

Electronic Supplementary Information

Efficient Synthesis of Ynones from Carboxylic Acids and Terminal Alkynes via Pd/Cu Catalysis using 2-Chloroimidazolium Chloride

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1. General experimental details

All air- and moisture-sensitive reactions were carried out under an atmosphere of argon, magnetically stirred, and monitored by thin layer chromatography (TLC). IPrCl-Cl was prepared as described.¹ Unless otherwise noted, all reagents were obtained from commercial suppliers and used without further purification. The NHC precursors were dried under vacuum before use. NMR spectra were recorded on either Bruker 300 spectrometer operating at 300 MHz and 75 MHz for ¹H acquisition and ¹³C acquisitions. Chemical shifts were referenced to the residual proton solvent peak (¹H: CDCl₃, δ 7.26; (CD₃)₂SO, δ 2.49), solvent ¹³C signals (CDCl₃, δ 77.16; (CD₃)₂SO, δ 39.52). Signals are listed in ppm, and multiplicity identified as s=singlet, br=broad, d=doublet, t=triplet, q=quartet, m=multiplet; coupling constant in Hz. High resolution mass spectra were obtained using Bruker MALDI-TOF-MS.

2. General procedure for the Synthesis of Ynones (3aa-3f'a)

A mixture of carboxylic acids (0.40 mmol), phenylacetylene (0.20 mmol), IPrCl-Cl (0.44 mmol), CuI (5 mol%) and Pd(PPh₃)₂Cl₂ (2 mol%) in Et₃N (3 mL) was stirred at 90 °C under argon atmosphere for 3 h. The reaction was quenched by water and extracted with dichloromethane. The combined organic extracts were dried over Na₂SO₄, concentrated in vacuum. The resulting residue was purified by silica gel column chromatography to afford the desired products.

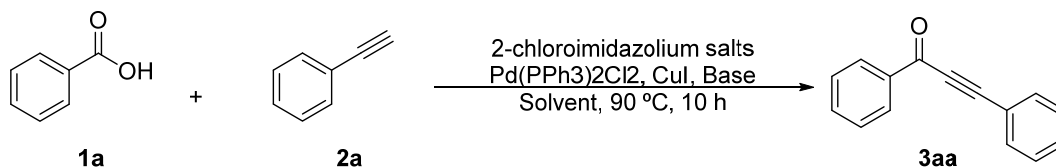
3. General procedure for the Synthesis of Ynones (3ab-3ao)

A mixture of benzoic acid (0.40 mmol), alkynes (0.20 mmol), IPrCl-Cl (0.44 mmol), CuI (5 mol%) and Pd(PPh₃)₂Cl₂ (2 mol%) in Et₃N (3 mL) was stirred at 90 °C under argon atmosphere for 3 h. The reaction was quenched by water and extracted with dichloromethane. The combined organic extracts were dried over Na₂SO₄,

concentrated in vacuum. The resulting residue was purified by silica gel column chromatography to afford the desired products.

4. Table S1, S2, S3 and S4

Table S1. Effects of the quantity of 2-chloroimidazolium salts



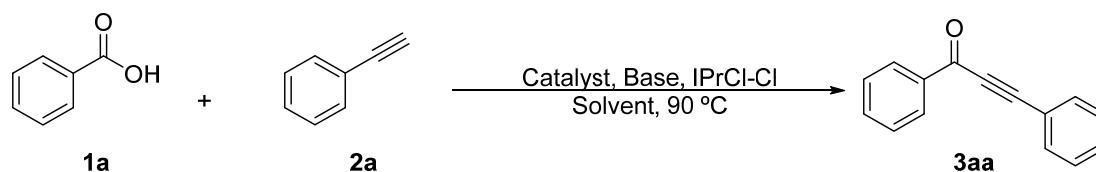
Entry	2-Chloroimidazolium salt (equiv)	Base	Solvent	Yield (%) ^b
1 ^a	IPrCl-Cl (2.0)	Et ₃ N	toluene	60
2	IPrCl-Cl (2.2)	Et ₃ N	toluene	67
3	IPrCl-Cl (2.5)	Et ₃ N	toluene	65
4	IPrCl-Cl (3.0)	Et ₃ N	toluene	59

^aGeneral reaction conditions: benzoic acid (0.40 mmol), phenylacetylene (0.20 mmol), Pd(PPh₃)₂Cl₂ (5 mol%),

CuI (5 mol%), base (0.80 mmol), solvent (3 mL) were stirred and heated at 90 °C under argon atmosphere for 10 h.

^bDetermined by ¹H NMR and diethyl D-tartrate was used as internal standard.

Table S2. Effects of catalyst

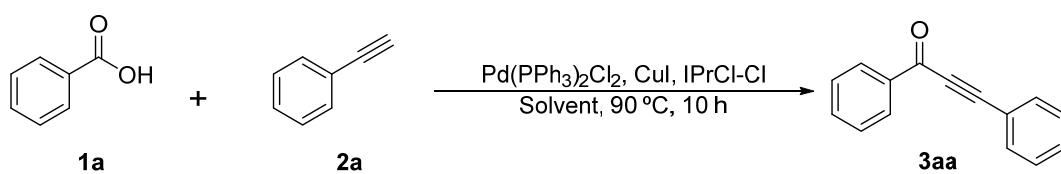


Entry	Catalyst	Base	Solvent	Yield (%) ^b
1 ^a	5 mol% CuI	Et ₃ N	toluene	n. d.
2	5 mol% Pd(PPh ₃) ₂ Cl ₂	Et ₃ N	toluene	31
3	5 mol% CuI/5 mol% Pd(PPh ₃) ₂ Cl ₂	Et ₃ N	toluene	67
4	5 mol% CuI/5 mol% Pd(PPh ₃) ₄	Et ₃ N	toluene	55
5	5 mol% CuI/5 mol% Pd(OAc) ₂	Et ₃ N	toluene	17

6	5 mol% CuI/5 mol% Pd(OAc) ₂ /12 mol% PPh ₃	Et ₃ N	toluene	31
7	5 mol% CuBr/5 mol% Pd(PPh ₃) ₂ Cl ₂	Et ₃ N	toluene	61
8	5 mol% CuCl/5 mol% Pd(PPh ₃) ₂ Cl ₂	Et ₃ N	toluene	50

^a General reaction conditions: benzoic acid (0.40 mmol), phenylacetylene (0.20 mmol), IPrCl-Cl (0.44 mmol), base (0.80 mmol), solvent (3 mL) were stirred and heated at 90 °C under argon atmosphere for 10 h. ^b Determined by ¹H NMR and diethyl D-tartrate was used as internal standard.

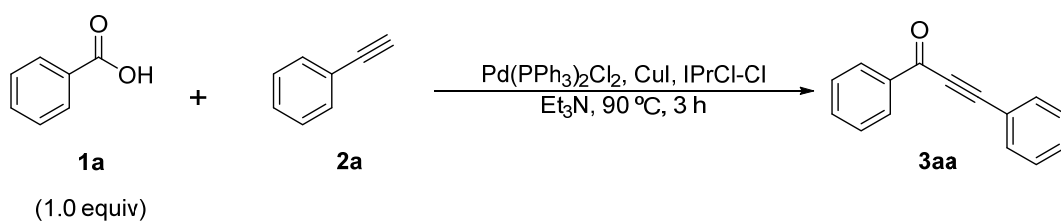
Table S3. Effects of the toluene/Et₃N mixed solvent ratio



Entry	Solvent	Yield (%) ^b
1 ^a	toluene/ Et ₃ N=1/2	75
2	toluene/ Et ₃ N=2/1	69
3	Et ₃ N	84

^a General reaction conditions: benzoic acid (0.40 mmol), phenylacetylene (0.20 mmol), Pd(PPh₃)₂Cl₂ (5 mol%), CuI (5 mol%), IPrCl-Cl (0.44 mmol), solvent (3 mL) were stirred and heated at 90 °C under argon atmosphere for 10 h. ^b Determined by ¹H NMR and (d)-diethyltartrate was used as internal standard

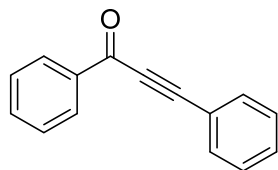
Table S4. Effects of the quantity of phenylacetylene



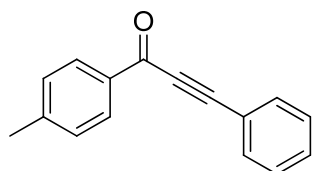
Entry	Equiv of Phenylacetylene	Yield (%) ^b
1 ^a	0.5	83
2	0.8	76
3	1.0	73
4	1.5	66

^aGeneral reaction conditions: benzoic acid (0.40 mmol), Pd(PPh₃)₂Cl₂ (2 mol%), CuI (5 mol%), IPrCl-Cl (0.44 mmol), solvent (3 mL) were stirred and heated at 90 °C under argon atmosphere for 3 h. ^bDetermined by ¹H NMR and diethyl D-tartrate was used as internal standard.

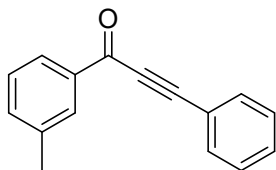
5. Characterization Data of Isolated Products



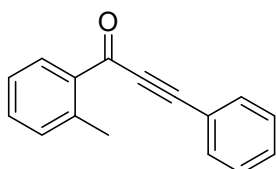
1,3-Diphenylprop-2-yn-1-one (3aa)²: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.168 mmol (84%). Light yellow solid. mp: 48-50 °C. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.36-8.10 (m, 2H), 7.78-7.66 (m, 2H), 7.62 (d, *J* = 7.1 Hz, 1H), 7.56 -7.45 (m, 3H), 7.45-7.36 (m, 2H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 178.10, 136.91, 134.23, 133.15, 130.91, 129.64, 128.77, 128.71, 120.15, 93.22, 86.96.



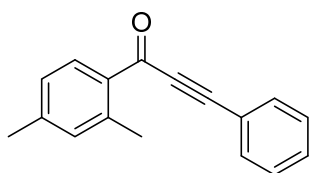
3-Phenyl-1-(p-tolyl)prop-2-yn-1-one (3ba)³: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.176 mmol (88%). Light yellow solid. mp: 70-72 °C. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.10 (d, *J* = 8.2 Hz, 2H), 7.72-7.60 (m, 2H), 7.47-7.42 (m, 1H), 7.41-7.33 (m, 2H), 7.27 (d, *J* = 8.2 Hz, 2H), 2.40 (s, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 177.57, 145.19, 134.58, 132.95, 130.66, 129.63, 129.32, 128.63, 120.17, 92.55, 86.98, 21.75.



3-Phenyl-1-(m-tolyl)prop-2-yn-1-one (3ca)⁴: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.154 mmol (77%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.10-7.96 (m, 2H), 7.72-7.64 (m, 2H), 7.51-7.35 (m, 5H), 2.44 (s, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 178.23, 138.54, 136.98, 135.04, 133.09, 130.81, 129.82, 128.74, 128.58, 127.16, 120.25, 92.93, 87.09, 21.38.

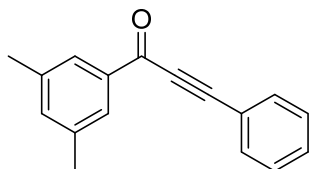


3-Phenyl-1-(o-tolyl)prop-2-yn-1-one (3da)⁵: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.164 mmol (82%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.31 (dd, J = 7.7, 1.4 Hz, 1H), 7.70-7.62 (m, 2H), 7.50-7.34 (m, 5H), 7.28 (d, J = 7.5 Hz, 1H), 2.69 (s, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 179.83, 140.54, 135.81, 133.25, 132.99, 132.26, 130.67, 128.72, 125.98, 120.43, 91.90, 88.49, 22.02.

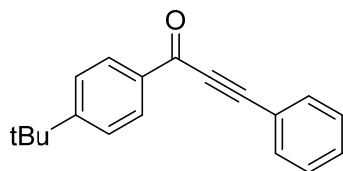


1-(2,4-Dimethylphenyl)-3-phenylprop-2-yn-1-one (3ea)⁶: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.122 mmol (61%). Light yellow oil. TLC: R_f = 0.65 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.22 (d, J = 7.9 Hz, 1H), 7.71-7.59 (m, 2H), 7.49-7.35 (m, 3H), 7.15 (d, J = 8.0 Hz, 1H), 7.07 (s, 1H), 2.66 (s,

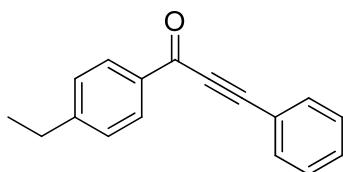
3H), 2.38 (s, 3H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 179.27, 143.89, 140.65, 133.70, 133.24, 133.06, 132.86, 130.48, 128.64, 126.63, 120.52, 91.27, 88.49, 22.01, 21.56.



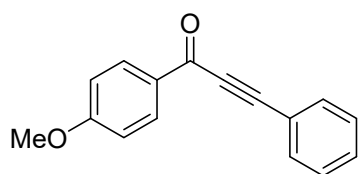
1-(3,5-Dimethylphenyl)-3-phenylprop-2-yn-1-one (3fa)⁵: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.154 mmol (77%). Light yellow oil. TLC: R_f = 0.65 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 7.82 (s, 2H), 7.67 (dd, J = 7.9, 1.3 Hz, 2H), 7.49-7.36 (m, 3H), 7.23 (s, 1H), 2.39 (s, 6H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 178.27, 138.31, 136.98, 135.91, 132.97, 130.68, 128.66, 127.34, 120.26, 92.60, 87.16, 21.18.



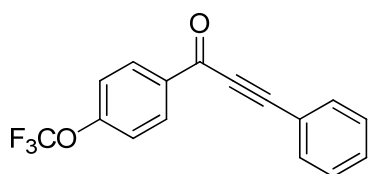
1-(4-(Tert-butyl)phenyl)-3-phenylprop-2-yn-1-one (3ga)⁷: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.152 mmol (76%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.21-8.12 (m, 2H), 7.71-7.62 (m, 2H), 7.57-7.49 (m, 2H), 7.49-7.42 (m, 1H), 7.42-7.34 (m, 2H), 1.35 (s, 9H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 177.59, 158.06, 134.54, 132.99, 130.68, 129.54, 128.66, 125.60, 120.24, 92.60, 87.07, 35.23, 31.03.



1-(4-Ethylphenyl)-3-phenylprop-2-yn-1-one (3ha)⁶: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.162 mmol (81%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.15 (d, J = 8.3 Hz, 2H), 7.71-7.62 (m, 2H), 7.51-7.43 (m, 1H), 7.43-7.36 (m, 2H), 7.33 (d, J = 8.5 Hz, 2H), 2.72 (q, J = 7.6 Hz, 1H), 1.27 (t, J = 7.6 Hz, 2H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 177.71, 151.40, 134.88, 133.03, 130.72, 129.84, 128.70, 128.21, 120.29, 92.64, 87.07, 29.12, 15.16.

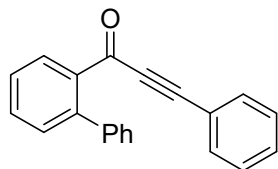


1-(4-Methoxyphenyl)-3-phenylprop-2-yn-1-one (3ia)³: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 35/1) afforded 0.144 mmol (72%). Light yellow solid. mp: 95-97 °C. TLC: R_f = 0.45 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.19 (d, J = 9.0 Hz, 2H), 7.67 (dd, J = 8.1, 1.5 Hz, 2H), 7.51-7.44 (m, 1H), 7.44-7.36 (m, 2H), 6.98 (d, J = 9.0 Hz, 2H), 3.89 (s, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 176.76, 164.61, 133.05, 132.08, 130.69, 130.43, 128.76, 120.47, 114.00, 92.41, 87.05, 55.70.

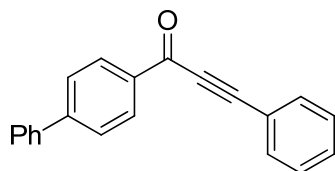


3-Phenyl-1-[4-(trifluoromethoxy)phenyl]-2-propyn-1-one (3ja): The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 35/1) afforded 0.106 mmol (53%). Light yellow oil. TLC: R_f = 0.45 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.26 (d, J = 8.7 Hz, 2H), 7.67 (dd, J = 8.2, 1.3 Hz, 2H), 7.51-7.38 (m, 3H), 7.33 (d, J = 8.7 Hz, 2H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 176.33, 153.50, 135.26, 133.20, 131.63, 131.11, 128.85, 122.15, 120.44, 119.98, 118.71, 93.91, 86.67. ¹⁹F NMR (376 MHz,

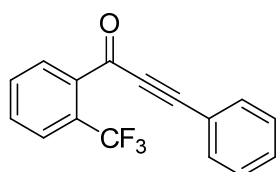
Chloroform-*d*) δ -57.57. IR (cm^{-1}) 2199, 1644. HRMS (MALDI) m/z $[\text{M}+\text{H}]^+$ calcd for $\text{C}_{16}\text{H}_9\text{F}_3\text{O}_2$: 291.0633, found: 291.0638.



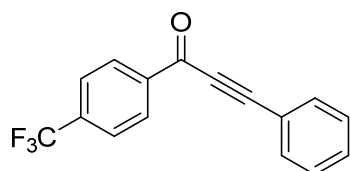
1-([1,1'-Biphenyl]-2-yl)-3-phenylprop-2-yn-1-one (3ka)⁸: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.094 mmol (47%). Light yellow oil. TLC: R_f = 0.50 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 7.94 (dd, J = 7.8, 1.2 Hz, 1H), 7.57 (td, J = 7.5, 1.3 Hz, 1H), 7.45 (td, J = 7.6, 1.3 Hz, 1H), 7.42-7.38 (m, 5H), 7.35-7.31 (m, 2H), 7.26-7.20 (m, 4H).; ^{13}C NMR (75 MHz, Chloroform-*d*) δ 180.77, 142.81, 140.50, 138.09, 133.05, 132.25, 131.14, 130.52, 130.14, 129.63, 128.47, 128.38, 127.92, 127.51, 120.15, 93.93, 88.90.



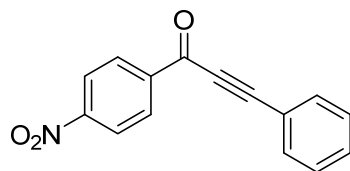
1-([1,1'-Biphenyl]-4-yl)-3-phenylprop-2-yn-1-one (3la)⁵: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.158 mmol (79%). Light yellow solid. mp: 107-109 °C. TLC: R_f = 0.50 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.30 (d, J = 8.6 Hz, 2H), 7.78-7.69 (m, 4H), 7.69-7.62 (m, 2H), 7.53-7.40 (m, 6H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 177.67, 146.94, 139.87, 135.91, 133.20, 130.90, 130.29, 129.13, 128.82, 128.56, 127.46, 127.40, 120.32, 93.22, 87.16.



3-Phenyl-1-[2-(trifluoromethyl)phenyl]-2-propyn-1-one (3ma): The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.070 mmol (35%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.11 (d, J = 7.0 Hz, 1H), 7.80 (d, J = 8.1 Hz, 1H), 7.74-7.64 (m, 2H), 7.64-7.60 (m, 2H), 7.52-7.45 (m, 1H), 7.44-7.35 (m, 2H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 177.86, 137.65, 133.23, 132.02 (d, J = 9.7 Hz), 131.24, 128.82, 127.36 (q, J = 5.6 Hz), 125.28, 121.65, 119.82, 94.45, 88.17. ^{19}F NMR (376 MHz, Chloroform-*d*) δ -58.27. IR (cm^{-1}) 2196, 1656. HRMS (MALDI) m/z $[\text{M}+\text{H}]^+$ calcd for $\text{C}_{16}\text{H}_9\text{F}_3\text{O}$: 275.0684, found: 275.0678.

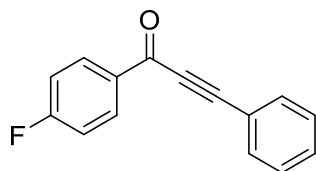


3-Phenyl-1-(4-(trifluoromethyl)phenyl)prop-2-yn-1-one (3na)⁵: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.100 mmol (50%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.32 (d, J = 8.1 Hz, 2H), 7.77 (d, J = 8.6 Hz, 2H), 7.72-7.63 (m, 2H), 7.55-7.47 (m, 1H), 7.47-7.37 (m, 2H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 176.75, 139.57, 135.29 (q, J = 32.7 Hz), 133.30, 131.29, 129.90, 128.91, 125.81 (q, J = 3.7 Hz), 121.88, 119.83, 94.56, 86.72.

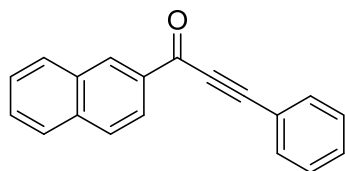


1-(4-Nitrophenyl)-3-phenylprop-2-yn-1-one (3oa)⁷: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 35/1) afforded 0.074 mmol (37%). Light yellow solid. mp: 154-156 °C. TLC: R_f = 0.50 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.37 (s, 4H), 7.71 (dd, J = 8.2, 1.4 Hz, 2H), 7.57-7.51 (m, 1H), 7.50-7.41 (m, 2H). ^{13}C NMR (75 MHz,

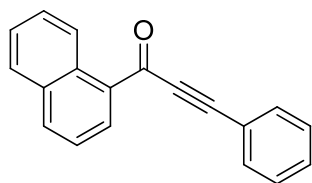
Chloroform-*d*) δ 176.01, 151.03, 141.18, 133.42, 131.59, 130.57, 129.01, 124.00, 119.55, 95.55, 86.68.



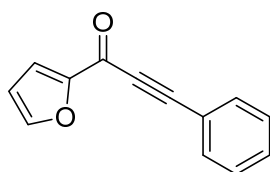
1-(4-Fluorophenyl)-3-phenylprop-2-yn-1-one (3pa)⁵: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.142 mmol (71%). Light yellow solid. mp: 60-62 °C. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.29-8.16 (m, 2H), 7.72-7.60 (m, 2H), 7.49-7.43 (m, 1H), 7.43-7.34 (m, 2H), 7.20-7.10 (m, 2H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 176.30, 168.16, 164.76, 133.45 (d, J = 2.8 Hz), 133.07, 132.23 (d, J = 9.7 Hz), 130.93, 128.74, 119.97, 115.86 (d, J = 22.2 Hz), 93.37, 86.65.



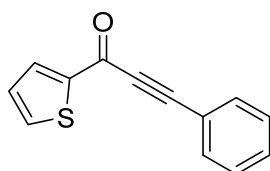
1-(Naphthalen-2-yl)-3-phenylprop-2-yn-1-one (3qa)⁵: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.150 mmol (75%). Light yellow solid. mp: 93-95 °C. TLC: R_f = 0.55 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.75 (s, 1H), 8.20 (dd, J = 8.6, 1.7 Hz, 1H), 7.99 (d, J = 7.6 Hz, 1H), 7.93-7.81 (m, 2H), 7.72 (dd, J = 7.8, 1.4 Hz, 2H), 7.64-7.52 (m, 2H), 7.51-7.39 (m, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 177.83, 136.11, 134.38, 133.05, 132.60, 132.37, 130.79, 129.86, 129.01, 128.70, 128.52, 127.90, 126.94, 123.90, 120.18, 93.06, 87.12.



1-(Naphthalen-1-yl)-3-phenylprop-2-yn-1-one (3ra)⁹: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.134 mmol (67%). Light yellow solid. mp: 92-94 °C. TLC: R_f = 0.55 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 9.30 (d, J = 8.6 Hz, 1H), 8.65 (dd, J = 7.3, 1.3 Hz, 1H), 8.06 (d, J = 8.2 Hz, 1H), 7.89 (d, J = 8.1 Hz, 1H), 7.74-7.64 (m, 3H), 7.63-7.52 (m, 2H), 7.51-7.35 (m, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 179.67, 135.13, 134.56, 133.86, 132.92, 130.72, 130.62, 128.94, 128.66, 128.61, 126.75, 125.97, 124.48, 120.31, 91.73, 88.55.

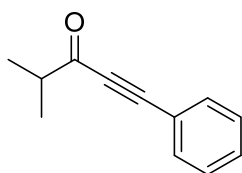


1-(Furan-2-yl)-3-phenylprop-2-yn-1-one (3sa)¹⁰: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 30/1) afforded 0.154 mmol (77%). Light yellow solid. mp: 53-55 °C. TLC: R_f = 0.40 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 7.71-7.56 (m, 3H), 7.49-7.32 (m, 4H), 6.62-6.54 (m, 1H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 164.73, 153.21, 148.10, 133.04, 130.91, 128.71, 121.02, 119.85, 112.73, 91.91, 86.26.

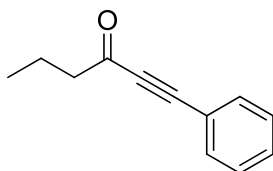


3-Phenyl-1-(thiophen-2-yl)prop-2-yn-1-one (3ta)¹¹: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 30/1) afforded 0.162 mmol (81%). Light yellow solid. mp: 55-57 °C. TLC: R_f = 0.40 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.01 (dd, J = 3.8, 1.2

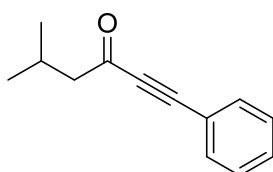
Hz, 1H), 7.73 (dd, $J = 4.9, 1.2$ Hz, 1H), 7.66 (dt, $J = 6.7, 1.5$ Hz, 2H), 7.52-7.46 (m, 1H), 7.45-7.37 (m, 2H), 7.19 (dd, $J = 4.9, 3.8$ Hz, 1H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 169.90, 145.11, 135.33, 135.16, 133.17, 130.97, 128.83, 128.46, 120.11, 91.86, 86.64.



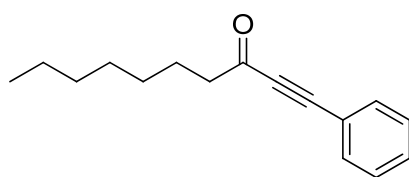
4-Methyl-1-phenylpent-1-yn-3-one (3ua)¹²: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.034 mmol (17%). Light yellow oil. TLC: $R_f = 0.65$ (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 7.63-7.53 (m, 2H), 7.50-7.42 (m, 1H), 7.42-7.33 (m, 2H), 2.76 (p, $J = 7.0$ Hz, 1H), 1.28 (s, 3H), 1.26 (s, 3H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 192.26, 133.16, 130.73, 128.76, 120.38, 91.72, 87.04, 43.26, 18.19.



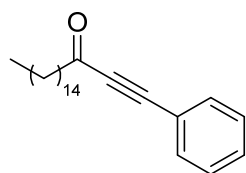
1-Phenylhex-1-yn-3-one (3va)¹³: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.124 mmol (62%). Light yellow oil. TLC: $R_f = 0.65$ (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 7.61-7.53 (m, 2H), 7.50-7.42 (m, 1H), 7.42-7.33 (m, 2H), 2.65 (t, $J = 7.3$ Hz, 2H), 1.78 (h, $J = 7.4$ Hz, 2H), 1.00 (t, $J = 7.4$ Hz, 3H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 188.31, 133.17, 130.77, 128.75, 120.23, 90.68, 87.99, 47.55, 17.85, 13.71.



5-Methyl-1-phenylhex-1-yn-3-one (3wa)¹⁴: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.068 mmol (34%). Light yellow oil. TLC: $R_f = 0.65$ (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 7.62-7.51 (m, 2H), 7.47-7.41 (m, 1H), 7.41-7.32 (m, 2H), 2.54 (d, $J = 7.0$ Hz, 2H), 2.40-2.26 (m, 1H), 1.01 (d, $J = 6.6$ Hz, 6H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 187.92, 133.12, 130.73, 128.72, 120.23, 90.52, 88.26, 54.59, 25.39, 22.56.

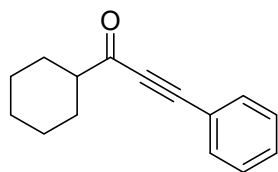


1-Phenyldec-1-yn-3-one (3xa)¹⁵: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.100 mmol (50%). Light yellow oil. TLC: $R_f = 0.65$ (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 7.60-7.54 (m, 2H), 7.48-7.42 (m, 1H), 7.42-7.35 (m, 2H), 2.66 (t, $J = 7.0$ Hz, 2H), 1.80-1.69 (m, 2H), 1.40-1.24 (m, 8H), 0.88 (t, $J = 6.9$ Hz, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 188.47, 133.13, 130.75, 128.72, 120.16, 90.66, 87.96, 45.66, 31.76, 29.13, 29.08, 24.29, 22.71, 14.18.

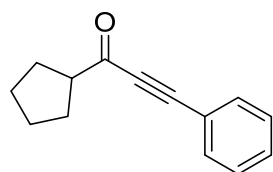


1-Phenyloctadec-1-yn-3-one (3ya)¹⁶: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.102 mmol (51%). Light yellow solid. mp: 50-52 °C. TLC: $R_f = 0.65$ (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 7.62-7.53 (m, 2H), 7.51-7.39 (m, 2H), 7.42-7.34 (m, 2H), 2.66 (t, $J = 7.3$ Hz, 2H), 1.74 (p, $J = 7.2$ Hz, 2H), 1.26 (s, 24H), 0.88 (t, $J = 6.5$ Hz, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 188.38, 133.16, 130.74, 128.75, 120.31, 90.66, 88.05, 45.71, 32.07, 29.83, 29.80, 29.74, 29.59, 29.50, 29.18,

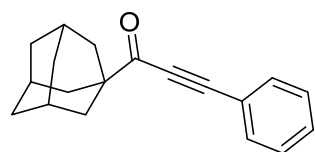
24.37, 22.83, 14.23.



1-Cyclohexyl-3-phenylprop-2-yn-1-one (3za)¹¹: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.094 mmol (47%). Light yellow oil. TLC: R_f = 0.65 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 7.65-7.52 (m, 2H), 7.49-7.41 (m, 1H), 7.41-7.31 (m, 2H), 2.49 (tt, J = 11.0, 3.6 Hz, 1H), 2.12-1.98 (m, 2H), 1.89-1.76 (m, 2H), 1.72-1.63 (m, 1H), 1.60-1.44 (m, 2H), 1.40-1.20 (m, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 191.47, 133.06, 130.63, 128.66, 120.28, 91.40, 87.31, 52.38, 28.40, 25.89, 25.49.

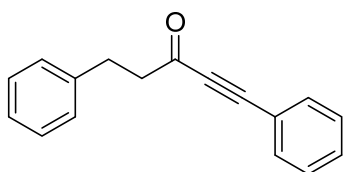


1-Cyclopentyl-3-phenylprop-2-yn-1-one (3a'a)¹⁴: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.046 mmol (23%). Light yellow oil. TLC: R_f = 0.65 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 7.56 (dd, J = 8.1, 1.5 Hz, 2H), 7.48-7.41 (m, 1H), 7.41-7.32 (m, 2H), 3.03 (tt, J = 8.6, 7.2 Hz, 1H), 2.11-1.85 (m, 4H), 1.77-1.59 (m, 4H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 191.18, 133.10, 130.67, 128.72, 120.34, 91.26, 87.43, 53.91, 29.27, 26.13.

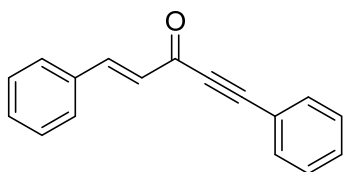


1-((3r,5r,7r)-Adamantan-1-yl)-3-phenylprop-2-yn-1-one (3b'a)¹¹: The general

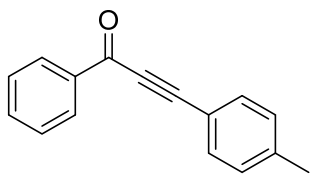
procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.074 mmol (37%). Light yellow oil. TLC: R_f = 0.65 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 7.63-7.54 (m, 2H), 7.47-7.40 (m, 1H), 7.40-7.32 (m, 2H), 2.09 (s, 3H), 1.98-1.90 (m, 6H), 1.80-1.68 (m, 6H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 193.99, 133.04, 130.56, 128.65, 120.42, 92.28, 86.12, 47.01, 38.20, 36.59, 27.98.



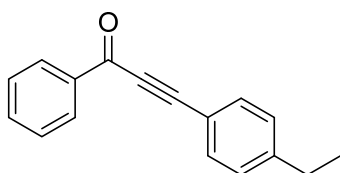
1,5-Diphenylpent-1-yn-3-one (3c'a)¹¹: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.060 mmol (30%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 7.58-7.52 (m, 2H), 7.46-7.42 (m, 1H), 7.37 (t, J = 7.5 Hz, 2H), 7.29 (t, J = 7.5 Hz, 2H), 7.23-7.18 (m, 3H), 3.07-3.03 (m, 2H), 3.01-2.98 (m, 2H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 186.99, 140.37, 133.18, 130.88, 128.76, 128.69, 128.48, 126.43, 120.02, 91.29, 87.88, 47.10, 30.10.



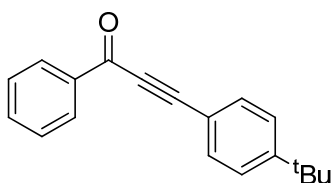
(E)-1,5-diphenylpent-1-en-4-yn-3-one (3d'a)¹⁷: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.140 mmol (70%). Light yellow solid. mp: 69-71 °C. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 7.92 (d, J = 16.1 Hz, 1H), 7.71-7.64 (m, 2H), 7.64-7.55 (m, 2H), 7.50-7.37 (m, 6H), 6.88 (d, J = 16.1 Hz, 1H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 178.28, 148.37, 134.17, 133.03, 131.26, 130.72, 129.18, 128.79, 128.77, 128.64, 120.31, 91.64, 86.74.



1-Phenyl-3-(p-tolyl)prop-2-yn-1-one (3ab)²: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.170 mmol (85%). Light yellow solid. mp: 65-67 °C. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.32-8.13 (m, 2H), 7.65-7.56 (m, 3H), 7.55-7.47 (m, 2H), 7.21 (d, J = 7.8 Hz, 2H), 2.39 (s, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 178.13, 141.66, 136.93, 134.11, 133.19, 129.58, 129.55, 128.65, 116.95, 93.94, 86.81, 21.83.

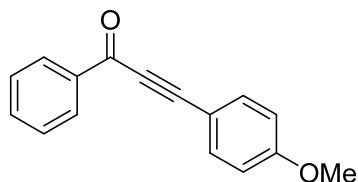


3-(4-Ethylphenyl)-1-phenylprop-2-yn-1-one (3ac)¹⁸: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.158 mmol (79%). Light yellow solid. mp: 75-77 °C. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.33-8.15 (m, 2H), 7.66-7.57 (m, 3H), 7.51 (dd, J = 8.3, 7.0 Hz, 2H), 7.24 (d, J = 8.0 Hz, 2H), 2.68 (q, J = 7.6 Hz, 2H), 1.25 (t, J = 7.6 Hz, 3H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 178.13, 147.83, 134.10, 133.30, 129.58, 128.65, 128.37, 117.19, 93.96, 86.80, 29.08, 15.25.

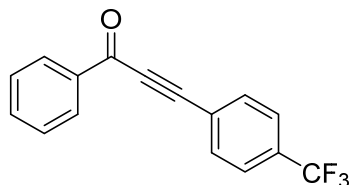


3-(4-(Tert-butyl)phenyl)-1-phenylprop-2-yn-1-one (3ad)¹⁹: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.150 mmol (75%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.31-8.12 (m, 2H), 7.70-7.56

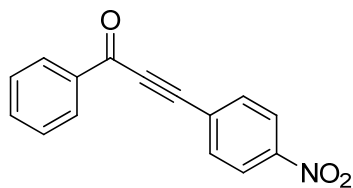
(m, 3H), 7.55-7.49 (m, 2H), 7.47-7.40 (m, 2H), 1.34 (s, 9H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 178.19, 154.66, 137.01, 134.12, 133.09, 129.63, 128.68, 125.85, 117.05, 93.93, 86.80, 35.17, 31.12.



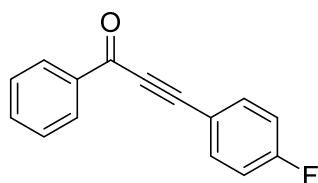
3-(4-Methoxyphenyl)-1-phenylprop-2-yn-1-one (3ae)²: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 35/1) afforded 0.156 mmol (78%). Light yellow solid. mp: 82-84 °C. TLC: R_f = 0.45 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.26-8.15 (m, 2H), 7.69-7.55 (m, 3H), 7.54-7.45 (m, 2H), 6.99-6.84 (m, 2H), 3.82 (s, 3H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 178.05, 161.81, 137.10, 135.18, 133.95, 129.50, 128.62, 114.50, 111.89, 95.41, 86.95, 55.46.



