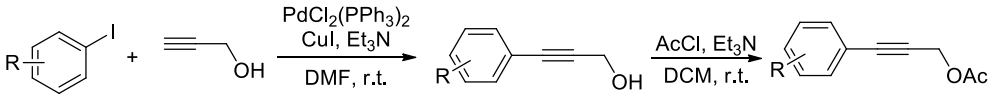
Yield: 85%

^{1}H NMR (400 MHz, DMSO-d_6, δ ppm):8.11 (d, *J* = 8.0 Hz, 2H), 7.59 (t, *J* = 6.8 Hz, 1H), 7.48-7.45 (m, 4H), 7.33-7.30 (m, 3H), 5.16 (s, 2H).

^{13}C NMR (100 MHz, DMSO-d_6, δ ppm):166.0, 133.3, 132.0, 129.9, 129.6, 128.8, 128.5, 128.3, 122.2, 86.6, 83.1, 53.4.

III. The GeneralSyntheticProcedureand Analytical Data forPropargylic Acetates (Path b)

Propargylic alcohols (Path b)**SI-8** were synthesized from aryl iodides and propargylic alcohols through sonogashira reaction. Esterification of **SI-8** gave Propargylic acetates**SI-9**.

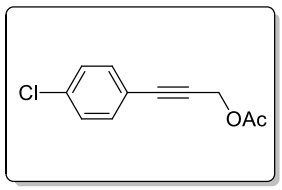


SI-6 **SI-7** **SI-8** **SI-9**

To a solution of **SI-6** (3.0 mmol), CuI (32.8 mg, 0.3 mmol) and $PdCl_2(PPh_3)_2$ (63.2 mg, 0.09 mmol) in Et_3N (5 mL) was added propargyl alcohol**SI-7** (185.0 mg, 3.3 mmol) and DMF (3 mL)at r.t.under N_2. After stirring for 1 hour, the mixture was extracted by EA and washed with an aqueous solution of $NaCl_{sat}$(30 mL x 3). The organic part was dried over Na_2SO_4 and evaporated to solid in the addition of silica gal. The crude phenyl propargylicalcohols**SI-8**were purified by flash chromatography.

Dropwise adding acetyl chloride (235.5 mg, 3.0 mmol) to the mixture of **SI-8** (1.5 mmol), triethylamine (303.6 mg, 3.0 mmol) and DCM (4.0 mL). Stirring the solution rapidly for 10 minutes and quenched by 10 mL water. The mixture was extracted by EA (30 mL x 3)and washed with an aqueous solution of $NaCl_{sat}$(30 mL x 3). The crude products weredried over Na_2SO_4, evaporated and purified by flash chromatography. Dried by vacuum,the purified propargylic acetates**SI-9** were gained.

Analytical Data:



$C_{11}H_9ClO_2$

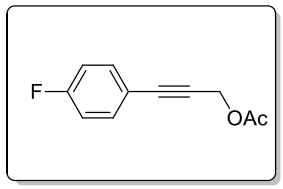
MW: 208.03 $g.mol^{-1}$

Light-Yellow liquid

Yield: 38%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.36 (dd, *J* = 36.4 Hz, *J* = 8.4 Hz, 4H), 4.89 (s, 2H), 2.13 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):170.3, 134.9, 133.2, 128.7, 120.6, 85.3, 83.9, 52.7, 20.8.



$C_{11}H_9FO_2$

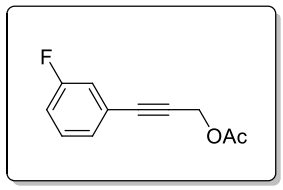
MW: 192.06 g.mol^{-1}

Light-Yellow liquid

Yield: 88.9%

^{1}H NMR (400 MHz,$CDCl_3$, δ ppm):7.44 (dd, *J* = 8.2 Hz, *J* = 5.6 Hz, 2H), 7.00 (t, *J* = 2.1 Hz, 2H), 4.89 (s, 2H), 2.13 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):170.4,162.8 (d, *J* = 248.6 Hz), 133.9 (d, *J* = 8.4 Hz), 118.2 (d, *J* = 3.6 Hz), 115.7 (d,*J* = 21.9),85.4, 82.7, 52.8, 20.8.



$C_{11}H_9FO_2$

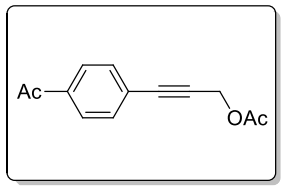
MW: 192.06g.mol^{-1}

Light-Yellow liquid

Yield: 89.6%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.31-7.22 (m, 2H), 7.14 (d, *J* = 9.6 Hz, 1H), 7.07-7.02 (m, 1H), 4.89 (s, 2H), 2.13 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):170.3, 162.8 (d, *J* = 245.1), 129.9 (d, *J* = 8.6 Hz), 127.8 (d, *J* = 3.1 Hz), 123.9 (d, *J* = 9.4 Hz), 118.7 (d, *J* = 22.7 Hz), 116.2 (d, *J* = 21.0 Hz), 85.2 (d, *J* = 3.4 Hz), 85.2 (d, *J* = 3.4 Hz), 83.9, 52.6, 20.8.



$C_{13}H_{12}O_3$

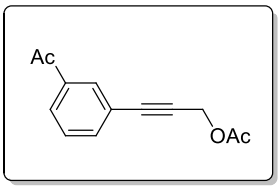
MW: 216.08 g.mol^{-1}

White solid

Yield: 99%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm): 7.82 (d, *J* = 8.0 Hz, 2H), 7.45 (d, *J* = 8.0 Hz, 2H), 4.84 (s, 2H), 2.51 (s, 3H), 2.06 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):197.1, 170.1, 136.6, 131.9, 128.1, 126.9, 86.2, 85.4, 52.5, 26.5, 20.7.



$C_{13}H_{12}O_3$

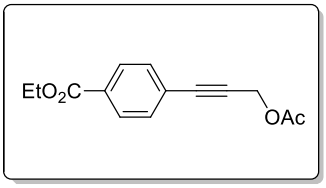
MW: 216.08 g.mol^{-1}

Light-Yellow solid

Yield: 85.5%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):8.04 (t, *J* = 1.6 Hz, 1H), 7.93 (dt,*J* = 8 Hz, *J* = 1.2Hz, 1H), 7.64 (dt,*J* = 8 Hz,*J* = 1.2 Hz, 1H), 7.44 (t, *J*= 7.6 Hz, 1H), 4.92 (s, 2H), 2.61 (s, 3H), 2.15 (s,3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):197.3, 170.3, 137.1, 136.1, 131.9, 128.7, 128.4, 122.8, 85.4, 84.0, 52.7, 26.7, 20.8.



$C_{14}H_{14}O_4$

MW: 246.09g.mol^{-1}

White solid

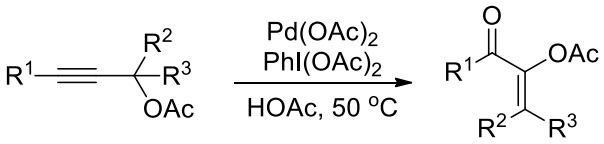
Yield: 97%

^{1}H NMR (400 MHz, $CDCl_3$, δppm):7.99 (d, *J* = 8.4 Hz, 2H), 7.50 (d, *J* = 8.4 Hz, 2H), 4.91 (s, 2H), 4.37 (dd, *J* = 14.4Hz, *J* = 7.2Hz, 2H), 2.14 (s, 3H), 1.39 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):170.2, 165.9, 131.7, 130.4, 129.4, 126.7, 85.8, 85.6, 61.2, 52.6, 20.7, 14.3.

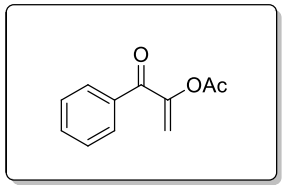
IV. Tahe General Synthetic Procedure and Analytical Data for acetoxyenones

To a solution of$Pd(OAc)_2$(3.4mg, 0.015 mmol) and $PhI(OAc)_2$ (106.3mg, 0.33 mmol) in HOAc (3 mL) was added **SI-10** (0.3 mmol). Stirringfor 10minutes at 50 ^oC, 5 mL water was added to quench the reaction. Then the mixture was extracted by EA and washed with an aqueous solution of $NaCl_{sat}$(30 mL x 3). The organic part was dried over Na_2SO_4, evaporated and purified by flash chromatography. The purified acetoxyenones**SI-11** were dried by vacuum.



SI-10 **SI-11**

Analytical Data:



$C_{11}H_{10}O_3$

MW: 190.06 g.mol^{-1}

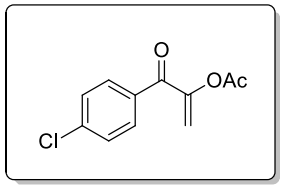
Light-Yellow liquid

Yield: 81%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.87-7.84 (m, 2H), 7.58 (t, *J* = 7.6 Hz, 1H), 7.46 (t, *J* = 7.6 Hz, 2H), 5.72 (d, *J* = 2.0 Hz, 1H), 5.59 (d, *J* = 2.0 Hz, 1H), 2.24 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):189.8, 169.0, 151.2, 136.2, 133.0, 129.6, 128.4, 114.6, 20.4.

MS (EI) *m/z*:190(M^+); **HRMS:** Calcd for$C_{11}H_{10}O_3$190.0630, found190.0633.



$C_{11}H_9ClO_3$

MW: 224.02 g.mol^{-1}

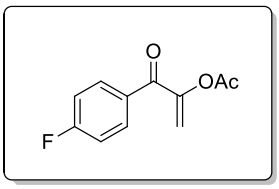
Green-Yellow liquid

Yield: 75%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.80 (d, *J* = 6.0 Hz, 2H), 7.44 (d, *J* = 6.0 Hz, 2H), 5.70 (d, *J* = 1.6 Hz, 1H), 5.54 (d, *J* = 1.6 Hz, 1H), 2.22 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 188.6, 169.0, 150.9, 137.5, 134.5, 131.1 (d, *J* = 21.1 Hz), 128.1 (d, *J* = 13.2 Hz), 114.3, 20.4.

MS (EI) *m/z*:224 (M^+); **HRMS:** Calcd for $C_{11}H_9ClO_3$ 224.0240, found 224.0242.



$C_{11}H_9FO_3$

MW: 208.05 g.mol^{-1}

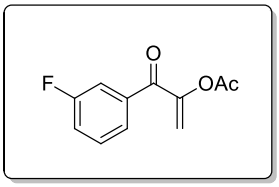
Green-Yellow liquid

Yield: 85%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.93-7.89 (m, 2H), 7.15 (t, *J* = 8.4 Hz, 2H), 5.70 (d, *J* = 2.4 Hz, 1H), 5.54 (d, *J* = 2.0 Hz, 1H), 2.23 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 188.3, 169.0, 162.9 (d, *J* = 299.6 Hz), 151.0, 132.4, 132.2 (d, *J* = 9.3 Hz), 115.7 (d, *J* = 21.8 Hz), 114.1, 20.4.

MS (EI) *m/z*:208 (M^+); **HRMS:** Calcd for $C_{11}H_9FO_3$ 208.0536, found 208.0533.



$C_{11}H_9FO_3$

MW: 208.05 g.mol^{-1}

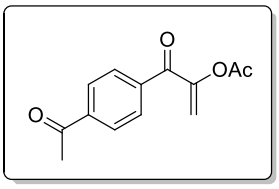
Green-Yellow liquid

Yield: 73%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.65 (d, *J* = 7.6 Hz, 1H), 7.54 (d, *J* = 9.2 Hz, 1H), 7.47-7.42 (m, 1H), 7.29 (dd, *J* = 8.4 Hz, *J* = 2.8 Hz, 1H), 5.73 (d, *J* = 2.0 Hz, 1H), 5.59 (d, *J* = 2.4 Hz, 1H), 2.24 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 188.4, 169.0, 162.4 (d, *J* = 246.8 Hz), 150.8, 138.1 (d, *J* = 6.7 Hz), 130.2 (d, *J* = 7.7 Hz), 125.3 (d, *J* = 3.0 Hz), 120.1 (d, *J* = 21.3 Hz), 116.4 (d, *J* = 22.6 Hz), 114.8, 20.4.

MS (EI) *m/z*:208 (M^+); **HRMS:** Calcd for $C_{11}H_9FO_3$ 208.0536, found 208.0534.



$C_{13}H_{12}O_4$

MW: 232.07 g.mol^{-1}

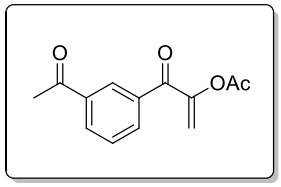
Yellow liquid

Yield: 72%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):8.02 (d, *J* = 8.4 Hz, 2H), 7.91 (d, *J* = 8.4 Hz, 2H), 5.76 (d, *J* = 2.0 Hz, 1H), 5.58 (d, *J* = 2.0 Hz, 1H), 2.65 (s, 3H), 2.23 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 197.5, 189.1, 169.0, 151.0, 140.0, 139.8, 129.6, 128.2, 115.3, 26.9, 20.4.

MS (EI) *m/z*:232 (M^+); **HRMS:** Calcd for $C_{13}H_{12}O_4$ 232.0736, found232.0736.



$C_{13}H_{12}O_4$

MW: 232.07 g.mol^{-1}

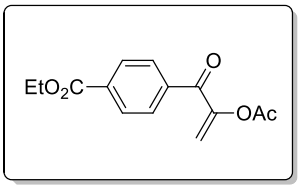
Yellow liquid

Yield: 76%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):8.40 (t, *J* = 1.6 Hz, 1H), 8.17 (dt, *J* = 8.0 Hz, *J* = 1.2 Hz, 1H), 8.04 (dt, *J* = 7.6 Hz, *J* = 1.6 Hz, 1H), 7.58 (t, *J* = 7.6 Hz, 1H), 5.75 (d, *J* = 2.0 Hz, 1H), 5.58 (d, *J* = 2.4 Hz, 1H), 2.64 (s, 3H), 2.23 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 197.2, 189.0, 169.0, 150.9, 137.2, 136.6, 133.8, 132.3, 129.3, 128.9, 114.9, 26.8, 20.4.

MS (EI) *m/z*:232 (M^+); **HRMS:** Calcd for $C_{13}H_{12}O_4$ 232.0736, found232.0737.



$C_{14}H_{14}O_5$

MW: 262.08 g.mol^{-1}

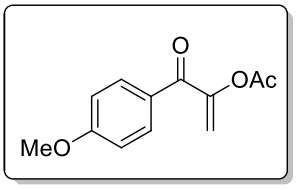
Yield liquid

Yield: 47%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):8.12 (d, *J* = 8.4Hz, 2H), 7.88 (d, *J* = 8.4Hz, 2H), 5.74 (*J* = 2.0Hz, 1H), 5.58 (d, *J* = 2.0Hz, 1H), 4.41 (dd, *J* = 14.0Hz, *J* = 6.8Hz,2H), 2.23 (s, 3H), 1.41 (t, *J* = 7.2Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):189.2, 168.9, 165.7, 151.1, 139.8, 134.1, 129.5, 129.3, 115.1, 61.5, 20.4, 14.3.

MS (EI) *m/z*:262 (M^+); **HRMS:** Calcd for $C_{14}H_{14}O_5$ 262.0841, found264.0842.



$C_{12}H_{12}O_4$

MW: 220.07 g.mol^{-1}

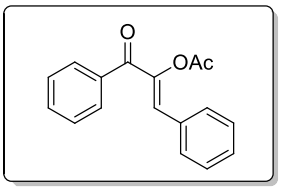
Yellow liquid

Yield: 55%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.90-7.86 (m, 2H), 6.95-6.91 (m, 2H), 5.63 (d, *J* = 2.0 Hz, 1H), 5.47 (d, *J* =2.0 Hz, 1H), 3.85 (s, 3H), 2.21 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):189.4, 169.0, 163.7, 151.2, 132.1, 128.8, 113.8, 113.2, 55.6, 20.5.

MS (EI) *m/z*:220 (M^+); **HRMS:** Calcd for $C_{12}H_{12}O_4$ 220.0736, found220.0735.



$C_{17}H_{14}O_3$

MW: 266.09 g.mol^{-1}

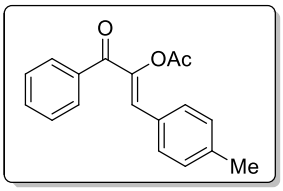
Yellow liquid

Yield: 58%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.87 (d, *J* = 6.8 Hz, 2H), 7.64-7.61 (m, 2H), 7.59 (d, *J* = 7.6 Hz, 1H), 7.49 (t, *J* = 7.6 Hz, 2H), 7.43-7.39 (m, 3H), 6.87 (s, 1H), 2.35 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 190.7, 168.5, 144.6, 137.5, 136.9, 132.6, 132.2, 130.3, 130.0, 129.6, 129.5, 128.9, 128.4, 20.8.

MS (EI) *m/z*:266 (M^+); **HRMS:** Calcd for $C_{17}H_{14}O_3$ 266.0943, found266.0945.



$C_{18}H_{16}O_3$

MW: 280.11 g.mol^{-1}

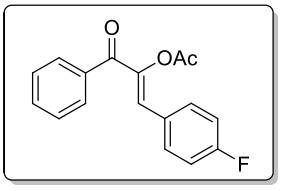
Yellow liquid

Yield: 66%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.85 (dd, *J* = 8.4 Hz, *J* = 1.2 Hz, 2H), 7.58 (t, *J* = 7.6 Hz, 1H), 7.52 (d, *J* = 8.4 Hz, 2H), 7.48 (t, *J* = 7.6 Hz, 2H), 7.21 (d, *J* = 8.4 Hz, 2H), 6.86 (s, 1H), 2.38 (s, 3H), 2.35 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 190.7, 168.5, 144.1, 140.5, 137.1, 132.4, 130.3, 130.0, 129.6, 129.4, 129.4, 128.4, 21.5, 20.8.

MS (EI) *m/z*:280 (M^+); **HRMS:** Calcd for $C_{18}H_{16}O_3$ 280.1099, found280.1099.



$C_{17}H_{13}FO_3$

MW: 284.08 g.mol^{-1}

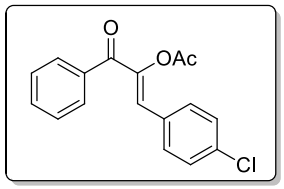
Yellow liquid

Yield: 59%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.86-7.84 (m, 2H), 7.63 (td, *J* = 6.4 Hz, *J* = 2.4Hz, 2H), 7.59 (d, *J* = 7.6 Hz, 1H), 7.49 (t, *J* = 8.0 Hz, 2H), 7.10 (t, *J* = 8.8 Hz, 2H), 6.83 (s, 1H), 2.35 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 190.5, 168.4, 163.4 (d, *J* = 250.7 Hz), 144.3 (d, *J* = 2.4 Hz), 136.8, 132.6, 132.3 (d, *J* = 8.4 Hz), 129.4, 128.5, 128.3, 116.0 (d, *J* = 21.6 Hz), 20.8.

MS (EI) *m/z*:284 (M^+); **HRMS:** Calcd for $C_{17}H_{13}FO_3$ 284.0849, found284.0848.



$C_{17}H_{13}ClO_3$

MW: 300.06g.mol^{-1}

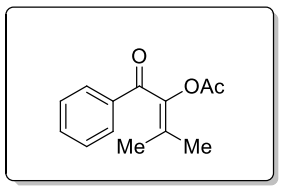
Yellow liquid

Yield: 62%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.86-7.84 (m, 2H), 7.62-7.55 (m, 3H), 7.49 (t, *J* = 8.0 Hz, 2H), 7.38 (d, *J* = 8.8 Hz, 2H), 6.81 (s, 1H), 2.34 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 190.5, 168.4, 144.9, 136.7, 135.9, 132.7, 131.4, 130.7, 129.5, 129.1, 128.5, 127.9, 20.8.

MS (EI) *m/z*:300 (M^+); **HRMS:** Calcd for $C_{17}H_{13}ClO_3$ 300.0553, found300.0553.



$C_{13}H_{14}O_3$

MW:218.09 g.mol^{-1}

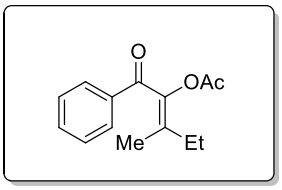
Yellowliquid

Yield: 70%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.82 (dd, *J* = 8.4 Hz, *J* = 1.2 Hz, 2H), 7.52 (t, *J* = 7.2 Hz, 1H), 7.42 (t, *J* = 7.6 Hz, 2H), 2.04 (s, 3H), 1.88 (s, 3H), 1.85 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):190.9, 169.3, 137.7, 132.6, 129.1, 128.4, 20.3, 20.1, 19.5.

MS (EI) *m/z*:218 (M^+); **HRMS:** Calcd for $C_{13}H_{14}O_3$ 218.0943, found218.0942



$C_{14}H_{16}O_3$

MW: 232.11 g.mol^{-1}

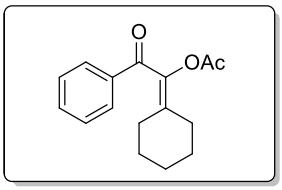
Yellow liquid

Yield: 75%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.85-7.82 (m, 2H), 7.52(t,*J* = 7.2 Hz, 1H), 7.43 (t, *J* = 7.6 Hz, 2H), 2.26-2.22 (m, 2H),2.04 (s, 1.3H), 2.03 (s, 1.7H), 1.87 (s, 1.7 H), 1.84 (s, 1.3H), 1.08(dd, *J* = 17.2 Hz,*J* = 7.6 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):191.1, 190.8, 169.4, 169.2, 139.8, 139.1, 139.0, 137.8, 137.8, 132.6, 132.6, 129.1, 129.0, 128.3, 128.3, 29.7, 26.2, 26.1, 20.3, 17.5, 16.4, 12.6, 11.9.

MS (EI) *m/z*:232 (M^+); **HRMS:** Calcdfor$C_{14}H_{16}O_3$ 232.1099, found232.1098.



$C_{16}H_{18}O_3$

MW: 258.13 g.mol^{-1}

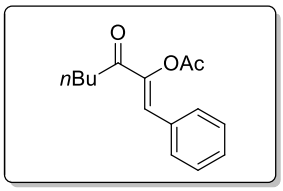
Light-Yellow liquid

Yield: 77%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.88 (d, *J* = 7.2 Hz, 2H), 7.53 (t, *J* = 7.2 Hz, 1H), 7.43 (t, *J* = 8.0 Hz, 2H), 2.34 (t, *J* = 5.6 Hz, 2H), 2.20 (t, *J* = 6.4 Hz, 2H), 2.08 (s, 3H), 1.67 (d, *J* = 7.6 Hz, 2H), 1.58-1.52 (m, 4H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):191.4, 169.5, 140.0, 138.0, 137.0, 132.8, 129.2, 128.4, 29.8, 28.8, 27.5, 27.3, 26.1, 20.4.

MS (EI) *m/z*:258 (M^+); **HRMS:** Calcdfor$C_{16}H_{18}O_3$ 258.1256, found258.1255.



$C_{15}H_{18}O_3$

MW: 246.13 g.mol^{-1}

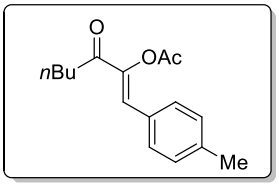
Yellow liquid

Yield: 66%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):7.61 (dd,*J* = 7.6 Hz, *J* = 2.0 Hz, 2H), 7.42-7.39 (m, 3H), 7.18 (s, 1H), 2.76 (t, *J* = 7.2 Hz, 2H), 2.34 (s, 3H), 1.72-1.65 (m, 2H), 1.42-1.36 (m, 2H), 0.95 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):194.7, 168.6, 144.7, 132.1, 130.2, 130.0, 128.9, 127.2, 37.0, 26.4, 22.4, 20.8, 13.9.

MS (EI) *m/z*:246 (M^+); **HRMS:** Calcd for $C_{15}H_{18}O_3$ 246.1256, found 246.1258.



$C_{16}H_{20}O_3$

MW: 260.14 $g.mol^{-1}$

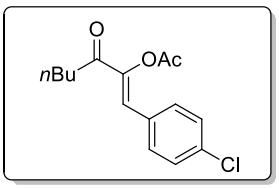
Yellow liquid

Yield: 78%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm): 7.50 (d, *J* = 8.4 Hz, 2H), 7.21 (d, *J* = 8.0 Hz, 2H), 7.16 (s, 1H), 2.74 (t, *J* = 7.2 Hz, 2H), 2.37 (s, 3H), 2.34 (s, 3H), 1.71-1.64 (m, 2H), 1.41-1.40 (m, 2H), 0.92 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm): 194.6, 168.6, 144.2, 140.5, 130.2, 129.6, 129.3, 127.4, 37.0, 26.4, 22.4, 21.5, 20.8, 13.9.

MS (EI) *m/z*:260 (M^+); **HRMS:** Calcd for $C_{16}H_{20}O_3$ 260.1412, found 260.1415.



$C_{15}H_{17}ClO_3$

MW:280.09 $g.mol^{-1}$

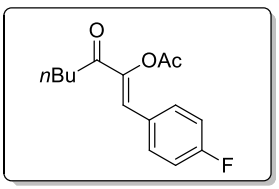
Yellow liquid

Yield: 82%

^{1}H NMR (400 MHz, $CDCl_3$, δ ppm): 7.53 (d, *J* = 8.8 Hz, 2H), 7.37 (d, *J* = 8.8 Hz, 2H), 7.11 (s, 1H), 2.73(t, *J* = 7.2 Hz, 2H), 2.33 (s, 3H), 1.70-1.63 (m, 2H), 1.41-1.35 (m, 2H), 0.93 (t, *J* = 7.6 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):194.5, 168.4, 145.0, 135.9, 131.3, 130.6, 129.1, 125.7, 37.0, 26.3, 22.3, 20.7, 13.9.

MS (EI) *m/z*:280 (M^+); **HRMS:** Calcd for $C_{15}H_{17}ClO_3$ 280.0866, found 280.0867.



$C_{15}H_{17}FO_3$

MW:264.12g.mol^{-1}

Yellow liquid

Yield: 85%

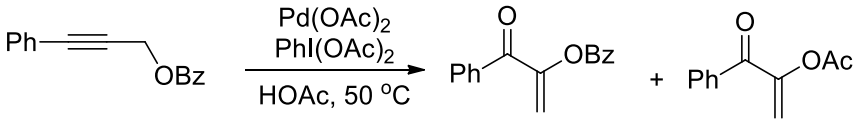
^{1}H NMR (400 MHz, $CDCl_3$, δ ppm): 7.62-7.59 (m, 2H), 7.13 (s, 1H), 7.09 (t, *J* = 8.8 Hz, 2H), 2.73 (t, *J* = 7.2 Hz, 2H), 2.34 (s, 3H), 1.71-1.63 (m, 2H), 1.41-1.35 (m, 2H), 0.94 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):194.5, 168.5, 163.4 (d, *J* = 250.5 Hz), 144.5 (d, *J* = 2.3 Hz), 132.2 (d, *J* = 8.4 Hz), 128.3 (d, *J* = 3.5 Hz), 125.9, 116.1 (d, *J* = 21.7 Hz),37.0, 26.3, 22.3, 20.7, 13.9.

MS (EI) *m/z*:264 (M^+); **HRMS:** Calcd for $C_{15}H_{17}FO_3$ 264.1162, found 264.1162.

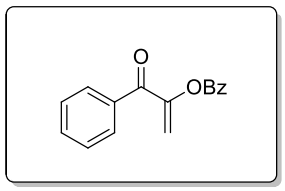
V. The General Synthetic Procedure and Analytical Data forCompounds2t.

To a solution of $Pd(OAc)_2$ (3.4mg, 0.015 mmol) and $PhI(OAc)_2$ (106.3mg, 0.33 mmol) in HOAc (3 mL) was added **1t** (71.9 mg, 0.3 mmol). Stirring for 10minutes at 50 ^oC, 5 mL water was added to quench the reaction. Then the mixture was extracted by EA and washed with an aqueous solution of $NaCl_{sat}$(30 mL x 3). The organic part was dried over Na_2SO_4, evaporated and purified by flash chromatography. The purified acetoxyenones**2t**and **2a** were dried by vacuum.



1t **2t** **2a**

Analysis Data :



$C_{16}H_{12}O_3$

MW: 252.08 $g.mol^{-1}$

Light-Yellow liquid

Yield: 56%

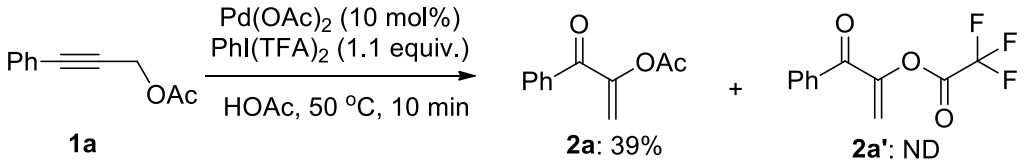
^{1}H NMR (400 MHz, $CDCl_3$, δ ppm):8.14 (d, *J* =7.2 Hz, 2H), 7.94 (d, *J* =7.6 Hz, 2H), 7.65-7.57 (m, 2H), 7.48 (dd, *J* =12.8 Hz, *J* = 8.0 Hz, 4H), 5.86 (d, *J* = 2.0 Hz, 1H), 5.69 (d, *J* = 2.0 Hz, 1H).

^{13}C NMR (100 MHz, $CDCl_3$, δ ppm):189.7, 164.8, 151.4, 136.2, 133.9, 133.0, 130.3, 129.7, 128.6, 128.4, 114.6.

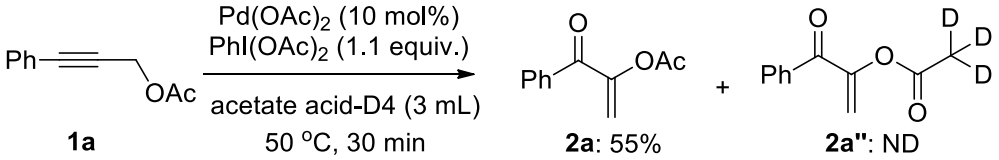
MS (EI) *m/z*:252 (M^+); **HRMS:** Calcd for$C_{16}H_{12}O_3$252.0786, found252.0788.

VI. The General Synthetic Procedure for Control Experiment.

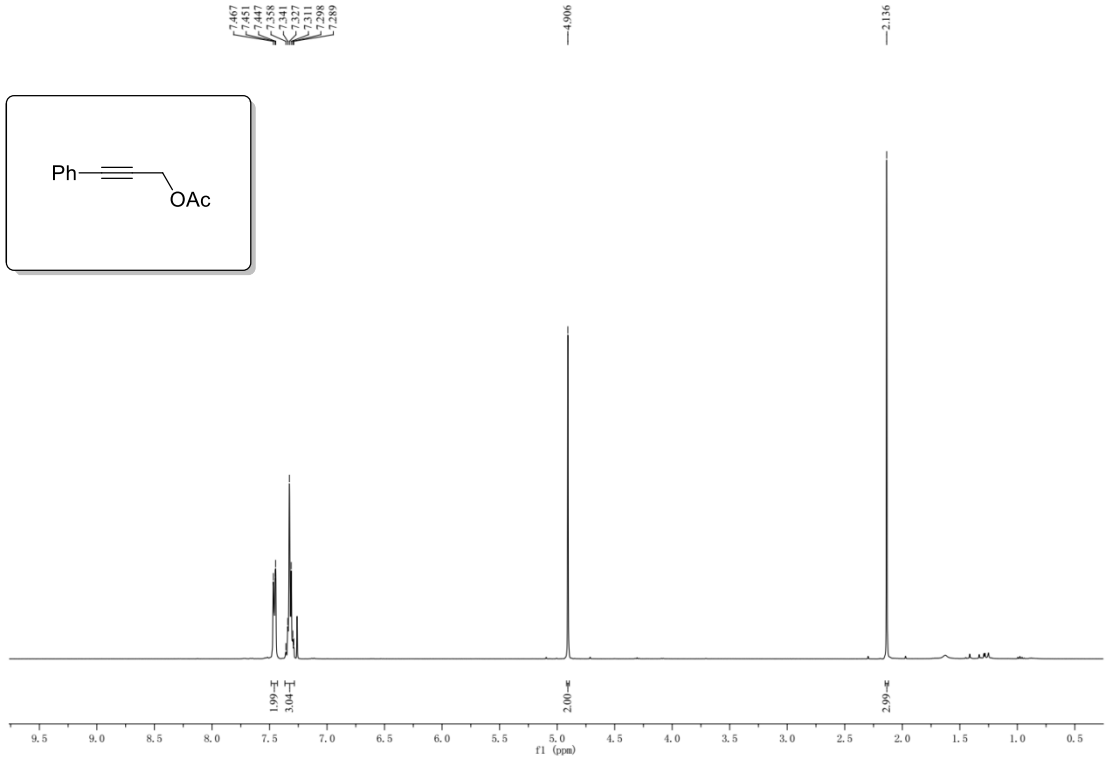
To a solution of $Pd(OAc)_2$ (3.4 mg, 0.015 mmol) and $PhI(TFA)_2$ (141.9 mg, 0.33 mmol) in HOAc (3 mL) was added **1a** (52.3 mg, 0.3 mmol). Stirringfor 10 minutes at 50 ^oC, 5 mL water was added to quench the reaction. Then the mixture was extracted by EA and washed with an aqueous solution of $NaCl_{sat}$(30 mL x 3). The organic part was dried over Na_2SO_4, evaporated and purified by flash chromatography. The purified acetoxyenones**2a** were dried by vacuum.