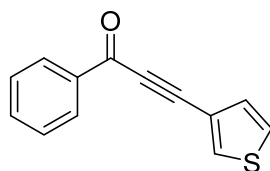
1-Phenyl-3-(4-(trifluoromethyl)phenyl)prop-2-yn-1-one (3af)²: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.080 mmol (40%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.25-8.16 (m, 2H), 7.82-7.73 (m, 2H), 7.71-7.60 (m, 3H), 7.56-7.47 (m, 2H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 177.71, 136.69, 134.54, 133.26, 132.32 (d, J = 32.9 Hz), 129.70, 128.84, 125.71 (q, J = 3.8 Hz), 122.96 (d, J = 166.0 Hz), 90.53, 88.20.



3-(4-Nitrophenyl)-1-phenylprop-2-yn-1-one (3ag)²⁰: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 35/1) afforded 0.068 mmol (34%). Light yellow solid. mp: 145-147 °C. TLC: R_f = 0.50 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.29 (d, J = 9.0 Hz, 2H), 8.22-8.17 (m, 2H), 7.83 (d, J = 9.0 Hz, 2H), 7.70-7.63 (m, 1H), 7.57-7.51 (m, 2H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 177.50, 148.66, 136.52, 134.80, 133.79, 129.77, 128.95, 126.91, 123.96, 89.98, 89.32.

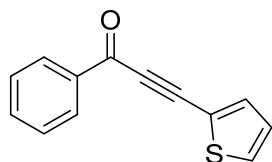


3-(4-Fluorophenyl)-1-phenylprop-2-yn-1-one (3ah)²: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.132 mmol (66%). Light yellow solid. mp: 80-82 °C. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.26-8.17 (m, 2H), 7.74-7.67 (m, 2H), 7.66-7.58 (m, 1H), 7.58-7.45 (m, 2H), 7.20-7.05 (m, 2H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 178.04, 164.13 (d, J = 253.9 Hz), 136.86, 135.50 (d, J = 8.9 Hz), 134.34, 129.67, 128.78, 116.53, 116.23, 92.14, 86.91.

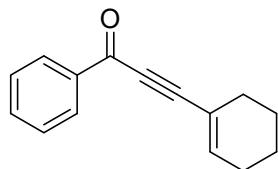


1-Phenyl-3-(thiophen-3-yl)prop-2-yn-1-one (3ai)²¹: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 30/1) afforded 0.136 mmol (68%). Brown oil. TLC: R_f = 0.40 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.32-8.12 (m, 2H), 7.84 (dd, J = 2.9, 1.3 Hz,

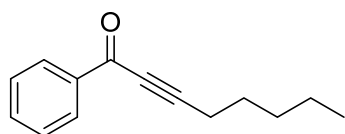
1H), 7.68-7.56 (m, 1H), 7.56-7.44 (m, 2H), 7.37 (dd, $J = 5.0, 2.9$ Hz, 1H), 7.31 (dd, $J = 5.0, 1.2$ Hz, 1H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 178.07, 136.95, 134.18, 134.00, 130.37, 129.62, 128.71, 126.38, 119.49, 88.61, 87.28.



1-Phenyl-3-(thiophen-2-yl)prop-2-yn-1-one (3aj)²²: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 30/1) afforded 0.150 mmol (75%). Brown oil. TLC: $R_f = 0.40$ (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.27-8.07 (m, 2H), 7.67-7.59 (m, 1H), 7.58 (dd, $J = 3.7, 1.2$ Hz, 1H), 7.55-7.46 (m, 3H), 7.10 (dd, $J = 5.1, 3.7$ Hz, 1H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 177.63, 136.83, 134.21, 131.78, 129.55, 128.74, 127.89, 119.97, 91.75, 87.14.

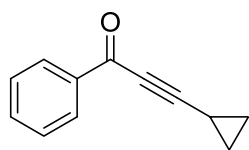


3-cyclohexenyl-1-phenylprop-2-yn-1-one (3ak)²³: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.110 mmol (55%). Light yellow oil. TLC: $R_f = 0.55$ (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.13 (d, $J = 7.6$ Hz, 2H), 7.58 (t, $J = 7.3$ Hz, 1H), 7.46 (t, $J = 7.5$ Hz, 2H), 6.63-6.53 (m, 1H), 2.30-2.16 (m, 4H), 1.73-1.56 (m, 4H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 178.28, 142.83, 137.08, 133.91, 129.52, 128.57, 119.19, 95.86, 85.26, 28.45, 26.25, 22.01, 21.16.

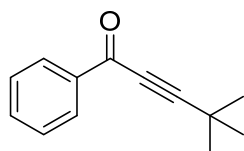


1-Phenyl-oct-2-yn-1-one (3al)²⁴: The general procedure was followed, and flash

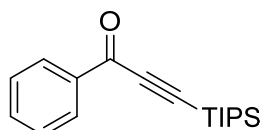
chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.124 mmol (62%). Light yellow oil. TLC: R_f = 0.65 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.13 (d, J = 7.1 Hz, 2H), 7.58 (t, J = 7.4 Hz, 1H), 7.46 (t, J = 7.5 Hz, 2H), 2.48 (t, J = 7.1 Hz, 2H), 1.72-1.61 (m, 2H), 1.49-1.32 (m, 4H), 0.92 (t, J = 7.1 Hz, 3H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 178.33, 137.00, 133.95, 129.62, 128.56, 97.00, 79.75, 31.19, 27.59, 22.21, 19.26, 14.00.



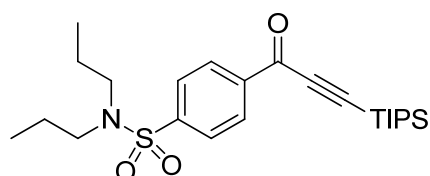
3-Cyclopropyl-1-phenylprop-2-yn-1-one (3am)²: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.100 mmol (50%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.09 (d, J = 7.1 Hz, 2H), 7.57 (t, J = 7.4 Hz, 1H), 7.45 (t, J = 7.5 Hz, 2H), 1.60-1.44 (m, 1H), 1.10-0.95 (m, 4H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 178.04, 136.91, 133.88, 129.49, 128.52, 101.27, 75.57, 10.01, 0.08.



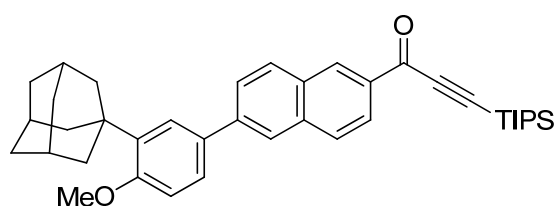
4,4-Dimethyl-1-phenylpent-2-yn-1-one (3an)²⁵: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.086 mmol (43%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ^1H NMR (300 MHz, Chloroform-*d*) δ 8.12 (d, J = 8.2 Hz, 2H), 7.59 (t, J = 7.4 Hz, 1H), 7.47 (t, J = 7.7 Hz, 2H), 1.38 (s, 9H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 178.49, 137.05, 133.94, 129.60, 128.57, 104.09, 78.16, 30.25, 28.13.



1-Phenyl-3-(triisopropylsilyl)prop-2-yn-1-one (3a'o)¹¹: The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.120 mmol (60%). Light yellow oil. TLC: R_f = 0.60 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.18 (d, J = 7.6 Hz, 2H), 7.61 (t, J = 7.4 Hz, 1H), 7.48 (t, J = 7.6 Hz, 2H), 1.22-1.08 (m, 21H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 177.60, 136.77, 134.18, 129.62, 128.67, 103.09, 98.07, 18.65, 11.17.



N,N-Dipropyl-4-(3-(triisopropylsilyl)propioloyl)benzenesulfonamide (3e'o): The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 30/1) afforded 0.098 mmol (49%). Colorless oil. TLC: R_f = 0.35 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.27 (d, J = 8.4 Hz, 2H), 7.92 (d, J = 8.3 Hz, 2H), 3.22-3.01 (m, 4H), 1.65-1.47 (m, 6H), 1.24-1.13 (m, 19H), 0.88 (t, J = 7.4 Hz, 6H). ¹³C NMR (75 MHz, Chloroform-*d*) δ 176.17, 145.24, 139.35, 130.13, 127.39, 102.74, 100.35, 50.17, 22.16, 18.71, 11.26. IR (cm⁻¹) 2943, 2148, 1649. HRMS (MALDI) m/z [M+H]⁺ calcd for C₂₄H₃₉NO₃SSi: 450.2498, found: 450.2488.



1-(6-(3-((3r,5r,7r)-Adamantan-1-yl)-4-methoxyphenyl)naphthalen-2-yl)-3-(triisopropylsilyl)prop-2-yn-1-one (3f'o): The general procedure was followed, and flash chromatography (petroleum ether/ethyl acetate = 40/1) afforded 0.142 mmol (71%). Light yellow oil. TLC: R_f = 0.50 (petroleum ether/ethyl acetate = 20/1). ¹H NMR (300 MHz, Chloroform-*d*) δ 8.80 (s, 1H), 8.18 (dd, J = 8.6, 1.6 Hz, 1H), 8.09-7.97 (m, 2H), 7.94 (d, J = 8.6 Hz, 1H), 7.83 (dd, J = 8.5, 1.6 Hz, 1H), 7.62 (d, J = 2.2 Hz, 1H), 7.56

(dd, $J = 8.4, 2.3$ Hz, 1H), 7.01 (d, $J = 8.5$ Hz, 1H), 3.91 (s, 3H), 2.25-2.17 (m, 6H), 2.12 (s, 3H), 1.82 (s, 6H), 1.27-1.20 (m, 21H). ^{13}C NMR (75 MHz, Chloroform- d) δ 177.50, 159.25, 142.37, 139.25, 136.76, 134.22, 132.96, 132.53, 131.29, 130.37, 128.66, 126.86, 126.14, 125.91, 124.98, 124.35, 112.32, 103.51, 97.92, 55.32, 40.78, 37.39, 37.29, 29.28, 18.78, 11.36. IR (cm^{-1}) 2903, 2141, 1623. HRMS (MALDI) m/z $[\text{M}+\text{H}]^+$ calcd for $\text{C}_{39}\text{H}_{48}\text{O}_2\text{Si}$: 577.3502, found: 577.3502.

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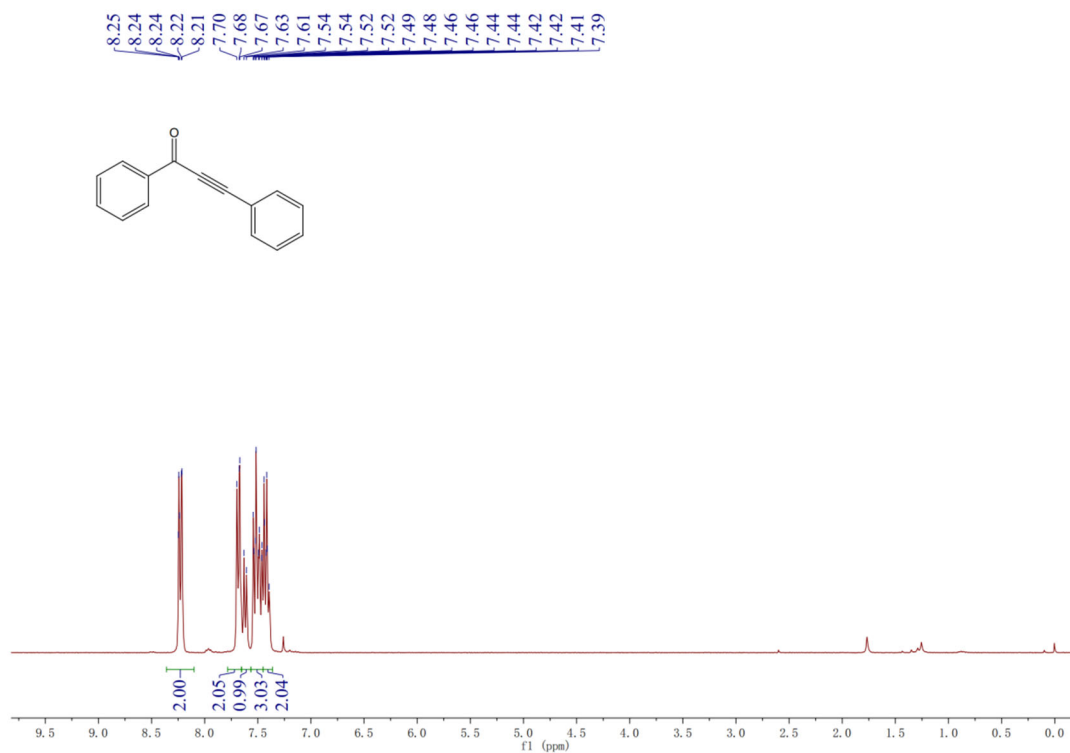
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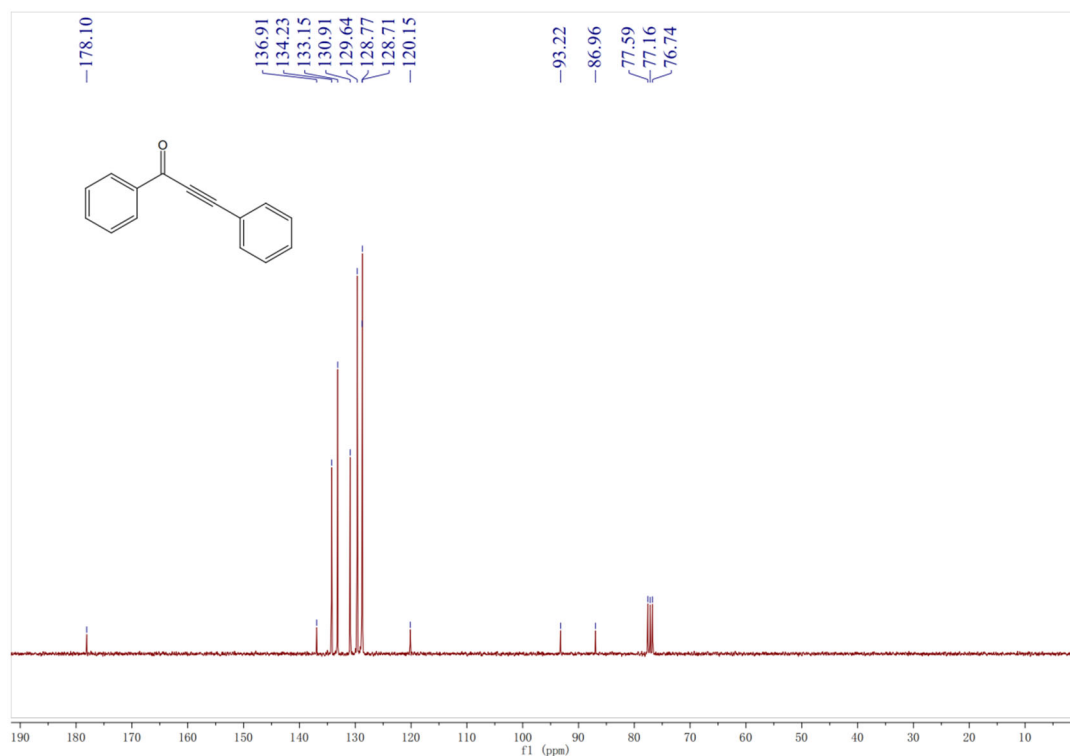
Conditions, *Angew. Chem. Int. Ed.*, 2015, **54**, 7872-7876.

7. Copies of ^1H NMR, ^{19}F NMR and ^{13}C NMR of compounds

1,3-Diphenylprop-2-yn-1-one (3aa) ^1H NMR (300 MHz, CDCl_3)



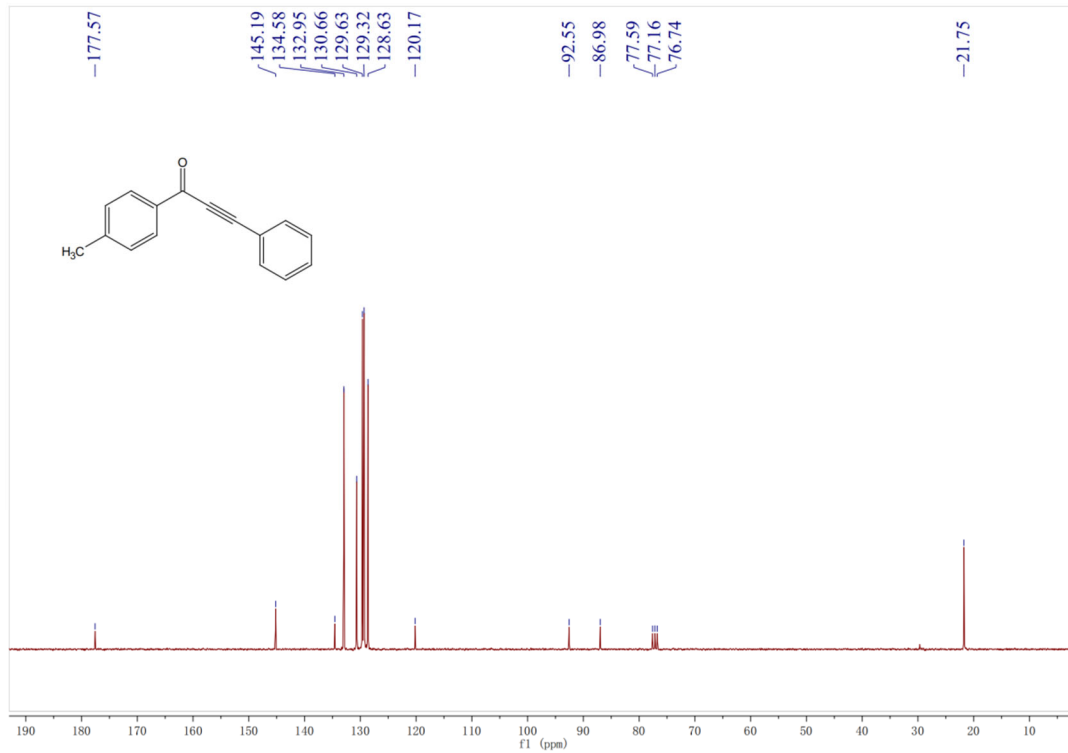
1,3-Diphenylprop-2-yn-1-one (3aa) ^{13}C NMR (75 MHz, CDCl_3)



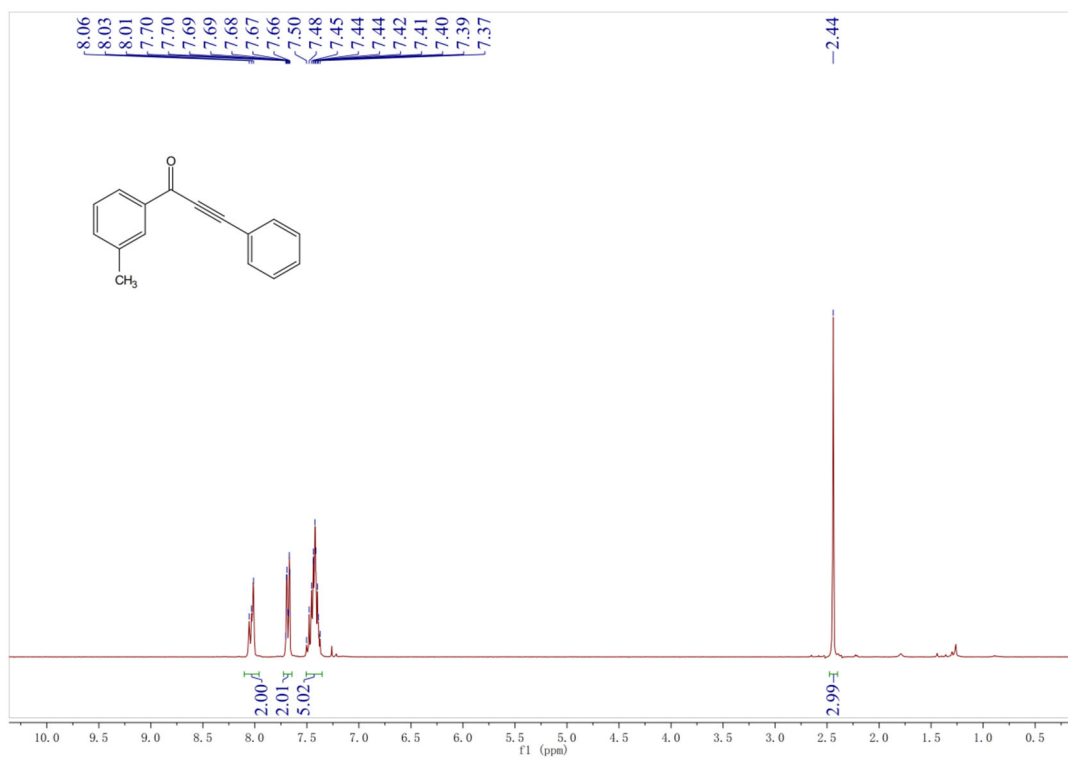
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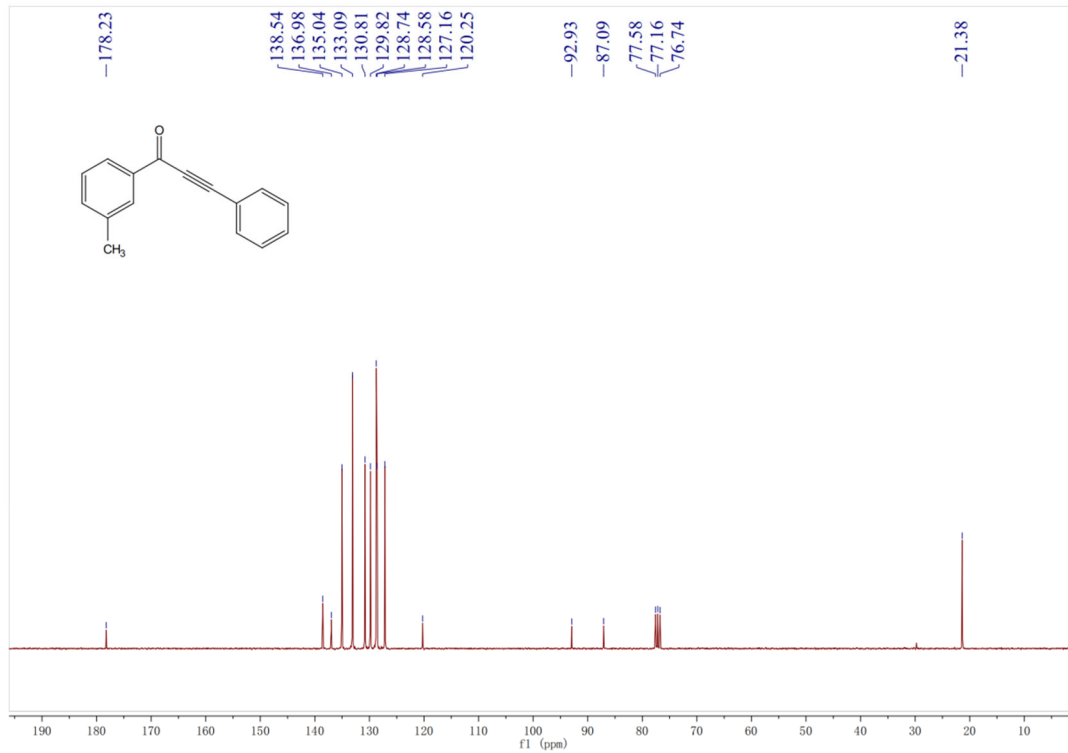
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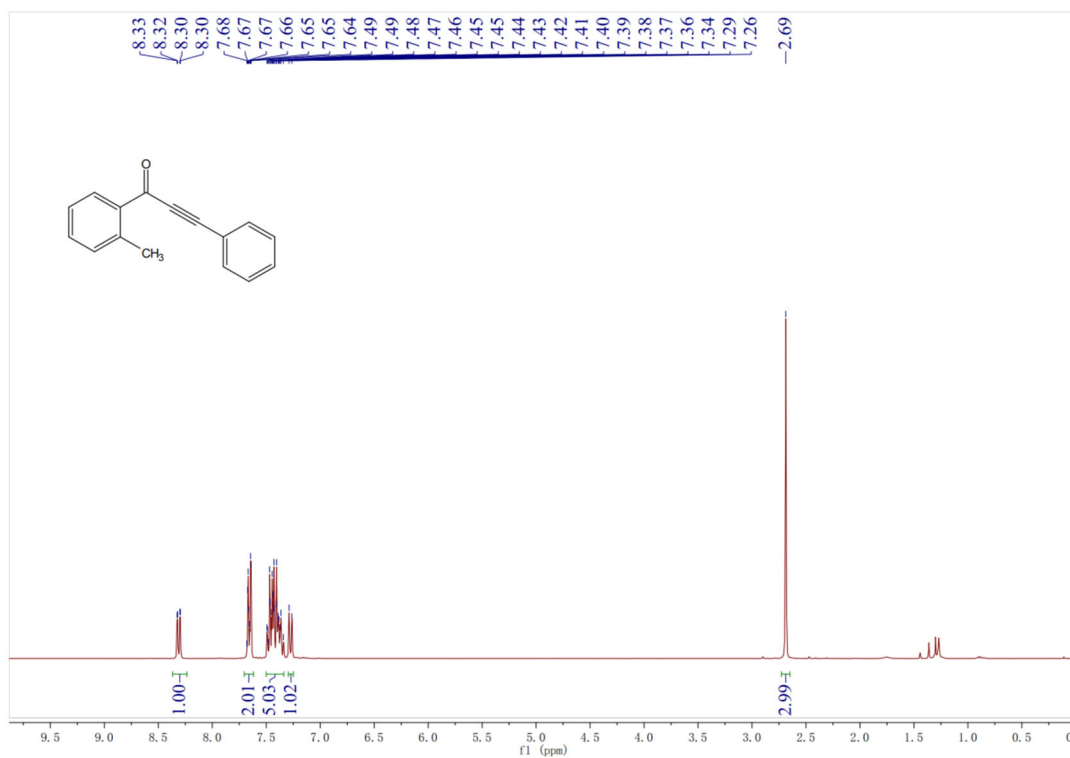
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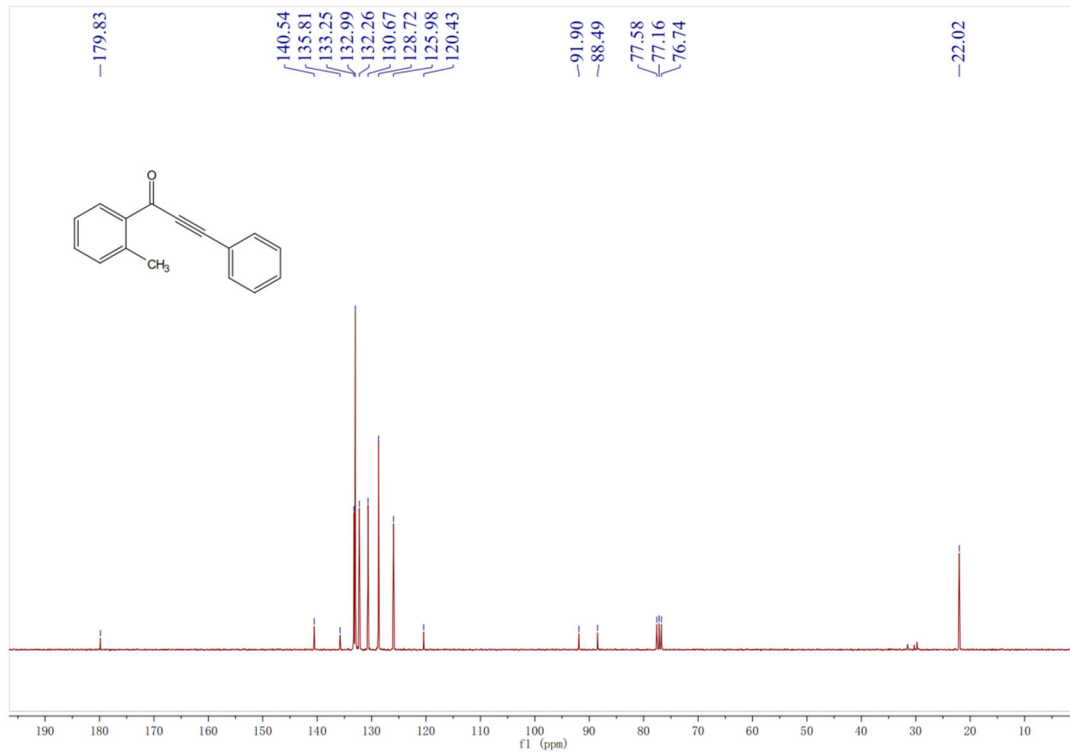
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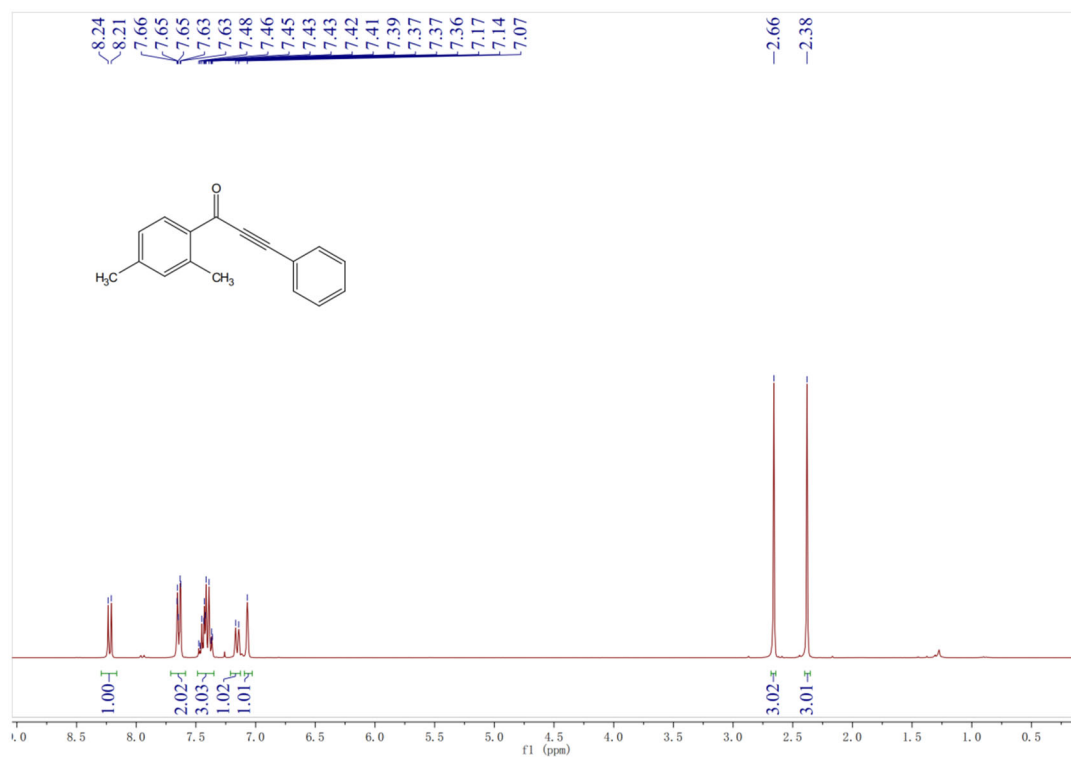
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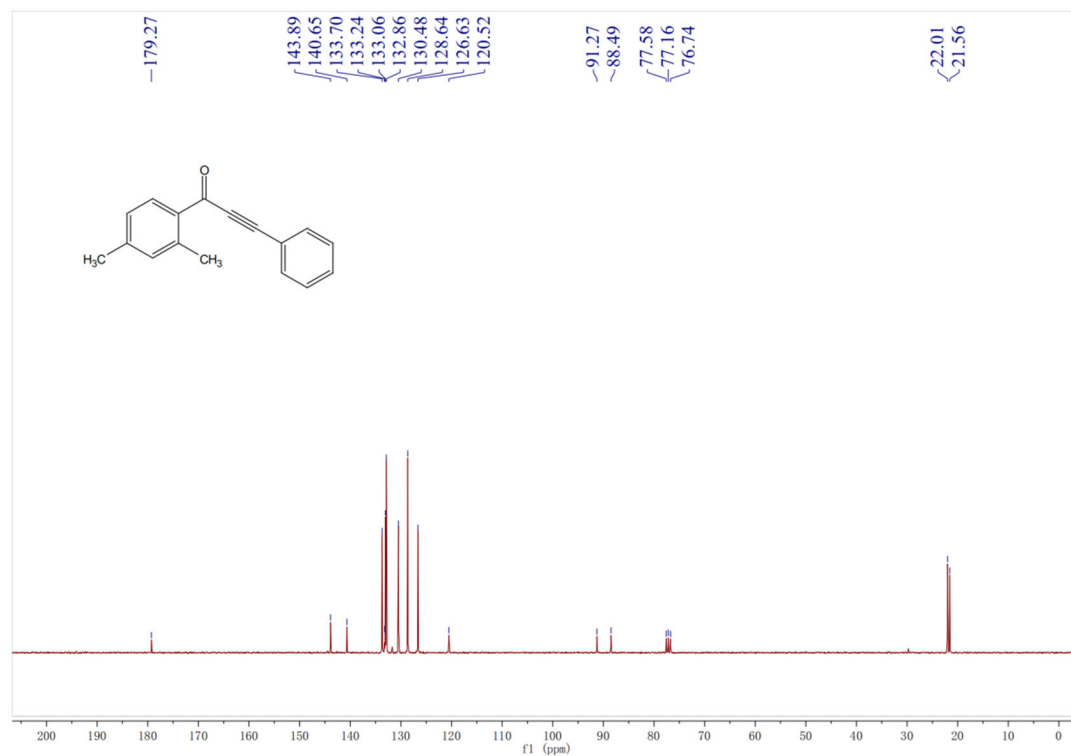
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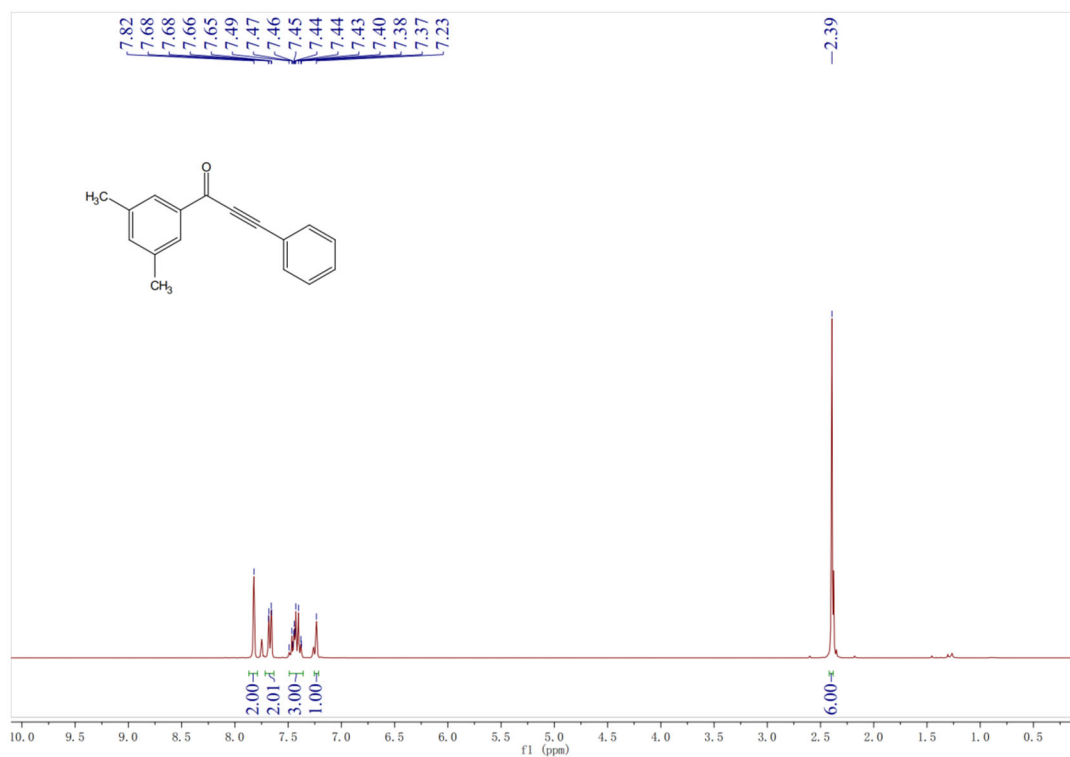
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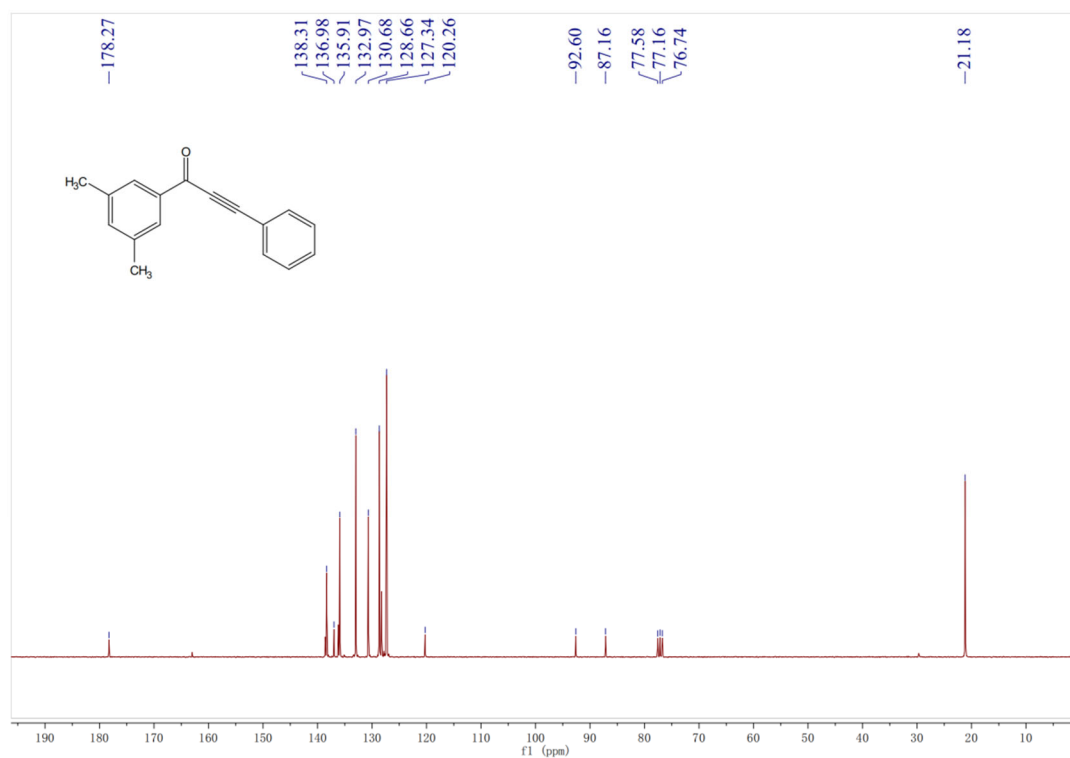
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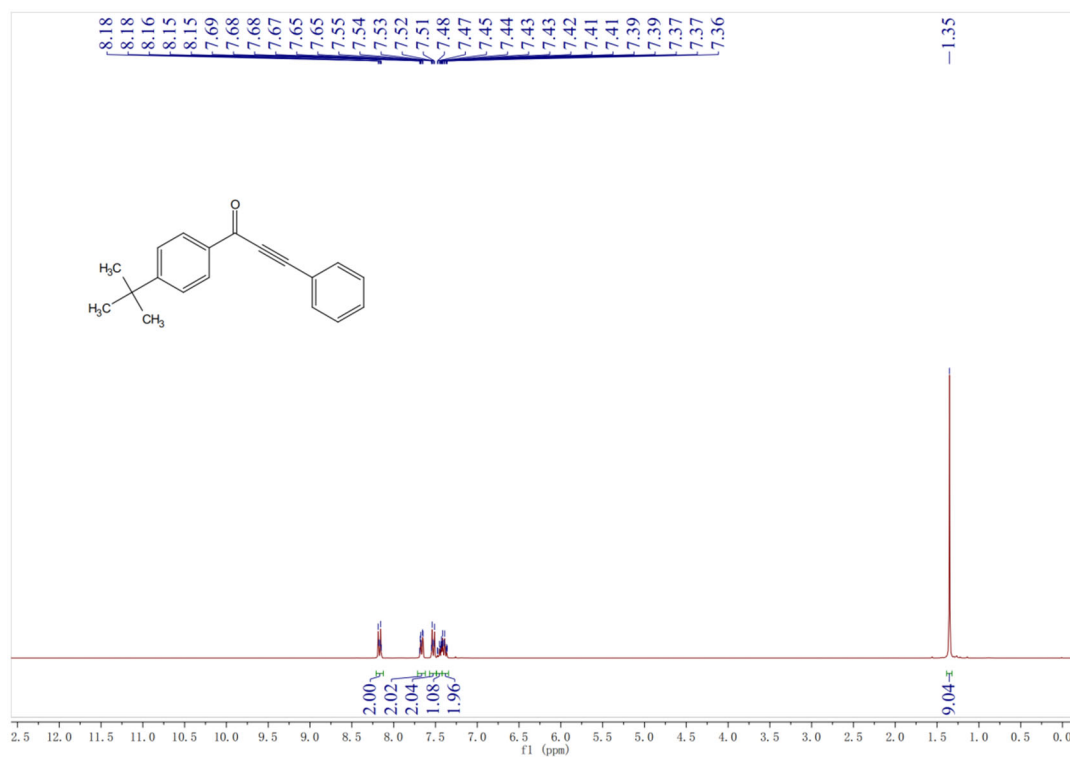
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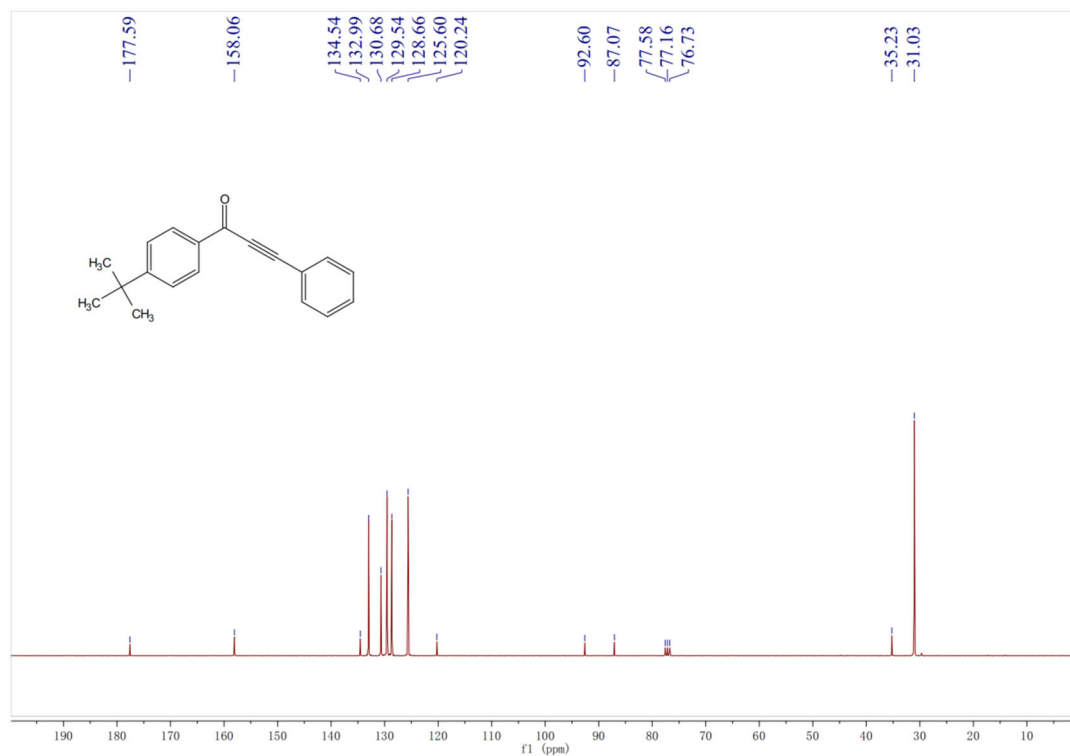
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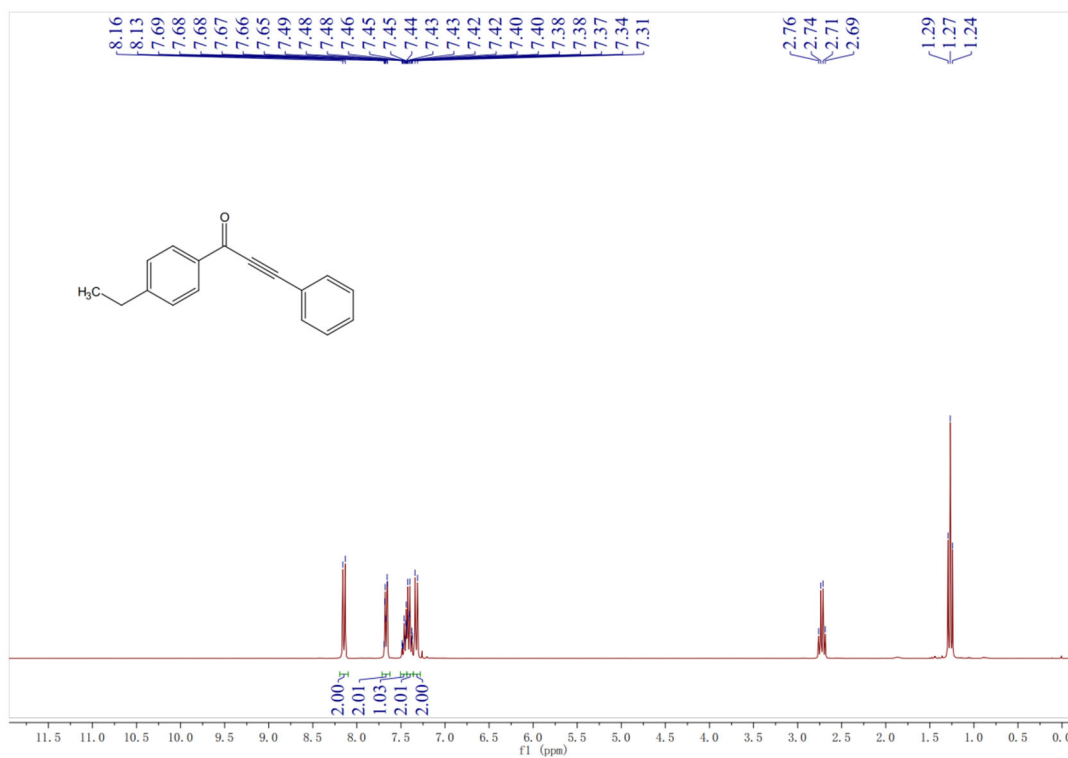
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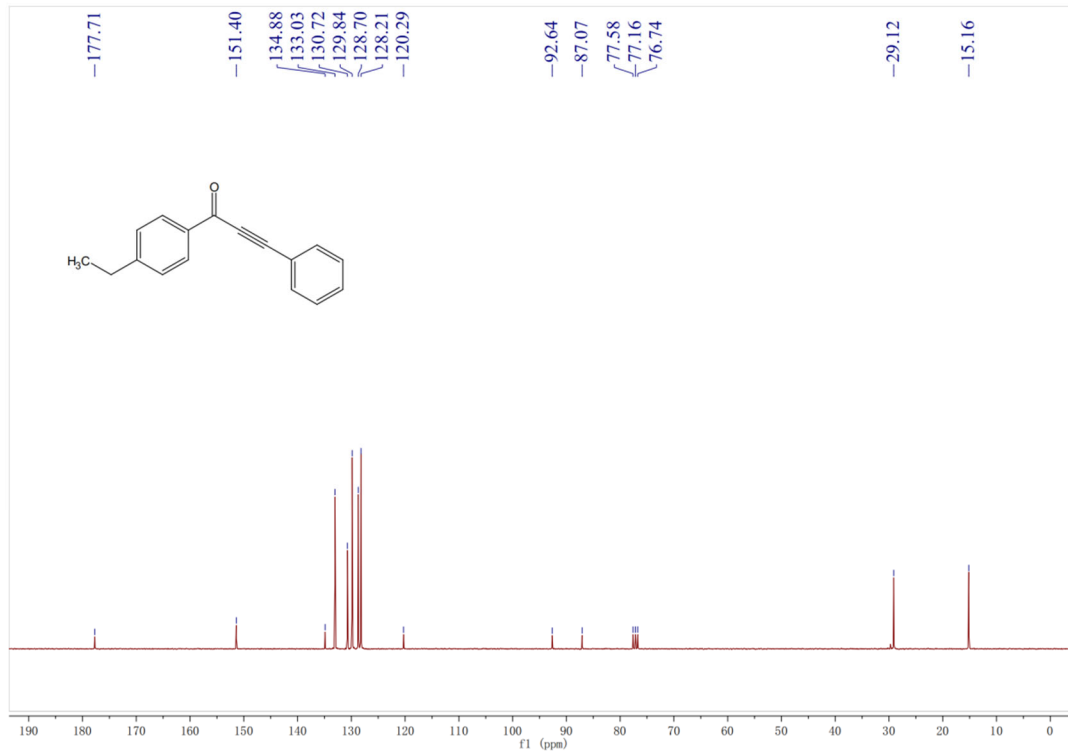
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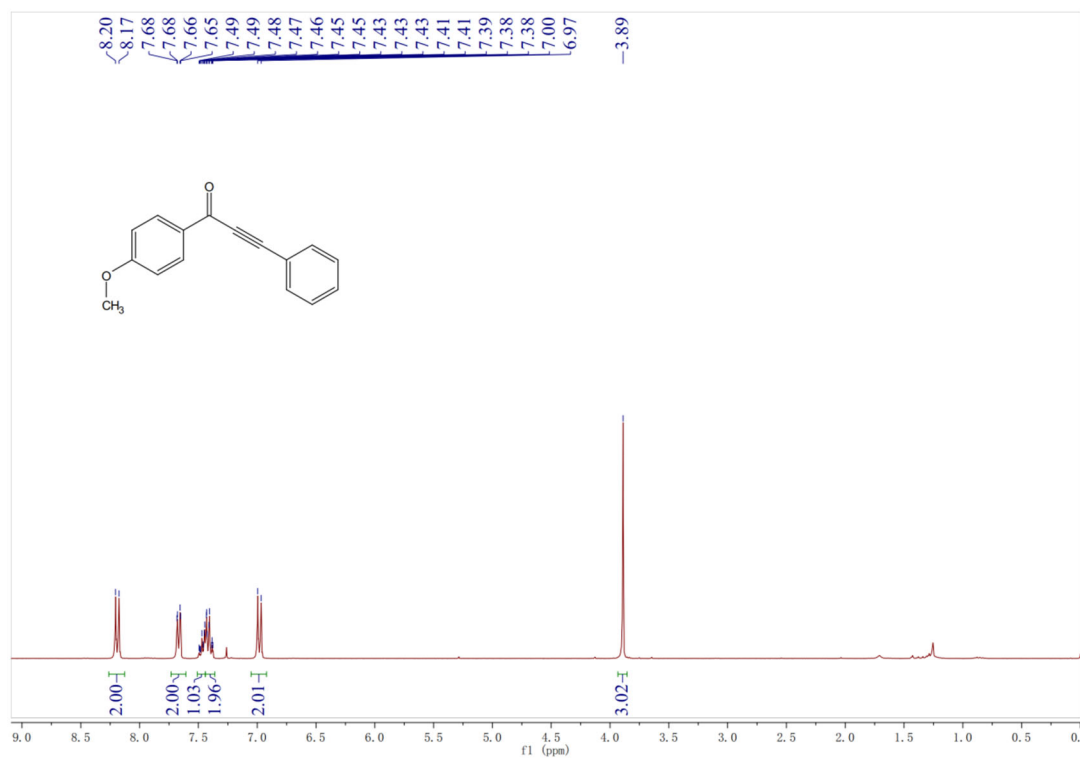
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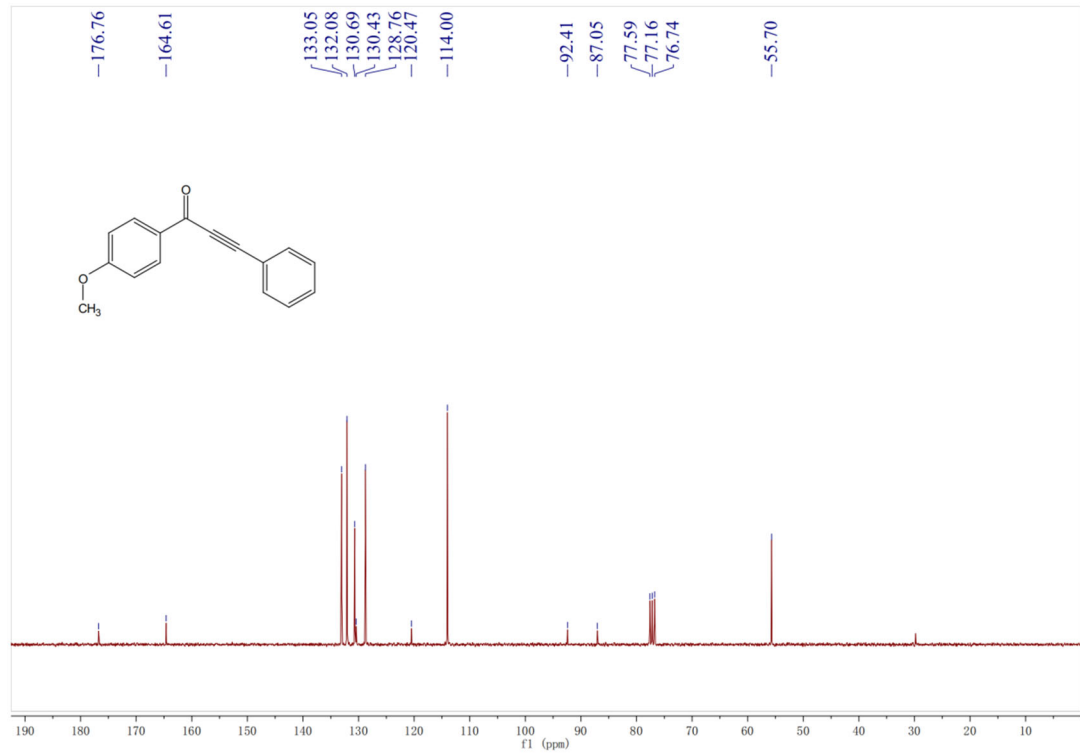
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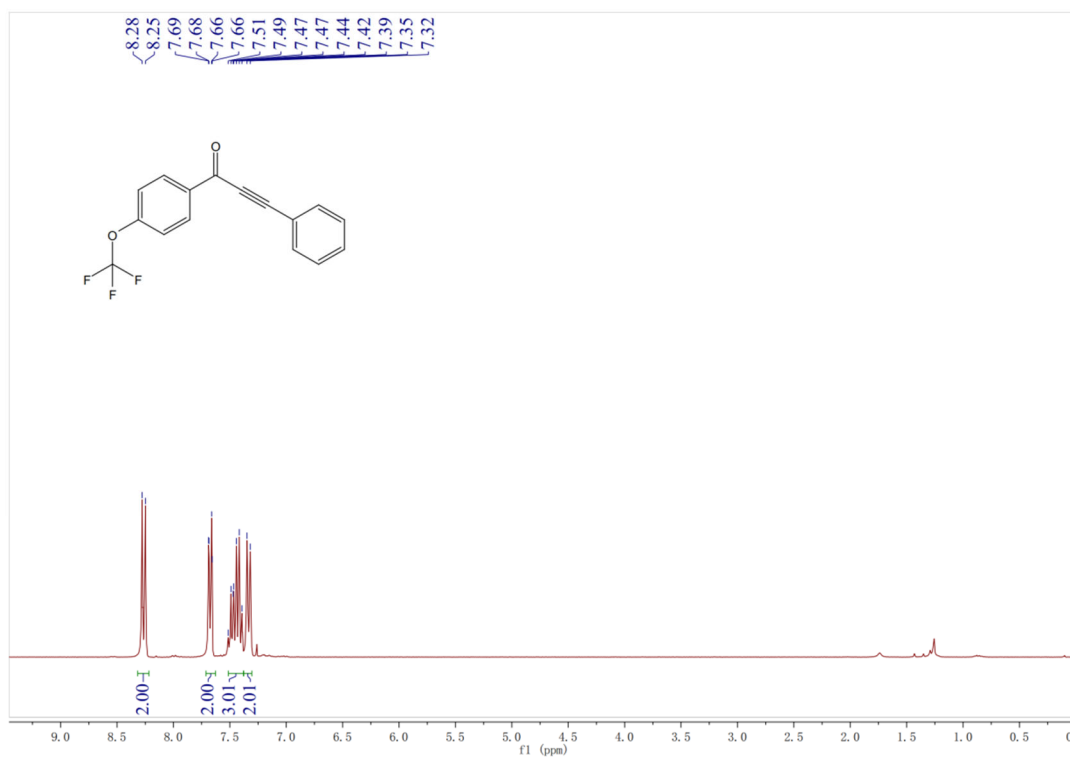
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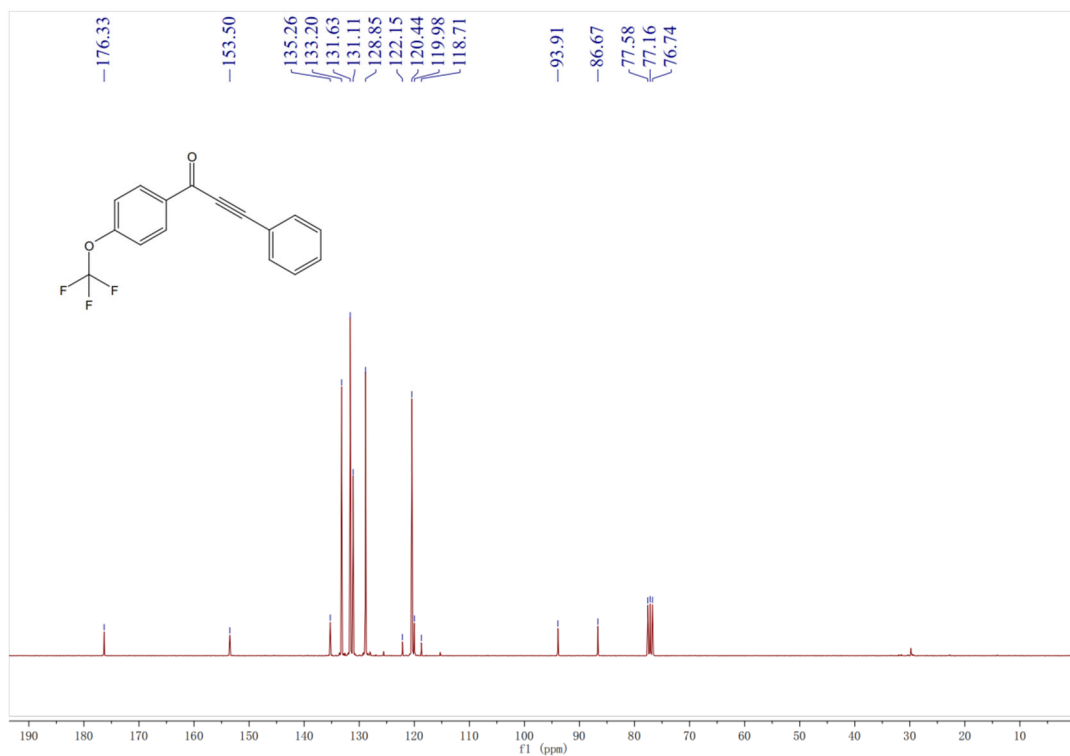
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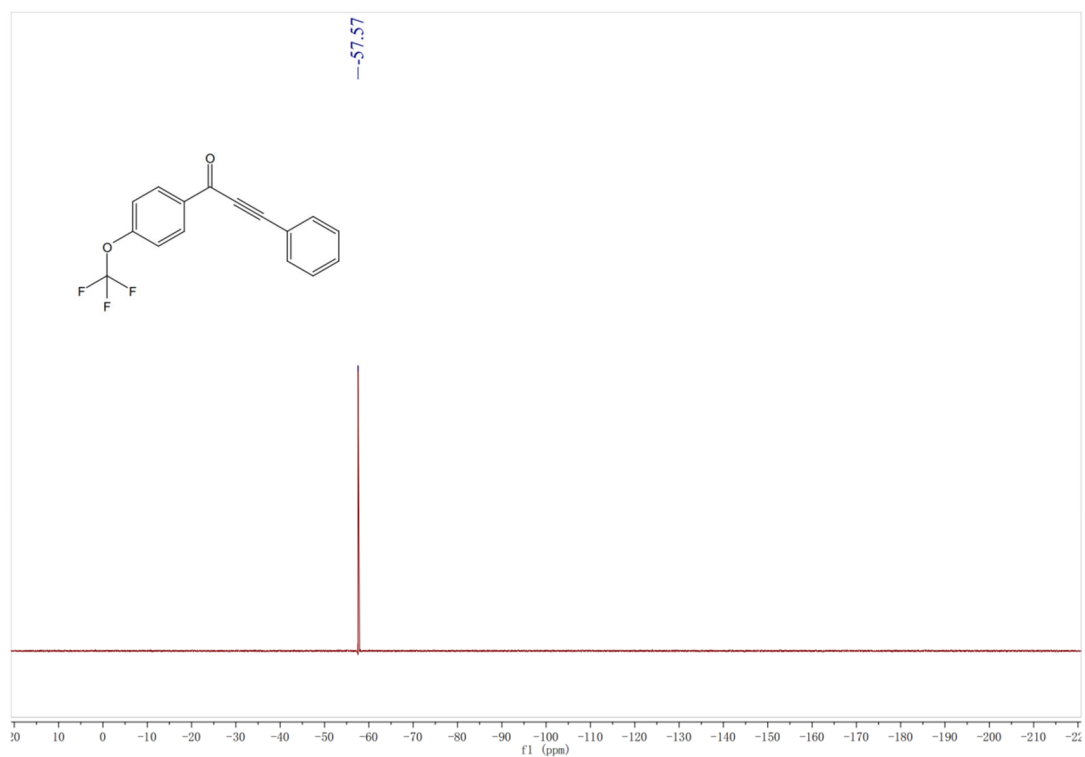
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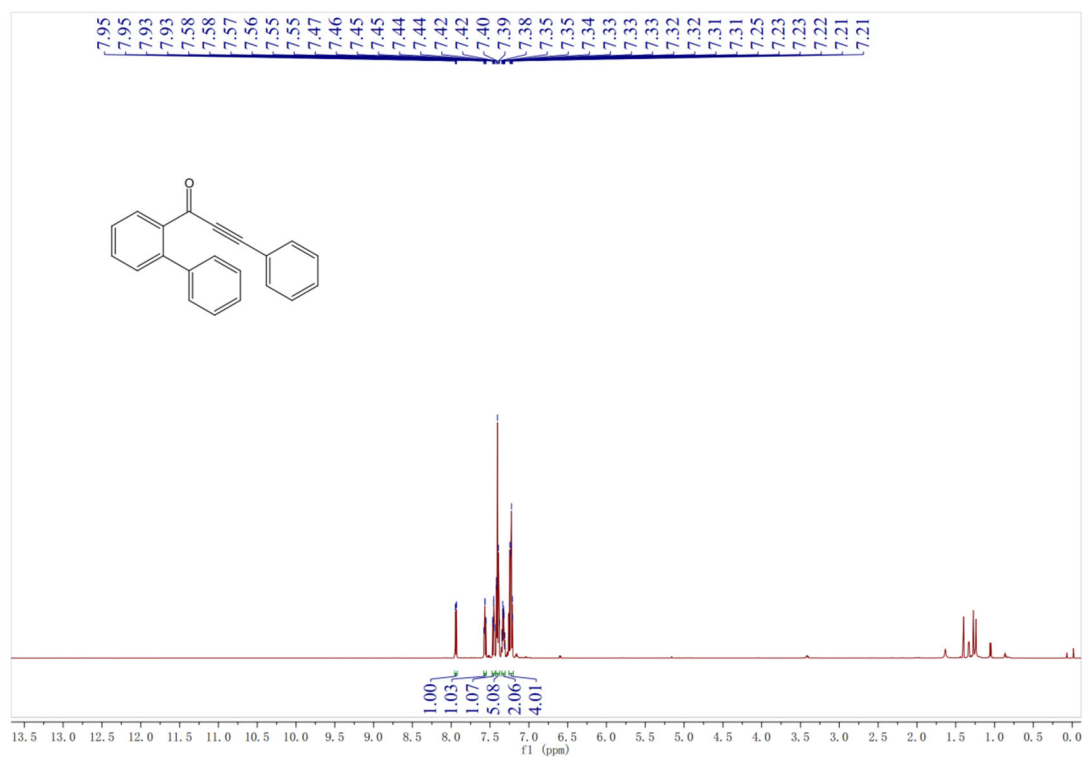
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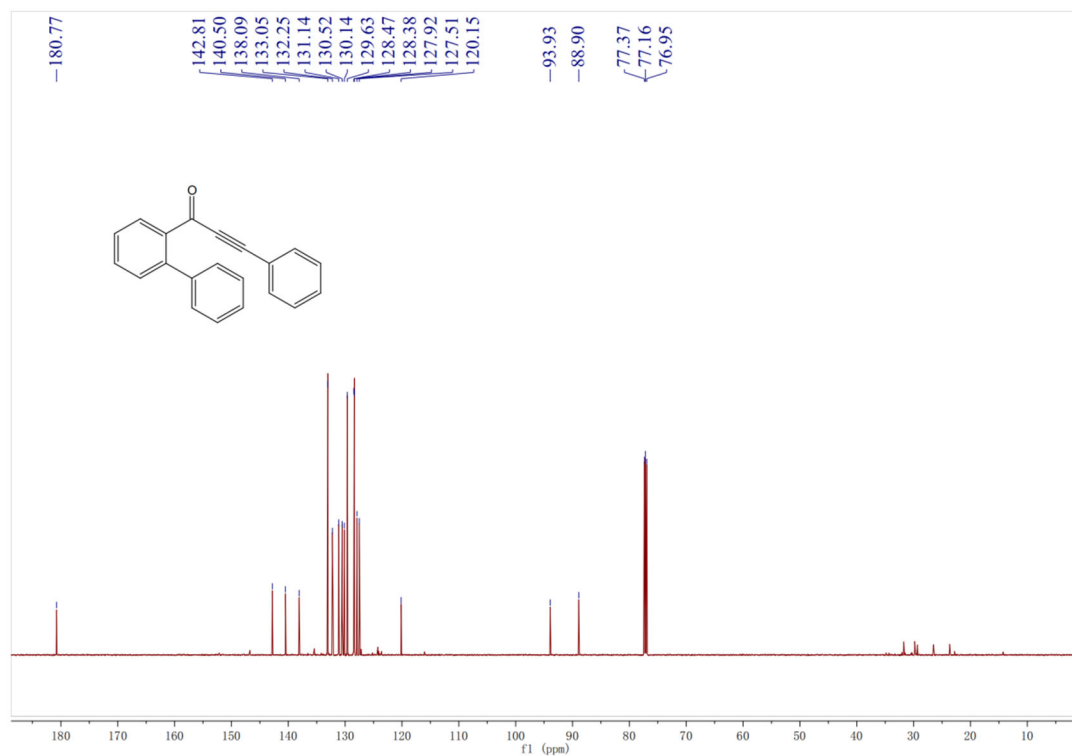
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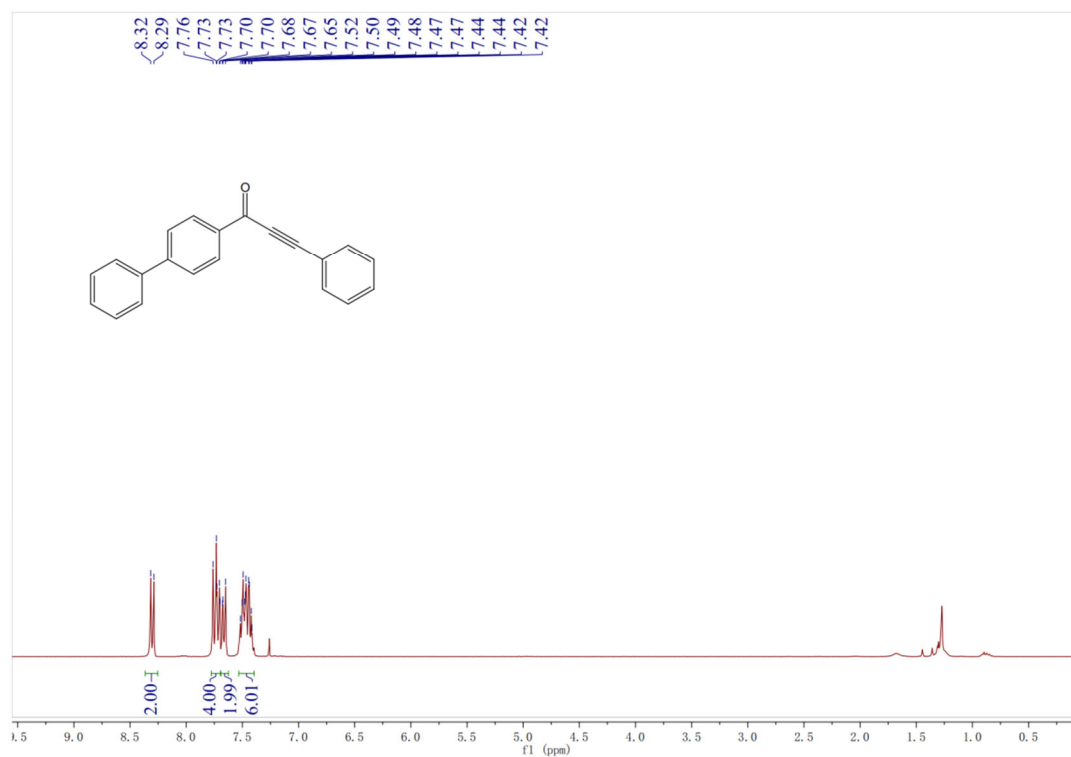
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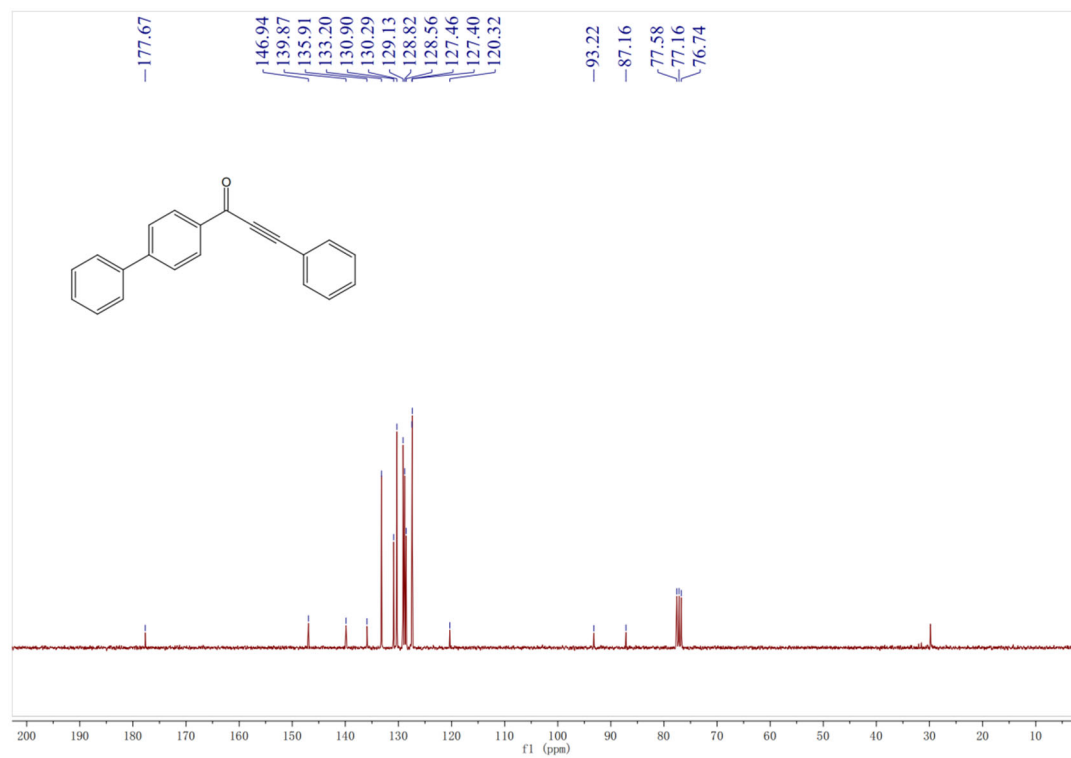
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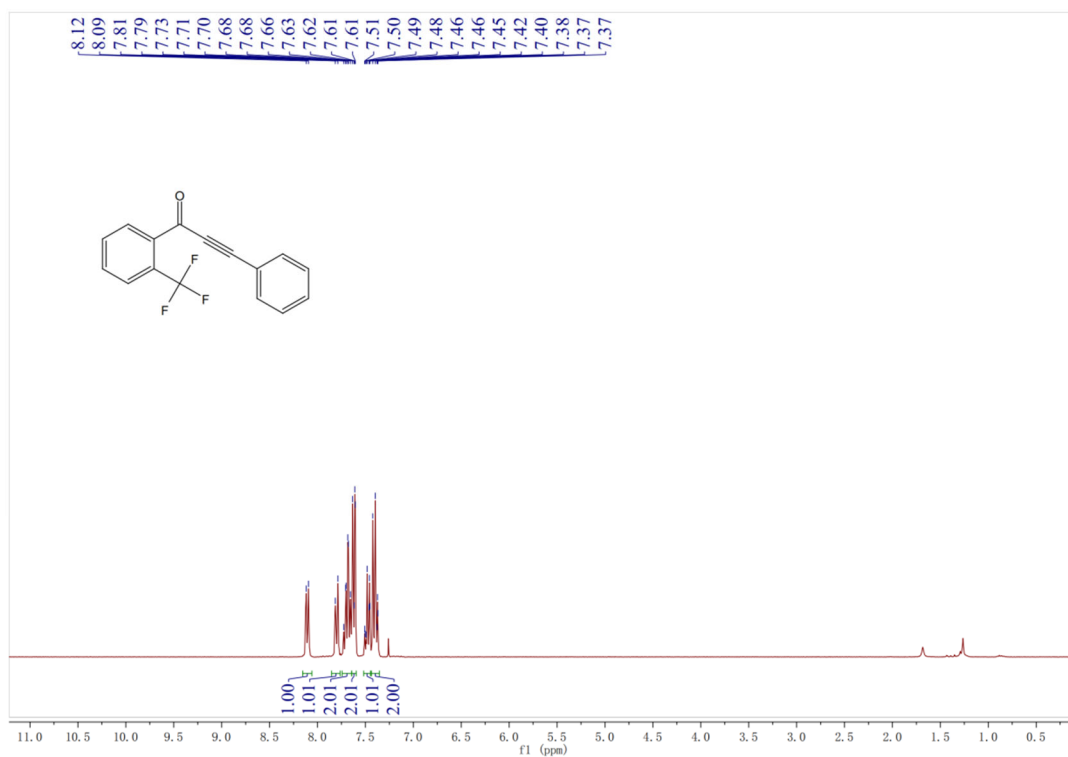
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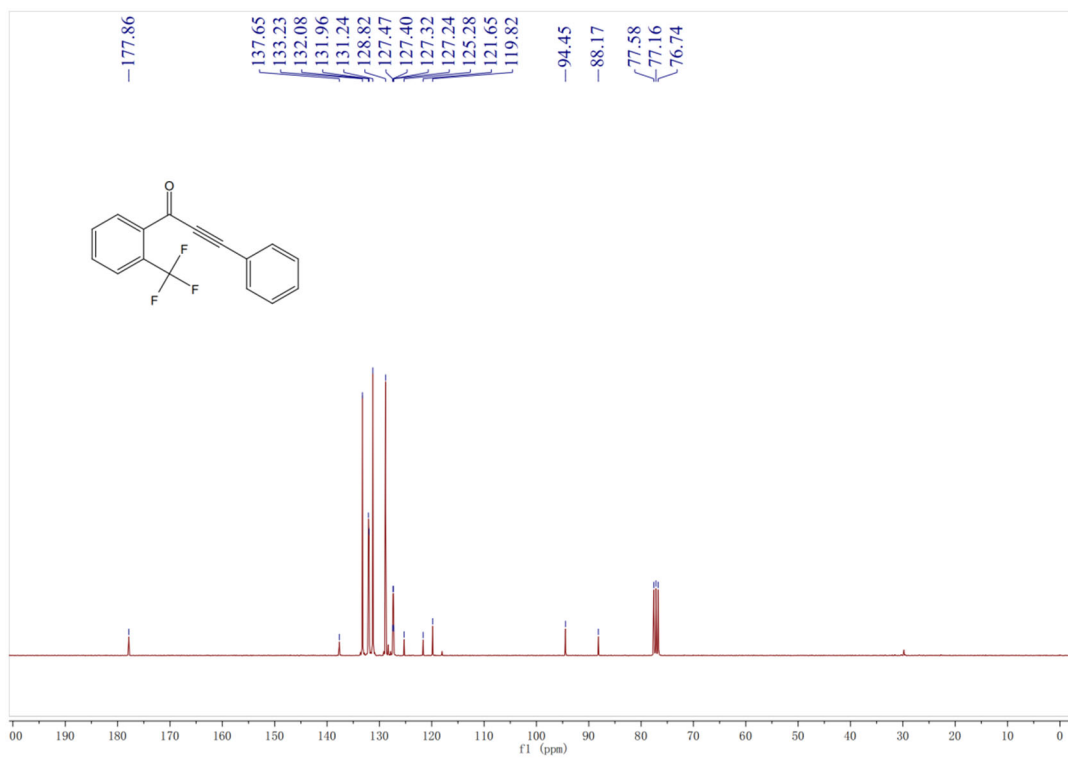
1-([1,1'-Biphenyl]-4-yl)-3-phenylprop-2-yn-1-one (3la) ¹³C NMR (75 MHz, CDCl₃)