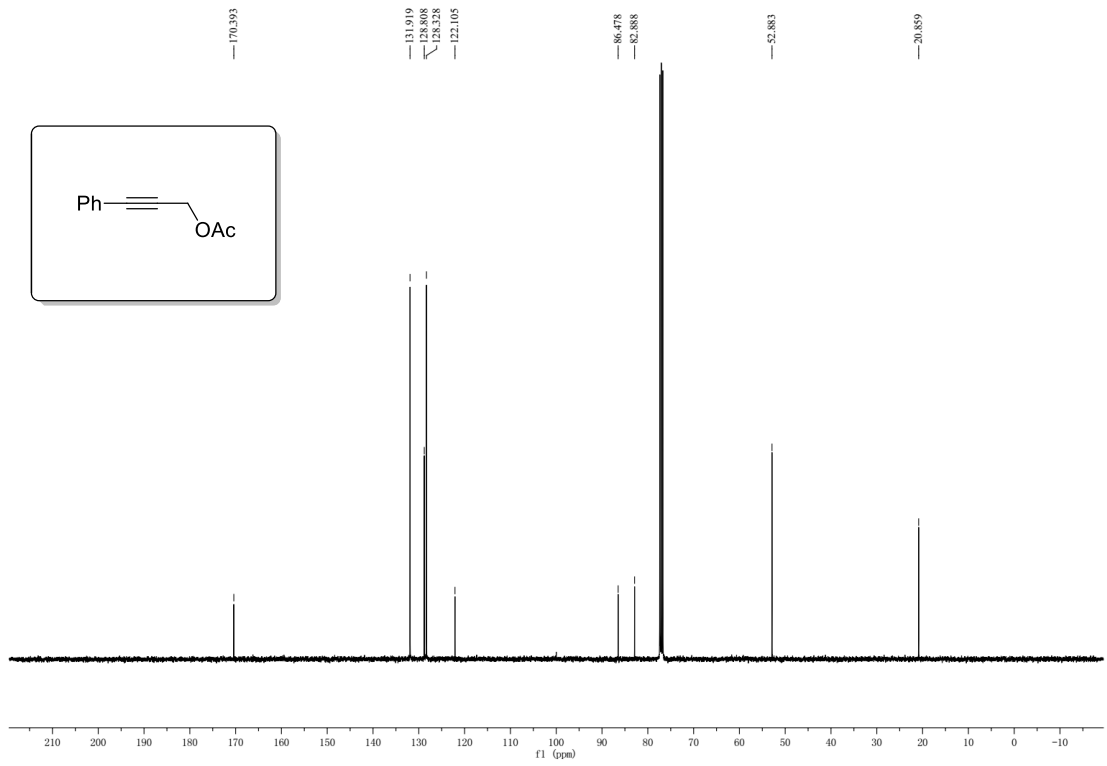


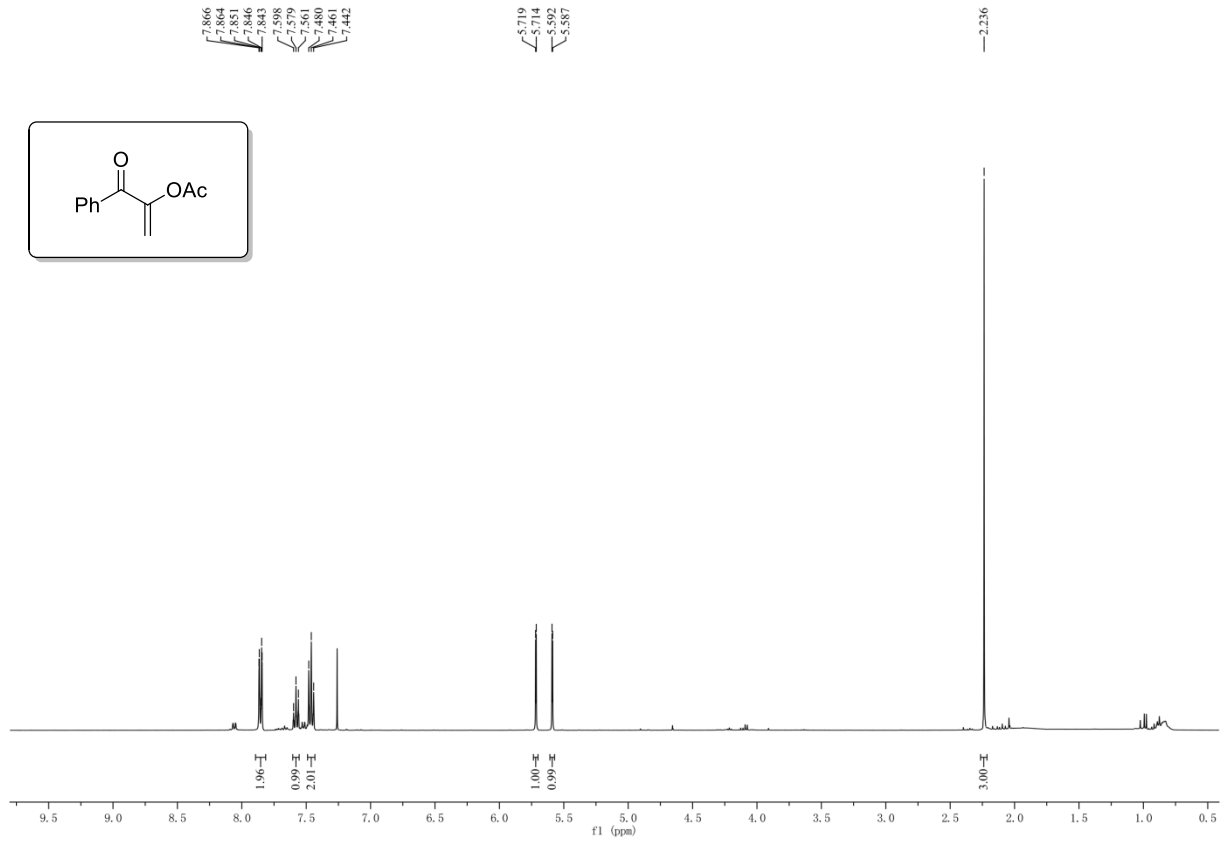
To a solution of $Pd(OAc)_2$ (3.4 mg, 0.015 mmol) and $PhI(OAc)_2$ (106.3 mg, 0.33 mmol) in deuterium-labelled acetate acid-D4(3 mL) was added **1a** (52.3mg, 0.3 mmol). Stirringfor 30minutes at 50 ^oC, 5 mL water was added to quench the reaction. Then the mixture was extracted by EA and washed with an aqueous solution of $NaCl_{sat}$(30 mL x 3). The organic part was dried over Na_2SO_4, evaporated and purified by flash chromatography. The purified acetoxyenones**2a** were dried by vacuum.



VII. Copies of the ^{1}H NMR, ^{13}C NMR



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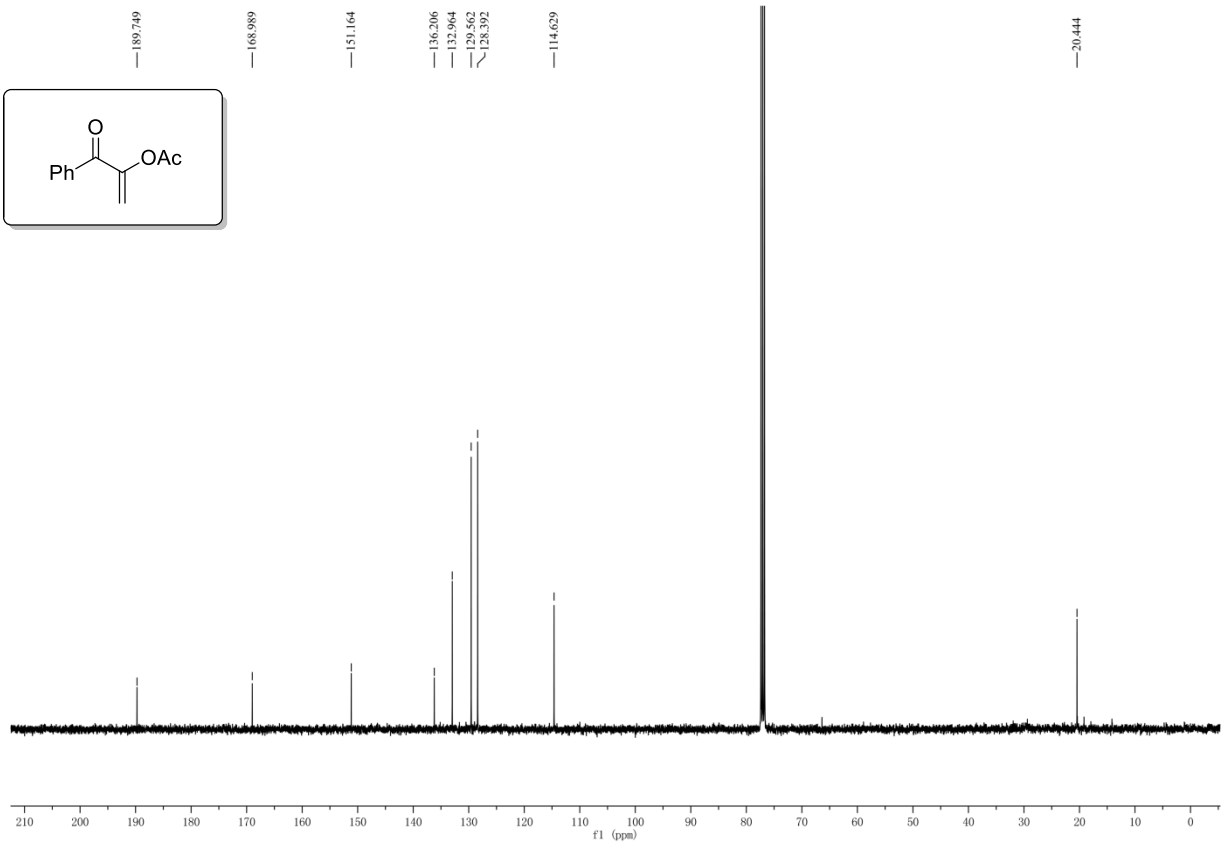
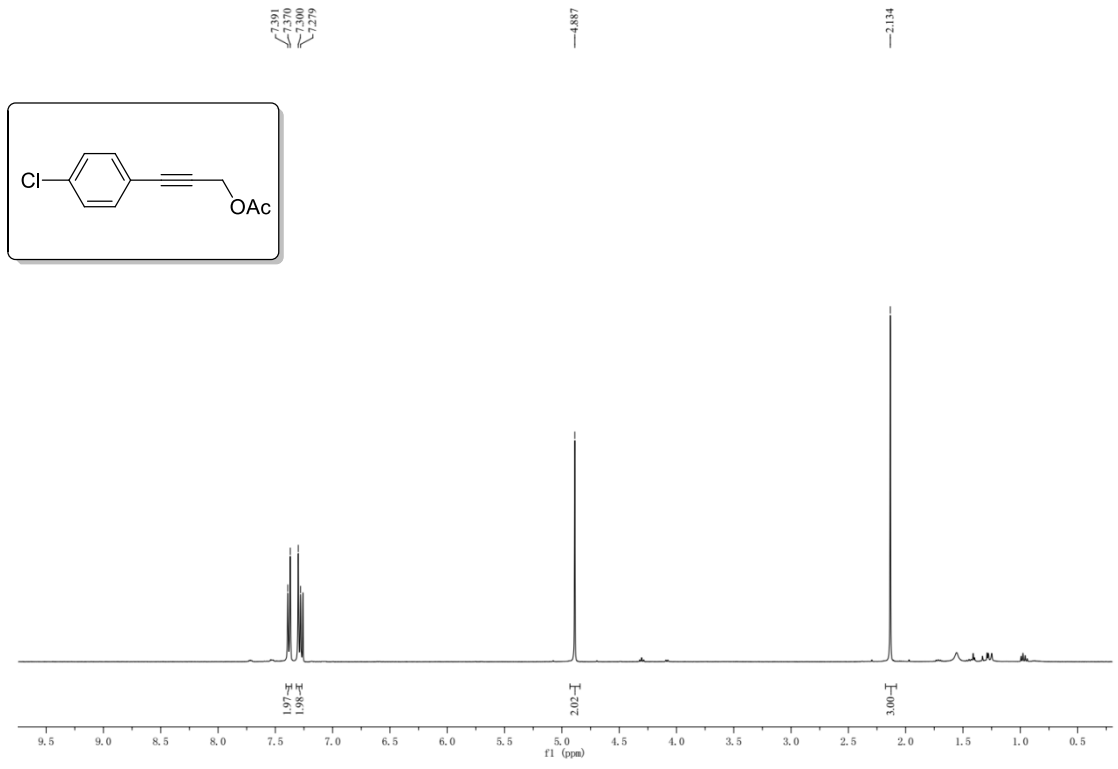
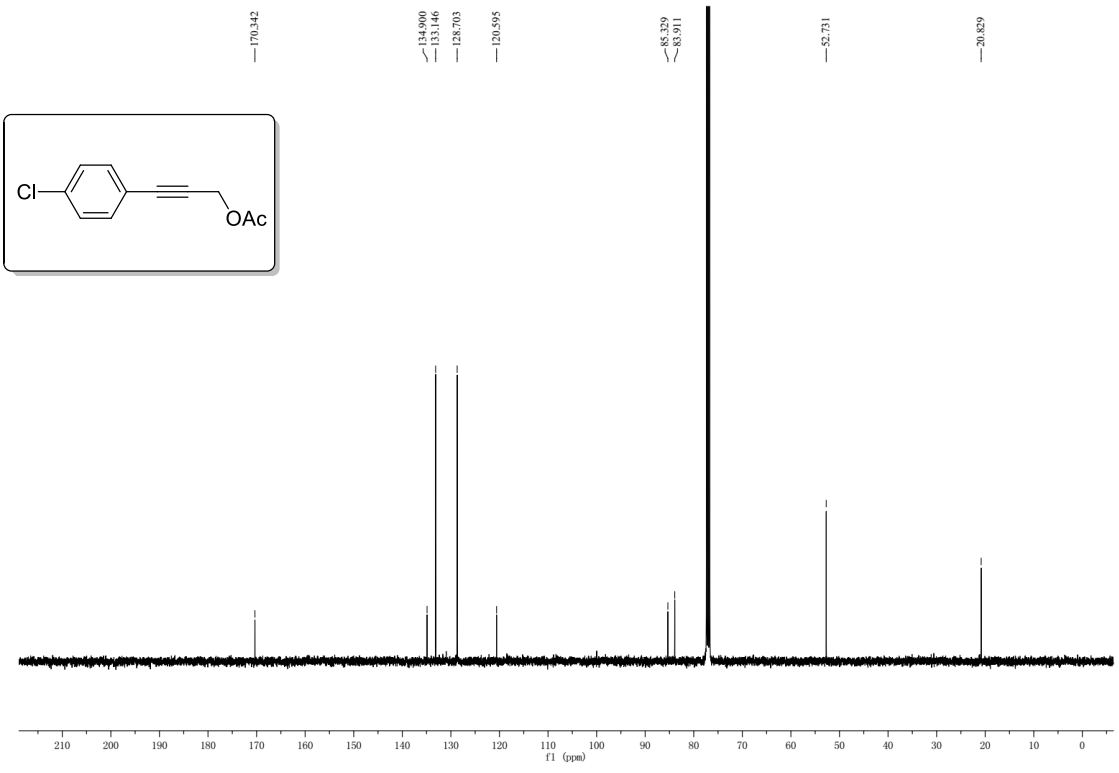
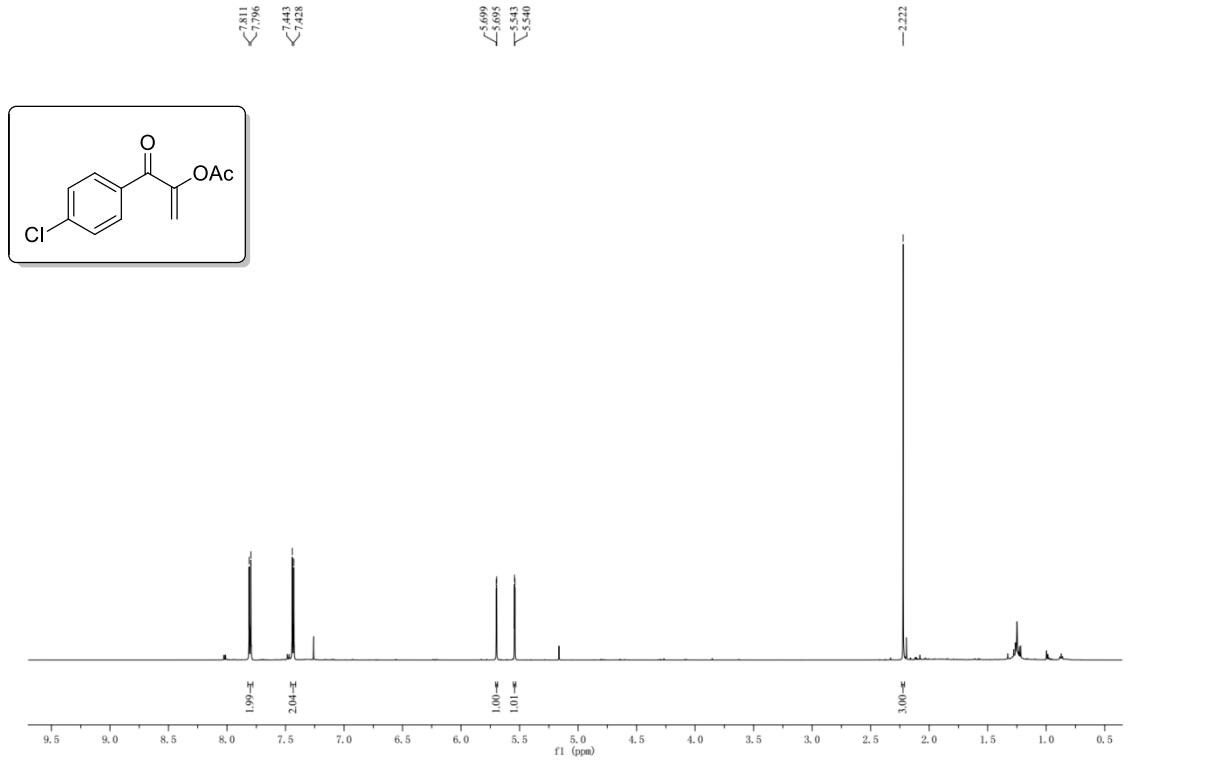
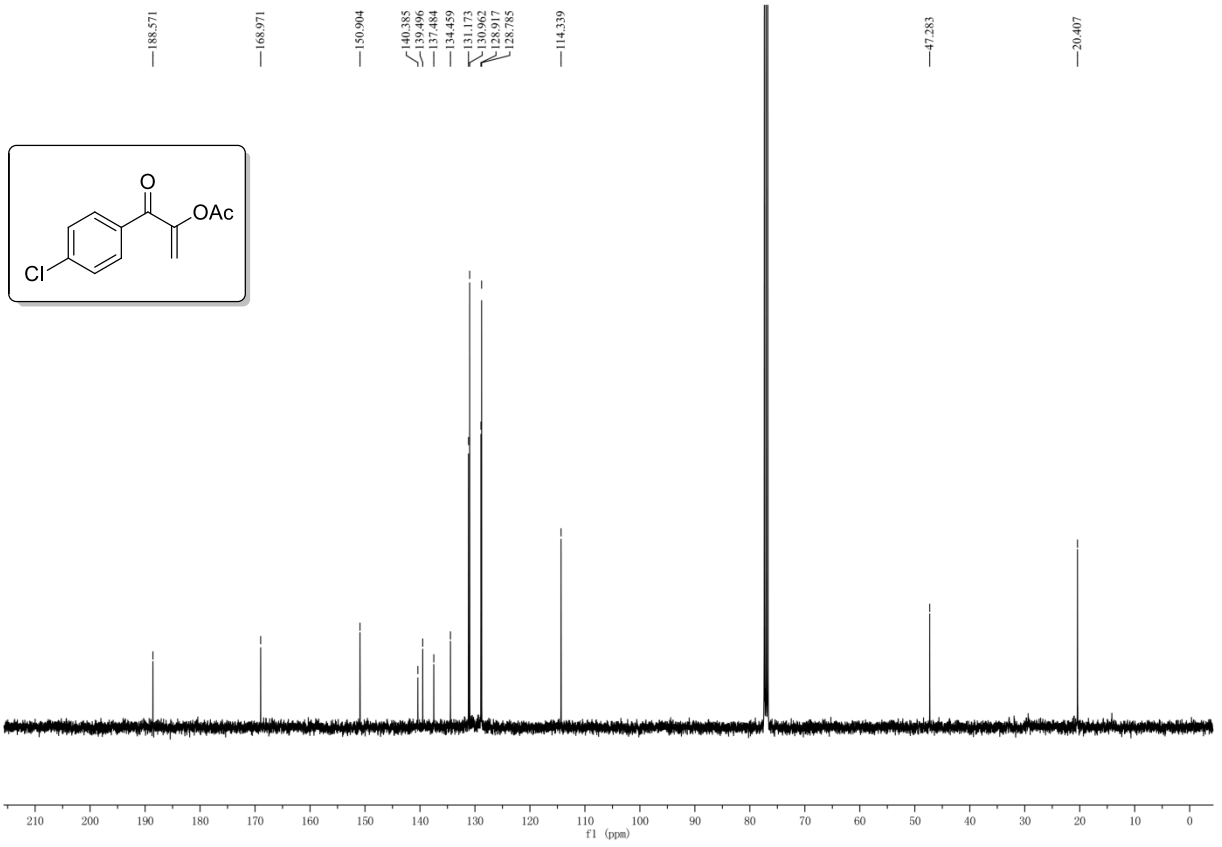
7.864
7.851
7.846
7.843
7.598
7.579
7.561
7.480
7.461
7.442
5.719
5.714
5.592
5.587
2.236
O
Ph
OAc
1.96
0.99
2.01
1.00
0.99
3.00
f1 (ppm)


189.749
168.989
151.164
136.206
132.964
129.562
128.392
114.629
20.444
O
Ph
OAc
f1 (ppm)


7.391
7.370
7.300
7.279
4.887
2.134
Cl
OAc
1.97
1.98
2.02
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)


170.342
134.900
133.146
128.703
120.595
85.329
83.911
52.731
20.829
Cl
OAc
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


7.811
7.796
7.443
7.428
5.699
5.695
5.543
5.540
2.222
O
OAc
Cl
1.99
2.04
1.00
1.01
3.00
f1 (ppm)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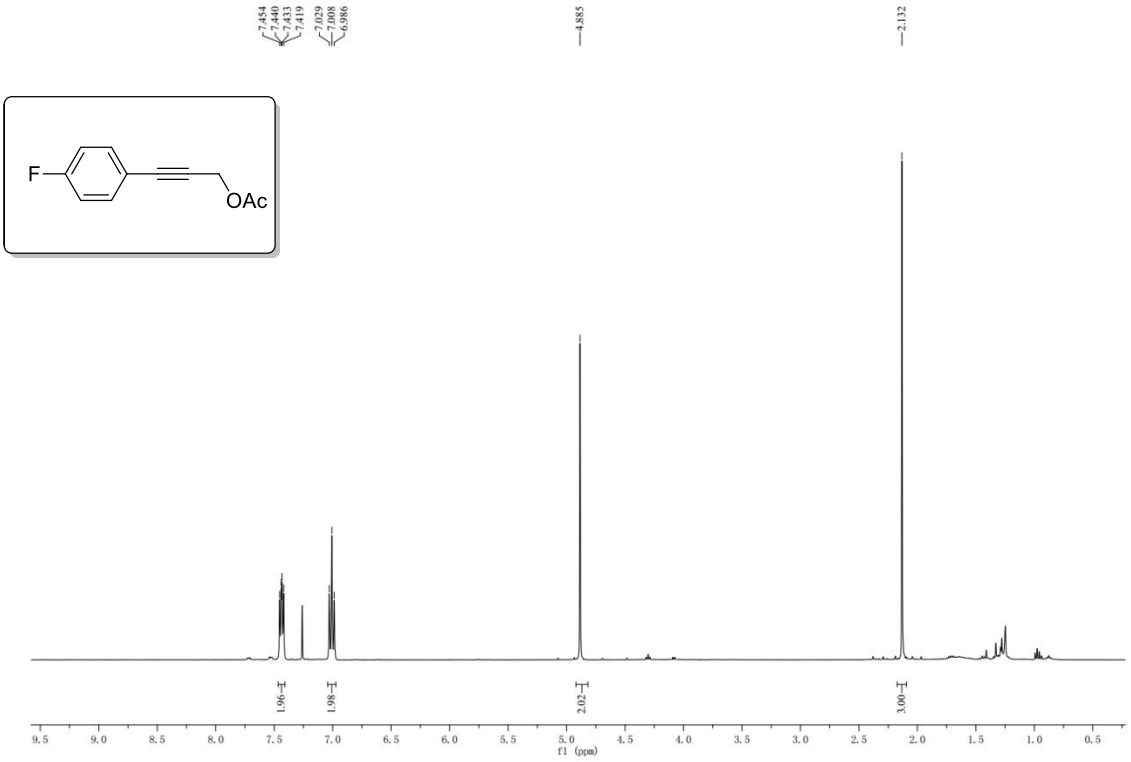
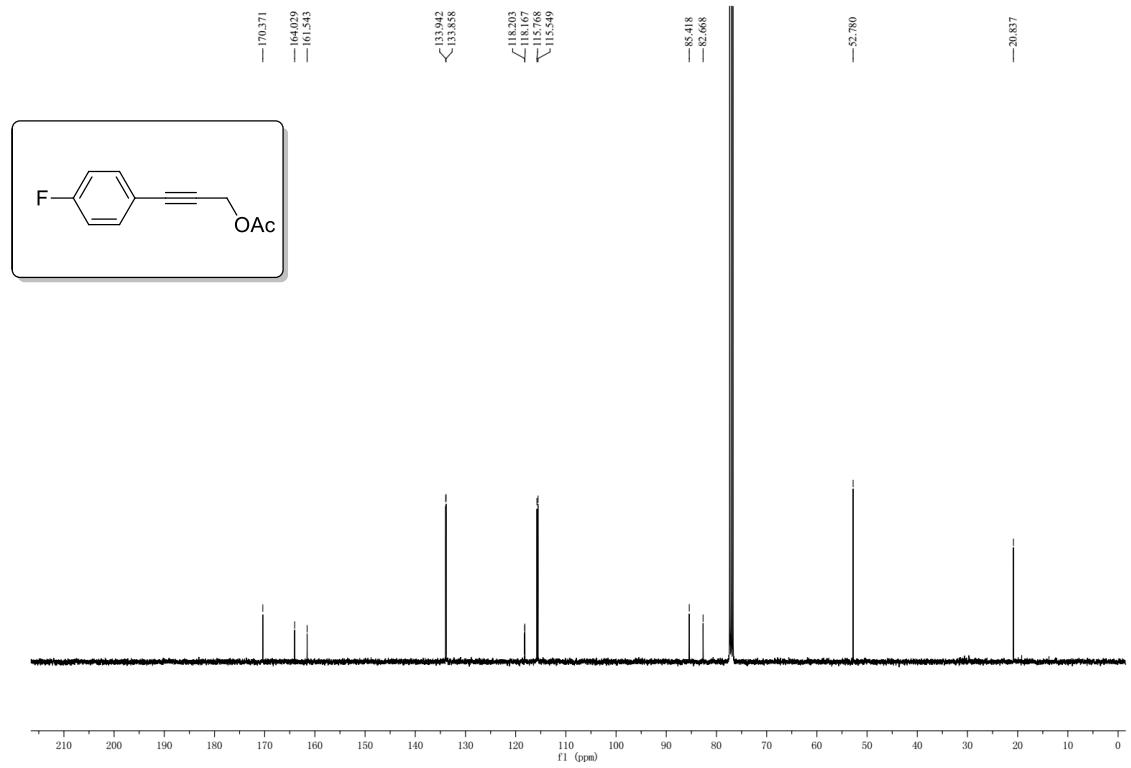
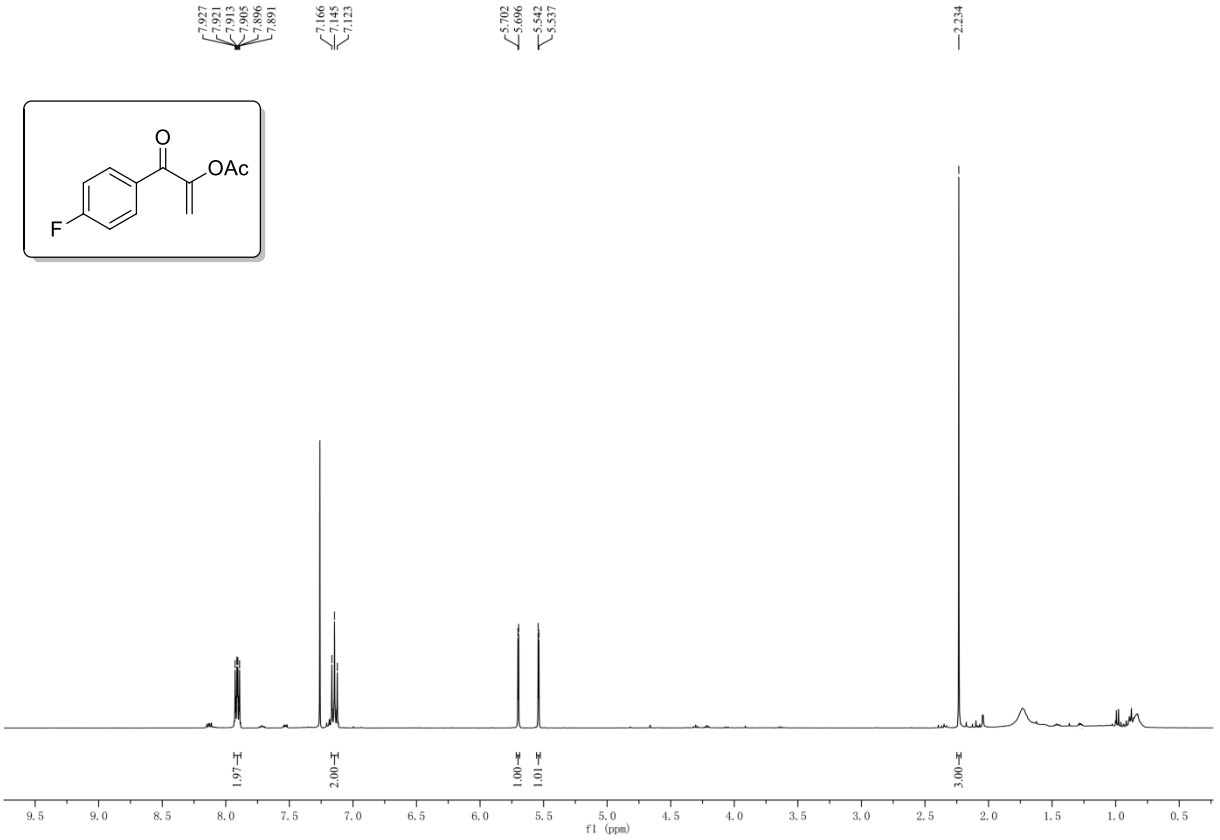
168.971
150.904
140.385
139.496
137.484
134.459
131.173
130.962
128.917
128.785
114.339
47.283
20.407
O
OAc
Cl
f1 (ppm)


7.454
7.440
7.433
7.419
7.029
7.008
6.986
4.885
2.132
F
OAc
1.96
1.98
2.02
3.00
f1 (ppm)


170.371
164.029
161.543
133.942
133.858
118.203
118.167
115.768
115.549
85.418
82.668
52.780
20.837
F
OAc
f1 (ppm)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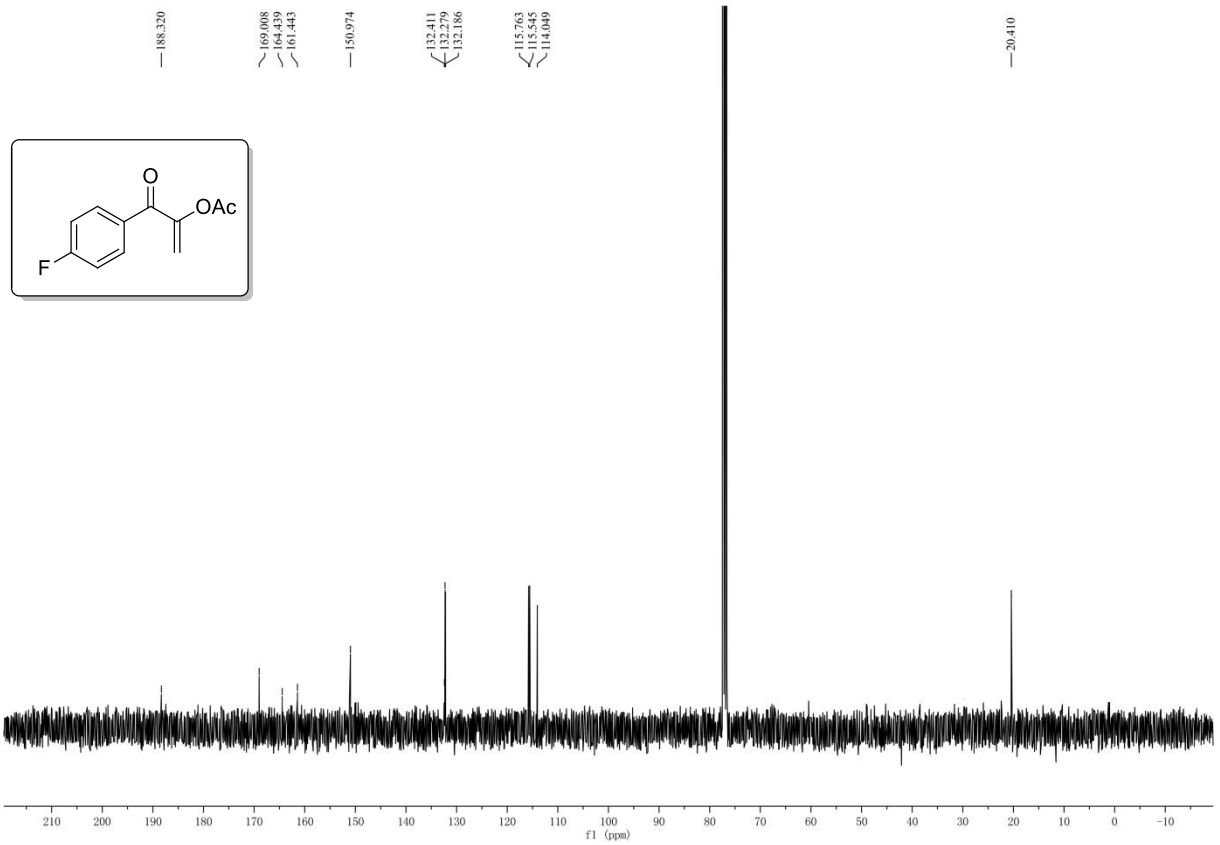
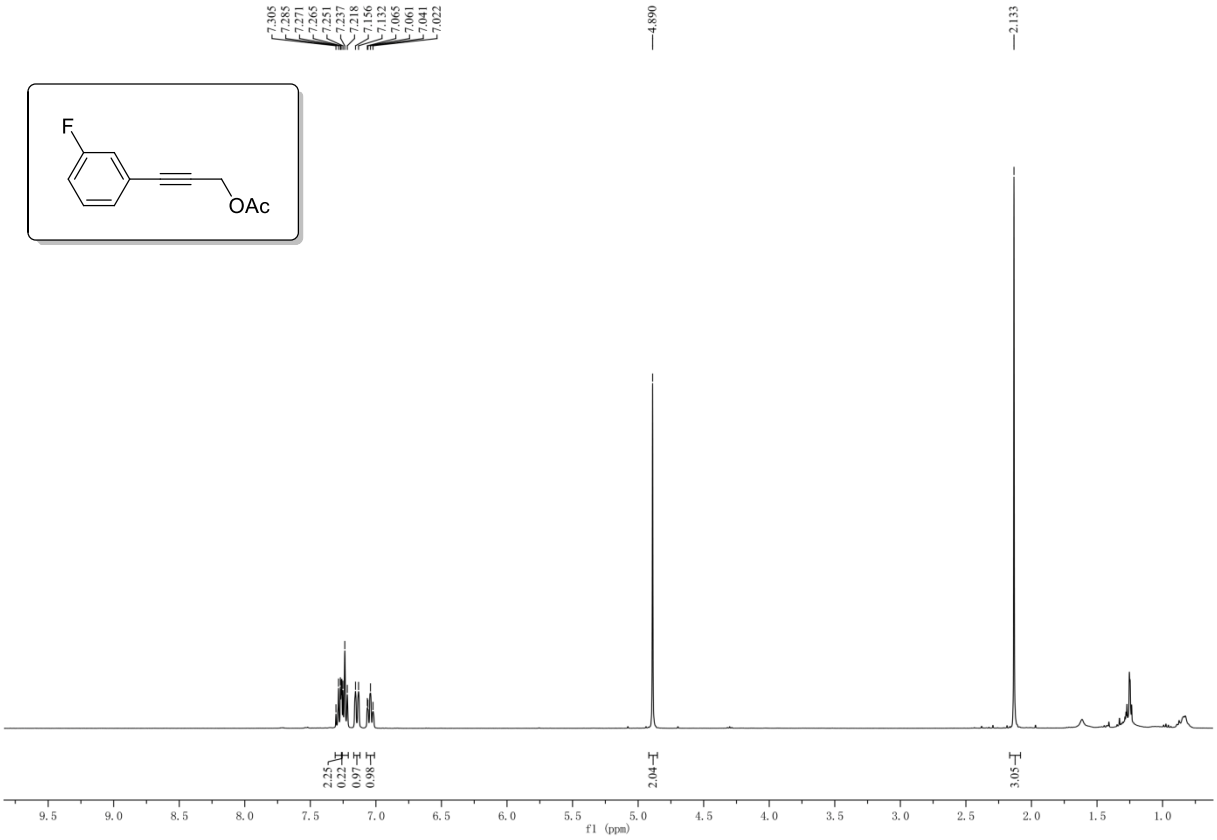
7.921
7.913
7.905
7.896
7.891
7.166
7.145
7.123
5.702
5.696
5.542
5.537
2.234
O
OAc
F
1.97
2.00
1.00
1.01
3.00
f1 (ppm)