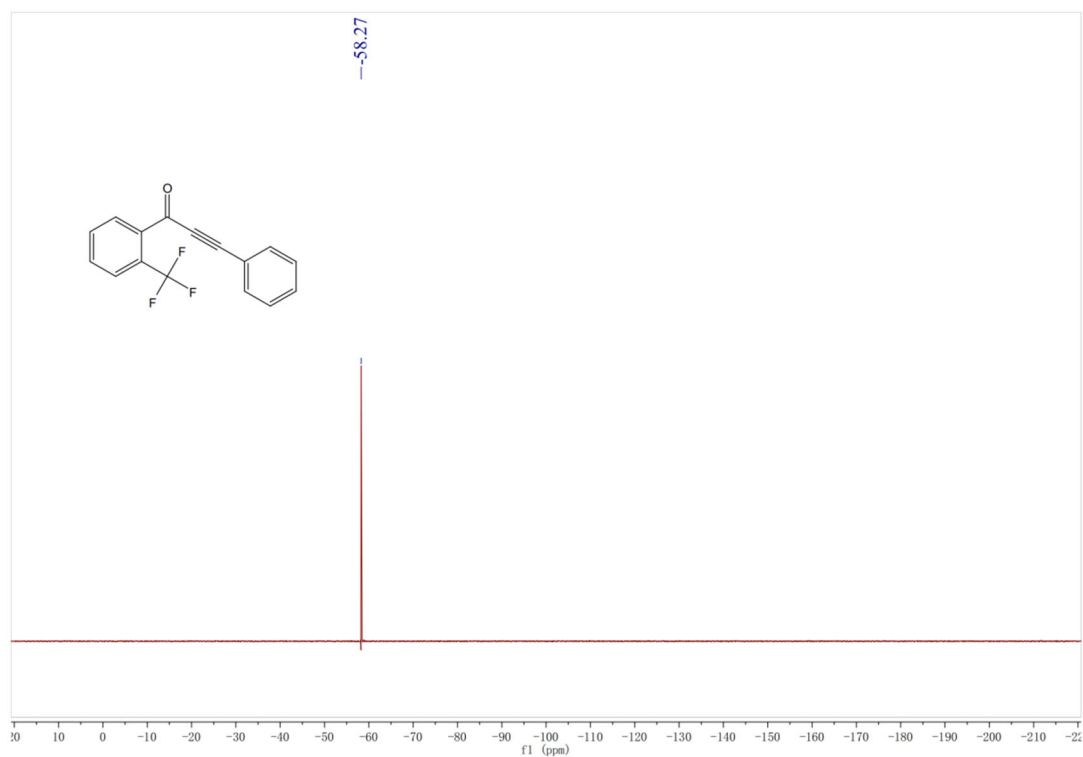
3-Phenyl-1-[2-(trifluoromethyl)phenyl]-2-propyn-1-one (3ma) ¹H NMR (300 MHz, CDCl₃)



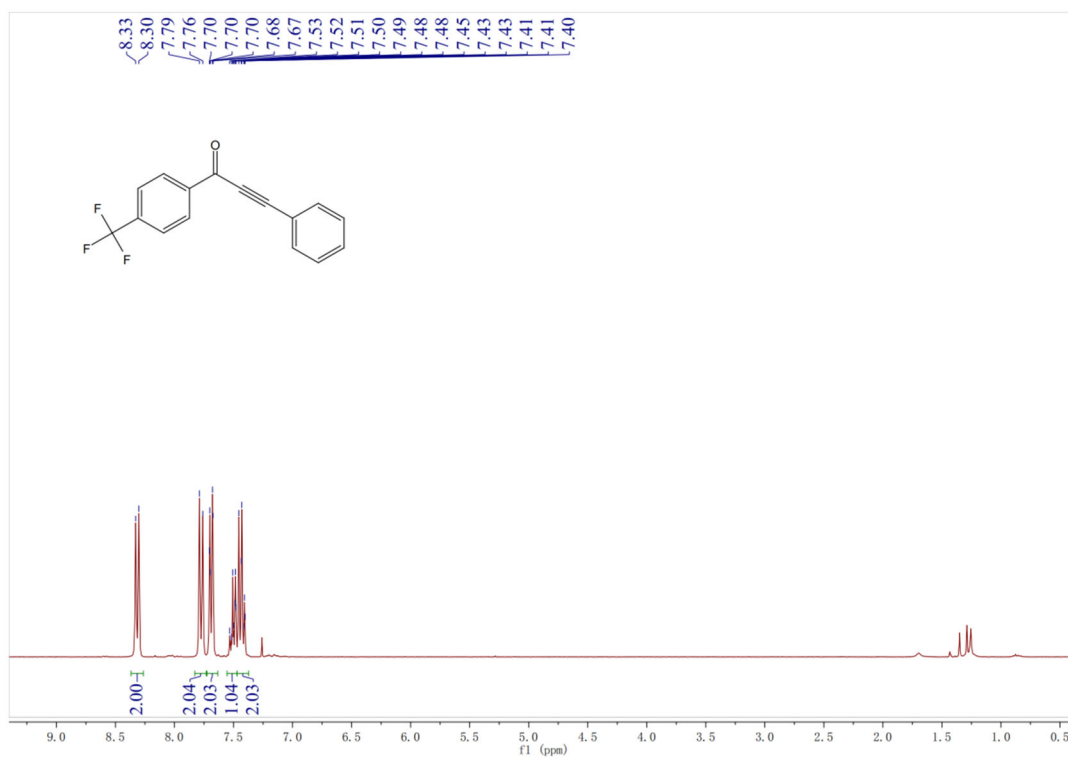
3-Phenyl-1-[2-(trifluoromethyl)phenyl]-2-propyn-1-one (3ma) ¹³C NMR (75 MHz, CDCl₃)



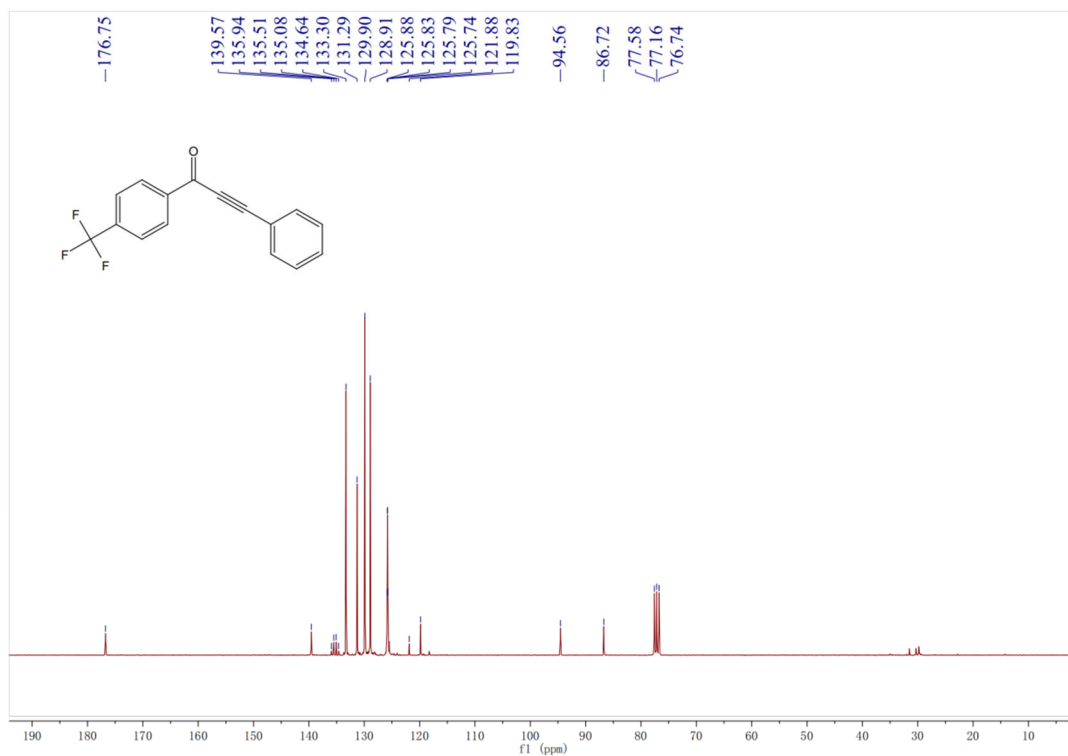
3-Phenyl-1-[2-(trifluoromethyl)phenyl]-2-propyn-1-one (3ma) ¹⁹F NMR (376 MHz, CDCl₃)



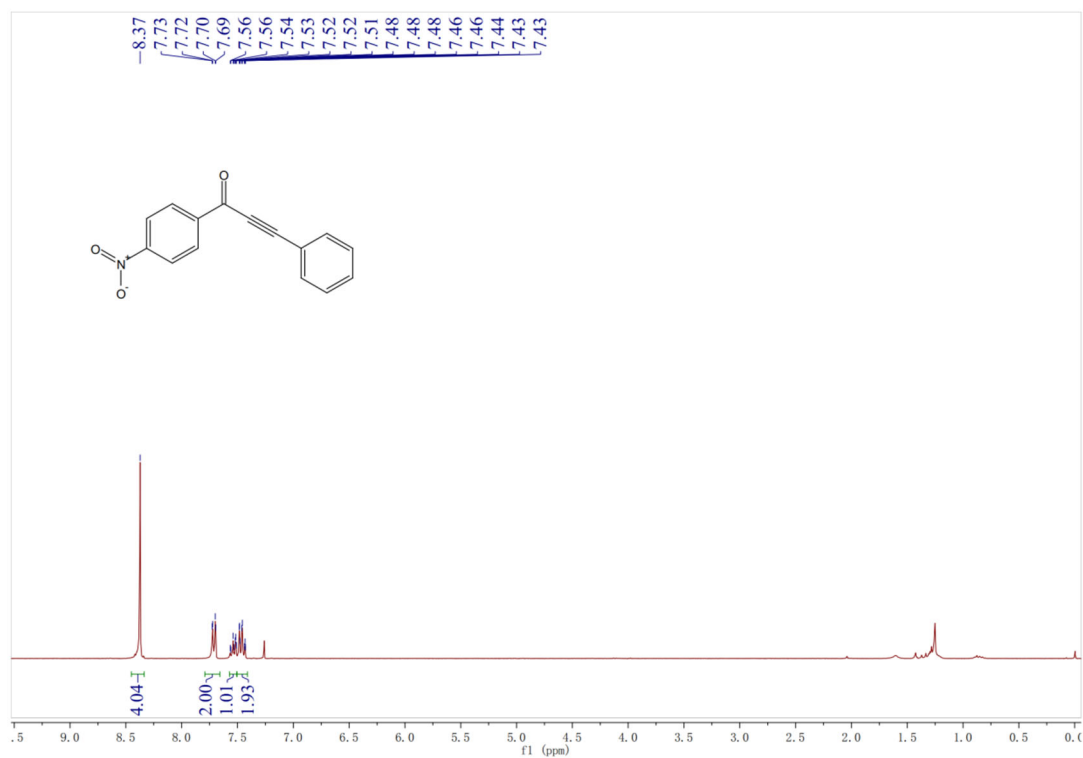
3-Phenyl-1-(4-(trifluoromethyl)phenyl)prop-2-yn-1-one (3na) ¹H NMR (300 MHz, CDCl₃)



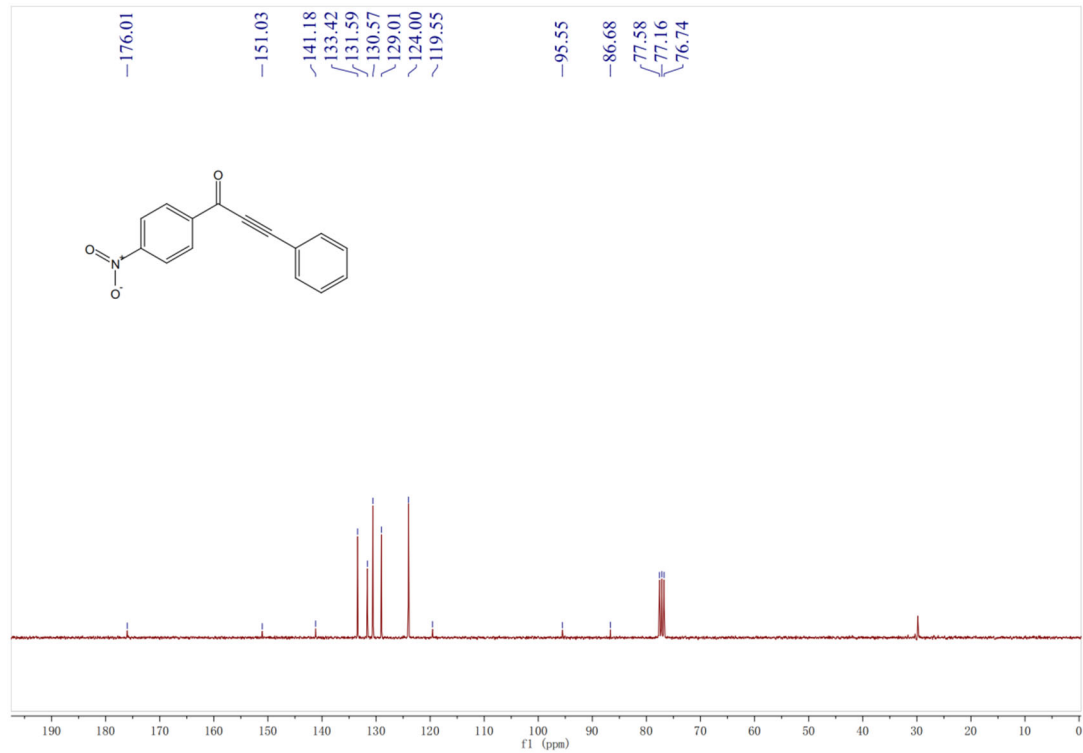
3-Phenyl-1-(4-(trifluoromethyl)phenyl)prop-2-yn-1-one (3na) ¹³C NMR (75 MHz, CDCl₃)



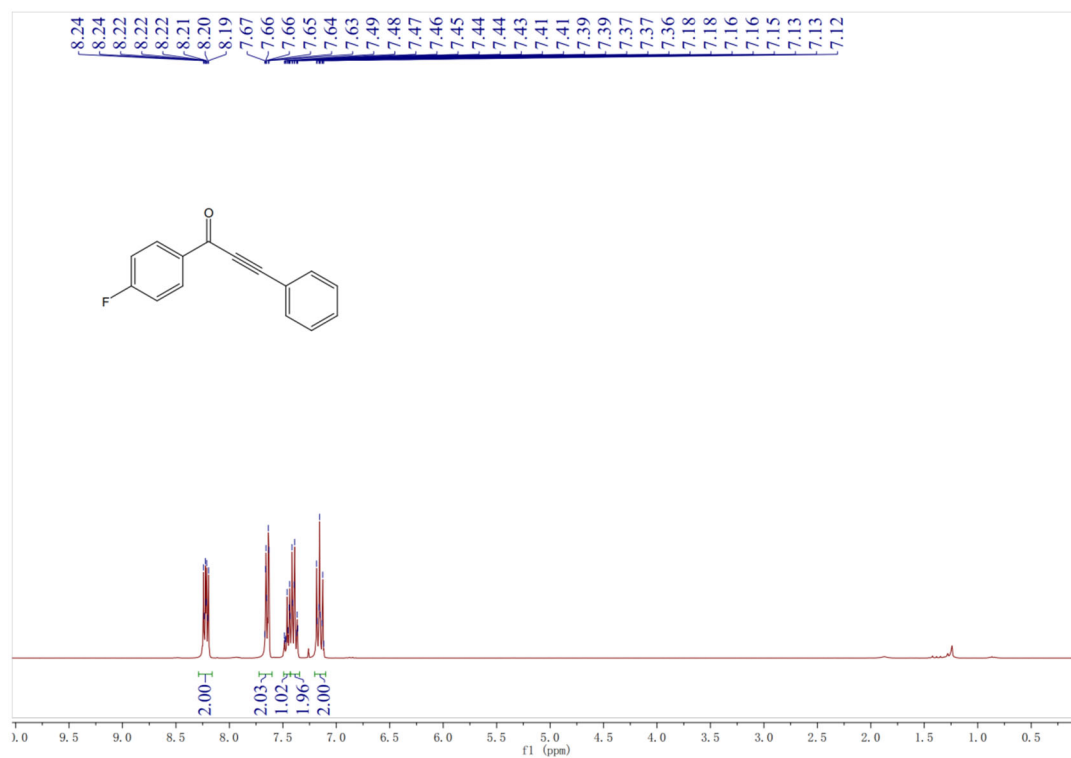
1-(4-Nitrophenyl)-3-phenylprop-2-yn-1-one (30a) ¹H NMR (300 MHz, CDCl₃)



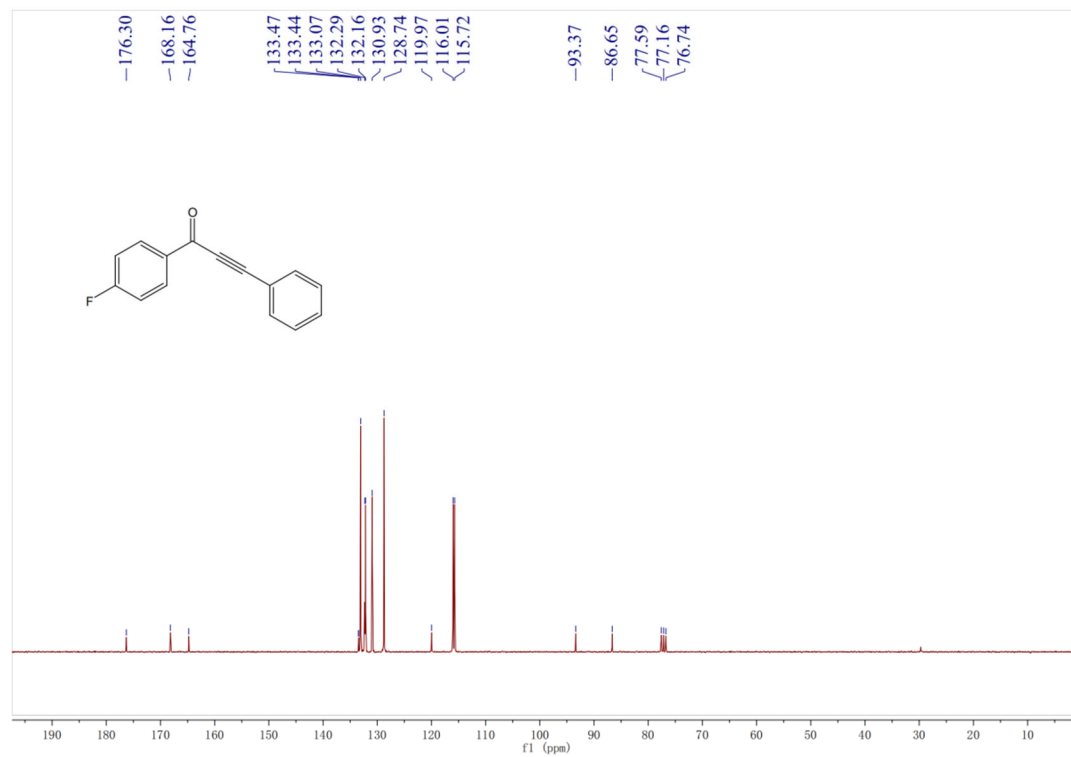
1-(4-Nitrophenyl)-3-phenylprop-2-yn-1-one (30a) ¹³C NMR (75 MHz, CDCl₃)



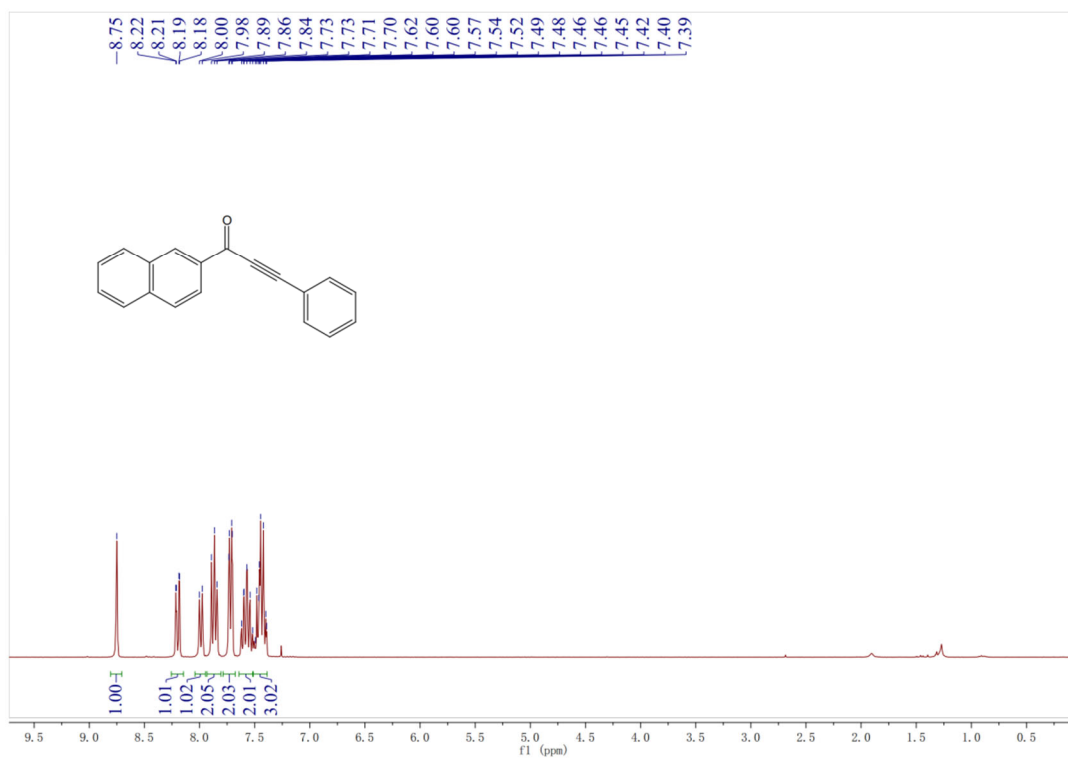
1-(4-Fluorophenyl)-3-phenylprop-2-yn-1-one (3pa) ^1H NMR (300 MHz, CDCl_3)



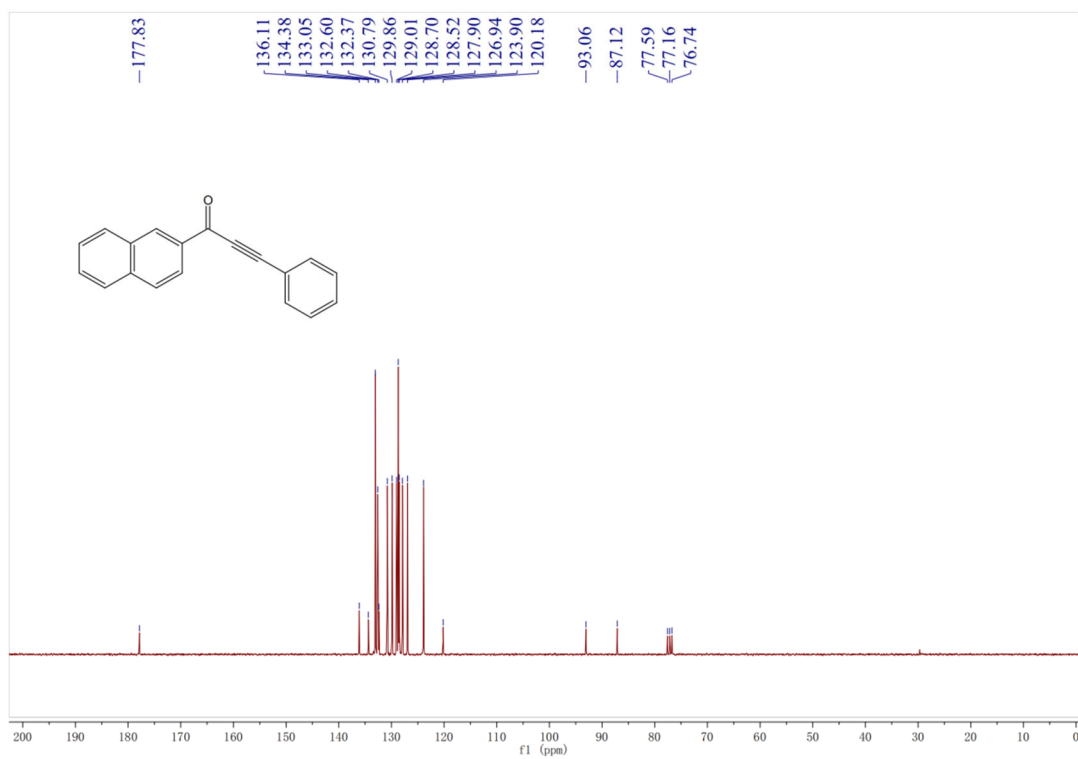
1-(4-Fluorophenyl)-3-phenylprop-2-yn-1-one (3pa) ^{13}C NMR (75 MHz, CDCl_3)



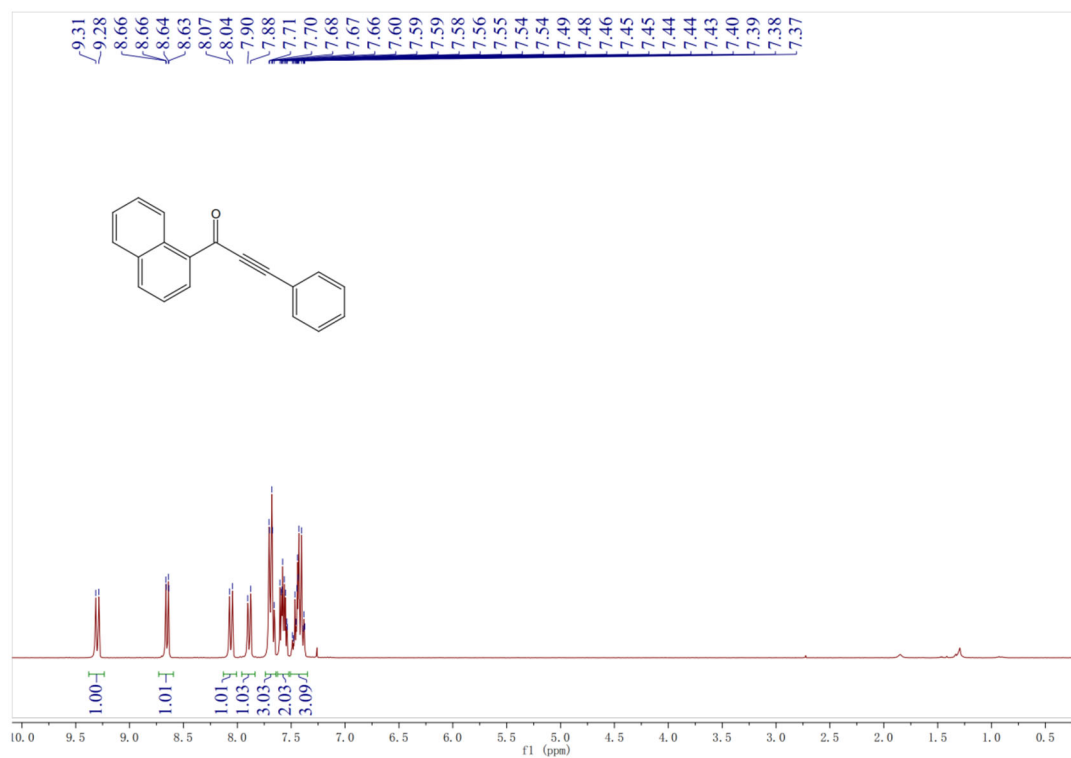
1-(Naphthalen-2-yl)-3-phenylprop-2-yn-1-one (3qa) ¹H NMR (300 MHz, CDCl₃)



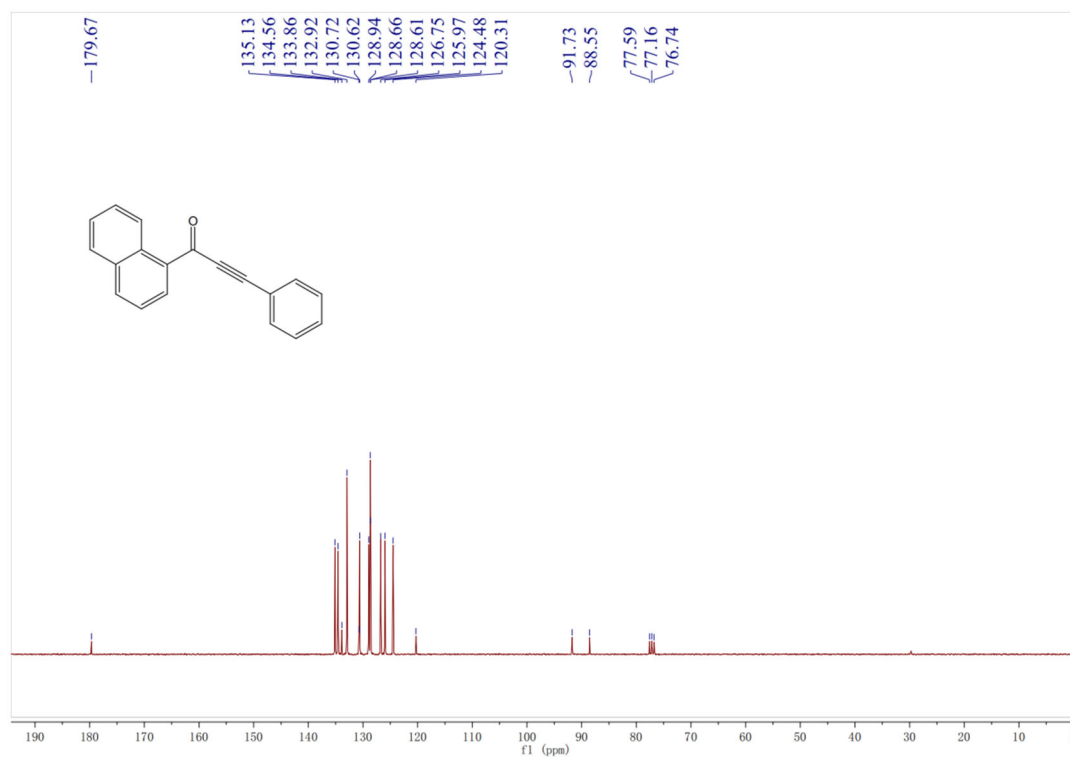
1-(Naphthalen-2-yl)-3-phenylprop-2-yn-1-one (3qa) ¹³C NMR (75 MHz, CDCl₃)