188.320
169.008
164.439
161.443
150.974
132.411
132.279
132.186
115.763
115.545
114.049
20.410
O
OAc
F
f1 (ppm)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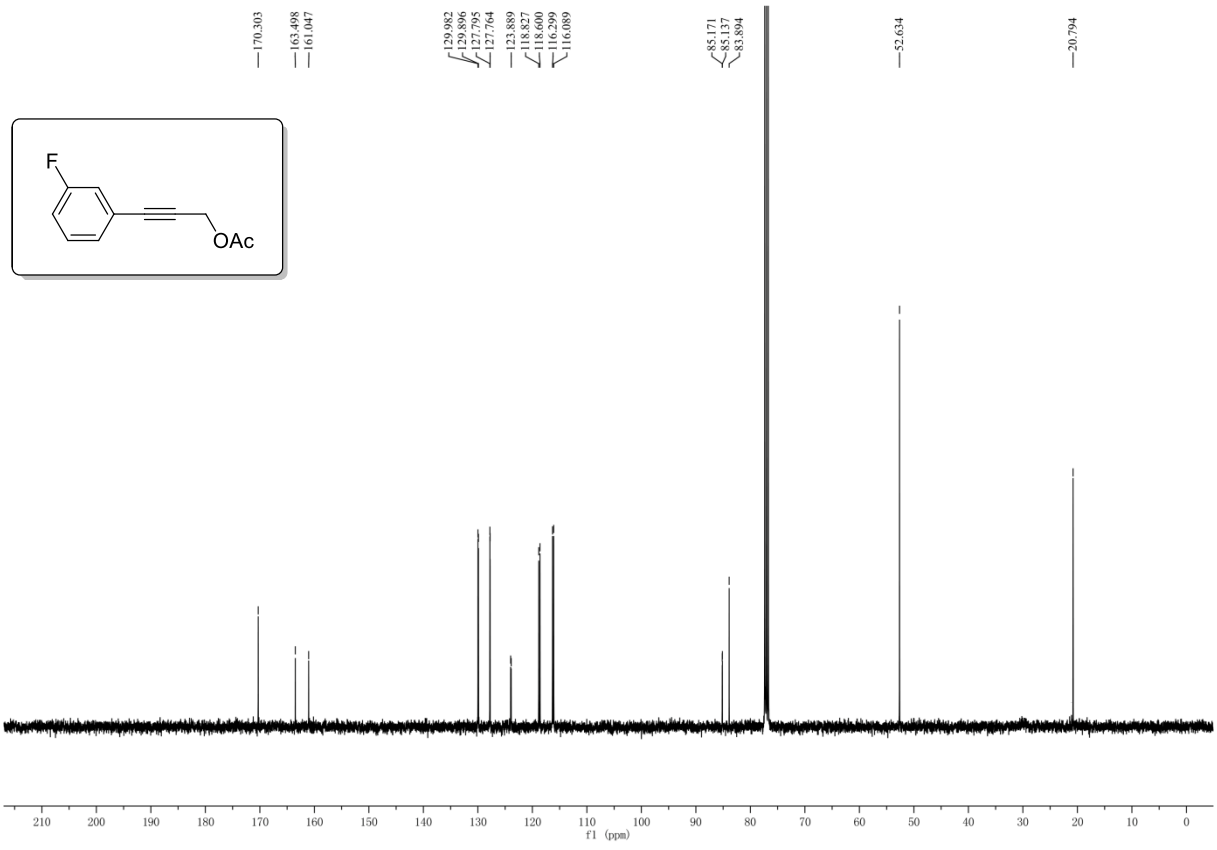
7.285
7.271
7.265
7.251
7.237
7.218
7.156
7.132
7.065
7.061
7.041
7.022
4.890
2.133
F
OAc
2.25
0.22
0.97
0.98
2.04
3.05
f1 (ppm)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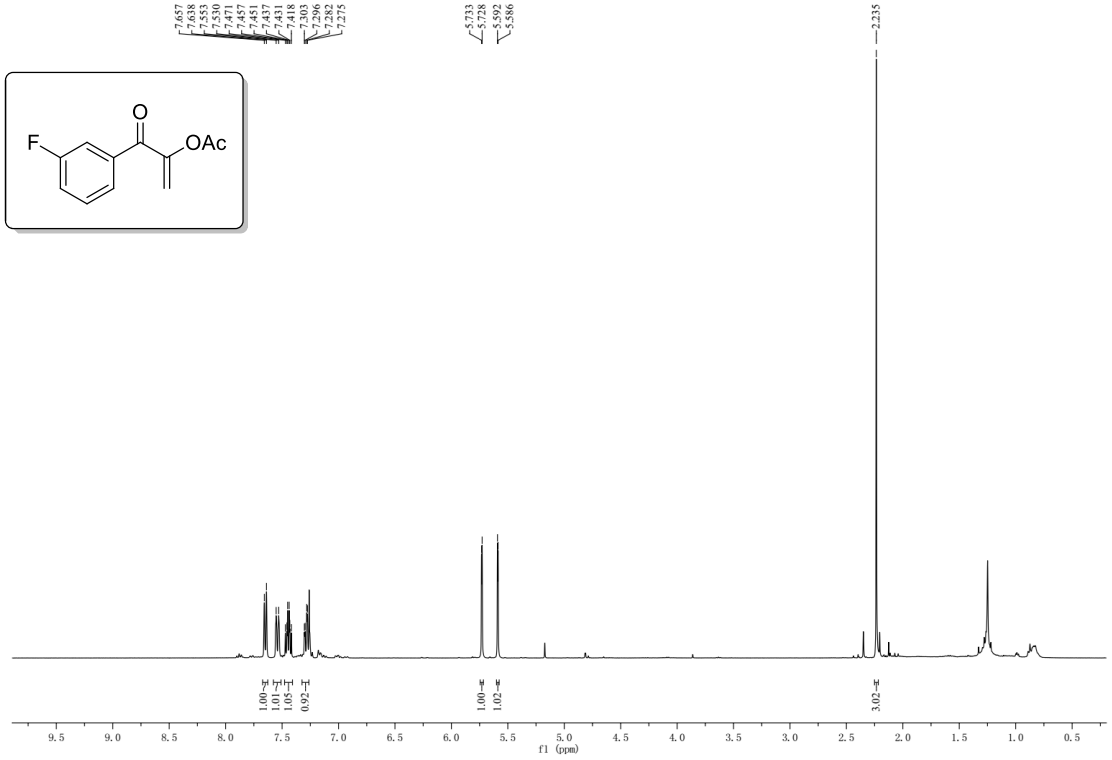
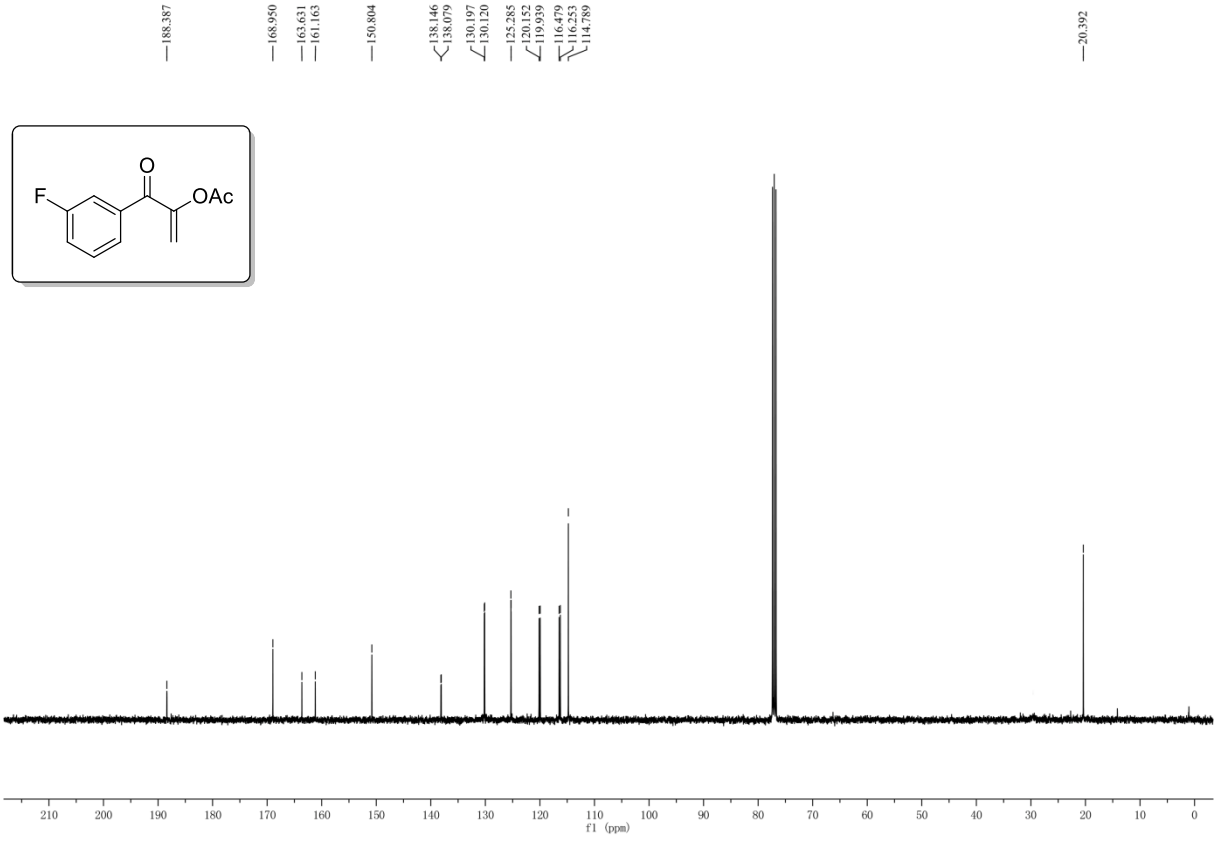
161.047
129.982
129.896
127.795
127.764
123.889
118.827
118.600
116.299
116.089
85.171
85.137
83.894
52.634
20.794
F
OAc
f1 (ppm)


7.657
7.638
7.553
7.530
7.471
7.457
7.451
7.437
7.431
7.418
7.303
7.296
7.282
7.275
5.733
5.728
5.592
5.586
2.235
F
O
OAc
1.00
1.01
1.05
0.92
1.00
1.02
3.02
f1 (ppm)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161.163
150.804
138.146
138.079
130.197
130.120
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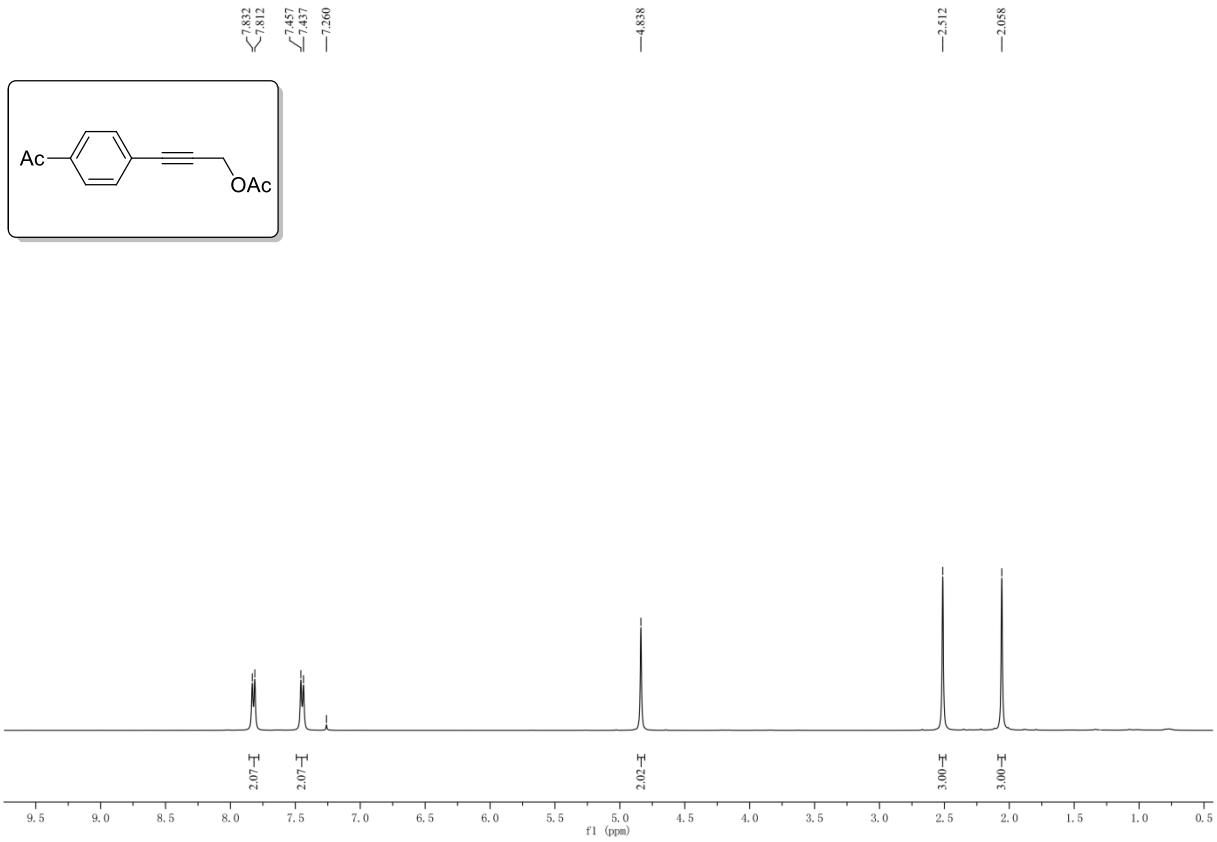
120.152
119.939
116.479
116.253
114.789
20.392
F
O
OAc
f1 (ppm)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7.812
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7.437
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2.058
Ac
OAc
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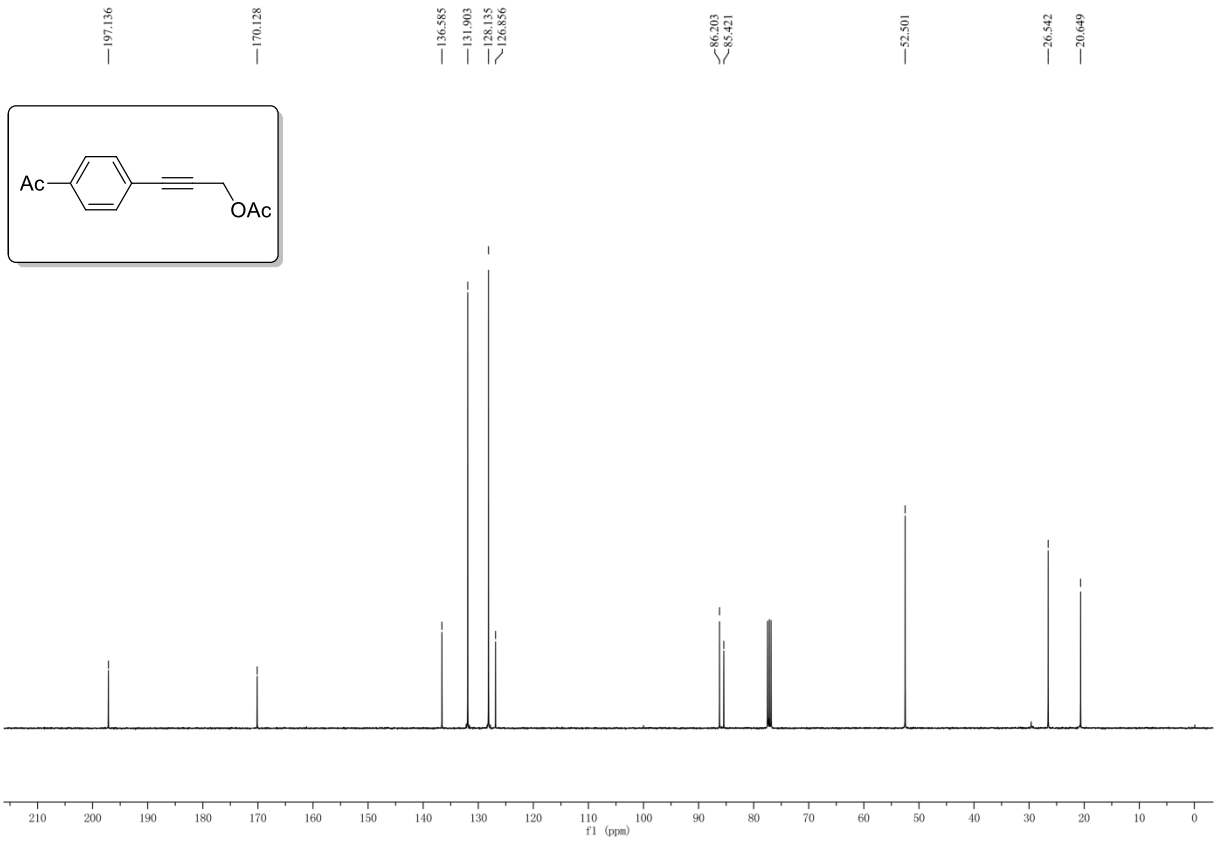
2.07
2.02
3.00
3.00
f1 (ppm)