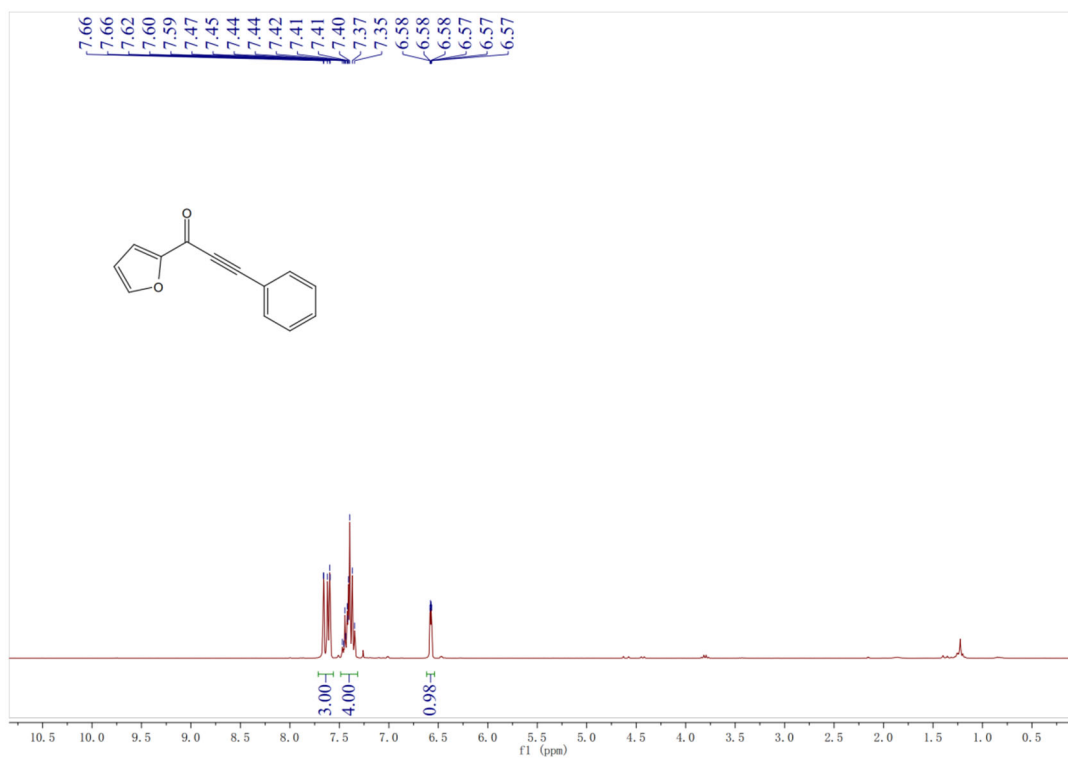
1-(Naphthalen-1-yl)-3-phenylprop-2-yn-1-one (3ra) ¹H NMR (300 MHz, CDCl₃)



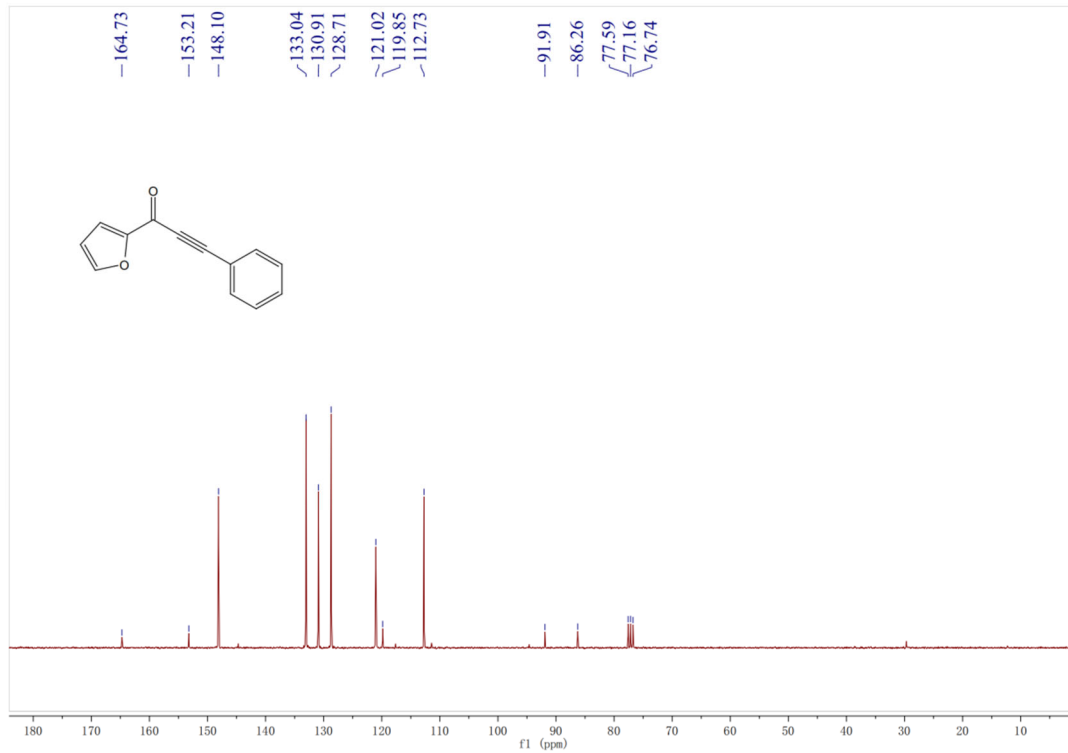
1-(Naphthalen-1-yl)-3-phenylprop-2-yn-1-one (3ra) ¹³C NMR (75 MHz, CDCl₃)



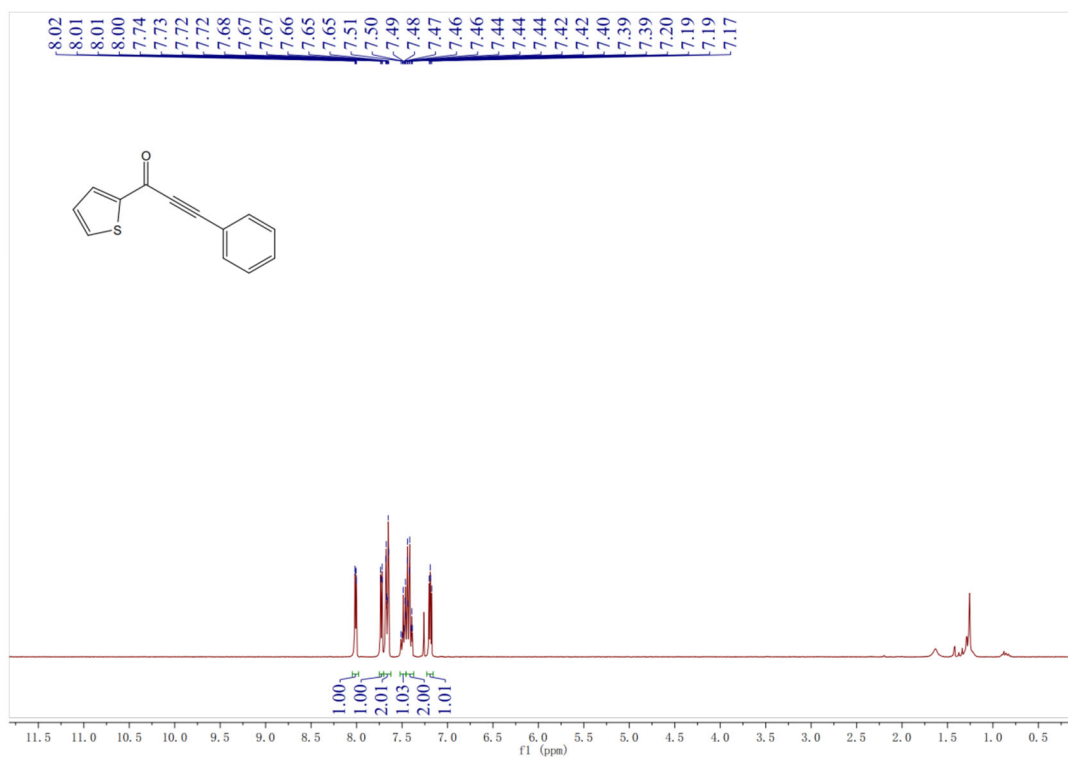
1-(Furan-2-yl)-3-phenylprop-2-yn-1-one (3sa) ¹H NMR (300 MHz, CDCl₃)



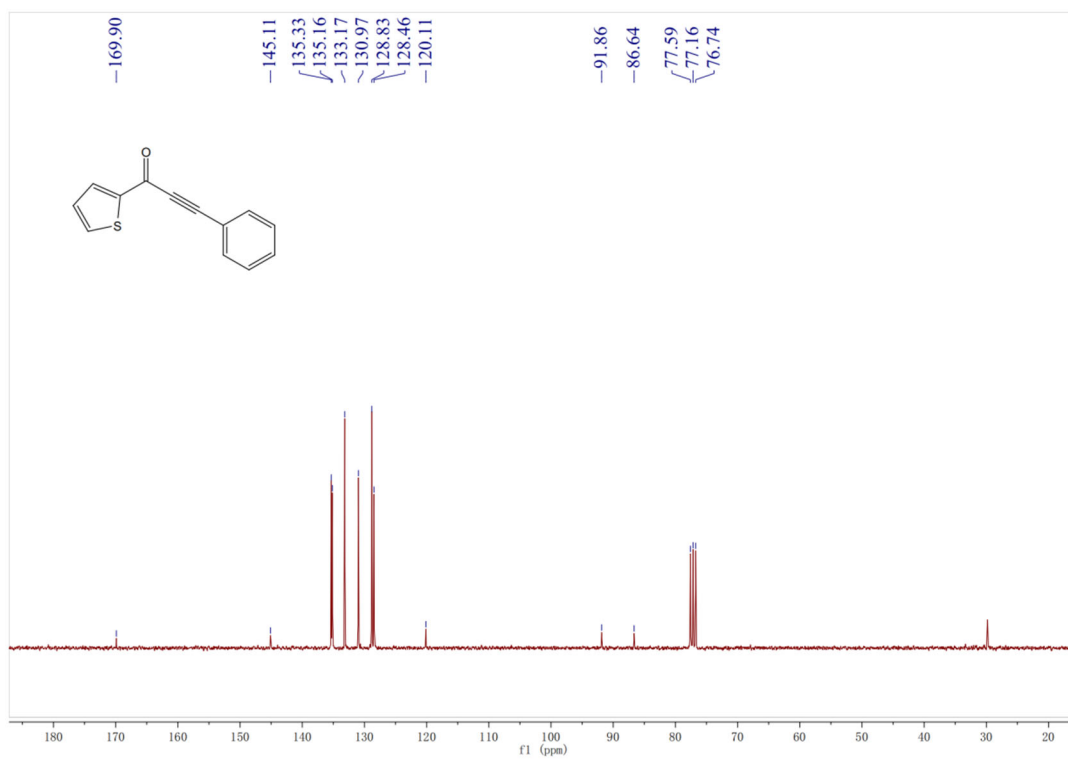
1-(Furan-2-yl)-3-phenylprop-2-yn-1-one (3sa) ¹³C NMR (75 MHz, CDCl₃)



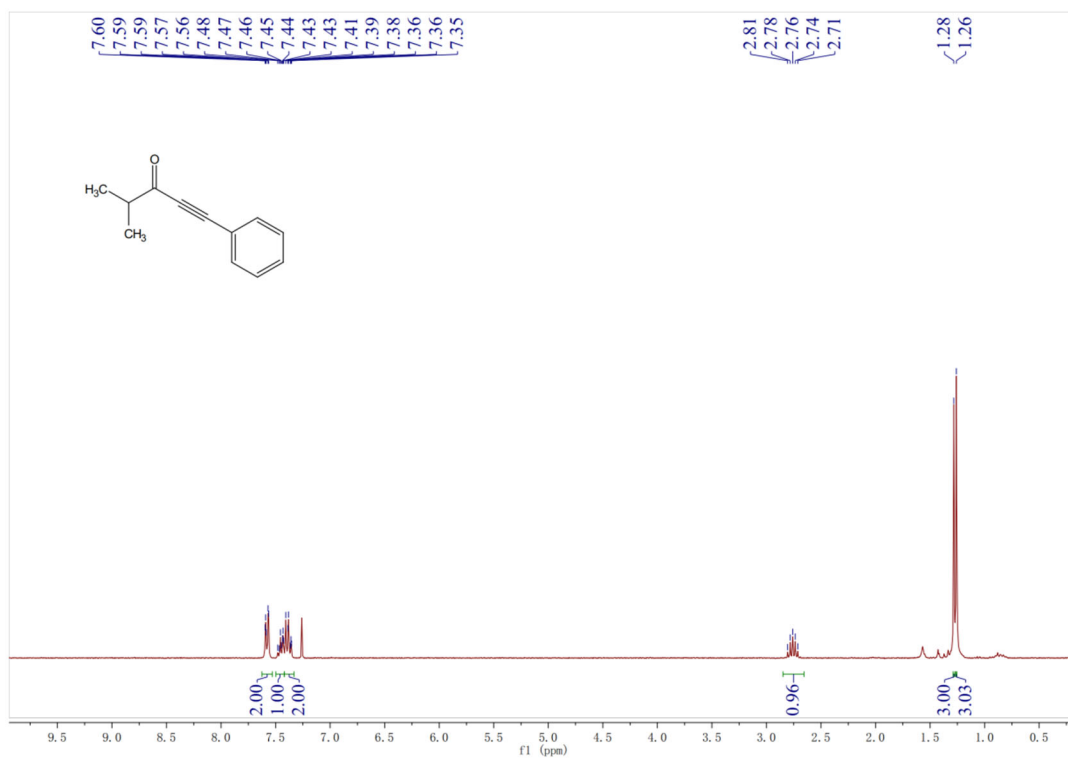
3-Phenyl-1-(thiophen-2-yl)prop-2-yn-1-one (3ta) ^1H NMR (300 MHz, CDCl_3)



3-Phenyl-1-(thiophen-2-yl)prop-2-yn-1-one (3ta) ^{13}C NMR (75 MHz, CDCl_3)



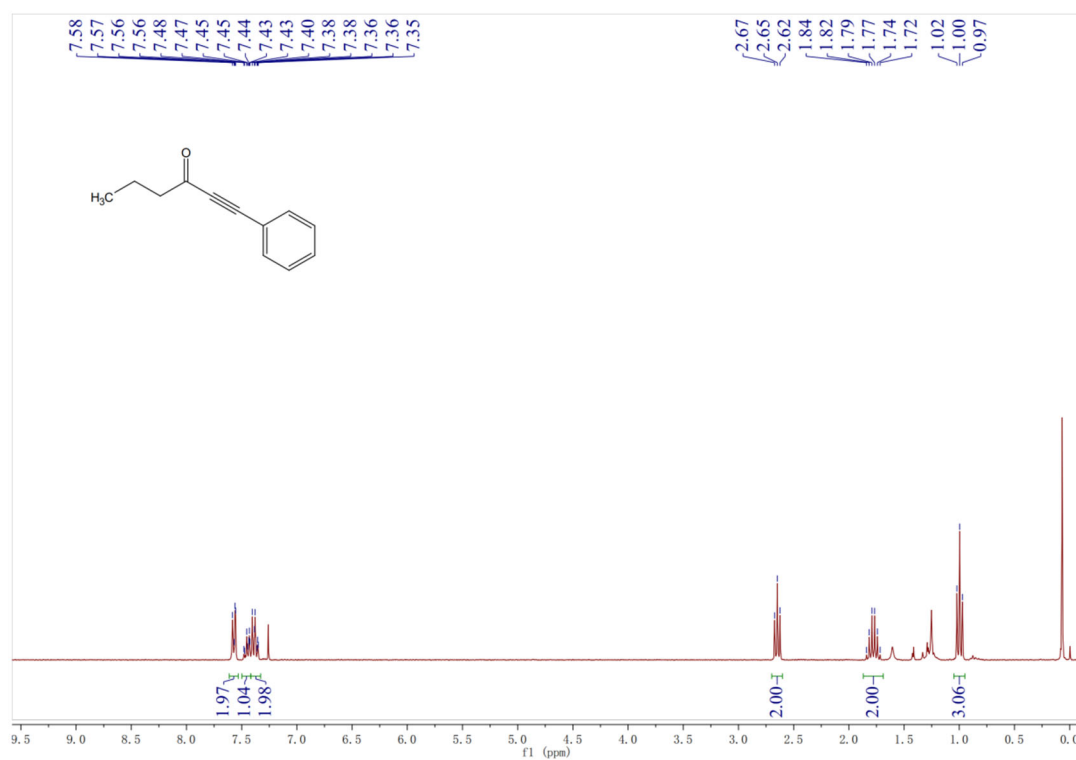
4-Methyl-1-phenylpent-1-yn-3-one (3ua) ^1H NMR (300 MHz, CDCl_3)



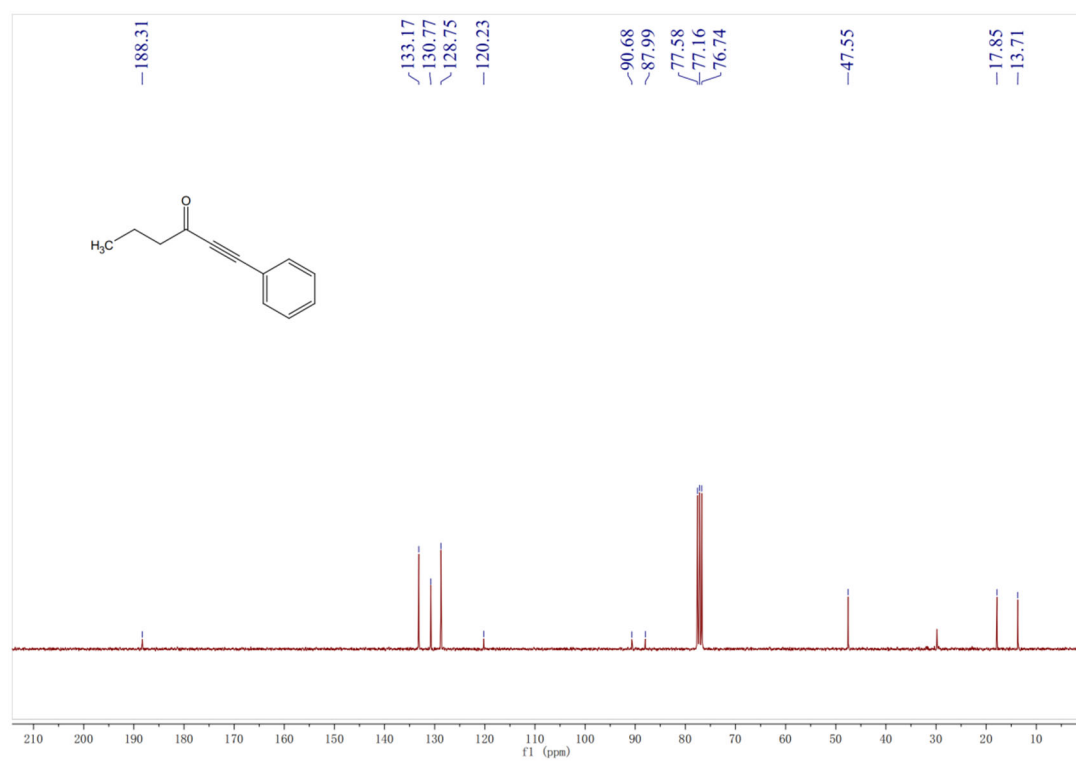
4-Methyl-1-phenylpent-1-yn-3-one (3ua) ^{13}C NMR (75 MHz, CDCl_3)



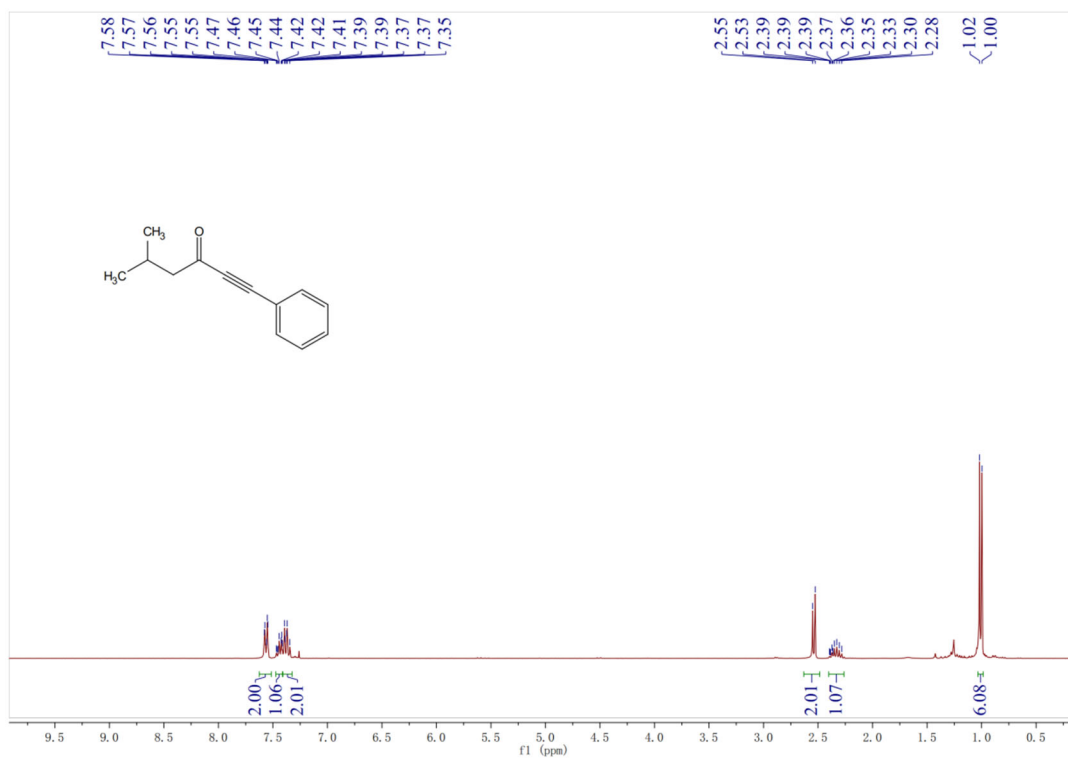
1-Phenylhex-1-yn-3-one (3va) ¹H NMR (300 MHz, CDCl₃)



1-Phenylhex-1-yn-3-one (3va) ¹³C NMR (75 MHz, CDCl₃)



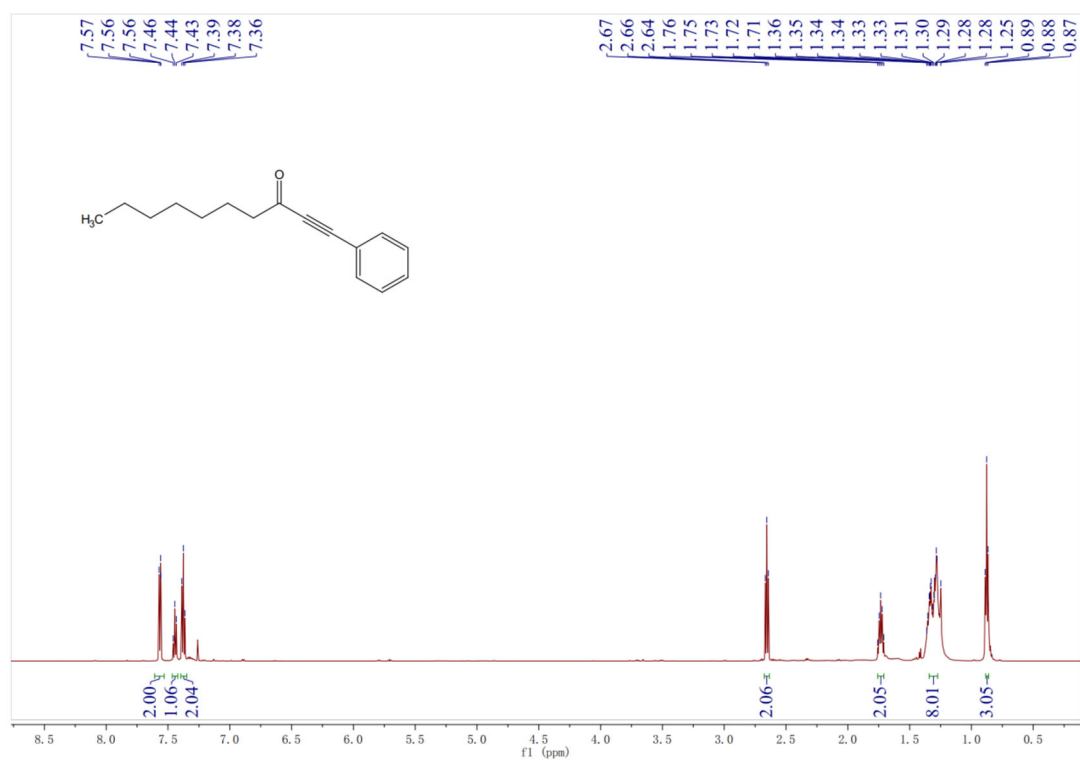
5-Methyl-1-phenylhex-1-yn-3-one (3wa) ¹H NMR (300 MHz, CDCl₃)



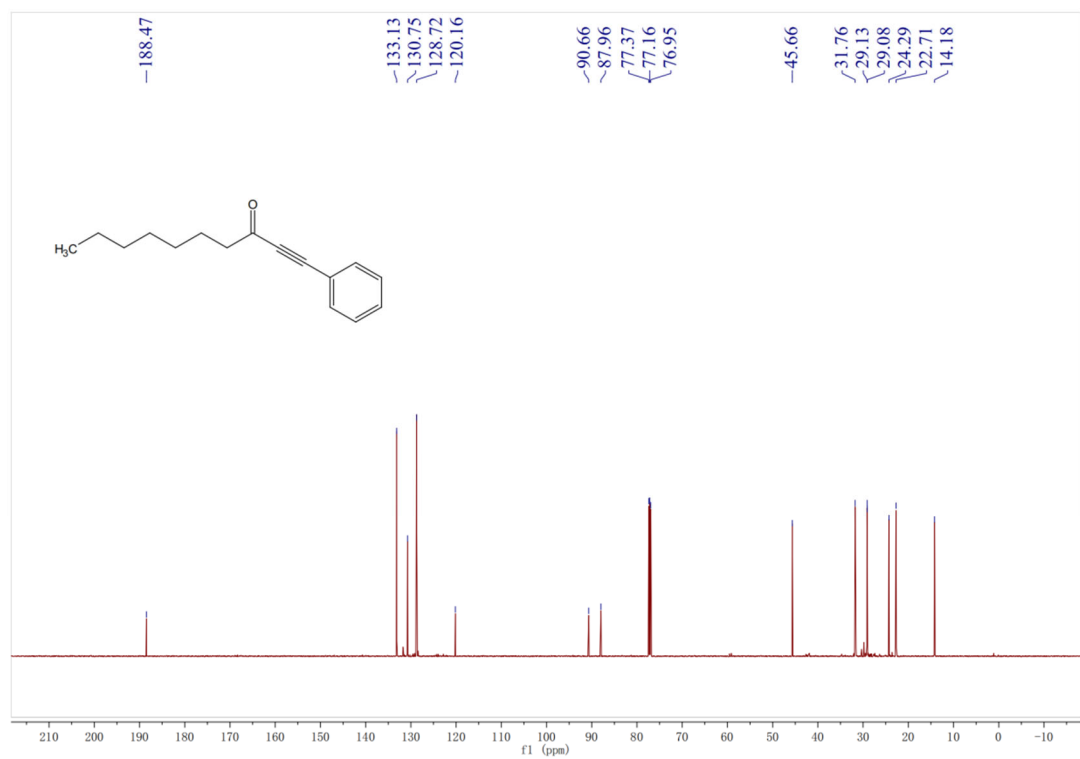
5-Methyl-1-phenylhex-1-yn-3-one (3wa) ¹³C NMR (75 MHz, CDCl₃)



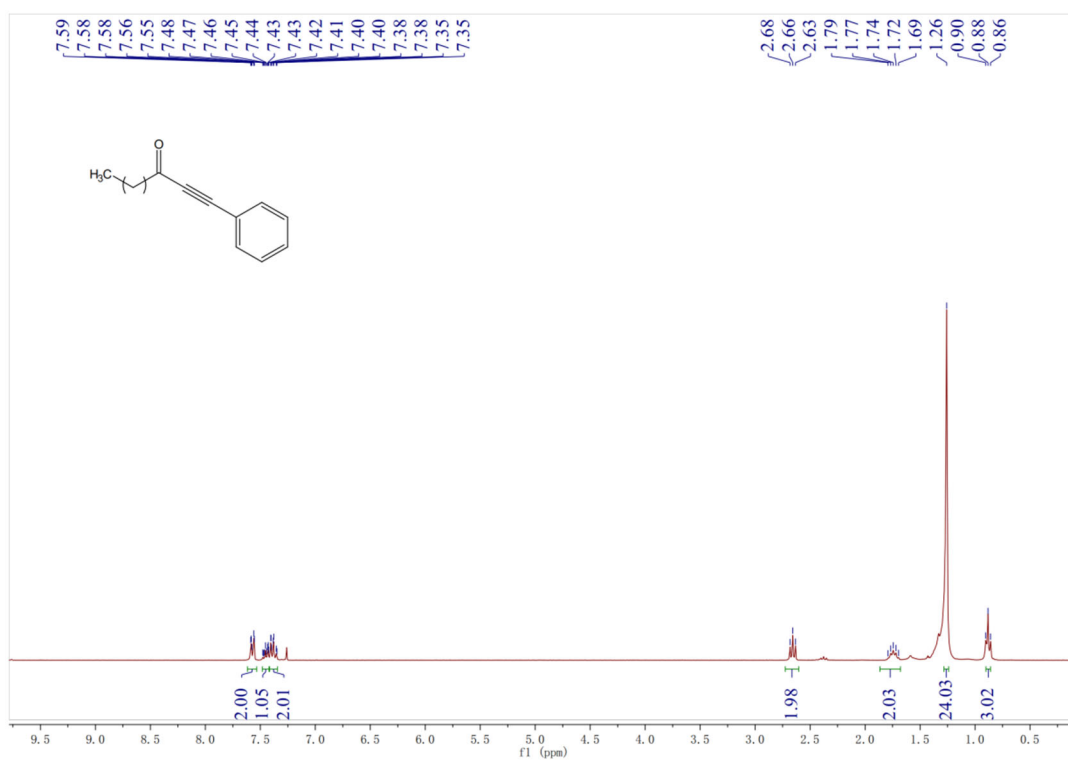
1-Phenyldec-1-yn-3-one (3xa) ¹H NMR (300 MHz, CDCl₃)



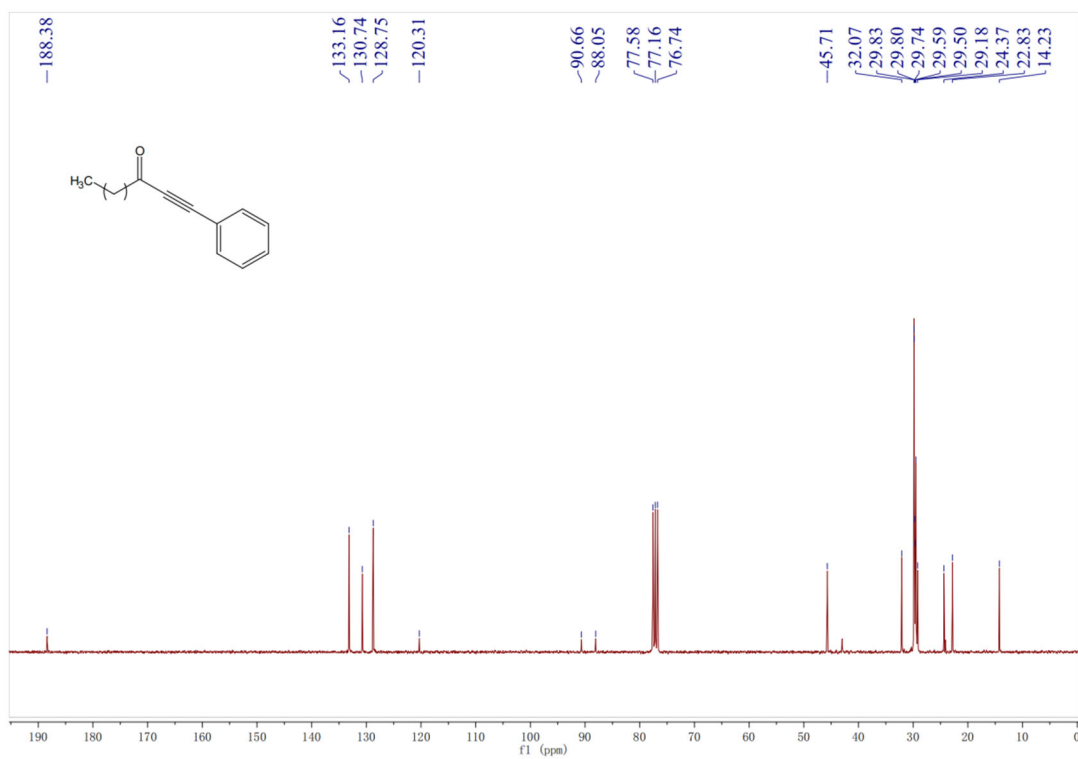
1-Phenyldec-1-yn-3-one (3xa) ¹³C NMR (75 MHz, CDCl₃)



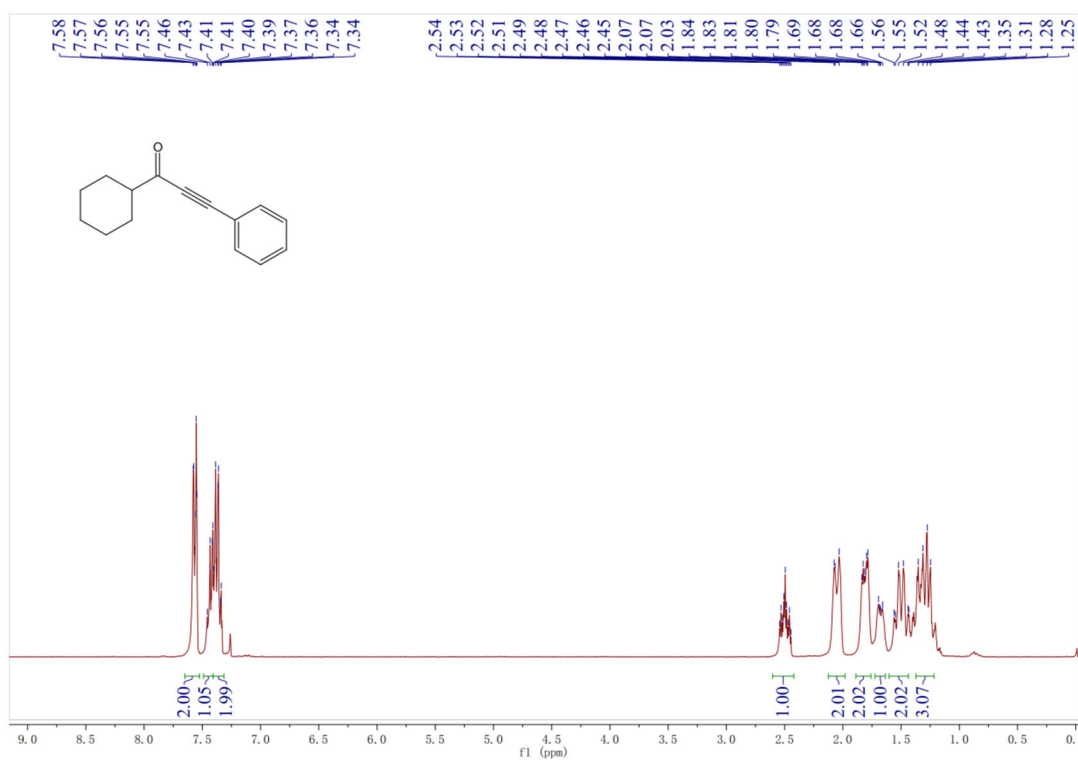
1-Phenyloctadec-1-yn-3-one (3ya) ¹H NMR (300 MHz, CDCl₃)