197.136
170.128
136.585
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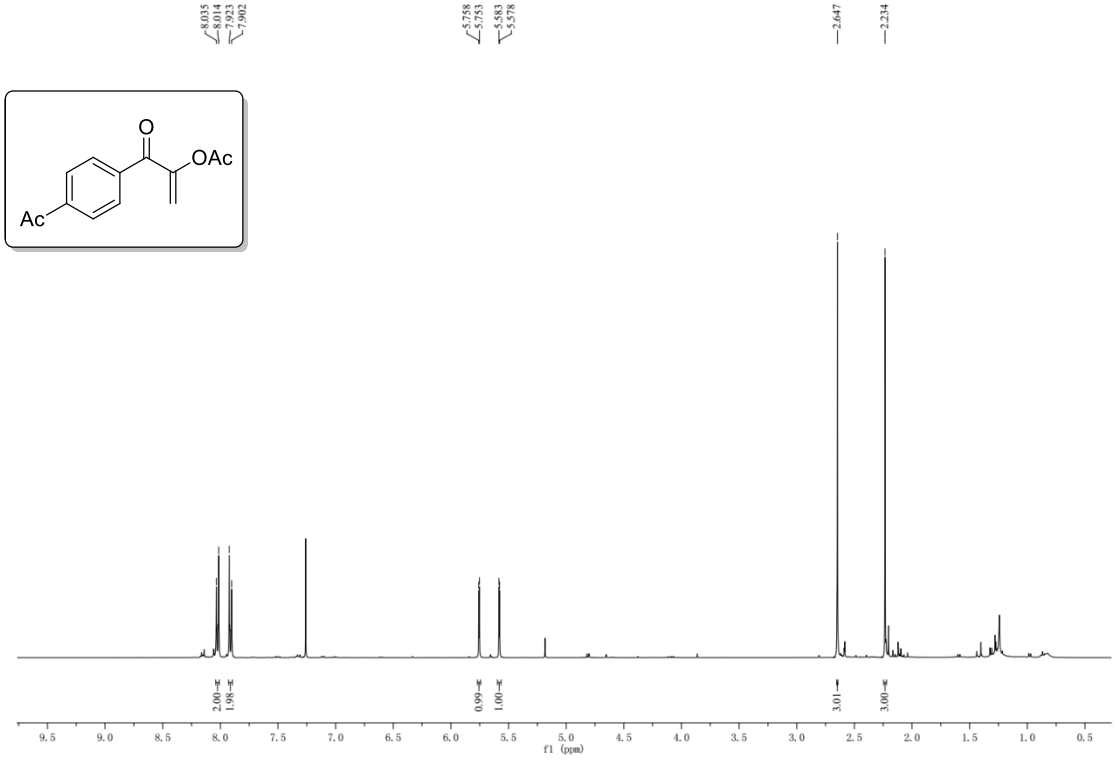
128.135
126.856
86.203
85.421
52.501
26.542
20.649
Ac
OAc
f1 (ppm)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8.014
7.923
7.902
5.758
5.753
5.583
5.578
2.647
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O
OAc
Ac
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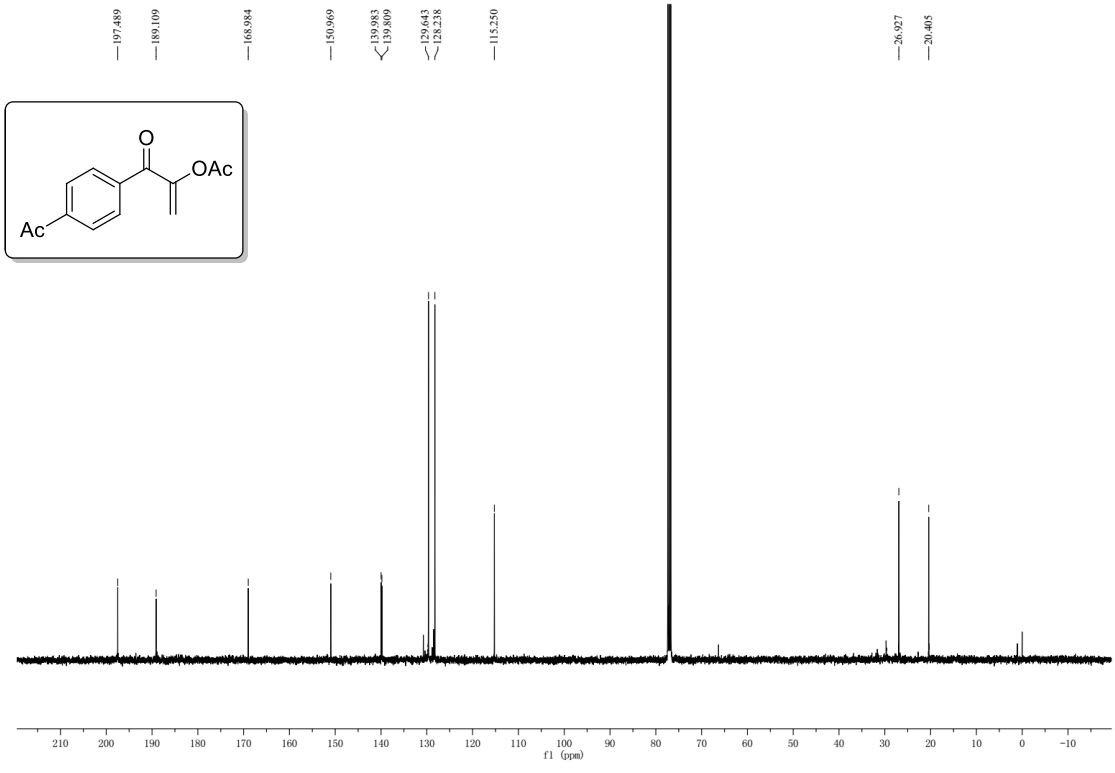
0.99
1.00
3.01
3.00
f1 (ppm)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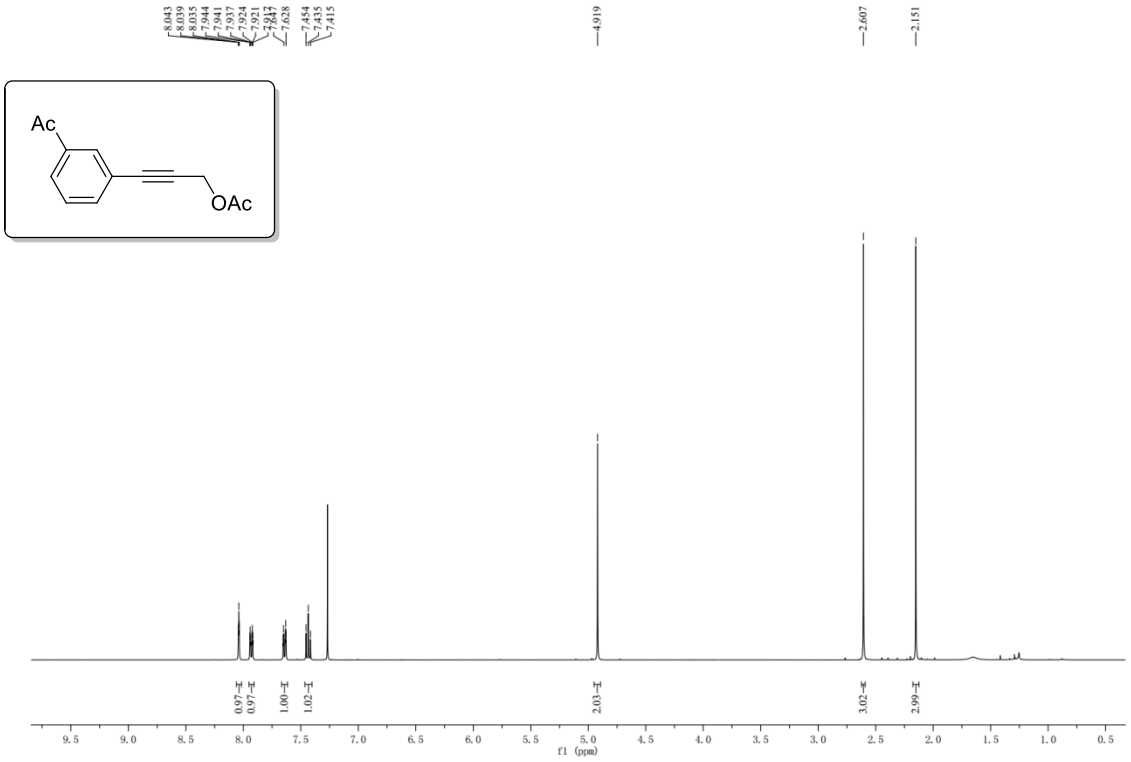
OAc
Ac
f1 (ppm)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7.941
7.937
7.924
7.921
7.628
7.454
7.435
7.415
4.919
2.607
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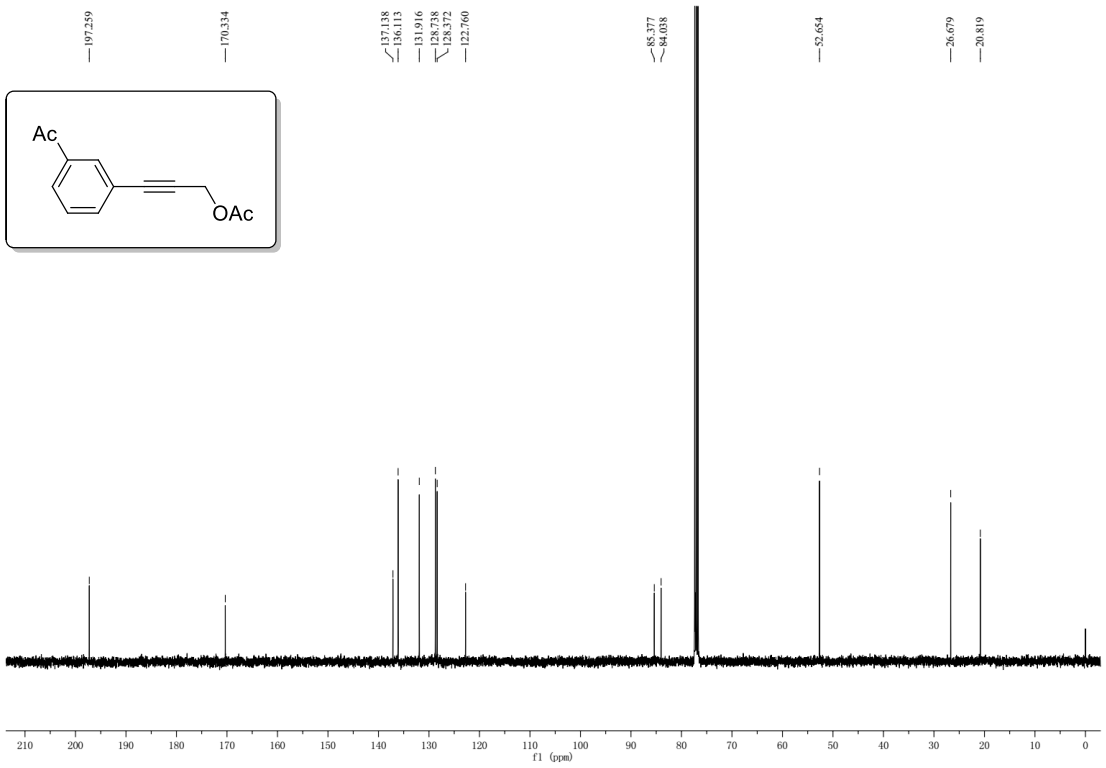
Ac
OAc
0.97
0.97
1.00
1.02
2.03
3.02
2.99
f1 (ppm)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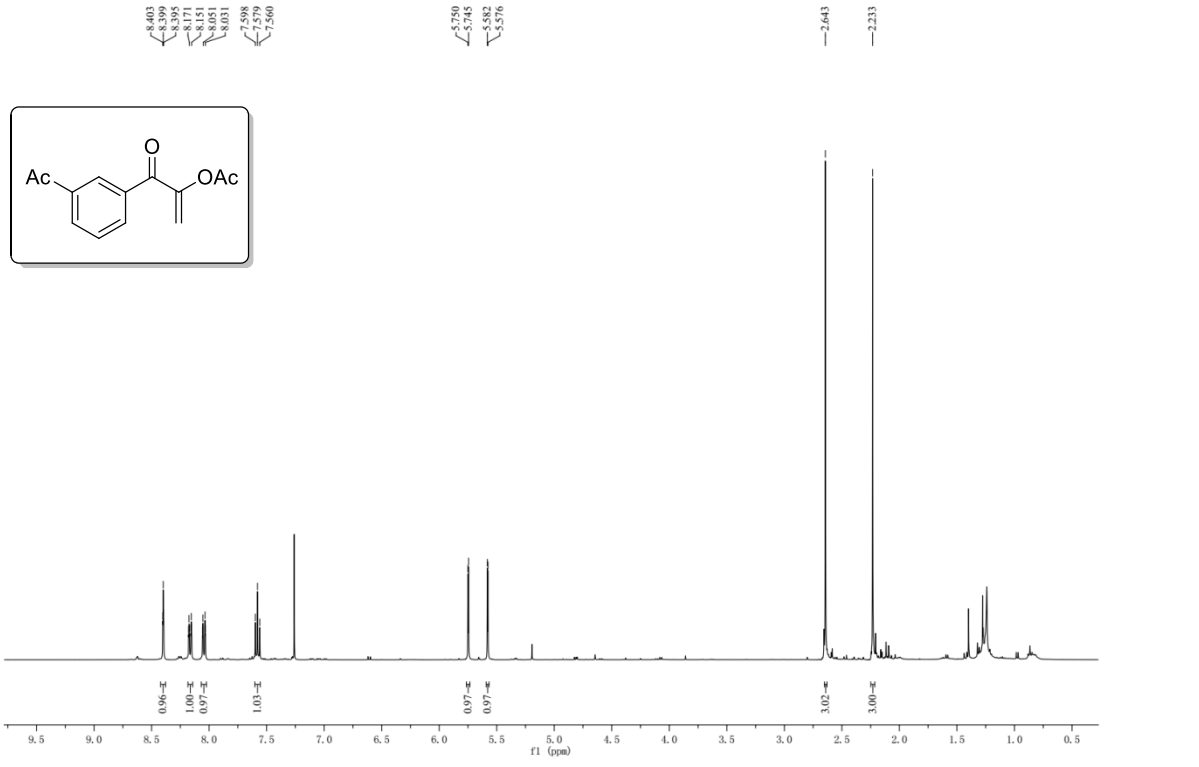
137.138
136.113
131.916
128.738
128.372
122.760
85.377
84.038
52.654
26.679
20.819
Ac
OAc
f1 (ppm)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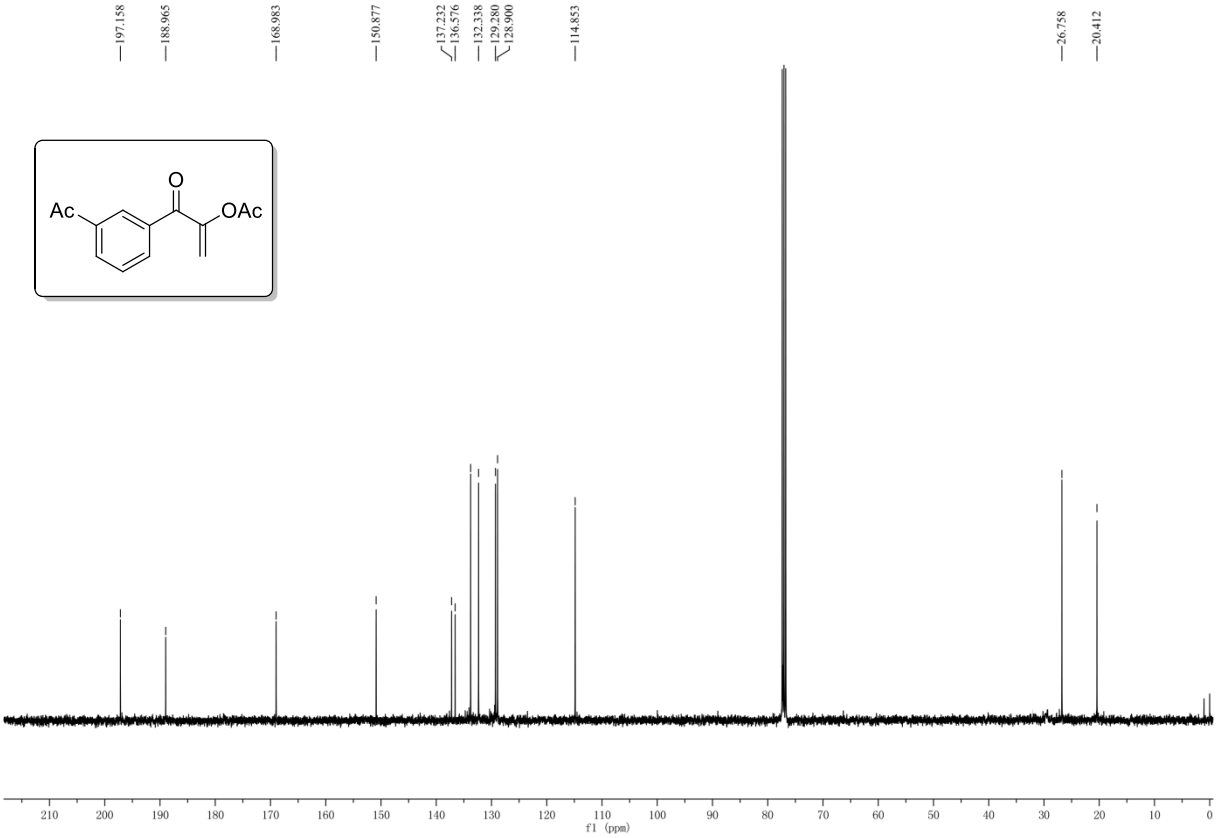
8.399
8.395
8.171
8.151
8.051
8.031
7.598
7.579
7.560
5.750
5.745
5.582
5.576
2.643
2.233
Ac
O
OAc
0.96
1.00
0.97
1.03
0.97
0.97
3.02
3.00
f1 (ppm)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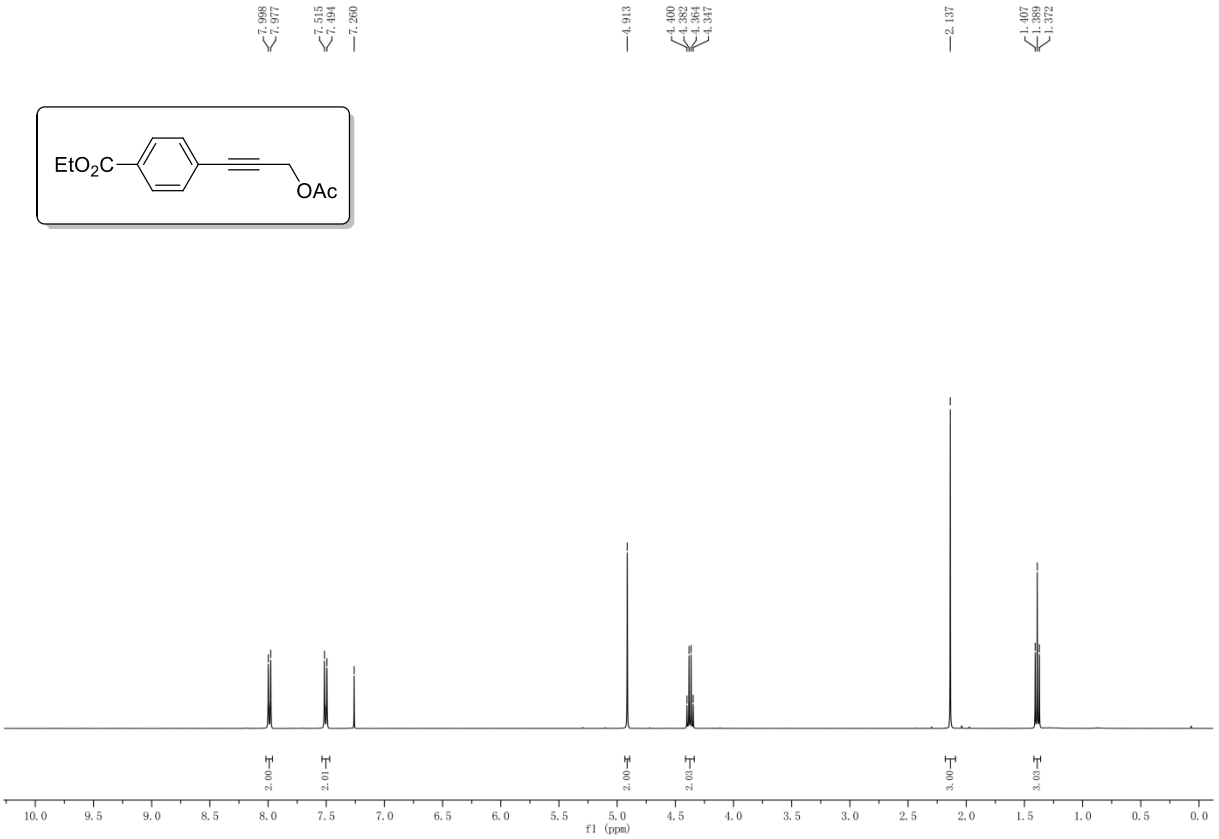
20.412
Ac
O
OAc
f1 (ppm)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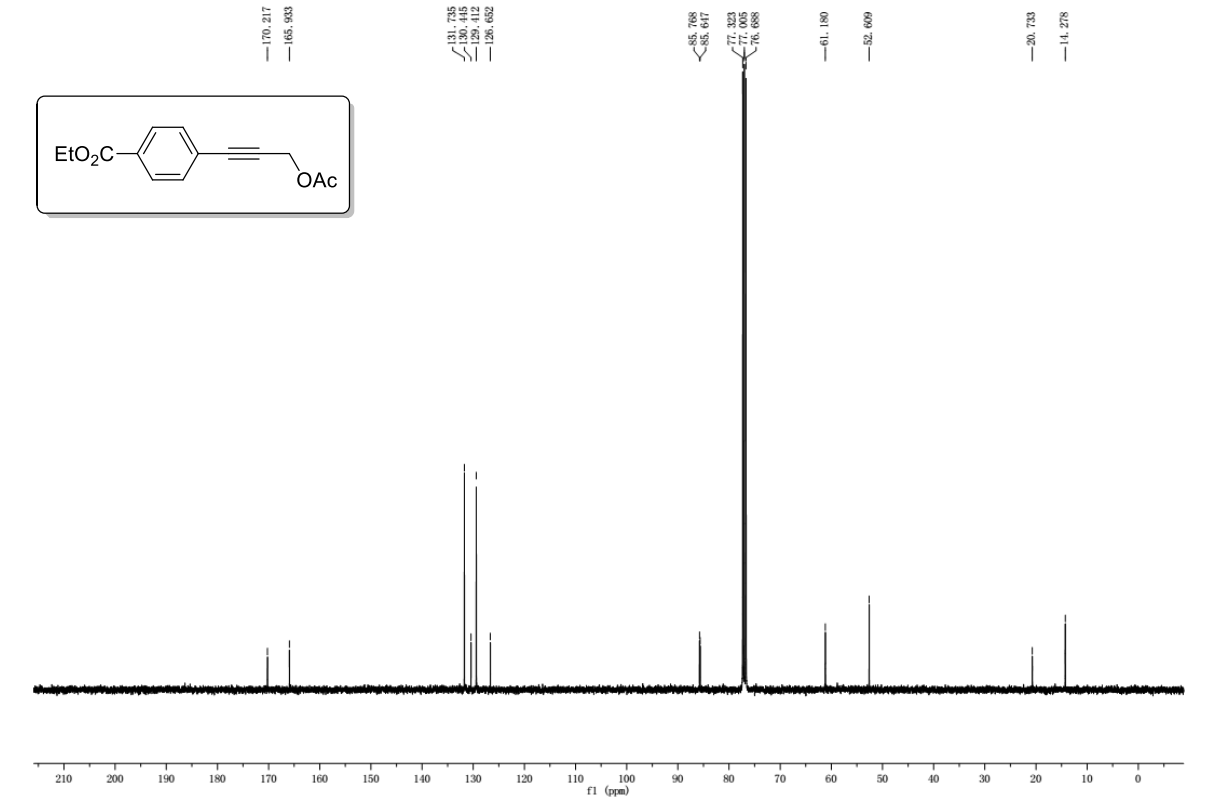
7.260
4.913
4.400
4.382
4.364
4.347
2.137
1.407
1.389
1.372
EtO2C
OAc
2.00
2.01
2.00
2.03
3.00
3.03
f1 (ppm)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129.412
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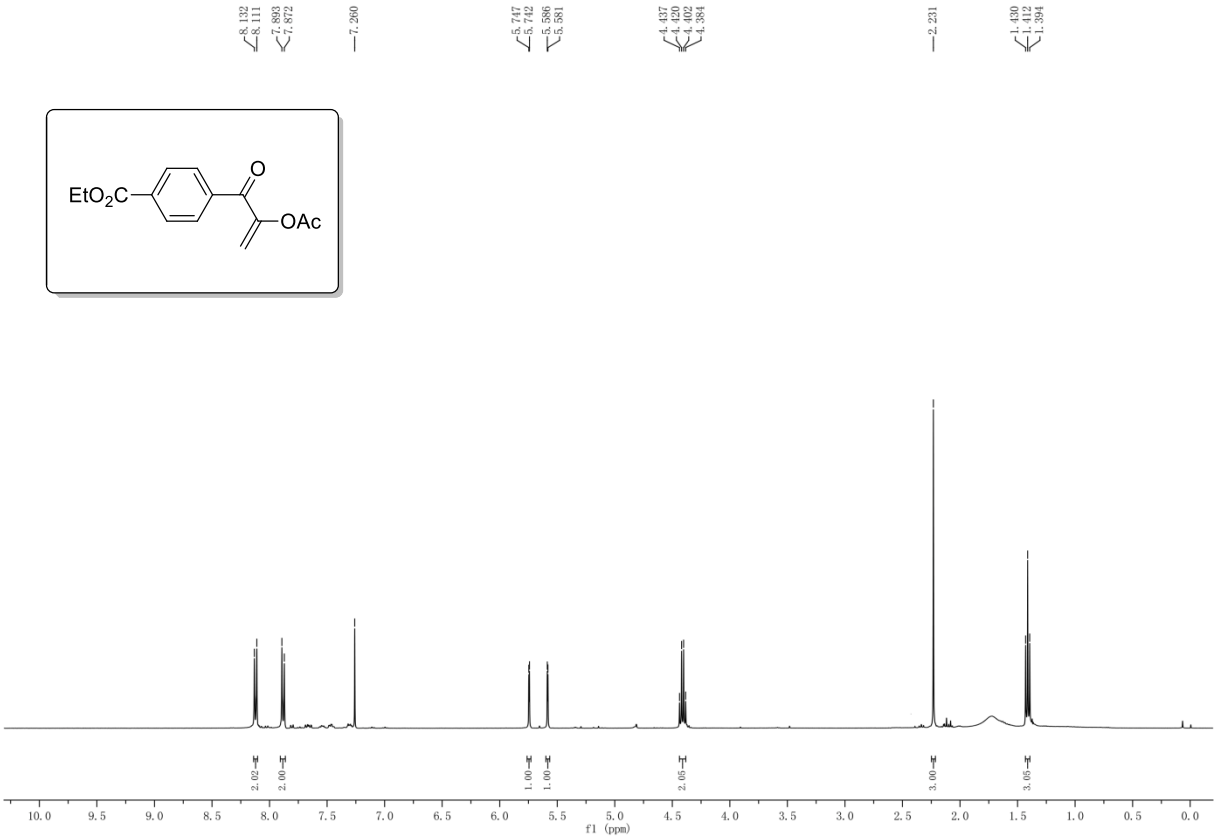
20.733
14.278
EtO2C
OAc
f1 (ppm)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5.586
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4.420
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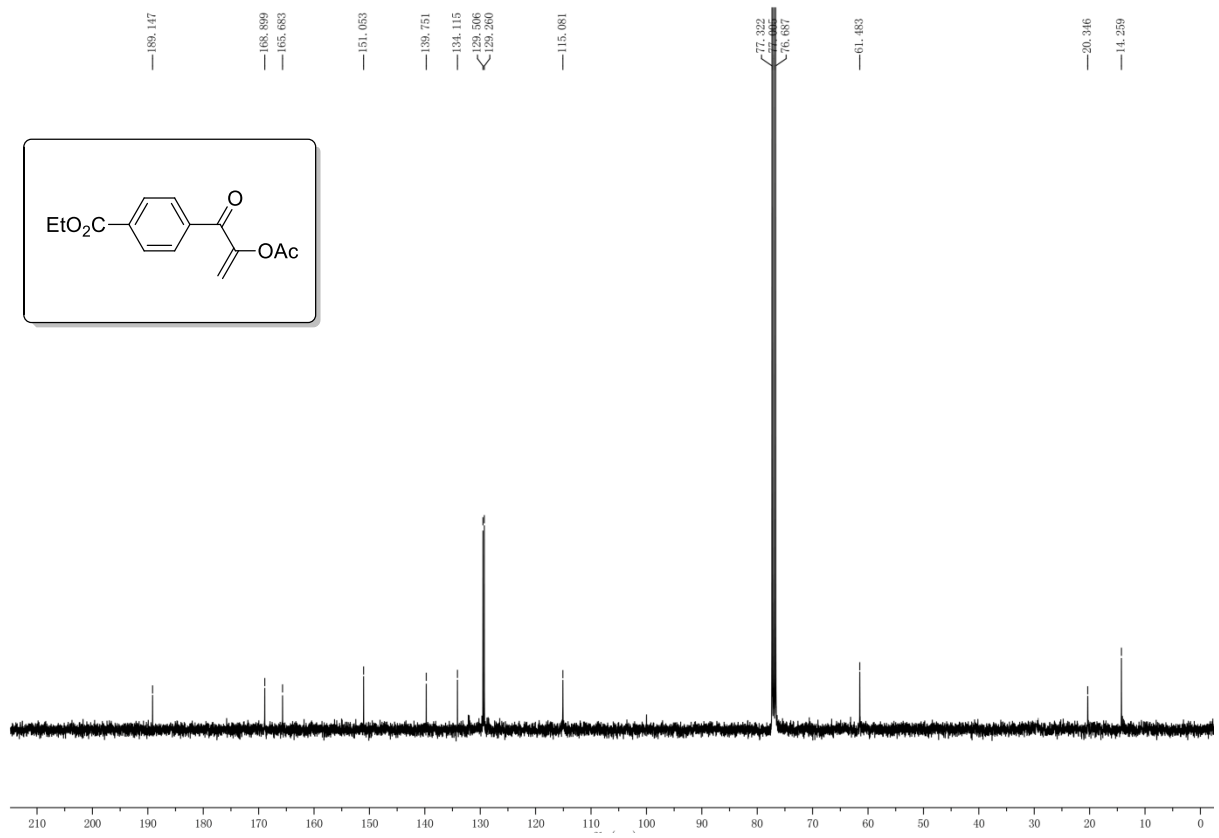
4.384
2.231
1.430
1.412
1.394
EtO2C
O
OAc
2.02
2.00
1.00
1.00
2.05
3.00
3.05
f1 (ppm)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139.751
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129.260
115.081
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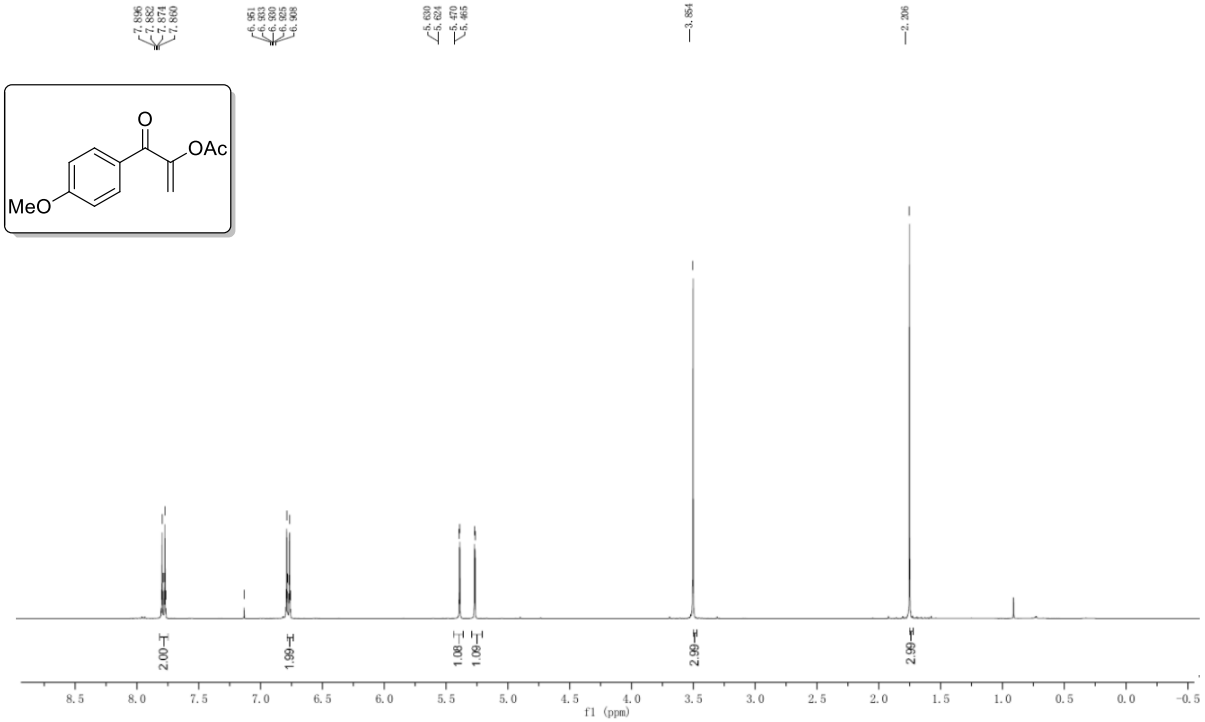
77.005
76.687
61.483
20.346
14.259
EtO2C
O
OAc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6.930
6.925
6.908
5.630
5.624
5.470
5.465
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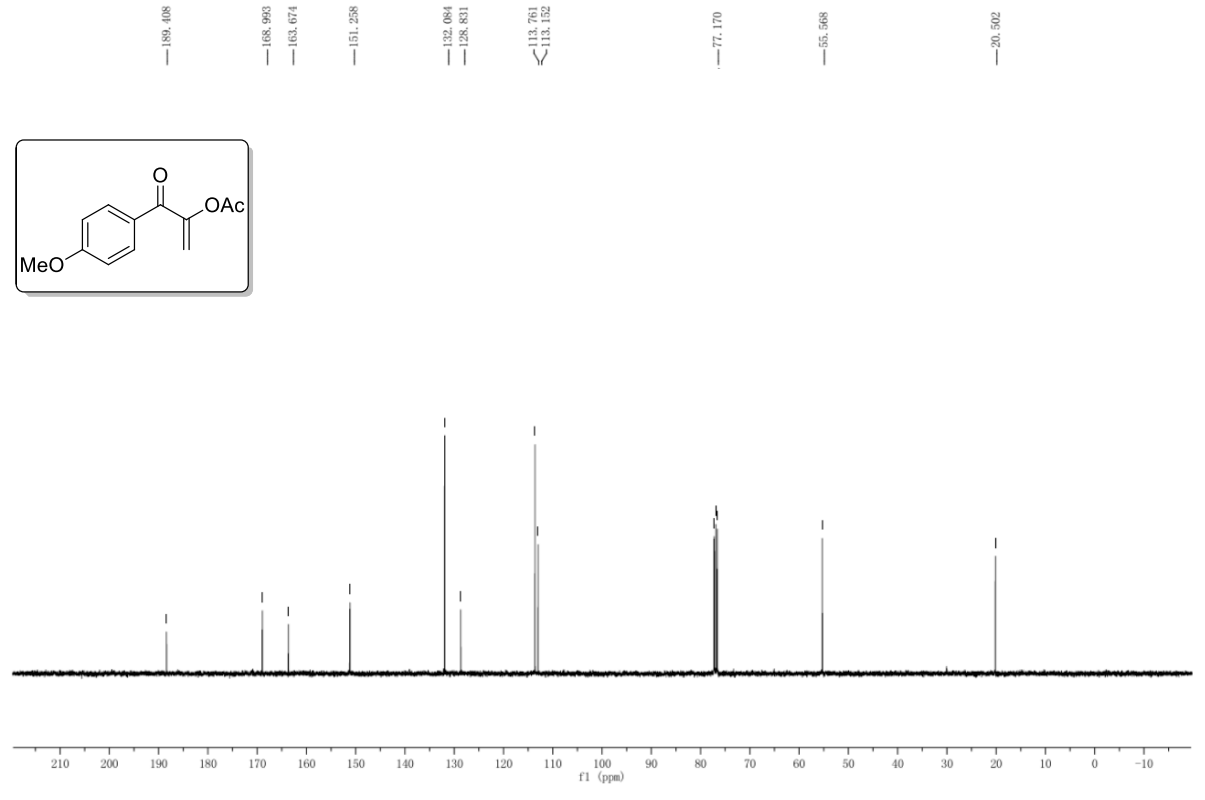
O
OAc
MeO
2.00
1.99
1.08
1.09
2.99
2.99
f1 (ppm)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163.674
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128.831
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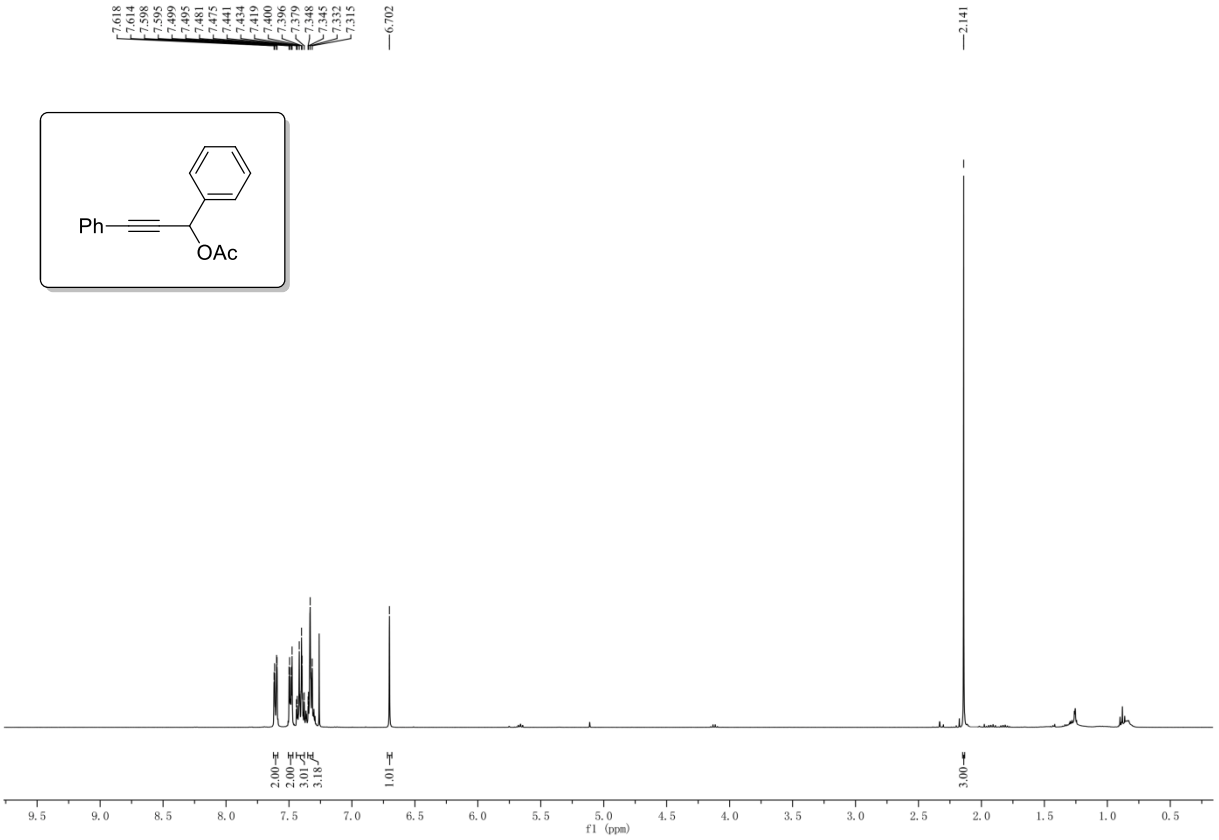
113.152
77.170
55.568
20.502
O
OAc
MeO
f1 (ppm)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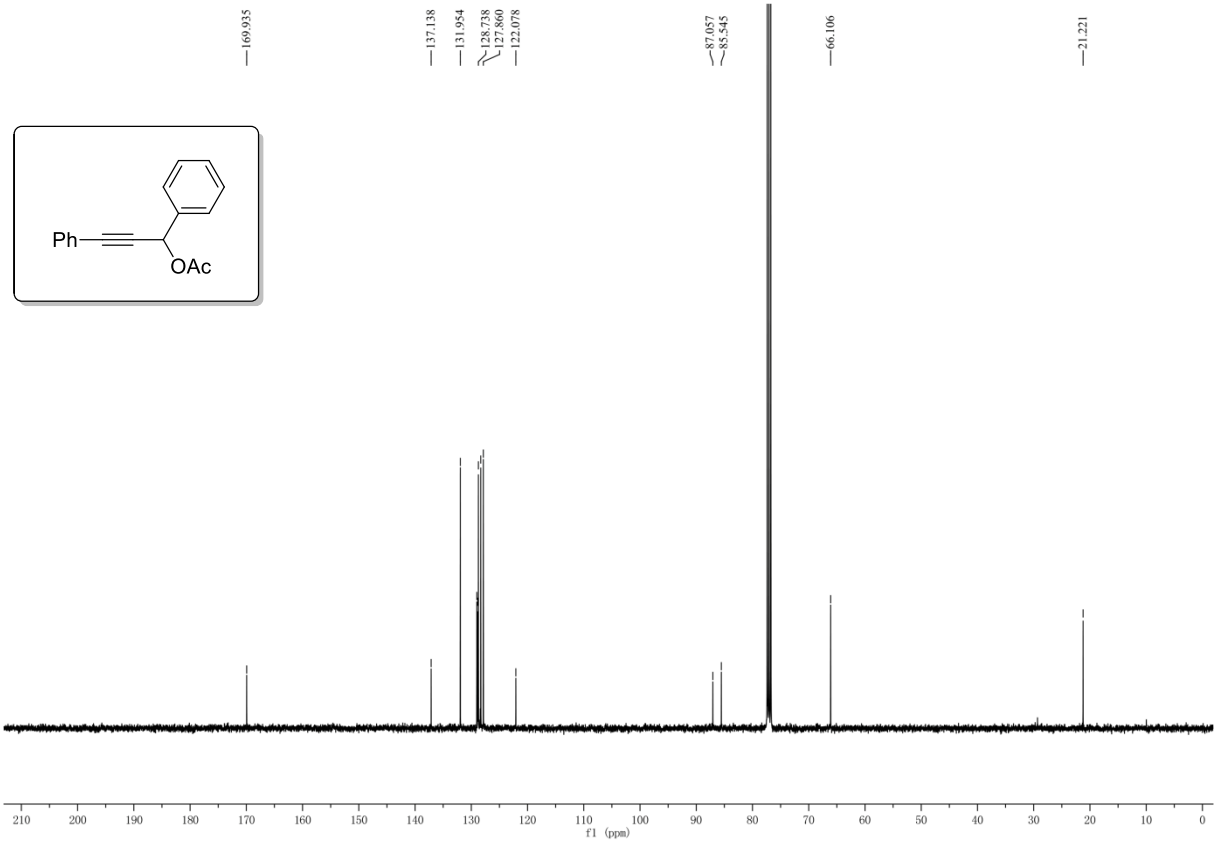
7.481
7.475
7.441
7.434
7.419
7.400
7.396
7.379
7.348
7.345
7.332
7.315
6.702
2.141
Ph
OAc
2.00
2.00
3.01
3.18
1.01
3.00
f1 (ppm)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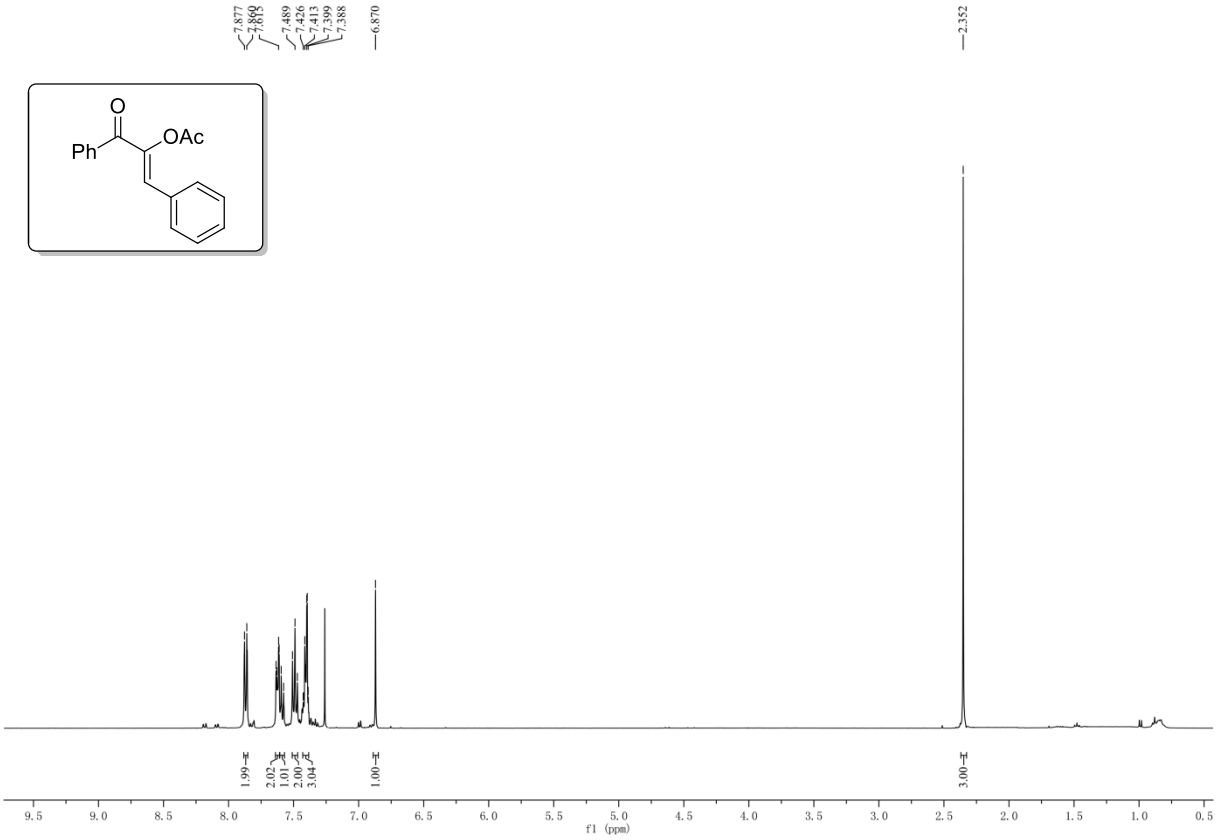
87.057
85.545
66.106
21.221
Ph
OAc
f1 (ppm)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7.815
7.489
7.426
7.413
7.399
7.388
6.870
2.352
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Ph
OAc