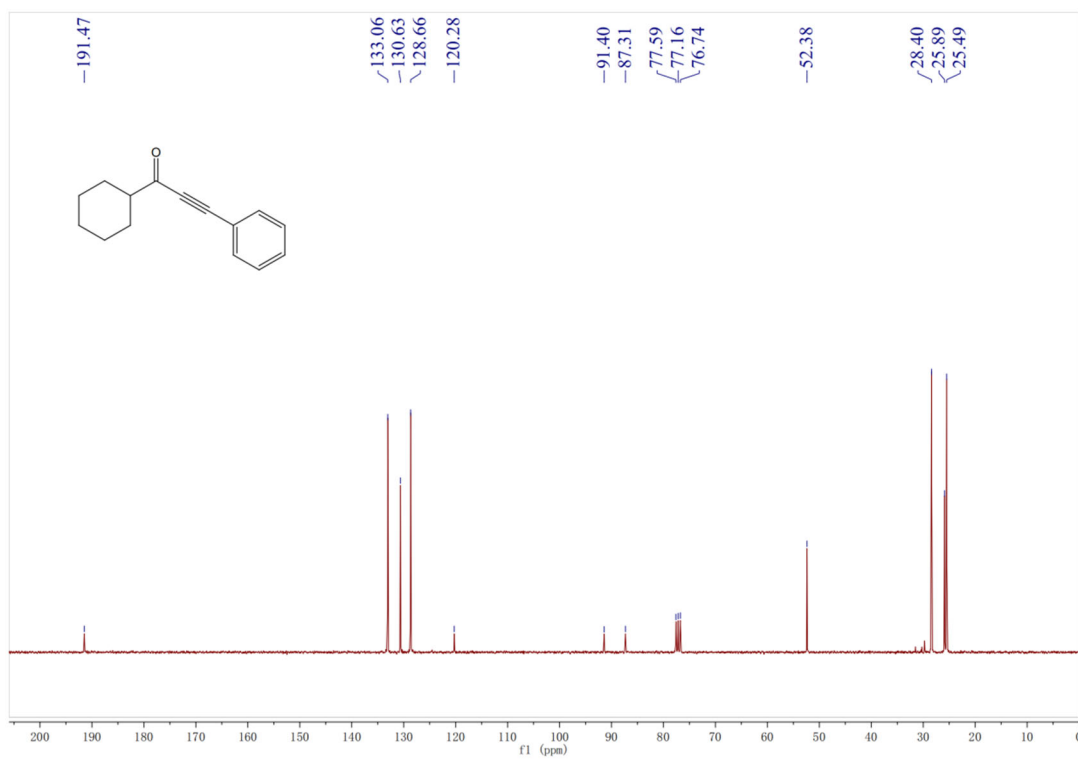
1-Phenyloctadec-1-yn-3-one (3ya) ¹³C NMR (75 MHz, CDCl₃)



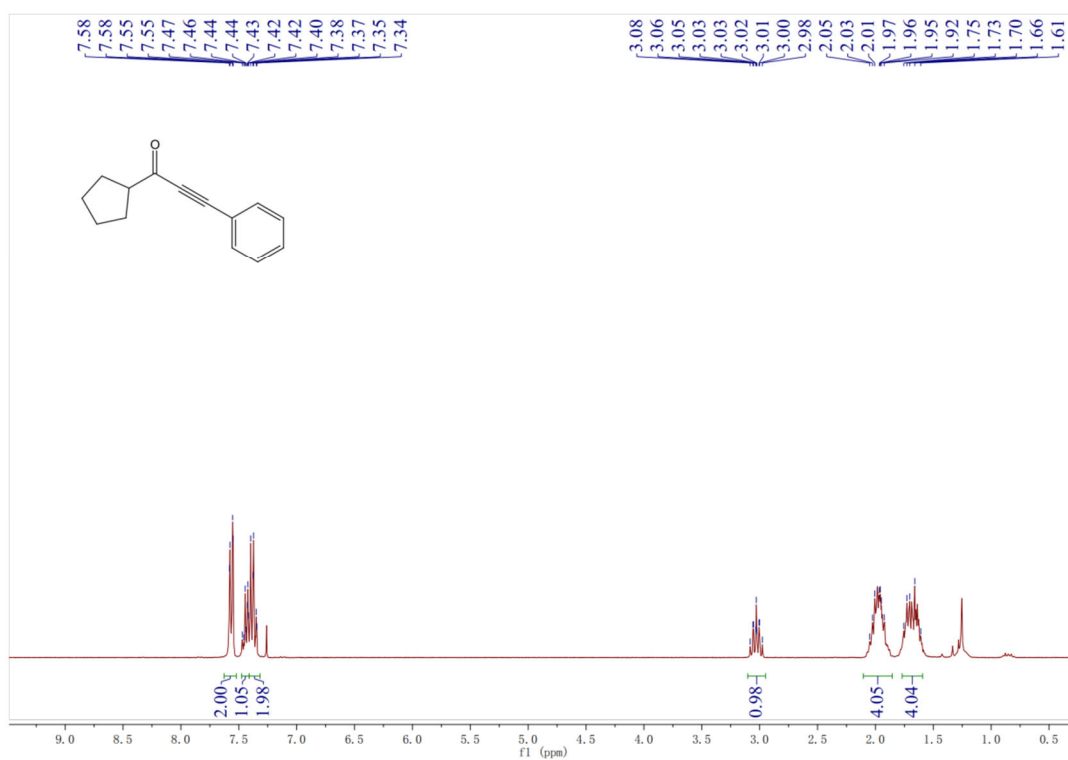
1-Cyclohexyl-3-phenylprop-2-yn-1-one (3za) ¹H NMR (300 MHz, CDCl₃)



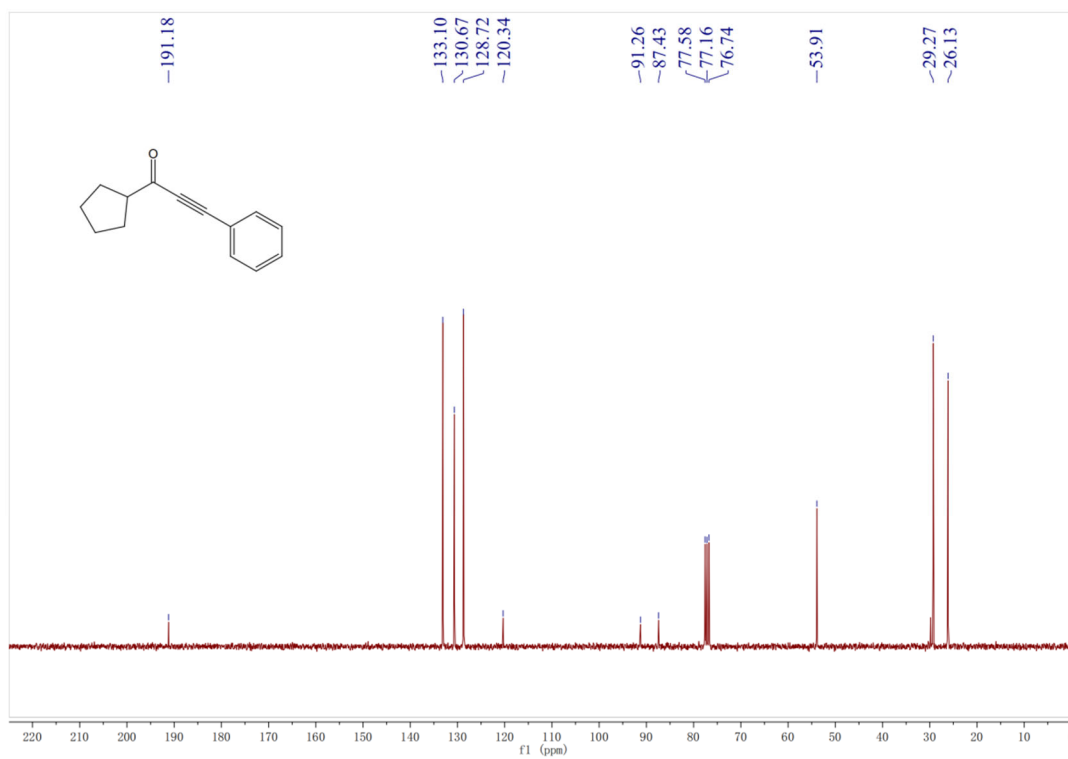
1-Cyclohexyl-3-phenylprop-2-yn-1-one (3za) ¹³C NMR (75 MHz, CDCl₃)



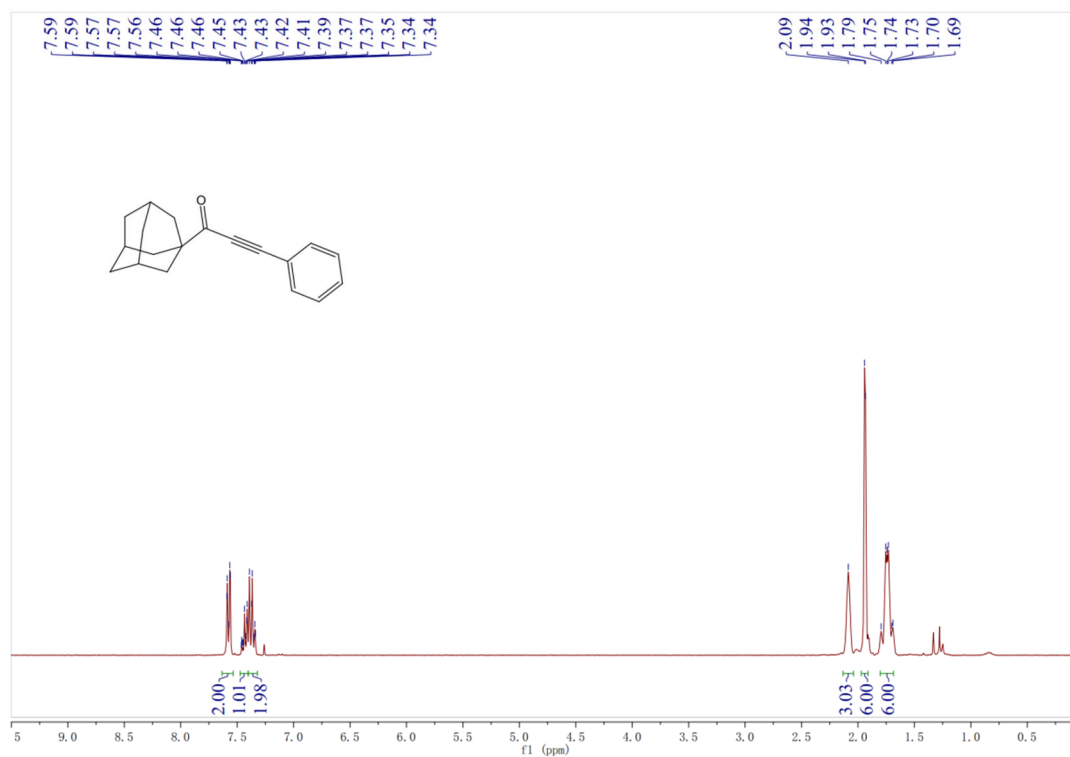
1-Cyclopentyl-3-phenylprop-2-yn-1-one (3a'a) ¹H NMR (300 MHz, CDCl₃)



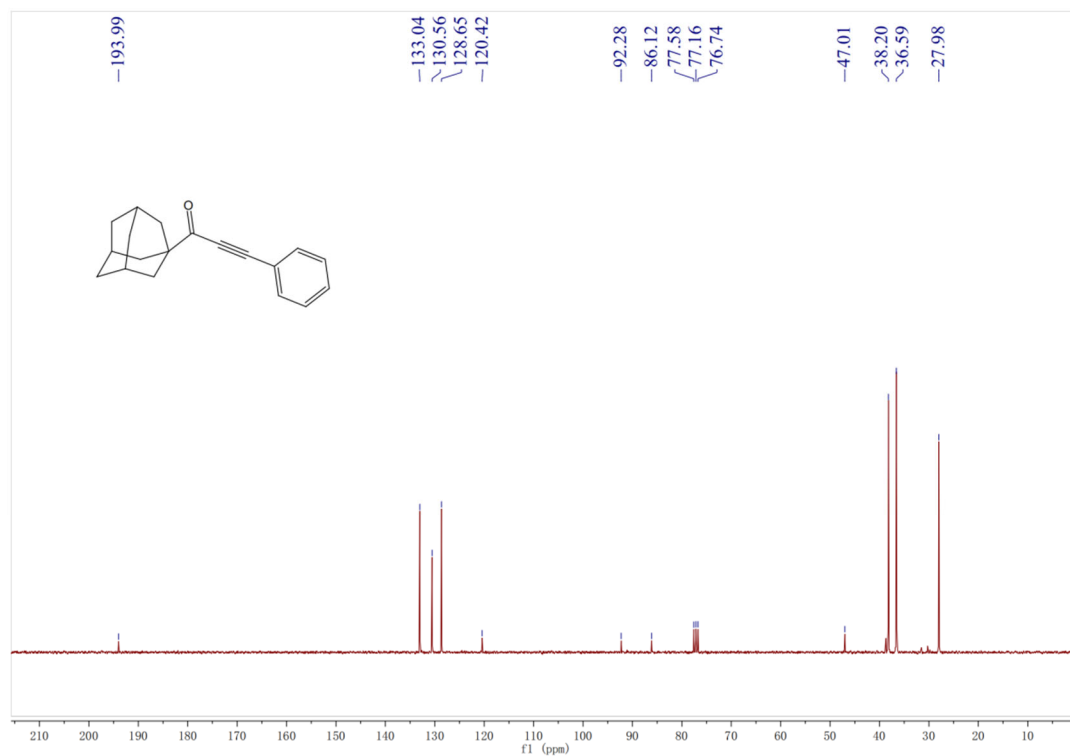
1-Cyclopentyl-3-phenylprop-2-yn-1-one (3a'a) ¹³C NMR (75 MHz, CDCl₃)



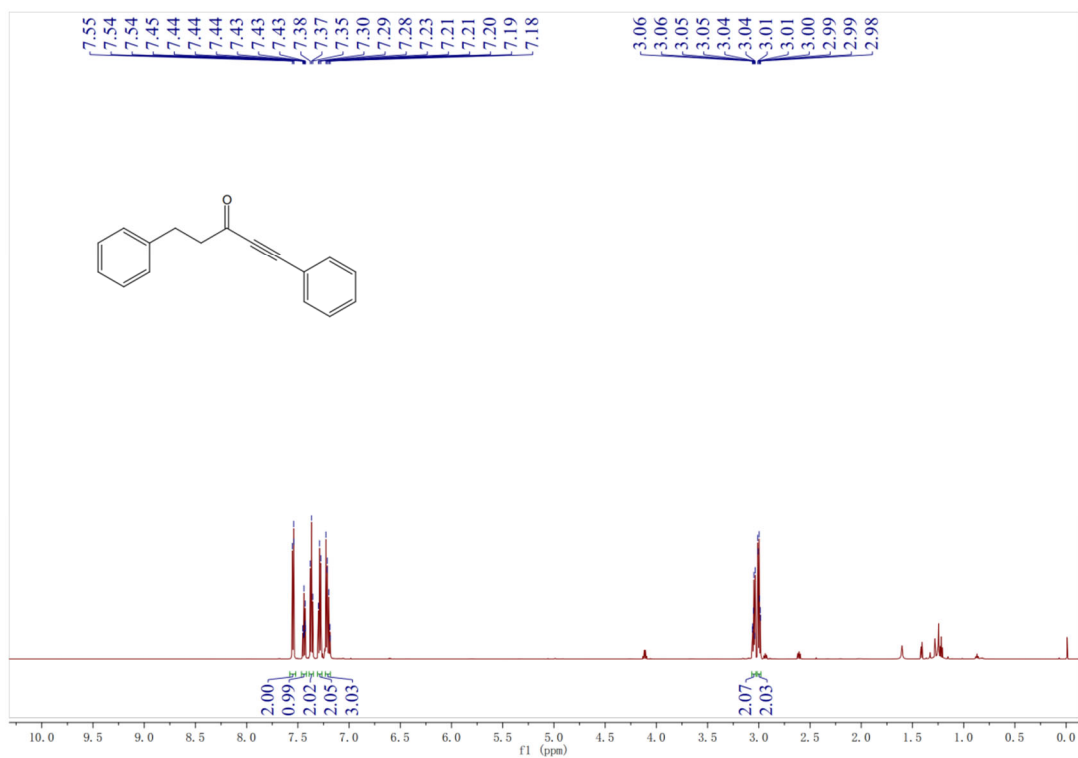
1-((3r,5r,7r)-Adamantan-1-yl)-3-phenylprop-2-yn-1-one (3b'a) ¹H NMR (300 MHz, CDCl₃)



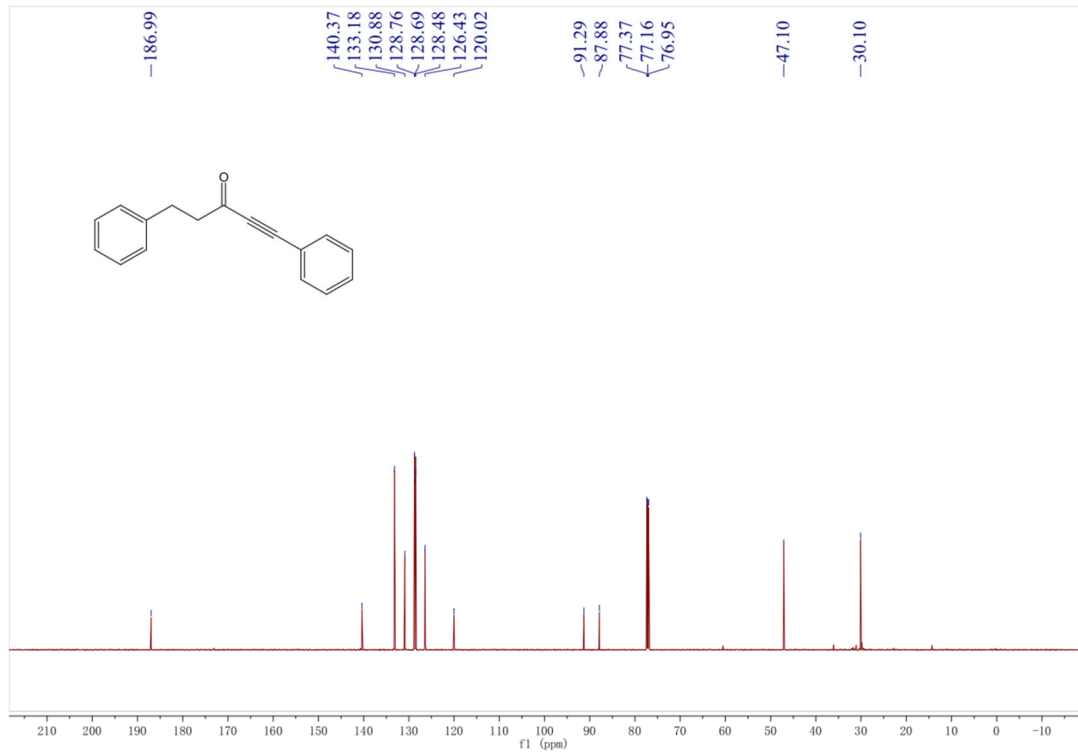
1-((3r,5r,7r)-Adamantan-1-yl)-3-phenylprop-2-yn-1-one (3b'a) ¹³C NMR (75 MHz, CDCl₃)



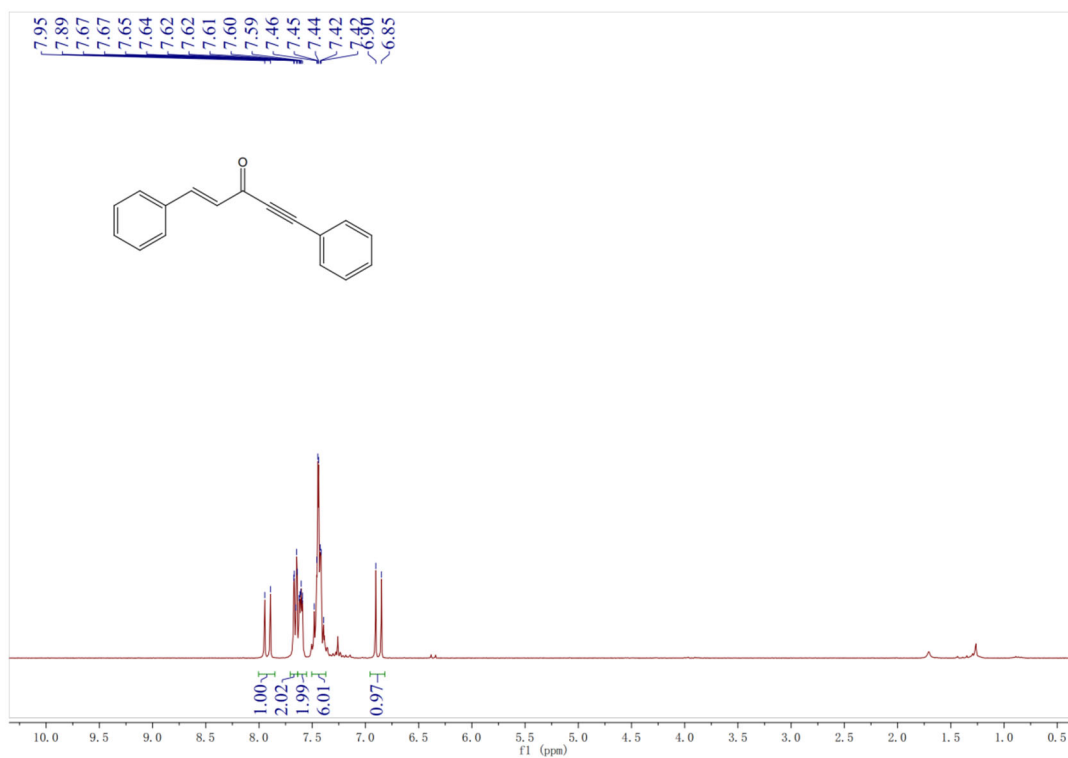
1,5-Diphenylpent-1-yn-3-one (3c'a) ¹H NMR (300 MHz, CDCl₃)



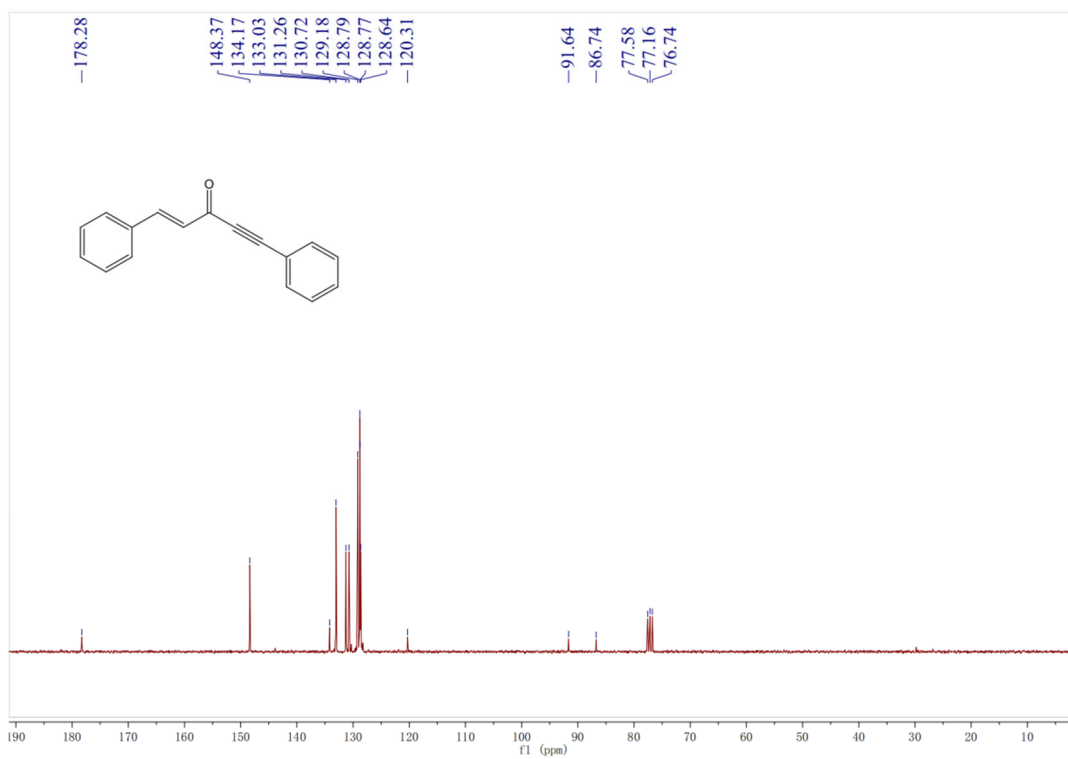
1,5-Diphenylpent-1-yn-3-one (3c'a) ¹³C NMR (75 MHz, CDCl₃)



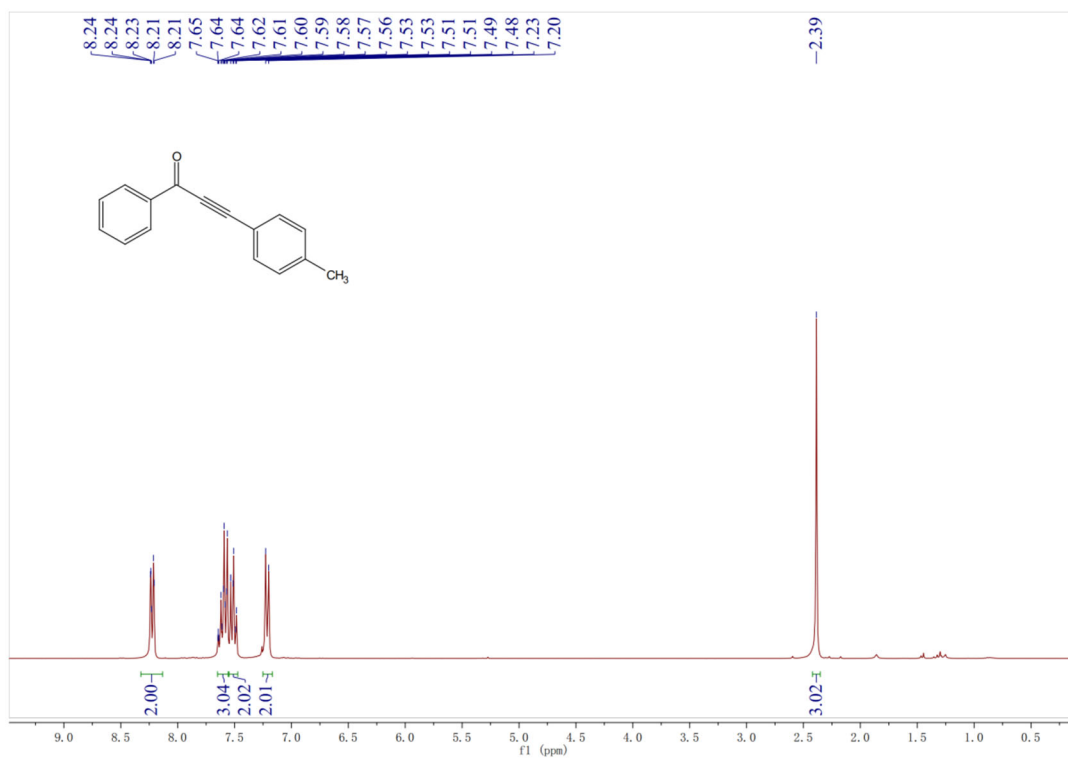
(E)-1,5-diphenylpent-1-en-4-yn-3-one (3d'a) ¹H NMR (300 MHz, CDCl₃)



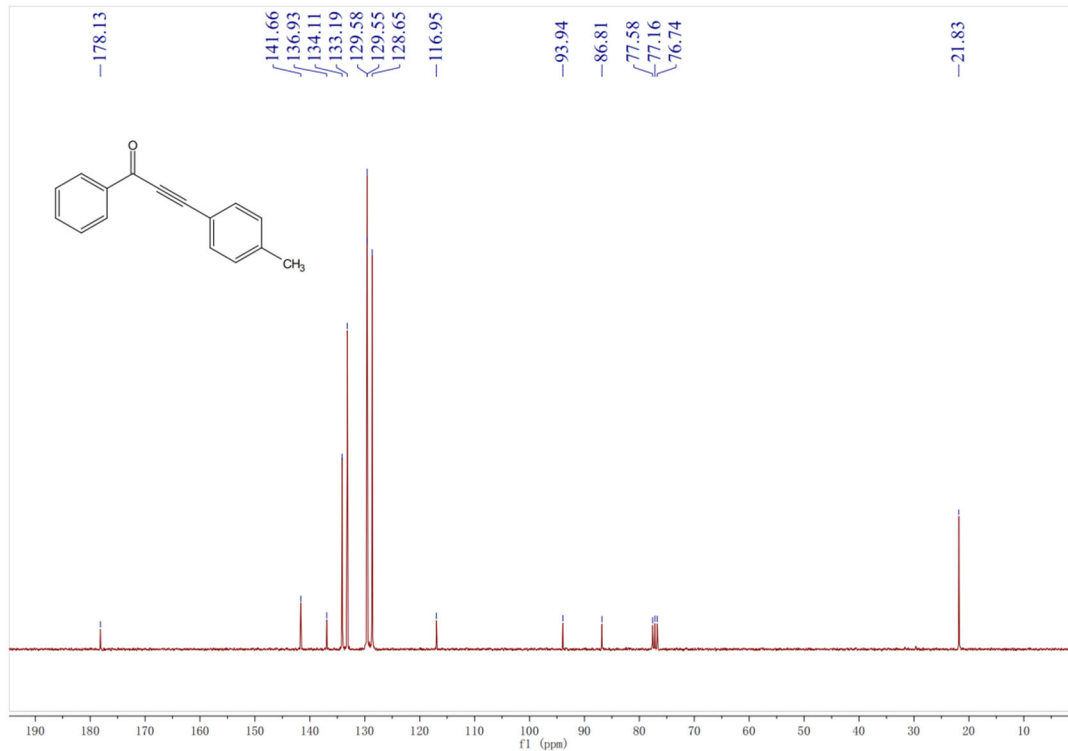
(E)-1,5-diphenylpent-1-en-4-yn-3-one (3d'a) ¹³C NMR (75 MHz, CDCl₃)



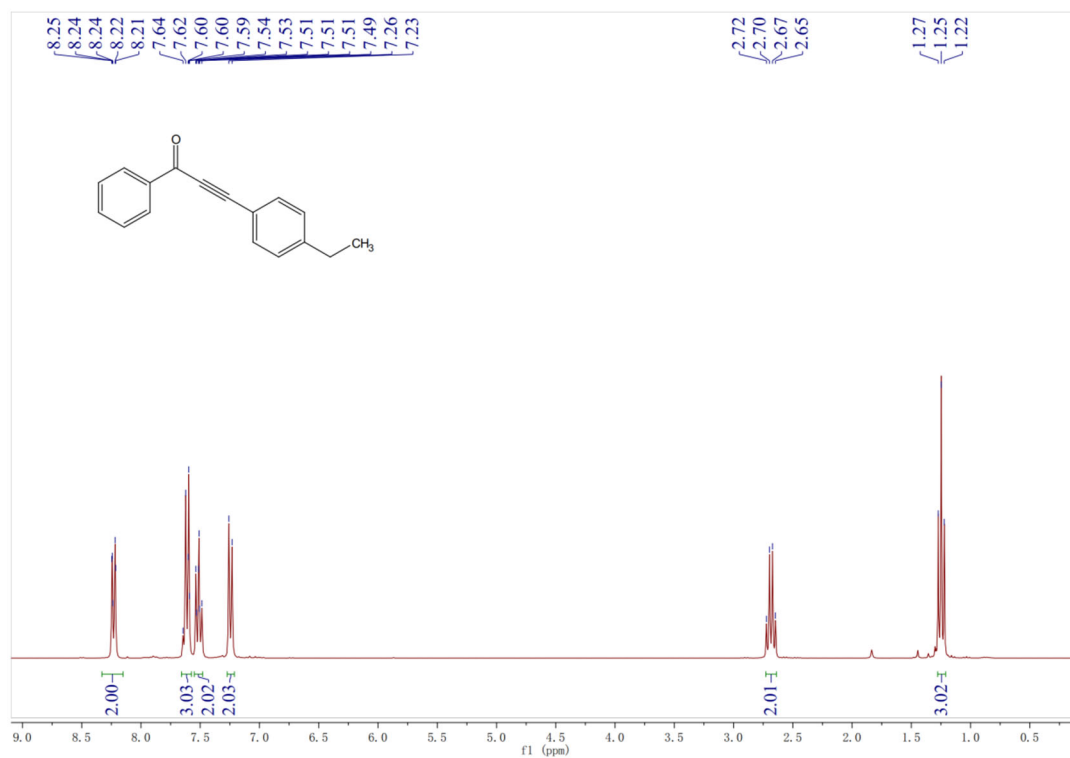
1-Phenyl-3-(p-tolyl)prop-2-yn-1-one (3ab) ^1H NMR (300 MHz, CDCl_3)



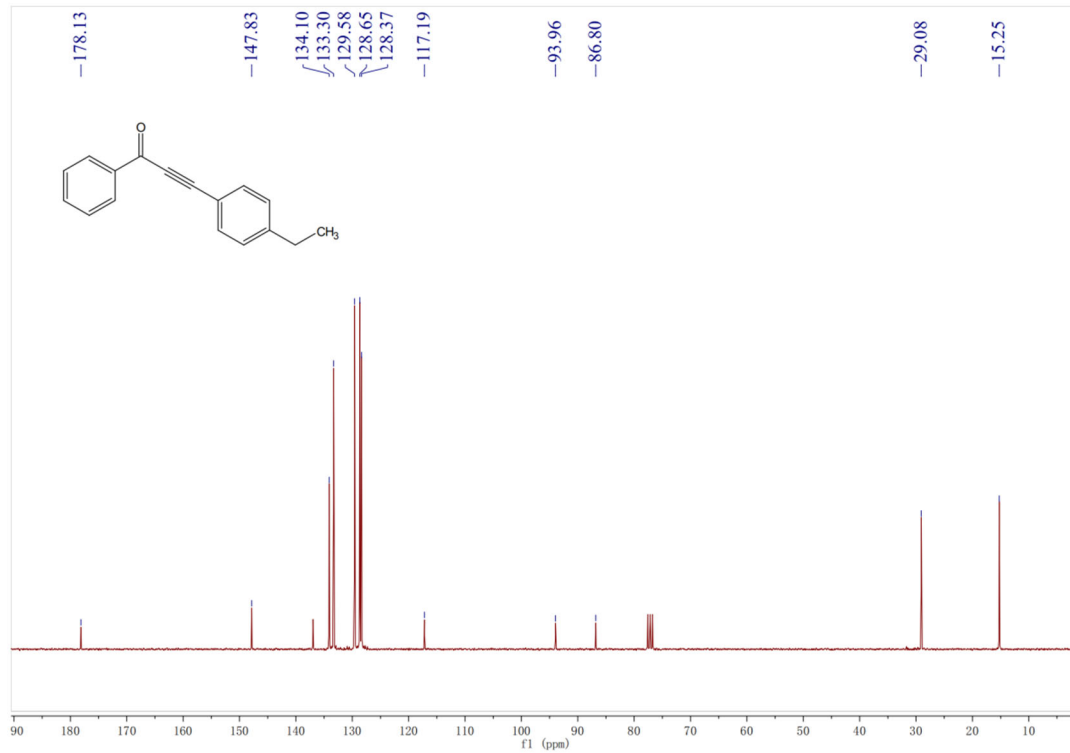
1-Phenyl-3-(p-tolyl)prop-2-yn-1-one (3ab) ^{13}C NMR (75 MHz, CDCl_3)



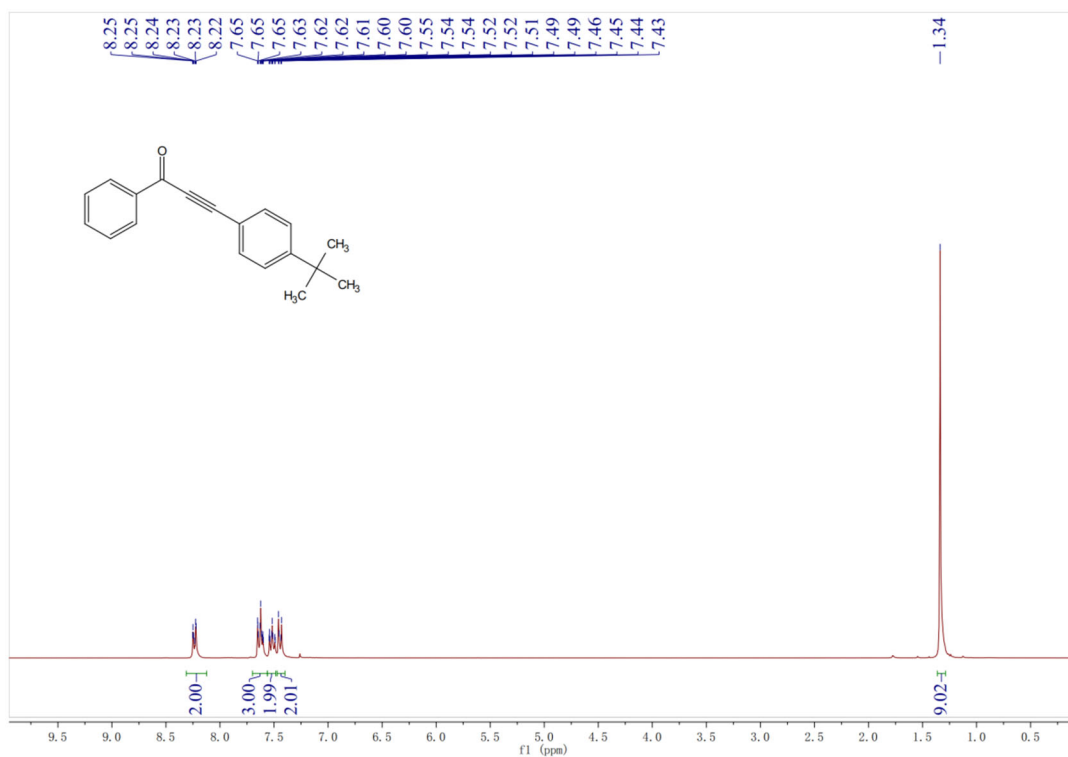
3-(4-Ethylphenyl)-1-phenylprop-2-yn-1-one (3ac) ¹H NMR (300 MHz, CDCl₃)



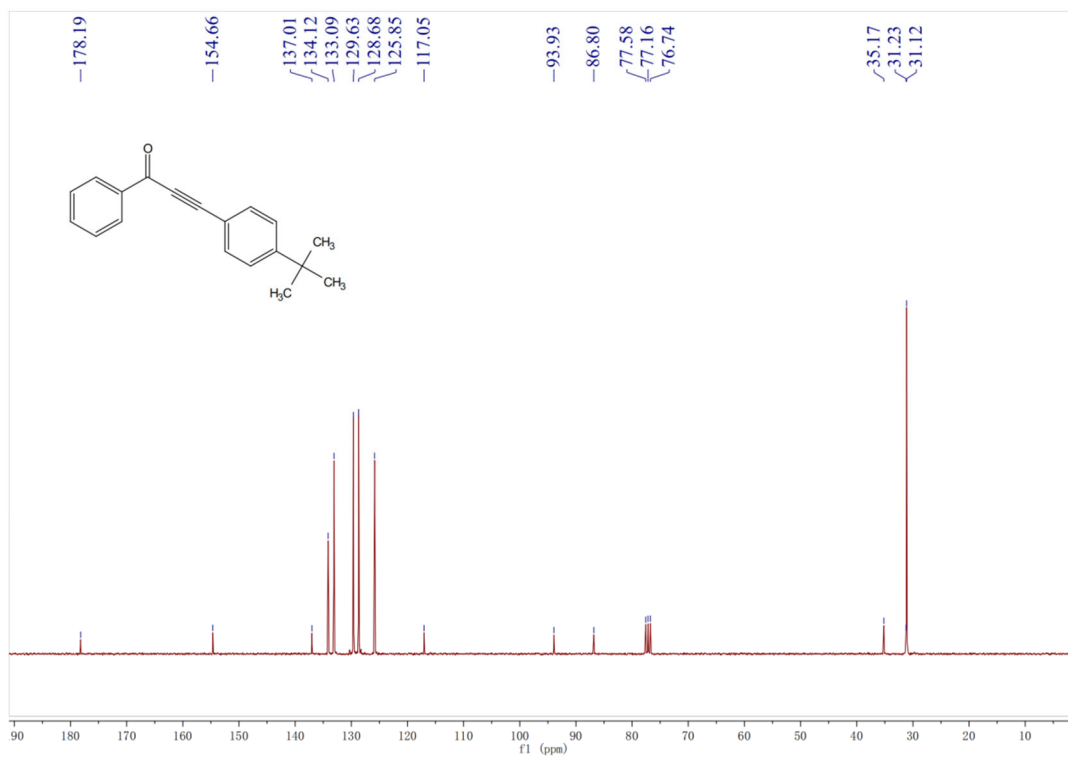
3-(4-Ethylphenyl)-1-phenylprop-2-yn-1-one (3ac) ¹³C NMR (75 MHz, CDCl₃)



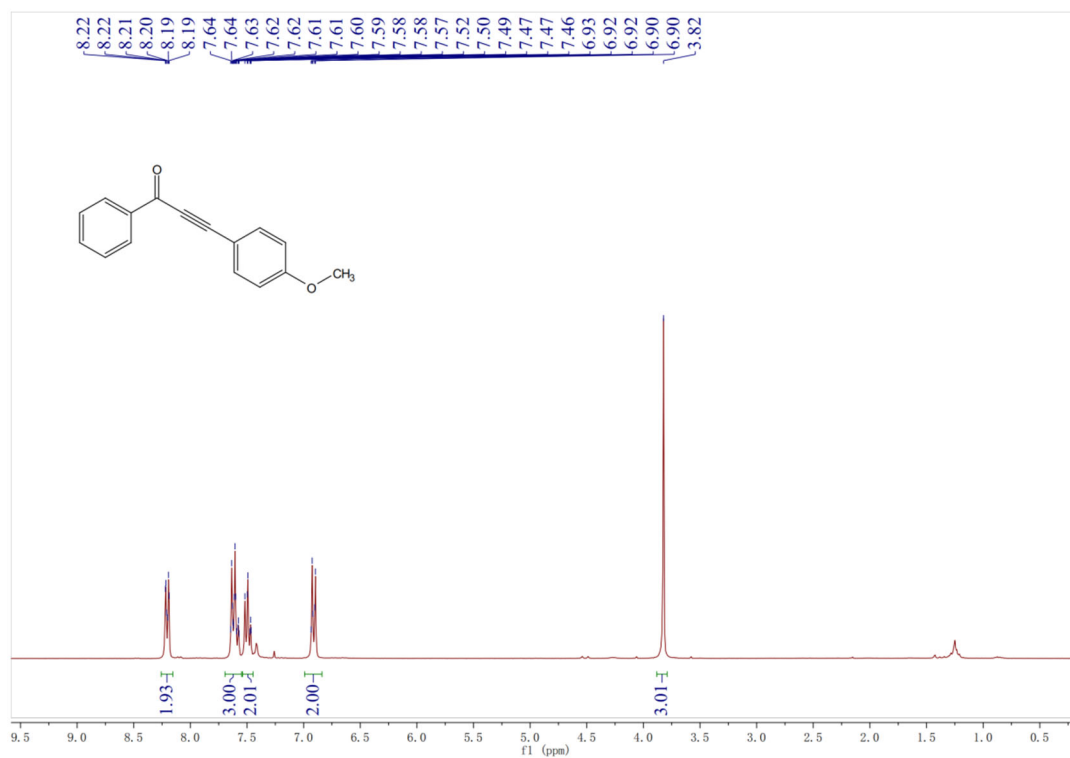
3-(4-(Tert-butyl)phenyl)-1-phenylprop-2-yn-1-one (3ad) ¹H NMR (300 MHz, CDCl₃)



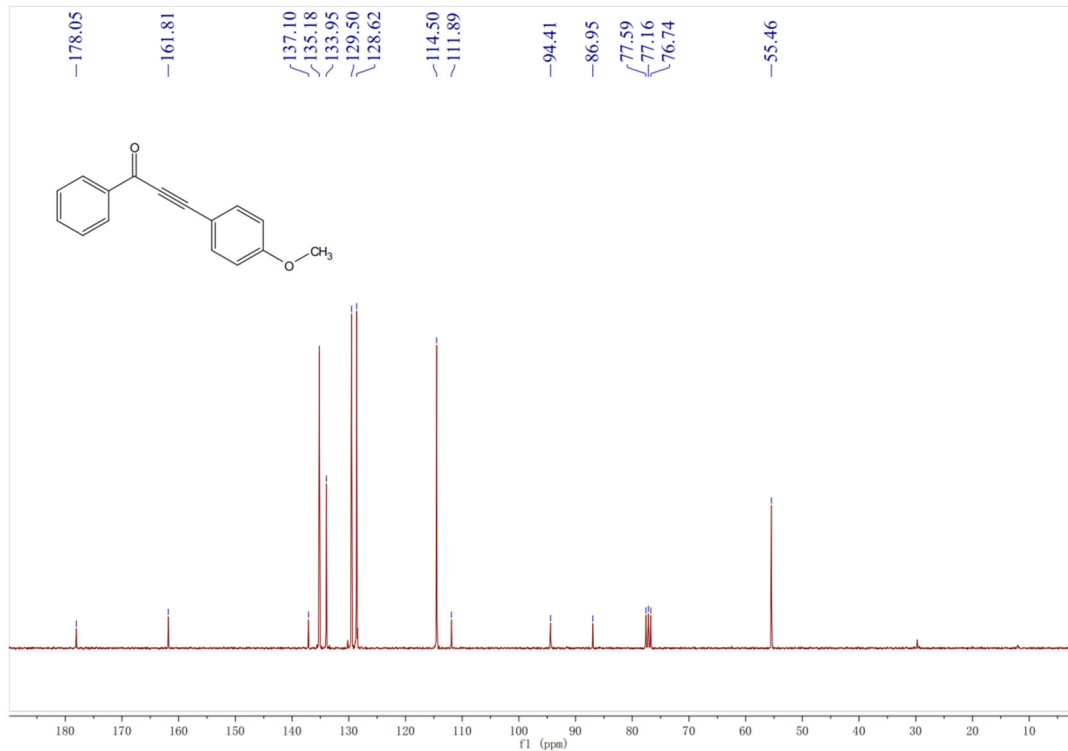
3-(4-(Tert-butyl)phenyl)-1-phenylprop-2-yn-1-one (3ad) ¹³C NMR (75 MHz, CDCl₃)



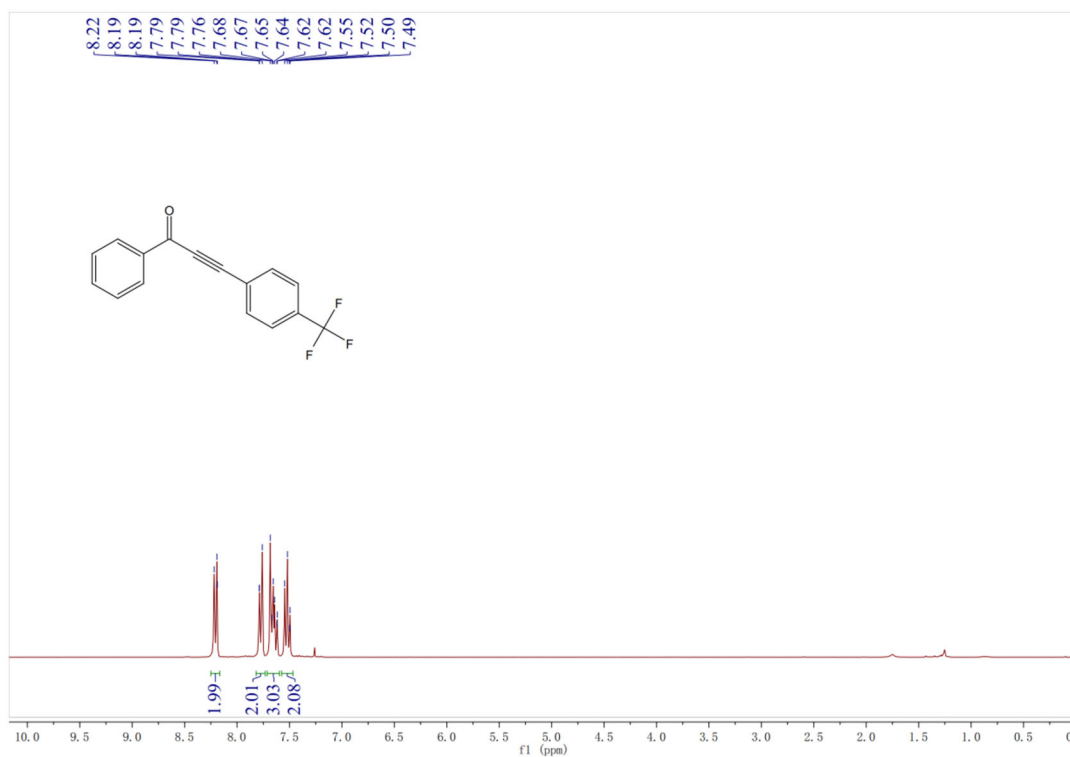
3-(4-Methoxyphenyl)-1-phenylprop-2-yn-1-one (3ae) ¹H NMR (300 MHz, CDCl₃)



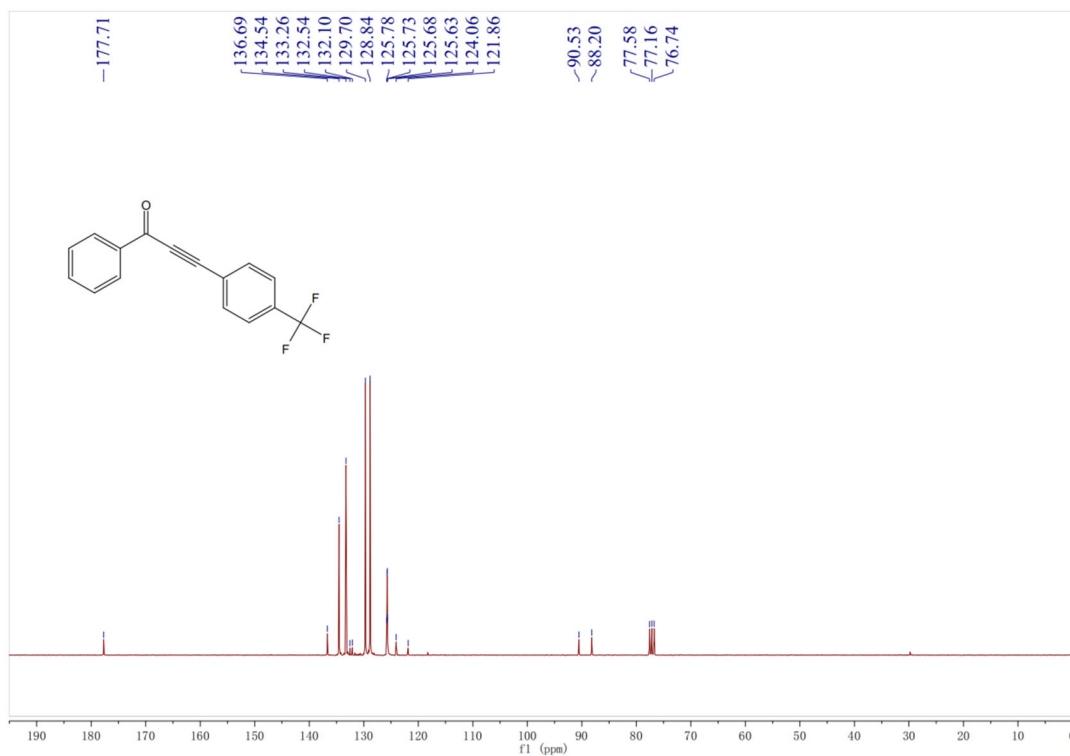
3-(4-Methoxyphenyl)-1-phenylprop-2-yn-1-one (3ae) ¹³C NMR (75 MHz, CDCl₃)



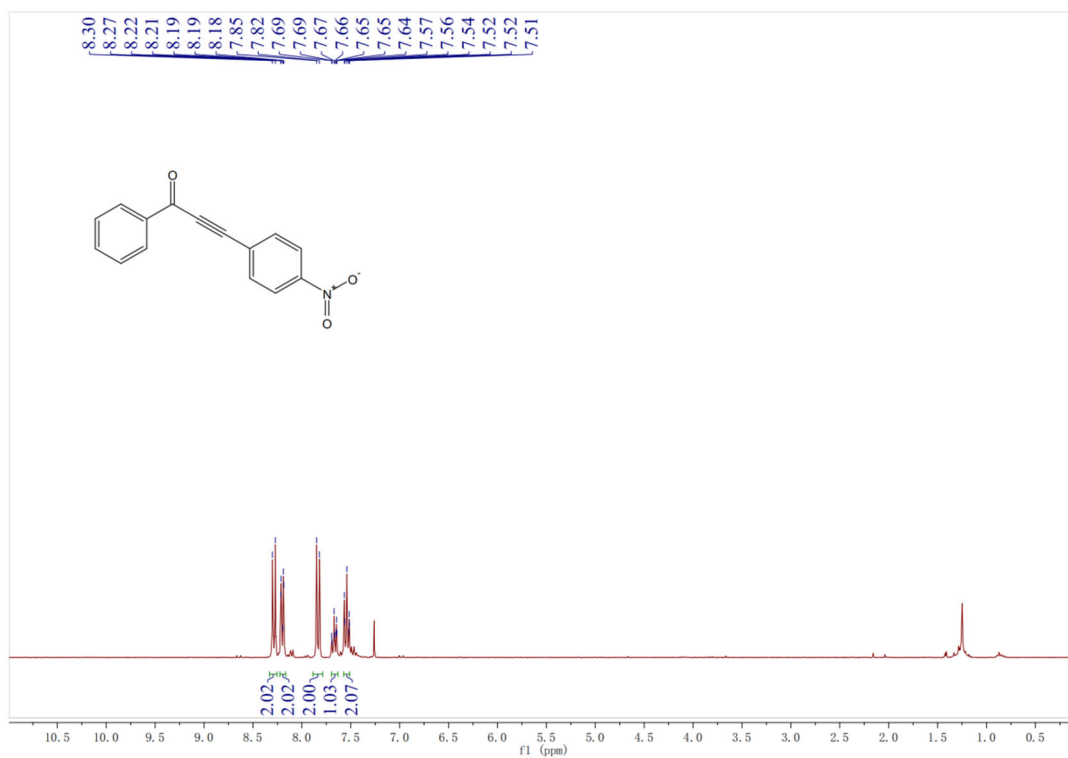
1-Phenyl-3-(4-(trifluoromethyl)phenyl)prop-2-yn-1-one (3af) ¹H NMR (300 MHz, CDCl₃)



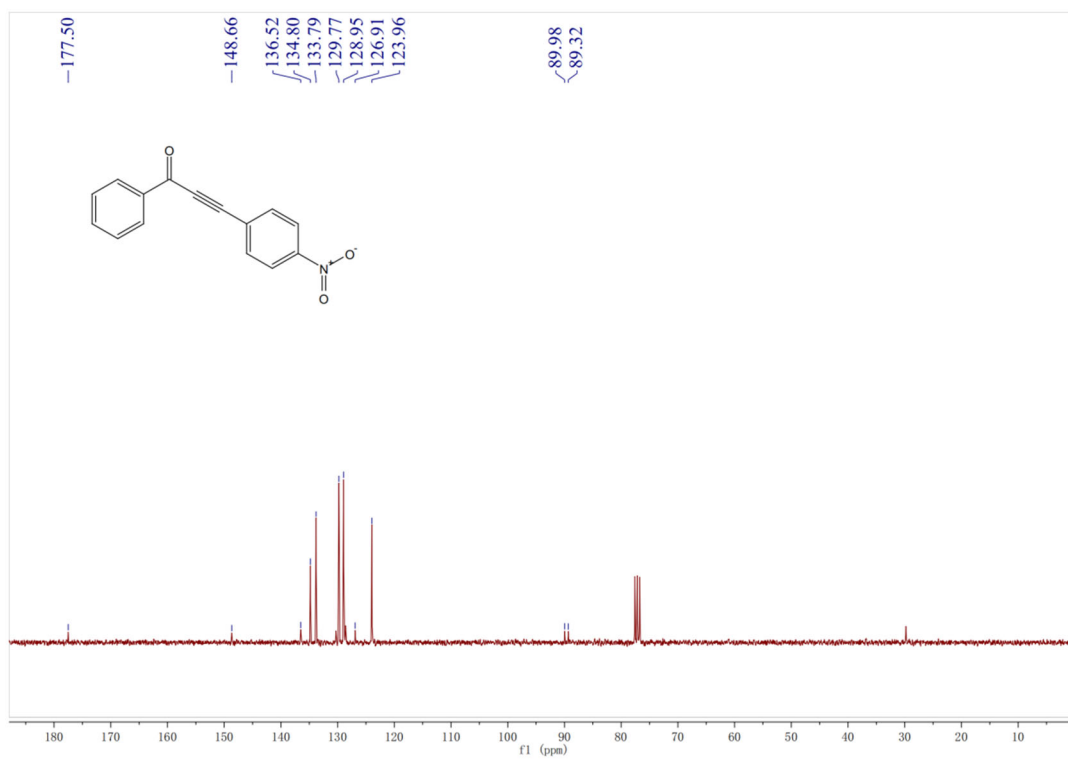
1-Phenyl-3-(4-(trifluoromethyl)phenyl)prop-2-yn-1-one (3af) ¹³C NMR (75 MHz, CDCl₃)



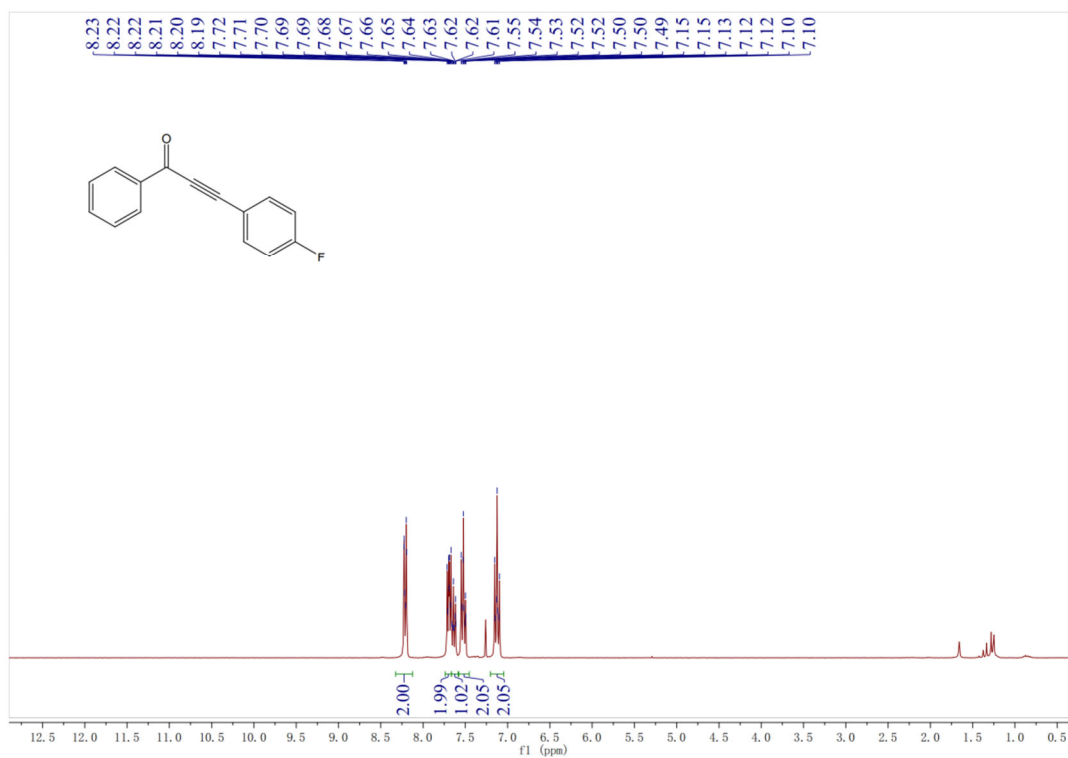
3-(4-Nitrophenyl)-1-phenylprop-2-yn-1-one (3ag) ¹H NMR (300 MHz, CDCl₃)



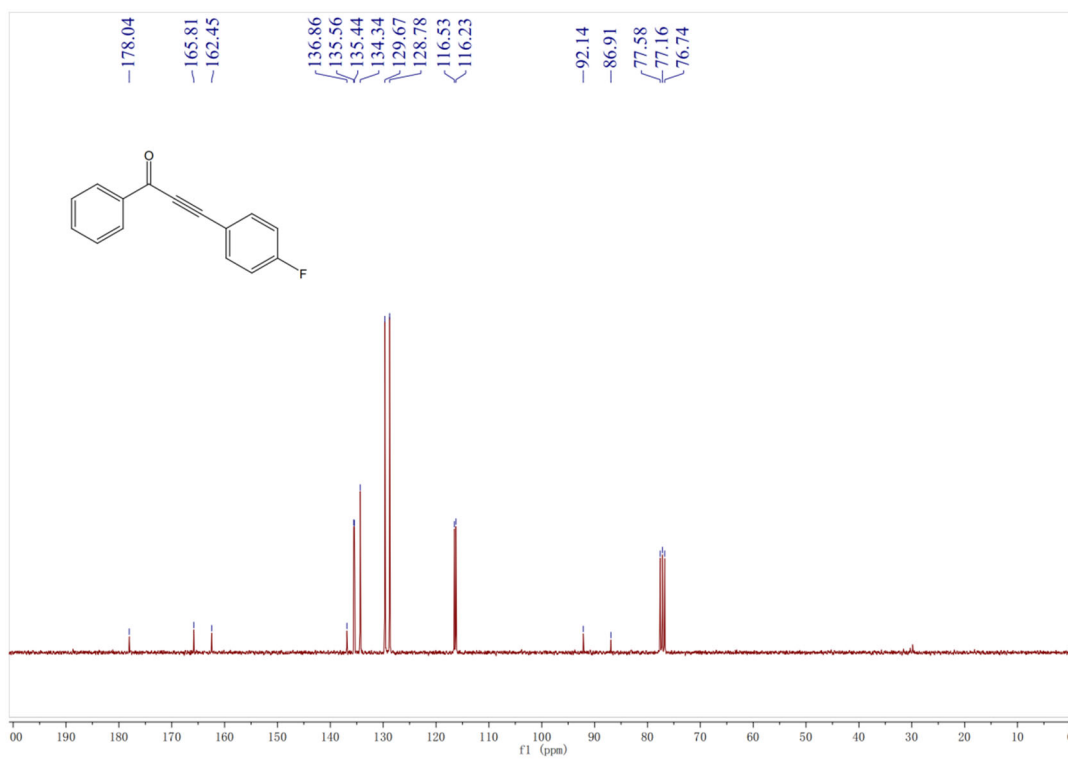
3-(4-Nitrophenyl)-1-phenylprop-2-yn-1-one (3ag) ¹³C NMR (75 MHz, CDCl₃)



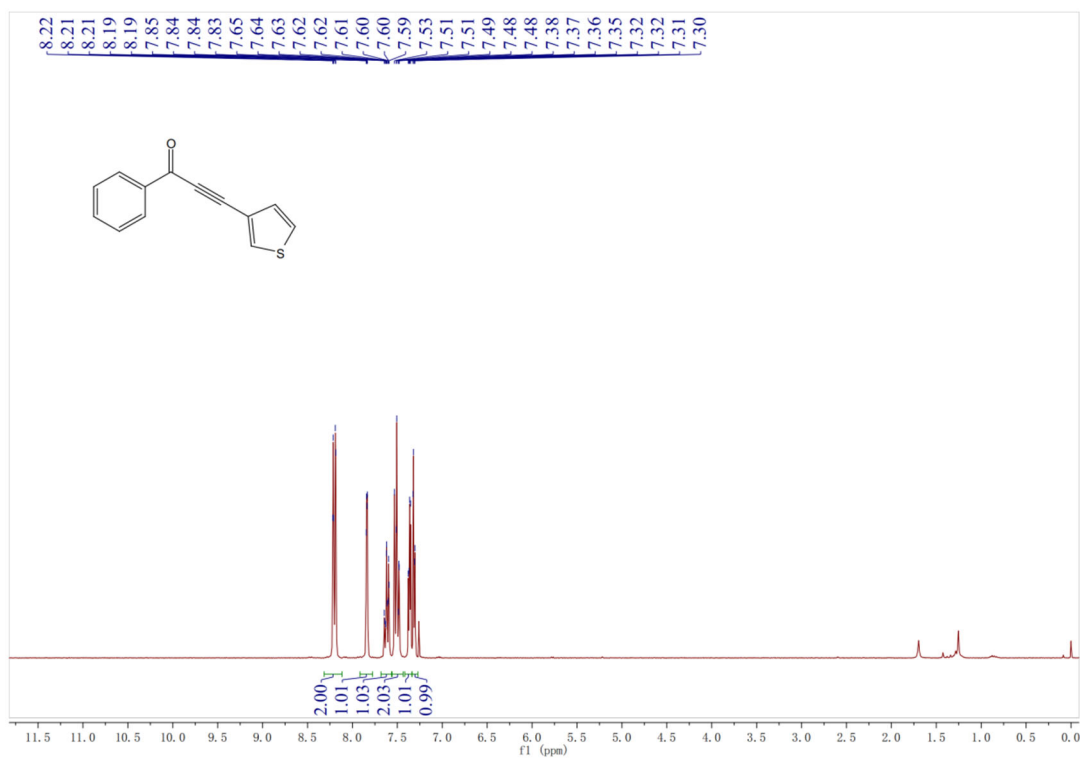
3-(4-Fluorophenyl)-1-phenylprop-2-yn-1-one (3ah) ^1H NMR (300 MHz, CDCl_3)



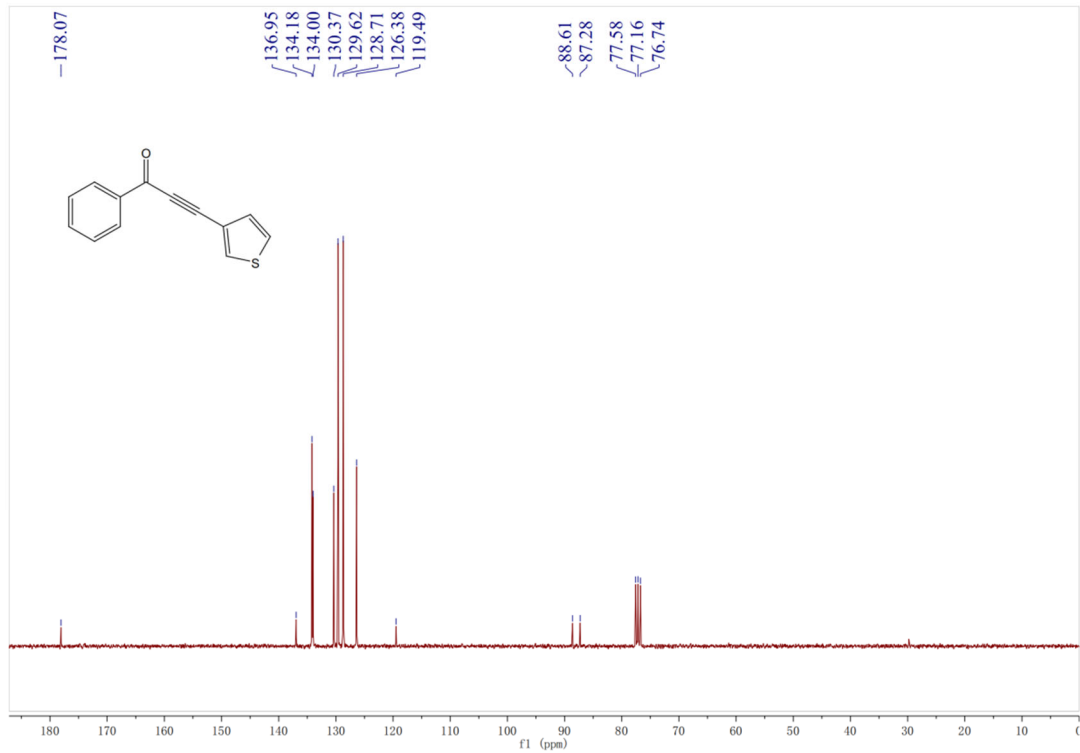
3-(4-Fluorophenyl)-1-phenylprop-2-yn-1-one (3ah) ^{13}C NMR (75 MHz, CDCl_3)



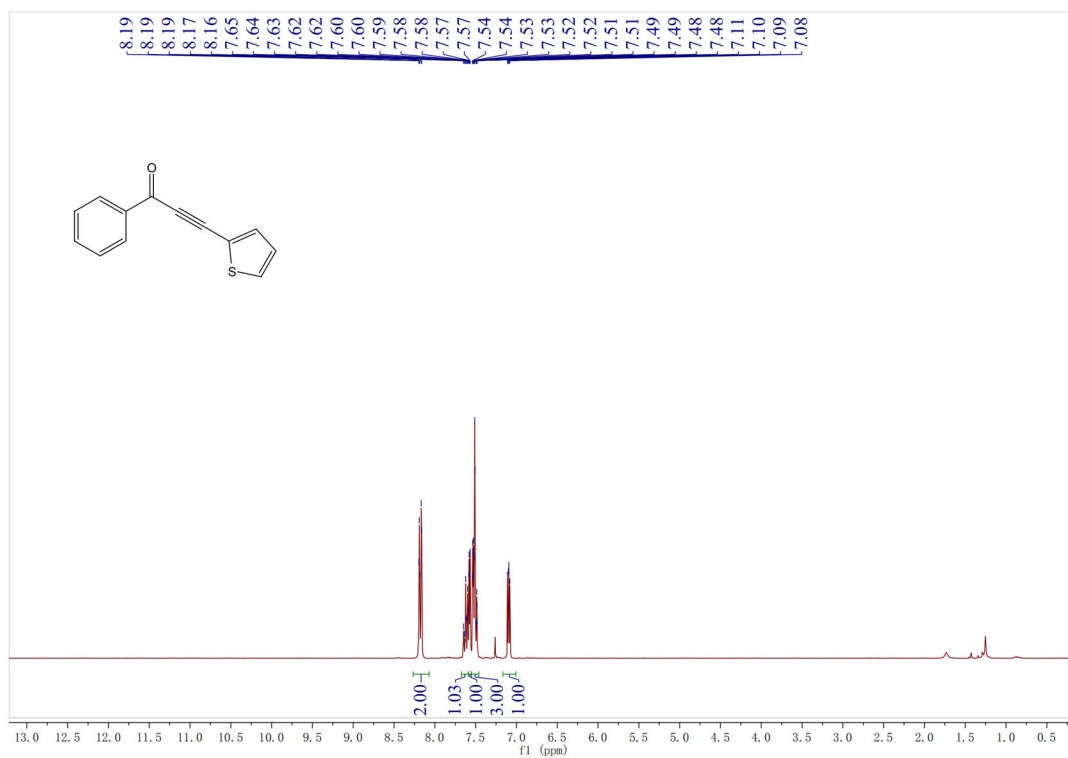
1-Phenyl-3-(thiophen-3-yl)prop-2-yn-1-one (3ai) ^1H NMR (300 MHz, CDCl_3)



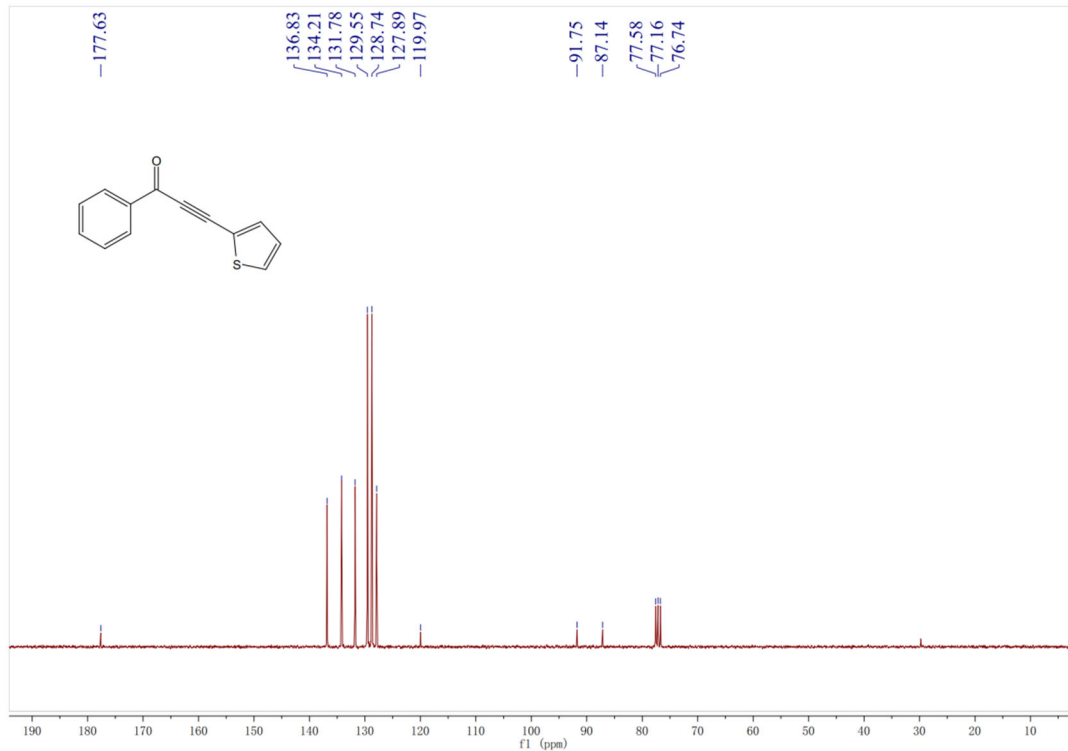
1-Phenyl-3-(thiophen-3-yl)prop-2-yn-1-one (3ai) ^{13}C NMR (75 MHz, CDCl_3)