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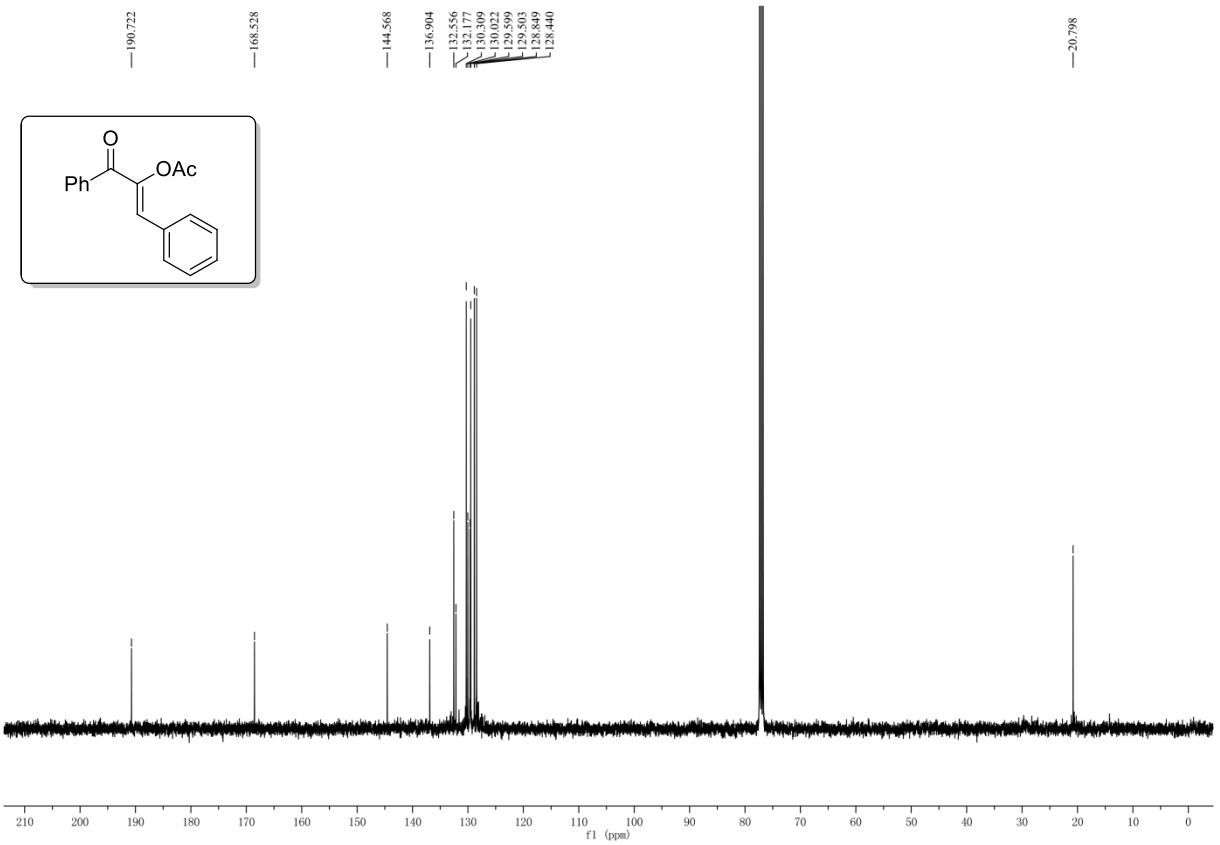
2.02
1.01
2.00
3.04
1.00
3.00
f1 (ppm)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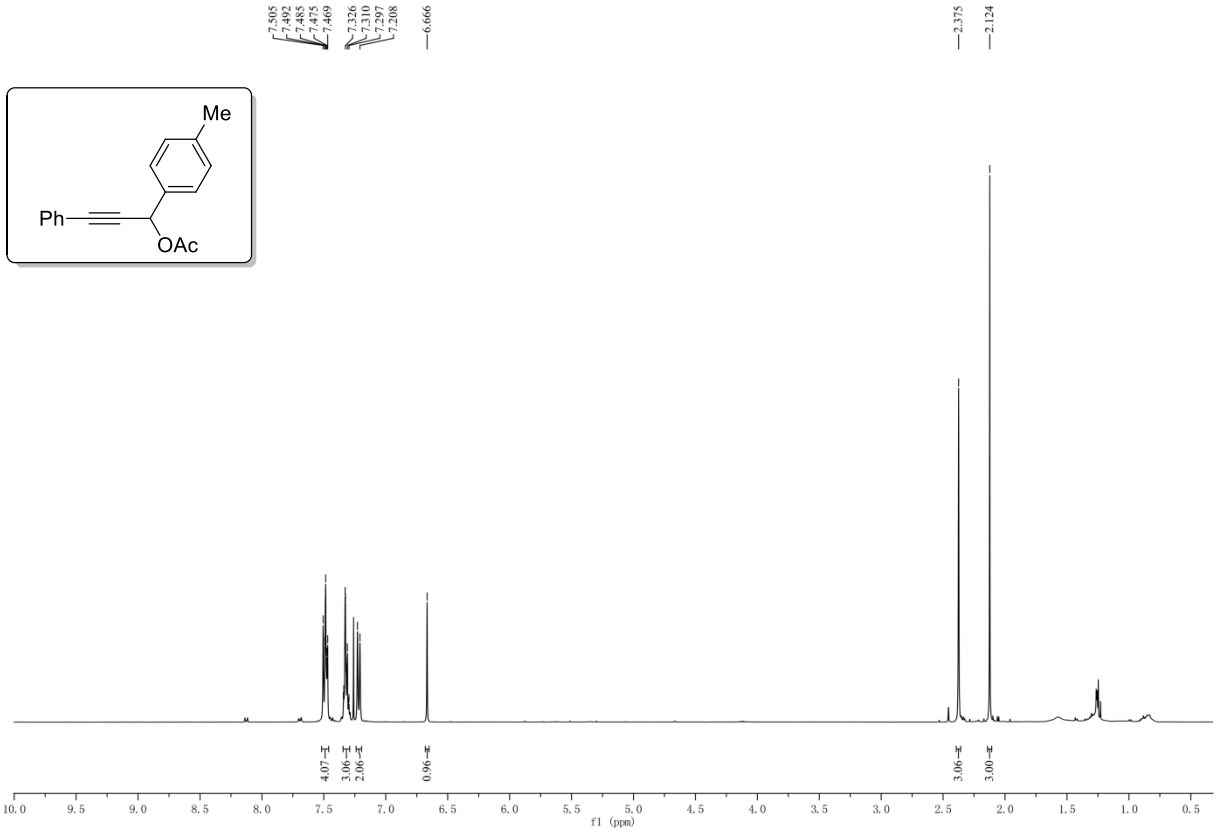
Ph
OAc
f1 (ppm)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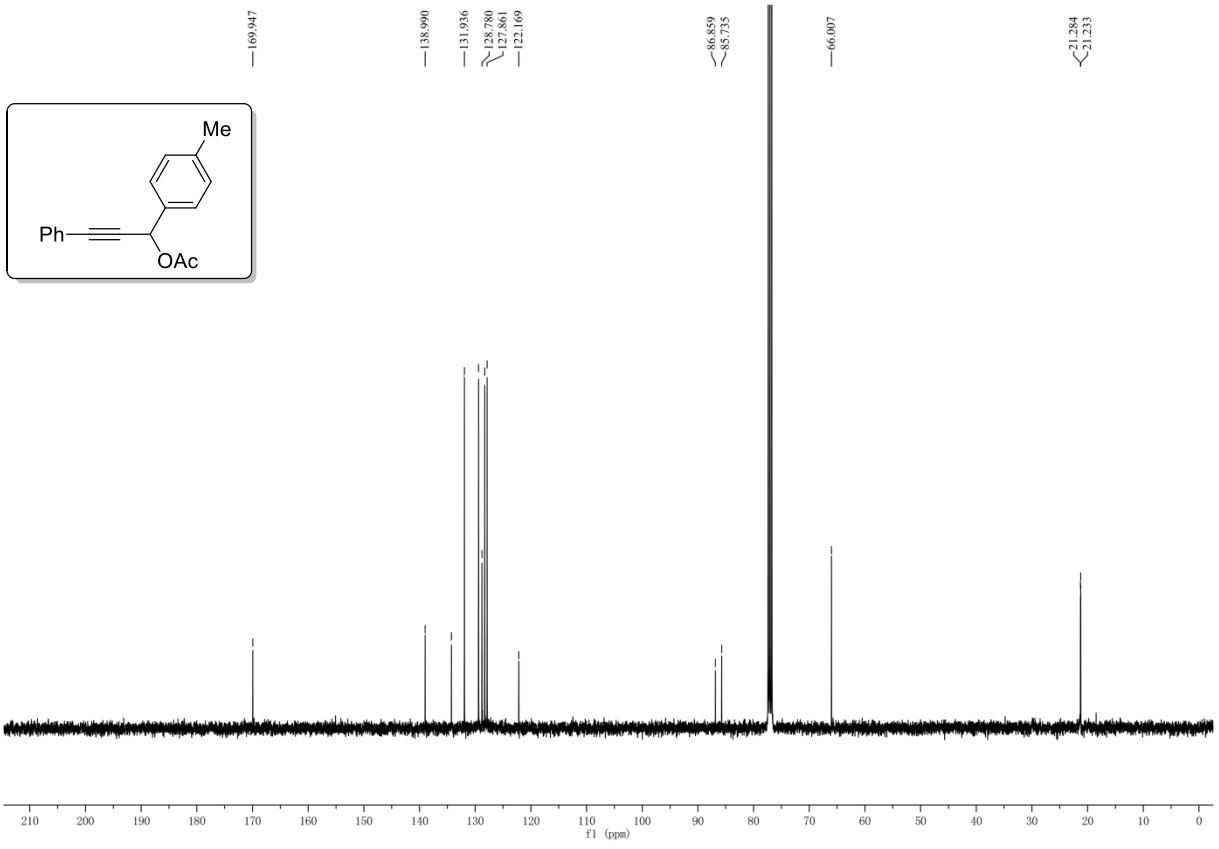
7.492
7.485
7.475
7.469
7.326
7.310
7.297
7.208
6.666
2.375
2.124
Me
Ph
OAc
4.07
3.06
2.06
0.96
3.06
3.00
f1 (ppm)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85.735
66.007
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21.233
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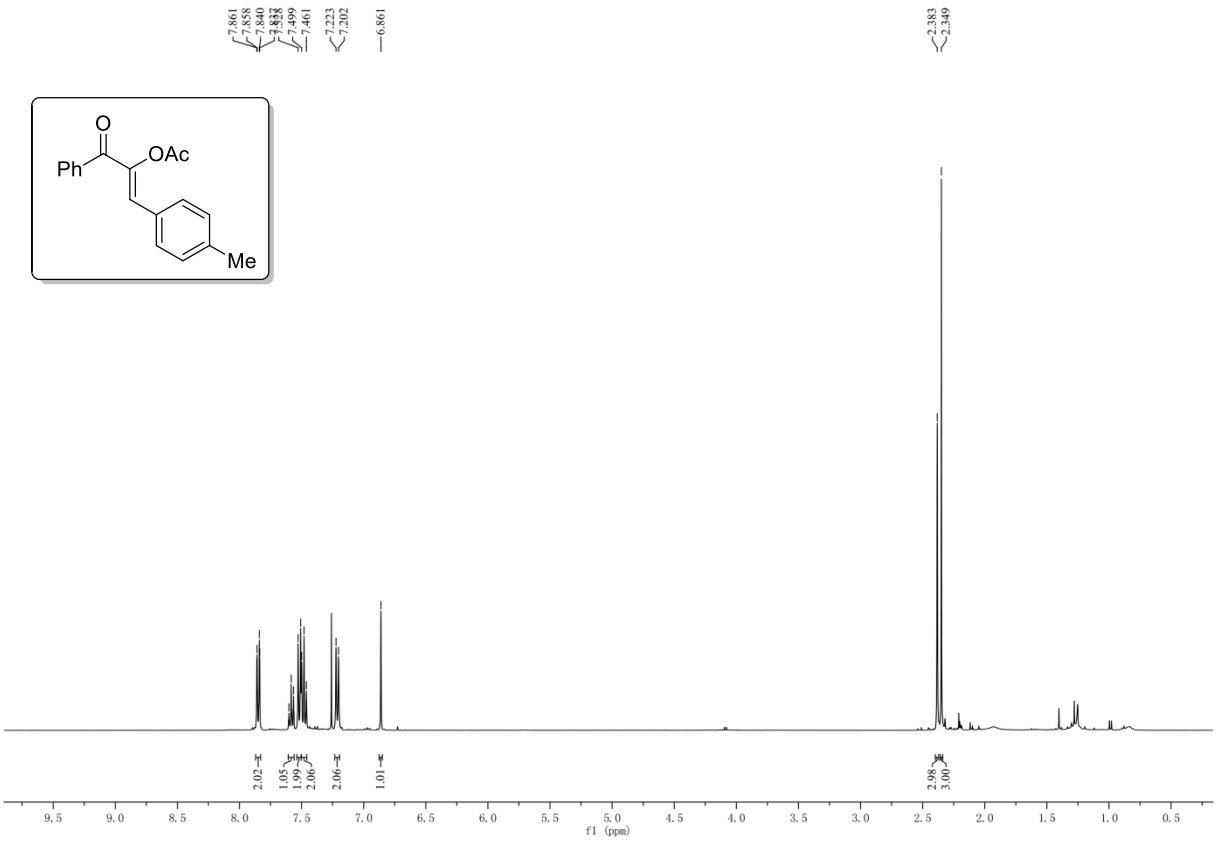
Ph
OAc
f1 (ppm)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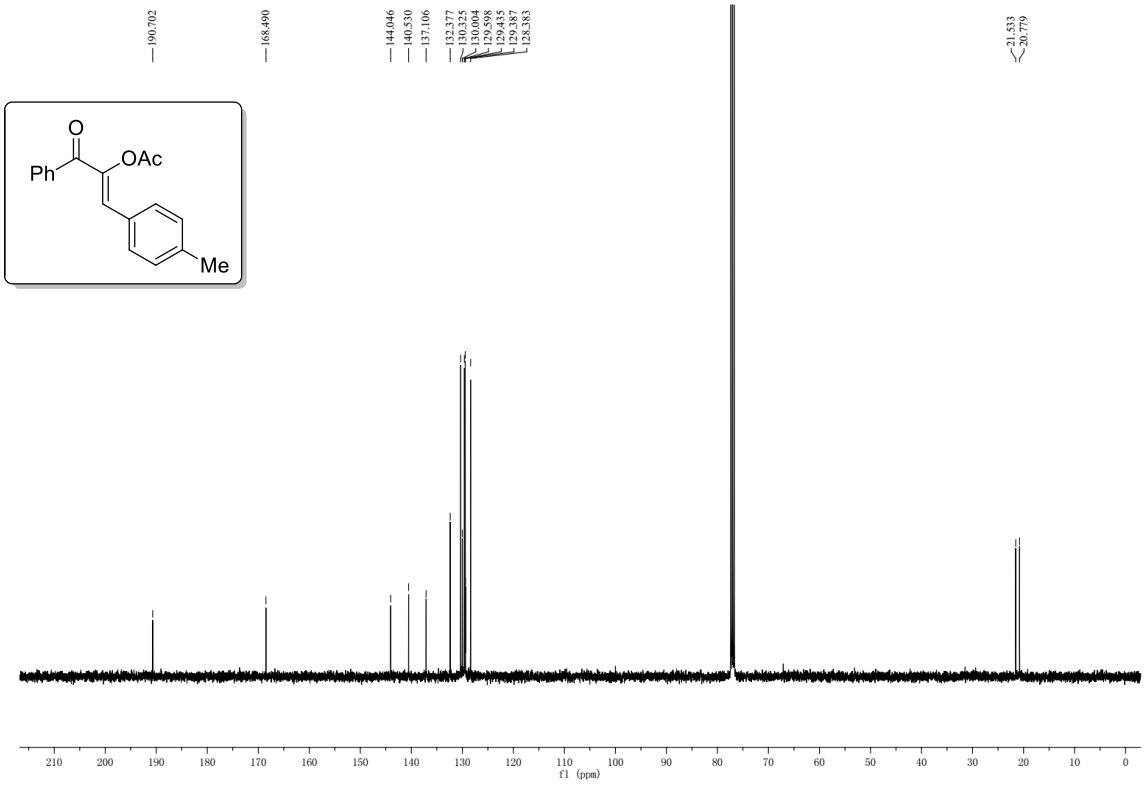
7.858
7.840
7.499
7.461
7.223
7.202
6.861
2.383
2.349
O
OAc
Ph
Me
2.02
1.05
1.99
2.06
2.06
1.01
2.98
3.00
f1 (ppm)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129.435
129.387
128.383
21.533
20.779
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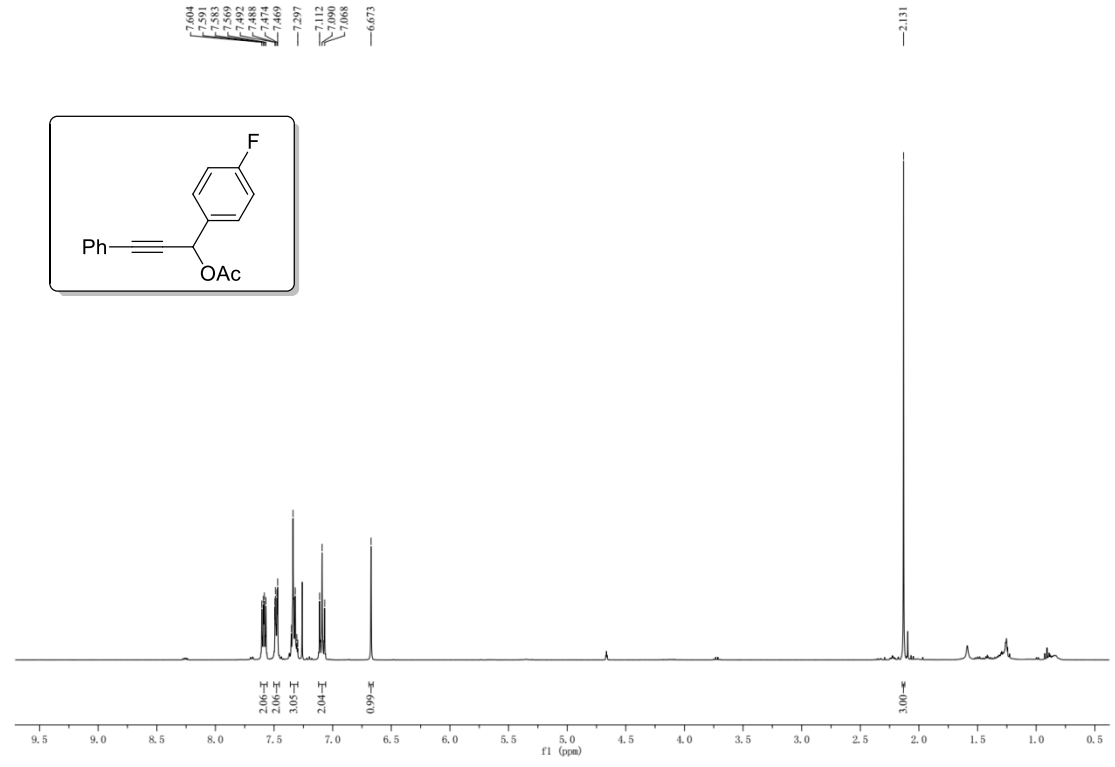
OAc
Ph
Me
f1 (ppm)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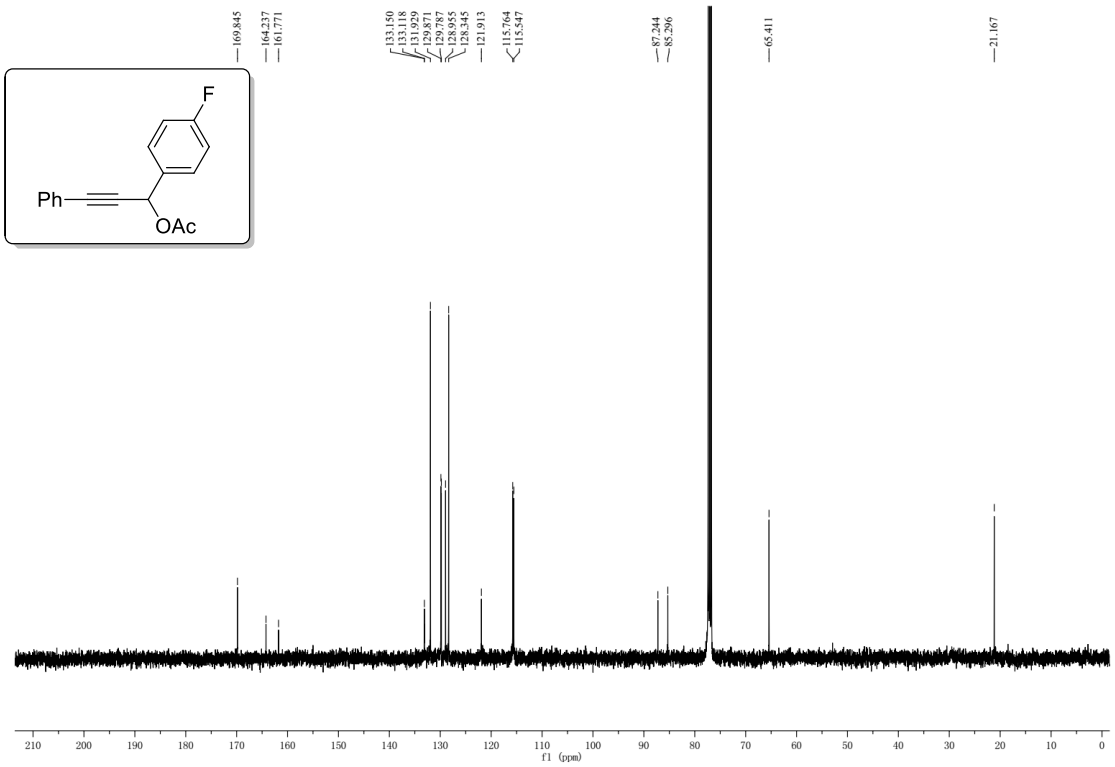
7.492
7.488
7.474
7.469
7.297
7.112
7.090
7.068
6.673
2.131
F
Ph
OAc
2.06
2.06
3.05
2.04
0.99
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)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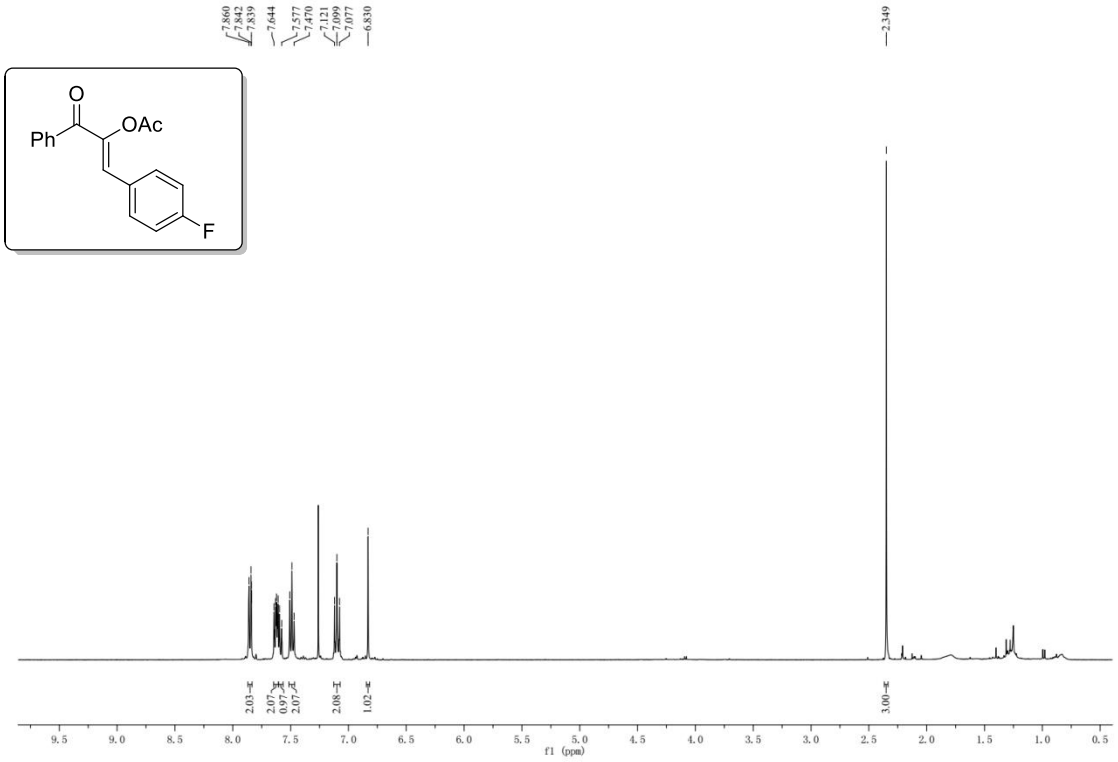
129.871
129.787
128.955
128.345
121.913
115.764
115.547
87.244
85.296
65.411
21.167
F
Ph
OAc
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)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7.839
7.644
7.577
7.470
7.121
7.099
7.077
6.830
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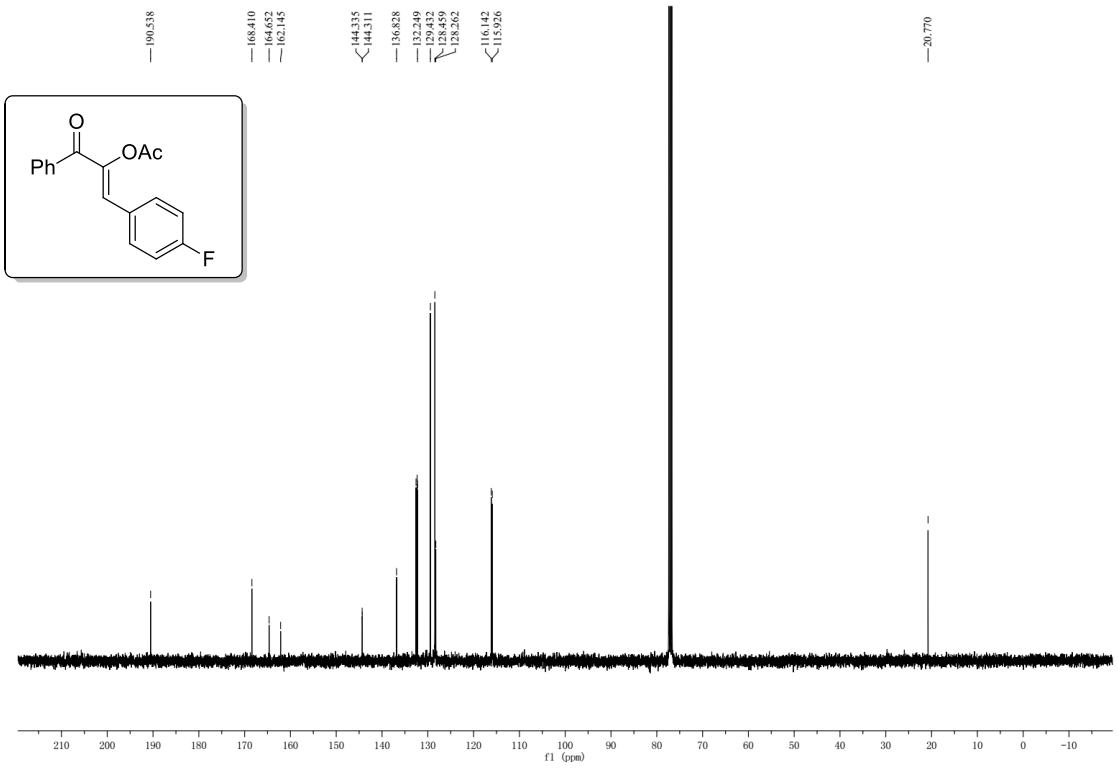
O
OAc
Ph
F
2.03
2.07
0.97
2.07
2.08
1.02
3.00
f1 (ppm)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144.311
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116.142
115.926
20.770
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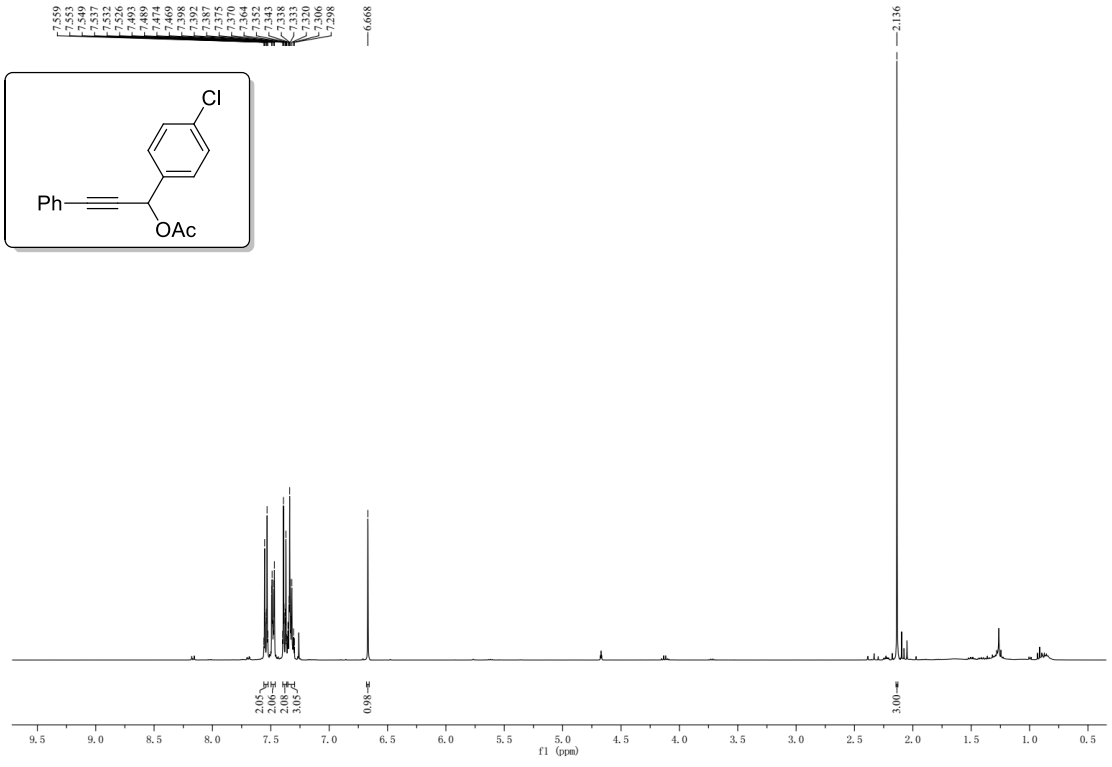
OAc
Ph
F
f1 (ppm)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7.549
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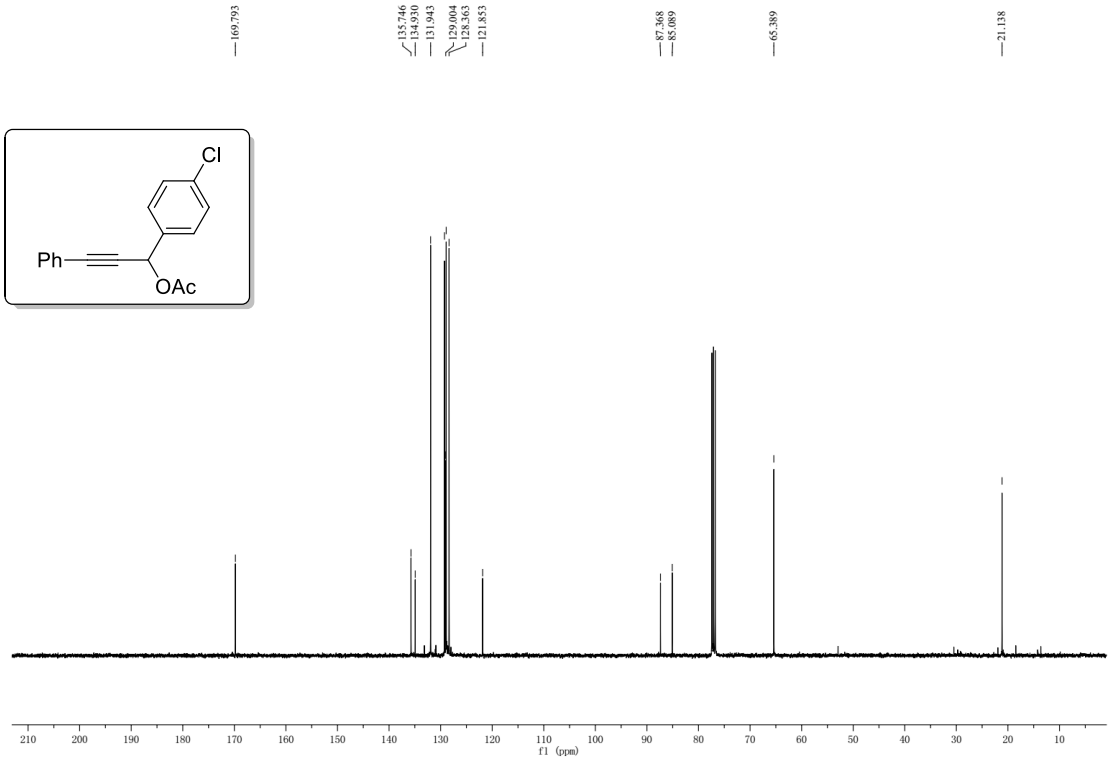
7.489
7.474
7.469
7.398
7.392
7.387
7.375
7.370
7.364
7.352
7.343
7.338
7.333
7.320
7.306
7.298
6.668
2.136
Cl
Ph
OAc
2.05
2.06
2.08
3.05
0.98
3.00
f1 (ppm)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87.368
85.089
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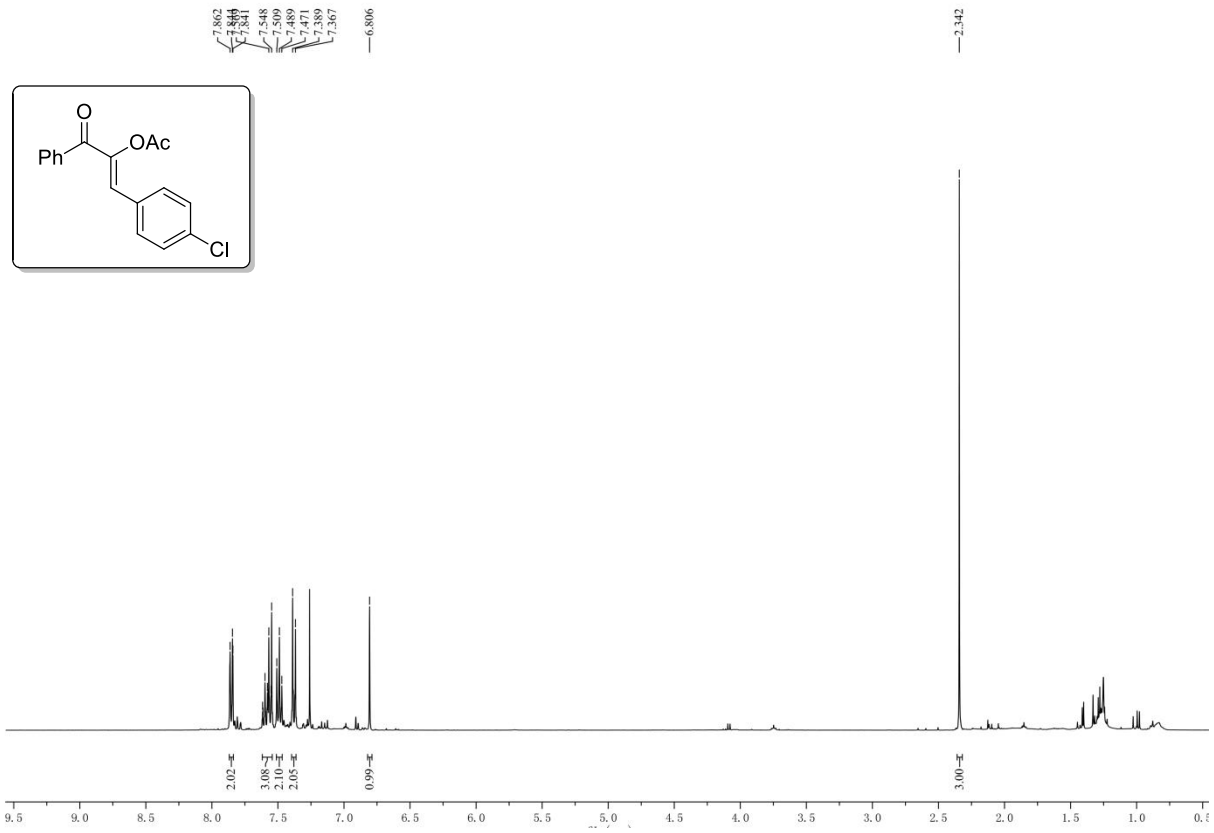
21.138
Cl
Ph
OAc
f1 (ppm)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7.841
7.548
7.509
7.489
7.471
7.389
7.367
6.806
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OAc
Ph
Cl
2.02
3.08
2.10
2.05
0.99
3.00
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
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5.0
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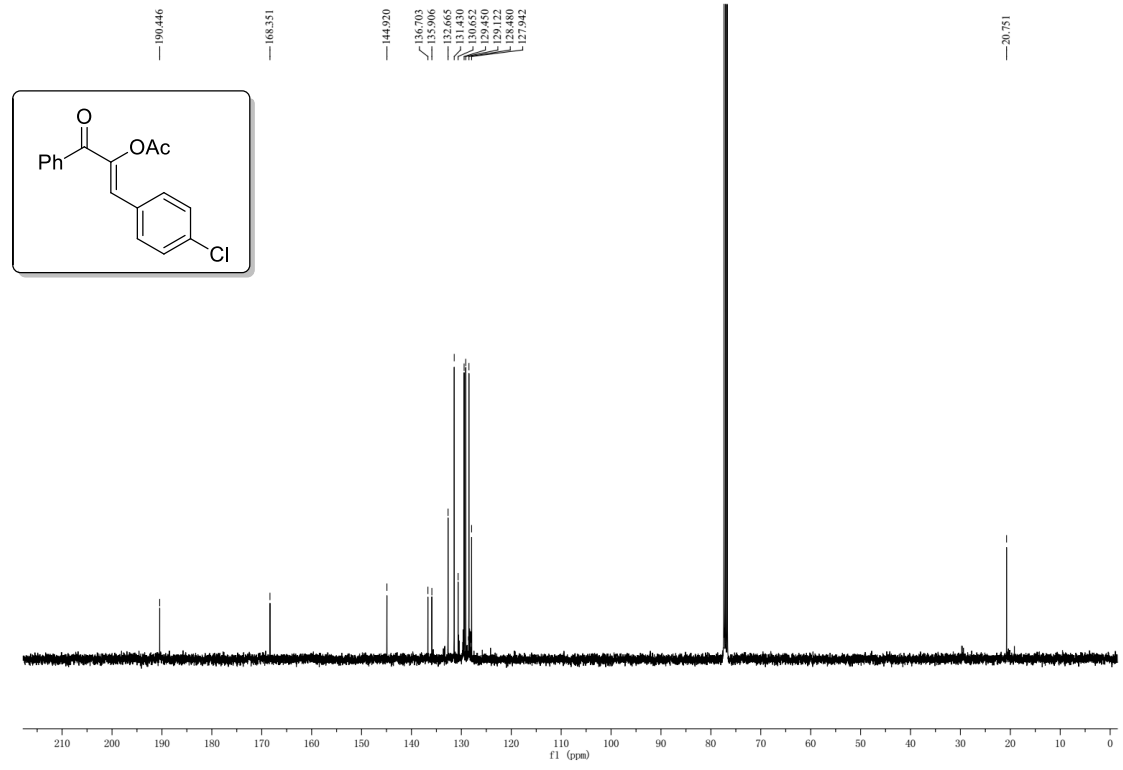
3.0
2.5
2.0
1.5
1.0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129.122
128.480
127.942
20.751
O
OAc
Ph
Cl
210
200
190
180
170
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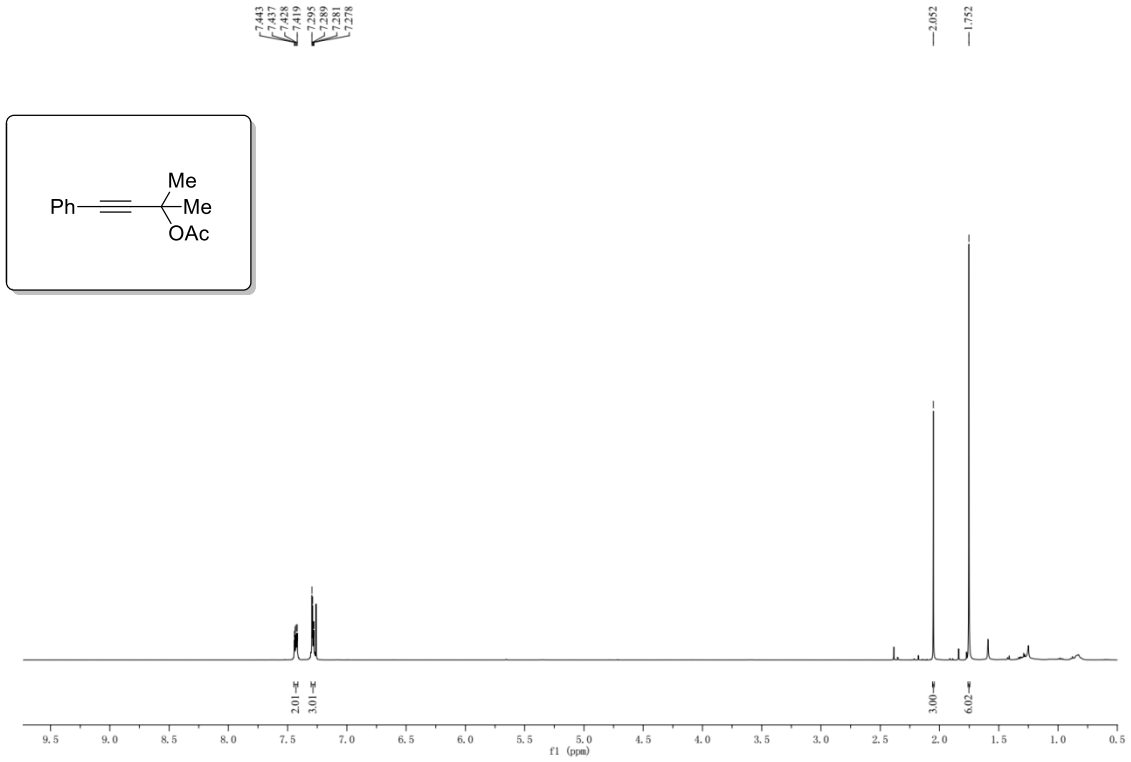
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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Me
OAc
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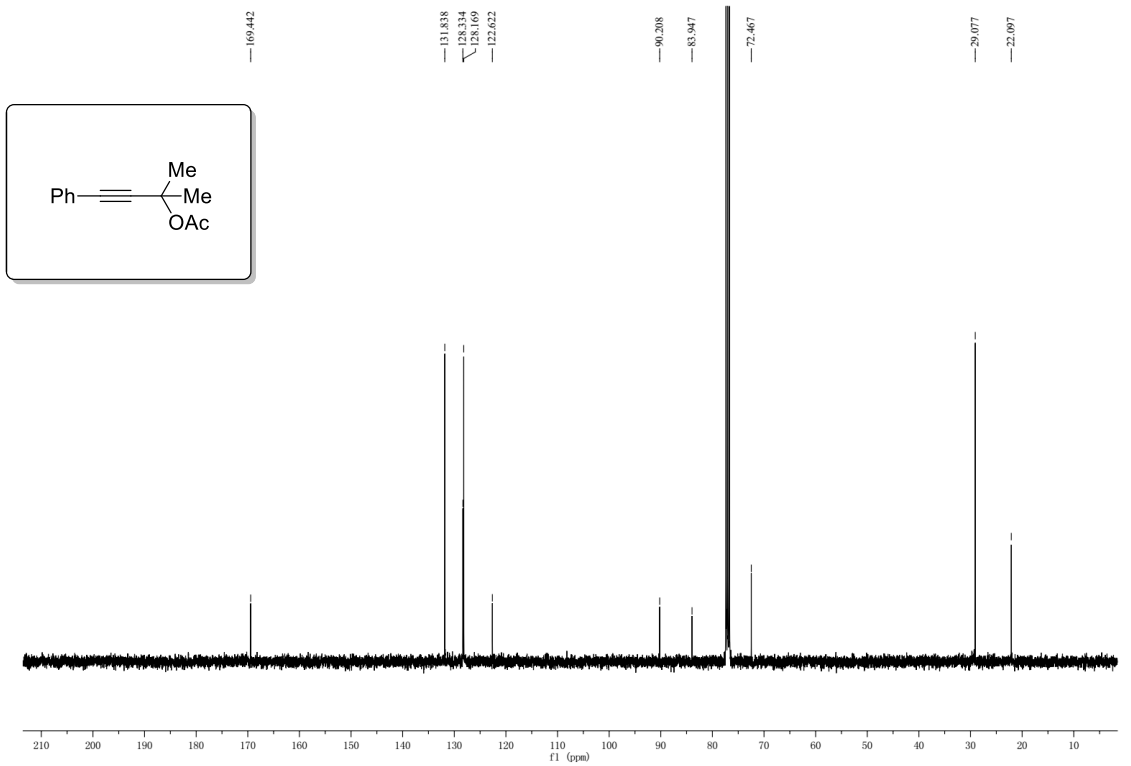
3.01
3.00
6.02