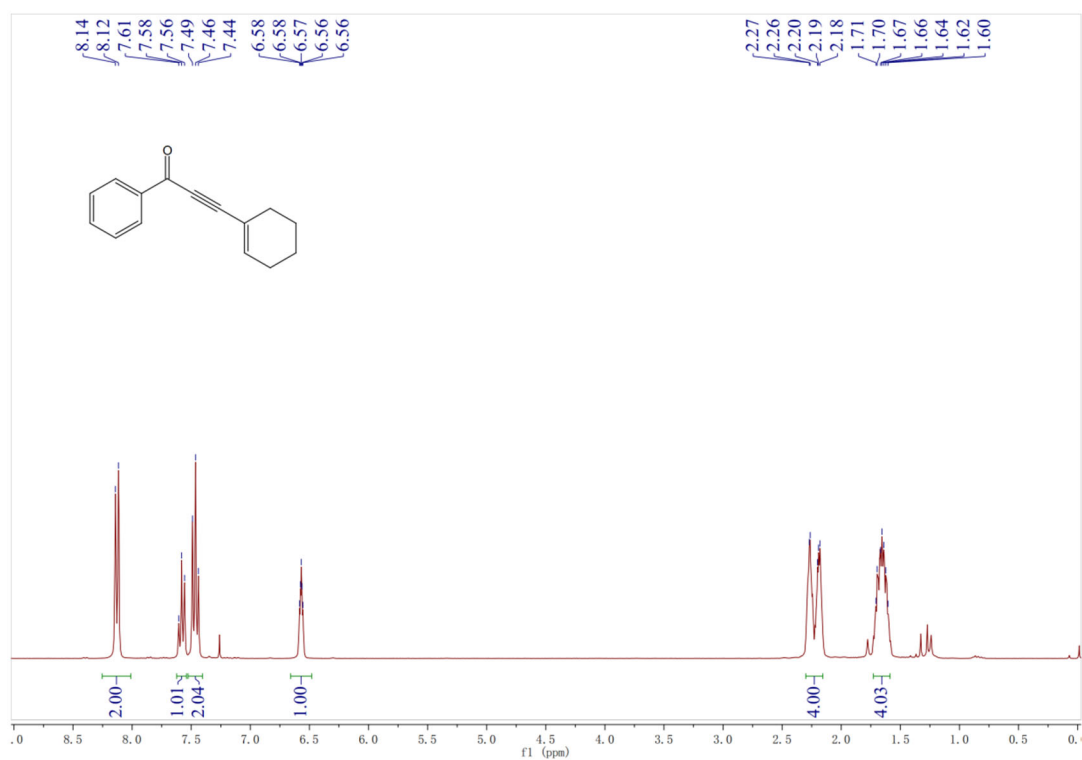
1-Phenyl-3-(thiophen-2-yl)prop-2-yn-1-one (3aj) ¹H NMR (300 MHz, CDCl₃)



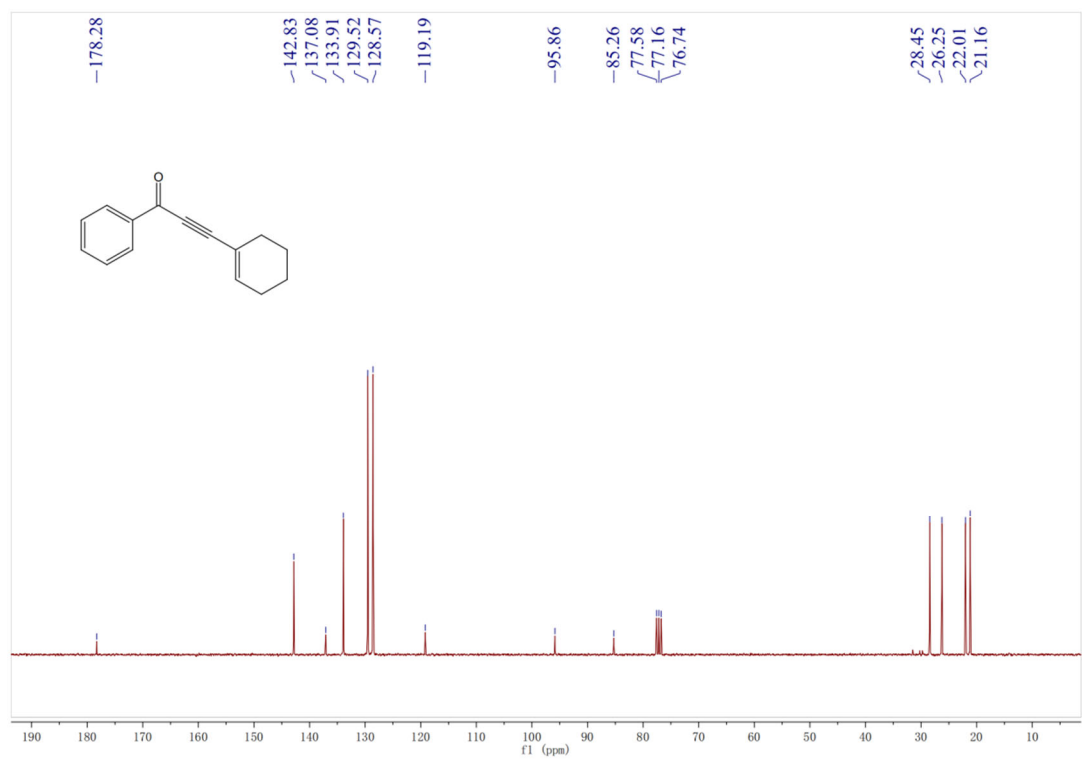
1-Phenyl-3-(thiophen-2-yl)prop-2-yn-1-one (3aj) ¹³C NMR (75 MHz, CDCl₃)



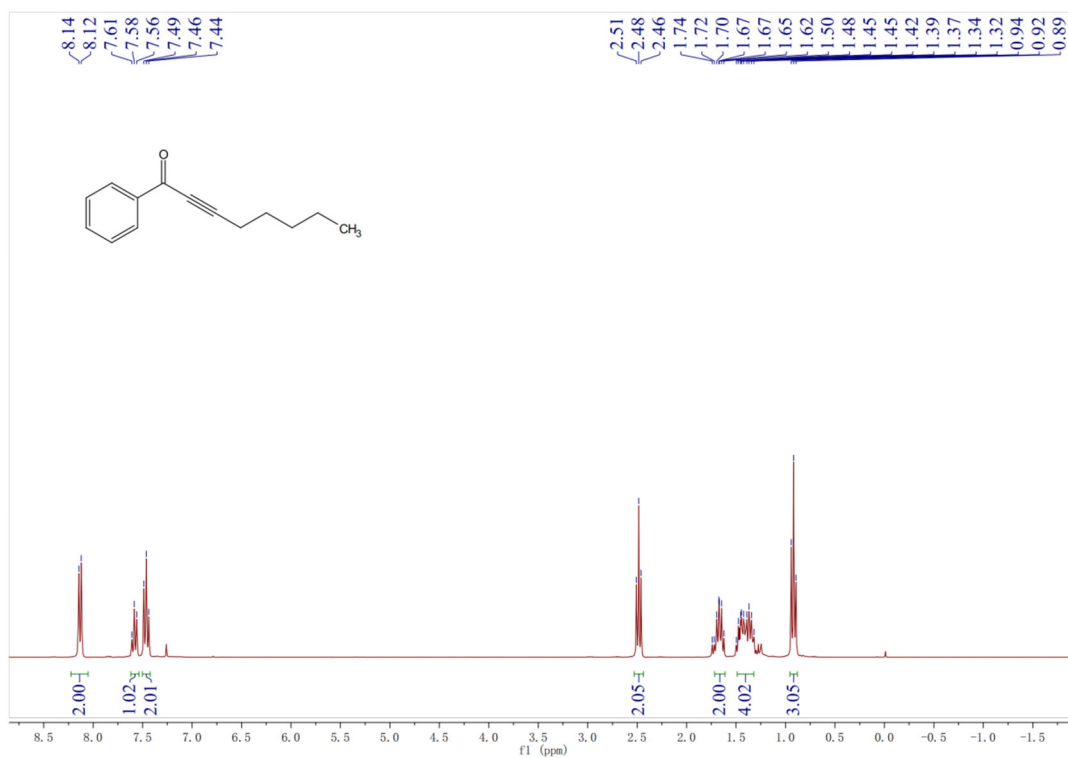
3-cyclohexenyl-1-phenylprop-2-yn-1-one (3ak) ¹H NMR (300 MHz, CDCl₃)



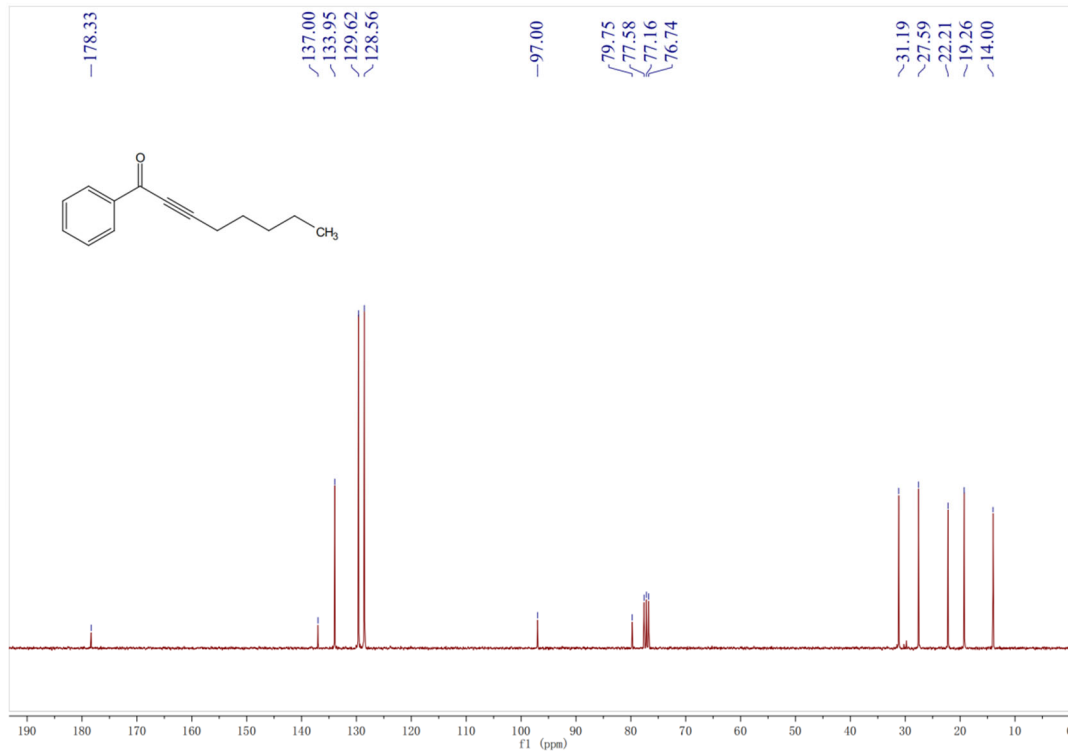
3-cyclohexenyl-1-phenylprop-2-yn-1-one (3ak) ¹³C NMR (75 MHz, CDCl₃)



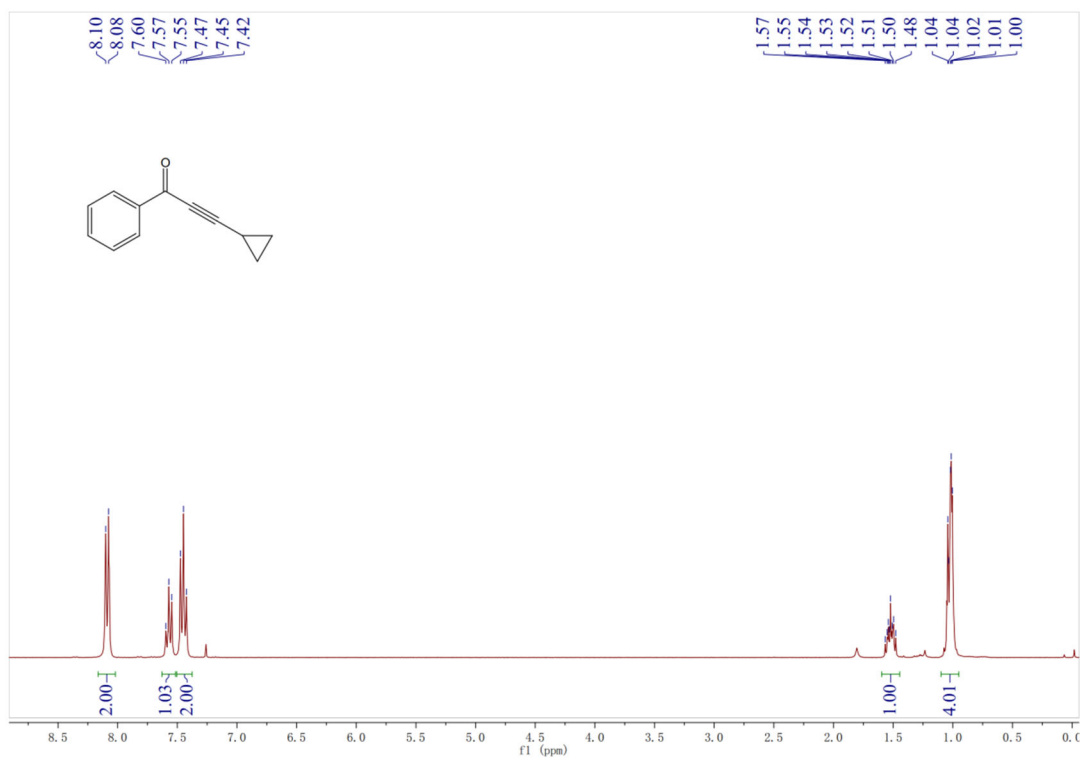
1-Phenyl-2-octyn-1-one (3a) ^1H NMR (300 MHz, CDCl_3)



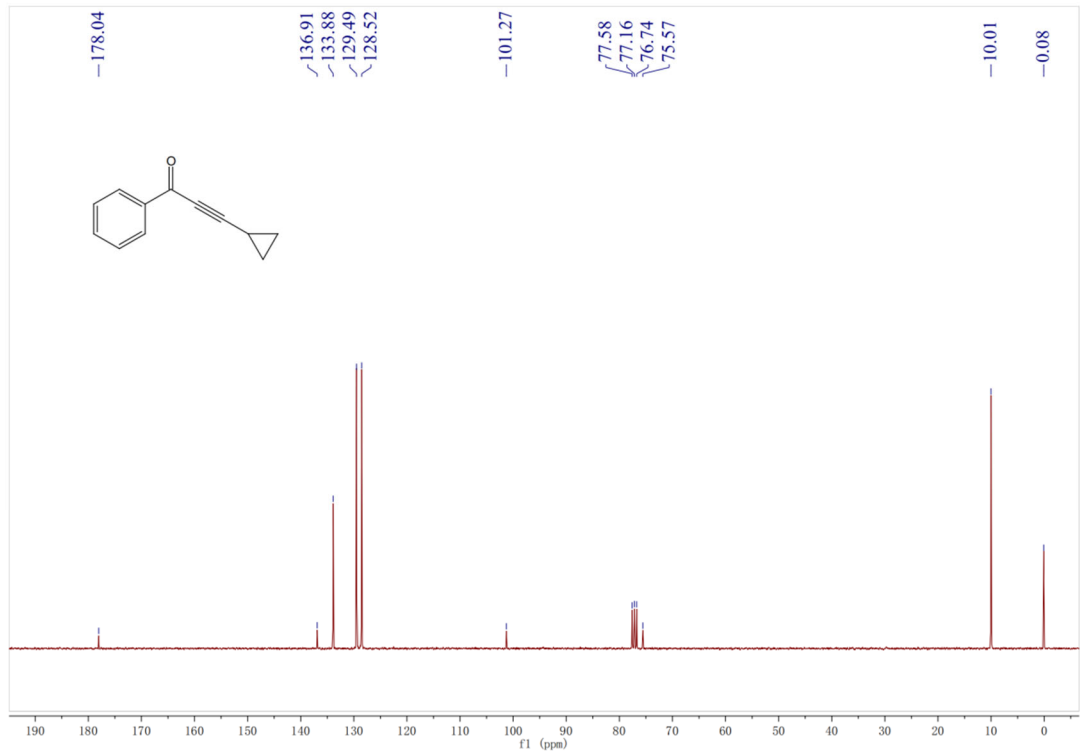
1-Phenyl-2-octyn-1-one (3a) ^{13}C NMR (75 MHz, CDCl_3)



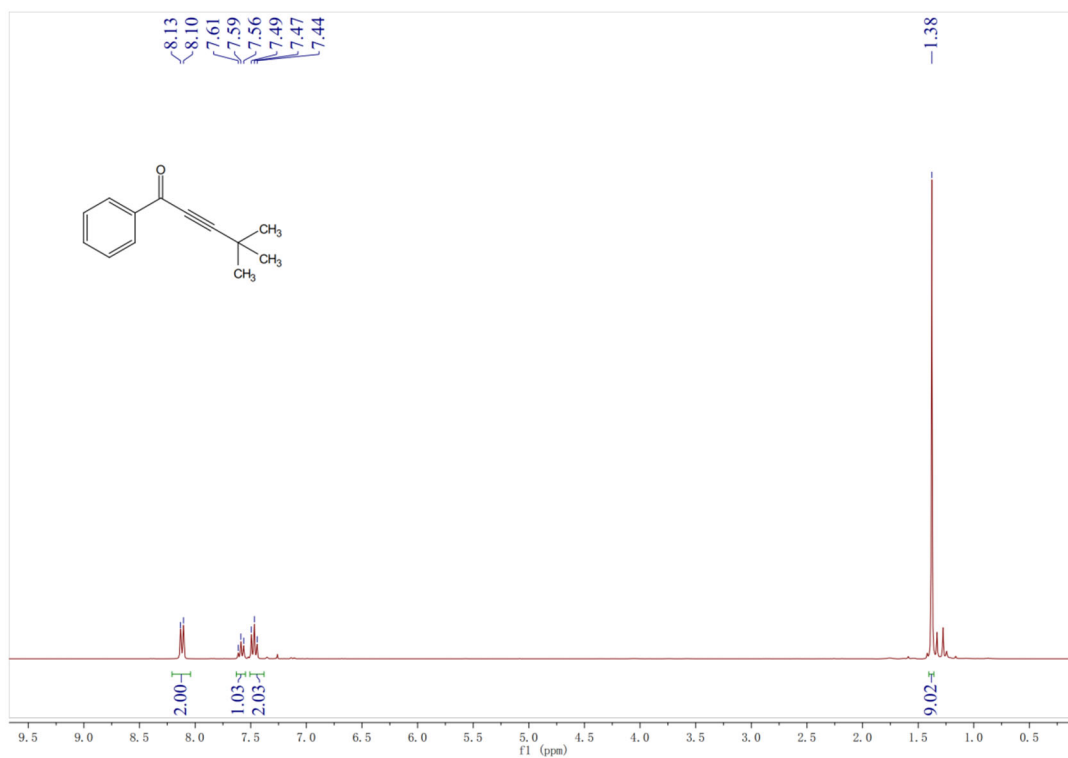
3-Cyclopropyl-1-phenylprop-2-yn-1-one (3am) ¹H NMR (300 MHz, CDCl₃)



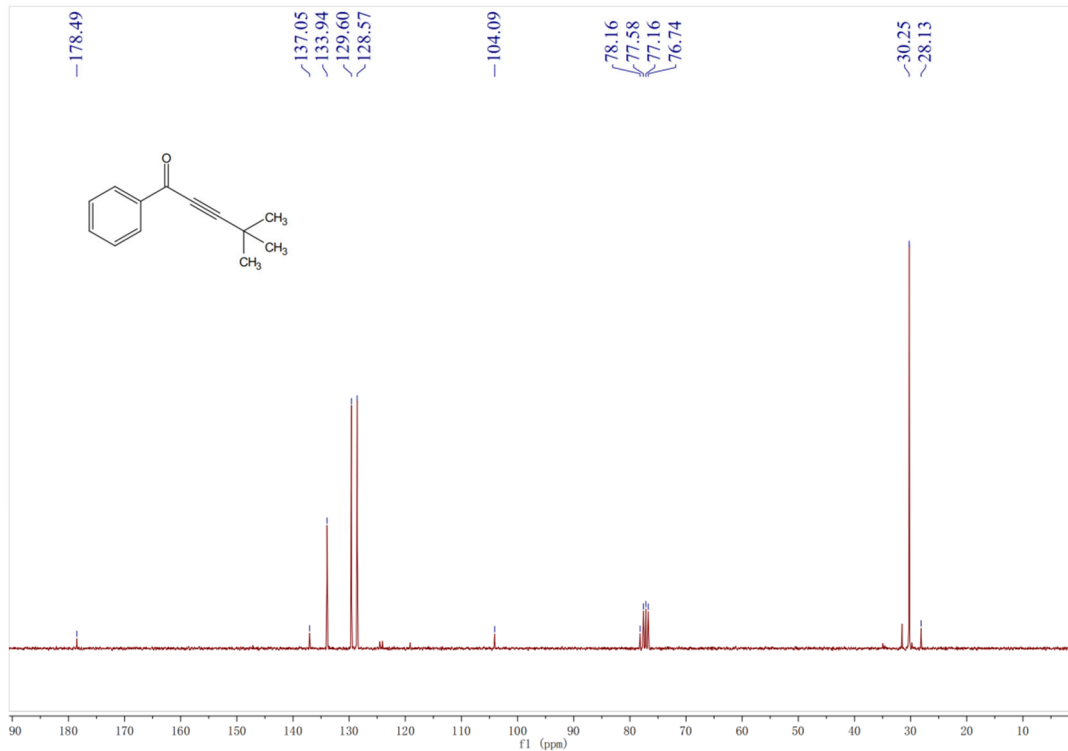
3-Cyclopropyl-1-phenylprop-2-yn-1-one (3am) ¹³C NMR (75 MHz, CDCl₃)



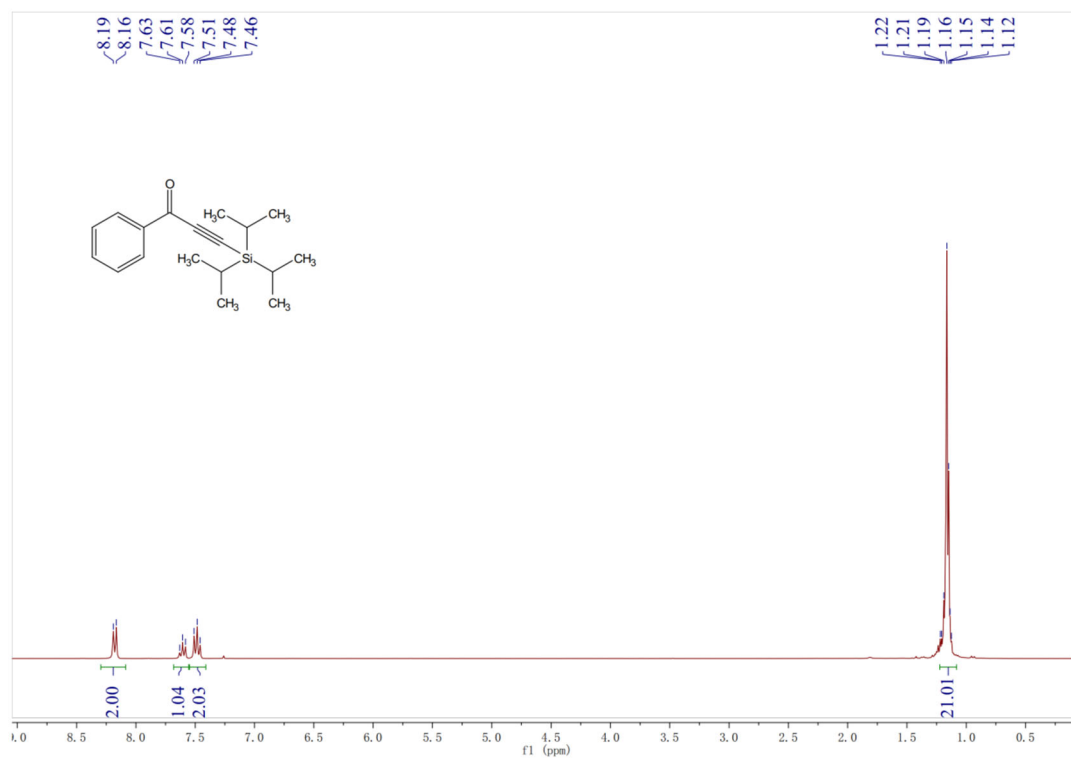
4,4-Dimethyl-1-phenylpent-2-yn-1-one (3an) ^1H NMR (300 MHz, CDCl_3)



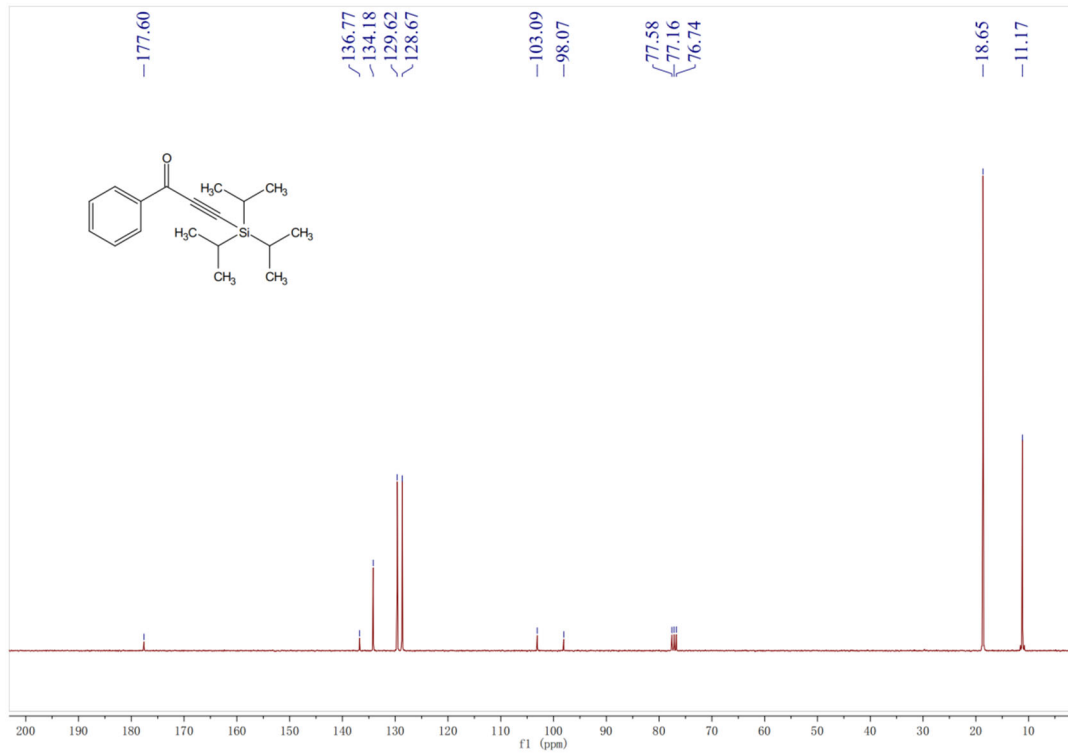
4,4-Dimethyl-1-phenylpent-2-yn-1-one (3an) ^{13}C NMR (75 MHz, CDCl_3)



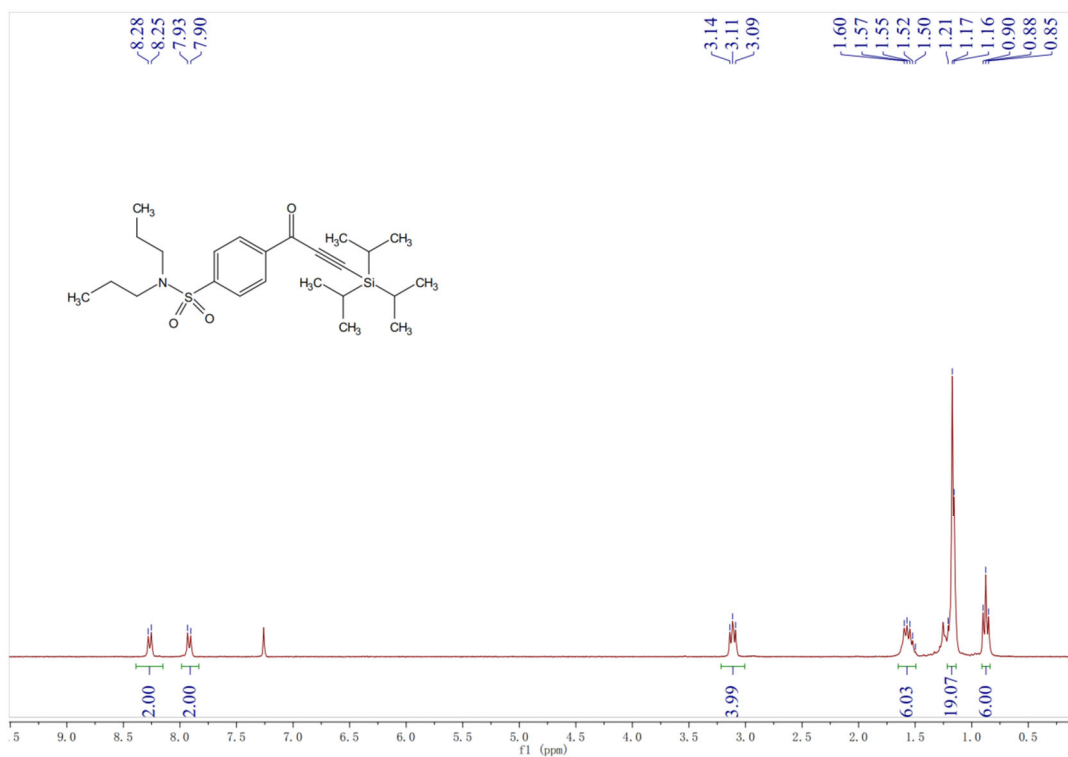
1-Phenyl-3-(triisopropylsilyl)prop-2-yn-1-one (3ao) ¹H NMR (300 MHz, CDCl₃)



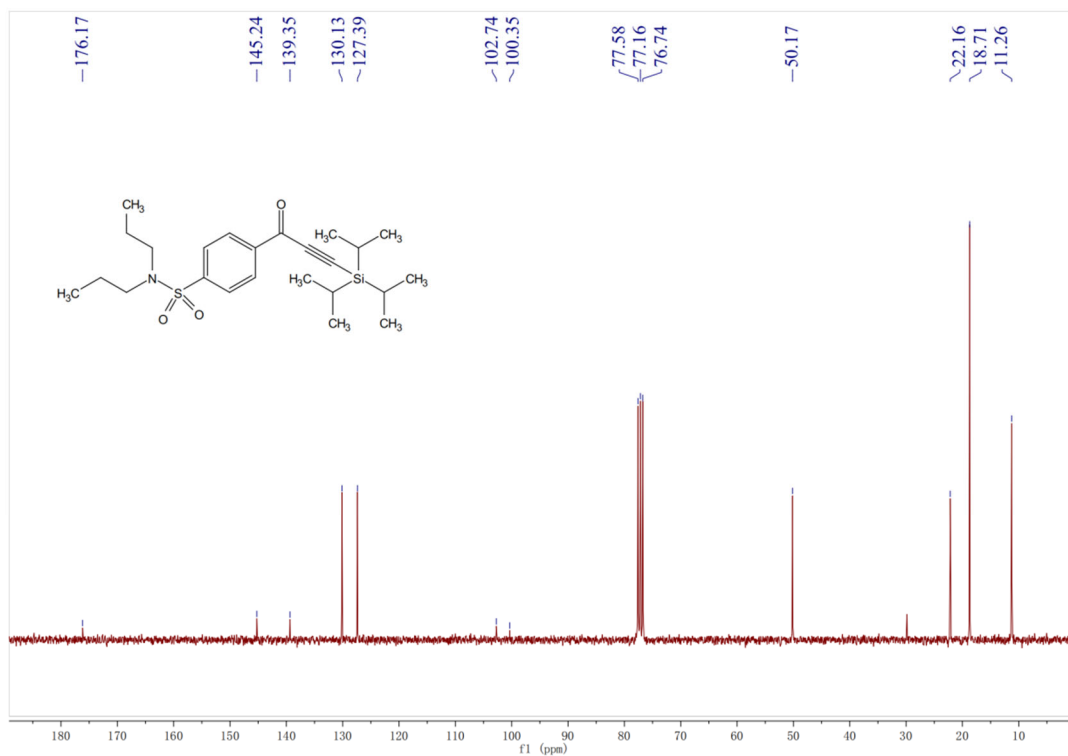
1-Phenyl-3-(triisopropylsilyl)prop-2-yn-1-one (3ao) ¹³C NMR (75 MHz, CDCl₃)



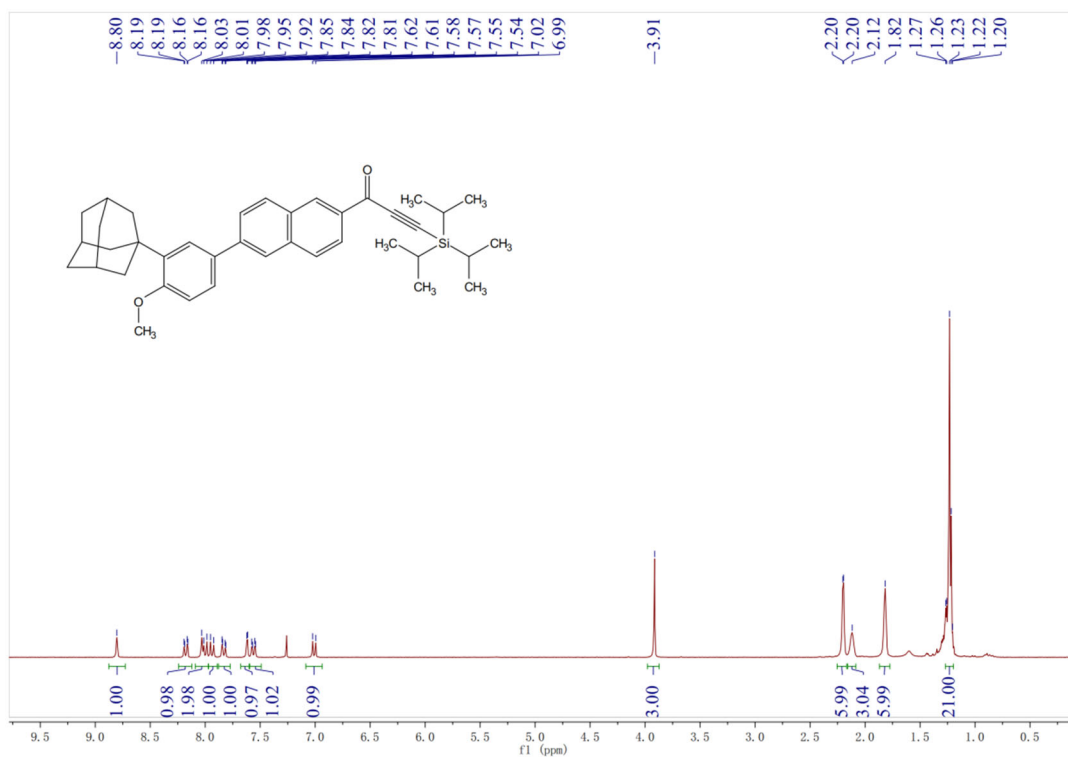
N,N-Dipropyl-4-(3-(triisopropylsilyl)propioloyl)benzenesulfonamide (3e'o) ¹H
NMR (300 MHz, CDCl₃)



N,N-Dipropyl-4-(3-(triisopropylsilyl)propioloyl)benzenesulfonamide (3e'o) ¹³C
NMR (75 MHz, CDCl₃)



1-(6-(3-((3*r*,5*r*,7*r*)-Adamantan-1-yl)-4-methoxyphenyl)naphthalen-2-yl)-3-(triisopropylsilyl)prop-2-yn-1-one (3f'o) ¹H NMR (300 MHz, CDCl₃)



1-(6-(3-((3*r*,5*r*,7*r*)-Adamantan-1-yl)-4-methoxyphenyl)naphthalen-2-yl)-3-(triisopropylsilyl)prop-2-yn-1-one (3f'o) ¹³C NMR (75 MHz, CDCl₃)