f1 (ppm)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72.467
29.077
22.097
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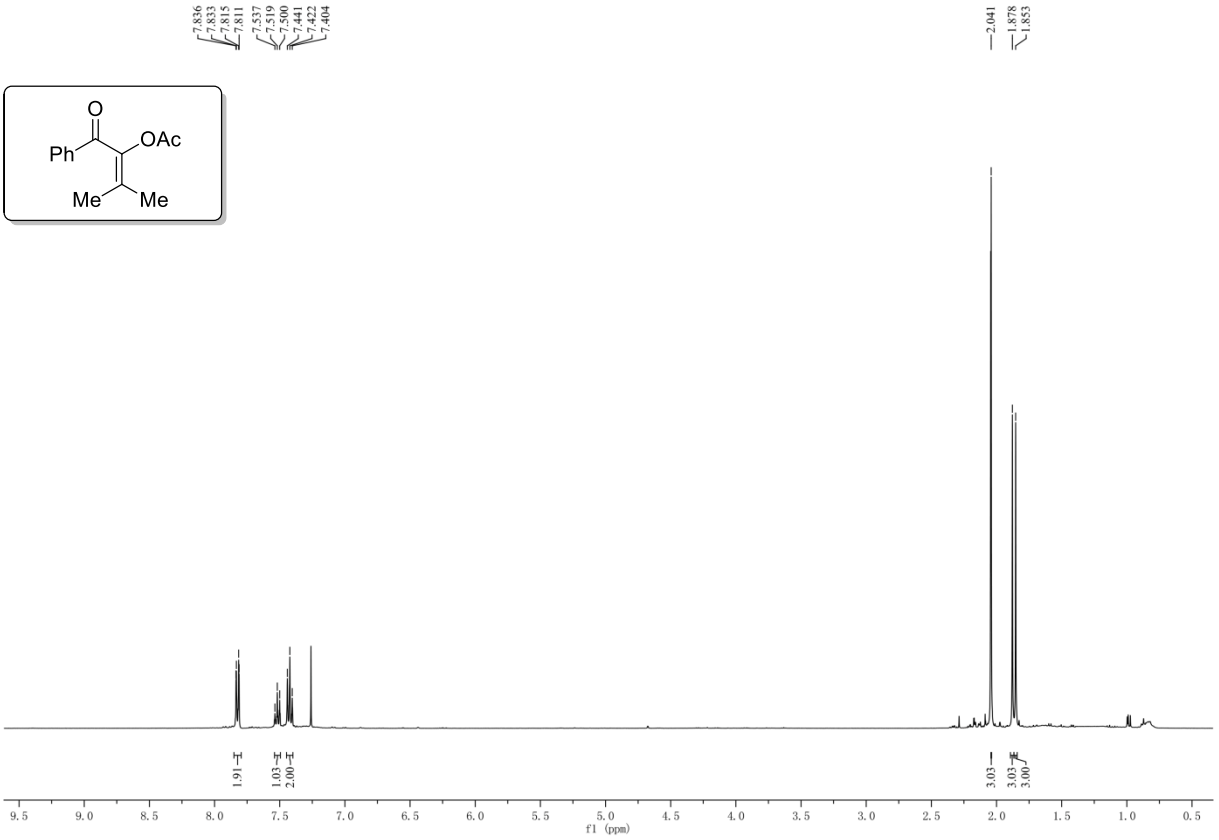
Ph
Me
OAc
f1 (ppm)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Ph
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Me
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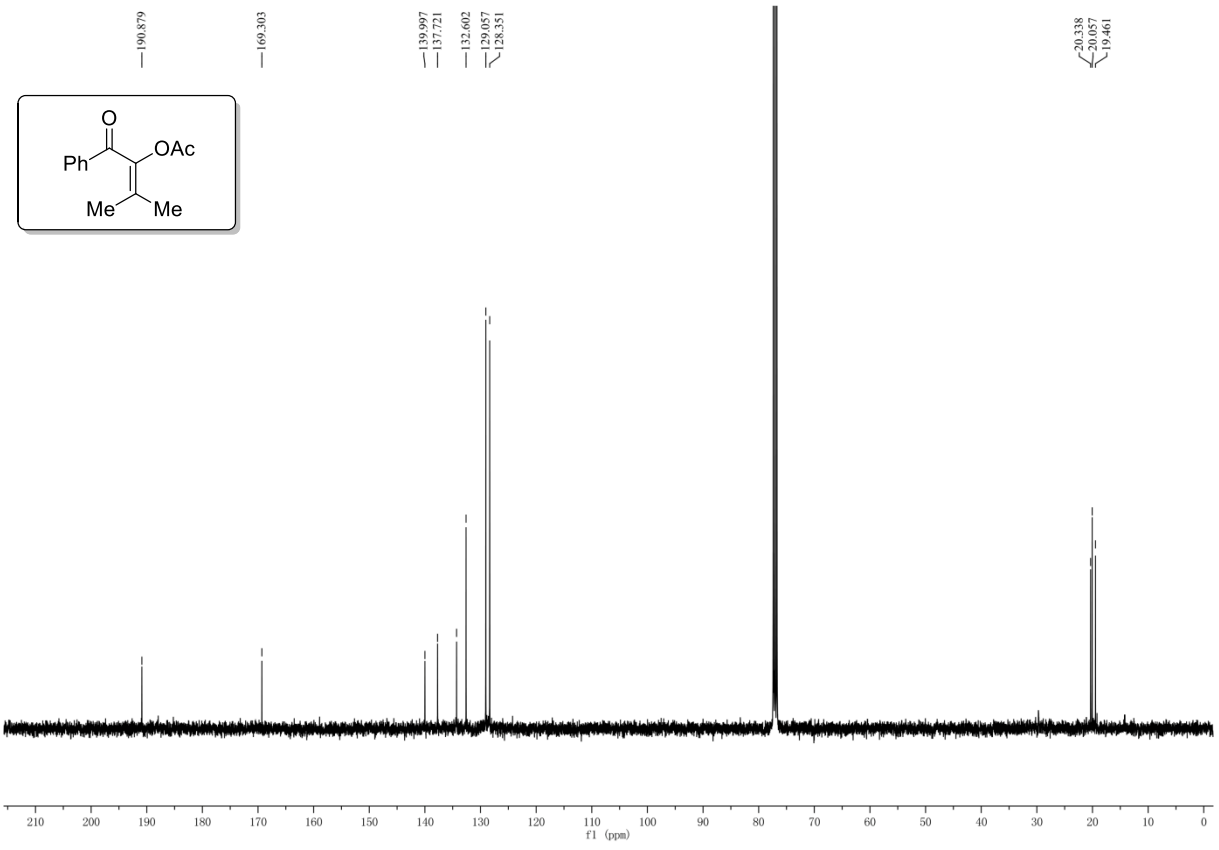
2.00
3.03
3.03
3.00
f1 (ppm)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20.338
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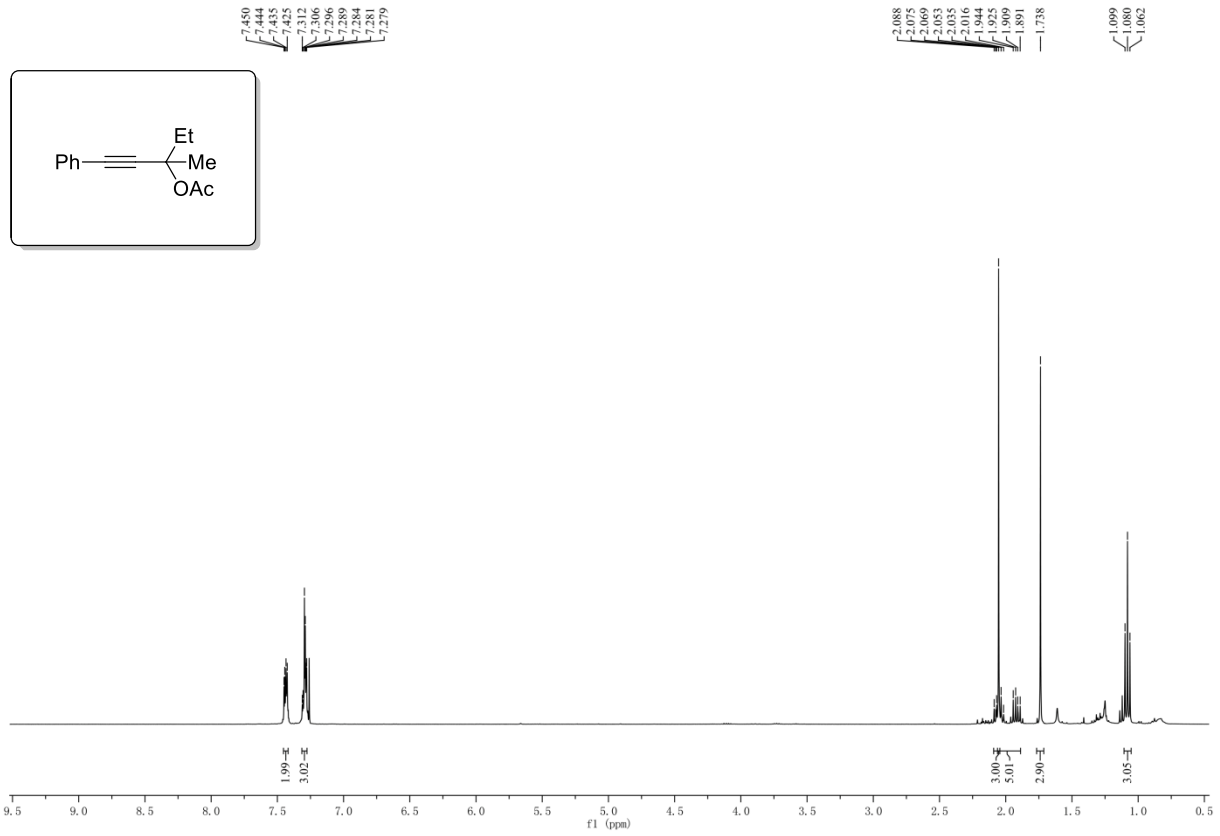
Ph
OAc
Me
Me
f1 (ppm)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7.289
7.284
7.281
7.279
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2.075
2.069
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2.035
2.016
1.944
1.925
1.909
1.891
1.738
1.099
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Ph
Me
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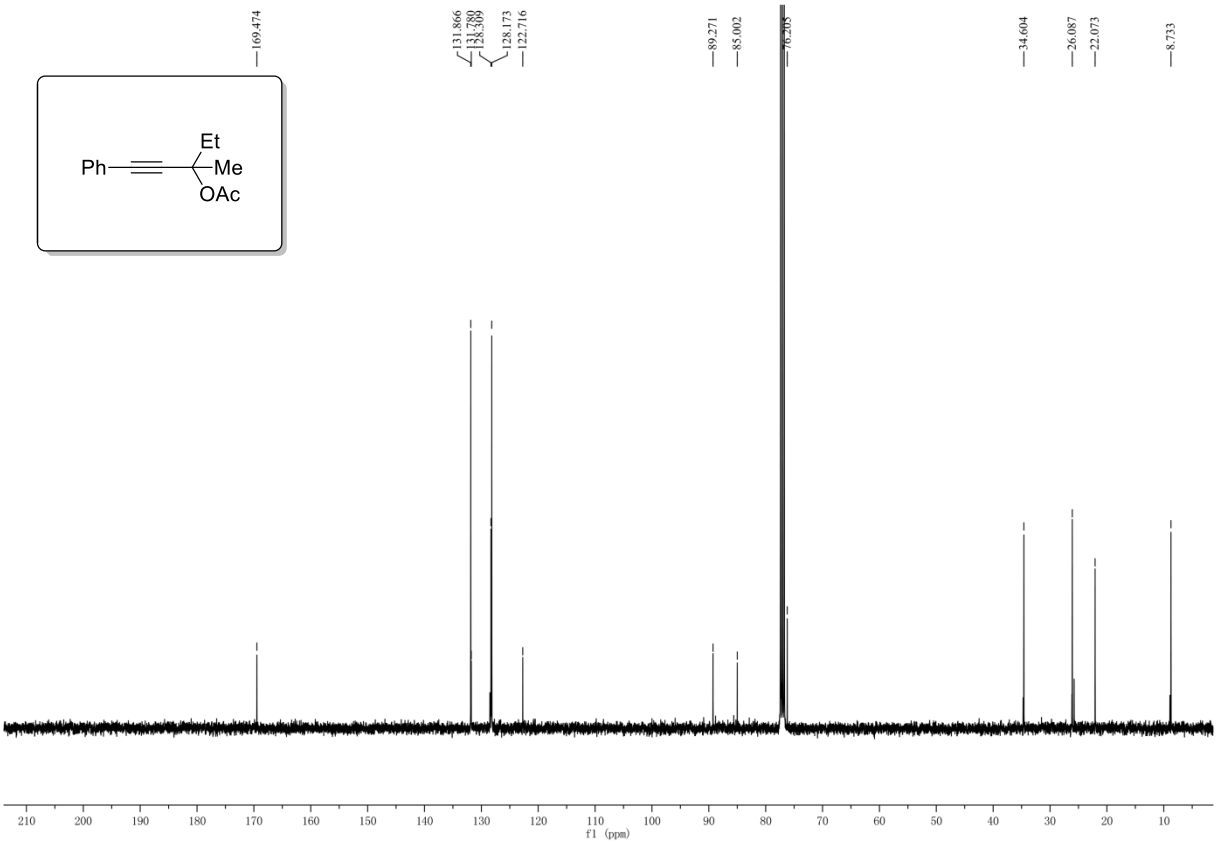
3.00
5.01
2.90
3.05
f1 (ppm)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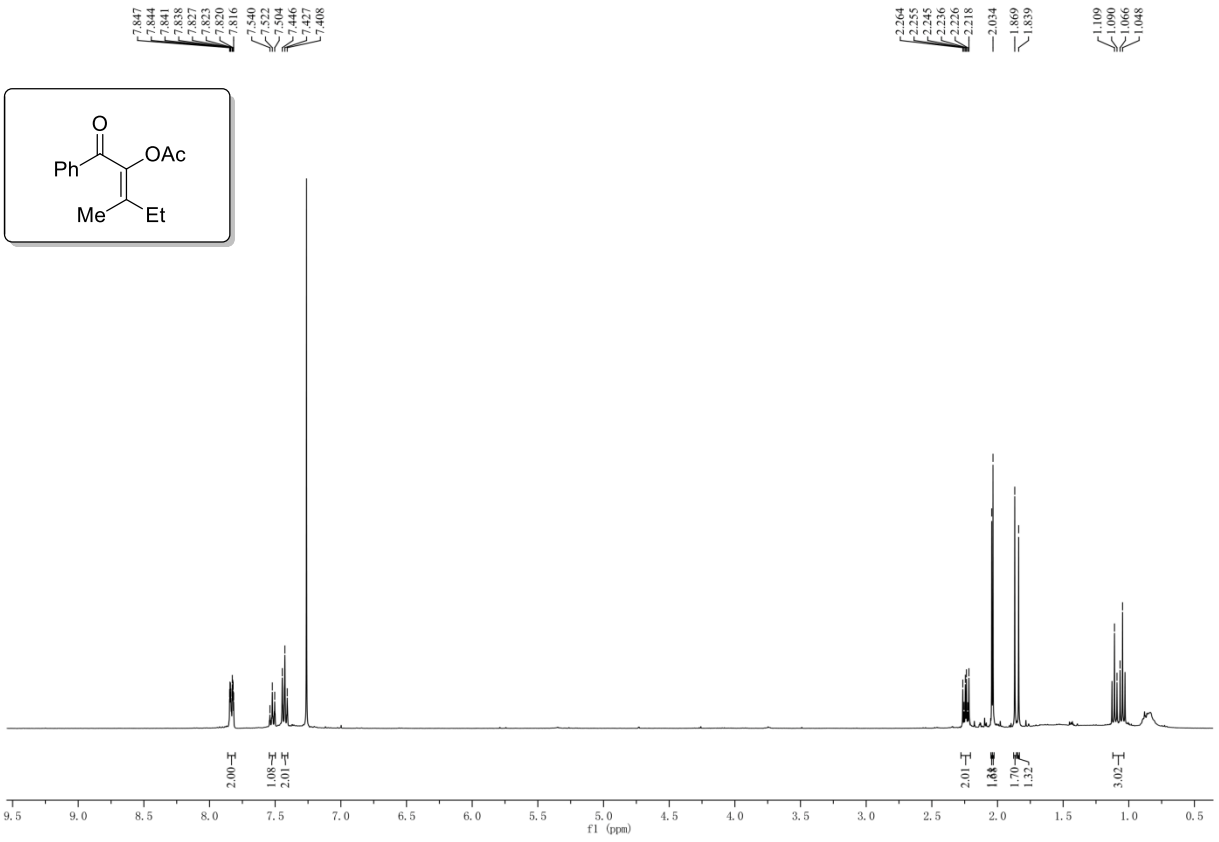
Me
OAc
f1 (ppm)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7.408
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2.255
2.245
2.236
2.226
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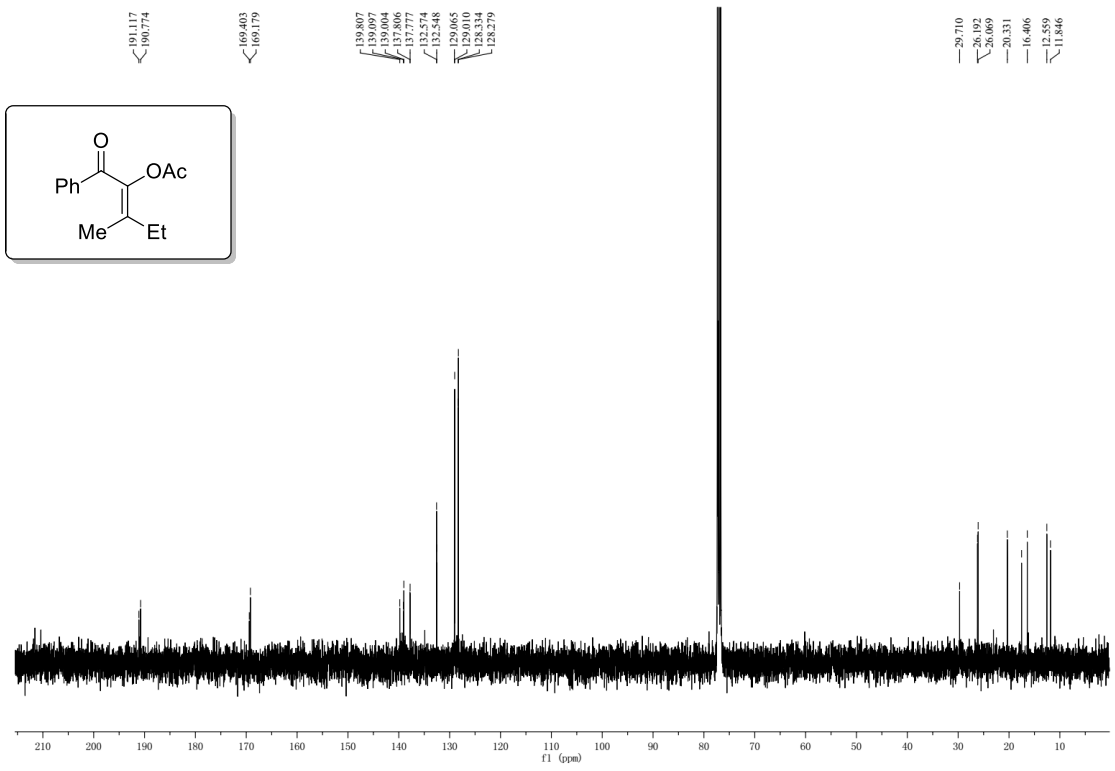
2.034
1.869
1.839
1.109
1.090
1.066
1.048
O
Ph
OAc
Me
Et
2.00
1.08
2.01
2.01
1.70
1.32
3.02
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)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129.010
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128.279
29.710
26.192
26.069
20.331
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Ph
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Me
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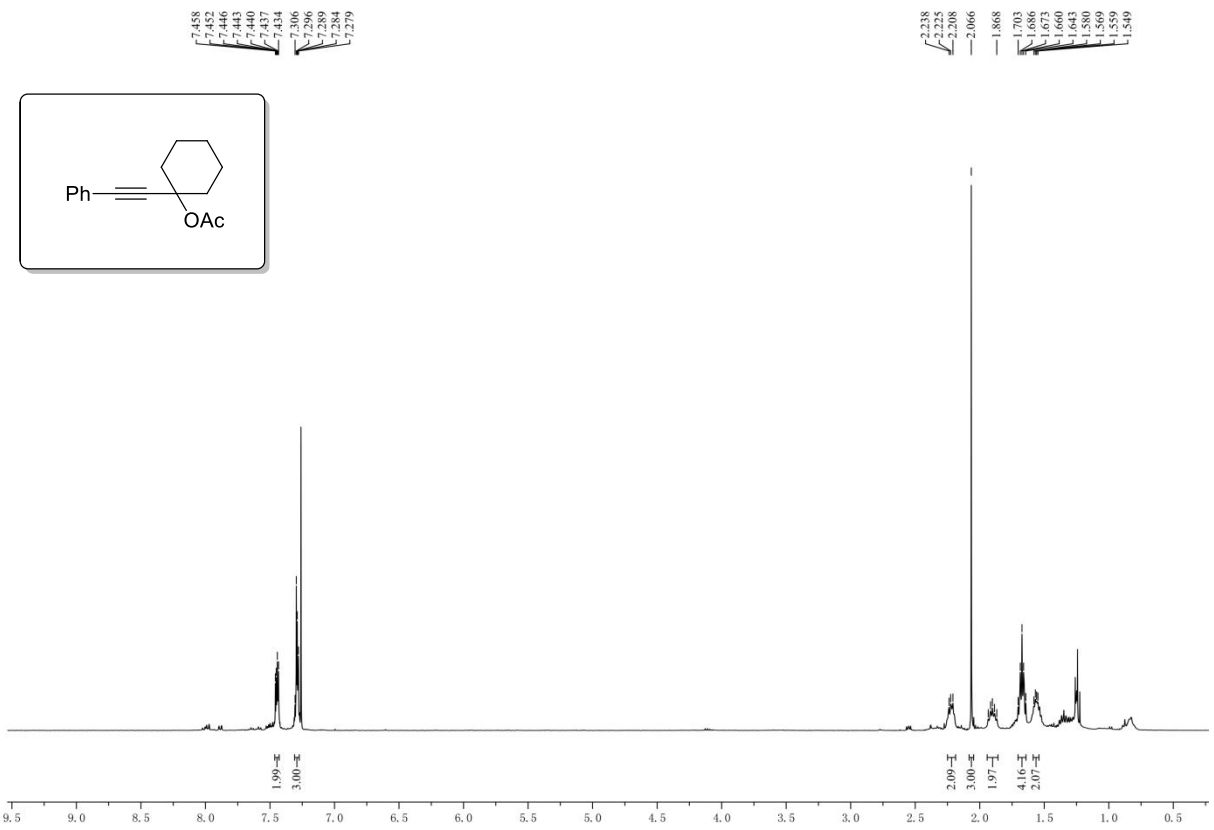
f1 (ppm)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2.225
2.208
2.066
1.868
1.703
1.686
1.673
1.660
1.643
1.580
1.569
1.559
1.549
Ph
OAc
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3.00
2.09
3.00
1.97
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2.07
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9.0
8.5
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7.0
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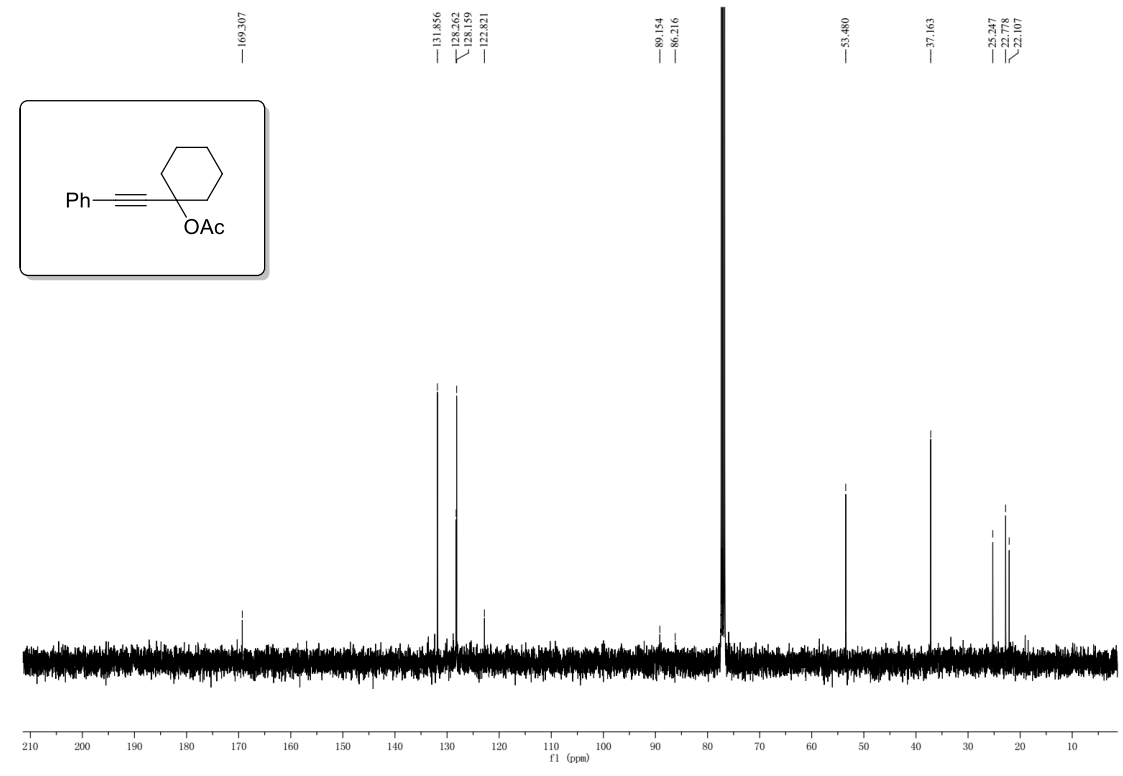
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25.347
22.778
22.107
Ph
OAc
210
200
190
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100
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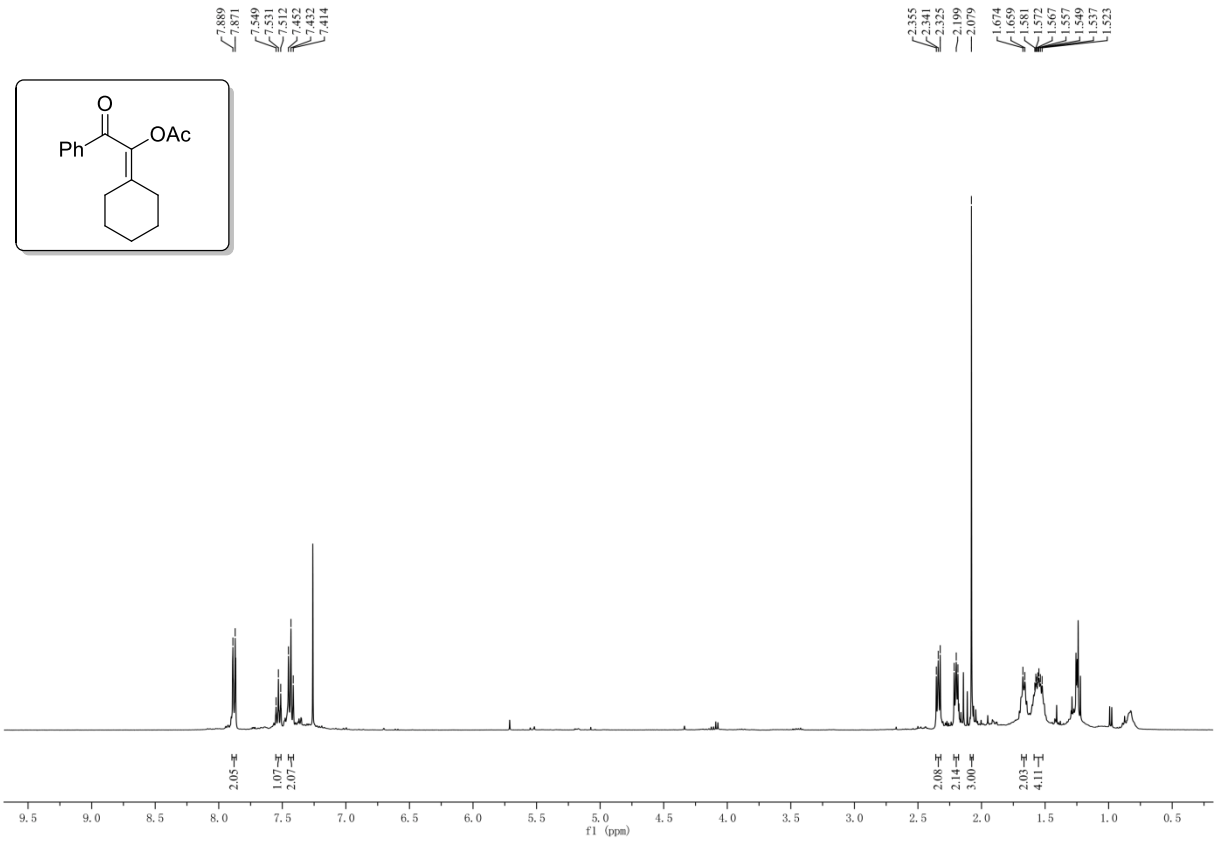
60
50
40
30
20
10
f1 (ppm)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2.079
1.674
1.659
1.581
1.572
1.567
1.557
1.549
1.537
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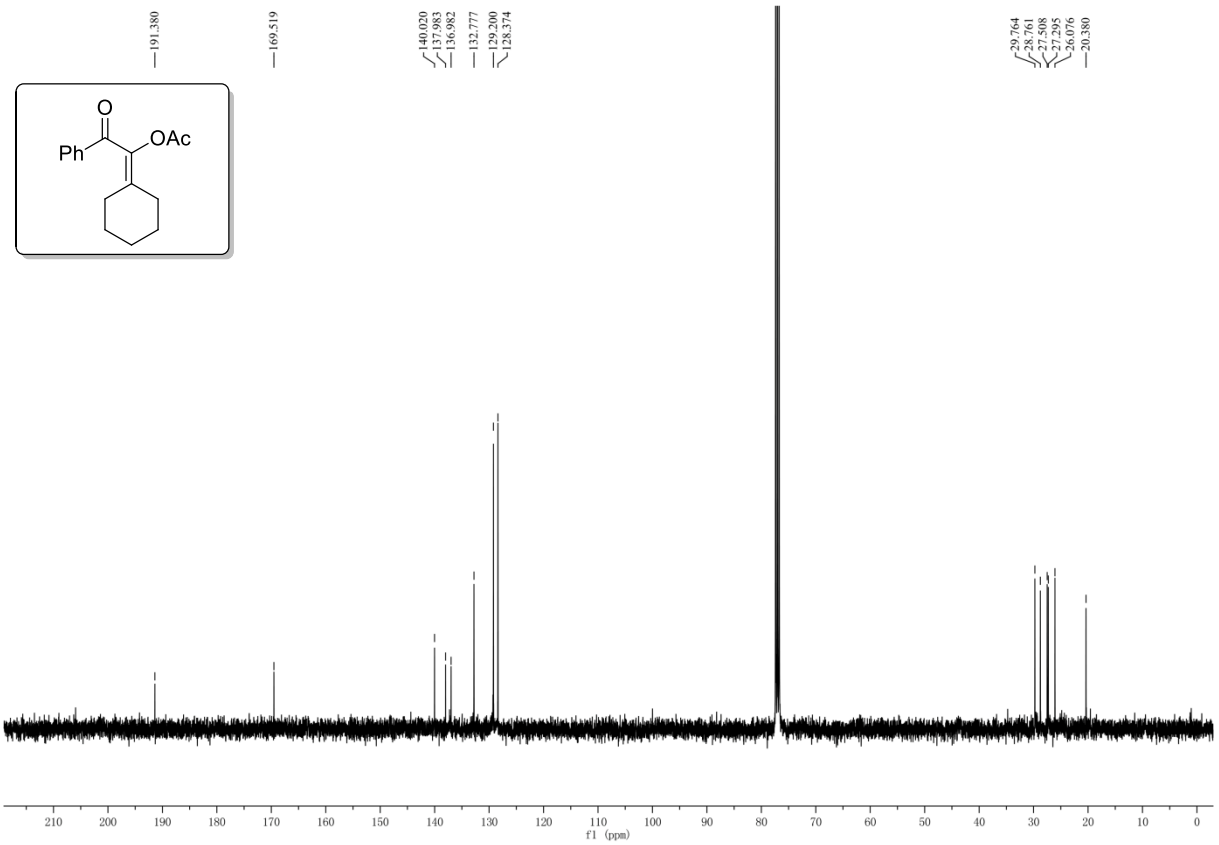
1.07
2.07
2.08
2.14
3.00
2.03
4.11
f1 (ppm)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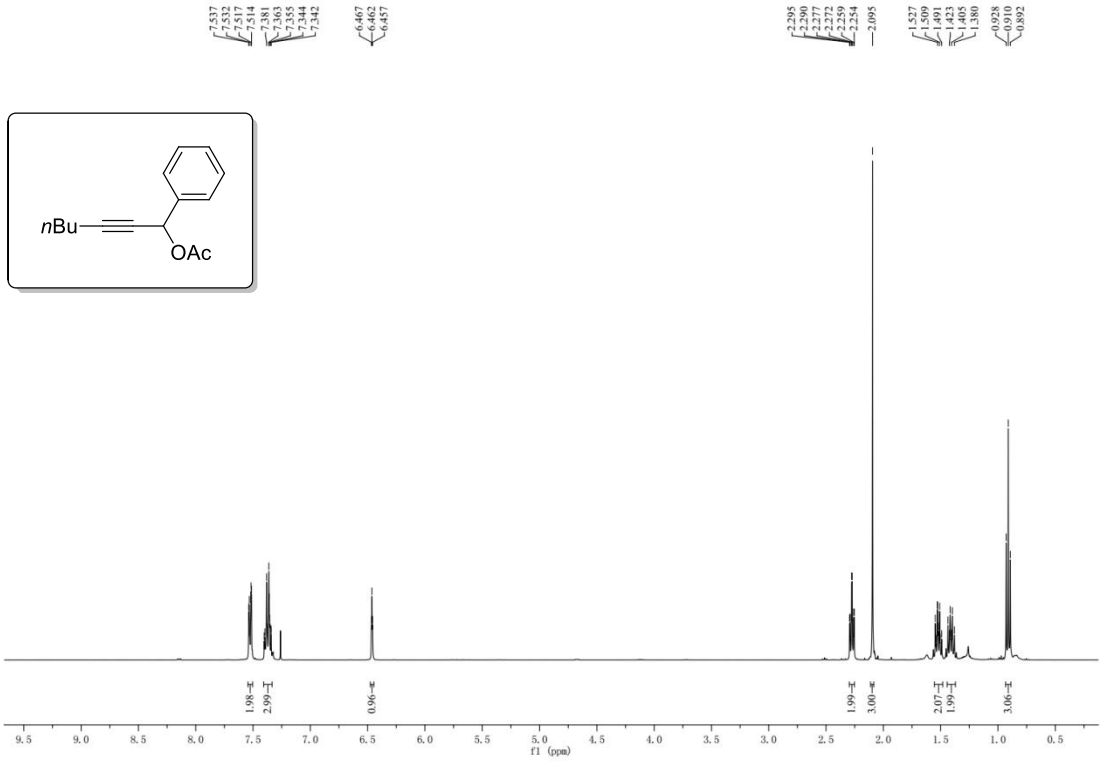
Ph
OAc
f1 (ppm)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2.254
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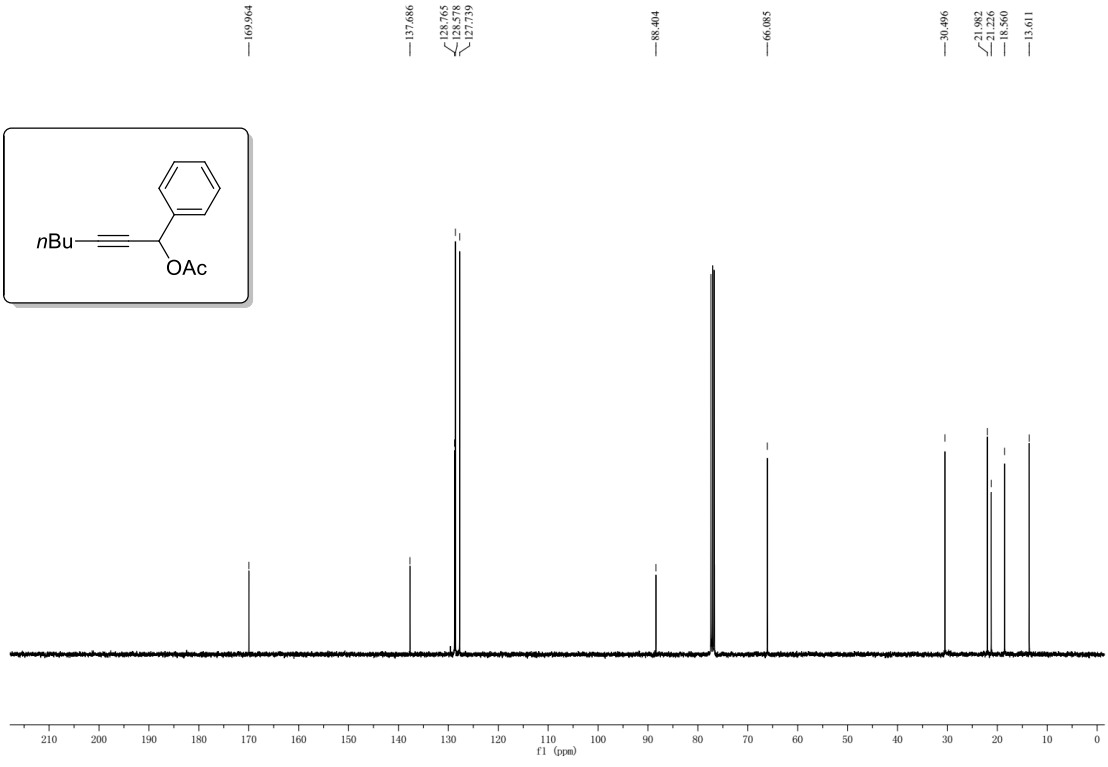
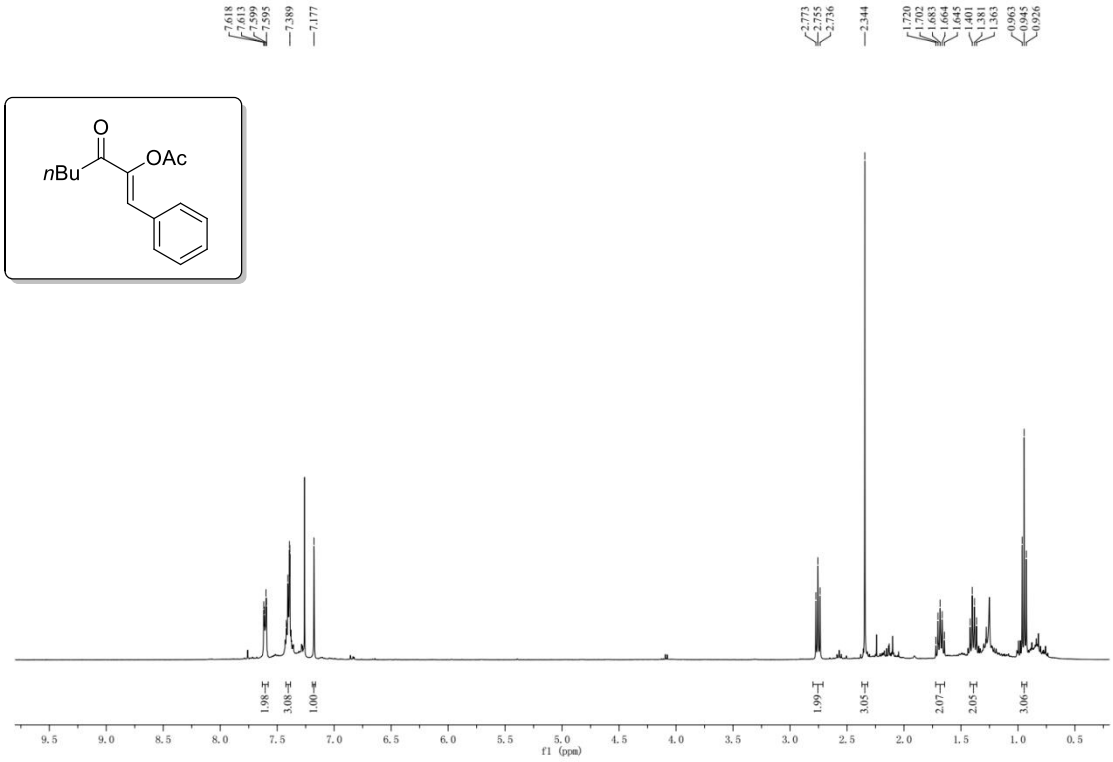
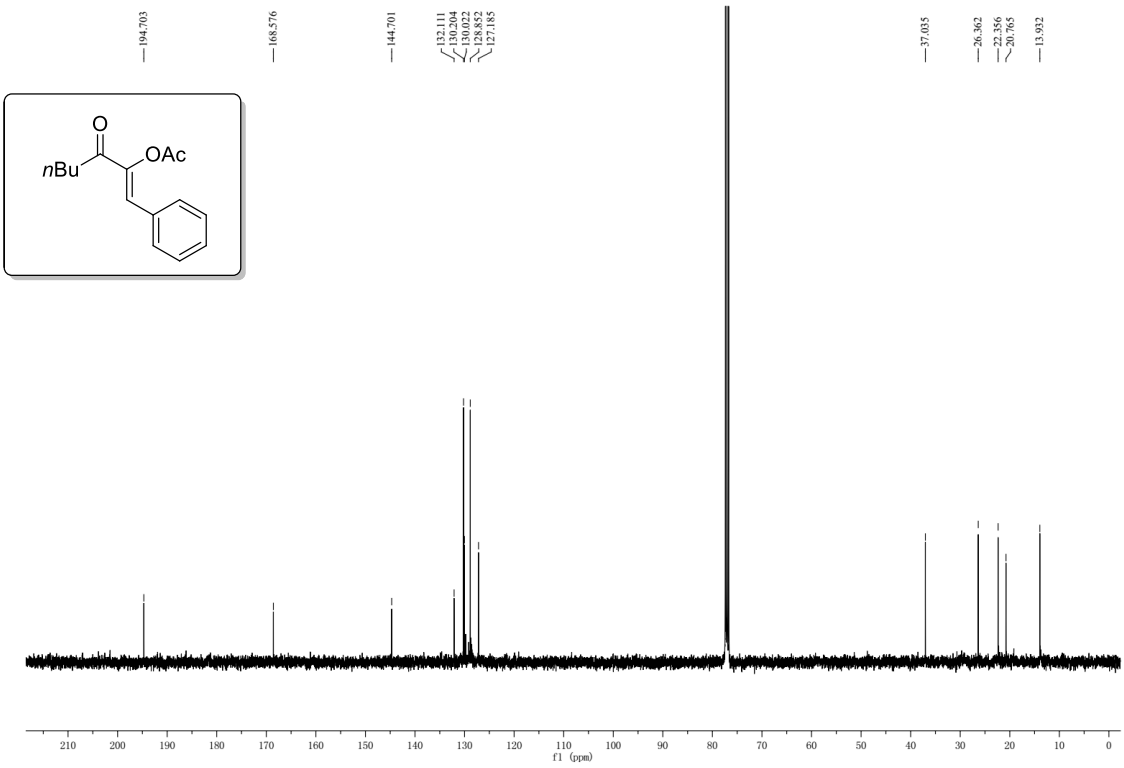
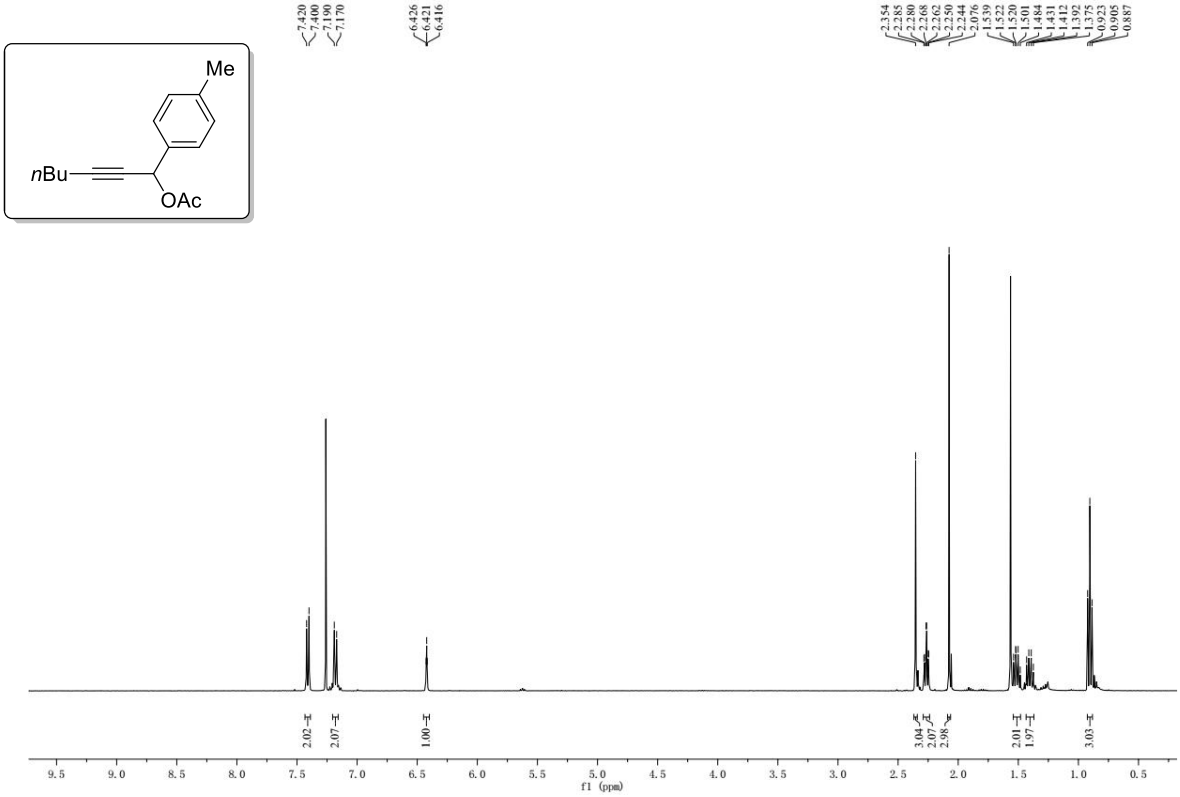
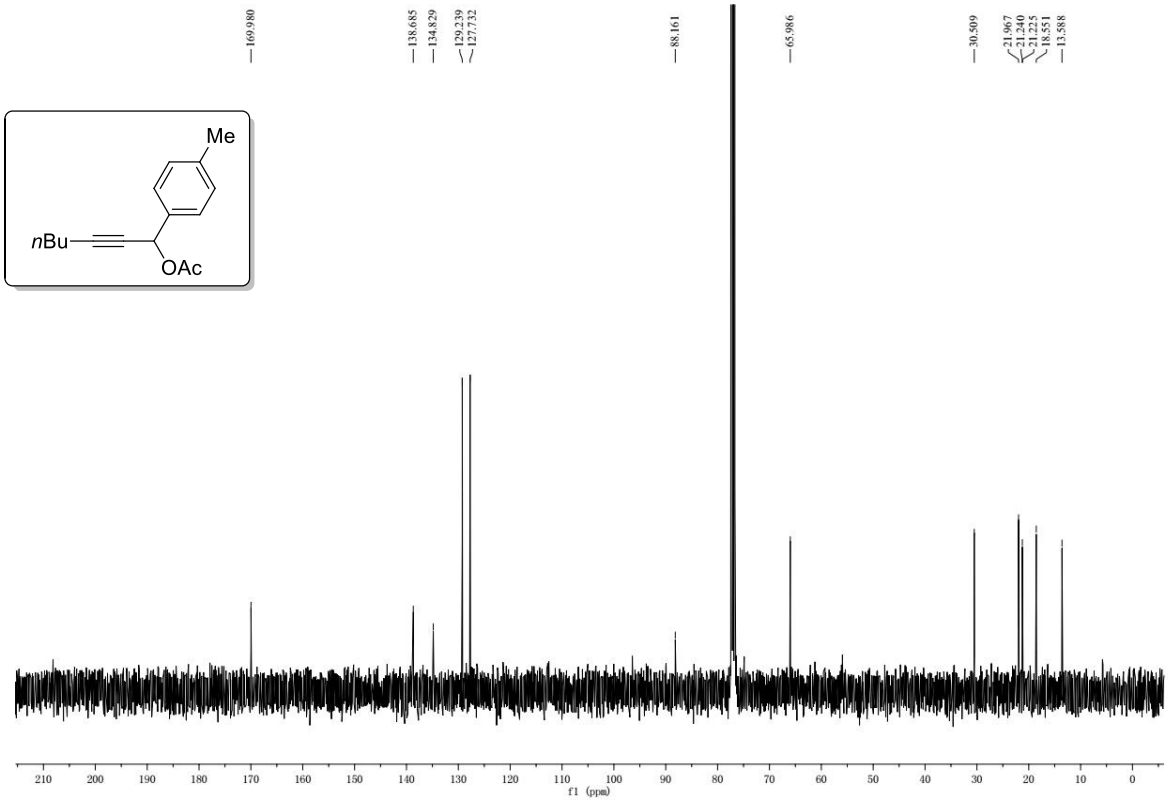
1.509
1.491
1.423
1.405
1.380
0.928
0.910
0.892
nBu
OAc
1.98
2.99
0.96
1.99
3.00
2.07
1.99
3.06
f1 (ppm)

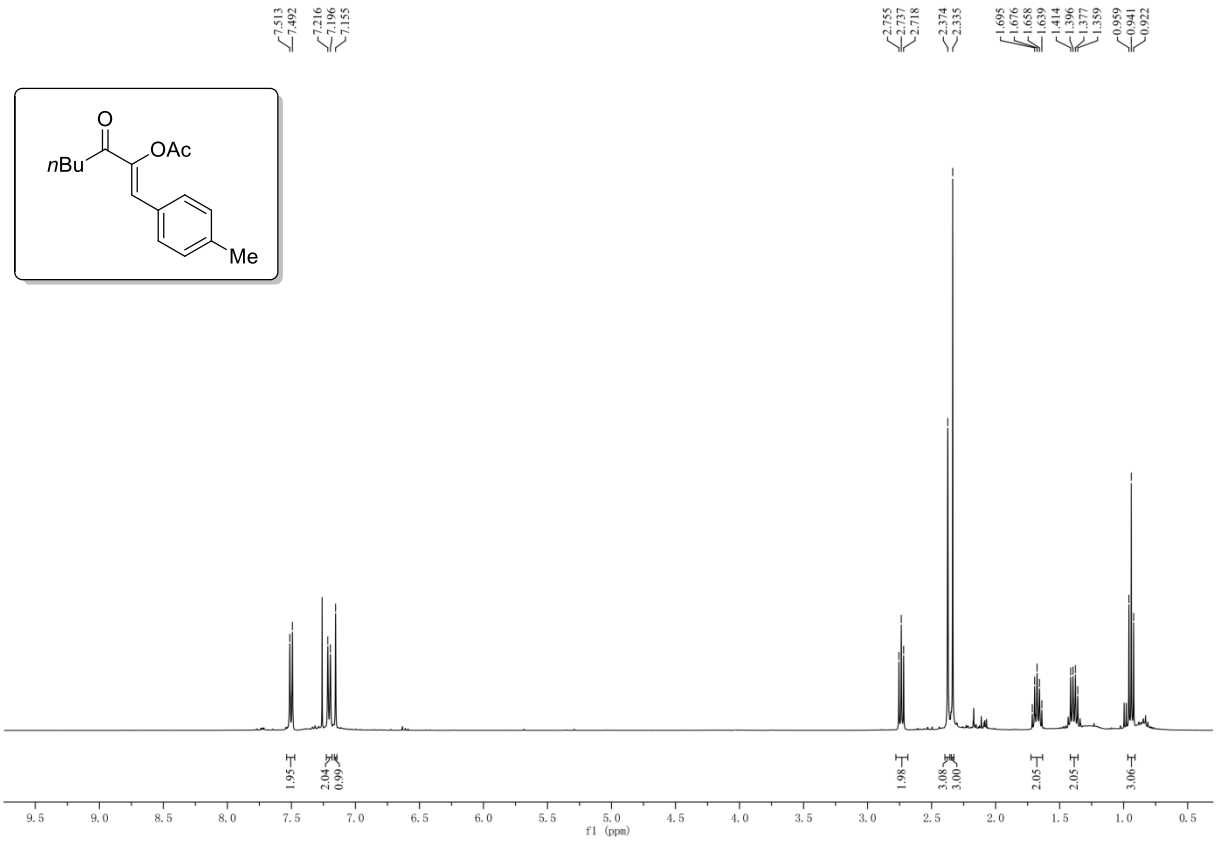

169.964
137.686
128.765
128.578
127.739
88.404
66.085
30.496
21.982
21.226
18.560
13.611
nBu
OAc
f1 (ppm)

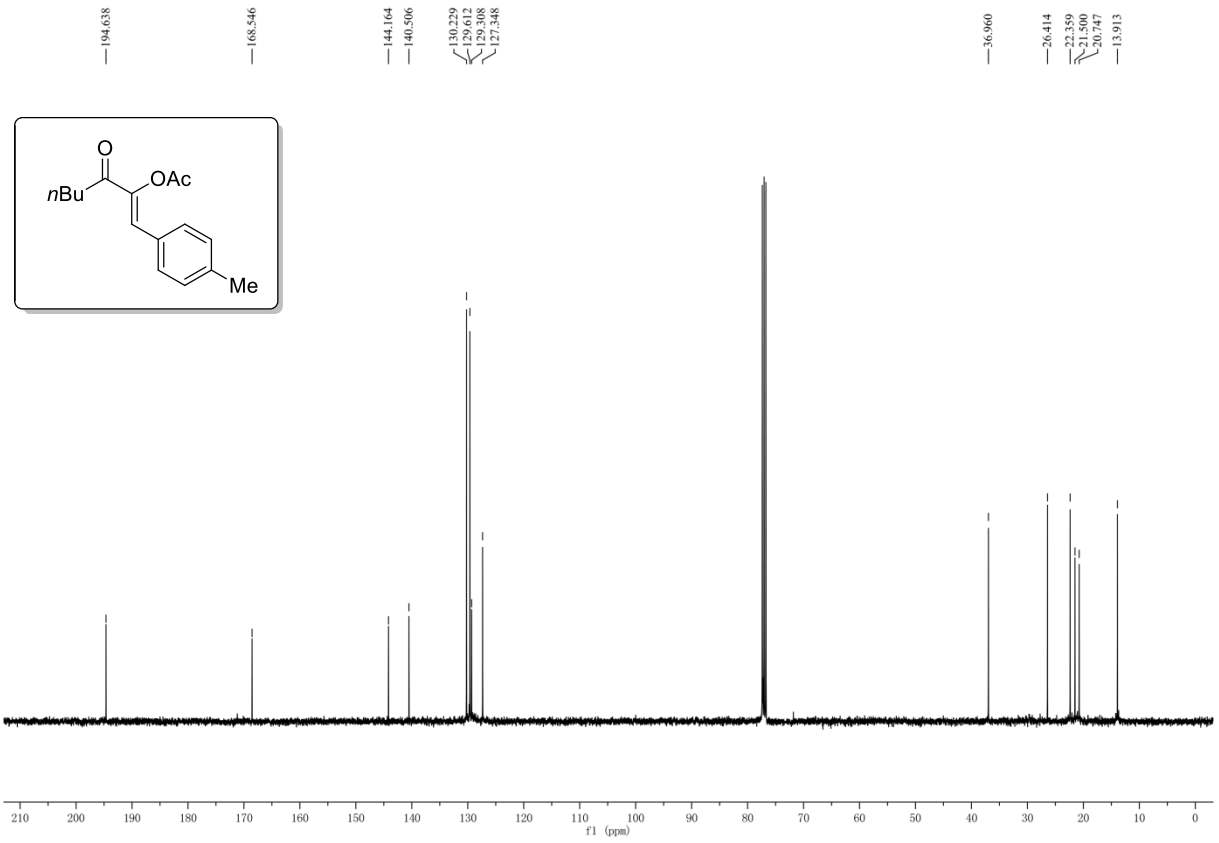

7.618
7.613
7.599
7.595
7.389
7.177
2.773
2.755
2.736
2.344
1.720
1.702
1.683
1.664
1.645
1.401
1.381
1.363
0.963
0.945
0.926
O
OAc
nBu
1.98
3.08
1.00
1.99
3.05
2.07
2.05
3.06
f1 (ppm)


194.703
168.576
144.701
132.111
130.204
130.022
128.852
127.185
37.035
26.362
22.356
20.765
13.932
O
OAc
nBu
f1 (ppm)


Me
nBu
OAc
7.420
7.400
7.190
7.170
6.426
6.421
6.416
2.354
2.285
2.190
2.268
2.262
2.259
2.244
2.076
1.539
1.522
1.520
1.501
1.484
1.431
1.412
1.392
1.375
0.923
0.905
0.887
2.02
2.07
1.00
3.04
2.07
2.98
2.01
1.97
3.03
f1 (ppm)


Me
nBu
OAc
169.980
138.685
134.829
129.239
127.732
88.161
65.986
30.509
21.967
21.240
21.225
18.551
13.588
f1 (ppm)


7.513
7.492
7.216
7.196
7.155
2.755
2.737
2.718
2.374
2.335
1.695
1.676
1.658
1.639
1.414
1.396
1.377
1.359
0.959
0.941
0.922
O
OAc
nBu
Me
1.95
2.04
0.99
1.98
3.08
3.00
2.05
2.05
3.06
f1 (ppm)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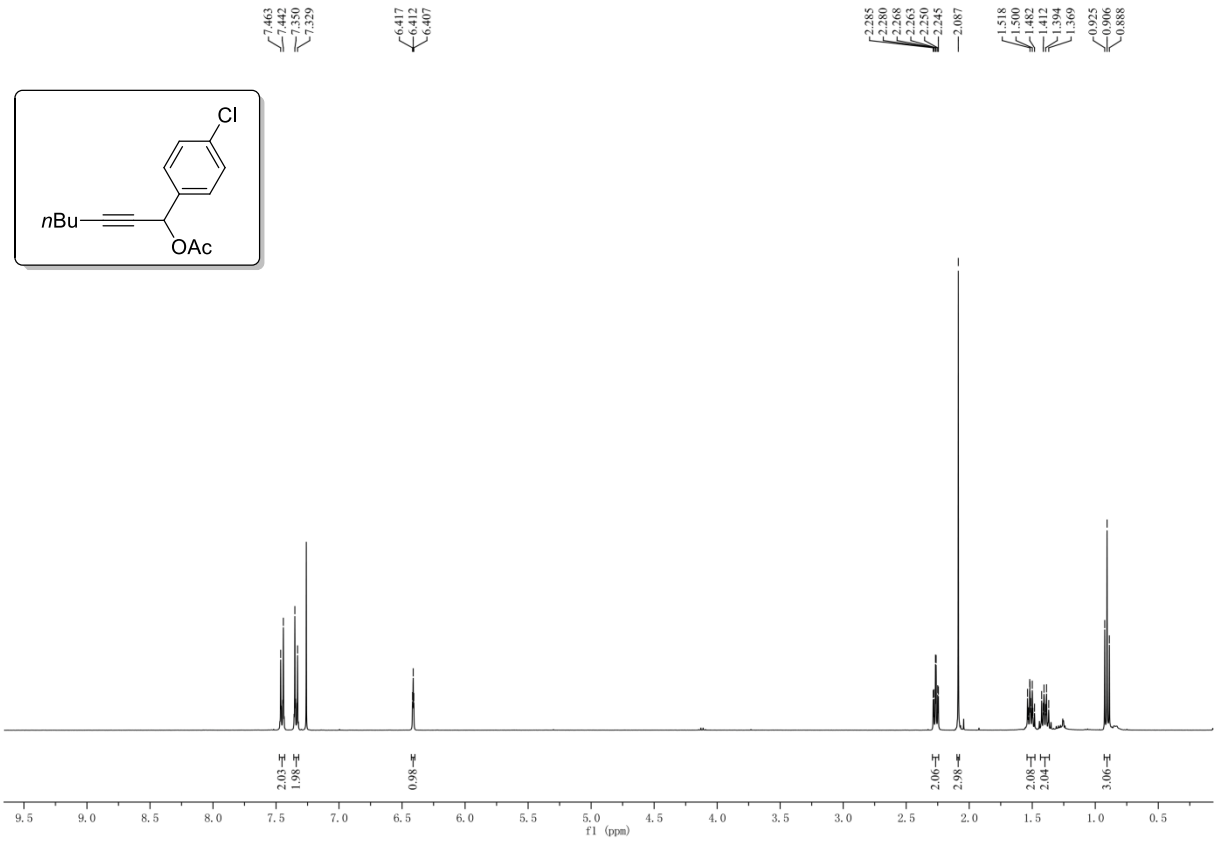
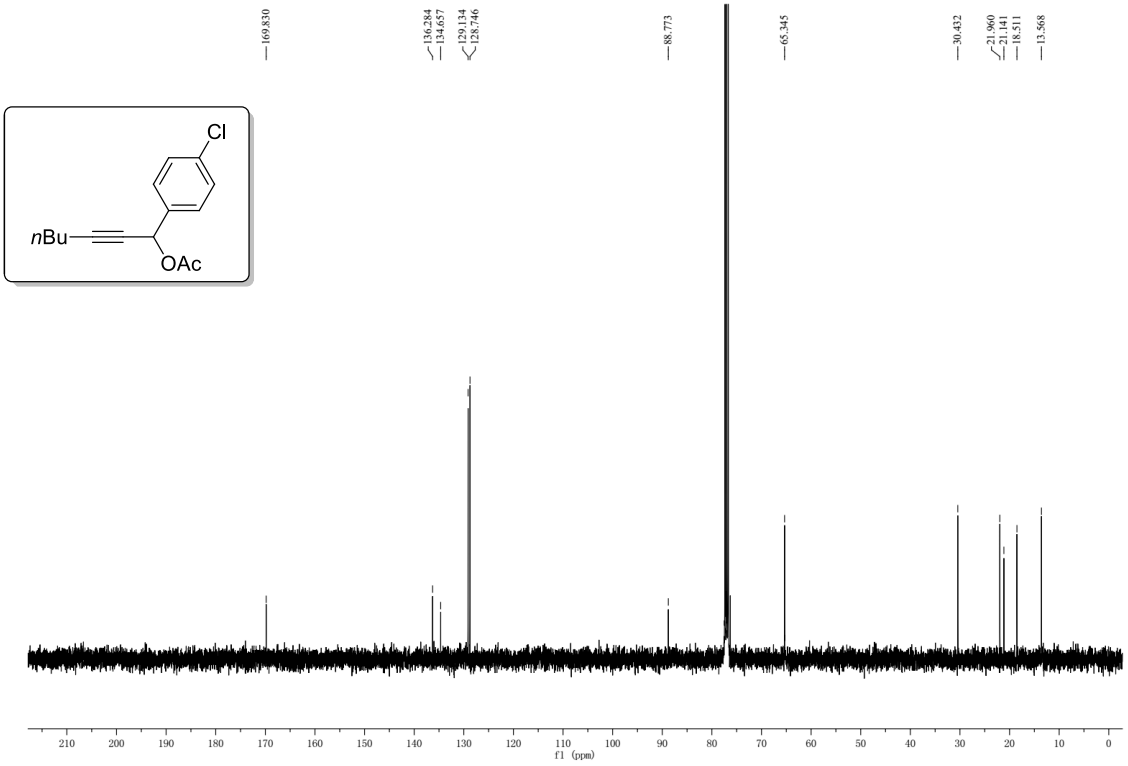
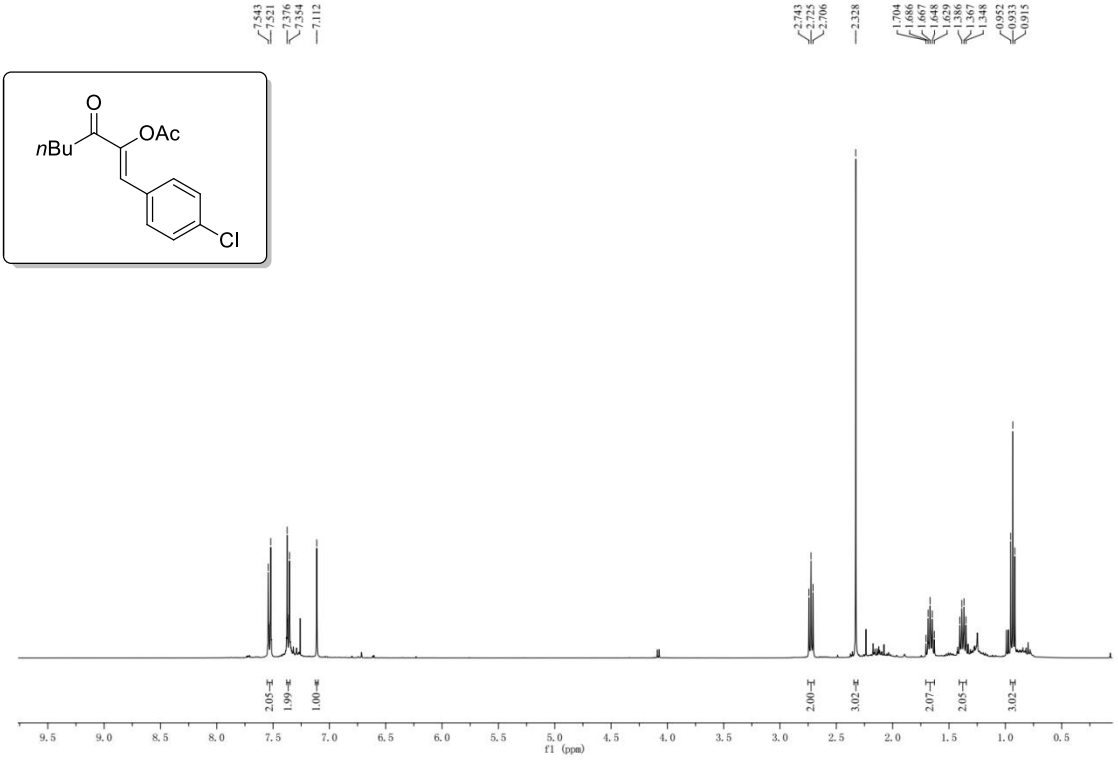
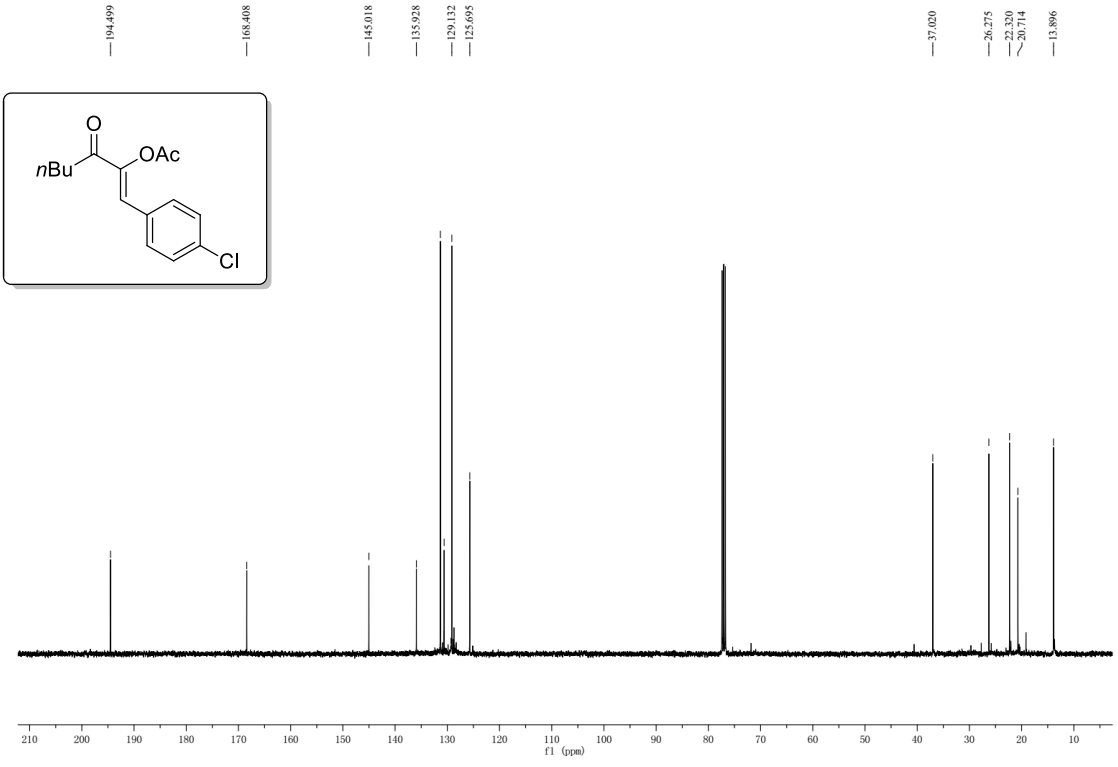
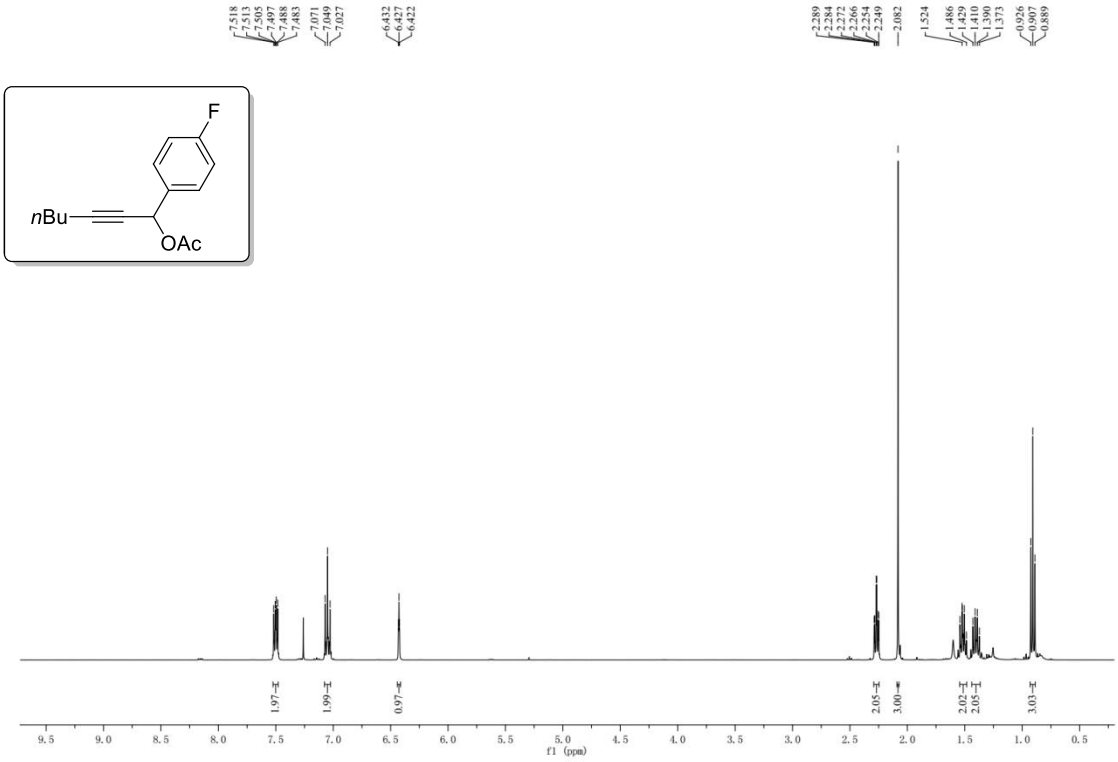
168.546
144.164
140.506
130.229
129.612
129.308
127.348
36.960
26.414
22.359
21.500
20.747
13.913
O
OAc
nBu
Me
f1 (ppm)

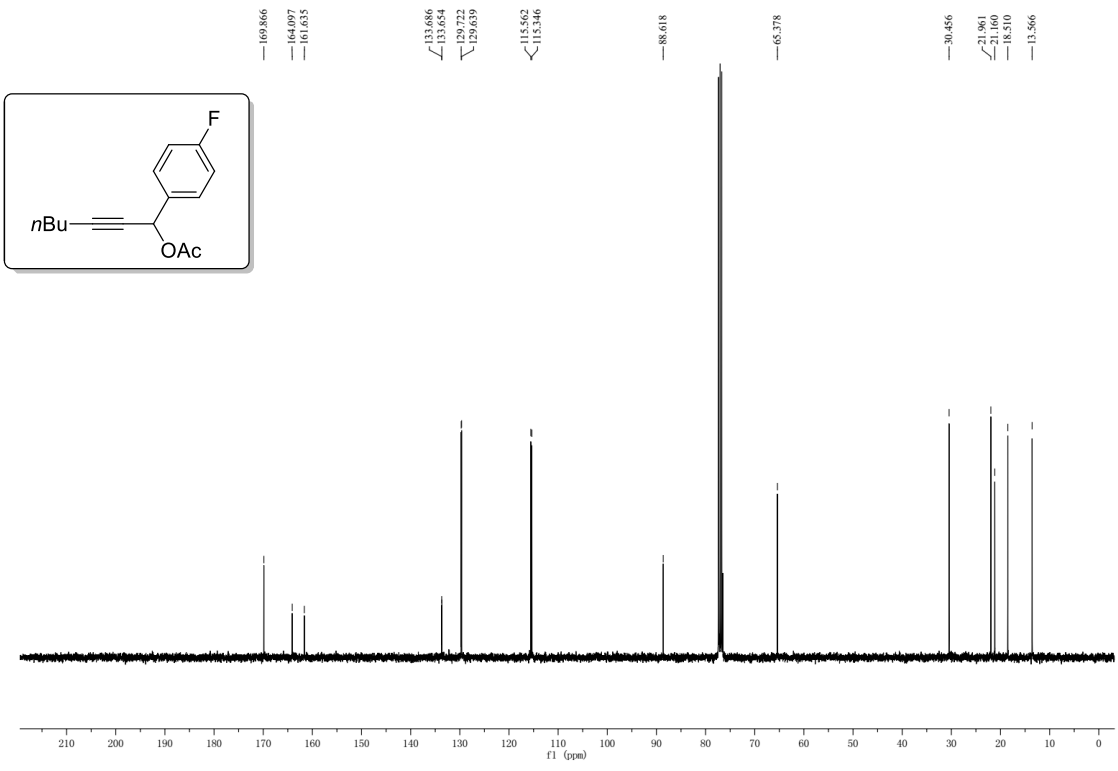

7.463
7.442
7.350
7.329
6.417
6.412
6.407
2.285
2.280
2.268
2.263
2.250
2.245
2.087
1.518
1.500
1.482
1.412
1.394
1.369
0.925
0.906
0.888
Cl
nBu
OAc
2.03
1.98
0.98
2.06
2.98
2.08
2.04
3.06
f1 (ppm)

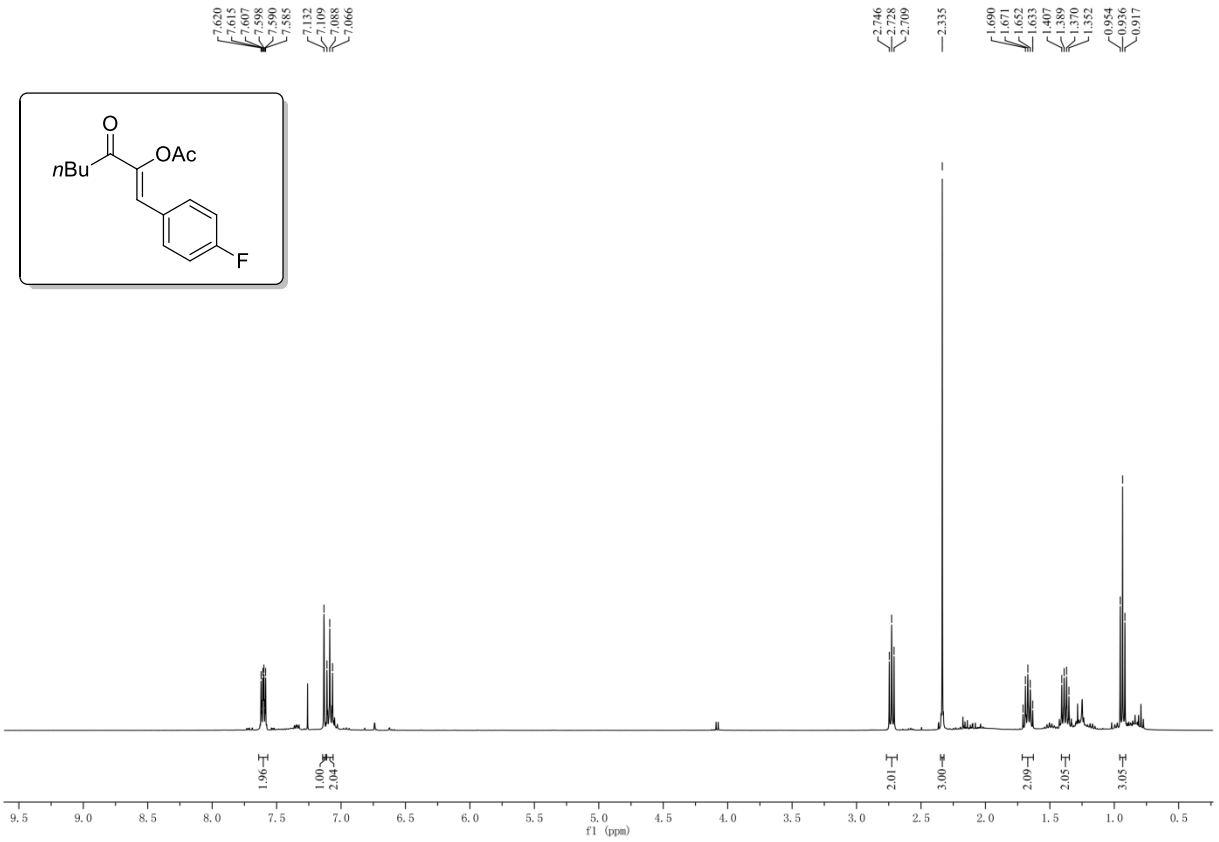

169.830
136.284
134.657
129.134
128.746
88.773
65.345
30.432
21.960
21.141
18.511
13.568
Cl
nBu
OAc
f1 (ppm)

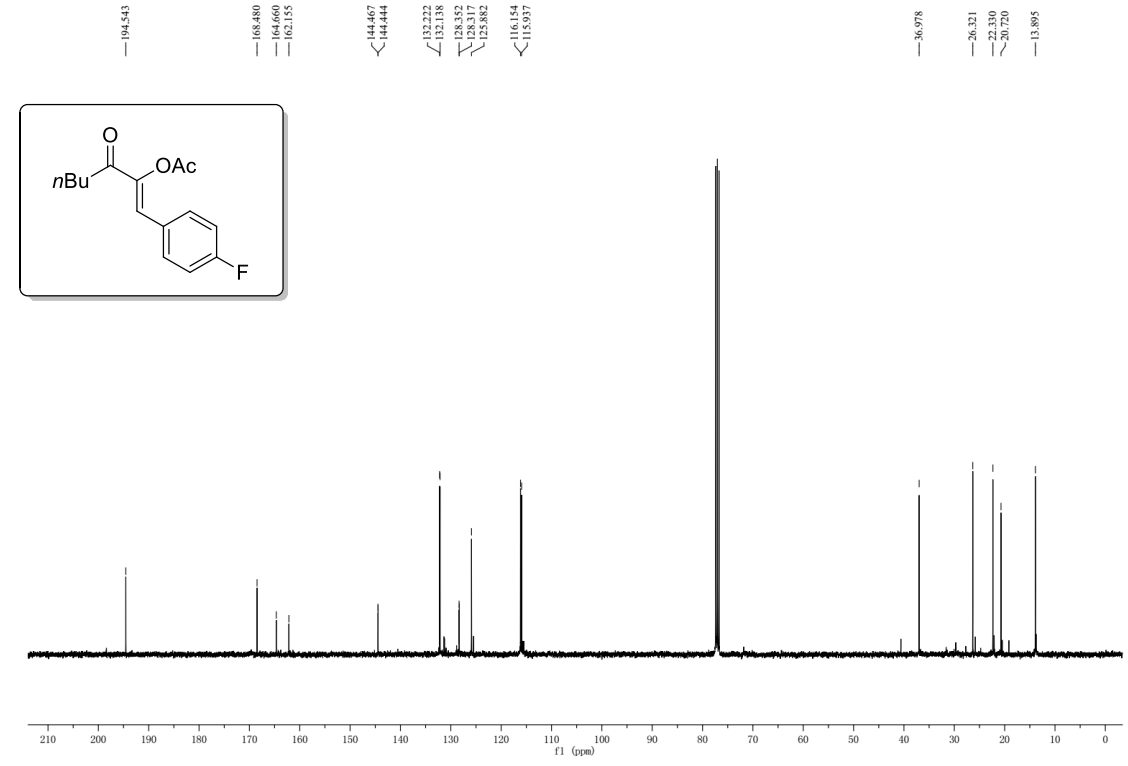

7.543
7.521
7.376
7.354
7.112
2.743
2.725
2.706
2.328
1.704
1.686
1.667
1.648
1.629
1.620
1.386
1.367
1.348
0.952
0.933
0.915
O
OAc
nBu
Cl
2.05
1.99
1.00
2.00
3.02
2.07
2.05
3.02
f1 (ppm)

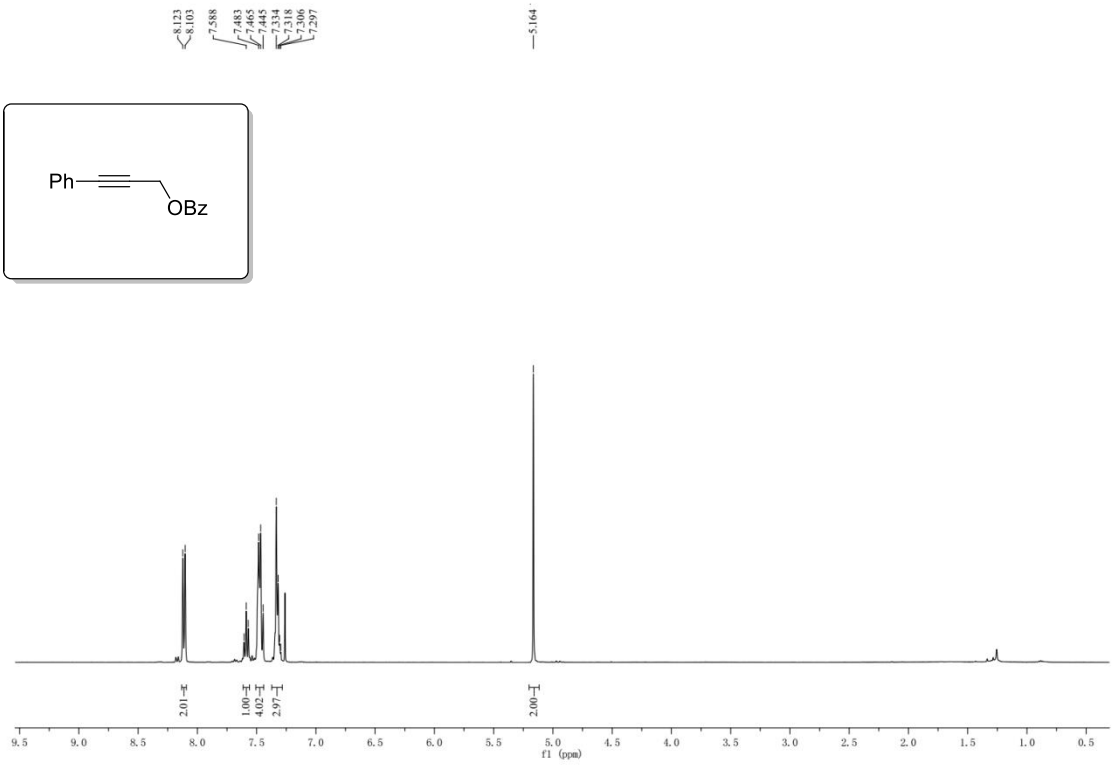

194.499
168.408
145.018
135.928
129.132
125.695
37.020
26.275
22.320
20.714
13.896
O
OAc
nBu
Cl
f1 (ppm)

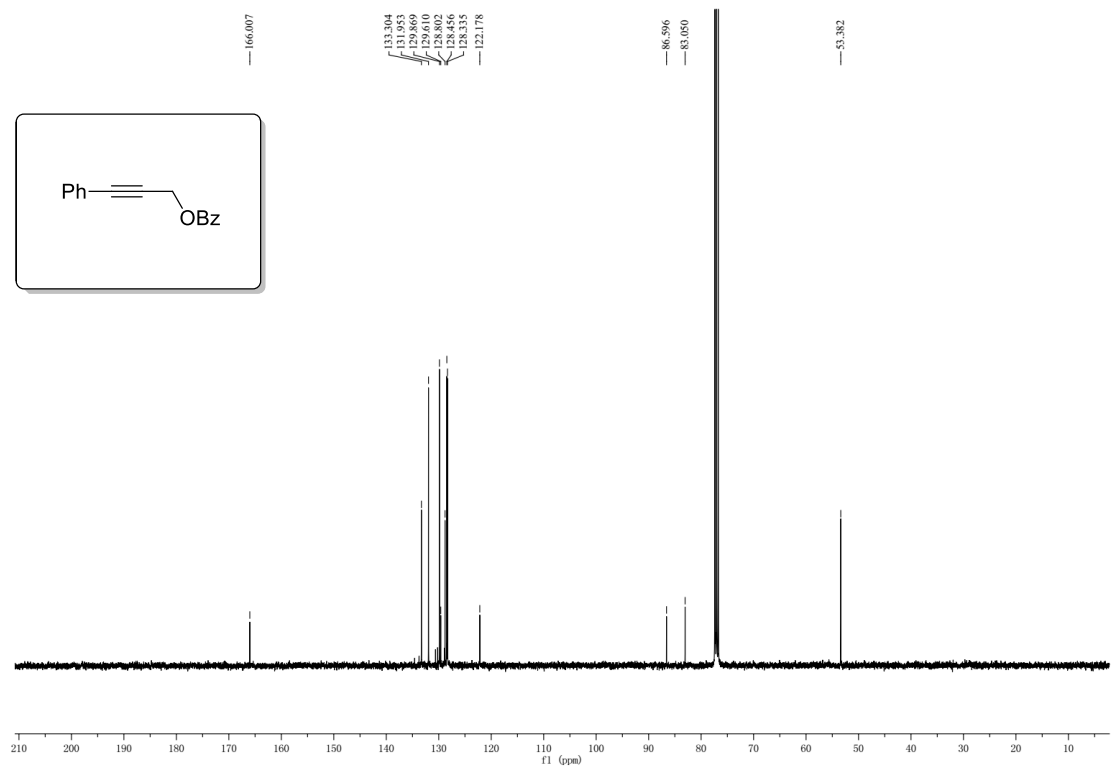

F
nBu
OAc
7.518
7.513
7.505
7.497
7.488
7.483
7.071
7.049
7.027
6.432
6.427
6.422
2.289
2.284
2.272
2.266
2.254
2.249
2.082
1.524
1.486
1.429
1.410
1.390
1.373
0.926
0.907
0.889
1.97
1.99
0.97
2.05
3.00
2.02
2.05
3.03
f1 (ppm)

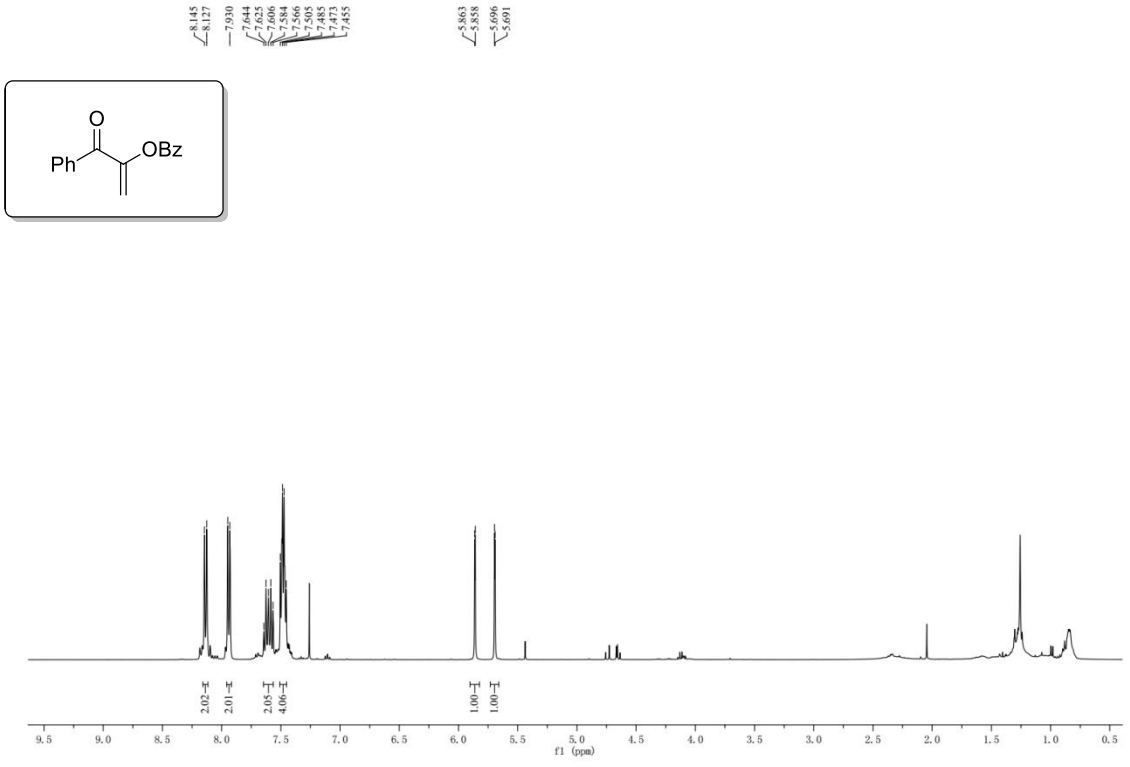

F
nBu
OAc
169.866
164.097
161.635
133.686
133.654
129.722
129.639
115.562
115.346
88.618
65.378
30.456
21.961
21.160
18.510
13.566
f1 (ppm)

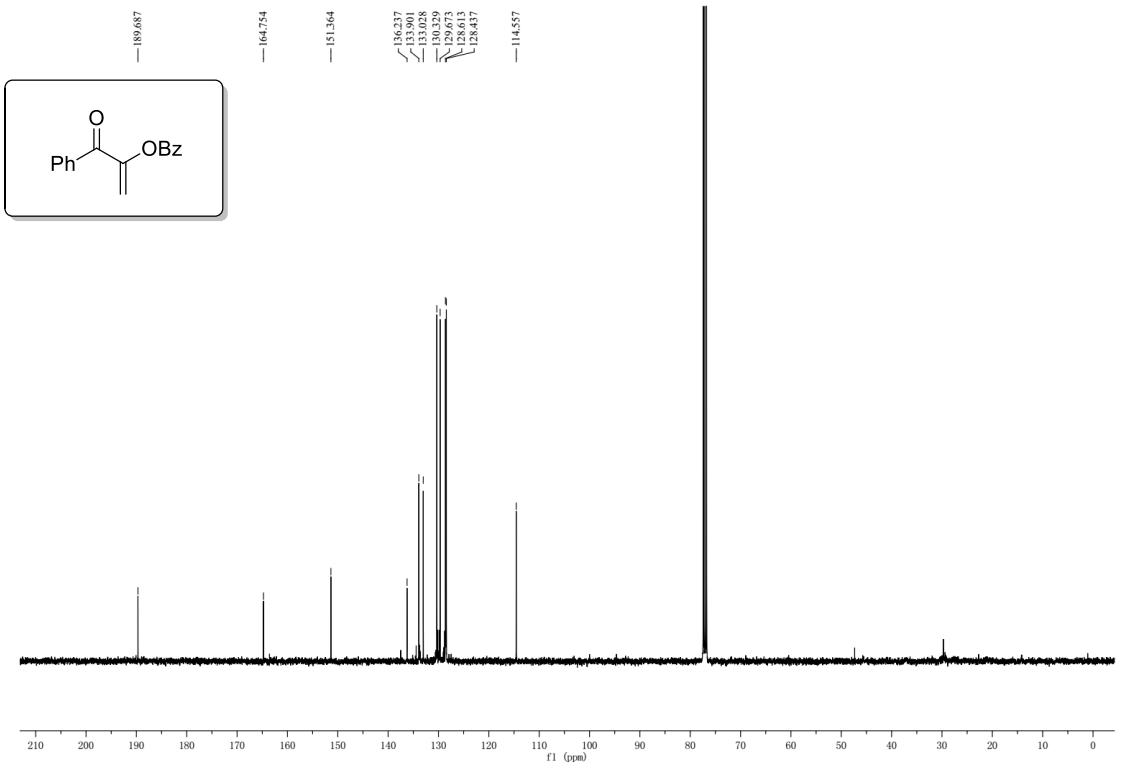

7.620
7.615
7.607
7.598
7.590
7.585
7.132
7.109
7.088
7.066
2.746
2.728
2.709
2.335
1.690
1.671
1.652
1.633
1.407
1.389
1.370
1.352
0.954
0.936
0.917
O
OAc
nBu
F
1.96
1.00
2.04
2.01
3.00
2.09
2.05
3.05
f1 (ppm)


194.543
168.480
164.660
162.155
144.467
144.444
132.222
132.138
128.352
128.317
125.882
116.154
115.937
36.978
26.321
22.330
20.720
13.895
O
OAc
nBu
F
f1 (ppm)


8.123
8.103
7.588
7.483
7.465
7.445
7.334
7.318
7.306
7.297
5.164
Ph
OBz
2.01
1.00
4.02
2.97
2.00
f1 (ppm)


166.007
133.304
131.953
130.960
129.610
128.802
128.456
128.335
122.178
86.596
83.050
53.382
Ph
OBz
f1 (ppm)


8.145
8.127
7.930
7.644
7.625
7.606
7.584
7.566
7.505
7.485
7.473
7.455
5.863
5.858
5.696
5.691
O
Ph
OBz
2.02
2.01
2.05
4.06
1.00
1.00
f1 (ppm)


189.687
164.754
151.364
136.237
133.901
133.028
130.329
129.673
128.613
128.437
114.557
O
Ph
OBz
f1 (ppm)